SCOTSMAN®

SERVICE MANUAL

ACM 85
AC 125
AC 175
AC 225

R 134 A / R 404 A VERSIONS

Electronic cubers with storage

MS 1000.08 REV. 03/98

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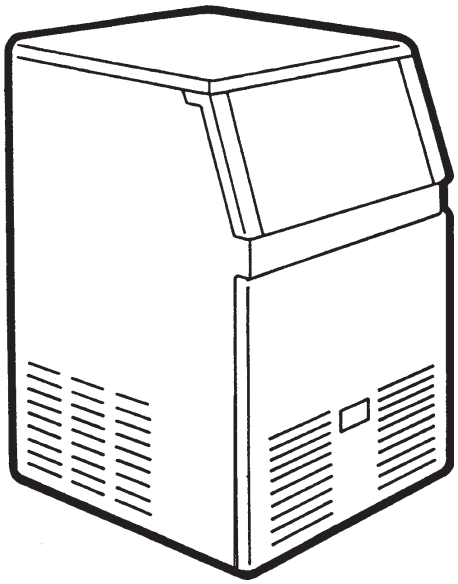
SPECIFICATIONS

ELECTRONIC CUBER MODEL ACM 85

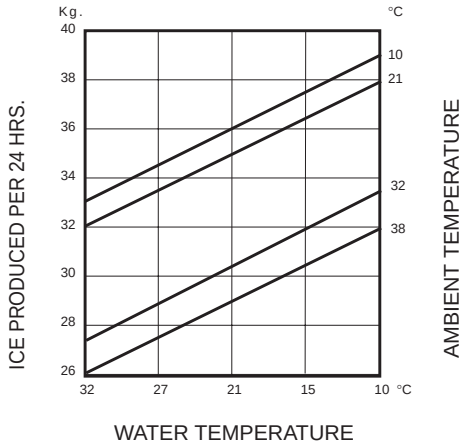


Important operating requirements:

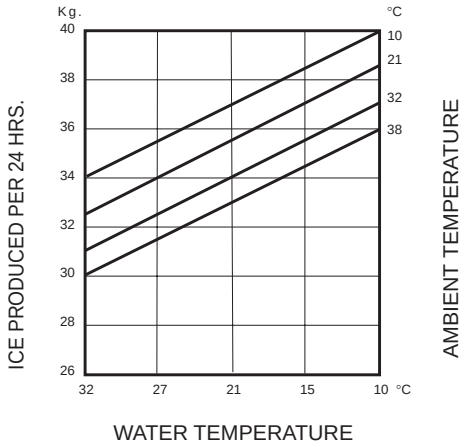
	MIN	MAX
Air temperature	10°C (50°F)	40°C (100°F)
Water temperature	5°C (40°F)	40°C (100°F)
Water pressure	1 bar (14 psi)	5 bar (70 psi)
Electr. voltage variations from voltage rating specified on nameplate	-10%	+10%

ice making capacity

AIR COOLED MODELS

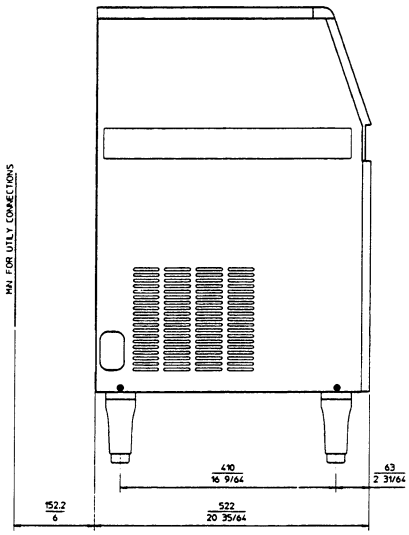


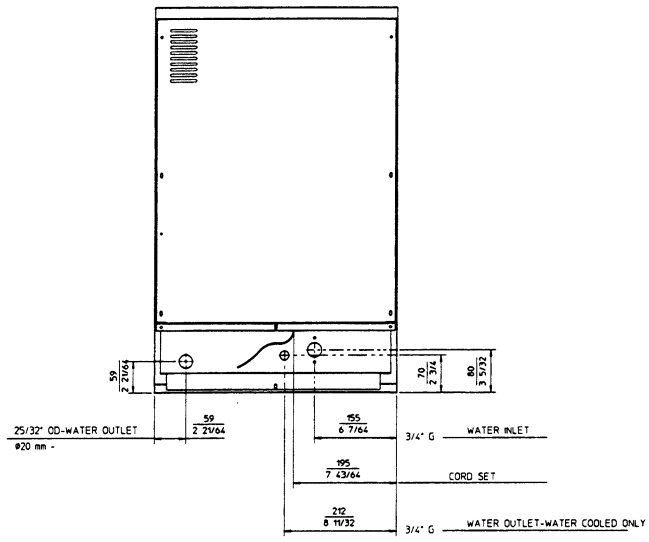
WATER COOLED MODELS

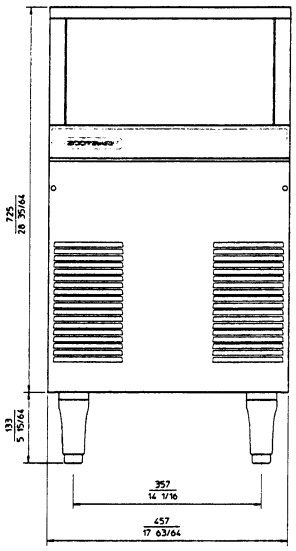


NOTE. *With the unit in "built-in" conditions, the ice production is gradually reduced in respect to the levels shown in the graf, up to a maximum of 10% at room temperatures higher than 32°C.*
The daily ice-making capacity is directly related to the condenser air inlet temperature, water temperature and age of the machine.
To keep your SCOTSMAN CUBER at peak performance levels, periodic maintenance checks must be carried out as indicated on page 38 of this manual.

SPECIFICATIONS (CONT'D)







FRONT VIEW

HEIGHT (without legs)	790 mm.
HEIGHT (with legs)	930 mm.
WIDTH	457 mm.
DEPTH	523 mm.
WEIGHT	44 Kgs.

ACM 85 - CUBER MACHINE SPECIFICATION

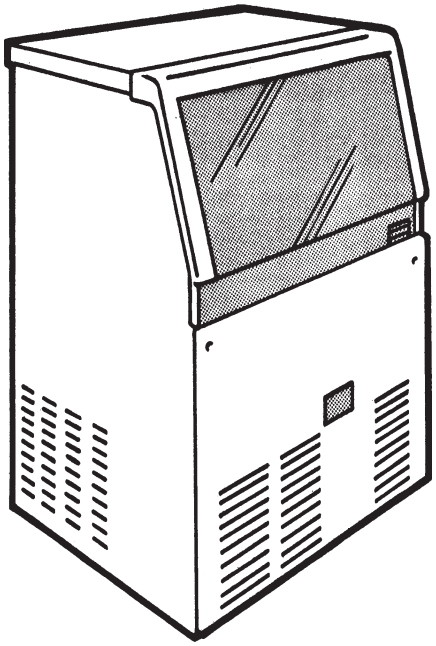
Model	Cond.	Finish	Comp. HP	Ice bin cap. Kgs.	Water requirem LTx24 HR
ACM 85 AS	Air	S/Steel	3/8	14	140
ACM 85 WS	Water	S/Steel			380*

Basic electr.	Amps.	Start Amps	Watts	Electr. power cons. Kwh per 24 Hrs	No of Wires	Amp. Fuse
230/50/1	3.2	17	500	10	3 x 1 m/m^2	10

Cubes per harvest: 24 medium
* At 15°C (60°F) water temperature

SPECIFICATIONS

ELECTRONIC CUBER MODEL AC 125

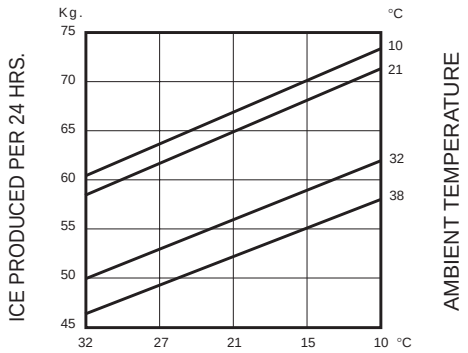


Important operating requirements:

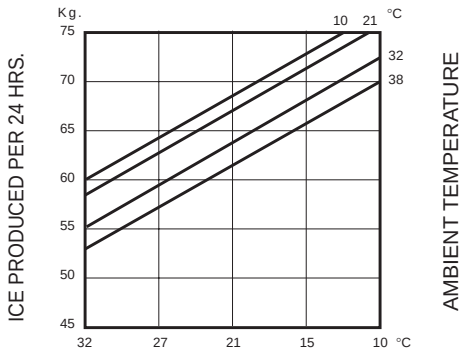
	MIN	MAX
Air temperature	10°C (50°F)	40°C (100°F)
Water temperature	5°C (40°F)	40°C (100°F)
Water pressure	1 bar (14 psi)	5 bar (70 psi)
Electr. voltage variations from voltage rating specified on nameplate	-10%	+10%

ice making capacity

AIR COOLED MODELS

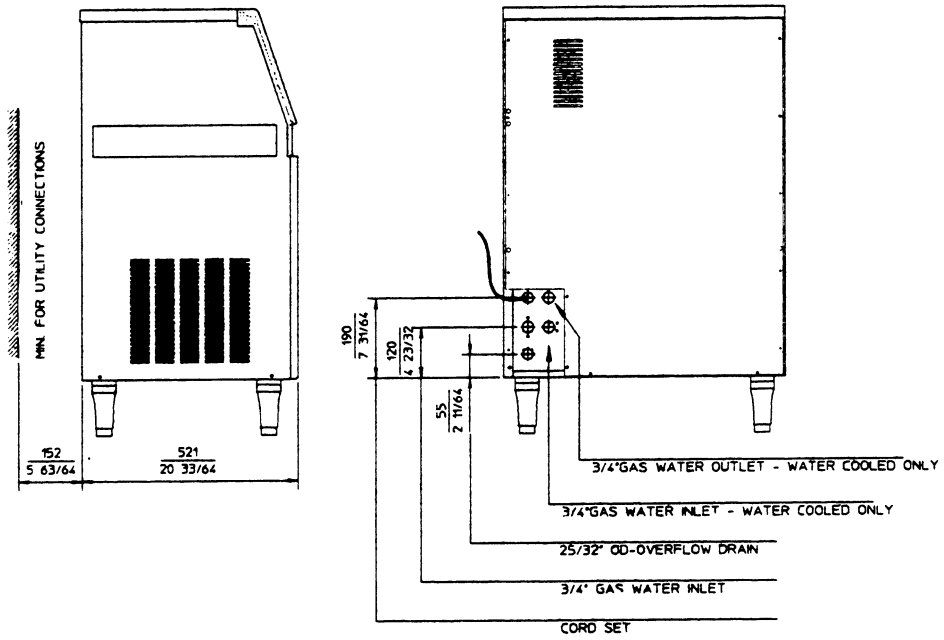


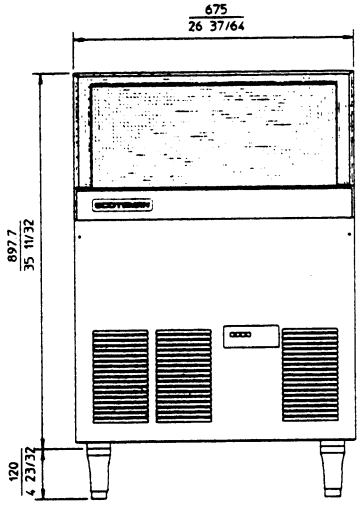
WATER COOLED MODELS



NOTE. *With the unit in "built-in" conditions, the ice production is gradually reduced in respect to the levels shown in the graf, up to a maximum of 10% at room temperatures higher than 32°C.*
The daily ice-making capacity is directly related to the condenser air inlet temperature, water temperature and age of the machine.
To keep your SCOTSMAN CUBER at peak performance levels, periodic maintenance checks must be carried out as indicated on page 38 of this manual.
Production charts shown indicate the production of ACM models; ice production of ACL and ACS models is 10% lower.

SPECIFICATIONS (CONT'D)





FRONT VIEW

HEIGHT (without legs)	900 mm.
HEIGHT (with legs)	1020 mm.
WIDTH	675 mm.
DEPTH	520 mm.
WEIGHT	75 Kgs.

AC 125 - CUBER MACHINE SPECIFICATIONS

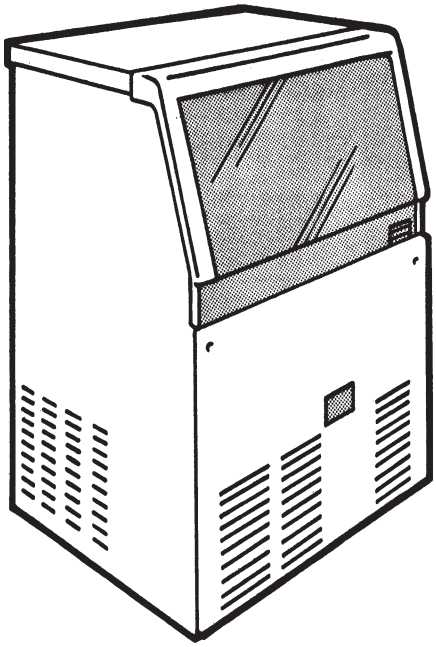
Model	Cond.	Finish	Comp. HP	Ice bin cap. Kgs.	Water requirem LTx24 HR
AC 125 AS	Air	S/Steel	1/2	28	160
AC 125 WS	Water	S/Steel			680*

Basic electr.	Amps.	Start Amps	Watts	Electr. power cons. Kwh per 24 Hrs	No of Wires	Amp. Fuse
230/50/1	3.8	20	670	13	3 x 1 m/m^2	10

Cubes per harvest: 36 large / 48 medium / 84 small
* At 15°C (60°F) water temperature

SPECIFICATIONS

ELECTRONIC CUBER MODEL AC 175

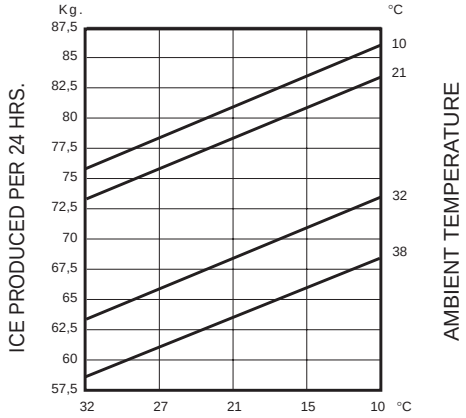


Important operating requirements:

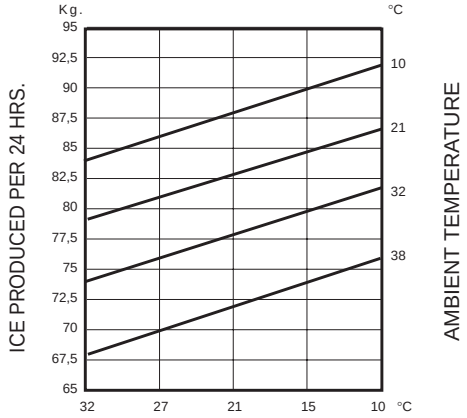
	MIN	MAX
Air temperature	10°C (50°F)	40°C (100°F)
Water temperature	5°C (40°F)	40°C (100°F)
Water pressure	1 bar (14 psi)	5 bar (70 psi)
Electr. voltage variations from voltage rating specified on nameplate	-10%	+10%

ice making capacity

AIR COOLED MODELS

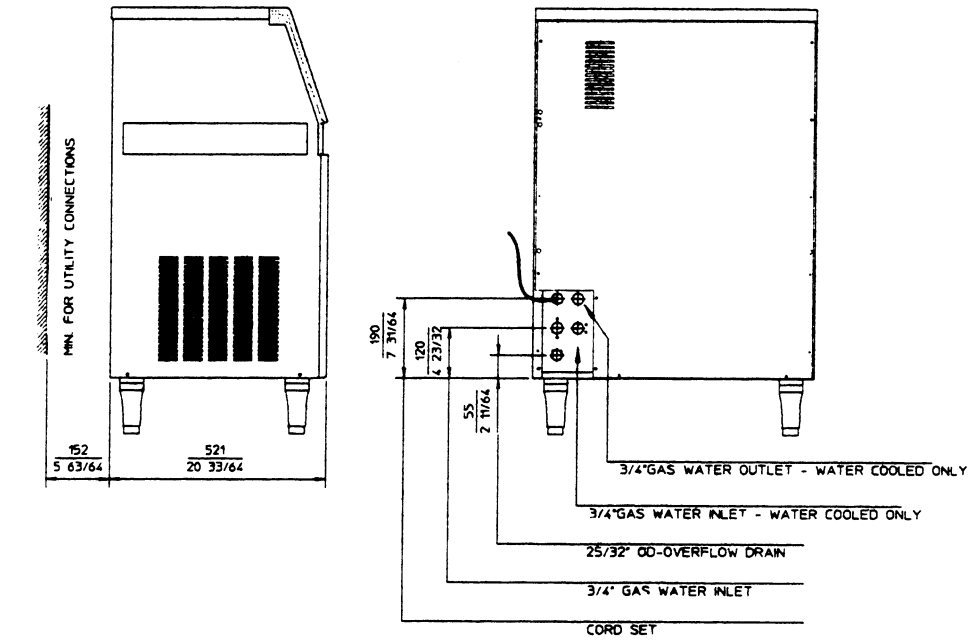


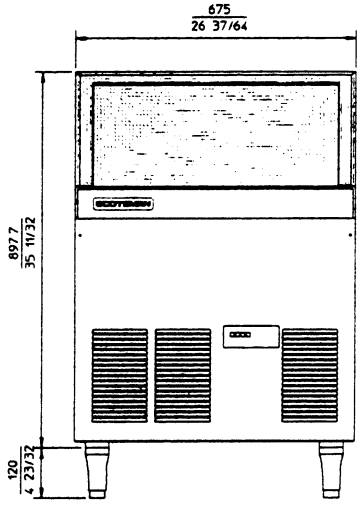
WATER COOLED MODELS



NOTE. *With the unit in "built-in" conditions, the ice production is gradually reduced in respect to the levels shown in the graf, up to a maximum of 10% at room temperatures higher than 32°C.*
The daily ice-making capacity is directly related to the condenser air inlet temperature, water temperature and age of the machine.
To keep your SCOTSMAN CUBER at peak performance levels, periodic maintenance checks must be carried out as indicated on page 38 of this manual.
Production charts shown indicate the production of ACM models; ice production of ACL and ACS models is 10% lower.

