VESTFROST SOLUTIONS

+43ºC
+5ºC

A

3 YEARS WARRANTY

12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Vestfrost Solutions is working towards reaching the UN - Global Sustainable Development Goals by 2030.

The Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all.
In order to implement Goal no 12 ”Responsible Consumption and Production”, this manual has been printed on recycled paper.

Technical manual VLS 086A RF SDD - EMD-EMS

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WARNING

WARNING:
Keep ventilation openings in the appliance's cabinet or in the built-in structure clear of obstruction.

WARNING:
Do not use **mechanical devices** or other means to accelerate the defrosting process, other than those recommended by the manufacturer.

WARNING:
Do not damage the refrigerant circuit.

WARNING:
Do not use **electrical appliances** inside the storage compartment, unless they are of a type recommended by the manufacturer.

WARNING:
Danger: Risk of fire or explosion. Flammable refrigerant is used. To be repaired only by trained personnel.

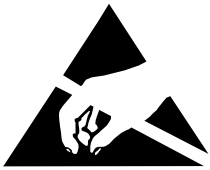
WARNING:
When positioning the appliance, ensure the power cable is not trapped or damaged.

WARNING:
Do not locate multiple portable socket-outlets or portable power supplies at the rear of the appliance.

- Always keep the keys in a separate place and out of reach of children.
- Children should be supervised to ensure that they do not play with the appliance.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Before servicing or cleaning the appliance, unplug the appliance from the mains or disconnect the electrical power supply.
- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent, or similarly qualified persons in order to avoid a hazard.

- Frost formation on the interior evaporator wall and upper parts is a natural phenomenon. Therefore, the appliance should be defrosted during normal cleaning or maintenance.
- Please note that changes to the appliance construction will cancel all warranty and product liability.
- Do not store explosives, such as aerosol cans with flammable propellants in the unit.

Perform the following steps to prevent ESD damage:

- Use a wired ESD wrist strap that is properly grounded. Touching the chassis before handling parts does not ensure adequate ESD protection on parts sensitive to ESD damage.
- Handle all static-sensitive components in a static-safe area. If possible, use anti-static floor pads and workbench pads.
- When unpacking a static-sensitive component from its shipping carton, do not remove the component from the anti-static packing material until you are ready to install the component. Before unwrapping the anti-static packaging, ensure that you discharge static electricity from your body.
- Before transporting a static-sensitive component, place it in an anti-static container or packaging.
- 

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Contents

Periodic preventive maintenance checks

Daily Check:
Monitor Temperature
Internal lid is placed properly
Lid fits and lock tight to cabinet
Lid gasket not faulty.
Condensation build up in vaccine compartment.

Weekly maintenance:
Remove any water at the bottom of the refrigerator with a cloth.
Wipe of water droplets on the inside wall.

Monthly maintenance:
Clean grille for compressor compartment.

6 Month:
Clean condenser coils

Yearly maintenance:
Check electrical connections and components.
Check electrical connections, cables, wirings from PV panel system.

Regularly:
Clean Solar Panels
Check Solar Panels are not shaded at any time of the day

PQS Code	**Model**	**PQS Performance specifications** Specification reference:	**PQS Independent type-testing protocol** Product verification protocol:
e	VLS 086A RF SDD	E003/RF05.6	E003/RF05-VP.5

