Tetra Centri H 610HGD

Spec. No. 881154-01-03

Issue 0205 Order No. C120055

Tetra Pak

This document is valid for:

C120055 / 881154-01-03

Order No./Specification No.

Index_en.fm

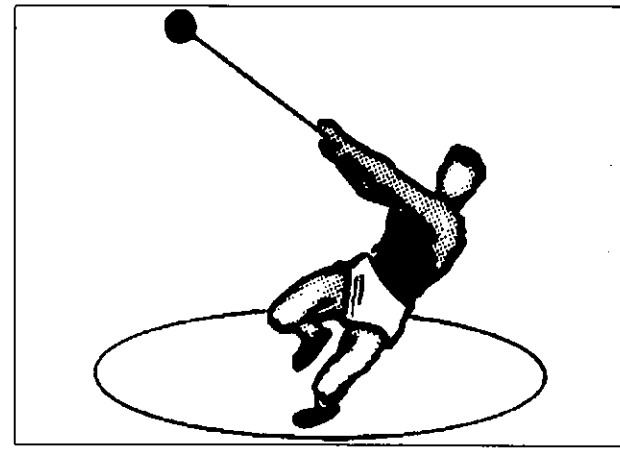
Tetra Pak

Study instruction manuals and observe the warnings before installation, operation, service and maintenance.

Not following the instructions can result in serious accidents.

In order to make the information clear only foreseeable conditions have been considered. No warnings are given, therefore, for situations arising from the unintended usage of the machine and its tools.

Safety Instructions



The centrifugal separator includes parts that rotate at high speed. This means that:

- Kinetic energy is high
- Great forces are generated
- Stopping time is long

Manufacturing tolerances are extremely fine. Rotating parts are carefully balanced to reduce undesired vibrations that can cause a breakdown. Material properties have been considered carefully during design to withstand stress and fatigue.

The separator is designed and supplied for a specific separation duty (type of liquid, rotational speed, temperature, density etc.) and must not be used for any other purpose.

Incorrect operation and maintenance can result in unbalance due to build-up of sediment, reduction of material strength, etc., that subsequently could lead to serious damage and/or injury.

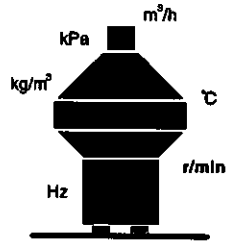
The following basic safety instructions therefore apply:

- **Use the separator only for the purpose and parameter range specified by Alfa Laval.**
- **Strictly follow the instructions for installation, operation and maintenance.**
- **Ensure that personnel are competent and have sufficient knowledge of maintenance and operation, especially concerning emergency stopping procedures.**
- **Use only Alfa Laval genuine spare parts and the special tools supplied.**

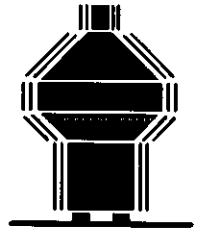
DANGER

Disintegration hazards

- Use the separator only for the purpose and parameter range specified by Alfa Laval.
- If excessive vibration occurs, **stop** separator and **keep bowl filled** with liquid during rundown.
- When power cables are connected, always check direction of motor rotation. If incorrect, vital rotating parts could unscrew.
- Check that the gear ratio is correct for power frequency used. If incorrect, subsequent overspeed may result in a serious break down.
- Welding or heating of parts that rotate can seriously affect material strength.
- Wear on the large lock ring thread must not exceed safety limit. ϕ-mark on lock ring must not pass opposite ϕ-mark by more than specified distance.
- Inspect regularly for **corrosion** and **erosion** damage. Inspect frequently if process liquid is corrosive or erosive.



S0051311



S0055611

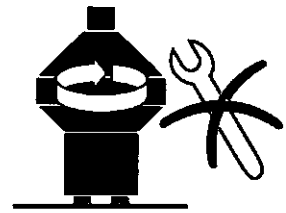
DANGER

Entrapment hazards

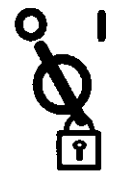
- Make sure that rotating parts have come to a **complete standstill** before starting **any** dismantling work.
- To avoid accidental start, switch off and lock power supply before starting **any** dismantling work.
- Assemble the machine **completely** before start. **All** covers and guards must be in place.

Electrical hazards

- Follow local regulations for electrical installation and earthing (grounding).



S0051111

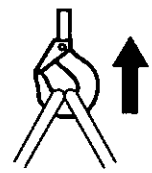


S0051011

WARNING

Crush hazards

- Use correct lifting tools and follow lifting instructions.
- Do **not** work under a hanging load.



S0051711

Noise hazards

- Use ear protection in noisy environments.

S0051611

CAUTION

Burn hazards

- Lubrication oil and various machine surfaces can be hot and cause burns.

Cut hazards

- Sharp edges on separator discs and lock ring threads can cause cuts.

S0055411

S0054311

Warning signs in the text

Pay attention to the safety instructions in this manual. Below are definitions of the three grades of warning signs used in the text where there is a risk for injury to personnel.

DANGER

Type of hazard

This type of safety instruction indicates a situation which, if not avoided, could result in **fatal injury** or fatal damage to health.

WARNING

Type of hazard

This type of safety instruction indicates a situation which, if not avoided, could result in **disabling injury** or disabling damage to health.

CAUTION

Type of hazard

This type of safety instruction indicates a situation which, if not avoided, could result in **light injury** or light damage to health.

NOTE

This type of instruction indicates a situation which, if not avoided, could result in damage to the equipment.

Environmental Issues

MM2.2100017en2.lm

This page intentionally left blank

Environmental Issues

Unpacking

Packing material for Tetra Centri consists of wood, plastics, cardboard boxes and in some cases metal straps.

Wood and cardboard boxes can be reused, recycled or used for energy recovery.

Plastics should be recycled or burnt at a licensed waste incineration plant.

Metal straps should be sent for material recycling.

Operation

Tetra Centri is designed for low consumption of resources.

Airtight design minimizes electrical power consumption.

Water consumption and ejection of sludge can be controlled and are adapted to each specific application.

Maintenance

During maintenance oil and wear parts in the machine are replaced.

Oil must be taken care of in agreement with local regulations.

Rubber and plastics should be burnt at a licensed waste incineration plant. If not available they should be disposed to a suitable licensed land fill site.

Bearings and other metal parts should be sent to a licensed handler for material recycling.

Seal rings and friction linings should be disposed to a licensed land fill site.

Discontinuation of machine operation

When machine is taken out of service, it can be returned to Tetra Pak for dismantling.

If handled locally, parts mentioned above shall be handled as described.

Motor consists of iron and/or aluminium, copper and insulation material and should be split in fractions by specialist.

Remaining parts are mainly stainless steel. Some parts are bronze. Frame bottom is cast iron.

Tetra Pak

Tetra Pak Processing Components AB, Box 103, S-221-00 Lund, Sweden

1. Technical data

This page intentionally left blank

Technical data

Alfa Laval ref. 560070, rev. 1(H 610HGD-74C), 557434, rev. 0 (A 610HGD-74C)

NOTE

The separator is a component operating in an integrated system including a monitoring system. If the technical data in the system description does not agree with the technical data in this instruction manual, the data in the system description is the valid one.

Product number	881154-03-01
Separator type	H 610HGD-14C
Application **H 610HGD-14C**	Hot milk.
Restrictions	Feed temperature: 0 °C to +100 °C. Ambient temperature: +5 °C to +45 °C. Discharge intervals: 1 - 60 minutes. Maximum allowed density of operating liquid: 1000 kg/m^3 Basic demands for PX-sealing not fulfilled. Only land based installations are permitted. Separator bowl must be kept filled during stopping sequence. Use of the machine in applications subject to hygienic demands requires an well-adapted cleaning program. Risk for corrosion and erosion have to be investigated in each case by the application centre. Further restrictions and instructions are found in other chapters in this manual.
Designed in accordance with directives and standards	89/392 EEC 91/368 EEC 93/44 EEC — The Council Directive of the European Communities. (CE-marking is possible if manuals are included in the delivery). EN 292-2 — Safety of machines. 89/336 EEC — EMC and amendments related to said directive.

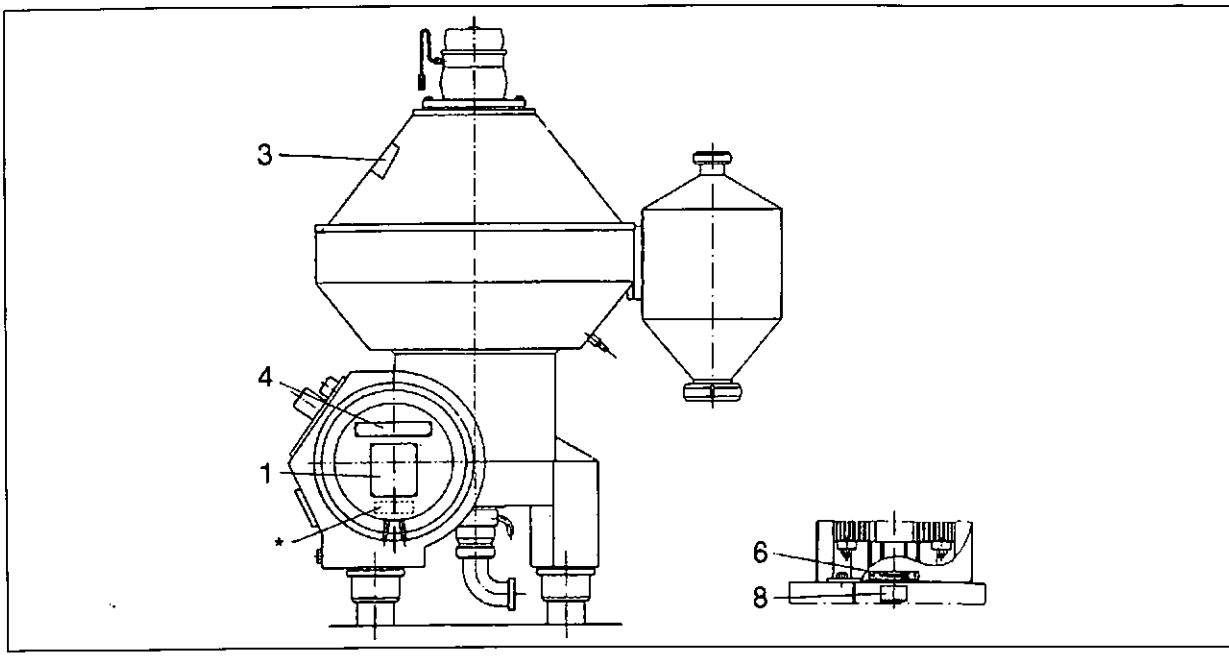
Bowl speed max.	6240 / 6235	r/min 50 Hz / 60 Hz
Speed motor shaft max.	1500 / 1800	r/min 50 Hz / 60 Hz
Revolution counter	118-125 / 142-150	r/min 50 Hz r/min 60 Hz
Gear ratio	104:25 97:28	50 Hz 60 Hz
Hydraulic capacity **H 610HGD-14C**	15 000	kg/h
Min./max. discharge volume	5	litres fixed discharge volume
Max. density of sediment / feed	1046 / 1030	kg/m^3
Motor power	18,5	kW
Power consumption **H 610HGD-14C**	9,5 / 15	kW (idling / at max. capacity)
Lubricating oil volume	12	litres
Max. running time without flow **H 610HGD-14C** **- empty bowl** **- filled bowl**	 180 180	 minutes minutes

Starting time	6 / 6,5	minutes (min. / max.)
Stopping time with brake	6,5 / 7	minutes (min. / max.)
Stopping time without brake	18	minutes (avarage)
Sound power / sound pressure level	9,1 / 74	Bel (A) / dB(A)
Vibration level max.	7,1 / 9	mm/s (new sep. / sep. in use)
Alarm levels for vibration monitor: connection 750	9 / 14	mm/s (1st / 2nd)
Volume of bowl	10	litres
Bowl max. inner diameter	405	mm
Weight of bowl	274	kg
Weight of separator	1021	kg (without motor)
Bowl body material	AL 111 2377-02	

There are no other materials than stainless steel in contact with process fluid except for sealings and gaskets.

Identification and safety signs, machine H 610HGD-74C

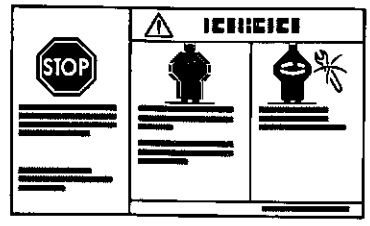
Alfa Laval ref. 556162, rev.0



1. Machine plate Text on plate:

Separator	H 610HGD-74C
Manufacturing serial No / Year	XXXX
Product No	881154-01-03
Machine top part	548940-01
Outlet	558820-01
Bowl	549514-01 / -02
Machine bottom part	549501-01 / -02 (50 Hz / 60 Hz)
Max. speed (bowl)	6240 / 6235 r/min (50 Hz / 60 Hz)
Direction of rotation (bowl)	←
Speed motor shaft	1500 / 1800 r/min (50 Hz / 60 Hz)
El. current frequency	50 Hz / 60 Hz
Recommended motor power	18,5 kW
Max. density of feed	1030 kg/m^3
Max. density of sediment	1046 kg/m^3
Max. density of operating liquid	1000 kg/m^3
Process temperature min./max.	0 / 100 °C

3. Safety label



S0061521

Text on label:

DANGER

Read the instruction manuals **before** installation, operation and maintenance. Consider inspection intervals.

Failure to strictly follow instructions can lead to fatal injury.

If excessive vibration occurs, **stop** separator and **keep bowl filled** with liquid during rundown.

Out of balance vibration will become worse if bowl is not full.

Separator must **stop rotating** before **any** dismantling work is started.

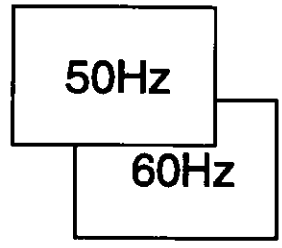
4. Name plate "Tetra Pak"

Tetra Pak

S0063221

6. Arrow indicating direction of rotation

8. Frequency label 50 Hz / 60 Hz



S0063111

* Space reserved for plate indicating representative

2. Application and CIP

This page intentionally left blank

Separation of hot milk

There is no exact limit for hot milk separation temperature. To avoid misunderstandings definitions in terms of process parameters must exist.

Our definition is:

"Separation of milk at 45-65°C, leaving less than 0.1% fat in the skimmed milk with a cream fat content of approximately 40%".

Process

Raw milk of known fat content, free from air, should be fed to the milk separator at relatively constant temperature and capacity. A change in operating conditions will influence the skimming efficiency. Standardised cream and skimmed milk are the products leaving the separator.

Sediment discharged from the centrifuge during separation may contain bacteria, leucocyte, hair, sand and similar. If the hot milk separator is the first centrifugal clarification step in the dairy, the discharged sediment is not possible to recycle. The best way to dispose it is to sterilise it with steam and dump it.

Factors influencing safety

It is important that you set the sediment discharge volume and the sediment discharge interval to match not only the sediment content in the milk but also the production schedule and the operating conditions. Always follow the given recommendations. Check on discharge size and cleaning result now and then.

Adjustments in separation process

It may be necessary to adjust the separation process, for example when raw milk fat content changes, when you desire a different cream fat content or when capacity changes.

Cream flow

Adjustment of cream flow is the common way to tune the separation process. By increased cream flow follow a lower cream fat content and vice versa.

Pay special attention to adjustments when cream fat content is 40% or more. Most equipment following the separator is normally not designed for high fat contents. Normal tuning does not influence the fat content in the skimmed milk.

Separation efficiency

With efficiency for a separator, we normally mean the ability to reduce the fat content in milk. But we can also define the performance in terms of the possibility to produce cream with a consistent and high fat content, or a production with no unintentional stops.

For standardisation of milk, fat content in skimmed milk is of less importance because part of the cream is re-mixed to get the proper fat

content in the standardised milk. For this reason you may standardise at a higher capacity than used for skimming.

To maintain a high availability it is important to make necessary adjustments with care, to run a proper cleaning every day and to make the recommended daily checks. Maintenance may be carried out by certified personnel only.

Product quality

The product quality in a milk separation process is most often measured in terms of free fat and air in the discharged products. The temperature for crystallisation and melting of milk fat range from 17-38°C. Therefore, it is important to heat the milk to about 45°C before separation, to be sure not to damage globules with partly melted fat. Free fat causes two serious faults, sticking and clumping. Rancid flavours may also develop as a result of lipolytic reactions.

If the incoming milk contains too much air there will primarily be a problem with cream control and foaming in product tanks. Secondarily, air is the major cause for destruction of fat globule membranes. The membranes may repair themselves again, but the globule is smaller and free fat has occurred. Smaller globules mean more fat in skimmed milk.

Sampling and analysing methods

Free fat in cream

The cream sample is extracted in petroleum ether, followed by evaporation, drying and weighing. The result is judged as follows:

Good quality < 0.3 %free fat in sample

Poor quality 0.3-1.0 %free fat in sample

Bad quality > 1.0 %free fat in sample

Fat content in cream and milk

Methods like Gerber and Babcock or automatic analysing equipment like Milkotester and MilkoScan are sufficient when an accuracy of 0.1% for the milk and 0.5% volumetric for the cream is sufficient. They are quick and simple methods.

Fat content in skimmed milk

The fat content in skimmed milk is relatively low and gravimetric methods preferred for accurate analyses of the absolute level. Other methods may be used for indications only.

Air content

Fill a bottle with narrow neck through a plastic hose until the bottle is full. Hold the hose under the liquid level. Leave the bottle at 55-60°C for 1 hour. The amount of water needed to fill the bottle again in relation to the original sample volume gives the air content in percentage.

Cleaning

There is a risk for burning on and sedimentation of protein inside the bowl at separation temperatures above 65°C (not recommended), or if the centrifuge has been idling with product. These product residue can be very hard to get rid of by normal cleaning procedures.

A normal cleaning starts with a thorough rinsing with cool water (the colder the better) to make protein residue easier to remove, followed by lye, a second rinsing, acid and the final rinsing and cooling. See our general recommendation for concentrations, temperatures and duration of lye and acid cleaning.

This page intentionally left blank

Cleaning-in-place (CIP)

General

High hygiene in connection with a good processing procedure is a necessity in all food industries today. The consumers make heavy demands upon the quality and the keeping quality of the food products. Mechanization and automation have made great progress and the cleaning procedures, previously mainly performed by manual work, have become an integrated part in modern processing. This holds true for the dairy industry as well.

The chosen methods of cleaning and disinfection of the processing equipment is of outmost importance. During processing, the milk is generally subjected to some kind of heating. The main constituents in the milk, protein-fat-lactose and mineral salts, are influenced by the heating or other treatment and precipitate on the treating surfaces. The created layer must be removed when cleaning the equipment in order to secure high grade products.

In that connection questions like:

- which are the constituents in the "dirt"?
- how much?
- in which state are the constituents?
- aiming at physical, chemical and/or biological cleaning?
- etc.

have to be put forward. The answers to these and similar questions will give cleaning times, temperatures, flow rates as well as detergents and sequences.

It is important that the cleaning methods are optimized in order to give approved results at lowest costs and load on sewage system and environment.

The check of the cleaning result must be looked upon as an important part of the cleaning work. This checking can be divided into an ocular inspection and a bacteriological check. Due to the automation, the processing lines are now less available for ocular inspection. That means that more intensive bacteriological checking, concentrated to strategic places in the processing line, e.g. sections with vacuum where risk for infection is greater, will substitute the ocular inspection. As a rule, the counting of coliform bacteria is used as an indicator of the cleaning result.

Water quality

Water is the primary factor of all cleaning. To be usable for cleaning purposes the following demands must be fulfilled:

1) Free from objectionable suspended matter

2) Free from objectionable taste, odor or color

3) Not excessively hard

4) Low iron and manganese content

5) Devoid of pathogenesis and with a low total count of bacteria

6) Free from toxic substances

In most countries the Health Authorities require a certain degree of water quality for food purposes.

The following measures can be adopted in order to improve existing water of less good quality:

1) Sedimentation

2) Filtration

3) Chlorination

4) pH-control

5) Softening

The chemical quality, especially with regard to the hardness, must be carefully considered. The carbonate hardness, e.g. salts of calcium and magnesium, as well as the hardness of non-carbonate constituents in the water, such as sulphates and gypsum, partly make the detergent inactive. A further drawback is the precipitation of these carbonates on cleaned surfaces. Water with a high degree of hardness must therefore be softened.

Sometimes lower pH can be acceptable. That is when the cleaning cycle ends with slightly acidified rinse water in order to prevent bacterial growth. This acid solution also "passivates" the stainless surface somewhat.

Some facts about detergents

In most cases water alone cannot clean objects. Its power to remove dirt and deposits is insufficient. Chemicals which increase the cleaning effect of the water must be added in order to obtain a satisfactory result. Sodium hydroxide (NaOH), also known as caustic soda, is a well-known detergent. It has been used in the dairy industry for a long time, mainly where dairy products have been heated. Cleaning of tanks and pipeline systems was previously performed apart from e.g. plate heat exchangers and often by means of weaker detergents. When the automatic Cleaning-In-Place method

- CIP - was introduced, the detergent solution is distributed from a central detergent tank. In integrated cleaning procedure consequently needs a composed detergent, suitable for all cleaning purposes.

It is certainly not possible to produce one which is perfect for each special purpose. It is, however, possible to get well on the way by mixing adequately existing detergents of different characteristics.

A good detergent must have the following characteristics:

1) Strong emulsifying effect

2) Good wetting properties

3) Easy to rinse off

4) Keeps dirt suspended, also when diluted greatly

5) Prevent depositing of carbonates

6) Strong bactericidal effect

7) Low corrosiveness

Alkali as detergent

The best way to dissolve protein is to treat it with alkali. (In narrow passages it might be better to start with acid. Alkali has a swelling effect on protein while acid results in con-traction. See "Acid Cleaning Solution"). The most suitable cleaning agent is sodium hydroxide. It is the strongest of the alkalis and only small quantities are needed to make the pH of the cleaning solution rise to the required level. In order to make the protein soluble within a reasonable time, cleaning with high pH, between 12 and 13, is needed. When it comes to attacking and removing dried-in or burnt-on rests of milk, the cleaning solution must have a softening or colloidal power. This power seems mostly to depend on the alkalinity: the higher the alkalinity the greater the power. The dissolving effect of sodium hydroxide upon albumin is good and its micro-bicidal effect is high.

In the table below a comparison is made between sodium hydroxide (NaOH) and sodium carbonate (Na_2CO_3) concerning pH in solutions of varying strength

The table shows that the pH value in the sodium carbonate solutions is not dependent on the concentration in the same way as the pH value in sodium hydroxide solutions. This is due to the buffering capacity of the sodium carbonate which also means that the cleaning ability is maintained in a superior way compared with solutions of sodium hydroxide. However, the sodium carbonate sometimes used is, not very suitable due to slow action in dissolving protein in combination with a poor bactericidal effect.

At high temperatures, above 50°C, the sodium hydroxide partly attacks the fat and also easily hydrolyses it into soluble soap. The power of alkaline detergents to attack and remove fatty deposits very likely has its explanation

in that saponification first occurs and that the produced soap then attacks and emulgates the fat.

Alkali always forms the basic substance of a detergent and it is now supplemented with surface tension reducing mediums, so called wetting agents, with power to emulsify the fat.They are also active in keeping freed dirt suspended in the detergent solution.

Wetting agents as a supplement

The surface tension is a factor which regulates the main part of all phenomena at the interface between fluid bodies and objects which are insoluble in each other. The main task of the wetting agent is to reduce this surface tension between water and fat so that the cleaning solution can wet and attack the fatty impurities.The effect of surface active substances is explained by the fact that they fix a position in the surface layer between water and fat, their molecules being such that part of the molecule dissolves most easily in the fat and part of it in the water. In that way, connecting links are produced between the cleaning solution and the fatty substances. There are different types of wetting agents. The common property of all types is that one part of the molecule attracts the water - the hydrofilic group - and one part attracts the fatty substances - the hydrophobic group.

