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Horizontal Gear Parts

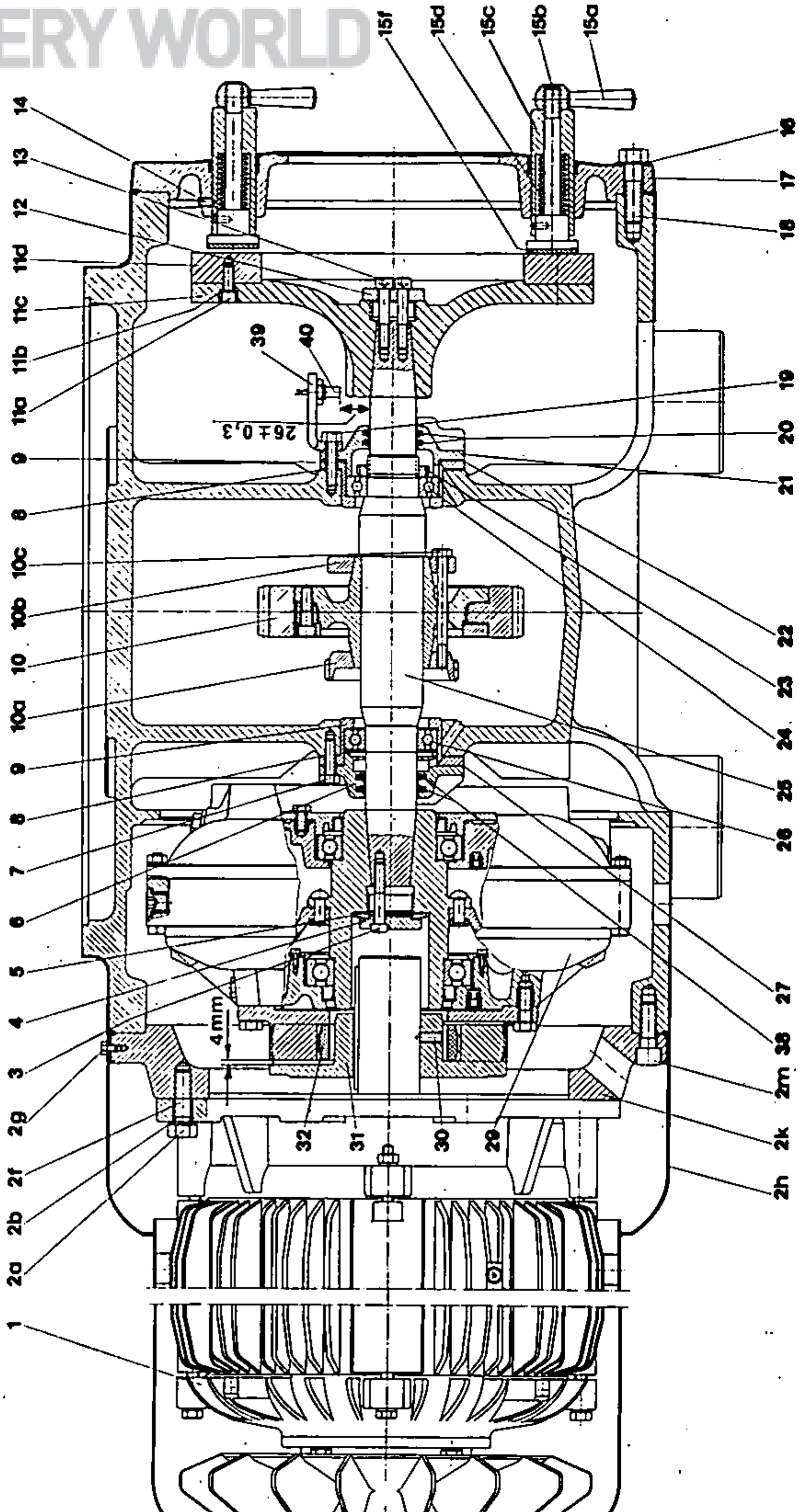


Fig. 15

Pneumatic Brake

(on special order only)

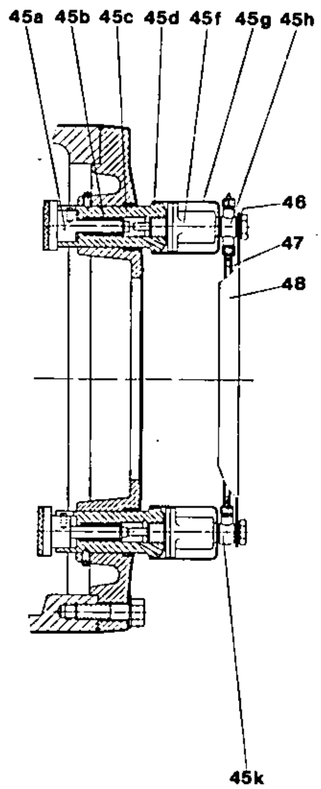


Fig. 15/1

No. in Fig.	Part - No.	Qty.	Part Description
45a	1166-1031-000	2	Brake bolt (with lining), complete
-	0021-4096-850	2	* Brake lining
-	0026-1263-550	8	* Countersunk rivet
45b	0006-4120-300	2	Cylindrical pressure spring
45c	0021-3555-300	2	Brake housing
45d	0007-2580-750	2	Gasket 42/2.5
45f	0021-3690-010	2	Compressed-air cylinder
45g	0026-2144-400	2	Cap
45h	0018-3740-640	1	T-type hose connection R 1/4"
45k	0018-3730-640	1	Angular hose connection R 1/4"
46	0004-2245-770	2	Gasket 15/21x0.25
47	0018-0585-848	1	Pipe
48	1166-1044-000	1	Protecting sheet

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

Vertical Gear Parts

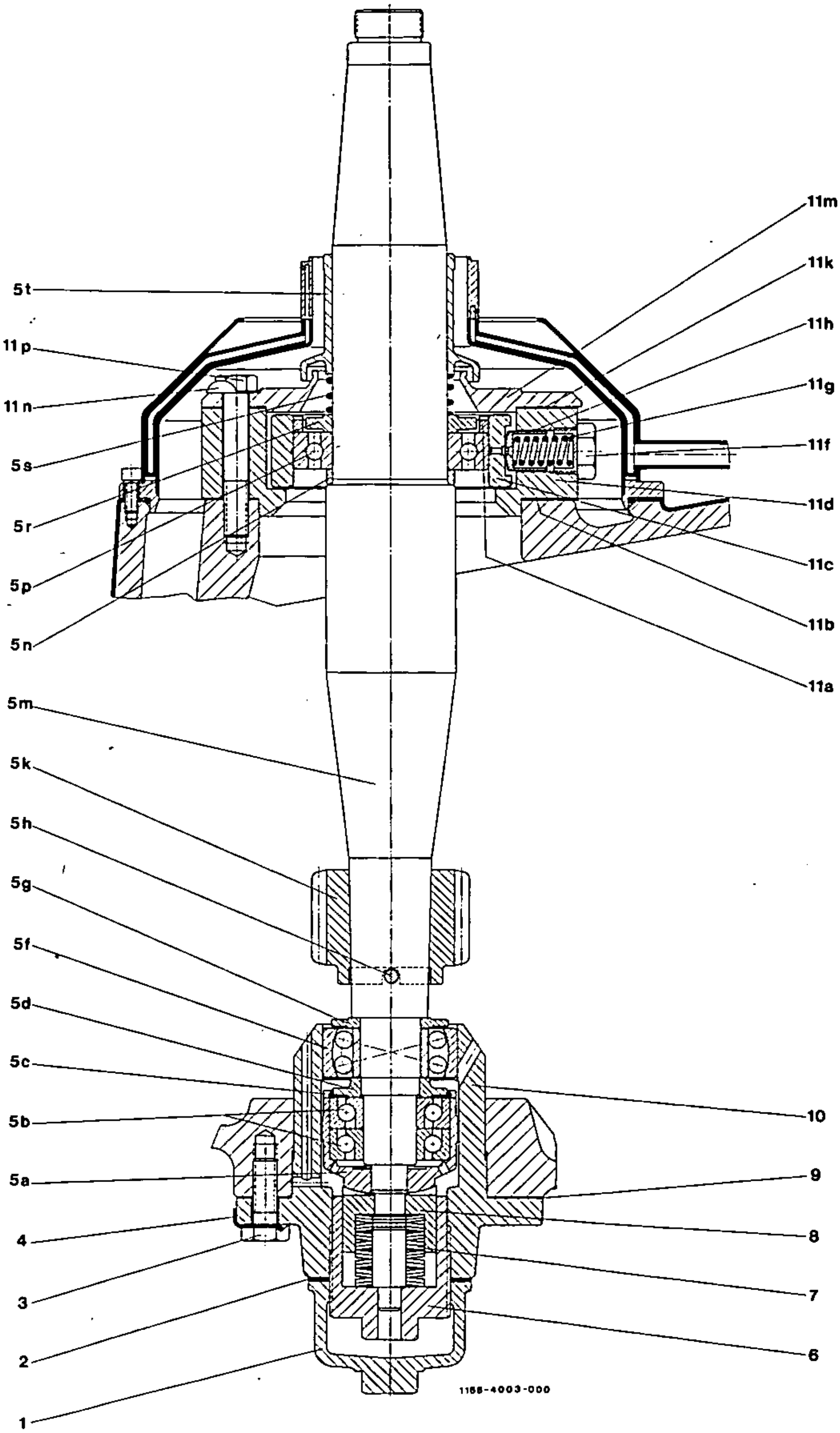


Fig. 14

Horizontal Gear Parts

(f = 50 Hz)

No. in Fig.	Part - No.	Qty.		Part Description
1	5970-L	1	*	Motor
-	1165-1021-L	1		Flange assembly (2a-m)
2a	0013-0282-400	8		Hexagon nut M 16 DIN 934
2b	0026-1330-190	8		Lock washer A 16 DIN 127
2f	0019-7727-090	8		Stud M 16x45 DIN 939 - 5.6
2g	0019-6839-300	8		Hex head screw M 6x10 DIN 933
2h	1080-1475-050	1		Cover
2k	1165-1028-L	1		Flange
2m	0019-6202-150	8		Allen screw M 16x45 DIN 912 - 8.8
3	0019-6150-150	3		Allen screw M 10x55 DIN 912 - 8.8
4	0026-1640-030	1		Centering disc
5	0006-4404-010	1		Cup spring
6	3050-3375-010	1		Bearing cover
7	0019-6938-150	3		Hex head screw M 10x35 DIN 933 - 8.8
8	0004-1850-740	2		Gasket 99/140x1
9	1166-3131-000	2		Bearing housing
10	1167-3449-020	1		Worm wheel assembly with clamp plates
10a	1166-3447-000	1	**	Clamp plate, toothed
10b	1166-3446-000	1	**	Clamp plate
10c	0019-6525-150	4	**	Hex head screw M 10x110 DIN 931 - 8.8
-	1166-3368-020	1		Brake pulley assembly (11a-d)
11a	0019-6144-150	6		Allen screw M 10x25 DIN 912 - 8.8
11b	0026-1337-190	6		Lock washer A10 DIN 127
11c	1166-3371-030	1		Brake pulley
11d	3170-3371-000	1		Brake ring
12	0026-0405-030	1		Disc
13	0019-6150-150	2		Allen screw M 10x55 DIN 912 - 8.8
14	0019-9063-150	2		Threaded pin AM 8x10 DIN 916 - 10.9
15	3170-1043-000	2		Brake assembly (15a-f)
15a	0021-3514-300	2		Brake handle
15b	3170-1031-000	2		Brake bolt (with lining)
15c	0021-3537-300	2		Brake housing
15d	0006-4208-160	2		Cylindrical pressure spring
15f	0021-4096-850	2		Brake lining
-	0026-1263-550	8		Countersunk rivet
16	0026-1353-400	4		Washer
17	3170-1065-010	1		Cover
18	0019-6608-400	4		Hex head screw M 16x60 DIN 931
19	0019-6512-150	3		Hex head screw M 10x40 DIN 931
20	0004-1956-830	2		Felt ring 45 DIN 5419
21	3170-3375-000	1		Bearing cover
22	0004-1822-740	1		Gasket 90/140x1
23	0013-0448-090	1		Grooved nut M50x1.5 SKF/KM10
24	0011-6210-000	1		Grooved ball bearing 6210 DIN 625
25	1166-3400-000	1		Worm wheel shaft
26	0011-6210-000	1		Grooved ball bearing 6210 DIN 625
27	0004-1822-740	1		Gasket 90/140ø x1
29	see page 16/1	1		Fluid clutch (see fig. 16)
30	0019-8984-150	1		Threaded pin M 10x25 DIN 914 - 10.9
31	3158-3389-L	1		Cam hub
32	3158-3282-000	1		Cam ring
38	0004-1957-830	2		Felt ring 50 DIN 5419
39	1168-1192-000	1		Bracket
40	0005-0964-000	1		Proximity switch

* When ordering a motor, be sure to state voltage and frequency.

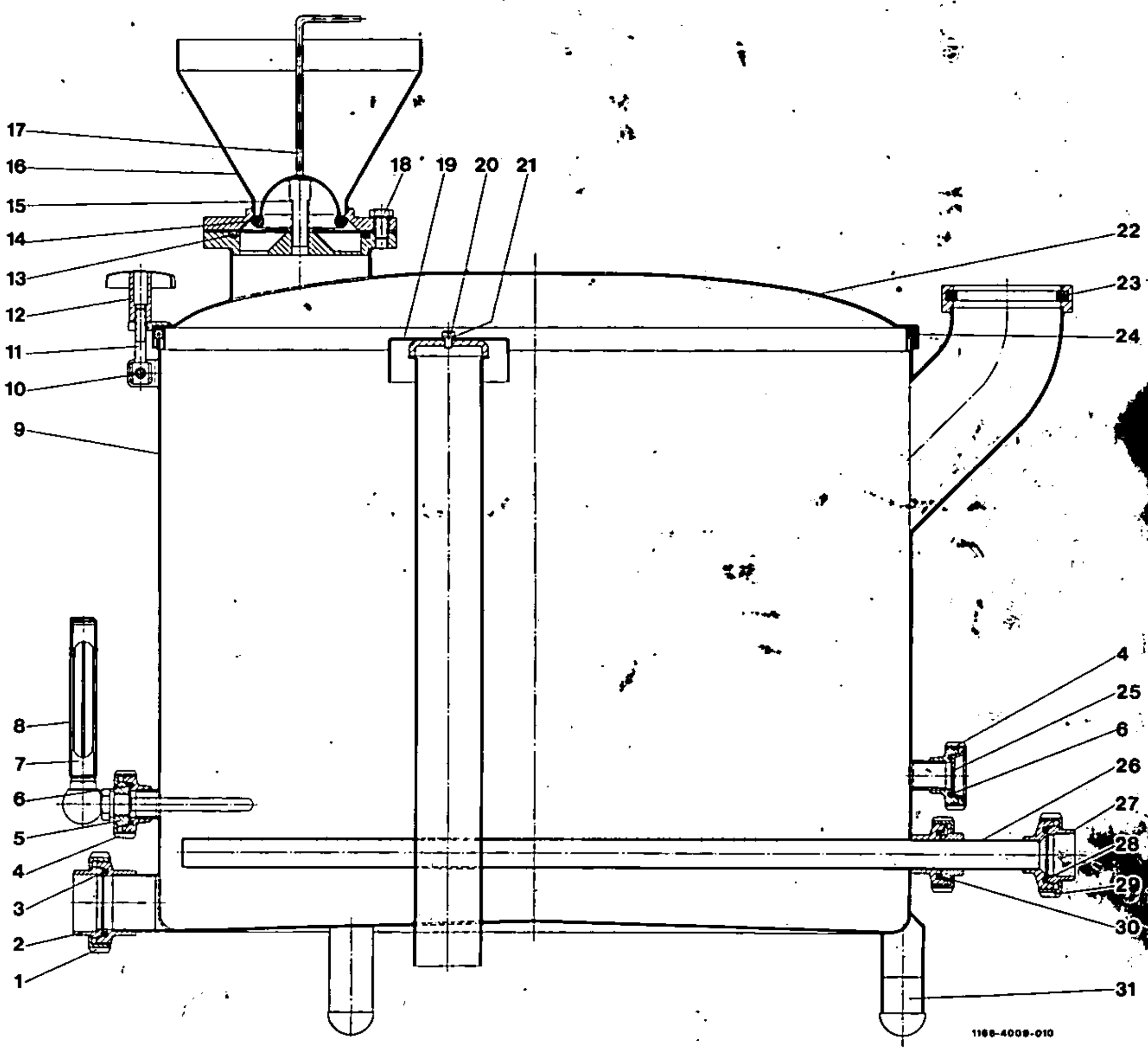
** This part is included in worm wheel assembly with clamp plates, item 10, but it is also available as separate item. When the worm wheel needs replacement, the worm 5k, fig. 14, should be replaced as well (see section 8.5, No.4).

Fluid Clutch

No. in Fig.	Part - Number	Qty.		Part Description
-	1166-3280-000	1		Fluid clutch assembly (1-29) (see also fig. 15, no. 29)
1	-	1	*	Cam flange
2	0019-6971-150	8		Hex head screw M12x35 DIN 933- 8.8
3	0026-0772-170	8		Washer B 12 DIN 137
4	0004-2913-830	1		Sealing ring 105x130x13
5	0026-0182-170	1		Spacer ring ANS 160x26
6	0011-6021-400	1		Grooved ball bearing 6021 M/C4 DIN 625
7	0019-6518-150	36		Hex head screw M10x70 DIN 931 - 8.8
8	-	1	*	Clutch casing 470∅
9	0004-2385-858	1		Packing cord 1 mm ∅, 1400 mm long
10	0026-0771-170	36		Lock washer B 10 DIN 137
11	0013-0279-150	36		Hexagon nut M 10 DIN 934 - 8
12	-	1	*	Primary wheel 470∅
13	0026-0180-170	1		Spacer ring AN 140x24
14	0007-2944-830	1		Gasket 140/30
15	0011-6018-400	1		Grooved ball bearing 6018 M/C4 DIN 625
16	-	1	*	Secondary hub with secondary wheel 425∅
17	0004-2912-830	1		Sealing ring 90x110x13
18	-	1	**	Sealing ring cover
19	0019-6903-150	8		Hex head screw M8x20 DIN 933 -
20	0026-0770-170	8		Lock washer B 8 DIN 137
21	0004-2144-280	2		Gasket 22/29∅ x 1.5
22	-	2	**	Threaded bolt M 22x1.5x20
23	0004-2131-280	1		Gasket 18/24∅ x 1.5
24	0019-1490-000	1		Threaded plug M 18x1.5x15
25	3158-3287-010	1		Oil control ring 119/192∅ x 4.5
26	0019-2234-030	8		Fillister head screw AM 5x16 DIN 84 - 4.
27	0026-0750-170	8		Lock washer 5 DIN 7980
29	0019-1551-090	1		Oil fill plug M 22x1.5

* If this part needs replacment, the complete clutch must be returned to the factory for repair. Instead of part-number state item-number (see first column).

** Instead of part-number state item-number (see first column).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1166-4009-010

Fig. 21

Flow Constrictor

Maximum throughput rate:15000 litres/h.

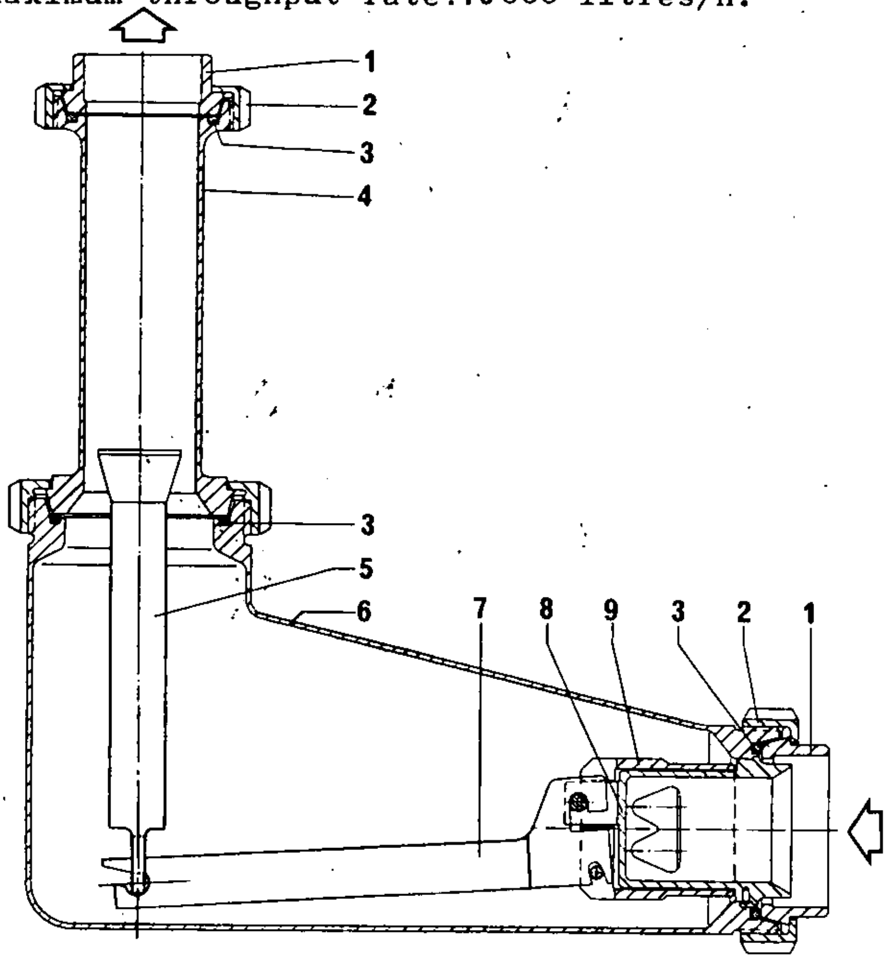
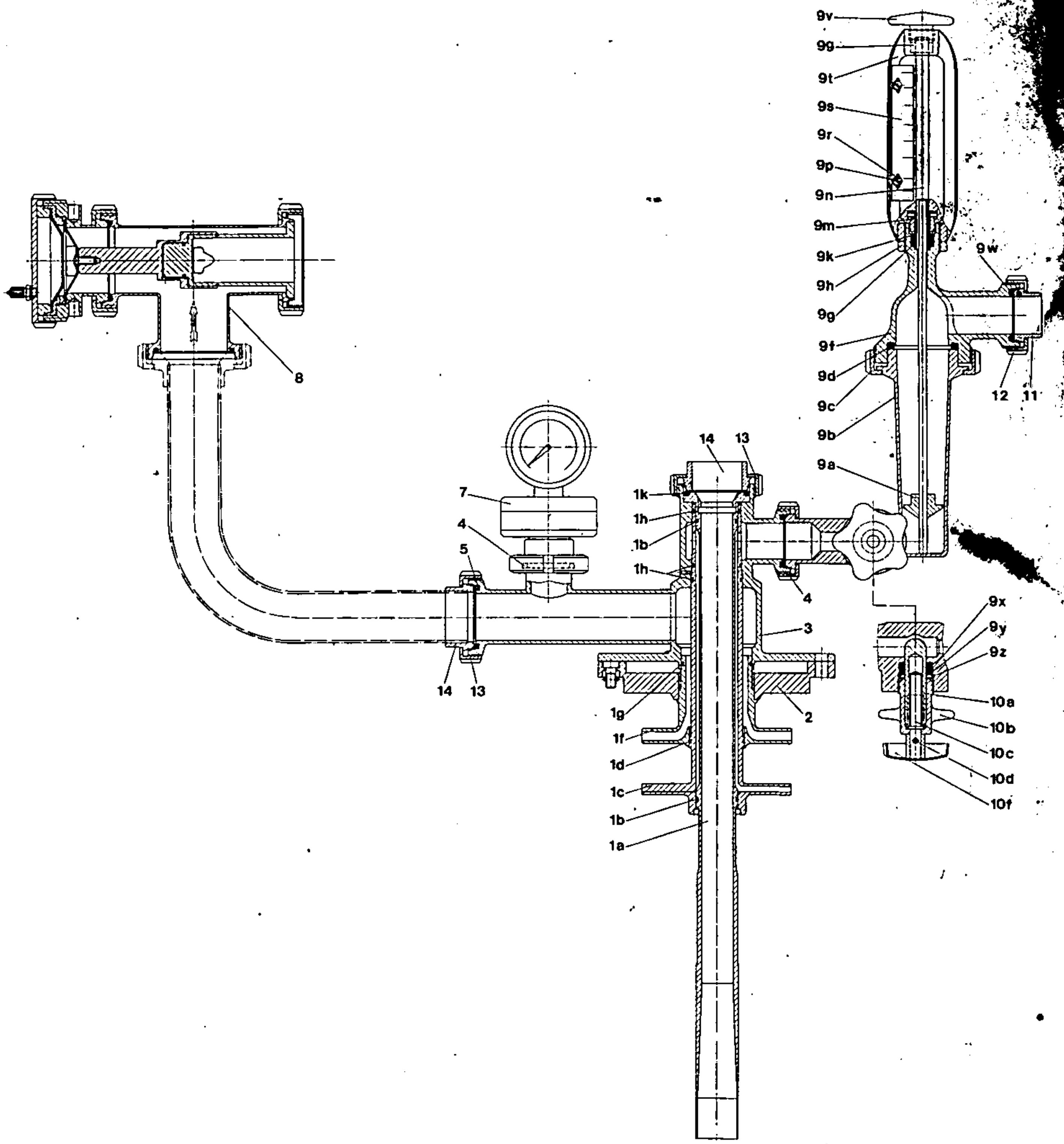


Fig. 22

IMPORTANT: Be sure to install the flow constrictor in such a manner that the inlet is fitted to a horizontal piece of pipe and the control tube 4 is directed vertically upwards.

No. in Fig.	Part - No.	Qty.		Part Description
-	8251-2150-070	1		Flow constrictor, complete (1-9)
1	0018-4636-400	2		Cone connection 65/50
2	0013-2846-300	2		Grooved coupling nut
3	0007-2212-750	3		Gasket G 65 DIN 11851
4	-	1	*	Pipe
5	-	1	*	Float
6	-	1	*	Housing
7	-	1	*	Throttling lever
8	-	1	*	Throttling housing
9	-	1	*	Regulating piece

* This part can only be replaced by a WESTFALIA factory engineer or by a special repair shop authorized by WESTFALIA, because its replacement requires re-adjustment of the flow constrictor. Therefore, when ordering this part, the flow constrictor must be returned to the factory.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1k
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1b
1h
14
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3
2
1g
1f
1d
1c
1b
1a
9x
9y
9z
10a
10b
10c
10d
10f

Fig. 18

No.in Fig.	Part - No.	Qty.		Part Description
-	1170-6600-L	1		Bowl, complete (1-23)
1	0019-1450-400	1		Threaded plug
2	0007-1970-690	1		Gasket 26.5/35x5.25
3	3159-6280-000	1		Piston valve assembly (3a-f)
3a	3159-6281-000	1		Valve housing
3b	0007-2920-750	3		Gasket 23.3/2.4
3c	0004-2341-840	1		Gasket 6/9.9x10.5
3d	0007-2923-750	2		Gasket 9.3/2.4
3f	3159-6276-000	1		Valve piston
4	1170-6501-000	1	*	Sliding piston
5	0007-2962-750	1		Gasket 611/635x12
7	1167-6604-050	1	*	Bowl bottom, complete
7a	3117-6609-010	1	**	Arresting piece
7b	0019-2233-400	1	**	Fillister head screw AM 5x12 DIN 84
7c	0007-2564-750	1		Gasket 170/3
7d	0007-2944-750	1		Gasket 140/3
7f	0019-6112-400	4		Allen screw M 6x35 DIN 912
7g	1167-6597-000	1		Ring
8	1167-6631-030	1	*	Lock ring
-	1170-6660-000	1		Set of discs (9a-f)
9a	1167-6662-010	1		Bottom disc
9b	1167-6663-040	4		Disc
9c	1167-6663-020	211		Disc
9d	1167-6664-010	1		Compensating disc
9f	1165-6666-000	1		Top disc
10	0007-2586-750	1		Gasket 108/10
11	1170-6620-000	1	*	Distributor
14	0007-2546-750	1		Gasket 600/5
15	0007-2969-840	1		Gasket 579.7x11
16	0013-2964-400	1		Spindle nut, complete
16a	0007-2597-750	1	**	Gasket 50/4
17	1170-6610-010	1	*	Bowl top
18	1167-6650-020	1		Separating disc
19	1167-6670-030	1		Upper disc (specially shaped)
21	1167-6645-050	1		Centripetal pump chamber cover
22	0007-2854-750	1		Gasket 190/202x6
23	1165-6631-010	1		Lock ring

* This part can only be replaced by a WESTFALIA factory engineer or by a special repair shop authorized by WESTFALIA, because of special re-fitting to machine and possible re-balancing of bowl.

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

Solenoid Valve R 3/8"

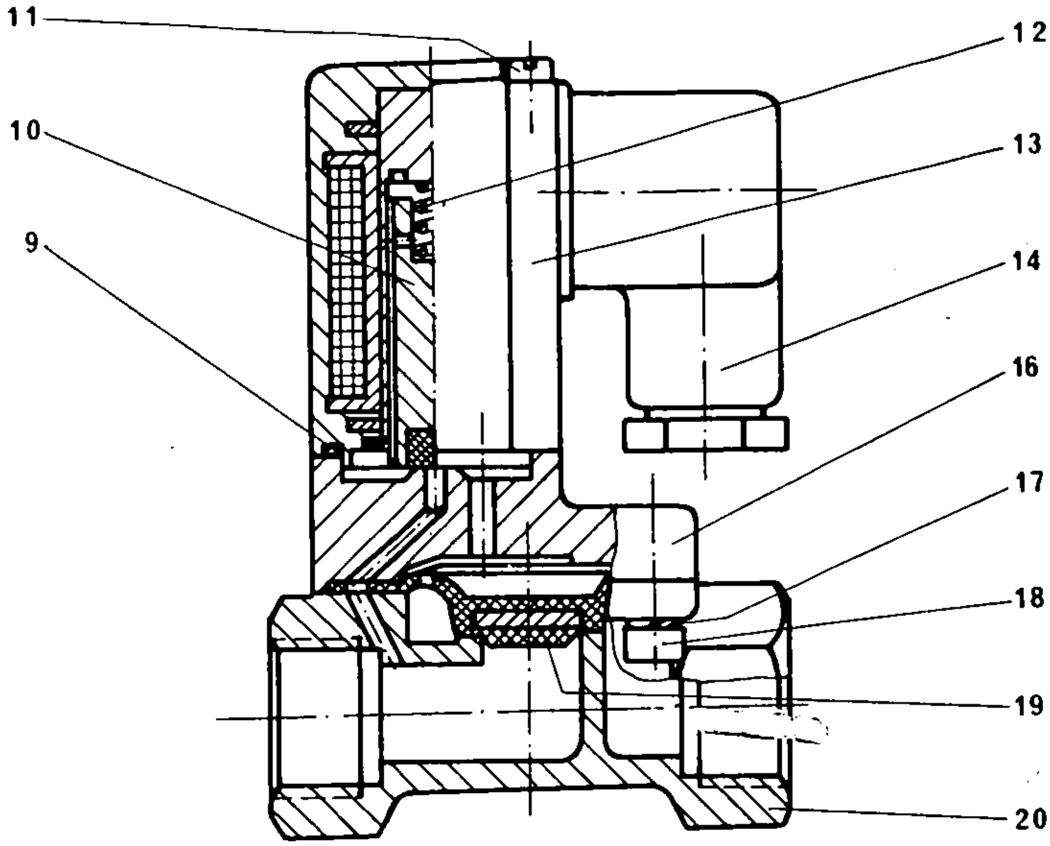


Fig. 17/2

No. in Fig.	Part - No.	Qty.	Part Description
-	0018-3711-600	1	Solenoid valve, complete (9-20)
9	0007-1946-750	1	Gasket 25/1.5
10	0018-3710-040	1	Solenoid core
11	0019-2387-400	4	Cylindrical screw M 4x55 DIN 84
12	0006-4079-300	1	Pressure spring
13	0018-3710-800	1	Solenoid head 50/60 Hz
14	0018-3710-050	1	Coupler socket
15			
16	0018-3711-070	1	Valve cover
17	0026-1322-170	4	Lock washer A4 DIN 127
18	0019-6077-400	4	Allen screw M 4x10 DIN 912
19	0018-3711-750	1	Diaphragm
20	0018-3711-080	1	Valve housing

Feed and Discharge Connections and Centripetal Pump

No.in Fig.	Part - No.	Qty.	Part Description
-	1170-2213-010	1	Double centripetal pump, complete (1a-k)
1a	1170-2246-000	1	Feed tube
1b	0007-1936-750	2	Gasket 29.2/3
1c	1170-2241-000	1	Lower centripetal pump (up to max. 5 bar)
1d	0007-1944-750	1	Gasket 44.2/3
1f	1170-2252-000	1	Upper centripetal pump (up to max. 5 bar)
1g	0007-2929-750	1	Gasket 55.2/3
1h	0007-2925-750	3	Gasket 36.2/3
1k	0007-2211-750	1	Gasket G50 DIN 11851
-	1170-2296-030	1	Feed and discharge connections, compl. (2-10f)
2	1170-2217-000	1	Disc
3	1170-2301-000	1	Feed and discharge housing
4	0007-2210-750	2	Gasket G40 DIN 11851
5	0007-2211-750	1	Gasket G50 DIN 11851
7	8918-2100-080	1	Pressure gauge
8	see special IM	1	Constant pressure valve
-	8021-2000-150	1	Flowmeter, complete (9a-10f)
9a	8021-2012-000	1	Float
9b	8021-2001-190	1	Inlet cup
9c	0013-2846-300	1	Grooved coupling nut F65 DIN 11851
9d	0007-2279-750	1	Gasket 56/68x6
9f	8021-2003-120	1	Outlet pipe
9g	0007-2298-750	2	Gasket 13.5/22x10
9h	0013-3010-300	1	Nut M 33x1.5
9k	0026-1375-300	1	Washer
9m	0019-1380-300	1	Threaded bush
9n	0001-0083-820	1	Cylindrical sight glass
9p	0004-5261-720	2	Gasket 4.8/9.0x1
9r	0019-2478-300	2	Cheese head screw M 4x8 DIN 85
9s	8021-2017-000	1	Scale 700 - 4,000 l/h
9t	8020-2002-000	1	Intermediate piece
9v	0019-1732-400	1	Handle screw
9w	0007-2210-750	1	Gasket G40 DIN 11851
9x	0007-2285-750	2	Gasket 22/32x5
9y	0026-5508-300	1	Washer
9z	0026-1445-300	1	Snap ring
-	1072-2273-020	1	Stuffing box, complete (10a-f)
10a	1072-2279-020	1	Round-slide valve
10b	1072-2284-000	1	Stuffing box housing
10c	0019-1590-610	1	Threaded bolt
10d	0026-1062-400	1	Cylindrical pin
10f	0021-3096-300	1	Handle
11	0018-3949-300	1	Cone connection D40 DIN 11851
12	0013-2844-300	1	Grooved coupling nut F40 DIN 11851
13	0013-2845-300	2	Grooved coupling nut F50 DIN 11851
14	0018-3955-300	2	Cone connection D50 DIN 11851

Operating-Water Connection

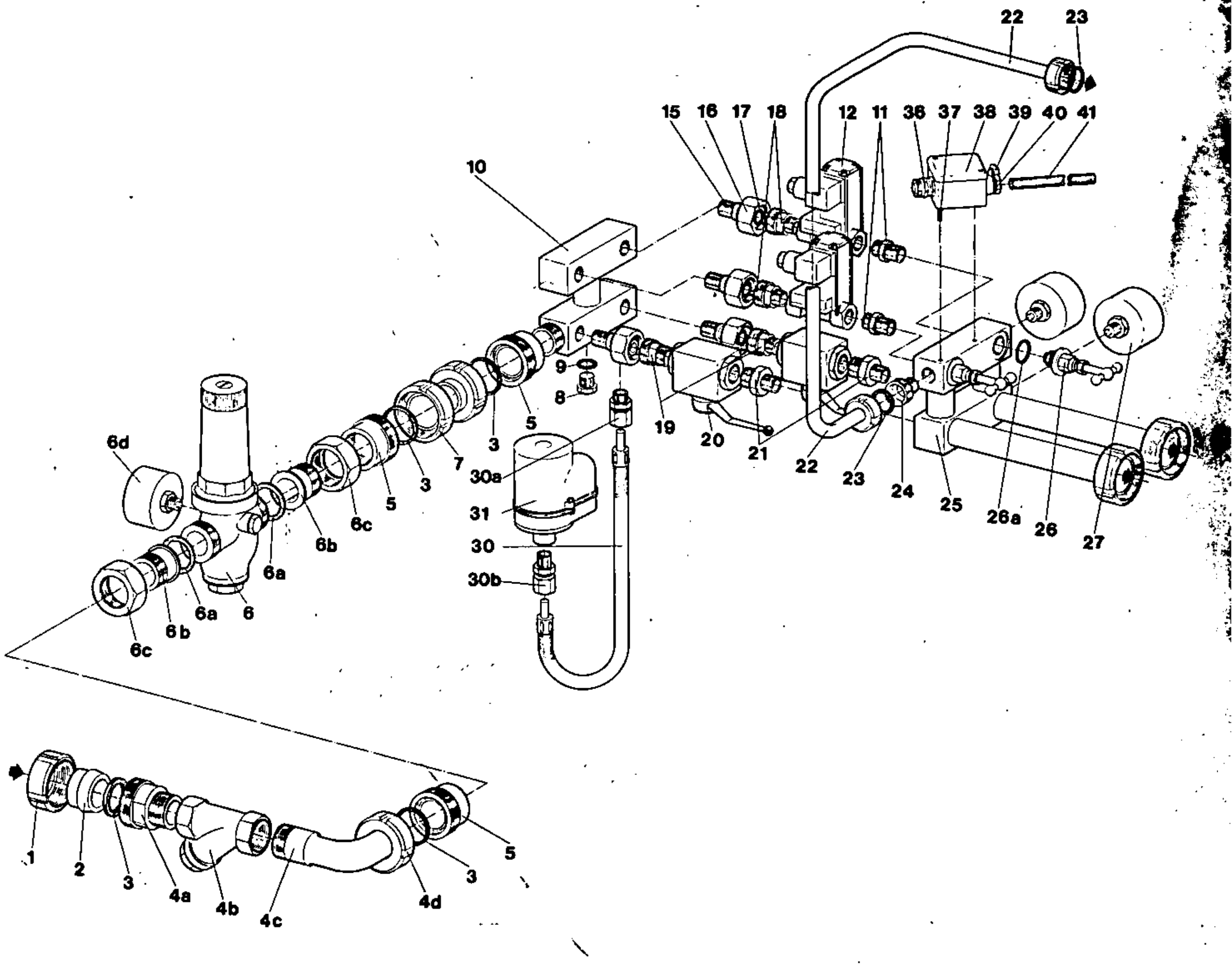


Fig. 17/1

Fluid Clutch

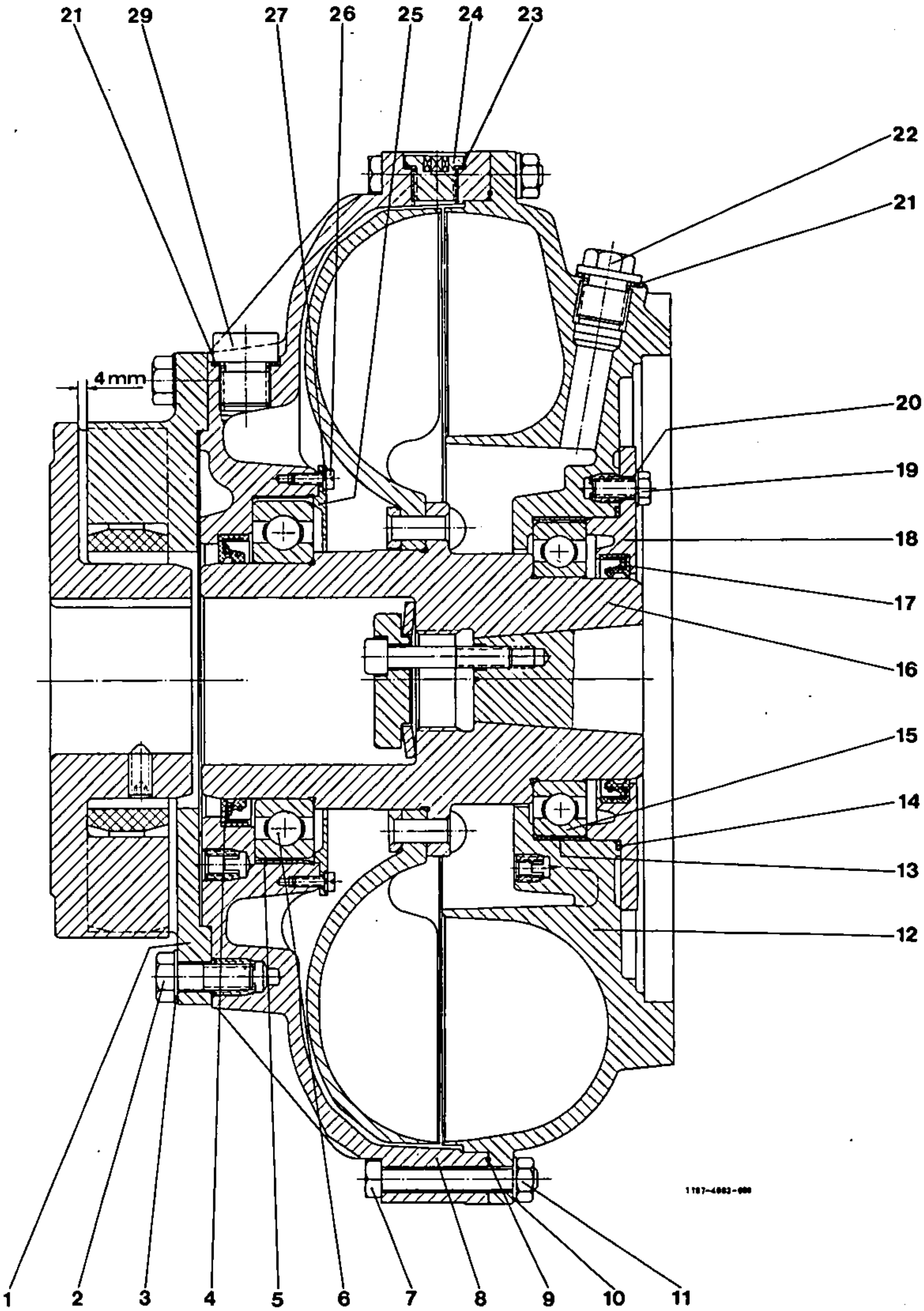


Fig. 16

Operating-water connection

No. in Fig.	Part - No.	Qty.		Part Description
-	8134-2100-270	1		Operating-water connection with protecting case (1-27 and 36-41)
1	0013-2842-300	1		Grooved coupling nut F25 DIN 11851
2	0018-3939-300	1		Cone connection D25 DIN 11851
3	0007-2208-750	4		Gasket G 25 DIN 11851
-	8134-2201-010	1		Pipe line, complete (4a-d)
4a	0018-4502-400	1		Threaded connection 25/R1"
4b	0018-2525-640	1		Strainer R 1"
4c	0018-1609-300	1		Bend
4d	0013-2842-300	1		Grooved coupling nut F25 DIN 11851
5	0018-4086-400	3		Threaded connection 25/R 1"
6	0018-1741-000	1		Water pressure reducer, complete
6a		2	*	Gasket
6b		2	*	Threaded connection
6c		2	*	Coupling nut
6d	0001-0299-610	2	*	Pressure gauge
7	3014-2166-000	1		Connection pipe
8	0019-0137-300	1		Hex head screw R 1/4" x 12
9	0004-5268-880	2		Gasket 13/19x1.5
10	8134-2195-000	1		Connection piece
11	0018-0961-300	2		Double nipple 3/8"
12	0018-3711-600	2		Solenoid valve 3/8"
15	0018-3854-300	4		Connection piece 10/R3/8"
16	0013-2818-400	4		Coupling nut R 3/4"
17	0007-2230-750	4		Gasket 15.5/21.5 x 4
18	0018-4645-300	2		Threaded connection R 3/4" R 3/8"
19	0018-4646-300	2		Threaded connection R 3/4" R 1/2"
20	0018-1709-640	2		Ball valve 1/2"
21	0018-1788-300	2		Reducing nipple 1/2" / 3/8"
22	8134-2201-040	1		Pipe line
23	0007-2402-750	2		Gasket 17/23 x 3
24	0018-4645-300	1		Threaded connection R 3/4" / R 3/8"
25	8134-2193-110	1		Connection piece
26	0018-1299-640	2		Upper part of valve 1/2" DIN 3519,cpl.
26a	0004-5276-710	2	*	Gasket 22/26 x 1
27	0001-0299-610	2		Pressure gauge
-	8134-2355-020	1		Protecting case
-	0005-3355-630	1		Cable gland Pg 9
-	1165-2350-000	1		Pressure switch assembly (30-31)
30	0018-1870-000	1		Low-pressure hose, complete
30a	0018-3465-400	1	*	Screw coupling DL 8 DIN 2353 R 1/4"
30b	0018-3560-400	1	*	Screw coupling DL 8 R 3/8"
31	0005-0675-900	1		Pressure switch F 5
36	0005-3358-630	1		Cable gland Pg 9
37	0019-2376-630	2		Fillister head screw AM 4x16 DIN 84
38	0005-0862-900	1		Branch box
39	0005-0222-630	1		Plug Pg 9
40	0005-0203-630	1		Cable gland C4 Pg 11x6-9 DIN 46320
41	0005-0772-608	1		Protecting hose

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

Sectional Diagram illustrating Sealing of the Bowl and Removal of the Solid Matter

1 Injection chamber for sealing water
2 Injection chamber for opening water
3 Sealing chamber
4 Sliding piston
5 Feed channel for opening water
6 Piston valve
7 Valve piston
8 Gasket
9 Bowl gasket
10 Discharge channel for sealing water
11 Sediment space
12 Operating-water feed
13 Pressure gauge
14 Solenoid valve
16 Strainer

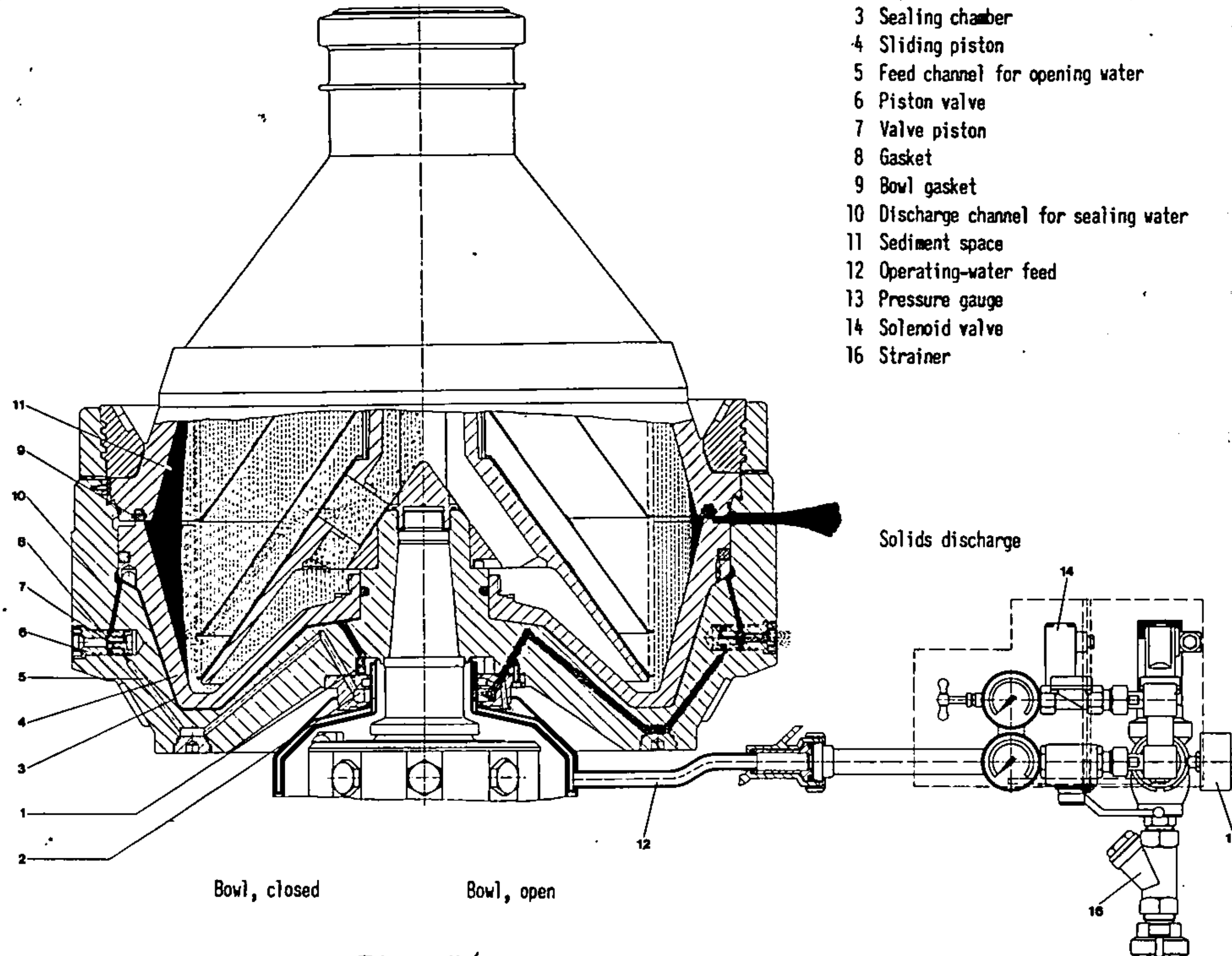


Fig. 5/1a

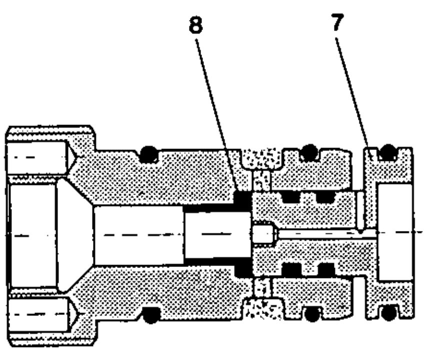


Fig. 5/1b

Functional diagram showing valve during separation.

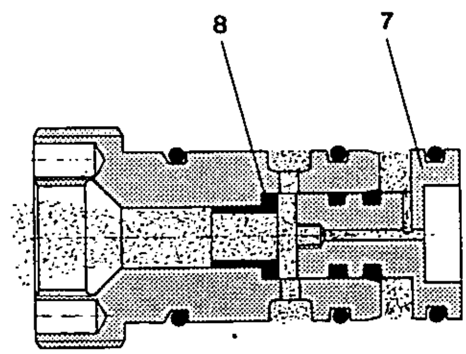


Fig. 5/1c

Functional diagram showing valve during solids ejection.

5.2. Timing unit

Partial sediment ejections during milk processing are programmed by the timing unit TVA 2-M. By pressing the button "Partial de-sludging", the program in action can be interrupted and a partial ejection process can be initiated immediately.

Total ejections during cleaning-in-place are initiated manually, by pressing the button "Total de-sludging" on the timing unit.

For details, refer to the instruction manual "WESTFALIA Timing Unit".

5.3. Operating-water connection

The inner diameter of the operating-water supply line shall be 25 mm (1") and the pressure in this line shall be at least 1.5 bar.
Important: Pressure fluctuations must not exceed 0.5 bar.
Operating-water consumption: 2000 l/h.

The operating-water connection is provided with a water-pressure reducer K (fig. 5/3) by means of which the line pressure is to be throttled to 1 bar. To adjust the water-pressure reducer, proceed as follows:

1) Open rapid-closing valve D (fig. 5/3) all the way.
2) Adjust pressure with adjusting screw J so that pressure gauge on pressure reducer indicates 1 bar.
3) Close rapid-closing valve D again.

The operating water must be clean and should meet the following specifications:

Hardness:	$\leq 15^{o}$	English hardness at separating temperatures of up to 55°C
	$\leq 7.5^{o}$	English hardness at separating temperatures exceeding 55°C
Chlorine ions:	$\leq$100 mg/l	
pH value:	6.5 to 7.5	

The strainer in filter G has to be cleaned from time to time.

Pressure gauges M and N (fig. 5/3) merely serve for checking the closing and opening operations.

5.3.1. Arrangement of the solenoid valves

In addition to the automatic solenoid valves, the operating-water connection comprises two rapid-closing valves D and F connected in parallel with solenoid valves A and B, as well as two shut-off valves a and b.
This arrangement allows changing over to manual operation in the event of failure of solenoid valves A or B for opening or closing of the bowl or in the event of failure of the timing unit.
When changing over to manual operation, rapid-closing valve D is to be opened to the extent that sealing water flows out of the operating-water discharge (see no. 18 in dimensioned drawing on page 0/7) at a rate of approx. 50 l/h in order to assure continuance of the separating process.
If the solenoid valves are defective, close manually-operated valves a and b.

Partial sediment ejection, initiated manually

1) Open rapid-closing valve D all the way.
2) Open rapid-closing valve F in order to open the bowl. As soon as de-sludging noises csn be heard, close rapid-closing valve F in order to close the bowl.
3) Throttle rapid-closing valve D so that sealing water flows out of the operating-water discharge at a rate of approx. 50 litres/h.

8. The Gear

8.1. Removing the vertical gear parts

After dismantling the bowl, loosen oil drain screw and let oil drain into oil cup. Then remove upper sight glass.

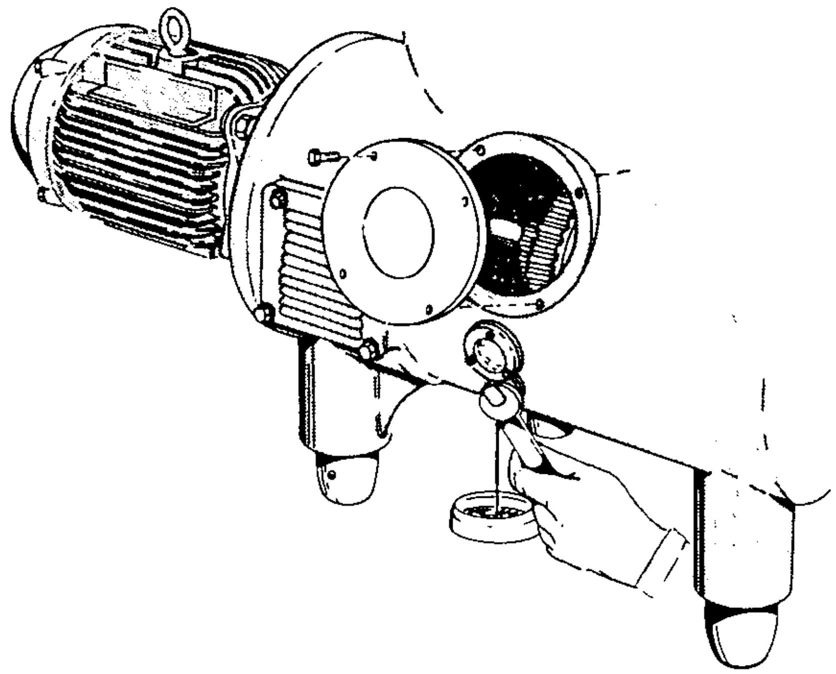


Fig. 8/1a

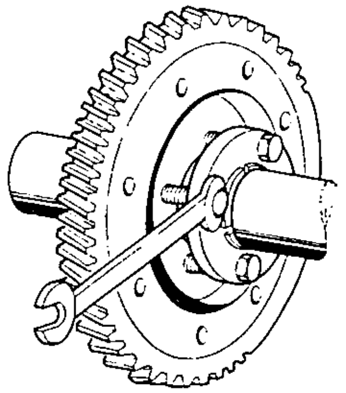


Fig. 8/1b

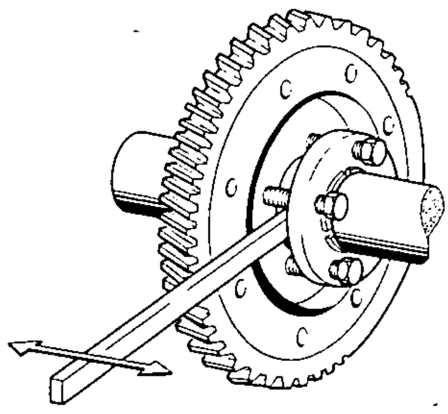


Fig. 8/1c

Loosen hex head screws in clamp plates of worm wheel (fig. 8/1b). Then slacken clamp plates until worm wheel can be moved on worm wheel shaft (fig. 8/1c). Push worm wheel to the left.

7. Cleaning

7.1. Cleaning-in-place

The separator is generally included in the C-I-P cycle of the pasteurizers. For cleaning the separator, the detergents used for cleaning the pasteurizers will be adequate. However, be sure that the last cleaning agent to be circulated is acid.

After milk processing, the residual milk is displaced and the whole equipment thoroughly flushed with water. Flushing is followed by two "total ejections" accomplished by pressing the push button "total ejection" on timing unit TVA 2-M.

The plant must be flushed with water and subsequent flush de-sludgings have to be performed even if the plant cannot be C-I-P-cleaned for some reason after milk processing.

The C-I-P-programme should comprise the following programme steps:

1) Flushing with caustic solution,

2) Flushing with water,

3) Flushing with acid solution,

4) Flushing with water.

<u>IMPORTANT:</u> Each of the programme steps 1 - 4 should be finished up with a total ejection.

During each programme step the spring-controlled constant-pressure valve incorporated in the skim milk line is to be throttled several times by actuating the snap closure (cover). This will cause flooding of the centripetal pump chamber of the separator, resulting in thorough flushing of hood and sediment collector. If the separator is not equipped with a constant-pressure valve, the valve in the skim milk line must be throttled several times by hand.

<u>IMPORTANT:</u> Bear in mind that bowl parts of stainless steel will be attacked by chlorine. Therefore, make sure that detergents are free from chlorine.

7.2. Manual cleaning

In spite of cleaning-in-place, the bowl should be dismantled for check-up and manual cleaning <u>once a month</u> (see 4.3). On this occasion, guide surfaces and threads should be cleaned and wiped dry and lightly greased with the special lubricating paste furnished with the machine. After removal of the sliding piston 4 (fig. 5/1a), the sealing chamber 3 should be cleaned with special care.

8.2.2. Assembling the neck bearing bridge

The upper ball bearing of the spindle is contained in pressure ring 11c which is held by nine radially arranged, evenly distributed springs 11g.

1) Insertpressure ring 11c in neck bearing bridge 11d in such a manner that the nine recesses of the pressure ring face the nine tapholes of the neck bearing bridge.

2) Grease spring pistons 11h thoroughly. Fit neck bearing springs 11g into the nine spring pistons. Then put the spring pistons into threaded plugs 11f.

3) Screw the threaded plugs together with neck bearing springs and spring pistons into the tapholes of neck bearing bridge, and tighten.

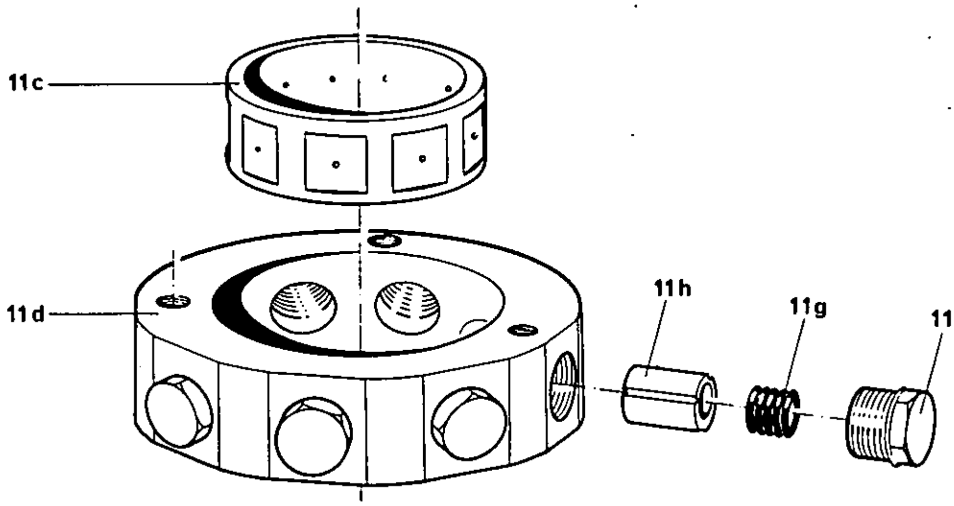


Fig. 8/4a

8.2.3. Installing spring column into bottom bearing

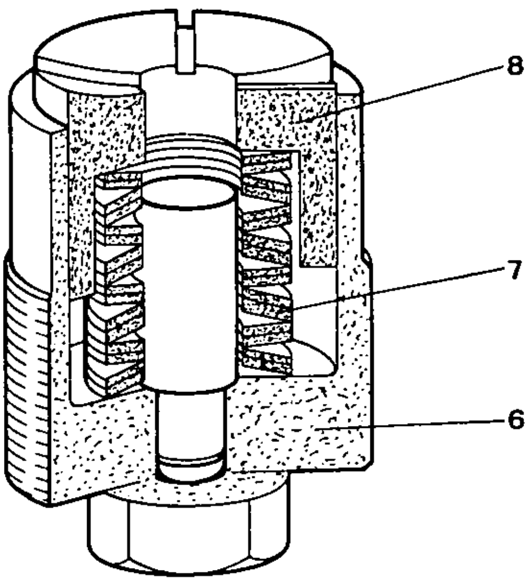


Fig. 8/4b

1) Slide cup springs 7 on bolt of bottom bearing threaded piece 6 as illustrated in fig. 8/4b.

2) Slip bottom bearing pressure piece 8 over spring column.

8.3. Bowl height

8.3.1. Checking the bowl height

NOTE: The bowl height has been adjusted at the factory before shipment of the separator. It must be checked for possible re-adjustment before the first start of the separator, after re-assembling the vertical gear parts, after exchanging the bowl or the centripetal pump, and as soon as the centripetal pump shows any grinding marks.

Prerequisite to correct bowl height adjustment is that

a) bowl is properly closed ("O" marks on bowl lock ring and on bowl bottom must be in line with each other),

b) hood is properly seated on sediment collector and hex head screws are tightened securely,

c) upper centripetal pump is screwed onto lower centripetal pump as far as it will go and that centripetal pump assembly is screwed all the way into the disc.

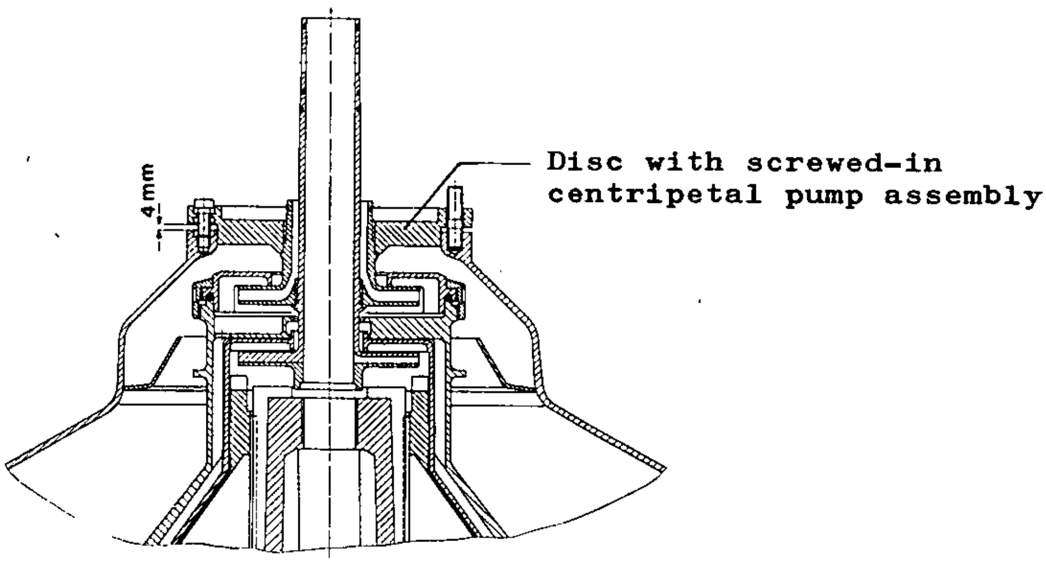


Fig. 8/5

The bowl height is correct when the disc can be raised by about 4 mm. Otherwise the bowl height has to be re-adjusted (see 8.3.2).

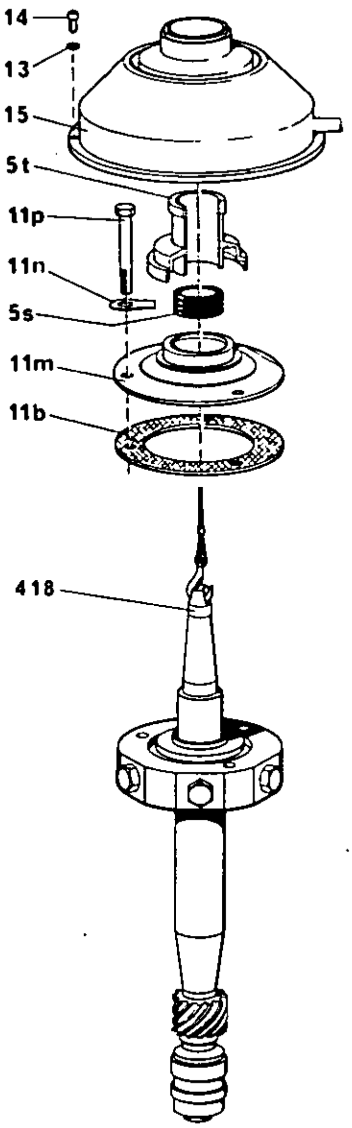


Fig. 8/2a

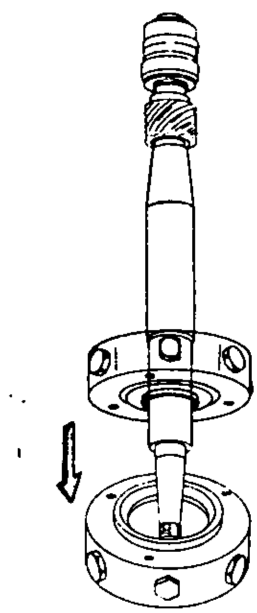


Fig. 8/2b

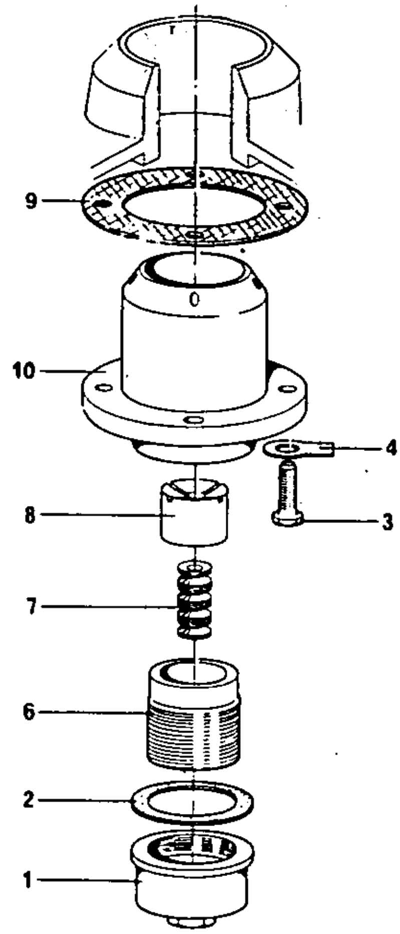


Fig. 8/2c

Fig. 8/2a:

Take off operating-water connection and remove bushes 37 and 39 (fig. 13/1).
Undo screws 14 and remove operating-water feed 15 and spindle cap 5t. Straighten tab washers 11n and unscrew hex head screws 11p. Take off protection cap 11m and spindle spring 5s.

Screw tool 418 onto worm spindle and lift out spindle together with neck bearing bridge.

Fig. 8/2b:

To remove neck bearing bridge, hold spindle in inverted position, upper end down, and tap lightly against a wooden surface. Neck bearing bridge will then slide off.

Fig. 8/2c:

Unscrew bottom bearing cap 1 and remove gasket 2. Unscrew bottom bearing threaded piece 6, and remove it together with spring column 7 and bottom bearing pressure piece 8.

Should the case arise that bottom bearing housing 10 has to be replaced, then proceed as follows: Straighten tab washers 4 and undo hex head screws 3. Take two of these screws and thread them into the tapholes of the bottom bearing housing. By doing so, the bottom bearing housing will be pressed out of the frame.

8.2. Re-assembly of vertical gear parts (fig. 14)

For re-assembly proceed in reverse order of removal (see 8.1) and according to instructions given in sect. 8.2.1 - 8.2.3.

8.2.1. Important hints for re-assembly

1) Before re-assembling the vertical gear parts, clean gear chamber thoroughly.

2) Check condition of ball bearings before re-fitting them onto worm spindle.
   IMPORTANT: Use only high-speed precision ball bearings as per List of Parts.
   For reasons of safety, replace ball bearings of worm spindle and worm wheel shaft every 5,000 running hours.

3) Before fitting ball bearings, ball bearing protection rings 5d and 5g, and ring 5n onto spindle, heat these parts in oil to approx. 80°C.

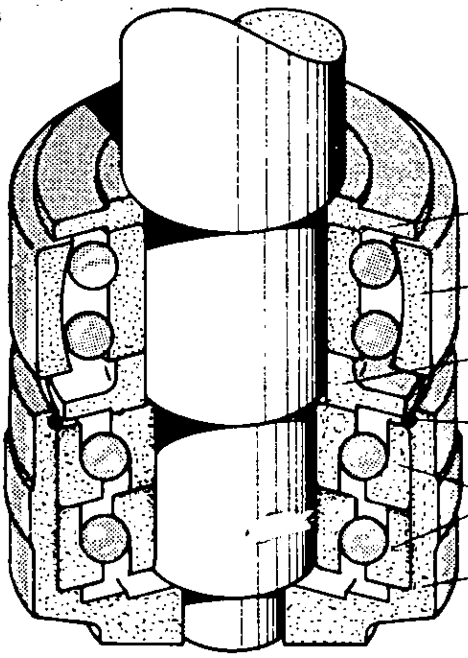


Fig. 8/3

4) If one of the angular contact ball bearings 5b needs replacement, be sure to replace both of them. Note that the angular contact ball bearings may be loaded axially in one direction only. They must be installed as shown in fig. 8/3. The narrow rim of the outer ring of each ball bearing must be on top. Faulty mounting will inevitably result in damage to bearings.
   For assembly proceed as follows:
   Slide the warmed-up angular contact ball bearings onto the spindle, slide snap ring 5c over ball bearings and let ball bearings cool down. Then fit bottom bearing pressure housing 5a over ball bearings and press snap ring 5c into groove of bottom bearing pressure housing.

5) It must be possible to install the worm spindle, with ball bearings attached, without having to hit on the upper spindle end, and to move the built-in spindle axially by hand. If this is not the case, remove burrs from the bottom bearing housing, using a very fine emery cloth.

6) When worm is worn and needs replacement, the worm wheel assembly with clamp plates 10 (fig. 15) shall be replaced at the same time, since this part, being worn down as well, would cause premature wear to the new worm.

7) When installing neck bearing bridge assembly 11c-h, make sure that gaskets 11b and 11k are in good condition. Be sure to insert distance ring 11a.

8) Before installing the neck bearing protection cap, check to be sure that there is a clearance of 3 - 3.5 mm between cams of distance ring 11a (fig. 8/6) and neck bearing bridge 11d. If not, proceed as per instructions of sect. 8.3.2.

9) IMPORTANT: After re-assembling the vertical gear parts, check bowl height for possible re-adjustment (see 8.3).

8.3.2. Re-adjusting the bowl height

For re-adjustment of the bowl height proceed as follows:

Unscrew bottom bearing cap 1 (fig. 14). Adjust bowl height (refer to fig. 8/5) by turning bottom bearing threaded piece 6. A full turn of the bottom bearing threaded piece to your Right or to your Left raises or lowers the bowl by 2 mm.

If the distance shown in fig. 8/5 <u>is greater than 4 mm</u>, the bowl is <u>too high</u>. Lower the bowl by turning the bottom bearing threaded piece in counter-clockwise direction.

If the distance shown in fig. 8/5 <u>is less than 4 mm</u>, the bowl is <u>too low</u>. Raise the bowl by turning the bottom bearing threaded piece in clockwise direction.

If the bowl has to be raised by more than 1 mm, it has to be removed (see 4.3). Remove operating-water connection and take out bushes 37 and 39 (fig. 13/1). Undo screws 14 and remove operating-water feed 15. Take off spindle cap 5t (fig. 14). Undo screws 11p and remove neck bearing protection cap 11m. Then turn bottom bearing threaded piece in clockwise direction until proper height is adjusted.

<u>Each time the bowl has been lowered or raised</u>, check if there is a clearance of 3 to 3,5 mm between cams of distance ring 11a (fig. 8/6) and neck bearing bridge 11d. In order to be able to check this clearance, remove bowl, operating-water connection, bushes 37 and 39 (fig. 13/1), operating-water feed, spindle cap and neck bearing protection cap, unless these parts have already been removed before raising the bowl by more than 1 mm. This check is not required if it has been made after re-assembling the vertical gear parts (see 8.2.1 No. 8) and the bowl had not to be raised by more than 1 mm.

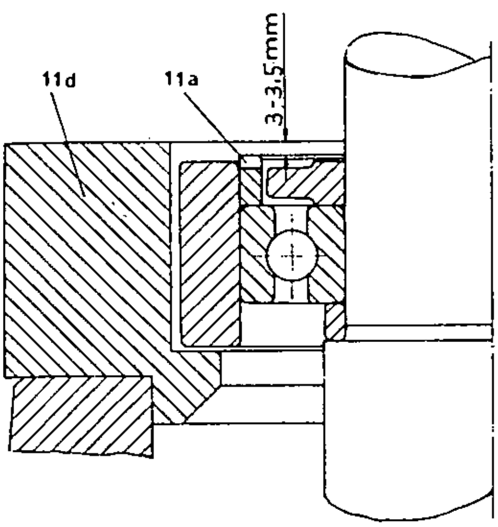


Fig. 8/6

If the clearance between the cams of the distance ring and the neck bearing bridge is smaller than 3 mm, the cams have to be filed to proper dimension. If the distance is greater than 3,5 mm, increase height of cams by welding or check with the factory for a new distance ring with properly sized cams.

After checking the clearance between distance ring and neck bearing bridge, re-install the above-mentioned parts. When installing the operating-water feed, check to be sure that gasket 38 (fig. 13/1) is in good condition.

Replace bottom bearing cap including gasket 2 (fig. 14) and close tightly.

Bear in mind that after fastening the neck bearing protection cap, the distance ring and, hence, the ball bearing 5p (fig. 14) will be under pressure until the spring column 7 in the bottom bearing is compressed by the weight of the bowl.

8.4. Removal of the horizontal gear parts

8.4.1. Removing the motor

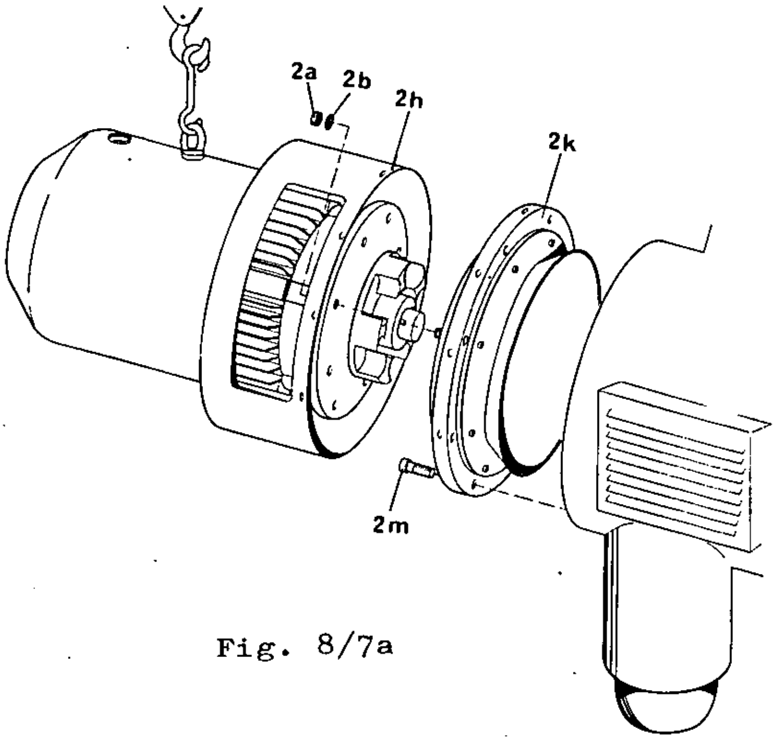


Fig. 8/7a

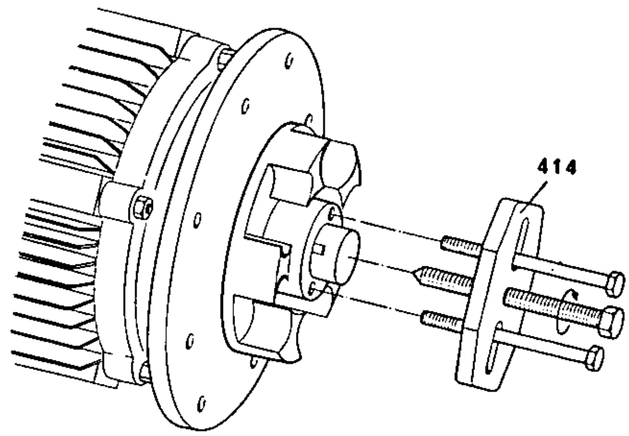


Fig. 8/7b

Remove lead-in wires from motor terminals. Unscrew hex head screws 2g and move cover 2h sidewards. Sling motor to hoist and tighten carrying rope. Then unscrew hexagon nuts 2a through opening of cover which can be turned on the flange. Take off lock washers 2b.
Use hoist to lift off motor together with cam hub (see fig. 8/7a).

For removing cam hub from motor shaft end use puller 414 (fig. 8/7b).

8.4.2. Removal of the fluid clutch

After removing the motor, undo Allen screws 2m and take off flange 2k (see fig. 8/7a).

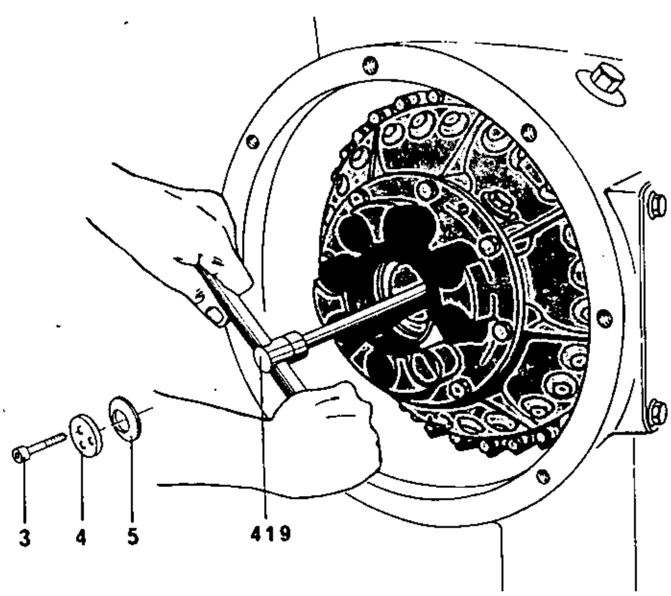


Fig.. 8/7c

Loosen Allen screws 3 (fig. 8/7c) with torque-indicating wrench 416 (fig. 20) by consecutively giving each screw a quarter of a turn until tension of cup spring 5 slackens. Then screw out Allen screws all the way and remove washer 4 and cup spring 5.

It may happen that one of the three Allen screws can only be loosened by applying great force. In this case re-tighten the two remaining screws so that all three screws are equally tight. Then start loosening again as described above.

Be sure the socket of the wrench 416 is not worn!

To remove fluid clutch from cone of worm wheel shaft use pulling device 419.

8.4.3. Removing the worm wheel shaft

Remove fluid clutch (see sect. 8.4.2).

Loosen oil drain screw and let oil drain into oil cup. Remove upper sight glass (see fig. 8/1a).

Loosen hex head screws in clamp plates of worm wheel. Slacken clamp plates and push worm wheel to the left (fig. 8/1b, 8/1c).

Undo hex head screws 18 and remove cover 17.

Use wrench 416 to unscrew Allen screws 13. Remove disc 12.

By means of tool 419, pull brake pulley assembly 11a-d off the cone of worm wheel shaft.

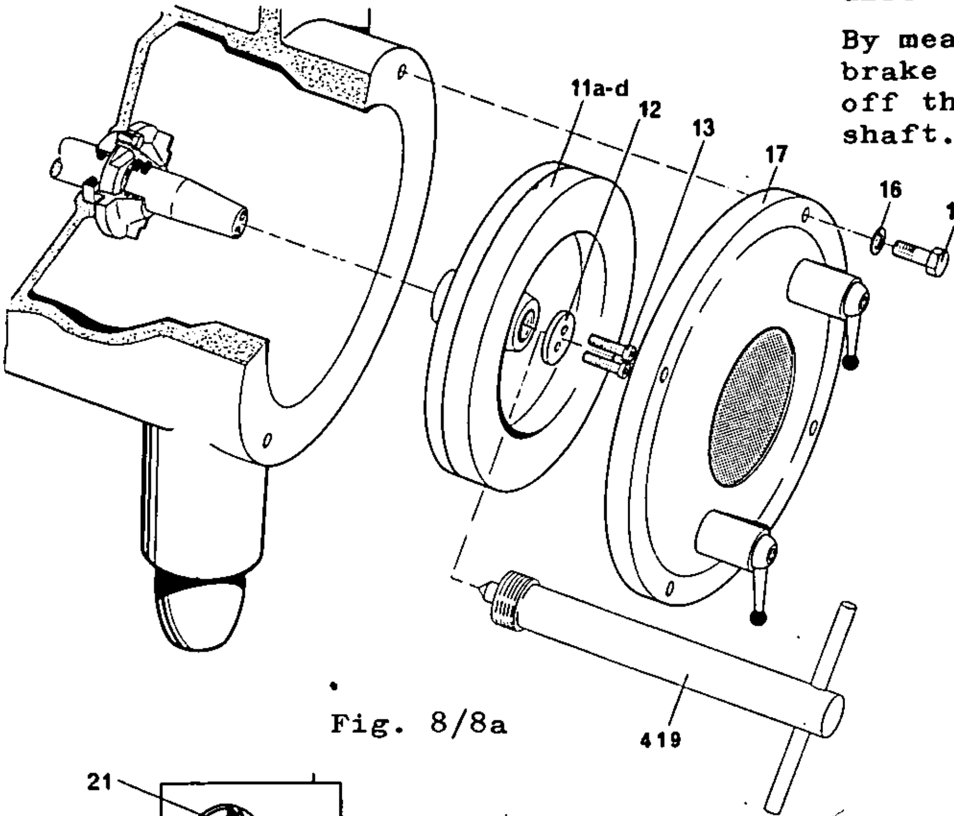


Fig. 8/8a

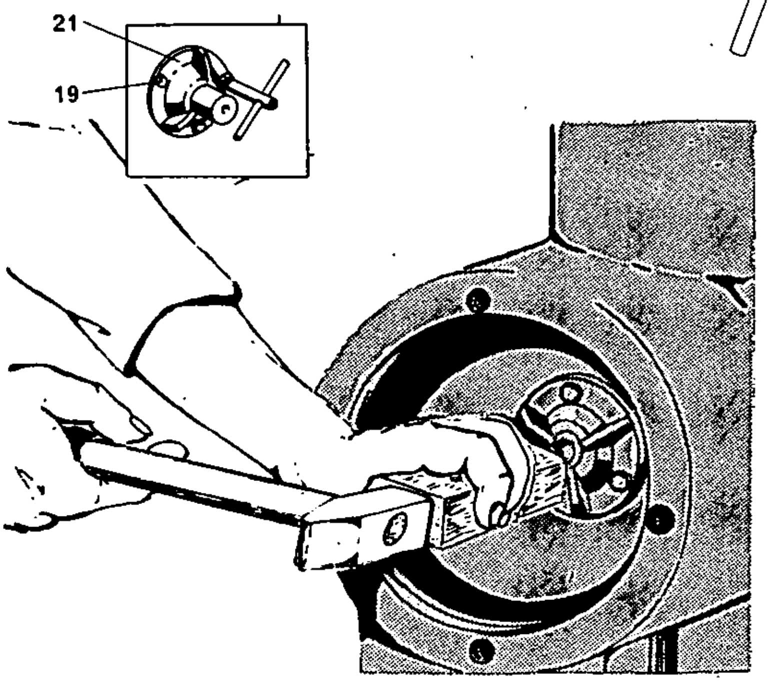


Fig. 8/8b

Remove hex head screws 19 from bearing cover 21 on the brake side (fig. 8/8b). Place a hard wood block against worm wheel shaft end, on motor side and rap gently with a hammer to drive the shaft, along with ball bearing, nut, and bearing cover, towards the <u>brake side</u>. When shaft has completed loosened from ball bearing on motor side, pull it out by hand. While doing so, hold worm wheel to prevent damage to gear teeth. Then take worm wheel assembly with clamp plates out of gear chamber.

8.5. Re-assembling the horizontal gear parts (fig. 15)

For re-assembly proceed in reverse order of removal (see sect. 8.4) and according to the following instructions:

1) The worm wheel with clamp plates (item 10 in fig. 15) has been balanced in the factory as complete assembly. To avoid unbalance, do NOT exchange component parts separately.

2) When mounting the worm wheel assembly with clamp plates, be sure to push it towards the brake side until it rests against the shoulder of the worm wheel shaft 25. This will ensure correct positioning of the toothed rim with reference to the worm.

3) The worm wheel must be firmly clamped to the worm wheel shaft, - accomplished by tightening screws 10c in the two clamp plates. Tighten the screws crosswise, by single turns, to make sure clamp plates are drawn together evenly.

4) IMPORTANT: When the toothed rim is worn, the entire worm wheel assembly with clamp plates has to be replaced. The worm 5k (fig.14) shall be replaced at the same time, since this part, being worn down as well, would cause premature wear to the new worm wheel.

5) Re-adjust proximity switch 40 with the aid of adjusting ring 439 (fig. 8/9).

6) Before installing the fluid clutch and the brake drum, apply a thin film of grease to the tapered ends of the worm wheel shaft. Then clean and wipe dry the tapered ends with a rag. Clean also inside of hubs of fluid clutch and brake drum very carefully, to assure proper fitting.

7) The fluid clutch and the brake drum must be firmly clamped to the worm wheel shaft. This is accomplished by tightening Allen screws with torque wrench 416 (fig. 20). Tighten the screws consecutively, by single turns. Give the final tightening at 4 - 4.1 mkp on the torque scale. When installing the fluid clutch, be sure to place cup spring 5 under washer. For correct arrangement refer to fig. 15.

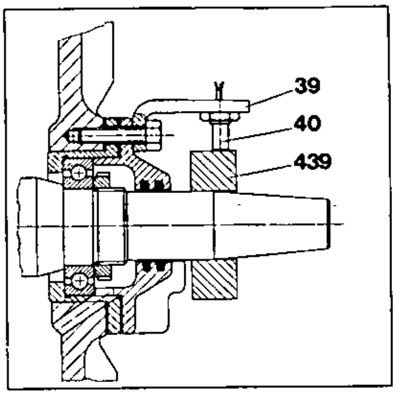


Fig. 8/9

8) When installing the motor, make sure that there is a clearance of 4 mm between cam hub 31 and fluid clutch (fig. 15 or 16). The distance has to be checked after exchanging the motor, the cam hub, the fluid clutch or the worm wheel shaft. If necessary, adjust the distance by displacing the cam hub on the motor shaft and drilling a new hole into the motor shaft for threaded pin 30.

9) Fill gear chamber with the oil specified in sect. 2. Oil level must be slightly above middle of sight glass.

10) To run in new gear parts (worm wheel and worm) let the separator run - without bowl - for about one hour. During this time, switch motor several times on and off.

11) For reasons of safety, replace ball bearings of worm wheel shaft and of worm spindle every 5,000 running hours.

9. The Fluid Clutch

9.1. General

The fluid clutch (Turbo Clutch) gradually brings the bowl to its rated speed, eliminating premature wear on gear parts and on motor. The motor power is transmitted by means of a closed oil circuit between a primary wheel driven by the motor shaft and a secondary wheel driving the worm wheel shaft of the separator.

The oil level in the fluid clutch must be up to the mark of the oil level indicator plate, to ensure that the bowl comes up to its rated speed within its starting time (see sect. 3.3).

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

The oil in the clutch has to be changed every 5,000 working hours. It should be changed when the ball bearings of the worm spindle and of the worm wheel shaft are being replaced.

The clutch requires

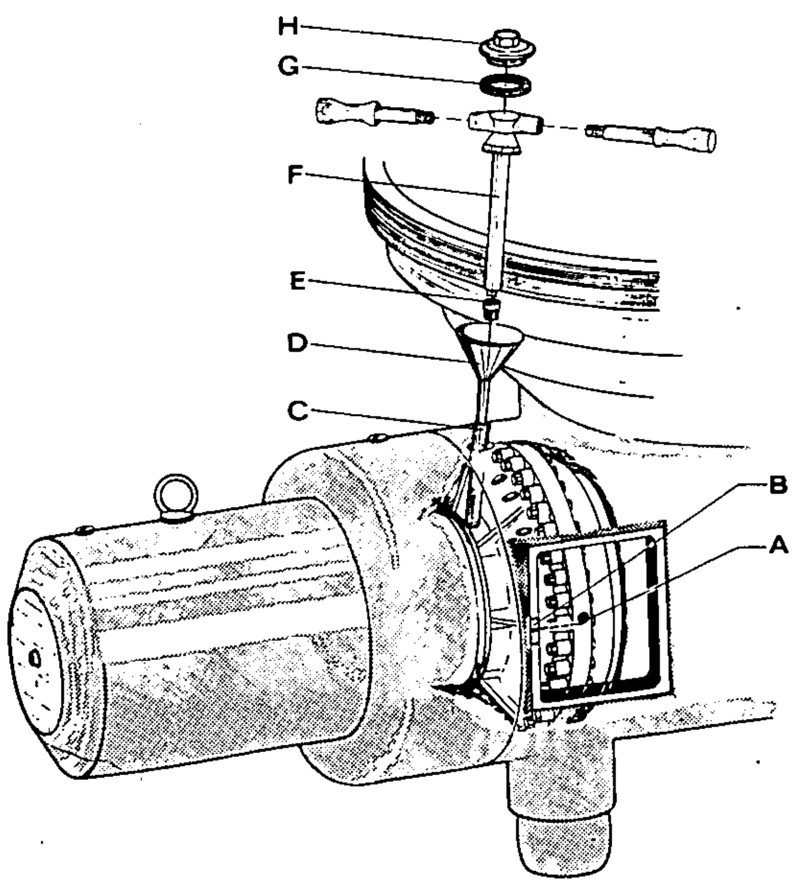
approx. 6,5 litres of oil when using a 1455 rpm motor,
approx. 5,35 litres of oil when using a 1745 rpm motor.

Be sure to use only the type of oil specified in sect. 9.4.

9.2. Checking the oil level

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

Before checking the oil level, make sure oil has cooled down.



<u>Checking the oil level:</u>

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

Fig. 9/1

For checking the oil level, proceed as follows:
Remove the ventilation grid so that the oil level indicator plate can be seen. Bring the clutch into such a position that threaded plug A (fig. 9/1) can be removed without oil flowing out. Unscrew threaded plug with a wrench. Then turn clutch until lower edge of taphole is in line with mark on oil level indicator plate (fig. 9/1). In this position, the oil level in the clutch must be up to the lower edge of the taphole, so that the oil begins to overflow. If this is not the case, refill oil (see 9.3).

9.3. Re-filling of oil (fig. 9/1)

Remove threaded plug H. Loosen oil fill screw E with wrench F. Then take off the handles from the wrench and continue unscrewing the oil fill screw until it comes off. Now thread oil fill pipe C into the oil fill hole, introduce funnel D and pour in oil. Then check oil level (see 9.2) before replacing oil fill screw including gasket. Use wrench F to firmly tighten the oil fill screw.

9.4. Type of oil

For filling the clutch, use only steam turbine oil

Shell Turbo Oil T32

which has proved satisfactory in operation by meeting requirements as regards viscosity, flash point, lubricating properties, compatibility with metals and gaskets, aging, etc.

Two cans, each containing 5 litres of Turbo T32 oil, are furnished with the separator.

If this type of oil is not readily available, steam turbine oils which comply with the following specifications, may be used, however, temporariliy only.

Designation: Lubricating oil TD-L 16 (according to DIN 51515) (steam turbine oil with additives giving increased protection against corrosion and increased resistance to aging).

Kinemat. viscosity:	32 cSt / 40 °C
Density / 15 °C:	max. 0.900 g/ml
Pour point:	≦ -6 °C
Corrosive effect on copper:	max. degree of corrosion 2 (according to DIN 51759)
steel:	no corrosion (according to DIN 51585)
Aging characteristics:	Increase of the neutralization number after 1000 h: max. 2.0 mg KOH/g oil.

Contrary to DIN 51515:

Open flash point according to Cleveland: approx. 220 °C

9.5. Dismantling the fluid clutch (fig. 16)

The fluid clutch should not be dismantled in the site. If damage occurs, the clutch should be returned to the manufacturer for repair to assure correct fitting of the spare parts and, hence, proper functioning of the clutch. In the meantime, a spare clutch can be placed at your disposal.

If however, you decide to remove leakage of the clutch in the site, we recommend to check first sealing 17 because it is more easily accessible than sealing ring 4.
After taking the clutch out of the frame (see 8.4.2) remove screws 19 and lock washers and take off cover 18. Now check sealing ring 17 and replace it when its sealing lip is no more soft and elastic.

If, however, sealing ring 4 or the ball bearings have to be replaced, the clutch has to be dismantled in the following manner:

1) Loosen screw 24 and let oil drain.
2) Undo hexagon nuts 11 and remove them with lock washers 10. Then remove screws 7.
3) Press primary wheel off the clutch casing 8 by threading two of the screws 7 into the tapholes of primary wheel 12.
   IMPORTANT: Bear in mind that the fluid clutch has been balanced in the factory. Therefore, be sure to mark both primary wheel 12 and clutch casing 8 before taking them apart, so that, when being re-assembled, these parts will be brought back into their original position.
4) Press ball bearing 15 out of primary wheel 12.
5) Undo screws 2 and remove cam flange 1.
6) Force secondary hub with secondary wheel 16 out of the clutch casing. Be sure not to damage running surfaces for the sealing rings. See also 9.6. no.6.
7) Screw screws 26 out of the clutch casing and remove oil control ring 25.
8) Press ball bearing 6 and sealing ring 4 out of the clutch casing.

9.6. Re-assembling the fluid clutch (fig. 16)

1) Moisten sealing rings. Press sealing ring 4 into the clutch casing by applying the tool shown in fig. 9/3 and then lightly hitting against bolt B. In order to be able to use the tool for pressing sealing ring 17 into cover 18, screw the bolt B into the other side of the disc. Then proceed in the same way as for sealing ring 4. The tool consisting of disc (part no. 3158-9939-000) and bolt (part no. 3170-9877-010) is supplied on special order only.

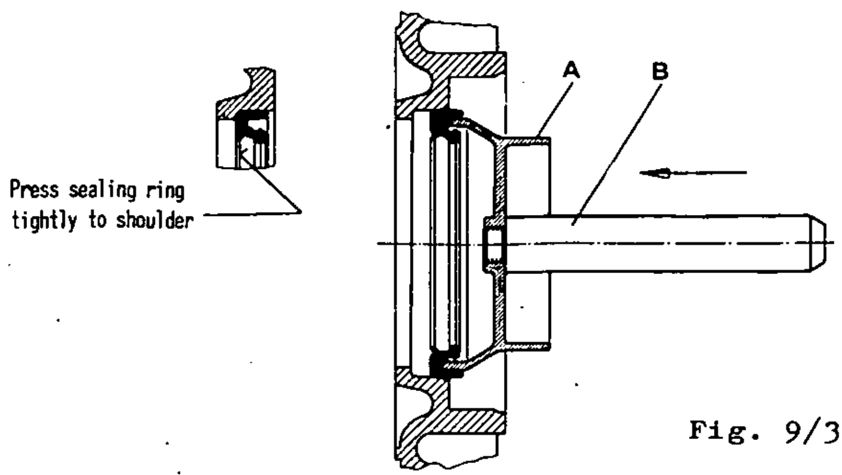


Fig. 9/3

Pressing the sealing ring into clutch casing.

2) Insert spacer ring 5 in clutch casing and spacer ring 13 in primary wheel (fig. 9/4a). The bevelled edge of each ring must snap into the groove of the bearing neck (fig. 9/4b). This will ensure that the spacer rings cannot move axially.

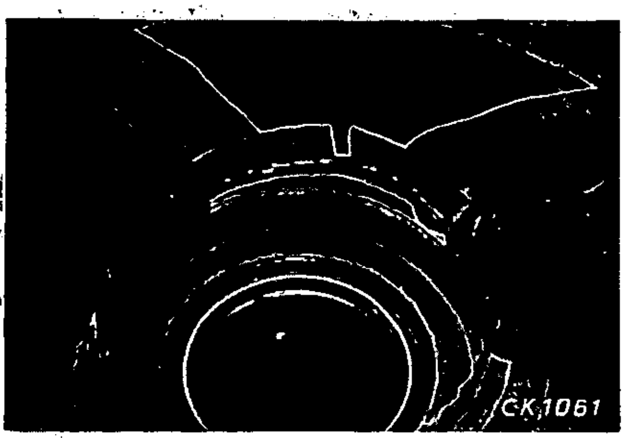


Fig. 9/4a

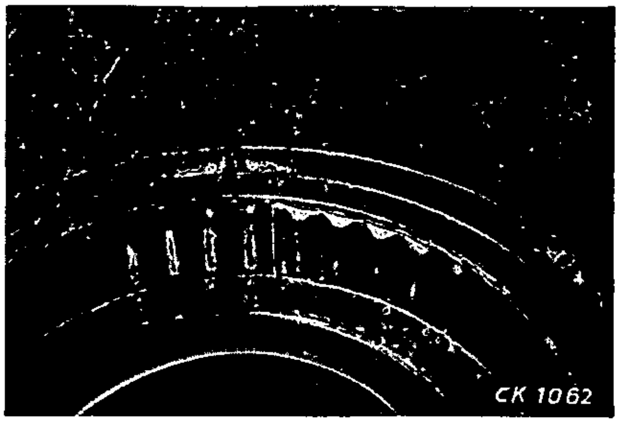


Fig. 9/4b

3) Press ball bearing 6 into clutch casing and ball bearing 15 into primary wheel. Check if the ball bearings pressed into the spacer rings have an absolutely tight fit. If this is not the case, the spacer rings have to be replaced. If necessary, return the clutch to the factory for repair.

4) Apply some oil-resistant sealing compound to oil control ring 25. Then fasten ring to clutch casing with screws 26. Be sure to fit lock washers.

5) Insert gasket 14 in groove of primary wheel. Then fasten cover 18 to primary wheel with screws 19. Be sure to fit spring washers.

6) Press secondary hub with secondary wheel, 16, into clutch casing. IMPORTANT: The surfaces contacting the sealing rings 4 and 17 must be perfectly smooth to ensure oil-tightness of the fluid clutch. If necessary, re-polish contact surfaces.

7) Fasten cam flange 1 to clutch casing with screws 2. Be sure to fit spring washers.

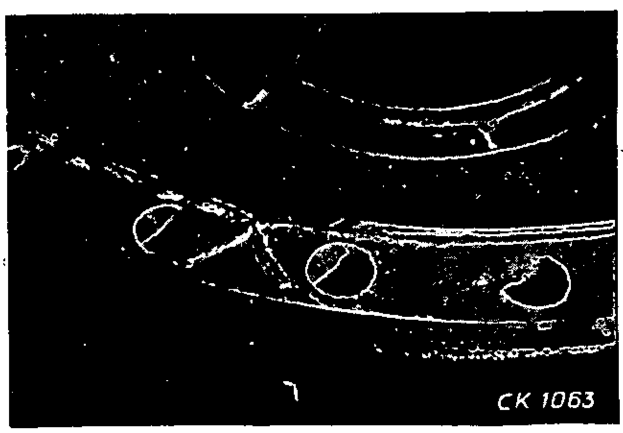


Fig. 9/4c

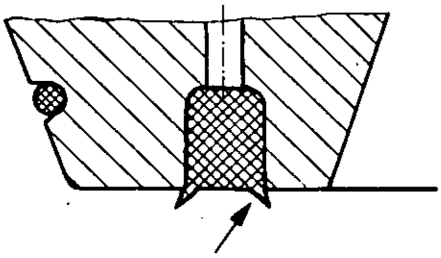
8) Place Teflon packing cord 9 on sealing surface of clutch casing as shown in fig. 9/4c. Make sure cord ends are crossed. To keep the cord in its place coat it with grease. Sealing surfaces of primary wheel and clutch casing must be in perfect condition; they must not be coated with a sealing compound.

9) Press primary wheel on secondary hub so that the marks on primary wheel and on clutch casing are in line (see sect. 9.5, no. 3). Then screw primary wheel and clutch casing together.

10. Trouble Shooting

10.1. General

Troubles	Causes	Remedies
10.1.1. The bowl does not come up to rated speed or takes too long to do so (see 3.3).	1) Brakes are on.	Release brakes by turning handles in clockwise direction.
	2) Motor is incorrectly connected.	Check connection.
	3) Oil level in fluid clutch is too low or clutch is leaking.	Re-fill oil (see 9.3). Re-tighten nuts 11 of screws 7 (fig. 16) on clutch. If sealing rings 4 and 17 do not seal properly, ask for a reconditioned clutch in exchange for your clutch.
	4) Bowl is placed too high or too low and rubs against centripetal pump.	Adjust to correct bowl height (see 8.3).
	5) Clamp plates are not tight enough. Worm wheel slips on shaft.	Tighten long hex head screws on worm wheel evenly and firmly. Tighten crosswise, by single turns.
	6) Feed line is open.	Close feed line.
10.1.2. The bowl speed drops during operation.	1) Oil level in fluid clutch is too low.	Re-fill oil (see 9.3).
	2) Motor speed drops during operation.	Check line voltage and inspect motor.
10.1.3. The bowl comes up to rated speed too quickly (in less than 8 minutes). Motor pulls too high a starting current.	The clutch contains too much oil.	Check oil level (see 9.2) Drain surplus oil.

Troubles	Causes	Remedies
10.1.4. Uneven run of the separator.	1) Incomplete solids ejection. The remaining solids have deposited unevenly in the bowl. 	De-sludge the bowl several times (6.2.2). If this does not improve conditions, close the bowl and fill it with water to attenuate the increased vibrations occurring during slowing-down of the bowl. Stop the separator and apply brakes. If bowl is leaking, leave feed open. Clean bowl thoroughly. Remove protruding edges of bowl gaskets with a knife (see sketch).
	2) Bowl is incorrectly assembled or if the plant has several separators, parts of different bowls may have been interchanged.	Check and assemble bowl properly (see 4.1).
	3) Pressure in disc stack has slackened.	Check if bowl lock ring is screwed in tightly (see sect. 4.1, No. 15). Check disc count. If necessary, add spare disc.
	4) Bowl is damaged and, therefore, out of balance.	Send bowl to factory or authorized factory repair shop. Do NOT attempt to make your own repairs. Never weld or solder. Bowl is made of heat-treated steels.
	5) Neck bearing springs are weak or broken.	Replace all nine neck bearing springs.
	6) Ball bearings are worn.	Replace damaged bearings. IMPORTANT: As spindle bearings use only ball bearings with increased accuracy of running (see Parts List).

Troubles	Causes	Remedies
10.1.4. Uneven run of the separator (cont'd.).	7) Gear parts are in bad condition as a result of 1. normal wear, 2. premature wear caused by a) lack of oil, b) oil of too low a viscosity, (in general recognizable by blue tempering colour of gear parts) c) metal abrasives present in the oil due to the following possible causes: - viscosity of oil is too low, - oil has not been changed in time, - gear chamber has not been cleaned, d) replacement of one gear part only, instead of both parts, e) infiltration of water because shut-off valves D and F (fig. 5/3) for sealing water were open for a longer period during shut-down of the separator.	Clean gear chamber thoroughly. Replace damaged gear parts: see 8.2, No.6 and 8.5, No. 4. Change theoil (see sect. 2). If necessary, change oil more often. Regarding <u>infiltration of water</u>, the following should be kept in mind: During shut-down of the separator, the shut-off valves D and F must always be kept closed.
10.1.5. Bowl lock ring is difficult to loosen.	Bowl has not been dismantled at regular intervals (see page 0/3, No.10).	Unscrewing of the bowl lock ring can be very much facilitated by blocking the bowl, which is accomplished by putting wedges between bowl bottom and sediment collector.

10.2. Bowl performance

Troubles	Causes	Remedies
10.2.1. The bowl does not close at all. **IMPORTANT:** In this case switch off feed pump immediately.	1) The amount of sealing water fed to the bowl is insufficient because a) the water pressure in the supply line to the operating-water connection is too low (see 5.3) b) the water discharge holes in the top of the operating-water feed 15 (fig.13/1) are clogged with scale.	a) Check water pressure in the supply line which should be 1.5 bar. The pressure reducer shall be adjusted to 1 bar (for adjustment refer to sect. 5.3). After switching on the timing unit and after each de-sludging procedure the sealing-water valve is open for 60 seconds. During this time the amount of discharging sealing water should be measured at the operating-water discharge. The sealing water must discharge at a rate of 550 l/h. Opening of the sealing-water valve for measuring can be repeated by operating the main switch of the timing unit. b) Clean discharge holes.
	2) Gasket 38 (fig. 13/1) is damaged or not inserted.	Replace or insert gasket.
	3) Strainer G (fig. 5/3) is dirty.	Clean strainer.
	4) Gaskets of piston valve 3 (fig. 19) are damaged.	Remove valve (see 4.5) and install new gaskets.
	5) Solenoid valve A (fig. 5/3) does not function properly, because the diaphragm has become brittle and, therefore, fails to seal properly.	Install a new diaphragm. Make sure that hole on outer rim of diaphragm lies over hole of valve housing.
	6) Rapid-closing valve F (fig. 5/3) is damaged. There is a continuous flow of opening water to the bowl.	Install a new rapid-closing valve.
	7) Gasket 5 (fig. 19) in sliding piston is damaged or its edges have been frayed through the up and down movement of the piston.	Replace damaged gasket. If, however, only the edges of the gasket are frayed and the gasket is not damaged otherwise, it can be re-used after grinding it off with an emery wheel.
	8) The operating-water feed is clogged.	Clean operating-water feed.

1.2. Installation

When installing the separator make sure that sufficient room is available (at least 300 mm) for mounting and removing the motor and for removing the horizonzal drive shaft which is to be pulled out towards the brake side.

Do NOT install a shut-off device in the line which will be connected to the operating-water discharge line 5a-c (fig. 13/1). The line should have 50 mm (2") I.D. It should have sufficient fall and must NOT be too long to allow the discharging operating water to flow off freely, since otherwise the water will rise and enter the upper section of the frame, resulting in slowing-down of the bowl.

The supply line to the operating-water connection should have 25 mm (1") I.D., the operating-water pressure should be at least 1.5 bar. The pressure must not fluctuate by more than 0.5 bar. Operating-water consumption: 50 litres/h.

For mounting and removing the bowl parts, a 500 kg hoist (minimum lifting height 2800 mm; see installation plan) will be indispensable). On request a WESTFALIA Swivel Hoist can be supplied.

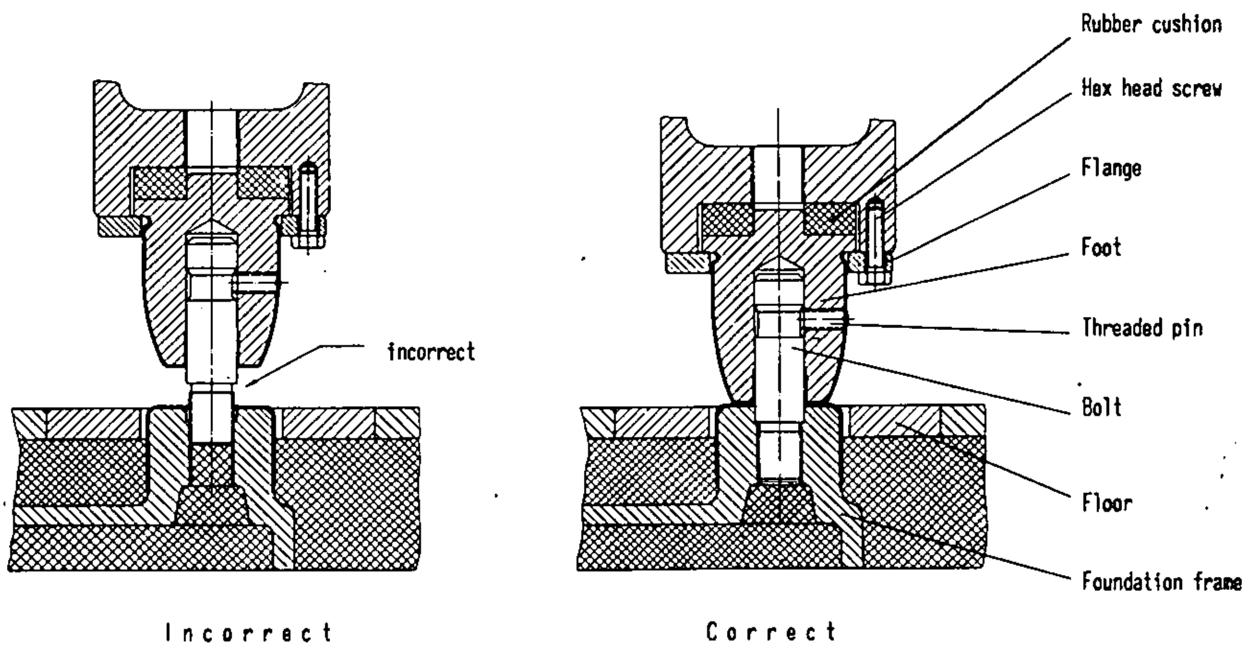


Fig. 1/2

Screw bolts into the four mounting blocks of foundation frame; <u>make sure they are tight</u>. Embed the foundation frame in the floor so that the mounting blocks of the frame protrude above the plane of the floor by about 5 mm. Fill up the space below the foundation frame with concrete. Make sure that the mounting blocks are <u>absolutely level</u> and grout the frame with concrete, inside and outside. To accelerate setting of cement, commercial rapid binding agents may be used.

By means of flanges and hex head screws fasten feet with fitted-on rubber cushions to separator frame. Then lift the separator frame with its feet onto the bolts of the foundation frame and tighten the threaded pins with a wrench.

2. Lubrication

2.1. Lubrication of bearings and gear parts

All bearings and gear parts are splash lubricated from a central oil bath.

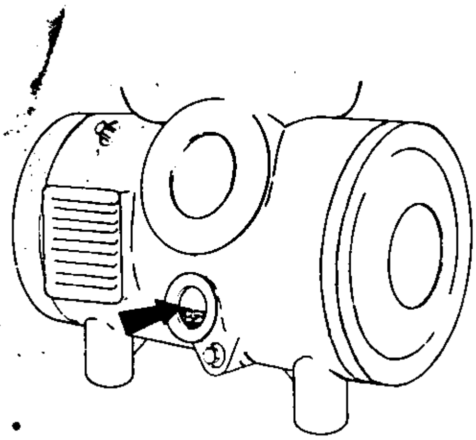


Fig. 2/1

OIL LEVEL

Before initial start-up of separator, fill gear chamber with oil. To do this, remove upper sight glass and fill in oil until oil level is slightly above middle of oil level sight glass. About 5.5 litres of oil are required for one filling. During operation oil level must never be allowed to sink below middle of oil level sight glass; refill oil when necessary.

OIL CHECK

Check oil level once a week.
From time to time check if oil contains water. To do this, loosen oil drain screw and allow a small amount of oil to drain. An immediate oil change becomes necessary when the oil shows a milky colouring (emulsification).

OIL CHANGE

Make first oil change after about 250 operating hours; then change oil every 750 operating hours. However be sure not to wait longer than 6 months to change the oil.

Each time when carrying out oil change, thoroughly clean gear chamber and flush with thin-bodied oil, prior to filling in new oil. Remove all metal particles from inner walls and corners of the gear chamber. Do NOT use fluffy cleaning rags or cotton waste. The sight glass should also be cleaned, as a layer of oil will probably have deposited on the inner side of the glass and this is easily mistaken for the oil level.

LUBRICATING OIL

As lubricating oil use only a gear oil designated

C-LP 114 (according to DIN 51502)

or designated

ISO VG 220 (according to ISO/DIS 3448).

The lubricating oil shall meet the following requirements:

1) Viscosity: 114 ± 8cSt at 50°C, (220 ± 22 cSt at 40°C)

2) Additives:
   a) additives giving increased protection against corrosion and increased resistance to aging, - with properties preventing corrosion on steel according to DIN 51355/B, degree of corrosion 0. Corrosive effect on copper according to DIN 51759/100 A3, degree of corrosion 1.
   b) additives for decreasing wear and increasing the load-carrying capacity. The "FZG" gear rig test according to DIN 51354 as well as the test according to A/16.6/90, load grade > 12, must have been passed.

3) Demulsifying behaviour according to DIN 51599: < 60 minutes.

The gear oil designated "Separator lubricating oil C-LP 114" which has been extensively investigated by us meets the above requirements and should preferably be used. For the order number refer to page 20/1 of the parts list.

<u>IMPORTANT!</u> Do NOT use motor vehicle lubricating oils, since they are likely to emit disturbing odours.

2.2. Lubrication of the motor bearings

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

Upon energizing of the magnet head, the core is pulled upwards so that the integrally vulcanized sealing element of the pilot valve is lifted from the valve seating, thus enabling the water to escape towards the discharge side of the valve. Since the diameter of the outlet opening of the chamber above the diaphragm is larger than the diameter of the inlet opening, the water flows out more quickly than it flows in and, consequently, the pressure acting upon the upper surface of the diaphragm decreases. As soon as it has become smaller than the pressure acting on the underside of the diaphragm (required pressure difference at least 0,5 bar), the diaphragm is lifted off its seat, thus opening the valve.

When current supply is cut off, the spring pushes down the magnet core, thus closing the pilot valve: liquid pressure builds up again above the diaphragm, and the solenoid valve closes.

Maintenance

The solenoid valves are maintenance-free. However, care should be taken that the coupler sockets are always screwed tightly to the magnet heads to ensure perfect sealing action of the gaskets.

Electric troubles

If it has been found that the timing unit functions properly and that voltage is present at the valve terminals of the terminal strip while the associated time function element is operating, the trouble will have to be ascribed either to a defective solenoid coil or to open circuit between terminal strip and valve, or to poor connection.

If the solenoid coil has proved to be defective, remove the magnet head after having withdrawn the coupler socket (to do this, loosen holding screw) and after having loosened the Allen screws.

The solenoid coil is cast integral with the magnet head. Therefore, if the coil needs replacement, the complete assembly (magnet head, part-no. 0018-3710-800, see page 17/3) will have to be exchanged.

Technical data

Solenoid valve		Type:	40 A / 121
Part - no.			0018-3711-600
Pipe connection		R	3/8"
Voltage		V	220 AC
Frequency		Hz	50/60
Optional voltages		V	24 AC, 115 AC, 24 DC
Power consumption:	pull-in	VA	approx. 20
(AC operation)	operation	VA	approx. 16
(DC operation)		W	approx. 12
Duty cycle		%	100
Frequency of operations		/h	1000
Type of enclosure		IP	65
Pressure range		bar	0.5 - 10
Temperature:	medium	°C	+90
	ambient	°C	+35
Cable entry		Pg	9

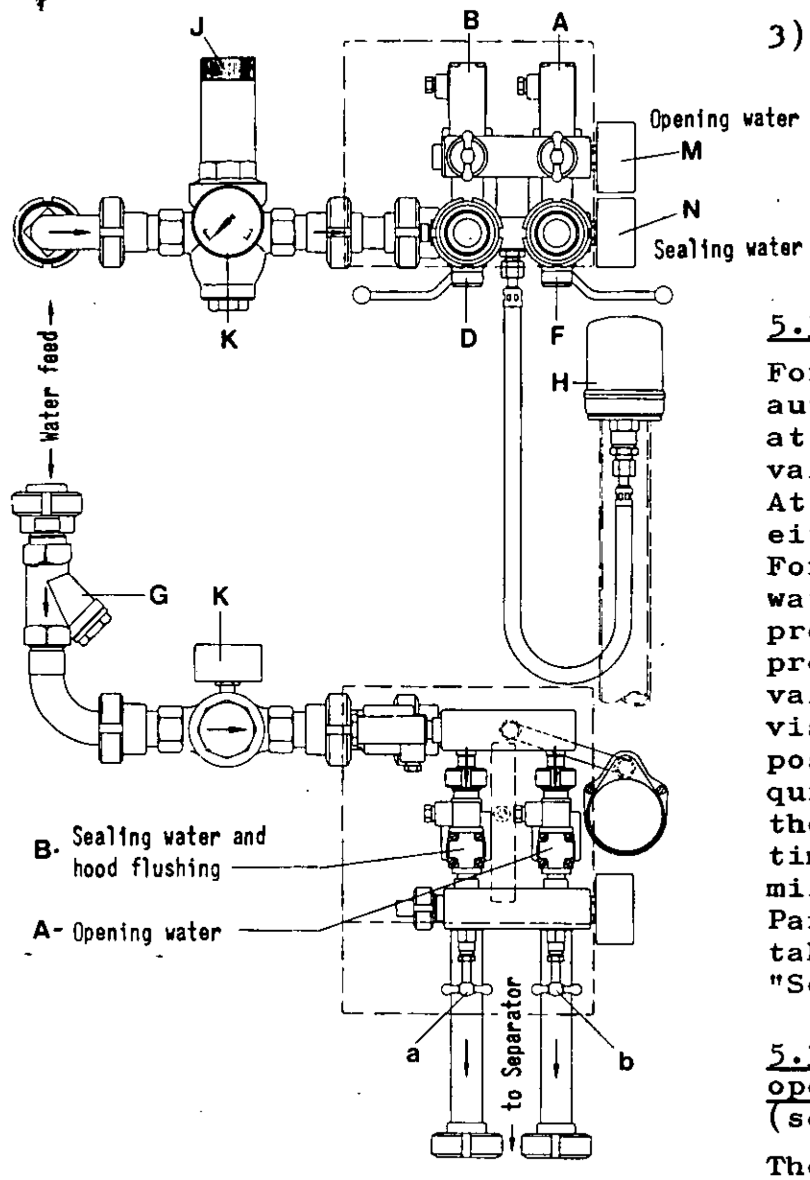


Fig. 5/3

Total ejection, initiated manually

1) Stop milk feed pump.
2) First open rapid-closing valve D, then open valve F.
3) When the de-sludging noises have stopped, close rapid-closing valve F and after about 5 seconds throttle rapid-closing valve D so that water will emerge from the operating-water discharge at the rate of 50 liters/h.

5.3.2. Pressure switch

For proper functioning of the automatic control a pressure of at least 0.6 bar is required while valve D is open.
At a lower pressure the bowl will either not open or not close.
For this reason the operating-water line is provided with pressure switch H which signals pressure drop below the minimum value by giving an audible or visible alarm. If it is not possible to re-establish the required water pressure immediate the switch "Separation" on the timing unit is to be opened and the milk supply is to be stopped.
Partial de-sludgings will no longer take place, and pilot lamp "Separation" will go out.

5.3.3. Solenoid valves for operating water and flush water (see fig. 17/2)

The solenoid valves incorporated in the operating-water feed line assembly are 2/2-way straight-flow valves with 2-way piloting.
The solenoid head is completely moulded in epoxy resin ensuring perfect protection against entry of moisture, good dissipation of heat and perfect electrical insulation. So equipped, these valves are fully tropicalized.

Operating principle

In the normal, i.e. closed condition of the valve (de-energized), the water flowing into the valve from the feed side is unable to escape. It flows through a bore into the chamber above the diaphragm where a pressure equal to the water line pressure builds up. However, since the area exposed to water pressure on the upper side of the diaphragm is larger than the area exposed to the same pressure on the underside, the the diaphragm is kept pressed against the valve seating.

4.3. Removing the feed and discharge system, - Dismantling the bowl

CAUTION: To avoid accidents do NOT loosen any part of the separator or of the feed and discharge system before the bowl has stopped completely.

Note that the bowl has NOT stopped before the gear sight glass is clear and the worm wheel has ceased rotating.

Proceed in reverse order of assembly (see sect. 4.1 and 4.2). The following should be kept in mind:

Handle bowl parts with care.

Be sure to replace worn gaskets.

Before opening the bowl, release the brakes by turning the two handles clockwise.

Use wrench 429 to remove feed tube from feed and discharge housing. After having removed the feed and discharge housing, loosen the two Allen screws in the disc. Then use wrench 421 to remove the double centripetal pump from the disc (left-hand thread).

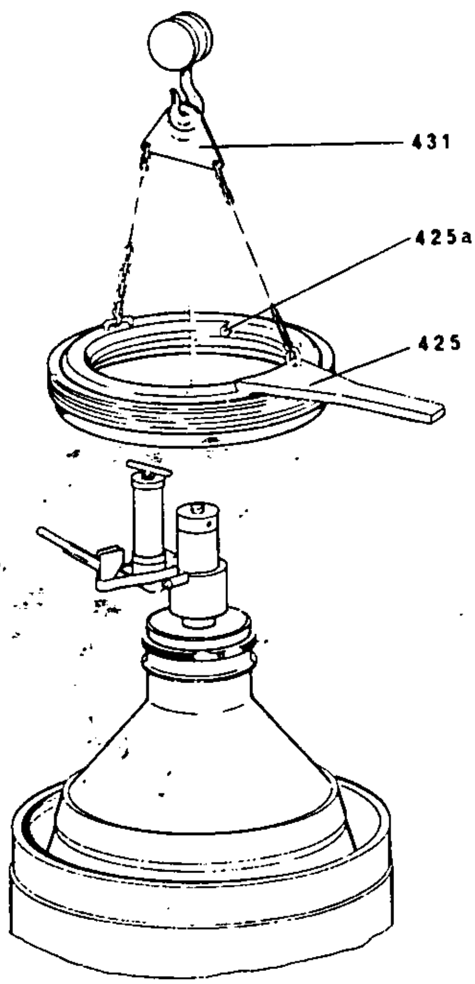


Fig. 4/6

After having unscrewed the small lock ring and removed the centripetal pump chamber cover, screw upper centripetal pump off the lower centripetal pump, using wrench wrench 421 (left-hand thread). While doing so, block lower centripetal pump by introducing a screwdriver into the holes of centripetal pump shaft. Then compress disc stack by means of hydraulic compressing device in order to facilitate loosening of the bowl lock ring (see 4.1, No. 14 a - f).

Now unscrew the bowl lock ring (left-hand thread) with the aid of annular wrench 425. Loosen the ring by lightly hitting against wrench handle with mallet 405.

Remove hydraulic compressing device as described in sect. 4.1 under No.16 .

Fig. 4/6

Lock annular wrench 425 by screwing hex head screw 425a into groove of bowl lock ring. Then lift off annular wrench and lock ring with the aid of device 431.

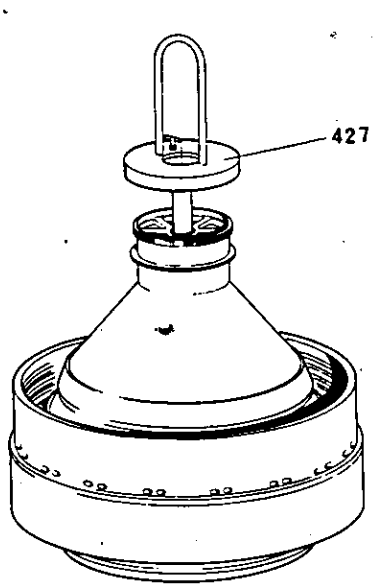


Fig. 4/7a

Fig. 4/7a:

Screw device 427 onto bowl top and, by means of a hoist, remove bowl top from bowl bottom.

If the separating disc is stuck in the bowl top, rap bowl top with a copper or light metal hammer until the separating disc comes loose. Do NOT let it drop on the floor.

If the separating disc cannot be detached in this manner, proceed as follows: Place the bowl top on a wooden surface. Pass a brass mandrel through the outer holes in the upper part of bowl top and place it on the outer edge of the separating disc. Detach the separating disc by slightly hammering the mandrel. Do NOT place a mandrel on the inner edge of the separating disc.

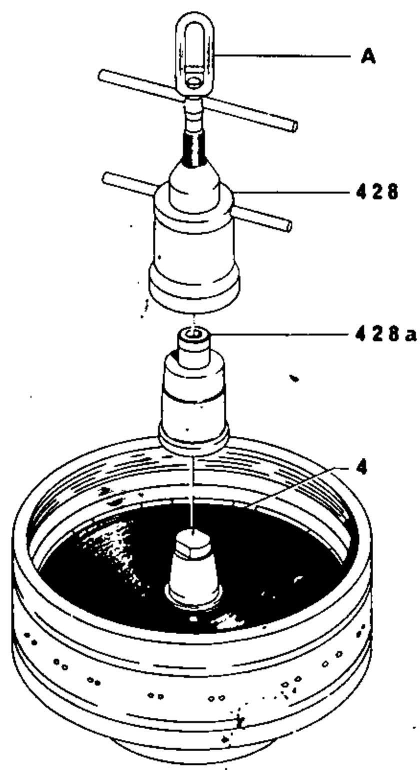


Fig. 4/7b

Fig. 4/7b:

Place pressure piece 428a on bowl bottom in such a manner that arresting pins of bowl bottom catch into holes of pressure piece. Screw jack 428 onto sliding piston. Turn jack-screw in clockwise direction in order to pull the sliding piston off the bowl bottom. Then lift out the sliding piston.

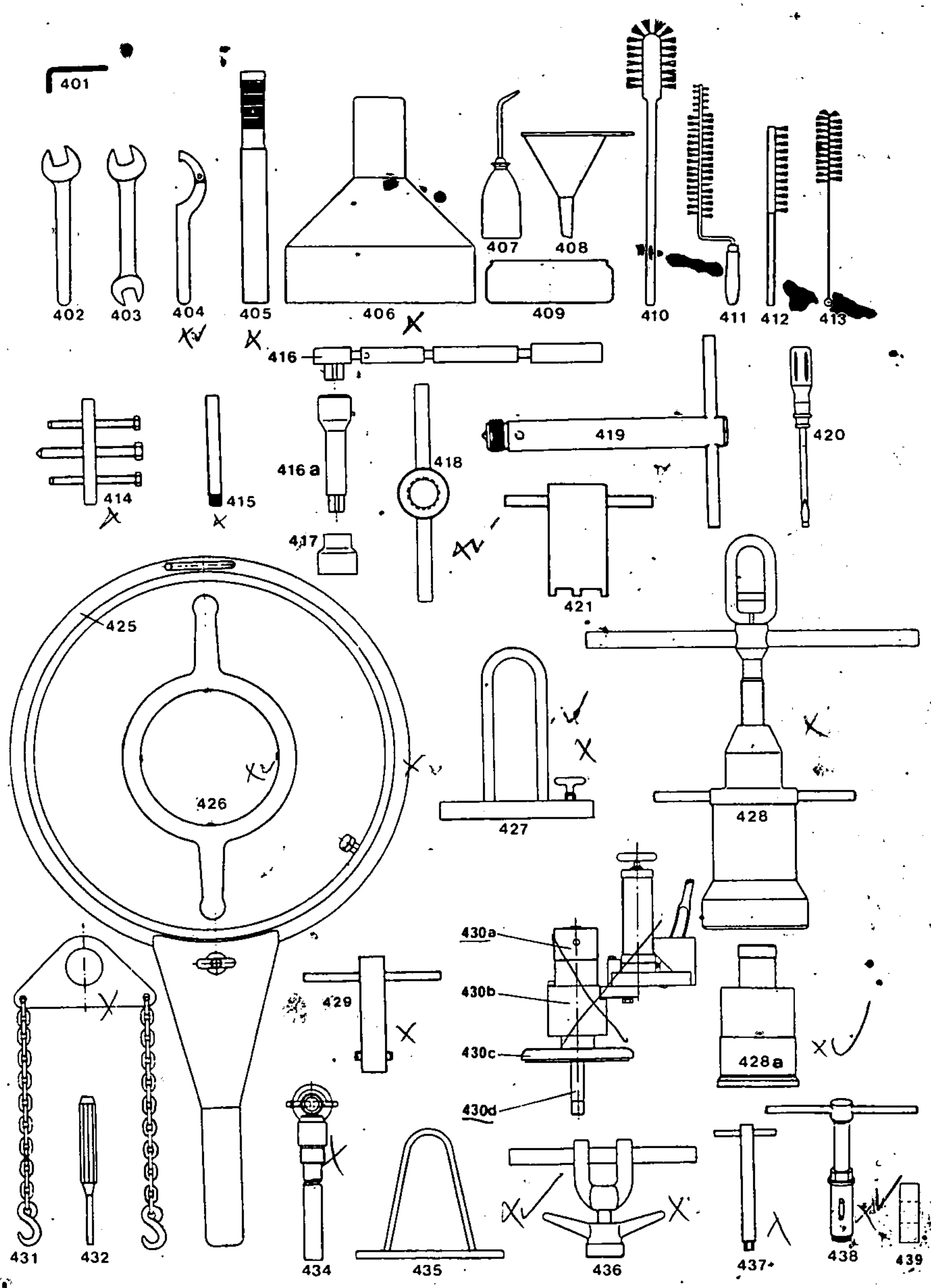

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Fig. 20

No.in Fig.	Part - No.	Qty.	Part Description
-	1165-9200-040	1	Sterilizing tank assembly (1-31)
1	0013-2845-300	1	Grooved coupling nut F50 DIN 11851
2	0018-3955-300	1	Cone connection D50 DIN 11851
3	0007-2211-750	1	Gasket G50 DIN 11851
4	0013-2842-300	2	Grooved coupling nut F25 DIN 11851
5	0018-4269-400	1	Cone connection R 1/2"
6	0007-2208-750	2	Gasket G25 DIN 11851
7	0001-0675-400	1	Angle thermometer
8	1165-9462-000	1	Bush
9	1165-9210-030	1	Sterilizing tank
10	0026-1102-400	6	Cylindrical pin
11	0019-1363-300	6	Hinge screw
12	0021-3128-300	6	Handle screw
13	0007-2121-750	1	Gasket 118/130x7
14	0007-2483-750	1	Gasket 65/10
15	0006-4081-400	1	Cylindrical pressure spring
16	1165-9698-010	1	Funnel
17	1165-9277-000	1	Cap
18	0019-6966-400	3	Hex head screw M 12x20 DIN 933
19	0026-2108-400	1	Cap
20	0019-2507-400	1	Lens head screw M 6x10 DIN 85
21	0026-1382-400	1	Washer 6.4 DIN 125
22	1165-9208-020	1	Cover
23	0007-2309-750	1	Gasket 92/112x10
24	0004-2364-758	1	Packing cord 8x8x2200
25	0001-0261-300	1	Blind cap
26	1165-9205-000	1	Flush pipe
27	0018-3949-300	1	Cone connection D40 DIN 11851
28	0007-2210-750	1	Gasket G40 DIN 11851
29	0013-2844-300	1	Grooved coupling nut F40 DIN 11851
30	0007-2209-750	1	Gasket G32 DIN 11851
31	0021-3155-700	3	Foot

CAUTION: To avoid damage to the threads due to pressing, the threaded bolt must be screwed in and the threaded ring screwed on **all the way.** If the threaded ring cannot be screwed down completely, then the piston and the cylinder of the compressing device prove to be too far apart. To bring them back into their starting position, loosen screw "F" by two turns and move the pump lever to its lowest position. Now you can screw down the threaded ring, thereby bringing piston and cylinder into proper position.

e) Check to be sure that all screw connections of the compressing device are tightened securely and that return duct of check valve is closed by means of screw "F".
Before the first use of the compressing device fill oil container of pump with oil and de-aerate the hydraulic chamber (see 4.6).

f) Actuate lever of piston pump until the pressure gauge indicates a pressure of 330 - 360 bar. If the maximum pressure is not attained and oil flows out of the stroke limiting hole, then bolt 430d has not been screwed far enough into the distributor. The compressing device is only ready for use again when bolt 430d and threaded ring 430a have been brought back into the position as described under 14a-d on page 4/3.
While compressing the disc stack make sure that arresting piece of bowl bottom snaps into groove of bowl top and that bowl top does not become tilted.

15) Use annular wrench 425 and lifting device 431 to place bowl lock ring onto bowl bottom (see fig. 4/6). Screw in the lock ring (left-hand thread) with the aid of the annular wrench (without hitting the wrench handle with a mallet) until the "O" marks on ring and on bowl bottom are 3 to 5 cm apart. Then hit wrench handle with mallet 405 to obtain "O" mark alignment.

IMPORTANT: If the bowl lock ring can be tightened **by hand** with the aid of the annular wrench so that the distance between the two "O" marks is less than 3 cm, a spare disc has to be added because the pressure in the disc stack has slackened (see sect. 4.1, No. 9b). If the distance between "O" marks is more than 5 cm, check if all bowl parts are properly locked in place. If the pressure in the disc stack is too high, it can be reduced by greasing the spacers of the discs (e. g. with cream).

16) Move pump lever down as far as it will go to prevent it from jumping back. Only then loosen screw "F" to enable the oil to return from the hydraulic cylinder into the oil container. The compressing device can now be removed from the bowl.

17) Screw upper centripetal pump (with inserted gasket) onto lower centripetal pump (left-hand thread). Then use wrench 421 to tighten the upper centripetal pump until it hits stop. While doing so, block the lower centripetal pump by sticking a screwdriver through the holes of the pump tube.

18) Insert gasket 22 in groove of centripetal pump chamber cover 21.

19) Mount centripetal pump chamber cover. Watch for proper location.

20) Tighten centripetal pump chamber lock ring 23 by lightly rapping against handle of annular wrech 426 (left-hand thread).

21) Check to see if bowl can be turned by hand.

4.2. Assembling the feed and discharge connections

1) Fasten lifting device 435 (fig. 20) to the hood by means of cap nuts 41h. With the aid of a hoist place hood so onto sediment collector that the "0" marks on sediment collector and on hood are in line with each other. Connect flush lines. Fasten hood to sediment collector by means of hex head screws.

2) Place disc onto hood. Screw centripetal pump into disc and tighten it with wrench 421, turning fully counter-clockwise.

3) Before the initial start-up, after re-assembling the vertical gear parts or exchanging the bowl check bowl for proper height (see 8.3).

4) Fasten disc to hood by means of the two Allen screws.

5) Install feed and discharge housing and fasten with cap nuts 41h.

6) Install feed tube with inserted gaskets in feed and discharge housing.

7) Connect feed and discharge lines.