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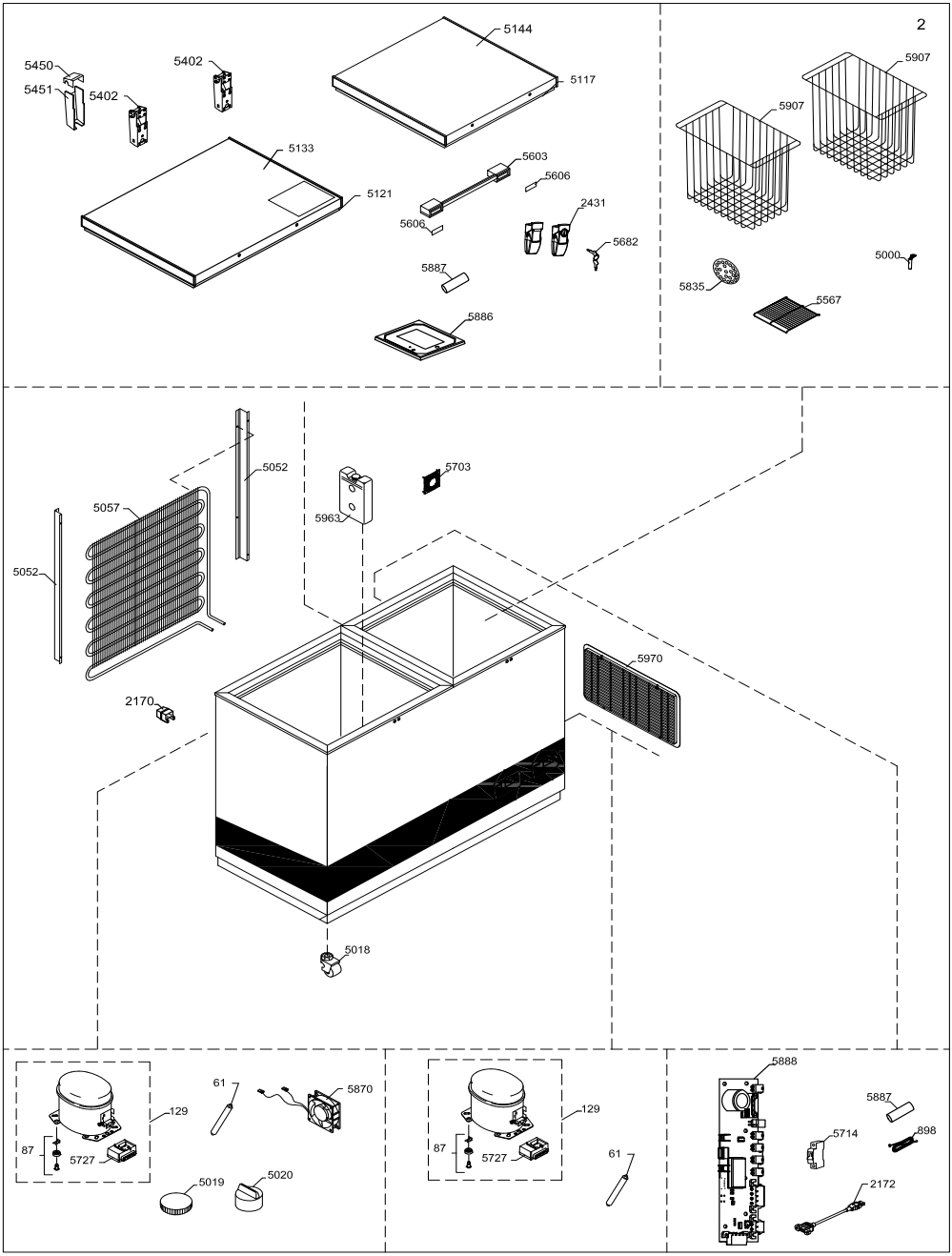
Complete spare part list VLS086A RF SDD

