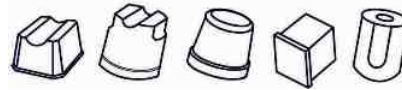


Ice for Life.



ICE MAKERS
MAQUINAS PRODUCTORAS DE HIELO



“TECHNICAL MANUAL”

PULSAR (modular)

MP-401

ICE CUBE MANUFACTURING MODULE

- LARGE ICE CUBE PRODUCTION – 400 kg/day
- THREE-PHASE POWER 3.3 KW MP 401 / 2*3.3 KW
- COMPRESSORS
- STAINLESS STEEL FRAME 18/8
- WITHOUT PUMP OR SPRINKLERS
- AIR OR WATER CONDENSATION. REMOTE AIR CONDENSER OPTION
- COPPER TUBE CONDENSERS
- COMPONENT SELECTION – PRESSURE SWITCH, MICROS, PRESSURE V. – FROM THE BEST BRANDS IN THE MARKET.
- 30/40/60 GR. ICE CUBES

OPERATING PRINCIPLE (PER UNIT)

Start-up and Cycle Operation

When the machine is connected, it starts with a start-up timing t_{arr} of 30s during which all is stop, including the compressor. The display reads STARTING.

CAUTION: ONCE THE MACHINES IS CONNECTED, IT IS NORMAL THAT THE COMPRESSOR/S STARTS/START SPONTANEOUSLY AND STOP A FEW MINUTES AFTER. WHEN THE UNIT SWITCH IS MOVED TO THE POSITION 1, SUCH EFFECT DISAPPEARS.

After such period, the working cycle starts that starts with a launching period t_d . The low pressure switch will connected the compressor (S) when the solenoid valve opens and detects that the pressure in the reefer circuit is 2.5 Bar, also the hot gas and water valves (Q + P) open during the t_d period. The display shows the indication: HARVEST.

After launching, ice manufacturing starts. Manufacturing has a first stage of pre-cooling. The compressor – fan assembly (S + R) continues operating, starts the turbine's engine M_t and the valves P + Q close. The display shows the SC probe temperature corresponding to the evaporator. When the cycle probe gathers a temperature lower than the set point (-12°C) the timing phase starts.

A period t_f is timed which is a function of the reading at that time of the room probe (SA) The display shows the indication: PRODUCING. Also the manufacturing remaining time is shown with some boxes in the lower section.

Once t_f finishes, a new cycle starts with a launching.

Full Storage Stop

If the ice storage bin is full, it reached the stock thermostat so temperature lowers which results in a machine stop just before the launching corresponding to that cycle. FULL BIN appears on the display.

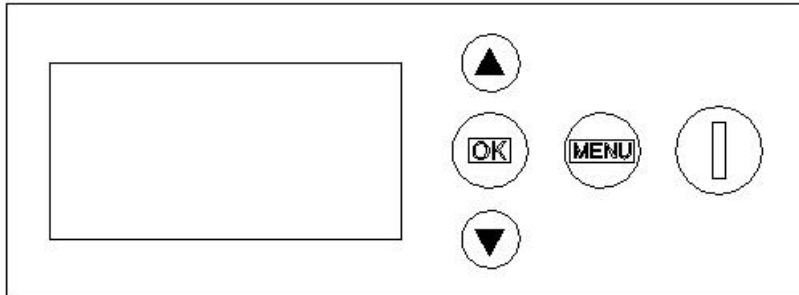
In case the storage thermostat drops during ice manufacturing, the machine operates until t_f ends. Then, the machine stops. This situation continues until the T_1 storage thermostat is replaced. Then the machine starts a new cycle with a launching.

In case the temperature around the storage thermostat bulb drops during launching, the machine will stop at that moment. This situation continues until the T_1 storage thermostat is replaced. Then the machine starts a new cycle with a launching.

The disconnection of the I_p switch or I_d remote switch results in a machine stop, like the one generated by the stock thermostat.

CAUTION! THE EMERGENCY SWITCH STOPS THE MACHINE AT THE TIME IT IS ACTIVATED.

Electronics Operation



User's Menu

It can be accessed with the machine turned off and by pressing only once the key menu.

Main menu	
1.	Time adjustment
2.	Programmer
	A. Activate
	B. Deactivate
3.	No. of ice cubes
	N / A
4.	Ice-cube size
5.	Language
	a. Spanish •
	b. English
	c. French
	d. Italian
	e. German

1. Time adjustment

It will show the time that the machine has, flashing the values that can be changed; with the up/down arrows we will adjust the values and when selecting the desired value press OK.

2. Programmer

It is Deactivated by default, Activate it with the arrows + OK program OK

3. No. of ice cubes

Do not use

4. Ice-cube size.

By default, enlarge or reduce the size with the arrow keys. Press OK when the desired size is selected.

