SIMAG

SERVICE MANUAL

SV 130
SV 210
SV 310
SV 530

R 404 A VERSION

Electronic modular cubers

MS 1000.24 REV. 10/2004

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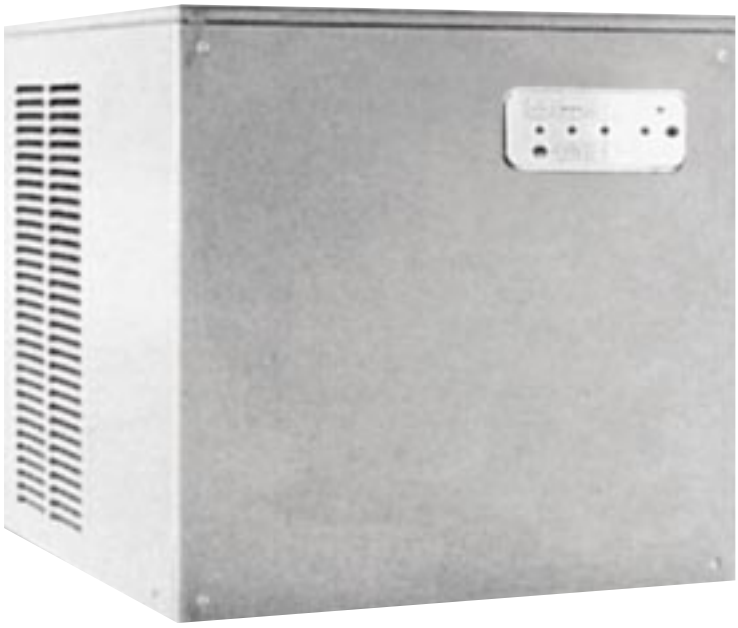
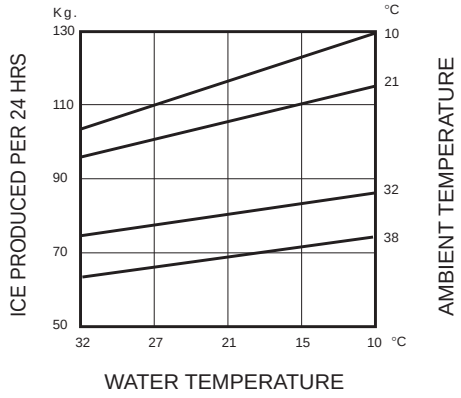
SPECIFICATIONS

MODULAR CUBER SV 130

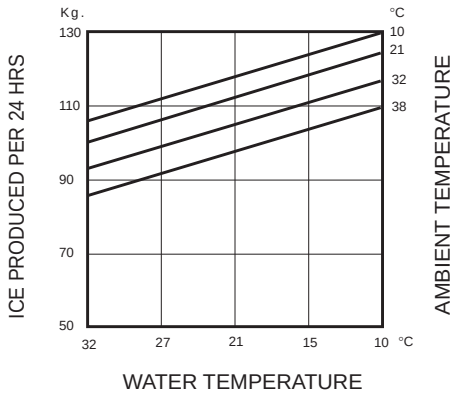


ice making capacity

AIR COOLED MODELS

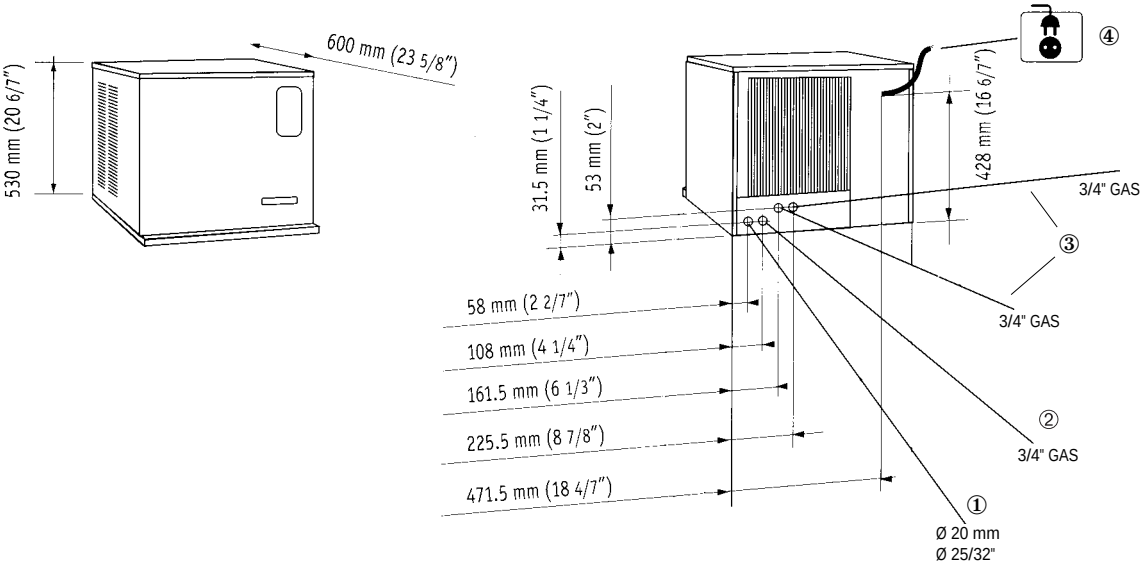


WATER COOLED MODELS



***NOTE**. To keep your Modular cuber performing at its maximum capacity, it is necessary to perform periodic maintenance as outlined on page 29 of this manual.*

SPECIFICATIONS (CONT'D)



① 20 mm - WATER OUTLET

② 20 mm - WATER OUTLET - WATER COOLED ONLY

③ 3/4" GAS WATER INLET

④ CORD SET

Accessoires
KSC 12 - Cube stacking kit

Dimensions:

HEIGHT	530 mm. (20" 6/7)
WIDTH	560 mm. (22")
DEPTH	600 mm. (23 5/8")
WEIGHT	52 Kgs.

SV 130 - MACHINE SPECIFICATIONS

Model	Cond. unit	Finish	Comp. HP	Water req. lt/24 HR
SV 130 - AS **SV 130 - WS**	Air Water	Stainless Steel	5/8	190 1200*

Model	Basic electr.	amps	Start amps	watts	Electric power cons. Kwhx24 HR.	N. of wires	Amps Fuse
SV 130 - AS **SV 130 - WS**	220-240/50/1	4.0 3.8	20 20	750 650	18 15.6	3x1,5 mm^2	10

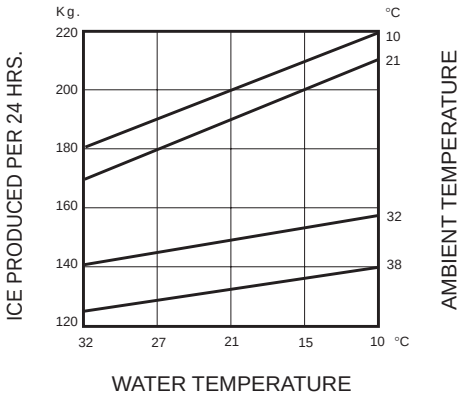
Cubes per harvest: 132 Full
* With water at 15°C

SPECIFICATIONS

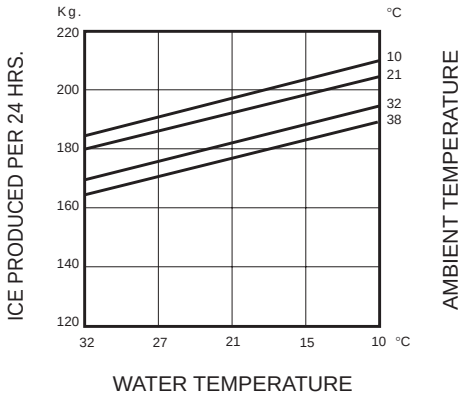
MODULAR CUBER SV 210

ice making capacity

AIR COOLED MODELS



WATER COOLED MODELS



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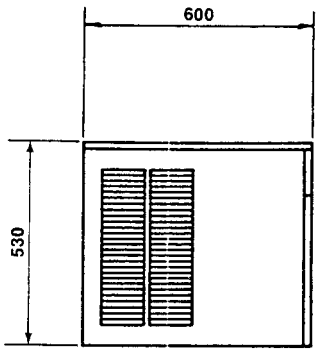
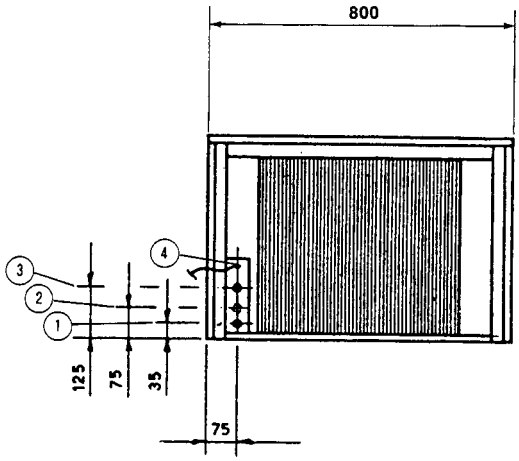




① 20 mm - WATER OUTLET

② 20 mm - WATER OUTLET - WATER COOLED ONLY

③ 3/4" GAS WATER INLET

④ CORD SET

Accessoires
KSC 18 - Cube stacking kit

Dimensions:

HEIGHT	530 mm. (20" 7/8)
WIDTH	800 mm. (31" 1/2)
DEPTH	600 mm. (25" 3/8)
WEIGHT	77 Kgs.