SPECIFICATIONS (CONT'D)





FRONT VIEW

HEIGHT (without legs)	900 mm.
HEIGHT (with legs)	1020 mm.
WIDTH	675 mm.
DEPTH	520 mm.
WEIGHT	75 Kgs.

AC 175 - CUBER MACHINE SPECIFICATIONS

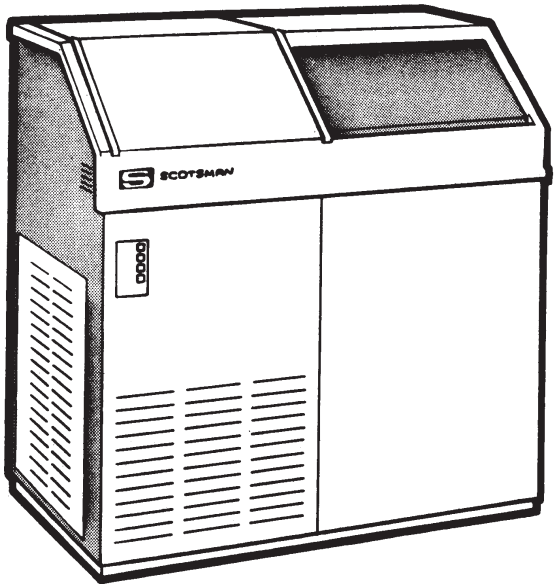
Model	Cond.	Finish	Comp. HP	Ice bin cap. Kgs.	Water requirem LTx24 HR
AC 175 AS	Air	S/Steel	3/4	28	160
AC 175 WS	Water	S/Steel			1000*

Basic electr.	Amps.	Start Amps	Watts	Electr. power cons. Kwh per 24 Hrs	No of Wires	Amp. Fuse
230/50/1	5.3	29	850	18	3 x 1 m/m^2	16

Cubes per harvest: 36 large / 48 medium
* At 15°C (60°F) water temperature

SPECIFICATIONS

ELECTRONIC CUBER MODEL AC 225

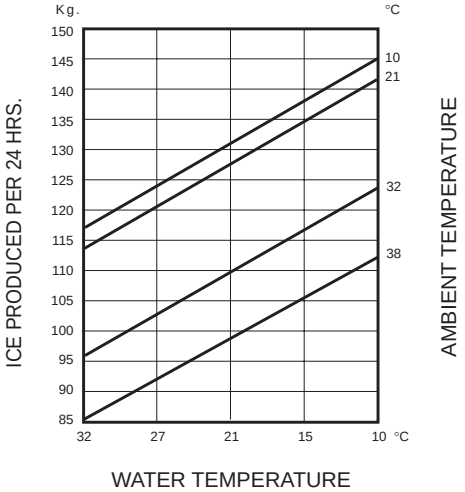


Important operating requirements:

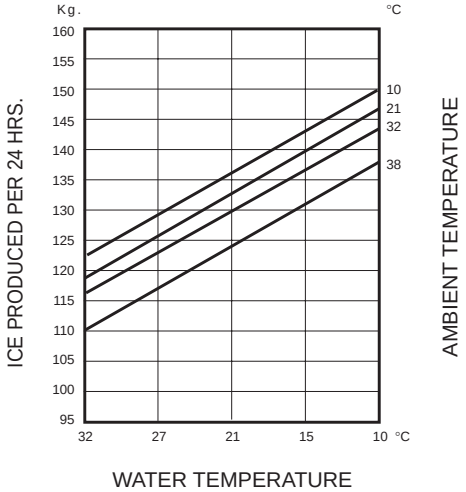
	MIN	MAX
Air temperature	10°C (50°F)	40°C (100°F)
Water temperature	5°C (40°F)	40°C (100°F)
Water pressure	1 bar (14 psi)	5 bar (70 psi)
Electr. voltage variations from voltage rating specified on nameplate	-10%	+10%

ice making capacity

AIR COOLED MODELS

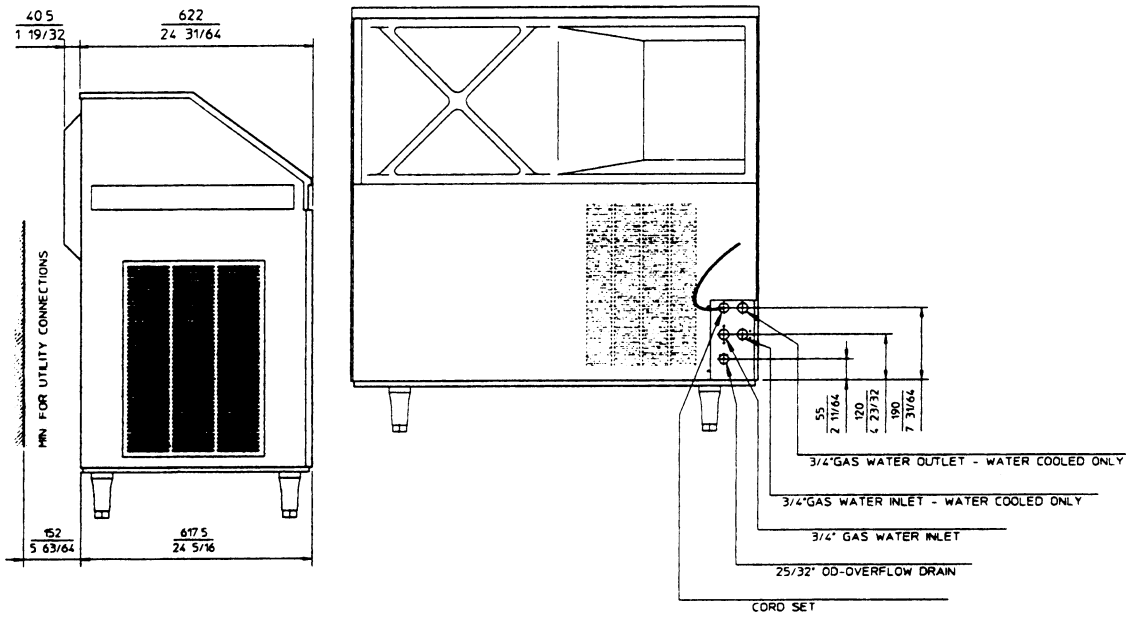


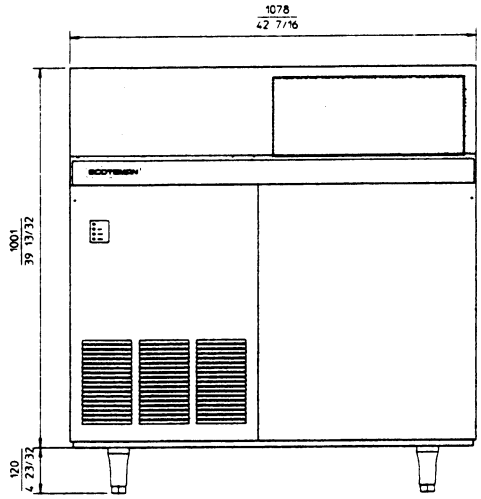
WATER COOLED MODELS



NOTE. *With the unit in "built-in" conditions, the ice production is gradually reduced in respect to the levels shown in the graf, up to a maximum of 10% at room temperatures higher than 32°C.*
The daily ice-making capacity is directly related to the condenser air inlet temperature, water temperature and age of the machine.
To keep your SCOTSMAN CUBER at peak performance levels, periodic maintenance checks must be carried out as indicated on page 38 of this manual.
Production charts shown indicate the production of ACM models; ice production of ACL and ACS models is 10% lower.

SPECIFICATIONS (CONT'D)





FRONT VIEW

HEIGHT (without legs)	1006 mm.
HEIGHT (with legs)	1126 mm.
WIDTH	1078 mm.
DEPTH	660 mm.
WEIGHT	115 Kgs.

AC 225 - CUBER MACHINE SPECIFICATIONS

Model	Cond.	Finish	Comp. HP	Ice bin cap. Kgs.	Water requirem LTx24 HR
AC 225 AS	Air	S/Steel	1	70	250
AC 225 WS	Water	S/Steel			1500*

Basic electr.	Amps.	Start Amps	Watts	Electr. power cons. Kwh per 24 Hrs	No of Wires	Amp. Fuse
230/50/1	5.3	29	1100	22	3 x 1.5 m/m^2	16

Cubes per harvest: 72 large / 102 medium / 198 small.
* At 15°C (60°F) water temperature

GENERAL INFORMATION AND INSTALLATION

A. INTRODUCTION

This manual provides the specifications and the step-by-step procedures for the installation, start-up and operation, maintenance and cleaning for the SCOTSMAN ACM 85, AC 125, AC 175 and AC 225 icemakers.
The Electronic Cubers are quality designed, engineered and manufactured.
Their ice making systems are thoroughly tested providing the utmost in flexibility to fit the needs of a particular user.

NOTE. *To retain the safety and performance built into this icemaker, it is important that installation and maintenance be conducted in the manner outlined in this manual.*

B. UNPACKING AND INSPECTION

1. Call your authorized SCOTSMAN Distributor or Dealer for proper installation.

2. Visually inspect the exterior of the packing and skid. Any severe damage noted should be reported to the delivering carrier and a concealed damage claim form filled in subjet to inspection of the contents with the carrier's representative present.

3. a) Cut and remove the plastic strip securing the carton box to the skid.

b) Remove the packing nails securing the carton box to the skid.

c) Cut open the top of the carton and remove the polystyre protection sheet.

d) Pull out the polystyre post from the corners and then remove the carton.

4. Remove the front and (if any) the rear panels of the unit and inspect for any concealed damage. Notify carrier of your claim for the concealed damage as steted in step 2 above.

5. Remove all internal support packing and masking tape. (Leg package is located in the storage bin compartment).

6. Check that refrigerant lines do not rub against or tuch other lines or surfaces, and that the fan blade moves freely.

7. Check that the compressor fits snugly onto all its mounting pads.

8. Use clean damp cloth to wipe the surfaces inside the storage bin and the outside of the cabinet.

9. See data plate on the rear side of the unit and check that local main voltage corresponds with the voltage specified on it.

CAUTION. Incorrect voltage supplied to the icemaker will void your parts replacement program.

10. Remove the manufacturer's registration card from the inside of the User Manual and fill-in all parts including: Model and Serial Number taken from the data plate.
Forward the completed self-addressed registration card to the SCOTSMAN Europe Frimont factory.

11. If necessary fit the four legs into their seats on the machine base and adjust them to the desired level.

C. LOCATION AND LEVELING

WARNING. This Ice Cuber is designed for indoor installation only. Extended periods of operation at temperature exceeding the following limitations will constitute misuse under the terms of the SCOTSMAN Manufacturer's Limited Warranty resulting in LOSS or warranty coverage.

1. Position the unit in the selected permanent location.
Criteria for selection of location include:

a) Minimum room temperature 10°C (50°F) and maximum room temperature 40°C (100°F).

b) Water inlet temperatures: minimum 5°C (40°F) and maximum 40°C (100°F).

c) Well ventilated location for air cooled models. Clean the air cooled condenser at frequent intervals.

d) Service access: adequate space must be left for all service connections through the rear of the ice maker. A minimum clearance of 15 cm (6") must be left at the sides of the unit for routing cooling air drawn into and exhausted out of the compartment to maintain proper condensing operation of air cooled models.

2. Level the unit in both the left to right and front to rear directions.

D. ELECTRICAL CONNECTIONS

See data plate for current requirements to determine wire size to be used for electrical connections. All SCOTSMAN icemakers require a solid earth wire.
All SCOTSMAN ice machines are supplied from the factory completely pre-wired and require only electrical power connections to wire cord provided at the rear of the unit.
Make sure that the ice machine is connected to its own circuit and individually fused (see data plate for fuse size).
The maximum allowable voltage variation should not exceed -10% and + 10% of the data plate rating. Low voltage can cause faulty functioning and may be responsible for serious damage to the overload switch and motor windings.

NOTE. *All external wiring should conform to national, state and local standards and regulations.*

Check voltage on the line and the ice maker's data plate before connecting the unit.

E. WATER SUPPLY AND DRAIN CONNECTIONS

GENERAL

When choosing the water supply for the ice cuber consideration should be given to:

a) Length of run

b) Water clarity and purity

c) Adequate water supply pressure

Since water is the most important single ingredient in producting ice you cannot emphasize too much the three items listed above.
Low water pressure, below 1 bar may cause malfunction of the ice maker unit.
Water containing excessive minerals will tend to produce cloudy coloured ice cubes, plus scale build-up on parts of the water system.

WATER SUPPLY

Connect the 3/4" male fitting of the solenoid water inlet valve, using the flexible tube supplied to the cold water supply line with regular plumbing fitting and a shut-off valve installed in an accessible position between the water supply line and the unit.
If water contains a high level of impurities, it is advisable to consider the installation of an appropriate water filter or conditioner.

WATER SUPPLY - WATER COOLED MODELS

The water cooled versions of SCOTSMAN Ice Makers require two separate inlet water supplies, one for water sprayed for making the ice cubes and the other for the water cooled condenser.
Connect the 3/4" male fitting of the water inlet, using the flexible tube supplied to the cold water supply line with regular plumbing fitting and a shut-off valve installed in an accessible position between the water supply line and the unit.

WATER DRAIN

The recommended drain tube is a plastic or flexible tube with 18 mm (3/4") I.D. which runs to an open trapped and vented drain. When the drain is a long run, allow 3 cm pitch per meter (1/4" pitch per foot)
A vent at the unit drain connection is also required for proper sump drainage.

WATER DRAIN - WATER COOLED MODELS

Connect the 3/4" male fitting of the condenser water drain, utilizing a second flexible tubing to the **open trapped and vented drain.**

NOTE. *The water supply and the water drain must be installed to conform with the local code. In some case a licensed plumber and/ or a plumbing permit is required.*

F. FINAL CHECK LIST

1. Is the unit level? (IMPORTANT)

2. Have all the electrical and plumbing connections been made, and is the water supply shut-off valve open?

3. Has the voltage been tested and checked against the data plate rating?

4. Have the bin liner and cabinet been wiped clean?

5. Have the bolts holding the compressor down been checked to ensure that the compressor is snugly fitted onto the mounting pads?

6. Has the owner/user been given the User Manual and been instructed on the importance of periodic maintenance checks?

7. Has the Manufacturer's registration card been filled in properly? Check for correct model and serial number against the serial plate and mail the registration card to the factory.

8. Check all refrigerant lines and conduit lines to guard against vibrations and possible failure.

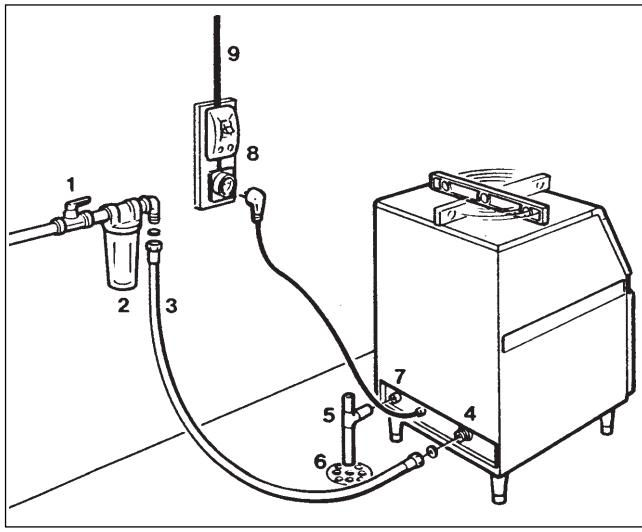
9. Is the unit in a room where ambient temperatures are within a minimum of 10°C (50°F) even in winter months?

