TEKNOFREEZE

400 - 600 - 800

electronic version

Use and Maintenance Manual

English version
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Introduction

This manual includes the operating and maintenance instructions for the machine.
The contents of this manual are intended for an operator already instructed on the precautions necessary when working with electrified systems and moving parts.

Using and keeping the manual

This manual provides instructions for the safe operation of the machine and for regular maintenance procedures. This manual does not deal with the calibration, adjustment or unscheduled maintenance of the machine as these procedures are the sole responsibility of the servicing technician, who must work on the machine in compliance with its technical and design specifications.

While reading this manual is indispensable, it cannot substitute the necessary skills acquired by technical personnel through adequate preliminary training.

The manual must be kept whole and in good condition for the entire lifespan of the machine. After use, the manual must be returned to a safe and protected place, together with the certification of EC compliance (or manufacturer's declaration of compliance).

In the event of lost or damaged documentation, a copy may be obtained from the manufacturer by quoting the reference number, the machine serial number and the year of construction.

The machine is built in compliance with applicable EC legislation and the relative implementing technical legislation, as certified by the declaration of compliance issued by the manufacturer and annexed with the manual.

chapter 1

Technological description

1.1 Machine functions

The TEKNOFREEZE continuous freezer caters for the needs of both industrial and small scale ice-cream production. Specifically, this machine freezes and aerates the mixture to create a particularly stiff and consistent ice-cream at a temperature of -5 to -6°C.

The machine is built from superior quality materials in compliance with EU directives for the production of foodstuffs and offers outstanding performance.

The stainless steel construction and removable side panels of the TEKNOFREEZE allow for easy maintenance and cleaning, and the machine is compliant with all recent health and hygiene legislation.

The machine's unique tilted freezer cylinder system maximises productive capacity while minimising energy consumption, significantly saving energy costs.

A piston pump constantly meters the air and mixture allowing extremely precise ice-cream volume control.

All TEKNOFREEZE models are fitted with a compressed air sterilising system with regenerable cartridge filters.

These machines are predisposed for connection to an integrated programme CIP (cleaning in place) unit, which washes and disinfects the machine without necessitating complex disassembly procedures.

All basic machine motions are mechanically executed and electronically synchronised by PLC, making them programmable.

The user interface is a touch screen mounted on the control console.

1.2 Description of the machine

The main components of the machine are as follows:

1 ice-cream outlet pipe
2 operator panel
3 compressor
4 freezer cylinder
5 mixture/air pump
6 washing bypass (CIP)
7 mixture feed hose
8 safety valve
9 adjustable feet

Continuous freezer with productive capacity (at 100% volume overrun):

- from 100 to 400 litres/hour of ice-cream (Teknofreeze 400)
- from 200 to 600 litres/hour of ice-cream (Teknofreeze 600)
- from 250 to 800 litres/hour of ice-cream (Teknofreeze 800)

Stainless steel construction with removable side panels for maintenance and inspection:

Technical specifications :

- Built-in refrigerator compressor: 5,5 kW (Teknofreeze 400), 7,5 kW (Teknofreeze 600), 11 kW (Teknofreeze 800).
- motor powering dasher shaft: 4 kW (Teknofreeze 400), 5,5 kW (Teknofreeze 600), 7,5 kW (Teknofreeze 800).
- dual cylinder mixture/air pump: 1,1 kW (Teknofreeze 400, 600, 800).
- Integrated CIP washing system with separate controls
- Tilted freezer cylinder (a technological innovation to increase energy efficiency and facilitate maintenance and cleaning), with dasher and scraper blades.
- Foodstuff compliant safety pressure release valve (pressure control plug) for freezer cylinder.
- Pneumatic valve for automatic ice-cream pressure regulation in freezer cylinder
- Connections with foodstuff compliant hoses
- Compressed air sterilising system with regenerable cartridge filters.

“Touch screen” electronic panel for operating the machine and controlling the following operating parameters:

- hourly production capacity
- mixture feed temperature
- mixture outlet temperature
- ice-cream hardness
- volume overrun
- cylinder pressure
- compressor parameter control
- speed and hot gas back-pressure regulation.

The machine operating parameters for individual batches may be stored as recipes and retrieved automatically whenever needed.

The machine may be started and stopped in manual or automatic mode.

1.3 Operation

The piston in the first cylinder of the pump aspirates mixture from the vat and delivers it to the second cylinder in the quantity and at the speed set by the operator. The second cylinder therefore receives a metered volume of mixture plus an operator-defined quantity of filtered and sterilised air from the compressed air system.
A constant flow of mixture and air is transferred from the second pump cylinder to the freezer cylinder, where it is transformed into ice-cream.
We recommend installing a supplementary centrifugal pump between the mixture vat and the freezer, especially if the two machines are more than five metres apart. If necessary, TEKNO-ICE can supply the most appropriate pump for your operating conditions.

The in-built refrigerating system freezes the mixture in the freezer cylinder, while blades mounted on the dasher shaft continuously scrape the surface of the cylinder clean to maintain optimum heat transfer between the ice-cream and the freezer cylinder.
Simultaneously, the specially designed dasher shaft gives the ice-cream a soft and creamy appearance.

A fundamental factor in this process is the ice-cream pressure in the freezer cylinder. This pressure is kept constant as long as the freezer is in use by a special regulator valve.
The ideal operating pressure is 6 - 7 bar. The resulting ice-cream is delivered via the outlet line to the production machines.

The operator panel includes special controls to set the overrun, hourly production and the hardness of the ice-cream.

1.4 Technical specifications

The following specifications are for the machine in standard configuration.
For more detailed information concerning this machine, see the diagrams included in the chapter DIAGRAMS AND REPLACEMENT PARTS.

MODEL		**400**	**600**	**800**
ICE CREAM PRODUCTION		100 to 400	200 to 600	250 to 800
Ice cream outlet temperature	°C	- 8 to –5.5	-8 to -5.5	-8 to –5.5
Overrun	%	above 120%	above 120%	above 120%
Mix inlet piping		1"	1"	1"
Ice cream outlet piping		1.1/2"	1.1/2"	1.1/2"
REFRIGERATION CHARACTERISTICS				
Refrigeration Capacity (-30°/+30°C)	Kcal /h	8,650- 8970	10300 –12,250	15400 – 18,000
Refrigerant		R404A	R404A	R404A
Refrigerant Charge	kg	5.05	5.05	7.05
CONDENSATION				
With tap or well water (+15/+18°C)	lt/h	800	1050	1600
With tower water (+25/+28°C) circulation	lt/h	2600	3400	5200
Minimum Pressure	bar	1.05	1.05	1.05
Inlet/Outlet	mm	Ø 30	Ø 30	Ø 30
ELECTRIC SPECIFICATIONS				
Dasher Motor	Kw	4	5.05	7.05
Air/Mix Pump Motor	Kw	1.01	1.01	1.01
Refrigeration Compressor	HP	7.05	10	15
Total Installed Power	Kw	10.05	14	19.05
Standard Voltage	Volt	400	400	400
Standard Frequency	Hz	50	50	50
Phases	No.	3	3	**3**
DIMENSIONS AND WEIGHT				
Width	mm	800	800	965
Length	mm	1460	1460	1650
Height	mm	1800	1800	1850
Net Weight	kg	580	615	705

1.5 Working area for the operator

The machine does not need to be supervised during operation. The operator normally stands in front of the bulk unloading station or at the control console.

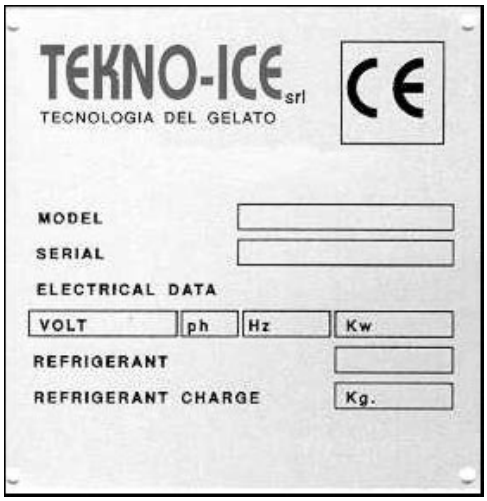
1.6 Noise emissions

The noise emissions of the machine, measured in a clear field, do not exceed 70 dB(A).
During operation, noise emissions are dependent on a number of other factors such as background noise levels, other machines or devices installed near the TEKNOFREEZE and other sources that cannot be evaluated in advance by the manufacturer.

It is therefore the user's responsibility to measure the noise emissions produced by the machine during normal operation and to provide adequate personal protection devices (earmuffs) should noise emission levels exceed the limits prescribed by legislation in the country of installation.

1.7 Identification

The identification details for the machine are stamped on a plate mounted on the machine itself.



1.7.1 Manufacturer data

Manufacturer: **TEKNO-ICE srl**
Address: via Lazio, 37 - 20090 Buccinasco MI ITALY
Phone: +39 02 488676.1
Fax: +39 02 4882153
Website: www.teknoice.com
e-mail: teknoice@teknoice.com

1.8 Guarantee

TEKNO-ICE srl guarantees the machine for twelve months from the date of shipping, based on a usage of 8 hours per day.
During this period, **TEKNO-ICE srl** will replace or repair any defective component.

The guarantee is limited to the replacement or repair of the defective component and does not cover shipping and labour costs.

The guarantee is for one year on all components with the exclusion of wear and consumption materials.

The guarantee is annulled if the machine is not used (if not installed within 18 months).

The guarantee does not cover parts subject to wear, such as bushings, bearings, seals and consumables.

Incorrect usage of the machine, tampering, work carried out by unauthorised personnel and the use of non-original spare parts will render the guarantee null and void.

TEKNO-ICE srl declines all responsibility in the event of any of the above.

For all technical correspondence with **TEKNO-ICE srl**, use the form provided in the following paragraph.

1.9 Notice form

Fill out the upper box with the details of the machine, photocopy the page, describe the nature of the problem in the bottom section and send by fax.

TEKNO-ICE srl - via Lazio 37 - Buccinasco ITALY FAX (+39) 02 4882153

Model: TEKNOFREEZE _____ Date of supply: _____

Serial No _____ Order N. _____

Description of defect:

Date noted : _____
Operating hours : _____
Signature : _____

chapter 2

Precautions for use and maintenance

2.1 General notes

WARNING
Read this manual thoroughly, paying particular attention to the contents of this chapter, before carrying out any work on the machine.

This machine has been designed and built in compliance with the requisites of Machine Directive 98/37/EC, taking into consideration all normal and reasonably foreseeable usage of the machine.

This machine has been built for the application specified in the declaration of compliance annexed with this manual.
The machine must never be used for any purpose other than its intended application nor operated in any way other than as described in the manual.
All maintenance jobs must be carried out according to the criteria and schedules specified in this manual.

2.2 Symbols used

This manual uses graphic symbols to inform the reader of specific hazards involved in certain operations. These symbols are as follows:

WARNING
This symbol warns of possible events that could cause serious personal injury or damage to the machine if adequate precautionary measures are not taken.

WARNING
This symbol warns of possible events that could cause minor personal injury or damage to the machine if adequate precautionary measures are not taken.

IMPORTANT
This symbol is used to indicate important information that should be read with particular care.

2.2.1 Definition of the terms “operator” and “specialised technician”

The term “operator” is used to describe the professional person authorised to access the machine for purposes concerning production and regular maintenance.

This definition refers to persons who understand the operating and maintenance procedures for the machine, and who meet the following prerequisites:

1 they must have adequate training authorising them to operate in compliance with safety standards near electrified components and moving parts.
2 they must be trained to use personal protection devices and to provide basic first aid.

The term “specialised technician” indicates the professional person authorised to install the machine, start the machine for the first time and conduct unscheduled maintenance.

This definition refers to persons who understand the installation, assembly, repairs and servicing procedures for the machine, in possession of specialised technical qualification. In addition to the prerequisites specified for a generic operator, a specialised technician must also have been technically trained or have received specific training for the use and maintenance of the machine in safety.

2.3 Personal protection Equipment (PPE)

WARNING

The protection devices mentioned in this paragraph must be worn at all times during the operation and maintenance of the machine.

Persons working and/or transiting near the machine must not wear garments with loose sleeves, shoelaces, belts, bracelets or any other object that could constitute a source of danger. Long hair must be tied up so that it is not a hazard.

2.3.1 Safety devices necessary

The following list summarises the protection devices that must be worn.

Accident prevention and spark prevention footwear with rubber sole and reinforced toecap
Worn: at all times

Waterproof rubber gloves
Worn: during washings

Protective garments
Worn: at all times

Protective eyewear
Worn: during washings

Protective earmuffs
Worn: whenever noise levels measured during production exceed the danger threshold prescribed by applicable legislation in the country of installation.

Hard hat
Worn: whenever the machine is operated in an area with suspended loads (e.g. conveyors).

2.3.2 Danger signs

The following signs must be displayed in all access points to the area in which the machine is installed:

Electrified parts
Indicates the presence of electrified components.

Emergency measures
Do not use water to extinguish fires. Use only powder or CO_2 extinguishers.

No smoking
Smoking is prohibited wherever this sign is displayed

2.4 Residual risks

Residual risks are all those risks that cannot be eliminated during the design stage and, as a result, are potentially still present in the machine.

These risks are identified by a specific analysis conducted as described by the 98/37/EC Machine Directive. The documentation relative to this analysis is included in the technical dossier for the machine archived by the manufacturer.

No known residual risks have been found with the TEKNOFREEZE machine.

2.5 General warnings

CAUTION

The machine generates, uses and may irradiate radio frequency energy.
If not installed and operated in accordance with the instructions given in this manual, the machine may cause interference with radio communications.

- The machine must be maintained and operated in accordance with the instructions given herein and following the exact procedures described.
- The division manager must instruct all operating and maintenance personnel on the safe usage and maintenance of the equipment.
- Access to machine for any maintenance operation is only permitted to specialised and appropriately trained personnel.

Throughout the duration of maintenance work, "**Maintenance in progress**" signs must be placed in locations visible from all access points.

- The electric power connection to the machine (and any accessories installed) must be earthed to discharge short circuit currents and electrostatic charges.
  The mains voltage must match the value indicated on the machine identification plate. Power adapters must not be used.
- Any maintenance work may only be performed with the machine at a standstill. The main electrical power switch must be open and locked with the relative padlock.
  The power line must be electrically disconnected.
- Accessing the any other part of the machine without first disconnecting electrical power and waiting for the machine to come to a complete standstill is severely prohibited.
- To ensure correct machine operation, the operator must respect all speed, pressure and temperature limitations and, in general, comply with the instructions given in the manual.
- Placing combustible material in the vicinity of the electrical cabinet is severely prohibited. The electrical cabinet must always be locked shut. Access to the keys must only be allowed to specifically trained personnel.
- Never disable the safety systems or ignore indications, alarms or warnings, whether generated automatically or displayed on plates installed on the machine.
- Never work outside the areas protected by active or passive safety systems. The correct position for the operator during production is described in the paragraph titled "Working area for the operator" in chapter 1.
- Never, for any reason, modify, tamper with or alter the structure of the machine, the devices installed, the operating sequence etc. without prior consent from the manufacturer.
- All regular and unscheduled maintenance operations must be recorded in a specific register, indicating the date, time and type of job performed, the name of the maintenance operator and any other useful information.