Percent		0.25	0.5	1.0	2.0
NaOH	pH	12.5	12.8	13.0	13.3
Na_2CO_3	pH	11.3	11.4	11.6	11.7

Depending on if the hydrofilic group has a positive charge, a negative charge or -is neutral, one speaks about cation-active, anion-active or non-ionizing surface-active substances.

Wetting agents are active regardless of the hardness of the water, without giving precipitates, and they can be used in both acid and alkaline solutions. Too high concentration of the wetting agent requires longer rinsing time

Complex forming compounds as a supplement

It is wrong to believe that the work of the detergent should be concluded as soon as the object has become clean. Another important task remains. This is to dispose of the dirt so that it will not be re-adsorbed on the cleaned surface. With deter-gents composed an unsuitable way, the risk becomes great for such a re-adsorption, particularly when the cleaning solution is circulated and detergent solution is re-used. Sodium polyphosphates have these suspension qualities. The best results are obtained together with a wetting agent.

Polyphosphates also serve as softeners of the water. This is of great importance in order to prevent the formation of milk stone, calcium soaps

and connected precipitations.The precipitation is largely reduced by the action of the polyphos-phates in the detergent but cannot be entirely prevented. The hardness of the water is in this case important as the calcium salts react with the detergent and reduce its power. Costs for water softening have to be compared to the costs for detergent. It is therefore often necessary to perform cleaning alternatively with nitric acid and alkali, also for tanks and pipeline systems for which alkali treatment normally would be sufficient. It has been found that sodium tripolyphosphate and also sodium hexametaphosphate are very suitable as softeners and dispersing agents. Both of them are sensitive to heat as polyphosphates hydrolyse to octophosphates, i.e. reduced effect if recycled. There are softeners of other types, such as ethylenediaminetetra acetic-acid (EDTA) (careful dosing due to the influence on the environment). They have superior chemical stability but lower dispersion effect.

Acid cleaning solution

As mentioned previously, the alkaline cleaning only is not sufficient. In a processing line, especially where heat treatment has taken place. An acid cleaning solution is therefore used as a supplement and acts as separate treatment within the cleaning cycle. Inorganic acids have strong dissolving effects on the protein and are normally used in the first stage of the cleaning cycle in order to prepare the burnt-on deposits prior to the alkaline treatment. On the other hand, an acid solution can often be used as the second treatment, particularly when precipitation of calcium carbonates, together with albumin due to high hardness of water, still remain on the cleaned surface after a treatment with a composed alkaline detergent. Sometimes it is necessary, especially when sterilizing milk and milk products, to repeat the acid treatment - acid-alkaline-acid. Another reason to finish with acid is that acid "passivates" the stainless surfaces and protects them.

The two most commonly used inorganic acids for cleaning purposes are nitric acid (HNO_3) and phosphoric acid (H_3PO_4). The latter has a lower coefficient of dissociation than nitric acid and also lower corrosion effect. The nitric acid is, however, the most efficient and with a normal solution strength for cleaning, it does not harm acid-resistant steel.

On the other hand nitrites are more dangerous than phosphates for human beings.

Disinfection

The term disinfection is used when the micro-organisms, not necessarily all of them, are destroyed by means of physical and chemical treatment. On the other hand, sterilization means complete extermination of the micro-organisms in a substrate created on the processing surfaces of equipment.

It is normally not a question of sterilization after a CIP cycle, but also when there is naturally an ambition to obtain as good results as possible.

Even if the cleaning has been well done, there will remain a number of bacteria, also on surfaces which are polished. The smallest remains of sugar

and protein particularly if colloidally swelled products of protein remain - can cause bacterial growth.

Disinfection methods

There are different methods to be used for disinfection. They are:

1) Steam treatment

2) Hot-water treatment

3) Chlorination

4) Disinfection with non-chlorine agents

Disinfection by means of heat treatment is an excellent method. The temperature must, however, be high and combined with a sufficiently long contact time which the following table shows (not valid for spore-forming bacteria).

- 80°C water kills bacteria within 5 - 15 seconds
- 70°C water kil1s bacteria within about 30 seconds
- 63°C water kills bacteria within 1 800 seconds

As a comparison, it can be added that the highest temperature you can keep your hands in is about 55°C.

Disinfection by means of direct steam can be left an open question, partly because it involves certain disadvantages in connection with burning-on of deposits and partly because of the difficulties to fit the steam disinfection into a system based upon the circulation principle. Hot-water disinfection is, on the other hand, fully in line with the principle and generally recommended in automatic CIP built by Tetra Pak.

Steam and hot water are physical means of disinfection. There are many chemical means of disinfection. Two of these are chlorine, which is used to an ever increasing extent, and "Oxonia".

Most frequently used today is sodium hypochlorite (NaOC1) which has a very high bactericidal effect. In a disinfectant containing chlorine it is the quantity of active chlorine, i.e. chlorine in a free or active state, that is important for the disinfecting efficiency. The liberated oxygen acts is a strong oxidizing agent and the micro-organisms are destroyed by oxidation. One deciliter of sodium hypochlorite per 100 liters of water is recommended when using chlorine in practice. The contact time should be minimum 5 minutes and maxi-mum 15 minutes. The temperature of the chlorine solution must not exceed 25°C because of the corrosion risk. Should the rules regarding the use of chlorine solutions not be observed, this can result in serious damage to the stainless steel equipment, particularly plate heat exchangers. It is mostly the temperature and the overdosing of chlorine which cause damage.

The disadvantage of using chlorine as a disinfectant is mainly the corrosiveness, particularly at temperatures above 25°C, which has limited

the use, at least in CIP systems. Within the food industry there is very often a demand for an ultimate disinfection with chlorine compound after the circulation of hot water. There is nothing which prevents doing so, provided everything is managed in the right way. As a rule it can be said that if chlorine is used immediately after cleaning and the processing line is not used, for instance overnight, the chlorine solution must be removed by means of rinsing with water or by means of compressed air, in order to decrease the risk of corrosion. The latter is mainly applicable to pipeline systems. The most efficient way in all disinfection work is considered to be disinfection just prior to the processing.

Except for Oxonia a number of non-chlorine disinfecting agents are available, such as quaternary ammonium compounds, iodophors, etc. Many of them are quite efficient from a disinfecting point of view. They have, however, drawbacks which make them less suitable. Iodophor is difficult to rinse away and might therefore cause a higher iodine content in the product. The presence of quaternary ammonium compounds can prohibit normal fermentation in milk products where fermentation is required and they have therefore become disrupted in dairy processing. Another disadvantage is precipitation created when milk and quaternary ammonium compounds are mixed.

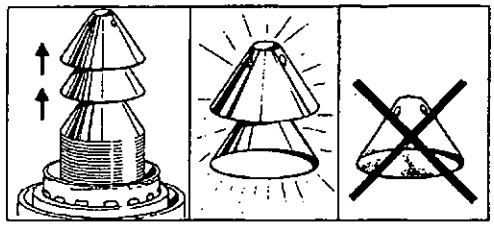
The advantage of the non-chlorine disinfecting agents is the low corrosiveness.

General procedure for cleaning of MRPX separators

One prerequisite for satisfactory separating efficiency is that the separator parts in contact with product have been perfectly cleaned before the feed is turned on.

Normally the separator is incorporated in a combined unit 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 should be used - acid solution and alkaline solution (lye).

The bowl must be emptied repeatedly during the various cleaning stages.

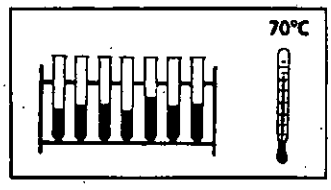


Check of cleaning

The bowl should be dismantled and the cleaning checked after the first operation with process liquid. Repeat the check after 3 - 4 days and after a further 14 days. If the results are favourable, the bowl can be left untouched until a minor overhaul is due. This should normally be made after about 3 months.

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

Note! A greyish film (but not containing milk residue) may also occur on the discs if the lye has been circulated after the acid. To remove the film an extra run with acid for about 10 minutes is recommended.



If the bowl turns out to be badly cleaned, check the temperature and concentrations of the acid and lye. Correct any deviations from the recommended values. Do not sample the concentration only once, but preferable several times.

Cleaning - guiding values

1) Immediately after completion of the separating, pre-rinse with water.

   It is important to pre-rinse as thoroughly as possible to prevent milk residue 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.

3) Intermediate rinse.

4) Circulation of alkaline solution, the main ingredient of which is NaOH. Circulation time depends on degree of contamination, as for acid washing.

5) After-rinse with water.

6) Hot water disinfection shall be effected immediately prior to separation.

In disinfection with chlorous agents the temperature must in no circumstances exceed 25°C, as chlorine is highly corrosive at higher temperatures.

For the **acid solution** use nitric acid (HNO_3). Suitable concentration is 0.8 - 1% in solution. Find out the exact concentration of the acid purchased (normally 53%).

As for the **alkaline solution** a so-called detergent compound should be used comprising NaOH plus a complexing agent (for instance sodium polyphosphates $Na_5P_3O_1O$, EDTA or NTA) with a nonionic wetting agent. The concentration of the alkaline solution should amount to 1 - 1.5% so that a pH-value of 12 to 13 is obtained.

For **disinfection** with chlorous agents such as sodium hypochlorite (NaOCl) use maximum 1 deciliters per 100 liters of water. As regards non-chlorous disinfectants follow strictly the instructions issued for such agents.

Cleaning guide

Rinsing/washing time (minutes)		Type of discharge/ number of ejections		Liquid temp. °C
		large disch.	small disch.	
Pos. 1	15 - 20	3 - 4		
Pos. 2	20 - 30		2 - 3	70 ± 3
Pos. 3	10 - 15	2 - 3		
Pos. 4	35 - 45		3 - 4	75 ± 3
Pos. 5	10 -15	2 - 3		
Pos. 6	6 -10			90

3. Air and water quality

This page intentionally left blank

Air and water quality requirements

Compressed air

The air supply to pneumatic instruments such as transmitters, controllers, converters, relays etc. must be of such a quality that satisfactory function is ensured for a reasonable time.

To this end three conditions must be fulfilled:

1) Dirt in the form of solid particles down to a size below 10 micron (0.01 mm) must be removed from the air. This is preferably done by means of special filters or reducing valves provided with filters.
2) Oil is always transferred to the compressed air from oil lubricated compressors and must be removed to the highest possible degree. It constitutes a serious contamination, which it is difficult to remove from the instruments. Special filters or oil separators must, therefore, be provided before the instruments. In small plants, oilfree compressors can be used as an alternative.
3) In the compressed air system, a condensation takes place at various rates depending on the moisture content at the air inlet, the temperature before and after the compressor, partially lower temperature in any cold zones passed by the pipe (outdoor, cellar etc.) and likewise.

   The air must thus be dried with regards to the lowest temperature existing after the drying device, so that condensate in the instruments is avoided. Note that the air will also be cooled through expansion after passing constrictions and nozzles in the instruments, with condensation as a result. In view of the above, the following must be observed:

   At the inlet to an instrument, the dew point of the compressed air should lie at least 10°C below the lowest ambient temperature. This is usually obtained by using an absorption drier of suitable capacity. If the air contains much water, provide a primary separator before the filter.

Air filters should be placed so as to be easily surveyable and accessible in order to facilitate daily condition checks, and exchange of the filter cartridge.

Note! Tetra Pak accepts no liability for consequences arising from unsatisfactorily purified compressed air supplied by the customer.

Service water

Specific requirements regarding the quality of water

Water is used in the separator for several different functions: Discharge-Turbidity free water, solids content << 0.001 percentage of volume mechanisms, liquid seals, as cooling media and for flushing.

Bad quality of the water can with time cause erosion, corrosion and/or operating problems in the separator and must therefore be treated to meet certain demands.

The following requirements are of fundamental importance.

1) Turbidity-free water, solids content < 0,001% of volume.

   Deposits must not be allowed to form in certain areas in the separator.

2) Max. particle size 50 µm.

3) Total hardness ≤ 180 mg $CaCO_3$ per liter

   Chalk deposits can build-up if the water is hard (corresponds to 10°H or 12,5 °E). Increased operating temperature accelerates the chalk built-ups.

4) Chloride content ≤ 100 ppm NaCl (equivalent to 60mg Cl/l).

   Chloride ions contribute to corrosion on the separator surfaces in contact with the operating water, including the spindle. Corrosion is a process that is accelerated by increased separating temperature, low pH, and high chloride ion concentration. A chloride concentration above 60 mg/l is not recommended.

5) pH > 6

   Increasing acidity (lower pH) increases corrosion; this is accelerated by increased temperatures and high chloride ion content.

For test methods, contact a supplier representative.

If these demands cannot be met, the water should be pretreated according to the supplier's recommendations.

Note! Tetra Pak accepts no liability for consequences arising from unsatisfactorily purified water supplied by the customer.

4. Unpacking and placing

This page intentionally left blank

Unpacking and placing

Unpacking the separator

The separator should be unpacked as soon as possible after arrival.

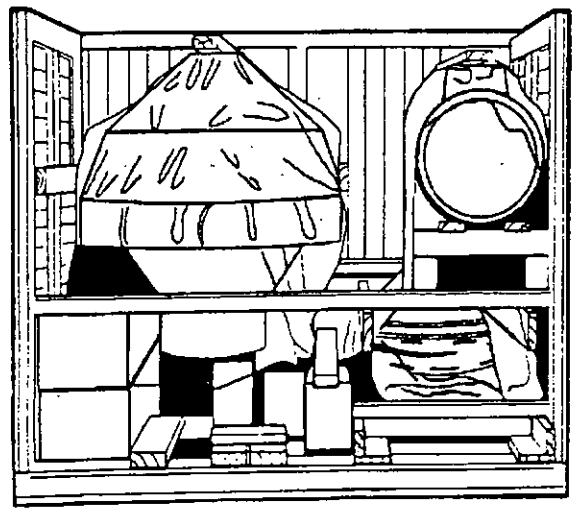
Take the following items into consideration in order to avoid damage to the machine and parts in the crate.

1) Always open the top first.
2) Lift out heavy parts above the bowl, for example motor etc.
3) Then remove the long side marked as shown on figure.

When unpacking take care not to scratch metal or painted surfaces. Check by means of the packing list that all parts have been delivered and are unpacked.

Report immediately to Tetra Pak if any parts are missing

.



Example of placement of the parts in the crate

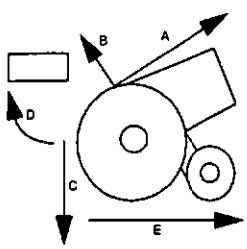
General advice when placing the separator

The separator should be placed so that the load bearing construction in the floor is utilized as much as possible.

The separator should be placed so that the sound level is not amplified by reflections from walls and ceiling.

If necessary, the wall and ceiling surfaces must be damped.

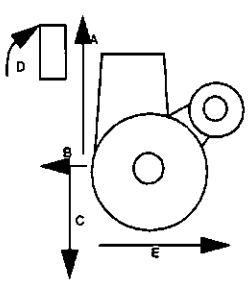
A beam for the lifting device should reach out over the separator in order to facilitate the work around the machine.



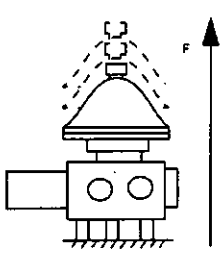
Lay-out (see fig.)

The following items should be taken into consideration when the separator shall be placed.

a) The space should be so large that the motor shroud can be removed.
b) Sufficient space for work with oil, brake and speed indicator.
c) Space for pallets for separator parts.
d) Space for the door on the control panel. (Note! Placing varies with different control panels.)
e) It must be possible to be able to remove the pallets from the room as dismantling progresses.
f) Space above the machine is required for dismantling.



There should also be space for spares and tools close to the separator (in the same room).



Lifting device

The lifting device should be designed so that it can lift vertically with a velocity below 1.5 m/min. It should be able to lift the weight of the heaviest separator part with a wide margin (overhead crane or something similar). Always use slings.

Noise

Noise a growing problem in modern process plants. As a manufacturer of centrifuges, Tetra Pak are endeavouring to lower the noise level of the machines. However, equally important to the efforts of reducing noise is the correct installation of the machines.

The following text provides a brief orientation of a number of factors that should be taken into account in connection with machine installations, but must be regarded as general guidelines only, not to be used in detailed studies. For such analyses, someone with acoustic competence must be consulted.

Centrifuge installation noise level sound data, emission

Sound data are normally given as sound pressure level in dB at a distance of one metre from major sound emitting surfaces and as an average value at a number of points. Measuring is carried out in free space (no reflected sound) or with correction to apply to free space. In free space, the simple rule applies that doubling the distance to the source of sound results in a reduction of the sound level by 6 dB.

Within a room, on the other hand, the noise level is affected by the acoustic properties of the room. Through the reflection of the sound from the walls, the sound level will be higher in the room than in free space (as out-of-doors). The extent of reflection is influenced by the capability of the wall to absorb sound which is defined by the absorption factor α which may range between 0 and 1. A high absorption factor means that reflection is small, approximating free space conditions.

A low absorption factor, i.e. high-reflection surfaces, raises the sound level. By increasing room sound absorption, the sound level of the room can be reduced.

The sound data specified for Tetra Pak centrifuges are obtained in accordance with ISO R495, ISO R1680, IEC 179, and IEC 225.

Machine Positioning

Depending on where in a room a machine is positioned, the effect of reflected sound from the surroundings varies, and thus also the noise level.

Example:

(See fig. 1) If the walls of the room are fully reflecting (α =O) and the centrifuge is positioned in the middle of the floor area, a sound level of, say 82 dB is recorded. Moving the centrifuge close to one of the walls raises the sound level by 3 dB to 85 dB. Moving the machine into a corner would add another 3 dB, to make a total of 88 dB.

Effect of several sources of sound

In any premises used for processing there are usually several sources of sound, and it is the accumulated level of noise that is of interest. The several sources of sound are totalled at each point where the total noise level is relevant. Fig. 2 is applicable when two different noise levels or several equally high noise levels are to be totalled at a given point.

Example:

Two sources of sound produce at a given point a noise level of 80 and 84 dB respectively. The total noise level at this point will then be, according to graph 2a, approx.- 85.5 dB. Three sources of sound produce at a given point 80 dB each. The total noise level at this point will then be, according to graph 2b, approx. 85 dB.

Note that the effects of the premises themselves have to be added-to the above levels of noise.

Measures in the premises to reduce noise level

In premises with small absorption area (tiling, concrete etc.), absorption can simply be in-creased by lining the ceiling (and perhaps also the walls) with sound deadening material of sanitary type. As a result, the reverberation level will drop, while the close-range level will not be effected, i.e. the contribution from reflected sound will decrease, while the direct sound remains unaltered.

Another way of limiting the travel of sound is screening. The effectiveness of screening very much depends on the size and position of the screen, and the presence of sound-deadening material.

If an extreme lowering of the noise level is required, the machine must be enclosed. The construction of a special, separate room for remote-controlled separators is of course a good way of solving the noise problem. However, in multi-machine installations, service and maintenance work aspects must be taken into account.

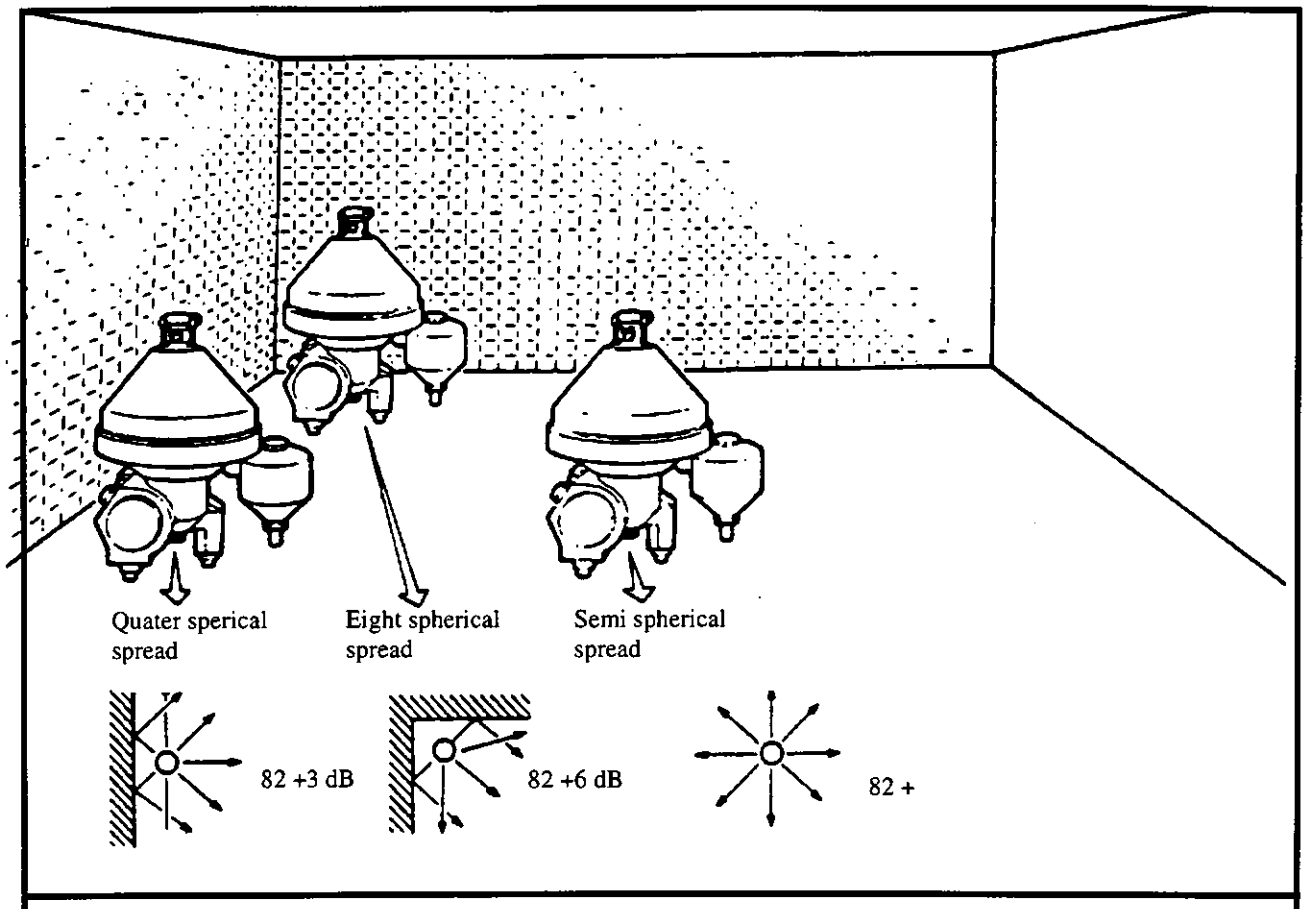
Installation aspects

By taken a number of noise aspects into consideration when installing machinery, it is possible to keep the noise level at a minimum. It is important that all openings in the frame hood and top of the machine are "enclosed". For instance, the sludge outlet should he routed to an acoustically "enclosed" system. The same applies to ventilation and drain piping.

In routing and fitting the piping, a certain degree of flexibility in the pipe system must be ensured, for instance by fitting elbows or bends before the connections to the machine. If possible, the suspension of the piping should be such as to absorb vibrations.

Installation on base

Tetra Pak centrifuges are equipped with vibration absorbers and should not be placed on special bases or plinths. The vibrations absorbers supplied with the machine feet should not be exchanged for absorbers of a different type.



