



MXG SERIES

MXG SERIES CUBERS

TECHNICAL SERVICE TRAINING

Welcome to another Scotsman technical service presentation
This one will cover the electronic MXG series Ice Cube Machines





MXG 328 A/W

Max. Ice Production = 150 Kg/24h*

* 10/10°C= Air & Water Inlet Temperature

Small Gourmet
8 g



25,5 x mm 22,5 mm x 21 mm

Medium Gourmet
20 g



34,5 mm x 30,5 mm x 29,5 mm

Large Gourmet
39 g



41,5 mm x 38 mm x 35 mm



MXG 428 A/W

Max. Ice Production = 195 Kg/24h*

* 10/10°C= Air & Water Inlet Temperature

Small Gourmet
8 g



25,5 x mm 22,5 mm x 21 mm

Medium Gourmet
20 g



34,5 mm x 30,5 mm x 29,5 mm

Large Gourmet
39 g



41,5 mm x 38 mm x 35 mm



MXG 438 A/W

Max. Ice Production = 195 Kg/24h

*10/10°C = Air & Water Inlet Temperature

Small Gourmet
8 g



25,5 x mm 22,5 mm x 21 mm

Medium Gourmet
20 g



34,5 mm x 30,5 mm x 29,5 mm

Large Gourmet
39 g



41,5 mm x 38 mm x 35 mm



MXG 638 A/W

Max. Ice Production = 340 Kg/24h

*10/10°C = Air & Water Inlet Temperature

Small Gourmet
8 g



25,5 x mm 22,5 mm x 21 mm

Medium Gourmet
20 g



34,5 mm x 30,5 mm x 29,5 mm

Large Gourmet
39 g



41,5 mm x 38 mm x 35 mm



MXG 938 A/W

Max. Ice Production = 400 Kg/24h

*10/10°C = Air & Water Inlet Temperature

Small Gourmet
8 g



25,5 x mm 22,5 mm x 21 mm

Medium Gourmet
20 g



34,5 mm x 30,5 mm x 29,5 mm

Large Gourmet
39 g



41,5 mm x 38 mm x 35 mm

TOPICS

On the next slides are shown the following steps by steps procedures:

- **UNPACKING**
- **INSTALLATION**
- **START UP AND OPERATIONAL CHECKS**
- **OPERATING PRINCIPLES and COMPONENTS**
- **MAINTENANCE**
- **SERVICE ANALYSIS**



NEW MXG SERIES

UNPACKING

UNPACKING

The machines are supplied in a carton box secured by two plastic strips to a wooden base. Check first the outside conditions of carton box and wooden base then cut the two plastic strips, remove the tape and then the carton box.





NEW MXG SERIES

UNPACKING

Slip away – remove
plastic strip



UNPACKING

Remove front panel
air filter (AC version
only)



UNPACKING

Remove front panel
screws and the
panel

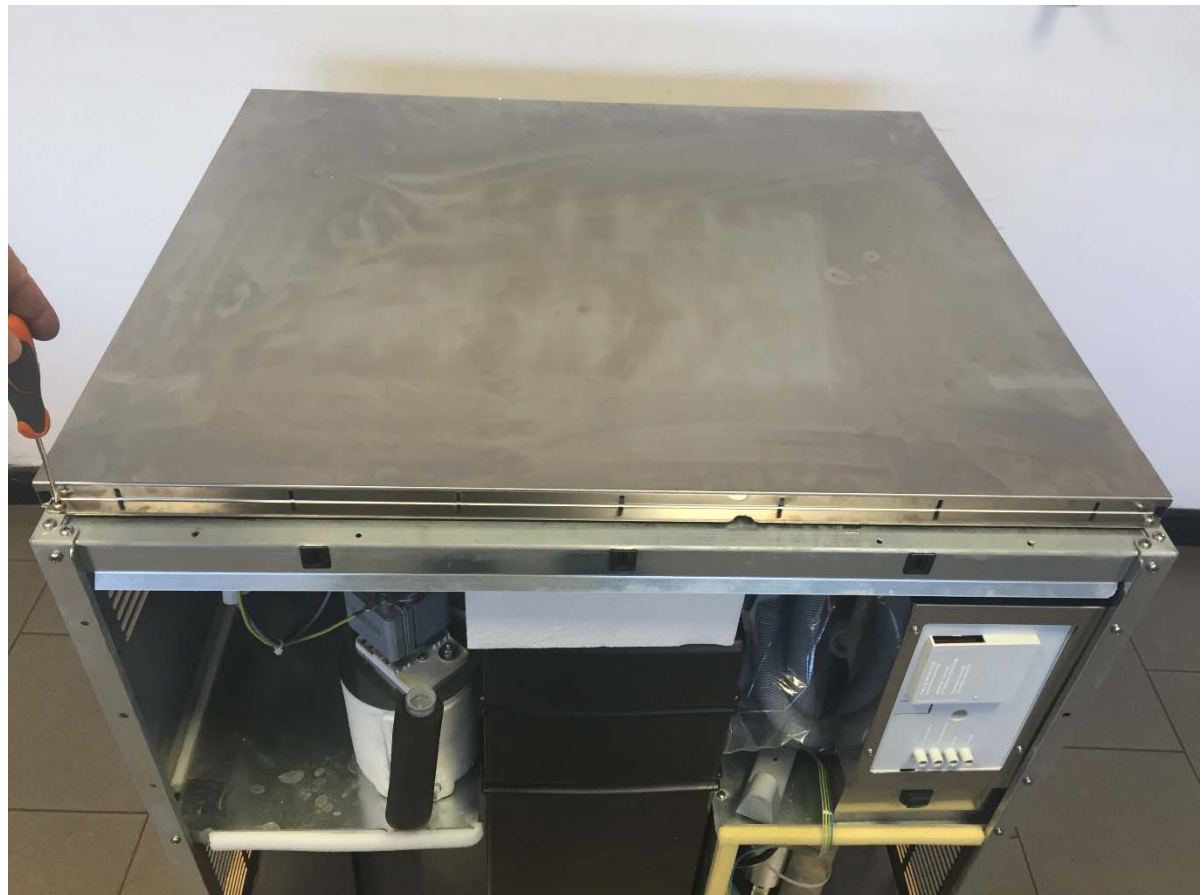




NEW MXG SERIES

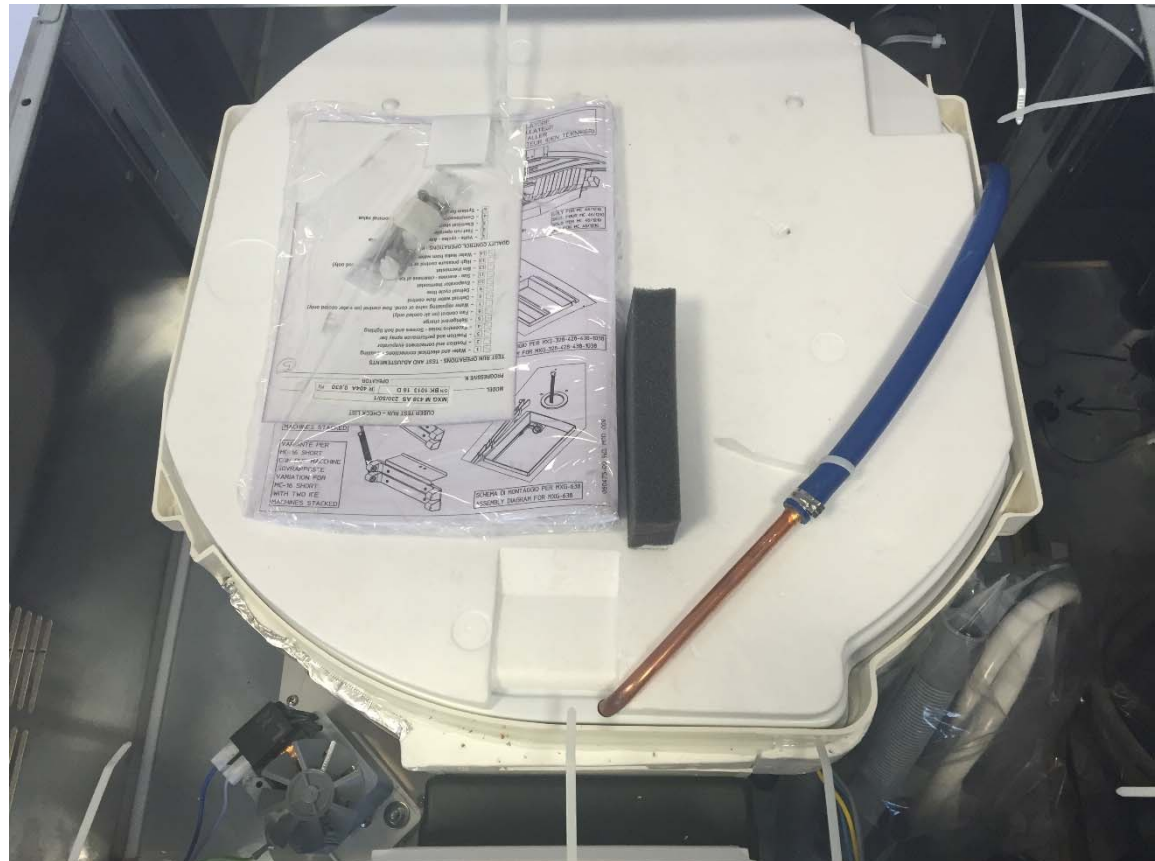
UNPACKING

Remove top panel
screws and the
panel



UNPACKING

Remove I/R bracket
installation
instruction and
water inlet and
outlet hoses



UNPACKING

Remove side
panels screws and
the panels



UNPACKING

.....unscrew

the unit

frame from

the wooden

base....





NEW MXG SERIES

UNPACKING

The Modular Cuber machines require for the installation the use of a companion storage bin to store the ice produced.

Perfect “matching” storage bins are:

SB 193 – 322 for MXG 328-428

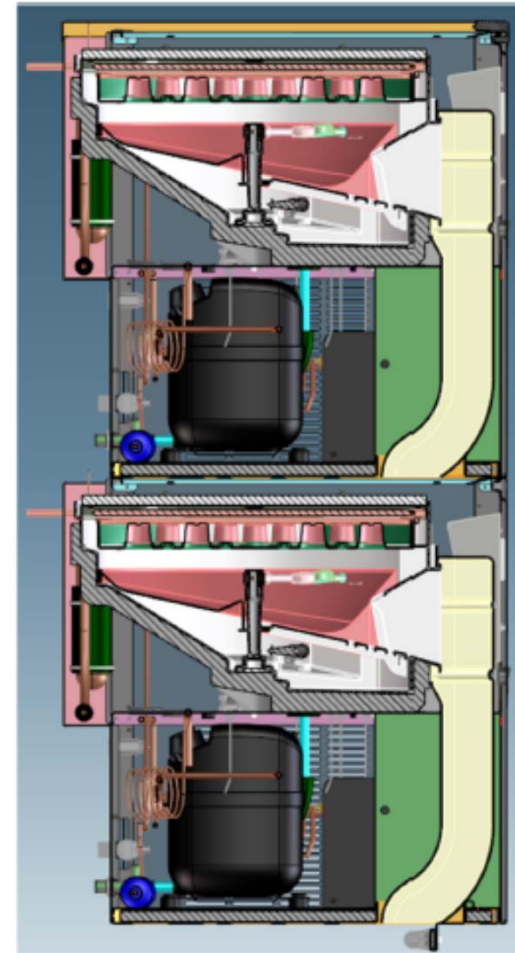
SB 393 – 530 for MXG 438-638-938



UNPACKING

Due to design reason MXG series can not be stacked:

- Ice chutes not aligned
- Not enough space for Service over the bottom unit top evaporator
- Not possible to remove bottom unit front panel





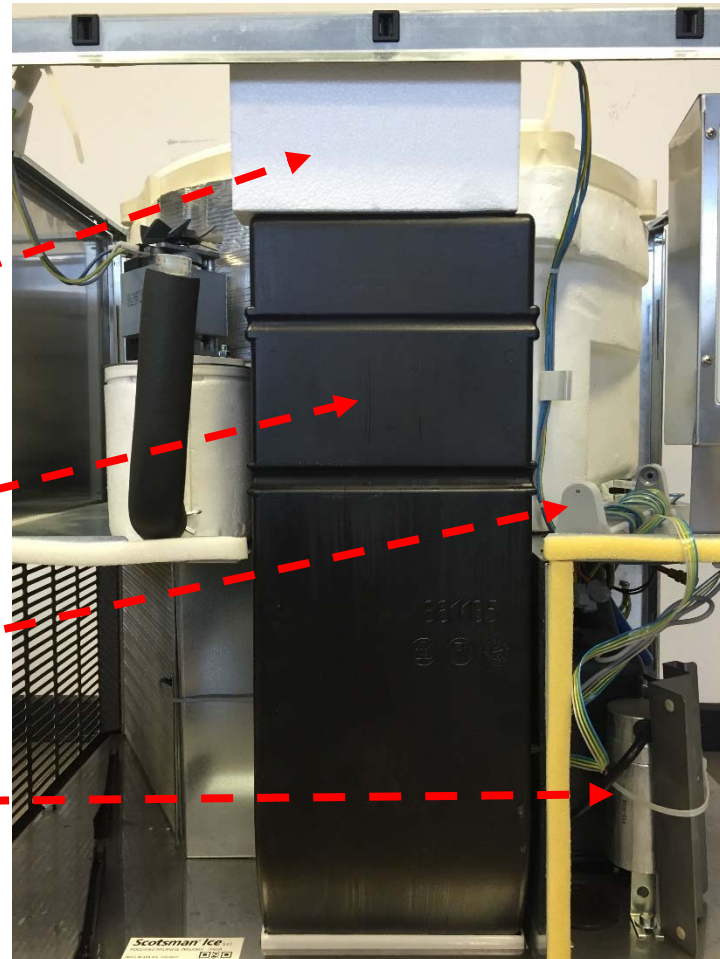
NEW MXG SERIES

INSTALLATION

INSTALLATION

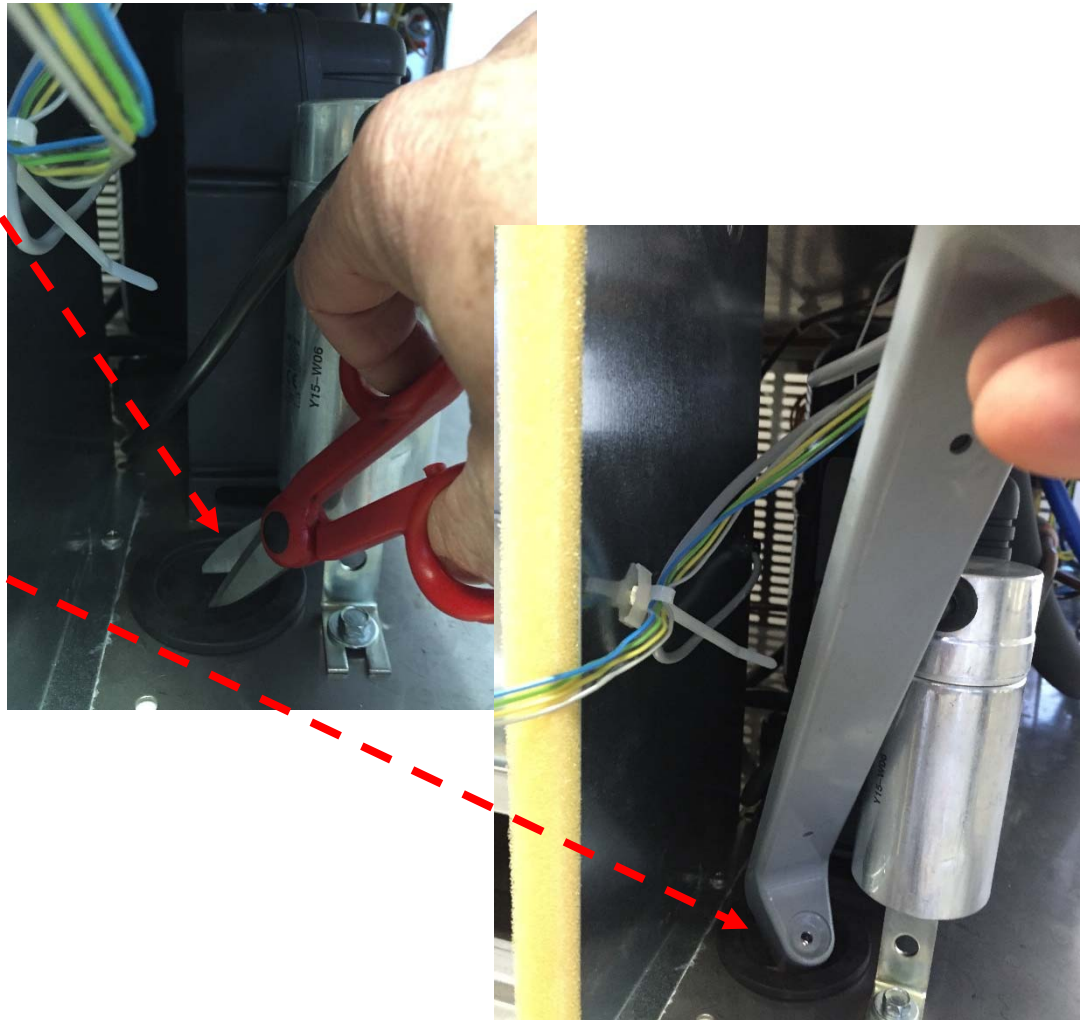
After having installed the ice maker on top of chosen bin, remove polystyrene block form ice chute top and remove the ice chute.

locate I/R and its bracket, release the same from clamps



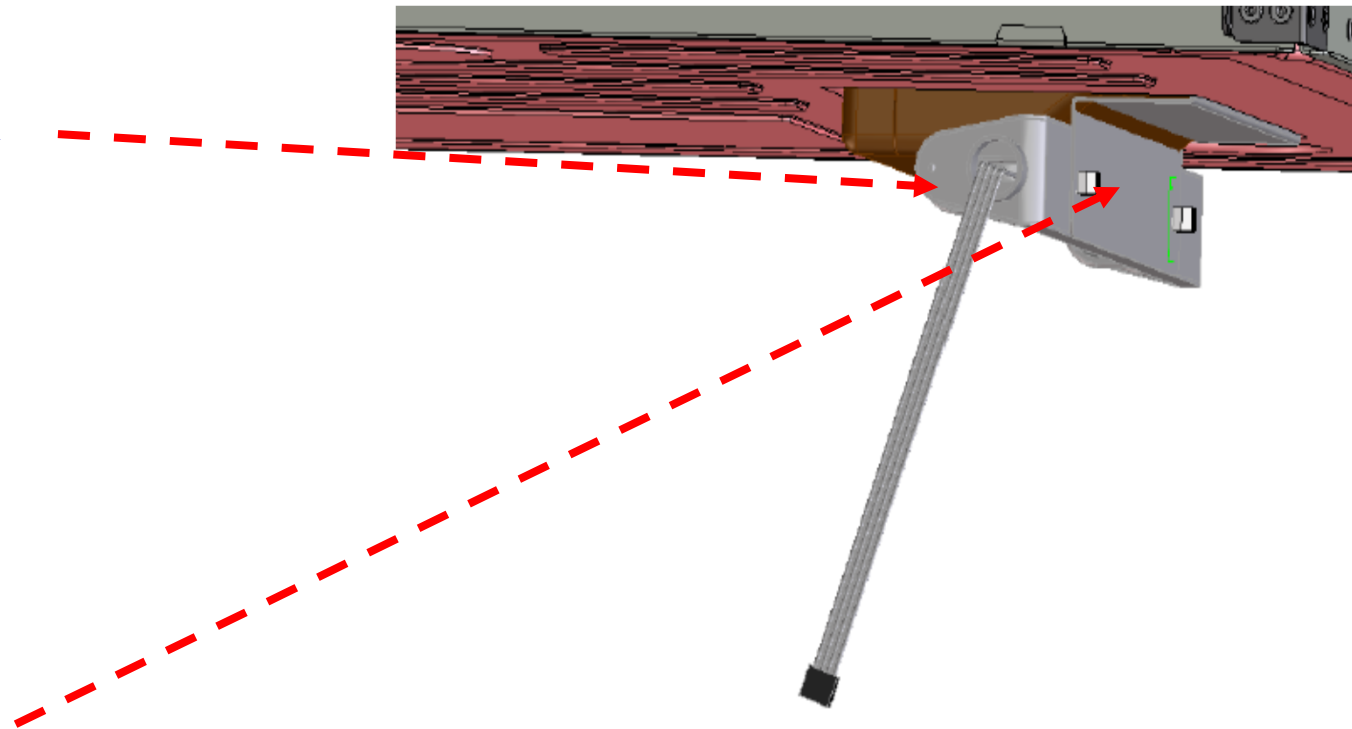
INSTALLATION

Cut the unit base gasket, pass the I/R sensor through the same reaching the inner bin area.



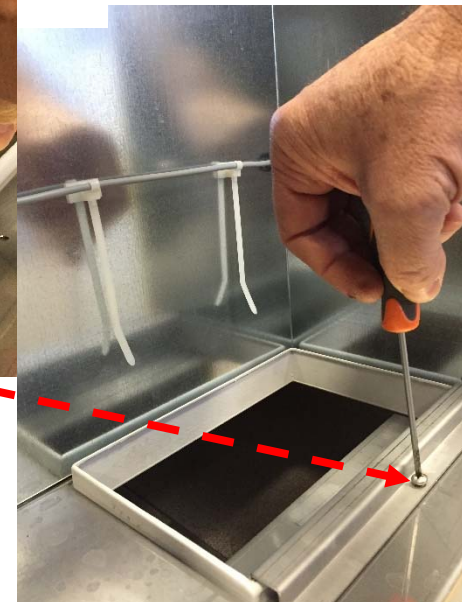
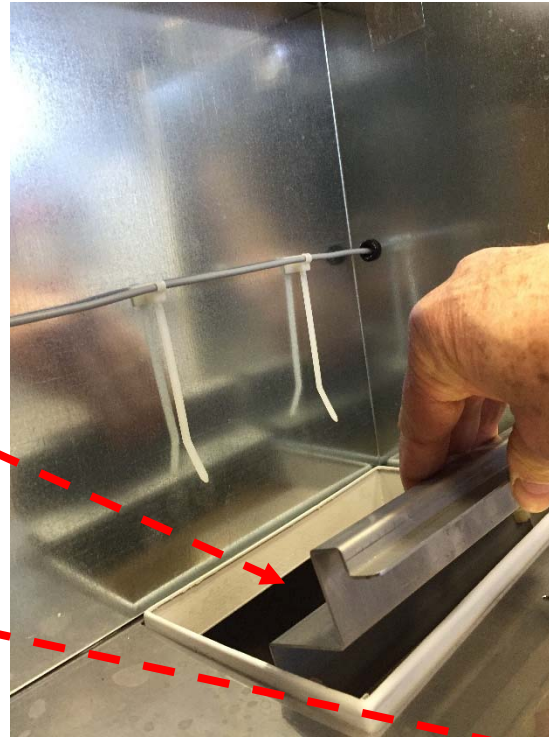
INSTALLATION

Fix the IR
by
supplied
screws to
related
bracket



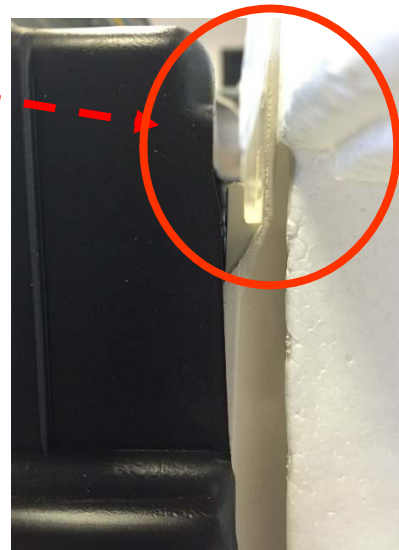
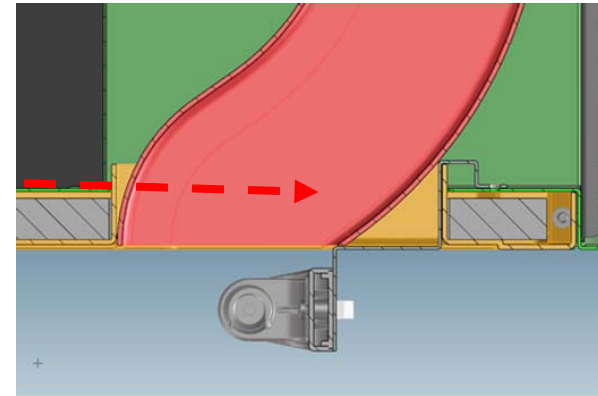
INSTALLATION

Fix IR bracket at
ice chute
discharge area by
stainless steel
screw



INSTALLATION

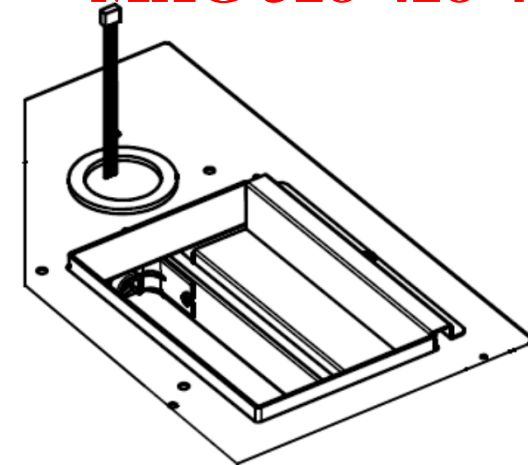
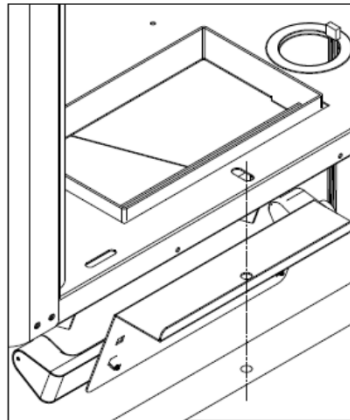
Once installed optical level sensor, re-install ice chute previously removed paying attention to hang the same to its hook rim point.



INSTALLATION

MXG 328-428-438-938

Note different
location
according to
MXG models



MXG 638

INSTALLATION

Check the data plate of the machine located on the rear panel for correct voltage as well as for the proper wiring/fuse size.

Remember that all machines require a solid earth wire.

Scotsman[®] Ice S.r.l.
POGLIANO MILANESE (MILANO) - ITALIA

MXG M 438 AS 230/50/1				
Serial Number BK 1013 16 D				
230	V ~	8,6 A	50 Hz	1850 W
Cl.T	IP21	R 404A 0,630 Kg	16 A	

MRF **XG43A**

MADE IN ITALY

EAC

Contiene gas fluorurati ad effetto serra disciplinati dal Protocollo di Kyoto
Contains fluorinated greenhouse gases covered by the Kyoto Protocol
Ermeticamente sigillato - Hermetically sealed
Schiuma insufflata mediante gas fluorurati ad effetto serra
Foam blown with fluorinated greenhouse gases



INSTALLATION

Check for the correct water and ambient conditions that should be:

- Min. ambient temperature 10°C (50F)
- Max. ambient temperature 40°C (100F)
- Min. water temperature 5°C (40F)
- Max. water temperature 35°C (90F)
- Min. water pressure 1 bar (14 PSI)
- Max. water pressure 5 bar (70 PSI)

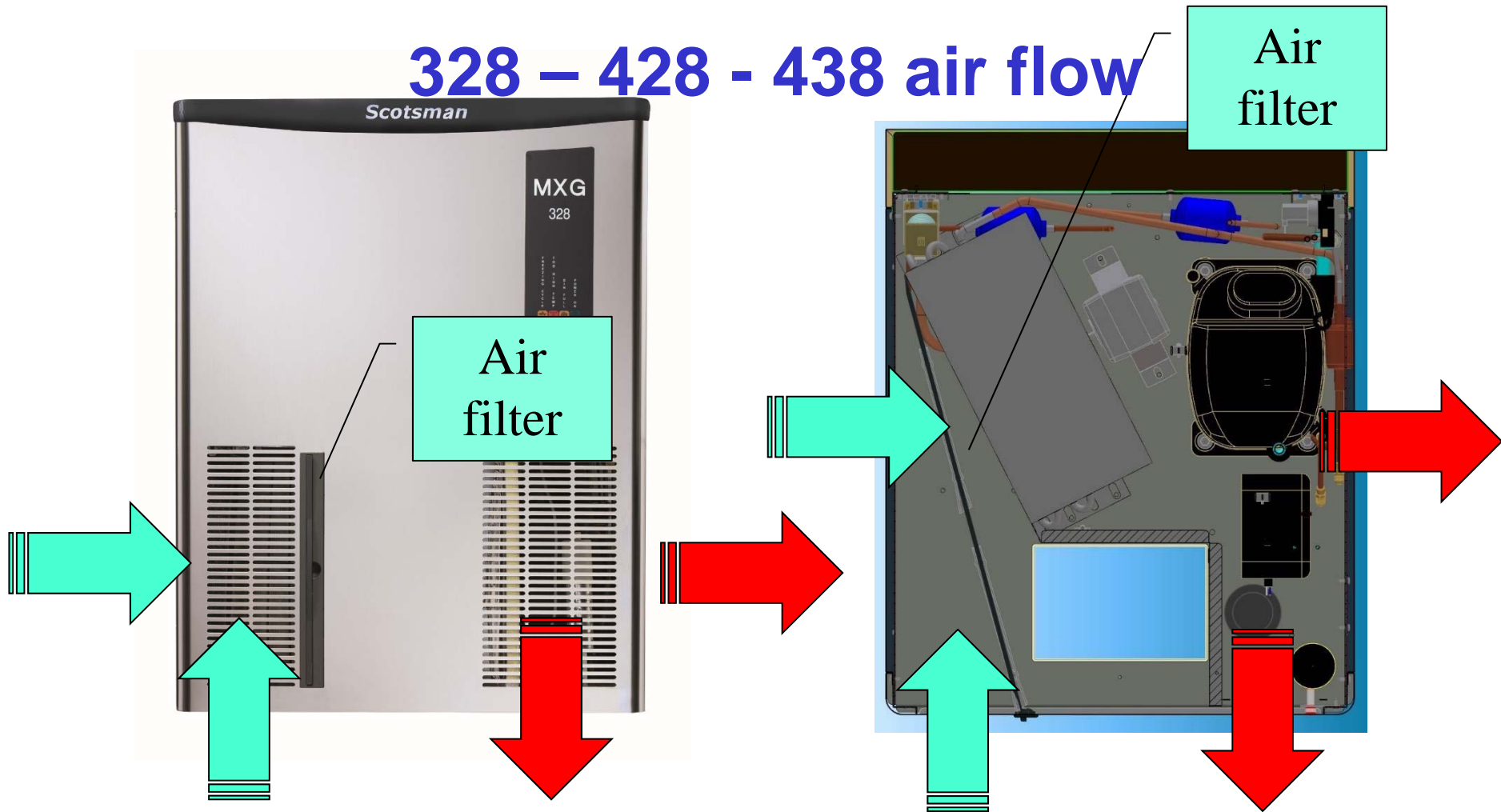
INSTALLATION

Adequate space must be left for proper water and electrical connections on the rear side of the machine. A minimum clearance of 15 cm on both sides for best routing air.