0061	6530120	Filter drier,
0087	0-6038175	Base plate fittings, complete
0129	8-036510223	Compressor - BD35K 101Z0211 10-45V - ECU 6520845
0898	7090546	Sensor kit, NTC, 1050mm, 1xTyco/2p Yellow
2170	0-A9301260103	Distance piece
2172	7020486	USB-C cable, panel mount, 150mm, w/JST connector
2431	A915010	Lock complete snap locks and key
5000	3010049	Drain plug
5018	1510306	wheel with feet
5019	3010358	Plastic lid
5020	3010483-01	Duckbill valve DU 225.001-154.01 / Műanyag rögzítő csap
5052	2040504	Fittings for condenser
5057	6010537	WOT condenser
5117	3021235-01	Gasket 538,8x636,8mm in white PY-45361A
5121	3021405-01	Gasket 589x635mm VLS086
5133	52009086677	Lid foamed without handle/hinges/To Cooler
5144	52009086050	Lid foamed without handle/hinges/Freezer
5402	1510059	Hinge
5402	1510135	Hinge with spring
5450	3011135-01	Top part for hinge cover
5451	3010032-01	Bottom part for hinge cover
5567	3510538	Bottom grating
5603	8471782	Handle
5606	8090054	Inlay for handle
5606	8090342-94	Inlay for handle,Vestfrost print
5682	1510255	Nikel-plated Key
5703	3010506-01	Ventilation screen 120x120mm
5714	7060389	Overcurrent circuit breaker
5727	6520845	Inverter for BD35K compressor
5835	3011458-01	Filter for drain VLS
5870	7090507	Fan
5886	7021146	Peacock VLS controller, EMS level 2
5887	7060400	EMS battery - Litium
5888	7021145	Penguin VLS controller, EMS level 1 - SDD Combi
5907	3510535	Basket VLS096
5963	A93010357	ICE-PACK 0,6 L
5970	3010308-01	Motor screen
XXXX	1006744	Wirediagram

Subject to changes without prior notice.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87
5727
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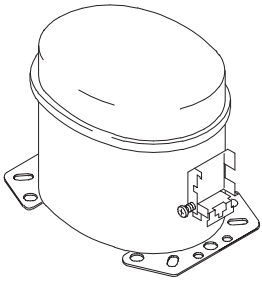
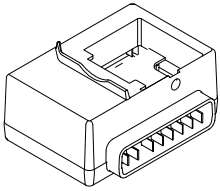
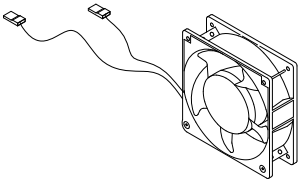
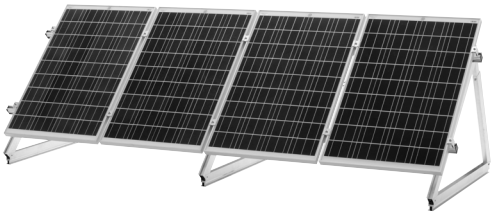
Vital components

Position	Item no	Description	
0129	8-036510223	Compressor	
0898	7090546	Sensor kit	
5727	6520845	Starting Device ECU	
5870	7090507	Fan	
PV Solar Panel Kit 4x180W			

Health and safety guidance – Warning!

Before any repair job be aware of following!

WARNING:
Before servicing or cleaning the appliance, disconnect it from power source.

WARNING:
Danger risk of fire or explosion. Flammable refrigerant used. To be repaired only by trained personnel.

(R600a)

