Scotsman®
Ice Systems

SERVICE MANUAL
NU100/150/220/300

Part Number 99300407-01 Version: A

Tables of Content	Page
How to use this manual	2
Model and serial number	2
Specifications	3-7
Overview and installation	8
Safety instructions	8
Position and level adjustment	8
Water supply and drainage connection	9
Power supply connection	9
Final check list	10
Start-up	11
Operating check	12
Ice machine adjustments	13
How the ice maker works	14
Freezing cycle	14-15
Harvest cycle	16-17
Components Description	18-20
Wiring diagram	21
Trouble shooting table	22-23
MAINTENANCE & CLEANING INSTRUCTION	24
Summary	24
Maintenance of refrigeration system	24
Water system cleaning	24-25
Winterizing Procedures	25

How to Use this manual

This manual is provided as an aid to the service technician in installation, operation, and maintenance of the ice machines. This manual can also assist the service technician to troubleshoot and diagnose most of the problems that may occur with the machine.

Most aspects of the NU Series machines are covered in this manual, however, if you encounter any conditions not addressed herein, please contact the Scotsman Technical Service Department for assistance. You can contact the Scotsman Technical Services Department in the following ways:

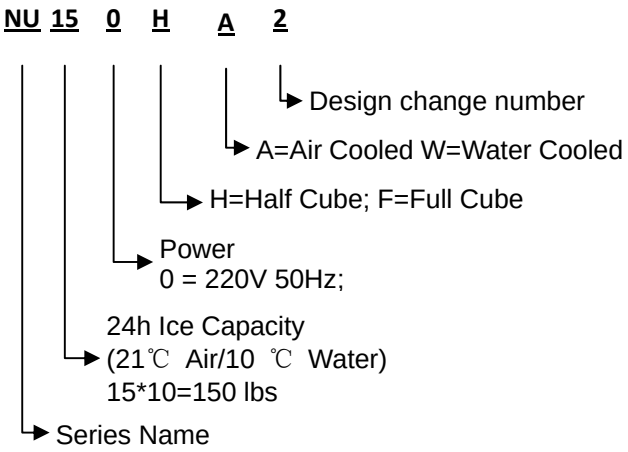
Scotsman Ice systems (Shanghai) Co.LTD
Room 2503, Building NO.2, NO.20 of Xu Hong Middle Road, Xuhui District, Shanghai, China

Telephone Numbers: +86 21 61313200
Service hotline: +86 400 630 0076
service@scotsman-china.com
www.scotsman-china.com

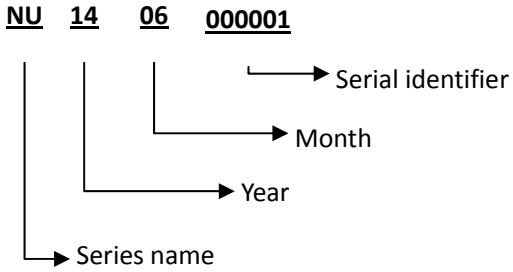
NU series service part list is provided separately with this manual.

Model and Serial Number

Model Numbers



Serial numbers



The serial number includes 12 numbers; the front 2 letters are the series name, the next 2 numbers are referring to the year the machine was manufactured, then the 2 month codes, the final six numbers are the serial identifier.

NU100/150 Specification

Water Temperature
NU100

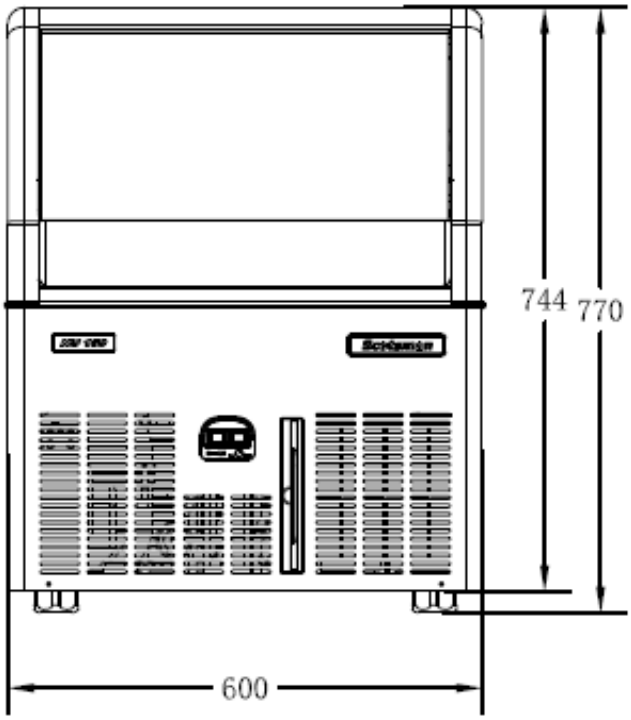
Air Temperature F ℃	50° 10°	60° 15°	70° 21°	90° 32°	
50° 10°	121 55				lbs kg
70° 21°	99 45				lbs kg
90° 32°			70.4 32		lbs kg
100° 38°				59.4 27	lbs kg

Water Temperature
NU150

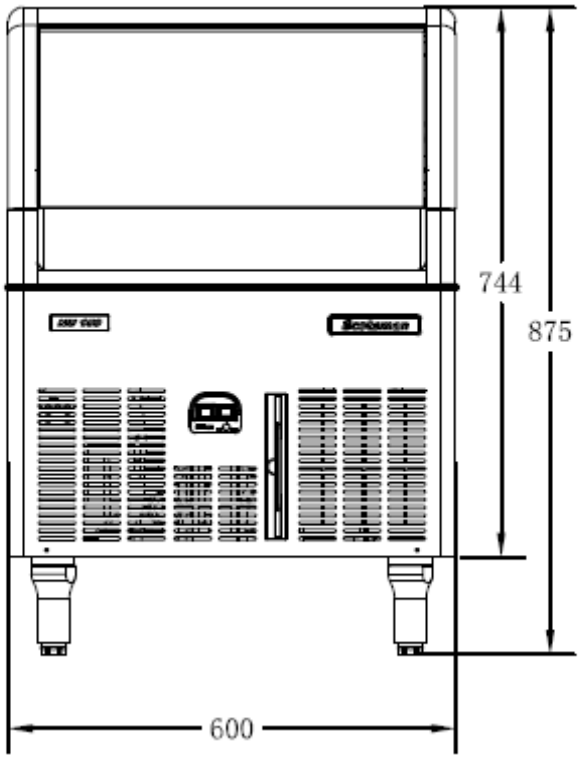
Air Temperature F ℃	50° 10°	60° 15°	70° 21°	90° 32°	
50° 10°	176 80				lbs kg
70° 21°	150 68				lbs kg
90° 32°			106 48		lbs kg
100° 38°				88 40	lbs kg

MODEL	Condenser	Minimum Circuit Ampacity (A)	Fuse (A)	Water Consumption (Gal)	Power Consumption (KWH)	Size mm (Width*Depth*Height)	Net Weight (kg)
				32℃ Air/21℃ Water 100lbs Ice			
NU100*A	Air Cooled	3.5	10	32	12.6	600*610*770	50
NU150*A	Air Cooled	4	10	20	8.5	600*610*770	50

