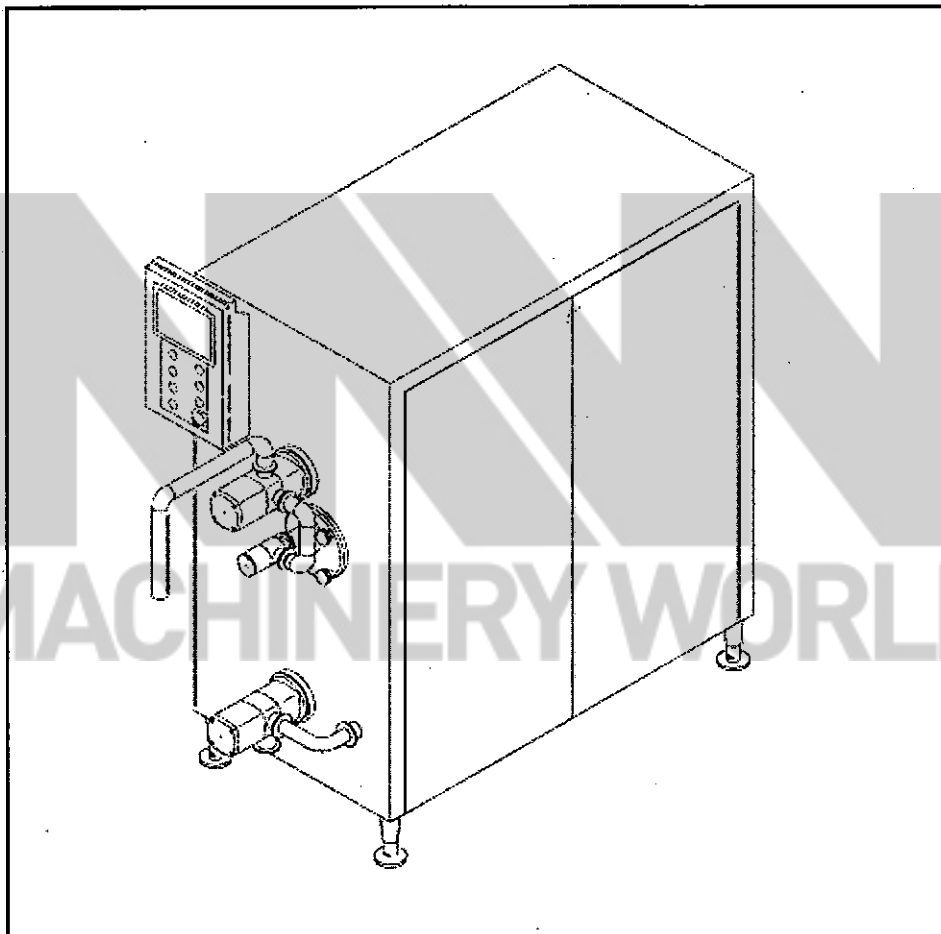


# OM

## Operation Manual

### Hoyer Frigus SF 1200 N1

Z1381040-01en



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#### WARNING

Read and follow all safety precaution instructions throughout this manual and on safety signs attached to this equipment.

Failure to follow all safety precaution instructions could result in death or serious injury.

 **Tetra Pak**

Doc. No. OM-Z1381040-01en

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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.

The English version of this document is the original language version.

This document was produced by:

**Tetra Pak Food Machinery (Shanghai) Co., Ltd.**

*Business Unit Ice Cream*

201 East Kang Qiao Road

201315 Shanghai

P.R. China

Additional copies can be ordered from Tetra Pak. When ordering additional copies, always provide the document number.

Doc. No. OM-Z1381040-01en

Issue 2010-06

This manual is valid for:

Series No./ Machine No.

Sign.

- i Introduction
- ii Safety Precautions
- 1 Operation

# OM

## Operation Manual

Hoyer Frigus SF 1200 N1  
Z1381040-01en

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Machine or equipment configurations that this manual is valid for are described on the next page.

Doc. No. OM-Z1381040-01en

Issue 2010-06

 **Tetra Pak**

**Tetra Pak Food Machinery (Shanghai)  
Co., Ltd.**

Valid for:





# i Introduction

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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	
MFC	Mass Flow Controller	
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.

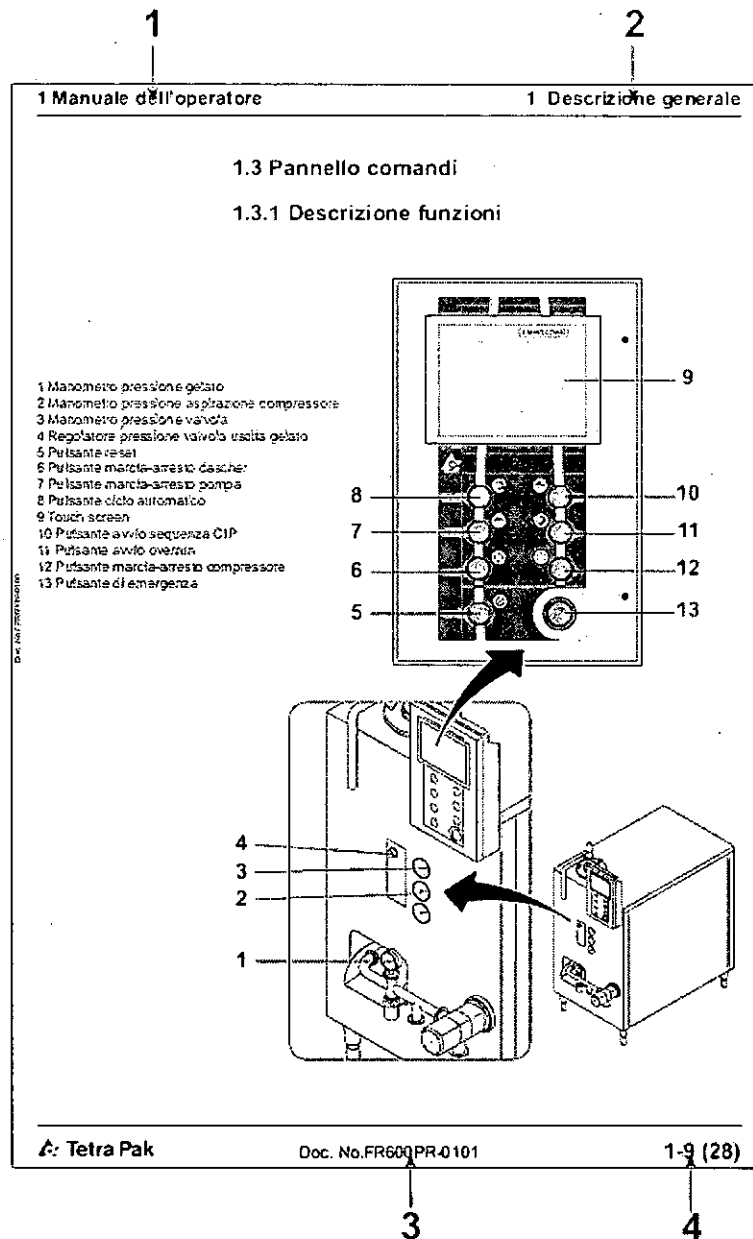
### i.3.1 Delivered Manuals

The documents delivered with this machine or equipment include:

- 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.

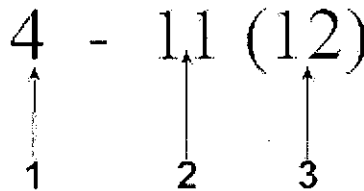


- 1 Section name
- 2 Chapter name
- 3 Document number
- 4 Page number

### i.3.3 Page Numbering

A page number has three parts:

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



- 1 Chapter number
- 2 Consecutive page number
- 3 Total number of pages

### i.3.4 Typographical Conventions

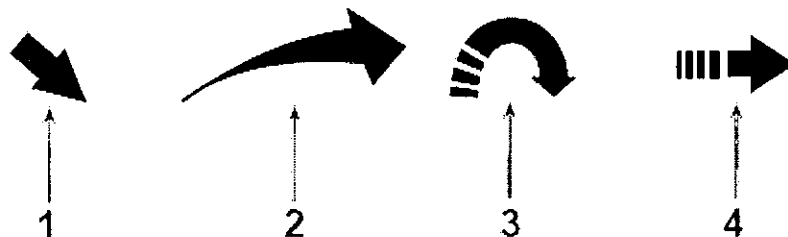
Controls on the operator panel, emergency stop devices, and program steps are printed in CAPITAL LETTERS.

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
- A rotation movement arrow (3) indicates rotational movement of an object. The arrow points in the direction of rotation
- A straight movement arrow (4) indicates movement of an object. The arrow points in the direction of movement.



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

## 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:

**Tetra Pak Food Machinery (Shanghai) Co., Ltd.**

*Business Unit Ice Cream*

201 East Kang Qiao Road, Pudong

Shanghai 201315

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](mailto:ProductDocumentationBUIC@tetrapak.com)



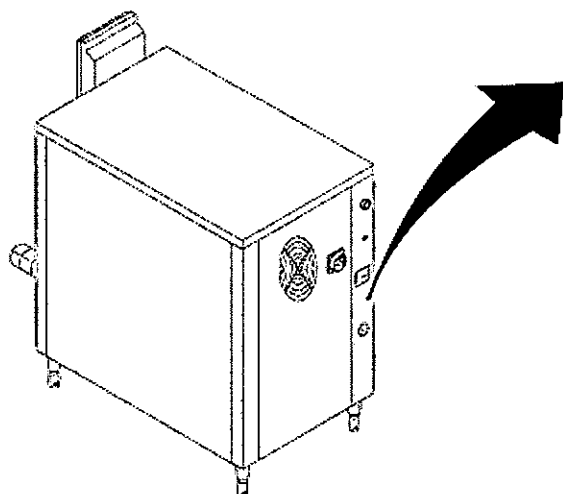
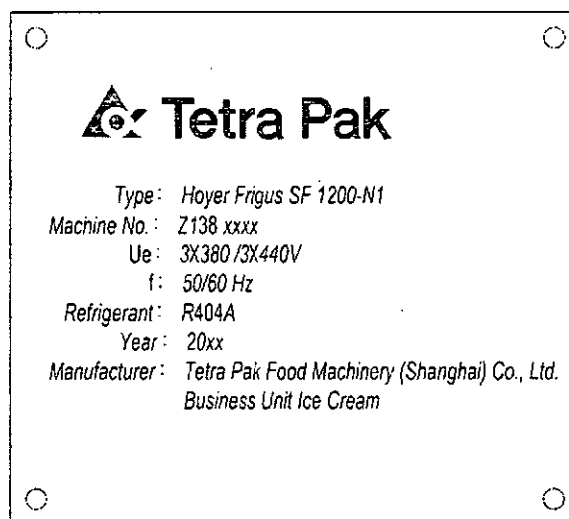
## i.5 Identification

### 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

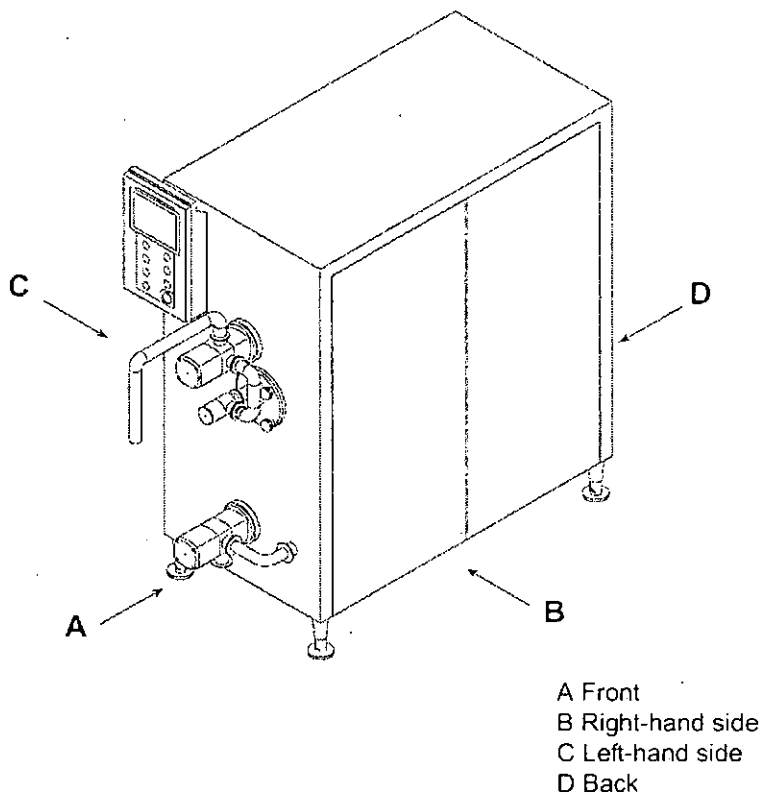
The below illustration shows an example of the machine plate and its location on the machine or equipment. The machine plate carries data needed when contacting Tetra Pak concerning this specific machine or equipment.



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

## i.6 Orientation

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



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## i.7 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 hairnet) and clean clothes (preferably white).
- Do not wear watches, rings, necklaces, earrings, or any other jewellery.

## 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) Change of Product

d) Stop

### Care

e) care and cleaning

# 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.

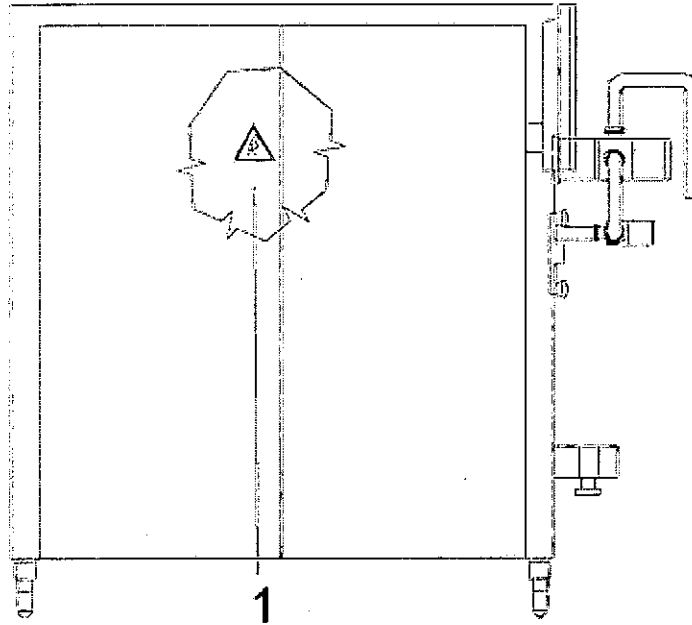
Pos.	ISO signs	ANSI signs
1		
	<p><b>Hazardous voltage with power supply disconnecter switched off.</b> Can shock, burn, or cause death. Do not touch.</p>	

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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.



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## ii.5 Protective devices



**DANGER**

Unshielded hazards. Never inch 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

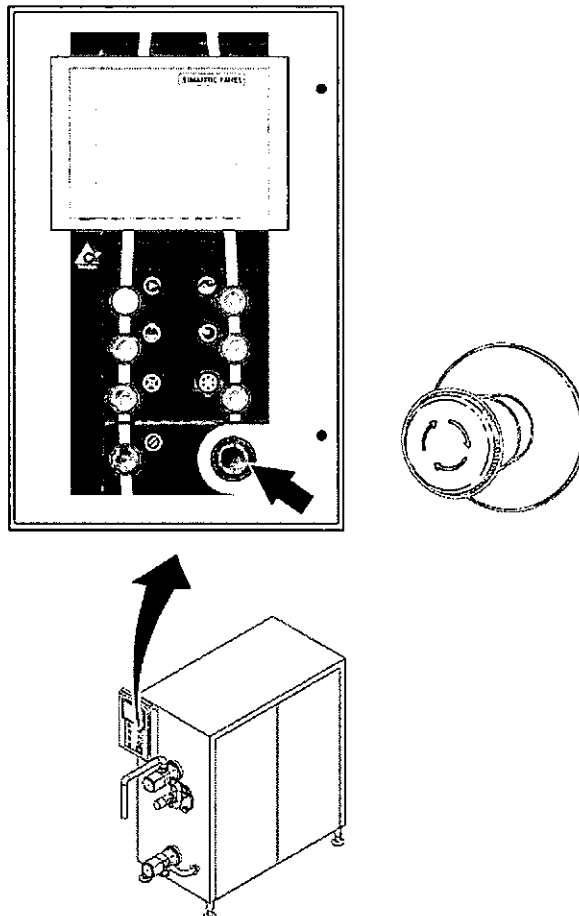
Learn the positions of the EMERGENCY STOP devices in order to stop the machine or equipment immediately in case of an emergency situation.

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) indicates where to find them on the machine or equipment.



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## 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

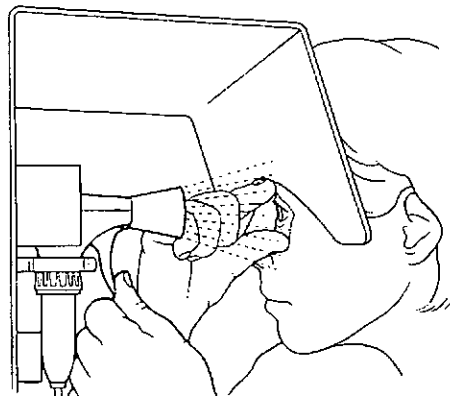
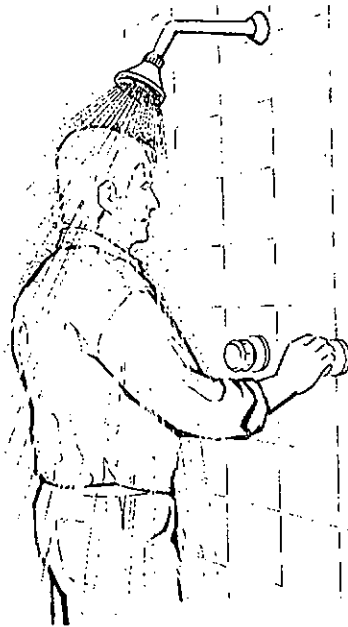
**! WARNING**

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.

