



SERVICE MANUAL FOR FF 1 – 5 E MODELS

(Evaporator Only)

380v – 415v 3 phase 50hz



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I. Overview

Read this service manual carefully before installation and operation of this ice machine.

This Service Manual gives an introduction of operating conditions, performance parameters, installation and troubleshooting procedures of the FF series Sub Zero ice machines. The ice making system has a vertical, static evaporator with a rotating auger. The machine is equipped with a P.C. board, which controls and monitors the functionality, indicating:

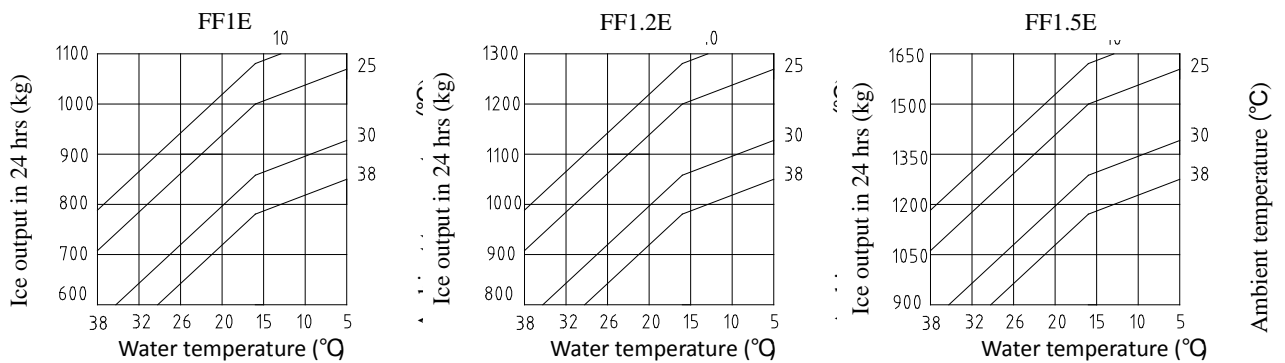
- (1) Ice level
- (2) Water level in water tank
- (3) Motor and gearbox operation
- (4) Temperature of Evaporator

II. Operation Conditions & Performance Parameters

1. Conditions for Operation

	Minimum Conditions	Operating	Maximum Operating Conditions
Ambient Temperature	5°C		40°C
Water Temperature	5°C		40°C
Water Pressure	0.15MPa		0.5MPa
Deviation from Voltage Rating	-10%		+10%

2. Diagram for Ice Output of Ice Machine

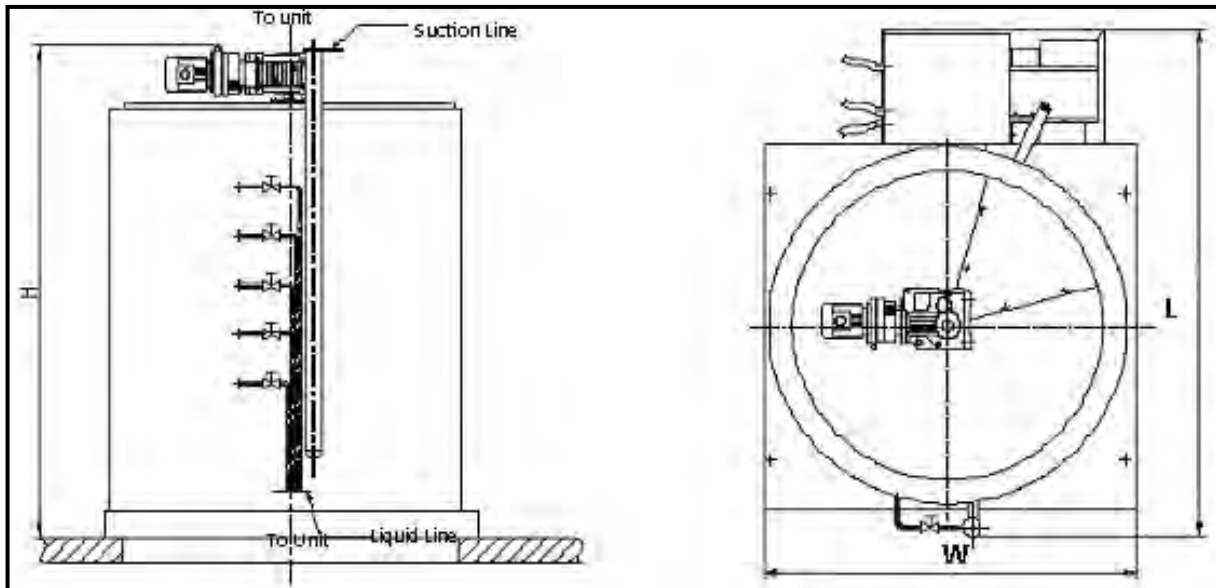


The parameters are subject to change without notice.

3. Dimensions (see figure 1)

Pipe Connection (Front View)

Pipe Connection (Top View)



Type	Standard Ice Output 1000kg /24h	Dimension mm (L×W×H)	Gear Box Motor Power (W)	Water Pump Motor Power (W)	Water Consumption l/h	Refrigeration Power (kW)	Inflow Tube OD Φ(mm)	Air Suction Tube OD Φ(mm)	Weight (t) kg	Water Inlet Pipe (female threaded)	Water over flow Pipe (OD)
FF1E	1	1050*850*870	180	10	42	5.5	12.7	22	170	3/4"	Φ21
FF1.2E	1.2	1050*850*880	180	10	50	6.6	12.7	22	180	3/4"	Φ21
FF1.5E	1.5	1050*850*1050	180	10	63	8.5	12.7	28	200	3/4"	Φ21
FF2E	2	1050*850*1080	180	20	83	11.0	12.7	28	230	3/4"	Φ21
FF2.4E	2.4	1050*850*1250	180	20	100	13.5	12.7	28	240	3/4"	Φ21
FF3E	3	1050*850*1300	180	20	125	16.5	12.7	28	280	3/4"	Φ21
FF5E	5	1850*1150*1250	370	65	208	28.0	28	54	800	1'	2*Φ21

4. Specifications

- Notes:
- Standard operating conditions: Ambient temperature 25°Cair and water temperature 16°C
 - The evaporator temperature shall be -22°Cand condenser temperature + 45°C(air-cooled) or 40°C(water-cooled).
An EPR valve is recommended with multi compressor/ evaporator systems.
 - Power supply: 415V/50HZ/3N
 - Refrigerant: R404A
 - Supply water pressure: 0.15-0.5MPa

III. Packing/ Transportation/ Storing and Installation

1. **Packing, Transportation and Storing** The ice machine is packed in plywood.

Beware of collision, vibration, tilting, inversion, etc. in transportation and storage. Ice machine should be kept below 40C, dry, and well-ventilated

Before you begin:

- A. Check your paperwork to determine the model received matches your order.
- B. After uncrating and removing all packing material, inspect equipment for any shipping damage.
- C. Check whether all connections (water system, refrigerant system, etc.), electrical connections (wires, PC board, etc.) and mechanical system are in good condition.

2. Installation

- A. Electrical connections must comply with local standards and requirements on the rating plate of the machine.
- B. An isolation switch must be installed
- C. Constant water supply (Pressure between 0.15 kPa to 0.5 MPa) and stop cock shall be supplied within 1 mtr of the ice machine. Suitable drainage point shall be within 1 mtr of ice machine. Two separate water drainage lines shall be required for draining the ice machine and the ice storage bin.
- D. The ice machine shall not be placed (1) without suitable ventilation; (2) next to heat sources; or (3) outdoors.
- E. To ensure ice quality a water filter should be installed in icemaker inlet water line.

3. Pipe connection Diagram and Machine dimensions and Ice Outlet Dimensions of 1-3-ton FFE Ice-makers

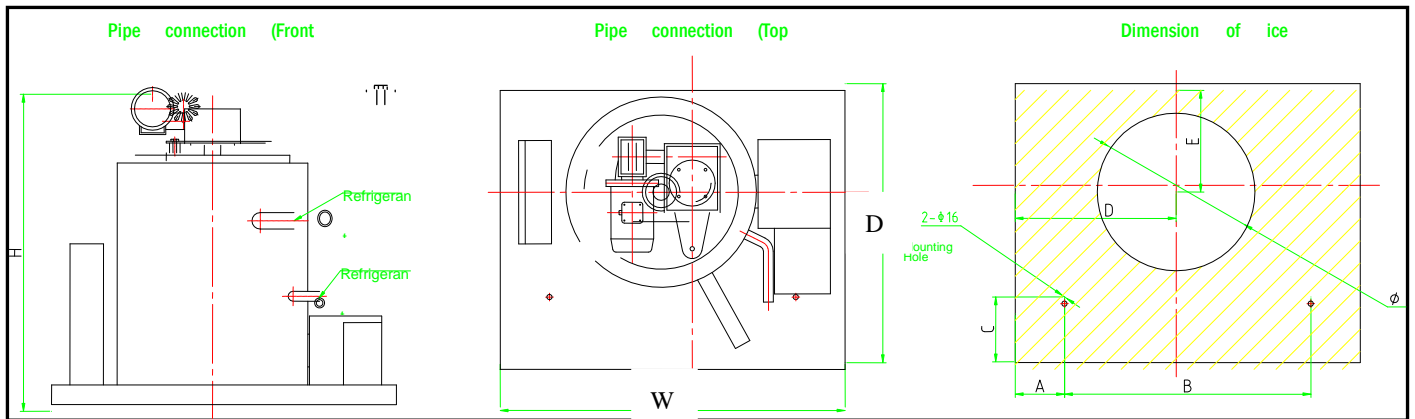


Figure 3

Type	A	B	C	D	E	D	W	H	Φ
FF1E	150	750	198	490	310	1050	850	870	480
FF1.2E	150	750	198	490	310	1050	850	880	480
FF1.5E	150	750	198	490	310	1050	850	1050	480
FF2E	150	750	198	490	310	1050	850	1080	480
FF2.4E	150	750	198	490	310	1050	850	1250	480
FF3E	150	750	198	490	310	1050	850	1300	480

IV. Operating Procedures

1. Before start up check the following:

- 1) Power connections are safe, reliable and complies with local standards and requirements on the rating plate on the machine
- 2) Water pressure is within the specified range of 0.15-0.5MPa.
- 3) The earth wire is securely connected.
- 4) All fastening bolts have been tightened.

2. Start

- 1) Open water supply valve to fill up the water tank, the float valve will automatically close when water reaches the desired level.
- 2) During testing turn on the circuit breaker, Turn Manual "Off/Auto" button on the electrical cabinet to Start position, enabling the ice-maker to enter a 5-minute-delay state (Start Delay indicator light blinks) which is followed by the automatic start of gear box and water pump (1) Check that the ice blade is rotating in the right direction (2) water level in distributor pan is aligned with the red mark and water flow is adequate. If operation is normal then switch Stop / Start switch to Stop.
- 3) Ice production stage: Switch the Start/Stop button of ice machine to Start, which enables the ice machine to start ice production after a 5-minute delay. Start refrigeration system and open suction and liquid line valves. When refrigeration system reaches an evaporator temperature of -20c, Ice will be produced.

3. Stop

When the Manual "Off/Auto" button is switched off, water pump and liquid line solenoid valve stop working immediately, and the gear box stops working after a 3-minute delay so as to remove ice left on the interior of the evaporator cylinder.

4. Failure due to alarm

- 1) Unit stopped due to ice full level alarm (normal stop):

When PC board detects full level of ice in storage bin, Water pump and solenoid valve are stopped first, and then the gear box motor stops after a 3-minute delay and ice full level indicator turns on at the same time. Now the system is in stand-by mode. After the ice is removed from bin full sensor, the system will return to normal operating status: gear box motor, water pump and solenoid valve will be started in sequence.

- 2) Failure due to low water level alarm:

When PC board detects low water level in the storage tank: water pump and solenoid valves stop first, and then gear box motor stops after a 1-minute delay and low water level indicator turns on at the same time. Now the system is in stand-by mode. After the water tank is refilled, the system automatically returns to normal operating status: gear box motor, water pump and solenoid valve will be started in sequence.

- 3) Failure due to low speed of gear box motor (Fault Light ON)

When PC board sensor detects suspension, reversal or low speed of gear box motor, Gear box motor, water pump and solenoid valve stop and give alarms simultaneously. Fault will need to be diagnosed, eliminated and PC fault reset for system to return to service.