5. Language.

By default the language is Spanish; choose the language with the arrows OK in the desired language.

To exist press menu.

The used values are maintained memorized in the following starts up, (with out electrical shutdowns)



Installer's Menu

It can be accessed with the machine turned off by pressing the three buttons for 10 seconds. (Up + Down Arrows + OK)

Configuration menu	30	40	60	gr
1. Tc temperature set point	(-12)	(-12)	(-12)	°C
2. Manufacturing time	12	18	24	min
3. Removal time	150	150	180	seg

1. Set point temperature

When this temperature is reached, the manufacturing time start counting. (Modify with arrows up/down OK).

2. Sp maximum time

It measures the maximum time it should take to reach the temperature set point. It is modified with the arrows (up, down, OK). Maximum time 60 min.

3. Sp minimum time

It measures the minimum time it should take to reach the temperature set point. Minimum time 1 min.

4. Manufacturing time

It controls the manufacturing time of the machine since it reaches the temperature set point up to the launching startup. The controller will recalculate this time in function of the temperature of the environment and the water. It is modified with the up / down arrows, OK.

5. Start-up time

It indicates the time that the machine must wait until starting up the compressor, fan, pump and other outlets. It is modified with the up / down arrows, OK. Start-up time 30 seconds.

6. Removal time

It marks the seconds the removal takes. The controller will recalculate the time in function of the temperature of the environment and the water. Modify Arrows up/down OK

7. By default

This option will return all the parameters of the machine to the standard default configuration. By pressing both arrows, you will be asked if we are sure of returning to all the default parameters and we will select between the "OK or MENU" options. In case of selecting OK, all the default options will be applied and you will return to the Configuration Menu and in case of pressing MENU, we will go out of this option without making any change.

<u>Default values.</u>	
Set point temperature	-1 °C
Tc max time Tc	60 min
Min Tc time	4 min
Manufacturing time	22 min
Startup time	30 sec
Removal time	1m30sec

Information Menu

You can access the menu any time (with the machine turned on or turned off) by pressing 10" the MENU button. This menu provides machine operation, possible breakdowns, duration of the last processes and temperature information.

Information menu	
1.	Room Temp Probe / Cycle temp probe
2.	Manufacturing time last cycle / Last complete cycle time.
3.	Last cycle cooling time
4.	Input / Output

1. Room T. / Cycle T.

It shows the values that are being registered, the room temperature probe, the temperature of incoming air, the temperature of the cycle where the ice cubes are manufactured; in these registries, in case of failures (*****) will be shown.

1. Manufacturing T. / Complete T.

Manufacturing T. gives us the time used in the last cycle from the moment the set-point temperature is reached until the removal begins.

Complete T. gives us the sum of manufacturing time plus removal time.

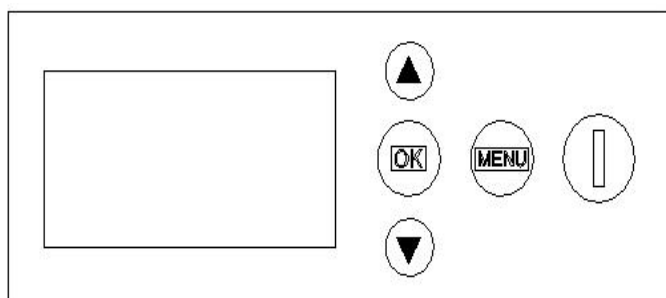
2. Cooling T. / Removal T.

Cooling T. shows us the time that passes until the set-point temperature is

reached from the end of the removal.
 Removal T. during the removal and cooling gives us the time used during the last removal. During the manufacturing process it will show a backwards count indicating the time to get to the next removal.

3. Input (I)/Output (O) signals

It shows us the information of what inputs and outputs are activated by means of empty boxes without signal or full boxes with signal



Inputs	
Storage bin thermostat	1
Security Pressure Switch	2
Non in use	3
Free Input	4
Outputs	
Free Output	1
Solenoid	2
How gas, Electrovalve, Water inlet	3
Free Output	4

REFRIGERANT LOAD

Observe the sight glass. No bubbles should be observed during most of the duration of the cycle. Just at the end, and coinciding with the stop of the condenser fans, some could be observed during a few instants. If the bubbles

remaining during most of the cycle, please notify the technical services in order to locate the leak and reload refrigerant.

WATER CHLORINATION

Check that the manufacturing water is chlorinated with 0.5 gr of chlorine every 1000 liters of water.

Should the water not be chlorinated, proceed as follows:

AMOUNT OF HYPOCHLORITE 5% TO BE ADDED TO THE MANUFACTURING WATER DAILY, IN RELATION WITH THE KILOS OF MANUFACTURED ICE.