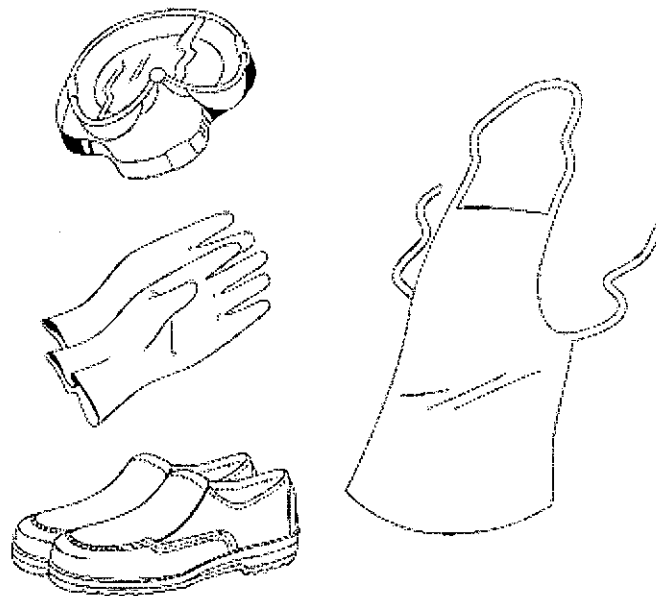
If irritation or pain is experienced due to having inhaled products for cleaning and sterilization vapour

- 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.



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## Handling



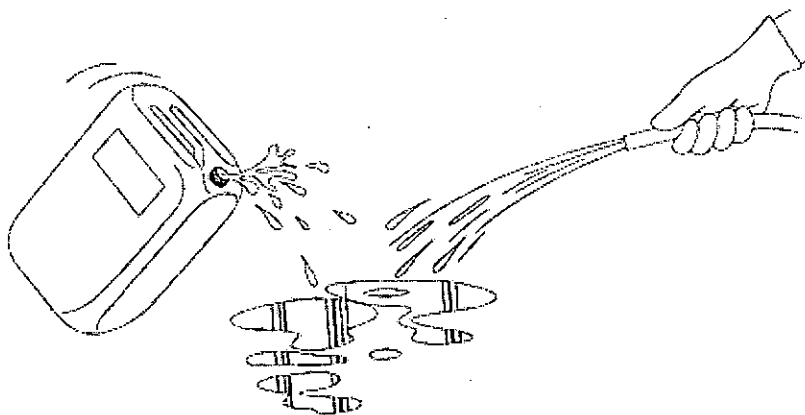
### WARNING

**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.



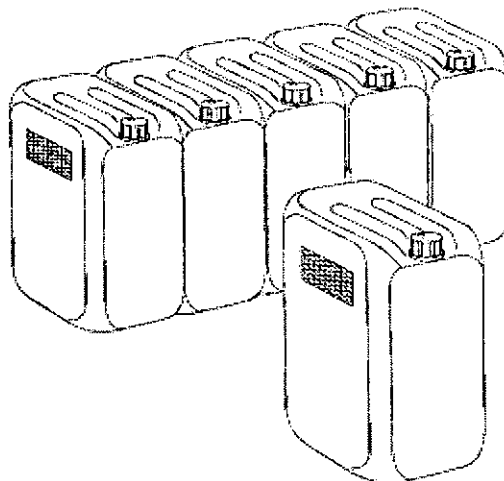
### Storage

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.



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## ii.8 Supply systems

### ii.8.1 Electrical cabinet



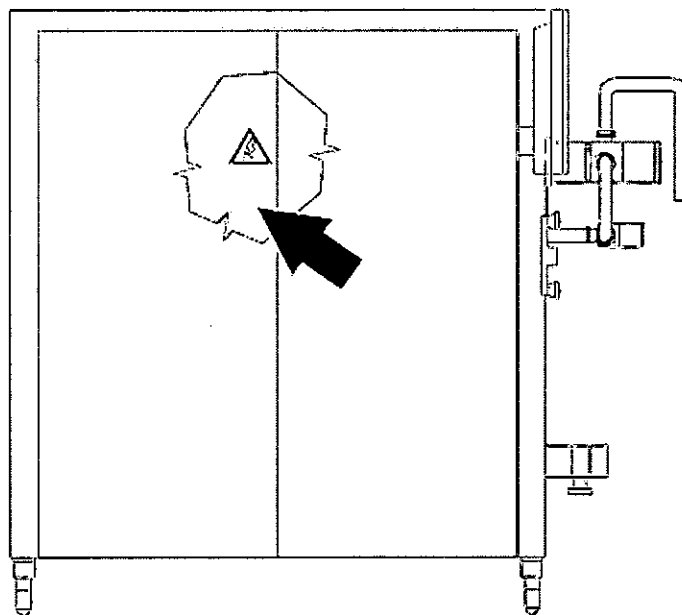
Hazardous voltage. Electric shock will cause death or serious injury.

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 Water supply



**WARNING**

**Water Under Pressure**

Certain maintenance procedures may require water supply systems to be on.

These exceptions are clearly stated in the Maintenance Manual.

### 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

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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.

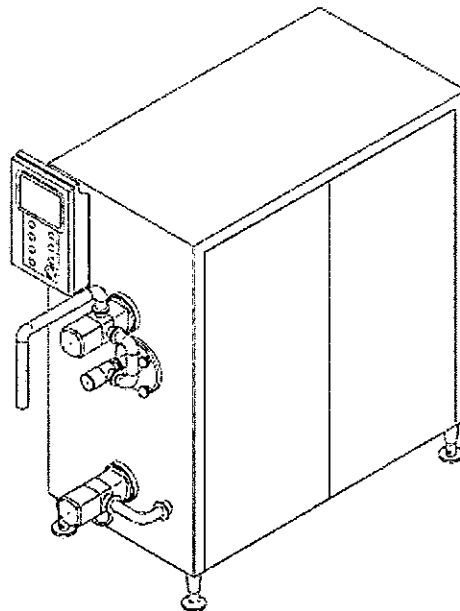
A freezing cylinder with a dasher and blades, inside which air is uniformly blended into the mix and the product is cooled until it takes on a thick consistency.

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 ice cream pump which regulates the cylinder pressure and sends ice cream to the use.

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



## 1.1.2 Main Groups

### 1.1.2.1 Filter Set

The compressed air supply (the machine does not include an air compressor) passes through a micro-filter (1) for removal of oil vapours, an active carbon filter (2) which eliminates odours and through the air dryer (3).

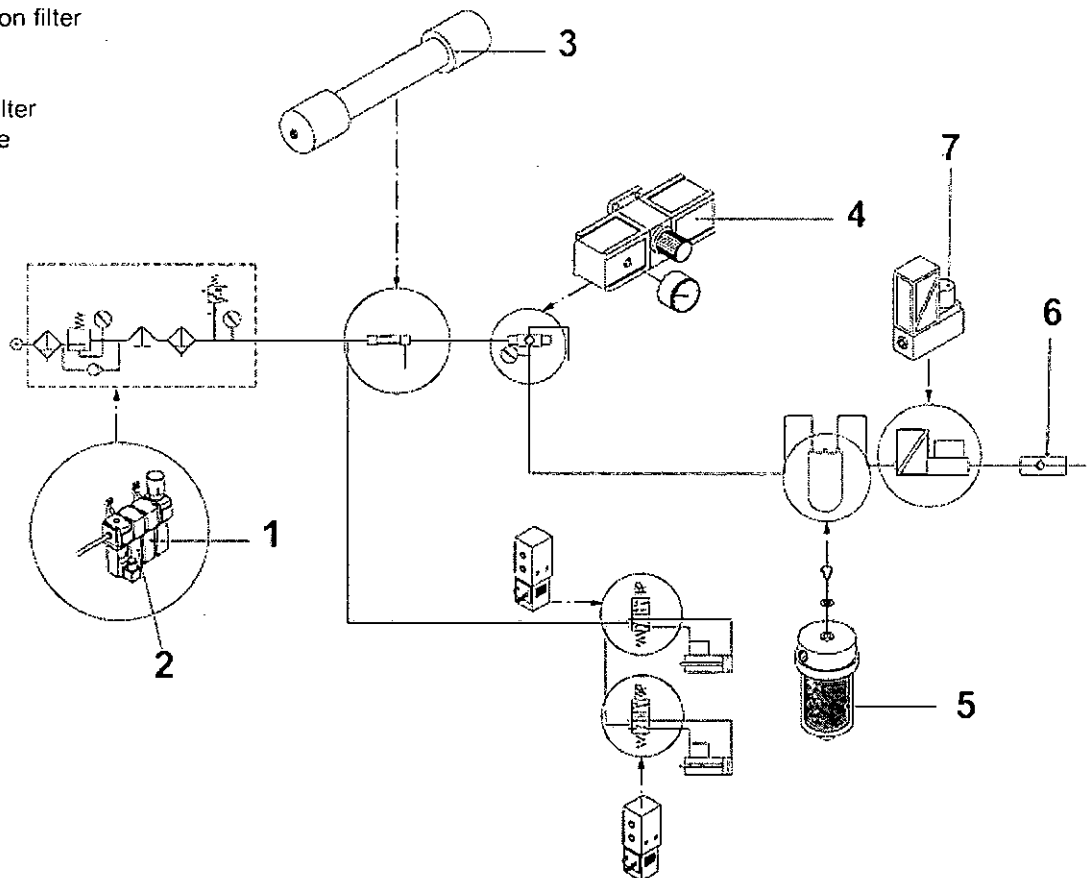
After the air filters the air, it goes through an “air booster”(4) that increases the pressure up to the values suitable for its injection below the pump.

Finally, the clean and pressurised air goes through a (sterilizing) Teflon (5) membrane filter with microscopic pores specifically intended to stop the passage of bacteria.

The sanitised air thus obtained is let into the mix through a check valve (6) below the pump, with a capacity controlled by a “mass flow controller”.

The desired capacity is set by the operator on the control panel of the PLC that controls the “mass flow controller”(7).

- 1 Micro-filter
- 2 Active carbon filter
- 3 Air dryer
- 4 Air booster
- 5 Sterilizing filter
- 6 Check valve



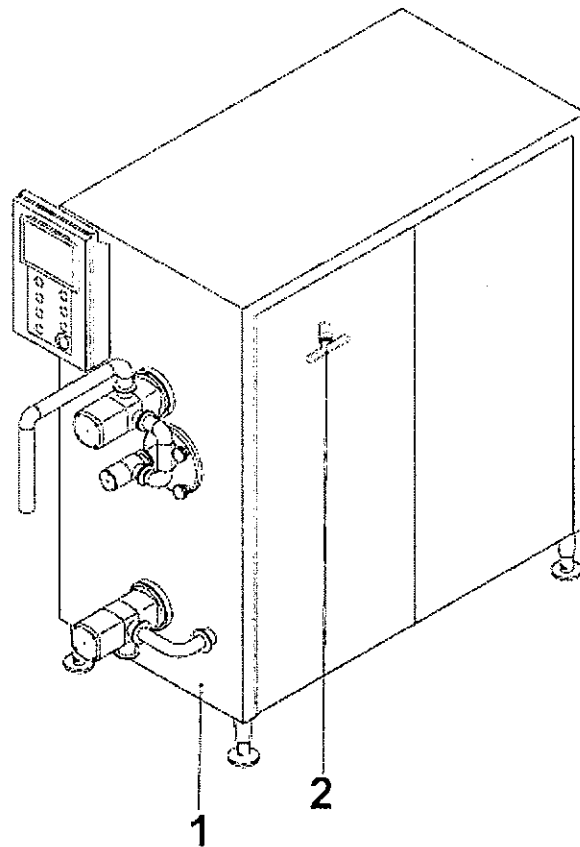
### 1.1.2.2 Mix Pump

The pump (1) receives the product from the ageing vats, doses the quantity set by the operator according to the required hourly output, and transfers it to the freezing cylinder.

The sanitised air is injected, by means of a check valve (2) below the pump.

By adjusting the capacity of sanitised air, the operator therefore controls the desired volume, which remains constant throughout the production cycle.

The pump is driven by an electric motor commanded by an inverter (for speed adjustment) and includes a pneumatic by-pass for the CIP washing. The pump speed is controlled by PLC, which measures the mix flow rate by a flow meter, in order to maintain the mix flow to the cylinder constant.



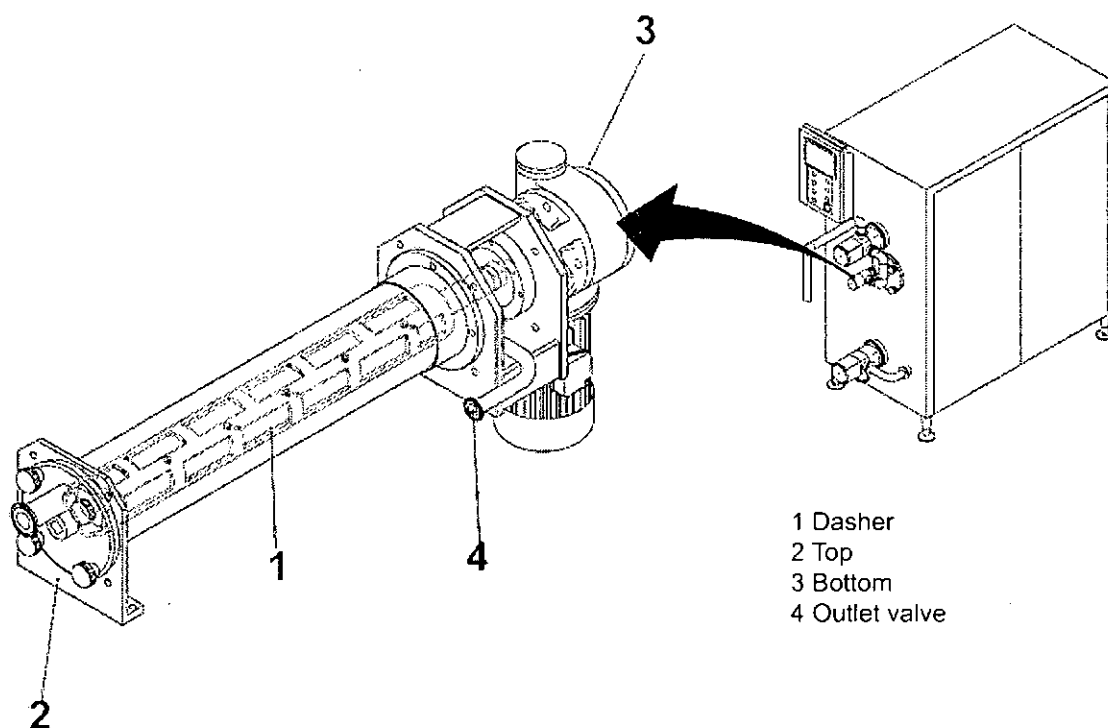
1 Pump  
2 Check valve

### 1.1.2.3 Freezing Cylinder

This is the most important part of the machine. It consists of an pipe positioned horizontally 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 three blades rotates inside it with eight blades that scrap the chrome-plated inside surface to ensure that frozen ice cream does not build up on the walls. The right (2) and left (3) ends of the cylinder are closed by two covers, which incorporate the mix feed pipe (left) (3).

Mix blended with sanitary air coming from the pump flows into left part of the cylinder (3); on its way to the right 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 right side and it is sucked by the ice cream pump which regulates 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.





### 1.1.2.4 Refrigeration Plant

Composed of the freezing cylinder (evaporator), two Scroll Compliant rotary compressors, two high efficiency condensers, 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.

### 1.1.2.5 Electrical System

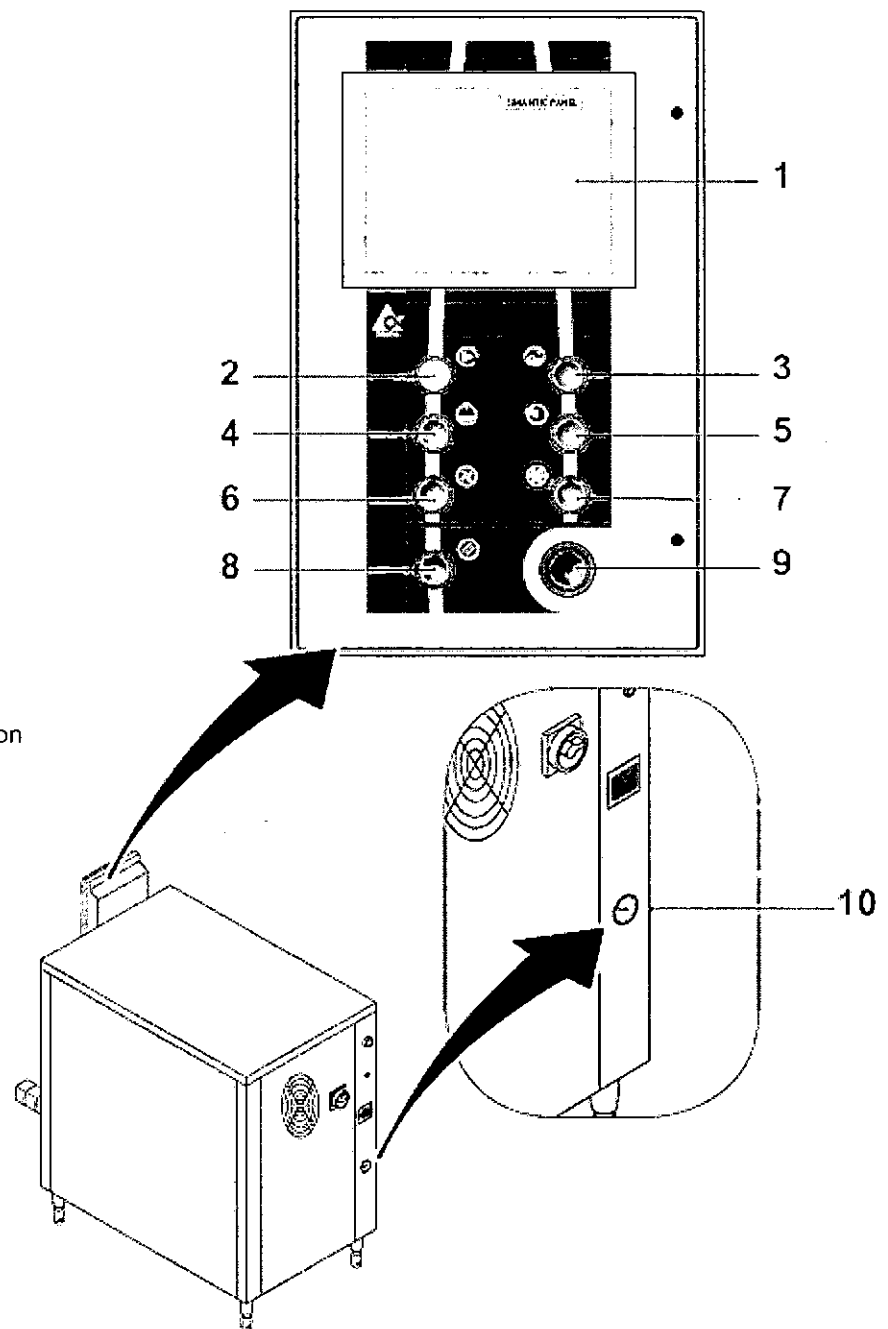
The electrical system consists of the operator panel and the electrical cabinet which is inside the machine. By means of the operator panel all the machine functions can be activated or deactivated and adjusted, and all anomalies are indicated.

