ETL BLAST CHILLER SERIES

SERVICE MANUAL

1. BASIC SERVICE INSTRUCTION

The controller provides alarm and failure codes to shortly identify roots of problems and go investigating directly the concerned parts. Furthermore a service submenu allows technicians to check rapidly all the sensors, scrolling room/needle/evaporator temperatures.

1.1. ALARM/FAILURE LIST

Tab 1

CODE	CAUSE	CONSEQUENCE
Er0	ROOM PROBE FAILURE	Doesn't allow to run any cycle. If a cycle is running, it is forced to stop.
Er1	EVAPORATOR PROBE FAILURE	During storage, evaporator fans are cut out.
Er3	NEEDLE PROBE FAILURE	Doesn't allow to run a needle probe set temperature cycle. If a needle probe cycle is running, it is forced to stop.
HP	HIGH DISCHARGE PRESSURE (OR LOW SUCTION PRESSURE)*	Doesn't allow to run any cycle. If a cycle is running, compressor, evaporator and condenser fans are cut out.
d-r	DOOR IS OPEN FOR MORE THAN P39	Compressor and condenser fan are cut out. Evaporator fan are cut in/out according to parameter P37
AH	HIGHT ROOM TEMPERATURE	Nothing happens
AL	LOW ROOM TEMPERATURE	Nothing happens
Err	MOTHER BOARD-KEYBOARD CONNECTION FAILURE **	Nothing happens
Res	POWER FAILURE DURING RUNNING OF CYCLE	The cycle starts again as soon as power is restored. The message Res blinks to indicate the cycle has been resumed.

*Although the controller board is equipped with one additional dedicated input for low pressure switch, pressure switch device installed in this series can only provide a single output (closed or opened). The high/low pressure switch is connected among terminals #48-49. The circuit is normally opened, it closes both when high/low pressure limits are exceeded. So the code failure "HP" could mean actually a high discharge pressure as well as a low suction pressure.

**Deep troubleshooting on connection failure between keyboard and interface board (look at RS 485 (1):

1. GND wire connection missing: The display digits blink and grow dim
2. - wire connection missing: display might work, without giving any specific alarm
3. + wire connection missing: Err is displayed
4. 12V wire missing: no light at all on the display

1.2. ALARM LIST CHECK

Thanks to the HACCP features, the controller allows to check the occurred alarm. It provides alarm codes, date of alarm, maximum/minimum occurred temperature (if dealing with a high/low temperature alarm), alarm duration. To access the alarm log list (only possible during OFF mode) keep pressed the program key for 5 seconds

All the information concerning the alarm will be displayed. To scroll through the alarms use the up/down keys. To exit press the program key.

1.3. SERVICE MENU (PARAMETER SETTING)

1.3.1. Enter the parameter list

The service menu can be accessed only during OFF mode.

Press the up/down keys

together for 5 seconds to enter the menu. Label PA (password) will be shown as first. The controller doesn't need actually any password to configure the parameters. By pressing the up arrow key the parameter list can be accessed directly (first parameter is P0). Scroll the parameter by pressing Up/down keys. Select a parameter by pressing the time key

Change the value by up/down keys. Press again time key to save and go back to the list.

1.3.2. Parameter list (factory setting)

The following table shows parameter factory settings for both Blast chiler units (GBC) and shock freezer (GBF).
Note: Selecting a freezing cycle on a GBC unit will anyway run a normal chilling cycle (cabinet at 4°F, needle probe end cycle temperature at 37°F)

CODE	U.O.M.	GBC	DESCRIPTION	GBF
P0	-	0	unit of temperature measurement 0 = °F	0

CODE	U.O.M.	GBC	DESCRIPTION	GBF
			1 = °C	
P1	°F	4	cabinet probe offset	4
P2	°F	0	evaporator probe offset	0
P3	°F	0	needle probe offset	0
GROUP	-	-	***MAIN CONTROLLER***	-
P4	°F	20	operational setpoint during the second hard chill step; also, operational setpoint during normal chilling (with reference to the cabinet probe)	20
P5	°F	-4	operational setpoint during freezing (with reference to the cabinet probe)	-40
P6	°F	-4	operational setpoint during the first hard chill step (with reference to the cabinet probe)	-4
P7	°F	37	operational setpoint during post-chill storage (with reference to the cabinet probe)	37
P8	°F	-4	operational setpoint during post-freeze storage (with reference to the cabinet probe)	-4
P9	°F	2	P4, P5, P6, P7 and P8 differential	2
P10	°F	37	set temperature chill end temperature (with reference to the needle probe)	37
P11	°F	37	set temperature freeze end temperature (with reference to the needle probe)	0
P12	°F	46	temperature at which the hard chill switches from the first step to the second (with reference to the needle probe)	46
P13	°F	99	temperature above which it is not possible to start a set-temperature operational cycle (with reference to the needle probe)	99
P14	°F	9	needle probe and cabinet temperature gap for verification of correct needle probe insertion 0 = the test will not be performed	9
P15	s	60	duration of the second test to check correct needle probe insertion; see also P14	60
P16	min	90	maximum set temperature chill duration; also timed chill duration	90
P17	min	90	maximum set temperature freeze duration; also timed freeze duration	270
P18	min	45	first hard timed chill step duration	45
GROUP	-	-	***COMPRESSOR PROTECTIONS***	-
P19	min	0	compressor delay from device power on (from restoration of power)	0
P20	min	0	minimum elapsed time period between two consecutive compressor start-up operations	0
P21	min	0	minimum compressor shut-down time	0
GROUP	-	-	***DEFROSTING***	-

CODE	U.O.M.	GBC	DESCRIPTION	GBF
P22	-	1	defrost type 0 = electric (defrost on relay) 1 = hot gas (defrost compressor and relay on) 2 = air (evaporator fan on)	1
P23	°F	46	defrost end temperature (with reference to the evaporator probe)	46
P24	min	10	maximum defrost duration	10
P25	h	6	defrost interval during storage; see also P26 0 = intermittent defrosting will never be activated (only the first will be activated)	6
P26	min	1	first defrost delay from start of storage; see also P25	1
P27	-	1	defrosting at start of chilling and freezing 1 = YES	1
P28	min	2	drip-drain duration	2
P29	-	0	resetting of compressor protections at start of defrosting (only if P22 = 1) 1 = YES	0
P30	s	30	elapsed time between the defrost request and switching on the compressor (only if P22 = 1 and providing that the compressor is off when the defrost is requested); see P31 (7) (8)also	30
P31	s	0	elapsed time between the defrost request and activation of the solenoid valve (only if P22 = 1 and on condition that the compressor is off when defrosting is requested); see also P30	0
GROUP	-	-	***EVAPORATOR FAN***	-
P32	°F	37	temperature above which the evaporator fan is switched off during storage (with reference to the evaporator probe)	37
P33	°F	2	P32 differential	2
P34	-	0	evaporator fan activity during defrosting (only if P22 = 0 or 1) 0 = on 1 = off	0
P35	min	3	evaporator stop time after dripping	3
P36	°F	99	temperature above which the evaporator fan is switched off (with reference to the cabinet probe)	99
P37	-	1	effect caused by activation of microport input on evaporator fan 0 = no effect 1 = the evaporator fan will be switched off	1
GROUP	-	-	***DIGITAL INPUTS***	-
P38	-	1	microport input contact type 0 = NA (input active with contact closed) 1 = NC (input active with contact open)	1
P39	min	0	micro port input alarm delay	0

CODE	U.O.M.	GBC	DESCRIPTION	GBF
P40	-	1	high pressure input contact type 0 = NA (input active with contact closed) 1 = NC (input active with contact open)	1
P41	min	120	high pressure input alarm delay	120
P42	-	0	low pressure input contact type 0 = NA (input active with contact closed) 1 = NC (input active with contact open)	0
P43	min	0	low pressure input alarm delay	0
P44	-	0	compressor thermal protection input contact type 0 = NA (input active with contact closed) 1 = NC (input active with contact open)	0
P45	min	0	compressor thermal protection input alarm delay	0
GROUP	-	-	***CABINET STERILISATION***	-
P46	min	5	UV light on duration (duration of cabinet sterilisation)	5
GROUP	-	-	***NEEDLE PROBE HEATING***	-
P47	°F	99	needle probe heating end temperature (with reference to the needle probe)	99
P48	s	15	maximum duration of needle probe heating	15
GROUP	-	-	***DOOR ELEMENTS***	-
P49	°F	41	the temperature, below which the door elements are switched on (with reference to the cabinet probe)	41
P50	°F	4	P49 differential	4
GROUP	-	-	***CONDENSER FAN***	-
P51	-	1	condenser fan activity in the absence of the condenser probe (P61 = 0) 0 = in parallel with compressor 1 = on	1
P52	°F	68	the temperature below which the condenser fan is switched off in the presence of the condenser probe (P61 = 1) and on condition that the compressor is on (with reference to the condenser probe); see also P54	68
P53	°F	9	P52 differential	9
P54	s	30	condenser fan switch off delay on switching off the compressor in the presence of the condenser probe (P61 = 1); see also P52	30
GROUP	-	-	***MISCELLANEOUS***	-
P55	s	3	chill and freeze cycle completion buzzer duration	3
P56	s	15	maximum buzzer duration during an alarm state	15
P57	s	10	elapsed time between switching on the compressor and pump down valve activation (pump down in power up); also elapsed time between deactivation of the pump down valve and switching off the compressor (pump down in power down)	10

CODE	U.O.M.	GBC	DESCRIPTION	GBF
P58	-	0	defrost parameter units of measurement 0 = P25 h, P24, P26, P28 and P35 min 1 = P25 min, P24, P26, P28 and P35 s	0
P59	-	0	reserved	0
P60	-	0	probe type 0 = NTC 1 = PTC	0
P61	-	0	condenser probe enabling 1 = YES	0
GROUP	-	-	***CONDENSER TEMPERATURE ALARMS***	-
P62	°F	99	the temperature above which the condenser temperature alarm is activated (with reference to the condenser probe)	99
P63	°F	18	P62 differential	18
GROUP	-	-	***CABINET TEMPERATURE ALARMS***	-
P64	°F	-7	temperature below which the minimum temperature alarm is activated during post-chill storage, with relation to P7, i.e. "P7 + P64" (with reference to the cabinet probe) 0 = no alarm	-7
P65	°F	7	temperature above which the maximum temperature alarm is activated during post-chill storage, with relation to P7, i.e. "P7 + P65" (with reference to the cabinet probe) 0 = no alarm	7
P66	°F	0	temperature below which the minimum temperature alarm is activated during post-freezing storage, with relation to P8, i.e. "P8 + P66" (with reference to the cabinet probe) 0 = no alarm	-7
P67	°F	0	temperature above which the maximum temperature alarm is activated during post-freezing storage, with relation to P8, i.e. "P8 + P67" (with reference to the cabinet probe) 0 = no alarm	7
P68	°F	0	P64, P65, P66 and P67 differential	0
P69	min	25	storage operation start-up temperature alarm delay	25
P70	min	10	temperature alarm delay	10
GROUP	-	-	***DATA PRINTING***	-
P71	-	0	enable printing 1 = YES	0
P72	min	5	print interval	5
P73	-	0	HACCP alarm list deletion 1 = YES	0

CODE	U.O.M.	GBC	DESCRIPTION	GBF
P74	-	2	Baudrate 0=2400 1=4800 2=9600 3=19200	2
P75	-	2	Bit polarity 0=no polarity 1=even 2=odd	2
P76	-	1	Board address	1

1.3.3. Temperature probes displaying

A quick mode to check directly the probe values, is by provided by the controller. During OFF mode keep pressed together for 5 seconds needle probe and down arrow keys

Labels Pr1, Pr2 and Pr3 can be scrolled through up/down keys

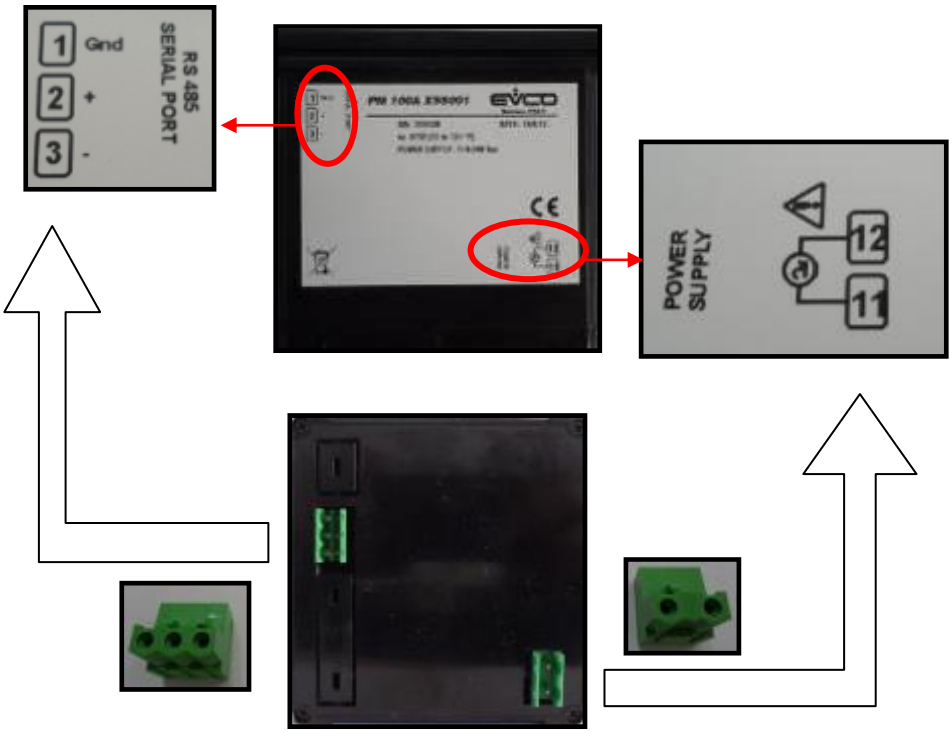
Tab 2

LABEL	RELATED PROBE
Pr1	cabinet probe
Pr2	needle probe
Pr3	evaporator probe

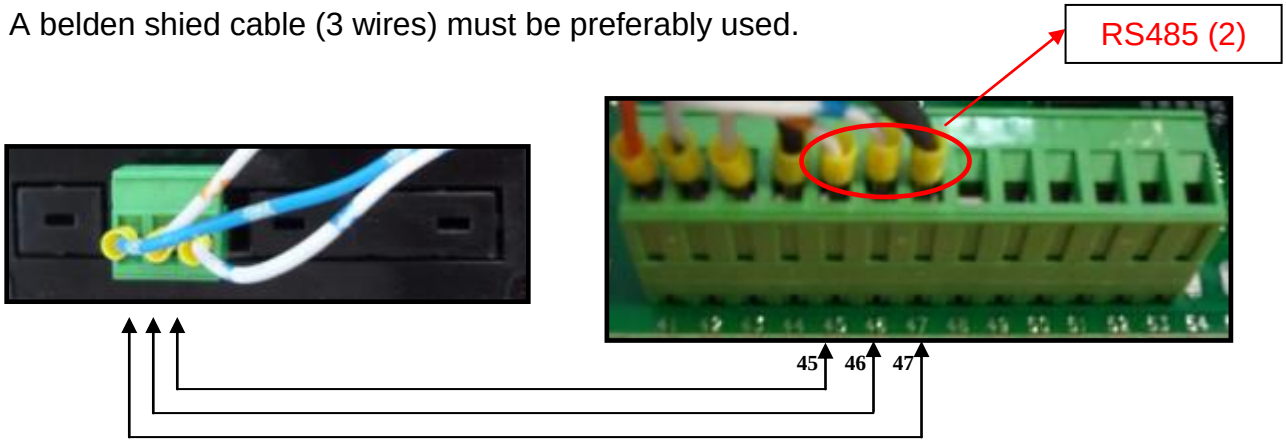
A very useful information is provided by checking the evaporator probe, especially when there are troubles in reaching the cabinet set point (i.e. -40°F) and the evaporator coil is supposed to be starved or short of gas. When cabinet temperature is set to -40 °F and the setpoint is going to be reached, the actual evaporator temperature is approx -49°F (0 psig). The Pr3 label, seen after shutting down the controller, may show temperature down to – 42°F (indeed there is a limit in the NTC signal reading by the controller, therefore temperature lower than -42°F will be never shown). I any case, when there is a suspect of starved evaporator, a quick proof with the empty cabinet can be done. Within maximum 40-50mins (ambient temperature at 90°F) with compressor continuously running, the cabinet temperature must be at -40°F. If not, the evaporator temperature should be checked from the display. Evaporator temperature not going under -22°F within 40/50mins, may probably indicate a starved evaporator.

1.4. HACCP PRINTER

Detailed instruction on how to use/install and trouble shoot the HACCP printer, are worth mentioning in this manual. Printer option can be ordered as a special option upon request for the blast chillers, as well as installed as a retrofit device. Printer has its own supply connector (110 VAC to 240 VAC 50/60 Hz). Printer must be connected to the main board through the second RS 485 serial port.

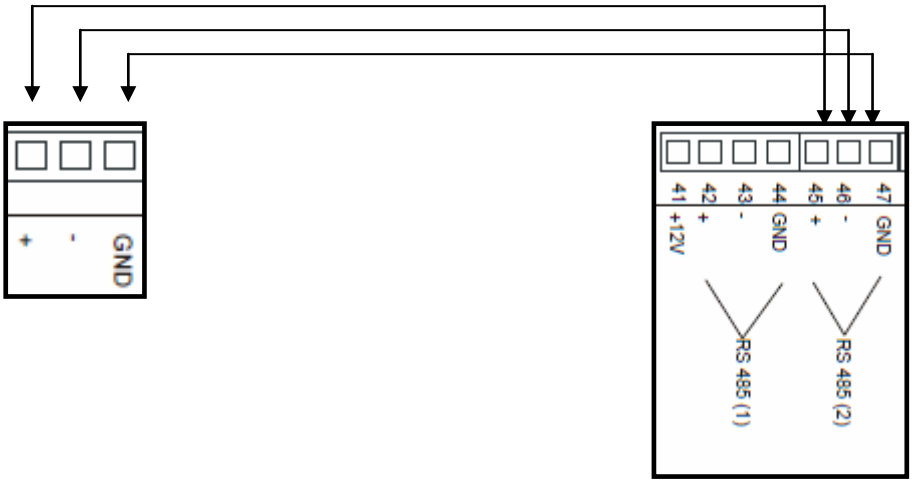


A belden shied cable (3 wires) must be preferably used.



PRINTER TERMINAL BLOCK

MAIN BOARD TERMINAL BLOCK



The main controller must be set to enable printer/main board communication. The parameter that needs to be configured is P71 (set it at 1 to enable RS485 (2) printer port). Furthermore ensure that P76=1, P75=2 and P74=2. An On/Off LED shows the printer device status (red is On).

By pressing the Feed key is possible to output blank paper (both during On or Off status).

1.4.1. Printing alarm list

To print the alarm list the controller must be in Off mode. The beginning procedure is the same than checking the alarm list: press the program key for 5 seconds

If the printer communication has been enabled, the first label shown is “Prt”. To print the alarm list press again the program key

To exit from the printing label press up/down keys:

the alarm list will be only shown on the displayed.

Maximum number of alarm filed is 10. Printed codes are as shown in the Tab 1. Alarm duration , maximum/minimum temperature, date&hour, alarm number and alarm code are shown.

