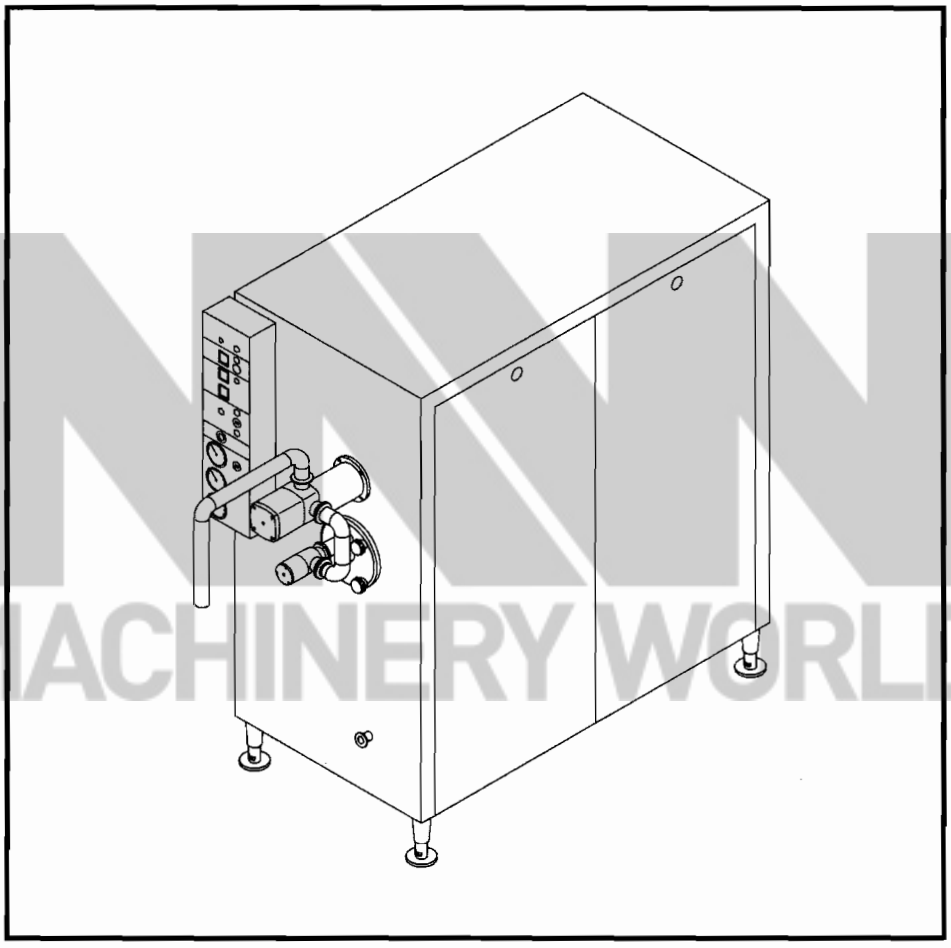
OM

Operation 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. OM-F12C01-0100

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. OM-F12C01-0100

Version 2006-01

This manual is valid for:

Series No./ Machine No. Sign.

OM
Operation Manual

Hoyer Frigus SF 1200 C1
59232300000

i Introduction

ii Safety Precaution

1 General Description

2 Alarms and Troubleshootin

3 Preparation

4 Production

5 Change of product

6 Stop

7 Care and Cleaning

8 Technical Data

Doc. No. OM-F12C01-0100

Version 2006-01

Tetra Pak

Tetra Pak Hoyer S.p.A.

This page intentionally left blank

i Introduction

About the Introduction Chapter

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

Manual Information . . . . . i - 5

Delivered Manuals . . . . . i - 5

Page Layout . . . . . i - 6

Page Numbering . . . . . i - 7

Typographical Conventions . . . . . i - 7

Symbols . . . . . i - 7

Machine Introduction . . . . . i - 8

Intended Use of the Equipment . . . . . i - 8

Manufacturer . . . . . i - 8

Service . . . . . i - 8

Identification . . . . . i - 9

CE Classification . . . . . i - 9

Machine Plate . . . . . i - 9

Orientation . . . . . i - 10

Hygiene . . . . . i - 11

Abbreviations and Terminology . . . . . i - 12

How to Use This Operation Manual . . . . . i - 13

Purpose of the operaton manual . . . . . i - 13

Operator workflow . . . . . i - 13

Preparation cycle . . . . . i - 13

Production cycle . . . . . i - 13

Care . . . . . i - 13

This page intentionally left blank

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

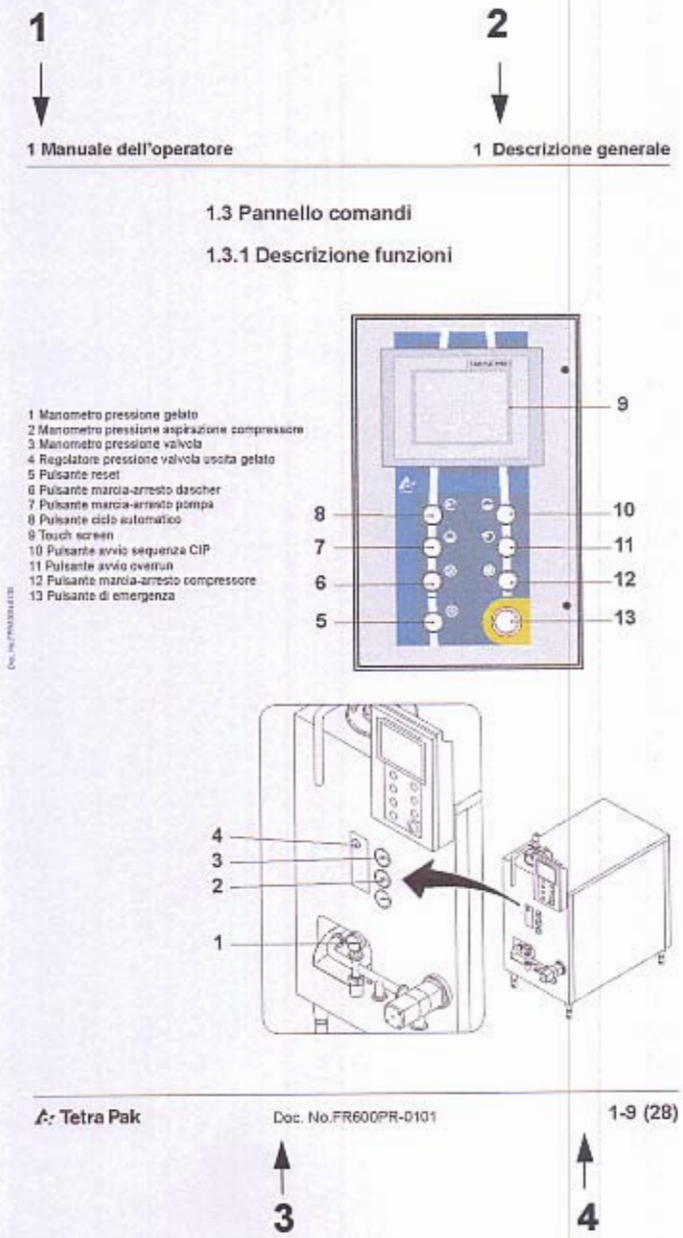
  - Provides technicians with information on maintaining the equipment

  - 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.

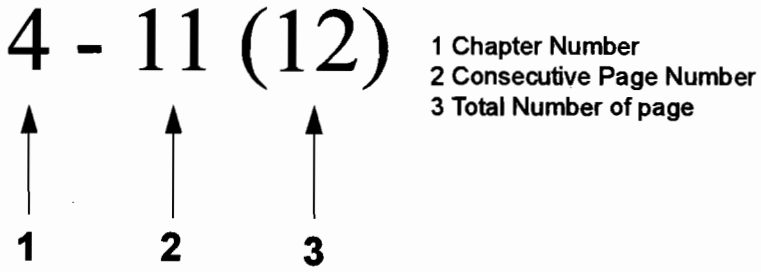


1 Chapter name
2 Section name
3 Document number
4 Page number

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.



Typographical Conventions

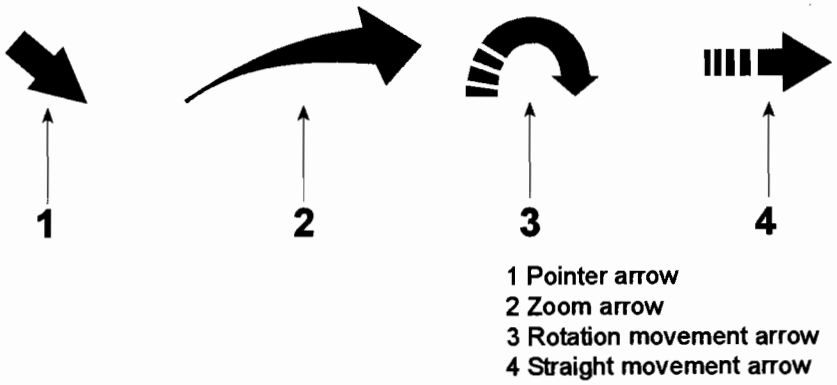
Controls on the operator panel, emergency stop devices, and program steps are printed in CAPITAL LETTERS.

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.



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.

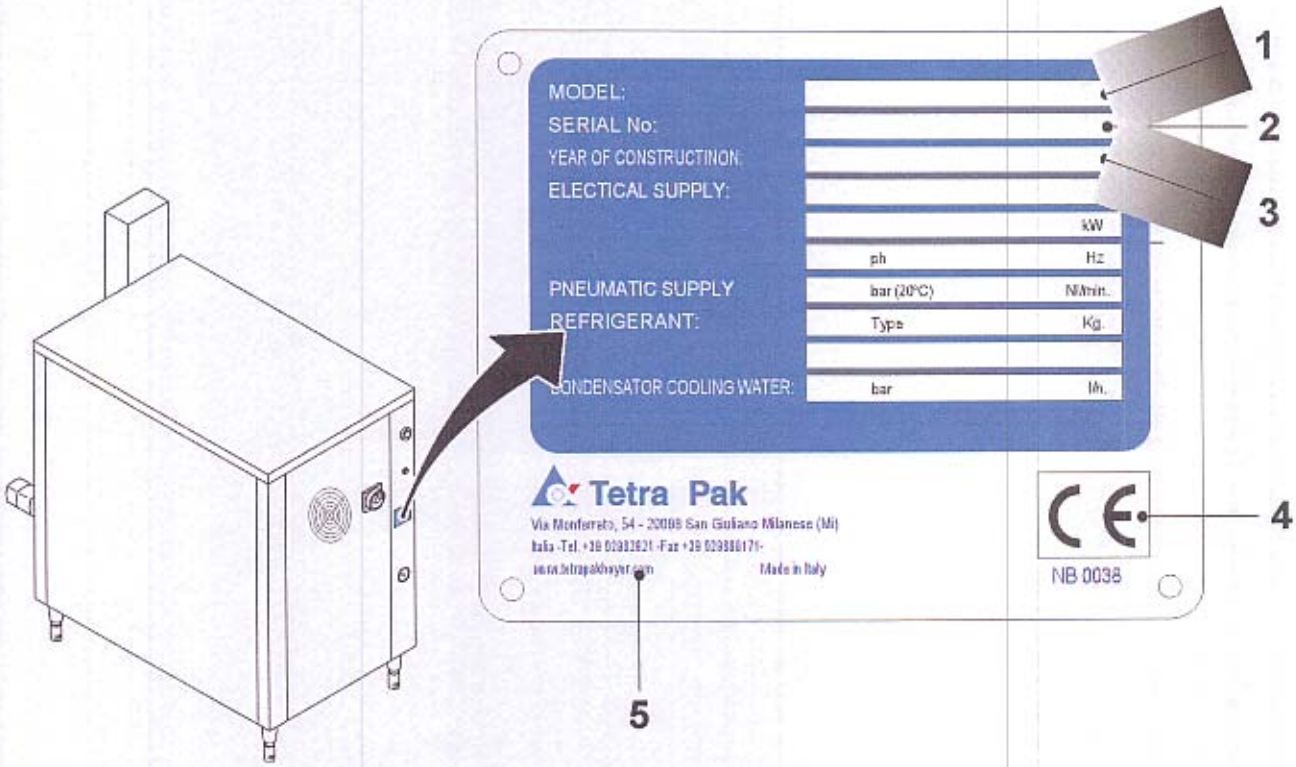
Identification

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.