The electrical cabinet at the rear contains the main switch and all control and power devices.

### 1.1.3 Control Panel

#### 1.1.3.1 Description of the functions

- 1 Touch screen
- 2 Automatic cycle push button
- 3 C.I.P. washing push button
- 4 Pump start/stop push button
- 5 Overrun start push button
- 6 Dasher start/stop push button
- 7 Compressor start/stop push button
- 8 Reset push button
- 9 Emergency stop push button
- 10 Overrun pressure gauge



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1.1.3.2 Main page

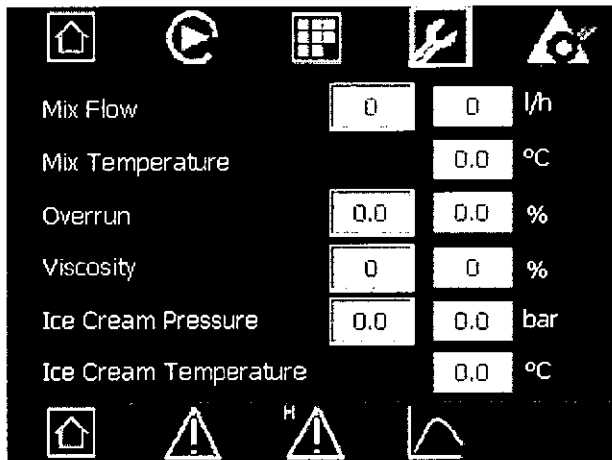


Fig. 1

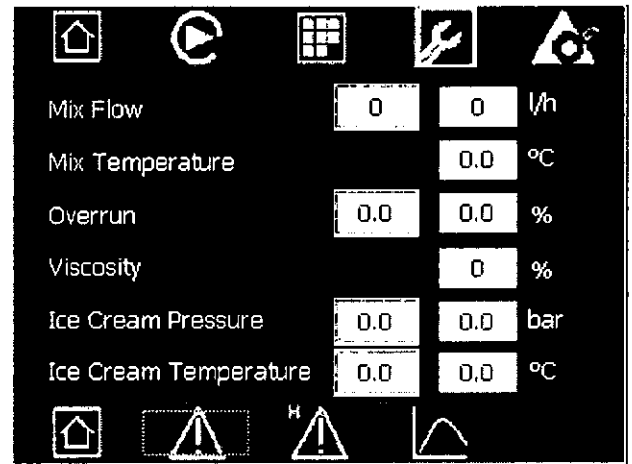







Fig. 2

Fig. 1: Main page when hot gas control is based on ice cream viscosity.

Fig. 2: Main page when hot gas control is based on ice cream temperature.

The upper part of all the pages is dedicated to the menu while the lower part is dedicated to the sub menu available for the selected menu. The menu and sub menu selected are highlighted with the same colour of background. For example in the figures 1 e 2 are selected the main menu and main sub menu. The menu available are the following:


-  Main menu with the main production data, alarms and trends of variables.
-  Production menu with the detailed production data.
-  Recipes Menu.
-  Cleaning and maintenance Menu.
-  Set up menu.

(Cont'd)


(Cont'd)

The sub menu and the function present in the different menu will be described in detail after.

All the parameters that are modifi able by operator have a 3D edge

ex:  it is enough to push on the cell in order to modify the value.

All the actual values of the variables do not have 3 D edge ex:

 and they are not adjutable.

### 1.1.3.3 "Programming and control panel" page

#### General description

Hoyer Frigus is operated by means of a control panel. On the panel alarms and information are shown and parameters and programs (recipes) can be changed.

Emergency stop function is placed below the panel.

The machine cannot run if the emergency stop is activated.

#### Touch panel

The panel is a standard touch panel. The screen is used to observe the operating status of the machine or system being monitored and, at the same time, to intervene directly in the process running simply by touching the buttons and displaying input data fields.

#### Operating touch elements

Touch elements are contact-sensitive operating elements present on the touch panel screen, such as buttons, input fields and message windows. Their operation is basically no different from pressing conventional keys.

Touch elements are operated by touching them lightly with your finger or a suitable object.

**Note!** Never use pointed or sharp instruments to operate the touch panel to prevent damage to the plastic surface of the touch screen.



#### CAUTION

**Be sure to touch only one point of the touch panel screen element. Never touch more than one touch element at a time. Otherwise, an action may be unintentionally initiated.**

#### Operation acknowledgement

As soon as the touch panel detects valid contact with a touch element, it responds by displaying a visual acknowledgement. An acknowledgement is independent of communication with the PLC.

It is not an indication of the required action actually having been executed.

The type of visual acknowledgement is dependent on the operating element touched.

### - Buttons

In the case of 3D-effect configurations, visual representation is distinguished according to the statuses *touched* or *untouched*.

Examples of representation are illustrated below by means of the status button.



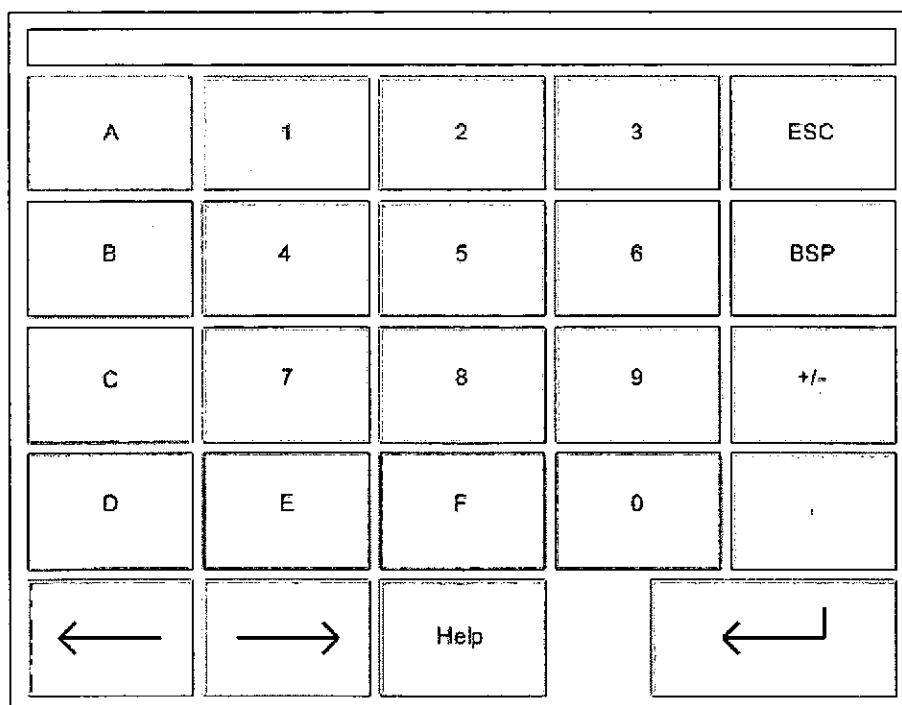
### - Input fields

After an input field has been touched, the screen keyboard shown in the figure appears, as acknowledgment of the operation.

#### Entering numeric values





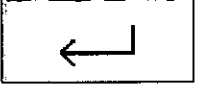


In order to enter numeric values, the touch panel automatically displays a numeric screen keyboard, for example after touching an input field. Keys on the keyboard which are available for operation are highlighted as 3D keys, those not available are simply displayed as areas. After completing the input, the screen keyboard is automatically hidden.

Below illustrates an example of the screen keyboard for entering numeric values. The keys A to F for entering hexadecimal values are inoperable in this example. The HELP key is only displayed when help text has been configured for that particular input field.



Screen keyboard for numeric values

### Meaning of buttons

BUTTON	FUNCTION	PURPOSE
	Enter character	Enter character via the keyboard in normal or Shift level
	Move input position to the left	Move current input position one character to the left
	Move input position to the right	Move current input position one character to the right
	Cancel (Echap)	Discard input and close the screen keyboard
	Enter	Confirm input and close the screen keyboard
	Call in help text	Calls in the configured help text
	Backspace	Deletes the character to the left of the current cursor position

#### Procedure

Numeric values are entered character by character using the input keys on the screen keyboard. If a value already exists in the field, this is deleted on entering the first character.

After beginning entering a value, it is impossible to exit from the field without either confirming the entry or cancelling it.

Characters entered are aligned to the right.

On entering a new character, all those already entered are shifted one position to the left (pocket calculator format).

Invalid characters are rejected and an error message appears. On exceeding the maximum number of characters, the last character entered is overwritten.

Confirm the values entered by pressing ENTER or cancel the input by pressing ESC.

The window is closed in both cases.

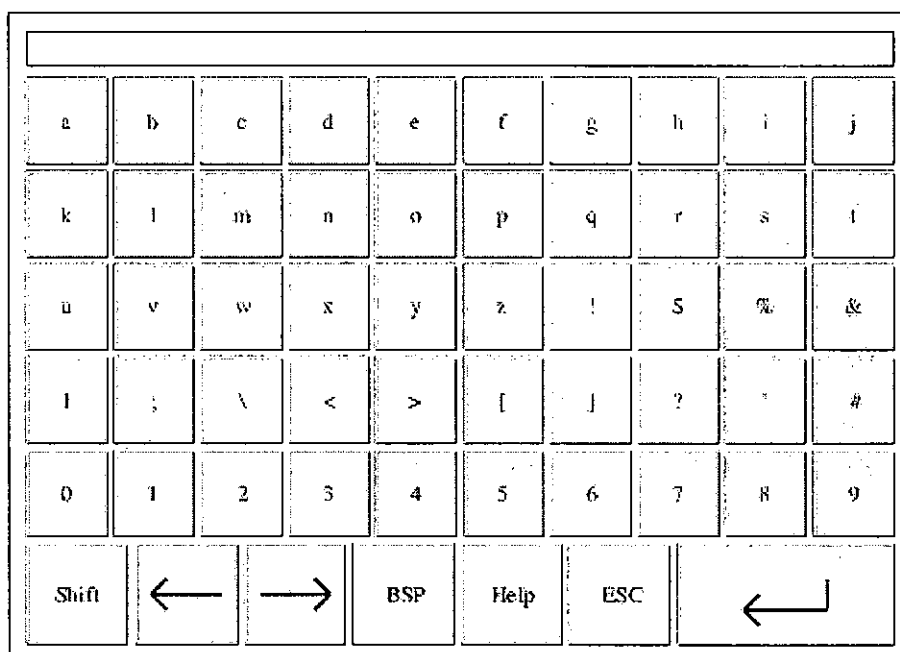
#### Limit value text

Limit values can be configured for numeric fields. In this case, values entered are accepted only when they lie within the limits configured. If an attempt is made to enter a value which is outside the configured limits, it is rejected and the original value automatically reinserted.

### Entering alphanumeric values

In order to enter alphanumeric values, the touch panel automatically displays an alphanumeric screen keyboard after touching an input field. Keys on the keyboard which are available for operation are highlighted as 3D keys, those not available are simply displayed as areas. After completing the input, the keyboard is automatically hidden.

Below illustrates an example of a normal screen keyboard to enter alphanumeric values. The HELP key is only displayed when help text has been configured for that particular input field.



Screen keyboard for alphanumeric values, normal level

#### Keyboard levels

The alphanumeric screen keyboard has two levels:

- Normal level
- Shift level

Toggle between the two levels by pressing the SHIFT key.



Screen keyboard for alphanumeric values, shift

a	b	c	d	e	f	g	h	i	j
k	l	m	n	o	p	q	r	s	t
u	v	w	x	y	z	!	\$	%	&
!	;	\	<	>	[	]	?	'	#
0	1	2	3	4	5	6	7	8	9
Shift	←	→	BSP	Help	ESC	↵			

**Procedure**

Characters entered are aligned to the left. Following each entry, the cursor skips to the right to the next entry position.

If an alphanumeric input field already contains a value, it is displayed in reversed colours and deleted as the new value is entered.

In order to edit an existing value, press one of the cursor keys as the first entry. On pressing CURSOR LEFT, the cursor remains on the first character, after pressing CURSOR RIGHT it skips to the second character. In this case, the value reverts back to its normal representation and can be edited.

On exceeding the maximum number of characters, the last character entered is overwritten.

Confirm the value entered by pressing ENTER or cancel the input by pressing ESC.



The window is closed in both cases.

The current input position is displayed in reversed colours. Invalid characters (e.g. values higher 23 when specifying the time for a clock) are rejected and an error message appears. On exceeding the maximum number of characters which can be entered, the last character entered is overwritten.

## 1.1.4 Main pages

### 1.1.4.1 Main menu

#### 1.1.4.1.1 Main sub menu

Press Main Menu  and Main sub menu  to access the following page.

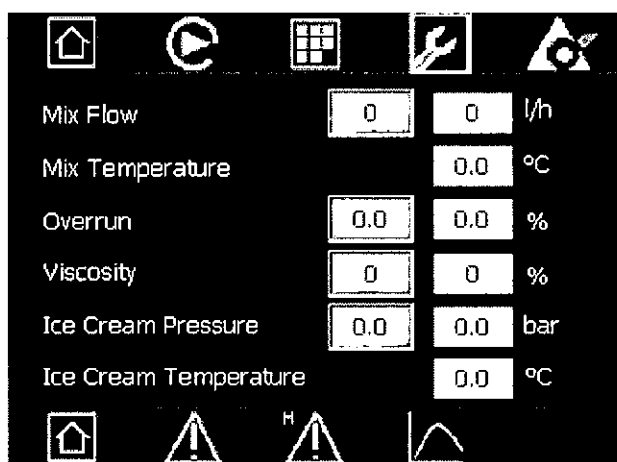


Fig. 1

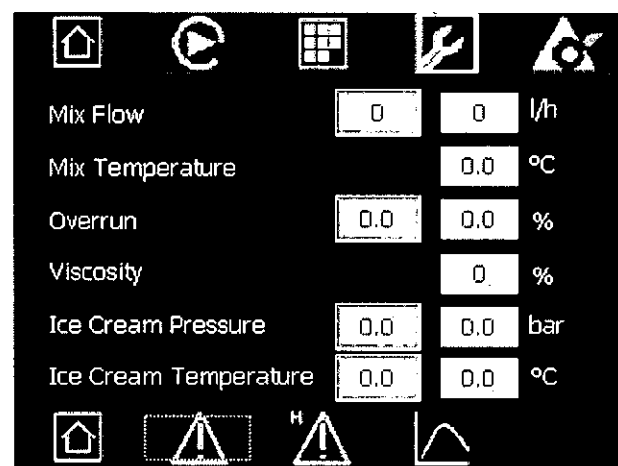


Fig. 2

Fig. 1: Main page when hot gas control is based on ice cream viscosity.

Fig. 2: Main page when hot gas control is based on ice cream temperature.

In this page are contained the main production parameters of the machine. In the left column are reported the set point values;

pushing on the cell it is possible to modify the set value. In the right column is shown the actual value of the variable. The parameter available are the following:

Mix Flow: Mix flow rate processed by the machine.

Mix Temperature: Mix inlet temperature.

(Cont'd)

*(Cont'd)*



Overrun: Air percentage added to ice cream, calculated in reference to the mix flow.

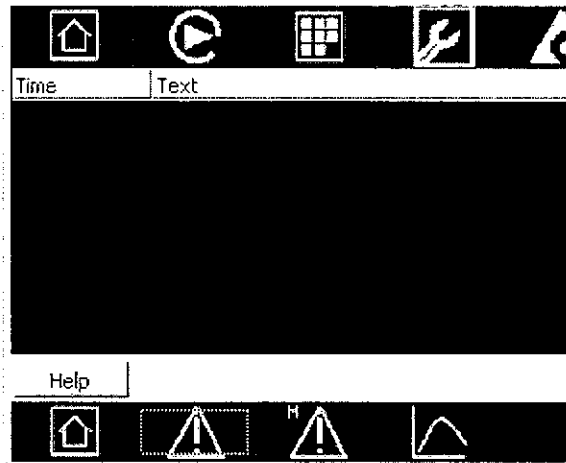
Viscosity: Ice cream viscosity, calculated in percentage referred to nominal dasher motor load current.

Ice Cream Pressure: Ice cream pressure inside the freezing cylinder.



Ice Cream Temperature: Ice cream outlet temperature from the freezing cylinder.

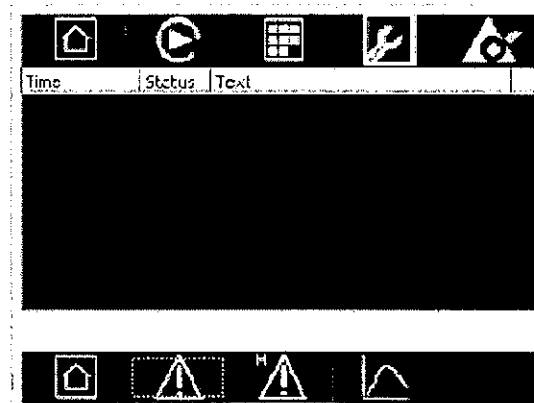
1.1.4.1.2 Sub menu Alarms

Press Main Menu  and Sub menu Alarms  to access the following page that contains the active alarm messages with the time in which the alarm is appeared. When an alarm happens, the reset button lights. It is sufficient to remove the alarm cause and push the reset button and the alarm message disappear.