1.4.2. Printing cycle data

Thanks to the HACCP printer of course is also possible to print the data history related to performed freezing/chilling cycle. If the printer is kept On and if a cycle is started, printing of data starts automatically with the cycle. The data capture frequency is specified by the parameter P72 (print interval, min). e.g. if P72 is set to 1, the device will print each minute, providing

- Type of cycle (first line above date)
- Start date&hour
- Time, cabinet and needle probe temperatures (each capture line)

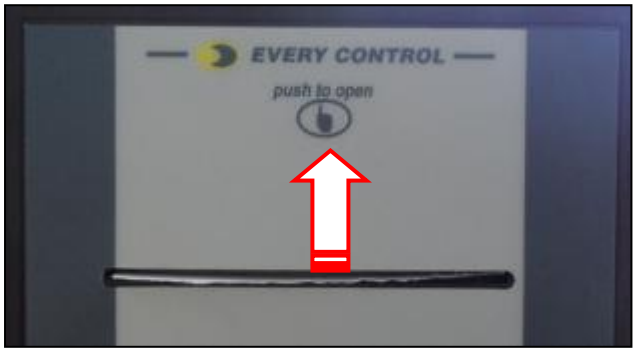
Type of cycle legend:

Tab 3

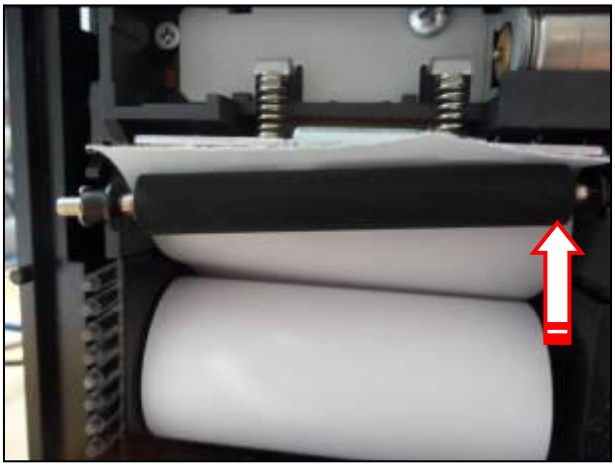
Cycle code	Description
T*	**Needle probe soft chilling**
T***	**Needle probe freezing**
T>>>*	**Needle probe hard chilling**
t*	**Time soft chilling**
t***	**Time freezing**
t>>>*	**Time hard chilling**
P1……..99	**Programmed cycle**

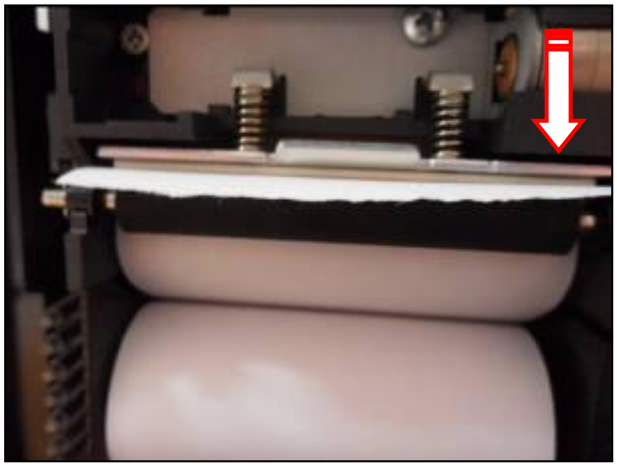
1.4.3. How to replace the paper roll

a) Push on the printer front panel, the cover will open allowing the paper roll to be accessed



Remove the printer roller by pulling it from one side. Fit the new paper roll and place the paper between the rollers. Reset roller and printer cover.





2. TROUBLESHOOTING

If from a first inspection there isn't any chance to fix the problem, a deeper troubleshooting may be necessary. The unit may need to be dismounted and some electrical/mechanical parts to be checked.

2.1. PROBES

The blast chiller units are equipped with Negative Temperature Coefficient thermistor sensors (briefly NTC). Room and evaporator probes have the same exterior structure, needle probe has a different sensor element. Both probes are anyway NTC type and have the same resistance Vs Temperature chart.

ROOM/EVAPORATOR PROBE TYPE

NTC PROBE

BULB

PROBE MEASURING

NTC NEEDLE PROBE TYPES

2.1.1. Checking probes

When a probe alarm occurs, it means that something is wrong with the sensor reading.
The problem may concern:

a. the probe cables or bulb

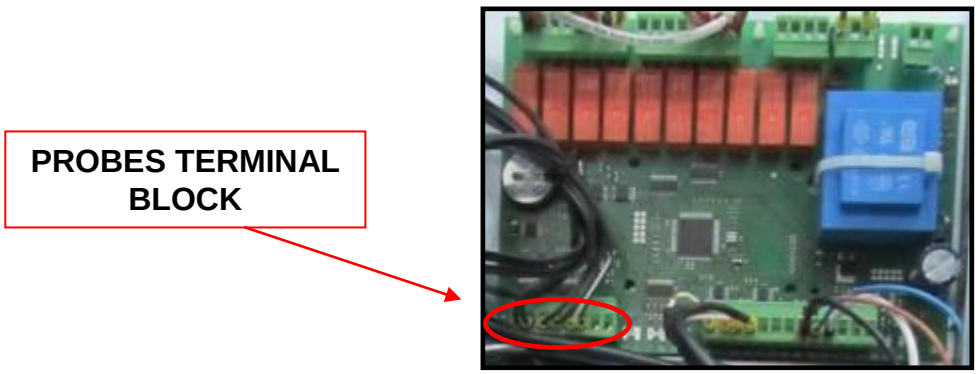
The probe alarms (Er0, Er1, Er3) are commonly due to an interruption (open circuit) in the cables. Occasionally it may happen that a probe cable goes short to the chassis, or the two probe wires go short each other.
To detect the alarm root, disconnect the concerned probe and ohm out the two cables between each other.

- If the reading is 0 Ohms it means the probe wires are shorted between each-other. Replace the probe.
- If the reading is ∞, that means the probe circuit is opened. Replace the probe
- If the reading matches with the chart table 3, then the probe works good, jump to b. or c.
- If the reading it's not 0, neither ∞ and doesn't match with the chart table, then the probe may be out of range (very unusual). Replace the probe.

If none out of 4 above options can be easily detected, then Ohm out the probe wires one by one against chassis. If the reading is 0 (or anyway less than ∞), it means the probe is short to the chassis. Replace the probe.
Alternatively and much more rapidly, a spare probe can be used. If the alarm keeps on buzzing, go to pint b. or c.

b. the probe to board terminal connection

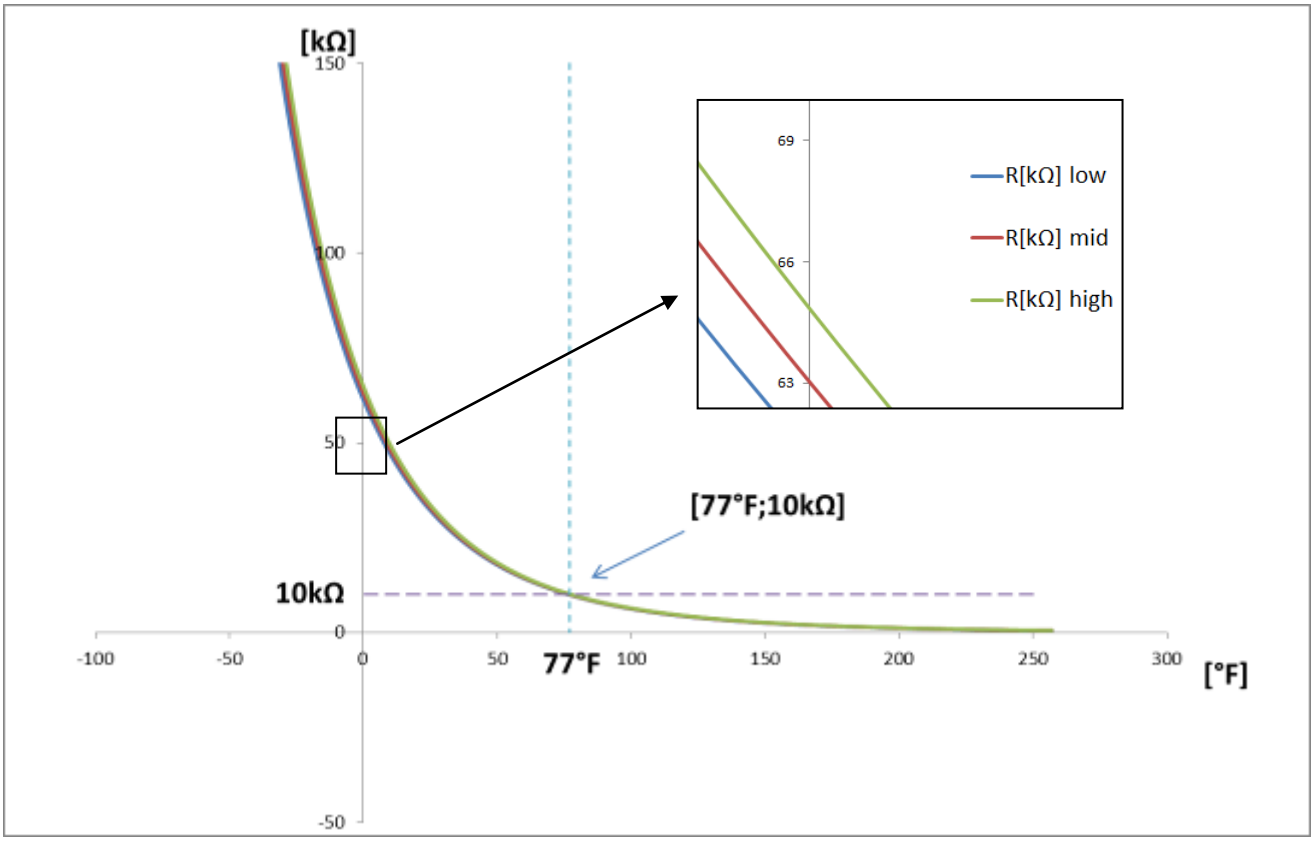
Check for rust, water, humidity, loosen/lost connections on the probe terminal block.



c. the main board internal circuits or the mother board processor

If instruction as per points a. and b. have been performed without any clear outcome and the alarm still occurs, then try to replace the main board.

2.1.2. NTC (10kOhms@77°F) Diagram and Chart Table



Tab 4rt Table

Tab 5

T[°F]	R[kΩ] low	R[kΩ] mid	R[kΩ] high	T[°F]	R[kΩ] low	R[kΩ] mid	R[kΩ] high
-40	197,1	**205,2**	213,6	***42,8***	20,98	**21,35**	21,73
-38,2	186,3	**193,8**	201,6	***44,6***	20,12	**20,47**	20,82
-36,4	176,1	**183,1**	190,4	***46,4***	19,3	**19,63**	19,96
-34,6	166,5	**173,1**	179,8	***48,2***	18,52	**18,83**	19,14
-32,8	157,5	**163,6**	170	***50***	17,78	**18,06**	18,35
-31	149,1	**154,8**	160,7	***51,8***	17,07	**17,34**	17,61
-29,2	141,2	**146,5**	152	***53,6***	16,39	**16,64**	16,89
-27,4	133,7	**138,7**	143,8	***55,4***	15,75	**15,98**	16,22
-25,6	126,7	**131,3**	136,1	***57,2***	15,13	**15,35**	15,57
-23,8	120,1	**124,4**	128,9	***59***	14,54	**14,74**	14,95
-22	113,9	**117,9**	122,1	***60,8***	13,98	**14,17**	14,36
-20,2	108	**111,8**	115,7	***62,6***	13,44	**13,62**	13,79
-18,4	102,5	**106**	109,7	***64,4***	12,92	**13,09**	13,26
-16,6	97,34	**100,6**	104	***66,2***	12,43	**12,59**	12,74

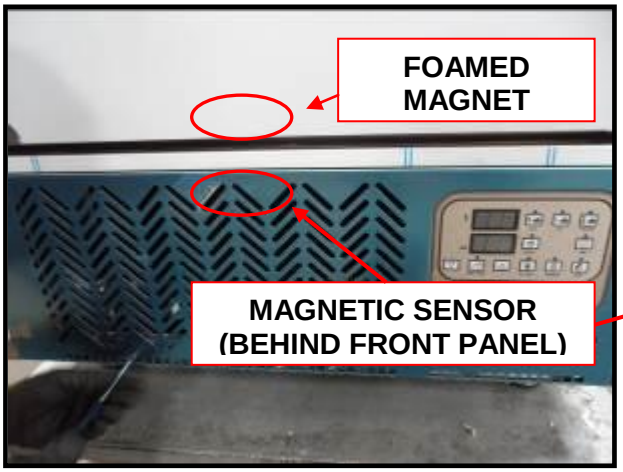
-14,8	92,45	**95,51**	98,67	***68***	11,96	**12,11**	12,25
-13	87,83	**90,69**	93,64	***69,8***	11,51	**11,65**	11,78
-11,2	83,47	**86,15**	88,91	***71,6***	11,08	**11,21**	11,33
-9,4	79,35	**81,86**	84,43	***73,4***	10,67	**10,79**	10,9
-7,6	75,47	**77,81**	80,22	***75,2***	10,28	**10,38**	10,49
-5,8	71,79	**73,99**	76,24	***77***	9,9	**10**	10,1
-4	68,32	**70,37**	72,48	***78,8***	9,532	**9,632**	9,732
-2,2	65,04	**66,96**	68,93	***80,6***	9,18	**9,279**	9,379
-0,4	61,94	**63,74**	65,58	***82,4***	8,843	**8,942**	9,041
1,4	59,01	**60,69**	62,41	***84,2***	8,52	**8,619**	8,718
3,2	56,23	**57,8**	59,41	***86***	8,21	**8,309**	8,407
5	53,6	**55,07**	56,58	***87,8***	7,914	**8,012**	8,11
6,8	51,11	**52,49**	53,9	***89,6***	7,63	**7,727**	7,825
8,6	48,75	**50,04**	51,36	***91,4***	7,358	**7,454**	7,551
10,4	46,51	**47,72**	48,96	***93,2***	7,097	**7,192**	7,288
12,2	44,39	**45,52**	46,68	***95***	6,847	**6,941**	7,036
14	42,38	**43,44**	44,52	***96,8***	6,606	**6,7**	6,794
15,8	40,47	**41,46**	42,48	***98,6***	6,376	**6,468**	6,562
17,6	38,66	**39,59**	40,54	***100,4***	6,155	**6,246**	6,338
19,4	36,94	**37,81**	38,7	***102,2***	5,942	**6,033**	6,124
21,2	35,31	**36,13**	36,96	***104***	5,738	**5,828**	5,918
23	33,76	**34,53**	35,31	***105,8***	5,542	**5,631**	5,72
24,8	32,29	**33**	33,73	***107,6***	5,354	**5,441**	5,529
26,6	30,89	**31,56**	32,24	***109,4***	5,173	**5,259**	5,346
28,4	29,56	**30,19**	30,83	***111,2***	4,999	**5,084**	5,17
30,2	28,29	**28,88**	29,48	***113***	4,832	**4,916**	5
32	27,09	**27,64**	28,2	***114,8***	4,671	**4,754**	4,837
33,8	25,94	**26,46**	26,98	***116,6***	4,517	**4,598**	4,68
35,6	24,85	**25,33**	25,83	***118,4***	4,368	**4,448**	4,529
37,4	23,81	**24,26**	24,72	***120,2***	4,225	**4,304**	4,383
39,2	22,82	**23,24**	23,68	***122***	4,087	**4,165**	4,243
41	21,88	**22,27**	22,68	***123,8***	3,954	**4,031**	4,108

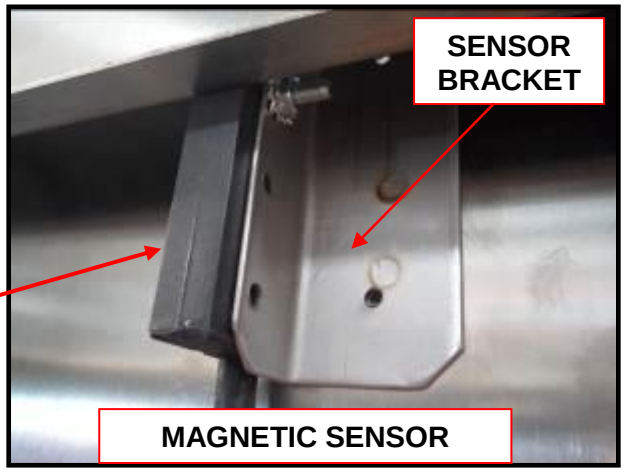
T[°F]	R[kΩ] low	R[kΩ] mid	R[kΩ] high	T[°F]	R[kΩ] low	R[kΩ] mid	R[kΩ] high
127,4	3,704	**3,778**	3,853	***210,2***	0,9505	**0,9826**	1,016
129,2	3,585	**3,658**	3,732	***212***	0,9247	**0,9563**	0,9888
131	3,471	**3,543**	3,616	***213,8***	0,8998	**0,9307**	0,9626
132,8	3,362	**3,432**	3,504	***215,6***	0,8756	**0,9059**	0,9372
134,6	3,256	**3,325**	3,396	***217,4***	0,852	**0,8818**	0,9125
136,4	3,154	**3,222**	3,291	***219,2***	0,8292	**0,8584**	0,8885
138,2	3,056	**3,123**	3,191	***221***	0,8071	**0,8357**	0,8653
140	2,961	**3,027**	3,094	***222,8***	0,7856	**0,8136**	0,8427
141,8	2,869	**2,934**	3	***224,6***	0,7647	**0,7922**	0,8207
143,6	2,781	**2,845**	2,91	***226,4***	0,7444	**0,7715**	0,7994
145,4	2,696	**2,759**	2,823	***228,2***	0,7248	**0,7513**	0,7787
147,2	2,614	**2,676**	2,738	***230***	0,7057	**0,7317**	0,7586
149	2,535	**2,595**	2,657	***231,8***	0,6872	**0,7127**	0,7391
150,8	2,459	**2,518**	2,578	***233,6***	0,6692	**0,6943**	0,7202
152,6	2,385	**2,443**	2,503	***235,4***	0,6518	**0,6764**	0,7018
154,4	2,313	**2,371**	2,429	***237,2***	0,6349	**0,659**	0,6839
156,2	2,245	**2,301**	2,358	***239***	0,6185	**0,6421**	0,6666

158	2,178	**2,233**	2,29	***240,8***	0,6026	**0,6258**	0,6498
159,8	2,114	**2,168**	2,224	***242,6***	0,5871	**0,6099**	0,6334
161,6	2,052	**2,105**	2,16	***244,4***	0,5721	**0,5945**	0,6176
163,4	1,992	**2,045**	2,098	***246,2***	0,5576	**0,5795**	0,6022
165,2	1,935	**1,986**	2,039	***248***	0,5435	**0,565**	0,5873
167	1,879	**1,929**	1,981	***249,8***	0,5298	**0,5509**	0,5728
168,8	1,825	**1,874**	1,925	***251,6***	0,5165	**0,5372**	0,5587
170,6	1,773	**1,821**	1,871	***253,4***	0,5037	**0,524**	0,5451
172,4	1,722	**1,77**	1,819	***255,2***	0,4912	**0,5111**	0,5318
174,2	1,673	**1,72**	1,768	***257***	0,4791	**0,4986**	0,5189
176	1,626	**1,672**	1,719				
177,8	1,58	**1,625**	1,672				
179,6	1,535	**1,58**	1,625				
181,4	1,492	**1,536**	1,58				
183,2	1,45	**1,493**	1,537				
185	1,409	**1,451**	1,494				
186,8	1,37	**1,411**	1,453				
188,6	1,331	**1,372**	1,413				
190,4	1,294	**1,334**	1,374				
192,2	1,258	**1,297**	1,337				
194	1,222	**1,261**	1,3				
194	1,222	**1,261**	1,3				
195,8	1,188	**1,226**	1,264				
197,6	1,155	**1,192**	1,23				
199,4	1,123	**1,159**	1,196				
201,2	1,092	**1,127**	1,164				
203	1,062	**1,097**	1,132				
204,8	1,033	**1,067**	1,102				
206,6	1,004	**1,038**	1,072				
208,4	0,977	**1,01**	**1,044**				

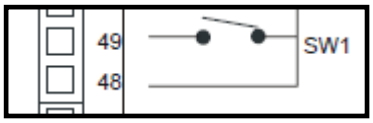
2.2. DOOR SWITCH

Each model is equipped with a magnetic door switch. The door opening is detected by a magnetic sensor. When the door is closed the sensor is activated from a magnet foamed in the bottom part of the door, coming close to the sensor (each door has two magnets inside: one in the bottom side and an additional one in the upper side, allowing the door to be reversed).





When the sensor is activated (closed door) the two wires circuit gets closed. The two wires are connected to terminals 49/48. When the circuit gets opened (open door) an alarm occurs (d-r, see Tab 1).

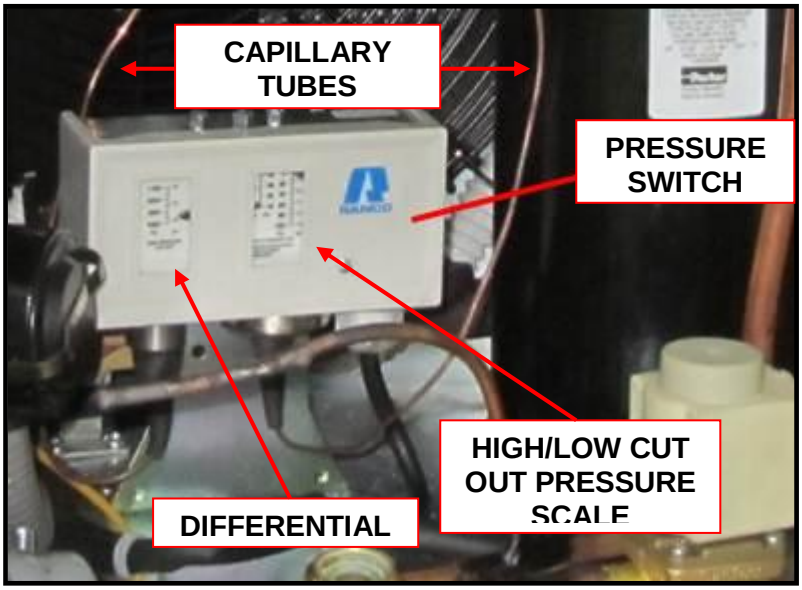


2.2.1. Checking the door switch

It may happen that the magnetic sensor is faulty, or the wires interrupted/shorted. In that case d-r alarm is always on, so the switch cables must be checked (disconnect the cables from 49/48 and ohm out the switch). If the switch works good, check for rust, loosen/lost connections on the terminal block. If the alarm keeps buzzing, tray to replace the mother board.