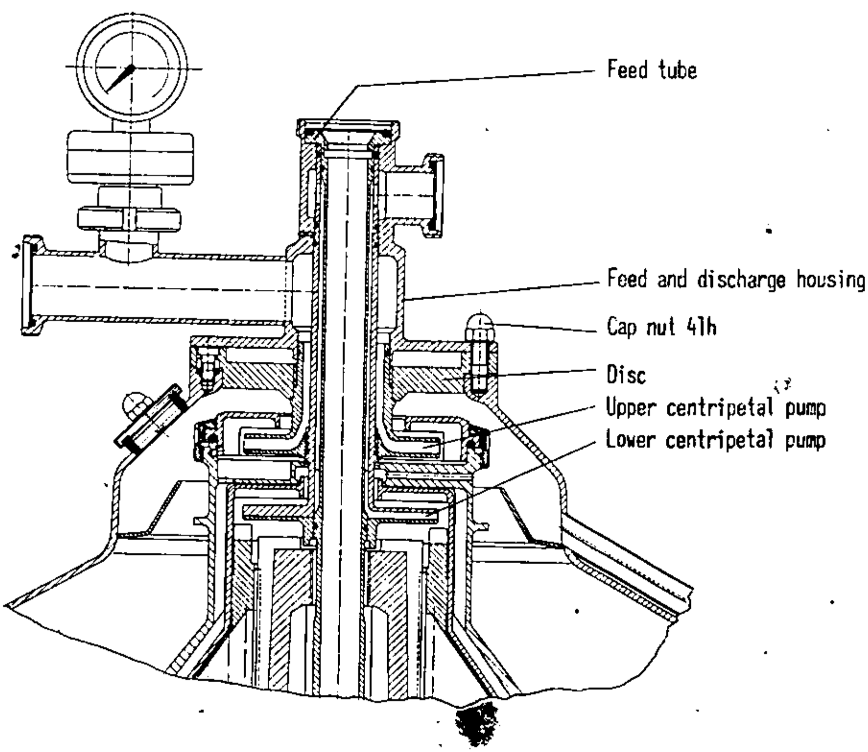
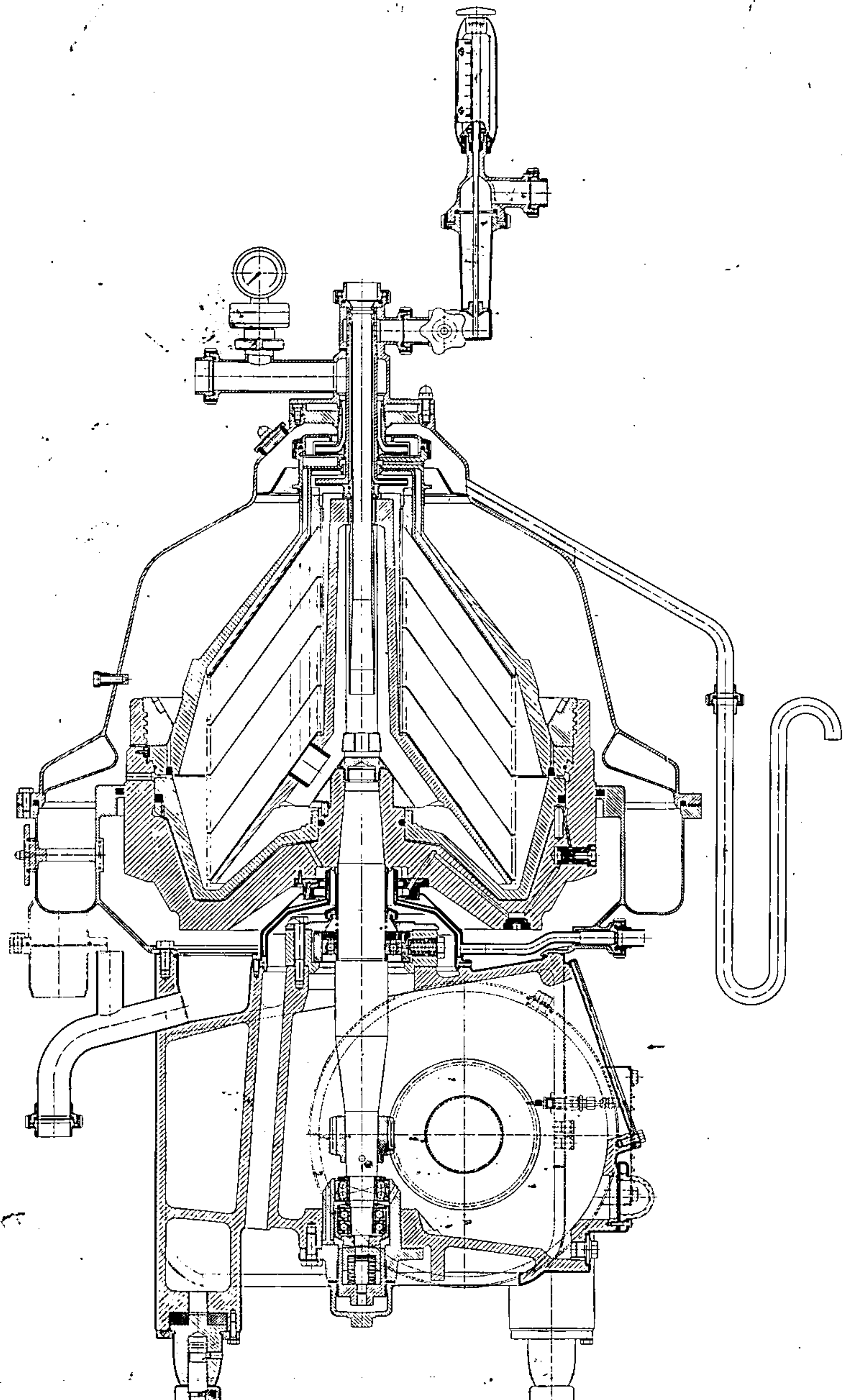


Fig. 4/5

List of Parts

Sectional View of the Separator



Westfalia Separator AG

Serial No.
1665901

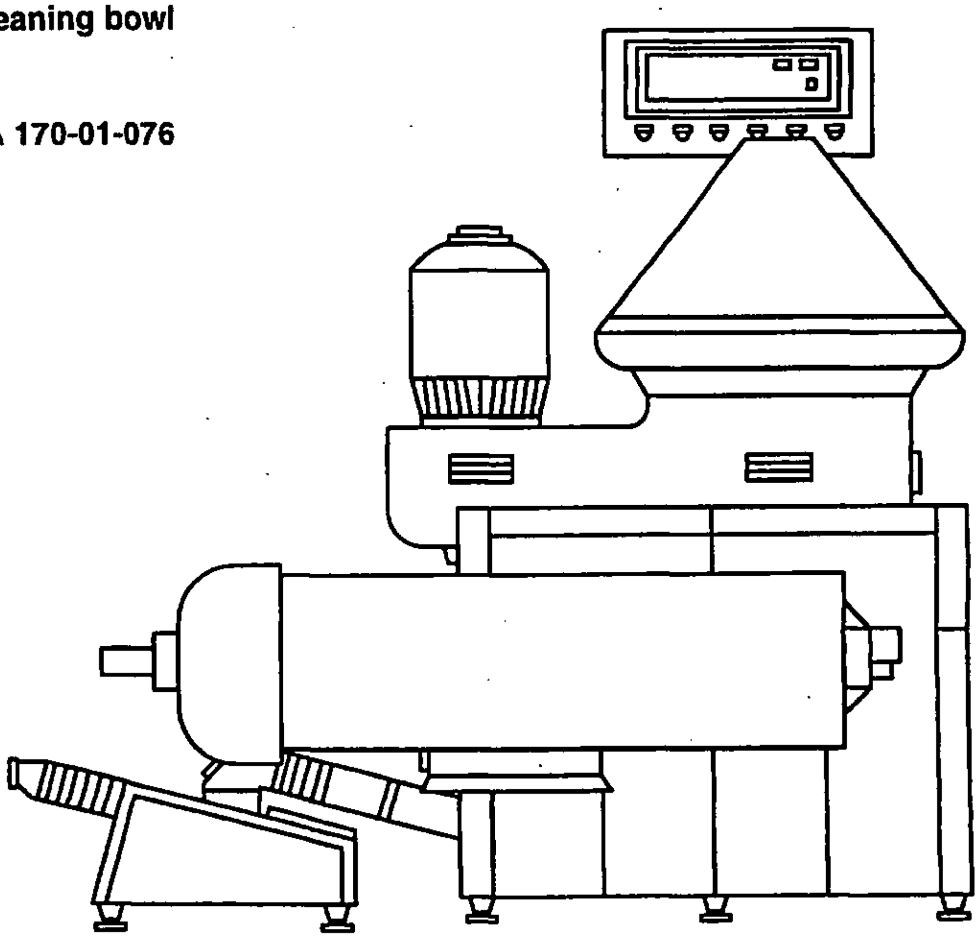
Instruction Manual and Parts List

No. 1175-9001-000

Edition 0280

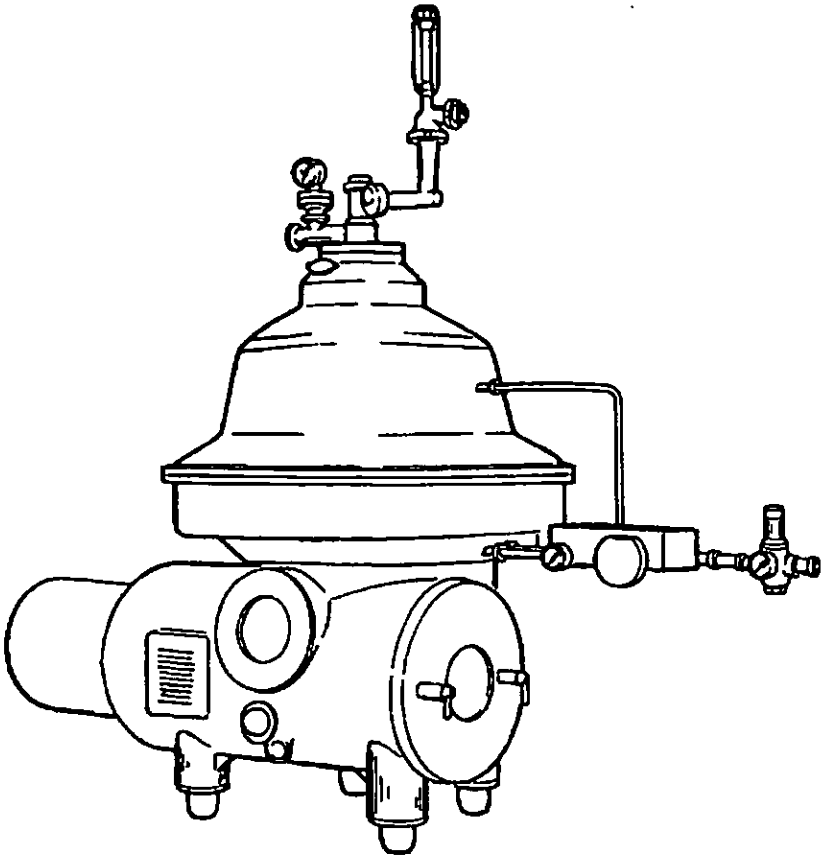
**Milk-Separator
with self-cleaning bowl**

Model MSA 170-01-076



GEA
Process Technology Division

Subject to modification!



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

For your safety

- **Strictly adhere to instructions marked with this symbol**

  This avoids damage to the machine and other units.

- **Take special care when carrying out operations marked with this symbol -**

  otherwise danger to life.

- **Observe accident prevention regulations**

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

- **Instruction manual**

  Follow only the instructions given in this manual

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

- **Maintain the separator as specified -**

  in this manual

- **Carry out safety checks on the separator -**

  as described in chapter "Safety precautions" in this manual

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

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

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

Note
Notes
Notizen
Anotaciones
Notizen
Notes
Note

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List of Parts

Safety precautions

Correct usage

The separator is designed

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

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

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

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

Safety stickers on the machine

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

- Clean dirty stickers.
- Replace damaged stickers.

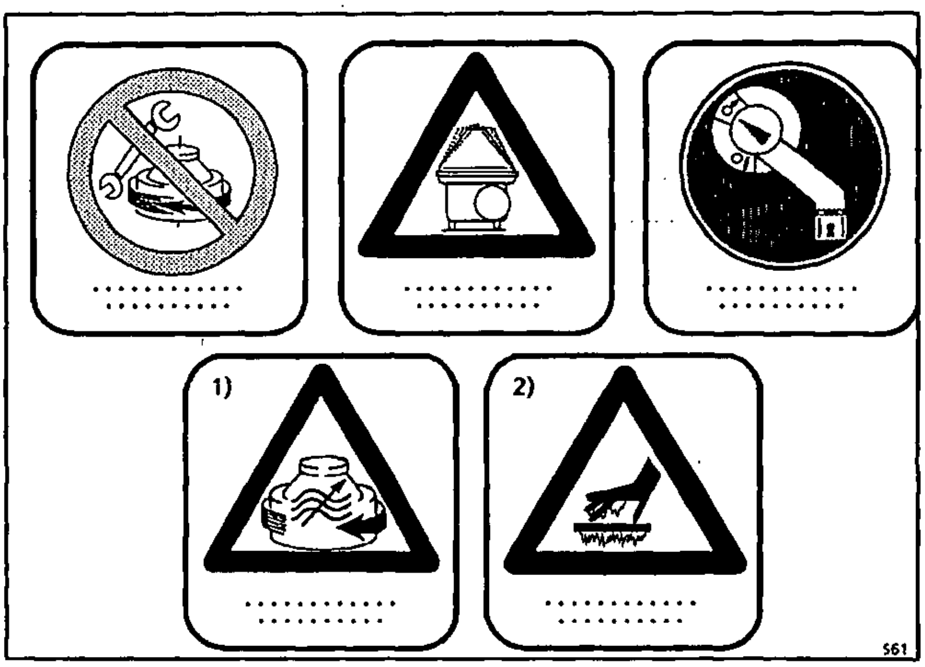


Fig. 1

1) Only in case of operation with frequency converter

2) Only in case of hot operation

Basic operating principles

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

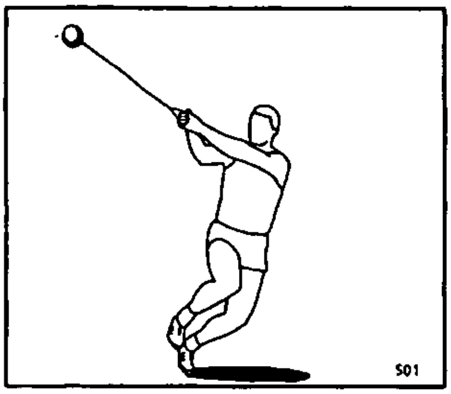


Fig. 2

High centrifugal forces are produced in the rotating bowl.

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

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

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

Bowl speed and product

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

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

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

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

Operations on the separator

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

Special attention must be given to:

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

Assembly

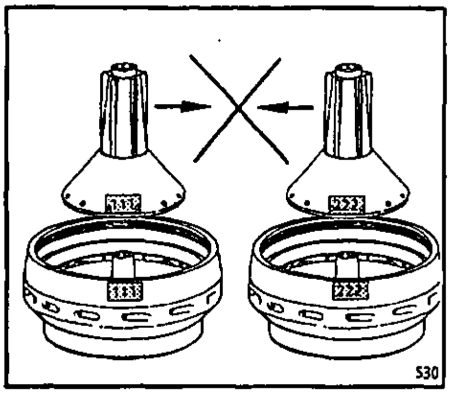


Fig. 3

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

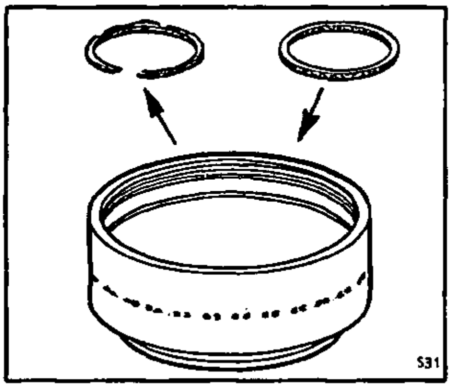


Fig. 4

- Damaged parts must be replaced immediately by new parts.

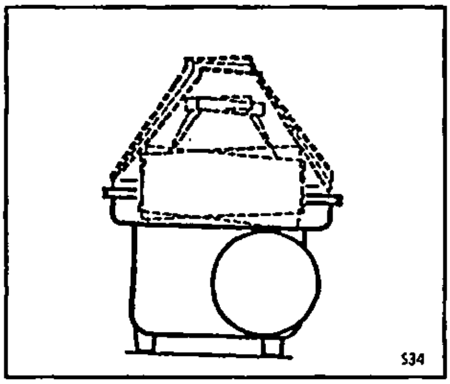


Fig. 5

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

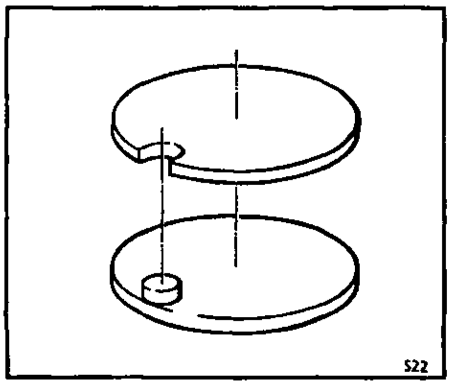


Fig. 6

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

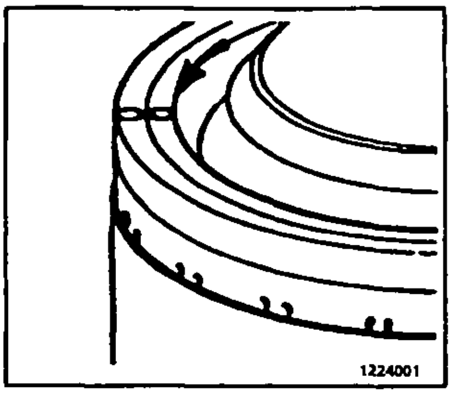


Fig. 7

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

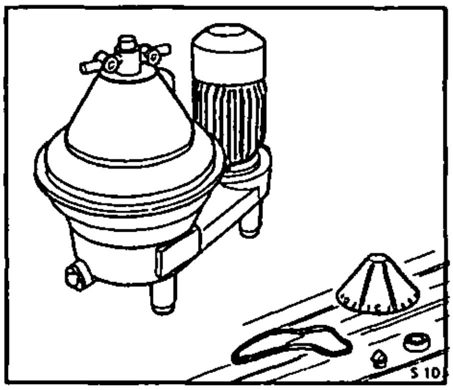


Fig. 8

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

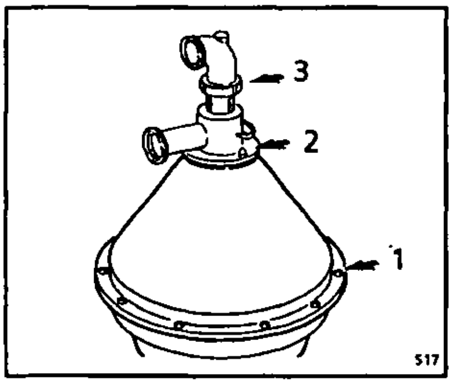


Fig. 9

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

Electrical appliances

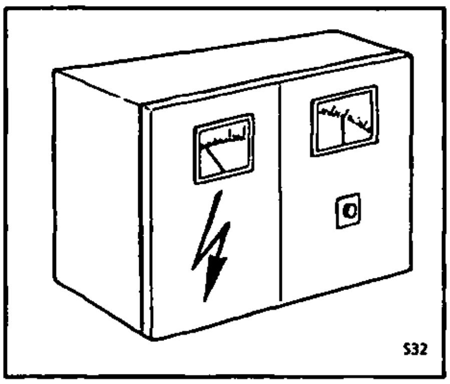


Fig. 10

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

Before start-up

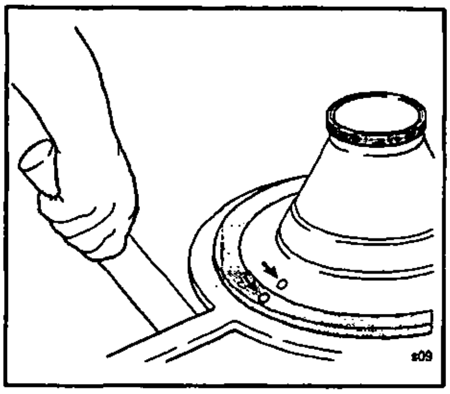


Fig. 11

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

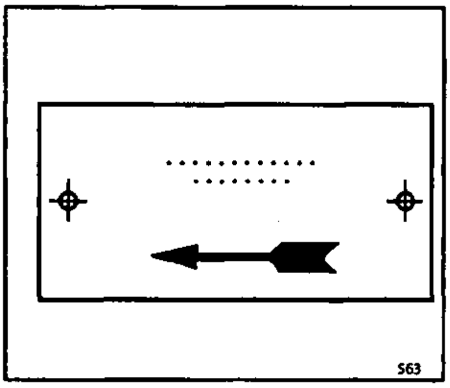


Fig. 12

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

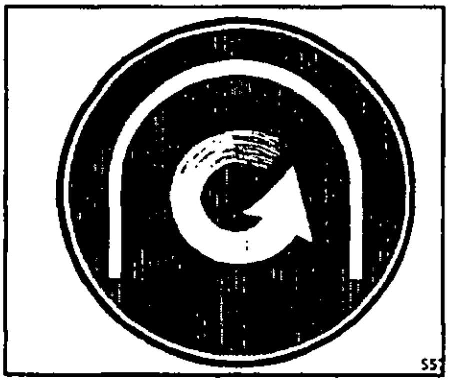


Fig. 13

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

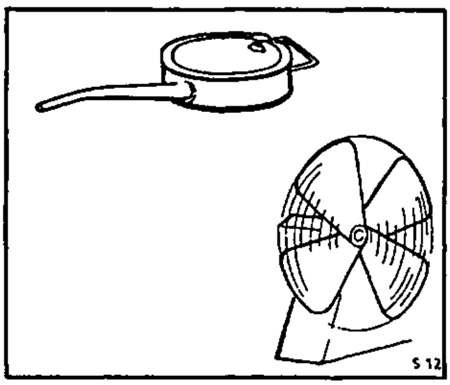


Fig. 14

- Check that the lubrication and cooling systems are serviceable.

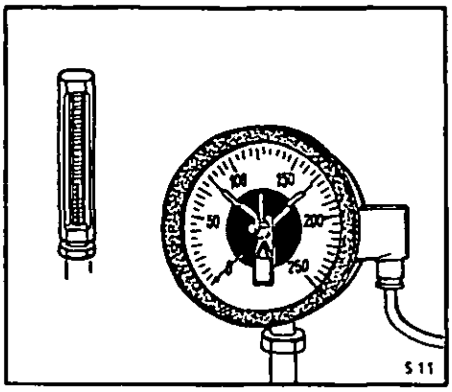


Fig. 15

- Check whether the supervisory equipment is operational and the correct limit values are adjusted.
- When hoods, concentrate collectors and vessels are pressurized, e.g. by
  - inert gas,
  - cooling,
  - steam sterilization etc.

  the pressures stated on the name-plate must not be exceeded.

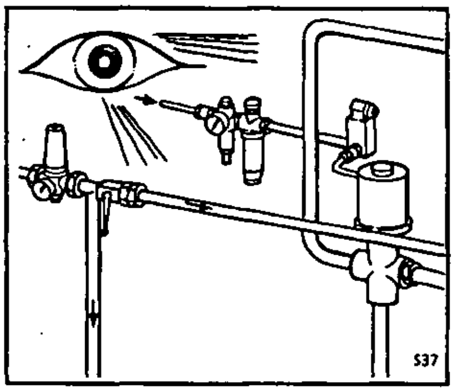


Fig. 16

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

Operation

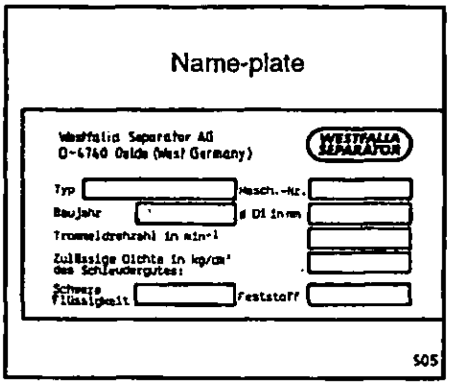


Fig. 17

- Refer to chapter »operation«.
- Note nameplate. The values for
  - bowl speed
  - density of the heavy liquid,
  - density of solids (centrifugally dry)

  are max. values and must not be exceeded.

Fig. 18

- Wear ear protection.

Fig. 19

In case of frequency converter operation:

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

Fig. 20

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

Fig. 21

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

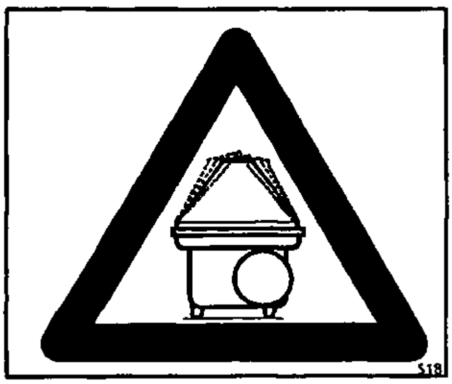


Fig. 22

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

Fig. 23

Only in case of hot operation:

- Product-contacting parts such as
  - pipes and hoses,
  - hood,
  - solids collector

  reach temperatures over 80 °C.

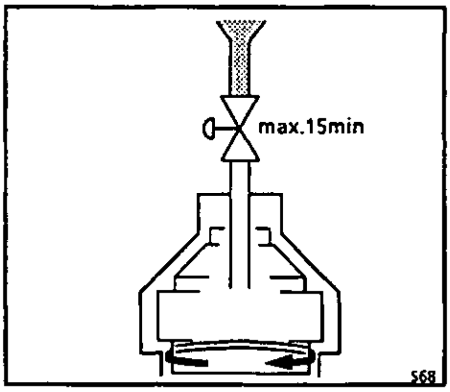


Fig. 24

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

Shut-down and »Emergency-Off«

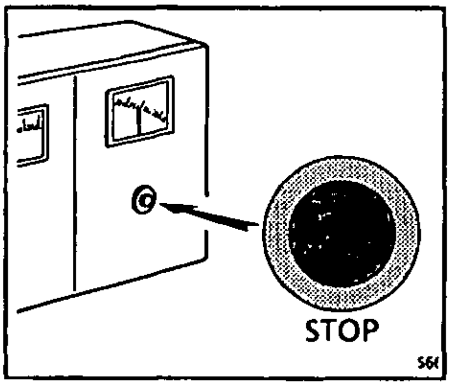


Fig. 25

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

Maintenance and repair

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

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

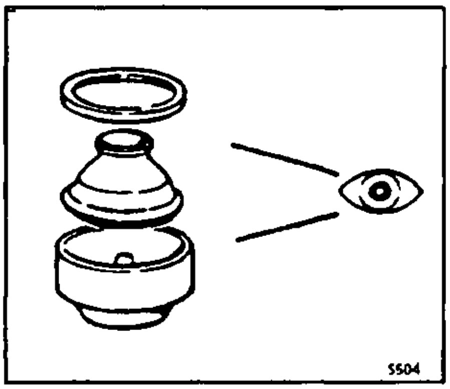


Fig. 26

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

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

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

Stop

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

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

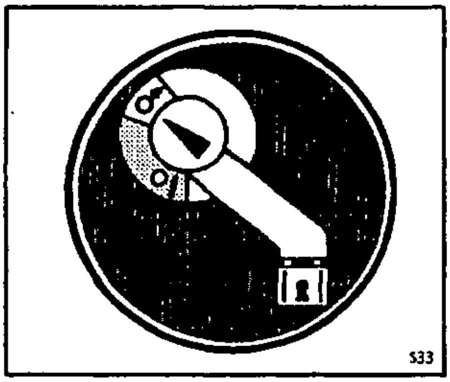


Fig. 27

Before maintenance and servicing:

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

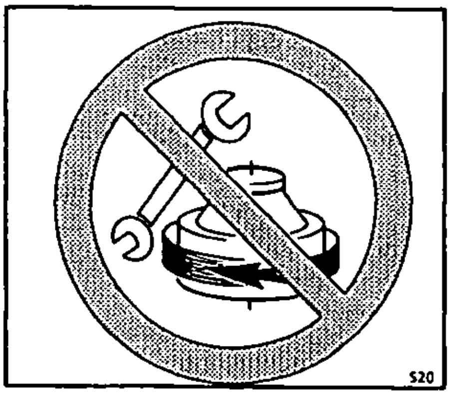


Fig. 28

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

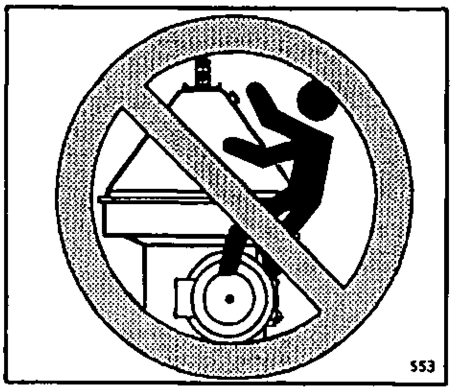


Fig. 29

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

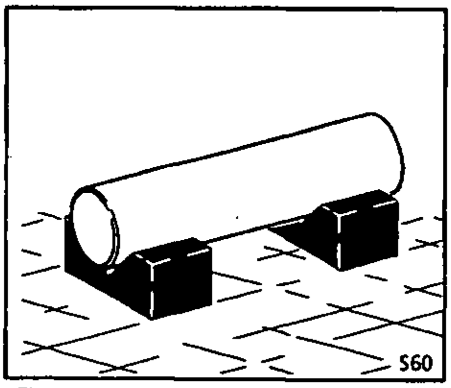


Fig. 30

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

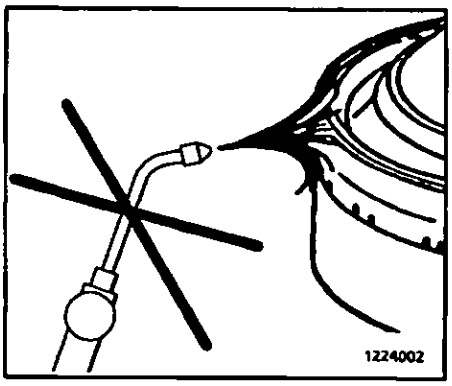


Fig. 31

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

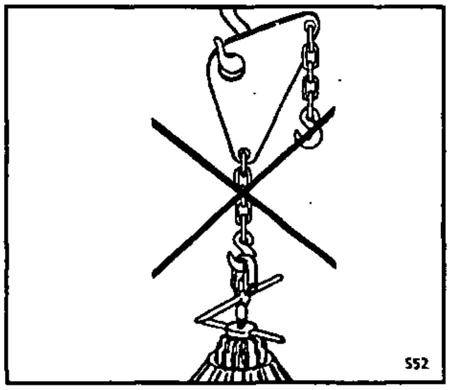


Fig. 32

- Load-carrying equipment such as lifting devices for
  - bowl or distributor,
  - chains etc.

  may only be used for work routines as described in this instruction manual.
- Do not use damaged or incomplete load carrying equipment.

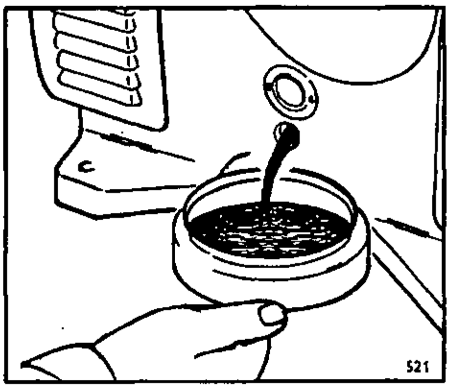


Fig. 33

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

Corrosion

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

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

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

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

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

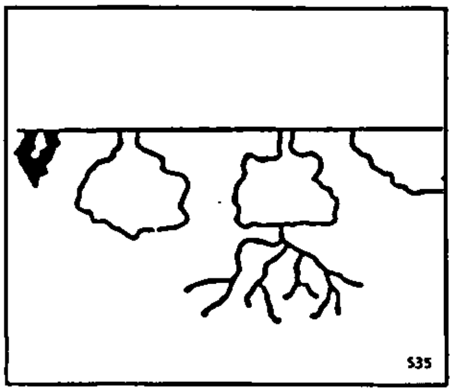


Fig. 34

Possible formation of pit-shaped corrosion.

Such pittings can only be investigated by a materials expert.

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

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

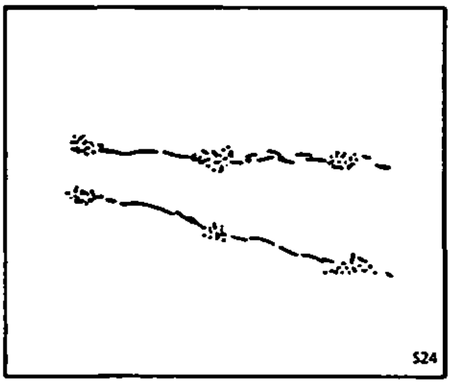


Fig. 35

Pittings

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

Such pittings should be investigated by a materials expert.

Erosion

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

The following factors favour the occurence of erosion:

- hard solids particles
- high throughput capacities

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

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

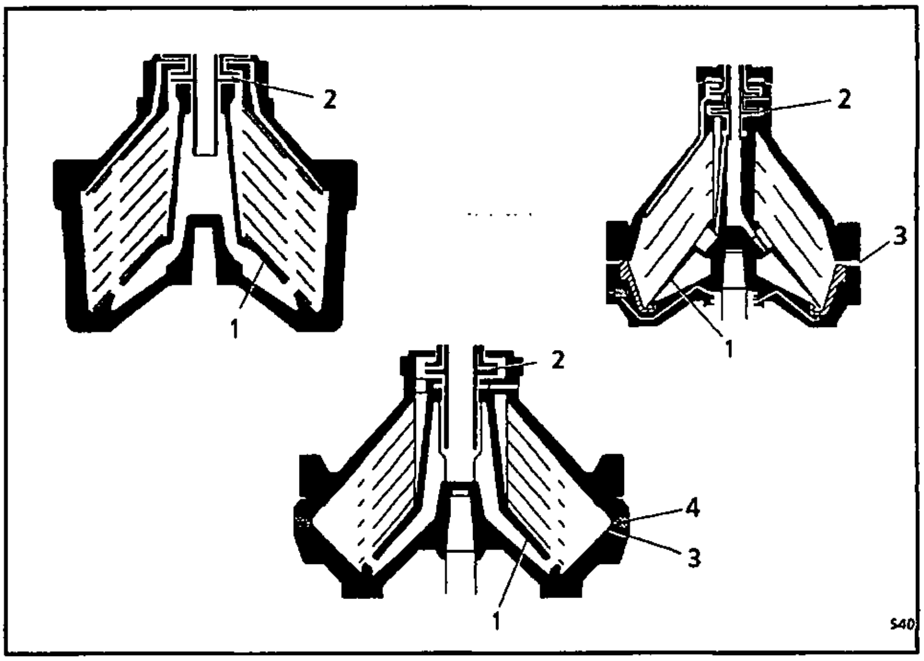


Fig.36

The surfaces most susceptible to erosion are:

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

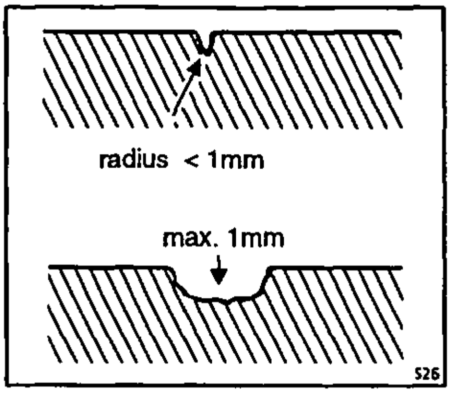


Fig. 37

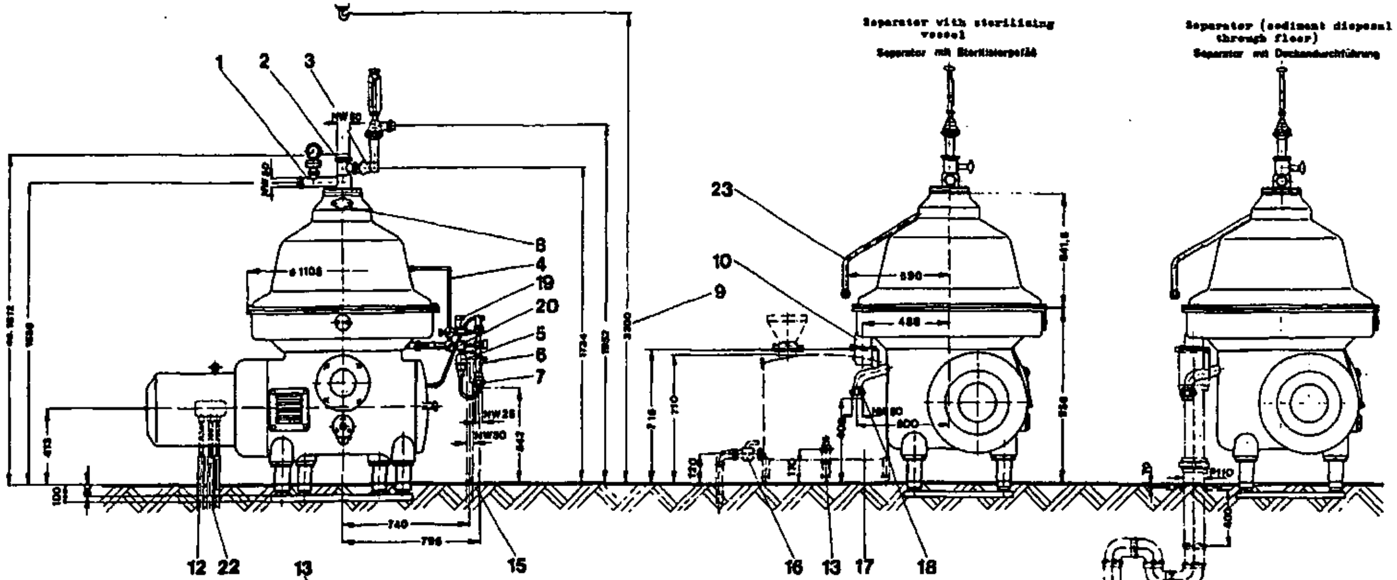
Signs of erosion which you should immediately report to your nearest Westfalia Separator representative:

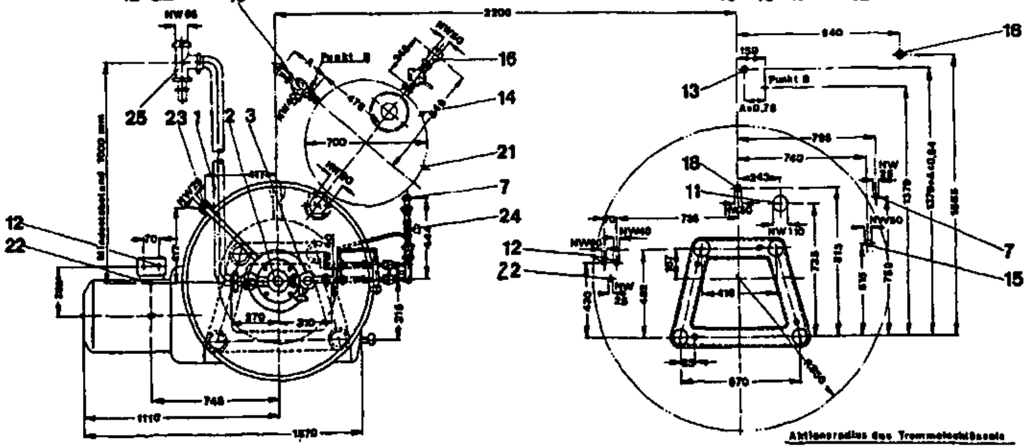
- The bottom of the erosion mark has a radius smaller than 1 mm (large notch effect).
- The depth of erosion mark exceeds 1 mm at the deepest point.

Dimensioned Drawing (for installation plan of flow constrictor refer to page Z2/2)

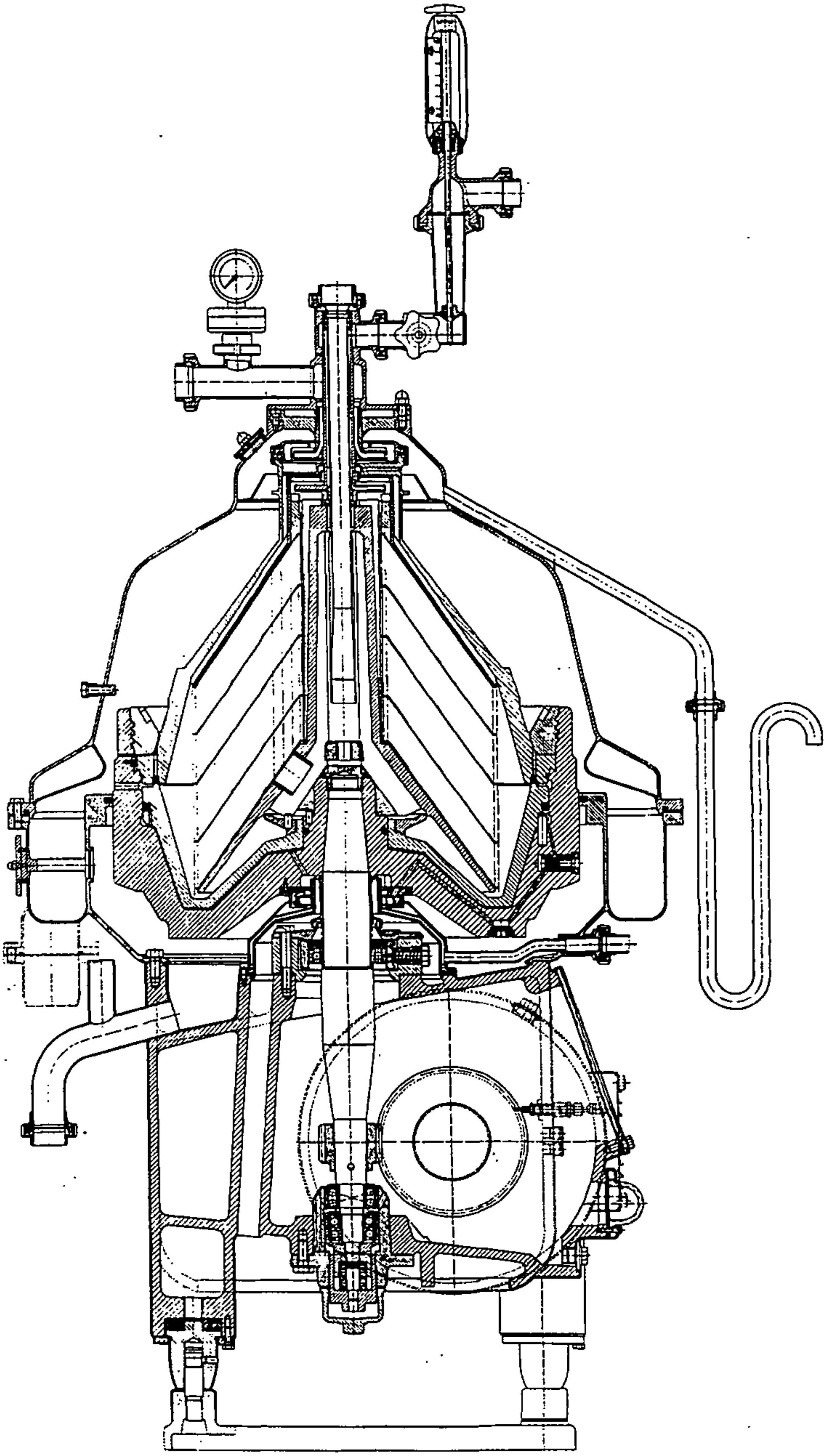
Separator with sterilising vessel / Separator mit Sterilisiergefäß

Separator (sediment disposal through floor) / Separator mit Durchandurchführung





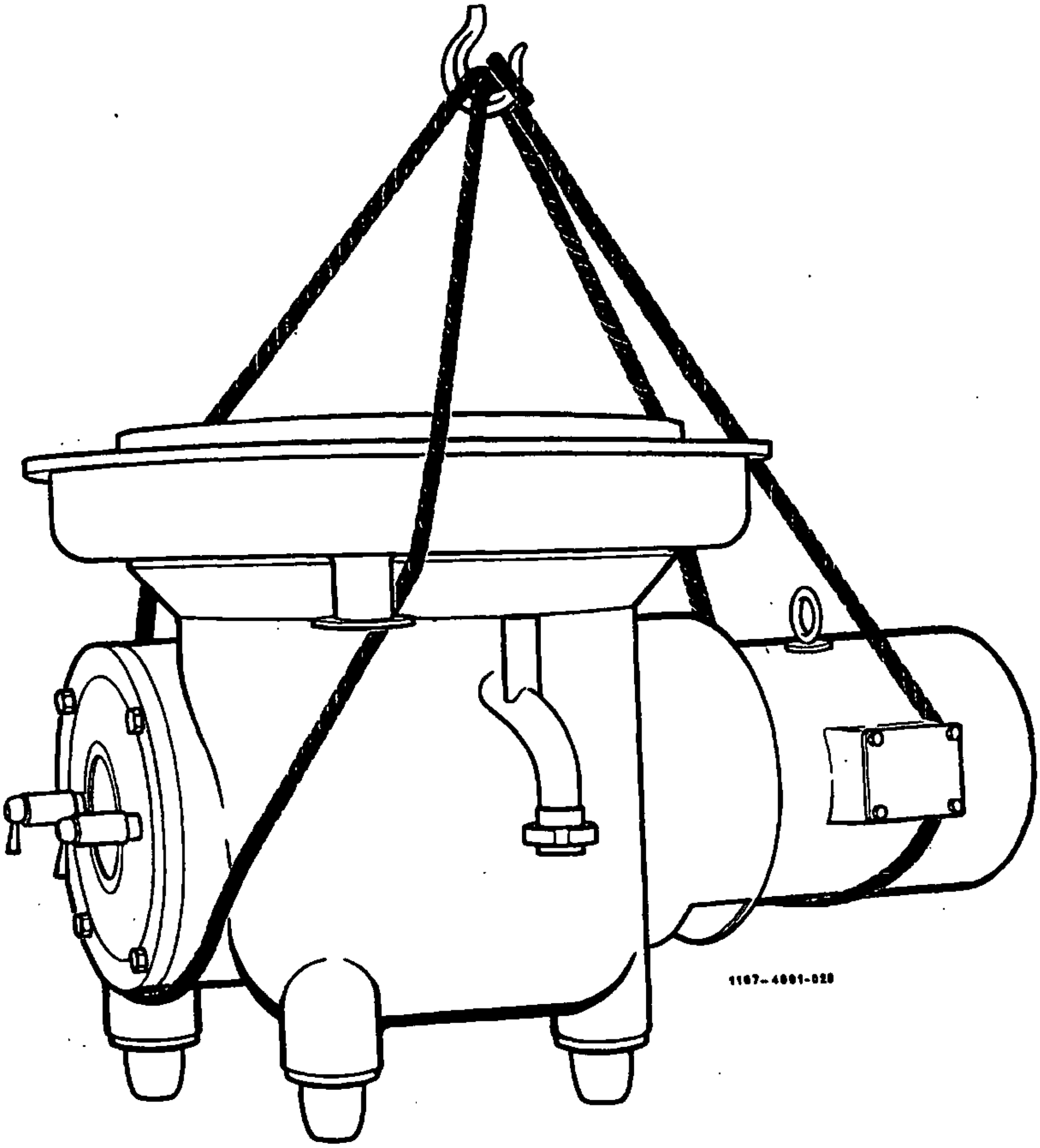
25	Constant pressure valve	
24	Water pressure reducer	
23	Overflow	
22	Connection for PTC resistors	
21	Connection piece for temperature feelers	
20	Rapid-closing valves	
19	Solenoid valves	
18	Operating-water discharge	
17	Sterilising vessel	
16	Discharge (sterilising vessel)	
15	Power supply for solenoid valves and pressure switch	
14	Thermometer (sterilising vessel)	
13	Steam supply (sterilising vessel)	
12	Power supply for motor	
11	Sediment disposal through floor, if required	
10	Sediment discharge	
9	Minimum lifting height for hoist	
8	Overflow inspection cover	
7	Operating-water feed	
6	Strainer	
5	Pressure switch	
4	Flush line	
3	Cream discharge	
2	Feed	
1	Skim milk discharge	
A	The dimension depends on make and type of fittings used	
	Bowl speed	4700 rpm
	Total net weight of machine	2790 kg
	Minimum lifting capacity of hoist	500 kg
	Skimming capacity	20000 l/h
	Motor power	30 kW, 50 Hz



1. Installation

1.1. Transport

Suspend the separator as shown in fig. 1/1. To prevent ropes from slipping, wind part of a rope around the crane hook. When lowering the separator, make sure it touches down gently.



Weight: 1000 kg

Fig. 1/1

1.2. Installation

When installing the separator make sure that sufficient room is available (at least 15") for mounting and removing the motor and for removing the horizontal drive shaft which is to be pulled out towards the brake side.

Do NOT install a shut-off device in the line which will be connected to the operating-water discharge line 5a-c (fig. 13/1). The line should have 2" I.D. It should have sufficient fall and must NOT be too long to allow the discharging operating-water to flow off freely, since otherwise the water will rise and enter the upper section of the frame, resulting in slowing-down of the bowl.

The supply line to the operating-water connection should have 1" I.D., the operating-water pressure should be approx. 21 psi. The pressure must not fluctuate by more than 7 psi. Operating-water consumption: 50 litres/h.

For mounting and removing the bowl parts, a 500 kg hoist (minimum lifting height 3.2 m; see installation plan) will be indispensable. On request a WESTFALIA Swing Crane can be supplied.

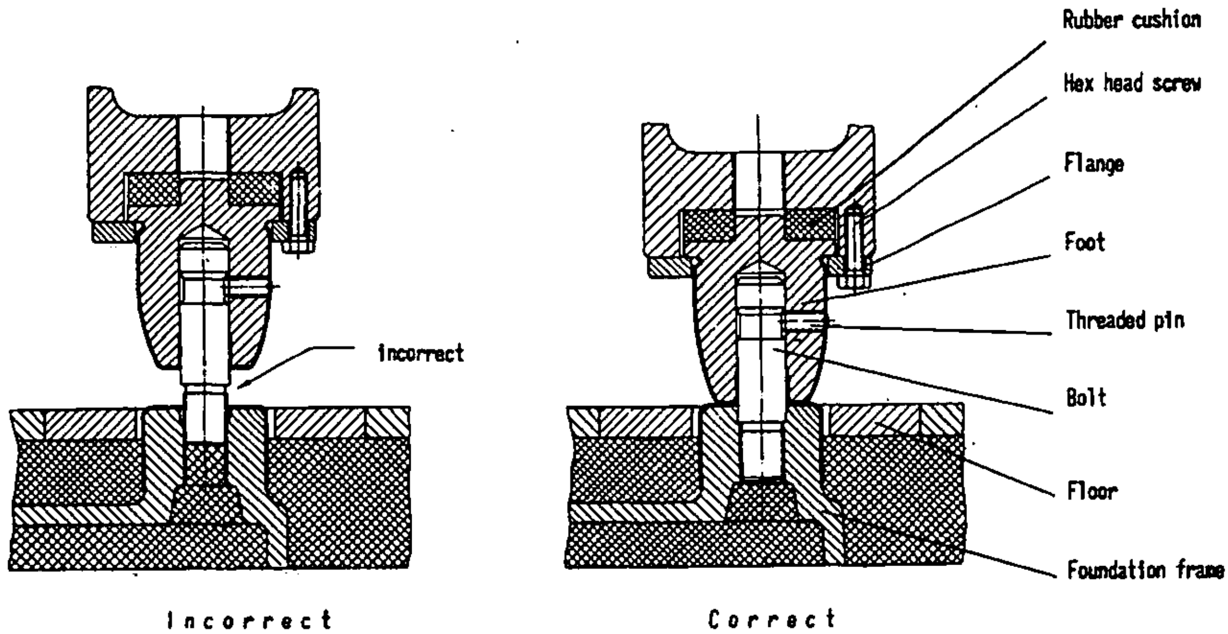


Fig. 1/2

Screw bolts into the four mounting blocks of foundation frame; make sure they are tight. Embed the foundation frame in the floor so that the mounting blocks of the frame protrude above the plane of the floor by about 5 mm = 0.2". Fill up the space below the foundation frame with concrete. Make sure that the mounting blocks are absolutel level and grout the frame with concrete, inside and outside. To accelerate setting of cement, commercial rapid binding agents may be used.

By means of flanges and hex head screws fasten feet with fitted-on rubber cushions to separator frame. Then lift the separator frame with its feet onto the bolts of the foundation frame and tighten the threaded pins with a wrench.

2. Lubrication

2.1. Lubrication of bearings and gear parts

All bearings and gear parts are splash lubricated from a central oil bath.

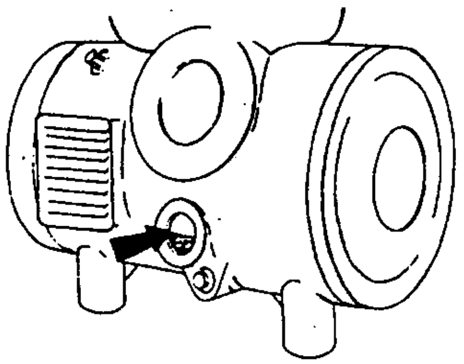


Fig. 2/1

OIL LEVEL

Before initial start-up of separator, fill gear chamber with oil. To do this, remove upper sight glass and fill in oil until oil level is slightly above middle of oil level sight glass. About 5.5 litres of oil are required for one filling. During operation oil level must never be allowed to sink below middle of oil level sight glass; refill oil when necessary.

OIL CHECK

Check oil level once a week.
From time to time check if oil contains water. To do this, loosen oil drain screw and allow a small amount of oil to drain. An immediate oil change becomes necessary when the oil shows a milky colouring (emulsification).

OIL CHANGE

Make first oil change after about 250 operating hours; then change oil every 750 operating hours. However be sure not to wait longer than 6 months to change the oil.

Each time when carrying out oil change, thoroughly clean gear chamber and flush with thin-bodied oil, prior to filling in new oil. Remove all metal particles from inner walls and corners of the gear chamber. Do NOT use fluffy cleaning rags or cotton waste. The sight glass should also be cleaned, as a layer of oil will probably have deposited on the inner side of the glass and this is easily mistaken for the oil level.

LUBRICATING OIL

As lubricating oil use only a gear oil designated

C-LP 114 (according to DIN 51502)

or designated

ISO VG 220 (according to ISO/DIS 3448).

The lubricating oil shall meet the following requirements:

1) Viscosity: 114 ± 8cSt at 50°C, (220 ± 22 cSt at 40°C)

2) Additives:
   a) additives giving increased protection against corrosion and increased resistance to aging, - with properties preventing corrosion on steel according to DIN 51355/8, degree of corrosion 0. Corrosive effect on copper according to DIN 51759/100 A3, degree of corrosion 1.

   b) additives for decreasing wear and increasing the load-carrying capacity. The "FZG" gear rig test according to DIN 51354 as well as the test according to A/16.6/90, load grade > 12, must have been passed.

3) Demulsifying behaviour according to DIN 51599: < 60 minutes.

The gear oil designated "Separator lubricating oil C-LP 114" which has been extensively investigated by us meets the above requirements and should preferably be used. For the order number refer to page 20/1 of the parts list.

IMPORTANT! Do NOT use motor vehicle lubricating oils, since they are likely to emit disturbing odours.

2.2. Lubrication of the motor bearings

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

3. Motor Connection

3.1. 30 kW Three-phase AC motor

The separator is driven by a flange type motor via a fluid clutch. The motor is started by means of an automatic star-delta switch. Switching over from star to delta connection takes place after 20 seconds. During this time (20 seconds) the cooling-water valve for the clutch is open.

Motor protection is ensured by PTC resistor type temperature feelers incorporated in the winding of the motor. They have to be connected to an appropriate tripping unit. External voltage higher than 2.5 volts must not be applied to the terminals of the temperature feelers. When testing for continuity, do NOT use a test lamp but only an ohmmeter. The measuring circuit line (between tripping unit and motor) shall be laid separate from other lines.

The starting current of the motor can reach 1.8 times the value of the rated current. Dimensioning of switches, wiring, and fuses should, therefore, be based upon the starting current and NOT on the rated current.

50 Hz		Minimum section of lead-in wires	Rated current of fuses
Voltage V	Rated current Amps	mm^2	Amps
220	102	50	200
380	59	25	100

3.2. Direction of rotation of the bowl

IMPORTANT: The bowl must rotate in clockwise direction when looked at from above. The direction of rotation of the bowl is correct when the square head screw on the front side of the motor cover rotates in the direction of the arrow. The direction of rotation can be reversed by interchanging two lead-in wires.

3.3. Speed and starting time of the bowl

The bowl speed is 4700 rpm and is indicated on the rpm-meter.

Starting of the bowl takes about 12 minutes.

3.4. RPM Meter

The RPM meter monitors the bowl speed. It consists of a proximity switch, a measuring instrument, and an indicating instrument with a limit value relay.

If the bowl speed drops below 4600 rpm because the clutch is defective or the bowl has opened irregularly, the milk pump is switched off automatically and an alarm is given. If the bowl fails to reach the operating speed of 4700 rpm within the pre-set starting time of 13 minutes, the RPM meter prevents starting of the milk pump and triggers a signal.

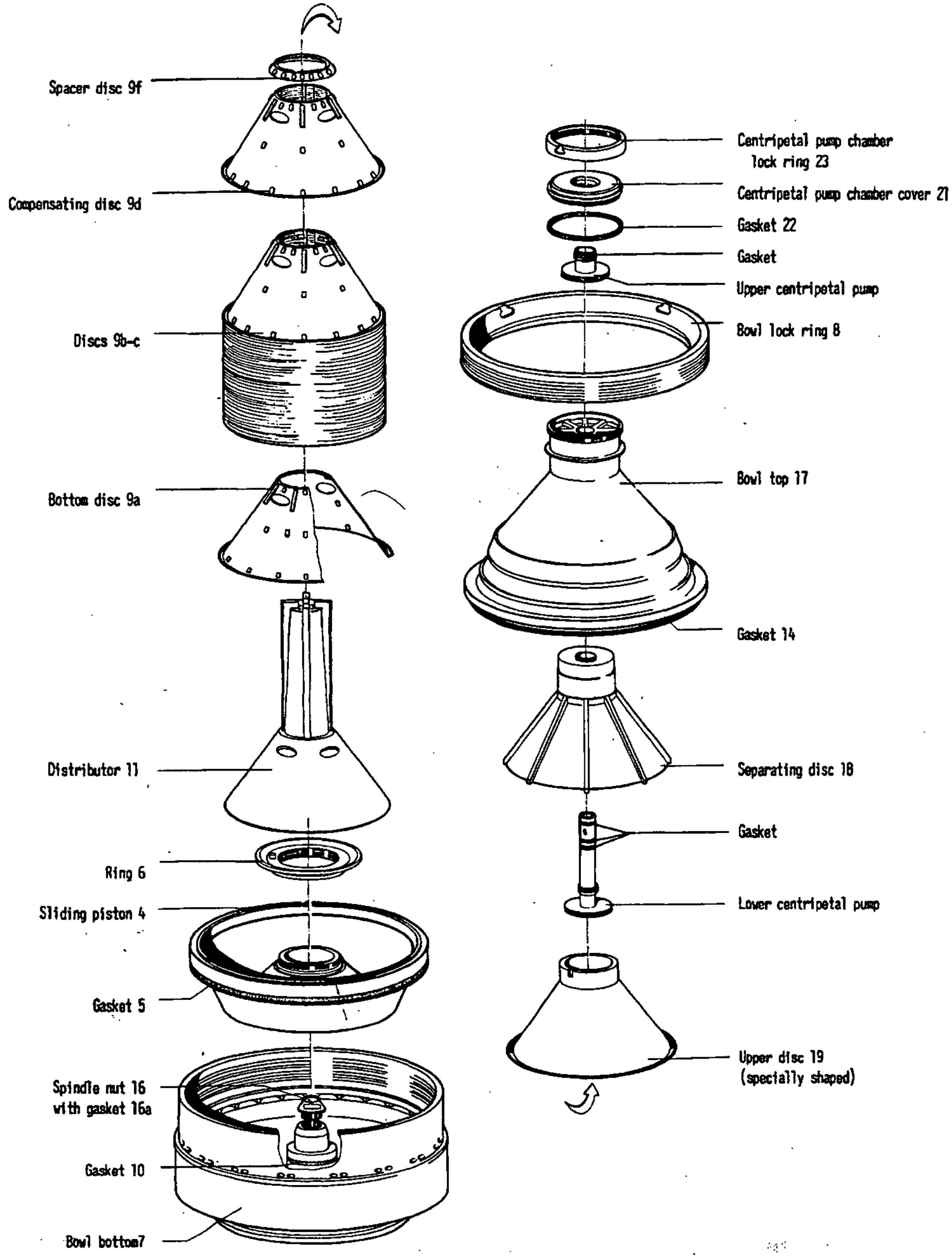


Fig. 4/1

Exploded view of the bowl

4. Bowl and Feed and Discharge Connections

4.1. Assembly of the bowl
(for tools refer to page 20/2)

Before assembling the bowl, make sure that all contact surfaces of the bowl parts are clean.

When assembling the bowl, make sure that the "O" marks of all bowl parts are in line.

If the plant has several centrifuges, be careful not to interchange parts of different bowls, since each bowl has been balanced individually. The main parts of the bowl are marked with the last three digits of the Serial-Number of the separator.

1) Oil the upper part of the worm spindle (thread, cone and cylindrical guide surface for spindle cap). It must be possible to move the spindle cap easily up and down on the spindle. Then clean and wipe dry the conical part of the spindle with a smooth rag. Carefully clean the inside of the bowl hub as well to assure proper fitting.
2) Use jack 436 to place bowl bottom 7 onto spindle.
3) Insert gasket 16a in spindle nut 16.
4) Tightly srew on spindle nut (left-hand thread), using a wrench.
5) Fit gasket 10 into hub of bowl bottom.

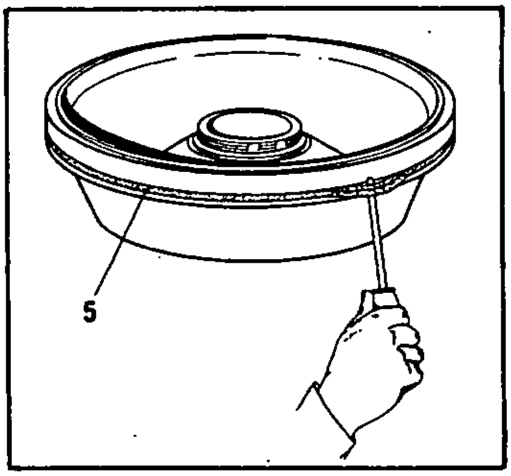


Fig. 4/2

6) Thoroughly clean groove in sliding piston 4 for gasket 5 and apply a thin film of grease.

   In case the gasket is new and a bit too tight, stretch it out equally all the way around until its outer diameter is almost equal to the outer diameter of the groove in the sliding piston.

   Then put the gasket into the groove of the sliding piston. Stick a screwdriver under the gasket and run it around the sliding piston two or three times (see fig. 4/2). Then tap the gasket back into its groove with a rubber hammer.

   The gasket is now equally stretched all the way around and assures best sealing effect during operation.

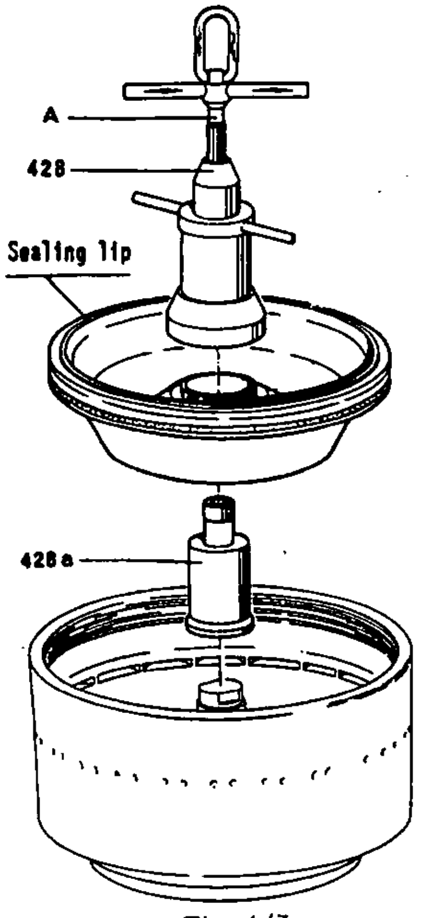


Fig. 4/3a

7) **Fig. 4/3a:** Lightly grease guide surfaces of sliding piston and of bowl bottom with the supplied lubricating paste. Place pressure piece 428a onto hub of bowl bottom. Make sure that arresting pins of bowl bottom fit into holes of pressure piece. Then install the sliding piston with the aid of jack 428. The "O" marks must be aligned. By turning jackscrew "A" counter-clockwise, lower the sliding piston slowly until the arresting pins of the bowl bottom catch into the holes of the sliding piston.

CAUTION: Be careful not to damage sealing lip of sliding piston.

7a) Screw ring 6 by hand onto sliding piston until it hits stop.

8) Place distributor 11 into bowl bottom, using mounting tool 434. Make sure that the three arresting pins of the bowl bottom fit into the recesses of the distributor. The "O" marks of both parts must be aligned.

9a) Stack discs 9a-c onto the neck of the distributor in numerical order, beginning with No. 1.

9b) Mount compensating disc 9d (with spacers at the outer rim thicker than those at the inner rim) and spacer ring 9f.

IMPORTANT: If a spare disc has to be added in order to obtain the necessary pressure in the disc set, be sure to place it below compensating disc 9d; never place it between compensating disc and spacer disc 9f.

9c) Place on upper disc 19 (specially shaped).

10) Place lower centripetal pump (with inserted gaskets) onto the distributor.

11) Mount separating disc 18. Make sure the "O" marks on separating disc and on bowl bottom are in line with each other.

12) Use device 427 to place bowl top 17 (with inserted gasket 14) onto the bowl bottom. Make sure the arresting piece of the bowl bottom fits into the groove of the bowl top. The "O" marks of both parts must be in line with each other.

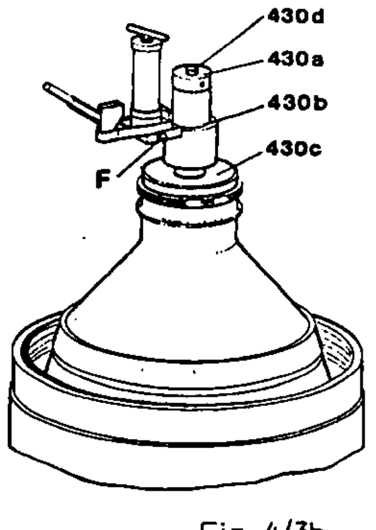


Fig. 4/3b

13) Carefully clean, wipe dry and grease threaded areas of bowl bottom and of bowl lock ring 8 as well as the contact surfaces, to prevent seizing of the threads. For greasing use the supplied lubricating paste; apply a thin film only.

14) Before screwing in the bowl lock ring, compress the disc stack by means of compressing device 430 (fig. 4/3b) in the following manner (see also sect. 4.6):

a) Place disc 430c onto the bowl top.

b) Screw bolt 430d down into the distributor until there is a clearance of 32 - 35 mm between end thread of bolt and upper edge of pump tube (see fig. 4/10).

c) Insert hydraulic compressing device 430b in centering recess of disc 430c.

d) Screw on threaded ring 430a and tighten it so that its upper edge is flush with end thread of bolt 430d.

CAUTION: To avoid damage to the threads due to pressing, the threaded bolt must be screwed in and the threaded ring screwed on **all the way.** If the threaded ring cannot be screwed down completely, then the piston and the cylinder of the compressing device prove to be too far apart. To bring them back into their starting position, loosen screw "F" by two turns and move the pump lever to its lowest position. Now you can screw down the threaded ring, thereby bringing piston and cylinder into proper position.

e) Check to be sure that all screw connections of the compressing device are tightened securely and that return duct of check valve is closed by means of screw "F".
Before the first use of the compressing device fill oil container of pump with oil and de-aerate the hydraulic chamber (see 4.6).

f) Actuate lever of piston pump until the pressure gauge indicates a pressure of 330 - 360 bar. If the maximum pressure is not attained and oil flows out of the stroke limiting hole, then bolt 430d has not been screwed far enough into the distributor. The compressing device is only ready for use again when bolt 430d and threaded ring 430a have been brought back into the position as described under 14a-d on page 4/3.
While compressing the disc stack make sure that arresting piece of bowl bottom snaps into groove of bowl top and that bowl top does not become tilted.

15) Use annular wrench 425 and lifting device 431 to place bowl lock ring onto bowl bottom (see fig. 4/6). Screw in the lock ring (left-hand thread) with the aid of the annular wrench (without hitting the wrench handle with a mallet) until the "O" marks on ring and on bowl bottom are 3 to 5 cm apart. Then hit wrench handle with mallet 405 to obtain "O" mark alignment.

    IMPORTANT: If the bowl lock ring can be tightened **by hand** with the aid of the annular wrench so that the distance between the two "O" marks is less than 3 cm, a spare disc has to be added because the pressure in the disc stack has slackened (see sect. 4.1, No. 9b). If the distance between "O" marks is more than 5 cm, check if all bowl parts are properly locked in place. If the pressure in the disc stack is too high, it can be reduced by greasing the spacers of the discs (e. g. with cream).

16) Move pump lever down as far as it will go to prevent it from jumping back. Only then loosen screw "F" to enable the oil to return from the hydraulic cylinder into the oil container. The compressing device can now be removed from the bowl.

17) Screw upper centripetal pump (with inserted gasket) onto lower centripetal pump (left-hand thread). Then use wrench 421 to tighten the upper centripetal pump until it hits stop. While doing so, block the lower centripetal pump by sticking a screwdriver through the holes of the pump tube.

18) Insert gasket 22 in groove of centripetal pump chamber cover 21.

19) Mount centripetal pump chamber cover. Watch for proper location.

20) Tighten centripetal pump chamber lock ring 23 by lightly rapping against handle of annular wrech 426 (left-hand thread).

21) Check to see if bowl can be turned by hand.

4.2. Assembling the feed and discharge connections

1) Fasten lifting device 435 (fig. 20) to the hood by means of cap nuts 41h. With the aid of a hoist place hood so onto sediment collector that the "0" marks on sediment collector and on hood are in line with each other. Connect flush lines. Fasten hood to sediment collector by means of hex head screws.

2) Place disc onto hood. Screw centripetal pump into disc and tighten it with wrench 421, turning fully counter-clockwise.

3) Before the initial start-up, after re-assembling the vertical gear parts or exchanging the bowl check bowl for proper height (see 8.3).

4) Fasten disc to hood by means of the two Allen screws.

5) Install feed and discharge housing and fasten with cap nuts 41h.

6) Install feed tube with inserted gaskets in feed and discharge housing.

7) Connect feed and discharge lines.

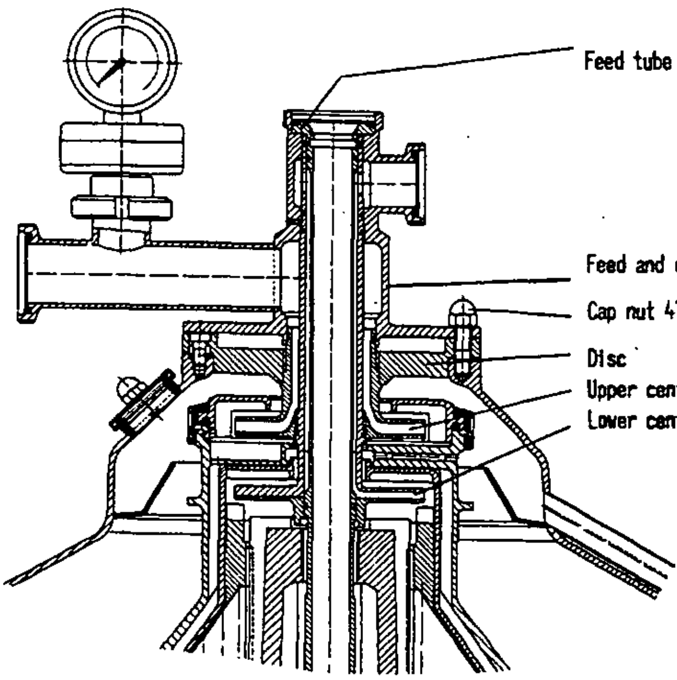


Fig. 4/5

4.3. Removing the feed and discharge system, - Dismantling the bowl

CAUTION: To avoid accidents do NOT loosen any part of the separator or of the feed and discharge system before the bowl has stopped completely.

Note that the bowl has NOT stopped before the gear sight glass is clear and the worm wheel has ceased rotating.

Proceed in reverse order of assembly (see sect. 4.1 and 4.2). The following should be kept in mind:

Handle bowl parts with care.

Be sure to replace worn gaskets.

Before opening the bowl, release the brakes by turning the two handles clockwise.

Use wrench 429 to remove feed tube from feed and discharge housing. After having removed the feed and discharge housing, loosen the two Allen screws in the disc. Then use wrench 421 to remove the double centripetal pump from the disc (left-hand thread).

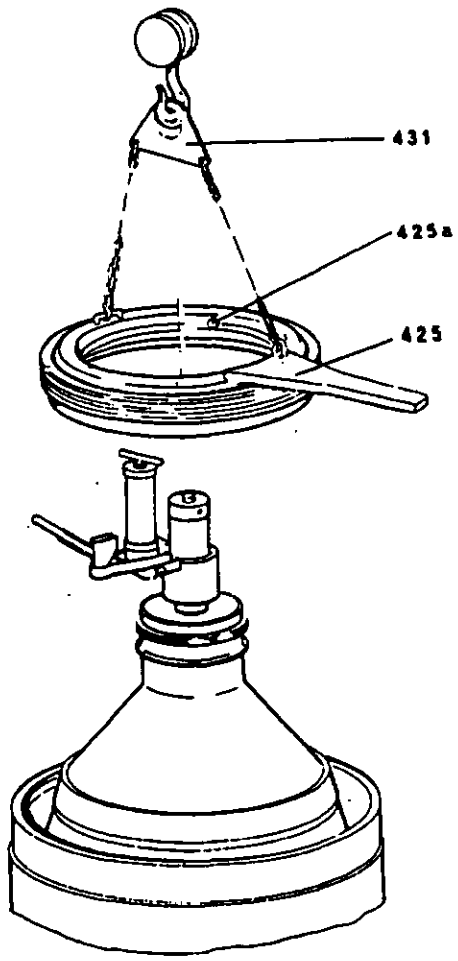


Fig. 4/6

After having unscrewed the small lock ring and removed the centripetal pump chamber cover, screw upper centripetal pump off the lower centripetal pump, using wrench wrench 421 (left-hand thread). While doing so, block lower centripetal pump by introducing a screwdriver into the holes of centripetal pump shaft. Then compress disc stack by means of hydraulic compressing device in order to facilitate loosening of the bowl lock ring (see 4.1, No. 14a-f).

Now unscrew the bowl lock ring (left-hand thread) with the aid of annular wrench 425. Loosen the ring by lightly hitting against wrench handle with mallet 405.

Remove hydraulic compressing device as described in sect. 4.1 under No. 16.

Fig. 4/6

Lock annular wrench 425 by screwing hex head screw 425a into groove of bowl lock ring. Then lift off annular wrench and lock ring with the aid of device 431.

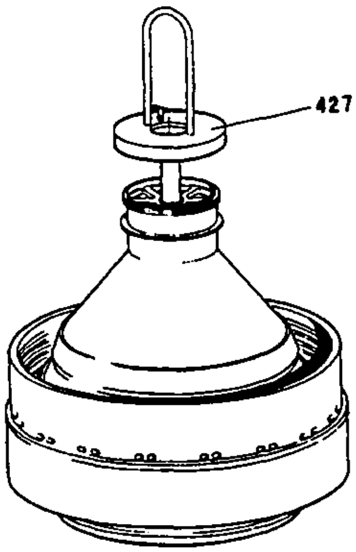


Fig. 4/7a

Fig. 4/7a:

Screw device 427 onto bowl top and, by means of a hoist, remove bowl top from bowl bottom.

If the separating disc is stuck in the bowl top, rap bowl top with a copper or light metal hammer until the separating disc comes loose. Do NOT let it drop on the floor.

If the separating disc cannot be detached in this manner, proceed as follows: Place the bowl top on a wooden surface. Pass a brass mandrel through the outer holes in the upper part of bowl top and place it on the outer edge of the separating disc. Detach the separating disc by slightly hammering the mandrel. Do NOT place a mandrel on the inner edge of the separating disc.

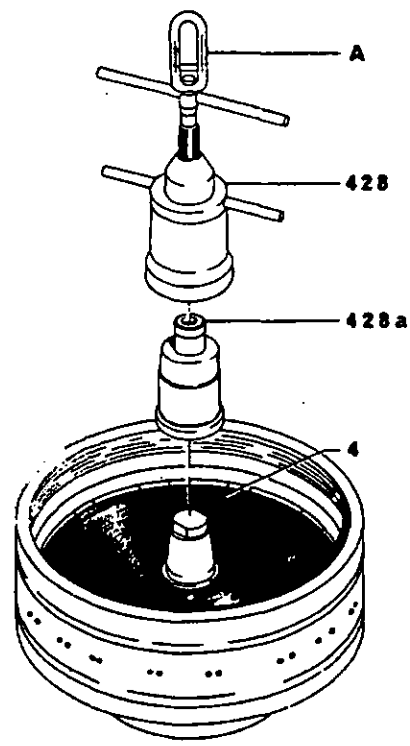


Fig. 4/7b

Fig. 4/7b:

Place pressure piece 428a on bowl bottom in such a manner that arresting pins of bowl bottom catch into holes of pressure piece. Screw jack 428 onto sliding piston. Turn jack-screw in clockwise direction in order to pull the sliding piston off the bowl bottom. Then lift out the sliding piston.

4.4. Removal and installation of Polyamid gasket 15 (fig. 19)

4.4.1. Removing the Polyamid gasket from the bowl top

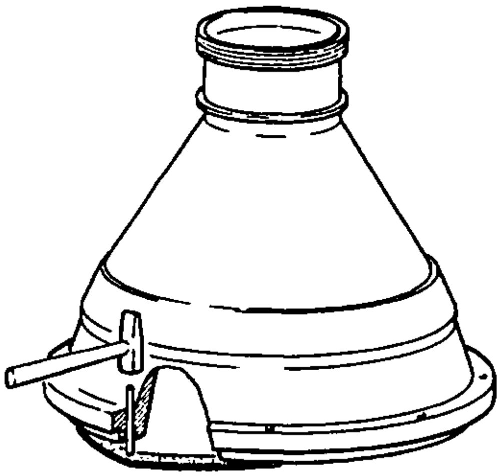


Fig. 4/8a

Remove Polyamid gasket from groove of bowl top with the aid of the drift pin supplied with the machine: Introduce the drift pin into the holes which are equally distributed around the bowl top and hammer on to the pin until the gasket becomes loose.

4.4.2. Installing the Polyamid gasket into the bowl top

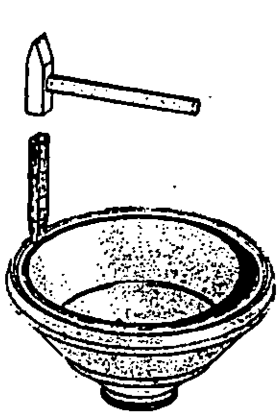


Fig. 4/8b

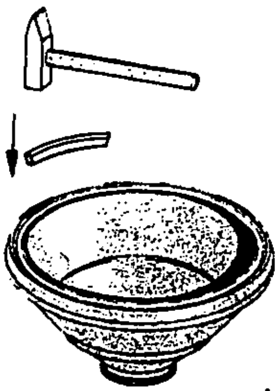


Fig. 4/8c

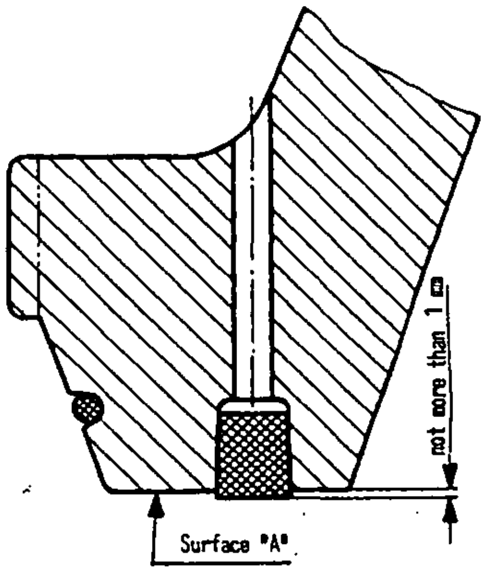


Fig. 4/8d

1) Keep gasket for about 5 minutes in approx. 80°C hot water to warm it up.
2) Wipe gasket dry.
3) Insert gasket (with its narrow side facing the bowl top) into the clean groove of bowl top. Place a piece of hard wood (fig. 4/8b) or a piece of the old Polyamid gasket (fig. 4/8c) on the new gasket and hammer the gasket evenly into the groove until its sealing surface protrudes from surface "A" of bowl top by not more than 1 mm (fig. 4/8d).

4.5. Removing the piston valve

Remove piston valve assembly 3a-f once a month for cleaning. On this occasion check the gaskets and replace them, if necessary.

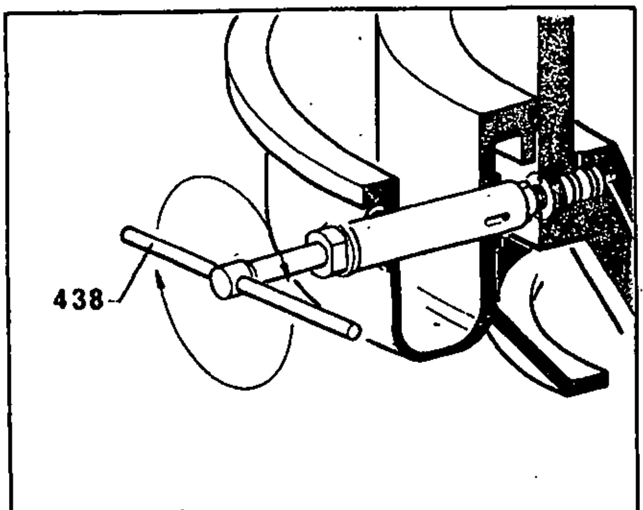
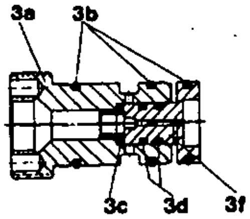


Fig. 4/9 a



Screw wrench 438 into piston valve.

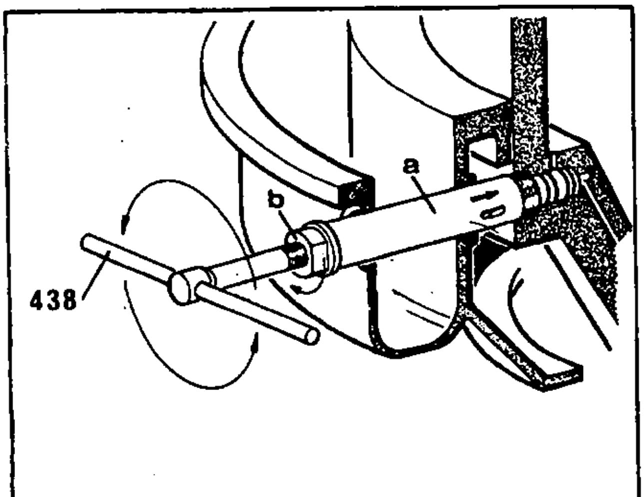


Fig. 4/9 b

Introduce pins of bush a of wrench 438 into boreholes of valve. Tighten nut b. Then unscrew piston valve by means of wrench 438.

Before installing the valve, moisten gaskets 3b and grease threaded area. Then screw in valve as far as it will go. However, be sure not to screw it in too tightly.

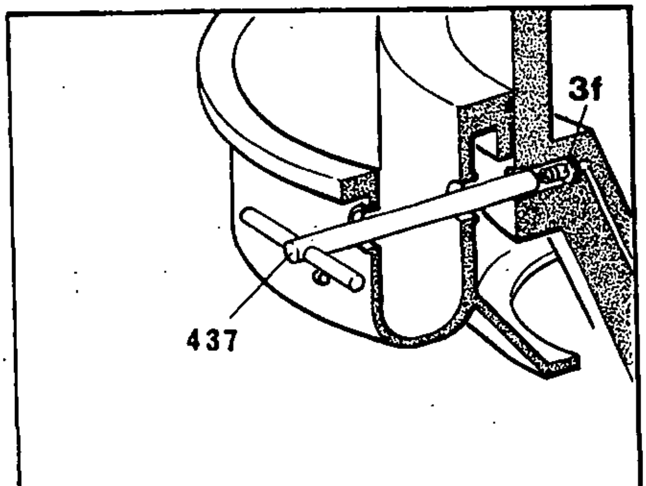


Fig. 4/9 c

Screw wrench 437 into valve piston 3f and withdraw piston from bowl bottom.

4.6. Hydraulic Disc Stack Compressing Device

4.6.1. Operating principle

By means of oil pump A oil is pumped under high pressure into hydraulic chamber B. Due to the increased pressure in this chamber, piston D is moved downwards. Cylinder C is held by threaded ring 430a, screwed onto bolt 430d. The lower end of the bolt is screwed into the distributor.
When the piston moves downwards, pressure is exerted on the bowl top, via disc 430c, resulting in compression of the disc stack.

4.6.2. Oil pump

Oil pump A is capable of producing a maximum pressure of 400 bar. It consists of oil container A2, pump head A1 and check valve A4. The holding capacity of the oil container is 350 cm^3.
Filling in oil: Before the first use of the compressing device, unscrew cover A3 and fill the container with oil. Then replace the cover and screw it on tightly.
De-aerate the pressure chamber B. To do this, loosen vent screw E and actuate the pump until oil escapes through the vent hole. Then re-tighten the vent screw.

4.6.3. Hydraulic fluid

As hydraulic fluid, the lubricating oil furnished with the separator and designated C-LP 114 (106-122 cSt/50 °C) can be used.

4.6.4. Pressure gauge

The hydraulic pressure exerted upon the disc stack is indicated by pressure gauge G (indicating range 0 - 600 bar) attached to check valve A4.
The pressure required to compress the disc stack ranges between 330 - 360 bar. It may be higher than 360 bar, but must **not** be lower than 330 bar.
The maximum permissible pressure is 390 bar.

4.6.5. Stroke limiting hole

To prevent damage to the compressing device in the event of incorrect mounting the hydraulic unit is provided with a stroke limiting hole H. If bolt 430d and threaded ring 430a have not been screwed down properly (see sect. 4.1, no. 14a-d) the oil in hydraulic chamber B will escape through this hole.

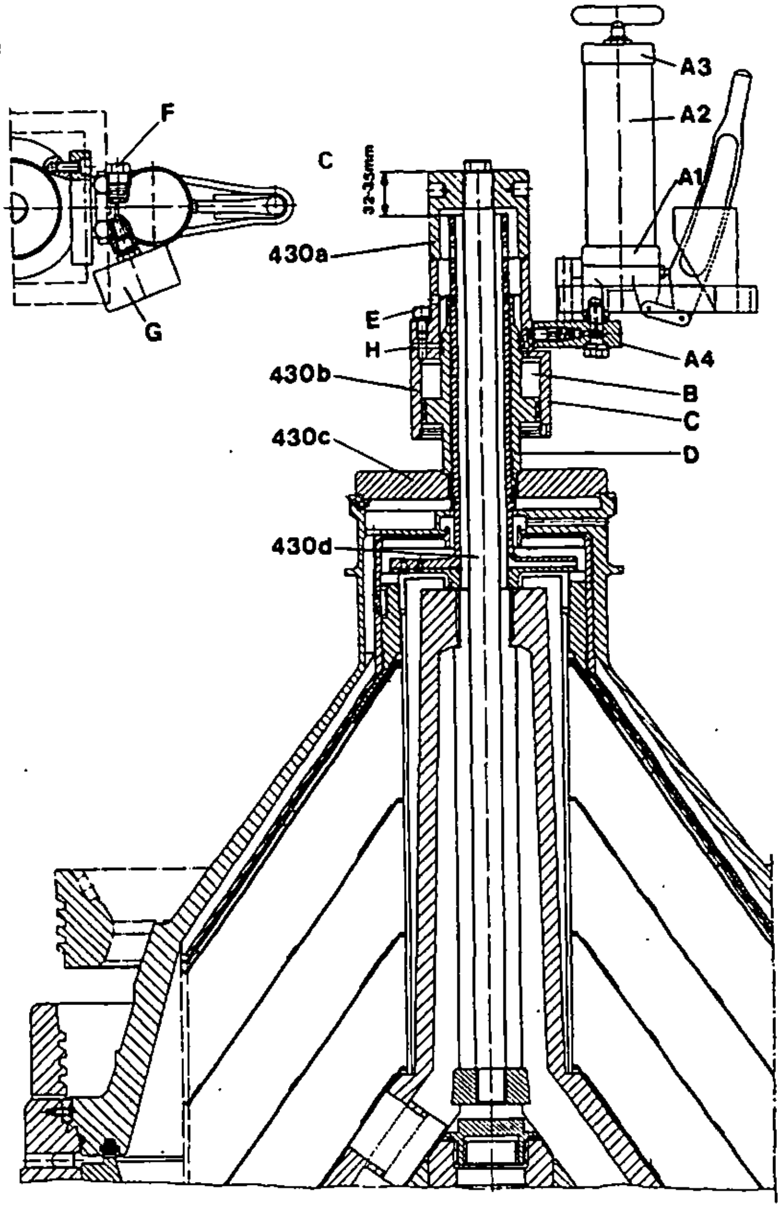


Fig. 4/10

430	Compressing device, compl.
430a	Threaded ring
430b	Hydraulic unit
430c	Disc
430d	Bolt
A	Oil pump
A1	Pump head
A2	Oil container
A3	Cover
A4	Check valve
B	Hydraulic chamber
C	Cylinder
D	Piston
E	Vent screw
F	Valve screw
G	Pressure gauge
H	Stroke limiting hole

5. Technical Information

5.1. Functioning of the hydraulic system of the bowl

The self-cleaning bowl is equipped for ejecting the sediment during operation. Dirt particles accumulate in the conical space 11 of the bowl from where they are automatically discharged through ejection ports in the bowl bottom at pre-determined intervals.

The sliding piston 4 is hydraulically actuated to open and close the bowl ports. The water pressure created in the filled sealing chamber 3 keeps the bowl closed. When water drains out of the sealing chamber after opening of the opening-water valve, the product pressure above the piston pushes the piston down and opens the bowl ports.

Sealing of the bowl:

When the bowl has reached the speed necessary for developing the hydraulic pressure (after about 10 minutes), the main switch of the timing unit is to be closed, whereupon the sealing-water valve opens for 60 seconds. The sealing water flows into sealing chamber 3 underneath the sliding piston. The water pressure in the sealing chamber pushes the sliding piston upwards and presses it against gasket 9, thus sealing the bowl.

The sealing chamber is sealed off by valve piston 7 which is pressed through centrifugal force against gasket 8 and thus seals water discharge channel 10.

To make up for sealing-water losses, sealing water is supplied every 60 seconds for a period of 1 second, controlled by an electronic impulse relay.

Opening of the bowl (sediment ejection):

When opening-water valve is opened for sediment ejection, water flows through channel 5 to valve 6. The water pressure pushes valve piston 7 inwards thus opening channel 10. The water contained in sealing chamber 3 can then flow off (fig. 5/1c). As the liquid level recedes, the sealing pressure acting on the underside of the piston quickly decreases. As soon as it is smaller than the opening pressure acting on the upper side of the piston, the latter is pushed downwards, thus opening the ports in the bowl bottom for solids ejection.

Re-sealing of the bowl:

After sediment ejection the opening-water valve closes and the sealing-water valve opens. Valve piston 7 re-seals discharge channel 10 and sealing chamber 3 fills up with water. The liquid pressure in the sealing chamber exceeds the product pressure in the centrifugation room. The sliding piston is pushed upwards, thus re-sealing the centrifugation room.

The sediment ejections are initiated by the automatic timing unit (see sect. 5.2).

Sectional Diagram illustrating Sealing of the Bowl and Removal of the Solid Matter

1 Injection chamber for sealing water
2 Injection chamber for opening water
3 Sealing chamber
4 Sliding piston
5 Feed channel for opening water
6 Piston valve
7 Valve piston
8 Gasket
9 Bowl gasket
10 Discharge channel for sealing water
11 Sediment space
12 Operating-water feed
13 Pressure gauge
14 Solenoid valve
16 Strainer

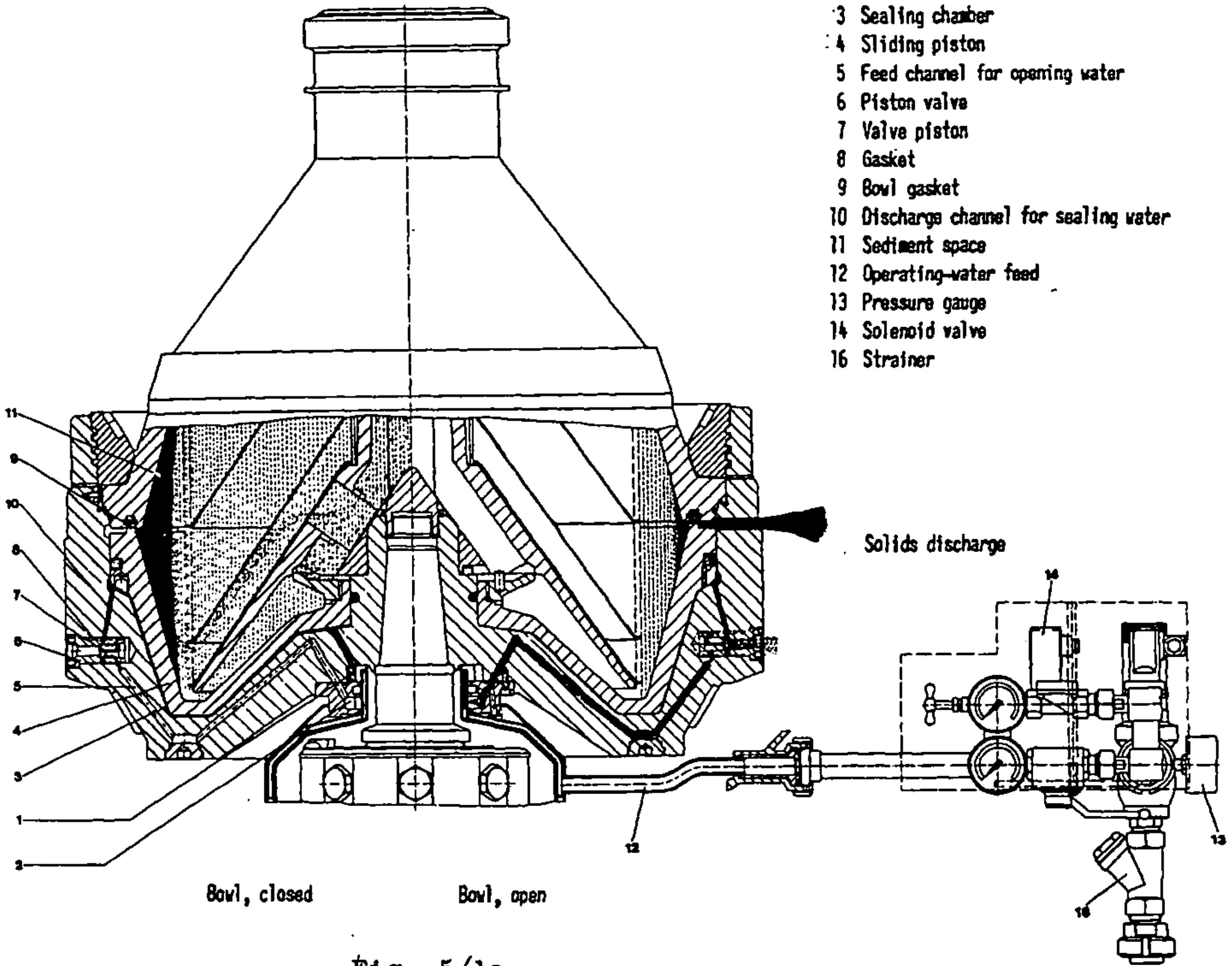


Fig. 5/1a

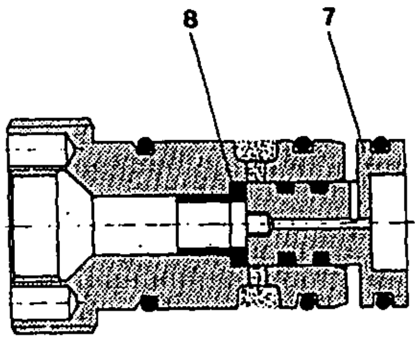


Fig. 5/1b

Functional diagram showing valve during separation.

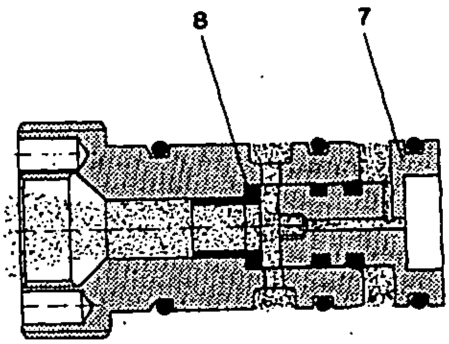


Fig. 5/1c

Functional diagram showing valve during solids ejection.

5.2. Timing unit

Partial sediment ejections during milk processing are programmed by the timing unit TVA 2-M. By pressing the button "Partial de-sludging", the program in action can be interrupted and a partial ejection process can be initiated immediately.

Total ejections during cleaning-in-place are initiated manually, by pressing the button "Total de-sludging" on the timing unit.

For details, refer to the instruction manual "WESTFALIA Timing Unit".

5.3. Operating-water connection

The inner diameter of the supply line to be connected to the operating-water system shall be 1", and the pressure in this line shall be at least 1.5 bars.
Important: Pressure fluctuations must not exceed 0.5 bar.

The operating-water connection is provided with a water-pressure reducer K (fig. 5/3) by means of which the line pressure is to be throttled to 1 bar. To adjust the water-pressure reducer, proceed as follows:

1) Open rapid-closing valve D (fig. 5/3) all the way.
2) Adjust pressure with adjusting screw J so that pressure gauge on pressure reducer indicates 1 bar.
3) Close rapid-closing valve D again.

The operating water must be clean so that at temperatures up to 80°C no precipitations will occur. It may be cold or lukewarm.

The strainer in filter G has to be cleaned from time to time.

Pressure gauges M and N (fig. 5/3) merely serve for checking the closing and opening operations.

5.3.1. Arrangement of the solenoid valves

In addition to the automatic solenoid valves, the operating-water connection comprises two rapid-closing valves D and F connected in parallel with solenoid valves A and B, as well as two shut-off valves a and b.
This arrangement allows changing over to manual operation in the event of failure of solenoid valves A or B for opening or closing of the bowl or in the event of failure of the timing unit.
When changing over to manual operation, rapid-closing valve D is to be opened to the extent that sealing water flows out of the operating-water discharge (see no. 18 in dimensioned drawing on page 0/7) at a rate of approx. 50 l/h in order to assure continuance of the separating process.
If the solenoid valves are defective, close manually-operated valves a and b.

Partial sediment ejection, initiated manually

1) Open rapid-closing valve D all the way.
2) Open rapid-closing valve F in order to open the bowl. As soon as de-sludging noises can be heard, close rapid-closing valve F in order to close the bowl.
3) Throttle rapid-closing valve D so that sealing water flows out of the operating-water discharge at a rate of approx. 50 litres/h.

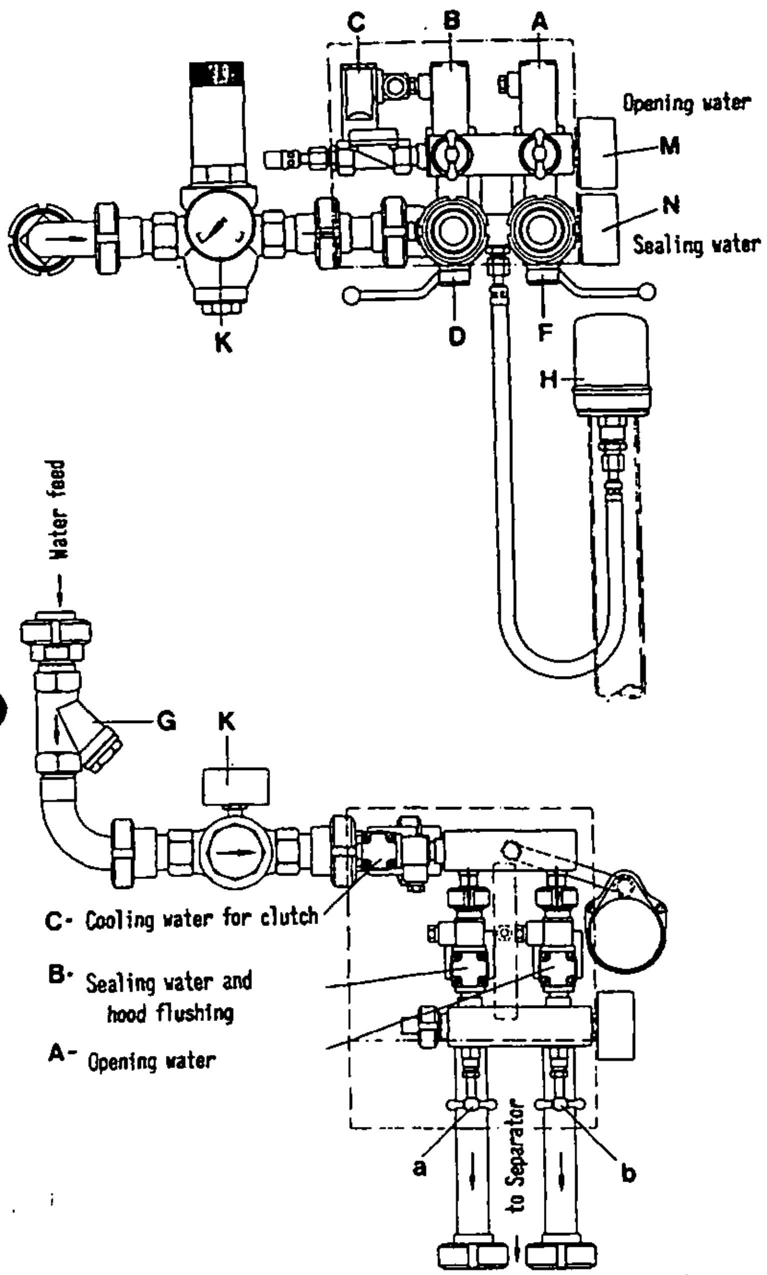


Fig. 5/3

Complete sediment ejection, initiated manually

1) Stop milk feed pump.
2) First open rapid-closing valve D, then open valve F.
3) When the de-sludging noises have stopped, close rapid-closing valve F and after about 5 secon throttle rapid-closing valve D so that water will emerge from the operating-water discharge at the rate of approx. 50 l/h.

5.3.2. Pressure switch

For proper functioning of the automatic control a pressure of at least 0.6 bar is required while sealing-water valve D is open.
At a lower pressure the bowl will not open, or not close. For this reason the operating-water line is provided with pressure switch H which signals pressure drop below the minimum value by giving an audible or visible alarm.
If it is not possible to re-establish the required water pressure immediately, the switch "Separation" on the timing unit is to be switched off and the milk supply is to be stopped. Partial de-sludgings will no longe take place and pilot lamp "Separation" will go out.

5.3.3. Solenoid valves for operating water, flush water for hood, and clutch cooling-water (fig. 17/2)

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

Operating principles

In the normal, i.e. closed condition of the valve (de-energized) the water flowing into the valve from the feed side is unable to escape. It flows through a bore into the chamber above the diaphragm where a pressure equal to the water line pressure builds up. However, since the area exposed to water pressure on the upper side of the diaphragm is larger than the area exposed to the same pressure on the underside, the diaphragm is kept pressed against the valve seating.

Upon energizing of the magnet head, the core is pulled upwards so that the integrally vulcanized sealing element of the pilot valve is lifted from the valve seating, thus enabling the water to escape towards the discharge side of the valve. Since the diameter of the outlet opening of the chamber above the diaphragm is larger than the diameter of the inlet opening, the water flows out more quickly than it flows in and, consequently, the pressure acting upon the upper surface of the diaphragm decreases. As soon as it has become smaller than the pressure acting on the underside of the diaphragm (required pressure difference at least 0,5 bar), the diaphragm is lifted off its seat, thus opening the valve.

When current supply is cut off, the spring pushes down the magnet core, thus closing the pilot valve: liquid pressure builds up again above the diaphragm, and the solenoid valve closes.

Maintenance

The solenoid valves are maintenance-free. However, care should be taken that the coupler sockets are always screwed tightly to the magnet heads to ensure perfect sealing action of the gaskets.

Electric troubles

If it has been found that the timing unit functions properly and that voltage is present at the valve terminals of the terminal strip while the associated time function element is operating, the trouble will have to be ascribed either to a defective solenoid coil or to open circuit between terminal strip and valve, or to poor connection.

If the solenoid coil has proved to be defective, remove the magnet head after having withdrawn the coupler socket (to do this, loosen holding screw) and after having loosened the Allen screws.

The solenoid coil is cast integral with the magnet head. Therefore, if the coil needs replacement, the complete assembly (magnet head, part-no. 0018-3710-800, see page 17/3) will have to be exchanged.

Technical data

Solenoid valve		Type:	40 A / 121
Part - no.			0018-3711-600
Pipe connection		R	3/8"
Voltage		V	220 AC
Frequency		Hz	50/60
Optional voltages		V	24 AC, 115 AC, 24 DC
Power consumption:	pull-in	VA	approx. 20
(AC operation)	operation	VA	approx. 16
(DC operation)		W	approx. 12
Duty cycle		%	100
Frequency of operations		/h	1000
Type of enclosure		IP	65
Pressure range		bar	0.5 - 10
Temperature:	medium	°C	+90
	ambient	°C	+35
Cable entry		Pg	9

6. Operation

6.1. Starting the separator

1) Check to be sure that
   a) brakes are released,
   b) oil level in gear chamber is slightly above middle of sight glass,
   c) hex head screws for fastening the hood and cap nuts for fastening the feed and discharge housing are tightened securely,
   d) cream valve is open,
   e) main valve in operating-water line is open.
2) Switch on the motor.
3) After a starting time of 10 minutes turn on main switch on control cabinet: the bowl closes.
4) After another two minutes start the water circulation as it is commonly practiced in dairies.
5) After switching over to milk processing proceed as follows:

   Operate switch "Separation" on control cabinet. After having opened the milk feed valve, throttle constant-pressure valve on skim milk side by adjusting the operating-pressure reducing valve incorporated in the control cabinet. At the same time adjust cream valve to desired cream flow rate.
   Throttle constant-pressure valve while maintaining the desired cream flow rate, until slight overflow occurs. To check the overflow open inspection cover of hood a little. The pressure indicated by the pressure gauge in the skim milk line at the moment of overflow, is to be considered as maximum pressure. Then adjust pressure reducing valve until a pressure of 0.3 - 0.5 bar lower than the maximum pressure is obtained.

   Adjustment of the constant-pressure valve to the operating pressure is only necessary during initial starting of the separator.

For the maximum back pressure in the connected processing equipment, permissible for the centripetal pumps supplied, refer to page 18/1.

To fully utilize the discharge pressure of the cream pump, e.g. when the separator is used for milk clarification where cream and skim milk are re-combined after separation, adjust the constant-pressure valve to the highest possible discharge pressure.

When clarifying milk, it may happen that cream with too high a butterfat content emerges from the separator although the cream valve is open and maximum pressure is prevailing in the skim milk line. This indicate that the backpressure is too high for the cream pump. To overcome this difficulty, the backpressure of the equipment downstream the separator has to be reduced or a booster pump has to be installed.
It should be noted that cream with a very high butterfat content, i.e. extremely viscous cream will lead to incorrect flowmeter reading inasmuch as the measuring rod is lifted to a higher level, thus indicating a flow rate that is higher than the actual cream flow.

If there is constant overflow in spite of a low skim milk discharge pressure, check condition of gaskets in centripetal pump chamber cover and on pump shafts.

In some cases, especially when using heaters with a low back pressure, it may be suitable to install in the line after or ahead of the heater a throttling valve and set it to about 1.5 bar in order to ensure foamfree operation of the separator.

The separating temperature should range between 40 and 50°C. If the milk tends to precipitate too great an amount of albumin, a separating temperature of about 35°C may be more suitable.

Possible causes of inefficient separation:

1) Unfavourable pre-treatment of the milk (pumps, agitator, high temperature),

2) Variations in temperature, in bowl speed or in throughflow capacity,

3) Leakage at separating disc,

4) Re-mixing of cream and skim milk after separation, e.g. caused by leaking cocks in pipe lines connected for drink milk production. Note that during milk separation the drain valve in the connection line must be open,

5) Homogenized return milk added to the raw milk.

Skim milk samples should be taken at the screwed union of the skim milk discharge.

If the trouble cannot be found with the separator or with the equipment ahead of the separator, check condition of chemicals used to analyse the skim milk. To make a test, fill water instead of skim milk into butyrometers.

6.2. Sediment ejection (de-sludging)

6.2.1. Partial sediment ejection (partial de-sludging)

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

To accomplish partial ejection, opening-water is briefly fed to the bowl via solenoid valve A (fig. 5/3). The duration of opening-water supply (= duration of partial ejection: 0.5 to 2 seconds) varies with the amount of ejected sediment and must, therefore, be determined by tests which can be carried out with water. During each partial ejection an additional amount of approx. 0.2 l/sec. of flush water flows off through the sediment discharge. This amount is to be deducted from the measured total volume.

When separating milk, adjust the duration of partial ejection so that approx. 5 litres will be ejected from the bowl.

When separating whey, adjust the duration of partial ejection so that approx. 10 litres will be ejected from the bowl.

Partial ejections are accomplished automatically at pre-determined intervals, controlled by the timing unit (5.2) or by another special device.

When the time adjusted at time function element "Separation" has elapsed (1 hour when separating milk and 15 to 30 minutes when separating whey), the first partial ejection takes place. Time function element "Pre-flushing" is to be set so as to ensure opening of solenoid valve B "Sealing and flush water" (fig. 5/3) 10 seconds before each partial ejection. The water injected into the hood will prevent incrustation of the sediment.

Time function element "Partial de-sludging" has to be adjusted so as to cause solenoid valve A "Opening water" to open briefly. Injection of opening water will cause the bowl to open and to eject 5 to 10 litres of sediment. Sealing and flush water valve B remains open during solids ejection and closes 60 seconds after the ejection process. The period of time during which this valve is to remain open after sediment ejection (at least 60 seconds) is adjustable by means of time function elemen "Subsequent flushing".

By operating push button "Partial sediment ejection", the separating process is interrupted and a partial sediment ejection is immediately initiated. When this enforced partial sediment ejection is finished, the program automatically re-starts the separating process.

The liquid obtained from a partial ejection process (approx. 5 litres of sediment and 15 litres of flush water) is collected in the sterilizing tank. The tank is capable of holding the liquid obtained from five partial ejections.
In the sterilizing tank, 1 kg of alkaline detergent has to be added. The mixture is heated up with steam to 95°C and kept at this temperature for 10 minutes. It can then be sent to the sewer.

6.2.2. Total ejection (total de-sludging)

For cleaning-in-place after milk processing a special timing unit is required. If this is not available, total ejections can be initiated by manual control of the timing unit TVA 2-M.

The switch "Separation" on the timing unit is to be kept in closed position. To initiate the total ejection, push button "Total de-sludging" has to be actuated.

Provided that the electrical installation has been carried out properly (see installation plan of timing unit), the feed pump(s) is (are) automatically switched off by pressing push button "Total de-sludging" and re-started automatically approx. one minute after total ejection. Interruption of the liquid supply to the bowl by stopping the feed pump is necessary for the recovery of the bowl speed which drops during total ejection.

After re-filling of the bowl (check increase of discharge pressure on separator), another total ejection can be initiated by pressing again push button "Total de-sludging".

Should the feed pump(s) fail to stop automatically during total ejection, switch off pump(s) manually and re-start it (them) one minute after total ejection.

6.2.3. Manually controlled sediment ejections

In case of emergency (e.g. failure of the timing unit or of the solenoid valves), the bowl can also be emptied by opening and closing the by-pass valves associated to the solenoid valves (see 5.3.1). During sediment ejection, the bowl speed will drop slightly. Bear in mind that sediment ejection is allowed to be repeated only when the bowl has re-attained its operating speed.

7. Cleaning

7.1. Cleaning-in-place

The separator is generally included in the C-I-P cycle of the pasteurizers. For cleaning the separator, the detergents used for cleaning the pasteurizers will be adequate. However, be sure that the last cleaning agent to be circulated is acid.

After milk processing, the residual milk is displaced and the whole equipment thoroughly flushed with water. Flushing is followed by two "total ejections" accomplished by pressing the push button "total ejection" on timing unit TVA 2-M.

The plant must be flushed with water and subsequent flush de-sludgings have to be performed even if the plant cannot be C-I-P-cleaned for some reason after milk processing.

The C-I-P-programme should comprise the following programme steps:

1) Flushing with caustic solution,

2) Flushing with water,

3) Flushing with acid solution,

4) Flushing with water.

<u>IMPORTANT:</u> Each of the programme steps 1 - 4 should be finished up with a total ejection.

During each programme step the spring-controlled constant-pressure valve incorporated in the skim milk line is to be throttled several times by actuating the snap closure (cover). This will cause flooding of the centripetal pump chamber of the separator, resulting in thorough flushing of hood and sediment collector. If the separator is not equipped with a constant-pressure valve, the valve in the skim milk line must be throttled several times by hand.

<u>IMPORTANT:</u> Bear in mind that bowl parts of stainless steel will be attacked by chlorine. Therefore, make sure that detergents are free from chlorine.

7.2. Manual cleaning

In spite of cleaning-in-place, the bowl should be dismantled for check-up and manual cleaning <u>once a month</u> (see 4.3). On this occasion, guide surfaces and threads should be cleaned and wiped dry and lightly greased with the special lubricating paste furnished with the machine. After removal of the sliding piston 4 (fig. 5/1a), the sealing chamber 3 should be cleaned with special care.

8. The Gear

8.1. Removing the vertical gear parts

After dismantling the bowl, loosen oil drain screw and let oil drain into oil cup. Then remove upper sight glass.

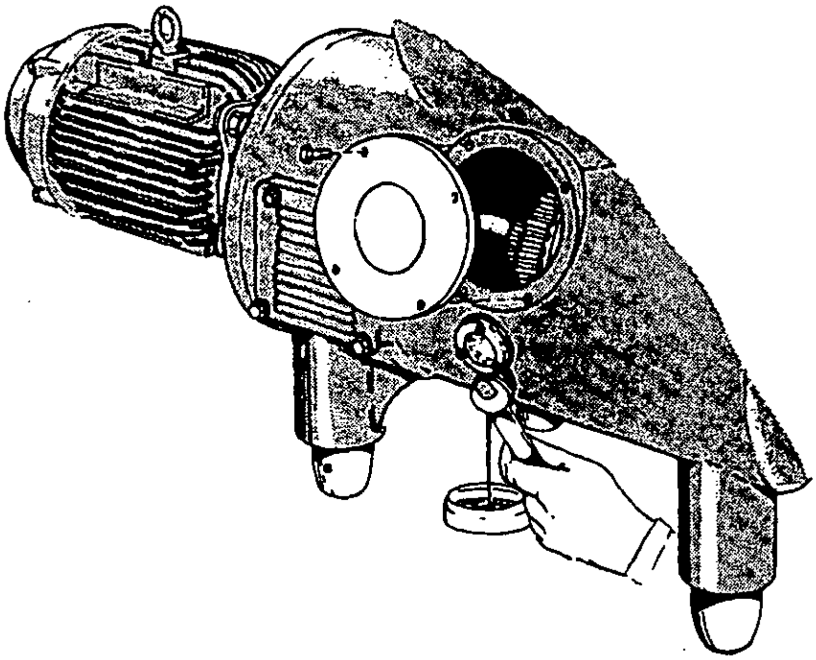


Fig. 8/1a

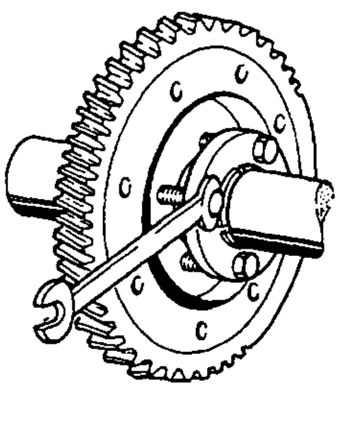


Fig. 8/1b

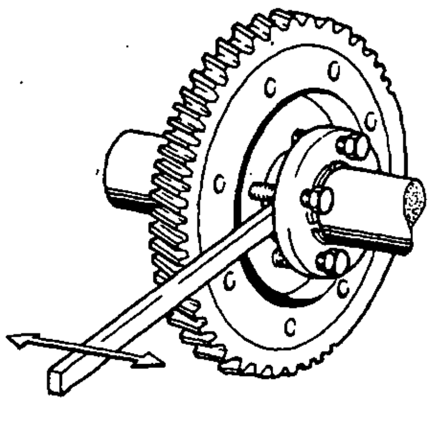


Fig. 8/1c

Loosen hex head screws in clamp plates of worm wheel (fig. 8/1b). Then slacken clamp plates until worm wheel can be moved on worm wheel shaft (fig. 8/1c). Push worm wheel to the left.

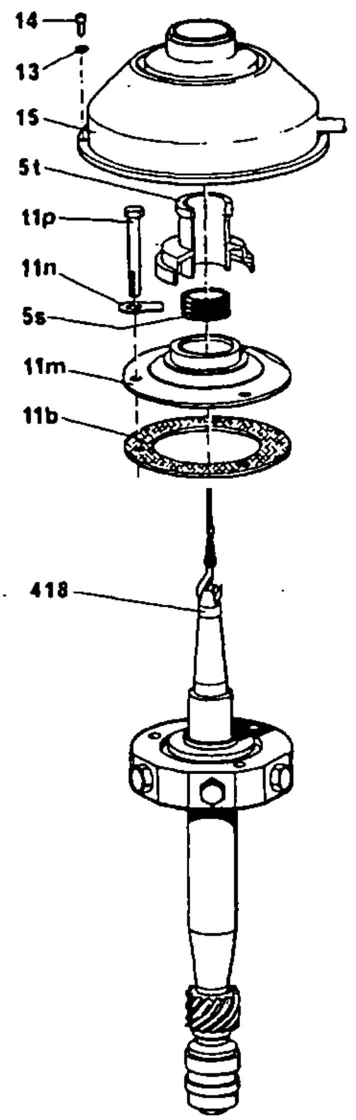


Fig. 8/2a

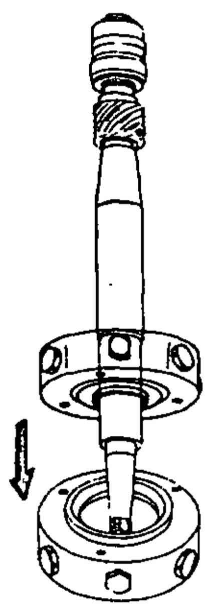


Fig. 8/2b

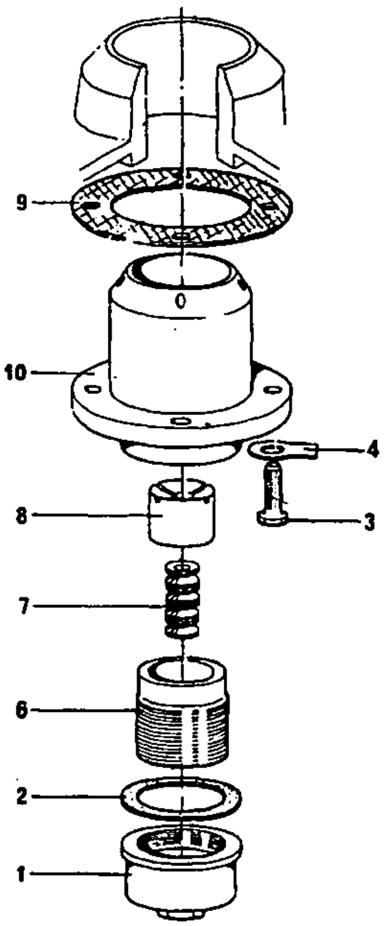


Fig. 8/2c

<u>Fig. 8/2a:</u>

Take off operating-water connection and remove bushes 37 and 39 (fig. 13/1).
Undo screws 14 and remove operating-water feed 15 and spindle cap 5t. Straighten tab washers 11n and unscrew hex head screws 11p. Take off protection cap 11m and spindle spring 5s.

Screw tool 418 onto worm spindle and lift out spindle together with neck bearing bridge.

<u>Fig. 8/2b:</u>

To remove neck bearing bridge, hold spindle in inverted position, upper end down, and tap lightly against a wooden surface. Neck bearing bridge will then slide off.

<u>Fig. 8/2c:</u>

Unscrew bottom bearing cap 1 and remove gasket 2. Unscrew bottom bearin threaded piece 6, and remove it together with spring column 7 and botto bearing pressure piece 8.

Should the case arise that bottom bearing housing 10 has to be replaced then proceed as follows: Straighten tab washers 4 and undo hex head screws 3. Take two of these screws and thread them into the tapholes of the bottom bearing housing. By doing so, the bottom bearing housing will be pressed out of the frame.

8.2. Re-assembly of vertical gear parts (fig. 14)

For re-assembly proceed in reverse order of removal (see 8.1) and according to instructions given in sect. 8.2.1 - 8.2.3.

8.2.1. Important hints for re-assembly

1) Before re-assembling the vertical gear parts, clean gear chamber thoroughly.

2) Check condition of ball bearings before re-fitting them onto worm spindle.
   IMPORTANT: Use only high-speed precision ball bearings as per List of Parts.
   For reasons of safety, replace ball bearings of worm spindle and worm wheel shaft every 5,000 running hours.

3) Before fitting ball bearings, ball bearing protection rings 5d and 5g, and ring 5n onto spindle, heat these parts in oil to approx. 80°C.

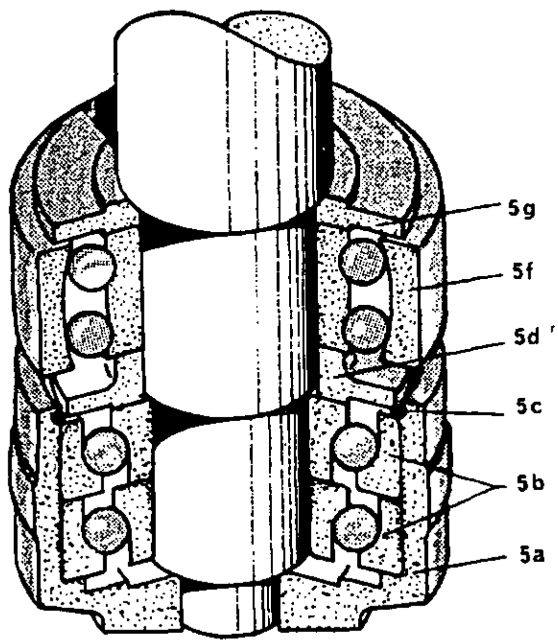


Fig. 8/3

4) If one of the angular contact ball bearings 5b needs replacement, be sure to replace both of them. Note that the angular contact ball bearings may be loaded axially in one direction only. They must be installed as shown in fig. 8/3. The narrow rim of the outer ring of each ball bearing must be on top. Faulty mounting will inevitably result in damage to bearings.
   For assembly proceed as follows:
   Slide the warmed-up angular contact ball bearings onto the spindle, slide snap ring 5c over ball bearings and let ball bearings cool down. Then fit bottom bearing pressure housing 5a over ball bearings and press snap ring 5c into groove of bottom bearing pressure housing.

5) It must be possible to install the worm spindle, with ball bearings attached, without having to hit on the upper spindle end, and to move the built-in spindle axially by hand. If this is not the case, remove burrs from the bottom bearing housing, using a very fine emery cloth.

6) When worm is worn and needs replacement, the worm wheel assembly with clamp plates 10 (fig. 15) shall be replaced at the same time, since this part, being worn down as well, would cause premature wear to the new worm.

7) When installing neck bearing bridge assembly 11c-h, make sure that gaskets 11b and 11k are in good condition. Be sure to insert distance ring 11a.

8) Before installing the neck bearing protection cap, check to be sure that there is a clearance of 2.5 - 3 mm between cams of distance ring 11a (fig. 8/6) and neck bearing bridge 11d. If not, proceed as per instructions of sect. 8.3.2.

9) IMPORTANT: After re-assembling the vertical gear parts, check bowl height for possible re-adjustment (see 8.3).

8.2.2. Assembling the neck bearing bridge

The upper ball bearing of the spindle is contained in pressure ring 11c which is held by nine radially arranged, evenly distributed springs 11g

1) Insert pressure ring 11c in neck bearing bridge 11d in such a manner that the nine recesses of the pressure ring face the nine tapholes of the neck bearing bridge.

2) Grease spring pistons 11h thoroughly. Fit neck bearing springs 11g into the nine spring pistons. Then put the spring pistons into threaded plugs 11f.

3) Screw the threaded plugs together with neck bearing springs and spring pistons into the tapholes of neck bearing bridge, and tighten.

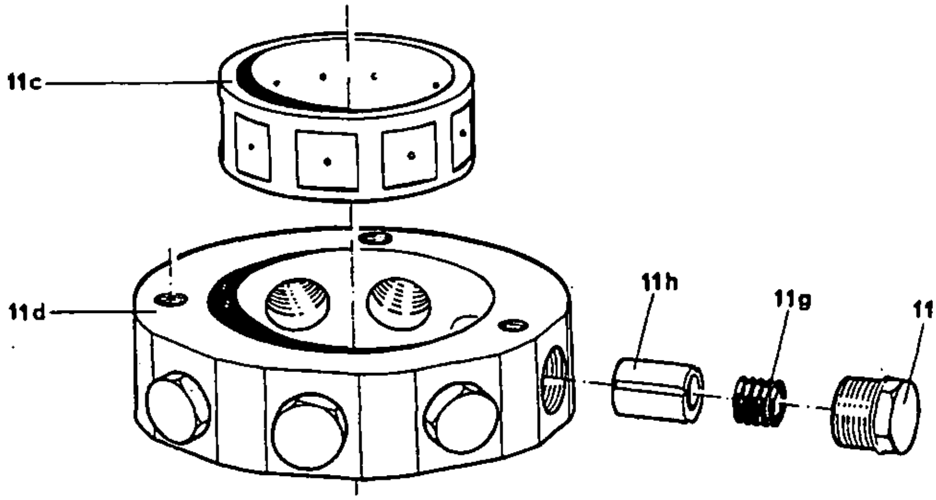


Fig. 8/4a

8.2.3. Installing spring column into bottom bearing

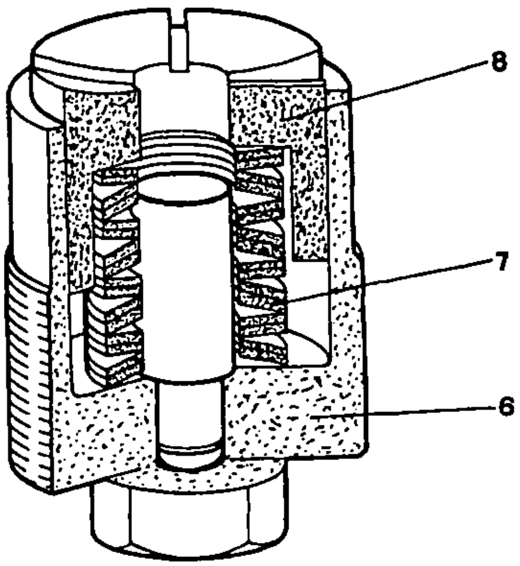


Fig. 8/4b

1) Slide cup springs 7 on bolt of bottom bearing threaded piece 6 as illustrated in fig. 8/4b.

2) Slip bottom bearing pressure piece 8 over spring column.

8.3. Bowl height

8.3.1. Checking the bowl height

NOTE: The bowl height has been adjusted at the factory before shipment of the separator. It must be checked for possible re-adjustment before the first start of the separator, after re-assembling the vertical gear parts, after exchanging the bowl or the centripetal pump, and as soon as the centripetal pump shows any grinding marks.

Prerequisite to correct bowl height adjustment is that

a) bowl is properly closed ("O" marks on bowl lock ring and on bowl bottom must be in line with each other),

b) hood is properly seated on sediment collector and hex head screws are tightened securely,

c) upper centripetal pump is screwed onto lower centripetal pump as far as it will go and that centripetal pump assembly is screwed all the way into the disc.

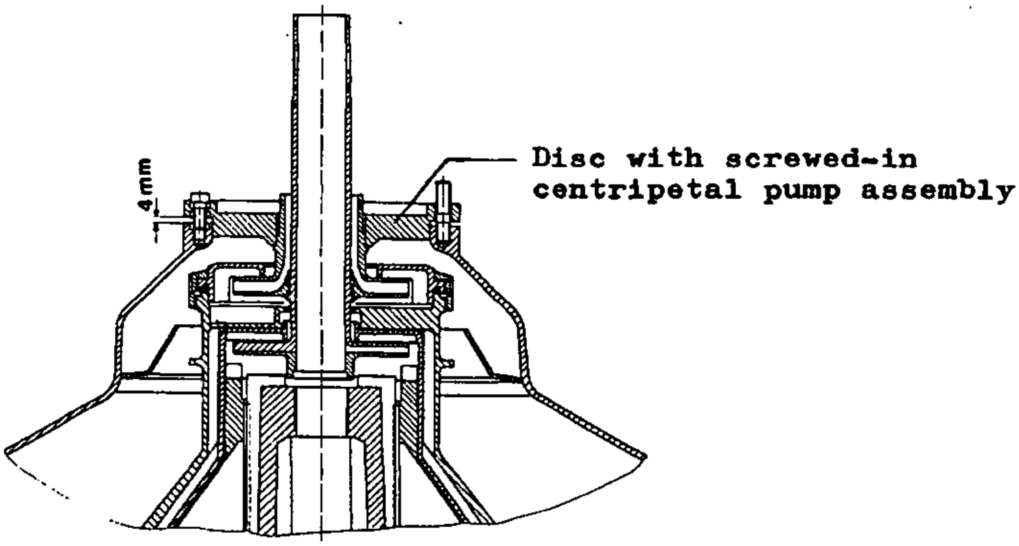


Fig. 8/5

The bowl height is correct when the disc can be raised by about 4 mm. Otherwise the bowl height has to be re-adjusted (see 8.3.2).

8.3.2. Re-adjusting the bowl height

For re-adjustment of the bowl height proceed as follows:

Unscrew bottom bearing cap 1 (fig. 14). Adjust bowl height (refer to fig. 8/5) by turning bottom bearing threaded piece 6. A full turn of the bottom bearing threaded piece to your Right or to your Left raises or lowers the bowl by 2 mm.

If the distance shown in fig. 8/5 is greater than 4 mm, the bowl is too high. Lower the bowl by turning the bottom bearing threaded piece in counter-clockwise direction.

If the distance shown in fig. 8/5 is less than 4 mm, the bowl is too low. Raise the bowl by turning the bottom bearing threaded piece in clockwise direction.

If the bowl has to be raised by more than 1 mm, it has to be removed (see 4.3). Remove operating-water connection and take out bushes 37 and 39 (fig. 13/1). Undo screws 14 and remove operating-water feed 15. Take off spindle cap 5t (fig. 14). Undo screws 11p and remove neck bearing protection cap 11m. Then turn bottom bearing threaded piece in clockwise direction until proper height is adjusted.

Each time the bowl has been lowered or raised, check if there is a clearance of 2.5 to 3 mm between cams of distance ring 11a (fig. 8/6) and neck bearing bridge 11d. In order to be able to check this clearance, remove bowl, operating-water connection, bushes 37 and 39 (fig. 13/1), operating-water feed, spindle cap and neck bearing protection cap, unless these parts have already been removed before raising the bowl by more than 1 mm. This check is not required if it has been made after re-assembling the vertical gear parts (see 8.2.1 No. 8) and the bowl had not to be raised by more than 1 mm.

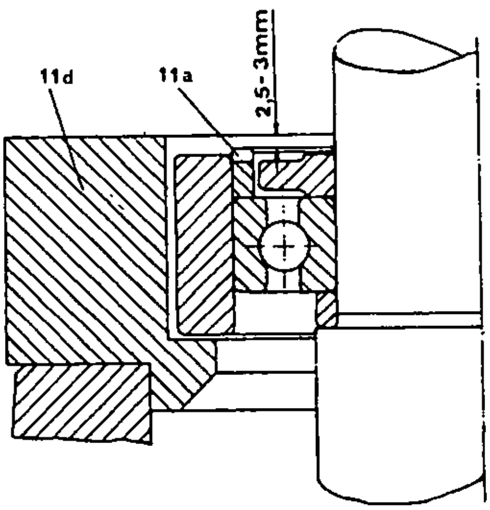


Fig. 8/6

If the clearance between the cams of the distance ring and the neck bearing bridge is smaller than 2.5 mm, the cams have to be filed to proper dimension. If the distance is greater than 3 mm, increase height of cams by welding or check with the factory for a new distance ring with properly sized cams.

After checking the clearance between distance ring and neck bearing bridge, re-install the above-mentioned parts. When installing the operating-water feed, check to be sure that gasket 38 (fig. 13/1) is in good condition.

Replace bottom bearing cap including gasket 2 (fig. 14) and close tightly.

Bear in mind that after fastening the neck bearing protection cap, the distance ring and, hence, the ball bearing 5p (fig. 14) will be under pressure until the spring column 7 in the bottom bearing is compressed by the weight of the bowl.

8.4. Removal of the horizontal gear parts

8.4.1. Removing the motor

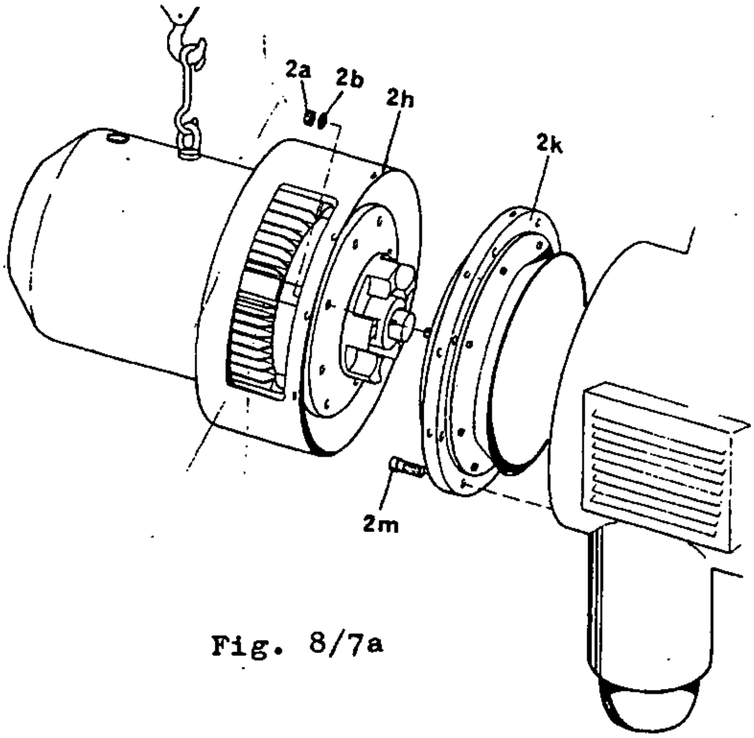


Fig. 8/7a

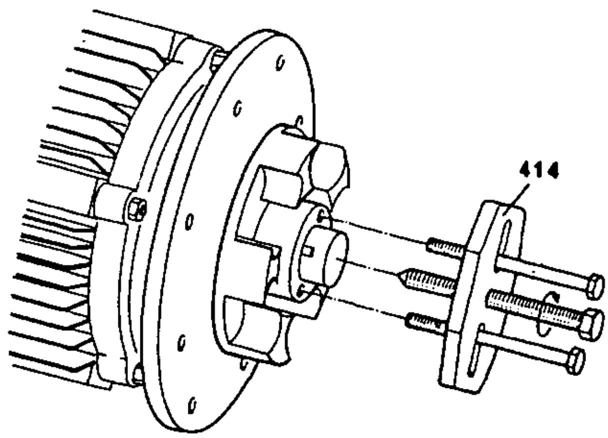


Fig. 8/7b

Remove lead-in wires from motor terminals. Unscrew hex head screws 2g and move cover 2h sidewards. Sling motor to hoist and tighten carrying rope. Then unscrew hexagon nuts 2a through opening of cover which can be turned on the flange. Take off lock washers 2b.
Use hoist to lift off motor together with cam hub (see fig. 8/7a).

For removing cam hub from motor shaft end use puller 414 (fig. 8/7b).

8.4.2. Removal of the fluid clutch

After removing the motor, undo Allen screws 2m and take off flange 2k (see fig. 8/7a).

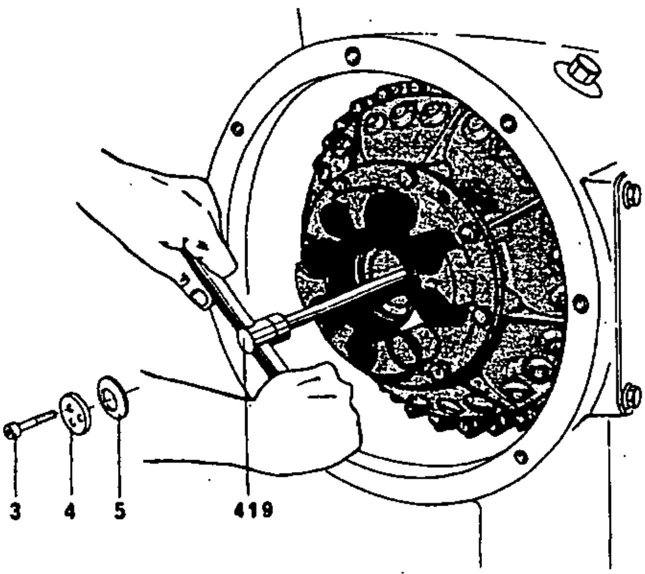


Fig. 8/7c

Loosen Allen screws 3 (fig. 8/7c) with torque-indicating wrench 416 (fig. 20) by consecutively giving each screw a quarter of a turn until tension of cup spring 5 slackens. Then screw out Allen screws all the way and remove washer 4 and cup spring 5.

It may happen that one of the three Allen screws can only be loosened by applying great force. In this case re-tighten the two remaining screws so that all three screws are equally tight. Then start loosening again as described above.

Be sure the socket of the wrench 416 is not worn!

To remove fluid clutch from cone of worm wheel shaft use pulling device 419.

8.4.3. Removing the worm wheel shaft

Remove fluid clutch (see sect. 8.4.2).

Loosen oil drain screw and let oil drain into oil cup. Remove upper sight glass (see fig. 8/1a).

Loosen hex head screws in clamp plates of worm wheel. Slacken clamp plates and push worm wheel to the left (fig. 8/1b, 8/1c).

Undo hex head screws 18 and remove cover 17.

Use wrench 416 to unscrew Allen screws 13. Remove disc 12.

By means of tool 419, pull brake pulley assembly 11a-d off the cone of worm wheel shaft.

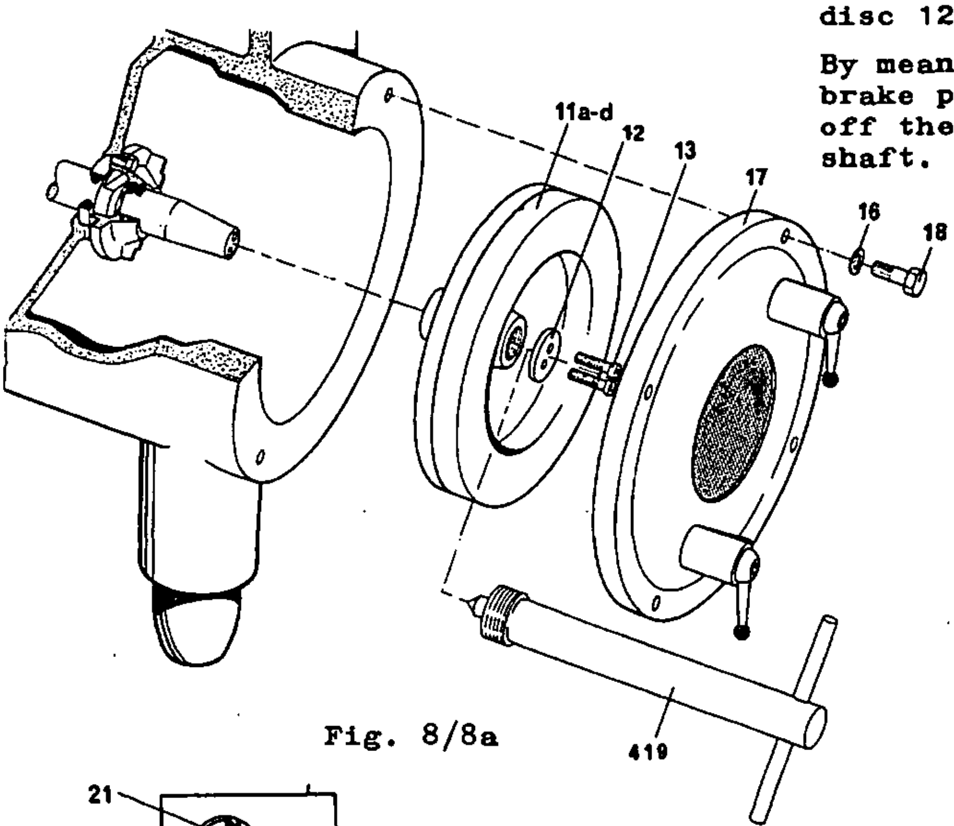
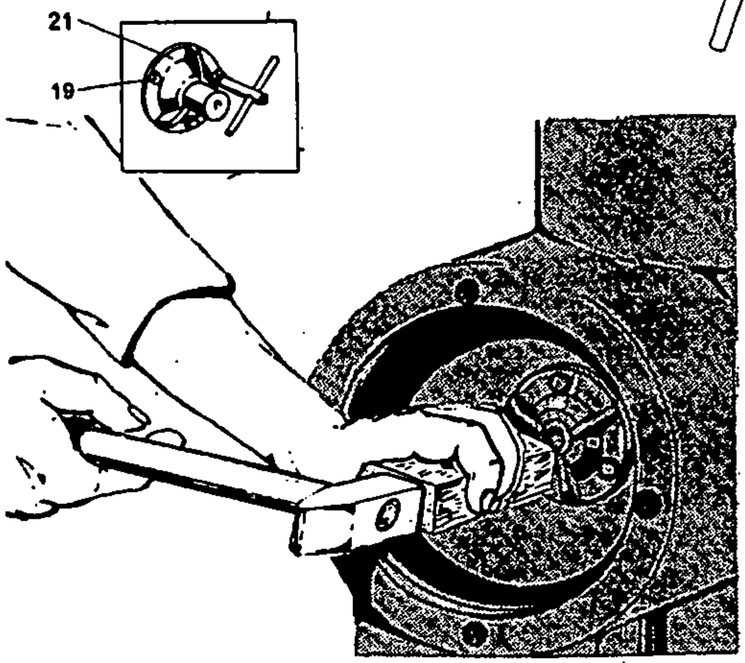


Fig. 8/8a



Remove hex head screws 19 from bearing cover 21 on the brake side (fig. 8/8b). Place a hard wood block against worm wheel shaft end, on motor side and rap gently with a hammer to drive the shaft, along with ball bearing, nut, and bearing cover, towards the brake side. When shaft has completed loosened from ball bearing on motor side, pull it out by hand. While doing so, hold worm wheel to prevent damage to gear teeth. Then take worm wheel assembly with clamp plates out of gear chamber.

Fig. 8/8b

8.5. Re-assembling the horizontal gear parts (fig. 15)

For re-assembly proceed in reverse order of removal (see sect. 8.4) and according to the following instructions:

1) The worm wheel with clamp plates (item 10 in fig. 15) has been balanced in the factory as complete assembly. To avoid unbalance, do NOT exchange component parts separately.

2) When mounting the worm wheel assembly with clamp plates, be sure to push it towards the brake side until it rests against the shoulder of the worm wheel shaft 25. This will ensure correct positioning of the toothed rim with reference to the worm.

3) The worm wheel must be firmly clamped to the worm wheel shaft, - accomplished by tightening screws 10c in the two clamp plates. Tighten the screws crosswise, by single turns, to make sure clamp plates are drawn together evenly.

4) IMPORTANT: When the toothed rim is worn, the entire worm wheel assembly with clamp plates has to be replaced. The worm 5k (fig.14) shall be replaced at the same time, since this part, being worn down as well, would cause premature wear to the new worm wheel.

5) Re-adjust proximity switch 40 with the aid of adjusting ring 439 (fig. 8/9).

6) Before installing the fluid clutch and the brake drum, apply a thin film of grease to the tapered ends of the worm wheel shaft. Then clean and wipe dry the tapered ends with a rag. Clean also inside of hubs of fluid clutch and brake drum very carefully, to assure proper fitting.