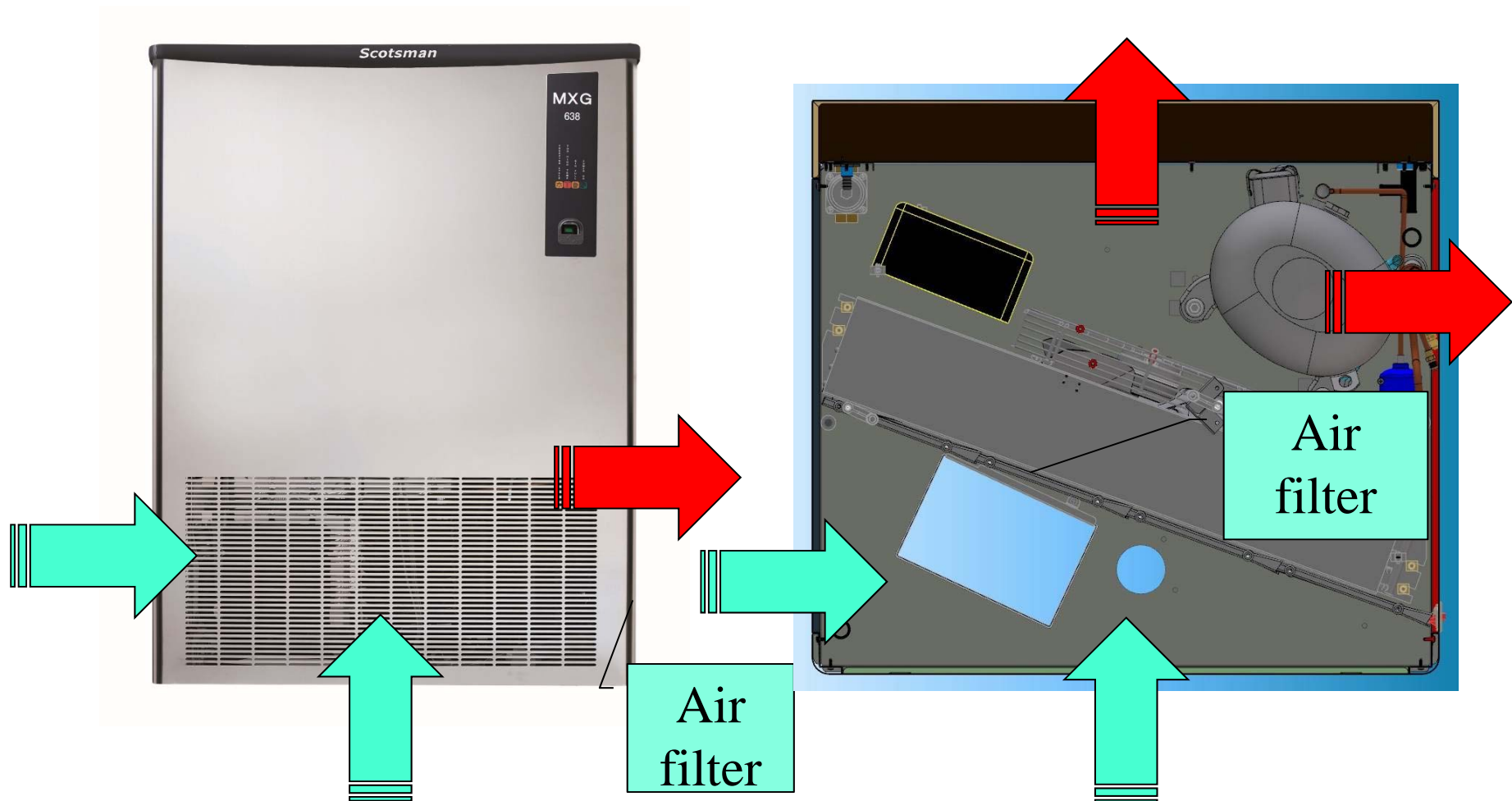
INSTALLATION

328 – 428 - 438 air flow



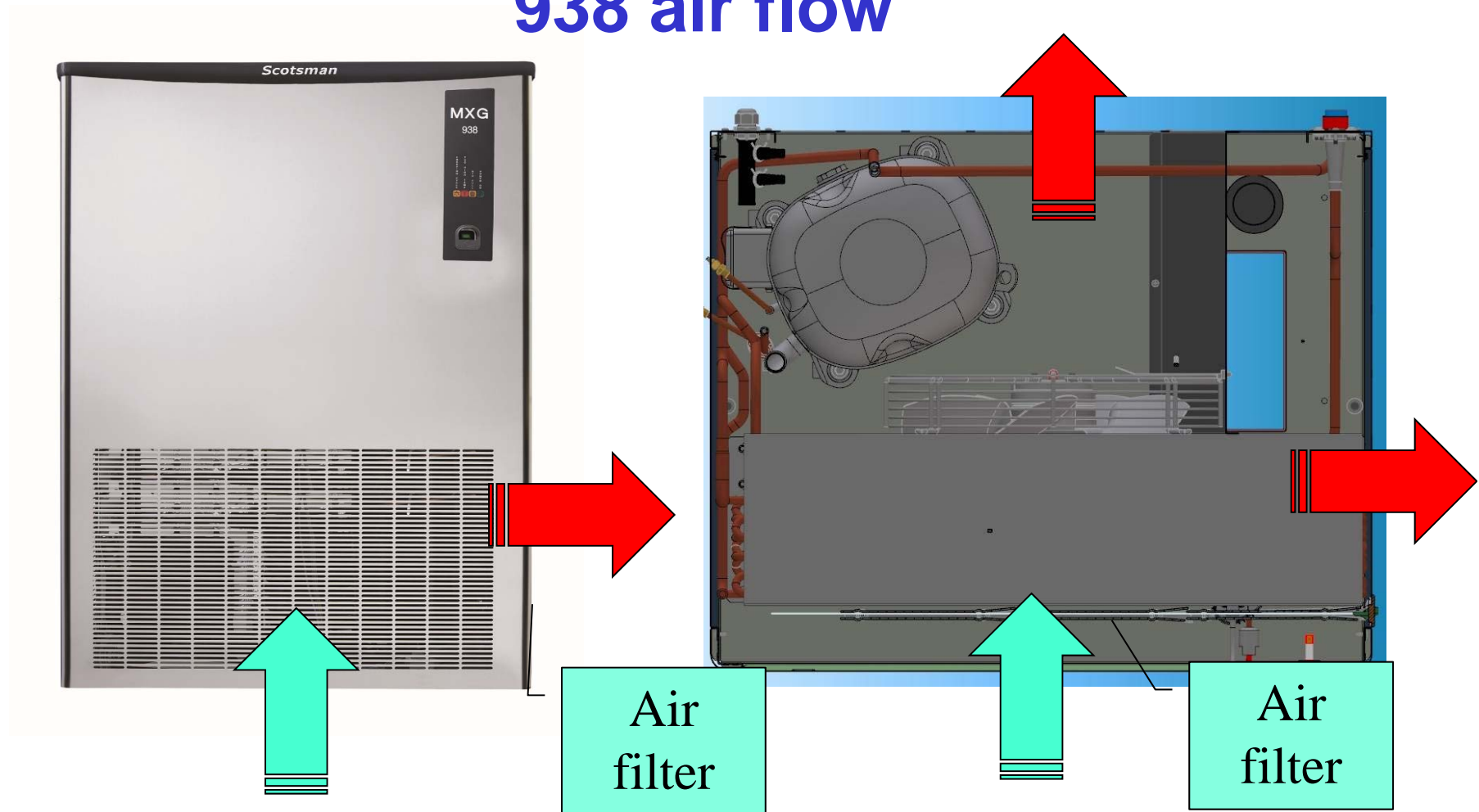
INSTALLATION

638 air flow



INSTALLATION

938 air flow



STACKING INSTALLATION

Level the unit on
both directions front
to rear and right to
left side using the
adjustable legs.



INSTALLATION - ELECTRICAL

Install, on the cable supply with the machine, an adequate electrical plug according to the local standards and regulations.

Maximum voltage variation should be $\pm 10\%$.

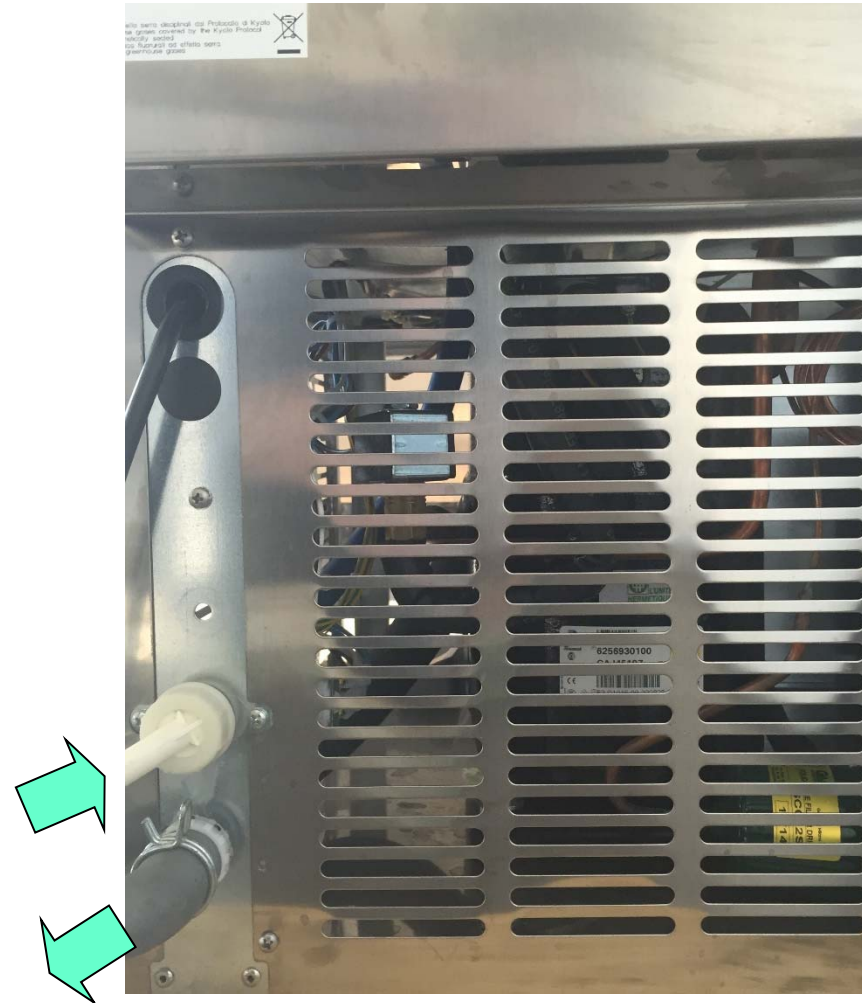
Machine must be individually fuse protected.



INSTALLATION – WATER PIPING

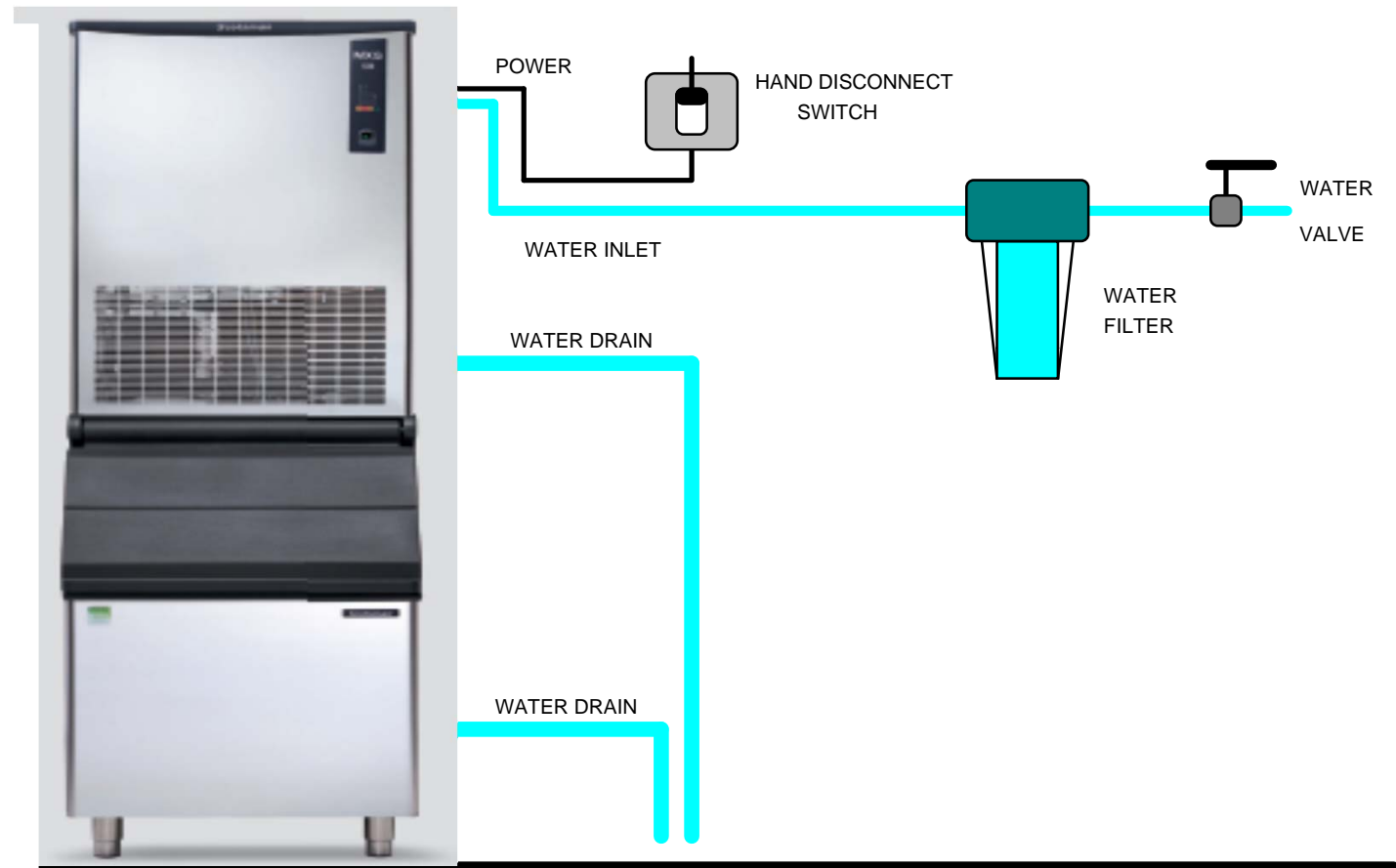
Connect the water inlet 3/4" male threat of the water inlet solenoid valve to the water supply line by means of the rubber hose provided with machine. Install on water supply line closed to the machine a water valve (tap).

Connect the 20 mm O.D. fitting of the water drain with the flexible hose supply with the machine securing it by proper



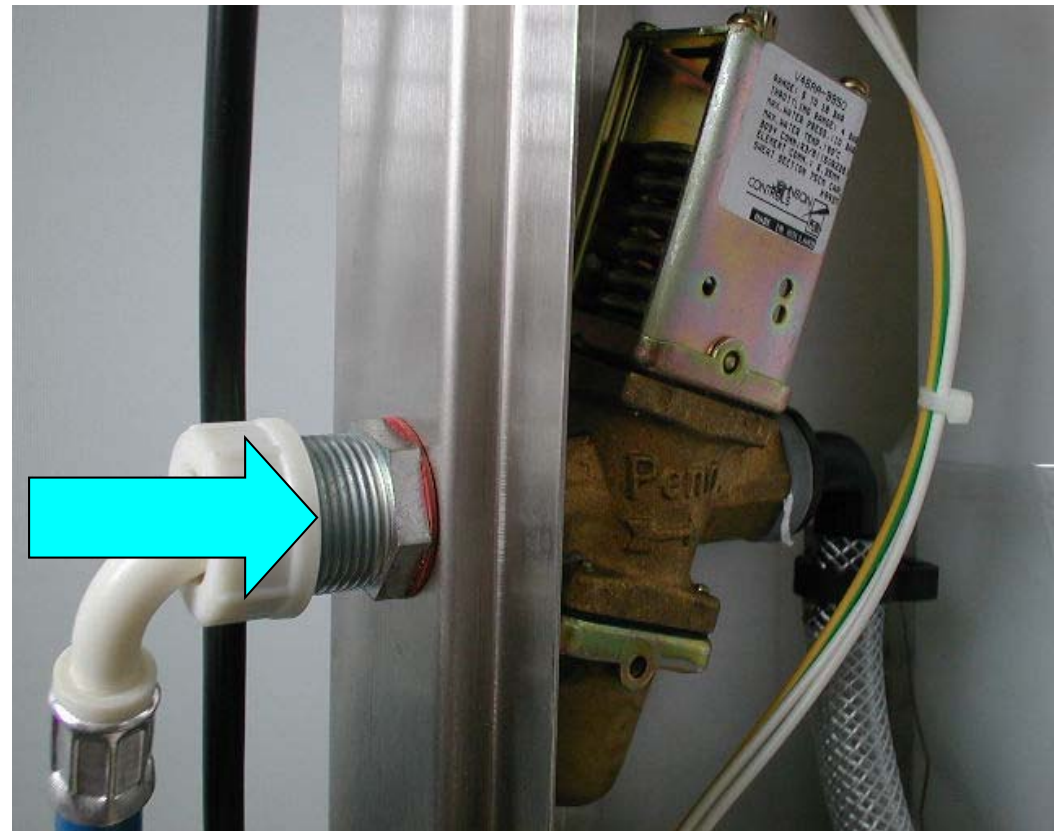
TYPICAL INSTALLATION

AIR COOLED VERSION



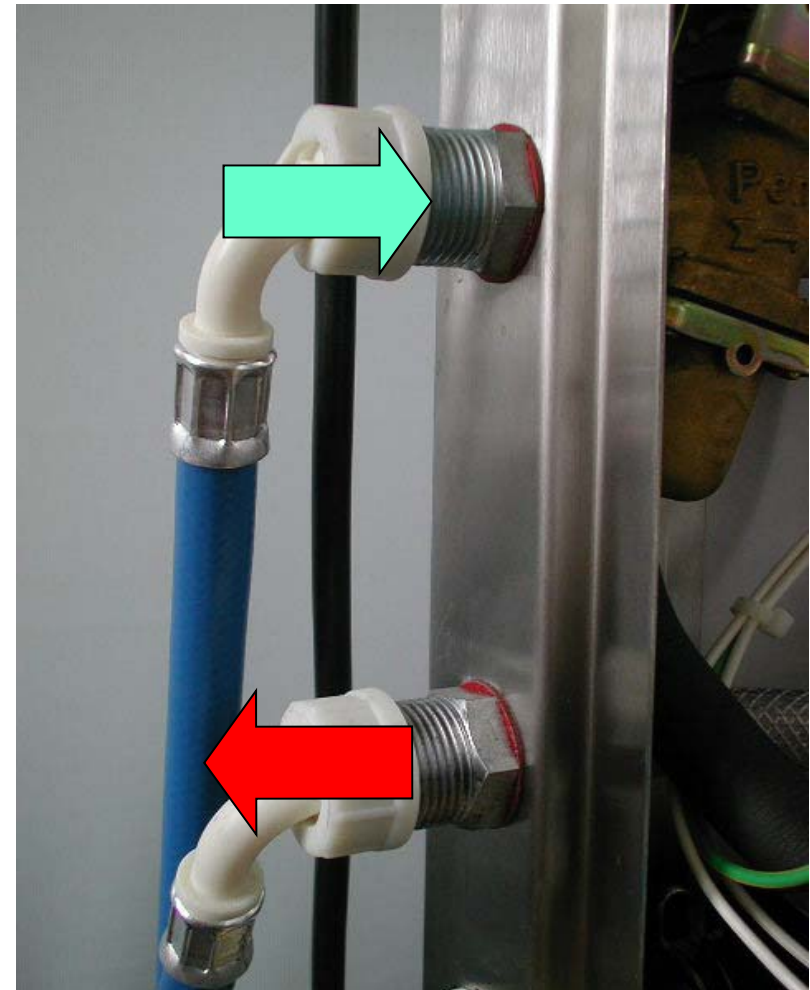
INSTALLATION

On the water cooled version there are two separate 3/4" male thread water inlet fittings.....



INSTALLATION

.....a second separate
drain hose must be
connected to the outlet
3/4" male fitting located
on the upper side of the
water regulating valve.

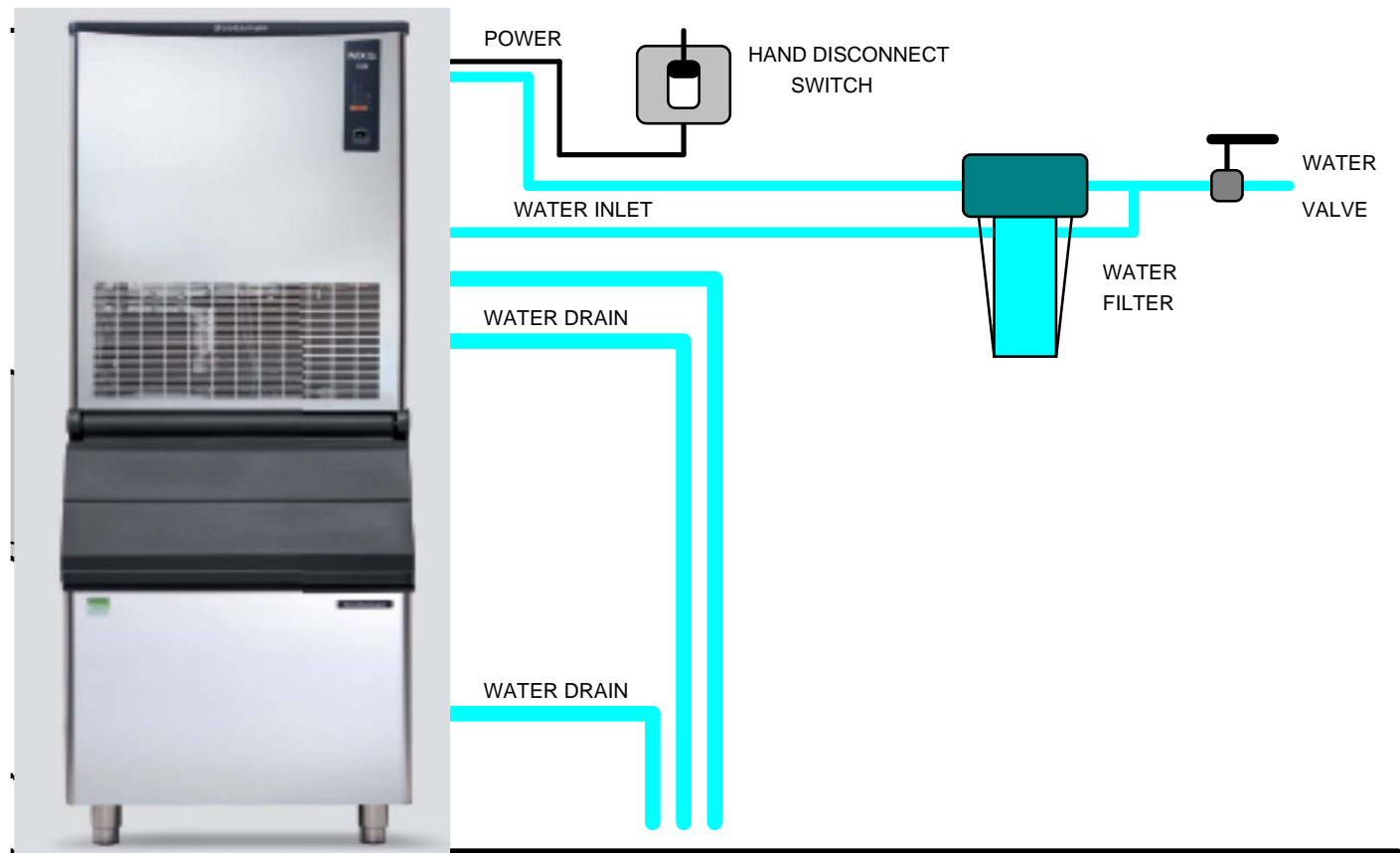




NEW MXG SERIES

TYPICAL INSTALLATION

WATER COOLED VERSION



START UP AND OPERATIONAL CHECKS

START UP AND OPERATIONAL CHECKS

Open the water tap/valve and Switch ON the power on the electrical supply line.



START UP AND OPERATIONAL CHECKS

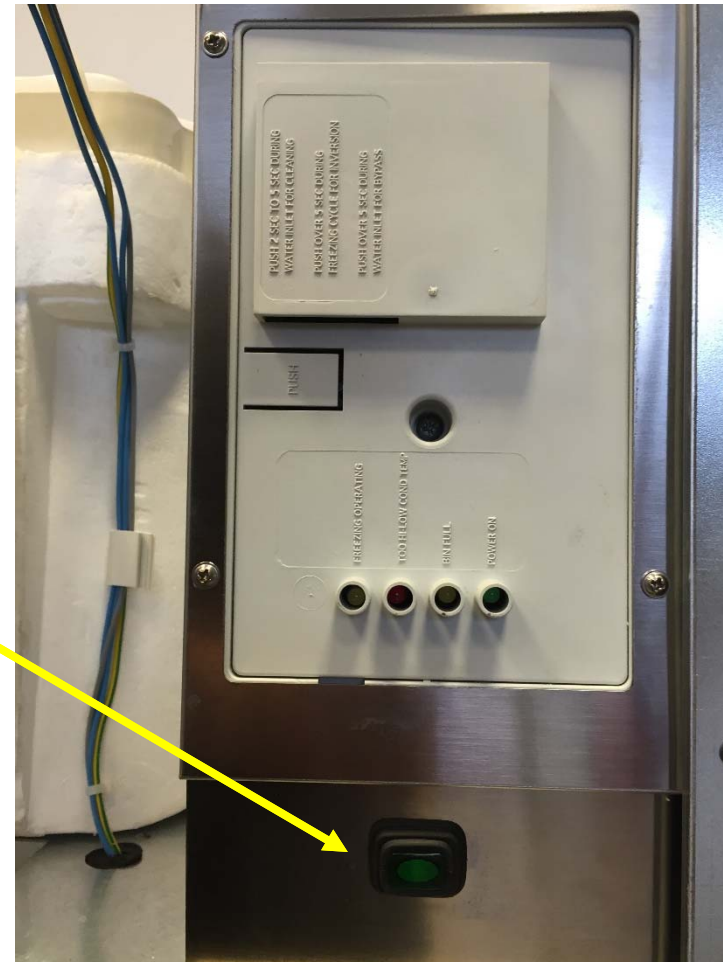
Green Lighted
Master Push
Switch located in
the front panel.

By pushing it is
possible to Switch
ON and OFF the
machine.



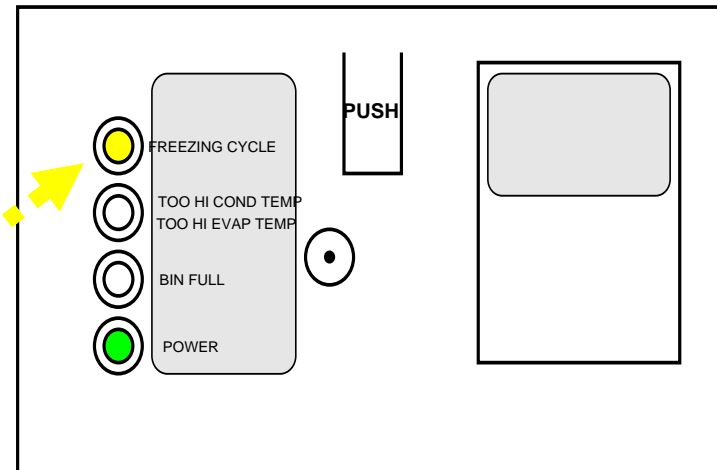
START UP AND OPERATIONAL CHECKS

Push the Green
Push Button
Switch to Start
Up the machine



START UP AND OPERATIONAL CHECKS

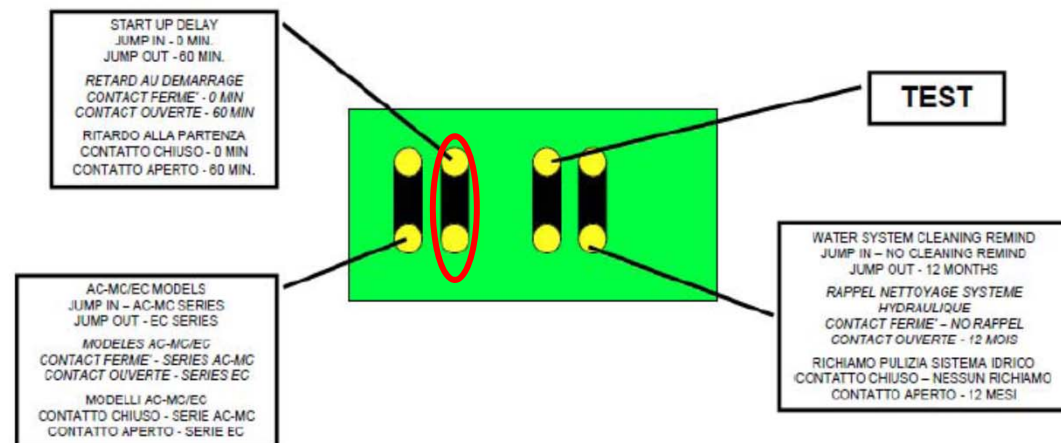
A start-up delay is factory set at 60' on the models MXG 638 - 938 with the Yellow LED blinking.



