

OM

Operation Manual

Frigus SF 300-C1 Z1320313-01en



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.



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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:

Shanghai Tetra Pak Hoyer Ice Cream Machinery Co., Ltd.
1018 Dong San Li Qiao Road
100125 Shanghai
P.R.China

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. OM-Z1320313-01en.book

Issue 2006-10

This manual is valid for:

Series No./ Machine No. Sign.

- i Introduction
- ii Safety Precautions
- 1 Operation

OM

Operation Manual

Frigus SF 300-C1
Z1320313-01en

A list of all optional equipment, optional kits, and rebuilding kits that this manual is valid for is found on the next page.

Doc. No. OM-Z1320313-01en.book

Issue 2006-10

 **Tetra Pak**

Shanghai Tetra Pak Hoyer Ice Cream

Valid for:

i Introduction

General informations about Introduction section

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

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i.1 About the introduction chapter

Risk of serious personal injury. To ensure maximum safety, always read the chapter “Safety precautions” before operating or servicing the machine or equipment.

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

i.2 Abbreviations and Terminology

Abbreviation/ Terminology	Meaning	Translation
CIP	Cleaning In Place	
SPC	Spare parts catalogue	

i.3 Manual information

Tetra Pak recommends that delivered documentation should be studied carefully and always kept available to those who will operate the machine or equipment.

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

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

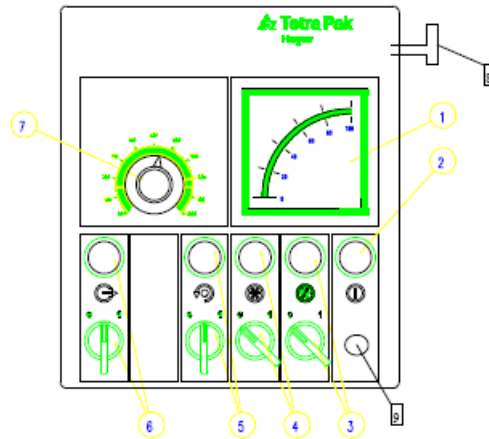
i.3.1 Delivered Manuals








The documents delivered with this machine or equipment include:

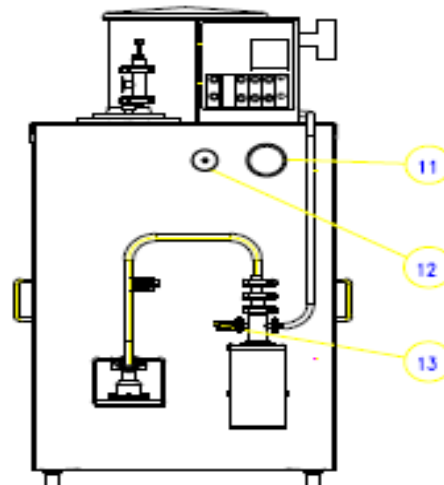
- **Electrical Manual (EM)**
The purpose of this manual is to provide the service technicians and electricians with information required for service and maintenance
- **Installation Manual (IM)**
The purpose of this manual is to provide installation personnel with the information required for installation
- **Maintenance Manual (MM)**
The purpose of this manual is to provide the service technicians with information required for maintenance and service
- **Operation Manual (OM)**
The purpose of this manual is to provide the operator with information on how to handle and operate the machine or equipment before, during, and after production
- **Spare Parts Catalogue (SPC)**
The purpose of this manual is to provide necessary information for ordering spare parts from Tetra Pak
- **Technical Manual (TEM)**
The purpose of this manual is to provide necessary information required for installation, service and maintenance

i.3.2 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.



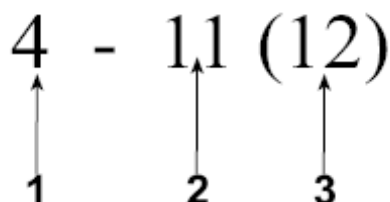
-  Instrument indicating load on dasher, Pos. 1.
 -  Lamp indicating control current, Pos. 2.
 -  Switch for hot gas open/close and lamp for indication, Pos. 3.
 -  Switch for stop/start of refrigeration and lamp for indication, Pos. 4.
 -  Potentiometer for control of air/mix flow, Pos. 7.
 -  Switch for stop/start of dasher and lamp for indication, Pos. 5.
 -  Switch for stop/start of air/mix pump and lamp for indication, Pos. 6.
- When emergency occurs, press emergency stop button, Pos.8, immediately
- When emergency stops, press reset button, Pos.9.



i.3.3 Page Numering

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 pages

i.3.4 Typographical Conventions

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

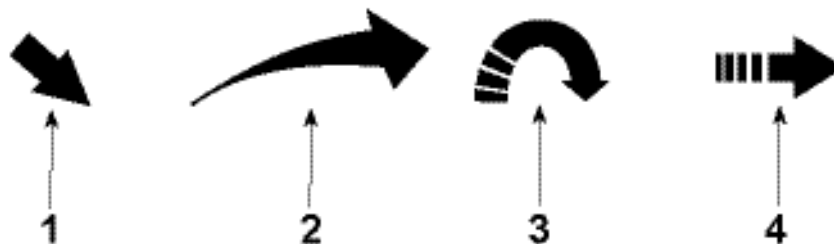
Cross-references are underlined.

i.3.5 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

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



i.4 Machine Introduction

i.4.1 Intended use of the machine or equipment

The intended use of this Tetra Pak machine or equipment is to inject fruit pieces, nuts, candies and other free flowing granulates into ice cream or similar products.