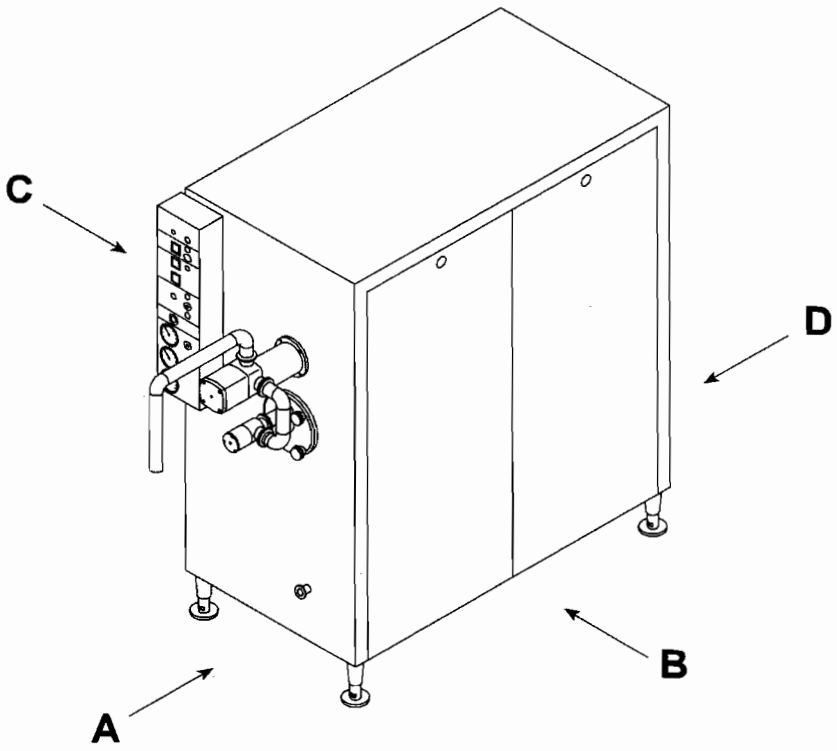


1 Machine type
2 Machine serial number
3 Year of manufacture
4 CE mark
5 Manufacturer

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 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) Change of product

d) Stop

Care

e) Care and cleaning

This page intentionally left blank

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.

Safety Messages Description . . . . . ii - 5

Personnel Requirements. . . . . ii - 6

Skilled Person. . . . . ii - 6

Instructed Person. . . . . ii - 6

Safety Signs . . . . . ii - 7

Locations of Safety Signs . . . . . ii - 8

Safety Devices . . . . . ii - 9

Emergency Stop . . . . . ii - 9

Emergency STOP Push-Buttons . . . . . ii - 10

Personal Protection. . . . . ii - 11

Entaglement Hazard . . . . . ii - 11

Hazardous Materials . . . . . ii - 12

Emergency Procedure. . . . . ii - 13

Products for cleaning and sterilization . . . . . ii - 13

Personal Protective Equipment . . . . . ii - 14

Handling . . . . . ii - 15

Disposal . . . . . ii - 16

Storage . . . . . ii - 16

Cooling Media R404A . . . . . ii - 17

Emergency Procedures . . . . . ii - 17

Handling and Storage of Cooling Media R404A ii - 17

Disposal of Cooling Media R404A . . . . . ii - 17

Supply Systems . . . . . ii - 18

Electrical Cabinet . . . . . ii - 18

Air Supply . . . . . ii - 19

Water Supply . . . . . ii - 19

This page intentionally left blank

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.

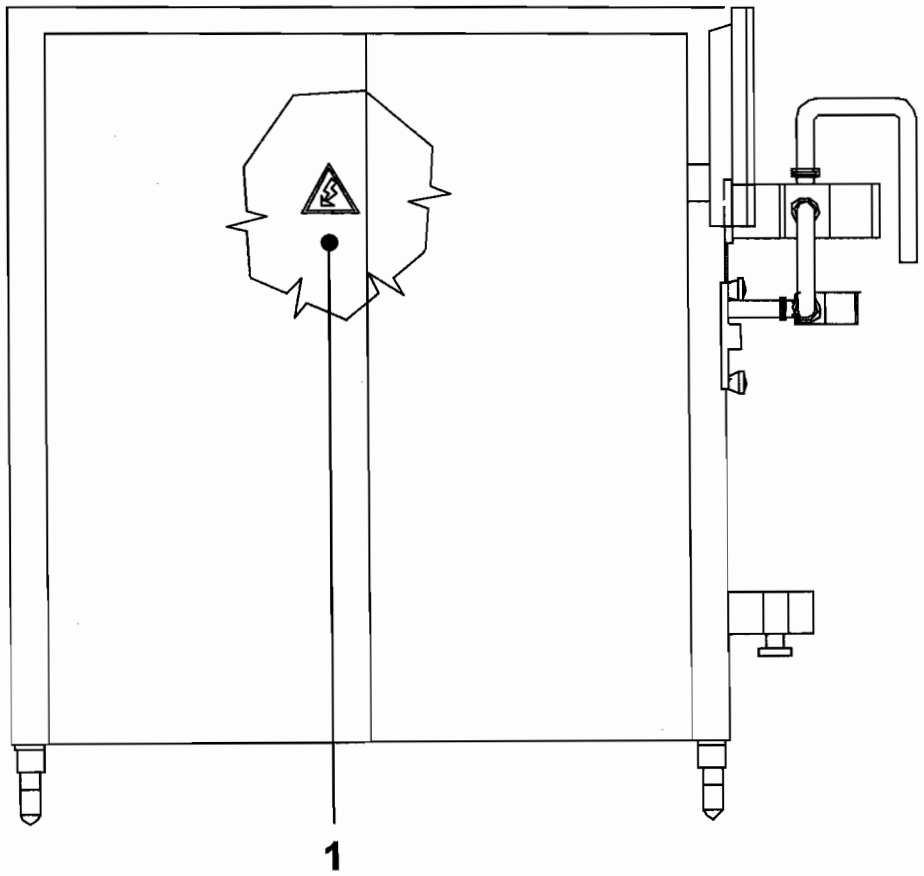
Note! The position numbers (Pos.) in the table refer to the positions in the illustration(s) in the Locations of Safety Signs section.

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.

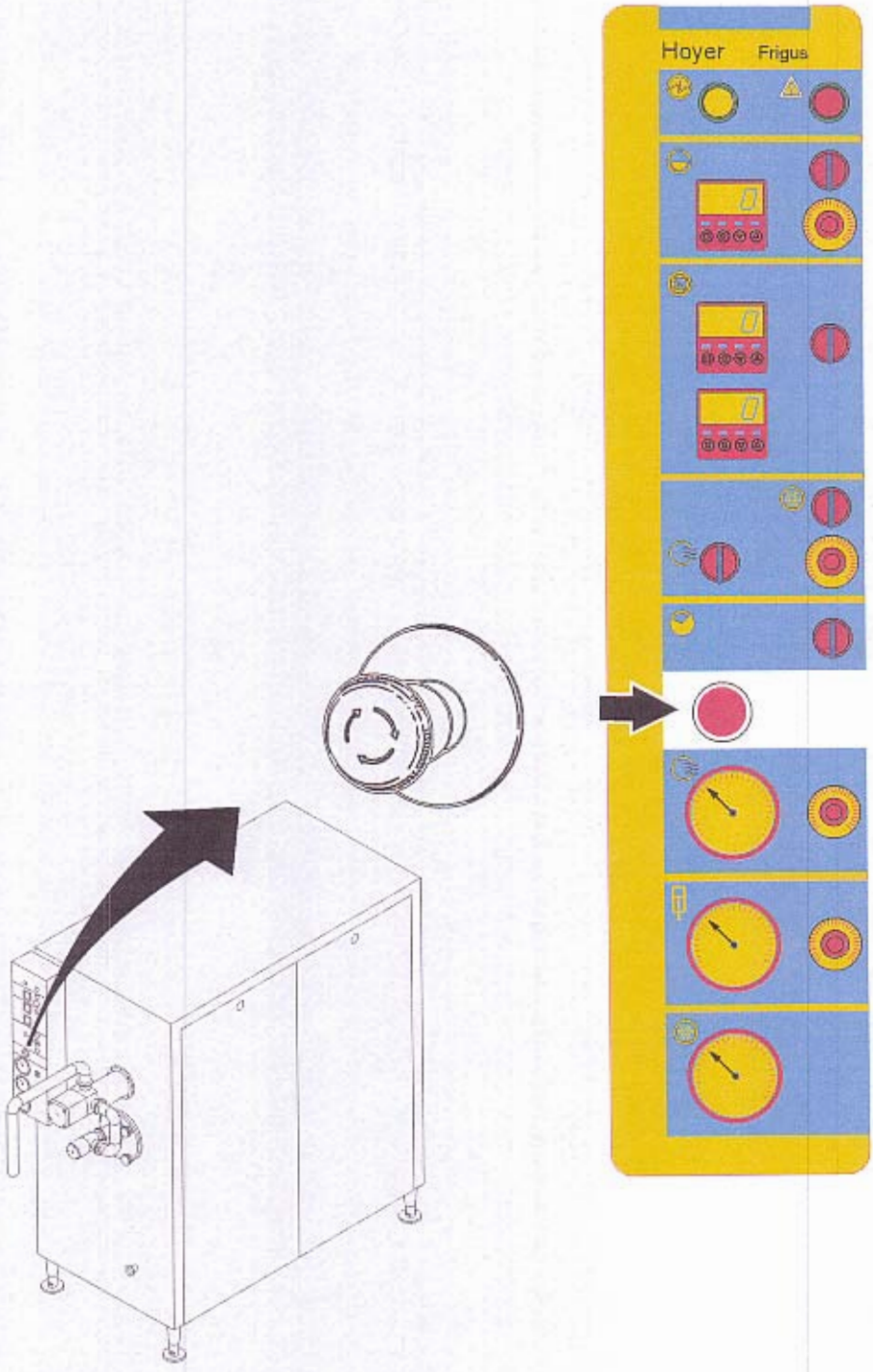
WARNING
Hazardous voltage
Activating a safety device, such as pressing an EMERGENCY STOP push-button or opening a door, does not disconnect the power supply from this equipment..

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.