MM2.21000004en2.fm

Accumulation of two sound sources

Increase (to add to maximum level) dB

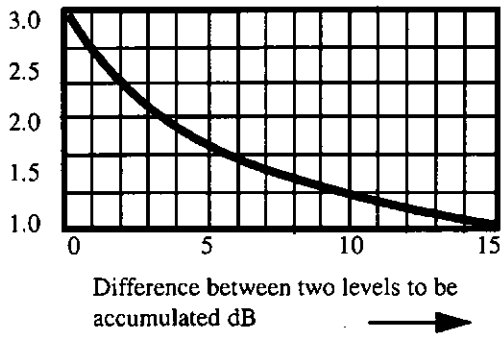


Fig. 2a

Accumulation of several sound sources with same sound level

Increase dB

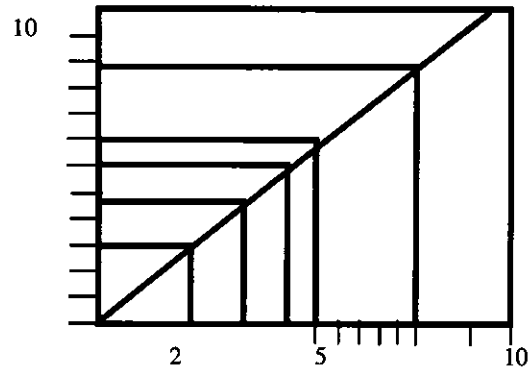


Fig. 2b

This page intentionally left blank

Lifting the separator

Alfa Laval ref. 549818, rev. 1

WARNING

Crush hazards

Use correct lifting tools and follow lifting instructions. Do **not** work under hanging load.

DANGER

Entrapment hazard

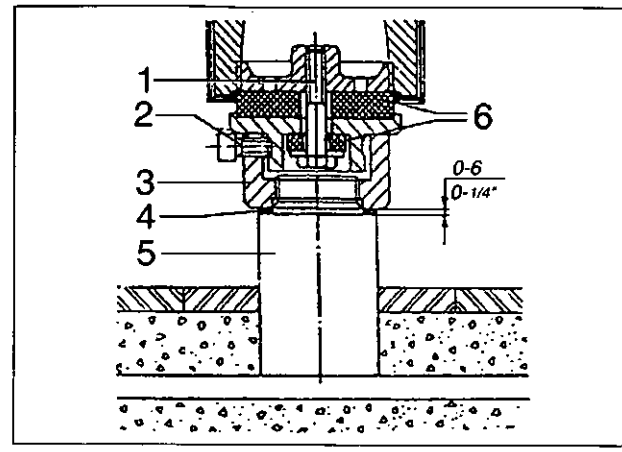
Make sure that rotating parts have come to a **complete standstill** before starting **any** dismantling work.

The revolution counter indicates separator rotation.

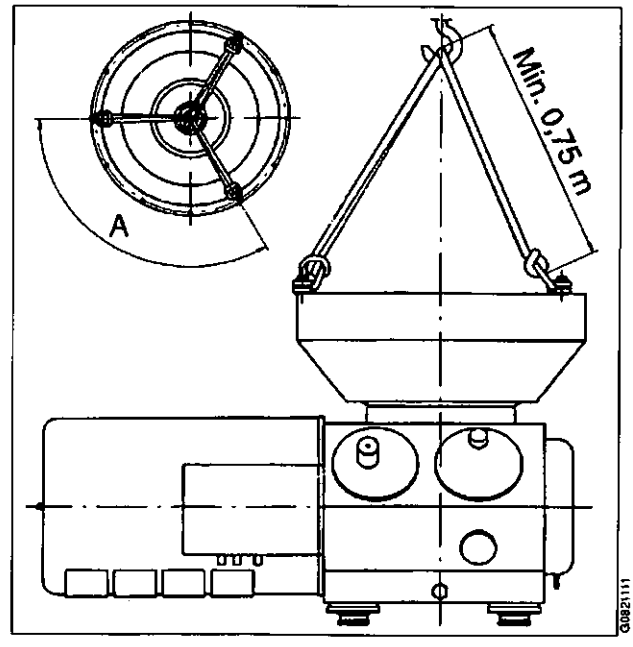
Remove in order stated

- Inlet
- Outlet
- Frame hood
- Cyclone
- Bowl

Loosen the set screws (2). Screw the three lifting eyes on the frame – see figure – and lift the separator. For checking the tightening of screws (1) or for checking and replacing vibration dampers (6) the separator must be lifted approx. 0,5 m.



1. *Screw and washer*
2. *Set screw*
3. *Holder*
4. *Adjusting washer*
5. *Foundation foot*
6. *Vibration damper*

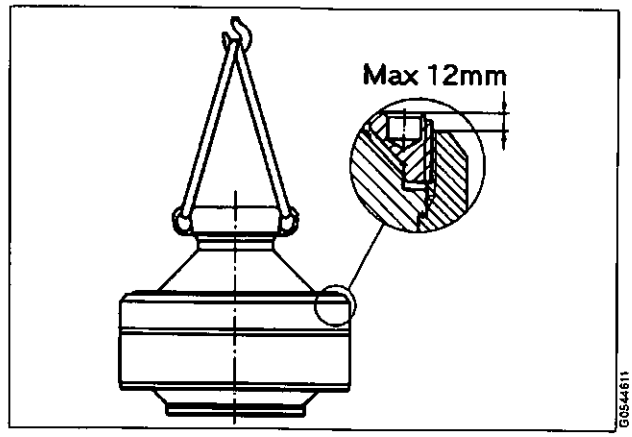


Weight to lift 1100 kg

A. 3 space 120°

Lifting of the complete bowl in one piece to be done **only** when unpacking at delivery of the separator.

Never try to lift the complete bowl into or out of the separator frame, follow the description for disassembly and assembly.



Weight to lift 300 kg

WARNING

Crush hazards

Use correct lifting tools and follow lifting instructions. Do **not** work under hanging load.

This page intentionally left blank

5. Foundation

This page intentionally left blank

Foundation

Installation of separator foundation plate

The following instructions are to be looked upon as guidelines for installation. Local building regulations, quality of building materials etc. must be discussed from case to case with a construction engineer.

The recommendations are based on the loads given at the end of this chapter and are minimum demands.

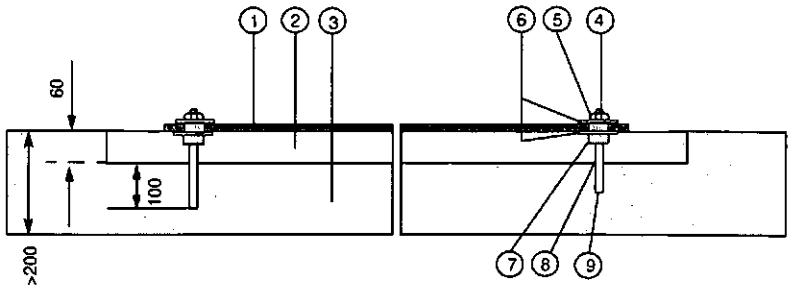
General advice

- Always centre the lifting device in relation to the centre mark on the foundation plate before the plate is covered.
- Always check that the foundation plate is horizontal before pouring the concrete.
- Remember that the concrete on top of the foundation plate does not contribute to the strength of the installation.
- The insulation must be restored/intact.
- Always contact a construction engineer if a separator is to be placed on the second floor. Regarding loads, see the end of this chapter.
- Avoid to make holes **through** the floor if a separator is placed on the second floor.

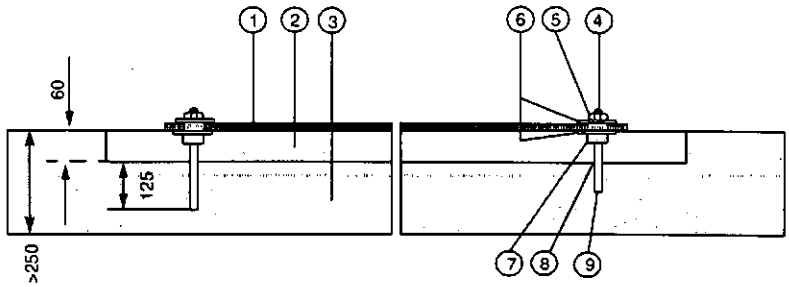
Installation

1) Make a hole in the floor, 60 mm wider than the plate on all sides and with a depth of 60 mm (see fig.).

   Note that the maximum distance between the top of the tiles and the bottom of the plate should be 90 mm when the installation is finished.
2) Bore seven holes in the concrete with the foundation plate as a template. Diameter 20 mm and depth 100 or 125 mm (concrete quality).
3) Put the adhesive anchor cartridges into the holes and mount the pin bolts (do not forget to remove excessive cartridge before mounting the pin bolt).
4) Level the plate by adjusting the nuts as shown in the fig (pos 7).
5) Tighten the nuts on the top.
6) Pour concrete into the cavity to the level where the insulation should be. Make sure that the space under the plate is filled.
7) Restore the insulation. The new insulation must overlap the old one by 150 mm.
8) Finalize the installation with supplementary concreting and titles.



A. valid for structural concrete with compressive cylinder strength fcc ≥ 2100 psi



B. valid for structural concrete with compressive cylinder strength 500 psi < fcc < 2100 psi

MM2.2100005en2.fm

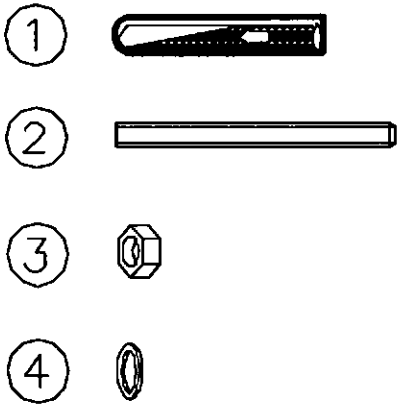
Part No.	No. Pcs.	Name, symbol A	Name, symbol B	Material note	
1	1	Foundation Plate	Foundation Plate		See dim drawing
2	Min 60 litres	Expanding concreting below the foundation plate	Expanding concreting below the foundation plate		Betec. Embeco or similar
3		Structural concrete	Structural concrete		
4	7	Pin bolt Hilti M16*220 galv or similar	Pin bolt Hilti M16*240 galv or similar	5.8*	
5	7	Nut M6M 16 BHB galv	Nut M6M BHB galv	8.8**	Bulten Ltd.
6	14	Washer S4B 18*50 galv	Washer S4B 18*50 galv		Bulten Ltd.
7	7	Nuts for vertical adjustment M6M 16 BHB galv	Nuts for vertical adjustment M6M 16 BHB galv	8.8**	
8	7	Bore hole ø 18*100	Bore hole ø 18*125		The boring dust must be removed from the bore hole carefully.
9	7	Adhesive anchor cartridge Hilti M8P 16*125	Adhesive anchor cartridge Hilti M8P 16*125		Hilti, order no. 670 521***

* Yield stress 58 000 psi
** Yield stress 93 000 psi
***The part of the cartridge above the concrete surface shall be removed immediately before mounting the pin bolt.
All dimensions are in millimeters unless otherwise stated.

MM2.2100005en2.fm

This page intentionally left blank

CAUTION:
ALLWAYS USE PROTECTIVE GOGGLES.



BT=CONCRETE
E=EXPANDING CONCRETE
S=FOUNDATION

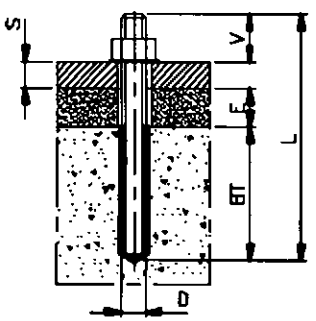


FIG.1

D= ø14MM
V=20MM
BT=DRILL DEPTH=120 MM
L=BT+E+S+V

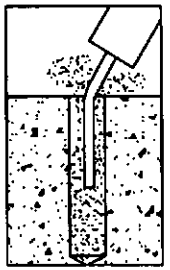


FIG.2

CLEAN UP THE HOLE ACCURATE WITH COMPRESSED AIR. WHEN CLEANING WITH WATER, BE SURE THAT ALL WATER ARE GONE BEFORE THE CARTRIDGE IS PUT INTO THE BOTTOM OF THE HOLE (THE HOLE COULD BE MOISTURED)

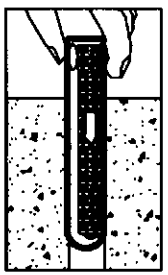


FIG.3

ALLWAYS NOTE THE ARROW DIRECTION BEFORE MOUNTING THE CARTRIDGE. TO BE CORRECT MOUNTED THE ARROW DIRECTION SHOULD ALLWAYS POINT AGAINST THE HOLE WERE IT IS TO BE MOUNTED.

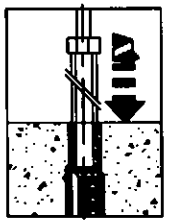


FIG.4

MOUNTING OF THE BOLT COULD BE DONE EITHER BY HAND OR BY GLAZING HAMMER TO ROTATE AND HAMMER THE ANCHOR BOLT TO THE BOTTOM OF THE HOLE.

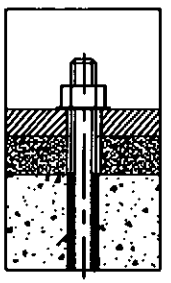


FIG.5

CORRECT MOUNTED CHEMICAL ANCHOR CARTRIDGE BOLT.

MOUNTING IN DRY HOLE
RECOMMENDED HARDENING TIMES:

AMBIENT TEMP.	CURING TIME:
+20°C AND MORE	1 HOUR
+10°C TO +°20C	2 HOUR
0°C TO +10°C	5 HOUR
– 5°C TO 0°C	10 HOUR

MOUNTING IN MOISTURED HOLE
RECOMMENDED HARDENING TIMES:

AMBIENT TEMP.	CURING TIME:
+20°C AND MORE	2 HOUR
+10°C TO +°20C	4 HOUR
0°C TO +10°C	10 HOUR
– 5°C TO 0°C	NOT RECOMENDED

THE ANCHOR BOLT MAY NOT BE LOADED BEFORE THE CORRECT HARDENING TIME

NOTE:

POS. SEE SPECIFICATION 32310-0615-1

REV.	QTY	DESCRIPTION	DATE	SIGN.

INSTALLATION INSTRUCTIONS CHEM. ANCHOR CARTRIDGE

MACHINERY LAYOUT

Alfa Laval LUND Sweden

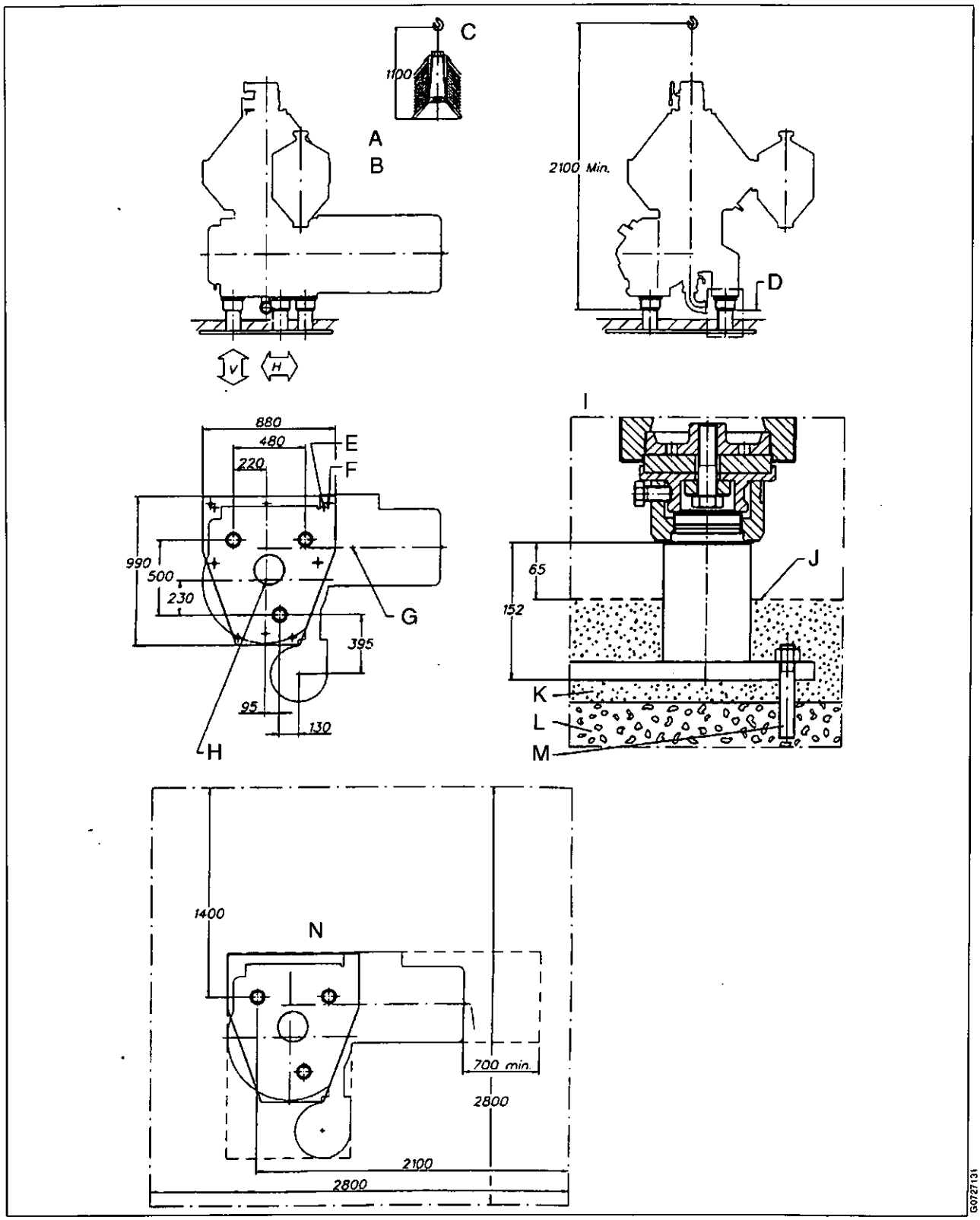
MAN REV	ORIGINAL
	ACAD
ARCHIVE 0615018 Date:950130	CAD REV B

SCALE	DEPT.	DRAWN	CHECKED	APPR.	DATE	DRAWING NO	PAGE
-(A3)	SID	CHM			941212	32310-0615	

This page intentionally left blank

Foundation drawing

Alfa Laval ref. 549928, rev. 2



A. *Max. height of largest component incl. lifting tool*
B. *Recommended speed for lifting:*
   - Low speed 0,5 – 1,5 m/min
   - High speed 2 – 6 m/min
C. *Min. lifting capacity required when doing service: 800 kg*
D. *Horizontal max. deviation 0,4°*
E. *3 holes M20 for horizontal adjustment*
F. *7 holes Ø 20 for anchorage*
G. *Center of motor*
H. *Center for lifting device*
I. *Installation acc. to stated foundation forces*
J. *Floor level*
K. *Expanding concrete*
L. *Structural concrete*
M. *Anchor bolt*
N. *Service side*

·—·—·— *Recommended free floor space for unloading when doing service*

- - - - - *No fixed installations within this area*

Vertical force not exceeding 20 kN/foot

Horizontal force not exceeding 20 kN/foot

Total static load max. 16 kN

6. Motor drive data

This page intentionally left blank

Motor drive data

General

Always earth the centrifuge.

Never attach cables in rigid pipes to a centrifuge motor. Use a short run of flexible connection at the motor (Tetra Pak recommends a minimum of 2 feet).

Never wash down a centrifuge with a direct water stream. The motors are **not** sealed and can be damaged by direct hosing. On machines which do not have motor covers, restrict cleaning of outside of machine frame or covers to brushing, sponging or wiping while the motor is running or is still hot. Care should also be taken on covered motors.

Never direct a hose at the louvers in the cover.

Do not repeatedly start and stop a centrifuge. A good rule is no more than one start and stop every two hours. Ordinary motor overloads will not protect the motor from more frequent starts, since they are connected only in delta phase.

Always interlock the feed pump contactor and the delta contactor in the separator starter, so operation cannot start until full speed is reached.

MM2.2100006en2.fm

Wire Sizes

Characteristics of the centrifuge and the motor determine wire size. Do not determine wire size on horse power rating only. See the cable dimensions table in this chapter, for control torque motors with star/delta start. Wiring and fusing must be at least in accordance with local codes.

Speed of Rotation

Check that the direction of rotation is correct in star- and delta connection.

Check RPM of the bowl; most machines are equipped with a speed indicator. See the machine manual.

If machine speed is not in accordance with machine plate or instruction manual data, **do not operate**. (If rated machine speed is not available, contact Tetra Pak).

This page intentionally left blank

In and outlet pressures

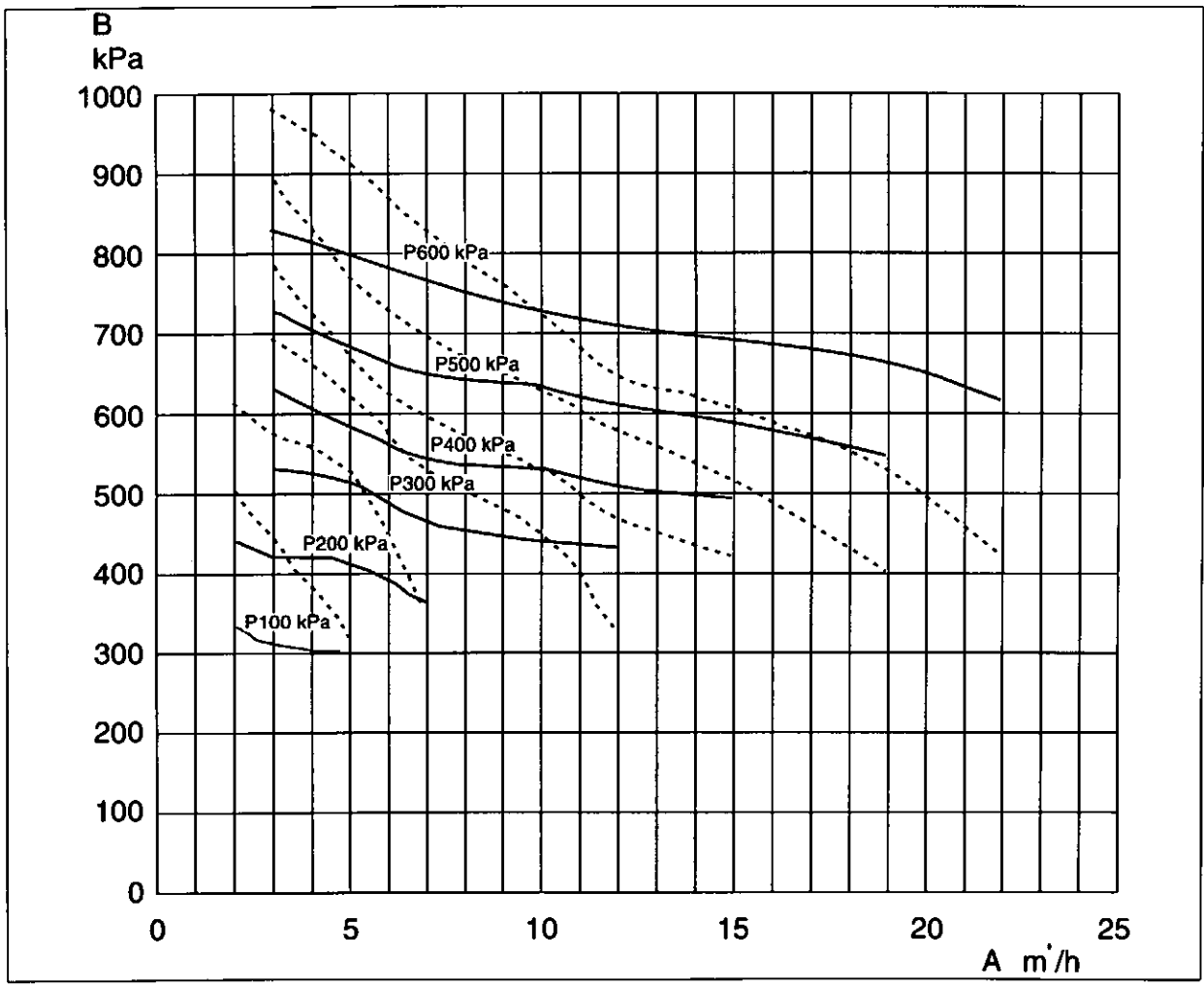
Permissible inlet and outlet pressures

Inlet Recommended inlet pressure is 400 - 600 kPa

Min. 300 kPa, Max. 600 kPa

Outlet Recommended outlet pressure: 400 - 700 kPa

Diagram for H 610HGD-74C



——— *Light phase*

- - - - - *Heavy phase*

The constant inlet pressure directly before the separator as shown in the illustration.

