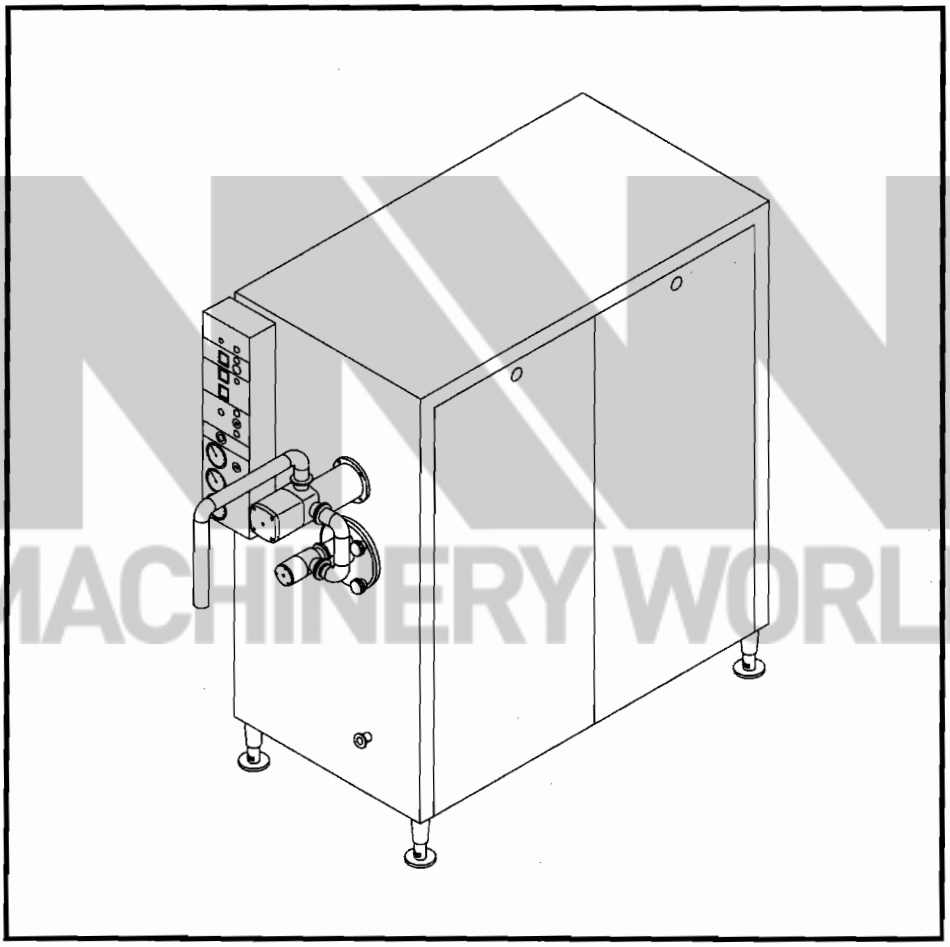
TeM

Technical Manual

Hoyer Frigus SF 1200 C1

59232300000



WARNING

Read and follow all safety precautions before working on or near this equipment.

Read all safety precautions throughout this manual and on safety signs attached to this equipment. Failure to follow all safety precautions could result in death or serious injury.

Tetra Pak

Doc. No. TeM-F12C01-0100

The content of this manual is in accordance with the design and construction of the machine or equipment at the time of publishing. Tetra Pak reserves the right to introduce design modifications without prior notice.

This document was produced by:

Tetra Pak Hoyer S.p.A.
Via Monferrato, 54
20098 - San Giuliano Milanese
Italia

Additional copies can be ordered from Tetra Pak Parts or the nearest Tetra Pak office. When ordering additional copies, always provide the document number. This can be found in the machine specification document. It is also printed on the front cover and in the footer on each page of the manual.

Doc. No. TeM-F12C01-0100

Versione 2006-01

Questo manuale e' valido per:

Serie No./ Macchina No. Firma

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Tetra Pak

Tetra Pak Hoyer S.p.A.

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i Introduction

About the Introduction Chapter

This chapter contains basic information about this manual and related Tetra Pak equipment.

Manual Information

Tetra Pak recommends reading all delivered manuals carefully. Make sure that the delivered manuals are available to personnel who operate or maintain the equipment.

It is important to keep this manual for the lifetime of the equipment and to pass the manual on to any subsequent holder or user.

Tetra Pak will not be held responsible for any damage to the equipment caused by not following the instructions given in this manual.

Delivered Manuals

The manuals delivered with this equipment include:

- Operation Manual (OM)

  This manual provides the operator with information on handling and operating the equipment before, during, and after the production.
- Technical Manual (TeM)

  - Provides technicians with information required to safely install the equipment

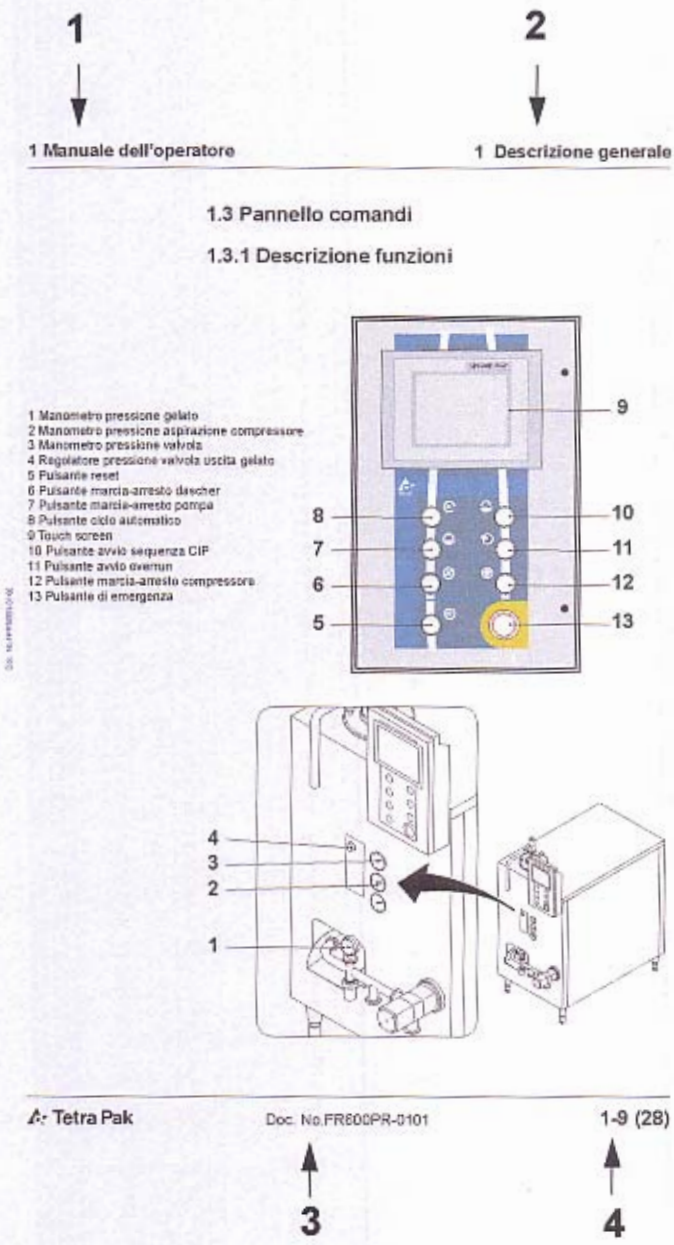
  - Provides technicians with information on maintaining the equipment

  - Provides the information necessary to order spare parts from Tetra Pak
- Electrical Manual (EM)

  This manual provides technicians with information about the equipment's electrical system.

Page Layout

Every main page in a manual contains a header and a footer. The page header contains the section name (2) and the chapter name (1). The page footer contains the manual's document number (3), and the page number (4). See also the section Page Numbering.

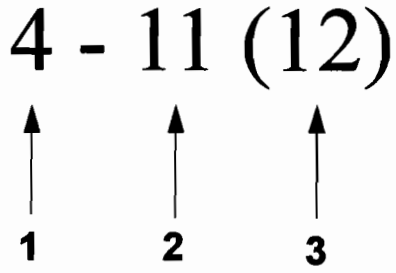


1 Chapter name
2 Section name
3 Document number
4 Page number

Page Numbering

A page number has three parts:

- chapter number (1)
- consecutive page number (2) within the chapter
- total number of pages (3) in the chapter.



1 Chapter Number
2 Consecutive Page Number
3 Total Number of page

Typographical Conventions

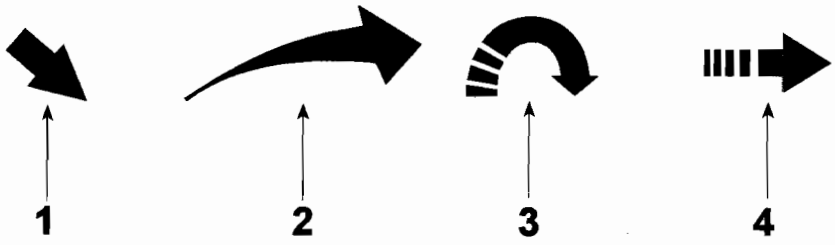
Controls on the operator panel, emergency stop devices, and program steps are printed in CAPITAL LETTERS.

Cross-references are underlined.

Symbols

The following symbols are used in illustrations:

- A pointer arrow (1) indicates the position of an object
- A zoom arrow (2) indicates that an object view is enlarged. The arrow points towards the enlarged view of the object
- A rotation movement arrow (3) indicates rotational movement of an object. The arrow points in the direction of rotation
- A straight movement arrow (4) indicates movement of an object. The arrow points in the direction of movement.



1 Pointer arrow
2 Zoom arrow
3 Rotation movement arrow
4 Straight movement arrow

Machine Introduction

Intended Use of the Equipment

The intended use of this Tetra Pak equipment is to mixes sanitised air into ice cream mix to obtain the desired overrun, cools and whisk the mix with air incorporated in it to create the viscous product known as ice cream, and supplies sufficient pressure to convey the ice cream to its destination through a pipe.

All other use is prohibited. Tetra Pak will not be held responsible for injury or damage if the equipment is used for any other purpose.

Manufacturer

This Tetra Pak equipment has been manufactured by:

Tetra Pak Hoyer S.p.A.

Via Monferrato, 54

20098 - San Giuliano Milanese

Italia

Service

If you encounter problems when operating this equipment, contact the nearest Tetra Pak office.

Contact the Tetra Pak Hoyer Spa or the nearest TP office with other inquiries, comments, or suggestions for improvement regarding the equipment and its documentation.

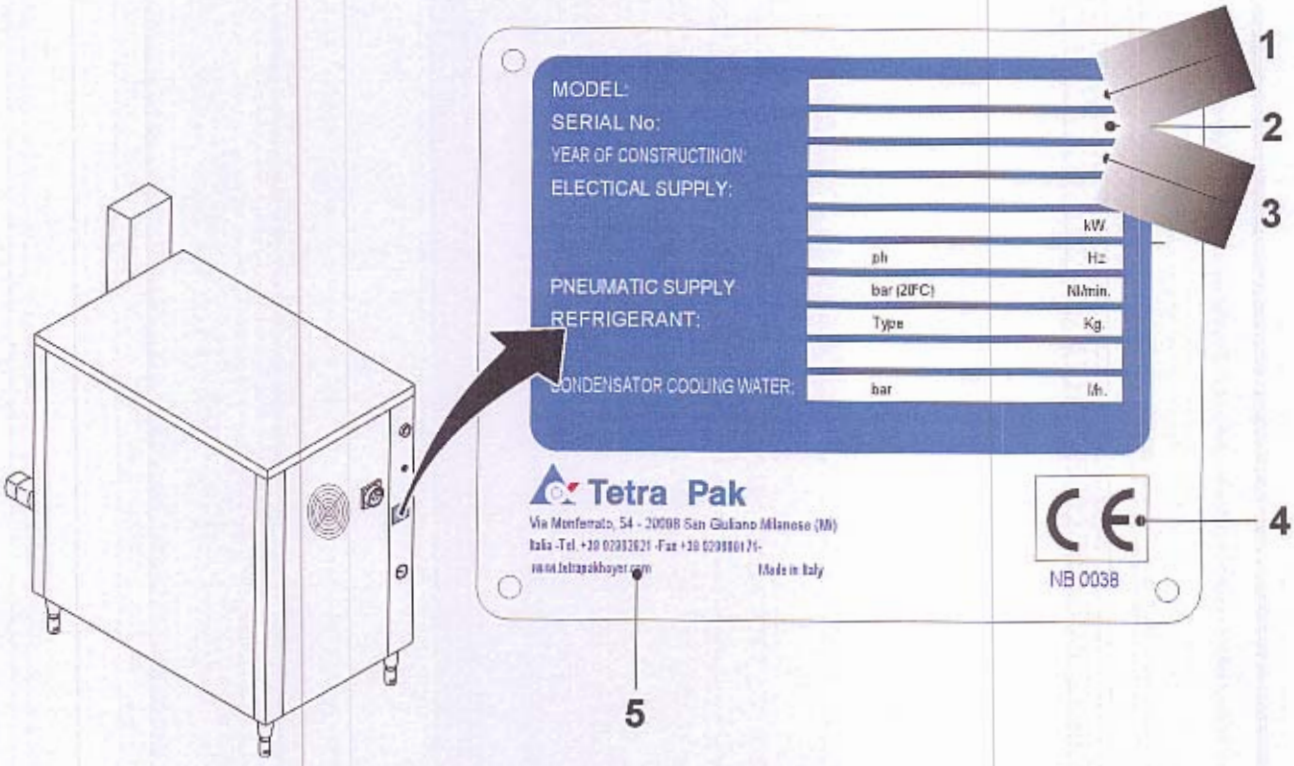
Identification

CE Classification

The machine complies with the basic health and safety regulations of the European Economic Area (EEA).

Machine Plate

The illustration below shows an example of the machine plate and its location on the equipment. The machine plate carries data needed when contacting Tetra Pak concerning this specific equipment.

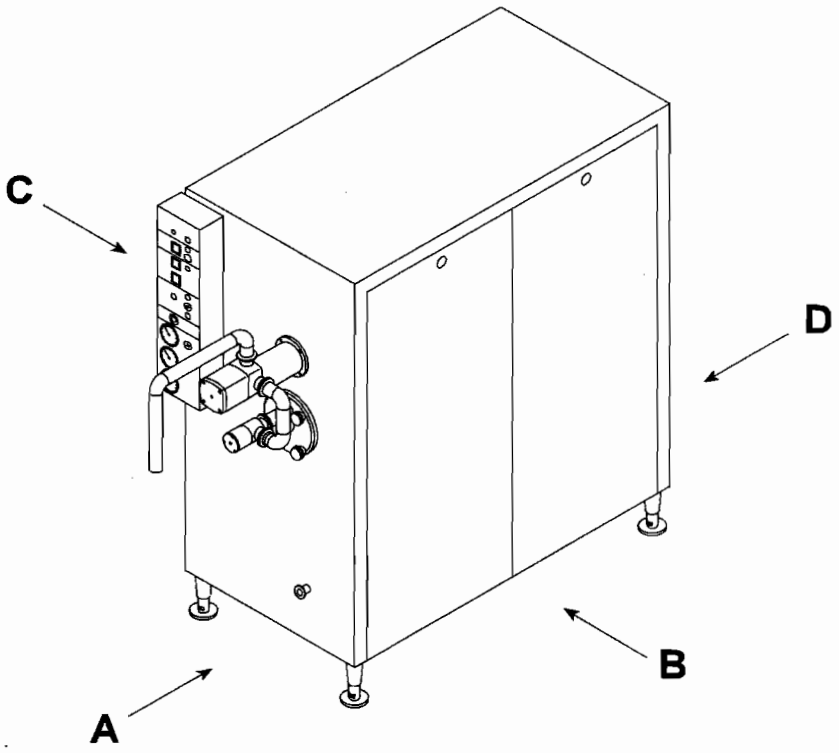


1 Machine type
2 Machine serial number
3 Year of manufacture
4 CE mark
5 Manufacturer

Orientation

The illustration below shows the orientation of the equipment.

This orientation information will be used throughout this manual.



A Front
B Right-hand side
C Left-hand side
D Back

Hygiene

Avoid microbiological pollution of the parts in contact with the product:

- Never clean the floors or the equipment in the work room (area) when the equipment is in production
- Compressed air used for cleaning purposes is to be used only for cleaning filters.
- Disinfect your hands before touching anything that may come into contact with the product.
- Keep your hands and gloves clean. Always wear hair protection (cap or hairmet) and clean clothes (preferably white).
- Do not wear a watch, ring, necklace, earrings, or any other exposed jewellery.

Abbreviations and Terminology

Abbreviation/ Terminology	Meaning	Translation
CIP	Cleaning in place	
MFC	Mass flow controller	
SPC	Spare parts catalogue	

How to Use This Installation Chapter

Purpose of the installation chapter

The installation chapter provides operators with information on handling, installation and connections of the machine.

Operator workflow

Beginning with Chapter 1, the content is structured to follow the operator workflow, as described below.

Technical data

a) Technical data and drawing

b) Connections

Transport

c) Crate handling

Unpacking

Positioning and connections

d) Trasporting the machine

e) Positioning

f) Levelling

g) Connections

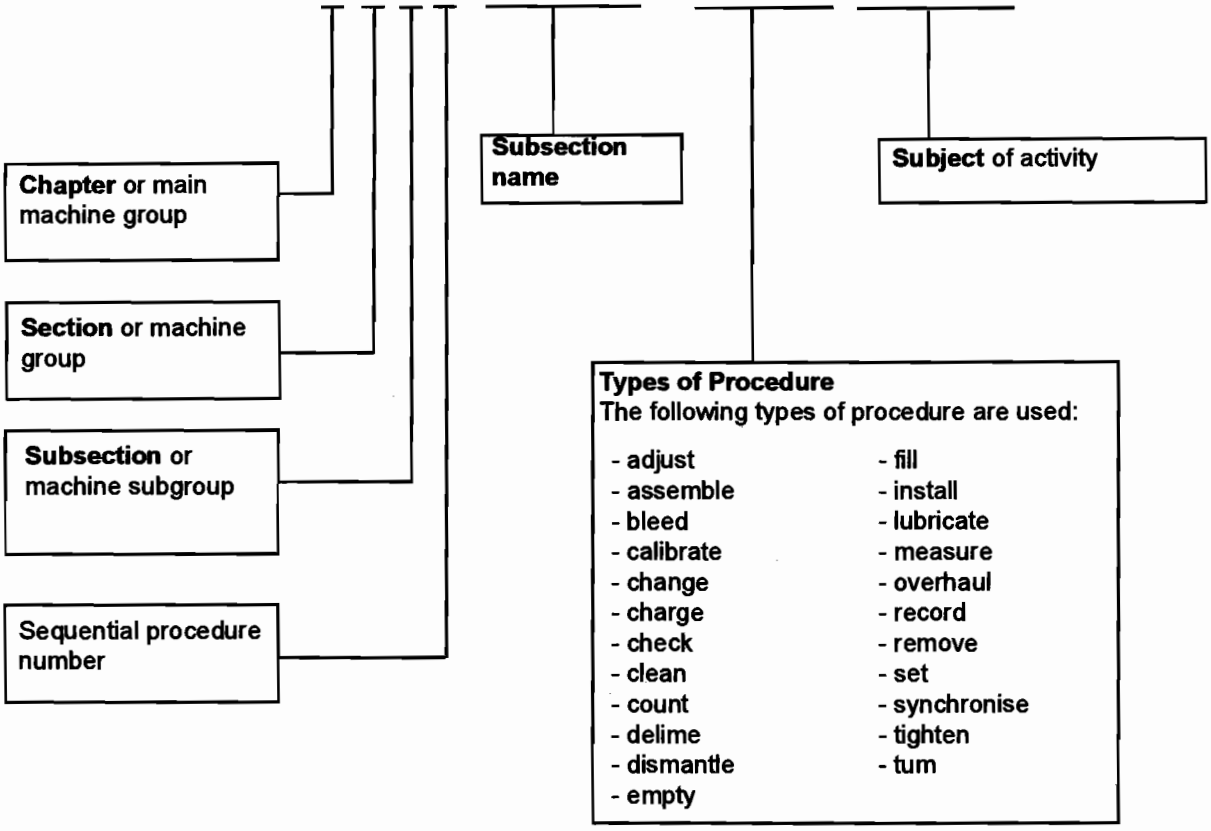
h) Final installation check

How to Use The Maintenance Instructions Chapter

Procedure Codes

Maintenance procedures are designated as shown in the example.

2.1.1-8 Cylinder - Check gasket



Procedure Start Table

Each maintenance procedure described in this manual begins with a table containing information needed to begin the procedure. This information includes the following:

• **Machine status** (1) shows actuator status, program step, and any other machine status necessary to begin the procedure

• **Special equipment** (2) shows a list of personal protective equipment and special tools that are not normally carried by a service technician, but are needed in the procedure

• **Consumables** (3) shows items, such as lubricants, that are required to perform the procedure. Consumables do not include replacement parts.

• **SPC reference** (4) shows the assembly number, found in the index of the Spare Parts Catalogue (SPC).

2.1.1-1 Frigus SF 1200 - Change Blades

1	Machine status	Power supply disconnecting device OFF Air valve OFF
2	Special equipment	Protective gloves
3	Consumables	Grease
4	SPC references	123456-0100

1 Machine status
2 Special equipment
3 Consumables
4 SPC References

Tetra Pak Maintenance System

To ensure uninterrupted production, all equipment must be maintained on a regular basis.