This delay can be set up with the Jumper n.3

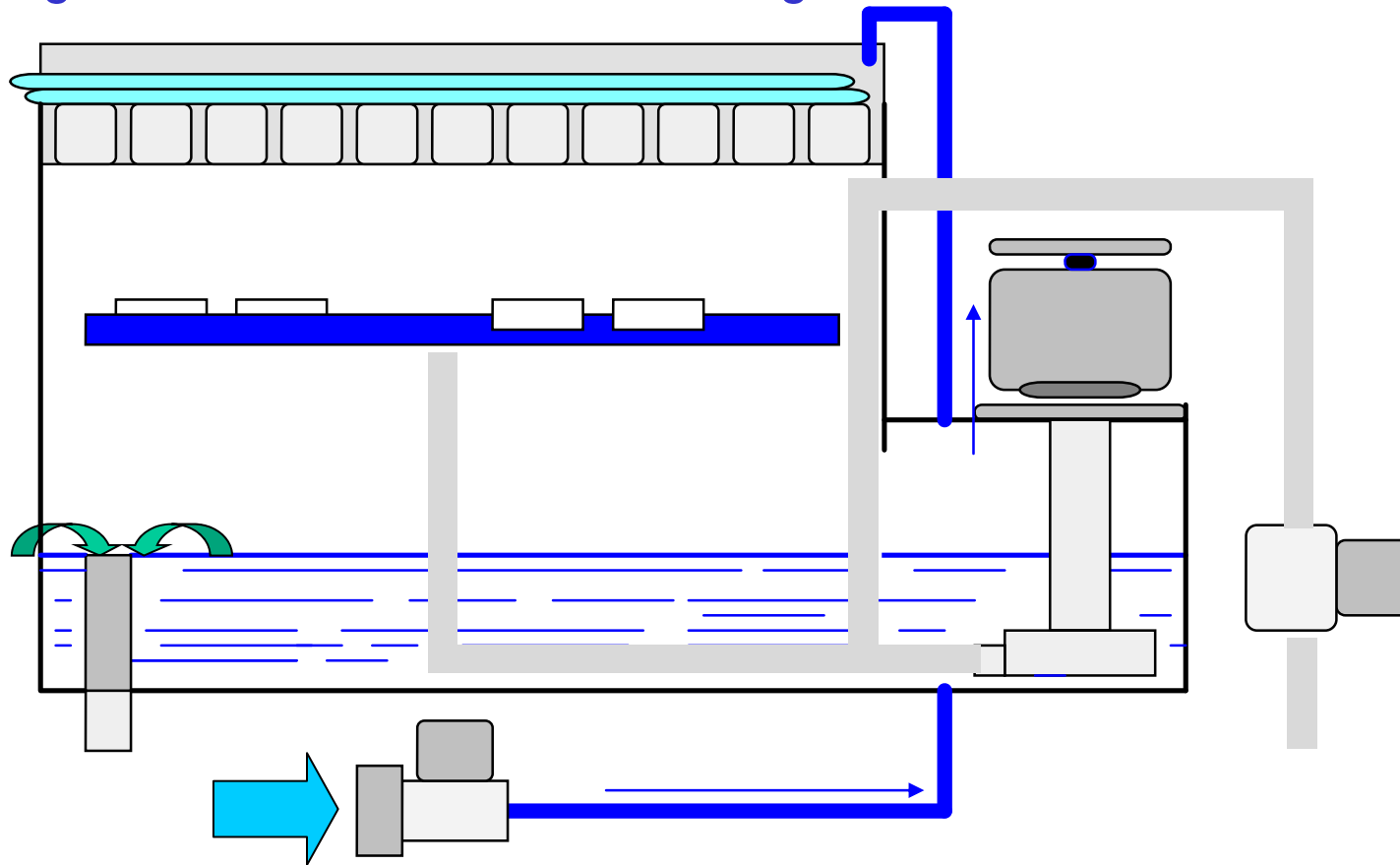
Jump IN = 0'

Jump OUT = 60'



START UP AND OPERATIONAL CHECKS

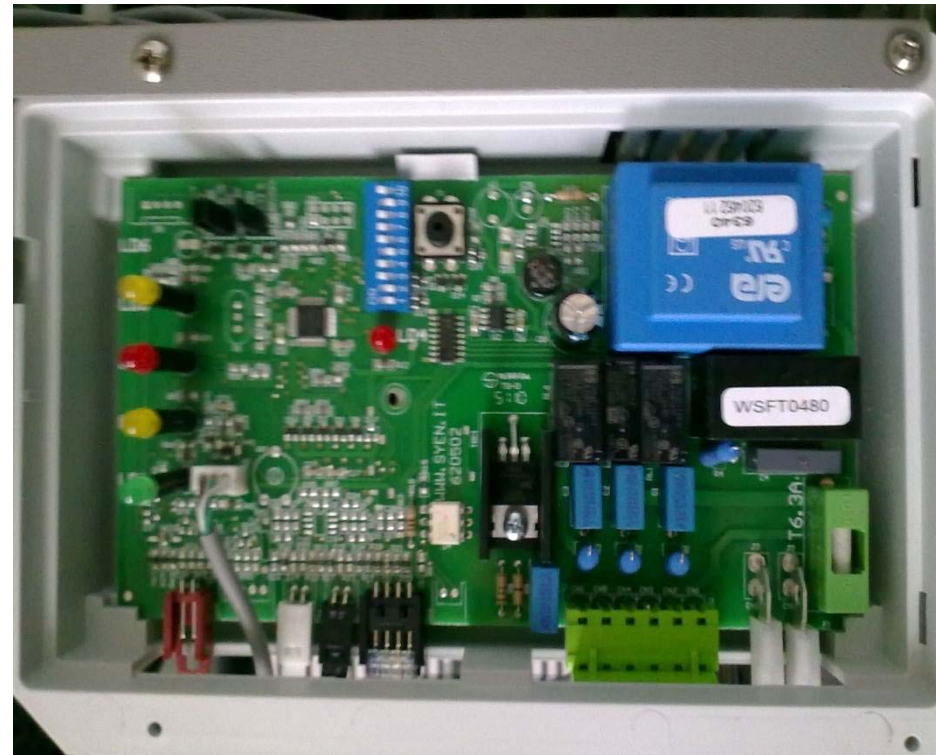
Once the start delay is elapsed the Ice Machine will start up automatically through the 5 minutes of “Water Filling Phase”.



START UP AND OPERATIONAL CHECKS

The components energized during this period are:

- PC Board



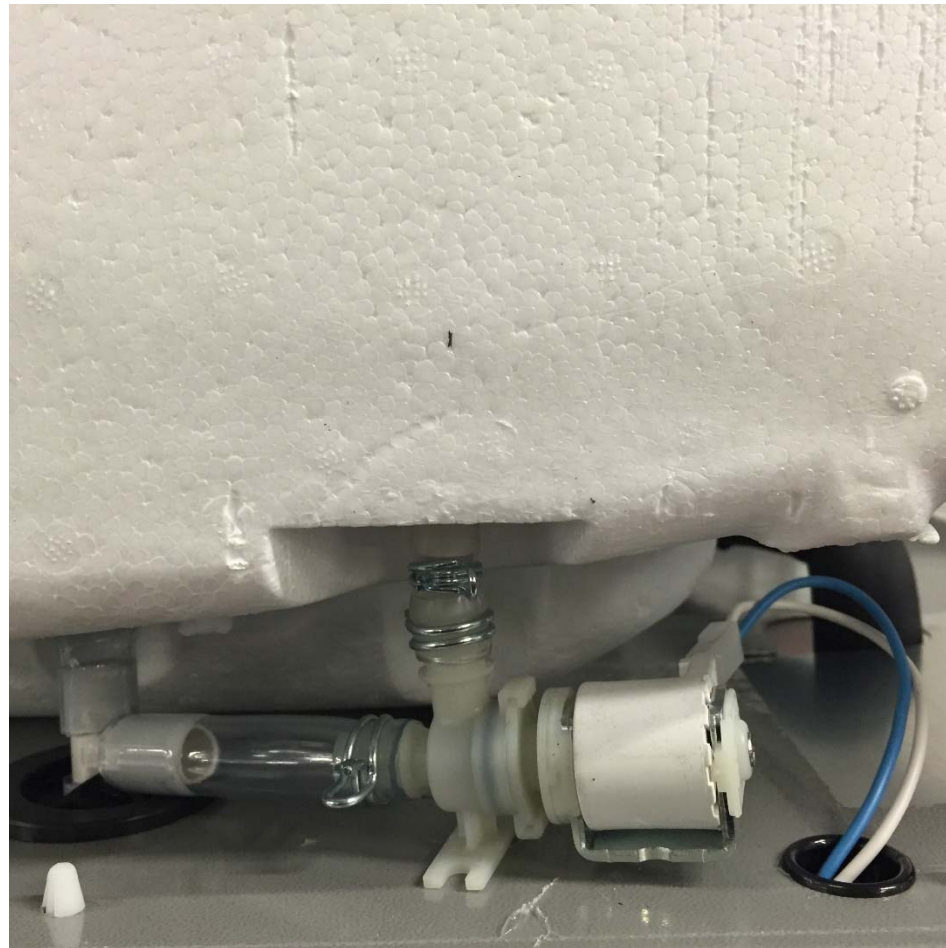
START UP AND OPERATIONAL CHECKS

- Water Inlet Solenoid Valve



START UP AND OPERATIONAL CHECKS

- Water drain valve



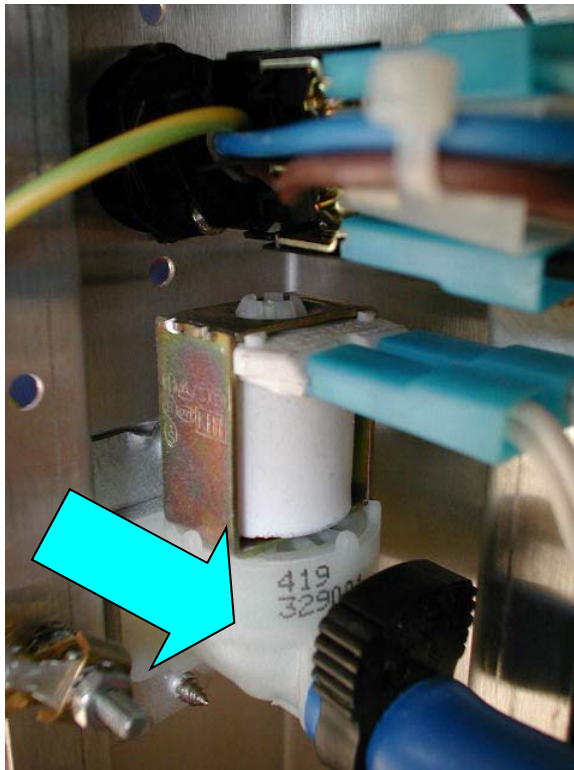
START UP AND OPERATIONAL CHECKS

- Hot Gas Solenoid Valve

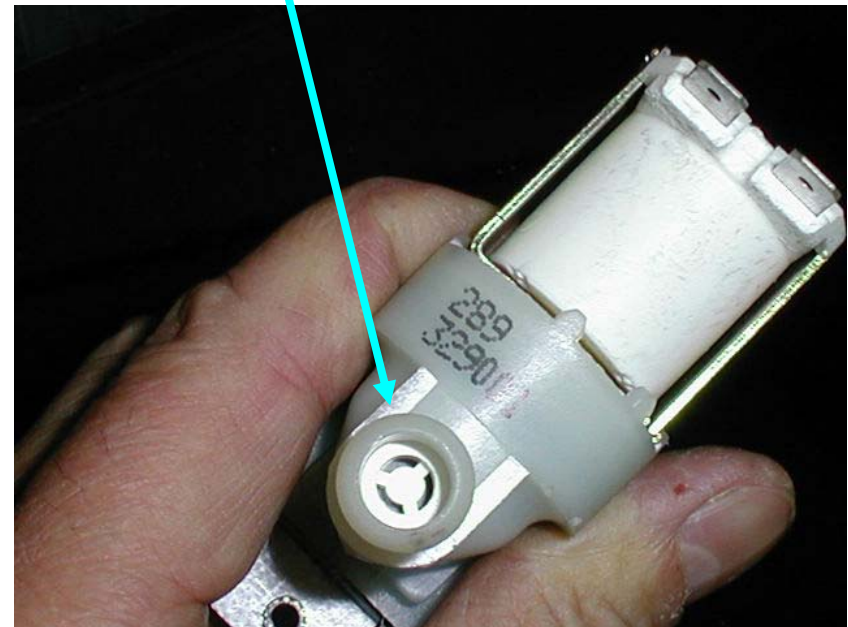


START UP AND OPERATIONAL CHECKS

During the first 5' the water goes through the Water Inlet Valve then...

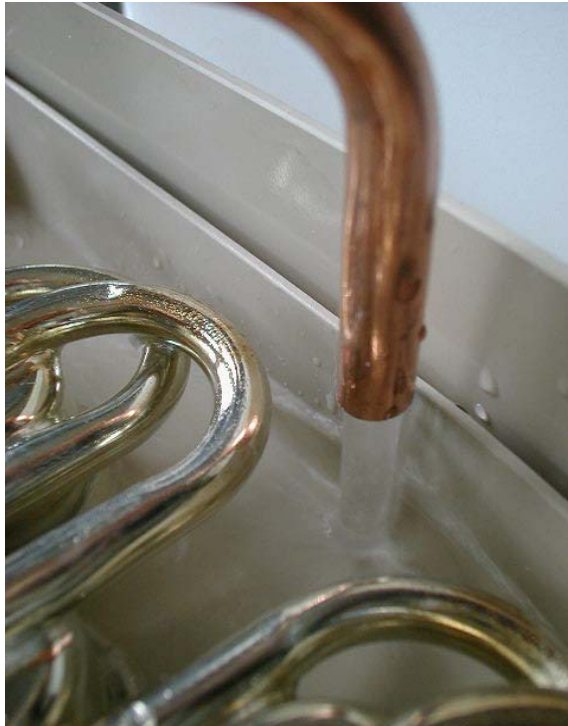


....flows into the small orifice of the “Flow Control” located on the outlet port of the same.

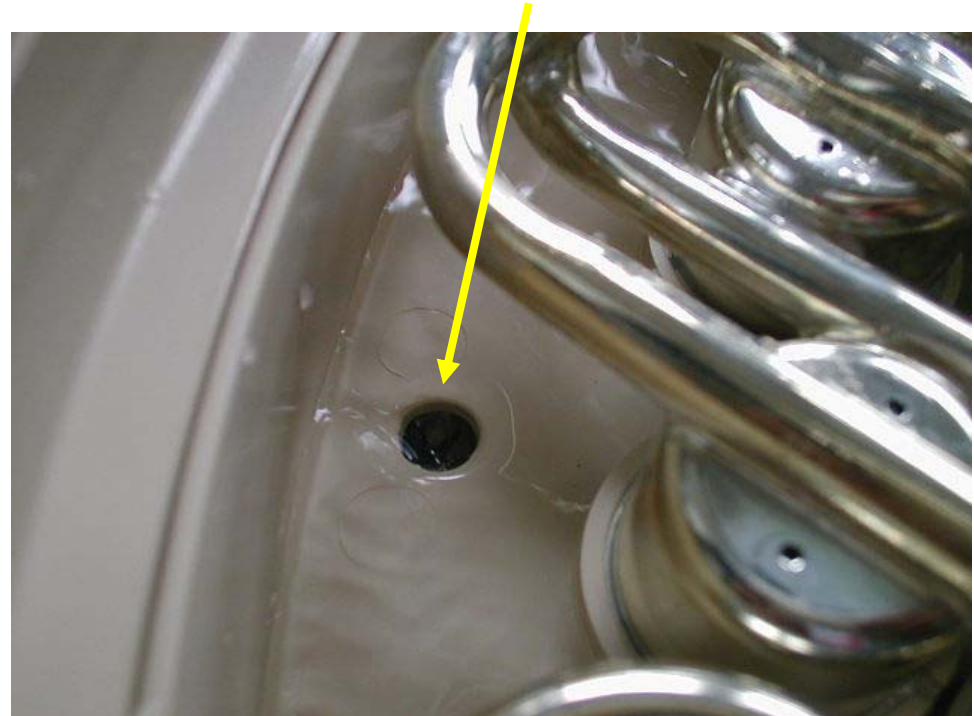


START UP AND OPERATIONAL CHECKS

Following the plastic inlet hose the incoming water arrive on the upper side of the evaporator....



.... where it flows onto the plastic evaporator platen dribbling down through the holes located on the corners.



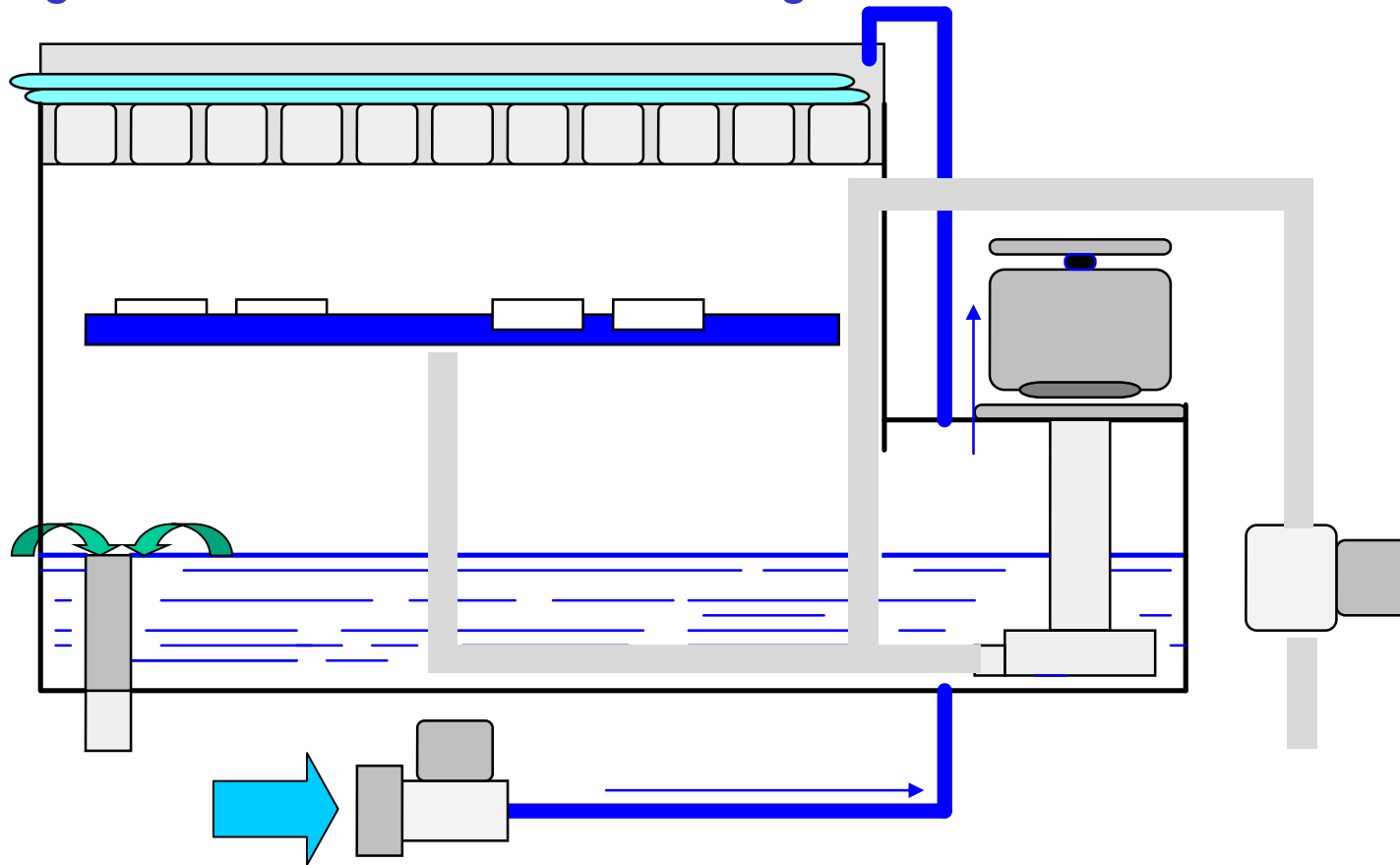
START UP AND OPERATIONAL CHECKS

Dribbled water is collected down into the water sump where is located the overflow that assures the proper water level and quantity for the next freezing cycle.



START UP AND OPERATIONAL CHECKS

Once the start delay is elapsed the Ice Machine will start up automatically through the 5 minutes of “Water Filling Phase”.



START UP AND OPERATIONAL CHECKS

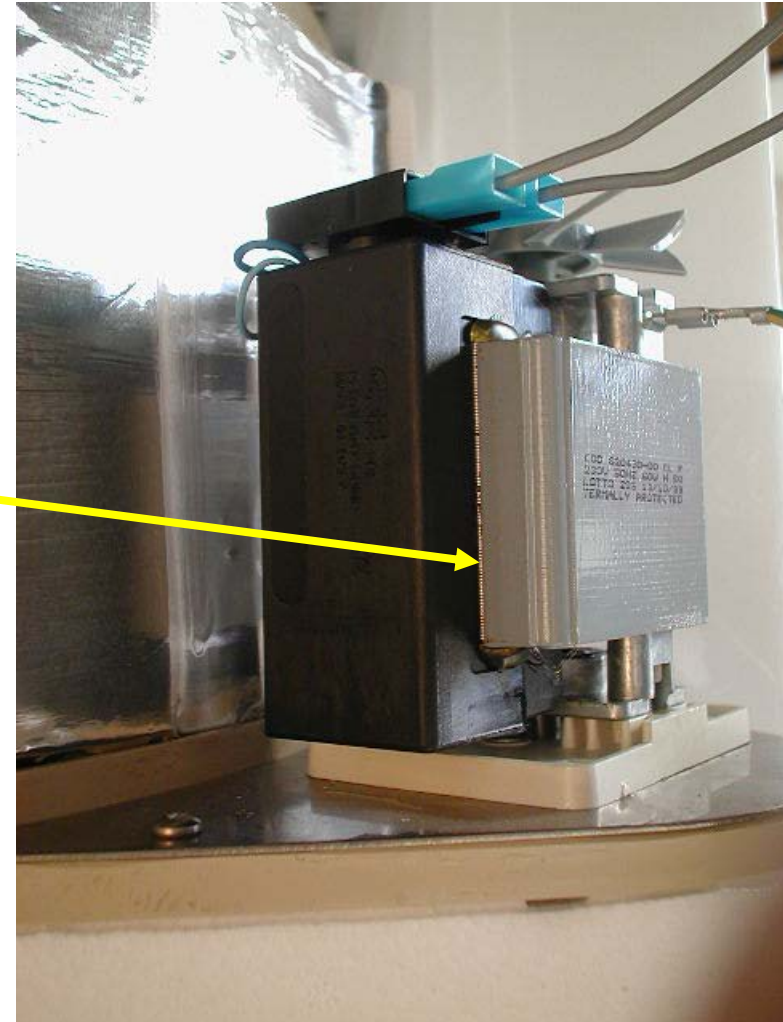
After the first 5' of water filling phase the machine start up automatically on freezing cycle with the following electrical components in operation:

- **Compressor**



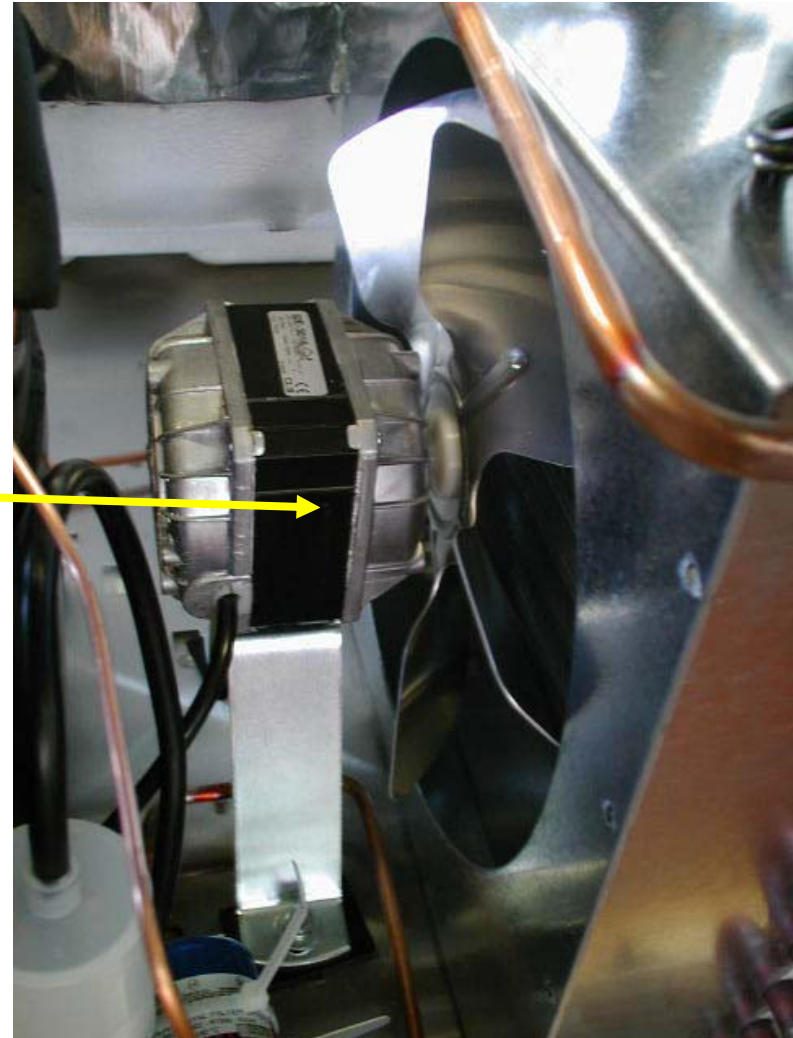
START UP AND OPERATIONAL CHECKS

- Water Pump



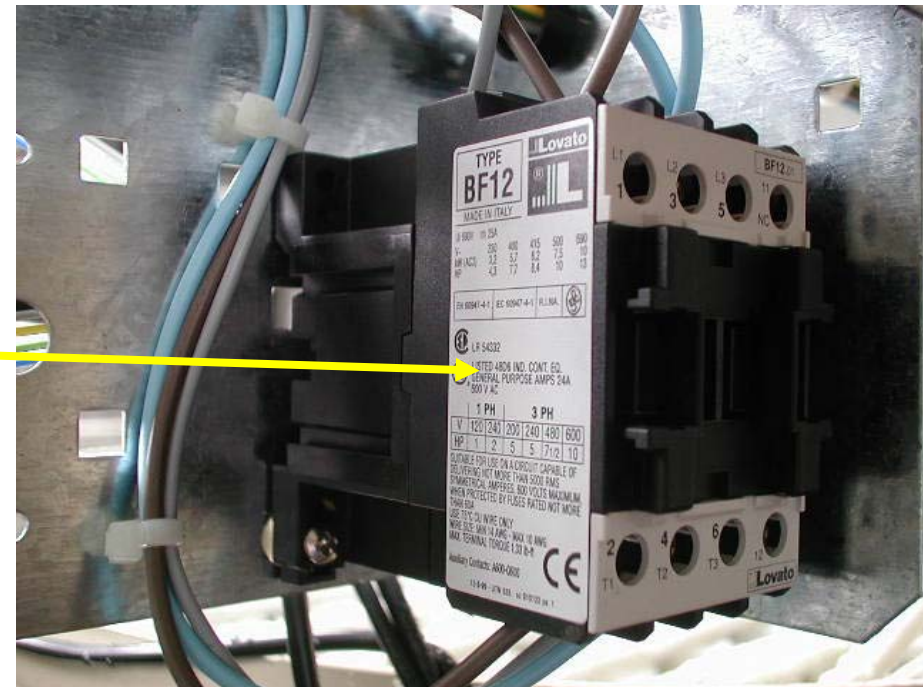
START UP AND OPERATIONAL CHECKS

- **Fan Motor (on air cooled version only)**



START UP AND OPERATIONAL CHECKS

- Contactor



START UP AND OPERATIONAL CHECKS

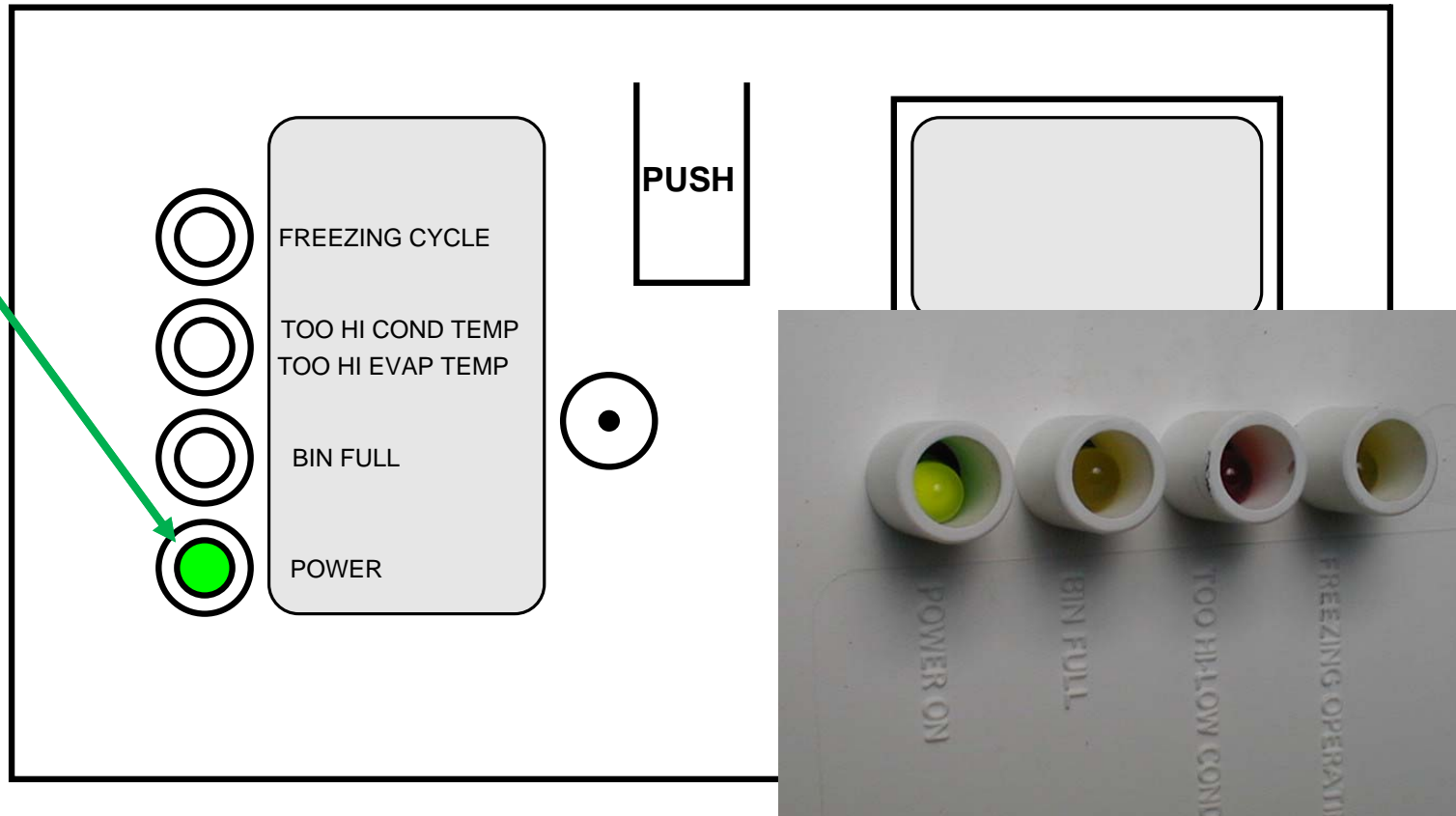
The operation of the fan motor is controlled by a condenser temperature sensor located within the fins of condenser that transmit a signal to the PC Board to activate in ON-OFF mode the fan motor so to keep between two pre-set values the condenser temperature and pressure.