4) High evaporator temperature alarm (Fault Light FLASHING)

After 10-minutes of operation, PC board begins temperature detection program: when evaporator temperature exceeds a set point, the microprocessor implements a Hi-temp fault program: water pump and solenoid valve stop immediately and gear box stops after a 6-minute delay and gives alarm signal simultaneously. The fault will need to be diagnosed, rectified and fault reset for system to return to service.

Other notes: This machine does not indicate condenser temp.

A. Electric box Panel Diagram 5 :

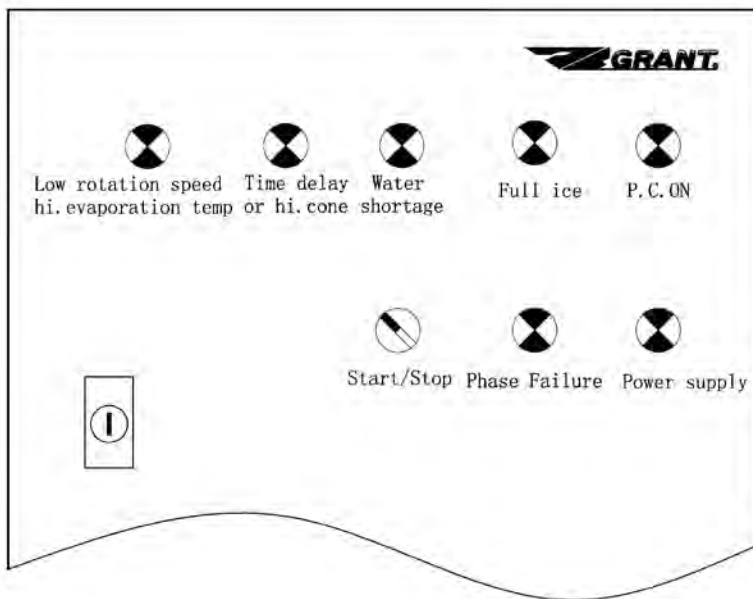


Figure 5



Manual Off/Auto switch install on ITS

B. Manual “Off/Auto” Switch

- a. Starts or Stops the machine.
- b. Restarts the machine after a fault has been rectified.

C. “DIP” Switch: P.C. board is equipped with 8 “DIP” switches, which do not need to be adjusted in normal operation, all switches are set to OFF position except No.2, No.3 and No.6 switch to ON position, as shown in Figure 6 below.

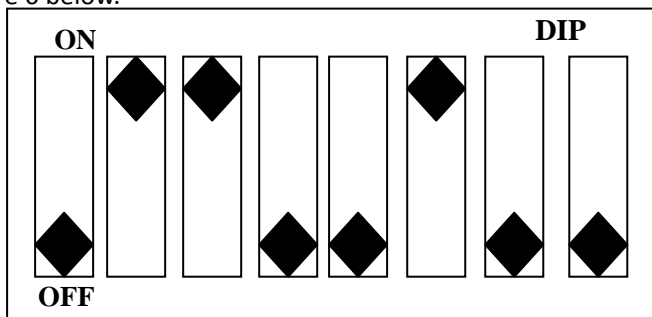


Figure 6

No.1 Switch: When the switch is set to ON position, the machine will be started without a 5-minute delay; when it is set to OFF position, the machine will be started with a 5-minute delay. The switch is set to OFF position at factory. No.2 & No.3 switches: are in ON position for sub zero ice production. No.6 switch: Alarm buzzer, factory set in On position.

V. Operating Principles

1. Refrigeration System (See Figure7)

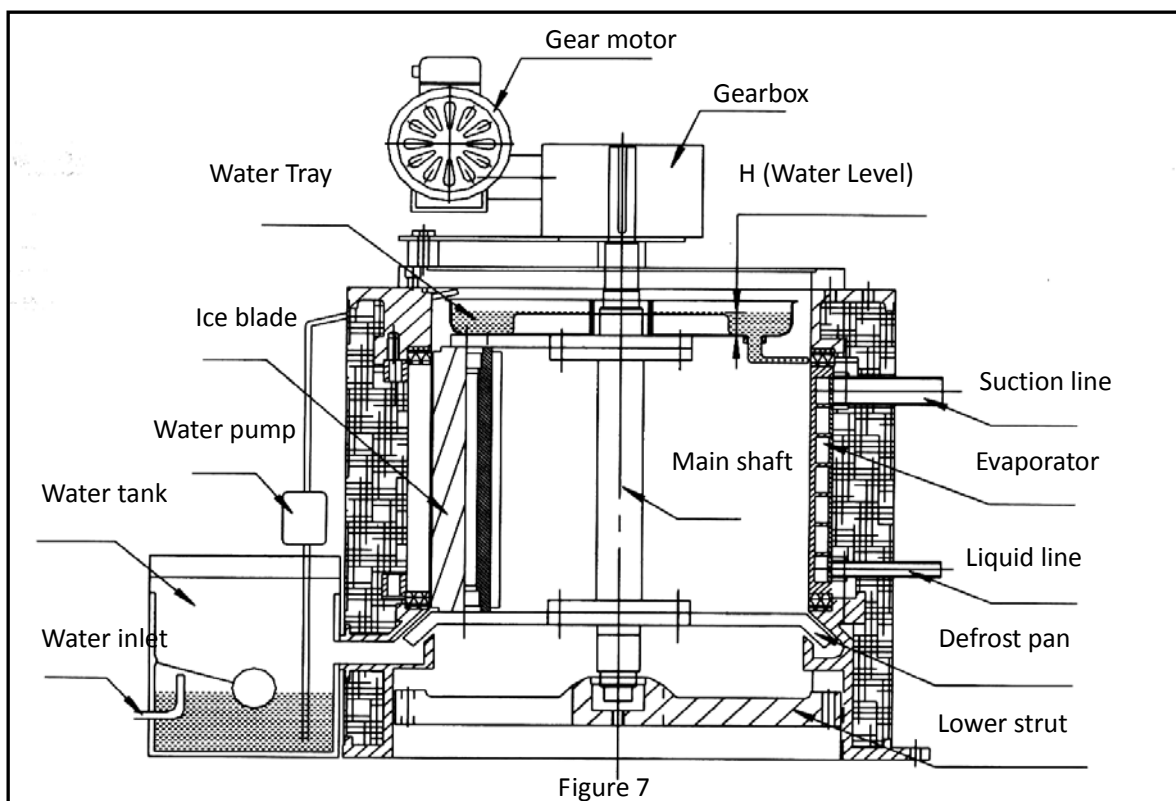
When liquid refrigerant flows through evaporator cylinder, the refrigerant lowers the temperature of the evaporator cylinder through heat exchange, meanwhile water in contact with the evaporator surface freezes, and ice detaches from the surface from the action of the ice blade rotation and falls into ice storage bin.

2. Water Circulation System (See Figure7)

Supply water flows into the water tank via the float valve. Water is pumped into the distributor pan and then flows to the evaporator's interior surface. The cooling process occurs gradually and part of the water turns into ice. The ice is detached from the interior by the rotating blade and falls into the ice storage bin.

Note :

- 1) Feed water level is monitored by a sensor. In case water tank runs out of water or has soft water (demineralized), P.C. board stops the operation of the machine and the yellow LED turns on to indicate low water level alarm. The machine will reset to normal operation after water level recovers.
- 2) When being tested at the factory, the water level in water distributor pan has been set in line with the red mark on the water level indicating bolt, If the water level is not in line with the red mark, the specified water level can be achieved through adjusting the valve in water tank or the valve fixed on the top of evaporator (with the depth of water in the pan being 26mm for 10-ton and smaller ice machine, 38mm for 15-ton and bigger ice machine).



3. Ice Level Control.

Between ice machine and ice storage tank there is an optical ice level control sensor. When the ice reaches the sensor and blocks the optical beam, the red LED at the center of the P.C. board goes out immediately. After the light beam has been blocked for a given time, production of ice stops and the yellow LED turns on to indicate ice full state. When ice is removed from the sensor, the light beam resumes and the red LED on the P.C. board lights immediately. Ice machine restarts in 10 seconds and ice full, yellow LED goes out.

4. Gear box system

This system consists of gearbox motor and gearbox. The former drives the latter, and the gearbox output shaft propels the rotating ice blade and water distributor pan. When gearbox motor runs in the wrong direction or its speed is less than 1300rpm, a signal is sent by the sensor to the P.C. board, which stops the operation of ice machine. The cause of fault must be identified and the fault eliminated before ice machine will restart. Press the Reset button on the P.C. board once or turn the Start/Stop button to reset the unit.

5. P.C. Board Control System (See Figure 8)

THE P.C. Board controls the entire process of ice machine operation based on the signals transmitted by different sensors.

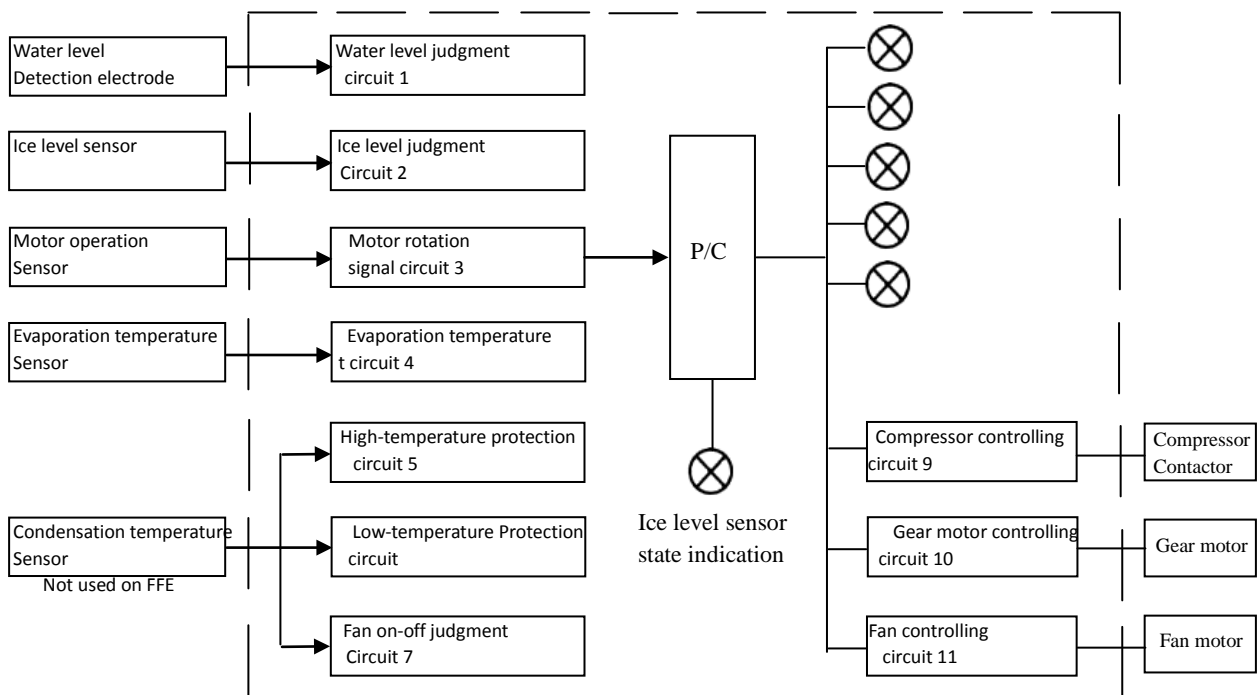


Figure 8

VI. Safety Precautions :



Warning: Main power supply must be cut before conducting any operation for clearance and maintenance ,Especially when the ice-machine is in the “bin full” and “no water” states. In this case, **DO NOT** do any maintenance or repair of the ice-machine (especially the inner part of the machine), Ice-machine may automatically start at any time.

Special care for the following safety precautions shall be taken into account during commissioning, normal operation and maintenance of ice machine.

- 1) No repair or maintenance shall be carried out before ice machine has been confirmed not in operation and disconnected from main power supply.
- 2) With ice machine in operation or energized, no body part or other object shall be allowed to enter the evaporator barrel.
- 3) After a power loss or outage, Take care to check rotation of gearbox
- 4) During installation, commissioning and operation be sure not to allow body to contact discharge pipes.
- 5) All refrigerant pipe work needs to be inspected and fully pressure tested before commissioning.
- 6) All state and local guide lines and standards must be adhered to.

VII. Cleaning Procedures



Warning: No cleaning or maintenance shall be carried out on the machine prior, to carrying out correct isolation procedures to isolate the machine from the power and water supply. Coast Distributors recommends the use of PPE when carrying out a service or maintenance on either the ITS, BIN, or Grant ice machine.