Tetra Pak has developed a planned maintenance system to keep pace with the ongoing development of new and existing equipment from Tetra Pak, and to meet the demands set by customers for higher efficiency and better economy.

Planned Maintenance Program

The Tetra Pak planned maintenance system reduces unplanned downtime and maintenance time for complete production lines, as well as for individual equipment.

With the Tetra Pak maintenance system, preventive maintenance can be performed before production is affected. The system is continually updated based on experience with Tetra Pak equipment worldwide.

The Tetra Pak planned maintenance system maintains records of when maintenance is performed, when parts are changed, whether alterations are made, and so on. These records, combined with usage statistics, enable reliable predictions of the service life of all equipment parts.

Checklists and Spare Parts Recommendations

Customers using the Tetra Pak planned maintenance system receive checklist from their local Tetra Pak office whenever planned maintenance is due. These checklists are individualised for each customer, according to the type of equipment, equipment usage, and maintenance occasion. In addition, the system recommends spare parts, rotation units, tools, and templates according to the statistics collected.

Tip! Contact the local Tetra Pak office for additional information about the Tetra Pak Maintenance System and its planned maintenance program

How to Use The Spare Parts Catalogue

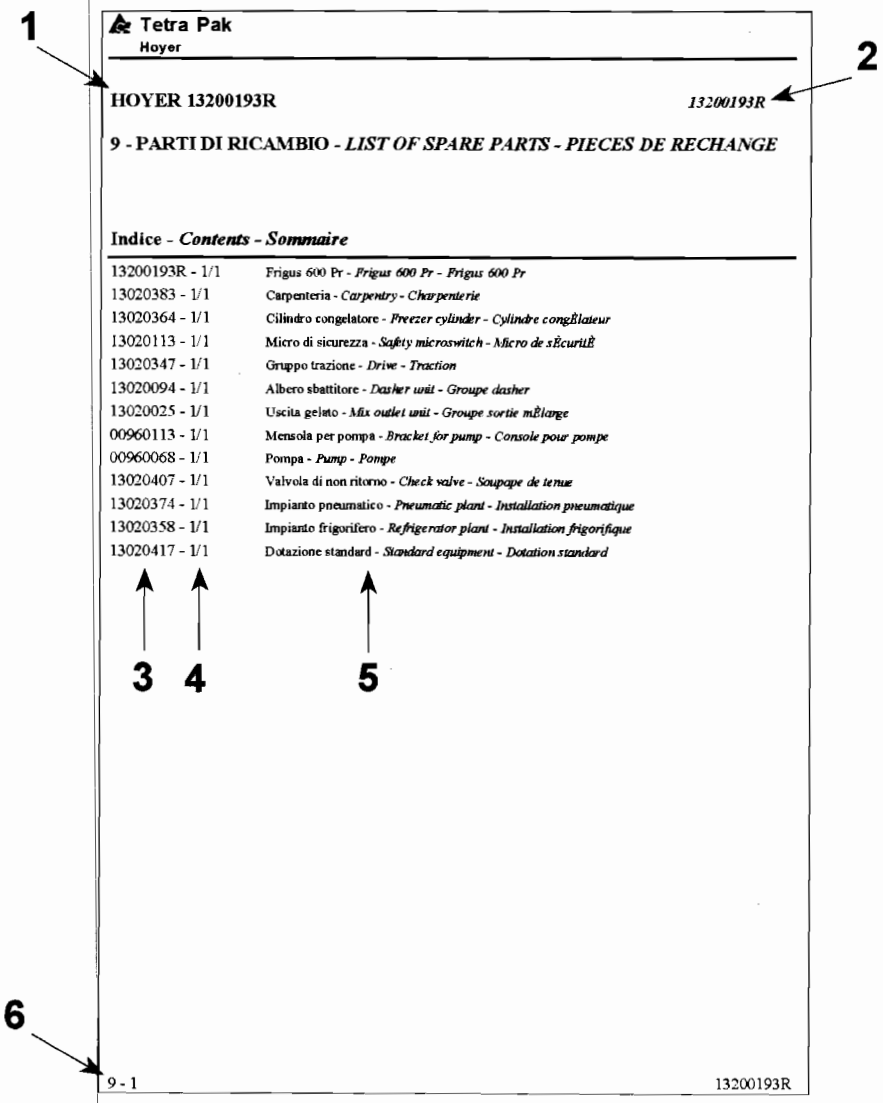
Purpose of the Spare Parts Catalogue

The catalogue provides the informations necessary to order spare parts from Tetra Pak.

First page

The first page of catalogue contains:

- the name of machine (1);
- the code of machine (2);
- the code (3) of groups that compose the machine;
- the number of tables of the group (4);
- the description of the group (5);
- the number of the page (6);

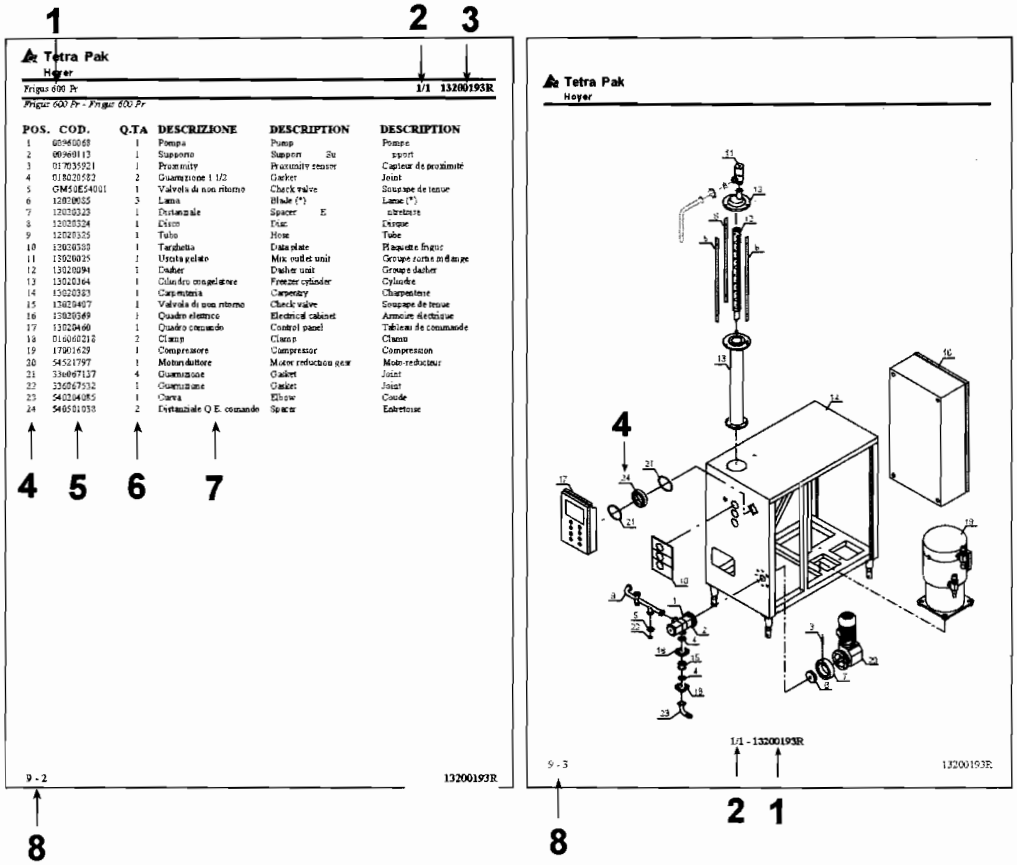


Spare Parts Table

Tables of spare parts are composed from a bill of materials, which in association with a figure, allows identification of components.

The spare parts tables contains:

- the code (1) of group;
- the number of tables of group (2);
- the description of group (3);
- the position of the component (4)
- the code (5) of the component;
- the quantity (6) of the component;
- the description of component (7);
- the number of page (8).



ii Safety Precaution

Read the Safety Precautions

WARNING

Read and follow all safety precautions before working on or near this equipment.

Read all safety precautions throuyghout this manual and on safety signs attached to this equipment. Failure to follow all safety precautions could result in death or serious injury.

Definitions

Energy Isolating Device. A mechanical device that physically prevents transmission or release of energy.

Power Supply Disconnector. The energy isolating device for the electrical power supply to the equipment.

Lockout. The use of a device, such as a padlock, to make sure that an energy isolating device, such as a power supply disconnector, cannot be operated.

Lockout Procedure. A procedure to put each necessary energy isolating device in its safe position to prevent the energising of the equipment, such as when a maintenance procedure should be carried out.

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Safety Messages Description

A safety message is always accompanied by a safety alert symbol and a signal word.

This is the **safety alert symbol**. It is used to alert about potential personal injury hazards. To avoid hazards, obey all safety messages that follow this symbol.

The following safety alert symbols and **signal words** are used in this manual to inform the user of hazards.

 DANGER

"Danger" indicates an imminently hazardous situation which, if not avoided, **will** result in **death or serious injury**.

 **WARNING**

"Warning" indicates a potentially hazardous situation which, if not avoided, **could** result in **death or serious injury**.

 **CAUTION**

Caution indicates a potentially hazardous situation which, if not avoided, **may** result in **minor or moderate injury**. It may also be used to alert against unsafe practices

CAUTION

Caution without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Personnel Requirements

Note! Personnel includes all persons working on or near this equipment.

Only skilled or instructed personnel are allowed to work with this equipments.

Skilled Person

A skilled person must have relevant education and experience to enable him or her to identify hazards, analyse risks, and avoid hazards which electricity, machinery, chemicals, other energies, and supply systems on this equipment can create.
Skilled persons must meet local regulations, such as certifications and qualifications for working with electricity, mechanical systems, and so on.

Instructed Person

An instructed person must be adequately advised or supervised by a skilled person. The skilled person enables the instructed person to identify hazards, analyse risks, and avoid hazards which electricity, machinery, chemicals, other energies, and supply systems on this equipment can create.

Safety Signs

WARNING

Damaged or missing safety signs increase the risk of death or serious injury. Replace all missing or damaged safety signs immediately.

There are two types of safety sign

- ISO signs are used worldwide
- ANSI signs are used in the United States only.

The table shows all safety signs that are located on this equipment.

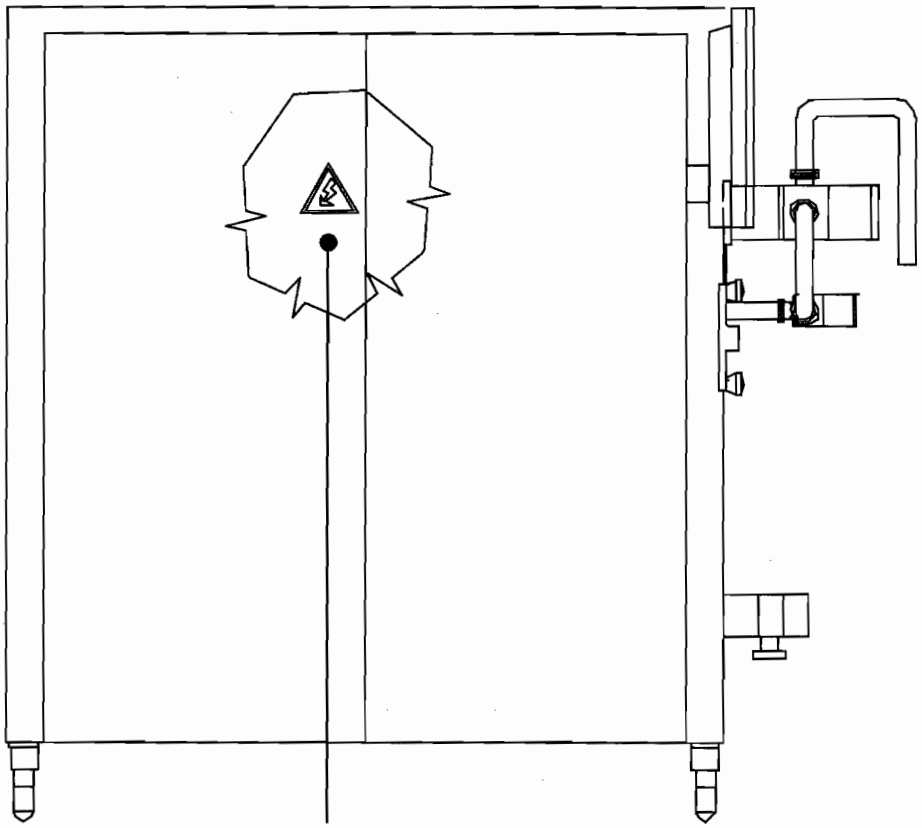
Note! The position numbers (Pos.) in the table refer to the positions in the illustration(s) in the Locations of Safety Signs section.

Pos.	Sign ISO	Sign ANSI
1		
	Hazardous voltage with power supply disconnector switched off. Can shock, burn, or cause death. Do not touch.	

Locations of Safety Signs

Note! Make sure that each safety sign is undamaged and in its correct position after installation and maintenance. Replace all missing or damaged safety signs immediately.

The illustration shows where the safety signs are located. The position numbers refer to the table in the Safety Signs section.



Safety Devices

WARNING
Unshielded hazard
Never inch or run this equipment if any safety device is inoperative.

Change inoperative components of the safety system immediately.

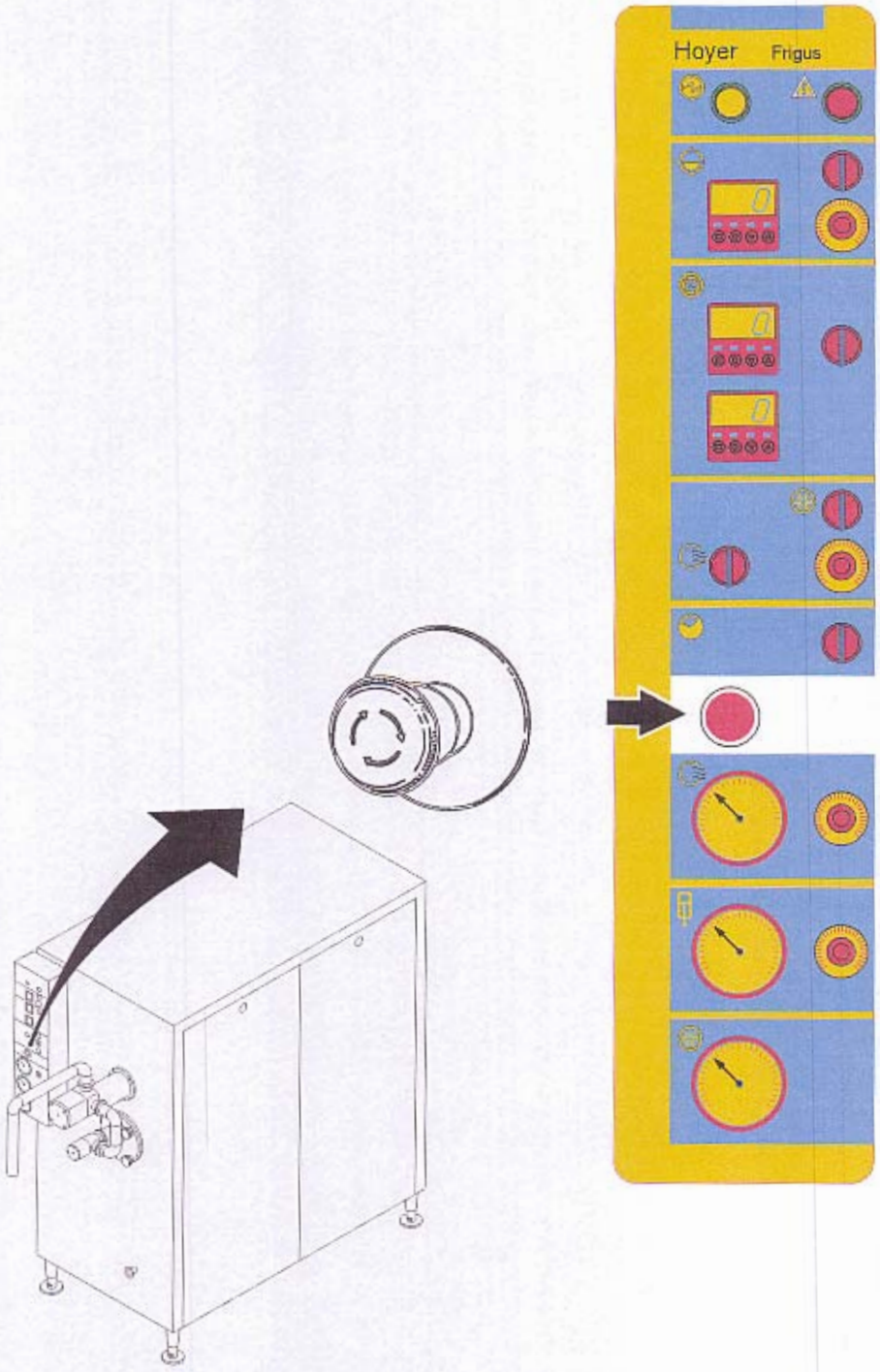
WARNING
Hazardous voltage
Activating a safety device, such as pressing an EMERGENCY STOP push-button or opening a door, does not disconnect the power supply from this equipment..

Emergency Stop

Emergency stop devices are used to stop this equipment immediately in an emergency. Learn the positions of all emergency stop devices and how to use them.
Instructions for a normal production stop are included in the Stop chapter of the Operation Manual.

Emergency STOP Push-Buttons

Push the EMERGENCY STOP push-button to stop this equipment immediately.
The illustration shows an EMERGENCY STOP push-button. The location of each EMERGENCY STOP push-button is shown by an arrow.



Personal Protection

This section applies to all personnel at all times when this equipment is in operation. For special personal protection required when handling hazardous materials, see the Hazardous Materials section.

Entaglement Hazard

WARNING

Risk of entanglement. Do not wear jewellery or loose clothing when working on or near this equipment. Long hair may not be loose.

Hazardous Materials

WARNING

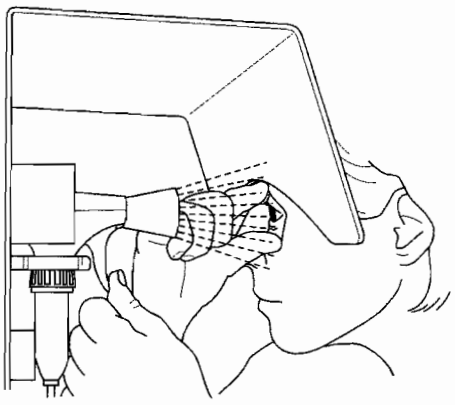
Contact with chemicals can cause death, serious injury and illness.

Always follow the chemical manufacturer's instructions when handling chemicals.

Make sure that:

- the showers work
- an eyewash device, movable or wall-mounted, is available and operational
- additional washing facilities are nearby.

Note! Learn the locations of all washing facilities in order to act immediatly in case of accident.



Products for cleaning and sterilization

The cleaning of the machine and its components previews to use of chemical products. The following table indicates the various type of recommended products.

Detergent	Descaler	Disinfectabt
SU928 (Diversey Lever)	P3-topax 99 (60°C) (Henkel Ecolab)	P3-topax 99 (60°C) (Henkel Ecolab)
SU616 (Diversey Lever)	SU475 (Diversey Lever)	SU330 (Diversey Lever)
SU157 (Diversey Lever)	P3-PE4 Spezial a (Henkel Ecolab)	P3-Dix forte (Henkel Ecolab)
P3-N421 (Henkel Ecolab)		P3-Oxjsan (Henkel Ecolab)

WARNING
Corrosive chemical.
Wear personal protective equipment. Consult the instructions on the label of the tank/container, or on the safety instruction of the product.

In both liquid and gas states, products for cleaning and sterilization may cause irritation or damage if it comes into contact with skin, mucous membranes, eyes, or clothes. Call for medical attention immediately if there is an accident.

Emergency Procedure

If there is an accident involving the products for cleaning and sterilization, the interested area has to be circumscribed from the leak using absorbent material in order to avoid the environmental contamination.
The product must be eliminated as dangerous or not dangerous waste according to the waste European codes "CER."
If the products for cleaning and sterilization is swallowed

- do not attempt to cause vomiting
- drink large amounts of lukewarm water to dilute the peroxide
- call for medical attention immediately.

If splashes or vapour from products for cleaning and sterilization come in contact with the eyes

- wash the eyes thoroughly with lukewarm water for 15 minutes (keep eyelids wide apart)
- call for medical attention immediately.

If products for cleaning and sterilization comes into contact with skin or clothes

- rinse immediately with plenty of water
- call for medical attention immediately if skin burns appear
- thoroughly wash the clothes before wearing them again.

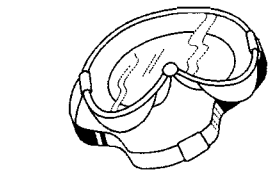
If irritation or pain is experienced due to having inhaled products for cleaning and sterilization vapour

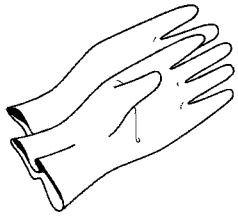
- leave the affected area and get some fresh air
- call for medical attention if the symptoms get worse.