SV 210 - MACHINE SPECIFICATIONS

Model	Cond. unit	Finish	Comp. HP	Water req. lt/24 HR
SV 210 - AS **SV 210 - WS**	Air Water	Stainless Steel	1 1/4	380 1800*

Model	Basic electr.	amps	Start amps	watts	Electric power cons. Kwhx24 HR.	N. of wires	Amps Fuse
SV 210 - AS **SV 210 - WS**	220-240/50/1	6 5.5	30 30	1100 1050	26.4 25.2	3x1,5 mm^2	16

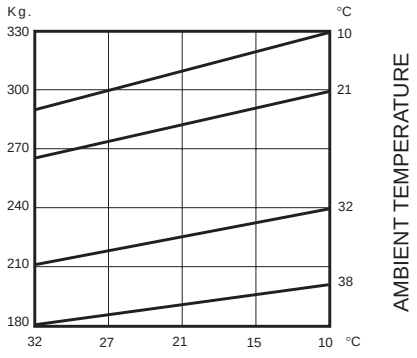
Cubes per harvest: 204 Full
* With water at 15°C

SPECIFICATIONS

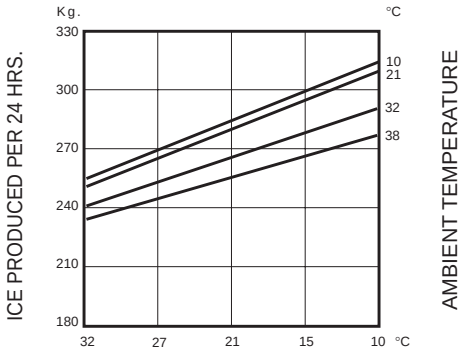
MODULAR CUBER SV 310

ice making capacity

AIR COOLED MODELS



WATER COOLED MODELS



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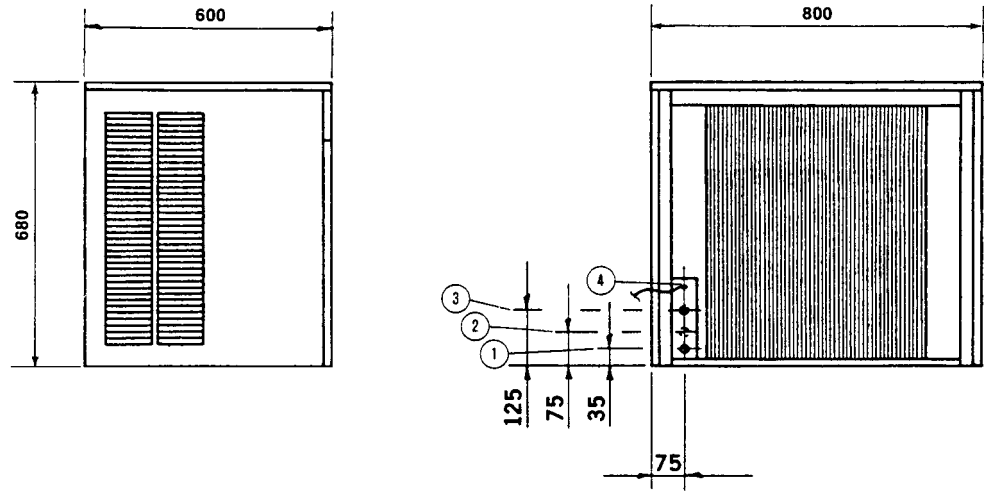
SPECIFICATIONS (CONT'D)



① 20 mm - WATER OUTLET

② 20 mm - WATER OUTLET - WATER COOLED ONLY

③ 3/4" GAS WATER INLET

④ CORD SET

Accessoires
KSC 25 - Cube stacking kit

Dimensions:

HEIGHT	680 mm. (26" 3/4)
WIDTH	800 mm. (31" 1/2)
DEPTH	600 mm. (23" 5/8)
WEIGHT	100 Kgs.

SV 310 - MACHINE SPECIFICATIONS

Model	Cond. unit	Finish	Comp. HP	Water req. lt/24 HR
SV 310 - AS **SV 310 - WS**	Air Water	Stainless Steel	2	470 3100*

Model	Basic electr.	amps	Start amps	watts	Electric power cons. Kwhx24 HR.	N. of wires	Amps Fuse
SV 310 - AS **SV 310 - WS**	220-240/50/1	9,0 8,0	49 49	1600 1500	38,4 36,0	3x1,5 mm^2	16

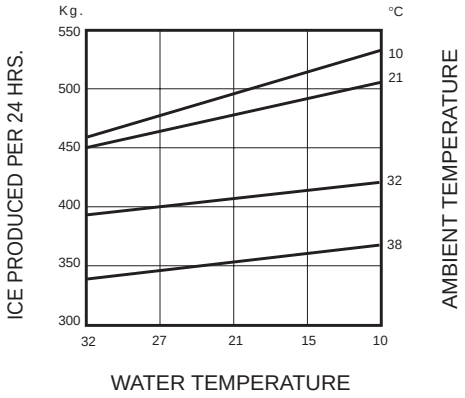
Cubes per harvest: 289 Full
* With water at 15°C

SPECIFICATIONS

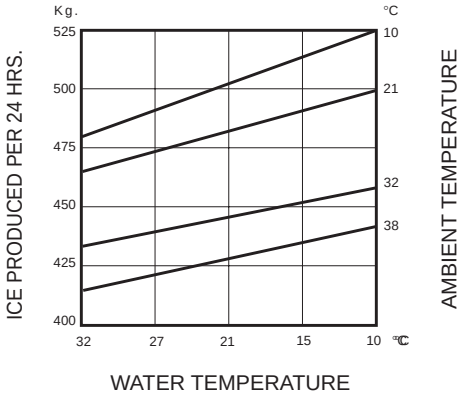
MODULAR CUBER SV 530

ice making capacity

AIR COOLED MODELS



WATER COOLED MODELS



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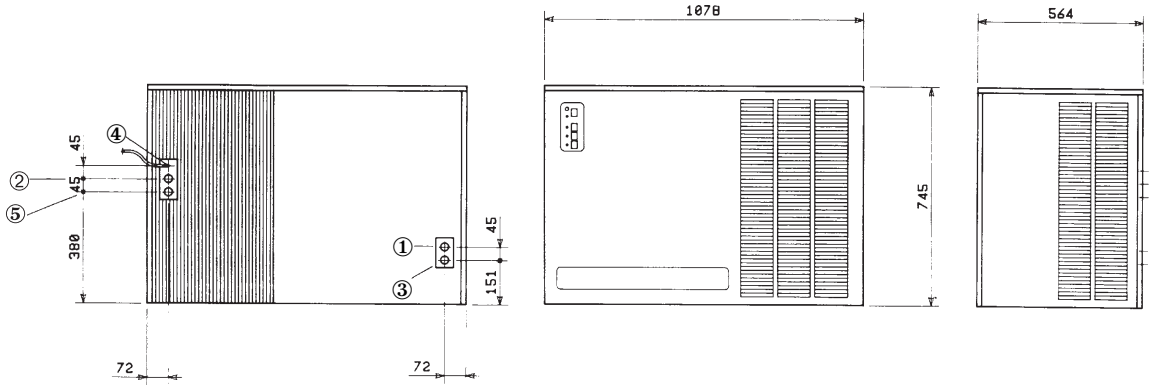
SPECIFICATIONS (CONT'D)



① 20 mm - WATER OUTLET

② 20 mm - WATER OUTLET - WATER COOLED ONLY

③ 3/4" GAS WATER INLET

④ CORD SET

⑤ WATER INLET - WATER COOLED ONLY

Accessoires
KSC 50 - Cube stacking kit

Dimensions:

HEIGHT	745 mm. (29" 5/8)
WIDTH	1078 mm. (42" 1/2)
DEPTH	564 mm. (22" 1/4)
WEIGHT	128 Kgs.

SV 530 - MACHINE SPECIFICATIONS

Model	Cond. unit	Finish	Comp. HP	Water req. lt/24 HR
SV 530 - AS **SV 530 - WS**	Air Water	Stainless Steel	3	720 4800*

Model	Basic electr.	amps	watts	Electric power cons. Kwhx24 HR.	N. of wires	Amps Fuse
SV 530 - AS **SV 530 - WS**	400/50/3 N	6.5 6.0	2500 2200	60 53	5x1,5 mm^2	16

Cubes per harvest: 578 Full
* With water at 15°C

FOR THE INSTALLER

INTRODUCTION

These instructions provide the specifications and the step-by-step procedures for the installation, start up and operation for the SIMAG Model SV 130-210-310-530 Modular Cubers.
The Models SV 130-210-310-530 Modular Cubers are quality designed, engineering and constructed, and are thoroughly tested icemaking systems, providing the utmost in flexibility to fit the needs of a particular user.

INSTALLATION NOTE: *Allow 15 cm. minimum space at sides and back for ventilation and utility connections.*

STORAGE BIN

The SV 130 stack on top of Simag bin model R80; the SV 210-310 stack onto SIMAG bin model R 150 while the model SV 530 onto bin R 250.

Refrigerant R 404 A
Charge per nameplate rating.

STANDARD LEGS: Furnished with storage bin. Four legs screw into mounting sockets on cabinet base. Provide 16 cm. (6'') minimum height including adjustable leveling foot.
Optional Kit Casters for R 80 - R 150 (KRB 390) and for R 250 (KRB 550) are available on request.

IMPORTANT OPERATING REQUIREMENTS

	MINIMUM	MAXIMUM
Air Temperature	**10°C** (50°F)	**40°C** (100°F)
Water Temperature	**5°C** (40°F)	**35°C** (90°F)
Water Pressures	1 bar gauge	5 bar gauge
Electrical Voltage Variations Voltage rating specified on nameplate	-10%	+10%

Extended periods of operation exceeding these limitations constitues misuse under the terms of Manufacturer's Limited Warranty, resulting in a loss of warranty coverage.

SELECT LOCATION

The first step in installing the equipment is to select the location. The purchaser of the unit will have a desired spot in mind, check out that spot to insure that it is:

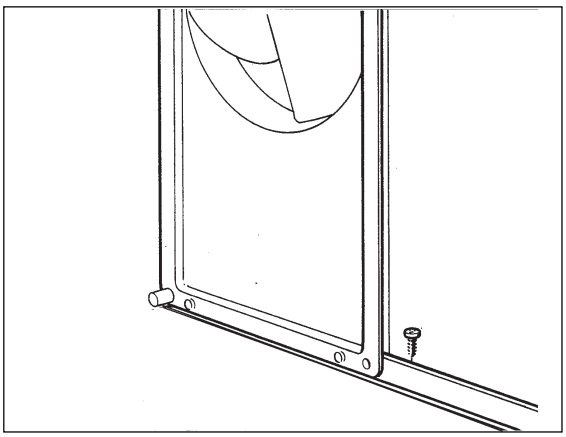
- indoors, in an environment that does not exceed the air and water temperature limitations for the equipment.
- that the necessary utilities are available including the correct voltage electrical power.
- that there be space around the installed machine for service, 15 cm. minimum left, right, and rear for air-cooled models.

STORAGE BIN

The SIMAG bins for these units are the R 80, R 150 and R 250.
Other bins may be available with bin tops to vary the storage capacity. Lay the bin on its back, using cardboard from the carton to support it, screw in the legs.
Stand the bin upright, and correct any possible small tears in the machine mounting gasket with food grade silicone sealant.

ICE MACHINE

The use of a mechanical lift is recommended for lifting the uncrated icemaker onto the bin.
Remove front, top and sides panels.
Place the unit directly onto the bin, align it with the back of the bin. Locate the hardware package, take out two mounting screws, and use them to secure the Icemaker to the two sides of the bin. See illustration below.