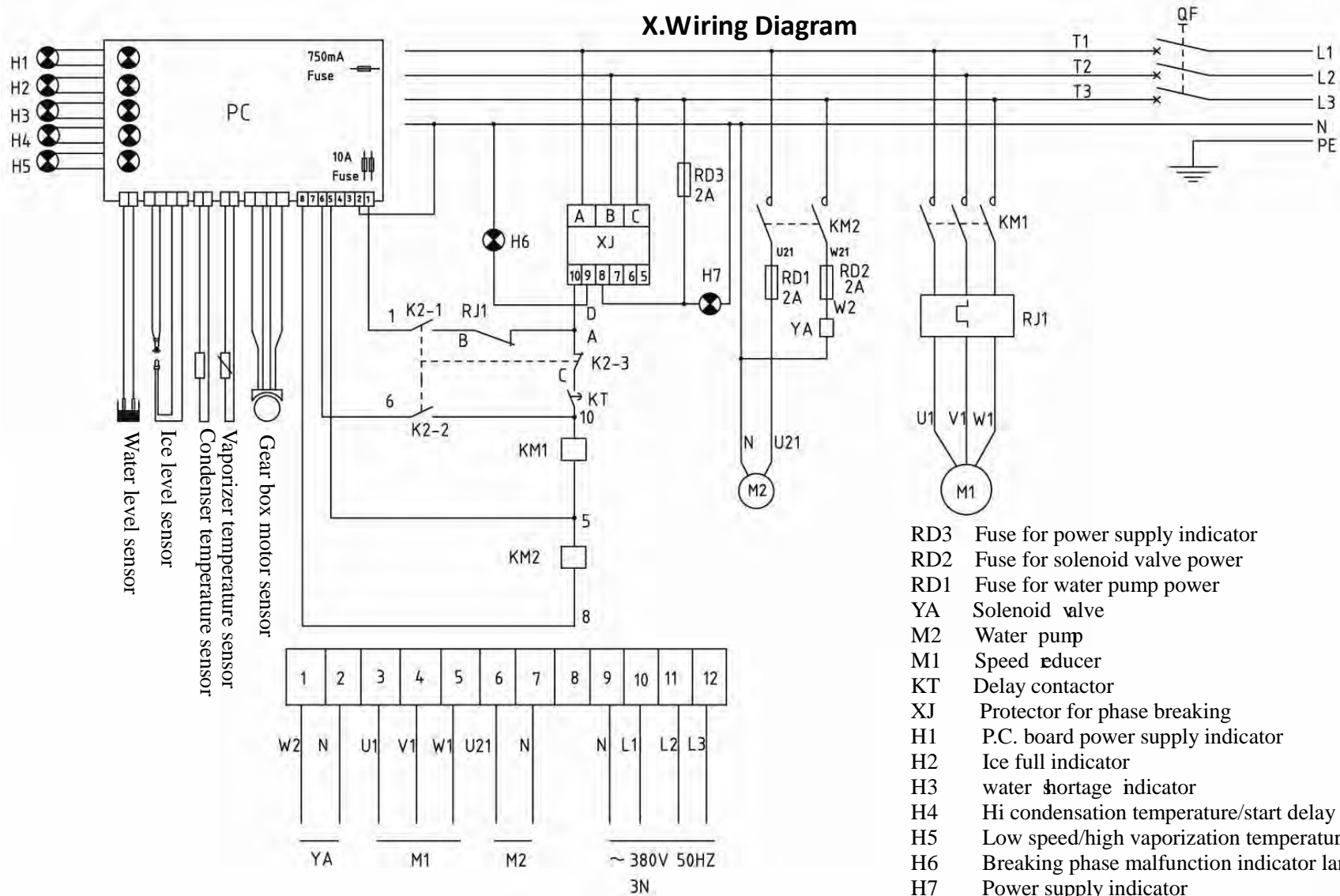
1. Carry out correct isolation procedures and test unit for power loss.
2. Isolate the water supply to the machine.
3. Remove and replace the water filter cartridge and purge approx 4ltrs of water through filter.
4. Carry out visual inspection of the unit.
5. Remove the black top plastic cover on the evaporator.
6. Check condition of water distributor and tubes.
7. Check condition of plastic water pan at the bottom of evaporator.
8. Check water float operation and water level. Adjust or replace if required.
9. Check water trough for foreign matter and clear if required.
10. Check water reservoir.
11. Check for any water leaks.
12. Isolate the refrigeration circuit, so as no refrigeration of the evaporator occurs this can be done by either separating the compressor overload from the contactor (all AR models)or isolating the power to the liquid line solenoid valve coil on (all FFE models)
13. Drain the water from the water reservoir via the drain tap on rear of tank and measure water quantity. This is to ascertain how much cleaning solution is required.
14. Make up correct amount of cleaning solution as per manufacturer's directions and empty solution into the water reservoir.
15. Re-energize the power to the machine and set dip switch 1of 8 (time delay override) to the up position and turn the machine on.
16. Run the machine for the correct indicated time as per chemical manufactures directions (usually 20 min). During this time the machine will fault on high evaporator temp alarm (10 min delay) and will require a reset to start the alarm delay over again.
17. Once the cleaning time has elapsed, turn unit off and drain the water and flush the system 4 times.
18. Clean the bin and flush / check the drain.
19. Drain the water from the water reservoir via rear drain tap.
20. Mix up and add sanitizer solution to the system, turn unit back on.
21. Sanitize bin.
22. Follow the manufactures directions on the sanitization procedure.
23. After 10 min reset and wait another 10 min. Once this time has elapsed, turn the unit off and drain the water and flush the system 4 times.
24. Carry out correct isolation procedure and test unit for power loss.
25. Re-connect the compressor overload or solenoid valve coil power.
26. Reset the delay timer dip switch (no 1 of 8) back to the off position "Down".
27. Clean the unit, condenser and covers where fitted.
28. Turn the water back on to the machine.
29. Re-energize the power and turn the machine on.
30. Check operation of unit.
31. Check Auto/Off/Man operation and time clock setting.
32. Check bin legs, door and trolleys where applicable.

The above procedure takes approx 1.5 to 2 hrs depending on, if is on a slope front bin or a Follett ITS.

VIII. Trouble-shooting

Fault Description	Possible Causes	Recommendations
Machine inactive (1) PC board Power indicator not on (2) Ice full level indicator on (3) Low water level indicator on (4) Evaporator temp indicator (flashing) (5) Low rotation speed indicator (on)	Main switch is set to OFF position P.C. board's fuse blown (750mA) Malfunction of P.C board Connection wire loose Malfunction of ice level control assy. Low water level or water too soft Evaporator temp. sensor damaged Low gas charge High ambient temp Gear box motor's rotation reversed Gear box motor's spinning speed is too low	Selector switch needs to be set to ON position Replace the fuse and diagnose the cause of fuse fault Replace the P.C.Board Check the wiring Clean or replace ice level control assembly Please refer to recommendations for low water level alarm Replace Check/ leak test and repair Check motor wiring and capacitor/ phase rotation Check motor bearing, evaporator cylinder bearings, TX adjustment
Compressor runs intermittently	Voltage is too low Non condensables Loose compressor contact terminals	Check supply power and wiring Eliminate the fault Check and tighten all wiring
Low ice production	Expansion valve partially blocked or not adjusted properly Moisture in the system Low water level in distributor pan Low refrigerant charge	Adjust TX valve Reclaim gas, evacuate and charge Adjust it to the specified water level Check for leaks and charge
Ice machine in operation but no ice is being produced	No water in water cylinder for ice production Gear box not rotating	Check water pump , flow valve and pipe work Check, repair or replace it
Water leak	Water level is too high in water tank Water level is too high in distributor pan	Adjust Adjust
Noisy gearbox	Motor's bearings worn out Gear box low in lubrication oil Gear box's bearing and gears worn	Check or replace it Check gear box and add lube oil Check and replace the worn parts
Low water level	Feed water pipe blocked	Dismantle and clean the pipe

X.Wiring Diagram

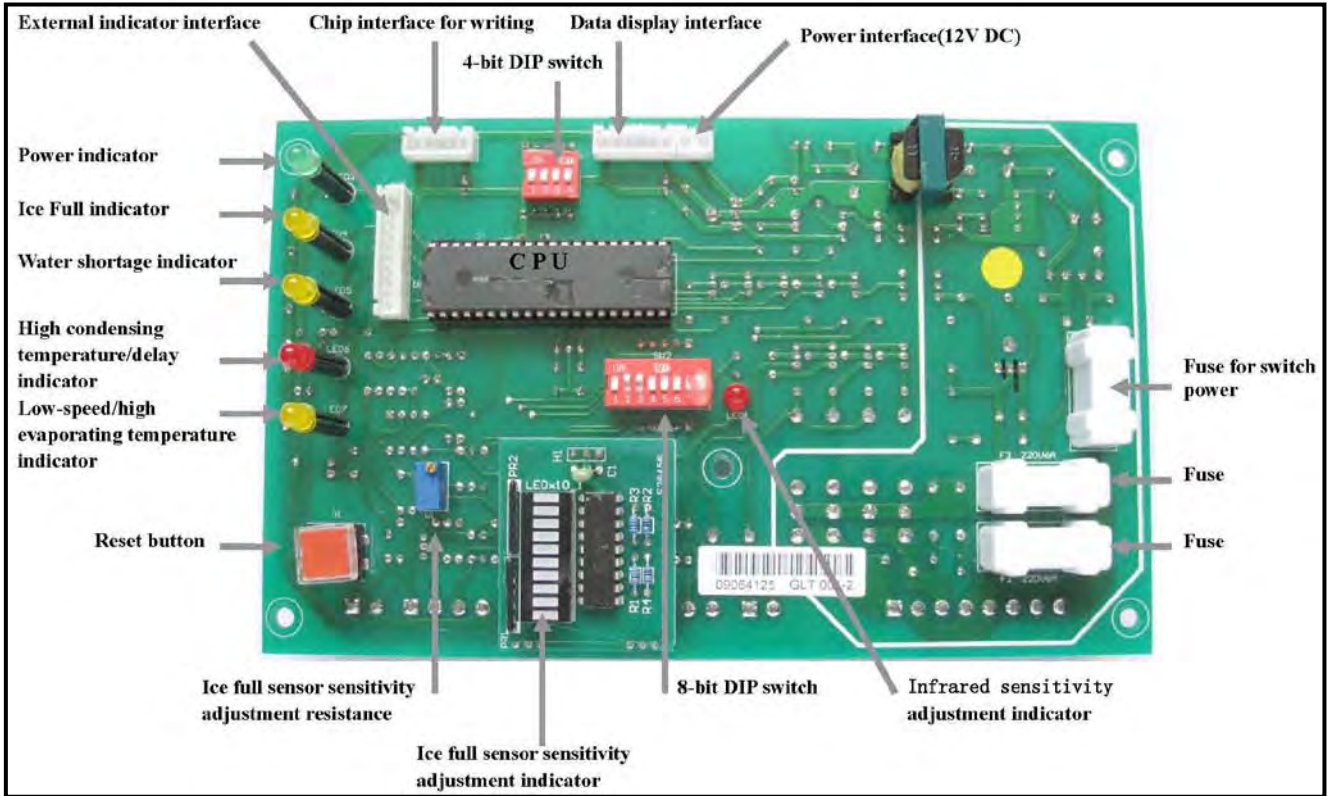


- RD3 Fuse for power supply indicator
- RD2 Fuse for solenoid valve power
- RD1 Fuse for water pump power
- YA Solenoid valve
- M2 Water pump
- M1 Speed reducer
- KT Delay contactor
- XJ Protector for phase breaking
- H1 P.C. board power supply indicator
- H2 Ice full indicator
- H3 water shortage indicator
- H4 Hi condensation temperature/start delay indicator
- H5 Low speed/high vaporization temperature indicator
- H6 Breaking phase malfunction indicator lamp
- H7 Power supply indicator
- RJ1 Thermal overload protector for speed reducer
- KM2 AC contactor of water pump
- KM1 AC contactor of speed reducer
- K2 P.C. board switch
- QF Air switch