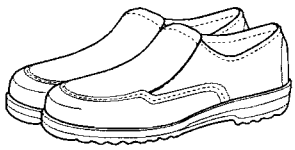
Personal Protective Equipment

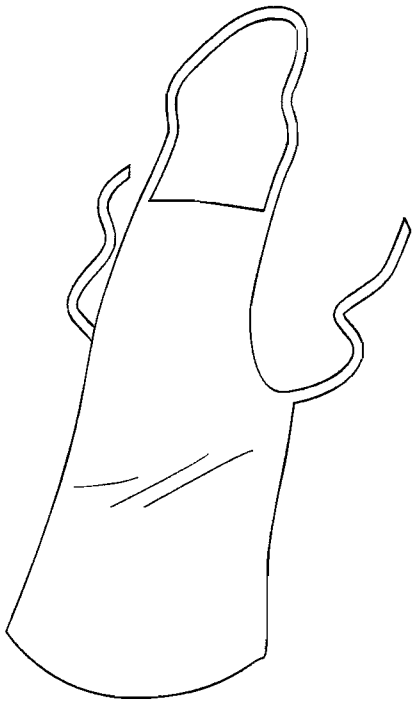
The personal protective equipment for products for cleaning and sterilization is

- safety goggles.
- protective gloves made of neoprene.
- apron‘.
- shoes made of PVC, PE plastic, or rubber.







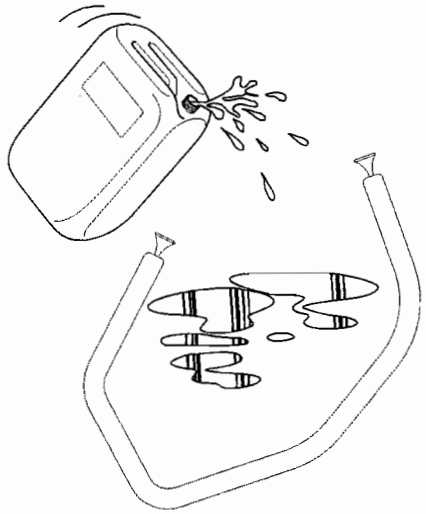


Handling

WARNING
Sudden and violent chemical reaction.
Avoid any contamination of products for cleaning and sterilization.

The products for cleaning and sterilization they can react suddenly and violently with many compounds or if it is contaminated.
Ensure that equipment used for handling and diluting the products is clean before it comes in contact with the products. Pumps or other equipment used for handling the products must be used for this purpose only and must be manufactured from appropriate materials, such as stainless steel 316 L, glass, polyethylene, or teflon. After use, make sure that all product residue is rinsed away.

In case of accidental leak (spill) of technical products and product waste ice cream, the interested area has to be circumscribed from the leak using absorbent material in order to avoid the environmental contamination.
The product must be eliminated as dangerous or not dangerous waste according to the waste European codes "CER."

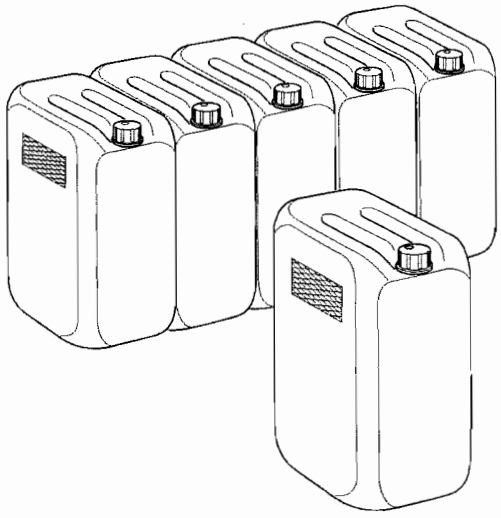


Storage

The products for cleaning and sterilization must be stored in the original container delivered by the supplier.
Keep the container upright and fitted with its proper cap.

Make sure that the area used for storage of products for cleaning and sterilization is:

- cool, clean, and well ventilated
- shielded from direct sunlight
- kept free from combustible materials.



Disposal

The products for cleaning and sterilization should be sent to an approved facility for disposal.

Cooling Media R404A

WARNING
Refrigerant gas

High concentration of cooling media R404A vapour can cause dizziness, headache, confusion and unconsciousness. In liquid form R404A can cause frostbite injuries on contact with the skin. Always wear personal protective equipment.

Emergency Procedures

Inhaling large quantities of cooling media R404A vapour can cause dizziness, headache, confusion and unconsciousness. In liquid form cooling media R404A can cause frostbite injuries on contact with the skin.
In the case of an accidental release of this refrigerant:

- leave the affected area immediately
- remove victims to fresh air and if necessary administer expired air resuscitation and/or cardiopulmonary resuscitation. Call for immediate medical attention
- in case of contact with eyes or skin, soak the exposed areas with luke warm water, not hot or cold. Call for immediate medical attention
- allow the vapour to dissipate, use auxiliary ventilation if available.

Handling and Storage of Cooling Media R404A

When handling cooling media R404A, make sure that:

- the cylinders are stored in a cool dry place away from direct sunlight or sources of heat
- the areas used for the storage and handling of this refrigerant are adequately ventilated
- the cylinders are transported carefully
- the cylinder valves are opened slowly.

Disposal of Cooling Media R404A

Cooling media R404A should whenever possible be reprocessed or recycled. Contact the manufacturer or supplier for information on authorised refrigerant reclamation and recycling programs.

Supply Systems

Electrical Cabinet

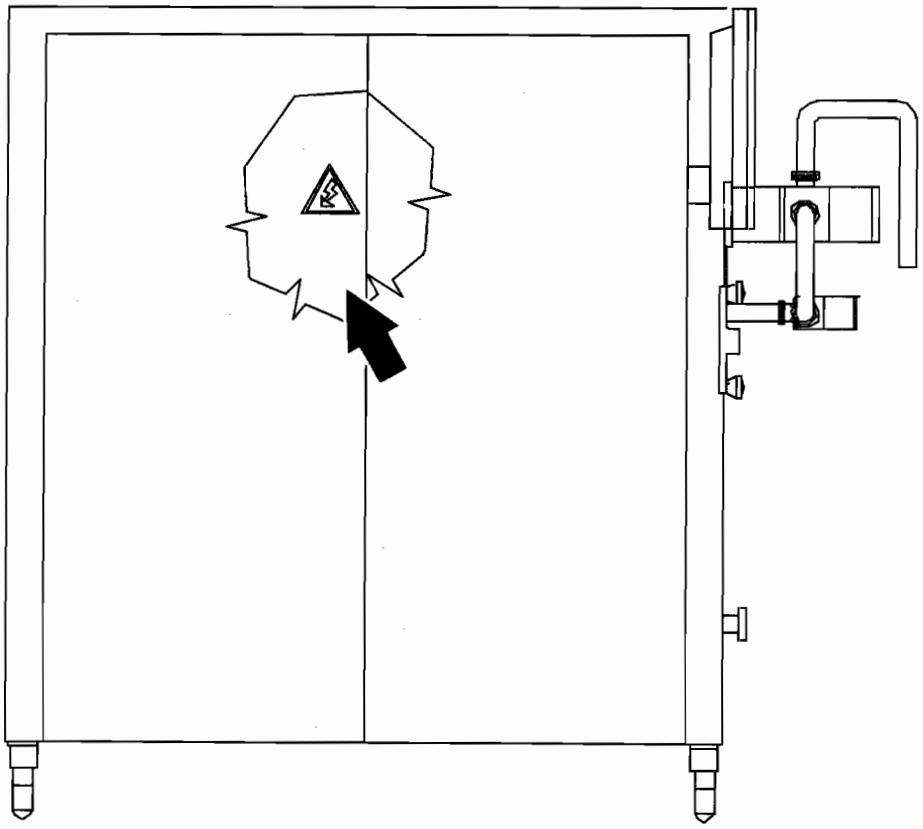
DANGER

Hazardous voltage.
Will shock, burn, or cause death. The power supply disconnector must be switched off and secured with a lock before maintenance inside the electrical cabinet.

Note! The key to the lock must be removed by the technician and retained in his/her possession until all work is completed.

Make sure that the electrical cabinet doors are closed after working inside the electrical cabinet. Doors with lock must be locked.

The location of each electrical cabinet is shown by an arrow.



Air Supply

WARNING
Compressed air.
Close the main air valve before any maintenance.

Certain maintenance procedures may require the air supply systems to be on. These exceptions are clearly stated in the Maintenance Manual.

Water Supply

WARNING
Water under pression.
Close the water supply valves before any maintenance.

Certain maintenance procedures may require water supply systems to be on. These exceptions are clearly stated in the Maintenance Manual.

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1 Installation Instructions

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1.1 Technical data

Nominal output

Nominal output	400-1200 l/h	105-316 gals/h
Temperature inlet of mix	+ 5°C	+ 41°F
Temperature outlet icecream	- 5 ° c	+ 23 °F
Overrun	100 %	100 %

Nominal output figures are based on the following conditions and standard mix recipe:

Ingredients	**%**
Fat (HCO)	10,0
Skilled milk powder	10,5
Sugar	12,0
Glycose sirup	5,0
Stabilizer/emulsifier	0,5
Total Solids	**38,0**
Water	**62,0**
TOTAL	**100,0**

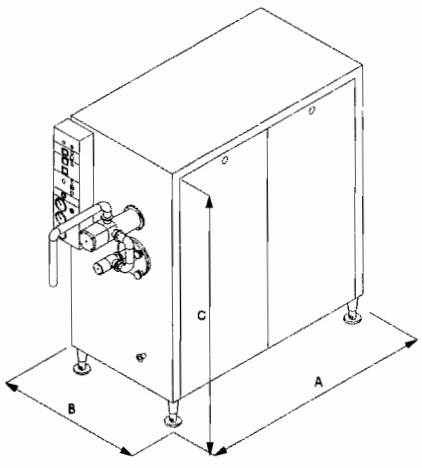
Upon receipt of the actual mix recipe a more precise capacity and outlet temperature can be determined

Refrigerating plant

Refrigerating gas R404A	5,2 Kg	11,44 lbs

1.1.1 Installation Drawing

Dimension	mm	in
A	1600	63
B	840	33,1
C	1800 ± 25	70,9



Connection Data

1 Compressed air (1/2" Gas- female).

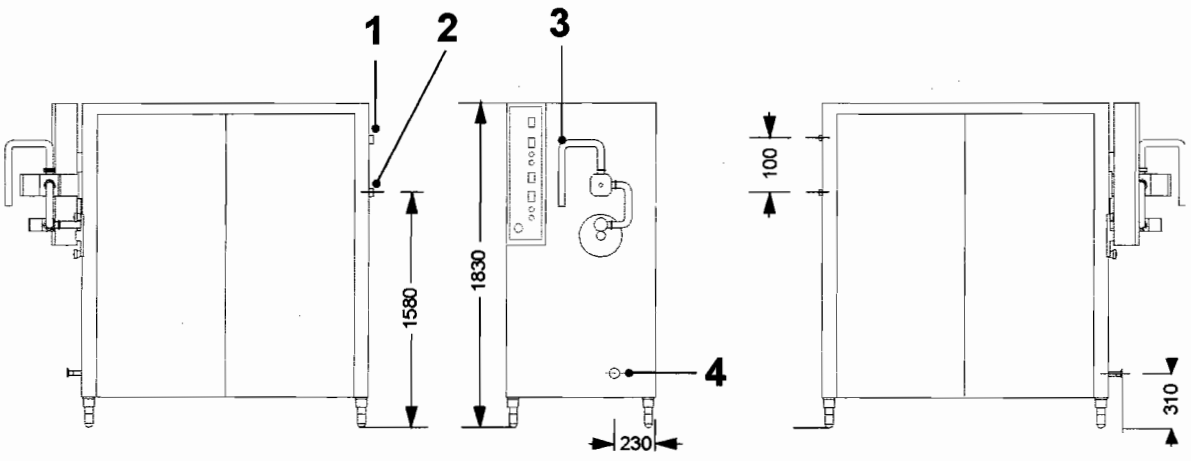
2 Electrical connection.

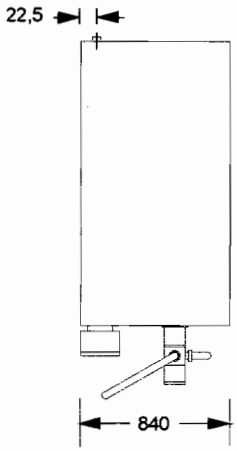
3 Outlet of ice cream (attacco clamp 1 1/2" Gas).

4 Inlet of mix (attacco clamp 1" Gas).

5 Water outlet connector (1" Gas- female).

6 Water inlet connector "tower water " (1" Gas- female).





1 Electrical connection
2 Compressed air
3 Outlet ice cream
4 Inlet mix

1.1.2 Weights

Net weight	1200 Kg	2647 lbs

1.1.3 Connections

Compressed air

Compressed air		
Operating pressure	4-8 bar	4-8 bar
Consumption (max)	20 Nl/min	566 cu.ft
Filtering degree	A0	A0
Connector	1/2" female gas	1/2" female gas

Electrical specifications

Dasher motor:	9,2	kW
Ice cream pump motor	0,75	kW
Mix pump motor	1,5	kW
Refrigerator compressor	2 x 10	kW
Auxiliaries	0,85	kW
Total installed power	32,3	

Electromagnetic compatibility

Conforms to VDE 0843/IEC801; wiring in accordance with EN55011

Condensation water

Dwell water	+ 5°C - – l/h	41 °F - gals/h
Mains water	+ 15°C - 2000 l/h	59 °F - 530 gals/h
Tower water	+ 28°C - 6000 l/h	82,4 °F - 1588 gals/h
Water inlet connector	1" gas female	1" gas female
Water outlet connector	1 1/2" gas female	1 1/2" gas female

1.1.4 Noise

A-weighted equivalent sound pressure level at 1 metre:
Leq(A) = 69,9 dB(A)
Max. C-weighted instantaneous sound pressure level at working positions: less than 130 dB/20uPa
Max. non-weighted sound pressure level at working positions: less than 140 dB/20uPa

1.2 Moving and unpacking

The machine is packed in wooden crates. Unpacking must be done close to the installation position.

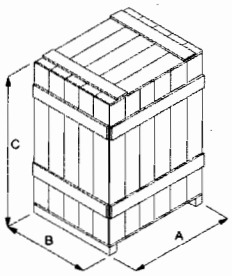
1.2.1 Crate handling

1.2.1.1 Crate data

List of contents:

Frigus SF 1200 C1
Standard equipment
Adjustable feet
Startup kit (if included in the supply)

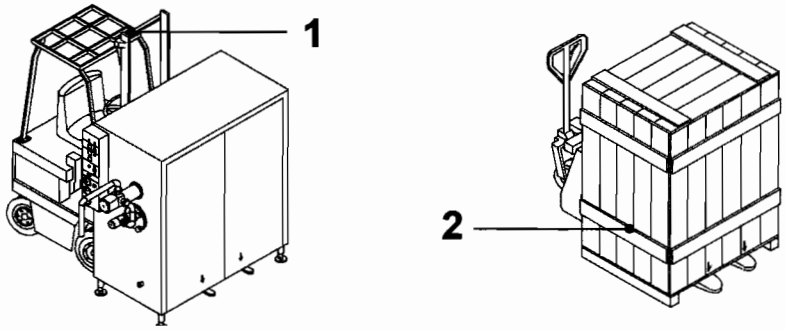
Dimension	mm	in
A	2250	88,6
B	1050	41,4
C	2100	82,7
Weight	1450	3196
Volume	5	176,5



1.2.1.2 Crate lifting

The crate may be easily transported by a lift truck (1) or an transpallets (2)..

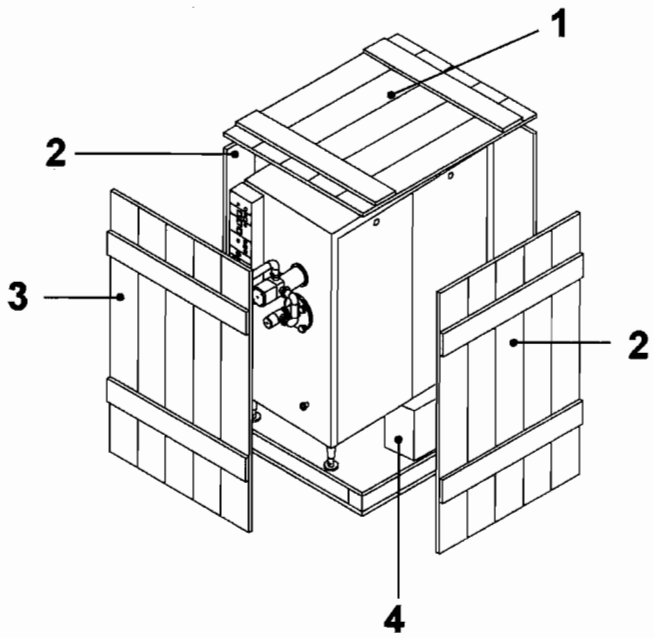
1 Lift truck
2 Transpallets



1.3 Unpacking

When the crate is positioned in the place of installation, proceed to remove the machine from its packaging as follows:

Unnail the top cover (1) and remove it. Do the same with the side panels (2) and the front panel (3). Take care with the wooden spacers between the walls of the crate.
Remove the standard equipment from the crate (4).
Unnail the wooden blocks that hold the machine in place during transport and remove the protective cellophane.
Check that the content of the package corresponds to the shipping documents.
Make sure that all covers and panels are correctly fastened in place and there are no loose parts.
Visually inspect all electrical components to make sure they are in perfect condition.
If any part or component is missing, notify Tetra Pak Hoyer immediately.



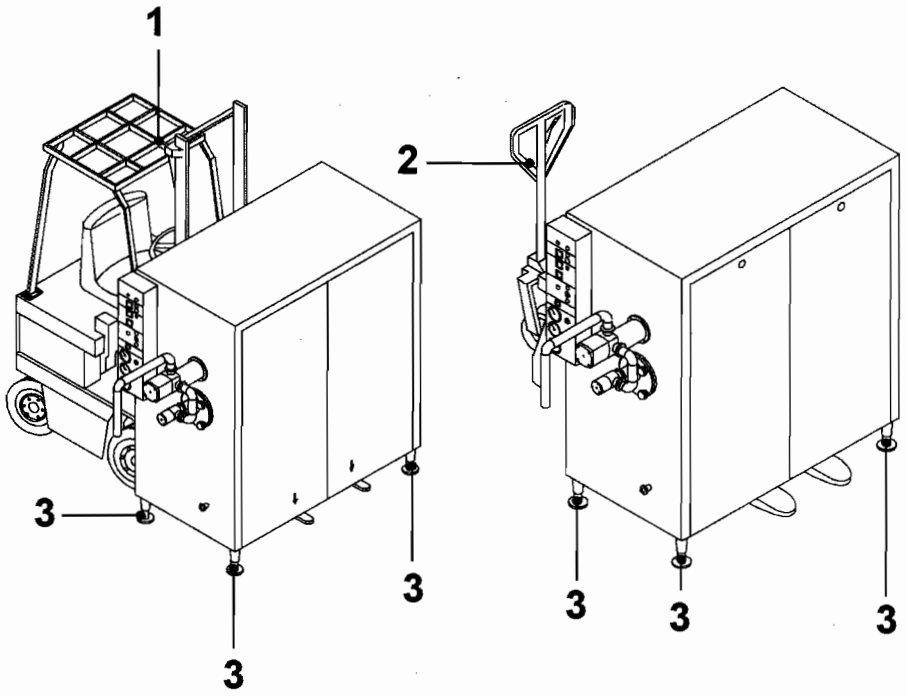
1 Top cover
2 Side panels
3 Front panel
4 Standard equipment

1.4 Positioning and Connections

The machine is fully tested and regulated in the factory prior to shipment to the customer. Installation simply involves connecting up the pipes for the condenser cooling water supply, ice cream mix intake and outlet, compressed air supply and electric power supply. There is no need for internal adjustments to the machine; we recommend that factory settings not be changed.

1.4.1 Moving

The machine may be easily transported by a lift truck (1) or an transpallets (2).
When the machine is raised remove the adjustable feet (3) from the crate and mount them.



1 Lift truck
2 Transpallets
3 Adjustable feet

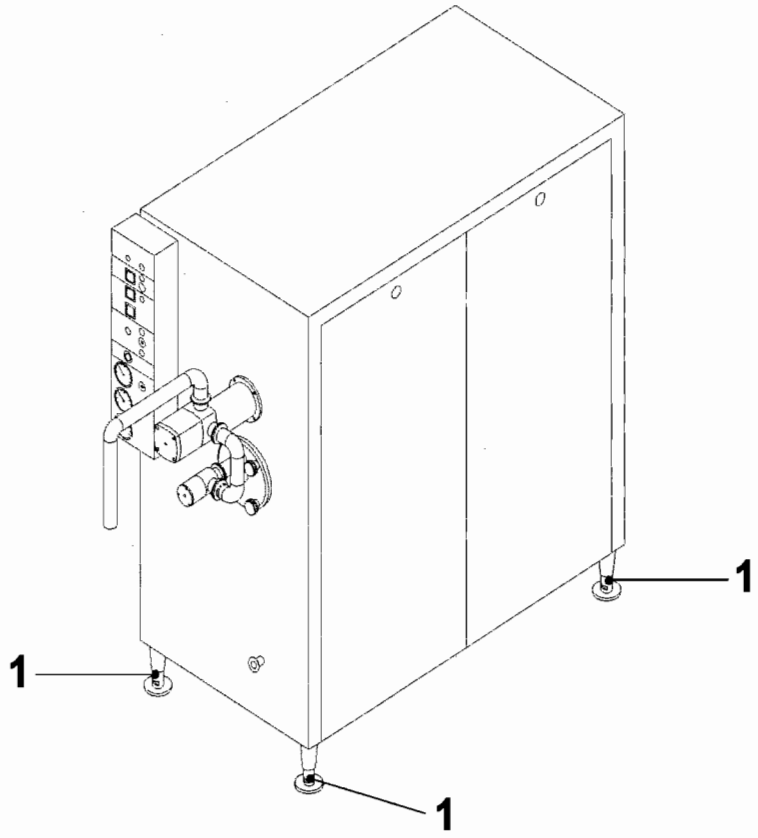
1.4.2 Positioning

Position the machine in its operating position and check the plate data to make sure that the machine is compatible with the site's electrical power supply.

