



ICE MAKERS  
FABBRICATORE DI  
GHIACCIO A CUBETTI  
MACHINE À GLACE  
EN CUBES  
EISWÜRFELBEREITER  
(Würfelform)

104322     **B20**

104337     **B40**

104347     **B45**

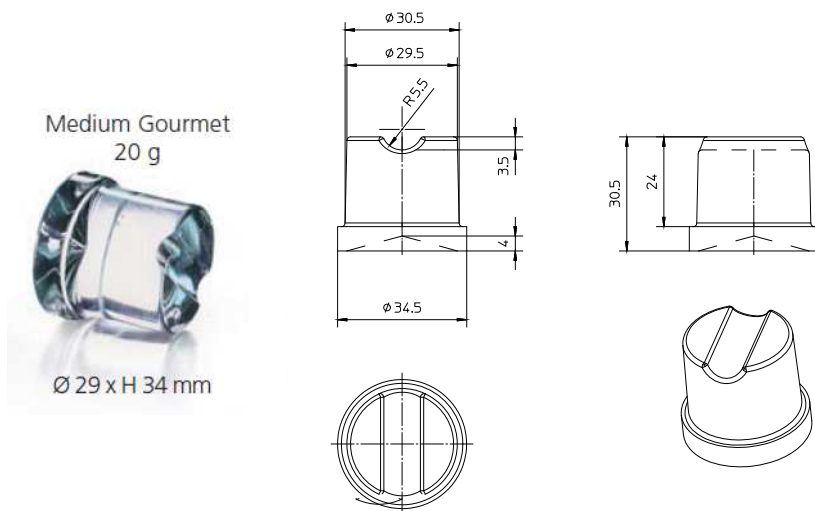
104382     **B75**

104392     **B90**

INSTRUCTION MANUAL  
LIBRETTO ISTRUZIONE  
MANUEL DE ISTRUCTION  
BETRIEBSHANDBUCH

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# Serie B - Würfelform



MODELL

B20

B40

B45

B75

B90



## Eiswürfel Programm

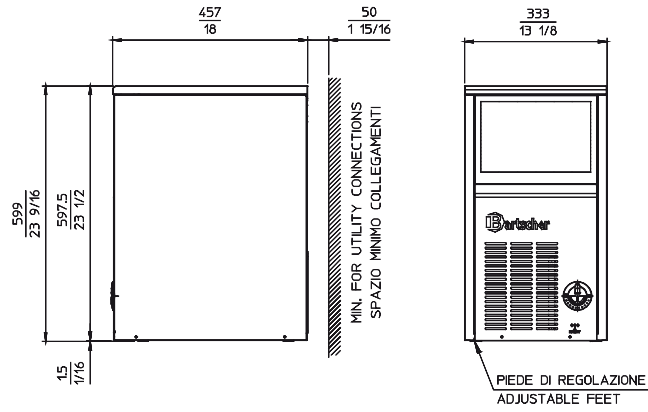
	15	24	32	44	56
Eisproduktion (10°C / 10°C)	20 kg	39 kg	46 kg	75 kg	88 kg
Eisproduktion (21°C / 15°C)	17 kg	35 kg	44 kg	70 kg	80 kg

## Abmessungen

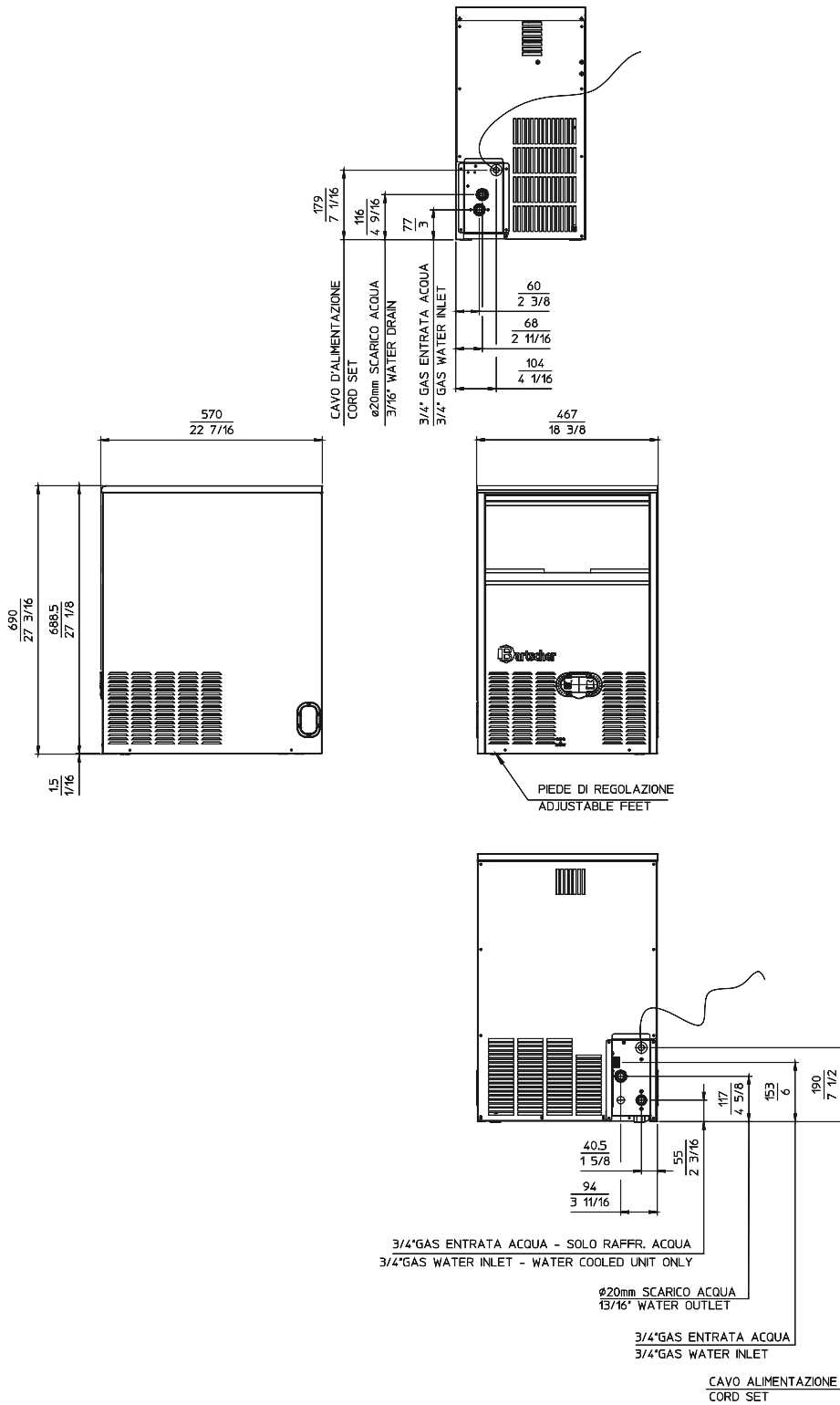
Externe Breite	333 mm	467 mm	467 mm	535 mm	700 mm
Externe Höhe mit Füße(ohne Füße)	(599) mm	(690) mm	912(790) mm	1033(910) mm	1022(900) mm
Tiefe	457 mm	570 mm	570 mm	600 mm	600 mm
Vorratsbehälter	6 kg	15 kg	22 kg	40 kg	40 kg
Netto Gewicht / Brutto	28 kg / 33 kg	35 kg / 41 kg	38 kg / 44 kg	45 kg / 53 kg	56 kg / 65 kg
Verpackungsabmessungen BxTxH (mm)	400x530x690	540x640x800	540x640x900	610x680x1080	770x680x990
Kältemittel	R134a	R404a	R404a	R404a	R404a

# Abmessungen

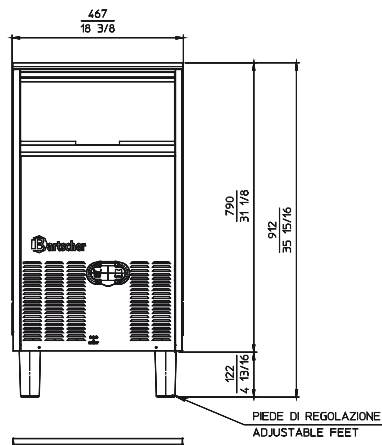
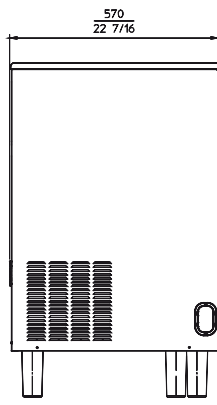
## B20