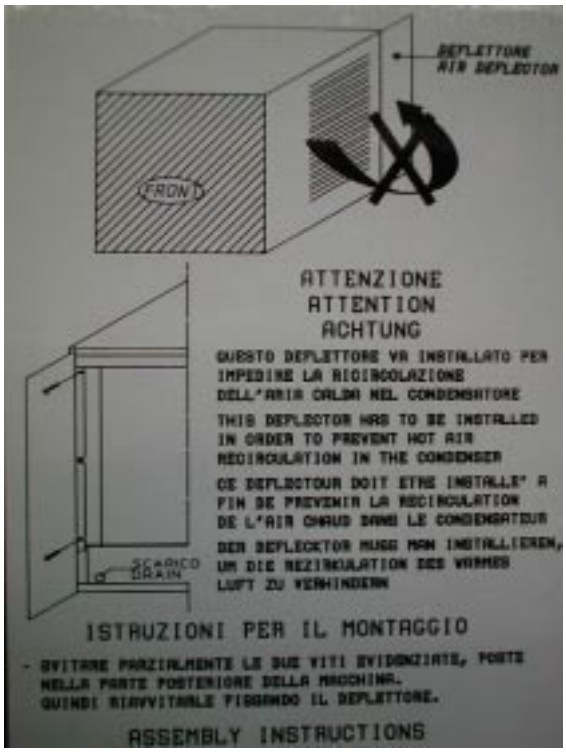


Remove all shipping material as well as the masking tapes from the ice deflector/evaporator cover.

Remove first the ice deflector/evaporator cover then the masking tape from the ice thickness sensor.

SV 130 - AIR SEPARATOR

Install on the rear right side of the machine the air separator as per instruction provided with it.



STACKING INSTALLATION

To stack a second SV onto the present one, first remove the top panel from the lower machine. Add a bead of food grade silicone sealant to the top edges of the lower units freezing compartment. Lift the top machine onto the bottom

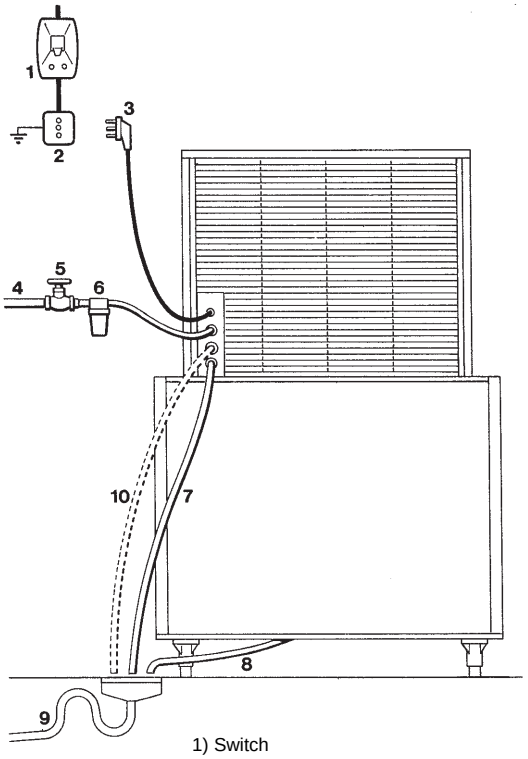
machine, (the use of a mechanical lift is recommended for this step). Align the two machines cabinets, and using the 2 screw from the top units, hardware package, fasten the two units together at the side cabinets.
Then make use of the Stacking Kit KSC 12, KSC 21, KSC 32 or KSC 50 to be mounted as per fitting instructions included in their package, respectively on SV 130, SV 210, on SV 310 and SV 530 located in the bottom for proper conveying, of the ice cubes made by the top unit, into the storage bin.
With food grade silicone perfectly seal the edge between the freezing compartment of the upper machine and of the bottom machine so to avoid any possible leak of water through the clearence in between.

FOR THE PLUMBER

CONFORM TO ALL APPLICABLE CODES

WATER INLET

AIR-COOLED MODELS: The recommended water supply is **cold** water, 3/8'' O.D. copper tubing, connected a - 3/4'' gas - male fitting at the back of the cabinet. Install a hand valve near the machine to control the water supply.



1) Switch
2) Plug receptacle
3) Electrical plug
4) Water inlet
5) Shut-off valve
6) Water filter
7) Water outlet line
8) Bin water outlet line
9) Open vented water drain
10) Water outlet from the condenser: water cooled version only.

When choosing the water supply for the SV Cuber, consideration should be given to:

A. Length of run.

B. Water clarity and purity.

C. Adequate water supply pressures.

Since water is the most important single ingredient in producing ice you cannot over emphasize the three items listed above. Low water pressure, below 1 bar may cause malfunction, of the icemaker unit. Water containing excessive minerals will tend to produce cloudy colored ice cubes, plus scale build-up on parts in the water system.
Heavily chlorinated water can be controlled using charcoal or carbon filters.

DRAINS

AIR-COOLED MODELS: There is one 20 mm. dia sump drain fitting at the back of the cabinet. Insulations in high humidity areas is recommended. The ideal drain receptacle would be a trapped and vented floor drain.
WATER-COOLED MODELS: Besides the above drain, **a separate** condenser drain must be run. Connect it to the - 3/4'' gas - condenser drain connection at the back of the cabinet.
STORAGE BIN: **A separate** gravity type drain needs to be run, similar to the air-cooled sump drain. **Insulation of this drain line is recommended.**

FOR THE ELECTRICIAN

ELECTRICAL CONNECTIONS

The unit come equipped with an electrical cord for power supply. The lead wires must be connected to an electrical plug that corresponds to the local electrical codes and requirements or to a separate two poles disconnect box with opening to the contacts of about 3 millimeters.
The disconnect box shoulds be placed close to the selected ice maker location to be easily and prompt reached.
Undersized wiring or unproperly installed electrical circuit will result in major problems and malfunctions.
Voltage variations shoud not exceed ten percent.

IMPORTANT - All plumbing and electrical connections must be made by licensed plumbers and electricians, this one must follow the electrical specifications printed on the ice maker nameplate.

NOTE: *All SIMAG Cubers require a neutral wire and a solid earth ground wire to prevent possible severe Electrical Shock Injury to individuals or extensive damage to equipments.*

FINAL CHECK LIST

1. Is the cabinet/bin level?

2. Is the cuber in a location where ambient temperatures are a minimum of 10°C (50-degrees F.) all year around and to not exceed a maximum of 40°C. (100°F.).

3. Is there at least a 15 cm. clearance behind and around the cabinet for all connections and for proper air circulation?

4. Have all electrical and piping connections been made?

5. Has the electrical power supply wiring been properly connected and the voltage tested and checked against the nameplate rating? Has the unit properly grounded.

6. Is the water supply line shutoff valve installed and opened and has the inlet water supply pressure been checked to insure a minimum of 1 bar without exceeding a maximum of 5 bar.

7. Have the compressor holddown bolts been checked to be sure the compressor is snug on the mounting pads.

8. Check all refrigerant lines and conduit lines to gard against vibration and possible failure.

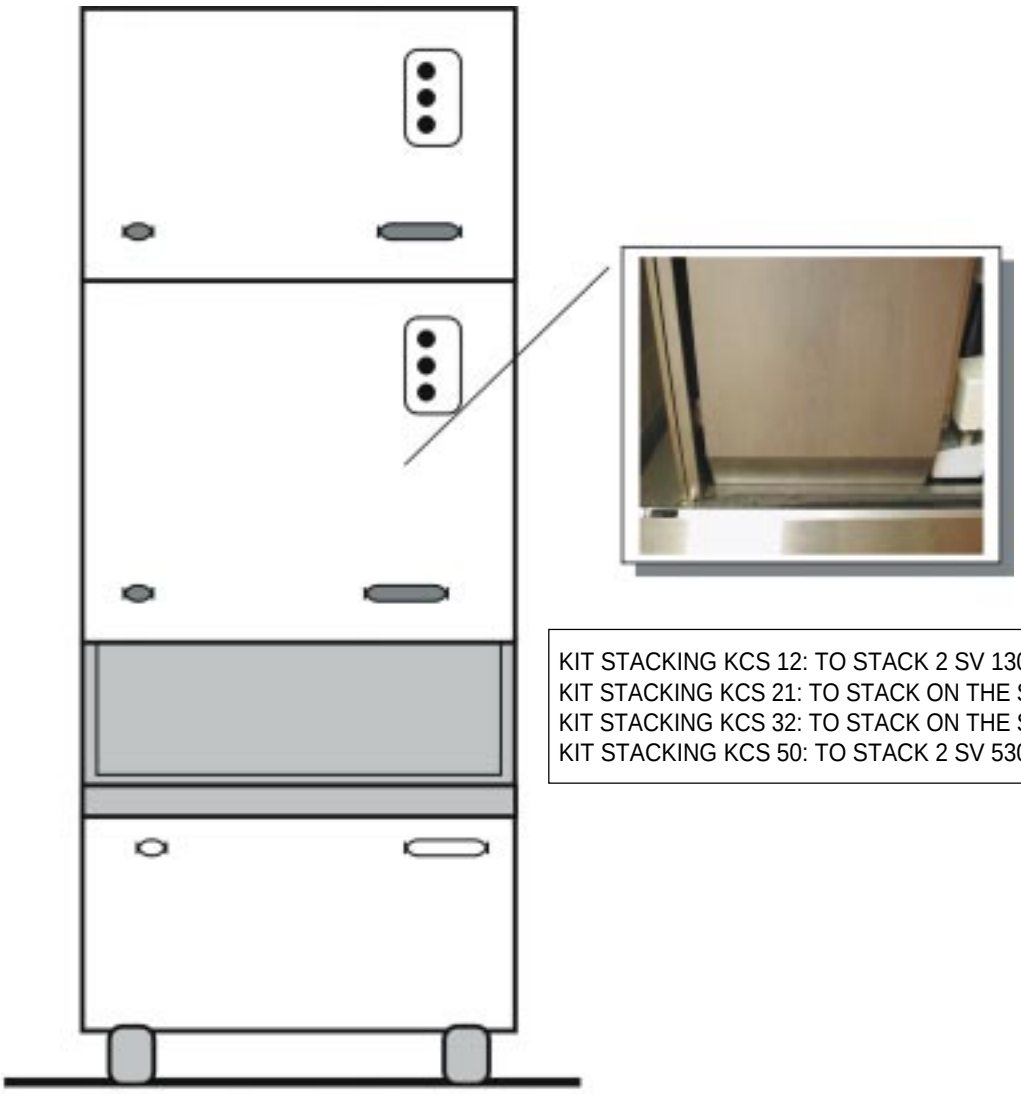
9. Has the cuber and the bin been wiped clean with clean damp cloths?