1.4.3 Levelling

Level the machine with a spirit level by means of the adjustable feet (1).

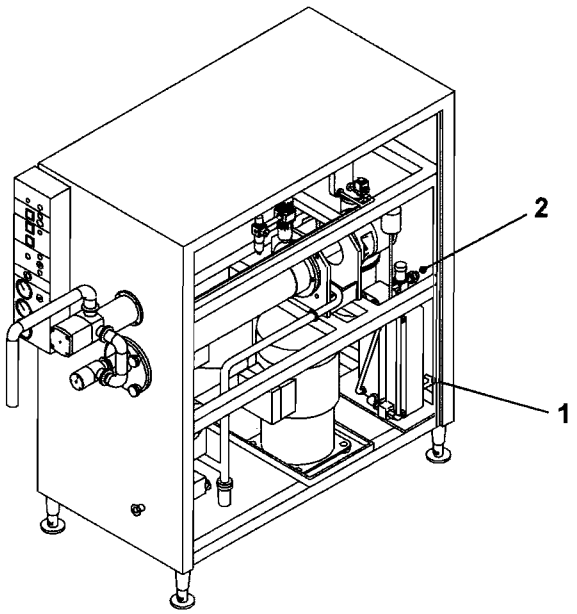
1 Adjustable feet



1.4.4 Connections

1.4.4.1 Cooling water connection

Connect up the supply of condenser cooling water, taking care to get the direction of water flow correct: water must flow in through the connection at the bottom (1) and out through the connection at the top (2). It is recommended that two on/off taps be installed close to the machine, as well as a small drain tap close to the bottom connection; it is also a good idea to connect up these two taps with the machine through two pipe unions (three-piece connectors) to make it easy to separate the freezer from the installation. The machine is fitted with a pressure valve which controls the flow of water in inverse proportion to its temperature to obtain constant cooling (constant condensation pressure on the coolant side); this makes it possible to use water supplies with widely varying temperatures for cooling the condenser. The water flow varies as a result, from about 2000 litres/hour at 5°C to 6000 litres/hour at 28°C (average values for machine in operation at maximum production rate).
Pipe diameter depends on pipe length and the pumps available, and must never be less than the diameter of the connections, which is 1 1/2" gas.
It is essential to wash out the pipes BEFORE connecting them to the machine by flushing them with water to eliminate any particles or dirt. If the water that flows out of the pipes continues to be dirty, it will be necessary to install a filter with a filtering capacity and size appropriate to the type and amount of dirt conveyed at the intake (1) (the bottom connection).Using tower water connecting the feeding to the intermediate inlet and plug bottom inlet (1).



1 Bottom connection
2 Top connection

1.4.4.2 Ice cream intake and outlet connection

Connect the mix supply pipe to the mix pump inlet connection (1) on the front of the machine. The machine has a CIP washing programme permitting thorough, safe washing of the machine without dismantling its parts; it will therefore be necessary to prepare the required connections between the CIP washing pump and solutions and the mix pipe.
Make sure that the mix flows "spontaneously" to the machine connection (1), and does not need to be suctioned by the freezer pump; this may be done by simply positioning the aging vats higher than the freezer (check that the spontaneously flowing supply is sufficient even when the mix level in the containers is low), or by installing a suitable centrifugal pump close to the vats. Take care to ensure that there is no air getting into the pipes, which could pollute the product and result in fluctuation of ice cream overrun.
Connect up the ice cream outlet (2) to the utility. Use the shortest possible pipe, with as few curves as possible, and use a pipe which is shiny inside; the pipe does not need to be insulated. Make sure that ice cream pressure in the cylinders does not exceed 12 bar (the absolute maximum permitted value); if this should occur, move the freezer closer to the ice cream utility and/or use hot gas to produce softer ice cream.

⚠ CAUTION
The inlet mix must be without solid particles as seeds and fruit fibers, etc. These particles should be responsible of extreme wear of the pump. The use of mix with solid particles is to be considered an improper use of the machine and automatically stop the guarantee.

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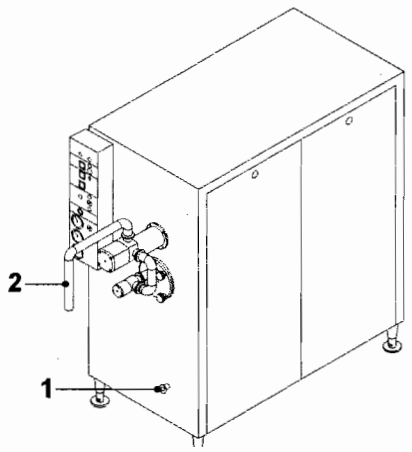


1 Connection
2 Ice cream outlet

(Cont'd)

⚠ CAUTION
Pipes must be dismantled and washed thoroughly after completing this procedure to ensure that no hard solid particles are conveyed toward the freezer mix pump. This is very important as solid particles such as metal burr or welding residues could severely damage the freezer pump and will invalidate the guarantee.

1.4.4.3 Compressed air connection

Connect the compressed air supply pipe to the connection on the rear of the machine; it is recommended that an easily removable tap and connection be assembled close to the machine connection.
The supply pressure measured on the machine must never drop below 4 bar.
It is strongly recommended that the compressed air supply in the place of installation be fitted with an air drying system and A0 filters to remove oil vapours and residual fine particles.
Remove the cartridge of the sterilizing filter from the standard equipment and insert it in the body of the filter.

1.4.4.4 Electrical connection

⚠ WARNING
Electrical connection must be made exclusively by competent technicians who are familiar with safety legislation and authorised to perform and certify electrical installations.

Check the identification plate to make sure that the machine is compatible with the site's power supply. Connect the machine's power supply to the site's distribution panel and protect it with a suitable device, complying with all regulations for correct electrical installation in effect in the place of installation.
We recommend installing an automatic circuit breaker on the distribution panel, complying with local regulations.
Great care must be taken to ensure correct connection with the earth, as incorrect connection could cause severe damage to the machine's electronic parts and injury or death to the operator.
The section of the power supply cable must be determined on the basis of its length and the grid used during testing prior to shipment; if this cable is not long enough, it must be replaced in its

(Cont'd)

(cont'd)

entirety, without making any connections.
The machine's electrical installation includes a device for checking that phase sequence is correct to ensure that the motors turn in the right direction; if the machine does not work after connection, but the touch screen light comes on, two of the three wires in the machine's cable must be reversed on the distribution panel which supplies the machine.

1.4.5 Installation check

Check that connections have been made correctly:

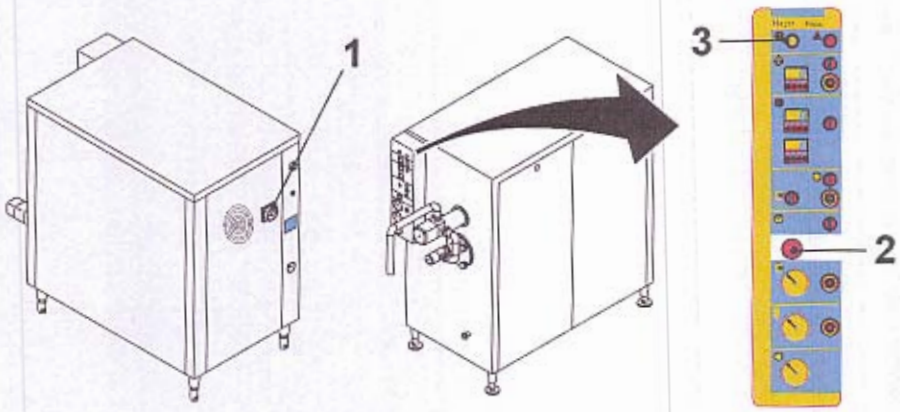
a. Slowly open the cooling water intake tap and check that there are no leaks. Open the outlet tap and check that water can flow freely and that any air in the circuit has been expelled (this involves turning on the machine's cooling compressor because of the pressure valve which blocks the flow of water - see below).

b. Turn on the compressed air supply tap and check that there is no leakage and that pressure is between 4 and 8 bar. If the installation does not have a drier, bleed condensation from the line before turning on the tap on the machine.

c. Turn the main switch on the machine's rear panel to the (1) position.

Release the emergency button (2). Make sure that the panel switches on. Check that the power on light (3) and the indicators come on. If only the power on light (3) comes on, change the direction of rotation of the phases by switching the positions of two wires in the machine's power supply cable on the distribution panel (refer to installation instructions); all motors will then turn correctly in the direction indicated by the arrows in figure

1 Main switch
2 Emergency button
3 Light



1.5 Disposal

If the machine must definitely be demolished, carry out the following operations:
a) Contact personal qualified for the disposal/recovery of the R404A refrigerant gas.
b) Unload the oil from the boxes of the gears. Eliminate the oil following the instructions of the producer.
c) Disassemble completely the machine and separate the following materials:
- stainless steel AISI 304 (EN 14301)
- aluminium (light alloies)
- rubber (estates, or-ring, etc.)
- PETand PVC, PTFE
- electric cables
- pneumatic pipes
- electric components

d) The recycle or the disposal of the materials, groups and components has to be in conformity with the local norms.

2 Maintenance Instructions

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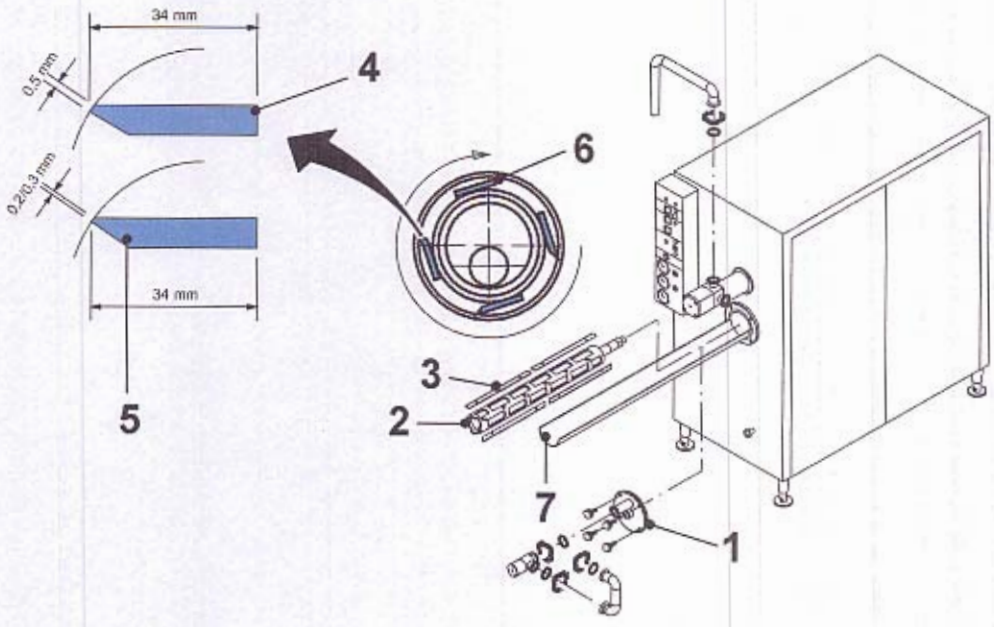
2.1 Frigus SF 1200 C1

2.1.1 Frigus

2.1.1-1 Frigus - Adjust blades

Machine status	Power supply disconnecting device OFF Air valve OFF
Special equipment	Protective gloves
SPC reference	59232300000

a) Dismantle the cover cylinder (1).
b) Remove the dasher (2) and the blades (3).
c) If the edge of the blade is not in perfect condition may be sharpened.
d) This requires use of a special machine. The blade needs sharpening if the width of the cutting end exceeds 0.5 mm (4).
e) After sharpening the thickness of the cutting edge must be minimum 34 mm (5). If the width is lower it is necessary to replace the blades
f) The blades must be assembled in their pins so that they can tilt when the dasher rotates.
g) It is important to assemble the blades as shown (6).
To prevent blows that could damage the freezer cylinder, a "shaft protection" is supplied. The protection (7) must be positioned on the cylinder as shown in the figure.
h) Reassemble the dasher (2), attention to not damage the bottom of cylinder, and the cover cylinder (1).



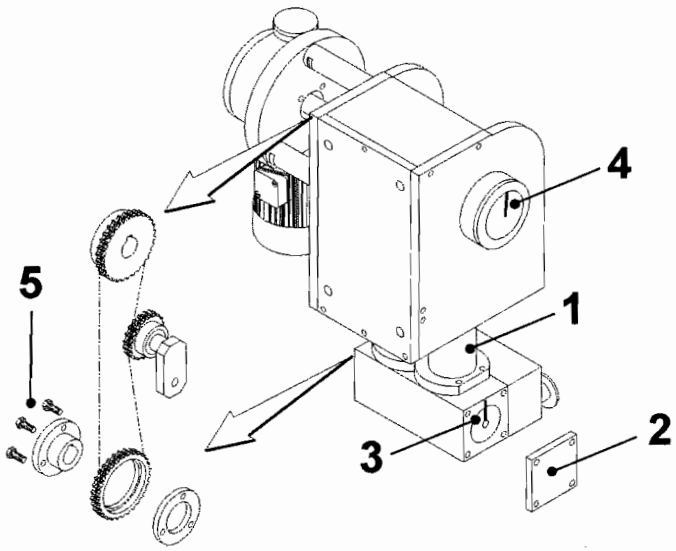
1 Cover
2 Dasher
3 Blades
4 Blade 0,5 mm
5 Blade 34 mm
6 Blade assembly
7 Protection

2.1.1-2 Frigus - Check pump alignment

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020112

a) Position the piston (1) at the bottom dead point on the shaft.
b) Remove the rotor cover (2) and check that the reference notch on the rotor (3) is vertical and faces with the notch positioned (4) on the upper rotor.
c) If the position of the notches in not correct, align them.
d) Slacken the chain tensioner, slacken the screws (5) anchoring the rotor pulley and aling the rotor notch in the correct position described in point b.
e) Tighten the screws (5) of the rotor pulley.
f) Tighten the chain with the chain tensionser.

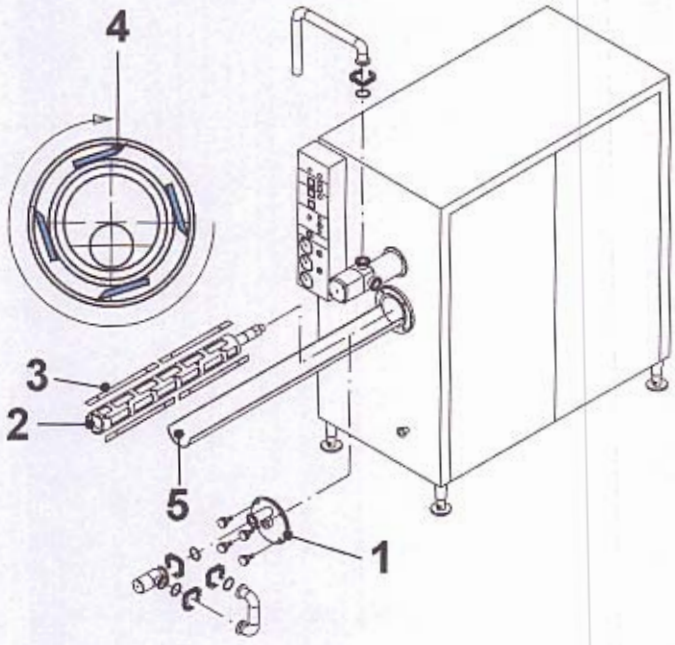
1 Piston
2 Cover
3 Rotor reference notch
4 Upper rotor reference notch
5 Screws



2.1.1-3 Frigus - Change blades

Machine status	Power supply disconnecting device OFF Air valve OFF
Special equipment	Protective gloves
SPC reference	13020421

a) Dismantle the cover cylinder (1).
b) Remove the dasher (2) and the blades (3).
c) The new blades must be assembled in their pins so that they can tilt when the dasher rotates.
d) It is important to assemble the blades as shown (4).
To prevent blows that could damage the freezer cylinder, a "shaft protection" is supplied. The protection (5) must be positioned on the cylinder as hown in the figure.
e) Reassemble the dasher (2), attention to not damage the bottom of cylinder, and the cover cylinder (1).



1 Cover cylinder
2 Dasher
3 Blades
4 Blades assembly
5 Protection

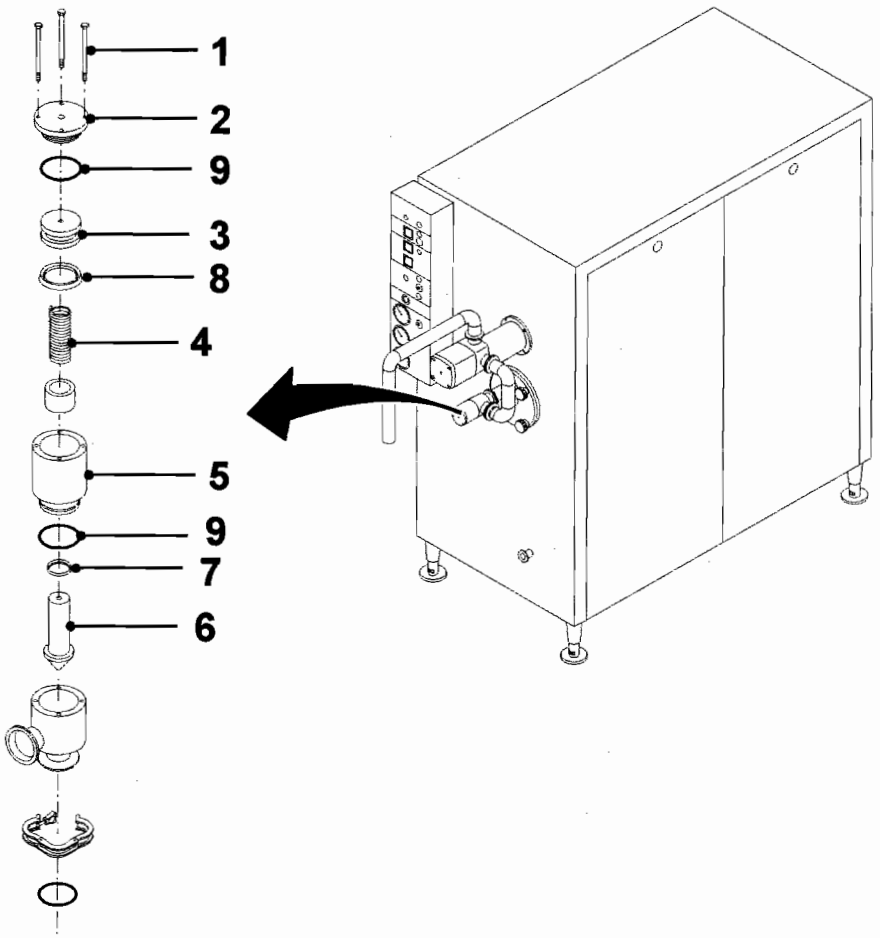
2.1.2 Check valve

2.1.2-1 Check valve - Change gasket and spring

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020025

a) Unscrew the screws (1) and dismantle the cap (2).
b) Remove the piston (3) and the spring (4).
c) remove the upper body (5) and the piston (6).
d) Remove the gaskets (7)-(8)-(9).
e) Change gaskets (7)-(8)-(9) and spring (4).
f) Reassembly carefully in inverse order.

1 Screw
2 Cap
3 Piston
4 Spring
5 Upper body
6 Piston
7 Gasket
8 Gasket
9 Gasket



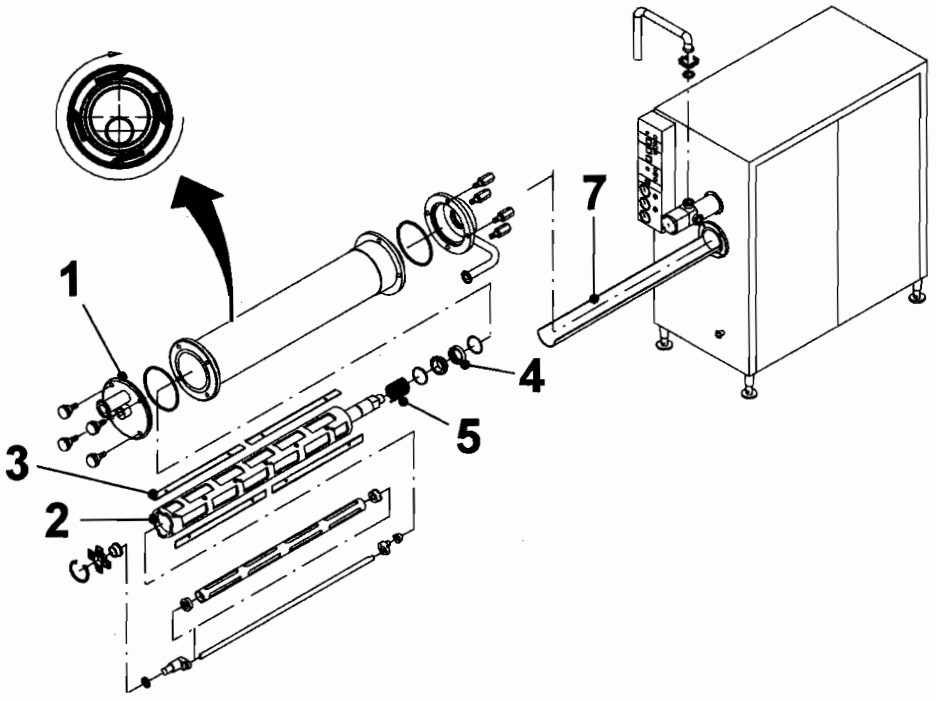
2.1.3 Dasher

2.1.3-1 Dasher - Adjust rotating seal

Machine status	Power supply disconnecting device OFF Air valve OFF
Special equipment	Protective gloves
SPC reference	13020421

a) Dismantle the cover cylinder (1).
b) Remove the dasher (2) and the blades (3).
c) Remove the rotating seal (4).
d) The rotating seal (4) has a housing made of hard metal which, under pressure from the spring (5), rotates against the bush.
e) Check that the surface of the housing has no scratches which could affect its hold.
f) Use fine emery paper to polish the surface. Rub them first against a very hard surface (mirror), then against one another.
g) The blades must be assembled in their pins so that they can tilt when the dasher rotates.
h) It is important to assemble the blades as shown (6).
To prevent blows that could damage the freezer cylinder, a "shaft protection" is supplied. The protection (7) must be positioned on the cylinder as hown in the figure.
i) Reassemble carefully in inverse order, attention to not damage the bottom of cylinder.