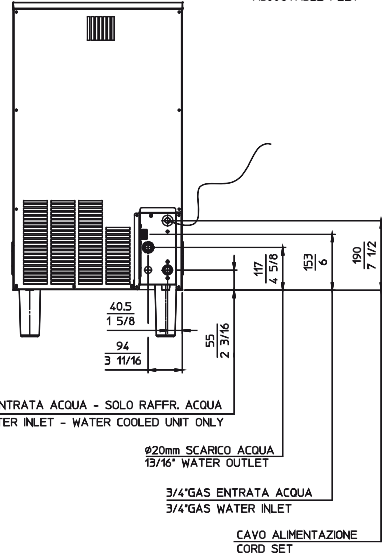
## B40



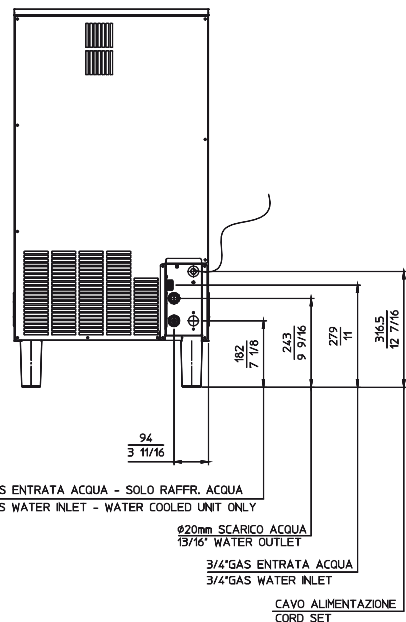
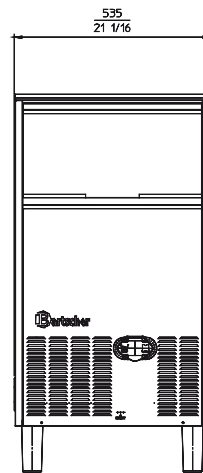
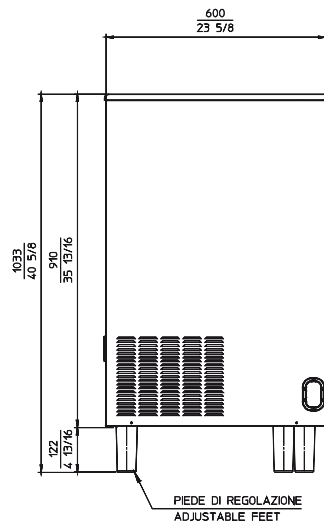
# B45



# Abmessungen



# B75



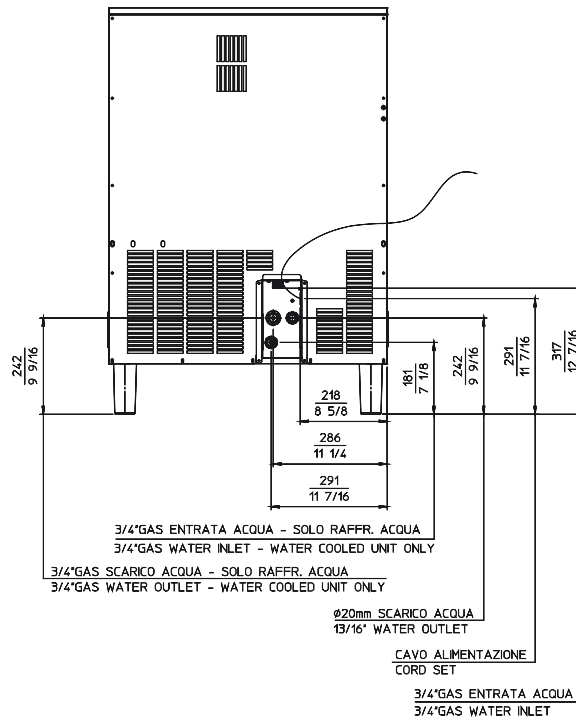
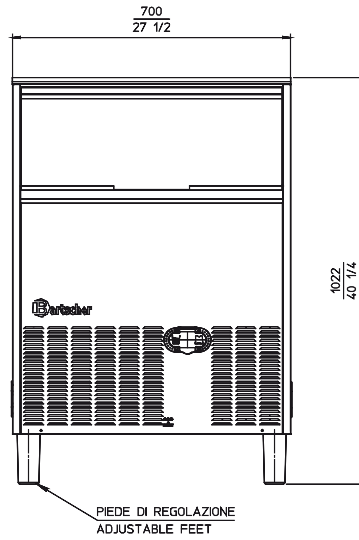
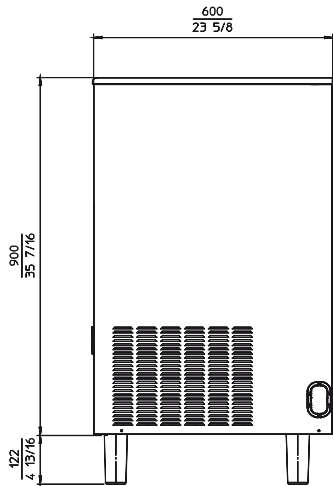


FIG. A

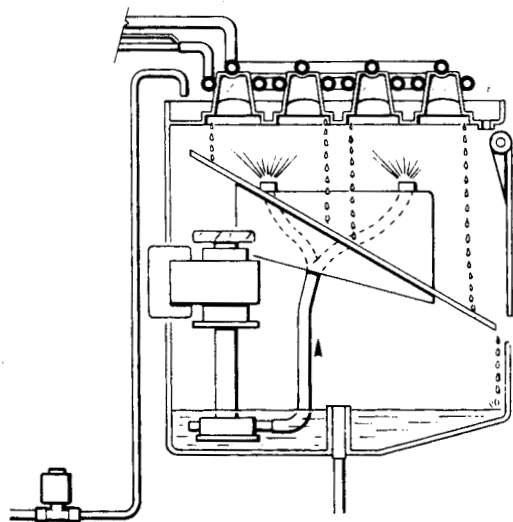


FIG. B

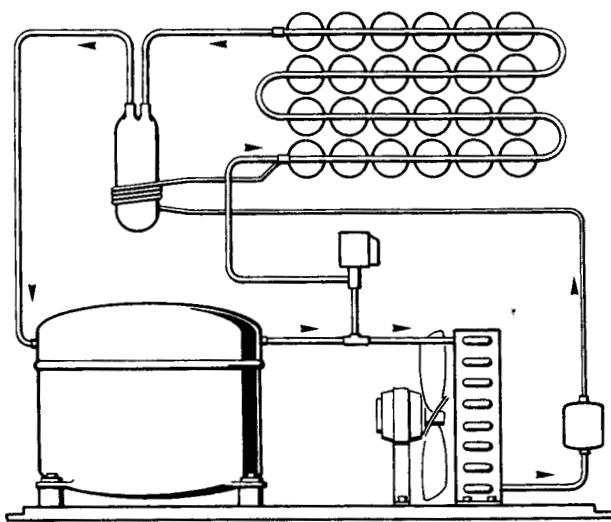


FIG. C

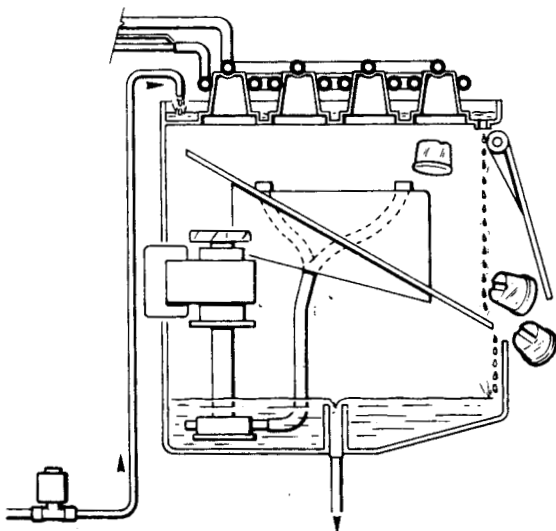
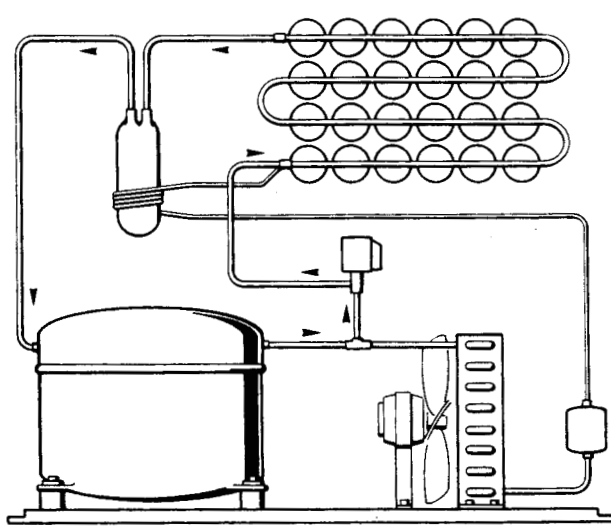