7) The fluid clutch and the brake drum must be firmly clamped to the worm wheel shaft. This is accomplished by tightening Allen screws with torque wrench 416 (fig. 20). Tighten the screws consecutively, by single turns. Give the final tightening at 4 - 4.1 mkp on the torque scale. When installing the fluid clutch, be sure to place cup spring 5 under washer. For correct arrangement refer to fig. 15.

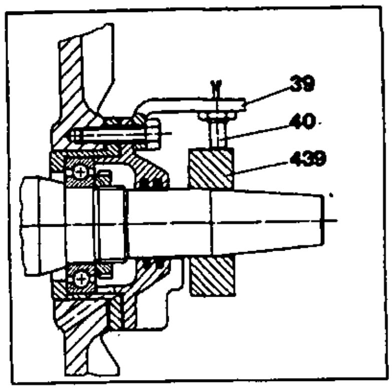


Fig. 8/9

8) When installing the motor, make sure that there is a clearance of 4 mm between cam hub 31 and fluid clutch (fig. 15 or 16). The distance has to be checked after exchanging the motor, the cam hub, the fluid clutch or the worm wheel shaft. If necessary, adjust the distance by displacing the cam hub on the motor shaft and drilling a new hole into the motor shaft for threaded pin 30.

9) Fill gear chamber with the oil specified in sect. 2. Oil level must be slightly above middle of sight glass.

10) To run in new gear parts (worm wheel and worm) let the separator run - without bowl - for about one hour. During this time, switch motor several times on and off.

11) For reasons of safety, replace ball bearings of worm wheel shaft and of worm spindle every 5,000 running hours.

9. The Fluid Clutch

9.1. General

The fluid clutch (Turbo Clutch) gradually brings the bowl to its rated speed, eliminating premature wear on gear parts and on motor. The motor power is transmitted by means of a closed oil circuit between a primary wheel driven by the motor shaft and a secondary wheel driving the worm wheel shaft of the separator.

The oil level in the fluid clutch must be up to the mark of the oil level indicator plate, to ensure that the bowl comes up to its rated speed within its starting time (see sect. 3.3).

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

The oil in the clutch has to be changed every 5,000 working hours. It should be changed when the ball bearings of the worm spindle and of the worm wheel shaft are being replaced.

The clutch requires

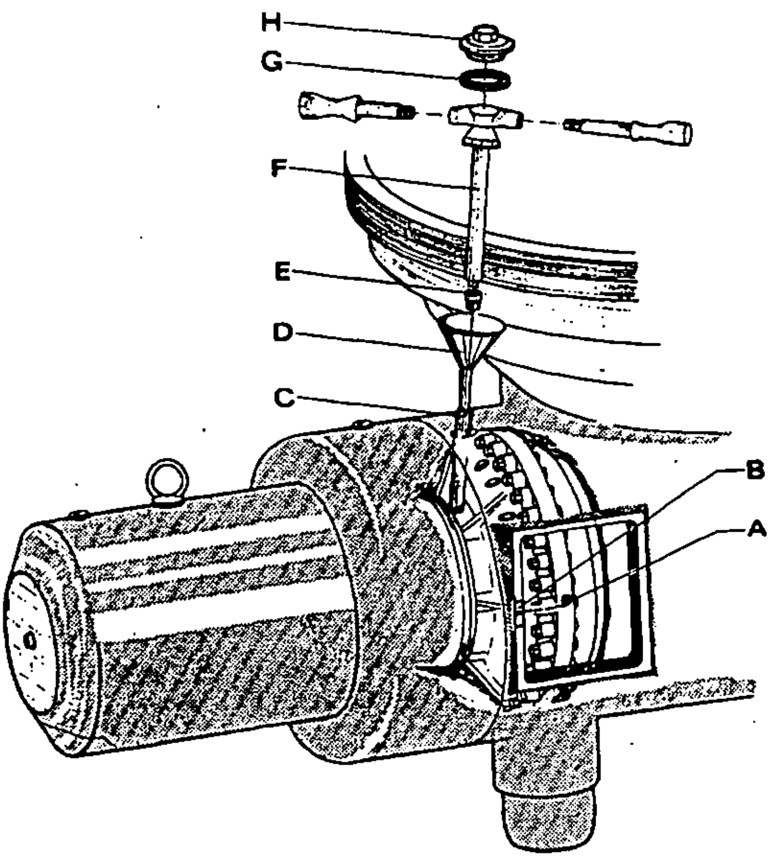
approx. 7.0 litres of oil when using a 1455 rpm motor,
approx. 6.0 litres of oil when using a 1745 rpm motor.

Be sure to use only the type of oil specified in sect. 9.4.

9.2. Checking the oil level

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

Before checking the oil level, make sure oil has cooled down.



Checking the oil level:

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

Fig. 9/1

For checking the oil level, proceed as follows:
Remove the ventilation grid so that the oil level indicator plate can be seen. Bring the clutch into such a position that threaded plug A (fig. 9/1) can be removed without oil flowing out. Unscrew threaded plug with a wrench. Then turn clutch until lower edge of taphole is in line with mark on oil level indicator plate (fig. 9/1). In this position, the oil level in the clutch must be up to the lower edge of the taphole, so that the oil begins to overflow. If this is not the case, refill oil (see 9.3).

9.3. Re-filling of oil (fig. 9/1)

Remove threaded plug H. Loosen oil fill screw E with wrench F. Then take off the handles from the wrench and continue unscrewing the oil fill screw until it comes off. Now thread oil fill pipe C into the oil fill hole, introduce funnel D and pour in oil. Then check oil level (see 9.2) before replacing oil fill screw including gasket. Use wrench F to firmly tighten the oil fill screw.

9.4. Type of oil

For filling the clutch, use only steam turbine oil

Shell Turbo Oil T32

which has proved satisfactory in operation by meeting requirements as regards viscosity, flash point, lubricating properties, compatibility with metals and gaskets, aging, etc.

Two cans, each containing 5 litres of Turbo T32 oil, are furnished with the separator.

If this type of oil is not readily available, steam turbine oils which comply with the following specifications, may be used, however, temporariliy only.

Designation: Lubricating oil TD-L 16 (according to DIN 51515) (steam turbine oil with additives giving increased protection against corrosion and increased resistance to aging).

Kinemat. viscosity:	32 cSt / 40 °C
Density / 15 °C:	max. 0.900 g/ml
Pour point:	≦ -6 °C
Corrosive effect on copper:	max. degree of corrosion 2 (according to DIN 51759)
steel:	no corrosion (according to DIN 51585)
Aging characteristics:	Increase of the neutralization number after 1000 h: max. 2.0 mg KOH/g oil.

Contrary to DIN 51515:

Open flash point according to Cleveland: approx. 220 °C

9.5. Dismantling the fluid clutch (fig. 16)

The fluid clutch should not be dismantled in the site. If damage occurs, the clutch should be returned to the manufacturer for repair to assure correct fitting of the spare parts and, hence, proper functioning of the clutch. In the meantime, a spare clutch can be placed at your disposal.

If however, you decide to remove leakage of the clutch in the site, we recommend to check first sealing 17 because it is more easily accessible than sealing ring 4.
After taking the clutch out of the frame (see 8.4.2) remove screws 19 and lock washers and take off cover 18. Now check sealing ring 17 and replace it when its sealing lip is no more soft and elastic.

If, however, sealing ring 4 or the ball bearings have to be replaced, the clutch has to be dismantled in the following manner:

1) Loosen screw 24 and let oil drain.
2) Undo hexagon nuts 11 and remove them with lock washers 10. Then remove screws 7.
3) Press primary wheel off the clutch casing 8 by threading two of the screws 7 into the tapholes of primary wheel 12.
   IMPORTANT: Bear in mind that the fluid clutch has been balanced in the factory. Therefore, be sure to mark both primary wheel 12 and clutch casing 8 before taking them apart, so that, when being re-assembled, these parts will be brought back into their original position.
4) Press ball bearing 15 out of primary wheel 12.
5) Undo screws 2 and remove cam flange 1.
6) Force secondary hub with secondary wheel 16 out of the clutch casing. Be sure not to damage running surfaces for the sealing rings. See also 9.6. no.6.
7) Screw screws 26 out of the clutch casing and remove oil control ring 25.
8) Press ball bearing 6 and sealing ring 4 out of the clutch casing.

9.6. Re-assembling the fluid clutch (fig. 16)

1) Moisten sealing rings. Press sealing ring 4 into the clutch casing by applying the tool shown in fig. 9/3 and then lightly hitting against bolt B. In order to be able to use the tool for pressing sealing ring 17 into cover 18, screw the bolt B into the other side of the disc. Then proceed in the same way as for sealing ring 4. The tool consisting of disc (part no. 3158-9939-000) and bolt (part no. 3170-9877-010) is supplied on special order only.

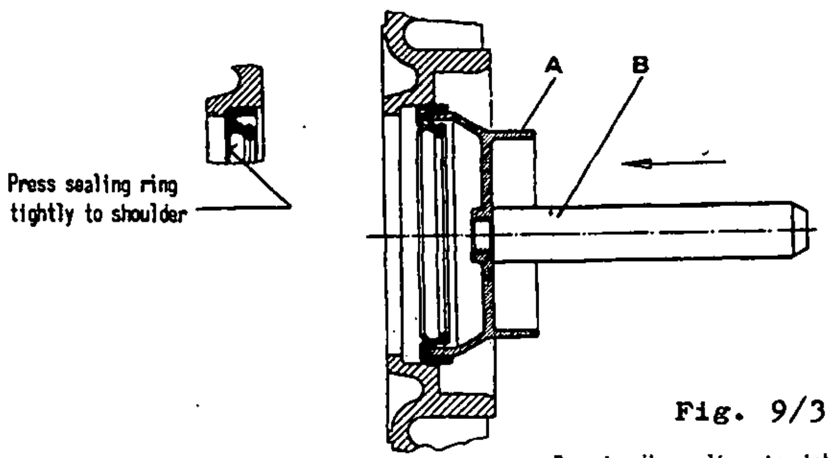


Fig. 9/3

Pressing the sealing ring into clutch casing.

2) Insert spacer ring 5 in clutch casing and spacer ring 13 in primary wheel (fig. 9/4a). The bevelled edge of each ring must snap into the groove of the bearing neck (fig. 9/4b). This will ensure that the spacer rings cannot move axially.

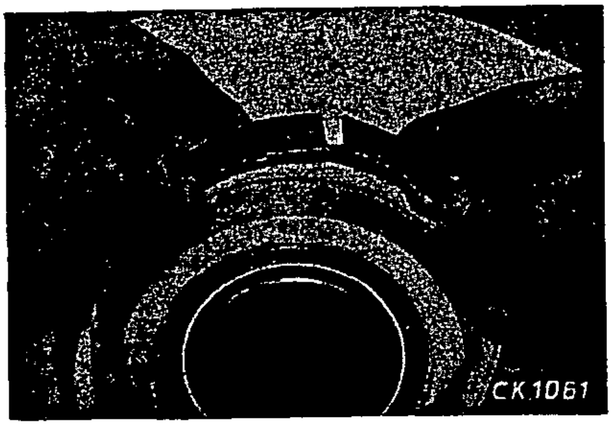


Fig. 9/4a

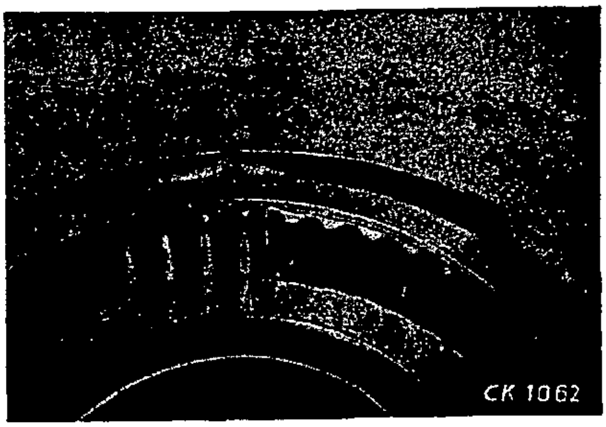


Fig. 9/4b

3) Press ball bearing 6 into clutch casing and ball bearing 15 into primary wheel. Check if the ball bearings pressed into the spacer rings have an absolutely tight fit. If this is not the case, the spacer rings have to be replaced. If necessary, return the clutch to the factory for repair.

4) Apply some oil-resistant sealing compound to oil control ring 25. Then fasten ring to clutch casing with screws 26. Be sure to fit lock washers.

5) Insert gasket 14 in groove of primary wheel. Then fasten cover 18 to primary wheel with screws 19. Be sure to fit spring washers.

6) Press secondary hub with secondary wheel, 16, into clutch casing. IMPORTANT: The surfaces contacting the sealing rings 4 and 17 must be perfectly smooth to ensure oil-tightness of the fluid clutch. If necessary, re-polish contact surfaces.

7) Fasten cam flange 1 to clutch casing with screws 2. Be sure to fit spring washers.

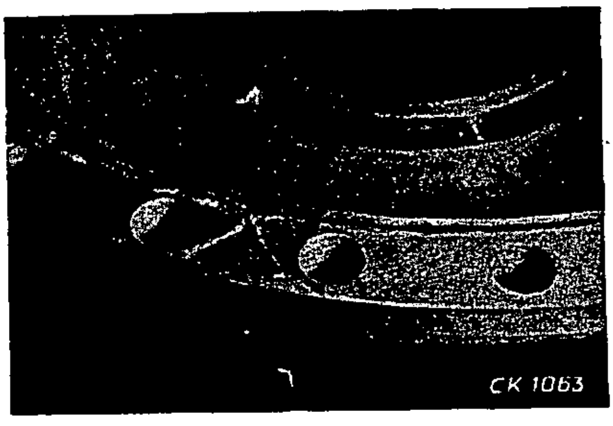


Fig. 9/4c

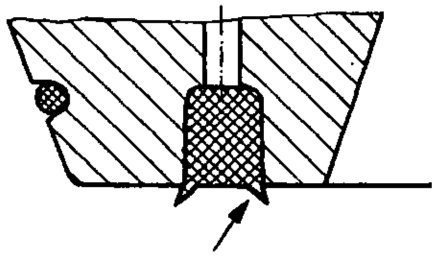
8) Place Teflon packing cord 9 on sealing surface of clutch casing as shown in fig. 9/4c. Make sure cord ends are crossed. To keep the cord in its place coat it with grease. Sealing surfaces of primary wheel and clutch casing must be in perfect condition; they must not be coated with a sealing compound.

9) Press primary wheel on secondary hub so that the marks on primary wheel and on clutch casing are in line (see sect. 9.5, no. 3). Then screw primary wheel and clutch casing together.

10. Trouble Shooting

10.1. General

Troubles	Causes	Remedies
10.1.1. The bowl does not come up to rated speed or takes too long to do so (see 3.3).	1) Brakes are on.	Release brakes by turning handles in clockwise direction.
	2) Motor is incorrectly connected.	Check connection.
	3) Oil level in fluid clutch is too low or clutch is leaking.	Re-fill oil (see 9.3). Re-tighten nuts 11 of screws 7 (fig. 16) on clutch. If sealing rings 4 and 17 do not seal properly, ask for a reconditioned clutch in exchange for your clutch.
	4) Bowl is placed too high or too low and rubs against centripetal pump.	Adjust to correct bowl height (see 8.3).
	5) Clamp plates are not tight enough. Worm wheel slips on shaft.	Tighten long hex head screws on worm wheel evenly and <u>firmly</u>. Tighten crosswise, by single turns.
	6) Feed line is open.	Close feed line.
10.1.2. The bowl speed drops during operation.	1) Oil level in fluid clutch is too low.	Re-fill oil (see 9.3).
	2) Motor speed drops during operation.	Check line voltage and inspect motor.
10.1.3. The bowl comes up to rated speed too quickly (in less than 10 minutes). Motor pulls too high a starting current.	The clutch contains too much oil.	Check oil level (see 9.2 Drain surplus oil.

Troubles	Causes	Remedies
10.1.4. Uneven run of the separator.	1) Incomplete solids ejection. The remaining solids have deposited unevenly in the bowl. 	De-sludge the bowl several times (6.2.2). If this does not improve conditions, close the bowl and fill it with water to attenuate the increased vibrations occurring during slowing-down of the bowl. Stop the separator and apply brakes. If bowl is leaking, leave feed open. Clean bowl thoroughly. Remove protruding edges of bowl gaskets with a knife (see sketch).
	2) Bowl is incorrectly assembled or if the plant has several separators, parts of different bowls may have been interchanged.	Check and assemble bowl properly (see 4.1).
	3) Pressure in disc stack has slackened.	Check if bowl lock ring is screwed in tightly (see sect. 4.1, No. 15). Check disc count. If necessary, add spare disc.
	4) Bowl is damaged and, therefore, out of balance.	Send bowl to factory or authorized factory repair shop. Do NOT attempt to make your own repairs. Never weld or solder. Bowl is made of heat-treated steels.
	5) Neck bearing springs are weak or broken.	Replace all nine neck bearing springs.
	6) Ball bearings are worn.	Replace damaged bearings. __IMPORTANT:__ As spindle bearings use only ball bearings with increased accuracy of running (see Parts List).

Troubles	Causes	Remedies
10.1.4. Uneven run of the separator (cont'd.).	7) Gear parts are in bad condition as a result of 1. normal wear, 2. premature wear caused by a) lack of oil, b) oil of too low a viscosity, (in general recognizable by blue tempering colour of gear parts) c) metal abrasives present in the oil due to the following possible causes: - viscosity of oil is too low, - oil has not been changed in time, - gear chamber has not been cleaned, d) replacement of one gear part only, instead of both parts, e) infiltration of water because shut-off valves D and F (fig. 5/3) for sealing water were open for a longer period during shut-down of the separator.	Clean gear chamber thoroughly. Replace damaged gear parts: see 8.2, No.6 and 8.5, No. 4. Change the oil (see sect. 2). If necessary, change oil more often. Regarding <u>infiltration of water</u>, the following should be kept in mind: During shut-down of the separator, the shut-off valves D and F must always be kept closed.
10.1.5. Bowl lock ring is difficult to loosen.	Bowl has not been dismantled at regular intervals (see page 0/3, No.10).	Unscrewing of the bowl lock ring can be very much facilitated by blocking the bowl, which is accomplished by putting wedges between bowl bottom and sediment collector

10.2. Bowl performance

Troubles	Causes	Remedies
10.2.1. The bowl does not close at all. IMPORTANT: In this case switch off feed pump immediately.	1) The amount of sealing water fed to the bowl is insufficient because a) the water pressure in the supply line to the operating-water connection is too low (see 5.3.3), b) the water discharge holes in the top of the operating-water feed 15 (fig.13/1) are clogged with scale.	a) Check water pressure in the supply line which should be 1.5 bar. The pressure reducer shall be adjusted to 1 bar (for adjustment refer to sect. 5.3). After switching on the timing unit and after each de-sludging procedure the sealing-water valve is open for 60 seconds. During this time the amount of discharging sealing water should be measured at the operating-water discharge. The sealing water must discharge at a rate of 550 l/h. Opening of the sealing-water valve for measuring can be repeated by operating the main switch of the timing unit. b) Clean discharge holes.
	2) Gasket 38 (fig. 13/1) is damaged or not inserted.	Replace or insert gasket.
	3) Strainer G (fig. 5/3) is dirty.	Clean strainer.
	4) Gaskets of piston valve 3 (fig. 19) are damaged.	Remove valve (see 4.5) and install new gaskets.
	5) Solenoid valve A (fig. 5/3) does not function properly, because the diaphragm has become brittle and, therefore, fails to seal properly.	Install a new diaphragm. Make sure that hole on outer rim of diaphragm lies over hole of valve housing.
	6) Rapid-closing valve F (fig. 5/3) is damaged. There is a continuous flow of opening water to the bowl.	Install a new rapid-closing valve.
	7) Gasket 5 (fig. 19) in sliding piston is damaged or its edges have been frayed through the up and down movement of the piston.	Replace damaged gasket. If, however, only the edges of the gasket are frayed and the gasket is not damaged otherwise, it can be re-used after grinding it off with an emery wheel.
	8) The operating-water feed is clogged.	Clean operating-water feed.

Troubles	Causes	Remedies
10.2.2. The bowl does not close and open properly.	1) Gasket 5 (fig. 19) in sliding piston does not fit properly at all points of the guide surfaces, thus failing to seal properly.	If necessary, stretch gasket. Before installing the gasket, lightly grease groove in sliding piston (see 4.1, No. 6).
	2) Gasket 15 (fig. 19) in bowl top is damaged.	Replace gasket (see 4.4).
	3) Gasket 10 (fig. 19) has not been inserted into hub of bowl bottom.	Insert gasket.
	4) Gasket 5 (fig. 19) in sliding piston is uneven in height.	Replace gasket. The difference in height on a gasket must not exceed 0.25 mm.
	5) The sealing surface of the sliding piston 4 (fig. 19) is damaged.	Exchange the sliding piston.
10.2.3. The bowl does not open at all or not completely.	1) Dirt or rubber particles have settled between sliding piston and bowl bottom.	Clean bowl parts. Round off edges of gaskets. Replace damaged gaskets. Grease guide surfaces with the special lubricating paste supplied.
	2) Sealing chamber 3 (fig. 5/1a) is soiled.	Remove sliding piston 4 and clean sealing chamber
	3) The boreholes in piston valve are clogged.	Remove the valve (see 4.5) and clean it.

LIST OF PARTS

IMPORTANT!

When ordering parts, please state the following:

1) Model 2) Serial-No.	of the Separator: Both designations are shown on the name-plate of the separator. The Serial-No. also appears on the rim of the sludge collector.
3) Description 4) Part-No.	of the part to be replaced: For details, see List of Parts. The Part-No. is also shown on all major parts.
5) Bowl Serial-No.	(only required when ordering bowl parts): The Bowl Serial-No. appears, in large figures, on bowl lock ring and on bowl bottom.

Part-Nos. ending with letter "L" (e.g. 3158-1021-L) designate parts which are available in different designs for the separator concerned. To ensure correct delivery of these parts, Model and Serial-No. of the Separator MUST be stated.

Frame and Hood

No. in Fig.	Part - No.	Qty.	Part Description
-	3170-1020-010	1	Foundation frame assembly (1a-c)
1a	3170-1003-010	1	Foundation frame
1b	0026-2031-300	4	Cap
1c	3157-1033-000	4	Bolt
-	2315-1015-010	4	Foot assembly (2a-c)
2a	2315-1011-000	4	Foot, stainless steel coated
2b	0019-6387-400	4	Threaded pin M 12x28 DIN 915
2c	0021-3018-750	4	Rubber cushion
3	0001-0516-300	4	Flange
4	0019-6937-400	12	Hex head screw M 10x30 DIN 933
5	1166-1006-030	1	Lower section of frame
5a	0018-3955-300	1	Cone connection D50 DIN 11851
5b	0013-2845-300	1	Grooved coupling nut F50 DIN 11851
5c	0007-2211-750	1	Gasket G50 DIN 11851
6	0007-2954-750	1	Gasket 590/4
7	0019-7036-400	8	Hex head screw M 16x35 DIN 933
8	0004-2290-400	8	Gasket 16,7/24x1,5
9	0007-2113-750	1	Gasket 94/104x6
10	1167-1045-000	1	Pipe connection
11	0019-6968-300	3	Hex head screw M 12x25 DIN 933
12	0007-2571-750	1	Gasket 297/4
13	0026-1325-300	8	Lock washer B8 DIN 127
14	0019-6122-400	8	Allen screw M8x20 DIN 912
15	1168-1219-000	1	Operating-water feeding device
16	1168-1018-010	1	Sediment collector
17	0007-2580-750	1	Gasket 42/2.5
18	1166-1183-000	1	Plug
19	0013-0404-400	2	Cap nut M8 DIN 1587
20	0007-2320-750	1	Gasket 45/55x5
21	0007-2803-840	1	Gasket 770/788x9.8
22	0019-0840-400	1	Oil drain screw
23	0004-5037-710	1	Gasket 38/50x1.5
24	0001-0022-400	1	Sight glass frame
25	0019-6845-400	3	Hex head screw M 6x25 DIN 933
26	0001-0027-830	1	Sight glass
26a	0004-5406-750	1	Gasket 110x3
26b	0004-5056-740	1	Gasket 70/80x2
27	0026-1371-400	4	Washer 13 DIN 125
28	0019-6970-400	4	Hex head screw M 12x30 DIN 933
29	3050-1085-010	1	Ventilation grid
30	0019-6966-400	4	Hex head screw M 12x20 DIN 933
31	0026-1375-300	4	Washer
32a	0001-0925-870	1	Sight glass
32b	1166-1157-020	1	Ring
33	0007-2229-750	1	Gasket 40/48x5
34	0019-1748-400	1	Plug
35	0004-5762-700	2	Gasket 273/322x2
36	0007-2208-750	2	Gasket G 25 DIN 11851
37	1167-1074-000	1	Bush
38	0007-2521-750	2	Gasket G15 DIN 11851
39	1168-1074-000	1	Bush
-	1175-7759-000	1	Hood assembly (41a-41n)
41a	0004-2364-758	1	Packing cord 8x8x3300
41b	0019-6970-400	8	Hex head screw M 12x30 DIN 933
-	0026-0165-400	4	Washer 13 DIN 433
41c	1168-7765-000	1	Hood
41d	0007-2262-750	1	Gasket 45/57x6
41f	1165-1061-000	1	Inspection cover
41g	0013-0405-400	2	Cap nut M10 DIN 1587
41h	0013-0406-400	4	Cap nut M12 DIN 1587
41k	1165-2775-000	1	Siphon
41m	0013-2842-300	1	Grooved coupling nut F25 DIN 11851
41n	0007-2208-750	1	Gasket G 25 DIN 11851

Frame and Hood

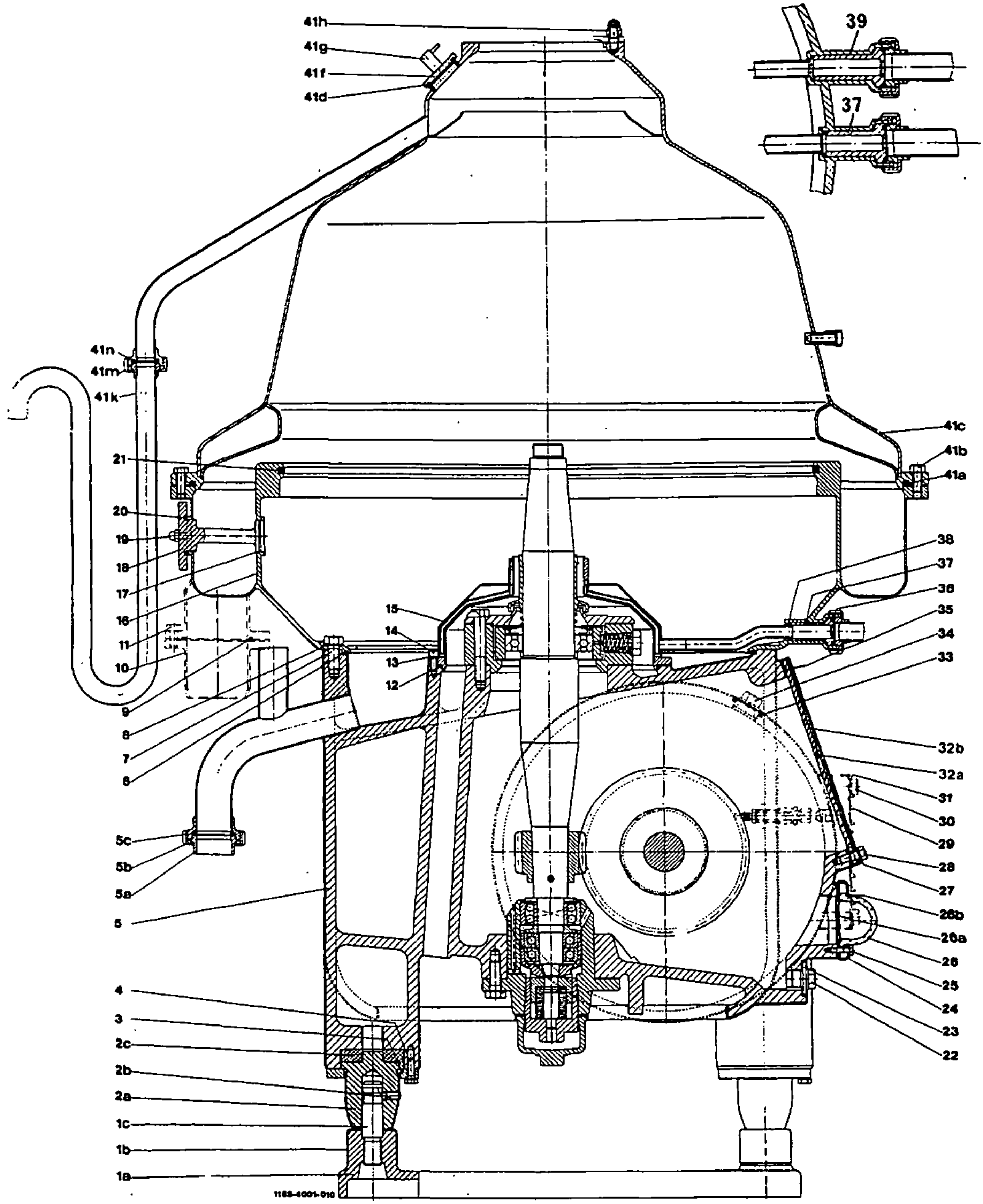


Fig. 13/1

Vertical Gear Parts (f=50 cycles)

No. in Fig.	Part - No.	Qty.		Part Description
1	0010-8003-210	1		Bottom bearing cap
2	0004-2221-740	1		Gasket 80/108x2
3	0019-7038-150	4		Hex head screw M 16x45 DIN 933
4	0026-5894-600	4		Tab washer 17 DIN 93
-	1166-3429-030	1		Worm spindle assembly (5a-t)
5a	0010-8012-020	1		Bottom bearing pressure housing
5b	0011-7307-100	2		Angular contact ball bearing 7307 BGM/P6 DIN 628
5c	0026-2109-170	1		Snap ring
5d	0008-4008-030	1		Ball bearing protection ring
5f	0011-2308-120	1		Pendulum ball bearing 2308 M/P6 DIN 630
5g	0008-4008-020	1		Ball bearing protection ring
5h	0026-1563-120	1		Cylindrical notched pin 10x70 DIN 1473
5k	1166-3423-000	1	*	Worm
5m	1166-3410-000	1		Spindle
5n	0008-7512-010	1		Ring
5p	0011-6215-110	1		Grooved ball bearing 6215 / P6 DIN 625
5r	0008-7508-000	1		Ball bearing protection ring
5s	0006-4311-160	1		Cylindrical pressure spring
5t	0008-7501-640	1		Spindle cap
6	0010-8002-040	1		Bottom bearing threaded piece
7	0006-4440-160	1		Spring column
8	0010-8001-200	1		Bottom bearing pressure piece
9	0004-5793-770	1		Gasket 130/204 x 0.3
10	3050-1112-020	1		Bottom bearing housing
-	0008-7500-010	1		Neck bearing bridge assembly with covering (11a-p)
11a	0008-7509-000	1		Distance ring
11b	0004-5851-770	1		Gasket 176/235 x 0.3
-	0008-7510-000	1		Neck bearing bridge assembly (11c-h)
11c	0008-7507-020	1		Pressure ring
11d	0008-7506-030	1		Neck bearing bridge
11f	0019-1423-030	9		Threaded plug
11g	0006-4380-090	1		Set of neck bearing springs
11h	0026-2220-110	9		Spring piston
11k	0004-5854-770	1		Gasket 167/250 x 0.3
11m	0008-7502-050	1		Protection cap
11n	0026-5894-600	3		Tab washer 17 DIN 93
11p	0019-6616-150	3		Hex head screw M 16x100 DIN 931

* When worm 5k is worn and needs replacement, the worm wheel assembly with clamp plates 10 (fig. 15) shall be replaced at the same time, since this part, being worn down as well, would cause premature wear to the new worm.

Vertical Gear Parts

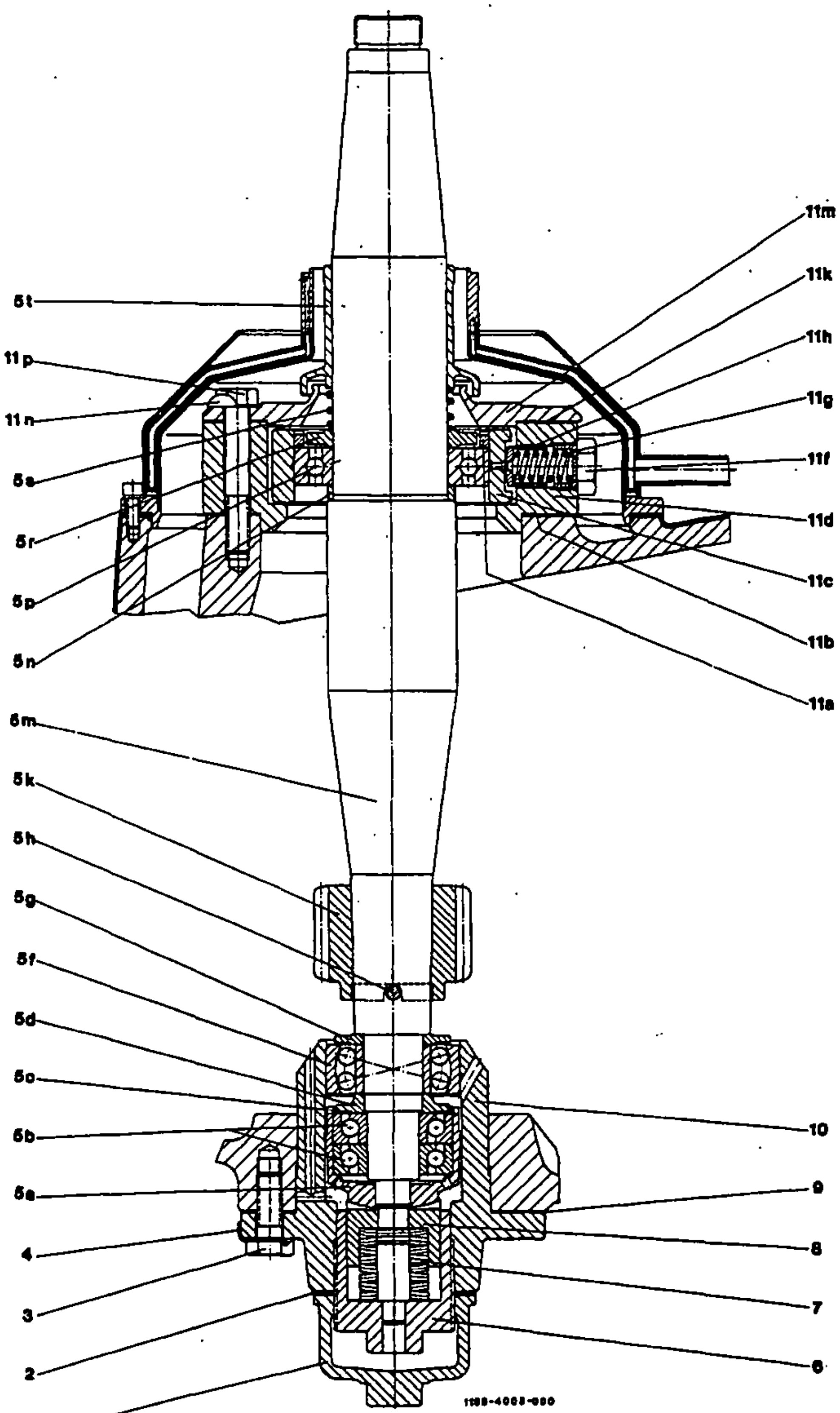


Fig. 14

Horizontal Gear Parts (f = 50 cycles)

No. in Fig.	Part - No.	Qty.	Part Description
1	5970-L	1	*Motor
-	1166-1021- L	1	Flange assembly (2a-m)
2a	0013-0282-400	4	Hexagon nut M 16 DIN 934
2b	0026-1330-190	4	Lock washer A 16 DIN 127
2c	0007-2501-750	2	Gasket 23/3
2d	0005-0226-300	2	Plug Pg 21
2f	0019-7727-090	4	Stud M 16x45 DIN 939
2g	0019-6839-300	8	Hex head screw M 6x10 DIN 933
2h	1080-1475-060	1	Cover
2k	1166-1028- L	1	Flange
2m	0019-6202-150	8	Allen screw M 16x45 DIN 912
3	0019-6150-150	3	Allen screw M 10x55 DIN 912
4	0026-1640-030	1	Centering disc
5	0006-4404-010	1	Cup spring
6	3050-3375-010	1	Bearing cover
7	0019-6938-150	3	Hex head screw M 10x35 DIN 933
8	0004-1850-740	2	Gasket 99/140x1
9	1166-3131-000	2	Bearing housing
10	1166-3449-020	1	Worm wheel assembly with clamp plates
10a	1166-3447-000	1	** Clamp plate with toothing
10b	1166-3446-000	1	** Clamp plate
10c	0019-6525-150	4	** Hex head screw M 10x110 DIN 931
-	1166-3368-020	1	Brake drum assembly (11a-d)
11a	0019-6144-150	6	Allen screw M 10x25 DIN 912
11b	0026-1337-190	6	Lock washer A10 DIN 127
11c	1166-3371-030	1	Brake drum
11d	3170-3371-000	1	Brake ring
12	0026-0405-030	1	Washer
13	0019-6150-150	2	Allen screw M 10x55 DIN 912
14	0019-9063-150	2	Threaded pin AM 8x10 DIN 916
-	3170-1043-000	2	Brake assembly (15a-f)
15a	0021-3514-300	2	Brake handle
15b	3170-1031-000	2	Brake bolt (with brake lining)
15c	0021-3537-300	2	Brake housing
15d	0006-4208-160	2	Cylindrical pressure spring
15f	0021-4096-850	2	Brake lining
-	0026-1263-550	8	Countersunk rivet
16	0026-1353-400	4	Washer
17	3170-1065-010	1	Cover
18	0019-6608-400	4	Hex head screw M 16x60 DIN 931
19	0019-6512-150	3	Hex head screw M 10x40 DIN 931 - 8.8
20	0004-1956-830	2	Felt ring 45 DIN 5419
21	3170-3375-000	1	Bearing cover
22	0004-1822-740	1	Gasket 90/140 x 1
23	0013-0448-090	1	Grooved nut M50x1.5 SKF/KM10
24	0011-6210-000	1	Grooved ball bearing 6210 DIN 625
25	1166-3400-000	1	Worm wheel shaft
26	0011-6210-000	1	Grooved ball bearing 6210 DIN 625
27	0004-1822-740	1	Gasket 90/140 x 1
29	see page 16/1	1	Fluid clutch (see fig. 16)
30	0019-8984-150	1	Threaded pin M 10x25 DIN 914
31	3158-3389- L.	1	Cam hub
32	3158-3282-000	1	Cam ring
33	0019-2507-400	1	Lens head screw AM 6x10 DIN 85
34	0018-1276-400	1	Pipe clamp
35	0018-0585-848	1	Pipe
36	1166-3710-000	1	Nozzle
37	0026-1369-030	2	Washer
38	0004-1957-830	2	Felt ring 50 DIN 5419
39	1168-1192-000	1	Angular bracket
40	0005-0964-000	1	Proximity switch

* When ordering this part, please state also voltage and frequency.

** This part is included in worm wheel assembly with clamp plates 10, but it is also available as separate item. When worm wheel is worn and needs replacement, it is recommended to replace the worm 5k (fig. 14) at the same time (see sect. 8.5, No. 4).

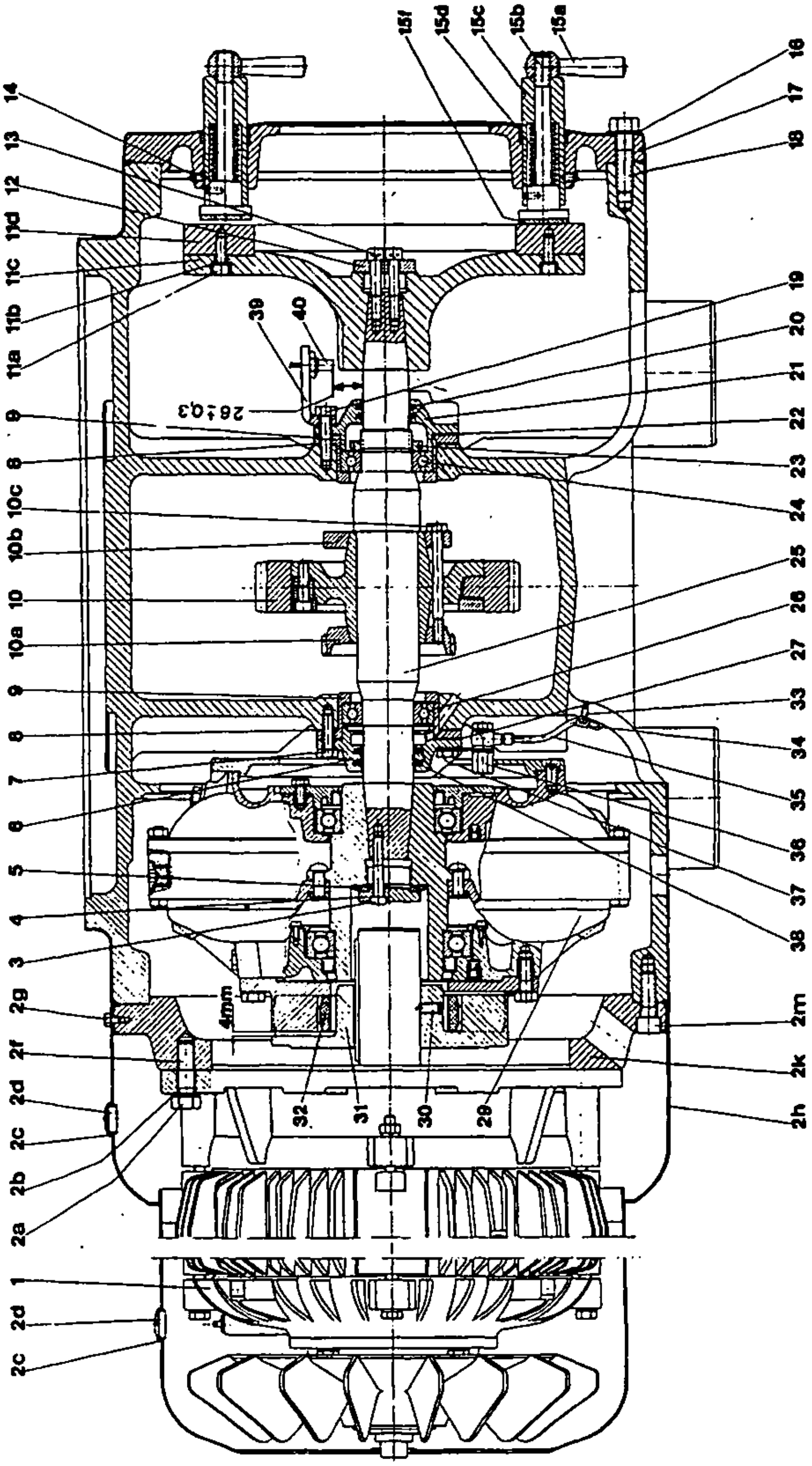

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Fig. 15

Pneumatic Brake

(on special order only)

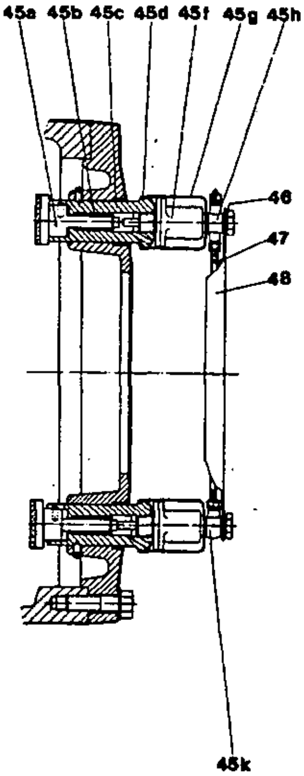

Fig. 15/1

No. in Fig.	Part - No.	Qty.	Part Description
45a	1166-1031-000	2	Brake bolt (with lining), complete
-	0021-4096-850	2	* Brake lining
-	0026-1263-550	8	* Countersunk rivet
45b	0006-4120-300	2	Cylindrical pressure spring
45c	0021-3555-300	2	Brake housing
45d	0007-2580-750	2	Gasket 42/2.5
45f	0021-3690-010	2	Compressed-air cylinder
45g	0026-2144-400	2	Cap
45h	0018-3740-640	1	T-type hose connection R 1/4"
45k	0018-3730-640	1	Angular hose connection R 1/4"
46	0004-2245-770	2	Gasket 15/21x0.25
47	0018-0585-848	1	Pipe
48	1166-1044-000	1	Protecting sheet

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

Fluid Clutch

No. in Fig.	Part - No.	Qty.		Part Description
-	1166-3280-020	1		Fluid clutch assembly (1-32) (see also fig. 15, No. 29)
1	-	1	*	Cam flange
2	-	8	**	Hex head screw M 12x35 DIN 931
3	-	8	**	Spring washer B 12 DIN 137
4	0004-2913-830	1		Sealing ring 105x130x13
5	0026-0182-170	1		Spacer ring ANS 160x26
6	0011-6021-400	1		Grooved ball bearing 6021 M /C4 DIN 625
7	-	36	**	Hex head screw M 10x70 DIN 931
8	-	1	*	Clutch casing 470 Ø
9	0004-2385-858	1		Packing cord 1 mm Ø, 1400 long
10	0026-0771-170	36		Spring washer B 10 DIN 137
11	-	36	**	Hexagon nut M 10 DIN 934
12	-	1	*	Primary wheel 470 Ø
13	0026-0180-170	1		Spacer ring AN 140x24
14	0007-2944-830	1		Gasket 140/3 Ø
15	0011-6018-400	1		Grooved ball bearing 6018 M/C4 DIN 625
16	-	1	*	Secondary hub with secondary wheel 425 Ø
17	0004-2912-830	1		Sealing ring 90x110x13
18	-	1	**	Sealing ring cover
19	-	8	**	Hex head screw M 8x20 DIN 933
20	0026-0770-170	8		Spring washer B 8 DIN 137
21	0004-2144-280	2		Gasket 22/29 Ø x 1,5
22	-	1	**	Lock screw M 22x1,5x20
23	0004-2131-280	1		Gasket 18/24 Ø x 1,5
24	0019-1490-000	1		Threaded plug M 18x1,5x15
25	3158-3287-010	1		Oil control ring 119/192 Ø x 4,5
26	-	8	**	Cylindrical screw AM 5x15 DIN 84
27	-	8	**	Lock washer 5 DIN 7980
29	0019-1551-090	1		Oil fill screw M 22x1,5
30	0019-8385-150	4		Cylindrical screw M 12x25 DIN 7984
31	0007-2035-750	1		Gasket 280/3
32	1166-3367-000	1		Ring

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

** Instead of part-number state item-number (see first column).

Fluid Clutch

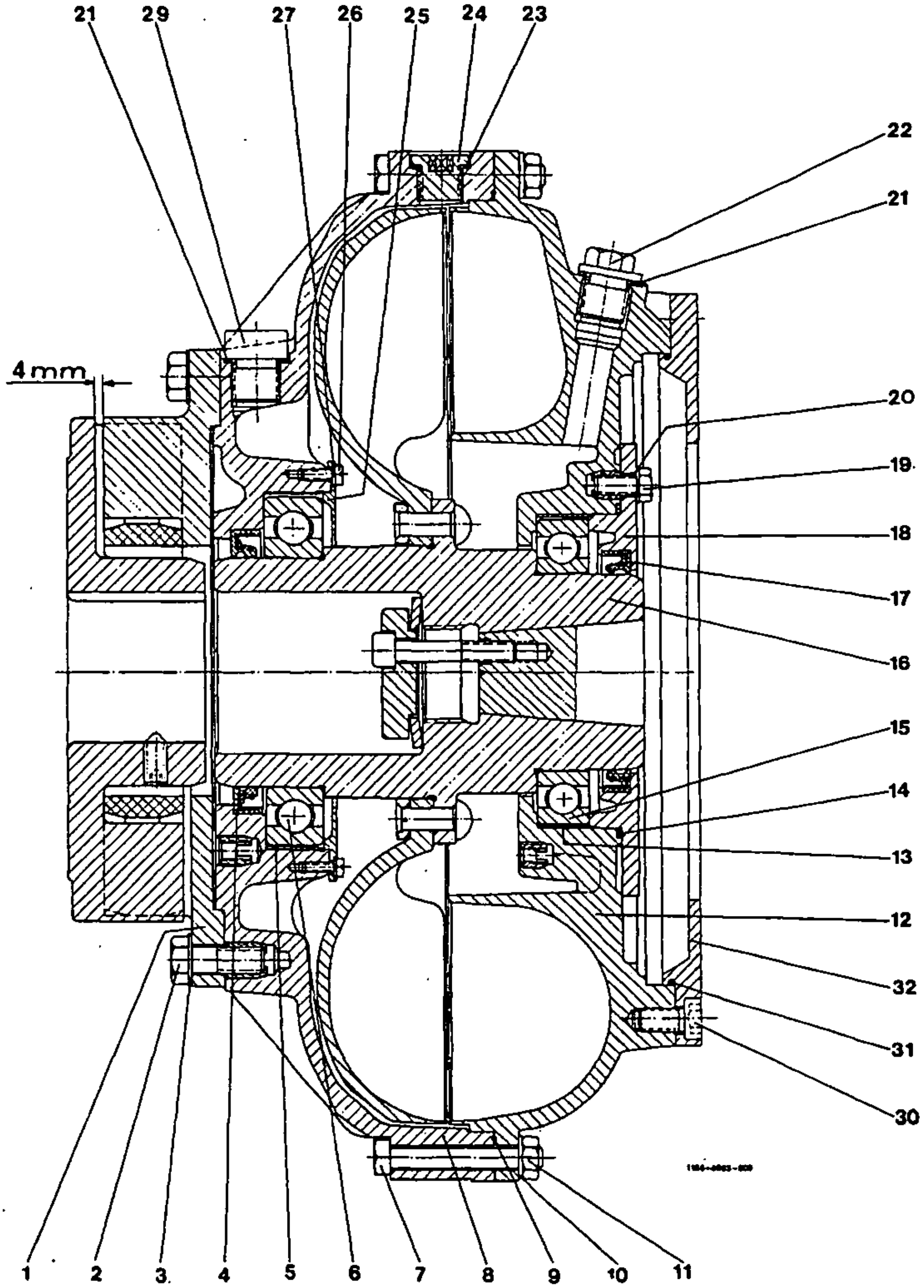

Fig. 16

Operating-water connection

No. in Fig.	Part - No.	Qty.		Part Description
-	8134-2100-280	1		Operating-water connection with protecting case (1-27, 36-41)
1	0013-2842-300	1		Grooved coupling nut F 25 DIN 11851
2	0018-3939-300	1		Cone connection D 25 DIN 11851
3	0007-2208-750	4		Gasket G 25 DIN 11851
-	8134-2201-010	1		Pipe line assembly (4a-d)
4a	0018-4502-300	1		Threaded connection 25/R1"
4b	0018-2525-640	1		Strainer R 1"
4c	0018-1609-300	1		Bend
4d	0013-2842-300	1		Grooved coupling nut
5	0018-4086-400	3		Threaded connection 25/R 1"
6	0018-1741-000	1		Pressure-reducing valve, complete
6a		2	*	Gasket
6b		2	*	Threaded connection
6c		2	*	Coupling nut
6d	0001-0299-610	2	*	Pressure gauge
7	3014-2166-000	1		Connection pipe
8	0019-0137-300	1		Hex head screw R 1/4" x 12
9	0004-5268-880	2		Gasket 13/19x1.5
10	8134-2195-000	1		Connection piece
11	0018-0961-300	3		Double nipple 3/8"
12	0018-3711-600	3		Solenoid valve 3/8"
13	0018-3465-400	2		Screw coupling DL 8 DIN 2353
14	0018-1870-010	1		Low-pressure hose
15	0018-3854-300	4		Connection piece 10/R3/8"
16	0013-2818-400	4		Hexagon coupling nut R 3/4"
17	0007-2230-750	4		Gasket 15.5/21.5x4
18	0018-4645-300	2		Threaded connection R 3/4"/R 3/8"
19	0018-4646-300	2		Threaded connection R 3/4"/R 1/2"
20	0018-1710-640	2		Ball valve 1/2"
21	0018-1788-300	2		Reducing nipple 1/2" / 3/8"
22	8134-2201-040	1		Pipe line
23	0007-2402-750	2		Gasket 17/23x3
24	0018-4645-300	1		Threaded connection R 3/4" / R 3/8"
25	8134-2193-110	1		Connection piece
26	0018-1299-640	2		Upper part of valve 1/2" DIN 3519, complete
26a	0004-5276-710	2	*	Gasket 22/26x1
27	0001-0299-610	2		Pressure gauge
-	8134-2355-020	1		Protecting case
-	0005-3355-630	1		Spiral hose coupling Pg 9
-	1165-2350-000	1		Pressure switch, complete (30-31)
30	0018-1870-000	1		Low-pressure hose, complete
30a	0018-3465-400	1	*	Screw coupling DL 8 DIN 2353 R 1/4"
30b	0018-3560-400	1	*	Screw coupling DL 8 R 3/8"
31	0005-0675-900	1		Pressure switch F5
32	1166-3308-000	1		Threaded piece
33	0007-2184-750	1		Gasket 15/22x3
34	0013-1023-250	1		Nut 3/8" - P4 DIN 2950
35	0018-3725-600	1		Hose coupling R 1/4" / 4x6
36	0005-3358-630	1		Spiral hose coupling Pg 9
37	0019-2376-630	2		Fillister head screw AM 4x16 DIN 84
38	0005-0862-900	1		Junction box
39	0005-0222-630	1		Plug Pg9
40	0005-0203-630	1		Cable gland C4 Pg 11x6-9 DIN 46320
41	0005-0772-608	1		Protective hose

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

Operating-water Connection

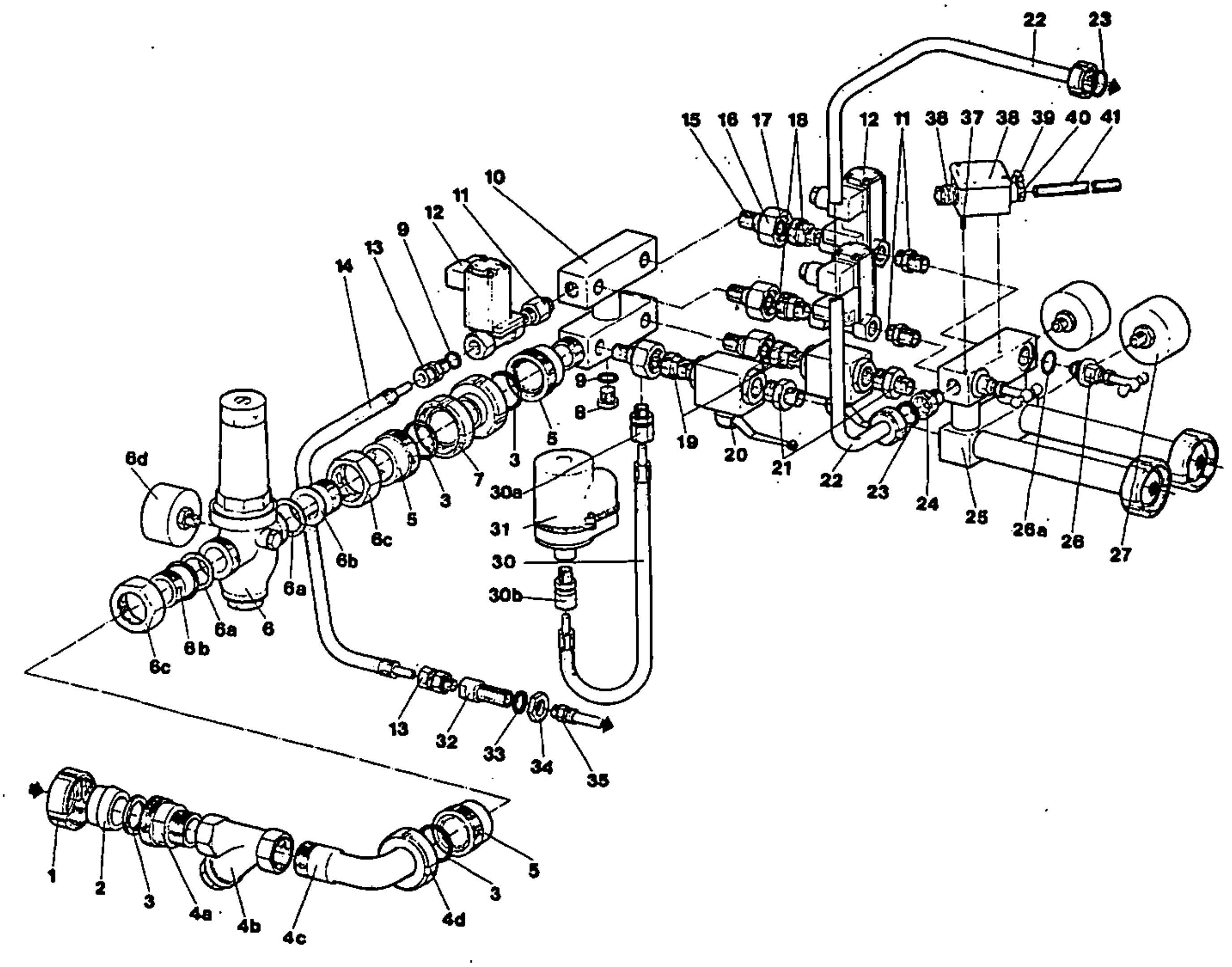

Fig. 17/1

Solenoid Valve R 3/8"

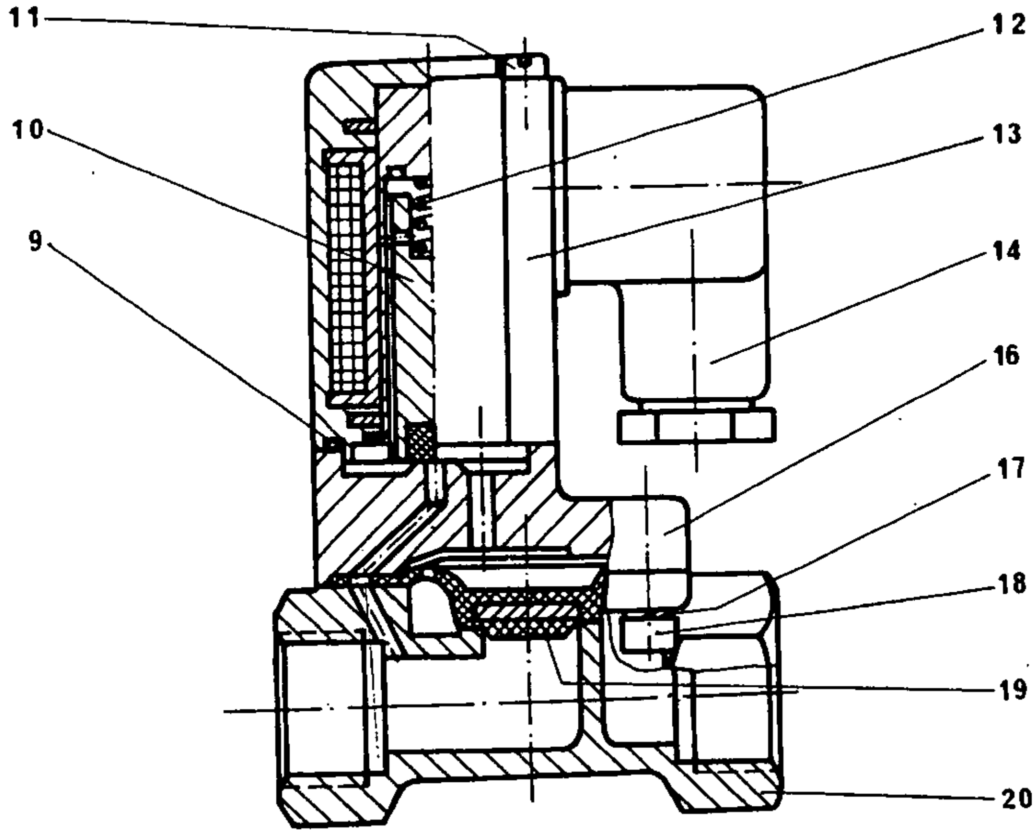

Fig. 17/2

No. in Fig.	Part - No.	Qty.	Part Description
-	0018-3711-600	1	Solenoid valve, complete (9-20)
9	0007-1946-750	1	Gasket 25/1.5
10	0018-3710-040	1	Solenoid core
11	0019-2387-400	4	Cylindrical screw M 4x55 DIN 84
12	0006-4079-300	1	Pressure spring
13	0018-3710-800	1	Solenoid head 50/60 Hz
14	0018-3710-050	1	Coupler socket
15			
16	0018-3711-070	1	Valve cover
17	0026-1322-170	4	Lock washer A4 DIN 127
18	0019-6077-400	4	Allen screw M 4x10 DIN 912
19	0018-3711-750	1	Diaphragm
20	0018-3711-080	1	Valve housing

Feed and Discharge Connections and Centripetal Pump

No. in Fig.	Part - No.	Qty.	Part Description
-	1175-2213-000	1	Double centripetal pump, complete (1a-k)
1a	1175-2246-000	1	Feed tube
1b	0007-1936-750	2	Gasket 29.2/3
1c	1175-2241-000	1	Lower centripetal pump 150 dia. (up to max. 5 bar)
1d	0007-1944-750	1	Gasket 44.2/3
1f	1175-2252-000	1	Upper centripetal pump 150 dia. (up to max. 5 bar)
1g	0007-2929-750	1	Gasket 55.2/3
1h	0007-2925-750	3	Gasket 36.2/3
1k	0007-2211-750	1	Gasket G50 DIN 11851
-	1175-2296-000	1	Feed and discharge connections, compl. (2-10f)
2	1175-2217-000	1	Disc
3	1175-2301-000	1	Feed and discharge housing
4	0007-2210-750	2	Gasket G40 DIN 11851
5	0007-2211-750	1	Gasket G50 DIN 11851
7	8918-2100-050	1	Pressure gauge
8	see special IM	1	Constant pressure valve
-	8021-2000-150	1	Flowmeter, complete (9a-10f)
9a	8021-2012-000	1	Float
9b	8021-2001-190	1	Inlet cup
9c	0013-2846-300	1	Grooved coupling nut F65 DIN 11851
9d	0007-2279-750	1	Gasket 56/68x6
9f	8021-2003-120	1	Outlet pipe
9g	0007-2298-750	2	Gasket 13.5/22x10
9h	0013-3010-300	1	Nut M33x1.5
9k	0026-1375-300	1	Washer
9m	0019-1380-300	1	Threaded bush
9n	0001-0083-820	1	Cylindrical sight glass
9p	0004-5261-720	2	Gasket 4.8/9.0x1
9r	0019-2478-300	2	Cheese head screw M4x8 DIN 85
9s	8021-2017-000	1	Scale 700 - 4,000 l/h
9t	8020-2002-000	1	Intermediate piece
9v	0019-1732-400	1	Handle screw
9w	0007-2210-750	1	Gasket G40 DIN 11851
9x	0007-2285-750	2	Gasket 22/32x5
9y	0026-5508-300	1	Washer
9z	0026-1445-300	1	Snap ring
-	1072-2273-020	1	Stuffing box, complete (10a-f)
10a	1072-2279-020	1	Round-slide valve
10b	1072-2284-000	1	Stuffing box housing
10c	0019-1590-610	1	Threaded bolt
10d	0026-1062-400	1	Cylindrical pin
10f	0021-3096-300	1	Handle
11	0018-3949-300	1	Cone connection D40 DIN 11851
12	0013-2844-300	1	Grooved coupling nut F40 DIN 11851
13	0013-2845-300	2	Grooved coupling nut F50 DIN 11851
14	0018-3955-300	2	Cone connection D50 DIN 11851

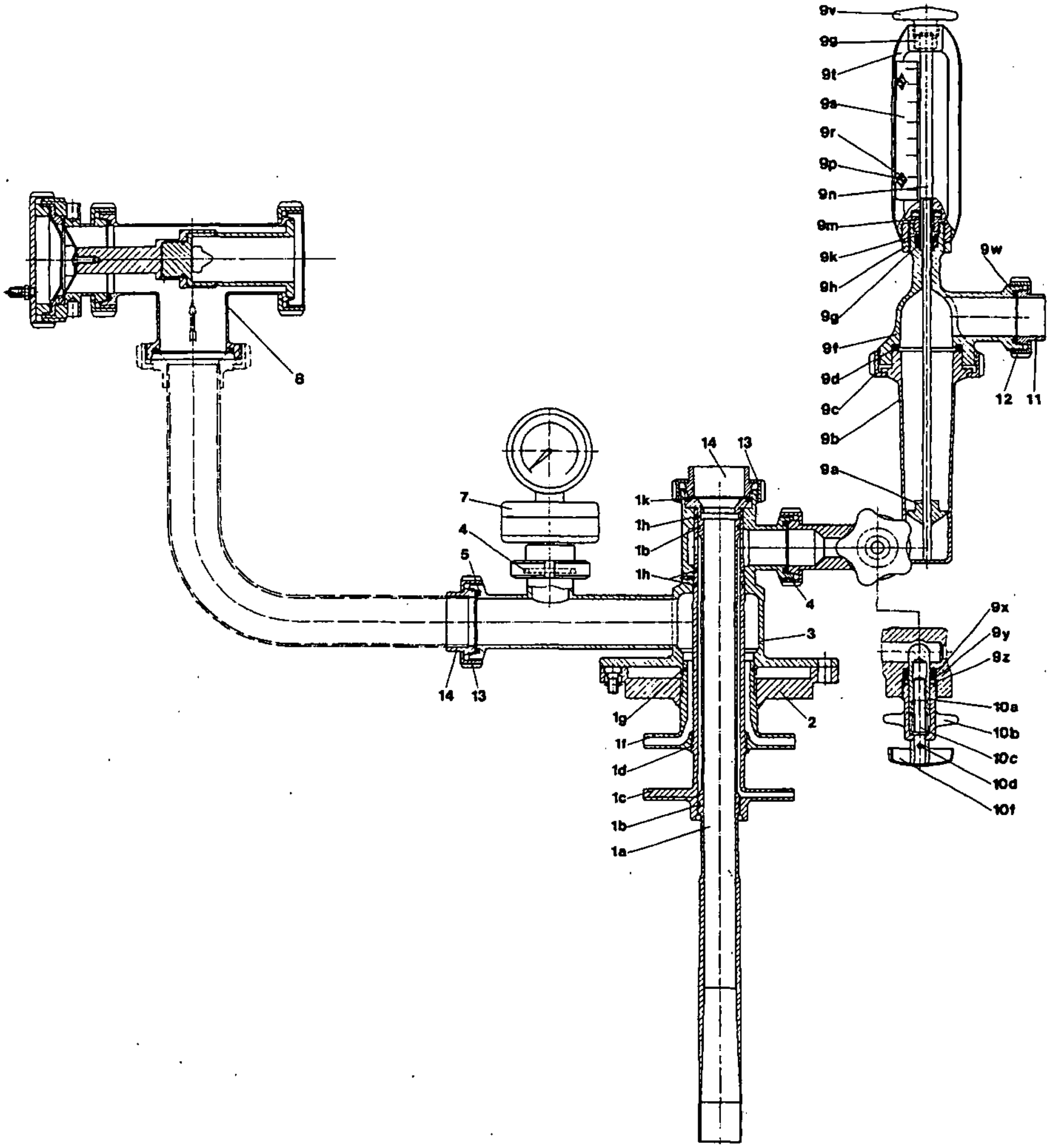
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Fig. 18

B o w l

No. in Fig.	Part - No.	Qty.		Part Description
-	1175-6600-000	1		Bowl, complete (1-23)
1	0019-1450-400	1		Threaded plug
2	0007-1970-690	1		Gasket 26.5/35x5.25
3	3159-6280-000	1		Piston valve assembly (3a-f) – 1
3a	3159-6281-000	1		Valve housing
3b	0007-2920-750	3		Gasket 23.3/2.4 – 2
3c	0004-2341-840	1		Gasket 6/9.9x10.5 – 2
3d	0007-2923-750	2		Gasket 9.3/2.4 – 2
3f	3159-6276-000	1		Valve piston
4	1168-6501-010	1	*	Sliding piston
5	0007-2964-750	1		Gasket 636/660x12
6	1168-6597-000	1		Ring
7	1168-6604-020	1	*	Bowl bottom, complete
7a	3117-6609-010	1	**	Arresting piece
7b	0019-2233-400	1	**	Fillister head screw AM 5x12 DIN 84
7c	0007-2704-750	1		Gasket 182/2
7d	1168-6597-010	1		Ring
7f	0019-6108-400	4		Allen screw M 6x20 DIN 912
7g	0007-2640-750	1		Gasket 150/3
8	1168-6631-000	1	*	Lock ring S 700x14
-	1168-6660-000	1	*	Set of discs (9a-f)
9a	1168-6662-000	1		Bottom disc
9b	1168-6663-010	4		Disc
9c	1168-6663-000	218		Disc
9d	1168-6664-000	1		Compensating disc
9f	1166-6666-000	1		Spacer disc
10	0007-2647-750	1		Gasket 119/10
11	1168-6620-020	1	*	Distributor
14	0007-2546-750	1		Gasket 600/5
15	0007-2466-840	1		Gasket 607x12.5
16	0013-3076-400	1		Spindle nut, complete
16a	0007-2382-850	1	**	Gasket 60/70x4
17	1175-6610-000	1	*	Bowl top
18	1175-6650-000	1		Separating disc
19	1168-6670-010	1		Upper disc (specially shaped)
21	1166-6645-020	1		Centripetal pump chamber cover
22	0007-2854-750	1		Gasket 190x6
23	1165-6631-000	1		Lock ring Tr 215x6 (left-hand thread)

* This part can only be replaced by a WESTFALIA factory engineer or by a special repair shop authorized by WESTFALIA, because of special re-fitting to machine and possible re-balancing of bowl.

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

B o w l

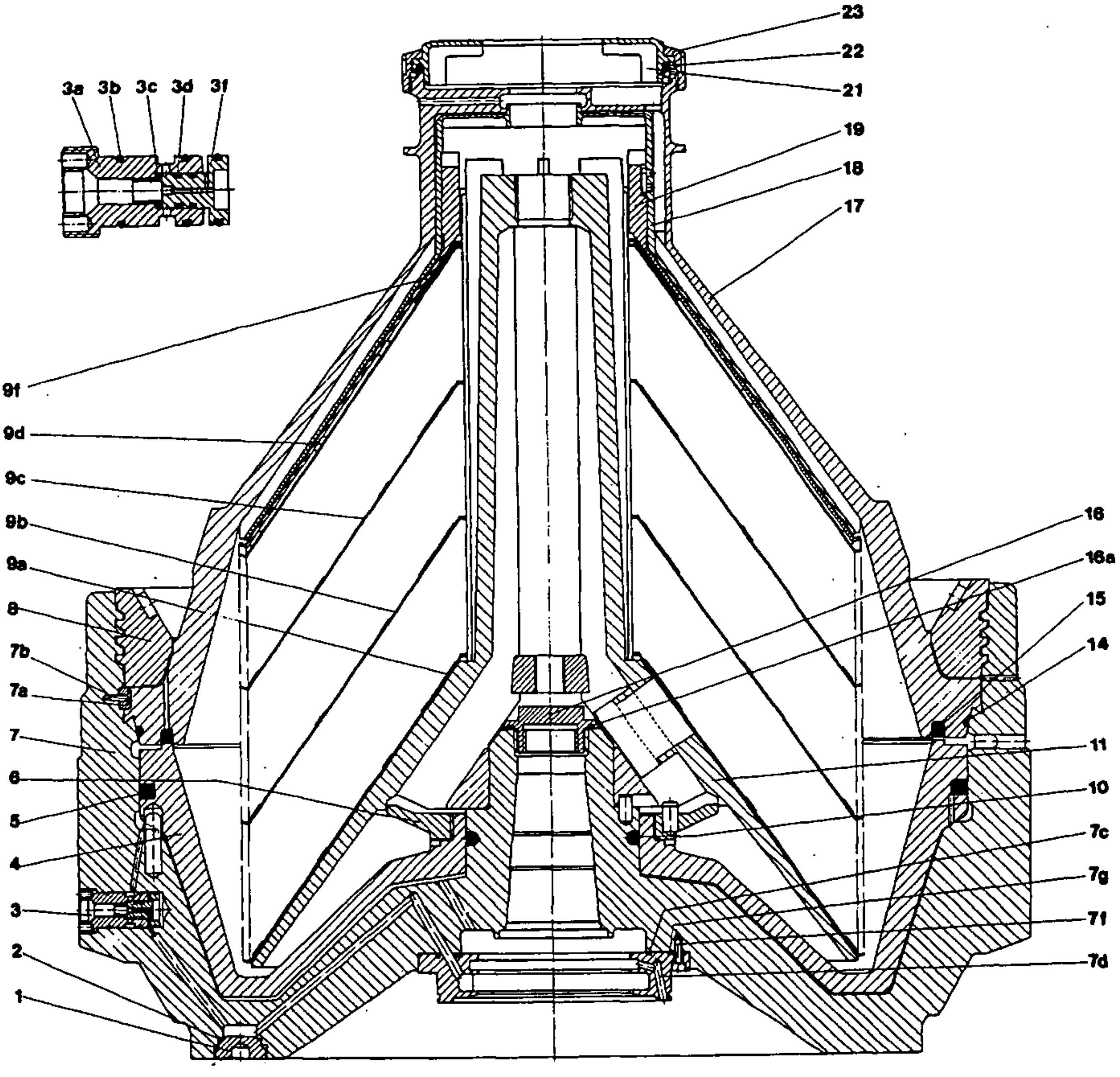

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Fig. 19

Tools and Accessories

All the parts mentioned in the packing list furnished with the separator should be found in the packing case.

No.in Fig.	Part-No.	Qty.	Part Description
401	0003-3774-320	1	Allen wrench 4 DIN 911
-	0003-3775-320	1	Allen wrench 5 DIN 911
-	0003-3776-320	1	Allen wrench 6 DIN 911
-	0003-3777-320	1	Allen wrench 8 DIN 911
-	0003-3778-320	1	Allen wrench 10 DIN 911
-	0003-3780-320	1	Allen wrench 14 DIN 911
402	0003-3720-000	1	Wrench 55 (for spindle nut)
403	0003-4202-320	1	Double-ended wrench 10x13 DIN 3110
-	0003-4205-320	1	Double-ended wrench 17x19 DIN 3110
-	0003-4208-320	1	Double-ended wrench 22x27 DIN 3110
-	0003-4209-320	1	Double-ended wrench 24x30 DIN 3110
-	0003-4211-320	1	Double-ended wrench 27x32 DIN 3110
-	0003-4222-320	1	Double-ended wrench 36x41 DIN 3110
404	0003-3846-000	1	Pivoted hook wrench 90/155
405	0003-0200-000	1	Mallet
406	0003-0303-000	1	Splash cover
407	0003-0256-890	1	Oil gun
408	0003-0168-890	1	Funnel
409	0003-0277-800	1	Oil cup
410	0003-4695-960	1	Brush 70x100x500
411	0003-4667-800	1	Rotary brush 41/26x213
412	0003-4690-960	1	Brush 35x125x285
413	0003-4540-960	4	Cylindrical brush 10x40x160
-	0003-4544-960	4	Cylindrical brush 15x85x285
-	0003-4551-800	1	Cylindrical brush 20x100x800
-	0003-4552-960	1	Cylindrical brush 45x110x270
414	1087-9910-010	1	Pulling device (for cam hub, fluid clutch)
415	0018-3430-030	1	Pipe M 22x1.5x200 (for fluid clutch)
416	0003-0590-000	1	Torque wrench
417	0003-0601-320	1	Socket 8
418	1166-9972-000	1	Lifting device for spindle
419	1166-9910-010	1	Puller (for fluid clutch and brake pulley)
420	0003-4636-050	1	Screwdriver 4.5x125
-	0003-4637-050	1	Screwdriver 8x150
421	0003-4533-100	1	Wrench (for centripetal pump)
425	0003-0345-000	1	Annular wrench (for large lock ring)
426	0003-4002-000	1	Annular wrench (for small lock ring)
427	1166-9840-000	1	Lifting device (for bowl top)
428	1166-9960-000	1	Jack (for sliding piston)
428a	1166-9805-000	1	Pressure piece (included in No. 428)
429	0003-4146-030	1	Wrench (for feed tube)
430	1175-9820-000	1	Disc stack compressing device (430a-d)
430a	1175-9851-000	1	Threaded ring
430b	1167-9770-000	1	Hydraulic unit
430c	1167-9939-000	1	Disc
430d	1175-9877-000	1	Bolt
431	2301-9970-000	1	Lifting device (for annular wrench with lock ring)
432	0003-0575-000	1	Pin punch C5 DIN 6450
434	1168-9970-010	1	Mounting tool
435	1175-9839-000	1	Lifting device (for hood)
436	3050-9930-000	1	Jack (for bowl bottom)
437	0003-3727-030	1	Wrench M4 (for valve piston)
438	1165-9895-010	1	Wrench (for bowl bottom)
439	1168-9823-000	1	Adjusting ring (for proximity switch)
-	0015-0014-080	5	2.5-litre can of separator lubricating oil C-LP 114 Viscosity at 50 °C: 114 ± 8cSt

-	0015-0050-090	2	5-litre can of clutch oil TD-L16
-	0015-0113-000	2	100-gram tube of special type grease (for threads of bowl)
-	0015-0121-000	1	0.85-kg can of ball and roller bearing grease K-L3k DIN 51825

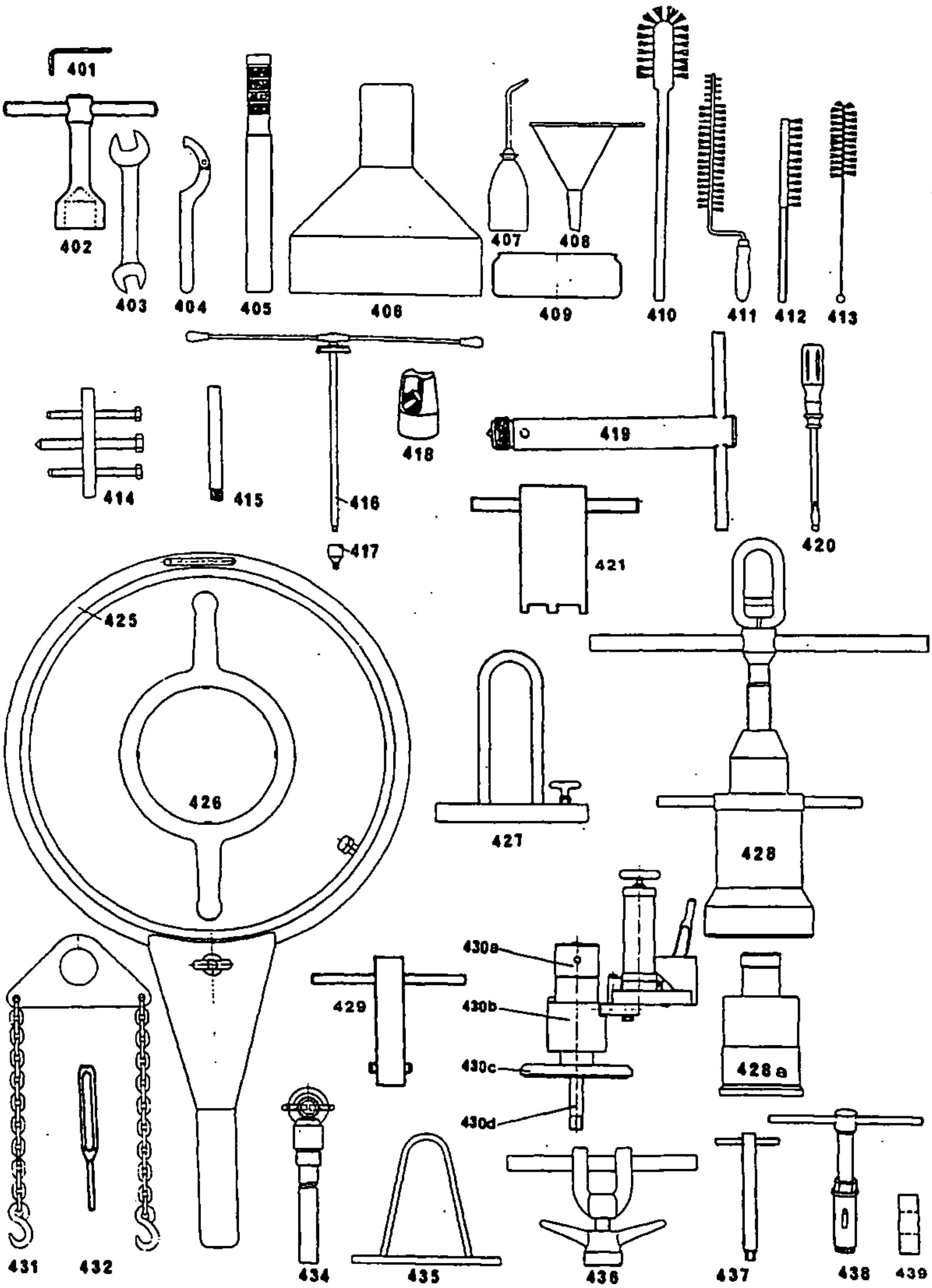


Fig. 20

Sterilizing Tank

No. in Fig.	Part - No.	Qty.	Part Description
-	1165-9200-040	1	Sterilizing tank assembly (1-31)
1	0013-2845-300	1	Grooved coupling nut F 50 DIN 11851
2	0018-3955-300	1	Cone connection D 50 DIN 11851
3	0007-2211-750	1	Gasket G 50 DIN 11851
4	0013-2842-300	2	Grooved coupling nut F 25 DIN 11851
5	0018-4269-400	1	Cone connection R 1/2"
6	0007-2208-750	2	Gasket G 25 DIN 11851
7	0001-0675-400	1	Angle thermometer
8	1165-9462-000	1	Bush
9	1165-9210-030	1	Sterilizing tank
10	0026-1102-400	6	Cylindrical pin
11	0019-1363-300	6	Hinge screw
12	0021-3128-300	6	Handle screw
13	0007-2121-750	1	Gasket 118/130x7
14	0007-2483-750	1	Gasket 65/10
15	0006-4081-400	1	Cylindrical pressure spring
16	1165-9698-010	1	Funnel
17	1165-9277-000	1	Cap
18	0019-6966-400	3	Hex head screw M 12x20 DIN 933
19	0026-2108-400	1	Cap
20	0019-2507-300	1	Lens head screw AM 6x10 DIN 85
21	0026-1382-400	1	Washer 6,4 DIN 125
22	1165-9208-020	1	Cover
23	0007-2309-750	1	Gasket 92/112x10
24	0004-2364-758	1	Packing cord 8x8x2200
25	0001-0261-300	1	Blind cap
26	1165-9205-000	1	Flush pipe
27	0018-3949-300	1	Cone connection D 40 DIN 11851
28	0007-2210-750	1	Gasket G 40 DIN 11851
29	0013-2844-300	1	Grooved coupling nut F 40 DIN 11851
30	0007-2209-750	1	Gasket G 32 DIN 11851
31	0021-3155-700	3	Foot

Sterilizing Tank

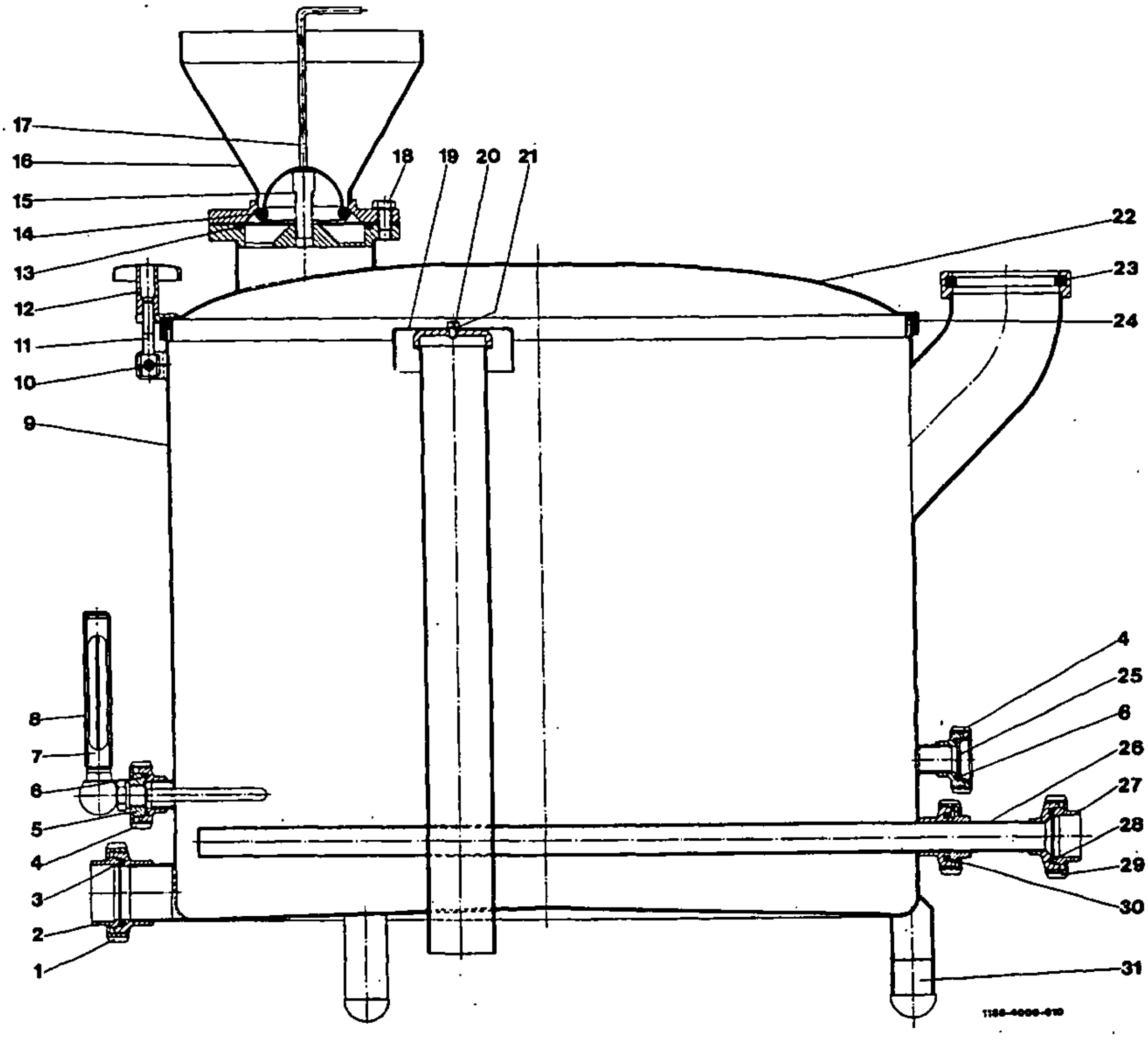


Fig. 21

Flow Constrictor

~~On special order only.~~

Maximum throughput rate:20000 litres/h.

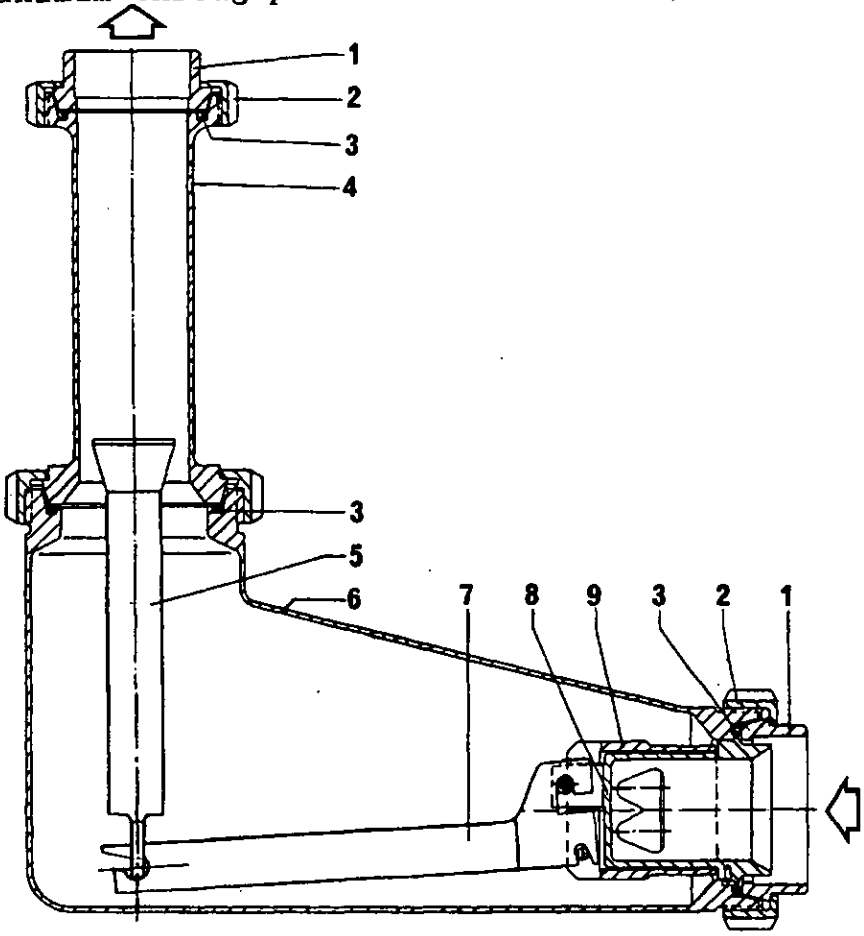


Fig. 22

IMPORTANT: Be sure to install the flow constrictor in such a manner that the inlet is fitted to a horizontal piece of pipe and the control tube 4 is directed vertically upwards.

No. in Fig.	Part - No.	Qty.		Part Description
-	8251-2200-070	1		Flow constrictor, complete (1-9)
1	0018-4636-400	2		Cone connection 65/50
2	0013-2846-300	2		Grooved coupling nut
3	0007-2212-750	3		Gasket G 65 DIN 11851
4	-	1	*	Pipe
5	-	1	*	Float
6	-	1	*	Housing
7	-	1	*	Throttling lever
8	-	1	*	Throttling housing
9	-	1	*	Regulating piece

* This part can only be replaced by a WESTFALIA factory engineer or by a special repair shop authorized by WESTFALIA, because its replacement requires re-adjustment of the flow constrictor. Therefore, when ordering this part, the flow constrictor must be returned to the factory.

Installation of the Flow Constrictor in the Piping of a Milk Processing Plant

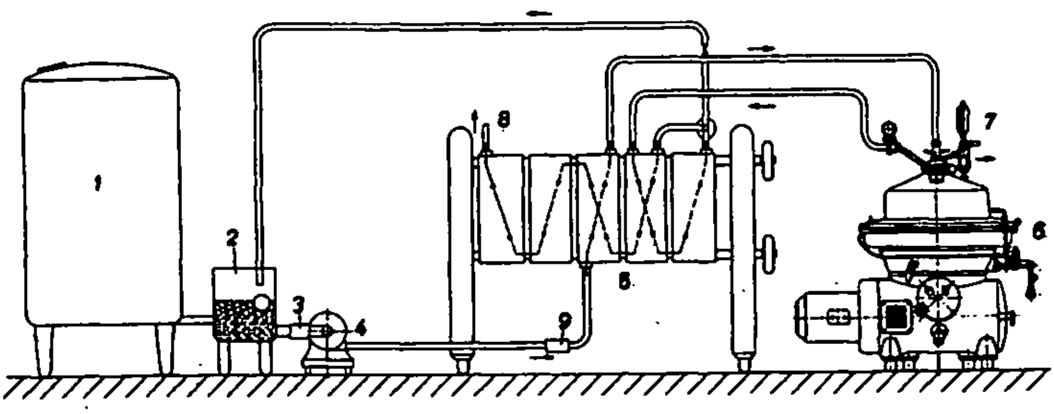


Fig. 1 Flow Constrictor between Pump and first Exchanger

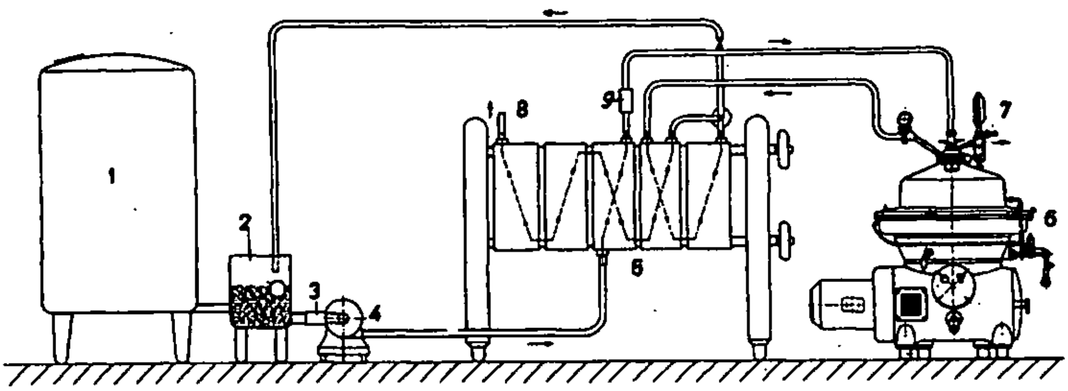


Fig. 2 Flow Constrictor between first Exchanger and Separator

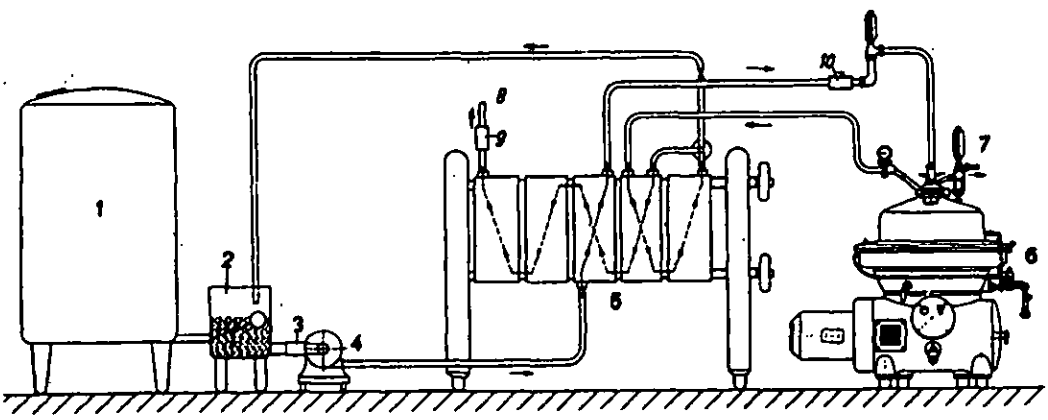
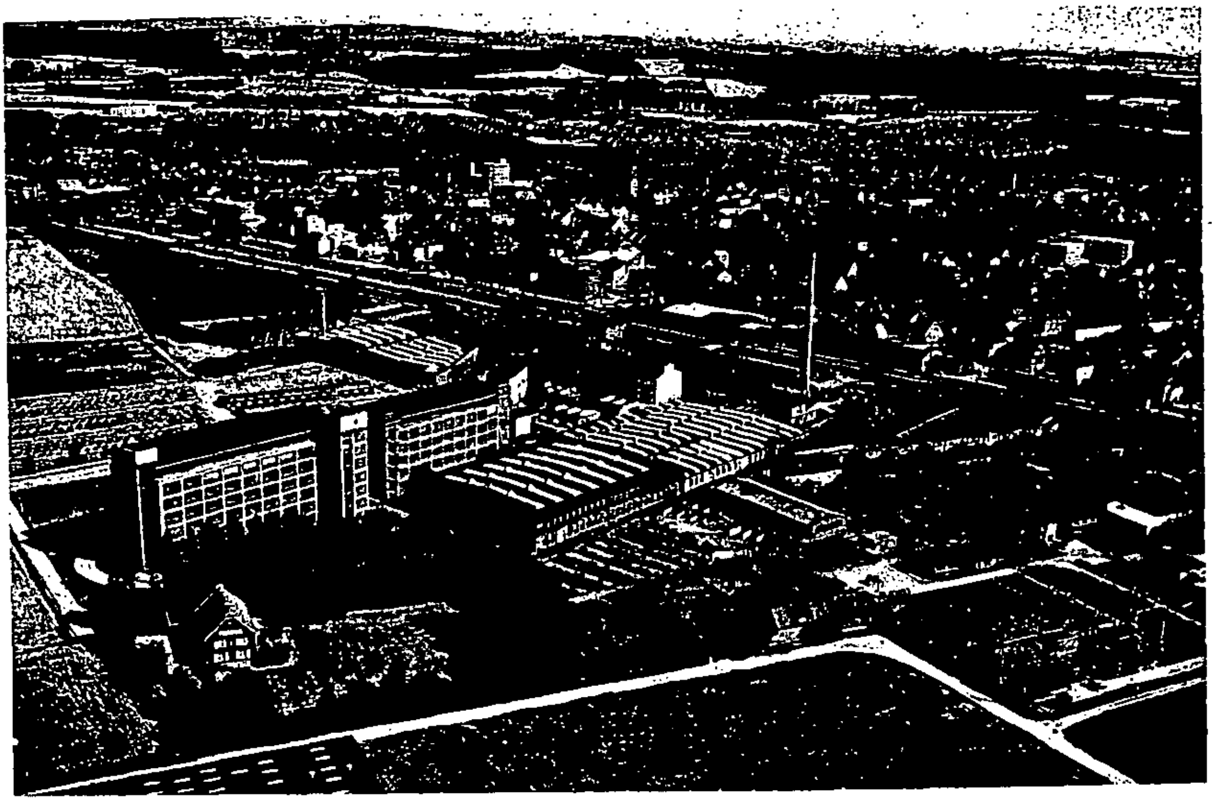


Fig. 3 Flow Constrictor behind the Cooler

Adjustable Flow constrictor and Flowmeter ahead of the Separator

1	Storage tank	6	Separator
2	Balance tank	7	Cream discharge
3	Strainer	8	to Storage tank
4	Milk pump	9	Flow constrictor
5	Heater and cooler	10	Adjustable flow constrictor

Note! When installing the flow constrictor make sure its cylindrical part is in upright position so that the milk flows through it from below.



Westfalia Separator AG., Oelde/Germany

Westfalia Separator AG

Unternehmensbereich
Prozeßtechnik

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0908 313366.

WESTFALIA SEPARATOR

INSTRUCTION MANUAL AND PARTS LIST

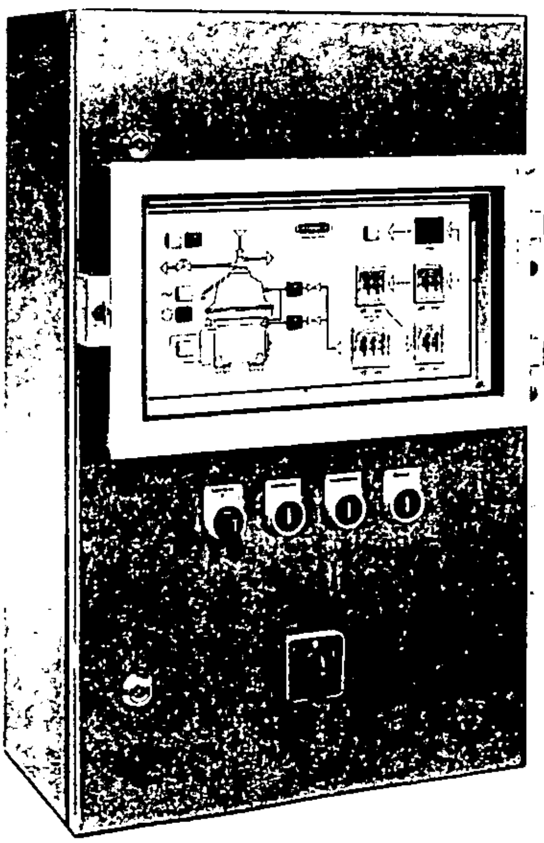
No. 8134 - 9001 - 400

WESTFALIA

Electronic Timing Unit

Model TVA 2-M

MSA 13-0



WESTFALIA SEPARATOR AG. / 4740 OELDE 1 (W.-GERMANY)

CABLES: WESTFALIA OELDE · PHONE: (02522) 771 · TELEX: 89474

No. 6267/1077 engl.

Printed in Germany

I M P O R T A N T

The instruction manual should be handed to the operator.

When corresponding with Westfalia Separator, please indicate the Type and Order-No. (quoted on the name-plate inside the control cabinet).

When ordering spare parts, please state also the Part-No. of the part to be replaced (see List of Parts).

WESTFALIA SEPARATOR AG.
4740 Oelde 1 W.-Germany

Typ:............... Baujahr:..........
Building year

Auftrags Nr.:...........................
Order No.

Nenn-bzw. Anschlußspannung:......~.......Hz V
Voltage rating c/s

Nenn-Betriebsstrom ca:......A
Current rating appr.

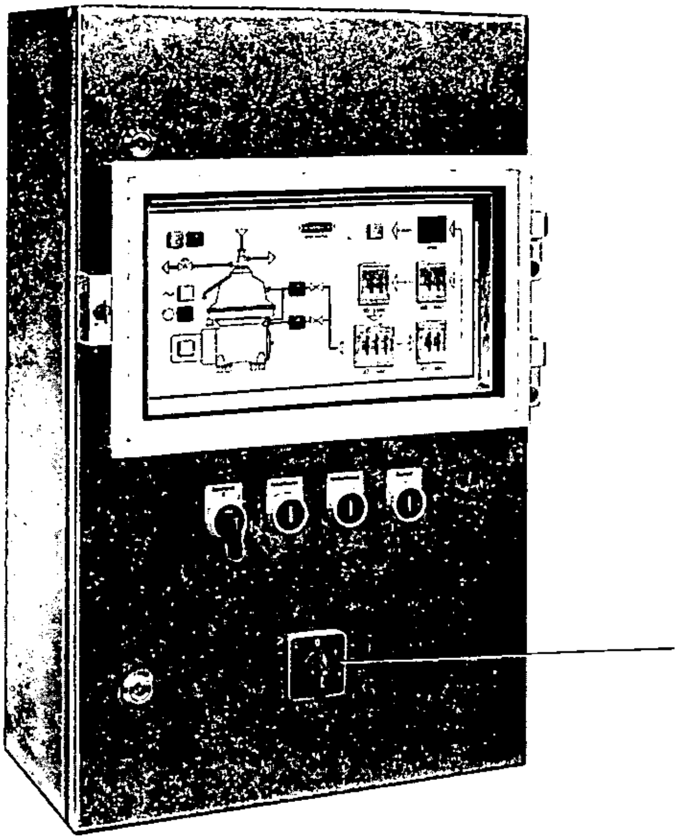
Zuleitungs-Sicherungen:......A
Mains fuses

Steuerspannung:......V ......Hz
Control voltage c/s

Schaltplan-Nr.:.........................
Wiring diagram No.

C O N T E N T S

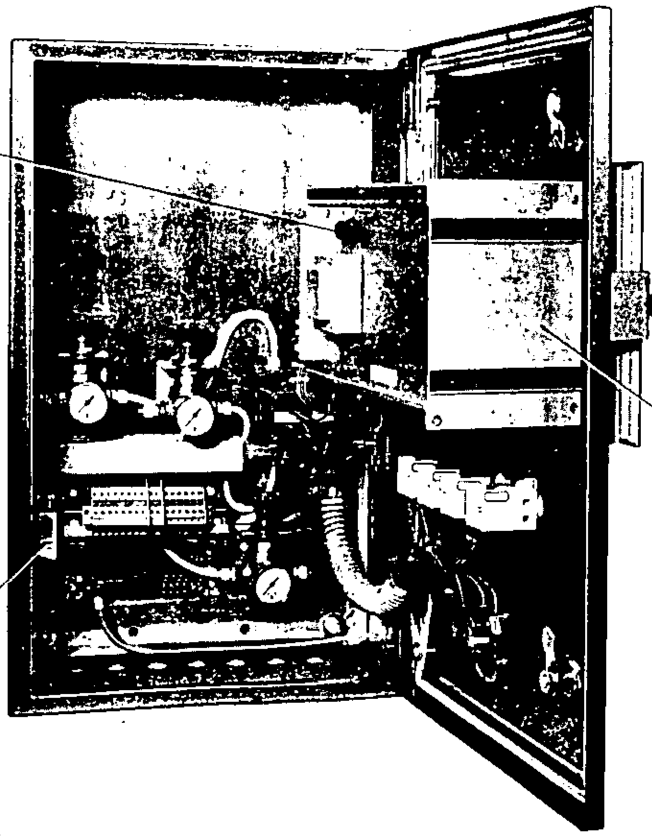
Timing unit, model TVA 2-M



Main switch

Fig. 1

Microfuse



Electronic
control unit,
type KS 064

Automatic
cut-out

Fig. 2

OPERATING INSTRUCTIONS

1. General

1.1. Application

The TVA 2-M timing unit with hardwired and fixed program is used for the automatic control of Westfalia milk separators of type MSA and the air-actuated constant pressure valves incorporated in the discharge lines of the separators.

It is programmed so as to automatically control partial sediment ejections (de-sludging) at regularly timed intervals during milk processing.

Total sediment ejections and temporary overflow of the bowl during the C-I-P process can be initiated either manually by push buttons or automatically by a separate C-I-P unit.

Sediment ejection (opening and closing of the bowl) is effected hydraulically by means of operating water which is supplied via two solenoid valves incorporated in the operating-water connection of the separator.

The constant pressure valves incorporated in the discharge lines of the separator are controlled by compressed air. The compressed-air control assembly, comprising solenoid valves and pressure reducers, is mounted on a panel inside the control cabinet.

Detailed information on the operating-water connection and the constant pressure valve is given in the instruction manuals for the separator and constant pressure valve respectively.

1.2. Design

The electronic control unit (with separator symbol, associated pilot lamps, digital indicator and set-point adjusters on the front panel) is flush-mounted in the door of the cabinet. It is covered by a protective window with snap closure. Below the control unit there are push buttons and selector switches for operation of the timing unit.

A panel inside the cabinet carries the compressed-air control assembly, an automatic cut-out as well as terminal blocks for the connection of the leads. All leads are brought into the cabinet from below through cable glands.

The timing unit is completely assembled and wired ready for connection. It complies with the regulations of the VDE.

2. Technical data

Supply voltage	220 VAC, -15/+10% (115 VAC, as optional feature)
Frequency	50 or 60 Hz
Power consumption	approx. 80 VA (incl. solenoid valves)
Control voltage	220 VAC for solenoid valves 12 VDC for circuit logic
Ambient temperature	up to +45°C
Housing	stainless steel, ground outside finish
Type of enclosure	IP 54
Dimensions	refer to dimensioned drawing in the appendix
Weight	25 kg
Cable inlets	8 x Pg 13.5 (from below)
Compressed air	min. pressure: 6 bars; max. pressure: 10 bars
Air consumption (constant pressure valves)	approx. 0.3 m^3/h
Compressed-air lines	6 x 1 mm
Switching capacity of contacts	continuous current $I_{th2} \leqq 6$ A at 250 VAC
	rated working current I_e/AC11 $\leqq$ 1 A at 250 VAC

3. Designation of front-mounted elements

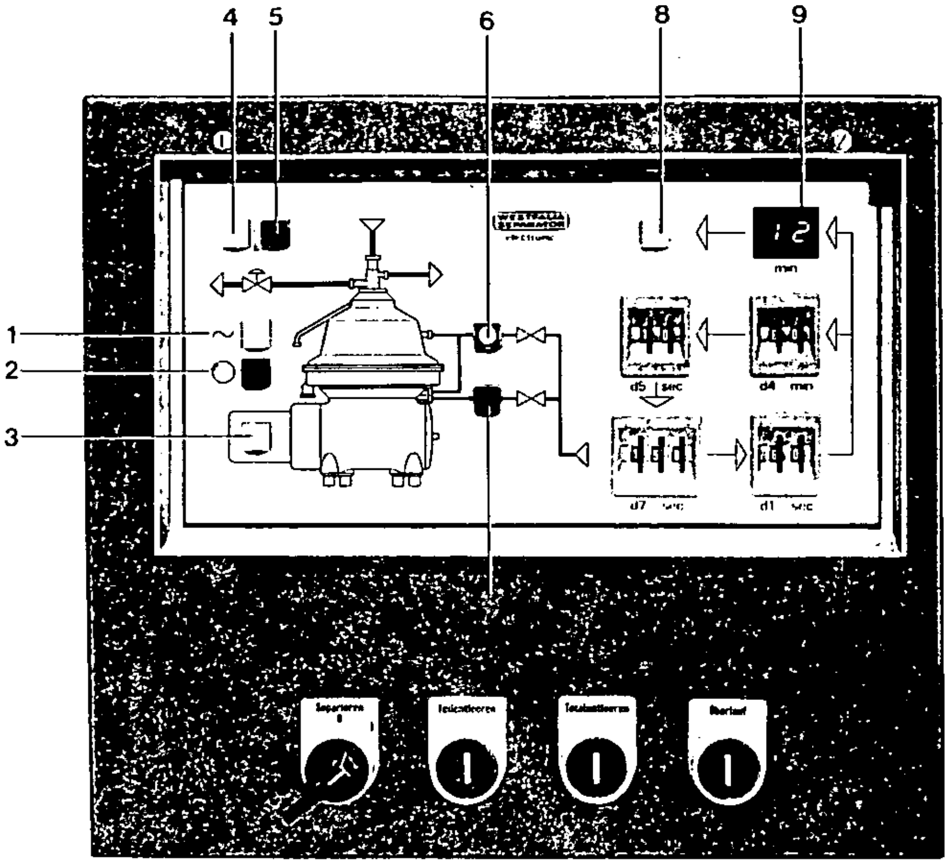


Fig. 3

Digital set-point adjusters:

d4 Separation
d5 Pre-flushing
d7 Partial sediment ejection
d1 Subsequent flushing

Digital indicator

9 Elapsed separation time (minutes)

Pilot lamps

1 Timing unit switched ON
2 Standstill of bowl
3 Motor switched ON
4 Constant pressure valves in operating position
5 Overflow (flushing of hood during C-I-P)
6 Flush and sealing water
7 Opening water
8 Separation

Selector switch

Separation 0 - I

Push buttons

Partial sediment ejection
Total sediment ejection
Overflow (flushing of hood during C-I-P)

4. Installation of the timing unit

The TVA 2-M timing unit should be mounted on a free-standing column of stainless steel tube (100 mm diameter and 1000 mm long) or fitted to a wall. A clearance of about 20 mm should be kept between the wall and the cabinet. Dimensions for fastening the cabinet are given in the dimensioned drawing in the appendix.

The mounting holes in the back wall of the cabinet must be sealed by means of gaskets supplied with the timing unit (Fig. 4).

If the timing unit is mounted on a column, the 4 mounting holes in the back wall are not used; they must be closed by means of screws and packing rubber.

Although selector switches and push buttons are dampproof and the electronic control unit is protected against entry of moisture by means of the protective window and the gasket in the door of the cabinet, the timing unit should not be installed in excessively humid areas.

If the electronic control unit is panel-mounted in a central control room (individual supply of the control unit; see drawing No. 8134-0404-3231), it must also be protected by the window.
In the a/m case, the compressed-air control assembly (mounted on a separate panel) for the pneumatic control of the constant pressure valves has to be installed separately (see drawing No. 8134-2219-040 in the appendix).

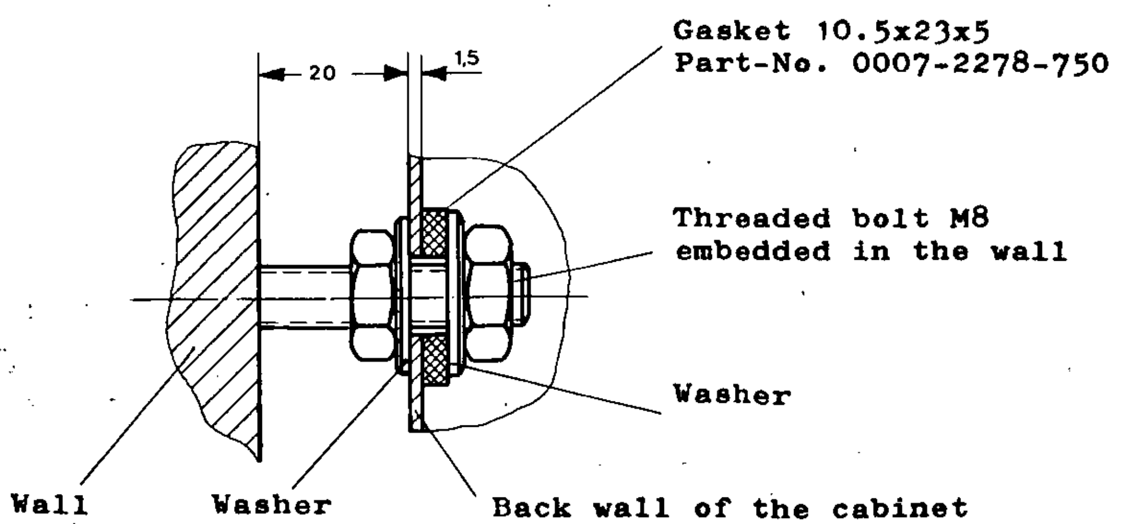


Fig. 4

5. Electrical connection

The timing unit is rated for an operating voltage of 220 VAC, 50 or 60 Hz. A special version for 115 VAC is available.

Before the timing unit is connected to the mains, attention should be paid to the voltage rating indicated on the red name-plate inside the control cabinet.

A wire cross section of 1.5 mm^2 will be sufficient for all lines. Proper connection of the terminals to the terminal block is shown in the attached connection diagram No. 8134-0404-0231. The current rating of the main fuse (delay-action fuse) should be 6 Amps.

The cable glands for the electric lines and the air hoses must be tightened properly and be packed with luting agent.

IMPORTANT

Series terminals 11 to 16 of the terminal block are provided for the 12 Volt input logic. This should be born in mind when leads are connected or tests are carried out, since high voltages may cause damage of the electronic control unit. The input terminals serve for signalling "Standstill of bowl" and "Motor switched ON" as well as for the connection of a C-I-P unit for automatic cleaning-in-place. The signalling cables should NOT be laid in the vicinity of power lines, and free conductors should NOT be used for AC control operations.

The potential-free output d3 of the control unit (series terminals 9 and 10 of the terminal block) is used for switching-off the feed pump of the separator during total sediment ejection (de-sludging) and must therefore be included in the motor control circuit (see circuit diagram No. 8134-0404-0301).

IMPORTANT

External voltage is applied to series terminals 9 and 10!

The outputs of the electronic control unit are provided with contacts which are potential-free if the control unit is supplied for panel-mounting (individual supply; see page 8, last paragraph). The outputs can be included in control circuits operating on any voltage up to 250 VAC.

The switching capacity of the contacts is given in section 2 "Technical data". The voltage rating of the solenoid valves for operating water and compressed air should, however, match the operating voltage of the control system.

6. Set-point adjustment and operation

Set-point adjustment of the electronic time function elements is effected by means of digital adjusters (Fig. 5).

Digital set-point adjusters are provided for:

Analogous time function element "Pre-flushing" controlling the duration of flush and sealing water addition (10 seconds) before partial sediment ejection as well as the duration of opening water addition for total sediment ejection.

* Digital time function element "Separation" controlling the time (approx. 60 minutes) after which partial sediment ejection is to take place.

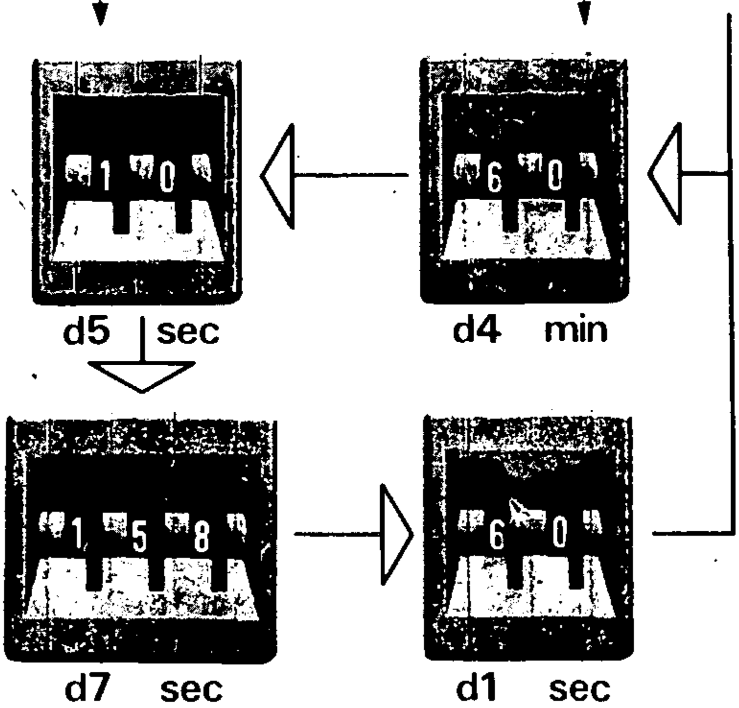


Fig. 5

Analogous time function element "Partial sediment ejection" controlling the duration of sealing and opening water addition for partial sediment ejection. The setting time is approx. 0.5 to 2 seconds, depending on the amount of solids to be ejected.

Analogous time function element "Subsequent flushing" controlling the duration of flush and sealing water addition (60 seconds) after partial and total sediment ejections as well as the time the product feed pump is switched off after total sediment ejection.

* If the mains frequency is 60 Hz, the value to be set on set-point adjuster d4 must be increased by 20%, e.g. from 60 to 72 minutes, since timing operation of the digital time function element d4 "Separation" is based on the mains frequency. This does not apply to the three analogous time function elements d1, d5 and d7.

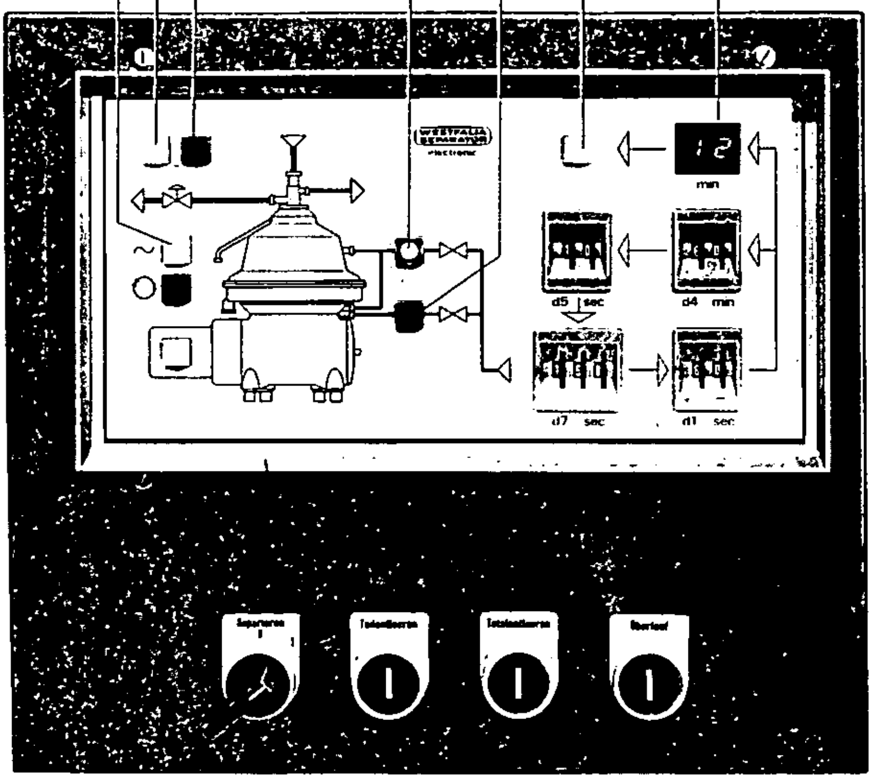


Fig. 6

After closing of the main switch (Fig. 1) the timing unit is ready for operation; pilot lamps "Timing unit switched ON" and "Constant pressure valves in operating position" (Fig. 6) light up. Simultaneously, time function element d1 starts operating to control flush and sealing water addition for closing of the bowl; pilot lamp "Flush and sealing water" lights up.

In addition, the internal impulse generator starts operating to open solenoid valve s1 in the flush and sealing water line at fixed-programmed intervals (60-second interval and 1-second impulse, analogous times) so that the bowl is kept closed. The impulse is indicated by lighting-up of pilot lamp "Flush and sealing water". If the timing unit is used to control the KSA 6-01-076 separator, impulse transmission to solenoid valve s1 is re-programmed in our works so that the impulse actuates solenoid valve s2. In this case, the impulse is indicated by pilot lamp "Opening water".

When selector switch "Separation" is set to position "I", time function element d4 starts controlling the separating time; pilot lamp "Separation" lights up. The elapsed separating time (in min.) is indicated by the digital LED* indicator. When the LED display corresponds with the setting of set-point adjuster d4, the separating time has elapsed and an automatically controlled partial sediment ejection will be carried out. The program sequence is shown in the following diagram.

* LED : Light Emitting Diodes

Time function elements

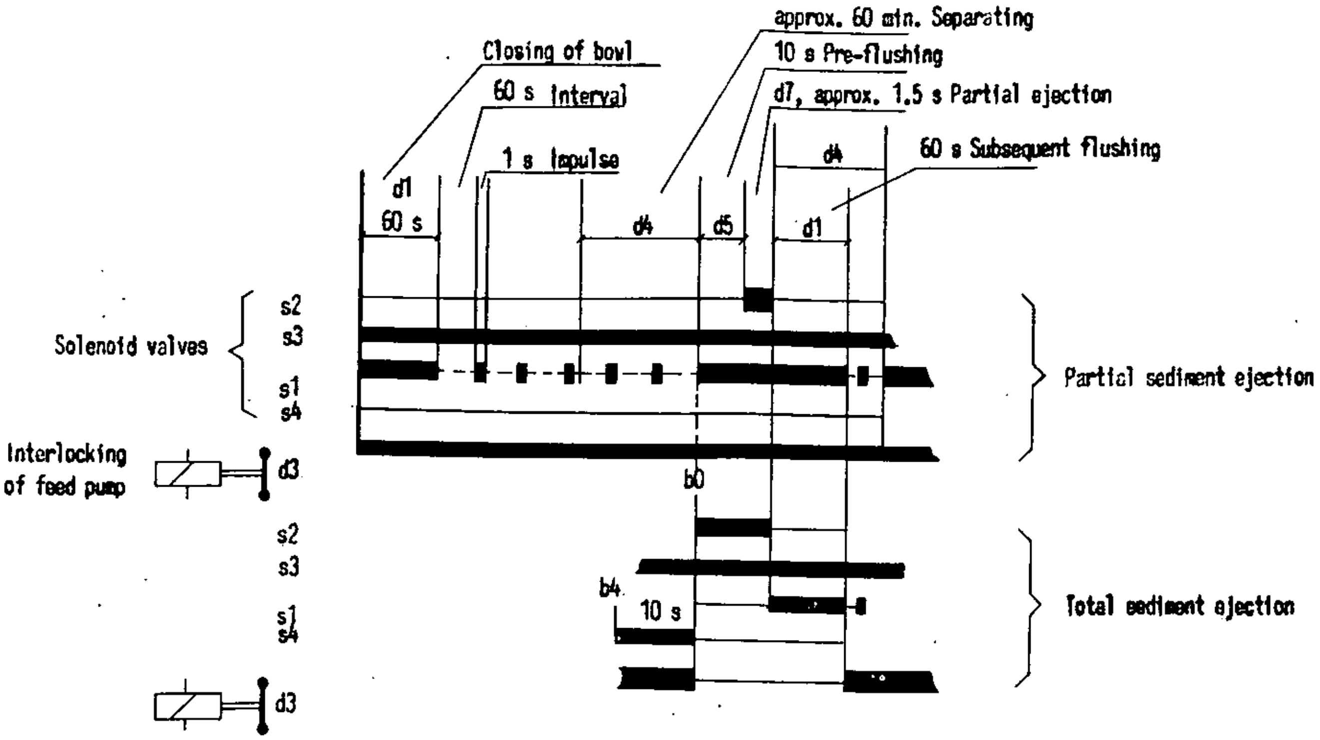


Fig. 7
Switching sequence diagram

The switching sequence of the time function elements is also shown on the front plate of the cabinet by arrows arranged between the set-point adjusters (Fig. 8).

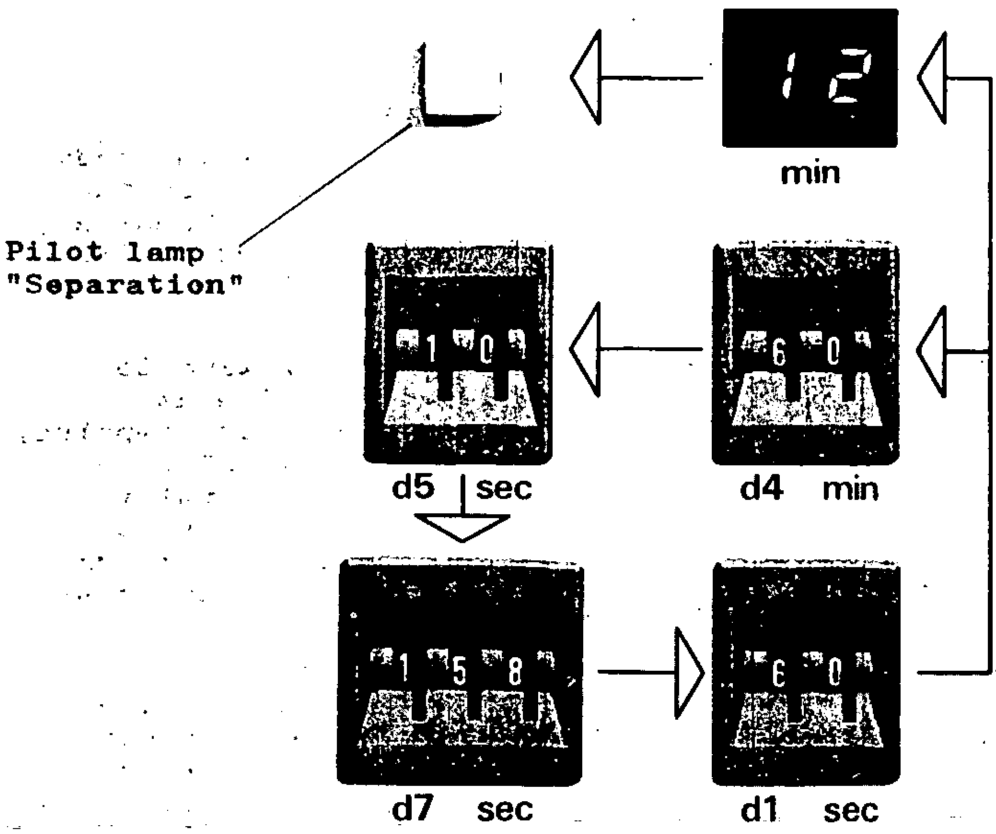


Fig. 8

By operating push button "Partial sediment ejection", the separating process is interrupted and a partial sediment ejection is immediately initiated. When this enforced partial sediment ejection is finished, the program automatically re-starts the separating process.

During the C-I-P process, total sediment ejections as well as temporary overflow of the bowl for flushing of the hood are initiated by operating the respective push buttons of the timing unit. The push buttons should be operated successively: first the "Overflow" button for about 10 seconds (pilot lamp "Overflow" will light up) and then, momentarily, the "Total sediment ejection" push button (Fig. 6).

Overflow of the bowl is effected by throttling of the constant pressure valve in the skim milk line when excess pressure is applied to the valve (approx. 10 seconds).

The "Overflow" and "Total sediment ejection" input signals can also be entered into the electronic timing unit automatically via potential-free contacts of a C-I-P unit (refer to switching sequence diagram "Cleaning-in-place").

Operation of the afore-mentioned three push buttons (Fig. 6) and external initiation of the "Overflow" and "Total sediment ejection" signals will only be effective if the selector switch "Separation" is in "I" position.

When selector switch "Separation" is set to "O" position, the separating process or the program is interrupted. The time function elements and the digital indicator return to starting position. The impulse generator, however, remains in operation.

Attention should also be paid to the instructions given in section 6 (Operation) and section 7 (Cleaning-in-place) of the instruction manual for the MSA type separator.

7. Malfunctions

Mains failure or interruption of current causes failure of the timing unit; all time function elements and the digital indicator return to starting position. After rectification of the fault, the program cycle is resumed, starting with the total separating time adjusted. Since it is generally not known when the last sediment ejection has taken place, a partial sediment ejection should be initiated by operating the "Partial sediment ejection" push button immediately upon the program cycle has been resumed.

A mounting plate inside the control cabinet carries an automatic cut-out (G 1A) for short-circuit and overload protection of all the electric components of the timing system (solenoid valves and electronic control unit). Upon response of the automatic cut-out, first the four solenoid valves should be checked.

The electronic control unit is, in addition, protected by a microfuse (Fig. 2) in the mains supply unit. Failure of the microfuse may be caused by a defective mains supply unit or a fault in the electronic circuit.

When the microfuse has to be replaced, the correct fuse element should be used (quoted above the fuse holder on the back of the electronic control unit). Two spare microfuses are supplied with the control unit.

If the electronic control unit does not function properly, it should be removed from the system and sent to Westfalia. It should not be repaired on site since special knowledge and suitable measuring devices are required.

The control unit does not require any maintenance; it operates without the use of wear-prone parts. A stock of individual components is usually not necessary.

If several control units are in use, it should, however, be considered to keep one electronic control unit in stock in order to permit quick replacement of a defective unit.

Operational reliability of the electronic timing unit is ensured even under the influence of disturbances caused by the control system itself as well as by pick-up via the inputs and the mains. Should, however, a temporary malfunction occur, e.g. if a wrong output signal of a storage element causes energization of the opening water valve (indicated by pilot lamp 7, Fig. 3) to last longer than the time pre-set on time function elements d5 and d7, the program has to be reset to starting position by operating the "Partial sediment ejection" or "Total sediment ejection" push button.

min

Resetting of the program to starting position by operating the "Partial sediment ejection" push button or even switching-off of the program cycle by momentarily opening the "Separation" selector switch may also be necessary if set-point adjuster d4 is reset during the separating process to a lower time value than that just shown by the digital indicator, e.g. from 60 minutes to 11 minutes (Fig. 9).

d4 min

Fig. 9

Resetting to a lower time value than that indicated causes failure of automatic partial sediment ejection. The program must, therefore, be reset to starting position in order that the next partial sediment ejection is carried out upon expiration of the time to which the time function element d4 has been reset.

The pilot lamps are equipped with T 5.5, 12 Volt, 50 mA incandescent lamps. Before a defective lamp can be replaced, the slip-on lamp cover must be removed. The lamp should be withdrawn from the socket with the aid of a lamp extractor (Fig. 10) consisting of a small piece of plastic hose (approx. 4 mm diameter and 100 mm long).

Two spare incandescent lamps are included in the delivery.

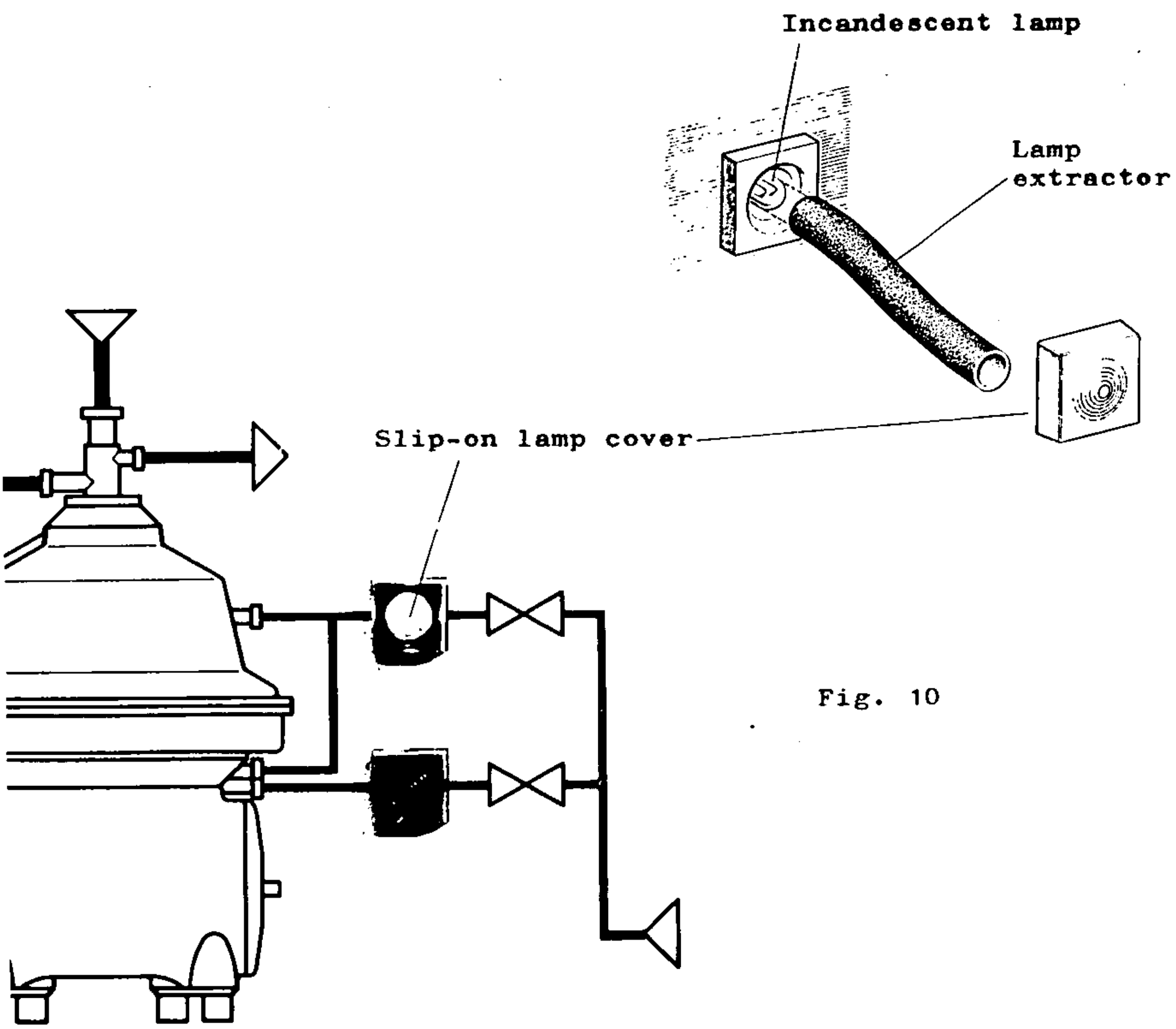


Fig. 10

8. Solenoid valves s3 and s4 for compressed air

8.1. Design and operating principles (Fig. 11)

These valves are direct acting 3-port/2-position solenoid valves where valve outlet A is relieved when the solenoid is de-energized. They are equipped with a manual operator (or override) for checking. The solenoid head is completely moulded in Epoxy resin ensuring perfect protection against entry of moisture, good dissipation of heat and perfect electrical insulation. These valves are fully tropicalized.

The armature of the solenoid head is incorporated in an oil-filled chamber which is completely isolated from the flow medium by a diaphragm.

The brass valve body is fastened to the solenoid head by means of two screws. These screws and the precisely adjusted valve seats must not be removed or re-adjusted.

Both valves are mounted on a two-valve connection block. The ports of the connection block and valves are marked as follows (Fig. 11):

P = Pressure connection
A = Valve outlet
R = Relief connection

When the solenoid is de-energized, valve port P is closed while port R is open and in communication with outlet A. When energized, the solenoid attracts the armature, causing the diaphragm to be shifted from the left-hand valve seat to the right-hand one. Passage P - A is thus opened and passage R - A is closed. Since the central port A is the outlet of the valve chamber around the end of the armature, it communicates with the passage of either the left-hand or right-hand seat, depending on which of the two is open.

The relief connection R of the solenoid valve is closed by a plug; the pressure is relieved via the constant pressure valve.

8.2. Maintenance

The solenoid valves do not require any maintenance.

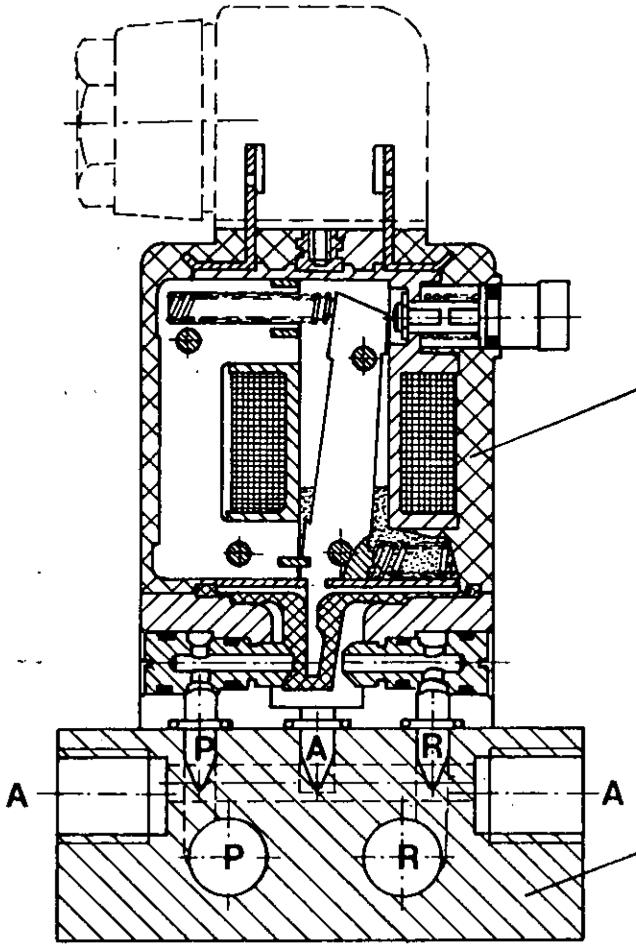
8.3. Malfunctions

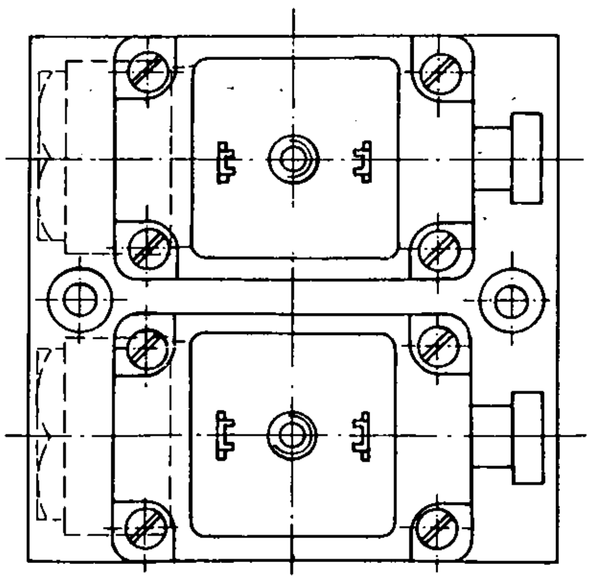
If it has been found that the control unit functions properly and that voltage is present at the valve terminals, malfunction has to be ascribed to a defective solenoid coil. In such a case, the complete solenoid valve (Part-No. 0018-4485-800) must be replaced. The same applies to mechanical failures.

8.4. Technical data

Solenoid valve for compressed air Part-No. 0018-4485-800	Type	331 / C
Pipe connection	R	1/4"
Voltage	V	220 AC
Frequency	Hz	50/60
Optional voltages	V	24 AC, 115 AC 24 DC
Power consumption: pull-in (AC operation)	VA	30
Power consumption: operation (AC operation)	VA	15
Power consumption: (DC operation)	W	8
Duty cycle	%	100
Frequency of operations	/min.	approx. 1000
Type of enclosure	IP	65
Pressure range	bar	0 - 10
Temperature: medium	°C	up to 90
Temperature: ambient	°C	up to 45
Cable entry	Pg	9
Screw couplings for air hoses	mm	6 x 1
Mounting position		at random

3/2-way solenoid valve





When mounting the valves on the connection block, make sure that the valve ports marked with R and P coincide with the respective ports of the connection block.