1 Cover cylinder
2 Dasher
3 Blades
4 Rotating seal
5 Spring
6 Blades assembly
7 Protection



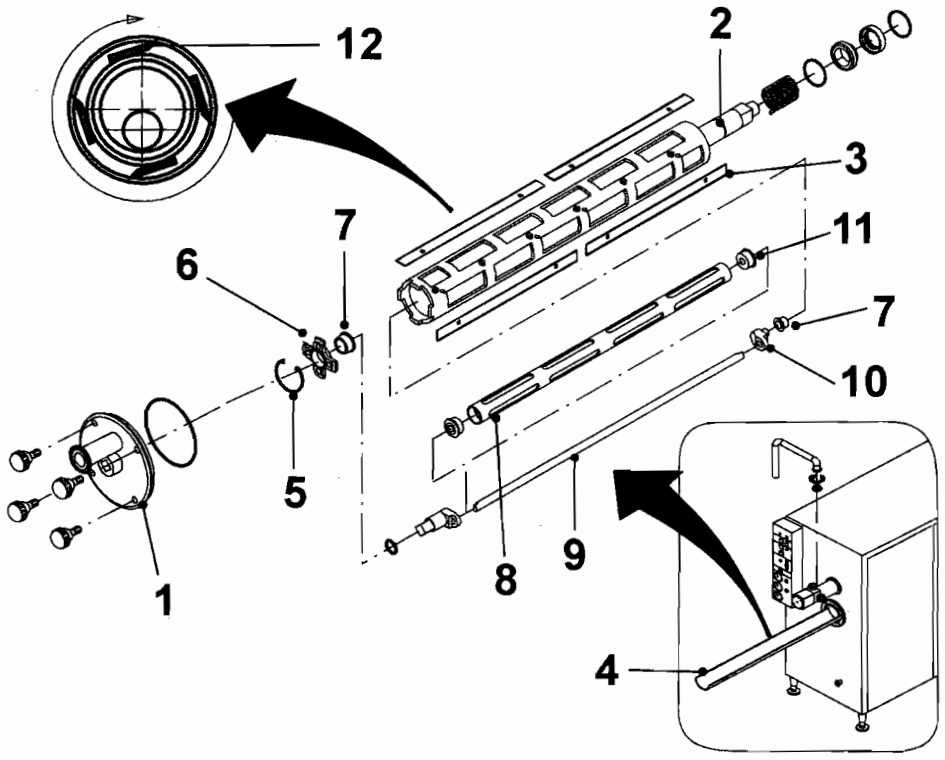
2.1.3-2 Dasher - Check eccentric

Machine status	Power supply disconnecting device OFF Air valve OFF
Special equipment	Protective gloves
Consumables	Atomic T 1938 Longlife grease EP Low temp
SPC reference	13020421

a) Dismantle the cover cylinder (1).
b) Remove the dasher (2) and the blades (3).
c) Check that the eccentric (8-9-10-11) turns freely inside the dasher (2).
d) If this in not the case, dismantle the elastic ring (5) and remove the support (6), the eccentric (8-9-10-11) from the dasher (2) and check the condition of the bushings (7).
e) Check that the internal pipe (8) turns freely around the rod (9).
f) If this is not the case, dismantle the pins (10), the rod (9) and check the condition of the bushings (11).
g) Lubricate the bushings before reassembling the dahser.

(Cont'd)

1 Cover cylinder
2 Dasher
3 Blades
4 Protection
5 Elastic ring
6 Support
7 Bushing
8 Internal pipe
9 Rod
10 Pins
11 Bushings
12 Blades assembly



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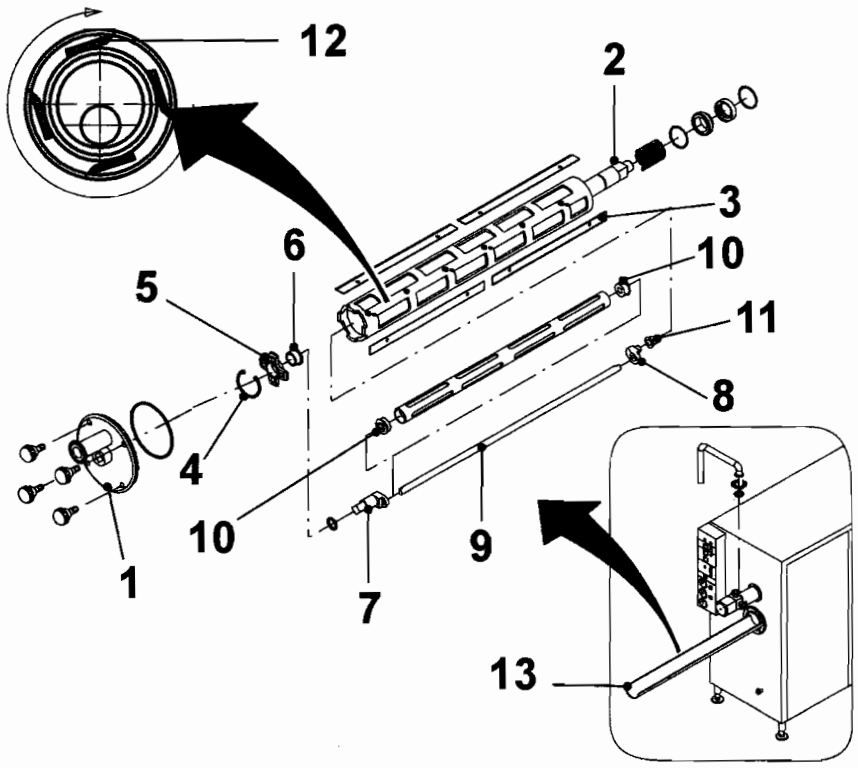
h) The blades must be assembled in their pins so that they can tilt when the dasher rotates.
i) It is important to assemble the blades (12) as shown.
To prevent blows that could damage the freezer cylinder, a protection is supplied. The protection (4) must be positioned on the cylinder as shown in the figure.
j) Reassemble carefully in inverse order, attention to not damage the bottom of the cylinder.

2.1.3-3 Dasher - Change bushings

Machine status	Power supply disconnecting device OFF Air valve OFF
Special equipment	Protective gloves
Consumables	Atomic T 1938 Longlife grease EP Low temp
SPC reference	13020421

a) Dismantle the cover cylinder (1).
b) Remove the dasher (2) and the blades (3).
c) Dismantle the elastic ring (4) and remove the support (5), the bushing (6), the pins (7)-(8), the rod (9), the bushings (10) and the bushing (11) from the dasher (2).
d) Change the bushings (6)-(10)-(11).
e) Lubricate the bushings before reassembling the dasher.
f) The blades must be assembled in their pins so that they can tilt when the dasher rotates.
g) It is important to assemble the blades (12) as shown.
To prevent blows that could damage the freezer cylinder, a protection is supplied. The protection (13) must be positioned on the cylinder as shown in the figure.
h) Reassemble carefully in inverse order, attention to not damage the bottom of the cylinder.

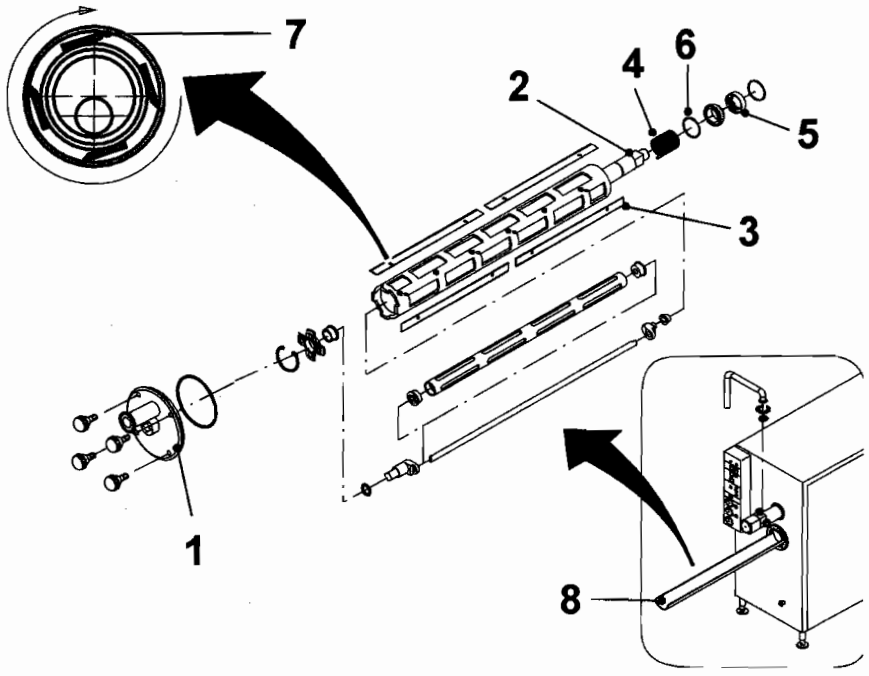
1 Cover cylinder
2 Dasher
3 Blades
4 Elastic ring
5 Support
6 Bushing
7 Pin
8 Pin
9 Rod
10 Bushing
11 Bushing
12 Blades assembly
13 Protection



2.1.3-4 Dasher - Change rotating seal, gasket and spring

Machine status	Power supply disconnecting device OFF Air valve OFF
Special equipment	Protective gloves
SPC reference	13020421

a) Dismantle the cover cylinder (1).
b) Remove the dasher (2) and the blades (3).
c) Remove the spring (4). the rotating seal (5) and the gasket (6).
d) Change the spring (4). the rotating seal (5) and the gasket (6).
e) The blades must be assembled in their pins so that they can tilt when the dasher rotates.
d) It is important to assemble the blades (7) as shown.
To prevent blows that could damage the freezer cylinder, a protection is supplied. The protection (8) must be positioned on the cylinder as shown in the figure.
g) Reassemble carefully in inverse order, attention to not damage the bottom of the cylinder.



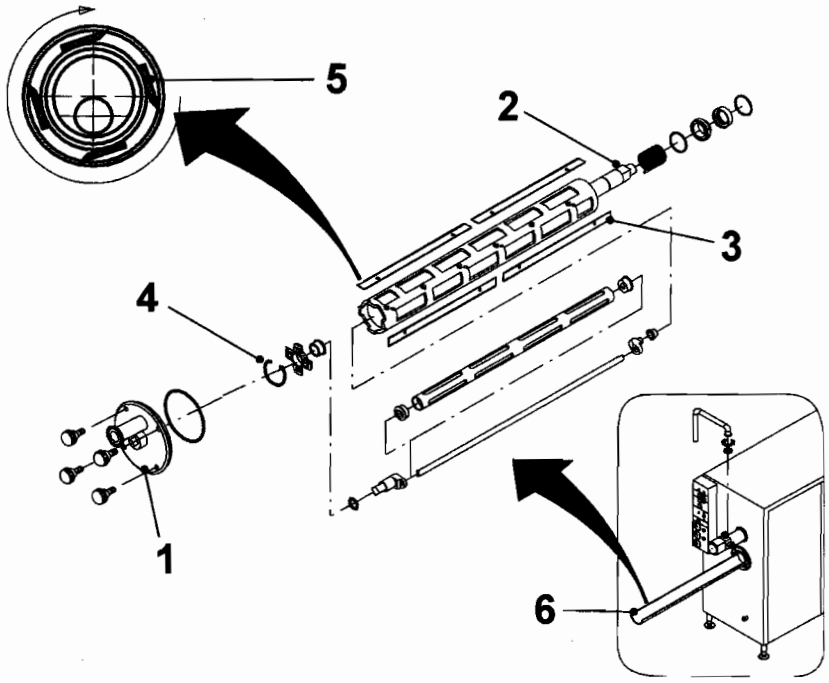
1 Cover cylinder
2 Dasher
3 Blades
4 Spring
5 Rotating seal
6 Gasket
7 Blades assembly
8 Protection

2.1.3-5 Dasher - Change elastic ring

Machine status	Power supply disconnecting device OFF Air valve OFF
Special equipment	Protective gloves
SPC reference	13020421

a) Dismantle the cover cylinder (1).
b) Remove the dasher (2) and the blades (3).
c) Remove the elastic ring (4).
d) Change the elastic ring (4).
e) The blades must be assembled in their pin so that they can tilt when the dasher rotates.
f) It is important to assemble the blades (5) as shown.
To prevent blows that could damage the freezer cylinder, a protection is supplied. The protection (6) must be positioned on the cylinder as shown in the figure.
g) Reassemble carefully in inverse order, attention to not damage the bottom of the cylinder.

1 Cover cylinder
2 Dasher
3 Blades
4 Elastic ring
5 Blades assembly
6 Protection



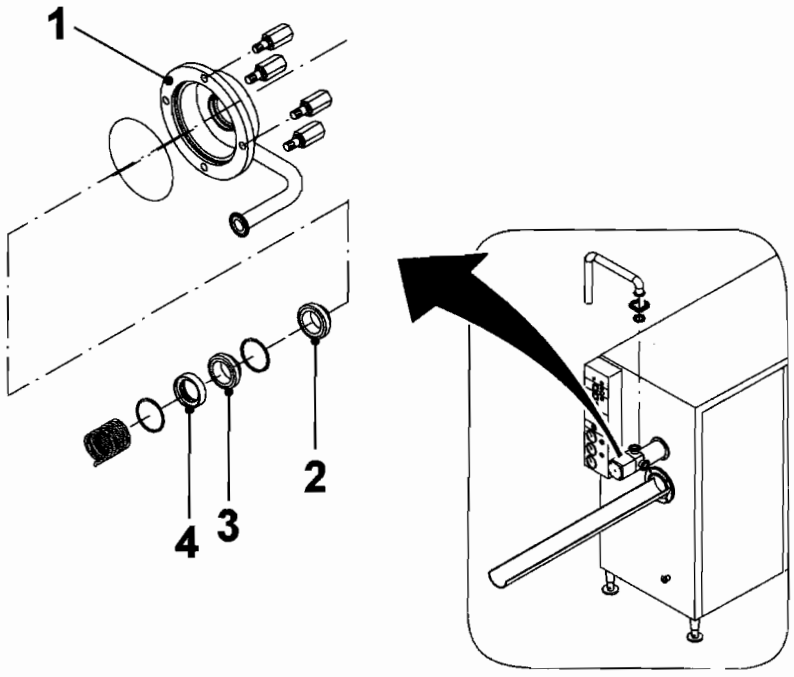
2.1.4 Cylinder

2.1.4-1 Cylinder - Check ring

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020400

a) Dismantle the connecting pipe.
b) Remove the bottom (1).
c) Unscrew the ring nut (2) and remove the ring (3).
d) Check that the surface of the housing has no scratches which could affect its hold.
e) Use fine emery paper to polish the surface. Rub them first against a very hard surface (mirror) then against rub them one against the other the ring (3) and rotating seal (4) of dasher.
f) Reassemble carefully in inverse order.

1 Bottom
2 Ring nut
3 Ring
4 Rotating seal

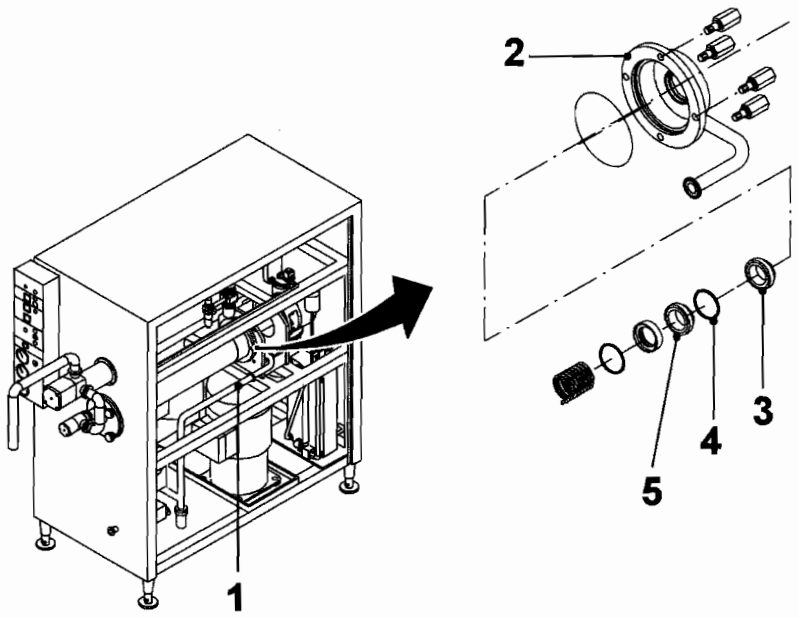


2.1.4-2 Cylinder - Change ring and gasket

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020400

a) Dismantle the connecting pipe (1).
b) Remove the bottom (2).
c) Unscrew the ring nut (3) and remove the ring (4) and the gasket (5).
d) Change the ring (4) and the gasket (5).
e) Reassemble carefully in inverse order.

1 Connecting pipe
2 Bottom
3 Ring nut
4 Ring
5 Gasket

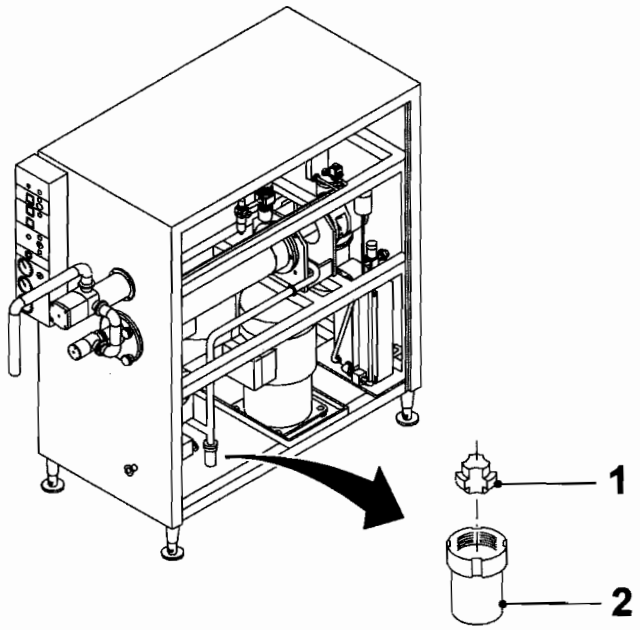


2.1.4-3 Cylinder - Change shutter

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020400

a) Dismantle the cup (1).
b) Remove the shutter (2).
c) Change the shutter (2)
d) Reassemble carefully in inverse order.

1 Cup
2 Shutter

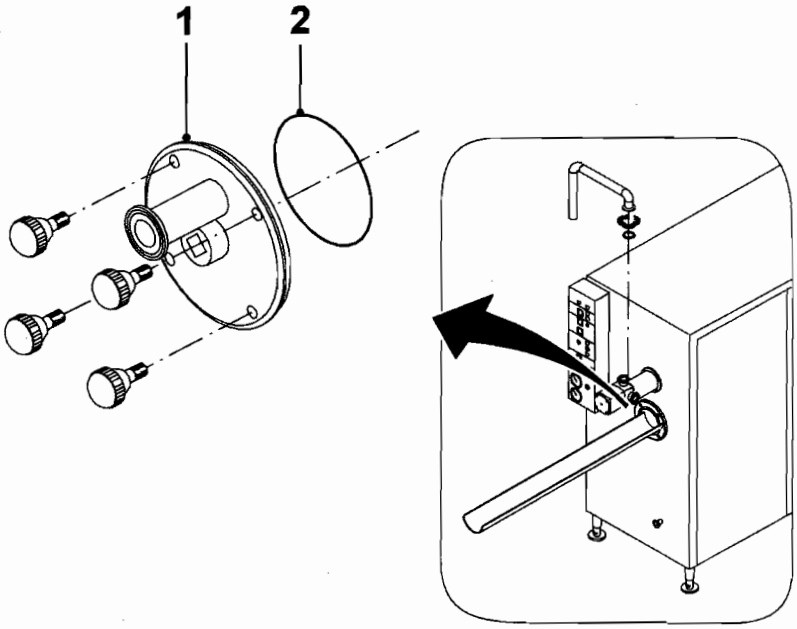


2.1.4-4 Cylinder - Change gasket

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020400

a) Dismantle the upper part of the cylinder (1).
b) Remove the gasket (2).
c) Change the gasket (2)
d) Reassemble carefully in inverse order.