If necessary, use the pages at the end of the chapter titled “Maintenance”.

- The machine and operator work station must be kept perfectly clean. All residue or waste material must be removed, transferred to labelled containers and disposed of in compliance with legislation in the country of installation.

- Once maintenance is complete, check the machine thoroughly to ensure that no tools or materials have been left in the operating area of the machine before restoring electrical and pneumatic connections.

2.6 Emergency measures

The following information is of a general nature. The measures necessary for the type of products used must be determined from the technical sheets provided by the suppliers of the products themselves.

2.6.1 First aid

Follow company regulations and conventional procedures for first aid.

2.6.2 Fire prevention measures

- Do not use water to extinguish fires. Use only powder or CO_2 extinguishers. Preferably use extinguishers loaded with special powders for metal fires.

- Certain products may release toxic fumes into the air when heated or burnt. Always wear breathing equipment when extinguishing fires. Always follow the indications given in the technical sheets for the materials used.

Unpacking and locating the machine

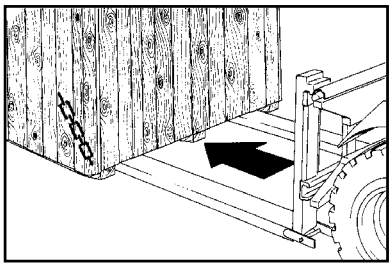
3.1 Unpacking

If the machine has been shipped packed, open and move the crate in the sequence shown.
Upon delivery, inspect crates and boxes to ensure that they are not crushed or damaged.
The details of the machine are specified in the delivery note. Markings, weights and dimensions are specified in the packing list.

Machines not packed for shipping are secured to a wooden base. In this case, once the machine has been unloaded from the truck with a fork lift, remove the nails securing the machine to the wooden base.

IMPORTANT

The packaging used is in compliance with the environmental requisites prescribed by EU packing legislation (Official Gazette of European communities No. L. 365/19).
Wooden crates and cardboard boxes may be easily recycled.
Plastic wrappings are made from materials containing no hazardous metals. For the disposal of plastic wrappings, contact your local waste management authority.



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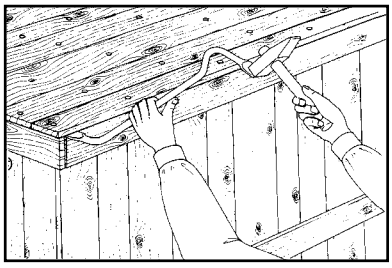

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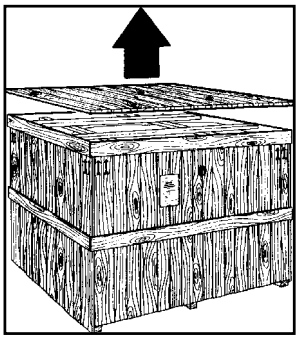

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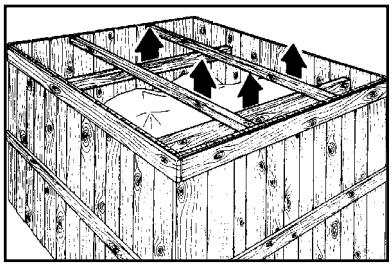

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3.2 Visual check

Visually inspect the machine internally and externally.

Any deformation noted is an indication of damage sustained during transport, which may compromise machine function.
In particular, check:
- connection cables;
- metal and painted surfaces;
- tightness of screws.

3.3 Storage

In either of the following cases:

- installation not immediately after delivery;
- uninstalling and storage pending relocation,

place the machine in a covered location protected from the weather and dust.

The machine must be stored in the following conditions:
Temperature: + 15 to + 40 °C (59 to 104 °F)
Relative humidity: 30 to 90 %.

3.4 Packing list

The contents of the packing list will vary depending on the specific details of the relative order. Generally speaking, the packing must contain the following:

- the machine
- the operating manual
- standard spare parts
- any accessories agreed upon

For the complete list, please consult the machine delivery notes.

3.5 Movement

The machine must only be manoeuvred by suitable trained and instructed personnel, using the personal protection devices specified in chapter 2.

The machine may be unloaded from the truck and transferred to the installation site using a fork lift truck to lift the case or wooden base onto which the machine is secured.

Use a transpallet or fork lift to manoeuvre the machine into its definitive installation location, in accordance with the following instructions.

1 Insert the lift forks from the rear of the machine, ensuring that they protrude approximately 30 cm from the opposite side.
When using a transpallet, lift the machine only if strictly necessary.
With a transpallet or fork lift, take care not to damage the wheels.

2 Secure the machine to the transpallet or fork lift before movement.

WARNING
Never move the machine without first securing it safely to the transpallet or fork lift.

3.6 Precautions for positioning the machine

Leave a free space of at least 1 metre all around the machine.

Ensure that the machine and control console are sufficiently illuminated for easy identification of all parts.
Install additional artificial lighting if natural light is not sufficient.

IMPORTANT

According to UNI EN 10380 standards, the luminosity in a generic work area (such as a control room, a fixed work station in a production plant, etc.) must be, on average 300 lux (acceptable range 200 to 500 lux).

The lighting system should guarantee an average luminosity of 300 lux in the work place. Luminosity is dependent on a number of factors, such as the characteristics of the work place (more or less reflective walls and ceiling, light source height, etc.) and the type of light source used.

chapter 4

Installation

4.1 Positioning

After positioning the machine in the required location, use a spirit level to ensure that it is perfectly level. Level the machine if necessary with the adjustable feet.

Position the continuous freezer as near as possible to the machine where the ice cream is required, to prevent overpressure in the ice-cream line. The two machines should not be further than 4 to 5 metres apart.

To facilitate production and maintenance operations, a free space of at least one metre must be left all around the machine.

4.2 Cleaning and disinfecting

Once the machine has been installed, it must be cleaned to remove any dust, foreign matter or dirt accumulated during transport , and disinfect.
Use the following to remove these products:
- regular detergent;
- compressed air spray gun;
- soft cloths.

Proceed as follows:

1 Spray detergent onto the treated surface with the spray gun until all product has been removed.
2 Remove any traces of fuel oil and dry surfaces with soft cloths.
3 Do not use direct jets of water on the panel; delicately clean it with a soft cloth and spray for the monitor.

CAUTION
Ensure that non-painted metal parts haven't been corroded by infiltrated moisture or stagnant water.

The assembly area must be protected from draughts which may carry contaminants. All tubes, cables and components brought into the assembly area must be correctly sealed.

Components that have been warehoused without being filled or treated with protective oil must be dismantled, cleaned and lubricated before use.

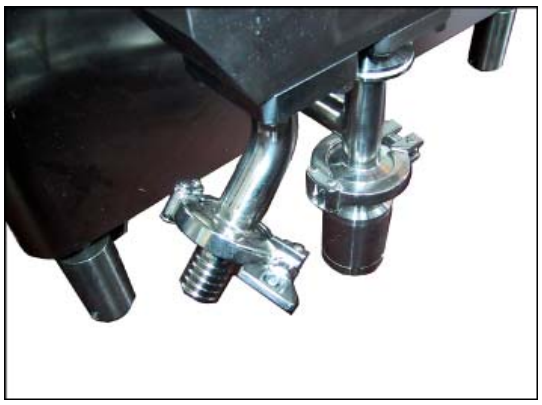
4.3 Connecting pipes and hoses

Before connecting the machine to the electrical mains and compressed air system, connect the ice-cream feed and output pipes.

Where the machine is shipped partially dismantled, assembly according to the diagrams given in the chapter DIAGRAMS AND REPLACEMENT PARTS.

4.3.1 Mixture feed hoses/ connectors

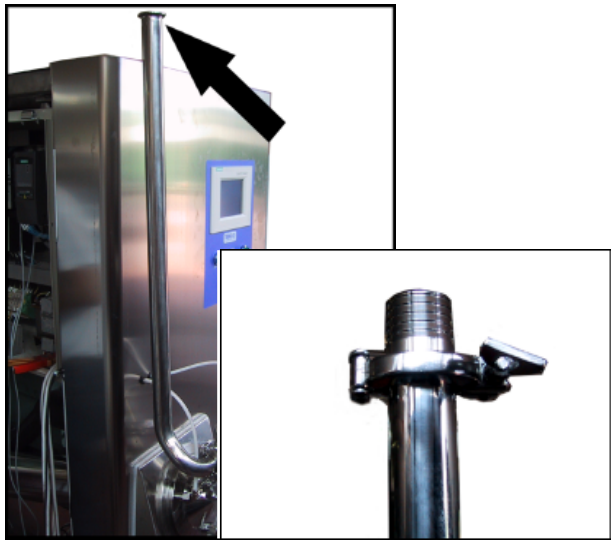
The mixture feed connector at the bottom front of the machine connects the TEKNOFREEZE to the mixture conditioning vat installed upstream of the machine.



Use only stainless steel or foodstuff compliant plastic hoses with a diameter of at least 1".

4.3.2 Ice-cream outlet hoses/ connectors

The ice-cream outlet connector at the top front of the machine connects the TEKNOFREEZE to production machines (fillers, extrusion lines etc.) installed downstream of the machine.



Use only stainless steel or foodstuff compliant plastic hoses with a diameter of at least 1 1/2".

4.4 Connections

4.4.1 Electric connections

WARNING
Electrical connections must only be carried out by specialised personnel.

The control panel is shipped ready wired and needs only to be connected to mains power.

The cross section for each of the four wires (3 phases + earth) in the power cable must be at least:
- 6 mm² with a 230V power supply and 10 mm² with a 400V power supply for teknofreeze 400-600.
- 10 mm² with a 230V power supply and 16 mm² with a 400V power supply for TEKNOFREEZE 800.

The power connection, including the earth line, must pass through a mains power disconnector capable of disconnecting the machine completely from mains power.
The cable (3 phase wires + earth) is connected via the disconnector switch to the RST terminals on the terminal board. The cable is routed into the electrical cabinet via a special cable guide.

See the electrical diagram for more detailed information on mains connections, wire cross section, current absorption, etc.

WARNING

The machine must never be switched on if not equipped with an efficient earth connection made in compliance with the technical specifications prescribed by applicable legislation. Before switching on the main switch, ensure that the mains voltage and frequency comply with the specifications given on the machine identification plate.

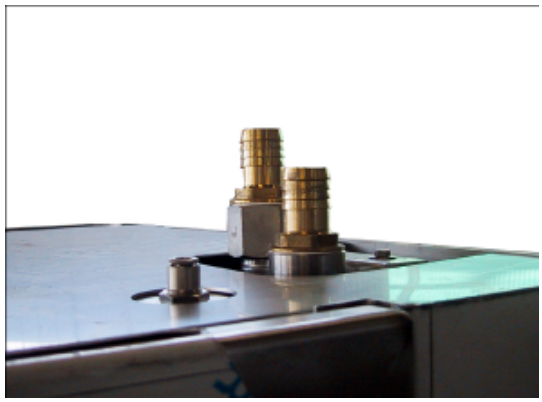
If the machine needs to be moved frequently, install a plug on the end of the power cable and connect to a switched socket outlet.

4.4.2 Water connections

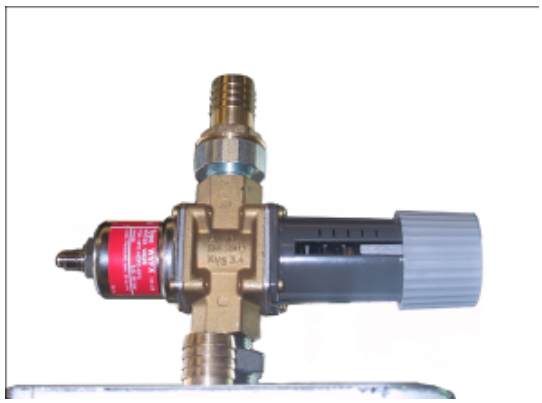
1 Connect the water inlet line from the water column (or from the well/mains) to condenser water inlet connector (tubing with lower position condenser inlet).

Preferably use a braid reinforced plastic hose and secure to the connector with a jubilee clamp.

Connection with water column (standard)



Connection with mains or well water (optional)

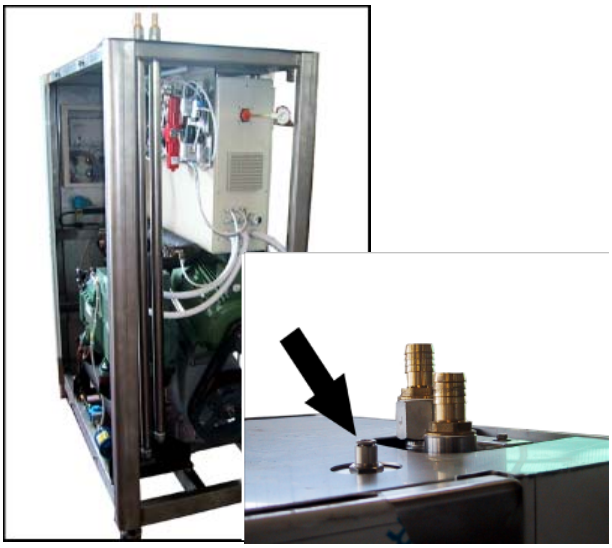


2 Connect the return line to the outlet connector. Preferably use a braid reinforced plastic hose and secure to the connector with a jubilee clamp.

We recommend installing a manual cut-off valve on the feed and return lines near the freezer (tubing with lower position condenser inlet).
We also recommend installing a flood prevention device.

4.4.3 Pneumatic connections

1 Connect the compressed air line to the quick connector located at the rear of the machine (see following figure).
A pressure of 6 - 8 bar is necessary.
The compressed air used must be suitable for use with foodstuffs.



Unless already present, we recommend installing a manual valve in the compressed air line, near the machine.

The line must be free of obstructions or restrictions. The diameter of the line must not be less than the diameter of the air inlet connector (8 mm).