1.1.4.1.3 Sub menu Alarms History



Press Main Menu  and Sub menu Alarms History  you enter in the following page that contains all the alarm messages, with the relative time, appeared since the machine is been switched on. When the machine is switched off the History is reset.

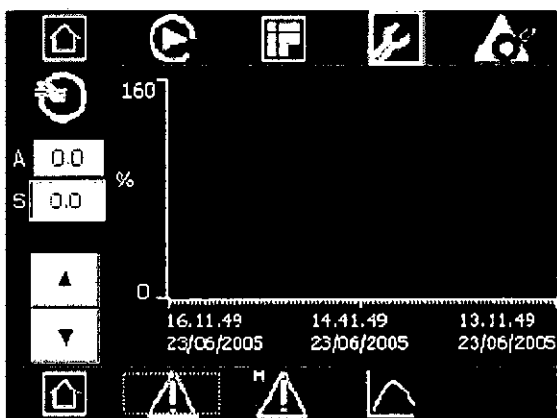


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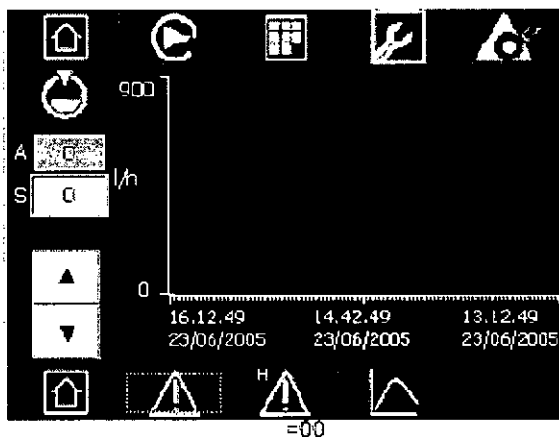
1.1.4.1.4 Sub menu Trend

Pressing Main Menu  and sub menu trend  you enter in the pages that contain the graphic trend of the production parameters. The time range of the graphs cover the last three hours. Pushing the buttons arrow

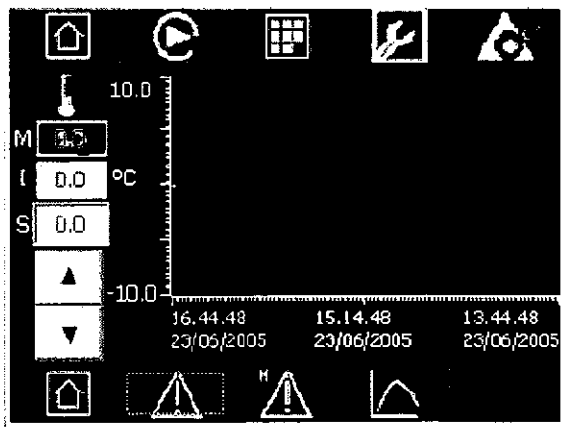
up  and arrow down  it is possible to scroll all the following graph pages.



Overrun: A is the actual value and S is the set point value.

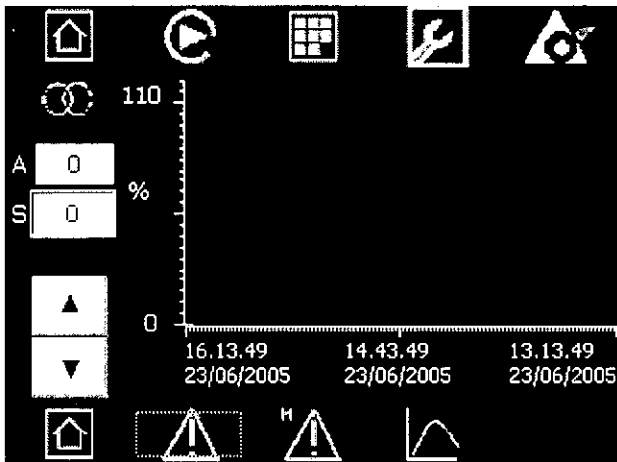


Mix Flow: A is the actual value and S is the set point value.

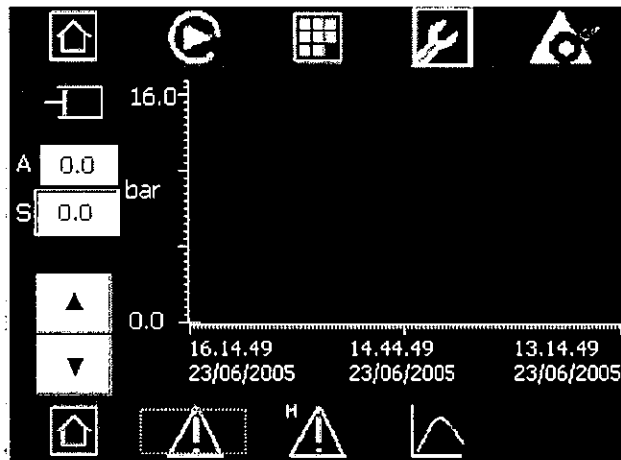


Actual mix temperature M, actual ice cream temperature I and ice cream temperature set point value S (this cell appears only if it is active the hot gas control based on ice cream temperature).

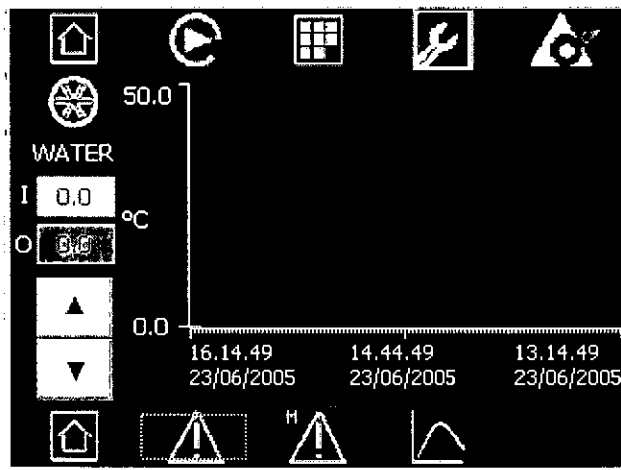
TechPub\_2514345\_0105 - OM\_Z1381026-Chapter.fm



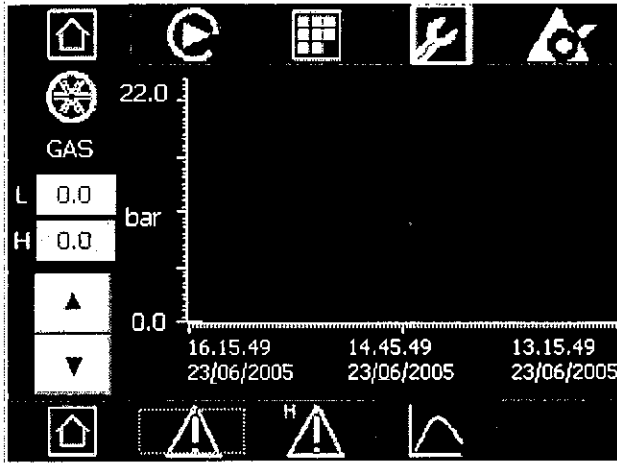
Ice cream viscosity: **A** is the actual value and **S** is the set point value (this cell appears only if it is active the hot gas ).



Ice cream pressure inside the freezing cylinder: **A** is the actual value and **S** is the set point value.





Condensation water temperature inlet **I** and outlet **O**.



Suction pressure **L** and discharge pressure **H** of the refrigerating system compressors.

## 1.1.4.2 Production Menu

## 1.1.4.2.1 Sub menu Mix flow

Pressing Production Menu  and sub menu mix flow  you enter in the pages that contains the detailed production parameters related to the mix:

The cell **Mix flow** green and the bar graph show the actual value of mix flow rate.

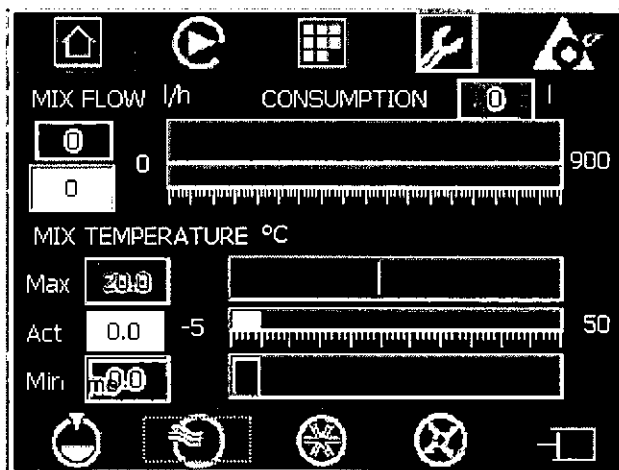
The cell **Mix flow** yellow and the bar graph show the set point value of mix flow rate. Pushing on the yellow cell it is possible to modify the set point value for the mix flow.

The variable **Consumption** is the amount of mix processed by the machine starting from the beginning of the automatic production cycle and it is reset when a new cycle begins.

The cell **Mix temperature Act** is the actual value of the mix inlet temperature.



The cell **Mix temperature Max** is the maximum value set for the mix inlet temperature. If the actual temperature is higher than this value the machine gives an alarm message. Pressing on the cell it is possible to modify the set point value.

The cell **Mix temperature Min** is the minimum value set for the mix inlet temperature. If the actual temperature is lower than this value the machine gives an alarm message. Pressing on the cell it is possible to modify the set point value.





1.1.4.2.2 Sub menu overrun

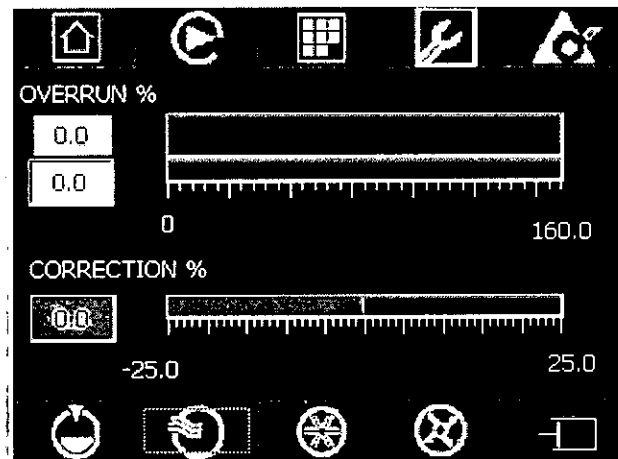
Pressing production menu  and submenu overrun  you enter in the page that contains the detailed production parameters related to overrun:

The cell **Overrun** green and the bar graph show the actual value of air percentage that is added to the mix.



The cell **Overrun** yellow and the bar graph show the set point value of air percentage that is added to the mix.

Pressing on the yellow cell it is possible to modify the set point value for air percentage.

**Correction** is the set point value of the overrun correction. If the overrun value measured is different from the actual value read by the machine it is possible to apply a correction factor in order to align the two values.

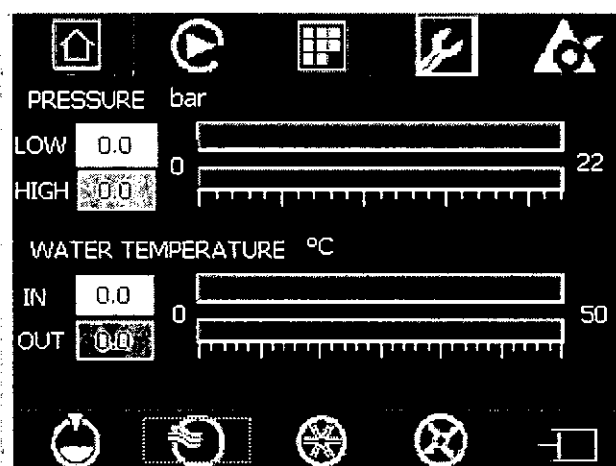


## 1.1.4.2.3 Sub menu Refrigeration



Pressing production menu  and sub menu refrigeration  you enter in the page that contains the detailed production parameters related to refrigeration:

**Pressure Low and High** are the suction and discharge pressure of the compressors.





**Water Temperature In and Out** are the inlet and outlet temperatures of the condensation water.



1.1.4.2.4 Sub menu Dasher/Hot gas

Pressing production menu  and sub menu Dasher/Hot Gas  you enter in the page that contains the detailed production parameters related to dasher and hot gas control:

**Speed** is the dasher rotation speed set. Pressing on the cell it is possible to modify this value.

The button  /  allow to choose if to control the hot gas based on viscosity (  ) in this case the viscosity set-points is active, otherwise based on ice cream temperature (  ) in this case the temperature set-point is active. It is sufficient to push on the button in order to change its status.

The cell **Viscosity** green and the bar graph show the actual value of the viscosity.

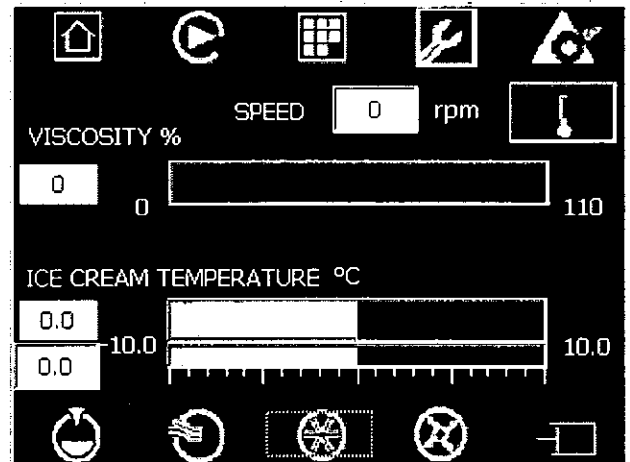
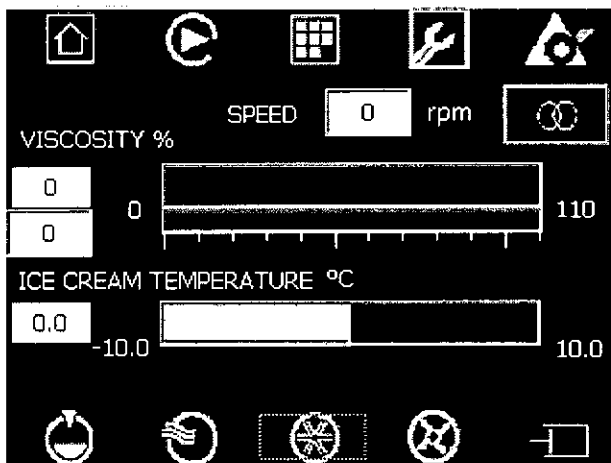
The cell **Viscosity** yellow and the bar graph show the set point value of viscosity.

The cell **Ice cream temperature** green and the bar graph show the actual value of the ice cream outlet temperature.

The cell **Ice cream temperature** gialla yellow and the bar graph show the set point value of the temperature.


Pressing on the yellow cell it is possible to modify the set point value for the viscosity or temperature.

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## 1.1.4.2.5 Sub menu Ice Cream Pressure

Pressing production menu  and sub menu ice cream pressure

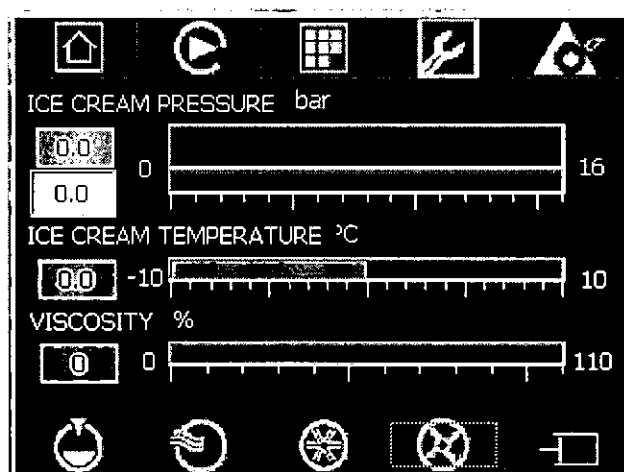
 you enter in the page that contains the detailed production parameters related to ice cream pressure:

The cell **Ice Cream Pressure** green and the bar graph show the actual value of the ice cream pressure in the freezing cylinder.


The cell **Ice Cream Pressure** yellow and the bar graph show the set point value of ice cream pressure in the cylinder. Pressing on the yellow cell it is possible to modify the set point value for ice cream pressure.


The cell **Ice Cream Temperature** green and the bar graph show the actual value of the ice cream outlet temperature.

The cell **Viscosity** green and the bar graph show the actual value of the viscosity.




### 1.1.4.3 Recipe Menu


Pressing the Menu Recipe  you enter in the page for choose and save the recipe.

**Load an existing recipe:** pressing the button arrow down  you enter in the recipes list. At this point it is sufficient to choose the wanted recipe and it is automatically loaded.


**Modify an existing recipe:**

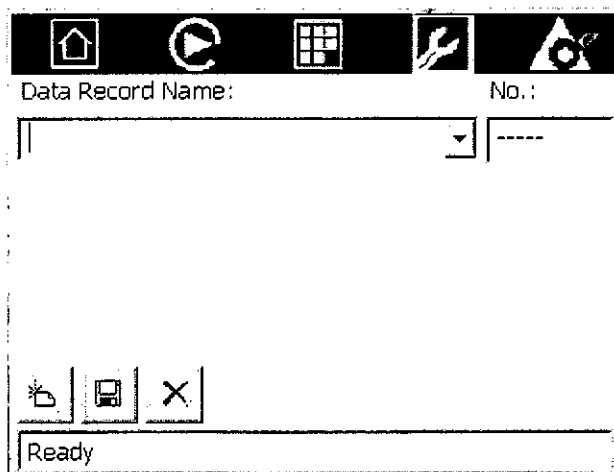
- Load the recipe that you want modify
- Go to the Main page and modify the process parameters wanted.
- Return to Recipe page push  to save.
- The system ask to confirm before saving, if you are sure press Yes

**Create a recipe:**

- Press on the cell **Data Record Name** and insert the name of the new
- recipe. In alternative it is possible to push .
- Go to the main page and modify the process parameters wanted.
- Return to Recipe page push to save.
- The system ask to confirm before saving, if you are sure press Yes.