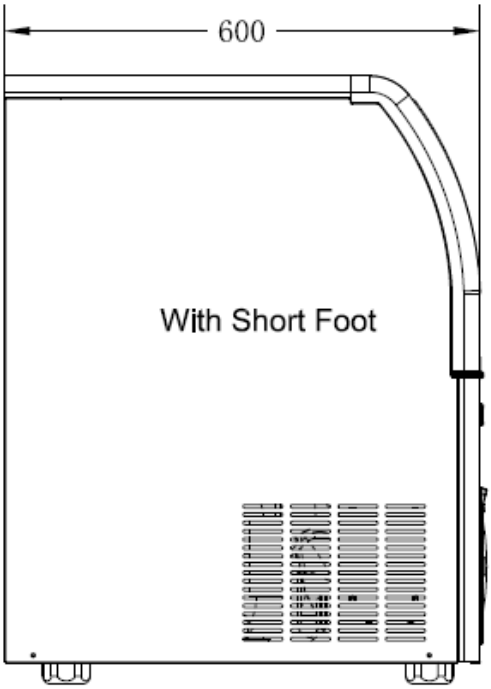
NU100/150 Size

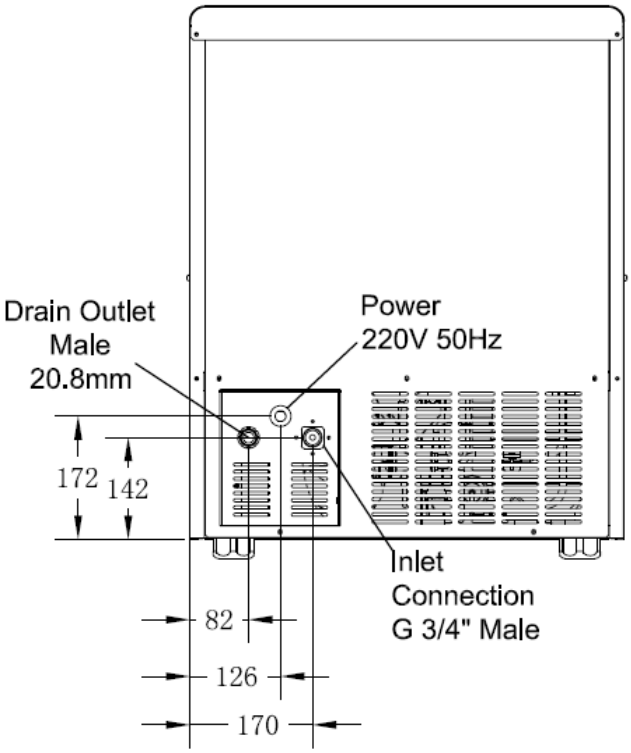


With Short Foot



With High Foot





NU220/300 Specification

Water Temperature
NU220

Air Temperature

℉ ℃	50° 10°	60° 15°	70° 21°	90° 32°	
50° 10°	242 110				lbs kg
70° 21°	220 100				lbs kg
90° 32°			154 70		lbs kg
100° 38°				132 60	lbs kg

Water Temperature
NU300

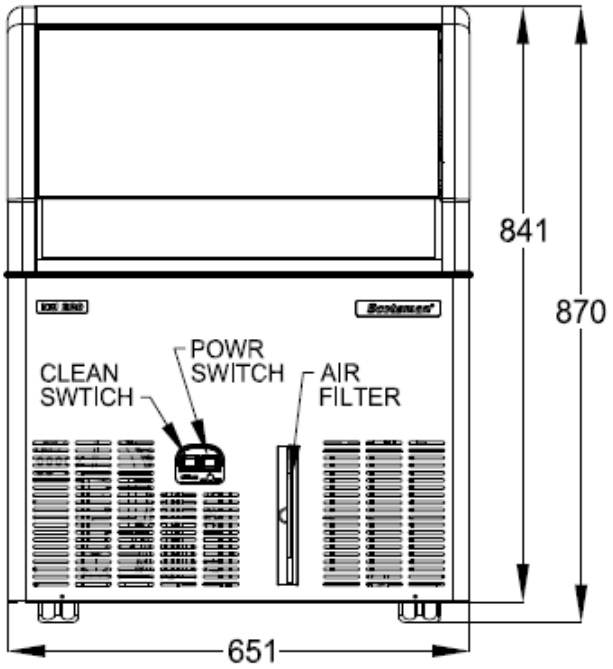
Air Temperature

℉ ℃	50° 10°	60° 15°	70° 21°	90° 32°	
50° 10°	308 140				lbs kg
70° 21°	293 133				lbs kg
90° 32°			220 100		lbs kg
100° 38°				180 82	lbs kg

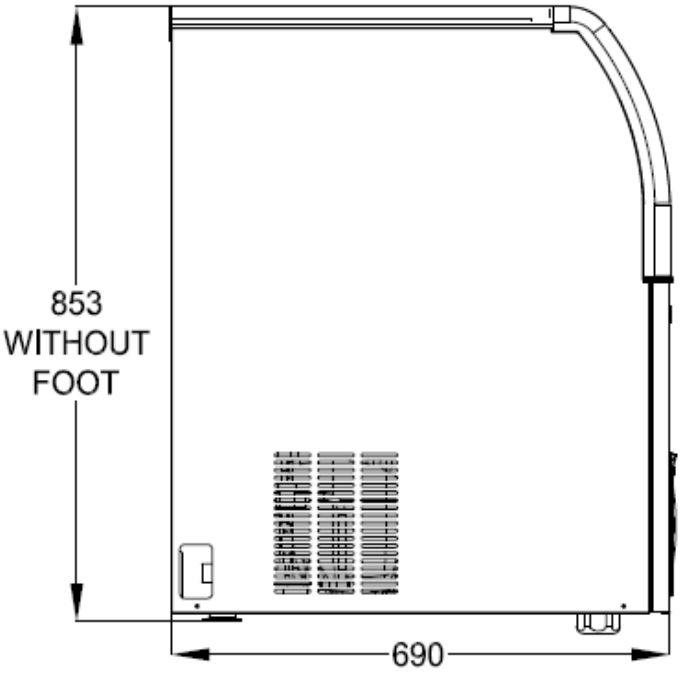
MODEL	Condenser	Minimum Circuit Ampacity (A)	Fuse (A)	Water Consumption (Gal)	Power Consumption (KWH)	Size mm (Width* Depth* Height)	Net Weight (kg)
				32℃ Air/21℃ Water 100lbs Ice			
NU220*A	Air Cooled	4.5	10	19	9	650*690*870	65
NU300*A	Air Cooled	5	10	19	8	650*690*1004	65