CAUTION

Compressed air containing impurities, moisture or oil residue may cause the air valves to deteriorate prematurely. The machine is equipped with an air filtering system with an automatic condensate drain (see figure). We nonetheless recommend installing an air dryer filter upstream of the air compressor and performing regular and thorough maintenance on the compressor.

chapter 5

Starting-up

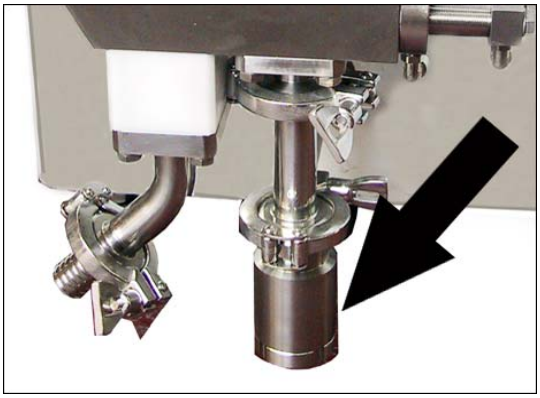
WARNING

Before performing any start up operation, read and implement the instructions given in the chapter titled "Precautions foruse and maintenance of the machine".

5.1 Preliminary procedures

After installation, the following checks must be performed before commencing production:

1 After ensuring that the safety conditions necessary to do so are met, turn on the main switch on the control console;
2 in this way, the oil compressor heating is switched on (at least 8 hours before starting);
3 check that the EMERGENCY button on the control console is in the released position and that the voltage indicator lamp is lit. For more information regarding these devices, consult the chapter titled PRODUCTION;
4 check that the compressed air cut-off valve (located upstream of the rapid connector, if fitted) is in the operating position;
5 Ensure that the machine has been cleaned and disinfected correctly, as described in chapter 4;
6 drain all remaining water or disinfectant solution from the hoses, removing the safety valve installed in the cylinder inlet line;

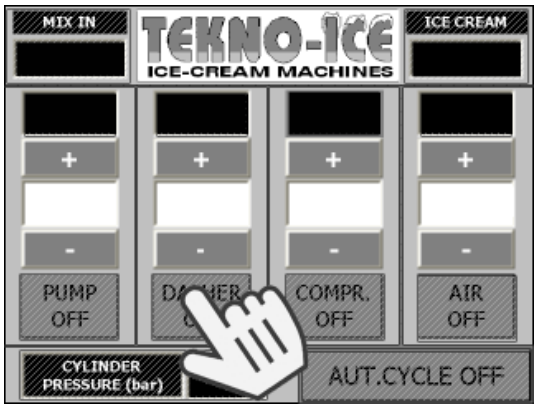


After cleaning, refit the valve.

7 Check that the foodstuff compliant hoses (mixture feed and ice-cream outlet lines) are correctly mounted and that the relative connectors are securely tightened.
See chapter 4.
8 Ensure that the condensation water and air cut-off valves are in their respective operating positions.

5.1.1 Checking direction of rotation

To check that phases have been connected correctly, operate the dasher motor for a brief instant.



Operate the dasher motor for a few seconds and check that the shaft rotates in the direction indicated by the arrow on the motor.

If the direction is incorrect, swap two of the phases in the power line.

WARNING

When carrying out the above operation, read and implement the directions given in the chapter "Precautions for operation and maintenance"

5.2 Start procedure

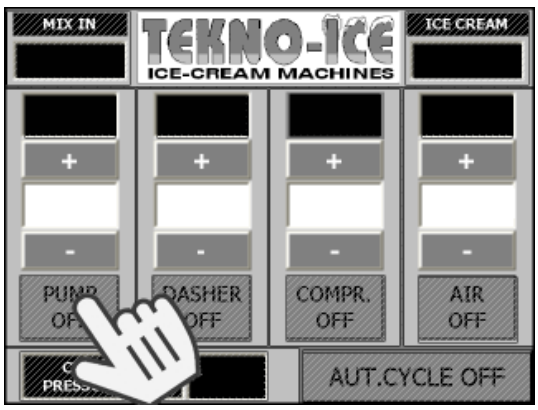
1 Open the conditioning vat mixture outlet valve after bleeding any air from the freezer pump line by loosening the butterfly bolt on the pump body itself.

If a centrifugal pump is installed between the freezer pump and the vat, start the freezer pump only after bleeding the entire line (vat – centrifugal pump and centrifugal pump - freezer).

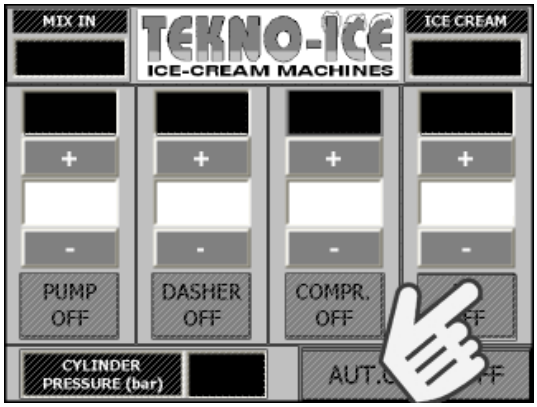
This procedure must be carried out before starting the freezer pump.

IMPORTANT

For more detailed information about the operator panel functions, see the following chapter.

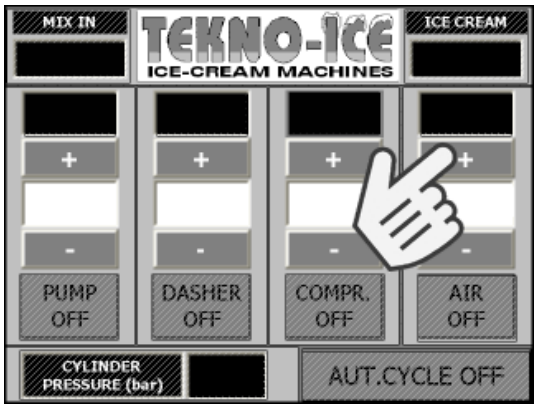


2 Enable air metering (OVERRUN).

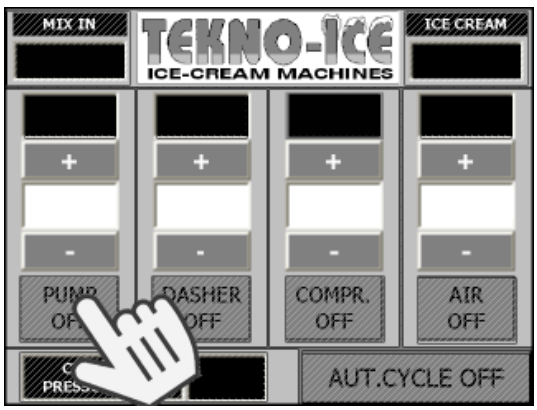


This enables the addition of foodstuff-compliant air to the mixture.

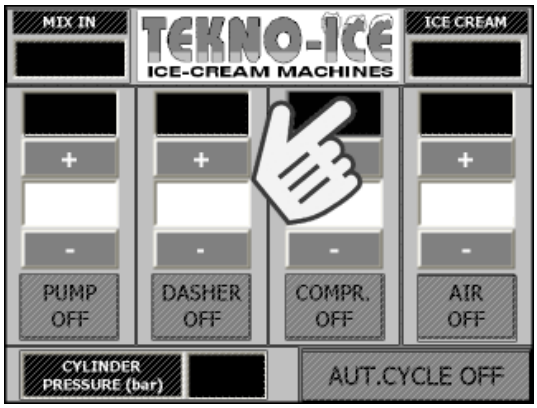
Adjust the quantity of air added with buttons + and -. Alternatively, touch the relative field and enter the correct value on the numpad displayed. Set this parameter to 50% of the final volume required.

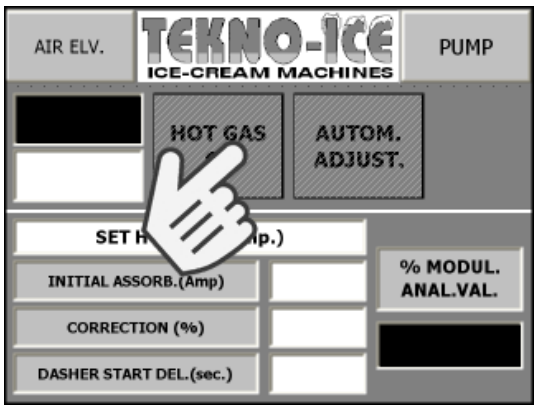


3 When mixture starts to come out of the ice-cream outlet pipe, stop the pump.

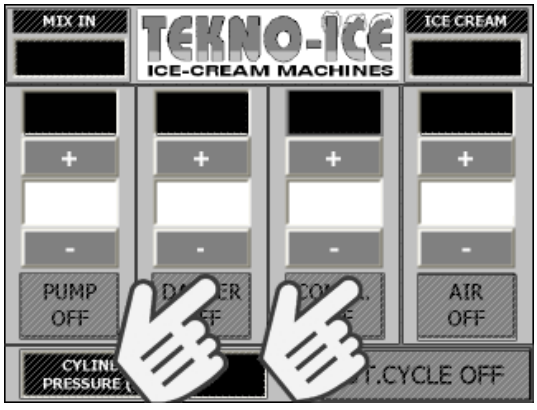


4 Check that the “hot gas” function is disabled (OFF button).

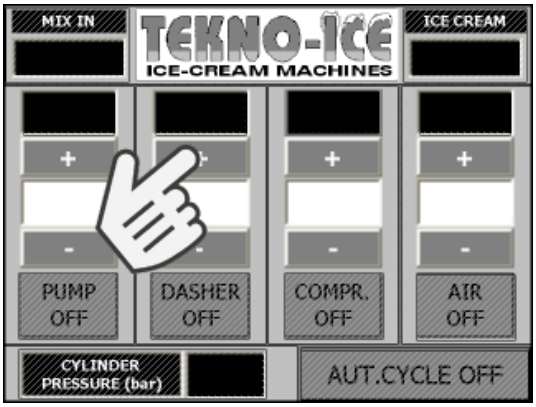




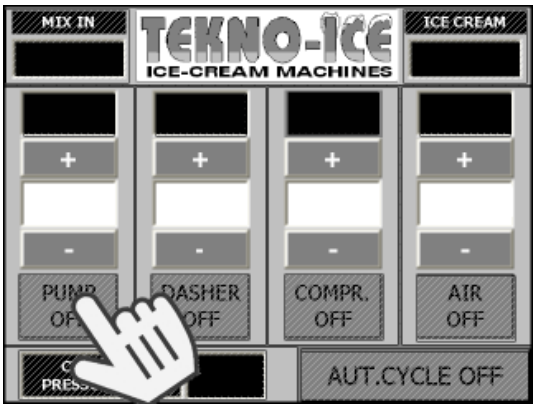
5 Start the dasher then the refrigerator compressor. Note that the compressor will not start unless the dasher has been activated.



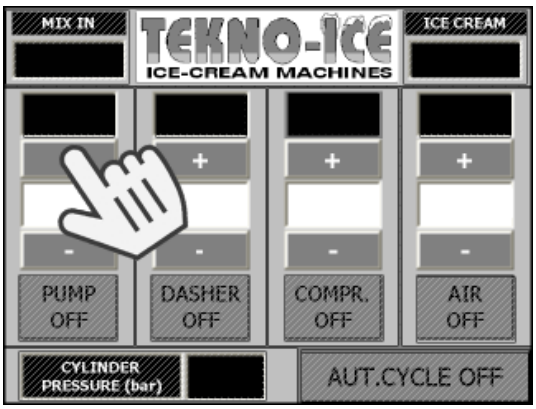
6 Set ice-cream hardness to a value of 7/8 Amperes (400 V) or 15/16 Amperes (230V). Set the value with the + and - buttons. Alternatively, touch the relative field and enter the correct value on the numpad displayed.



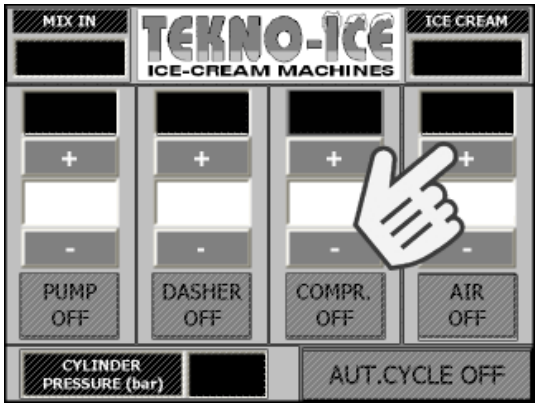
7 Monitoring from the control panel, wait for the ice-cream to reach the hardness value required, then restart the mixture pump.
Note that the higher the amperage setting for the motor, the more viscous the ice-cream.



8 Pressing the + button for the pump, gradually increase the pump speed to the desired ice-cream flow rate. The value is displayed in the black box above the button.



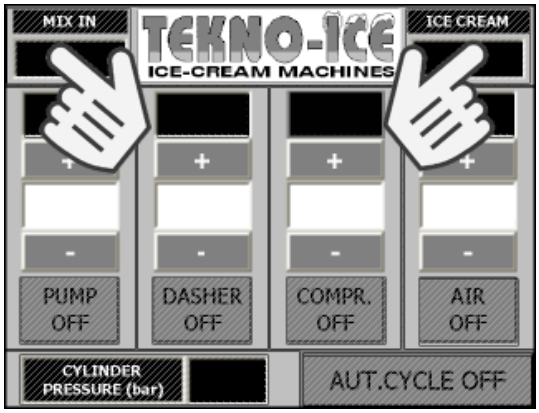
9 Pressing the + button for the dasher, gradually increase the ice-cream hardness setting to the desired value, as indicated in the black box above the button.



IMPORTANT
After each variation to a parameter, wait 2 or 3 minutes before checking the results

5.2.1 Temperature calibration

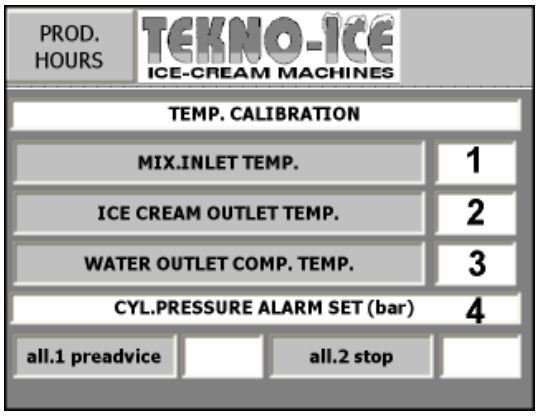
Press MIX IN or ICE-CREAM from the MAIN menu to access the TEMPERATURE CALIBRATION function.



This function is used to correct the temperature readout (mixture at inlet and ice-cream at outlet) if the value displayed on the screen does not match the actual temperature measured manually with a thermometer.

This function is password-protected.

IMPORTANT
The passwords are delivered separately from this manual. For more information contact the TEKNO-ICE technical support service.