Fig. 11

No. in Fig.	Part-No.	Qty.	Part Description
-	0018-4485-600	1	3/2-way solenoid valve block
1	0018-4485-800	2	⌈ Solenoid valve
2	0018-4485-280	1	⌊ Connection block

9. Connection of the air lines and adjustment of the pressure reducers

The compressed-air lines should be connected in accordance with the opposite installation diagram.

The pressure reducers inside the control cabinet have to be adjusted as follows:

1) Pressure reducer 1 for adjusting the excess pressure required for the constant pressure valve in the skim milk line to cause temporary overflow of the bowl during the C-I-P process:

   This valve should be set so that overflow of the bowl occurs. The maximum pressure is 5 bars.

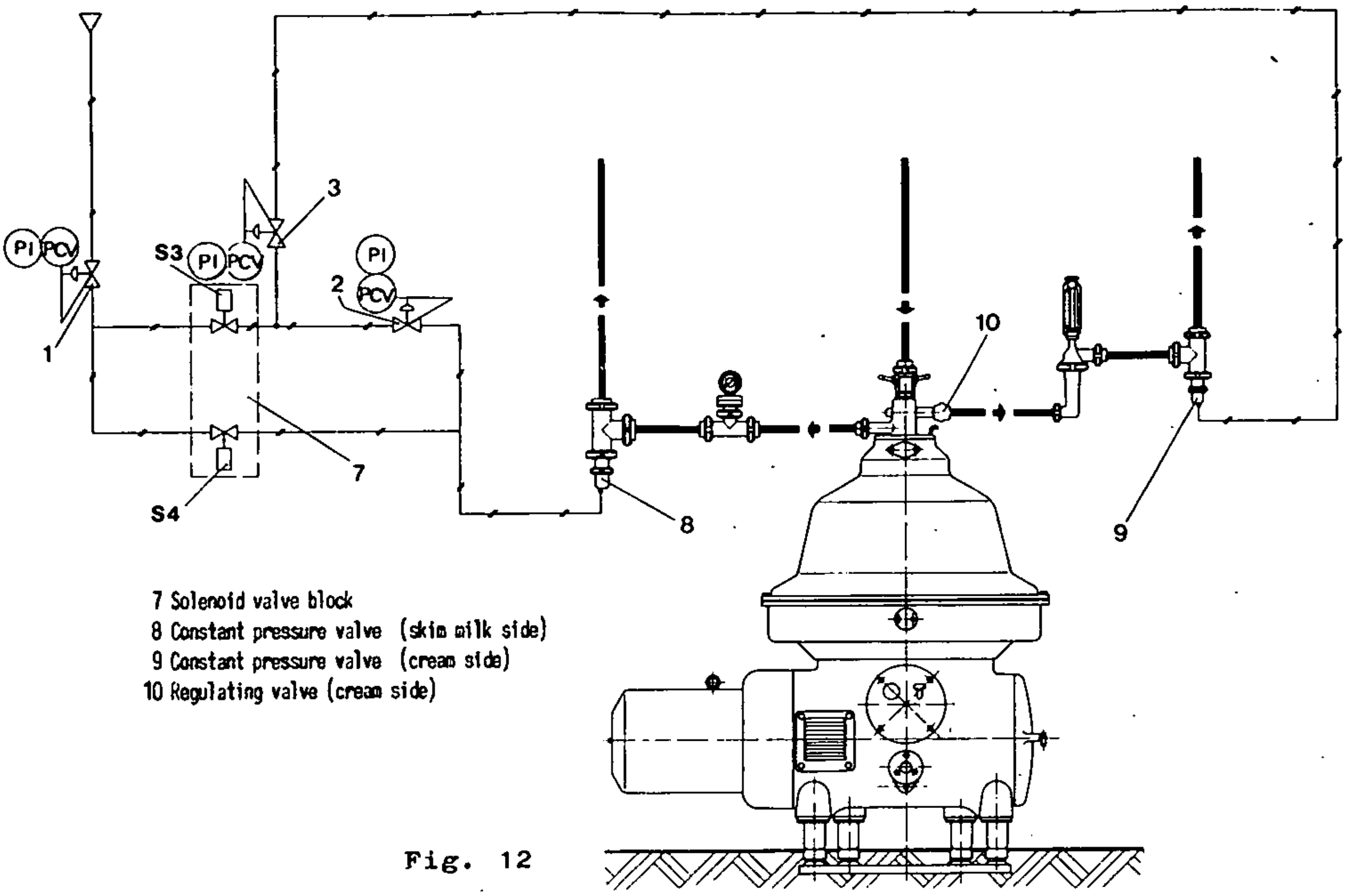
2) Pressure reducer 2 for adjusting the operating pressure in the skim milk line:

   This valve should be set to a pressure of up to 4 bars. The maximum operating pressure of the separator will then be 6 bars.

3) Pressure reducer 3 for adjusting the supply pressure to the constant pressure valve in the cream line:

   This valve should be set so that the discharge capacity is by about 50% higher than that under normal operating conditions. The desired operating capacity has to be adjusted by means of the manual regulating valve 10.

Installation diagram for the constant pressure valves



7 Solenoid valve block
8 Constant pressure valve (skim milk side)
9 Constant pressure valve (cream side)
10 Regulating valve (cream side)

Fig. 12

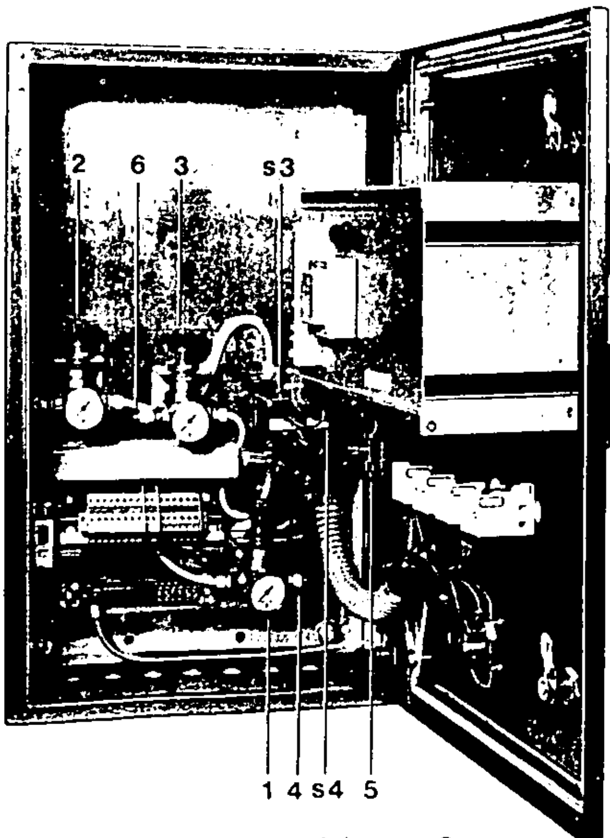


Fig. 13

Pressure reducers

1 for excess pressure adjustment
(constant pressure valve in skim milk line)

2 for operating pressure adjustment
(constant pressure valve in skim milk line)

3 for operating pressure adjustment
(constant pressure valve in cream line)

Solenoid valves

s3 for actuation of constant pressure valves
(operating position)

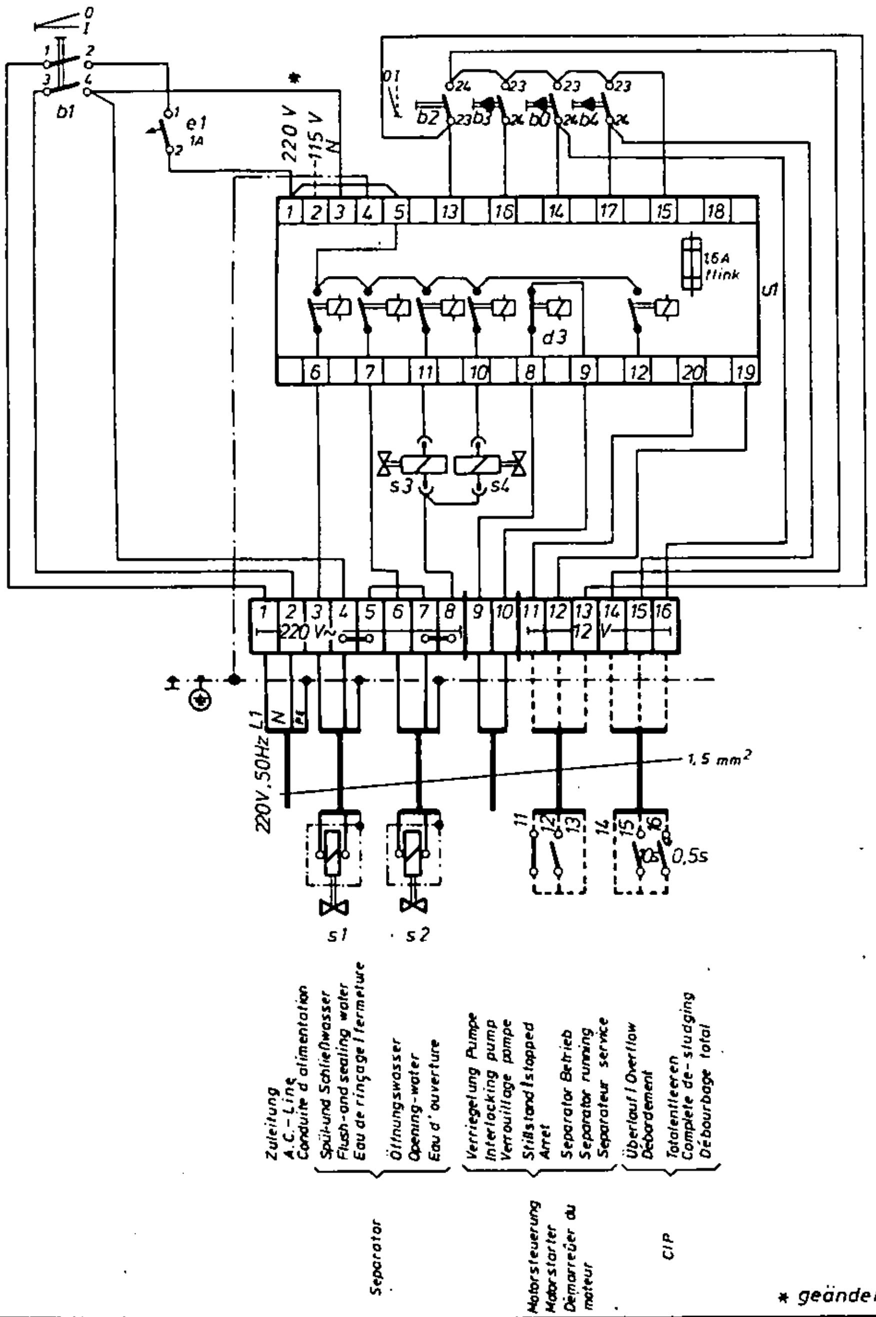
s4 for actuation of constant pressure valve
in skim milk line
(excess pressure)

Compressed-air connections

4 Air inlet

5 Air outlet
(constant pressure valve in skim milk line)

6 Air outlet
(constant pressure valve in cream line)



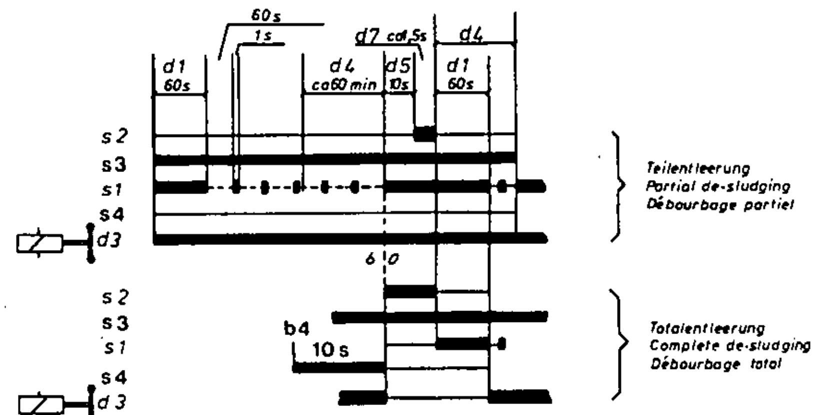
b0	Totalentleeren Complete de-sludging Débourbage total	
b1	Hauptschalter Main switch Interrupteur principal	
b2	Separieren Separation Séparation	
b3	Teilentleeren Partial de sludging Débourbage partiel	
b4	Überlauf Overflow Débordement	

Zuleitungssicherung 6A
Rated current of lead-in wires fuse 6A
Courant nominal de la fusible de secteur 6A

Schaltvermögen des potentialfreien Öffners für Verriegelung Milchpumpe:
Switching capacity of potential-free break contact for electrical interlocking of milk pump:
Pouvoir de coupoure du contact rupteur sans potentiel pour le verrouillage électrique de la pompe a lait:

Dauerstrom J_{th2} $\hat{=}$ 6A bei 250V~
Permanent current
Permanent courant

Nennbetriebsstrom J_e / AC 11 $\hat{=}$ 1A bei 250V~
Rated current
Nominal courant



Funktions-Diagramm
Operating program
Diagramme de programmation

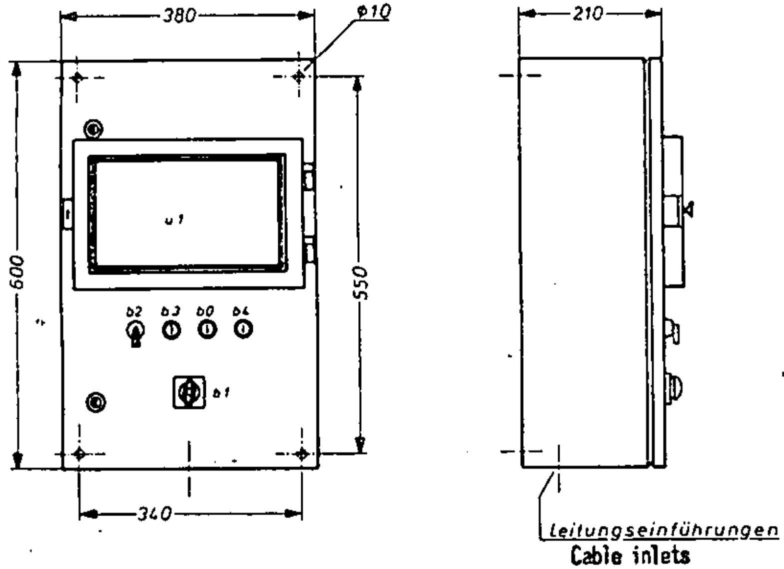
* geändert am 31.3.77 Ni.

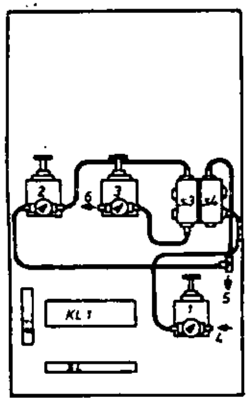
WESTFALIA SEPARATOR 4740 Oelde i. Westf.	1976	Datum	Name	Projekt	Steuergerät TVA2-M elektronisch Timing unit Programmateur	Anschlußplan Connection diagram Plan de disposition	Zeichnungs-Nr. 8134-0404-0231	Blatt 1
	Gez.	29.10	11.					Bestehend aus 1 Blatt
	Gepr.	3.11.	Ni.					

Timing unit equipment list

Design. in layout plan and circuit diagram	Part-No.	Description	Type	Techn. data	Make
		Housing	AE 1038 V2A	600x380x210 mm	Loh
bo	0005-1196-020	Push button	DT kf 11	1 NO + 1 NC	AEG
b1	0005-0490-000	Main switch	C1 7 A 201 EG 002 SOC		Kraus & Naimer
b2	0005-3515-900	Front element	SWSTL		AEG
b2	0005-1196-910	Panel-mounting element	kf 11	1 NO + 1 NC	AEG
b3	0005-1196-020	Push button	DT kf 11	1 NO + 1 NC	AEG
b4	0005-1196-020	Push button	DT kf 11	1 NO + 1 NC	AEG
u1	8134-0402-090	Electronic control unit	KS 064	115/220 V 50/60 Hz	Schleicher Electronic
s3	0018-4485-800	Solenoid valve	331/C	220 V 50/60 Hz, 15 VA 0 - 10 bars	Bürkert
s4	0018-4485-800	Solenoid valve	331/C	220 V 50/60 Hz, 15 VA 0 - 10 bars	Bürkert
1	0018-1749-600	Pressure reducer		R 1/8" 0.5-10 bars	Biegler & Co.
2	0018-1749-600	Pressure reducer		R 1/8" 0.5-10 bars	Biegler & Co.
3	0018-1749-600	Pressure reducer		R 1/8" 0.5-10 bars	Biegler & Co.
KL 1	0005-0510-890	Terminal block	SAK 4 KrG	0.5-4 mm^2,750 VAC 36 A	Weidmüller
e1		Automatic cut-out	SP3 121	1 A	Siemens
	0005-0354-000	Incandescent lamp	T 5.5	12 V 50 mA	
	0005-0542-000	Fuse		F 1.6 A	

b0	Totalentleeren	Complete de-sludging	Débourbage total
b1	Hauptschalter	Main switch	Interrupteur principal
b2	Separieren	Separation	Séparation
b3	Teilentleeren	Partial de-sludging	Débourbage partiel
b4	Überlauf	Overflow	Débordement
u1	Steuergerät	Timing unit	Programmateur





1 Überdruck, Excess pressure, Surpression
Konstantdruckventil Magermilchseite
Pressure control valve skim milk side
Vanne à pression constante côté lait écrémé

2 Betriebsdruck, Operating pressure, Pression de service
Konstantdruckventil Magermilchseite
Pressure control valve skim milk side
Vanne à pression constante côté lait écrémé

3 Betriebsdruck, Operating pressure, Pression de service
Konstantdruckventil Rahmseite
Pressure control valve cream milk side
Vanne à pression constante côté creme

4 Steuerlufteintritt, Control air inlet, Admission d' air de commande

5 Steuerluftaustritt, Control air outlet, Sortie d' air de commande
Konstantdruckventil Magermilchseite
Pressure control valve skim milk side
Vanne à pression constante côté lait écrémé

6 Steuerluftaustritt, Control air outlet, Sortie d' air de commande
Konstantdruckventil Rahmseite
Pressure control valve cream milk side
Vanne à pression constante côté creme.

WESTFALIA SEPARATOR
4740 Oelde i. Westf.

	Datum	Name	Projekt
Gez.	30.3.77.		
Gepr.			

Steuergerät TVA2-M elektronisch
Timing unit
Programmateur

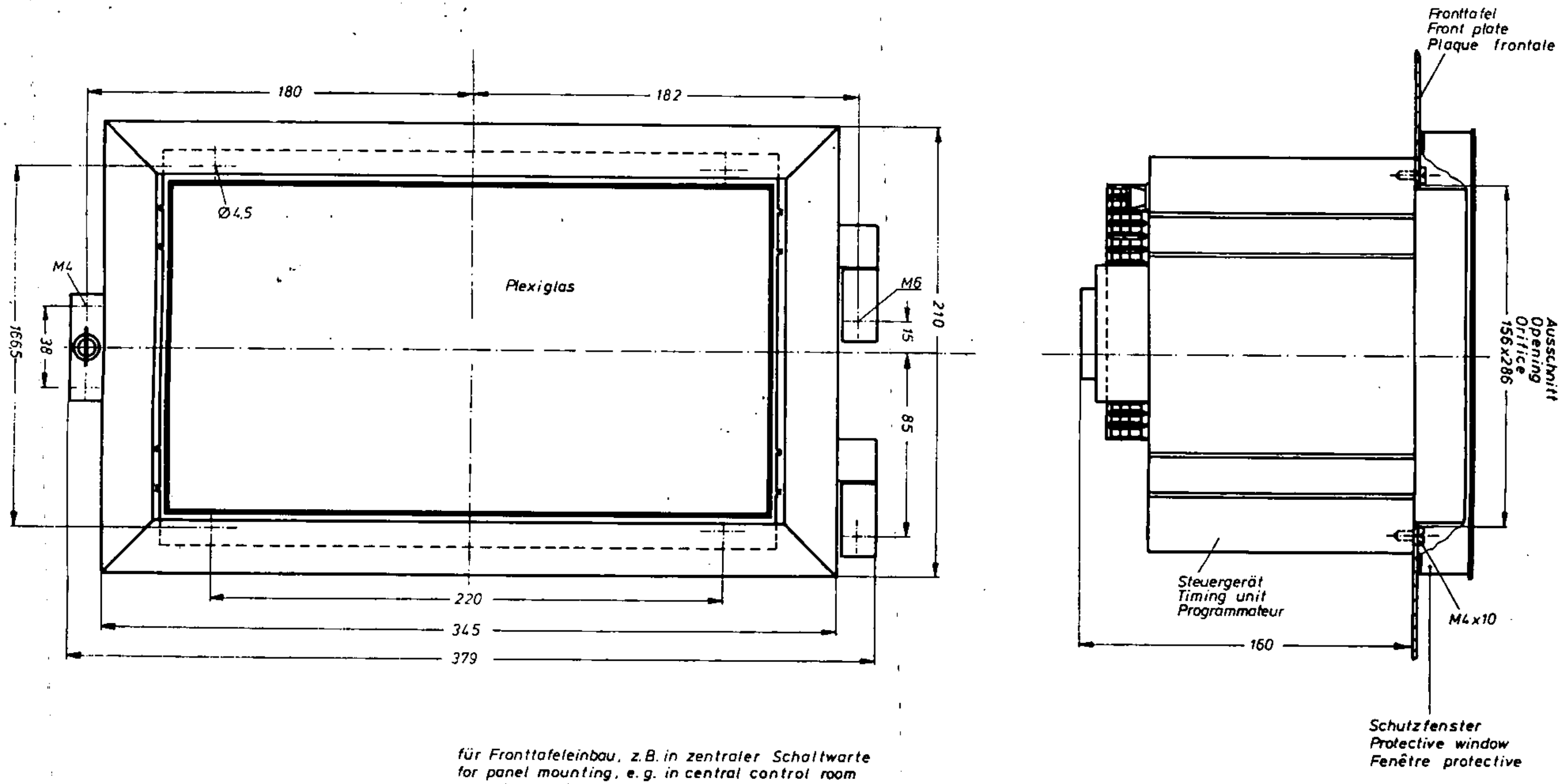
Aufbauplan
Arrangement of control elements
Disposition des éléments

Zeichnungs-Nr. 8134-0404-2231

Blatt

Bestehend aus ... Blatt

Panel-mounting of the electronic timing unit



für Fronttafeleinbau, z.B. in zentraler Schaltwarte
for panel mounting, e.g. in central control room
pour installation dans la plaque frontale, par ex. dans une station centrale de commande

WESTFALIA SEPARATOR
4740 Oelde i. Westf.

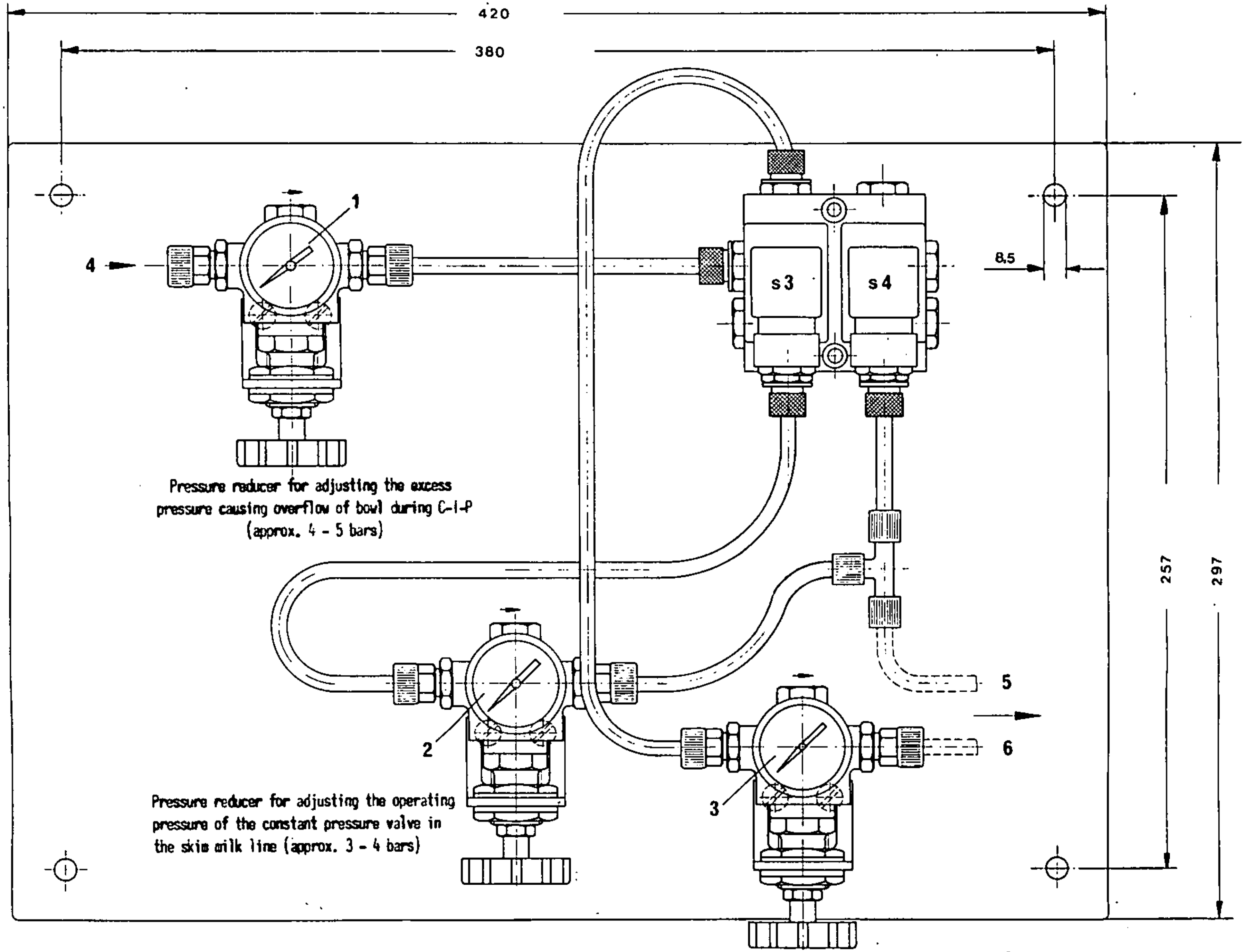
1977	Datum	Name	Projekt
Gez	25.4.	[illegible]	
Gepr			

Steuergerät Typ KS 064
Timing unit
Progammateur

Zeichnungs-Nr. 8134-0404-3231

Blatt | Bestehend aus Blatt

Compressed-air control assembly



Pressure reducer for adjusting the excess pressure causing overflow of bowl during C-I-P (approx. 4 - 5 bars)

Pressure reducer for adjusting the operating pressure of the constant pressure valve in the skim milk line (approx. 3 - 4 bars)

Pressure reducer for adjusting the constant pressure valve in the cream line; it should be set so that the discharge capacity is by 50% higher than that during normal operation.

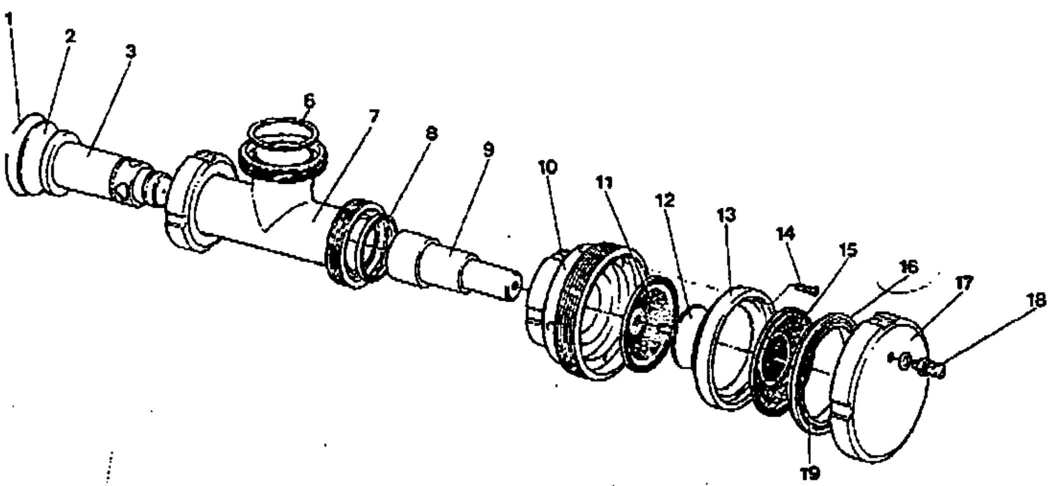
Drawing No. 8134-2219-040

FAX NR 01749 862 430 A. J. BARBER

ATT. PETER HORNER

MS860-01-076 S/N 1672 548

Constant-Pressure Valve with Diaphragm (air-controlled)



Lip seal £4.50

+ Seals for replacement (prevents leakage)

* Fig. 5

No. in Fig.	Part - No. Valve sizes NW 40, 1 1/2"	NW 50 , 2"	NW 65, 2 1/2"	Qty	Part Description
-	8268-2310-280	8267-2310-220	8266-2310-270	1	Constant-pressure valve assembly
1	0026-1485-170	0026-1489-170	0026-1490-170	1	Snap ring *
2	0004-2058-700	0004-2067-700	0004-2069-700	1	Gasket *
3	8268-2163-070	8267-2169-070	8266-2163-050	1	Throttling piece
6	0007-2210-750	0007-2211-750	0007-2212-750	1	Gasket
7	0018-1646-400	0018-1647-400	0018-1648-400	1	T-piece
8	0007-2210-750	0007-2211-750	0007-2212-750	1	Gasket
9	8268-2279-060	8267-2279-030	8266-2279-020	1	Slide
10	8268-2331-040	8267-2331-030	8266-2331-000	1	Housing
2 — 11	0004-2311-750	0004-2311-750	0004-2311-750	1	Diaphragm 90 +
12	8268-2247-010	8268-2247-010	8268-2247-010	1	Disc
13	8268-2257-020	8268-2257-020	8268-2257-020	1	Ring
14	0019-9389-400	0019-9389-400	0019-9389-400	6	Countersunk screw M5x12 DIN 7991
* 15	0004-2312-750	0004-2312-750	0004-2312-750	1	Diaphragm 105 +
16	8268-2257-030	8268-2257-030	8268-2257-030	1	Ring
17	0013-3298-300	0013-3298-300	0013-3298-300	1	Blind nut 90
18	0018-3724-600	0018-3724-600	0018-3724-600	1	Hose coupling R 1/8"
19	0007-1987-750	0007-1987-750 1989	0007-1987-750	1	Gasket 79.5/3 +

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

TOTAL P.01

Klemmleiste :-X1

Seite 1

Klemmennummer	Blatt/Pfad	Ziel intern Anschluß	Ziel intern Bezeichnung	Brücken	Ziel extern Anschluß	Ziel extern Bezeichnung	Funktionstext
PE				●			PE
1	1.1	2	-Q0				Incoming
2	1.2	4	-Q0				Incoming
3	1.2	6	-Q0				Incoming
PE				●			PE
4	1.3	2	-F5		U1	-M1	Separator
5	1.3	4	-F5		V1	-M1	Separator
6	1.3	6	-F5		W1	-M1	Separator
PE				●			PE
7	1.6	2	-K3		W2	-M1	Separator
8	1.7	4	-K3		U2	-M1	Separator
9	1.7	6	-K3		V2	-M1	Separator
PE				●			PE
10	2.3	2	-K4		U	-M2	Milkpump
11	2.3	4	-K4		V	-M2	Milkpump
12	2.3	6	-K4		W	-M2	Milkpump
PE				●			PE
13	3.6	T1	-F6			-M1	Thermistor
14	3.6	T2	-F6			-M1	Thermistor
PE				●			PE
15							Endswitch
16	6.7	9	-A1				Endswitch
PE				●			PE
17	11.5	14	-K5H				Opening-water
18				●			Opening-water
19	11.6	14	-K6H				Sealing-water
20				●			Sealing-water
21	11.7	14	-K7H				Brake-water
22				●			Brake-water
23	11.7	14	-K8H				Overflow 1
24				●			Overflow 1
25	12.2	14	-K9H				Overflow 2
26							Overflow 2
PE				●			PE
27	12.3	14	-K10H				Klaxon
28							Klaxon
PE				●			PE
29	12.4	11	-K4H				Milkp. Extern
30	12.4	14	-K4H				Milkp. Extern
PE				●			PE
PE				●			PE
PE				●			PE
PE				●			PE

Kabelbezeichnung intern

Kabelbezeichnung extern

Safety Switch

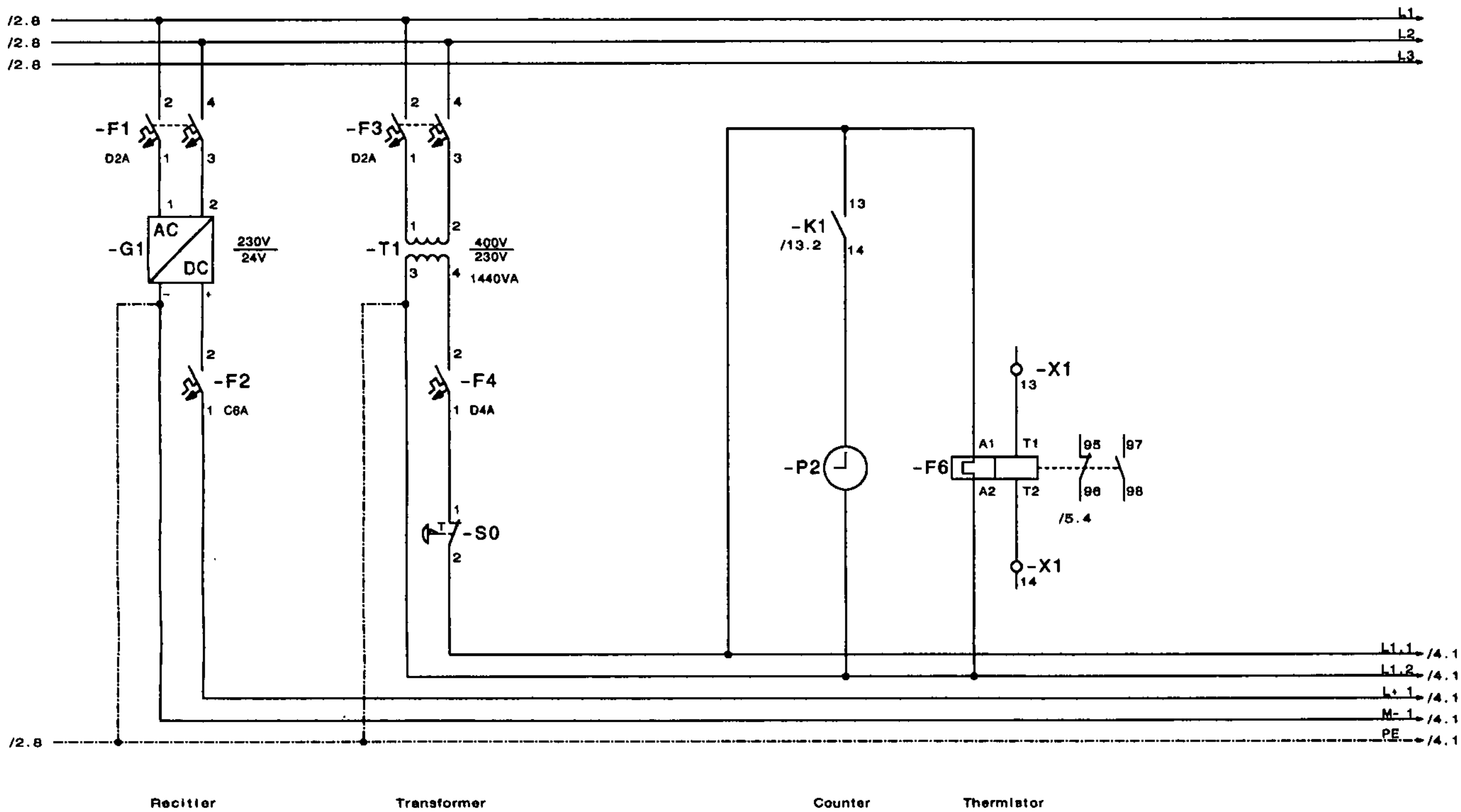
Zustand	Änderung	Datum	Name				
				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH
				Bearb.	Schneider		
				Gepr.			
				Norm		Urspr. / Ers. f.	Ers. d.

Firm: Waith

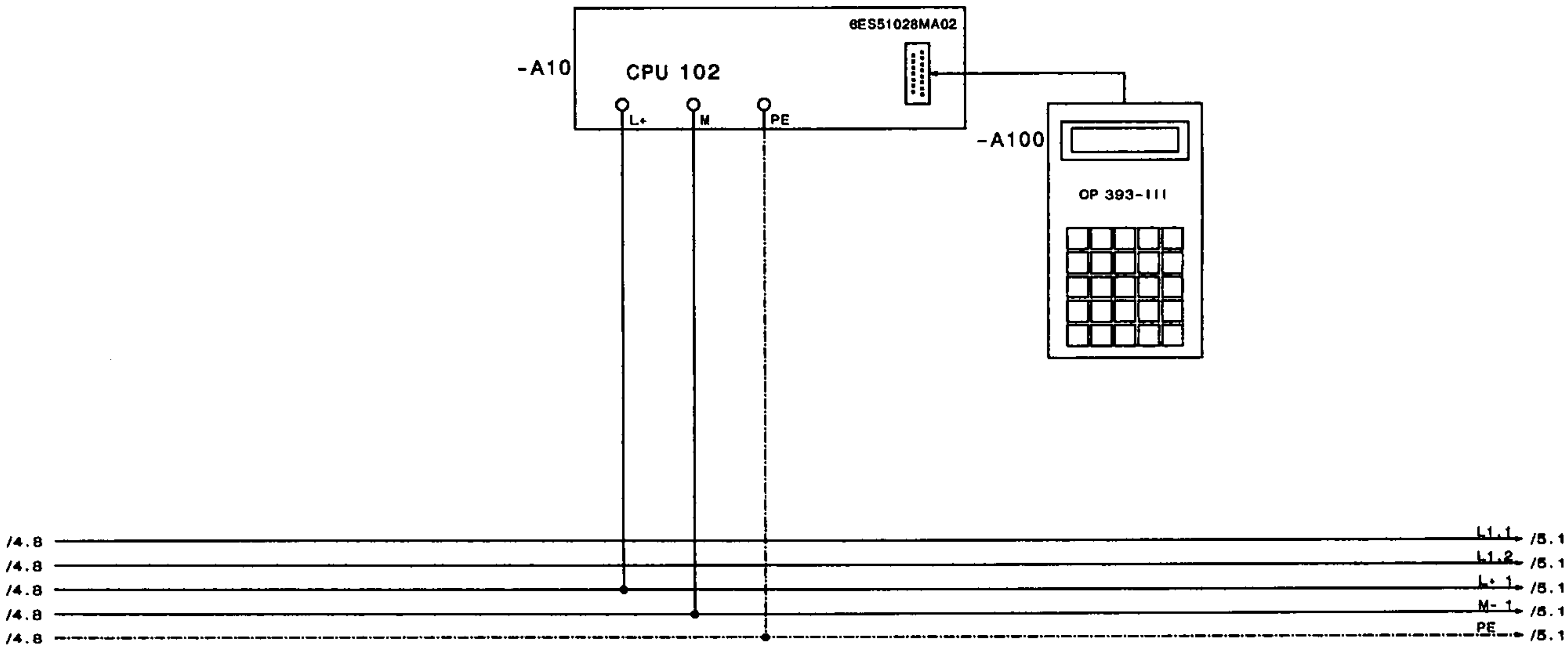
Terminal

WI-9709-N-MSB60-120

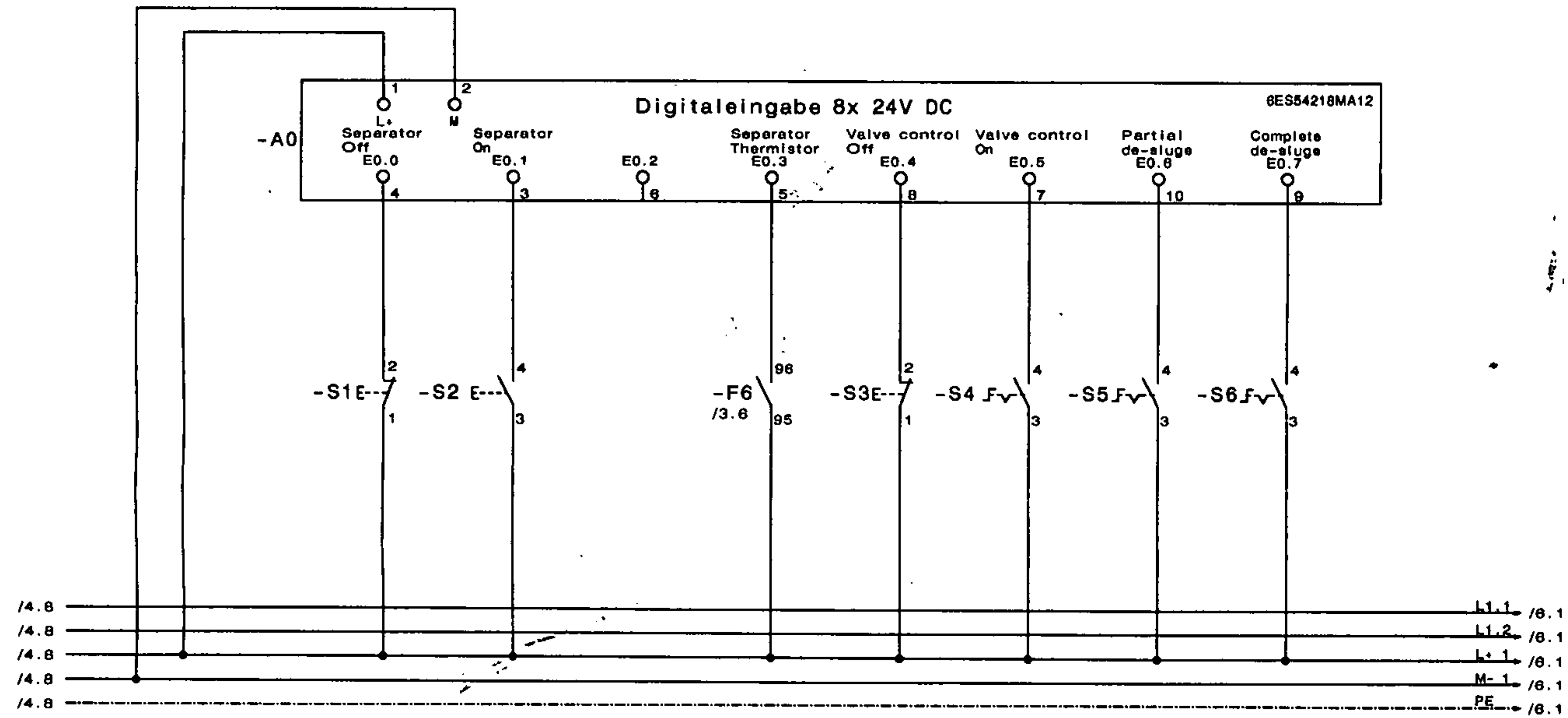
Blatt 13 von 13 Bl.



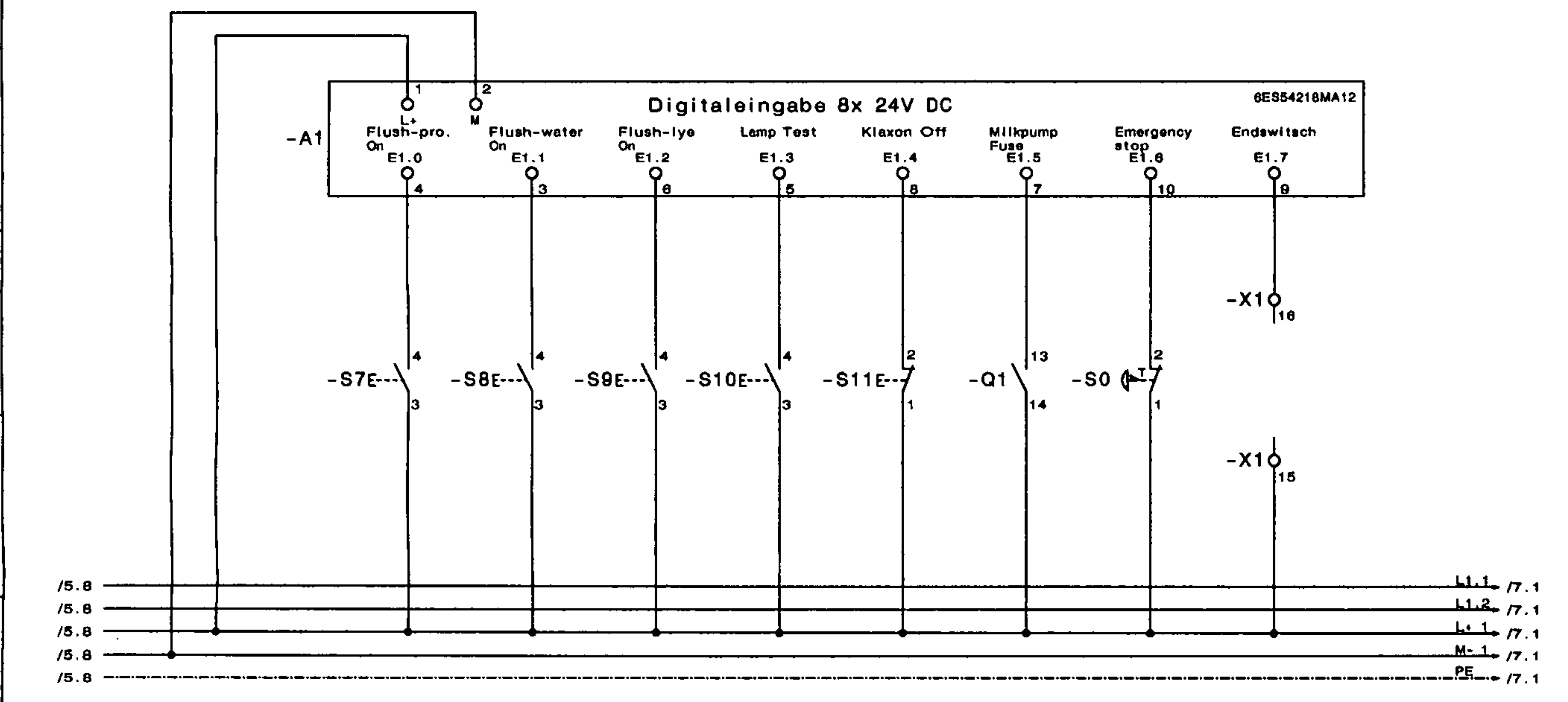
				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH	Firm: Waith	Control circuit 1
				Bearb.	Schneider				
				Gepr.					WI-9709-N-MSB60-120 — Blatt 3
Zustand	Änderung	Datum	Name	Norm		Urspr. — Ers. f.	Ers. d.		von 13 Bl.



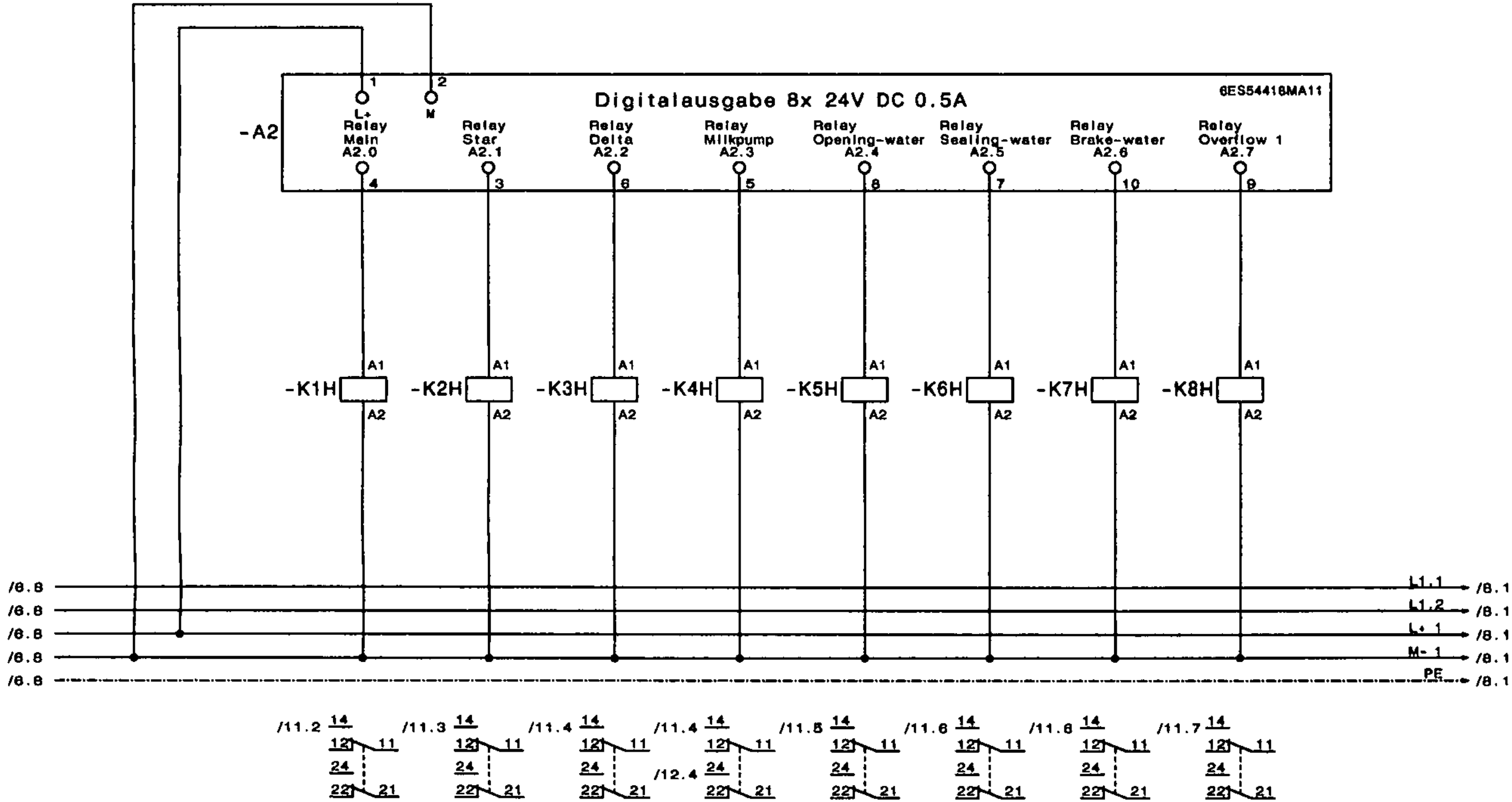
				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH	Firm: Waith	-A10 SPS-CPU102
				Bearb.	Schneider				
				Gepr.					WI-9709-N-MSB60-120
Zustand	Änderung	Datum	Name	Norm		Urspr. / Ers. f.	Ers. d.		Blatt 4 von 13 Bl.



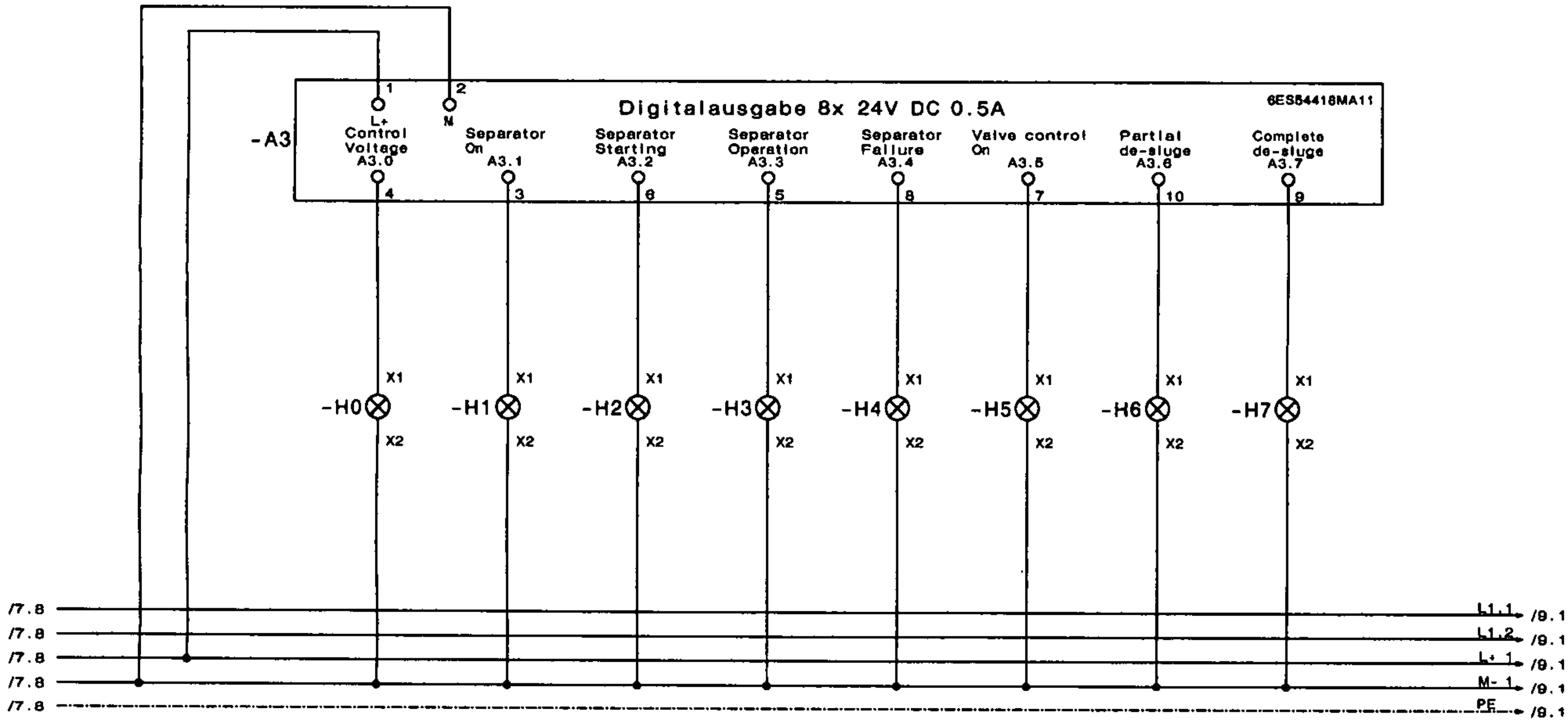
				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH	Firm: Waith	-A0 SPS-DE24VDC
				Bearb.	Schneider				
				Gepr.					WI-9709-N-MSB60-120
Zustand	Änderung	Datum	Name	Norm.		Urspr. / Ers. f.	Ers. d.		Blatt 5 von 13 Bl.



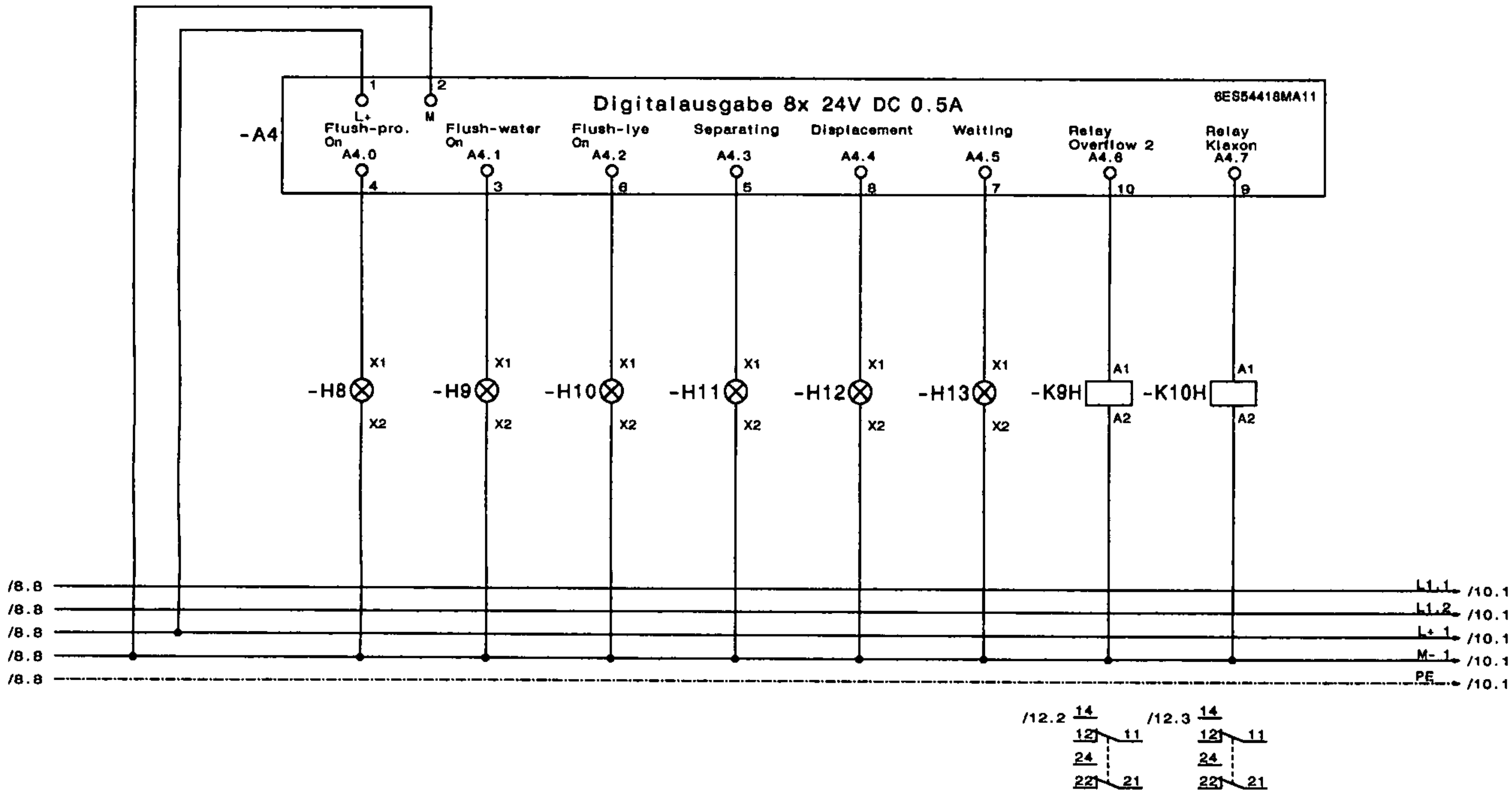
				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH	Firm: Waith	-A1 SPS-DE24VDC
				Bearb.	Schneider				
				Gepr.					WI-9709-N-MSB60-120
Zustand	Änderung	Datum	Name	Norm		Urspr. / Ers. f.	Ers. d.		Blatt 6 von 13 Bl.



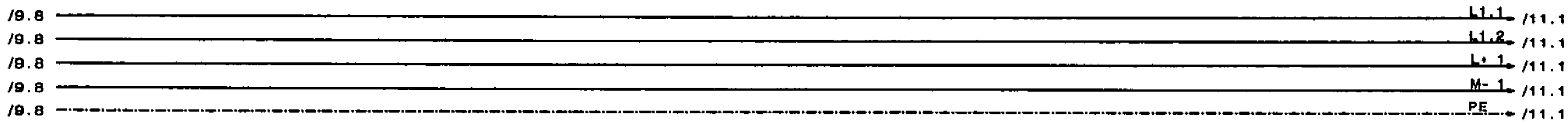
				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH	Firm: Waith	-A2 SPS-DA24VDC
				Bearb.	Schneider				
				Gepr.					WI-9709-N-MSB60-120 / Blatt 7
Zustand	Änderung	Datum	Name	Norm		Urspr. / Ers. f.	Ers. d.		von 13 Bl.



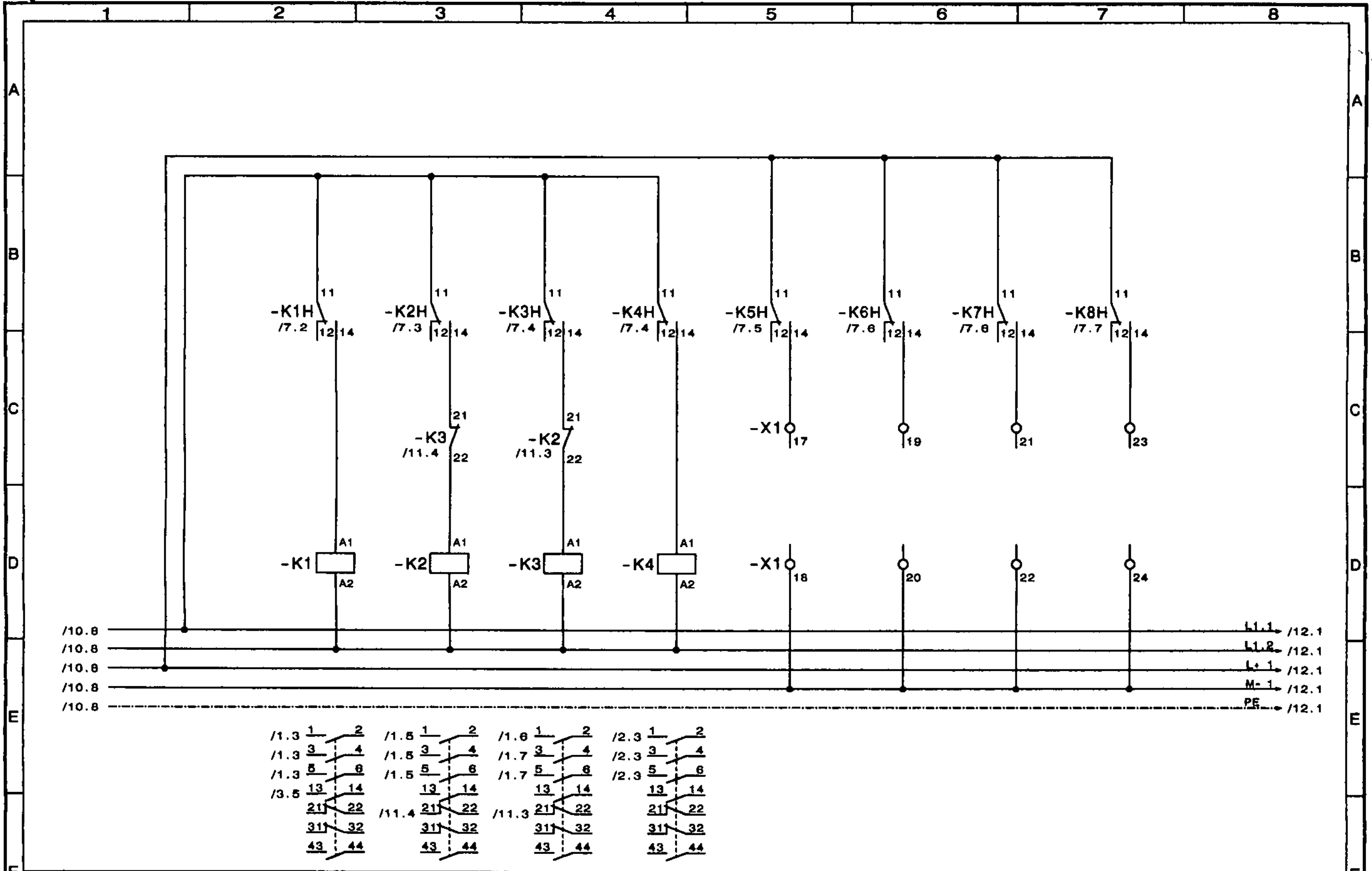
				Datum	24.09.97	MSB60-01-076		Winkelhorst Trenntechnik GmbH	Firm: IAF Kuba	-A3	SPS-DE24VDC	
				Bearb.	Schneider							
				Gepr.							WI-9709-N-MSB60-120	Blatt 8
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.				von 13 Bl.



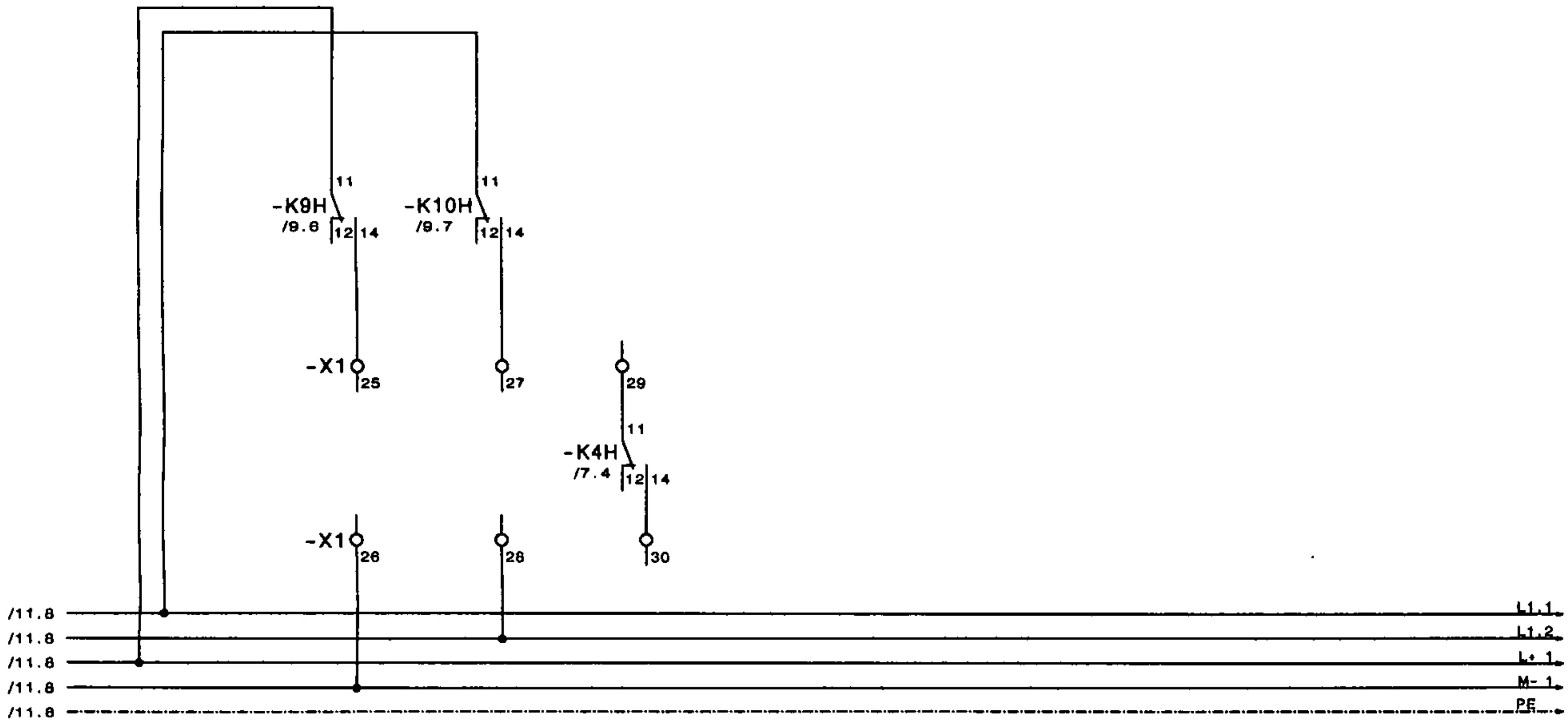
				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH	Firm: Waith	-A4	SPS-DE24VDC
				Bearb.	Schneider					
				Gepr.					WI-9709-N-MSB60-120	Blatt 9
Zustand	Änderung	Datum	Name	Norm		Urspr. / Ers. f.	Ers. d.			von 13 Bl.



				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH	Firm: Waith	-A5 SPS-back up
				Bearb.	Schneider				
				Gepr.					WI-9709-N-MSB60-120
Zustand	Änderung	Datum	Name	Norm		Urspr. / Ers. f.	Ers. d.		Blatt 10 von 13 Bl.



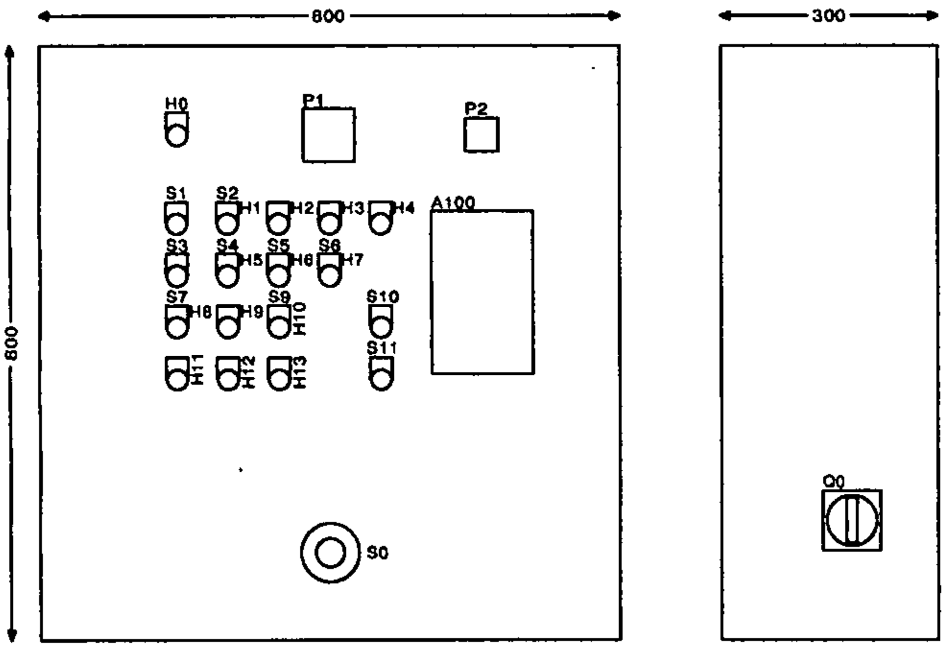
				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH	Firm: Waith	Control circuit 2
				Bearb.	Schneider				
				Gepr.					WI-9709-N-MSB60-120
Zustand	Änderung	Datum	Name	Norm		Urspr. / Ers. f.	Ers. d.		Blatt 11 von 13 Bl.



				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH	Firm: Waith	Control circuit 3
				Bearb.	Schneider				
				Gepr.					WI-9709-N-MSB60-120	Blatt 12
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.		von 13 Bl.

01908 311 384

FAO DARREN BARBER — 1NV3 RSF BARBERS PANEL

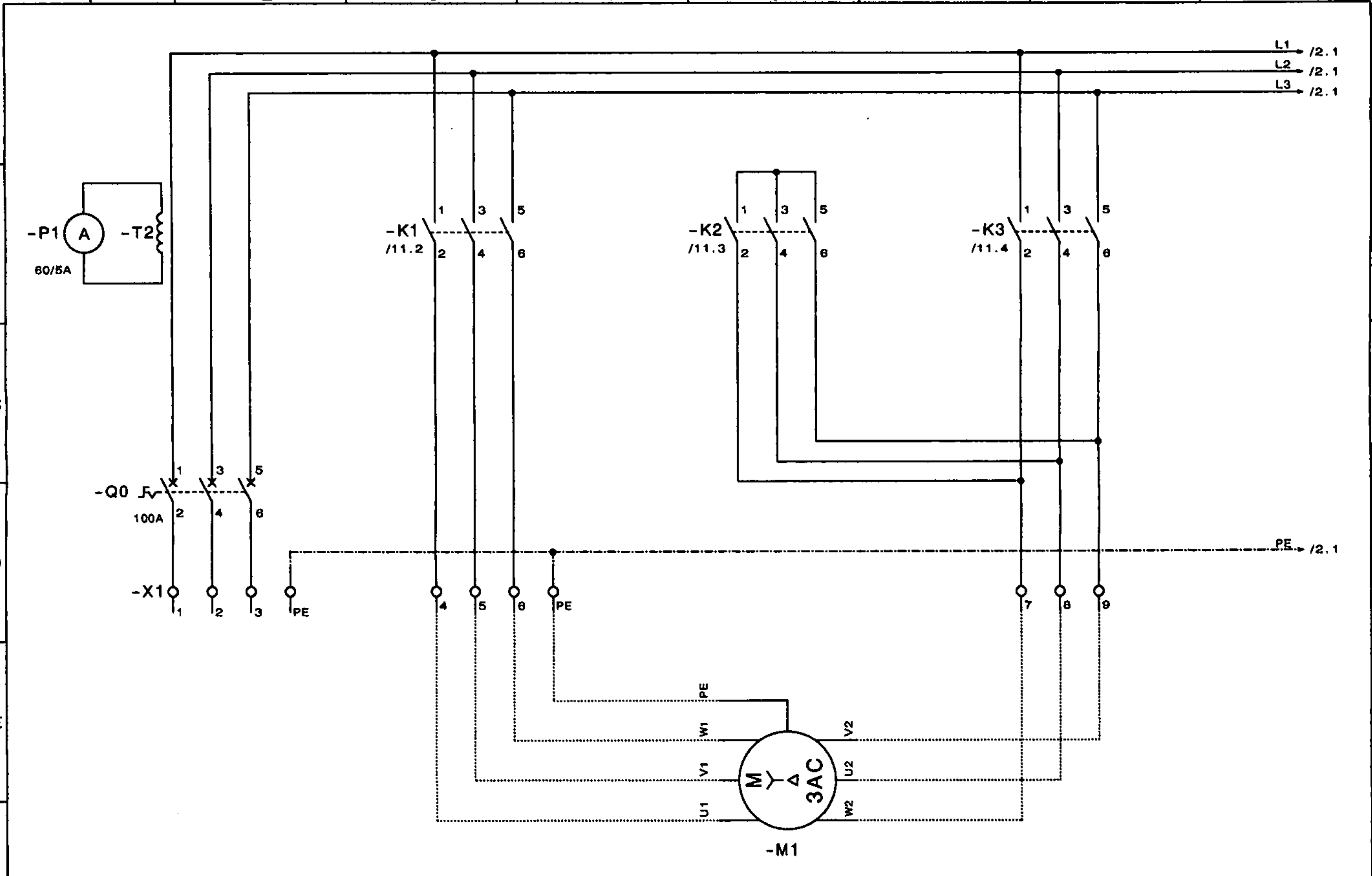


S0	Emergency stop		H0	Control Voltage
S1	Separator Off		H1	Separator On
S2	Separator On		H2	Separator Starting
S3	Valve control Off — MAN.		H3	Separator Operation
S4	Valve control On		H4	Separator Failure
S5	Partial de-sluge		H5	Valve control On
S6	Complete de-sluge		H6	Partial de-sluge
S7	Flush-pro. On		H7	Complete de-sluge
S8	Flush-water On		H8	Flush-pro. On
S9	Flush-lye On		H9	Fluge-water On
S10	Lamp Test		H10	Flush-lye On
S11	Klaxon Off/Reset		H11	Separating
			H12	Displacement
P1	Amperemeter		H13	Waiting
P2	Counter			
Q0	Main switch			
A100	OP 393-III			

(BUTTON FOR HIGH PRESSURE WATER SET ADDITIONAL)

[illegible] Valve 3 Bar 5 Bar.

				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH	Firm: Waith	Arragement
				Bearb.	Schneider				WI-9709-N-MSB60-120
				Gepr.					Blatt 0
Zustand	Änderung	Datum	Name	Norm					von 13 Bl.



				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH	Firm: Waith	Motor circuit 1	
				Bearb.	Schneider					
				Gepr.					WI-9709-N-MSB60-120	Blatt 1
Zustand	Änderung	Datum	Name	Norm		Urspr. / Ers. f.	Ers. d.			von 13 Bl.

Constant-Pressure Valve with Diaphragm (air-controlled)

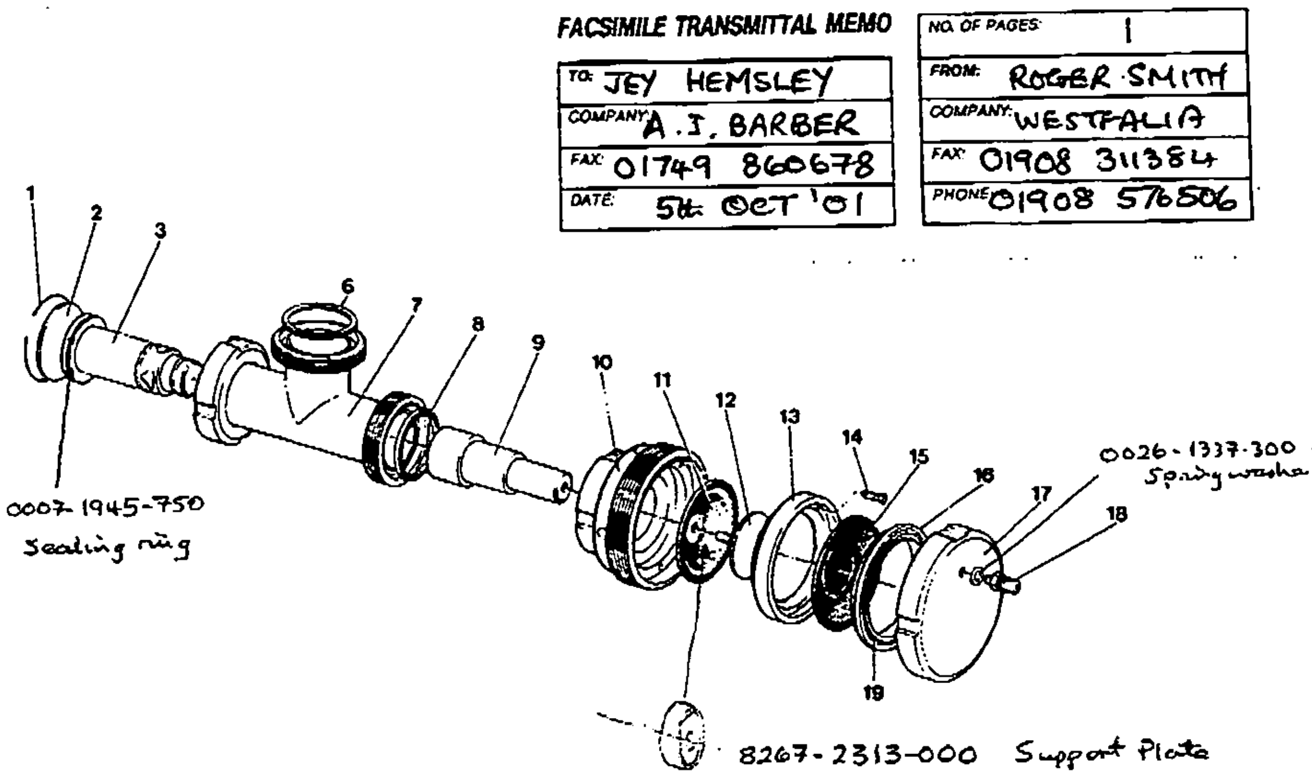


Fig. 5

MSA 170 MSA 130

No. in Fig.	Part - No. Valve sizes NW 40, 1 1/2"	NW 50 , 2"	NW 65, 2 1/2"	Qty	Part Description
-	8268-2310-280	8267-2310-220	8266-2310-270	1	Constant-pressure valve assembly
1	0026-1485-170	0026-1489-170	0026-1490-170	1	Snap ring *
2	0004-2058-700	0004-2067-700	0004-2069-700	1	Gasket *
3	8268-2163-070	8267-2163-070	8266-2163-050	1	Throttling piece
6	0007-2210-750	0007-2211-750	0007-2212-750	1	Gasket
7	0018-1646-400	0018-1647-400	0018-1648-400	1	T-piece
8	0007-2210-750	0007-2211-750	0007-2212-750	1	Gasket
9	8268-2279-060	8267-2279-030	8266-2279-020	1	Slide
10	8268-2331-040	8267-2331-030	8266-2331-000	1	Housing
11	0004-2311-750	0004-2311-750	0004-2311-750	1	Diaphragm 90
12	8268-2247-010	8268-2247-010	8268-2247-010	1	Disc
13	8268-2257-020	8268-2257-020	8268-2257-020	1	Ring
14	0019-9389-400	0019-9389-400	0019-9389-400		Countersunk screw M5x12 DIN 7991
15	0004-2312-750	0004-2312-750	0004-2312-750	1	Diaphragm 105
16	8268-2257-030	8268-2257-030	8268-2257-030	1	Ring
17	0013-3298-300	0013-3298-300	0013-3298-300	1	Blind nut 90
18	0018-3724-600	0018-3724-600	0018-3724-600	1	Hose coupling R 1/8"
19	0007-1989-750	0007-1989-750	0007-1989-750	1	Gasket 87/3

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

DOCUMENT TRANSMITTAL

Westfalia Separator Ltd

'Habig' House
Old Wolverton
Milton Keynes
MK12 5PY
Tel: 01908 313366
Fax: 01908 311384

Date: 19th October 1999

RECEIVED
21 OCT 1999

To: AJ & RG Barber
Maryland Farm
Ditcheat
Shepton Mallet
Somerset BA4 6PR

Attn: Mr Peter Horner

Transmittal No: DT/001

P.O. No: 013302
Customer Ref:
Supplier Ref: 9906014

Sender: Mr R.J.Dickerson

Signature: R. J. Dickerson.

For Your:

☐ Approval* ☐ Comment

☒ Information ☐ Other (See Remarks)

*Approval required within 10 calendar days or delivery may be affected.

Project Document Number:	Title / Description:	Suppliers Document Number:	Rev.	Repro. / Print
	Instruction Manual & Parts List	1175-9001-000	0	1 x A4 Copy

Remarks:

Please Acknowledge Receipt:

Received By: Date: Sheet 1 of 1

DOCUMENT TRANSMITTAL

Westfalia Separator Ltd
'Habig' House
Old Wolverton
Milton Keynes
MK12 5PY
Tel: 01908 313366
Fax: 01908 311384

Date: 19th October 1999

RECEIVED
21 OCT 1999

To: AJ & RG Barber
Maryland Farm
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Transmittal No: DT/001

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For Your:

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Project Document Number:	Title / Description:	Suppliers Document Number:	Rev.	Repro. / Print
	Instruction Manual & Parts List	1175-9001-000	0	1 x A4 Copy

Remarks:

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7.1 Cleaning-in-place

The separator is generally included in the CIP cycle of the pasteurizers. For cleaning the separator, the detergents used for cleaning the pasteurizers will be adequate. However, be sure that the last cleaning agent to be circulated is acid.

After milk processing, the residual milk is displaced and the whole equipment thoroughly flushed with water. Flushing is followed by two "total ejections" accomplished by pressing the push button "total ejection" on timing unit TVE 2-M.

The plant must be flushed with water and subsequent flush de-sludgings have to be performed even if the plant cannot be CIP-cleaned for some reason after milk processing.

The CIP-programme should comprise the following programme steps:

1) Flushing with caustic solution,
2) Flushing with water,
3) Flushing with acid solution,
4) Flushing with water.

IMPORTANT: Each of the programme steps 1 - 4 should be finished up with a total ejection.

During each programme step the spring-controlled constant-pressure valve incorporated in the skim milk line is to be throttled several times by actuating the snap closure (cover). This will cause flooding of the centripetal pump chamber of the separator, resulting in thorough flushing of hood and sediment collector.

If the separator is not equipped with a constant-pressure valve, the valve in the skim milk line must be throttled several times by hand.

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

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WESTFALIA
SEPARATOR

INSTRUCTION MANUAL AND PART LIST

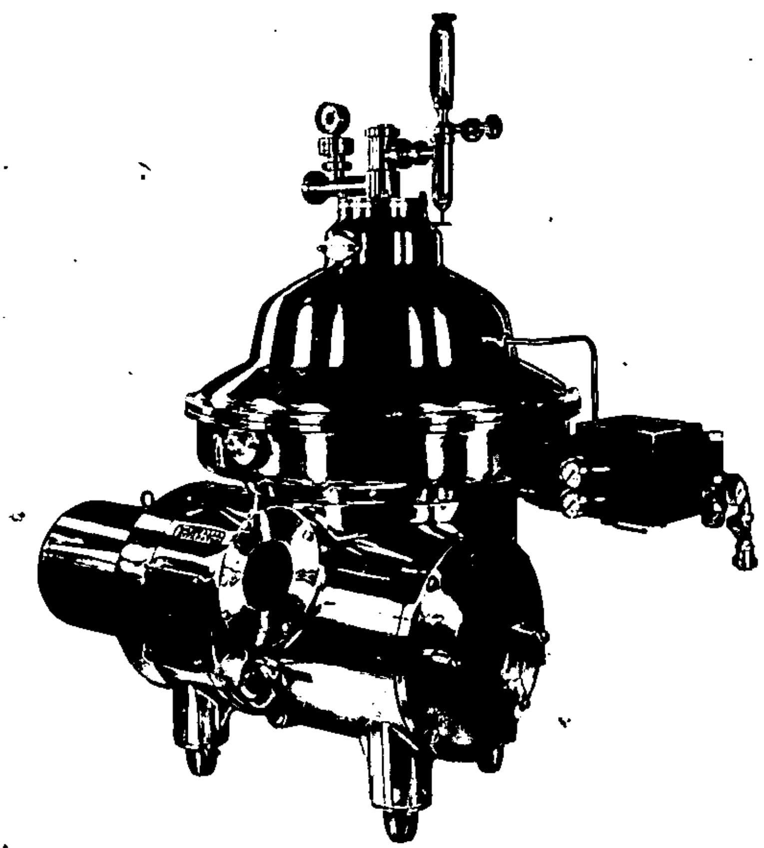
No. 1176-9001-001

WESTFALIA

Milk Separator

Model MSB 60-01-076

with self-cleaning bowl



WESTFALIA SEPARATOR AG / 4740 OELDE 1 (W.-GERMANY)
CABLES: WESTFALIA OELDE · PHONE: (02522) 771 · TELEX: 89474

No. 7229/580, engl.

Printed in W.-Germany

IMPORTANT HINTS

The WESTFALIA Separator is a high-speed centrifuge which works reliably provided that it is operated and looked after in accordance with our operating instructions. Please read carefully through the directions so that you will be able to operate and service your separator in such a manner that you can extract from it the greatest possible efficiency.

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

1) When connecting the motor, be sure to connect the PTC resistor type temperature feelers incorporated in the motor winding to an appropriate tripping device (see sect. 3.1).

2) The pressure in the operating-water supply line shall be at least 1.5 bars. Fluctuations of pressure must NOT exceed 0.5 bar.

3) Before each start-up check to be sure that

   hood and centripetal pump are fastened securely,

   oil level in gear chamber is slightly above middle of sight glass,

   brakes are released. (Since the fluid clutch is not protected against overload, applied brakes can cause overheating of the oil, which again can lead to damage of the clutch).

4) Feed milk to separator only after the bowl has been closed which is accomplished by feeding sealing water.

5) If the bowl comes up to rated speed (as per name-plate of separator) in less than 5 minutes, the motor will pull too high a starting current. This indicates that the fluid clutch contains too much oil.

6) Make first oil change after 250 running hours. When gear parts are broken in, change oil every 750 running hours. Use the oil specified on page 2/1. Whenever changing the oil, clean the gear chamber.

7) Check oil level every week. During operation, oil level must never be allowed to sink below middle of sight glass.

   Check regularly for water in oil. To do this, loosen oil drain screw and allow a small amount of oil to drain.

8) Replace ball bearings of worm spindle and worm wheel shaft and change oil in fluid clutch every 5,000 running hours.

9) Do NOT loosen any part of the separator or of the feed and discharge connections before the bowl has stopped completely.

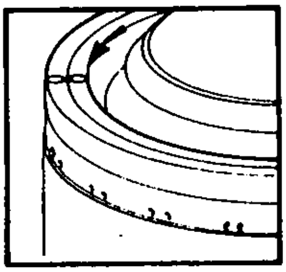
Note that the bowl has NOT stopped before the gear sight glass is clear and the worm wheel has ceased rotating.

10) Dismantle the bowl once a month for inspection:
Thoroughly clean and wipe dry contact surfaces and threads of bowl bottom and lock ring and apply a thin film of lubricating paste furnished with the separator, to prevent galling of the threads.

11) When dismantling the bowl be sure to place bowl parts on a rubber mat or wooden surface, never on the stone floor.

12) After removing the bowl bottom, place splash cover 406 (fig. 20) over worm spindle to prevent wash liquid from seeping into the gear chamber.
Do NOT flush inside of upper section of frame with water hose; wash by hand.

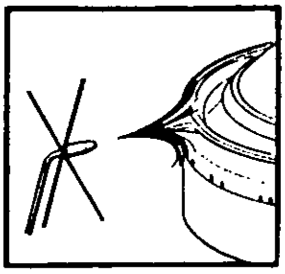
13) Before installing the bowl bottom, oil the upper part of the spindle (thread, cone and cylindrical guide surface for spindle cap). It must be possible to move the spindle cap easily up and down on the spindle.
Then clean and wipe dry the conical part of the spindle with a smooth rag. Also, clean the inside of the bowl hub carefully to assure proper fitting.



14) When assembling the bowl, strictly adhere to the instructions given in sect. 4 to avoid undue unbalance.
Before starting the bowl be sure it is completely assembled.

IMPORTANT: Make sure that bowl lock ring has been tightened properly, i.e. that "O" marks on bowl bottom and bowl lock ring are aligned.

15) When pressure in disc stack has slackened, add spare disc (see sect. 4.1, no. 15).



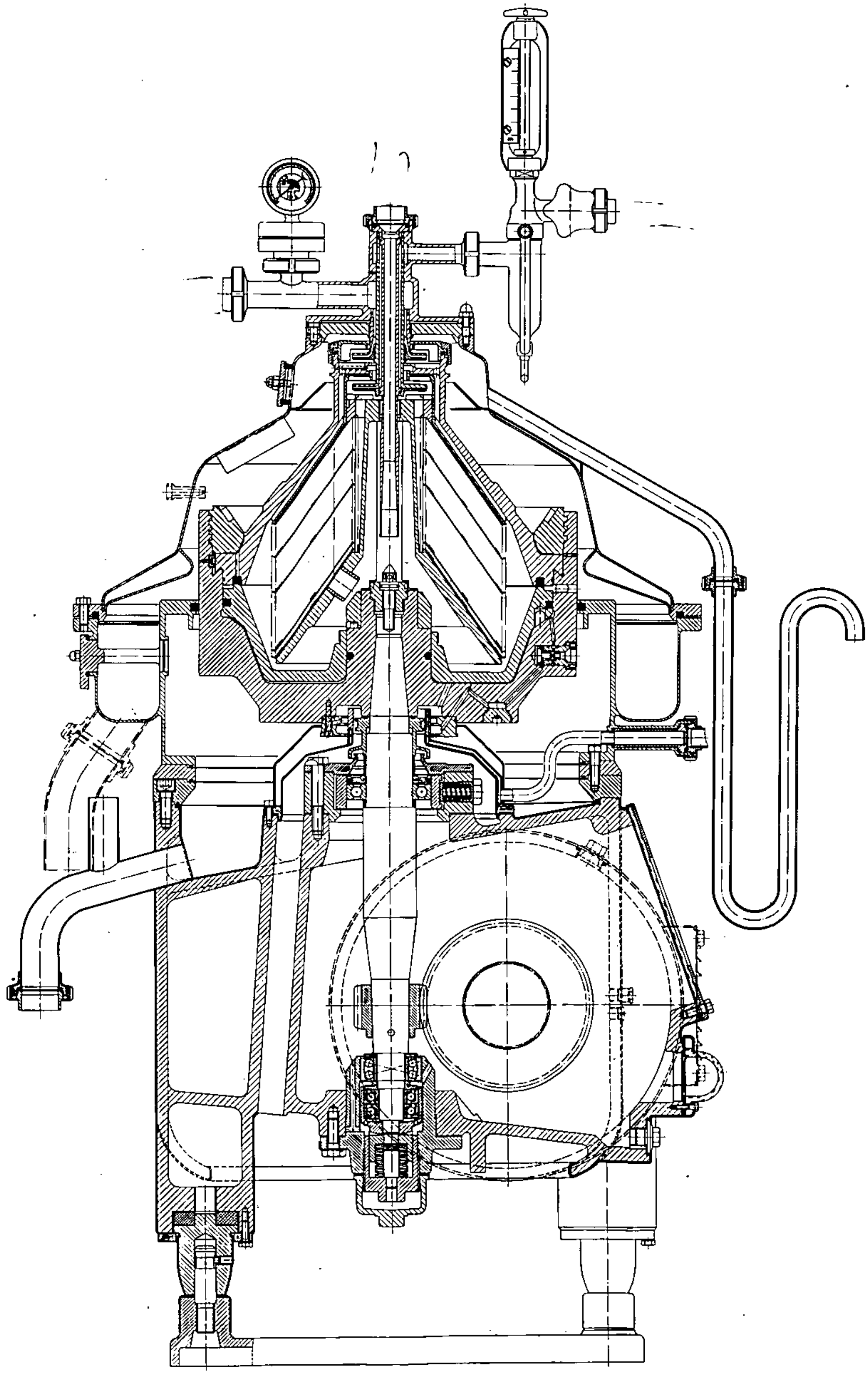
16) Never use blow-torch on bowl parts or expose bowl to heat of open flame.

17) Four weeks after the initial start of the separator or after replacement of the main bowl gasket, be sure to check the gasket for burrs which may have formed during operation. Remove burrs with a knife (see drawing, page 10/2). Excessive formation of burr is likely to destroy the gasket, thus causing leakage of the bowl.

CONTENTS

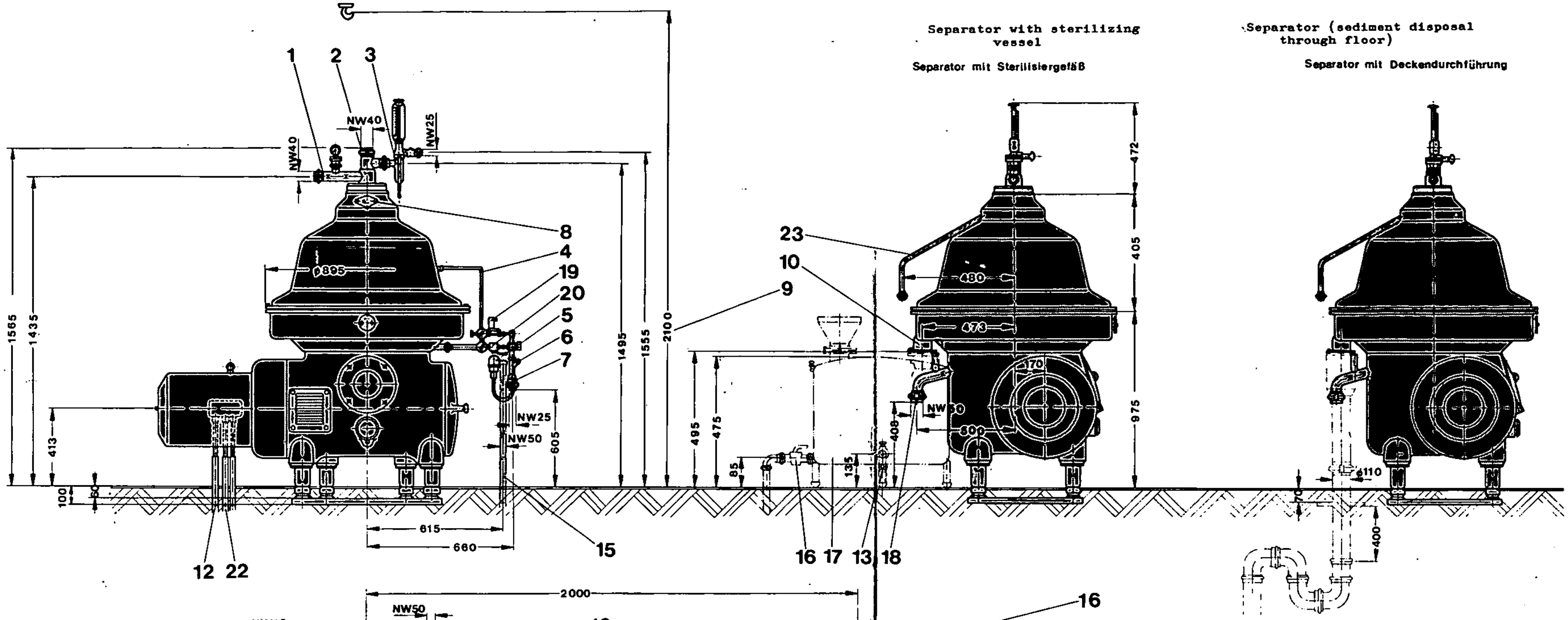
List of Parts

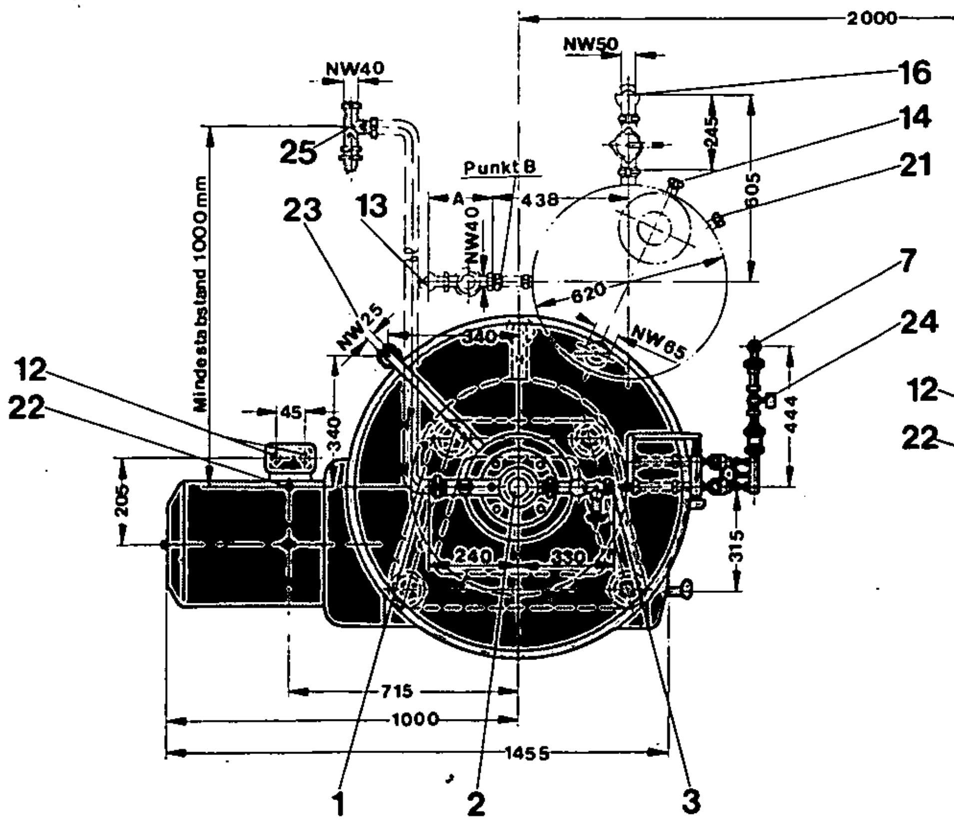
Sectional view of the separator

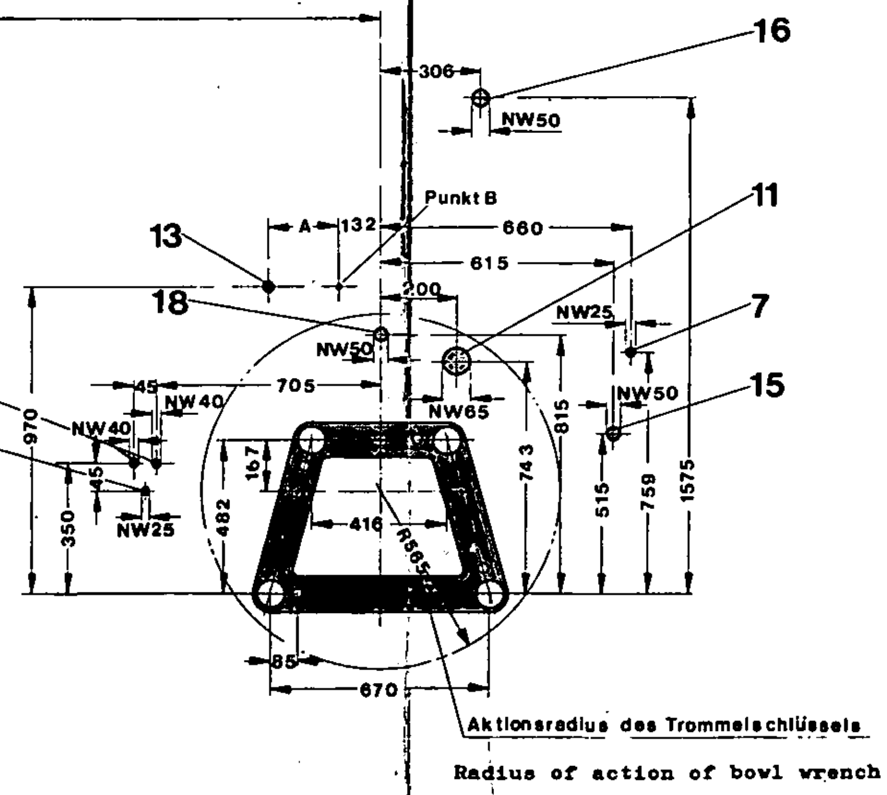


Dimensioned drawing (for installation plan of flow constrictor refer to page 23)

(for installation plan of flow constrictor refer to page 23)







25	Constant pressure valve
24	Water pressure reducer
23	Overflow
22	Connection for PTC resistors
21	Connection piece for temperature feelers
20	Rapid-closing valves
19	Solenoid valves
18	Operating-water discharge
17	Sterilizing vessel
16	Discharge (sterilizing vessel)
15	Power supply for solenoid valves and pressure switch
14	Thermometer (sterilizing vessel)
13	Steam supply (sterilizing vessel)
12	Power supply for motor
11	Sediment disposal through floor, if required
10	Sediment discharge
9	Minimum lifting height for hoist
8	Overflow inspection cover
7	Operating-water feed
6	Strainer
5	Pressure switch
4	Flush line
3	Cream discharge
2	Feed
1	Skim milk discharge
A	The dimension depends on make and type of fittings used

	Bowl speed	6450 rpm
	Total net weight of machine	1550 kg
	Minimum lifting capacity of hoist	500 kg
	Skimming capacity	7000 l/h
	Motor power	17 kW, 50 Hz

Dimensioned drawing

1. Installation

1.1. Transport

Suspend the separator as shown in fig. 1/1. Never attach rope to eye bolt on motor. To prevent rope from slipping, wind it around the crane hook. When lowering the separator, make sure it touches down gently.

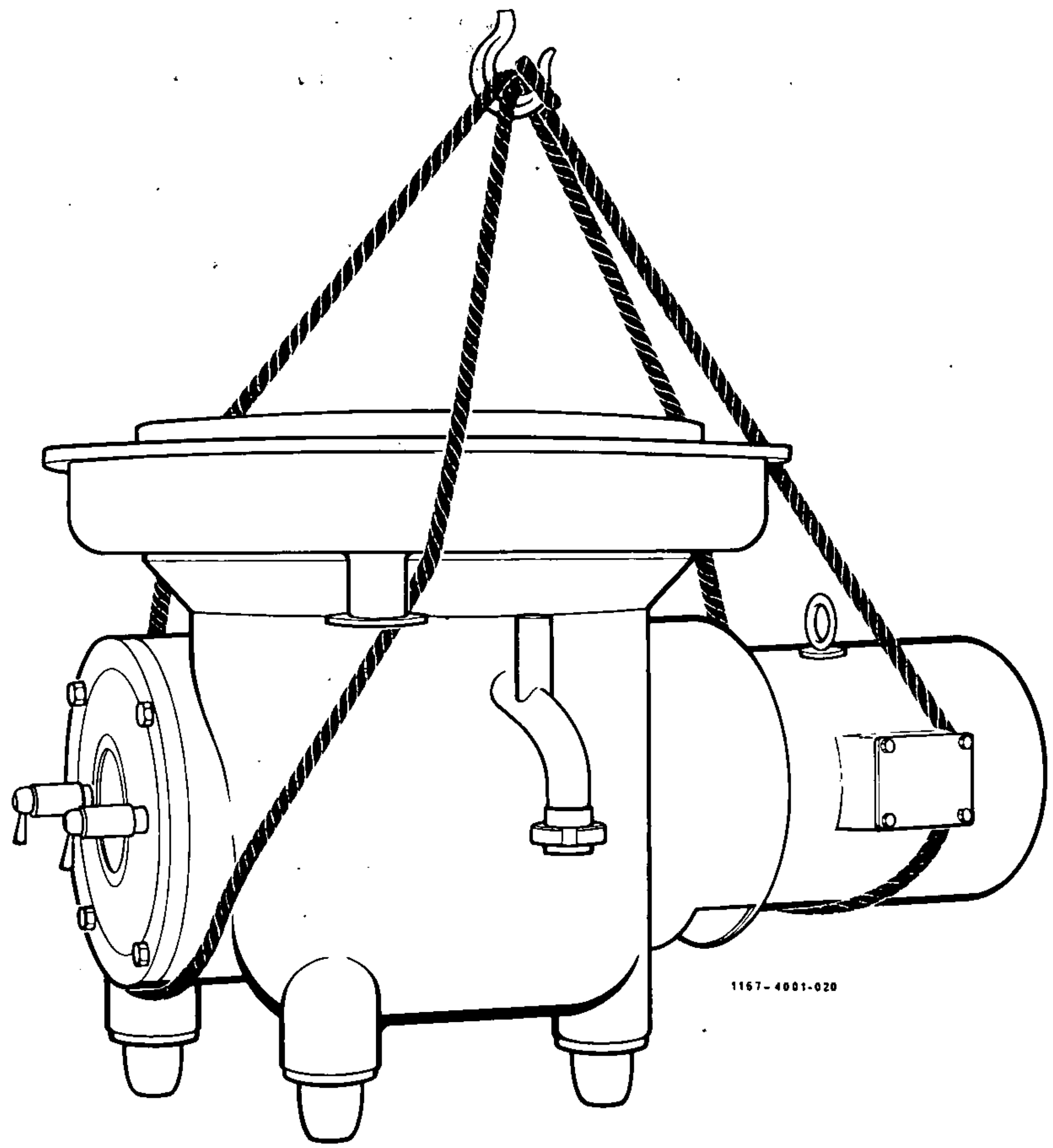


Fig. 1/1

Weight: 1000 kg

1.2. Installation

When installing the separator make sure that sufficient room is available (at least 300 mm) for mounting and removing the motor and for removing the horizonzal drive shaft which is to be pulled out towards the brake side.

Do NOT install a shut-off device in the line which will be connected to the operating-water discharge line 5a-c (fig. 13/1). The line should have 50 mm (2") I.D. It should have sufficient fall and must NOT be too long to allow the discharging operating water to flow off freely, since otherwise the water will rise and enter the upper section of the frame, resulting in slowing-down of the bowl.

The supply line to the operating-water connection should have 25 mm (1") I.D., the operating-water pressure should be at least 1.5 bar. The pressure must not fluctuate by more than 0.5 bar. Operating-water consumption: 50 litres/h.

For mounting and removing the bowl parts, a 500 kg hoist (minimum lifting height 2100 mm; see installation plan) will be indispensable). On request a WESTFALIA Swivel Hoist can be supplied.

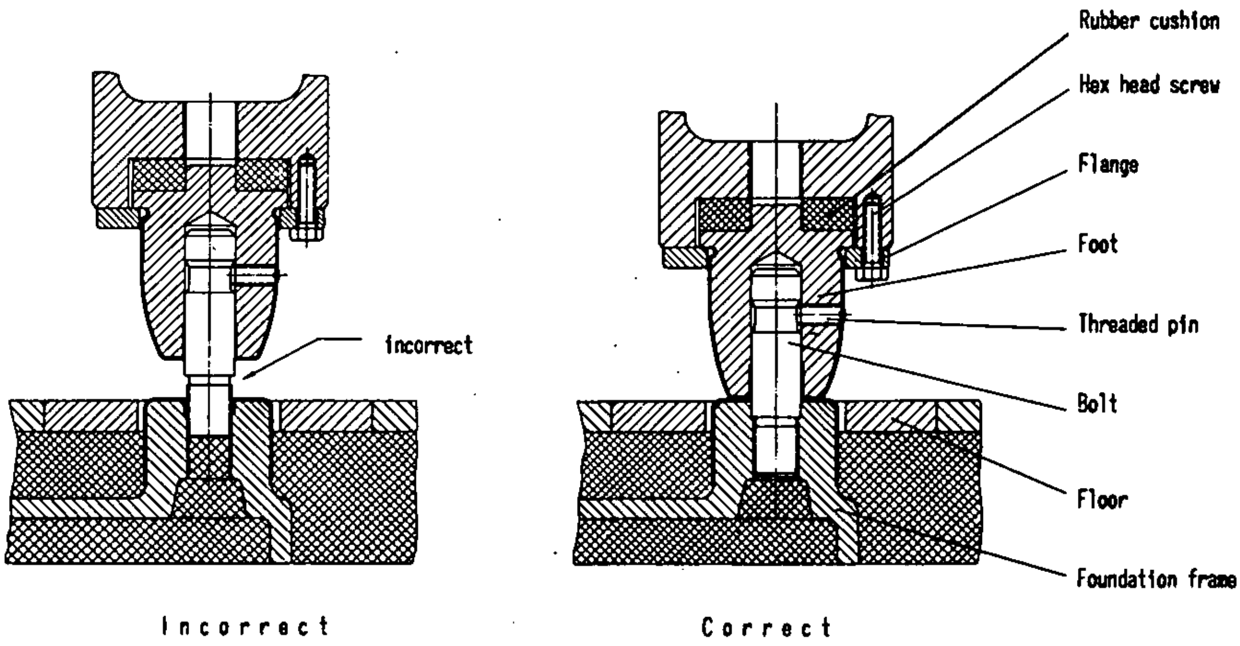


Fig. 1/2

Screw bolts into the four mounting blocks of foundation frame; make sure they are tight. Embed the foundation frame in the floor so that the mounting blocks of the frame protrude above the plane of the floor by about 5 mm. Fill up the space below the foundation frame with concrete. Make sure that the mounting blocks are absolutely level and grout the frame with concrete, inside and outside. To accelerate setting of cement, commercial rapid binding agents may be used.

By means of flanges and hex head screws fasten feet with fitted-on rubber cushions to separator frame. Then lift the separator frame with its feet onto the bolts of the foundation frame and tighten the threaded pins with a wrench.

2. Lubrication

2.1. Lubrication of bearings and gear parts

All bearings and gear parts are splash lubricated from a central oil bath.

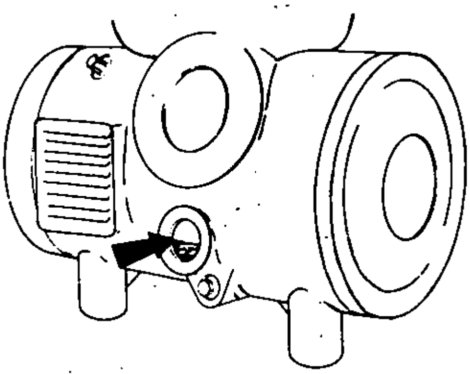


Fig. 2/1

OIL LEVEL

Before initial start-up of separator, fill gear chamber with oil. To do this, remove upper sight glass and fill in oil until oil level is slightly above middle of oil level sight glass. About 5.5 litres of oil are required for one filling. During operation oil level must never be allowed to sink below middle of oil level sight glass; refill oil when necessary.

OIL CHECK

Check oil level once a week.
From time to time check if oil contains water. To do this, loosen oil drain screw and allow a small amount of oil to drain. An immediate oil change becomes necessary when the oil shows a milky colouring (emulsification).

OIL CHANGE

Make first oil change after about 250 operating hours; then change oil every 750 operating hours. However be sure not to wait longer than 6 months to change the oil.

Each time when carrying out oil change, thoroughly clean gear chamber and flush with thin-bodied oil, prior to filling in new oil. Remove all metal particles from inner walls and corners of the gear chamber. Do NOT use fluffy cleaning rags or cotton waste. The sight glass should also be cleaned, as a layer of oil will probably have deposited on the inner side of the glass and this is easily mistaken for the oil level.

LUBRICATING OIL

As lubricating oil use only a gear oil designated

C-LP 114 (according to DIN 51502)

or designated

ISO VG 220 (according to ISO/DIS 3448).

The lubricating oil shall meet the following requirements:

1) Viscosity: 114 ± 8cSt at 50°C, (220 ± 22 cSt at 40°C)

2) Additives:
   a) additives giving increased protection against corrosion and increased resistance to aging, - with properties preventing corrosion on steel according to DIN 51355/B, degree of corrosion 0. Corrosive effect on copper according to DIN 51759/100 A3, degree of corrosion 1.
   b) additives for decreasing wear and increasing the load-carrying capacity. The "FZG" gear rig test according to DIN 51354 as well as the test according to A/16.6/90, load grade > 12, must have been passed.

3) Demulsifying behaviour according to DIN 51599: < 60 minutes.

The gear oil designated "Separator lubricating oil C-LP 114" which has been extensively investigated by us meets the above requirements and should preferably be used. For the order number refer to page 20/1 of the parts list.

<u>IMPORTANT!</u> Do NOT use motor vehicle lubricating oils, since they are likely to emit disturbing odours.

2.2. Lubrication of the motor bearings

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

CAUTION: To avoid damage to the threads due to pressing, the threaded bolt must be screwed in and the threaded ring screwed on **all the way.** If the threaded ring cannot be screwed down completely, then the piston and the cylinder of the compressing device prove to be too far apart. To bring them back into their starting position, loosen screw "F" by two turns and move the pump lever to its lowest position. Now you can screw down the threaded ring, thereby bringing piston and cylinder into proper position.

e) Check to be sure that all screw connections of the compressing device are tightened securely and that return duct of check valve is closed by means of screw "F".
Before the first use of the compressing device fill oil container of pump with oil and de-aerate the hydraulic chamber (see 4.6).

f) Actuate lever of piston pump until the pressure gauge indicates a pressure of 200 - 250 bar. If the maximum pressure is not attained and oil flows out of the stroke limiting hole, then bolt 430d has not been screwed far enough into the distributor. The compressing device is only ready for use again when bolt 430d and threaded ring 430a have been brought back into the position as described under 14a-d on page 4/3.
While compressing the disc stack make sure that arresting piece of bowl bottom snaps into groove of bowl top and that bowl top does not become tilted.

15) Use annular wrench 425 and lifting device 431 to place bowl lock ring onto bowl bottom (see fig. 4/6). Screw in the lock ring (left-hand thread) with the aid of the annular wrench (without hitting the wrench handle with a mallet) until the "O" marks on ring and on bowl bottom are 3 to 5 cm apart. Then hit wrench handle with mallet 405 to obtain "O" mark alignment.

IMPORTANT: If the bowl lock ring can be tightened **by hand** with the aid of the annular wrench so that the distance between the two "O" marks is less than 3 cm, a spare disc has to be added because the pressure in the disc stack has slackened (see sect. 4.1, No. 9b). If the distance between "O" marks is more than 5 cm, check if all bowl parts are properly locked in place. If the pressure in the disc stack is too high, it can be reduced by greasing the spacers of the discs (e. g. with cream).

16) Move pump lever down as far as it will go to prevent it from jumping back. Only then loosen screw "F" to enable the oil to return from the hydraulic cylinder into the oil container. The compressing device can now be removed from the bowl.

17) Screw upper centripetal pump (with inserted gasket) onto lower centripetal pump (left-hand thread). Then use wrench 421 to tighten the upper centripetal pump until it hits stop. While doing so, block the lower centripetal pump by sticking a screwdriver through the holes of the pump tube.

18) Insert gasket 23 in groove of centripetal pump chamber cover 22.

19) Mount centripetal pump chamber cover. Watch for proper location.

20) Tighten centripetal pump chamber lock ring 24 by lightly rapping against handle of annular wrech 426 (left-hand thread).

21) Check to see if bowl can be turned by hand.

4.2. Assembling the feed and discharge connections

1) Fasten lifting device 435 (fig. 20) to the hood by means of cap nuts 41h. With the aid of a hoist place hood so onto sediment collector that the "0" marks on sediment collector and on hood are in line with each other. Connect flush lines. Fasten hood to sediment collector by means of hex head screws.

2) Place disc onto hood. Screw centripetal pump into disc and tighten it with wrench 421, turning fully counter-clockwise.

3) Before the initial start-up, after re-assembling the vertical gear parts or exchanging the bowl check bowl for proper height (see 8.3).

4) Fasten disc to hood by means of the two Allen screws.

5) Install feed and discharge housing and fasten with cap nuts 41h.

6) Install feed tube with inserted gaskets in feed and discharge housing.

7) Connect feed and discharge lines.

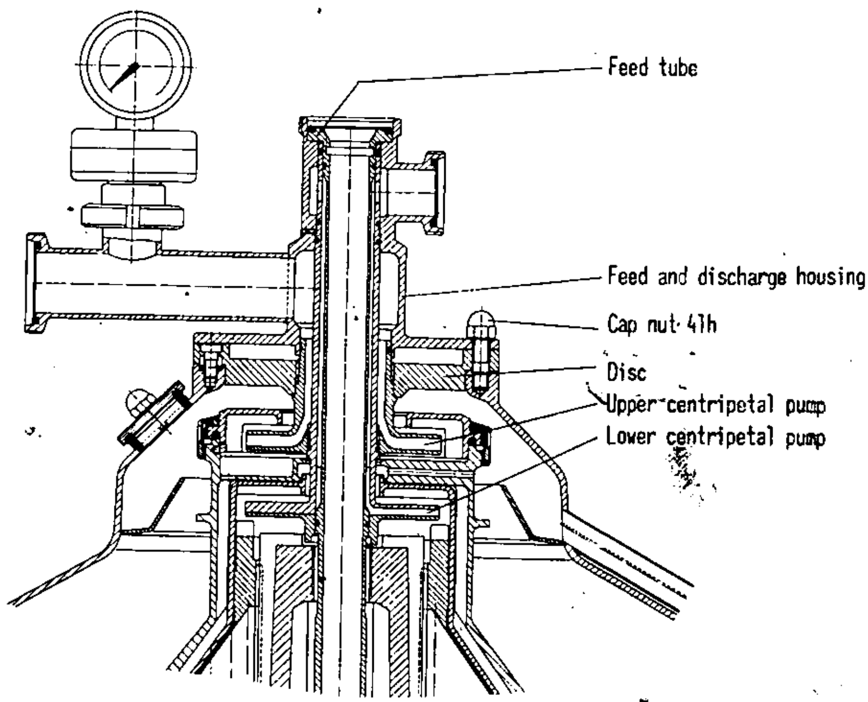


Fig. 4/5

4.3. Removing the feed and discharge system, - Dismantling the bowl

CAUTION: To avoid accidents do NOT loosen any part of the separator or of the feed and discharge system before the bowl has stopped completely.

Note that the bowl has NOT stopped before the gear sight glass is clear and the worm wheel has ceased rotating.

Proceed in reverse order of assembly (see sect. 4.1 and 4.2). The following should be kept in mind:

Handle bowl parts with care.

Be sure to replace worn gaskets.

Before opening the bowl, release the brakes by turning the two handles clockwise.

Use wrench 429 to remove feed tube from feed and discharge housing. After having removed the feed and discharge housing, loosen the two Allen screws in the disc. Then use wrench 421 to remove the double centripetal pump from the disc (left-hand thread).

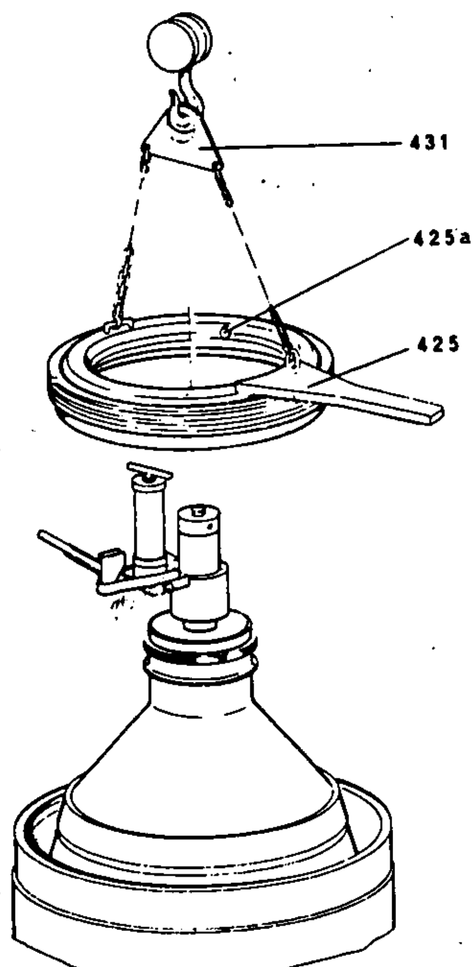


Fig. 4/6

After having unscrewed the small lock ring and removed the centripetal pump chamber cover, screw upper centripetal pump off the lower centripetal pump, using wrench wrench 421 (left-hand thread). While doing so, block lower centripetal pump by introducing a screwdriver into the holes of centripetal pump shaft. Then compress disc stack by means of hydraulic compressing device in order to facilitate loosening of the bowl lock ring (see 4.1, No. 14a-f).

Now unscrew the bowl lock ring (left-hand thread) with the aid of annular wrench 425. Loosen the ring by lightly hitting against wrench handle with mallet 405.

Remove hydraulic compressing device as described in sect. 4.1 under No. 16.

Fig. 4/6

Lock annular wrench 425 by screwing hex head screw 425a into groove of bowl lock ring. Then lift off annular wrench and lock ring with the aid of device 431.

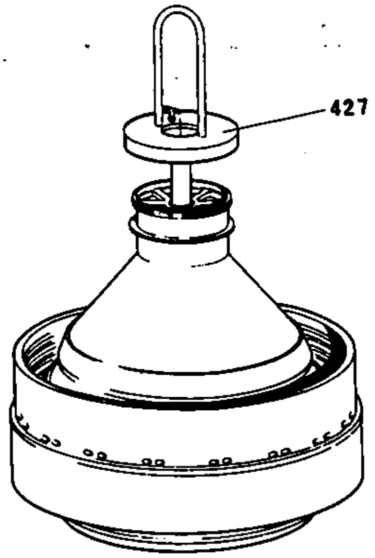


Fig. 4/7a

Fig. 4/7a:

Screw device 427 onto bowl top and, by means of a hoist, remove bowl top from bowl bottom.

If the separating disc is stuck in the bowl top, rap bowl top with a copper or light metal hammer until the separating disc comes loose. Do NOT let it drop on the floor.

If the separating disc cannot be detached in this manner, proceed as follows: Place the bowl top on a wooden surface. Pass a brass mandrel through the outer holes in the upper part of bowl top and place it on the outer edge of the separating disc. Detach the separating disc by slightly hammering the mandrel. Do NOT place a mandrel on the inner edge of the separating disc.

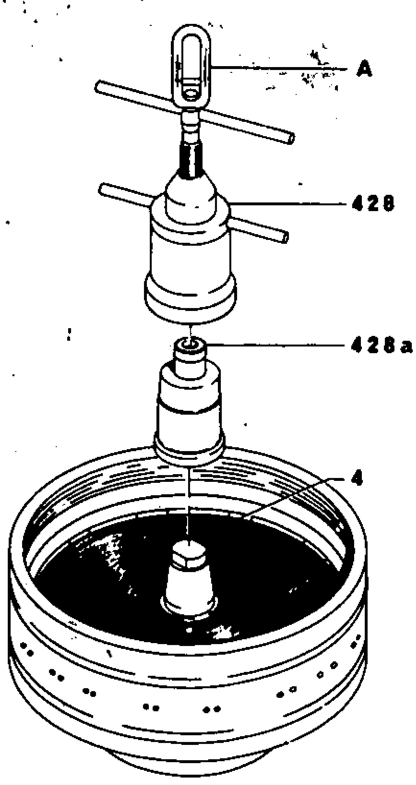


Fig. 4/7b

Fig. 4/7b:

Place pressure piece 428a on bowl bottom in such a manner that arresting pins of bowl bottom catch into holes of pressure piece. Screw jack 428 onto sliding piston. Turn jack-screw in clockwise direction in order to pull the sliding piston off the bowl bottom. Then lift out the sliding piston.

4.4. Removal and installation of Polyamid gasket 15 (fig. 19)

4.4.1. Removing the Polyamid gasket from the bowl top

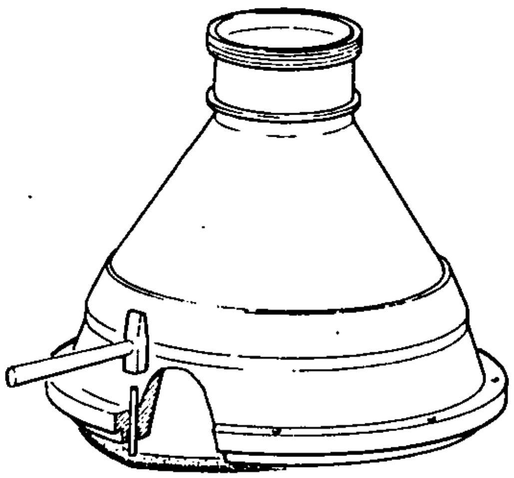


Fig. 4/8a

Remove Polyamid gasket from groove of bowl top with the aid of the drift pin supplied with the machine: Introduce the drift pin into the holes which are equally distributed around the bowl top and hammer on to the pin until the gasket becomes loose.

4.4.2. Installing the Polyamid gasket into the bowl top

Fig. 4/8b

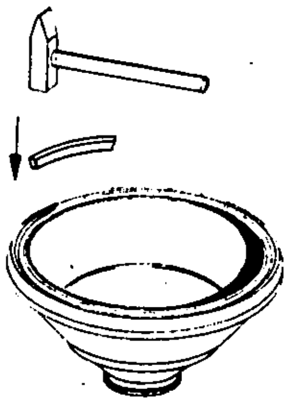


Fig. 4/8c

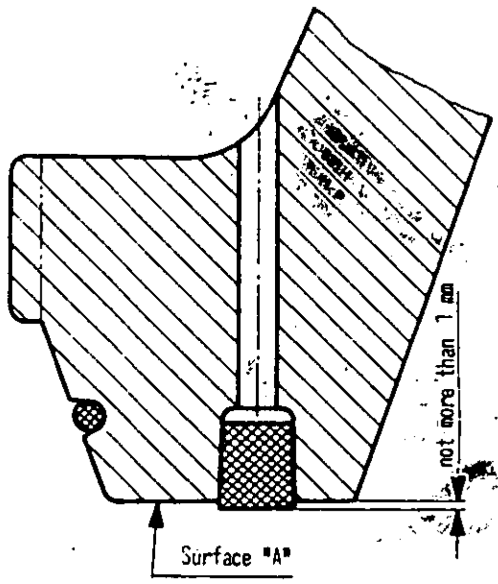


Fig. 4/8d

1) Keep gasket for about 5 minutes in approx. 80°C hot water to warm it up.
2) Wipe gasket dry.
3) Insert gasket (with its narrow side facing the bowl top) into the clean groove of bowl top. Place a piece of hard wood (fig. 4/8b) or a piece of the old Polyamid gasket (fig. 4/8c) on the new gasket and hammer the gasket evenly into the groove until its sealing surface protrudes from surface "A" of bowl top by not more than 1 mm (fig. 4/8d).

5. Removing the piston valve

Remove piston valve assembly 3a-f once a month for cleaning. On this occasion check the gaskets and replace them, if necessary.

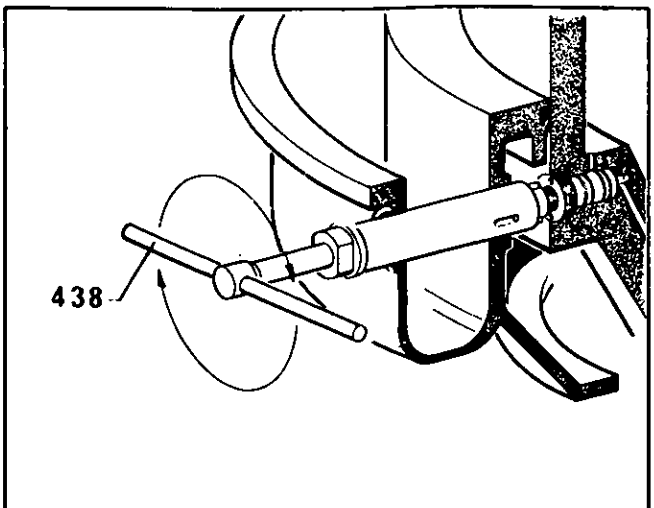
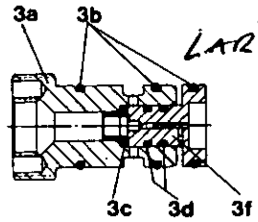


Fig. 4/9 a



0007-2920 750 x3
Large rubber rings

0007-2923-750
SMALL RUBBER RINGS
x2

Screw wrench 438 into piston valve.

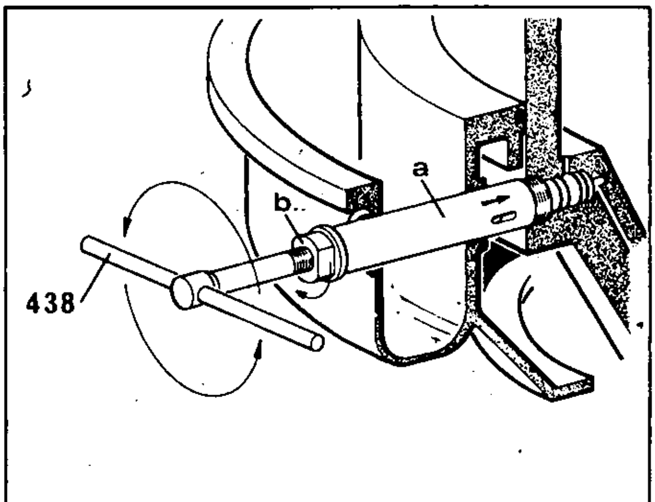


Fig. 4/9 b

Introduce pins of bush a of wrench 438 into boreholes of valve. Tighten nut b. Then unscrew piston valve by means of wrench 438.

Before installing the valve, moisten gaskets 3b and grease threaded area. Then screw in valve as far as it will go. However, be sure not to screw it in too tightly.

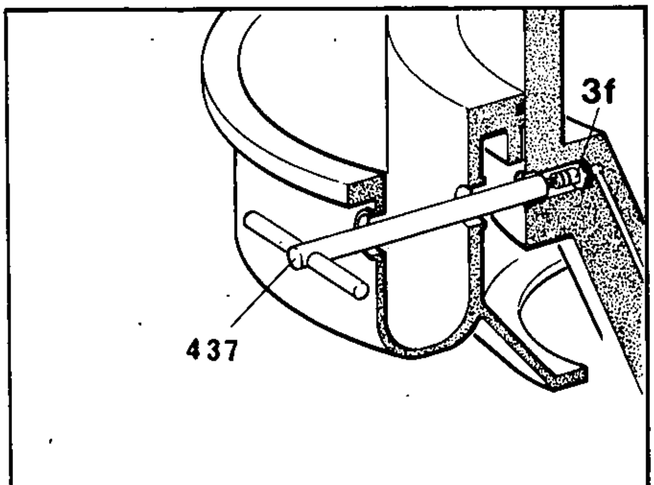


Fig. 4/9 c

Screw wrench 437 into valve piston 3f and withdraw piston from bowl bottom.

4.6. Hydraulic Disc Stack Compressing Device

4.6.1. Operating principle

By means of oil pump A oil is pumped under high pressure into hydraulic chamber B. Due to the increased pressure in this chamber, piston D is moved downwards. Cylinder C is held by threaded ring 430a, screwed onto bolt 430d. The lower end of the bolt is screwed into the distributor.
When the piston moves downwards, pressure is exerted on the bowl top, via disc 430c, resulting in compression of the disc stack.

4.6.2. Oil pump

Oil pump A is capable of producing a maximum pressure of 400 bar. It consists of oil container A2, pump head A1 and check valve A4. The holding capacity of the oil container is 350 cm^3.
Filling in oil: Before the first use of the compressing device, unscrew cover A3 and fill the container with oil. Then replace the cover and screw it on tightly.
De-aerate the pressure chamber B. To do this, loosen vent screw E and actuate the pump until oil escapes through the vent hole. Then re-tighten the vent screw.

4.6.3. Hydraulic fluid

As hydraulic fluid, the lubricating oil furnished with the separator and designated C-LP 114 (106-122 cSt/50 °C) can be used.

4.6.4. Pressure gauge

The hydraulic pressure exerted upon the disc stack is indicated by pressure gauge G (indicating range 0 - 600 bar) attached to check valve A4.
The pressure required to compress the disc stack ranges between 330 - 360 bar. It may be higher than 360 bar, but must **not** be lower than 330 bar.
The maximum permissible pressure is 390 bar.

4.6.5. Stroke limiting hole

To prevent damage to the compressing device in the event of incorrect mounting the hydraulic unit is provided with a stroke limiting hole H. If bolt 430d and threaded ring 430a have not been screwed down properly (see sect. 4.1, no. 14a-d) the oil in hydraulic chamber B will escape through this hole.

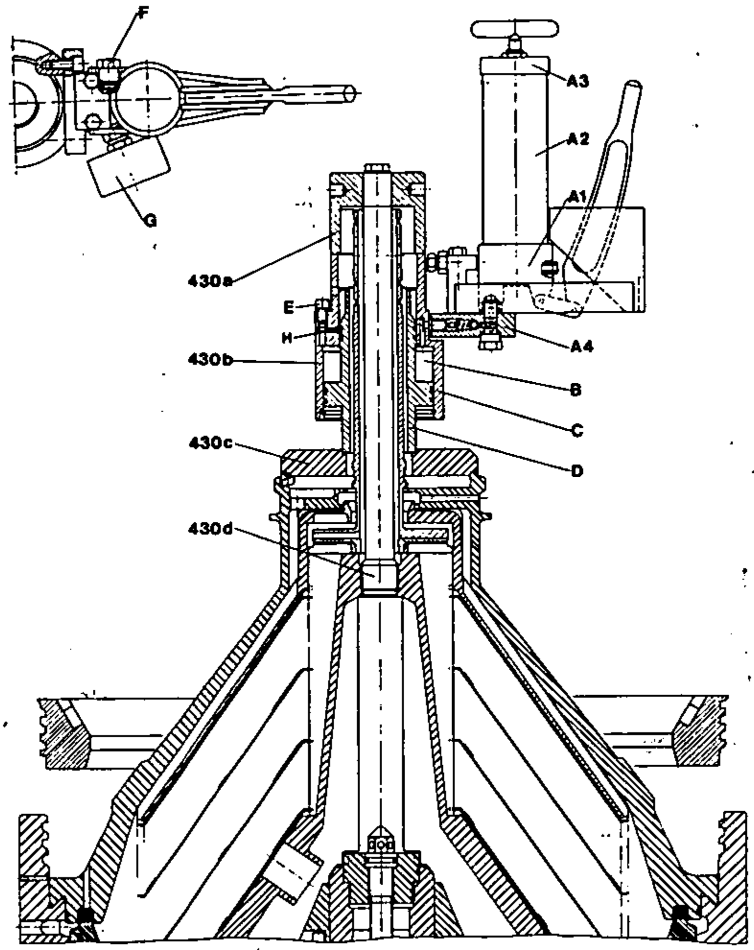


Fig. 4/10

430	Compressing device, compl.
430a	Threaded ring
430b	Hydraulic unit
430c	Disc
430d	Bolt
A	Oil pump
A1	Pump head
A2	Oil container
A3	Cover
A4	Check valve
B	Hydraulic chamber
C	Cylinder
D	Piston
E	Vent screw
F	Valve screw
G	Pressure gauge
H	Stroke limiting hole

5. Technical Information

5.1. Functioning of the hydraulic system of the bowl

The self-cleaning bowl is equipped for ejecting the sediment during operation. Dirt particles accumulate in the conical space 11 of the bowl from where they are automatically discharged through ejection ports in the bowl bottom at pre-determined intervals.

The sliding piston 4 is hydraulically actuated to open and close the bowl ports. The water pressure created in the filled sealing chamber 3 keeps the bowl closed. When water drains out of the sealing chamber after opening of the opening-water valve, the product pressure above the piston pushes the piston down and opens the bowl ports.

Sealing of the bowl:

When the bowl has reached its rated speed, the timing unit is switched on whereupon the sealing-water valve opens for 60 seconds. The sealing water flows into sealing chamber 3 underneath the sliding piston. The water pressure in the sealing chamber pushes the sliding piston upwards and presses it against gasket 9, thus sealing the bowl.

The sealing chamber is sealed off by valve piston 7 which is pressed through centrifugal force against gasket 8 and thus seals water discharge channel 10.

To make up for sealing-water losses, sealing water is supplied every 60 seconds for a period of 1 second, controlled by an electronic impulse relay.

Opening of the bowl (sediment ejection):

When opening-water valve is opened for sediment ejection, water flows through channel 5 to valve 6. The water pressure pushes valve piston 7 inwards thus opening channel 10. The water contained in sealing chamber 3 can then flow off (fig. 5/1c). As the liquid level recedes, the sealing pressure acting on the underside of the piston quickly decreases. As soon as it is smaller than the opening pressure acting on the upper side of the piston, the latter is pushed downwards, thus opening the ports in the bowl bottom for solids ejection.

Re-sealing of the bowl:

After sediment ejection the opening-water valve closes and the sealing-water valve opens. Valve piston 7 re-seals discharge channel 10 and sealing chamber 3 fills up with water. The liquid pressure in the sealing chamber exceeds the product pressure in the centrifugation room. The sliding piston is pushed upwards, thus re-sealing the centrifugation room.

The sediment ejections are initiated by the automatic timing unit (see sect. 5.2).

Sectional Diagram illustrating Sealing of the Bowl and Removal of the Solid Matter

1 Injection chamber for sealing water
2 Injection chamber for opening water
3 Sealing chamber
4 Sliding piston
5 Feed channel for opening water
6 Piston valve
7 Valve piston
8 Gasket
9 Bowl gasket
10 Discharge channel for sealing water
11 Sediment space
12 Operating-water feed
13 Pressure gauge
14 Solenoid valve
16 Strainer

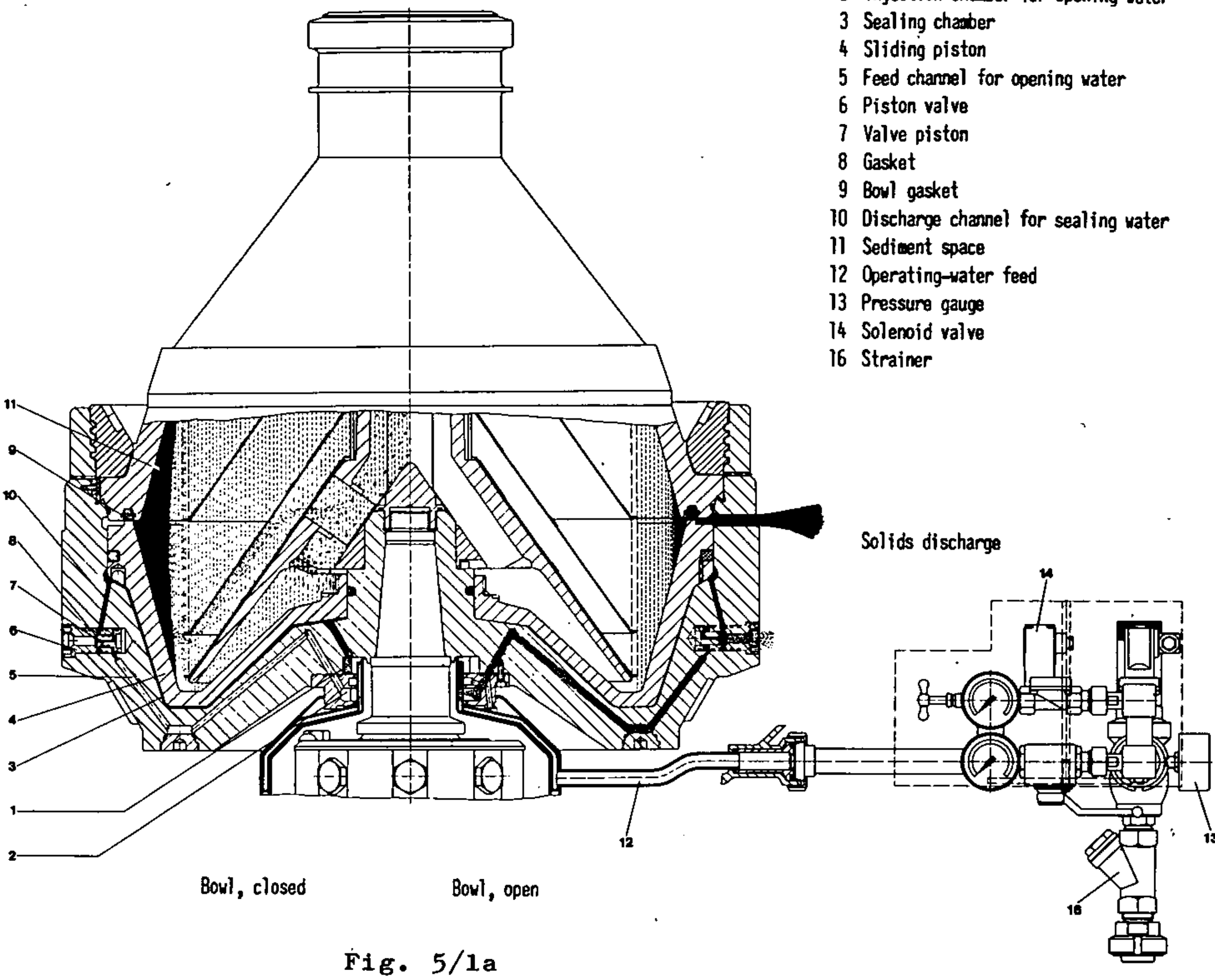


Fig. 5/1a

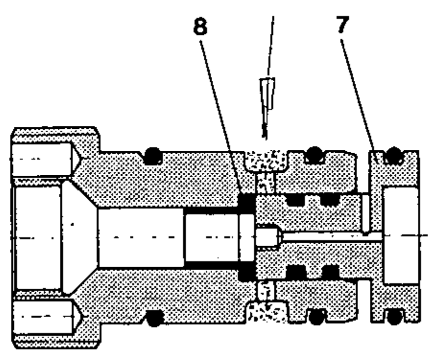


Fig. 5/1b

Functional diagram showing valve during separation.