10. Is there at least a 15 cm (6") clearance around the unit for proper air circulation?

11. Has the water supply pressure been checked to ensure a water pressure of at least 1 bar (14 psi).

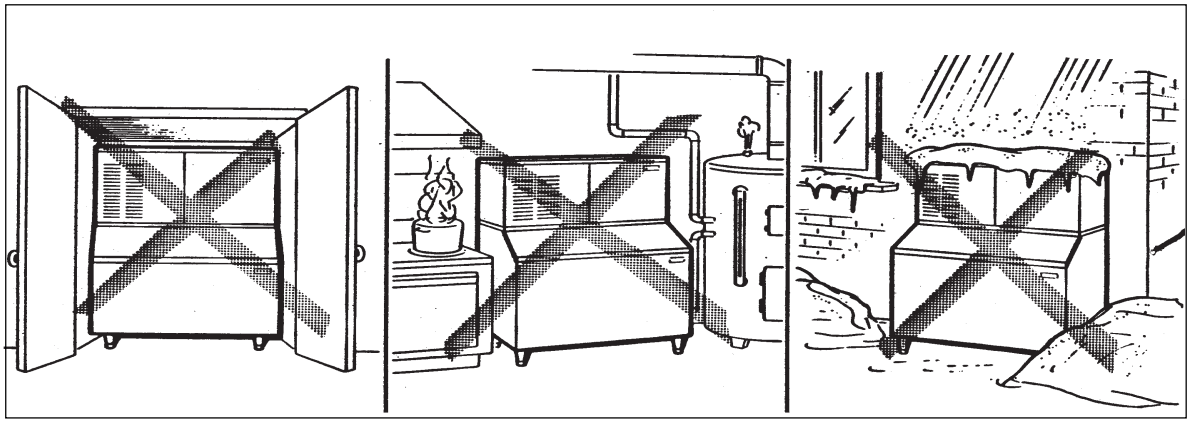
12. Has the owner been given the name and the phone number of the authorized SCOTSMAN Service Agency serving him?

G. INSTALLATION PRACTICE



1. Hand shut-off valve
2. Water filter
3. Water supply line (flexible hose)
4. 3/4" male fitting
5. Vented drain
6. Open trapped vented drain
7. Drain fitting
8. Main switch
9. Power line

WARNING. This icemaker is not designed for outdoor installation and will not function in ambient temperatures below 10°C (50°F) or above 40°C (100°F).
This icemaker will malfunction with water temperatures below 5°C (40°F) or above 40°C (100°F).



OPERATING INSTRUCTIONS

START UP

After having correctly installed the ice maker and completed the plumbing and electrical connections, perform the following "Start-up" procedure.

A. Give power to the unit to start it up by switching "ON" the power line main disconnect switch.

NOTE. *Every time the unit returns under power, after having been switched off, the water inlet valve, the hot gas valve and the water drain valve get energized for a period of 5 minutes, thus to admit new water to the machine sump reservoir to fill it up and, eventually, to wash-off any dirt that can have deposited in it during the unit off period (Fig.1).*

B. During the water filling operation, check to see that the incoming water dribbles, through the evaporator platen dribbler holes, down into the sump reservoir to fill it up and also that the incoming surplus of water flows out through the overflow pipe into the drain line.

During the water filling phase the components energized are:

THE WATER INLET SOLENOID VALVE
THE HOT GAS SOLENOID VALVE
THE WATER DRAIN SOLENOID VALVE

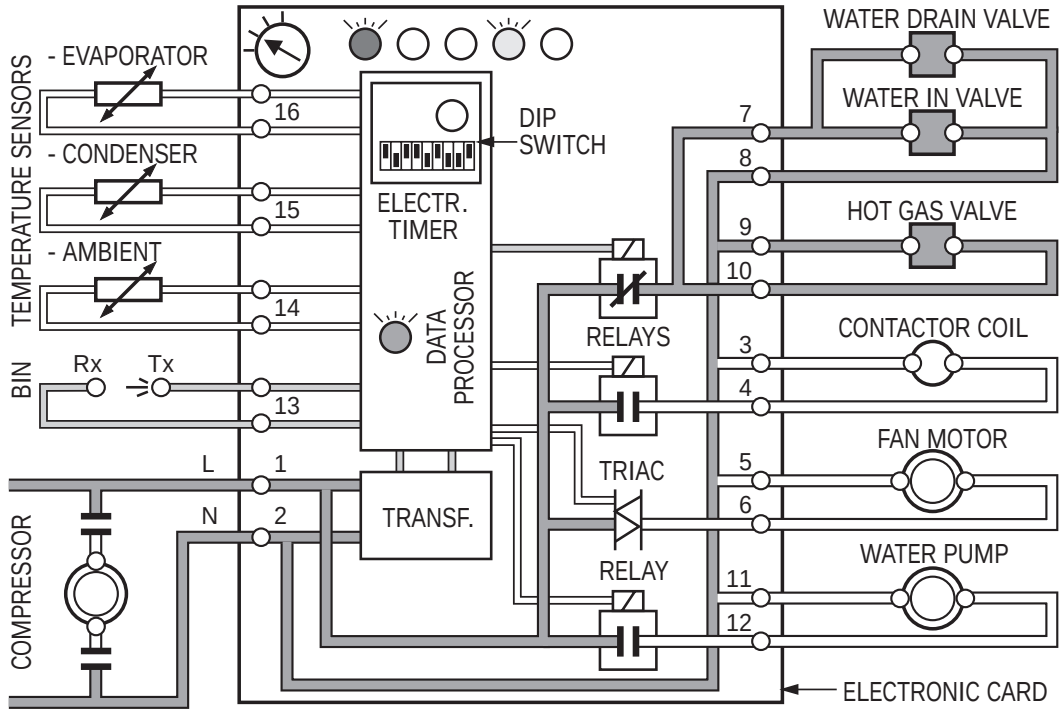
NOTE*. If in the 5 minutes lenght of the water filling phase the machine sump reservoir does not get filled with water up to the rim of the overflow pipe, it is advisable to check:*

1. The water pressure of the water supply line that must be at least ***1 bar (14 psig)*** *Minimum (Max 5 bar-70 psig).*

2. The filtering device installed in the water line that may reduce the water pressure below the Minimum value of 1 bar (14 psig).

3. Any clogging situation in the water circuit like the inlet water strainer and/or the flow control.

FIG. 1



C. At completion of the water filling phase (5 minutes) the unit passes automatically into the freezing cycle with the start up of:

COMPRESSOR

WATER PUMP

FAN MOTOR (in air cooled version) controlled by the condensing temperature sensor located within the condenser fins (Fig.2).

OPERATIONAL CHECKS

D. Install, if required, the refrigerant service gauges on both the high side and low side Scraeder valves to check the compressor head and suction pressures.

NOTE. *On air cooled models, the condenser temperature sensor, which is located within the condenser fins, keep the head (condensing) pressure between 8.5 and 9.5 bar (110÷130 psig) on models ACM 85, AC 125 and AC 175 and between 15 and 17 bar on model AC 225.*

In case of condenser clogging such to prevent the proper flow of the cooling air or, in case the fan motor is out of operation or shortage of water in the water cooled condenser, the condenser temperature rises and when it reaches 70°C (160°F) - for air cooled version - or 62°C (145°F) - for water cooled version - the condenser temperature sensor shuts-off the ice maker with the consequent light-up of the RED WARNING LIGHT (Fig.3).

After having diagnosed the reason of the rise of temperature and removed its cause, it is necessary to turn the head of the selector - always using an appropriate scewdriver - first on the ***RE-SET*** *position then return it on previous* ***OPERATION*** *position or unplug (wait few seconds) and plug in again the unit, thus to put the machine in condition to initiate a new freezing cycle.*

The machine restarts with the usual 5 minutes water filling phase in order to provide enough water into the sump tank.

FIG. 2

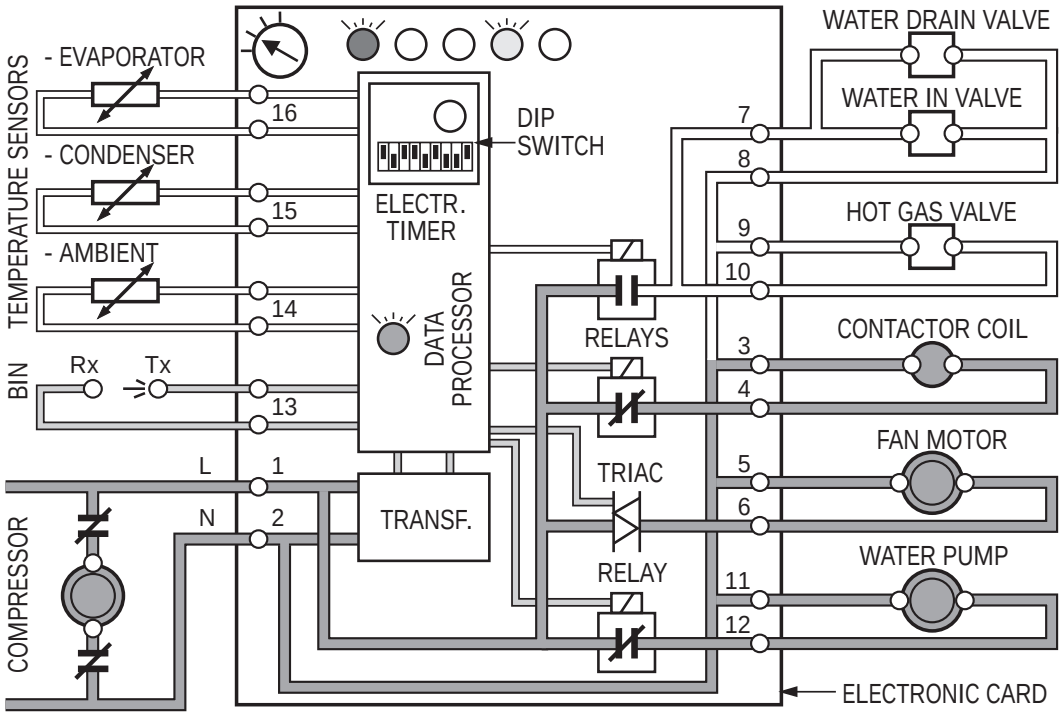
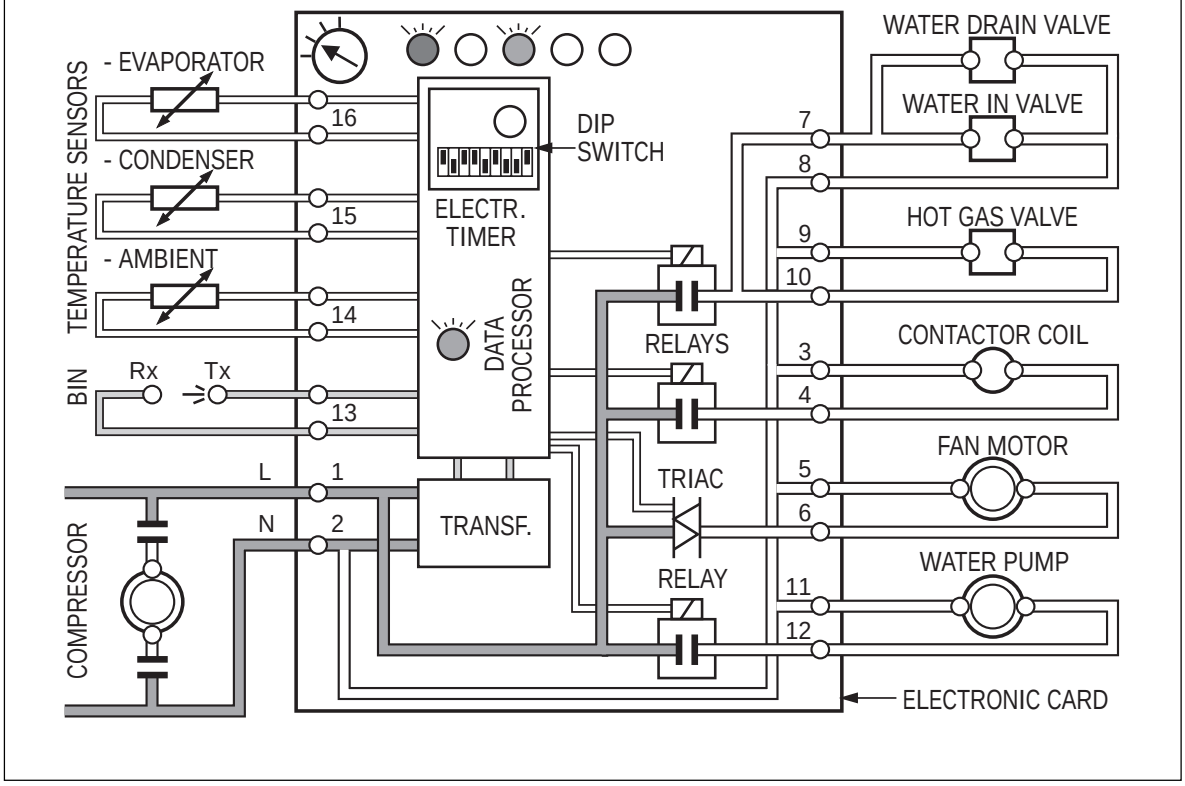
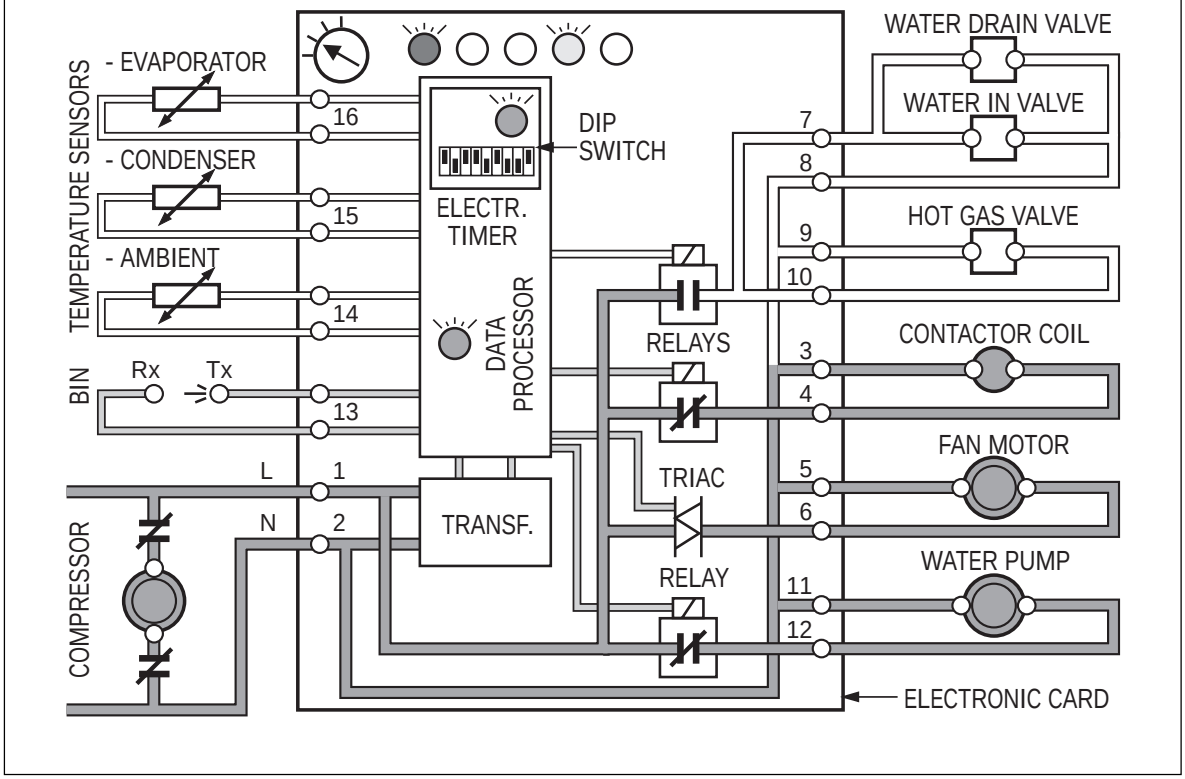


FIG. 3



E. Check to see through the ice discharge opening that the spray system is correctly seated and that the water jets uniformely reach the interior of the inverted mold cups; also make sure that the plastic curtain (ACM 85 & AC 125-175) is hanging freely and there is not excessive water spilling through it.