1.2.4 Refrigerating plant

Composed of the freezing cylinder (evaporator), two Scroll Compliant rotary compressor, two high efficiency condenser, an economiser, a thermostatic valve and a number of minor accessories. All these components are designed specifically for operation at low temperatures using R404A coolant gas.
Cooling is carried out by steam compression: the compressor pumps gas into the condenser, where it is cooled and liquefied, and the liquid gas then passes through the thermostatic valve and is vaporized in the freezer cylinder (transforming into gaseous state once more) before returning to the compressor and starting the cycle again. Vaporization of gas in the freezing cylinder removes heat from the ice cream mix, which cools down; the heat is then disposed of in the condenser, where it is transferred to the water coming from the cooling tower (or well), heating it.
A pressure switch valve assembled on the condenser water circuit keeps condensation pressure constant, independently of water temperature.
The system mounted on the Frigus is a particularly efficient one which makes use of a dependable, low maintenance Scroll compressor which acts as a two-stage compressor with an economiser to obtain considerable cooling capacity and improved dependability.

1.2.5 Electrical system

The electrical system consists of the operator panel and the electrical cabinet which covers all the rear of the machine. By means of the operator panel all the machine functions can be activated or deactivated and adjusted, and all anomalies are indicated. The electrical cabinet at the rear contains the main switch and all control and power devices.

1.3 Control panel

1.3.1 Description of the functions

1 Power indicator lamp

2 Overload indicator lamp

3 Pump start/stop switch

4 Litre counter

5 Pump speed potentiometer

6 Dasher motor ammeter

7 Dasher start/stop switch

8 Ice cream pressure display

9 Compressor start/stop switch

10 Overrun switch

11 Hot gas potentiometer

12 CIP washing switch

13 Emergency stop pushbutton

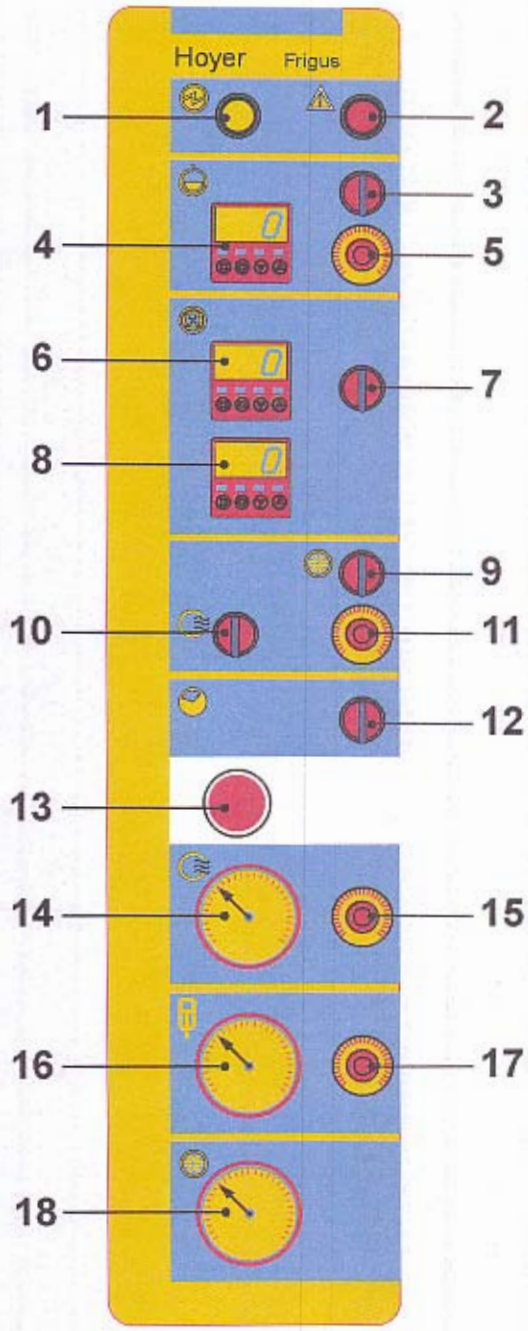
14 Overrun pressure gauge

15 Overrun pressure regulator

16 Cylinder pressure gauge

17 Cylinder pressure regulator

18 Compressor intake pressure gauge



This page intentionally left blank

2 Alarms and Troubleshooting

This page intentionally left blank

2.1 Troubleshooting ..... 2 - 5

This page intentionally left blank

2.1 Troubleshooting

Problem	Probable cause	Remedy
The lamp does not switch on.	• Power failure. • General switch in "0" position. • General switch fault. • Protection triggered.	• Restore voltage supply. • Turn general switch to "1". • Replace. • Reset the protection.
The pump stops, or does not start.	• No compressed air. • Selector fault. • Pump rotor seized. • Inverter in emergency state. • Inverter thermal cutout • Bearings blocked. • Inverter fault. •Main motor fault.	• Check compressed air pressure. • Replace selector. • Remove rotor, check condition and if necessary replace. • Turn off the general switch and turn back on after a few minutes. • Wait 20 seconds, then restart the pump. • Replace following instructions in "Mechanical maintenance" section • Replace. • Replace/repair.
Mixer shaft stops or does not start.	• Thermal cutout tripped. • Selector fault. • Motor fault. • Build up of ice in the cylinder.	• Reset thermal cutout. • Replace selector. • Replace/repair. • Turn on hot gas and attend.
The refrigerator compressor will not start up.	• Dasher off. • Thermal cutout tripped. • Electronic overload tripped. • Selector fault. • High-pressure cutoff switch tripped. • Low pressure cutoff tripped.	• Restart dasher. • Reset. • Reset by switching general switch off then on again. • Replace selector. • Check water temperature. •Turn on hot gas for about 30 seconds.
No flow or insufficient flow of mix.	• No mix supply. • Mix supply hose crimped or blocked. • Air bubbles in the supply hose. • The pump has stopped. • The pump is out of phase.	• Restore supply. • Remove blockage/crimp. • Stop overrun, increase pump speed to recall mix rapidly into the cylinder, reset desired pump speed and restart overrun. • See problem "The pump stops, or does not start". • Align the pump.
The mixer shaft is malfunctioning.	• Ice-cream too hard. • Scraper blades worn. • Reduction gear broken.	• To increase the injection of warm gas. • Sharpen or replace, following correct fitting procedure. • Replace.
Mix cooling problematic at start-up.	• Condenser out of or low on water. • Hot water. • Refrigerator unit fault.	• Check water supply. • Check water temperature. • Call qualified refrigerator technician.

Ice-cream too soft.	• Excessive ice-cream production rate. • Input mix too hot. • Water supply to condenser insufficient. • Condenser cooling water too hot. • Ice-cream outlet valve too open. • No coolant gas. • Coolant gas filter blocked. • Refrigerator unit fault.	• Reduce the production. • Check that mix is at 4°C. • Check water supply. Adjust pressure valve (if present) as explained in the "Refrigerator unit maintenance" section. • Check temperature of tower water. • Increase pressure on ice-cream outlet valve. • Check for leaks in refrigerator unit and reset gas charge. • Replace filter. • Call refrigerator technician.
Overrun insufficient.	• Loss of pressure in compressed air system. • Clogged filters. • Check valve seal worn or dirty. • Water or mix in compressed air system. • Compressed air supply failure. • Overrun regulator fault. • Insufficient overrun pressure. • The pump is out of phase. • Pump rotor worn.	• Check compressed air system for leaks and check solenoid valve operation. • Replace as described in the "Compressed air system maintenance". • Replace as described in the "Mechanical maintenance/Cleaning" section". • Replace the non-return valve O-ring as in point above and clean system. • Reset. • Replace. • Correct overrun pressure. • Align the pump. • Replace.
Refrigerator compressor starts but shuts down immediatly.	• Condenser water supply closed. • Condenser water supply hoses pinched. • Condenser water supply hoses pinched of insufficient diameter.	• Turn on faucets. • Remove crimps. • Replace with hoses of diameter at least as that of the hose connections on the machine.
The compressor ices up.	• Condenser water too cold. • Blades worn. • Thermostatic valve fault. • Excessive quantity of coolant gas.	• Check water temperature. • Replace. • Replace. • Unload gas and reload observing value in technical data.
Hourly ice-cream production rate remains unchanged even by changing the capacity through the panel.	• Inverter fault.	• Replace.
Hot gas activates before correct time.	• Instrumental decalibrated.	• Calibrate instrument.
Hot gas does not activate.	• Instrumental decalibrated. • Instrumental fault.	• Calibrate instrument. • Replace instrument.
Hot gas activates but with no effect.	• Hot gas faucet closed. • Hot gas solenoid and valve fault.	• Open faucet. • Replace.

3 Preparation

This page intentionally left blank

3.1 Preparation. . . . . 3 - 5

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

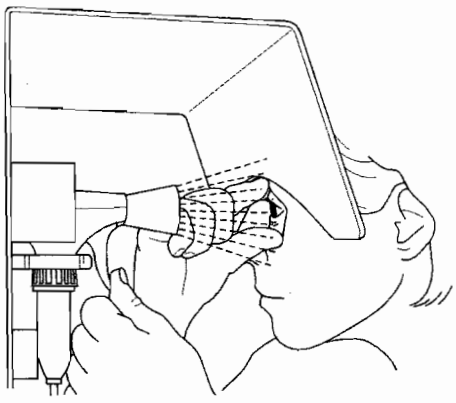
Contact with chemicals can cause death, serious injury and illness.

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.

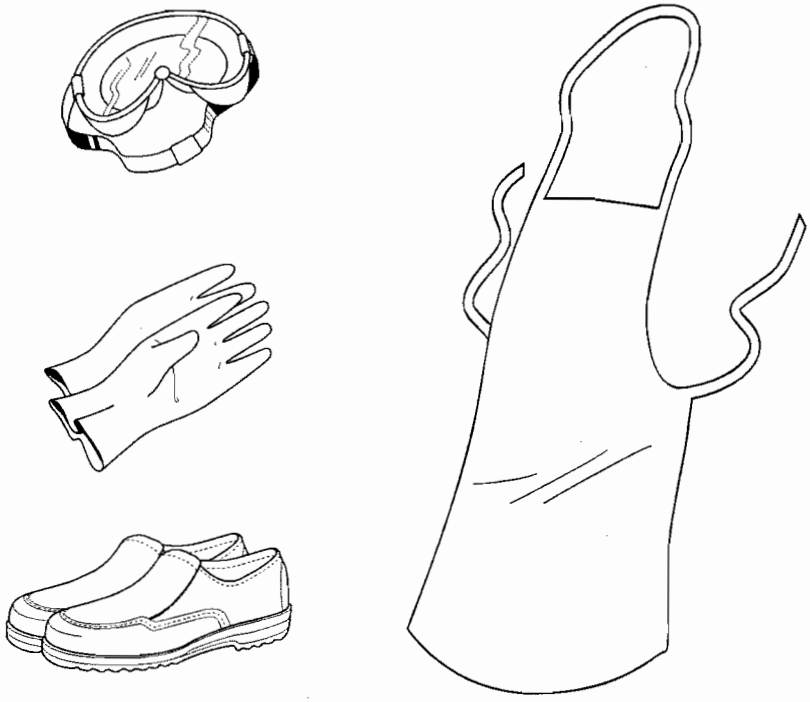
If irritation or pain is experienced due to having inhaled products for cleaning and sterilization vapour

- 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.