FIG. D



TECHNICAL SPECIFICATIONS - SPECIFICHE TECNICHE - DONNÉES TECHNIQUE - TECHNISCHE ANGABEN

	<b>B 20</b>		<b>B 40</b>		<b>B 45</b>		<b>B 75</b>		<b>B 90</b>	
Voltage	230/50/1		230/50/1		230/50/1		230/50/1		230/50/1	
Tension	-10 / +10%		-10 / +10%		-10 / +10%		-10 / +10%		-10 / +10%	
Tension	-10 / +10%		-10 / +10%		-10 / +10%		-10 / +10%		-10 / +10%	
Spannung	-10 / +10%		-10 / +10%		-10 / +10%		-10 / +10%		-10 / +10%	
Condensation	Air	Water	Air	Water	Air	Water	Air	Water	Air	Water
Condensazione										
Condensation										
Kühlung										
Bin capacity (kg)	6		15		22		39		39	
Capacità contenitore (kg)	6		15		22		39		39	
Capacité bac glaçons (kg)	6		15		22		39		39	
Lademenge (kg)	6		15		22		39		39	
Cubes per cycle	15		24		32		44		56	
Cubetti per ciclo	15		24		32		44		56	
Glaçons par cycle	15		24		32		44		56	
Würfel per Zyklus	15		24		32		44		56	
Running amps	1,9		2,7		2,7		4,3		4,3	
Amperaggio di marcia	1,9		2,7		2,7		4,3		4,3	
Amperage en marche	1,9		2,7		2,7		4,3		4,3	
Ampere	1,9		2,7		2,7		4,3		4,3	
Starting amps	9,7		15,5		15,5		19,4		19,4	
Amperaggio avviamento	9,7		15,5		15,5		19,4		19,4	
Amperage de démarrage	9,7		15,5		15,5		19,4		19,4	
Start Ampere	9,7		15,5		15,5		19,4		19,4	
Power - Watt	280		410		550		690		860	
Potenza - Watt	280		410		550		690		860	
Puissance - Watt	280		410		550		690		860	
Leistung - Watt	280		410		550		690		860	
Power cons. in 24 hrs - Kwh	6,5		9,3		9,9		14,6		15,8	
Consumo elettr. in 24 ore - Kwh	6,5		9,3		9,9		14,6		15,8	
Cons. electr. en 24 hrs - Kwh	6,5		9,3		9,9		14,6		15,8	
Stromverbrauch in 24 Std. - kWh	6,5		9,3		9,9		14,6		15,8	
Water consumption - l/hr	3		5		6		8,5		8,5	
Consumo acqua - l/ora	3		5		6		8,5		8,5	
Consommation eau - l/hr	3		5		6		8,5		8,5	
Wasserverbrauch - l/hr	3		5		6		8,5		8,5	
Wire size - mmq	3 x 1,5		3 x 1,5		3 x 1,5		3 x 1,5		3 x 1,5	
Sezione cavi - mmq	3 x 1,5		3 x 1,5		3 x 1,5		3 x 1,5		3 x 1,5	
Section fils - mmq	3 x 1,5		3 x 1,5		3 x 1,5		3 x 1,5		3 x 1,5	
Kabelstärke - mmq	3 x 1,5		3 x 1,5		3 x 1,5		3 x 1,5		3 x 1,5	
Refrigerant metering device	Capillary tube		Capillary tube		Capillary tube		Capillary tube		Capillary tube	
Disp. espansione refrigerante	Capillary tube		Capillary tube		Capillary tube		Capillary tube		Capillary tube	
Détente du Réfrigérant	Capillary tube		Capillary tube		Capillary tube		Capillary tube		Capillary tube	
Kühlmittel - Expansionsystem	Capillary tube		Capillary tube		Capillary tube		Capillary tube		Capillary tube	



**TECHNICAL SPECIFICATIONS - SPECIFICHE TECNICHE - DONNÉES TECHNIQUE - TECHNISCHE ANGABEN**

	<b>B 20</b>	<b>B 40</b>	<b>B 45</b>	<b>B 75</b>	<b>B 90</b>
Refrigerant Refrigerante Refrigerant Kühlmittel	R134A	R404A	R404A	R404A	R404A
Refrig. charge - gr Carica refrig. - gr Charge refrig. - gr Kühlmittel - Füll. - gr	190	160	210	250	260
Hi.pressure - Freezing cycle - bar Press. mandata - ciclo congel. - bar Haute pression cycle congel. - bar Hochdruckbereich - Gefrierfase - bar	7-11*	7-10#	13-18*	14-21,5*	11-17#
Suction pressure - End freezing cycle - bar Press. aspiraz. - Fine ciclo cong. - bar Bas pression - Fin cycle congel. - bar Niederdruckbereich - Gefrierfase - bar	0-0,1	1,2	1,3	1,1	1,4
				13-17,5*	17#
				350	310
				340	320
				13,5-16,5*	15#

\*) 21°C - Room Temperature - Temperatura ambiente - Temperature ambiente -

#) 15°C - Water inlet temperature - Temperatura entrata acqua - Temperature arrivé eau

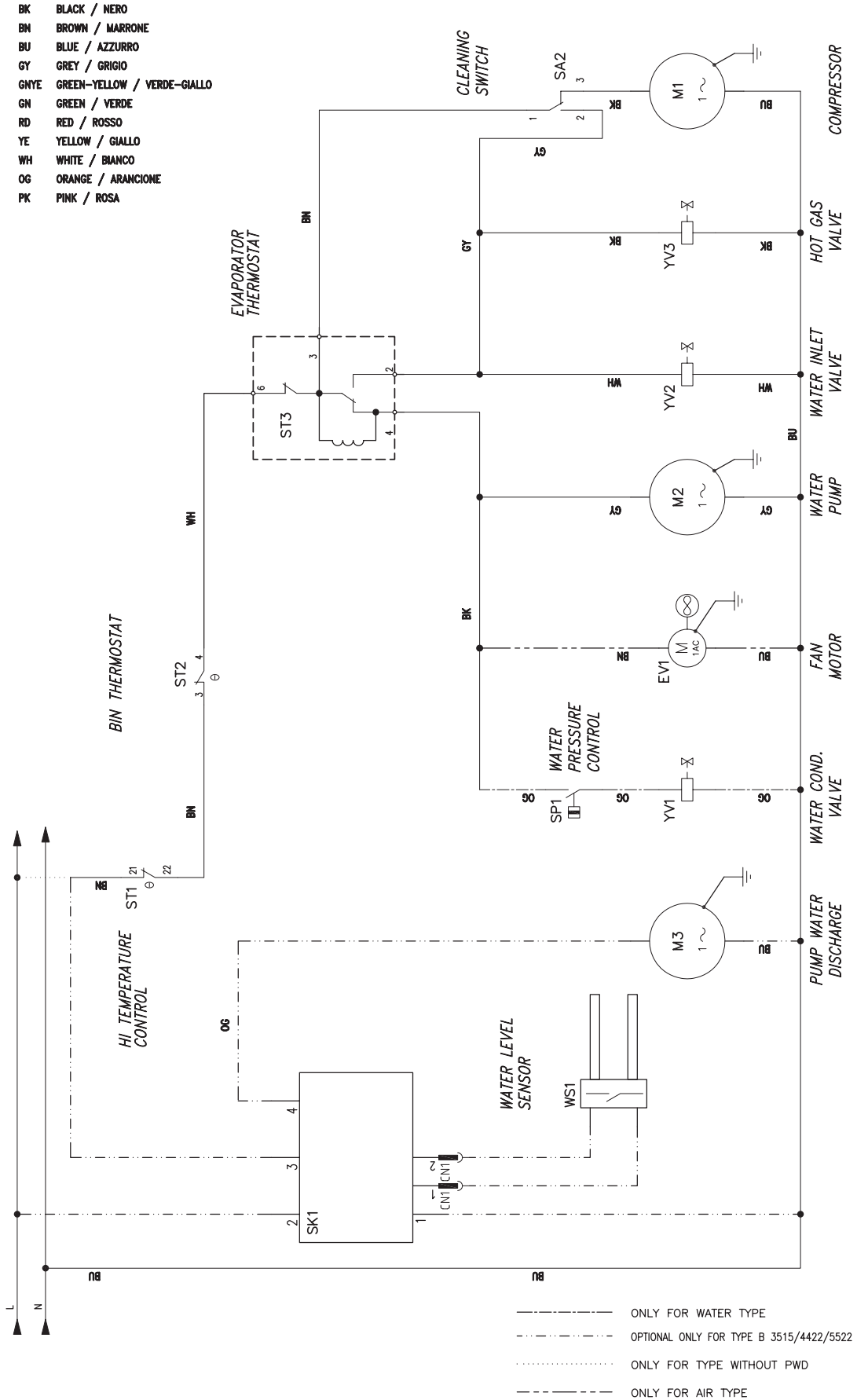
# B20 - B 40 - B 45

f)