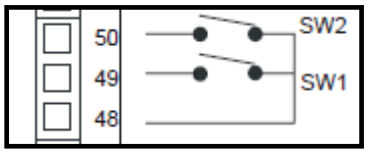
2.3. PRESSURE SWITCH

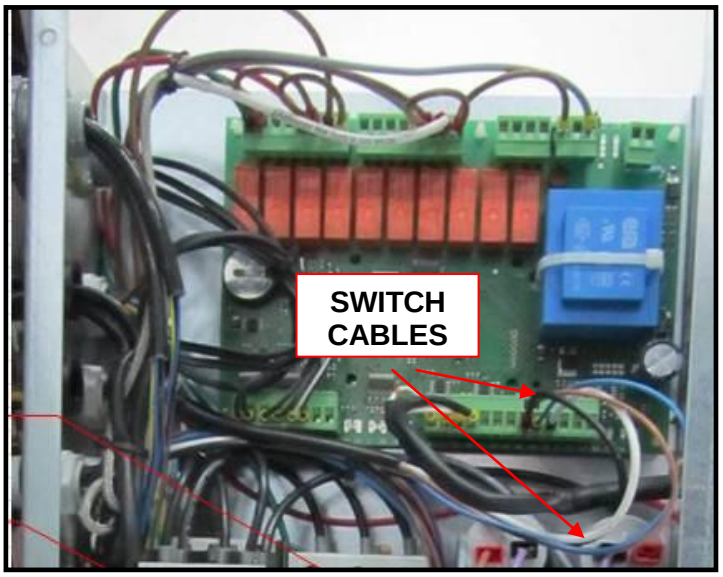
A pressure regulating switch is installed in all the units, to prevent compressor failures or not proper running due to high discharge pressure or low suction pressure.



2.3.1. Pressure switch working principles

The switch provides a free voltage normally closed output connected to pins 48/49 on the board's terminal block. A common input on 48 is shared with the door switch connection.
When pressures reading is above/below high/low limits, then the output gets opened and an hp alarm occurs. See Tab1 for details.
Both high and low pressures events reach to same alarm code. This happens because the switch output is made by two wires only and only the high pressure input on board's terminal block is used (SW2).





Once the proper pressure re-establish (high or low pressure limits +/- hysteresis) then the switch provide an automatic reset.

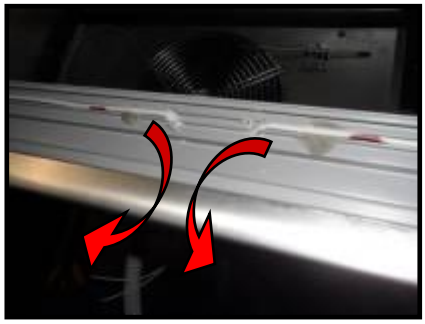
2.3.2. Pressure switch factory setting

Nobody is allowed to modify factory setting fro pressure switch

- High pressure limit =420 psig
- Low pressure limit = 0 psig
- Differential = 10 psi

2.4. DOOR FRAME HEATER

Both shocking freezers and blast chiller units come with a frame heater to prevent frost on the gasket external border line. The heater could be either 115V or 220V rated, depending on the unit. Three phase units come with a 220V rated heater to be connected among two mains. Heater cable runs around the frame, under a plastic strip cover. Cable end terminals go through the bottom cabinet panel toward the electric box.


2.4.1. Heater cable features

a) 115V
- Length = 7.8 feets
- Resistance = 1.4 kΩ
- Current = 80 mAmps

b) 220V
- Length (heated part) = 6.5 feets
- Resistance = 2.4 kΩ
- Current = 90 mAmps

2.5. MAIN BOARD

Every unit has a main board to supply electrical components. In the remote units this board is located in the condensing unit. The board has 10 outputs (10 relays) as shown in the scheme at the following page.

The relays work as indicated in the below reference table:

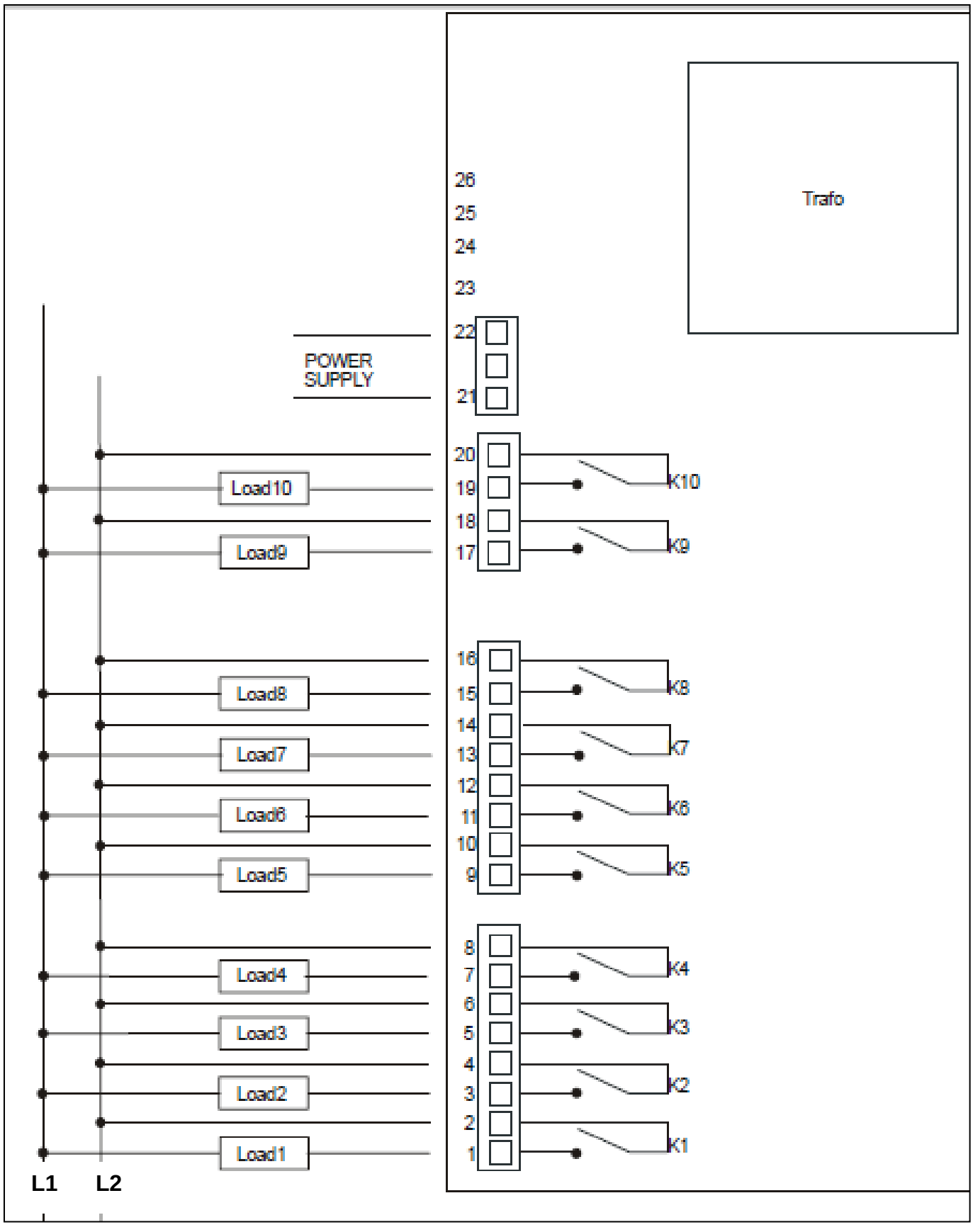
RELAIS	RELATED COMPONENT
K1 (Load1)	COMPRESSOR CONTACTOR COIL
K2 (Load2)	PUMP-DOWN VALVE
K3 (Load3)	EVAPORATOR FAN MOTOR CONTACTOR COIL
K4 (Load4)	DEFROST VALVE
K5 (Load5)	UV LAMP
K6 (Load6)	HEATED NEEDLE PROBE
K7 (Load7)	CONDENSER FAN MOTOR CONTACTOR COIL
K8 (Load8)	DOOR FRAME HEATER
K9 (Load9)	LIGHT
K10 (Load10)	ALLARM

Each load is continuously connected to L1 (or neutral). L2 is cut-in and off by the dedicated relay.

2.5.1. Checking relay outputs

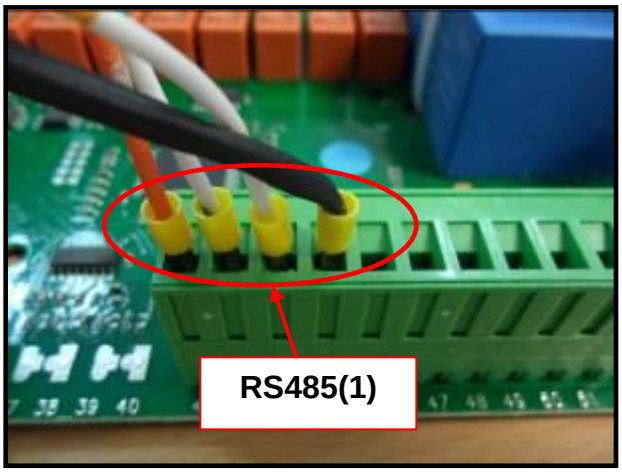
When a component is not running it may be useful to understand if the related relay output is working properly. The relays should cut-in and off according to the logic sequences of the controller. To check an output just disconnect the input Line to the relay and the output

wire (e.g. to check K10 disconnect both wires on 19 and 20 terminals). Ohm out the relay terminals and check if the contact is closed when the relay is activated. A faulty relay may remain always opened or become shorted. When this occurs, replace the board,

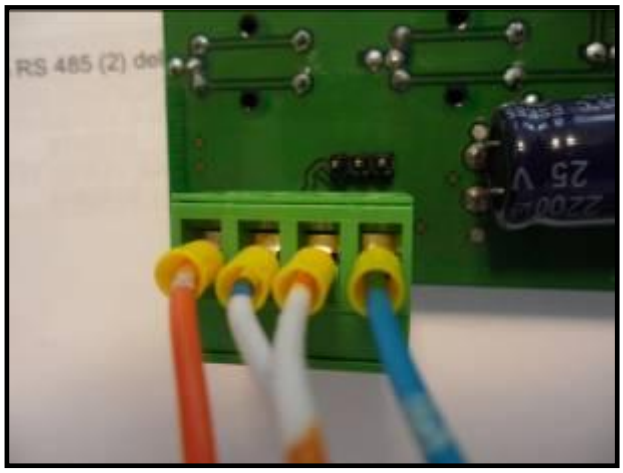


2.6. KEYBOARD

The RS485(1) port on the relay board is used to connect the keyboard.



CONNECTION ON RELAY BOARD



CONNECTION ON KEYBOARD

2.6.1. Keyboard Troubleshooting

Main troubles that can occur on the keyboard are:

1. GND wire connection missing: The display digits blink and grow dim
2. - wire connection missing: display might work, without giving any specific alarm
3. + wire connection missing: Err is displayed
4. 12V wire missing: no light at all on the display
5. Keyboard faulty: all the cables are properly connected but the display do not work

2.7. REFRIGERANT PRESSURES CHECK

Refrigerant high and low pressure values are closely related to:

- ambient temperature
- heat load in the cabinet(full, empty)
- status of the cycle (beginning with a lot of steam, frozen food etc)
- cabinet temperature
- TX valve regulation
- Evaporator coil airflow
- Condenser coil airflow

Even if at least two pressures gauge ports are available on each unit for checking low and high pressure values, nothing can be said about the proper working of the unit by only measuring these pressures. A more careful analysis must be done considering above listed conditions and measuring also temperature in some specific point (see 1.3.3. for

more information about evaporator temperature checking). For instance, if from a low pressure checking the outcome is 0.1 psig, this could be a correct pressure if in the cabinet the temperature is at the minimum (-40°F) and if the evaporator temperature is -49°F accordingly. If not, the evaporator could be starved and actual temperature could be much more higher than -49°F. In this last case, even if the pressure may appear to be correct, the unit is not working properly. Although is not recommended to base a troubleshooting on two pressure measurements, below there is some figure on refrigerant pressure values.

SUCTION PRESSURE: 1.5/2 psig

This pressure should be measured when the cabinet temperature is stable at -40°F, and compressor running.

DISCHARGE PRESSURE: 230 psig

This value can vary extensively and reach up to 360 psig, depending on ambient temperature and heat load inside the cabinet. Higher value of condensing pressure may cause the pressure switch to trip.

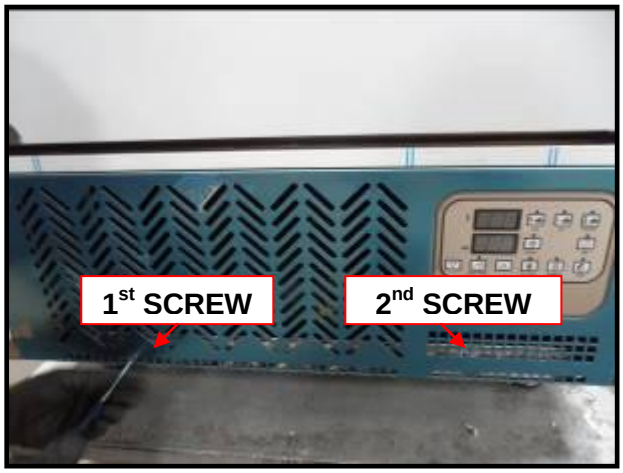
3. SERVICE AND REPAIR

This chapter deals with repairing/replacing instruction, of both mechanical and electrical components.

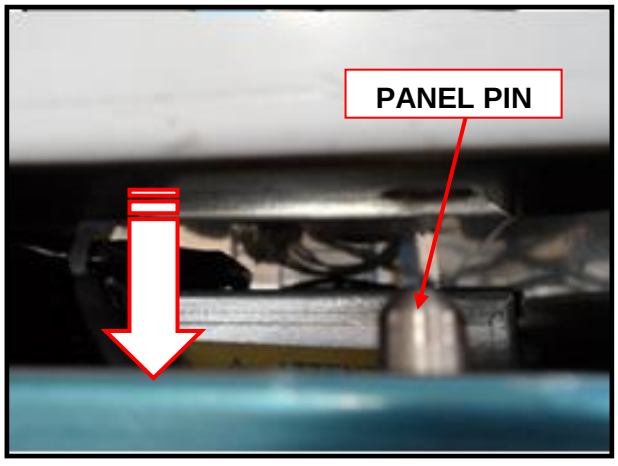
3.1. REMOVE THE FRONT PANEL

3.1.1. Units from GBC30SG to GBF171-132S

a) Remove the two bottom screws by inserting the screwdriver through the squared holes

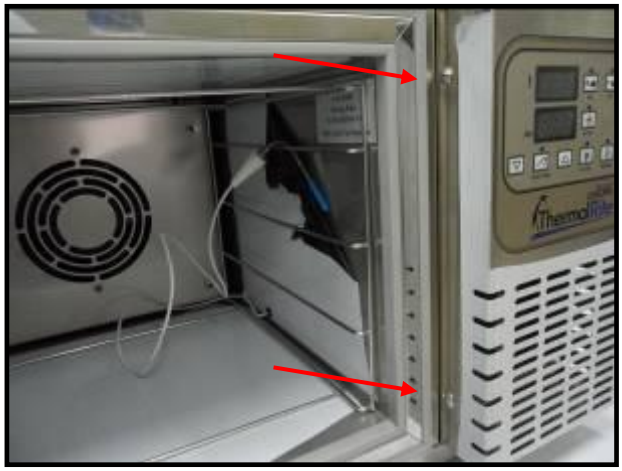


b) The front panel is fixed on the top by two pins (left and right). Just pull the pane lfrom the bottom side and let the pins exit the holes



3.1.2. GBF15-11S (smallest self-contained unit)

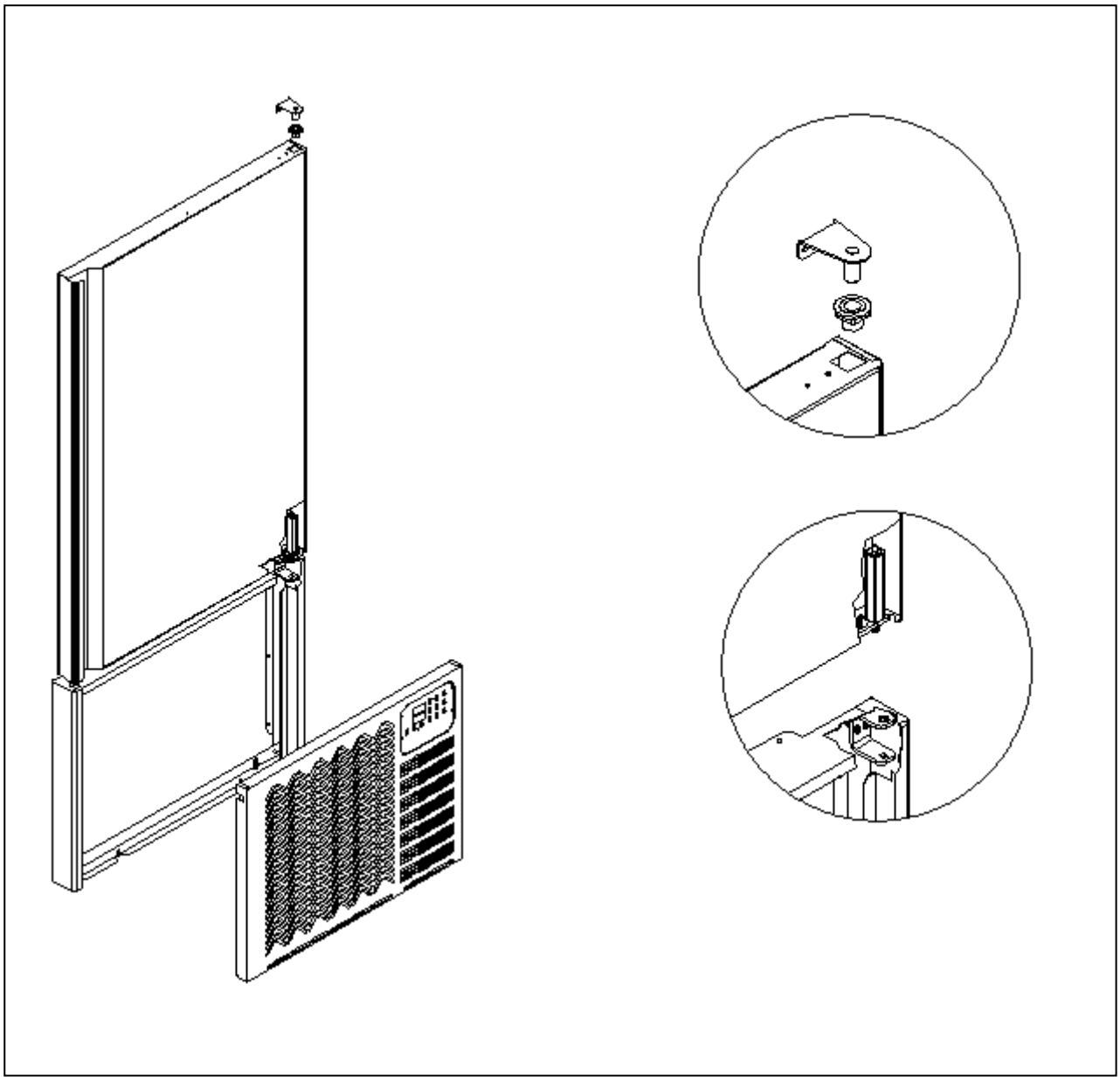
a) Unscrew on the side panel and on the front panel on the door frame side



b) Remove the front panel to access to the condenser coil, keyboard and door switch.