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

i.4.2 Manufacturer

This Tetra Pak machine or equipment has been manufactured by:

Shanghai Tetra Pak Hoyer Ice Cream Machinery Co., Ltd.
1018 Dong San Li Qiao Road, Pudong
Shanghai 100125
P.R.China

i.4.3 Service

If problems are encountered when operating this machine or equipment, contact the nearest Tetra Pak centre or market company.

Contact this mail address, if you have any questions regarding the documentation:

ProductDocumentationBUIC@tetrapak.com

i.5 Identification

i.5.1 CE classification

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

i.5.2 Machine plate

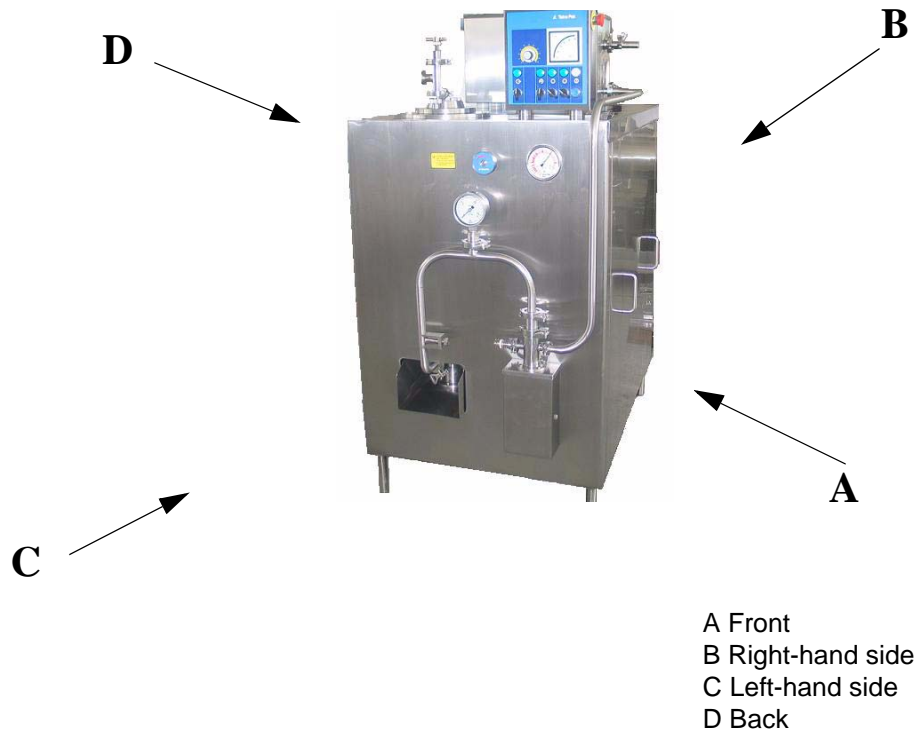
The below illustration shows an example of the machine plate and its location on the machine or equipment. The machine plate carries data needed when contacting Tetra Pak concerning this specific machine or equipment.



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

i.6 Orientation

The illustration below shows the orientation of the equipment. This orientation information will be used throughout this manual.



i.7 Hygiene

Ice cream production, like other foodstuffs, requires high sanitary standards. That is why the strictest demands should be made on cleaning of devices and tools getting in touch with the ice cream, ingredients coating and packaging materials. In addition, the production area should be kept very clean.

Personal hygiene should also be considered as a part of the sanitary standards:

- Personal body hygiene
- Headgear
- Hygiene of work clothes
- Hygiene of footwear
- Hand hygiene

ALWAYS make sure that the detergents and disinfectants applied are approved by the local authorities.

NEVER use a detergent which chemical properties will damage the metals and alloys to be cleaned.

i.8 How to Use This Operation Manual

Purpose of the operation manual

The operation manual provides operators with information on handling and operating the equipment before, during, and after production.

Operator workflow

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

Preparation cycle

a) Preparation

Production cycle

b) Start

c) Checks

d) Supply of Materials

e) Conversion

f) Change of Product

g) Stop

Care

h) care and cleaning

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ii Safety Precautions

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ii.1 Read the safety precautions

All persons operating, servicing, adjusting or otherwise working with or near this machine or equipment must carefully read and follow all safety instructions in this manual and warning signs on the machine or equipment itself. Failure to do so could result in death, serious injury, and damage to the machine or equipment.

Call for medical attention immediately in case of an accident.

ii.2 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. Obey all safety messages that follow this symbol to avoid death or injury.

The following safety alert symbols and “signal words” are used in this manual and on the machine or equipment itself to inform the user of hazards.



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



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



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

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

ii.3 Personnel requirements

Note! Personnel includes **all** persons performing work on or near the machine or equipment.

Only skilled or instructed persons are allowed to work with the machine or equipment.

ii.3.1 Skilled person

A skilled person must have relevant education and experience to enable him or her to identify hazards, analyze risks, and avoid hazards which electricity, mechanics, chemicals, and supply systems can create.

Skilled persons must meet local regulations, such as certifications and qualifications for working with electricity, mechanical systems, and so on.

ii.3.2 Instructed person

An instructed person must be adequately advised or supervised by a skilled person to enable him or her to identify hazards, analyze risks, and avoid hazards which electricity, mechanics, chemicals, and supply systems on the machine or equipment can create.

ii.4 Safety signs

ii.4.1 Safety Signs

 **WARNING**




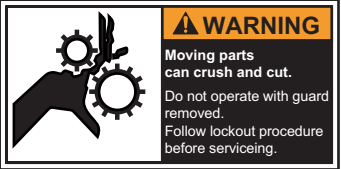
Hazards without safety signs drastically increase the risk of death or serious injury.