<u>Ice Kg</u>	<u>5% Hypochlorite (cc)</u>	<u>Chlorine (cc)</u>
250	2.5	0.125
500	5	0.250
750	7.5	0.380
1000	10	0.500
1500	15	0.75
2000	20	1
3000	40	2.5
6000	60	3

POUR 20 cc. OF HYPOCHLORITE 5% IN THE RECIRCULATION CONTAINER.

BEFORE ACTING ON THE VALVES, CHECK:

- Water pressure
- Condition of the filters
- Water distribution

CAUTION: *Valves are very sensitive, DO NO MOVE THEM MORE THAN 1/6 TURN IN EACH REGULATION.*

It is important to reinstall the plugs with the seal in good conditions, otherwise leaks may occur. Before installing the plugs, be sure to dry their seats.

MAINTENANCE PROGRAM

DAILY

- Treated and network water pressure (minimum 3 kg/cm²)
- Refrigerant load (it could be observed through the liquid sight glass)
- Manufacturing water chlorination and PH

WEEKLY

- Water inlet filters.

MONTHLY (or every 2000 cycles)

- Condition of the transmission belts.
- CLEANING OF AIR CONDENSERS.
- Condition of curtains.
- Bacteriologic analysis of the water (take a sample at the recirculation deposit, before daily chlorination, if performed).

EVERY SIX MONTHS (or every 10000 cycles)

- Cleaning of fans and TURBINE engines.
- Condition of the turbine bearings.
- Ice outlet cleaning.
- Water tray cleaning.
- Machine general cleaning.

ANNUAL (or every 15000 cycles)

- Check the regulation of the expansion valves.
- Check the regulation of pressure switches.
- Check the regulation of the pressure valve (only in the case of water condensation).
- Cleaning the ice manufacturing assembly.
- Revision of engine bearings.
- Revision of turbine bearings.

They are slightly reduced in a 5% to 10%.

NOTE: In the case of machines condensated by water, the water condensation consumption has been measured and is 192 l/h, with an room temperature of 20°C and water temperature of 15°C.

TECHNICAL CHARACTERISTICS

ICE PRODUCTION MODULE – 400 KG

(60 GR ICE CUBE)

(Room Temp. 20°C / Water Temp. 15°C)

1 INTENSITY POWER

	WATER CONDENSATION (W)		AIR CONDENSATION (A)	
	POWER (W)	INT. (A)	POWER (W)	INT. (A)
TOTAL MAXIMUM	5600	9	5600	9
TOTAL MEDIA	3100	5.22	3580	6.12
FANS			654	3.3
TURBINE ENGINE	2 x 130	2 x 0.53	2 x 130	2 x 0.53

2 ICE PRODUCTION

- Length of the cycle with water temperature of 15°C and room temperature of 20°C 24 minutes

- Ice cube weight 52 gr.
- Ice weight per cycle (52 x 132 units) 6,864. Kg.
- Kilos per minute (6864 / 24) 0.286Kg.
- Kilos per day 0.286 x 1140 min / 24 hs. 411.84 Kg
- Number of cubes per cycle 132
- Theoric weight (in the evaporator) 60 gr.

Production data shown above is theoretic, some cubes broke and the average weight is of 52 gr. in practice.

HEAVY production of the machine with the above temperature conditions is:

- Length of cycle 26 minutes.
- Weight of produced ice per cycle 6,658 Kg.
- Kilos per minute (6,658 / 26) 0.256 Kg
- Kilos per day (0.277 / 1440) 368,750 Kg

TECHNICAL CHARACTERISTICS
40 GR ICE PRODUCTION MODULE
(Room Temp. 20°C / Water Temp. 15°C)

1 INTENSITY POWER

	AIR CONDENSATION (W)		AIR CONDENSATION (A)	
	POWER (W)	INT. (A)	POWER (W)	INT. (A)
TOTAL MAXIMUM	5600	9	5600	9
TOTAL MEDIA	3100	5.22	3580	6.12
FANS			654	3.3
TURBINE ENGINE	2 x 130	2 x 0.53	2 x 130	2 x 0.53

2 ICE PRODUCTION

- Length of the cycle with water temperature of 15°C and room temperature of 20°C 19.5 minutes

- Ice cube weight 32 gr.
- Ice weight per cycle (32 x 168 units) 5,376 Kg
- Kilos per minute (5,376 / 19.5) 0.276 Kg
- Kilos per day 0.276 x 1140 min / 24 hs. 396,997 Kg
- Number of cubes per cycle 168
- Theoric weight (in the evaporator) 40 gr.

Production data shown above is theoric, some cubes broke and the average weight is of 32 gr. in practice.