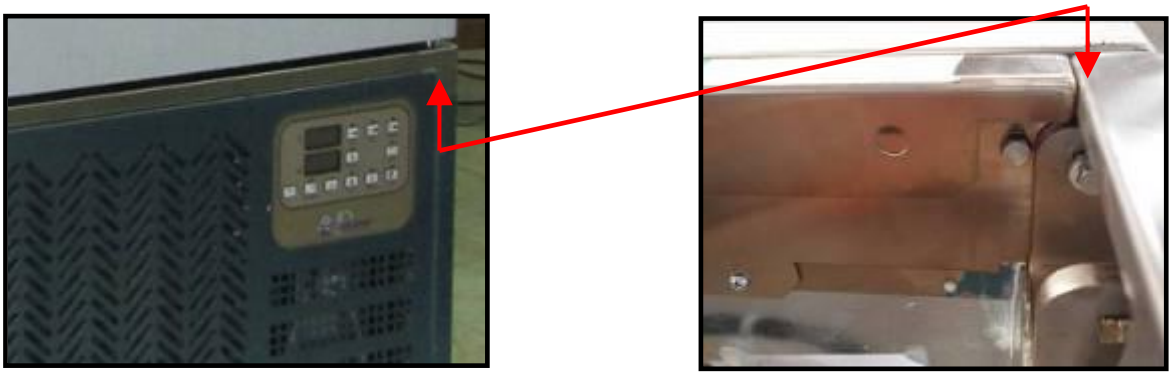
3.2. DOOR REVERSING

Each door can be easily reversed from right to left hinged type. Hinges, stirrups, bushes are assembled as per images below:

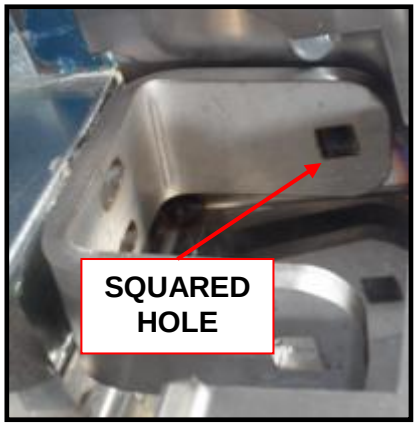


Reversing instrruction:

a) Remove the front panel and look for the C shaped stirrup under the right side of the door

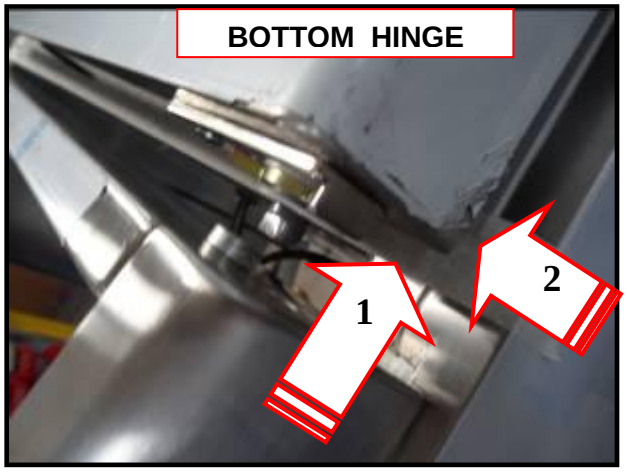


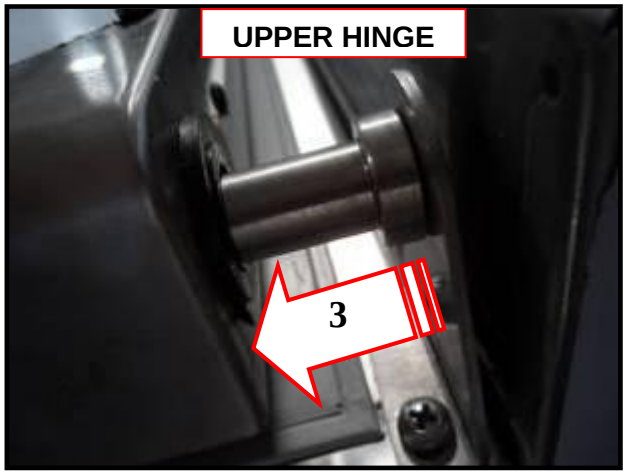
b) Unscrew the stirrup and take it off by removing the hinge pin from the squared hole



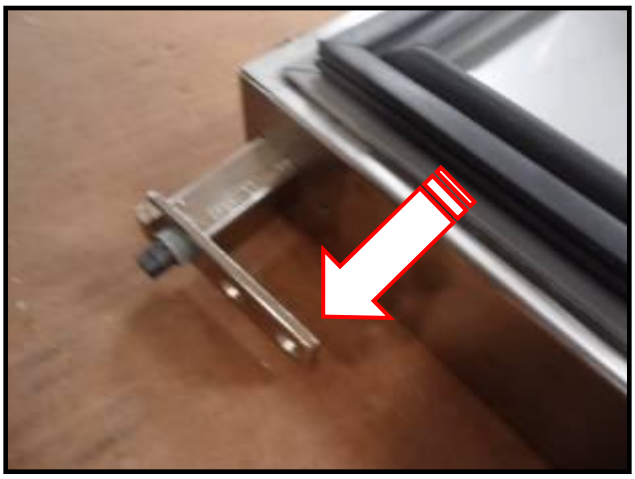
c) Unscrew the upper hinge

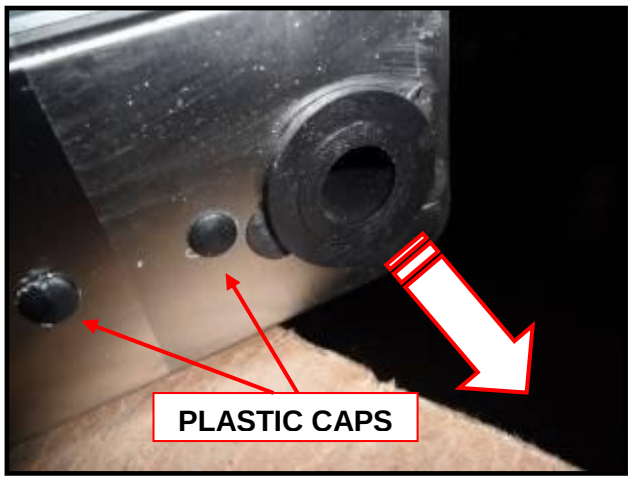
d) Lift the door up, pull it and take it away



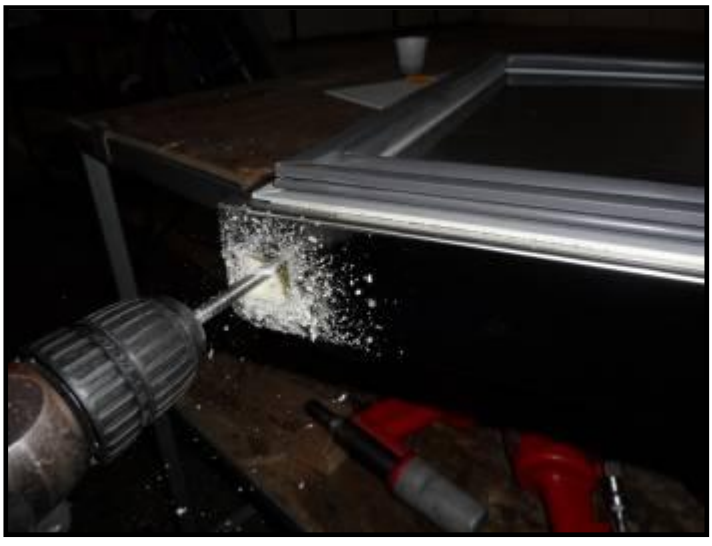


e) Extract the bottom door hinge and the upper plastic bush from the door

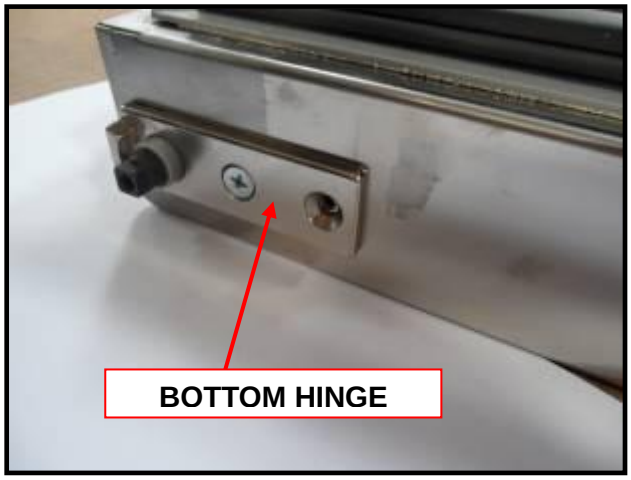




f) Remove the foam from the right upper door hole

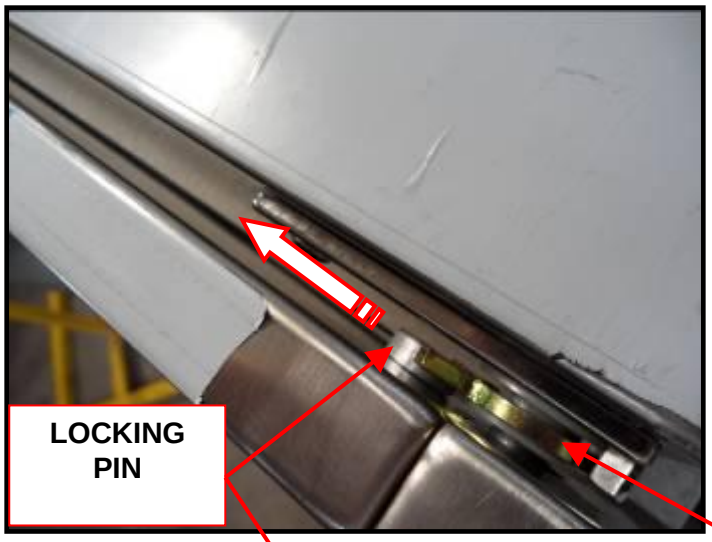


g) Cross the bottom hinge and upper plastic bush positioning. Fit he small plastic caps on the screw holes that were previously holding the bottom hinge.

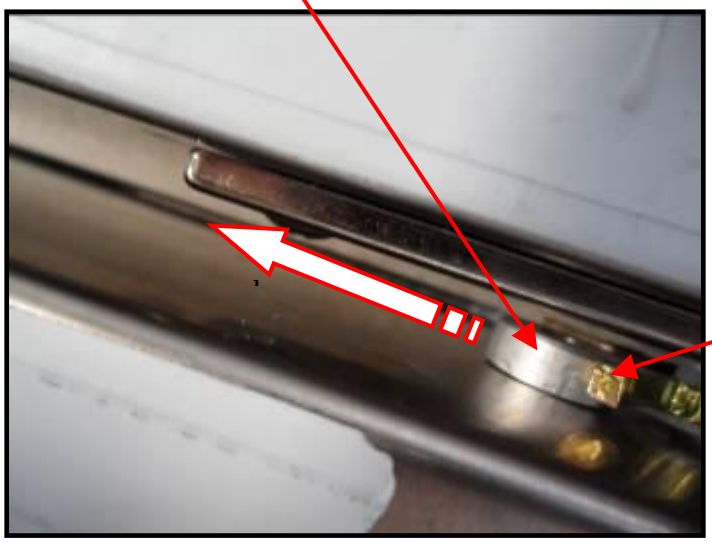


h) Move the locking pin from the right to the left side (by fitting it in the provided opposite hole on the frame panel). Fit pins and nylon bushings as shown.

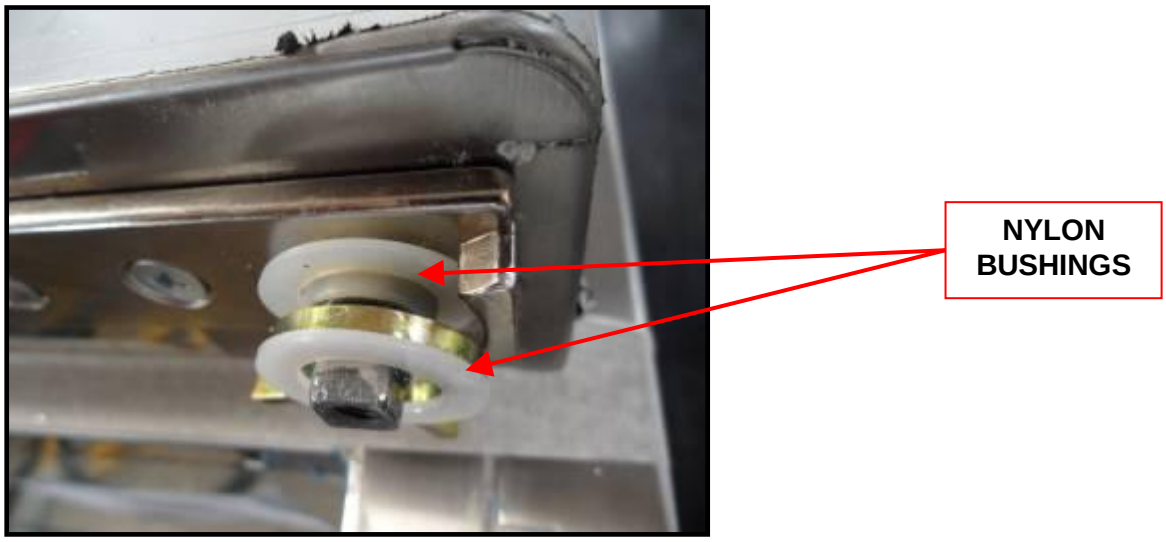
\



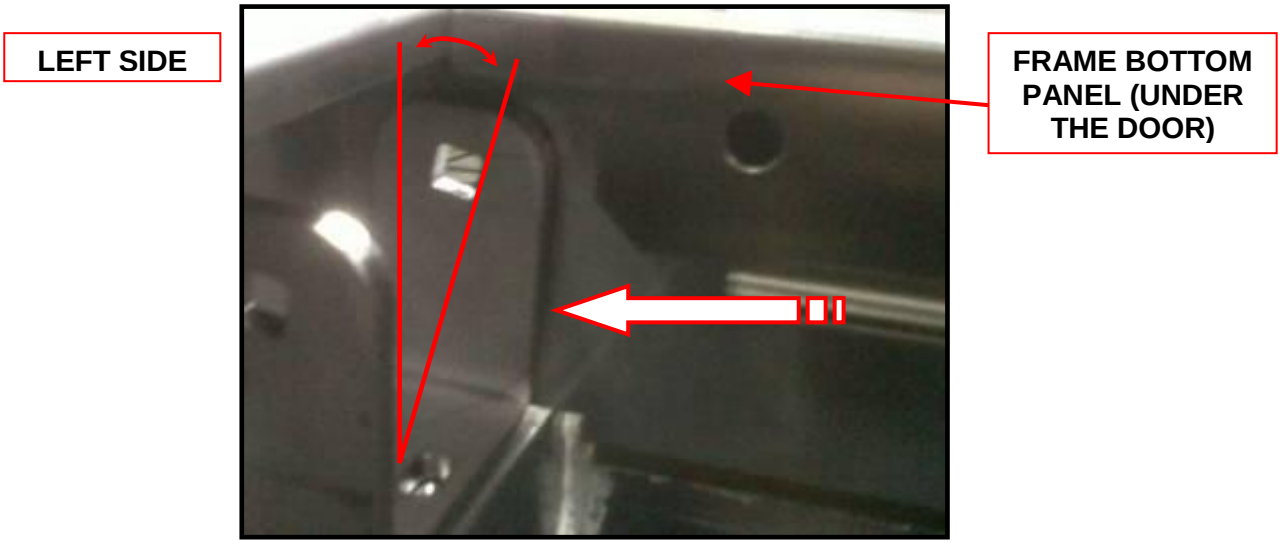
LOCKING PIN



LOCKING Ω RING



i) Move the C shaped stirrup from the right side to the left one, screw it on the housing without tightening. Be careful that the stirrup is positioned with the square hole according to the angle below indicated. The right angle will allow the hinge spring to be loaded when the door is closed, therefore providing a better sealing pushing the gasket against the door frame.

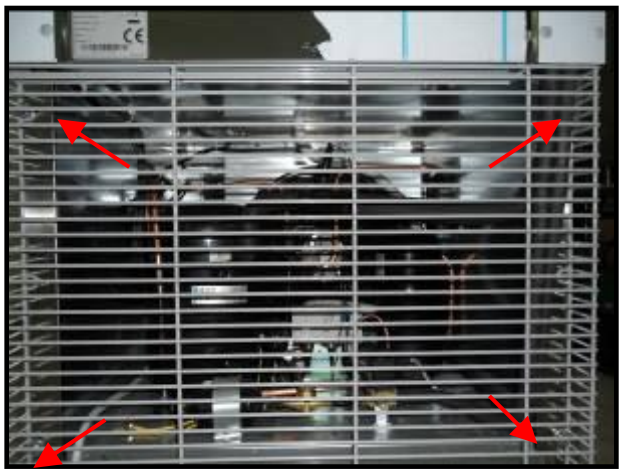


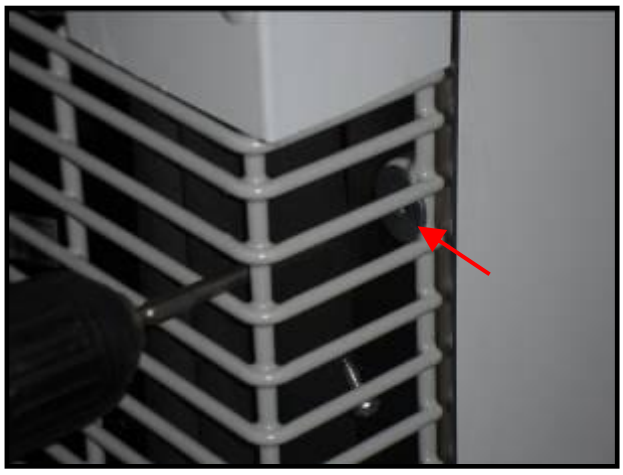
j) Turn the door upside down, fit the upper hinge, fit the bottom hinge pin in the stirrup squared hole. Tighten the screws to fix the C stirrup and the upper hinge. Check the proper working of the door and sealing. Fit back the front panel.

3.3. HOW TO ACCESS TO THE CONDENSING UNIT

3.3.1. Units from GBC39S to GBF171-132S

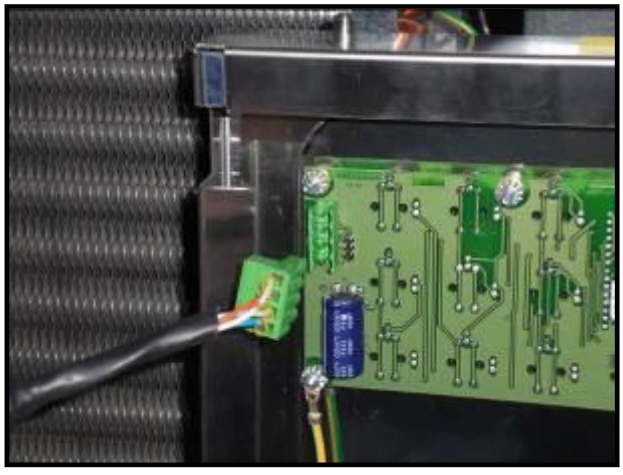
I. Remove the rear grid by unscrewing corner screws



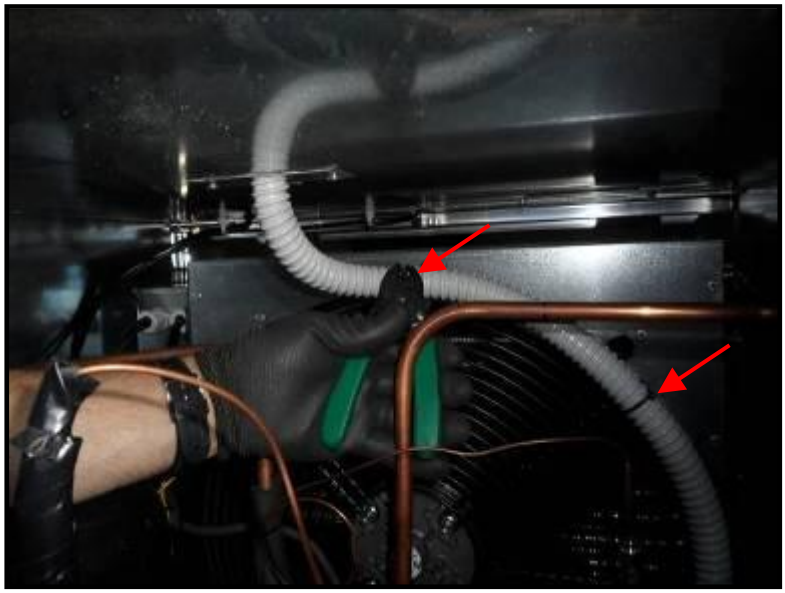


II. Remove the front panel and unscrew the left and right bolts from the compressor basis plate at the condenser sides

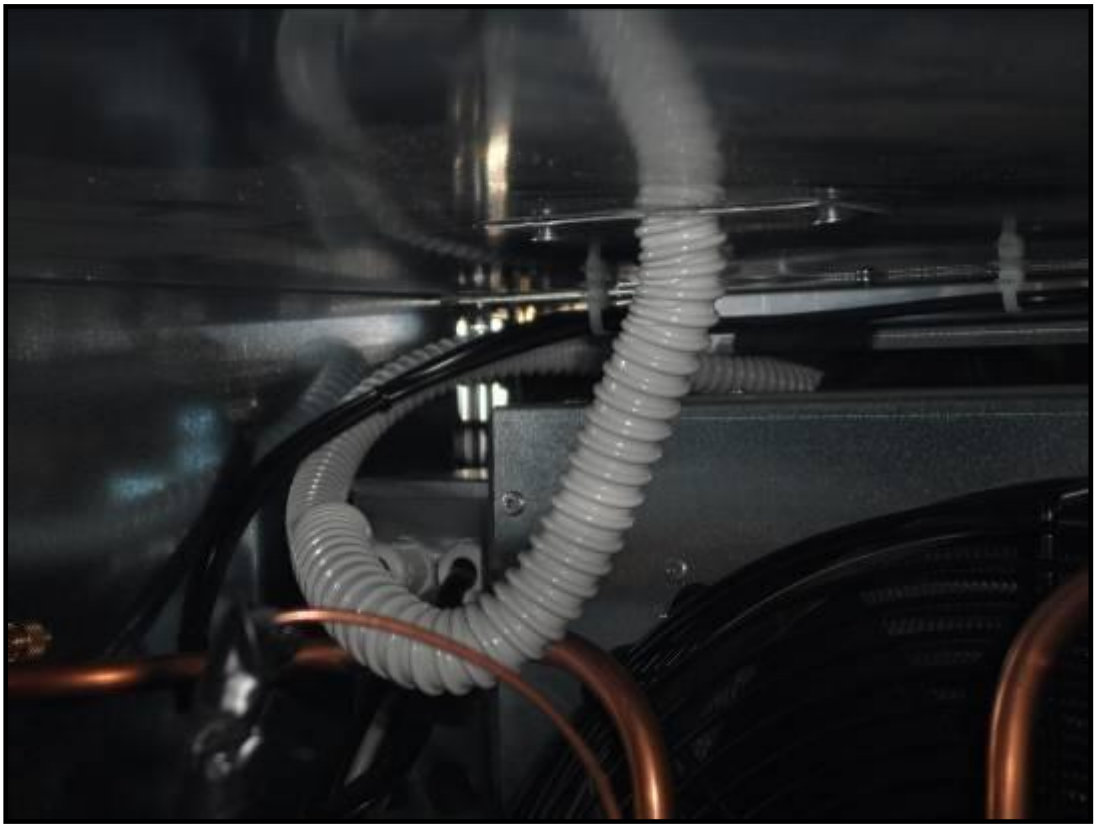
III. Disconnect the keyboard. Loosen or cut plastic ties in order to extend cables length and make possible to slide out compressor basis



