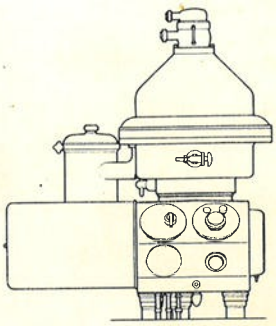
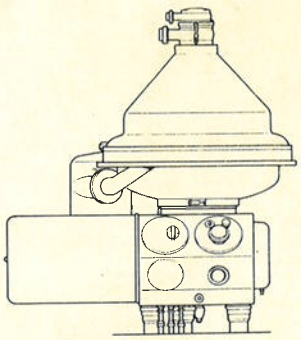
ALFA-LAVAL

Operator's Manual



MRPX 314 HGV-74C



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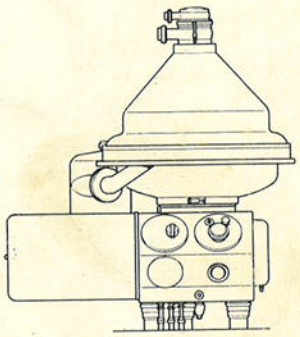

MRPX 418 HGV-74C

OM

Self-Cleaning Hermetic Milk Separators

MRPX 314 HGV-74C
MRPX 318 HGV-74C
MRPX 418 HGV-74C

Table for process and operating data – to be noted in connection with machine trimming.

Machine type	**Manufacturing No.:**	**Date**

	Separation	**Standardization**	**Clarification**
Throughput			
Inlet pressure			
Skimmilk pressure			
Cream pressure			
Impeller combination	/ /	/ /	/ /
Ejection volume			
Operating water pressure (partial ejection			

Notes

Book No.: OM SO 1450E /7511

ALFA-LAVAL AB – S 147 00 TUMBA – SWEDEN

CONTENTS

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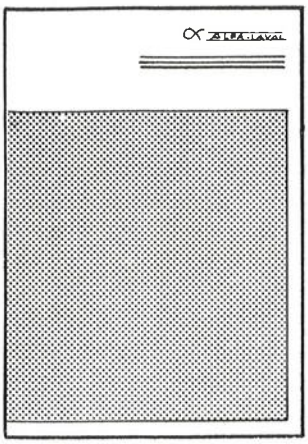
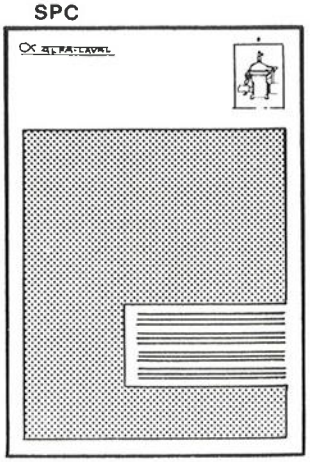


SPC



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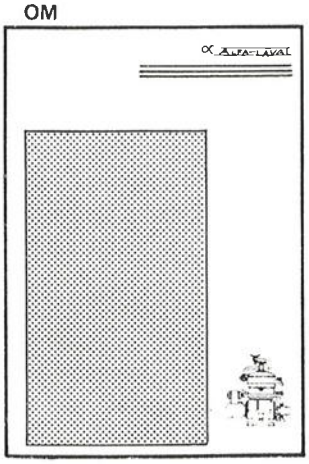

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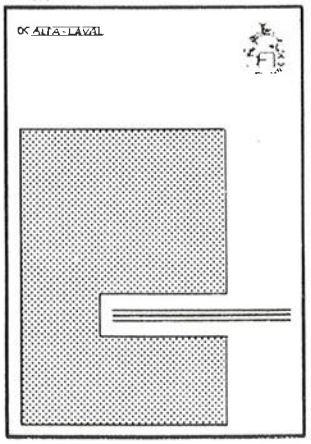
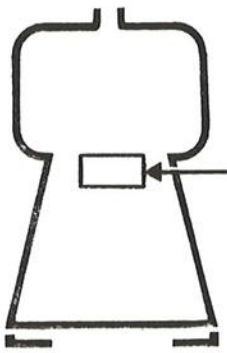


When ordering a manual state: ◇ manual name

machine type
manufact. No.
spec. No. or prod. No.

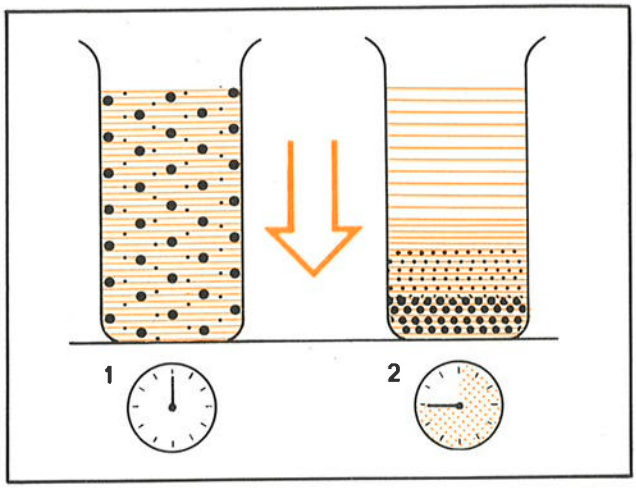


◇ Example
OM (Operator's Manual)
MRPX xxxx
manufact. No. 1234567

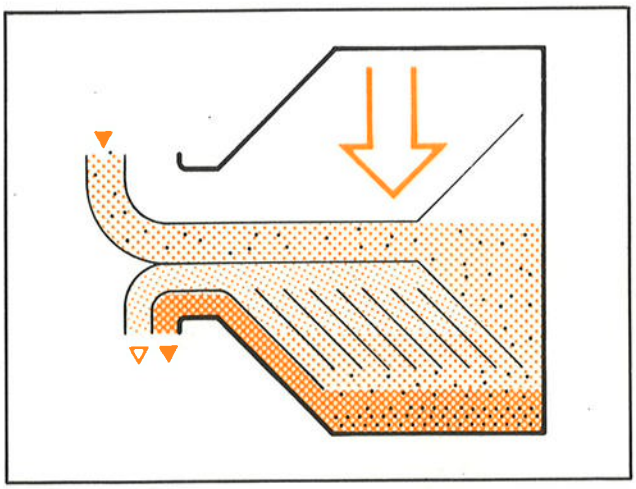
Manual	Contents	Intended for
ID Installation Data	Installation instructions, measurements, technical data	Project engineers Design engineers Fitters Production engineers
OM Operator's Manual	Instructions on operation and daily maintenance of machine	Machine operator
SPC Spare Parts Catalogue	Spare parts lists	Maintenance personnel Purchasing department
MR Maintenance and Repair	Maintenance schedule, disassembly and assembly instructions, adjusting measurements, repair instructions	Maintenance personnel

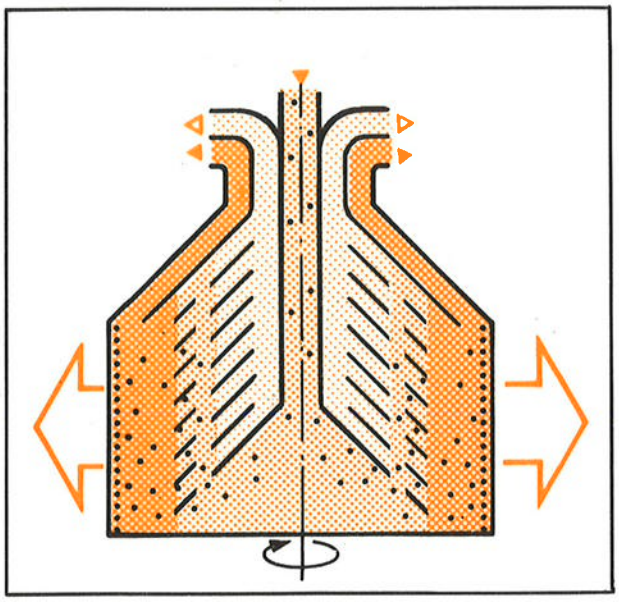
Separation by gravity

A turbid liquid in a stationary vessel will clear slowly as the heavy particles in the liquid mixture are sinking to the bottom under the influence of gravity. The lighter liquid phase will rise while the heavier sinks.



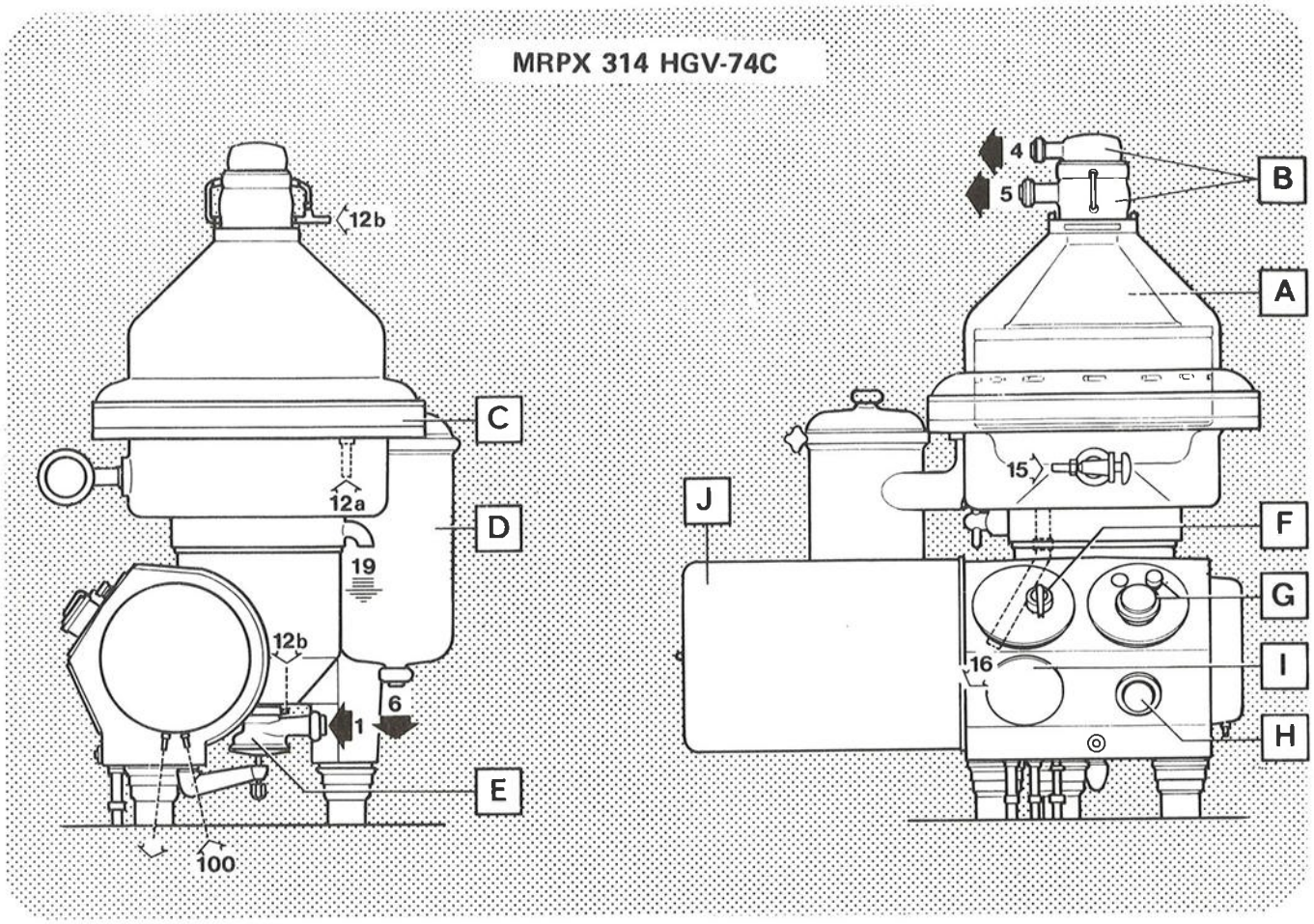
Continuous separation and sedimentation can be achieved in a settling tank having the outlets arranged at levels suited to the density ratio of the two liquid phases. Any solid and heavier particles in the liquid mixture will settle and form a sediment layer on the tank bottom.