Replace all missing or damaged safety signs immediately.

There are two types of safety sign

- ISO signs are used in most markets
- ANSI signs are used in the US market only

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

ISO sign	ANSI sign
 <p>Hazardous voltage. Will cause death or serious injury. Disconnect power before servicing. Lockout machine.</p>	
 <p>Moving parts can crush and cut. Do not operate with guard removed. Follow lockout procedure before servicing.</p>	

ii.4.2 Location of safety signs

Note! Always ensure that all safety signs on the machine or equipment are undamaged and in their correct position after installation and maintenance.

The illustration below indicates where the safety signs are located.



ii.5 Protective devices



DANGER

Unshielded hazards. Never touch or run the machine or equipment if any component of the safety system is inoperative. All inoperative components of the safety system must be changed immediately.

Note! Activating a safety device, such as an EMERGENCY STOP, or opening an interlocked safeguard does not switch off the power supply to the machine or equipment.

ii.5.1 Emergency Stop

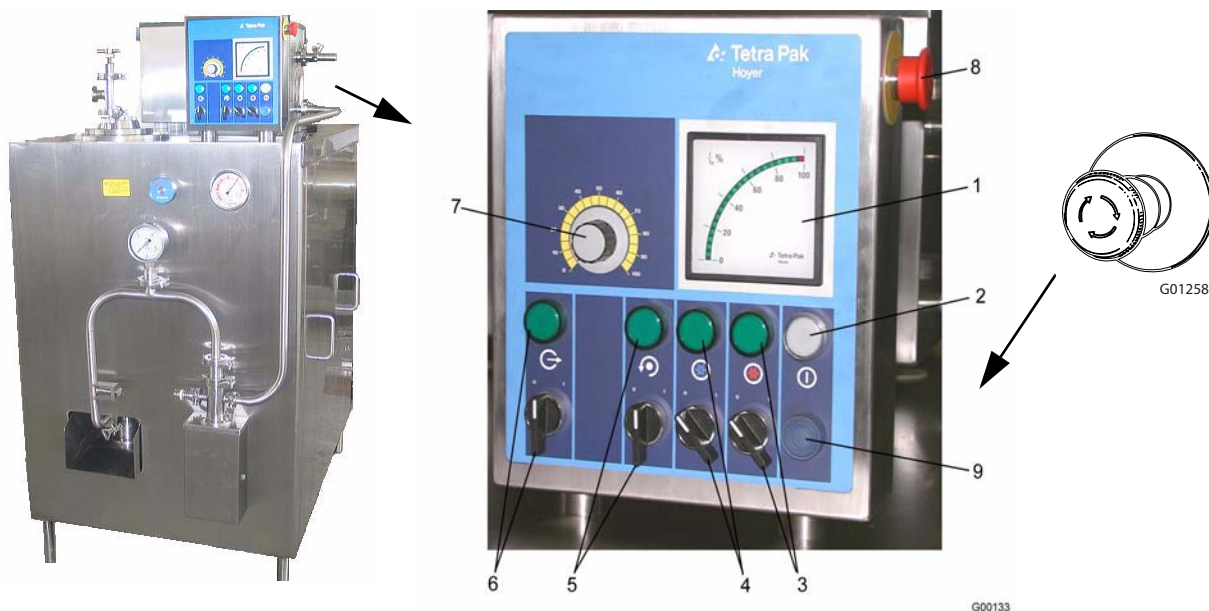
Learn the positions of the EMERGENCY STOP devices in order to stop the machine or equipment immediately in case of an emergency situation.

To stop production the normal way, see the *operation manual*.

ii.5.2 Emergency stop push buttons

Push one of the EMERGENCY STOP push buttons to stop the machine or equipment immediately.

The illustration below shows an emergency stop push button. Arrow(s) indicate(s) where to find them on the machine or equipment.



ii.6 Personal protection

Note! Personal protection required when handling hazardous materials is specified for each substance, see the section “Hazardous materials”.

ii.6.1 Hearing Protection



WARNING

Hazardous noise level. Risk of impaired hearing. Wear hearing protection.



CAUTION

Hazardous noise level. Risk of impaired hearing. Hearing protection is recommended.

ii.6.2 Risk of entanglement



WARNING

Risk of entanglement. No jewellery such as rings, watches, bracelets, or necklaces may be worn when performing work on or near the machine or equipment.

ii.7 Hazardous materials

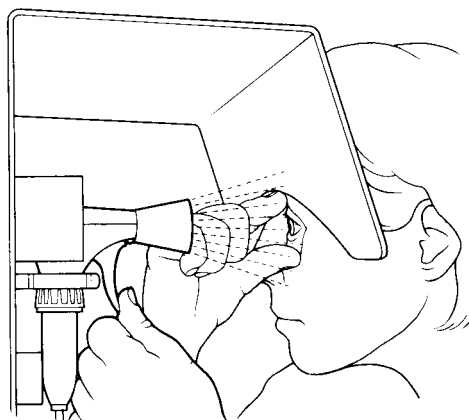
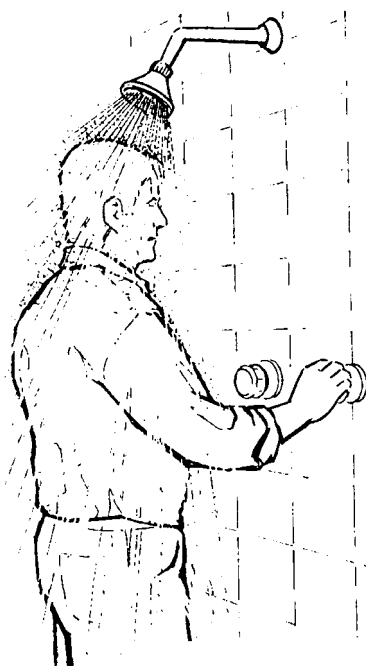
WARNING

Contact with chemicals can cause injury and illnesses. Always follow the manufacturer's instructions when handling chemical products.