FIG. 4



F. The ice making process takes place thereby, with the water sprayed into the molds that gets gradually refrigerated by the heat exchange with the refrigerant flowing into the evaporator serpentine. During the freezing process, when the evaporator temperature falls below an established value, the evaporator temperature sensor supplies a low voltage power signal to the electronic control device (P.C.BOARD) in order to activate an electronic timer. This one takes over the control of the freezing cycle up to the complete formation of the ice cubes (Fig.4).

NOTE. *The lenght of the entire freezing cycle is governed by the evaporator temperature sensor which has its probe placed in contact with the evaporator serpentine (Non adjustable) in combination with the electronic timer (Adjustable) incorporated in the P.C.BOARD. The timer adjustment is factory set in consideration of the ice maker type, cooling version and ice cube size (Small, Medium, Large). It is possible, however, to modify the timed lenght of the freezing cycle, by changing the* ***DIP SWITCH*** *keys setting. In Table B of PRINCIPLE OF OPERATION are shown the various time extensions of the freezing cycle second phase, in relation with the different DIP SWITCH keys setting.*

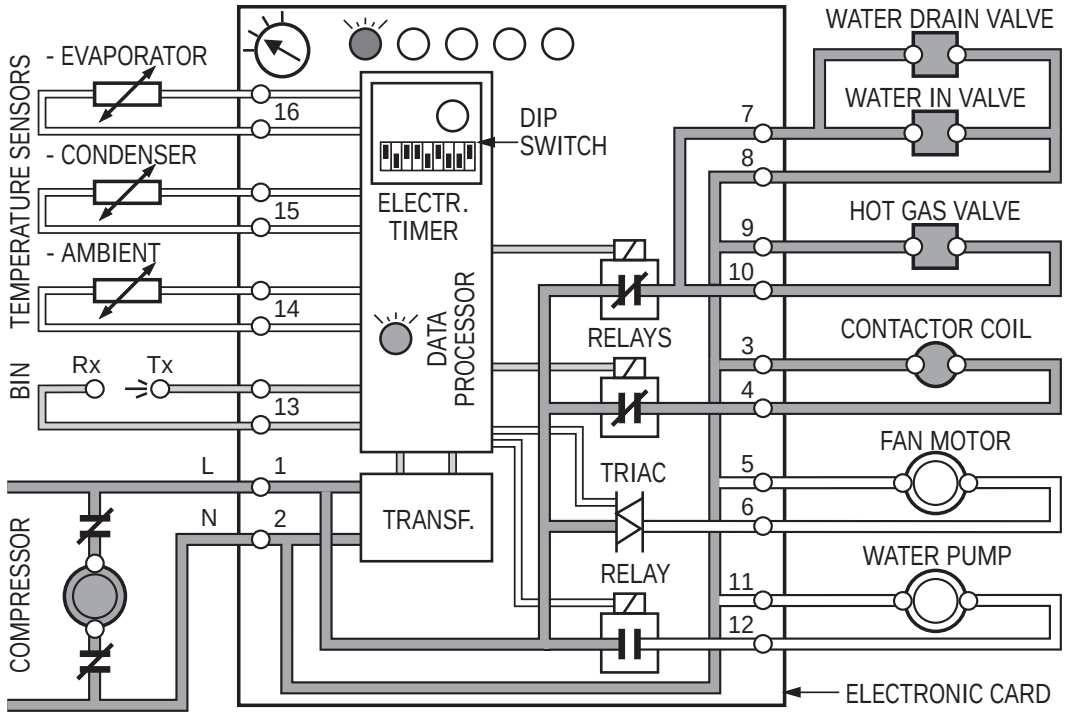
G. After about 17÷20 minutes from the beginning of the freezing cycle, in an hypothetic ambient temperature of 21°C, the defrost cycle takes place with the hot gas, the water inlet and the water drain valves simoultaneously activated (Fig. 5).

The electrical components in operation on models are:

COMPRESSOR
WATER INLET VALVE
HOT GAS VALVE
WATER DRAIN VALVE
and the
WATER PUMP
on the first 15 seconds on model ACM 85 & AC 125-175 and on the first 30 seconds on model AC 225.

NOTE. *The lenght of the defrost cycle is determinated by the DIP SWITCH keys setting in conjunction with the ambient temperature sensor located just in front of the condenser. The lenght of defrost cycle can be adjusted by changing the combination setting of keys 5, 6 and 7 of* ***DIP SWITCH*** *as illustrated on Table C of PRINCIPLE OF OPERATION.*
As shown, per each individual keys combination, it is possible to have a different lenght of the defrost cycle in relation to the different ambient temperature situations; shorter when the ambient temperature is high and longer in colder ambients to partially compensate the lenght of the freezing cycle, which is longer in high ambient temperatures and shorter in low ones.

FIG. 5



H. Check, during the defrost cycle, that the incoming water flows correctly into the sump reservoir in order to refill it and that the surplus overflows through the overflow drain tube.

I. Check the texture of ice cubes just released. They have to be in the right shape with a small depression of about 5-6 mm in their crown.
If not, wait for the completion of the second cycle before performing any adjustment.
If required, the lenght of the timed freezing cycle can be modified by changing the **DIP SWITCH** keys setting as illustrated in OPERATING PRINCIPLE.
If the ice cubes are shallow and cloudy, it is possible that the ice maker runs short of water during the freezing cycle second phase or, the quality of the supplied water requires the use of an appropriate water filter or conditioner.

J. To be sure of the correct operation of ice level control device, place one hand between its sensing "eyes" to interrupt the light beam.
The **RED LIGHT** located in the front of the P.C.BOARD goes immediately OFF, and after 60 seconds, the unit stops with the simultaneous glowing of the **2nd YELLOW LIGHT** to monitor the **BIN FULL** situation (Fig.6).

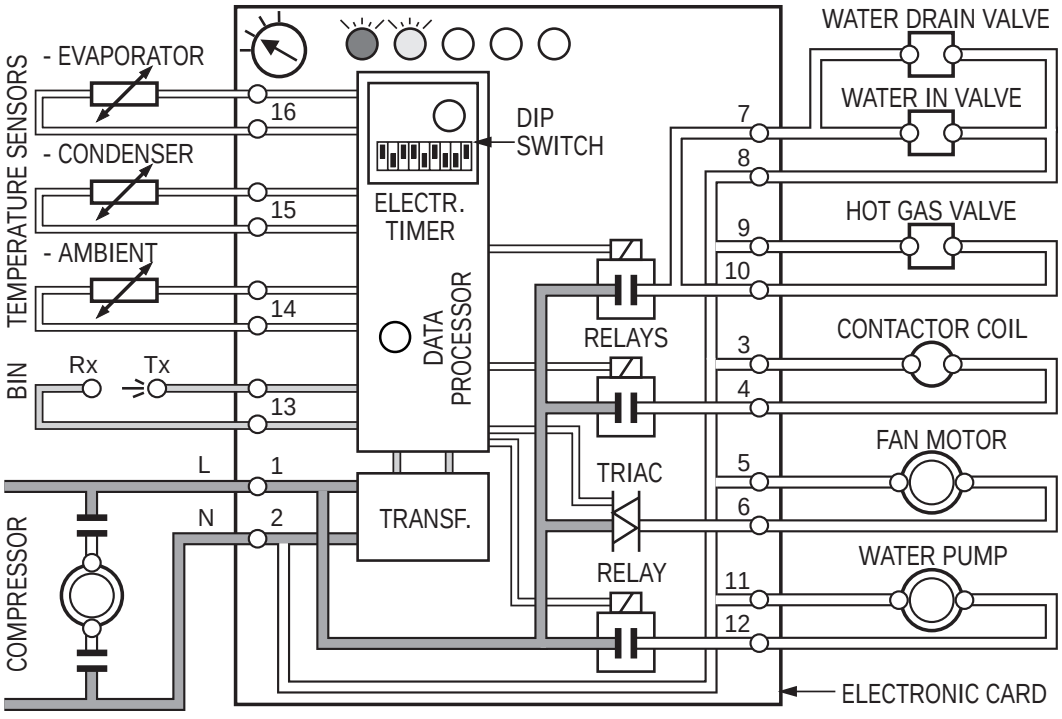
Take the hand out from the ice level control sensors to allow the resumption of the light beam; the **RED LIGHT**, located in the front of the P.C.BOARD, will glow immediately.
After approximately 6 seconds the ice maker resume its operation with the immediate glowing of the **FOURTH YELLOW LIGHT** indicating **UNIT IN OPERATION** and the extinguishing of the **"BIN FULL" YELLOW LIGHT.**

NOTE. *The* ***ICE LEVEL CONTROL (INFRARED SYSTEM)*** *is independent of the temperature however, the reliability of its detection can be affected by external light radiations or by any sort of dirt and scale sediment which may deposit directly on the light source and on the receiver.To prevent any possible ice maker malfunction, due to negative affection of the light detector, it is advisable to locate the unit where it is not reached by any direct light beam or light radiation, also it is recommended to keep the bin door constantly closed and to follow the instructions for the periodical cleaning of the light sensor elements as detailed in the MAINTENANCE AND CLEANING PROCEDURES.*

K. Remove, if fitted, the refrigerant service gauges and re-fit the unit service panels previously removed.

L. Instruct the owner/user on the general operation of the ice machine and about the cleaning and care it requires.

FIG. 6



PRINCIPLE OF OPERATION
How it works

In the **SCOTSMAN** cube ice makers the water used to make the ice is kept constantly in circulation by an electric water pump which primes it to the spray system nozzles from where it is diverted into the inverted mold cups of the evaporator. A small quantity of the sprayed water freezes into ice; the rest of it cascades by gravity into the sump assembly below for recirculation.

FREEZING CYCLE

The hot gas refrigerant discharged out from the compressor reaches the condenser where, being cooled down, condenses into liquid. Flowing into the liquid line it passes through the drier filter, then it goes all the way through the capillary tube where, due to the heat exchanging action, it looses some of its heat content so that its pressure and temperature are lowered as well.
Next the refrigerant enters into the evaporator serpentine (which has a larger I.D. then the capillary) and starts to boil off; this reaction is emphasized by the heat transferred by the sprayed water.
The refrigerant then increases in volume and changes entirely into vapor.
The vapor refrigerant then passes through the suction accumulator (used to prevent that any small amount of liquid refrigerant may reach the compressor) and through the suction line. In both the accumulator and the suction line it exchanges heat with the refrigerant flowing into the capillary tube (warmer), before to be sucked in the compressor and to be recirculated as hot compressed refrigerant gas.
The freezing cycle is controlled by the evaporator temperature sensor (which has its probe in contact with the evaporator serpentine) that determines the length of its first portion of the cycle.
When the temperature of the evaporator serpentine drops to a pre-set value, the evaporator sensor probe changes its electrical resistance allowing a low voltage current (15 volts) to flow to the P.C. BOARD which in turn activates an electronic timer.

The timer, which is built-in the P.C. BOARD, takes over from the evaporator temperature sensor, the control of the freezing cycle up to its completion.

NOTE. *The change of the electric potential of the evaporator sensor with the consequent activation of the timer (Time mode) is signalled by the glowing-up of the RED LED located in the front of the P.C. BOARD.*

ATTENTION. In case, after 15 minutes from the beginning of the freezing cycle, the temperature of the evaporator sensor probe is higher then 0° C (32°F) (shortage of refrigerant, inoperative hot gas valve, etc.) the P.C. BOARD switch OFF immediately the unit with the simultaneous blinking of the WARNING RED LED.

The length of this second portion of the freezing cycle is pre-fixed and related to the setting of the first four DIP SWITCH keys.
The DIP SWITCH keys setting is made in consideration of the type of condenser used.
In Table B are indicated the various lengths of the second portion of freezing cycle (Time mode) in relation to the different combinations of the DIP SWITCH KEYS.
In Table A herebelow are illustrated the DIP SWITCH keys combinations for the three different models and versions as they are set in the factory.

The electrical components in operation during the freezing cycle are:

COMPRESSOR
FAN MOTOR (in air cooled version)
WATER PUMP
CONTACTOR COIL
and during the second phase of freezing cycle (Time mode) they are joined by the
ELECTRONIC TIMER

TAB. A **DIP SWITCH FACTORY SETTING COMBINATIONS PER MODEL AND VERSION**

DIP SWITCH	FREEZING CYCLE 1	2	3	4	DEFROST CYCLE 5	6	7	DIAGN. 8	W.PUMP 9	KWD 10
ACM 85 A	ON	ON	OFF	ON	ON	ON	OFF	OFF	ON	OFF
ACM 85 W	ON	ON	OFF	ON	OFF	OFF	ON	OFF	ON	OFF
ACM 125 A	ON	ON	OFF	ON	ON	ON	OFF	OFF	ON	OFF
ACM 125 W	OFF	ON	OFF	ON	OFF	OFF	ON	OFF	ON	OFF
ACM 175 A & W	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	ON	OFF
ACS 225 A & W	OFF	OFF	ON	ON	OFF	OFF	ON	OFF	ON	ON
ACM 225 A & W	ON	ON	OFF	ON	OFF	ON	ON	OFF	ON	ON
ACL 225 A & W	OFF	OFF	OFF	ON	OFF	OFF	ON	OFF	ON	ON