1 MIXTURE INLET TEMPERATURE
Used to adjust the mixture inlet temperature readout when the value displayed does not match the actual temperature measured manually with a thermometer.

2 ICE-CREAM OUTLET TEMPERATURE
Used to adjust the ice-cream outlet temperature readout when the value displayed does not match the actual temperature measured manually with a thermometer.

3 WATER OUTLET COMP. TEMPERATURE
Used to adjust the condensation water outlet temperature readout when the value displayed does not match the actual temperature measured manually with a thermometer.
The temperature is measured by the system with a sensor installed in the rigid water outlet pipe.

4 CYLINDER PRESSURE ALARM SET PREADVICE/ STOP (bar)
Sets the warning and arrest thresholds for the freezer cylinder ice-cream pressure alarm.
The arrest condition alarm stops the machine.

chapter 6

Production

WARNING

Before performing any operation, read and implement the instructions given in the chapter titled "Precautions for operation and maintenance of the machine".

6.1 Control console

IMPORTANT

The indications given in this paragraph are indicative only as the configuration of the console varies depending on the specification of the machine. For more detailed information, see the annexed electrical diagram.

1 Main switch
Turning on the main switch at the rear of the machine powers up the control console and the machine.
Lamp No. 4 lights up

2 Control panel
This is the user interface and is described in the following paragraph.

3 Reset
Used to reset the system upon machine starts or after active alarm. In the event of ine or more alarms, the push-button flashes.

4 Power supply
The lamp lights up when the main switch is turned on (1)

5 CIP (cleaning in place)

Enables the washing cycle.
More information is given later in this chapter.

6 Emergency
This button stops all machine functions and puts the machine into emergency mode.
To reset the system, rectify the cause of the emergency and release the button by turning anticlockwise. Then press the reset push-button (3).

6.2 Operator panel

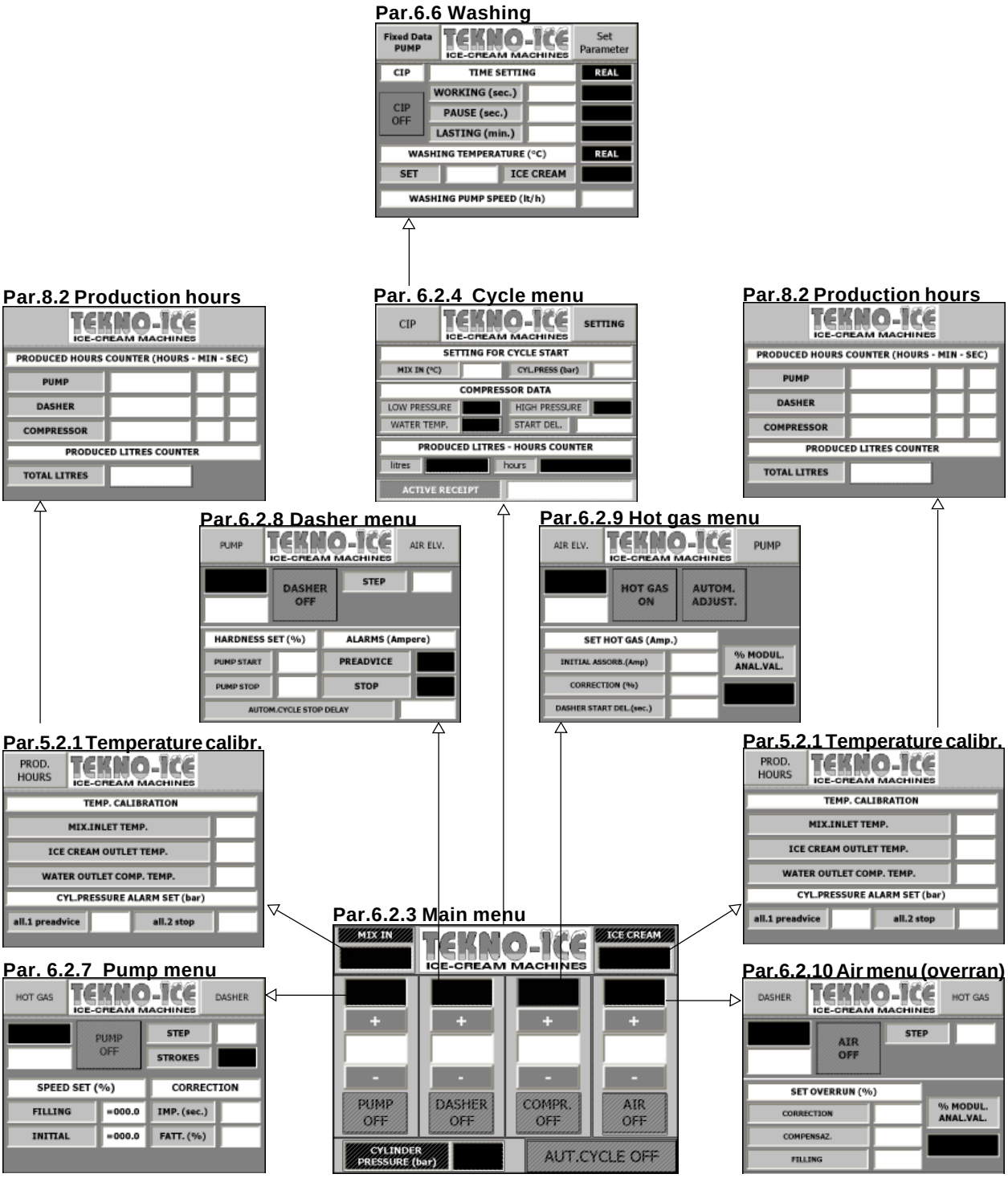
6.2.1 Navigating the screens displayed on the panel

The following is the map of the screens displayed by the panel.
Detailed descriptions are given in the following paragraphs.
Press TEKNO-ICE in any of the screens to return to the main screen.

6.2.2 Changing language

The interface language may be selected when the panel is switched on.
To change the language, press the touch-screen button as shown.
Once the required language has been selected, press any other area on the touch-screen to access the MAIN MENU.

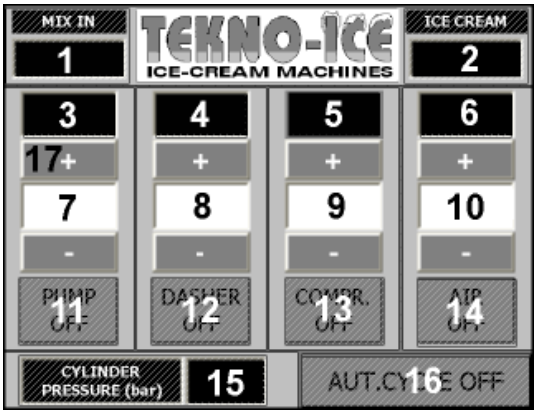
The language may also be changed while the production cycle is in progress from the PASSWORD MENU screen described later in this chapter.


Par.6.6 Washing
Fixed Data PUMP
TEKNO-ICE ICE-CREAM MACHINES
Set Parameter
CIP
TIME SETTING
REAL
CIP OFF
WORKING (sec.)
PAUSE (sec.)
LASTING (min.)
WASHING TEMPERATURE (°C)
REAL
SET
ICE CREAM
WASHING PUMP SPEED (lt/h)
Par.8.2 Production hours
PRODUCED HOURS COUNTER (HOURS - MIN - SEC)
PUMP
DASHER
COMPRESSOR
PRODUCED LITRES COUNTER
TOTAL LITRES
Par. 6.2.4 Cycle menu
CIP
SETTING
SETTING FOR CYCLE START
MIX IN (°C)
CYL.PRESS (bar)
COMPRESSOR DATA
LOW PRESSURE
HIGH PRESSURE
WATER TEMP.
START DEL.
PRODUCED LITRES - HOURS COUNTER
litres
hours
ACTIVE RECEIPT
Par.8.2 Production hours
Par.6.2.8 Dasher menu
PUMP
AIR ELV.
DASHER OFF
STEP
HARDNESS SET (%)
ALARMS (Ampere)
PUMP START
PREADVICE
PUMP STOP
STOP
AUTOM.CYCLE STOP DELAY
Par.6.2.9 Hot gas menu
AIR ELV.
PUMP
HOT GAS ON
AUTOM. ADJUST.
SET HOT GAS (Amp.)
INITIAL ASSORB.(Amp)
CORRECTION (%)
DASHER START DEL.(sec.)
% MODUL. ANAL.VAL.
Par.5.2.1 Temperature calibr.
PROD. HOURS
TEMP. CALIBRATION
MIX.INLET TEMP.
ICE CREAM OUTLET TEMP.
WATER OUTLET COMP. TEMP.
CYL.PRESSURE ALARM SET (bar)
all.1 preadvice
all.2 stop
Par.5.2.1 Temperature calibr.
Par.6.2.3 Main menu
MIX IN
ICE CREAM
PUMP OFF
DASHER OFF
COMPR. OFF
AIR OFF
CYLINDER PRESSURE (bar)
AUT.CYCLE OFF
Par. 6.2.7 Pump menu
HOT GAS
DASHER
PUMP OFF
STEP
STROKES
SPEED SET (%)
CORRECTION
FILLING
INITIAL
IMP. (sec.)
FATT. (%)
Par.6.2.10 Air menu (overran)
AIR OFF
SET OVERRUN (%)
CORRECTION
COMPENSAZ.
FILLING

6.2.3 Main menu

This is the main operating menu.
In addition to monitoring the production cycle, this menu also allows access to the submenus described individually in this chapter.

IMPORTANT
Values displayed on these menus on a black background are read-only parameters. User-definable values are displayed on a white background.



1 MIX IN (°C)
Displays the mixture temperature at the machine inlet. Touch the relative field to access the temperature calibration function.

2 ICE-CREAM (°C)
Displays the ice-cream temperature at the machine outlet.
Touch the relative field to access the temperature calibration function.

3 MIXTURE FLOW RATE (l/h)
Displays effective mixture flow rate. Touch the relative field to access the pump parameter menu.
To set the flow rate, touch the relative field **(7)** and enter the desired value or use the +/- buttons **(17)**. Using the +/- buttons is generally preferable if only small adjustments are necessary.

4 ICE-CREAM HARDNESS (amp)
Displays the effective hardness of the ice-cream. The value is displayed in Amperes, as it corresponds to the current absorption of the dasher motor.
To set ice-cream hardness, touch the relative field **(8)** and enter the desired value or use the +/- buttons **(17)**.
Using the +/- buttons is generally preferable if only small adjustments are necessary.
Touch the relative field to access the dasher parameter menu.

5 HOT GAS (%)
Displays the quantity of gas introduced.
Hot gas from the refrigerator circuit is injected into the freezer cylinder to maintain constant ice-cream hardness and, as a result, dasher motor current absorption.
To set the hot gas function, touch the relative field **(9)** and enter the desired value or use the +/- buttons **(17)**. Using the +/- buttons is generally preferable if only small adjustments are necessary.
Touch the relative field to access the hot gas function parameter menu

6 OVERRUN (%)
Displays the quantity of air added to the mixture.
To set the parameter, touch the relative field **(10)** and enter the desired value or use the +/- buttons **(17)**. Using the +/- buttons is generally preferable if only small adjustments are necessary.
Touch the relative field to view the OVERRUN parameters.

7 ICE-CREAM FLOW RATE (l/h)
Used to set the required ice-cream flow rate.
Touch the relative field to call up the numpad and enter the desired value.
Use the +/- buttons **(17)** for small variations.

8 SET ICE-CREAM HARDNESS (amp)
Used to set the hardness (viscosity) of the ice-cream. The value is displayed in Amperes, as it corresponds to the current absorption of the dasher motor.
Touch the relative field to call up the numpad and enter the desired value.
Use the +/- buttons **(17)** for small variations.
The higher the value set, the harder the ice-cream.

9 HOT GAS (%)
Hot gas injection reduces the hardness of the ice-cream.
Hot gas from the refrigerator circuit is injected into the freezer cylinder to maintain constant ice-cream hardness and, as a result, dasher motor current absorption.
In MANUAL mode, the quantity of hot gas injected may be adjusted with the +/- buttons **(17)**.
Touch the relative field **(5)** to toggle between manual and automatic modes.

10 OVERRUN (%)
Sets the quantity of air added to the mixture.
Touch the relative field to call up the numpad and enter the desired value.

Use the +/- buttons **(17)** for small variations. This parameter, which varies depending on the desired formulation, is generally set to 100 for 50% mixture and 50% air.

11 PUMP ON/OFF
Enables/disables the PUMP. The automatic cycle will not start if the pump is ON.

12 DASHER OFF/ON
Enables/disables the DASHER. The automatic cycle will not start if the dasher is ON.

13 COMPR. ON/OFF
Enables/disables the REFRIGERATOR COMPRESSOR.
The automatic cycle will not start if the compressor is ON.

14 AIR ON/OFF
Enables/disables OVERRUN (air).
The automatic cycle will not start if overrun is ON.

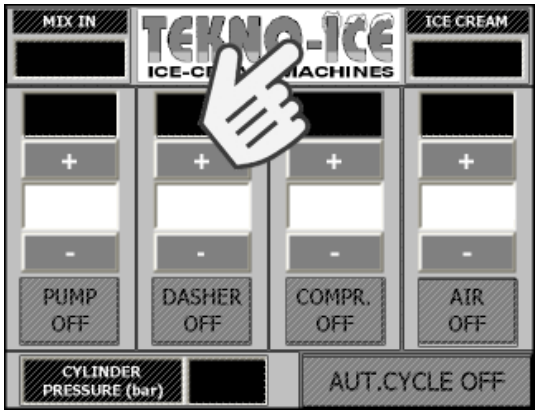
15 CYLINDER PRESSURE (bar)
Displays ice-cream pressure in freezer cylinder.

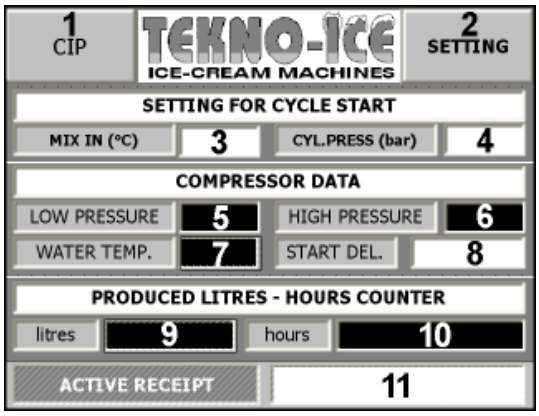
16 AUTOMATIC CYCLE ON/OFF
Enables/disables automatic cycle.

Press the script "TEKNO-ICE" to return to the main menu

6.2.4 Cycle menu

Touch the script TEKNO-ICE in the main menu to access the CYCLE parameter menu.