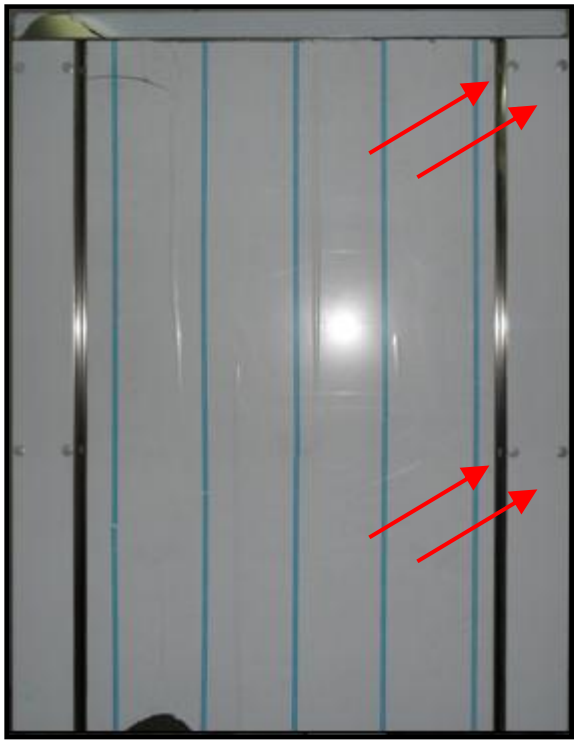
IV. Cut the ties which hold the draining duct

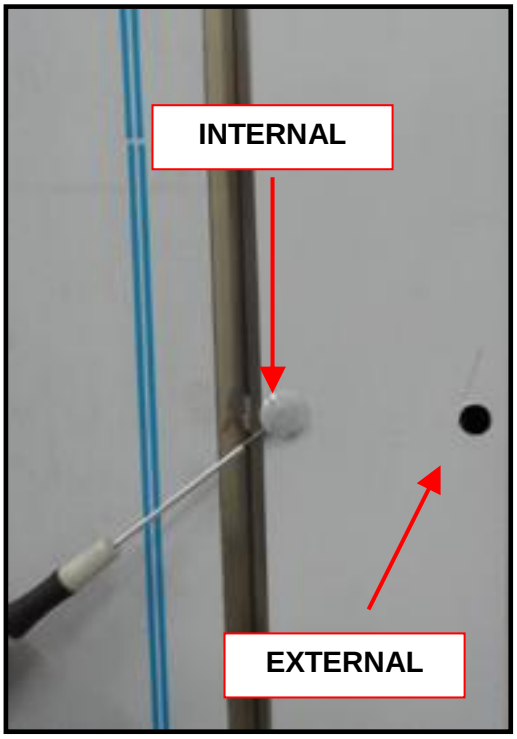


V. Fix the draining pipe in order to prevent interfering with the basis movement while sliding

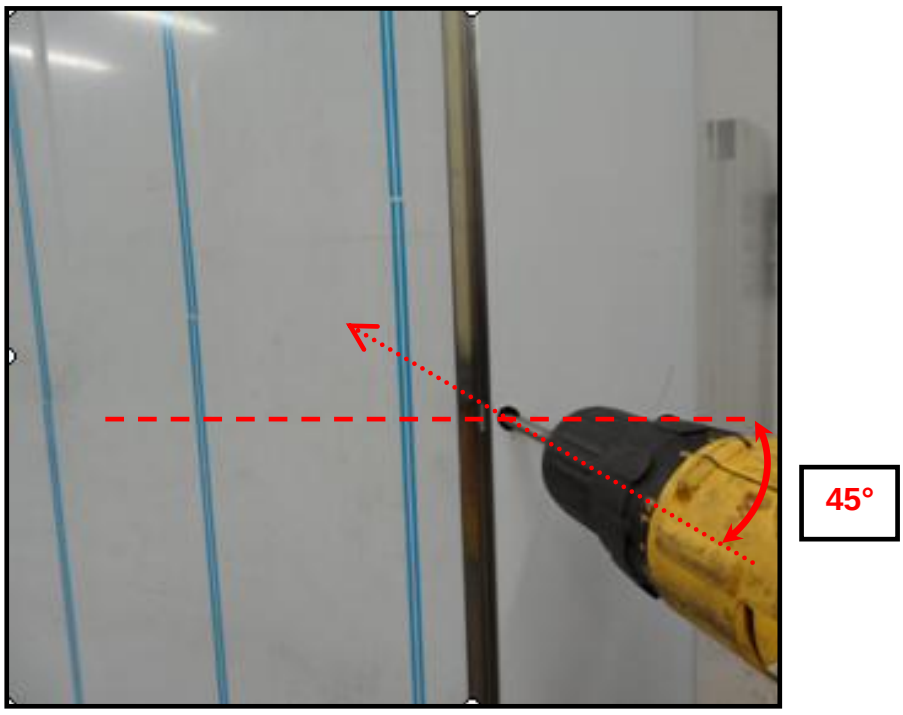


VI. Remove the caps from the corner s/s angles

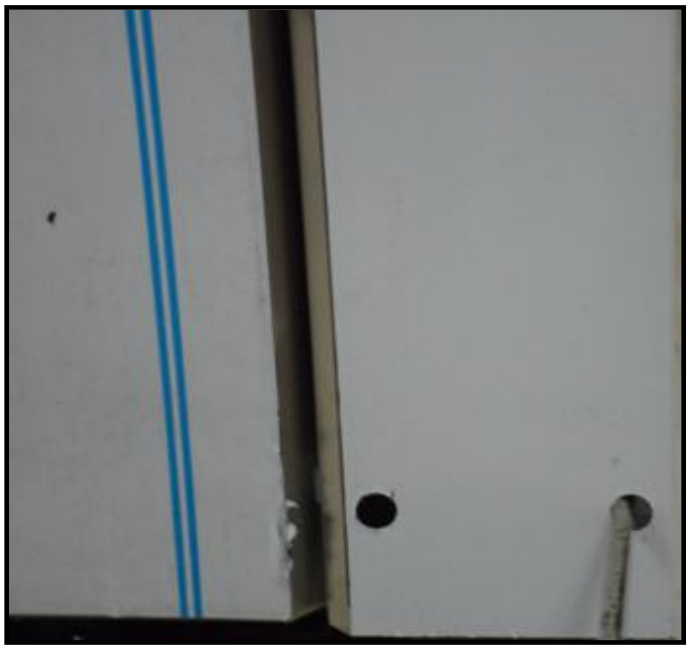


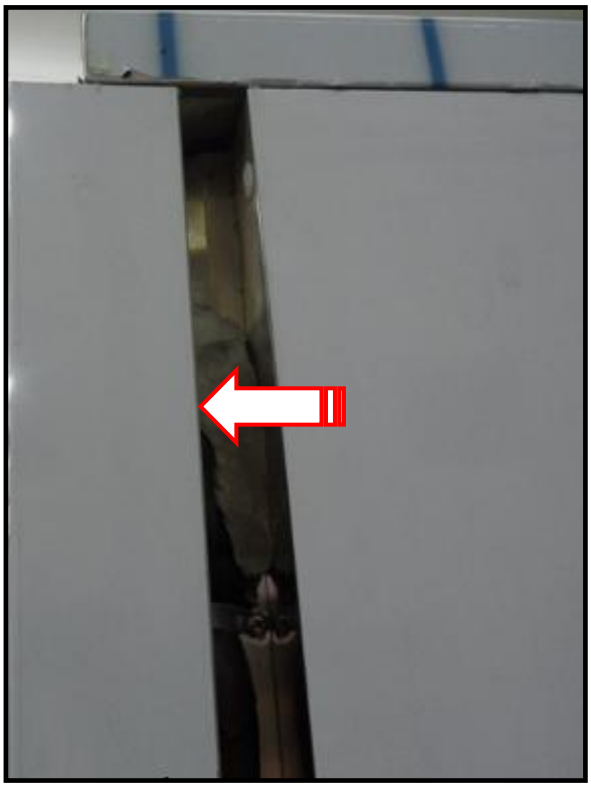


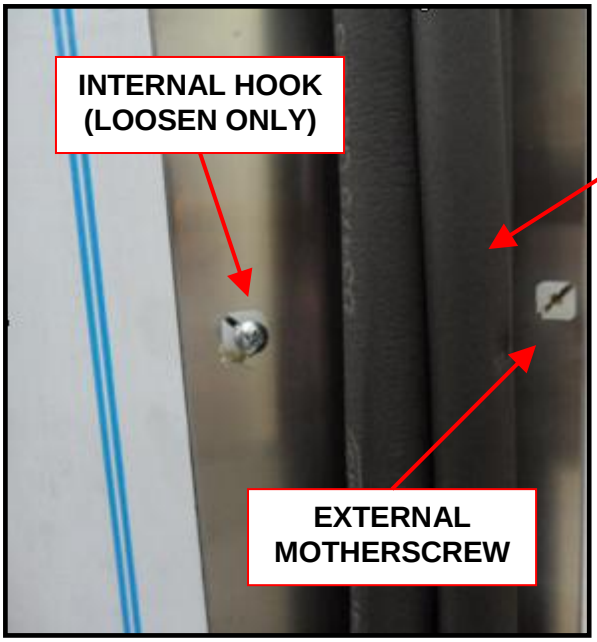
VII. Once the caps have been removed unscrew as shown below. Internal screws of the corner angle must be reached placing the screwdriver on a 45° direction with respect to the back panel. They only need to be loosened.



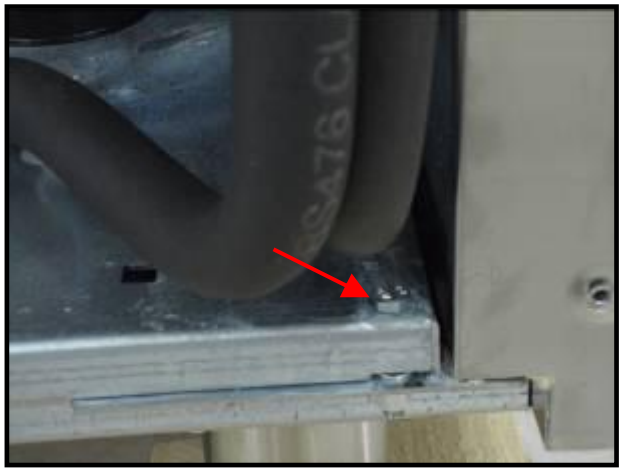
VIII. The external screws must be completely removed. After that, the angle cover can be removed.



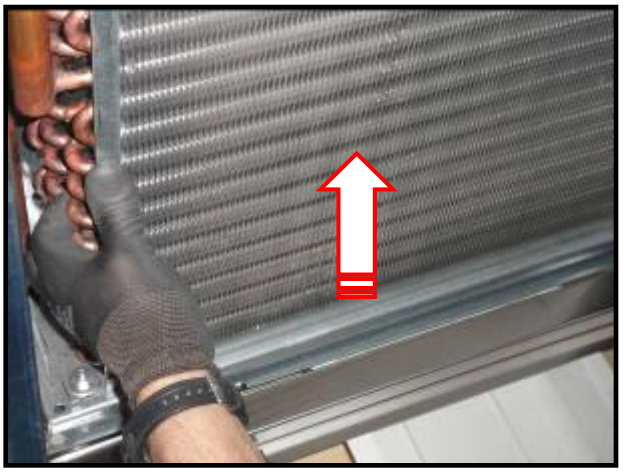


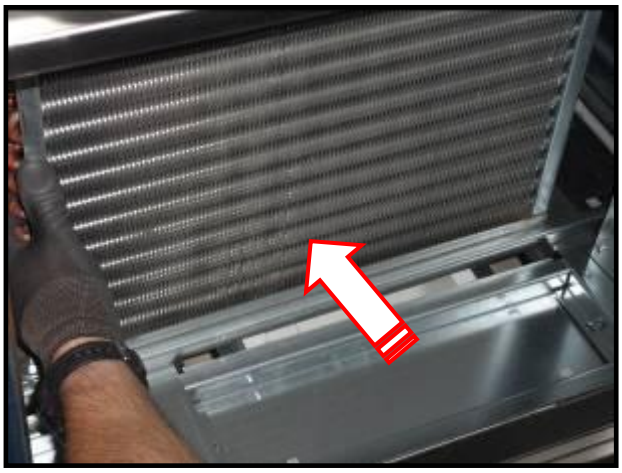


IX. Unscrew the right and left bolts from the compressor basis plate

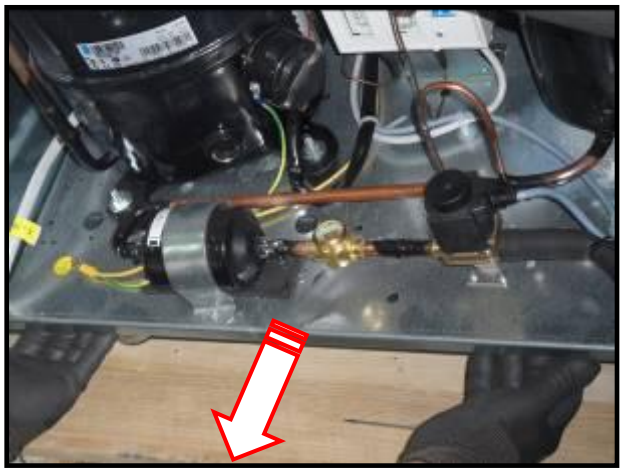


X. On the front side lift up a little bit the basis panel (that is linked to the underneath panel) by holding the condenser and pushing it forward

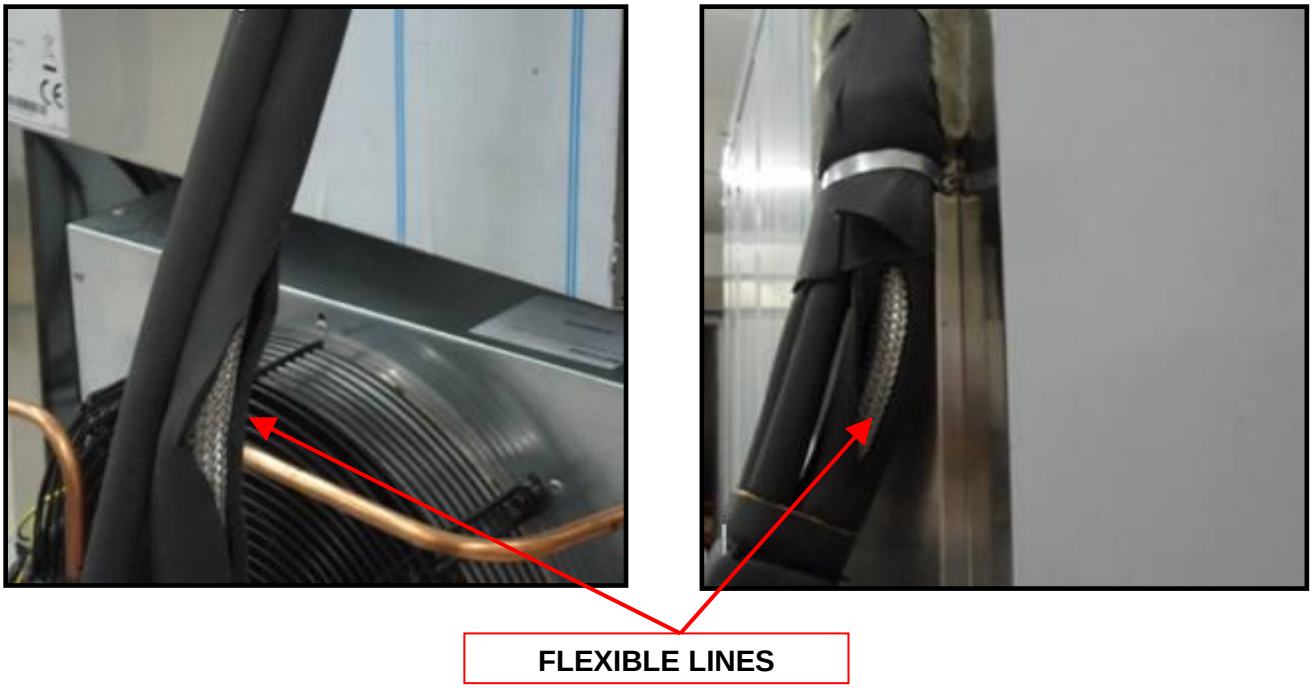




XI. On the back side pull the panel out as much as it's needed



XII. The system is designed wit two flexible pipe lines to make the operation easier.



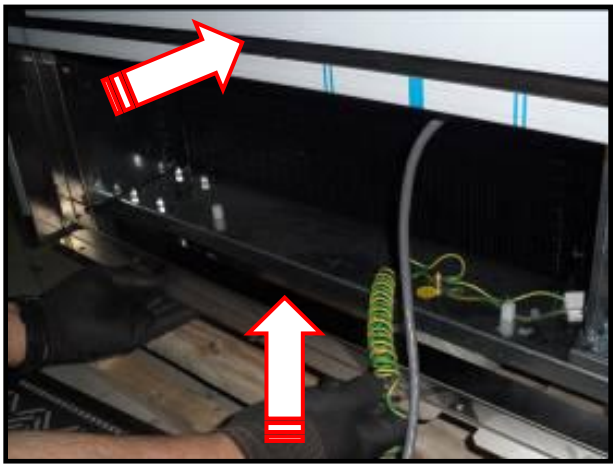
3.3.2. Units from GBC30SG to GBF44-26SP

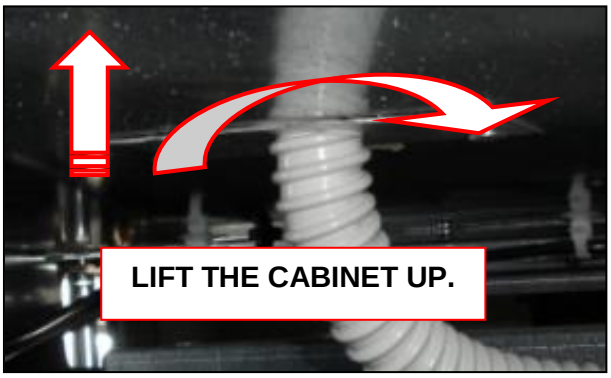
The above units do not come with any sliding panel to host the condensing units. Everything is built in the basis panel of the body structure. That's why procedure to access those components is different from the above described, even though it is similar regarding some points.
Instruction:

i. Follow instruction from I to VIII from chapter 3.3.1.