START UP AND OPERATIONAL CHECKS

On PC Board the LED energized are:

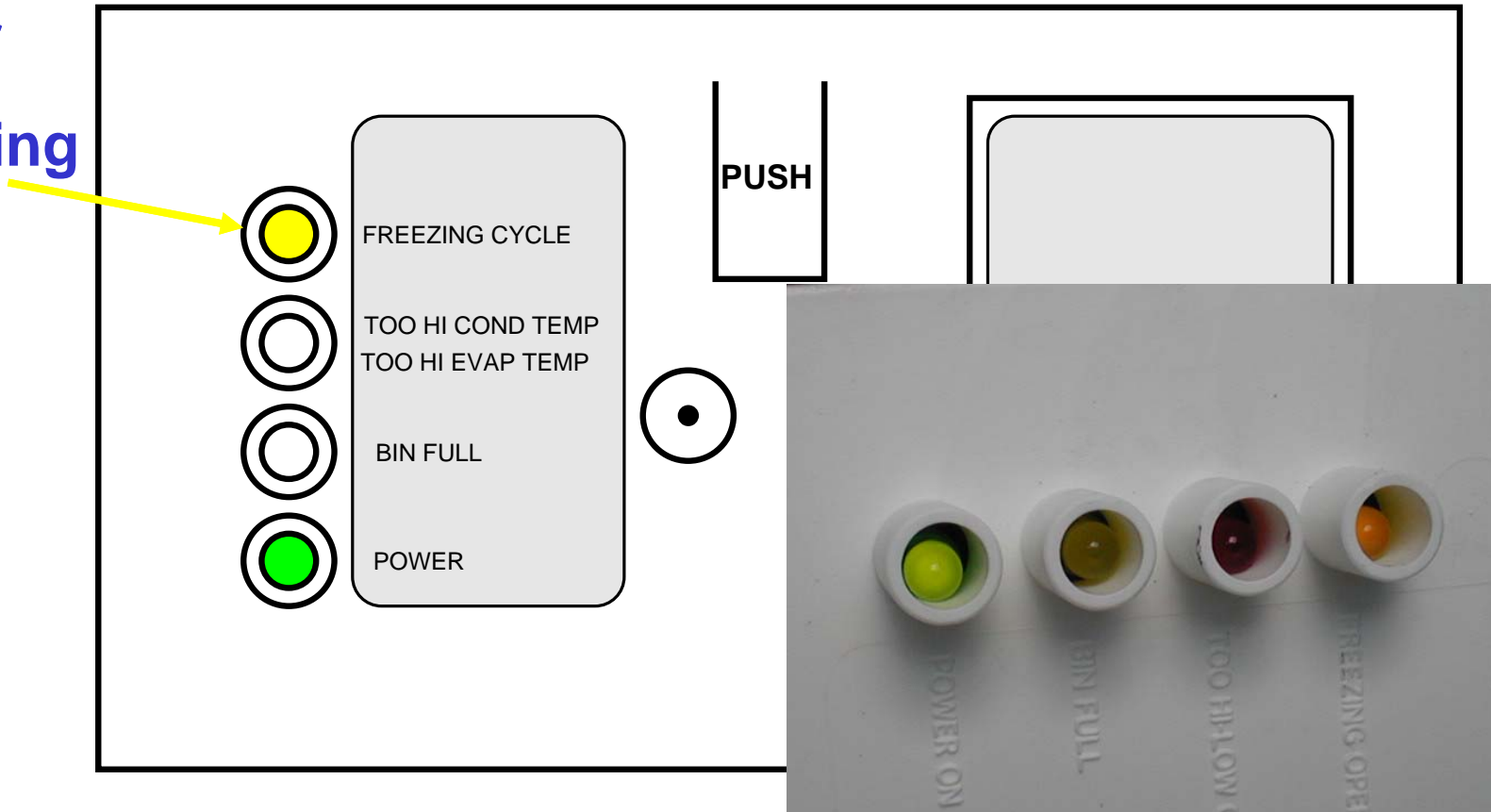
- **Power**



START UP AND OPERATIONAL CHECKS

On PC Board the LED energized are:

- Power
- Freezing



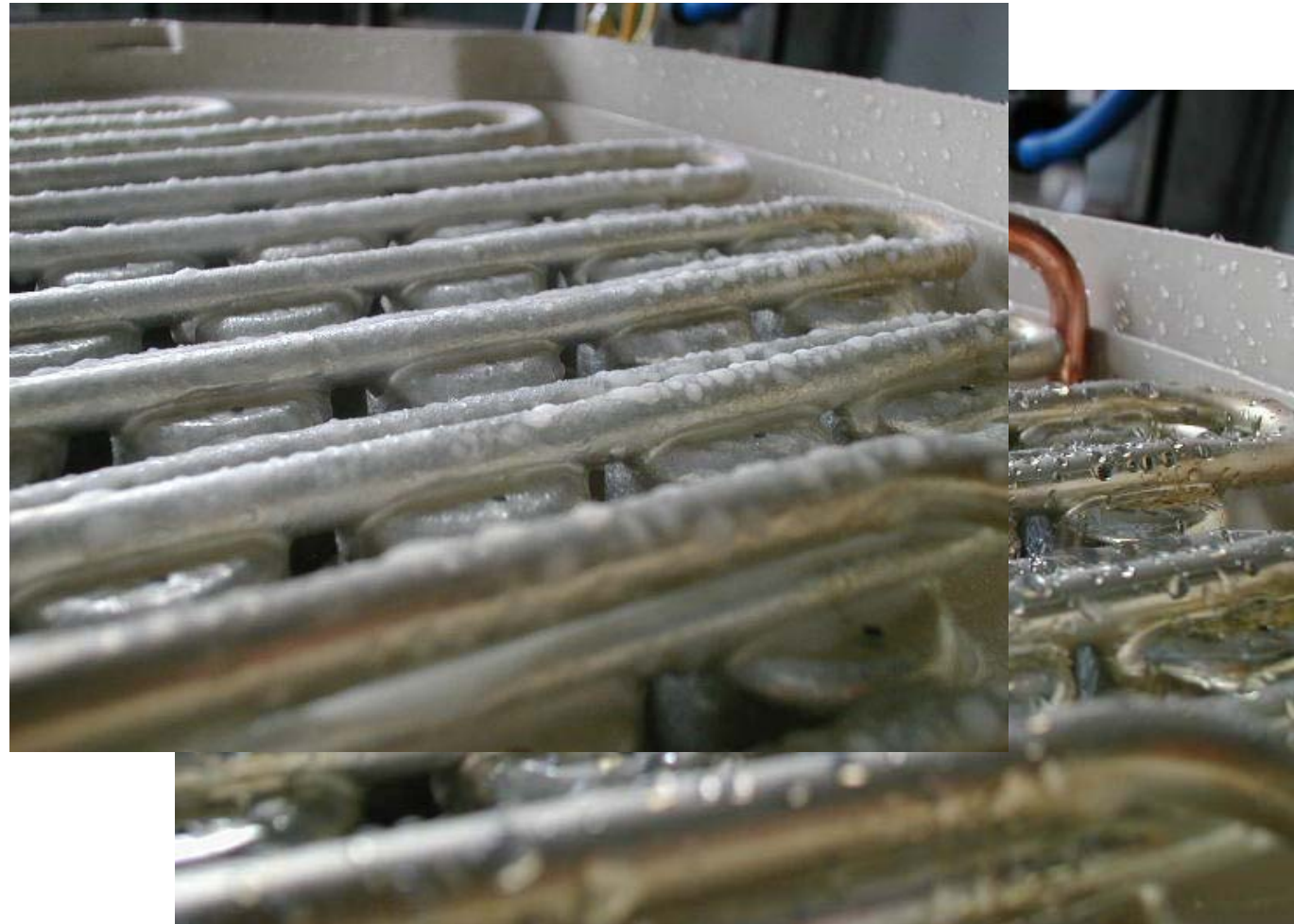
START UP AND OPERATIONAL CHECKS

Water is
circulating by
the water pump
into the
inverted tin
plated copper
molds of the
evaporator....

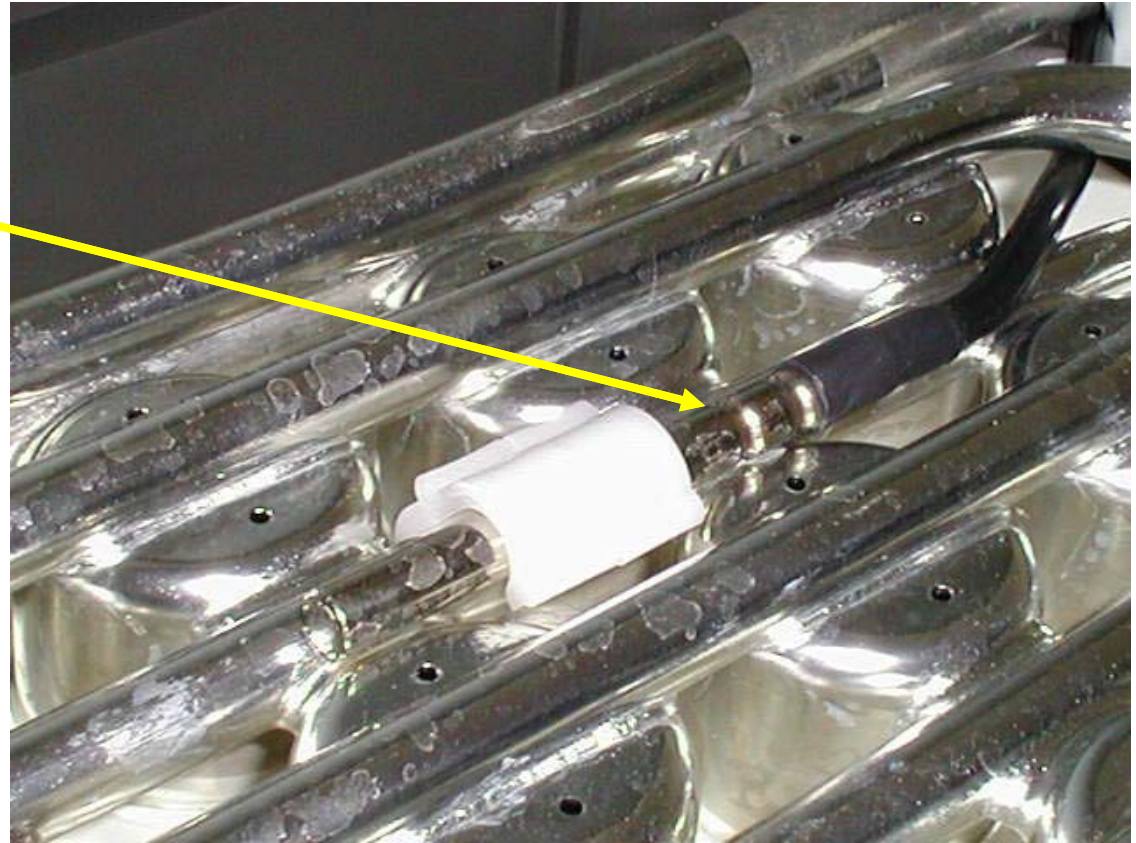


START UP AND OPERATIONAL CHECKS

....while the refrigerant is flowing into the serpentine welded on the upper side of the tin plated copper molds.

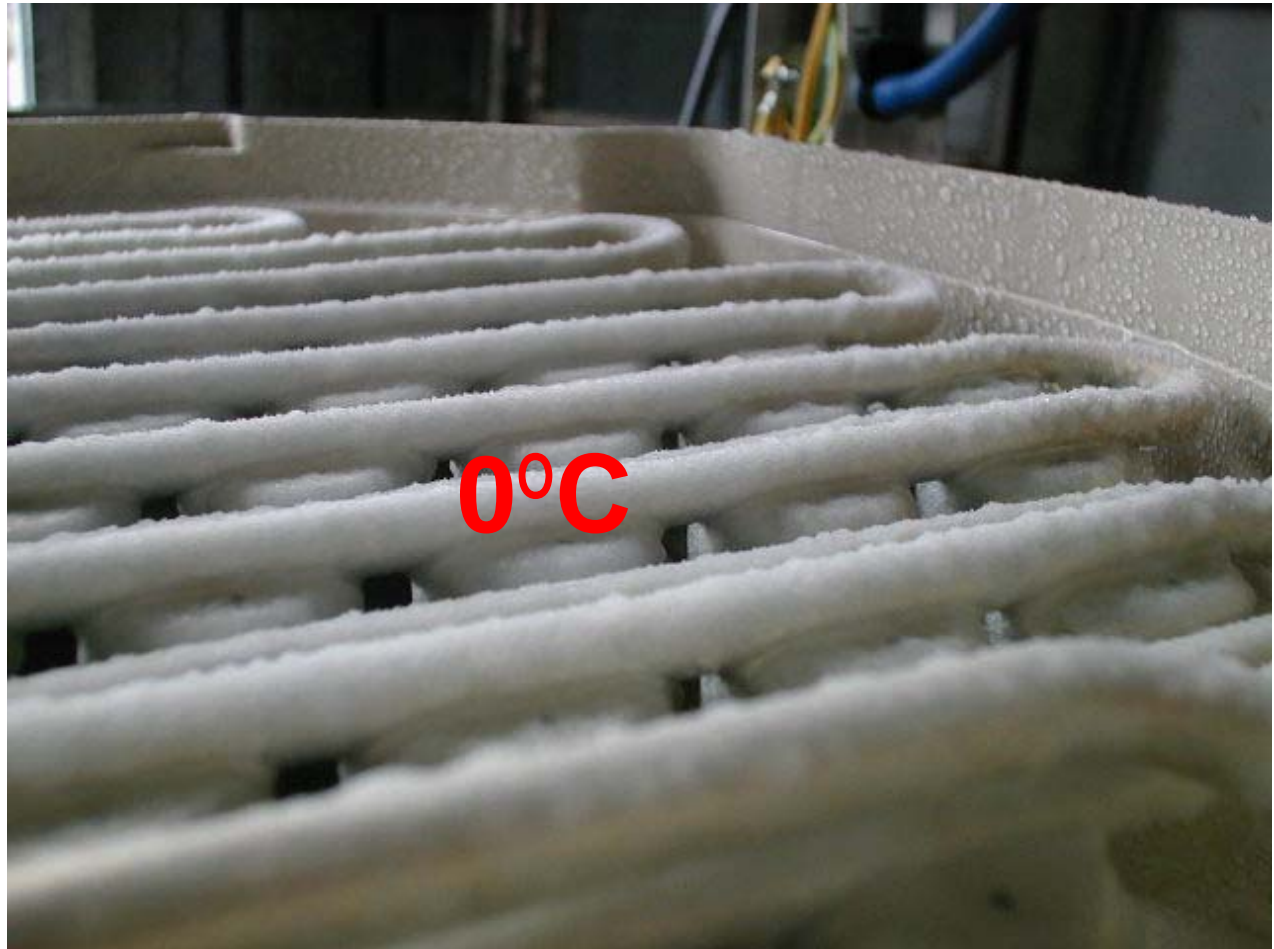


- **EVAPORATOR
SENSOR**



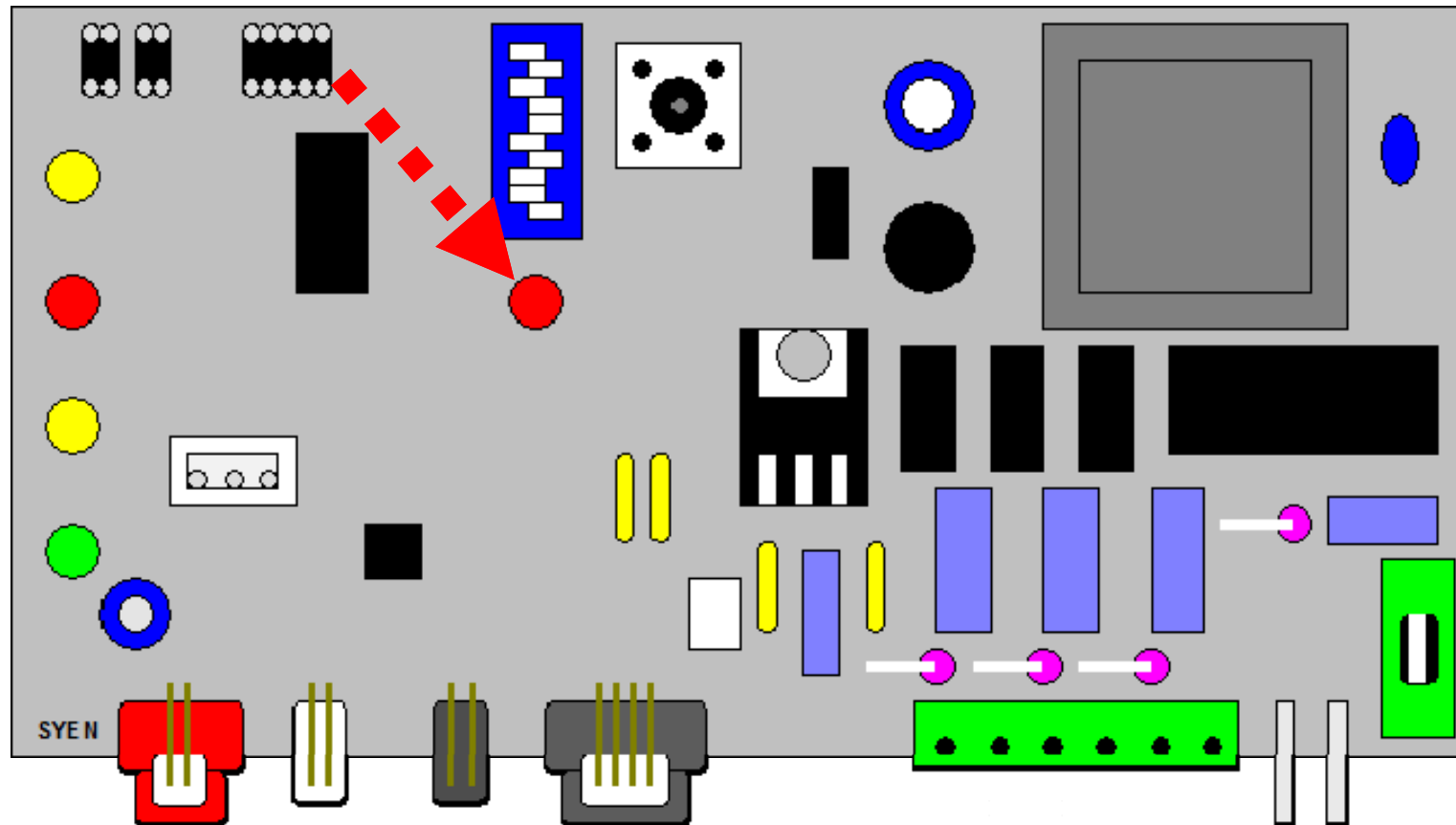
START UP AND OPERATIONAL CHECKS

After approximately 5 minutes since the start up of the freezing cycle, the temperature of the evaporator serpentine drops down to 0°C....



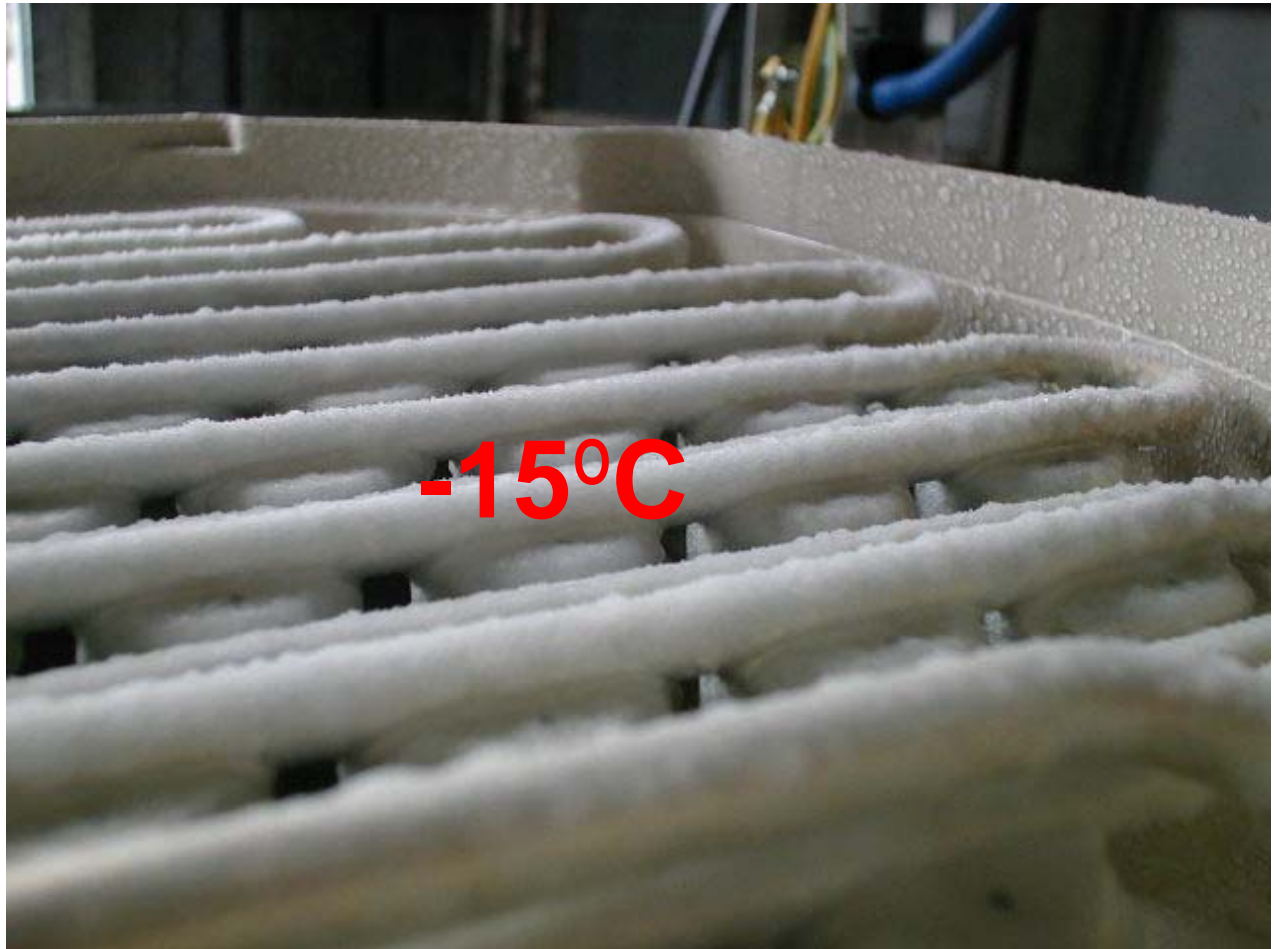
START UP AND OPERATIONAL CHECKS

....with the blinking of the small RED LED located in the center of PC Board.



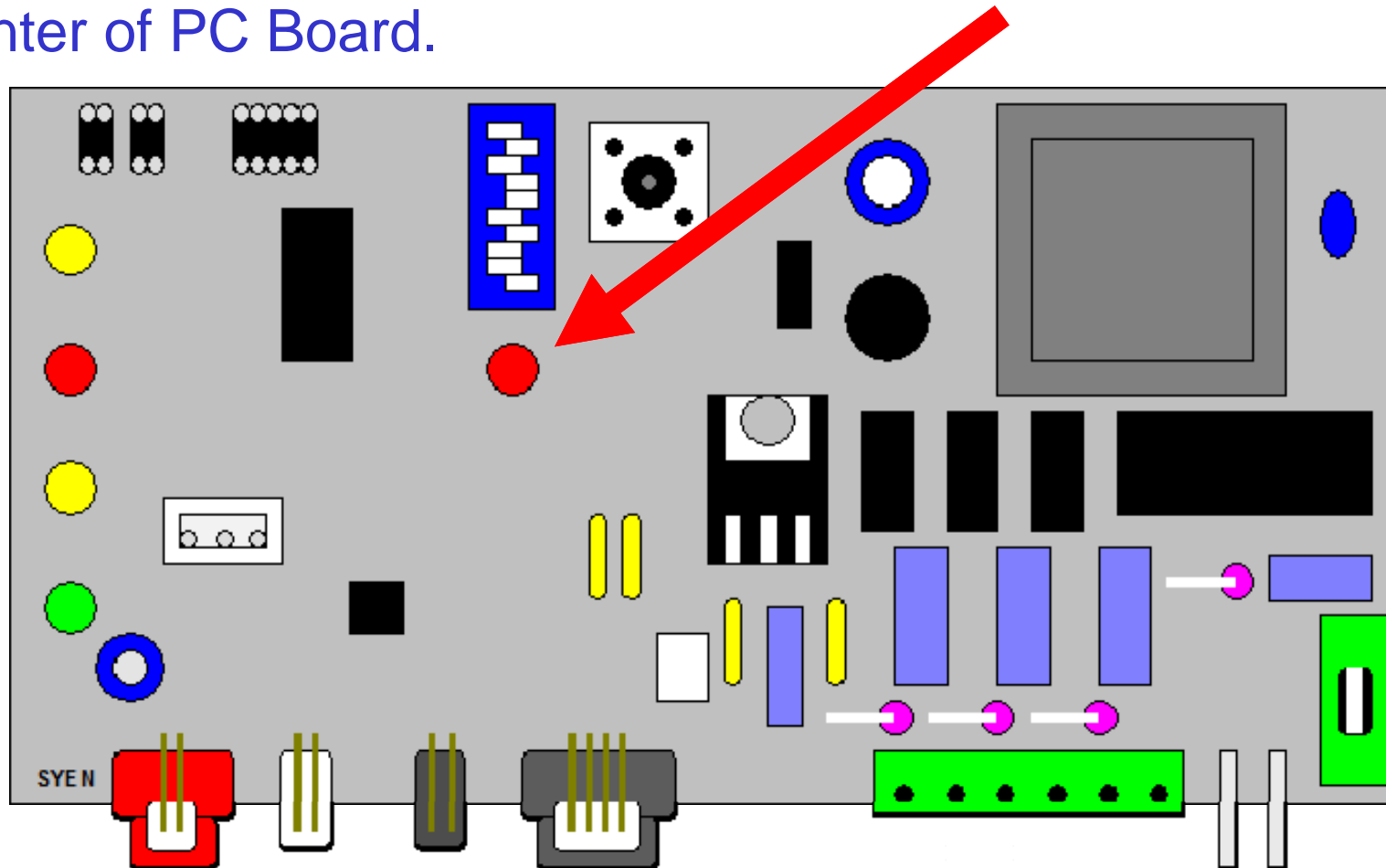
START UP AND OPERATIONAL CHECKS

After approximately 10 minutes from the start up of the freezing cycle, the temperature of the evaporator serpentine drops down to - 15°C....



START UP AND OPERATIONAL CHECKS

....with the light ON steady of the small RED LED located in the center of PC Board.



START UP AND OPERATIONAL CHECKS

The machine remains in the freezing cycle till its completion for an additional time according to the set up of the first four DIP SWITCH of the PC Board.

TIMED PORTION FREEZING CYCLE TEMPS PHASE TEMPORISÉE CONGELATION TEMPI FASE TEMPORIZZATA CONGELAMENTO				
1	2	3	4	
ON	ON	ON	ON	1 min.
OFF	ON	ON	ON	3 min.
ON	OFF	ON	ON	5 min.
OFF	OFF	ON	ON	7 min.
ON	ON	OFF	ON	9 min.
OFF	ON	OFF	ON	11 min.
ON	OFF	OFF	ON	13 min.
OFF	OFF	OFF	ON	15 min.
ON	ON	ON	OFF	17 min.
OFF	ON	ON	OFF	19 min.
ON	OFF	ON	OFF	21 min.
OFF	OFF	ON	OFF	23 min.
ON	ON	OFF	OFF	25 min.





Ice Systems

NEW MXG SERIES

START UP AND OPERATIONAL CHECKS

[illegible]

START UP AND OPERATIONAL CHECKS

Once completed the freezing cycle the machine enters into the defrost or harvest cycle with the following electrical components in operation:

- **Compressor**



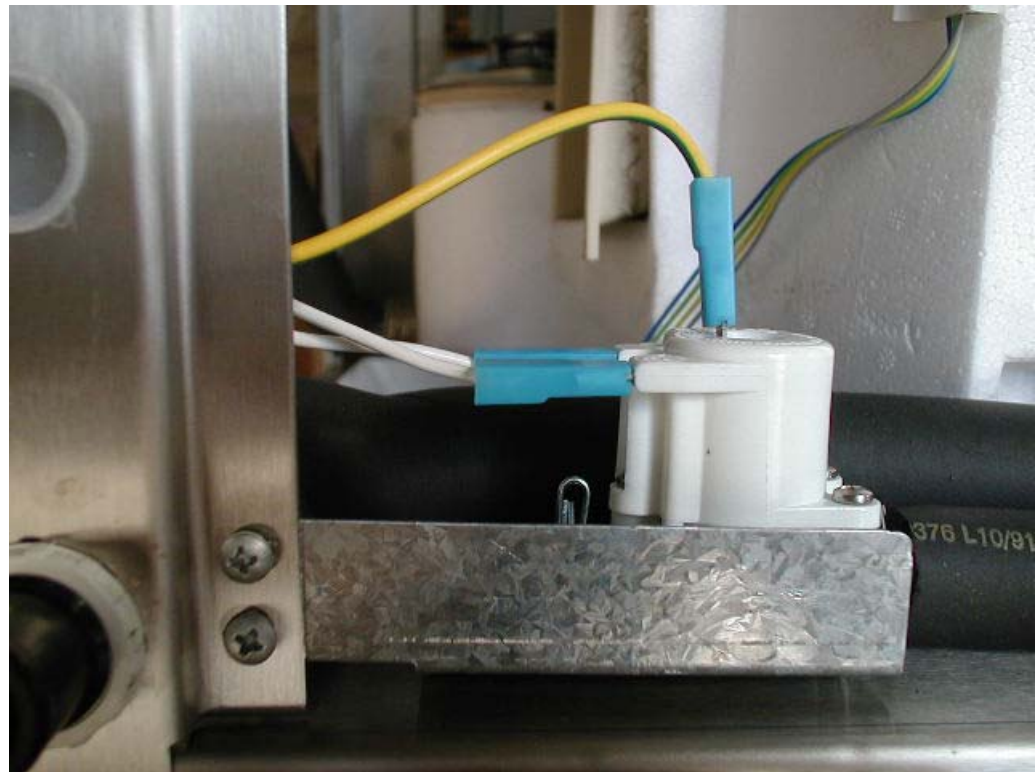
START UP AND OPERATIONAL CHECKS

- **Water Inlet Solenoid valve**



START UP AND OPERATIONAL CHECKS

- Water Drain Solenoid Valve





NEW MXG SERIES

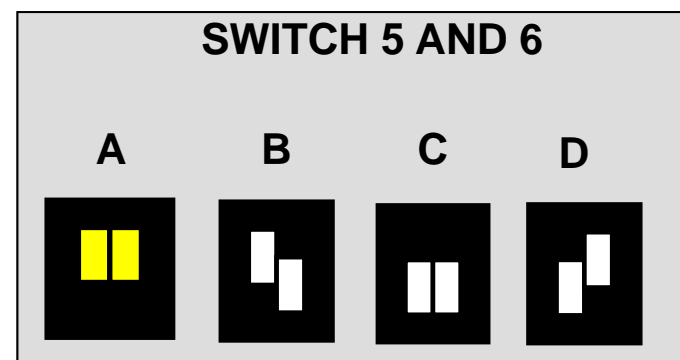
START UP AND OPERATIONAL CHECKS

- Hot Gas Valve



START UP AND OPERATIONAL CHECKS

The length of the defrost or harvest cycle is controlled by the PC Board according to the setting of the DIP SWITCH 5 and 6 and it is related to the time that the machine takes to drop the evaporating temperature from 0°C to -15°C (**time T₂**) as shown on the table.