10. Has the owner/user been given the User Manual and instructed on how to operate the icemaker and the importance of periodic maintenance?

11. Has the owner/user been given the name and telephone number of the Authorized SCOTSMAN Distributor or Service Agency serving him?

12. Has the Manufacturer's Registration Card been properly filled out?
Check for correct Model and Serial Numbers from nameplate, then mail the completed card to the Manufactured.

TYPICAL STACKING INSTALLATION



KIT STACKING KCS 12: TO STACK 2 SV 130's
KIT STACKING KCS 21: TO STACK ON THE SV 210
KIT STACKING KCS 32: TO STACK ON THE SV 310
KIT STACKING KCS 50: TO STACK 2 SV 530's

START-UP

1. START-UP

1. If not yet done remove screws and pull the Front Panel out.

2. Open the water supply line shut-off valve.

> ***NOTE:*** *Observe that the inlet water can be seen flowing into the Sump Assembly.*
> *Allow water to fill the Sump about three minutes until the water is at level.*
> *The float should cause the water flow to stop few mm. from reservoir overflow.*

When the float has been risen from the water filling the Sump Assy, the water has forced all trapped air out of Water Pump and pump tube, thus preventing the pumping of water filled with air bubbles.

3. Put unit under power by moving power line switch to ON position.
Immediately the fourth "LED" will glow and four-five seconds later the third one too together with the compressor.

Check operation of the freezing cycle:

a) **Compressor** is operating.

b) **Fan motor** (in air cooled version) controlled by the condensing temperature sensor located in contact with the condenser copper tube.

c) **Water pump** is operating as seen by water moving through the tygon tube up to the water distributor at the top of evaporator plate, where water is uniformly distributed and cascades down over the egg-crate evaporator back into the Sump for recirculation.

> ***NOTE:*** *The **Water pump** will start up after a minute delay time controlled by the PC Board so to avoid any possibility to such air (cavitation).*

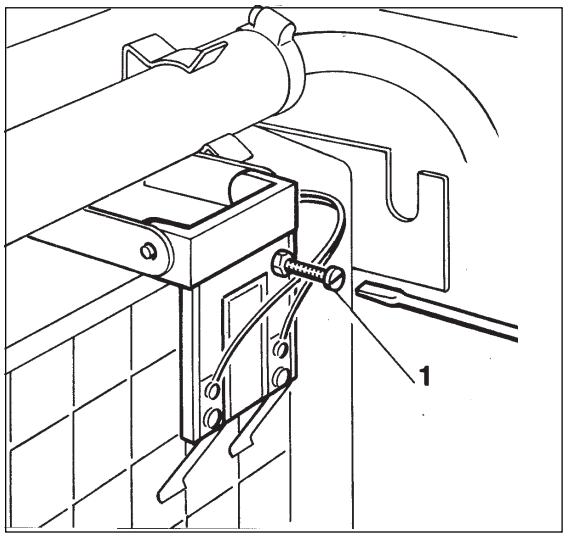
> ***NOTE:*** *Do not remove the evaporator deflector cover as it will cause the switching off of the machine at "STORAGE BIN FULL".*

4. First freezing time will range between 19 and 22 minutes.
Longer time for temperature above 25°C and shorter time required when temperature are below 25°C.
Average complete cycle time is about 22 min.

5. Make sure of correct operation of float valve and water pump.

6. Check for any irregular noise source and if any, eliminate it.

7. Observe first ice cube harvest and check size of ice cubes; if an adjustment is required thread down or out screw N. 1 as shown on below illustration.



This screw position determines the distance between the sensor reeds and the egg-crate evaporator thus keeping the ice cube at a proper thickness.

> ***NOTE:*** *This type of machine produce an "ICE PLATE" that breaks when falls down into the storage bin. Setting the ice thickness sensor in order **to have single ice cubes may cause malfunction of the machine.***

8. Observe second and third cube harvest.
Check if size and shape combination is correct.
In areas where extreme problem water conditions exist, filtering or purifyng equipment is recommended.

> ***NOTE:*** *If water used is too soft, "demineralized" the ice thickness sensor might not be able to sense the water on its reeds, there by it will not switch the unit on harvest cycle.*
> *A safety system built in the P.C. Board switches the unit on harvest cycle whenever the freezing period gets longer then 40'.*

NOTE: *To assure a correct operation of the machine the water must have a* ***minimum electrical conductivity of 20 µs.***

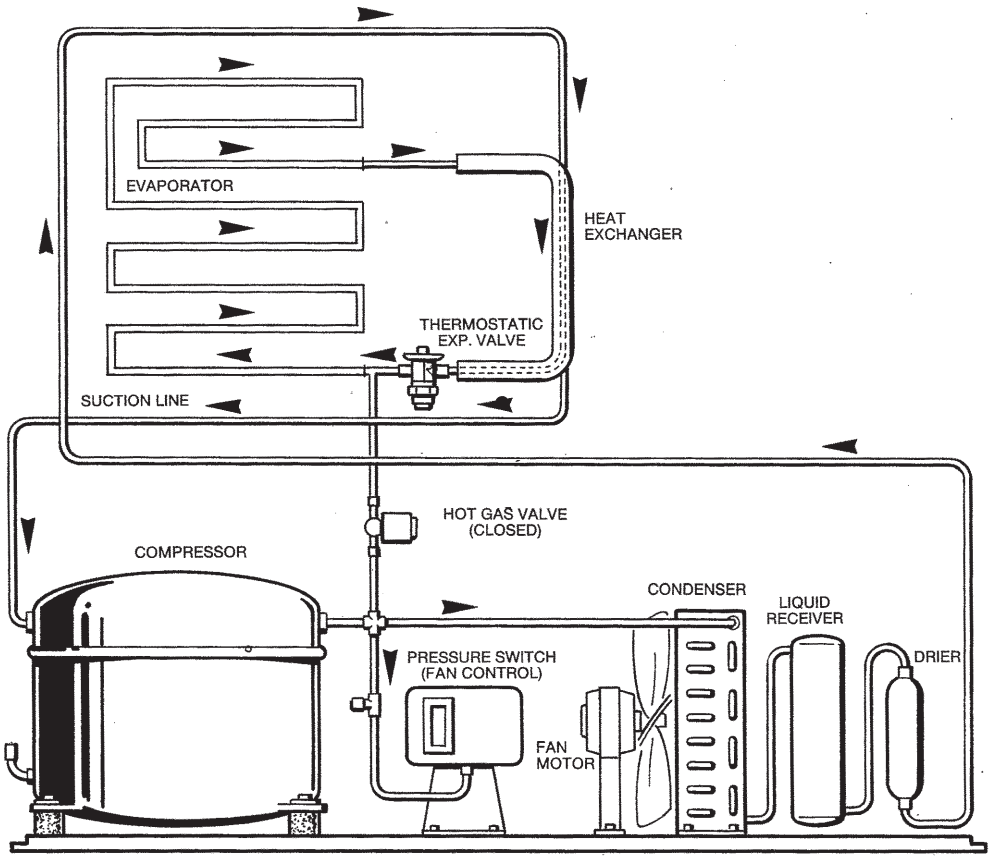
9. Check operation of magnetic switch controlling it by keeping open the bottom end of plastic deflector for more than 30 seconds. The machine must switch off at storage bin full.
Release the plastic deflector. The machine should restart in the freezing cycle mode within few seconds going through a 3' delay time **(green LED blinking).**

10. Place again all cabinet panels and screws previously removed.

11. Thoroughly explain to owner/user the significant specifications of the ice maker start-up, reset and operation, going through the procedures in the operating instructions.
Answer all questions about the ice maker by the owner and inform the owner himseft of the name and telephone number of the authorized service agency serving him.

OPERATION

FREEZE CYCLE



REFRIGERATION SYSTEM SCHEMATIC

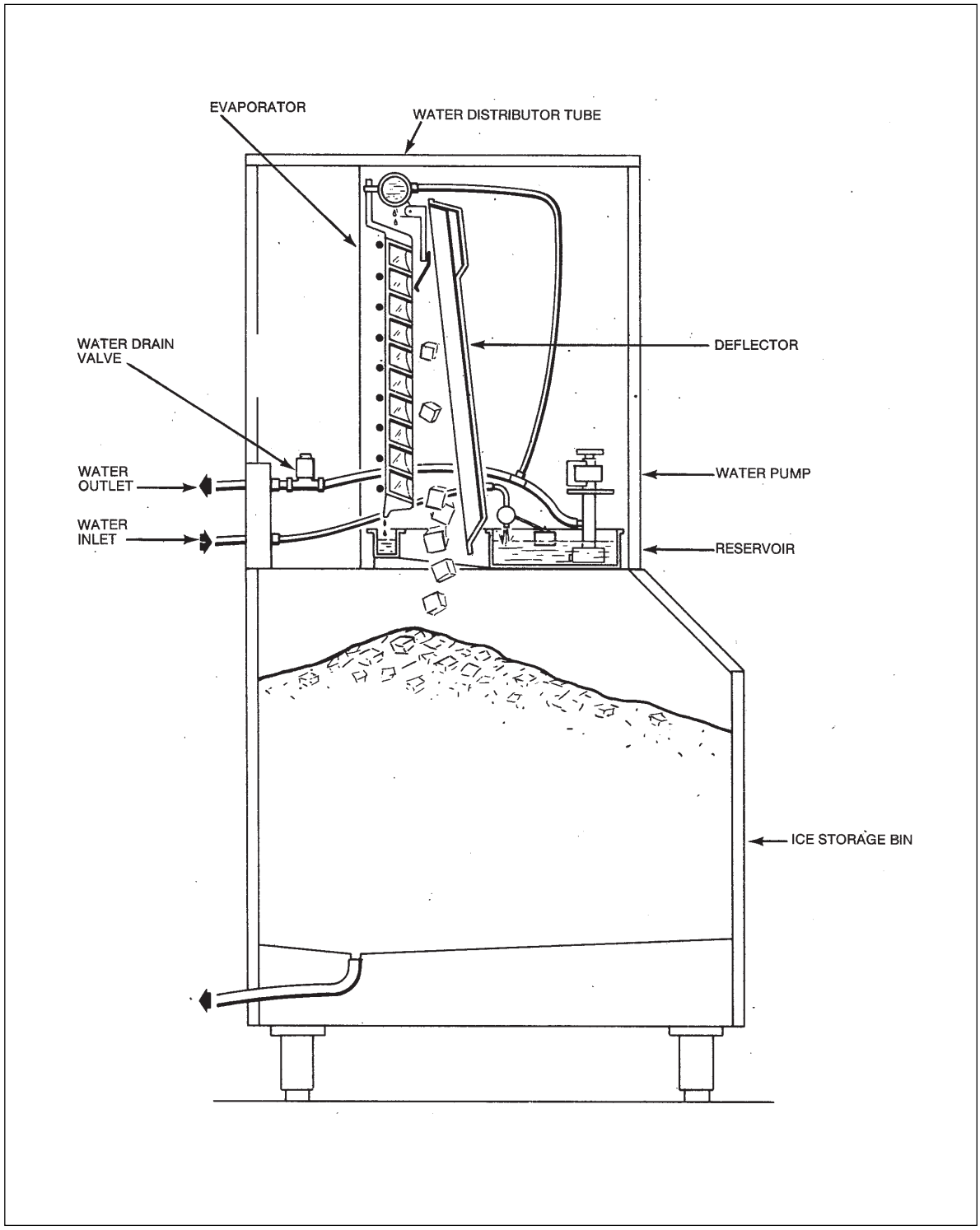
REFRIGERATION DURING FREEZE:

This ice machine employes either air or water as a condensing media, the refrigeration system for either one is a follows:
At the hermetic compressor, Refrigerant is compressed into a high temperature, high pressure gas.
The gas moves through the **discharge** line into the **condenser**, air or water-cooled. If air-cooled, the discharge pressure will change with the heat load and the ambient air temperature.
If water-cooled, the discharge pressure is controlled by the amount of water flowing through the **condenser** - which is determined by the water regulating valve.
After the gas is cooled in the condenser, giving up much of its heat, the gas condenses into a high pressure liquid. This liquid travels through the **liquid line** to the metering device, a **thermostatic expansion valve** on models SV 130-210-310 and two thermostatic expansion valves on model SV 530.
The thermostatic expansion valve meters how much liquid refrigerant is to be allowed into the evaporator section of the refrigeration system.
This is determined by the temperature of the TXV sensing bulb, located on the **suction line** manifold, at the outlet of the **evaporator**.
If the bulb senses a warm suction line, more refrigerant is allowed into the evaporator, (common at the beginning of the freeze cycle) and when the temperature begins to fall, less refrigerant is allowed through.
This is why the suction side gauge pressure will decline throughout the freeze cycle. At the evaporator, the liquid refrigerant released from high pressure, boils off in the low pressure environment and absorbs heat, thus cooling the evaporator surface and anything near it, such as water.
The low pressure refrigerant vapor then is forced through the heat exchanger where any excess liquid refrigerant boils-off, allowing only refrigerant vapor to enter the compressor suction tube, where it is recompressed into high pressure, high temperature gas again and the cycle repeats.

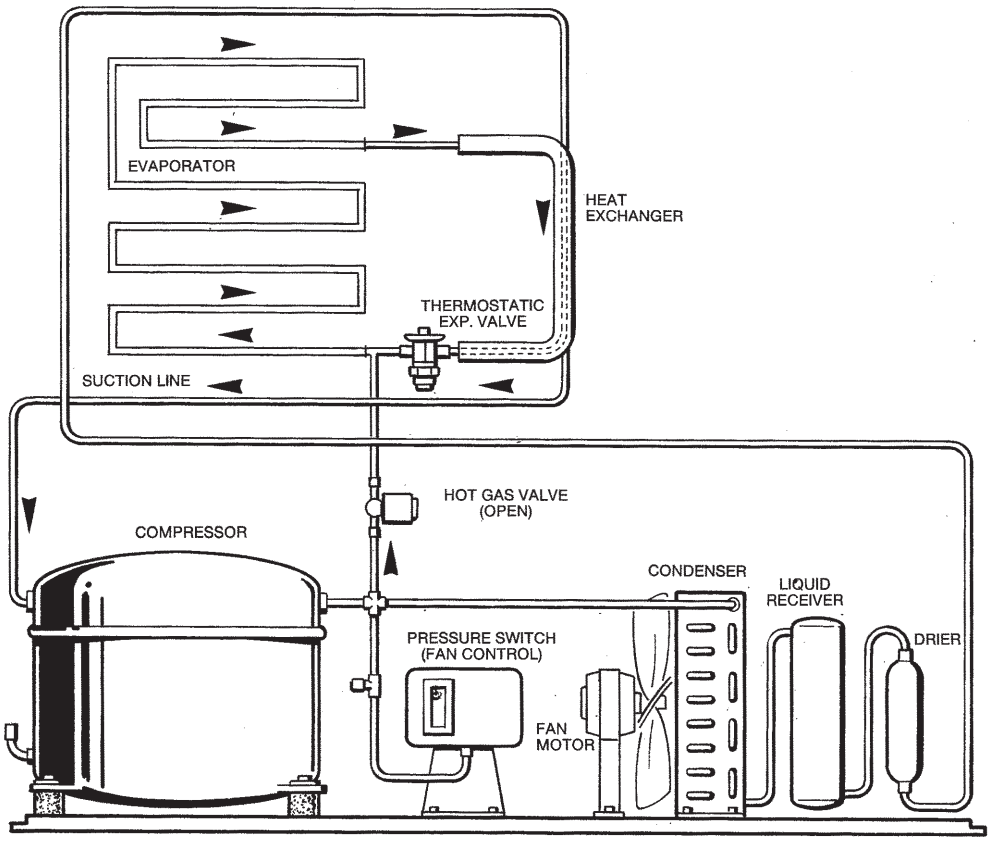
FREEZE CYCLE

WATER SYSTEM

A mechanical float valve is used to control the level of the water into the reservoir/sump.
A pump, running continuously, after the first minute of freezing cycle, forces the water to the top of the evaporators, where it is distributed through a water tube and then cascades down the evaporator surface by gravity. As it flows accross the refrigerated evaporator, some of the water will be chilled enough to change form, turn to ice, and stay frozen onto the evaporator cells. Most of the water returns to the reservoir, to be sucked back into the pump, and repumped over the evaporator.



HARVEST (DEFROST) CYCLE



REFRIGERATION SYSTEM SCHEMATIC

REFRIGERATION SYSTEM DURING HARVEST

The refrigeration system performs the harvest of ice by use of a hot gas bypass valve. When the time comes to de-ice the evaporators, the hot gas valve is energized, and the high temperature, high pressure gas bypasses the condenser, and is allowed directly into the evaporator. The high pressure gas is cooled by the cold evaporator so it condenses into a liquid, giving up its heat as it does so. This heat warms the evaporator and the ice frozen onto the evaporator surface melts, releasing the frozen cubes. Ice then falls by gravity into the storage bin.
The liquid refrigerant goes through the suction line into the heat exchanger where it boils-off so that only refrigerant vapor is drawn into the suction tube of the compressor.

WATER SYSTEM

During the harvest cycle, the electric water drain valve is energized thereby opening the drain line.

All water remained in the reservoir at the end of freezing cycle is pumped-out, to the waste, through the water solenoid and drain line during the first 20 seconds of the defrost cycle eliminating any possible build-up and accumulation of minerals concentration and impurities in the water reservoir.
As the pump stops, the incoming water, passing through the float valve, has still sufficient time, before the beginning of the next start up of the water pump, to properly fill up the sump/reservoir, so that there would not be any cavitation problem when the water pump will resume its operation. This grants a better ice formation inside the cooling cells.
When the released ice cubes drop into the bin, they open-up for a fraction of a seconds the bottom end of plastic deflector.
This deflector swinging motion is enough to reset the contact of the magnetic switch which - via electronic control board - deenergizes the water drain valve allowing the unit to initiate a new freezing cycle.

On model SV 530 the release of the ice plate from the second evaporator will cause the restart of the machine in the freezing cycle.

NOTE: *In case the P.C. Board does not receive the pulse from the second magnetic switch, after 40 second from the first pulse, it will switch the unit from defrost to freezing cycle.*

The harvest cycle lasts about 1.5÷2 minutes.

CONTROL SEQUENCE

At the start of the freezing cycle, the contacts of the magnetic switch mechanically operated by the actuator plate of the deflector cover are closed, thereby - via electronic control board - closing the circuit to the main contactor coil and consequently to the compressor and fan motors and to the water pump motors.
Then, as the ice thickness reaches the value that corresponds to the full cube size, the film of water that constantly cascades over the slab of ice formed on the evaporator, arrives to establish a contact between the two fingers (energised at low voltage) of the ice sensor control, located on the front upper right side of the evaporator. If the contact between the two fingers of the ice sensor remains established - by the film of water - for more than 10 seconds, a small relay of the electronic board, get energized, controlling - simultaneously both the hot gas valve and the water drain valve.

NOTE: *in case of failure of ice level sensor, the P.C. Board turns - on automatically the unit into the defrost cycle when the freezing cycle reaches 40 minutes.*

At this point, the unit initiates the defrost cycle. The hot gas circulating into the evaporator serpentine causes a slight melting of ice cubes which get released from their molds. Once entirely released the ice cubes drop simultaneously into the ice storage bin below; by doing so they move apart from the evaporator bottom end the plastic deflector. This plastic deflector has on its side a magnetic switch that on account of the deflector swinging motion, caused by the ice while dropping in the bin, opens and closes their contacts. This will, in turn, disactivate the relay contacts that controls the hot gas and water drain valve which get deenergized allowing the unit to start a new freezing cycle.

When the ice bin is full of ice, the last batch of ice cubes released from the evaporator accumulates to keep the bottom end of the plastic deflector in open position; with the magnetic switch contacts open for longer than 30'' the entire unit stops.
On model SV 530 in case one or both the ice slabs, released from the evaporator, are maintaining in open position their corresponding deflector for longer than 30 seconds, with the consequent opening of the magnetic switch for the same extension of time, the P.C. Board cause the stopping of the unit operation. This normally occures in the full ice storage bin situation which are signalled by the simoultaneous glowing of the corresponding LED. The machine will restart when the ice deflector will be back in its normal vertical position (both for model SV 530) provided that 3' are elapsed from unit stop. If not the machine will delay its restart till 3' are elapsed with the blinking of the green LED.

SERVICE SPECIFICATION

In servicing a machine, it is often, useful to compare that individual units operating characteristics to those of a normally operating machine. The data that follows gives those characteristics; however, be aware that these values are for NEW, CLEAN machine operating at 21 °C ambient and 15 °C water. USE THESE NUMBERS AS A GUIDELINE ONLY.