NU220 Size

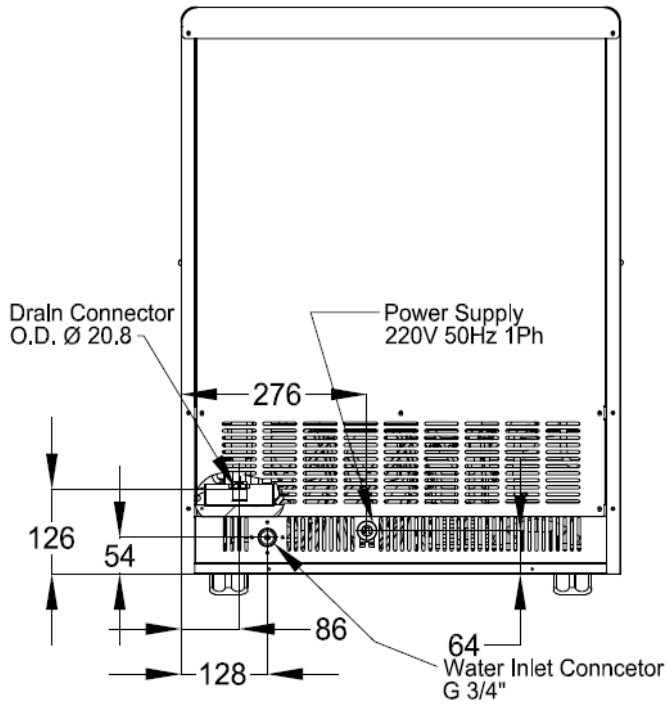
FRONT VIEW



SIDE VIEW

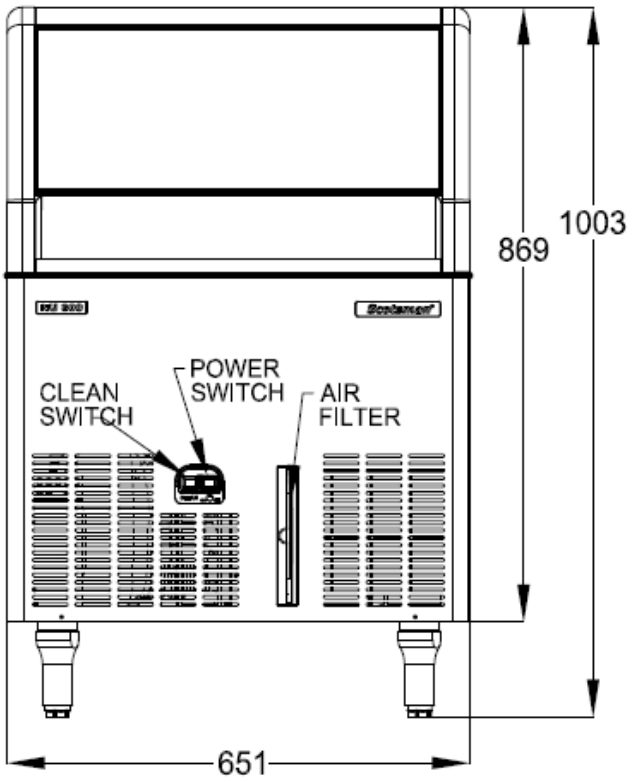


BACK VIEW

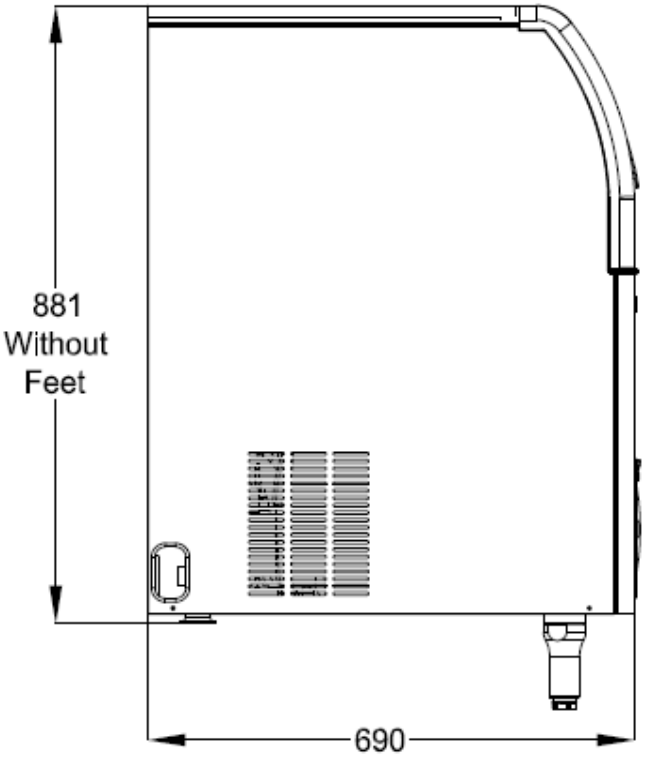


NU300 Size

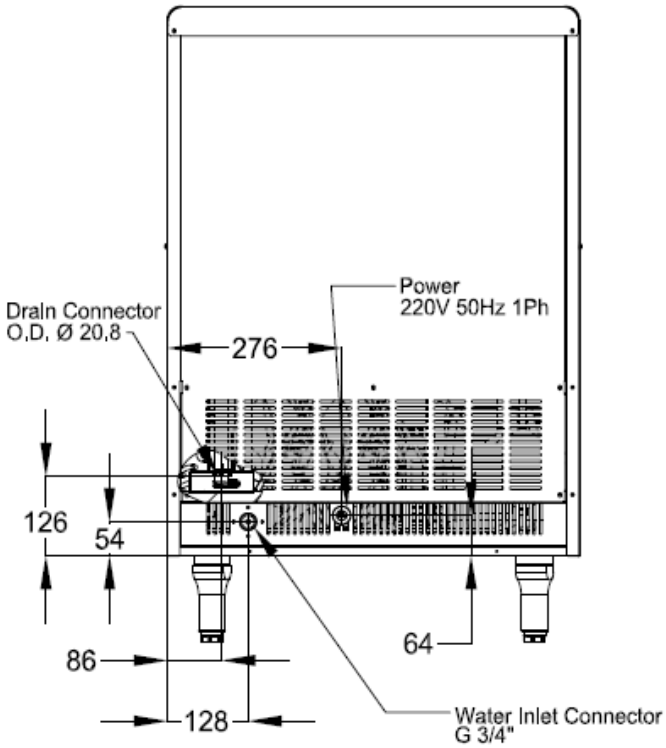
FRONT VIEW



SIDE VIEW



BACK VIEW



Overview and installation

This manual is provided the instruction in installation, start-up, operation, maintenance, cleaning and each operation procedure for Scotsman NU series ice machine.

Safety instruction

In order to ensure the machine working normally in long term, please read the manual carefully and implement strictly before installation. The producer is not responsible for any damage or body injury due to ignoring the safety instructions. If there is any doubt, please contact the local dealer.

Installation requirements

Please ensure the following items are met during you determining the installation location:

- Power source: the power switch for the ice machine should be hand reachable, ensure that the power supply reliable grounded.
- Water supply: the water supply switch should be hand reachable.

Water drain: be sure that the drain pipe has 3cm drop per meter.

Note:
In order to avoid any infection on the user, the water for making ice should be the potable water. If needs, please install water filter or water processor.

In order to reach its high performance and ensure its durability, please pay attention to the following items:

Operating parameters	Lowest	Highest
Ambient temperature	10C (50F)	40C (100F)
Water inlet temperature	5C (40F)	35C(90F)
Water inlet pressure	1 bar gauge	5 bar gauge
Maximum power supply variation based on the nameplate	-10%	+10%

Orientation and level adjustment

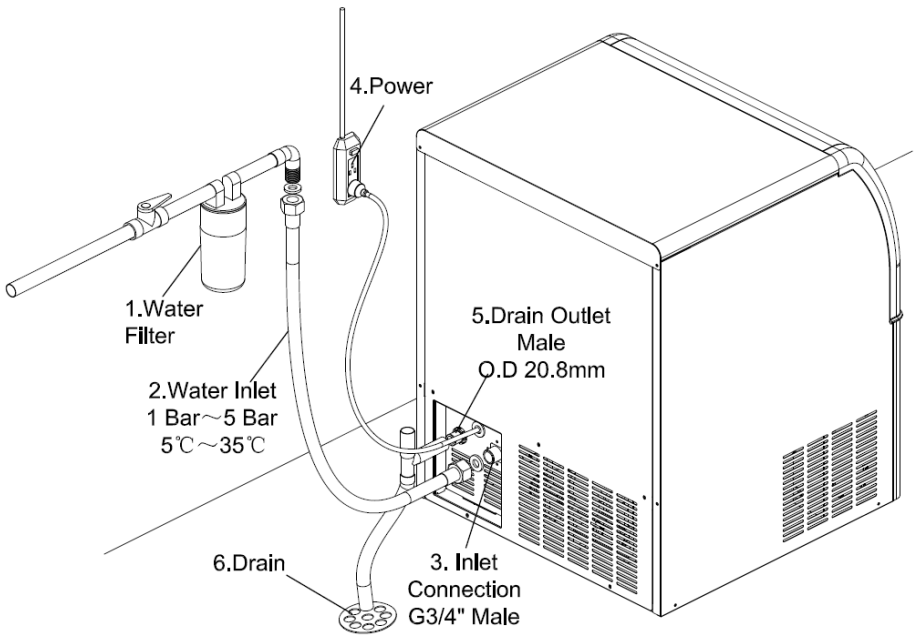
Note:

This ice machine is only designed for indoor installation. For the loss or damage caused by exceeding the following limited temperature or involved in the security claims, it is beyond the general finite warranty clause of Scotsman producer.

In order to get good ventilation and heat radiation, the distance between the machine and the wall, etc. should be more than 150mm.

Don't hang curtain or pile any goods around the machine to avoid overheat caused by bad ventilation, be sure there is no heat source (such as stove, oven, etc.) around the machine and the working environment of the ice maker should not be over humidity.

Before use, install the four supplied legs into leg acceptor on bottom side of unit base, Level the unit in both the left to right and front to rear directions.