Centrifugal separation

In a rapidly rotating vessel the gravity is replaced by the centrifugal force, which can be thousands of times greater. Separation and sedimentation are continuous and very fast. When liquid and solid particles in a liquid mixture are subjected to the centrifugal force in a separator bowl, it takes only a few seconds to achieve what takes many hours in a tank under the influence of gravity.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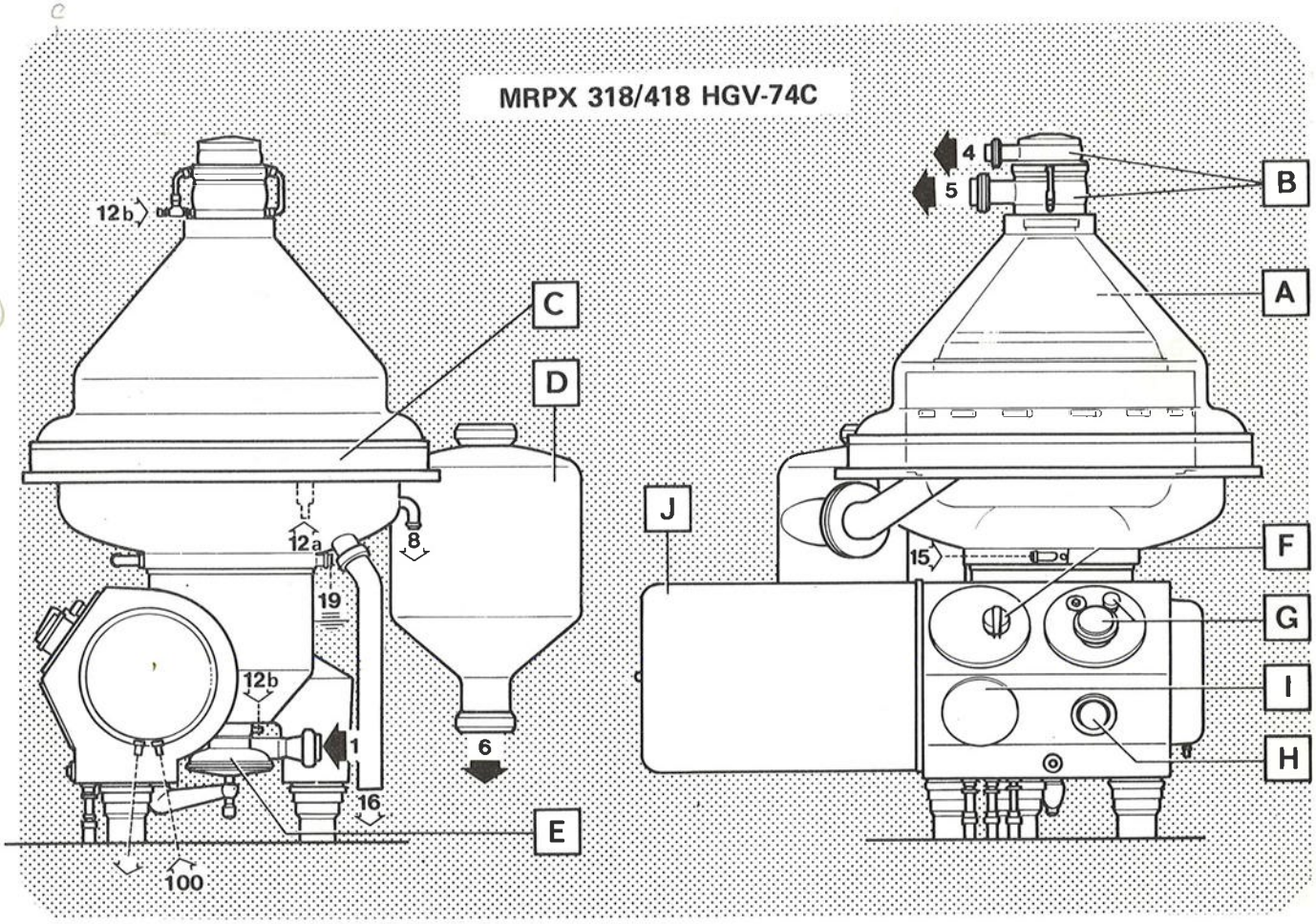
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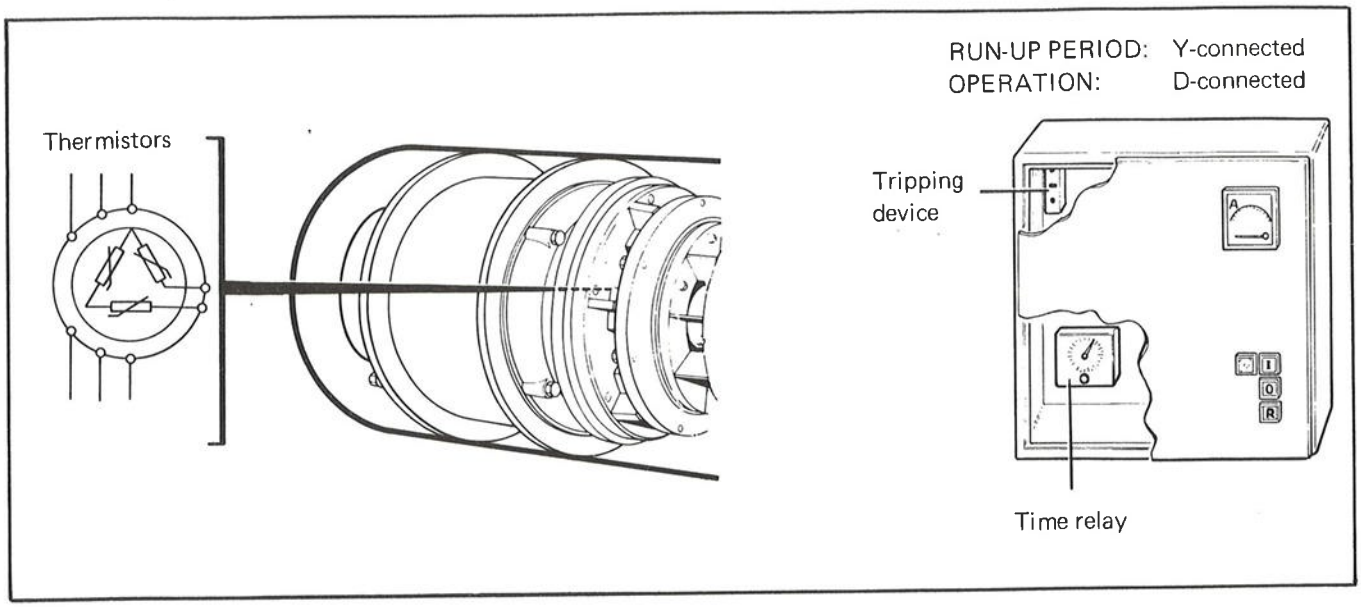
SO 1456

MOTOR



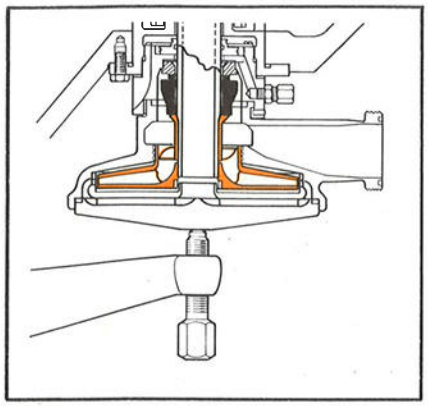
The machine is provided with a rigid coupling and for this reason the motor must be able to stand long run-up times.

The motor delivered with the machine is, therefore, of special design. It has – in comparison with a standard three-phase motor – a higher-class insulation, higher rotor resistance and larger iron masses which counter-act the temperature rise in the motor when starting. Furthermore, the motor is provided with thermal sensors in the form of thermistors in the stator windings. The thermistors are to be connected to a special tripping device in the starter.

The motor is designed for star/delta starting, i.e. it must be connected in star throughout the acceleration period of the bowl. Switching from starting to operation position is normally performed by a time relay in the starter. However, if the machine is equipped for speed monitoring, this equipment can be utilized to effect the switch-over.

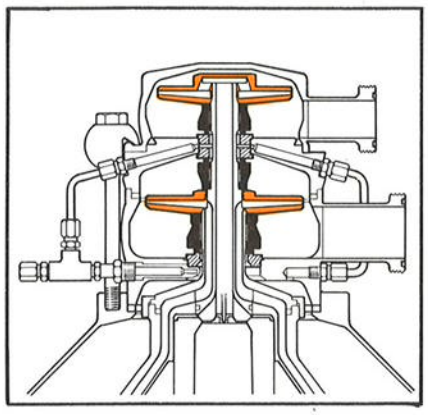
Obs: It is important that the time relay in the starter should be set to the recommended time – see Data. If switching from Y to D is too early, the current will increase considerably. Besides, the worm gearing will be subjected to infavourable strain.

The overload protection (for instance in the shape of bimetal relais) in the starter must be connected in the D-circuit. The protection must be inoperative during the run-up period.



INLET PUMP

The pump is screwed on to the bowl spindle and thus partakes in its rotation. It is dimensioned to produce the pressure required for the liquid transport through the machine (bowl spindle and bowl), and an excess pressure in the outlets as well. This excess pressure can at times be sufficient to transport the skimmilk and cream through further apparatuses and pipes.



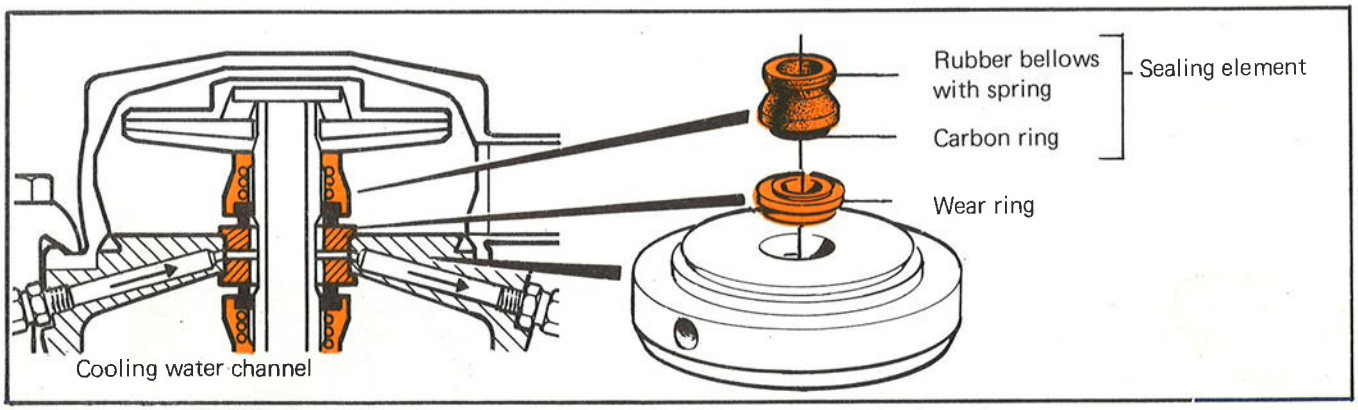
OUTLET PUMPS

The pumps are screwed to the top disc in the bowl and thus partake in its rotatation. They serve to give the skimmilk, and the cream respectively, the necessary pressure, if the inlet pump is insufficient for this purpose.

Recommendations concerning selection of or omission of impellers in view of inlet and outlet pressures and throughput are given on page 36.

AXIAL SEALS

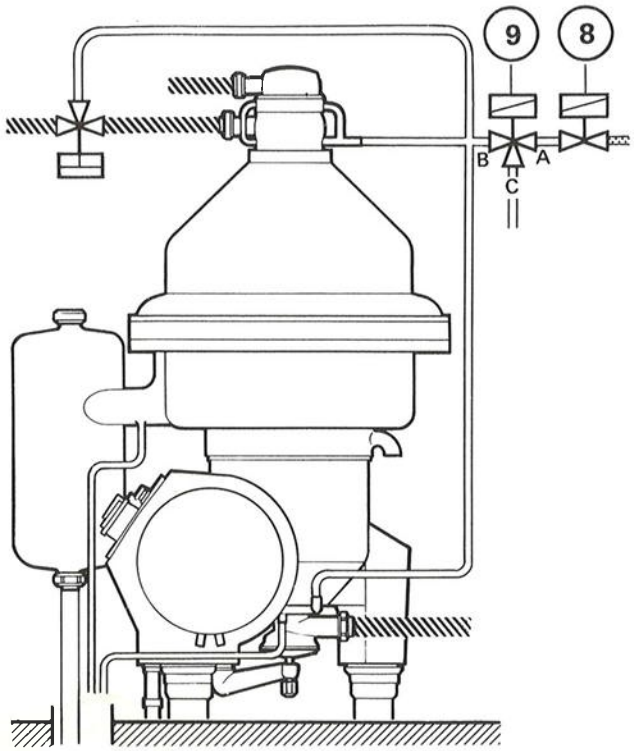
The connection of the inlet and outlets to the bowl is made airtight (hermetic) by means of axial seals. In the outlets are three seals and in the inlet is one.



An axial seal consists of a non-rotary wear ring and a rotary sealing element. Generally, the wear ring has a wearing surface of stainless steel. The sealing element comprises a ring of technical carbon fixed in a rubber bellows provided with a spring. Through the elasticity of the bellows and the spring the carbon ring will be pressed against the wear ring.

To reduce the friction between carbon ring and wear ring these must always be in contact with liquid when the bowl rotates. During separation the rings are lubricated by the process liquid, during the other periods of rotation by cooling water supplied through special channels.

During Separation

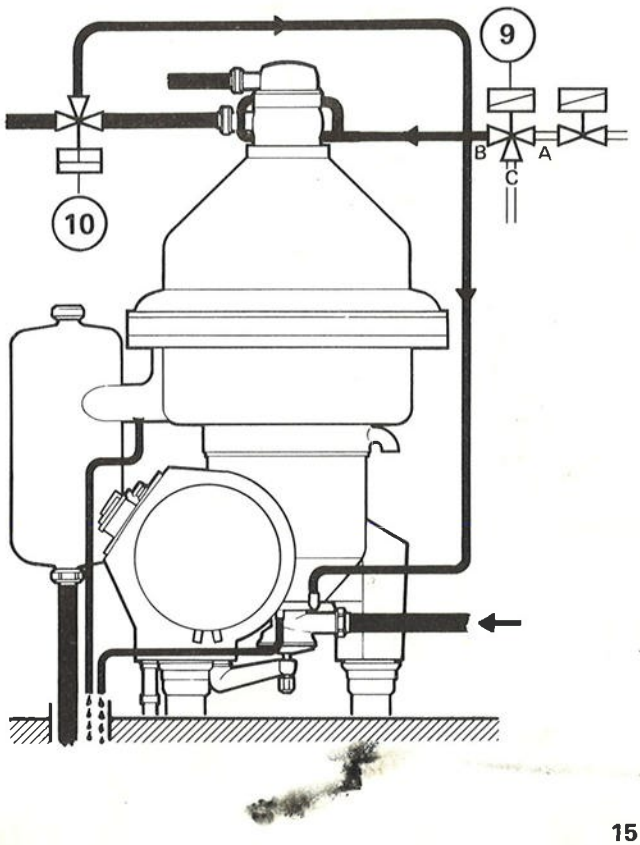


The cooling water supply is cut out. The three-way solenoid valve (9) is open between A and C. Consequently, cooling water cannot mix with the product if the solenoid valve (8) happens to be leaky.