**Delete a recipe:**

- Press the button arrow down and select the recipe to delete.
- Press .
- The system ask to confirm before deleting, if you are sure press Yes.





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1.1.4.4 Menu Maintenance  
 1.1.4.4.1 Sub menu working hours

Pressing Menu maintenance  and sub menu working hours  you enter in the page that contains the working hours of the main components of the machine:

In the first page there are the total working hours of the functioning of the following components:


- Mix pump
- Ice Cream Pump
- Dasher Motor
- Compressor 1/2

Pressing the buttons arrow up  and arrow down  it is possible to enter in the following page that contains:

**Duration:** working hours to which is suggested to do maintenance to the component.

**Remaning:** Remaining working hours bifore the component reaches the suggested working hours for maintenance programmed.



When this counter arrives to zero, the machine gives a warning message for the operator. Once the programmed maintenance is done it is sufficient press

the button  to reset the variable Remaining to the initial value.

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1.1.4.4.2 Sub menu CIP cycle

Pressing Menu maintenance  and sub menu CIP Cycle  you enter in the page that contains the parameters CIP cycle of the machine:

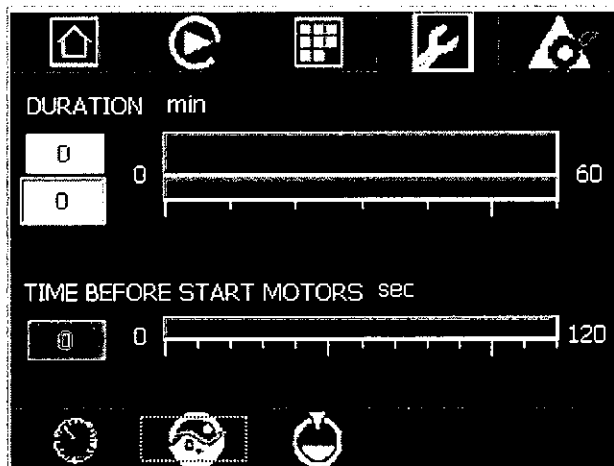
The cell **Duration** green and the bar graph show the actual value of the CIP cycle duration.

The cell **Duration** yellow and the bar graph show the set point value for CIP cycle duration. Pressing on the yellow cell it is possible to modify set-point value for the CIP cycle duration.

During the cycle the machine activates automatically and periodically the motors of the pumps and dasher.

**Time before start Motors:** It is the time remaining before the machine activate the motors of the pumps and dasher.

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## 1.1.4.4.3 Sub menu Pumps

Pressing the Menu maintenance  and sub menu pumps  you enter in the page for pumps maintenance:



**Mix Pump Flow:** Mix flow actual value.

**Mix Pump Leakage:** Value of the internal leakage of the mix pump. If this value is higher the warning value the machine gives a warning message to the operator suggesting to do pump regulation.

Pressing the button **Mix pump**

 /  you open and close the mix pump by pass.

Pressing the button **Ice Cream pump**

 /  you open and close the mix pump by pass.



It is sufficient to press the button to change its status.





1.1.4.5 Set up Menu

1.1.4.5.1 Sub menu Clock

Pressing the set up menu  and the sun menu clock  you enter in the page to see and regulate the date and time.

The date is shown in the format month/day/year and the time in the format AM/PM.

To Regulate the date and the time proceed in the following way:

**Month:** Press on the cell and set the correct month.

**Day:** Press on the cell and set the correct day.

**Year:** Press on the cell and set the correct year.

**Hour:** Press on the cell and set the correct hour.

**Min:** Press on the cell and set the correct minutes.



**Sec:** Press on the cell and set the correct seconds.



Once that all the corrects data are been entered press the button set and date and time will be automatically up dated.

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## 1.1.4.5.2 Sub menu Panel

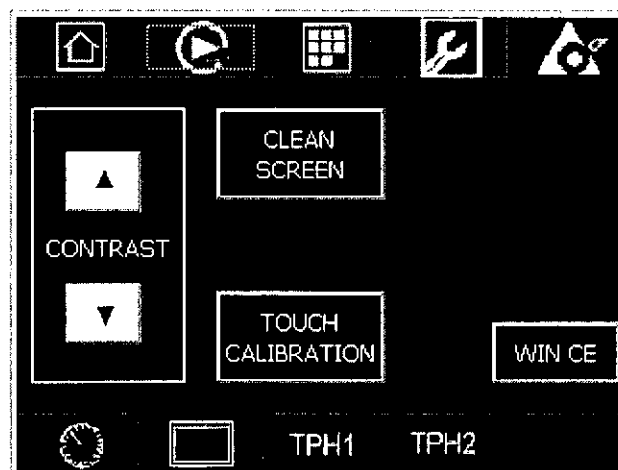
Pressing set up menu  and sub menu panel  you enter in the page for the operator panel settings:

**Contrast:** Pressing the buttons arrow up  and arrow down  you increase or reduce the panel contrast.



**Clean Screen:** Pressing this button you make the panel insensible to the touch for some seconds allowing the cleaning.



**Touch Calibration:** Pressing this button you activate the function for calibrate the panel sensibility to the operator touch.

**Win CE:** Pressing this button you enter in the operative system of the panel.

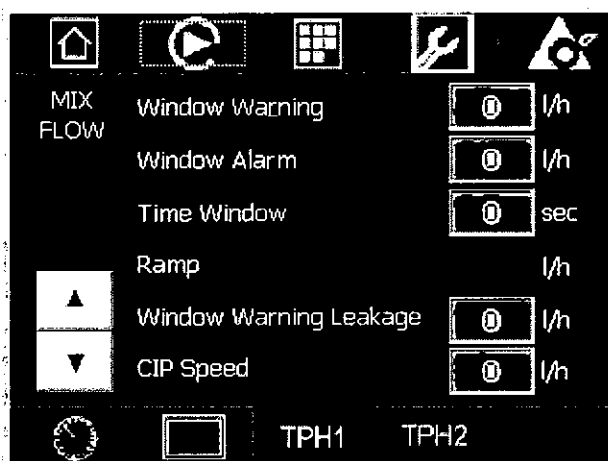


1.1.4.5.3 Sub menu Parameters 1st Level

Pressing Menu set-up  and sub menu Parameters 1° Level  you enter in the page for 1° level parameters setting:

Pushing the buttons arrow up  and arrow down  it is possible to scroll the following pages:

Mix Flow: Page related to mix flow rate.



**Window Warning:** This is the warning value for the difference between actual mix flow and set point mix flow. If this difference exceeds the set value for a time higher than **Time window** the machine gives a warning message. Default value: 20 L/h

**Window Alarm:** This is the alarm value for the difference between actual mix flow and set point mix flow. If this difference exceeds the set value for a time higher than **Time window** the machine gives an alarm message and stops the production. Default value 50 L/h

**Time window:** Waiting time before the warning or alarm. Default value 5 sec

**Ramp:** Value for the mix flow ramp at the start of production and at the set point changing. Default value 20 L/h

(Cont'd)

(Cont'd)

**Window Warning Leakage:** This is the warning value for mix pump leakage. If this parameter exceeds the set value for a time higher than **Time window** the machine gives a warning message.

Default value 50 L/h

**CIP Speed:** Mix pump speed when it is activated during CIP.

Default value 200 L/h

**Overrun:** Page related to sanitary air flow.



**Window Warning:** This is the warning value for the difference between the actual air flow rate and set point. If this difference exceeds the set value for a time higher than **Time window** the machine gives a warning message.

Default value 10 L/h

**Window Alarm:** This is the alarm value for the difference between the actual air flow rate and set point. If this difference exceeds the set value for a time higher than **Time window** the machine gives an alarm message and stops the production. Default value 20 L/h

**Time window:** the machine gives a warning message. Default value 5 sec

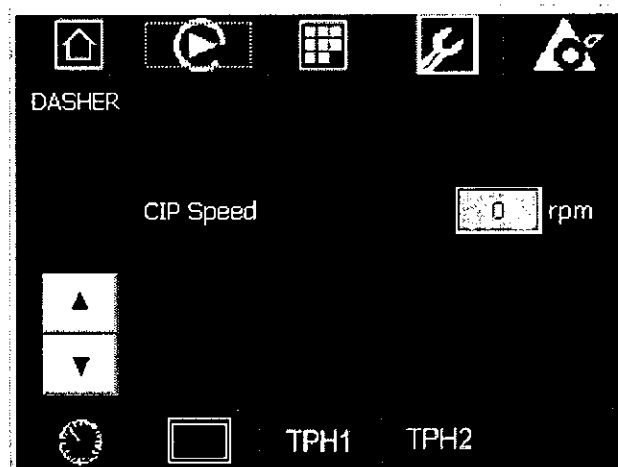
**Ice Cream - Cycle:** Page related to automatic production cycle.



**Max Time for Mix Ramp:** During automatic cycle starting phase, the mix pump goes to the minimum flow rate and waits that the viscosity (or the ice cream temperature in relation to which type of regulation is active) reaches the set value. If after the time reported in this parameter the set-point has not been reached yet the machine starts in any case the flow ramp phase. Default value 120 sec

**Pressure Stop cycle:** The automatic stop production phase ends only when the ice cream pressure in the cylinder drops below this value. Default value 2.5 bar

**Dasher:** Page related to dasher



**CIP Speed:** This is the dasher rotation speed during CIP cleaning cycle. Default value 150 rpm

**Viscosity & Cooling:** Page related to viscosity and refrigeration.



**Limit for High Viscosity:** Alarm limit for viscosity too high 100%

**CIP:** Page related to CIP cleaning cycle

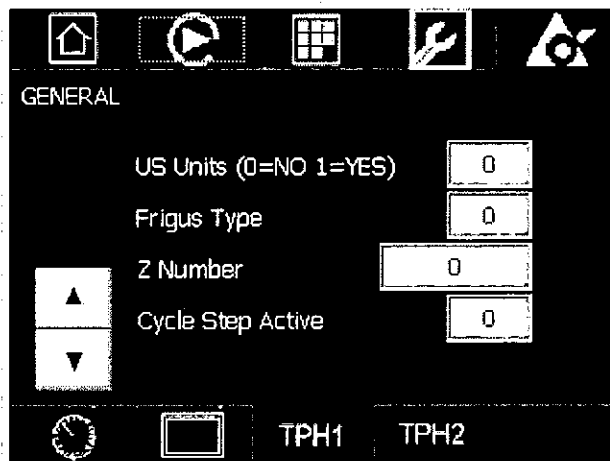


During the CIP cleaning cycle, the pumps and dasher motors are periodically activated for a time equal to **Time Motor On** and are stopped for a time equal to **Time Motor OFF**.

**Time Motor On:** Default value 5 sec

**Time Motor OFF:** Default value 60 sec

**General:** Page related to general parameters.



**US Units:** 0 for European units: L/h, bar, etc.



1 for American units: Gal/h, Psi, etc.

**Frigus Type:** Machine Model

**Z Number:** Serial Number

**Cycle Step Active:** Number of active step of the control software

## 1.1.4.5.4 Sub menu Parameters 2nd Level

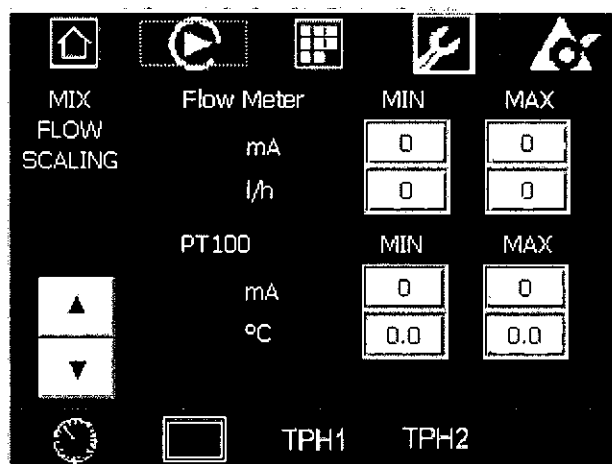
Pressing Menu set-up  and sub menu Parameters 2° Level  you enter in the page for 1° level parameters setting.

 **CAUTION**

To modify the parameters container in these pages can compromise gravely the functioning of the machine. The modification of these parameters can be done only after Tetrapak Hoyer S.p.A. authorization. Not authorized modification will make the machine guarantee not valid.

Pushing the buttons arrow up  and arrow down  it is possible to scroll the following pages:

**Mix Flow Scaling:** Page related to the scaling of analogical signals coming from the instruments related to mix.



**Flow Meter:** Mix flow measuring.

(Cont'd)



(Cont'd)

Default scale:

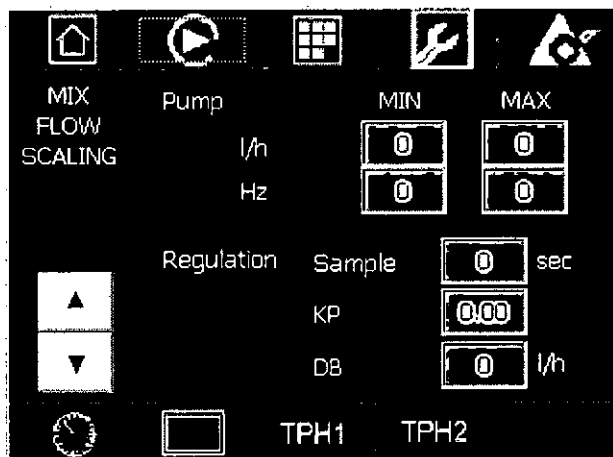
	MIN	MAX
mA	4	20
l/h	0	900

**PT100:** Mix temperature transducer.

Default scale:

	MIN	MAX
mA	4	20
°C	0	100

**Mix Flow Scaling:** Page related to mix pump speed scaling and to mix flow regulation.



**Pump:** conversion Flow rate-frequency for the mix pump.

Default scale:

	MIN	MAX
l/h	200	869
Hz	23	100

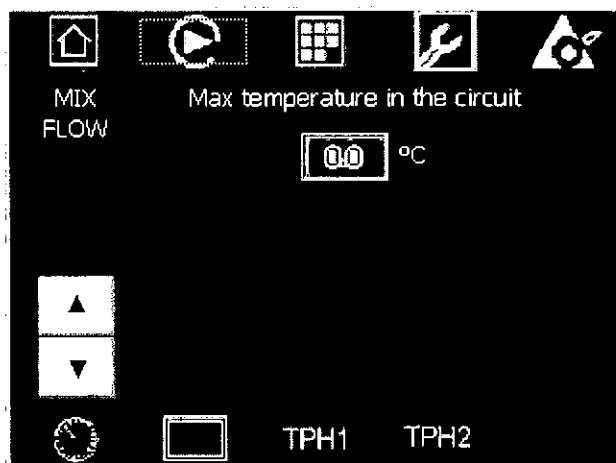
**Regulation:** Regulation parameters.

**Sample:** Sampling time of the difference between actual mix flow and set-point. Default value 3 sec.

**Kp:** Proportional coefficient. Default value 0.30

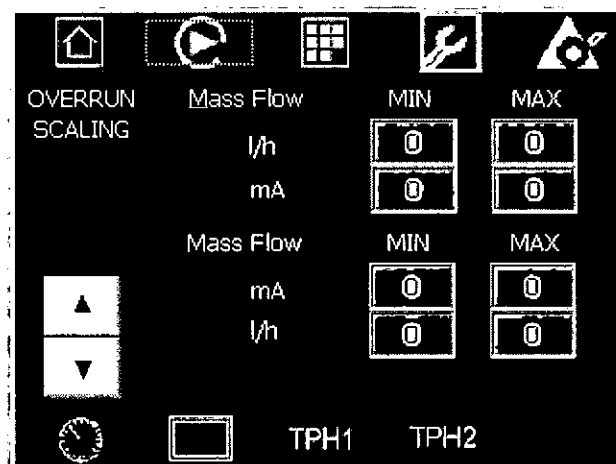
**DB:** Dead band. Default value 1 l/h

**Max temperature in the circuit:** This is the maximum temperature value of the liquid in inlet to the machine. If inlet temperature exceeds this value, the mix pump is stopped and the pump by-pass is closed in order to prevent damages to the machine. Default value 70°C



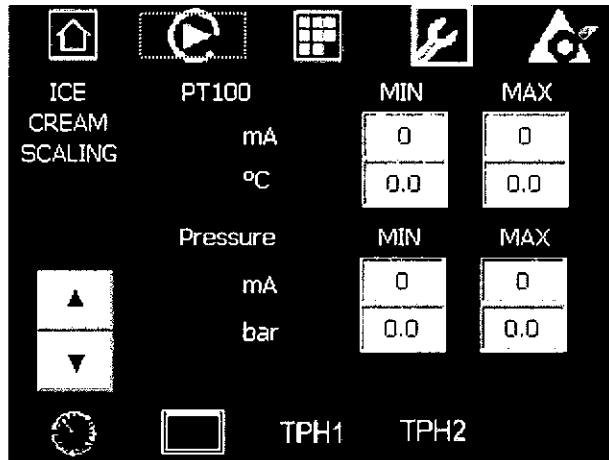
**Overrun Scaling:** Page related to the scaling of analogical signals coming from the air mass flow controller.

Default scale:



	MIN	MAX
l/h	0	800
mA	0	20
	MIN	MAX
mA	0	20
l/h	0	800

**Ice Cream Scaling:** Page related to the scaling of analogical signals coming from the instruments related to ice cream.