A. Inlet flow

B. Outlet pressure for light and heavy phase

The curves have been obtained when operating with water and when 10% of the total flow was taken out as light phase.

7. Sludge and water outlet

This page intentionally left blank

Sludge and water outlet

General

The main purpose of the sludge cover and the cyclone is to reduce the kinetic energy of the discharged liquid as smoothly as possible. The cyclone is also a part of the ventilation. When the bowl is rotating, air is sucked from the lower and upper parts of the frame and blown out through the cyclone.

Because of this, it is obvious that:

- the cyclone must not be fixed to floor or piping
- the cyclone outlet must not be blocked

When the separator moves, e.g. because of vibrations or at discharge, the movement increases with the radius from the axis of rotation. If the cyclone is fixed to floor or piping, it will counteract the movement and sooner or later cracks in the frame or piping will occur.

The air circulation in the frame is changed instantly when a discharge takes place. The liquid leaving the bowl presses out the air. If the cyclone outlet is blocked air and liquid have to find other ways out. At best only part of it goes down under the bowl and causes burning on. The situation will be similar, but not as violent, if there is a blockage down the waste line.

The air inside the frame, leaving through the cyclone, has high humidity.

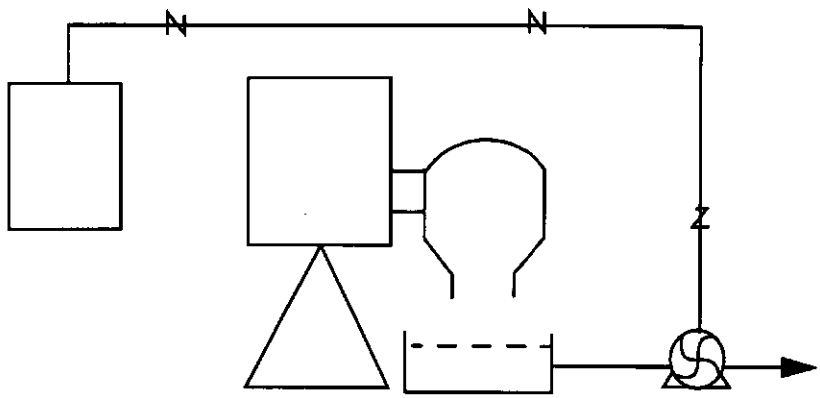
Therefore:

- do not connect two cyclones to the same pipe. There is a risk that one separator is working while the other one is stationary. If there is a connection from one cyclone to the other, air with high humidity might enter into the separator that is **not** working and condense. This can damage the driving device.

When both separators are working, a discharge from one of them blocks the pipe with the consequences mentioned above.

There are two more things that are worth mentioning:

- it should be possible to see the flow from the outlets
- it should be possible to dismantle the cyclone/ - outlet easily



The pump can be either level or time controlled.
The filter cloth has to be changed/cleaned manually.

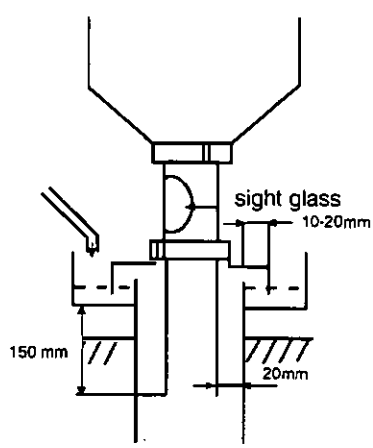
Installation examples

a) In installations, where it is desirable to have a rather dry sludge, the mixture of flushing water and milk can be filtered directly. If it is legal the filtrate can be pasteurized/sterilized and then evaporated.

b) As mentioned above, the cyclone is part of the ventilation. The air flowing through the cyclone generates noise. In installations where this noise contributes to a total high noise level, it can be interesting to reduce it.

c) The outlets from the paring tube, drain tube, discharge outlet seal(s), inlet seal and frame hood are to be gathered to the funnel shaped part as shown on the drawing below.

* The figure refers to the dimensioned drawings.

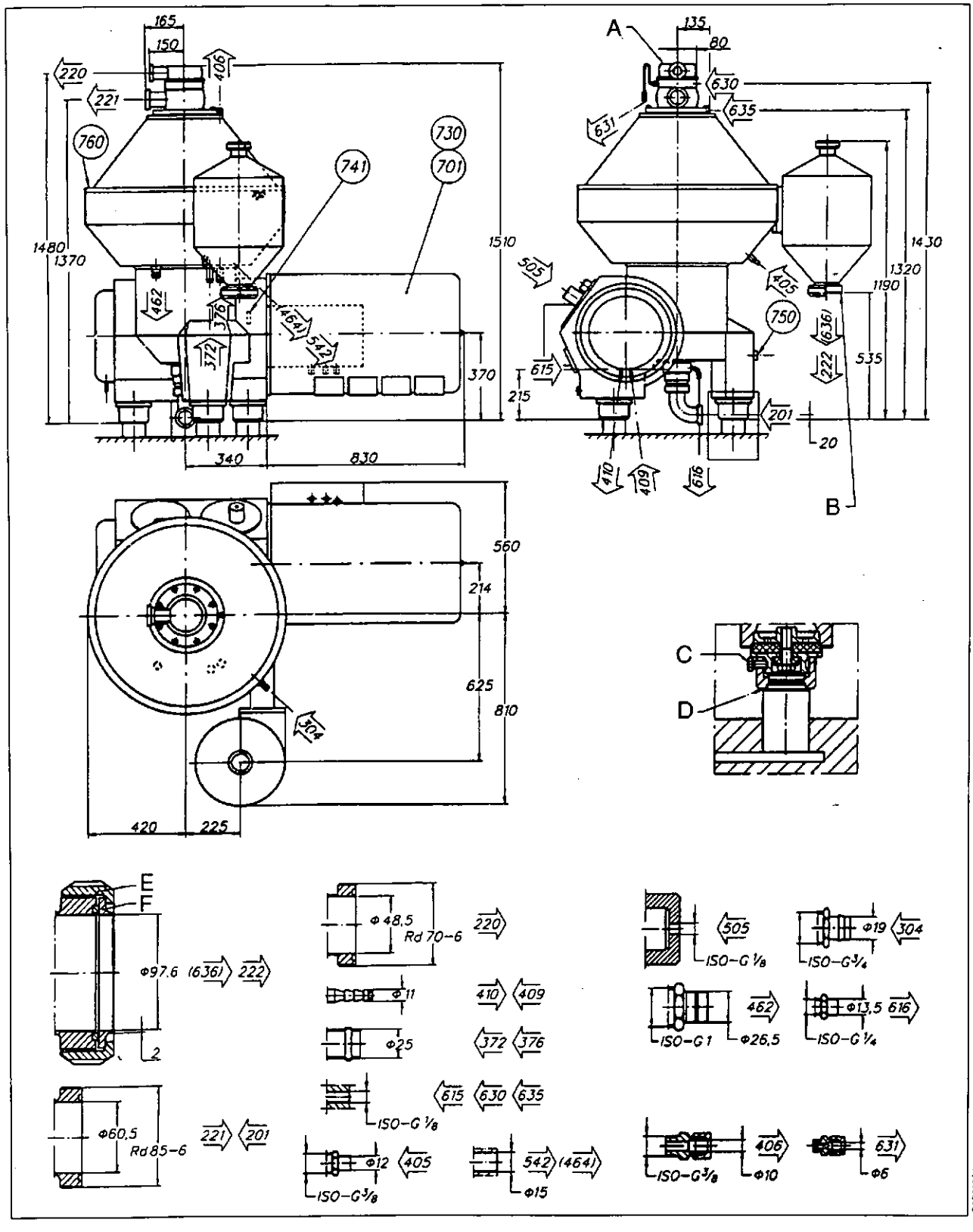


8. Media connections

This page intentionally left blank

Basic size drawing

Alfa Laval ref. 549929, rev. 3



A. *Maximum horizontal displacement at the inlet and outlet connections during operation ±20 mm*
B. *Maximum vertical displacement at the cyclone connection during operation ±10 mm*
C. *Tightening torque 100 Nm*
D. *Adjusting washers, max. 4 pcs/foot*
E. *Nut, DN 101,6, SMS 1148*
F. *Stainless steel*

Connections 201, 220 and 221 turnable 360°.

All connections to be installed non-loaded and flexible

Data for connections, see "Connection list".

Connection No.	Description	Requirements / limits
409	Inlet for water to lubrication oil cooler • Consumption • Pressure	Fresh water Min. 80 - 100 litres/h Max. 50 kPa
410	Outlet from lubrication oil cooler	
462	Drain of frame top part, lower • Draining of discharge liquid and splash in connection with discharge	
464	Drain of the space between frame top part and bearing housing	
505	Inlet for compressed air to brake • Pressure	See "Compressed air" 400 ± 50 kPa
542	Ventilation of frame bottom part	Do not block the hole. No restrictions allowed
615	Inlet for sealing liquid between media and ambient area at hollow spindle • Consumption	See "Service water" 60 – 80 litres/h
616	Outlet for sealing liquid between media and ambient area at hollow spindle	Free outlet, without water trap
630	Inlet for sealing liquid between media at hermetic top • Consumption	See "Service water" 60 - 80 litres/h
631	Outlet for sealing liquid between media at hermetic top	
635	Inlet for sealing liquid between media and the frame top • Consumption	See "Service water" 60 - 80 litres/h
636	Outlet for sealing liquid, water	
701	Motor for separator Technical data: See Interface description and "Electric motor" • Allowed frequency variation (momentarily during max. 5 seconds:	 ± 5% ± 10%)
730	Temperature sensor, motor winding Type	 PTC-thermistor 190 °C

Connection No.	Description	Requirements / limits
741	Speed sensor for motor shaft (option) Type For technical data see "Interface description"	Inductive proximity switch
750	Unbalance sensors, vibration (option) Type For technical data see "Interface description"	Velocity transducer
760	Cover interlocking switch (option) Type For technical data see "Interface description"	Mechanical switch

Connection list

Alfa Laval ref. 557431, rev. 1

Connection No.	Description	Requirements / limits
201	Inlet for product	
	• Allowed temperature	Min. 0 °C, max. 100 °C
220 Cream	Outlet for light phase	
	• Back pressure	0 - 700 kPa
221 Skim	Outlet for heavy phase	
	• Back pressure	0 - 600 kPa
222	Outlet for sludge (sediment)	To be installed in such a way that the cyclone can not be filled with sludge
	• Discharge volume	Approx. 5 litres
	• Discharge interval	Min. 1 minute, max. 4 hours
304	Flushing in sediment outlet	
	• Consumption	Approx. 10 litres/discharge
372	Inlet for discharge liquid	See "Service water"
	• Consumption	Approx. 0,4 litres/discharge
	• Pressure	200 kPa
	• Time	Min. 0,7 sec., max. 4,8 sec
376	Inlet for make-up liquid	See "Service water"
	• Consumption	Max. 10 litres/discharge
	• Pressure	Min. 30 kPa, max. 50 kPa
405	Inlet for cooling liquid, frame top	Fresh water
	• Consumption	Min. 100 litres/h
	• Pressure	Max. 50 kPa
406	Outlet for cooling liquid, frame top	

DANGER

Disintegration hazard

Pressure in connections **405** and **406** must not be higher than **50 kPa.** Risk for deformation of frame hood and consequent contact with rotating parts.

NOTE

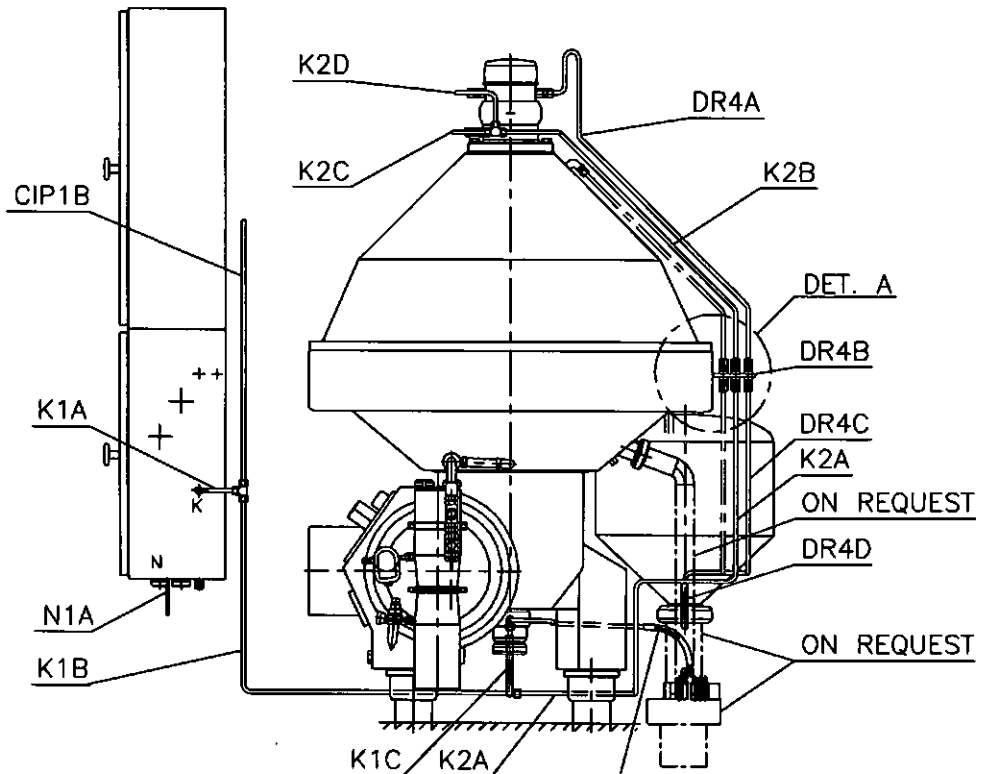
Outlet **406**, **464** and **542** must be open. No restrictions are allowed.

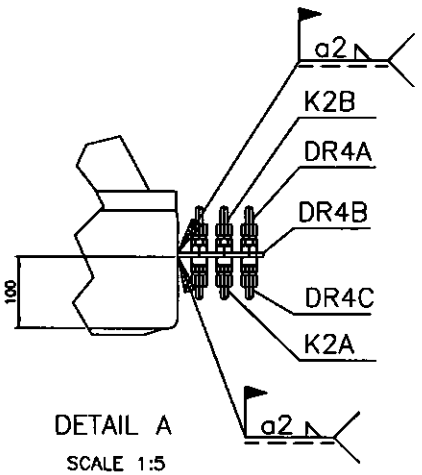
POS	QTY.	PART NO./DWG	DENOMINATION	TYPE/DATA	REMARK
1	1	32310-0465-1	**CONN. DETAILS**		
2			**PIPE, CONTAINING FOLLOWING**		
	12 m	32310-0163-4	PIPE	Ø10x1.0 SANDVIK 3R60 SEAMLESS	6x2 m

Dept	Appr.	Checked	Drawn	Date	Title	Rev	Archive	Date	Specification No.	Page
SID			CHM	970321	ASSEMBLING-LIST FOR CONN. SET AXIAL SEALS . TWO PH. OUTLET	A	0464101A	970321	32310-0464-1	

POS	QTY.	PART NO./DWG	DENOMINATION	TYPE/DATA	REMARK
1			**BOX, CONTAINING FOLLOWING**	L x W x H	
	1	31341-0160-1	NON RETURN VALVE	ALFA	MARKED=CIPV2
	4	31801-8302-1	MALE THREAD COUPL.	GE10-LR 1/4"	
	1	32310-0441-1	BANJO COUPL.-MALE THREAD	DSVWE10-LR 1/8"	
	3	31801-8309-1	REDUCING BUSH	R I 1/4"-1/8"	
	3	31801-8303-1	TEE	T10-L	
	1	31801-8301-1	STRAIGHT JOINT COUPLING	G10-L	
	3,00 m	1995-101-048	AIR HOSE	6/4	
	1	31801-5158-1	BEND	R4-6	
	1	31801-5158-3	MALE THREAD COUPL.	R6-6-1/8"	
	0,10 m	1995-101-056	HOSE ARMOURED PVC	Ø16/10 TYPE 1046	
	1	32310-0436-1	HOSE ARMOURED PTFE	Ø10 TEXAN	
	1	32310-0443-1	THREAD SEAL FOR ALL COUPLINGS	LOCTITE 275	
	1	32310-0430-1	SEPARATOR PIPE SUPPORT		COMPLETE
	1	32310-0427-1	CIP VALVE ASSEMBLY	LKAPS-V,DN25	COMPLETE
2			**INSTALLATION DRAWINGS:**		
		32310-1146	FLUSH. ARR. AXIAL SEALS. TWO PH. OUTLET		
		32310-1146-1	SPEC.		
		32310-0465-1	DETAIL LIST FOR CONN. SET		
			FLUSH. ARR. AXIAL SEALS. TWO PH. OUTLET		

Dept	Appr.	Checked	Drawn	Date	Title	Rev	Archive	Date	Specification No.	Page
SID			CHM	970321	DETAIL LIST FOR CONN. SET AXIAL SEALS . TWO PH. OUTLET	B	0465101B	970321	32310-0465-1	





DETAIL A
SCALE 1:5

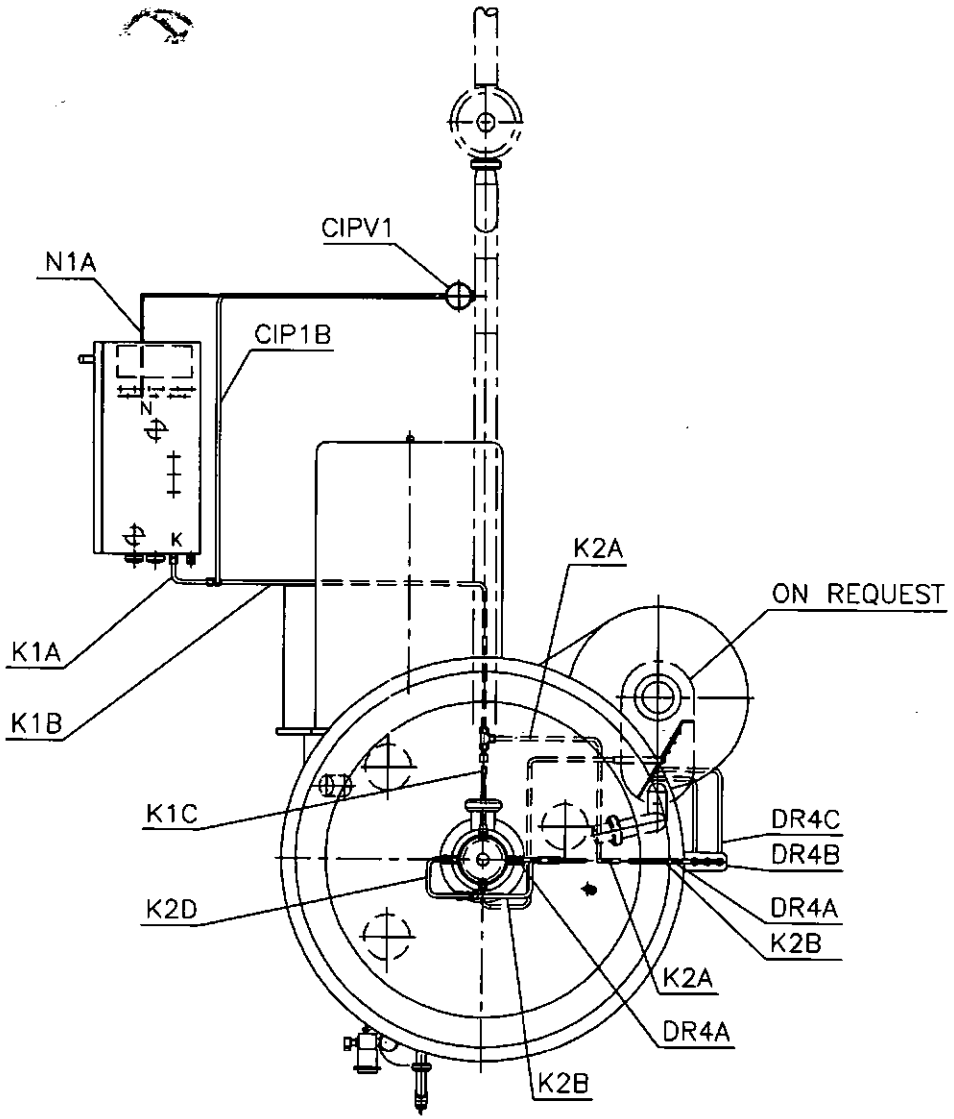
IMPORTANT

THE OUTLET PIPE SHOULD
NOT BE MOUNTED HIGHER
THAN ITS OUTLET CONNECTION.

NOTE:
POS. SEE SPECIFICATION 32310-1146-1
PLAN VIEW SEE PAGE 2
FRONT VIEW SEE PAGE 3
FLOW CHART SEE PAGE 4

REV.	QTY	DESCRIPTION	DATE	SIGN.

FLUSH. ARR. AXIAL SEALS TWO PHASE OUTLET SECTIONAL VIEW MACHINERY LAYOUT							MAN REV	ORIGINAL ACAD
							ARCHIVE 114601b	CAD REV B
SCALE 1:10(A2)	DEPT. SID	DRAWN CHM	CHECKED	APPR.	DATE 940518	DRAWING NO 32310-1146		PAGE 1(4)



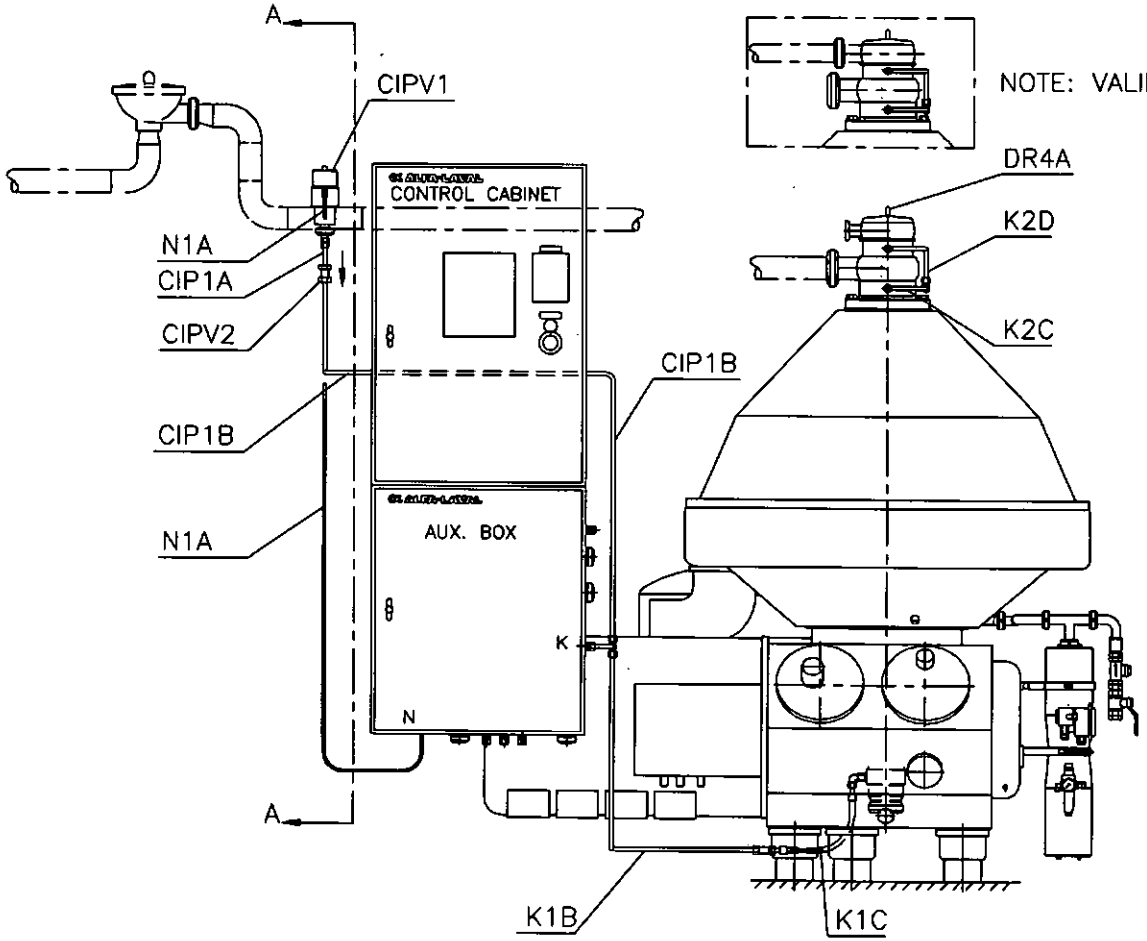
REV.	QTY	DESCRIPTION	DATE	SIGN.