HEAVY production of the machine with the above temperature conditions is:

- Length of cycle 20 minutes.
- Weight of produced ice per cycle 5,227Kg.
- Kilos per minute (5,227 / 20) 0.261 Kg
- Kilos per day (0.261 / 1440) 376,344 Kg

All this production data has been performed with the water supplied by Sociedad de Aguas Potables de Valencia, S.A.

With treated water (solid content less than 80 ppm), production are slightly lower in a 5-10%.

TECHNICAL CHARACTERISTICS
30 GR ICE PRODUCTION MODULE
(Room Temp. 20°C / Water Temp. 15°C)

INTENSITY, POWER

	AIR CONDENSATION (W)		AIR CONDENSATION (A)	
	POWER (W)	INT. (A)	POWER (W)	INT. (A)
TOTAL MAXIMUM	5600	9	5600	9
TOTAL MEDIA	3100	5.22	3580	6.12
FANS			654	3.3
TURBINE ENGINE	2 x 130	2 x 0.53	2 x 130	2 x 0.53

2 ICE PRODUCTION

- Length of the cycle with water temperature of 15°C and room temperature of 20°C 14 minutes

- Ice cube weight 22 gr.
- Ice weight per cycle (22 x 168 units) 3,696 Kg
- Kilos per minute (3,696 / 12) 0.308 Kg
- Kilos per day 396,997 Kg
- Number of cubes per cycle 168
- Theoric weight (in the evaporator) 30 gr.

Production data shown above is theoric, some cubes broke and the average weight is of 22 gr. in practice.

HEAVY production of the machine with the above temperature conditions is:

- Length of cycle 16 minutes.
- Weight of produced ice per cycle 3,496Kg.
- Kilos per minute (5,227 / 20) 0.218 Kg
- Kilos per day 376,344 Kg

All this production data has been performed with the water supplied by Sociedad de Aguas Potables de Valencia, S.A.

With treated water (solid content less than 80 ppm), production are slightly

lower in a 5-10%.

NOTE: In the case of machines condensated by water, the water condensation consumption has been measured and is 92 l/h, with a room temperature of 20°C and water temperature of 15°C.

3 ICE AMOUNT

Ice amount depends on two factors:

- Water quality
- Manufacturing rate.

The most influencing factor is water quality, PERFECT CUBES are obtained with treated water with less than 60 ppm.

4 WATER NEEDS

With a room temperature below 35°C.

- Liters / day 3000 liters
- Liters / cycle 42 liters

From these 3000 liters, 2000 could be recovered in case the feed of the machine is performed through a supply deposit and a pressure group, and the water should have at least 50 ppm.

- MINIMUM feeding pressure 3 Bar
- MAXIMUM feeding pressure 7 Bar

If the pressure is below 3 Bar, it should be reported so the inlet flowmeter (added to the machine) could be replaced and, in this case, minimum pressure could reach 0.5 Bar. In any case, below 1 Bar, production decreases.

5 CONDENSATION

The machine is designed to condensate by air or water (air condenser could be remotely located).

OPERATION

WATER CYCLE

The water to manufacture ice comes from the drinking water network of the municipality.

From the network, it enters into a 1,000 / 10,000 liter tank that works as a reserve in case of a water supply interruption. With a pressure group (4 Bar minimum), water is sent through the decalcifier / deionizer to another tank that also operates as a reserve tank.

With another pressure group and through a filter, water is sent to the machines. Unused water falls due to gravity to the recovery deposit from where, by means of a pump and also through a filter, it returns to the reserve deposits.

The bypass that enters the machine without passing through the decalcifier / deionizer is a safety connection. Machines under normal operation do not consume water from such connection.