Always 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 positions of all washing facilities in order to act without delay in case of an accident.



ii.7.1 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	Disinfectant
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 security card of 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 Procedures

If there is an accident involving the products for cleaning and sterilization, rinse the affected area as soon as possible with large amounts of water. 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.

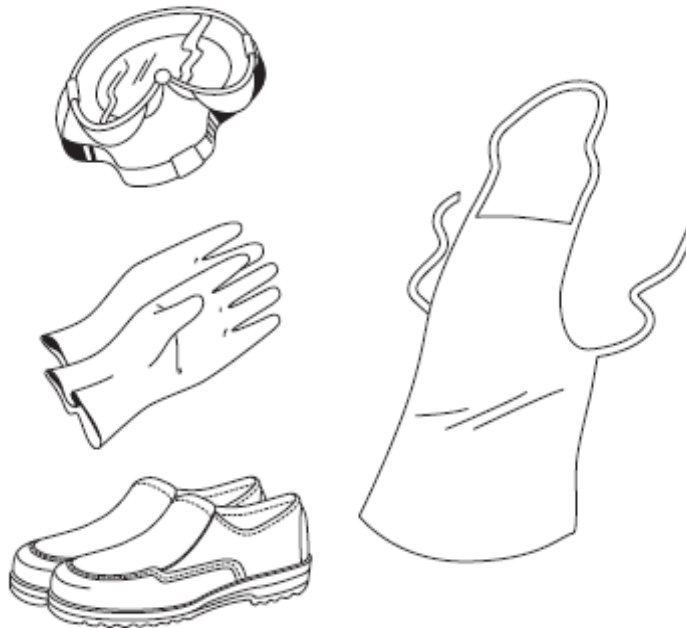
If irritation or pain is experienced due to having inhaled products for cleaning and sterilization vapour

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

ii.7.2 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

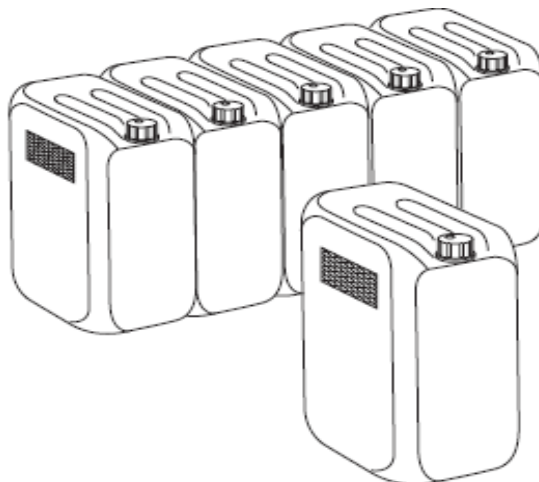
**WARNING**

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 tefl on. After use, make sure that all product residue is rinsed away.

If products for cleaning and sterilization is spilled, dilute it with large amounts of water and fl ush it into a drain.



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.



ii.8 Supply systems

ii.8.1 Electrical cabinet



Hazardous voltage. Electric shock will cause death or serious injury.

The power supply disconnecting device must be turned OFF and secured with a lock before any service is carried out inside the electrical cabinet

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

Make sure that the electrical cabinet doors are locked after performing any work in the electrical cabinet.

An arrow in the illustration below indicates the location of an electrical cabinet.



ii.8.2 Power supply



Hazardous voltage and moving machinery. The power supply disconnecting device must be turned OFF and secured with a lock before any service is carried out.

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

Certain maintenance procedures require supply systems to be turned on. These exceptions are clearly stated in the maintenance manual.

The illustration below shows the power supply disconnecting device and the arrow indicates its location.



ii.8.3 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.

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1 Operation

Description

Frigus 300 is a simple and robust continuous ice cream freezer, designed and built according to the latest guidelines for hygienic food processing machinery.

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1.1 General Description

1.1.1 Design

All parts of the freezer are produced from high quality materials and engineered to meet strict standards of hygiene, reliability and durability.

All parts of the freezer in contact with mix and ice cream are manufactured from stainless materials.

The freezer cabinet is a self-supporting construction with bottom plate, front panel, back panel and top plate in stainless steel plate welded and bolted together. The two stainless steel side plates are detachable.

The control panel in stainless steel execution, is located on top of the freezer cabinet and includes the following operational features:

- start/stop of the mix pump
- start/stop of the dasher
- start/stop of the refrigeration system
- start/stop of the hot gas system
- electronic control of the ice cream capacity
- electronic display of the ice cream viscosity

The mix/air pump is located on the front panel of the freezer, making it easy to clean and maintain.

Safety valve. The mix pipe from the mix pump to the freezing cylinder is equipped with a safety valve which protects the mix pump in case the ice cream line to the filler is closed or clogged up.

The freezing cylinder with its hard chromium-plated and mirror-finished inner surface provides efficient freezing of the mix.

The dasher is equipped with scraper blades and a beater made of stainless steel.