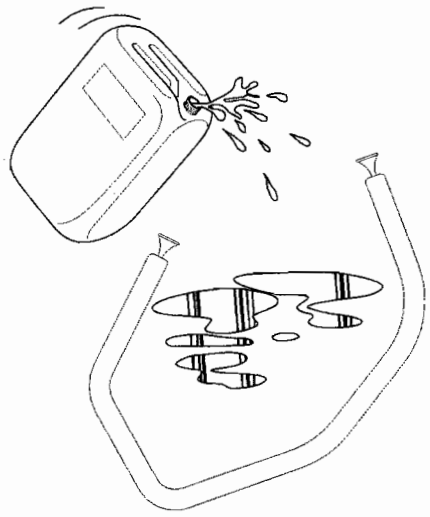


Handling

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."

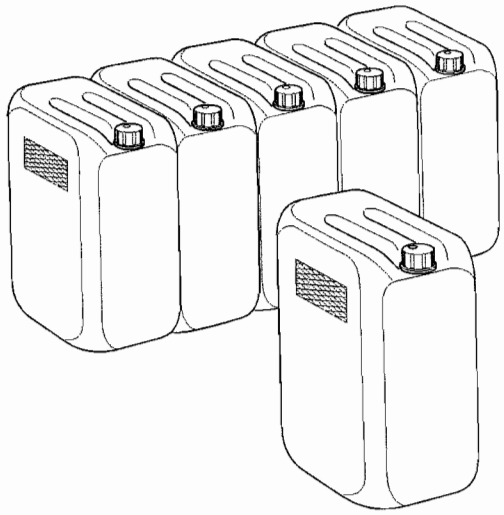


Storage

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

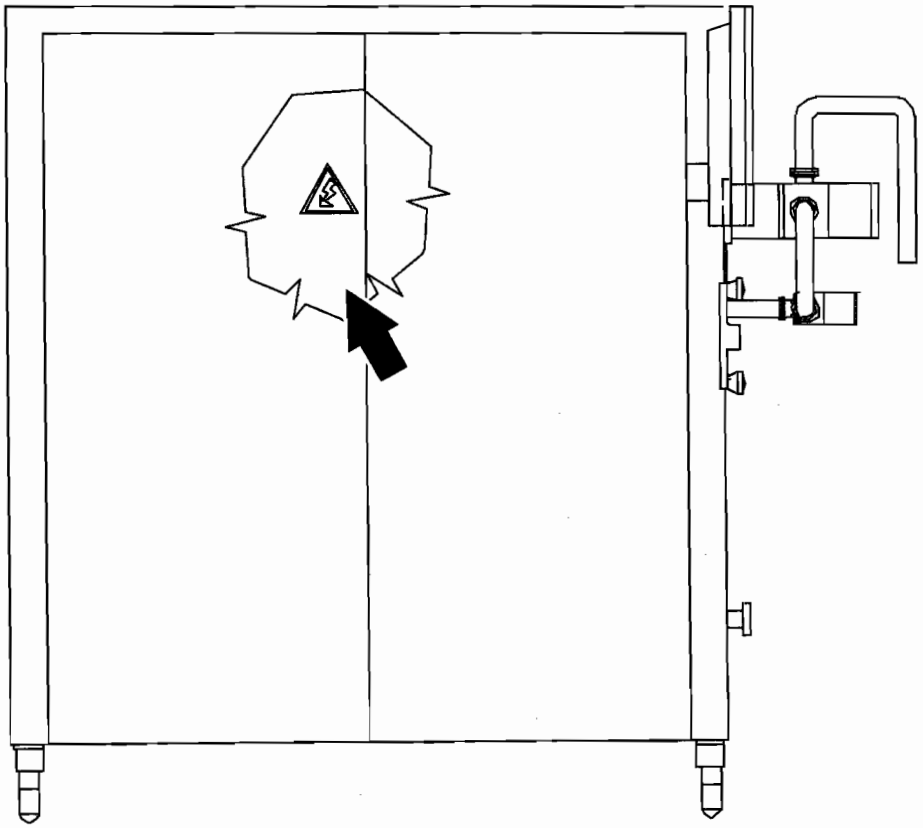
DANGER

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.

This page intentionally left blank

1 General Description

This page intentionally left blank

1.1 General description . . . . . 1 - 5
1.1.1 Functional description . . . . . 1 - 5
1.2 Main groups . . . . . 1 - 6
1.2.1 Filter set . . . . . 1 - 6
1.2.2 Mix pump . . . . . 1 - 7
1.2.3 Freezing cylinder . . . . . 1 - 8
1.2.4 Refrigerating plant . . . . . 1 - 9
1.2.5 Electrical system . . . . . 1 - 10
1.3 Control panel . . . . . 1 - 11
1.3.1 Description of the functions . . . . . 1 - 11

This page intentionally left blank

1.1 General description

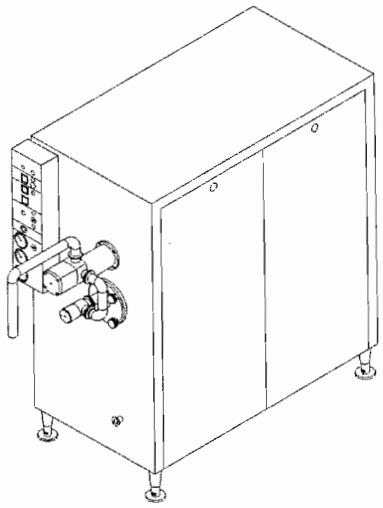
The machine mixes sanitised air into ice cream mix to obtain the desired overrun, cools and agitates the mix with air incorporated in it to create the viscous product known as ice cream, and supplies sufficient pressure to convey the ice cream to its destination through a pipe.

1.1.1 Functional description

In order to carry out these functions the machine incorporates the following components:

- a set of filters which sanitise air coming from the compressed air supply.
- a pump which receives mix from ageing vats, adds sanitised air, and sends the product to the freezing cylinder.
- a "mass flow controller" which controls the compressed sanitised air capacity that is added to the mix.
- a freezing cylinder with a dasher and blades, inside which air is uniformly blended into the mix and the product is cooled until it takes on a thick consistency.
- a refrigerating plant connected to the outside wall of the freezing cylinder to cool it down.
- an electrical system for command and control of all machine functions.
- an extraction pump that sends the ice cream from the cylinder to the users.

All these items of equipment are assembled on a sturdy, compact stainless steel frame.

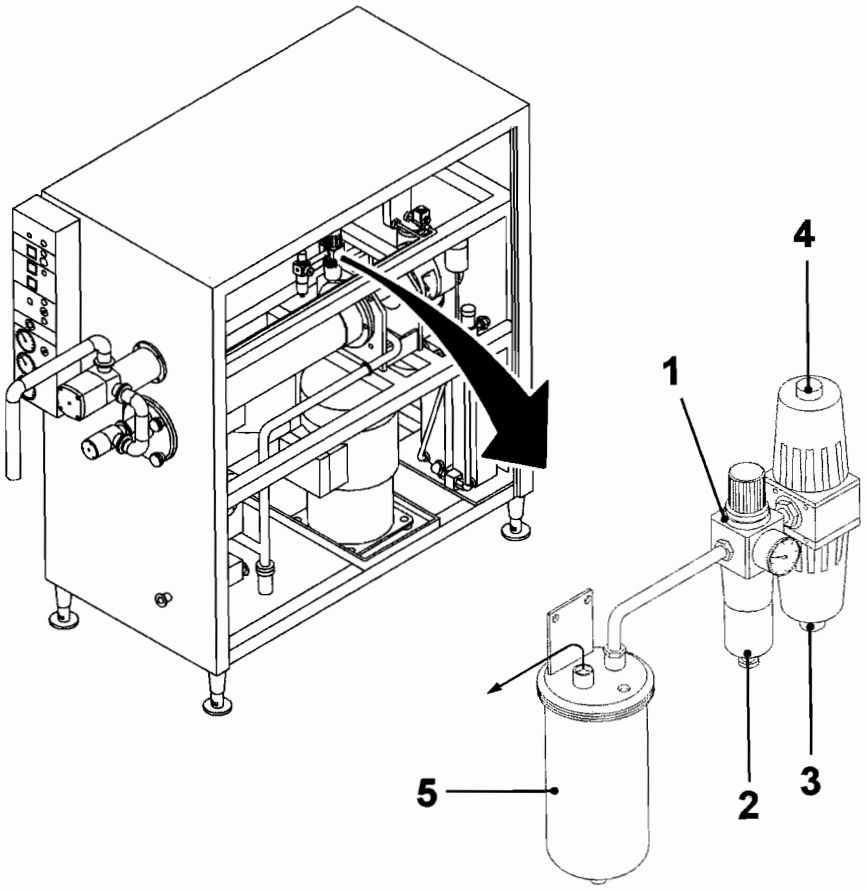


1.2 Main groups

1.2.1 Filter set

The shop's compressed air (the machine does not have an air compressor of its own) passes through a pressure reducer (1) and a mesh filter (2) to separate out any large particles; these are followed by a microfilter for oil vapours (3) and an active carbon filter (4) to eliminate odours.
Finally, the clean air goes through a (sterilisable) Teflon (5) membrane filter with microscopic pores specifically intended to stop the passage of bacteria. The sanitised air thus obtained is let in between the first and second stage of the mixing pump at a pressure which may be controlled by the operator using the control panel; the changes of the pressure permit variation of ice cream volume.

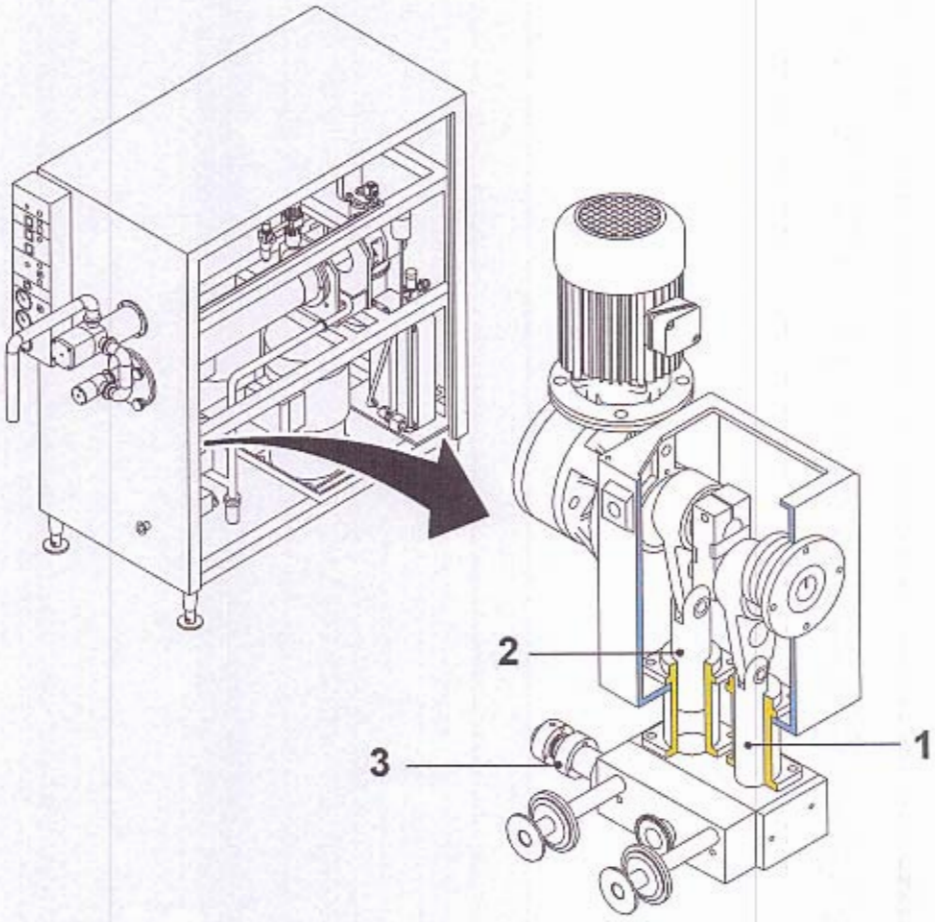
1 Pressure reducer
2 Mesh filter
3 Oil filter
4 Active carbon filter
5 Steriling filter