LENGTH OF HARVEST CYCLE ACCORDING TO THE TIME TO DROP THE EVAP. TEMPERATURE FROM 0°C TO -13°C

LENGTH HARVEST CYCLE	PROGRAMS			
	A	B	C	D
180"	Up to 6'	***	Up to 9'	***
165"	6'-7'	Up to 3'	9'-10'	***
150"	7'-8'	3'-3'15"	10'-11'	***
135"	8'-9'	3'15"-3'30"	11'-12'	***
120"	9'-10'	3'30"-4'30"	12'-13'	Up to 3'
105"	10'-12'	4'30"-6'	13'-15'	3-4'
90"	>12'	>6'	>15'	>4'



NEW MXG SERIES

START UP AND OPERATIONAL CHECKS

It's possible to extend the length of the defrost cycle by means of the DIP SWITCH 7 and 8 as per below chart.

DIP SWITCH		ADDITIONAL DEFROST TIME
7	8	
ON	ON	0
OFF	ON	30"
ON	OFF	60"
OFF	OFF	WATER PUMP OFF

START UP AND OPERATIONAL CHECKS

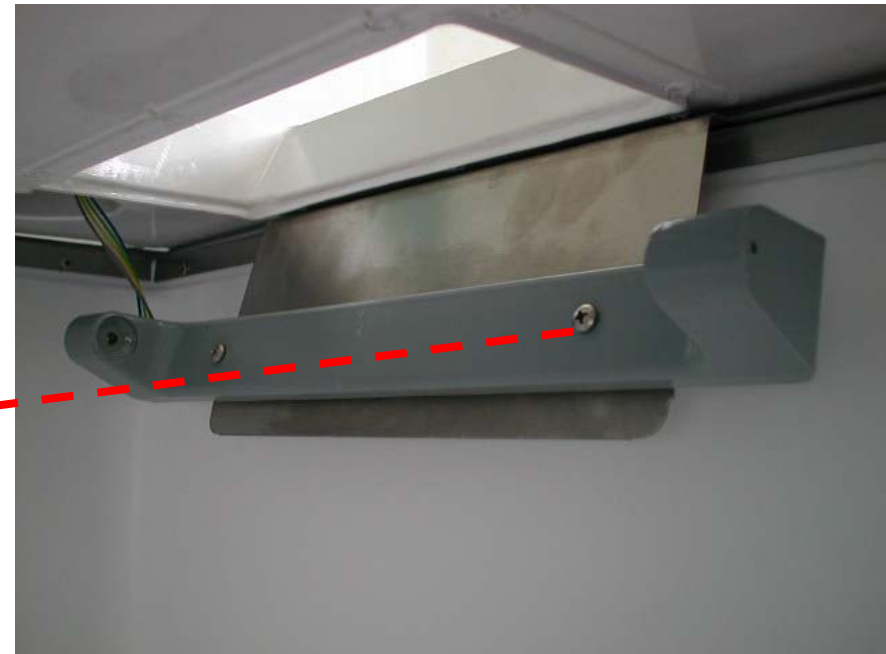
During the defrost or harvest cycle the combined action of refrigerant in Hot Gas state and incoming Water are going to partially melt the ice cubes in contact with the tin plated copper molts with the dropping down of the same through the curtain.



START UP AND OPERATIONAL CHECKS

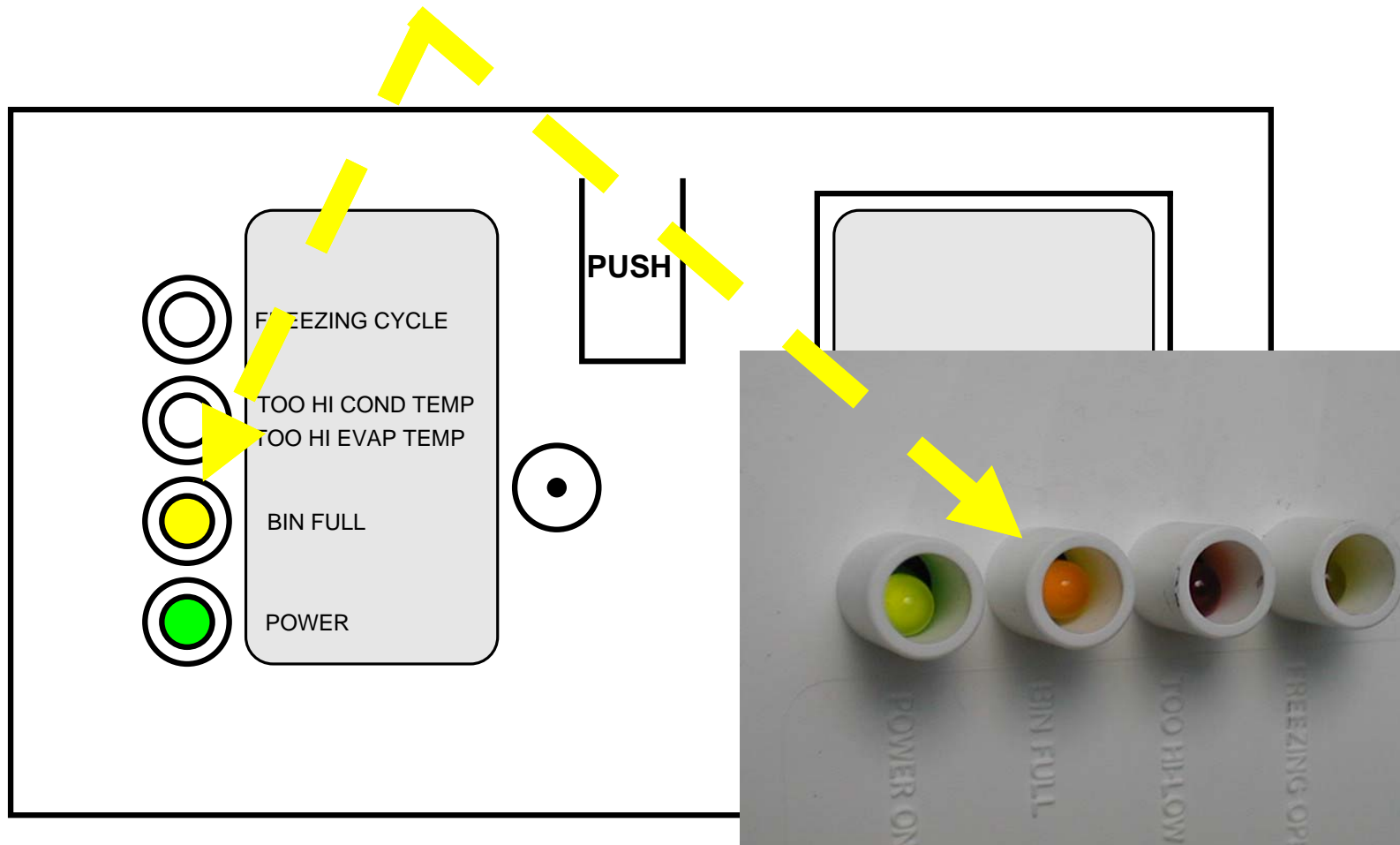
Ice maker turns OFF just when bin is full by ice and cubes cut the I/R beam.

It is possible to test I/R operation by keeping some ice cubes between lenses during a defrost



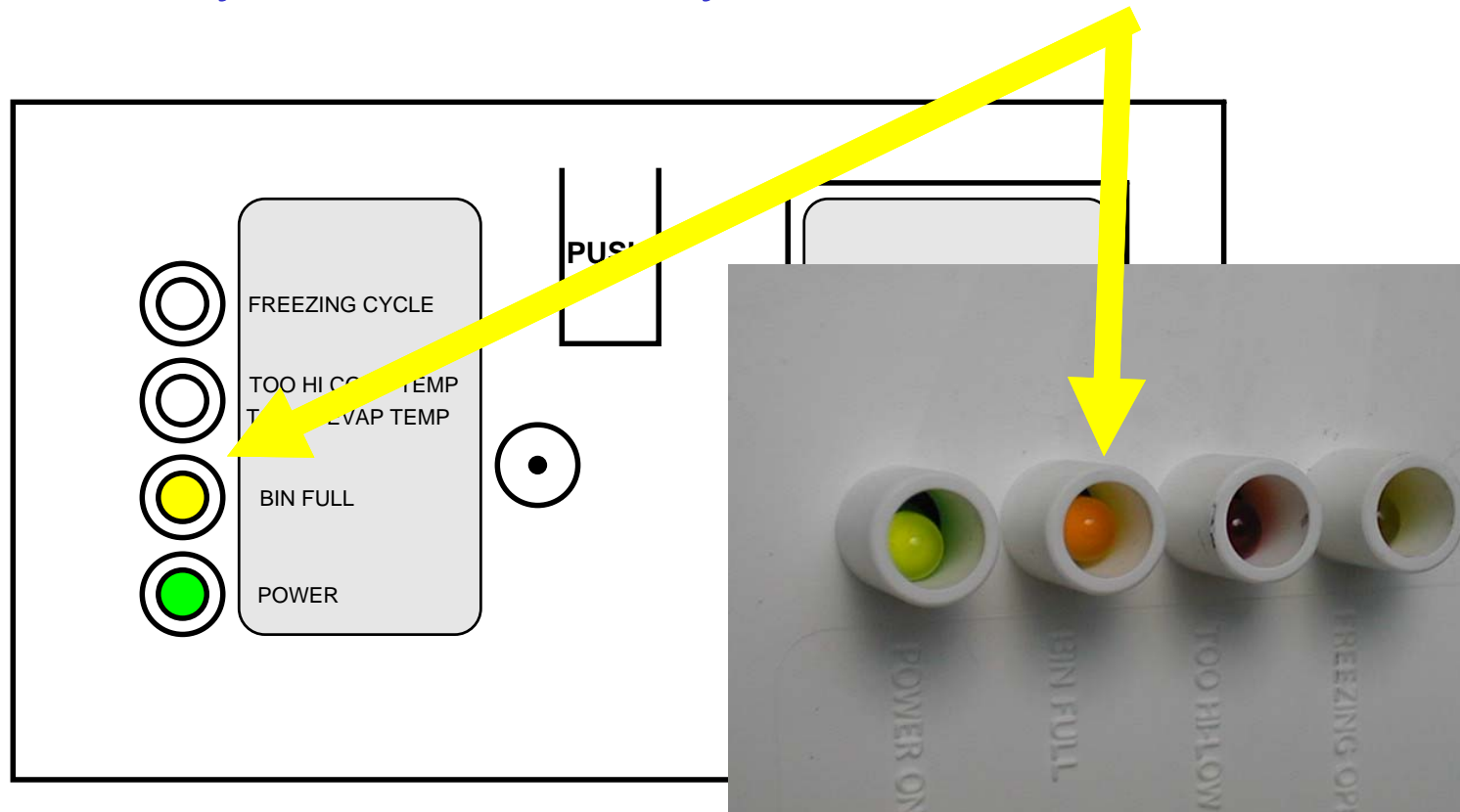
START UP AND OPERATIONAL CHECKS

The Bin Full YELLOW LED starts to blink slow.



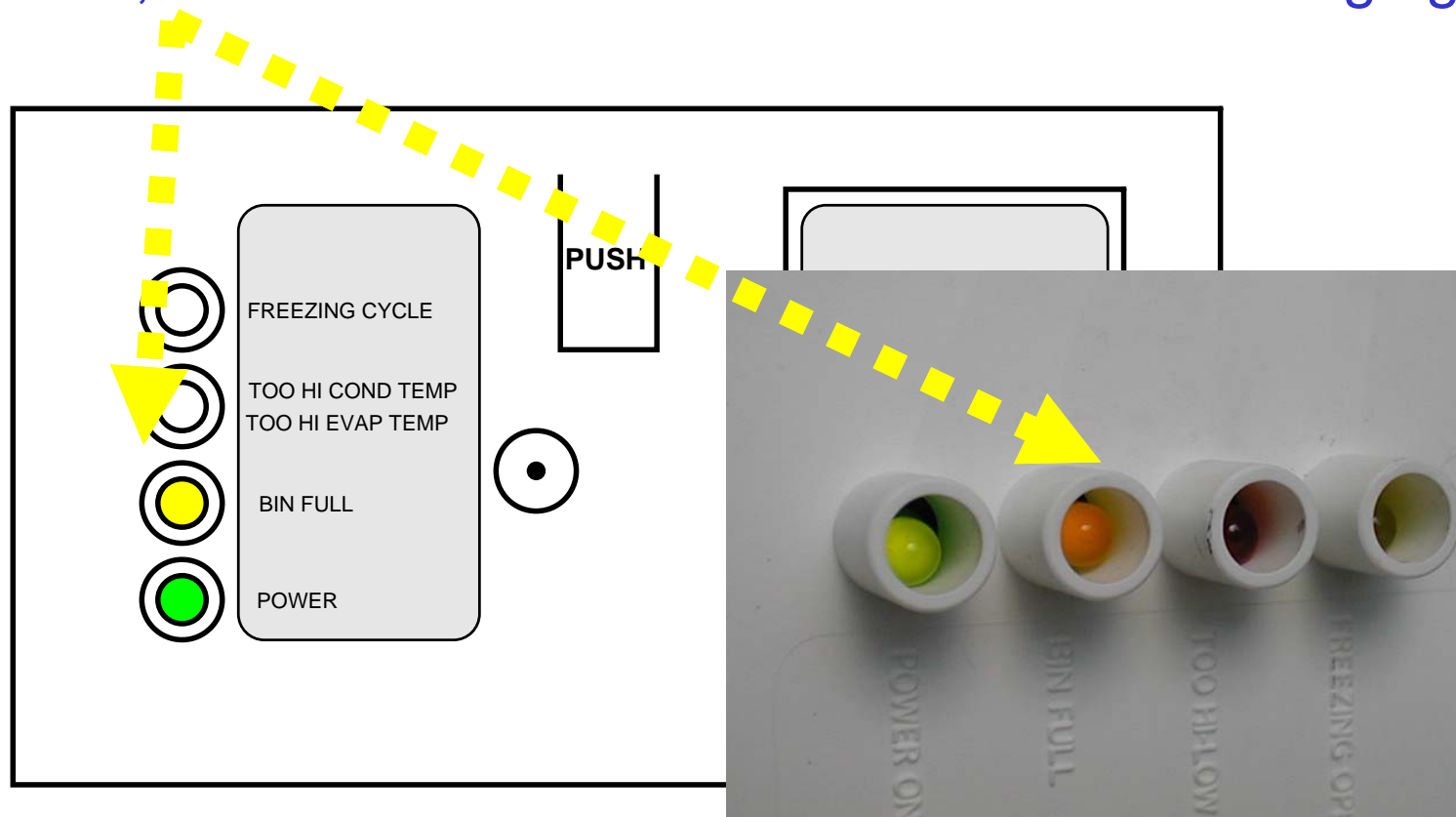
START UP AND OPERATIONAL CHECKS

..till defrost cycle is elapsed thus to release all ice cubes from inverted mold cups; after that the machine will stop at bin full condition with the yellow LED steady ON



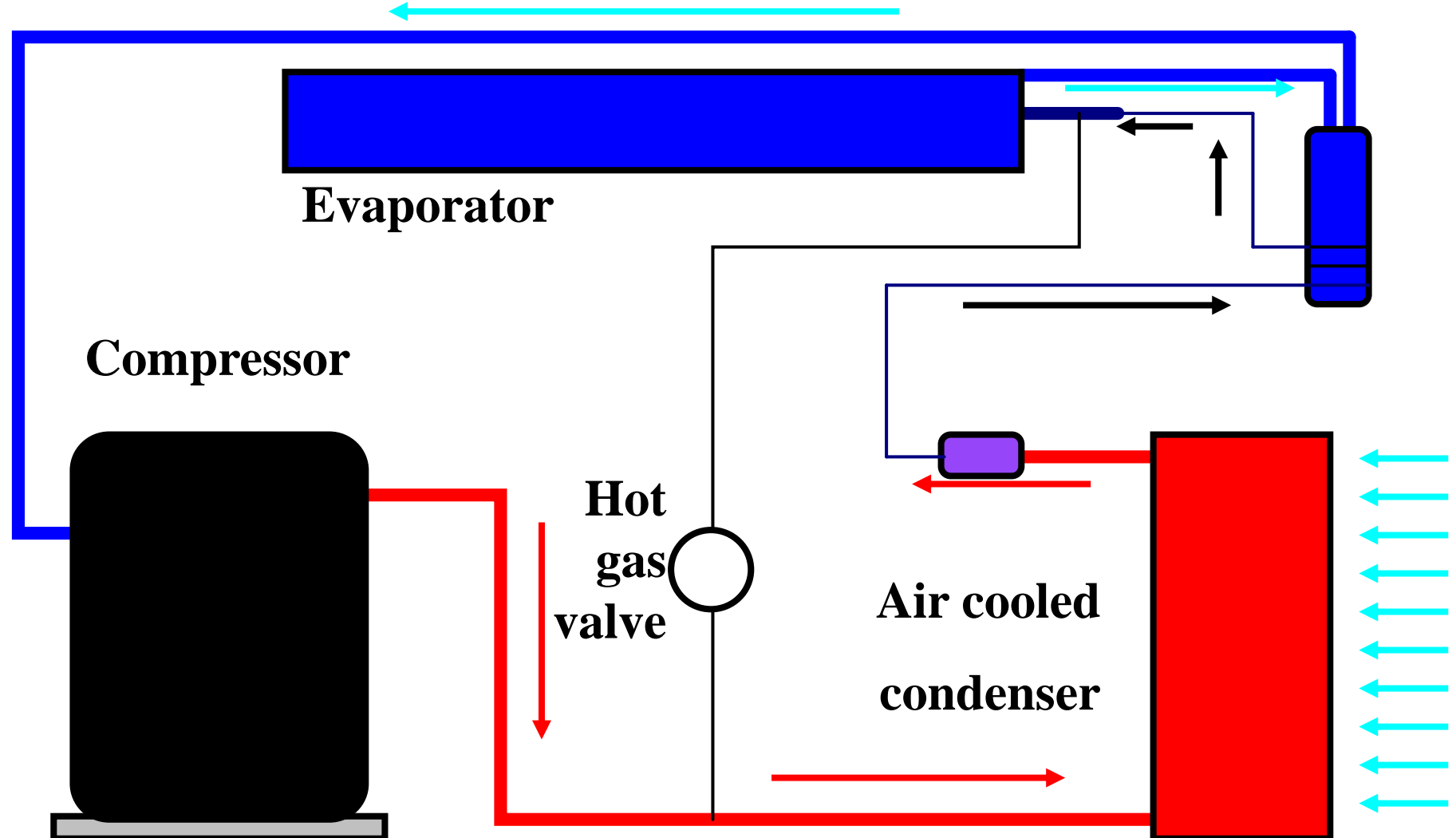
START UP AND OPERATIONAL CHECKS

As soon as the ice is removed between transmitter and received the infrared beam is resumed immediately with fast a blinking of the Yellow LED, then the machine restart with 45" of recharging water

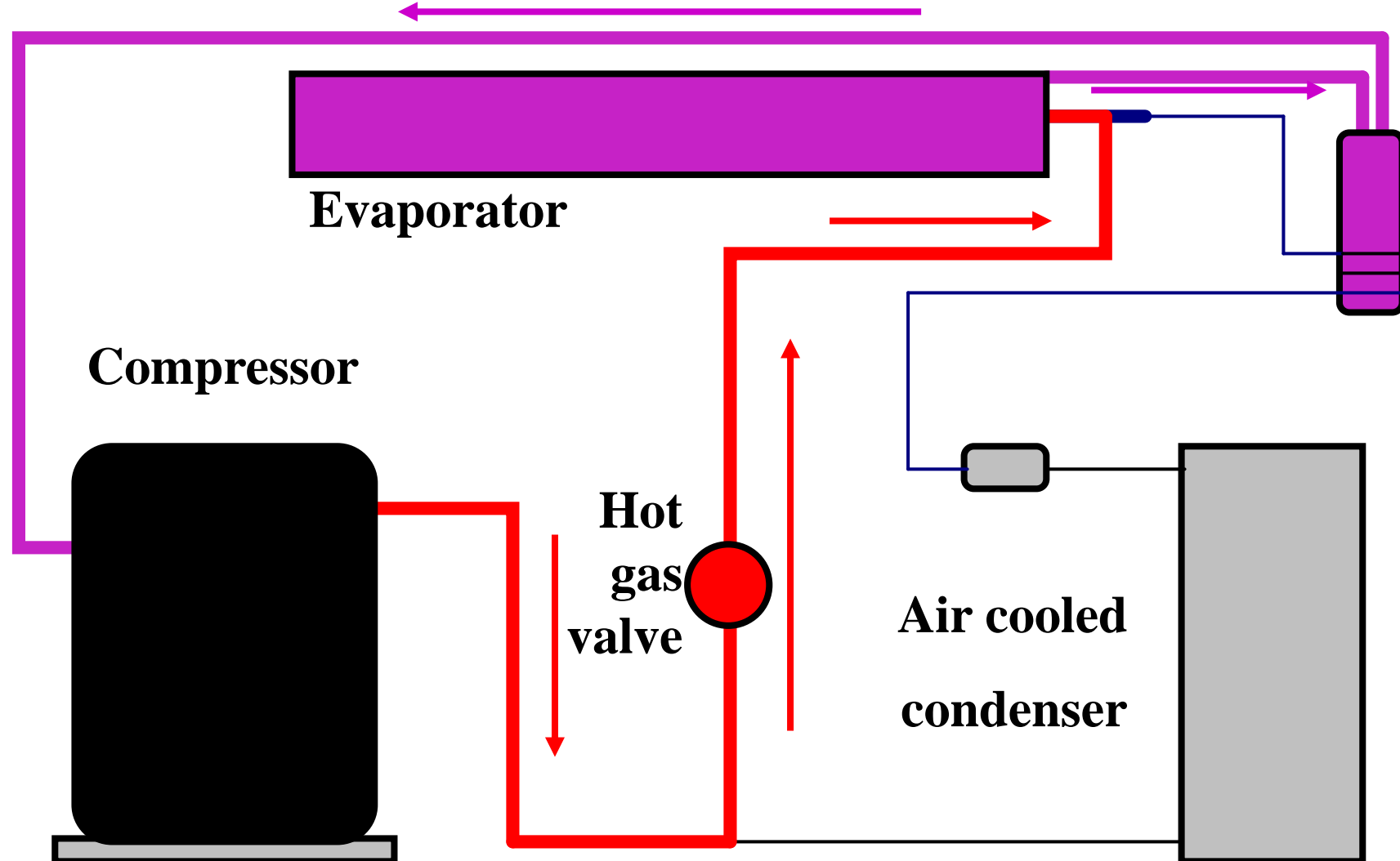


OPERATING PRINCIPLES and COMPONENTS

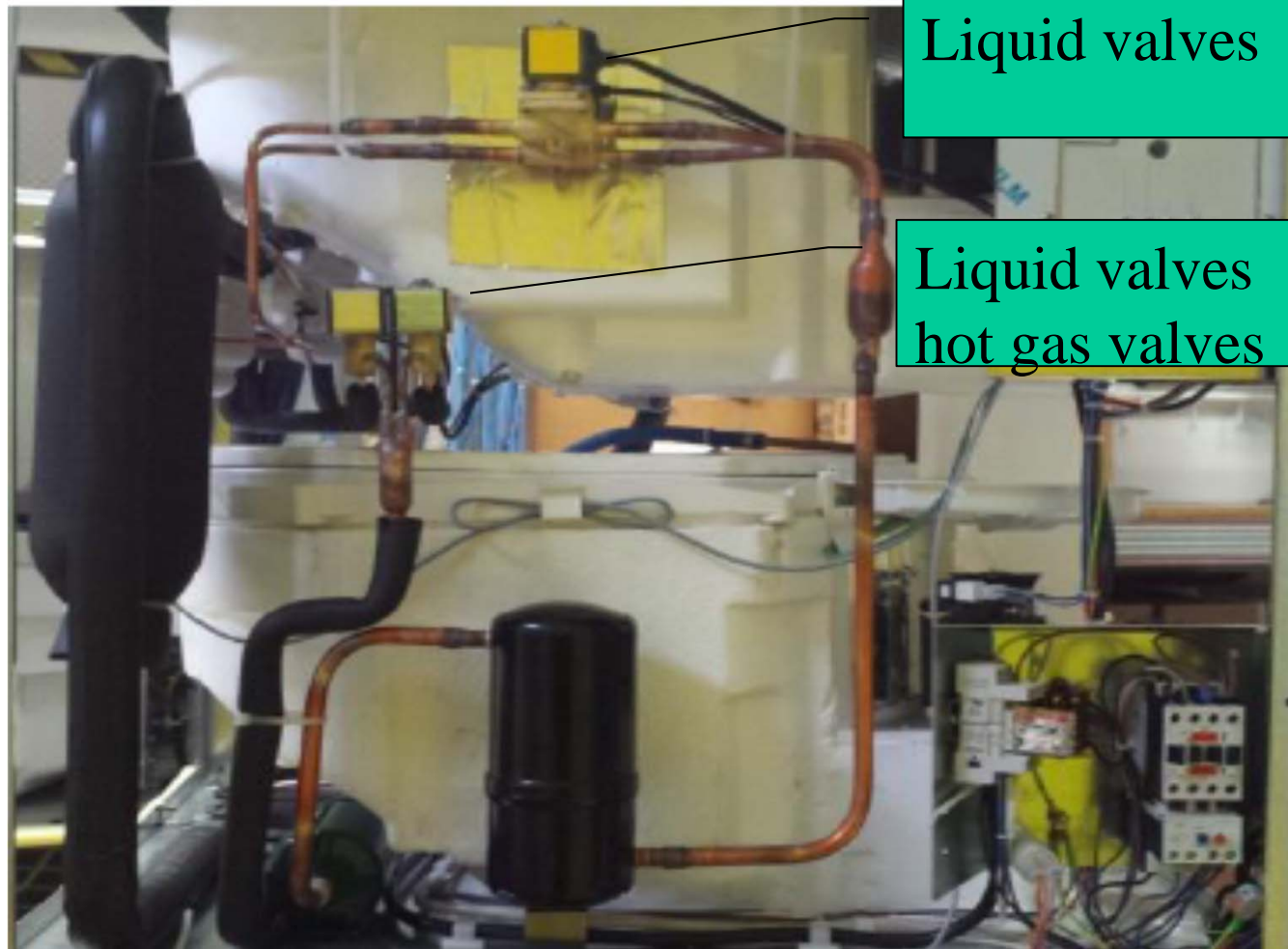
OPERATING PRINCIPLES - FREEZE



OPERATING PRINCIPLES - HARVEST

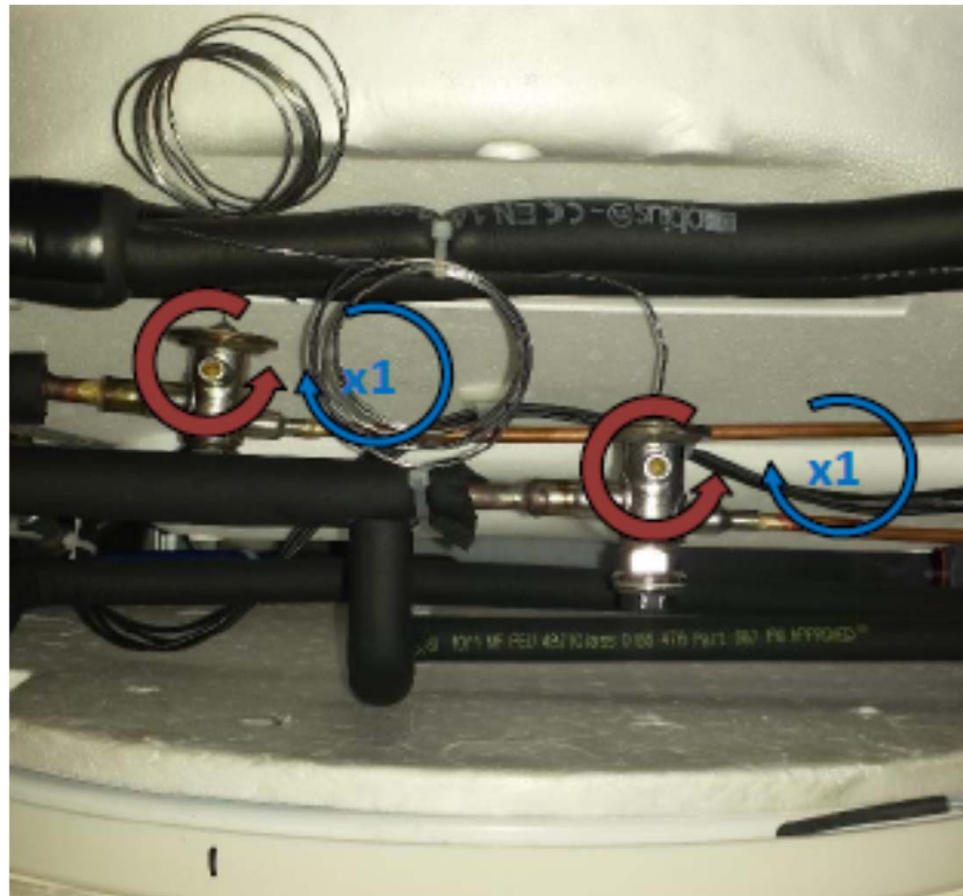


OPERATING PRINCIPLES 938



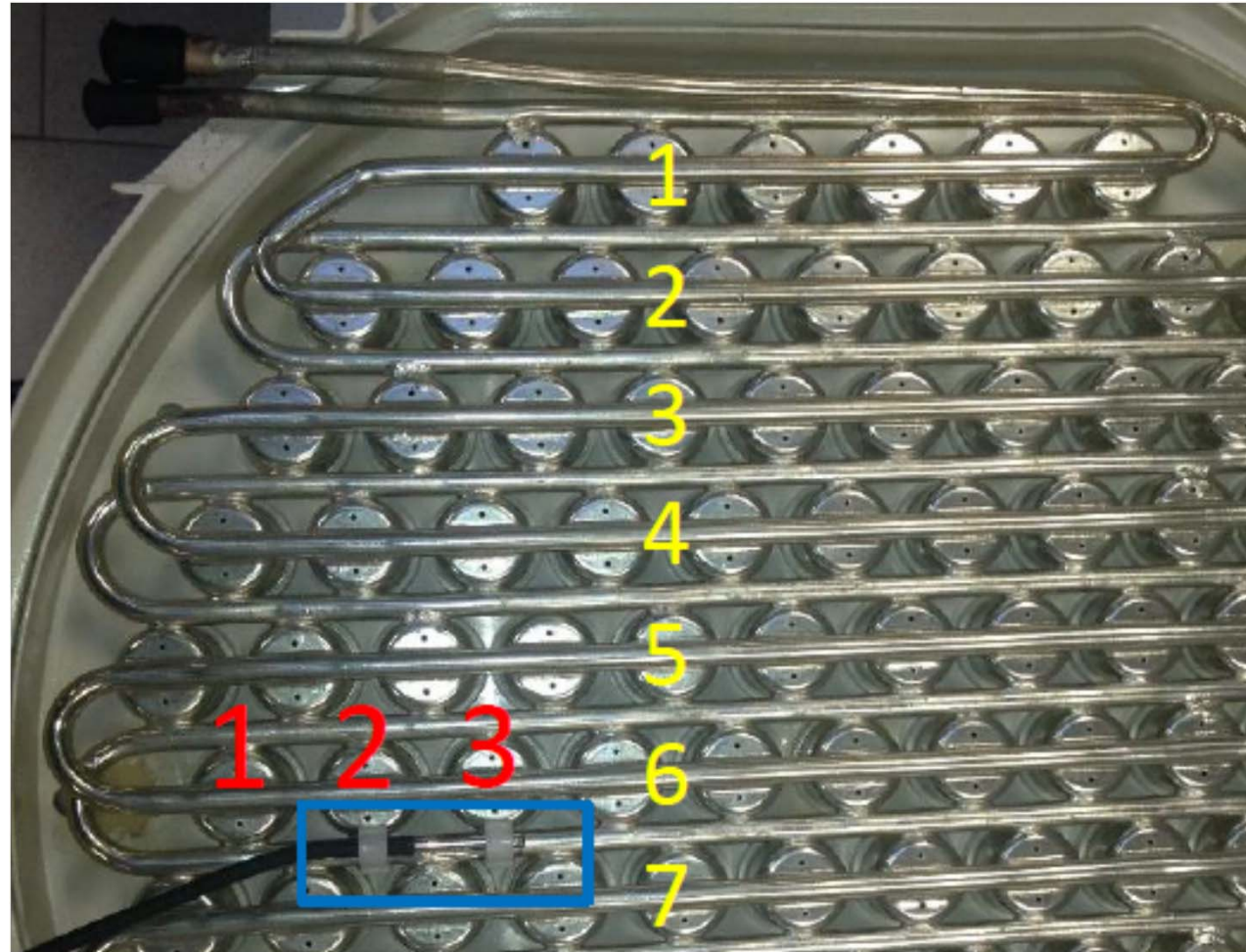
OPERATING PRINCIPLES 938

TXV
valves
factory
setting,
full
opening
(counterclockwise)
then 1 turn
clockwise