1 Upper part of the cylinder
2 Gasket

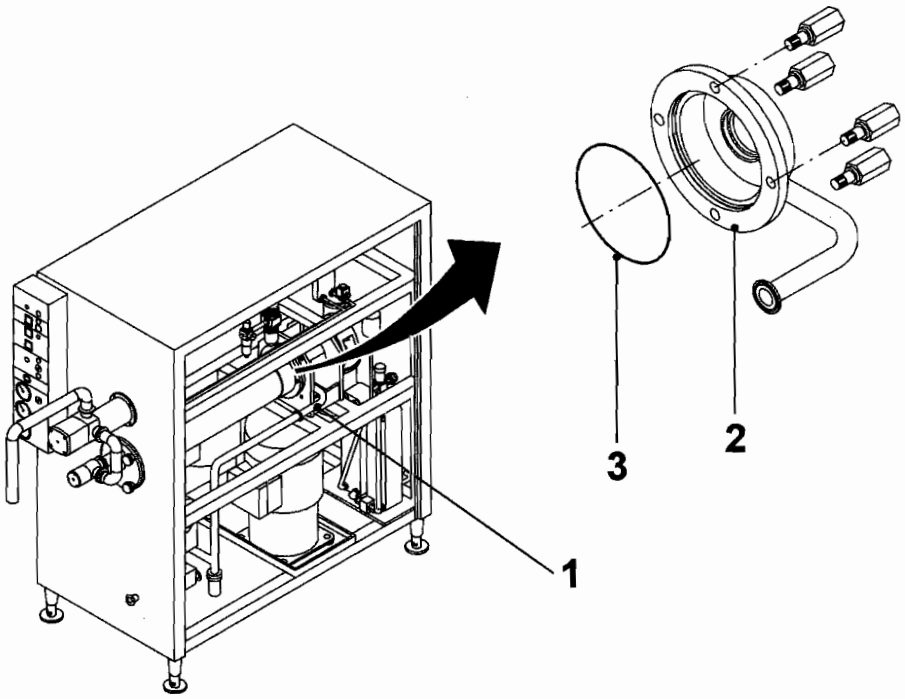


2.1.4-5 Cylinder - Change gasket

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020400

a) Dismantle the connecting pipe (1).
b) Remove the bottom (2).
c) Remove the gasket (3).
d) Change the gasket (3)
e) Reassemble carefully in inverse order.

1 Connecting pipe
2 Bottom
3 Gasket

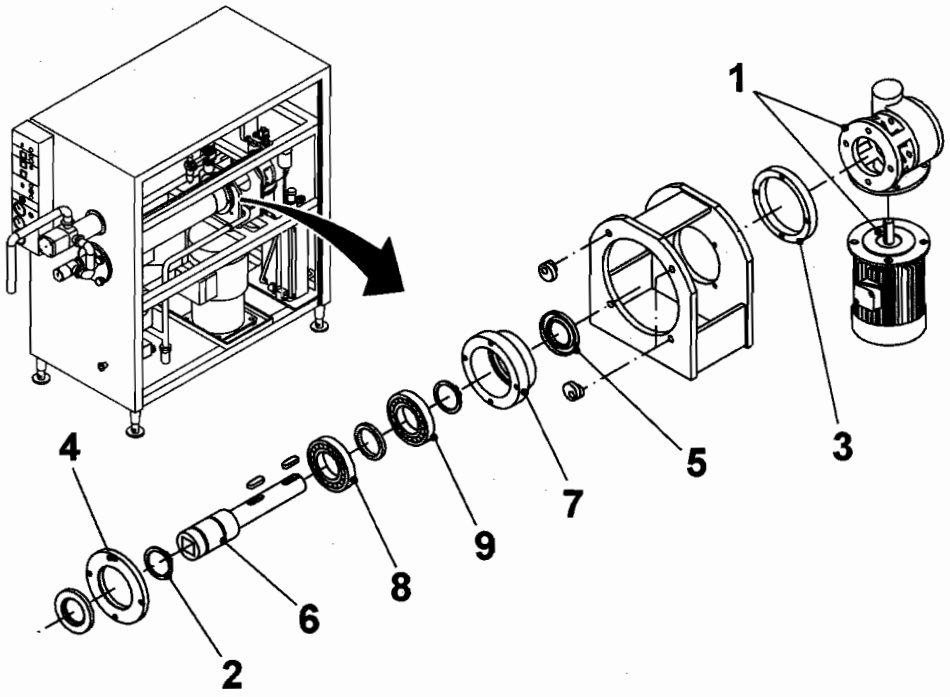


2.1.4-6 Dasher motor drive - Change bearings

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020400

a) Dismantle the motor and the reducer (1).
b) Dismantle the cover (4) and the centering ring (3).
c) Dismantle the seeger (2) and the gasket (5).
d) Remove the bearing holder bushing (7) and the shaft (6) from the side of the reducer.
e) Remove the bearings (8) (9).
f) Change the bearings (8) (9).
g) Reassemble carefully in inverse order.
h) Check that the shaft (6) correctly rotates.

1 Motor and reducer
2 Cover
3 Centering
4 Seeger
5 Gasket
6 Shaft
7 Bearing holder bushing
8 Bearing
9 Bearing

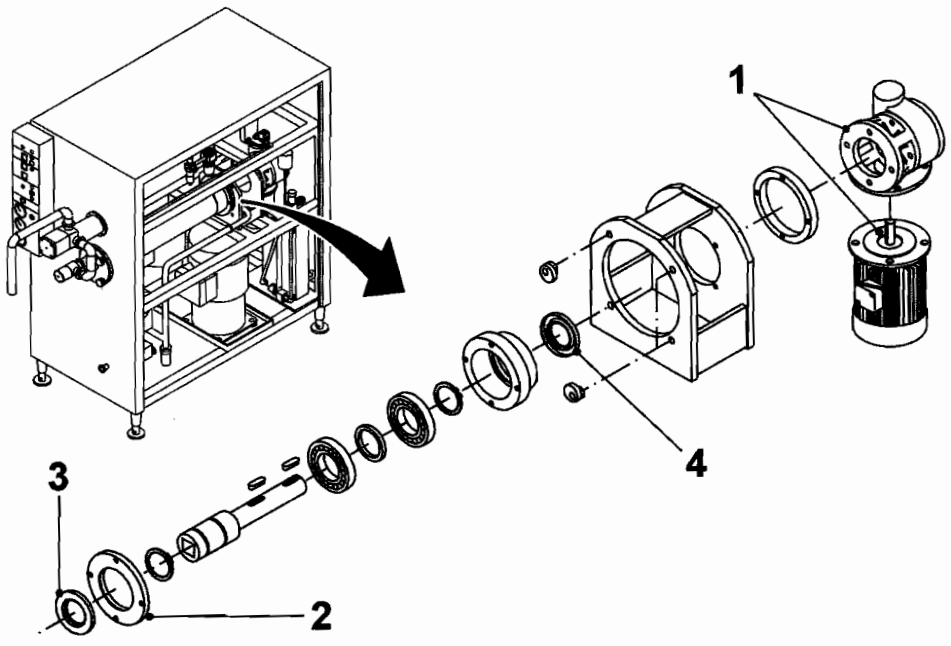


2.1.4-7 Dasher motor drive - Change gaskets

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020400

a) Dismantle the motor and the reducer (1).
b) Remove the ring (2) unscrewing the dowel-lock.
c) Remove and chage the gasket (3) from the ring (2).
d) Remove the gasket (4).
e) Change the gasket (4).
f) Reassemble carefully in inverse order.

1 Motor and reducer
2 Ring
3 Gasket
4 Gasket

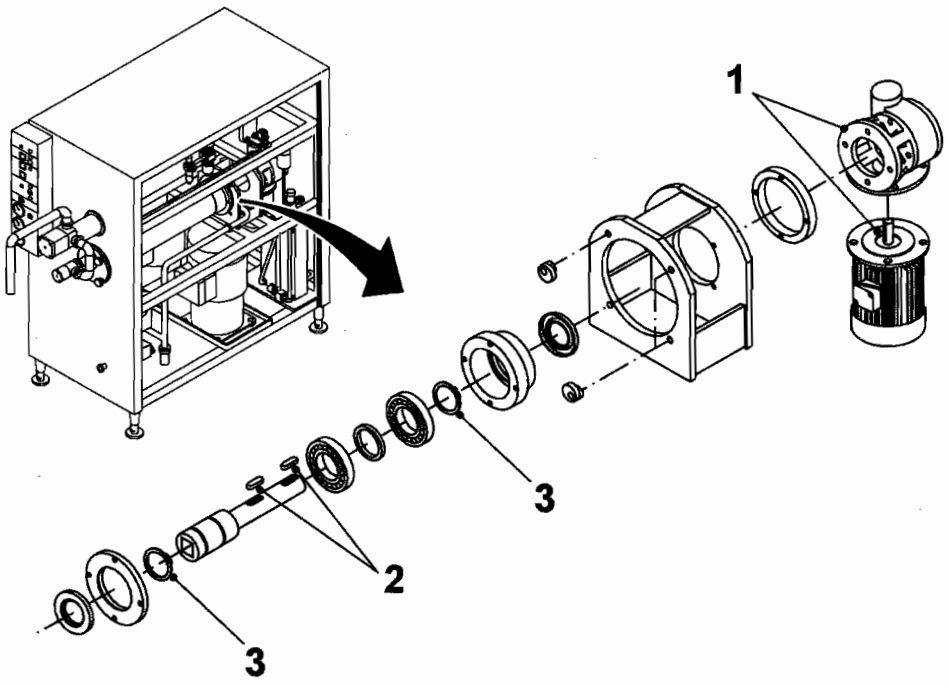


2.1.4-8 Dasher motor drive - Change keys and seeger

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020400

a) Dismantle motor and reducer (1).
b) Remove the keys (2) and seeger (3).
c) Change keys (2) and seeger (3).

1 Motor and reducer
2 Keys
3 Seeger

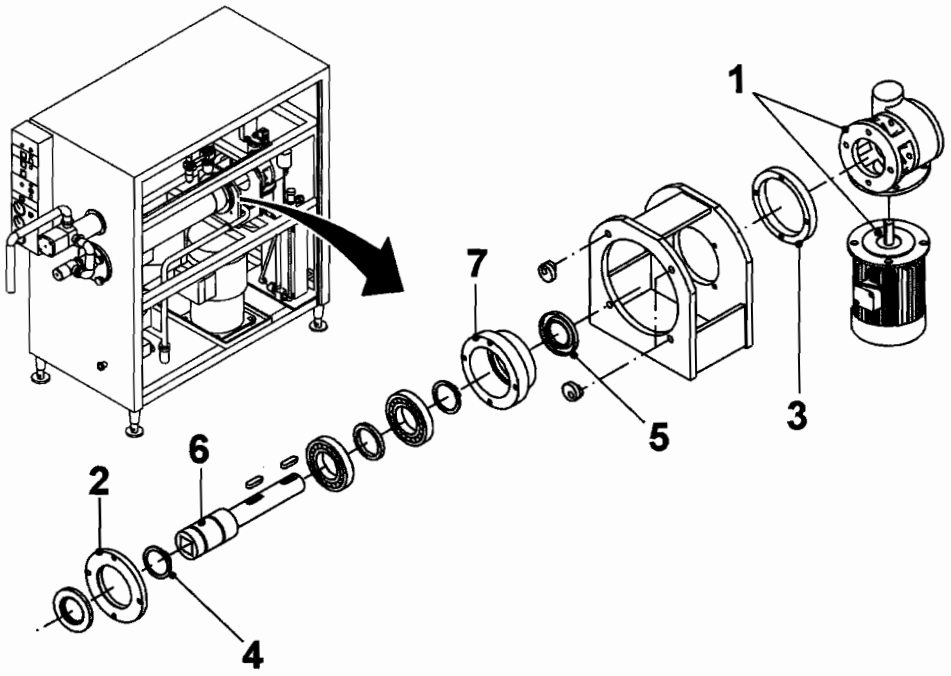


2.1.4-9 Dasher motor drive - Change shaft

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020400

a) Dismantle motor and reducer (1).
b) Dismantle the cover (2) and the centering ring (3).
c) Dismantle the seeger (4) and the gasket (5).
d) Remove the bearing holder bushing (7) and the shaft (6) from the side of the reducer.
e) Change the shaft (6).
f) Reassemble carefully in inverse order.
g) Check the shaft (6) correctly rotates.

1 Motor and reducer
2 Cover
3 Centering ring
4 Seeger
5 Gasket
6 Shaft
7 Bearing holder bushing



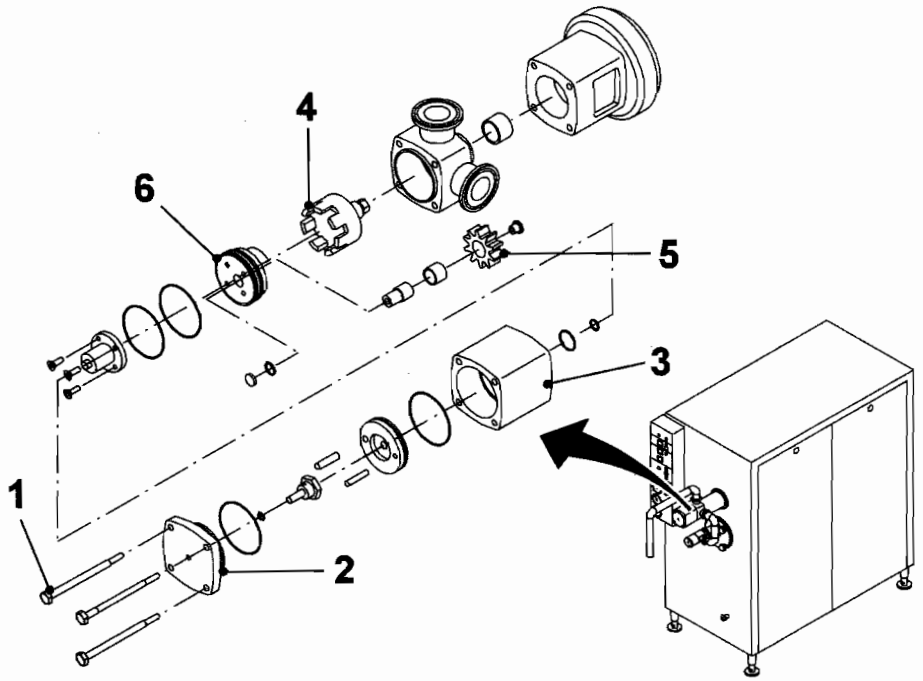
2.1.5 Pump

2.1.5-1 Pompa - Change impeller, wheel and protection

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020004

a) Unscrew the screws (1), dismantle the cover (2) and the pump body (3).
b) Remove the impeller (4), the wheel (5) and the protection (6).
c) Change the impeller (4), the wheel (5) and the protection (6).
d) Reassemble carefully in inverse order.

1 Screw
2 Cover
3 Pump body
4 Impeller
5 Wheel
6 Protection

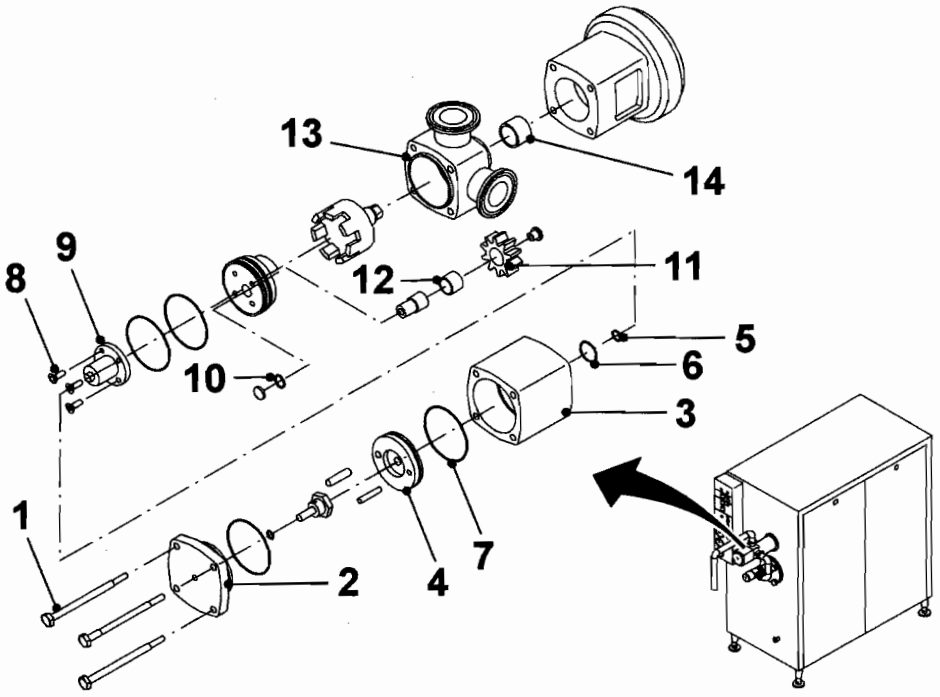


2.1.5-2 Pump - Change gaskets, bushings and screws

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020004

a) Unscrew the screws (1), dismantle the cover (2) and the pump body (3).
b) Remove the piston (4).
c) Remove the gaskets (5) (6) (7).
d) Unscrew the screws (8) and remove the rod (9).
e) Remove the gasket (10).
f) Remove the wheel (11).
g) Remove the bushing (12).
h) Remove the pump body (13).
i) Remove the bushing (14).
l) Change the gaskets (5) (7) (6) (10), the bushings (12) (14) and the screws (8).
m) Reassemble carefully in inverse order.

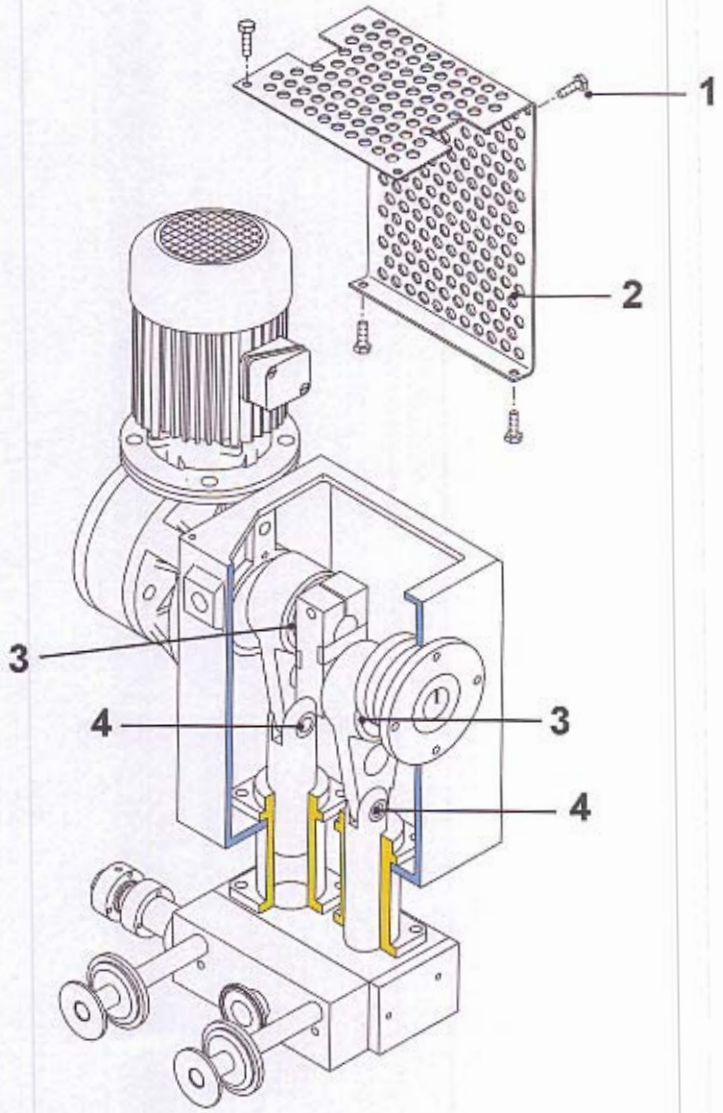
1 Screws
2 Cover
3 Pump body
4 Piston
5 Gasket
6 Gasket
7 Gasket
8 Screw
9 Rod
10 Gasket
11 Wheel
12 Bushing
13 Pump body
14 Bushing



2.1.5-3 Pump - Lubricate bearings

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020112

a) Unscrews the screws (1) and dismantle the protection (2).
b) Lubricate the bearings (3) (4) of the connecting rods with the apposite lubricators.
c) Reassemble the protection (2).