1.2.2 Mix pump

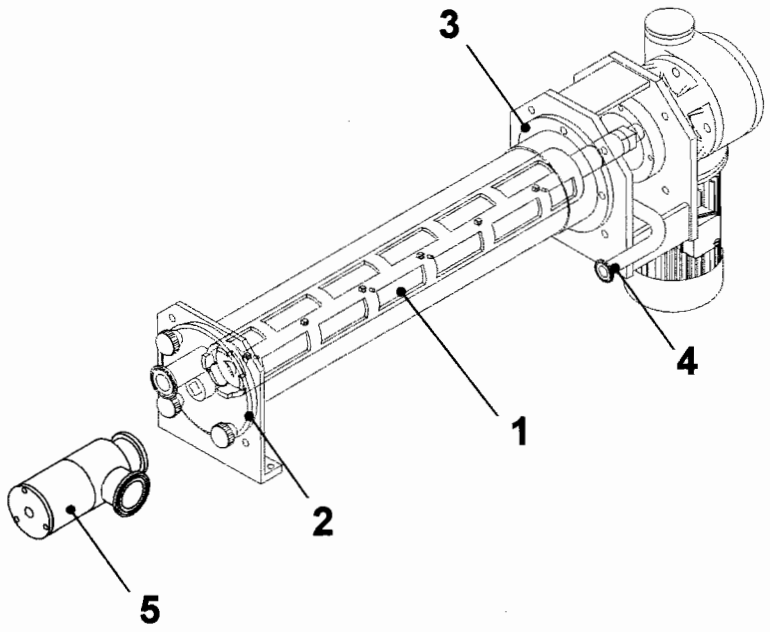
It is a two-stage pump constructed with two pistons of different sizes; the first (1) receives and batches a quantity of mix determined by the operator on the basis of the desired hourly production; the second stage (2) receives mix dispensed by the first stage and sanitised air let in between the two stages and puts it all into the freezer cylinder.
As the difference in volume between the first and the second stage (a result of the size of the pistons) does not change under different pump pressure and speed conditions, the quantity of air let in per mixing unit is also constant and depends on the pressure of the air. By adjusting the pressure of sanitised air, the operator therefore controls the increase in volume, which remains constant throughout the production cycle.
The pump is driven by an electric motor commanded by an inverter (for speed changes) and incorporates a pneumatically driven by pass (3) for CIP washing. It works properly at relatively high pressures, so that no extraction pump is needed coming off the machine.

1 Piston
2 Piston
3 By Pass



1.2.3 Freezing cylinder

This is the most important part of the machine. It consists of an pipe positioned upright with a chrome coating on its inside walls, surrounded by a jacket in which coolant fluid flows to achieve a cooling effect. A dasher (1) with eight blades rotates inside it, scraping the chrome-plated inside surface to ensure that frozen ice cream does not build up on the walls. Both the extremities , the front one (2) and the back one(3), are closed by two covers, which incorporate the mix feed pipe (4) and the ice cream outlet valve (5). Mix blended with sanitary air coming from the pump flows into the back part of the cylinder ; on its way to the top it is whisked by the dasher (1) and cooled by contact with the walls of the cylinder, kept cold by the refrigerating plant. The ice cream forms and then flows out of the ice cream outlet valve (5), which is controlled pneumatically to regulate the pressure of ice cream in the cylinder.
In order to make sure the machine operates correctly, it is important to be very careful not to damage the cylinder, always making sure that the scraper blades are in perfect condition and have been assembled correctly.



1 Dasher
2 Front extremity
3 Back extremity
4 Mix feed pipe
5 Ice cream outlet valve

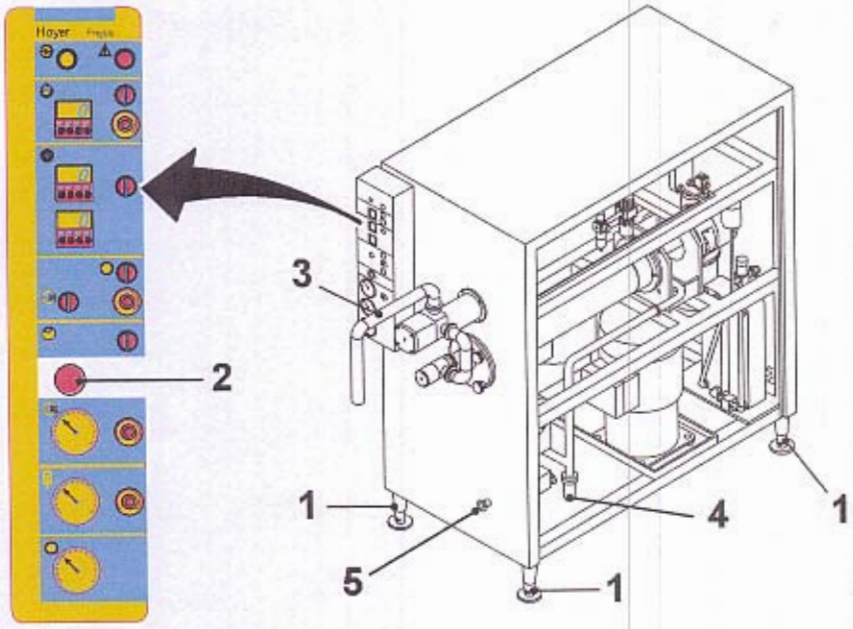
This page intentionally left blank

3.1 Preparation

Perform the following checks before starting production:

a. Check that the machine is stable and has been levelled, and adjust feet (1) if necessary.
b. Check that the main switch is on.
c. Check that the water and compressed air valves are open.
d. Check that the emergency stop button (2) has been released.
e. Check that the clamp fittings are tightly fitted.
f. Check that the ice cream outlet (3) pipe is fitted correctly.
g. Check that the safety valve (4) is correctly fitted.
h. Check that the mix intake (5) pipe is fitted correctly.
i. Check that the all panels are assembled and fitted.
l. Check that the machine has been sterilised.

WARNING
It is dangerous to operate the machine with the closing panels dismantled.



1 Adjustable feet
2 Emergency stop button
3 Icecream outlet pipe
4 Safety valve
5 Mix intake pipe

This page intentionally left blank

4 Production

This page intentionally left blank

4.1 Start production . . . . . 4 - 5
4.1.1 Start . . . . . 4 - 5

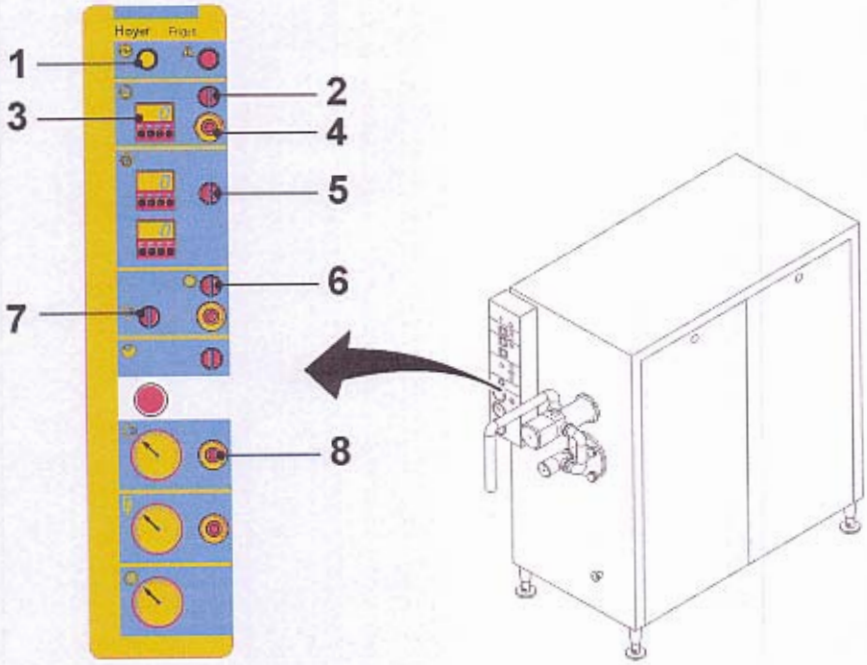
This page intentionally left blank

4.1 Start production

4.1.1 Start

a. Connect the pump intake to the mix container.
b. Check that the power ON indicator (1) on the operator panel is on.
c. Start the pump with the switch (2).
Mix flow in litres/hour corresponding to pump speed will be shown on the indicator (3).
d. Start up the sanitised air plant with the switch (7).
Check that the switch light comes on.
e. Wait for mix to start coming out of the freezer outlet pipe.
f. Reduce pump speed to its minimum with the potentiometer (4).
g. Start the dasher with the switch (5) and check that the switch indicator light comes on.
h. Start up the refrigerator compressor using the switch (6). Cooling will begin and the mix contained inside the freezer cylinder will begin to harden.
i. Use the regulator (8) to adjust the percentage of sanitised air to be injected into the mixtures. The regulation takes effect after a few minutes.
k. Set the pressure of the ice cream inside the cylinder with the regulator (2) which activates the pneumatic valve set above the cylinder.
j. The hardness of the ice cream can be monitored on the gauge which measures the amount of current absorbed by the dasher motor, proportionate to the hardness of the ice cream.