WIRING DIAGRAM - SCHEMA ELETTRICO - SCHÉMA ÉLECTRIQUE - SCHALTUNGSSCHEMA

AIR & WATER COOLED - RAFFREDDAMENTO AD ARIA ED AD ACQUA.  
REFROIDISSEMENT A AIR ET A EAU - LUFT- UND WASSERGEKÜHLT

230/50-60/1

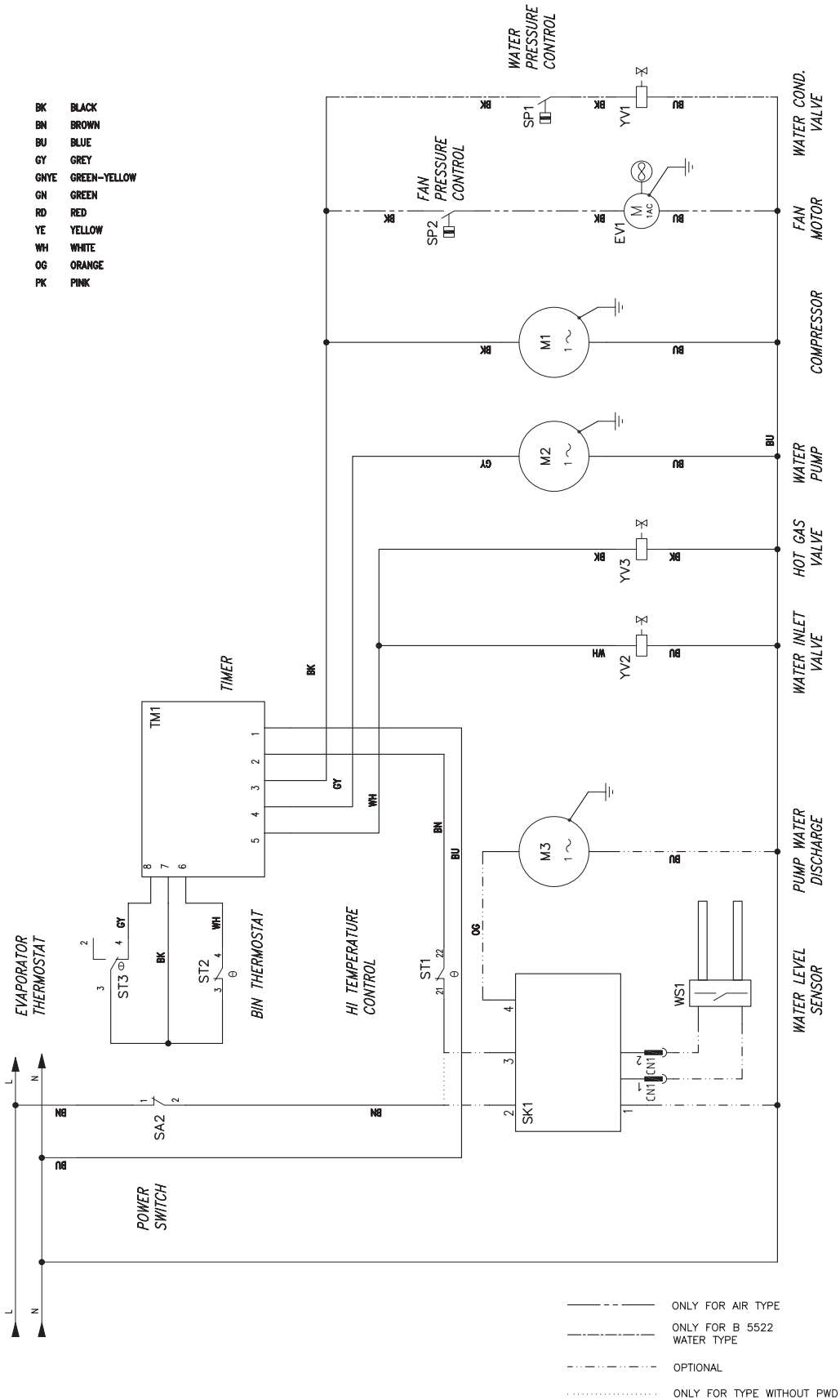























**B 75 - B 90**

WIRING DIAGRAM - SCHEMA ELETTRICO - SCHÉMA ÉLECTRIQUE - SCHALTUNGSSCHEMA

**ELECTRONIC TIMER VERSION - VERSIONE CON TIMER ELETTRONICO**

230/50-60/1

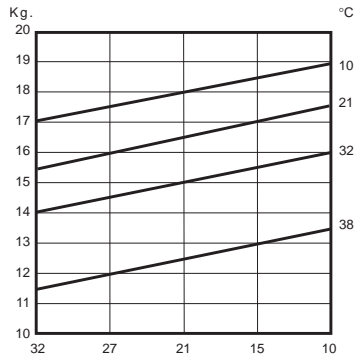


Sim.\Sym.	Sigla \Item	Funzione \Use Type	Sim.\Sym.	Sigla \Item	Funzione \Use Type	Sim.\Sym.	Sigla \Item	Funzione \Use Type
	EV1	Fan motor Ventilatore		TM1	Electronic timer Timer elettronico			
	M1	Compressor Compressore		WS1	Water level sensor Sensore livello acqua			
	M2	Water pump Pompa acqua		YV1	Water condenser valve Elettrovalvola condensatore acqua			
	M3	Pump water discharge Pompa scarico acqua		YV2	Water Inlet valve Elettrovalvola ingresso acqua			
	SA2	Power switch Interruttore generale		YV3	Hot gas valve Elettrovalvola gas caldo			
	SK1	PWC control board Scheda controllo PWC						
	SP1	Pressure water control Pressostato acqua						
	SP2	Fan pressure control Pressostato ventilatore						
	ST1	HI Temperature control Controllo alta temperatura						
	ST2	Bin thermostat Termostato magazzino						
	ST3	Evaporator thermostat Termostato evaporatore						

# Capacità di produzione - Ice making capacity - Capacité de production - Eisproduktionskapazität

PRODUZIONE GHIACCIO PER 24 ORE - ICE PRODUCED PER 24 HRS.  
 PRODUCTION DE GLACE PAR 24 HEURES - EISWURFELPRODUKTION IN 24 STD.

RAFFREDDAMENTO AD ARIA - AIR COOLED MODELS  
 CONDENSATION PAR AIR - LUFTKÜHLUNG



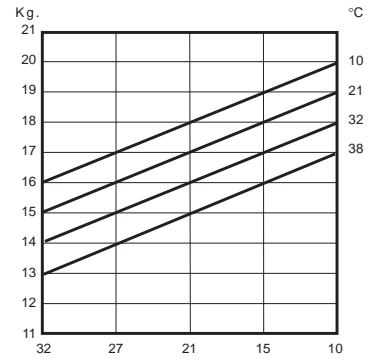
TEMPERATURA ACQUA - WATER TEMPERATURE  
 TEMPÉRATURE DE L'EAU - WASSERTEMPERATUR

TEMPERATURA AMBIENTE - AMBIENT TEMPERATURE  
 TEMPÉRATURE AMBIANT - RAUMTEMPERATUR

**B 20**

PRODUZIONE GHIACCIO PER 24 ORE - ICE PRODUCED PER 24 HRS.  
 PRODUCTION DE GLACE PAR 24 HEURES - EISWURFELPRODUKTION IN 24 STD.