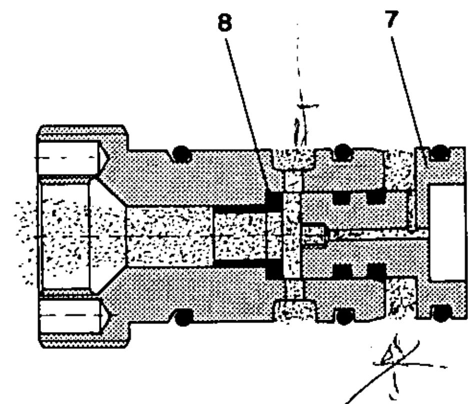


Fig. 5/1c

Functional diagram showing valve during solids ejection.

5.2. Timing unit

Partial sediment ejections during milk processing are programmed by the timing unit TVA 2-M. By pressing the button "Partial de-sludging", the program in action can be interrupted and a partial ejection process can be initiated immediately.

Total ejections during cleaning-in-place are initiated manually, by pressing the button "Total de-sludging" on the timing unit.

For details, refer to the instruction manual "WESTFALIA Timing Unit".

5.3. Operating-water connection

The inner diameter of the operating-water supply line shall be 25 mm (1") and the pressure in this line shall be at least 1.5 bar.
Important: Pressure fluctuations must not exceed 0.5 bar.
Operating-water consumption: 2000 l/h.

The operating-water connection is provided with a water-pressure reducer K (fig. 5/3) by means of which the line pressure is to be throttled to 1 bar. To adjust the water-pressure reducer, proceed as follows:

1) Open rapid-closing valve D (fig. 5/3) all the way.
2) Adjust pressure with adjusting screw J so that pressure gauge on pressure reducer indicates 1 bar.
3) Close rapid-closing valve D again.

The operating water must be clean and should meet the following specifications:

Hardness:	$\leq 15^{o}$	English hardness at separating temperatures of up to 55°C
	$\leq 7.5^{o}$	English hardness at separating temperatures exceeding 55°C
Chlorine ions:	≤ 100 mg/l	
pH value:	6.5 to 7.5	

The strainer in filter G has to be cleaned from time to time.

Pressure gauges M and N (fig. 5/3) merely serve for checking the closing and opening operations.

5.3.1. Arrangement of the solenoid valves

In addition to the automatic solenoid valves, the operating-water connection comprises two rapid-closing valves D and F connected in parallel with solenoid valves A and B, as well as two shut-off valves <u>a</u> and <u>b</u>.
This arrangement allows changing over to manual operation in the event of failure of solenoid valves A or B for opening or closing of the bowl or in the event of failure of the timing unit.
When changing over to manual operation, rapid-closing valve D is to be opened to the extent that sealing water flows out of the operating-water discharge (see no. 18 in dimensioned drawing on page 0/7) at a rate of approx. 50 l/h in order to assure continuance of the separating process.
If the solenoid valves are defective, close manually-operated valves <u>a</u> and <u>b</u>.

Partial sediment ejection, initiated manually

1) Open rapid-closing valve D all the way.
2) Open rapid-closing valve F in order to open the bowl. As soon as de-sludging noises csn be heard, close rapid-closing valve F in order to close the bowl.
3) Throttle rapid-closing valve D so that sealing water flows out of the operating-water discharge at a rate of approx. 50 litres/h.

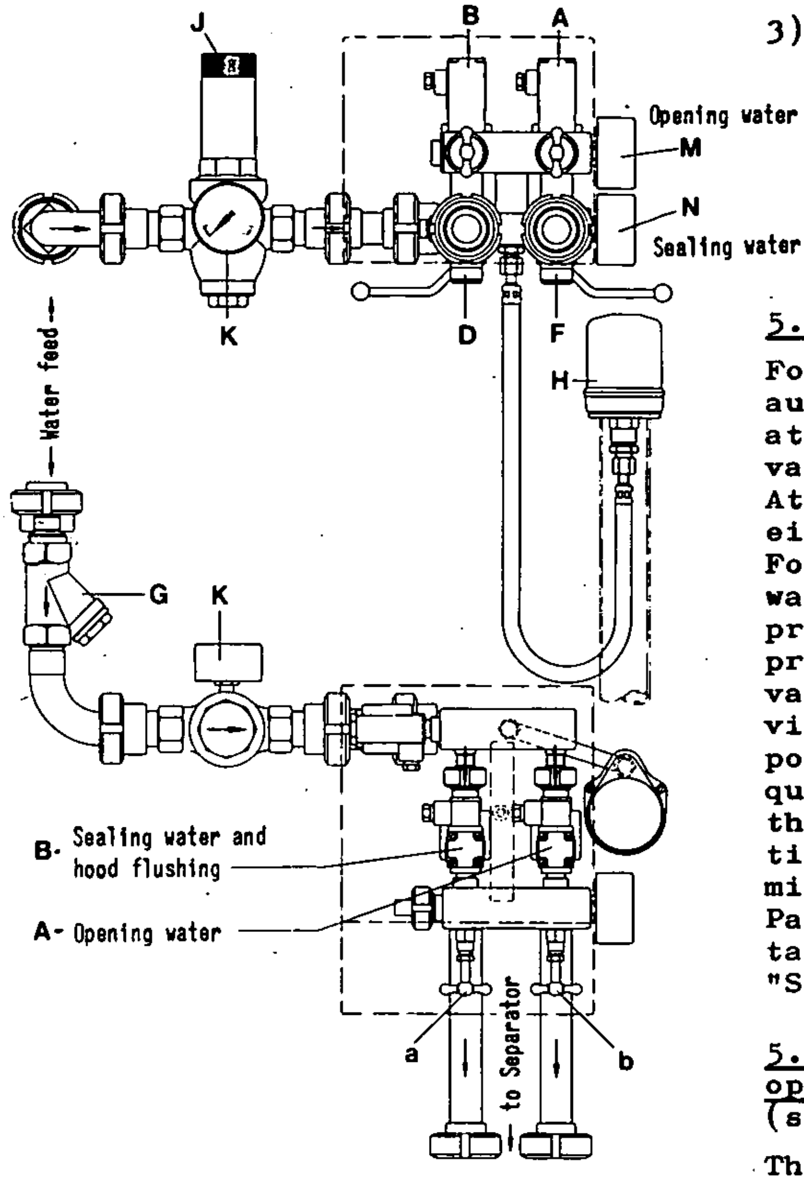


Fig. 5/3

Total ejection, initiated manually

1) Stop milk feed pump.
2) First open rapid-closing valve D, then open valve F.
3) When the de-sludging noises have stopped, close rapid-closing valve F and after about 5 seconds throttle rapid-closing valve D so that water will emerge from the operating-water discharge at the rate of 50 liters/h.

5.3.2. Pressure switch

For proper functioning of the automatic control a pressure of at least 0.6 bar is required while valve D is open.
At a lower pressure the bowl will either not open or not close.
For this reason the operating-water line is provided with pressure switch H which signals pressure drop below the minimum value by giving an audible or visible alarm. If it is not possible to re-establish the required water pressure immediately, the switch "Separation" on the timing unit is to be opened and the milk supply is to be stopped. Partial de-sludgings will no longer take place, and pilot lamp "Separation" will go out.

5.3.3. Solenoid valves for operating water and flush water (see fig. 17/2)

The solenoid valves incorporated in the operating-water feed line assembly are 2/2-way straight-flow valves with 2-way piloting. The solenoid head is completely moulded in epoxy resin ensuring perfect protection against entry of moisture, good dissipation of heat and perfect electrical insulation. So equipped, these valves are fully tropicalized.

Operating principle

In the normal, i.e. closed condition of the valve (de-energized), the water flowing into the valve from the feed side is unable to escape. It flows through a bore into the chamber above the diaphragm where a pressure equal to the water line pressure builds up. However, since the area exposed to water pressure on the upper side of the diaphragm is larger than the area exposed to the same pressure on the underside, the the diaphragm is kept pressed against the valve seating.

Upon energizing of the magnet head, the core is pulled upwards so that the integrally vulcanized sealing element of the pilot valve is lifted from the valve seating, thus enabling the water to escape towards the discharge side of the valve. Since the diameter of the outlet opening of the chamber above the diaphragm is larger than the diameter of the inlet opening, the water flows out more quickly than it flows in and, consequently, the pressure acting upon the upper surface of the diaphragm decreases. As soon as it has become smaller than the pressure acting on the underside of the diaphragm (required pressure difference at least 0,5 bar), the diaphragm is lifted off its seat, thus opening the valve.

When current supply is cut off, the spring pushes down the magnet core, thus closing the pilot valve: liquid pressure builds up again above the diaphragm, and the solenoid valve closes.

Maintenance

The solenoid valves are maintenance-free. However, care should be taken that the coupler sockets are always screwed tightly to the magnet heads to ensure perfect sealing action of the gaskets.

Electric troubles

If it has been found that the timing unit functions properly and that voltage is present at the valve terminals of the terminal strip while the associated time function element is operating, the trouble will have to be ascribed either to a defective solenoid coil or to open circuit between terminal strip and valve, or to poor connection.

If the solenoid coil has proved to be defective, remove the magnet head after having withdrawn the coupler socket (to do this, loosen holding screw) and after having loosened the Allen screws.

The solenoid coil is cast integral with the magnet head. Therefore, if the coil needs replacement, the complete assembly (magnet head, part-no. 0018-3710-800, see page 17/3) will have to be exchanged.

Technical data

Solenoid valve		Type:	40 A / 121
Part - no.			0018-3711-600
Pipe connection		R	3/8"
Voltage		V	220 AC
Frequency		Hz	50/60
Optional voltages		V	24 AC, 115 AC, 24 DC
Power consumption:	pull-in	VA	approx. 20
(AC operation)	operation	VA	approx. 16
(DC operation)		W	approx. 12
Duty cycle		%	100
Frequency of operations		/h	1000
Type of enclosure		IP	65
Pressure range		bar	0.5 - 10
Temperature:	medium	°C	+90
	ambient	°C	+35
Cable entry		Pg	9

6. Operation

6.1. Starting the separator

1) Check to be sure that

   a) brakes are released (to release them,turn the handles clockwise),

   b) oil level in gear chamber is slightly above middle of sight glass,

   c) hex head screws for fastening the hood and cap nuts for fastening the feed and discharge housing are tightened securely,

   d) cream valve is open,

   e) main valve in operating-water line is open.

2) Switch on the motor.

3) Wait until the bowl has reached its rated speed after approx. 10 minutes. Only then turn on the main switch on the control cabinet; the bowl closes.

4) After another two minutes start the water circulation as it is commonly practiced in dairies.

5) After switching over to milk processing proceed as follows:

   Operate switch "Separation" on control cabinet. After having opened the milk feed valve, throttle constant-pressure valve on skim milk side by adjusting the operating-pressure reducing valve incorporated in the control cabinet. At the same time adjust cream valve to desired cream flow rate.
   Throttle constant-pressure valve while maintaining the desired cream flow rate, until slight overflow occurs. To check the overflow open inspection cover of hood a little. The pressure indicated by the pressure gauge in the skim milk line at the moment of overflow, is to be considered as maximum pressure. Then adjust pressure reducing valve until a pressure of 0.3 - 0.5 bar lower than the maximum pressure is obtained.

   Adjustment of the constant-pressure valve to the operating pressure is only necessary during initial starting of the separator.

For the maximum back pressure in the connected processing equipment, permissible for the centripetal pumps supplied, refer to page 18/1.

To fully utilize the discharge pressure of the cream pump, e.g. when the separator is used for milk clarification where cream and skim milk are re-combined after separation, adjust the constant-pressure valve to the highest possible discharge pressure.

When clarifying milk, it may happen that cream with too high a butterfat content emerges from the separator although the cream valve is open and maximum pressure is prevailing in the skim milk line. This indicates that the backpressure is too high for the cream pump. To overcome this difficulty, the backpressure of the equipment downstream the separator has to be reduced or a booster pump has to be installed.
It should be noted that cream with a very high butterfat content, i.e. extremely viscous cream will lead to incorrect flowmeter reading inasmuch as the measuring rod is lifted to a higher level, thus indicating a flow rate that is higher than the actual cream flow.

If there is constant overflow in spite of a low skim milk discharge pressure, check condition of gaskets in centripetal pump chamber cover and on pump shafts.

In some cases, especially when using heaters with a low back pressure, it may be suitable to install in the line after or ahead of the heater a throttling valve and set it to about 1.5 bar in order to ensure foamfree operation of the separator.

The separating temperature should range between 40 and 50°C. If the milk tends to precipitate too great an amount of albumin, a separating temperature of about 35°C may be more suitable.

Possible causes of inefficient separation:

1) Unfavourable pre-treatment of the milk (pumps, agitator, high temperature),

2) Variations in temperature, in bowl speed or in throughflow capacity,

3) Leakage at separating disc,

4) Re-mixing of cream and skim milk after separation, e.g. caused by leaking cocks in pipe lines connected for drink milk production. Note that during milk separation the drain valve in the connection line must be open,

5) Homogenized return milk added to the raw milk.

Skim milk samples should be taken at the screwed union of the skim milk discharge.

If the trouble cannot be found with the separator or with the equipment ahead of the separator, check condition of chemicals used to analyse the skim milk. To make a test, fill water instead of skim milk into butyrometers.

6.2. Sediment ejection (de-sludging)

6.2.1. Partial sediment ejection (partial de-sludging)

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

To accomplish partial ejection, opening-water is briefly fed to the bowl via solenoid valve A (fig. 5/3). The duration of opening-water supply (= duration of partial ejection: 0.5 to 2 seconds) varies with the amount of ejected sediment and must, therefore, be determined by tests which can be carried out with water. During each partial ejection an additional amount of approx. 0.2 l/sec. of flush water flows off through the sediment discharge. This amount is to be deducted from the measured total volume.

When separating milk, adjust the duration of partial ejection so that approx. 3 litres will be ejected from the bowl.

When separating whey, adjust the duration of partial ejection so that approx. 5 litres will be ejected from the bowl.

Partial ejections are accomplished automatically at pre-determined intervals, controlled by the timing unit (5.2) or by another special device.

When the time adjusted at time function element "Separation" has elapsed (1 hour when separating milk and 15 to 30 minutes when separating whey), the first partial ejection takes place. Time function element "Pre-flushing" is to be set so as to ensure opening of solenoid valve B "Sealing and flush water" (fig. 5/3) 10 seconds before each partial ejection. The water injected into the hood will prevent incrustation of the sediment.

Time function element "Partial de-sludging" has to be adjusted so as to cause solenoid valve A "Opening water" to open briefly. Injection of opening water will cause the bowl to open and to eject 3 to 5 litres of sediment. Sealing and flush water valve B remains open during solids ejection and closes 60 seconds after the ejection process. The period of time during which this valve is to remain open after sediment ejection (at least 60 seconds) is adjustable by means of time function element "Subsequent flushing".

By operating push button "Partial sediment ejection", the separating process is interrupted and a partial sediment ejection is immediately initiated. When this enforced partial sediment ejection is finished, the program automatically re-starts the separating process.

The liquid obtained from a partial ejection process (approx. 3 litres of sediment and 17 litres of flush water) is collected in the sterilizing tank. The tank is capable of holding the liquid obtained from three partial ejections.
In the sterilizing tank, 1 kg of alkaline detergent has to be added. The mixture is heated up with steam to 95°C and kept at this temperature for 10 minutes. It can then be sent to the sewer.

6.2.2. Total ejection (total de-sludging)

For cleaning-in-place after milk processing a special timing unit is required. If this is not available, total ejections can be initiated by manual control of the timing unit TVA 2-M.

The switch "Separation" on the timing unit is to be kept in closed position. To initiate the total ejection, push button "Total de-sludging" has to be actuated.

Provided that the electrical installation has been carried out properly (see installation plan of timing unit), the feed pump(s) is (are) automatically switched off by pressing push button "Total de-sludging" and re-started automatically approx. one minute after total ejection. Interruption of the liquid supply to the bowl by stopping the feed pump is necessary for the recovery of the bowl speed which drops during total ejection.

After re-filling of the bowl (check increase of discharge pressure on separator), another total ejection can be initiated by pressing again push button "Total de-sludging".

Should the feed pump(s) fail to stop automatically during total ejection, switch off pump(s) manually and re-start it (them) one minute after total ejection.

6.2.3. Manually controlled sediment ejections

In case of emergency (e.g. failure of the timing unit or of the solenoid valves), the bowl can also be emptied by opening and closing the by-pass valves associated to the solenoid valves (see 5.3.1). During sediment ejection, the bowl speed will drop slightly. Bear in mind that sediment ejection is allowed to be repeated only when the bowl has re-attained its operating speed.

7. Cleaning

7.1. Cleaning-in-place

The separator is included in the C-I-P cycle of the pasteurizers. The cleaning intervals and detergents suitable for the pasteurizers are also adequate for the separator. The last cleaning solution to be circulated must always be acid.

After milk processing, the residual milk is displaced and the whole system thoroughly flushed with water. Flushing is followed by two complete de-sludgings by pressing the button "complete de-sludging" on the timing unit TVA 2-M.

Flushing of the plant with water and the subsequent flush de-sludgings must also be performed if for some reason or other the plant cannot be cleaned in place after milk processing.

The C-I-P cycle should comprise the following steps:

1) Caustic solution circulation, (40 MIN.) (ODC 1%) TEMP 160°F
2) Flushing with water,
3) Acid solution circulation,
4) Flushing with water.

IMPORTANT: Each of the programme steps 1 - 4 is finished up by a total de-sludging procedure.

During each programme step the constant-pressure valve incorporated in the skim milk line has to be throttled several times by actuating the push button "overflow". This will cause flooding of the centripetal pump chamber, resulting in thorough flushing of hood and sediment collector. If the separator is not equipped with a constant-pressure valve, the skim milk valve should be throttled several times by hand.

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

7.2. Manual cleaning

In spite of cleaning-in-place, the bowl should be dismantled (see 4.3) once a month and cleaned manually. On this occasion, clean and wipe dry the guide surfaces and threads and apply a thin film of the supplied paste. After having removed sliding piston 4 (fig. 5/1a), clean sealing chamber 3 with care.

8. The Gear

8.1. Removing the vertical gear parts

After dismantling the bowl, loosen oil drain screw and let oil drain into oil cup. Then remove upper sight glass.

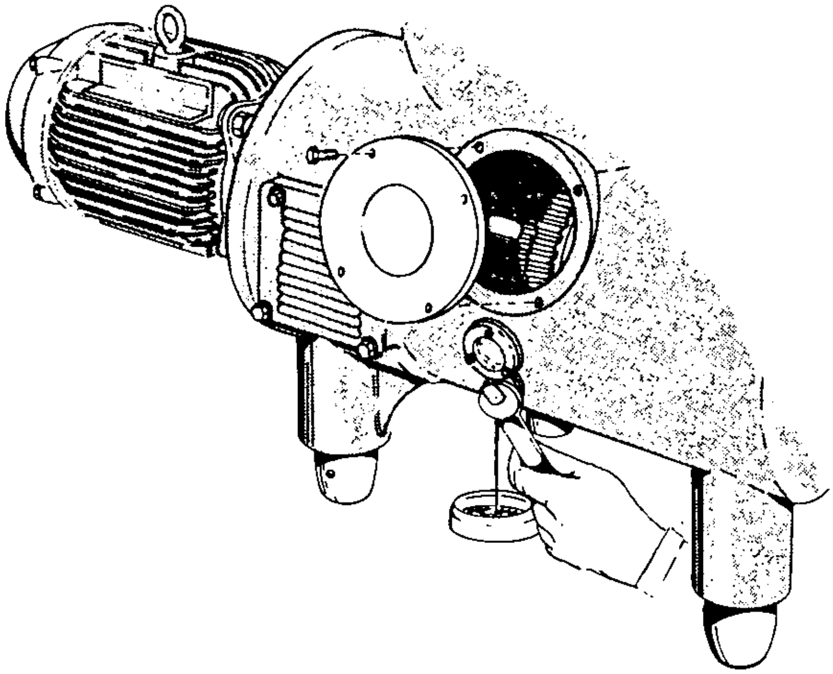


Fig. 8/1a

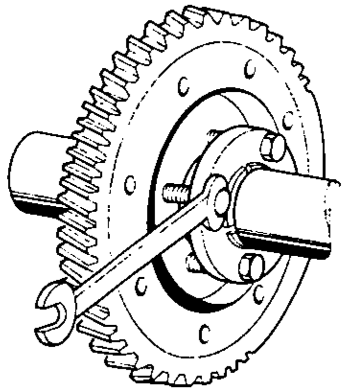


Fig. 8/1b

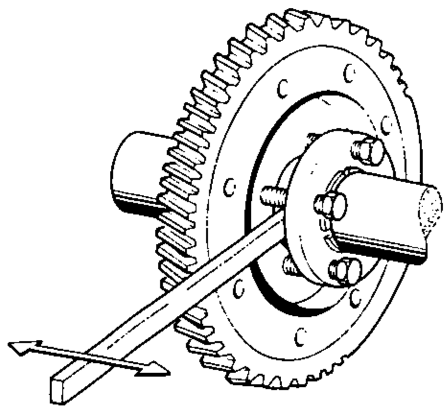


Fig. 8/1c

Loosen hex head screws in clamp plates of worm wheel (fig. 8/1b). Then slacken clamp plates until worm wheel can be moved on worm wheel shaft (fig. 8/1c). Push worm wheel to the left.

9. The Fluid Clutch

9.1. General

The fluid clutch (Turbo Clutch) gradually brings the bowl to its rated speed, eliminating premature wear on gear parts and on motor. The motor power is transmitted by means of a closed oil circuit between a primary wheel driven by the motor shaft and a secondary wheel driving the worm wheel shaft of the separator.

The oil level in the fluid clutch must be up to the mark of the oil level indicator plate, to ensure that the bowl comes up to its rated speed within its starting time (see sect. 3.3).

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

The oil in the clutch has to be changed every 5,000 working hours. It should be changed when the ball bearings of the worm spindle and of the worm wheel shaft are being replaced.

The clutch requires

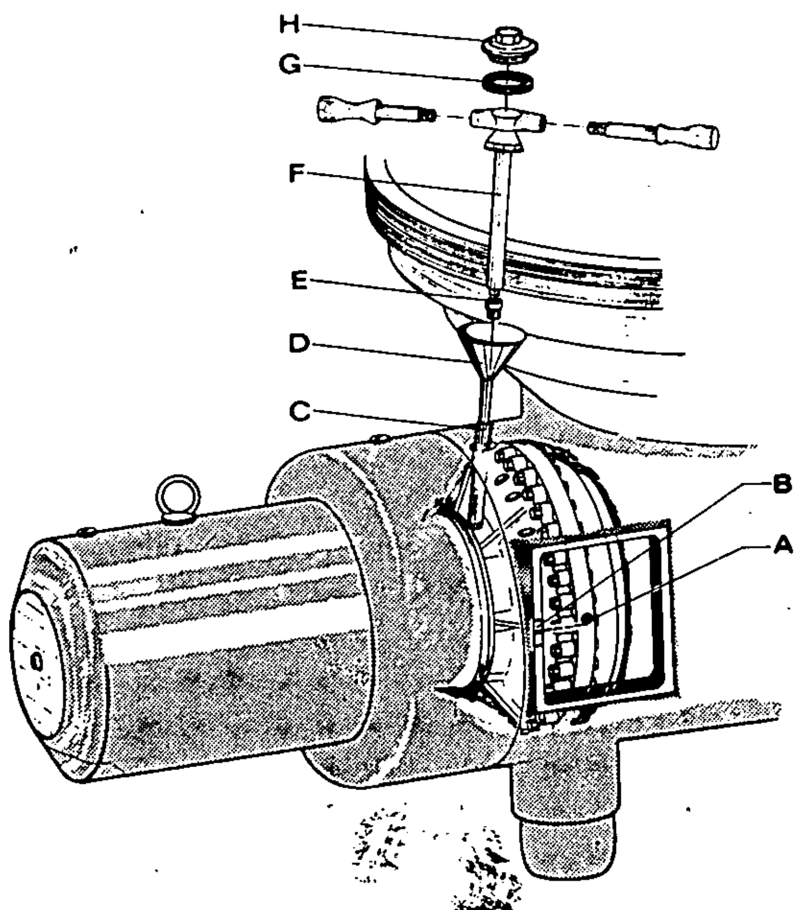
approx. 6.0 litres of oil when using a 1455 rpm motor,
approx. 4.8 litres of oil when using a 1745 rpm motor.

Be sure to use only the type of oil specified in sect. 9.4.

9.2. Checking the oil level

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

Before checking the oil level, make sure oil has cooled down.



<u>Checking the oil level:</u>

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

Fig. 9/1

For checking the oil level, proceed as follows:
Remove the ventilation grid so that the oil level indicator plate can be seen. Bring the clutch into such a position that threaded plug A (fig. 9/1) can be removed without oil flowing out. Unscrew threaded plug with a wrench. Then turn clutch until lower edge of taphole is in line with mark on oil level indicator plate (fig. 9/1). In this position, the oil level in the clutch must be up to the lower edge of the taphole, so that the oil begins to overflow. If this is not the case, refill oil (see 9.3).

9.3. Re-filling of oil (fig. 9/1)

Remove threaded plug H. Loosen oil fill screw E with wrench F. Then take off the handles from the wrench and continue unscrewing the oil fill screw until it comes off. Now thread oil fill pipe C into the oil fill hole, introduce funnel D and pour in oil. Then check oil level (see 9.2) before replacing oil fill screw including gasket. Use wrench F to firmly tighten the oil fill screw.

9.4. Type of oil

For filling the clutch, use only steam turbine oil

Shell Turbo Oil T32

which has proved satisfactory in operation by meeting requirements as regards viscosity, flash point, lubricating properties, compatibility with metals and gaskets, aging, etc.

Two cans, each containing 5 litres of Turbo T32 oil, are furnished with the separator.

If this type of oil is not readily available, steam turbine oils which comply with the following specifications, may be used, however, temporariliy only.

Designation: Lubricating oil TD-L 16 (according to DIN 51515) (steam turbine oil with additives giving increased protection against corrosion and increased resistance to aging).

Kinemat. viscosity:	32 cSt / 40 °C
Density / 15 °C:	max. 0.900 g/ml
Pour point:	≦ -6 °C
Corrosive effect on copper:	max. degree of corrosion 2 (according to DIN 51759)
steel:	no corrosion (according to DIN 51585)
Aging characteristics:	Increase of the neutralization number after 1000 h: max. 2.0 mg KOH/g oil.

Contrary to DIN 51515:

Open flash point according to Cleveland: approx. 220 °C

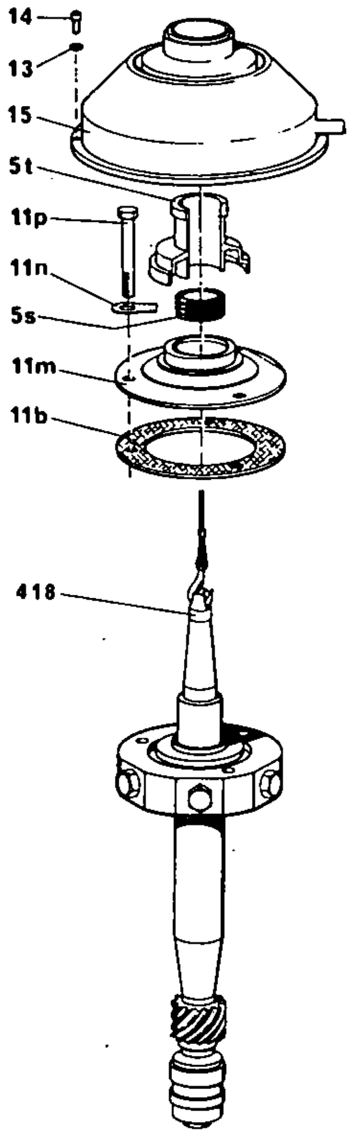


Fig. 8/2a

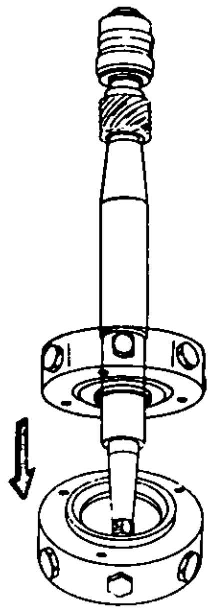


Fig. 8/2b

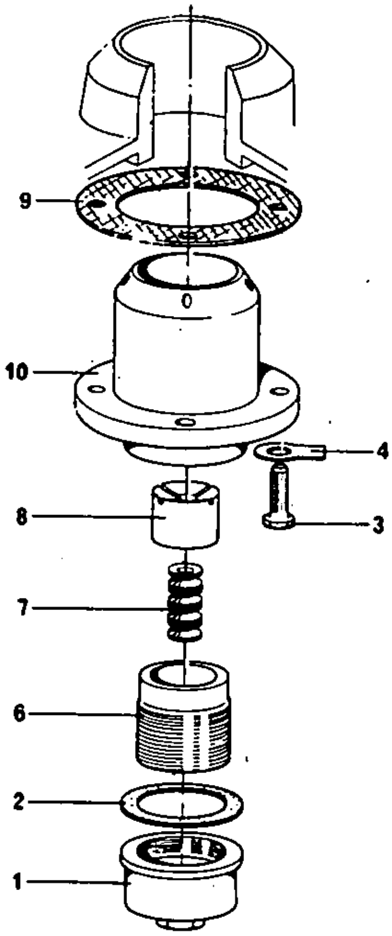


Fig. 8/2c

Fig. 8/2a:

Take off operating-water connection and remove bushes 37 and 39 (fig. 13/1).
Undo screws 14 and remove operating-water feed 15 and spindle cap 5t. Straighten tab washers 11n and unscrew hex head screws 11p. Take off protection cap 11m and spindle spring 5s.

Screw tool 418 onto worm spindle and lift out spindle together with neck bearing bridge.

Fig. 8/2b:

To remove neck bearing bridge, hold spindle in inverted position, upper end down, and tap lightly against a wooden surface. Neck bearing bridge will then slide off.

Fig. 8/2c:

Unscrew bottom bearing cap 1 and remove gasket 2. Unscrew bottom bearing threaded piece 6, and remove it together with spring column 7 and bottom bearing pressure piece 8.

Should the case arise that bottom bearing housing 10 has to be replaced, then proceed as follows: Straighten tab washers 4 and undo hex head screws 3. Take two of these screws and thread them into the tapholes of the bottom bearing housing. By doing so, the bottom bearing housing will be pressed out of the frame.

8.2. Re-assembly of vertical gear parts (fig. 14)

For re-assembly proceed in reverse order of removal (see 8.1) and according to instructions given in sect. 8.2.1 - 8.2.3.

8.2.1. Important hints for re-assembly

1) Before re-assembling the vertical gear parts, clean gear chamber thoroughly.

2) Check condition of ball bearings before re-fitting them onto worm spindle.
   IMPORTANT: Use only high-speed precision ball bearings as per List of Parts.
   For reasons of safety, replace ball bearings of worm spindle and worm wheel shaft every 5,000 running hours.

3) Before fitting ball bearings, ball bearing protection rings 5d and 5g, and ring 5n onto spindle, heat these parts in oil to approx. 80°C.

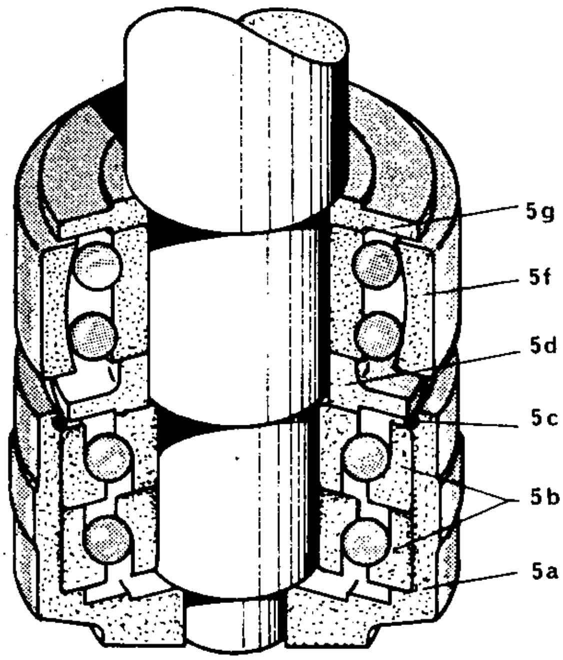


Fig. 8/3

4) If one of the angular contact ball bearings 5b needs replacement, be sure to replace both of them. Note that the angular contact ball bearings may be loaded axially in one direction only. They must be installed as shown in fig. 8/3. The narrow rim of the outer ring of each ball bearing must be on top. Faulty mounting will inevitably result in damage to bearings.
   For assembly proceed as follows:
   Slide the warmed-up angular contact ball bearings onto the spindle, slide snap ring 5c over ball bearings and let ball bearings cool down. Then fit bottom bearing pressure housing 5a over ball bearings and press snap ring 5c into groove of bottom bearing pressure housing.

5) It must be possible to install the worm spindle, with ball bearings attached, without having to hit on the upper spindle end, and to move the built-in spindle axially by hand. If this is not the case, remove burrs from the bottom bearing housing, using a very fine emery cloth.

6) When worm is worn and needs replacement, the worm wheel assembly with clamp plates 10 (fig. 15) shall be replaced at the same time, since this part, being worn down as well, would cause premature wear to the new worm.

7) When installing neck bearing bridge assembly 11c-h, make sure that gaskets 11b and 11k are in good condition. Be sure to insert distance ring 11a.

8) Before installing the neck bearing protection cap, check to be sure that there is a clearance of 3 - 3.5 mm between cams of distance ring 11a (fig. 8/6) and neck bearing bridge 11d. If not, proceed as per instructions of sect. 8.3.2.

9) IMPORTANT: After re-assembling the vertical gear parts, check bowl height for possible re-adjustment (see 8.3).

8.2.2. Assembling the neck bearing bridge

The upper ball bearing of the spindle is contained in pressure ring 11c which is held by nine radially arranged, evenly distributed springs 11g.

1) Insertpressure ring 11c in neck bearing bridge 11d in such a manner that the nine recesses of the pressure ring face the nine tapholes of the neck bearing bridge.

2) Grease spring pistons 11h thoroughly. Fit neck bearing springs 11g into the nine spring pistons. Then put the spring pistons into threaded plugs 11f.

3) Screw the threaded plugs together with neck bearing springs and spring pistons into the tapholes of neck bearing bridge, and tighten.

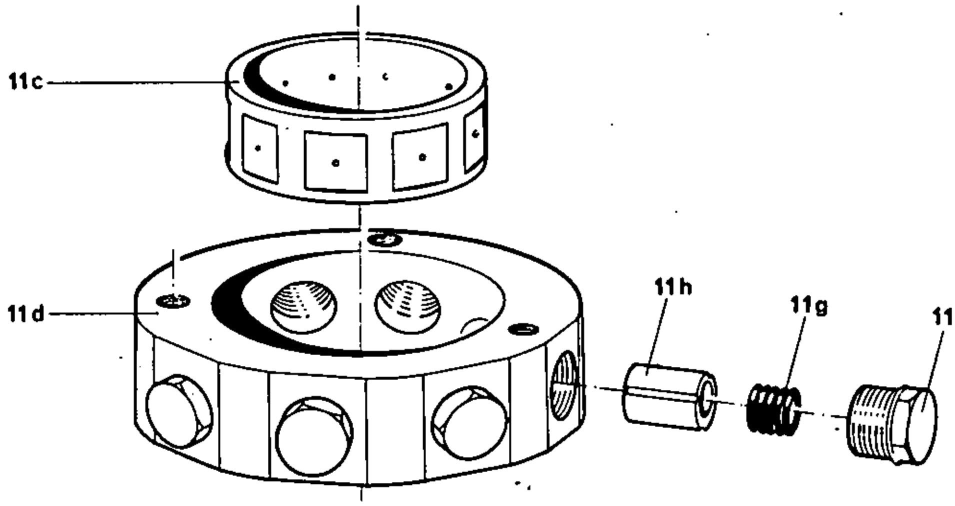


Fig. 8/4a

8.2.3. Installing spring column into bottom bearing

1) Slide cup springs 7 on bolt of bottom bearing threaded piece 6 as illustrated in fig. 8/4b.

2) Slip bottom bearing pressure piece 8 over spring column.

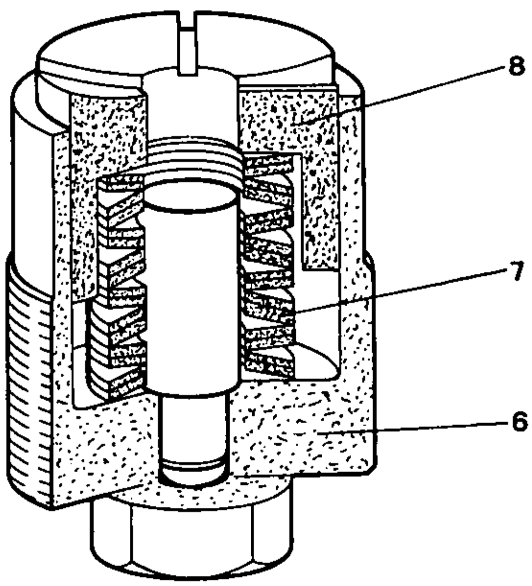


Fig. 8/4b

8.3. Bowl height

8.3.1. Checking the bowl height

NOTE: The bowl height has been adjusted at the factory before shipment of the separator. It must be checked for possible re-adjustment before the first start of the separator, after re-assembling the vertical gear parts, after exchanging the bowl or the centripetal pump, and as soon as the centripetal pump shows any grinding marks.

Prerequisite to correct bowl height adjustment is that

a) bowl is properly closed ("O" marks on bowl lock ring and on bowl bottom must be in line with each other),

b) hood is properly seated on sediment collector and hex head screws are tightened securely,

c) upper centripetal pump is screwed onto lower centripetal pump as far as it will go and that centripetal pump assembly is screwed all the way into the disc.

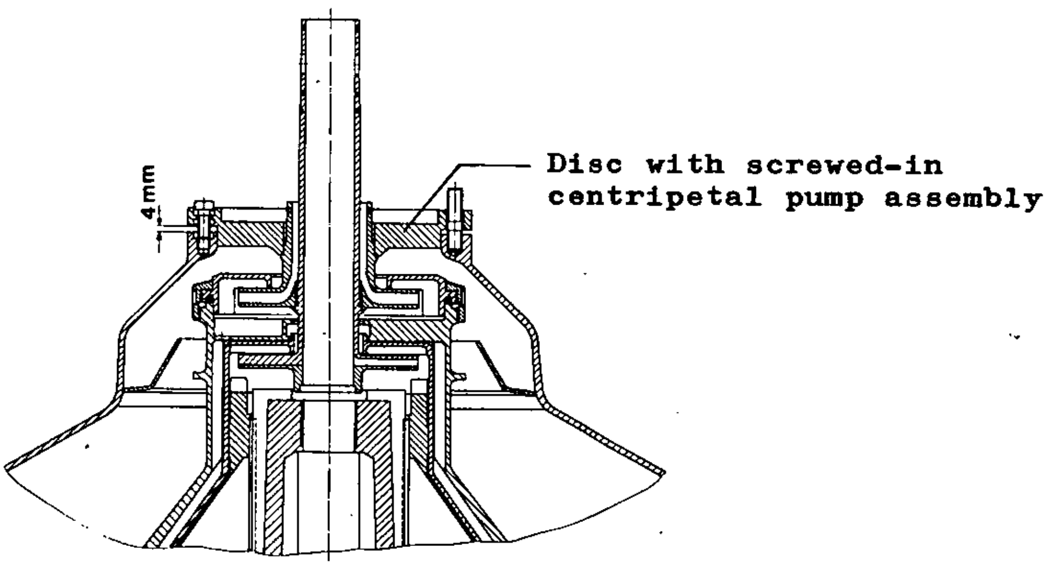


Fig. 8/5

The bowl height is correct when the disc can be raised by about 4 mm. Otherwise the bowl height has to be re-adjusted (see 8.3.2).

8.3.2. Re-adjusting the bowl height

For re-adjustment of the bowl height proceed as follows:

Unscrew bottom bearing cap 1 (fig. 14). Adjust bowl height (refer to fig. 8/5) by turning bottom bearing threaded piece 6. A full turn of the bottom bearing threaded piece to your Right or to your Left raises or lowers the bowl by 2 mm.

If the distance shown in fig. 8/5 is greater than 4 mm, the bowl is too high. Lower the bowl by turning the bottom bearing threaded piece in counter-clockwise direction.

If the distance shown in fig. 8/5 is less than 4 mm, the bowl is too low. Raise the bowl by turning the bottom bearing threaded piece in clockwise direction.

If the bowl has to be raised by more than 1 mm, it has to be removed (see 4.3). Remove operating-water connection and take out bushes 37 and 39 (fig. 13/1). Undo screws 14 and remove operating-water feed 15. Take off spindle cap 5t (fig. 14). Undo screws 11p and remove neck bearing protection cap 11m. Then turn bottom bearing threaded piece in clockwise direction until proper height is adjusted.

Each time the bowl has been lowered or raised, check if there is a clearance of 3 to 3.5 mm between cams of distance ring 11a (fig. 8/6) and neck bearing bridge 11d. In order to be able to check this clearance, remove bowl, operating-water connection, bushes 37 and 39 (fig. 13/1), operating-water feed, spindle cap and neck bearing protection cap, unless these parts have already been removed before raising the bowl by more than 1 mm. This check is not required if it has been made after re-assembling the vertical gear parts (see 8.2.1 No. 8) and the bowl had not to be raised by more than 1 mm.

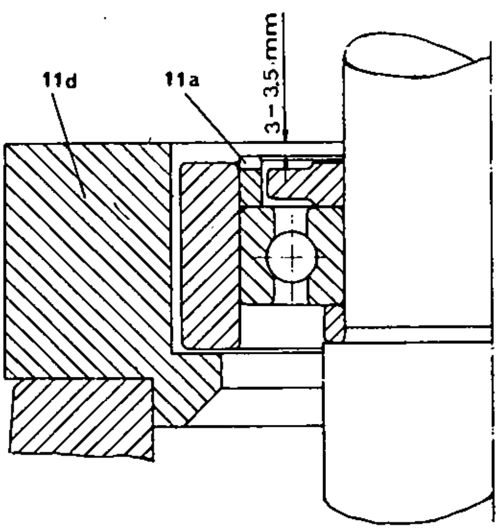


Fig. 8/6

If the clearance between the cams of the distance ring and the neck bearing bridge is smaller than 3 mm, the cams have to be filed to proper dimension. If the distance is greater than 3.5 mm, increase height of cams by welding or check with the factory for a new distance ring with properly sized cams.

After checking the clearance between distance ring and neck bearing bridge, re-install the above-mentioned parts. When installing the operating-water feed, check to be sure that gasket 38 (fig. 13/1) is in good condition.

Replace bottom bearing cap including gasket 2 (fig. 14) and close tightly.

Bear in mind that after fastening the neck bearing protection cap, the distance ring and, hence, the ball bearing 5p (fig. 14) will be under pressure until the spring column 7 in the bottom bearing is compressed by the weight of the bowl.

8.4. Removal of the horizontal gear parts

8.4.1. Removing the motor

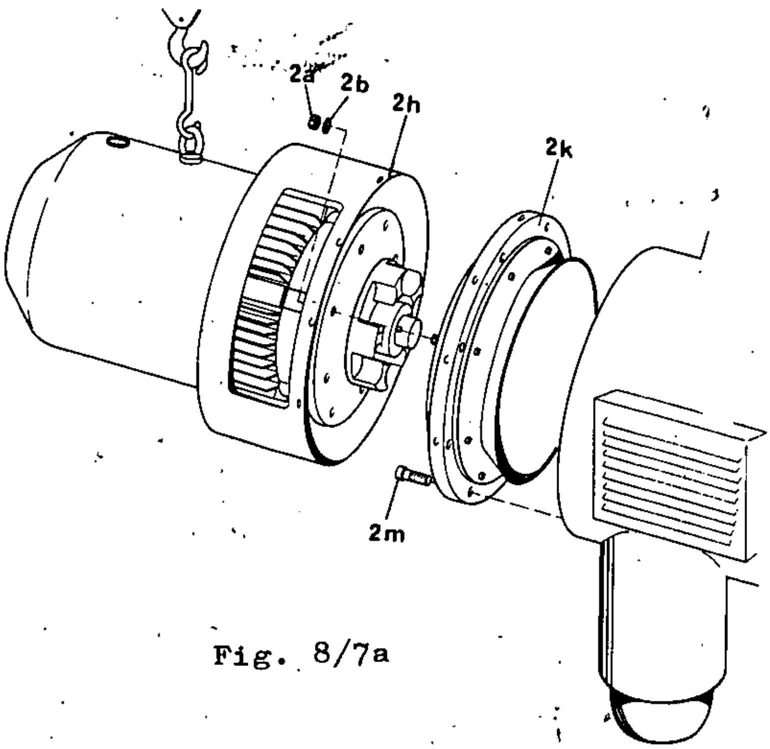


Fig. 8/7a

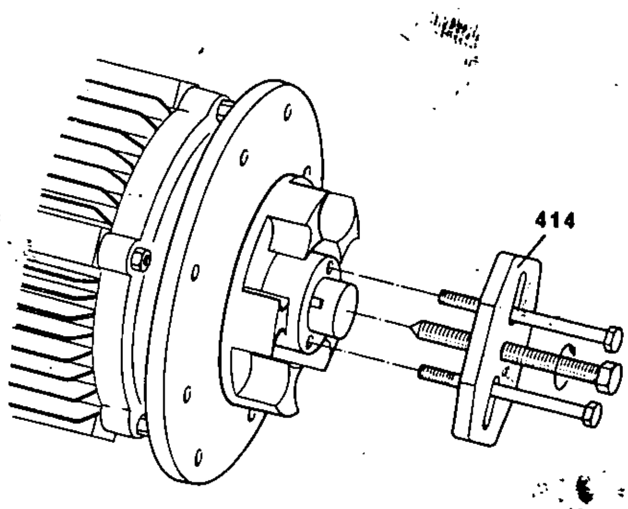


Fig. 8/7b

Remove lead-in wires from motor terminals. Unscrew hex head screws 2g and move cover 2h sidewards. Sling motor to hoist and tighten carrying rope. Then unscrew hexagon nuts 2a through opening of cover which can be turned on the flange. Take off lock washers 2b.
Use hoist to lift off motor together with cam hub (see fig. 8/7a).

For removing cam hub from motor shaft end use puller 414 (fig. 8/7b).

8.4.2. Removal of the fluid clutch

After removing the motor, undo Allen screws 2m and take off flange 2k (see fig. 8/7a).

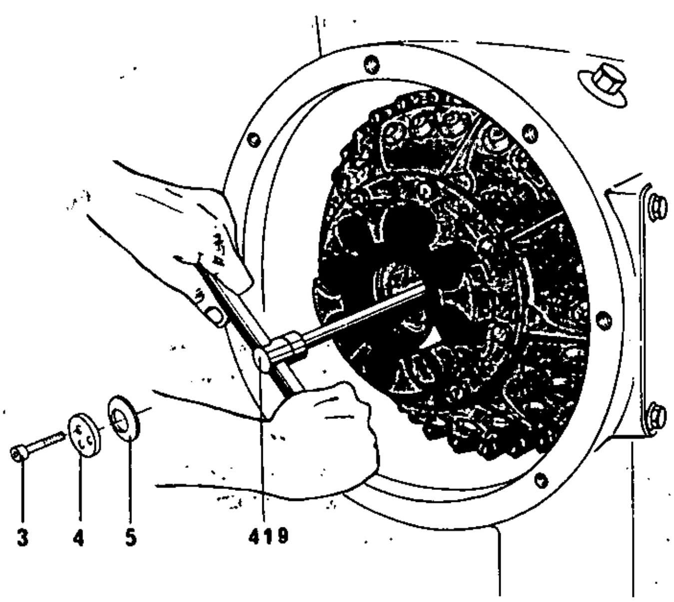


Fig. 8/7c

Loosen Allen screws 3 (fig. 8/7c) with torque-indicating wrench 416 (fig. 20) by consecutively giving each screw a quarter of a turn until tension of cup spring 5 slackens. Then screw out Allen screws all the way and remove washer 4 and cup spring 5.

It may happen that one of the three Allen screws can only be loosened by applying great force. In this case re-tighten the two remaining screws so that all three screws are equally tight. Then start loosening again as described above.

Be sure the socket of the wrench 416 is not worn!

To remove fluid clutch from cone of worm wheel shaft use pulling device 419.

8.4.3. Removing the worm wheel shaft

Remove fluid clutch (see sect. 8.4.2).

Loosen oil drain screw and let oil drain into oil cup. Remove upper sight glass (see fig. 8/1a).

Loosen hex head screws in clamp plates of worm wheel. Slacken clamp plates and push worm wheel to the left (fig. 8/1b, 8/1c).

Undo hex head screws 18 and remove cover 17.

Use wrench 416 to unscrew Allen screws 13. Remove disc 12.

By means of tool 419, pull brake pulley assembly 11a-d off the cone of worm wheel shaft.

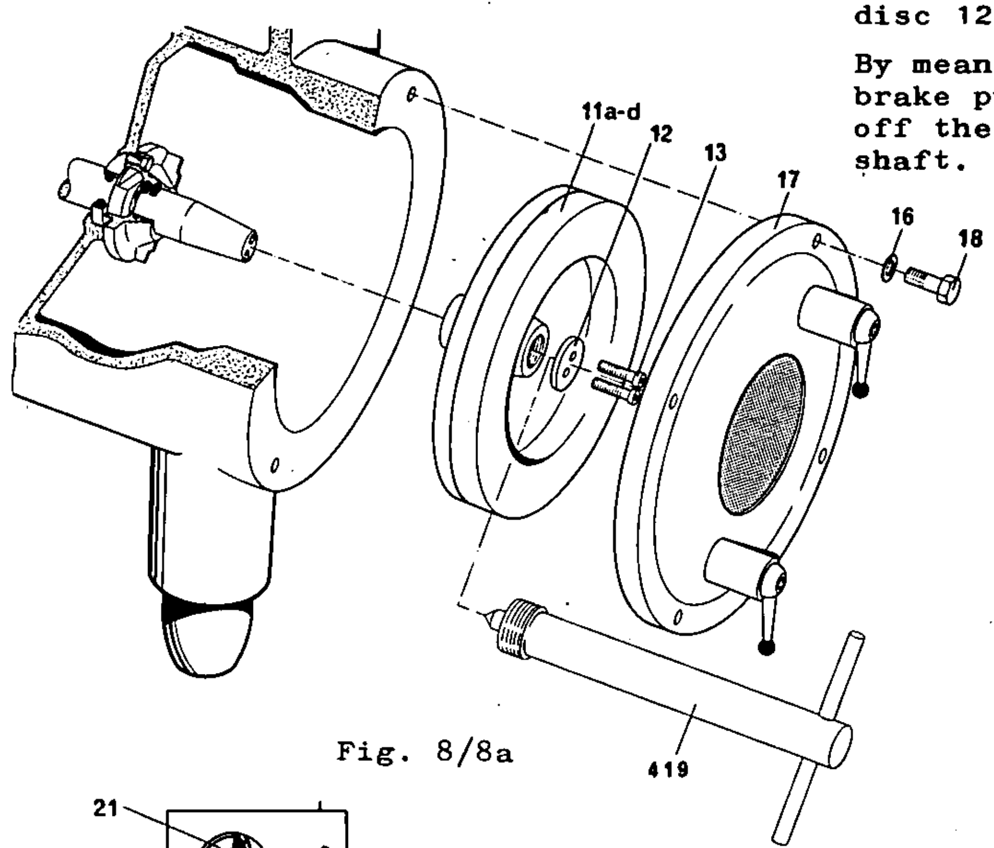
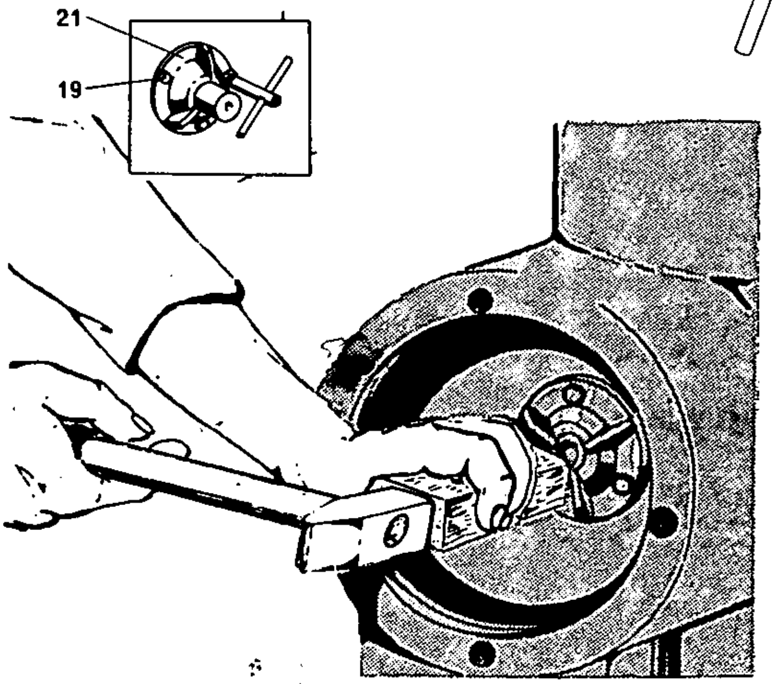


Fig. 8/8a



Remove hex head screws 19 from bearing cover 21 on the brake side (fig. 8/8b). Place a hard wood block against worm wheel shaft end, on motor side and rap gently with a hammer to drive the shaft, along with ball bearing, nut, and bearing cover, towards the <u>brake side</u>. When shaft has completed loosened from ball bearing on motor side, pull it out by hand. While doing so, hold worm wheel to prevent damage to gear teeth. Then take worm wheel assembly with clamp plates out of gear chamber.

Fig. 8/8b

8.5. Re-assembling the horizontal gear parts (fig. 15)

For re-assembly proceed in reverse order of removal (see sect. 8.4) and according to the following instructions:

1) The worm wheel with clamp plates (item 10 in fig. 15) has been balanced in the factory as complete assembly. To avoid unbalance, do NOT exchange component parts separately.

2) When mounting the worm wheel assembly with clamp plates, be sure to push it towards the brake side until it rests against the shoulder of the worm wheel shaft 25. This will ensure correct positioning of the toothed rim with reference to the worm.

3) The worm wheel must be firmly clamped to the worm wheel shaft, - accomplished by tightening screws 10c in the two clamp plates. Tighten the screws crosswise, by single turns, to make sure clamp plates are drawn together evenly.

4) IMPORTANT: When the toothed rim is worn, the entire worm wheel assembly with clamp plates has to be replaced. The worm 5k (fig.14) shall be replaced at the same time, since this part, being worn down as well, would cause premature wear to the new worm wheel.

5) Re-adjust proximity switch 40 with the aid of adjusting ring 439 (fig. 8/9).

6) Before installing the fluid clutch and the brake drum, apply a thin film of grease to the tapered ends of the worm wheel shaft. Then clean and wipe dry the tapered ends with a rag. Clean also inside of hubs of fluid clutch and brake drum very carefully, to assure proper fitting.

7) The fluid clutch and the brake drum must be firmly clamped to the worm wheel shaft. This is accomplished by tightening Allen screws with torque wrench 416 (fig. 20). Tighten the screws consecutively, by single turns. Give the final tightening at 4 - 4.1 mkp on the torque scale. When installing the fluid clutch, be sure to place cup spring 5 under washer. For correct arrangement refer to fig. 15.

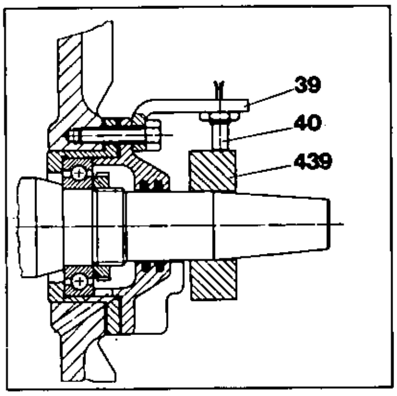


Fig. 8/9

8) When installing the motor, make sure that there is a clearance of 4 mm between cam hub 31 and fluid clutch (fig. 15 or 16). The distance has to be checked after exchanging the motor, the cam hub, the fluid clutch or the worm wheel shaft. If necessary, adjust the distance by displacing the cam hub on the motor shaft and drilling a new hole into the motor shaft for threaded pin 30.

9) Fill gear chamber with the oil specified in sect. 2. Oil level must be slightly above middle of sight glass.

10) To run in new gear parts (worm wheel and worm) let the separator run - without bowl - for about one hour. During this time, switch motor several times on and off.

11) For reasons of safety, replace ball bearings of worm wheel shaft and of worm spindle every 5,000 running hours.

9.5. Dismantling the fluid clutch (fig. 16)

The fluid clutch should not be dismantled in the site. If damage occurs, the clutch should be returned to the manufacturer for repair to assure correct fitting of the spare parts and, hence, proper functioning of the clutch. In the meantime, a spare clutch can be placed at your disposal.

If however, you decide to remove leakage of the clutch in the site, we recommend to check first sealing 17 because it is more easily accessible than sealing ring 4.
After taking the clutch out of the frame (see 8.4.2) remove screws 19 and lock washers and take off cover 18. Now check sealing ring 17 and replace it when its sealing lip is no more soft and elastic.

If, however, sealing ring 4 or the ball bearings have to be replaced, the clutch has to be dismantled in the following manner:

1) Loosen screw 24 and let oil drain.

2) Undo hexagon nuts 11 and remove them with lock washers 10. Then remove screws 7.

3) Press primary wheel off the clutch casing 8 by threading two of the screws 7 into the tapholes of primary wheel 12.
IMPORTANT: Bear in mind that the fluid clutch has been balanced in the factory. Therefore, be sure to mark both primary wheel 12 and clutch casing 8 before taking them apart, so that, when being re-assembled, these parts will be brought back into their original position.

4) Press ball bearing 15 out of primary wheel 12.

5) Undo screws 2 and remove cam flange 1.

6) Force secondary hub with secondary wheel 16 out of the clutch casing. Be sure not to damage running surfaces for the sealing rings. See also 9.6. no.6.

7) Screw screws 26 out of the clutch casing and remove oil control ring 25.

8) Press ball bearing 6 and sealing ring 4 out of the clutch casing.

9.6. Re-assembling the fluid clutch (fig. 16)

1) Moisten sealing rings. Press sealing ring 4 into the clutch casing by applying the tool shown in fig. 9/3 and then lightly hitting against bolt B. In order to be able to use the tool for pressing sealing ring 17 into cover 18, screw the bolt B into the other side of the disc. Then proceed in the same way as for sealing ring 4. The tool consisting of disc (part no. 3158-9939-000) and bolt (part no. 3170-9877-010) is supplied on special order only.

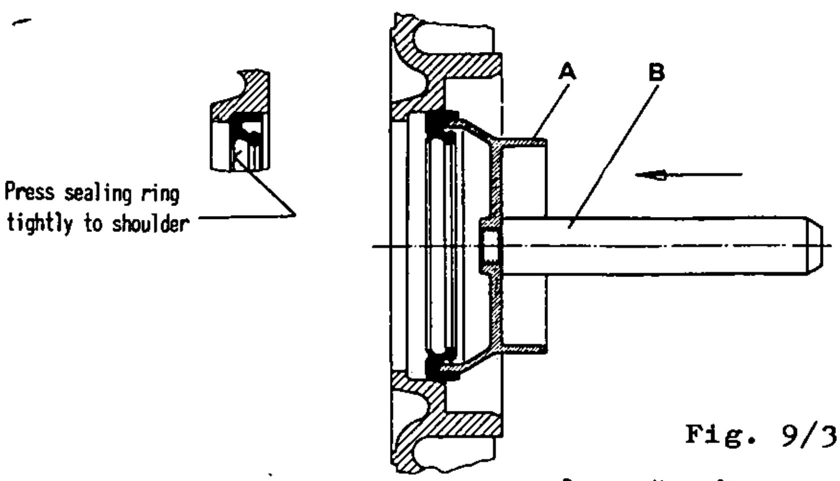


Fig. 9/3

Pressing the sealing ring into clutch casing.

2) Insert spacer ring 5 in clutch casing and spacer ring 13 in primary wheel (fig. 9/4a). The bevelled edge of each ring must snap into the groove of the bearing neck (fig. 9/4b). This will ensure that the spacer rings cannot move axially.

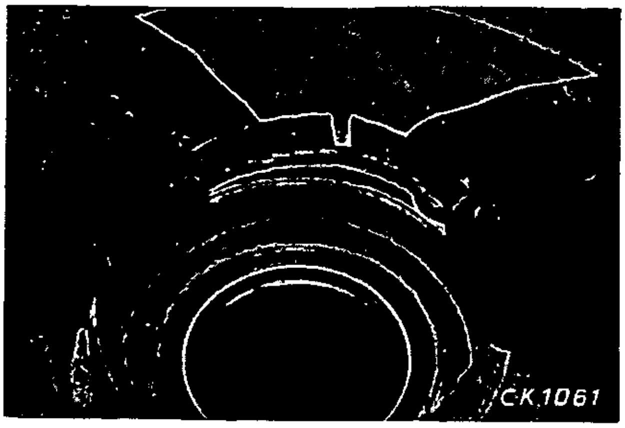


Fig. 9/4a

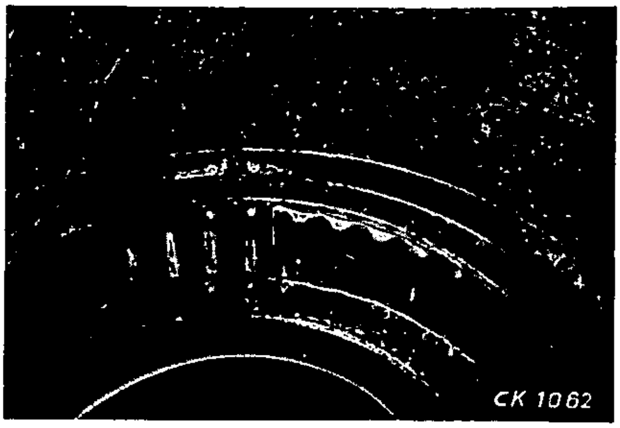


Fig. 9/4b

3) Press ball bearing 6 into clutch casing and ball bearing 15 into primary wheel. Check if the ball bearings pressed into the spacer rings have an absolutely tight fit. If this is not the case, the spacer rings have to be replaced. If necessary, return the clutch to the factory for repair.

4) Apply some oil-resistant sealing compound to oil control ring 25. Then fasten ring to clutch casing with screws 26. Be sure to fit lock washers.

5) Insert gasket 14 in groove of primary wheel. Then fasten cover 18 to primary wheel with screws 19. Be sure to fit spring washers.

6) Press secondary hub with secondary wheel, 16, into clutch casing. IMPORTANT: The surfaces contacting the sealing rings 4 and 17 must be perfectly smooth to ensure oil-tightness of the fluid clutch. If necessary, re-polish contact surfaces.

7) Fasten cam flange 1 to clutch casing with screws 2. Be sure to fit spring washers.

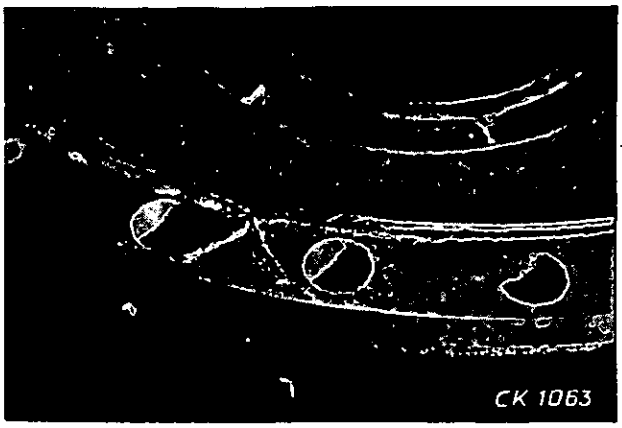


Fig. 9/4c

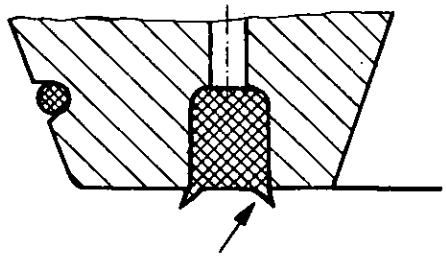
8) Place Teflon packing cord 9 on sealing surface of clutch casing as shown in fig. 9/4c. Make sure cord ends are crossed. To keep the cord in its place coat it with grease. Sealing surfaces of primary wheel and clutch casing must be in perfect condition; they must not be coated with a sealing compound.

9) Press primary wheel on secondary hub so that the marks on primary wheel and on clutch casing are in line (see sect. 9.5, no. 3). Then screw primary wheel and clutch casing together.

10. Trouble Shooting

10.1. General

Troubles	Causes	Remedies
10.1.1. The bowl does not come up to rated speed or takes too long to do so (see 3.3).	1) Brakes are on.	Release brakes by turning handles in clockwise direction.
	2) Motor is incorrectly connected.	Check connection.
	3) Oil level in fluid clutch is too low or clutch is leaking.	Re-fill oil (see 9.3). Re-tighten nuts 11 of screws 7 (fig. 16) on clutch. If sealing rings 4 and 17 do not seal properly, ask for a reconditioned clutch in exchange for your clutch.
	4) Bowl is placed too high or too low and rubs against centripetal pump.	Adjust to correct bowl height (see 8.3).
	5) Clamp plates are not tight enough. Worm wheel slips on shaft.	Tighten long hex head screws on worm wheel evenly and <u>firmly</u>. Tighten crosswise, by single turns.
	6) Feed line is open.	Close feed line.
10.1.2. The bowl speed drops during operation.	1) Oil level in fluid clutch is too low.	Re-fill oil (see 9.3).
	2) Motor speed drops during operation.	Check line voltage and inspect motor.
10.1.3. The bowl comes up to rated speed too quickly (in less than 5 minutes). Motor pulls too high a starting current.	The clutch contains too much oil.	Check oil level (see 9.2). Drain surplus oil.

Troubles	Causes	Remedies
10.1.4. Uneven run of the separator.	1) Incomplete solids ejection. The remaining solids have deposited unevenly in the bowl. 	De-sludge the bowl several times (6.2.2). If this does not improve conditions, close the bowl and fill it with water to attenuate the increased vibrations occurring during slowing-down of the bowl. Stop the separator and apply brakes. If bowl is leaking, leave feed open. Clean bowl thoroughly. Remove protruding edges of bowl gaskets with a knife (see sketch).
	2) Bowl is incorrectly assembled or if the plant has several separators, parts of different bowls may have been interchanged.	Check and assemble bowl properly (see 4.1).
	3) Pressure in disc stack has slackened.	Check if bowl lock ring is screwed in tightly (see sect. 4.1, No. 15). Check disc count. If necessary, add spare disc.
	4) Bowl is damaged and, therefore, out of balance.	Send bowl to factory or authorized factory repair shop. Do NOT attempt to make your own repairs. Never weld or solder. Bowl is made of heat-treated steels.
	5) Neck bearing springs are weak or broken.	Replace all nine neck bearing springs.
	6) Ball bearings are worn.	Replace damaged bearings. IMPORTANT: As spindle bearings use only ball bearings with increased accuracy of running (see Parts List).

Troubles	Causes	Remedies
10.1.4. Uneven run of the separator (cont'd.).	7) Gear parts are in bad condition as a result of 1. normal wear, 2. premature wear caused by a) lack of oil, b) oil of too low a viscosity, (in general recognizable by blue tempering colour of gear parts) c) metal abrasives present in the oil due to the following possible causes: - viscosity of oil is too low, - oil has not been changed in time, - gear chamber has not been cleaned, d) replacement of one gear part only, instead of both parts, e) infiltration of water because shut-off valves D and F (fig. 5/3) for sealing water were open for a longer period during shut-down of the separator.	Clean gear chamber thoroughly. Replace damaged gear parts: see 8.2, No.6 and 8.5, No. 4. Change theoil (see sect. 2). If necessary, change oil more often. Regarding <u>infiltration of water</u>, the following should be kept in mind: During shut-down of the separator, the shut-off valves D and F must always be kept closed.
10.1.5. Bowl lock ring is difficult to loosen.	Bowl has not been dismantled at regular intervals (see page 0/3, No.10).	Unscrewing of the bowl lock ring can be very much facilitated by blocking the bowl, which is accomplished by putting wedges between bowl bottom and sediment collector.

10.2. Bowl performance

Troubles	Causes	Remedies
10.2.1. The bowl does not close at all. **IMPORTANT:** In this case switch off feed pump immediately.	1) The amount of sealing water fed to the bowl is insufficient because a) the water pressure in the supply line to the operating-water connection is too low (see 5.3) b) the water discharge holes in the top of the operating-water feed 15 (fig.13/1) are clogged with scale.	a) Check water pressure in the supply line which should be 1.5 bar. The pressure reducer shall be adjusted to 1 bar (for adjustment refer to sect. 5.3). After switching on the timing unit and after each de-sludging procedure the sealing-water valve is open for 60 seconds. During this time the amount of discharging sealing water should be measured at the operating-water discharge. The sealing water must discharge at a rate of 550 l/h. Opening of the sealing-water valve for measuring can be repeated by operating the main switch of the timing unit. b) Clean discharge holes.
	2) Gasket 38 (fig. 13/1) is damaged or not inserted.	Replace or insert gasket.
	3) Strainer G (fig. 5/3) is dirty.	Clean strainer.
	4) Gaskets of piston valve 3 (fig. 19) are damaged.	Remove valve (see 4.5) and install new gaskets.
	5) Solenoid valve A (fig. 5/3) does not function properly, because the diaphragm has become brittle and, therefore, fails to seal properly.	Install a new diaphragm. Make sure that hole on outer rim of diaphragm lies over hole of valve housing.
	6) Rapid-closing valve F (fig. 5/3) is damaged. There is a continuous flow of opening water to the bowl.	Install a new rapid-closing valve.
	7) Gasket 5 (fig. 19) in sliding piston is damaged or its edges have been frayed through the up and down movement of the piston.	Replace damaged gasket. If, however, only the edges of the gasket are frayed and the gasket is not damaged otherwise, it can be re-used after grinding it off with an emery wheel.
	8) The operating-water feed is clogged.	Clean operating-water feed.

Troubles	Causes	Remedies
10.2.2. The bowl does not close and open properly.	1) Gasket 5 (fig. 19) in sliding piston does not fit properly at all points of the guide surfaces, thus failing to seal properly.	If necessary, stretch gasket. Before installing the gasket, lightly grease groove in sliding piston (see 4.1, No. 6).
	2) Gasket 15 (fig. 19) in bowl top is damaged.	Replace gasket (see 4.4).
	3) Gasket 10 (fig. 19) has not been inserted into hub of bowl bottom.	Insert gasket.
	4) Gasket 5 (fig. 19) in sliding piston is uneven in height.	Replace gasket. The difference in height on a gasket must not exceed 0.25 mm.
	5) The sealing surface of the sliding piston 4 (fig. 19) is damaged.	Exchange the sliding piston.
10.2.3. The bowl does not open at all or not completely.	1) Dirt or rubber particles have settled between sliding piston and bowl bottom.	Clean bowl parts. Round off edges of gaskets. Replace damaged gaskets. Grease guide surfaces with the special lubricating paste supplied.
	2) Sealing chamber 3 (fig. 5/1a) is soiled.	Remove sliding piston 4 and clean sealing chamber.
	3) The boreholes in piston valve are clogged.	Remove the valve (see 4.5) and clean it.

LIST OF PARTS

IMPORTANT!

When ordering parts, please state the following:

1) Model 2) Serial-No.	of the Separator: Both designations are shown on the name-plate of the separator. The Serial-No. also appears on the rim of the sediment collector.
3) Description 4) Part-No.	of the part to be replaced: For details refer to List of Parts. The Part-No. is also shown on all major parts.
5) Bowl Serial-No.	(only required when ordering bowl parts): The Bowl Serial-No. appears, in large figures, on bowl lock ring and on bowl bottom.

Part-Numbers ending with letter "L" (e.g. 3158-1021-L) designate parts which are available in different designs for the separator concerned. To ensure correct delivery of these parts, **Model and Serial-No. of the Separator MUST be stated.**

No.in Fig.	Part - No.	Qty.	Part Description
-	3170-1020-010	1	Foundation frame assembly (1a-c)
1a	3170-1003-010	1	Foundation frame
1b	0026-2031-300	4	Cap
1c	3157-1033-000	4	Bolt
-	2315-1015-010	4	Foot, complete (2a-c)
2a	2315-1011-000	4	Foot with lining
2b	0019-6387-400	4	Threaded pin M 12x28 DIN 915
2c	0021-3018-750	4	Rubber cushion
3	0001-0516-300	4	Flange
4	0019-6937-400	12	Hex head screw M 10x30 DIN 933
5	1166-1006-030	1	Lower section of frame, complete
5a	0018-3955-300	1	Cone connection D50 DIN 11851
5b	0013-2845-300	1	Grooved coupling nut F50 DIN 11851
5c	0007-2211-750	1	Gasket G50 DIN 11851
6	0007-2954-750	1	Gasket 590/4
7	0019-6202-400	8	Allen screw M 16x45 DIN 912
8	0004-2290-400	8	Gasket 16.7/24x1.5
9	0007-2212-750	1	Gasket G65 DIN 11851
10	1169-1177-020	1	Bend
11	0013-2846-300	1	Grooved coupling nut F65 DIN 11851
12	0007-2571-750	1	Gasket 297/4
13	0026-1325-300	8	Lock washer B8 DIN 127
14	0019-6122-400	8	Allen screw M 8x20 DIN 912
15	2265-1219-000	1	Operating-water feed
16	1169-1018-010	1	Sediment collector
17	0007-2580-750	1	Gasket 42/2.5
18	1169-1183-000	1	Plug
19	0013-0404-400	2	Cap nut M8 DIN 1587
20	0007-2320-750	1	Gasket 45/55x5
21	0007-2808-840	1	Gasket 545/563x9.8
22	0019-0840-400	1	Oil drain screw
23	0004-5037-710	1	Gasket 38/50x1.5
24	0001-0022-400	1	Sight glass frame
25	0019-6845-400	3	Hex head screw M 6x25 DIN 933
26	0001-0027-830	1	Sight glass
26a	0004-5406-750	1	Gasket 110x3
26b	0004-5056-740	1	Gasket 70/80x2
27	0026-1371-400	4	Washer 13 DIN 125
28	0019-6970-400	4	Hex head screw M 12x30 DIN 933
29	3050-1085-010	1	Ventilation grid
30	0019-6966-400	4	Hex head screw M 12x20 DIN 933
31	0026-1375-300	4	Washer
32a	0001-0925-870	1	Sight glass 322x5
32b	1166-1157-020	1	Ring
33	0007-2229-750	1	Gasket 40/48x5
34	0019-1748-400	1	Plug
35	0004-5762-700	1	Gasket 273/322x2
36	0007-2208-750	2	Gasket G25 DIN 11851
37	1169-1074-000	1	Sleeve
38	0007-2521-750	2	Gasket G15 DIN 11851
39	1169-1074-010	1	Sleeve

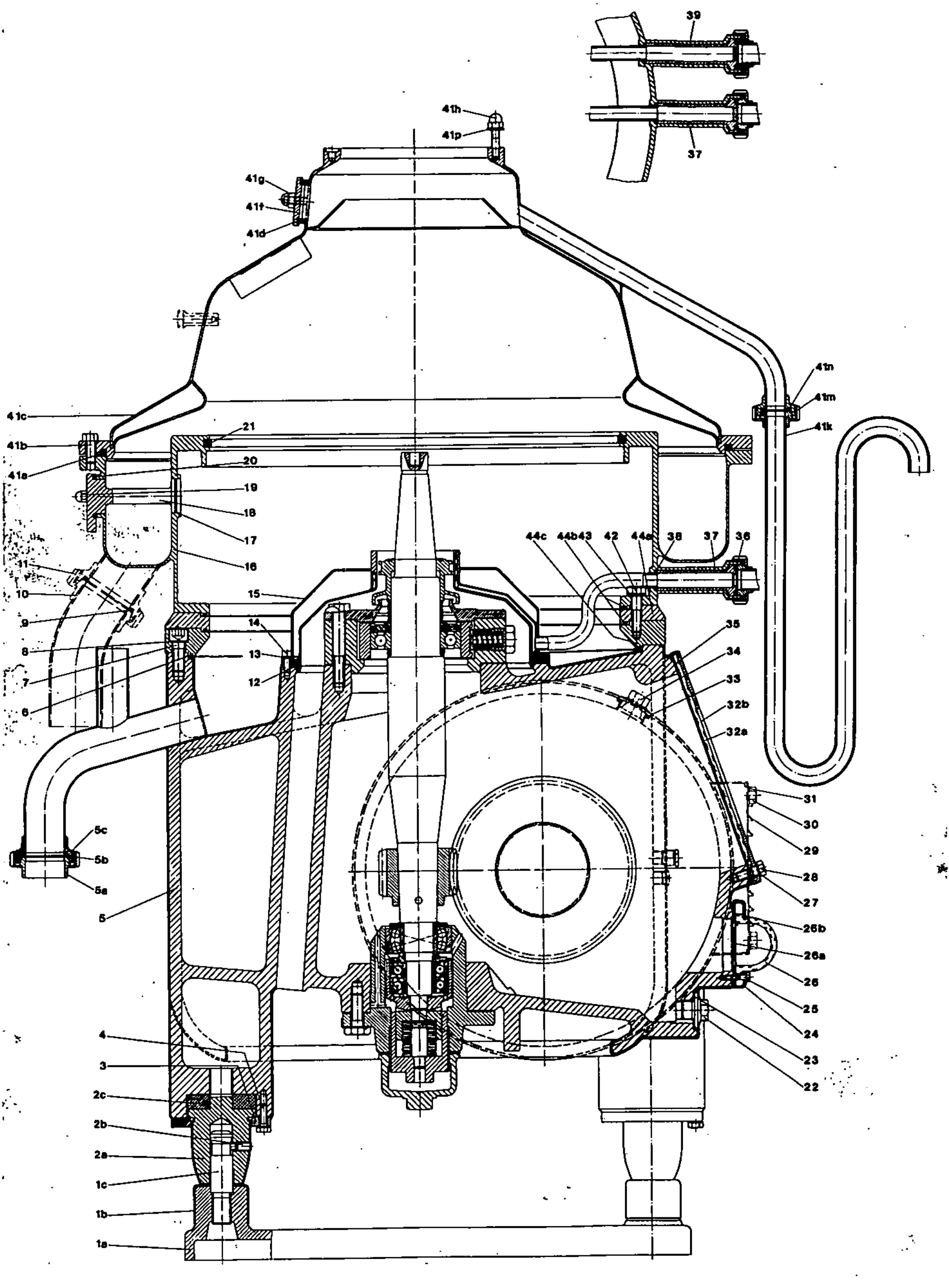

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Fig. 13/1

No.in Fig.	Part - No.	Qty.	Part Description
-	1176-7759-000	1	Hood assembly (41a-41p)
41a	0004-2364-758	1	Packing cord 8x8x2620
41b	0019-6970-400	8	Hex head screw M 12x30 DIN 933
41c	1169-7765-000	1	Hood
41d	0007-2262-750	1	Gasket 45/57x6
41f	1165-1061-000	1	Inspection cover
41g	0013-0405-400	2	Cap nut M10 DIN 1587
41h	0013-2645-300	4	Cap nut M10
41k	1165-2775-000	1	Siphon, complete
41m	0013-2842-300	1	Grooved coupling nut F25 DIN 11851
41n	0007-2208-750	1	Gasket G25 DIN 11851
41p	0026-1348-400	4	Washer 10.5 DIN 125
42	0019-6536-400	8	Hex head screw M 12x50 DIN 931
43	0004-2286-400	8	Gasket 12.7x18x1.5
44a	2265-1157-020	1	Ring
44b	0007-2693-750	2	Gasket 562/572x5
44c	2265-1157-030	1	Ring

No. in Fig.	Part - No.	Qty.		Part Description
1	0010-8003-210	1		Bottom bearing cap
2	0004-2221-740	1		Gasket 80/108x2
3	0019-7038-150	4		Hex head screw M 16x45 DIN 933 - 8.8
4	0026-5894-600	4		Tab washer 17 DIN 93
-	2265-3429-000	1		Worm spindle assembly (5a-u)
5a	0010-8012-020	1		Bottom bearing pressure housing
5b	0011-7307-100	2		Angular contact ball bearing 7307 BGM/P6 DIN 628
5c	0026-2109-170	1		Snap ring
5d	0008-4008-030	1		Ball bearing protection ring
5f	0011-2308-120	1		Pendulum ball bearing 2308 M/P6 DIN 630
5g	0008-4008-020	1		Ball bearing protection ring
5h	0026-1579-120	1		Straight grooved pin 10x60 DIN 1473 - 6.8
5k	2265-3423-000	1	*	Worm
5m	2265-3410-000	1		Spindle
5n	0008-6512-050	1		Ring
5p	0011-6213-180	1		Grooved ball bearing 6213/MA P63 DIN 625
5r	0008-6508-050	1		Ball bearing protection ring
5s	0006-4383-160	1		Cylindrical pressure spring
5t	0008-5501-700	1		Spindle cap
5u	0007-2445-750	1		Gasket 63/73x3
6	0010-8002-040	1		Bottom bearing threaded piece
7	0006-4440-160	1		Spring column
8	0010-8001-200	1		Bottom bearing pressure piece
9	0004-5793-770	1		Gasket 130/204x0.3
10	3050-1112-020	1		Bottom bearing housing
-	0008-6500-090	1		Neck bearing bridge assembly with covering (11a-p)
11a	0008-6509-050	1		Distance ring
11b	0004-5851-770	1		Gasket 176/235x0.3
-	0008-6510-070	1		Neck bearing bridge assembly (11c-h)
11c	0008-6507-000	1		Pressure ring
11d	0008-6506-000	1		Neck bearing bridge
11f	0019-1423-030	9		Threaded plug
11g	0006-4380-090	1		Set of neck bearing springs
11h	0026-2220-110	9		Spring piston
11k	0004-5852-770	1		Gasket 156/235x0.3
11m	0008-6502-120	1		Protection cap
11n	0026-5894-600	3		Tab washer 17 DIN 93
11p	0019-6616-150	3		Hex head screw M 16x100 DIN 931 - 8.8

* When this part needs replacement, the worm wheel assembly with clamp plates, 10a-g, fig. 15, should be replaced as well.

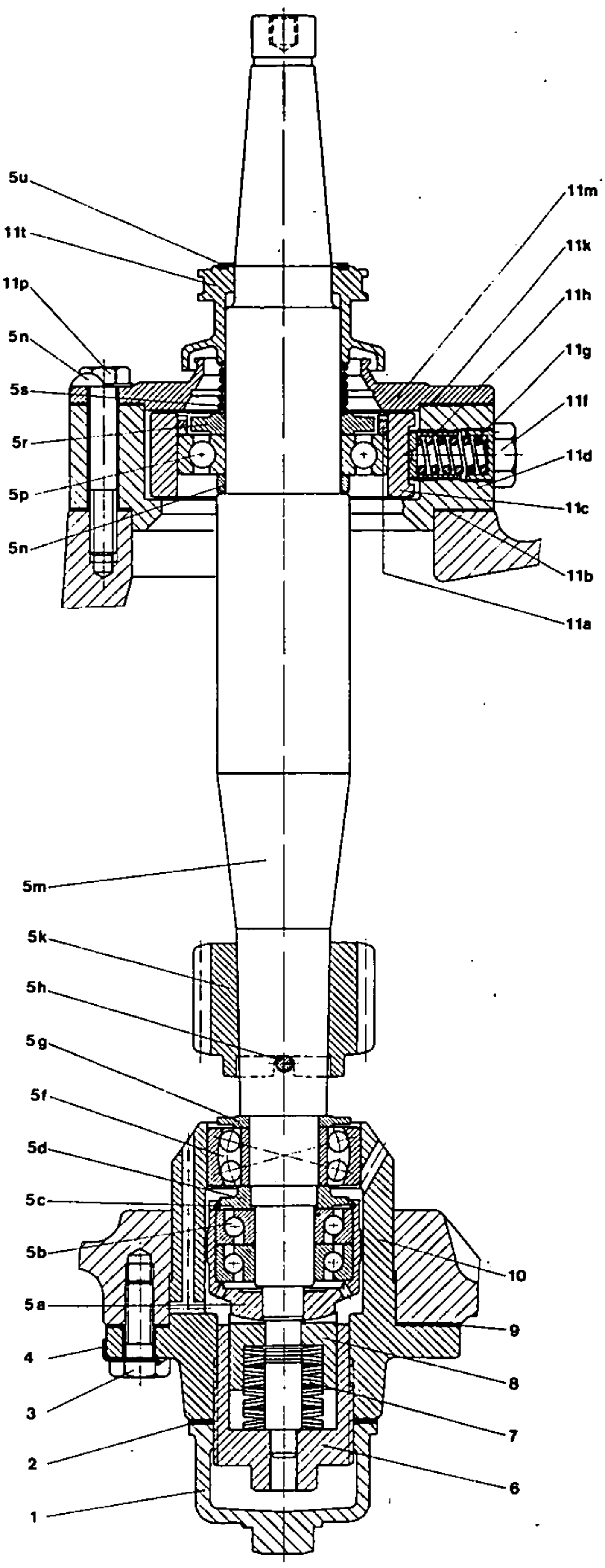
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Fig. 14

Horizontal Gear Parts (f = 50 Hz)

No. in Fig.	Part - No.	Qty.		Part Description
1	5990-L	1	*	Motor
-	1176-1021-L	1		Flange assembly (2a-m)
2a	0013-0282-400	8		Hexagon nut M 16 DIN 934
2b	0026-1330-190	8		Lock washer A 16 DIN 127
2f	0019-7727-090	8		Stud M 16x45 DIN 939 - 5.6
2g	0019-6839-300	8		Hex head screw M 6x10 DIN 933
2h	1176-1475-000	1		Cover
2k	1165-1028-L	1		Flange
2m	0019-6202-150	8		Allen screw M 16x45 DIN 912 - 8.8
3	0019-6150-150	3		Allen screw M 10x55 DIN 912 - 8.8
4	0026-1640-030	1		Centering disc
5	0006-4404-010	1		Cup spring
6	3050-3375-010	1		Bearing cover
7	0019-6938-150	3		Hex head screw M 10x35 DIN 933 - 8.8
8	0004-1850-740	2		Gasket 99/140x1
9	1166-3131-000	2		Bearing housing
10	2265-3449-000	1		Worm wheel assembly with clamp plates
10a	1166-3447-000	1	**	Clamp plate
10b	1166-3446-000	1	**	Clamp plate
10c	0019-6525-150	4	**	Hex head screw M 10x110 DIN 931 - 8.8
-	1166-3368-020	1		Brake pulley assembly (11a-d)
11a	0019-6144-150	6		Allen screw M 10x25 DIN 912 - 8.8
11b	0026-1337-190	6		Lock washer A10 DIN 127
11c	1166-3371-030	1		Brake pulley
11d	3170-3371-000	1		Brake ring
12	-0026-0405-030	1		Disc
13	0019-6150-150	2		Allen screw M 10x55 DIN 912 - 8.8
14	0019-9063-150	2		Threaded pin AM 8x10 DIN 916 - 10.9
-	3170-1043-000	2		Brake assembly (15a-f)
15a	0021-3514-300	2		Brake handle
15b	3170-1031-000	2		Brake bolt (with lining)
15c	0021-3537-300	2		Brake housing
15d	0006-4208-160	2		Cylindrical pressure spring
15f	0021-4096-850	2		Brake lining
-	0026-1263-550	8		Countersunk rivet
16	0026-1353-400	4		Washer
17	3170-1065-010	1		Cover
18	0019-6608-400	4		Hex head screw M 16x60 DIN 931
19	0019-6512-150	3		Hex head screw M 10x40 DIN 931 - 8.8
20	0004-1956-830	2		Felt ring 45 DIN 5419
21	3170-3375-000	1		Bearing cover
22	0004-1822-740	1		Gasket 90/140x1
23	0013-0448-090	1		Grooved nut M 50x1.5 SKF/KM 10
24	0011-6210-000	1		Grooved ball bearing 6210 DIN 625
25	1166-3400-000	1		Worm wheel shaft
26	0011-6210-000	1		Grooved ball bearing 6210 DIN 625
27	0004-1822-740	1		Gasket 90/140x1
29	see page 16/1	1		Fluid clutch (see fig. 16)
30	0019-8984-150	1		Threaded pin M 10x25 DIN 914 - 10.9
31	3158-3389-L	1		Cam hub
32	3158-3282-000	1		Cam ring
38	0004-1957-830	2		Felt ring 50 DIN 5419
39	1168-1192-000	1		Bracket
40	0005-0964-000	1		Proximity switch

* When ordering a motor, be sure to state voltage and frequency.

** This part is included in worm wheel assembly with clamp plates, item 10, but it is also available as separate item. When the worm wheel needs replacement, the worm 5k, fig. 14, should be replaced as well (see section 8.5, No. 4).

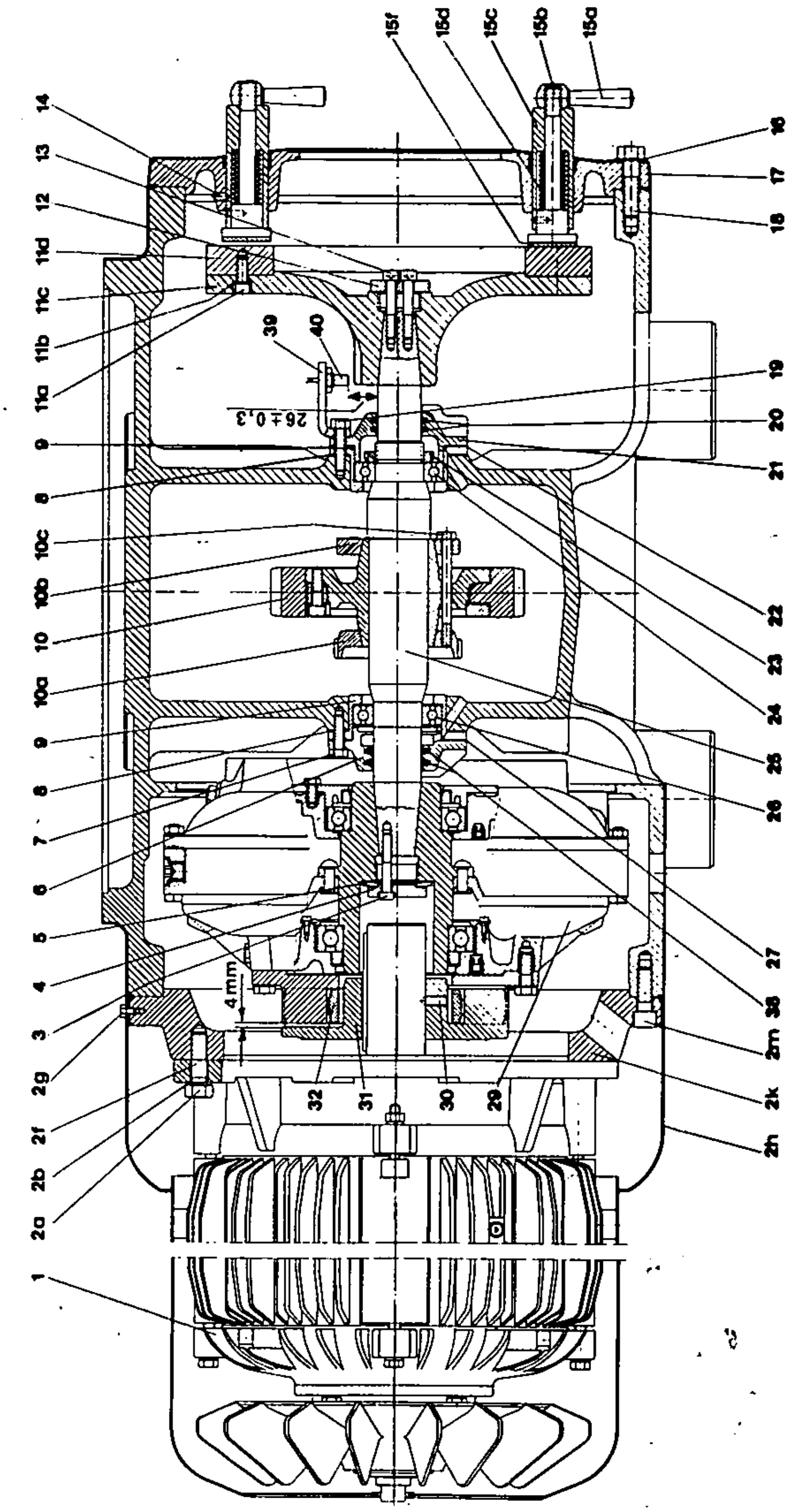
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Fig. 15

Pneumatic Brake

(on special order only)

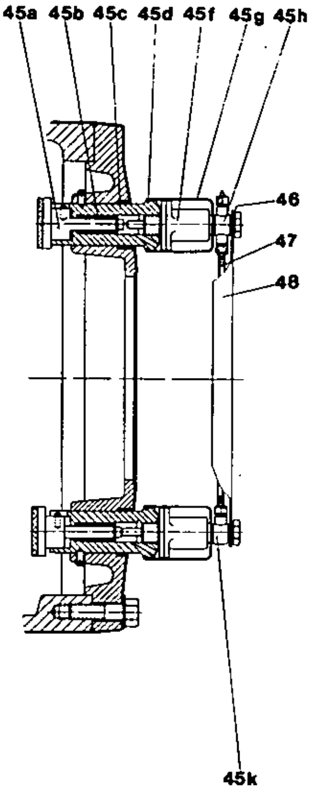

Fig. 15/1

No. in Fig.	Part - No.	Qty.		Part Description
45a	1166-1031-000	2		Brake bolt (with lining), complete
-	0021-4096-850	2	*	Brake lining
-	0026-1263-550	8	*	Countersunk rivet
45b	0006-4120-300	2		Cylindrical pressure spring
45c	0021-3555-300	2		Brake housing
45d	0007-2580-750	2		Gasket 42/2.5
45f	0021-3690-010	2		Compressed-air cylinder
45g	0026-2144-400	2		Cap
45h	0018-3740-640	1		T-type hose connection R 1/4"
45k	0018-3730-640	1		Angular hose connection R 1/4"
46	0004-2245-770	2		Gasket 15/21x0.25
47	0018-0585-848	1		Pipe
48	1166-1044-000	1		Protecting sheet

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

Fluid Clutch

No. in Fig.	Part - Number	Qty.		Part Description
-	1166-3280-000	1		Fluid clutch assembly (1-29) (see also fig. 15, no. 29)
1	-	1	*	Cam flange
2	0019-6971-150	8		Hex head screw M12x35 DIN 933- 8.8
3	0026-0772-170	8		Washer B 12 DIN 137
4	0004-2913-830	1		Sealing ring 105x130x13
5	0026-0182-170	1		Spacer ring ANS 160x26
6	0011-6021-400	1		Grooved ball bearing 6021 M/C4 DIN 625
7	0019-6518-150	36		Hex head screw M10x70 DIN 931 - 8.8
8	-	1	*	Clutch casing 470Ø
9	0004-2385-858	1		Packing cord 1 mm Ø, 1400 mm long
10	0026-0771-170	36		Lock washer B 10 DIN 137
11	0013-0279-150	36		Hexagon nut M 10 DIN 934 - 8
12	-	1	*	Primary wheel 470Ø
13	0026-0180-170	1		Spacer ring AN 140x24
14	0007-2944-830	1		Gasket 140/3Ø
15	0011-6018-400	1		Grooved ball bearing 6018 M/C4 DIN 625
16	-	1	*	Secondary hub with secondary wheel 425Ø
17	0004-2912-830	1		Sealing ring 90x110x13
18	-	1	**	Sealing ring cover
19	0019-6903-150	8		Hex head screw M8x20 DIN 933 -
20	0026-0770-170	8		Lock washer B 8 DIN 137
21	0004-2144-280	2		Gasket 22/29Ø x 1.5
22	-	2	**	Threaded bolt M 22x1.5x20
23	0004-2131-280	1		Gasket 18/24Ø x 1.5
24	0019-1490-000	1		Threaded plug M 18x1.5x15
25	3158-3287-010	1		Oil control ring 119/192Ø x 4.5
26	0019-2234-030	8		Fillister head screw AM 5x16 DIN 84 - 4.6
27	0026-0750-170	8		Lock washer 5 DIN 7980
29	0019-1551-090	1		Oil fill plug M 22x1.5

* If this part needs replacment, the complete clutch must be returned to the factory for repair. Instead of part-number state item-number (see first column).

** Instead of part-number state item-number (see first column).

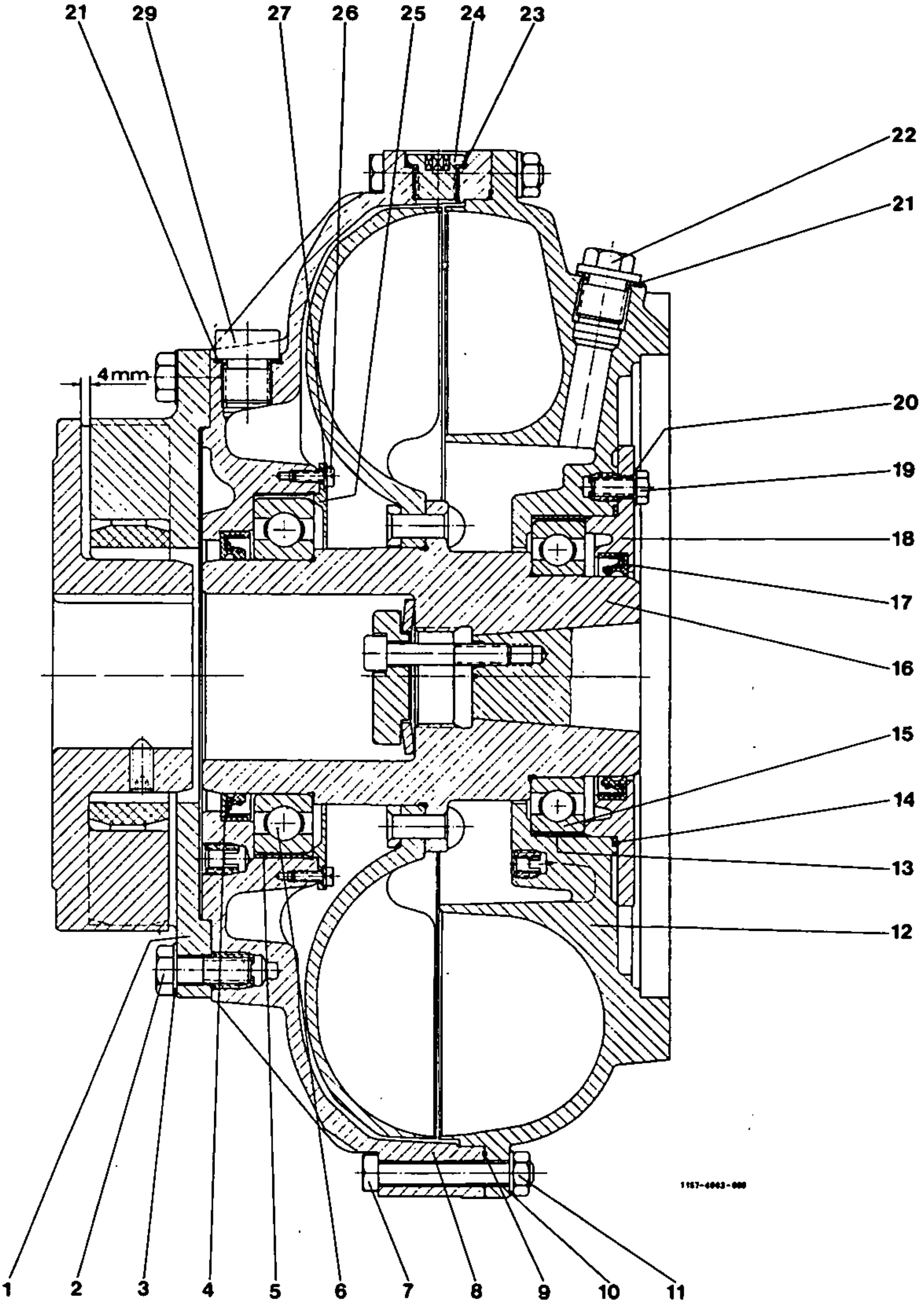
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Fig. 16

Operating-water connection

No. in Fig.	Part - No.	Qty.		Part Description
-	8134-2100-	1		Operating-water connection with protecting case (1-27 and 36-41)
1	0013-2842-300	1		Grooved coupling nut F25 DIN 11851
2	0018-3939-300	1		Cone connection D25 DIN 11851
3	0007-2208-750	4		Gasket G 25 DIN 11851
-	8134-2201-010	1		Pipe line, complete (4a-d)
4a	0018-4502-400	1		Threaded connection 25/R1"
4b	0018-2525-640	1		Strainer R 1"
4c	0018-1609-300	1		Bend
4d	0013-2842-300	1		Grooved coupling nut F25 DIN 11851
5	0018-4086-400	3		Threaded connection 25/R 1"
6	0018-1741-000	1		Water pressure reducer, complete
6a		2	*	Gasket
6b		2	*	Threaded connection
6c		2	*	Coupling nut
6d	0001-0299-610	2	*	Pressure gauge
7	3014-2166-000	1		Connection pipe
8	0019-0137-300	1		Hex head screw R 1/4" x 12
9	0004-5268-880	2		Gasket 13/19x1.5
10	8134-2195-000	1		Connection piece
11	0018-0961-300	2		Double nipple 3/8"
12	0018-3711-600	2		Solenoid valve 3/8"
15	0018-3854-300	4		Connection piece 10/R3/8"
16	0013-2818-400	4		Coupling nut R 3/4"
17	0007-2230-750	4		Gasket 15.5/21.5 x 4
18	0018-4645-300	2		Threaded connection R 3/4" R 3/8"
19	0018-4646-300	2		Threaded connection R 3/4" R 1/2"
20	0018-1709-640	2		Ball valve 1/2"
21	0018-1788-300	2		Reducing nipple 1/2" / 3/8"
22	8134-2201-	1		Pipe line
23	0007-2402-750	2		Gasket 17/23 x 3
24	0018-4645-300	1		Threaded connection R 3/4" / R 3/8"
25	8134-2193-	1		Connection piece
26	0018-1299-640	2		Upper part of valve 1/2" DIN 3519,cpl.
26a	0004-5276-710	2	*	Gasket 22/26 x 1
27	0001-0299-610	2		Pressure gauge
-	8134-2355-020	1		Protecting case
-	0005-3355-630	1		Cable gland Pg 9
-	1165-2350-000	1		Pressure switch assembly (30-31)
30	0018-1870-000	1		Low-pressure hose, complete
30a	0018-3465-400	1	*	Screw coupling DL 8 DIN 2353 R 1/4"
30b	0018-3560-400	1	*	Screw coupling DL 8 R 3/8"
31	0005-0675-900	1		Pressure switch F 5
36	0005-3358-630	1		Cable gland Pg 9
37	0019-2376-630	2		Fillister head screw AM 4x16 DIN 84
38	0005-0862-900	1		Branch box
39	0005-0222-630	1		Plug Pg 9
40	0005-0203-630	1		Cable gland C4 Pg 11x6-9 DIN 46320
41	0005-0772-608	1		Protecting hose

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

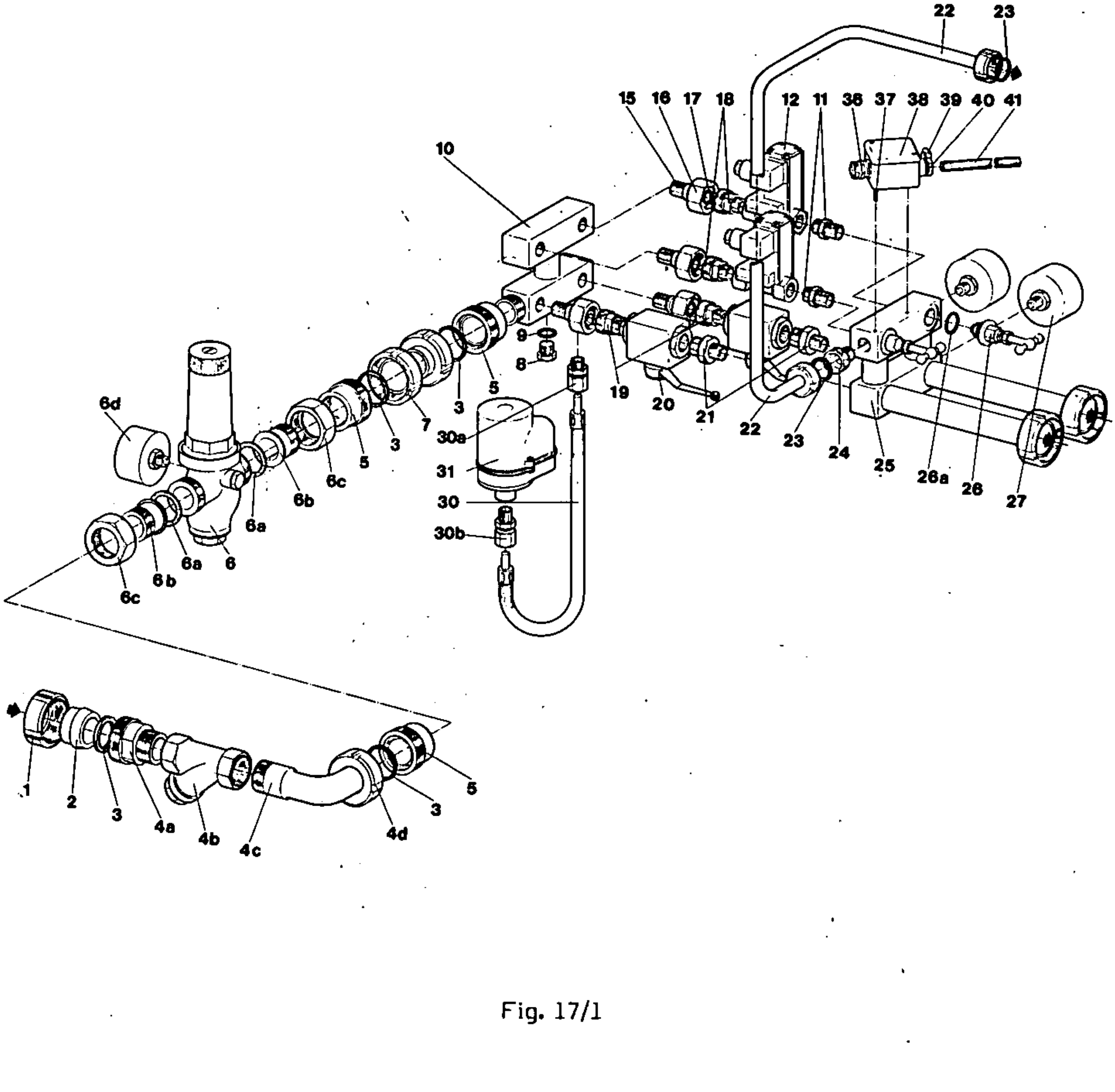
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Fig. 17/1

Solenoid Valve R 3/8"

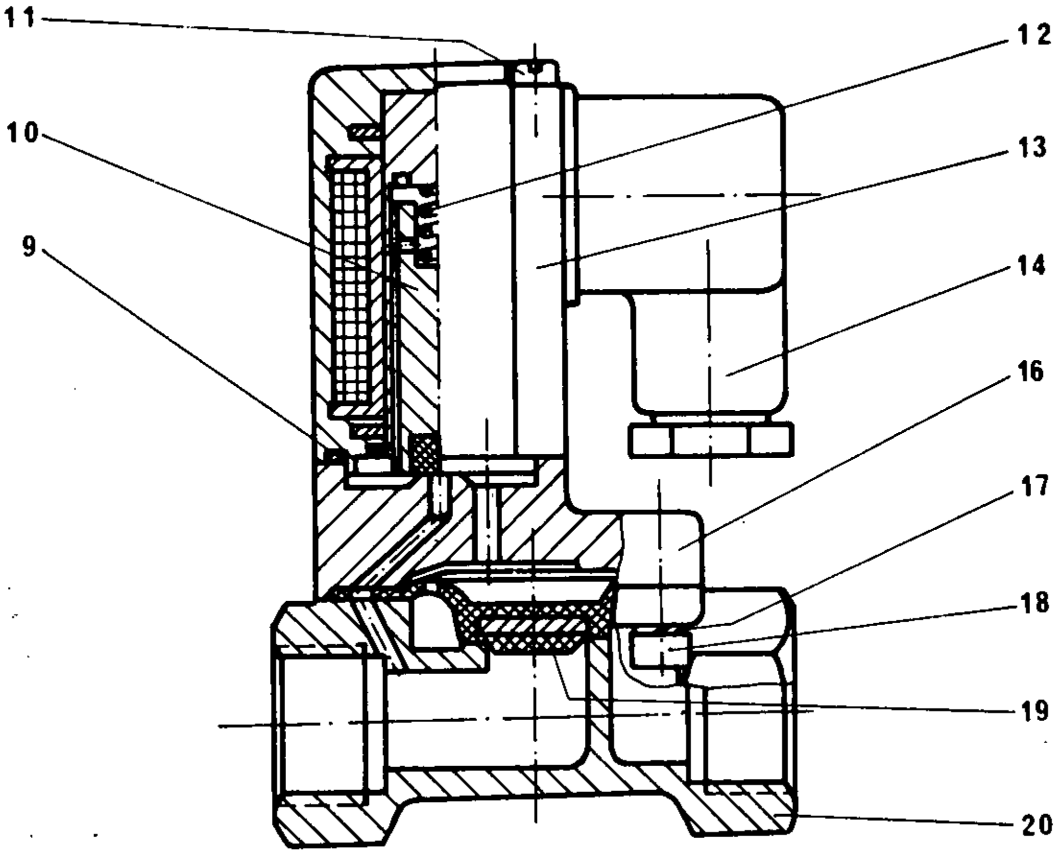

Fig. 17/2

No. in Fig.	Part - No.	Qty.	Part Description
-	0018-3711-600	1	Solenoid valve, complete (9-20)
9	0007-1946-750	1	Gasket 25/1.5
10	0018-3710-040	1	Solenoid core
11	0019-2387-400	4	Cylindrical screw M 4x55 DIN 84
12	0006-4079-300	1	Pressure spring
13	0018-3710-800	1	Solenoid head 50/60 Hz
14	0018-3710-050	1	Coupler socket
15			
16	0018-3711-070	1	Valve cover
17	0026-1322-170	4	Lock washer A4 DIN 127
18	0019-6077-400	4	Allen screw M 4x10 DIN 912
19	0018-3711-750	1	Diaphragm
20	0018-3711-080	1	Valve housing

Maximum throughput rate: 7,000 l/h

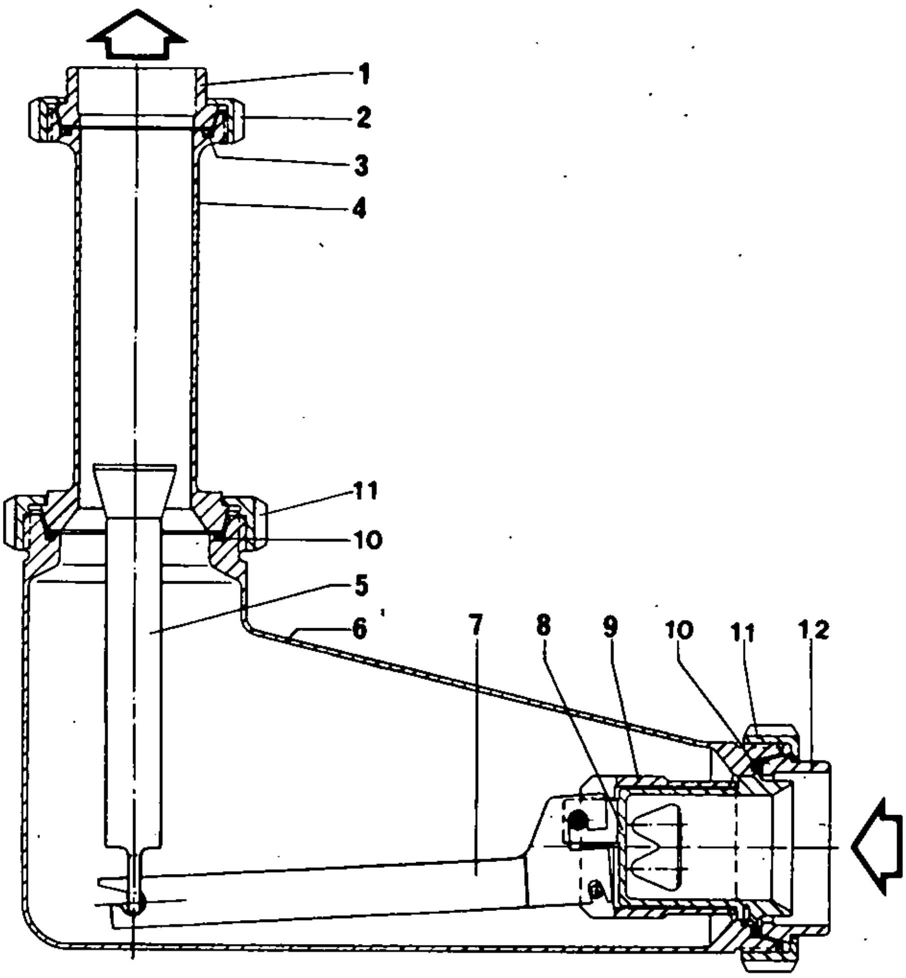

Fig. 18/1

NOTE: Be sure to install the flow constrictor in such a manner that the inlet is fitted to a horizontal piece of pipe and the control tube 4 is directed vertically upwards.

No.in Fig.	Part - No.	Qty.		Part Description
-	8250-2070-090	1		Flow constrictor, complete (1-12)
1	0018-3955-300	1		Cone connection D50 DIN 11851
2	0013-2845-300	1		Grooved coupling nut F50 DIN 11851
3	0007-2211-750	1		Gasket G50 DIN 11851
4	-	1	*	Control tube
5	-	1	*	Float.
6	-	1	*	Housing
7	-	1	*	Throttling lever
8	-	1	*	Throttling housing
9	-	1	*	Regulating piece
10	0007-2212-750	2		Gasket G65 DIN 11851
11	0013-2846-300	2		Grooved coupling nut F65 DIN 11851
12	0018-4636-400	1		Reducing cone connection 65/50

* This part can only be replaced by a WESTFALIA factory engineer or by a special repair shop authorized by WESTFALIA, because its replacement requires re-adjustment of the flow constrictor. Therefore, when ordering this part, the flow constrictor must be returned to the factory.

Feed and Discharge Connections and Centripetal Pump

No.in Fig.	Part - No.		Qty.	Part Description
-	1176-2213-000		1	Double centripetal pump, complete (1a-k)
1a	1176-2246-000		1	Feed tube
1b	0007-2501-750		2	Gasket 23/3
1c	1176-2241-000		1	Lower centripetal pump, dia. 115 (up to 5 bar max.)
1d	0007-2925-750		1	Gasket 36.2/3
1f	1176-2252-000		1	Upper centripetal pump, dia. 120 (up to 5 bar max.)
1g	0007-2730-750		1	Gasket 46.2/3
1h	0007-1900-750		3	Gasket 31/2.5
1k	0007-2210-750		1	Gasket G40 DIN 11851
-	1176-2296-000		1	Feed and discharge connections, complete (2-10f)
2	1176-2217-000		1	Ring
3	1176-2301-000		1	Feed and discharge housing
4	0007-2210-750		2	Gasket G40 DIN 11851
5	0007-2208-750		1	Gasket G25 DIN 11851
7	8918-2100-080		1	Pressure gauge
8	see special IM		1	Constant-pressure valve
	Measuring range: **50 - 350 l/h**	**200 - 1,400 l/h**		
-	8020-2040-080	8020-2240-050	1	Flowmeter, complete (9a-10f)
9a	0019-1732-400	0019-1732-400	1	Handle screw
9b	0007-2298-750	0007-2298-750	2	Gasket 13.5/22x10
9c	0019-2478-300	0019-2478-300	2	Cheese head screw M 4x8 DIN 85
9d	0004-5261-720	0004-5261-720	2	Gasket 4.8/9.0x1
9e	8020-2017-000	8020-2217-000	1	Scale
9f	8020-2002-030	8020-2002-030	1	Intermediate piece
9g	0001-0083-820	0001-0083-820	1	Cylindrical sight glass
9h	0019-1380-300	0019-1380-300	1	Threaded sleeve
9k	0026-1375-300	0026-1375-300	1	Washer
9m	0013-3010-300	0013-3010-300	1	Nut M 35x1.5
9n	8020-2003-170	8020-2003-170	1	Outlet pipe
9p	0019-0170-400	0019-0170-400	2	Hex head screw M 12x17.5
9q	0007-2209-750	0007-2209-750	1	Gasket G32 DIN 11851
9r	8020-2001-110	8020-2001-110	1	Inlet cup
9s	8020-2006-010	8020-2206-010	1	Measuring tube
9t	8020-2012-000	8020-2012-000	1	Float
9u	8020-2004-030	8020-2004-030	1	Clamp
9v	0019-0002-300	0019-0002-300	1	Handle screw
9w	0007-2208-750	0007-2208-750	1	Gasket G25 DIN 11851
9x	0007-2285-750	0007-2285-750	2	Gasket 22/32x5
9y	0026-5508-300	0026-5508-300	1	Washer
9z	0026-1445-300	0026-1445-300	1	Snap ring
-	1072-2273-020	1072-2273-020	1	Stuffing box, complete (10a-f) 354.53 136.88
10a	1072-2279-020	1072-2279-020	1	Round-slide valve
10b	0019-1590-610	0019-1590-610	1	Threaded bolt
10c	1072-2284-000	1072-2284-000	1	Stuffing box housing
10d	0026-1062-400	0026-1062-400	1	Cylindrical pin
10f	0021-3096-300	0021-3096-300	1	Handle screw
11	0018-3939-300		1	Cone connection D25 DIN 11851
12	0013-2842-300		1	Grooved coupling nut F25 DIN 11851
13	0013-2844-300		2	Grooved coupling nut F40 DIN 11851
14	0018-3949-300		2	Cone connection D40 DIN 11851

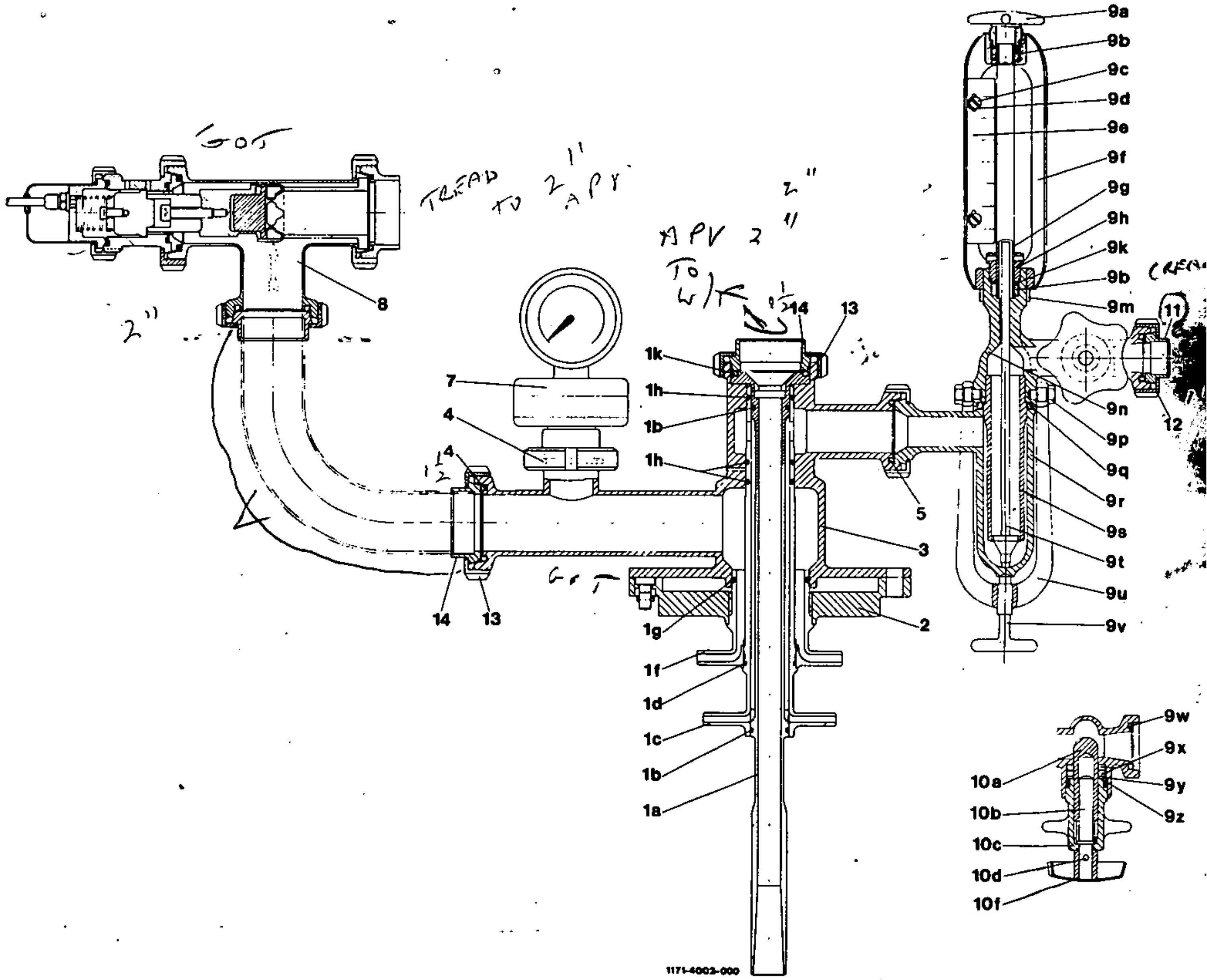
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Fig. 18/2

No.in Fig.	Part - No.	Qty.		Part Description
-	1176-6600-000	1		Bowl, complete (1-28)
1	0019-1450-400	1		Threaded plug
2	0007-1970-690	1		Gasket 26.5/35x5.25
3	1169-6280-010	1		Valve assembly (3a-f)
3a	1169-6281-010	1		Valve housing
3b	0007-2920-750	3		Gasket 23.3/2.4
3c	0004-2341-840	1		Gasket 6/9.9x10.5
3d	0007-2923-750	2		Gasket 9.3/2.4
3f	1169-6276-000	1		Valve piston
4	1169-6501-000	1	*	Sliding piston
5	0007-2478-750	1		Gasket 445/465x10
7	1169-6604-030	1	*	Bowl bottom, complete
7a	3117-6609-010	1	**	Arresting piece
7b	0019-2233-400	1	**	Cheese head screw AM 5x12 DIN 84
8	1169-6631-010	1	*	Bowl lock ring
-	1176-6660-000	1	*	Set of discs (9a-c)
9a	1066-6662-040	1		Bottom disc
9b	1066-6663-060	4		Disc
9c	1066-6663-120	126		Disc
9h	1033-6670-010	1		Upper disc (specially shaped)
10	0007-2079-750	1		Gasket 100/10
11	1169-6620-000	1	*	Distributor
14	0007-2631-750	1		Gasket 440/4
15	0007-2967-840	1		Gasket 416.8x10
16	0019-1935-400	1		Threaded sleeve Tr 44x3
17	0007-1944-750	1		Gasket 44.2x3
18	0007-2392-750	1		Gasket 19.2x3
19	0019-0441-420	1		Spindle screw M 18x1.5
20	1169-6610-010	1	*	Bowl top
21	1033-6650-000	1		Separating disc
22	1176-6642-000	1		Centripetal pump chamber cover
23	0007-2133-750	1		Gasket 140/152x4
24	1072-6631-080	1		Lock ring
25	1169-6597-000	1		Ring
26	0007-2640-750	1		Gasket 150/3
27	0007-2555-750	1		Gasket 179/3
28	0019-6126-400	4		Allen screw M 8x35 DIN 912

* This part can only be replaced by a WESTFALIA service engineer or by a special repair shop authorized by WESTFALIA, because of special re-fitting to machine and possible re-balancing of bowl.

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

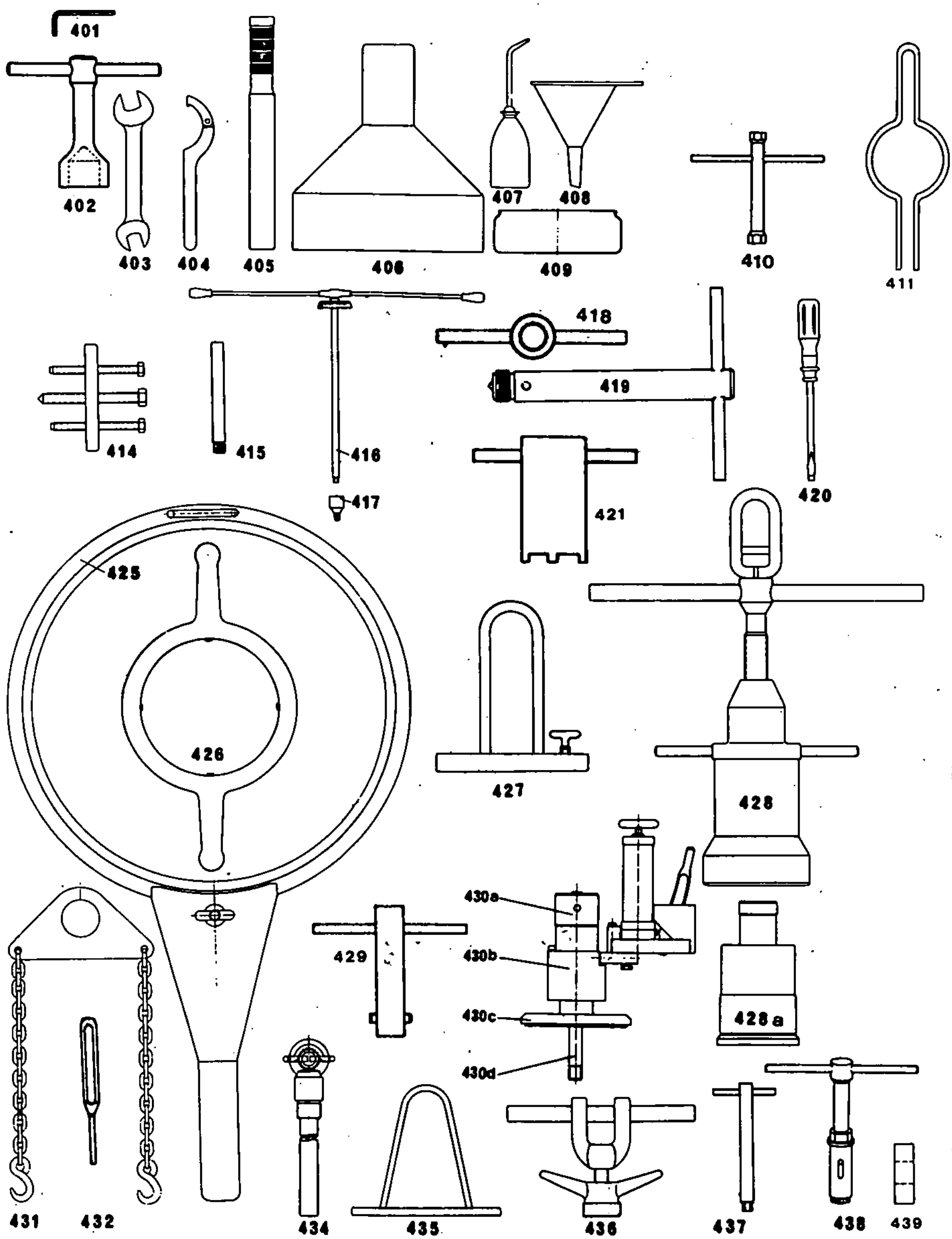
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Fig. 20

No.in Fig.	Part - No.	Qty.	Part Description
-	1169-9200-000	1	Sterilizing tank assembly (1-31)
1	0013-2845-300	1	Grooved coupling nut F50 DIN 11851
2	0018-3955-300	1	Cone connection D50 DIN 11851
3	0007-2211-750	1	Gasket G50 DIN 11851
4	0013-2842-300	2	Grooved coupling nut F25 DIN 11851
5	0018-4269-400	1	Cone connection R 1/2"
6	0007-2208-750	2	Gasket G25 DIN 11851
7	0001-0675-400	1	Angle thermometer
8	1165-9462-000	1	Bush
9	1169-9210-000	1	Sterilizing tank
10	0026-1102-400	6	Cylindrical pin
11	0019-1363-300	6	Hinge screw
12	0021-3128-300	6	Handle screw
13	0007-2121-750	1	Gasket 118/130x7
14	0007-2483-750	1	Gasket 65/10
15	0006-4143-300	1	Cylindrical pressure spring
16	1169-9698-000	1	Funnel
17	1169-9277-000	1	Cap
18	0019-6966-400	3	Hex head screw M 12x20 DIN 933
19	0026-2108-400	1	Cap
20	0019-2507-400	1	Lens head screw M 6x10 DIN 85
21	0026-1382-400	1	Washer 6.4 DIN 125
22	1169-9208-000	1	Cover
23	0007-2399-750	1	Gasket 68/82x8
24	0004-2364-758	1	Packing cord 8x8x1960
25	0001-0261-300	1	Blind cap
26	1169-9205-000	1	Flush pipe
27	0018-3949-300	1	Cone connection D40 DIN 11851
28	0007-2210-750	1	Gasket G40 DIN 11851
29	0013-2844-300	1	Grooved coupling nut F40 DIN 11851
30	0007-2209-750	1	Gasket G32 DIN 11851
31	0021-3155-700	3	Foot

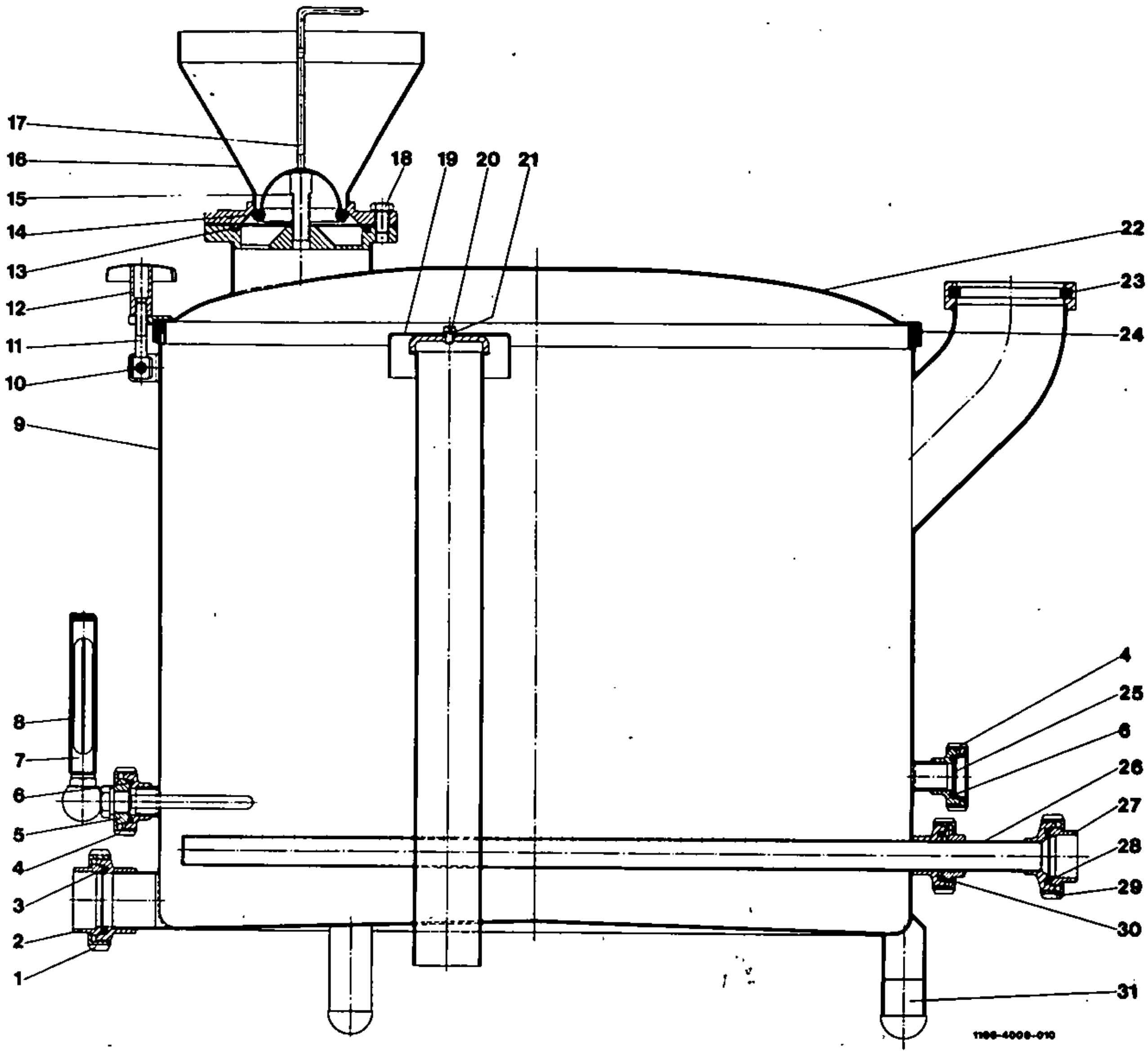
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Fig. 21

Measuring range: 4,000 - 14,000 litres/h

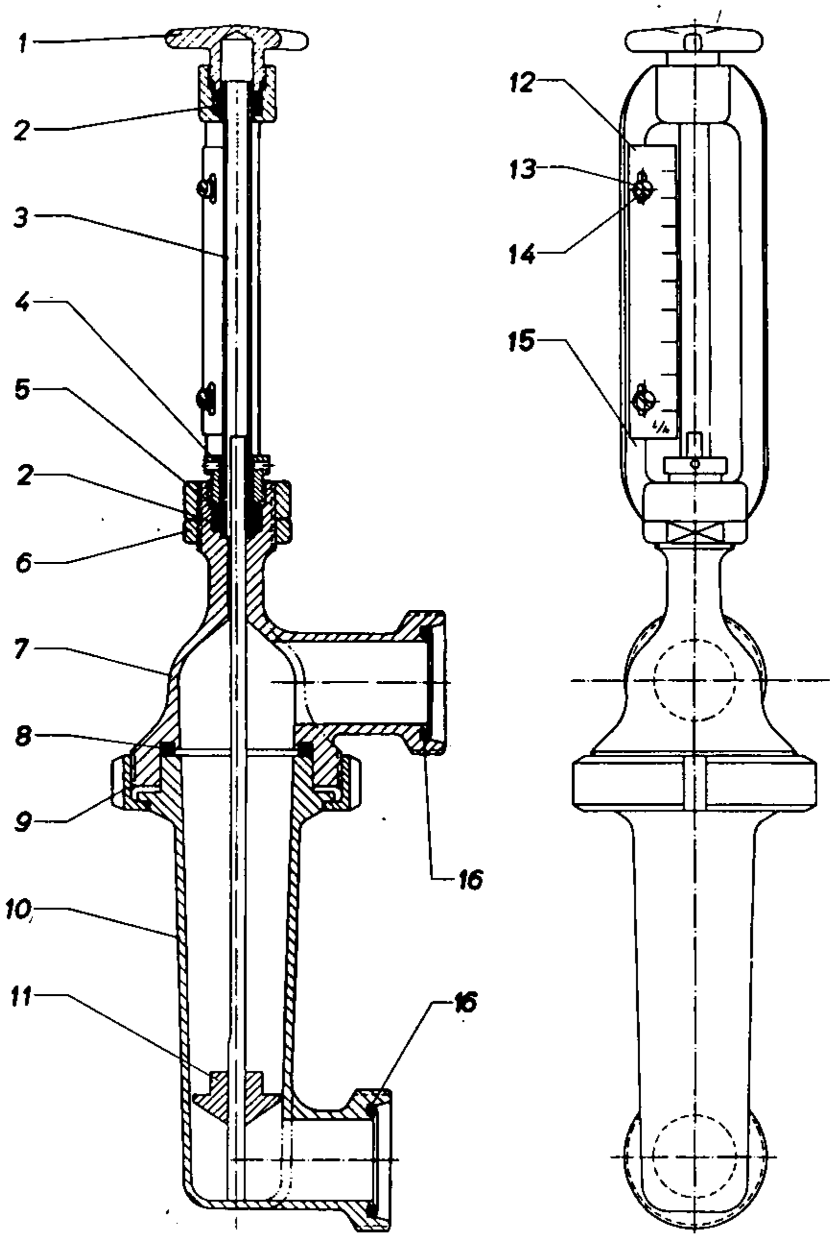
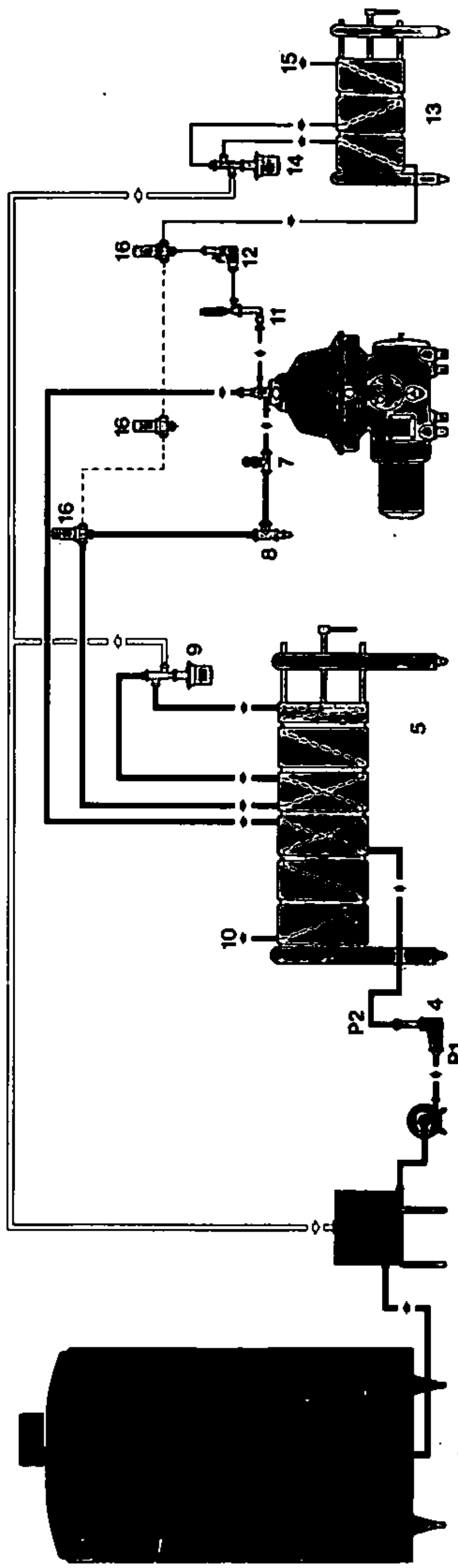


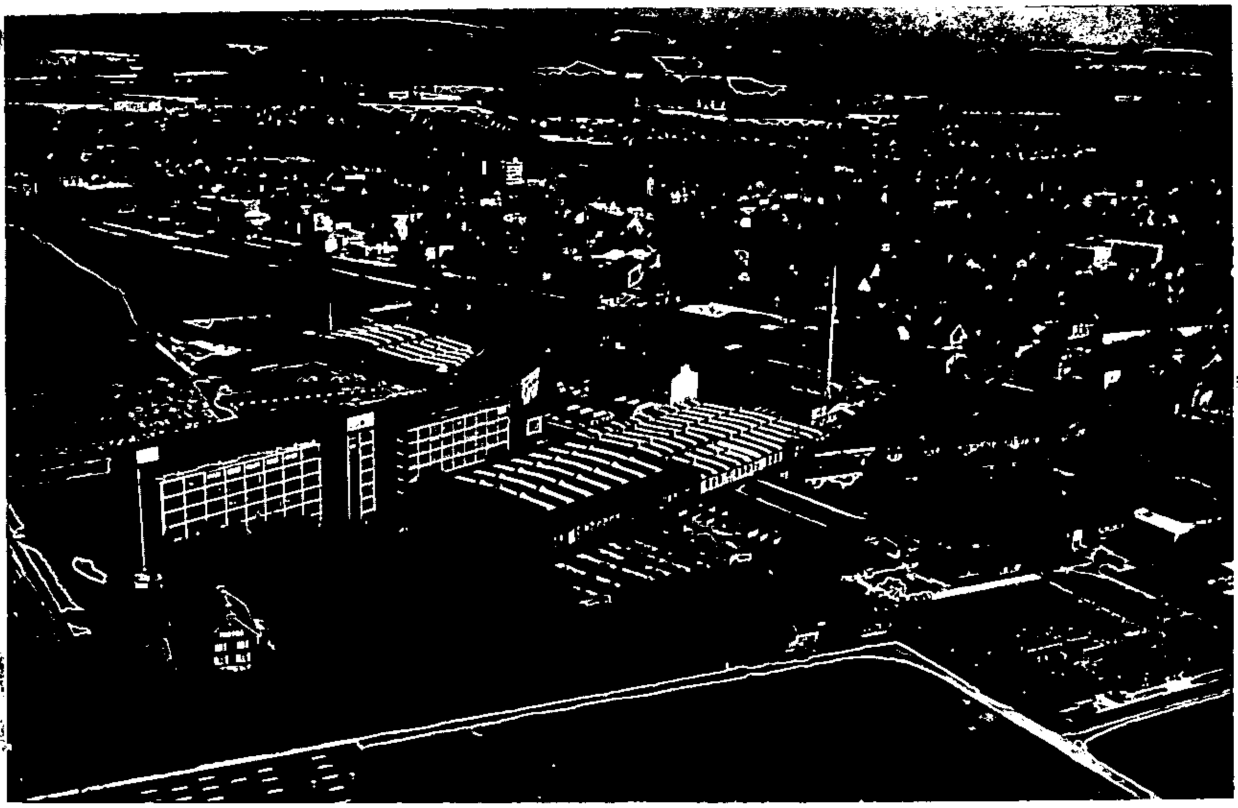
Fig. 22

No.in Fig.	Part - No.	Qty.	Part Description
-	8021-2200-000	1	Flowmeter, complete (1-16)
1	0019-1732-400	1	Handle screw
2	0007-2298-750	2	Gasket 13.5/22x10
3	0001-0083-820	1	Cylindrical sight glass
4	0019-1380-300	1	Threaded sleeve
5	0026-1375-300	1	Washer
6	0013-3010-300	1	Nut M 35x1.5
7	8022-2003-120	1	Outlet pipe
8	0007-2279-750	1	Gasket 56/68x6
9	0013-2846-300	1	Grooved coupling nut F65 DIN 11851
10	8021-2001-150	1	Inlet cup
11	8021-2212-000	1	Float
12	8021-2217-000	1	Scale 4,000 - 14,000 l/h
13	0004-5261-720	2	Gasket 4.5/9.0x1
14	0019-2478-300	2	Cheese head screw AM 4x8 DIN 85
15	8020-2002-000	1	Intermediate piece
16	0007-2210-750	2	Gasket G40 DIN 11851



1 Storage tank
2 Balance tank with float valve, approx. 200 litres
3 Milk pump (capacity slightly larger than rated capacity of separator)
4 Flow constrictor
$P_1 - P_2$ = 0.5 bar min., 2.0 bar max.
5 Heater and cooler
6 Westfalia Separator
7 Pressure gauge
8 Constant pressure valve for adjusting the operating pressure
9 Flow diversion valve
10 Line to tank
11 Flowmeter with hand valve
12 Adjustable flow constrictor
13 Cream heater and cooler
14 Flow diversion valve
15 Line to cream tank
16 3-way valve

Note:
When installing the flow constrictor make sure its cylindrical part is in upright position so that the milk flows through it from below.