(cont'd)

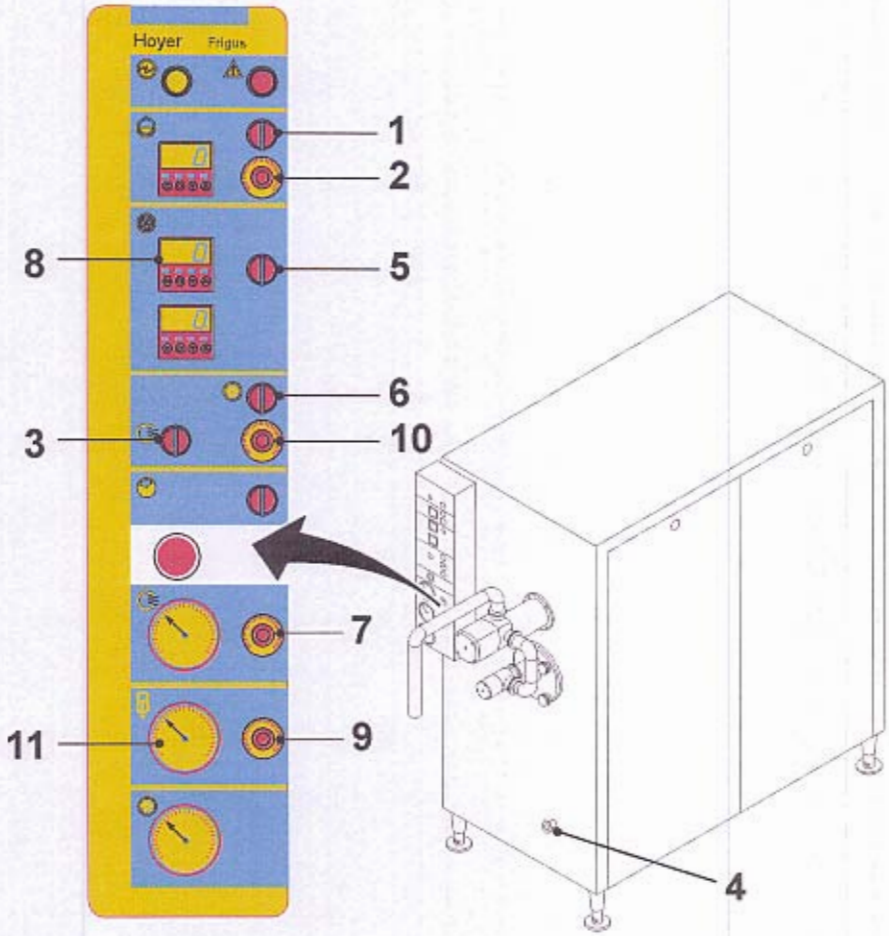


1 Indicator
2 Pump switch
3 Indicator
4 Pump potenziometer
5 Dasher switch
6 Compressor switch
7 Sanitized air switch
8 Regolator

(cont'd)

l. When the ice cream takes on the correct consistency, use the potentiometer (1) to increase pump speed slowly up to the desired rate of flow.

Check that the ice cream pressure inside the freezer cylinder is between 4 and 8 bar on the pressure gauge (3).
The pressure should not exceed 10 bar, and can be reduced as follows:
• make sure that the ice cream outlet hose is not pinched and that it is no longer than 3 metres;
• adjust the hot gas regulator with the potentiometer (4) ti soften the ice cream.
If excessive pressure is due to low production, it may be necessary to increase pump speed using the potentiometer (1).



1 Pump switch
2 Potenziometer
3 Air switch
4 Mix Outlet
5 Dasher switch
6 Compressore switch
7 Pneumatic regulator
8 Amperometer
9 Regulator
10 Potenziometer
11 Manometer

5 Change of product

This page intentionally left blank

5.1 Change of product. . . . . 5 - 5
5.1.1 Manual stop . . . . . 5 - 5
5.1.2 Production restart . . . . . 5 - 6

This page intentionally left blank

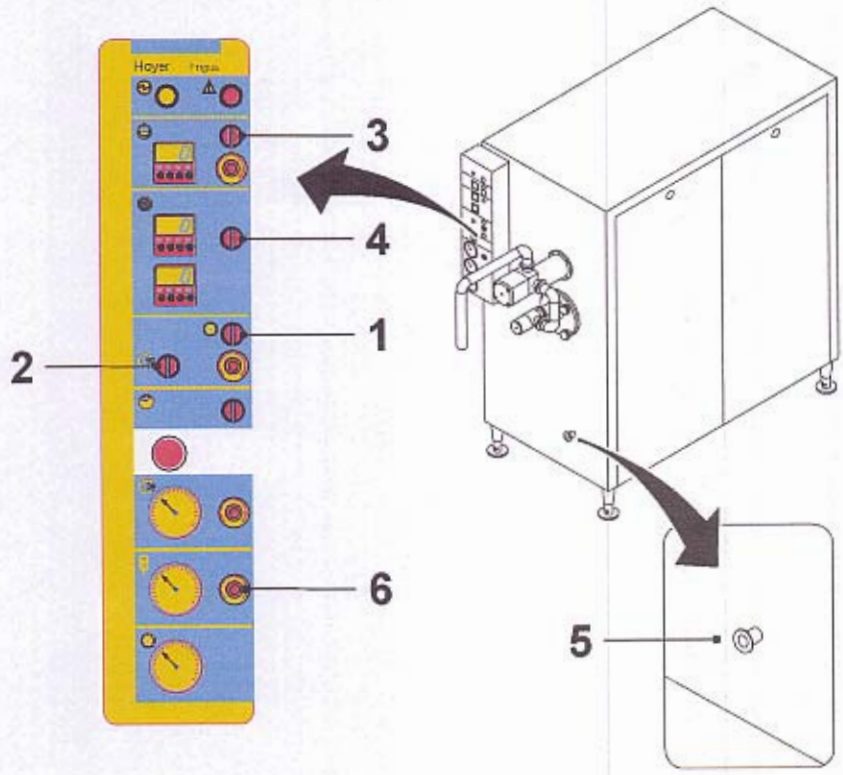
5.1 Change of product

If production of different flavours of ice cream is organized so as to produce lighter coloured flavours first and successively produce darker and darker flavours, product changeovers will be very quick and involve very little waste.
All that need be done in this case is switch the mix supply from one flavour to another; if the pipes from the containers are set up with switch taps all that need be done is close one tap and open another, without stopping the freezer.

If it takes more time to change the mix the machine must be stopped.

5.1.1 Manual stop

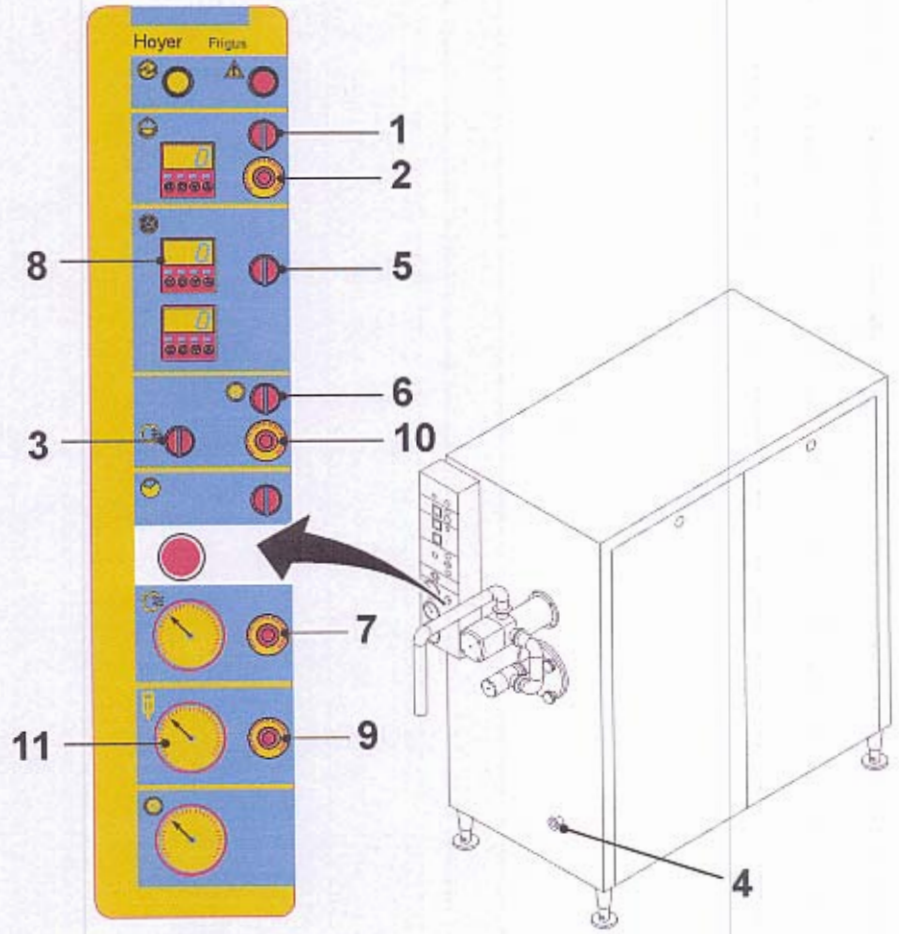
a. Stop the refrigerator compressor by turning the switch anti-clockwise (1).
b. Stop the overrun by turning the switch anti-clockwise (2).
c. Stop the pump by turning the switch anti-clockwise (3).
d. Bring to 0 the pressure into the cylinder by using the pressure regulator (6).
e. Stop the dasher by turning the switch anti-clockwise (4).
f. Disconnect the supply to the freezer (5) from the vat containing the mix for which production is to be stopped, and connect it up to the container containing the new (darker) mix to be produced.



1 Compressor start/stop switch
2 Overrun switch
3 Pump start/stop switch
4 Dasher start/stop switch
5 Freezer feeding
6 Cylinder pressure regulatior

5.1.2 Production restart

a. Turn the pump on at low speed using switch (1) and potentiometer (2).
b. Start up the sanitised air plant using the switch (3).
c. Wait until mix starts to come out (4).
d. Turn on the dasher with the switch (5).
e. Turn on the refrigerator compressor with the switch (6).
f. Adjust the quantity of sanitised air let into the mix using the pneumatic regulator (7).
g. Set cylinder pressure between 4 and 8 bar (see manometer (11)) using the regulator (9).
h. Wait until the ammeter (8) indicates that the ice cream is sufficiently hardened.
i. Increase pump speed to obtain the desired ice cream production speed using the potentiometer (2).
l. If necessary, adjust the hardness of the ice cream with the potentiometer (10).



1 Pump start/stop switch
2 Pump potentiometer
3 Overrun switch
4 Mix start
5 Dasher start/stop switch
6 Compressor start/stop switch
7 Overrun pressure regulator
8 Ammeter
9 Cylinder pressure regulator
10 Hot gas potentiometer
11 Cylinder pressure gauge