Pressure regulating valve. A constant pressure regulating valve is installed at the ice cream outlet of the freezing cylinder. The valve ensures the constant pressure in the freezing cylinder.

1.1.1.1 The refrigeration system

The refrigeration system is equipped with a built-in semi-hermetic freon compressor. The operating conditions of the refrigeration system can be monitored on a manometer on the front of the freezer cabinet.

Defrosting of the freezing cylinder and adjustment of the ice cream viscosity can take place by means of a freon hot gas valve, operated from the front of the freezer cabinet.

The freon condenser is a water-cooled, shell-and-tube type. The water side of the condenser is easy to clean and maintain.

1.1.2 Operating Principles

The ice cream mix is supplied to the freezer direct or via a mix balancing tank placed on top of the freezer cabinet.

The ice cream mix is led to the mix pump which is fitted with an adjustable air intake valve, and pumps a mixture of mix and air into the freezing cylinder. During the passage through the freezing cylinder the air is whipped into ice cream by a dasher.

The Freezing of the ice cream mix is carried out by means of liquid freon evaporating in the cooling jacket around the freezing cylinder.

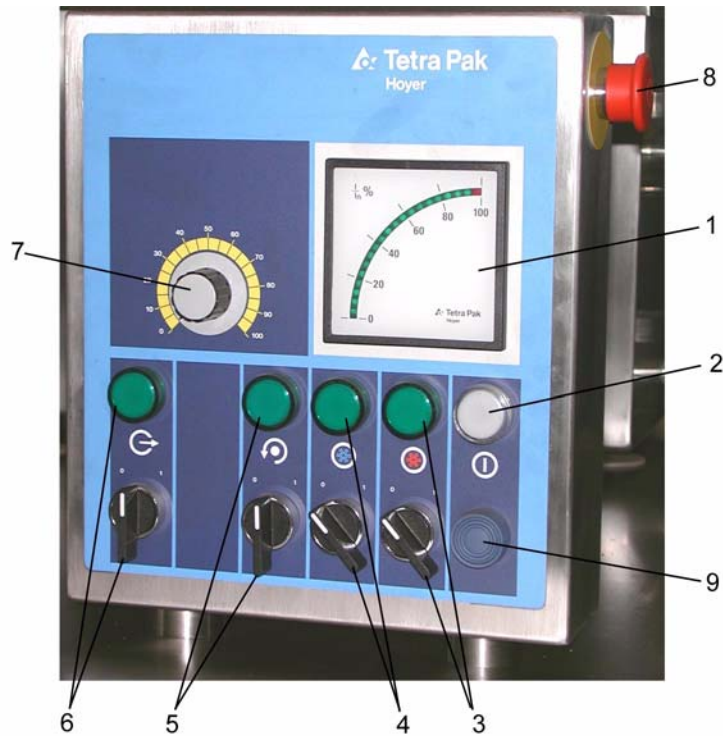
The stainless steel blades of the dasher scrape the frozen ice cream from the inside wall of the freezing cylinder, and the pump presses the ice cream forwards via the adjustable, constant pressure valve to a filling machine.

1.1.3 Before starting up

Perform the following checks before starting production:

- 1) Check that the machine is stable and has been levelled, and adjust the feet if necessary.
- 2) Clean and disinfect the machine carefully.
- 3) Check that the main switch is on.
- 4) Check that the emergency stop button has been released.
- 5) Check that the mix intake and ice cream outlet pipes are fitted correctly.
- 6) It is important for the performance of the freezer that the following factors are in order:
 - There must be sufficient cooling water on the condenser.
 - The machine must be left with power on for a minimum of 6 hours before starting the refrigerating compressor.
 - The refrigerating compressor features an oil heater that removes the freon from the oil.
 - Mix supply and pressure level must be constant.
 - The cream outlet pipe must not be blocked. If it is blocked, the pump will become damaged during operation.

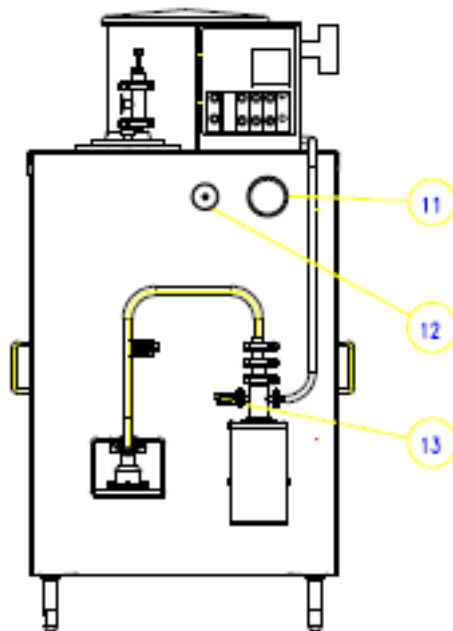
1.2 Control Panel



G00133

1. Instrument indicating load on dasher.
2. Lamp indicating control current.
3. Switch for hot gas open/close / lamp for indication.
4. Switch for stop/start of refrigeration / lamp for indication.
5. Switch for stop/start of dasher and lamp for indication.
6. Switch for stop/start of air/mix pump / lamp for indication.
7. Potentiometer for control of air/mix flow.
8. Emergency stop button.
9. Button for reset after Emergency stop.

Frontview of the machine



11. Manometer indicating suction temperature and suction pressure.
12. Hand wheel for adjustment of refrigeration capacity.
13. Control of overrun by using knurled finger screw.

1.2.1 Troubleshooting

Fault: The refrigerating compressor does not start when the refrigeration starts.