Water supply and drainage connection

Choose the ice machine water supply should be considered:

- Water quality requirements：Ice thickness detector cannot work normally in non conductible water; Water containing too many minerals will produce a cloudy like ice and increase water scale accumulation of each part of the water system.
- Enough water pressure ： The water pressure should be between 1 to 5 bar. Ice machine cannot work normally if the water pressure is lower than 1 bar (14 psi).

You cannot ignore these three requirements, because water is the key factor in the ice making.

Water supply

Connect the 3/4" male thread connector of water inlet solenoid valve with supply line connector and install a water supply valve in an accessible position between the water supply line and the unit.

If water contains a high level of impurities, it is advisable to install an appropriate water filter or treatment facility.

Water Drain

The recommended drain tube is a plastic or flexible tube with 18 mm (3/4") I.D. which runs to an open sewer.

Note: The water supply and the water drain must installation should conform to the local code. In some case a licensed plumber or a plumbing permit is required.

Note ：Ensure the drain pipe has 3 cm drop per meter at least.

Electrical Connections

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

Note:

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

- Check consistency between voltage on the line and the ice maker’s data plate before connecting the unit (power supply).

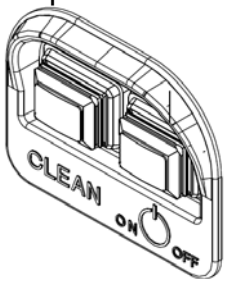
Final Check List

1. Is the unit in a room where ambient temperatures are within a Minimum of 10℃ (50℉) even in winter?
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 been connected, and is the water supply valve open?
5. Is the power supply voltage in accordance with the nameplate ratings?
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 come-off by vibrations and possible damage.
8. Have the bolts holding the compressor been checked to ensure that the compressor is fixed onto the mounting base?
9. Have the ice bin and cabinet been wiped clean?
10. Has the user been given the Manual and been instructed on the importance of periodic maintenance checks?
11. Has the manufacturer’s registration card been filled in properly? Check for correct model and serial number according to the serial plate and mail the registration card to the factory.
12. Has the user been given the name and the phone number of the authorized SCOTSMAN Service Agent?

Start-Up

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

- Connect the main power switch.
- Power on the power switch on the right side of the NU front panel.



Power Switch Panel

Note:
Every time the unit returns under power after having been switched off, the water supply valve, defrost valve, water pump and the water drain valve get energized for a period of 3 Minutes, thus to admit new water to the machine sump reservoir to fill it up and eventually, to wash-off any dirt that can have deposited in it during the unit off period.

During the cleaning operation, check and see that the incoming water flows through the inlet pipe above the water trough into the drain pipe.

During the water filling phase the components energized are:

- Water inlet solenoid valve
- Defrost solenoid valve
- Water pump
- Water drain solenoid valve

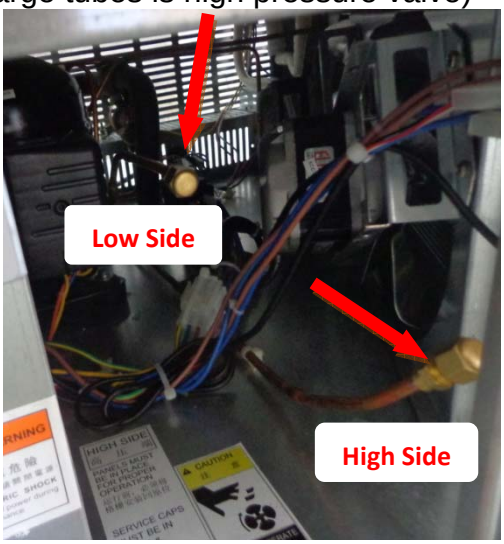
Note:
If within 3 Minutes of the water filling phase, the machine water trough does not get filled with water from the water inlet, it is advisable to check:

- The water pressure of the water supply pipe that must be at least 1 bar (14 psi). Max 5 bar(70 psi).
- The filtering device installed in the water pipe that may reduce the water pressure below the Minimum value of 1 bar (14 psi).
- Any clogging situation occurs to the inlet water strainer and/or the flow controller of the inlet valve.

At the end of the cleaning operation, the unit will enter into the freezing cycle automatically with the start up of compressor; water level of the water tank gets into the control state. The water pump starts to work after the startup of compressor 30 seconds. Fan Motor (air cooled model) is controlled by the temperature sensor of the condenser.

Operating check

If required, the refrigerant service gauges can be mounted on the high pressure side and low pressure side to check discharge and suction pressures of the compressor. (The valve welded with the compressor shell is low pressure valve; the valve welded with discharge tubes is high pressure valve)



Check the evaporator, check whether the spray system is correctly seated and whether the water jets spray water on the surface of the evaporator uniformly, and also make sure that there is no excessive water spilling from evaporator plate into ice bin.

The ice making processes start with the water uniformly flowing through the surface of the evaporator, the ice molds then get gradually refrigerated by the heat exchange which has refrigerant flowing into the evaporator coil. During the freezing process, the ice thickness sensor controls the freezing cycle time. The electric components in operation during the ice making cycles are:

- Compressor
- Water pump
- Fan Motor is controlled by the temperature sensor of the condenser.

Note: The ice thickness sensor is installed on the surface of the evaporator; the length of the entire freezing cycle is controlled by the interval time of the ice thickness sensor probes the ice cubes.

- If room temperature is below 15℃, the ice making cycle will be shorter (about 15-25 Minutes).
- If room temperature is above 30℃, the ice making cycle will be longer (about 25-40 Minutes).

The defrost cycle takes place with the defrost valve and water drain valve simultaneously activated. The electric components in operation during defrost cycle are:

- Compressor
- Defrost valve
- Pump and the Water drain valve (controlled by PC board and can drain after each cycle)
- Fan Motor (air cooled model) is controlled by the temperature sensor of the condenser.

Note:
The length of the defrost cycle is automatically controlled by the program of the PC board, depending on the ice required thickness and ambient condition.

Inspection during defrost cycle

- Check whether the water drain's operation is normal (if water drain function is set), and that water in the sump reservoir is correctly drained.
- Check the quality of ice cubes just released. If it doesn't reach the requirement, some adjustment should be carried out (See adjustment procedure). If the ice cubes are thin and cloudy, probably the ice machine is shortage of water or the water quality is not good. It may require the usage of an appropriate water filter or treatment unit.
- To make sure the correct operation of the ice level control, use your hand to press the ice sliding plate down which simulates the bin is full, so the ice cube cannot go through the ice sliding plate and fall into the ice bin. After 40 seconds, the unit should stop with the Bin Full indicator light on the display plate of PC board. Move your hand out to allow the resumption of the ice

sliding plate. After 3 minutes, the ice maker returns to ice making cycle.

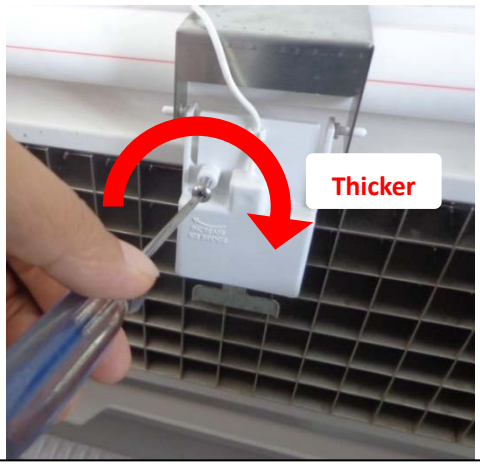
Remove the refrigerant service gauges (if fitted) and refit the unit panels previous removed after adjustment.

Instruct the user on the general operation of the ice maker, the cleaning and maintenance.

Ice machine adjustments

Adjustment of ice thickness

The ice thickness has been adjusted to a suitable position before it was shipped out. If needed, adjust the screw on the ice thickness sensor properly to meet the suitable thickness. Clockwise rotation can make the ice thickness thicker, while counterclockwise can make the ice thickness thinner.



Note：
When adjusting the screw on the ice thickness sensor, do not adjust too much, 1 laps per time or so; after three cycles, if the ice thickness still cannot meet the requirements, adjust it again. The ice thickness could be adjusted to a required level by this mean.