OPERATING PRINCIPLES 938

Evaporator
sensor location



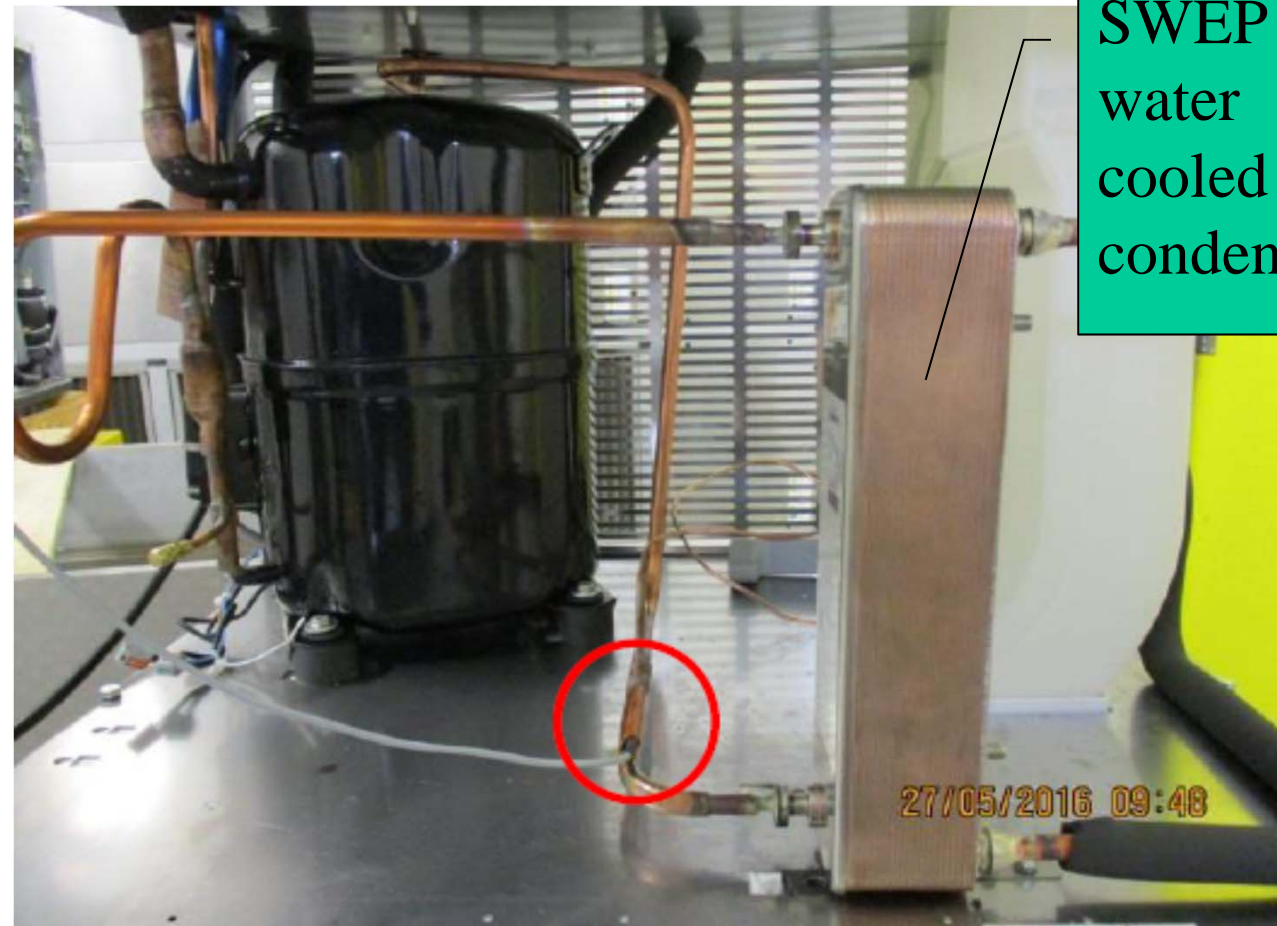
OPERATING PRINCIPLES 938

Condenser
sensor
location
air cooled
version



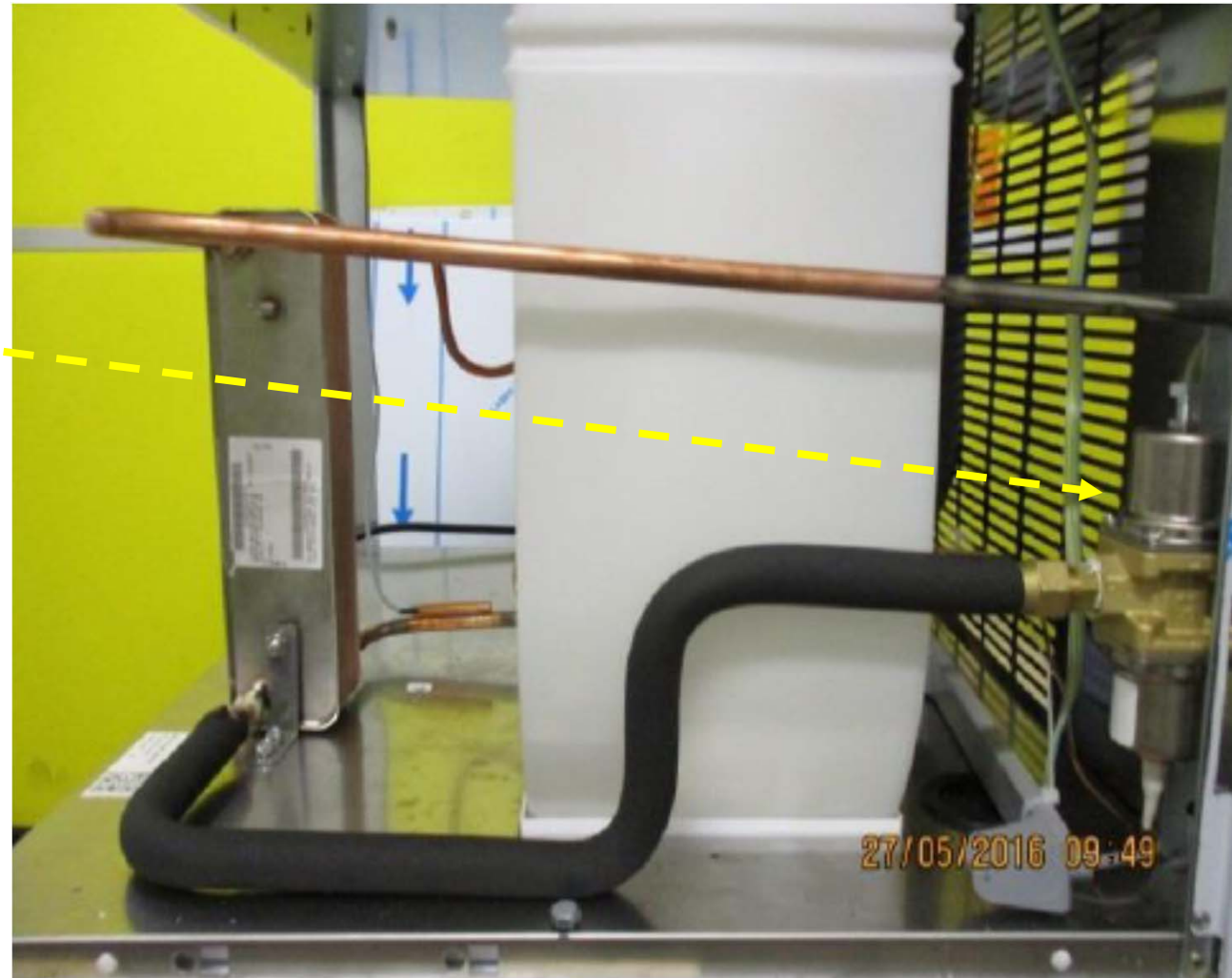
OPERATING PRINCIPLES 938 - FREEZE

Condenser
sensor
location
water
cooled
version

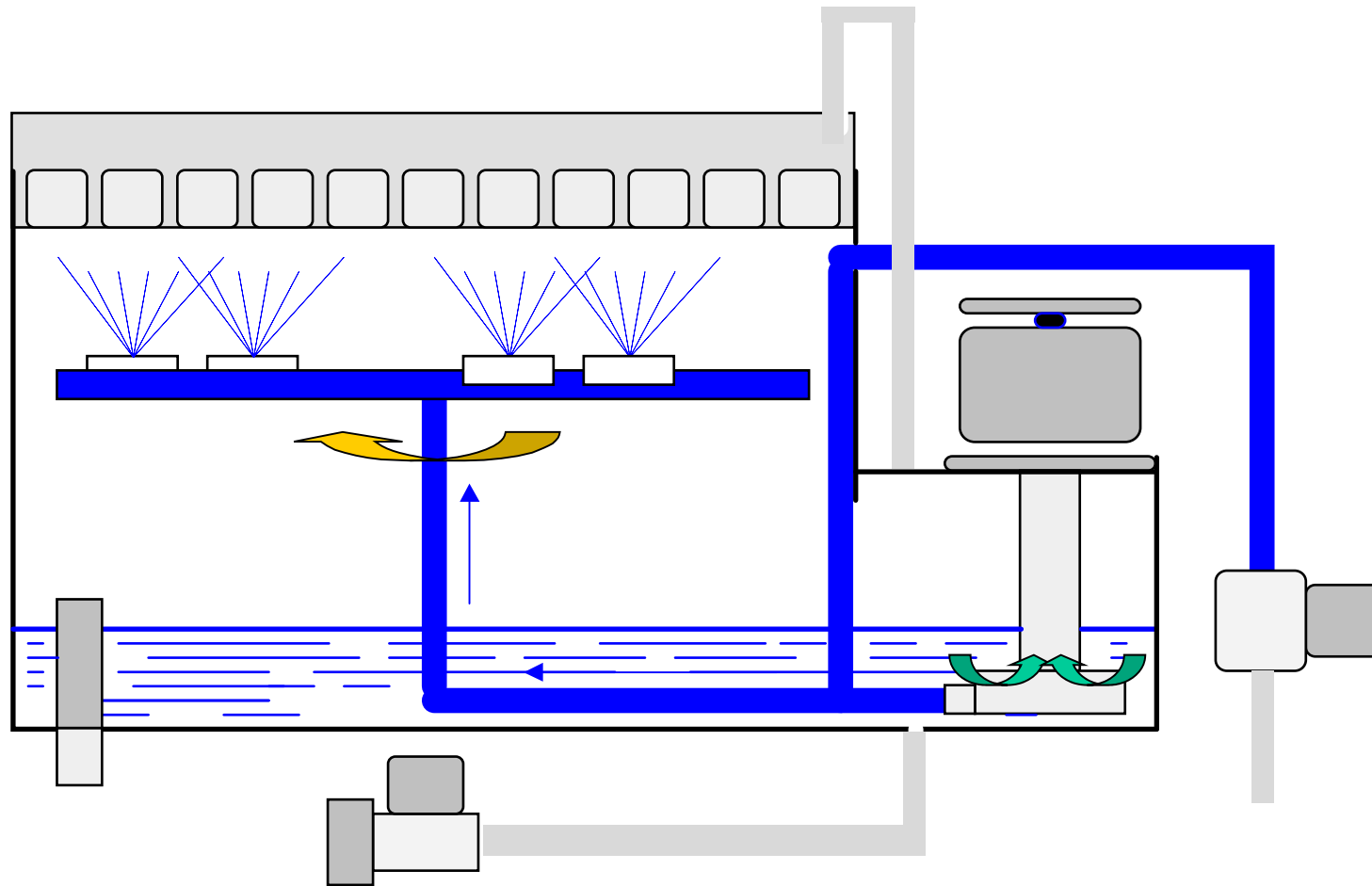


OPERATING PRINCIPLES 938

DANFOS
S water
regulating
valve set
at 17 bar

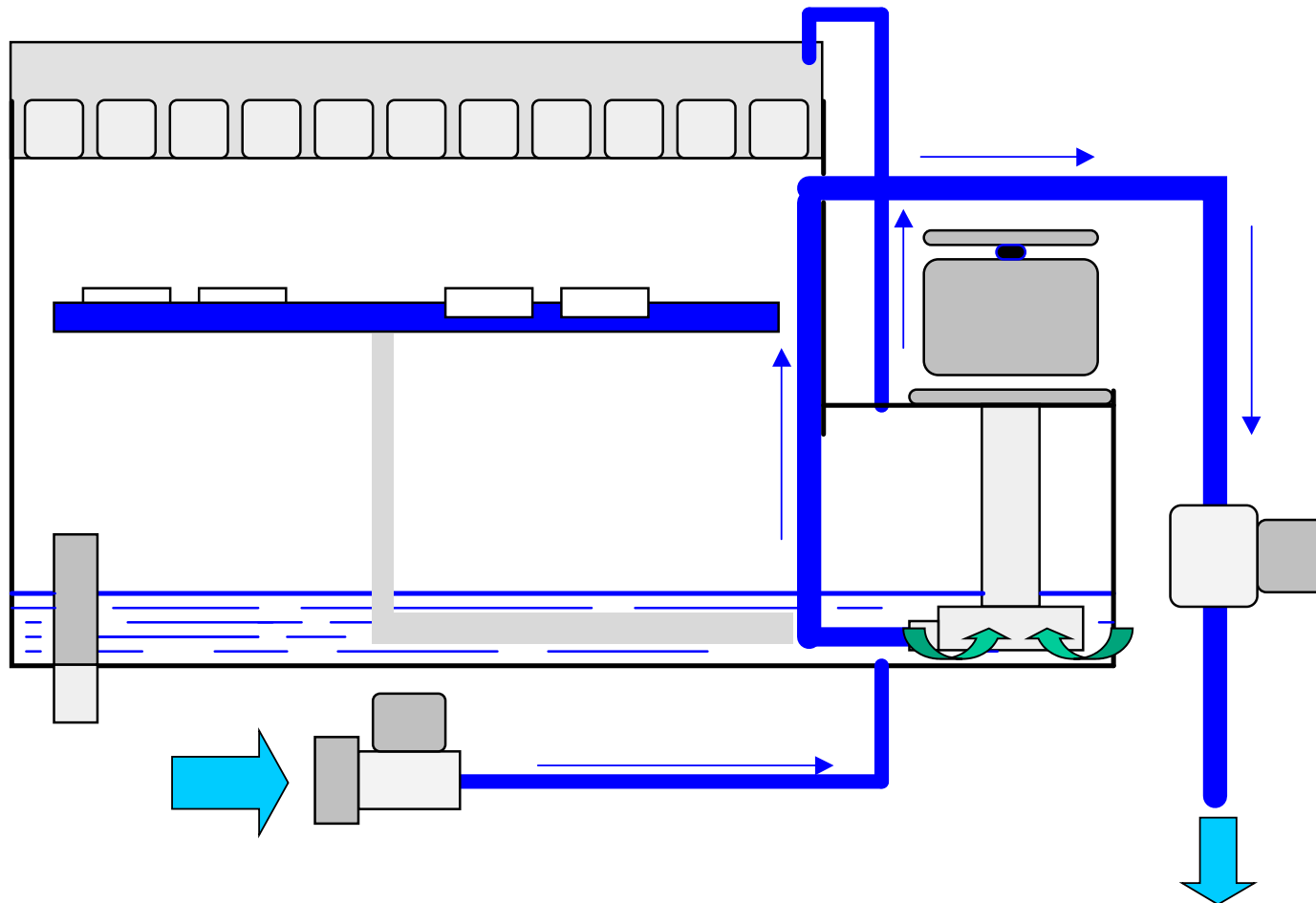


WATER SYSTEM – FREEZING CYCLE



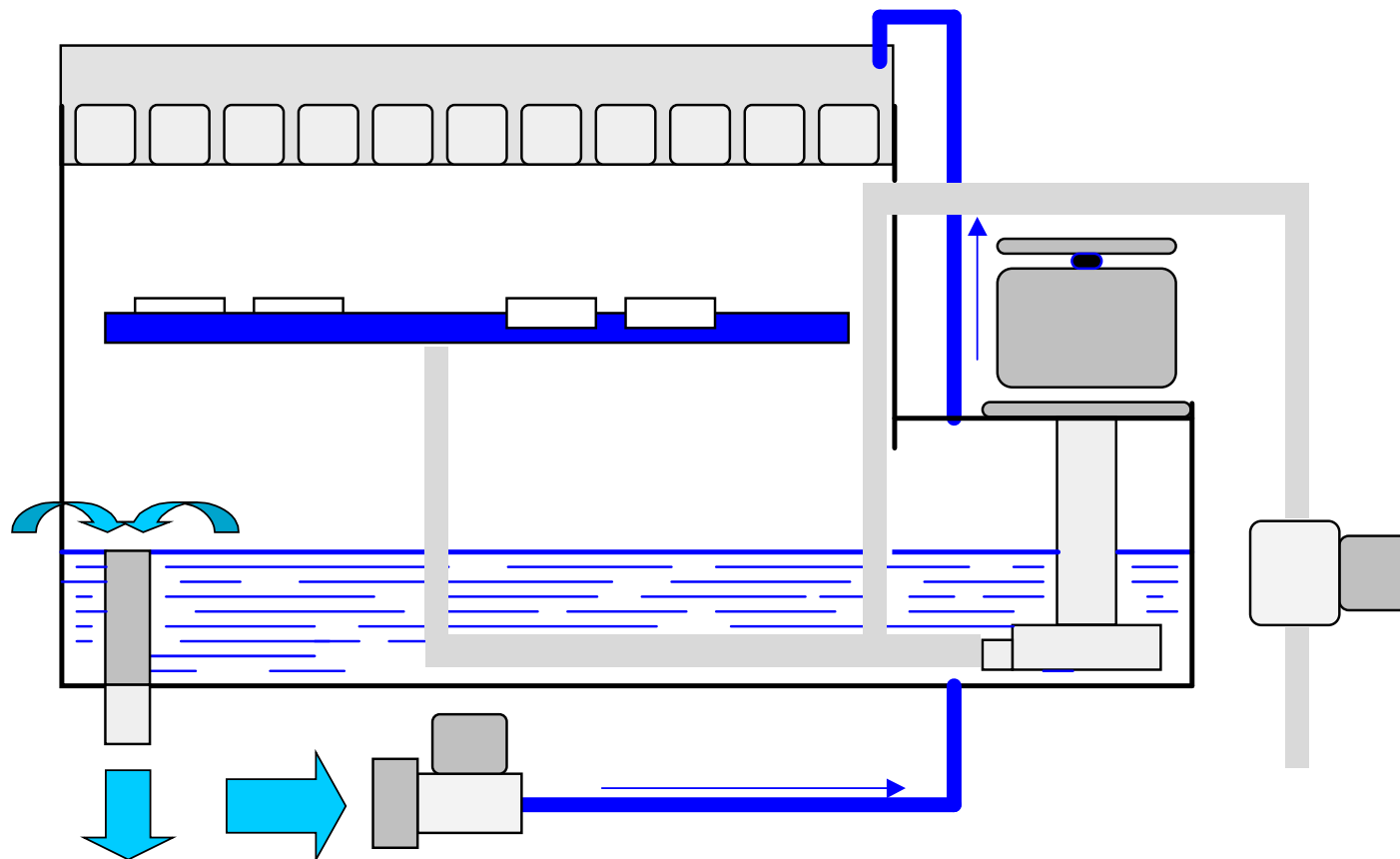
WATER SYSTEM – HARVEST CYCLE

FIRST PORTION 30"