Normally, no liquid (process liquid) should now come from the seals. However, a minor leakage of short duration may occur occasionally, e.g. after an ejection or when the seals are new. This is of no practical importance to the function of the machine.

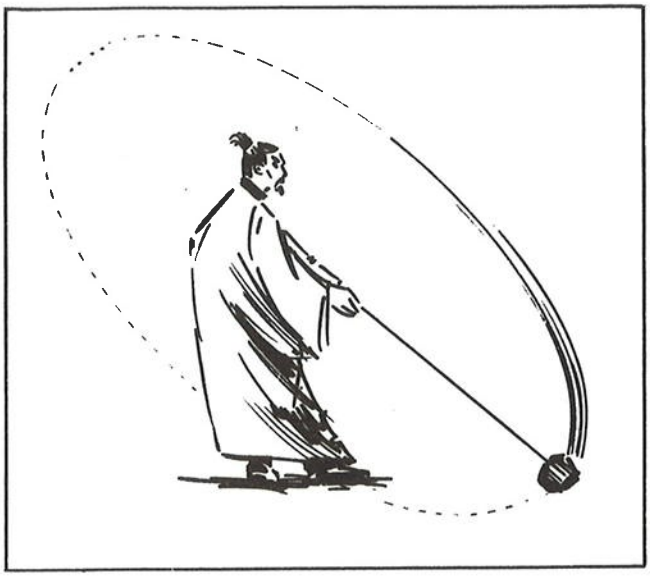
In case of heavier leakage the seals must of course be inspected and, if necessary, replaced.

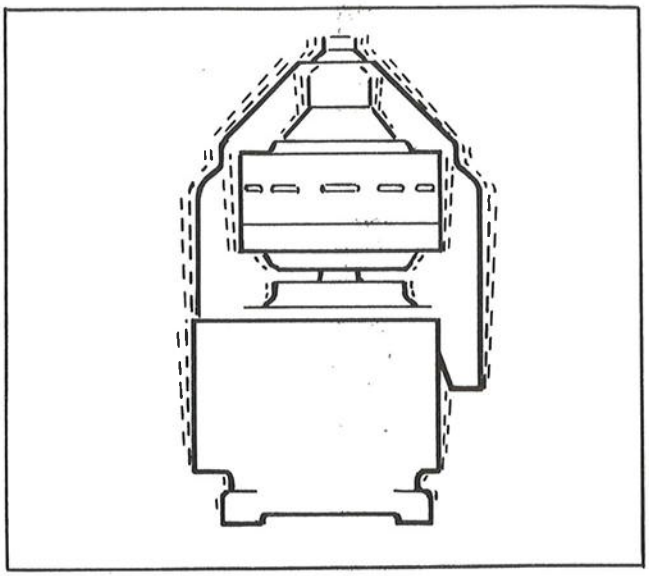
During Cleaning (CIP)



To clean the space around the seals preferably draw washing liquid from the skimmilk outlet, for instance via an SRC valve (10) and conduct it into the cooling piping. The three-way valve (9) is open between A and C, thus preventing washing liquid from entering the cooling water side even when both solenoid valves should happen to be untight.

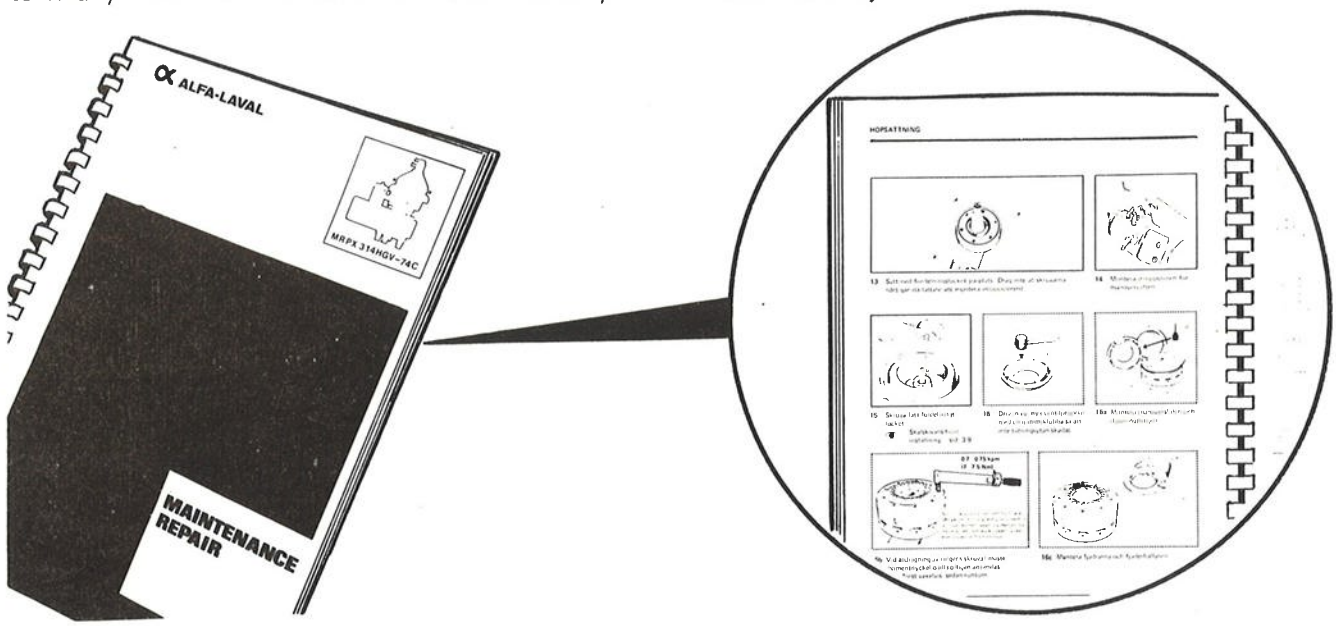
CENTRIFUGAL FORCE





In centrifugal separators the bowl is running at a very high speed, normally between 4000 and 5000 r.p.m.

Great forces are at work, subjecting the machine to heavy stress. It is essential to follow exactly the directions concerning assembly of bowl, operation, overhaul and the safety precautions as well. **Remember particularly that the bowl is a balanced unit, which will get out of balance with vibrations as a consequence when incorrectly assembled or insufficiently cleaned.**



DISASSEMBLY/ASSEMBLY

The Maintenance and Repair Manual describes how to disassemble and assemble the machine in the right order, using the suitable tools. It furthermore states the inspections to be made at regular intervals, and how the inspections are carried out.

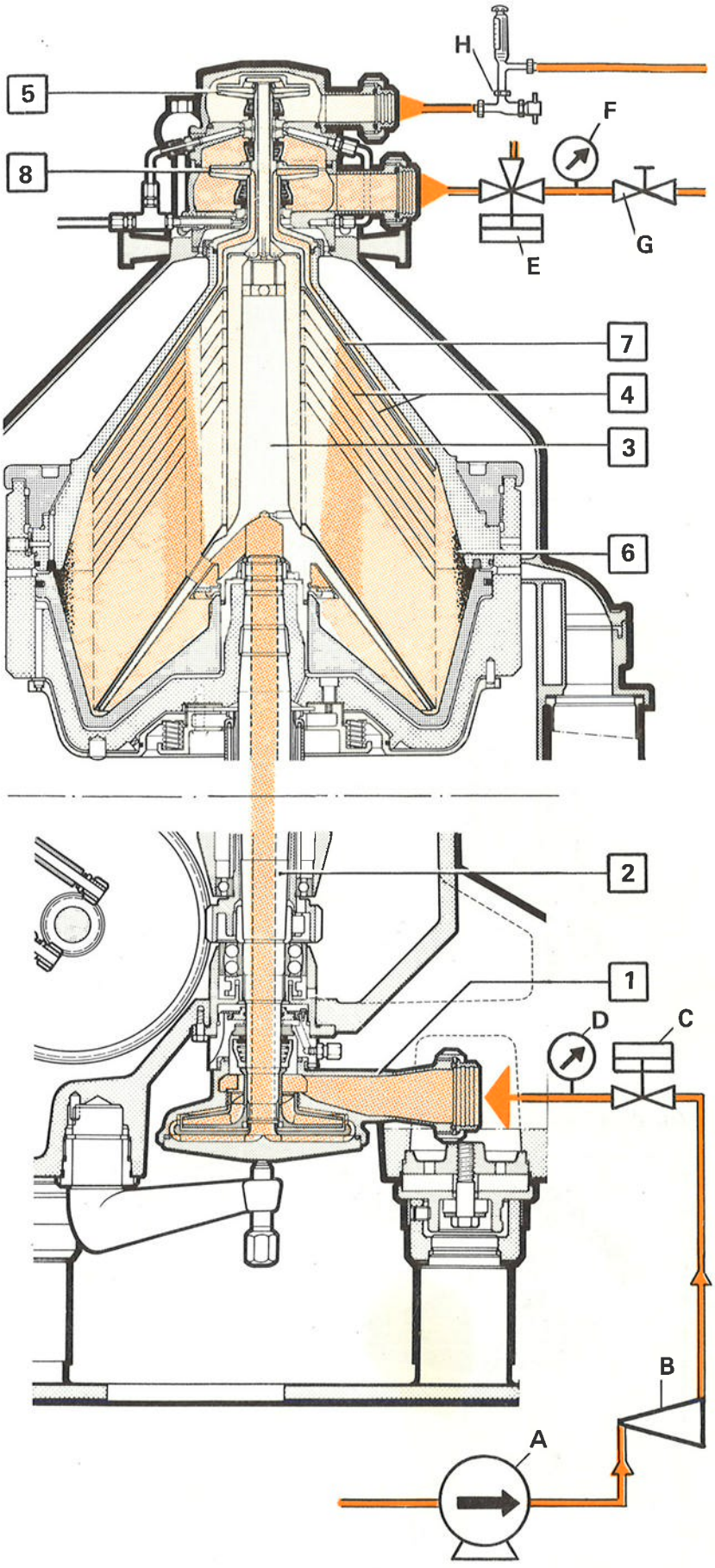
Read the above manual and make yourself familiar with the handling of the parts and prevention of faults in the machine.

Overleaf are some examples of items to be specially observed when dismantling or assembling the bowl, inlet and outlet parts.

MILK FLOW THROUGH THE MACHINE

— see adjoining figure

The milk is fed to the pump (1) for further conveyance through the hollow bowl spindle (2) to the distributor (3) and onwards through the distribution holes in the discs (4). The separation takes place in the spaces between the discs. The cream is forced along the upper sides of the discs towards the bowl centre, leaves the bowl and is reforwarded by the impeller (5). The rest, skimmilk and sediment, moves along the undersides of the discs towards the bowl periphery where the sediment settles in the sediment space (6), The skimmilk continues along the upper side of the top disc (7) to the impeller (8), which effects the further transportation.



Legend

1 Inlet pump
2 Bowl spindle (hollow)
3 Distributor
4 Bowl discs
5 Impeller — cream
6 Sediment space
7 Top disc
8 Impeller — skimmilk

A Feed pump

B Flow controller

C (SRC-valve) for turning off the liquid supply to the bowl before a total ejection. Prevents that liquid is sucked into the bowl allthough the feed pump has been switched off.

D Pressure gauge

E Three-way valve (SRC-valve or equivalent) for delivery of detergent to axial seal cooling system.

F Pressure gauge

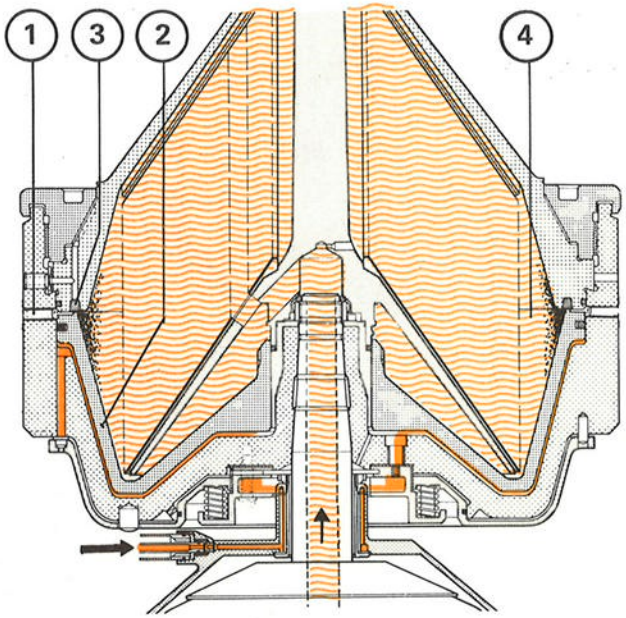
G Throttling valve (manual or automatic) for final adjustment of throughput.