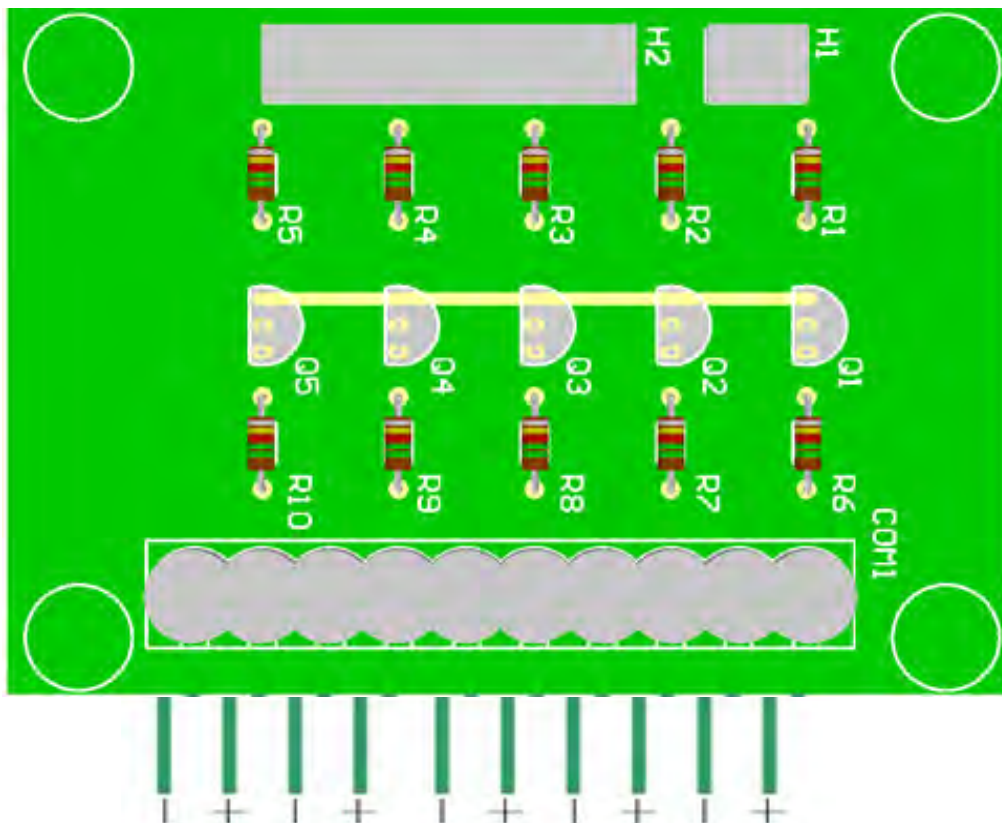
Notes: This machine does not use condenser temperature sensor

X. PC BOARD EXPLAINED

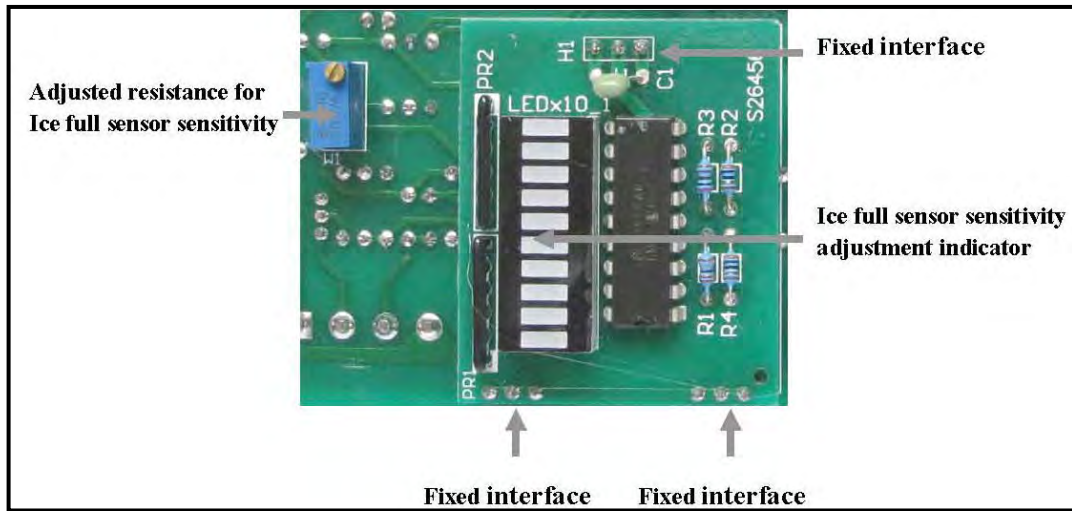
1、 Ice making PC board layout (back)



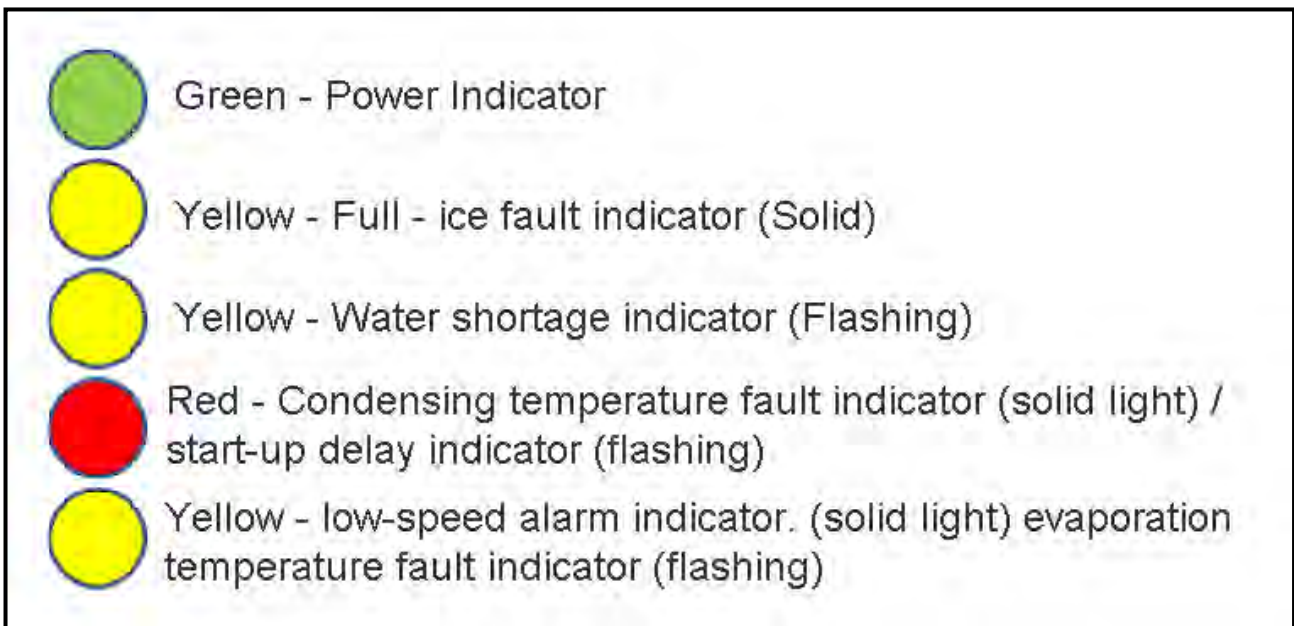
b) Ice making external indicator small board layout



c) Ice full sensor sensitivity small board layout



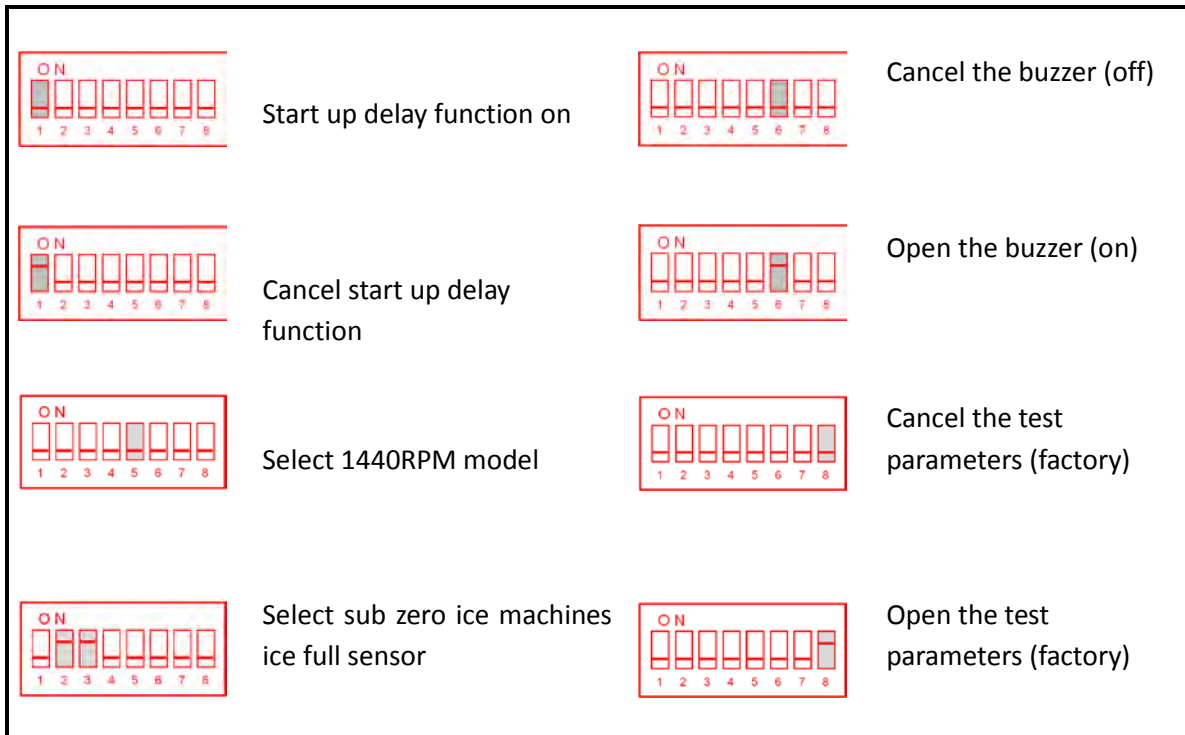
2. Fault Indicator



* When the power frequency is lower than 45Hz more than five seconds all the indicator lights flash at the same time

3. Dip Switch

1. 8-bit DIP switch (Attention: Please press reset button before resetting DIP switch.)



Eight-bit DIP switches on the centre of the PC board (Figure 3-1) are from left to right. Override is when dip switch is in the on position.

The function of the first bit DIP switch: Selects the starting up delay function. When the first bit DIP switch is on, the unit will start up with no delay. (This feature is used during maintenance of the ice machine). When dip switch is in the off position the unit will have a five minute delay, which is to ensure the sensor is clear of ice.

The function of the second and third bit DIP switch: Select the ice full sensor to suit ice type. To select sub zero machine ice-full sensor, both dip switch`s 2 and 3 are in the on position.

The function of the fourth bit DIP switch: DIP switch invalid.

The function of the fifth bit DIP switch: Selects the models of the gear motor.

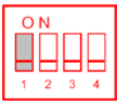







1440 RPM when the dip switch is in the off position (**the location of switch has been set up at the factory, the user should not be touched**)

The function of the sixth bit DIP switch: Selects the buzzer alarm. When the sixth bit DIP switch is in the on position, the buzzer will alarm when a fault is triggered, in contrast, the buzzer is silent when the dip switch is in the off position.

The function of the seventh bit DIP switch: DIP switch is invalid.

The function of the eighth bit DIP switch: Selects the test parameters .(testing the PC board design parameters at factory).(the switch has been set off at the factory)

b) 4-bit DIP switch (Warning: Please press reset button before resetting DIP switch.)