**PT100:** Ice cream temperature transducer.

Default scale:

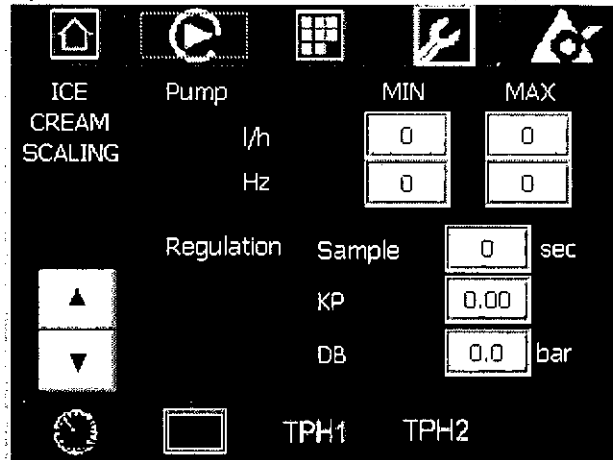
	MIN	MAX
mA	4	20
°C	-10	+10

**Pressure:** Ice cream pressure transducer.

Default scale:

	MIN	MAX
mA	4	20
bar	0	16

**Ice Cream Scaling:** Page related to mix pump speed scaling and ice cream pressure regulation.



**Pump:** conversion flow rate-frequency for the ice cream pump.

Default scale

	MIN	MAX
l/h	200	1440
Hz	12	85

**Regulation:** Regulation parameters.

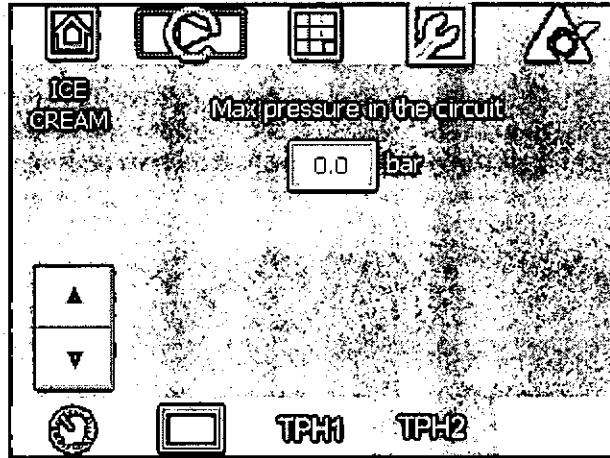
**Sample:** Sampling time of the difference between actual pressure and set-point. Default value 3 sec.

**Kp:** Proportional coefficient. Default value 0.50

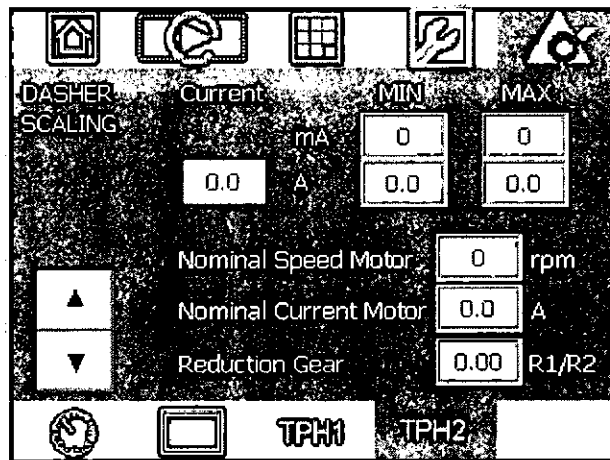
**DB:** Dead band. Default value 0.1 bar

**Max pressure in the circuit:** This is the maximum temperature value pressure in the freezing cylinder. If the pressure exceeds this value, the mix pump is stopped to prevent damage to the machine.

Default value 13 bar.



**Dasher Scaling:** Page related to the scaling of the current absorbed by the dasher motor and to rotation speed.



**Current:** conversion of the analogical signal for dasher motor absored current.

Default scale:

	MIN	MAX
mA	0	20
A	0	20

(Cont'd)

(Cont'd)

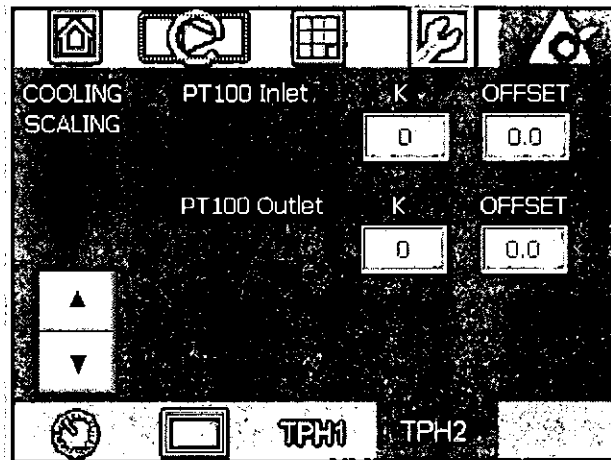
In the green cell is reported the actual current value.

**Nominal speed Motor:** nominal motor speed. Default value: 1450rpm

**Nominal Current Motor:** nominal motor current. Default value: 18.5 A

**Reduction Gear:** reduction gear ratio. Default value: 7.0

**Cooling Scaling:** Page related to the analogical signals of the thermal probes for condensation water temperatures.



**PT100 Inlet:** inlet water thermal probe

**K:** gain, default value 1.

**Offset:** default value 0

**PT100 Outlet:** outlet water thermal probe

**K:** gain, default value 1.

**Offset:** default value 0

**Cooling Scaling:** Page related to analogical signals scaling of the pressure transducers for the refrigerating system.



**Pressure outlet:** Compressors discharge pressure.

Default scale:

	MIN	MAX
mA	4	20
bar	0	50

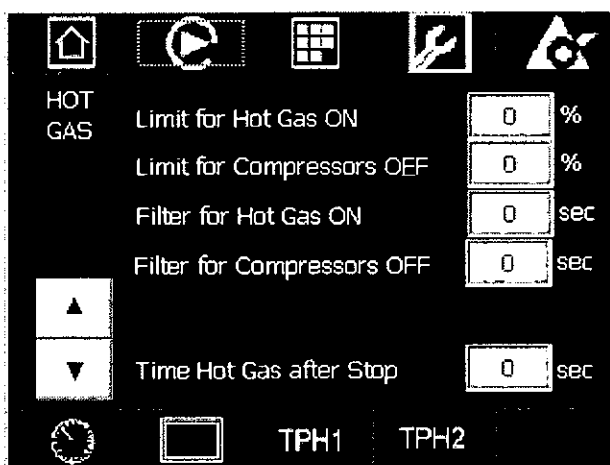
**Pressure suction:** Compressors suction pressure.

Default scale:

	MIN	MAX
mA	0	20
bar	0	20



**Hot Gas:** Page related to safety parameters for hot gas and compressors.



**Limit for Hot Gas ON:** When the viscosity exceeds this value for a time higher than **Filter for Hot Gas ON** the hot gas automatically activated.

**Limit for Compressors OFF:** When the viscosity exceeds this value for a time higher than **Filter for Compressors OFF** the compressors switch off automatically.

**Time Hot Gas after Stop:** Each time that the dasher switches off or you reset the emergency the hot gas is activated for a time equal to the value of this parameter.

Default values:

**Limit for Hot Gas ON:** 100%

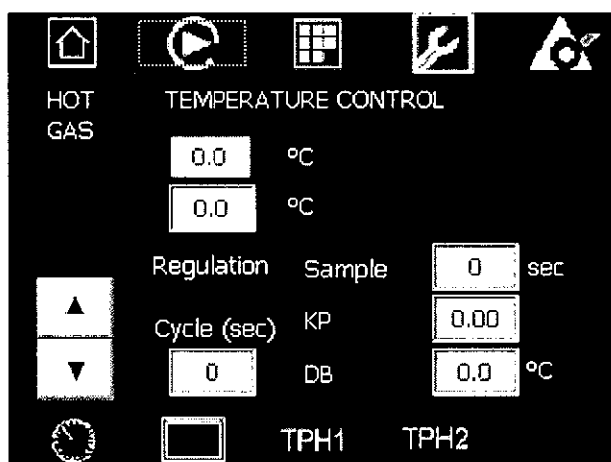
**Limit for Compressors OFF:** 110 %

**Filter for Hot Gas ON:** 5 sec

**Filter for Compressors OFF:** 5 sec

**Time Hot Gas after Stop:** 30 sec

**Hot Gas Temperature Control:** Page related hot gas automatic control parameters when the option of control based on ice cream temperature is active.



In the green cell is shown the ice cream temperature actual value.

In the yellow cell is shown the ice cream temperature set point value.

**Regulation:** Regulation parameters.

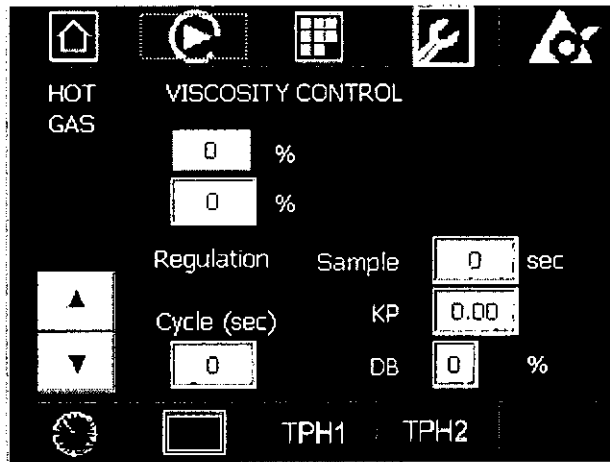
**Sample:** Sampling time of the difference between actual temperature and set-point. Default value 9 sec.

**Kp:** Proportional coefficient. Default value 1.0

**DB:** Dead band. Default value 0.2 °C

**Cycle:** Control cycle time. Default value 30 sec.

**Hot Gas Viscosity Control:** Page related hot gas automatic control parameters when the option of control base on ice cream viscosity is active.



In the green cell is shown the viscosity actual value.

In the yellow cell is shown the ice cream viscosity set point value.

**Regulation:** Regulation parameters.

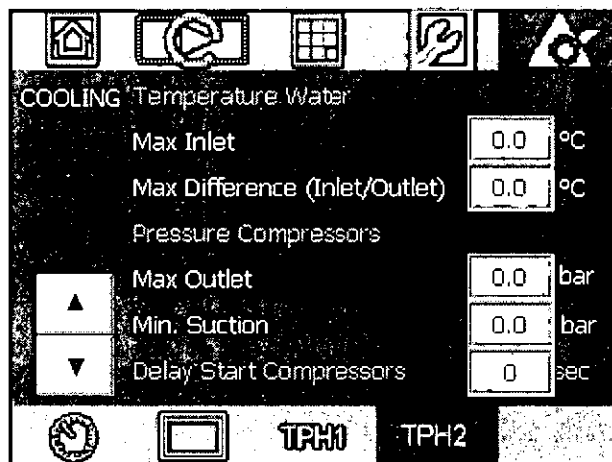
**Sample:** Sampling time of the difference between actual viscosity and set-point. Default value 5 sec.

**Kp:** Proportional coefficient. Default value 2.0

**DB:** Dead band. Default value 1%

**Cycle:** Control cycle time. Default value 5 sec.

**Cooling:** Page related to warning/alarm parameter for the refrigeration system.



**Temperature water:** Condensation water temperature

**Max inlet:** If the inlet water temperature to the condensers exceeds this value, the machine gives a warning message to the operator.

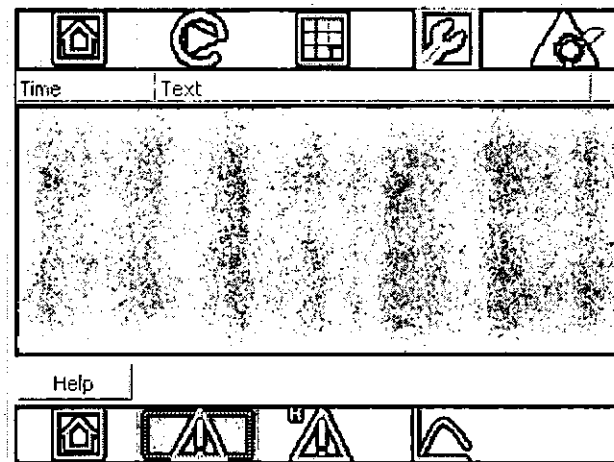
**Max Difference (inlet/outlet):** If the difference between the outlet and inlet temperature to the condenser exceeds this value, the machine gives a warning message to the operator.



**Pressure Compressors:** Pressures of the compressors.

**Max outlet:** If the discharge pressure exceeds this value, the machine blocks the compressors and shows an alarm message.

**Min Suction:** If the suction pressure drops below this value, the machine blocks the compressors and shows an alarm message.

## 1.2 Alarms



Pressing Main Menu  and Sub Menu Alarms  it is possible to enter into the following page that contains the active alarm messages with the time in which the alarm is happened.

When an alarm happens, the reset button is lighted. It is enough to eliminate the alarm cause and press the reset button and the alarm message disappears.

Pos	Alarm	Cause/Solution	Machine Action	Instruction to Operator
93	-Frequency converter mix pump fault	Mix pump start fault	Stop mix pump	Check the pump working
91	-Mix pump overload	Pump overload	Stop mix pump	Check the pump working
129	- <i>Emergency stop</i> activated	Emergency stop button is activated	Stop machine	Find the cause and restart the production
131	- <i>Phase seq not correct</i>	Phase seq not correct	Stop machine	Invert two power supply phases
97	- <i>Dasher motor</i> overload	Main motor overload	Stop main motor	Check the temperature relay
120	- <i>Compressor 1</i> overheat	Compressor overheat	Stop compressor	Check the compressor working
119	- <i>Compressor 1</i> overload	Compressor overload	Stop compressor	Check the temperature relay
113	- <i>Outlet safety</i> pressure compressor 1	Discharge compressor 1 over the limit	Stop compressor	Check the compressor working
41 X	- <i>Impending</i> overload	Impending overload	Machine in function - Only signalling	Check the viscosity
43	- <i>Stop compressor</i> for viscosity too high	The maximum viscosity has been reached	Stop main motor and compressor	Decrease the viscosity parameters in the panel
1	- <i>Flow overrun</i> irregular	Overrun air capacity anomaly	Machine in function - Only signalling	Check the air controller working and the set data
2	- <i>Flow overrun</i> fault	Failing overrun	Stop compressed air supply	Check the air controller working and the set data
82	- <i>Air pressure</i> fault	Air pressure fault	Stop compressed air supply	Check the working and connection of the compressed air supply
	- <i>Maintenance</i> warning	Scheduled maintenance operations are necessary	Machine in function - Only signalling	Carry out the operations required and restart the production cycle
	- <i>PLC memory</i> lost	PLC memory lost	Machine in function - Only signalling	Contact the Technical Service
	- <i>PLC restarted</i>	PLC restarted	Machine in function - Only signalling	Wait for the data loading completion
133	- <i>Set up</i> fault	Set up fault	Machine in function - Only signalling	Check the data and reset the loading
94	- <i>Temperature in the</i> circuit over limit	The temperature in the circuit exceeded the allowed limit	Stop mix pump and by-pass closing to the pump	Check the liquid inlet temperature and reduce it
9	- <i>Mix temperature</i> fault	The thermal probe is out of order	Machine in function - Only signalling	Check the probe wiring

Pos	Alarm	Cause/Solution	Machine Action	Instruction to Operator
10	- Mix flow irregular	The flow rate fluctuations exceed the warning limit set	Machine in function - Only signalling	Check that the mix reaches correctly the machine and the limit set is correct
11	- Mix too hot	The mix inlet temperature exceed the warning values	Machine in function - Only signalling	Check that the limit is correctly set and inlet mix temperature
12	- Mix too cold	The mix inlet temperature is lower than the minimum limit set by operator	Machine in function - Only signalling	Check that the limit is correctly set and inlet mix temperature
13	- Adjust mix pump	The pump leakage exceed the warning value, it is necessary to adjust the mix pump	Machine in function - Only signalling	Execute the pump adjusting procedure.
33	- Condensing water too high	The inlet water to the condenser is too hot	Machine in function - Only signalling	Reduce the inlet water temperature
34	- Insufficient condensing flow	The condensation water flow is not enough	Machine in function - Only signalling	Check the water flow
35	- Inlet water temperature fault	The thermal probe for inlet water to the condenser is out of order	Machine in function - Only signalling	Check the probe wiring
36	- Outlet water temperature fault	The thermal probe for outlet water to the condenser is out of order	Machine in function - Only signalling	Check the probe wiring
42	- Viscosity too high	The maximum viscosity limit has been reached	Machine in function - Only signalling	Reduce the ice cream viscosity or increase the mix flow
81	- Mass flow fault	The overrun mass flow controller is out of order	Stop overrun	Check the instrument wiring
89	- Mix flow fault	The flow rate fluctuations exceed the alarm limit set	Stop mix pump	Check that the mix reaches correctly the machine and the limit set is correct
90	- Flow meter fault	The mix flow meter is out of order	Stop mix pump	Check the instrument wiring
92	- Mix pump overheat			
98	- Dasher motor overheat			
99	- Dasher motor frequency converter fault			
105	- Temperature ice cream fault	The ice cream thermal probe is out of order	Machine in function - Only signalling	Check the probe wiring

Pos	Alarm	Cause/Solution	Machine Action	Instruction to Operator
106	-- Pressure ice cream fault	The ice cream pressure probe is out of order	Machine in function - Only signalling	Check the probe wiring
107	- Pressure ice cream over maximum limit	The ice cream pressure exceed the maximum limit set	Stop mix pump	Check that the outlet pipe is not closed and the limit is set correctly
108	- Motor ice cream pump overload		Stop ice crem pump motor	
109	- Motor ice cream overheat		Interruzione funzionamento motore pompa gelato	
110	- Frequency converter ice cream pump fault		Stop ice crem pump motor	
114	- Suction safety pressure compressor 1	Suction compressor 1 below the limit	Stop compressor	Check the compressor working
115	- Outlet safety pressure compressor 2	Discharge compressor 2 over the limit	Stop compressor	Check the compressor working
116	- Suction safety pressure compressor 2	Suction compressor 2 below the limit	Stop compressor	Check the compressor working
137	- Compressor 2 overload	Compressor overload	Stop compressor	Check the thermal relay
138	- Compressor 2 overheat	Compressor overheat	Stop compressor	Check the compressor working
117	- High outlet pressure compressors	Compressors discharge pressure too high	Stop compressor	Check refrigerating group functioning
118	- Low suction pressure compressors	Compressors suction pressure too low	Stop compressor	Check refrigerating group functioning
121	- Current dasher motor fault	Error in reading dasher motor current	Stop dasher motor	
139	- Outlet compressors pressure fault	The compressors discharge pressure probe is out of order	Stop compressor	Check the instrument wiring
140	- Suction compressors pressure fault	The compressors suction pressure probe is out of order	Stop dasher motor	Check the instrument wiring