H Cream flow meter

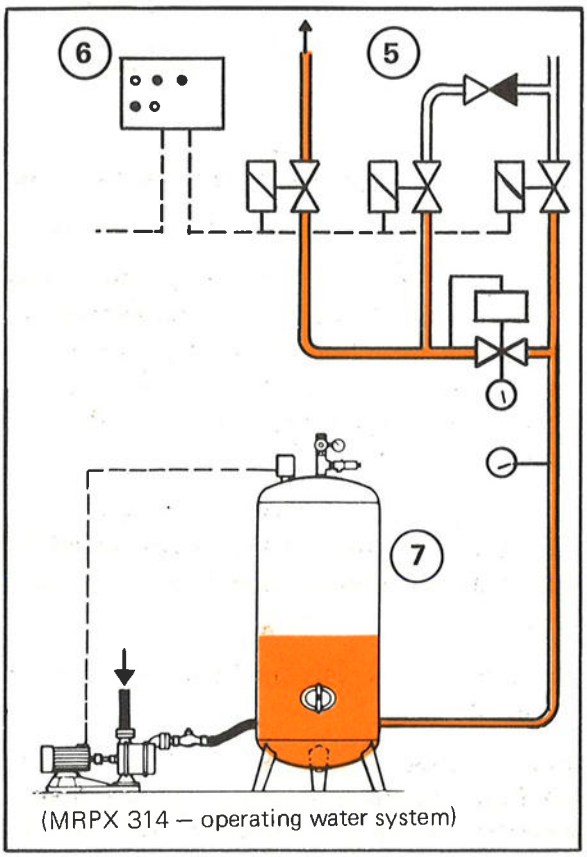
GENERAL

The sediment ejection takes place through a number of slots (1) in the bowl wall. Between ejections these slots are covered by a large slide valve, the so-called sliding bowl bottom (2), which forms an inner bottom in the separating space. The sliding bowl bottom is pressed upwards against a seal ring (3) by the operating liquid pressure acting on its underside.

When the sediment space (4) is partly filled, more operating liquid is fed to the ejection mechanism causing the sliding bowl bottom to uncover the ports. As a result the sediment is thrown out through the ports.



1 Sediment ports (slots)
2 Sliding bowl bottom
3 Seal ring
4 Sediment space
5 Valve system
6 Control unit
7 Liquid elevator



(MRPX 314 – operating water system)

The supply of operating water takes place through a valve system (5) consisting of solenoid valves, one or more pressure regulators, and non-return valves. The solenoid valves are operated by a control unit (6).

The sediment ejecting function of the respective machine is described in detail on page 24, and 27 respectively.

The operating water, which must be pure and soft, is normally drawn from a liquid elevator (7) that is specially intended for this purpose. This will ensure a water feed of fairly **constant pressure and flow, which is a prerequisite for satisfactory functioning of the ejection mechanism.**

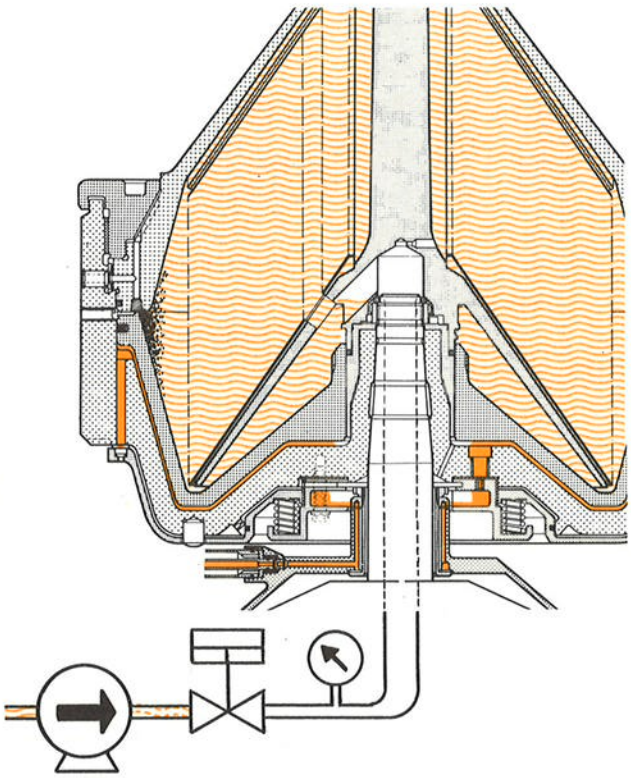
Of course the operating water may also be drawn from the general water supply, provided that this is free of heavy pressure fluctuations and can satisfy the demands on pressure and flow.

Required operating water flow and demands on water quality – see Data.

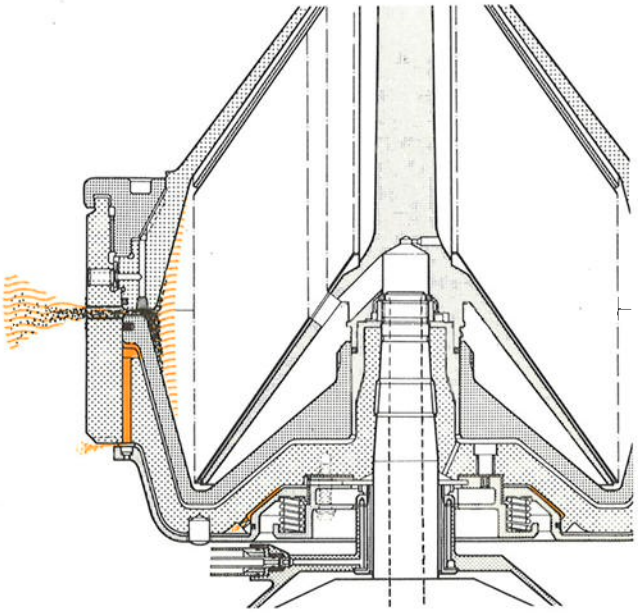
(General)

Total Ejection

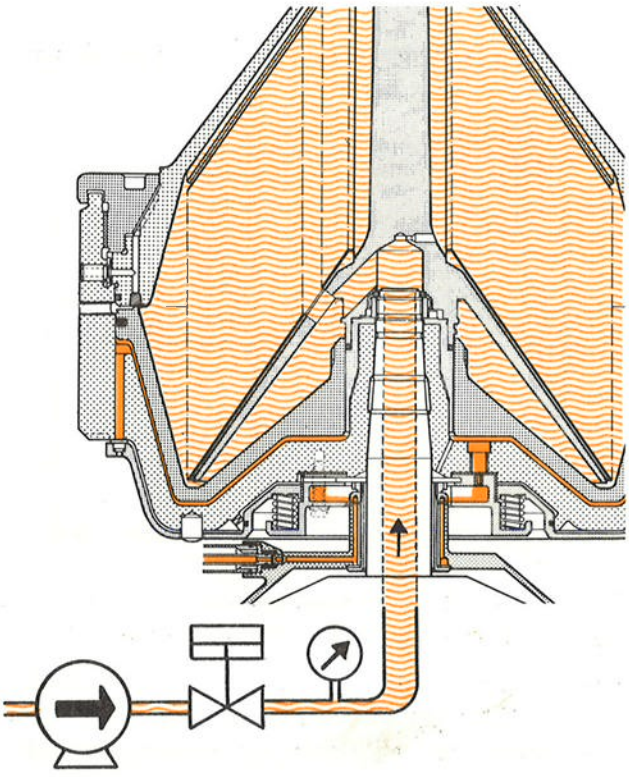
Total ejection is generally used during the water rinsing periods of the cleaning procedure.



1 Prior to a total ejection the valve cuts off the liquid feed to the bowl.



2 Then the entire content of the bowl is ejected.

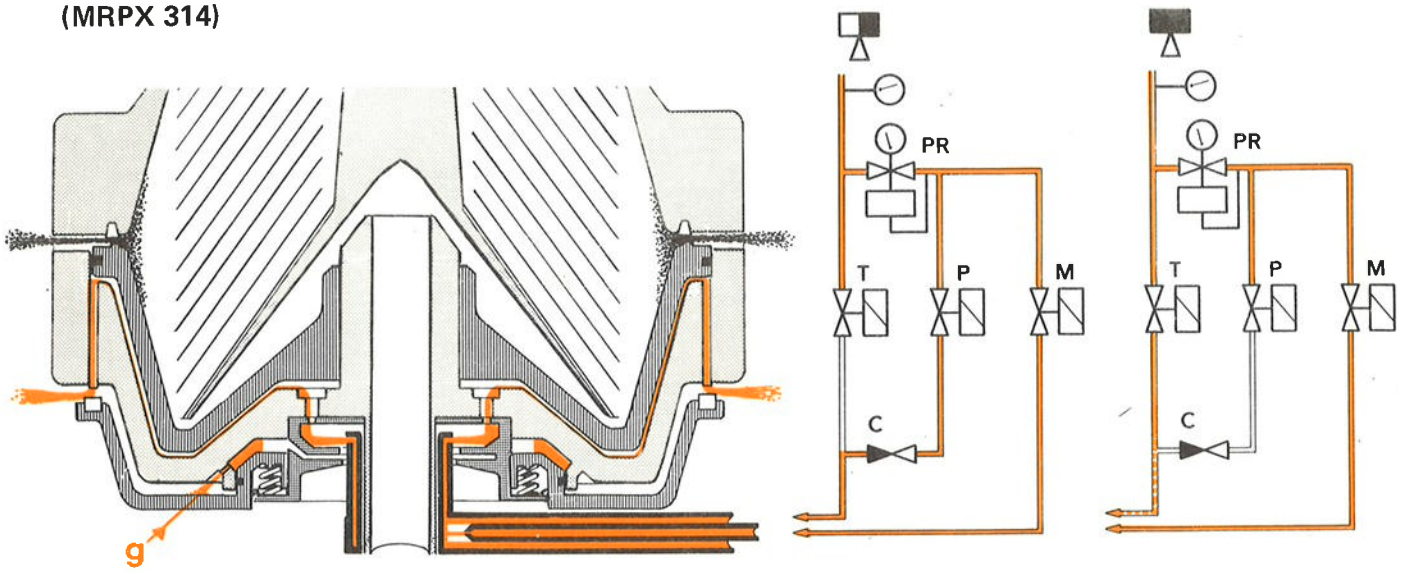


3 When the bowl has closed, the liquid feed to the bowl is reopened.

Note:

Observe that the bowl speed drops slightly at partial as well as total ejection. For this reason a further ejection should not be effected until the bowl has regained its operation speed, otherwise the momentary load on the motor may become to heavy.

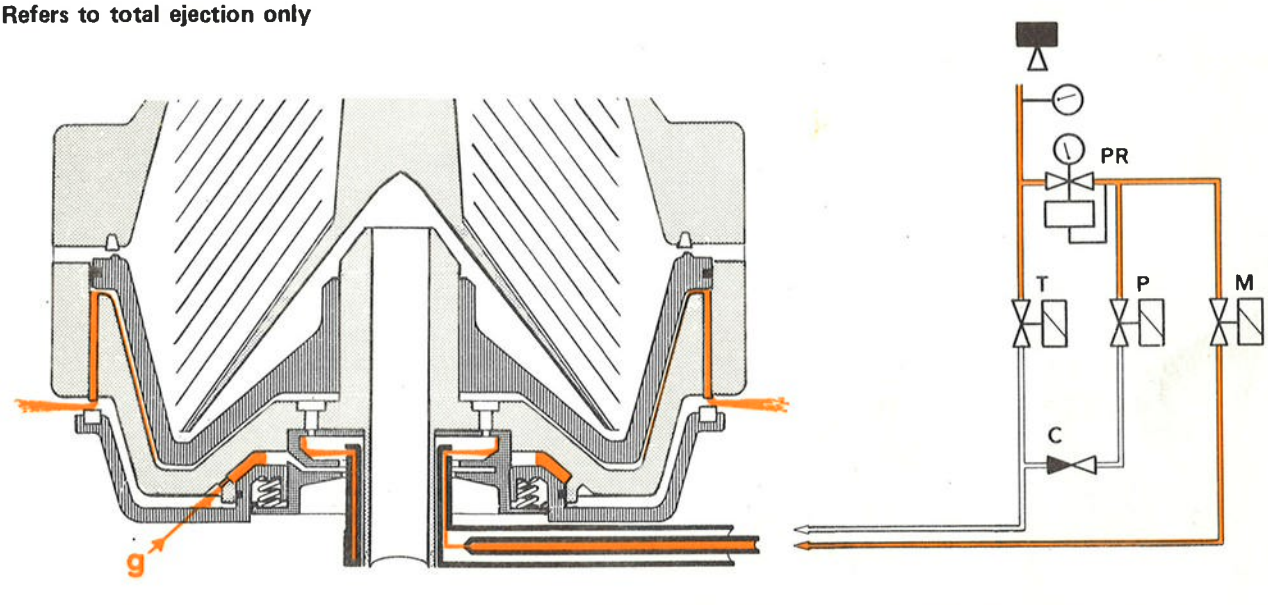
(MRPX 314)