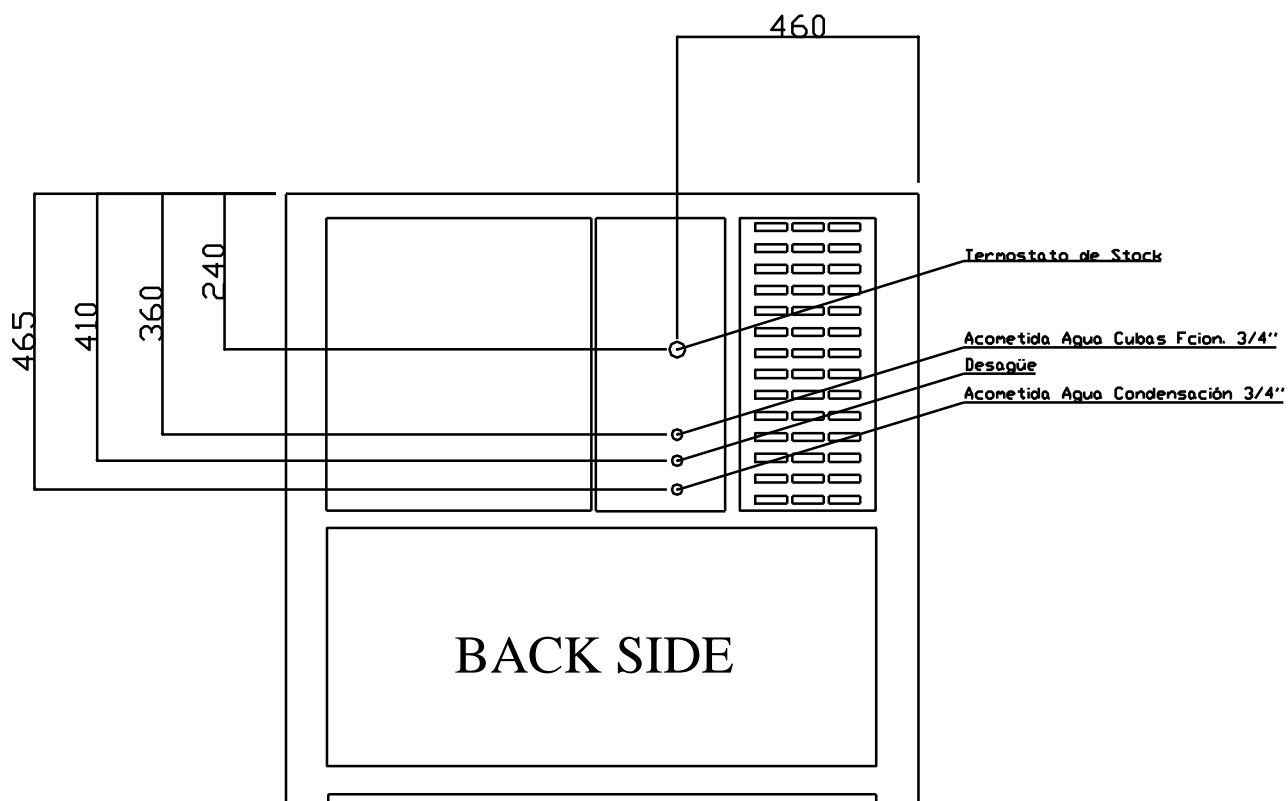
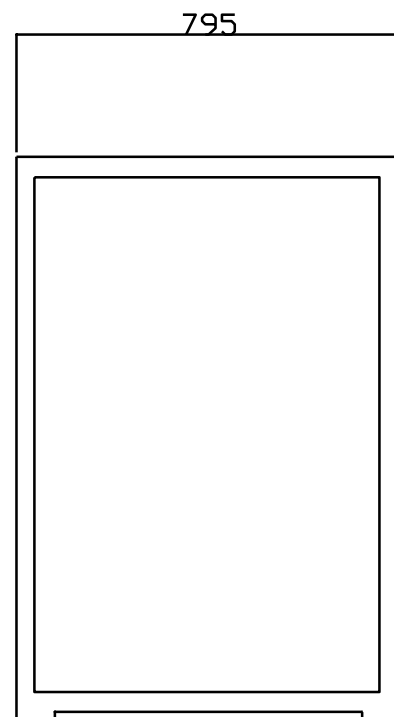
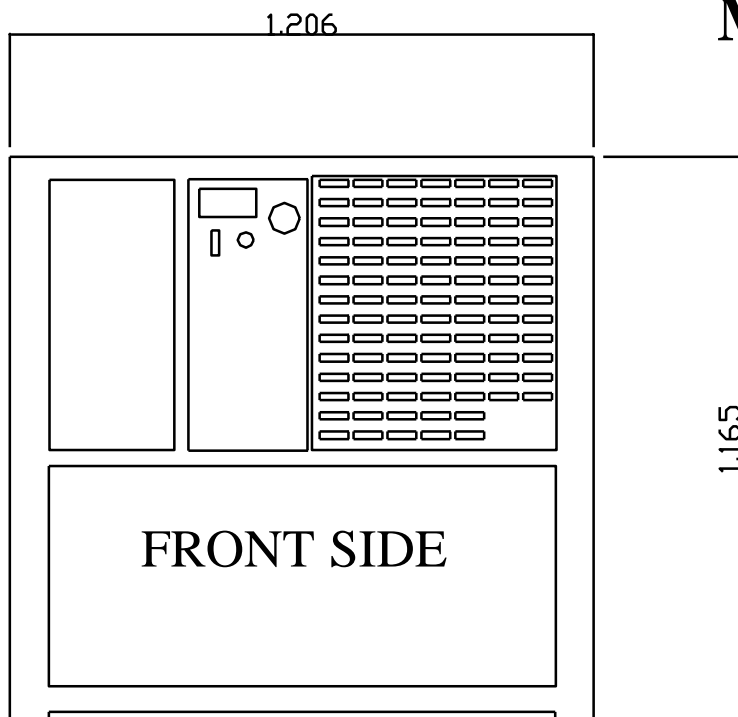
ICE CYCLE

Already treated water from reserve tanks enters into the machines. It excess flows from the overflow and returns to the recovery tanks. With this, it is achieved that the quantity of water spent equals the kilos of produced ice.