RAFFREDDAMENTO AD ACQUA - WATER COOLED MODELS  
 CONDENSATION PAR EAU - WASSERKÜHLUNG

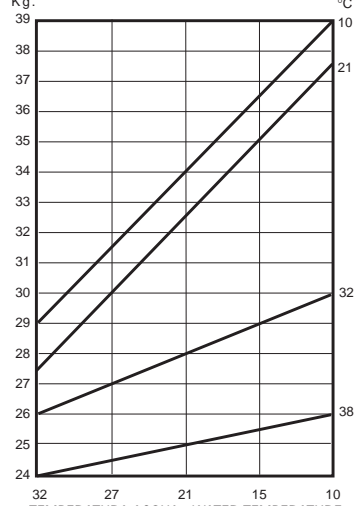


TEMPERATURA ACQUA - WATER TEMPERATURE  
 TEMPÉRATURE DE L'EAU - WASSERTEMPERATUR

TEMPERATURA AMBIENTE - AMBIENT TEMPERATURE  
 TEMPÉRATURE AMBIANT - RAUMTEMPERATUR

PRODUZIONE GHIACCIO PER 24 ORE - ICE PRODUCED PER 24 HRS.  
 PRODUCTION DE GLACE PAR 24 HEURES - EISWURFELPRODUKTION IN 24 STD.

RAFFREDDAMENTO AD ARIA - AIR COOLED MODELS  
 CONDENSATION PAR AIR - LUFTKÜHLUNG



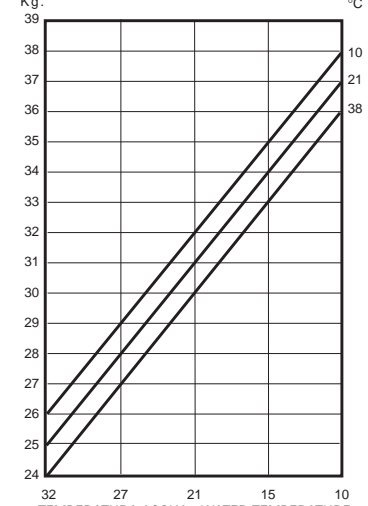
TEMPERATURA ACQUA - WATER TEMPERATURE  
 TEMPÉRATURE DE L'EAU - WASSERTEMPERATUR

TEMPERATURA AMBIENTE - AMBIENT TEMPERATURE  
 TEMPÉRATURE AMBIANT - RAUMTEMPERATUR

**B 40**

PRODUZIONE GHIACCIO PER 24 ORE - ICE PRODUCED PER 24 HRS.  
 PRODUCTION DE GLACE PAR 24 HEURES - EISWURFELPRODUKTION IN 24 STD.

RAFFREDDAMENTO AD ACQUA - WATER COOLED MODELS  
 CONDENSATION PAR EAU - WASSERKÜHLUNG

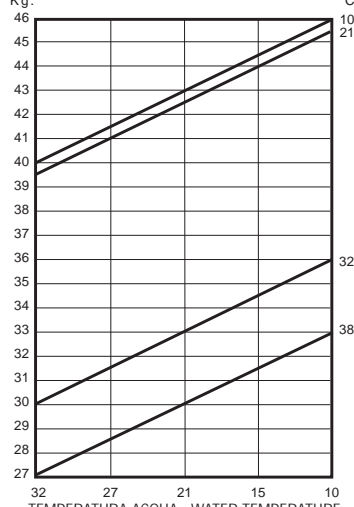


TEMPERATURA ACQUA - WATER TEMPERATURE  
 TEMPÉRATURE DE L'EAU - WASSERTEMPERATUR

TEMPERATURA AMBIENTE - AMBIENT TEMPERATURE  
 TEMPÉRATURE AMBIANT - RAUMTEMPERATUR

PRODUZIONE GHIACCIO PER 24 ORE - ICE PRODUCED PER 24 HRS.  
 PRODUCTION DE GLACE PAR 24 HEURES - EISWURFELPRODUKTION IN 24 STD.

RAFFREDDAMENTO AD ARIA - AIR COOLED MODELS  
 CONDENSATION PAR AIR - LUFTKÜHLUNG



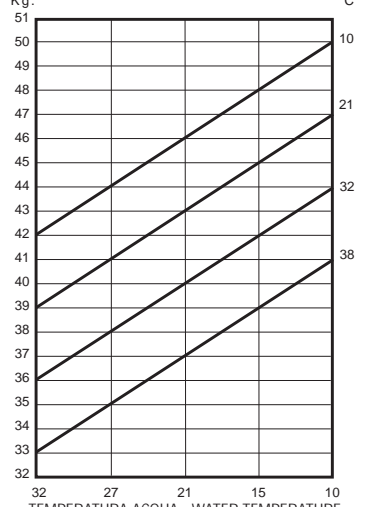
TEMPERATURA ACQUA - WATER TEMPERATURE  
 TEMPÉRATURE DE L'EAU - WASSERTEMPERATUR

TEMPERATURA AMBIENTE - AMBIENT TEMPERATURE  
 TEMPÉRATURE AMBIANT - RAUMTEMPERATUR

**B 45**

PRODUZIONE GHIACCIO PER 24 ORE - ICE PRODUCED PER 24 HRS.  
 PRODUCTION DE GLACE PAR 24 HEURES - EISWURFELPRODUKTION IN 24 STD.

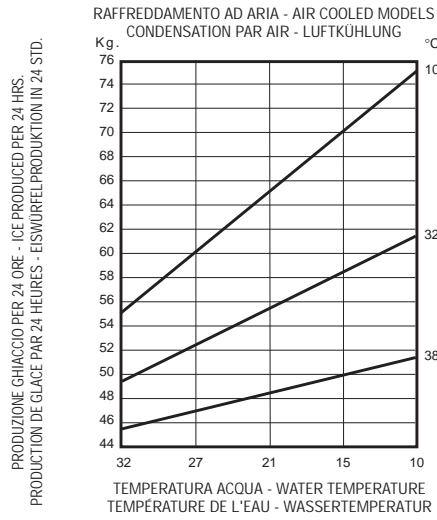
RAFFREDDAMENTO AD ACQUA - WATER COOLED MODELS  
 CONDENSATION PAR EAU - WASSERKÜHLUNG



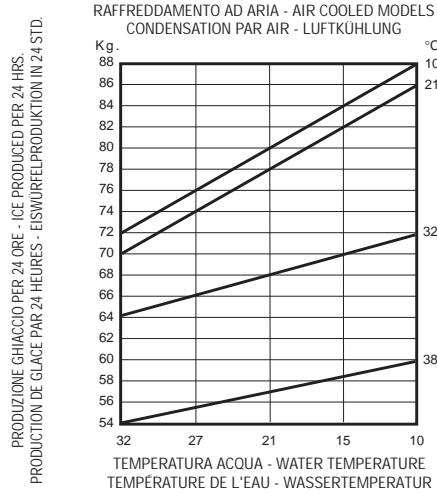
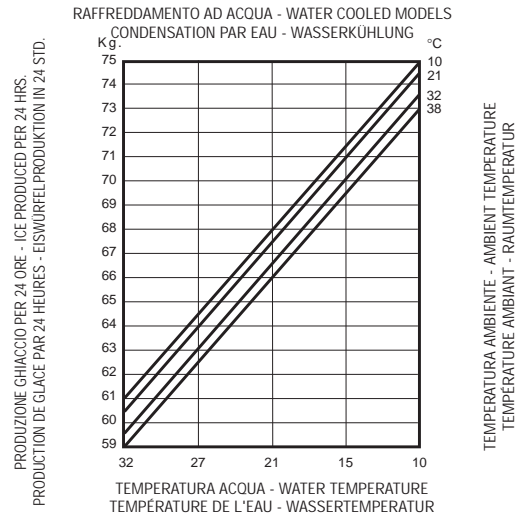
TEMPERATURA ACQUA - WATER TEMPERATURE  
 TEMPÉRATURE DE L'EAU - WASSERTEMPERATUR

TEMPERATURA AMBIENTE - AMBIENT TEMPERATURE  
 TEMPÉRATURE AMBIANT - RAUMTEMPERATUR

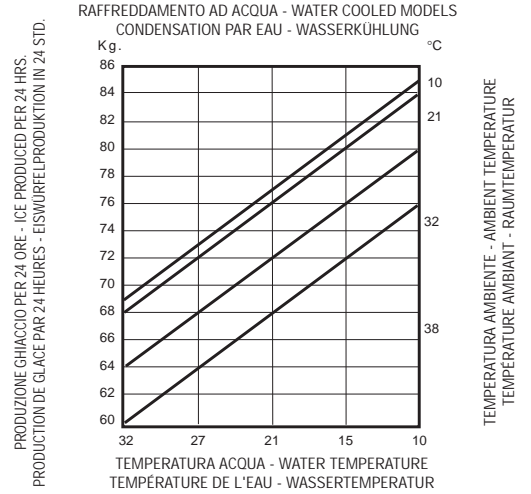
Capacità di produzione - Ice making capacity - Capacité de production - Eisproduktionskapazität



**B 75**



**B 90**



# GENERAL INFORMATION AND INSTALLATION

## A. INTRODUCTION

These 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.