FIG. A

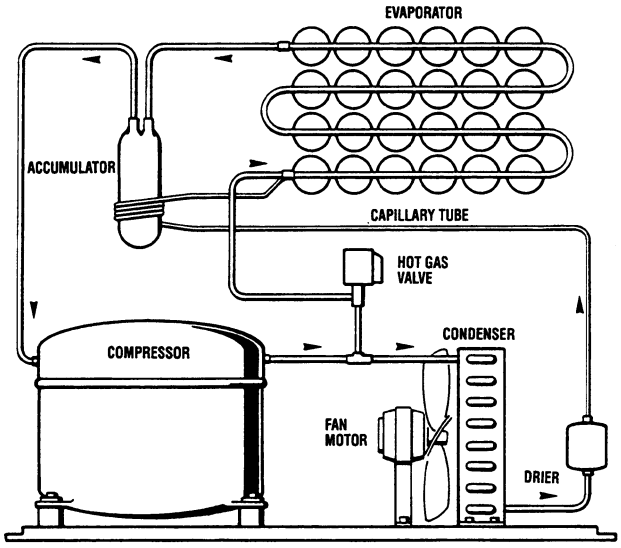


FIG. B

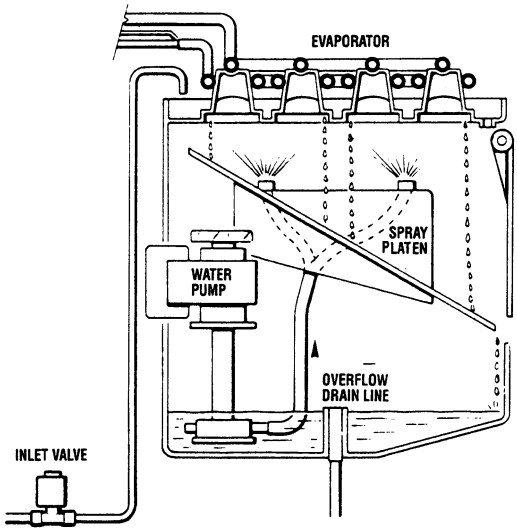


FIG. C

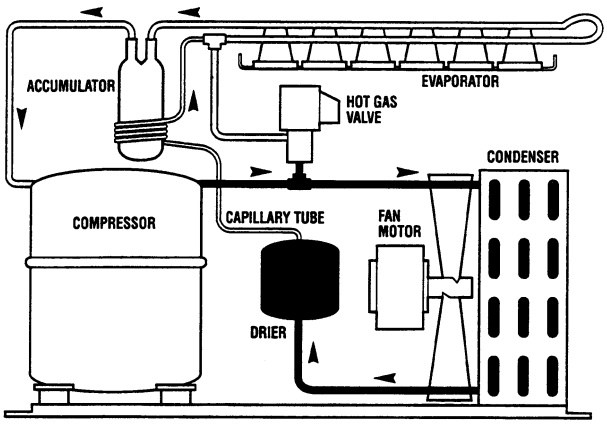


FIG. D

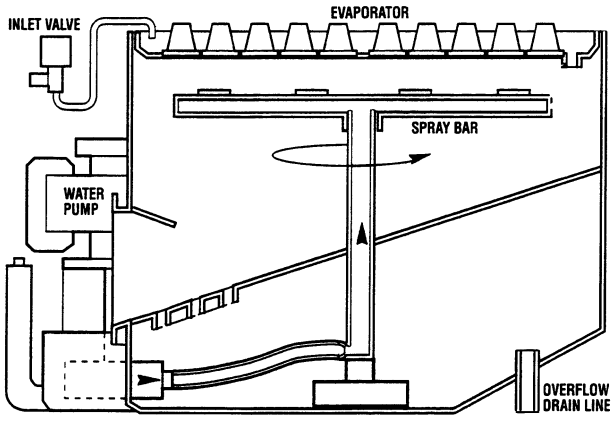


FIG. E

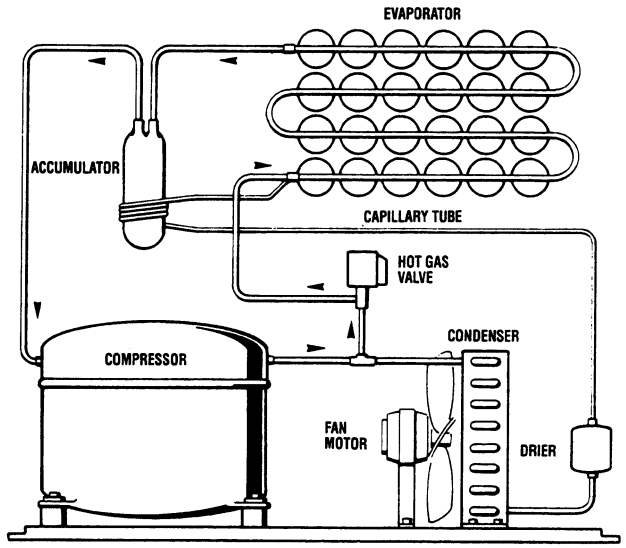


FIG. F

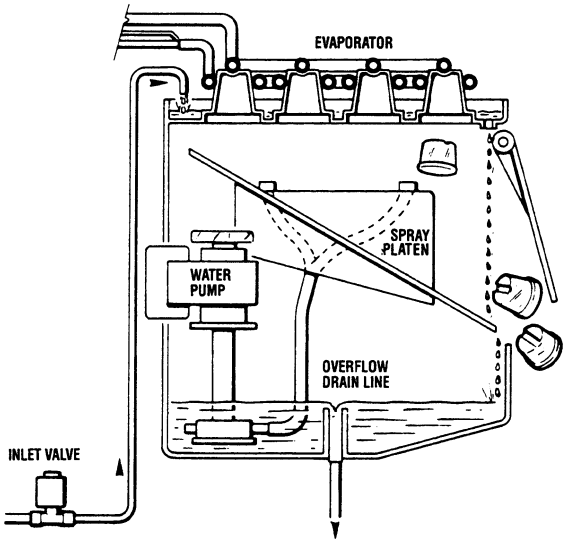


FIG. G

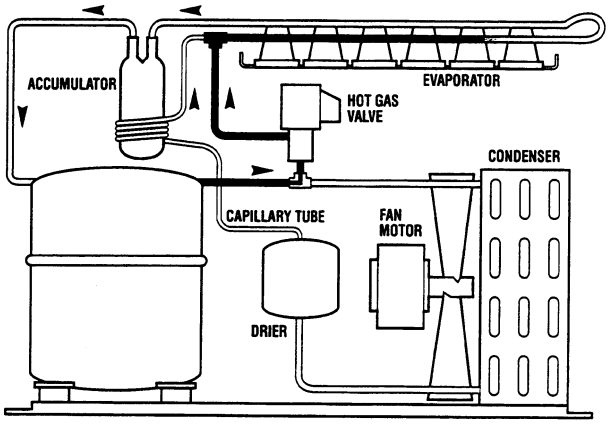
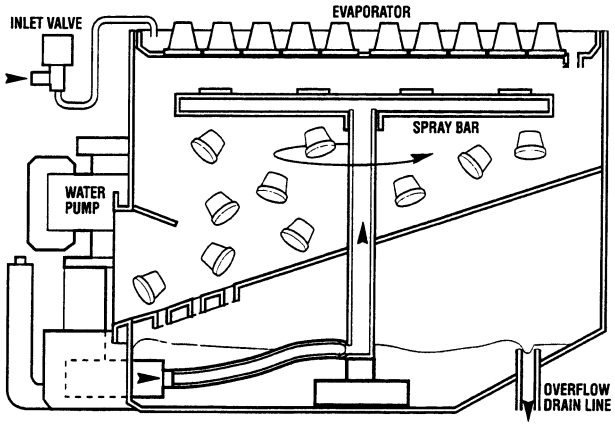


FIG. H



The refrigerant head pressure, in the course of the freezing cycle, ranges between 8.5 and 9.5 bars (110÷130 psig) on models ACM 85, AC 125 and AC 175 and between 15 and 17 bar (210 ÷ 240 psig)on model AC 225 being controlled by the temperature sensor probe located within the condenser fins (air cooled version) or, on the condenser tube coil (water cooled version).
On the air cooled version, the condenser temperature sensor, when senses a rising of the condenser temperature beyond the pre-fixed limit, changes its electrical resistance and transmits a low voltage power flow to the Micro Processor of P.C. BOARD which in turn energizes, through a **TRIAC**, the **FAN MOTOR**.

When the opposite situation occures, i.e. the condenser temperature gets below the pre-fixed limit, the temperature sensor changes again its electrical resistance reducing therefore the current flow to the P.C. BOARD to cause the fan motor temporary cut-off.

***NOTE**. In case the condenser temperature probe senses that the condenser temperature has rised to 70°C (160°F) - on air cooled versions - or 62°C (145°F) - on water cooled versions - for one of the following reasons:*

***CLOGGED CONDENSER** (Air cooled version)*

***INSUFFICIENT FLOW OF COOLING WATER** (Water cooled version)*

***FAN MOTOR OUT OF OPERATION** (Air cooled version)*

AMBIENT TEMPERATURE HIGHER THEN 40°C (100°F)

it causes the total and immediate SHUT-OFF of the machine in order to prevent the unit from operating in abnormal and dangerous conditions.
*When the ice maker stops on account of this protective device, there is a simultaneous glowing of the **RED LED**, warning the user of the **Hi Temperature** situation.*
*After having eliminated the source of the condenser hi-temperature, to restart the machine it is necessary first to rotate for a while the program selector on **RE-SET** position then again on **OPERATION** position or to unplug (wait few seconds) and plug in again the unit. The ice machine resumes its normal operation by going through the 5 minutes water filling phase.*

At the start of the freezing cycle the refrigerant suction or lo-pressure lowers rapidly to 1 bar - 14 psig on models ACM 85, AC 125 and AC 175 and to 2.5 bar (35 psig) on model AC 225 then it declines gradually - in relation with the growing of the ice thickness - to reach, at the end of the cycle, approx. 0 bar - 0 psig on models ACM 85, AC 125 and AC 175 and to 1.7 bar (24 psig) on AC 225 with the cubes fully formed in the cup molds.
The total length of the freezing cycle ranges from 20 to 25 minutes.

DEFROST OR HARVEST CYCLE (Fig.E and G)

As the electronic timer has carried the system throughout the second phase of freezing cycle, the defrost cycle starts.

ATTENTION. In case the unit is able to reach 0°C (32°F) evaporating temperature within 15 minutes, but after 45 minutes from the beginning of the freezing cycle it has not yet reached the evaporator temperature of -15°C (5°F) the machine goes straight into the defrost cycle omitting the timed portion of the freezing cycle relied to the setting of the first four DIP SWITCHES.

***NOTE.** The length of the defrost cycle is predetermined by the setting of the DIP SWITCH KEYS NO. 5, 6 and 7 and it is relied as well to the ambient temperature as detailed in Table C.*

The electrical components in operation during this phase are:

COMPRESSOR

WATER INLET VALVE

HOT GAS VALVE

WATER DRAIN VALVE

and the

WATER PUMP

on the first 15 seconds on model ACM 85 & AC 125-175 and on the first 30 seconds on model AC 225.

The incoming water, passing through the water inlet valve and the flow control, runs over the evaporator platen and then flows by gravity through the dribbler holes down into the sump/ reservoir. (Fig. F and H)
The water filling the sump/reservoir forces part of the surplus water from the previous freezing cycle to go out to the waste through the overflow pipe. This overflow limits the level of the sump water which will be used to produce the next batch of ice cubes.
Meanwhile, the refrigerant as hot gas, discharged from the compressor, flows through the hot gas valve directly into the evaporator serpentine by-passing the condenser.
The hot gas circulating into the serpentine of the evaporator warms up the copper molds causing the defrost of the ice cubes. The ice cubes, released from the cups, drop by gravity onto a slanted cube chute, then through a curtained opening they fall into the storage bin.

***NOTE.** The length of the defrost cycle, factory set, can change according to the ambient temperature (as shown on Table C) in order to reduce it with high ambient temperature and recover some of the time spent for the longer freezing cycle.*

At the end of the defrost cycle, the hot gas valve, the water inlet valve and the water drain valve close and the machine starts again a new freezing cycle.

OPERATION - CONTROL SEQUENCE

At the start of freezing cycle the evaporator temperature sensor controls the length of the first part of the freezing cycle. As it reaches a predetermined temperature it supplies a low voltage current to the P.C. BOARD in order to activate the electronic timer which takes over the control of the freezing cycle for a pre-fixed time according to the DIP SWITCH keys setting (see Tab. B).

> ***NOTE**. The evaporator temperature sensor, factory pre-set, is the same for all the models and is not adjustable in the field.*

Once completed the freezing cycle 2nd phase the system goes automatically into the defrost cycle which has also a pre-fixed length that can slightly change in relation to the ambient temperature as shown in Table C. At completion of the defrost cycle the P.C. BOARD command the unit to start again a new freezing cycle.

OPERATION - ELECTRICAL SEQUENCE

The following charts illustrate which switches and which components are ON or OFF during a particular phase of the icemaking cycle.
Refer to the wiring diagram for a reference.

BEGINNING FREEZE

Electrical components (Loads)	ON	OFF
Compressor	●	
Fan Motor (Air cooled only) and TRIAC	●	
Hot Gas Valve		●
Water Inlet Valve		●
Water Drain Valve		●
P.C.Board Relay 1 Coil		●
P.C.Board Relay 2 & 3 Coil	●	
Water Pump	●	
Contactor Coil	●	
P.C.B. Timer		●

Elctronic Controls & Sensors	ON	OFF
Evaporator Sensor		●
Condenser Sensor	●	
Ambient Sensor		●
Ice Level Control	●	

TIMED FREEZE

Electrical components (Loads)	ON	OFF
Compressor	●	
Fan Motor (Air cooled only) and TRIAC	●	●
Hot Gas Valve		●
Water Inlet Valve		●
Water Drain Valve		●
P.C.Board Relay 1 Coil		●
P.C.Board Relay 2 & 3 Coil	●	
Water Pump	●	
Contactor Coil	●	
P.C.B. Timer	●	

Electronic Controls & Sensors	ON	OFF
Evaporator Sensor	●	
Condenser Sensor	●	●
Ambient Sensor		●
Ice Level Control	●	

HARVEST (Drain portion - first 15 or 30 sec.)

Electrical components (Loads)	ON	OFF
Compressor	●	
Fan Motor (Air cooled only)and TRIAC		●
Hot Gas Valve	●	
Water Inlet Valve	●	
Water Drain valve	●	
P.C.Board Relay 1 & 2 Coil	●	
P.C.Board Relay 3 Coil	●	
Water Pump	●	
Contactor Coil	●	
P.C.B. Timer	●	

Electronic Controls & Sensors	ON	OFF
Evaporator Sensor		●
Condenser Sensor		●
Ambient Sensor	●	
Ice Level Control	●	

HARVEST (Water filling portion)

Electrical components (Loads)	ON	OFF
Compressor	●	
Fan Motor (Air cooled only)and TRIAC		●
Hot Gas Valve	●	
Water Inlet Valve	●	
Water Drain valve	●	
P.C.Board Relay 1 & 2 Coil	●	
P.C.Board Relay 3 Coil		●
Water Pump		●
Contactor Coil	●	
P.C. Board Timer	●	

Electronic Controls & Sensors	ON	OFF
Evaporator Sensor		●
Condenser Sensor		●
Ambient Sensor	●	
Ice Level Control	●	

OPERATING CHARACTERISTICS

ACM 85, AC 125 and AC 175

Freeze Cycle

Average Discharge
Pressure A/C: 9.5÷8.5 bars (130÷110 psig)

Average Discharge
Pressure W/C: 9 bars (125 psig)

Suction Pressure
End Freeze Cycle: 0 ÷ 0.1 bar (0 ÷ 1 psig)

AC 225

Freeze Cycle

Average Discharge
Pressure A/C: 15 ÷ 17 bars (210÷240 psig)

Average Discharge
Pressure W/C: 17 bars (240 psig)

Suction Pressure
End Freeze Cycle: 1.7 bar (24 psig)

REFRIGERANT CHARGE (R 134 A)

	Air cooled	Water cooled
ACM 85	290 gr (10.2 oz.)	250 gr (8.8 oz.)
AC 125	450 gr (15.9 oz.)	300 gr (10.6 oz.)
AC 175	450 gr (15.9 oz.)	330 gr (11.6 oz.)

REFRIGERANT CHARGE (R 404 A)

	Air cooled	Water cooled
AC 225	620 gr (22 oz.)	450 gr (16 oz.)

COMPONENTS DESCRIPTION

A. EVAPORATOR TEMPERATURE SENSOR

The evaporator temperature sensor probe, located in contact with the evaporator serpentine, detects the dropping of the evaporator temperature during the freezing cycle and signals it by supplying a current flow to the micro processor of P.C. BOARD.
According to the current received, the micro processor supplies power to the electronic timer built into the P.C. BOARD so that it takes control of the length of the 2nd phase of freezing cycle. The length of the timed phase is pre-fixed by the setting of the keys 1, 2, 3 and 4 of the DIP SWITCH.
The activation of the electronic timer is indicated by the lighting up of the RED LED placed in the front of the P.C. BOARD.
This lighting up occures usually in the mid period of the freezing cycle and signals the switching from the first to the second phase of the freezing cycle.

NOTE. *Whenever, after 15 minutes from the beginning of the freezing cycle, the evaporating temperature have not yet reached the value of 0°C (32°F), the P.C.Board switches OFF the machine with the BLINKING of RED LED.*

B. CONDENSER TEMPERATURE SENSOR

The condenser temperature sensor probe, located within the condenser fins (air cooled version) or in contact with the tube coil (water cooled version) detects the condenser temperature variations and signals them by supplying current, at low voltage, to the P.C. BOARD.
In the air cooled versions, in relation to the different current received, the micro processor of the P.C. BOARD supplies, through a TRIAC, the power at high voltage to the fan motor so to cool the condenser and to reduce its temperature.
In case the condenser temperature rises and reaches **75°C (170°F)** - on air cooled models - or **62°C (145°F)** - on water cooled models - the current arriving to the micro processor is such to cause an immediate and total stop of the machine operation.

C. AMBIENT TEMPERATURE SENSOR

The probe of this sensor, located in the front of the ice maker condenser (Air cooled version) and on the water supply line to the condenser (Water cooled version) has the function to detect the ambient or the water temperature and by changing its own electrical resistance supplies a different current flow to the P.C. BOARD.
This different current flow received by the P.C.BOARD, is elaborated by the micro processor in order to extend or shorten the defrost cycle length (longer in cold ambient situations, shorter in warm ones).

D. ICE BIN LEVEL LIGHT CONTROL

The electronic ice bin level control, located into the storage bin, has the function to stop the operation of the ice machine when the light beam between the light source and the sensor is interrupted by the ice cubes stored into the bin. When the light beam is interrupted the RED LED located in the front of the P.C. BOARD goes off; in case the light beam is constantly interrupted for more than 60 seconds, the ice machine stops with the glowing-up of the **2nd YELLOW LED** to monitor the situation of ice bin full.
The 60 seconds of delay prevent that an ice scoop movement or the ice dropping through the ice chute (interrupting for a while the light beam) can stop the operation of the unit.
As soon as the ice is scooped out (with the resumption of the light beam between the two infrared sensor of ice level control) the RED LED is lighted up and after 6 seconds the ice machine restarts again with the extinguishing the 2nd YELLOW LED.

E. P.C. BOARD (Data processor)

The **P.C. BOARD**, fitted in its plastic box located in the front of the unit, consists of two separated printed circuits one at high and the other at low voltage integrated with a program selector, of two fuses one on power in (100mA) and one on power out (16 A), of five aligned **LEDS** monitoring the operation of the machine, of two extra monitoring **RED LEDS**, of one **DIP SWITCH** with ten keys, of one small jumper located on its back side, of input terminals for the leads of the sensor probes and input and output terminals for the leads of the ice maker electrical wires.
The P.C. BOARD is the brain of the system and it elaborates, through its micro processor, the signals received from the four sensors in order to control the operation of the different electrical components of the ice maker (compressor, water pump, solenoid valves, etc.).
By turning the program selector it is possible to put the unit in the following different situations:

CLEANING/RINSING. The water pump is the only electrical component in operation and it must be used during the cleaning or the rinsing procedure of the water system of ice machine.