1	Pressostat	<p>Reset high/low pressostat, Pos. 72, and start again.</p> <p>If this attempt fails:</p> <p>Ensure that the solenoid valve, Pos. 82, on the liquid pipe opens when refrigeration is activated. In that case the pressure in the manometer increases, Pos. 11, to about room temperature.</p> <p>Call for service to check that the high/low pressostat is working properly.</p> <p>Check that the thermal relays have been deactivated.</p>
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Fault: The refrigerating compressor starts but stops again.

1	Condenser water supply closed.	Ensure that there is water in the condenser and that the hoses are not blocked.
2		Reset high/low pressostat, Pos. 72.
3		<p>Start refrigeration.</p> <p>If this attempt fails:</p> <p>Check the oil pressure switch, Pos. 74, and the oil level in the refrigerating compressor, Pos 71. If the oil pressure switch is deactivated, wait approx. 5 minutes and reset the oil pressostat.</p>
		Check what is the reason for oil failure. If the refrigerating compressor needs oil, call for service to fill up with oil.
		If the refrigerating compressor has been overloaded, call for service to reset thermal relay 31Q9 in the high-voltage cabinet, and check the power consumption.

Fault: Freeze-up

1	If the main motor is overloaded, the refrigerating compressor might stop.	<p>Start hot gas</p> <p>Open hand wheel to maximum</p> <p>Wait a few minutes until the ice cream in the freezing barrel has become warmer.</p>
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2	Dasher overloaded	Call for service to reset thermal relay 10Q5 in the high-voltage cabinet, and check the power consumption. Start dasher Start pump Start hot gas Adjust the viscosity of the ice cream by means of the hand wheel to avoid overload of the dasher.
3	The thermal relay of the dasher motor deactivates before the instrument indicates 100%	Call for service to adjust the instrument according to the following procedure.

Fault: Ice cream too soft.

1	Hot gas.	Stop the hot gas. If the ice cream is still soft after a few minutes, reduce the pump speed.
2	The mix temperature.	Check the mix temperature. It must be lower than 5° C.
3	The condenser temperature.	Check the condenser temperature in the manometer, Pos. 76. The normal condenser temperature is between 30°C and 40°C.
4	The water supply Full refrigeration capacity can only be achieved if the water temperature is lower than 30°C and only provided that the sufficient volume is available. The freezer's refrigeration capacity is largest when the condenser temperature is low.	Check that the water supply is constant and that the water is sufficiently cold.
		If the water valve, Pos. 78, is opened (turn handle clockwise), the condenser pressure drops and the water consumption increases.
		If the water valve is closed, the condenser pressure increases and the water consumption drops.
		If water is tapped from a cooling tower, open the water valve to maximum.
5	Suction pressure/temperature	<p>Check the suction pressure/temperature in the manometer. The temperature must be between -26°C and -30°C. If this is not the case, call for service to check the refrigerating system.</p> <p>The problem may be caused by the following factors:</p> <p>The thermostatic expansion valve, Pos. 83, is incorrectly set or defective.</p> <p>The filter of the refrigeration plant, Pos 80, is blocked.</p> <p>Every time the refrigerating system is opened, the filter must be replaced by a new one.</p> <p>The hot gas valve, Pos. 85, cannot close (defective/worn).</p> <p>Valve for fluid, Pos. 82, is blocked (defective) or electrically deactivated.</p> <p>Not enough coolant has been filled in. Bubbles appear in the liquid indicator, coolant needs to be filled in.</p>

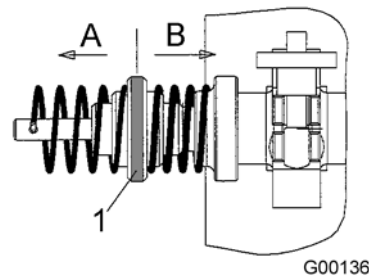
Fault: Refrigerating compressor does not stop automatically when refrigeration is switched off.

	Closed valves	Valve for liquid, Pos. 82, or hot gas valve, Pos. 84, does not close, and the suction pressure, Pos. 11, does not drop to approx. -45°C.
	The suction pressure drops to -45°C, but the pressostat, Pos. 72, does not switch off.	If the pressostat does not switch off, it is necessary to increase the minimum pressure over the instructions for the pressostat.
	The suction pressure does not drop sufficiently.	Stop the refrigerating compressor by switching off the power to the freezer. Check the solenoid valves and replace if necessary.
	When the dasher motor is operating, the refrigeration compressor can start automatically, if it has been activated, provided that the freezing barrel pressure increases to approx. 0°C.	

1.3 Start

Procedure for starting production:

- 1) Start pump.
- 2) Stop pump when the mix leaves the outlet pipe.
- 3) Start dasher.
- 4) Start refrigeration.
- 5) The mix will start to freeze in the freezing barrel. When the instrument indicated a dasher load which produces a suitable ice cream viscosity, proceed as follows:
- 6) Start Pump
- 7) Adjust overrun by means of the knurled screw on the air valve. A few minutes may pass after each adjustment until the result shows in the ice cream at the end of the cream outlet pipe.



- 8) Overrun is reduced by turning the knurled screw, pos. 1, of the air valve in the direction indicated by the A arrow. Overrun is increased by turning the knurled screw, pos 1, of the air valve in the direction indicated by the B arrow.
- 9) Adjust the pump speed to the required production capacity by adjusting the potentiometer.
- 10) Adjust the ice cream temperature.
- 11) Gradually open the hand wheel to increase the ice cream temperature.
- 12) Gradually close the hand wheel to lower the ice cream temperature.