These ice makers have been engineered to our own rigid safety and performance standards.

**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. 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 subject to inspection of the contents with the carrier's representative present.

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

b) Cut open the top of the carton and remove the polystyrene protection sheet.

c) Pull out the polystyrene posts from the corners and then remove the carton.

3. Remove the front and the rear panels of the unit and inspect for any concealed damage. Notify carrier of your claim for the concealed damage as stated in step 1 above.

4. Open the bin door and remove all internal support packing and masking tape.



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

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

7. 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.**

8. 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 factory.

## C. LOCATION AND LEVELLING

**WARNING.** **This Ice Cuber is designed for indoor installation only. Extended periods of operation at temperatures exceeding the following limitations will constitute misuse under the terms of the Manufacturer's Limited Warranty resulting in LOSS of 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 35°C (90°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.

**NOTE.** *With the unit in "built-in" conditions, the ice production is gradually reduced in respect to the levels shown in the graph, 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 **CUBER** at peak performance levels, periodic maintenance checks must be carried out as indicated on Cleaning Section of this manual.*

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 on electrical connections. All icemakers require a **solid earth wire**.

The ice machines are supplied from the factory completely pre-wired and require only electrical power connections to wire cord provided on the back 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 producing 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 built-up on parts of the water system.

##### Water supply

Connect the 3/4" male fitting of the solenoid water inlet valve, using the flexible hose 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 supply - Water cooled models (B75 - B90)

The water cooled versions of series 75 and 90 require two separate inlet water supplies, one for the water sprayed for making the ice cubes and the other for the water cooled condenser.

Connect the 3/4" male fitting of the water regulating valve using the flexible hose supplied with the unit 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. 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 vertical open vent, at the unit drain connection, is also required for proper sump drainage.

##### Water drain - Water cooled models

The water drain line from the condenser, on water cooled versions, is internally connected with the drain fitting of the unit.

It is strongly recommended therefore to install a vertical open vent on unit drain line high point to ensure good draining and to direct the drain line to a trapped and vented floor drain receptacle. This to make sure of the proper flow of the drained water as, in case of poor drainage, the water ranning out from the condenser may inopportunately flow, through the unit drain tubing, into the ice storage bin.

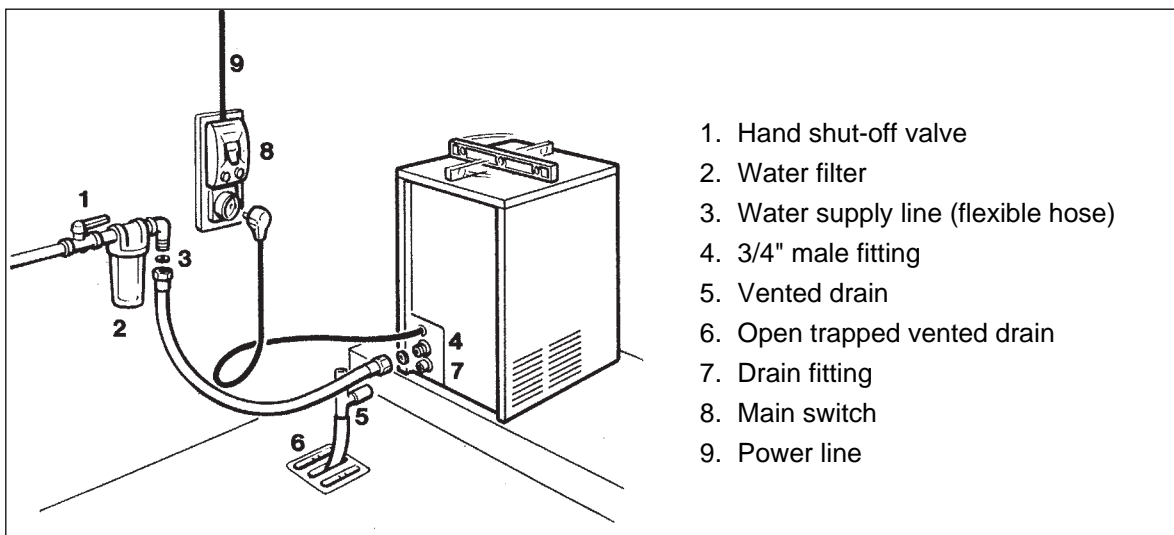
**NOTE.** The water supply and the water drain must be installed to conform with the local code. In some case a licensed plumber and/ or a plumbing permit is required.



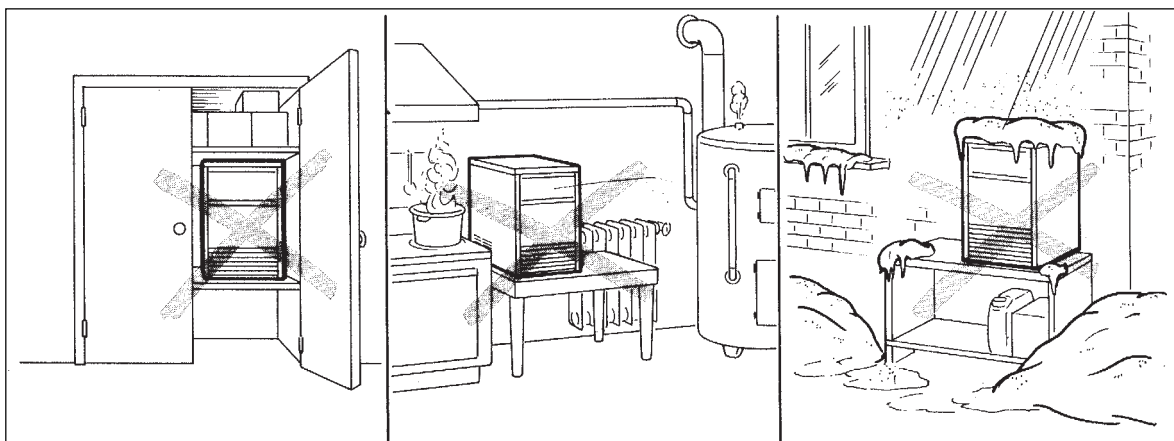
## F. FINAL CHECK LIST

1. Is the unit in a room where ambient temperatures are within a minimum of 10°C (50°F) even in winter months?
2. Is there at least a 15 cm (6") clearance around the unit for proper air circulation?
3. Is the unit level? (IMPORTANT)
4. Have all the electrical and plumbing connections been made, and is the water supply shut-off valve open?
5. Has the voltage been tested and checked against the data plate rating?
6. Has the water supply pressure been checked to ensure a water pressure of at least 1 bar (14 psi).
7. Check all refrigerant lines and conduit lines to guard against vibrations and possible failure.
8. Have the bin liner and cabinet been wiped clean?
9. Has the owner/user been given the User Manual and been instructed on the importance of periodic maintenance checks?
10. 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.
11. Has the owner been given the name and the phone number of the authorized Service Agency serving him?

## G. INSTALLATION PRACTICE



**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 35°C (90°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.

#### **B20 - B40 - B45**

**A.** Remove the unit front panel and locate the cleaning switch on the control box.

**B.** Set the cleaning switch in the cleaning position (II). This will close the electrical circuit to the water inlet valve and to the hot gas valve.

**C.** Switch ON the power line disconnect switch. Unit will start up in water filling phase mode. During this phase the components energized are:

**WATER INLET SOLENOID VALVE**  
**HOT GAS SOLENOID VALVE**

The **Water pump** and the **Fan motor** are also in operation.

**D.** Let unit stay in water filling phase mode for about three/four minutes till water is coming out from the drain hose, then move the cleaning switch to the operation position (I).

#### **B75 - B90**

**A.** Give power to the unit to start it up by switching ON the power line main switch; the unit will start automatically in defrost cycle with the following components energized:

**WATER INLET SOLENOID VALVE**  
**HOT GAS VALVE**  
**COMPRESSOR**  
**ELECTRONIC TIMER**

**NOTE.** During the defrost cycle, the water inlet solenoid valve is energized. The water flows through the valve to the back side of the evaporator platen and then down to fill up the icemaker sump tank for the next freezing cycle.

### OPERATIONAL CHECKS

**A.** The unit now starts its first freezing cycle with the following components in operation:

**COMPRESSOR**  
**WATER PUMP**

**FAN MOTOR** in air cooled version

**B.** Check to see through the ice discharge opening that the spray system is correctly seated and that the water jets uniformly reach the interior of the inverted cup molds; also make sure that the plastic curtain is hanging freely and there is not excessive water spilling through it.

**C.** The ice making process takes place thereby, with the water sprayed into the molds that gets gradually refrigerated by the heat exchanged with the refrigerant flowing into the evaporator serpentine.