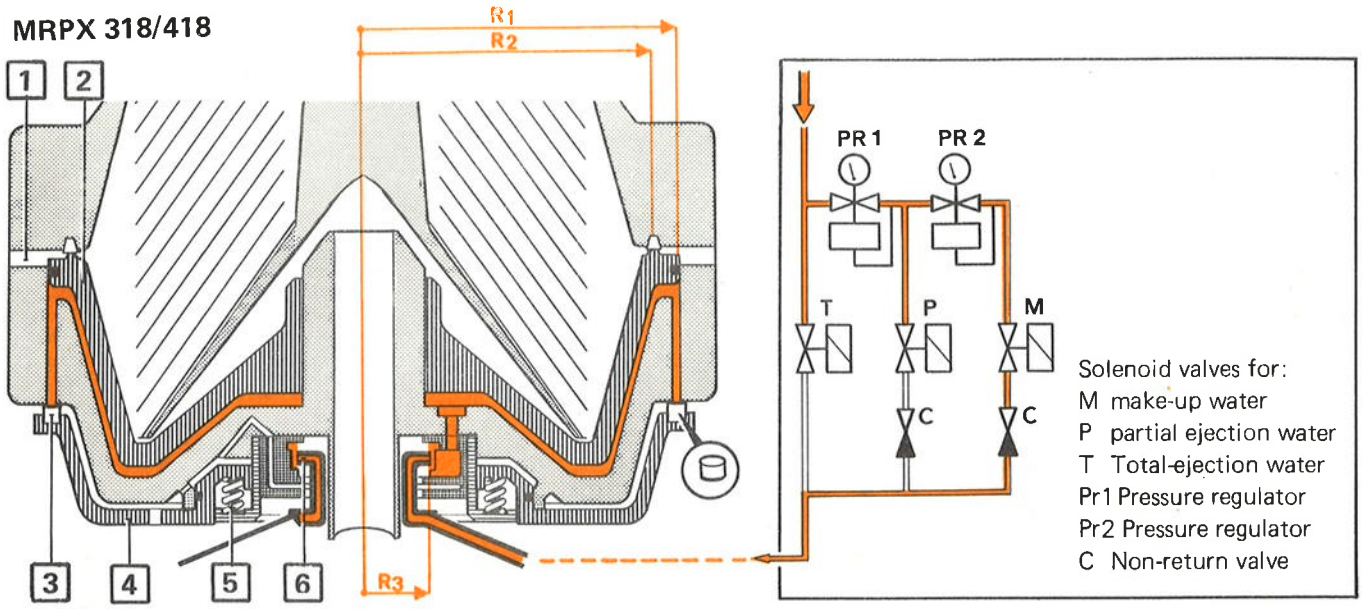
When the operating water pressure on the underside of the sliding bowl bottom drops, the latter is forced downwards uncovering the slots in the bowl wall, and a sediment ejection occurs.

The operating water on the upper side of the operating slide flows out through a nozzle (g).

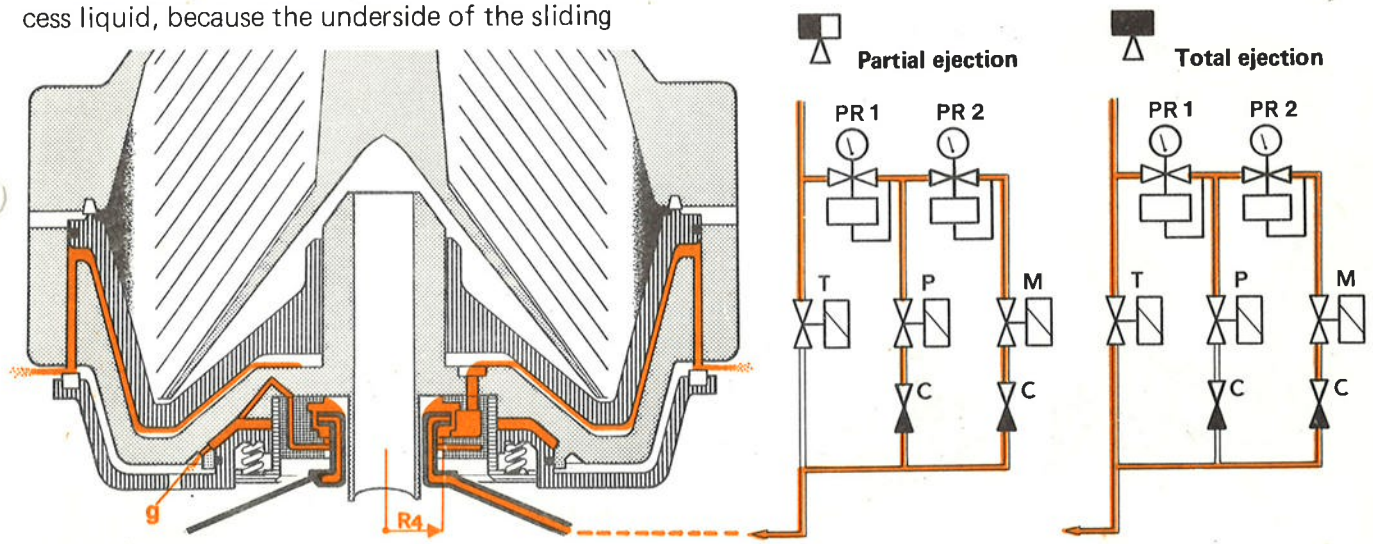
Refers to total ejection only



To obtain sufficient drainage at (g) during total ejection so that the coil springs can press the operating slide upwards, the feed through the outer, wider tube is cut off for some seconds (so-called waiting time).



The sediment ejection takes place through a number of slots (1) in the bowl wall. Between ejections these slots are covered by a large slide valve, the so-called sliding bowl bottom (2), which forms an internal bottom in the separating space. The sliding bowl bottom is pressed upwards against a seal ring by the operating water pressure acting on its underside. This pressure builds up during rotation because of the centrifugal force and increases with the distance from the axis of rotation. The operating water exerts an upwards pressure exceeding the counter-acting downward pressure from the process liquid, because the underside of the sliding bowl bottom has a larger pressure surface (radius R_1) than its upper side (radius R_2).
The chamber under the sliding bowl bottom is closed by valve plugs (3) seated in the operating slide (4). The slide is pressed upwards by coil springs (5). Leakage or evaporation of operating water is made up for automatically by the paring disc (6), which maintains a constant horizontal operating liquid level (radius R_3), as its pumping effect neutralizes the static pressure from the supply.

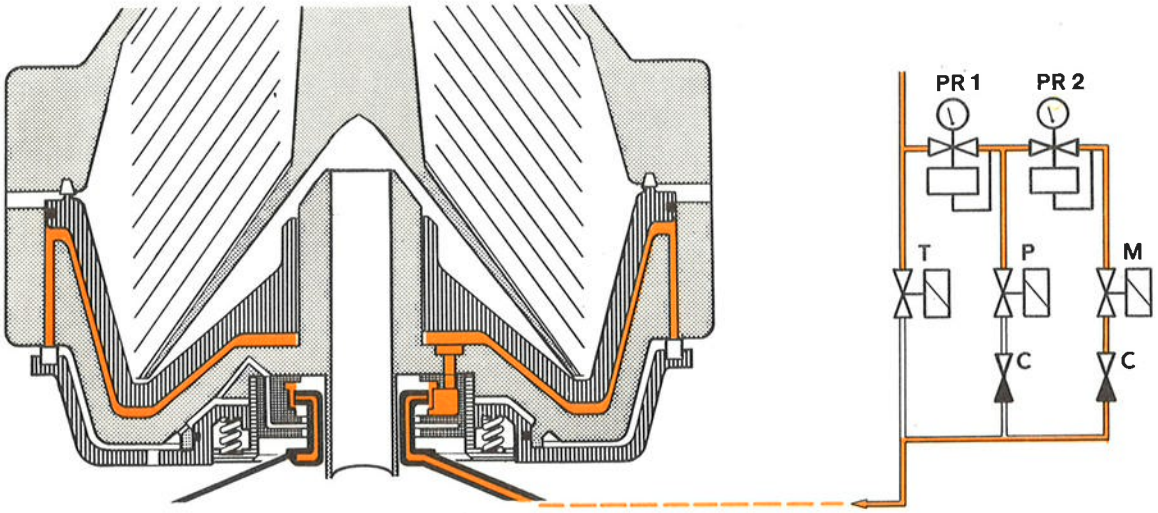


Operating water (high-pressure water) is now supplied in such quantities that it flows over the lower edge of the paring chamber (radius R_4) and continues through a channel out to the upper side of the operating slide. The slide is now forced downwards by the liquid pressure, thereby opening discharge valves from the chamber below the sliding bowl bottom so that the operating water in the chamber flows out.

Note! At partial ejection the ejection quantity is adjusted by means of the pressure regulator Pr1. The larger the water feed, the larger the ejection quantity, and vice versa.

SO 1475

(MRPX 318/418)



The paring disc device now counterbalances the static pressure from the operating water supply. The situation is identical with that shown in the first illustration of the series but for the difference that the ejection cycle is now accomplished.

Throughput

An increase of the throughput above the rated value will raise the fat content in the skimmilk.

A very high fat content in the cream ($\geqslant$ 45 %) will impair the skimming.

Intermingling of air in the milk immediately before separation results in poorer skimming.

A clogged bowl cannot give normal separation.

Condition of the disc stack. A neglected disc stack – having deformed discs or discs coated with milkstone or otherwise badly cleaned – will give poor skimming.

Age of milk

The milk is less separable after storing than immediately after milking. The separability impairs most during the first 24 hours after milking.

Besides fat from the inseparable fat globules the skimmilk can contain fat from fat globules, so-called cream splashes, which have got into the skimmilk after having been already separated from it once, for instance because skimmilk pipes and pipes for whole milk or cream are connected to leaky cocks. Furthermore, the sampling vessels for skimmilk can have been "infected" by whole milk or cream.

DETERMINATION OF THE FAT CONTENT OF SKIMMILK

Gravimetric methods

a. The Röse-Gottlieb method with Mojonnier and Semi-Micro modifications

b. Stoldt and Weibull-Stoldt

Butyrometric methods

a. The Gerber-method

b. The Babcock method

Only the gravimetric methods give reliable information on the skimmilk fat content.

However, reliability is obtained only on condition that the determination is performed exactly according to directions at laboratories with first-class equipment and trained personnel.

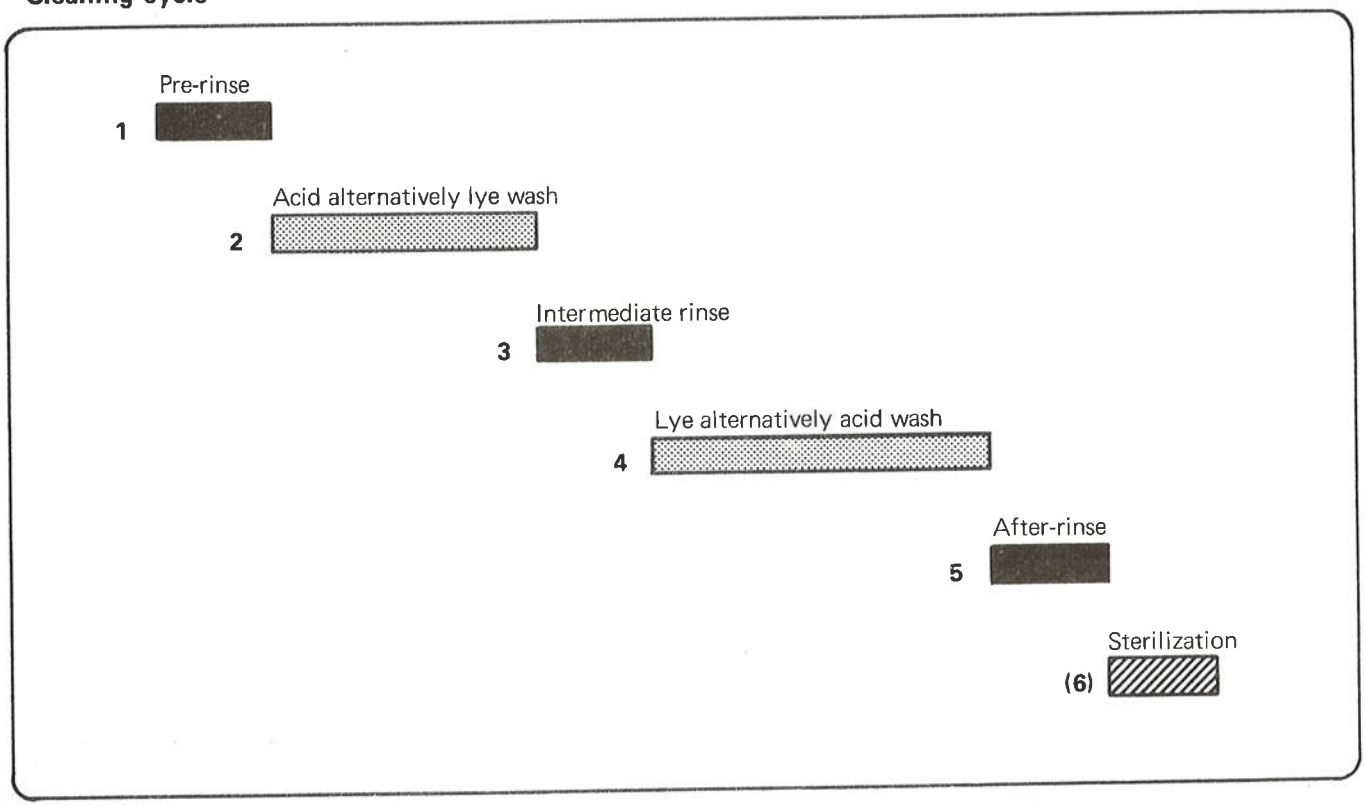
The butyrometric methods can be used only for quick-tests when any occasional gravely unsuccessful operations are to be investigated.

There is no reliable comparative figure between results from butyrometric and gravimetric methods.