FLUSH. ARR. AXIAL SEALS
TWO PHASE OUTLET
PLAN VIEW
MACHINERY LAYOUT

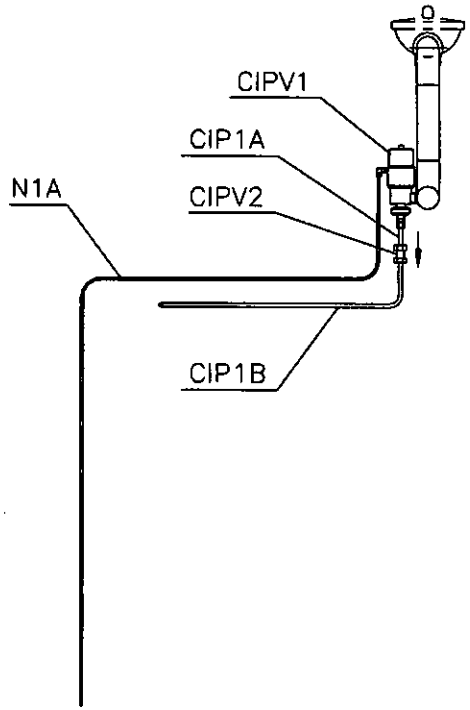
Alfa Laval
LUND Sweden

MAN REV	ORIGINAL
	ACAD
ARCHIVE 1146029 Order 980803	CAD REV
	B

SCALE	DEPT.	DRAWN	CHECKED	APPR.	DATE	DRAWING NO	PAGE
1:10(A2)	SID	CHM			940518	32310-1146	2(4)



NOTE: VALID FOR BM-



SECTION A-A

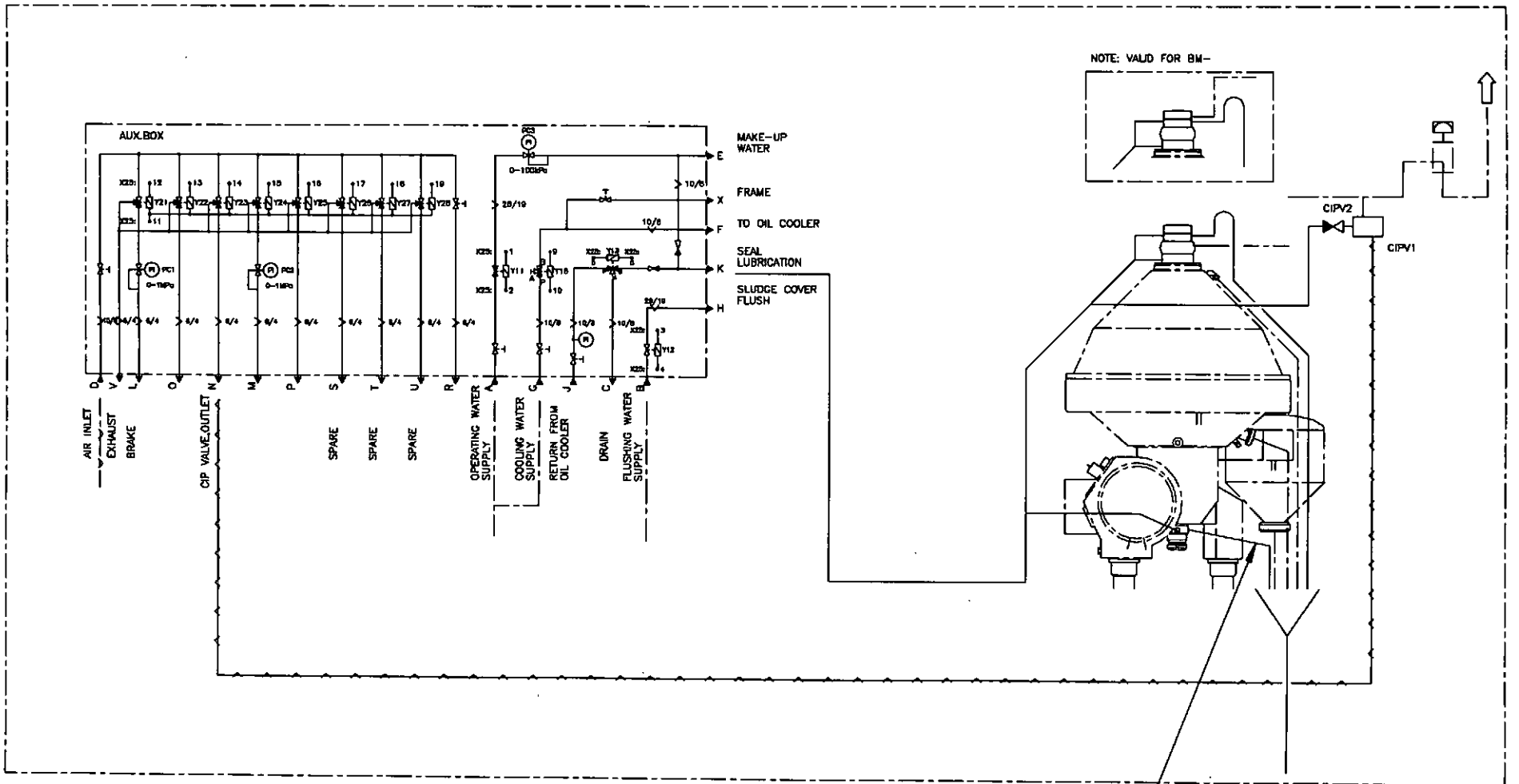
C		TEXT "NOTE: VALID FOR BM-" ADDED	990419	
REV.	QTY	DESCRIPTION	DATE	SIGN.

FLUSH. ARR. AXIAL SEALS
TWO PHASE OUTLET
FRONT VIEW
MACHINERY LAYOUT

Alfa Laval
LUND Sweden

MAN REV	ORIGINAL
	ACAD
ARCHIVE 1146030 Date:990419	CAD REV
	C

SCALE	DEPT.	DRAWN	CHECKED	APPR.	DATE	DRAWING NO	PAGE
1:10(A2)	SID	CHM			940518	32310-1146	3(4)



REV.	QTY	DESCRIPTION	DATE	ICON
C		TEXT "NOTE: VALID FOR BM-" ADDED	990419	

FLOWCHART
FLUSHING AXIAL SEALS
TWO PHASE OUTLET
FLOWCHART

Alfa Laval

SCALE	DEPT.	DRAWN	CHECKED	APPR.	DATE	DRAWING NO.	SHEET
-(A1)	SID	CHM			941031	32310-1146	4(4)

ORIGINAL ACAD
CAD REV C

POS	QTY.		PART NO./DWG	DENOMINATION	TYPE/DATA	REMARK
	1		32310-0443-1	THREAD SEAL FOR ALL COUPLINGS	LOCTITE 275	
CIPV1	1		32310-0427-1	CIP VALVE ASSEMBLY	LKAPS-V,DN25	CIP VALVE
	1		32310-0438-1	REDUCING CONN. NUT	Ø25/10	
CIPV2	1		31341-0160-1	NON RETURN VALVE	ALFA	CIP VALVE
K1A	0,2	m	32310-0163-4	PIPE (CONN. TO AUX.BOX)	Ø10x1.0 SANDVIK 3R60	SEAL LUBRICATION
	1		31801-8302-1	MALE THREAD COUPL.	GE10-LR 1/4"	
	1		31801-8303-1	TEE (CONN. TO CIP1B AND K1B)	T 10-L	
K1B	2	m	32310-0163-4	PIPE (CONN. TO K1A)	Ø10x1.0 SANDVIK 3R60	
	1		31801-8303-1	TEE (CONN. TO K2A AND K1C)	T 10-L	
K1C	1		32310-0436-1	HOSE ARM. PTFE (CONN. TO SEP. BOTTOM)	Ø10 TEXAN	
	1		32310-0441-1	BANJO COUPL.-MALE THREAD	DSVWE10-LR 1/8"	
K2A	2	m	32310-0163-4	PIPE (CONN. TO K1B AND DR4B)	Ø10x1.0 SANDVIK 3R60	SEAL LUBRICATION
K2B	1,3	m	32310-0163-4	PIPE (CONN. TO DR4B)	Ø10x1.0 SANDVIK 3R60	
	1		31801-8303-1	TEE (CONN. TO K2C AND K2D)	T 10-L	
K2C	0,3	m	32310-0163-4	PIPE (CONN. TO K2B AND TO SEP. TOP)	Ø10x1.0 SANDVIK 3R60	
	1		31801-8302-1	MALE THREAD COUPL.	GE10-LR 1/4"	
	1		31801-8309-1	REDUCING BUSH	R I 1/4"-1/8"	
K2D	0,4	m	32310-0163-4	PIPE (CONN. TO K2B AND TO SEP. TOP)	Ø10x1.0 SANDVIK 3R60	
	1		31801-8302-1	MALE THREAD COUPL.	GE10-LR 1/4"	
	1		31801-8309-1	REDUCING BUSH	R I 1/4"-1/8"	

Dept	Appr.	Checked	Drawn	Date	Title	Rev	Archive	Date	Specification No.	Page
SID			CHM	940222	FLUSHING ARR. FOR AXIALS SEALS. TWO PHASE OUTLET	B	1146102B	950915	32310-1146-1	1/2

POS	QTY.		PART NO./DWG	DENOMINATION	TYPE/DATA	REMARK
CIP1A	0,05	m	32310-0163-4	PIPE (CONN. TO CIPV1)	Ø10x1.0 SANDVIK 3R60	CIP
CIP1B	2,6	m	32310-0163-4	PIPE (CONN. TO K1A)	Ø10x1.0 SANDVIK 3R60	
N1A	2,9	m	1995-101-048	AIR HOSE	6/4	AIR TO CIP VALVE
	1		31801-5158-1	BEND	R4-6	
	1		31801-5158-3	MALE THREAD COUPL.	R6-6-1/8"	
DR4A	1,2	m	32310-0163-4	PIPE (CONN. TO SEP. TOP AND DR4B)	Ø10x1.0 SANDVIK 3R60	DRAIN
	1		31801-8302-1	MALE THREAD COUPL.	GE10-LR 1/4"	
	1		31801-8309-1	REDUCING BUSH	R I 1/4"-1/8"	
DR4B	1		32310-0430-1	SEPARATOR PIPE SUPPORT		
DR4C	1,3	m	32310-0163-4	PIPE (CONN. TO DR4B)	Ø10x1.0 SANDVIK 3R60	
DR4D	0,1	m	1995-101-056	HOSE ARM. PVC (CONN. TO DRAIN FUNNEL)	Ø16/10 TYPE 1046	

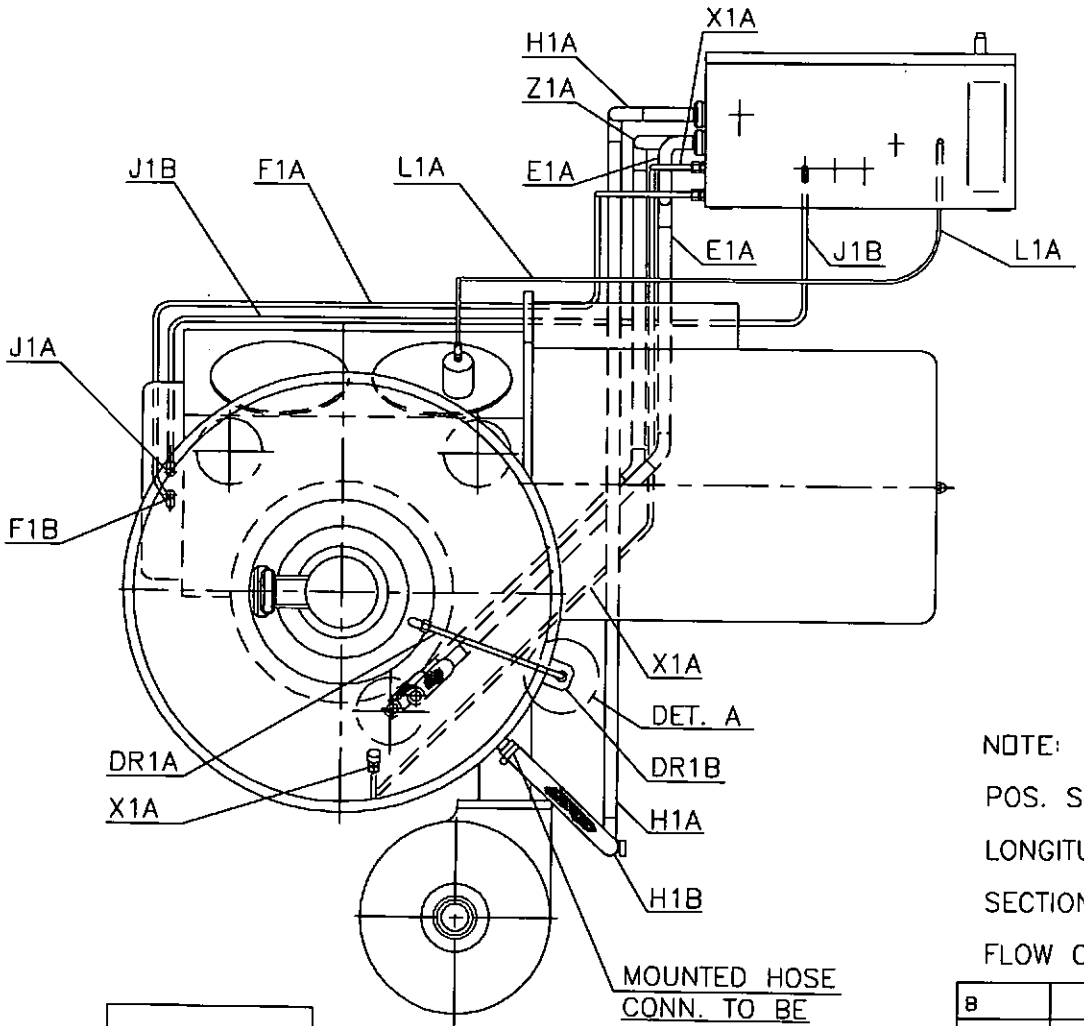
Dept		Appr.	Checked	Drawn	Date	Title	Rev	Archive	Date	Specification No.	Page
SID				CHM	940222	FLUSHING ARR. FOR AXIALS SEALS. TWO PHASE OUTLET	B	1146102B	950915	32310-1146-1	2/2

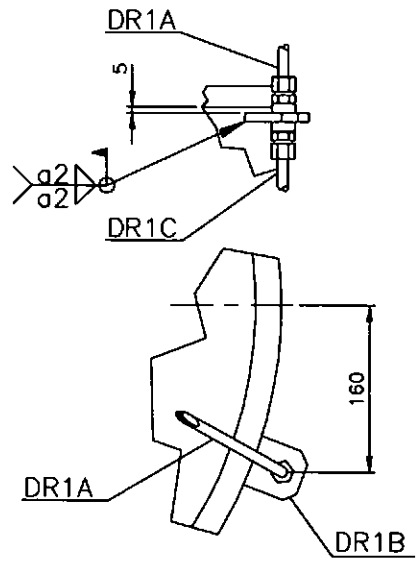
POS	QTY.		PART NO./DWG	DENOMINATION	TYPE/DATA	REMARK
1	1		32310-0475-1	**CONN. DETAILS**		
2				**PIPE ,CONTAINING FOLLOWING**		
	10	m	32310-0163-4	PIPE	Ø10x1.0 SANDVIK 3R60 SEAMLESS	5x2 m
	8	m	1535-158-072	PIPE	Ø25x1.2 AISI 304	4x2 m

Dept	Appr.	Checked	Drawn	Date	Title	Rev	Archive	Date	Specification No.	Page
SID			CHM	970321	ASSEMBLING-LIST CONN. SET CONN. SET SCS 92 B	A	0474101A	970321	32310-0474-1	1/1

POS	QTY.		PART NO./DWG	DENOMINATION	TYPE/DATA	REMARK
1				**BOX, CONTAINING FOLLOWING**	L x W x H	
	3		190613	NUT	Ø25	
	3		190704	WELDING LINER	Ø25	
	8		190683	BEND 90 DEG	Ø25	
	2		9611-30-0809	BEND 45 DEG	Ø25	
	1		191570	HOSE CONN. STRAIGHT	Ø25	
	2		191596	HOSE CONN. BEND	Ø25	
	2		190601	SEAL RING	Ø25 NITRILE	
	3		31801-8302-1	MALE THREAD COUPL.	GE10-LR 1/4 A	
	1		31801-8307-1	MALE THREAD COUPL.	GE10-LR 3/8 A	
	1		31801-8308-1	BEND, MALE THREAD COUPL.	WE10-LR 3/8 A	
	3		31801-8301-1	STRAIGHT JOINT COUPLING	G10-L	
	2	m	1995-101-057	HOSE ARMOURED PVC	Ø34/25 TYPE 1046	
	0,4	m	1995-101-056	HOSE ARMOURED PVC	Ø16/10 TYPE 1046	
	6		42174	HOSE CLAMP	26-38 TYPE 2024	
	4		2245102-04	HOSE CLAMP	11-17 TYPE 2024	
	1		32310-0443-1	THREAD SEAL FOR ALL COUPLINGS	LOCTITE 275	
	1		32310-0432-1	SEPARATOR PIPE SUPPORT		COMPLETE
	1		32310-0440-1	HOSE CONN. Ø34/25-ISO G 3/4 A		COMPLETE
	15	m	1995-101-048	AIR HOSE	6/4	
	1		31801-5158-1	BEND	R4-6	
	1		31801-5158-3	MALE THREAD COUPL.	R6-6-1/8"	
2				**INSTALLATION DRAWINGS:**		
			32310-1150	CONN. SET FOR SCS 92 B		
			32310-1150-1	SPEC.		
			32310-0475-1	DETAIL LIST FOR CONN. SET CONN. SET SCS 92 B		

Dept	Appr.	Checked	Drawn	Date	Title DETAIL LIST FOR CONN. SET CONN. SET SCS 92 B	Rev	Archive	Date	Specification No.	Page
SID			CHM	970321		D	0475101D	990208	32310-0475-1	1/1





DETAIL A

SCALE 1:5

NOTE:

POS. SEE SPECIFICATION 32310-1150-1

LONGITUDINAL VIEW SEE PAGE 2

SECTIONAL VIEW SEE PAGE 3

FLOW CHART SEE PAGE 4

VALID FOR
MRPX 610

REV.	QTY	DESCRIPTION	DATE	SIGN.
B		BRAKE HOSE, L1A, ADDED	990209	

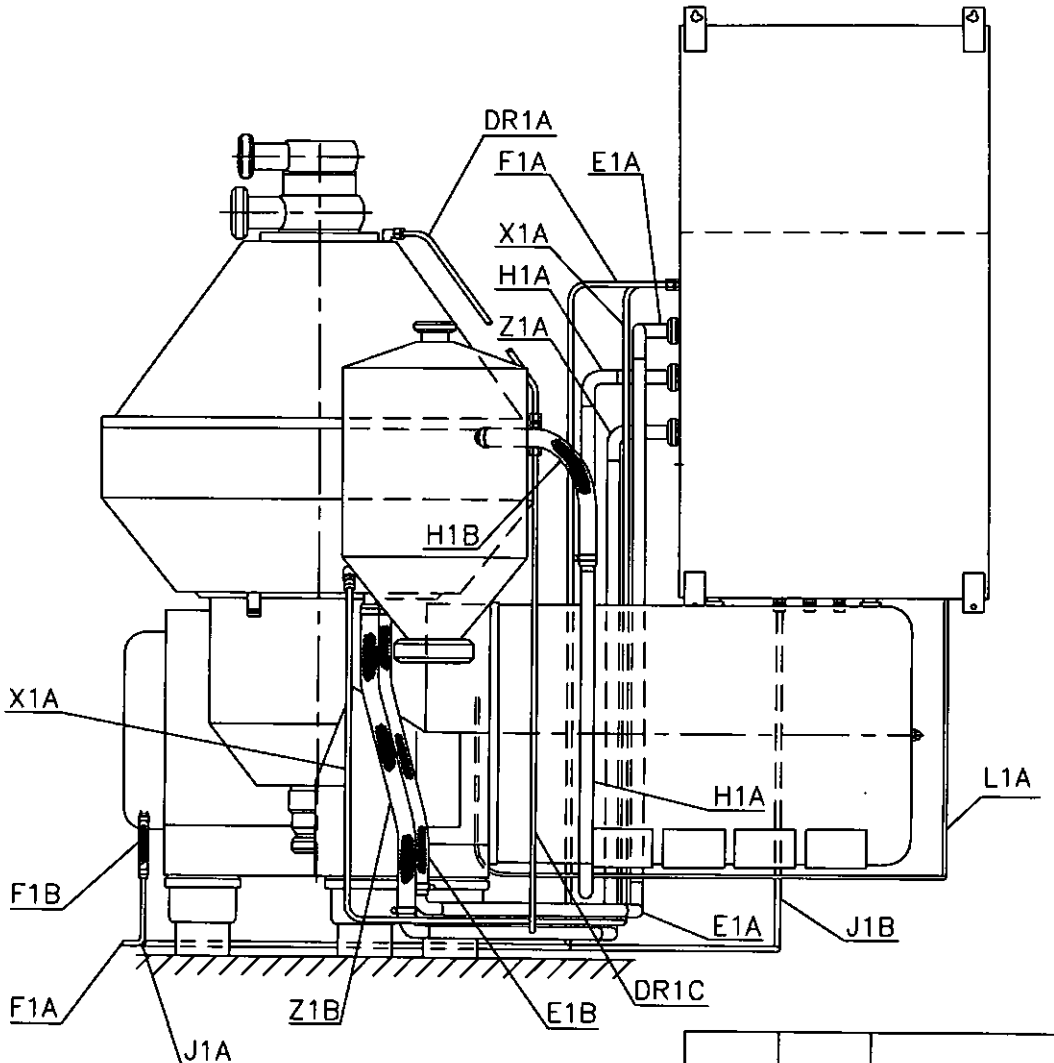
CONNECTION SET SCS 92B

PLAN VIEW
MACHINERY LAYOUT

Alfa Laval
LUND Sweden

MAN REV	ORIGINAL
	ACAD
ARCHIVE 115001B Date:990209	CAD REV B

SCALE	DEPT.	DRAWN	CHECKED	APPR.	DATE	DRAWING NO	PAGE
1:10(A3)	SID	CHM			950228	32310-1150	1(4)



REV.	QTY	DESCRIPTION	DATE	SIGN.