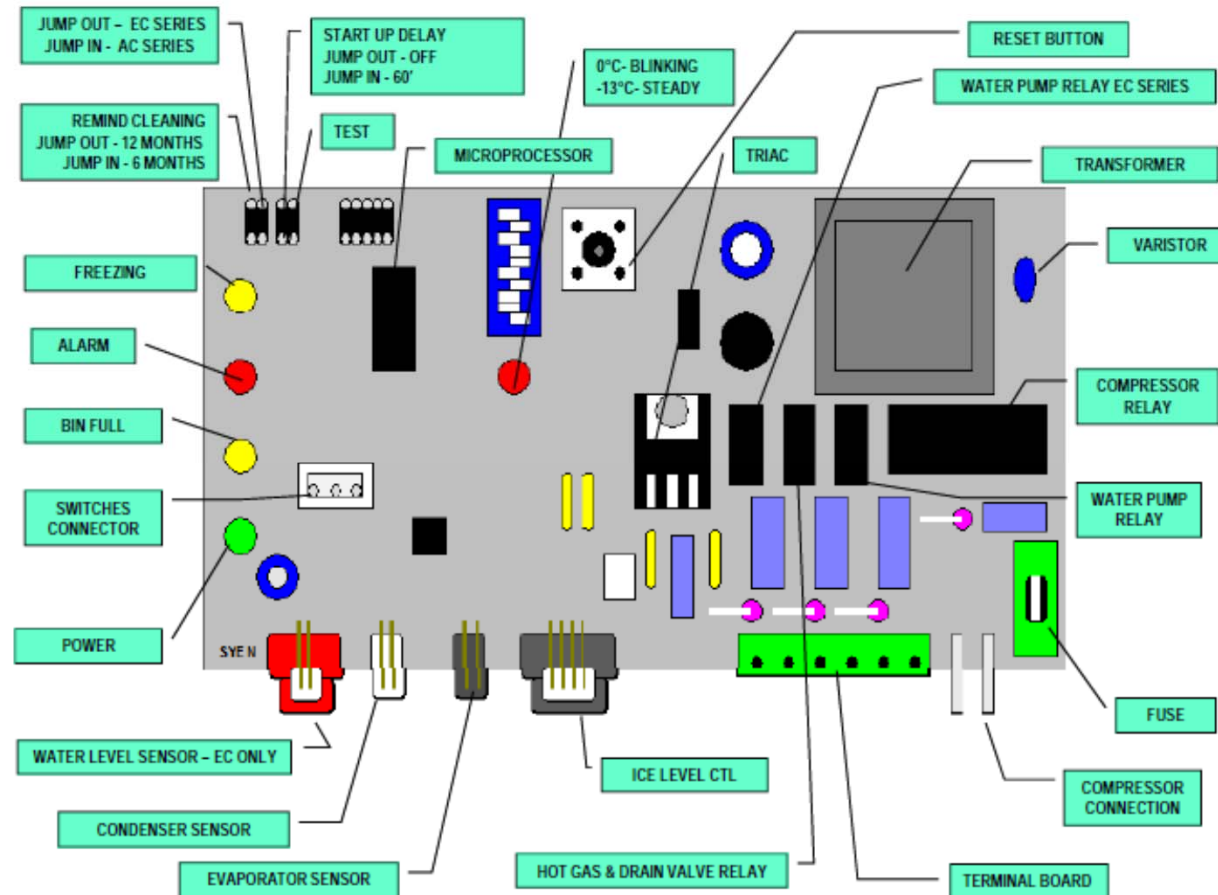


WATER SYSTEM – HARVEST CYCLE

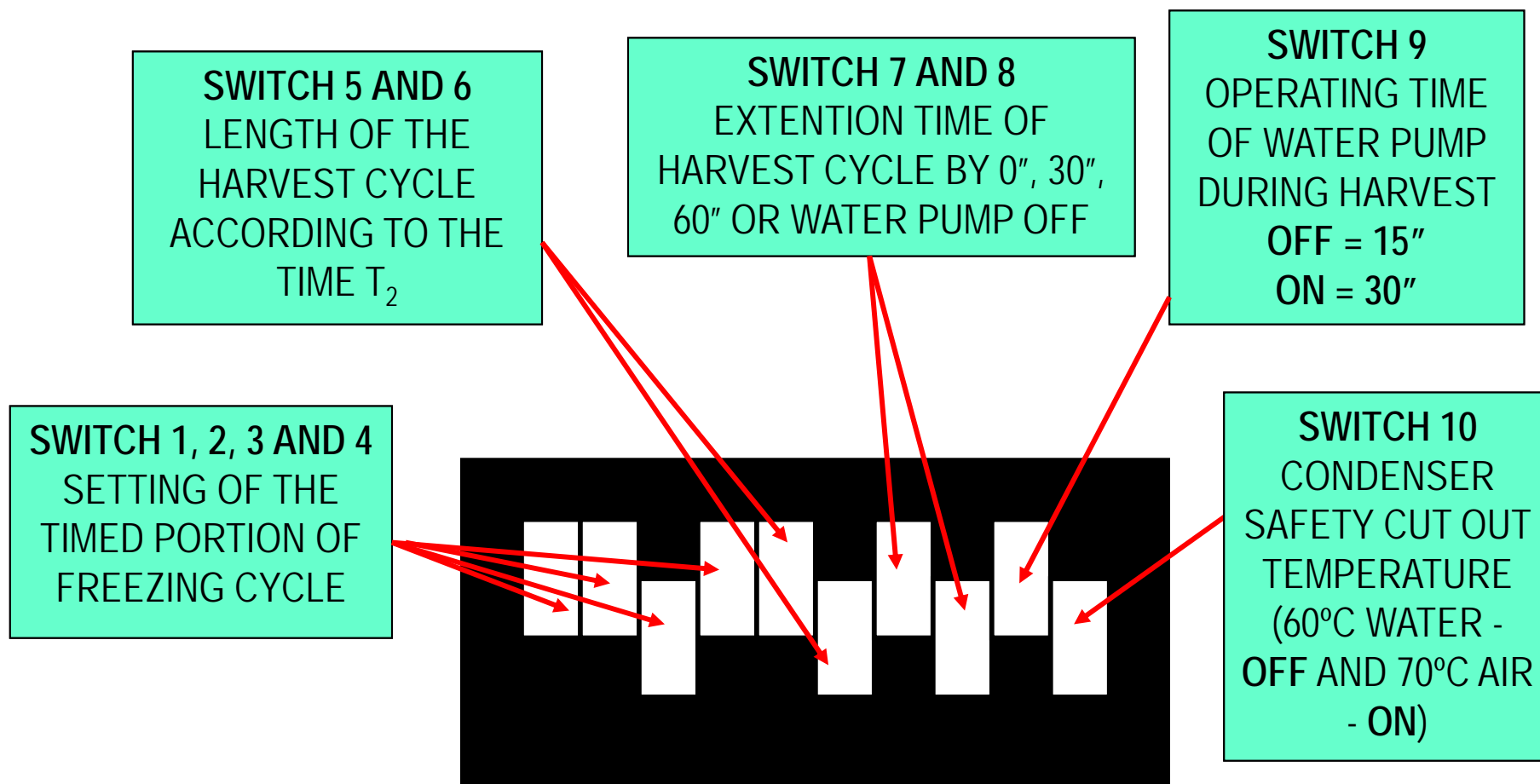
SECOND PORTION



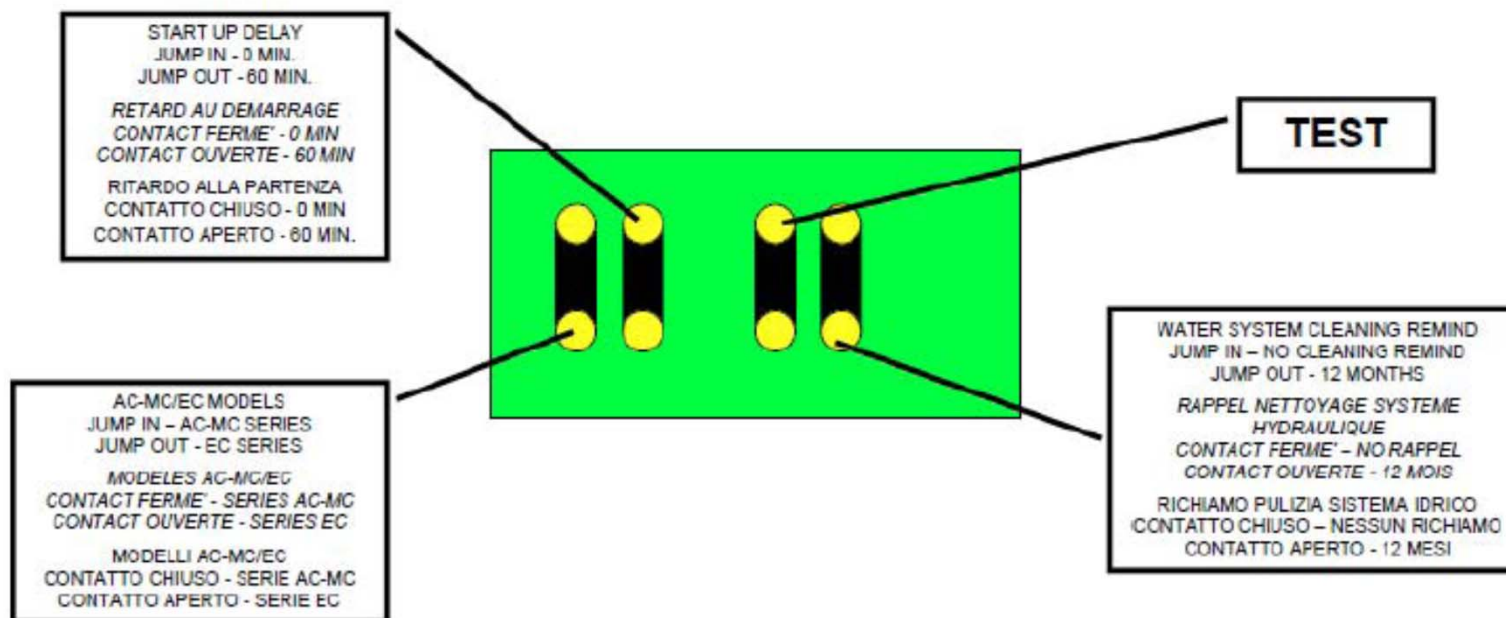
OPERATING PRINCIPLES – PC BOARD



OPERATING PRINCIPLES – DIP SWITCHES



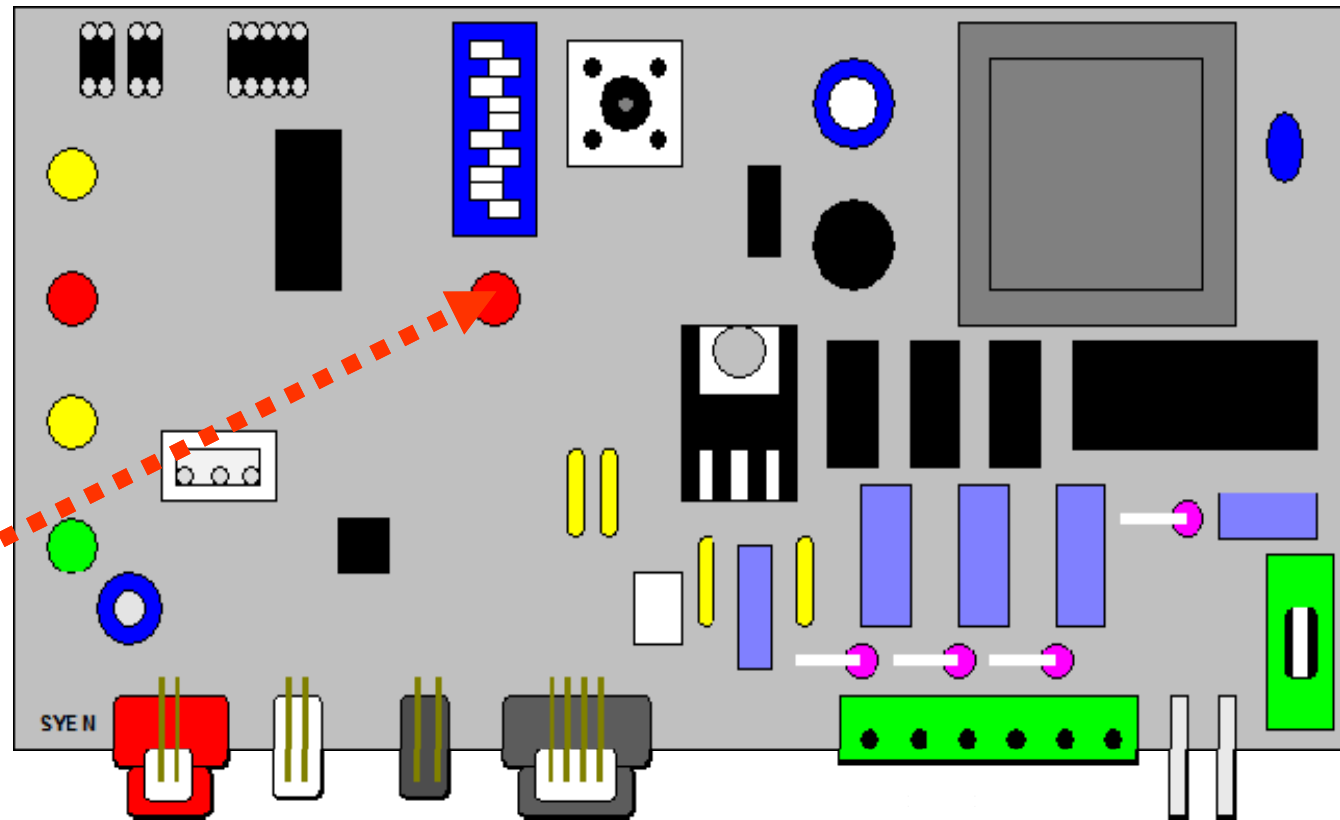
OPERATING PRINCIPLES – JUMPERS



OPERATING PRINCIPLES – PC BOARD

Time T_1

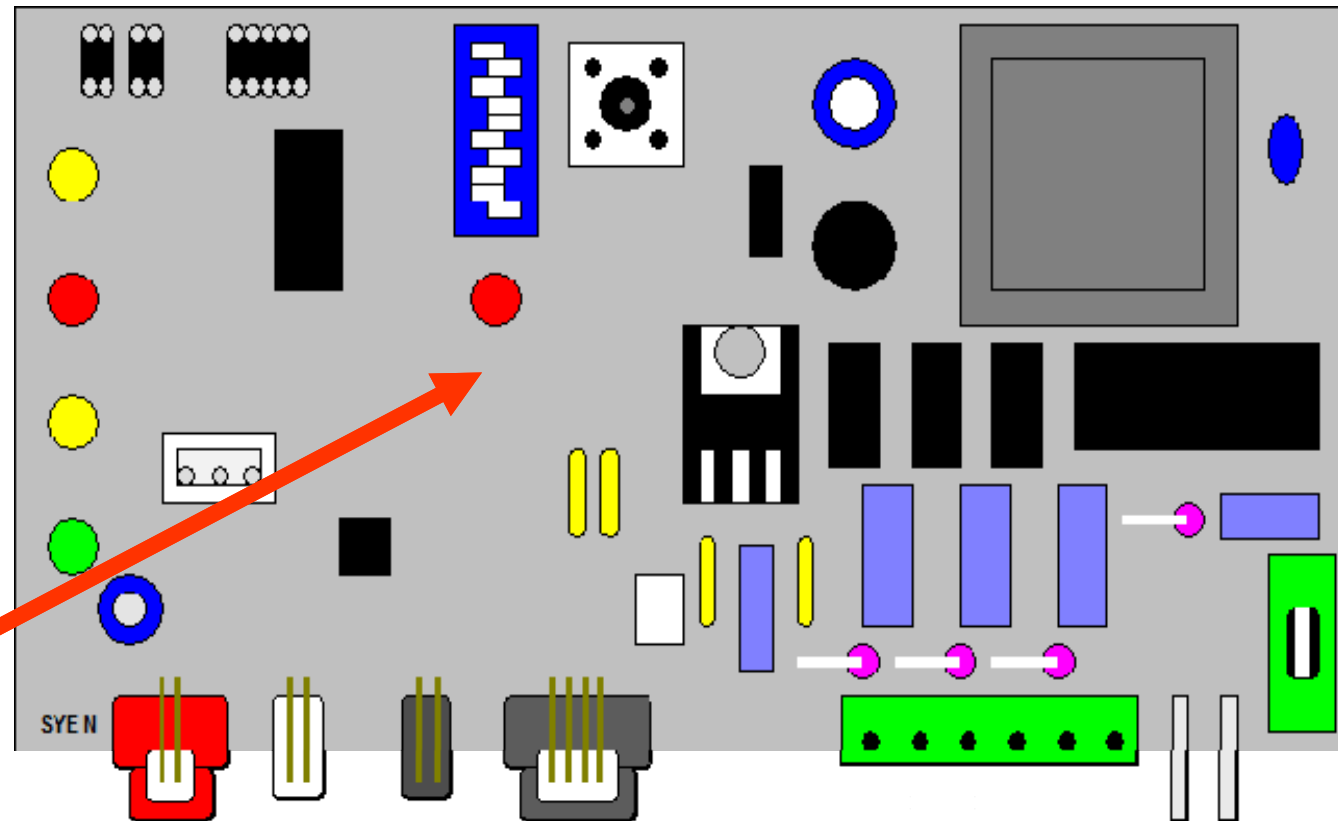
From start
up of
freezing
cycle till
the blinking
of 0°C Red
LED



OPERATING PRINCIPLES – PC BOARD

Time T_2

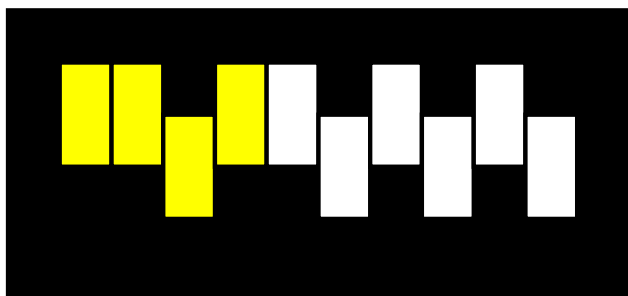
From
blinking of
Red LED
till the light
ON steady
of -15°C
Red LED



OPERATING PRINCIPLES – PC BOARD

Time T_a

Added time controlled
by the PC Board
according to the setting
of the DIP SWITCH
1, 2, 3 and 4.



LENGTH OF TIMED PORTION OF FREEZING CYCLE – FIRST 4 SWITCHES					
	25'		23'		21'
	19'		17'		15'
	13'		11'		9'
	7'		5'		3'

OPERATING PRINCIPLES – PC BOARD

Time T_s

Harvest Time T_s is controlled by the PC Board and it is inversely proportional to the Time T_2 of the Freeze Cycle (from 0°C to -13°C) as per the **combination A** of the Table.

Time T_s is NOT adjustable.

LENGTH OF HARVEST CYCLE ACCORDING TO THE TIME TO DROP THE EVAP. TEMPERATURE FROM 0°C TO -13°C

LENGTH HARVEST CYCLE	PROGRAMS			
	A	B	C	D
180"	Up to 6'	***	Up to 9'	***
165"	6'-7'	Up to 3'	9'-10'	***
150"	7'-8'	3'-3'15'	10'-11'	***
135"	8'-9'	3'15"-3'30"	11'-12'	***
120"	9'-10'	3'30"-4'30"	12'-13'	Up to 3'
105"	10'-12'	4'30"-6'	13'-15'	3-4'
90"	>12'	>6'	>15'	>4'



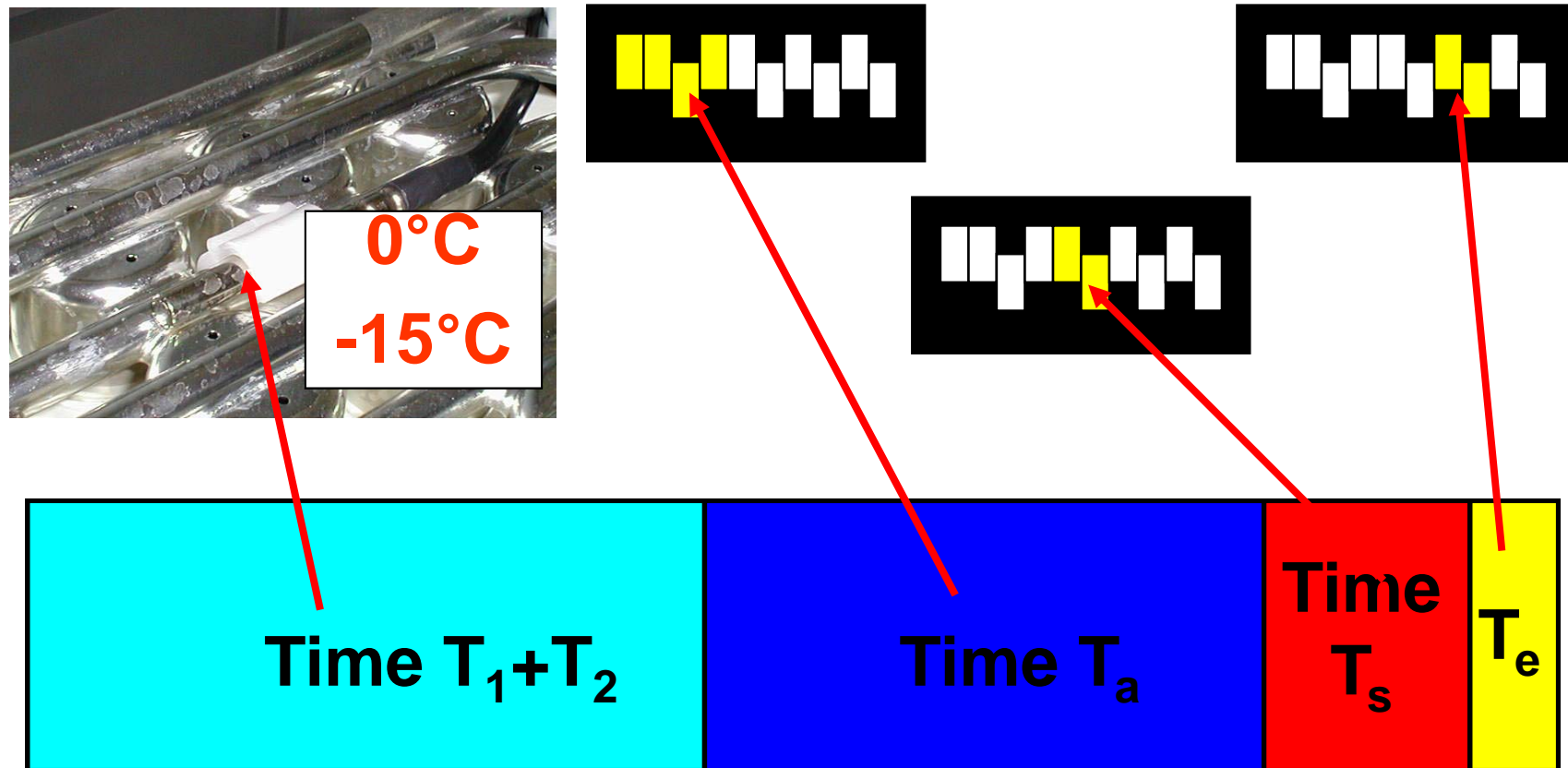
NEW MXG SERIES

OPERATING PRINCIPLES – PC BOARD

It's possible to **extend the length of the harvest cycle (T_e)** by means of the **DIP SWITCH 7 and 8** as per below chart.

DIP SWITCH		ADDITIONAL DEFROST TIME
7	8	
ON	ON	0
OFF	ON	30"
ON	OFF	60"
OFF	OFF	WATER PUMP OFF

OPERATING PRINCIPLES – PC BOARD



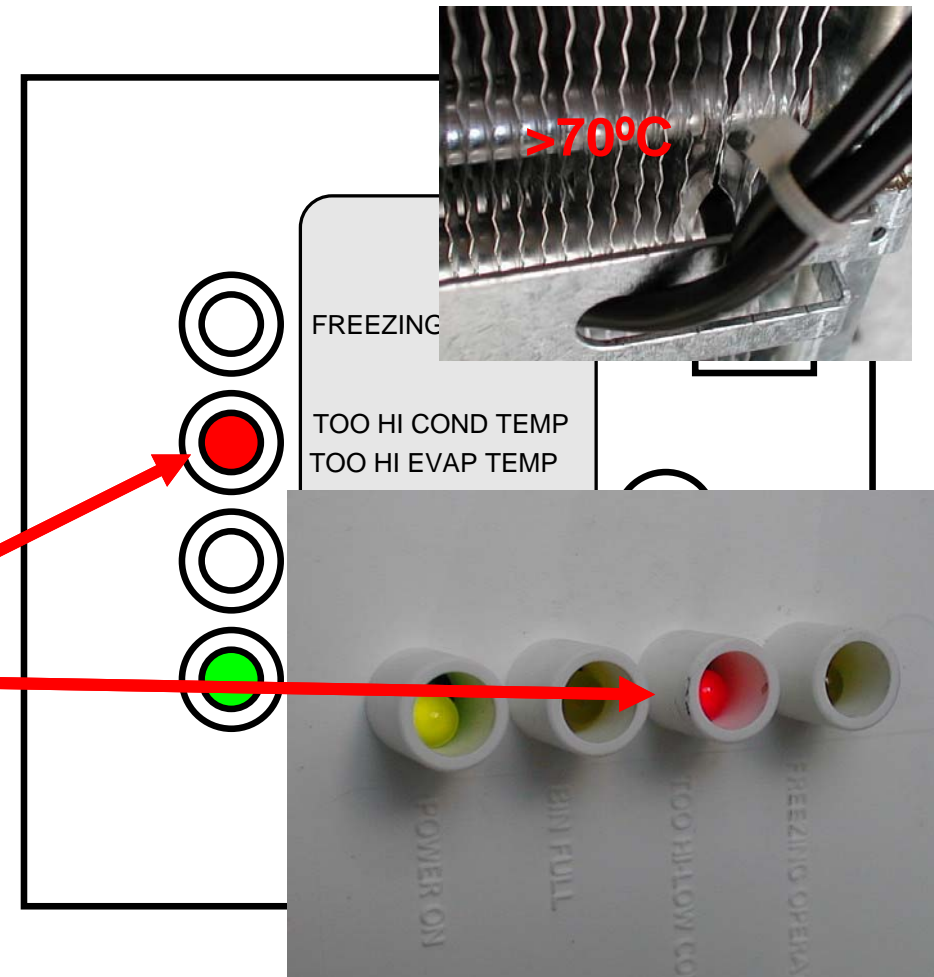
$$\text{Freezing} = T_1 + T_2 + T_a$$

$$\text{Defrost/Harvest} = T_s + T_e$$

OPERATING PRINCIPLES – PC BOARD ALARMS

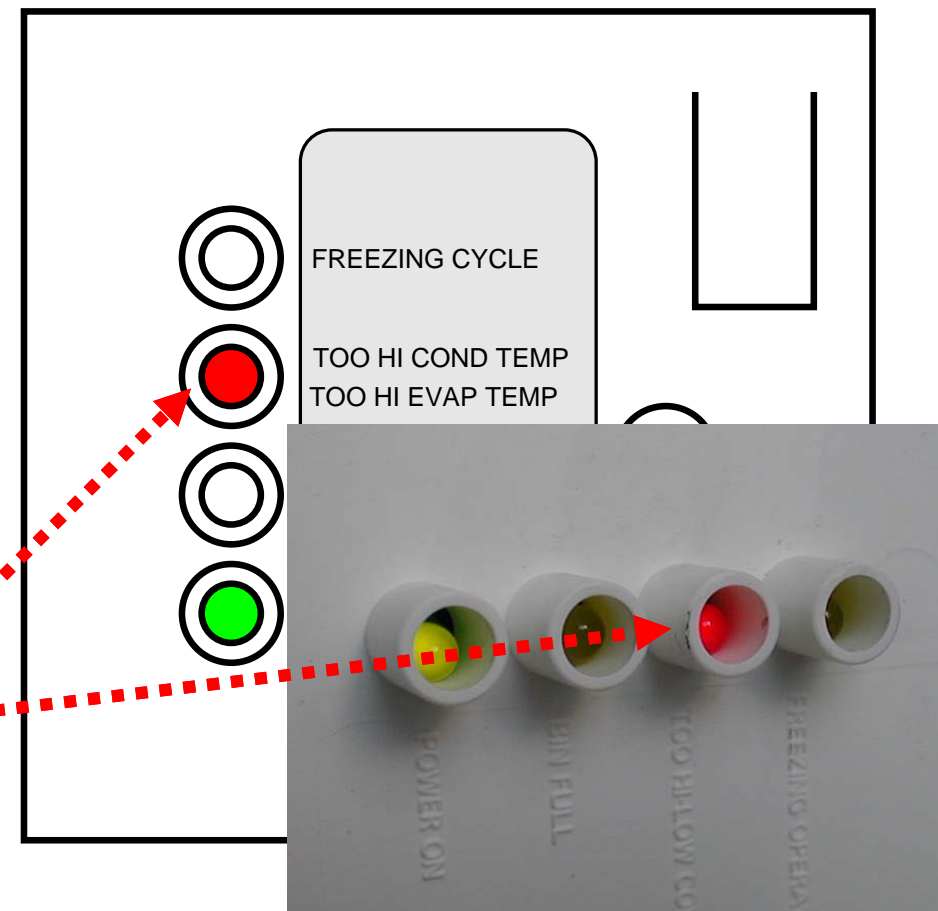
TOO HI COND. TEMPERATURE

Whenever the condensing temperature rise up to **70°C** (air cooled version) or **60°C** (water cooled version) the PC Board will switch OFF immediately the entire machine with the **light ON** of the **Red ALARM LED**.



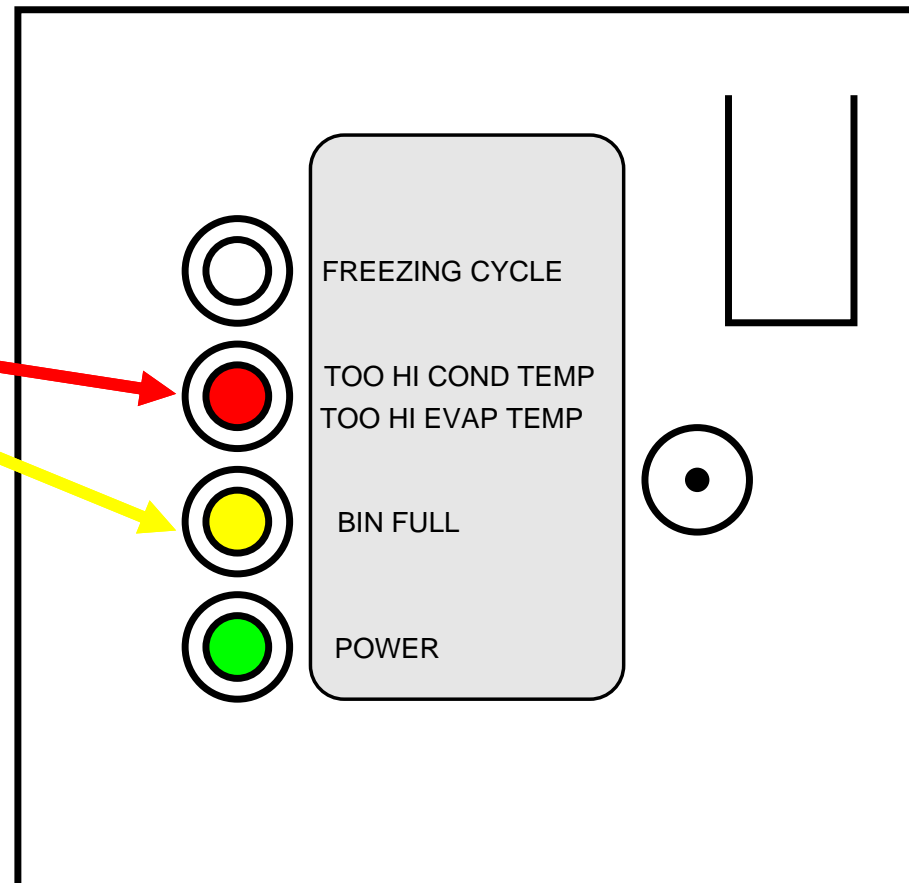
OPERATING PRINCIPLES – PC BOARD ALARMS TOO HI EVAPORATOR TEMPERATURE

In case the evaporating temperature remains higher than **0°C** after **15 minutes** from the beginning of the freezing cycle the PC Board will switch OFF immediately the entire machine with the **blinking of the Red ALARM LED.**



OPERATING PRINCIPLES – PC BOARD ALARMS CONDENSER SENSOR OUT OF ORDER

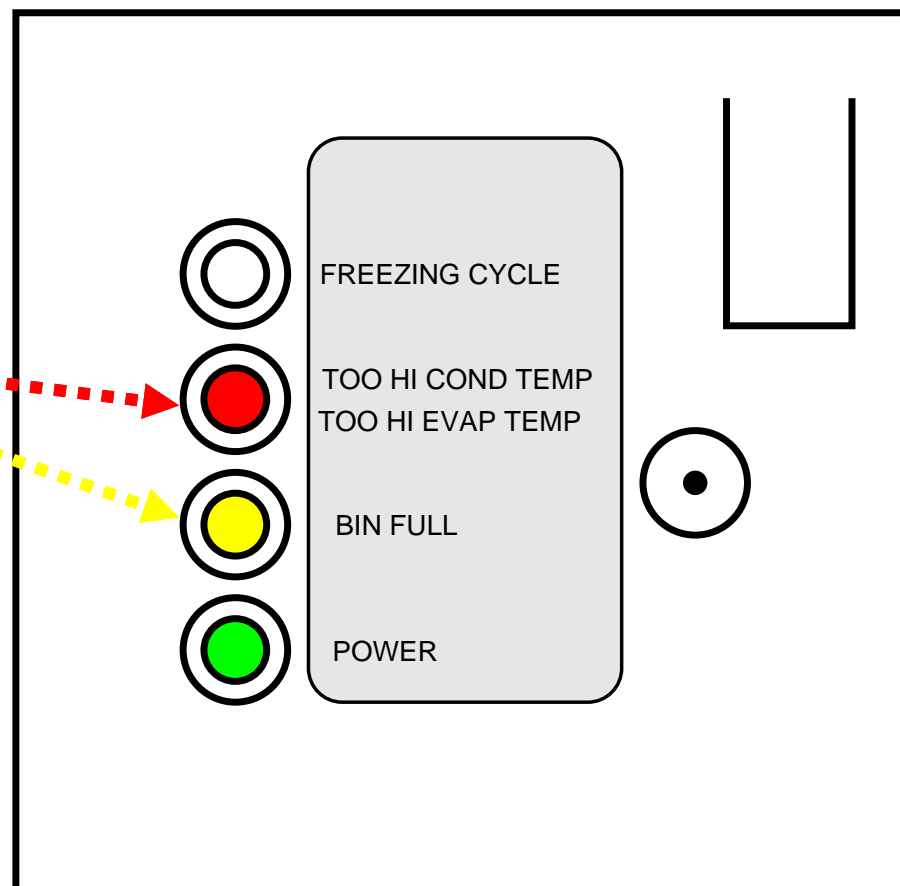
In case both the Red and Yellow LED are **light ON steady** the condenser sensor is out of order and need to be replaced.



OPERATING PRINCIPLES – PC BOARD ALARMS

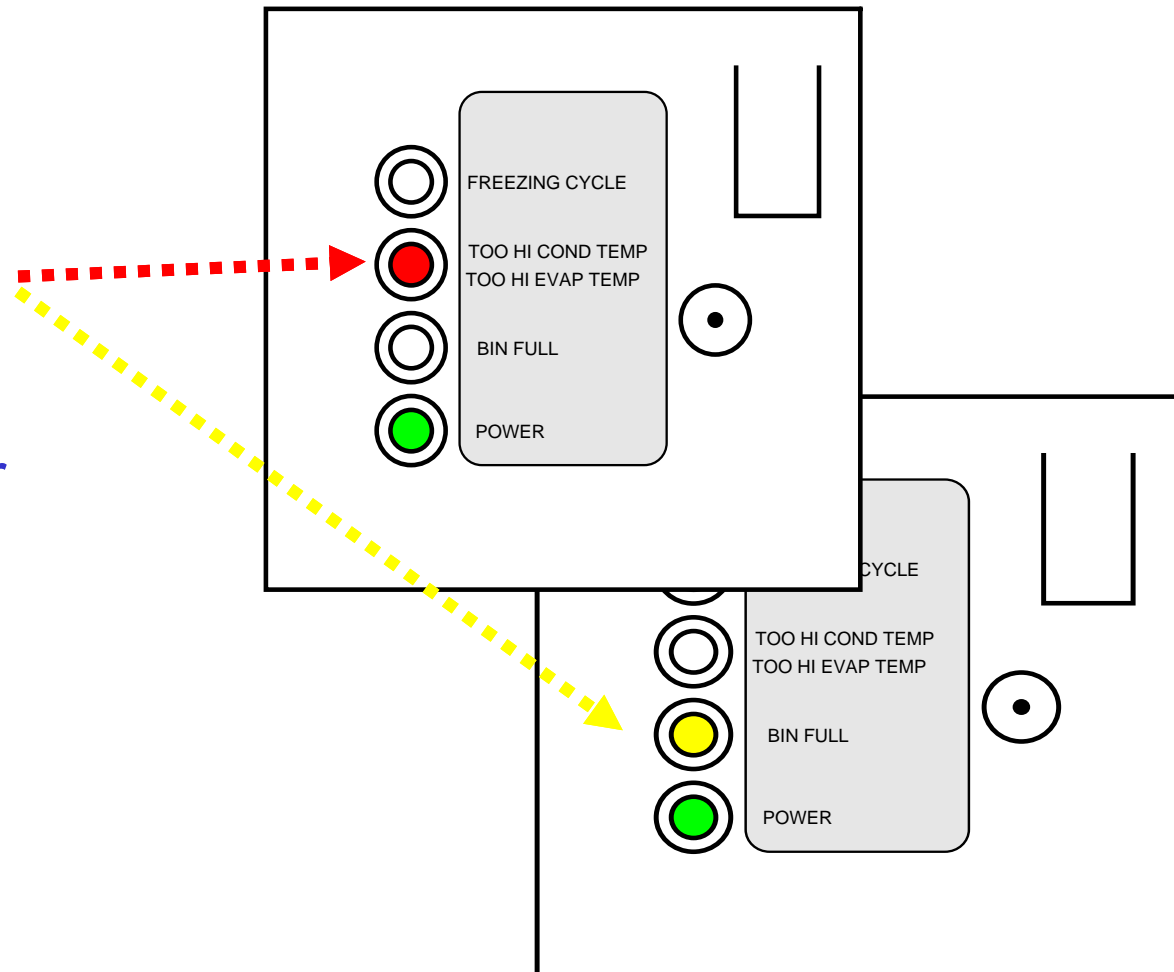
EVAPORATOR SENSOR OUT OF ORDER

In case both the Red and Yellow LED are **blinking** the evaporator sensor is out of order and need to be replaced.