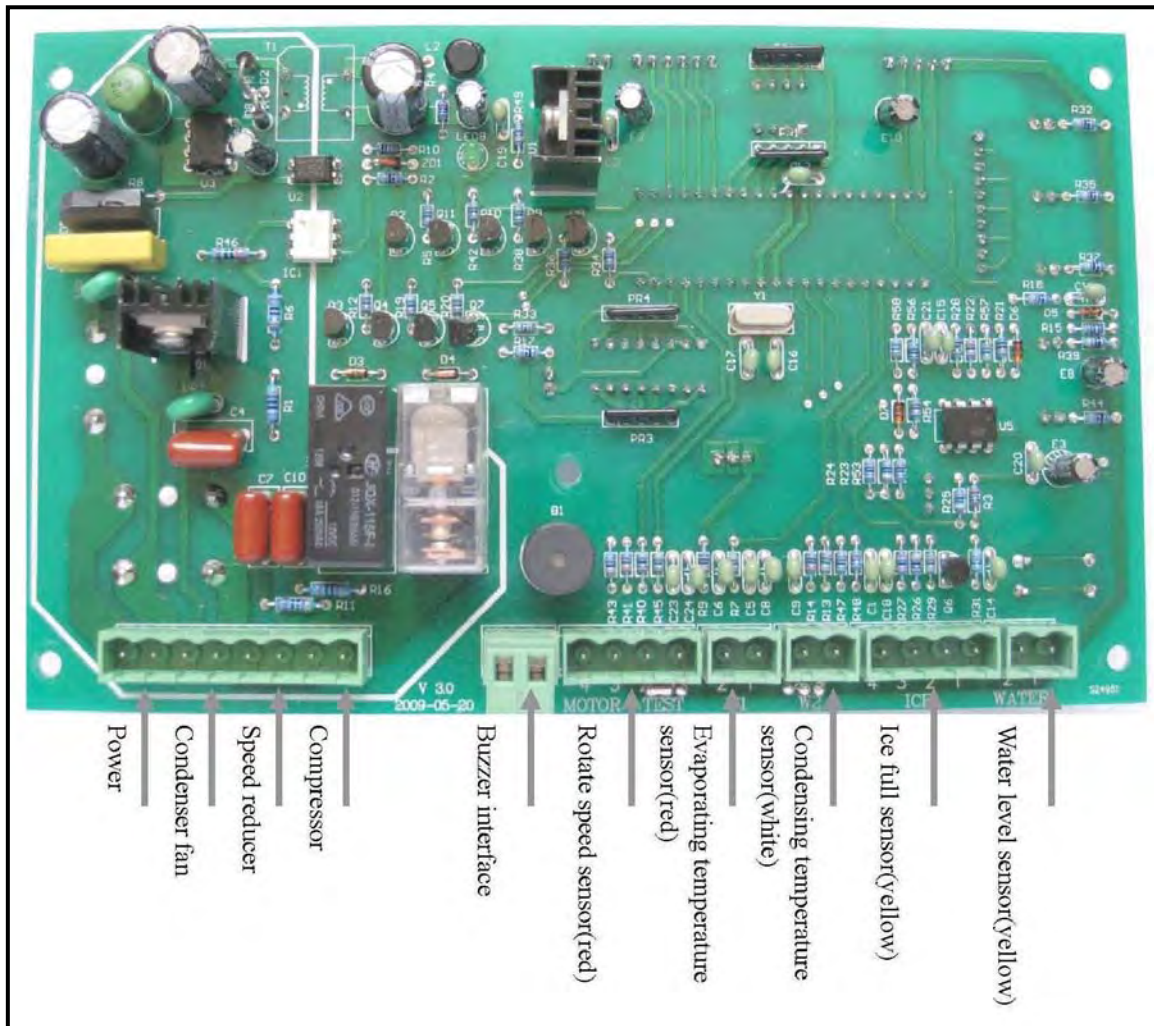
	Turns on the low-rotating speed fault protection		Turns on the evaporating temperature protection
	Turns on the low-rotating speed fault protection		Turns on the evaporator temperature protection
	Turns on the condensing temperature protection		Turns on the ice full protection
	Turns on the condensing temperature protection		Turns on the ice full protection

Four-bit DIP switches on the center of the PC board (Figure 3-2) are in order from left to right.

The function of the 4 dip switch's are to bypass any of the 4 sensors so the machine can continue to function until the fault is rectified. When a bypass is activated the fault light for that sensor will continue to be activated until the fault is rectified and the unit is reset.

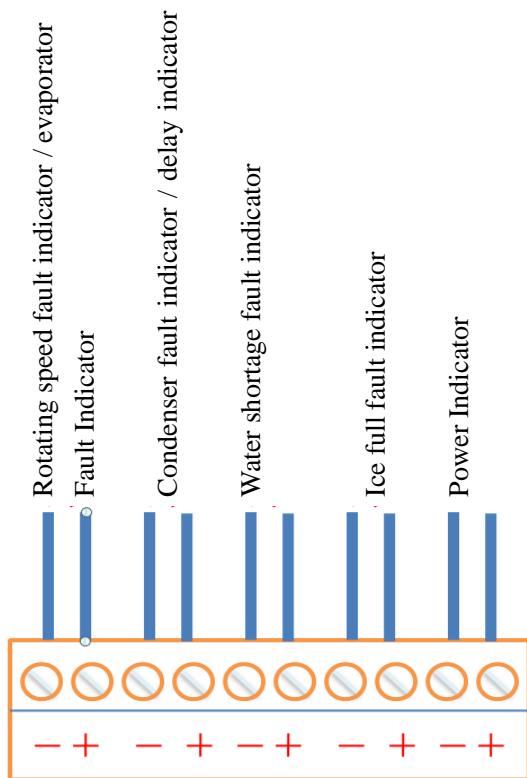
4 . Electrical wiring diagram

a). Ice machine PC board wiring diagram

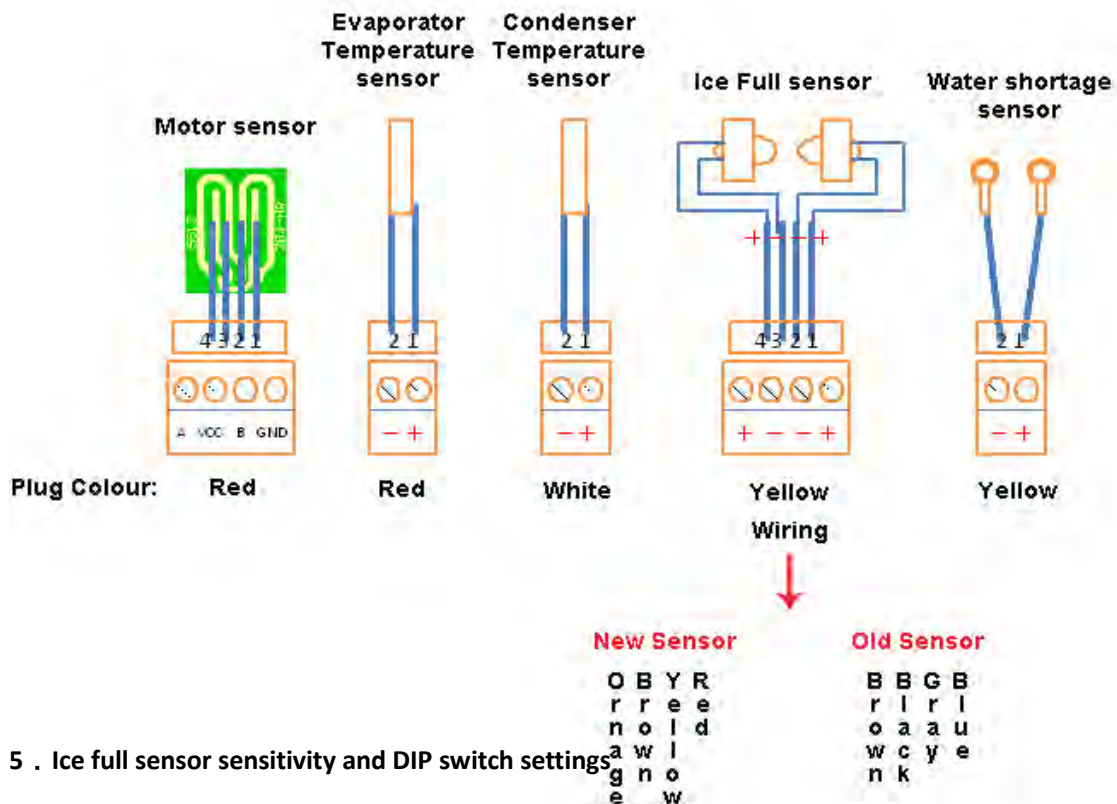


Ice making PC board layout (front) figure 4-1

b) Ice machine external indicator (small board) wiring diagram



c) Ice making sensor wiring diagram



5 . Ice full sensor sensitivity and DIP switch settings

a)、Ice full sensor sensitivity settings

Flake ice machine : XB70—XB550 model

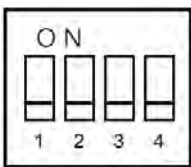
5 indicator.

Sub Zero machine : PBO.4F/A—PB50F/A model 5 indicator.

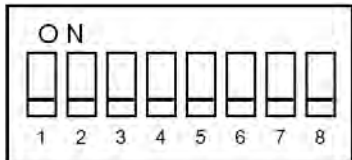
b) setup of ice full sensor sensitivity

Ice full sensor sensitivity may diminish after a certain period of time. At this time, It can be adjusted by the ice full sensitivity resistor on the PC board. Clockwise rotation will increase the number of lights; ice full sensor sensitivity will increase accordingly. Anti clockwise rotation will decrease sensitivity and decrease the number of lights

The LED 1 next to the 8 dip switches is the sensitivity indicator, when the LED is lit the bin is empty, when the LED is off the bin is full.



- 1(ON): Cancel ice full protection.**
- 2(ON): Cancel evaporation temperature protection.**
- 3(ON): Cancel condensing temperature protection.**
- 4(ON): Cancel low rotating speed protection.**

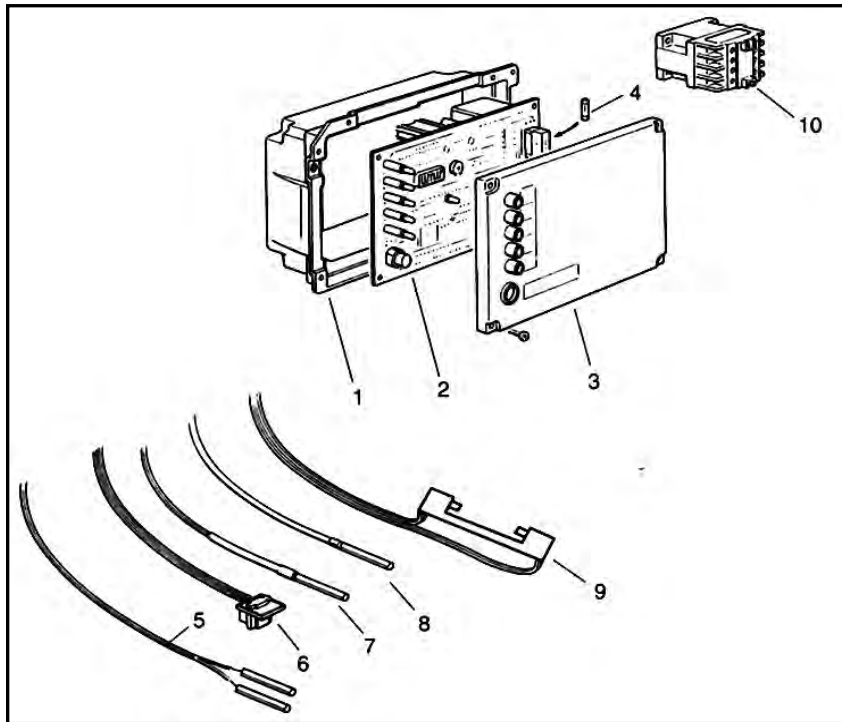


- 1 (ON): Cancel starting up delay.**
- 2,3 (ON): Select sub zero ice machine's ice-full sensor**
- 4 (OFF): Not Used**
- 5 (OFF): Select 1440RPM model.**
- 6 (ON): Turn on the buzzer.**

Warning: Please press reset button before resetting DIP switch

Spare Parts

P.C. Board and Sensor Assy.