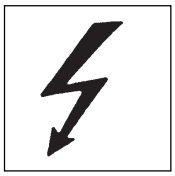
STAND BY. The unit remain under electrical power but OUT of operation. It can be used by the service engineer in order to stop the unit during the service and inspection operations.

IN OPERATION. The unit is running through the freezing and defrost cycles stopping automatically only at full bin situation.

RE-SET/HI TEMPERATURE. To be selected to resume the unit operation when the ice maker shuts off due to the intervention of the condenser temperature sensor (too high condensing temperature) or evaporator temperature sensor (too high after 15 minutes from the beginning of the freezing cycle).

The five LEDS, placed in a row in the front of the P.C. BOARD, monitor the following situations:

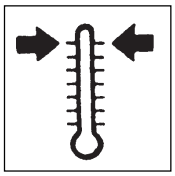
GREEN LIGHT
Unit under electrical power



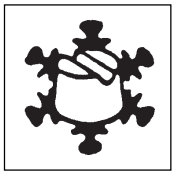
YELLOW LIGHT
Unit shut-off at full storage bin

RED LIGHT
Unit shut-off due to hi condensing temperature

RED LIGHT BLINKING
Unit shut-off due to hi evaporating temperature



YELLOW LIGHT
Unit in freezing cycle mode



YELLOW LIGHT
Unit in cleaning/rinsing mode (not appearing in the front panel)

By means of one small jumper, located on the back side of the P.C. Board, can be modified the cut-OUT condensing temperature (safety temperature) from 70°C (160 °F) - for air cooled versions to 62° (145 °F) - for water cooled versions.

F. DIP SWITCH

The P.C.BOARD which controls the entire operation of the ice maker, has a **DIP SWITCH with ten switching keys** which allow to set up the micro processor program in order to extend or to shorten the length of freezing and defrost cycles in relation to the different model and versions of ice machines.

The DIP SWITCH first four keys setting determines the length of the 2nd phase of freezing cycle (controlled by the electronic timer) as detailed in the table B.

TAB. B

LENGTH OF TIMED PORTION OF FREEZING CYCLE ACCORDING TO THE DIP SWITCH SETTING COMBINATIONS

		1	2	3	4	
1	ON / OFF	ON	ON	OFF	OFF	25 min.
2	ON / OFF	OFF	OFF	ON	OFF	23 min.
3	ON / OFF	ON	OFF	ON	OFF	21 min.
4	ON / OFF	OFF	ON	ON	OFF	19 min.
5	ON / OFF	ON	ON	ON	OFF	17 min.
6	ON / OFF	OFF	ON	ON	ON	15 min.
7	ON / OFF	ON	OFF	OFF	ON	13 min.
8	ON / OFF	OFF	ON	OFF	ON	11 min.
9	ON / OFF	OFF	ON	ON	OFF	9 min.
10	ON / OFF	OFF	OFF	ON	ON	7 min.
11	ON / OFF	OFF	ON	ON	ON	5 min.
12	ON / OFF	ON	OFF	ON	ON	3 min.
13	ON / OFF	OFF	OFF	OFF	OFF	1 min.

The DIP SWITCH keys 5, 6 and 7 setting determines the length of the defrost cycle according to the ambient temperature sensor as specified in table C.

TAB. C

LENGTH OF DEFROST CYCLE (IN SEC.) ACCORDING TO THE AMBIENT TEMPERATURE AND TO THE DIP SWITCH SETTING COMBINATIONS

	5	6	7	0÷5 °C	5÷10 °C	10÷15 °C	15÷20 °C	20÷25 °C	25÷30 °C	30÷35 °C	35÷40 °C
ON / OFF	ON	ON	OFF	180"	150"	120"	90"	90"	90"	90"	90"
ON / OFF	OFF	OFF	ON	210"	180"	150"	120"	120"	120"	90"	90"
ON / OFF	OFF	ON	OFF	240"	210"	180"	150"	150"	120"	120"	90"
ON / OFF	ON	OFF	OFF	240"	210"	180"	150"	150"	120"	120"	120"
ON / OFF	OFF	OFF	OFF	270"	240"	210"	180"	180"	150"	150"	150"

The 8th DIP SWITCH key allows to make a rapid check up of the P.C. BOARD output connections (compressor, water pump, fan motor, water inlet and hot gas solenoid valves) energizing them in rapid sequence (2 seconds) one by one.
DURING THE AUTOMATIC OPERATION OF THE ICE MAKER THIS KEY MUST BE SET IN OFF POSITION.

ATTENTION. The check up of the P.C.BOARD output must be performed in a very short time in order to avoid frequent start and stop (every few seconds) of the electrical components which may damage them specially the compressor.

The 9th key allows the operation of the water pump even during the defrost cycle, as required when it is necessary to drain out the remaining water from the sump.

The 10th key is used to supply power to the water pump for the first 15 seconds of the defrost cycle (ACM 85, AC 125 & AC 175) - position OFF - and for the first 30 seconds - position ON (AC 225).

G. WATER SPRAY SYSTEM

Through its nozzles, the water pumped, is sprayed in each individual cup to be frozen into ice.
It consists of one spray platform on model ACM 85 and two separated spray platforms on AC 125-175 which have six spray nozzles each.
On the AC 225 the spray bar is self rotating being propelled by a stream of water passing through an hole located in one arm of the spray bar.

H. WATER PUMP

The water pump operates continually throughout the freezing cycle and on the first 15 or 30 seconds of the defrost cycle so to such the remaining water from the sump tank (reach in mineral salts) and drain it out.
During the freezing cycle the pump primes the water from the sump to the spray system and through the spray nozzles sprays it into the inverted cup molds to be frozen into crystal clear ice cubes.
It is recommended that the pump motor bearings be checked at least every six months.

I. WATER INLET SOLENOID VALVE - 3/4 MALE FITTING

The water inlet solenoid valve is activated by the micro processor of the P.C. BOARD during the first 5 minutes of water filling phase as well as during the defrost cycle.
When energized it allows a metered amount of incoming water to flow over the evaporator cavity to assist the hot gas in defrosting the ice cubes. The water running over the evaporator cavity drops by gravity, through the dribbler holes of the platen, into the sump reservoir where it will be sucked by the water pump and primed to the spray system.

J. HOT GAS SOLENOID VALVE

The hot gas solenoid valve consists basically in two parts: the valve body and the valve coil.
Located on the hot gas line, this valve is energized through the micro processor of P.C. BOARD during the defrost cycle as well as during the water filling phase.
During the defrost cycle the hot gas valve coil is activated so to attract the hot gas valve piston in order to give way to the hot gas discharged from compressor to flow directly into the evaporator serpentine to defrost the formed ice cubes.

K. FAN MOTOR (Air cooled version)

The fan motor is controlled through the P.C. BOARD and the TRIAC by the condenser temperature sensor. Normally it operates only during the freezing cycle to draw cooling air through the condenser fins. In the second part of the freezing cycle, the fan motor can run at intermittance as the condenser pressure must be kept between two corresponding head pressure values.

L. COMPRESSOR

The hermetic compressor is the heart of the refrigerant system and it is used to circulate and retrieve the refrigerant throughout the entire system. It compresses the low pressure refrigerant vapor causing its temperature to rise and become high pressure hot vapor which is then released through the discharge valve.

M. WATER REGULATING VALVE (Water cooled version)

This valve controls the head pressure in the refrigerant system by regulating the flow of water going to the condenser.
As pressure increases, the water regulating valve opens to increase the flow of cooling water.

N. CONTACTOR (AC 125-175 & AC 225)

Placed outside of the control box it is controlled by the P.C. BOARD in order to close or open the electrical circuit to the compressor.

O. WATER DRAIN SOLENOID VALVE

The water drain solenoid valve, electrically connected in parallel to the water inlet and to the hot gas solenoid valves, is energized for all the length of the defrost cycle.
By means of the water pump, that remains energized for 15 or 30 seconds at the beginning of the defrost cycle, it allows the drain out of all remaining water (rich of minerals deposited during the previous freezing cycle) from the sump tank. By doing so it allows to the ice maker to make every new freezing cycle with new fresh water, avoiding thereby the accumulation of sediments and scales, which soon or later will cause the partial or total clogging of the water system on the unit.

ADJUSTMENT, REMOVAL AND REPLACEMENT PROCEDURES

A. ADJUSTMENT OF THE CUBE SIZE

CAUTION. Before performing actual adjustment of the cube size , check other possible causes for cube size problems, refer to the Service Diagnosis Section for problem review and analysis.
Do not perform any adjustment till the icemaking system has progressed through several complete freezing and harvest cycle, to observe size and quality of ice cubes and whether or not the cube size problem exists.

I. If the cubes are shallow size (Indentation is too deep) probably the length of the second phase of the freezing cycle is too short so, to extend such length you have to:

1. Locate the DIP SWITCH on the front of the P.C.Board.

2. Take note of the combination of the first four DIP SWITCH KEYS and check the corrisponding length of freezing cycle 2nd phase on Table B.

3. Set the same DIP SWITCH KEYS to correspond to the prior combination shown on Table B which allow an extention of two more minutes of the length of the freezing cycle.

4. Observe the ice cubes in the next two harvests and eventually repeat steps 2 and 3 above until proper ice cubes size is achieved. See figure.

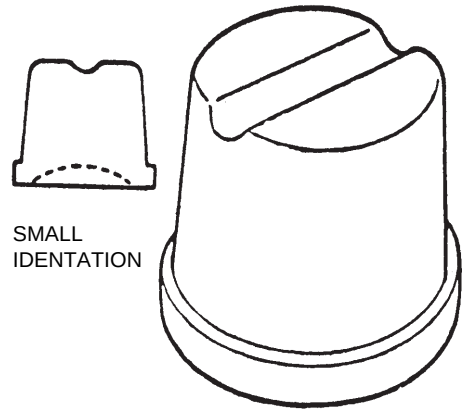
II. If the cubes are oversize size (Indentation is too full) probably the length of the second phase of the freezing cycle is too long.
To shorten such length you have to:

1. Locate the DIP SWITCH on the front of the P.C.Board.

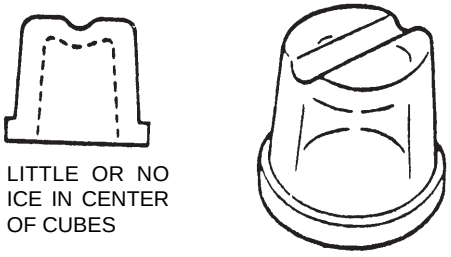
2. Take note of the combination of the first four DIP SWITCH KEYS and check the corrisponding length of freezing cycle 2nd phase on Table B.

3. Set the same DIP SWITCH KEYS to correspond to the next combination shown on Table B which allow a reduction of two minutes of the length of the freezing cycle.

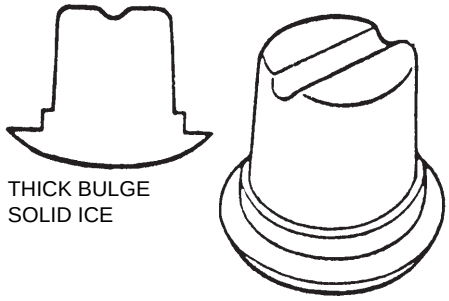
4. Observe the ice cubes in the next two harvests and eventually repeat steps 2 and 3 above until proper ice cubes size is achieved. See figure.



NORMAL SIZE-SHAPE



SHALLOW SIZE



OVER SIZE

WARNING. Disconnect electrical power supply to icemaker whenever replacement procedure are performed.

B. REPLACEMENT OF EVAPORATOR TEMPERATURE SENSOR

1. Remove front rear and top panels on models ACM 85 and AC125-175 and top and left side panel on model AC 225.

2. Remove the evaporator cover and snap off the metal clip securing the sensor probe to the serpentine.

3. Trace the evaporator sensor terminal plug on the rear side of the control box (blue color) and remove it from its socket by carefully pulling out the terminal plug securing clip.

4. To install the replacement evaporator sensor follow the above steps in reverse.

C. REPLACEMENT OF CONDENSER TEMPERATURE SENSOR

1. Remove front panel and on AC 225, the left side panel while on water cooled version of ACM 85 and AC 125-175 it is required to remove even the rear panel.

2. Trace the condenser sensor probe located within the condenser fins on air cooled version and withtrow it.
On water cooled version remove it by opening the plastic strap securing the probe to the refrigerant liquid line.

3. Trace the condenser sensor terminal plug on the rear side of the control box (black color) and remove it from its socket by carefully pulling out the terminal plug securing clip.

4. To install the replacement condenser sensor follow the above steps in reverse.

D. REPLACEMENT OF AMBIENT TEMPERATURE SENSOR

1. Remove front panel and on AC 225, the left side panel while on water cooled version of ACM 85 and AC 125-175 it is required to remove even the rear panel.

2. Trace the ambient sensor probe holded on its metal bracket in front of the condenser fins-on air cooled version-and remove it by unloosing its securing plastic clamp.
On water cooled version, remove it by opening the plastic strap securing the probe on the water supply line to the condenser.

3. Trace the ambient sensor terminal plug on the rear side of the control box (red color) and remove it from its socket by carefully pulling out the terminal plug securing clip.

4. To install the replacement ambient sensor follow the above steps in reverse.

E. REPLACEMENT OF OPTICAL ICE LEVEL CONTROL

1. Remove the front panel and on AC 225, the left side panel while on water cooled version of ACM 85 and AC 125-175 it is required to remove even the rear panel.

2. Trace the optical ice level control terminal plug (the only one with four terminal pins) on the rear side of the control box and remove it from its socket by carefully pulling out the terminal plug securing clip.

3. Remove the optical ice level control assy from the interior of the storage bin by unloosing its two securing screws.

4. Withtraw the entire optical ice level control wire and terminal plug through the hole located in the storage bin.

5. To install the replacement optical ice level control follow the above steps in reverse.

F. REPLACEMENT OF P.C. BOARD

1. Remove front panel.

2. Remove all sensor terminal plugs, located on the rear side of P.C. Board, by carefully releasing them out from their sockets clips.

3. Disconnect the terminal board connection plug from the rear side of P.C. BOARD then unloose the four screws holding the same to the plastic control box and remove it.

4. To install the replacement P.C. BOARD follow the above steps on reverse.

G. REPLACEMENT OF THE WATER PUMP (ACM 85)

1. Remove top panel and evaporator cover.

2. Disconnect the wires from the water pump motor.

3. Unloose the screws holding the metal bracket of the water pump to the sump.

4. Through the curtined opening reach the discharge port of the water pump and disconnect the plastic hose.

5. Unloose screw, washer and lockwasher and take the water pump off the bracket.

6. To install the replacement pump follow the above steps in reverse.

H. REPLACEMENT OF THE WATER PUMP (AC 125-175)

1. Remove the rear panel by loosening its screws.

2. Open the storage bin door, locate the plastic hose on the discharge port of the pump and disconnect it from the water pump body.

3. Loosen the screw and the yellow green ground wire.
Trace the pump leads and disconnect them.

4. Loosen the screw securing thr pump plate to the water reservoir and lift out the water pump assembly.

5. Loosen the screw and lock washers and lift the water pump off the bracket.

6. To install the replacement water pump follow the above steps on reverse.

I. REPLACEMENT OF THE WATER PUMP (AC 225)

1. Remove front and top panel.

2. Locate the water pump in the front right corner of the evaporator chamber.

3. Unloose the screw and the yellow green ground wire. Trace the pump electrical wire leads and disconnect them.

4. Remove the two screws securing the pump to sump tank.

5. Through the ice discharge opening remove first the removable inner plate then trace the plastic hose and disconnect it from the port of the pump body.

6. Pull out the pump assy from sump.

7. To install the replacement pump follow the above steps in reverse.

J. REPLACEMENT OF THE WATER INLET SOLENOID VALVE

1. Remove the rear panel on models ACM 85 and AC 125-175 and the left side panel on model AC 225.

2. Close the shut-off valve on the water supply line and disconnect it from the water inlet fitting at the rear of the cuber

3. Disconnect the electrical leads from the solenoid valve.

4. Unscrew the two screws securing the inlet solenoid valve to the cabinet.

5. Remove the corbin clamps and rubber hose; the valve is now free.

6. To install the replacement water inlet solenoid valve follow the above steps in reverse.

K. REPLACEMENT OF THE HOT GAS VALVE COIL

1. Remove rear panel on ACM 85 and AC 125-175 and the left side panel on model AC 225.

2. Unloose the nut securing the hot gas valve coil to its body.

3. Trace the electric wires belonging to the hot gas valve coil and disconnect them; then lift the valve coil fron the valve body.