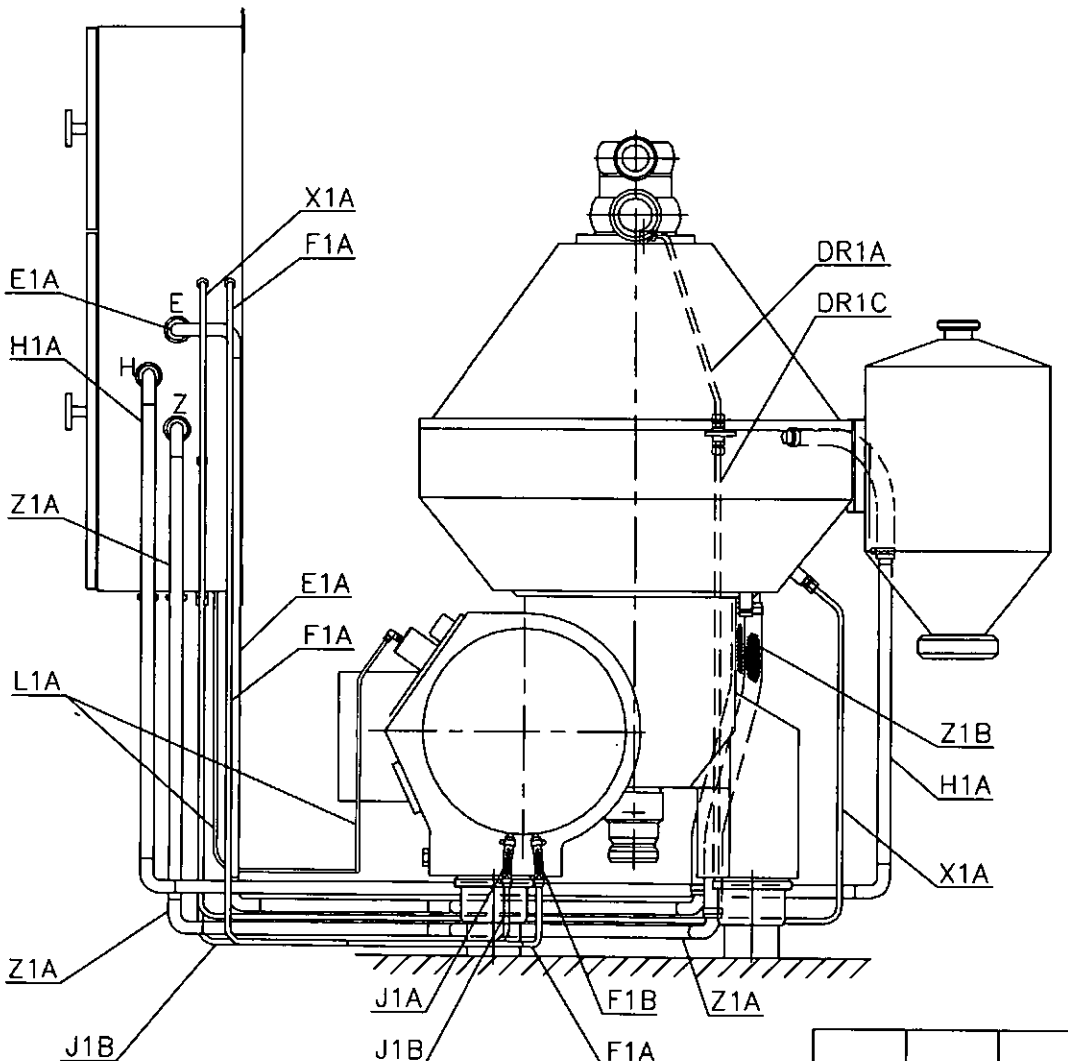
CONNECTION SET SCS 92B

LONGITUDINAL VIEW
MACHINERY LAYOUT

Alfa Laval
LUND Sweden

MAN REV	ORIGINAL
	ACAD
ARCHIVE 115002B Date:990209	CAD REV
	B

SCALE	DEPT.	DRAWN	CHECKED	APPR.	DATE	DRAWING NO	PAGE
1:10(A3)	SID	CHM			950228	32310-1150	2(4)



REV.	QTY	DESCRIPTION	DATE	SIGN.

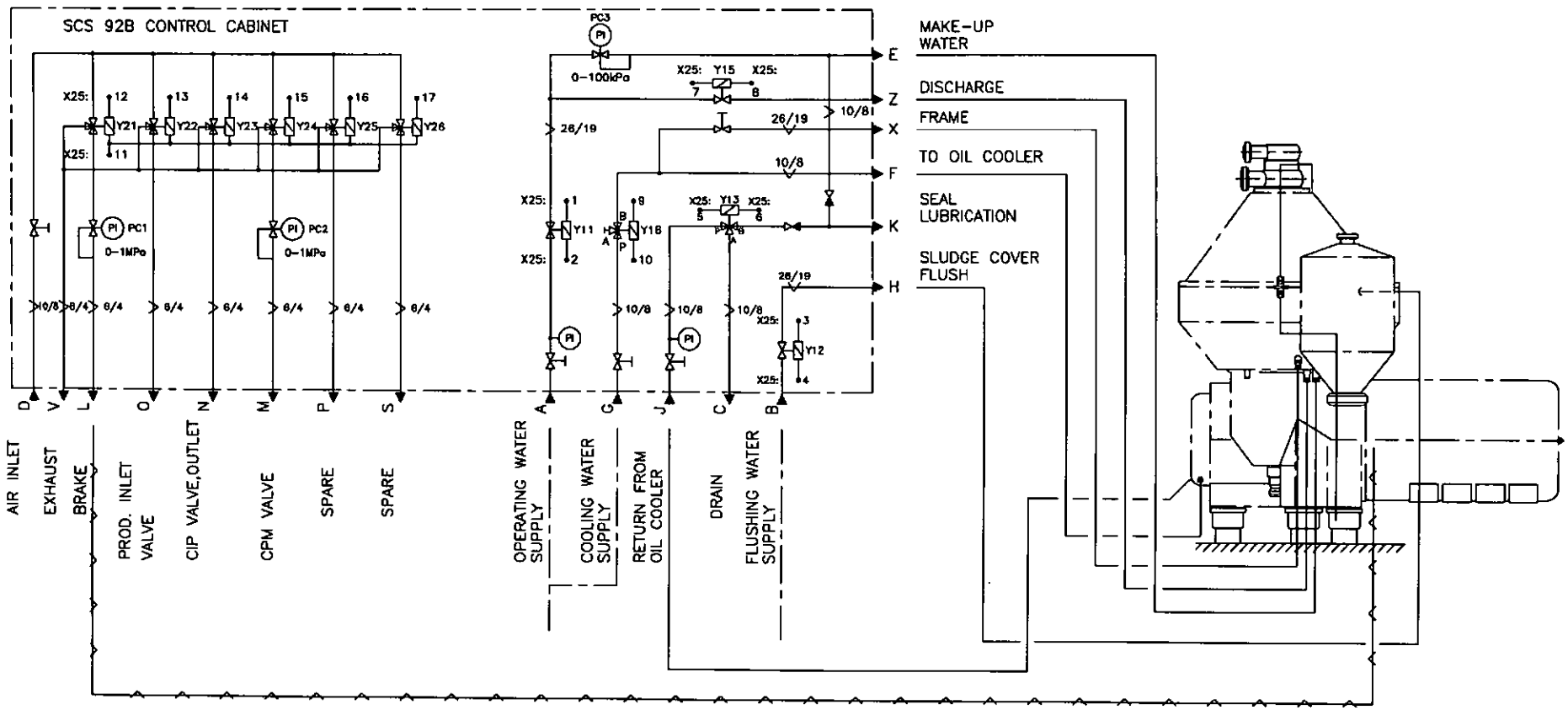
CONNECTION SET SCS 92B

SECTIONAL VIEW
MACHINERY LAYOUT

Alfa Laval
LUND Sweden

MAN REV	ORIGINAL
	ACAD
ARCHIVE 115003B Date:9990209	CAD REV
	B

SCALE	DEPT.	DRAWN	CHECKED	APPR.	DATE	DRAWING NO	PAGE
1:10(A3)	SID	CHM			950302	32310-1150	3(4)



REV.	QTY	DESCRIPTION	DATE	SIGN.
			MAN REV	ORIGINAL ACAD
FLOWCHART CONN. SET SCS 92B		Alfa Laval LUND Sweden	ARCHIVE 1150048	CAD REV B
FLOWCHART				

SCALE	DEPT.	DRAWN	CHECKED	APPR.	DATE	DRAWING NO	PAGE
-(A2)	SID	CHN			950228	32310-1150	4(4)

POS	QTY.		PART NO./DWG	DENOMINATION	TYPE/DATA	REMARK
	1		32310-0443-1	THREAD SEAL FOR ALL COUPLINGS	LOCTITE 275	
E1A	2,5	m	1535-158-072	PIPE (CONN. TO AUX.BOX)	Ø25x1.2	MAKE-UP WATER
	1		190613	NUT	Ø25	
	1		190704	WELDING LINER	Ø25	
	3		190683	BEND 90 DEG	Ø25	
	1		9611-30-0809	BEND 45 DEG	Ø25	
	1		191596	HOSE CONN. BEND	Ø25	
	1		190601	SEAL RING	Ø25 NITRILE	
E1B	0,7	m	1995-101-057	HOSE ARM. PVC (CONN. TO SEP. (376))	Ø34/25 TYPE 1046	
	2		42174	HOSE CLAMP	26-38 TYPE 2024	
F1A	3,3	m	32310-0163-4	PIPE (CONN. TO AUX.BOX)	Ø10x1.0 SANDVIK 3R60	TO OIL COOLER
	1		31801-8302-1	MALE THREAD COUPL.	GE10-LR 1/4"	
F1B	0,2	m	1995-101-056	HOSE ARM. PVC (CONN. TO SEP.)	Ø16/10 TYPE 1046	
	2		2245102-04	HOSE CLAMP	11-17 TYPE 2024	
H1A	3	m	1535-158-072	PIPE (CONN. TO AUX.BOX)	Ø25x1.2	SLUDGE COVER FL.
	1		190613	NUT	Ø25	
	1		190704	WELDING LINER	Ø25	
	3		190683	BEND 90 DEG	Ø25	
	1		191570	HOSE CONN. STRAIGHT	Ø25	
	1		190601	SEAL RING	Ø25 NITRILE	
H1B	0,5	m	1995-101-057	HOSE ARM. PVC (CONN. TO SEP. (304))	Ø34/25 TYPE 1046	
	2		42174	HOSE CLAMP	26-38 TYPE 2024	
	1		32310-0440-1	HOSE CONN.	Ø34/25-ISO G 3/4 A	

Dept	Appr.	Checked	Drawn	Date	Title	Rev	Archive	Date	Specification No.	Page
SID			CHM	950109	CONNECTION SET SCS 92B	C	1150102C	990209	32310-1150-1	1/2

POS	QTY.		PART NO./DWG	DENOMINATION	TYPE/DATA	REMARK
J1A	0,2	m	1995-101-056	HOSE ARM. PVC (CONN. TO SEP.)	Ø16/10 TYPE 1046	FR. OIL COOLER
	2		2245102-04	HOSE CLAMP	11-17 TYPE 2024	
J1B	3	m	32310-0163-4	PIPE (CONN. TO AUX.BOX)	Ø10x1.0 SANDVIK 3R60	
	1		31801-8302-1	MALE THREAD COUPL.	GE10-LR 1/4"	
X1A	4,0	m	32310-0163-4	PIPE (CONN. TO AUX.BOX)	Ø10x1.0 SANDVIK 3R60	TO FRAME
	1		31801-8302-1	MALE THREAD COUPL.	GE10-LR 1/4"	
	1		31801-8307-1	MALE THREAD COUPL.(CONN. TO SEP.)	GE10-LR 3/8"	
Z1A	2,2	m	1535-158-072	PIPE (CONN. TO AUX.BOX)	Ø25x1.2	DISCHARGE
	1		190613	NUT	Ø25	
	1		190704	WELDING LINER	Ø25	
	2		190683	BEND 90 DEG	Ø25	
	1		9611-30-0809	BEND 45 DEG	Ø25	
	1		191596	HOSE CONN. BEND	Ø25	
	1		190601	SEAL RING	Ø25 NITRILE	
Z1B	0,7	m	1995-101-057	HOSE ARM. PVC (CONN. TO SEP. (372))	Ø34/25 TYPE 1046	
	2		42174	HOSE CLAMP	26-38 TYPE 2024	
DR1A	0,6	m	32310-0163-4	PIPE (CONN. TO SEP. TOP (406))	Ø10x1.0 SANDVIK 3R60	DRAIN
	1		31801-8308-1	BEND, MALE THREAD COUPL.	WE10-LR 3/8"	
DR1B	1		32310-0432-1	SEPARATOR PIPE SUPPORT		
DR1C	1,0	m	32310-0163-4	PIPE	Ø10x1.0 SANDVIK 3R60	
L1A	15	m	1995-101-048	HOSE	6/4	AIR TO BRAKE
	1		31801-5158-1	BEND	R4-6	
	1		31801-5158-3	MALE THREAD COUPL.	R6-6-1/8"	

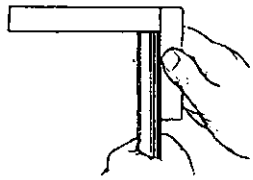
Dept	Appr.	Checked	Drawn	Date	Title	Rev	Archive	Date	Specification No.	Page
SID			CHM	950109	CONNECTION SET SCS 92B	C	1150102C	990209	32310-1150-1	2/2

Tetra Pak

General information and description of function of screwed pipe connections

The screwed pipe connections are based on screwed connections according to DIN 2353 with bore hole shape W DIN 3861 (24° cone) and the corresponding connection pieces, these elements are used as standard components. The screwed connection types described in the following all represent functional, tight connections between connection piece and pipe. The selection described must be adapted to the specific technical requirements. When the same connection pieces are used, the various pH systems can be exchanged on the connection side.

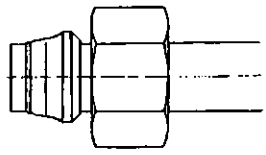
Preparation of pipes



1. Saw off the pipe at a right angle. Deviation of angle to pipe axis of up to ½° is permissible. **Do not use a pipe cutter!**

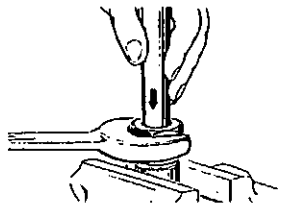
2. Lightly deburr pipe on the inside and outside of the cut edges. Bevel angles of up to 0,2 x 45° is permissible. Remove chips and particles.

Assembly of cutting ring screw connection



1. Lightly grease the threads of the union nut, thread and cone of the pre-assembly connection piece and cutting ring, using, for example anti-seize agent "Gleitmo 810" or Weicon High-Tech-Paste ASW 040 P.

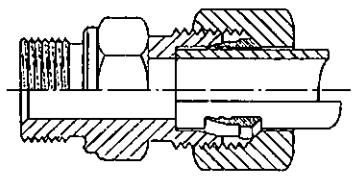
2. Slide union nut onto the pipe. Ensure that the cutting ring is positioned correctly.



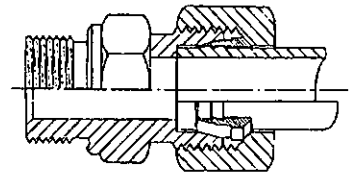
3. Screw the union nut onto the pre-assembly connection piece as far as possible by hand. At the same time press the pipe against the stop. As soon as the cutting ring has cut into the pipe, the tightening moment will increase noticeably.

   Tighten union nut using a wrench by approximately 1 revolution!

   Important: Do not turn the pipe with the nut!



Before the nut is tightened



After the nut is tightened

9. Other components

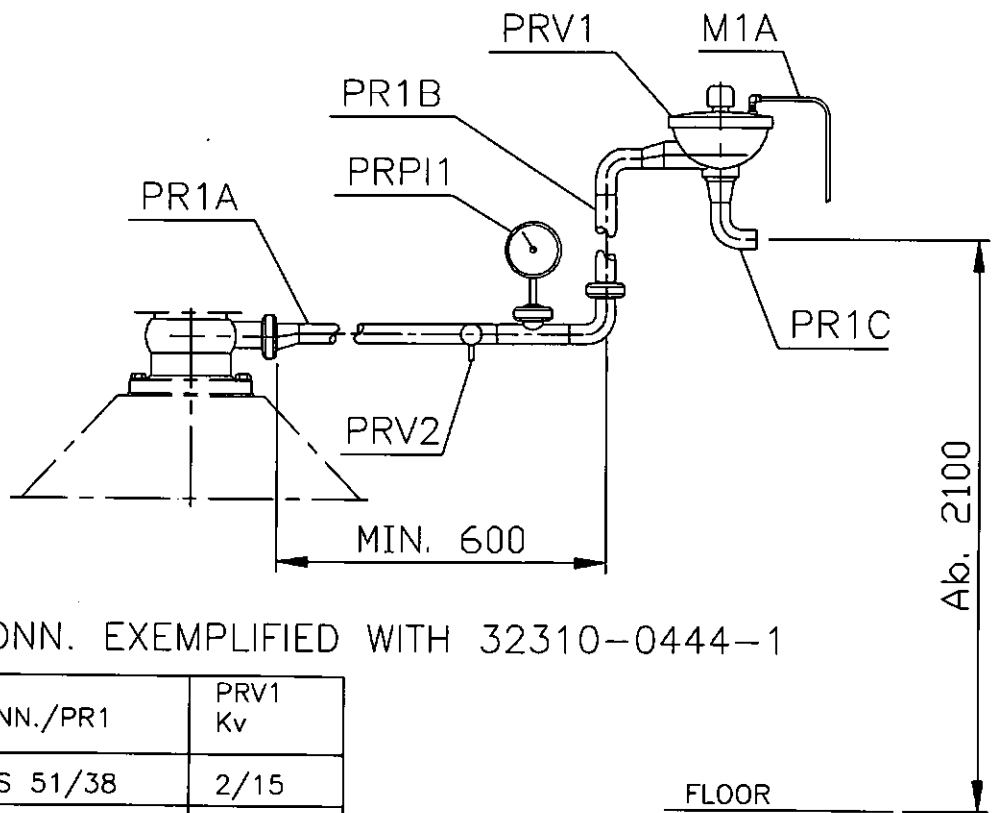
This page intentionally left blank

POS	QTY.	PART NO./DWG	DENOMINATION	TYPE/DATA	REMARK
1	1	32310-0487-6	**CONN. DETAILS**		
2			**PIPE, CONTAINING FOLLOWING**		
	2,0 m	1535-158-136	PIPE	Ø51x1.2 AISI 304	1x2 m

Dept	Appr.	Checked	Drawn	Date	Title	Rev	Archive	Date	Specification No.	Page
SID			CHM	970321	ASSEMBLING-LIST CONST. PRESS. UNIT.	A	0486601A	970321	32310-0486-6	1/1

POS	QTY.	PART NO./DWG	DENOMINATION	TYPE/DATA	REMARK
1			**BOX, CONTAINING FOLLOWING**	L x W x H	
	1	9612-3055-01	CONSTANT PRESSURE VALVE. Kv 23	TYPE CPMI-2, Ø51	PRV1
	1	31350-0020-1	SAMPLING COCK	TYPE 20	PRV2
	1	32229-4061-1	THERMOMETER BOSS		
	1	32249-0018-1	SEAL RING		
	1	31317-0896-5	ECCENTRIC REDUCER	Ø63.5 / 51	
	1	190617	NUT	Ø63.5	
	1	190708	WELDING LINER	Ø63.5	
	1	190605	SEAL RING	Ø63.5 NITRILE	
	1	190616	NUT	Ø51	
	1	190707	WELDING LINER	Ø51	
	1	190714	WELDING MALE PART	Ø51	
	3	31319-0218-1	BEND 90 DEG	Ø51	
	1	190604	SEAL RING	Ø51 NITRILE	
	10,0 m	1995-101-048	AIR HOSE	6/4	
	1	31801-5158-1	BEND	R4-6	
	1	31801-5158-4	MALE THREAD COUPL.	R6-6-1/4"	
	1	32310-0397-5	PRESSURE GAUGE WITH CONNECTION		PRPI1
2			**INSTALLATION DRAWINGS:**		
		32310-0444	CONST. PRESS. UNIT.		
		32310-0444-6	SPEC.		
		32310-0487-6	DETAIL LIST FOR CONN. SET CONST. PRESS. UNIT.		