Westfalia Separator AG., Oelde/Germany

6021-3096 370

LAST OIL CHANGE

1349.

WESTFALIA SEPARATOR

Betriebsanleitung

und

Ersatzteilliste

Nr. 8140-9000-000

WESTFALIA

Zahnradpumpe mit Motor Typ ZP

zur Förderung des Rahmes bei WESTFALIA Butterungsmaschinen

WESTFALIA SEPARATOR AG. / 474 OELDE (WESTF.)

TELEGRAMM-ADRESSE: WESTFALIA OELDE · TELEFON: 2222 OELDE · FERNSCHREIBER: 892899

VERKAUFSFILIALEN UND INGENIEURBÜROS:

Westfalia Separator AG. 1 Berlin-Wilmersdorf, Binger Straße 26a · Telefon: 894086 · Telegramm-Adresse: KRAFTSEPARATOR Berlin
Westfalia Separator AG. 6079 Buchschlag b. Frankfurt/Main, Dr.-Otto-Kämper-Ring 3 · Telefon: Langen 66470
Westfalia Separator AG. 2 Hamburg 22, Güntherstraße 47 · Telefon: 261851 · Telegramm-Adresse: SEPARATOR Hamburg · Fernschreiber: 212331
Westfalia Separator AG. 8 München-Obermenzing, Feichthofstr. 99 · Telefon: 887972/73 · Telegramm-Adresse: WESTFALIA München · Fernschreiber: 523340
Westfalia Separator AG. 85 Nürnberg-W, Chlodwigstraße 7 · Telefon: 63273 · Telegramm-Adresse: WESTFALIA Nürnberg · Fernschreiber: 622158
Westfalia Separator AG. 7 Stuttgart-S, Sonnenbergstraße 9 · Telefon: 240773 · Telegramm-Adresse: WESTFALIA Stuttgart · Fernschreiber: 723339

Ersatzteildienst durch Auslandsvertretungen in fast allen Ländern der Welt

Nr. 2987/863

WESTFALIA SEPARATOR

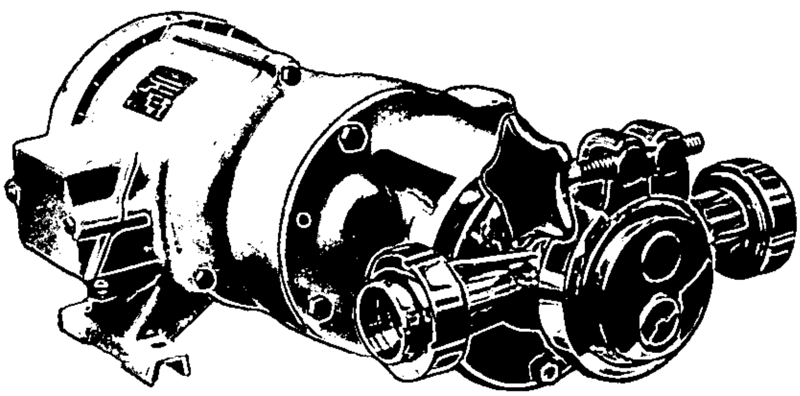
BETRIEBSANLEITUNG und ERSATZTEILLISTE

Nr. 8140-9000-000

WESTFALIA

Zahnradpumpe mit Motor Typ ZP

zur Förderung des Rahmes bei WESTFALIA Butterungsmaschinen



WESTFALIA SEPARATOR AG./ 4740 OELDE (WESTF.)

Telegramme: WESTFALIA Oelde . Ruf: Oelde 2222 . Fernschreiber: 892899

Nr. 2987/863

Senkrechter Schnitt
Zahnradpumpe mit Motor vollst. Typ ZP
für Anbau an die Butterungsmaschine BuC 800 und BuC 1500

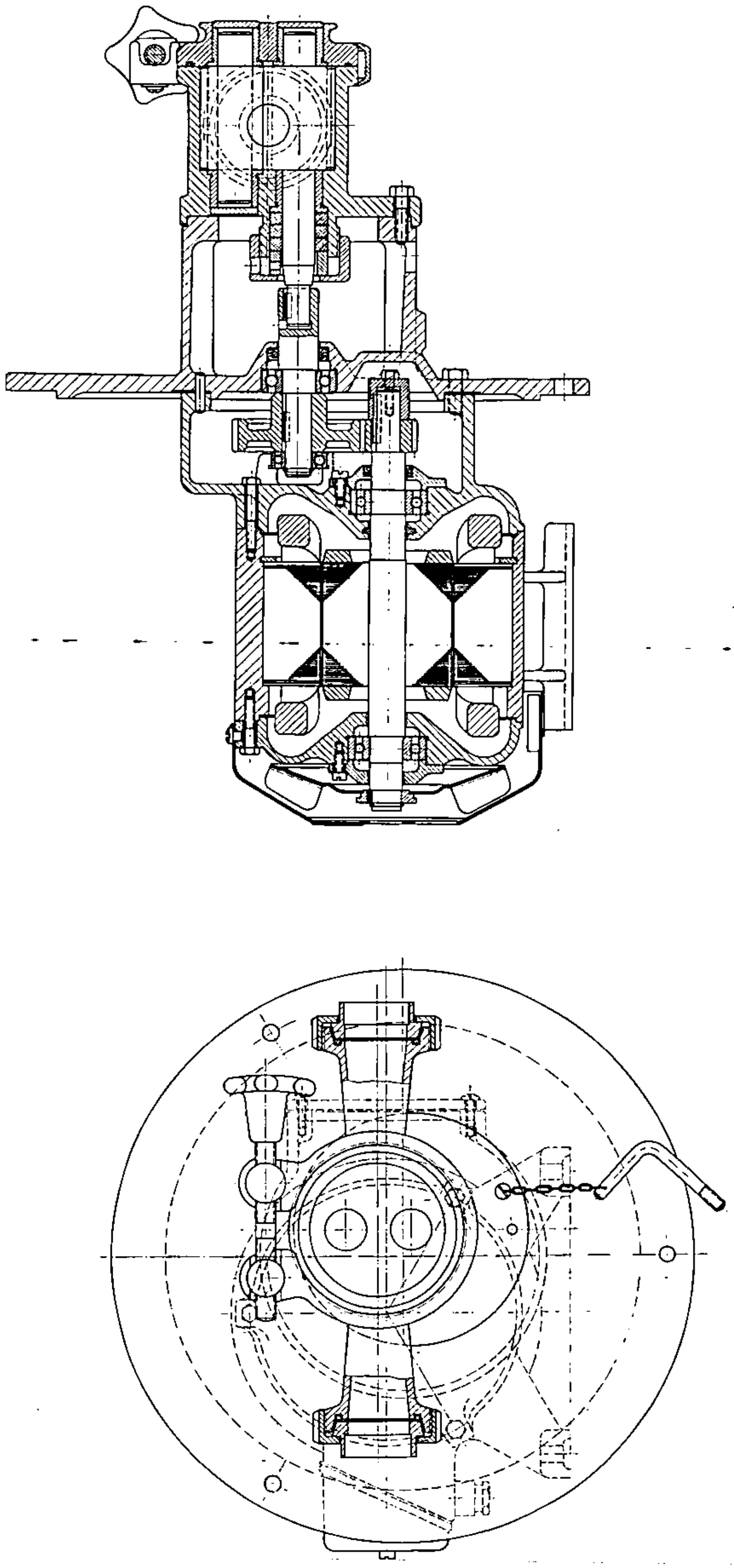
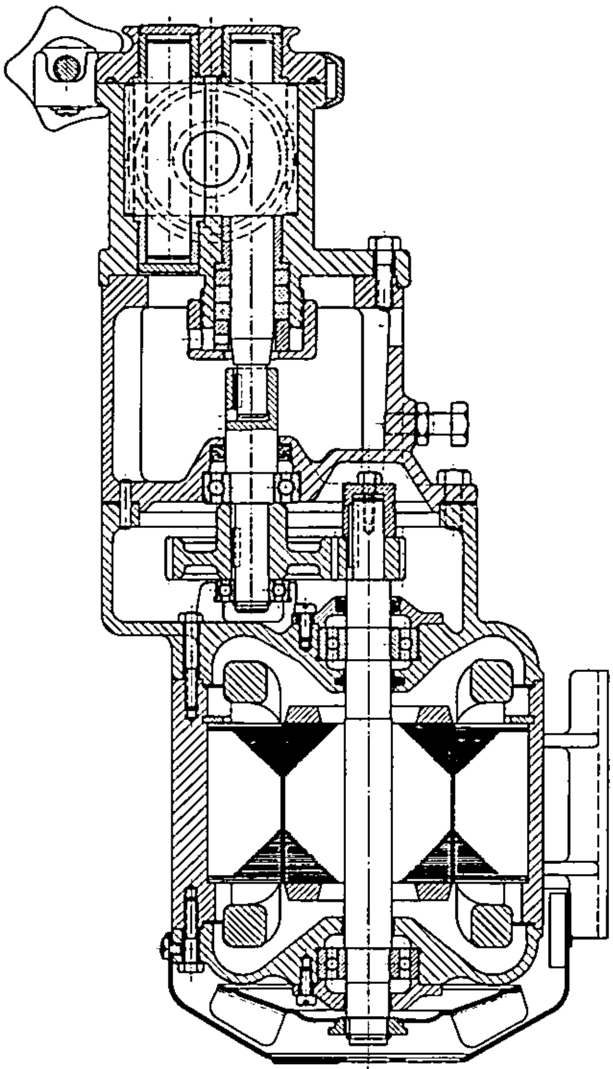


Bild 1

Senkrechter Schnitt
Zahnradpumpe mit Motor vollst. Typ ZP
zum Aufstellen (evtl. auf Sockel)



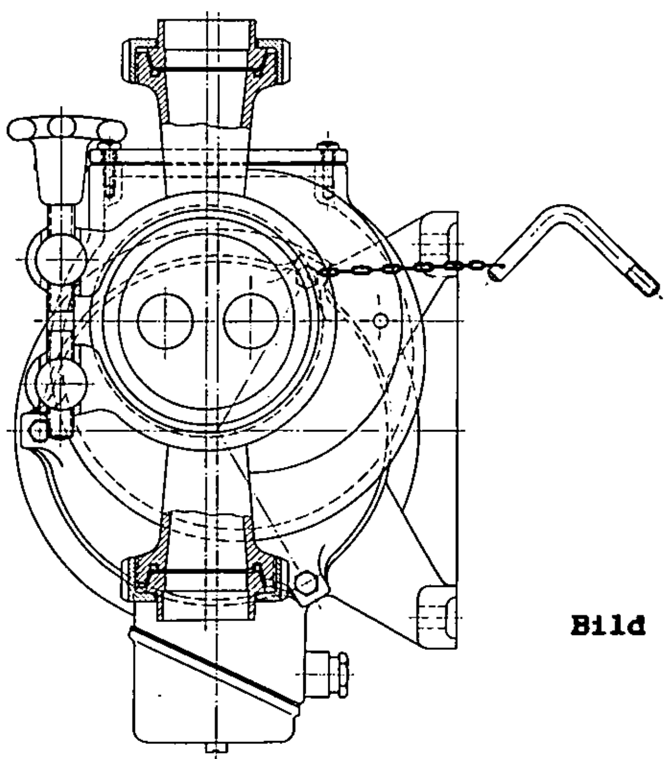


Bild 2

INHALTSVERZEICHNIS

Betriebsanleitung

Ersatzteilliste

WESTFALIA Zahnradpumpen für zulaufendes Fördergut
Typen ZP 800, 1200, 1500, 1800, 2000, 2200

1. Beschreibung der Pumpe

Die WESTFALIA Zahnradpumpe ist speziell für die Förderung von hochprozentigem Rahm gebaut. Das Pumpengehäuse, der Deckel und die Anschlußverschraubungen sowie die beiden Zahnradwellen und das Antriebsrad sind aus nichtrostendem Stahl hergestellt. Dagegen besteht das getriebene Zahnrad der besseren Laufeigenschaften wegen aus einer Spezial-Nickel-Legierung. Die Pumpenlager sind aus Spezial-Gußbronze gefertigt. Die Antriebswelle wird durch eine normale Packung-Stopfbuchse abgedichtet.

Die Leistung der Pumpe beträgt bei

nP	=	375 U/min.	800 l/h	Rahm	bei	einer	Förderhöhe	von	7	m	WS
nP	=	550 U/min.	1200 l/h	"	"	"	"	"	7	m	WS
nP	=	700 U/min.	1500 l/h	"	"	"	"	"	7	m	WS
nP	=	900 U/min.	1800 l/h	"	"	"	"	"	7	m	WS
nP	=	1150 U/min.	2000 l/h	"	"	"	"	"	7	m	WS
nP	=	1400 U/min.	2200 l/h	"	"	"	"	"	7	m	WS

2. Auseinandernehmen der Pumpe

Bei der Konstruktion der Pumpe wurde besonderer Wert darauf gelegt, daß alle Teile für die tägliche Reinigung leicht auseinandergenommen werden können. Nach Lösen des Spannringes vollst. 4a-g (Bild 4) kann man den Pumpendeckel vollst. 12a-c abziehen. Die Antriebswelle 17a läßt sich nach Einschrauben des mitgelieferten Gewindeschlüssels in das Kopfstück leicht aus dem Gehäuse herausziehen. Anschließend kann man die angetriebene Zahnradwelle 16a von Hand herausnehmen.

Für das Auswechseln der Getrieberäder 35 und 32d (Bild 3) schraubt man die drei Sechskantschrauben 11 heraus und zieht das Lagerschild mit Flansch 10 ab. Die beiden Getrieberäder liegen dann frei und können ausgebaut werden.

Die Pumpenlager werden während des Betriebes von der Förderflüssigkeit geschmiert; sie benötigen daher keine besondere Wartung.

Pumpenmotor Typ 3F 14-4, N = 0,65 kW

Bezeichnung und Bestellnummer der einzelnen Teile der Bilder 3 und 3a

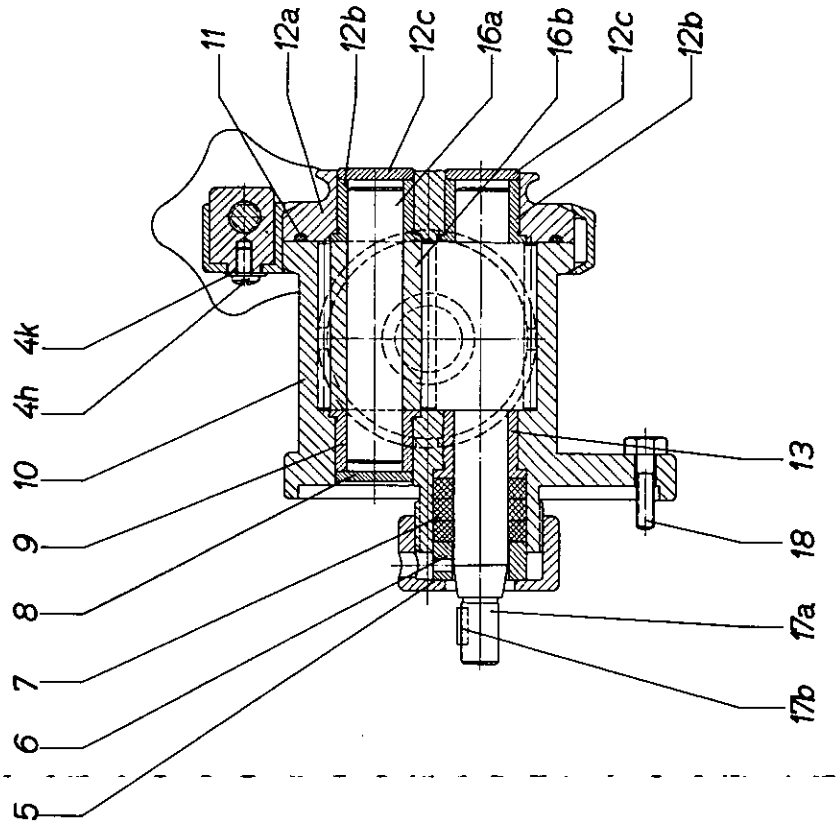
Nr. in d. Abb.		Bezeichnung der Teile	Stück	Bestellnummer
–	*	Zahnradpumpe mit Motor vollst.	1	8140-9000-L
–	*	Pumpenmotor vollst. 3F 14-4 (1-38)	1	5624-L
–		Motorgehäuse vollst. (1-31)		
		für Anbau der Pumpe an BuC 800, BuC 1500 (1-28)	1	5624-1100-010
		für Pumpe zum Aufstellen (1-9, 11-31)	1	5624-1100-000
1		Lüfterhaube vollst.	1	5763-1066-000
2		Zylinderschraube M 6x15 DIN 84-40 kad.	6	0019-2249-030
3		Lagerdeckel	1	5764-1123-000
4		Sechskantschraube M 6x30 DIN 931-50 kad.	6	0019-6456-090
5		Linsenkopfschraube M 5x6 DIN 85 - Ms verchr.	3	0019-2490-640
6		Motorschild	1	5764-1008-000
7		Filzring 22/32Ø x 4	1	0004-1937-830
8		Lagerschild vollst.	1	5624-1008-000
9		Radialdichtring A 25x37 DIN 6504	1	0004-5538-760
10	**	Lagerschild mit Flansch	1	5624-1067-010
11		Sechskantschraube M 8x20 DIN 931 - Ms verchr.	3	0019-6903-640
12		Scheibe	3	0026-1345-300
13		Dichtung	1	5619-1068-000
14		Radialdichtring A 20x30 DIN 6504	1	0004-5535-760
15		Lagerdeckel	1	5624-3375-000
16		Scheibe	1	0026-1362-600
17		Zylinderschraube AM 4x10 DIN 84 - Ms	1	0019-2218-600
18		Klemmkastendeckel	1	5763-1027-000
19		Zylinderschraube CM 6x40 DIN 84-40 kad.	2	0019-2413-030
20		Zylinderschraube AM 5x15 DIN 84 - 40 kad.	2	0019-2234-030
21		Dichtung 86 x 86 x 1	1	0004-5616-750
22		Klemmbrett vollst.	1	0005-0162-900
23		Dichtung 8/20Ø x 2	2	0004-5269-700
24		Verschlußstopfen	1	0005-0223-900
25		Stopfbuchsverschraubung	1	0005-0203-630
26		Deckel	1	5624-1004-000
27		Dichtung 48 x 120 x 1,5	1	0004-5681-740
28		Zylinderschraube M 5x12 DIN 84 - Ms verchr.	4	0019-2233-640
29	***	Lagerschild	1	5624-1067-000
30	***	Sechskantmutter M 10 DIN 934 - 40 kad.	1	0013-0279-030
31	***	Sechskantschraube M 6x35 DIN 631-50 kad.	1	0019-6457-090

* Je nach Pumpen-Drehzahl: Bei angebauter Pumpe siehe Tabelle, Seite 13; bei aufgestellter Pumpe siehe Tabelle, Seite 14.

** Nur für Anbau der Zahnradpumpe an BuC 800 und BuC 1500.

*** Nur für Zahnradpumpe zum Aufstellen.

Bilder 3 und 3a
siehe Innenseite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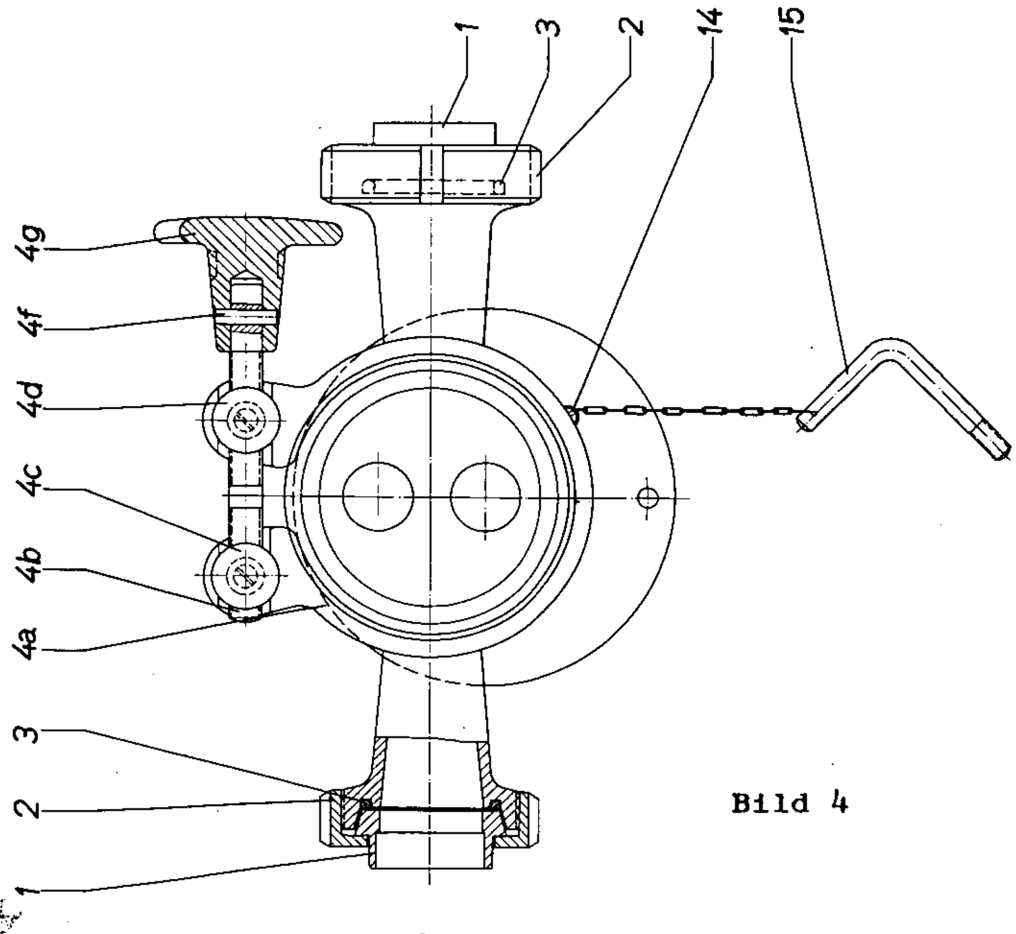
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Bild 4

Zahnradpumpe Typ ZP

Bezeichnung und Bestellnummer der einzelnen Teile des Bildes 4

Nr. in d. Abb.	Bezeichnung der Teile	Stück	Bestellnummer
-	Zahnradpumpe ZP vollst. (1-17b)	1	8140-9981-030
-	Pumpengehäuse vollst. (1-15)	1	8140-9100-030
1	Kegelstutzen	2	0018-3949-300
2	Nutmutter	2	0013-2844-300
3	Dichtring 42/52Ø x 5	2	0007-2210-700
-	Spannring vollst. (4a-k)	1	8140-9719-010
4a	Spannring	1	8140-9718-000
4b	Gewindebolzen	1	8140-9933-010
4c	Gewindestück (Linksgewinde)	1	1033-7717-000
4d	Gewindestück (Rechtsgewinde)	1	1033-7717-010
4f	Zylinderstift 5h8x24 DIN 7 - 18Cr 10Ni 2Mo	1	0026-1075-400
4g	Sterngriff	1	0021-3126-640
4h	Linsenschraube AM 6x10 DIN 85 - Ms verchr.	2	0019-2507-640
4k	Scheibe	2	0026-1343-300
5	Überwurfmutter	1	8140-9006-010
6	Druckring	1	8140-9357-020
7	Dichtschnur	1	0004-5382-758 ca. 250 lg.
8	Scheibe	1	8140-9092-010
9	Lagerbuchse	1	8140-9376-030
10	Pumpengehäuse	1	8140-9001-050
11	Dichtring 90/5Ø	1	0007-2482-760
-	Pumpendeckel vollst. (12a-c)	1	8140-9010-040
12a	Pumpendeckel	1	8140-9002-040
12b	Lagerbuchse	2	8140-9376-030
12c	Scheibe	2	8140-9092-010
13	Lagerbuchse (unten)	1	8140-9404-020
14	Halbrundschraube M 6x12 DIN 85 - 4D	1	0019-2508-000
15	Haken vollst.	1	8140-9075-000
-	Satz Förderräder (16a-17b)	1	8140-9300-010
-	Welle vollst. (16a-b)	1	8140-9429-010
16a	Welle	1	8140-3421-010
16b	Zahnrad	1	8140-3443-010
-	Zahnrad vollst. (17a-b)	1	8140-9399-010
17a	Welle mit Zahnrad	1	8140-9420-000
17b	Paßfeder	1	0026-1729-160
18	Sechskantschraube M 8x35 DIN 931-5D Kupr. verchr.	3	0019-6493-550

Umlaufleitung für Zahnradpumpe Typ ZP

(Auf besondere Bestellung)

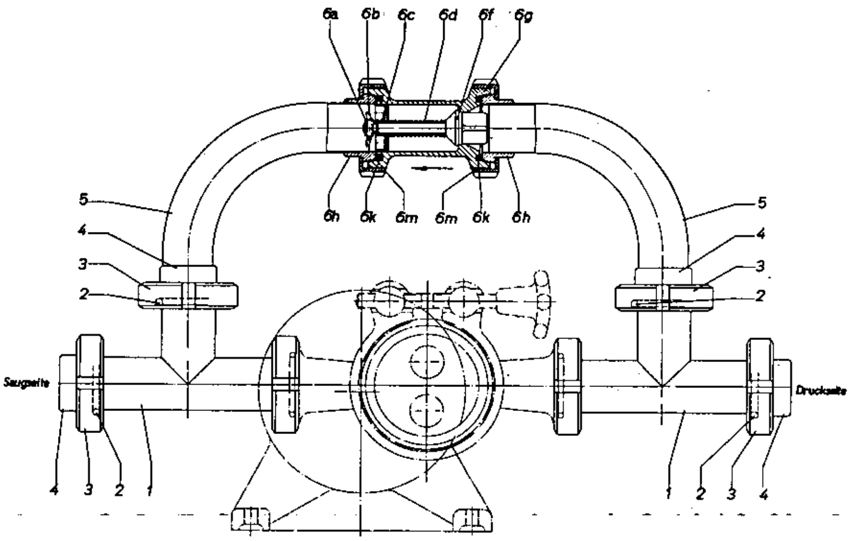


Bild 5

Nr. in d. Abb.	Bezeichnung der Teile	Stück	Bestellnummer
-	Umlaufleitung vollst. (1-6m)	1	8222-2298-000
1	T-Stück vollst.	2	0018-1642-300
2	Dichtring 42/52Ø x 5	4	0007-2210-750
3	Nutmutter	4	0013-2844-300
4	Kegelstutzen	4	0018-3949-300
5	Rohrbogen	2	0002-6218-310
-	Drosselventil vollst. (6a-m)	1	0807-2310-080
6a	Sechskantmutter M 8 DIN 934 - 18Cr 8Ni	1	0013-0278-300
6b	Zylinderstift 3h8x26 WSN 26-2/2 18Cr 8Ni	1	0026-1586-300
6c	Scheibe	1	0807-2313-000
6d	Zylindrische Druckfeder	1	0006-4318-300
6f	Ventilkegel	1	0807-2312-010
6g	Gehäuse	1	0807-2311-000
6h	Kegelstutzen	2	0018-3949-300
6k	Dichtring 42/52Ø x 5	2	0007-2210-750
6m	Nutmutter	2	0013-2844-300

Sockel für Zahnradpumpe Typ ZP

(Auf besondere Bestellung)

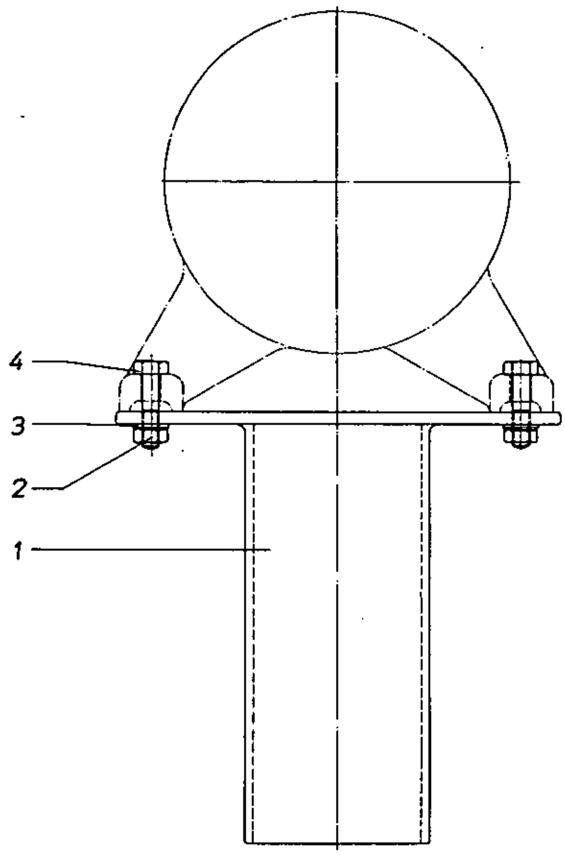


Bild 6

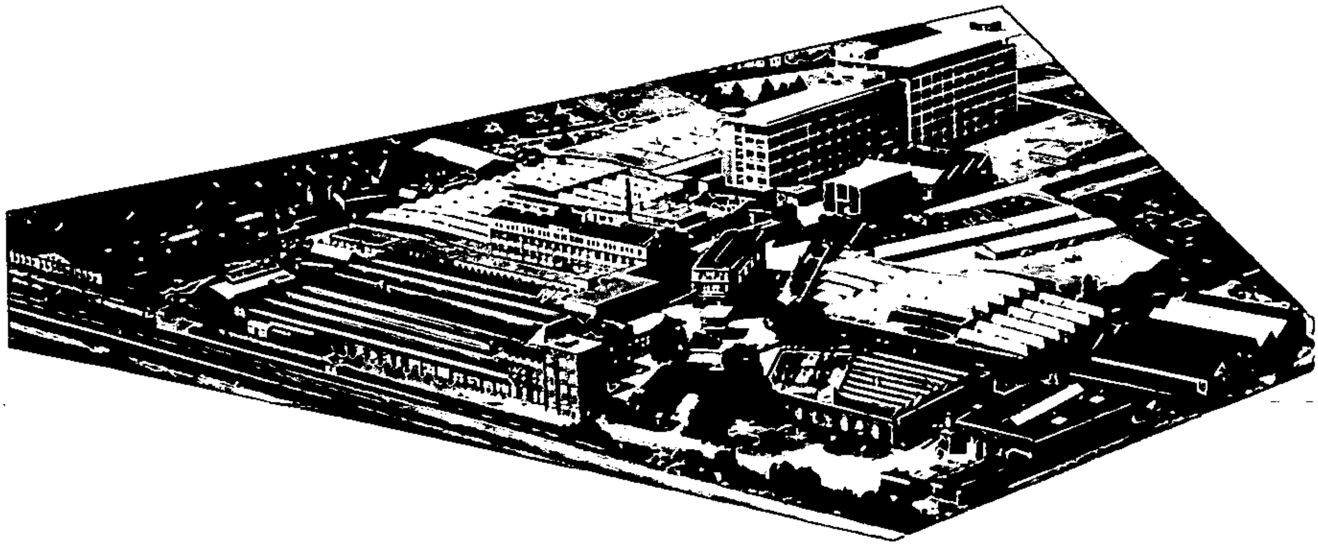
Nr.in d.Abb.	Bezeichnung der Teile	Stück	Bestellnummer
1	Sockel vollst.	1	8140-9055-000
2	Sechskantmutter M 8 DIN 934 - 16Cr 8Ni	4	0013-0278-300
3	Scheibe	4	0026-1345-300
4	Sechskantschraube M 8x30 DIN 931-Kupr.verchr.	4	0019-6492-550

Zahnradpumpe mit Motor vollst.
für Anbau an BuC 800 und BuC 1500

Pumpen-Typ	Pumpen-Drehzahl n	Zahnradpumpe mit Motor vollst. (Bild 3 und 4)	Pumpenmotor vollst. 1-38 (Bild 3, 3a)	Laufteile vollst. 32a-g (Bild 3)	Getriebewelle vollst. 32a-g (Bild 3)	Zahnrad 32d (Bild 3)	Zahnrad 35 (Bild 3)
ZP 800	375	8140-9000-200	5624-0004	5624-3300-010	5624-3429-010	5619-3423-010	5619-3443-010
ZP 1200	550	8140-9000-210	5624-0005	5624-3300-000	5624-3429-000	5619-3423-000	5619-3443-000
ZP 1500	700	8140-9000-220	5624-0006	5624-3300-020	5624-3429-020	5619-3423-020	5619-3443-020
ZP 1800	900	8140-9000-230	5624-0007	5624-3300-030	5624-3429-030	5619-3423-040	5619-3443-040
ZP 2000	1150	8140-9000-240	5624-0008	5624-3300-040	5624-3429-040	5619-3423-050	5619-3443-050
ZP 2200	1400	8140-9000-250	5624-0009	5624-3300-050	5624-3429-050	5619-3423-030	5619-3443-030

Zahnradpumpe mit Motor vollst. zum Aufstellen (evtl. auf Sockel)

Pumpen-Typ	Pumpen-Drehzahl n	Zahnradpumpe mit Motor vollst. (Bild 3 und 4)	Pumpenmotor vollst. 1-38 (Bild 3, 3a)	Laufteile vollst. 32a-37f (Bild 3)	Getriebewelle vollst. 32a-g (Bild 3)	Zahnrad 32d (Bild 3)	Zahnrad 35 (Bild 3)
ZP 800	375	8140-9000-170	5624-0002	5624-3300-010	5624-3429-010	5619-3423-010	5619-3443-010
ZP 1200	550	8140-9000-180	5624-0001	5624-3300-000	5624-3429-000	5619-3423-000	5619-3443-000
ZP 1500	700	8140-9000-190	5624-0003	5624-3300-020	5624-3429-020	5619-3423-020	5619-3443-020
ZP 1800	900	8140-9000-260	5624-0010	5624-3300-030	5624-3429-030	5619-3423-040	5619-3443-040
ZP 2000	1150	8140-9000-270	5624-0011	5624-3300-040	5624-3429-040	5619-3423-050	5619-3443-050
ZP 2200	1400	8140-9000-280	5624-0012	5624-3300-050	5624-3429-050	5619-3423-030	5619-3443-030



Fabrikansicht der Westfalia-Separator AG., Oelde (Westf.)

Unterlagenverzeichnis
Elektroschaltpläne

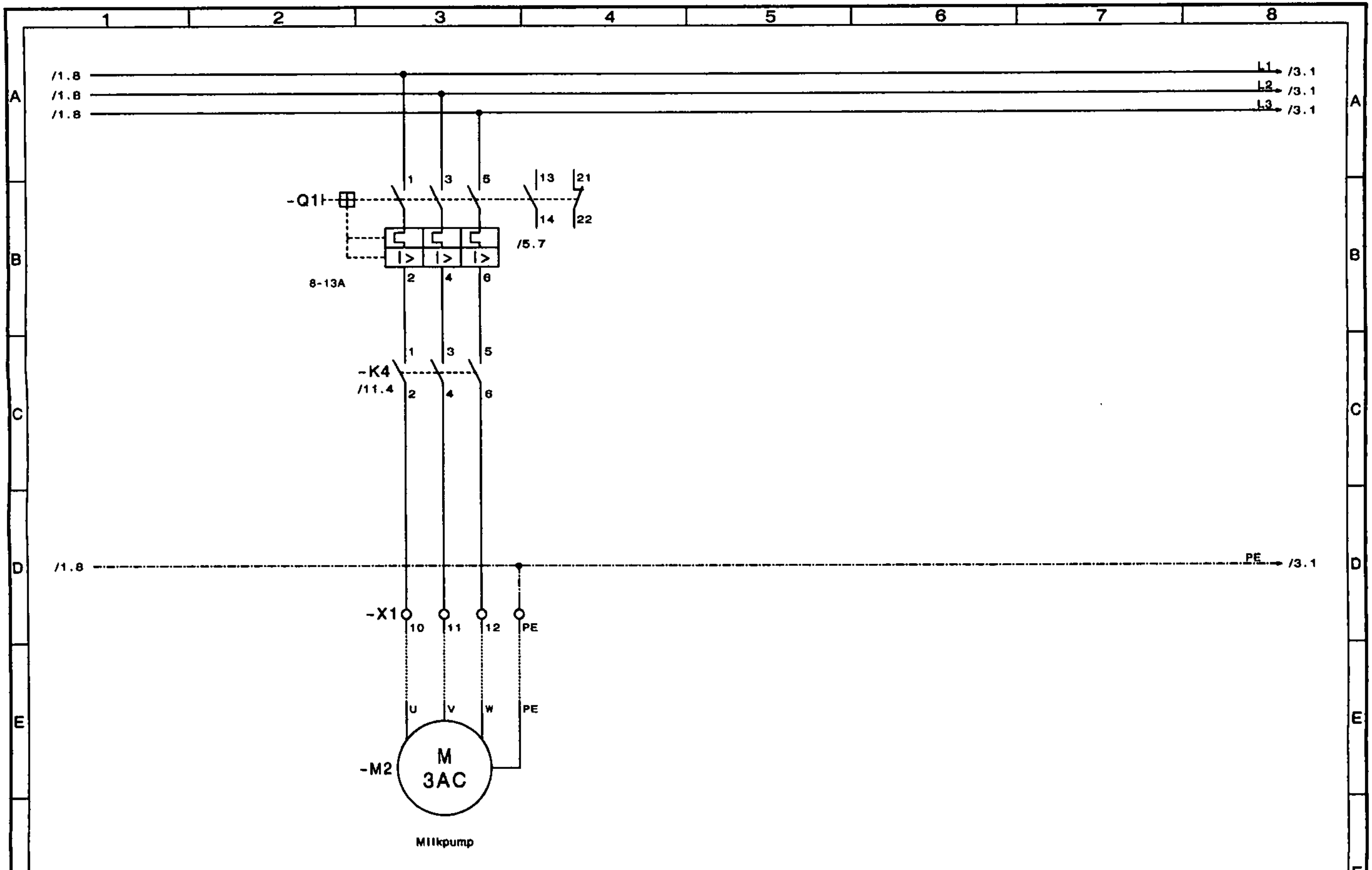
Inhalt von:	Maschine	Kunde	Schaltplannummer	Datum
	Selbstaustragender Tellerseparator	Waith	WI-9709-N-MSB60-120	24.09.1997

Part	List	Page	synopsis part A
A	Switch diagramm	0	Arrangement
B	Symbolik	1	Motor circuit 1
C	SPS FUP	2	Motor circuit 2
D	SPS QL / DB11 / DB12	3	Control ciruit 1
E	Programm 2 - 10	4	-A00 SPS-CPU102
F	Instruction Manuel	5	-A0 SPS-DE24VDC
		6	-A1 SPS-DE24VDC
		7	-A2 SPS-DA24VDC
		8	-A3 SPS-DA24VDC
		9	-A4 SPS-DA24VDC
		10	-A5 SPS-back up
		11	Control ciruit 2
		12	Control ciruit 3
		13	Terminal

				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH	Firm : Waith	Documents
				Bearb.	Schneider				
				Gepr.					WI-9709-N-MSB60-120	Blatt 0
Zustand	Änderung	Datum	Name	Norm		Urspr.:	Ers. d.		von 0 Bl.

OPERAND	SYMBOL	KOMMENTAR
E 0.0	S1	Separator Off
E 0.1	S2	Separator On
E 0.2		Free
E 0.3	F6	Separator Thermistore
E 0.4	S3	Valve control Off
E 0.5	S4	Valve control On
E 0.6	S5	Partial de-sludge
E 0.7	S6	Complet de-sludge
E 1.0	S7	Flush program On
E 1.1	S8	Flush water On
E 1.2	S9	Flush lye On
E 1.3	S10	Lamp test
E 1.4	S11	Klaxon Off/Reset
E 1.5	Q1	Fuse Milkpump
E 1.6	S0	Emergency-Stop
E 1.7	B0	End-switch
A 2.0	K1H	Main
A 2.1	K2H	Star
A 2.2	K3H	Delta
A 2.3	K4H	Milkpump
A 2.4	K5H	Opening water
A 2.5	K6H	Closing water
A 2.6	K7H	Pressure air brake
A 2.7	K8H	Over flow 1
A 3.0	H0	Contorl Voltage
A 3.1	H1	Separator On
A 3.2	H2	Separator start-up
A 3.3	H3	Separator operation
A 3.4	H4	Separator failure
A 3.5	H5	Valve control On
A 3.6	H6	Partial de-sludge
A 3.7	H7	Complet de-sludge
A 4.0	H8	Flush program On
A 4.1	H9	Flush water On
A 4.2	H10	Flush lye On
A 4.3	H11	Separation
A 4.4	H12	Displacement
A 4.5	H13	Waiting
A 4.6	K9H	Over flow 2
A 4.7	K10H	Klaxon
A 5.0		free
A 5.1		free
A 5.2		free
A 5.3		free
A 5.4		free
A 5.5		free
A 5.6		free
A 5.7		free

0:	KT = 000.0;	busy
1:	KT = 000.0;	Kann nicht verstellt werden
2:	KT = 000.0;	Kann nicht verstellt werden
3:	KT = 000.0;	Kann nicht verstellt werden
4:	KT = ~~180.2;~~ -1200	Timer Separation
5:	KT = 180.1;	busy
6:	KT = 000.0;	busy
7:	KT = 000.0;	Timer Displacement
8:	KT = 000.0;	Timer opening wa. Complet de-slu
9:	KT = 000.0;	Timer waiting
10:	KT = 000.0;	busy
11:	KT = 000.0;	busy
12:	KT = 000.0;	busy
13:	KT = 000.0;	Timer Flush program
14:	KT = 180.2;	Timer Separation Flush program
15:	KT = 005.2;	Timer opening water Flush progra
16:	KT = 250.1;	Timer waiting Flush program
17:	KT = 000.0;	busy
18:	KT = ~~002.2;~~ 1.0	Timer opening water Partial de-s
19:	KT = 005.2;	Timer closing water
20:	KT = 000.0;	busy
21:	KT = 000.0;	busy
22:	KT = 000.0;	busy
23:	KT = 000.0;	busy
24:	KT = 300.1;	Impuls water
25:	KT = 100.0;	Time Impuls water
26:	KT = 010.2;	Timer closing water Flush progra
27:	KT = 000.0;	free
28:	KT = 100.1;	Timer Emergency-stop
29:	KT = 000.2;	busy
30:	KT = 600.2;	Timer braking
31:	KT = 100.1;	busy
32:		



				Datum	24.09.97	MSB60-01-076	Winkelhorst Trenntechnik GmbH	Firm: Waith	Motor circuit 2
				Bearb.	Schneider				
				Gepr.					WI-9709-N-MSB60-120	Blatt 2
Zustand	Änderung	Datum	Name	Norm		Urspr.	Ers. f.	Ers. d.		von 13 Bl.

INSTRUCTION MANUAL

FOR CHANGING TIMERS AND COUNTERS AT THE VALVE CONTROL UNIT WITH OP 393-IIC

The following steps should be done one after the other:

1. Connect the unit OP 393 with the automation unit Simatic S5. (the connection cable is wired to the OP 393 and can be connected with the automation unit.) This is inapplicable for inbuilt automation units.

2. After approx. 5 sec. different preselection possibilities will appear in the OP 393, as well as the indication "?*89"

- Actuate the FTK.button (TMR) and put in the timer number with the FKT.buttons (0...9). (See documentation).

- In the event of an incorrect input of the timer number press FKT-button (CE) and repeat the input.

- Afterwards press the FKT.button (ENT)

  Now the display indicates "DB 11"

- Press the FKT.button (ENT) again.

  It is now possible to change the time as desired. (Optical check in the second row of the display)

- Press FKT.button (ENT) to store the input.

3. For additional changing of times press FKT.button (TMR), put in the timer number to be changed, press FKT.button (ENT)and put in the time. Press ENT to store.

Important:
Should there be programming errors, unplug and start again with step 1.

For adjusting the Counter:

- Press the FKT.button (CTR)

  The display indicates "DB 12"
  For changing proceed like for timer adjusting.

All timer facts will be stored in data logger 11. (DB 11)
All counter facts will be stored in data logger 12. (DB12)

VALVE CONTROL ON/OFF?)

FLUSH

START WILL K PUMP — Air op valve.

~~WATER~~?

VLASON

PLC.

Valve Shut off Flow

WESTFALIA SEPARATOR

Project Data Sheets
for
self-cleaning
Milk-skimming Separators
type MSA / MSB

<u>Enclosure</u>

I Instruction Manual and Parts List for the machine type ordered

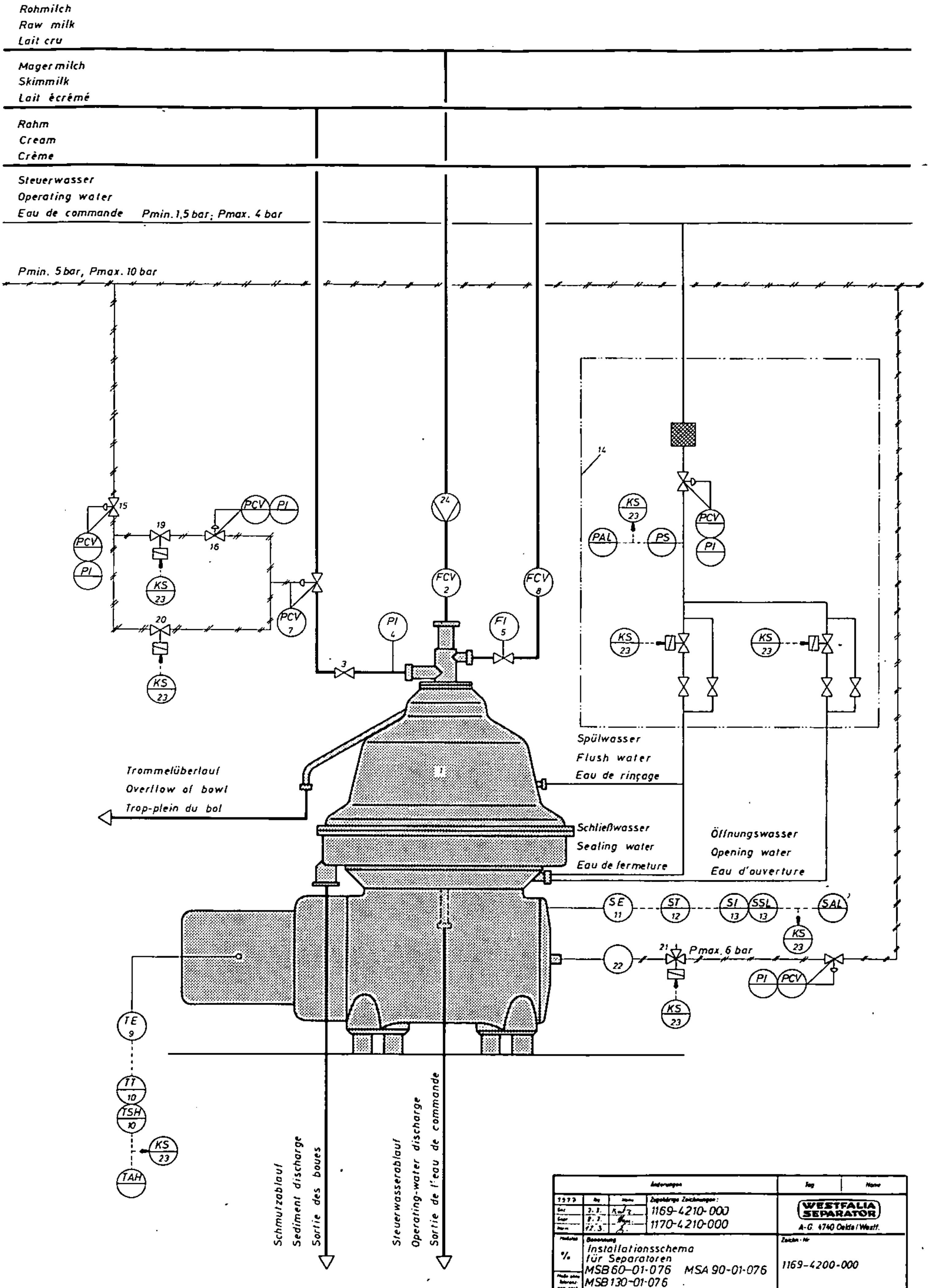
(for MSB 60 1176-9000-)
(" MSA 90 1171-9000-)
(" MSB 130 1227-9000-)
(" MSB 170 1228-9000-)
(" MSB 200 1229-9000-)

WESTFALIA SEPARATOR AG. / 4740 OELDE 1 (W.-GERMANY)
CABLES: WESTFALIA OELDE · PHONE: (02522) 771 · TELEX: 89474

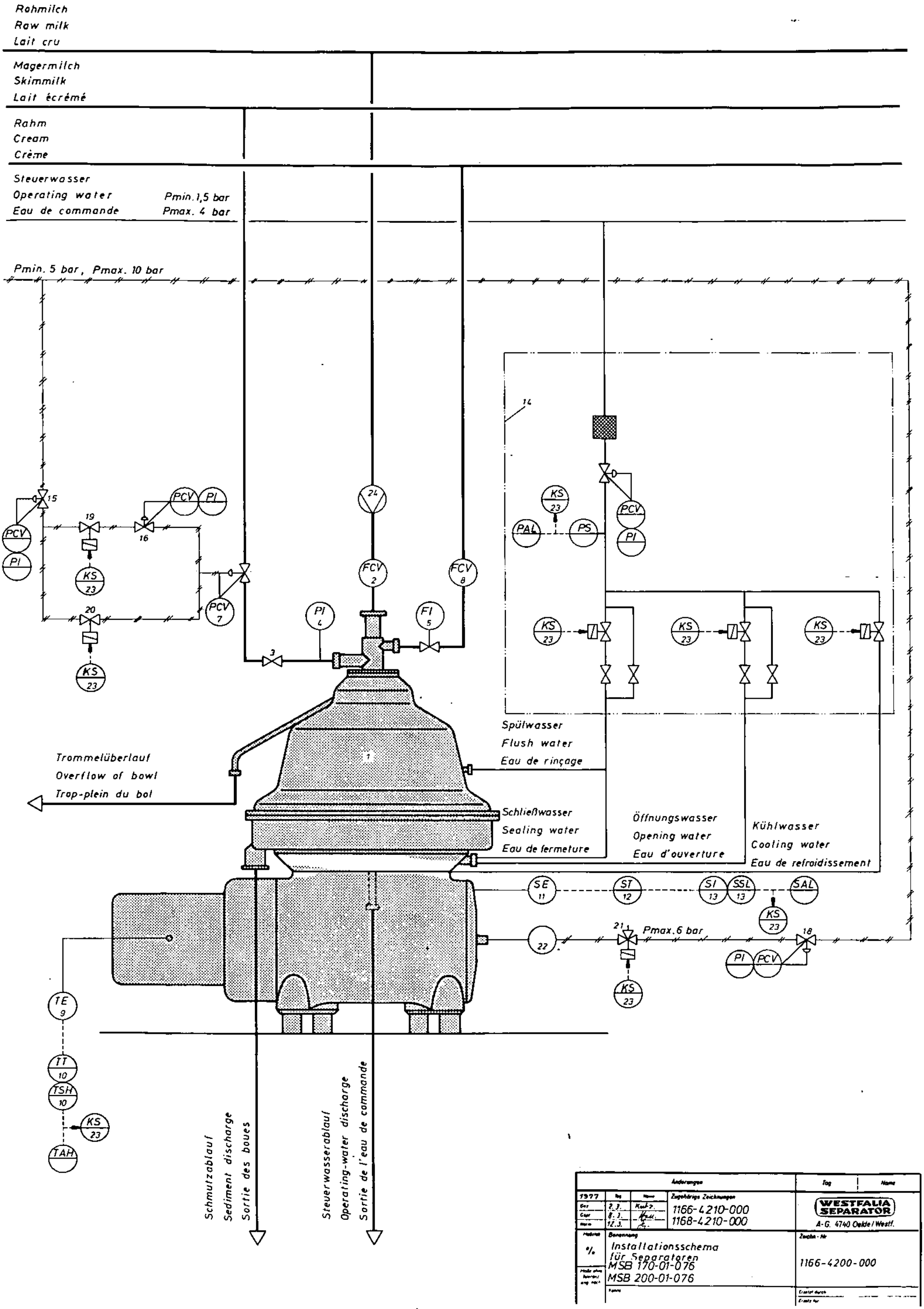
No. 6419/581 engl.

Printed in Germany

C O N T E N T S

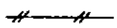


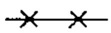
Änderungen				Tag	Name
1977	Tag	Name	Zugehörige Zeichnungen: 1169-4210-000, 1170-4210-000	WESTFALIA SEPARATOR A-G. 4740 Oelde/Westf.	
Gez.	2. 3.				
Gepr.	8. 3.				
Norm	12. 3.				
Maßstab: %	Benennung: Installationsschema für Separatoren MSB 60-01-076 MSA 90-01-076 MSB 130-01-076			Zeichn.-Nr: 1169-4200-000	
	Kunde			Ersetzt durch / Ersatz für	


Rohmilch
Raw milk
Lait cru
Magermilch
Skimmilk
Lait écrémé
Rahm
Cream
Crème
Steuerwasser
Operating water
Eau de commande
Pmin. 1,5 bar
Pmax. 4 bar
Pmin. 5 bar, Pmax. 10 bar
14
15
19
16
20
3
PCV
PI
KS 23
PCV 7
24
FCV 2
FCV 8
PI 4
FI 5
PAL
PS
1
Spülwasser
Flush water
Eau de rinçage
Trommelüberlauf
Overflow of bowl
Trop-plein du bol
Schließwasser
Sealing water
Eau de fermeture
Öffnungswasser
Opening water
Eau d'ouverture
Kühlwasser
Cooling water
Eau de refroidissement
SE 11
ST 12
SI 13
SSL 13
SAL
22
21
Pmax. 6 bar
18
TE 9
TT 10
TSH 10
TAH
Schmutzablauf
Sediment discharge
Sortie des boues
Steuerwasserablauf
Operating-water discharge
Sortie de l'eau de commande
Änderungen
Tag
Name
1977
Zugehörige Zeichnungen
1166-4210-000
1168-4210-000
WESTFALIA SEPARATOR
A-G. 4740 Oelde / Westf.
Benennung
Installationsschema
für Separatoren
MSB 170-01-076
MSB 200-01-076
Zeichn.-Nr
1166-4200-000

Produktleitung
Product line
Conduite du produit

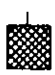

bewegliche Leitung
Hosepipes
Tuyaux flexibles

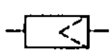

Druckluftleitung
Compressed-air line
Conduite d'air comprimé


Kapillarrohr
Capillary tubing
Tube capillaire

Elektroleitung
Electric line
Conducteur


Schauglas
Sight glass
Verre indicateur


Filter
Strainer
Filtre

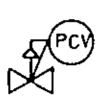

Sieb
Strainer
Filtre


Handbetätigtes Ventil
Hand operated valve
Vanne č commande manuelle


Rückschlagventil (-klappe)
Non-return valve (flap type)
Vanne (Clapet) de non-retour


Überdruckventil
Relief valve
Soupape de sécurité


Magnetbetätigtes Ventil
Solenoid valve
Electrovanne



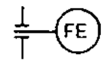
Konstantdruckventil
Pressure control valve
Vanne à pression constante


Kolbenbetätigtes Ventil
Picton actuated valve
Vanne à piston

Motorbetätigtes Ventil
Motor control valve
Vanne motorisée


Membranbetätigtes Ventil
Diaphragm operated valve
Vanne à membrane

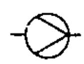

Schwimmerbetätigtes Ventil
Float operated valve
Vanne à flotteur



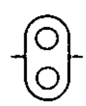
Blende
Flow restrictor
Diaphragme

Motor
Motor
Moteur


Wärmeaustauscher
Heat exchanger
Echangeur de chaleur

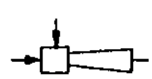

Pumpe (allgemein)
Pump (general)
Pompe (général)

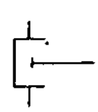

Kreiselpumpe
Centrifugal pump
Pompe centrifuge

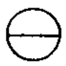

Zahnradpumpe
Gear pump
Pompe à engrenage


Kreiselkolbenpumpe
Rotary piston pump
Pompe à piston rotatif

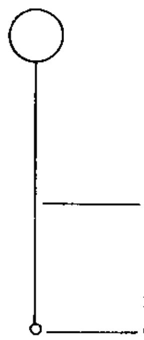

Exzenterschneckenpumpe
Eccentric screw pump
Pompe à vis excentrique


Strahlpumpe
Injector
Injecteur


Kolbenpumpe
Piston pump
Pompe à piston



MSR-Stelle (im Steuerschrank)
Process Measuring and Control Equipment
(in control cabinet)
Elément de mesuve et de commande
(sur armoire de commande)



MSR-Stelle (an Meß- od. Stellort)
Process Measuring and Control Equipment
(at measuring point or point of control)
Elément de mesure et de commande
(sur endroit de mesure ou de réglage)

Bezugslinie
Reference line
Ligne de référence

Meßort
Measuring point
Endroit de mesure

AE	Analysenregler Analysis element Elément d'analyse
AS	Preßluftanschluß Air supply Raccord air comprimé
CAH	Alarm für Max.-Leitwert Conductivity alarm high Alarme pour conductance maxi.
CAL	Alarm für Min.-Leitwert Conductivity alarm low Alarme pour conductance mini.
CIC	Leitwertregelung m. Anzeige Conductivity indicating control Régulation conductance avec indicateur
CS	Kontakt für Leitwert Conductivity switch Contact pour conductance
CSH	Kontakt f. Max.-Leitwert Conductivity switch high Contact pour conductance maxi.
CSL	Kontakt f. Min.-Leitwert Conductivity switch low Contact pour conductance mini.
CT	Leitwertumformer Conductivity transmitter Transmetteur conductance
DAH	Alarm f. Max.-Dichte Density alarm high Alarme pour densité maxi.
DAL	Alarm f. Min.-Dichte Density alarm low Alarme pour densité mini.
DSH	Kontakt für Max.-Dichte Density switch high Contact pour densité maxi.
DSL	Kontakt f. Min.-Dichte Density switch low Contact pour densité mini.
DT	Dichtemeßumformer Density transmitter Transmetteur mesure densité
FAH	Alarm f. Max.-Durchfluß Flow alarm high Alarme pour débit maxi.
FAL	Alarm für Min.-Durchfluß Flow alarm low Alarme pour débit mini.
FCV	Durchflußregelventil Flow control valve Vanne régulation débit
FE	Blende Flow restrictor Diaphragme
FG	Schauglas Sight glass Verre indicateur
FI	Durchflußmesser Flow indicator Débitmètre
FIC	Durchflußmengenregler m. Anzeige Flow indicating control Régulateur de débit avec indicateur
FSH	Kontakt f. Max.-Durchfluß Flow switch high Contact débit maxi.
FSL	Kontakt für Min.-Durchfluß Flow switch low Contact débit mini.
FT	Durchflußmeßumformer Flow transmitter Transmetteur mesure débit
HCV	Handregelventil Hand control valve Vanne à contrôle manuel
HS	Handschalter Hand switch Commutateur manuel
IAH	Alarm für Überstrom Current alarm high Alarme de surintensité
ISH	Überstromauslöser Overload release Relais de surintensité

KS	Steuerung Control system Système de contrôle	OE	Fotozelle Photocell Cellule photo
LAH	Alarm f. Max. Niveau Level alarm high Alarme niveau maxi.	OSH	Max.-Kontakt für Fotozelle Photocell switch high Contact maxi. cellule photo
LAL	Alarm für Min.-Niveau Level alarm low Alarme niveau mini.	OSL	Min.-Kontakt für Fotozelle Photocell switch low Contact mini. cellule photo
LIC	Niveau-Regelung mit Anzeige Level indicating control Régulation niveau avec indicateur	OT	Fotozelle-Meßumformer Photocell transmitter Transmetteur cellule photo
LS	Kontakt für Niveau Level switch Contact pour niveau	PAH	Alarm für Max.-Druck Pressure alarm high Alarme pression maxi.
LSH	Kontakt für Max.-Niveau Level switch high Contact niveau haut	PAL	Alarm für Min.-Druck Pressure alarm low Alarme pression mini.
LSL	Kontakt für Min.-Niveau Level switch low Contact niveau mini.	PCV	Konstantdruckventil Pressure control valve Vanne à pression constante
LT	Niveaumeßumformer Level transmitter Transmetteur pour niveau	PI	Manometer Pressure indicator Manomètre
NAH	Alarm f. Max.-Schwingung Vibration alarm high Alarme vibration maxi.	PS	Kontakt für Druck Pressure switch Contact pression
NC	Normal geschlossen (Ventil) Normally closed (valve) Normalement formée (vanne)	PSH	Kontakt f. Max.-Druck Pressure switch high Contact pour pression maxi.
NE	Schwingungsaufnehmer Vibration element Enregistreur des vibrations	PSL	Kontakt f. Min.-Druck Pressure switch low Contact pour pression mini.
NO	Normal offen (Ventil) Normally open (valve) Normalement ouverte (vanne)	SAH	Alarm für Max.-Drehzahl Speed alarm high Alarme pour vitesse maxi.
NSH	Kontakt f. Max.-Schwingung Vibration switch high Contact vibration maxi.	SAL	Alarm für Min.-Drehzahl Speed alarm low Alarme pour vitesse mini.
NT	Schwingungsmeßumformer Vibration transmitter Transmetteur vibrations	SE	Drehzahlinitiator Speed element Emetteur signal vitesse

SI Drehzahlanzeigegerät
Speed indicator
Indicateur de vitesse

SS Drehzahlkontakt
Speed switch
Contact vitesse

SSH Kontakt Max.-Drehzahl
Speed switch high
Contact pour vitesse maxi.

SSL Kontakt Min.-Drehzahl
Speed switch low
Contact pour vitesse mini.

ST Drehzahlmeßumformer
Speed transmitter
Transmetteur de vitesse

TAH Alarm Übertemperatur
Temperature alarm high
Alarme température trop élevée

TAL Alarm Min.-Temperatur
Temperature alarm low
Alarme température trop basse

TC Regler für Temperatur
Temperature control
Régulateur Température

TE Temperaturfühler
Temperature element
Sonde de température

TI Temperaturmeßgerät
Temperature indicator
Indicateur de température

TSH Kontakt für Max.-Temp[illegible]r
Temperature switch high
Contact température maxi.

TSL Kontakt für Min.-Temperatur
Temperature switch low
Contact température mini.

TT Temperaturmeßumformer
Temperature transmitter
Transmetteur température

ZA Alarm für best. Stellung
Position alarm
Alarme pour une certaine position

ZS Endschalter
Limit switch
Contact fin de course

O P E R A T I O N   D I A G R A M S

Pages 10 - 31
(on special order only)

Print No. 7168/480

Item	Qty	Designation	Price Sheet	I)	2)	3)
I	I	Separator, complete with motor	26/8	x		
2	I	Flow constrictor	see item I	x		
3	I	Skim milk valve	see item I		x	
4	I	Pressure gauge	see item I	x		
5	I	Cream valve	see item I	x		
7	I	Constant-pressure valve	see item I	x		
		(air-controlled, on skim milk side)				
8	I	Constant-pressure valve	26/IO		x	
		(air-controlled, on cream side)				
9	I	PTC temperature feeler	see item I	x		
IO	I	Motor protection tripping unit	26/IO		x	
		see technical data				
II	I	Speed element	see item I	x		
		see technical data				
I2	I	RPM meter	26/IO		x	
		see technical data				
I3	I	Speed indicator	26/IO		x	
		see technical data				
I4	I	Operating-water connection, complete	see item I	x		
		see description and technical data				
I5	I	Pr. reducer with pr. gauge for control air			x	
I6	I	" " " " " " " "			x	
I8	I	" " " " " " " "			x	
I9	I	Solenoid valve (normally closed)			x	
20	I	" " " "			x	
2I	I	Solenoid valve (three-way valve)			x	
22	2	Pneumatic brake	26/IO		x	
23	I	Control: plans		x		
24	I	Pump				x

	List of equipment Machine type MSB 60-0I-076 MSA 90-01-076	Drawing No. II76-42IO-000 1171-4210-000
	Associated drawings II69-4200-000	I) Must be obtained from WSO 2) Can be obtained from WSO 3) To be provided bycustomer

item	Qty	Designation	Price Sheet	I)	2)	3)
I	I	Separator, complete with motor	26/8	x		
2	I	Flow constrictor	see item I	x		
3	I	Skim milk valve	see item I		x	
4	I	Pressure gauge	see item I	x		
5	I	Cream valve	see item I	x		
7	I	Constant-pressure valve	see item I	x		
		(air-controlled, on skim milk side)				
8	I	Constant-pressure valve	26/IO		x	
		(air-controlled, on cream side)				
9	I	PTC temperature feeler	see item I	x		
IO	I	Motor protection tripping unit	26/IO		x	
		see technical data				
II	I	Speed element	see item I	x		
		see technical data				
I2	I	RPM meter	26/IO		x	
		see technical data				
I3	I	Speed indicator	26/IO		x	
		see technical data				
I4	I	Operating-water connection, complete	see item I	x		
		see description and technical data				
I5	I	Pr. reducer with pr. gauge for control air			x	
I6	I	" " " " " " " "			x	
I8	I	" " " " " " " "			x	
I9	I	Solenoid valve (normally closed)			x	
20	I	" " " "			x	
2I	I	Solenoid valve (three-way valve)			x	
22	2	Pneumatic brake	26/IO		x	
23	I	Control: plans		x		
24	I	Pump				x

	List of equipment Machine type MSB I30-OI-076	Drawing No. 1227-42IO-000
	Associated drawings II69-4200-000	I) Must be obtained from WSO 2) Can be obtained from WSO 3) To be provided by customer

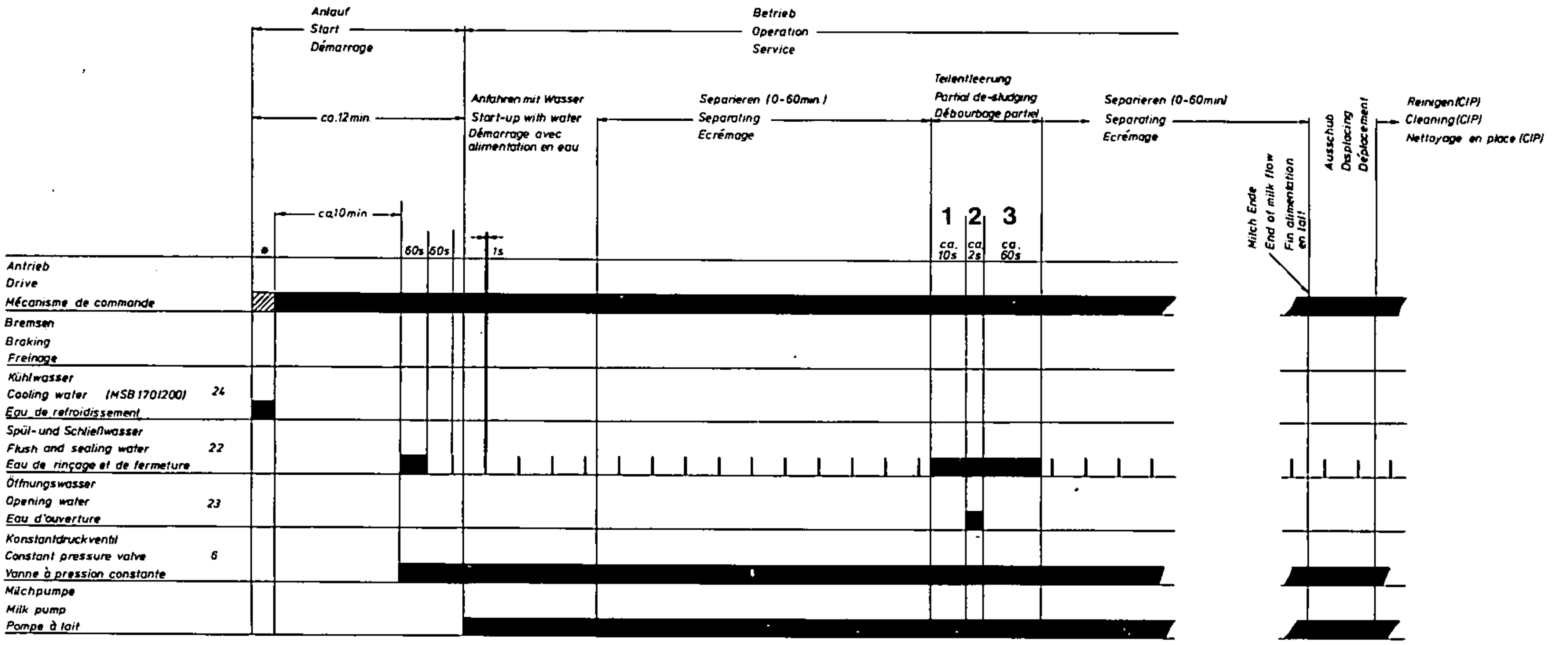
Item	Qty	Designation	Price Sheet	I)	2)	3)
I	I	Separator , complete with motor	26/8	x		
2	I	Flow constrictor	see item I	x		
3	I	Skim milk valve	see item I		x	
4	I	Pressure gauge	see item I	x		
5	I	Cream valve	see item I	x		
7	I	Constant-pressure valve	see item I	x		
		(air-controlled, on skim milk side)				
8	I	Constant-pressure valve	26/IO		x	
		(air-controlled, on cream side)				
9	I	PTC temperature feeler	see item I	x		
IO	I	Motor protection tripping unit	26/IO		x	
		see technical data				
II	I	Speed element	see item I	x		
		see technical data				
I2	I	RPM meter	26/IO		x	
		see technical data				
I3	I	Speed indicator	26/IO		x	
		see technical data				
I4	I	Operating-water connection, complete	see item I	x		
		see description and technical data				
I5	I	Pr. reducer with pr. gauge for control air			x	
I6	I	" " " " " " " "			x	
I8	I	" " " " " " " "			x	
I9	I	Solenoid valve (normally closed)			x	
20	I	" " " "			x	
2I	I	Solenoid valve (three-way valve)			x	
22	2	Pneumatic brake	26/IO		x	
23	I	Control: plans		x		
24	I	Pump				x

	List of equipment Machine type MSB I70-OI-076	Drawing No. 1228-42IO-OOO
	Associated drawings II66-4200-OOO	I) Must be obtained from WSO 2) Can be obtained from WSO 3) To be provided by customer

Item	Qty	Designation	Price Sheet	I)	2)	3)
I	I	Separator, complete with motor	26/8	x		
2	I	Flow constrictor	see item I	x		
3	I	Skim milk valve	see item I		x	
4	I	Pressure gauge	see item I	x		
5	I	Cream valve	see item I	x		
7	I	Constant-pressure valve	see item I	x		
		(air-controlled, on skim milk side)				
8	I	Constant-pressure valve	26/IO		x	
		(air-controlled, on cream side)				
9	I	PTC temperature feeler	see item I	x		
IO	I	Motor protection tripping unit	26/IO		x	
		see technical data				
II	I	Speed element	see item I	x		
		see technical data				
I2	I	RPM meter	26/IO		x	
		see technical data				
I3	I	Speed indicator	26/IO		x	
		see technical data				
I4	I	Operating-water connection, complete	see item I	x		
		see description and technical data				
I5	I	Pr. reducer with pr. gauge for control air			x	
I7	I	" " " " " " " "			x	
I8	I	" " " " " " " "			x	
I9	I	Solenoid valve (normally closed)			x	
20	I	" " " "			x	
2I	I	Solenoid valve (three-way valve)			x	
22	2	Pneumatic brake	26/IO		x	
23	I	Control: plans		x		
24	I	Pump				x

	List of equipment Machine type MSB 200-0I-076	Drawing No. 1229-42I0-000
	Associated drawings II66-4200-000	I) Must be obtained from WSO 2) Can be obtained from WSO 3) To be provided by customer

Schaltfolge-Diagramm
Switching sequence diagram
Diagramme de séquence des manoeuvres



1 Vorspülen
Pre-flushing
Pré-rinçage

2 Teilentleeren
Partial de-sludging
Débourbage partiel

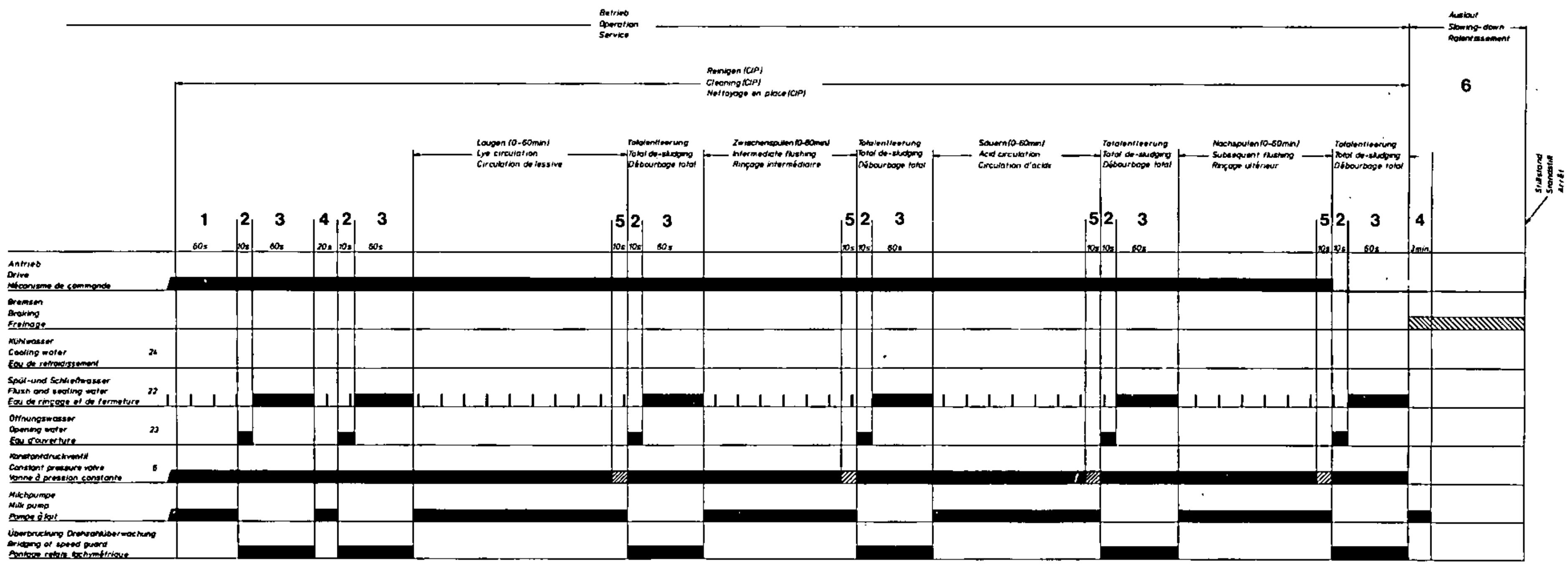
3 Nachspülen
Subsequent flushing
Rinçage ultérieur

■ In Tätigkeit
In action
En action

Zeitwerte mit "ca" sind einstellbar
Times preceded by "ca" are adjustable
Les valeurs de temps précédées par "ca" sont réglables

*5s bei MSB 60, MSA 90 und MSB130, 20s bei MSB 170 und MSB 200 (Motor in Sternschaltung)
5sec for MSB 60, MSA 90 and MSB130, 20sec. for MSB 170 and MSB 200 (Motor in star connection)
5sec. pour les types MSB 60, MSA 90 et MSB130, 20sec. pour les types MSB170 et MSB 200 (Moteur branché en étoile)

Schaltfolge-Diagramm
Switching sequence diagram
Diagramme de séquence des manoeuvres



1. System füllen
Filling of system
Remplissage du systeme

2 Totalentleerung
Total de-sludging
Débourbage total

3 Warten
Waiting
Attente

4 Trommel füllen
Filling of bowl
Remplissage du bol

5 Überlauf
Overflow
Débordement

6 Einschaltung der pneumatischen Bremse bei Betätigung von „Not Aus"
Switching-on of the pneumatic brake when „emergency stop" button is being pushed
Enclenchement du frein pneumatique lorsque le bouton „arrêt d'urgence" est actionné


In Tätigkeit
In action
En action

Der Ablauf der chemischen Reinigung (Lauge, Säure bzw. Säure, Lauge, Säure) ist vom Milchverarbeitungsbetrieb festzulegen
The CIP-programme (lye, acid or acid, lye, acid) has to be determined by the customer.
Le programme du nettoyage en CIP (lessive, acide, ou bien acide, lessive, acide) doit être déterminé par l'utilisateur.

Power data for MSB/MSA type separators

Separator type	Motor power kW	Motor speed RPM	Frequency Hz	Rated current at 380 V Amp.	Bowl speed approx. RPM	Start-up time approx. min
MSB 60	15	1500	50	30	6500	10
	15	1800	60	30		
MSA 90	18.5	1500	50	38	5920	10
	26	1800	60	50		
MSB 130	22	1500	50	42.5	4500	10
	26	1800	60	50		
MSB 170	30	1500	50	59	4500	10
	37	1800	60	72		
MSB 200	30	1500	50	59	4500	10
	37	1800	60	72		

6.1 Drive motor

The separator is driven by a three-phase AC motor via a fluid clutch. The motor is started by means of a star-delta switch. The starting current is approx. 1.8 times the value of the rated current. The switch-over times from star to delta, depending on separator type, are given in the circuit diagram 8134-0404-0301, page 4. Motor power, motor speed, bowl speed and starting time are given under 6.0 of power data for separators. The choice of switches, leads, and fuses should be based on the starting current.

6.2 Motor protection

Resistance type PTC temperature feelers incorporated in the motor winding protect the motor, via a tripping unit, against overloading. A phase failure relay is provided for protection of the motor in the event of a failure in an external power line (e.g. defective fuse, cable break). It also prevents the starting of the motor in the event of a phase failure and the associated overheating of the winding when the rotor is stationary.

6.3 RPM meter

The RPM meter monitors the separator against a decrease in speed in the event of a defective clutch and unintentional opening of the bowl. It also permits the operating speed to be monitored constantly. It consists of a proximity switch, a measuring instrument and indicating instrument with a limit value relay. If bowl revolutions fall below the control value, an acoustic malfunction signal must be triggered. Corrective measures must immediately be initiated by the operator, i.e. the separation process must be interrupted and the separator stopped. If the machine exceeds the specified starting time, a malfunction signal is also triggered and the milk pump is prevented from starting. If the selector switch is in the "Automatic" position, the milk pump is prevented from starting before the RPM control value is attained. The equipment for the RPM meter will be supplied with the separator.

The FSU2 measuring instrument is to be built into the motor control of the separator. The customer must house the digital indicating instrument in a special cabinet together with the switches and pilot lamps for the separator motor control, or in a central control panel if this is available.

If the timing unit type TVA2-M-S (see Technical Data 6874) is supplied, then the RPM meter is contained in the control cabinet.

6.4 Pressure switch

The pressure switch monitors the operating water. If the pressure falls below 0.6 bar a signal is triggered. Corrective measures are not initiated by it. However, it is not possible to switch on the separator if the pressure is too low or if there is no water present.

6.5 Pneumatic brake

A pneumatic brake is included in the special equipment for the separator. It consists of two brake cylinders in the separator frame and a solenoid valve in the control cabinet. It is switched on by operating the "EMERGENCY STOP" button. If the button "SEPARATOR OFF" is pressed, then the brake is not applied automatically. When the bowl has stopped, the pneumatic brake is to be vented by pressing the push button "Reset".

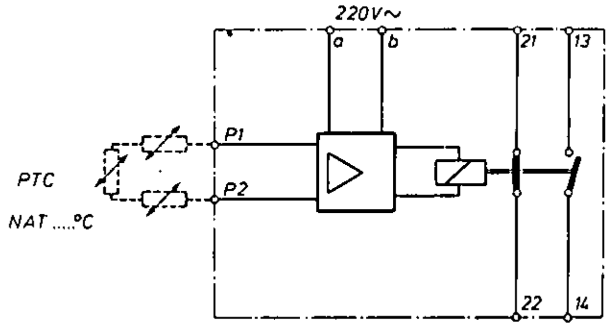
Application:

The motor protection tripping unit is used for thermal protection of AC motors. The motor is monitored against excessive heating of the windings by means of PTC temperature feelers which are incorporated in the winding ends.

Connection drawing:

PTC

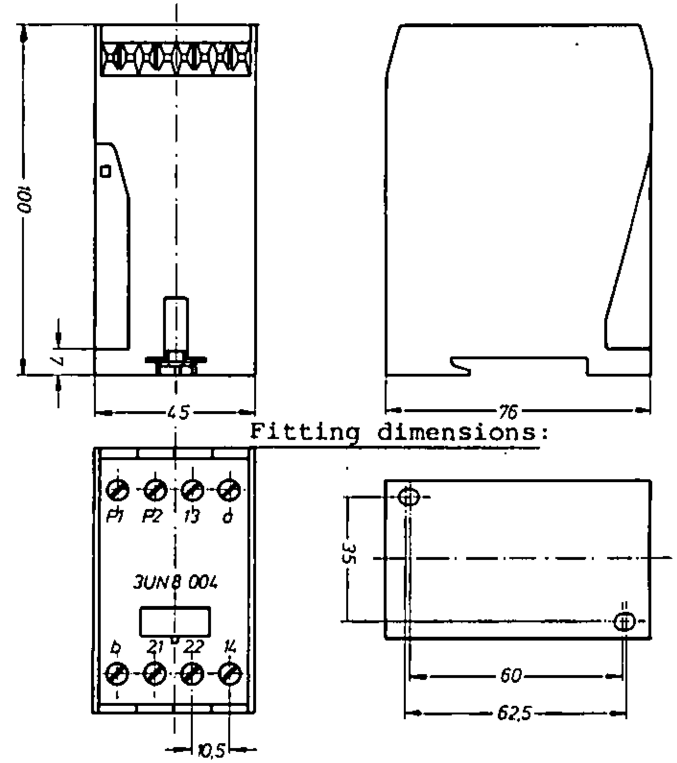
NAT ...°C



Method of operation:

The resistance of the feeler loop is electronically monitored. Under normal operation the output relay is energized. If a feeler reaches the rated response temperature (NAT) its resistance increases sharply de-energizing the output relay. This automatically resets when the feeler cools down.
The protection device works on the quiescent current principle and is consequently self-monitoring against breaks in the feeler loop itself.

Dimensioned drawing:



Fitting dimensions:

Technical data:

Voltage	220 V AC -20/+10 %
Frequency	40 - 60 Hz
Power consumption	3.5 VA
Reset value	NAT - 5° C
Temperature feeler circuit (open)	approx. 2VDC
Temperature feeler circuit (closed)	approx. 0.5VDC
Resistance of control lead	≦ 50 ohms
Output relay	I NO + I NC
switching capacity: permanent current I_{th2}	4 A
rated operating current I_e AC II	I.5 A / 250 V AC
Type of protection	IP 20
Ambient temperature	up to +55° C
Weight	0.35 kg

Motor protection tripping unit
3UN8 004

WS Part-No.
0005-1100-000

Technical data on the RPM meter

Separator type	Proximity switch type NJ 2-11-SN-G	Speed measuring device type FSU2	Speed indicator type KR-P/D3758
	Impulse/revolution	Input frequency (Hz) at 60 Hz	Indicating range revolution/min
MSB 60	10	300	6,780
MSA 90	10	300	6,230
MSB 130	10	300	4,800
MSB 170	10	300	4,800
MSB 200	10	300	4,800

Technical data on the RPM meter

Separator type	Proximity switch type NJ 2-11-SN-G	Speed measuring device type FSU2	Speed indicator type KR-P/D3758
	Impulse/revolution	Input frequency (Hz) at 50 Hz	Indicating range revolution/min
MSB 60	10	250	6,810
MSA 90	10	250	6,250
MSB 130	10	250	4,750
MSB 170	10	250	4,750
MSB 200	10	250	4,750

Application:

The RPM meter type FSU 2, FSU 2/Ex, FSU 2/Ex-Ex is used for the non-contact measuring of rate of revolutions. The control current circuit is matched to KONTEX switches. The device has a working range of 5 Hz - I kHz (corresponds at one imp./rev. to a speed range of 300 - 60 000 min^{-I})

Frequency $f = \frac{n \cdot imp}{60}$

Example:

$n = 1500\ min^{-I}$

imp. = IO

$f = \frac{1500\ .\ 10}{60} = 250\ Hz$

Method of operation:

The switch is influenced by a rotating segmented disc. The switch impulses are converted into an output current inside the unit which is proportional to the number of revolutions.

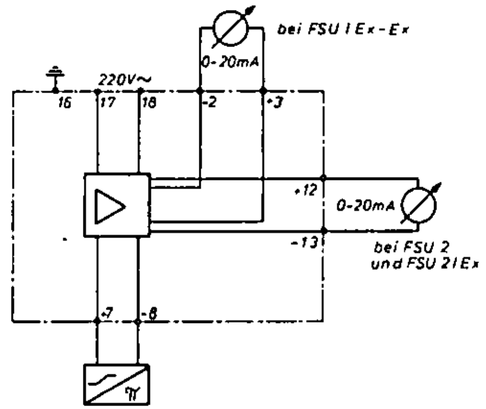
Technical data:

	FSU 2	FSU 2/Ex	FSU 2/Ex-Ex
Input frequency	* Hz	* Hz	* Hz
Voltage	220 VAC ± I5 %	220 VAC ± I5 %	220 VAC ± I5 %
Frequency	45 - 60 Hz	45 - 60 Hz	45 - 60 Hz
Power consumption	approx. I.5 VA	approx. I.5 VA	approx. I.5 VA
Control current circuit	-	(Ex)i G5	(Ex)i G5
Active area covered	≦ImA b.8.9 VDC	≦ImA b.8.9 VDC	≦ImA b.8.9 VDC
Active area free	≧3mA b. 4 VDC	≧3mA b. 4 VDC	≧3mA b. 4 VDC
Resistance of control lead	≦ IOO ohms	≦ IOO ohms	≦ IOO ohms
Permissible ext. inductance	-	I80 mH	270 mH
Permissible ext. capacitance	-	0.7 µF	I.5 µF
Output	-	-	(Ex)i G5
Load-independent DC	0-20 mADC	0-20 mADC	0-20 mADC
Load	0-250 ohm	0-250 ohm	0-II5 ohm
Permissible ext. inductance	-	-	4.5 mH
Permissible ext. capacitance	-	-	I.5 µF
Type of protection	IP 20	IP 20	IP 20
Ambient temperature	up to +60° C	up to +60° C	up to +60° C
Weight	0.3 kg	0.3 kg	0.3 kg

* Depending on separator type and frequency

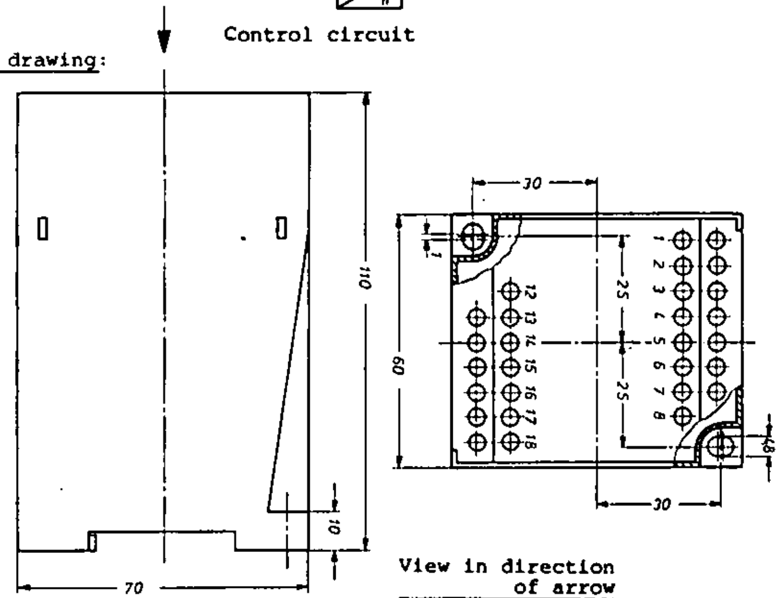
-42-

Connection drawing:



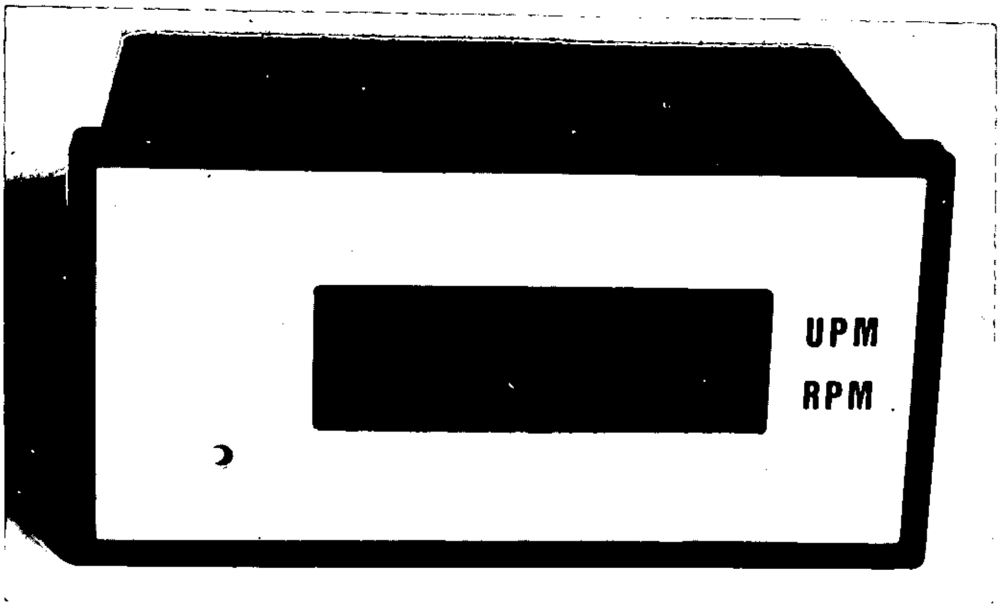
Control circuit

Dimensioned drawing:



View in direction of arrow

RPM meter
FSU 2, FSU 2/Ex, FSU 2/Ex-Ex



1. Application

The digital speed indicator is used for indicating the bowl speed. Its electronic limit value device allows monitoring the machine against drop in speed and excessive starting time.

2. Operation and adjustment

The pre-set limit value is electronically compared to the changing speed. When the actual value exceeds the pre-set limit value (minimum), the output relay pulls up. When the speed drops below the limit value, the output relay drops. A light-emitting diode, installed in the front panel of the unit, signals the limit value; it lights up when the pre-set limit value is exceeded.

The speed limit value is set by turning the limit-value adjuster (display x10) in the rear of the speed indicator to the left or to the right. The digital display in the adjuster serves for fixing the switch point and for indicating the selected limit value.

The speed indicator has been adjusted at the factory to the maximum bowl speed (see label) corresponding to a 20 mA input. Re-adjustment is only possible when the indicator is switched on (connected to auxiliary voltage). To do so, proceed as follows:

Disconnect the measuring line of the speed measuring unit FSU 2 from the measuring input of the speed indicator if it is connected.

Before doing so, cut off the power supply to the speed measuring unit FSU 2.

Install the adjusting bridge (see figure on next page).

Turn the coarse-adjustment trimmer slowly to + or – until the digital display on the front panel approximates to the desired speed value.

Turn the fine-adjustment trimmer slowly to + or – until the desired speed value is displayed. The units digit shows only 0 .

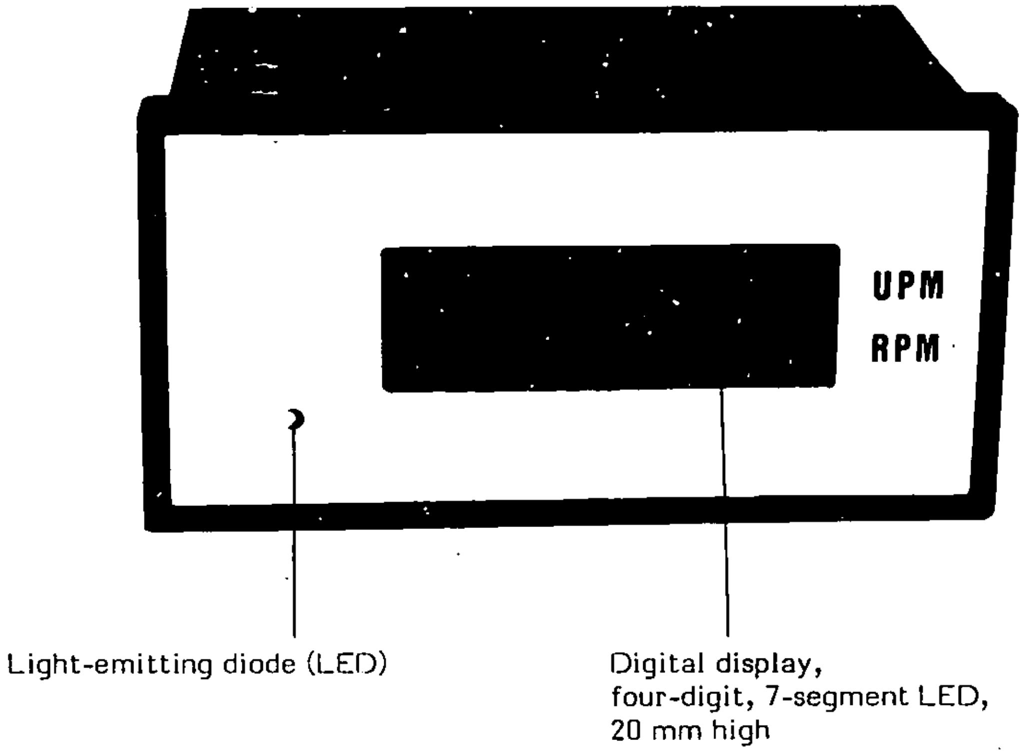
Remove the adjusting bridge and connect the measuring line.

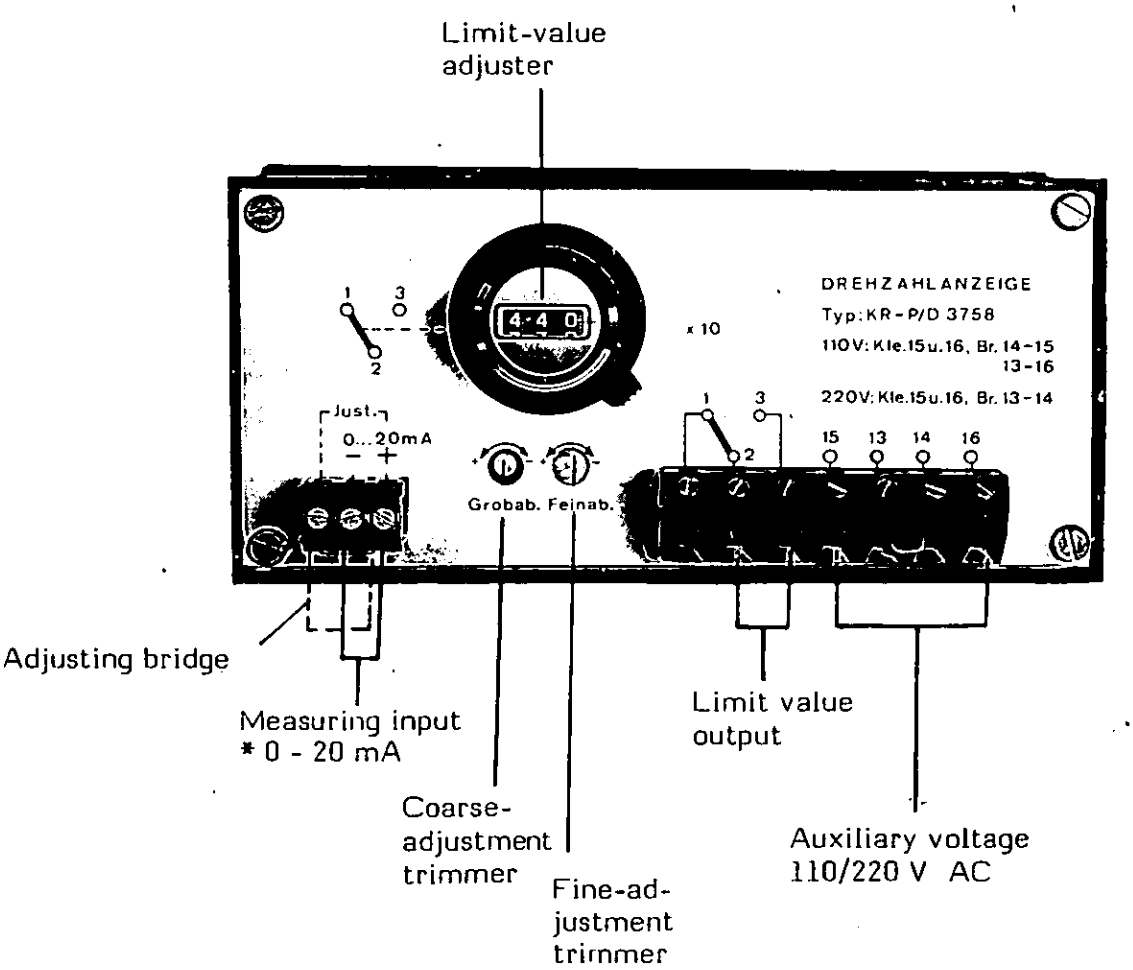
Set the limit-value adjuster to about 50 - 100 rpm below the bowl speed.

The speed indicator is ready for operation.

Deviations of the displayed value from the rated bowl speed stated on the name-plate of the separator can be corrected by re-adjusting the trimmer of the speed measuring unit FSU 2 while both the separator and the measuring unit are operating.

3. Designations





* from the output of the speed measuring unit FSU 2

4. Technical data

Indicating range:	approx. 800 - 9000 rpm *
Measuring range:	0 - 20 mADC
Limit value:	1, adjustable in the whole indicating range
Auxiliary voltage:	110/220 V AC, - 15 / + 10 %
Frequency:	40 - 60 Hz
Limit value output:	1 potential-free change-over minimum contact
Switching capacity:	resistive load: 2 A up to 250 V AC inductive load: 0.5 A up to 250 V AC
Protection:	front panel: IP 54 terminals: IP 00
Ambient temperature:	- 20° C to + 70° C

Deviation from the limit value and final display value:

a) < 1 % over the whole temperature range
< 0.5 % at ambient temperatures between + 15° C and + 30° C

b) < 0.5 % over the whole voltage range

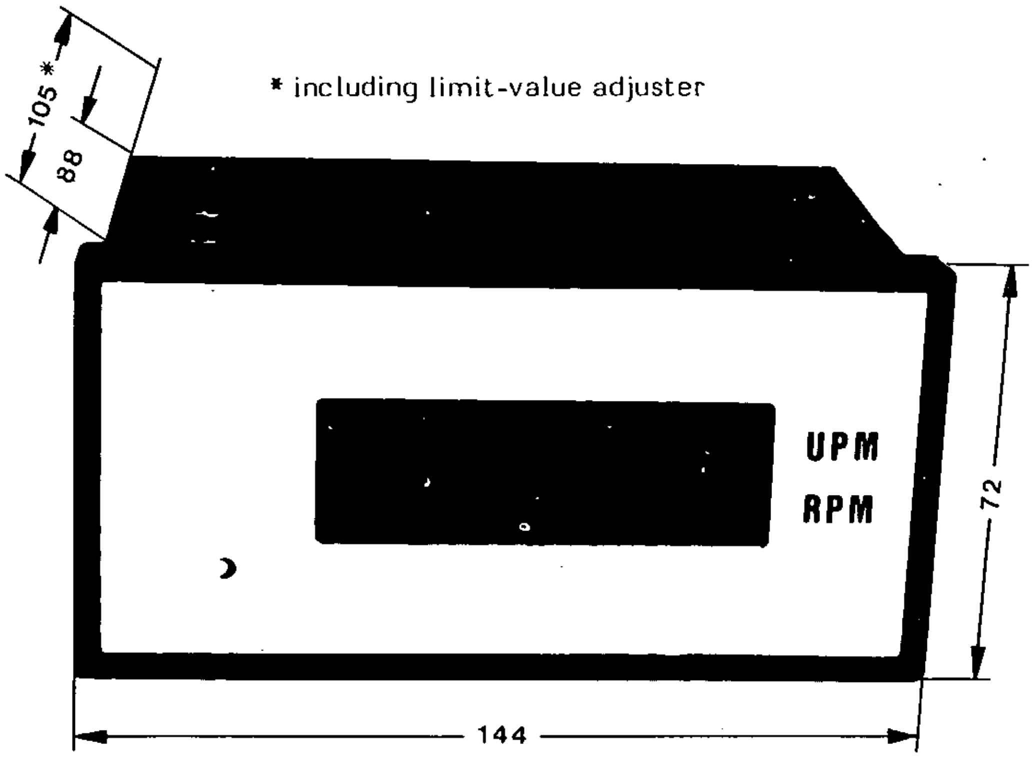
c) linearity tolerance < 0.5 % over the whole measuring range

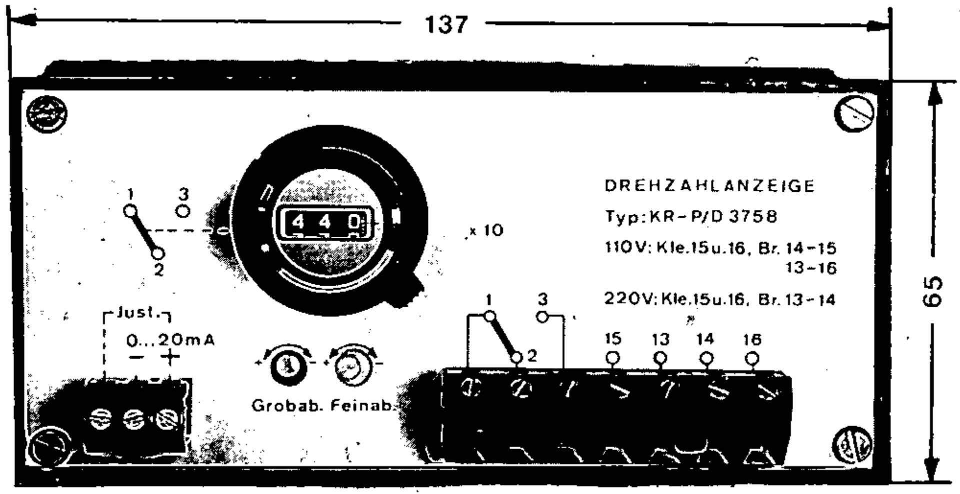
Weight:	0.6 kg
Housing:	black plastic housing, aluminium front panel, anodized
Connections:	see figures

* The final display value is adjustable between 800 and 9,000 rpm, corresponding to 20 mA.

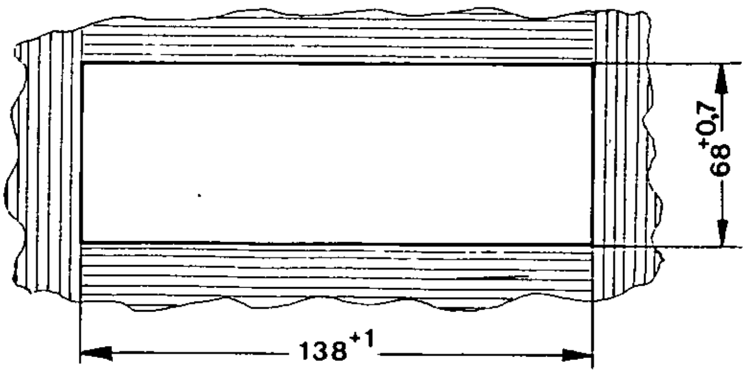
The measuring line between speed measuring unit FSU 2 and speed indicator has to be laid separate from other lines.

5. Dimensions and installation





Cut-out in switchboard

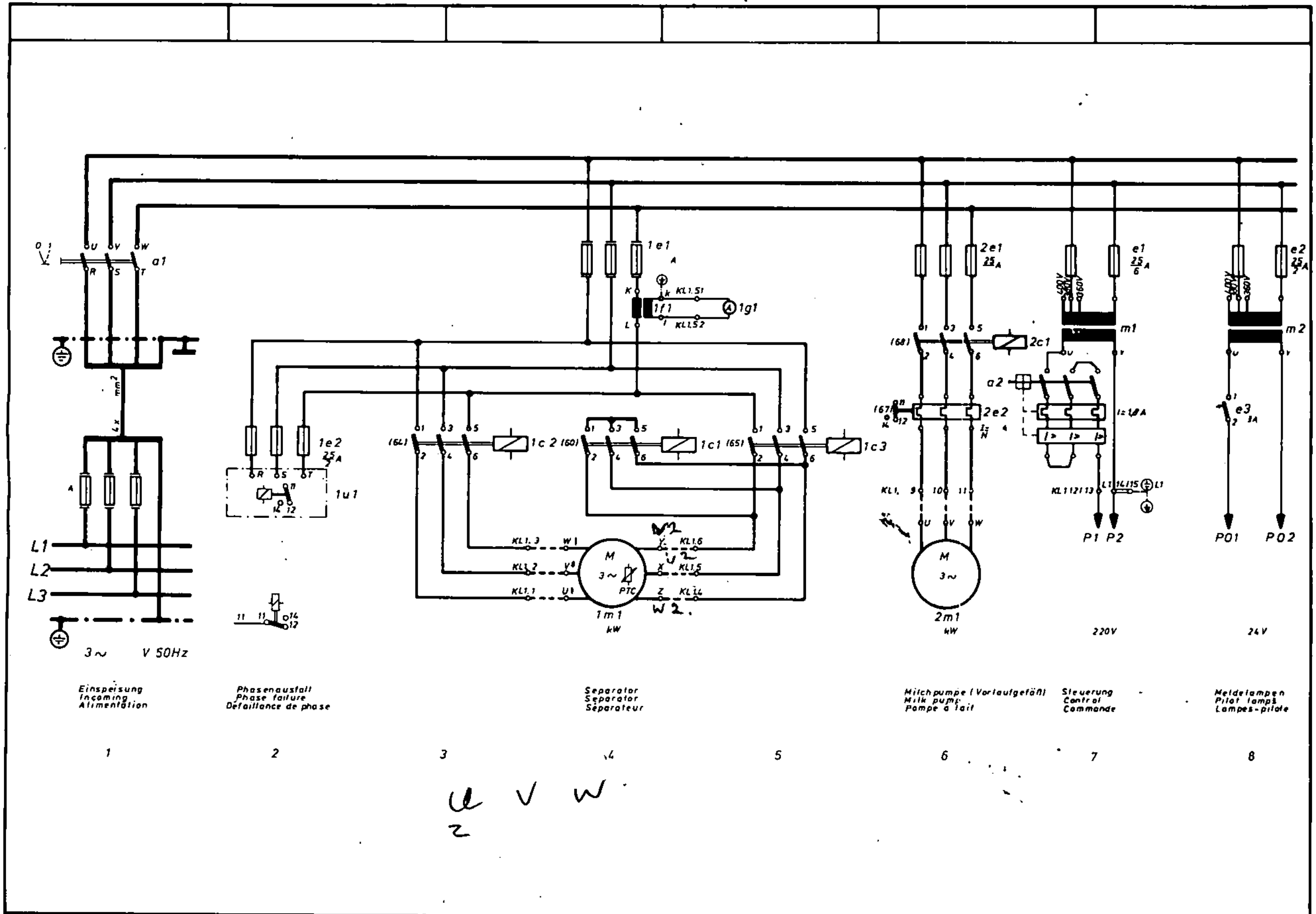


Dimensions in mm

Subject to modifications

6.6.4 Technical data

Proximity switch	Type	NJ2-II-SN-G
Supply voltage	V	8-
Active area covered	mA	≦ I
Active area free	mA	≧ 3
Resistance of control lead	Ohm	≦ IOO
Switching frequency, max.	kHz	3
Switch contact gap	mm	2
Type of protection	IP	67
Ambient temperature	ºC	up to +IOO
Cable lead-in (terminal box)	Pg	II



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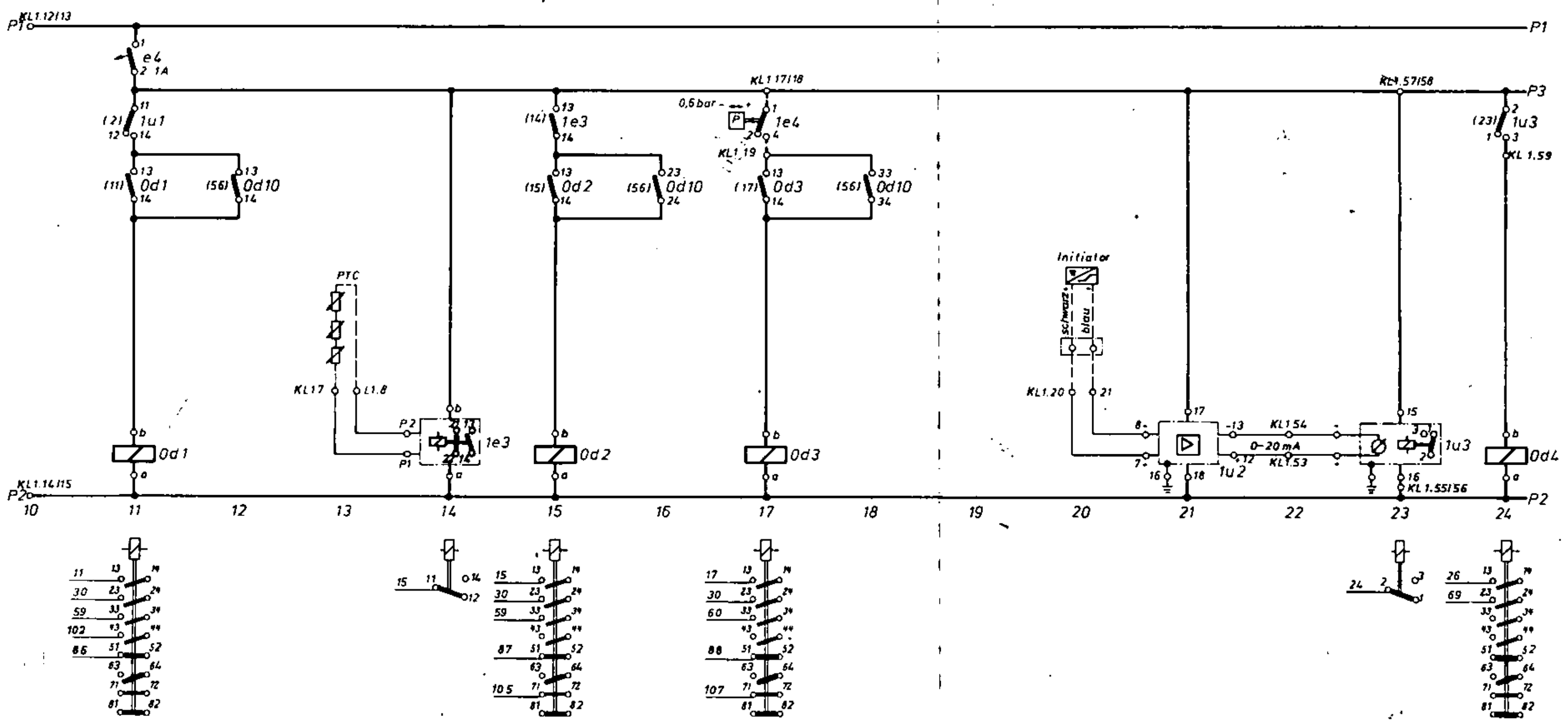


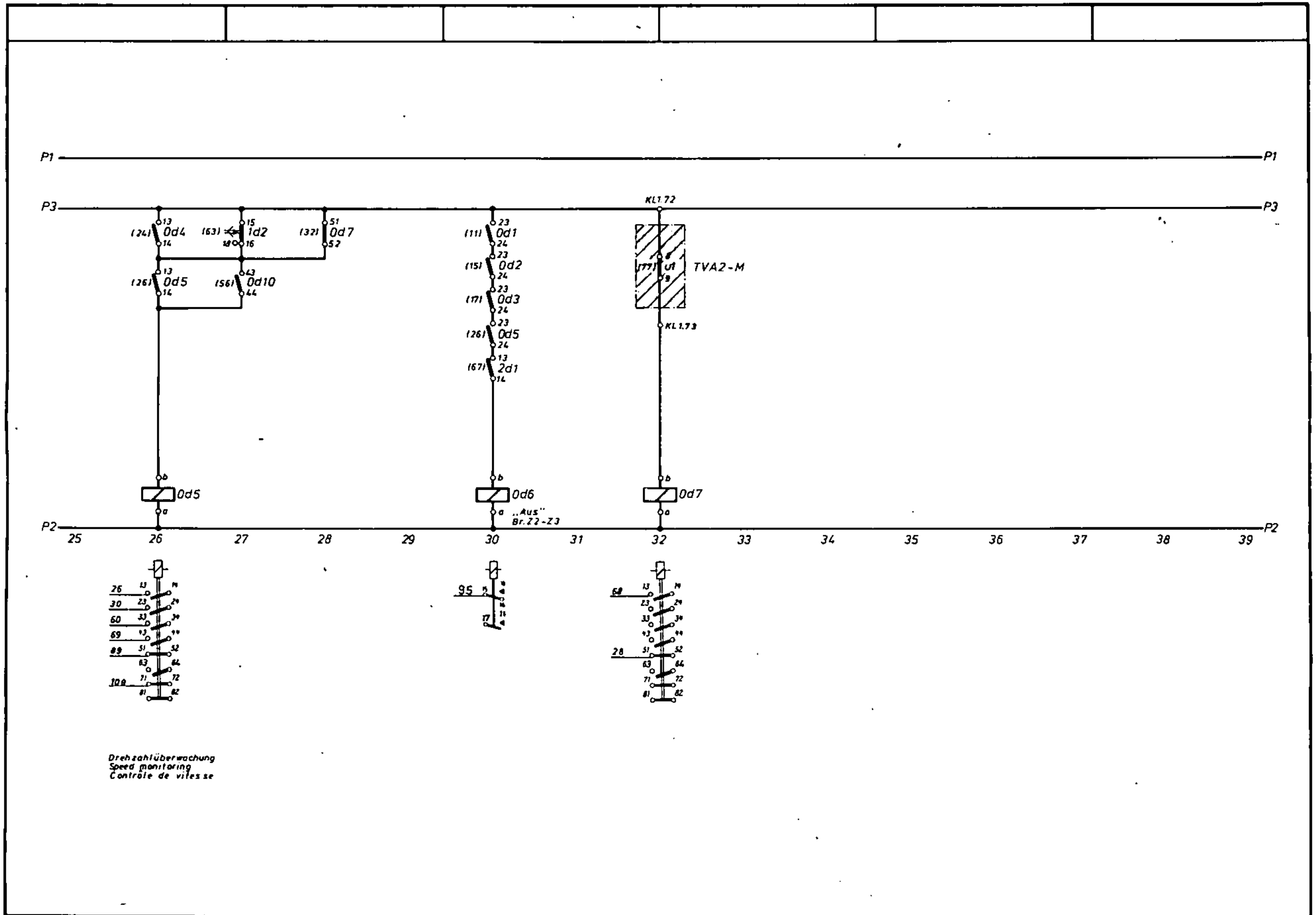
Phasenausfall
Phase failure
Défaillance de phase

Motortemperatur
Motor temperature
Température du moteur

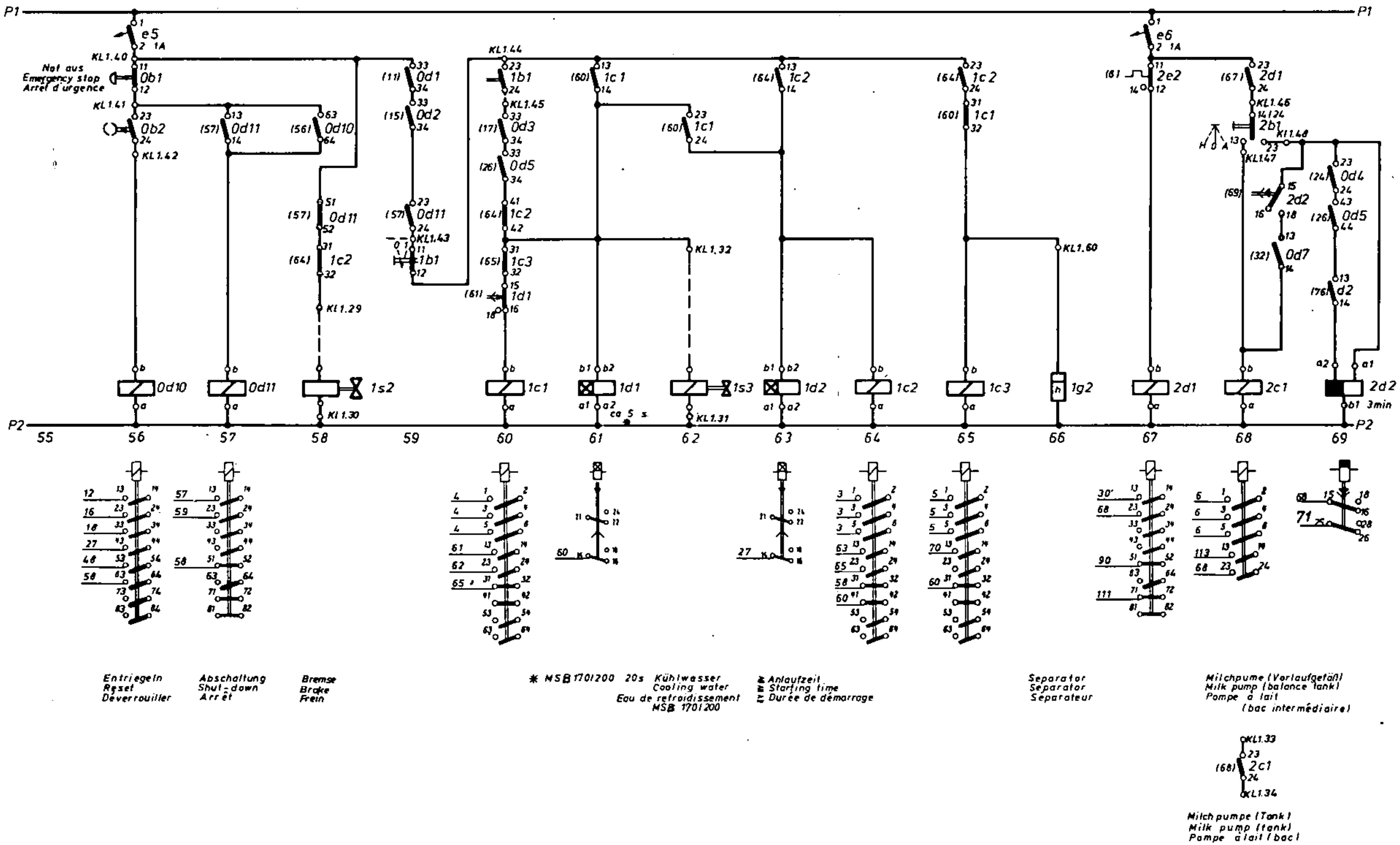
Steuerwasserdruck
Operating-water pressure
Pression d'eau de commande

Drehzahl
Revolution
Régime de rotation

WESTFALIA SEPARATOR 4740 Oelde i. Westf.	1978 Datum Name Gez 2.2. Gepr	Projekt MSA	Motorsteuerung Motor control Commande du moteur	Stromlaufplan Circuit diagram Schéma de circuit	Zeichnungs-Nr 8134-0404-030.1	Blatt 2	Bestehend aus 7 Blatt



WESTFALIA SEPARATOR 4740 Oelde i. Westf.	1978 Datum / Name; Gez 2.2.	Projekt MSA	Motorsteuerung Motor control Commande du moteur	Stromlaufplan Circuit diagram Schéma de circuit	Zeichnungs-Nr. 8134-0404-0301	Blatt 3 / Bestehend aus 7 Blatt



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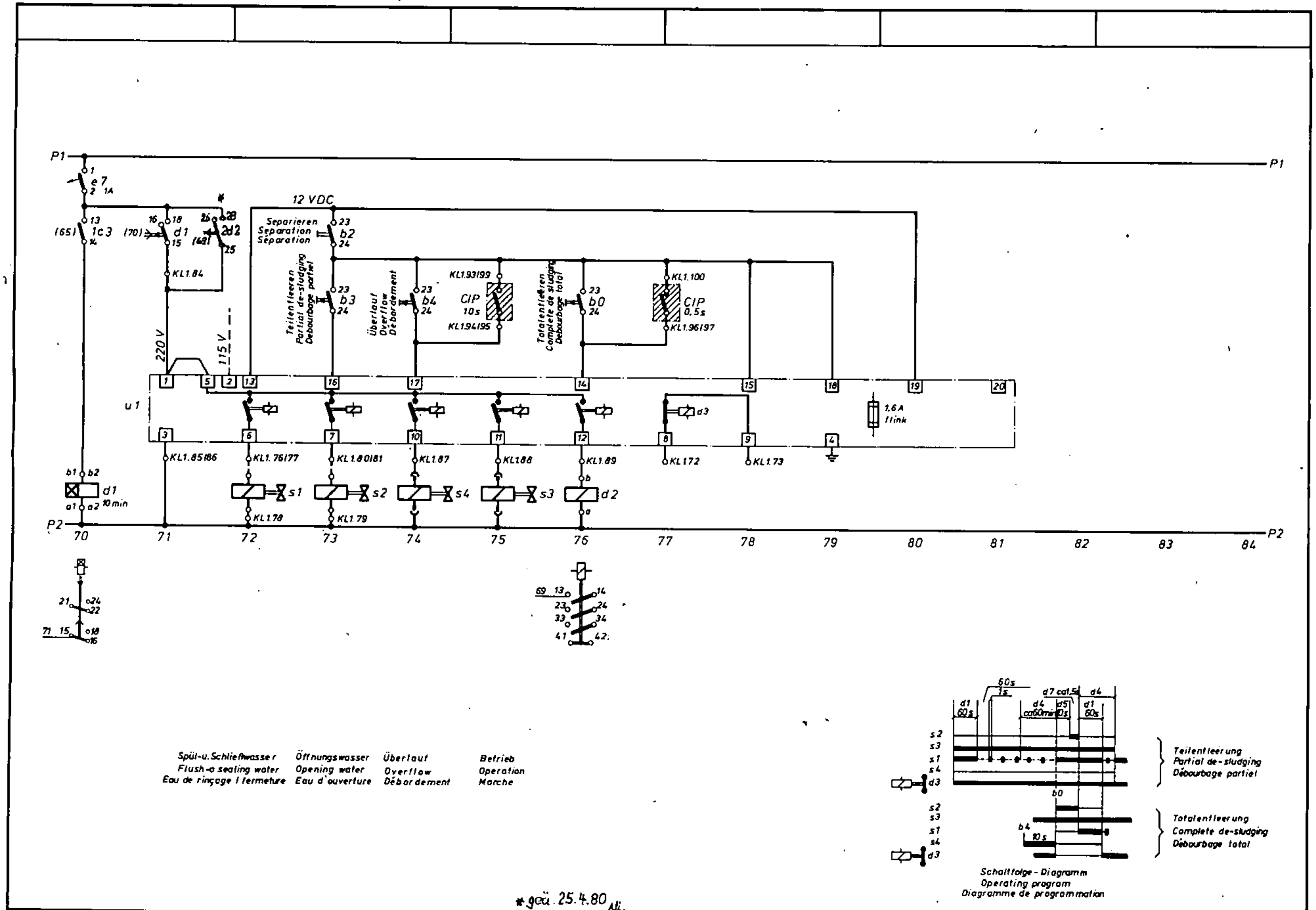


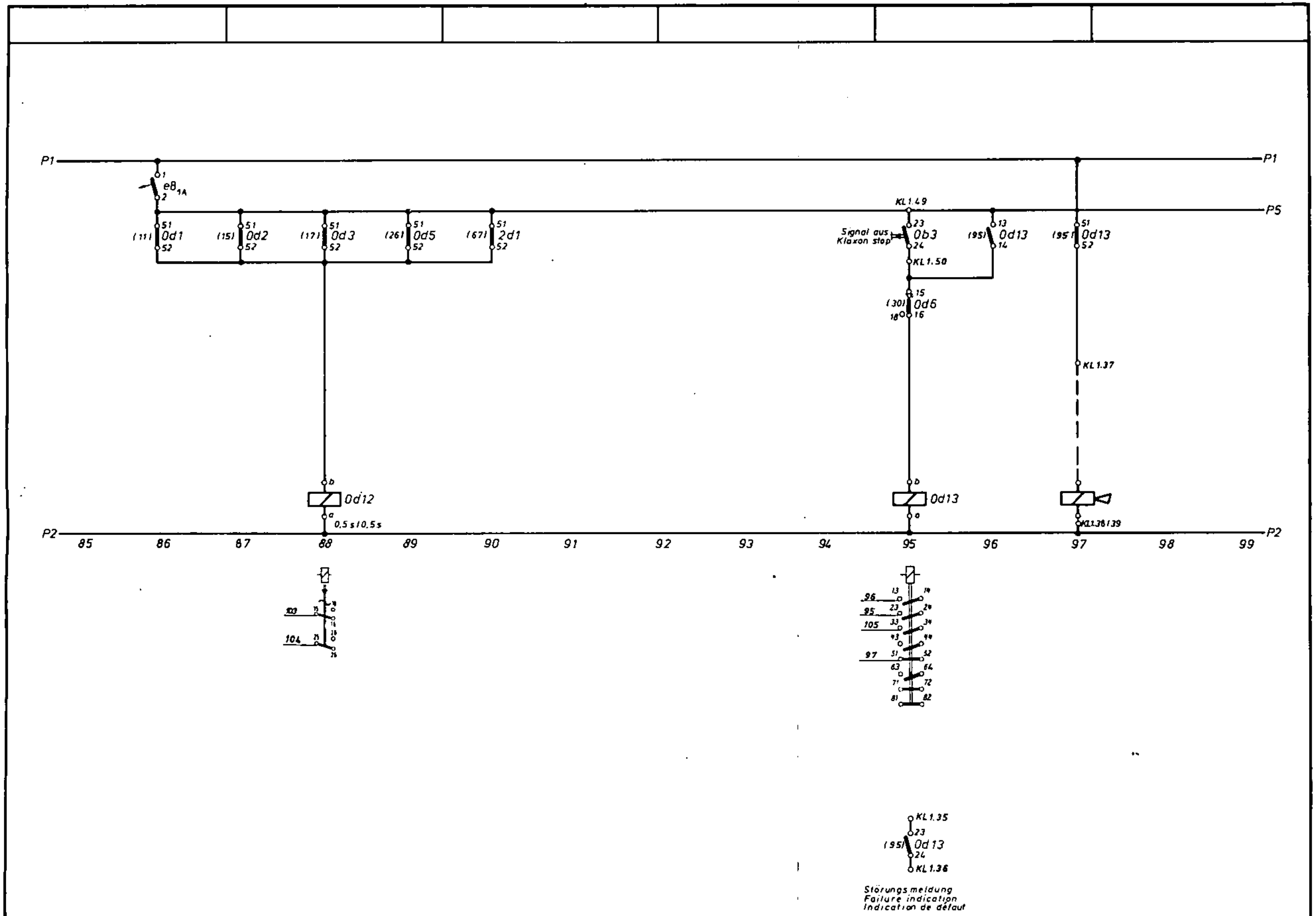
WESTFALIA SEPARATOR
4740 Oelde i. Westf.

1978	Datum	Name	Projekt
Gez.	3. 2.		MSA
Gepr.			

TVA 2- M elektronisch

Stromlaufplan
Circuit diagram
Schéma de circuit

Zeichnungs-Nr.	Blatt	Bestehend aus
8134-0404-0301	5	7 Blatt



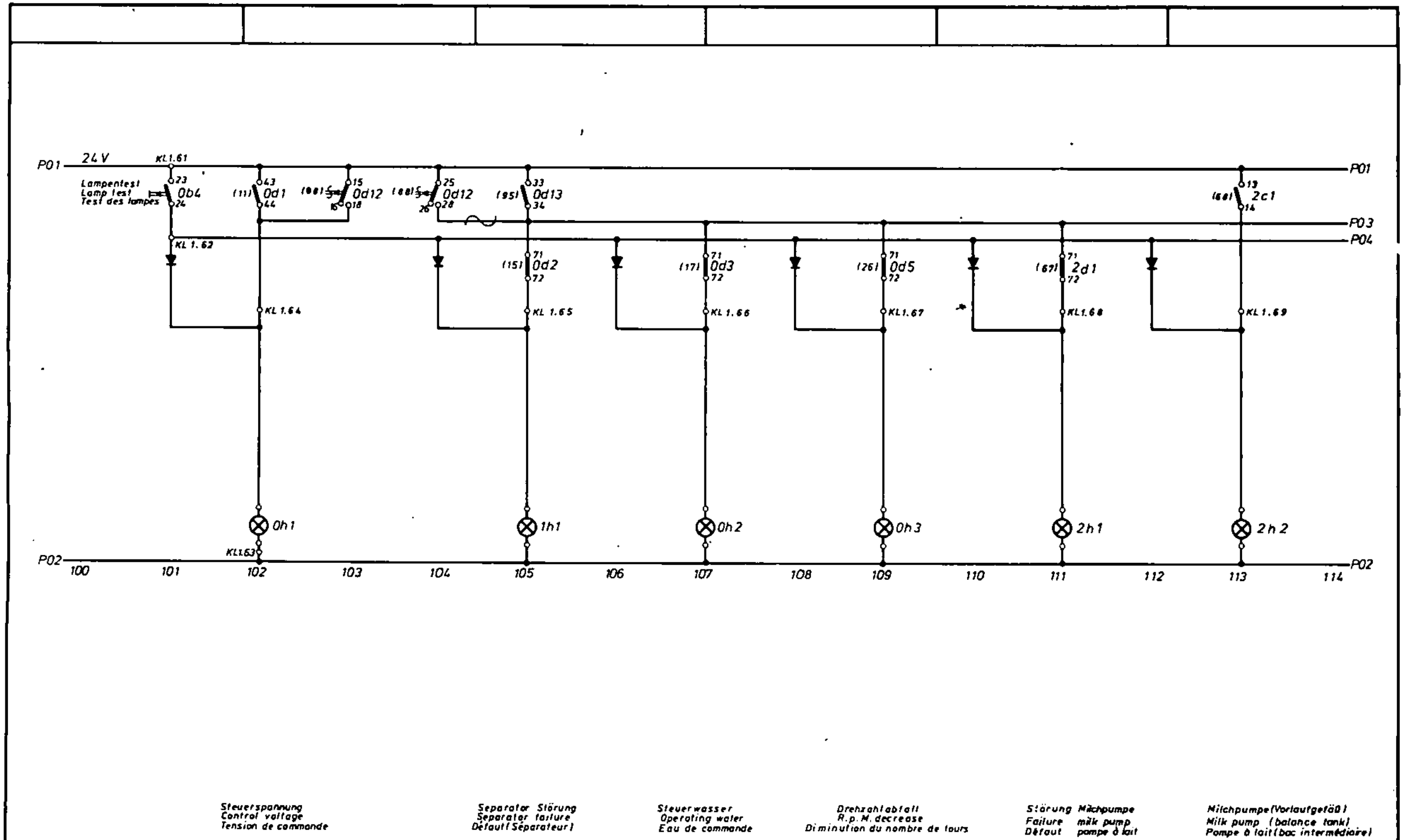
WESTFALIA SEPARATOR
4740 Oelde i. Westf.

1978	Datum	Name	Projekt
Gez.	3.2.		MSA
Gepr.			

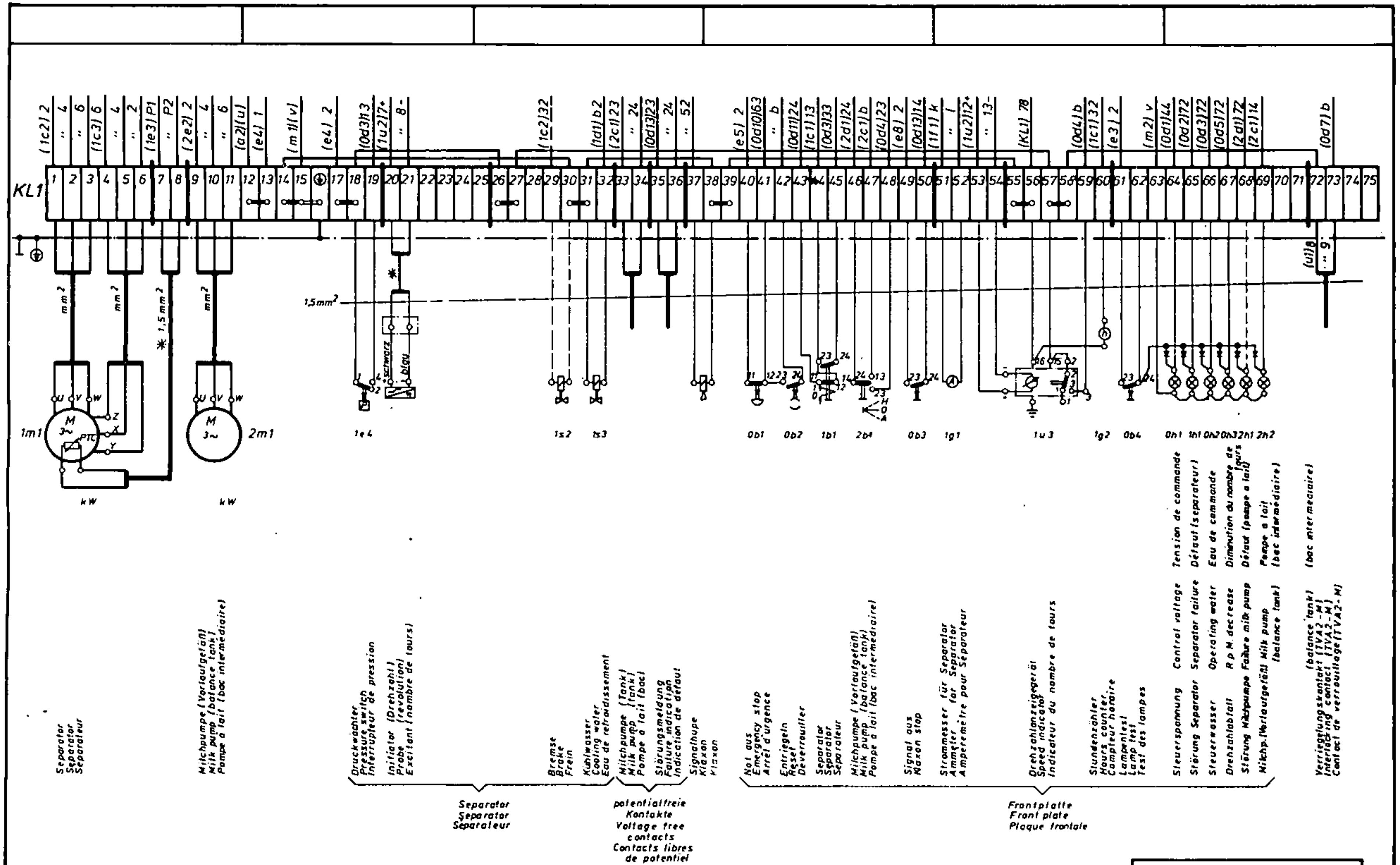
Motorsteuerung
Motor control
Commande du moteur

Stromlaufplan
Circuit diagram
Schéma de circuit

Zeichnungs-Nr.	Blatt	Bestehend aus
8134-0404-0301	6	7 Blatt



WESTFALIA SEPARATOR 4740 Oelde i. Westf.	1978	Datum 3. 2.	Name	Projekt MSA	Motorsteuerung Motor control Commande du moteur	Stromlaufplan Circuit diagram Schéma de circuit	Zeichnungs-Nr. 8134-0404-0301	Blatt 7	Bestehend aus 7 Blatt



✱ als getrennte Steuerleitung verlegen!

these control lines have to be separated from other lines!

ladisposition de ces conduite de commande doit être séparée des autres conduites!