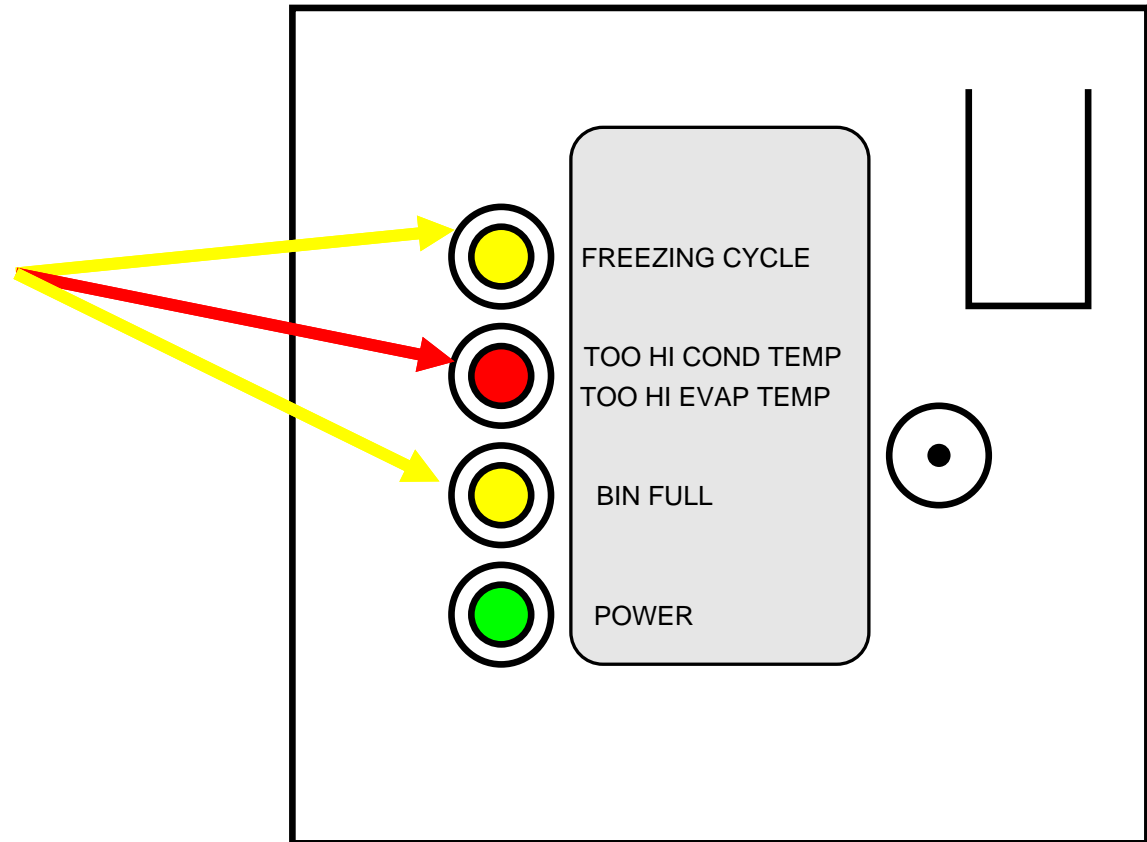
OPERATING PRINCIPLES – PC BOARD ALARMS ICE LEVEL CONTROL OUT OF ORDER

Whenever red and
yellow LEDs blink
alternatively ice level
control is out of order
then have to be
replaced



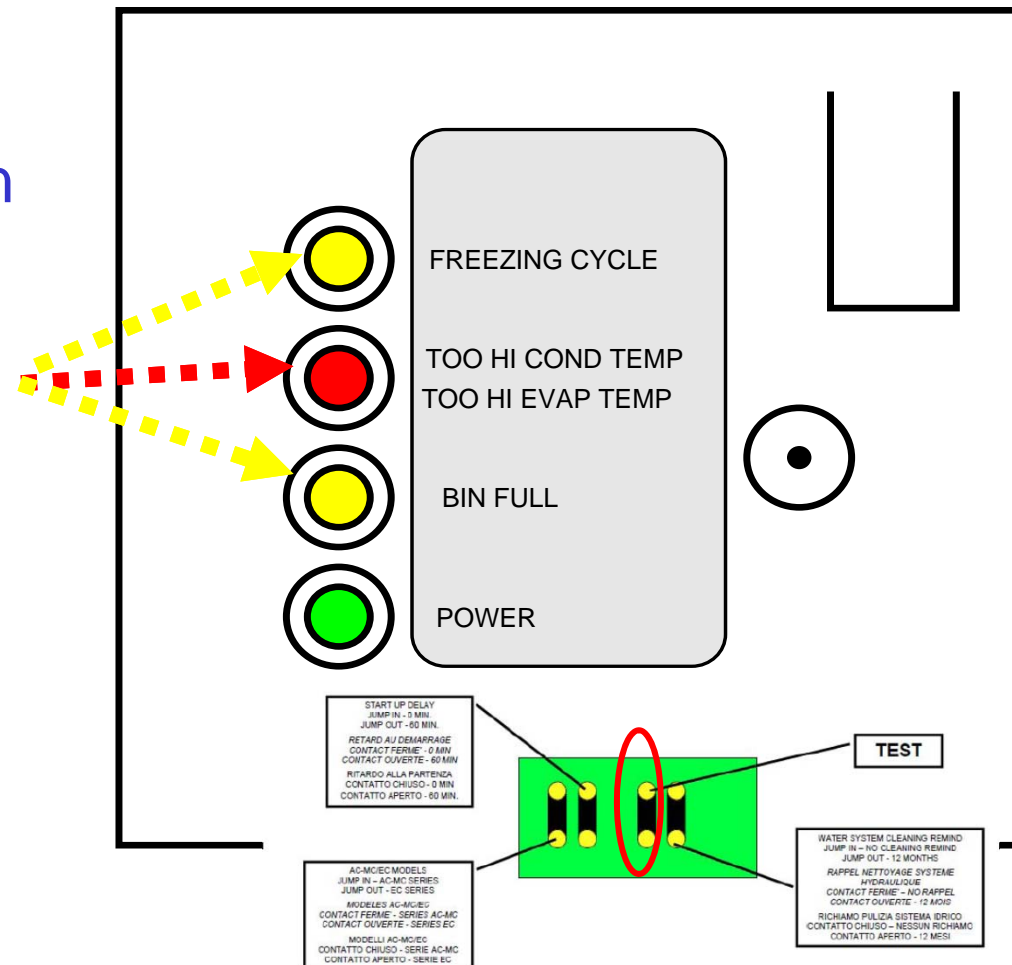
OPERATING PRINCIPLES – PC BOARD ALARMS ICE LEVEL CONTROL CALIBRATION

Three LED flash :
ice level control –
PCB balance /
calibration done



OPERATING PRINCIPLES – PC BOARD ALARMS CLEANING – MISSING TEST JUMPER

Three LEDs blinking: unit in
cleaning cycle or missing
test jumper removal

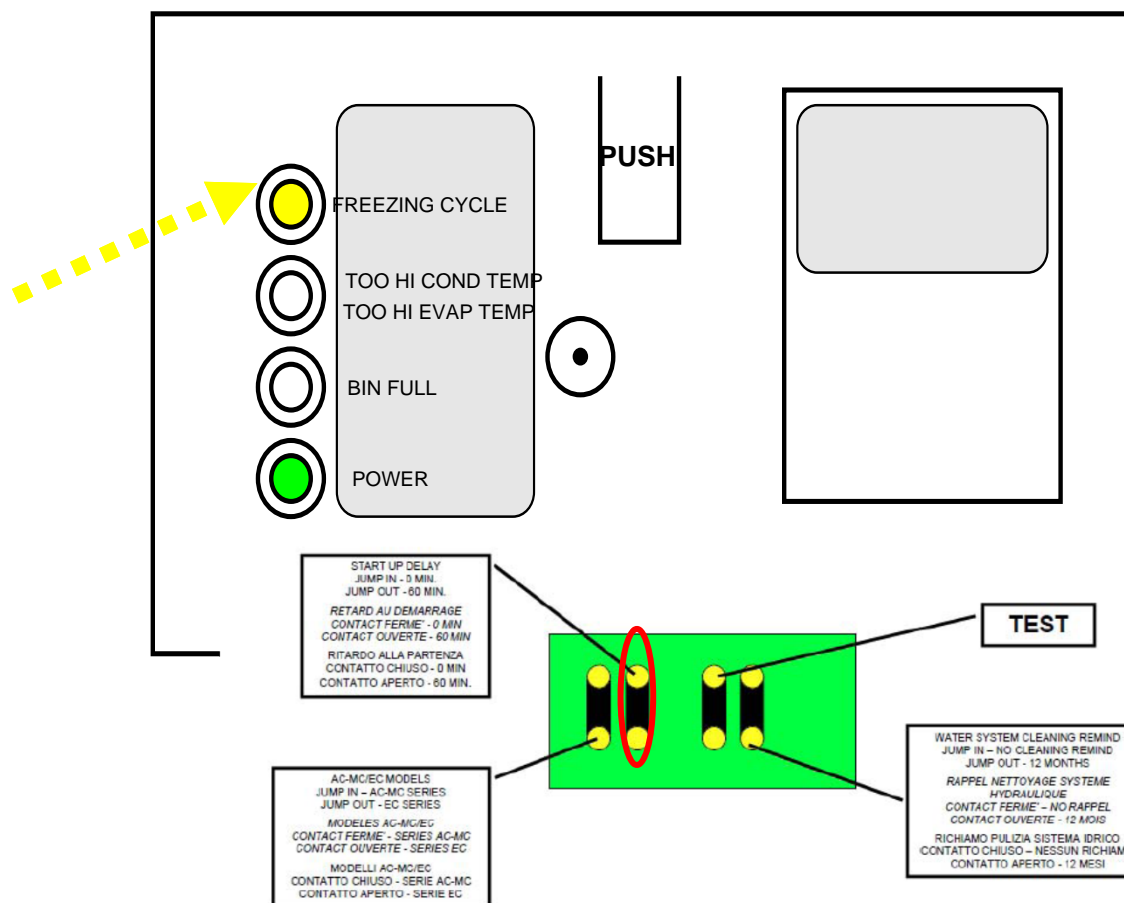


OPERATING PRINCIPLES – PC BOARD ALARMS

START UP DELAY

Yellow LED blinking at
unit start up with ice
maker OFF:

60' delay – Jumper J3
OPEN



COMPONENTS - REFRIGERANT SYSTEM

The components of the refrigerant system of the MC Series are composed by:

- **COMPRESSOR**



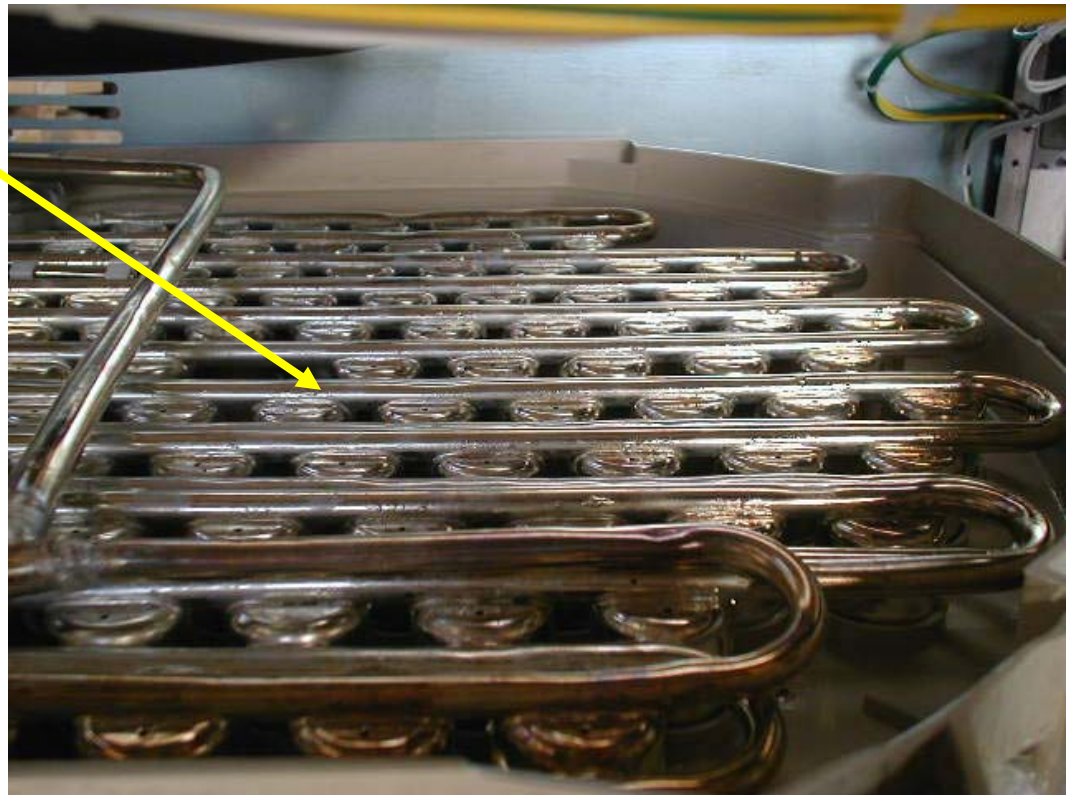
COMPONENTS - REFRIGERANT SYSTEM

- AIR COOLED CONDENSER



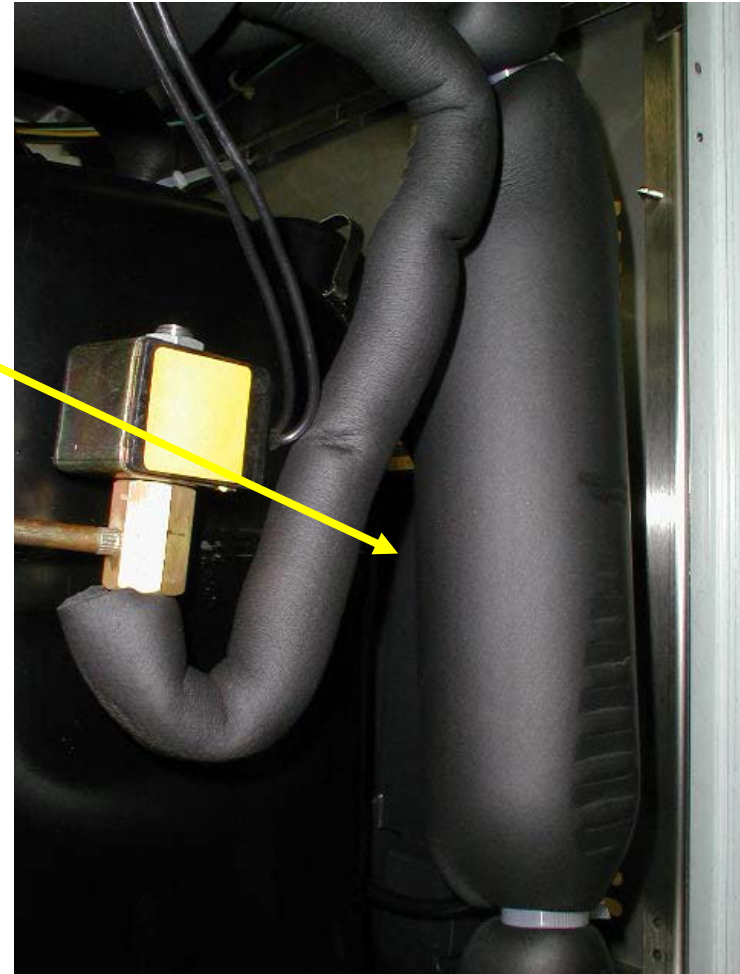
COMPONENTS - REFRIGERANT SYSTEM

- EVAPORATOR



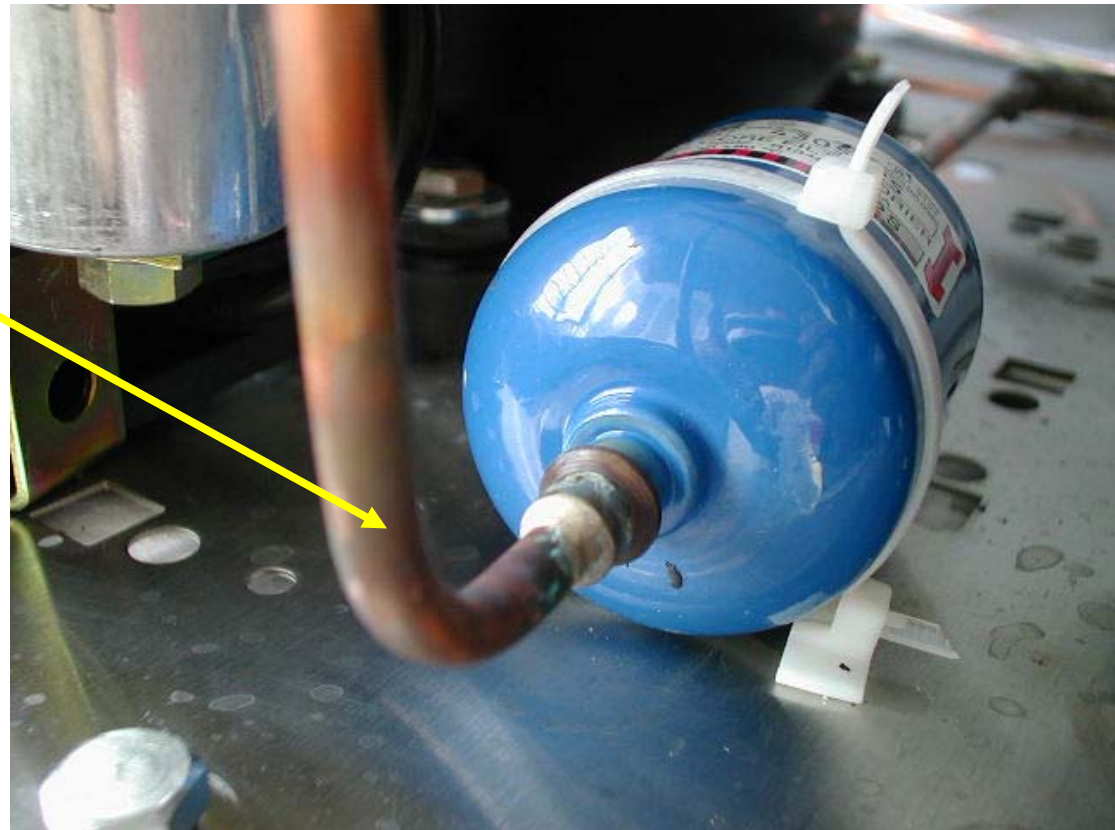
COMPONENTS - REFRIGERANT SYSTEM

- SUCTION LINE AND
CAPILLARY TUBE



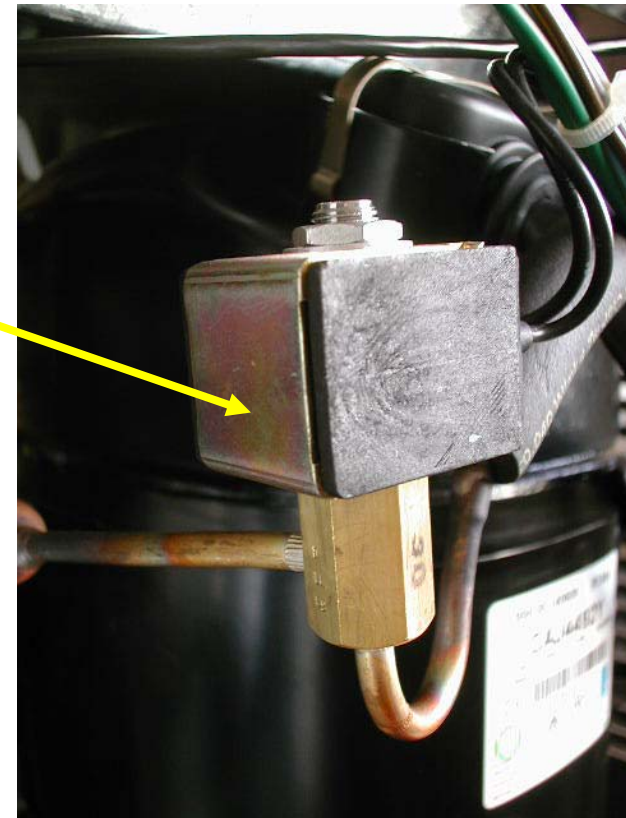
COMPONENTS - REFRIGERANT SYSTEM

- **DRIER**



COMPONENTS - REFRIGERANT SYSTEM

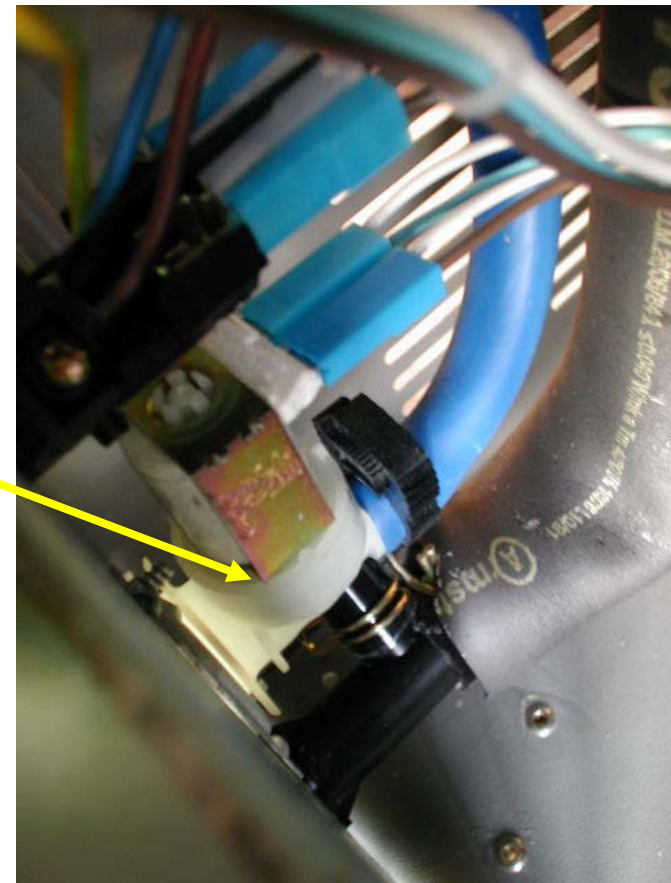
- HOT GAS VALVE



COMPONENTS - WATER SYSTEM

The components of the water system of the MC Series are composed by:

- **WATER INLET VALVE**



COMPONENTS - WATER SYSTEM

- WATER SUMP



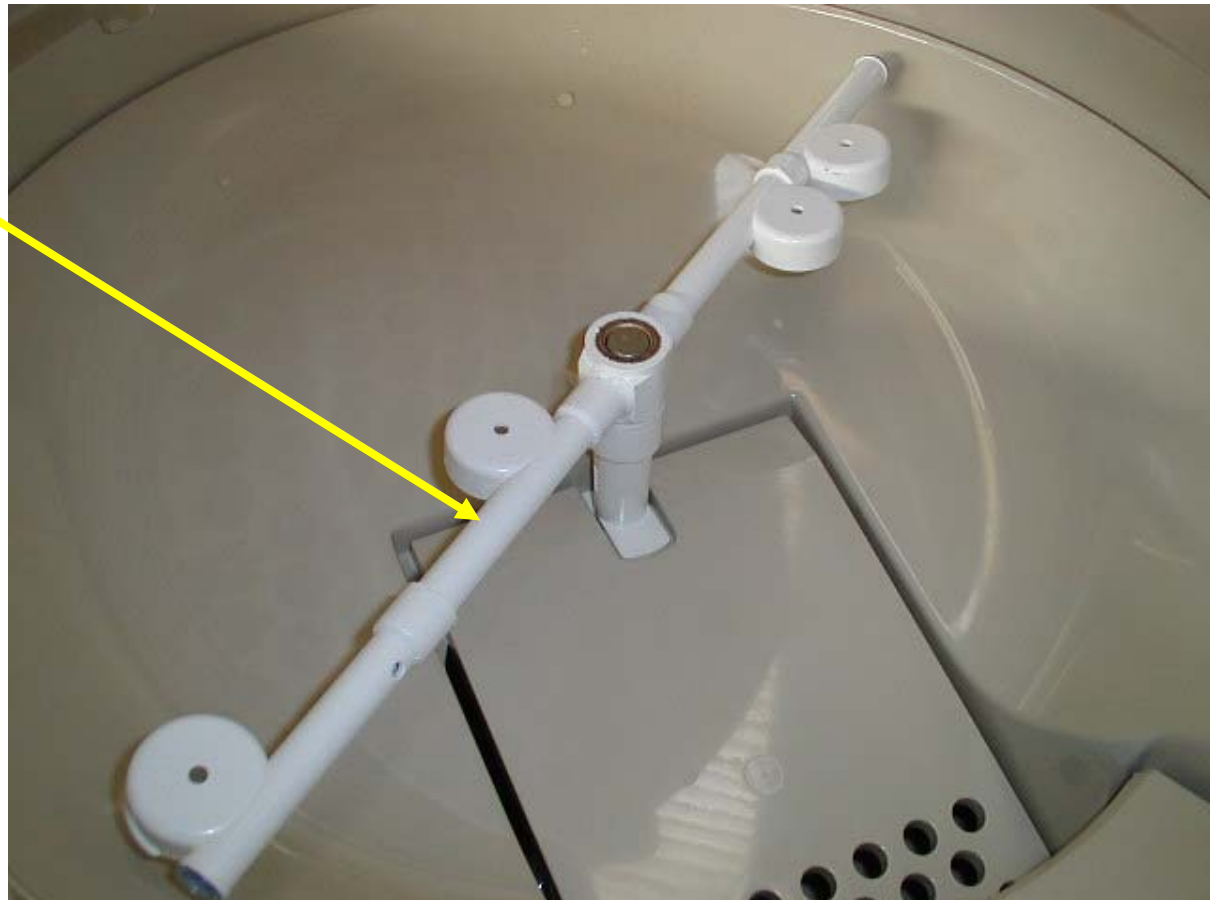
COMPONENTS - WATER SYSTEM

- WATER PUMP



COMPONENTS - WATER SYSTEM

- SPRAY BAR



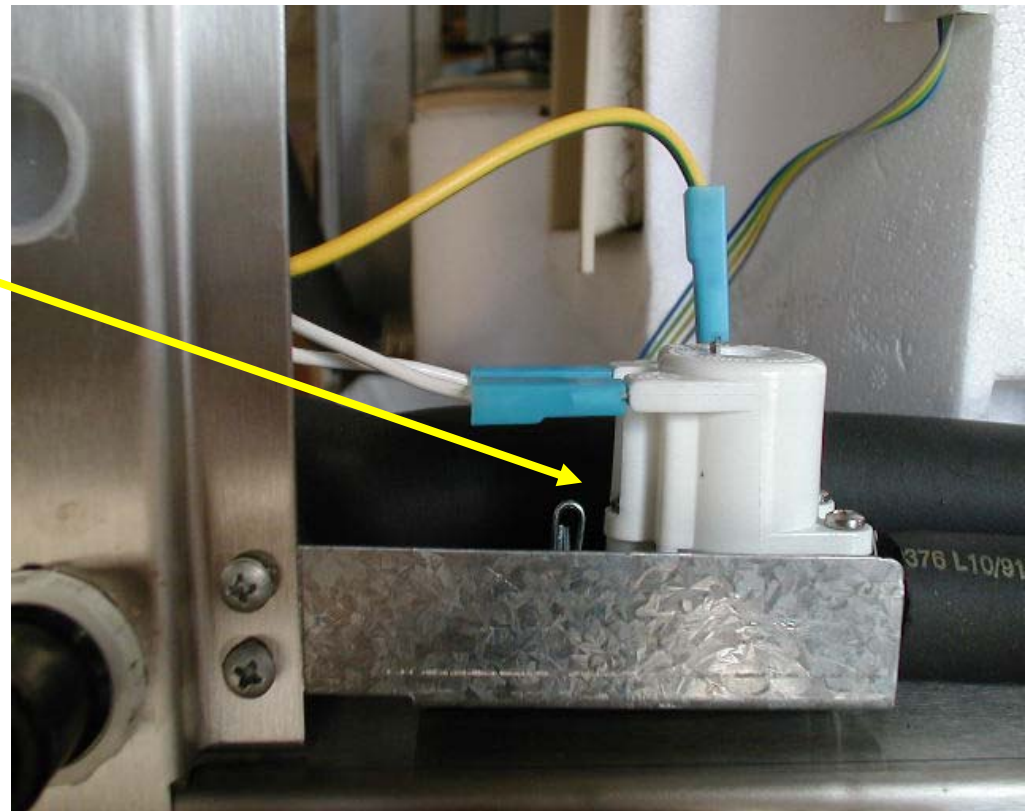
COMPONENTS - WATER SYSTEM

- OVERFLOW



COMPONENTS - WATER SYSTEM

- WATER DRAIN VALVE



COMPONENTS - ELECTRICAL CONTROLS

The components of the Electric System of the MXG Series are composed by:

- **MASTER SWITCH**



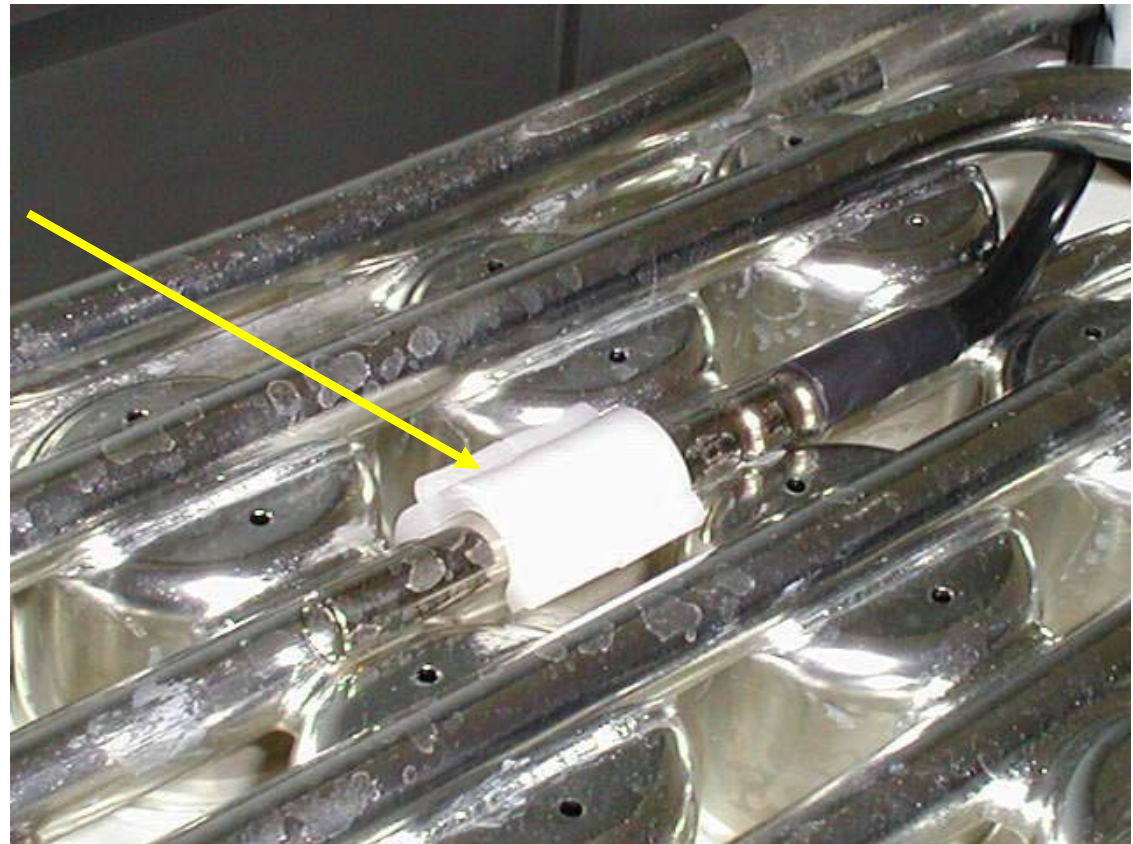
COMPONENTS - ELECTRICAL CONTROLS

- PC BOARD



COMPONENTS - ELECTRICAL CONTROLS

- **EVAPORATOR
SENSOR**



COMPONENTS - ELECTRICAL CONTROLS

- **CONDENSER SENSOR**



COMPONENTS - ELECTRICAL CONTROLS

- OPTICAL ICE LEVEL CONTROL



Scotsman[®]
Ice Systems

**END FIRST
HALF**