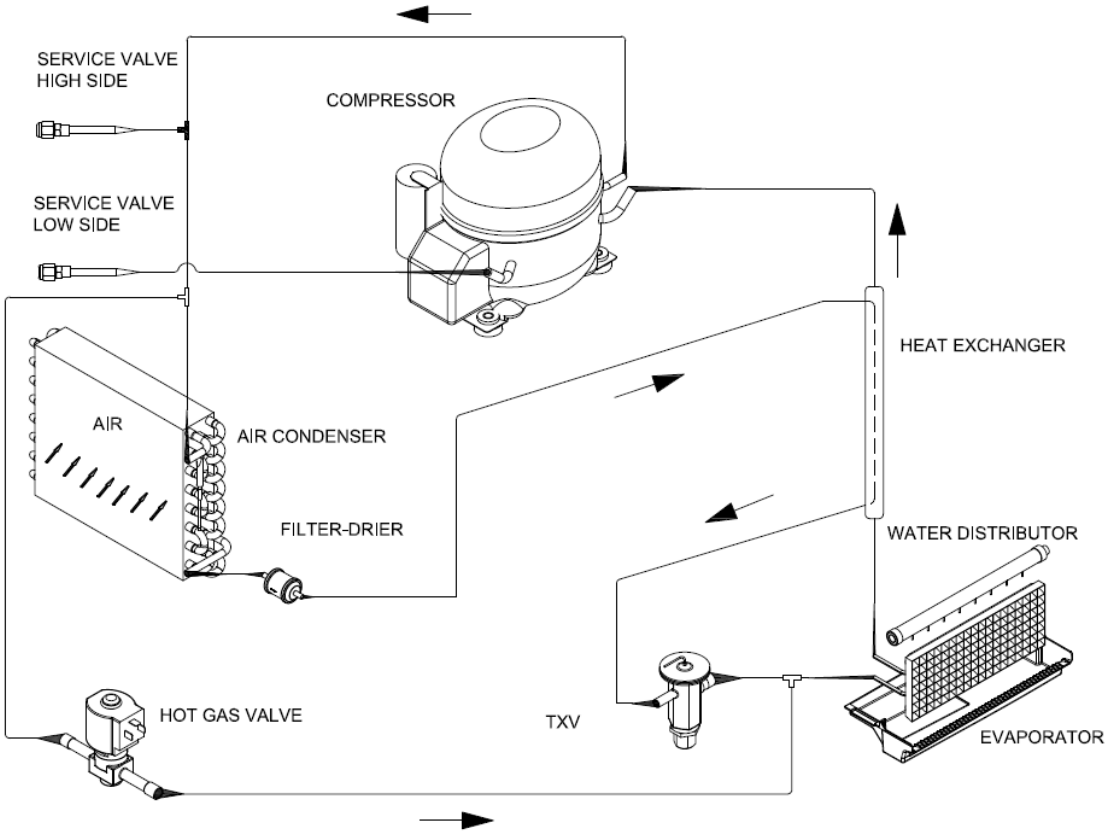
Drainage adjustment

The adjustment of the drainage number of the ice machine depends on the local water quality and water cleanliness.

Recommendation：
To obtain a higher degree of transparency ice and to maintain the cleanliness of the sink, recommends that the drainage is set behind one ice making cycle, this is the factory setting.

How the ice maker works

For NU ice maker, the water for making ice is pumped into the spray pipe by water pump. After flew out from the holes of spray pipe, then it will flow over the surface of the ice plate with constant and even speed. At this spot, some of the water will turn into ice; the other will flow back to the water trough by gravity and will be re-circulated by water pump.



Freezing Cycle

The refrigerant gas discharged from the compressor gets into the condenser, where it is cooled and condensed into liquid. The liquid will flow into drier filter, and then it will pass through the expansion valve. After that, the pressure and temperature of the refrigerant liquid will get much lower.

Then the refrigerant begins to evaporate when it gets into the evaporator coil pipes and exchange heat with water following over the ice molds.

The refrigerant then increases in volume and changes entirely into vapor during heat exchanging process. The refrigerant vapor then passes through the suction line heat exchanger (used to prevent that any small amount of liquid refrigerant may reach the compressor) at the suction line and flow through the suction pipe. It exchanges heat with the refrigerant flowing into the capillary tube or liquid line copper tubes (warmer), before to be sucked in the compressor and to be re-circulated as hot vapor.

The 30 seconds before freezing cycle is pre-cooling period, in this period, the compressor is working, water pump is not, fan is working (controlled by the temperature sensor of condenser) and water inlet valve is working (controlled by the water-level sensor in the water trough).

The freezing cycle is controlled by the ice thickness sensor, as long as the sensor probes the ice and holds for 30s, the ice thickness has reached the set point. Then, the freezing cycle is end. The total time of freezing cycle depends on the ambient temperature and ice thickness set.

Note:
Ice making indicator light, ZBLX green light on the display board (on the PC board display-ZBL1) will be illuminating since the beginning of ice making.

Note：
If defrost cycle does not start 60 Minutes after the starting of freezing cycle, the unit will automatically identify as freezing overtime and automatically enter into the defrost cycle. If the freezing overtime occurs to the ice maker 5 times in a row (caused by short of refrigerant, abnormal operation of defrost valve, etc.), freezing indicator light-ZBLX+R1LX lights will be blinking(on the PC board, it shows light SL1 blinking and light ZBL1 blinking). At this time, the user needs to disconnect the unit and contact with the service agent.

During refrigeration cycle, the pressure range of high-pressure side is:
NU100： 15～26 bar （218psi～377psi）
NU150： 15～27bar （218psi～391psi）
NU220： 15～26 bar （218psi～377psi）
NU300： 15～27bar （218psi～391psi）

The pressure of the high-pressure side is controlled by the condensation temperature sensor located at the condenser. If the condensation temperature senor senses the condensation temperature exceeds the set value, it will feed back to the PC board which will control the operation of fan.

Contrarily, when the condensation temperature senor is lower than the set value of condensation temperature, it will feed back to the PC board which will control the outage of fan.

Notes:
If condensation temperature probe senses the temperature is higher than 70℃(160°F), the unit will stop caused by the startup of protection device, while the R2LX on display board will be illuminating(light SL1 on PC board will quickly blink), warning user of too high condensation temperature.

After the condensation temperature is lower than 70℃(160°F), switch off the unit by the power button before the unit restarts, and switch on the ice maker, then waiting for 3 Minutes. After 3 Minutes of water injection, the ice maker is working normally.

Reasons for abnormal operation as follows:
Condenser is block;
- Air temperature is higher than 40 ℃ (100°F);
- To avoid abnormal operation and risk of the unit, the user should cut off the power upon one of the above reasons.

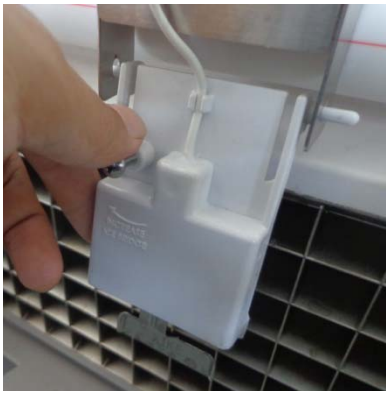
At the start of freezing cycle, pressure of refrigeration suction side or low-pressure side is rapidly reduced; the pressure will be gradually reduced as the ice thickness increases. When the ice cube is completely formed in the ice mold, pressure reaches:
NU100： 5～2 bar （58psi～29psi）
NU150： 5～2 bar （58psi～29psi）
NU220： 5～2 bar （58psi～29psi）
NU300： 5～2 bar （58psi～29psi）
Overall length of freezing cycle is between 15-40 Minutes.

Defrost cycle
The defrost cycle starts after the completion of the freezing cycle. Refrigerant hot gas discharged from the compressor flows into the evaporator coil though defrost valve.