## 1.2.2 Troubleshooting

Problem	Cause	Remedy
The screen does not switch on.	<ul style="list-style-type: none"> <li>-Power failure.</li> <li>-General switch in "0" position.</li> <li>-General switch fault.</li> <li>-Protection triggered.</li> <li>-Display fault.</li> </ul>	<ul style="list-style-type: none"> <li>-Restore voltage supply.</li> <li>-Turn general switch to "1"</li> <li>-Replace.</li> <li>-Reset the protection.</li> <li>-Replace the display.</li> </ul>
The pump stops, or does not start.	<ul style="list-style-type: none"> <li>-No compressed air.</li> <li>-Switch fault.</li> <li>-Pump rotor seized.</li> <li>-Inverter in emergency state.</li> <li>-Inverter thermal cutout</li> <li>-Bearings blocked.</li> <li>-Inverter fault.</li> <li>-Main motor fault.</li> </ul>	<ul style="list-style-type: none"> <li>-Check compressed air pressure.</li> <li>-Replace switch.</li> <li>-Remove rotor, check condition and if necessary replace.</li> <li>-Turn off the general switch and turn back on after a few minutes.</li> <li>-Wait 20 seconds, then restart the pump.</li> <li>-Replace following instructions in "Mechanical maintenance" section.</li> <li>-Replace.</li> <li>-Replace/repair.</li> </ul>
Mixer shaft stops or does not start.	<ul style="list-style-type: none"> <li>-Thermal cutout tripped.</li> <li>-Switch fault.</li> <li>-Motor fault.</li> <li>-Build up of ice in the cylinder.</li> </ul>	<ul style="list-style-type: none"> <li>-Reset thermal cutout.</li> <li>-Replace switch.</li> <li>-Replace/repair.</li> <li>-Turn on hot gas and attend.</li> </ul>
The refrigerator compressor will not start up.	<ul style="list-style-type: none"> <li>-Dasher off.</li> <li>-Thermal cutout tripped.</li> <li>-Electronic overload tripped.</li> <li>-Switch fault.</li> <li>-High-pressure cutoff switch tripped.</li> <li>-Low pressure cutoff tripped</li> </ul>	<ul style="list-style-type: none"> <li>Restart dasher.</li> <li>-Reset.</li> <li>-Reset by switching general switch off and then on again.</li> <li>-Replace switch.</li> <li>-Check water temperature.</li> <li>-Turn on hot gas for about 30 seconds</li> </ul>
No flow or insufficient flow of mix.	<ul style="list-style-type: none"> <li>-No mix supply.</li> <li>-Mix supply hose crimped or blocked.</li> <li>-Air bubbles in the supply hose.</li> <li>-The pump has stopped.</li> </ul>	<ul style="list-style-type: none"> <li>-Restore supply.</li> <li>-Remove blockage/crimp.</li> <li>-Stop overrun, increase pump speed to recall mix rapidly into the cylinder, reset desired pump speed and restart overrun.</li> <li>-See problem "The pump stops, or does not start"</li> </ul>
The mixer shaft is malfunctioning.	<ul style="list-style-type: none"> <li>-Ice-cream too hard.</li> <li>-Scraper blades worn.</li> <li>-Reduction gear broken.</li> </ul>	<ul style="list-style-type: none"> <li>-Reduce the set value of ice cream viscosity.</li> <li>-Sharpen or replace, following correct fitting procedure.</li> <li>-Replace.</li> </ul>
Mix cooling problematic at start-up.	<ul style="list-style-type: none"> <li>-Condenser out of or low on water.</li> <li>-Hot water.</li> <li>-Refrigerator unit fault</li> </ul>	<ul style="list-style-type: none"> <li>-Check water supply.</li> <li>-Check water temperature.</li> <li>-Call qualified refrigerator technician.</li> </ul>

Ice-cream too soft.	<ul style="list-style-type: none"> <li>- Excessive ice-cream production rate.</li> <li>Input mix too hot.</li> <li>-Water supply to condenser insufficient.</li> <li>-Condenser cooling water too hot.</li> <li>-Ice-cream outlet valve too open.</li> <li>-No coolant gas.</li> <li>-Coolant gas filter blocked.</li> <li>-Refrigerator unit fault.</li> </ul>	<ul style="list-style-type: none"> <li>-Reduce the production.</li> <li>-Check that mix is at 4°C.</li> <li>-Check water supply. Adjust pressure valve (if present) as explained in the "Refrigerator unit maintenance" section.</li> <li>-Check temperature of tower water.</li> <li>-Increase pressure on ice-cream outlet valve.</li> <li>-Check for leaks in refrigerator unit and reset gas charge.</li> <li>-Replace filter.</li> <li>-Call refrigerator technician.</li> </ul>
Overrun insufficient.	<ul style="list-style-type: none"> <li>-Loss of pressure in compressed air system.</li> <li>-Clogged filters.</li> <li>-Check valve seal worn or dirty.</li> <li>-Water or mix in compressed air system.</li> <li>-Compressed air supply failure.</li> <li>-Overrun regulator fault.</li> <li>-Insufficient overrun pressure.</li> <li>-The capacity is not read correctly from the controller.</li> </ul>	<ul style="list-style-type: none"> <li>- Check compressed air system for leaks and check solenoid valve operation.</li> <li>-Replace as described in the "Compressed air system maintenance" section.</li> <li>-Replace as described in the "Mechanical maintenance/Cleaning" section.</li> <li>-Replace the O-ring as in point above and clean system.</li> <li>-Reset.</li> <li>-Replace.</li> <li>-Correct overrun pressure on the internal regulator (booster).</li> <li>-Correct overrun on the touch screen.</li> </ul>
Refrigerator compressor starts but shuts down immediately.	<ul style="list-style-type: none"> <li>-Condenser water supply closed.</li> <li>-Condenser water supply hoses pinched.</li> <li>-Condenser water supply hoses of insufficient diameter.</li> </ul>	<ul style="list-style-type: none"> <li>- Turn on faucets.</li> <li>- Remove crimps.</li> <li>- Replace with hoses of diameter at least as that of the hose connections on the machine.</li> </ul>
The compressor ices up.	<ul style="list-style-type: none"> <li>- Condenser water too cold.</li> <li>-Blades worn.</li> <li>-Thermostatic valve fault.</li> <li>-Excessive quantity of coolant gas.</li> </ul>	<ul style="list-style-type: none"> <li>-Check water temperature.</li> <li>-Replace.</li> <li>-Replace.</li> <li>-Unload gas and reload observing value in technical data.</li> </ul>
Hourly ice-cream production rate remains unchanged even by changing the capacity through the panel.	<ul style="list-style-type: none"> <li>- Inverter fault.</li> </ul>	<ul style="list-style-type: none"> <li>-Replace.</li> </ul>
Hot gas activates before correct time.	<ul style="list-style-type: none"> <li>- Viscosity value set not correct.</li> </ul>	<ul style="list-style-type: none"> <li>-Verify the value.</li> </ul>
Hot gas does not activate.	<ul style="list-style-type: none"> <li>- Viscosity value set not correct.</li> </ul>	<ul style="list-style-type: none"> <li>- Verify the value.</li> </ul>
Hot gas activates but with no effect.	<ul style="list-style-type: none"> <li>- Hot gas faucet closed.</li> <li>- Hot gas solenoid and valve fault.</li> </ul>	<ul style="list-style-type: none"> <li>-Open faucet.</li> <li>- Replace.</li> </ul>

## 1.3 Preparation

### 1.3.1 Preparation

Perform the following checks before starting production:

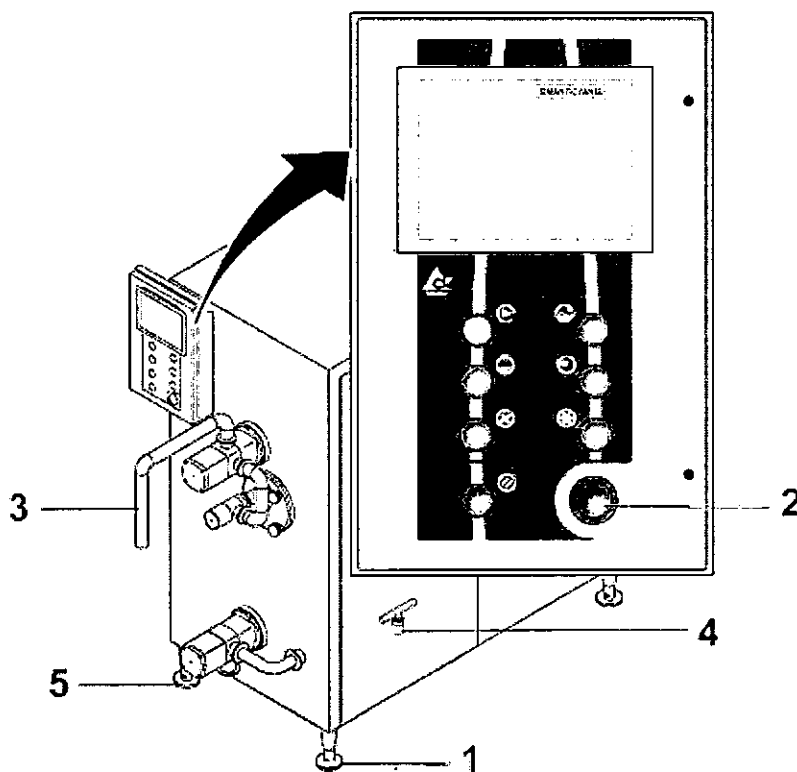
- a. Check that the machine is stable and has been levelled, and adjust feet (1) if necessary.
- b. Check that the main switch is on.
- c. Check that the water and compressed air valves are open.
- d. Check that the emergency stop button (2) has been released.
- e. Check that the clamp fittings are tightly 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.



#### CAUTION

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

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



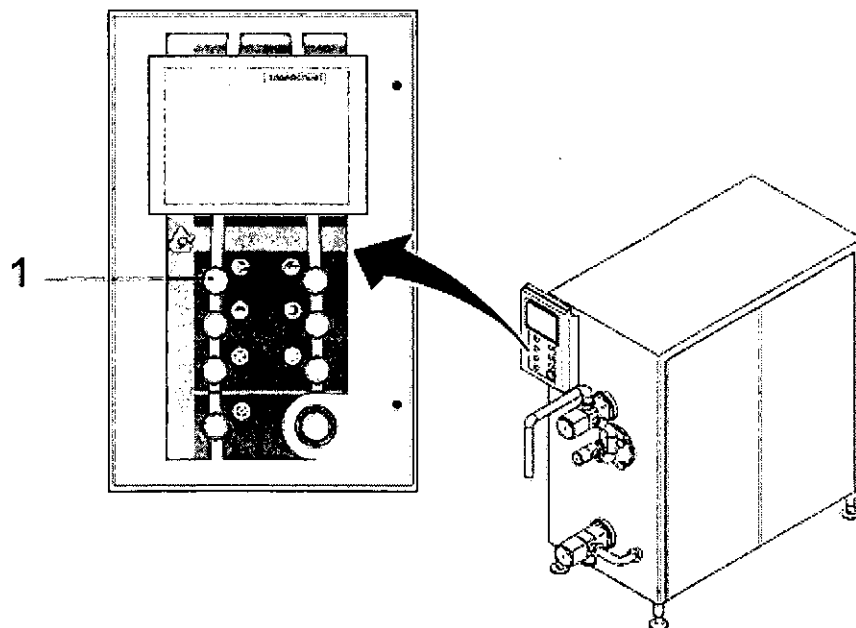
## 1.4 Start

### 1.4.1 Automatic start

- a. Connect the pump to the container containing the mixture.
- b. If the recipe has already been saved with the desired parameters, open the "Recipe" page and choose the desired recipe (see paragraph 1.4.6), if not, set the overrun flow, viscosity, ice cream temperature and pressure parameters.
- c. Start the automatic cycle by pressing the button (1) (the button starts blinking). The pump will start up at 2/3 max. speed.
- d. Wait for the mixture to go out of the freezer exiting pipe.
- e. By pressing the button again (1), the pump speed is automatically reduced to the minimum and the following devices are operated one after the other:
  - the dasher;
  - the refrigerator compressor;
  - the overrun (to the prefixed value of 50%).
- f. Once it is reached the viscosity or ice cream temperature set point or however after a maximum waiting time set adjustable by panel, the mix pump accelerates up to set point +15% and the ice cream pump slows down in order to increase ice cream pressure.

(Cont'd)

1 Button



*(Cont'd)*

When the real viscosity of the ice-cream approaches the value set, the freezer gradually reaches the productivity set.

## 1.5 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.

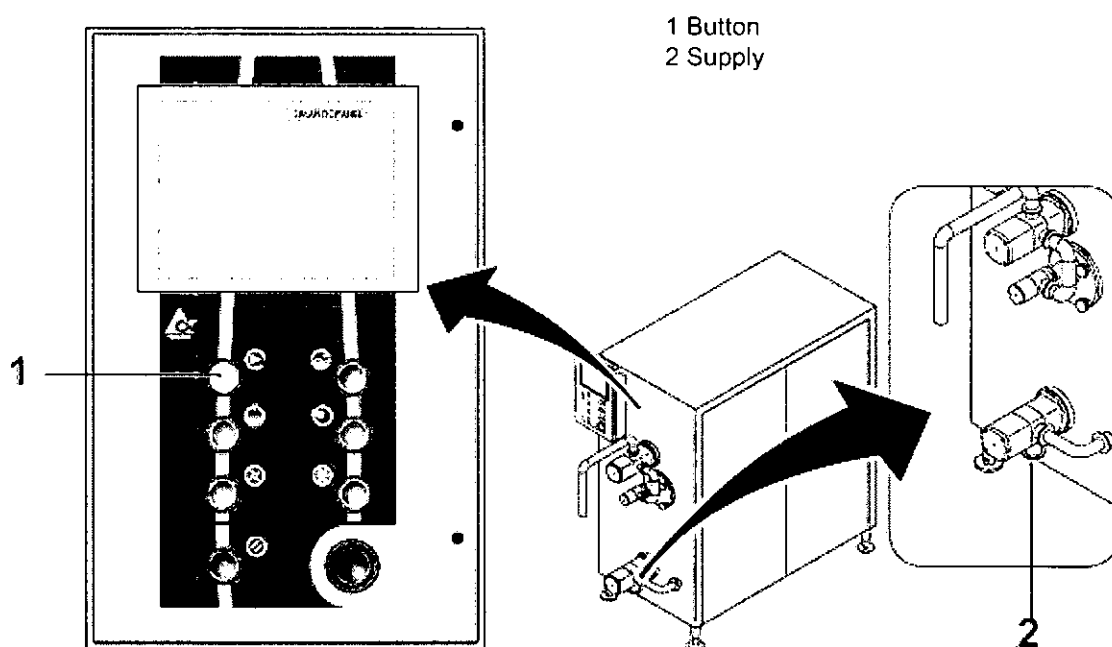
If it takes more time to change the mix the machine must be stopped.

### 1.5.1 Automatic stop

a. By pressing the button (1) the following devices are deactivated one after the other:

- the compressors immediately;
- the overrun;
- the pump;
- the dasher (after that the ice cream pressure is decreased below the stop cycle value set by panel).

b. Disconnect the supply to the freezer (2) from the tank 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.

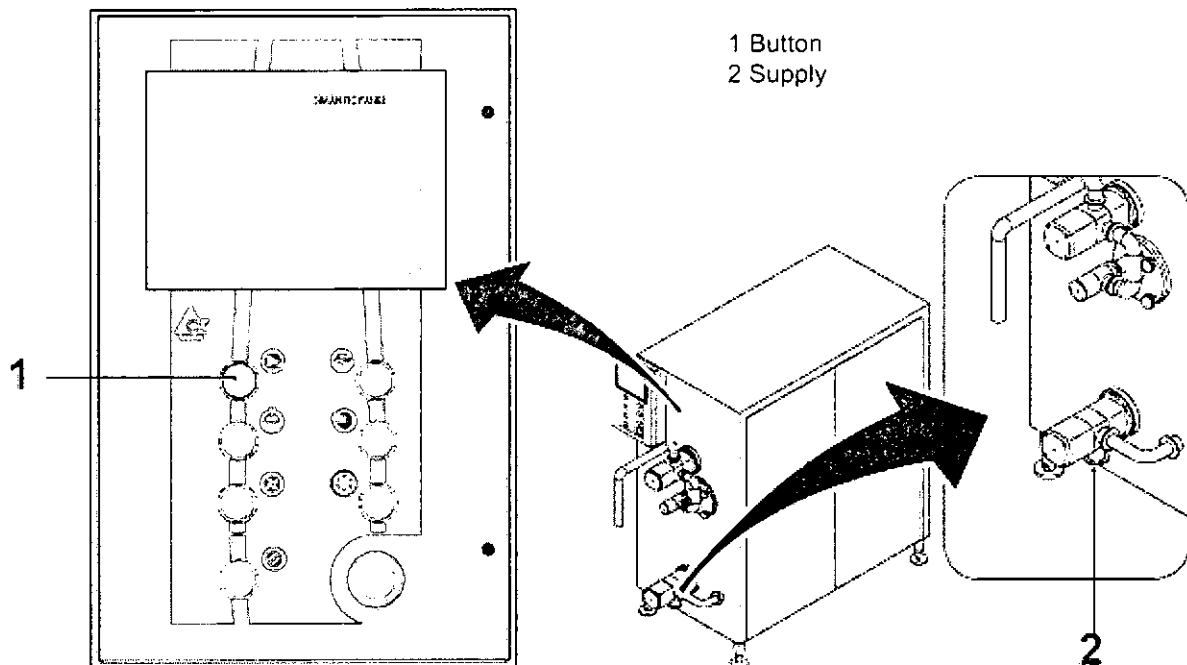


### 1.5.2 Manual stop

- a. Stop the refrigerator compressor using the button (1).
- b. Stop the overrun by pressing the button (2).
- c. Stop the pump by pressing the button (3).
- d. Stop the dasher by pressing the button (4).
- e. 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.

### 1.5.3 Production restart

- a. To start production again in automatic mode, see [paragraph 1.4.1 Automatic start](#).



## 1.6 Stop

### 1.6.1 Emergency Stop

When enabling an emergency button (1), the machine stops.

To reset the system functions, rearm the enabled button.