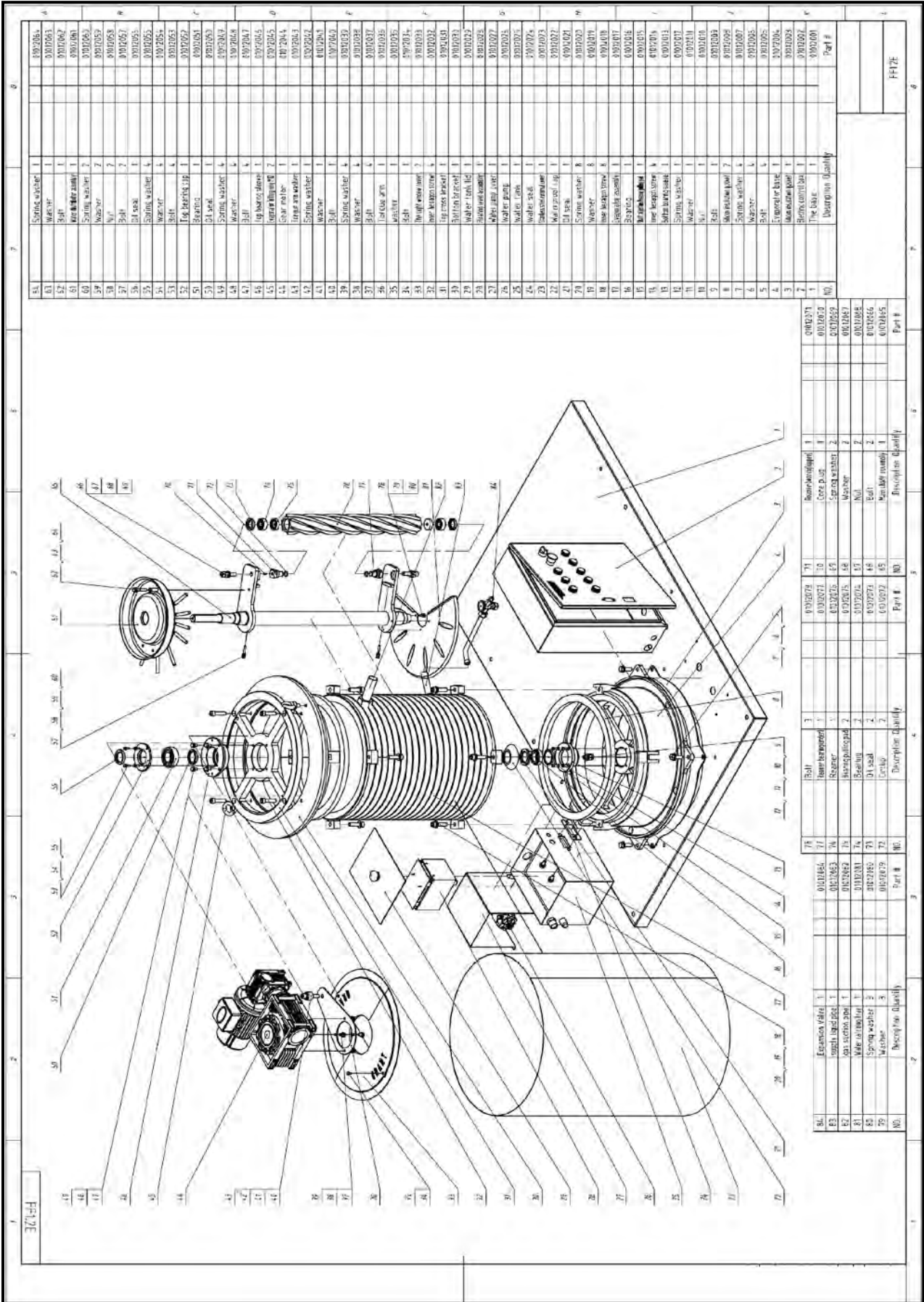


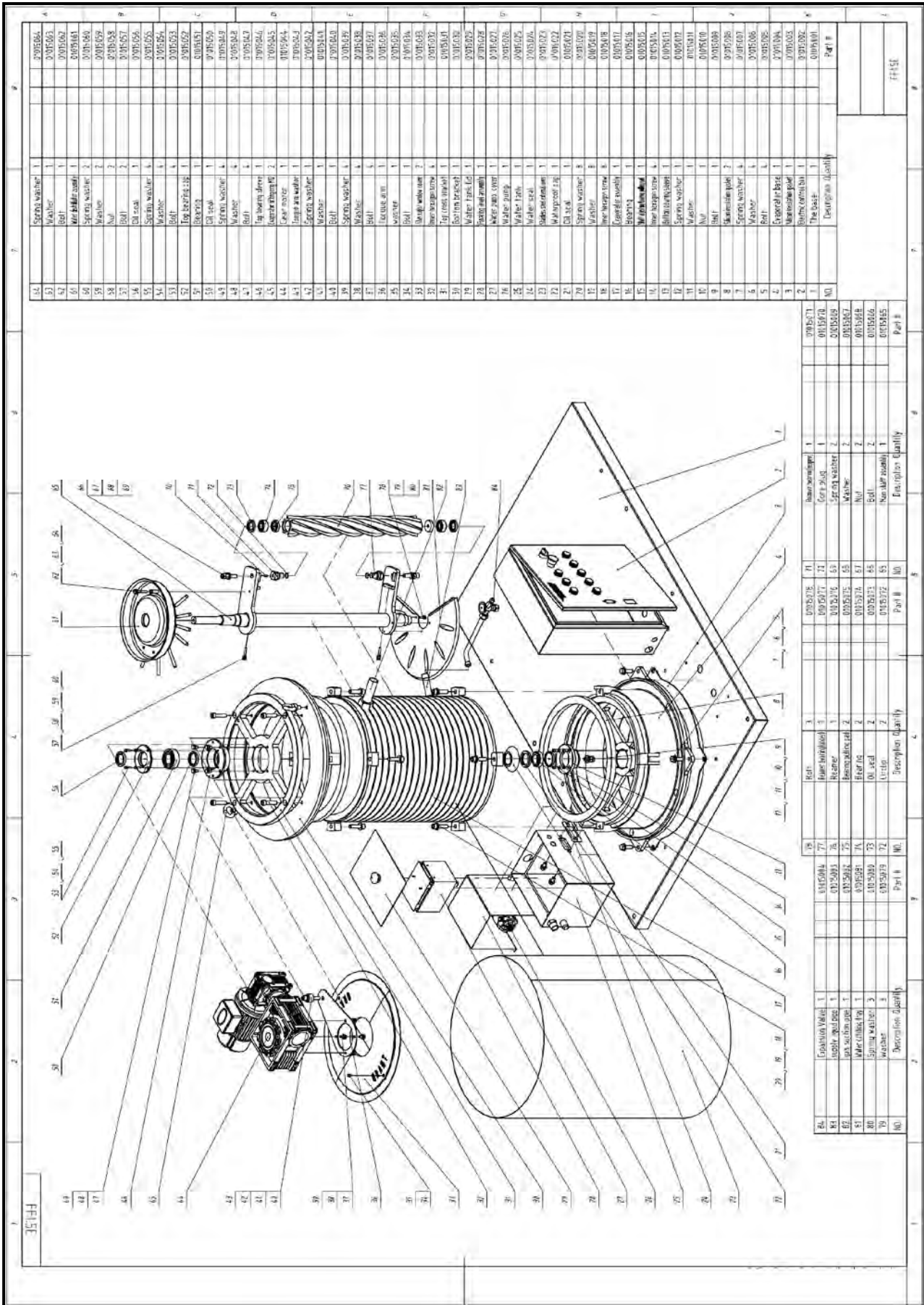
P.C.Board and Sensor Assy.

No .	Part No .	Designation
1	205001.00	Control box
2	205003.00	P.C. board assy.
3	205002.00	Control box cover
4	205004.00 205005.00	Fuse(750mA) Fuse(10A)
5	205007.00	Water level sensor
6	205008.00	Rotation Speed Sensor
7	205009.00	Condenser temperature sensor
8	205010.00	Evaporator temperature sensor
9	205011.00	Ice level control assy.
10	205006.00	Contactor

Evaporator & Water Assembly

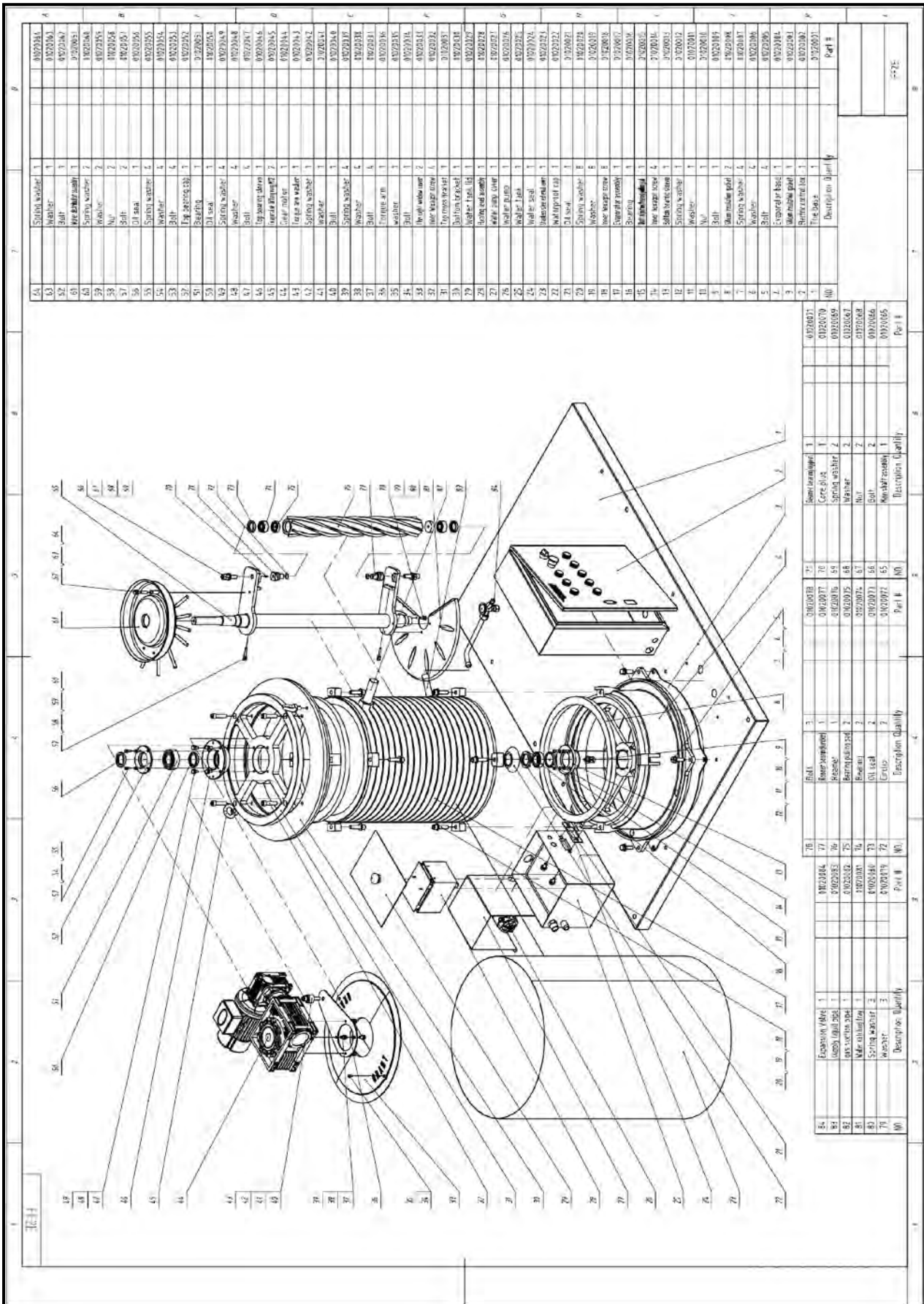
No.	Description	Quantity	Part #
1	Evaporator coil	1	010001
2	Motor assembly	1	010002
3	Control panel	1	010003
4	Support bracket	2	010004
5	Mounting plate	2	010005
6	Washer	2	010006
7	Nut	2	010007
8	Bracket	2	010008
9	Support plate	2	010009
10	Washer	2	010010
11	Nut	2	010011
12	Bracket	2	010012
13	Support plate	2	010013
14	Washer	2	010014
15	Nut	2	010015
16	Bracket	2	010016
17	Support plate	2	010017
18	Washer	2	010018
19	Nut	2	010019
20	Bracket	2	010020
21	Support plate	2	010021
22	Washer	2	010022
23	Nut	2	010023
24	Bracket	2	010024
25	Support plate	2	010025
26	Washer	2	010026
27	Nut	2	010027
28	Bracket	2	010028
29	Support plate	2	010029
30	Washer	2	010030
31	Nut	2	010031
32	Bracket	2	010032
33	Support plate	2	010033
34	Washer	2	010034
35	Nut	2	010035
36	Bracket	2	010036
37	Support plate	2	010037
38	Washer	2	010038
39	Nut	2	010039
40	Bracket	2	010040
41	Support plate	2	010041
42	Washer	2	010042
43	Nut	2	010043
44	Bracket	2	010044
45	Support plate	2	010045
46	Washer	2	010046
47	Nut	2	010047
48	Bracket	2	010048
49	Support plate	2	010049
50	Washer	2	010050
51	Nut	2	010051
52	Bracket	2	010052
53	Support plate	2	010053
54	Washer	2	010054
55	Nut	2	010055
56	Bracket	2	010056
57	Support plate	2	010057
58	Washer	2	010058
59	Nut	2	010059
60	Bracket	2	010060
61	Support plate	2	010061
62	Washer	2	010062
63	Nut	2	010063
64	Bracket	2	010064
65	Support plate	2	010065
66	Washer	2	010066
67	Nut	2	010067
68	Bracket	2	010068
69	Support plate	2	010069
70	Washer	2	010070
71	Nut	2	010071
72	Bracket	2	010072
73	Support plate	2	010073
74	Washer	2	010074
75	Nut	2	010075
76	Bracket	2	010076
77	Support plate	2	010077
78	Washer	2	010078
79	Nut	2	010079
80	Bracket	2	010080
81	Support plate	2	010081
82	Washer	2	010082
83	Nut	2	010083
84	Bracket	2	010084