4. To install the replacement hot gas valve coil follow previous steps in reverse.

L. REPLACEMENT OF WATER DRAIN SOLENOID VALVE

1. Remove the rear panel.

2. Trace and disconnect the electrical leads from the water drain solenoid valve coil.

3. Remove the corbin clamps and the plastic hoses from the valve.

4. Unloose the screws securing the valve to the frame and remove it.

5. To install the replacement water drain solenoid valve follow the above steps in reverse.

> ***NOTE.*** *When installing the new valve pay attention to the water flow direction.*

M. REPLACEMENT OF FAN MOTOR

1. Remove front and back panel on models ACM 85 and AC 125-175 and the front and left side panel on model AC 225.

2. Remove screws and yellow green ground wire. Trace the electrical leads of fan motor and disconnect them.

3. Remove the bolts securing the fan motor bracket to the cabinet base and then remove the assembly.

4. To install the replacement fan motor follow the above steps in reverse.

> ***NOTE.*** *When installing a new fan motor check that the fan blades do not touch any surfaces and move freely.*

N. REPLACEMENT OF PLASTIC CURTAIN (ACM 85 & AC 125-175)

1. Open the storage bin door to gain access to the curtain.

2. Remove the plastic curtain from the clips holding it, and take out.

3. To install the replacement plastic curtain follow the above steps in reverse.

O. REPLACEMENT OF SPRAY PLATFORM AND CHUTE (ACM 85 & AC 125-175)

1. Follow the steps in procedure N to remove the plastic curtain.

2. Lift the plastic spray system from the evaporator housing and remove the corbin clamp fastening the plastic hose to the port at the bottom of the spray platform.

3. Disconnect the plastic hose from the spray platform inlet port and remove it.

4. To install the replacement spray platform follow above steps in reverse.

P. REPLACEMENT OF SPRAY BAR (AC 225)

1. Slide open the bin door.

2. Reach through the ice opening and feel for the spray bar.

3. Rotate spray bar so that one of its end is aligned with ice opening.

4. Grab the spray bar center and lift it up off the jet bearing hub together with its race washer then draw it out through the ice opening.

5. To install the replacement spray bar follow above steps in reverse.

Q. REPLACEMENT OF DRIER

1. Remove front and back panel on models ACM 85 and AC 125-175 and the front and left side panel on model AC 225.

2. Recover the refrigerant from the system and transfer it in a container so to reclaim or recycle it.

3. Unsolder the refrigerant lines from the two ends of the drier (on ACM 85 and AC 125 the capillary tube from one side of the drier).

4. To install the replacement drier remove factory seals and solder the refrigerant lines (on ACM 85 and AC 125-175 even the capillary tube) taking precautions to NOT OVERHEAT the drier body.

5. Thoroughly evacuate the system to remove moisture and non condensable after drier replacement.

6. Charge the system with proper refrigerant by weight (see data plate of machine) and check for leaks.

7. Replace panels previously removed.

R. REPLACEMENT OF HOT GAS VALVE BODY

1. Follow the steps in procedures K to remove the hot gas valve coil.

2. Recover the refrigerant from the system and transfer it in a container so to reclaim or recycle it.

3. Unsolder the refrigerant lines from the hot gas valve body and remove it from the unit.

> ***NOTE. It is imperative*** *to install a replacement drier whenever the sealed refrigeration system is open.*
> *Do not replace the drier until all other repairs or replacements have been completed.*

4. To install the replacement hot gas valve body follow the above steps in reverse.

> ***NOTE.*** *Thoroughly evacuate the system to remove moisture and non condensables after hot gas valve replacement.*

S. REPLACEMENT OF EVAPORATOR PLATEN

1. Remove top rear and front panels.

2. Remove the plastic cover from the upper part of the evaporator platen.

3. Remove the evaporator sensor probe taking off the metal clips securing it to the evaporator serpentine.

4. Recover the refrigerant from the system and transfer it in a container so to reclaim or recycle it.

5. On ACM 85 and AC 125-175 remove the water inlet tube from the evaporator chamber after unloosing the appropriate screws.

6. Unsolder and disconnect the capillary tube and hot gas line from one serpentine of evaporator and the suction discharge line from the other serpentine.

7. Lift the evaporator platen assembly out of its seat.

NOTE. It is imperative *to install a replacement drier whenever the sealed refrigeration system is open.*
Do not replace the drier until all other repairs or replacements have been completed.

8. To install the replacement evaporator follow the above steps in reverse.

NOTE. *Thoroughly evacuate the system to remove moisture and non condensables after evaporator replacement.*

T REPLACEMENT OF AIR COOLED CONDENSER

1. Remove front and back panel on models ACM 85 and AC 125-175 and the front and left side panel on model AC 225.

2. Remove from the condenser fins the condenser as well as the ambient temperature sensor probes.

3. Remove the two bolts attaching the condenser to the base.

4. Recover the refrigerant from the system and transfer it in a container so to reclaim or recycle it.

5. Unsolder the refrigerant lines from the condenser and remove it from the unit.

NOTE. It isimperative *to install a replacement drier whenever the sealed refrigeration system is open.*
Do not replace the drier until all other repairs or replacements have been completed.

6. To install the replacement condenser follow the above steps in reverse.

NOTE. *Thoroughly evacuate the system to remove moisture and non condensables after condenser replacement.*

U. REPLACEMENT OF WATER COOLED CONDENSER

1. Remove front and back panel on models ACM 85 and AC 125-175 while the front and left side panel on model AC 225.

2. Remove the condenser and the ambient temperature sensor probes from condenser.

3. Remove bolts which secure the condenser to the unit base.

4. Remove the corbin clamps and disconnect the plastic hoses from the water cooled condenser.

5. Recover the refrigerant from the system and transfer it in a container so to reclaim or recycle it.

6. Unsolder the refrigerant lines from the condenser and remove it from the unit.

NOTE. It is imperative *to install a replacement drier whenever the sealed refrigeration system is open.*
Do not replace the drier until all other repairs or replacements have been completed.

7. To install the replacement condenser follow the above steps in reverse.

NOTE. *Thoroughly evacuate the system to remove moisture and non condensables after condenser replacement.*

V. REPLACEMENT OF WATER REGULATING VALVE (WATER COOLED MODELS)

1. Remove front and back panel on models ACM 85 and AC 125-175 and the front and left side panel on model AC 225.

2 Close the shut-off valve on the water supply line and disconnect it at the rear of the cuber.

3. Remove corbin clamp and disconnect the water hose from the outlet of water regulating valve.

4. Unloose the nut securing the water regulating valve to the unit frame.

5. Recover the refrigerant from the system and transfer it in a container so to reclaim or recycle it.

6. Trace the water regulating valve capillary tube and unsolder its end from the refrigerant line then remove it from the unit.

NOTE. It is imperative *to install a replacement drier whenever the sealed refrigeration system is open.*
Do not replace the drier until all other repairs or replacements have been completed.

7. To install the replacement water regulating valve follow the above steps in reverse.

NOTE. *Thoroughly evacuate the system to remove moisture and non condensables after water regulating valve replacement.*

NOTE. *The water flow that passes through the valve can be adjusted by means of the valve setting stem.*

W. REPLACEMENT OF COMPRESSOR

1. Remove back and front panels on models ACM 85 and AC 125-175 and the front and left side panel on model AC 225.

2. Remove the cover and disconnect the electrical leads from the compressor junction box.

3. Recover the refrigerant from the system and transfer it in a container so to reclaim or recycle it.

4. Unsolder and disconnect both the suction line and the discharge line from the compressor.

5. Remove the four compressor mounting bolts and the compressor from the unit base.

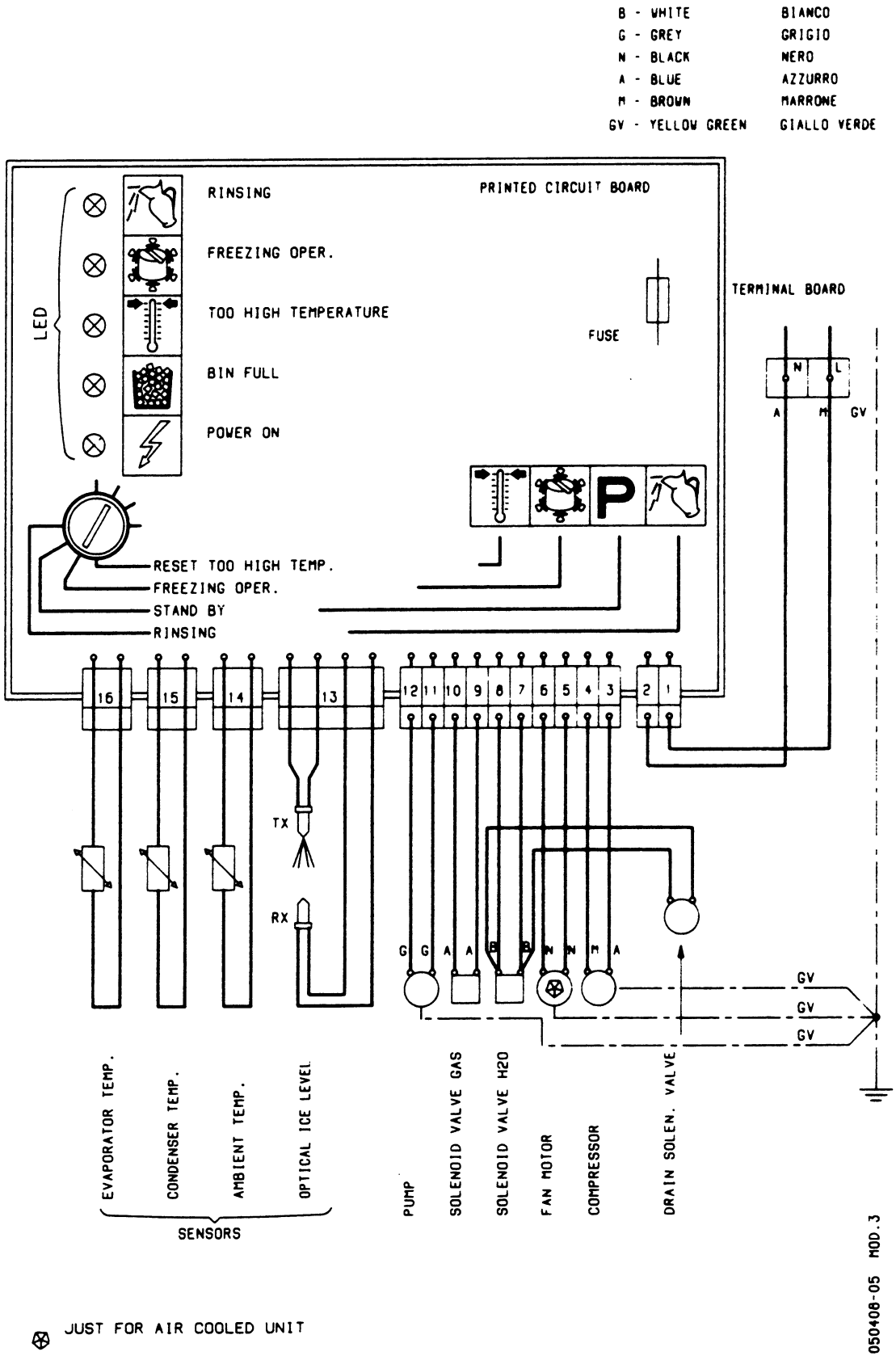
> ***NOTE. It is imperative to*** *install a replacement drier whenever the sealed refrigeration system is open.*
> *Do not replace the drier until all other repairs or replacements have been completed.*

6. To install the replacement compressor follow the above steps in reverse.

> ***NOTE.*** *Thoroughly evacuate the system to remove moisture and non condensables after compressor replacement.*

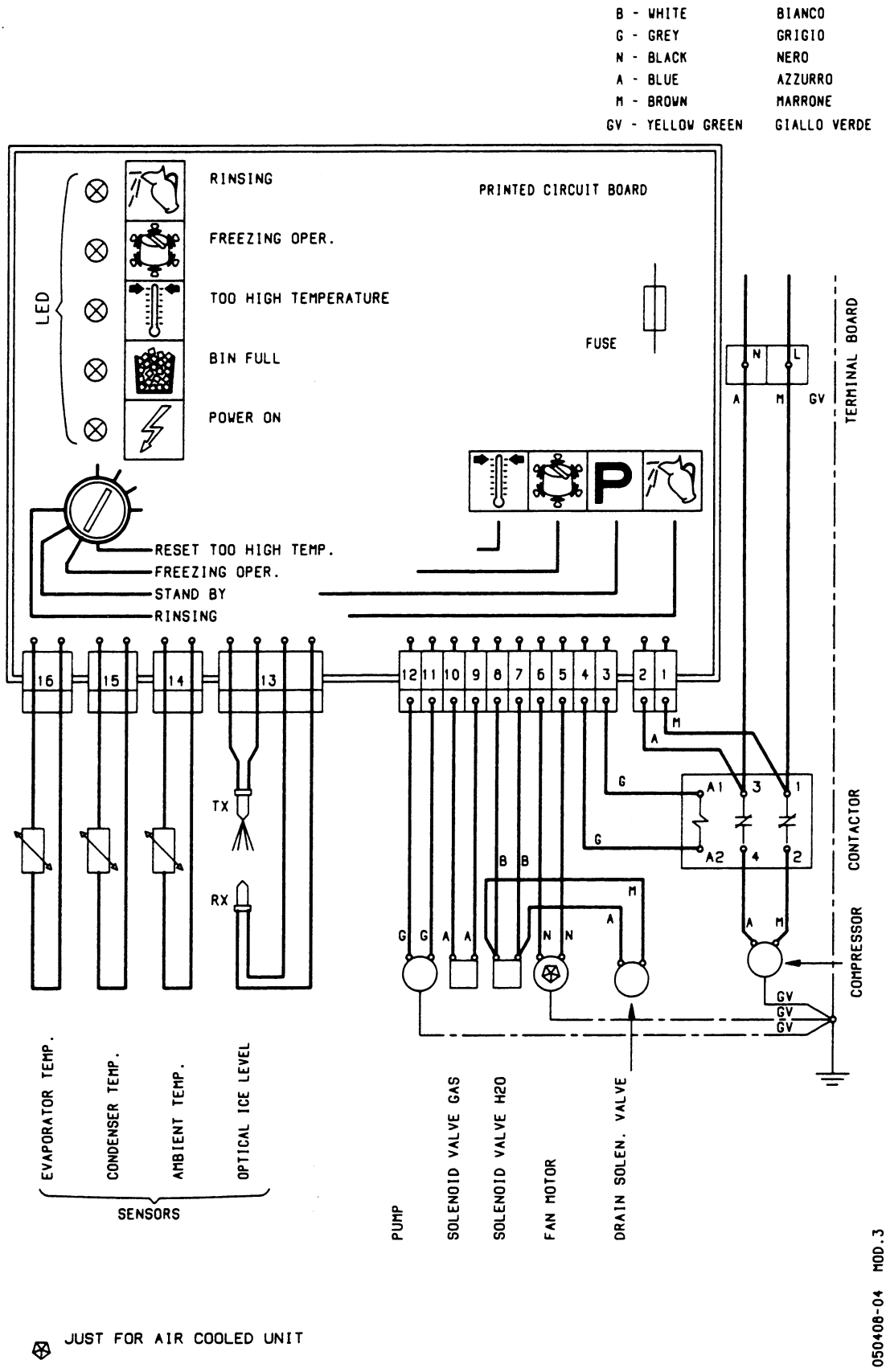
WIRING DIAGRAM

ACM 85 - AIR AND WATER COOLED 230/50/1



WIRING DIAGRAM

AC 125-175 & AC 225 - AIR AND WATER COOLED 230/50/1



SERVICE DIAGNOSIS

SYMPTOM	POSSIBLE CAUSE	SUGGESTED CORRECTION
Unit will not run (No warning LEDS glows)	Blown power in fuse in P.C.Board	Replace fuse & check for cause of blown fuse
	Main switch in OFF position	Turn switch to ON position
	Inoperative P.C.Board	Replace P.C.Board
	Loose electrical connections	Check wiring
(Green LED-Power ON glows)	P.C.Board selector in STAND BY	Move to OPERATING position
	Blown power out fuse in P.C. Board	Replace fuse & check for cause of blown fuse
(Bin full LED glows)	Inoperative ice level control	Clean or replace ice level control
	Inoperative P.C.Board	Replace P.C.Board
(Red-alarm LED glows)	High head pressure	Dirty condenser. Clean Inoperative fan motor. Replace Shortage of water (WC)
(Red-alarm LED blinks)	High evaporating temperature after 10 mins. beginning freeze	Hot gas valve leak - Replace it. Water inlet valve leak - Replace it. Evap. sensor inoperative - Replace it. Short of refrigerant.
Compressor cycles intermittently	Low voltage	Check circuit for overloading Check voltage at the supply to the building. If low, contact the power company
	Contactor with burnt contacts	Clean or replace
	Non-condensable gas in system	Purge the system
	Compressor starting device with loose wires	Check for loose wires in starting device
	Mechanical problem	Replace compressor
Cubes too small	Freezing cycle too short	Review setting of DIP SWITCH keys
	Capillary tube partially restricted	Blow charge, add new gas & drier, after evacuating systemwithvacuum pump
	Moisture in the system	Same as above
	Shortage of water	See remedies for shortage of water
	Shortage of refrigerant	Check for leaks & recharge
	Inoperative evaporator sensor	Replace sensor
Cloudy cubes	Shortage of water	See remedies for shortage of water
	Dirty water supply	Use water softner or water filter
	Accumulated impurities	Use SCOTSMAN Ice Machine cleaner
	Spray bar not rotating (AC 225) or slowly rotating	Remove spray bar & jet bearing and clean or replace them