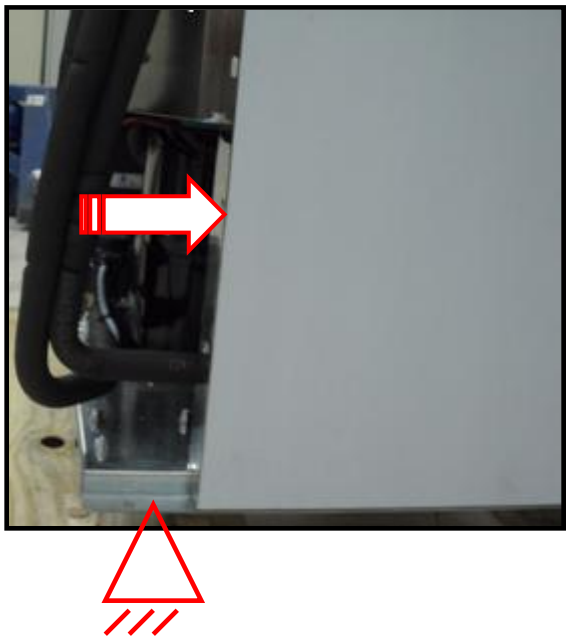
ii. Unscrew the 8 bolts from the bottom of the cabinet (4 each side)

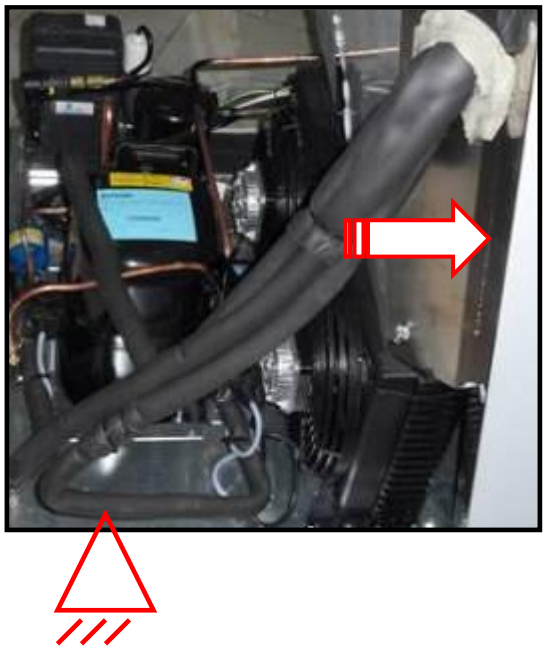
iii. On the front side, lift up the cabinet and pull it in order to make the draining duct overcome the condenser coil without damages.





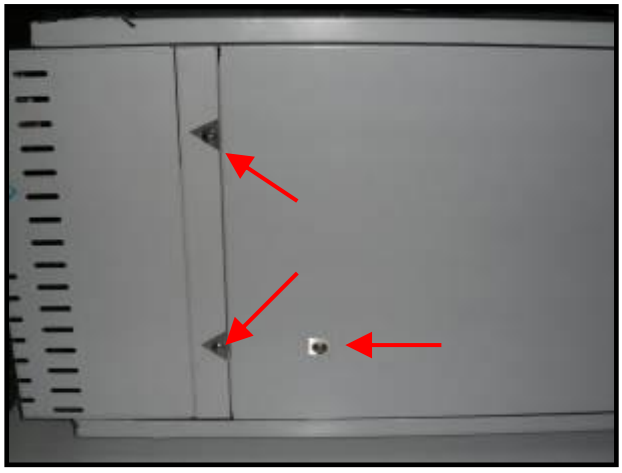
iv. While keeping in its place the cabinet basis, push the cabinet body from the back towards the front side as much as needed to access to the concerned part.

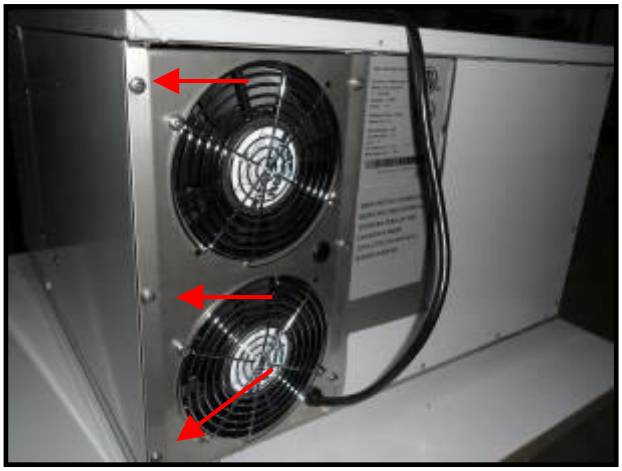




3.3.3. GBF15-11S (smallest self-contained unit)

I. Unscrew on the right side panel (3 screws). Unscrew on the back right side (3 screws)

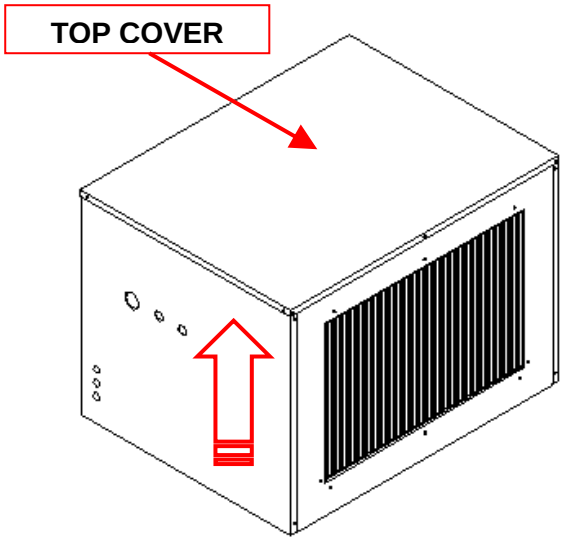




II. Remove the side panel to access the condensing unit

3.3.4. Remote units, units GBF440-385R and GBF837-727R

Remote units have a separate condensing unit built in a dedicate case. To access the condensing unit just unscrew the top metal cover and operate inside the box.



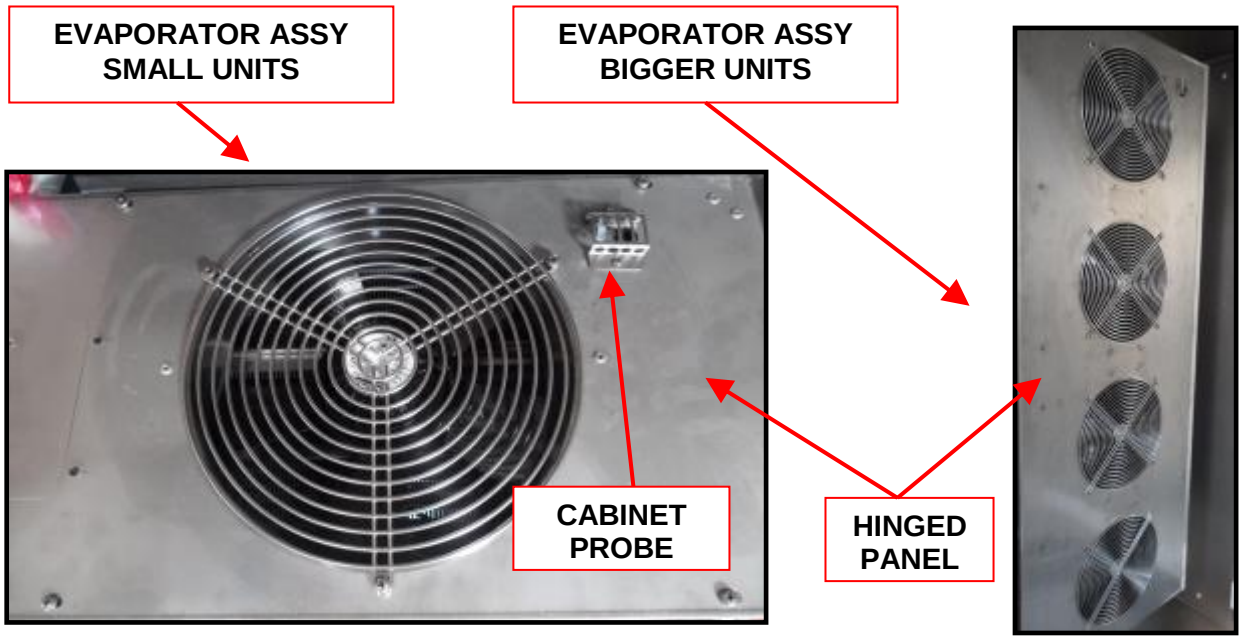
CONDENSING BOX

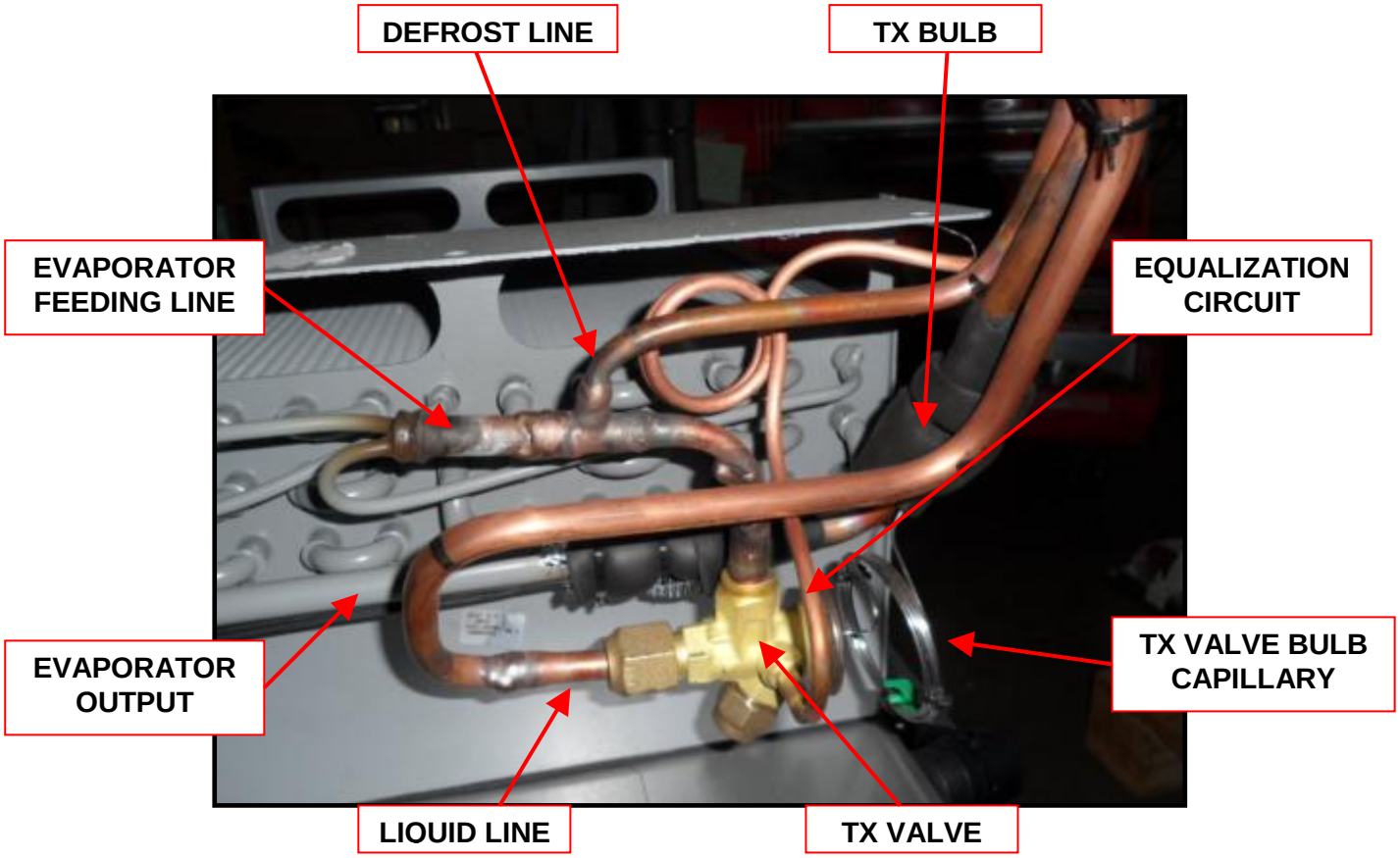
3.4. HOW TO ACCESS EVAPORATOR ASSY

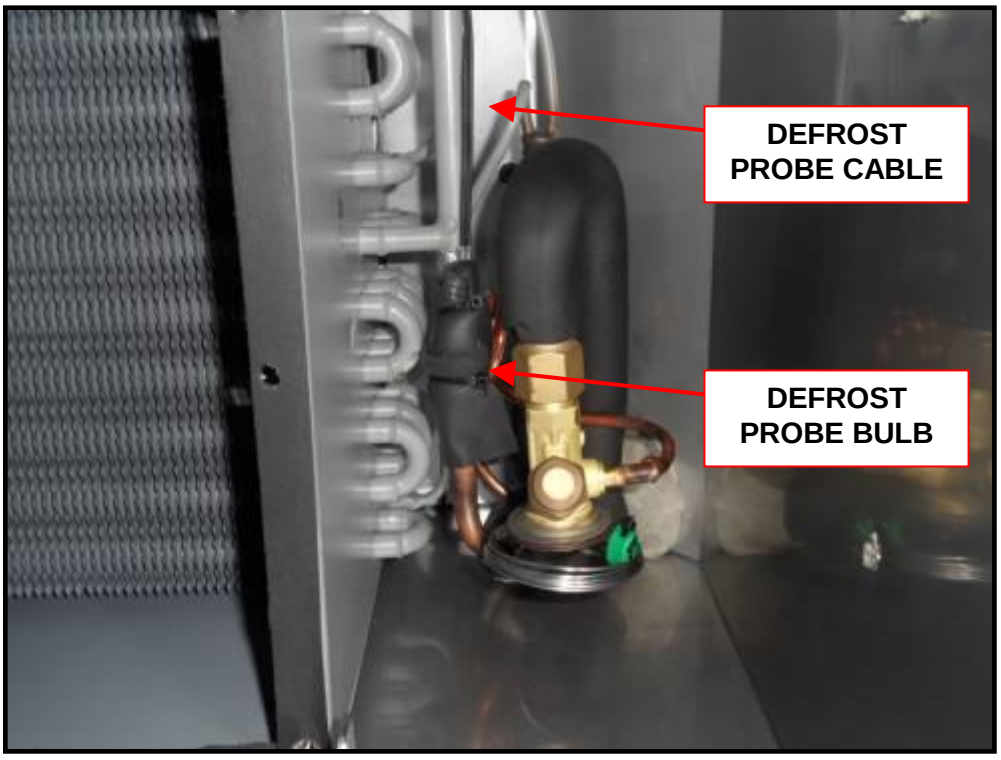
All the units, self contained as well as remote, are equipped with one evaporator assembly made by:

a. An evaporator coil battery
b. One or more evaporator fans (depending on the unit's size)
c. A TX valve (in some case M.O.P.)
d. A probe sensor positioned on the evaporator output (defrost probe)
e. A hinged cover panel holding motor fans and finger guards
f. A probe sensor placed on the hinged panel in the cabinet area (regulation probe)

3.4.1. Evaporator assy description

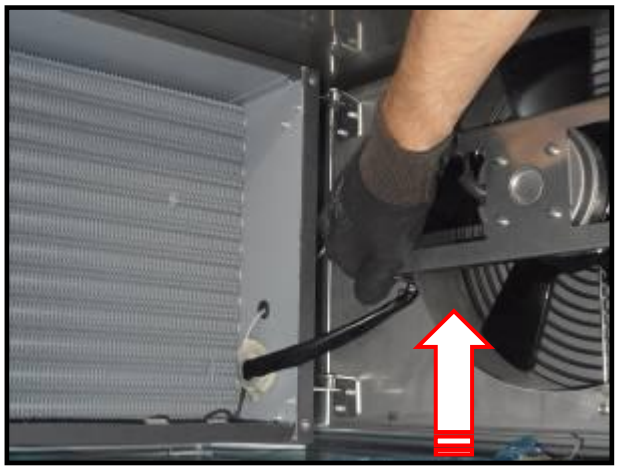






3.4.2. How to access to the evaporator

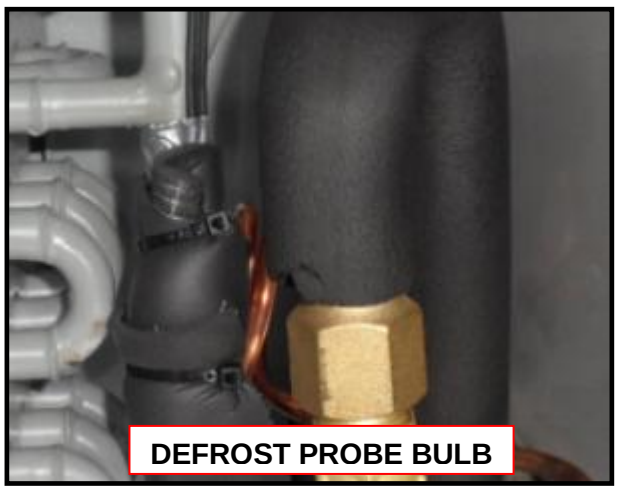
Remove the screws which fix the hinged panel to the evaporator shoulders and open the panel. Eventually lift the panel up and remove it



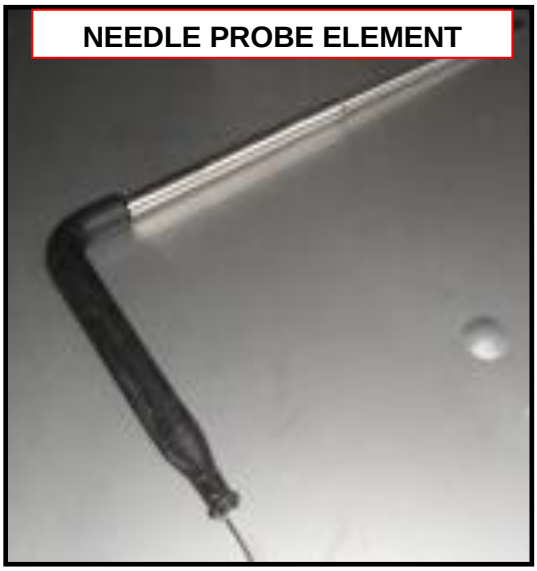
3.4.3. How to replace cabinet, evaporator or needle probe

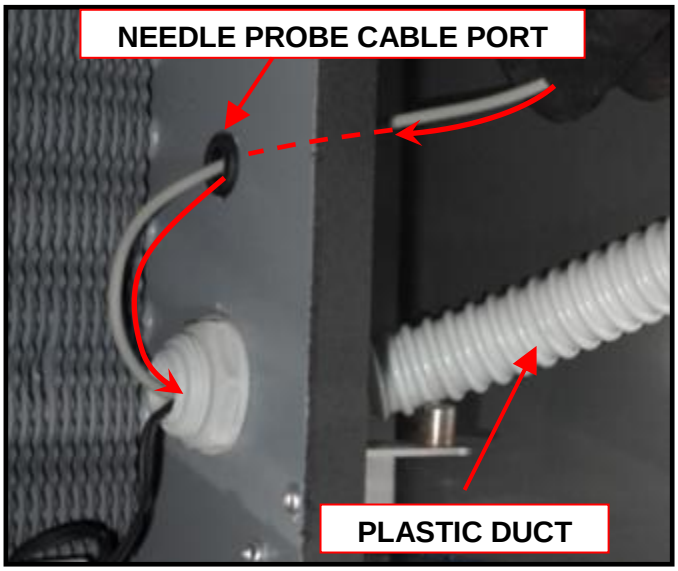
a. Cabinet probe is covered by a metal grid and is fitted in plastic tie. Remove both to replace the cabinet probe.

b. Evaporator probe bulb is positioned on the evaporator output tube, tighten by a plastic tie and wrapped by an aluminium tape. Then everything is insulated. When replacing the defrost probe, be careful that the factory configuration is rebuilt.

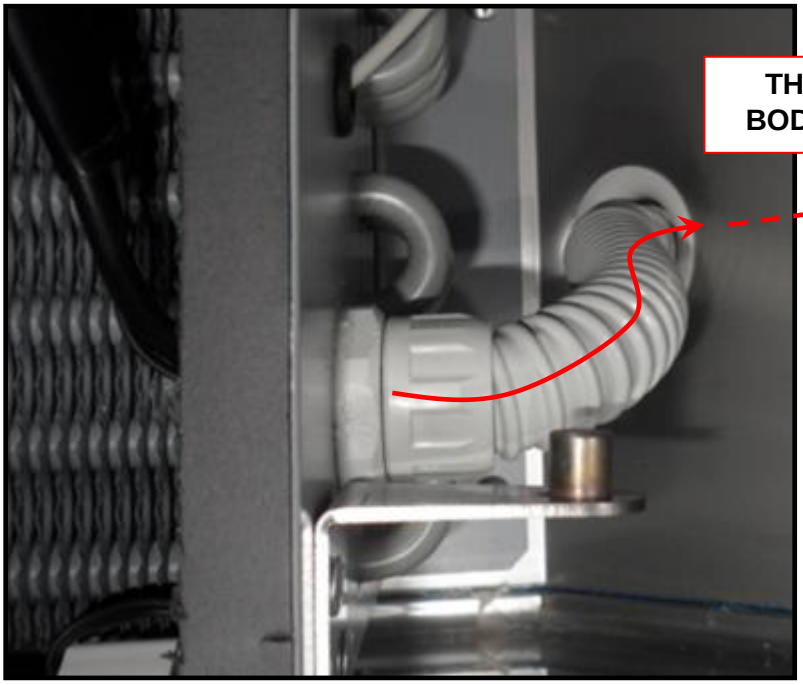


c. Needle probe cable firstly enters the evaporator assy trough a port, and then goes together with the other probe cables in a common tube toward the electrical box.