NO	Part #	Description	Quantity
14	200566A	Sprocket washer	1
15	200563	Washer	1
16	200562	Roller	1
17	200561	Key	1
18	200560	Sprocket washer	2
19	200559	Washer	2
20	200558	Nut	2
21	200557	Roller	2
22	200556	Oil seal	1
23	200555	Sprocket washer	4
24	200554	Washer	4
25	200553	Roller	4
26	200552	Top bearing cap	1
27	200551	Bearing	1
28	200550	Oil seal	1
29	200549	Sprocket washer	4
30	200548	Washer	4
31	200547	Roller	4
32	200546	Key	1
33	200545	Top bearing cap	1
34	200544	Bottom bearing cap	1
35	200543	Gear motor	1
36	200542	Sprocket washer	1
37	200541	Washer	1
38	200540	Roller	1
39	200539	Sprocket washer	1
40	200538	Washer	1
41	200537	Roller	1
42	200536	Key	1
43	200535	Top bearing cap	1
44	200534	Bottom bearing cap	1
45	200533	Gear motor	1
46	200532	Sprocket washer	1
47	200531	Washer	1
48	200530	Roller	1
49	200529	Key	1
50	200528	Top bearing cap	1
51	200527	Bottom bearing cap	1
52	200526	Gear motor	1
53	200525	Sprocket washer	1
54	200524	Washer	1
55	200523	Roller	1
56	200522	Key	1
57	200521	Top bearing cap	1
58	200520	Bottom bearing cap	1
59	200519	Gear motor	1
60	200518	Sprocket washer	1
61	200517	Washer	1
62	200516	Roller	1
63	200515	Key	1
64	200514	Top bearing cap	1
65	200513	Bottom bearing cap	1
66	200512	Gear motor	1
67	200511	Sprocket washer	1
68	200510	Washer	1
69	200509	Roller	1
70	200508	Key	1
71	200507	Top bearing cap	1
72	200506	Bottom bearing cap	1
73	200505	Gear motor	1
74	200504	Sprocket washer	1
75	200503	Washer	1
76	200502	Roller	1
77	200501	Key	1
78	200500	Top bearing cap	1
79	200499	Bottom bearing cap	1
80	200498	Gear motor	1
81	200497	Sprocket washer	1
82	200496	Washer	1
83	200495	Roller	1
84	200494	Key	1

NO	Part #	Description	Quantity
85	000571	Motor	1
86	000570	Gear	1
87	000569	Sprocket washer	2
88	000568	Washer	2
89	000567	Nut	2
90	000566	Roller	2
91	000565	Non-air assembly	1
92	000564	Encapsulation	1
93	000563	Roller	1
94	000562	Washer	1
95	000561	Key	1
96	000560	Top bearing cap	1
97	000559	Bottom bearing cap	1
98	000558	Gear motor	1
99	000557	Sprocket washer	1
100	000556	Washer	1
101	000555	Roller	1
102	000554	Key	1
103	000553	Top bearing cap	1
104	000552	Bottom bearing cap	1
105	000551	Gear motor	1
106	000550	Sprocket washer	1
107	000549	Washer	1
108	000548	Roller	1
109	000547	Key	1
110	000546	Top bearing cap	1
111	000545	Bottom bearing cap	1
112	000544	Gear motor	1
113	000543	Sprocket washer	1
114	000542	Washer	1
115	000541	Roller	1
116	000540	Key	1
117	000539	Top bearing cap	1
118	000538	Bottom bearing cap	1
119	000537	Gear motor	1
120	000536	Sprocket washer	1
121	000535	Washer	1
122	000534	Roller	1
123	000533	Key	1
124	000532	Top bearing cap	1
125	000531	Bottom bearing cap	1
126	000530	Gear motor	1
127	000529	Sprocket washer	1
128	000528	Washer	1
129	000527	Roller	1
130	000526	Key	1
131	000525	Top bearing cap	1
132	000524	Bottom bearing cap	1
133	000523	Gear motor	1
134	000522	Sprocket washer	1
135	000521	Washer	1
136	000520	Roller	1
137	000519	Key	1
138	000518	Top bearing cap	1
139	000517	Bottom bearing cap	1
140	000516	Gear motor	1
141	000515	Sprocket washer	1
142	000514	Washer	1
143	000513	Roller	1
144	000512	Key	1
145	000511	Top bearing cap	1
146	000510	Bottom bearing cap	1
147	000509	Gear motor	1
148	000508	Sprocket washer	1
149	000507	Washer	1
150	000506	Roller	1
151	000505	Key	1
152	000504	Top bearing cap	1
153	000503	Bottom bearing cap	1
154	000502	Gear motor	1
155	000501	Sprocket washer	1
156	000500	Washer	1
157	000499	Roller	1
158	000498	Key	1
159	000497	Top bearing cap	1
160	000496	Bottom bearing cap	1
161	000495	Gear motor	1
162	000494	Sprocket washer	1
163	000493	Washer	1
164	000492	Roller	1
165	000491	Key	1
166	000490	Top bearing cap	1
167	000489	Bottom bearing cap	1
168	000488	Gear motor	1
169	000487	Sprocket washer	1
170	000486	Washer	1
171	000485	Roller	1
172	000484	Key	1
173	000483	Top bearing cap	1
174	000482	Bottom bearing cap	1
175	000481	Gear motor	1
176	000480	Sprocket washer	1
177	000479	Washer	1
178	000478	Roller	1
179	000477	Key	1
180	000476	Top bearing cap	1
181	000475	Bottom bearing cap	1
182	000474	Gear motor	1
183	000473	Sprocket washer	1
184	000472	Washer	1
185	000471	Roller	1
186	000470	Key	1
187	000469	Top bearing cap	1
188	000468	Bottom bearing cap	1
189	000467	Gear motor	1
190	000466	Sprocket washer	1
191	000465	Washer	1
192	000464	Roller	1
193	000463	Key	1
194	000462	Top bearing cap	1
195	000461	Bottom bearing cap	1
196	000460	Gear motor	1
197	000459	Sprocket washer	1
198	000458	Washer	1
199	000457	Roller	1
200	000456	Key	1
201	000455	Top bearing cap	1
202	000454	Bottom bearing cap	1
203	000453	Gear motor	1
204	000452	Sprocket washer	1
205	000451	Washer	1
206	000450	Roller	1
207	000449	Key	1
208	000448	Top bearing cap	1
209	000447	Bottom bearing cap	1
210	000446	Gear motor	1
211	000445	Sprocket washer	1
212	000444	Washer	1
213	000443	Roller	1
214	000442	Key	1
215	000441	Top bearing cap	1
216	000440	Bottom bearing cap	1
217	000439	Gear motor	1
218	000438	Sprocket washer	1
219	000437	Washer	1
220	000436	Roller	1
221	000435	Key	1
222	000434	Top bearing cap	1
223	000433	Bottom bearing cap	1
224	000432	Gear motor	1
225	000431	Sprocket washer	1
226	000430	Washer	1
227	000429	Roller	1
228	000428	Key	1
229	000427	Top bearing cap	1
230	000426	Bottom bearing cap	1
231	000425	Gear motor	1
232	000424	Sprocket washer	1
233	000423	Washer	1
234	000422	Roller	1
235	000421	Key	1
236	000420	Top bearing cap	1
237	000419	Bottom bearing cap	1
238	000418	Gear motor	1
239	000417	Sprocket washer	1
240	000416	Washer	1
241	000415	Roller	1
242	000414	Key	1
243	000413	Top bearing cap	1
244	000412	Bottom bearing cap	1
245	000411	Gear motor	1
246	000410	Sprocket washer	1
247	000409	Washer	1
248	000408	Roller	1
249	000407	Key	1
250	000406	Top bearing cap	1
251	000405	Bottom bearing cap	1
252	000404	Gear motor	1
253	000403	Sprocket washer	1
254	000402	Washer	1
255	000401	Roller	1
256	000400	Key	1
257	000399	Top bearing cap	1
258	000398	Bottom bearing cap	1
259	000397	Gear motor	1
260	000396	Sprocket washer	1
261	000395	Washer	1
262	000394	Roller	1
263	000393	Key	1
264	000392	Top bearing cap	1
265	000391	Bottom bearing cap	1
266	000390	Gear motor	1
267	000389	Sprocket washer	1
268	000388	Washer	1
269	000387	Roller	1
270	000386	Key	1
271	000385	Top bearing cap	1
272	000384	Bottom bearing cap	1
273	000383	Gear motor	1
274	000382	Sprocket washer	1
275	000381	Washer	1
276	000380	Roller	1
277	000379	Key	1
278	000378	Top bearing cap	1
279	000377	Bottom bearing cap	1
280	000376	Gear motor	1
281	000375	Sprocket washer	1
282	000374	Washer	1
283	000373	Roller	1
284	000372	Key	1
285	000371	Top bearing cap	1
286	000370	Bottom bearing cap	1
287	000369	Gear motor	1
288	000368	Sprocket washer	1
289	000367	Washer	1
290	000366	Roller	1
291	000365	Key	1
292	000364	Top bearing cap	1
293	000363	Bottom bearing cap	1
294	000362	Gear motor	1
295	000361	Sprocket washer	1
296	000360	Washer	1
297	000359	Roller	1
298	000358	Key	1
299	000357	Top bearing cap	1
300	000356	Bottom bearing cap	1
301	000355	Gear motor	1
302	000354	Sprocket washer	1
303	000353	Washer	1
304	000352	Roller	1
305	000351	Key	1
306	000350	Top bearing cap	1
307	000349	Bottom bearing cap	1
308	000348	Gear motor	1
309	000347	Sprocket washer	1
310	000346	Washer	1
311	000345	Roller	1
312	000344	Key	1
313	000343	Top bearing cap	1
314	000342	Bottom bearing cap	1
315	000341	Gear motor	1
316	000340	Sprocket washer	1
317	000339	Washer	1
318	000338	Roller	1
319	000337	Key	1
320	000336	Top bearing cap	1
321	000335	Bottom bearing cap	1
322	000334	Gear motor	1
323	000333	Sprocket washer	1
324	000332	Washer	1
325	000331	Roller	1
326	000330	Key	1
327	000329	Top bearing cap	1
328	000328	Bottom bearing cap	1
329	000327	Gear motor	1
330	000326	Sprocket washer	1
331	000325	Washer	1
332	000324	Roller	1
333	000323	Key	1
334	000322	Top bearing cap	1
335	000321	Bottom bearing cap	1
336	000320	Gear motor	1
337	000319	Sprocket washer	1
338	000318	Washer	1
339	000317	Roller	1
3			



Part #	Description	Quantity
1	Explosion Valve	1
2	Washer	1
3	Ball	1
4	Spring Washer	1
5	Washer	1
6	Washer	1
7	Washer	1
8	Washer	1
9	Washer	1
10	Washer	1
11	Washer	1
12	Washer	1
13	Washer	1
14	Washer	1
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81	Washer	1
82	Washer	1
83	Washer	1
84	Washer	1

Part #	Description	Quantity
1	Explosion Valve	1
2	Washer	1
3	Ball	1
4	Spring Washer	1
5	Washer	1
6	Washer	1
7	Washer	1
8	Washer	1
9	Washer	1
10	Washer	1
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84	Washer	1