Note! The sequence of dasher and refrigeration start cannot be reversed. This is prevented by means of an electrical interlock. When the refrigeration process is started, the refrigerating compressor is automatically started by the low-pressure pressostat.

Note! If the hot gas switch is set to I, the hot gas will start.

Procedure for operation:

Once the freezer has been started, it is usually required to fine-tune the settings:

- 1) Adjust the pump speed to the required production capacity by adjusting the potentiometer.
- 2) Adjust overrun by means of the knurled screw on the air valve. A few minutes may pass after each adjustment until the result shows in the ice cream at the end of the cream outlet pipe.
- 3) Adjust the ice cream temperature.

1.4 Stop

1.4.1 Temporary Stop and Start

1.4.1.1 Temporary Stop

- 1) Stop refrigeration.
- 2) Stop pump.
- 3) Stop hot gas. The hot gas is stopped.
- 4) Stop dasher when the instrument indicates dropping dasher load.

Note! The refrigerating compressor stops automatically when the high/low pressostat reaches the pre-set minimum pressure.

1.4.1.2 Restart after Temporary Stop

- 1) Start dasher.
- 2) Start refrigeration. When the instrument indicates a dasher load which produces a suitable ice cream viscosity, proceed as follows
- 3) Start pump.
- 4) Start hot gas. If set to, the start will be done automatically.

1.4.2 Emergency Stop

If a dangerous situation should occur push the emergency stop immediately. The emergency stop is placed at the control panel, pos. 8.

To reset after emergency stop, release the emergency stop button and press the reset button which is located at the control panel, pos. 9.

1.4.3 Stop Production

- 1) Stop refrigeration. Feed clean water to the mix pump instead of mix.
- 2) Stop the pump when the quality of the ice cream reaching the filling machine becomes inadequate.
- 3) Stop dasher

Note! Do not switch off the machine. The refrigerating compressor features an oil heater that removes the freon from the oil, and the compressor must be left on for a minimum of 6 hours before the refrigerating compressor is started.

1.5 Care and Cleaning

Cleaning of the freezer can be carried out by connection to a central CIP system to ensure maximum hygiene at minimum operational cost.

The freezer is equipped with clamp type pipe connections.

The following recommended cleaning instruction should be followed after stopping production.

Steps	Approx. time	Approx. temp
1. Pre-rinse with water. Feed clean water to mix balance tank instead of mix. Start the dasher 3-4 times in cycles of 10-15 seconds.	7 minutes	min. 15
2. Lye wash - 1% caustic soda solution with wetting agent and phosphatic additives. Start the dasher 3-4 times in cycles of 10-15 seconds. Return the solution to the tank after use.	12 minutes	65 - 70
3. Flush with hot water. Start the dasher 3-4 times in cycles of 10-15 seconds.	12 minutes	min. 50
4. Disassemble and clean these components: mix balance valve pump freezing barrel pressure control valve Wash components in an industrial acid free detergent for manual cleaning of machine parts. The detergent must be approved for cleaning of chromium.		
5. Replace all parts on the ice cream freezer.		
6. Feed water to the mix balance tank and re circulate water from the pressure control valve to the mix balance tank. When the system is full of water, add hydrogen peroxide (H ₂ O ₂) to form a 200 ppm solution. Start the dasher 1-2 times in cycles of 10-15 seconds.	min. 5 minutes with 200 ppm H ₂ O ₂	
7. The hydrogen peroxide solution may be left in the ice cream freezer until the production is resumed (max. 48 hours).		
8. Pump the hydrogen peroxide solution out of the mix balance tank. Once the mix balance tank is empty, fill up with mix. The plant is now ready for production.		

This cleaning instruction is only meant as a guideline and must be adapted to local legislation and customers' own cleaning procedures.

**WARNING**

The scraper blades are very sharp and loosely fitted on the dasher. Handle scraper blades with care.

Note! Treat all the parts of the machine care as damage may reduce service life. Remove calcium salts 1-2 times every year with acetic acid (CH_3COOH) or citric acid ($((\text{COOH})\text{CH}_2\text{C}(\text{OH})(\text{COOH})\text{CH}_2(\text{COOH}))$) (pH 3.5 - 4.5) solution of max. 100 ppm by following this procedure:

After step 4 (see above), wash the parts in one of the above-mentioned weak acid solutions.

Immediately flush thoroughly with clean, cold water and proceed to step 5.

**WARNING**

Do not use detergents containing acid or chlorine except in the above-mentioned case.

Chlorine: Causes pitting and rust formation on stainless steel as well as pitting corrosion of the chromium plating.