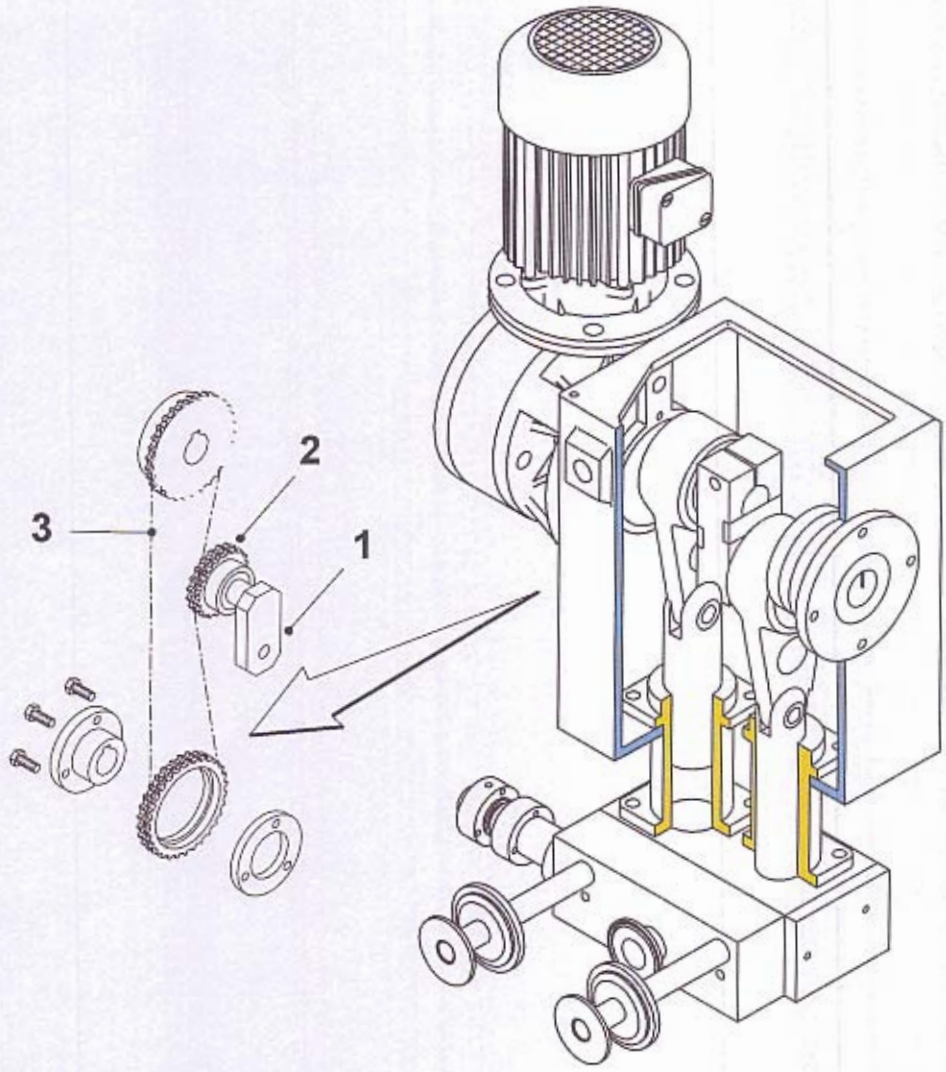
1 Screw
2 Protection
3 Bearing
4 Bearing

2.1.5-4 Pump - Adjust chain

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020101

a) Slacken the screw (1) of the tensioner (2).
b) Tension the chain (3) and tighten the screw (1).

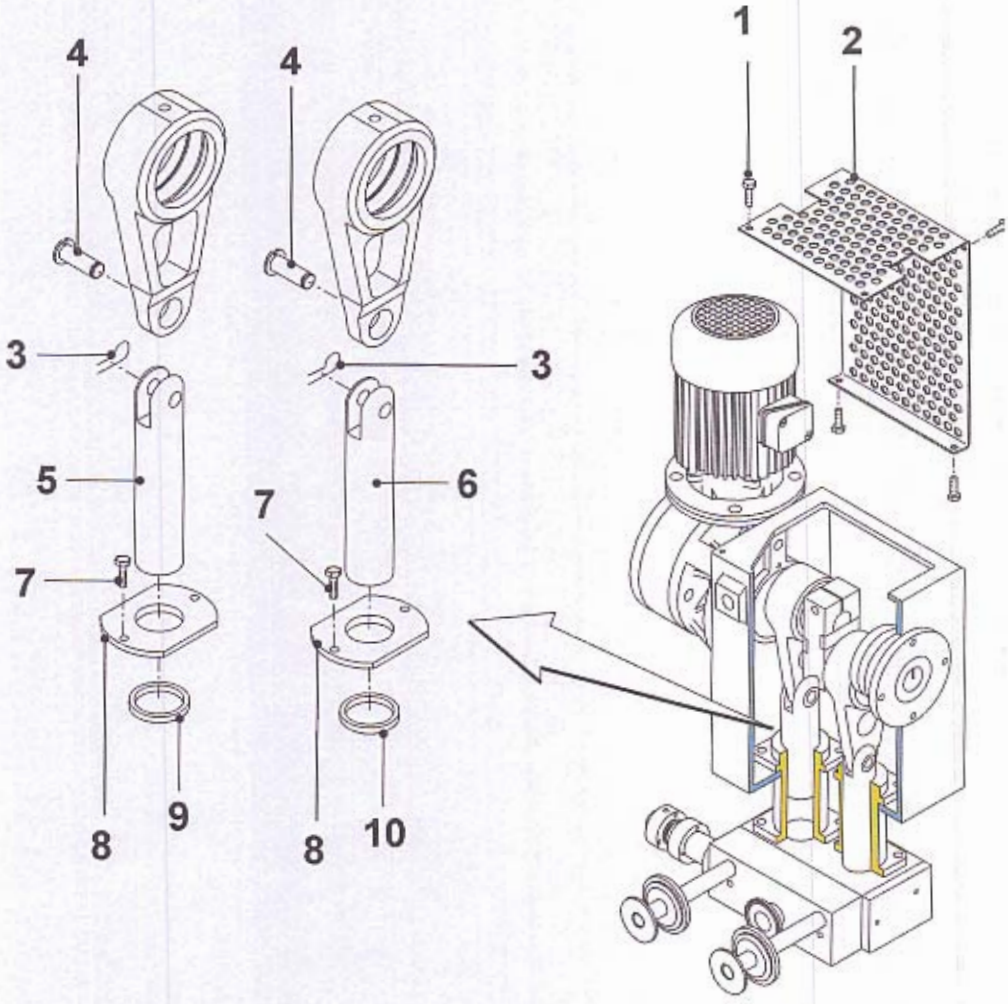
1 Screw
2 Tensioner
3 Chain



2.1.5-5 Pump - Change gaskets

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020112

a) Unscrew the screws (1) and dismantle the protection (2).
b) Extract the splits (3) and the pins (4) connecting the pistons (5) (6) to the connecting rods.
c) Extract the pistons (5) (6).
d) Unscrew the screws (7) and dismantle the gasket plates (8).
e) Extract the gaskets (9) (10).
f) Change the gaskets (9) (10) taking care not to pinch them.
g) Reassemble carefully in inverse order.

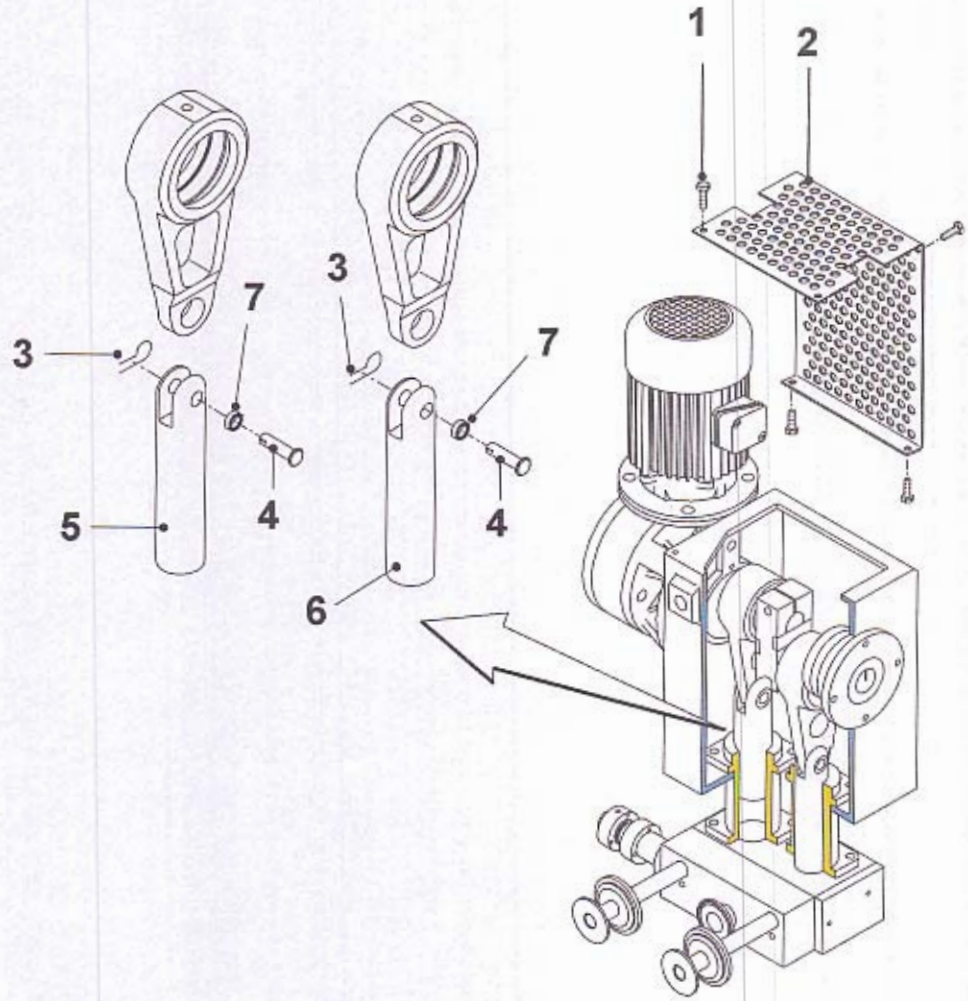


1 Screw
2 Protection
3 Split
4 Pin
5 Piston
6 Piston
7 Screw
8 Plate
9 Gasket
10 Gasket

2.1.5-6 Pump - Change pins, bearings, splits

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020112

a) Unscrew the screws (1) and dismantle the protection (2).
b) Remove the splits (3) and the pins (4) connecting pistons (5) (6) to the connecting rods.
c) Remove the bearings (7).
d) Replace the pins (4), the bearings (7) and the splits (3).
e) Reassemble carefully in inverse order.

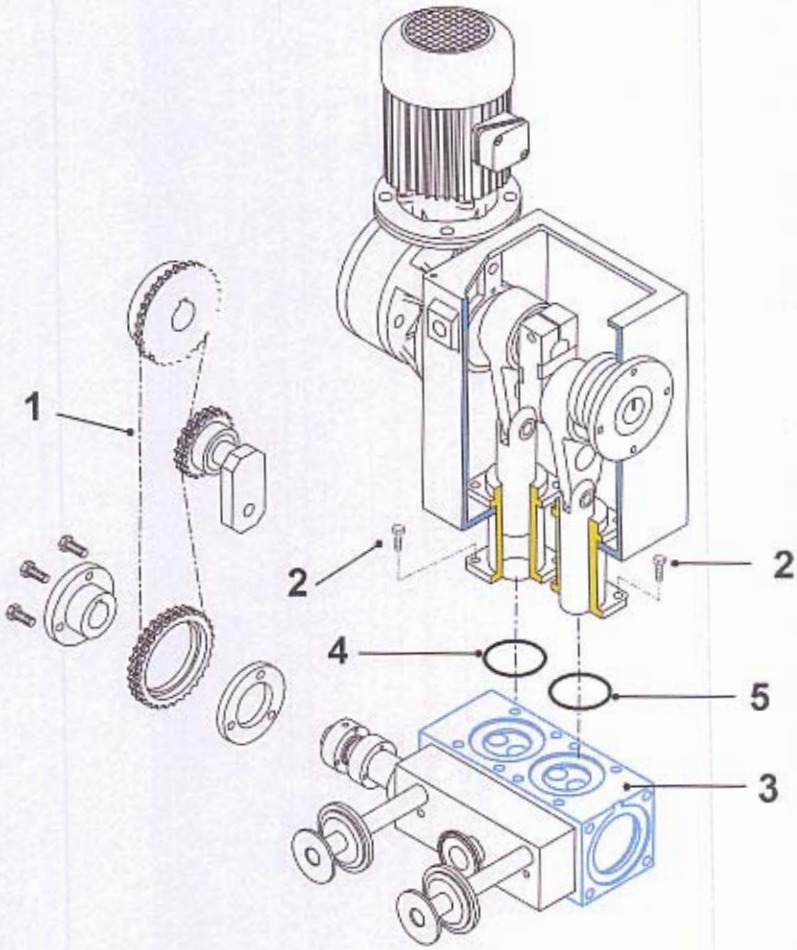


1 Screw
2 Protection
3 Split
4 Pin
5 Piston
6 Piston
7 Bearing

2.1.5-7 Pump - Change gaskets

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020112

a) Dismantle and remove the chain (1).
b) Unscrew the screws (2) positioned between cyilnders and distributor block (3).
c) Dismantle the distributor block (3).
d) Extract the gaskets (4) (5).
e) Change the gaskets (4) (5).
f) Reassemble carefully in inverse order.
h) For pump alignment see procedure 2.1.1-2 Frigus - Check pump alignment.
i) For tensioner the chain see procedure 2.1.5-4 Pump - Adjust chain.

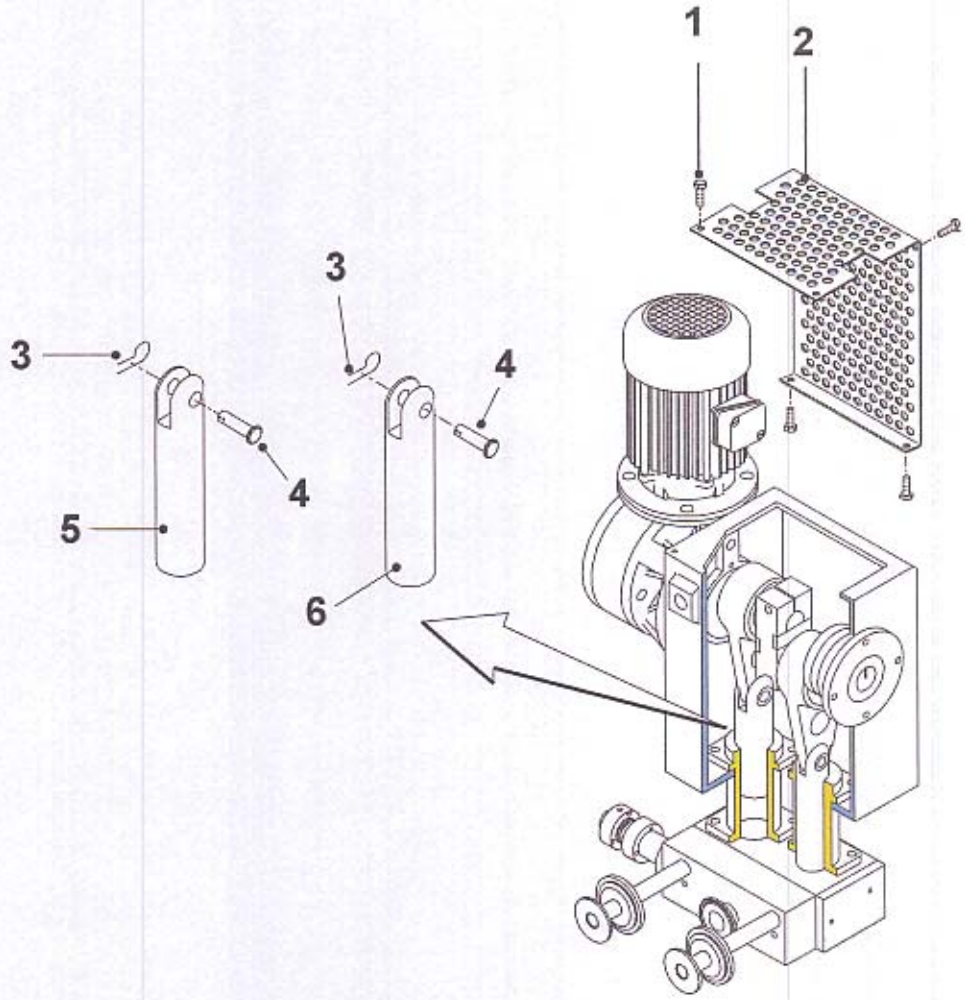


1 Chain
2 Screw
3 Distributor block
4 Gasket
5 Gasket

2.1.5-8 Pump - Change pistons

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020112

a) Unscrew the screws (1) and dismantle the protection (2).
b) Extract the splits (3) and pins (4) connecting the pistons (5) (6) to the connecting rods,
c) Remove the pistonsi (5) (6).
d) Change the pistons (5) (6).
e) Reassemble carefully in inverse order.



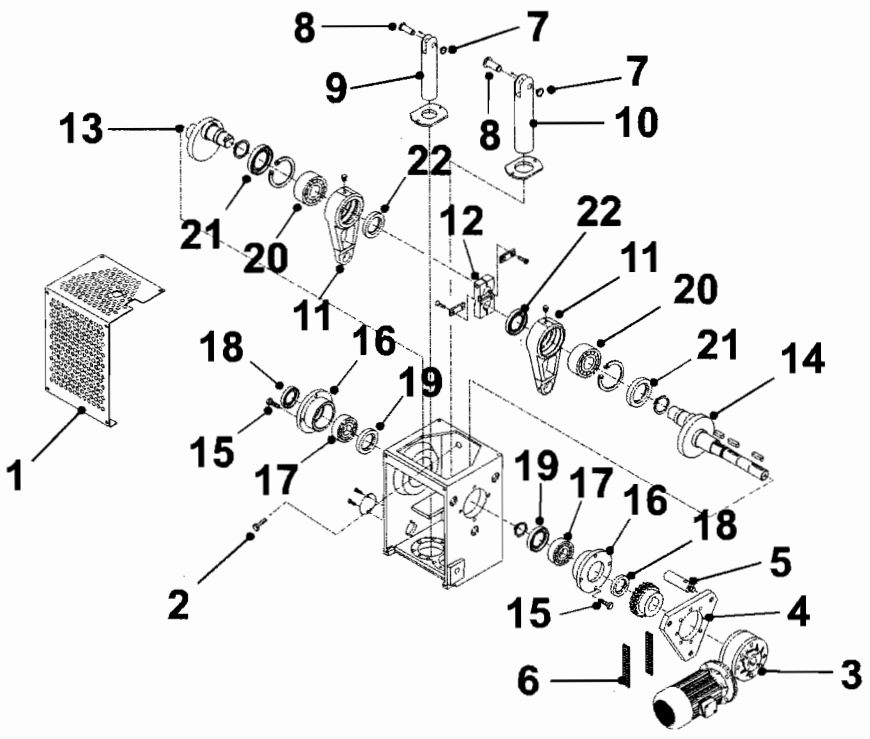
1 Screw
2 Protection
3 split
4 Pin
5 Piston
6 Piston

2.1.5-9 Pump - Change gaskets, bearings and chain

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020112

a) Dismantle the protection (1), siwtch off the electric cable from the pump motor and extract the pump from the machine unscrewing the bolts (2).
b) Slacken the screw of the tensioner and extract the chain (6).
c) Dismantle the gearmotor (3) and the plate (4) unscrewing the bolts of the columna (5).
d) Remove the elastic rings (7) and the pins (8) connecting the pistons (9) (10) to the connecting rods (11).
e) Slacken the blockign screws (12) of the half shafts (13) (14).
f) Unscrew the screws (15) and dismantle the flanges (16) and extract the bearings (17) and the gaskets (18) (19).
g) Extract from the connecting rods (11) the half shafts (13) (14), the bearings (20) and the gaskets (21) (22).
h) Change the bearings (17) (20), the gaskets (18) (19) (21) (22) and the chain (6).
i) Reassemble carefully in inverse order.
l) For pump alignment see procedure 2.1.1-2 Frigus - Check pump alignment.
m) For tensioner the chain see procedure 2.1.5-4 Pump - Adjust chain.

1 Protection
2 Bolt
3 Gearmotor
4 Plate
5 Column
6 Chain
7 Elastic ringsi
8 Pin
9 Piston
10 Piston
11 Connecting rod
12 Screw
13 Half shaft
14 Half shaf
15 Screw
16 Flange
17 Bearing
18 Gasket
19 Gasket
20 Bearingi
21 Gasket
22 Gasket

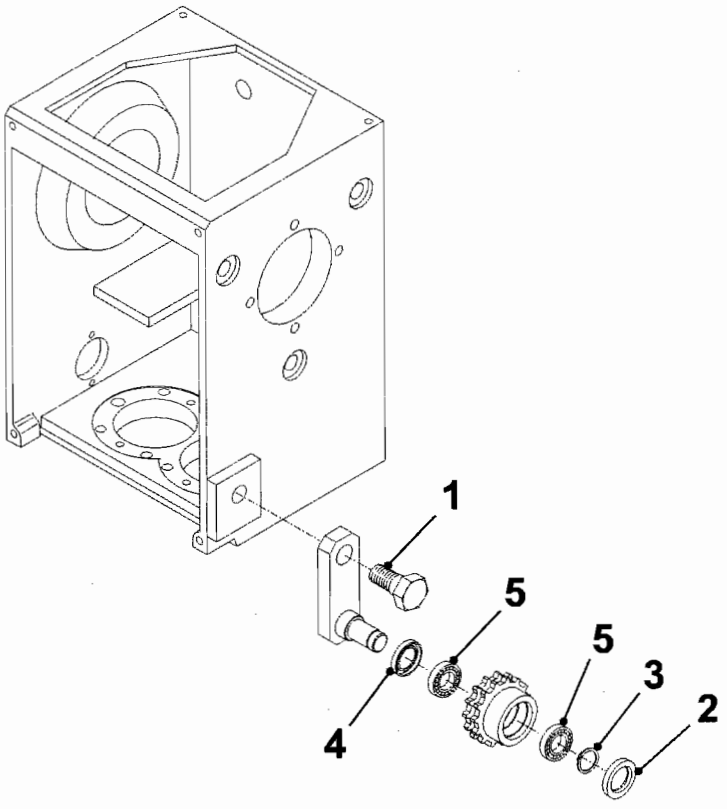


2.1.6 Pump belt tightener

2.1.6-1 Tightener - Change gaskets, bearings and seeger

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020101

a) Slacken the screw (1) of tightener.
b) Extract the gasket (2) and dismantle the seeger (3).
c) Extract the gasket (4) and the bearings (5).
d) Change the gaskets (2) (4) and the bearings (5).
e) Reassemble carefully in inverse order.
f) For tighten up the chain see procedure 2.1.5-4 Pump - Adjust chain.