1 CIP
Accesses the washing function parameter menu.

2 SETTING
This section is exclusively for the use of Tekno-ice technicians and is not described in this manual.

3 SETTING FOR CYCLE START:
MIX IN (°C)
Operator definable parameter for maximum admissible mixture temperature at pump inlet. If the temperature exceeds this value, a specific alarm is generated (see chapter ALARMS).

4 SETTING FOR CYCLE START:
CYLINDER PRESSURE (bar)
Operator definable parameter for the minimum ice-cream pressure necessary in cylinder to enable cycle start in automatic mode.
Usually set at 4 bar.

5 COMPRESSOR DATA:
LOW PRESSURE INTAKE (bar)
Displays refrigerator compressor intake pressure.

6 COMPRESSOR DATA:
HIGH PRESSURE, OUTLET (bar)
Displays refrigerant gas pressure at refrigerator compressor outlet.

7 COMPRESSOR DATA:
CONDENSATION WATER TEMPERATURE (°C)
Displays condensation water temperature at condenser outlet.

8 START DELAY (sec)
Used to delay compressor start relative to dasher start

9 PRODUCED LITRES/HOURS COUNTER:
LITRES
Displays total litres of mixture used in production.

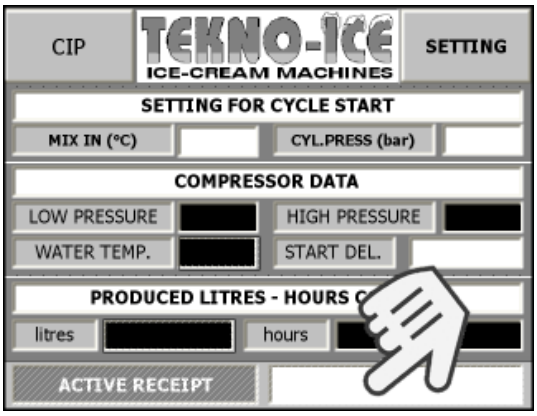
10 PRODUCED LITRES/HOURS COUNTER:
HOURS
Displays total production hours of machine.

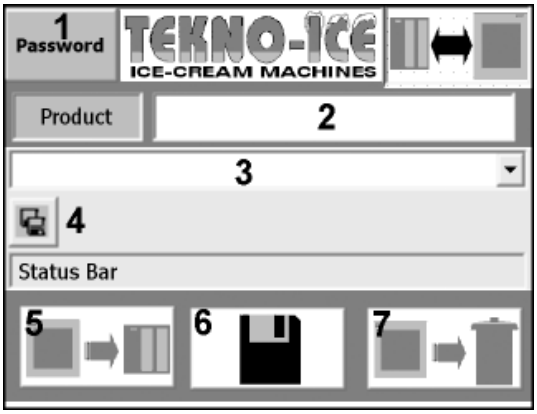
11 ACTIVE RECEIPT
Displays name of recipe currently in use. Touch the relative field to access the RECIPE MENU, described in the following paragraph

Press the script "TEKNO-ICE" to return to the main menu.

6.2.5 Recipe menu

The RECIPE menu is accessible from the CYCLE START menu.



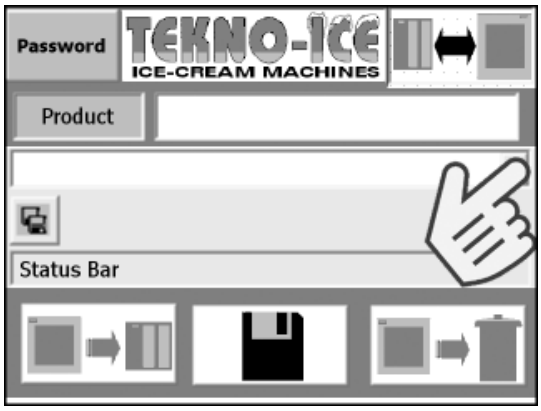


Recipes may be created, loaded and deleted in the RECIPE menu.
A recipe is a set of parameters necessary for production.

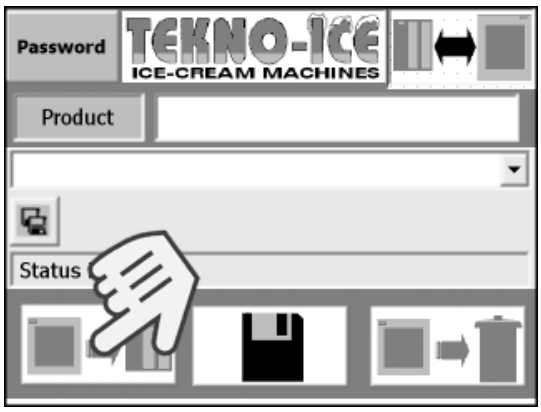
1 PASSWORD
Allows access to the PASSWORD MENU. See paragraph 6.2.6.
2 PRODUCT
This field displays the active recipe.
3 RECIPE NAME
Displays a list of the recipes in memory via a drop-down menu.
To recall a recipe, select one and transfer to the PLC (button 6).
4 SALVA NUOVA RICETTA
Saves a new recipe.
5 TRANSFER
Transfers the recipe selected from the drop-down menu (4) to the PLC.
6 SAVE
Saves the modifications made to a recipe in memory.
7 DELETE
Delete recipe (password protected function)

To select an existing recipe:

1 Press the screen as shown in the illustration and select the desired recipe from the drop-down menu containing the list of recipes in memory.

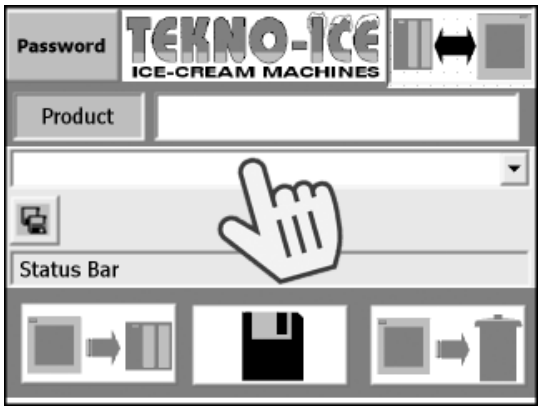


2 Press the button shown to transfer the recipe to the PLC.



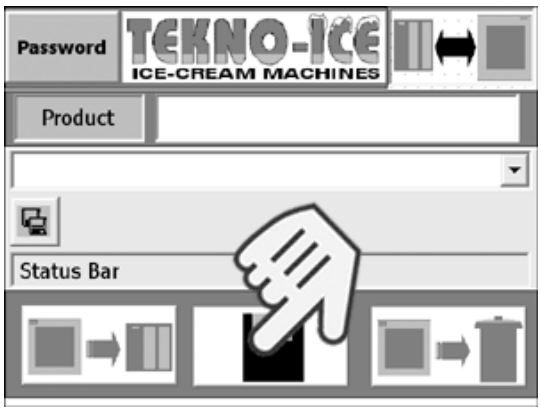
Creating a new recipe:

1 Press the screen as shown to call up the alphanumerical keypad shown below.



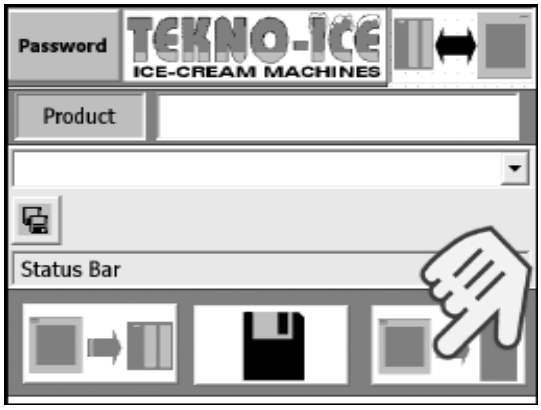
2 Enter the name of the new recipe.

3 Press the icon shown in the illustration to save the new recipe.



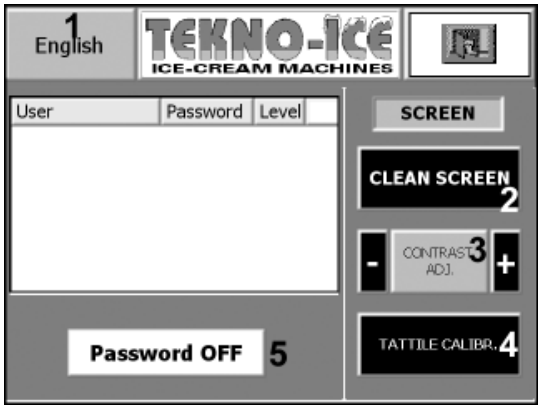
Deleting a recipe:

1 Press the button shown in the illustration. Some recipes may be password protected for deletion.
See paragraph 6.2.6.



6.2.6 Password and panel maintenance

Press PASSWORD in the RECIPE MENU.



Passwords for accessing different functions are set at three user levels during installation:

- 1st level:standard user (machine operator)
- 2nd level:line manager (maintenance technician)
- 3rd level:manager

The passwords are delivered separately from this manual. For more information contact the TEKNO-ICE technical support service.

This screen also contains the panel maintenance functions:

1 RECIPES
Displays the recipe management menu described in the previous paragraph.

2 CLEAN SCREEN
Disables touch function to allow the operator to clean the monitor

3 ADJUST CONTRAST
Increases or decreases the contrast of the operator panel monitor

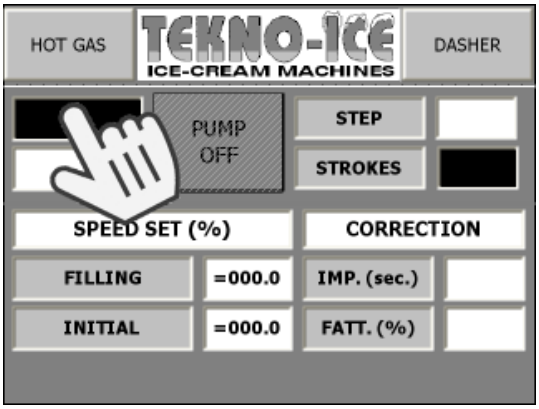
4 TATTILE CALIBRATION
Calibrates the pressure necessary to operate the touch-screen

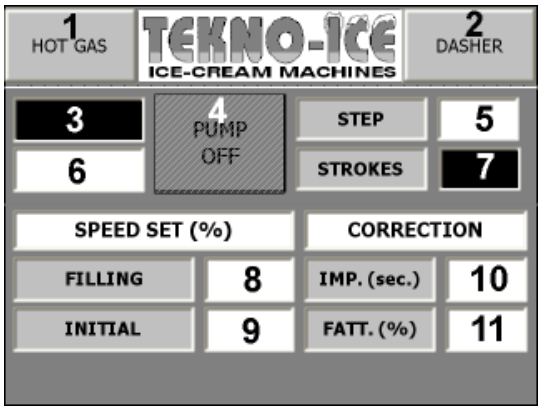
5 PASSWORD OFF
Enables and disables passwords

Press the script "TEKNO-ICE" to return to the main menu.

6.2.7 Pump menu

Press the field shown in the figure to access the PUMP MENU from the MAIN menu:





This menu contains the main pump parameters.

1 HOT GAS
Accesses the hot gas function parameter menu. See paragraph 6.2.9

2 DASHER
Accesses the dasher parameter menu. See paragraph 6.2.8

3 MIXTURE FLOW RATE (l/h)
Displays effective mixture flow rate. Displays the same value shown in the main menu.

4 PUMP ON/OFF
Enables/disables the PUMP. This function is also available from the main menu.

5 STEP
Sets the amount by which flow rate changes each time the +/- buttons are pressed in the main menu.

6 ICE-CREAM FLOW RATE (l/h)
Used to set the required ice-cream flow rate. Touch the relative field to call up the numpad and enter the desired value.
This function is also available from the main menu.

7 STROKES (No.)
The number of cycles performed by the piston. The system considers each complete cycle (aspiration, compression, exhaust) as one stroke.

8 SPEED SET: FILLING (%)
Used to set the pump speed when filling the cylinder at the start of the automatic cycle. Value is expressed as a percentage of the maximum motor speed.
Generally set to 100%.

9 SPEED SET: INITIAL (%)
The pump stops once the set pressure is reached in the cylinder (see MAIN MENU).
This parameter defines the pump speed upon restart, once the ice-cream has reached the required hardness.
Generally set to 40%.

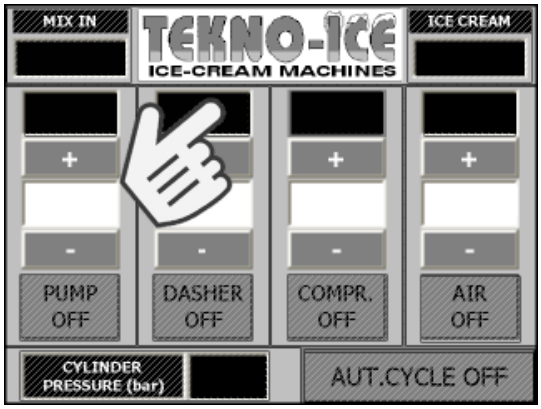
10 CORRECTION: PULSES (sec)
This parameter sets the pump speed increment rate, during the transition from initial speed to operating speed (see previous parameters).
Every *n* seconds, the pump motor speed is increased by the value set for the FACT parameter described as follows.

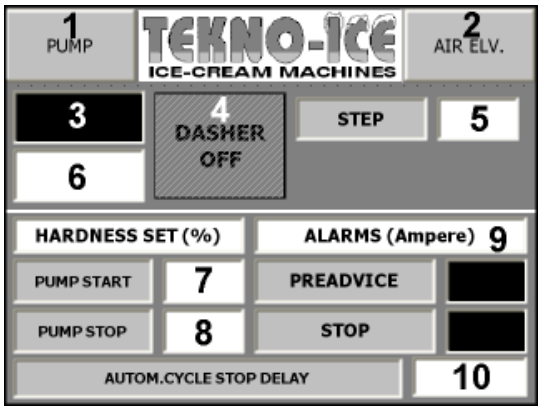
11 CORRECTION: FACT. (%)
This parameter sets the pump speed incremental step during the transition from initial speed to operating speed (see previous parameter).

Press the script "TEKNO-ICE" to return to the main menu

6.2.8 Dasher menu

Press the field shown in the figure to access the DASHER MENU from the MAIN menu:





This menu contains the main dasher parameters.

1 PUMP
Accesses the pump parameter menu. See paragraph 6.2.7

2 EV/AIR
Access the overrun (air) parameter menu. See paragraph 6.2.10

3 ICE-CREAM HARDNESS (Amp)
Displays the effective hardness of the ice-cream. The value is displayed in Amperes, as it corresponds to the current absorption of the dasher motor. Displays the same value shown in the main menu.