Refrigerant circulated in the evaporator coil heats the ice molds to melt the ice cubes. Ice cubes fall off from the mold cup, into declining ice sliding plate by gravity and finally fall into the ice bin.

Components Description

Ice thickness sensor



The ice thickness sensor is located at the top of the evaporator plate. During freezing cycle, if the sensor probes ice, it will convert into electronic signal which will be transmitted to the PC board.

The PC board will control the time of the freezing cycle according to the ice thickness signal. The time of the freezing cycle depends on the ambient temperature and the ice thickness; the higher the temperature is and the thicker the Ice thickness sets, the longer freezing cycle will be.

Note ：
Ice thickness sensor is inoperative with non conductible water.

Condenser temperature sensor

Note:
Defrost indicator light TBLX is illuminating (on PC board, the light TBL1 is illuminating) at the start of defrost.

After the end of defrost cycle, hot gas valve, drain valve (equipped as per PC board) closed. The unit starts its new ice making cycle.

Refrigerant charge
Refrigerant: R404A
NU100：320g
NU150：320g
NU220：360g
NU300：400g

The condenser temperature sensor probe is located in the condenser, which detects the condenser temperature variations and transmits electronic signals to PC board.

Note:
If the condenser temperature probe detects that the condenser temperature is over 70℃ (160℉), the PC board will stop the operation of the machine immediately. The light R2LX will alarm and keep illuminating (The light SL1 on PC board will quickly blink)

Ice Full Controller
The ice full controller is divided into two parts: one part is a magnet part which is installed in the ice slide plate, and the other part is a magnetic sensor, which is installed on the plastic frame of the evaporator.

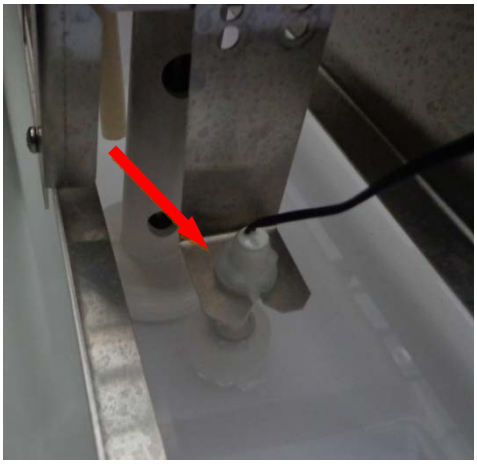
If the ice trough is not re-set and the magnetism is not sensed by the magnetic sensor within 40 seconds, it means that the ice cubes made in the last freezing cycle cannot drop into the ice storage bin, the ice storage bin

is full and the Bin Full BMLX (BML1 on PC board) Red LED indicates.

When the ice in the storage bin is taken out or moved, the ice trough is re-set, the magnetic sensor detects the magnetism, and the state of ice bin full is released then enters into the freezing cycle.

Note:
If the state of “ice bin full” is released within 3 minutes, the Bin Full BMLX Red LED blinks, 3 minutes later the ice machine will enter into freezing cycle automatically.
If the state of ”ice bin full” is released after 3 minutes more, the ice machine will enter into freezing cycle upon it is started.

Water Level Sensor



The water level sensor is located at the top of the water tank. When water level reaches a certain level during water filling, the magnetic sensor of the water level sensor detects the magnetism and signals it to the PC board. Once the PC board receives the signal, then it will power off the water inlet valve and water filling is stopped.

The water level sensor is installed on the support of water level sensor and can be adjusted.

Note:
When the water level in the water tank is considered to be too high and water overflows whenever water is filled, it is means that the water level sensor cannot control the water inlet valve, the position of the water level sensor can be adjusted lower. If the position of the water level sensor is adjusted low and the problem is not solved, it means that the water level sensor is failure and should be replaced.

Vertical Type Water Spray System

The water pump spray out the water sucked from the water tank. The water flow into the spray tube through the PVC tube, then pass the pinholes on the water tube, and then flow evenly through the ice molds of the evaporator, thus ice cubes are made. It is cycled continually.

Water pump

The water pump operates continually throughout the freezing cycle and keeps water flowing continually through the ice molds of the evaporator and produces ice cubes.

Recommendation:
The water pump should be checked at least every 3 months.

Water Inlet Solenoid valve - 3/4" Male Fitting

The water inlet solenoid valve is located on the up and down water support. The incoming water is controlled by the PC board, among which one water flow controller is used to control the water flow incoming the water tank.

Defrost Solenoid Valve

The defrosting solenoid valve, located at the hot gas bypass tube, is consisted of valve body and coil. During defrosting and water filling period, operation is controlled by the PC board.

During the defrost cycle, the defrost solenoid valve is energized and sucks the push rod of the valve body in order to let the hot gas discharged from the compressor to flow directly into the evaporator pipe to melt the formed ice cubes.

Fan

The Fan is controlled by PC board to draw cooling air through the condenser fins, thus to lower the discharge temperature of the compressor. Normally it operates intermittently only during the freezing cycle to keep the condenser pressure between two corresponding pressure values.

Compressor

The hermetic compressor is the heart of the refrigerant system of the ice machine and it is used to circulate and retrieve the refrigerant throughout the entire system.

It compresses the low pressure refrigerant vapor causing its temperature to rise and become high pressure hot vapor which is then released through the discharge valve and then will reach the condenser.

Water Drain Solenoid Valve

The water drain solenoid valve is controlled by the PC board. Based on the different configuration of the PC board(Drainage is set behind one ice freezing cycle, which is set by factory), it starts operating for 30 seconds so that all remaining water containing minerals in the water tank drains out.

High Pressure Control switch
The high Pressure Control is in the ice machine, when the ice machine occurs failure and the high pressure is more than 33bar(462psi), the high pressure control switch will cut off the electricity supply to protect the ice machine. The indicator lights ZBLX+R1LX will be keeping blink (on the PC board, light SL1 will bright.) until the high pressure lowers to 23bar (322psi), then can restart the ice machine.

Water temperature sensor
The water temperature sensor, located in the water pipes from the water pump to the ice plate, is used to detect the temperature of circulating water in real time and sent signals to PC board with which controls the operation of pump during the ice making cycle.

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

This drop in pressure causes the refrigerant to cool. The cooled refrigerant absorbs heat from the water circulating over the evaporator. As the evaporator fills with liquid refrigerant, the evaporator becomes colder.

The flow of refrigerant into the evaporator is controlled by the temperature at the outlet of the evaporator. The expansion valve bulb, mounted to the top of the suction pipe, senses the evaporator outlet temperature causing the expansion valve to open or close.

As ice forms on the evaporator, the temperature drops and the flow of refrigerant into the evaporator decreases, resulting in a drop in suction pressure.

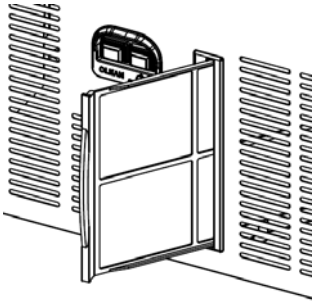
The evaporator should become completely flooded (filled with liquid refrigerant) during the freezing cycle. Only a completely flooded evaporator will have a uniform freeze pattern (ice forms across the evaporator). A starved evaporator (not enough liquid refrigerants) will have poor or have no ice formation, the outlet tube(s) exiting the evaporator will also not frost. All tubes should frost approximately 5 minutes from the start of the freezing cycle.

An expansion valve that is restricted or not opening properly will starve the evaporator resulting in lower than normal suction pressure. A low refrigerant charge will also starve the evaporator and cause low suction and discharge pressures. If not sure the amount refrigerant in the system, retrieve it back and recharge of the correct amount of refrigerant and then re diagnosis whether the valve is defective.