Dept	Appr.	Checked	Drawn	Date	Title	Rev	Archive	Date	Specification No.	Page
SID			CHM	970321	DETAIL LIST FOR CONN. SET CONST. PRESS. UNIT.	A	0487601A	970321	32310-0487-6	1/1

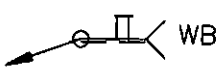


CONN. EXEMPLIFIED WITH 32310-0444-1

SPECIFICATION	CONN./PR1	PRV1 Kv
32310-0444-1	SMS 51/38	2/15
32310-0444-2	SMS 51/38	23
32310-0444-3	SMS 51/51	23
32310-0444-4	SMS 51/63.5	23
32310-0444-5	SMS 51/76.1	23
32310-0444-6	SMS 63.5/51	23
32310-0444-7	SMS 63.5/63.5	23
32310-0444-8	SMS 63.5/76.1	23
32310-0444-9	SMS 76.1/51	23

NOTE:

POS. SEE SPECIFICATION 32310-0444-X

WELD  WB

REV.	QTY	DESCRIPTION	DATE	SIGN.
C		SPECIFICATIONS ADDED	970522	

CONSTANT PRESSURE UNIT

MACHINERY LAYOUT

Alfa Laval LUND Sweden

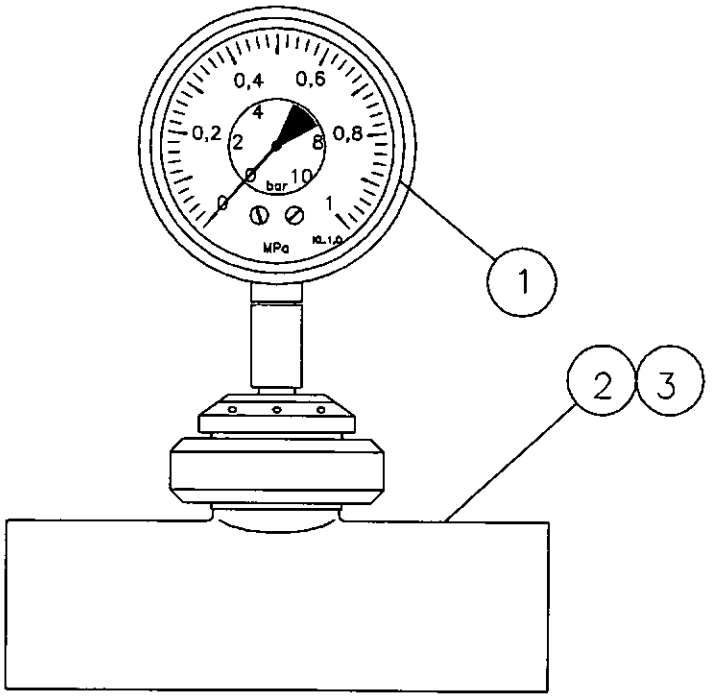
MAN REV	ORIGINAL
	ACAD
ARCHIVE 044401C Date:970522	CAD REV C

SCALE	DEPT.	DRAWN	CHECKED	APPR.	DATE	DRAWING NO	PAGE
1:10(A3)	SID	CHM			950202	32310-0444	

POS	QTY.		PART NO./DWG	DENOMINATION	TYPE/DATA	REMARK
PRV1	1		9612-3055-01	CONSTANT PRESSURE VALVE. Kv 23	TYPE CPMI-2, Ø51	PRODUCT OUTLET
PRV2	1		31350-0020-1	SAMPLING COCK	TYPE 20	PRODUCT OUTLET
	1		32229-4061-1	THERMOMETER BOSS		
	1		32249-0018-1	SEAL RING		
PRPI1	1		32310-0397-5	PRESSURE GAUGE WITH CONNECTION	0-10 BAR	PRODUCT OUTLET
PR1A	1,0	m	1535-158-136	PIPE	Ø51x1.2, AISI 304	PRODUCT OUTLET
	1		31317-0896-5	ECCENTRIC REDUCER	Ø63.5 / 51	
	1		190617	NUT	Ø63.5	
	1		190708	WELDING LINER	Ø63.5	
	1		190605	SEAL RING	Ø63.5 NITRILE	
			32310-0397-5	TEE (CONN. TO PRPI1)	Ø51 / 38	
	1		31319-0218-1	BEND 90 DEG	Ø51	
	1		190616	NUT	Ø51	
	1		190707	WELDING LINER	Ø51	
PR1B	1,0	m	1535-158-136	PIPE	Ø51x1.2, AISI 304	
	1		190714	WELDING MALE PART	Ø51	
	1		31319-0218-1	BEND 90 DEG	Ø51	
	1		190604	SEAL RING	Ø51 NITRILE	
PR1C	1		31319-0218-1	BEND 90 DEG	Ø51	
M1A	10,0	m	1995-101-048	AIR HOSE	6/4	AIR TO PRV1
	1		31801-5158-1	BEND	R4-6	
	1		31801-5158-4	MALE THREAD COUPL.	R6-6-1/4"	

Dept	Appr.	Checked	Drawn	Date	Title	Rev	Archive	Date	Specification No.	Page
SID			CHM	950201	CONSTANT PRESSURE UNIT.	A	0444601A	970602	32310-0444-6	1/1

Pressure Gauge For Vertical Mounting	
Dimension	Article Number
38,0 mm	32310-0397-4
51,0 mm	32310-0397-5
63,5 mm	32310-0397-1
76,0 mm	32310-0397-2
101,6 mm	32310-0397-3
25,0 mm	32310-0397-6



NOTE:

POS. SEE SPECIFICATION 32310-0397-X

REV.	QTY	DESCRIPTION	DATE	SIGN.
D		ART. 32310-0397-6 ADDED	970822	

PRESSURE GAUGE WITH CONNECTION

MACHINERY LAYOUT

Alfa Laval
LUND Sweden

MAN REV	ORIGINAL
	ACAD
ARCHIVE 039701D Date:970822	CAD REV D

SCALE	DEPT.	DRAWN	CHECKED	APPR.	DATE	DRAWING NO	PAGE
-(A4)	SID	CHM			950209	32310-0397	

POS	QTY.	PART NO./DWG	DENOMINATION	TYPE/DATA	REMARK
1	1	31801-5580-1	PRESSURE GAUGE	0-10 BAR	
2	1	32310-0492-2	TEE FOR PRESS. GAUGE	Ø51 / 38	
3	1	190603	SEAL RING	Ø38 NITRILE	

Dept	Appr.	Checked	Drawn	Date	Title	Rev	Archive	Date	Specification No.	Page
SID			CHM	950202	PRESSURE CONNECTION WITH CONNECTION	B	03975018	970326	32310-0397-5	1/1

Maintenance & Spare Parts

Constant-pressure modulating valve

(Alfa Laval)

CPM-2

1.0 41264-01.FRO

Tetra Pak

Doc No. 1241264-01

Constant-pressure modulating valve

CPM-2

Article No.	Type	Kv (m^3/h)	Connection
6-31801-9661-1	CPMI-2	2/15	W 51
6-31801-9661-2	CPMI-2	23	W 51
6-9612-3055-01	CPMI-2	23	W 51
6-9612-3055-02	CPMO-2	23	W 51
6-9612-3055-03	CPMI-2	2/15	W 51
6-9612-3055-04	CPMO-2	2/15	W 51
6-9612-3055-17	CPMI-2	7	W 51
6-9612-3055-19	CPMI-2	7	W 50

1.0 41264-01.FRO

Version 01

Doc No. 1241264-01

Tetra Pak

Tetra Pak Processing Systems AB

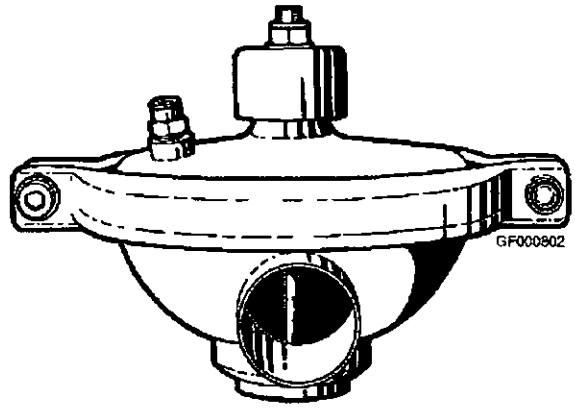
This page intentionally left blank

Maintenance

Constant-pressure modulating valve

General

CPMI-2 and CPMO-2 are sanitary constant-pressure valves for use in stainless steel pipe systems. The CPMI-2 (Constant-Pressure Modulating Inlet) maintains a constant pressure in the process line at the inlet side of the valve. CPMI-2 is often used after separators and heat exchangers or as an overflow valve. The CPMO-2 (Constant-Pressure Modulating Outlet) maintains a constant pressure in the process line at the outlet side of the valve. Typical applications are before filling/bottling machines etc.



2.2TF000606.EN

Change spare part kit

WARNING!

Risk of injury!
Make sure that the pipelines are drained and free from media before servicing the valve!
Never service the valve when it is hot!
Always disconnect compressed air before service!
The valve and the pipelines must **never** be pressurised when servicing the valve!

Disassemble

a) Loosen and remove clamp (4).

b) **CPMI-2:** Remove cover (5) together with the internal parts of the valve from the valve body (15).

c) Remove top nut (1), washer (2), and top (3) from the plug (14).

Note! In "d" ensure that the cover (5) is turned downwards and plug (14) is pulled upwards so that sectors (10) are not separated from the diaphragms (8,12).

d) **CPMI-2:** Remove plug (14) from the diaphragm unit and guide (7).
CPMO-2: Remove plug (14) from valve body (15), and remove cover (5) and internal parts of the valve.

e) Remove lower inner ring (11) and lower diaphragm (13).

f) Remove sectors (10).

g) Remove outer ring (12), upper inner ring (9), and upper diaphragm (8).

h) Remove guide (7) from cover (5).

i) Remove O-ring (6) from guide (7).

Reassemble

Change the parts of the spare part kit; the O-ring (6) and the diaphragms (8,13).

Lubricate the guide, the sectors, and the threads with food grade grease before reassembly.

a) Fit O-ring (6) on guide (7).

b) Fit lubricated guide (7) into cover (5).

Note! Turn cover (5) downwards before continuing, and make sure that the diaphragms are fitted correctly. One side of the lower diaphragm (which is in contact with the product) has a grey-blue colour. The flat side of the upper diaphragm should be fitted towards the cover.

c) Fit upper diaphragm (8), upper inner ring (9), and outer ring (12) on guide (7) and cover (5).

d) Fit sectors (10) between upper inner ring (9) and outer ring (12).

e) Fit lower inner ring (11) and lower diaphragm (13).

f) **CPMI-2:**Fit plug (14) in the diaphragm unit and guide (7) until the flange of the lug contacts the lower diaphragm (13).

2.2TF000606.EN

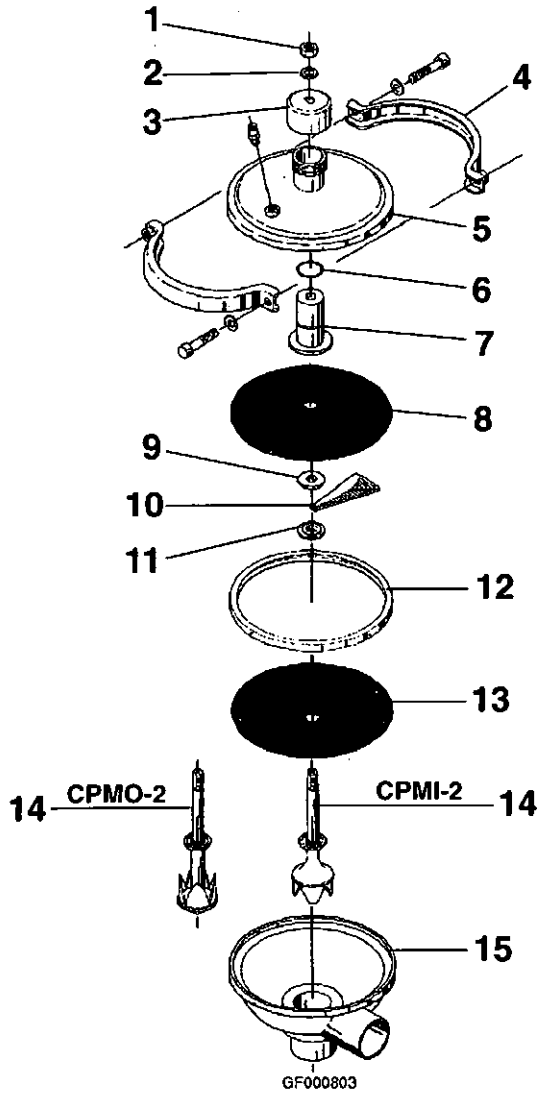
g) Fit valve body (15) in cover (5).

h) **CPMO-2**: Fit plug (14) through valve body (15) and in the diaphragm unit and guide (7) until the flange of the plug contacts the lower diaphragm (13).

i) Fit top (3), washer (2) an top nut (1) on plug (14).

j) Fit and tighten clamp (4) to a torque of 10-15 Nm.

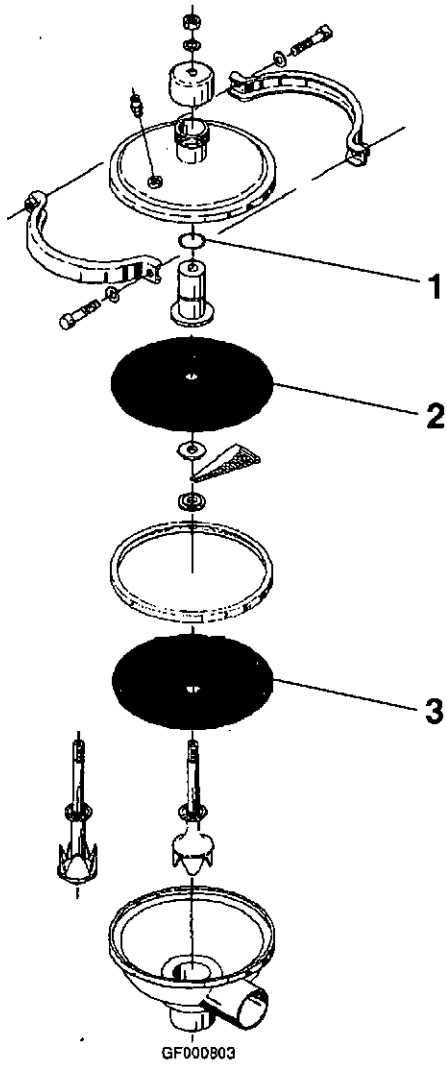
Note! **Pre-use check:** Lift and lower the valve top several times to ensure that the valve operates smoothly.



1 Top nut
2 Washer
3 Top
4 Clamp
5 Cover
6 O-ring
7 Guide
8 Upper diaphragm
9 Upper inner ring
10 Sector
11 Lower inner ring
12 Outer ring
13 Lower diaphragm
14 Plug
15 Body

2.2TF000606.EN

Spare parts



2.2TF000609.EN

Component article No.	Spare part article No.	Description	Included parts	Pos.	Qty.
6-9612-3055-01 6-9612-3055-02 6-9612-3055-03 6-9612-3055-04 6-9612-3055-17 6-9612-3055-19	6-9611-92-0218	Spare part kit	O-ring	1	1
			Upper diaphragm NBR	2	1
			Lower diaphragm EPDM/PTFE	3	1
6-31801-9661-1 6-31801-9661-2	6-0022-3406-49	Spare part	O-ring	1	1
	6-31356-0014-4	Spare part	Upper diaphragm EPDM/PTFE	2	1
	6-9612-3066-01	Spare part	Lower diaphragm EPDM/PTFE	3	1

This page intentionally left blank

2.2TF000609.EN

Tetra Pak

Maintenance & Spare Parts

Sampling valve
(LKM)
Type 20

1.0 11608-01.FRO

Tetra Pak

Doc No. 1211608-01

Sampling valve

Article No.	Connection	Gasket
6-31350-0020-1	G3/4"	NBR

1.0 11608-01.FRO

Version 01

Doc No. 1211608-01

Tetra Pak

Tetra Pak Processing Systems AB

This page intentionally left blank

Maintenance

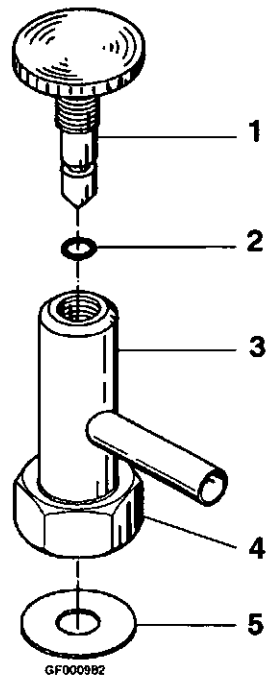
Change spare parts

WARNING!

Risk of injury!
Never service the valve when it is hot.
Make sure that the pipeline is drained and free from media before servicing the valve.
The valve and pipelines must **never** be pressurised when serviced.

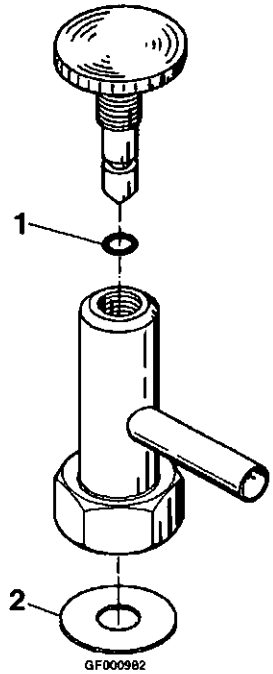
a) Unscrew nut (4) and remove the valve body (3) from the pipeline.
b) Remove packing (5).
c) Unscrew spindle (1) and remove O-ring (2).
d) Change the O-ring (2) and the packing (5).
e) Reassemble in reverse order.

2.2TF000726.EN



1 Spindle
2 O-ring
3 Valve body
4 Nut
5 Packing

Spare parts



2.2TF500679.EN

Component article No.	Spare part Article No.	Description	Pos.	Qty.
6-31350-0020-1	6-00223404-10	O-ring, NBR	1	1
	6-32249-0018-1	Packing	2	1

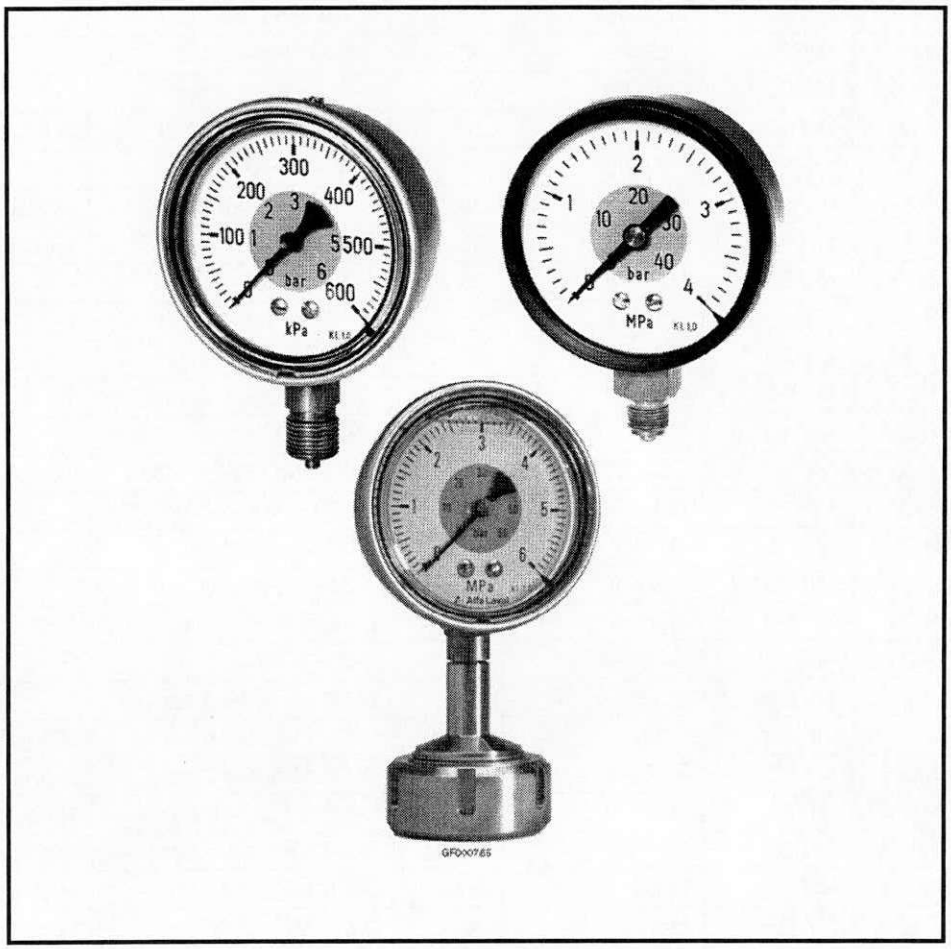
This page intentionally left blank

2.2TF500679.EN

Tetra Pak

Maintenance & Spare Parts

Pressure indicator
(Alfa Laval)



1.0 41172-01.fro

Tetra Pak

Doc No. 1241172-01

Pressure indicator

Article No.	Type	Connection	DN	Measuring range	Remark
6-00990018-02	MIP20	Rd60-6	38	0-1.6 MPa/0-16 bar	
6-00990018-04	MIP20	Rd70-6	51	0-1.0 Mpa/0-10 bar	
6-00990018-05	MIP20	Rd70-6	51	0-1.6 Mpa/0-16 bar	
6-00990018-07	MIP20	Rd60-6	38	0-600 kPa/0-6 bar	
6-00990018-08	MIP20	Rd60-6	38	0-400 kPa/0-4 bar	
6-00990018-09	MIP20	Rd60-6	38	-100-0 kPa/-1-0 bar	
6-00990018-10	MIP20	Rd70-6	51	-100-0 kPa/-1-0 bar	
6-00990018-11	MIP20	Rd60-6	38	0-600 kPa/0-6 bar	Horizontal
6-00990018-12	MIP20	Rd60-6	38	0-1.0 MPa/0-10 bar	Horizontal
6-00990018-13	MIP20	Rd60-6	38	0-1.0 MPa/0-10 bar	
6-00990018-14	MIP20	Rd70-6	51	0-1.0 MPa/0-10 bar	
6-00990018-16	MIP20	Rd60-6	38	0-2.5 Mpa/0-25 bar	
6-00990068-01	MIP10	G3/8"A	10	-100-0 kPa/-1-0 bar	
6-00990068-02	MIP10	G3/8"A	10	-100-150 kPa/-1-1.5 bar	
6-00990068-03	MIP10	G3/8"A	10	-100-500 kPa/-1-5 bar	
6-00990068-04	MIP10	G3/8"A	10	0-600 kPa/0-6 bar	
6-00990068-05	MIP10	G3/8"A	10	0-1 MPa/0-10 bar	
6-00990069-01	MIP20	G3/8"A	10	-100-0 kPa/-1-0 bar	
6-00990069-02	MIP20	G3/8"A	10	0-400 kPa/0-4 bar	
6-00990069-03	MIP20	G3/8"A	10	0-600 kPa/0-6 bar	
6-00990069-04	MIP20	G3/8"A	10	0-1.0 MPa/0-10 bar	
6-00990069-05	MIP20	G3/8"A	10	0-1.0 MPa/0-10 bar	Welded
6-31801-5580-1	MIP35	Rd60-6	38	0-1.0 MPa/0-10 bar	High pressure nut
6-31801-5580-2	MIP35	Rd60-6	38	0-1.6 MPa/0-16 bar	High pressure nut
6-31801-5580-3	MIP35	Rd60-6	38	0-2.5 MPa/0-25 bar	High pressure nut
6-31801-5580-4	MIP35	Rd60-6	38	0-4.0 MPa/0-40 bar	High pressure nut
6-31801-5580-5	MIP35	Rd60-6	38	0-6.0 MPa/0-60 bar	High pressure nut
6-31801-5580-6	MIP35	Rd60-6	38	0-8.0 MPa/0-80 bar	High pressure nut
6-31801-5973-1	MIP20	G3/8"A	10	0-16 bar (g)	

1.0 41172-01.fro

Issue 9802

Doc No. 1241172-01

Tetra Pak

Tetra Pak Processing Systems AB

This page intentionally left blank

Maintenance

General

The pressure indicator is well suited for high quality pressure measurement in practical service under severe conditions. The damping liquid ensures a stable reading and low wear of moving parts, particularly where high frequency pressure fluctuations and vibrations are present.

Check for leakage

Check if there is any leakage at the connection between the indicator and the pipeline. If there is, change the O-ring or sealing according to "Change O-ring / sealing".

Change O-ring / sealing

WARNING!

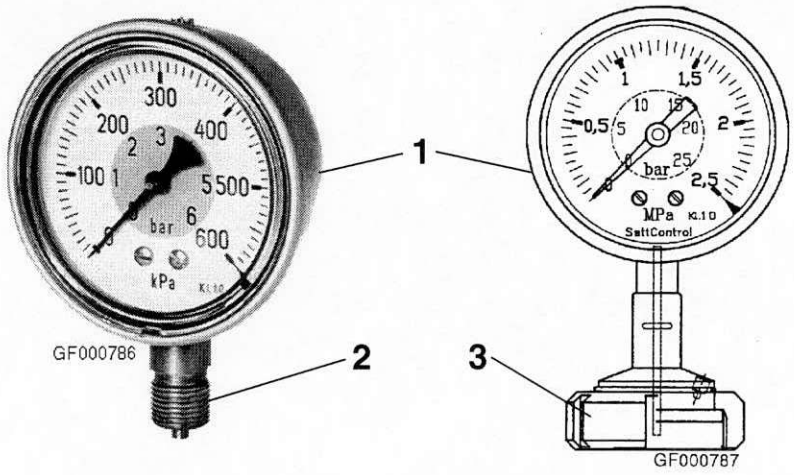
Risk of injury!
Make sure that the pipelines are drained and free from media before servicing the indicator!
Never service the indicator when it is hot!

a) Remove pressure indicator (1) from pipeline.

b) **MIP10/20:** Remove the remains of sealing tape or sealing compound from the threads (2) of the indicator (1).
MIP35: Remove O-ring (3).

c) **MIP10/20:** Fit sealing tape (Teflon tape or similar) or sealing compound (Loctite or similar) on the threads (2) of the indicator (1).
MIP35: Change O-ring (3) and fit new O-ring (3).

d) Fit the pressure indicator to the pipeline.



Change indicator

WARNING!

Risk of injury!
Make sure that the pipelines are drained and free from media before changing the indicator!
Never change the indicator when it is hot!

a) Remove pressure indicator (1) from pipeline.