GENERAL OUTLINES FOR THE CLEANING OF MRPX SEPARATORS

One prerequisite for satisfactory skimming efficiency is that the separator parts in contact with the milk have been perfectly cleaned before the milk feed is turned on.
Normally the separator is incorporated in an aggregat together with heat exchangers and further peripheral equipment, and due regard must be paid to this fact in determining the cleaning times and the volumes of detergent solution – even though the cleaning cycle is in principle the same for separator and heat exchanger.
Two kinds of detergents are to be used – acid solution and alkaline solution (lye).
The bowl must be emptied repeatedly during the various cleaning stages, either partially or totally.

Cleaning cycle



1 Immediately after accomplished cream separation pre-rinse with water.

It is important to pre-rinse as thoroghly as possible to prevent milk residues from mixing with subsequent detergent solution.

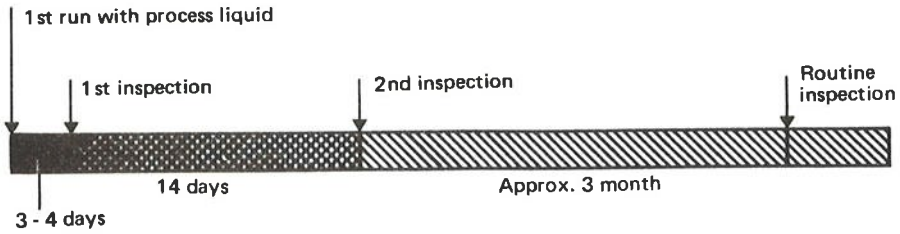
2 Circulate acid solution. The duration of circulation depends on the degree of contamination of the separator.

Note! In certain cases it may be better to start with lye solution, depending on milk quality, separating time, separating temperature and water hardness.

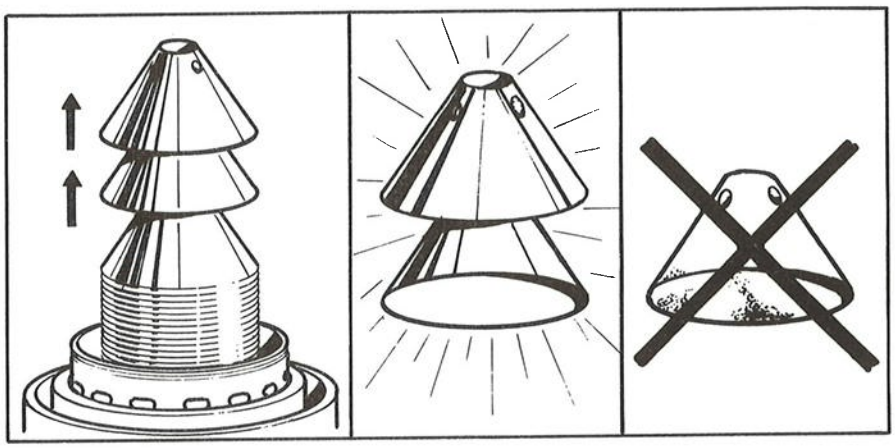
Guiding values

Rinsing/ washing time Minutes	Type of ejection/ number of ejections		Liquid temperature
	Total	Partial	
15 - 20	3 - 4		
20 - 30		2 - 3	70 ± 3

CHECK ON CLEANING

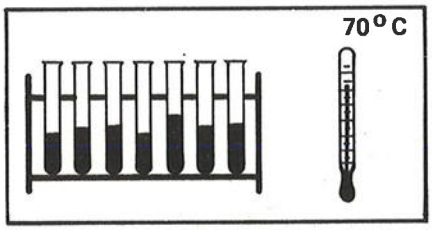


The bowl should be dismantled and the cleaning checked approx. 3 - 4 days after the first operation with process liquid. Repeat the check after a further 14 days. If the results are favourable, the bowl can be left untouched until a small overhaul is due, for instance replacement of valve plugs in the ejection mechanism. This should normally be made after approx. 3 months.



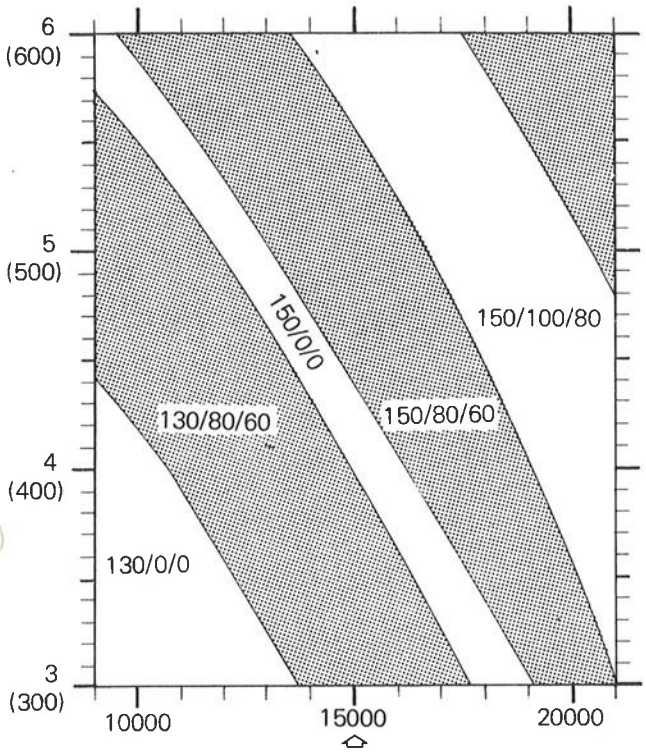
Inspect **all** the discs. The upperside as well as the underside of **every** disc must be bright. Fatty discs and sediment residues on the discs indicate bad cleaning.

Note: A greyish film (however not containing milk residues) may even occur on the discs if the lye has been circulated after the acid. To remove the film an extra run with acid for ca. 10 minutes is recommended.

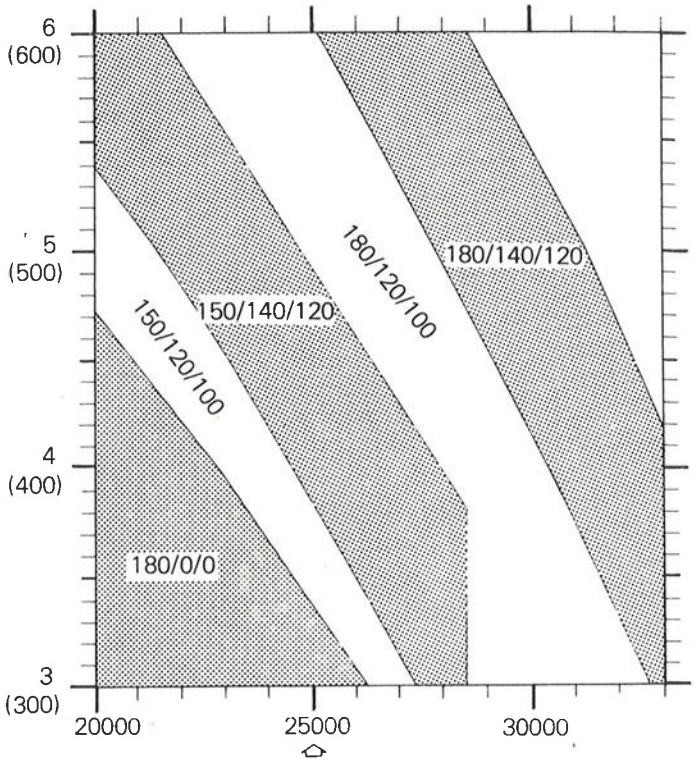


If the bowl turns out to be badly cleaned, check the temperature and concentration of the acid, and the lye respectively. Correct any deviations from the recommended values. Do not sample the concentration **once only**, but preferably 5 or 6 times at regular intervals during the entire cleaning cycle. In this way any fluctuations in the concentration can be verified.

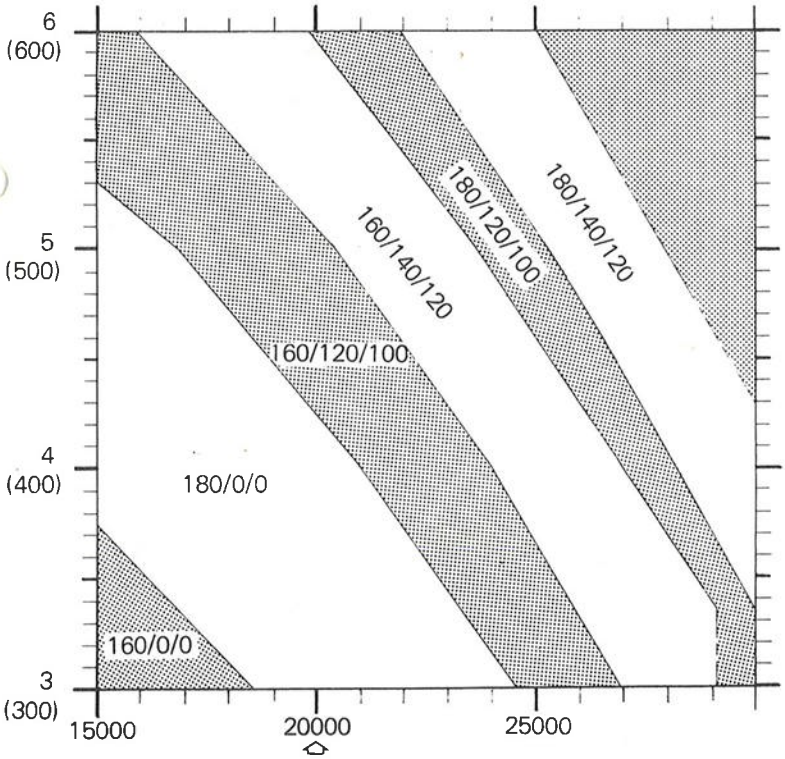
MRPX 314 HGV

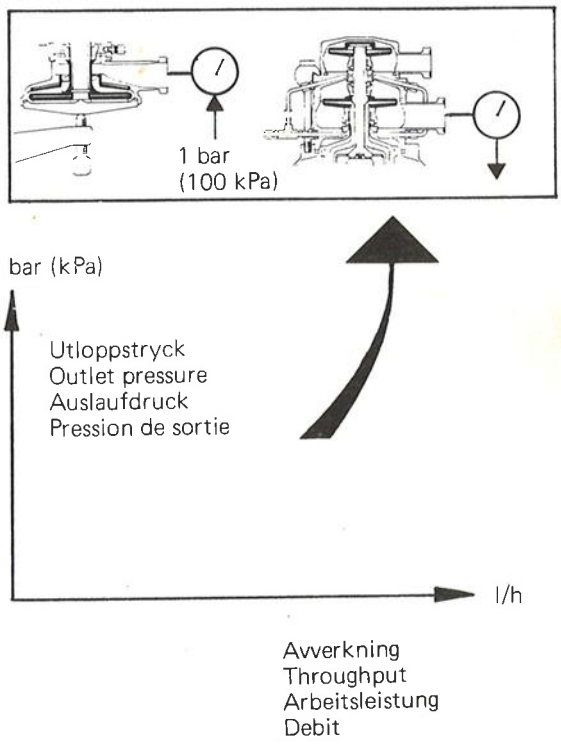


MRPX 418 HGV



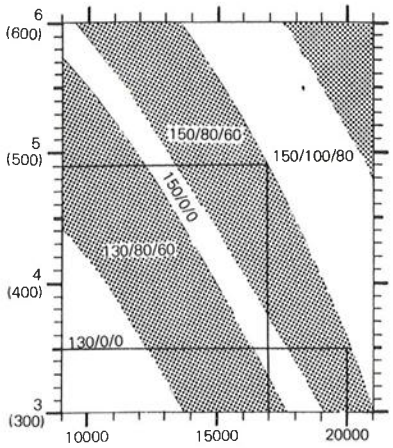
MRPX 318 HGV





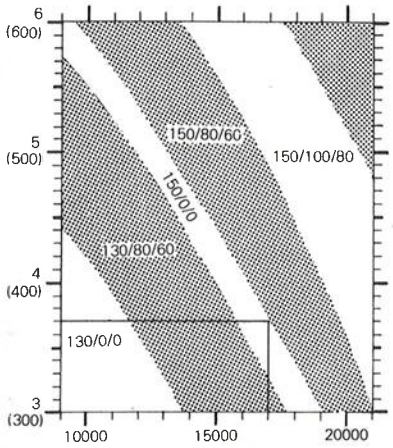
SO 1486S,E,T,F

(Selection of impellers)



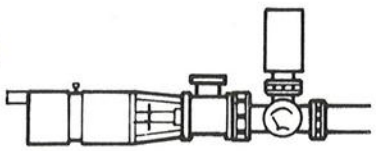
Installation case 2:2

With fully open outlet valve (and the combination 150/80/60) one will find that about 20000 lit/h goes through the separator, the pressure gauge in the skimmilk outlet indicating 3.5 bar (350 kPa). For desired throughput (17000 lit/h) the pressure gauge must indicate 4.9 bar (490 kPa). The difference, 1.4 bar (140 kPa) must be eliminated by means of the outlet throttle valve. However, this would involve a waste of energy.



Instead, use the impeller combination 150/0/0, which gives 3.7 bar (370 kPa) at 17000 lit/h. Now only the difference between 3.7 bar (370 kPa) and 3.5 bar (350 kPa), i.e. 0.2 bar (20 kPa) has to be eliminated.