### 1.6.2 Automatic stop

a. By pressing the button (2) the following devices are deactivated one after the other:

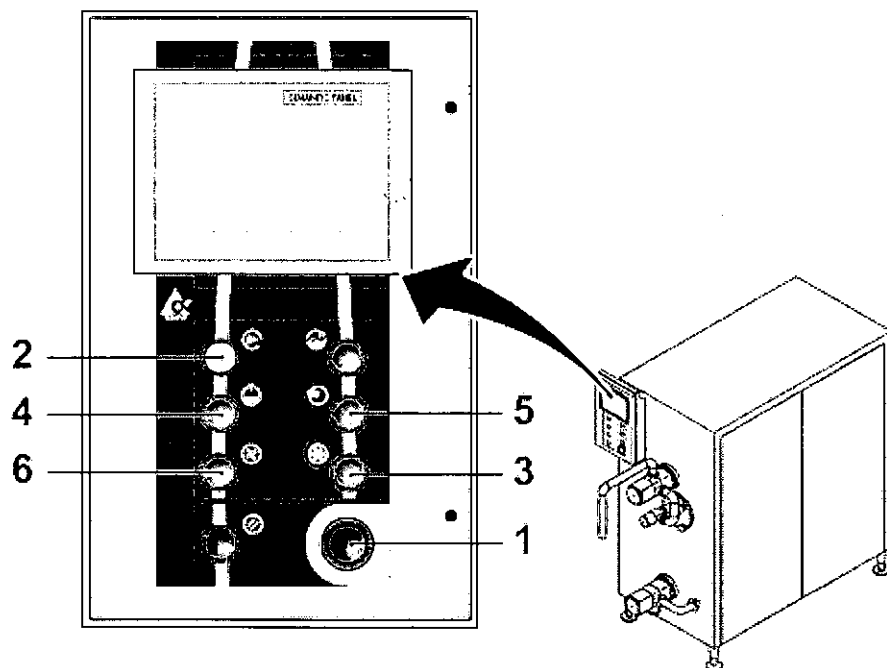
- the compressor immediately;
- the overrun;
- the pump;
- the dasher (after the ice cream pressure is decreased below the stop cycle value set by panel).

The stop of the various components occurs automatically and in a progressive way.

### 1.6.3 Manual Stop

- a. Stop the refrigerator compressor using the button (3).
- b. Stop the overrun by pressing the button (5).
- c. Stop the pump by pressing the button (4).
- d. Stop the dasher by pressing the button (6).

- 1 Emergency stop button
- 2 Automatic stop button
- 3 Compressor button
- 4 Pump button
- 5 Overrun button
- 6 Dasher button





## 1.7 Care and Cleaning

### 1.7.1 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.

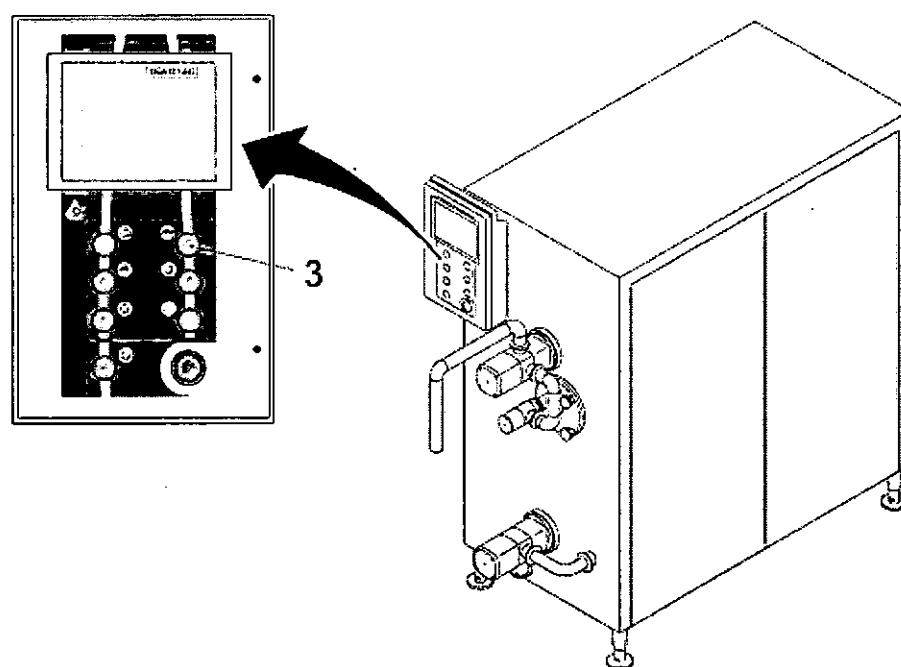
The correct speed of the flow for a good CIP washing is about 1,5 m/s in the frigus outlet pipe. This involves a capacity of 5000 l/h for a 1 1/2" outlet pipe. In these conditions, the pressure drop is about 2 bar. The CIP washing pump must guarantee these flow rate and pressure characteristics.

2. Connect the pump outlet to the mix inlet hose (1) and the freezer outlet hose (2) to the container.

3. Start the CIP wash cycle pushing button (3) (see par. 1.4.4.3 Sub menu Pumps).

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.

*(Cont'd)*



(Cont'd)

4. 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 noncaustic 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.

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

## 1.7.2 Manual Washing

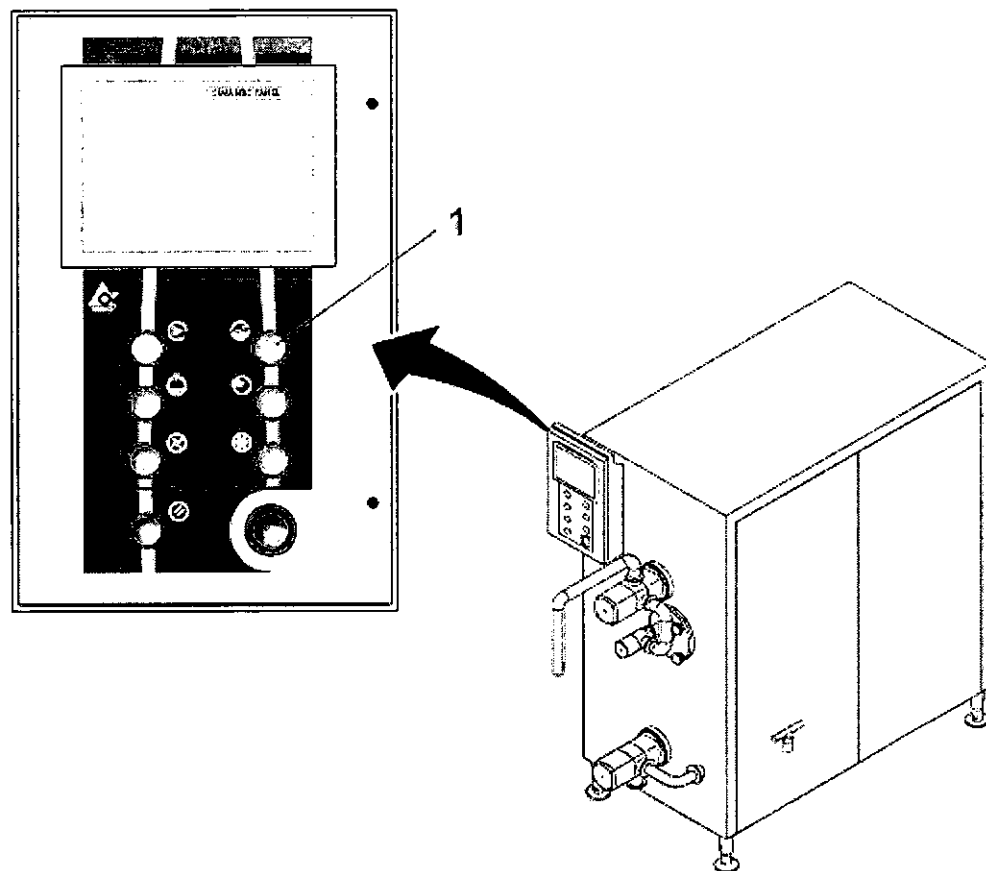
If the washing system is not available and the machine must be washed manually, it will be necessary to dismantle a number of parts and reassemble them very carefully after washing.

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 tank and supply the freezer pump with warm water, no hotter than 60 to 65°C.

Disassembling the check valve.

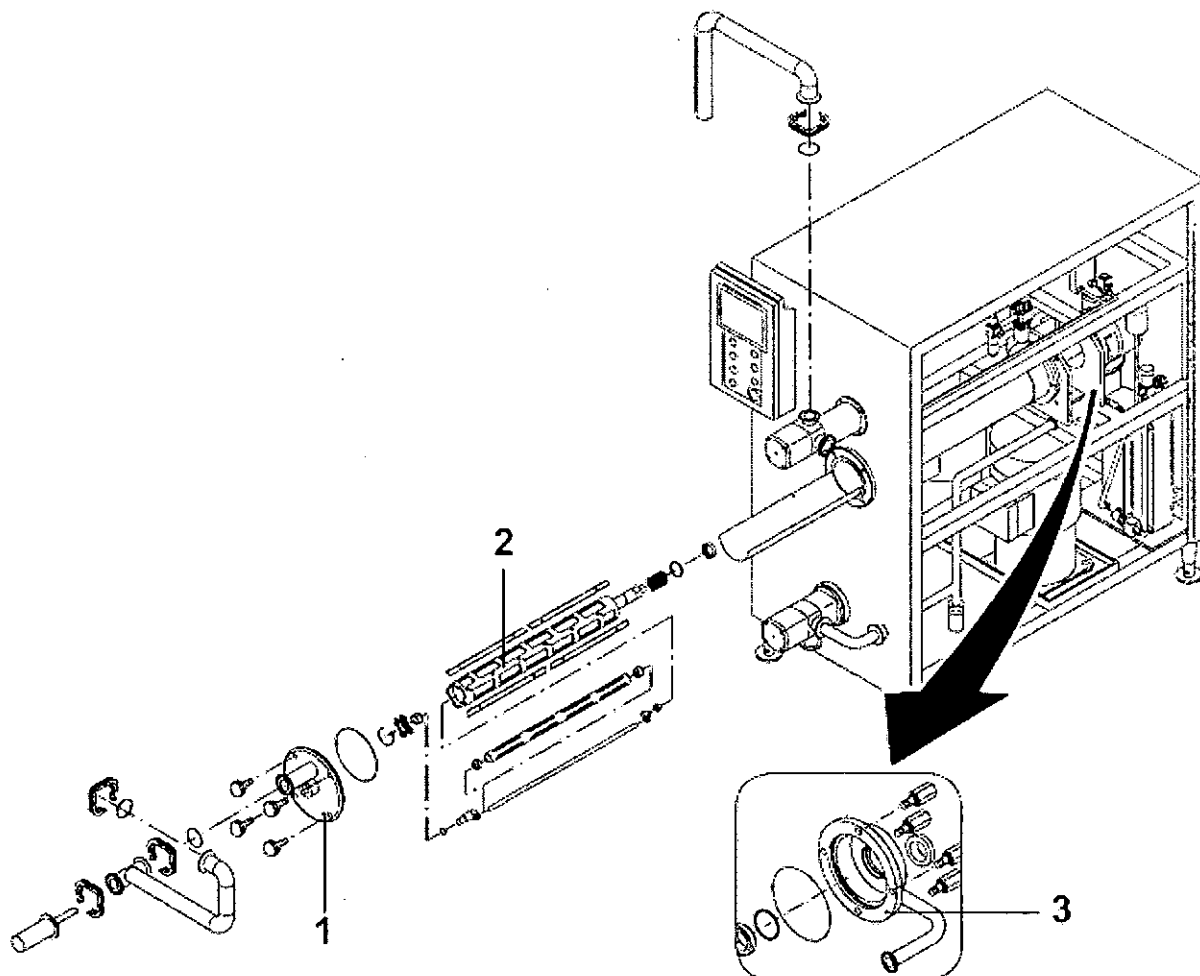
- c. Activate the pump by-pass by the button on the page “Maintenance Menu”, sub menu Pumps.
- d. Let hot water flow through the machine until the water flowing out of it is fairly clean.
- f. Drain the water contained inside the machine.



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

- a. Remove the cover (1) by unscrewing the knobs holding it in place.
- b. Disconnect the pipes and the cover.
- c. Remove the dasher (2) using protection provided.
- d. Dismantle the cylinder bottom (3).

(Cont'd)



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*(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.

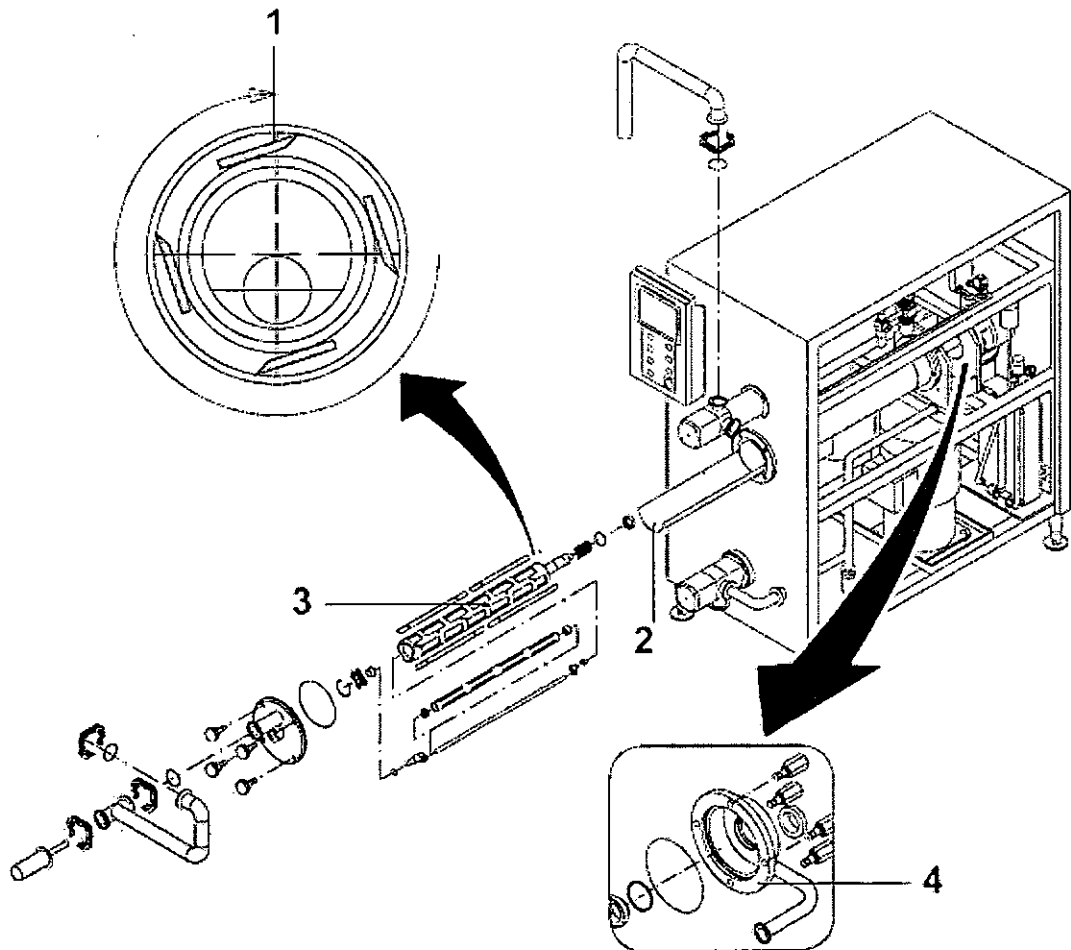
Be very careful when positioning the blades (1); the sharp part must be facing the cylinder.

**! CAUTION**

To prevent blows that could damage the freezer cylinder, a "shaft protection" is supplied.

The protection (2) must be positioned on the cylinder as shown in the figure.

Then assemble the shaft (3), being very careful not to hit and damage the ring on the mechanical seal at the bottom (4).

*(Cont'd)*

(Cont'd)

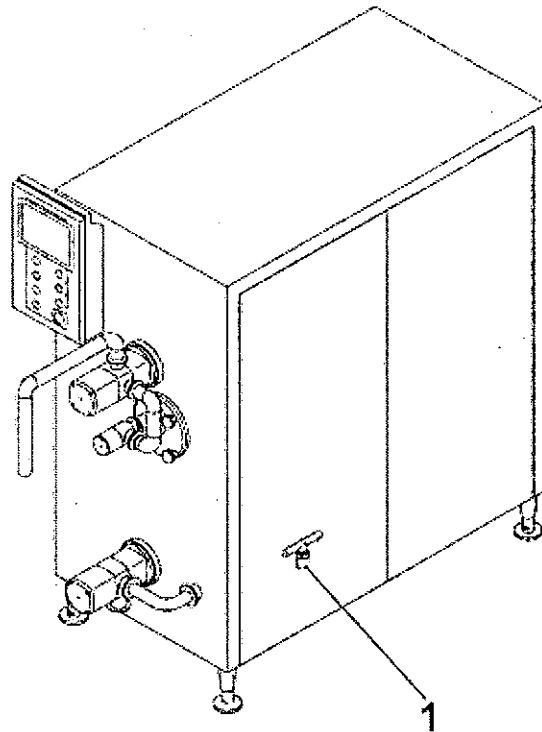
Finally, remove the ring and continue assembling all parts.

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) or activating the mix pump by-pass.

l. Reposition the safety valve.

The freezer is now ready for use again.



### 1.7.3 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)		

## 1.8 Technical Data

### Nominal Output

Nominal Output	400-1200 l/h	105-316 gals/h
Inlet of mix	+ 5°C	41°F
Outlet of ice cream temperature	-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
Skimmed milk powder	10,5
Sugar (sucrose)	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.

### Refrigeration plant

Refrigerating gas R404A	5,2 Kg	11,44 lbs
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### Noise

A-weighted equivalent sound pressure level at 1 metre:

$$Leq(A) = 69.9 \text{ dB(A)}$$

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 - 529 gals/h
Tower water	+28°C - 6000 l/h	82,4 °F - 1585 gals/h
Water inlet connector	1" gas female	1" gas female
Water outlet connector	1" gas female	1" gas female

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