Schutzmaßnahmen sind nach den Vorschriften des VDE, bzw. des zuständigen EVU auszuführen!

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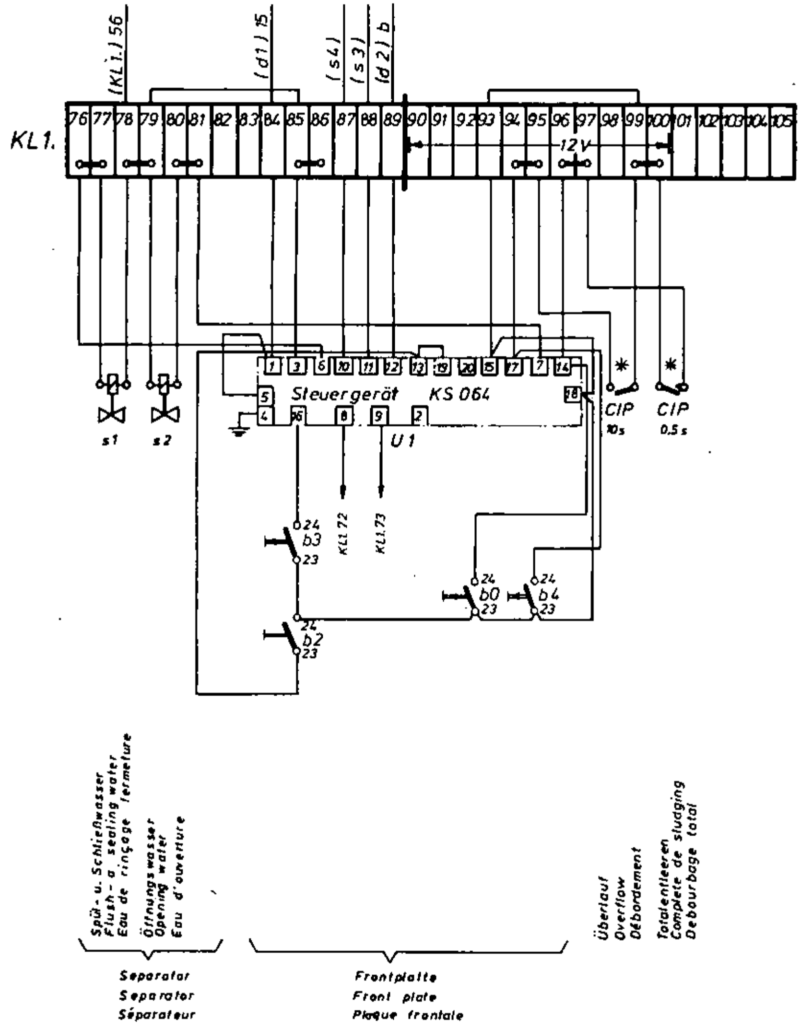

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7.0 Control cabinet TVA 2-M-S, in accordance with drawing 8I34-0404-2301, for separator motors and milk pumps

7.I General

The control cabinet contains the motor controls for the separator and milk pump. To provide a compact control unit for dairy use the TVA 2-M Electronic timing unit is also included in the control cabinet, but CIP control is not included. The actual electronic timing unit is provided for front panel installation and can, therefore, also be mounted in a control room where it should be covered by a protective window.

In dairies with an automatic cleaning plant (CIP control) it is possible to adapt the plant for use with the TVA 2-M timing unit. Thereby, total de-sludgings and periodic overflow of the bowl are automatically initiated. The actuation of total de-sludgings and overflow must be in accordance with the switching sequence diagram "Cleaning".

When the standard unit type TVA 2-M is supplied the customer must provide the motor control.

If the customer is providing the control cabinet, then it is advisable that the components of the RPM meter, i.e. speed measuring device and speed indicator are obtained from WS.

7.2 Construction

All switching components necessary for programming, operating and monitoring the separator and milk pump are fitted in the doors of the control cabinet. Further components are located on a mounting plate inside the cabinet.

Pressure reducers and solenoid valves for pneumatic control of the constant pressure valve are also on the mounting plate.

Series terminals are provided for connecting the electric wiring. The electric cables are inserted from below by means of cable glands in removable plates. A base serves as cable lead-in space and as a protection against ground moisture, and it also allows the cabinet to be placed higher up.

The control cabinet is completely assembled and flexibly wired ready for use. It complies with the regulations of the VDE.

The control cabinet is to be installed in the operating room.

Power is supplied to the control cabinet by means of a main switch which is lockable in the "Off Position".

NH fuses are provided for protection against short circuit. A control transformer supplies the control voltage. A circuit breaker on the secondary side of the transformer protects against short circuit and overloading. A special transformer provides power for the pilot lamps (24 V).

Several automatic cut-outs are shown in circuit diagram 8I34-0404-0301. They divide the control into sections for short circuit protection of the switching components. This has the advantage that, in the event of a short circuit, a selective switching off results and circuits not affected remain in operation. Fault finding is also simplified because of this.

All monitoring components operate on the potential-free principle. Sequence controls are also similarly designed, that is when one contact opens, the succeeding stage auxiliary cut-out is de-energized. The components thereby automatically monitor each other against voltage or power supply failure, faults in solenoids and contacts, and broken electrical wiring. All contacts are shown in the diagrams in the open or potential-free position. The contacts of hand-operated switches are not actuated or are shown in the off position.

Important!

In compliance with accident prevention regulations, the VDE OII3 for electrical equipment in manufacturing and processing machines refers to the use of a main switch which can be interlocked in the "Off" position, so that throughout the cleaning, maintenance and repair work, and during extended standstill times the total electrical equipment can be switched off or rendered potential-free.

This should be borne in mind when the customer is providing the motor control. The above also applies to the emergency stop device which is also required in accordance with VDE OII3.

7.3 Technical data

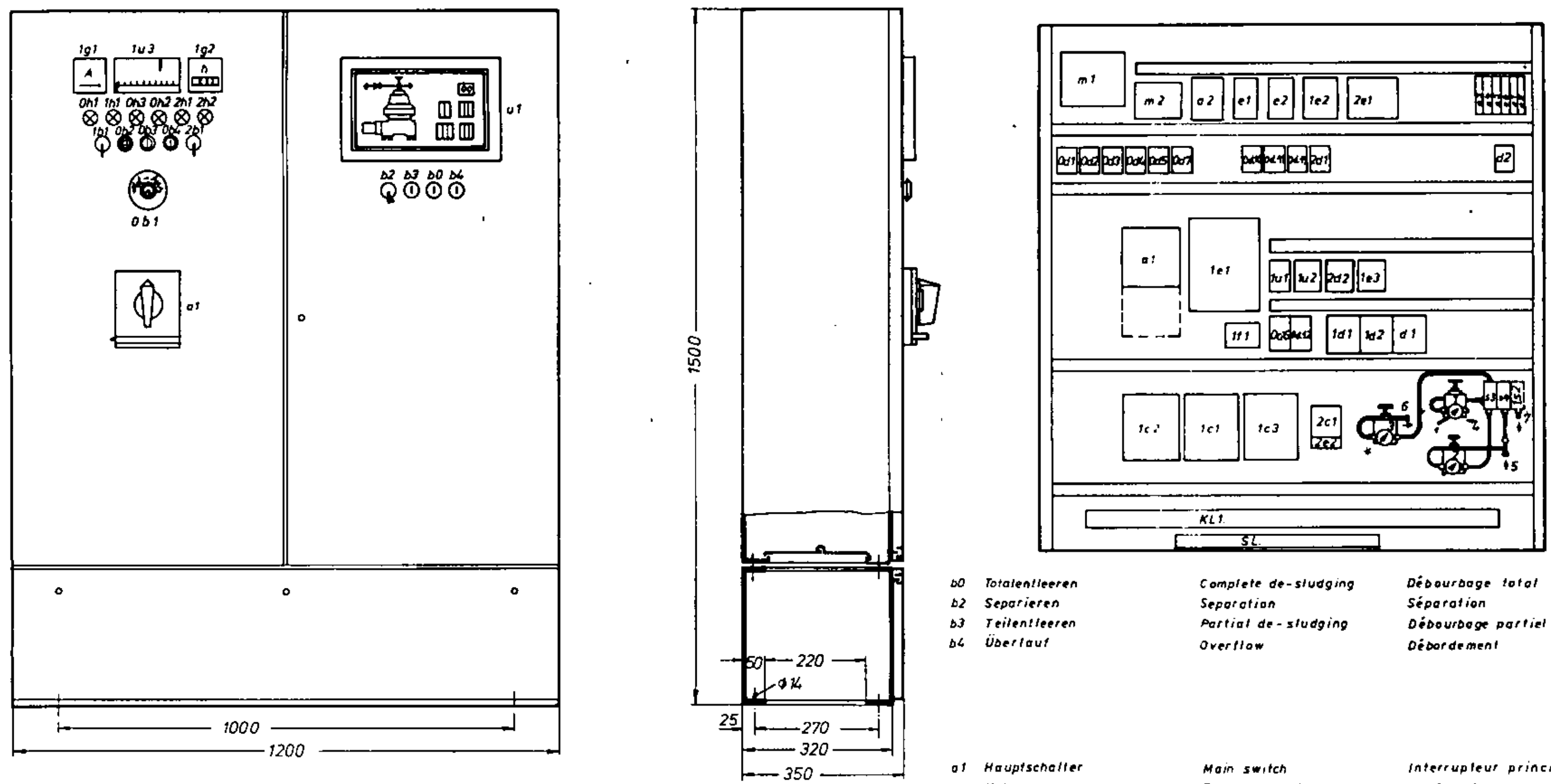
Construction diagram No. 8I34-0404-2301

Circuit diagram No. 8I34-0404-0301, pages I - 7

Terminal diagram No. 8I34-0404-1301, pages I - 2

Timing Unit	type	TVA 2-M-S
Connecting voltage (as specified)	V	200/220/380 AC 400/420/440
Frequency	Hz	50 or 60
Control voltage	V	220 AC
Housing		V2A
Type of protection	IP	54
Dimensions with base: height width depth	mm mm mm	I500 I200 350
Weight	kg	approx. I65
Ambient temperature	°C	up to +50
Cable lead-in	Pg	as per design
Compressed air: max. pressure min. pressure consumption (const. pr. valve)	bar bar m^3/h	IO 6 approx. 0.3
Pressure connection	mm	6 x I

M 1:10



b0	Totalentleeren	Complete de-studging	Débourbage total
b2	Separieren	Separation	Séparation
b3	Teilentleeren	Partial de-studging	Débourbage partiel
b4	Überlauf	Overflow	Débordement

a1	Hauptschalter	Main switch	Interrupteur principal
0b1	Not-aus	Emergency stop	Arrêt d'urgence
0b2	Entriegeln	Reset	Déverrouiller
0b3	Signal aus	Klaxon stop	Klaxon stop
0b4	Lampentest	Lamp test	Test des lampes
1b1	Separator	Separator	Séparateur
2b1	Milchpumpe	Milk pump	Pompe á lait
1g1	Strommesser	Ammeter	Ampèremètre
1g2	Stundenzähler	Hours counter	Compteur horaire
0h1	Steuerspannung	Control voltage	Tension de commande
0h2	Steuerwasser	Operating water	Eau de commande
0h3	Drehzahlabfall	R.p.M. decrease	Diminution du nombre de tours
1h1	Störung Separator	Separator failure	Défaut (separateur)
2h1	Störung Milchpumpe	Failure milk pump	Défaut (pompe á lait)
2h2	Milchpumpe	Milk pump	Pompe á lait
1u3	Drehzahlanzeigegerat	Speed indicator	Indicateur du nombre de tours
u1.	Steuergerät	Timing unit	Programmateur

Gewicht : ca. 165 kg
Weight : app. 165 kg
Poids : env. 165 kg

1 Überdruck, Excess pressure, Surpression
Konstantdruckventil Magermilchseite
Pressure control valve skim milk side
Vanne à pression constante côté lait écrémé

2 Betriebsdruck, Operating pressure, Pression de service
Konstantdruckventil Magermilchseite
Pressure control valve skim milk side
Vanne à pression constante côté lait écrémé

3 Betriebsdruck, Operating pressure, Pression de service
Konstantdruckventil Rahmseite
Pressure control valve cream milk side
Vanne à pression constante côté crème

4 Steuerlufteintritt, Control air inlet, Admission d'air de commande

5 Steuerluftaustritt, Control air outlet, Sortie d'air de commande
Konstantdruckventil Magermilchseite
Pressure control valve skim milk side
Vanne à pression constante côté lait écrémé

6 Steuerluftaustritt, Control air outlet, Sortie d'air de commande
Konstantdruckventil Rahmseite
Pressure control valve cream milk side
Vanne à pression constante côté creme

7 Bremse. Brake, Frein

WESTFALIA SEPARATOR 4740 Oelde i. Westf.	1978	Datum	Name	Projekt	Steuerschrank TVA 2-M-S	Aufbauplan	Zeichnungs-Nr.	Blatt
	Gez	2. 2.	Höfler	MSA	Control Cabinet		8134-0404-2301	Bestehend aus Blatt
	Gepr				Armoire de commande			

8.0 Valve timing unit

8.I General

The valve timing unit controls the milk separator type MSA.

During milk separation partial de-sludgings of the bowl are carried out automatically in accordance with the specified program. For manual chemical cleaning of the separator total de-sludgings and overflow of the bowl are initiated on the timing unit TVA 2-M by hand. When the timing unit is adapted to the automatic cleaning installation (CIP control) total de-sludgings and periodic overflow of the bowl are automatically initiated.

When a control cabinet type TVA 2-M-S is supplied for the separator motor and for the milk pump it also contains the timing unit.

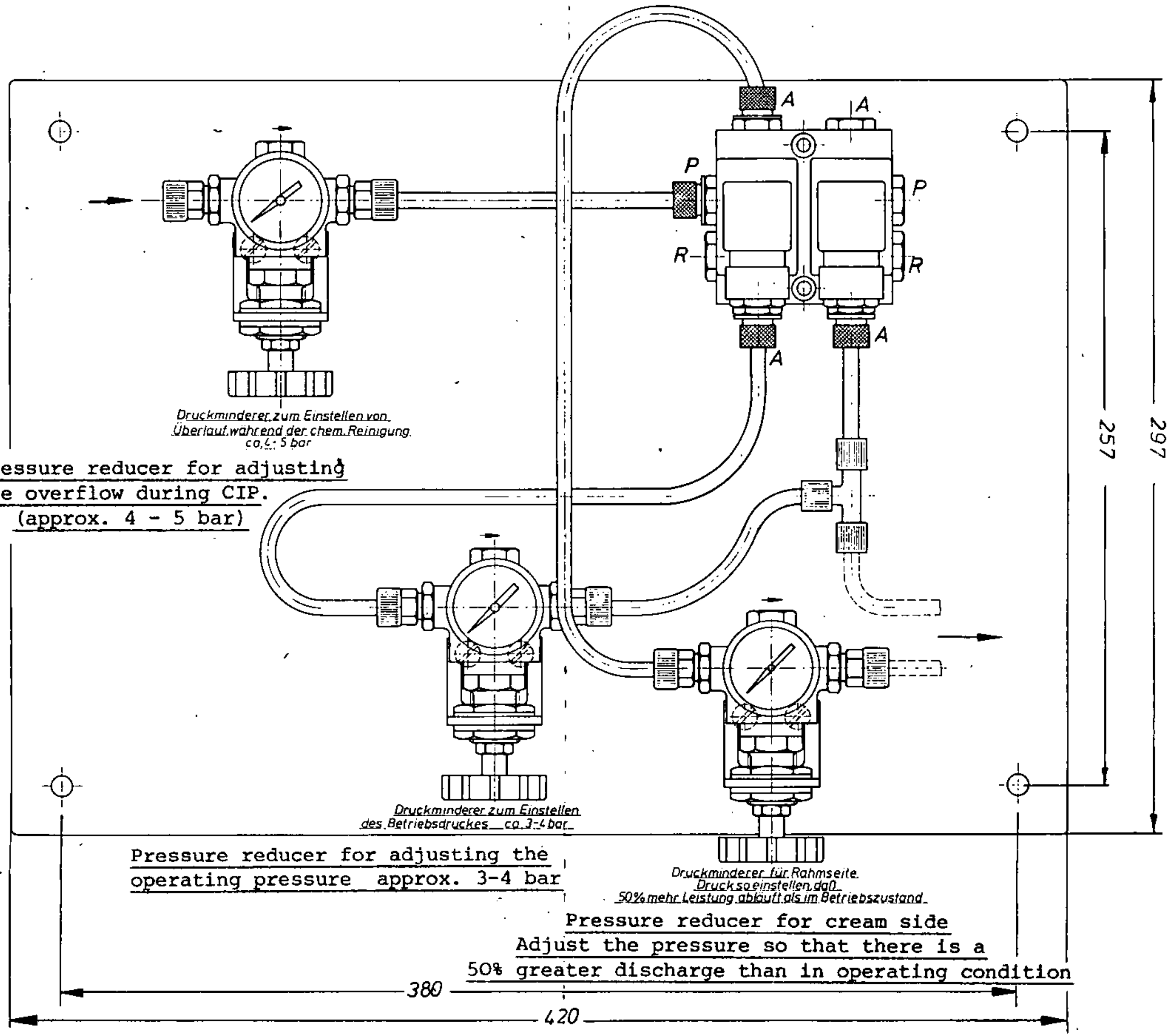
8.2 Construction

The valve timing unit consists of the timing unit type TVA 2-M and the operating-water connection.

The timing unit should be installed in the operating room. The operating-water connection is fitted to the separator.

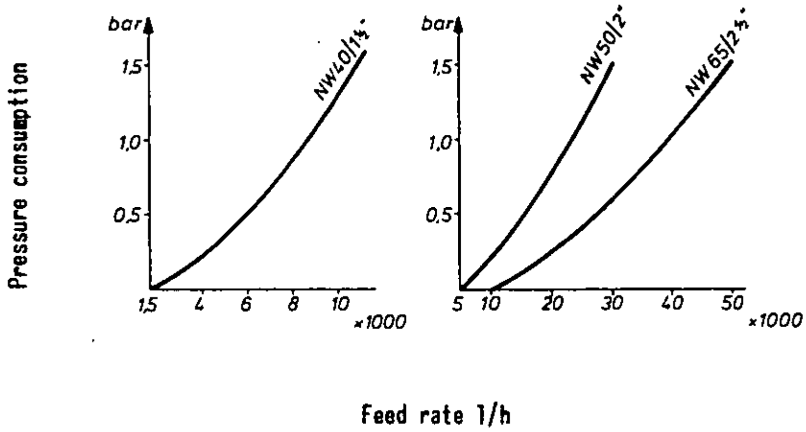
Ansteuerung der Konstantdruckventile

Control of the constant pressure valves

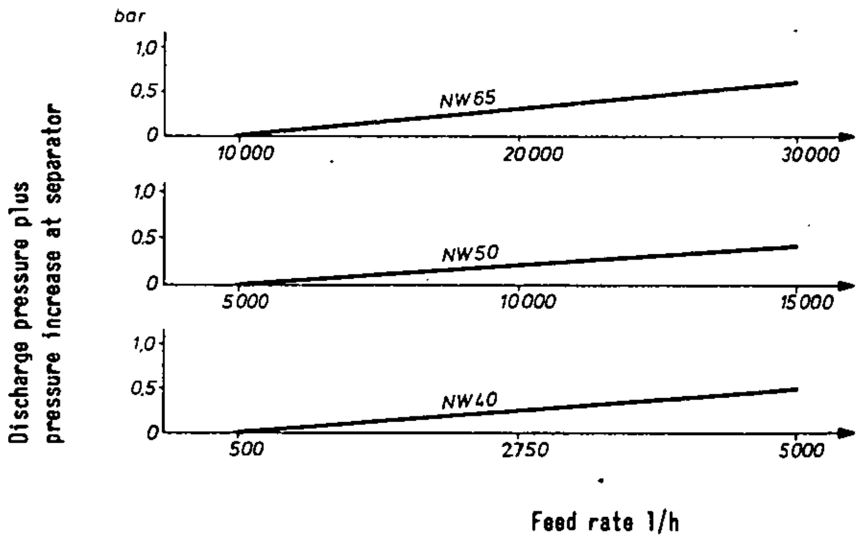


Teil-Nr. 8134-2219-040

8.4 Pressure consumption of constant-pressure valves



8.5 Increase of discharge pressure plotted against feed rate *



* The values refer to water. They only apply to air-controlled constant pressure valves with flat diaphragm. When spring-controlled constant pressure valves with flat diaphragm are used, the pressure increase will be higher.

9.0 Timing unit type TVA 2-M Electronic (see Technical Data No. 6141)

9.I Construction

All components necessary for programming, operating and monitoring the valve timing unit are fitted in the door.

Pressure reducers and solenoid valves for pneumatic control of the constant pressure valve on the separator are located inside on the mounting plate.

Series terminals are provided for connecting the electrical wiring. The electric cables are led in from below by means of cable glands.

The timing unit is completely assembled and flexibly wired ready for connection. It complies with the regulations of the VDE.

9.2 Adjusting, operating and mode of operation

See instruction manual for timing unit.

9.3 Technical data

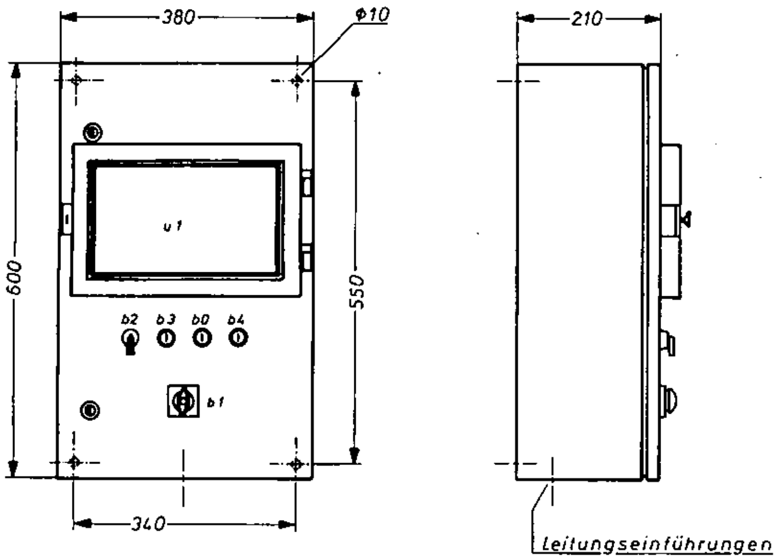
Construction diagram No. 8I34-0404-2301

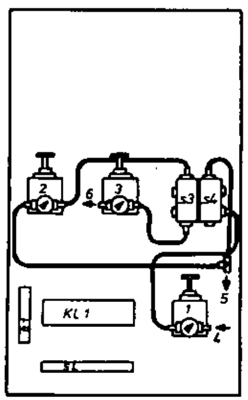
Connection diagram No. 8I34-0404-0301

Timing Unit	type	TVA 2-M
Connecting voltage	V	220 AC
Frequency	Hz	50 and 60
Power consumption (incl. solenoid valves)	VA	approx. 80
Control voltage (for solenoid valves)	V	220 AC
Control voltage (for circuit logic)	V	I2 DC
Switching capacity of the potential-free contacts: permanent current I_{th2}	A	≦ 6
Switching capacity of the potential-free contacts: rated working current I_e/ACII	A	≦ 1 at 250 VAC
Housing		V2A
Type of protection	IP	54
Dimensions: height	mm	600
width	mm	380
depth	mm	2IO
Weight	kg	25
Ambient temperature	°C	up to +50
Cable lead-in	Pg	8 x I3.5 (below)
Compressed air: max. pressure	bar	IO
min. pressure	bar	6
consumption (constant-pressure valve)	m^3/h	approx. 0.3
Pressure connection	mm	6 x I

2s 7. 60s

b0	Totalentleeren	Complete de-sludging	Débourbage total
b1	Hauptschalter	Main switch	Interrupteur principal
b2	Separieren	Separation	Séparation
b3	Teilentleeren	Partial de-sludging	Débourbage partiel
b4	Überlauf	Overflow	Débordement
u1	Steuergerät	Timing unit	Programmateur





1 Überdruck, Excess pressure, Surpression
Konstantdruckventil Magermilchseite
Pressure control valve skim milk side
Vanne à pression constante côté lait écrémé

2 Betriebsdruck, Operating pressure, Pression de service
Konstantdruckventil Magermilchseite
Pressure control valve skim milk side
Vanne à pression constante côté lait écrémé

3 Betriebsdruck, Operating pressure, Pression de service
Konstantdruckventil Rahmseite
Pressure control valve cream milk side
Vanne à pression constante côté crème

4 Steuerlufteintritt, Control air inlet, Admission d'air de commande

5 Steuerluftaustritt, Control air outlet, Sortie d'air de commande
Konstantdruckventil Magermilchseite
Pressure control valve skim milk side
Vanne à pression constante côté lait écrémé

6 Steuerluftaustritt, Control air outlet, Sortie d'air de commande
Konstantdruckventil Rahmseite
Pressure control valve cream milk side
Vanne à pression constante côté creme

WESTFALIA SEPARATOR
4740 Oelde i. Westf.

	Datum	Name	Projekt
Gez.	30.3.77.	[illegible]	
Gepr.			

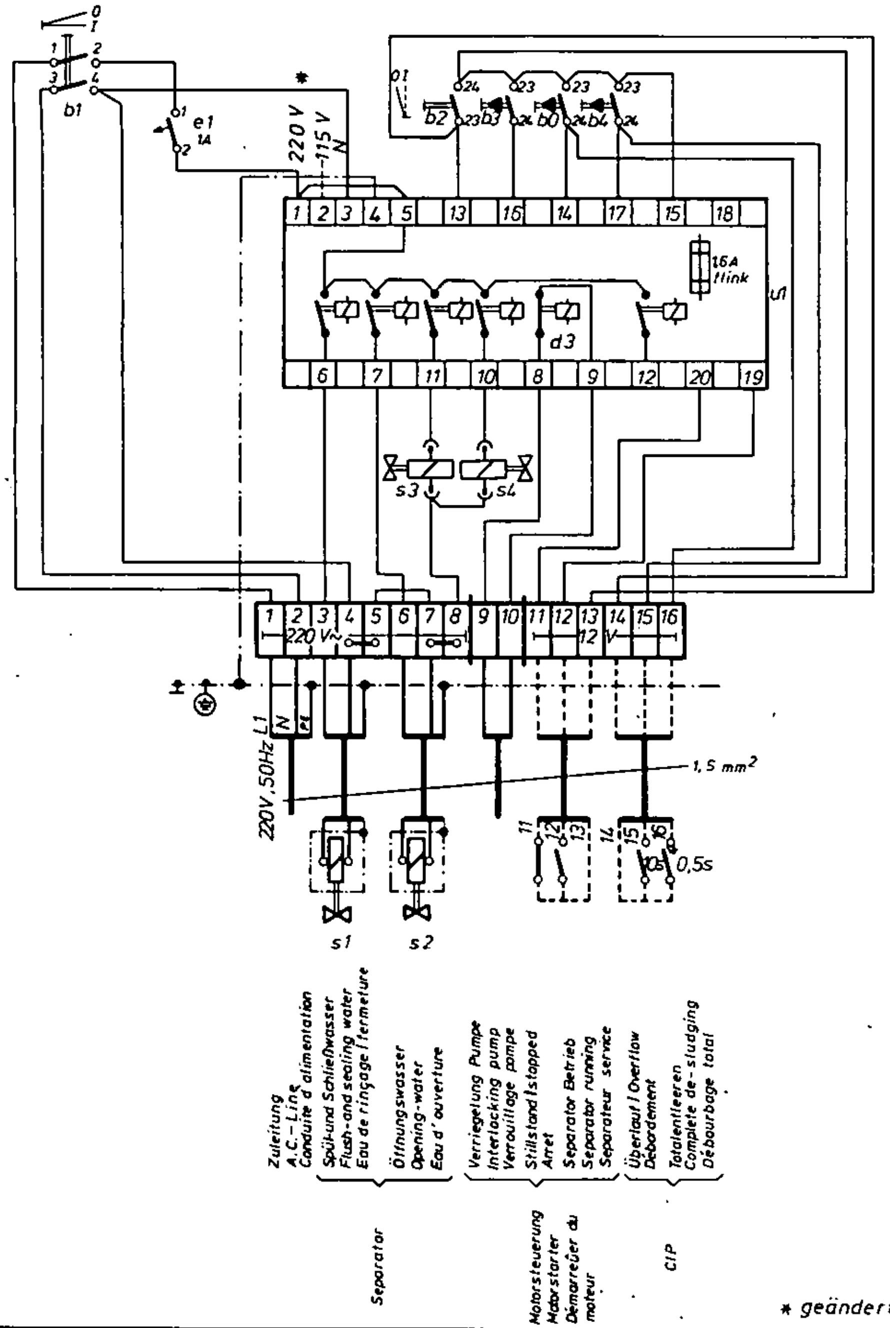
Steuergerät TVA2-M elektronisch
Timing unit
Programmateur

Aufbauplan
Arrangement of control elements
Disposition des éléments

Zeichnungs-Nr. 8134-0404-2231

Blatt

Bestehend aus Blatt



b0 Totalentleeren
Complete de-sludging
Débourbage total

b1 Hauptschalter
Main switch
Interrupteur principal

b2 Separieren
Separation
Séparation

b3 Teilentleeren
Partial de sludging
Débourbage partiel

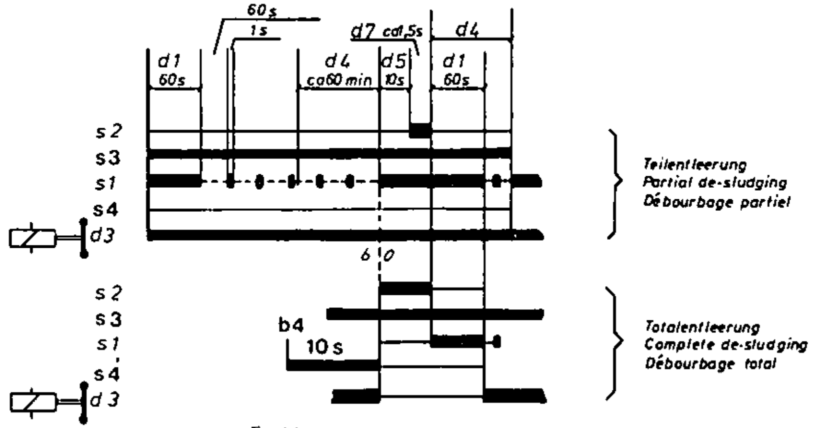
b4 Überlauf
Overflow
Débordement

Zuleitungssicherung 6A
Rated current of lead-in wires fuse 6A
Courant nominal de la fusible de secteur 6A

Schaltvermögen des potentialfreien Öffners für Verriegelung Milchpumpe:
Switching capacity of potential-free break contact for electrical interlocking of milk pump :
Pouvoir de coupoure du contact rupteur sans potentiel pour le verrouillage électrique de la pompe a lait:

Dauerstrom J_{th2} ≦ 6A bei 250V~
Permanent current
Permanent courant

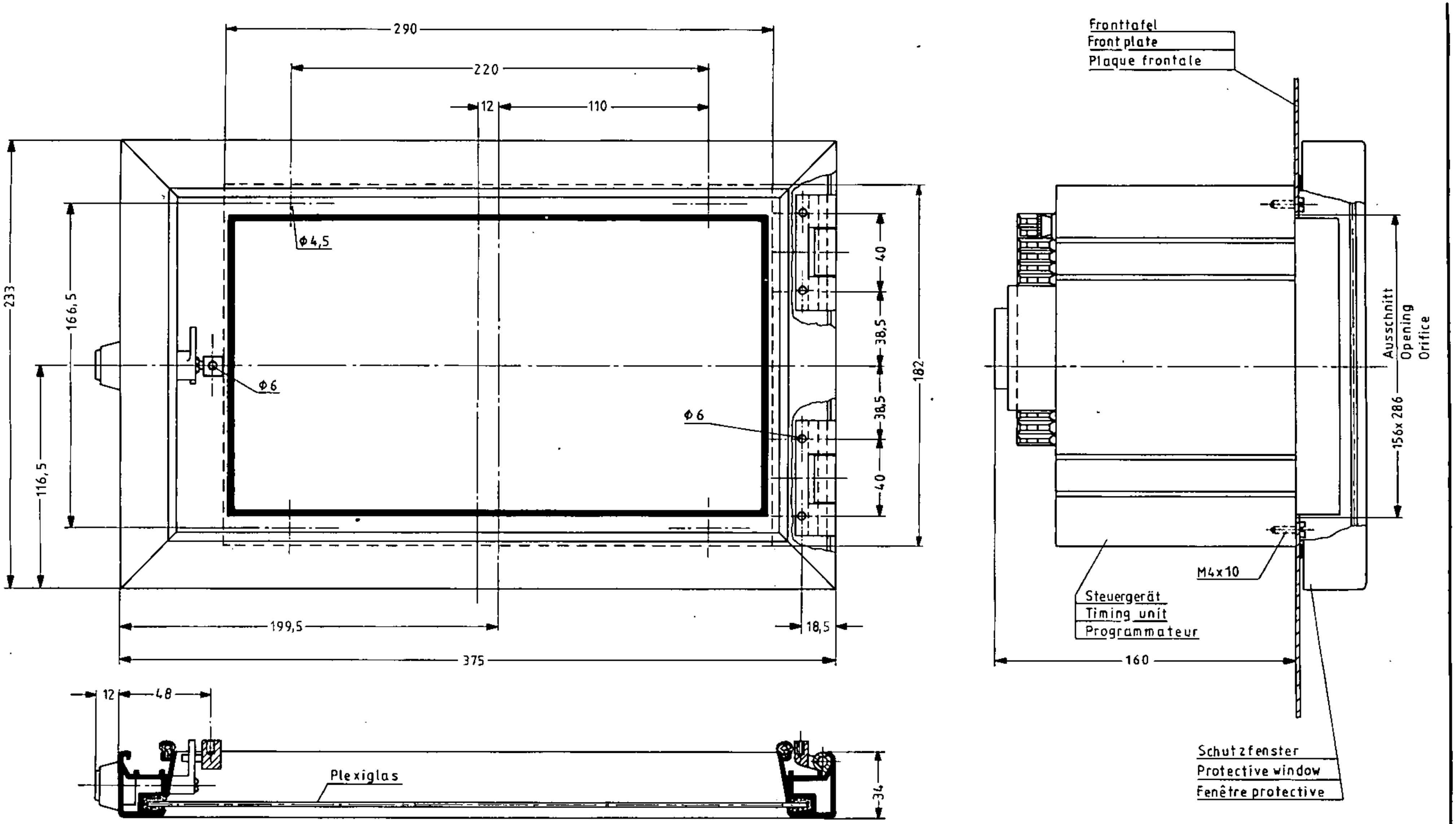
Nennbetriebsstrom J_e / AC 11 ≦ 1A bei 250V~
Rated current
Nominal courant



Funktions-Diagramm
Operating program
Diagramme de programmation

* geändert am 31.3.77 Ni.

WESTFALIA SEPARATOR 4740 Oelde i. Westf.	1976	Datum	Name	Projekt	Steuergerät TVA2-M elektronisch / Timing unit / Programmateur	Anschlußplan / Connection diagram / Plan de disposition	Zeichnungs-Nr 8134-0404-0231	Blatt 1	Bestehend aus 1 Blatt
	Gez.	29.10	11.						
	Gepr.	3.11.	Ni.						



für Fronttafeleinbau, z.B. in zentraler Schaltwarte
for panel mounting, e.g. in central control room
pour installation dans la plaque frontale, par ex. dans une station centrale de commande

	Datum	Name	Projekt			Zeichnungs-Nr.:	Format: 3
Gez	25.10.79			WESTFALIA SEPARATOR 4740 Oelde i. Westf.	Steuergerät Typ KS 064	8134-0404-4231	Blatt:
Geprüft					Timing unit		
Normgepr.					Programmateur		Blätter

10.0 Operating-water connection

10.1 Construction

The operating-water connection includes all components required for operating-water feed, adjusting, monitoring and maintenance. Included are solenoid valves, rapid-closing valves, hand valves, pressure gauges, pressure reducers, pressure switch and strainer.

The feed line for the operating-water connection should be of 25 mm (R1") nominal diameter. Cables are individually led in through glands for the solenoid valves, pressure switch and the proximity switch terminal box.

The operating-water connection is assembled ready for use.

10.2 Adjusting, operating and mode of operation

See the instruction manual for the separator.

10.2.1 Operating water

The operating water should be clean and should meet the following requirements:

Hardness:	$\leq 12^\circ$ dH* up to 55° C separating temperatures $\leq 6^\circ$ dH* above 55° C separating temperatures
Chlorine ions:	≤ 100 mg/l
pH value:	6.5 - 7.5

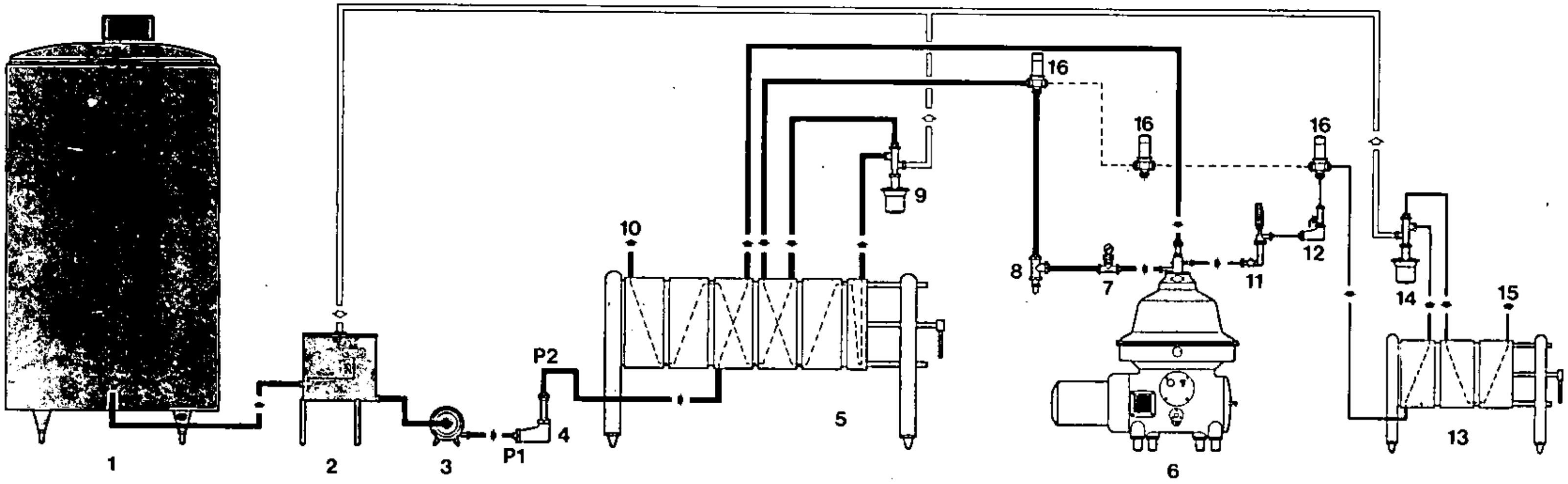
The strainer in filter has to be cleaned from time to time.

* To convert German hardness (dH) into English hardness multiply by 1.25.

IO.3 Technical data

Operating-water connection		
Pipe connection	mm	D25 DIN II85I
Operating-water: min. pressure (feed line) max. pressure max. pressure **differential**	bar bar bar	I.5 4 0.5
Operating-water: working pressure (separator) consumption max. temperature	bar l/h °C	I approx. 50 approx.+40
Solenoid valves	type	40 A/S2289
Pipe connection	R	3/8"
Voltage	V	220 **AC**
Frequency	Hz	50/60
Special voltages	V	24 AC, 115 AC, 24 DC
Power consumption: pull-in (with alternating current) working (with direct current)	VA VA W	approx. 30 approx. I6 approx. I2
Duty cycle (ED)	%	IOO
Switching frequency	/h	IOOO
Type of protection	IP	65
pressure range	bar	0.5 - IO
Temperature: medium ambient	°C °C	+90 +35
Cable lead-in	Pg	9
Pressure switch	type	FF4-8
Pressure connection	R	3/8"
Pressure range	bar	0,2-8
Control difference	bar	0,3-0,5
Switching capacity: permanent current I_{th2} rated working current I_e/ACII	A A	≦ 16 ≦ 6 at 220 VAC
Type of protection	IP	65
Temperature of medium	°C	+ 70
Cable lead-in	Pg	II

WESTFALIA SEPARATOR



1 Raw milk tank

2 Float-controlled balance tank, approx. 200 litres

3 Pump (pump capacity slightly higher than rated capacity of separator)

4 Flow constrictor P_1-P_2 = min. 0.5 bar
max. 2.0 bar

5 Heater and cooler

6 Westfalia Separator MSA

7 Pressure gauge

8 Constant-pressure valve for adjusting the operating pressure

9 Flow-diversing valve

10 to tank

11 Flowmeter with manual regulating valve

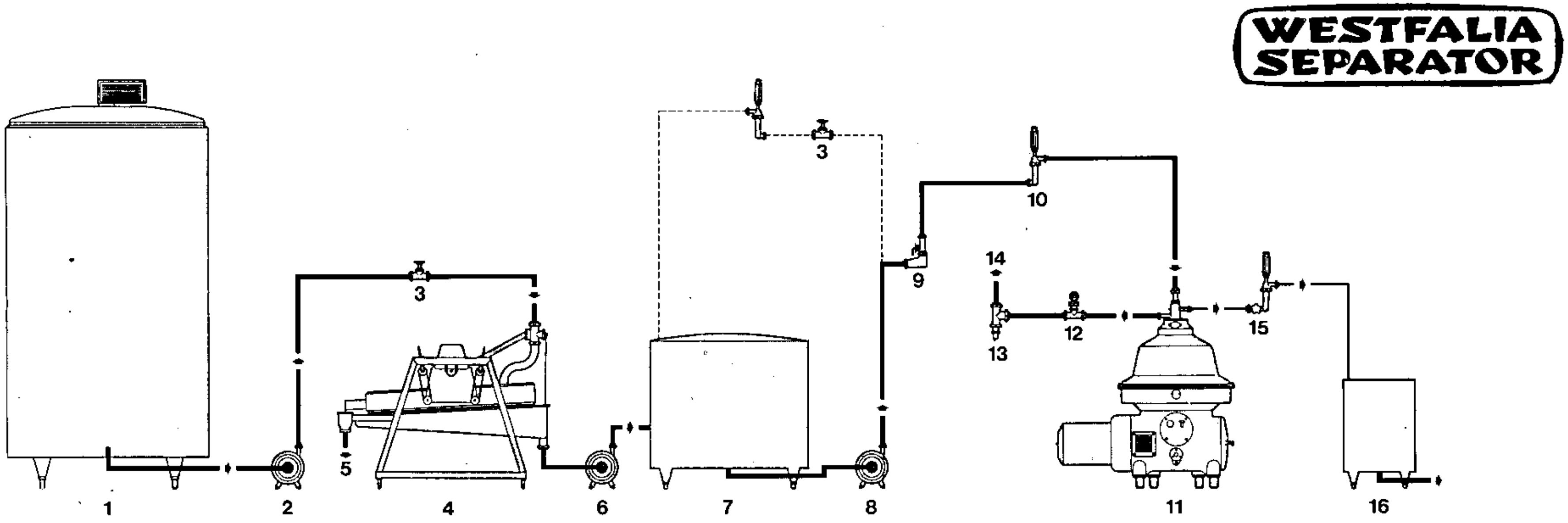
12 adjustable flow constrictor

13 Cream heater and cooler

14 Flow-diversing valve

15 to cream tank

16 3-way valve

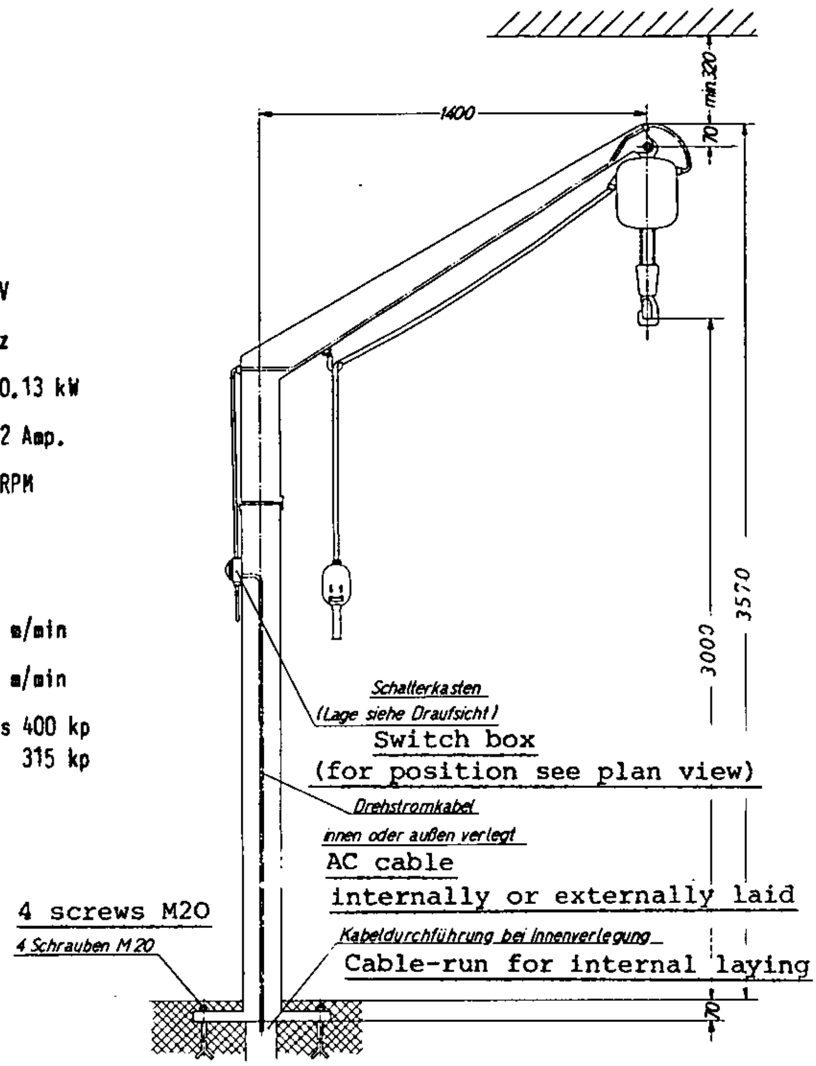


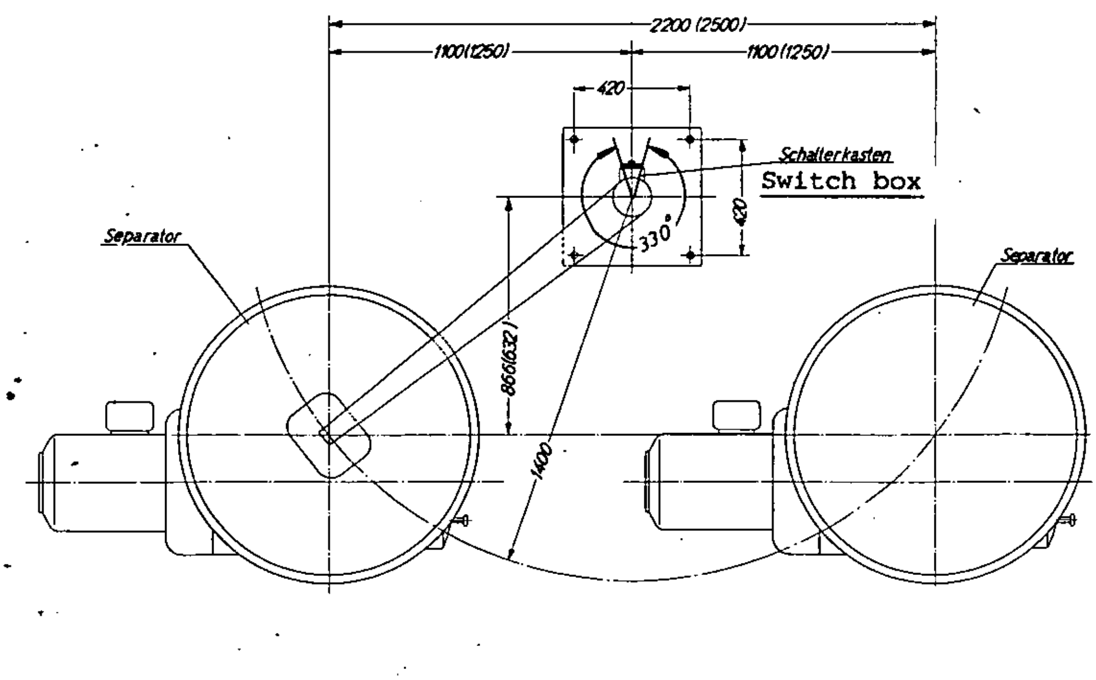
1 Whey tank with agitator
2 Centrifugal pump
3 Manual regulating valve
4 Vibrating screen
5 Solids discharge
6 Centrifugal pump
7 Balance tank (at least 5 m^3)
8 Centrifugal pump
9 Adjustable flow constrictor
10 Flowmeter
11 Westfalia separator
12 Pressure gauge for skimmed whey
13 Constant pressure valve
14 to skimmed-whey tank
15 Flowmeter with valve
16 Cream tank

Installation diagram of the swing crane for separators type MSB 60-01-076, MSA 90-01-076, MSB 130-01-076, MSB 170-01-076, MSB 200-01-076

<u>Motor</u>

Rated voltage	380 V
Rated frequency	50 Hz
Rated capacity	0.5/0.13 kW
Rated amperage	2/1.2 Amp.
Speed	710 RPM
Type of protection	P 33
Switching	Y
Slow lifting speed	1.25 m/min
Fast lifting speed	5 m/min
Weight	gross 400 kp net 315 kp





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WESTFALIA SEPARATOR

INSTRUCTION MANUAL AND PARTS LIST

No. 1170-9001-004

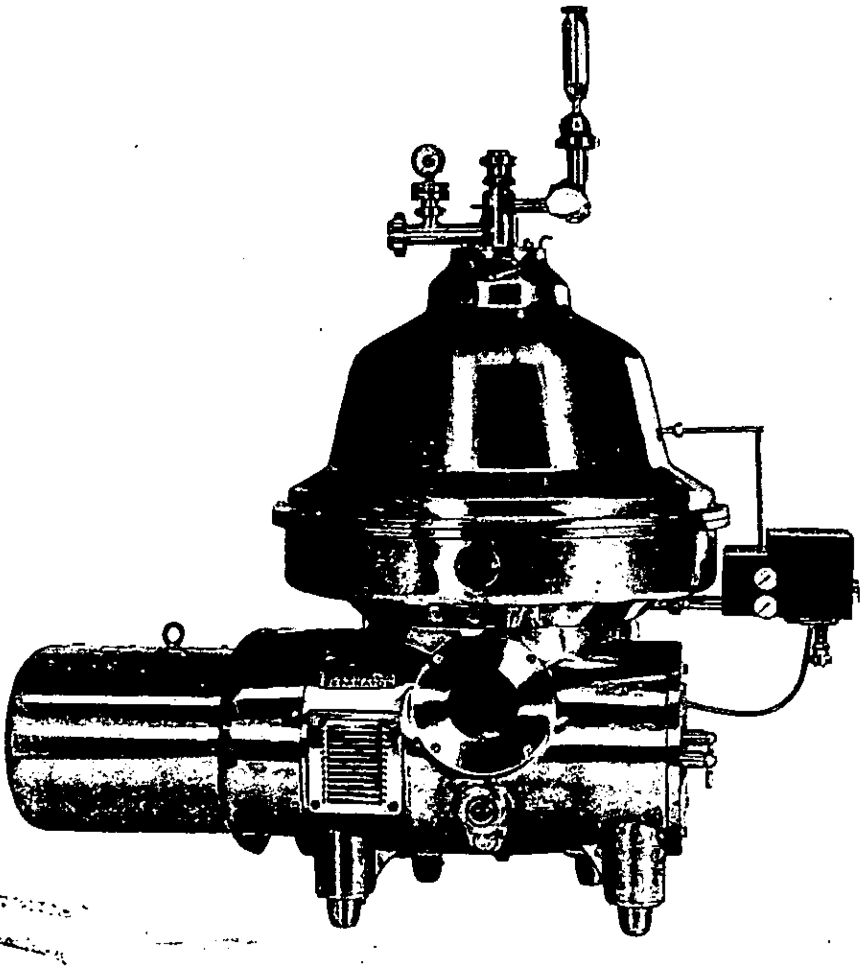
WESTFALIA

Milk Separator

Model MSA 130-01-076

with Self-Cleaning Bowl

(with incorporated piston valve)



IMPORTANT HINTS

The WESTFALIA Separator is a high-speed centrifuge which works reliably provided that it is operated and looked after in accordance with our operating instructions. Please read carefully through the directions so that you will be able to operate and service your separator in such a manner that you can extract from it the greatest possible efficiency.

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

1) When connecting the motor, be sure to connect the PTC resistor type temperature feelers incorporated in the motor winding to an appropriate tripping device (see sect. 3.1).

2) The pressure in the operating-water supply line shall be at least 1.5 bars. Fluctuations of pressure must NOT exceed 0.5 bar.

3) Before each start-up check to be sure that

   hood and centripetal pump are fastened securely,

   oil level in gear chamber is slightly above middle of sight glass,

   brakes are released. (Since the fluid clutch is not protected against overload, applied brakes can cause overheating of the oil, which again can lead to damage of the clutch).

4) Feed milk to separator only after the bowl has been closed which is accomplished by feeding sealing water.

5) If the bowl comes up to rated speed (as per name-plate of separator) in less than 8 minutes, the motor will pull too high a starting current. This indicates that the fluid clutch contains too much oil.

6) Make first oil change after 250 running hours. When gear parts are broken in, change oil every 750 running hours. Use the oil specified on page 2/1. Whenever changing the oil, clean the gear chamber.

7) Check oil level every week. During operation, oil level must never be allowed to sink below middle of sight glass.

   Check regularly for water in oil. To do this, loosen oil drain screw and allow a small amount of oil to drain.

8) Replace ball bearings of worm spindle and worm wheel shaft and change oil in fluid clutch every 5,000 running hours.

C O N T E N T S

9) <u>Do NOT loosen any part of the separator or of the feed and discharge connections before the bowl has stopped completely</u>.

Wait until the worm wheel has ceased rotating so that lubricating oil no longer splashes against the sight glass. You can then be sure that the bowl has stopped rotating.

10) <u>Dismantle the bowl once a month for inspection:</u>
Thoroughly clean and wipe dry contact surfaces and threads of bowl bottom and lock ring and apply a thin film of lubricating paste furnished with the separator, to prevent galling of the threads.

11) When dismantling the bowl be sure to place bowl parts on a rubber mat or wooden surface, never on the stone floor.

12) After removing the bowl bottom, place splash cover 406 (fig. 20) over worm spindle to prevent wash liquid from seeping into the gear chamber.
Do NOT flush inside of upper section of frame with water hose; wash by hand.

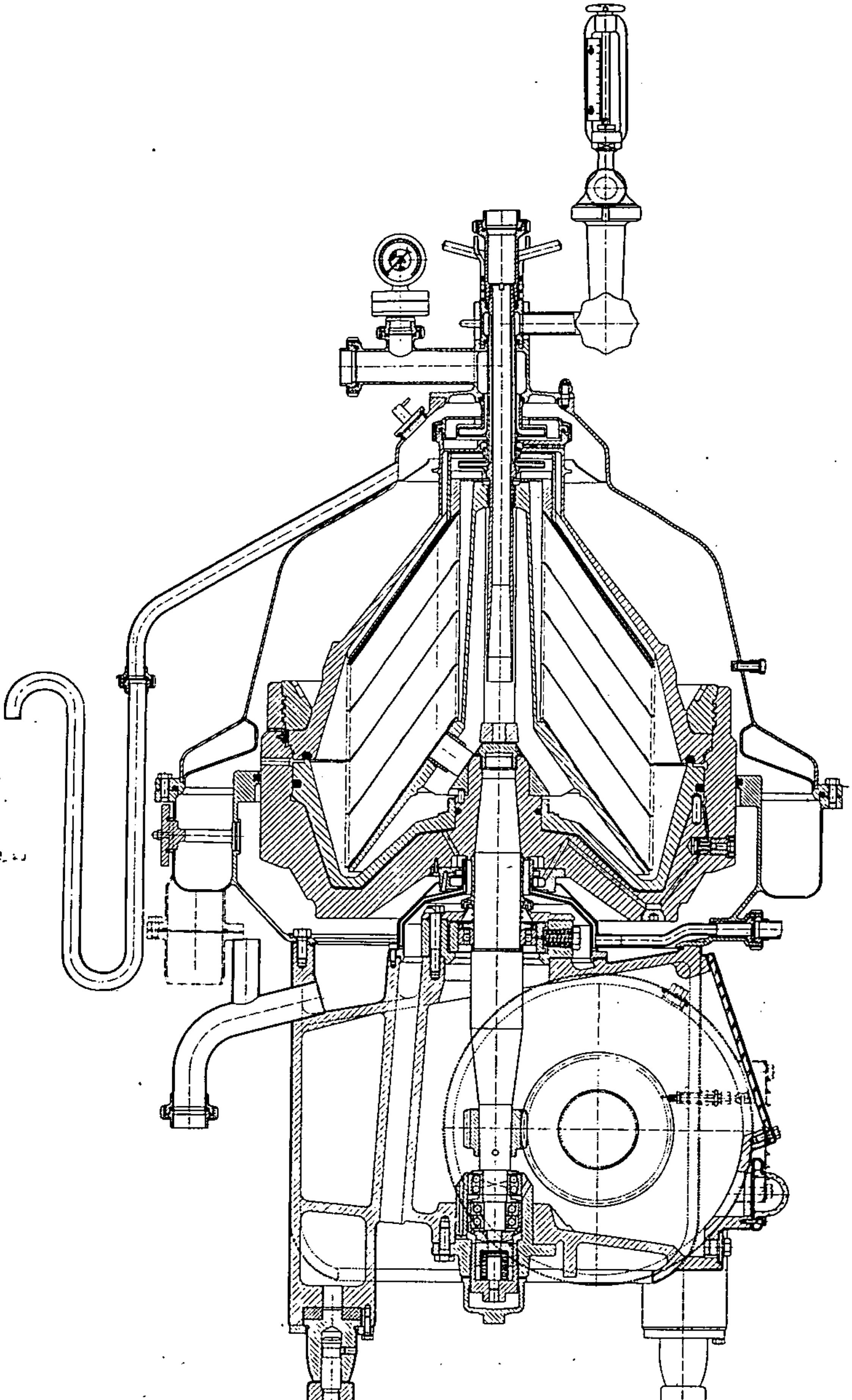
13) Before installing bowl bottom, oil upper part of spindle (thread, cone and cylindrical guide surface for spindle cap). It must be possible to move the spindle cap easily up and down on the spindle. Then <u>clean and wipe dry the conical part of the spindle with a smooth rag</u>. Also, <u>clean the inside of the bowl hub carefully to assure proper fitting</u>.

14) When assembling the bowl, strictly adhere to the instructions given in sect. 4 to avoid undue unbalance.
Before starting the bowl be sure it is completely assembled.

15) When pressure in disc stack has slackened, add spare disc (see sect. 4.1 No. 21).

16) Never use blow-torch on bowl parts or expose bowl to heat of open flame.

Sectional View of the Separator



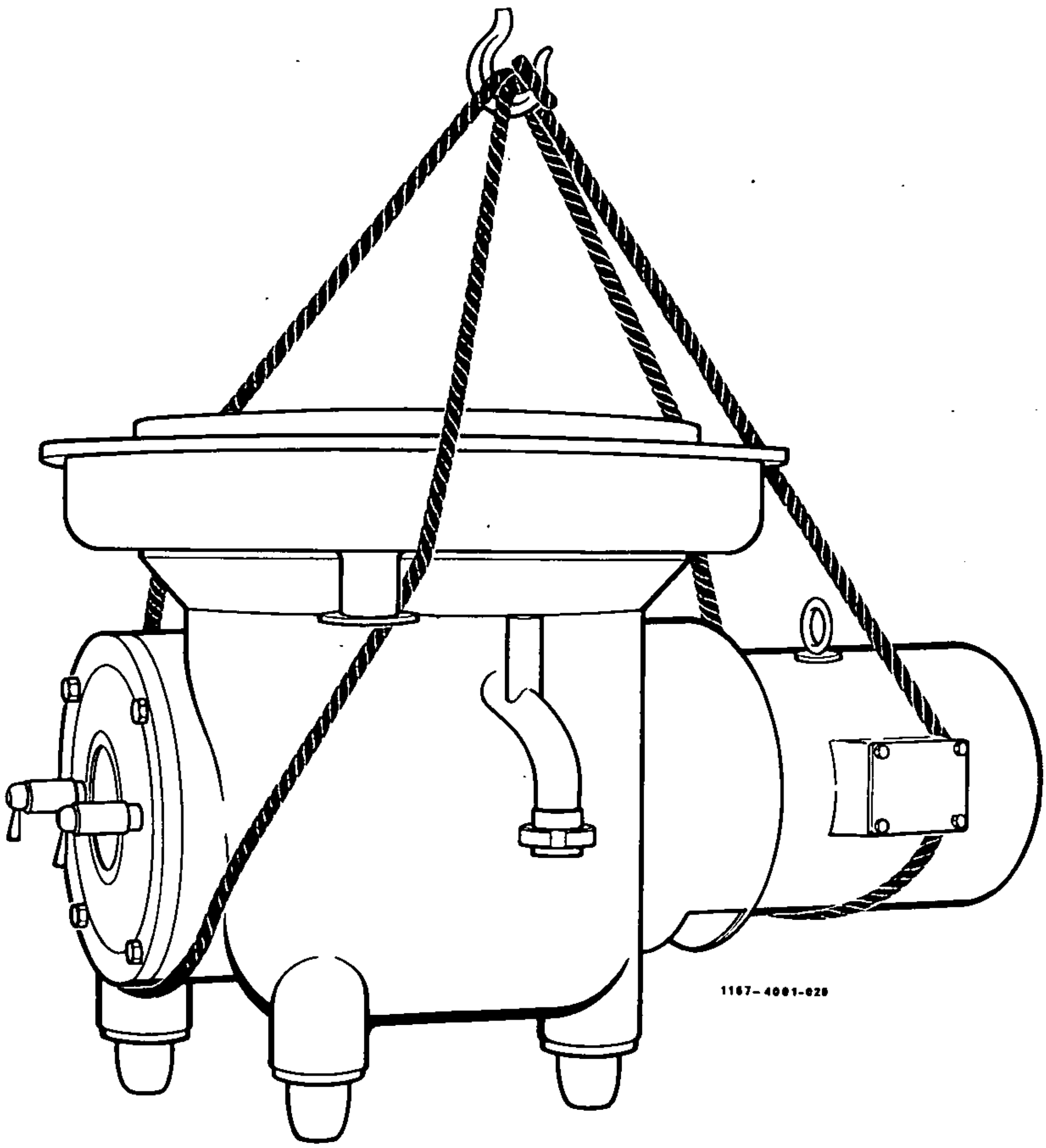
List of Parts

W O R K I N G   I N S T R U C T I O N S

1. Installation

1.1. Transport

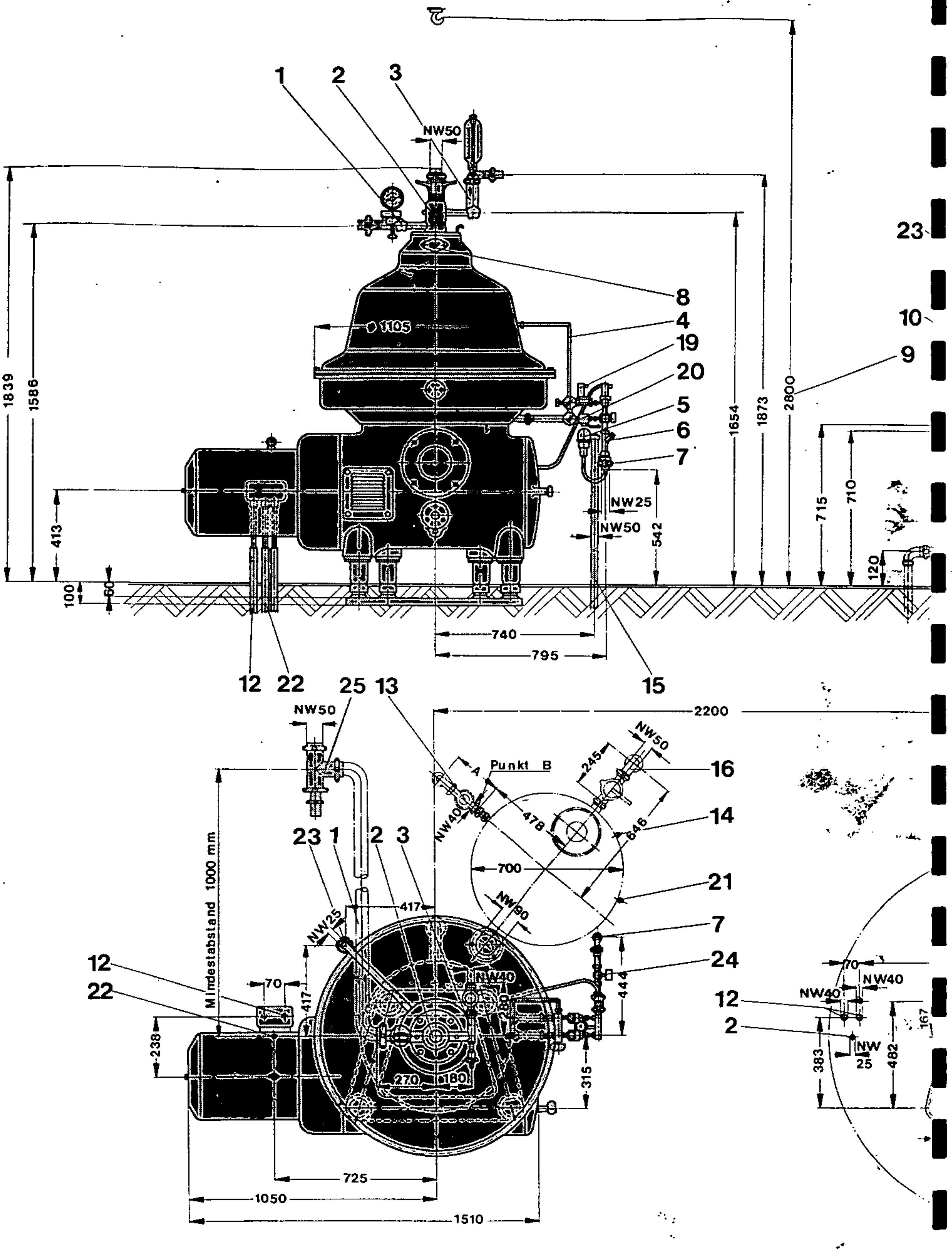
Suspend the separator as shown in fig. 1/1. To prevent ropes from slipping, wind part of a rope around the crane hook. When lowering the separator, make sure it touches down gently.



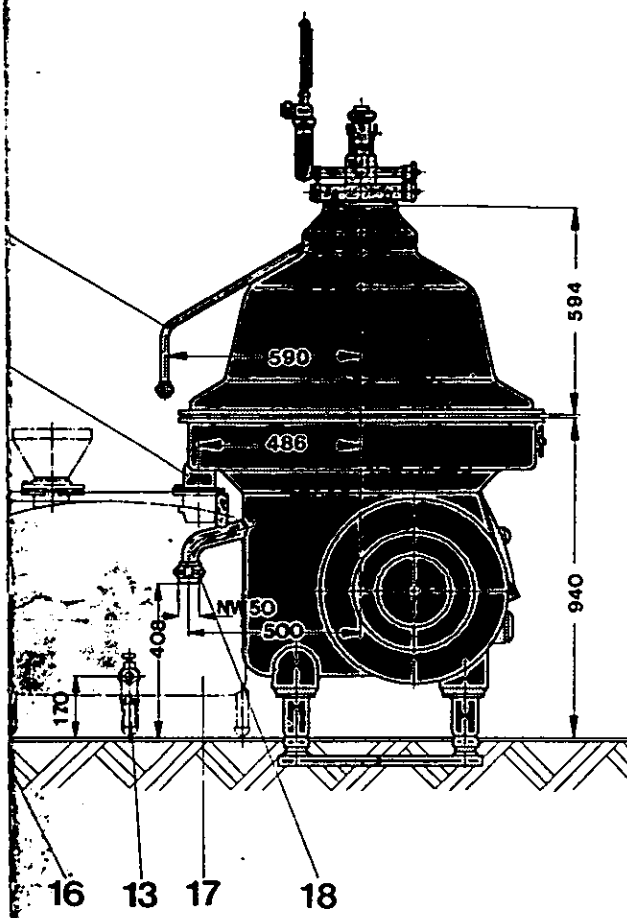
Weight: 1000kg

Fig. 1/1

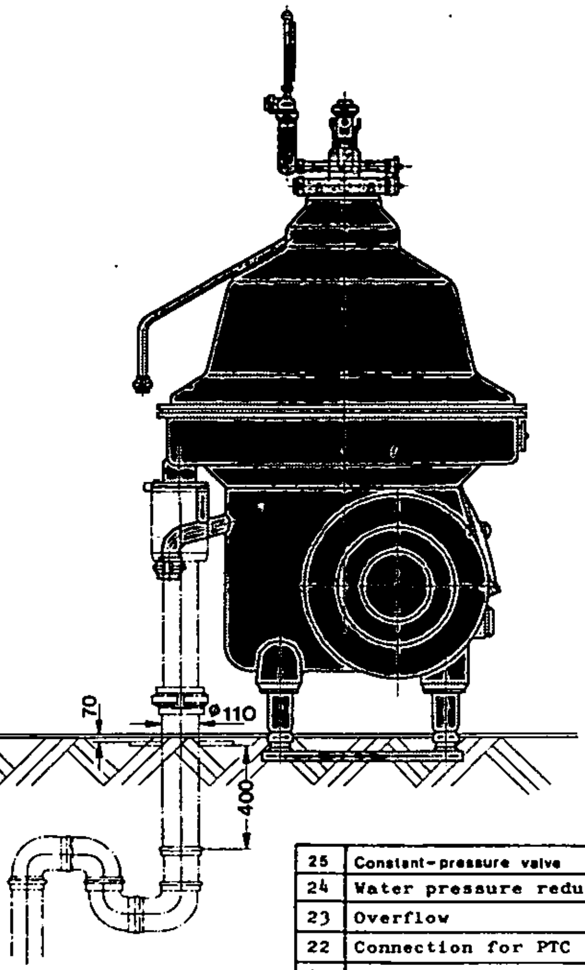
Dimensioned Drawing (For installation plan of flow constrictor refer to page 22/2)

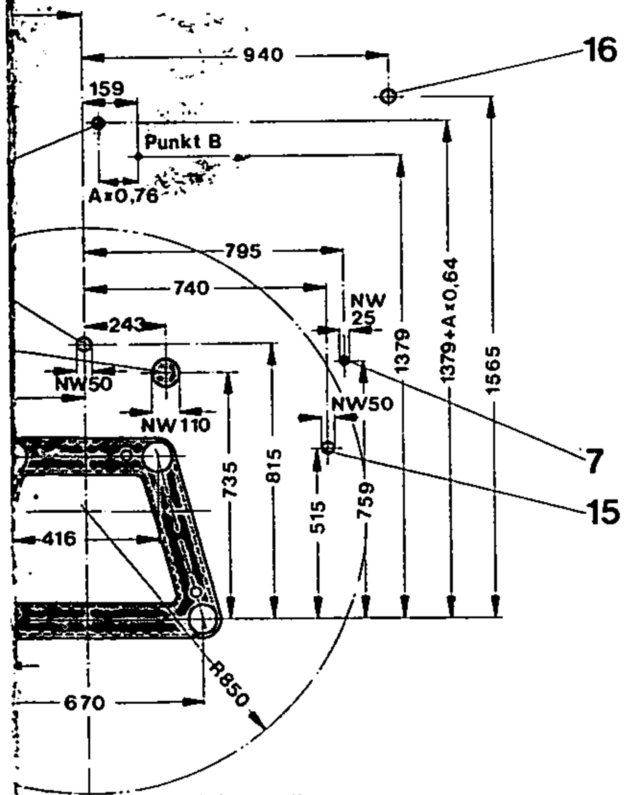


Separator with sterilizing vessel
Separator mit Sterilisiergefäß



Separator with sediment discharge through floor
Separator mit Deckendurchführung





Aktionsradius des Trommelschlüssels

Radius of action of bowl wrench

25	Constant-pressure valve
24	Water pressure reducing valve
23	Overflow
22	Connection for PTC resistors
21	Connection for telethermometer
20	Quick-acting valves
19	Solenoid valves
18	Operating-water discharge
17	Sterilizing tank
16	Outlet (sterilizing tank)
15	Power supply for selenoid valves and pressure switch
14	Thermometer (sterilizing tank)
13	Steam supply (sterilizing tank)
12	Power supply for motor
11	Sediment disposal through floor (if required)
10	Sediment discharge
9	Minimum lifting height for hoist
8	Overflow inspection cover
7	Operating-water feed
6	Strainer
5	Pressure switch
4	Flush line
3	Cream discharge
2	Feed
1	Skim milk discharge
A	This dimension depends on make and type of fittings.
	Bowl speed: 4500 rpm
	Weight of complete machine (net): 2150 kg
	Minimum lifting capacity of hoist: 500 kg
	Skimming capacity: 15,000 l/h
	Motor power: 22kW (30 hp) 50 Hz

Dimensioned Drawing

1.2. Installation

When installing the separator make sure that sufficient room is available (at least 15") for mounting and removing the motor and for removing the horizontal drive shaft which is to be pulled out towards the brake side.

Do NOT install a shut-off device in the line which will be connected to the operating-water discharge line 5a-c (fig. 13/1). The line should have 2" I.D. It should have sufficient fall and must NOT be too long to allow the discharging operating-water to flow off freely, since otherwise the water will rise and enter the upper section of the frame, resulting in slowing-down of the bowl.

The supply line to the operating-water connection should have 1" I.D., the operating-water pressure should be approx. 21 psi. The pressure must not fluctuate by more than 7 psi. Operating-water consumption: 50 litres/h.

For mounting and removing the bowl parts, a 500 kg hoist (minimum lifting height 2.8 m; see installation plan) will be indispensable. On request a WESTFALIA Swing Crane can be supplied.

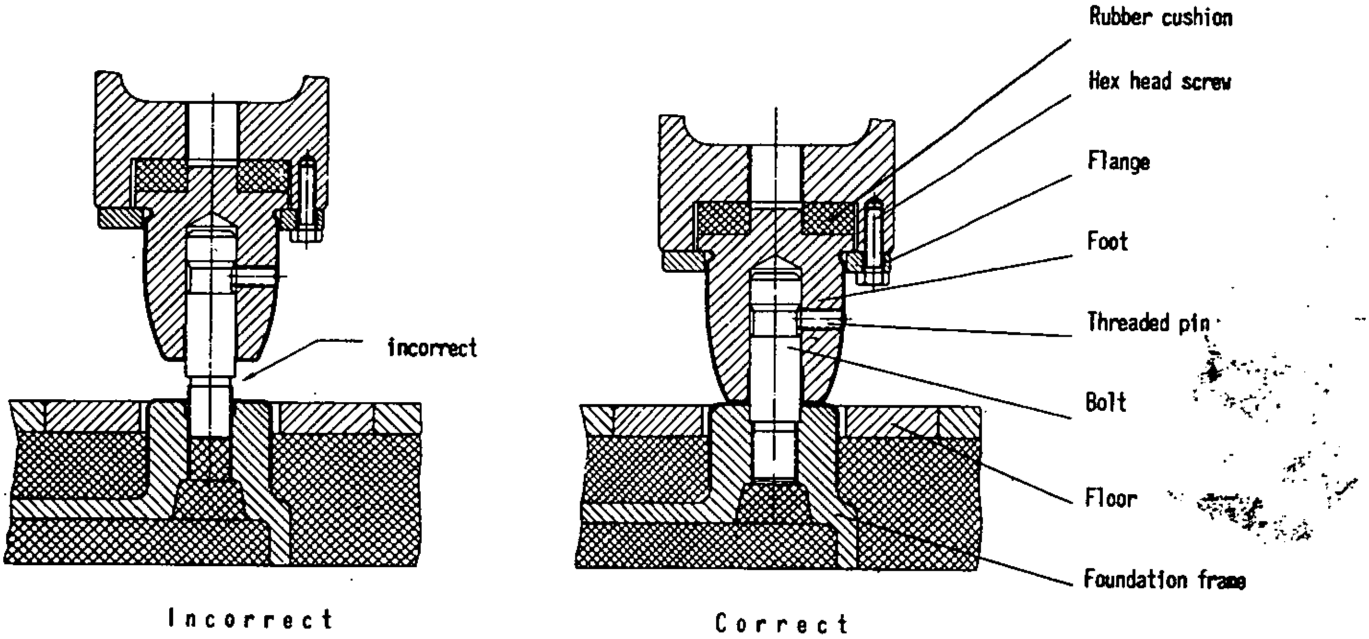


Fig. 1/2

Screw bolts into the four mounting blocks of foundation frame; make sure they are tight. Embed the foundation frame in the floor so that the mounting blocks of the frame protrude above the plane of the floor by about 5 mm = 0.2". Fill up the space below the foundation frame with concrete. Make sure that the mounting blocks are absolutely level and grout the frame with concrete, inside and outside. To accelerate setting of cement, commercial rapid binding agents may be used.

By means of flanges and hex head screws fasten feet with fitted-on rubber cushions to separator frame. Then lift the separator frame with its feet onto the bolts of the foundation frame and tighten the threaded pins with a wrench.

2. Lubrication

2.1. Lubrication of bearings and gear parts

All bearings and gear parts are splash lubricated from a central oil bath

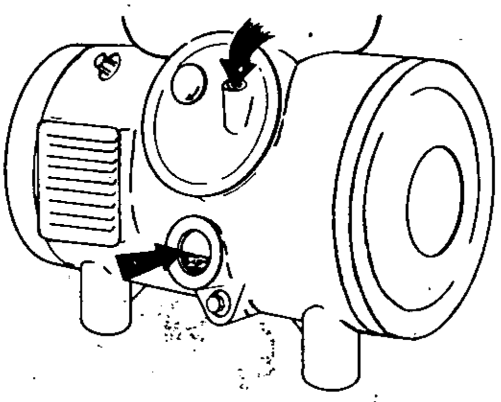


Fig. 2/1

OIL LEVEL

Before initial start-up of separator, fill gear chamber with oil. To do this, remove upper sight glass and fill in oil until oil level is slightly above middle of oil level sight glass. About 5.5 litres of oil are required for one filling. During operation oil level must never be allowed to sink below middle of oil level sight glass; refill oil when necessary.

OIL CHECK

Check oil level once a week.
From time to time check if oil contains water. To do this, loosen oil drain screw and allow a small amount of oil to drain. An immediate oil change becomes necessary when the oil shows a milky colouring (emulsification).

OIL CHANGE

Make first oil change after about 250 operating hours; then change oil every 750 operating hours. However be sure not to wait longer than 6 months to change the oil.

Each time when carrying out oil change, thoroughly clean gear chamber and flush with thin-bodied oil, prior to filling in new oil. Remove all metal particles from inner walls and corners of the gear chamber. Do NOT use fluffy cleaning rags or cotton waste. The sight glass should also be cleaned, as a layer of oil will probably have deposited on the inner side of the glass and this is easily mistaken for the oil level.

LUBRICATING OIL

As lubricating oil use only a gear oil designated

C-LP 114 (according to DIN 51502)

or designated

ISO VG 220 (according to ISO/DIS 3448). – CARTER EP 220 FORD FUELS

The lubricating oil shall meet the following requirements:

1) Viscosity: 114 ± 8cSt at 50°C, (220 ± 22 cSt at 40°C)

2) Additives:

a) additives giving increased protection against corrosion and increased resistance to aging, - with properties preventing corrosion on steel according to DIN 51355/B, degree of corrosion 0. Corrosive effect on copper according to DIN 51759/100 A3, degree of corrosion 1.

b) additives for decreasing wear and increasing the load-carrying capacity. The "FZG" gear rig test according to DIN 51354 as well as the test according to A/16.6/90, load grade > 12, must have been passed.

3) Demulsifying behaviour according to DIN 51599: < 60 minutes.

The gear oil designated "Separator lubricating oil C-LP 114" which has been extensively investigated by us meets the above requirements and should preferably be used. For the order number refer to page 20/1 of the parts list.

2.2. Lubrication of the motor bearings

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

3. Motor Connection

3.1. Three-phase AC motor, 17 kW

The separator is driven by a flange type motor via a fluid clutch. The motor is started by means of an automatic star-delta switch. Switching over from star to delta connection takes place after approx. 4 seconds.

Motor protection is ensured by PTC resistor type temperature feelers incorporated in the winding of the motor. They have to be connected to an appropriate tripping unit.

When testing for continuity, do NOT use a test lamp but only an ohmmeter. External voltage higher than 2.5 volts must not be applied to the terminals of the temperature feelers.

The measuring circuit line (between tripping unit and motor) should be laid separate from other lines.

The starting current of the motor can reach 1.8 times the value of the rated current. Dimensioning of switches, wiring, and fuses should, therefore, be based upon the starting current and not on the rated current.

3.2. Direction of rotation of the bowl

IMPORTANT: The bowl must rotate in clockwise direction when looked at from above. The direction of rotation of the bowl is correct, when the square-head screw on motor shaft end rotates in direction of arrow. The direction of rotation is reversed by interchanging two lead-in wires.

3.3. Speed and starting time of the bowl

The bowl speed is 6450 rpm. It is indicated by the RPM meter (see 3.4).

Starting of the bowl takes about 7 minutes.

3.4. RPM Meter

The RPM meter monitors the bowl speed. It consists of a proximity switch, a measuring instrument, and an indicating instrument with a limit value relay.

If the bowl speed drops below 6350 rpm because the clutch is defective or the bowl has opened irregularly, the milk pump is switched off automatically and an alarm is given. If the bowl fails to reach the operating speed of 6450 within the pre-set starting time of 8 minutes, the RPM meter prevents starting of the milk pump and triggers a signal.

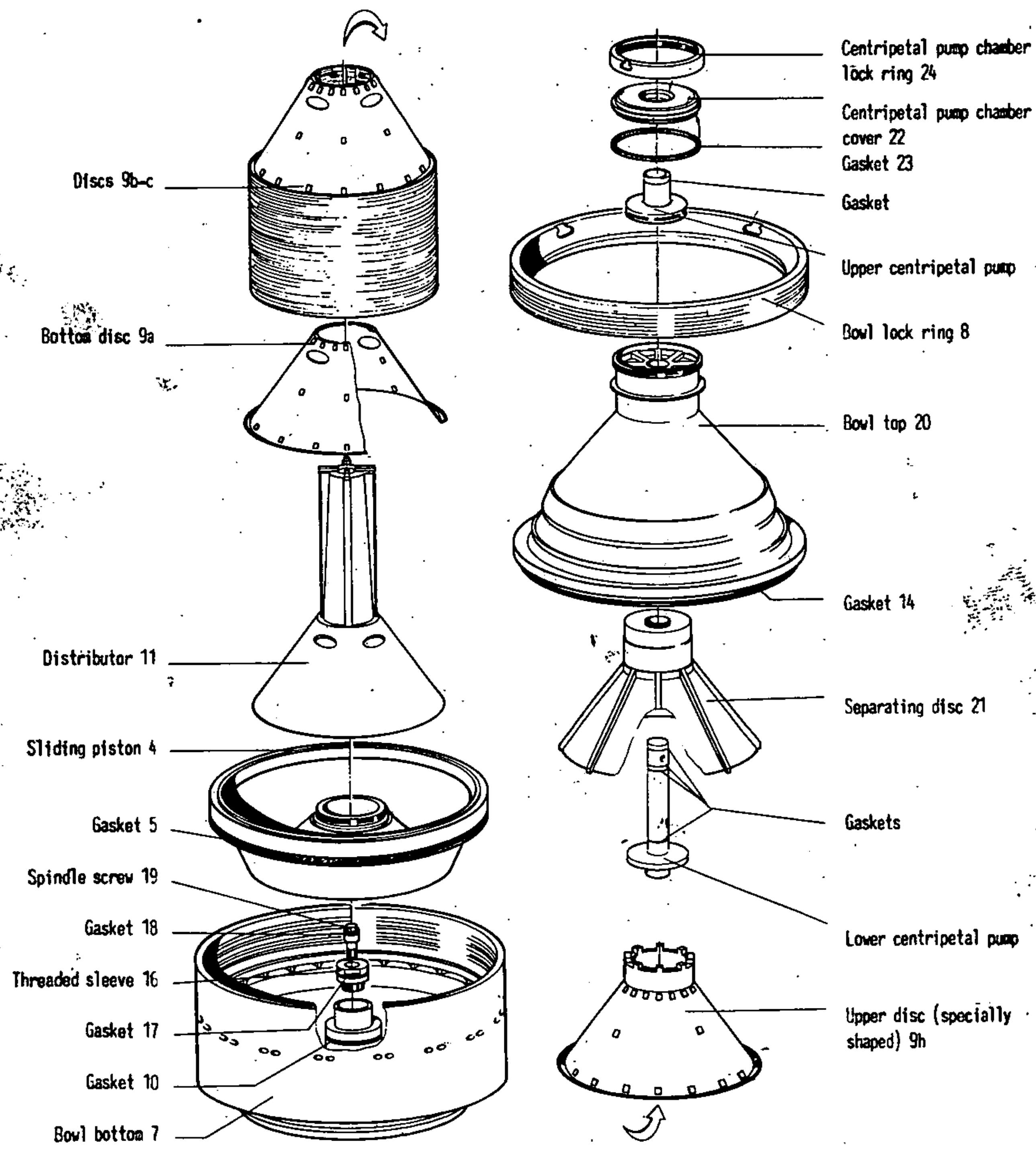


Fig. 4/1

Exploded view of the bowl

4. Bowl and Feed and Discharge Connections

Important Hints

The forces resulting from the high speed rotation of the bowl are likely to endanger the operating safety of the separator if the bowl has been improperly assembled or cleaned. When assembling the bowl, strictly adhere to the instructions given in this manual. In addition, the following should be considered:

- Prior to assembling the bowl parts, carefully clean all contact surfaces and grease them.
- When installing the bowl parts, make sure that the "0" marks of the bowl parts are in line. "0" mark alignment will ensure that the parts are properly positioned and locked in place by arresting pins and guide ribs. To avoid damage to guide surfaces and arresting pins when installing or removing the bowl parts, make sure the hoist is in the correct position. The hoist is to be operated at the low lifting speed. Never use violence when installing or removing the bowl parts.
- Before inserting the gaskets, check them for wear. Make sure that grooves and gaskets are clean and that gaskets are in perfect condition. Be careful not to twist the gaskets while inserting them and check to be sure that they fit properly in their grooves.
- If the plant has several separators, be careful not to interchange parts of different bowls, since each bowl has been balanced with its component parts. The parts of a bowl are marked with the serial-number of the separator or with the last three digits of the serial-number.

4.1. Assembly of the bowl (for tools refer to page 20/2)

1) Oil the upper part of the worm spindle (thread, cone and cylindrical guide surface for the spindle cap). It must be possible to move the spindle cap easily up and down on the spindle. Then clean and wipe dry the conical part of the spindle with a smooth rag. Carefully clean the inside of the bowl hub as well to assure proper fitting.
2) Use jack 436 to place bowl bottom 7 onto the spindle.
3) With the aid of wrench 402 screw threaded sleeve 16 (with inserted gasket 17) into the bowl bottom (left-hand thread).
4) Screw spindle screw 19 (with inserted gasket 18) tightly into worm spindle (left-hand thread), using wrench 410.
5) Insert gasket 10 in hub of bowl bottom.
6) Thoroughly clean groove in sliding piston 4 for gasket 5 and apply a thin film of grease.

   In case the gasket is new and a bit too tight, stretch it out equally all the way around until its outer diameter is almost equal to the outer diameter of the groove in the sliding piston.

   Then put the gasket into the groove of the sliding piston. Stick a screwdriver under the gasket and run it around the sliding piston two or three times (see fig. 4/2). Then tap the gasket back into its groove with a rubber hammer.

   The gasket is now equally stretched all the way around and assures best sealing effect during operation.

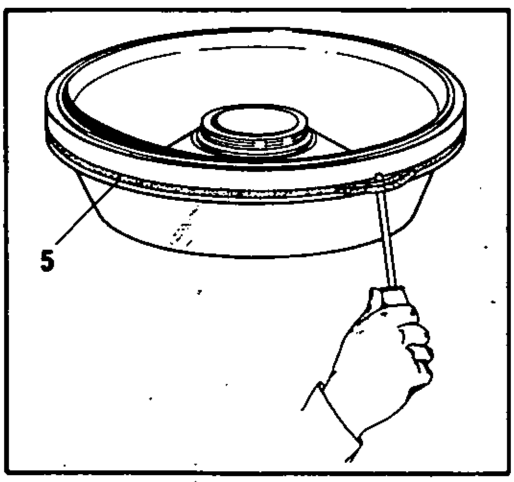


Fig. 4/2

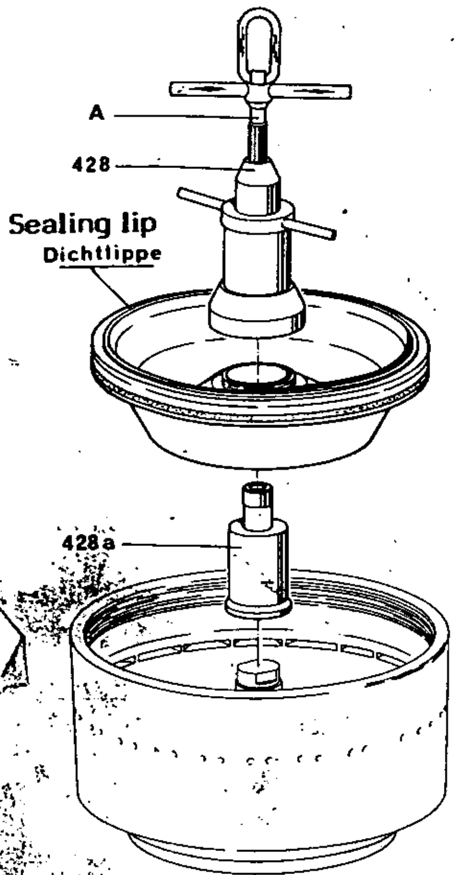


Fig. 4/3a

7) **Fig. 4/3a:** Lightly grease guide surfaces of sliding piston and of bowl bottom with the supplied lubricating paste. Place pressure piece 428a onto hub of bowl bottom. Make sure that arresting pins of bowl bottom fit into holes of pressure piece. Then install the sliding piston with the aid of jack 428. The "O" marks must be aligned. By turning jackscrew "A" counter-clockwise, lower the sliding piston slowly until the arresting pins of the bowl bottom catch into the holes of the sliding piston.

   CAUTION: Be careful not to damage sealing lip of sliding piston.

8) Place distributor 11 into bowl bottom, using mounting tool 434. Make sure that the three arresting pins of the bowl bottom fit into the recesses of the distributor. The "O" marks of both parts must be aligned.

9a) Stack discs 9a-c onto the neck of the distributor in numerical order, beginning with No. 1.

9b) Place on upper disc 9h (specially shaped).

10) Place lower centripetal pump (with inserted gaskets) onto the distributor.

11) Mount separating disc 21. Make sure the "O" marks on separating disc and on bowl bottom are in line with each other.

12) Use device 427 to place bowl top 20 (with inserted gasket 14) onto the bowl bottom. Make sure the arresting piece of the bowl bottom fits into the groove of the bowl top. The "O" marks of both parts must be in line with each other.

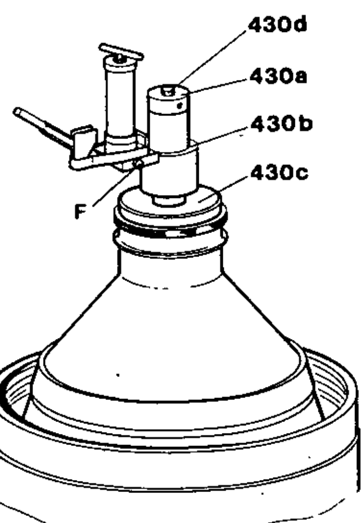


Fig. 4/3b

13) Carefully clean, wipe dry and grease threaded areas of bowl bottom and of bowl lock ring 8 as well as the contact surfaces, to prevent seizing of the threads. For greasing use the supplied lubricating paste; apply a thin film only.

14) Before screwing in the bowl lock ring, compress the disc stack by means of compressing device 430 (fig. 4/3b) in the following manner (see also sect. 4.6):

   a) Place disc 430c onto the bowl top.

   b) Screw bolt 430 d into the distributor all the way down.

   c) Insert hydraulic compressing device 430b in centering recess of disc 430c.

   d) Screw on threaded ring 430a and tighten it so that its upper edge is flush with end thread of bolt 430d.

CAUTION: To avoid damage to the threads due to pressing, the bolt must be screwed in and the threaded ring screwed on all the way. If the threaded ring cannot be screwed down completely, then the piston and the cylinder of the compressing device prove to be too far apart. To bring them back into "0" position, loosen screw "A" by two turns and move the pump lever to its lowest position. Now you can screw down the threaded ring, thereby bringing piston and cylinder into proper position.

19) Check to be sure that all screw connections of the compressing device are tightened securely and that return duct of check valve is closed by means of screw A.
Prior to the first use of the compressing device, fill oil container of pump with oil and de-aerate the hydraulic chamber (see 4.6).

20) Actuate the lever of the piston pump until the pressure gauge indicates 330 - 360 bars. While lowering the bowl top, be careful not to tilt it. The arresting piece of bowl bottom must fit into groove of bowl top.

21) Use annular wrench 425 and lifting device 431 to place bowl lock ring onto bowl bottom (see fig. 4/6). Screw in bowl lock ring with the aid of the annular wrench (without, however, hitting the wrench handle with the mallet) until "0" mark on ring and "0" mark on bowl bottom are 3 to 5 cm apart. Then hit wrench handle with the mallet to obtain "0" mark alignment.

NOTE: If the lock ring can be tightened by hand, with the aid of the annular wrench so that the distance between the two "0" marks is less than 3 cm, a spare disc has to be added because the pressure in the disc stack has slackened (see 4.1 No. 10). If the distance between the "0" marks exceeds 5 cm, check if all bowl parts are properly locked in place. If the pressure exceeds the maximum value stated above, although the bowl has been properly assembled, it can be reduced considerably by greasing the spacers on the discs (e.g. with cream).

22) Bring pump lever down into its lowest position, to prevent it from jumping back. Only then, loosen screw A to enable the oil to return from the hydraulic cylinder into the oil container. Then unscrew threaded ring 430a, remove the compressing device and disc 430c, and unscrew bolt 430d.

23) Install skim milk pump.

24) Insert gasket 22 in centripetal pump chamber cover 21.

25) Install centripetal pump chamber cover 21; make sure that arresting pin of bowl top catches into recess of centripetal pump chamber cover.

26) Screw on centripetal pump chamber lock ring 23 (left-hand thread) and tighten it by hitting handle of annular wrench 426.

27) Check if bowl can be turned by hand.

4.2. Assembling the feed and discharge connections

1) Fasten lifting device 435 (fig. 20) to hood by means of cap nuts 41h. Use hoist to place hood on sediment collector in such a manner that "O" marks of sediment collector and hood are in line. Connect flush lines. Fasten hood to sediment collector with hex head screws 41b.

2) Place skimmilk discharge with inserted gaskets 2d and 2u (fig.18/1) on to hood and fasten it with cap nuts 41h.

3) Place cream discharge with inserted gaskets 7a,b,d into skimmilk discharge.

4) Move locking device of handle connection piece upwards. Screw on handle connection piece (left-hand thread) and tighten it firmly. While tightening, block feed tube with wrench 429 (fig. 20). Then turn locking device until it snaps in. Handle connection piece is now properly locked in position.

5) Connect feed and discharge lines.

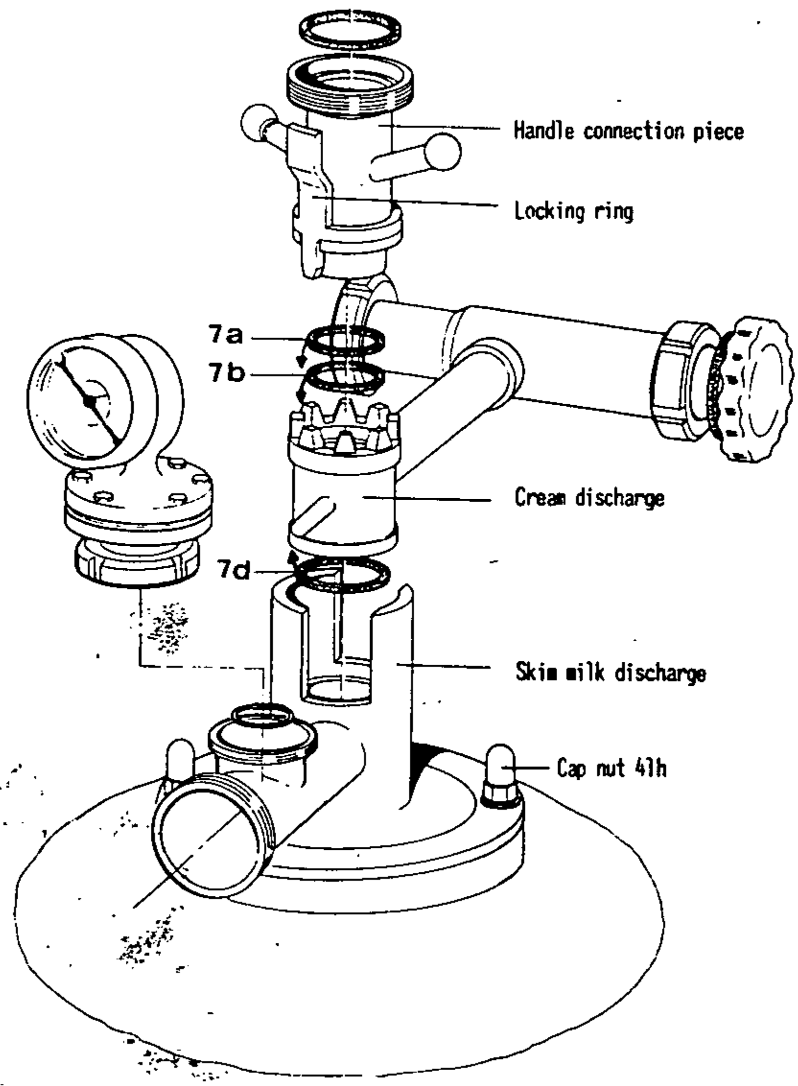


Fig. 4/4

4.3. Removing the feed and discharge connections Dismantling the bowl

CAUTION: To avoid accidents, do NOT loosen any part of the separator or of the feed and discharge connections before the bowl has stopped completely.

Wait until the worm wheel has ceased rotating so that lubricating oil no longer splashes against the sight glass. You can then be sure that the bowl has stopped rotating.

For removal and dismantling proceed in reverse order of assembly (see 4.1 and 4.2) and according to the following instructions:

Handle bowl parts with care.

Be sure to replace worn gaskets.

Before opening the bowl release the brakes by turning the two handles in clockwise direction.
After having unscrewed the small lock ring and removed the centripetal pump chamber cover and the upper centripetal pump, compress the disc stack by means of the hydraulic compressing device (see 4.1 No. 16 - 20) in order to facilitate loosening of the lock ring.

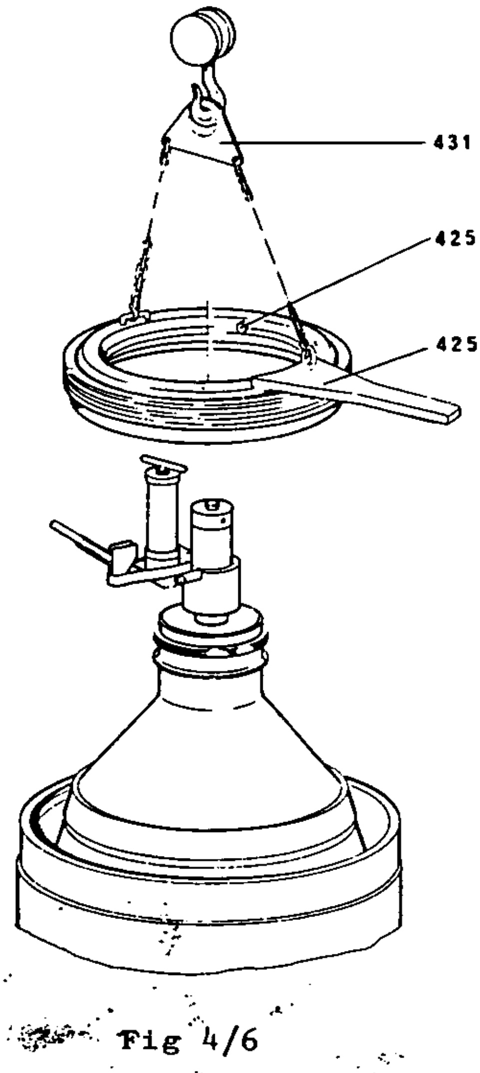


Fig 4/6

Unscrew bowl lock ring (left-hand thread) with annular wrench 425. Loosen the ring by hitting the wrench handle with mallet 405. Then remove disc stack compressing device (see 4.1 No. 22).

Fig. 4/6

Lock annular wrench 425 by screwing hex head screw 425a into groove of bowl lock ring. Then lift off annular wrench and lock ring with the aid of device 431.

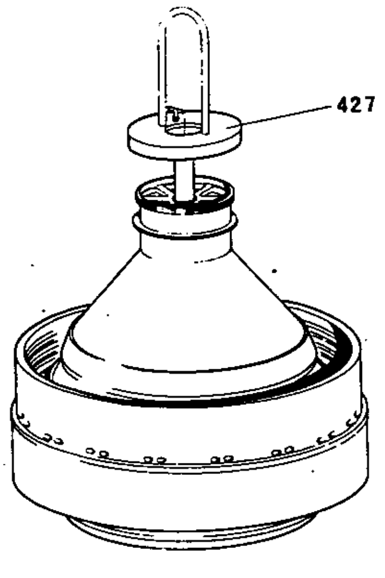


Fig. 4/7a

Fig. 4/7a:

Screw device 427 onto bowl top and, by means of a hoist, remove bowl top from bowl bottom.

If the separating disc is stuck in the bowl top, rap bowl top with a copper or light metal hammer until the separating disc comes loose. Do NOT let it drop on the floor.

If the separating disc cannot be detached in this manner, proceed as follows: Place the bowl top on a wooden surface. Pass a brass mandrel through the outer holes in the upper part of bowl top and place it on the outer edge of the separating disc. Detach the separating disc by slightly hammering the mandrel. Do NOT place a mandrel on the inner edge of the separating disc.

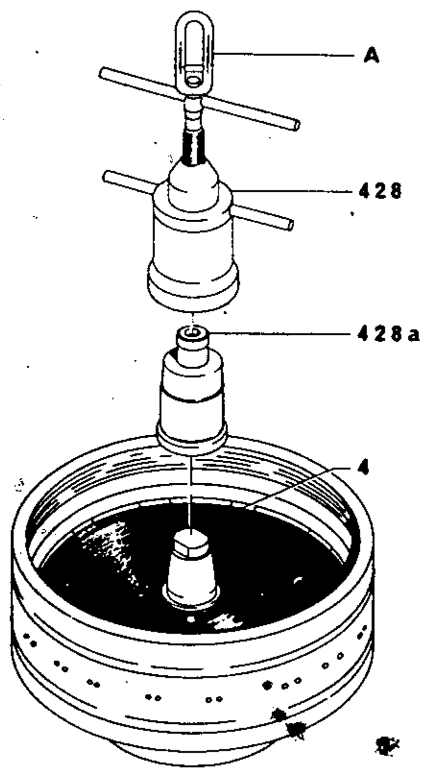


Fig. 4/7b

Fig. 4/7b:

Place pressure piece 428a on bowl bottom in such a manner that arresting pins of bowl bottom catch into holes of pressure piece. Screw jack 428 onto sliding piston. Turn jack screw in clockwise direction in order to pull the sliding piston off the bowl bottom. Then lift out the sliding piston.

4.4. Removal and Installation of Polyamid Gasket 15 (fig. 19)

4.4.1. Removing Polyamid gasket from bowl top

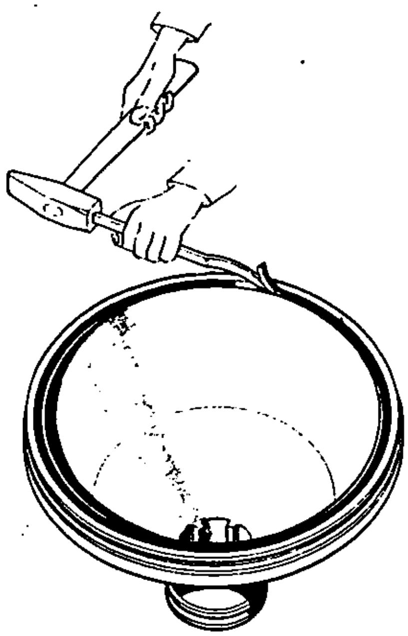


Fig. 4/8a

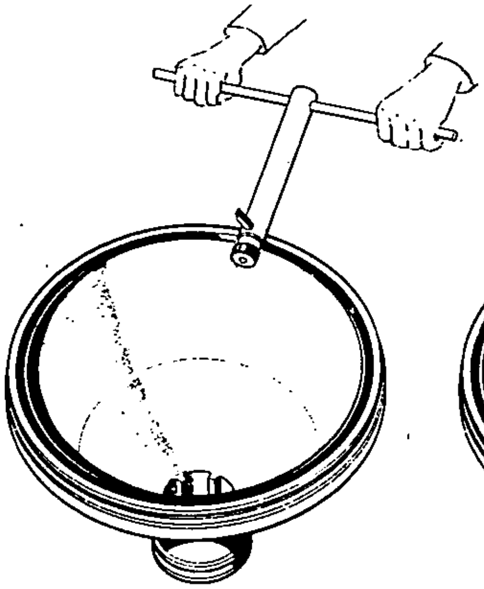


Fig. 4/8b

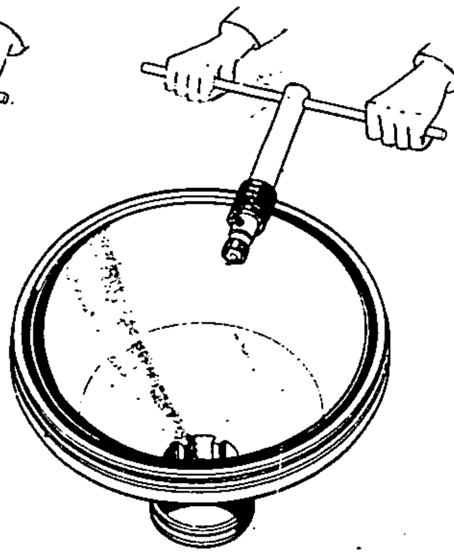


Fig. 4/8c

1) For about 10 minutes warm up gasket with a jet of hot water or steam (70 - 100°C).

2) Carefully cut the gasket with chisel 432 and lift a few inches of the gasket out of the groove (fig. 4/8a).

3) Put the end of the gasket through the hole of tool 419 (fig. 4/8b). By means of this tool roll up the gasket as shown in fig. 4/8c.

4.4.2. Installing the Polyamid gasket in the bowl top

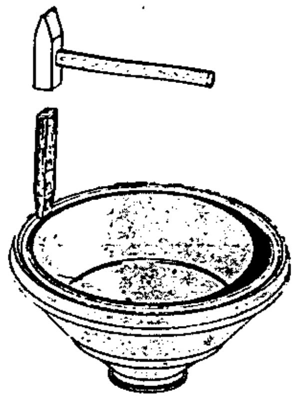


Fig. 4/9a

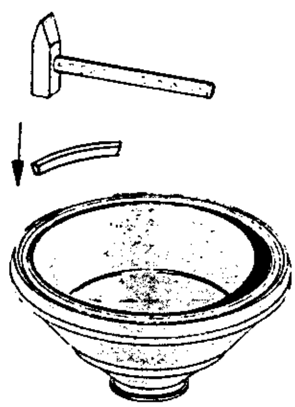


Fig. 4/9b

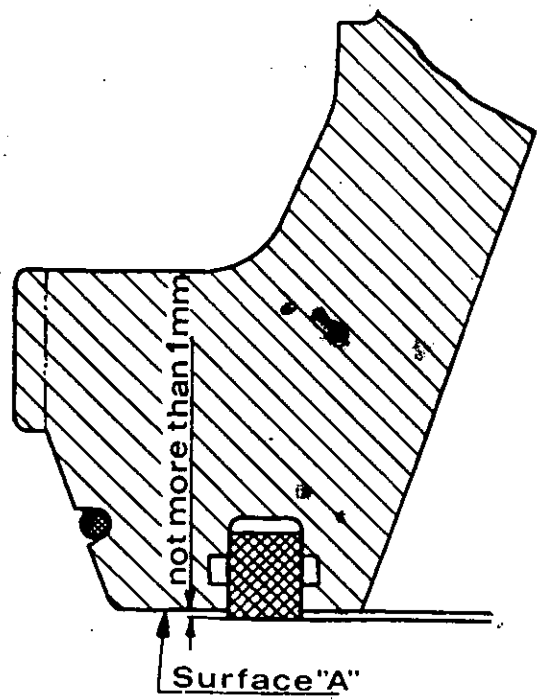


Fig. 4/9c

1) Keep gasket for about 5 minutes in 176°F water to warm it up.

2) Wipe the gasket dry.

3) Insert gasket (with its narrow side facing the bowl top) in the clean groo of bowl top. Place a piece of hard woo (fig. 4/9a) or a piece of the old Poly mid gasket (fig. 4/9b) on the new gask and hammer the gasket evenly into the groove until its sealing surface protrudes from surface "A" of bowl top by not more than 1 mm (fig. 4/9c). If the gasket protrudes by more than 1 mm, it will be very difficult to properly clo the bowl lock ring so that its "0" mar is in line with the "0" mark on the bo bottom.

4) After assembling the separator, preven air circulation in the separator by

   a) closing pipe connection 10 (fig. 13

   b) closing the milk feed line (by mean of a cock or a blind cap),

   c) closing the skim milk and cream valves.

   Frame drain and air vent on frame drai must NOT be closed.

5) Let the separator run for about one hour, with closed operating-water feed During this time, the bowl material wi be heated up by air friction to about 194°F, at which temperature the Polyam gasket will become pliable.

6) Now close the bowl by feeding operatin water. Through the upward movement of the piston the warmed-up gasket will b pressed into the anchor grooves.

7) About 15 minutes after closing the bow feed cold water to the bowl.

8) Be sure to re-open the sediment discharge (pipe connection 10, fig. 13/1) before sediment ejection takes place.

4.5. Removing the piston valve

Remove piston valve assembly 3a-f once a month for cleaning. On this occasion check the gaskets and replace them, if necessary.

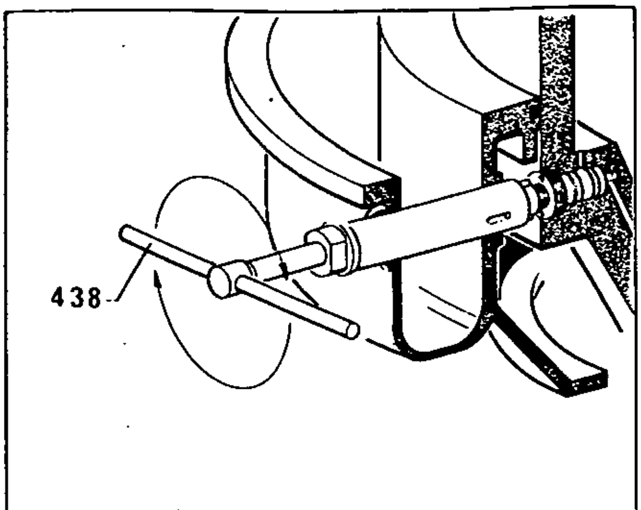
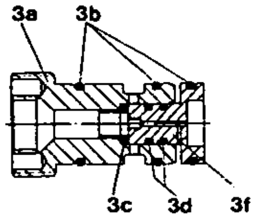


Fig. 4/10a



Screw wrench 438 into piston valve.

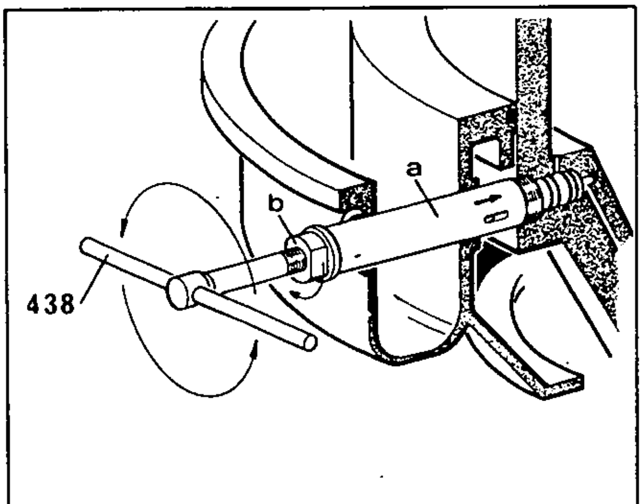


Fig. 4/10b

Introduce pins of bush a of wrench 438 into boreholes of valve. Tighten nut b. Then unscrew piston valve by means of wrench 438.

Before installing the valve, moisten gaskets 3b and grease threaded area. Then screw in valve as far as it will go. However, be sure not to screw it in too tightly.

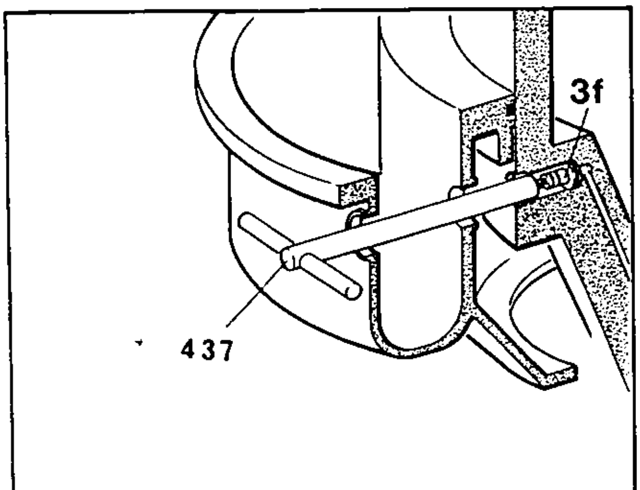


Fig. 4/10c

Screw wrench 437 into valve piston 3f and withdraw piston from bowl bottom.

4.6. Hydraulic disc stack compressing device (fig. 4/12)

4.6.1. Working principle

By means of pump 1, oil is conveyed under high pressure into hydraulic chamber 2. Due to the increase of pressure in this chamber, cylinder 3 is pressed against ring 5 on bolt 6 which is tightly threaded into the distributor, while piston 4 is forced downwards, thus compressing the disc stack via disc 7.

4.6.2. Oil pump

Oil pump 1 is designed so as to produce a pressure of up to 400 bars It consists of oil container 1b, pump head 1a, and check valve 1d. The holding capacity of the oil container is 350 cm^3.

Oil filling: Before using the compressing device for the first time, unscrew cover 1c and fill the oil container with oil. Then screw on the cover and tighten firmly.
Then de-aerate hydraulic chamber 2. To do this, loosen vent screw 8 and actuate the oil pump until oil escapes through the vent hole. Then re-tighten the vent screw.

4.6.3. Hydraulic fluid

As hydraulic fluid, the lubricating oil furnished with the separator designated C-LP 114 (106-122 cSt/50°C), can be used.

4.6.4. Pressure gauge

The hydraulic pressure excerted upon the disc stack can be read from pressure gauge 10 (measuring range 0 - 600 bars) which is fitted to check valve 1d.

The pressure required to compress the disc stack ranges between 330 and 360 bars.
It may be higher than 360 bars, but must not be lower than 330 bars. The maximum permissible pressure is 390 bars.

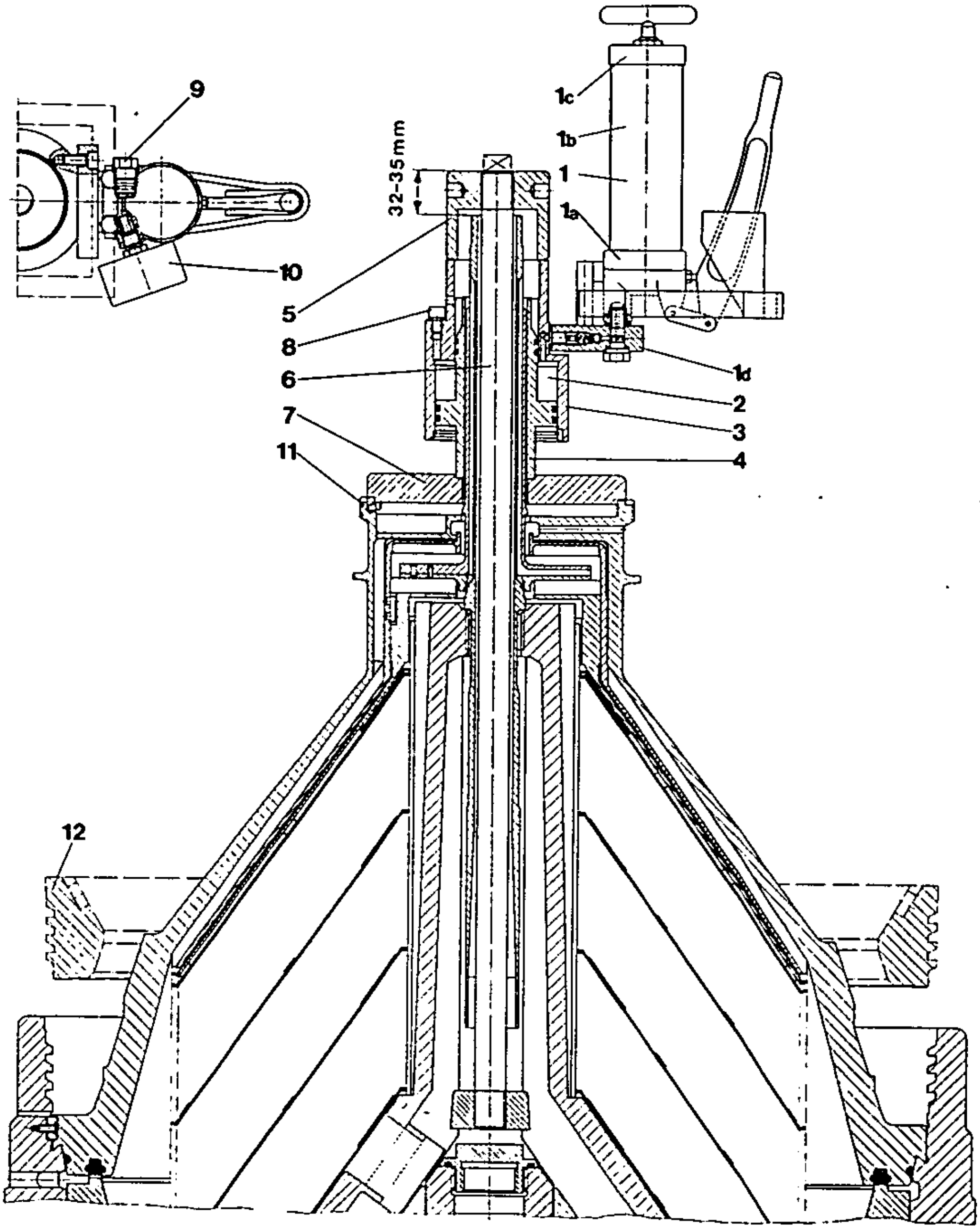


Fig. 4/12
Disc Stack Compressing Device

5. Technical Information

5.1. Functioning of the hydraulic system of the bowl

The self-cleaning bowl is equipped for ejecting the sediment during operation. Dirt particles accumulate in the conical space 11 of the bowl from where they are automatically discharged through ejection ports in the bowl bottom at pre-determined intervals.

The sliding piston 4 is hydraulically actuated to open and close the bowl ports. The water pressure created in the filled sealing chamber 3 keeps the bowl closed. When water drains out of the sealing chamber after opening of the opening-water valve, the product pressure above the piston pushes the piston down and opens the bowl ports.

Sealing of the bowl:

When the bowl has reached the speed necessary for developing the hydraulic pressure (after about 3 minutes), the main switch of the timing unit is to be closed, whereupon the sealing-water valve opens for 60 seconds. The sealing water flows into sealing chamber 3 underneath the sliding piston. The water pressure in the sealing chamber pushes the sliding piston upwards and presses it against gasket 9, thus sealing the bowl.

The sealing chamber is sealed off by valve piston 7 which is pressed through centrifugal force against gasket 8 and thus seals water discharge channel 10.

To make up for sealing-water losses, sealing water is supplied every 60 seconds for a period of 1 second, controlled by an electronic impulse relay.

After the bowl has reached its full speed, separation can commence.

Opening of the bowl (sediment ejection):

When opening-water valve is opened for sediment ejection, water flows through channel 5 to valve 6. The water pressure pushes valve piston 7 inwards thus opening channel 10. The water contained in sealing chamber 3 can then flow off (fig. 5/1c). As the liquid level recedes, the sealing pressure acting on the underside of the piston quickly decreases. As soon as it is smaller than the opening pressure acting on the upper side of the piston, the latter is pushed downwards, thus opening the ports in the bowl bottom for solids ejection.

Re-sealing of the bowl:

After sediment ejection the opening-water valve closes and the sealing-water valve opens. Valve piston 7 re-seals discharge channel 10 and sealing chamber 3 fills up with water. The liquid pressure in the sealing chamber exceeds the product pressure in the centrifugation room. The sliding piston is pushed upwards, thus re-sealing the centrifugation room.

The sediment ejections are initiated by the automatic timing unit (see sect. 5.2).

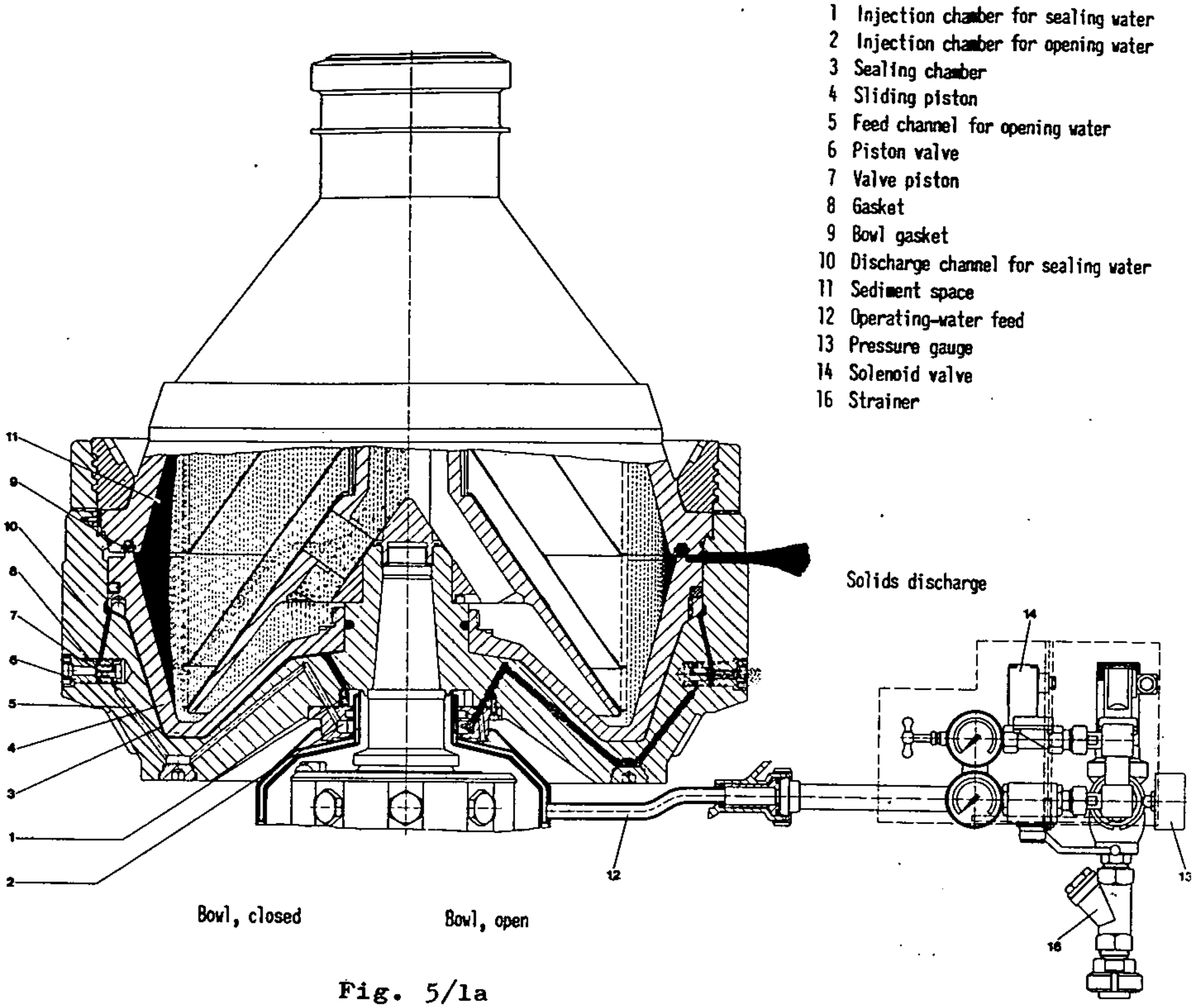


Fig. 5/1a

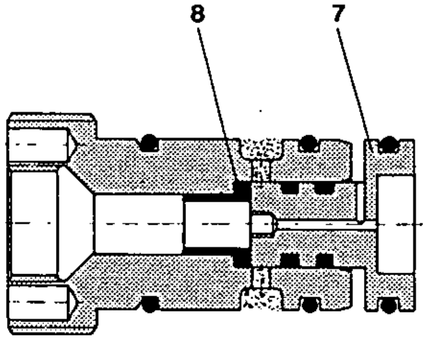


Fig. 5/1b

Functional diagram showing valve during separation.

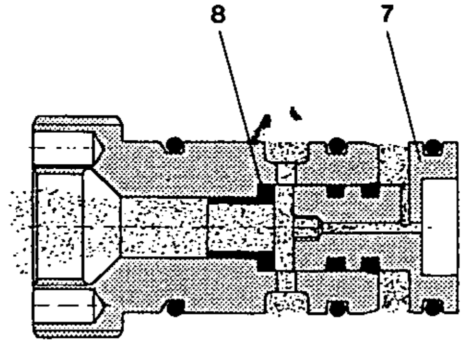


Fig. 5/1c

Functional diagram showing valve during solids ejection.

5.2. Timing unit

Partial sediment ejections during milk processing are programmed by the timing unit TVA 2-M. By pressing the button "Partial de-sludging", the programme in action can be interrupted and a partial ejection process can be initiated immediately.

Complete sediment ejections during cleaning-in-place are initiated manually, by pressing the button "Complete de-sludging" on the timing unit.

For details, refer to the instruction manual "WESTFALIA Timing Unit".

5.3. Operating-water connection

The inner diameter of the supply line to be connected to the operating-water system shall be 1", and the pressure in this line shall be at least 1.5 bars. Pressure fluctuations must not exceed 0.5 bar.

The operating-water connection is provided with a water-pressure reducer K (fig. 5/3) by means of which the line pressure is to be throttled to 1 bar. To adjust the water-presssure reducer, proceed as follows:

1) Open rapid-closing valve D (fig. 5/3) all the way.

2) Adjust pressure with adjusting screw J so that pressure gauge on pressure reducer indicates 1 bar.

3) Close rapid-closing valve D again.

The operating-water must be clean so that at temperatures up to 80°C no precipitations will occur. It may be cold or lukewarm.

The strainer in filter G has to be cleaned from time to time.

The pressure gauges M and N (fig. 5/3) merely serve for checking the closing and opening operations.

5.3.1. Arrangement of the solenoid valves

In addition to the two solenoid valves A and B, the operating-water connection comprises the quick-acting valves D and F, installed in parallel with valves A and B, as well as two shut-off valves a and b. This arrangement allows changing over to manual operation in the event of failure of solenoid valves A or B provided for opening or closing the bowl or in the event of failure of the timing unit. When changing over to manual operation, quick-acting valve D has to be opened to the extent that sealing-water flows out of the operating-water discharge of the frame (see item 18 on dimensioned drawing, page 0/7) at a rate of approx. 50 l/hr in order to ensure continuance of the separating process If the solenoid valves are defective, close the manually operated valves a and b.

Partial sediment ejection, manually controlled

1) Open quick-acting valve D all the way.
2) Open quick-acting valve F in order to open the bowl. As soon as de-sludging noises can be heard, close valve F in order to close the bowl.
3) Throttle valve D to the extent that sealing water flows out of the operating-water discharge at a rate of approx. 50 litres/hr.

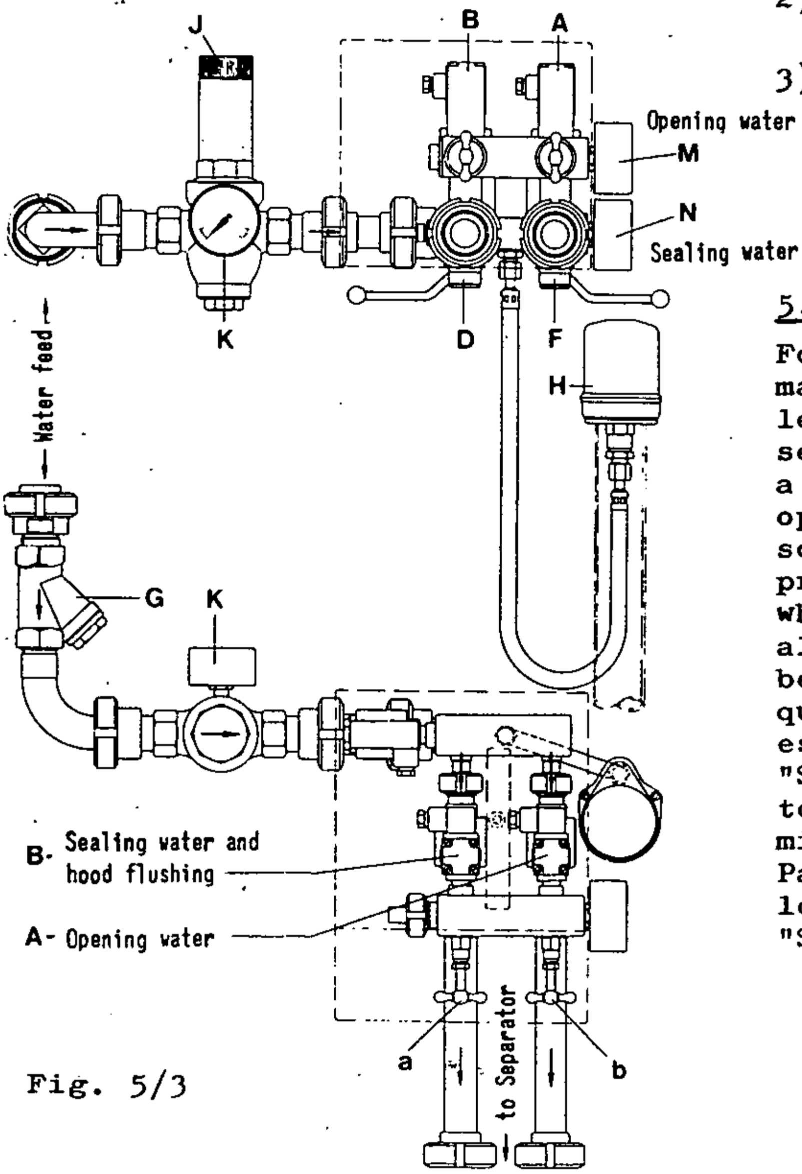


Fig. 5/3

Complete sediment ejection, manually controlled

1) Stop milk feed pump.
2) First open valve D, then open valve F.
3) When de-sludging noises have stopped, close valve F, and after about 5 seconds throttle valve D so that water will emerge from operating-water discharge at a rate of 50 l/h.

5.3.2. Pressure switch

For proper functioning of the automatic control, a pressure of at least 0.6 bar is required while sealing-water valve D is open. At a lower pressure, the bowl will not open or not re-close. For this reason the operating-water line is provided with a pressure switch H which triggers an audible or visibl alarm as soon as the pressure drops below the minimum value. If the required water pressure cannot be re-established immediately, the switch "Separation" on the timing unit is to be set to off-position and the milk supply is to be stopped. Partial de-sludgings will then no longer take place and pilot lamp "Separation" will go out.

5.3.3. How the solenoid valves function (fig. 17/2)

The solenoid valve (straight-way diaphragm valve) has its own pilot system. When the solenoid is de-energized, i.e. when the pilot valve is closed, the water passing from the feed side of the valve through a bore into the chamber above diaphragm 19 cannot escape so that a pressure equivalent to the line pressure builds up above the diaphrag Since the area of the upper side of the diaphragm exposed to water is by the flow area of the valve seat larger than the underside of the diaphragm exposed to the same liquid pressure, the diaphragm is press on the valve seat, thus keeping the valve closed.

Upon energizing of solenoid coil, core 10 is pulled upwards, and the plug is lifted from the valve seat, so that the water is able to escape towards the discharge side of the valve.

Since the diameter of the outlet opening of the chamber above the diaphragm is larger than the diameter of the inlet opening, the water flows out more quickly than it flows in, - resulting in pressure drop above the diaphragm. Through the higher pressure acting on the underside of the diaphragm, the latter is lifted off its seat, thus openin the valve.

When the current is cut off, spring 12 pushes down the magnet core, thus closing the pilot valve. Liquid pressure builds up again above the diaphragm, and the main valve closes.

5.3.4. Maintaining the valves

The solenoid valves do not require special maintenance. However, care should be taken that the magnet heads are always screwed tightly to the top of the valve body to ensure perfect sealing action of the gaskets.

5.3.5. Locating the electric troubles

If it has been found that the control cabinet functions properly and that voltage is present at the valve terminals of the terminal strip while the corresponding timing relay is operating, the trouble will have to be ascribed either to a defective solenoid coil, or to open circuit between terminal strip and valve, or to poor connection.

To repair a defective solenoid coil, pull the magnet housing off the valve top after having removed the coupler socket and loosened the Allen screws. The magnet housing can be mounted on the valve top in four different positions, each displaced by 90°.

The solenoid coil is cast integral with the magnet housing. Therefore if the coil needs replacement, the complete assembly (magnet head, Part-No. 0018-3710-800, page 17/3) will have to be replaced.

6. Operation

6.1. Starting the separator

1) Check to be sure that
   a) brakes are released,
   b) oil level in gear chamber is slightly above middle of sight glass,
   c) hex head screws for fastening the hood and cap nuts for fastening the discharge as well as the connection piece are tightened securely,
   d) skim milk and cream valves are open.
   e) main valve in operating-water line is open.

2) Switch on the motor.

3) Three minutes after start-up of separator turn on main switch of timing unit: the bowl closes.

4) As soon as the bowl has reached its operating speed, which is after about 10 minutes, water can be circulated as it is usually done in dairies. Throttle skim milk valve so as to produce the approximate skim milk pressure and adjust cream valve to approximately the desired cream flow rate.

5) After switching over to milk processing proceed as follows:

   Operate switch "Separation" on timing unit. After having opened the milk feed cock, throttle skim milk valve and, at the same time adjust cream valve to desired cream flow rate. Continue throttling skim milk valve, while maintaining the desired cream flow rate, until slight overflow occurs. To check the overflow, open inspection cover of hood a little. The pressure indicated by the pressure gauge the moment that overflow occurs, is to be considered as maximum pressure. Now re-open the skim milk valve to obtain a pressure of 0.3 to 0.5 bar lower than the maximum pressure. This discharge pressure must be maintained during separation.

   If the separator is equipped with a constant pressure valve, the maximum centripetal pump pressure and, hence, the operating pressure will be adjusted by means of this valve. Daily re-adjustment will then be eliminated.

For the maximum back pressure in the connected processing equipment, permissible for the centripetal pump sizes, refer to page 18/1.

To fully utilize the discharge pressure of the cream pump, e.g. when the separator is used for milk clarification where cream and skim milk are re-combined after separation, adjust the skim milk valve to the highest possible discharge pressure.

When clarifying milk, it may happen that cream with too high a butterfat content emerges from the separator although the cream valve is open and maximum pressure is prevailing in the skim milk line. This indicates that the back pressure is too high for the cream pump. To overcome this difficulty, the backpressure of the equipment downstream the separator has to be reduced or a booster pump has to be installed.
It should be noted that cream with a very high butterfat content, i.e. extremely viscous cream will lead to incorrect flowmeter reading inasmuch as the measuring rod is lifted to a higher level, thus indicating a flow rate that is higher than the actual cream flow.

If there is constant overflow in spite of a low skim milk discharge pressure, check condition of gaskets in centripetal pump chamber cover and in skim milk discharge and check if overlapping edges of centripetal pump chamber cover and of skim milk discharge are damaged at the sealing points.

In some cases, especially when using heaters with a low back pressure, it may be suitable to install in the line after or ahead of the heater a throttling valve and set it to about 1.5 bar in order to ensure foamfree operation of the separator.

The separating temperature should range between 40 and 50°C. If the milk tends to precipitate too great an amount of albumin, a separating temperature of about 35°C may be more suitable.

Possible causes of inefficient separation:

1) Unfavourable pre-treatment of the milk (pumps, agitator, high temperature).

2) Variations in temperature, in bowl speed or in throughflow capacity,

3) Leakage at separating disc,

4) Leakage in discharge lines and at cream pump tube,

5) Re-mixing of cream and skim milk after separation, e.g. caused by leaking cocks in pipe lines connected for drink milk production. Note that during milk separation the drain valve in the connection line must be open.

6) Homogenized return milk added to the raw milk.

Skim milk samples should be taken at the screwed union of the skim milk discharge.

If the trouble cannot be found with the separator or with the equipment ahead of the separator, check condition of chemicals used to analyse the skim milk. To make a test, fill water instead of skim milk into butyrometers.

6.2. Sediment ejection (de-sludging)

6.2.1. Partial sediment ejection (partial de-sludging)

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

To accomplish partial ejection, opening-water is briefly fed to the bowl via solenoid valve A (fig. 5/3). The duration of opening-water supply (= duration of partial ejection: 0.5 to 2 seconds) varies with the amount of ejected sediment and must, therefore, be determined by tests which can be carried through with water. During each partial ejection an additional amount of approx. 0.2 litre/sec. of flush water flows off through the sediment discharge. This amount is to be deducted from the measured total volume.

When separating milk, adjust the duration of partial ejection so that approx. 5 litres will be ejected from the bowl.

When separating whey, adjust the duration of partial ejection so that approx. 10 litres will be ejected from the bowl.

Partial ejections are accomplished automatically at pre-determined intervals, controlled by the timing unit (5.2) or by another special device.

When the time adjusted at the timing relay "Separation" has elapsed (1 hour when separating milk and 15 to 30 minutes when separating whey),the first partial ejection takes place. The timing relay "Pre-flushing" is to be set so as to ensure opening of the solenoid valve B "Sealing and flush water" (fig. 5/3) 10 seconds before each partial ejection. The water injected into the hood will prevent incrustation of the sediment.