If the evaporator is starved but the suction pressure is higher than normal, it shows the TXV is good; If the TXV keeps open or if the thermal bulb doesn't contact well with the suction pipe, the flow of refrigerant into the evaporator will be too much and the liquid refrigerant will flood the compressor. The suction pressure will be higher than normal; the formation of ice is uniform, but the ice making cycle will become longer.

symptoms	issue	corrections
Evaporator flooded but suction pressure not dropping. Compressor has been checked and appears well. Suction pipe at compressor may be colder than normal	the thermal bulb of TXV doesn't contact well with the suction pipe TXV bulb is installed incorrect System overcharged	Tighten bulb clamp, and confirm that the insulation is good. Put the thermal bulb on the top of suction pipe. Recharge the refrigerant, and replace the TXV.
Evaporator starved, no frost on pipe(s) exiting evaporator, suction pressure is low.	Machine low on refrigerant charge TXV restricted or stuck	Retrieve the recharged refrigerant back and recharge of the correct amount of refrigerant Replace TXV and dry filter

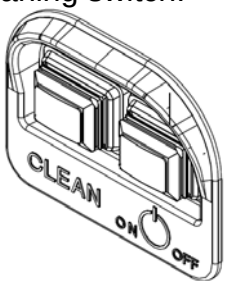
Air filter
The NU series air cooled ice machine is equipped with air inlet filter. As the ice machine runs, part of dust will be sucked in the machine through the filter, thus it cuts down the air volume to be sucked in and then the efficiency of the ice machine.



In order to enable the ice machine working efficiently, had better clean the air filter monthly. If the filter is damaged due to aging, call the Scotsman service agent to replace it.

Power switches on front panel

There are two buttons on NU front panel: the right green switch is the power switch, the red switch is the cleaning switch.

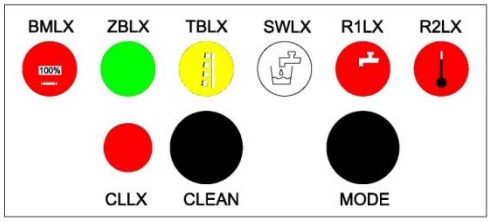


PC Board (Data processor)

The PC board, fitted in its box located in the left bottom of the front of the unit, consists of one power-in high voltage transformer, one PC board with both high and low voltage and a display panel connected with the PC board.

The PC board is the brain of the ice machine; it receives signals transmitted from the four sensors through its micro processor to control the operations of the different electrical components of the ice machine (such as compressor, Fan, defrosting valve, water inlet valve, drain valve, water pump).

The lamps on the control box



BMLX： Ice full
ZBLX： Freezing
TBLX： Defrosting
SWLX： Water Supplying
R1LX： Water Shortage
R2LX： High Temperature Alarm
CLLX： Cleaning
MODE： Mode Button（Function is the same with the main control board MODE)
CLEAN： Clean button（Function is the same with the main control board CLEAN)

Mode Button Functions

Press the button one time in order, the machine will enter the next step:
Power on - Water Supplying – Pre-Cooling – Freezing - Defrosting - Ice Bin Full Detecting

Warning:
Only authorized maintenance people are allowed to press the MODE button.

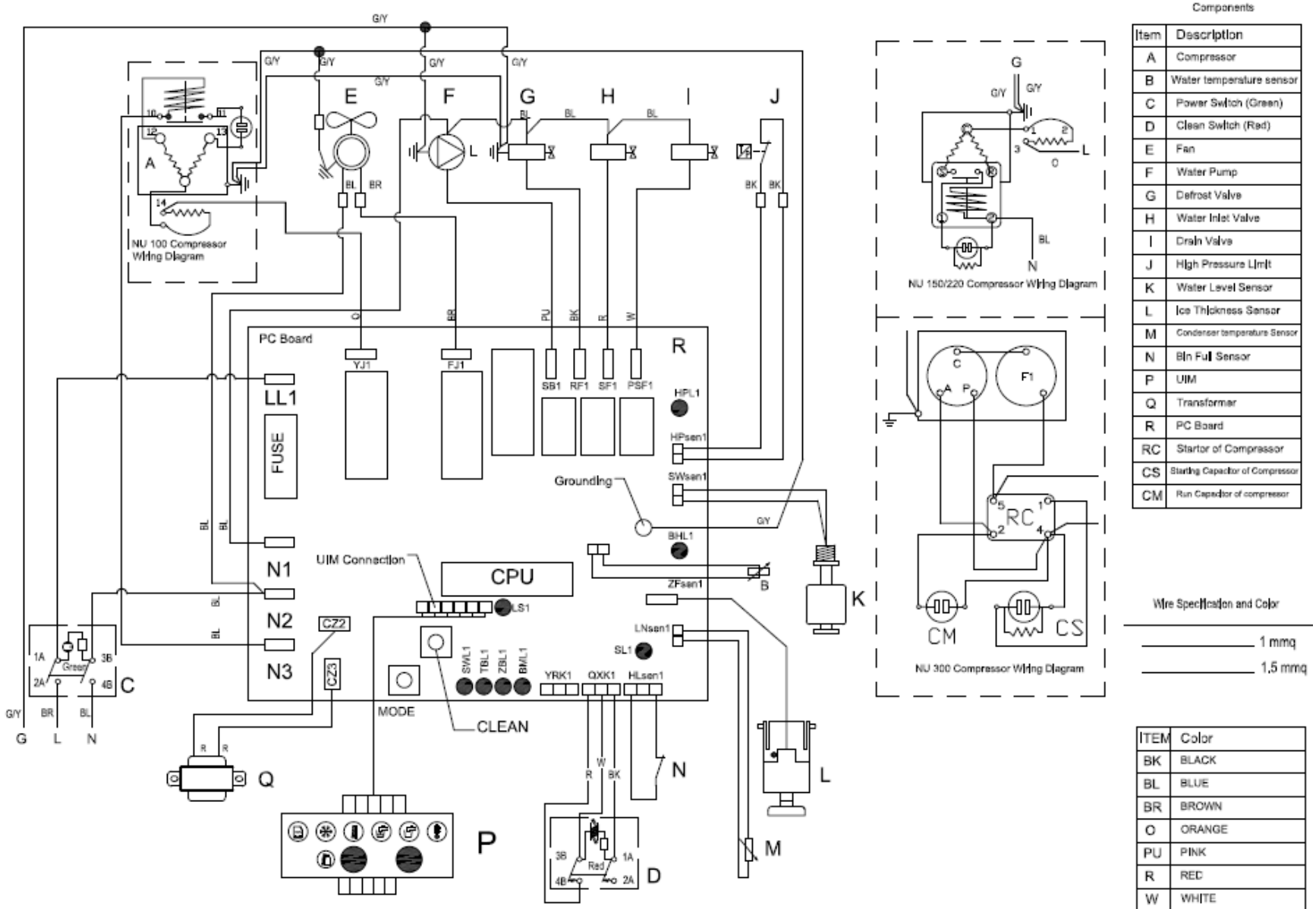
The function of the clean button

As power switching on, the clean button only activates in the first minute. Press the clean button and hold for 5 seconds, the ice machine will enter into the clean procedure automatically. Had better use Scotsman supplied cleaning solution and sanitizer to clean and sanitize.