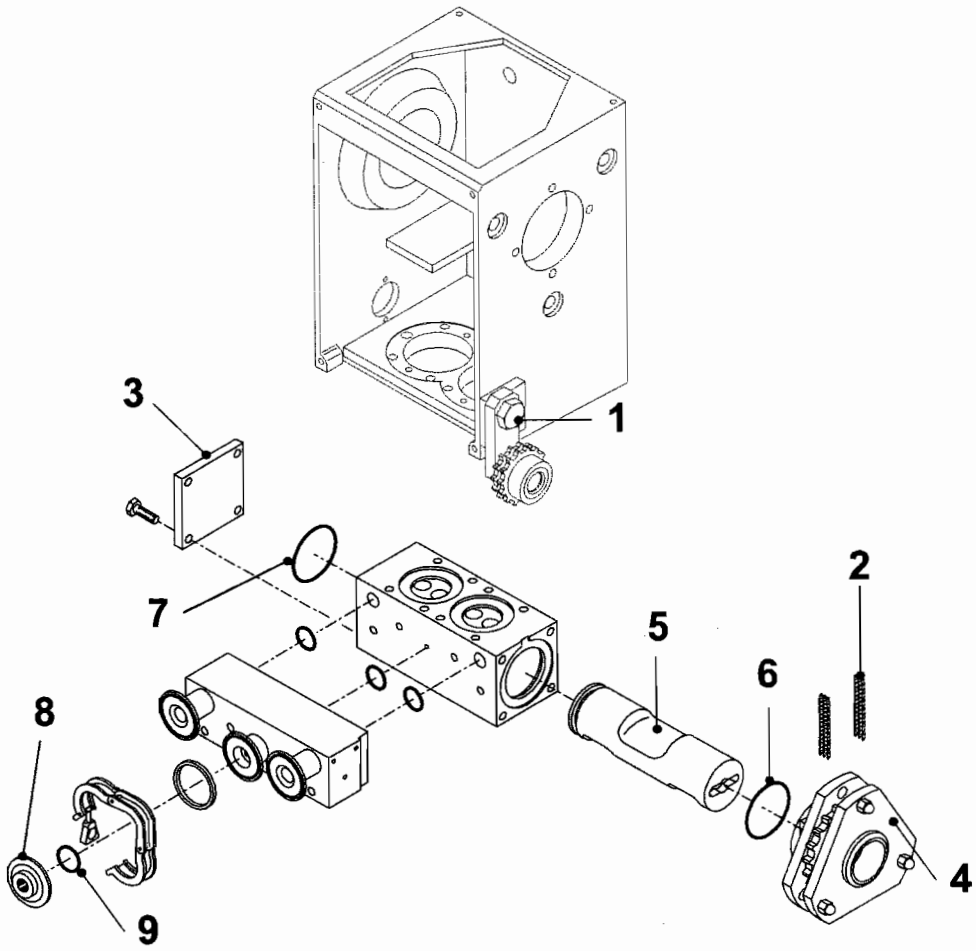
1 Screw
2 Gasket
3 Seeger
4 Gasket
5 Bearing

2.1.7 Distributor

2.1.7-1 Distributor - Change gaskets

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020111

a) Slackent the screw (1) of tightener and extract the chain (2).
b) Dismantle the cover (3) and the head (4) of distributor.
c) Extract the distributor (5) and the gaskets (6) (7) with a screw, aid with the hole M8 of the distributor.
d) Dismantle the valve (8) and extract the gasket (9).
e) Change the gaskets (6) (7) (9).
f) Reassemble carefully in inverse order.
g) For pump alignment see procedure 2.1.1-2 Frigus - Check pump alignment.
h) For tighten up see procedure 2.1.5-4 Pump - Adjust chain.



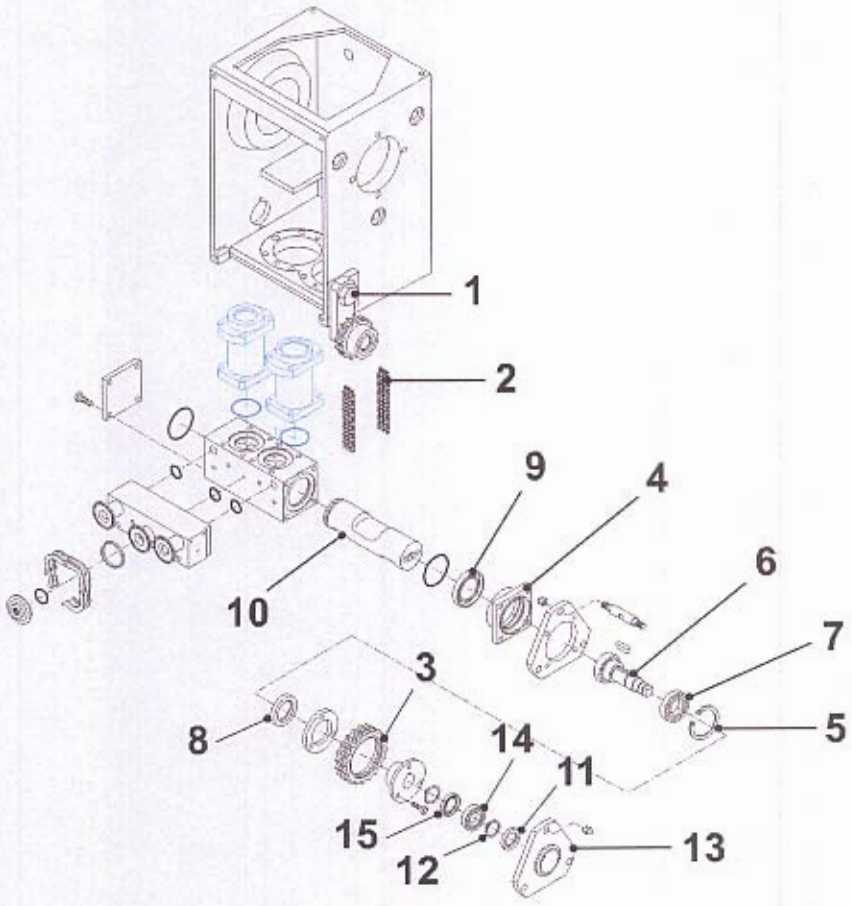
1 Screw
2 Chain
3 Cover
4 Head
5 Distributor
6 Gasket
7 Gasket
8 Valve
9 Gasket

2.1.7-1 Distributor - Change gaskets, distributor, bearings and seeger

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020111

a) Slacken the screw (1) and extract the chain (2).
b) Extract the plate (13), the gasket (11), the seeger (12), the bearing (14) and the gasket (15).
c) Extract the pulley (3), the gasket (8), the seeger (5), the bearing (7), the shaft (6).
d) Extract the distriutor head (4) and the gasket (9).
e) Change the gaskets (11) (15) (9), the bearings (7) (14), the seeger (12) (5) and the distributor (10).
f) Reassemble carefully in inverse order.
g) For pump alignment see procedure 2.1.1-2 Frigus - Check pump alignment.
h) For tighten up see procedure 2.1.5-4 Pump - Adjust chain.

1 Screw
2 Chain
3 Pulley
4 Distributor head
5 Seeger
6 Shaft
7 Bearing
8 Gasket
9 Gasket
10 Distributor
11 Gasket
12 Seeger
13 Plate
14 Bearing
15 Gasket



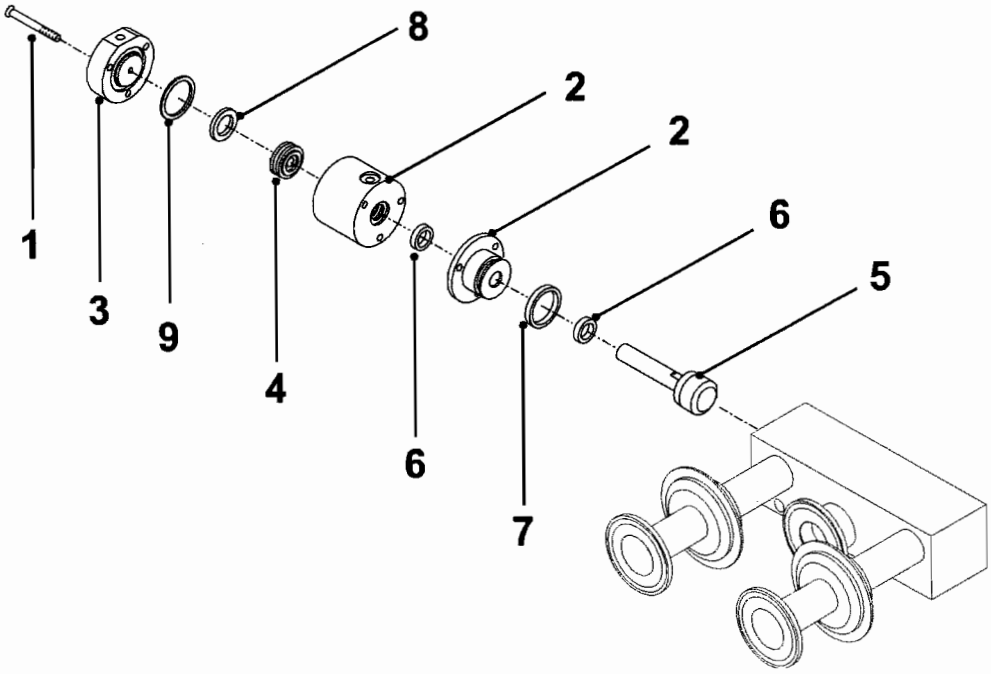
2.1.8 By-pass cylinder

2.1.8-1 By-pass cylinder - Change gaskets

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020105

a) Unscrew the screws (1) and dismantle the heads (2) (3) of the cylinder.
b) Extract the piston (4) and the cylinder stem (5).
c) Extract the gaskets (6) (7) (8) (9).
d) Change the gaskets (6) (7) (8) (9).
e) Reassemble carefully in inverse order.
f) For pump alignment see procedure 2.1.1-2 Frigus - Check pump alignment.

1 Vite
2 Testata
3 Testata
4 Pistone
5 Stelo
6 Guarnizione
7 Guarnizione
8 Guarnizione
9 Guarnizione



2.1.9 Refrigerating plant

2.1.9-1 Refrigerating plant - Condenser clean

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	59230200049

a) When condensation temperature is excessive for the conditions of operation in effect, it is time to clean the condenser.

b) The condensation temperature must be between 28°C and 36°C. If the water temperature is less than or equal to 28°C; about 6000 litres/hour of water will be required a temperature 28°C.

c) Check that these conditions are met and that all the rest is working properly before deciding that the condenser needs cleaning.

d) If the condenser does need cleaning, contact a qualified refrigerator technician who has the equipment required to carry out chemical cleaning.

WARNING:
Do not dissassemble the condenser and disconnect it from the coolant pipes for cleaning.

e) The frigus is fitted with two connections for cleaning the condenser: one inside the machine, at the top of the condenser next to the dasher motor. This connection is commonly closed off (washing solution inlet).
The other connection is normally used for condensation water inlet (washing solution outlet).

f) Turn off the cooling water inlet and outlet taps.

g) Use a closed washing circuit consisting of a container and a centrifugal pump; connect the pump delivery to the washing solution inlet through a flexible plastic hose. Connect another flexible plastic hose to the washing solution outlet to return solution to the container.

h) First let water run through to get rid of any solid particles in the condenser.

(Cont'd)

(Cont'd)

i) Then prepare a suitable buffered solution (such as Helnkel P3 T288) according to the manufacturer's instructions and put it in the container. Flush it through, following the instructions for use, until the solution's indicator (colour, change, pH, etc.) indicates that scale has been removed. This may take a few hours.

⚠ WARNING

Under no circumstances should strong inorganic acids such as hydrochloric acid, nitric acid, or sulphuric acid be used fro any reason. These acids are very dangerous and could cause irreparable damage to the condenser in only a few minutes.

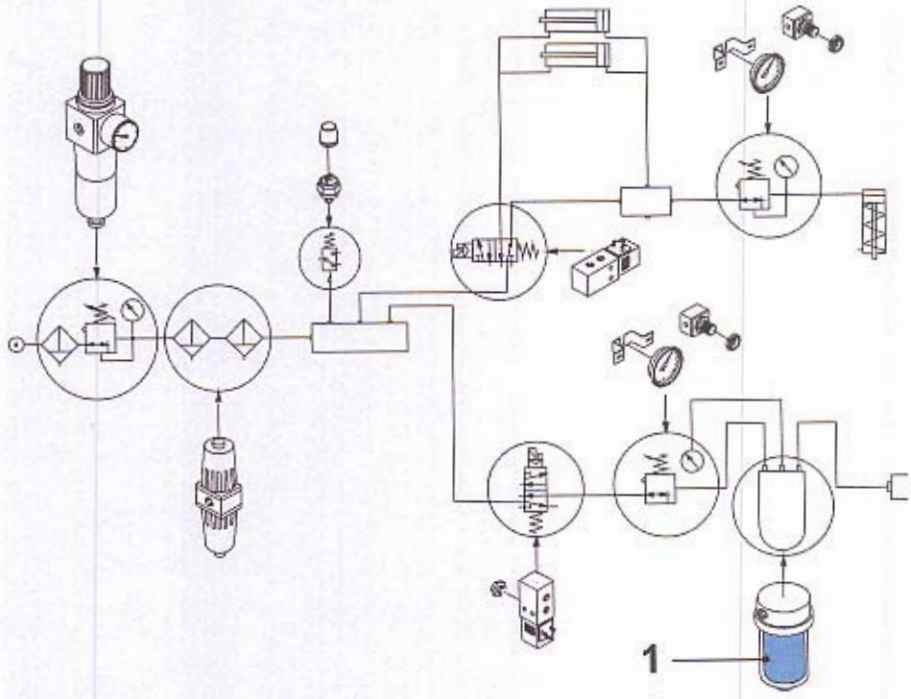
l) Passivate and rinse according to the instructions; remove pipes and close connections up again. Open the cooling water inlet and outlet taps again, and check that water is circulating normally with no leakage.

2.1.10 Pneumatic system

2.1.10-1 Pneumatic system - Change filter

Machine status	Power supply disconnecting device OFF Air valve OFF
SPC reference	13020419

The sterilizind filter cartridge during 6 months either iwht the active machine or unusued.
At the maturity time change the sterilizing cartridge (1).



1 Filter

2.2 Maintenance of the electrical system

The electrical system is conceived, designed and developed to ensure maximum protection for the continuous freezer components.
When a motor shuts down due to overload, the thermal overload light comes on to indicated overload cutout.
Another thermal overload cutout after resetting indicates that the fault/short circuit has not been eliminated and the electrical plant will have to be checked, or indicates that there is a mechanical component block.
If the motor compressors on the refrigerating plant shut down, check the pressure switches and electronic protections (located in the terminal board above the motor compressors). These operations must be done before working on the electrical system. Pay carefully attention to the wiring diagram.
The therminal board as numbered in the diagram is the same as the one installed on the freezer to facilitate checks.
Maintenance and repair operations should be performed by a qualified electrician.

2.3 Maintenance of the refrigerating plant

⚠ CAUTION
All repairs and inspections of the refrigerating plant must be performed exclusively by a qualified refrigerator technician.

Condensation
Coolant exiting the refrigerator compressor is condensed in the plate condenser by water, which may come from the water supply (or a well, or a circuit with a cooling tower). The Frigus has condenser with pressure valve which is factory set and keep condensation pressure at the optimal value (14 bar). If water from a cooling tower is used, it should be kept at the same temperature at all seasons, if possible (with a fan in the tower controlled by a thermostat) so as to keep the performance of the refrigerating plant uniform.

The condenser must be kept clean to ensure correct, efficient operation of the machine. All heat taken out of the ice cream mix and all energy consumed by the compressor to transfer this heat are transferred out of the system (in the cooling water) through the condenser. If the condenser is dirty, it will be difficult to get rid of the heat, and the freezer may not cool down sufficiently and may consume excess energy.
Decreased efficiency of the condenser is normally due to the combined action of particles of dirt in the flow of water and substances which have separated from the water (present even in very clean water).
Dirt particles, if large, will obstruct the passage of water; substances which separate from water and deposit on the exchange surfaces will obstruct the passage of heat.

Preventing soiling of the condenser
Prevent problems caused by dirt by keeping dirt out of the condenser. If cooling water comes from a circuit in which it is impossible to prevent entry of foreign particles (such as leaves, blades of grass or tiny insects in water from a tower or sand in well water), it will be necessary to decant and separate out these particles.
As specific protection for the freezer, one or more filters, periodically cleaned, may be installed at the water intake to stop all particles over 1 mm (largest dimension). The size and type of filter must be determined according to the amount and type of dirt in the water.

(Cont'd)

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To prevent efficiency from being decreased by substances separating out of the water, first analyse the water to determine what treatment would be best. All waters tend to corrode or scale the surfaces with which they come into contact; it is very difficult to achieve and maintain a balanced condition in which there is neither corrosion nor scaling.
The trend to corrode or scale depends on the type and amount of substances dissolved in water, the acidity of the water and the temperature at which it is used. It is recommended that users contact a specialist firm capable of recommending and supplying batching devices, substances, and procedures suited to the specific cooling water system in use.
This is particularly important in the case of water towers, where temperature, evaporation and continual ventilation with air in the environment can generate waters which are particularly polluted (by solid particles, algae, mineral salts, micro-organisms, gases, etc.) and damaging for the entire plant and the condenser in particular.

Thermostatic expansion valve
This valve is factory set during final testing to optimise the dependability and performance of the refrigerating plant.
The factory setting should not be changed for any reason. If the machine is not working properly, all parameters affecting performance should be checked, such as the temperature of incoming mix, wear on the scraper blades, and correct circulation of condensation water.

- If the refrigerating plant is not working as well as it should do, the reason may be:
  - insufficient condensation,
  - inefficient thermostat valve,
  - dirty or blocked up filter on the line,
  - hot gas solenoid valve blocked up or open,
  - liquid solenoid valve blocked up or closed,
  - low coolant level.
- Insufficient condensation may be caused by:
  - insufficient water coming from water supply:check that all taps (on the line that conveys water to the freezer) are open and water is flowing to the freezer properly.
  - optional pressure valve setting needs adjustment: adjust using the knob on its top.
  - if the optional water valve is set correctly, the temperature of the water (flowing out of the outlet with the system in operation) should have a temperature of 28/35°C.

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- If the thermostat valve is faulty, it will stay closed, stopping the flow of coolant.
- If the line filter is blocked up, it will get covered with frost which will block the flow of coolant. Dismantle and replace it. It must always be replaced whenever the cooling circuit is opened.
- If the solenoid valve which controls the flow of hot gas stays open, it will compromise the performance of the refrigerating plant considerably. Check the solenoid valve and replace if necessary.
- The liquid solenoid valve automatically closes the liquid line every time the refrigerator compressor stops.
- If the valve does not open, the refrigerating plant will tend to idle, and the vacuum pressure gauge will drop below -35°C. If this occurs, check that the power is on to the solenoid valve coil. If so, replace the coil.
- If the electrical system is working properly and you have checked all the above, poor performance may be due to low coolant level in the refrigerating plant. This will result in formation of gas bubbles which may be detected by the indicator.
- When the coolant level is low in the refrigerating plant, identify the cause of the leakage before adding more coolant.

⚠ CAUTION
Do not add coolant to the refrigerator circuit unless absolutely necessary. The refrigerating plant will not work properly with too much gas in it.

2.4 Maintenance of the pneumatic system

Periodically check the efficiency of the pneumatic system and check whether the filters are obstructed.

- Check that pneumatic connections are tight and the absence of leakages.
- Check that mix does not flow back from the pump.
- Check the efficiency of the valves.
- If air flow is insufficient, replace filter cartridges; if not, refer to the table of work listed in the section on preventive maintenance.

CAUTION
Do not open filters, especially the sterilised filter, unless there are problems with the pump's air supply.

2.5 Lubricating list

Component	Supplier	Type
1-Pump reducer	Agip	Blasia 320 (ISO 3448)
2-Compressor *	Mobil	EAL Arctic 22 CC ICI Emkarate RL 32 CF
3-Bearings	NILS	Atomic T 4938 Longlife grease EP Low temp
4-Bushings	NILS	Atomic T 4938 Longlife grease EP Low temp
5-Dasher motor	Shell	Tivela oil SC Shell Synthetic 320 (ISO 3448)

* Quantity: 4 litri
Life-long lubrication.

Note! The compressor guarantee will remain valid only if one of the two oils specified above is used. The compressor works only with these two specific oils. Ester oils must never be mixed with mineral oils and/or alkylic-benzene oils. Do not use mineral oils on cooling circuit components.

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4 Spare Parts

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