COMPONENT

Reservoir level ..... 30÷35 mm

Cube Size Control Ice Sensor - distance from evaporator ..... 5 ÷ 7 mm

High Pressure Safety Switch.
C/IN 20 bar - C/OUT 28 bar

OPERATING CHARACTERISTICS

On air-cooled models during the freezing cycle, the discharge pressure is maintained between two preset values by means of fan control (condenser sensor); and at the same time, the suction pressure will also decline reaching it's lowest point just before harvest. Compressor amps experience a similar drop.
On water-cooled, the discharge pressure is constantly, maintained during the freeze cycle by the water regulating valve. However, suction pressure and compressor amps, will still decline as the machine freezes ice.

Model	Disch. pressure freeze max	Disch. pressure freeze min	Hi press. Cut Out Safety	Suction pressure Beginning freeze	Suction pressure End freeze	Freezing time	Amp. compr. Beginning freeze	Amp. compr. End freeze
SV 130 A	16 bar	14 bar	28 bar	3.1 bar	1.9 bar	20'		
SV 130 W	17 bar	17 bar	28 bar	3.3 bar	2.2 bar	20'		
SV 210 A	15.5 bar	13.5 bar	28 bar	3.5 bar	1.7 bar	20'	5.0 A	4.0 A
SV 210 W	17 bar	17 bar	28 bar	3.0 bar	1.7 bar	20'	5.0 A	4.0 A
SV 310 A	16.5 bar	14.5 bar	28 bar	3.5 bar	1.7 bar	20'	8.0 A	5.5 A
SV 310 W	17 bar	17 bar	28 bar	2.8 bar	1.5 bar	22'	7.0 A	5.5 A
SV 530 A	17.5 bar	15.5 bar	28 bar	3.5 bar	1.6 bar	22'	6.5 A	5.5 A
SV 530 W	17 bar	17 bar	28 bar	28 bar	1.4 bar	22'	6.0 A	5.0 A

Refrigerant charge R 404 A

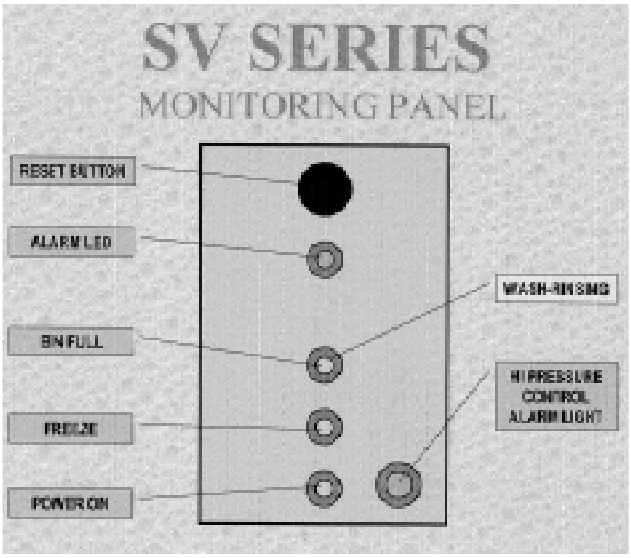
Model	SV 130	SV 210	SV 310	SV 530
Air cooled	700 gr.	1200 gr.	1700 gr.	2000 gr.
Water cooled	650 gr.	650 gr.	700 gr.	1200 gr.

Refrigerant metering device

Thermostatic expansion valve (2 on SV 530).

NOTE: *Always check nameplate on individual icemachine for special refrigerant charge before charging the refrigeration system. Such refrigerant charge is the average charge for the SV Modular Cubers. However it is important to check nameplate for each machine.*

COMPONENT DESCRIPTION



1. **Front Console Panel**

Equipped with four LED plus a warning light that when glow or blink are monitoring:

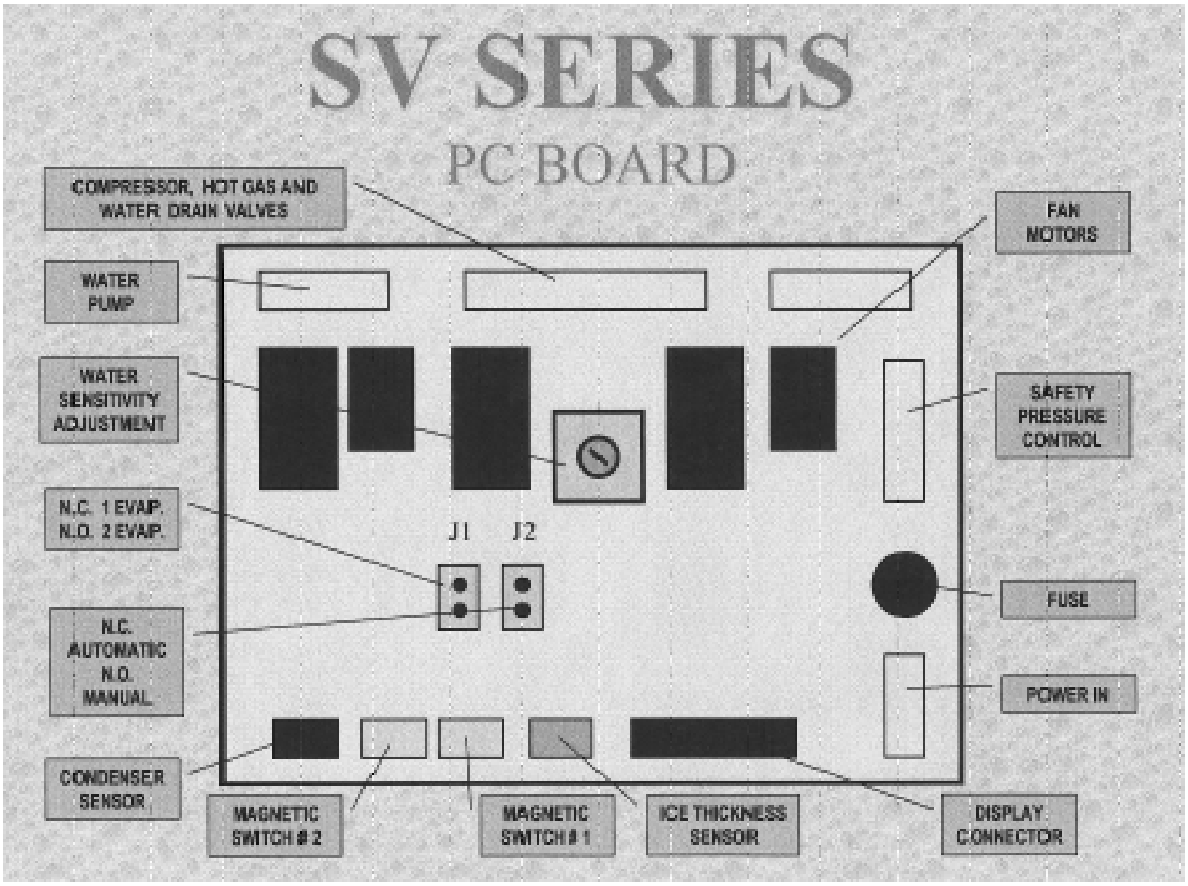
LED N. 1 - RED
GLOW - Machine off. Too long defrost cycle.
BLINK - Too high condensing temperature.
To restart the machine press the reset button.

LED N. 2 - GREEN
GLOW - Bin is full of ice.
BLINK - Cleaning mode.

LED N. 3 - GREEN
GLOW - Compressor is under power.
BLINK - 3' delay/waiting time.

LED N. 4 - GREEN
Power ON.

RED LIGHT - Too high condensing pressure.



2. **P.C. Board**

Located in the control box, this board is the brain of the system as it governs the ice machine cyclematic through sensors, relays and switch. It consists of two separated printed circuits one at high and the other at low voltage integrated with a fuse (4 A), of four connectors for the sensors/ switches (condenser sensor - BLACK -, two magnetic switches - BLUE - ice thickness sensor - RED -), of two jumpers (one J1 for the selection between models SV 130-210-310 - one magnetic switch - and the model SV 530 - two magnetic switches - and the second J2 for the selection between manual or automatic reset mode), of one outlet connector (front LED display - black) and of five plug in terminals for input and output power.
With the two upper pins of the P.C. Board jumped the same is set up in automatic reset mode while when disconnected is in manual reset mode.
With the bottom ones jumped the P.C. Board is set up to operate with one magnetic switch (SV 130-210 -310); when disconnected is set up for two magnetic switches (SV 530).
The P.C. Board is equipped by an electronic safety timer that turns-on automatically the unit to defrost cycle when freezing cycle is longer then 40 minutes and trip-off complete unit when defrost cycle is longer then 3 minutes (Red LED ON).

3. **Compressor Contactor**

Located in the control box, the compressor contactor functions to carry the compressor line current. The contactor is wired to receive power from the P.C. Board.

4. **Ice Thickness Sensor**

Located in the front upper right side off the evaporator, the sensor is made with two metal reeds in which passes power at low voltage. The two metal reeds, which are individually insulated, are set, through a setting screw, to maintain a minimum clearence from the evaporator (5÷7 m/m). Once ice is formed into each mold and is thick enough to fill-up that minimum clearance existing between the two sensor reeds, and the evaporator, the water that cascades over the ice has gradually approached to make contact between the two sensor reeds.
It is enough that this contact remains there for about 10 seconds that the P.C. Board receives the signals to put the ice machine on defrost.

5. **Magnetic Switch**

Located in the front of the evaporator front plastic deflector (one for each side on model SV 530), this switch sends a pulse to the P.C. Board which switches the machine back in the freezing cycle. On model SV 530 after the pulse sent by the second magnetic switch, signalling the dropping into the bin of the second slab of ice, the P.C. Board restarts a new freezing cycle.

> ***NOTE:*** *In case the P.C. Board does not receive the pulse from the second microswitch, after 40 second from the first pulse, it will switch in any case the unit from defrost to freezing cycle.*

6. **Hot Gas Solenoid Valve**

The Hot Gas Solenoid Valve functions only during the Harvest Cycle, to divert the hot discharge gas from the Compressor, bypassing the Condenden-ser and thermostatic expansion valve, for direct flow to the Evaporator Platen Assembly to release ice cubes from the ice cube molds.
The Hot Gas Solenoid Valve is comprised of two parts, the Body & Plunger and the Coil assembles. Installed in the discharge line of the Compressor, the energized solenoid coil lifts the valve stem within the valve body to cause the hot discarge gas to be diverted when the ice Thickness sensor has signalled to the P.C. Board to start the Harvest Cycle.