Observe



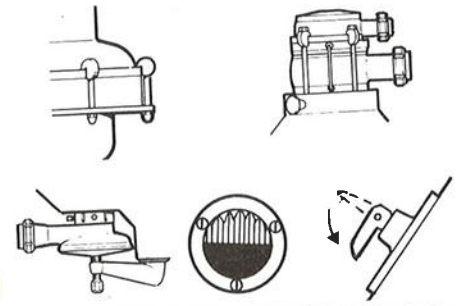
- In cases where the outlet pressures are controlled by automatic valves (e.g. SPCL valves) and a suitable impeller combination has not been found so that an unnecessarily great amount of pressure must be eliminated by the valves, pressure fluctuations may occur in the piping.
  If so, it may become necessary to turn down the diameter of the outlet impellers a little to secure favourable valve operation.
- If a cream with a fat content of only 18% - 20% is wanted, the quantity discharging by the cream outlet will be twice as large as when extracting cream containing 35% - 40% of fat. When remixing is desired it may be preferable to use a cream pump of the same size as the skimmilk pump in order to obtain the suitable remixing pressure.
- If the throughput must vary, for instance when the machine is to be utilized both for cleaning and standardization, choose the impeller for the **highest** throughput.

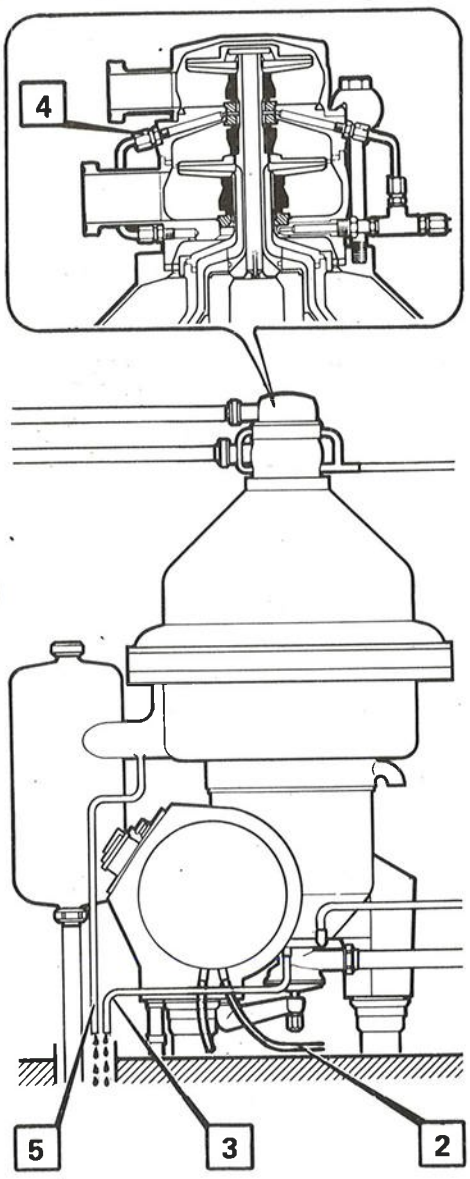
In cases where even the largest impeller combination is incapable of giving the desired throughput, the inlet pressure must be raised.

(Preparations)

- Assemble the bowl as well as the inlet and outlet parts as described in the Maintenance and Repair Manual (MR).
- Fit the suitable impellers according to diagram. Note down the pressure particulars.
- Pour oil in the quantity and of the quality prescribed into the worm gear housing – see Lubrication Schedule.

● BEFORE THE FIRST START





- Make sure the clamping bolts of frame hood and outlet are firmly tightened.
- Make sure the inlet pump cover is clamped (11 - 12 kpm).
- Check the oil level.
- Loosen the brake.
- MRPX 314: set the control valve into position 4.

- Switch on the control voltage for the programme equipment.
- Check that water flows from the oil-cooling coil (2).
- Make sure that water is supplied to the axial seals.

Check at (3) – from inlet pump seal
at (4) – from upper seals of outlet (note: disconnect the pipe)
at (5) – from lower seal of outlet

Setting of Time Relay

- Set time relay in starter.

MRPX 314: 13 min. approx. MRPX 318/418: 13 min. approx.

(Operation)

Separation

- Check the inlet pressure (guiding value 1 bar, min. pressure 0.5 bar).
- Adjust the skimmilk pressure to the value recorded at the selection of impellers.
- Adjust to suitable amount of cream.
- Check the throughput and make a final adjustment by modifying the inlet and outlet pressures. In case of greater deviations try an other impeller combination.
- Make sure that air is not sucked into the feed line for instance through the balance vessel, if any. This should be full always. The milk must flow calmly in the vessel without bubbling.

After separation perform the cleaning programme. Disassemble the bowl and check the cleaning 3 to 4 days after the first operation with milk.

STOP

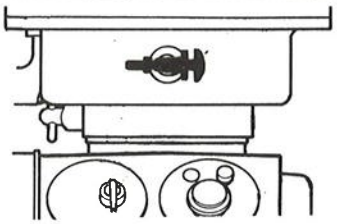
Make sure:

that the brake is applied

that no part of the machine is loosened until the bowl is stationary

that the bowl is closed and filled with liquid during the retardation time.

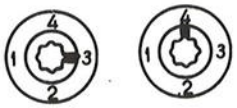
that water is fed to the axial seals till the bowl is stationary.



MRPX 314 – Appendix for manual control valve

The machine is equipped with a manual control valve, which can be used in an emergency to operate the ejection.
Proceed as follows:

Partial ejection



o Turn the control valve into position 3 and keep it so till the report is heard, i.e. the sediment is thrown out of the bowl.

o Restore the valve to position 4.

Total ejection

:: Turn the control valve into position 1 and keep it so till the report is heard.

:: Set the valve to 3 (via 2). Keep it in this position for 5 - 7 seconds. The bowl is now closed.

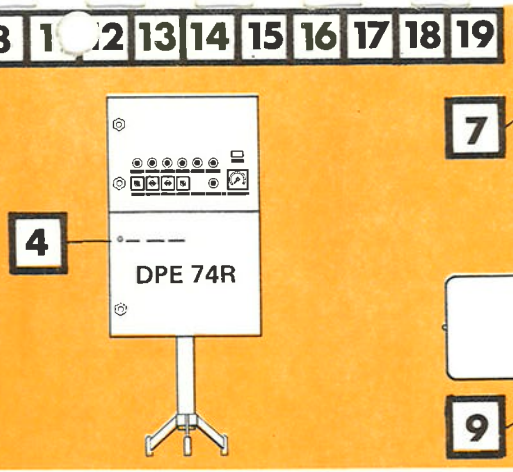
:: Set the valve to the operative position 4.

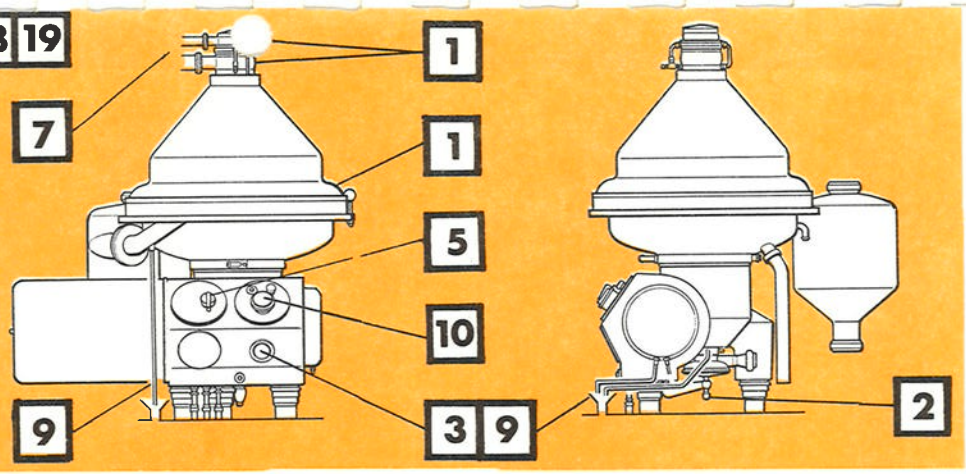
Always shut off the feed to the bowl before a total ejection.

ALFA-LAVAL

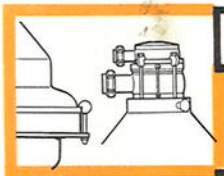
OPERATING INSTRUCTIONS

MRPX 314 HGV-74C
MRPX 318 HGV-74C
MRPX 418 HGV-74C





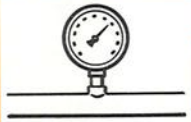
BEFORE START



1 Check that frame hood and outlet hinged bolts are tightened.

2 Check that inlet pump cover is clamped.

3



4 Check operating water pressure.

5 Release brake.
MRPX 314: check that control valve is in position 4.

6 Connect programme control unit.

7 Be sure valves in outlet are open or activated.

SEPARATION

Check that machine has correct inlet and outlet pressures. Check throughput.
Make sure that air is not sucked into the milk feed line.
Check that the feed of cooling water to the axial seals has stopped.
Check the seals for milk leakage. However, drip leakage is negligible.

13 To effect a manually operated partial ejection: press the button.

CLEANING

Cleaning of machine after separation is imperative.

14 **Manually operated Cleaning**

When rinsing with water set the programme selector to "CIP T". Total ejections will now follow at the preset intervals (normally 3 minutes).

When washing with detergent set the programme selector to "CIP P". Partial ejections will now take place at the preset intervals (normally 10 minutes).

15 To effect manually operated ejections during the cleaning

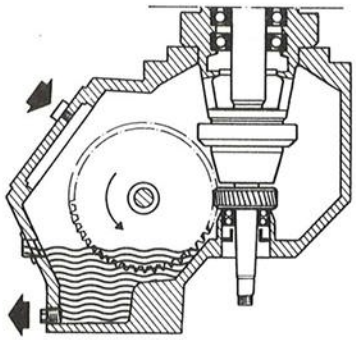
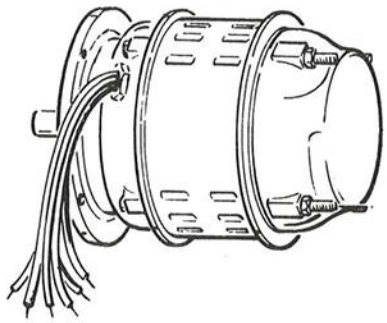
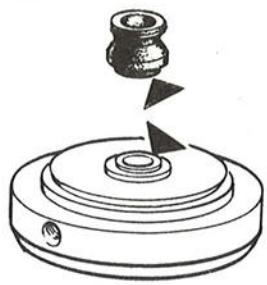
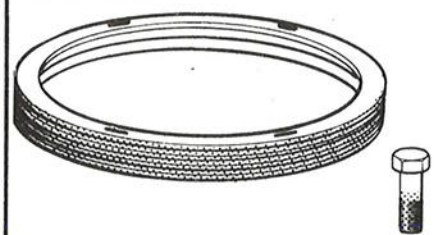
TROUBLE TRACING

Separating Function

Indication: High fat content in skimmilk	Indication: Cream stoppage	Indication: Cream is too thin	Indication: Cream is too thick	Cause	Remedy
				Wrong values of analysis	–
				Wrong sampling	–
				Natural properties of milk	Remember to readjust the cream outlet pressure when shifting to whole milk with a different fat content.
				Splitting of fat globules before the separator due to penetration of air in the milk at the pumping (in the production stage as well as storing and transport stages.	Always regulate a pump on its pressure side, as otherwise vacuum may occur in the pump and air be sucked into it. This would have a splitting effect on the fat globules.
				Splitting of fat globules in the separator due to air penetration in the milk because the feed pressure is too low or the level in the balance tank, if any, is temporarily too low.	Inlet pressure ca. 1 bar (100 kPa) Keep the balance tank permanently filled.
				Separating temperature is too low	Should be 50 - 60 ^{o}C
				Rate of throughput too high	Reduce the throughput
				Whole milk or cream has leaked in after the machine	Check that valves are correctly set, and tight.
				Sediment has clogged the disc stack	Change the cleaning programme or empty the bowl more frequently.
				Deformed discs	–
				Cream with an excessively high fat content is extracted. / The cream is cooled too much in the plate heat exchanger – the resistance in the pipe conduit increases (does **not** apply when an intermediate vessel is used)	Turn off the milk feed and shift to water. Re-adjust the cream outlet pressure.
				–	Throttle the cream discharge pipe or open more in the skimmilk pipe.
				–	Open more in the cream discharge pipe or throttle the skimmilk pipe.