**D.** On units B20 - B40 - B45 when the evaporator temperature reaches a preset value the evaporator thermostat or cube size control changes its contacts; the freezing cycle ends and starts the defrost or harvest cycle.

**E.** On models B75 - B90 freezing cycle is completed through an electronic timer energized by the evaporator thermostat. It starts when the cube size thermostat/control bulb (pig tail) located on the evaporator serpentine reaches a temperature of approx. -15°C (5°F).

*On units B75 - B90 the additional Time (8') of the freezing cycle starts when the cube size thermostat control bulb (pig tail) located on the evaporator coil reaches a temperature of approx. -15°C. Freezing time will range between 20 and 22 minutes in a 21°C ambient temperature, longer if above this temperature and shorter if below. Then the unit goes directly into the Defrost Cycle. The average complete cycle time is between 23 and 25 minutes.*

**F.** Check, during the first defrost/harvest cycle, that the incoming water flows correctly into the sump reservoir in order to re-fill it and the surplus overflows through the overflow drain tube.

**G.** Check the texture of ice cubes just released. Right size must have a small depression (about 5-6 mm) in their crown. If not, wait for the second defrost/harvest cycle before performing any adjustment.

**H.** If required on model B20 - B40 and B45, the length of the freezing cycle can be modified by turning the knob of the cube size control or evaporator thermostat located in front of the machine until the desired size is achieved.





If it is thought necessary, the above situations can be rectified by, in the first case, turning the control knob (as little or as much as is required) clockwise and, in the second case, turning the knob to the right counterclockwise.

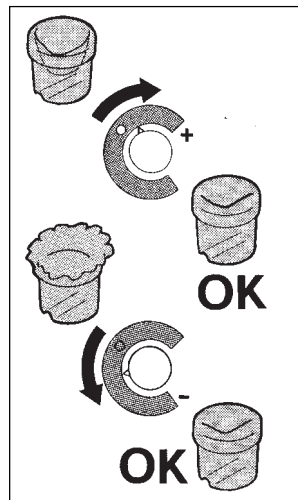
It should, however, be remembered that if the room temperature returns later to the 20 ÷ 30°C range, the knob indicator must once again be turned to the previous position.

If the ice cubes are shallow and cloudy, it is possible that the ice maker runs short of water during the end of the freezing cycle or, the quality of the supplied water requires the use of an appropriate water filter or conditioner.

I. At the end of the defrost or harvest cycle hold a handful of ice cubes against the bulb of the storage bin thermostat; the icemaker switch OFF in about one-two minutes. Take out the ice from the storage bin thermostat. The ice maker should restart automatically in three-four minutes.

**NOTE.** The bin thermostat is factory set at 1°C (35°F) OUT and 4°C (39°F) IN.

- If the temperature of the room in which the machine is placed is below 20°C, the cubes will tend to be partly hollowed out (see fig. on right).



- If, on the other hand, the room temperature is above 30°C the cubes produced will have a jagged rim of ice around the crown.



K. Re-fit the unit front panel then instruct the owner/user on the general operation of the ice machine and about the cleaning and care it requires.

## PRINCIPLE OF OPERATION

### How it works

In the ice makers the water used to make the ice is kept constantly in circulation by a water pump which primes it to the spray system nozzles from where it is diverted into the inverted cup molds of the evaporator (Fig. A).

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 (Fig. B)

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 it loses its pressure.

Next the refrigerant enters into the evaporator serpentine (which has a larger diameter than the capillary tube) 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 on B20-B40 and B45 is controlled by only the evaporator thermostat which has its bulb in contact with the evaporator serpentine while in B75 and B90 there is a second phase controlled by an electronic timer.

The electrical components in operation during the freezing cycle are:

#### COMPRESSOR

#### WATER PUMP

#### FAN MOTOR (in air cooled version)

On B20 air cooled versions (operating with R134a) the refrigerant head pressure is gradually reduced from the value of approx. 11 bar at beginning of the freezing cycle with the machine at 21°C ambient temperature, to a minimum value of approx. 7 bar just at the end of the freezing cycle, few seconds before the starting of the defrost cycle.

On B40, and B45 air cooled version operating with R404A, the head pressure drops from 19,5 bar to 13 bar while on the other bigger models (B75-B90) the refrigerant head pressure is kept between two present values (17-13,5 bar) by means of a fan pressure control.

The declining of the pressure is related to the reduction of the evaporating pressure, caused by the progressive growth of the ice thickness into the inverted cup molds and to the flow of air drawn through the air cooled condenser by the fan motor. The above values are in relation as well to the ambient temperature of the ice maker site and they are subject to rise with the increase of this temperature. On B20 water cooled versions (operating with R134a) the refrigerant head pressure ranges between 8,5 and 10 bar being controlled by an automatic high pressure control that energizes a water solenoid valve located on the water line to the condenser, which rates the cooling water to the condenser while on models B40, and B45 water cooled version operating with R404A, the head pressure ranges between 12 and 17 bar. On B75 and B90 water cooled version operating with R404A, the head pressure is constant at 15 bar controlled by a water regulating valve.

At starting of the freezing cycle the refrigerant suction or low-pressure lowers rapidly to 1,0 bar (on B20) and to 2,5-3,0 bar on all other models then it declines gradually – in relation with the growing of the ice thickness – to reach, at the end of the cycle, approx. 0-0,1 bar on B20 and 1,4-1,5 bar in the other models with the cubes fully formed in the cup molds.

### DEFROST OR HARVEST CYCLE (Fig. D)

On B20 - B40 and B45 the temperature of the evaporator thermostat, in contact with the evaporator serpentine, drops to a pre-set value it changes its electrical contacts energizing the herebelow shown components. (On B75 and B90 when the electro-nic timer completes the second portion of the freezing it changes its electrical contacts energizing the same components).

#### COMPRESSOR

#### WATER INLET SOLENOID VALVE

#### HOT GAS SOLENOID VALVE

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. C).

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 bypassing the condenser.

The hot gas circulating into the serpentine of the evaporator warms up the copper molds causing the harvest 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.

On B20 - B40 and B45 when the temperature of the evaporator thermostabulb reaches the value of  $+3 \pm 4^{\circ}\text{C}$  their electrical contacts move back to the previous position activating a new freezing cycle and deenergizing both the hot gas and the water inlet valves (closed). On B75 and B90 as soon as the electronic timer completes the defrost cycle, it activates a new freezing cycle deenergizing both the hot gas and the water inlet valves (closed).

**NOTE.** *On models B20 - B40 and, B45 the length of the defrost/harvest cycle (not adjustable) changes according to the ambient temperature (shorter for hi ambient temperature and longer for low one).*

## COMPONENTS DESCRIPTION

### A. WATER PUMP

The water pump operates continually throughout 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.

### B. WATER INLET SOLENOID VALVE - 3/4 MALE FITTING

The water inlet solenoid valve is energized only 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. On B20 - B40 and B45 water cooled versions the water inlet solenoid valve has one inlet and two outlets with two separate solenoids energized the first (ice production) by the contacts 3-2 of the evaporator thermostat and the second (water cooled condenser) by a specific hi pressure control.

### C. HOT GAS SOLENOID VALVE

The hot gas solenoid valve consists basically in two parts: the valve body and the valve coil. 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.

### D. BIN THERMOSTAT

The bin thermostat control body is located in the front of control box behind the front panel. The thermostat sensing tube is located into a bulb holder on the side wall of the ice storage bin where it automatically shuts the icemaker OFF

when in contact with the ice and re-starts the icemaker when the ice is removed. Factory settings are  $1^{\circ}\text{C}$  ( $35^{\circ}\text{F}$ ) OUT and  $4^{\circ}\text{C}$  ( $39^{\circ}\text{F}$ ) IN.

### E. CUBE SIZE CONTROL (EVAPORATOR THERMOSTAT)

#### B20 - B40 - B45

The cube size control (evaporator thermostat) body is located in the control box behind the front panel; it's basically a reverse acting temperature control which closes the contacts 3-2 when its temperature decreases and closes the opposite contacts 3-4 when the temperature rises.

The thermostat sensing bulb is located into a plastic tube (bulb holder) secured by two clips directly to the evaporator serpentine.

This control determines the length of the freezing cycle and correspondingly the size of the cubes. A lower setting will produce a larger cube (oversize) while a higher setting a smaller cuber (shallow size).

When closed on contacts 3-2 it activates the defrost or harvest cycle components.

The cube size control is set up in the factory (knob in the black dot position) and doesn't require any adjustment when the ambient temperature remains between  $20$  and  $30^{\circ}\text{C}$  ( $70$  and  $90^{\circ}\text{F}$ ).