7. **Condenser temperature sensor**

The condenser temperature sensor probe (located in contact with the condenser tube coil) 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 **65°C (150°F)** the current arriving to the micro processor is such to cause an immediate and total stop of the machine operation with the **blinking of the Red LED.**

8. **High Pressure Control**

The high Pressure Control, a safety control, is factory set to cut-out, at 28 bar and cut-in at 22 bar. The control, functions as a precautionary device to shut OFF electrical power to Icemaker, should a loss of water occur to the water cooled Condenser or a burnt out of one of both the fan motors on air cooled versions. The high Pressure Control is manual reset with reset button located on the rear side of the machine and a monitoring light on the Front Console Panel.

9. **Water Regulator Valve (Water Cooled Models)**

The Water Regulator Valve functions maintain a constant Compressor head pressure, by regulating the amount of incoming water flow through the Condenser, on water-cooled models. The valve operate through the refrigerant system high side pressure. Rotating the adjusting screw located on top of the valve, can INCREASE or DECREASE the water flow through the water-cooled Condenser, which in turn, will DECREASE or INREASE the Compressor operating head pressure.

10. **Water Distribution System**

The Water Distribution System function to eventy supply water to all cells of the evaporator plate. The water pump pumps water from the sump to the tee. From there water is channeled through the vertical tygon tube to the water distributors, above the evaporator plate, and from the holes in the distributor tube water flows to the cells on one side of the evaporator plate.
Gravity flow returns the unfrozen excess portion of water to the sump reservoir for recirculation.

11. **Water Drain Solenoid Valve**

The Water Outlet Solenoid Valve functions in conjunction with the water pump to flush-out the sump assembly at the beginning (first 20") of every harvest cycle. This action cleans-up and rinses the sump during each harvest cycle pre-venting dangerous water minerales concentration.

12. **Thermostatic Expansion Valve (TXV) (2 on model SV 530)**

The Thermostatic Expansion Valve regulates the flow of refrigerant to the evaporator and reduces pressure of liquid refrigerant from condensing pressure to evaporating pressure.

13. **Water pump**

The water pump primes the water from the sump to the water distributor tube/s and through the distributing holes it cascades down onto the evaporator cells by gravity so to be frozen into clear ice cubes. The water pump remains off during the first minute of the freezing cycle (to avoid any cavitation problem) while it's kept running during the first 20" of defrost/harvest cycle to drain out (purge) the remaining water from the sump (reach in mineral salts).

REMOVAL AND REPLACEMENT PROCEDURES

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

WATER PUMP

1. Remove front panel.
2. Remove the control box cover.
3. Unplug pump from P.C. Board.
4. Remove screws holding pump bracket to the right side of freezing compartment.
5. Pull pump forward and lift up.
6. Remove discharge hose from pump outlet.

Reverse to replace.

RESERVOIR

1. Close water valve on water supply line.
2. Remove front panel.
3. Remove evaporator front cover.
4. Remove reservoir drain plug and flush reservoir out.
5. Remove screws securing reservoir.
6. Lift-up and pull forward to remove reservoir.

Reverse to replace.

DISTRIBUTOR/WATER TUBE

1. Remove front panel.
2. Remove evaporator front cover.
3. Locate water distributor at the top of the evaporator.
4. Pull distributor forward to unsnap it from its holdind clamps.
5. Remove hose clamp and water hose.

Reverse to replace.

OUTLET WATER VALVE

1. Remove front and right side panel.
2. Remove fan motor shroud.
3. Unplug water valve.
4. Remove clamp securing outlet tube to valve.
5. Remove hose clamp and hose from inlet fitting.
6. Remove two screws and nuts securing valve to its metal bracket and remove valve.

Reverse to replace.

COMPRESSOR

1. Remove top panel (if possible), front panel, left side service panel and left fan motor shroud.
2. Store refrigerant charge in liquid receiver.
3. Disconnect electrical lines from compressor.
4. Isolate parts to be opened from rest of the system.
5. Remove compressor mounting bolts.

Reverse to reassemble.

CONDENSER - AIR COOLED

1. Remove both side panels and remove screws of condenser bracket.
2. Store most of refrigerant charge in liquid receiver.
3. Isolate parts to be opened from the rest of the system.
4. Cut or unsweat liquid and discharge lines.
5. Unbolt and remove condenser from unit re-ar side.

Reverse to reassemble.

CONDENSER - WATER COOLED

1. Shut-off water.
2. Remove front and left side panels.
3. Store most of refrigerant charge in liquid receiver.
4. Isolate parts to be opened from the rest of the system.
5. Unsweat water and refrigerant lines.
6. Unbolt and remove condenser.

Reverse to reassemble.

HOT GAS VALVE

1. Remove front, right side panel and right fan motor shroud.
2. Unplug hot gas valve.
3. Purge system of refrigerant.
4. Cut or unsweat valve, remove from machine.
5. To replace, heat sinking the valve is **CRITI-CAL**. Wrap the replacement valve in wet rags, and sweat into place. Leave rags on until joints cool.

Reverse steps 3-1 to reassemble.

WARNING - Be sure the electrical power supply circuit breaker and the inlet water supply are OFF, BEFORE starting any of the folloving REMOVAL AND REPLACE-MENT procedures as a precaution to prevent possible personal injury or damage to equipment.

REMOVAL AND REPLACEMENT OF THE DRIER

To remove the drier:

1. Remove front and left side panel.
2. Remove screws and remove left side fan motor shroud.
3. Store most of the refrigerant charge into liquid receiver.
4. Unsolder refrigeration lines at both ends of the drier and remove the drier.

To replace the drier.

CAUTION: If the factory seal is broken on the replacement drier, exposing it to the atmosphere more than a few minutes, the drier will absorb moisture from the atmosphere and lose substantial ability for moisture removal.

1. Remove the factory seals from the replacement drier and install the drier in the refrigerant lines with the arrow positioned in the direction of the refrigerant flow.
2. Solder the drier into the lines, two places, taking precautions to NOT OVERHEAT the drier body, during installation soldering.
3. Purge the system and check for leaks.
4. Throughly evacuate the system to remove moisture and non-condensables.
5. Charge the system with refrigerant, by weight. SEE NAMEPLATE.
6. Replace and attach front and left side panel.

NOTE: *Always install a replacement drier, anytime the sealed refrigeration system is opened. Do not replace the drier until all other repair or replacement has been completed.*

REMOVAL AND REPLACEMENT OF THE EVAPORATOR PLATE ASSEMBLY

1. Remove front and top panels.
2. Store refrigerant charge in liquid receiver and isolate parts to be opened from the rest of the systems.
3. Disconnect water distributor tube above the evaporator plate and remove it.
4. Unsnap and remove evaporator cover deflector.
5. Unloose and remove all screws securing the evaporator frame to the chassis.
6. Unsolder and remove the refrigerant lines at the top of the evaporator plate to be replaced.
7. Remove nuts at top and left and right side of the evaporator to remove top and side trimming that make the frame of the evaporator plate. The evaporator plate is now free.

To replace the evaporator plate, reverse the removal procedures. See nameplate. Weight in proper charge of R 404 A in liquid phase.

WATER REGULATING VALVE (WATER COOLED)

1. Shut off water.
2. Remove front and right side panel.
3. Unscrew water inlet fitting connection at the water regulator valve to condenser bracket.
4. Purge system of refrigerant.
5. Unscrew fitting connection at outlet of valve.
6. Unweld valve connection from "T" joint on system liquid line.
7. Remove valve from machine.

Reverse to reassemble.

THERMOSTATIC EXPANSION VALVE

1. Remove front and top and right side panels.
2. Purge system of refrigerant.
3. Unweld valve at inlet, equalizer, and outlet.
4. Remove insulation from valve bulb, remove mouting straps and valve from cabinet.
5. Place new valve bulb in same place as old valve, secure with straps, and reinsulate.

Reverse to reassemble.

NOTE: *Always install a replacement drier, anytime the sealed refrigeration system is opened. Do not replace the drier until all other repair or replacement has been completed.*
Throughly evacuate the system to remove moisture and non-condensables.

FAN MOTOR OR BLADE (LEFT AND RIGHT SIDE)

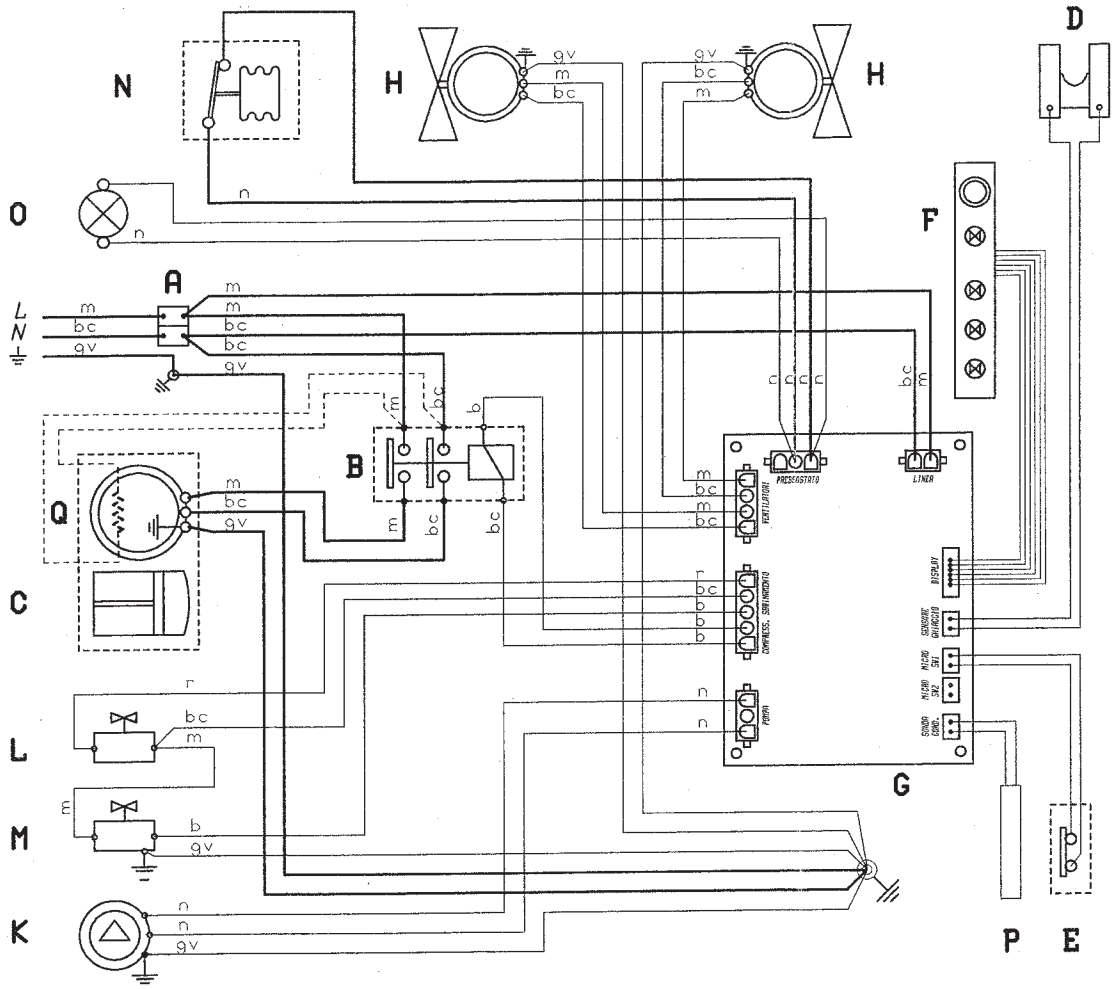
1. Remove top and left or right side service panels.
2. Remove screws and fan motor shroud.
3. Unplug fan motor to be removed.
4. Remove fan motor bracket from upper tie rod of unit chassis.
5. Remove fan blade from motor. Note location on motor shaft, and hub position.
6. To replace fan motor also, remove it from bracket.