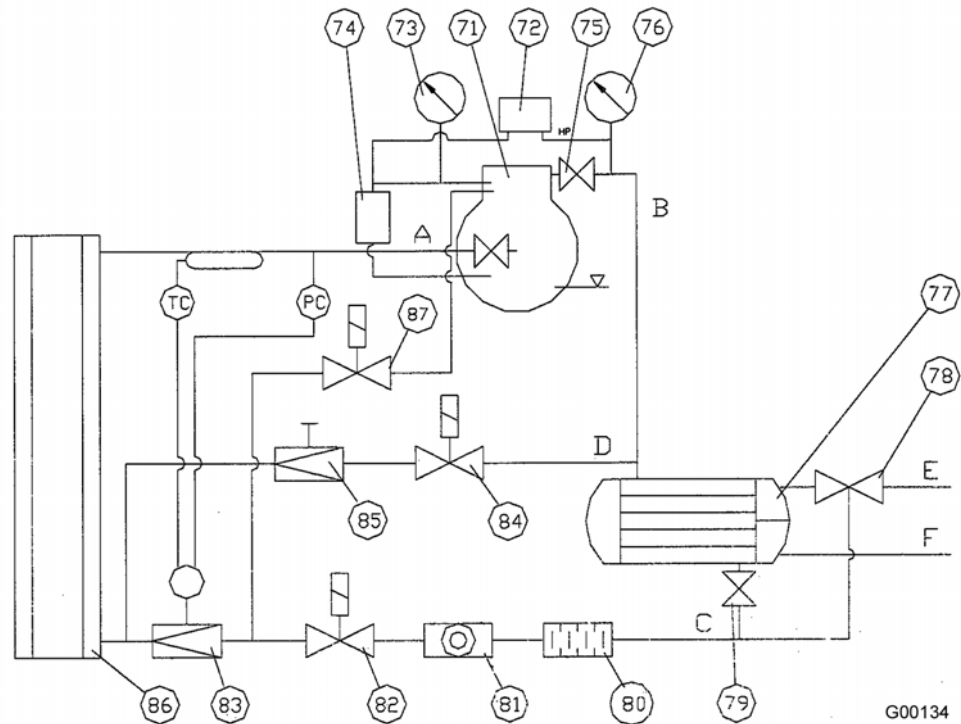
Acid: Breaks down the chromium plating.

Note! *The dasher must not be in operation during the cleaning process as this will cause unnecessary wear on both scraper blades and freezing barrel.*

Important: The total time spent on cleaning must not exceed 1 hour.

Note! If the ice cream freezer will not be used in production within 48 hours after cleaning, dry and assemble after step 4.

1.6 Refrigeration System



Suction side “A” of the refrigerating compressor, Pos. 71, is connected to the top of the freezing barrel, Pos. 86.

Pressure side “B” of the compressor is connected to the condenser, Pos. 77. The condensing heat from the condenser is conducted from the condenser to the cooling water. The volume of the cooling water is automatically controlled by the water control valve, Pos. 78.

The condensed freon is conducted from the condenser “C” through the filter, Pos. 80, the liquid indicator, Pos. 81, the solenoid valve, Pos. 82, and the thermostatic expansion valve, Pos. 83, to the freezing barrel.

The hot gas line “D” from the compressor’s pressure side through the solenoid valve, Pos. 84, and the control valve, Pos. 85, to the freezing barrel can be used to adjust the refrigeration capacity of the freezing barrel.

When operating at maximum refrigeration capacity, keep the solenoid valve closed.

When operating at reduced refrigeration capacity, keep the solenoid valve open and adjust the refrigeration capacity by means of the control valve. Slightly open control valve (cold ice cream), little reduction; widely open control valve (warm ice cream), large reduction.

The manometer, Pos. 76, indicates condensing pressure and temperature. In principle, keep the condensing pressure as low as possible in order to achieve the highest possible refrigeration capacity and the lowest possible power consumption.

(Cont'd)

(Cont'd)

A pressure controlled water valve, Pos. 78, is fitted on the water line to the condenser in order to keep water consumption to a minimum.

The pressure controlled water valve is factory-set to maintain a condensing temperature of between 30°C and 40°C. However, local conditions determine which condensing temperature the valve must be set to.

The refrigerating compressor is fitted with an oil pressostat, Pos. 74, which ensure unfailing lubrication of the refrigerating compressor. The compressor is also protected with a high-pressure/low-pressure pressostat, Pos. 72, which ensure against too low suction pressure (for instance lack of refrigerant to the compressor) and against too high outlet pressure (for instance insufficient cooling water supply). The high-pressure/low-pressure pressostat starts and stops the refrigerating compressor. This starting and stopping method ensures that the freezing barrel does not become filled with freon liquid which may cause liquid impact during the starting phase.

1.7 Freezing barrel

The freezing barrel interior is a nickel pipe plated with hard chromium on its inside; on the exterior it features a steel pipe and two flanges. The freezing barrel cannot be disassembled, and the risk of leakage of the refrigerating system is thus minimized.

The top cover is easily detached by way of two finger screws; the dasher, the beater and the scraper blades are then easily pulled out.



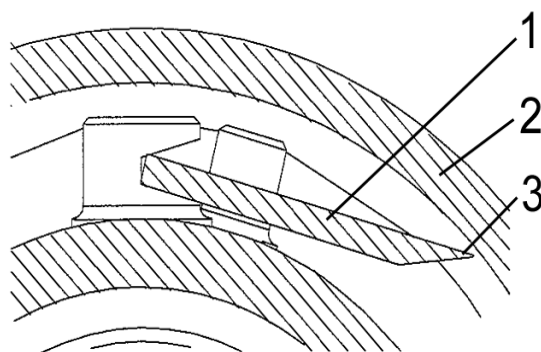
WARNING

The scraper blades are very sharp and loosely fitted on the dasher. Handle scraper blades with care.

Any leakage through the shaft sealing can easily be washed away with water. If the shaft sealing needs to be replaced, disassemble the dasher and the mix pipe. Turn the bottom cover clockwise and remove.

1.8 Checking scraper blades

The drawing illustrates a single scraper blade, pos. 1, in operating position in the freezing barrel, pos. 2.



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It is necessary to sharpen a blade when its cutting edge, pos. 3, is broader than 0.5 mm.

A correctly sharpened blade has a cutting edge, pos. 3, between 0.1 and 0.2 mm.

Note! A correct sharpening of the blades is only possible by means of a machine.