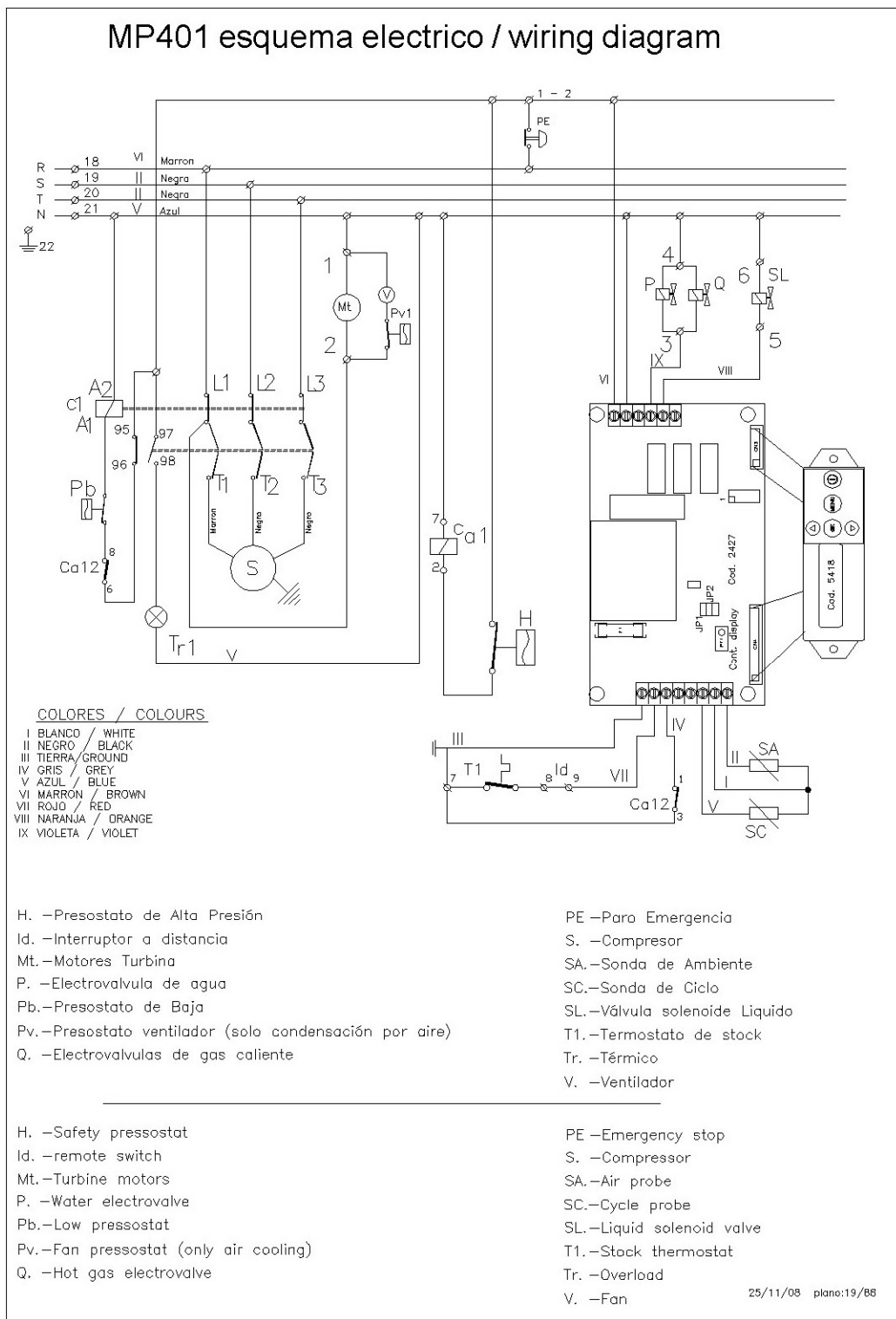
Once the water trays of the machines are full, the turbines and reefer compressors start and ice cube manufacturing starts.