6 Stop

This page intentionally left blank

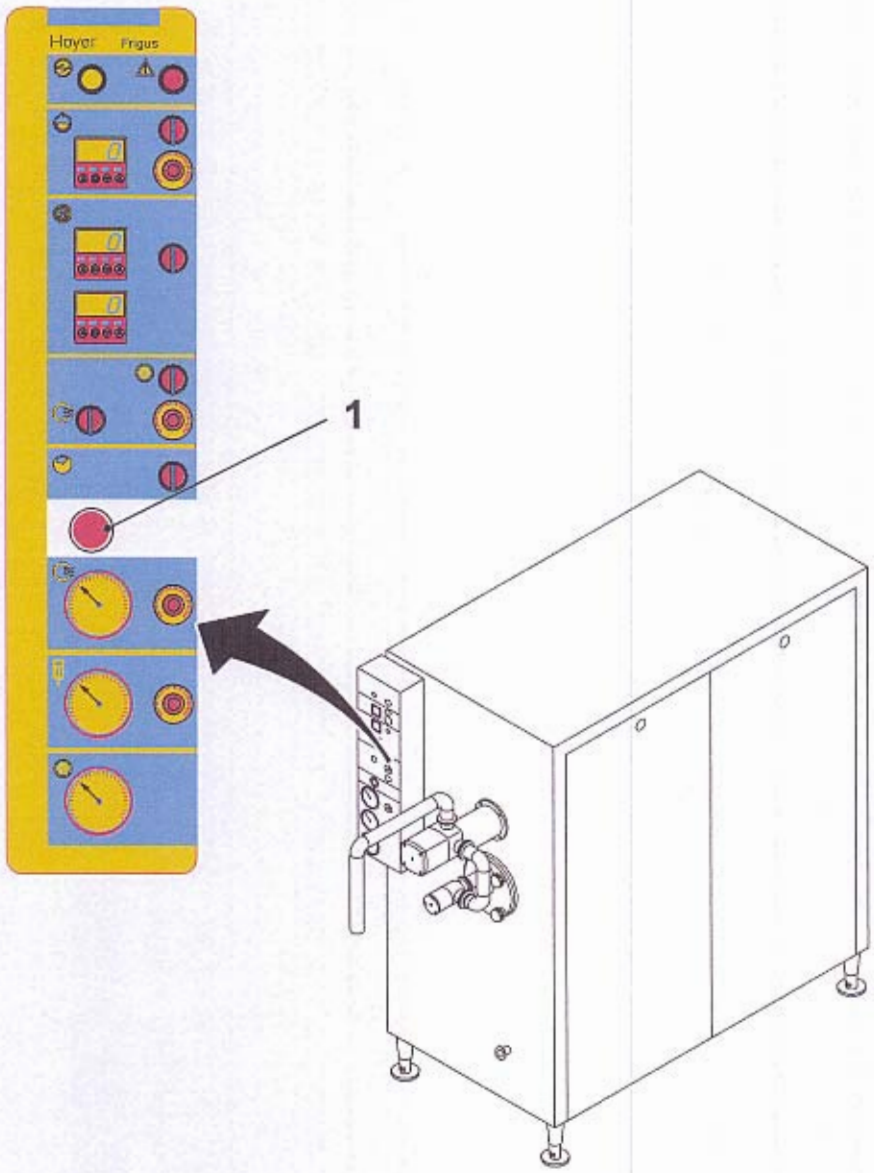
6.1 Emergency stop. . . . . 6 - 5

6.2 Stop. . . . . 6 - 6

This page intentionally left blank

6.1 Emergency stop

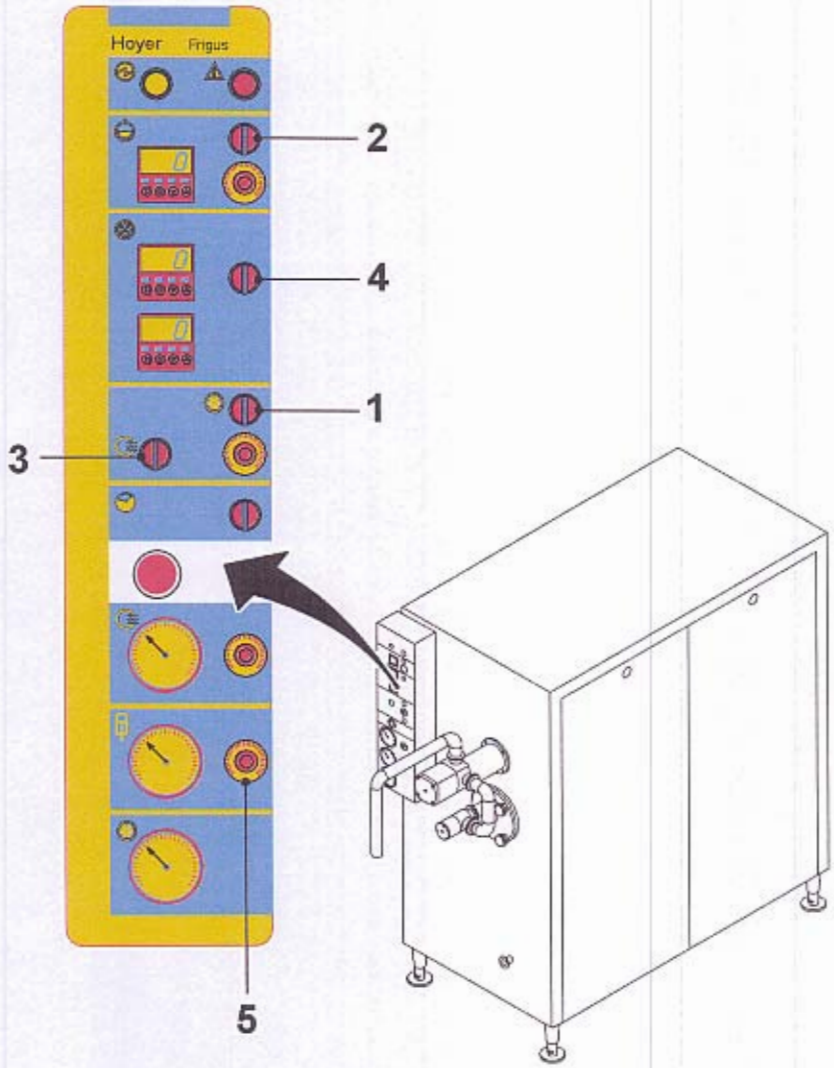
When enabling an emergency button (1), the machine stops.
To reset the system functions, rearm the enabled button.



1 Emergency stop button

6.2 Stop

a. Stop the refrigerator compressor by turning the switch anti-clockwise (1).
b. Stop the pump by by turning the switch anti-clockwise (2).
c. Stop the overrun by by turning the switch anti-clockwise (3).
d. Bring to 0 the pressure into the cylinder by using the pressure regulator (5).
e. Stop the dasher by by turning the switch anti-clockwise (4).



1 Compressor start/stop switch
2 Pump start/stop switch
3 Overrun switch
4 Dasher start/stop switch
5 Cylinder pressure regulator

7 Care and Cleaning

This page intentionally left blank

7.1 C.I.P. Washing . . . . . 7 - 5

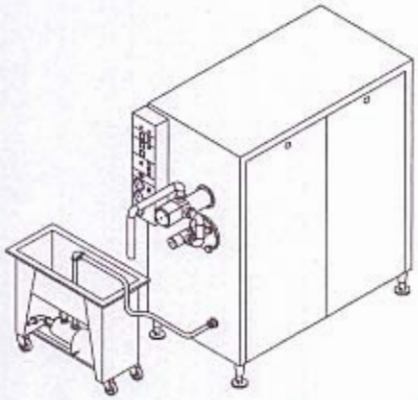
7.2 Manual washing. . . . . 7 - 7

7.3 Washing the outside of the machine . . . . . 7 - 11

This page intentionally left blank

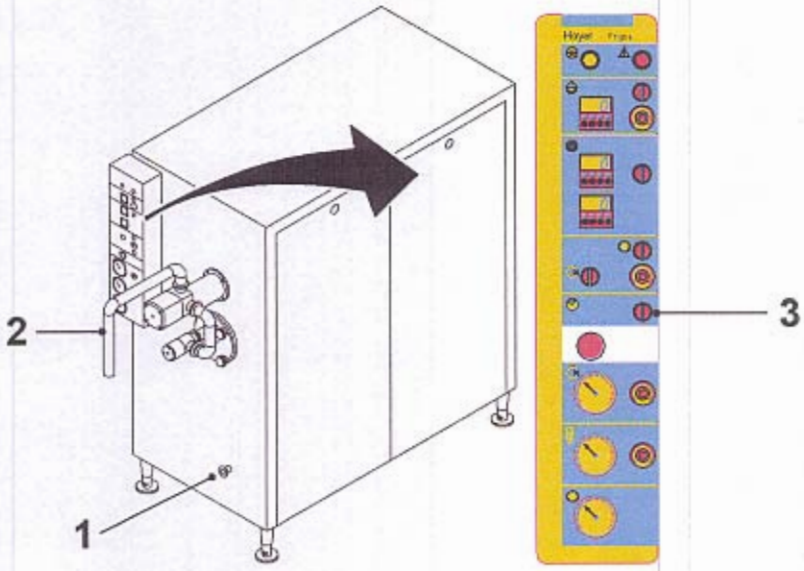
7.1 C.I.P. Washing

CIP (Cleaning In Place) washing permits cleaning of the internal parts of the machine which come into contact with the product with no need to dismantle the machine.
If you have no centralised washing system, you will at least need a container and a pump, as shown in the illustration:



1. Prepare washing solution at the correct temperature for the stage in the washing cycle to be performed (refer to table of wash stages and conditions) in an appropriate container.
2. The correct speed of the flow for a good CIP washing is about 1,5 m/s in the frigus outlet pipe. This involves a capacity of 5000 l/h for a 1 1/2" outlet pipe. In these conditions, the pressure drop is about 2 bar. The CIP washing pump must guarantee these flow rate and pressure characteristics.
3. Connect the pump outlet to the mix inlet hose (1) and the freezer outlet hose (2) to the container.
4. Start the CIP wash cycle using the selector(1).

(Cont'd)



1 Inlet hose
2 Outlet hose

(Cont'd)

In this condition the pump by-pass valve and the ice cream output valve are open at all times to maximise flow of cleaning solutions, while the dasher and pump work intermittently. The dasher and pump work for 5 seconds per minute throughout the duration of the wash cycle, so that they can be washed without causing excessive wear or severe damage to mechanical parts due to lack of lubrication.

5. Start up the wash tank pump. The wash cycle will be carried out as follows:

a- Prewash with warm water.
b- Detergent wash. Use an alkaline detergent which is non-caustic and does not form foam (containing a mixture of alkaline, sequestering, anti-corrosive and surfactant agents) with a pH of approximately 11 at a concentration of 1%. Use a concentration of 1.2% to 1.6%, depending on how dirty the machine is and how hard the water supply is.
c- Rinse with cold water.
d- Descaling wash. Use buffered phosphoric acid in a concentration of 0.5% to 1%.
e- Rinse with cold water.
f- Disinfectant wash. Use a moderately alkaline active disinfectant in a concentration of 1% to 1.2%.
g- Rinse with cold water.

6. At the end of the washing programm, stop the tank pump and disconnect hoses for connection with freezer. Wait until all water has flowed out.

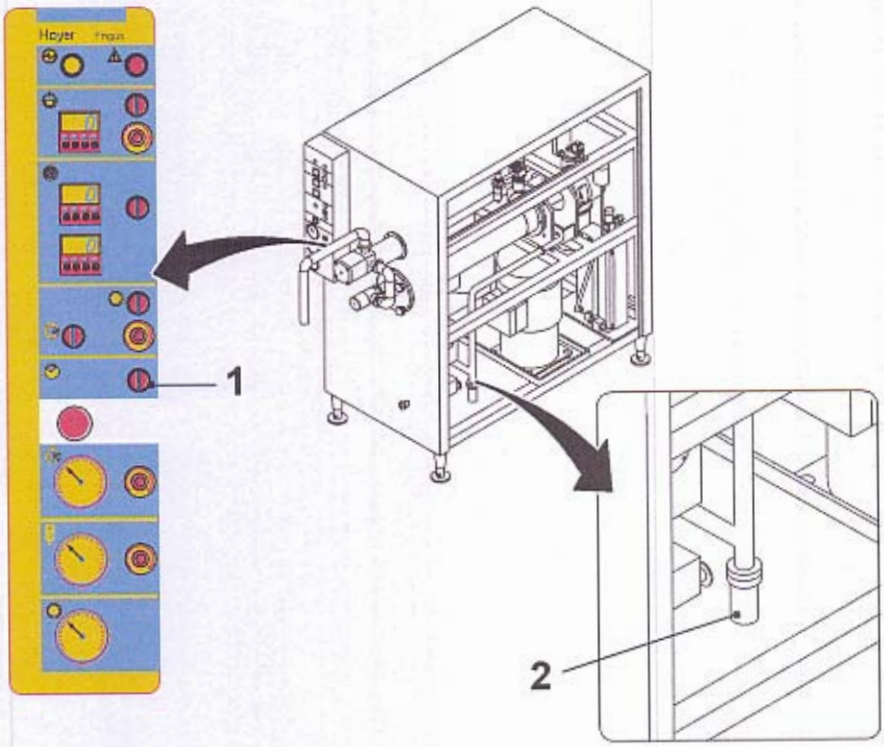
⚠ WARNING
Don't use the frigus pump as a washing pump because it can block and wear off excessibely.