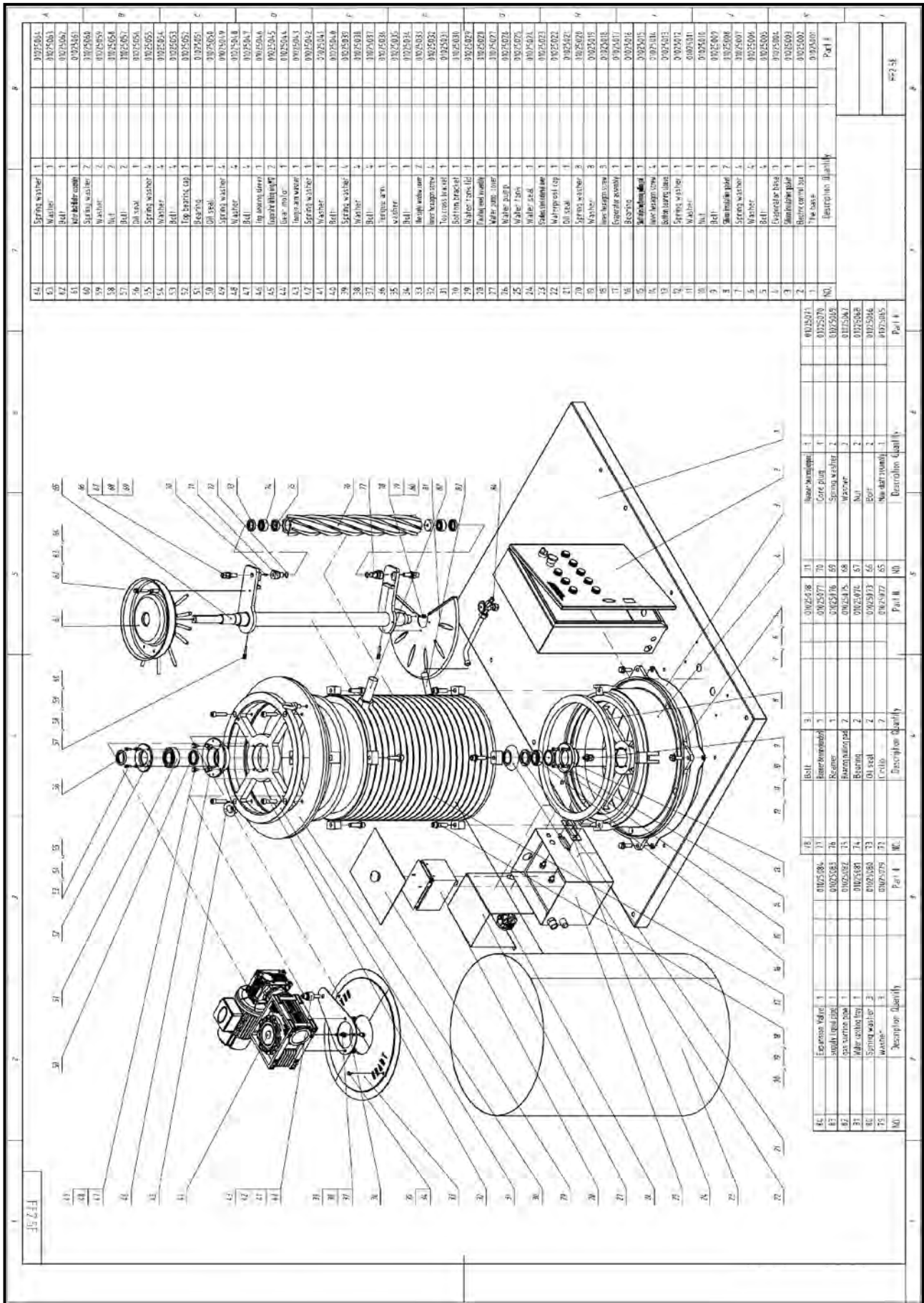


FIG 2-5F

NO.	DESCRIPTION	QUANTITY	REVISION
44	Engine water pump	1	
45	Spring washer	1	
46	Ball	1	
47	Washer	1	
48	Ball	1	
49	Washer	1	
50	Ball	1	
51	Washer	1	
52	Ball	1	
53	Washer	1	
54	Ball	1	
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69	Washer	1	
70	Ball	1	
71	Washer	1	
72	Ball	1	
73	Washer	1	
74	Ball	1	
75	Washer	1	
76	Ball	1	
77	Washer	1	
78	Ball	1	
79	Washer	1	
80	Ball	1	

NO.	DESCRIPTION	QUANTITY	REVISION
81	Ball	1	
82	Washer	1	
83	Ball	1	
84	Washer	1	
85	Ball	1	
86	Washer	1	
87	Ball	1	
88	Washer	1	
89	Ball	1	
90	Washer	1	
91	Ball	1	
92	Washer	1	
93	Ball	1	
94	Washer	1	
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Grant Timer with remote switch

The Grant unit can be fitted with a remote switch and timer, the function of this is twofold.

As the electrical control board is placed on the unit, this can make access to the factory fitted switches difficult.

The remote switch allows the ON/OFF/AUTO switch to be placed in an easily accessible location, such as when the unit is placed on a large ice bin or transport system i.e. Follet ITS or DEV.

The timer is designed to reduce the ice clumping found with storing scale type ice for long periods. The theory is to supply only the ice needed for the demand, an example would be:

Grant one ton FFE on a Follett DEV. (ice bin)

Customer requires 400 kg of ice at 7am and 200kg at 4pm.

Timer will require to be set from 10pm to 7am and 11am to 4pm

Grant 1 ton FFE = $1000\text{kg}/24\text{hrs} = 41\text{kg}/1\text{hr}$

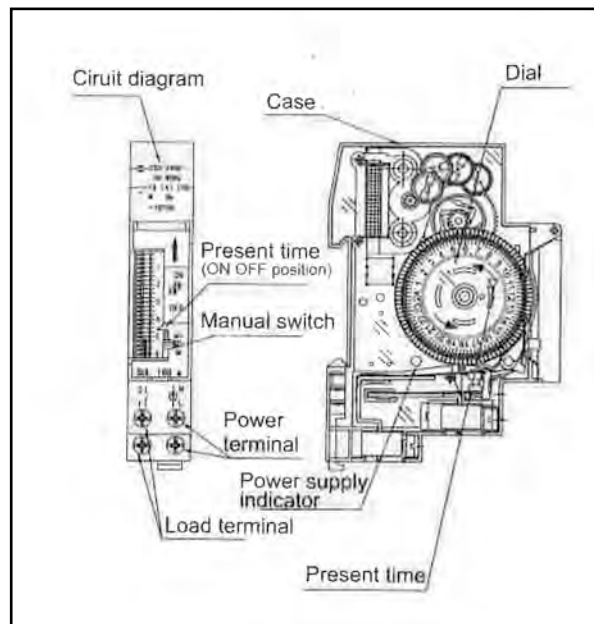
400kg will require the unit to run for 10hours.

200kg will require the unit to run for 5hours.

Of course this is only an example and every application will vary but the principal is the same, it will be up to the technician to consult with the customer and set timer to suit their needs.

With the timer set up correctly, the machine will produce Ice on demand and prevent clumping of ice in the storage bin.

a) Parts Identification



b) Operating Instructions

Before turning power ON, Check that your unit conforms to the operating voltage.

If the unit has not been in operation for a long period the battery may have discharged and may not work immediately. Connect the unit and switch power source on, wait for approximately ten minutes before setting the timer. Full power reserve is built up after approximately 72 hours.

1. Setting the timer

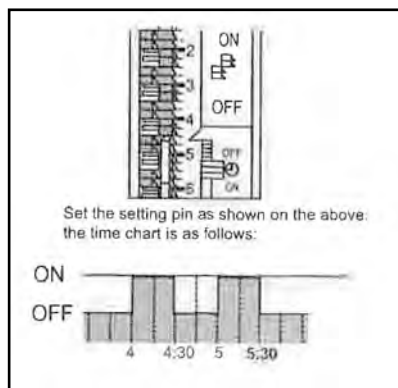
Set the setting pin between the desired times to the left or right of the dial.

Set the setting pin to the right of the dial; ON position

If the setting pin is set to the ON position continuously, it will continue only for the number of setting pins x 15 minutes.

Set the setting pin to the right until a click is heard

Set the setting pin to the left of the dial; OFF position

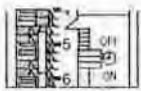


2. Adjust the present time

Turn the dial until the index is on the current time

3. Set the manual switch:

Use this switch to select either ON or OFF in manual or ON/OFF in the operation program.



“Auto”; output is turned ON and OFF according to the set program

Manual “ON”; output is turned ON irrespective of the program (Use this mode for test operation)

Manual “OFF”; output is turned OFF irrespective of the program.

After completing test operation set the manual switch to “AUTO”

c) Specifications

Rated Voltage		240VAC	
Voltage tolerance		220-260VAC	
Frequency		50hz	
Power consumption		1w	
Drive Method		Quartz controlled stepping motor	
Cycle		24 hours	
Time precision		+/-3 sec/ day at 22 degrees Celcius	
Load	Circuit		Separate
	Switch construction		SPST
	Manual ON/OFF		ON/AUTO/OFF switch
	Capacity	Resistive Load	16A
		Incandescent lamp	10A
		Inductive	12A
Motor		220v AC 1500W	
Setting	Present Time Setting		Turn dial until the index is at the current time
	ON/OFF program setting		15 minutes
	Minimum Unit		15 minutes
	Minimum interval		15 minutes
	No of ON/OFF operation		96 operations
Working reserve time		72 hours	
Ambient temperature		-10 degrees celcius ~ +50 degrees celcius	
Ambient humidity		Max 85%	
Weight		85g	

IX . Technical Notes

1. All PC boards after November 2009 will be the bypass model which will allow all sensors to be bypassed for diagnostic purposes.
2. All Grant ice machines up to 10 ton use the same PC board.
3. All grant ice machines 10 ton and over use a PLC.
4. All the old style PC boards have no bypass on any faults except by bridging using the correct ohm resister.
5. Bin full sensor can be bypassed by bridging terminals 2 and 3.
6. All sensors can be bypassed with the correct resister.
7. Low temp sensor can be bypassed with a 10 ohm resister.
8. High condenser temp sensor can be bypassed with a 91 ohm resister.
9. Gear motor speed sensor cannot be bypassed.
10. The square blue potentiometer on the PC board is to set/adjust the sensitivity of the bin full sensor. A correct setting is 5 lights on the small circuit card on the front of the board. If the sensitivity is set to high the sensor can burn out.
11. Speed sensor operates at 1440rpm with a 7% differential.
12. Speed of the gearbox is governed by the hertz and should be checked on every installation.
13. Hertz under 45 will cause low rotation fault.
14. Phase fail control requires a voltage of not less than 380 or greater than 450 volts, but can be set at 10% lower to get out of trouble but is not recommended.
15. Scrapper must always be set at 0.3mm off evaporator shell, use a set of feeler gauges.
16. Incorrect ice thickness will trip speed sensor and cause shuddering.
17. If gearbox / scrapper shuddering occur water flow is too great and should be reduced and or TX valve may need adjusting.
18. TX feed can be checked by ice formation on evaporator, i.e. ice forming lines in evaporator increase TX feed.
19. The core dryer fitted to the suction line has no core fitted; the dryer is there for quality control at the factory and is removed after testing.

X. Service Bulletins

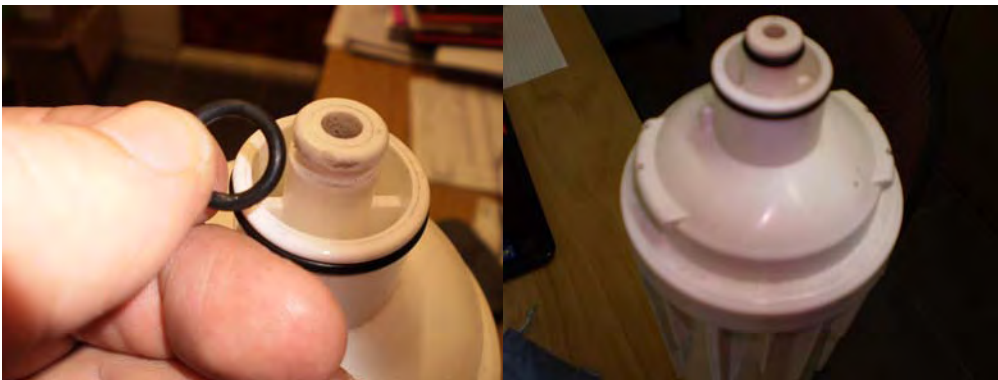
Coast tip of the week:

Blocked water filter bypass

If you need to bypass the water filter in an emergency you can carry out the following to get you out of trouble until you can replace the cartridge.

1. Isolate water to filter
2. Remove filter cartridge
3. Remove small O ring
4. Re-install filter cartridge
5. Turn water back on

By caring out the above, this bypasses the cartridge and allows water to flow to your machine.



NOTE: return and replace the filter cartridge as soon as possible

Water regulating valve

If there is water dripping or flowing into the bin from under the evaporator, check the water flow over the evaporator.



Ball float adjustment under

Water flow regulator valve

To adjust the water flow so as not to overflow the drain catchment tray, adjust this valve slowly to regulate the water flow. If the flow is too high, the water overflows the drain tray. If the flow is insufficient there will be little ice production.

Service & Maintenance Scedule

	JAN	FEB	MAR	APR	MAY	JUN
Date						
Water Cartridge changed						
Chemically Cleaned						
Sanitized						
Condensor cleaned						
Operation checked						
Technicians name						
	JUL	AUG	SEPT	OCT	NOV	DEC
Date						
Water cartridge changed						
Chemically cleaned						
Sanitized						
Condensor cleaned						
Operation checked						
Technicians name						

1800 688 590

Ph: **02 9545 5162**

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