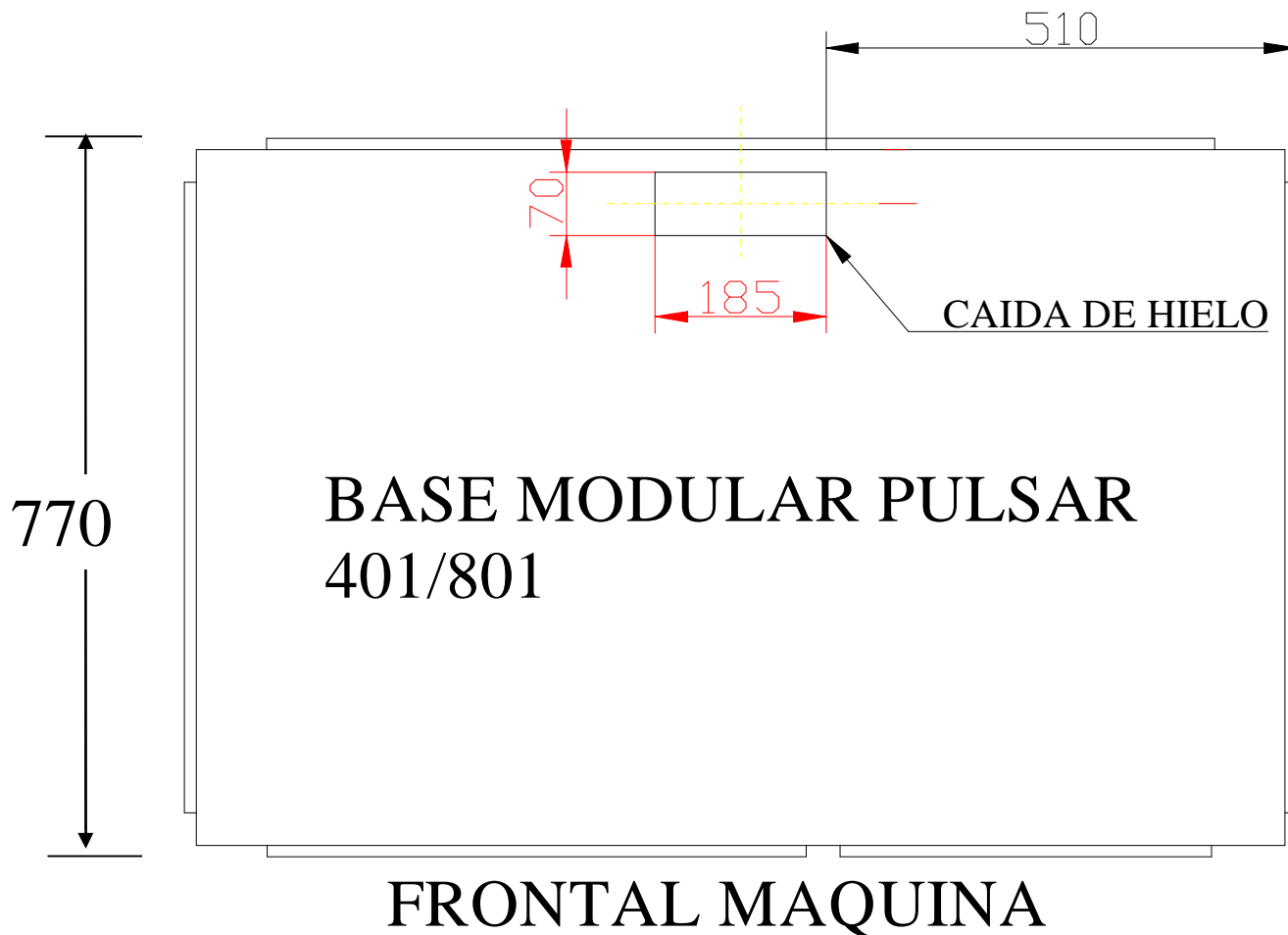
WITH AUTOMATIC PACKAGER / WEIGHT DEVICE: When the cycle ends, a valve enables hot gas to pass to the evaporators, cubes are detached and driven to tubes from which they are directed to the storage. From there, they are directed to the weight device / packager through belts. Cubes enter bags WITHOUT HUMAN MANIPULATION and as all materials where production occurs or from where the cubes pass are made of 18/8 STAINLESS STEEL or feeding grade PVC, THERE IS NO POSSIBILITY OF CONTAMINATION.