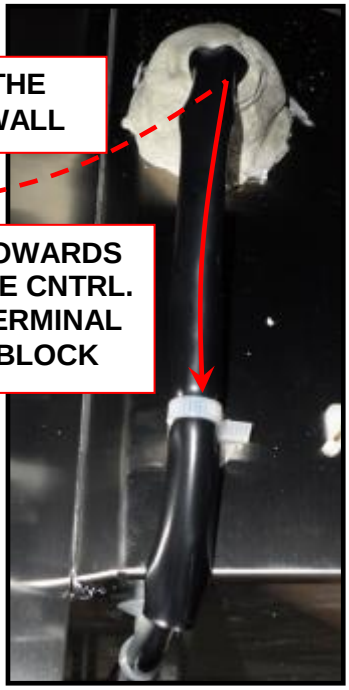




When replacing one of the above probe, remove the bubs and all the holding ties in the evaporator side. Disconnect the probe wires from the controller terminal block (see details at 2.1.1 picture). Tie the new probe end cable terminals to the old probe cable (cut the old bulbs to avoid blocking). From the electrical box side pull the old probe cable and let the new cable run through the plastic duct until reaching the terminal block on the controller.



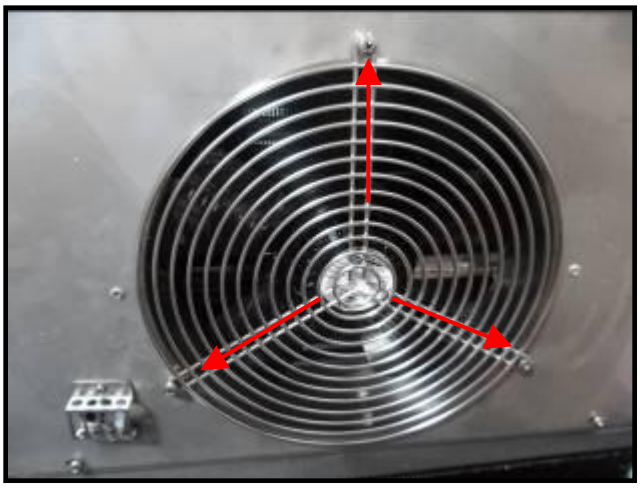
VIEW FROM INSIDE



VIEW FROM THE BACK, UNDER THE S/S LEFT ANGLE COVER

3.4.4. How to replace evaporator motor fans

a. Unscrew the finger guard, open the panel and unscrew the motor fan



b. Follow the cable path (same as the probes' one) and fit the new cable by tying it to the old one cable. From the electrical box, pull the old motor cable and let the new one pass through the plastic duct. Alternatively, cut the old cable and connect to the new motor fan with a suitable waterproof connection.

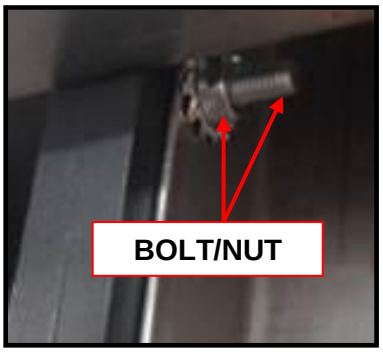
3.5. HOW TO REPLACE THE DOOR SWITCH

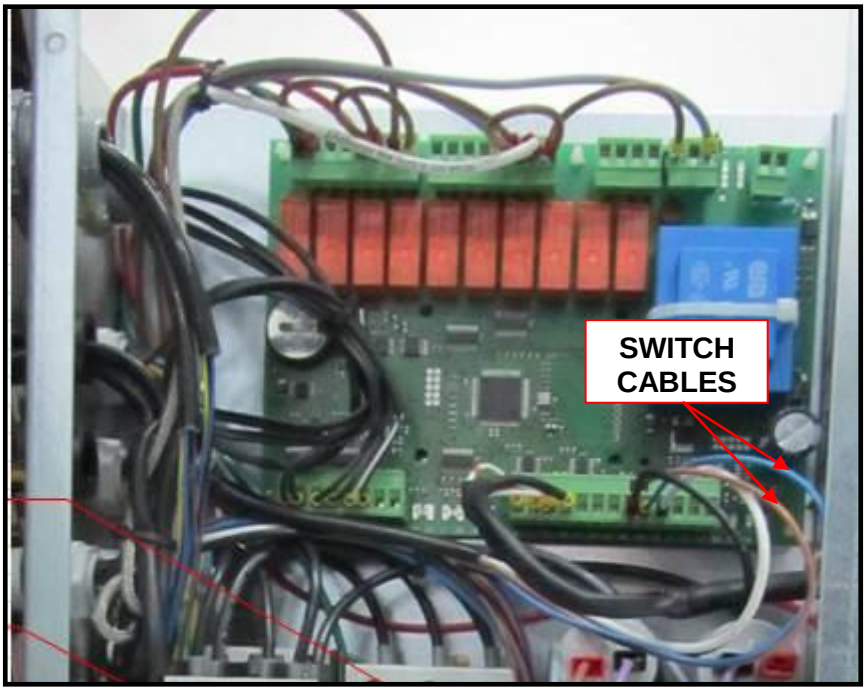
3.5.1. GBF15-11S (smallest self-contained unit)

a) remove the front panel. Follow instruction at 3.1.2.
b) Remove the screws that hold the switch on the panel
c) Disconnect the switch cables from terminals 48/49
d) Take the cables out of the electrical box and fit a new switch

3.5.2. Units from GBC30SG to GBF171-132S

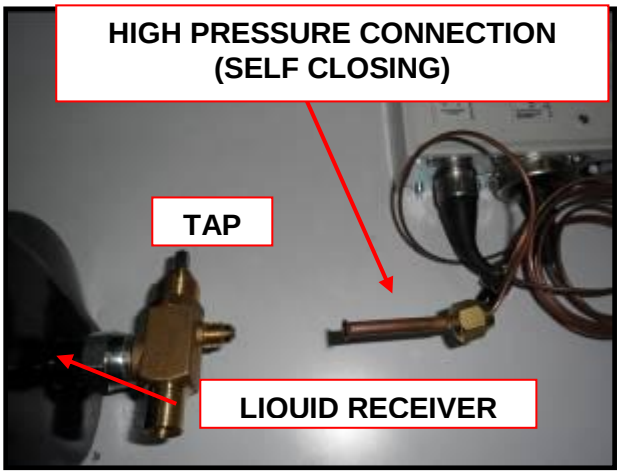
a. remove the front panel. Follow instruction at 3.1.1.
b. Unscrew the bolt/nut that hold the switch on the bracket (other info's at 2.2)
c. Disconnect the switch cables from terminals 48/49
d. Take the cables out of the electrical box and fit a new switch





3.6. HOW TO REPLACE THE PRESSURE SWITCH

It may happen that the pressure switch is mechanically blocked or faulty, giving an hp alarm even though pressures are good. To replace it, the capillary tubes must be disconnected . High pressure capillary tube is generally connected on the liquid receiver upper tab.



Before removing connections, the tap must be closed to prevent refrigerant loss.
Regarding low pressure side, a simple self closing Schroeder connection ¼" SAE is used.

3.7. HOW TO REPLACE THE DOOR FRAME HEATER

Frame heater might become interrupted or shorted. Before replacing the heater make sure the problem is with the heater itself and it's not in another place (for example missing supply). Cable features above help in troubleshooting

To replace the cable:

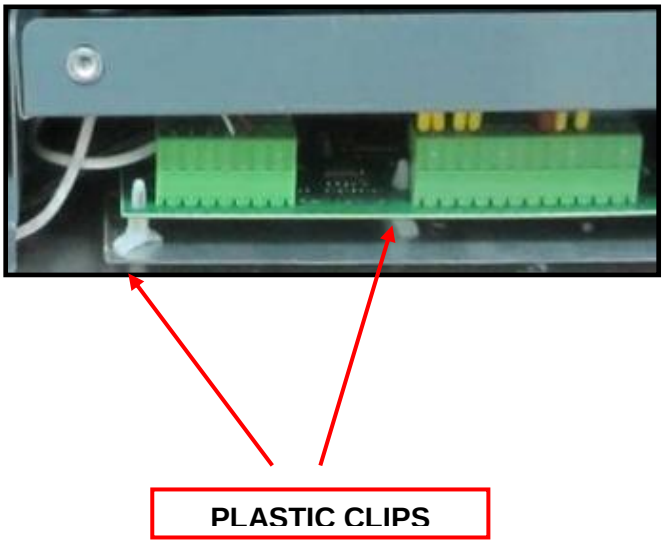
a) Insert a slice in the edges by softly hammering on it. (Place the slice plump-line with respect to the frame)
b) Rise the slice up and lever on the strip to gain space
c) Run the slice left and right to remove the strip (for all the strips)
d) Fit the new heater cable under all the strips (follow the provided path)
e) Re-fit the strips by pushing with hands





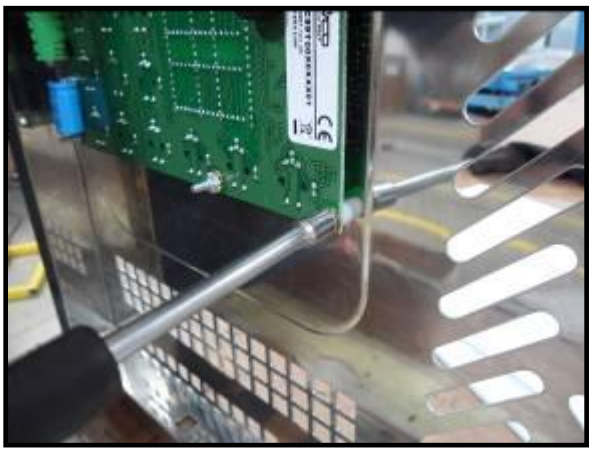

3.8. HOW TO REPLACE THE RELAY BOARD

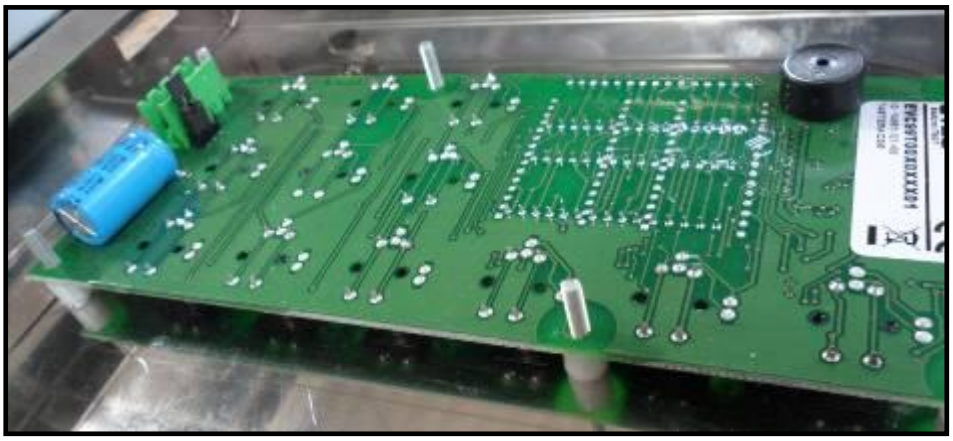
Relay board is held by 6 plastic clips (4 at the corners and 2 in the middle). Before removing the board disconnect the power supply and disconnect all the cables. To remove the board squeeze the clips on the top and pull the board out. To fit a new board, re-wire the cables according to the wiring diagram. Ensure the correct parameter setting is on the memory (1.3.2.)



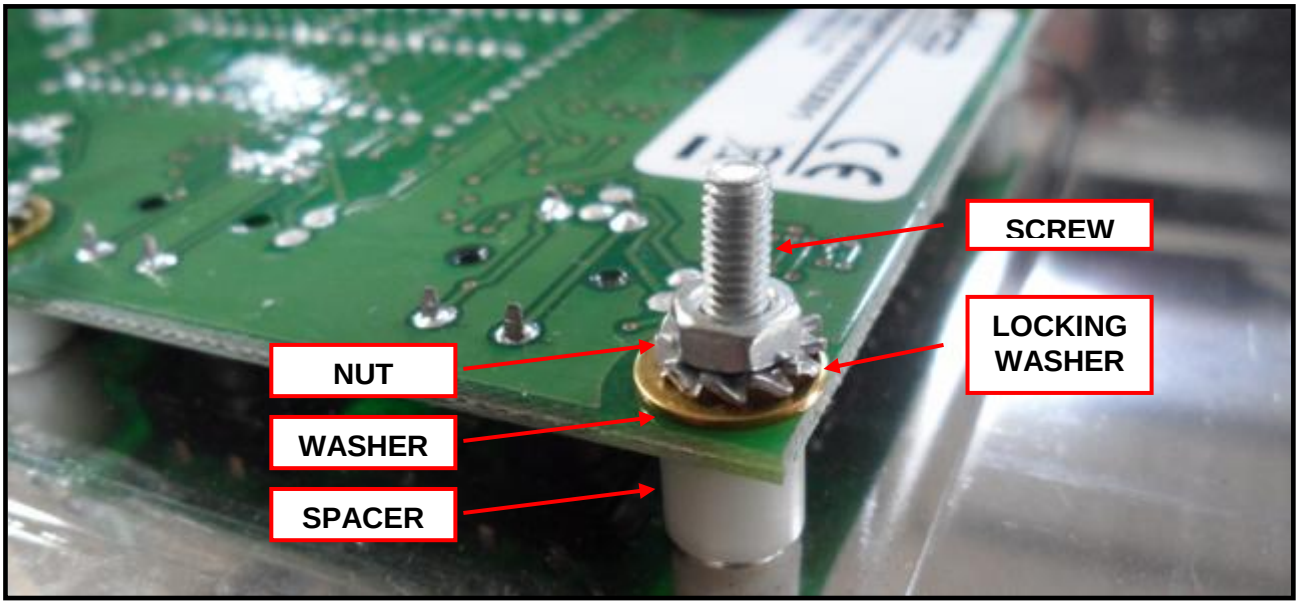
3.9. HOW TO REPLACE THE KEYBOARD

a) Remove the front panel (3.1.) and unscrew the faulty keyboard

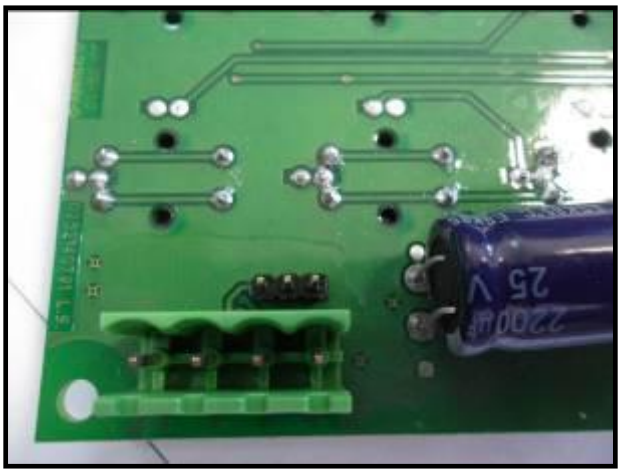


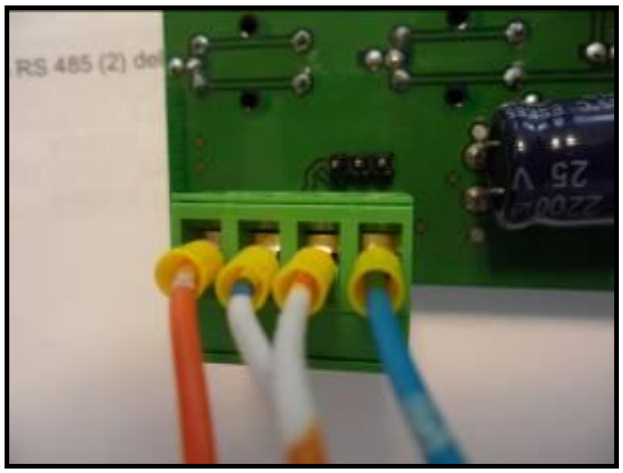


b) Fit the new keyboard and ensure the fixing tools are placed properly:



c) Connect the keyboard to the RS485(1) port, using the proper connector





4. VACUUM AND CHARGE PROCEDURE

Always perform Vacuum and charge procedure whenever one or more of the following action have been done:

- Replacement of compressor
- Replacement of a solenoid valve body
- Replacement of heat exchangers (condenser or evaporator)
- Replacement of a TX VALVE
- Replacement of a tank (liquid receiver or oil separator)
- Replacement of a filter
- Repair of a leakage
- Replacement of a pipe
- Any action which involves opening of the refrigeration system

NOTE:

A. BEFORE DOING VACUUM AND CHARGE, MIND TO REPLACE THE FILTER DRIER.

B. REFER TO DATA CHART TABLE TO CHARGE THE RIGHT AMOUNT OF REFRIGERANT

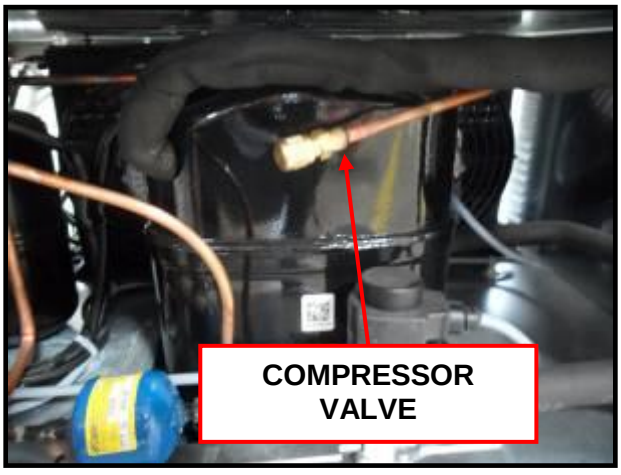
C. NO TOP OFF OF REFRIGERANT IS ALLOWED

4.1 Instruction for Vacuum and Charge

Before doing the vacuum all the refrigerant must be recovered with a proper machine. Best procedure is to pull the vacuum from more points

4.1.1. Self contained units

One point to pull the vacuum is compressor check pressure valve. The other one is the valve placed on the liquid receiver

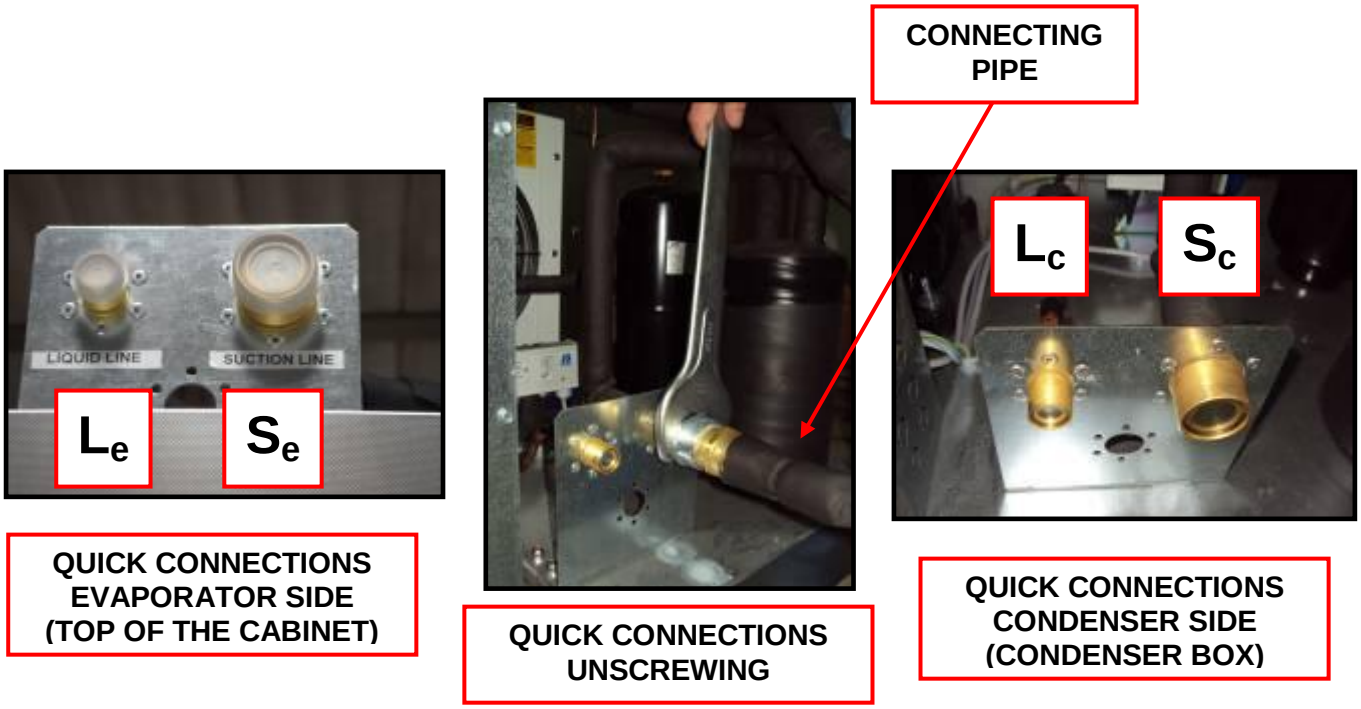


4.1.2. Remote units

On the remote units pull the vacuum from compressor check pressure valve and liquid receiver valve as well. The split evaporator unit is also equipped with one additional valve (or more than one) to be used for charge/pressure check purpose. Use this valve to pull the vacuum on the evaporator unit. Two options can be chosen:

i. Pull the vacuum in all the system with condensing and evaporating units connected trough pipes and recharge.

ii. Thanks to the membrane quick connections (self closing) used in the remote units, another option can be chosen: firstly pull the vacuum in the condensing unit separately and charge this unit with all the refrigerant (refer to DATA CHART TABLE). After that, pull the vacuum in the evaporator unit. NOTE: connect both suction and liquid pipes to evaporator unit (equipped with quick connections) to provide vacuum into them also. Once the vacuum has been created in the evaporator unit, just connect the pipes to the condensing unit previously charged.