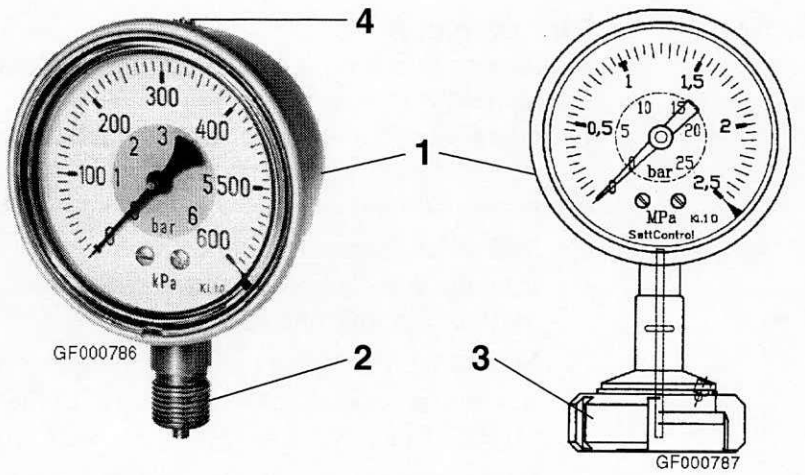
b) **MIP35:** Remove O-ring (3).

c) Change indicator (1).

d) If applicable, cut off the rubber cap (4) on top of the indicator.

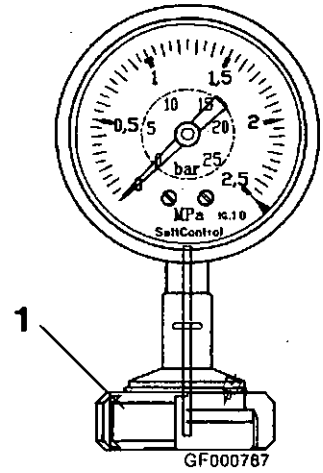
e) **MIP10/20:** Fit sealing tape (Teflon tape or similar) or sealing compound (Loctite or similar) on the threads (2) of the indicator (1).
MIP35: If needed, change O-ring (3) and fit new O-ring (3).

f) Fit the new pressure indicator to the pipeline.



2.2tf000607.en

Spare parts



Component article No.	Spare part article No.	Description	Pos	Qty
6-31801-5580-1 6-31801-5580-2 6-31801-5580-3 6-31801-5580-4 6-31801-5580-5 6-31801-5580-6	6-32101-0257-1	O-ring 40x5,3 EPDM	1	1

2.2ft000808.en

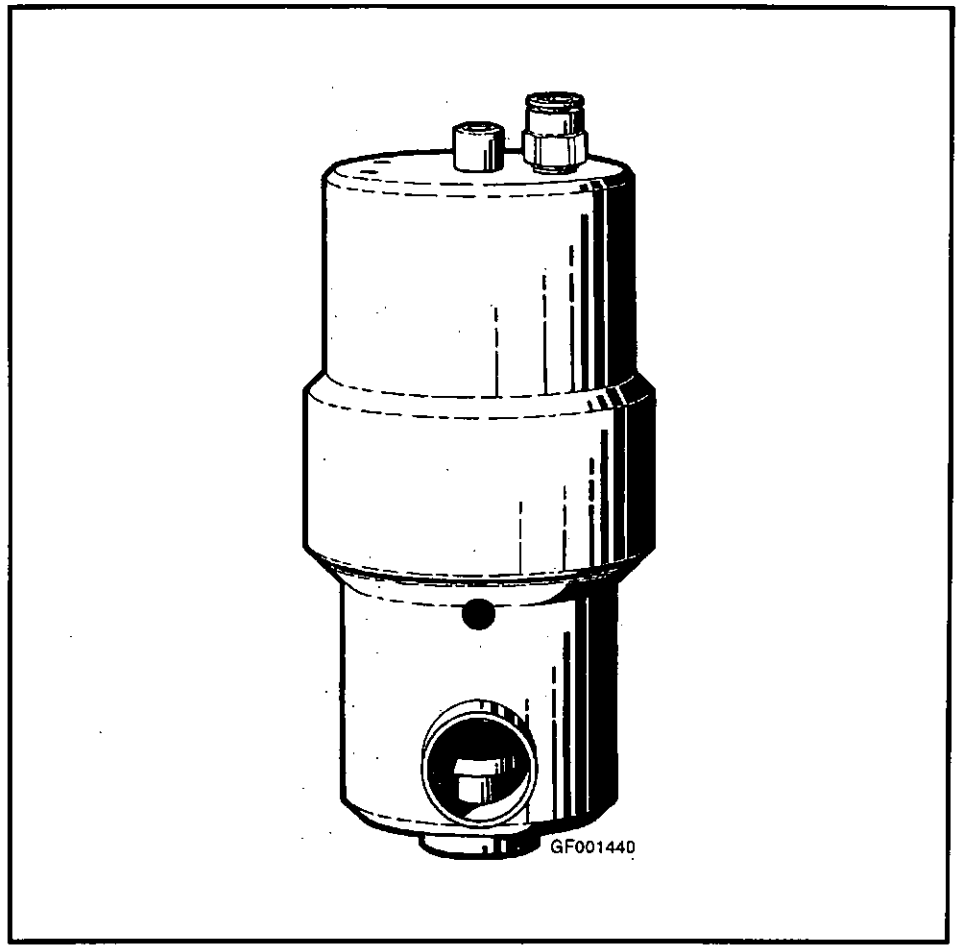
Tetra Pak

Maintenance & Spare Parts

Sanitary remote-controlled valve

(Alfa Laval Flow)

LKAP



1.0 41343-01.fro

Tetra Pak

Doc No. 1241343-01

Sanitary remote-controlled valve

LKAP

Article No.	Type	Connection	Actuator	Seals
6-9611-40-9541	LKAPS-V	W 25	NC	NBR
6-9611-40-9542	LKAPS-T	W 25	NC	NBR
6-9611-40-9543	LKAPS-V	W 25	NC	EPDM
6-9611-40-9544	LKAPS-T	W 25	NC	EPDM

1.0 41343-01.fro

Issue 9906

Doc No. 1241343-01

Tetra Pak

Tetra Pak Processing Systems AB

1.0 41343-01.toc

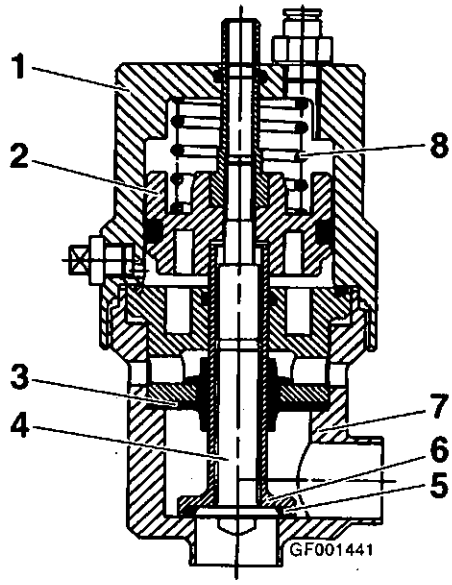
This page intentionally left blank

Function description

General

The LKAP pneumatic valve is a remote-controlled shut-off valve. The valve is operated by means of compressed air and supplied with spring (8) return.

LKAP consists of actuator with air cylinder (1) and piston (2), double lipseal (3) for stem (4), stem unit with replaceable O-ring (5) in plug (6), and valve body (7) with welding connections. It has visual indication of valve position and is available with 2 (LKAPS-V) or 3 side ports (LKAPS-T).



1 Cylinder
2 Piston
3 Lipseal
4 Stem
5 O-ring
6 Plug
7 Valve body
8 Spring

1.0T001026.en

Maintenance

Change spare part kits

WARNING!

Risk of injury!
- Make sure that the pipelines are drained and free from media before servicing the valve.
- **Never** service the valve when it is hot.
- **Never** service the valve with valve and pipelines under pressure.
- **Always** release compressed air after use.

Disassemble

a) Turn air cylinder (2) counter-clockwise by hand with a strap wrench or with a spanner.

b) Remove the air cylinder from valve body (15).

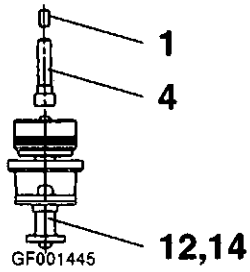
c) Pull out O-ring (3) from the air cylinder (2).

1.0Ti001027.en

d) Remove spring (5) and the rest of the internal parts from valve body (15).

e) Turn nut (4) counter-clockwise and remove it from valve parts (12) and (14).

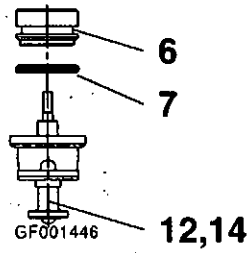
f) Remove screw (1) from the nut (4).



1 Screw
4 Nut
12 Hollow spindle
14 Valve spindle

g) Separate piston (6) from valve parts (12) and (14).

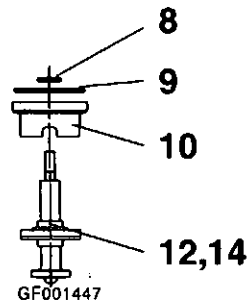
h) Pull off O-ring (7) from the piston (6).



6 Piston
7 O-ring
12 Hollow spindle
14 Valve spindle

i) Slide off bottom piece (10) from valve parts (12) and (14).

j) Remove O-rings (8,9) from the bottom piece (10).

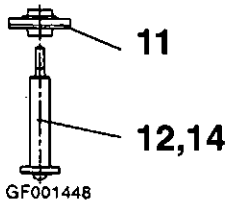


8 O-ring
9 O-ring
10 Bottom piece
12 Hollow spindle
14 Valve spindle

(Cont'd)

(Cont'd)

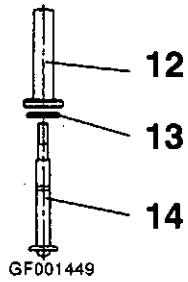
k) Pull off lip seal (11) from valve parts (12) and (14).



11 Lip seal
12 Hollow spindle
14 Valve spindle

l) Remove hollow spindle (12) from valve spindle (14).

m) Pull out O-ring (13) from the hollow spindle (12).



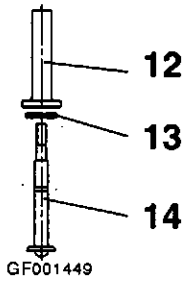
12 Hollow spindle
13 O-ring
14 Valve spindle

1.07f001027.en

Reassemble

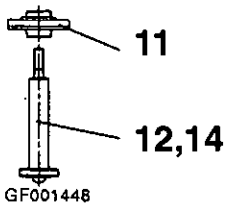
a) Fit O-ring (13) in hollow spindle (12).

b) Slide the hollow spindle (12) onto valve spindle (14).



12 Hollow spindle
13 O-ring
14 Valve spindle

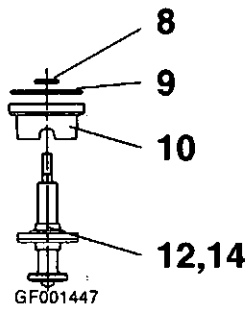
c) Fit lip seal (11) on valve parts (12) and (14).



11 Lip seal
12 Hollow spindle
14 Valve spindle

d) Fit O-rings (8,9) into the grooves of bottom piece (10).

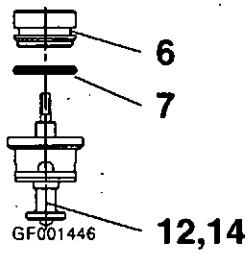
e) Slide the bottom piece (10) onto valve parts (12) and (14).



8 O-ring
9 O-ring
10 Bottom piece
12 Hollow spindle
14 Valve spindle

f) Fit O-ring (7) on piston (6).

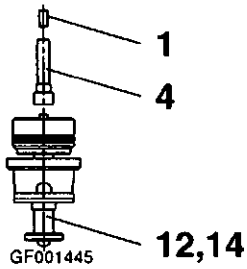
g) Guide the piston (6) onto valve parts (12) and (14).



6 Piston
7 O-ring
12 Hollow spindle
14 Valve spindle

h) Fit screw (1) in indication nut (4).

i) Guide the indication nut (4) onto valve parts (12) and (14), turn it clockwise and tighten.



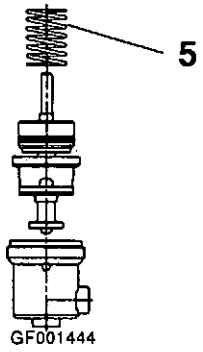
1 Screw
4 Nut
12 Hollow spindle
14 Valve spindle

(Cont'd)

(Cont'd)

j) Position spring (5) in the groove of piston (6).

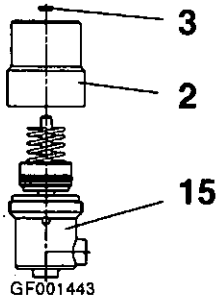
k) Fit valve parts (12) and (14) with the internal parts into valve body (15).



5 Spring

l) Slide O-ring (3) into the groove of air cylinder (2).

m) Fit the air cylinder (2) on valve body (15), turn it clockwise and tighten by hand with a strap wrench or with a spanner.



2 Cylinder
3 O-ring
15 Valve body

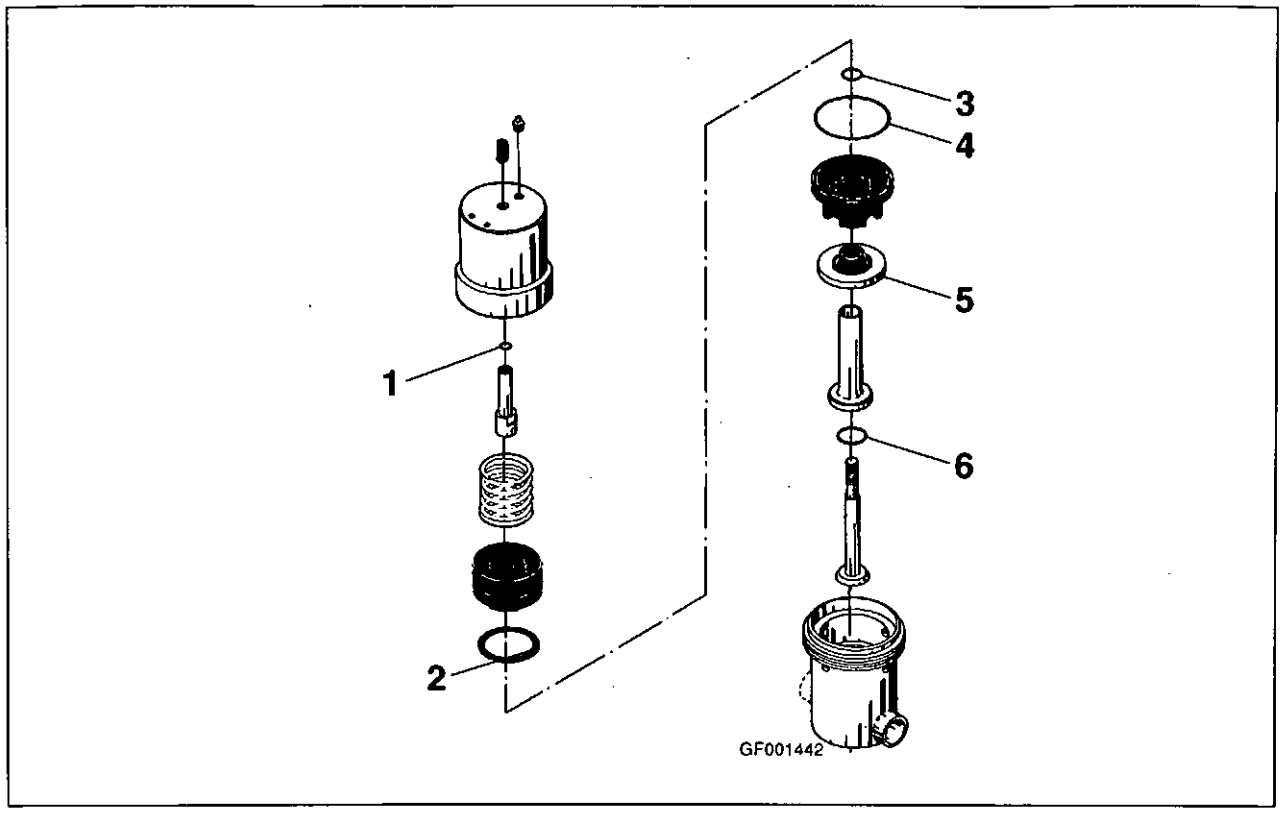
1.0T1001027.en

Note! Fix bottom piece (10) by means of two ø6mm mandrels so that a free discharge from the drain holes is maintained.

Pre-use check:

- Supply compressed air to the valve.
- Open and close the valve several times to ensure that it operates smoothly.

Spare parts



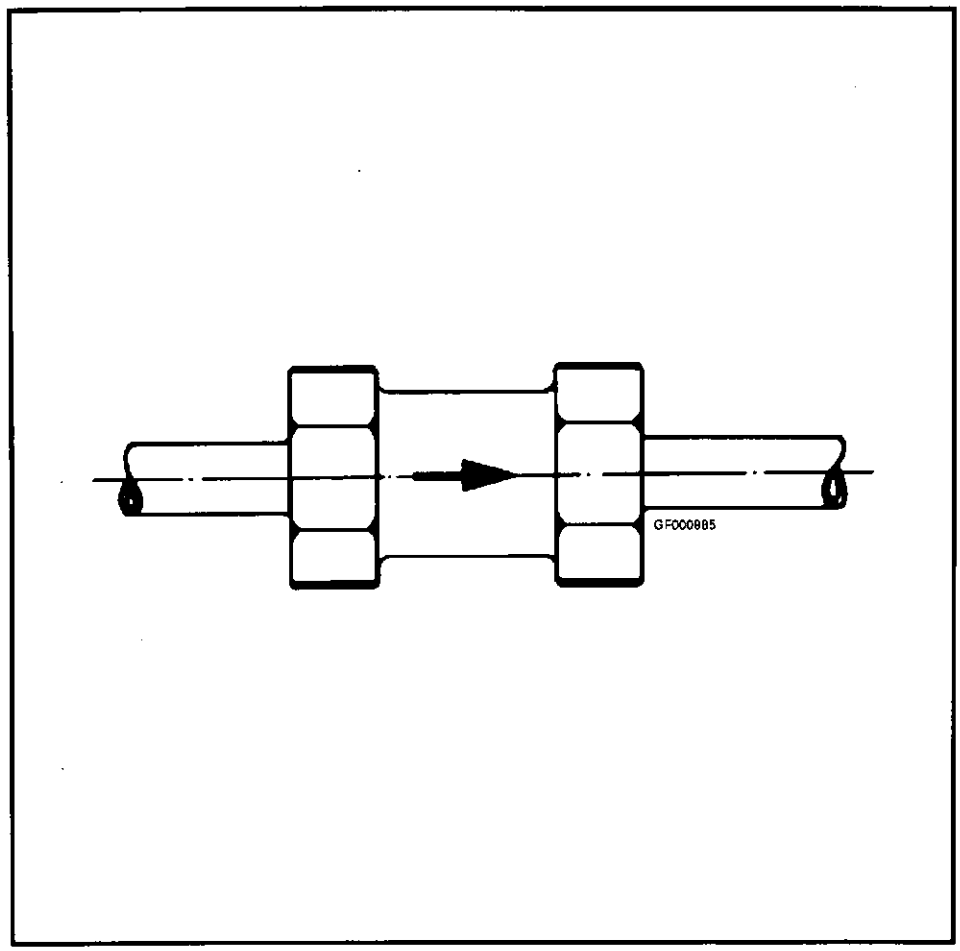
1.0T0001028.en

Component article No.	Spare part article No	Description	Included parts	Pos.	Qty.
6-9611-40-9541	6-9611-92-4001	Spare part kit,	O-ring	1	2
6-9611-40-9542		Actuator	O-ring	2	1
6-9611-40-9543			O-ring	3	1
6-9611-40-9544			O-ring	4	1
6-9611-40-9541	6-9611-92-4002	Spare part kit,	Lip seal	5	1
6-9611-40-9542		Valve	O-ring	6	1
6-9611-40-9543	6-9611-92-4003	Spare part kit,	Lip seal	5	1
6-9611-40-9544		Valve	O-ring	6	1

Tetra Pak

Maintenance & Spare Parts

Non-return valve
(Alfa-Laval)



1.0 41232-01.FRO

Tetra Pak

Doc No. 1241232-01

Non-return valve

Article No.	Connection
6-31341-0160-1	W10

1.0 41232-01.FRO

Issue 9902

Doc No. 1241232-01

Tetra Pak

Tetra Pak Processing Systems AB

Table of contents

1.0 41232-01.TOC

This page intentionally left blank

Maintenance

Non-return valve

Change spare parts

WARNING! **Risk of injury!**
Never service the valve when it is hot.
Make sure that the pipeline is drained and free from media before servicing the valve.
The valve and pipelines must **never** be pressurised when serviced.

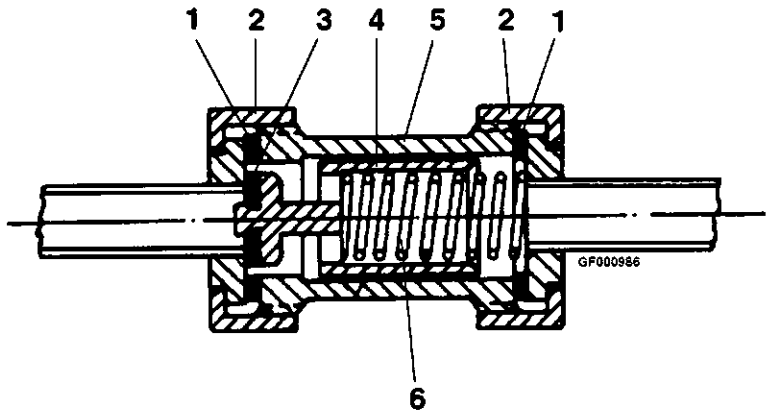
Note! Always change O-rings (1) and cone sealing (3) when servicing the valve.

a) Unscrew nuts (2).

Note! The spring (6) is under slight pressure.

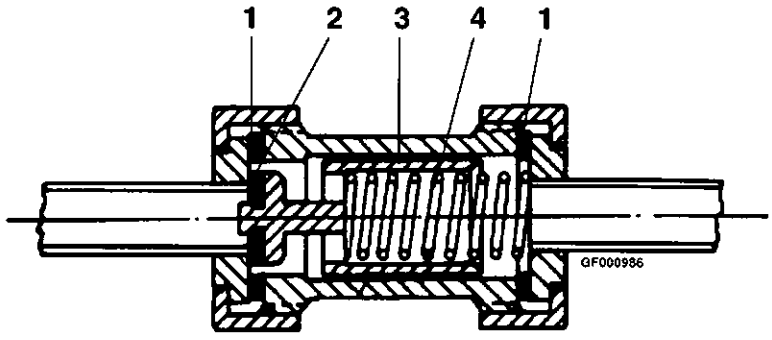
b) Remove complete valve from the pipeline.
c) Remove spring (6) and valve cone (4) from valve body (5).
d) If needed change the spring (6) and the valve cone (4).
e) Change O-rings (1) and cone sealing (3).
f) Reassemble in reverse order.

2.2TF000731.EN



1 O-ring
2 Nut
3 Cone sealing
4 Valve cone
5 Valve body
6 Spring

Spare parts



Component article No.	Spare part article No.	Description	Pos.	Qty.
6-31341-0160-1	6-00223404-36	O-ring	1	2
	6-31341-0164-1	Cone sealing	2	1
	6-31341-0162-1	Valve cone	3	1
	6-31341-0163-1	Spring	4	1

2.2TF000732.EN

This page intentionally left blank

2.2TF000732.EN

Tetra Pak