4 DASHER ON/OFF
Enables/disables the DASHER.
This function is also available from the main menu.

5 STEP
Sets the amount by which value changes each time the +/- buttons are pressed in the main menu.

6 SET ICE-CREAM HARDNESS (amp)
Used to set the hardness (viscosity) of the ice-cream. The value is displayed in Amperes, as it corresponds to the current absorption of the dasher motor.
Touch the relative field to call up the numpad and enter the desired value.
The higher the value set, the harder the ice-cream.
This function is also available from the main menu.

7 HARDNESS SET: PUMP START (%)
The pump stops once the set pressure is reached in the cylinder (see MAIN MENU).
This parameter sets at what ice-cream hardness the pump restarts (pump speed is set in the pump parameter menu).
Bear in mind that the percentage value set for this parameter is not relative to the entire current absorption of the dasher motor (which also absorbs current when working at zero

load, see parameter SET HOT GAS – INITIAL ABSORPTION in the hot gas function menu), and is only relative to the current effectively absorbed by mixing the ice-cream.

8 HARDNESS SET: PUMP STOP (%)
This parameter sets at what ice-cream hardness the pump stops, defining the end of the production cycle (AUTO CYCLE OFF)
Bear in mind that the percentage value set for this parameter is not relative to the entire current absorption of the dasher motor (which also absorbs current when working at zero load, see parameter SET HOT GAS – INITIAL ABSORPTION in the hot gas function menu), and is only relative to the current effectively absorbed by mixing the ice-cream.

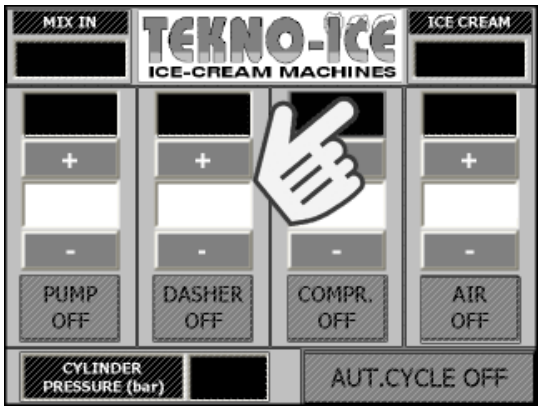
9 ALARMS PREADVICE/STOP (bar)
Sets the warning and arrest thresholds for the freezer cylinder ice-cream pressure alarm.
The arrest condition alarm arrests the automatic cycle.
This parameter may also be set from the temperature calibration menu.
See paragraph 5.2.1.

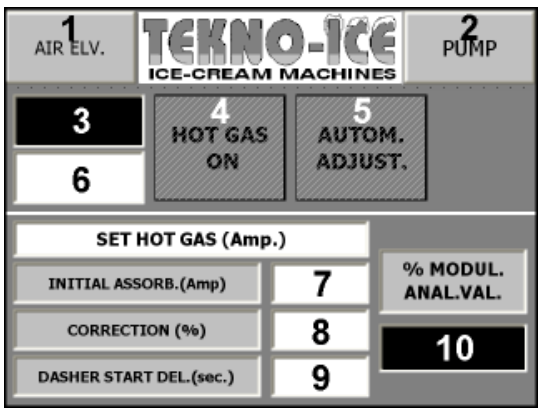
10 AUTOMATIC CYCLE STOP DELAY (sec)
Used to delay pump arrest at the end of the automatic cycle, to ensure that any residual product remaining in the freezer is completely emptied.

Press the script "TEKNO-ICE" to return to the main menu.

6.2.9 Hot gas menu

Press the field shown in the figure to access the HOT GAS MENU from the MAIN menu:





Hot gas injection reduces the hardness of the ice-cream. Hot gas from the refrigerator circuit is injected into the freezer cylinder to maintain constant ice-cream hardness and, as a result, dasher motor current absorption.

1 AIR ELV
Access the overrun (air) parameter menu. See paragraph 6.2.10

2 PUMP
Accesses the pump parameter menu. See paragraph 6.2.7

3 ICE-CREAM HARDNESS (A)
Displays the effective hardness of the ice-cream. The value is displayed in Amperes, as it corresponds to the current absorption of the dasher motor. The value displayed is the same as the parameter shown in the dasher menu.

4 HOT GAS ON/OFF
Enables/disables hot gas function. This function is password-protected.

5 MANUAL/AUTOMATIC ADJUST
Sets hot gas regulation mode. In manual mode, adjust with the +/- buttons in the main menu. In automatic mode, hot gas is injected automatically when the maximum current absorption threshold for the dasher is exceeded. In general, automatic mode is recommended.

6 SET ICE-CREAM HARDNESS (amp)
Used to set the hardness (viscosity) of the ice-cream. The value is displayed in Amperes, as it corresponds to the current absorption of the dasher motor.
Touch the relative field to call up the numpad and enter the desired value.
The higher the value set, the harder the ice-cream.
This function is also available from the main menu and the dasher parameter menu

CAUTION
The following parameters may only be modified by TEKNO-ICE technical personnel.

7 SET HOT GAS – INITIAL ABSORPTION (Amp)
Sets dasher current absorption at zero load (no ice-cream).

8 SET HOT GAS – CORRECTION (%)
Dasher absorption correction factor.

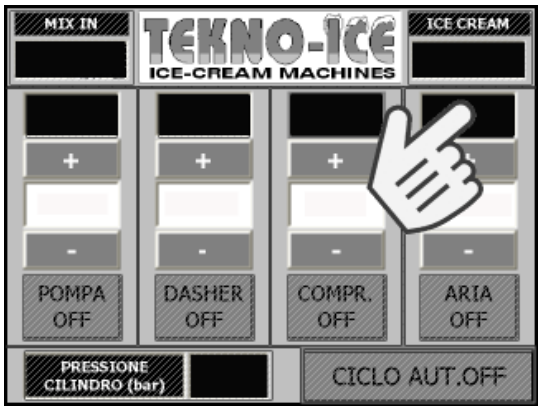
9 DASHER START DELAY (sec)
Delays dasher start in automatic cycle. During the delay period, hot gas is injected to eliminate any ice residue.

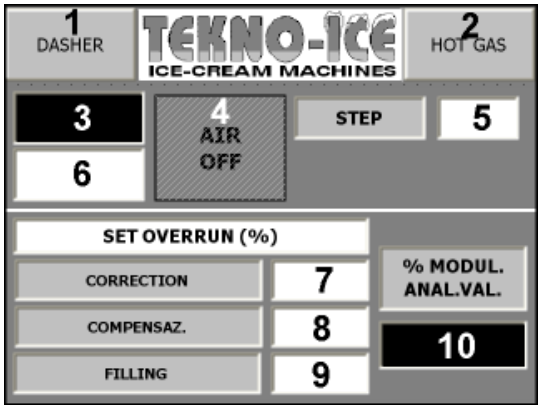
10 % MODULATING ANALOGUE VALVE
Displays time during which hot gas valve is kept open.

Press the script "TEKNO-ICE" to return to the main menu.

6.2.10 Air menu (overrun)

Press the field shown in the figure to access the AIR MENU (OVERRUN) from the MAIN menu:





The OVERRUN function sets the quantity of air added to the mixture.

1 DASHER
Accesses the dasher parameter menu. See paragraph 6.2.8

2 HOT GAS
Accesses the hot gas function parameter menu. See paragraph 6.2.7

3 OVERRUN (%)
Displays the quantity of air added to the mixture. This parameter is also displayed in the main menu.

4 AIR ON/OFF
Enables/disables OVERRUN.

5 STEP
Sets the amount by which value changes each time the +/- buttons are pressed in the main menu.

6 OVERRUN (%)
Sets the quantity of air added to the mixture. This function is also available from the main menu.

Touch the relative field to call up the numpad and enter the desired value.
This parameter, which varies depending on the desired formulation, is generally set to 100 for 50% mixture and 50% air.

CAUTION
The following parameters may only be modified by TEKNO-ICE technical personnel.

7 SET OVERRUN: CORRECTION (%)
Unused

8 SET OVERRUN: COMPENSATION (%)
Adjustment factor to compensate for differences between the effective quantity of air injected and the value displayed on the screen.

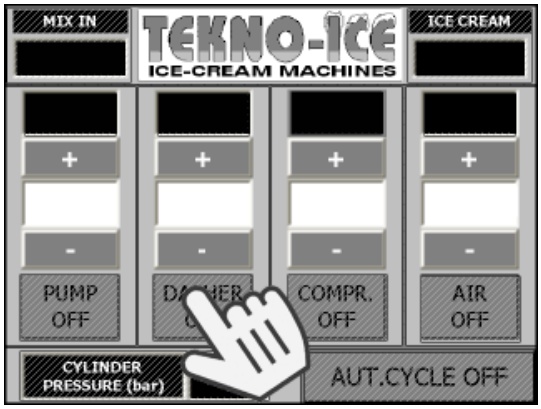
9 SET OVERRUN: FILLING (%)
Sets the quantity of air (expressed as a percentage) injected into the mixture during filling.

10 % MODULATING ANALOGUE VALVE
Displays time during which air valve is kept open.

6.3 Production cycle

6.3.1 Manual cycle

Production is normally carried out in automatic mode. However, the machine may also be operated in manual mode. Manual mode is normally used when starting the machine for the first time or for checking that a newly replaced component functions correctly.



In manual mode, the functions of each individual component are controlled directly from the operator panel.

ATTENZIONE
When in manual mode, there are no safeguards to ensure that operations or the cycle are performed in the correct sequence. Proceed with extreme caution!

6.3.2 Automatic cycle

During the automatic production cycle, the entire operating sequence is managed by the machine.

After ensuring that all preparations have been made in accordance with the instructions given in the chapter STARTING THE MACHINE FOR THE FIRST TIME and that all safety conditions necessary for starting the cycle are met, turn on the main switch, release the emergency button (if in the safety position) and press the reset button.

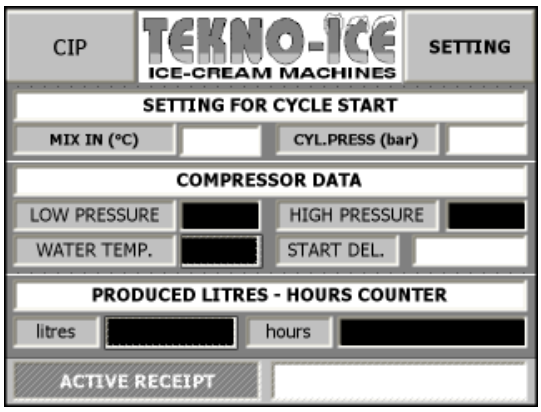
1 Ensure that the recipes to be used are correctly compiled and that all production parameters in the operator panel menu screens are correct.

For more detailed information, see the previous paragraph.

2 Call up the recipes to be used. See paragraph 6.2.5 for instructions.

3 Ensure that the pump, dasher, compressor and overrun are disabled (the respective buttons on the main menu must be OFF). If one of more of these functions is ON, the cycle will not start.

4 Start the cycle.



Description of the cycle

The cycle starts with cylinder filling. The filling speed depends on the FILL setting in the pump parameter menu.

Once the pressure set for the ICE-CREAM PRESSURE parameter in the cycle menu is reached, the pump stops.

The dasher, refrigerator compressor and overrun functions now start. Depending on the settings in the relative menus, the start of these functions may be delayed.

Once the ice-cream hardness reaches the value set for the parameter SET PUMP START HARDNESS (dasher parameter menu), the pump restarts. The initial pump speed depends on the value set for the parameter SET INITIAL SPEED (pump menu).

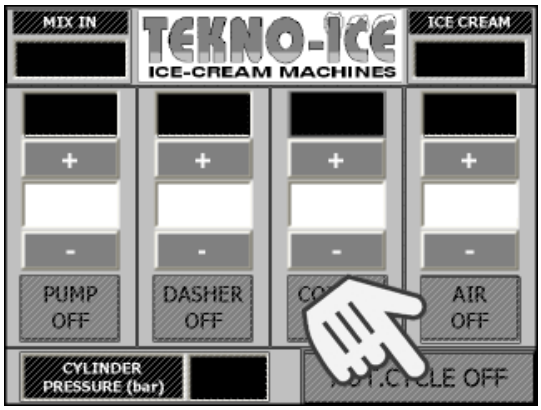
Press the relative button in the main menu again to end the cycle.

In the event of malfunction or alarms triggered during the production cycle, refer to the chapter titled DIAGNOSTICS.

6.4 Stopping the cycle

Once the production cycle is complete, proceed as follows to stop the machine.

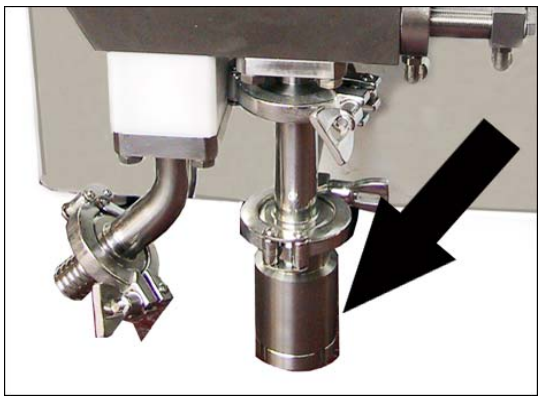
1 Touch the field in the main menu as shown in the figure to disable the automatic cycle. The machine commences the arrest sequence defined by the control programme.



2 Carry out the washing operations described in the following paragraph;

3 Once the washing procedure is complete, switch off the machine and switch off and padlock the mains power disconnector switch. Follow the instructions given in the paragraph PRECAUTIONS FOR USE AND MAINTENANCE with particular regard for the sections concerning the use of personal protection measures.

4 Remove the safety valve shown in the figure to completely drain any remaining water from the cylinder and pipes;



6.5 Emergency arrest

In the event of any situation requiring the machine to be arrested immediately, press the palm operated button on the control console.
The emergency button immediately cuts out electric power and the compressed air supply to all utilities, rendering the machine safe.

Proceed as follows to resume operation:

1 Turn the emergency arrest button anticlockwise.
2 Activate hot gas function for approximately one minute. See paragraph 6.2.10 for instructions.
3 Start the cycle as described in paragraph 6.3.