Timing relay "Partial de-sludging" has to be adjusted so as to cause solenoid valve A "Opening water" to open briefly. This causes the bowl to open and to eject 5 to 10 litres of sediment. The sealing and flush water valve B remains open during solids ejection and closes 60 seconds after the ejection process. The period of time during which this valve is to remain open after sediment ejection (at least 60 seconds) is adjustable by means of timing relay "Subsequent flushing".

The liquid obtained from a partial ejection process (approx. 5 litres of sediment and 15 litres of flush water) is collected in the sterilizing tank. The tank is capable of holding the liquid obtained from five partial ejections.

After giving 1 kg of alkaline detergent into the sterilizing tank, the liquid is heated up with steam to 95°C and kept at this temperature for 10 minutes. It can then be sent to the sewer.

6.2.2. Complete sediment ejection (complete de-sludging)

For cleaning-in-place after milk processing a special timing unit is required. If this is not available, complete ejections can be initiated by manual control of the timing unit TVA 2-M.

The switch "Separation" on the timing unit is to be kept in "ON" position. To initiate the complete sediment ejection, the push button "Complete de-sludging" is to be actuated.

Provided that the electrical installation has been carried out properly (see circuit diagram of timing unit), the feed pump(s) is (are) automatically switched off by pressing the push button "Complete de-sludging" and re-started automatically approx. one minute after complete ejection. (Interruption of the liquid supply to the bowl by stopping the feed pump is necessary for the recovery of the bowl speed which drops during complete ejection).

After re-filling of the bowl (check increase of discharge pressure on separator), another complete ejection can be performed by pressing again push button "Complete De-sludging".

Should the feed pump(s) fail to stop automatically during complete ejection, switch off pump(s) manually and re-start it (them) one minute after complete ejection.

6.2.3. Manually controlled sediment ejections

In case of emergency (e.g. failure of the timing unit or of the solenoid valves), the bowl can also be emptied by opening and closing the by-pass valves associated to the solenoid valves (see 5.3.1.). During sediment ejection, the bowl speed will drop slightly. Bear in mind that sediment ejection is only allowed to be repeated after the bowl has re-attained its operating speed.

7. Cleaning

7.1. Cleaning-in-place

The self-cleaning separator is included in the C-I-P system of the plant. For cleaning the separator, the detergents used for cleaning the pasteurizers will be adequate. However, be sure that the last cleaning agent to be circulated is acid.

After milk processing, the residual milk is displaced and the whole equipment thoroughly flushed with water. Flushing is followed by two sediment ejection procedures, accomplished by pushing the button "complete de-sludging" on the timing unit TVA 2-M.

Both the caustic solution circulation and the acid solution circulation are followed by flushing with water and subsequently by two "complete de-sludgings" each.

During the C-I-P process, the constant-pressure valve incorporated in the skim milk line should be throttled repeatedly by actuating the push button "overflow". This will cause flooding of the centripetal pump chamber of the separator, resulting in thorough flushing of hood and sediment collector. If the separator is not equipped with a constant-pressure valve, the skim milk valve should be throttled several times by hand.

<u>IMPORTANT:</u> Bear in mind that bowl parts of stainless steel will be attacked by chlorine. Therefore, make sure that detergents are free from chlorine.

7.2. Manual cleaning

In spite of cleaning-in-place, the bowl should be dismantled for check-up and manual cleaning once a month (see 4.3).
On this occasion clean and wipe dry guide surfaces and threads and apply a thin film of the special lubricating paste supplied.
After having removed sliding piston 4 (fig. 5/1a), clean sealing chamber 3 with special care.

8. The Gear

8.1. Removing the vertical gear parts

After dismantling the bowl, loosen oil drain screw and let oil drain into oil cup. Then remove upper sight glass.

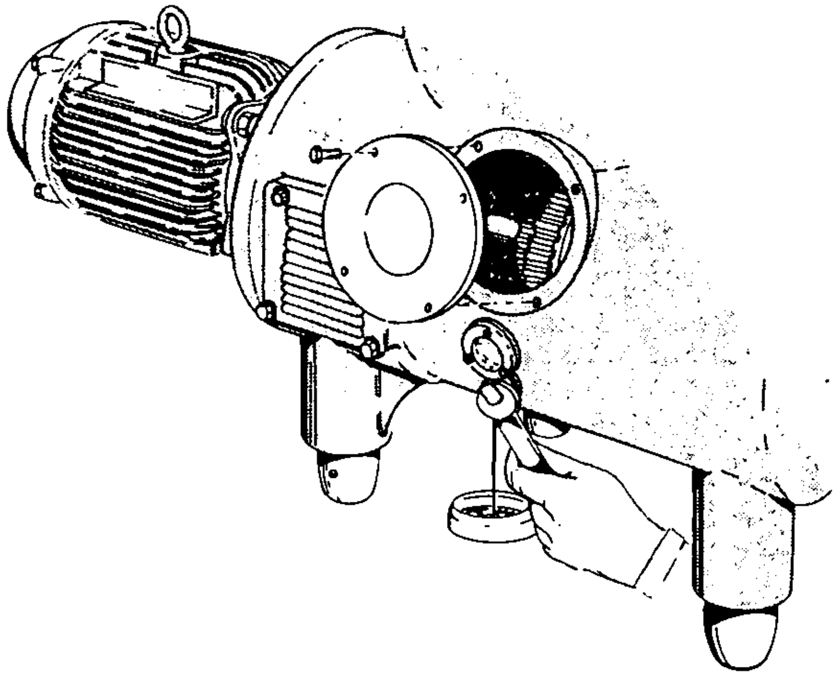


Fig. 8/1a

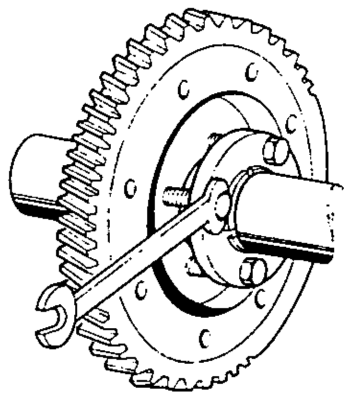


Fig. 8/1b

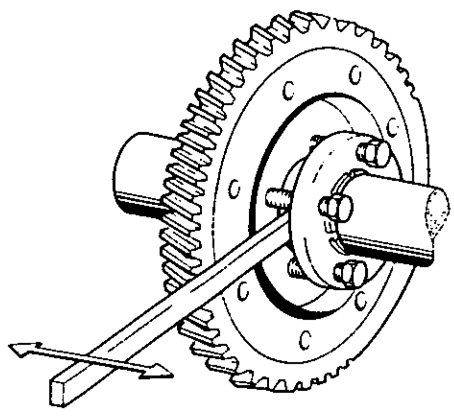


Fig. 8/1c

Loosen hex head screws in clamp plates of worm wheel (fig. 8/1b). Then slacken clamp plates until worm wheel can be moved on worm wheel shaft (fig. 8/1c). Push worm wheel to the left.

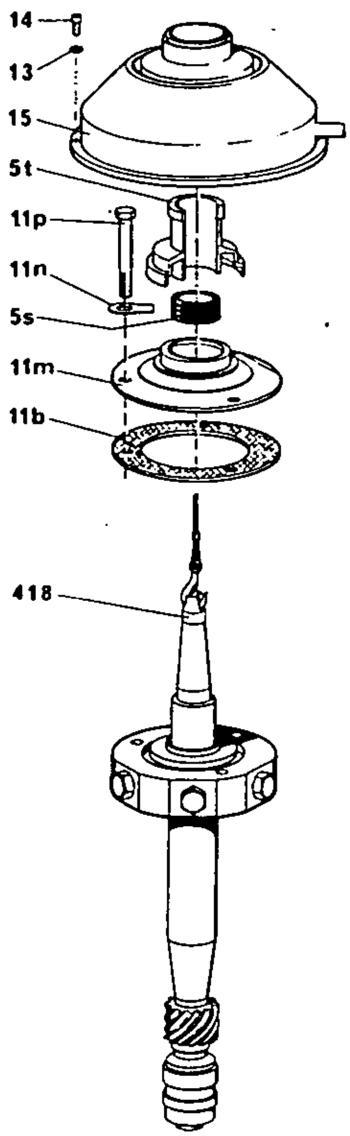


Fig. 8/2a

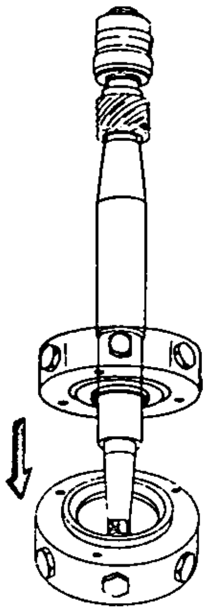


Fig. 8/2b

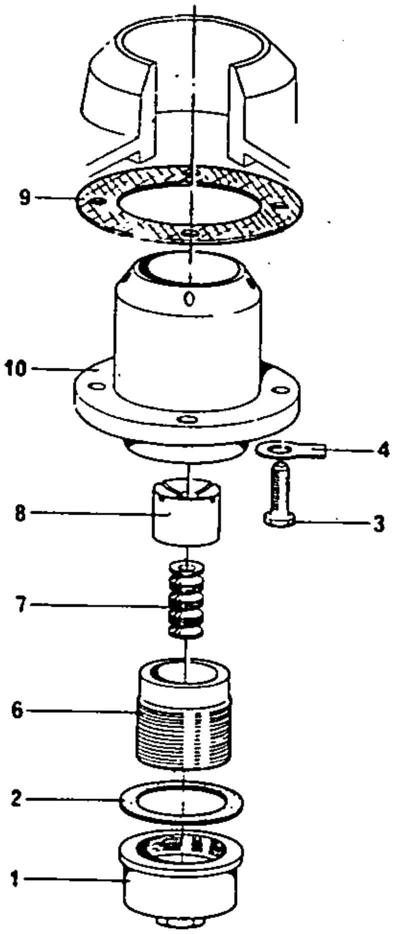


Fig. 8/2c

<u>Fig. 8/2a:</u>

Take off operating-water connection and remove bushes 37 and 39 (fig. 13/1).
Undo screws 14 and remove operating-water feed 15 and spindle cap 5t. Straighten tab washers 11n and unscrew hex head screws 11p. Take off protection cap 11m and spindle spring 5s.

Screw tool 418 onto worm spindle and lift out spindle together with neck bearing bridge.

<u>Fig. 8/2b:</u>

To remove neck bearing bridge, hold spindle in inverted position, upper end down, and tap lightly against a wooden surface. Neck bearing bridge will then slide off.

<u>Fig. 8/2c:</u>

Unscrew bottom bearing cap 1 and remove gasket 2. Unscrew bottom bearing threaded piece 6, and remove it together with spring column 7 and bottom bearing pressure piece 8.

Should the case arise that bottom bearing housing 10 has to be replaced, then proceed as follows: Straighten tab washers 4 and undo hex head screws 3. Take two of these screws and thread them into the tapholes of the bottom bearing housing. By doing so, the bottom bearing housing will be pressed out of the frame.

8.2. Re-assembly of vertical gear parts (fig. 14)

For re-assembly proceed in reverse order of removal (see 8.1) and according to instructions given in sect. 8.2.1 - 8.2.3.

8.2.1. Important hints for re-assembly

1) Before re-assembling the vertical gear parts, clean gear chamber thoroughly.
2) Check condition of ball bearings before re-fitting them onto worm spindle.
   IMPORTANT: Use only high-speed precision ball bearings as per List of Parts.
   For reasons of safety, replace ball bearings of worm spindle and worm wheel shaft every 5,000 running hours.
3) Before fitting ball bearings, ball bearing protection rings 5d and 5g, and ring 5n onto spindle, heat these parts in oil to approx. 80°C.

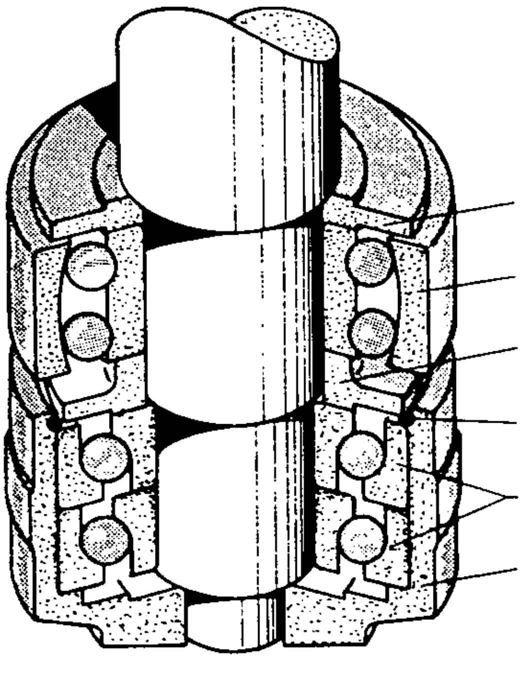


Fig. 8/3

4) If one of the angular contact ball bearings 5b needs replacement, be sure to replace both of them. Note that the angular contact ball bearings may be loaded axially in one direction only. They must be installed as shown in fig. 8/3. The narrow rim of the outer ring of each ball bearing must be on top. Faulty mounting will inevitably result in damage to bearings.
   For assembly proceed as follows:
   Slide the warmed-up angular contact ball bearings onto the spindle, slide snap ring 5c over ball bearings and let ball bearings cool down. Then fit bottom bearing pressure housing 5a over ball bearings and press snap ring 5c into groove of bottom bearing pressure housing.
5) It must be possible to install the worm spindle, with ball bearings attached, without having to hit on the upper spindle end, and to move the built-in spindle axially by hand. If this is not the case, remove burrs from the bottom bearing housing, using a very fine emery cloth.
6) When worm is worn and needs replacement, the worm wheel assembly with clamp plates 10 (fig. 15) shall be replaced at the same time, since this part, being worn down as well, would cause premature wear to the new worm.
7) When installing neck bearing bridge assembly 11c-h, make sure that gaskets 11b and 11k are in good condition. Be sure to insert distance ring 11a.
8) Before installing the neck bearing protection cap, check to be sure that there is a clearance of 3 - 3.5 mm between cams of distance ring 11a (fig. 8/6) and neck bearing bridge 11d. If not, proceed as per instructions of sect. 8.3.2.
9) IMPORTANT: After re-assembling the vertical gear parts, check bowl height for possible re-adjustment (see 8.3).

8.2.2. Assembling the neck bearing bridge

The upper ball bearing of the spindle is contained in pressure ring 11c which is held by nine radially arranged, evenly distributed springs 11g.

1) Insertpressure ring 11c in neck bearing bridge 11d in such a manner that the nine recesses of the pressure ring face the nine tapholes of the neck bearing bridge.

2) Grease spring pistons 11h thoroughly. Fit neck bearing springs 11g into the nine spring pistons. Then put the spring pistons into threaded plugs 11f.

3) Screw the threaded plugs together with neck bearing springs and spring pistons into the tapholes of neck bearing bridge, and tighten.

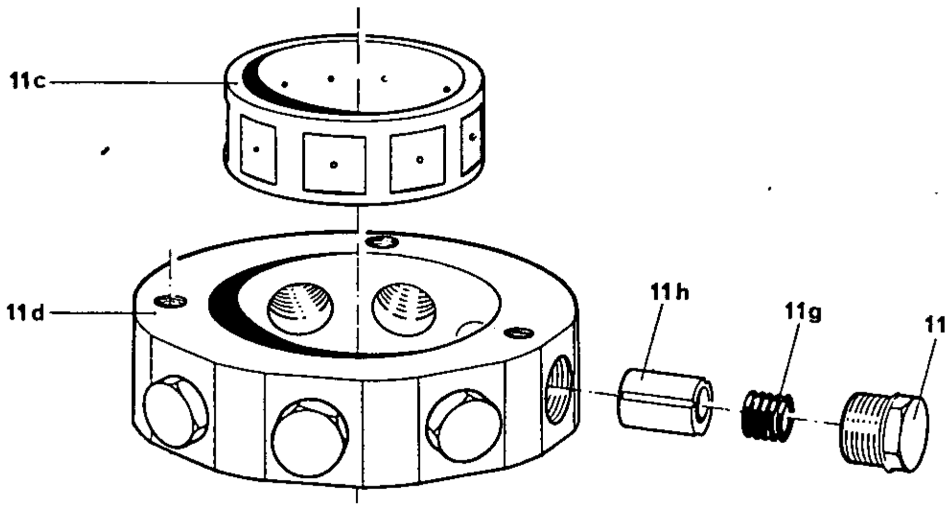


Fig. 8/4a

8.2.3. Installing spring column into bottom bearing

1) Slide cup springs 7 on bolt of bottom bearing threaded piece 6 as illustrated in fig. 8/4b.

2) Slip bottom bearing pressure piece 8 over spring column.

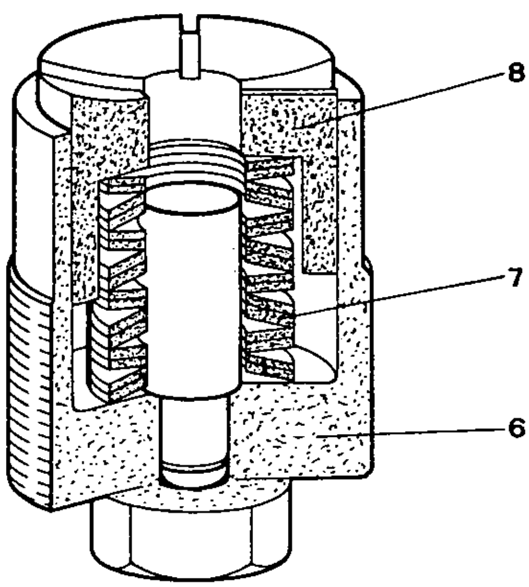


Fig. 8/4b

8.3. Bowl height

8.3.1. Checking the bowl height

NOTE: The bowl height has been adjusted at the factory before shipment of the separator. It must be checked for possible re-adjustment before the first start of the separator, after re-assembling the vertical gear parts, after exchanging the bowl or the centripetal pump, and as soon as the centripetal pump shows any grinding marks.

Prerequisite to correct bowl height adjustment is

a) that the bowl is properly closed ("0" marks on bowl lock ring and bowl bottom must be aligned),

b) that the hood is properly seated on the sediment collector and hex head screws 41b (fig. 13/1) are tightened securely,

c) that the connection piece (fig. 8/5) is tightened firmly.

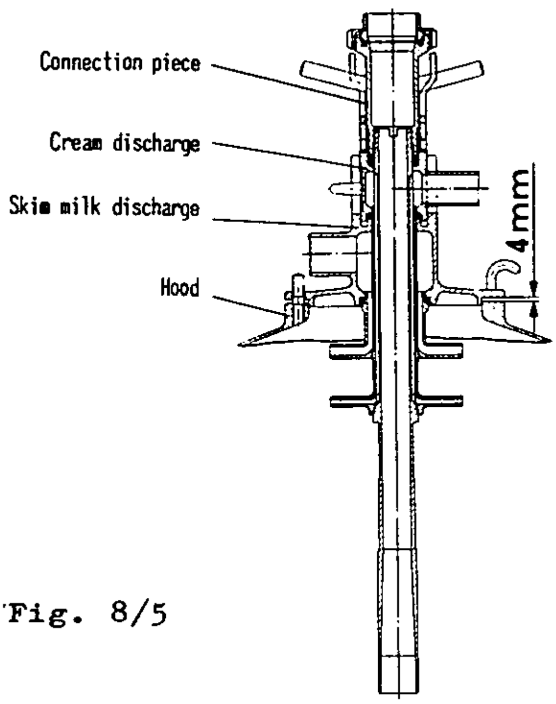


Fig. 8/5

The bowl height is correct when after loosening of the cap nuts, skim milk discharge together with cream discharge and connection piece can be raised so that there is a clearance of 4 mm between upper rim of hood and contact surface of skim milk discharge (fig. 8/5). If the clearance does not conform to this measurement, the bowl height has to be re-adjusted (see 8.3.2).

8.3.2. Re-adjusting the bowl height

For re-adjustment of the bowl height proceed as follows:

Unscrew bottom bearing cap 1 (fig. 14). Adjust bowl height (refer to fig. 8/5) by turning bottom bearing threaded piece 6. A full turn of the bottom bearing threaded piece to your Right or to your Left raises or lowers the bowl by 2 mm.

If the distance shown in fig. 8/5 is greater than 4 mm, the bowl is too high. Lower the bowl by turning the bottom bearing threaded piece in counter-clockwise direction.

If the distance shown in fig. 8/5 is less than 4 mm, the bowl is too low. Raise the bowl by turning the bottom bearing threaded piece in clockwise direction.

If the bowl has to be raised by more than 1 mm, it has to be removed (see 4.3). Remove operating-water connection and take out bushes 37 and 39 (fig. 13/1). Undo screws 14 and remove operating-water feed 15. Take off spindle cap 5t (fig. 14). Undo screws 11p and remove neck bearing protection cap 11m. Then turn bottom bearing threaded piece in clockwise direction until proper height is adjusted.

Each time the bowl has been lowered or raised, check if there is a clearance of 3 to 3,5 mm between cams of distance ring 11a (fig. 8/6) and neck bearing bridge 11d. In order to be able to check this clearance, remove bowl, operating-water connection, bushes 37 and 39 (fig. 13/1), operating-water feed, spindle cap and neck bearing protection cap, unless these parts have already been removed before raising the bowl by more than 1 mm. This check is not required if it has been made after re-assembling the vertical gear parts (see 8.2.1 No. 8) and the bowl had not to be raised by more than 1 mm.

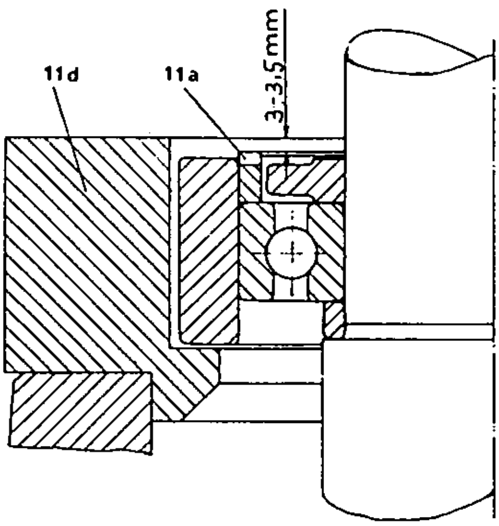


Fig. 8/6

If the clearance between the cams of the distance ring and the neck bearing bridge is smaller than 3 mm, the cams have to be filed to proper dimension. If the distance is greater than 3,5 mm, increase height of cams by welding or check with the factory for a new distance ring with properly sized cams.

After checking the clearance between distance ring and neck bearing bridge, re-install the above-mentioned parts. When installing the operating-water feed, check to be sure that gasket 38 (fig. 13/1) is in good condition.

Replace bottom bearing cap including gasket 2 (fig. 14) and close tightly.

Bear in mind that after fastening the neck bearing protection cap, the distance ring and, hence, the ball bearing 5p (fig. 14) will be under pressure until the spring column 7 in the bottom bearing is compressed by the weight of the bowl.

8.4. Removal of the horizontal gear parts

8.4.1. Removing the motor

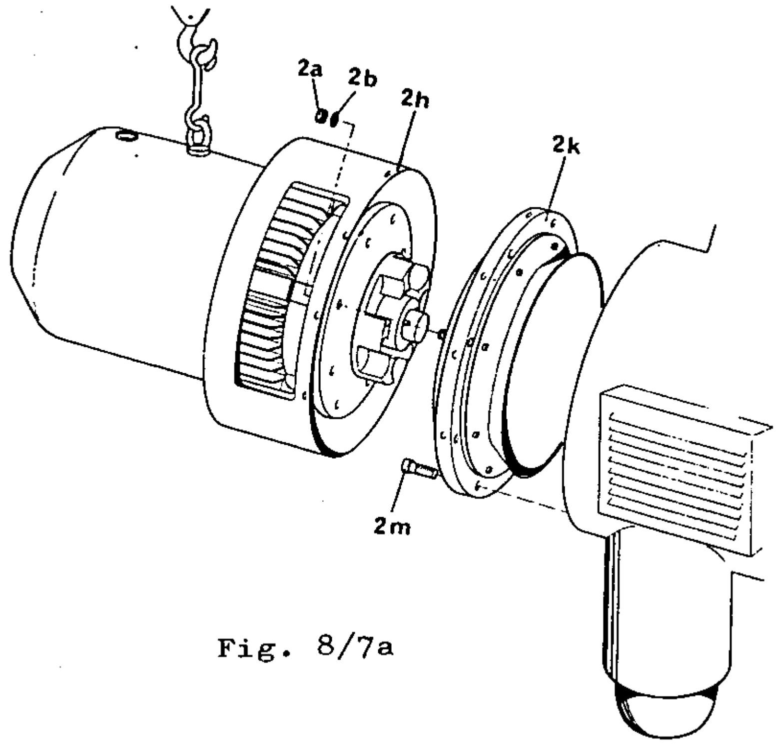


Fig. 8/7a

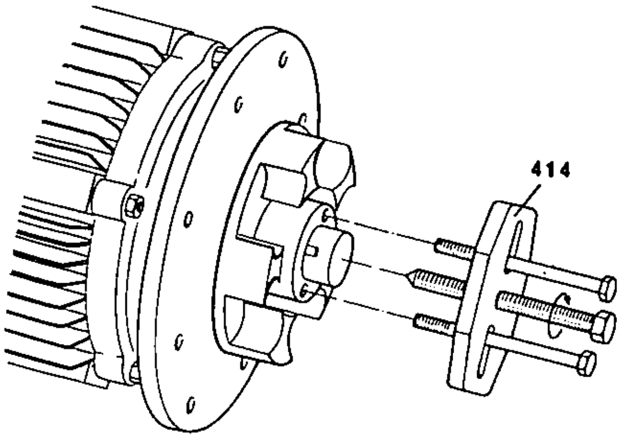


Fig. 8/7b

Remove lead-in wires from motor terminals. Unscrew hex head screws 2g and move cover 2h sidewards. Sling motor to hoist and tighten carrying rope. Then unscrew hexagon nuts 2a through opening of cover which can be turned on the flange. Take off lock washers 2b.
Use hoist to lift off motor together with cam hub (see fig. 8/7a).

For removing cam hub from motor shaft end use puller 414 (fig. 8/7b).

8.4.2. Removal of the fluid clutch

After removing the motor, undo Allen screws 2m and take off flange 2k (see fig. 8/7a).

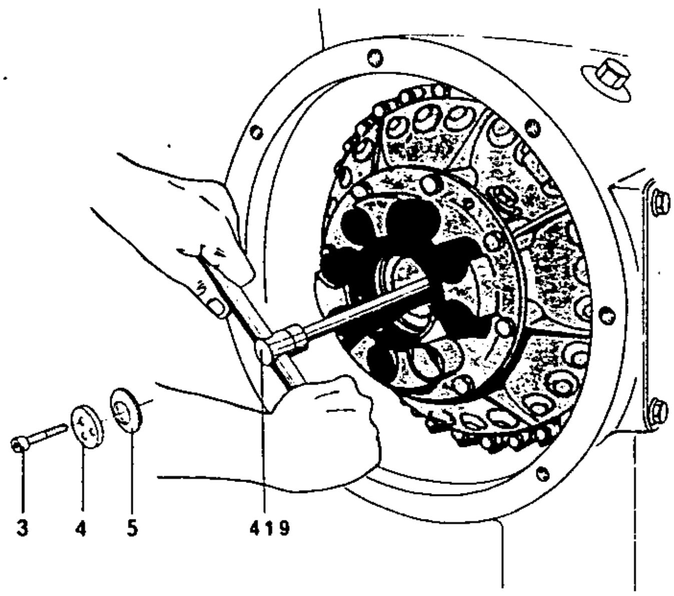


Fig. 8/7c

Loosen Allen screws 3 (fig. 8/7c) with torque-indicating wrench 416 (fig. 20) by consecutively giving each screw a quarter of a turn until tension of cup spring 5 slackens. Then screw out Allen screws all the way and remove washer 4 and cup spring 5.

It may happen that one of the three Allen screws can only be loosened by applying great force. In this case re-tighten the two remaining screws so that all three screws are equally tight. Then start loosening again as described above.

Be sure the socket of the wrench 416 is not worn!

To remove fluid clutch from cone of worm wheel shaft use pulling device 419.

8.4.3. Removing the worm wheel shaft

Remove fluid clutch (see sect. 8.4.2).

Loosen oil drain screw and let oil drain into oil cup. Remove upper sight glass (see fig. 8/1a).

Loosen hex head screws in clamp plates of worm wheel. Slacken clamp plates and push worm wheel to the left (fig. 8/1b, 8/1c).

Undo hex head screws 18 and remove cover 17.

Use wrench 416 to unscrew Allen screws 13. Remove disc 12.

By means of tool 419, pull brake pulley assembly 11a-d off the cone of worm wheel shaft.

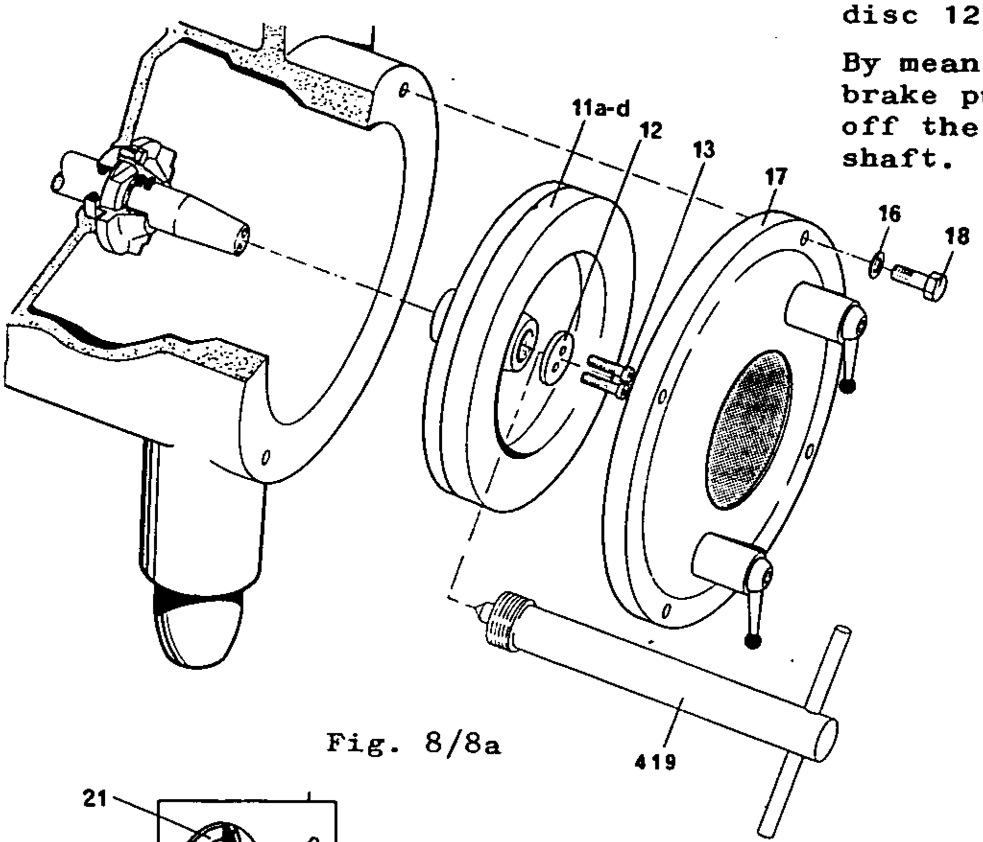


Fig. 8/8a

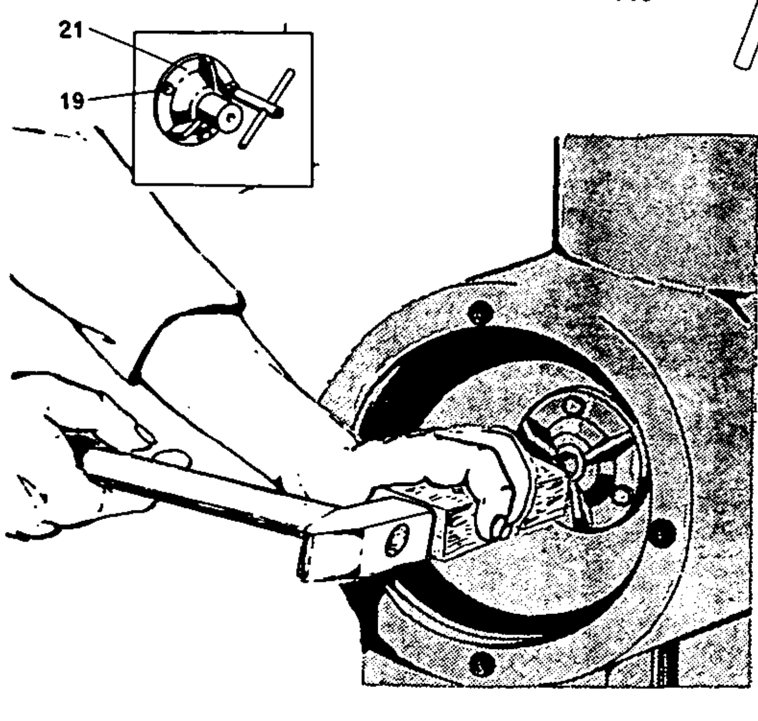


Fig. 8/8b

Remove hex head screws 19 from bearing cover 21 on the brake side (fig. 8/8b). Place a hard wood block against worm wheel shaft end, on motor side and rap gently with a hammer to drive the shaft, along with ball bearing, nut, and bearing cover, towards the brake side. When shaft has completed loosened from ball bearing on motor side, pull it out by hand. While doing so, hold worm wheel to prevent damage to gear teeth. Then take worm wheel assembly with clamp plates out of gear chamber.

8.5. Re-assembling the horizontal gear parts (fig. 15)

For re-assembly proceed in reverse order of removal (see sect. 8.4) and according to the following instructions:

1) The worm wheel with clamp plates (item 10 in fig. 15) has been balanced in the factory as complete assembly. To avoid unbalance, do NOT exchange component parts separately.

2) When mounting the worm wheel assembly with clamp plates, be sure to push it towards the brake side until it rests against the shoulder of the worm wheel shaft 25. This will ensure correct positioning of the toothed rim with reference to the worm.

3) The worm wheel must be firmly clamped to the worm wheel shaft, - accomplished by tightening screws 10c in the two clamp plates. Tighten the screws crosswise, by single turns, to make sure clamp plates are drawn together evenly.

4) IMPORTANT: When the toothed rim is worn, the entire worm wheel assembly with clamp plates has to be replaced. The worm 5k (fig.14) shall be replaced at the same time, since this part, being worn down as well, would cause premature wear to the new worm wheel.

5) Re-adjust proximity switch 40 with the aid of adjusting ring 439 (fig. 8/9).

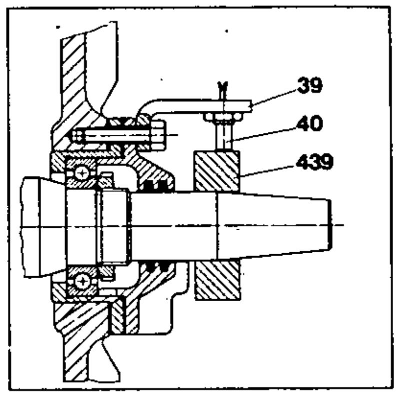


Fig. 8/9

6) Before installing the fluid clutch and the brake drum, apply a thin film of grease to the tapered ends of the worm wheel shaft. Then clean and wipe dry the tapered ends with a rag. Clean also inside of hubs of fluid clutch and brake drum very carefully, to assure proper fitting.

7) The fluid clutch and the brake drum must be firmly clamped to the worm wheel shaft. This is accomplished by tightening Allen screws with torque wrench 416 (fig. 20). Tighten the screws consecutively, by single turns. Give the final tightening at 4 - 4.1 mkp on the torque scale. When installing the fluid clutch, be sure to place cup spring 5 under washer. For correct arrangement refer to fig. 15.

8) When installing the motor, make sure that there is a clearance of 4 mm between cam hub 31 and fluid clutch (fig. 15 or 16). The distance has to be checked after exchanging the motor, the cam hub, the fluid clutch or the worm wheel shaft. If necessary, adjust the distance by displacing the cam hub on the motor shaft and drilling a new hole into the motor shaft for threaded pin 30.

9) Fill gear chamber with the oil specified in sect. 2. Oil level must be slightly above middle of sight glass.

10) To run in new gear parts (worm wheel and worm) let the separator run - without bowl - for about one hour. During this time, switch motor several times on and off.

11) For reasons of safety, replace ball bearings of worm wheel shaft and of worm spindle every 5,000 running hours.

9. The Fluid Clutch

9.1. General

The fluid clutch (Turbo Clutch) gradually brings the bowl to its rated speed, eliminating premature wear on gear parts and on motor. The motor power is transmitted by means of a closed oil circuit between a primary wheel driven by the motor shaft and a secondary wheel driving the worm wheel shaft of the separator.

The oil level in the fluid clutch must be up to the mark of the oil level indicator plate, to ensure that the bowl comes up to its rated speed within its starting time (see sect. 3.3).

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

The oil in the clutch has to be changed every 5,000 working hours. It should be changed when the ball bearings of the worm spindle and of the worm wheel shaft are being replaced.

The clutch requires

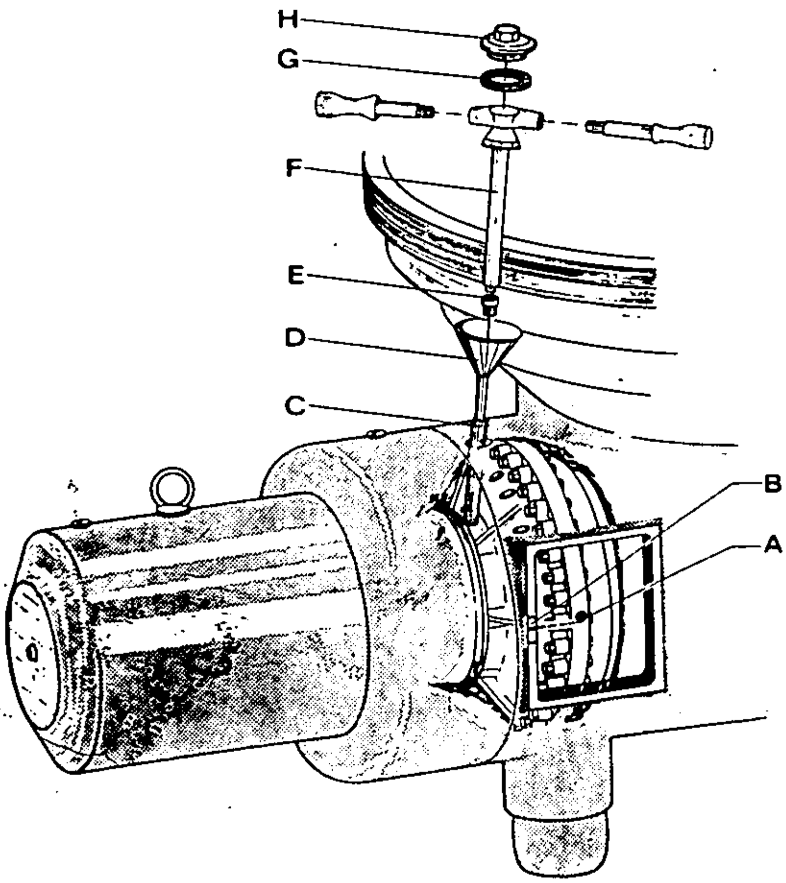
approx. 6,5 litres of oil when using a 1455 rpm motor,
approx. 5,35 litres of oil when using a 1745 rpm motor.

Be sure to use only the type of oil specified in sect. 9.4.

9.2. Checking the oil level

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

Before checking the oil level, make sure oil has cooled down.



Checking the oil level:

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

Fig. 9/1

For checking the oil level, proceed as follows:
Remove the ventilation grid so that the oil level indicator plate can be seen. Bring the clutch into such a position that threaded plug A (fig. 9/1) can be removed without oil flowing out. Unscrew threaded plug with a wrench. Then turn clutch until lower edge of taphole is in line with mark on oil level indicator plate (fig. 9/1). In this position, the oil level in the clutch must be up to the lower edge of the taphole, so that the oil begins to overflow. If this is not the case, refill oil (see 9.3).

9.3. Re-filling of oil (fig. 9/1)

Remove threaded plug H. Loosen oil fill screw E with wrench F. Then take off the handles from the wrench and continue unscrewing the oil fill screw until it comes off. Now thread oil fill pipe C into the oil fill hole, introduce funnel D and pour in oil. Then check oil level (see 9.2) before replacing oil fill screw including gasket. Use wrench F to firmly tighten the oil fill screw.

9.4. Type of oil

For filling the clutch, use only steam turbine oil

Shell Turbo Oil 27

which has proved satisfactory in operation by meeting requirements as regards viscosity, flash point, lubricating properties, compatibility with metals and gaskets, aging, etc.

Two cans, each containing 5 litres of Turbo 27 oil, are furnished with the separator.

If this type of oil is not readily available, steam turbine oils which comply with the following specifications, may be used, however, temporarily only.

Designation: Lubricating oil TD-L 16 (according to DIN 51515) (steam turbine oil with additives giving increased protection against corrosion and increased resistance to aging).

Kinemat. viscosity:	16 ......23 cSt/50°C
Density / 15°C:	max. 0.900 g/ml
Pour point:	≤ - 6°C
Corrosive effect on	
copper:	max. degree of corrosion 2 (according to DIN 51759)
steel:	no corrosion (according to DIN 51585)
Aging characteristics:	Increase of the neutralization number after 1000 h : max. 2.0 mg KOH/g oil.

Contrary to DIN 51515:

Open flash point according to Cleveland: approx. 220°C.

9.5. Dismantling the fluid clutch (fig. 16)

The fluid clutch should not be dismantled in the site. If damage occurs, the clutch should be returned to the manufacturer for repair to assure correct fitting of the spare parts and, hence, proper functioning of the clutch. In the meantime, a spare clutch can be placed at your disposal.

If however, you decide to remove leakage of the clutch in the site, we recommend to check first sealing 17 because it is more easily accessible than sealing ring 4.
After taking the clutch out of the frame (see 8.4.2) remove screws 19 and lock washers and take off cover 18. Now check sealing ring 17 and replace it when its sealing lip is no more soft and elastic.

If, however, sealing ring 4 or the ball bearings have to be replaced, the clutch has to be dismantled in the following manner:

1) Loosen screw 24 and let oil drain.
2) Undo hexagon nuts 11 and remove them with lock washers 10. Then remove screws 7.
3) Press primary wheel off the clutch casing 8 by threading two of the screws 7 into the tapholes of primary wheel 12.
   IMPORTANT: Bear in mind that the fluid clutch has been balanced in the factory. Therefore, be sure to mark both primary wheel 12 and clutch casing 8 before taking them apart, so that, when being re-assembled, these parts will be brought back into their original position.
4) Press ball bearing 15 out of primary wheel 12.
5) Undo screws 2 and remove cam flange 1.
6) Force secondary hub with secondary wheel 16 out of the clutch casing. Be sure not to damage running surfaces for the sealing rings. See also 9.6. no.6.
7) Screw screws 26 out of the clutch casing and remove oil control ring 25.
8) Press ball bearing 6 and sealing ring 4 out of the clutch casing.

9.6. Re-assembling the fluid clutch (fig. 16)

1) Moisten sealing rings. Press sealing ring 4 into the clutch casing by applying the tool shown in fig. 9/3 and then lightly hitting against bolt B. In order to be able to use the tool for pressing sealing ring 17 into cover 18, screw the bolt B into the other side of the disc. Then proceed in the same way as for sealing ring 4. The tool consisting of disc (part no. 3158-9939-000) and bolt (part no. 3170-9877-010) is supplied on special order only.

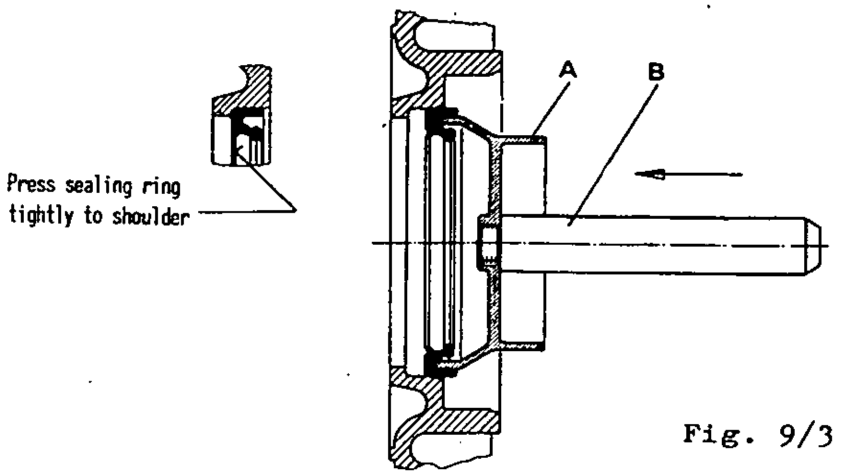


Fig. 9/3

Pressing the sealing ring into clutch casing.

2) Insert spacer ring 5 in clutch casing and spacer ring 13 in primary wheel (fig. 9/4a). The bevelled edge of each ring must snap into the groove of the bearing neck (fig. 9/4b). This will ensure that the spacer rings cannot move axially.

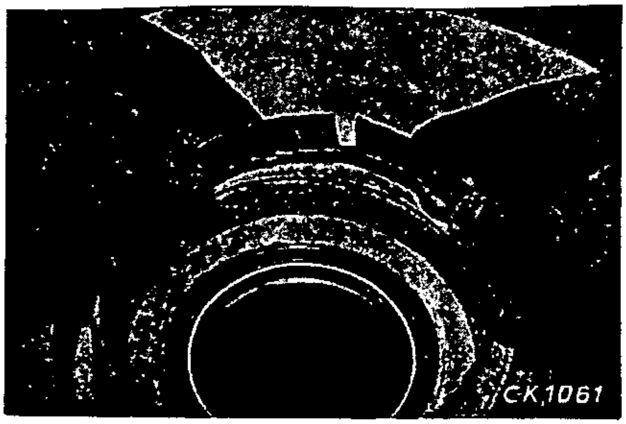


Fig. 9/4a

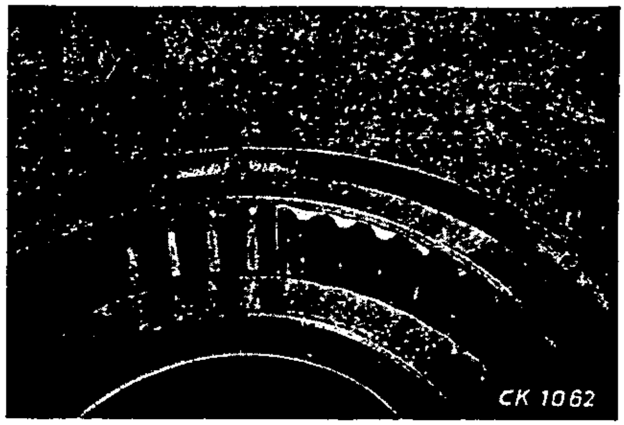


Fig. 9/4b

3) Press ball bearing 6 into clutch casing and ball bearing 15 into primary wheel. Check if the ball bearings pressed into the spacer rings have an absolutely tight fit. If this is not the case, the spacer rings have to be replaced. If necessary, return the clutch to the factory for repair.

4) Apply some oil-resistant sealing compound to oil control ring 25. Then fasten ring to clutch casing with screws 26. Be sure to fit lock washers.

5) Insert gasket 14 in groove of primary wheel. Then fasten cover 18 to primary wheel with screws 19. Be sure to fit spring washers.

6) Press secondary hub with secondary wheel, 16, into clutch casing. IMPORTANT: The surfaces contacting the sealing rings 4 and 17 must be perfectly smooth to ensure oil-tightness of the fluid clutch. If necessary, re-polish contact surfaces.

7) Fasten cam flange 1 to clutch casing with screws 2. Be sure to fit spring washers.

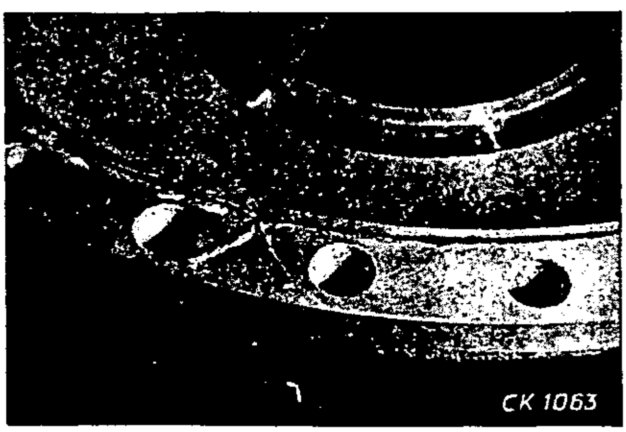


Fig. 9/4c

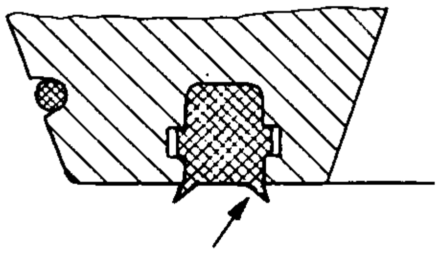
8) Place Teflon packing cord 9 on sealing surface of clutch casing as shown in fig. 9/4c. Make sure cord ends are crossed. To keep the cord in its place coat it with grease. Sealing surfaces of primary wheel and clutch casing must be in perfect condition; they must not be coated with a sealing compound.

9) Press primary wheel on secondary hub so that the marks on primary wheel and on clutch casing are in line (see sect. 9.5, no. 3). Then screw primary wheel and clutch casing together.

10. Trouble Shooting

10.1. General

Troubles	Causes	Remedies
10.1.1. The bowl does not come up to rated speed or takes too long to do so (see 3.3).	1) Brakes are on.	Release brakes by turning handles in clockwise direction.
	2) Motor is incorrectly connected.	Check connection.
	3) Oil level in fluid clutch is too low or clutch is leaking.	Re-fill oil (see 9.3). Re-tighten nuts 11 of screws 7 (fig. 16) on clutch. If sealing rings 4 and 17 do not seal properly, ask for a reconditioned clutch in exchange for your clutch.
	4) Bowl is placed too high or too low and rubs against centripetal pump.	Adjust to correct bowl height (see 8.3).
	5) Clamp plates are not tight enough. Worm wheel slips on shaft.	Tighten long hex head screws on worm wheel evenly and <u>firmly</u>. Tighten crosswise, by single turns.
	6) Feed line is open.	Close feed line.
10.1.2. The bowl speed drops during operation.	1) Oil level in fluid clutch is too low.	Re-fill oil (see 9.3).
	2) Motor speed drops during operation.	Check line voltage and inspect motor.
10.1.3. The bowl comes up to rated speed too quickly (in less than 8 minutes). Motor pulls too high a starting current.	The clutch contains too much oil.	Check oil level (see 9.2) Drain surplus oil.

Troubles	Causes	Remedies
10.1.4. Uneven run of the clarifier.	1) Incomplete solids ejection of the bowl. The remaining solids have deposited unevenly in the bowl. 	De-sludge the bowl several times. If that does not improve conditions, close the bowl and fill it with water in order to attenuate vibrations which occur during slowing-down of the bowl. Stop the separator and apply brakes. If bowl leaks, leave feed open. Clean the bowl thoroughly. Remove the protruding edges of the bowl gasket with a knife (see opposite sketch).
	2) The bowl is not properly assembled, or if the plant has several separators, parts of different bowls may have been interchanged.	Assemble bowl correctly (see 4.1).
	3) Disc pressure has slackened.	Check if bowl lock ring is screwed in firmly (see sect. 4.1, no. 21). Check disc count. If necessary, add spare disc.
	4) Bowl is damaged and, therefore, out of balance.	Send bowl to factory or authorized factory repair shop. Do NOT attempt to make your own repairs. Never weld or solder. Bowl is made of heat-treated steels!
	5) Neck bearing springs are weak or broken.	Replace all nine neck bearing springs.
	6) Ball bearings are worn.	Replace damaged bearings. <u>IMPORTANT:</u> As spindle bearings use only ball bearings with increased accuracy of running (see List of Parts).

Troubles	Causes	Remedies
10.1.4. Uneven run of the separator (cont'd.).	7) Gear parts are in bad condition as a result of 1. normal wear, 2. premature wear caused by a) lack of oil, b) oil of too low a viscosity, (in general recognizable by blue tempering colour of gear parts) c) metal abrasives present in the oil due to the following possible causes: - viscosity of oil is too low, - oil has not been changed in time, - gear chamber has not been cleaned, d) replacement of one gear part only, instead of both parts, e) infiltration of water because shut-off valves D and F (fig. 5/3) for sealing water were open for a longer period during shut-down of the separator.	Clean gear chamber thoroughly. Replace damaged gear parts: see 8.2, No.6 and 8.5, No. 4. Change theoil (see sect. 2). If necessary, change oil more often. Regarding <u>infiltration of water</u>, the following should be kept in mind: During shut-down of the separator, the shut-off valves D and F must always be kept closed.
10.1.5. Bowl lock ring is difficult to loosen.	Bowl has not been dismantled at regular intervals (see page 0/3, No.10).	Unscrewing of the bowl lock ring can be very much facilitated by blocking the bowl, which is accomplished by putting wedges between bowl bottom and sediment collector

10.2. Bowl performance

Troubles	Causes	Remedies
10.2.1. The bowl does not close at all. **IMPORTANT:** In this case switch off feed pump immediately.	1) The amount of sealing water fed to the bowl is insufficient because a) the water pressure in the supply line to the operating-water connection is too low (see 5.2.3), b) the water discharge holes in the top of the operating-water feed 15 (fig.13/1) are clogged with scale.	a) Check water pressure in the supply line which should be 1.5 bar. The pressure reducer shall be adjusted to 1 bar (for adjustment refer to sect. 5.3). After switching on the timing unit and after each de-sludging procedure the sealing-water valve is open for 60 seconds. During this time the amount of discharging sealing water should be measured at the operating-water discharge. The sealing water must discharge at a rate of 550 l/h. Opening of the sealing-water valve for measuring can be repeated by operating the main switch of the timing unit. b) Clean discharge holes.
	2) Gasket 38 (fig. 13/1) is damaged or not inserted.	Replace or insert gasket.
	3) Strainer G (fig. 5/3) is dirty.	Clean strainer.
	4) Gaskets of piston valve 3 (fig. 19) are damaged.	Remove valve (see 4.5) and install new gaskets.
	5) Solenoid valve A (fig. 5/3) does not function properly, because the diaphragm has become brittle and, therefore, fails to seal properly.	Install a new diaphragm. Make sure that hole on outer rim of diaphragm lies over hole of valve housing.
	6) Rapid-closing valve F (fig. 5/3) is damaged. There is a continuous flow of opening water to the bowl.	Install a new rapid-closing valve.
	7) Gasket 5 (fig. 19) in sliding piston is damaged or its edges have been frayed through the up and down movement of the piston.	Replace damaged gasket. If, however, only the edges of the gasket are frayed and the gasket is not damaged otherwise, it can be re-used after grinding it off with an emery wheel.
	8) The operating-water feed is clogged.	Clean operating-water feed.

Troubles	Causes	Remedies
10.2.2. The bowl does not close and open properly.	1) Gasket 5 (fig. 19) in sliding piston does not fit properly at all points of the guide surfaces, thus failing to seal properly.	If necessary, stretch gasket. Before installing the gasket, lightly grease groove in sliding piston (see 4.1, No. 6).
	2) Gasket 15 (fig. 19) in bowl top is damaged.	Replace gasket (see 4.4).
	3) Gasket 10 (fig. 19) has not been inserted into hub of bowl bottom.	Insert gasket.
	4) Gasket 5 (fig. 19) in sliding piston is uneven in height.	Replace gasket. The difference in height on a gasket must not exceed 0.25 mm.
	5) The sealing surface of the sliding piston 4 (fig. 19) is damaged.	Exchange the sliding piston.
10.2.3. The bowl does not open at all or not completely.	1) Dirt or rubber particles have settled between sliding piston and bowl bottom.	Clean bowl parts. Round off edges of gaskets. Replace damaged gaskets. Grease guide surfaces with the special lubricating paste supplied.
	2) Sealing chamber 3 (fig. 5/1a) is soiled.	Remove sliding piston 4 and clean sealing chamber
	3) The boreholes in piston valve are clogged.	Remove the valve (see 4.5) and clean it.

L I S T O F P A R T S

IMPORTANT!

When ordering parts, please state the following:

1) Model 2) Serial-No.	of the Separator: Both designations are shown on the name-plate of the separator. The Serial-No. also appears on the rim of the sludge collector.
3) Description 4) Part-No.	of the part to be replaced: For details, see List of Parts. The Part-No. is also shown on all major parts.
5) Bowl Serial-No.	(only required when ordering bowl parts): The Bowl Serial-No. appears, in large figures, on bowl lock ring and on bowl bottom.

Part-Nos. ending with letter "L" (e.g. 3158-1021-L) designate parts which are available in different designs for the separator concerned. To ensure correct delivery of these parts, Model and Serial-No. of the Separator MUST be stated.

Frame and Hood

No. in Fig.	Part - No.	Qty.	Part Description
-	3170-1020-010	1	Foundation frame assembly (1a-c)
1a	3170-1003-010	1	Foundation frame
1b	0026-2031-300	4	Cap
1c	3157-1033-000	4	Bolt
-	2315-1015-010	4	Foot, complete (2a-c)
2a	2315-1011-000	4	Foot with lining
2b	0019-6387-400	4	Threaded pin M12x28 DIN 915
2c	0021-3018-750	4	Rubber cushion
3	0001-0516-300	4	Flange
4	0019-6937-400	12	Hex head screw M10x30 DIN 933
5	1166-1006-030	1	Lower section of frame, complete
5a	0018-3955-300	1	Cone connection D50 DIN 11851
5b	0013-2845-300	1	Grooved coupling nut F50 DIN 11851
5c	0007-2211-750	1	Gasket G50 DIN 11851
6	0007-2954-750	1	Gasket 590/4
7	0019-7036-400	8	Hex head screw M16x35 DIN 933
8	0004-2290-400	8	Gasket 16.7/24x1.5
9	0007-2113-750	1	Gasket 94/104x6
10	1167-1045-000	1	Pipe connection
11	0019-6968-300	3	Hex head screw M12x25 DIN 933
12	0007-2571-750	1	Gasket 297/4
13	0026-1325-300	8	Lock washer A8 DIN 127
14	0019-6122-400	8	Allen screw M8x20 DIN 912
15	1168-1219-000	1	Operating-water feed
16	1165-1018-020	1	Sediment collector
17	0007-2580-750	1	Gasket 42/2.5
18	1165-1183-000	1	Plug
19	0013-0404-400	2	Cap nut M8 DIN 1587
20	0007-2320-750	1	Gasket 45/55x5
21	0007-2800-840	1	Gasket 725.5/744x9.8
22	0019-0840-400	1	Oil drain screw
23	0004-5037-710	1	Gasket 38/50x1.5
24	0001-0022-400	1	Sight glass frame
25	0019-6845-400	3	Hex head screw M6x25 DIN 933
26	0001-0027-830	1	Sight glass
26a	0004-5406-750	1	Gasket 110x3
26b	0004-5056-740	1	Gasket 70/80x2
27	0026-1371-400	4	Washer 13 DIN 125
28	0019-6970-400	4	Hex head screw M12x30 DIN 933
29	3050-1085-010	1	Ventilation grid
30	0019-6966-400	4	Hex head screw M12x20 DIN 933
31	0026-1375-300	4	Washer
32a	0001-0925-870	1	Sight glass 322x5
32b	1166-1157-020	1	Ring
33	0007-2229-750	1	Gasket 40/48x5
34	0019-1748-400	1	Plug
35	0004-5762-700	2	Gasket 273/322x2
36	0007-2208-750	2	Gasket G25 DIN 11851
37	1167-1074-000	1	Sleeve
38	0007-2521-750	2	Gasket G15 DIN 11851
39	1168-1074-000	1	Sleeve
-	1170-7759-000	1	Hood assembly (41a-41n)
41a	0004-2364-758	1	Packing cord 8x8x3300
41b	0019-6970-400	8	Hex head screw M12x30 DIN 933
41c	1170-7765-000	1	Hood
41d	0007-2262-750	1	Gasket 45/57x6
41f	1165-1061-000	1	Inspection cover
41g	0013-0405-400	2	Cap nut M10 DIN 1587
41h	0013-0406-400	4	Cap nut M12 DIN 1587
-	0026-0165-400	4	Washer 13 DIN 433
41k	1165-2775-000	1	Siphon, complete
41m	0013-2842-300	1	Grooved coupling nut F25 DIN 11851
41n	0007-2208-750	1	Gasket G25 DIN 11851

Frame and Hood

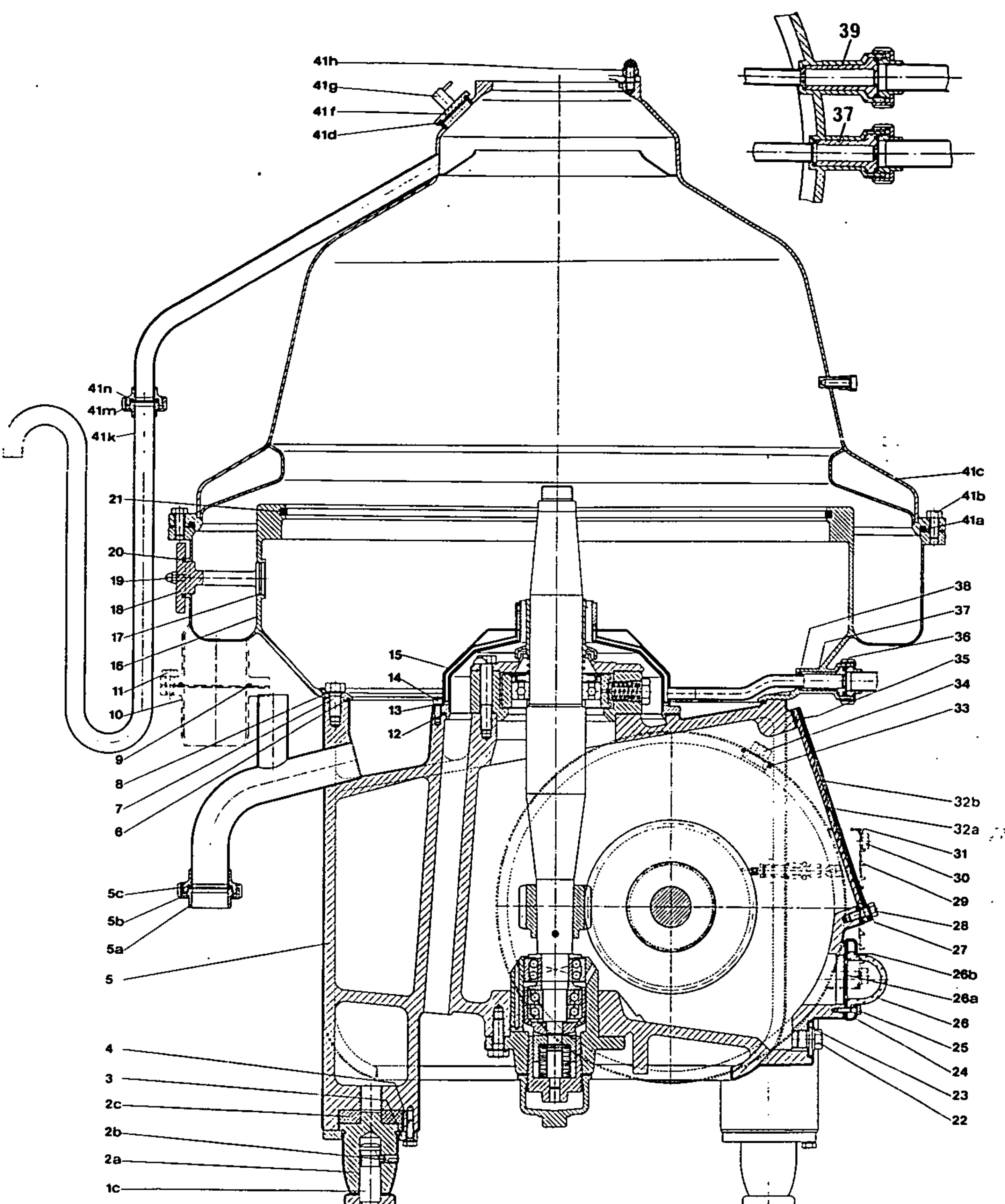


Fig. 13/1

Vertical Gear Parts

No. in Fig.	Part - No.	Qty.		Part Description
1	0010-8003-210	1		Bottom bearing cap
2	0004-2221-740	1		Gasket 80/108x2
3	0019-7038-150	4		Hex head screw M 16x45 DIN 933 - 8.8
4	0026-5894-600	4		Tab washer 17 DIN 93
-	1167-3429-020	1		Worm spindle assembly (5a-t)
5a	0010-8012-020	1		Bottom bearing pressure housing
5b	0011-7307-100	2		Angular contact ball bearing 7307 BGM/P 6 DIN 628
5c	0026-2109-170	1		Snap ring
5d	0008-4008-030	1		Ball bearing protection ring
5f	0011-2308-120	1		Pendulum ball bearing 2308 M/P6 DIN 630
5g	0008-4008-020	1		Ball bearing protection ring
5h	0026-1563-120	1		Straight grooved pin 10x70 DIN 1473-6S
5k	3170-3423-010	1	*	Worm
5m	3159-3410-000	1		Spindle
5n	0008-6512-050	1		Ring
5p	0011-6213-110	1		Grooved ball bearing 6213/P6 DIN 625
5r	0008-6508-050	1		Ball bearing protection ring
5s	0006-4383-160	1		Cylindrical pressure spring
5t	0008-6501-810	1		Spindle cap
6	0010-8002-040	1		Bottom bearing threaded piece
7	0006-4440-160	1		Spring column
8	0010-8001-200	1		Bottom bearing pressure piece
9	0004-5793-770	1		Gasket 130/204øx0.3
10	3050-1112-020	1		Bottom bearing housing
-	0008-6500-090	1		Neck bearing bridge assembly with covering (11a-p)
11a	0008-6509-050	1		Distance ring
11b	0004-5851-770	1		Gasket 176/235øx0.3
-	0008-6510-070	1		Neck bearing bridge assembly (11c-h)
11c	0008-6507-000	1		Pressure ring
11d	0008-6506-000	1		Neck bearing bridge
11f	0019-1423-030	9		Threaded plug
11g	0006-4380-090	1		Set of neck bearing springs
11h	0026-2220-110	9		Spring piston
11k	0004-5852-770	1		Gasket 156/235øx0.3
11m	0008-6502-120	1		Protection cap
11n	0026-5894-600	3		Tab washer 17 DIN 93
11p	0019-6616-150	3		Hex head screw M 16x100 DIN 931

* When this part needs replacement, the worm wheel assembly with clamp plates, 10a-g, fig. 15, should be replaced as well.

Vertical Gear Parts

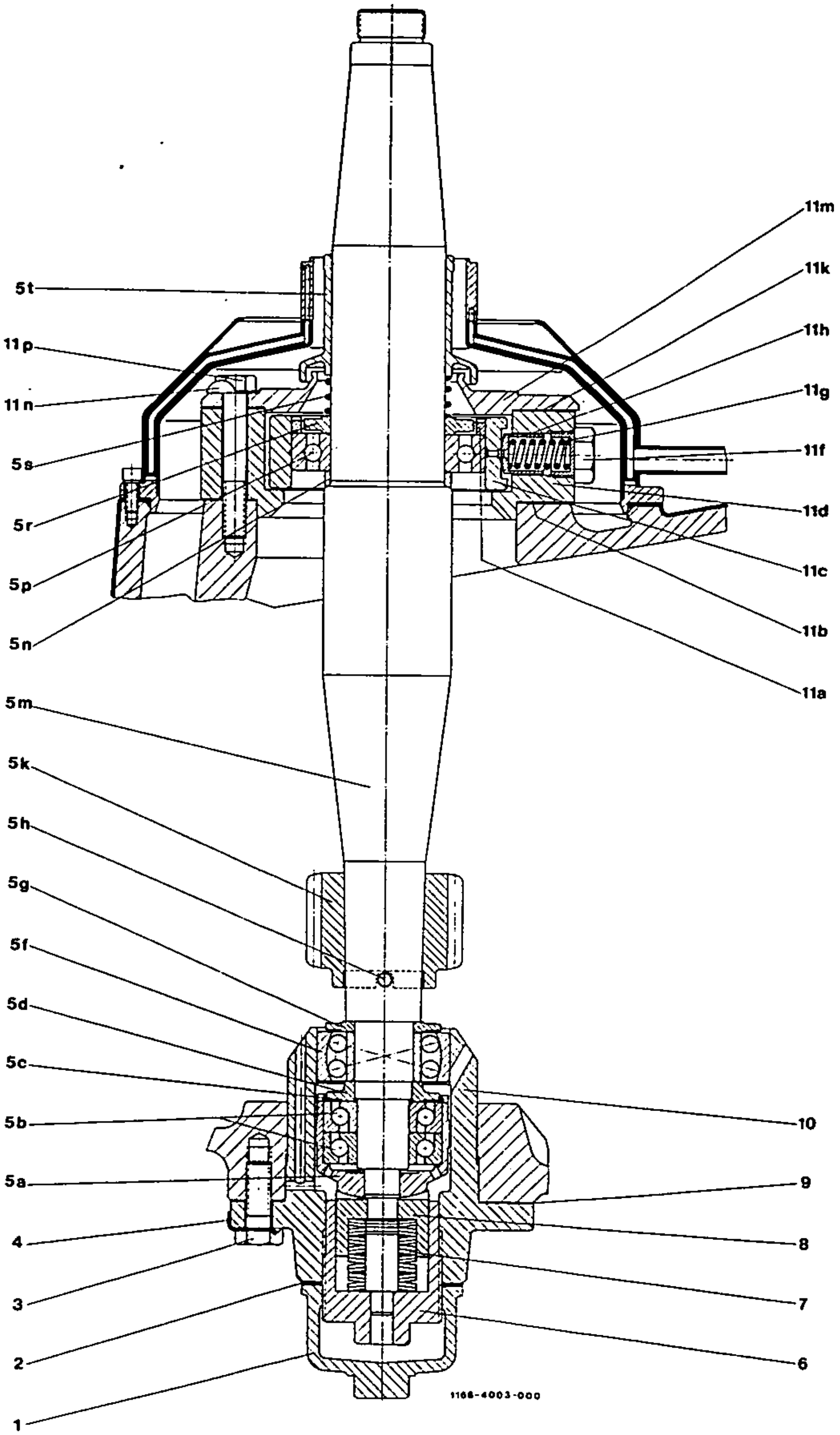


Fig. 14

Horizontal Gear Parts

(f = 50 Hz)

No. in Fig.	Part - No.	Qty.		Part Description
1	5970-L	1	*	Motor
-	1165-1021-000	1		Flange assembly (2a-m)
2a	0013-0282-400	8		Hexagon nut M 16 DIN 934
2b	0026-1330-190	8		Lock washer A 16 DIN 127
2f	0019-7727-090	8		Stud M 16x45 DIN 939 - 5.6
2g	0019-6839-300	8		Hex head screw M 6x10 DIN 933
2h	1080-1475-050	1		Cover
2k	1165-1028-000	1		Flange
2m	0019-6202-150	8		Allen screw M 16x45 DIN 912 - 8.8
3	0019-6150-150	3		Allen screw M 10x55 DIN 912 - 8.8
4	0026-1640-030	1		Centering disc
5	0006-4404-010	1		Cup spring
6	3050-3375-010	1		Bearing cover
7	0019-6938-150	3		Hex head screw M 10x35 DIN 933 - 8.8
8	0004-1850-740	2		Gasket 99/140x1
9	1166-3131-000	2		Bearing housing
10	1167-3449-020	1		Worm wheel assembly with clamp plates
10a	1166-3447-000	1	**	Clamp plate, toothed
10b	1166-3446-000	1	**	Clamp plate
10c	0019-6525-150	4	**	Hex head screw M 10x110 DIN 931 - 8.8
-	1166-3368-020	1		Brake pulley assembly (11a-d)
11a	0019-6144-150	6		Allen screw M 10x25 DIN 912 - 8.8
11b	0026-1337-190	6		Lock washer A10 DIN 127
11c	1166-3371-030	1		Brake pulley
11d	3170-3371-000	1		Brake ring
12	0026-0405-030	1		Disc
13	0019-6150-150	2		Allen screw M 10x55 DIN 912 - 8.8
14	0019-8974-150	2		Threaded pin AM 8x15 DIN 914 - 10.9
-	3170-1043-000	2		Brake assembly (15a-f)
15a	0021-3514-300	2		Brake handle
15b	3170-1031-000	2		Brake bolt (with lining)
15c	0021-3537-300	2		Brake housing
15d	0006-4208-160	2		Cylindrical pressure spring
15f	0021-4096-850	2		Brake lining
-	0026-1263-550	8		Countersunk rivet
16	0026-1353-400	4		Washer
17	3170-1065-010	1		Cover
18	0019-6608-400	4		Hex head screw M 16x60 DIN 931
19	0019-6512-400	3		Hex head screw M 10x40 DIN 931
20	0004-1956-830	2		Felt ring 45 DIN 5419
21	3170-3375-000	1		Bearing cover
22	0004-1822-740	1		Gasket 90/140x1
23	0013-0448-090	1		Grooved nut M50x1.5 SKF/KM10
24	0011-6210-000	1		Grooved ball bearing 6210 DIN 625
25	1166-3400-000	1		Worm wheel shaft
26	0011-6210-000	1		Grooved ball bearing 6210 DIN 625
27	0004-1822-740	1		Gasket 90/140øx1
29	see page 16/1	1		Fluid clutch (see fig. 16)
30	0019-8984-150	1		Threaded pin M 10x25 DIN 914 - 10.9
31	3158-3389-000	1		Cam hub
32	3158-3282-000	1		Cam ring
38	0004-1957-830	2		Felt ring 50 DIN 5419
39	1168-1192-000	1		Bracket
40	0005-0868-000	1		Proximity switch

* When ordering a motor, be sure to state voltage and frequency.

** This part is included in worm wheel assembly with clamp plates, item 10, but it is also available as separate item. When the worm wheel needs replacement, the worm 5k, fig. 14, should be replaced as well (see section 8.5, No.4).

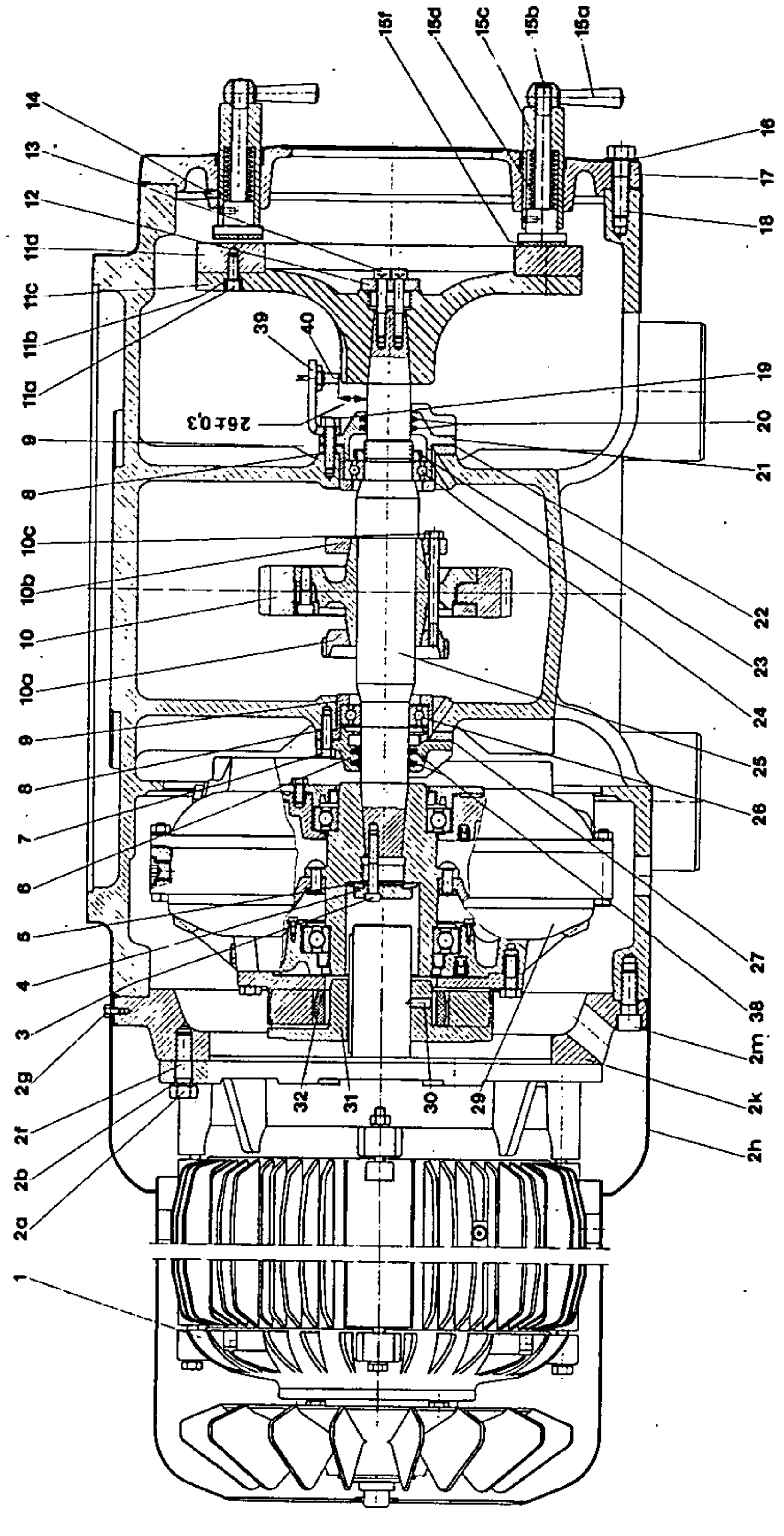

15f
15d
15c
15b
15a
14
13
12
11d
11c
11b
11a
39
40
26±0,3
9
8
10c
10b
10
10a
9
8
7
6
5
4
3
2g
2f
2b
2a
1
32
31
30
29
16
17
18
19
20
21
22
23
24
25
26
27
38
2m
2k
2h

Fig. 15

Pneumatic Brake

(on special order only)

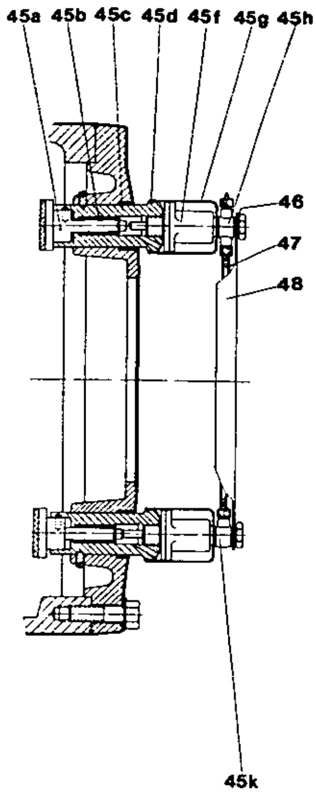


Fig. 15/1

No. in Fig.	Part - No.	Qty.		Part Description
45a	1166-1031-000	2		Brake bolt (with lining), complete
-	0021-4096-850	2	*	Brake lining
-	0026-1263-550	8	*	Countersunk rivet
45b	0006-4120-300	2		Cylindrical pressure spring
45c	0021-3555-300	2		Brake housing
45d	0007-2580-750	2		Gasket 42/2.5
45f	0021-3690-010	2		Compressed-air cylinder
45g	0026-2144-400	2		Cap
45h	0018-3740-640	1		T-type hose connection R 1/4"
45k	0018-3730-640	1		Angular hose connection R 1/4"
46	0004-2245-770	2		Gasket 15/21x0.25
47	0018-0585-848	1		Pipe
48	1166-1044-000	1		Protecting sheet

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

Fluid Clutch

No. in Fig.	Part - No.	Qty.		Part Description
-	1166-3280-000	1		Fluid clutch assembly (1-29) (see also fig. 15, item 29)
1	-	1	*	Cam flange
2	-	8	**	Hex head screw M 12x35 DIN 931
3	-	8	**	Spring washer B 12 DIN 137
4	0004-2913-830	1		Sealing ring 105x130x13
5	0026-0182-170	1		Spacer ring ANS 160x26
6	0011-6021-400	1		Grooved ball bearing 6021 M /C4 DIN 625
7	-	36	**	Hex head screw M 10x70 DIN 931
8	-	1	*	Clutch casing 470Ø
9	0004-2385-858	1		Packing cord 1 mm Ø, 1400 mm long
10	0026-0771-170	36		Spring washer B 10 DIN 137
11	-	36	**	Hexagon nut M 10 DIN 934
12	-	1	*	Primary wheel 470Ø
13	0026-0180-170	1		Spacer ring AN 140x24
14	0007-2944-830	1		Gasket 140/3Ø
15	0011-6018-400	1		Grooved ball bearing 6018 M /C4 DIN 625
16	-	1	*	Secondary hub with secondary wheel 425Ø
17	0004-2912-830	1		Sealing ring 90x110x13
18	-	1	**	Sealing ring cover
19	-	8	**	Hex head screw M 8x20 DIN 933
20	0026-0770-170	8		Spring washer B 8 DIN 137
21	0004-2144-280	2		Gasket 22/29Ø x 1,5
22	-	2	**	Plug M 22x1,5x20
23	0004-2131-280	1		Gasket 18/24Ø x 1,5
24	0019-1490-000	1		Threaded plug M 18x1,5x15
25	-	1	**	Oil control ring 119/192Ø x 4,5
26	-	8	**	Cylindrical screw AM 5x15 DIN 84
27	-	8	**	Lock washer 5 DIN 7980
29	0019-1551-090	1		Oil fill plug M 22x1,5

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

** Instead of part-number state item-number (see first column).

Fluid Clutch

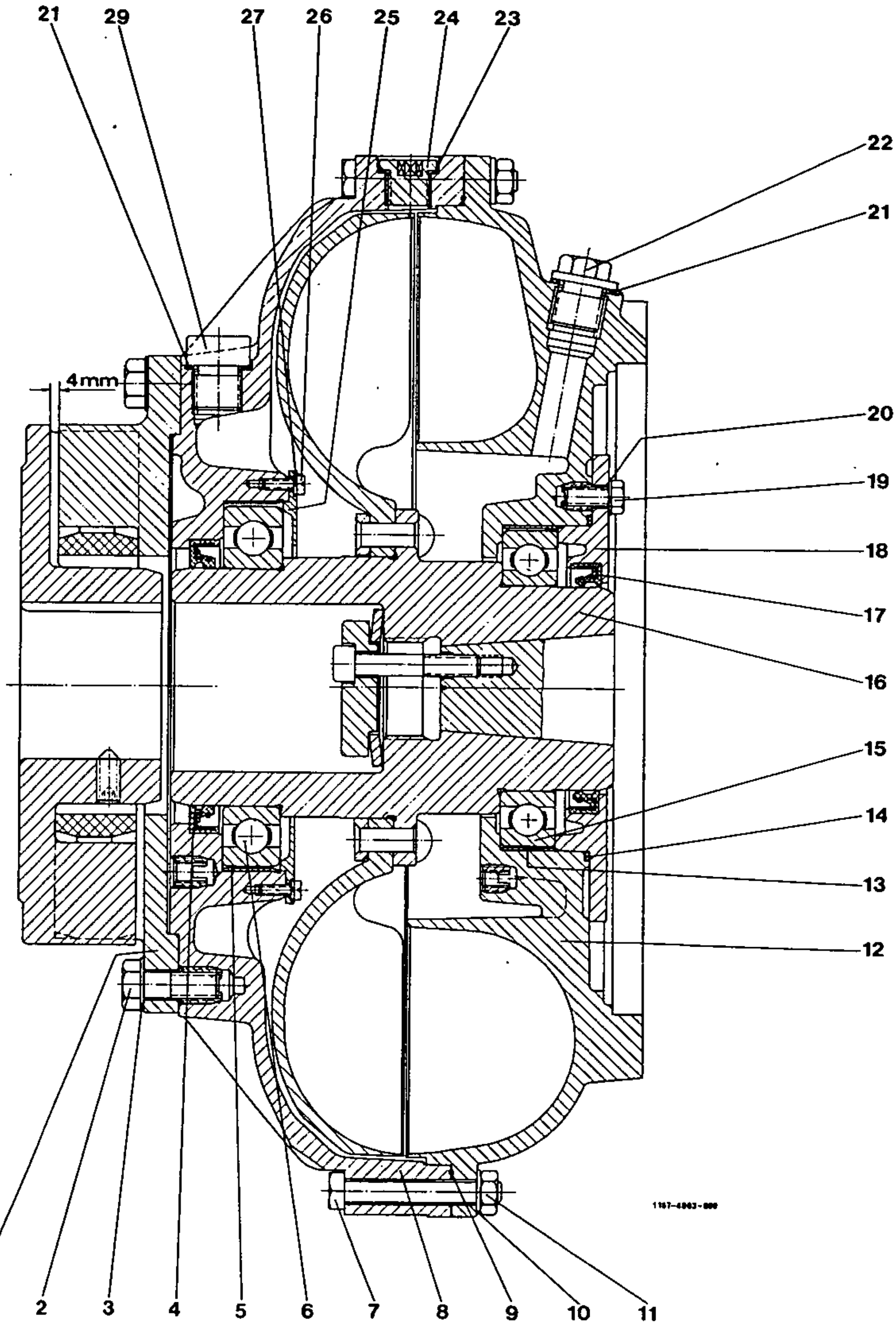


Fig. 16

Operating-water connection

No. in Fig.	Part - No.	Qty.		Part Description
-	8134-2100-270	1		Operating-water connection with protecting case (1-27)
1	0013-2842-300	1		Grooved coupling nut F25 DIN 11851
2	0018-3939-300	1		Cone connection D25 DIN 11851
3	0007-2208-750	4		Gasket G 25 DIN 11851
-	8134-2201-010	1		Pipe line, complete (4a-d)
4a	0018-4502-300	1		Threaded connection 25/R1"
4b	0018-2525-630	1		Strainer R 1"
4c	0018-1609-300	1		Bend
4d	0013-2842-300	1		Grooved coupling nut
5	0018-4086-400	3		Threaded connection 25/R 1"
6	0018-1741-000	1		Water pressure reducer, complete
6a		2	*	Gasket
6b		2	*	Threaded connection
6c		2	*	Coupling nut
6d	0001-0299-640	2	*	Pressure gauge
7	3014-2166-000	1		Connection pipe
8	0019-0137-300	1		Hex head screw R 1/4" x 12
9	0004-5268-880	2		Gasket 13/19x1.5
10	8134-2195-000	1		Connection piece
11	0018-0961-300	2		Double nipple 3/8"
12	0018-3711-600	2		Solenoid valve 3/8"
15	0018-3854-300	4		Connection piece 10/R3/8"
16	0013-2818-400	4		Coupling nut R 3/4"
17	0007-2230-750	4		Gasket 15.5/21.5 x 4
18	0018-4645-300	2		Threaded connection R 3/4" R 3/8"
19	0018-4646-300	2		Threaded connection R 3/4" R 1/2"
20	0018-1710-640	2		Ball valve 1/2"
21	0018-1788-300	2		Reducing nipple 1/2" / 3/8"
22	8134-2201-040	1		Pipe line
23	0007-2402-750	2		Gasket 17/23 x 3
24	0018-4645-300	1		Threaded connection R 3/4" / R 3/8"
25	8134-2193-110	1		Connection piece
26	0018-1299-640	2		Upper part of valve 1/2" DIN 3519,cpl.
26a	0004-5276-710	2		Gasket 22/26 x 1
27	0001-0299-640	2		Pressure gauge
-	8134-2355-020	1		Protecting case
-	0005-0862-900	1		Branch box 55x55x38
-	0019-2376-630	2		Fillister head screw AM 4x16 DIN 84
-	0005-3358-630	1		Cable gland Pg 9
-	0005-0203-630	1		Cable gland DIN 46255
-	0005-0222-630	1		Plug Pg 9
-	0005-3355-630	1		Cable gland Pg 9
-	0005-0772-608	1		Protecting hose Pg 9
-	1165-2350-000	1		Pressure switch assembly (30-31)
30	0018-1870-000	1		Low-pressure hose, complete
30a	0018-3465-400	1	*	Screw coupling DL 8 DIN 2353 R 1/4"
30b	0018-3560-400	1	*	Screw coupling DL 8 R 3/8"
31	0005-0675-900	1		Pressure switch F5
36	0005-3358-630	1		Cable gland Pg 9
37	0019-2376-630	2		Fillister head screw AM 4x16 DIN 84
38	0005-0862-900	1		Terminal box
39	0005-0222-630	1		Plug Pg 9
40	0005-0203-630	1		Cable gland A Pg 11 x A DIN 46255
41	0005-0772-608	1		Protecting hose

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

Operating-Water Connection

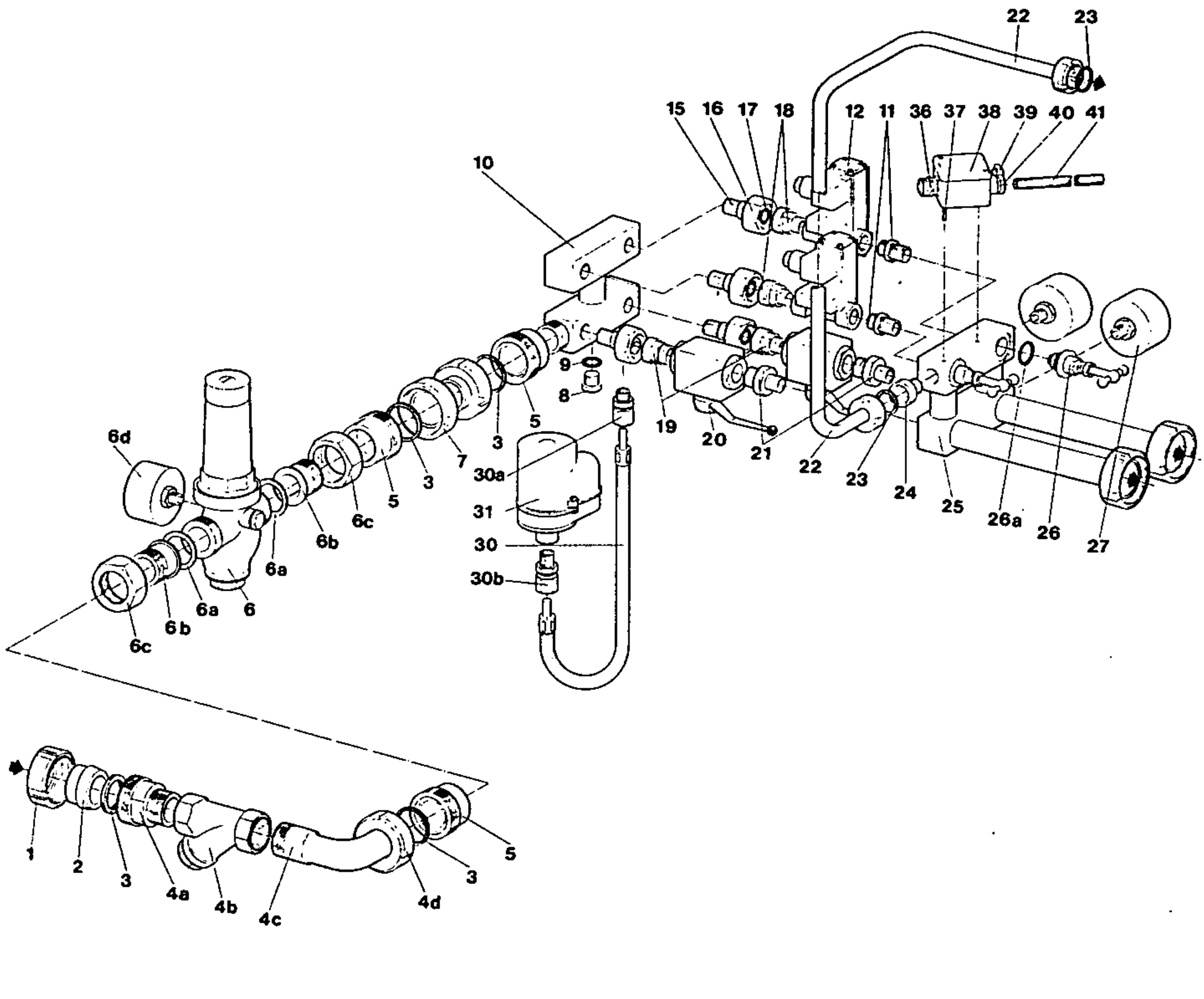


Fig. 17/1

Solenoid Valve R 3/8"

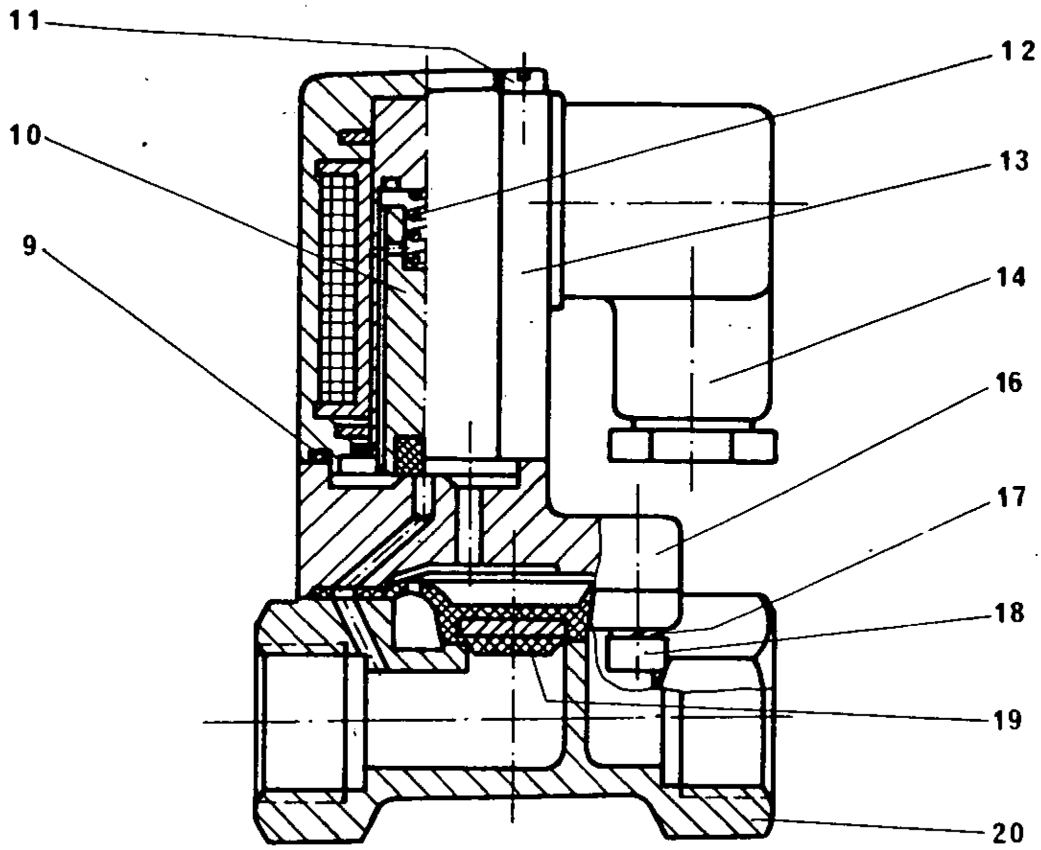


Fig. 17/2

No. in Fig.	Part - No.	Qty.	Part Description
-	0018-3711-600	1	Solenoid valve, complete (9-20)
9	0007-1946-750	1	Gasket 25/1.5
10	0018-3710-040	1	Solenoid core
11	0019-2387-400	4	Cylindrical screw M 4x55 DIN 84
12	0006-4079-300	1	Pressure spring
13	0018-3710-800	1	Solenoid head 50/60 Hz
14	0018-3710-050	1	Coupler socket
15			
16	0018-3711-070	1	Valve cover
17	0026-1322-170	4	Lock washer A4 DIN 127
18	0019-6077-400	4	Allen screw M 4x10 DIN 912
19	0018-3711-750	1	Diaphragm
20	0018-3711-080	1	Valve housing

No. in Fig.	Part - No.	Qty.	Part Description
-	1167-2296-030	1	Feed and discharge connections, complete
1a	0018-3955-300	1	Cone connection D 50 DIN 11851
1b	0013-2845-300	1	Grooved coupling nut F 50 DIN 11851
1c	0007-2211-750	1	Gasket G 50 DIN 11851
1d	1166-2190-020	1	Handle connection piece
-	1167-2295-030	1	Skim milk discharge,complete (2a-u)
2a	0007-2210-750	1	Gasket G 40 DIN 11851
2b	0007-2211-750	1	Gasket G 50 DIN 11851
2c	1167-2285-030	1	Skim milk discharge
2d	0007-2279-750	1	Gasket 56/68 x 6
2f	0013-2845-300	1	Grooved coupling nut F 50 DIN 11851
2u	0007-2564-750	1	Gasket 170/3
3	8918-2100-050	1	Pressure gauge
4	8266-2310-150	1	Constant pressure valve NW 65/50
6	see page 18/3	1	Flowmeter (see fig. 18/2)
-	1167-2289-000	1	Cream discharge, complete (7a-s)
7a	0007-2373-840	1	Gasket 35.5/47 x 5
7b	0007-2882-750	1	Gasket 35/47 x 6
7c	1167-2386-000	1	Cream discharge with valve housing
7d	0007-2892-750	1	Gasket 40/52 x 6
-	1166-2272-010	1	Valve cone assembly (7f-k)
7f	1166-2278-010	1	Valve cone
7g	0004-5720-840	1	Grooved ring 24/45
7h	1166-2268-000	1	Washer
7k	0026-2118-300	1	Snap ring
-	1166-2202-000	1	Adjusting screw assembly (7m-s)
7m	0013-2844-300	1	Grooved coupling nut F 40 DIN 11851
7n	1166-2217-000	1	Guide ring
7p	0013-0085-300	1	Knurled nut M 18x1.5
7r	1166-2276-000	1	Adjusting screw
~~7s~~	~~0026-0057-850~~	1	Washer
8	0018-3949-300	1	Cone connection D 40 DIN 11851
9	0013-2844-300	1	Grooved coupling nut F 40 DIN 11851
10	0007-2210-750	2	Gasket G 40 DIN 11851
-	1167-2213-080	1	Centripetal pump assembly (11a-c)
11a	1167-2252-000	1	Skim milk pump 140 Ø (up to 5.0 bars max.)
11b	1167-2241-030	1	Cream pump 140 Ø (up to 5.0 bars max.)
11c	1167-2246-[illegible]	1	Feed tube

Check First

Feed and Discharge Connections and Centripetal Pump

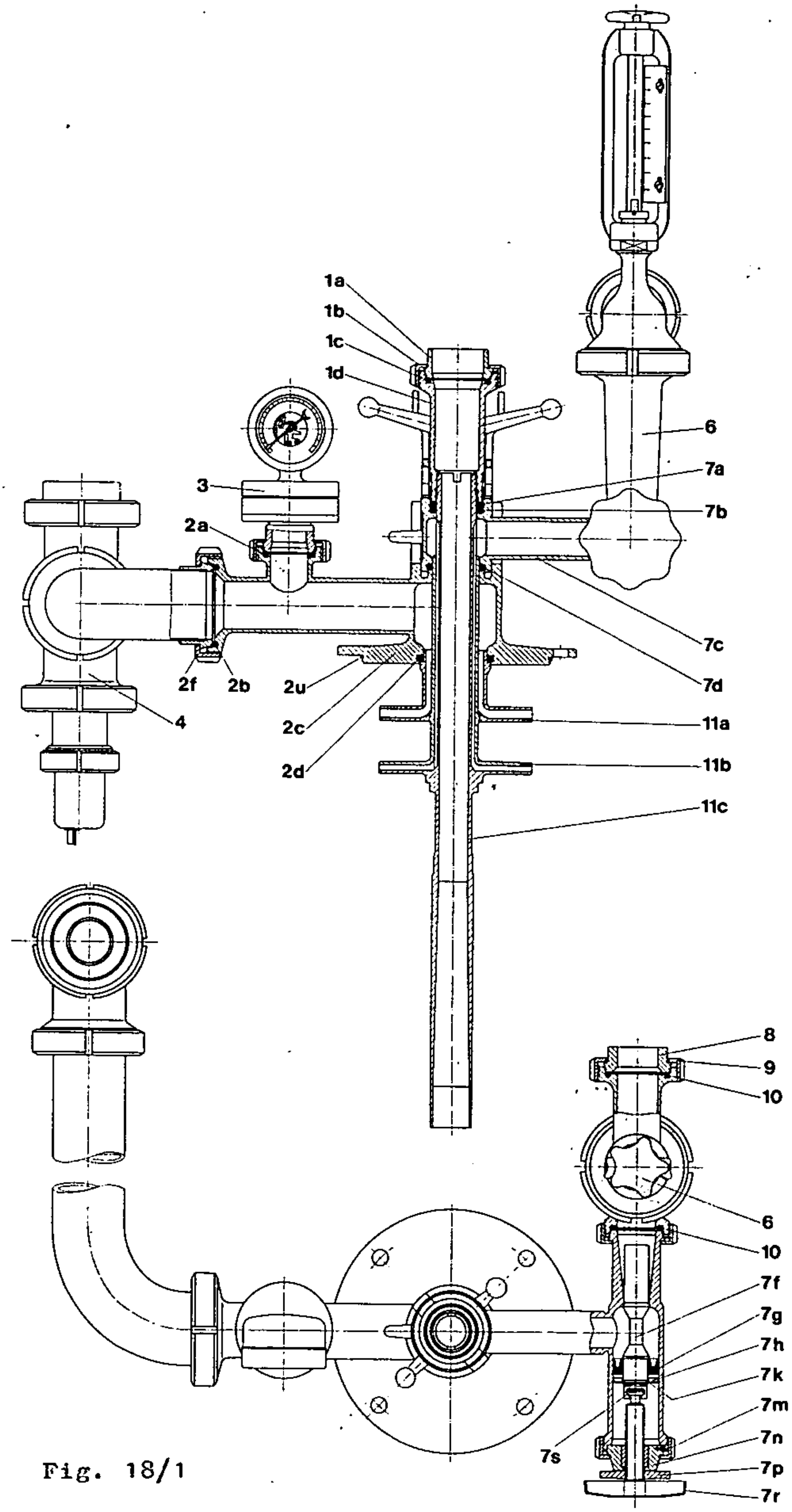


Fig. 18/1

Flowmeter

No. in Fig.	Part - No. Measuring range: 700 - 4000 1/h f.cream discharge	Part - No. Measuring range: 6000 - 30000 1/h for feed	Qty.	Part Description
-	8021-2000-090	8022-2100-080	1	Flowmeter assembly (1-16)
1	0019-1731-300	0019-1731-300	1	Handle screw
2	0007-2298-750	0007-2298-750	2	Gasket 13,5/22 Ø x 10
3	2 0001-0083-~~820~~ 890	(0001-0082-~~820~~ 890	1	Cylindrical sight glass
4	0019-1380-300	0019-1380-300	1	Threaded bush
5	0026-1375-300	0026-1375-300	1	Washer
6	0013-3010-300	0013-3010-300	1	Nut M 35x1,5
7	8021-2003-120	8022-2003-080	1	Outlet pipe
8	-	0007-2341-750	1	Gasket 85/95 Ø x 6
8	0007-2279-750	-	1	Gasket 56/68 Ø x 6
9	0013-2846-300	0013-2847-300	1	Grooved coupling nut
10	8021-2001-150	8022-2001-110	1	Inlet cup
11	8021-2012-010	8022-2112-000	1	Float
12	-	8022-2117-000	1	Scale 6000 - 30000 1/h
-	8021-2017-000	-	1	Scale 700 - 4000 1/h
13	0004-5261-720	0004-5261-720	2	Gasket 4,5/8,5 x 1
14	0019-2478-300	0019-2478-300	2	Lens head screw AM 4x8 DIN 85
15	8020-2002-000	8022-2002-000	1	Intermediate piece
16	-	0007-2211-750	2	Gasket G 50 DIN 11851
16	0007-2210-750	-	2	Gasket G 40 DIN 11851

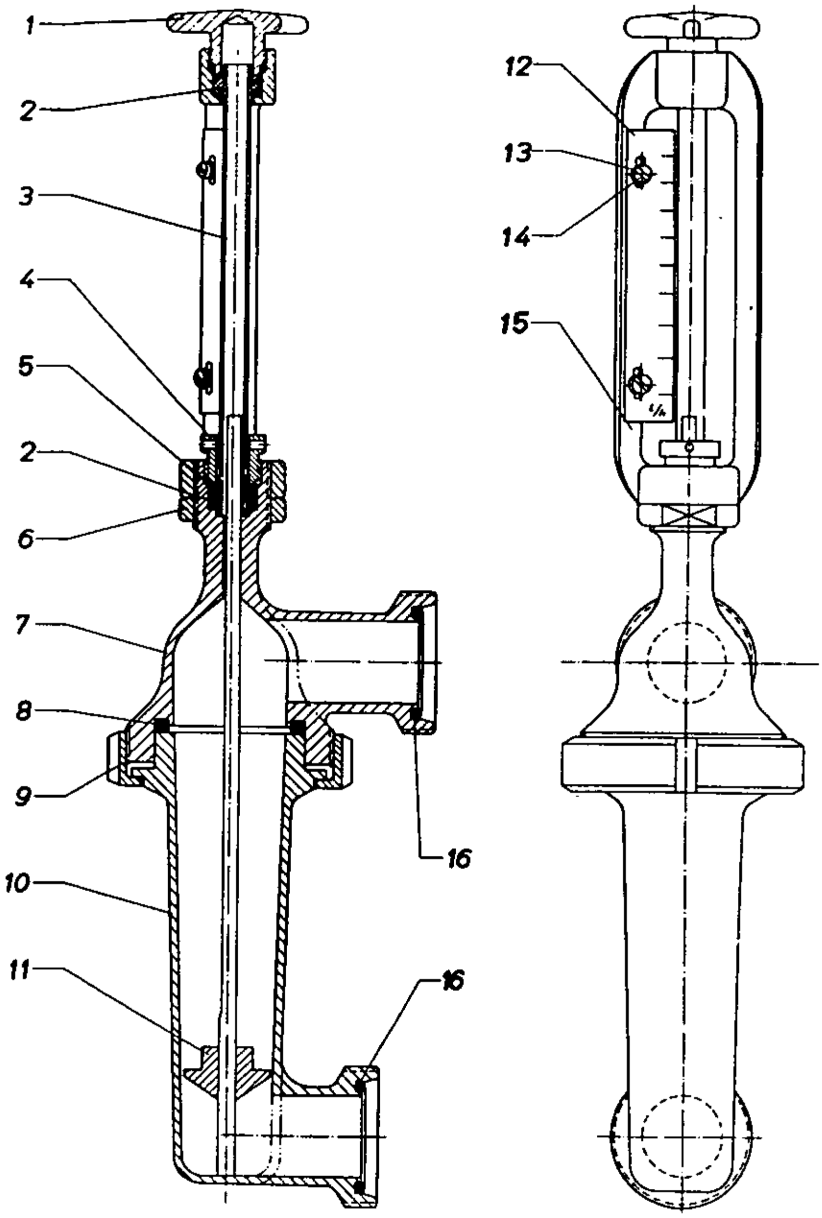


Fig. 18/2

Bowl

No. in Fig.	Part - No.	Qty.		Part Description
-	1170-6600-000	1		Bowl, complete (1-23)
1	0019-1450-400	1		Threaded plug
2	0007-1970-690	1		Gasket 26.5/35x5.25
3	3159-6280-000	1		Piston valve assembly (3a-f)
3a	3159-6281-000	1		Valve housing
3b	0007-2920-750	3		Gasket 23.3/2.4
3c	0004-2341-840	1		Gasket 6/9.9x10.5
3d	0007-2923-750	2		Gasket 9.3/2.4
3f	3159-6276-000	1		Valve piston
4	1170-6501-000	1	*	Sliding piston
5	0007-2962-750	1		Gasket 611/635x12
7	1167-6604-050	1	*	Bowl bottom, complete
7a	3117-6609-010	1	**	Arresting piece
7b	0019-2233-400	1	**	Fillister head screw AM 5x12 DIN 84
7c	0007-2564-750	1		Gasket 170/3
7d	0007-2944-750	1		Gasket 140/3
7f	0019-6112-400	4		Allen screw M 6x35 DIN 912
7g	1167-6597-000	1		Ring
8	1167-6631-010	1	*	Lock ring S 680x14 (left-hand thread)
-	1170-6660-000	1		Set of discs (9a-f)
9a	1167-6662-010	1		Bottom disc
9b	1167-6663-040	4		Disc
9c	1167-6663-020	211		Disc
9d	1167-6664-010	1		Compensating disc
9f	1165-6666-000	1		Top disc
10	0007-2586-750	1		Gasket 108/10
11	1170-6620-000	1	*	Distributor
14	0007-2546-750	1		Gasket 600/5
15	0007-2969-840	1		Gasket 579.7x11
16	0013-2964-400	1		Spindle nut, complete
16a	0007-2597-750	1	**	Gasket 50/4
17	1170-6610-000	1	*	Bowl top
18	1167-6650-020	1		Separating disc
19	1167-6670-030	1		Upper disc (specially shaped)
21	1167-6645-000	1		Centripetal pump chamber cover
22	0007-2854-750	1		Gasket 190/202x6
23	1165-6631-000	1		Lock ring Tr 215x6 (left-hand thread)

* This part can only be replaced by a WESTFALIA factory engineer or by a special repair shop authorized by WESTFALIA, because of special re-fitting to machine and possible re-balancing of bowl.

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

MICK WELLS

24' CHECK

07801 768499

01908 576546

Bowl

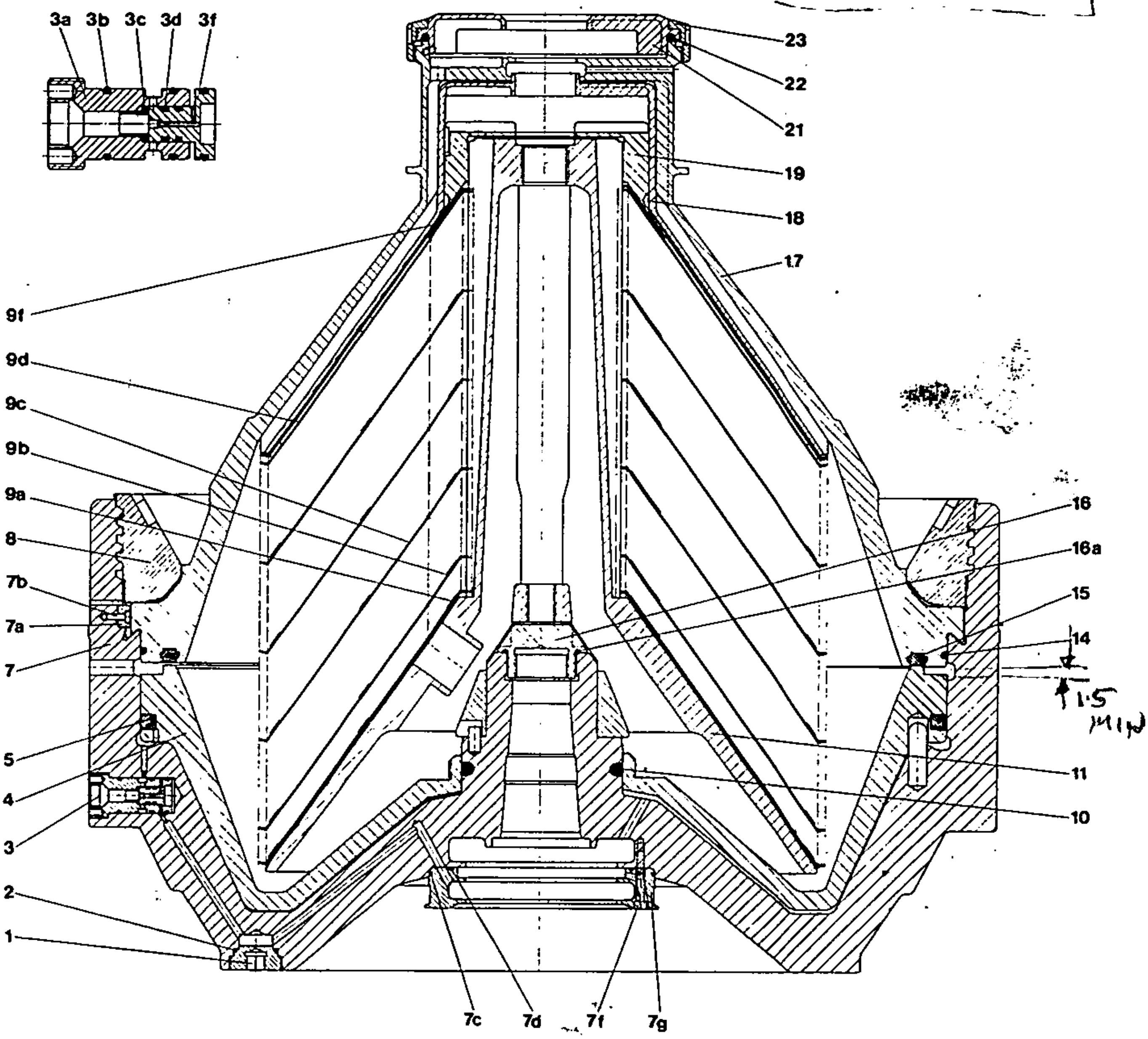


Fig. 19

Tools and Accessories

All the parts mentioned in the packing list furnished with the separator should be found in the packing case.

No. in Fig.	Part - No.	Qty.	Part Description
401	0003-3774-320	1	Allen wrench 4 DIN 911
-	0003-3775-320	1	Allen wrench 5 DIN 911
-	0003-3776-320	1	Allen wrench 6 DIN 911
-	0003-3777-320	1	Allen wrench 8 DIN 911
-	0003-3778-320	1	Allen wrench 10 DIN 911
-	0003-3780-320	1	Allen wrench 14 DIN 911
402	0003-4080-110	1	Single-ended wrench 50 (for spindle nut)
403	0003-4202-320	1	Double-ended wrench 10x13 DIN 3110
-	0003-4205-320	1	Double-ended wrench 17x19 DIN 3110
-	0003-4208-320	1	Double-ended wrench 22x27 DIN 3110
-	0003-4209-320	1	Double-ended wrench 24x30 DIN 3110
-	0003-4211-320	1	Double-ended wrench 27x32 DIN 3110
-	0003-4222-320	1	Double-ended wrench 36x41 DIN 3110
404	0003-3846-000	1	Pivoted hook wrench 90/155
405	0003-0201-000	1	Mallet
406	0003-0303-000	1	Splash cover
407	0003-0256-890	1	Oil gun
408	0003-0168-890	1	Funnel
409	0003-0277-800	1	Oil cup
410	0003-4695-960	1	Brush 70x100x500
411	0003-4667-800	1	Rotary brush 41/26x213
412	0003-4690-960	1	Brush 35x125x285
413	0003-4540-960	4	Cylindrical brush 10x40x160
[illegible]	0003-4544-960	4	Cylindrical brush 15x85x285
[illegible]	0003-4551-800	1	Cylindrical brush 20x100x800
[illegible]	0003-4552-960	1	Cylindrical brush 45x110x270
414	1087-9910-010	1	Puller (for cam hub, fluid clutch)
415	0018-3430-030	1	Tube M 22x1.5x200 (for fluid clutch)
416	0003-0590-000	1	Torque wrench
417	0003-0601-320	1	Socket 8
418	0984-9862-000	1	Spindle lifting device
419	1166-9910-010	1	Forcing tool (for fluid clutch and brake pulley)
420	0003-4636-050	1	Screwdriver 4.5x125
-	0003-4637-050	1	Screwdriver 8x150
425	0003-0353-000	1	Annular wrench (for large lock ring)
426	0003-4002-000	1	Annular wrench (for small lock ring)
427	1166-9840-000	1	Lifting device (for bowl top)
428	1165-9960-000	1	Jack (for sliding piston)
428a	1166-9805-000	1	* Pressure piece
429	0003-0135-000	1	Wrench (for feed tube)
430	1170-9820-000	1	Disc stack compressing device (430a-d)
430a	1167-9851-020	1	Threaded ring
430b	1167-9770-000	1	Hydraulic compressing device
430c	1167-9939-000	1	Disc
430d	1170-9877-000	1	Bolt
431	2301-9970-000	1	Lifting device (for annular wrench with lock ring)
432	0003-0217-030	1	Chisel
434	1170-9970-000	1	Lifting device
435	1165-9840-010	1	Lifting device (for hood)
436	3050-9930-000	1	Jack (for bowl bottom)
437	0003-3727-030	1	Wrench M4 (for valve piston)
438	1165-9895-010	1	Wrench (for bowl valve)
439	**1168-9823-000**	**1**	**Adjusting ring**
-	0015-0014-080	5	2.5-litre can of separator lubricating o C-LP 11 4 Viscosity at 50°C: 114± 8 cSt
-	0015-0050-090	2	5-litre can of Shell Turbo 27 Oil Viscosity at 50°C: 21 cSt - 3E (for fluid clutch)
-	0015-0113-000	2	100-gram tube of special type grease (for threads on bowl)
-	0015-0121-000	1	0.85 kg can of ball and roller bearing gr K-L3K DIN 51825

* This part is included in jack 428, but it is also available as separate item.

Tools and Accessories

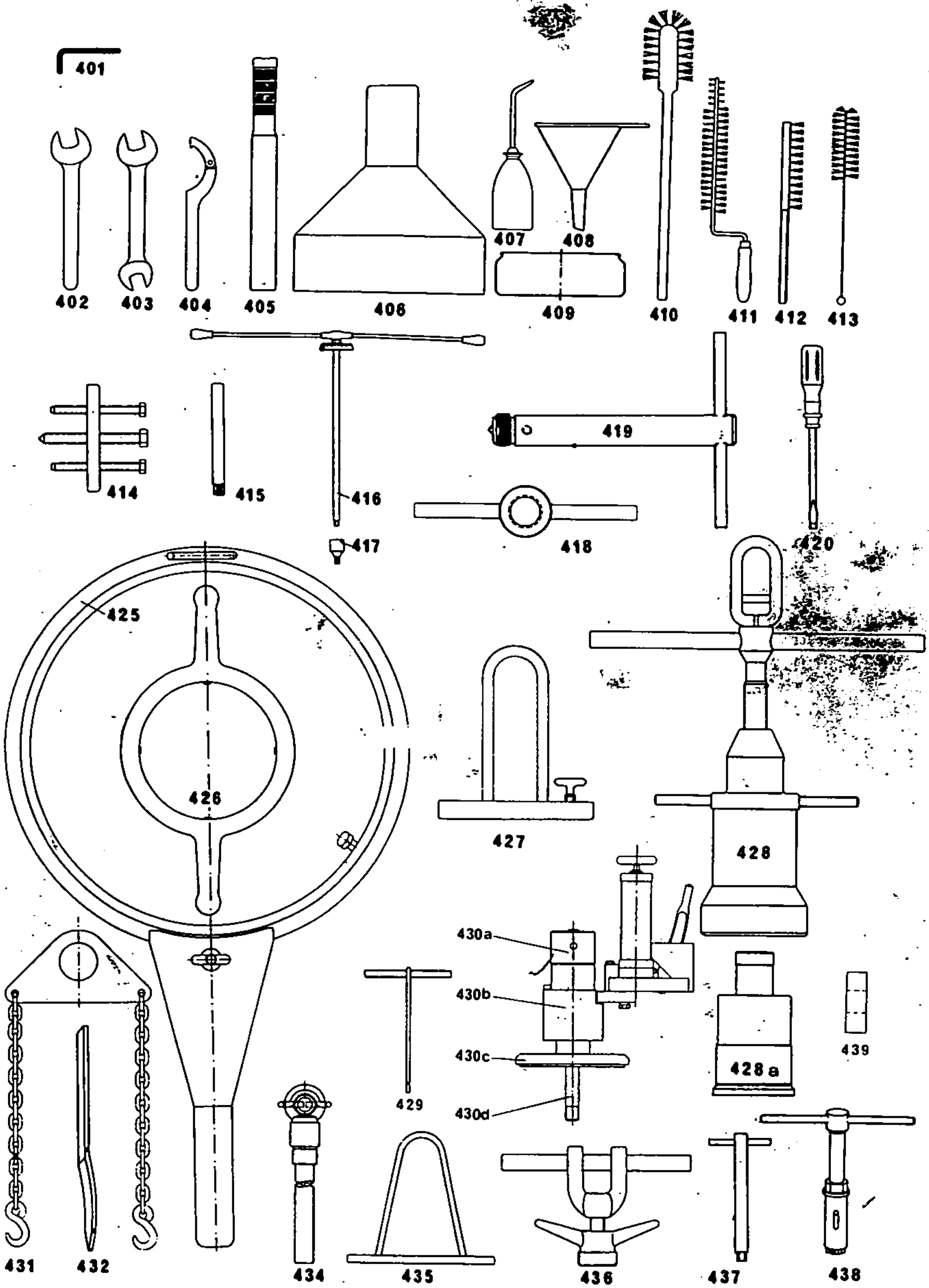


Fig. 20

1167-

Sterilizing Tank

No. in Fig.	Part - No.	Qty.	Part Description
-	1165-9200-040	1	Sterilizing tank assembly (1-31)
1	0013-2845-300	1	Grooved coupling nut F 50 DIN 11851
2	0018-3955-300	1	Cone connection D 50 DIN 11851
3	0007-2211-750	1	Gasket G 50 DIN 11851
4	0013-2842-300	2	Grooved coupling nut F 25 DIN 11851
5	0018-4269-400	1	Cone connection R 1/2"
6	0007-2208-750	2	Gasket G 25 DIN 11851
7	0001-0675-400	1	Angle thermometer
8	1165-9462-000	1	Bush
9	1165-9210-030	1	Sterilizing tank
10	0026-1102-400	6	Cylindrical pin
11	0019-1363-300	6	Hinge screw
12	0021-3128-300	6	Handle screw
13	0007-2121-750	1	Gasket 118/130x7
14	0007-2483-750	1	Gasket 65/10
15	0006-4081-400	1	Cylindrical pressure spring
16	1165-9698-010	1	Funnel
17	1165-9277-000	1	Cap
18	0019-6966-400	3	Hex head screw M 12x20 DIN 933
19	0026-2108-400	1	Cap
20	0019-2507-300	1	Lens head screw AM 6x10 DIN 85
21	0026-1382-400	1	Washer 6,4 DIN 125
22	1165-9208-020	1	Cover
23	0007-2309-750	1	Gasket 92/112x10
24	0004-2364-758	1	Packing cord 8x8x2200
25	0001-0261-300	1	Blind cap
26	1165-9205-000	1	Flush pipe
27	0018-3949-300	1	Cone connection D 40 DIN 11851
28	0007-2210-750	1	Gasket G 40 DIN 11851
29	0013-2844-300	1	Grooved coupling nut F 40 DIN 11851
30	0007-2209-750	1	Gasket G 32 DIN 11851
31	0021-3155-700	3	Foot

Sterilizing Tank

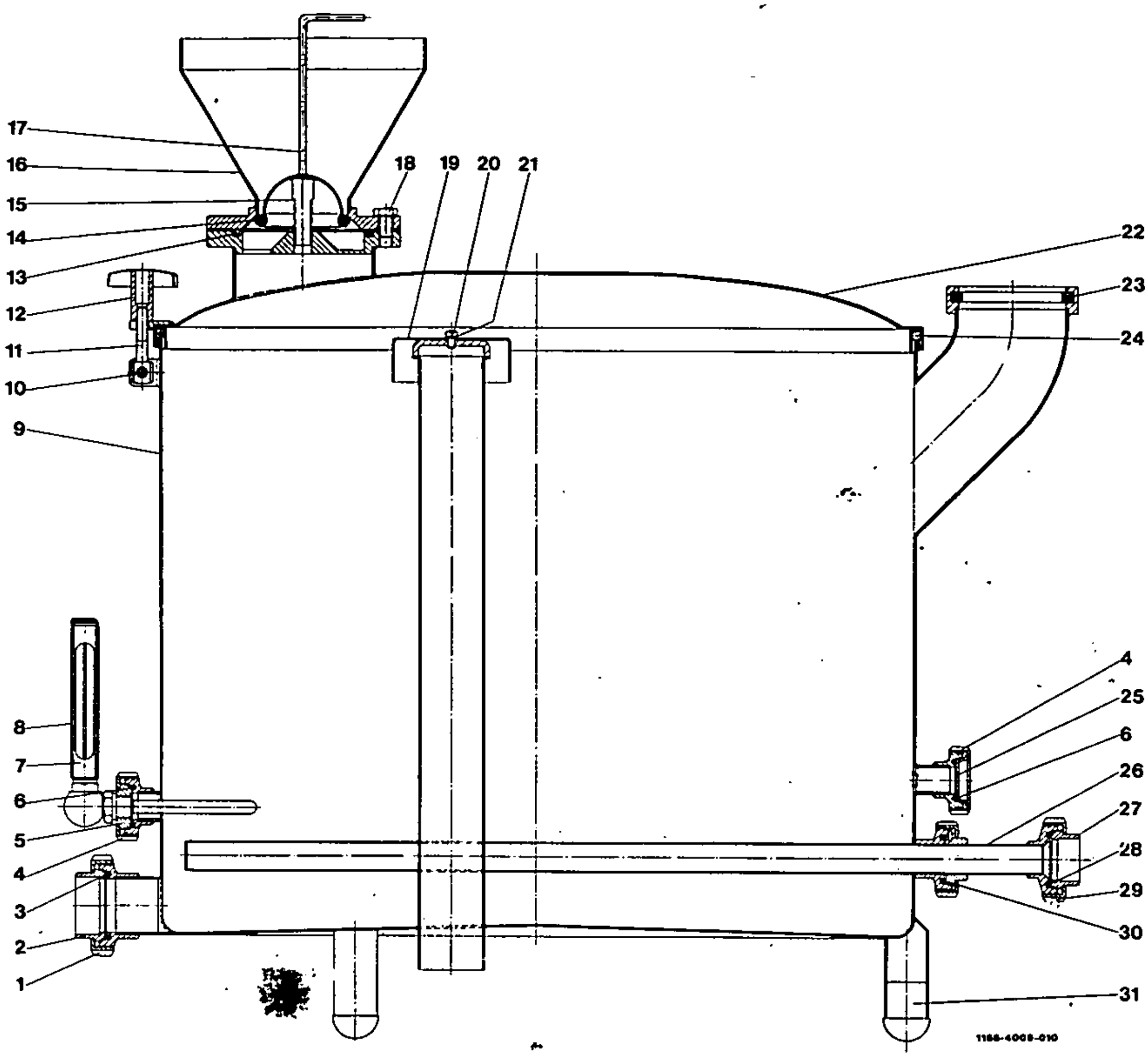


Fig. 21

Flow Constrictor

On special order only.

Maximum throughput rate:15000 litres/h.

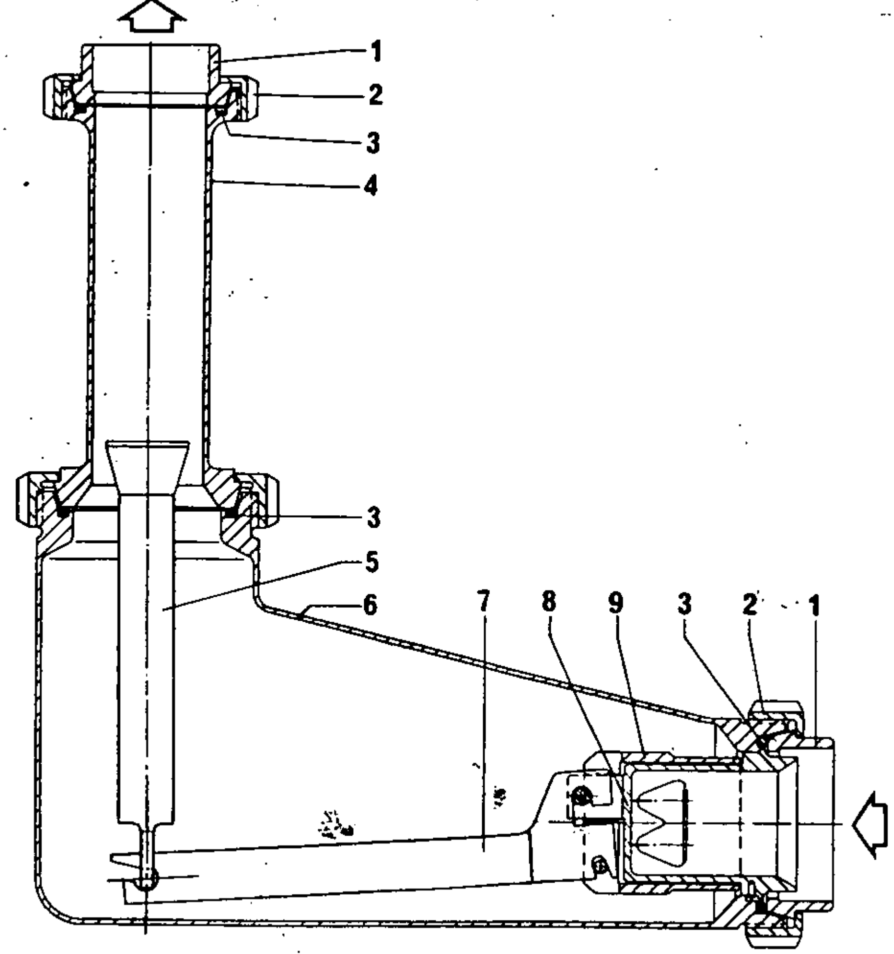


Fig. 22

IMPORTANT: Be sure to install the flow constrictor in such a manner that the inlet is fitted to a horizontal piece of pipe and the control tube 4 is directed vertically upwards.

No. in Fig.	Part - No.	Qty.		Part Description
-	8251-2150-070	1		Flow constrictor, complete (1-9)
1	0018-4636-400	2		Cone connection 65/50
2	0013-2846-300	2		Grooved coupling nut
3	0007-2212-750	3		Gasket G 65 DIN 11851
4	-	1	*	Pipe
5	-	1	*	Float
6	-	1	*	Housing
7	-	1	*	Throttling lever
8	-	1	*	Throttling housing
9	-	1	*	Regulating piece

* This part can only be replaced by a WESTFALIA factory engineer or by a special repair shop authorized by WESTFALIA, because its replacement requires re-adjustment of the flow constrictor. Therefore, when ordering this part, the flow constrictor must be returned to the factory.

Installation of the Flow Constrictor in the Piping of a Milk Processing Plant

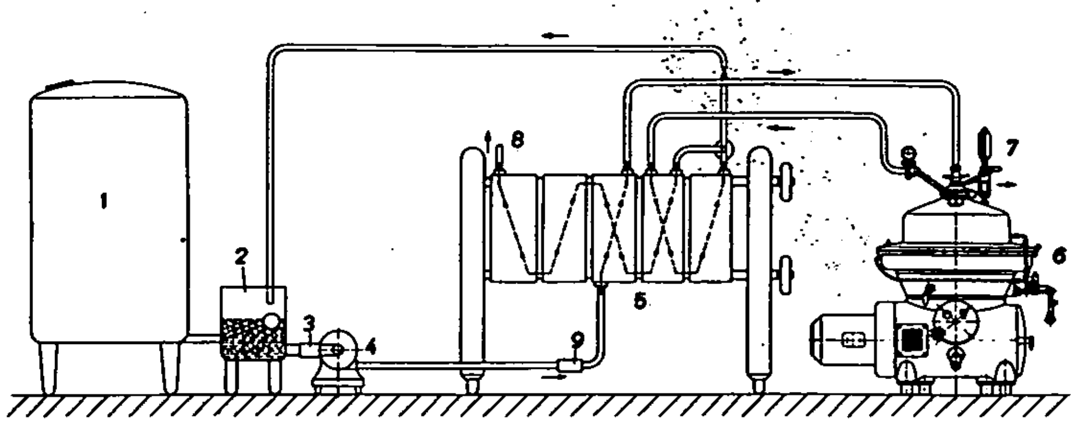


Fig. 1 Flow Constrictor between Pump and first Exchanger

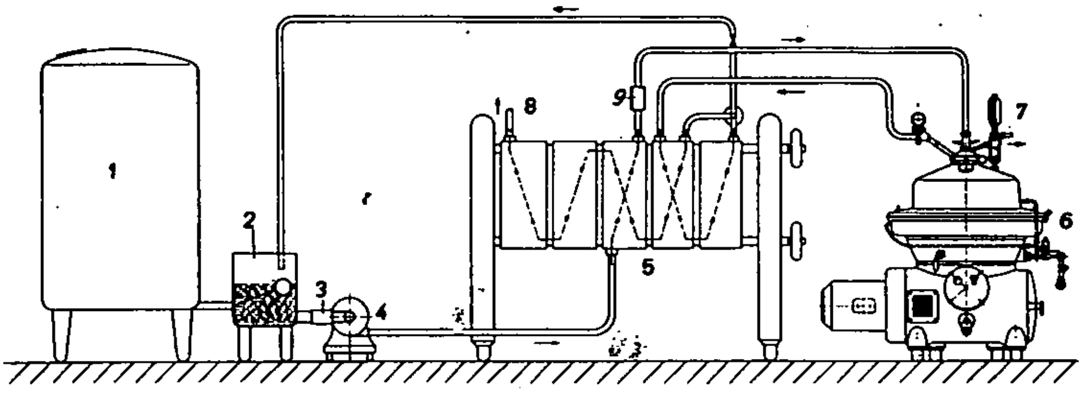


Fig. 2 Flow Constrictor between first Exchanger and Separator

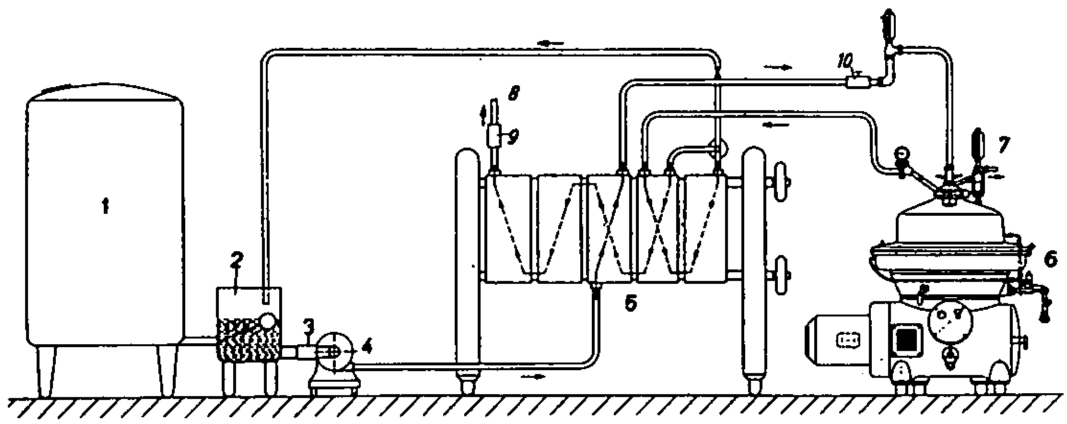


Fig. 3 Flow Constrictor behind the Cooler

Adjustable Flow constrictor and Flowmeter ahead of the Separator

1 Storage tank
2 Balance tank
3 Strainer
4 Milk pump
5 Heater and cooler
6 Separator
7 Cream discharge
8 to Storage tank
9 Flow constrictor
10 Adjustable flow constrictor

Note! When installing the flow constrictor make sure its cylindrical part is in upright position so that the milk flows through it from below.

Interlock Device (supplied on special order)

(Safety device for electro-mechanical locking of the hood)

When required, the separator can be equipped with a safety device that ensures electro-mechanical interlocking of the hood and top assembly while the bowl is rotating. This device has been designed with a view to preventing accidents which are likely to occur when ..tings are being loosened before the bowl ..s stopped rotating.

The interlock device consists of a proximit.. ..itch, zero-rpm relay. solenoid, rectifier, limit switch, and the p.. ..s listed on page 23/2.

The annular top part of bow 2 must fit over th.. .andle connection piece of the feed and discharge assembly. When the lower part of the arm is plugged into housing 15 attached to the separator frame, the limit switch 10,incorporated in the housing, closes the control circuit. This arrangement ensures that the drive motor cannot be started unless the hood has been installed and the handle connection piece has been screwed on.

After starting of the motor, solenoid 7 is actuated by the zero-rpm relay which is connected to the proximity switch monitoring the speed of the drive shaft. The locking pin of the solenoid snaps into the hole provided in the bow. As a result, the bow cannot be removed as long as the bowl is rotating.

When the drive motor has been switched off, the bow is unlocked by the zero-rpm relay as soon as the drive shaft and, hence, the bowl stops rotating. This is indicated by a pilot lamp. Only after this procedure it is possible to remove the bow and after it the h..
together with the feed and discharge assembly.
In the event of power failure, the bow will remain locked even when the bowl has ceased rotating.

Interlock Device (on special order)

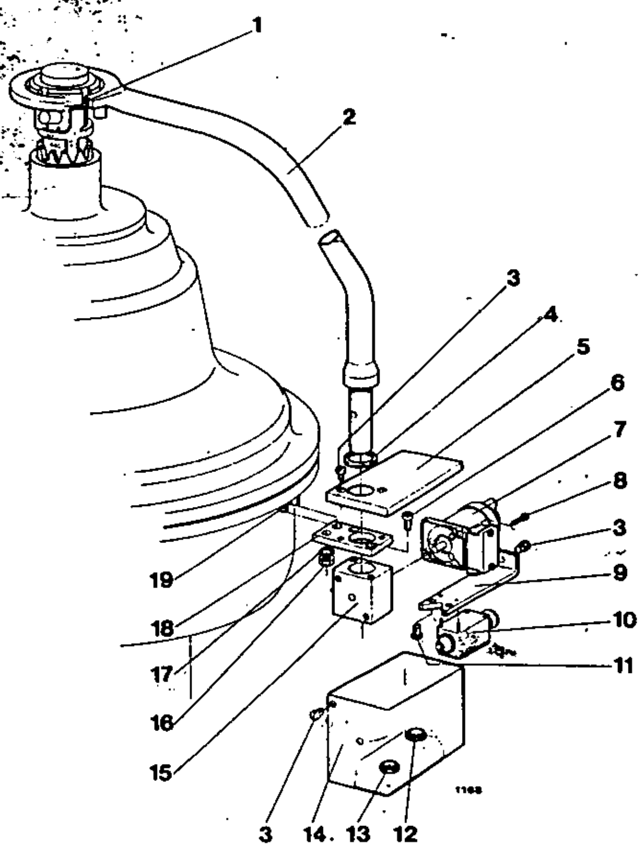


Fig. 23/1

Item No.	Part - Number	Qty.	Part Description
1	0007-2113-750	1	Gasket 94/104x6
2	1170-1248-000	1	Bow
3	0019-2507-400	5	Lens-head screw AM 6x10 DIN 85
4	0007-2246-750	1	Gasket 30/38x4
5	1168-2354-000	1	Cover plate
6	0019-8353-400	2	Allen screw M8x12 DIN 6912
7	0005-1165-000	1	Solenoid
8	0019-2248-400	2	Fillister head screw AM 6x12 DIN 84
9	1168-1145-020	1	Holder
10	0005-0643-280	1	Limit switch
11	0019-8353-400	2	Allen screw M8x12 DIN 6912
12	0013-2868-630	2	Hexagon nut A PG 11 DIN 46258
13	0005-0203-630	2	Cable gland A PG 11xA DIN 46255
14	1168-2356-000	1	Protecting case
15	1168-2352-000	1	Housing
16	0013-0280-400	2	Hexagon nut M 12 DIN 934
17	0026-1328-300	2	Lock washer A 12 DIN 127
18	1168-1079-000	1	Plate
19	1168-1051-000	2	Threaded bolt
	Items not shown in Fig.		
-	0005-1087-000	1	Zero-rpm relay
-	0005-3452-000	1	Rectifier
-	0018-1749-600	1	Pressure-reducing valve
-	0005-0868-000	1	Proximity switch
-	1168-1192-000	1	Bracket