MP 401

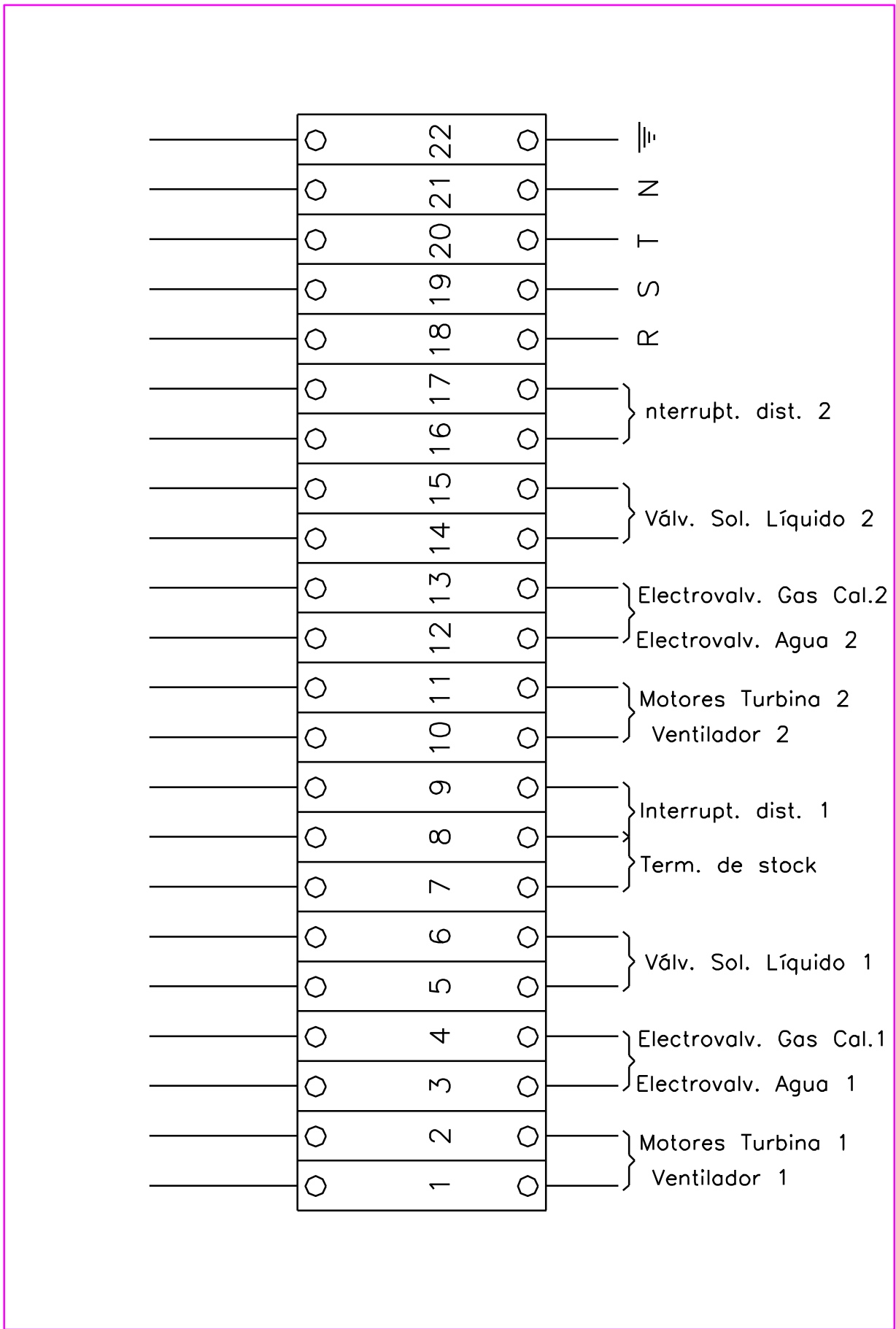


MP401 esquema electrico / wiring diagram





CAÍDA DE HIELO	ICE DROP
FRONTAL MÁQUINA	MACHINE FRONT
BASE MODULAR PULSAR	PULSAR MODULAR BASE



ERROR CODES FROM THE MANUFACTURING CONTROLLER.

Alarm	Probable cause	Verification	Solution
Storage Full Machine Stop	Thermostat failure	In the storage bin the ice cubes do not touch the thermostat rod	Check stock thermostat
Machine Stop Cycle Probe	Damaged cycle probe	Room temperature information menu *****	Replace cycle probe for a new one Or replace for the room temp. The machine keeps operating as if the room temperature was 20°C
High Temperature Machine Stop	Security pressure switch	Check fan or compressor	Replace the damaged pressure switch
		Objects that block the machine air inlet	Remove the objects that block the air flow
		Dirty condenser	Clean the condenser
Short Period Machine Stop	Ice cake formation in the machine	Check condensation and water inlet pressure	Adjust launching time
	The sprinklers do not water	The turbine does not work	Check turbine and turbine engine
		Lack of water	Check water inlet or possible leaks.
Long Period Machine Stop	Compressor or solenoid valve not operating	Output 1 information menu, signal during manufacturing process.	Change damaged devices
		The fan blades are in the wrong position	Reposition the blades
	Hot gas valve	Won't close	Replace valve
	Low refrigeration performance	Check refrigeration circuit	
	Water loss	Check electrovalve	Change damaged devices
	Lack of ventilation	Same as high temperature	Same as high temperature
		Low or no passage of recommended air outlets	Increase air outlets or create them if there aren't any