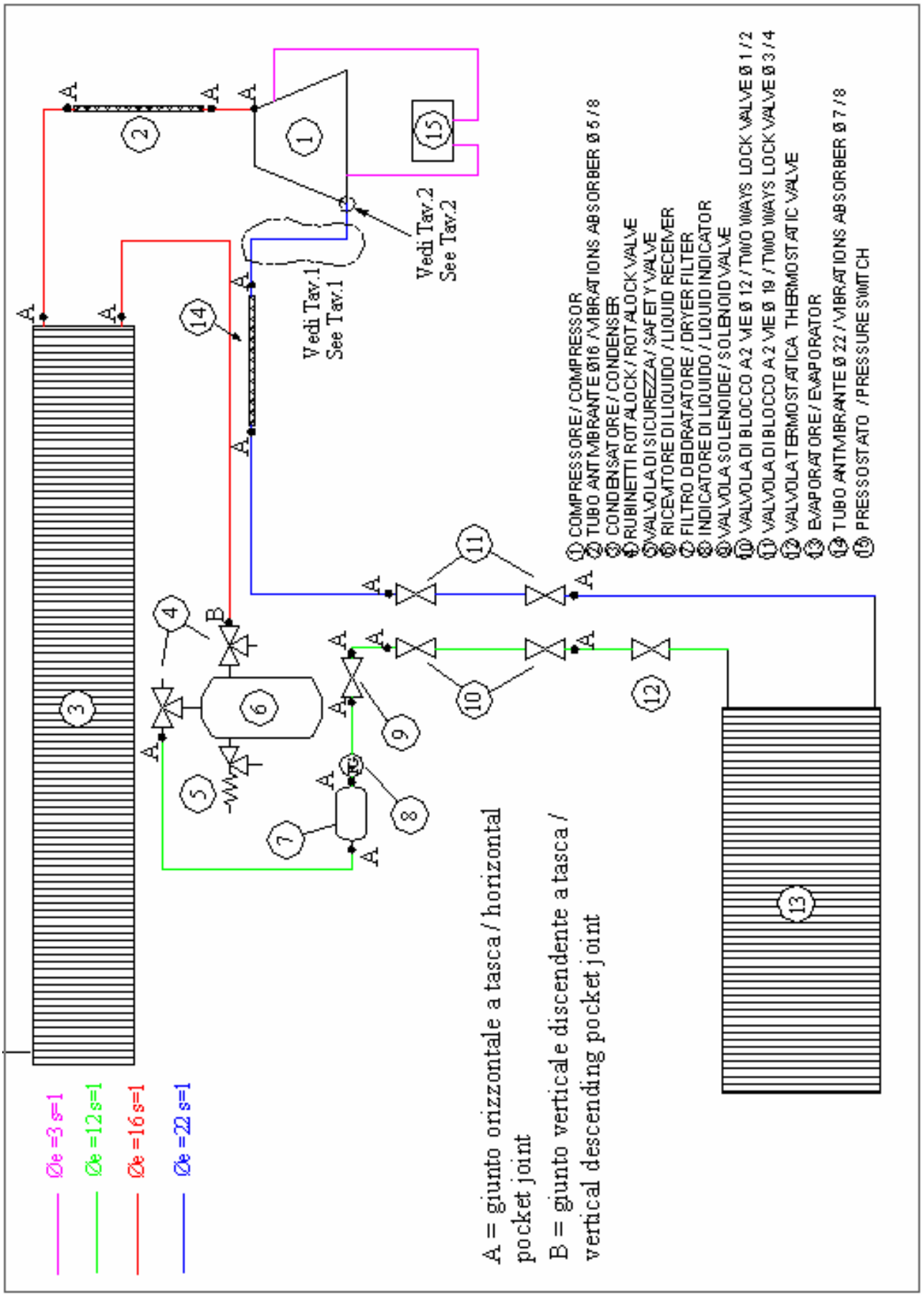
Last mentioned option is very helpful when only one components must be replaced. E.g. if the compressor needs to be replaced, it's not necessary to open the entire unit. Just disconnect the pipes at sections Lc and Sc and operate on the compressor.

4.1.3. Vacuum and charge recommendations

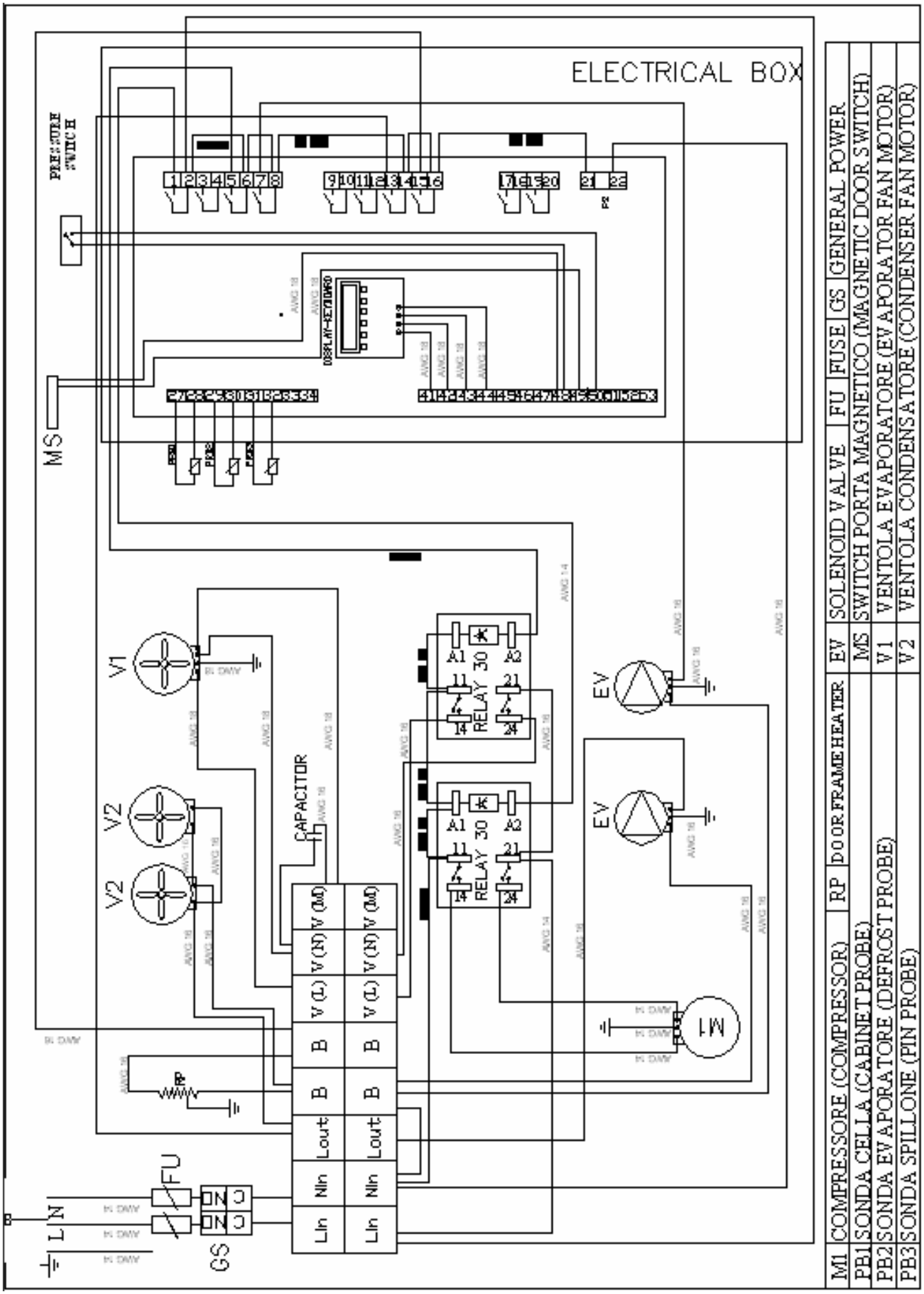
- Use a vacuum pump at least 50 gpm rated.
- Pull the vacuum for 1 hour and ½ at least
- **Replace the filter drier whenever the circuit has been opened**

5. SCHEMES AND WIRING DIAGRAMS

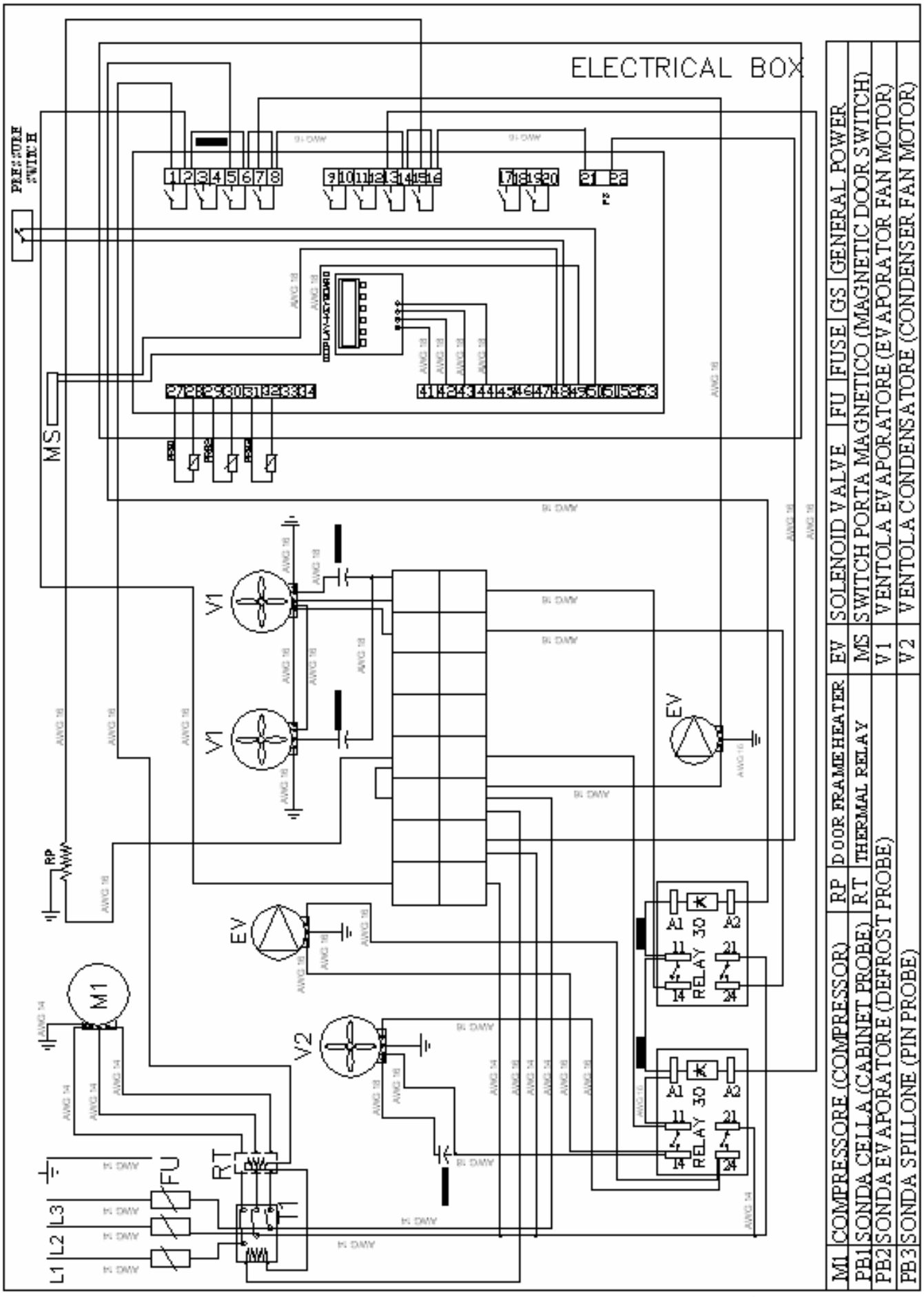
5.1. Scheme of components



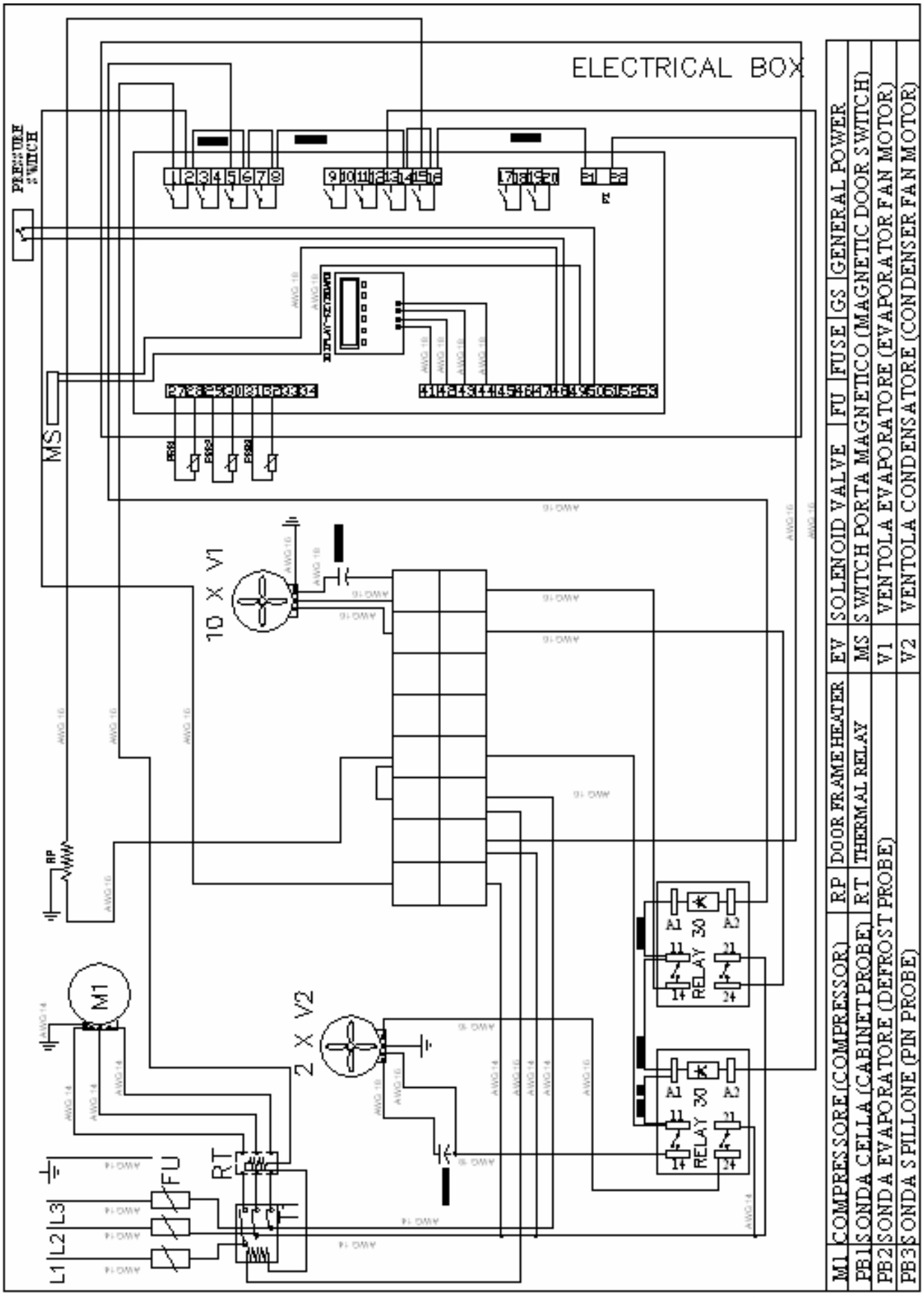
5.2. Wiring diagram single phase units (self contained)



5.3. Wiring diagram 3-PHASE units hot gas defrost (self contained)



5.4. Wiring diagram 3-PHASE units no active defrost (remote units)



I. HOW TO READ THE MODEL NUMBER

This manual applies to all the models in the table below. The models can be identified as follows:

MODEL NUMBER	CHILLING OUTPUT	FREEZING OUTPUT	UNIT TYPE
GBF15-11S	15	11	S
GBC30SG	30	NO FREEZING	SG
GBF30-17SG	30	17	SG
GBF44-26SG	44	26	SG
GBF30-17SP	30	17	SP
GBF44-26SP	44	26	SP
GBC39S	39	NO FREEZING	S
GBF39-24S	39	24	S
GBF52-37S	52	37	S
GBF61-44S	61	44	S
GBF77-55S	77	55	S
GBF176-143S	176	143	S
GBF242-209S	242	209	S
GBC88S	88	NO FREEZING	S
GBF88-66S	88	66	S
GBF143-110S	143	110	S
GBC112S	112	NO FREEZING	S
GBF112-77S	112	77	S
GBF171-132S	171	132	S
GBF440-385R	440	385	R
GBF837-727R	837	727	R

* Maximum amount of food (pounds) that can be chilled within 90 minutes

** Maximum amount of food (pounds) that can be frozen within 270 minutes

***S= SELF CONTAINED; G=GASTRONORM; P=PASTRY; R=REMOTE UNIT

II. DATA CHART TABLE

	COMPRESSOR RLA	COMPRESSOR LRA	MCA	MOP	CONDENSER FAN A	EVAPORATOR FAN A	VOLT/FREQUENCY	TOTAL A	REFRIGERANT TYPE	AMOUNT (Oz)	HIGH SIDE (Psig)	LOW SIDE (Psig)
GBF15-11S	-	-	-	-	-	-	100-115V/60 Hz/1Ph*	5,0	R404A	18	331	174
GBC30SG	-	-	-	-	-	-	100-115V/60 Hz/1Ph*	12,0	R404A	30	331	174
GBF30-17SG	-	-	-	-	-	-	100-115V/60 Hz/1Ph*	12,0	R404A	30	331	174
GBF44-26SG	-	-	-	-	-	-	100-115V/60 Hz/1Ph*	15,5	R404A	30	331	174
GBF30-17SP	-	-	-	-	-	-	100-115V/60 Hz/1Ph*	12,0	R404A	30	331	174
GBF44-26SP	-	-	-	-	-	-	100-115V/60 Hz/1Ph*	15,5	R404A	30	331	174
GBC39S	-	-	-	-	-	-	100-115V/60 Hz/1Ph*	15,5	R404A	31	331	174
GBF39-24S	-	-	-	-	-	-	100-115V/60 Hz/1Ph*	15,5	R404A	31	331	174
GBF52-37S	-	-	-	-	-	-	208-220V/60 Hz/1Ph	10,5	R404A	31	331	174
GBF61-44S	-	-	-	-	-	-	208-220V/60 Hz/1Ph	11,0	R404A	35	331	174
GBF77-55S	7,1	49,0	10,5	17,6	1,2	0,4	220V/60 Hz/3Ph	8,7	R404A	31	331	174
GBF176-143S	7,1	49,0	10,8	17,9	1,2	0,8	220V/60 Hz/3Ph	9,1	R404A	35	331	174
GBF242-209S	17,3	56,0	23,6	40,9	1,2	0,8	220V/60 Hz/3Ph	19,3	R404A	71	331	174
GBC88S	7,1	49,0	10,8	17,9	1,2	0,8	220V/60 Hz/3Ph	9,1	R404A	71	331	174
GBF88-66S	7,1	49,0	10,8	17,9	1,2	0,8	220V/60 Hz/3Ph	9,1	R404A	71	331	174
GBF143-110S	17,3	56,0	23,6	40,9	1,2	0,8	220V/60 Hz/3Ph	19,3	R404A	71	331	174
GBC112S	7,1	49,0	10,8	17,9	1,2	0,8	220V/60 Hz/3Ph	9,1	R404A	71	331	174
GBF112-77S	7,1	49,0	10,8	17,9	1,2	0,8	220V/60 Hz/3Ph	9,1	R404A	71	331	174
GBF171-132S	17,3	56,0	23,6	40,9	1,2	0,8	220V/60 Hz/3Ph	19,3	R404A	71	331	174
GBF440-385R	39,7	148,0	54,8	94,5	1,9	3,3	208-220V/60 Hz/3Ph	19,3	R404A	206	331	174
GBF837-727R	39,7	148,0	54,8	94,5	1,9	3,3	208-220V/60 Hz/3Ph	44,8	R404A	282	331	174

(*)VERSION 208-220V/60 Hz/1Ph ALSO AVAILABLE