Alarm lamps failure description:

lamps	State	Failure Description
BMLX + R1LX	On	Ice trough failure
ZBLX + R1LX	On	Making ice overtime more than 5 times
R1LX + R2LX	On	Condenser sensor failure
BMLX + R2LX	On	Ice thickness sensor failure
SWLX + R2LX	On	Water level sensor failure
R1LX	On	Shortage of water
R2LX	On	High temperature alarm
R1LX + R2LX	Blink	High pressure alarm
TBLX	Blink	Ice harvest overtime more than 3 times
SWLX	Slowly Blink	Water temperature sensor failure

Wiring diagram NU100/150/220/300



Components

Item	Description
A	Compressor
B	Water temperature sensor
C	Power Switch (Green)
D	Clean Switch (Red)
E	Fan
F	Water Pump
G	Defrost Valve
H	Water Inlet Valve
I	Drain Valve
J	High Pressure Limit
K	Water Level Sensor
L	Ice Thickness Sensor
M	Condenser temperature Sensor
N	Bin Full Sensor
P	UIM
Q	Transformer
R	PC Board
RC	Startor of Compressor
CS	Starting Capacitor of Compressor
CM	Run Capacitor of compressor

Wire Specification and Color

1 mmq

1,5 mmq

ITEM	Color
BK	BLACK
BL	BLUE
BR	BROWN
O	ORANGE
PU	PINK
R	RED
W	WHITE
G/Y	YELLOW/GREEN

Trouble shooting table

Symptom	Possible Cause	Suggested Correction
Unit does not run	Abnormal power supply	Check power supply voltage, if no voltage, check power supply line Check power supply voltage, if it is low, contact power supply company
	The fuse on PC board blew	Replace the fuse. If the fuse is broken again, check the cause.
	The machine is stopped abnormally(such as high temperature protection)	Press the MODE key on the PC board to reset, the machine starts or starts automatically 2 hours later or unplug the power plug, plug it again 3 minutes later, the machine starts.
	Ice full	Adjust the position of the ice cubes in the storage bin to let the ice trough reset and then start the machine
	Abnormal water supply	See the processing method for water-shortage
Compressor runs intermittently	Low voltage	Check circuit for overloading
	Non-condensable gas in system	Check power supply voltage, if it is low, contact power supply company Purge the system and re-charge
	Compressor starting device with loose wires	Check for loose wires in starting device
	Mechanical problem	Replace compressor
Cubes too small	Ice making cycle too short	Check the distance between the ice thickness and the evaporator plate
	Expansion valve partially blocked	Check the expansion valve, if damage , replace it
	Moisture in the system	Purge the system and re-charge
	Shortage of water	See the processing method for water-shortage
	Shortage of refrigerant	Check for leaks in the refrigerating system & recharge
Cloudy ice	Shortage of water	See the processing method for water- shortage
	Dirty water supply	Use water softener or water filter
	Accumulated impurities	Cleaning as the procedure
	Water temperature sensor failure	Replace the water temperature sensor
Shortage of water	Water spilling out through ice chute	Tighten the screws on the clamping plate of the PVC pipe to reduce water flow
	Water inlet solenoid valve not opening	Check, if damage, replace it
	Water leak in water tank	Check for the leaking points and repair it. If necessary, replace it.
	Water inlet valve blocked	Replace the water inlet valve
	Water drain valve leak	Check, if damage, replace it

Trouble shooting table

Symptom	Possible Cause	Suggested Correction
Irregular cubes size & some cloudy	Spray pipe blocked	Clean the spray pipe
	Shortage of water	See the processing method for water-shortage
	Machine unlevel	Level the machine as required
	Water temperature sensor failure	Replace the water temperature sensor
Decreased ice capacity	Inefficient compressor	Replace the compressor
	Water valve leak	Check, if damage, replace it
	Spray pipe blocked	Check, if blocked, clean it.
	Non-condensable gas in system	Vacuum and re-charge
	Bad ventilation	Improve ventilation or put the machine to the good ventilation place
	Too much dust on air filter	Clean the air filter, if needed, replace it.
	Expansion valve partially blocked	Check, if damage, replace it
	Defrost valve leaking	Change charged volume, release slowly
	Refrigerant over charge Shortage of refrigerant	Vacuum and re-charge according to the nameplate
	Discharge pressure too high or too low	Check for the cause of incorrect discharge pressure
	Defrost valve blocked or not open	Check, if damage, replace it
Unit doesn't defrost or no ice	PC board Failure	Check, if damage, replace it
	Defrost valve not opening	Check, if damage, replace it
	Water inlet solenoid valve not opening	Check, if damage, replace it
Incorrect discharge pressure	Inoperative condenser sensor	Check, if damage, replace it
	Too much or less charged refrigerant, or non-refrigerant gas was charged	Check whether the refrigeration system is leakage Vacuum and re-charge according to the nameplate and the requirement from Scotsman Company
	Inoperative PC board	Check, if damage, replace it
Excessive water on unit base	Water system leak	Check for the leaking points and repair it. If necessary, replace it.

Clean and maintenance

General

The periods and the procedures for maintenance and cleaning can be adjusted.

Cleaning, especially, depends upon local water and ambient conditions and the ice volume produced. Each ice machine must be maintained individually in accordance with its particular location requirements.

Note:
Cleaning should be varied according the local water quality and the operating condition of each ice machine. Check frequently cleanliness of ice cubes and the components of the water system before and after cleaning to determine the cleaning frequency and procedures needed.

Ice-making System Maintenance description

The following maintenance on the ice machine should be scheduled at least two times per year:

1. Unplug the power plug at the end of the defrost cycle.
2. Check and clean the water inlet strainer.
3. Check that the ice machine is leveled in side to side and in front to rear directions.
4. Use special ice machine cleaning liquid to clean water system, evaporator and ice storage bin.
5. When air cooled icemaker stops, can remove the air filter.
6. Check for water leaks and tighten drain pipe. Pour water into storage bin to verify whether the drain pipe is Smooth and clean.
7. Check for refrigerant leaks.
8. Check size, condition and quality of ice cubes. Perform adjustment of cube size control as required.

Water System Cleaning

Cleaning

1. Prepare special cleaning solution for the ice machine in a plastic container.

Warning:
Before opening cleaning solution, must check the instruction of the cleaning solution in order to avoid damage.

Note:
Cleaning solution for ice machine is corrosive. If it splashing on your mouth can cause mouth burns, So don't make it splash. In case cleaning solution splashes on your mouth or eyes, use a lot of water or milk to wash and should go to hospital immediately. When washing the external surface, children are not allowed to close.
Cleaning solution should be kept away from children.

2. Scoop out all the ice cubes stored into the bin to prevent them from being contaminated with the cleaning solution.
3. Use a brush to take some cleaning solution to dissolve the impurity material on the ice module of the evaporator and clean scale deposit.
4. Pour the cleaning solution into the water trough of the ice machine.
5. Turn on the power switch, press “clean button” and hold for 5 seconds, let the machine go to the Cleaning and rinsing procedure (Cleaning RED light will blink fast), all cleaning and rinsing time is about 40 minutes. After cleaning and rinsing procedure finished, the cleaning RED light will blink slowly.
6. Remove the water spray pipe and the water trough to wash them separately (if necessary).
7. Turn off the power switch after cleaning and rinsing process finished. Turn on the power switch again, the ice machine starts freezing cycle normally.

Sanitizing

Warning:
Never mix the cleaning solution with the sanitizer.

1. Do sanitizing after cleaning operation for the ice machine:
2. Prepare a plastic container, use warm water of 45-50℃ (113℉-122℉) to dilute the cleaning sanitizer.
3. Pour the sanitizer into the water trough of the ice machine.
4. Turn on the power switch, press “clean button” and hold for 5 seconds, let the machine go into the cleaning and rinsing procedure (Cleaning RED light will blink fast), all cleaning and rinsing time is about

40 minutes. After cleaning and rinsing procedure finished, the cleaning RED light will blink slowly.

5. At the end of the freezing cycle, make sure of proper quality and cleanness of the ice cubes and that, they do not have any acid taste.

Note:
If the ice is cloudy and sour, use hot water to dissolve them and pour them to the safety place appointed in order to avoid eating by mistake which may cause injury.

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

Note:
To prevent the accumulation of undesirable bacterial, it is necessary to sanitize the interior of the storage bin every week.

Winterizing Procedures

Important!
Whenever the ice machine is taken out of operation during the winter months, the procedure below must be performed. Failure to do so may cause serious damage and will void all warranties.

1. Check the ice machine, if ice is being made, initiate harvest or wait for freezing cycle end.
2. At the beginning of harvest, cut off the water supply to the ice machine.
3. At the end of harvest, cut off the power switch and drain water in the system completely as far as possible.
4. Take out all of the ice in the storage bin and discard.

Scotsman Ice Systems

Scotsman Ice Systems (Shanghai) Co., Ltd.

Address： Room 2505, Building 2, No 20 Xuhong Middle Rd, Shanghai, China. (200235)
Phone：00 86 - 21- 61313200
Fax: 00 86 - 21- 61313330
Hotline: 00 86 - 4006300076
E-Mail: sales@scotsman-china.com
Website: www.scotsman-china.com