SERVICE DIAGNOSIS

SYMPTON	POSSIBLE CAUSE	SUGGESTED CORRECTION
Shortage of water	Water spilling out through curtain	Check or replace curtain
	Water solenoid valve not opening	Replace valve
	Water leak in sump area	Locate and repair
	Water flow control plugged	Replace water inlet valve
	Leak of water drain valve	Replace valve
Irregular cubes size & some cloudy	Some jets plugged	Remove jet cover and clean
	Shortage of water	See shortage of water
	Unit not level	Level as required
	Spray bar not rotating (AC 225) and clean them	Remove spray bar & jet bearing
Cubes too large	Freezing cycle too long	Review setting of DIP SWITCH keys
Decreased ice capacity	Inefficient compressor	Replace
	Leaky water valve	Repair or replace
	Non-condensable gas in system	Purge the system
	Poor air circulation or excessive hot location (Red-alarm LED glows)	Relocate the unit or provide for more ventilation
	Overcharge of refrigerant	Correct the charge. Purge off slowly
	Capillary tube partially restricted	Blow charge, add new gas & drier, after evacuating system with vacuum pump
	Hot gas solenoid valve leaking	Replace valve
	Undercharge of refrigerant	Charge to data plate indication
	Spray bar not rotating (AC 225)	Remove spray bar & jet bearing and clean them
	Discharge head pressure too high	See incorrect discharge pressure
Poor harvest	Too short defrost time	Check & adjust DIP SWITCH keys 5-6-7
	Inoperative ambient sensor	Replace sensor
	Restriction in incoming water line	Check water valve strainer and flow control. If necessary enlarge the flow control orifice
	Water inlet valve not opening	Valve coil with open winding Replace valve
	Hot gas valve orifice restricted	Replace hot gas valve assy
	Air vented holes in mold cups	Clean out holes plugged
	Discharge head pressure too low	See incorrect discharge pressure

SERVICE DIAGNOSIS

SYMPTON	POSSIBLE CAUSE	SUGGESTED CORRECTION
Unit won't harvest	Inoperative P.C.Board	Replace P.C.Board
	Hot gas valve not opening	Valve coil with open winding Replace valve
	Water solenoid valve not opening	Valve coil with open winding Replace valve
Incorrect discharge pressure	Inoperative condenser sensor	Replace sensor
	Inoperative P.C.Board	Replace P.C.Board
	Water regulating valve misadjusted	Adjust its setting stem
Excessive water in unit base	Water tubing leaking	Check. Tighten or replace

MAINTENANCE AND CLEANING INSTRUCTIONS

A. GENERAL

The periods and the procedures for maintenance and cleaning are given as guides and are not to be construed as absolute or invariable.
Cleaning, especially, will vary depending upon local water and ambient conditions and the ice volume produced; and, each icemaker must be maintened individually, in accordance with its particular location requirements.

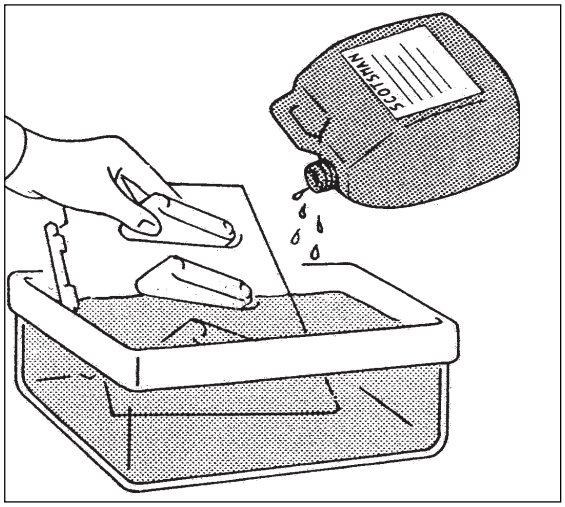
B. ICEMAKER

The following maintenance should be scheduled at least two times per year on these icemakers.

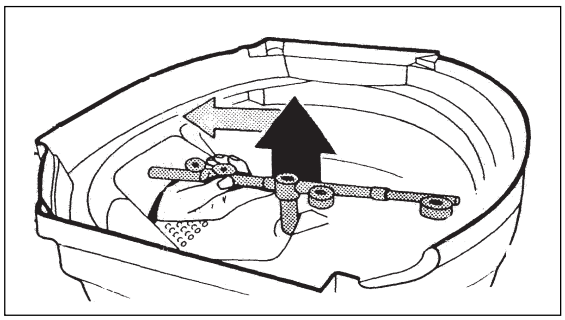
1. Check and clean the water line strainer.

2. Check that the icemaker is levelled in side to side and in front to rear directions.

3. Clean the water system, evaporator, bin and spray platens (ACM 85 & AC 125-175) using a solution of SCOTSMAN Ice Machine Cleaner. Refer to procedure C cleaning instructions and after cleaning will indicate frequency and procedure to be followed in local areas.

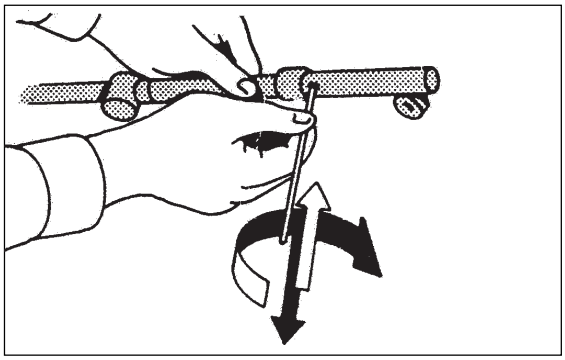


4. On AC 225 reach the water spray bar from the inside of the freezing chamber lifting it from its seat with its bottom trust washer.



Dip it into a tray filled with cleaning solution then rinse it under tap water stream.

With a pick clean the orifice of the water stream jet that propells the spray bar.



NOTE. *Cleaning requirements vary according to the local water conditions and individual user operation. Continuous check of the clarity of ice cubes and visual inspection of the water spraying parts before and after cleaning will indicate frequency and procedure to be followed in local areas.*

5. With the ice machine and fan motor OFF on air cooled models, clean condenser using vacuum cleaner, whisk broom or non metallic brush taking care to do not damage both the condenser and ambient temperature sensors.

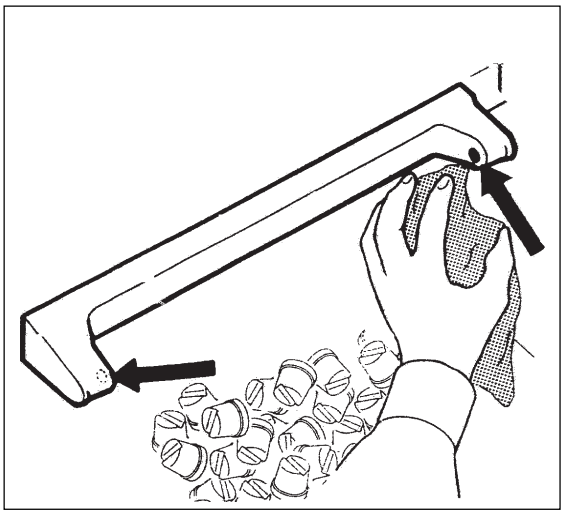
6. Check for water leaks and tighten drain line connections. Pour water down bin drain line to be sure that drain line is open and clear.

7. Check size, condition and texture of ice cubes. Perform adjustment of DIP SWITCH keys as required.

8. Check the ice level control sensor to test shut-off. Put your hand between the light source and the receiver so to cut off the light beam for at least one minutes.
This should cause the ice maker to shut off and the light up of the 2nd LED (yellow light).

IMPORTANT. Perform the above check only at the end of harvest cycle or at the beginning of freezing cycle in order to do not cause to the unit to make a double freezing cycle.

NOTE. *Within few seconds after the removal of the hand from the Infrared sensing light the icemaker restarts in freezing cycle.*
The ice level control uses devices that sense light, therefore they must be kept clean enough so they can "see".
Every month clean/wipe the sensing "eyes" with a clean soft cloth.



9. Check for refrigerant leaks.

C. CLEANING INSTRUCTIONS OF WATER SYSTEM

1. Remove the front and the top panels to gain access either to the control box and to the evaporator.

2. Wait till the end of defrost cycle then, with the help of a normal screwdriver, turn the program selector head on **STAND BY** position to temporaly stop the operation (Fig.8).

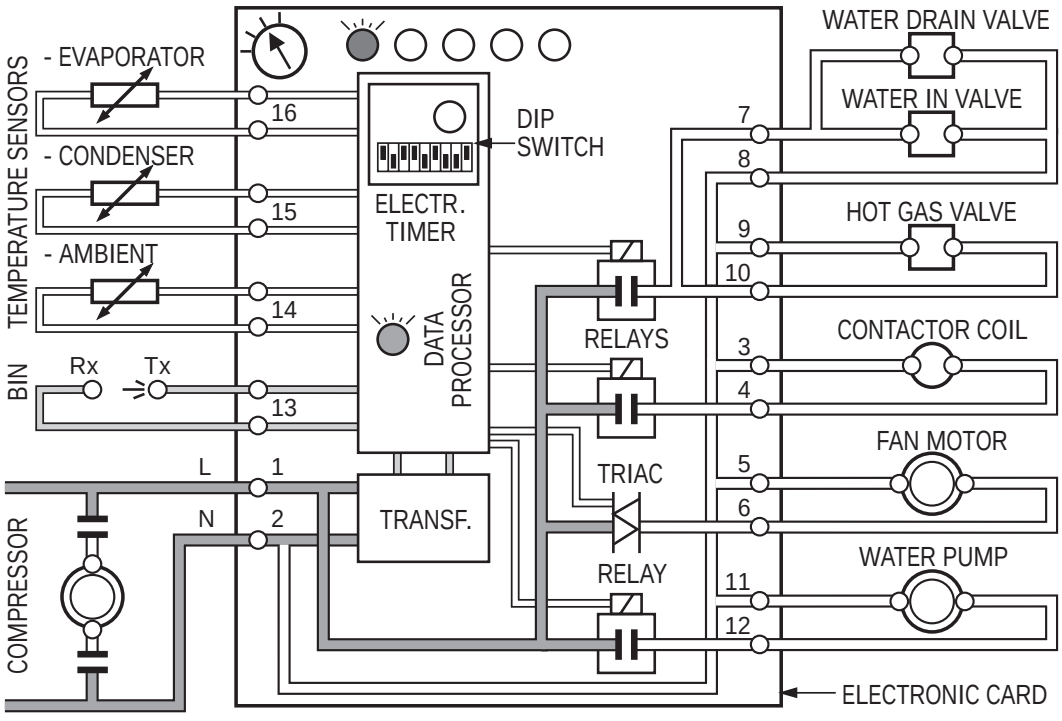
Cleaning

3. Prepare the cleaning solution by diluting in a plastic container two or three liters of warm water (45°-50°C) with a 0,2-0,3 liters of SCOTSMAN Ice Machine Cleaner.

WARNING. The SCOTSMAN Ice Machine Cleaner contains Phosphoric and Hydroxyacetic acids. These compounds are corrosive and may cause burns if swallowed, DO NOT induce vomiting. Give large amounts of water or milk. Call Physician immediately. In case of external contact flush with water. KEEP OUT OF THE REACH OF CHILDREN

4. Scoop out all the ice cubes stored into the bin in order to prevent them from being contaminated with the cleaning solution then flush out the water from the sump reservoir by removing the overflow stand-pipe or drain plug.

FIG. 7



5. Remove the evaporator cover then slowly pour onto the evaporator platen the cleaning solution. With the help of a brush dissolve the most resistant and remote scale deposits in the platen.

6. Set the program selector head on **CLEANING/RINSING.**
The 5th YELLOW LED lights-up (Fig.9).

NOTE. *With the system in CLEANING/ RINSING mode the water pump is the only component in operation to circulate the cleaning solution in the entire water system.*

7. Let the unit to remain in the **CLEANING/ RINSING** mode for about 20 minutes then turn the program selector on **STAND BY** again.

8. Flush out the cleaning solution from the sump reservoir then pour onto the evaporator cavity two or three liters of clean potable water to rinse the mold cups and the platen.
If necessary remove the water spray bar or spray platen to clean them separately as per steps 3 and 4 of paragraph B.

9. Turn again the program selector on **CLEANING/RINSING.** The water pump is again in operation to circulate the water in order to rinse the entire water system.

10. Flush out the rinsing water from the sump reservoir then turn the program selector on **RE-SET/HI TEMPERATURE** position and immediately afterward to **FREEZING OPERATION.**

NOTE. *By setting the selector on* ***RE-SET*** *first and then to* ***FREEZING OPERATION*** *the ice maker will perform the 5 minutes WATER FILLING phase i.e. the water inlet solenoid valve opens to allow the incoming water to rinse again the water system and to properly fill-up the sump reservoir for the next freezing cycle.*

Sanitation

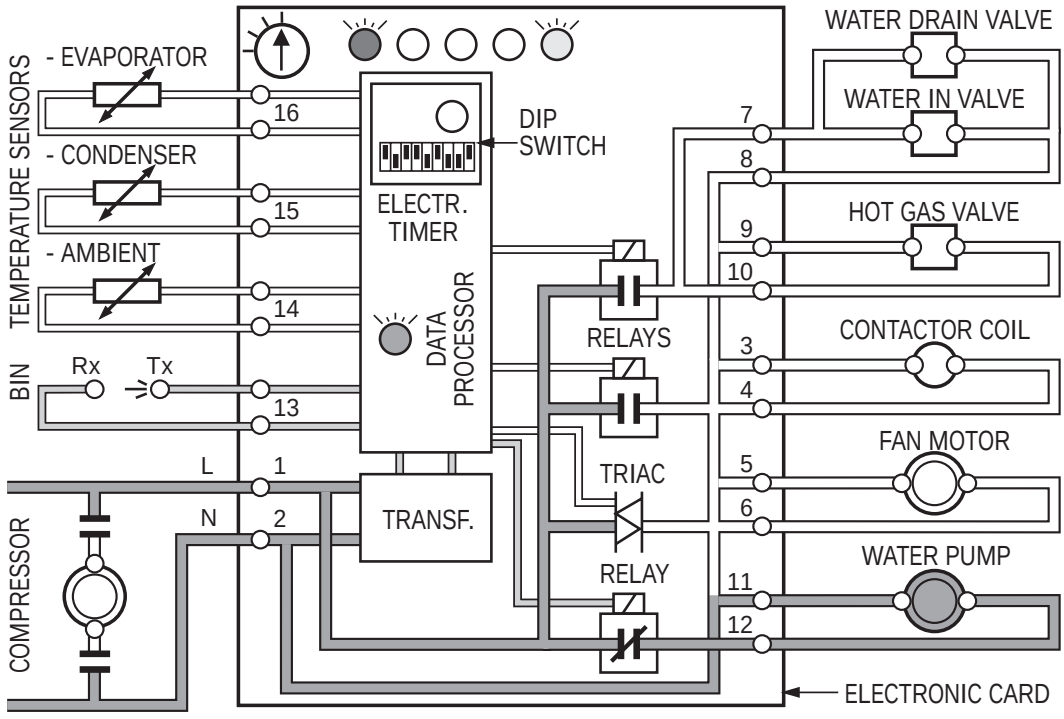
NOTE. Sanitation *of the water system is recommended to be done* ***once a month.***

11. Prepare in a plastic container the sanitation solution as per manufacturer dilution using warm water (45-50 °C).

NOTE. Never mix the cleaning with the sanitising solution.

12. Follow the procedures as per cleaning (from item 4 to item 10) just shorting the operation of the water pump to 10 minutes.

FIG. 8



13. Place again the evaporator cover and the unit service panels.

14. At completion of the freezing and harvest cycle make sure of proper texture and clearness of the ice cubes and that, they do not have any acid taste.

ATTENTION. *In case the ice cubes are cloudy, white and have an acid taste, melt them immediately by pouring on them some warm water. This to prevent that somebody could use them.*

15. Wipe clean and rinse the inner surfaces of the storage bin.

REMEMBER. *To prevent the accumulation of undesirable bacteria it is necessary to sanitize the interior of the storage bin with an anti-algae disinfectant solution every week.*

SCOTSMAN

ICE SYSTEMS

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