Noise		Cause	Remedy
		Normally moderate vibration during start and stop periods at the critical number of revolutions	None
		Bowl in unbalance due to: bad cleaning – wrong assembly – badly tightened lock ring – insufficient pressure in disc set – bowl assembled with parts from different bowls	Stop immediately and establish the cause. Insufficiently tightened lock ring can involve fatal danger.
		Set screws of foundation feet are loose	Tighten the screws
		Rubber washers of vibration dampers have lost elasticity	Exchange washers
		Top bearing spring broken	Exchange all the springs
		Foundation too weak	Reinforce foundation
		Tachometer reading is wrong	Check by means of revolution counter
		Wrong transmission ratio	Check whether the proper transmission is used in view of the motor speed
		Wrong motor speed	Stop immediately and exchange motor
		Brake is on	Release brake
		Voltage drop in mains	
		Antifriction bearing damaged	Locate defective bearing and exchange
		Motor defective	Exchange or repair motor
		Over-voltage	
		Brake lining worn or oily	Exchange or clean lining
		Motor overheated (thermistors in motor have cut out)	Let the motor rest for 3 - 4 hours. Remove motor hood.
		Condensation	
		Oil cooling coil leaky	Exchange or repair the coil
		Excessive feed of cooling water to inlet seal – throttling nozzle lacking. Deflector does not partake in spindle rotation	Fit throttling nozzle. Check whether deflector rotates together with spindle.
		Worm gear is worn	Exchange worm as well as worm wheel. In case of anormal wear check oil quality.
		Play between coupling disc and elastic plate is insufficient	Correct play: 2 -- 4 mm
		Wrong height positions	Measurements – see Maintenance and Repair Manual
		Time relay in starter has not switched over from Y to D	Check setting of relay. Timing – see Data Sheet
		Time relay in starter switching too early from Y to D	Check setting of relay. Timing – see Data Sheet

	Cause	Remedy
	Operating water pipes wrongly installed	See installation diagrams. Check these against the figures under "Sediment Ejecting Function".
	Closed or throttled valves	Loosen connections at machine and check water flow.
	Electrical or mechanical defects in solenoid valves or control unit	See manual for programme equipment.
	Wrong camtime (for total ejection)	Adjust the camtime — see programme equipment
	Camtime too short	Prolong the time
	Pressure in pipe for partial ejection too high/low	Reduce/increase the pressure
	Solenoid valve open too long (camtime too long)	Reduce the camtime — see programme equipment
	"Delay time" in total ejection is too short — insufficient drainage of chamber between operating slide and bowl body (only for MRPX 314)	Explanation of "delay time" — see under Sediment Ejection. Suitable time 4 - 5 secs.
	Excessive pressure in make-up water pipe	Reduce pressure
	Control paring disc device clogged or wrongly mounted	Disassemble the bowl Check whether operating water spurts through the holes in paring disc.
	Leakage at operating water distributing cover	Exchange defective seals.
	Leakage between valve plugs in operating slide and sealing surfaces in bowl body	Exchange valve plugs and/or polish sealing surfaces.
	The operating slide seizes	Clean, polish, lubricate.
	Operating slide springs defective	Exchange.
	Sliding bowl bottom seizes	Exchange seal ring. Lubricate.
	Drain nozzle in bowl body is clogged (bad drainage)	Clean
	Draining nozzle in bowl body not inserted	Check
	Channels to chamber under sliding bowl bottom are obstructed	Clean
	Leakage at operating slide seal ring that seals against bowl body	Exchange
	Channels to chamber between bowl body and operating slide upside are obstructed	Clean
	The bowl hood seal ring that seals against sliding bowl bottom is defective	Exchange seal ring

LUBRICATION POINT	LUBRICANT	INTERVAL/NOTES
Worm Gear Housing 	Primarily: **Polyglycol type synthetic lubrication oil** (see Worm Gear Housing Oils) Secondarily: Mineral type lubricating oil on a liquid paraffin base (see Worm Gear Housing Oils) **Oil quantity:** approx. 13 lit.	Oil fill before the first start. **Change the oil for the first time after 300 working hours and then once every 1000 operating hours.** **In seasonal operation before every operating period.** Top up when necessary (oil level in upper half of oil gauge glass). Clean before oil change. In case of change from synthetic to mineral lubricating oil or vice versa **carefully wipe out** the housing so as to remove the old oil entirely. **The oils are not miscible.** The machine has been test-run with synthetic oil,
Motor 	Follow motor supplyer's recommendations	Follow motor supplyer's recommendations
Axial Seals 	Castor oil (a few drops on the sealing surfaces)	Before every assembly
Bowl Parts 	Lock ring joint and sliding surfaces of ejection mechanism: Molybdenum disulfide paste and grease (or equivalents). Ejection mechanism screws: Oil or grease. In case of seizing tendency see "Lubricants for Screw Joint" Other Parts: Castor oil	Before every assembly. Detailed lubricating instruction — see Maintenance and Repair Manual
Bowl Spindle Cone 	Oil (very thin film)	Every time the bowl body is to be fitted on the bowl spindle (lubricate the spindle cone and then wipe off with a clean cloth).

ALFA-LAVAL

SELF–CLEANING HERMETIC MILK SEPARATOR MRPX 314 HGV-74C

Application

Separation, standardisation, and clarification of hot milk. Designed for continuous operation and CIP.

Rated Throughput

Hot milk separation: 15000 lit./h. Standardisation and clarification: 21000 lit./h.

Motor

22 kW controlled-torque motor for 380/660 V, 50 or 60 Hz 3-phases AC. (Other voltages on request).

Starting Current

Approx. 1.5 times the rated current.

Working Power

Depending on throughflow, pump wheel combinations, inlet and outlet pressures.

:: 15000 lit./h : 17.5 - 20.5 kW
:: 21000 lit./h : 18.5 - 21.5 kW

Speed

The prescribed speed of the worm wheel shaft, which must not be exceeded, is stamped on the name plate of the machine.

The table below indicates rpm.

Drive motor	1420 - 1500 (50 Hz)	1700 - 1800 (60 Hz)
Bowl	4810 - 5080	4850 - 5130
Tachometer	1420 - 1500	1700 - 1800
Revolution counter	118 - 125	142 - 150

Running-up Time (Time Relay Setting)

Approx. 13 min.

Stopping Time

Approx. 15 min. (Running out with brake applied).

Inlet and Outlet Impellers

See "Selection of Impellers"

Inlet Pressure

Guiding value: 1 bar (100 kPa)
Min. pressure to prevent air suction: 0.5 bar (50 kPa)

Outlet Pressure

Up to 6 bars (600 kPa) in skimmilk outlet.

Sediment Space Volume

9.6 lit.

Suitable Ejection Volume – partial ejection

Approx. 7 - 8 lit.

Ejection Interval

For milk separation: approx. 1 hour

SO 1500E

Material

All parts in contact with milk are of acid-resistant stainless steel. The motor casing and sludge cyclone are of stainless steel, and the lower part of the frame is clad in stainless steel.

Water Consumption

Operating water:
Intermittent flow of up to 3 lit./s (max. 4 seconds) at a constant pressure of 4 bars (400 kPa) corresponding to 2 lit. per partial ejection, 12 lit. per total ejection and up to 300 lit./h for make-up water.

Water for solids cover: 25 lit. per partial ejection.

Water for the axial seals (during starting and stopping): approx. 3 x 30 lit./h = 90 lit./h.
Water for cooling coil in oil bath: 80 lit./h (at 10 ^{o}C), 100 lit./h (at 20 ^{o}C), 150 lit./h (at 30 ^{o}C).

Water Quality

Operating water:

Content of suspended substance: less than 0.001 vol %.
Total hardness: less than 10 ^{o}dH.

Content of chlorides: less than 100 ppm (60 mg C1/1)

pH value: larger than 6

Water for axials seals:

As above for operating water.

Weights

Shipping Data

Basic unit without motor	
Net weight, approx.	1350 kg
Gross weight, approx.	1650 kg
Volume, approx.	4 m^3
Motor only	
Net weight, approx.	360 kg
Gross weight, approx.	440 kg
Volume, approx.	0.6 m^3

Other parts
Basic unit without motor, bowl, frame hood and cyclone: approx. 680 kg

Complete bowl: approx. 560 kg.

Overhead Hoist for 1000 kp (10 kN) is required.

ALFA-LAVAL

SELF–CLEANING HERMETIC MILK SEPARATOR MRPX 318 HGV-74C

Application

Separation, standardisation, and clarification of hot milk. Designed for continuous operation and CIP.

Rated Throughput

Hot milk separation: 20000 lit./h. Standardisation and clarification: 30000 lit./h.

Motor

30 kW controlled-torque motor for 380/660 V, 50 or 60 Hz 3-phases AC. (Other voltages on request).

Starting Current

Approx. 1.5 times the rated current.

Working Power

Depending on throughflow, pump wheel combinations, inlet and outlet pressures

:: 20000 lit./h : 17 - 22 kW
:: 30000 lit./h : 20 - 25 kW

Speed

The prescribed speed of the worm wheel shaft, which must not be exceeded, is stamped on the name plate of the machine.

Drive motor	1420 - 1500 (50 Hz	1700 - 1800 (60 Hz)
Bowl	3750 - 3960	3720 - 3940
Tachometer	1420 - 1500	1700 - 1800
Revolution counter	118 - 125	142 - 150

Running-up Time (Time Relay Setting)

Approx. 13 min.

Stopping Time

Approx. 25 min. (Running out with brake applied).

Inlet and Outlet Impellers

See "Selection of Impellers"

Inlet Pressure

Guiding value: 1 bar (100 kPa)
Min. pressure to prevent air suction: 0.5 bar (50 kPa).

Outlet Pressure

Up to 6 bars (600 kPa) in skimmilk outlet.

Sediment Space Volume

17.2 lit.

Suitable Ejection Volume – Partial Ejection

Approx. 10 - 12 lit.

Ejection Interval

For milk separation: approx. 1 hour.

Material

All parts in contact with milk are of acid-resistant stainless steel. The motor casing and sludge cyclone are of stainless steel, and the lower part of the frame is clad in stainless steel.

Water Consumption

Operating water:
Intermittent flow of up to 3 lit./s (max. 4 seconds) at a constant pressure of 4 bars (400 kPa) corresponding to 2 lit. per partial ejection, 12 lit. per total ejection and up to 300 lit./h for make-up water.

Water for solids cover: 25 lit. per partial ejection.

Water for the axial seals (during starting and stopping): approx. 3 x 30 lit./h = 90 lit./h.
Water for cooling coil in bath: 80 lit./h (at 10 ^{o}C), 100 lit./h (at 20 ^{o}C), 150 lit./h (at 30 ^{o}C).

Water Quality

Operating water:

Content of suspended substance: less than 0.001 vol %.
Total hardness: less than 10 ^{o}dH.

Content of chlorides: less than 100 ppm (60 mg C1/1).

pH value: larger than 6.

Water for axial seals:

As above for operating water.

Weights

Shipping Data

Basic unit without motor	
Net weight, approx.	1950 kg
Gross weight, approx.	2350 kg
Volume, approx.	4.7 m^3
Motor only	
Net weight, approx.	360 kg
Gross weight, approx.	440 kg
Volume, approx.	0.6 m^3

Other parts

Basic unit without motor, bowl, frame hood and cyclone: approx. 770 kg.

Complete bowl: approx. 1000 kg.

Overhead Hoist for 1500 kp (15 kN) is required.

ALFA-LAVAL

SELF–CLEANING HERMETIC MILK SEPARATOR MRPX 418 HGV-74C

Application

Separation, standardisation, and clarification of hot milk. Designed for continuous operation and CIP.

Rated Throughput

Hot milk separation: 25000 lit./h. Standardisation and clarification: 33000 lit./h.

Motor

37 kW controlled-torque motor for 380/660 V, 50 or 60 Hz 3-phases AC. (Other voltages on request).

Starting Current

Approx. 1.5 times the rated current.

Working Power

Depending on throughflow, pump wheel combinations, inlet and outlet pressures

:: 25000 lit./h : 22.5 - 27.5 kW
:: 33000 lit./h : 24 - 29.5 kW

Speed

The prescribed speed of the worm wheel shaft, which must not be exceeded, is stamped on the name plate of the machine.

The table below indicates rpm.

Drive motor	1420 - 1500 (50 Hz)	1700 - 1800 (60 Hz)
Bowl	4050 - 4280	4000 – 4230
Tachometer	1420 - 1500	1700 - 1800
Revolution counter	118 - 125	142 - 150

Running-up Time (Time Relay Setting)

Approx. 13 min.

Stopping time

Approx. 30 min. (Running out with brake applied).

Inlet and Outlet Impellers

See "Selection of Impellers"

Inlet Pressure

Guiding value: 1 bar (100 kPa)
Min. pressure to prevent air suction: 0.5 bar (50 kPa)

Outlet Pressure

Up to 6 bars (600 kPa) in skimmilk outlet.

Sediment Space Volume

17.2 lit.

Suitable Ejection Volume – Partial Ejection

Approx. 10 - 12 lit.

Ejection Interval

For milk separation: approx. 1 hour.

SO 1502E

Material

All parts in contact with milk are of acid-resistant stainless steel. The motor casing and sludge cyclone are of stainless steel, and the lower part of the frame is clad in stainless steel.

Water Consumption

Operating water:
Intermittent flow of up to 3 lit./s (max. 4 seconds) at a constant pressure of 4 bars (400 kPa) corresponding to 2 lit. per partial ejection, 12 lit. per total ejection and up to 50 lit./h for make-up water.

Water for solids cover: 25 lit. per partial ejection.

Water for the axial seals (during starting and stopping): approx. 3 x 30 lit./h = 90 lit./h.
Water for cooling coil in oil bath: 80 lit./h (at 10 ^{o}C), 100 lit./h (at 20 ^{o}C), 150 lit./h (at 30 ^{o}C).

Water Quality

Operating water:

Content of suspended substance: less than 0.001 vol %.
Total hardness: less than 10 ^{o}dH.

Content of chlorides: less than 100 ppm (60 mg C1/1).

pH value: larger than 6

Water for axial seals:

As above for operating water

Weights

Shipping Data:

Basic unit without motor	
Net weight, approx.	1950 kg
Gross weight, approx.	2350 kg
Volume, approx.	4.7 m^3
Motor only	
Net weight, approx.	360 kg
Gross weight, approx.	400 kg
Volume, approx.	0.6 m^3

Other parts:

Basic unit without motor, bowl, frame hood and cyclone: approx. 770 kg

Complete bowl: approx. 1000 kg.

Overhead Hoist for 1500 kp (15 kN) is required.