#### B75 - B90

The evaporator thermostat with its sensing bulb intimately in contact with the refrigerant outlet tube from the evaporator senses the evaporating refrigerant temperature (which declines in the course of the freezing cycle) and when this one reaches the pre-set value, it switches its contacts from 3-4 to 3-2 to activate the finishing cycle (2nd phase) through an electronic timer.

### F. FAN MOTOR (Air cooled version)

The fan motor on B20 - B40 and B45 is electrically connected in parallel to the water pump and it operates continuously only during the freezing cycle keeping the proper head pressure by circulating air through the condenser fins. On B75 and B90 the operation of fan motor is controlled by a fan pressure control adjusted at preset values.

### G. 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 (hot gas) which is then released through the discharge valve.

### H. WATER SPRAY SYSTEM

Through its nozzles it sprays the water in each individual cup to be frozen into ice.

**I. SAFETY HI TEMPERATURE THERMOSTAT**

Located in the control box it is a manual reset switch that trips OFF the operation of the machine when its bulb (located on the liquid line just before the drier) reaches the temperature of 70°C (158°F).

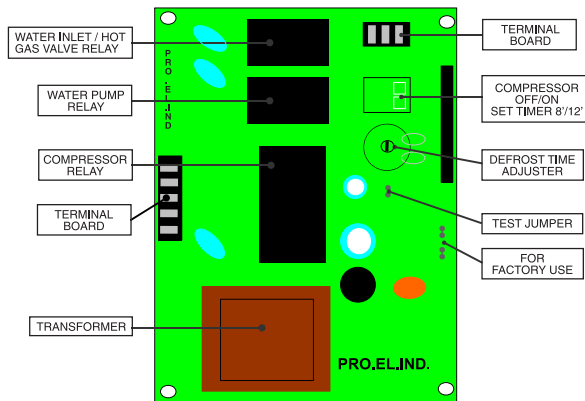
**J. CLEANING SWITCH (only B20-B40-B45)**

Located on the bottom left side of the control box is used to energize the water inlet and the hot gas valves so to charge the water into the sump tank of the machine.

**K. HI PRESSURE CONTROL (Water cooled version)**

Used only on B20-B40 and B45 water cooled versions it operates to keep between two preset values the hi-side or discharge pressure of the refrigerant system by energizing the coil of the water inlet solenoid valve that control the cooling water flow to the condenser.

**L. ELECTRONIC TIMER (B75 -B90)**



Equipped with a Two Keys Dip Switch and one Potentiometer, it manage the length of second fase of the freezing cycle and the entire defrost/ harvest cycle with a factory pre-set times . The first key (1) replaces the "Compressor Switch" used on the previous electro-mechanical version; factory setting is ON position to energize the compressor during the standard operation of the ice machine. The same key (1) is switched to OFF position when the cleaning cycle is required keeping the water pump only in operation. The second key (2) allows the setting of the timed portion (Ta) of the freezing cycle according to the model of the ice machine.

**Dip Switch factory setting combinations**

	N. 1	N. 2
B75 B90	ON	OFF

**Resuming Chart with Keys 1 & 2 functions**

	N. 1	N. 2
ON	Standard Setting Compressor ON	Ta = 12'
OFF	Cleaning Mode Compressor OFF	Standard Setting Ta = 8'

The potentiometer is used to adjust the defrost time and it is set directly from the factory according to the model of the ice machine. It can be adjustable from a minimum defrost time of 60" (turn clockwise), to a maximum of 180" (turn counterclockwise).

**M. MASTER SWITCH (only B75 -B90)**

Fitted in the control box the master switch has to be used to start-up and to stop the ice maker operation.

**N. COMPRESSOR SWITCH (only B75 - B90)**

Located in the control box is used to de-energized the compressor during the cleaning.

**O. FAN PRESSURE CONTROL (only B75 - B90)**

Used on air cooled ice makers to maintain the head pressure within the preset values.

**P. WATER REGULATING VALVE (only B75 - B90 Water cooled version only)**

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.

## MAINTENANCE AND CLEANING INSTRUCTIONS

### CLEANING INSTRUCTIONS OF WATER SYSTEM

1. Remove the front and top panels to gain access either to the control box and to the evaporator.
2. Make sure that all ice cubes have been released from their cups, then switch OFF the machine at main power switch, on models B20-B40 -B45, and on master switch on models B75 - B90.
3. Scoop out all the ice cubes stored into the bin in order to prevent them from being contaminated with the cleaning solution.
4. Remove the plastic cup located on the bottom of sump/freezing chamber to drain out all water and scale deposits.
5. Remove the curtain then, using a bottle, pour fresh water into the bottom of the sump/freezing chamber to clean out any possible scale deposit.
6. Install again the curtain as well as the bottom plastic cup.
7. Prepare the cleaning solution by diluting in a plastic container one or two liters of warm water (45°-50°C) with a 0,1-0,2 liters of Ice Machine Cleaner (on B20-B40 - B45) and 0,2-0,3 liters on B75 - B90.

**WARNING. The 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.**

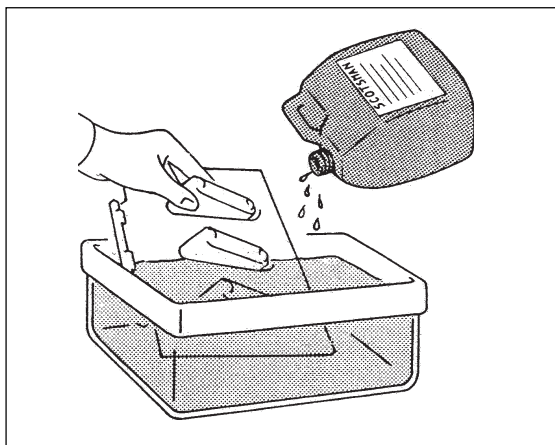
8. Remove the evaporator cover then slowly pour onto the evaporator platen the cleaning solution. With the help of a brush dissolve the most resistant and remote scale deposits in the platen.

#### **B20 - B40 - B45**

1. Switch ON again the machine at main power switch to start the icemaking process. Allow the ice maker to operate for about 20 minutes. Then turn the cleaning toggle switch to the "cleaning" position (II) till the release of the ice cubes from their cups then place it again to "operating" position (I).

**NOTE.** *The amount of Cleaner and the time needed for the cleaning of water system depends of the water conditions.*

2. Turn the cube size control knob counterclockwise to the OFF position to shut-off the ice maker then 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.
3. If necessary remove the water spray platen to clean it separately.



4. Turn again the cube size control knob to the normal operating position (black dot). The water pump is again in operation to circulate the water in order to rinse the entire water system. Do this operation twice so to be sure no more traces of descaling solution remains into the sump. Pour on the upper side of the evaporator platen fresh water with a capfull of disinfectant solution then turn again the machine in normal operating mode so to sanitize all the water system for approx. 10 minutes.

**NOTE.** *Do not mix descaling with disinfectant solution to avoid the generation of a very aggressive acid.*

5. Flush out the disinfectant solution from the sump reservoir then with the switch in "cleaning" position (II), turn the cube size control knob to the normal operating position. When water starts overflowing through the drain line, set the switch to "operation" position (I). The unit is now ready to resume normal operation.

**B75-B90**

1. Move the first key of dip switch to OFF position and set the master switch of the unit to ON position. Doing so, the only water pump will be in operation for the cleaning cycle.
2. Allow the system to operate for about 20 minutes. No ice will be produced because the compressor is not in operation.
3. At the end of this period set the master switch to the OFF position to shut off the icemaker.
4. Remove the plastic plug located on the bottom of the sump/freezing chamber to drain out all the cleaning solution and most of the mineral concentration through the drain tube and then replace it in its seat.
5. Pour onto the evaporator cavity two or three liters of clean potable water to rinse the mold cups and the platen.
6. If necessary remove the water spray platen to clean it separately.
7. Set again the master switch in ON position. The water pump is again in operation to circulate the water in order to rinse the entire water system.
8. Repeat steps 4,5 and 7 twice then pour on the upper side of the evaporator platen fresh water with a capfull of disinfectant solution then put again the master switch in ON position so to sanitize all the water system for approx. 10 minutes.

**NOTE.** *Do not mix descaling with disinfectant solution to avoid the generation of a very aggressive acid.*

9. Flush out the disinfectant solution from the sump reservoir. Move the first key of dip switch to ON position , then set the master switch of the unit to ON position. Let the unit run normally through the harvest/ defrost cycle for re-fill the sump reservoir. The unit is now ready to resume the normal operation.
10. Place again the evaporator cover and the unit service panels.
11. 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.*

12. 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.*