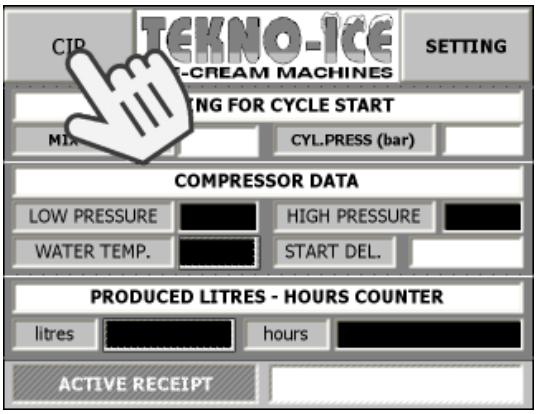
6.6 Washing

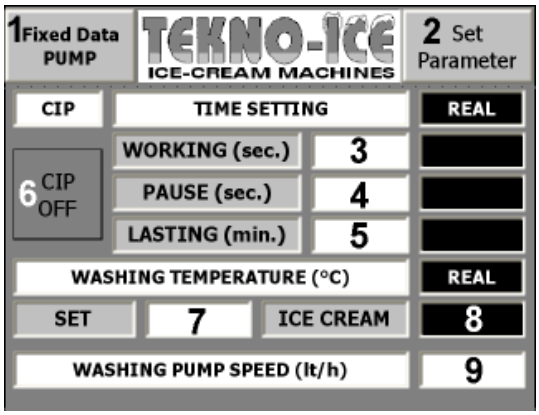
At the end of the production cycle, the TEKNOFREEZE machine must be cleaned to remove all residue of product.

The machine is predisposed for washing with the CIP system (Cleaning In Position), which washes the machine without necessitating the removal of any major components.

6.6.1 Setting parameters

Access the CIP menu from the CYCLE START menu by touching the relative field.
This menu contains the main parameters for the washing cycle.





1 FIXED DATA PUMP
Accesses the pump parameter menu. See paragraph 6.2.7

2 SET PARAMETER
This section is exclusively for the use of Tekno-ice technicians and is not described in this manual.

3 TIME SETTING: WORKING (sec)
Sets the operating cycle duration. Once this period has elapsed, the PAUSE time counter starts (following section).
The cycle time count is displayed in the adjacent black field.

4 TIME SETTING: PAUSE (sec)
Sets the time between dasher/pump arrest (via a switch on the control panel) and their subsequent restart. During the CIP cycle, the PAUSE parameter defines the interval at which washing cycles are performed until the time set for the parameter DURATION has elapsed.
The pause time count is displayed in the adjacent black field.

5 TIME SETTING: LASTING (min)
Defines the overall duration of the washing cycle (pause + work).
The time count is displayed in the adjacent black field.

6 CIP ON/OFF
Displays the state of the washing function (ON/OFF).

7 WASHING TEMPERATURE: SET (°C)
Sets the temperature at which the system displays an alarm (see chapter ALARMS).
The temperature is displayed in the TRUE field.

8 WASHING TEMPERATURE: ICE-CREAM (°C)
Displays the washing solution temperature at outlet.
This value is also displayed in the main menu.

9 WASHING PUMP SPEED (l/h)
Sets pump speed during wash cycle.

We recommend setting a value close to the minimum flow rate the pump is capable of delivering (e.g. 50 l/h).

6.6.2 Indications for the washing programme

CAUTION

When handling detergents and chemical products in general, follow the instructions given in the chapter PRECAUTIONS FOR USE AND MAINTENANCE and in the product information sheets carefully.
Follow the instructions given below carefully.
The washing solution and, in general, any liquid or solution used, must be disposed of in compliance with applicable legislation of the country of installation.

1 Do not use acid detergents or products containing chlorine other than those recommended in the table.
2 Hydrochloric acid corrodes stainless steel and chrome, creating microscopic pitting in the surface.
3 Do not work with washing solution temperatures above 60°C.
4 Once a week, dismantle the main machine components and clean manually, closely inspecting the surfaces to prevent mechanical problems and/or corrosion.
See paragraph 6.6.4 for instructions.
5 The choice of detergent, disinfectant, temperature, concentration and contact times with the machine components must be made very carefully. If necessary, contact the Tekno-Ice technical support service for advice.

The machine components in contact with product and washing solutions are made from the following materials:

Mechanical components:
AISI 304 stainless steel
Bushings:
Acetal resin (Hostaform)
Seals:
Buna rubber

Washing stage	**Min.**	**°C**
prewash with non-recirculated water	3/5	40/45
alkali wash (0.3/0.5% max. caustic soda)	10/15	60/65
rinse with non-recirculated water	3/5	18/20
descaling wash (citric or acetic acid at pH 3.5/4.5)	5/10	60/65
final rinse with non-recirculated water	3/5	18/20
disinfectant solution		18/20

The schedule for the procedures described above is given in the chapter 'Maintenance'.

6.6.3 Washing procedure

To correctly wash the machine after performing the first four steps in chapter 4 (cycle stop), proceed as follows:

1 With the machine at rest, remove the mixture line from the pump and connect the washing water line in its place.

Run the pump until clean water starts coming out of the freezer, then stop the machine again.

2 Connect the CIP system to the water inlet;

3 Connect the CIP system return line to the cylinder outlet;

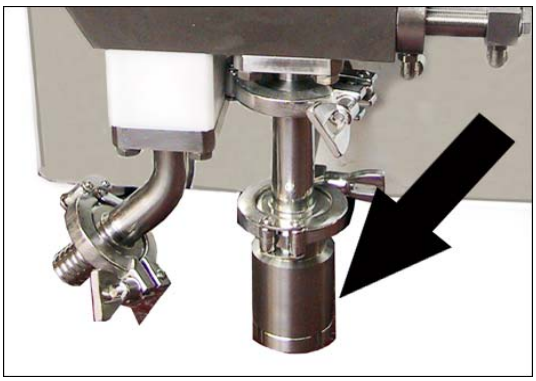
4 Ensure that the washing cycle settings are correct, then start the CIP system and turn the CIP selector on the operator panel to the left (see paragraph 6.1).
See the previous chapter for the correct detergent quantities.

5 At the end of the washing cycle, turn the selector to the right to stop the CIP system.

6 Fill the freezer with disinfectant solution by means of the pump, as done previously with the washing water.

Before resuming production, drain the solution and rinse thoroughly with water.

To ensure that all water has been drained completely from the freezer, remove and refit the safety valve.



6.6.4 Weekly cleaning

Regularly and at least one a week, clean the machine components as follows.

- prewash with lukewarm water (approx. 40°C);
- basic washing;
- rinse with room temperature water;
- acid washing;
- final rinse with room temperature water.
- Freezer filled with disinfecting solution.

chapter 7

Diagnostics

7.1 Alarm activation and reset

The machine has a self diagnostic function to identify the most probable malfunctions that may arise during normal operation.
These malfunctions are registered by the PLC in the control console and indicated by the illuminated RESET button and by a message on the operator panel.

7.1.1 Alarm activation

The activation of one or more alarms is signalled on by the illuminated RESET button and a message on the operator panel. The button remains lit until the operator rectifies the cause or causes and presses the button.

Depending on the alarm, the machine may be arrested or may continue with the cycle as normal.

Upon activation of one or more alarms:

1 Identify and rectify the cause of the alarm in accordance with the safety instructions given in chapter 2, with particular regard for sections concerning the use of personal protection devices.
2 Press RESET on the operator panel to acknowledge the alarm.

The following list describes the alarm messages possible during production.

This is merely a general list for all machine types. Depending on individual specifications, the machine may feature alarms not included in the following lists.

In this case, contact the TEKNO-ICE srl technical support servic

7.2 Alarms

IMPORTANT

The list of alarms given herein is merely indicative. Depending on individual specifications and the accessories included, some machines may feature alarms not described in the following list. Similarly, certain alarms mentioned may not feature on the machine.
For more information contact the TEKNO-ICE technical support service.

7.2.1 Alarm list

ALARM SIGNAL	CAUSE	REMEDY
al.01 - EMERGENCY BUTTON ACTIVATED	An emergency button has been pressed.	After resolving the cause, release the button and press the RESET button on the panel
al.02 - PUMP THERMAL OVERLOAD	Incorrectly calibrated overload switch Motor fault	Check Check After resolving the cause, press the RESET button on panel.
al.03 - DASHER THERMALOVERELOAD	Incorrectly calibrated overload switch Motor fault	Check Check After resolving the cause, press the RESET button on panel.
al.04 - COMPRESSOR THERMAL OVERLOAD	Incorrectly calibrated overload switch Motor fault	Check Check After resolving the cause, press the RESET button on panel.
al.05 - PUMP INVERTER FAULT	Irregular or interrupted power supply Torque control alarm activated.	Check electric power supply Check for mechanical stiffness. Consult relative manual. After resolving the cause, press the RESET button on panel.
al.06 - LOW COMPRESSOR PRESSURE	Fluid solenoid valve coil fault Insufficient refrigerant fluid Worn scraper blades	Check Check and top up if necessary Check After resolving the cause, press the RESET button on panel.
al.07 - HIGH COMPRESSOR PRESSURE	Interrupted condensation water supply Insufficient condensation water supply Condensation water temperature too high Dirty condenser	Check Check Check Wash manual rearm the high pressure switch

ALARM SIGNAL	CAUSE	REMEDY
al.08 - ELECTRONIC COMPRESSOR CIRCUIT BREAKER	Refrigerating system fault Irregular or interrupted mains power Electronic circuit breaker fault	Check Check Replace After resolving the cause, press the RESET button on panel.
al.09 - COMPRESSOR OIL PRESSURE SWITCH	Compressor oil too cold	Wait for oil to reach operating temperature Rearm relative pressure switch manually
al.10 - UNSUITABLE TEMPERATURE FOR WASHING	Washing solution temperature too high	Reduce washing solution temperature After resolving the cause, press the RESET button on panel.
al.11 - DASHER CURRENT ABSORPTION TOO HIGH	Ice cream too hard Hot gas function off Mechanical fault in drive system Motor fault Amperometric transformer fault	Check Check Check Check Check After resolving the cause, press the RESET button on panel.
al.12 - NO MIXTURE AT INLET	No mixture at inlet Mixture temperature above set value	Check Adjust setting After resolving the cause, press the RESET button on panel.
al.13 - PRODUCTION SPEED TOO HIGH	Parameter not compliant with production specifications	Reduce production speed value Adjust overrun parameter After resolving the cause, press the RESET button on panel.
al.14 - HIGH CYLINDER PRESSURE	Incorrectly calibrated counterpressure valve Blockage upstream of machine	Check Check After resolving the cause, press the RESET button on panel.
al.15 - START NOT ENABLED - FUNCTIONS IN MANUAL MODE	Machine performing automatic cycle	Disable all manually enabled functions

7.2.2 Troubleshooting

CAUTION

Some of the operations described above are unscheduled maintenance jobs and may only be carried out be specialised personnel or Tekno-Ice technicians.

PROBLEM	CAUSE	REMEDY
LAMP INDICATES NO VOLTAGE	Faulty lamp Main switch OFF No mains power	Replace Turn to ON Check
PUMP NOT WORKING	Thermal circuit breaker tripped Pump motor burnt out	Rearm Repair
PUMP WORKS BUT NO MIXTURE FLOW	Obstruction in mixture line Air in mixture feed line Dirt between valve and valve seat Worn ball valve	Remove Bleed air from line Open pump head, remove dirt and restart pump Replace
DASHER NOT WORKING	Thermal circuit breaker tripped Dasher motor burnt out	Rearm Repair
DASHER RUNS IRREGULARLY	Loose drive belts Damaged scraper blades Excessive ice-cream hardness	Tension Sharpen or replace Use hot gas
COMPRESSOR NOT WORKING	Dasher shaft not running Thermal circuit breaker tripped Pressure switch tripped Current circuit breaker tripped Compressor motor burnt out	Start shaft Rearm Rearm Check Repair
COMPRESSOR STOPS IMMEDIATELY AFTER STARTING	Insufficient condensation water Oil pressure switch tripped	Open manostat valve. Replace water lines with larger diameter tubing Rearm
ICE-CREAM TOO SOFT	Mixture temp. too high Hourly ice-cream production too high Hot gas openInsufficient ice-cream pressure in cylinder Refrigerating system malfunction	Increase mixture cooling Reduce ice-cream flow rate Close hot gas Adjust back pressure valve See chapter 'Maintenance' or call refrigeration specialist
INSUFFICIENT OVERRUN	No compressed air Overrun switch off Dirty filters Air leak in circuit Overrun regulator fault Insufficient ice-cream pressure in cylinder	Enable compressed air Turn overrun switch on Replace filters Rectify leaks Repair or replace Adjust back pressure valve
ICE-CREAM TOO HARD	Hot gas closed Production rate too low	Open hot gas Increase production rate

7.3 Machine malfunctions

IMPORTANT
The following are the most commonly encountered problems that may compromise production quality.

7.3.1 Electrical system malfunctions

The electrical system is designed to ensure maximum protection for the machine components.
In the event of an alarm, switch off mains power, open the electrical cabinet and rearm the tripped thermal overload circuit breaker. If the circuit breaker will not engage in the on position, wait a few seconds to allow it to cool then try again.
If the alarm is triggered again once production is resumed, check for mechanical and/or electrical problems.

In all cases:
- Do not repeatedly rearm magneto-thermal circuit breakers without identifying the cause of the alarm.
- Do not attempt to recalibrate magneto-thermal circuit breakers as this may cause damage to the motors;
- If the refrigerator compressor stops without a request from the operator (or cycle programme), check if one of the safety pressure switches or electronic circuit breakers on the compressor have been triggered.
  If the compressor motor thermal overload electronic circuit breaker has been triggered, to resume compressor operation, stop the dasher then restart the dasher and compressor sequence.
  If an oil pressure or high refrigerant pressure switch has been triggered, rearm the triggered pressure switch to resume compressor operation.
- If the low refrigerant pressure switch has been triggered, the switch is automatically rearmed once pressure returns to normal. To rearm the low pressure switch more quickly, activate the hot gas function for a few seconds.

In the event of reaching the maximum ice-cream hardness or maximum motor current thresholds, the operator may regulate dasher motor current absorption, activate the hot gas solenoid or stop the refrigerator compressor from the operator panel.

For more information see chapter 6.

7.3.2 Refrigeration system malfunctions

PROBLEM
Low refrigerant level
Indicated by bubbles or foam in the refrigerant sight glass.

Identify and rectify leaks. Top up refrigerant level in circuit.

PROBLEM
Insufficient condensation
Indicated by the activation of the high pressure switch due to excessively high pressure and/or temperature in outlet.

Possible causes
1 Incorrectly calibrated manostat valve.
  Recalibrate valve so that outlet water temperature is 28/30° C and outlet pressure is 14 bar (R404/507).
2 No water
  Check that water supply is available and that there are no obstructions in the lines
3 Dirty condenser
  Clean

PROBLEM
Excessive intake pressure
Hot gas solenoid valve
Indicated by the fact that the valve does not close completely, allowing hot gas continuously into the evaporator and reducing refrigerating capacity.