Reverse to reassemble.

NOTE: *When replacing a refrigeration component, the exact refrigerant charge must be* ***weighed*** *or metered into a completely evacuated system, because the SV is a* ***critically*** *charged system.*

SV 130-210-310-530 - WIRING DIAGRAM
220 V. 50 Hz. 1 ph.

m = brown
bc = light blue
gv = yellow green
b = white
n = black
r = red



A - Input terminal board
B - Compressor contactor
C - Compressor
D - Ice sensor
E - End defrosting switch (two on MV 50)
F - Led card
G - Electronic card
H - Fan motor (one on MV 12 and MV 50)
K - Water pump
L - Water dischargue electrovalve
M - Gas electrovalve
N - Max pressure switch
O - Max pressure switch signal
P - Condenser temperature probe
Q - Heating resistance of carter compr. (where used)

SERVICE DIAGNOSIS

The table below is intended as a quick reference to aid the Service Agent in determining the cause of a particular type of malfunction, as well as the recommended repair. It is not intended to be can exclusive list.

Reference to other portions of this manual, inclusing wiring diagrams, installation, and operation are recommended to better determine the cause of a problem.

SYMPTOM	POSSIBLE CAUSE	CORRECTION
Machine does not run. Warning Red LED ON	Defrost or harvest cycle too long (more then 3')	Check for hot gas valve failure, for malfunction of water pump, for shortage of water, for malfaction of magnetic switch, for proper operation of compressor contactor and for compressor operation.
Warning Red LED BLINKS	Too high condensing temperature	Check for correct operation of fan motor/s and condenser sensor.
Warning Red LIGHT ON	Too high condensing pressure	Check for correct operation of fan motor/s.
No warning LED/LIGHT ON	P.C. Board inoperative.	Remove board and check.
	No power to unit.	Check electrical source.
Bin full Yellow LED ON	Bin Full of ice.	Nome.
	Magnetic switch inoperative.	Check and replace.
Machine runs, compressor does not.	P.C. Board compressor relay open.	Test and replace.
	Compressor contactor open.	Test and replace.
	Compressor relay open.	Test and replace.
	Compressor winding open.	Test and replace.
Machine runs, makes ice, does not try to harvest.	Ice thickness control open.	Check sensor fingers if are not covered with scale sediment.
	Too soft water.	Water electrical conductivity must be higher then 20 µS. Machine can't run with demineralized water.
	Built-in relay on PE.C. Board open.	Check and replace P.C. Board.
Machine runs, makes and harvests ice. but very slowly.	Low refrigerant charge.	Check system for correct refr. charge. Check for leak weight in charge.

SERVICE DIAGNOSIS

SYMPTOM	POSSIBLE CAUSE	CORRECTION
Low ice capacity.	High discharge pressure due to not-condensable or overcharge.	Evacuate and weigh in charge.
	Inefficient compressor.	Replace.
	Condenser dirty.	Clean.
	Low water flow (Water-cooled).	Check and repair.
	High air temperature (air-cooled).	Check temperature of air entering condenser.
Machine makes irregular ice.	Low water supply.	Check Float valve not mantaining proper water level in reservoir.
	Plugged water distributor.	Clean water distributor.
	TXV supertheat wrong.	Adjust or replace.
	Refrigerant charge low.	Adjust-check for leak. recharge.

MAINTENANCE & CLEANING & SANITATION INSTRUCTIONS

A SCOTSMAN Ice System represent a sizable investment of time and money in any company's business. In order to receive the best return for that investment, in MUST receive periodic maintenance.
It is the USER'S RESPONSIBILITY to see that preferable, and less costly in the long run, to avoid possible down time by keeping it clean, adjusting it as needed and by replacing worn parts before they can cause failure. The following is a list of recommended maintenance that will help keep your machine running with a minimum of problems.
Maintenance and Cleaning should be scheduled at a MINIMUM of twice per year while sanitation once per month.

ICEMAKER

THE FOLLOWING MAINTENANCE SHOULD BE SCHEDULED AT LEAST TWO TIMES PER YEAR ON THIS ICEMAKER. CALL YOUR AUTHORIZED SCOTSMAN SERVICE AGENCY.

1. Check and clean or service any optional water treatment devices, if any installed.

2. Clean water strainer.

3. Check that the cabinet is level, in the side-to-side and front-to-back directions.

4. Clean/Sanitise the water system, evaporator plate and sump assembly, using a solution ot Ice Machine Cleaner/Sanitiser. Refer to CLEANING - Icemaker.

> ***NOTE:*** *Cleaning/Sanitising requirements vary according to local water conditions and individual user operation.*
> *Continuous check of the clarity of ice cubes and visual inspection of the water system parts, evaporator plates and the sump assembly before and after cleaning will indicate frequency and procedure to be followed in local areas.*

5. Check and tighten all bolts and screws.

6. Check for water leaks and make corrections.

7. Check the bin control to test shut-off.
Holding the evaporator deflector in open Position for more that 30", should cause the ice maker to shut-off.
Once the evaporator deflector is released in its closed position, the ice maker will restart.

8. Check cube size, adjust if required through setting screw of ice thickness control sensor.

9. With unit out of operation, clean the condenser using vacuum, cleaner, wisk broom or brush.
Instruct customer to clean condenser frequently DO NOT USE A WIRE BRUSH.

ICE STORAGE BIN

The interior liner of the bin is in contact with a food product, ice, and should be cleaned and sanitised regularly. Once a week sanitise it with a commercial food grade sanitiser compling with the manufacturer dilution.

CABINET EXTERIOR

Wipe up unit and bin cabinet exterior with a clean cloth or disposable paper wipers, soaked in warm water with mild detergent solution.

CLEANING - Ice maker

> **WARNING - 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 sxternal contact, flush with water. KEEP OUT OF THE REACH OF CHILDREN.**

1. Empty bin of ice.

2. Remove front panel.

3. Wait till the end of the defrost/harvest cycle then push the RESET BUTTON for 6-8 seconds. The machine should stop with the blinking of the Yellow LED (slow blink).

4. Pour 100 cc on SV 130, 200 cc on SV 210-310 and 400 cc on SV 530 of Scotsman Ice Machine Cleaner directly into the reservoir then push again the **RESET BUTTON** for a while. The water pump starts to operate with the fast blinking of the Yellow LED.

> ***NOTE:*** *The P.C. Board will keep the machine in Cleaning mode for 30 minutes. In case too long the cleaning mode can be stopped by pushing again the* ***RESET BUTTON****.*

5. After 20 minutes push the RESET BUTTON for a while. The P.C. Board put the machine in automatic rinsing mode with the special blinking (blink twice and repeat) of the Yellow LED.

NOTE: *RINSING mode consists of:*
a) energize the water drain valve and the water pump for 30 seconds to empty the reservoir
b) deenergize the water drain valve and the water pump for 1 minute
c) energize the water pump for 3 minutes.

The above sequence is repeted 7 times so to be sure to have removed any possible trace of Ice Machine Cleaner.

6. At the end of the 7th Rinsing cycle the P.C. Board stops the operation of the machine with the blinking (slow) of the Yellow LED.

7. Pushing the RESET BUTTON for 6-8 seconds the machine restarts in the freezing cycle.

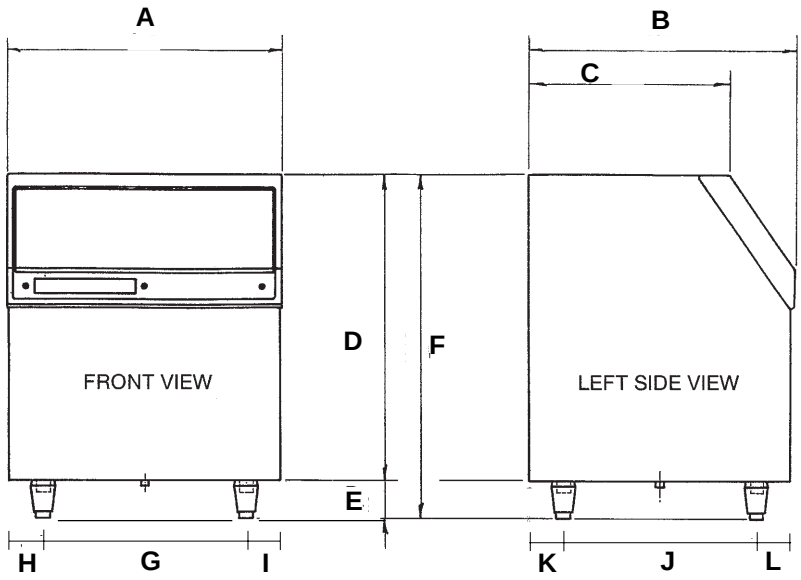
8. Replace the evaporator cover deflector and front panel.

9. Check the next batch of cubes to be sure all the cleaner is gone (no sour taste).

CAUTION - DO NOT use ice cubes produced from the cleaning solution. Be sure none remains in the bin.

10. Pour hot water into the storage bin melt the cubes, and to also clean the bin drain.

R 80 - R 150 - R 250 - BIN



	A	B	C	D	E	F	G	H	I	J	K	L
R 80	565	795	605	900	110	1010	435	65	65	560	110	110
R 150	805	795	600	900	110	1010	600	100	100	620	80	80
R 250	1075	785	550	820	110	980	877	97	97	582	96	96

DIMENSIONS ARE IN MILLIMETERS

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