Wash stage	Recommended products	% in water	°C	Minutes	Notes
Prewash	Water	100	50	5	drain away
Detergent wash	SU157 (Diverset Lever) P3-N421 (Henkel Ecolab)	1,2-1,6	max 70	15	recycle
Rinse Water	Water	100	20	5	drain away
Descaling wash	SU475 (Diverset Lever) P3-PE4 Spezial a (Henkel Ecolab)	0,5-1	max 70	10	recycle
Rinse Water	Water	100	20	5	drain away
Disinfectant wash	SU330 (Diverset Lever) P3-Dix forte (Henkel Ecolab)	1-1,2	20	10	recycle
Rinse Water	Water	100	20	10	drain away

7.2 Manual washing

If the washing system is not available and the machine must be washed manually, it will be necessary to dismantle a number of parts and reassemble them very carefully after washing.
In this case, proceed as follows:

a. Turn off the machine in automatic mode (see paragraph 6.2 Automatic stop).
b. Disconnect the mix supply from the vat and supply the freezer pump with warm water, no hotter than 60 to 65°C.
c. Start up the CIP cycle using the selector (1).
d. Let hot water flow through the machine until the water flowing out of it is fairly clean. Keep washing as short as possible to prevent damage to the pump.
f. Stop the the CIP cycle by using the selector (1).
g. Open the safety valve (2) to drain the water contained inside the machine.



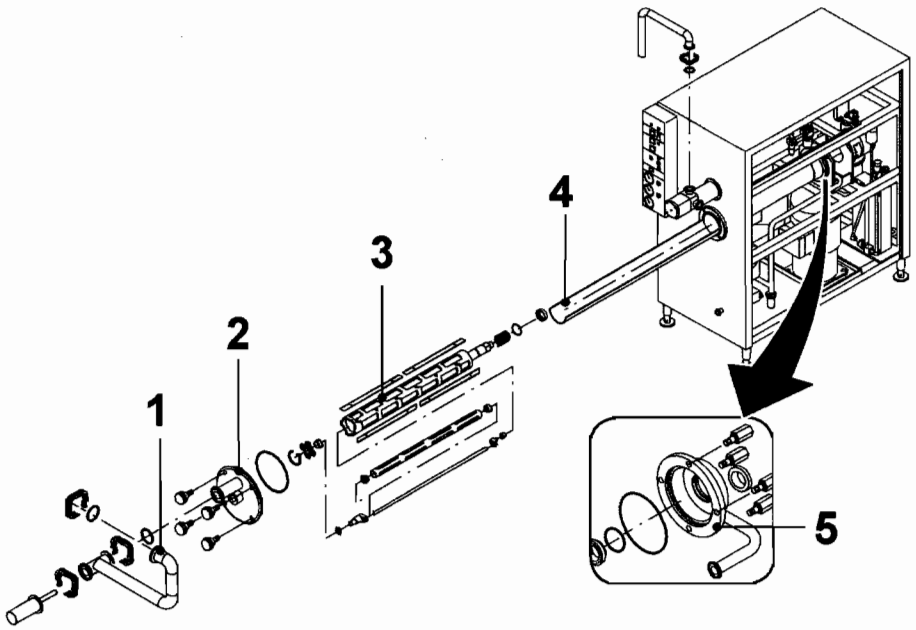
1 CIP button
2 Safety valve

Machine Status	Electrical power supply OFF Air valve OFF
Special equipment	Protective gloves

a. Disconnect the pipes (1) on top of the cover(2).
b. Remove the cover (2) by unscrewing the knobs holding it in place.
c. Remove the dasher (3) using the tool provided (4), and dismantle the blades .
d. Dismantle the cylinder bottom (5).

(Cont'd)

1 Pipes
2 Cover
3 Dasher
4 Protection
5 Cylinder bottom



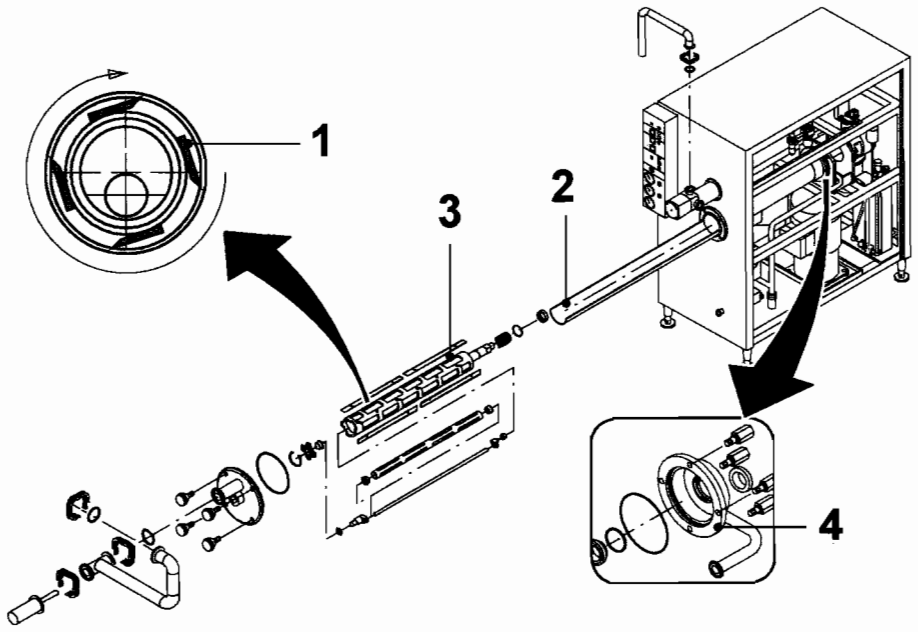
(Cont'd)

e. Wash all components thoroughly, immersing them in a solution containing the recommended percentage of an appropriate detergent.
f. Rinse well in running water.
g. Reassemble the parts in precisely the same position as before.
Be very careful when positioning the blades (1); the sharp part must be facing the cylinder.

⚠ CAUTION
To prevent blows that could damage the freezer cylinder, a "shaft raiser ring" is supplied.

The dasher (3) must be positioned on the protection (2) as shown in the figure.
Then assemble the dasher (3), being very careful not to hit and damage the ring on the mechanical seal at the bottom (4).

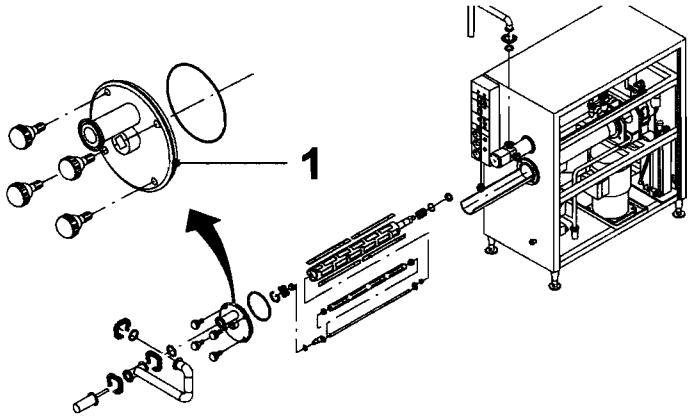
(Cont'd)



1 Blades
2 Protection
3 Dasher
4 Bottom

(prosegue)

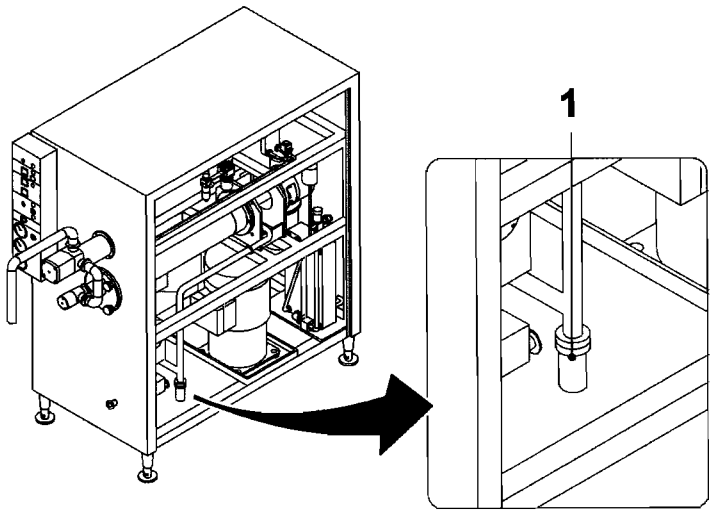
Finally, remove the ring and continue assembling all parts.
The latch on the cover (1) of the cylinder between the knobs is connected with a safety system; when closing the cylinder again, tighten up the knobs (by hand) to enable machine operation.



1 Cover

h. Sanitise the freezer by pumping a sterilising solution. Rinse and then drain the solution.
i. Before beginning production, it is recommended that rinse water be pumped through the system for 2 to 3 minutes. Drain the water by opening the safety valve (1).
l. Reposition the safety valve.

The freezer is now ready for use again.



1 Safety valve

7.3 Washing the outside of the machine

Proceed as follows to wash the outside of the machine:

a. Prewash with hot water (50°C).

b. Detergent wash.

Use an alkaline foaming detergent or a gel with high grease emulsifying power in a concentration of 2% to 10%, depending on how dirty the machine is and how hard the water supply is. Leave to act for 10 minutes.

c. Rinse with water.

Remove all soapy, emulsified dirt.

d. Descaling wash.

Use an acidic descaler with low viscosity containing a mixture of wetting and emulsifying agents in a concentration of 2% to 3%. The minimum recommended contact time is 15 - 20 minutes.

e. Rinse with water.

f. Disinfectant wash.

Use a suitable disinfectant diluted in water in a concentration of 1% to 1.2%. The minimum recommended contact time is 15 - 20 minutes.

g - Rinse with water.

CAUTION

Do not use high pressure jets of water.

Detergent	Descaler	Disinfectant
SU928 (Diversey Lever)	P3-topax 99 (60°C) (Henkel Ecolab)	P3-topax 99 (60°C) (Henkel Ecolab)
SU616 (Diversey Lever)		

This page intentionally left blank

8 Technical Data

This page intentionally left blank

8.1 Technical data . . . . . 8 - 5
Nominal output. . . . . 8 - 5
Refrigerating plant . . . . . 8 - 5
Noise . . . . . 8 - 5
Condensation water. . . . . 8 - 5

This page intentionally left blank

8.1 Technical data

Nominal output

Nominal output	400-1200 l/h	105-316 gals/h
Temperature inlet of mix	+ 5°C	+ 41°F
Temperature outlet ice cream	- 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

1.1.4 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

Condensation water

Dwell water		
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

This page intentionally left blank