Possible causes
1 Faulty valve
Check valve and replace if necessary.

PROBLEM
Insufficient intake pressure
Refrigerant fluid solenoid valve
Indicated by the fact that the valve does not open, causing a pressure drop in the intake section, triggering the low pressure switch.

Possible causes
1 Faulty valve
Check that solenoid coil is working correctly and replace if necessary.
Check solenoid and replace if necessary.

PROBLEM
Thermostat valve
Indicated by excessive or insufficient pressures causing reduced compressor efficiency and/or triggering the low pressure switch.

Possible causes
1 Incorrectly calibrated valve.
Calibrate the valve to an intake pressure/ temperature of -30/-32° C
2 Faulty valve.
Replace

chapter 8

Maintenance

WARNING

Before carrying out any maintenance work, ensure that the machine is disconnected from all electrical power and compressed air supplies and that any residual energy has been dissipated. Always used the Personal Protection Equipment specified in chapter 2.

8.1 Introduction

This chapter describes the regular maintenance procedures to be carried out on the machine.
To keep the machine in perfect working order, maintenance must be carried out exactly as described and according to the intervals specified.

In addition to maintenance, the machine must be cleaned thoroughly to prevent ice cream residue from compromising machine function.

In addition to the correct maintenance intervals, this chapter also specifies the qualifications required of the personnel performing the operation:

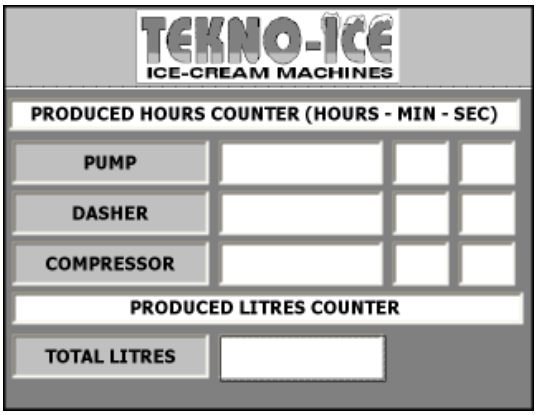
★	Simple job, may be carried out directly by operator.
★ ★	Operation requiring specific knowledge of the procedure. Carried out by maintenance personnel.
★ ★ ★	Complex operation that may only be carried out by TEKNO-ICE technicians or specialised personnel.

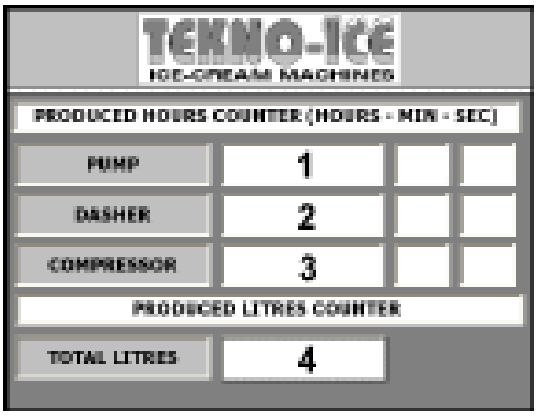
The final paragraph in this chapter may be used to record maintenance work carried out on the machine. Where the production division does not keep a specific maintenance log, we recommend entering maintenance details in this paragraph.

This will facilitate the work of the support technician should the need arise.
Components that have been warehoused without being filled or treated with protective oil must be dismantled, cleaned and lubricated before use.

8.2 Production hours

Press the button shown in the figure to access the PRODUCTION HOURS menu from the TEMPERATURE CALIBRATION menu.





The total operating times for the main components of the machine may be viewed and reset from this menu to ensure that the correct maintenance intervals are observed.
Once the required maintenance has been carried out, reset the value by entering “0” (zero).

1 **PUMP TIME (h/min/sec)**
Pump operating time.
2 **DASHER TIME (h/min/sec)**
Dasher operating time.
3 **COMPRESSOR TIME (h/min/sec)**
Compressor operating time.
4 **TOTAL LITRES (l)**
Indicates the total litres of mixture processed since the machine was last switched on.
The counter resets automatically at each new cycle start.

8.3 Regular maintenance

IMPORTANT
The maintenance intervals specified are based on a usage of eight hours per day and, as a result, are purely indicative. If the machine is used for more than one shift per day, the maintenance intervals must be modified accordingly. Maintenance intervals may also vary depending on the type of production, the working environment, ambient temperature and other factors. The effective maintenance intervals must therefore be assessed by the maintenance technician on the basis of his or her experience.

8.3.1 Daily maintenance

WASHING ★
At the end of production, wash the machine with the automatic CIP system (if installed) as described in the chapter PRODUCTION.
At the end of the washing cycle, we recommend filling the freezer with a disinfectant solution. Before resuming production, drain the disinfectant solution and rinse with clean water.
Used washing solution and disinfectant must be disposed of in compliance with applicable legislation in the country of installation.

Machines not equipped with a CIP system must be washed manually.

8.3.2 Weekly maintenance

DESCALING ★
Once a week, wash the machine with the automatic CIP system, using citric acid or vinegar.
For more information see the chapter PRODUCTION.
At the end of the washing cycle, fill the freezer with a disinfectant solution. Before resuming production, drain the disinfectant solution and rinse with clean water.
Used washing solution and disinfectant must be disposed of in compliance with applicable legislation in the country of installation.

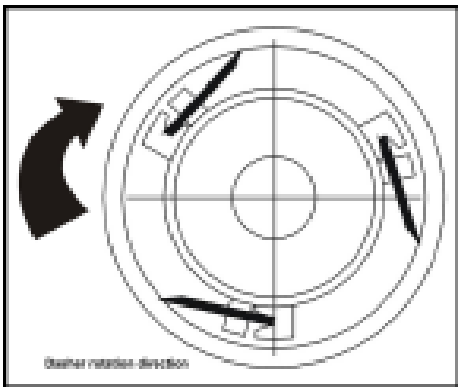
DASHER ★★
Once weekly, wash all dasher components with foodstuff compliant detergent solution.
For more information see paragraph 8.3.7

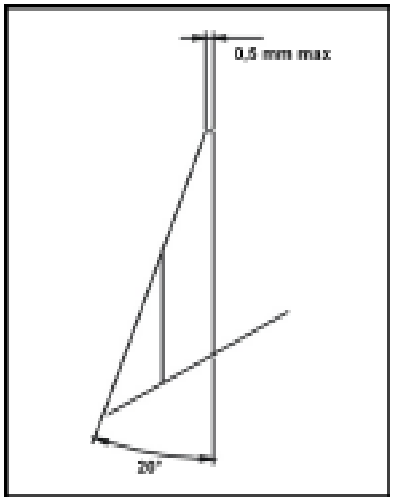
8.3.3 Quarterly maintenance

CHECKING BELT TENSION ★★
Check the tension of the shaft drive belt. The tension must be sufficient to drive the shaft without slipping or vibration, but must not be too high, to prevent overloading the bearings.
Press the belt at its mid point and check that deflection is approximately 5-10 mm.
If necessary, adjust the tensioner roller.

CHECKING ROTARY SEALS ★★★
Check contact surfaces between the two parts. If scoring is noted which may compromise seal integrity, polish surfaces with fine grade emery board or paper.
Lay component on a sheet of glass to check for scoring.
In the event of deep scoring, the parts must be replaced.

CHECKING SCRAPER BLADES ★★★
Check the thickness of the sharpened edge of the blades. Correct thickness is 0.2 mm. Sharpen or replace blades if thickness exceeds 0.5 mm.

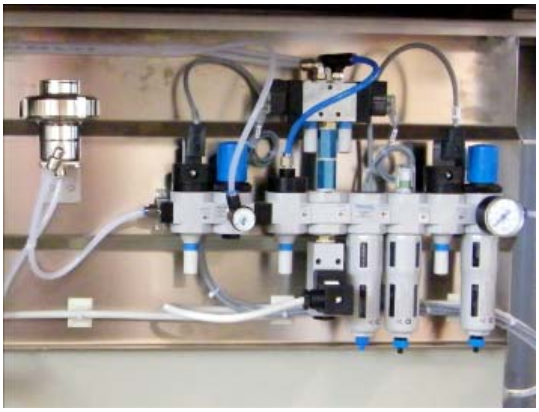




8.3.4 Six-monthly maintenance

SINTERED FILTER ★★
Regenerate or replace cartridge.

DOUBLE FILTER ★ ★
Check filter for clogging.
At the bottom of the double filter (**1**) is an oil separator cartridge with automatic condensate drain; at the top of the filter is an active charcoal filter.
Cartridge lifetime depends on the degree of contamination of the compressed air supply.
Check the indicator at the side of the cartridge (**2**) once a week. If the indicator is red, replace the cartridge.

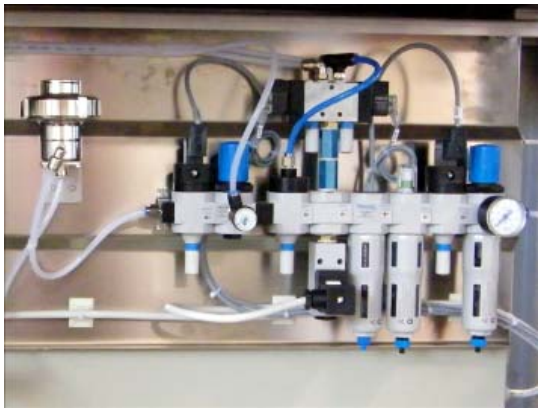


8.3.5 Yearly maintenance

MIXTURE PUMP SEALS ★ ★ ★
Replace seals.
See the chapter DIAGRAMS AND REPLACEMENT PARTS for replacement parts.

MIXTURE PUMP VALVES ★ ★ ★
Replace the three ball valves..
See the chapter DIAGRAMS AND REPLACEMENT PARTS for replacement parts.

DOUBLE FILTER ★ ★
Replace both cartridges.



BELTS ★ ★ ★
Check the drive belts tension.

ELECTRICAL SYSTEM ★ ★ ★
Check all connections and condition of cables and wires.

MACHINE ★ ★ ★
Perform general service.

DASHER★ ★ ★
Substitute the rotating seal and the bushes of the eccentric.

8.3.6 Two-yearly maintenance

CYLINDER BEARINGS ★★★
Replace.
See the chapter DIAGRAMS AND REPLACEMENT PARTS for replacement parts.

BELTS ★★★
Replace.
See the chapter DIAGRAMS AND REPLACEMENT PARTS for replacement parts.

8.3.7 Dasher maintenance

Perform dasher maintenance as follows:

1 Remove the ice-cream outlet lines, the back pressure valve and the DASHER cover;

2 Remove the DASHER from the cylinder using the extractor tool supplied as standard, as shown in the following figure.

3 Remove the ice-cream pressure manometer and the mixture inlet line.

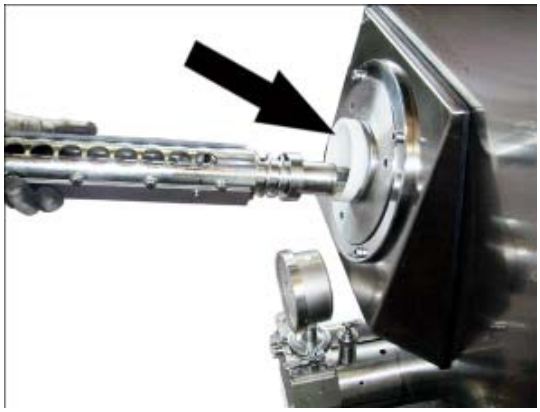
Remove the stop-block and the upper support. Remove the eccentric and check the condition of the bushes. Substitute them if necessary.

Wash all components with foodstuff compliant detergent solution and refit correctly.

WARNING
The blades are sharp - handle with care

Before refitting the shaft, ensure that the blades are positioned correctly. Lubricate the rotary seal gasket with petroleum jelly and refit seal spring in its respective seating, pushing until it snaps into the retainer recess.

Before refitting the shaft, mount the protective ring onto the cylinder, as shown in the figure, then slowly insert the shaft.



Once in position, rotate until the end engages in the relative seating.

4 Refit the cylinder cover, ensuring that it engages correctly with the centring pawl.

5 Retighten the three securing knobs.

6 Restart the machine

7 Fill the freezer with disinfectant solution using the mixture pump and drain via the safety valve.

8 Rinse the freezer with water before starting a new production cycle.

8.3.8 Compressor maintenance

The compressor is filled with lifetime lubricant and requires no additional lubrication.

In the event of repair work on the compressor, replace oil with :
SUNISO 3G (density = 9.4 Kg/m - viscosity at + 50 °C = 2.7 °E).

CALIBRATION:
LOW PRESSURE SWITCH
Minimum pressure 0.2 bar
Differential 0.6 bar
HIGH PRESSURE SWITCH
Maximum pressure 20 bar

8.4 Maintenance jobs

Where a specific production division maintenance log is not kept, we recommend using this section to record all maintenance performed on the machine.

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chapter 9

Dismantling

IMPORTANT

The disposal of toxic and or harmful waste, such as lubricants, is subject to specific legislation varying from country to country. Before carrying out any operation of this nature, contact the relevant authorities in the country of installation for information regarding this legislation.

Contact the manufacturer before dismantling the machine and use only personnel specialised in this field.

If necessary, contact a dismantling specialist.

If the machine has been out of action for a prolonged period (more than 15) days, drain the machine completely and clean thoroughly.

If chemical products (washing solutions, solvents, etc) are to be temporarily stored, comply with the indications given in the technical sheets for the products themselves. If missing, contact the supplier of the materials for copies of the technical sheets.

The machine and its components contain no toxic or harmful materials.
All lubricants must be drained and disposed of correctly dismantling.

For dismantling, the machine must be broken down into its component parts, and taken to a ferrous and aluminium waste collection facility.

The connection cables consist of copper cores with and insulating rubber sheathing.

For dismantling instructions, contact the manufacturer or refer to the construction drawings for the machine.

chapter 10

Spare parts

10.1 Identification modality

If it sees fit, the constructor may supply technical manuals and documentation for parts produced by third party manufacturers.

Where not supplied with the machine, this documentation is archived with the technical dossier for the machine.
In this case, contact the TEKNO-ICE srl technical support service for assistance identifying the necessary part.

If the parts necessary cannot be found or identified, contact the technical support service, quoting the model and serial number of the machine.

These details are given on the machine identification plate (see chapter 1).

chapter 11

Annexed diagrams and documentation

The documentation with diagrams for the machine is annexed with this manual.
If deemed necessary, the original and unmodified documentation received from third party manufacturers by TEKNO-ICE srl is also available.

This documentation may be included in this chapter or may be supplied separately for printing necessities.

All other documentation not given herein is included in the technical dossier and kept in the manufacturer's archive.

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