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Required basic tools

1. Nose plier

2. Screwdriver - size 1,0x6,0 + 0,6x3,5

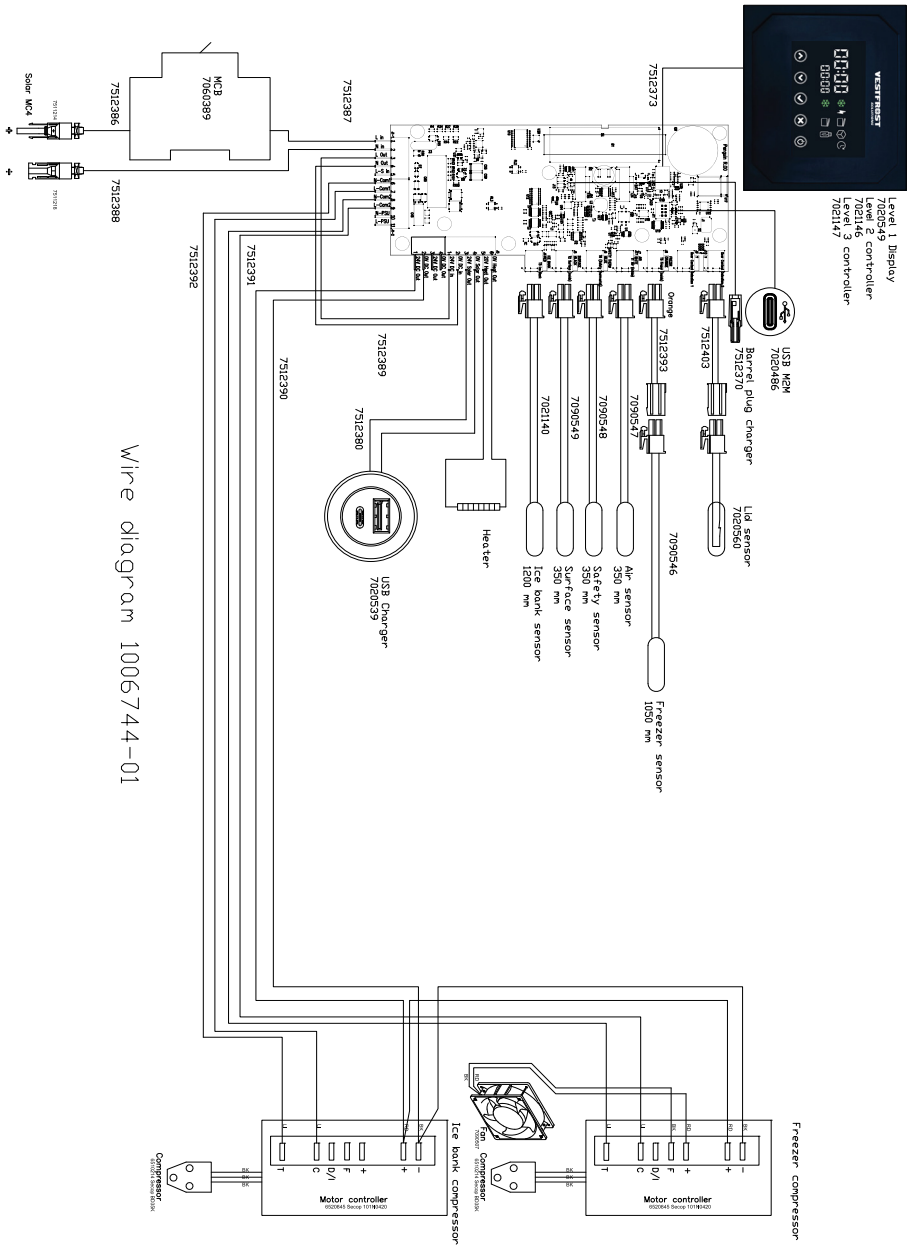
3. Torx screwdriver - size T10 + T20

4. Clamp meter

5. Multimeter

Proposed additional service kit/items
Sealing kit
Tar tape
Extra self-tapping screws

Wire diagram



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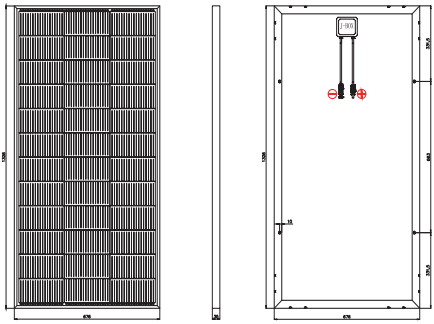
Solar panel

Type :	Type 2 according E003/PV01 direkt drive
Nominal voltage:	18V
Nominal power:	2 x 360W (standard test conditions)
Number of parallel connected modules per array:	2 parallel arrays 4 parallel modules pr array
Warranty:	Min. 3 years
Performance guarantee:	25 years (to 80% of original value)
Certificates:	UL, TÜV or compliance with the requirements of IEC 61215 IEC 61730
Electrical data	**VS-180MO**
Rated power Pmpp [Wp]	180
Power tolerance	± 3%
Rated current Impp [A]	8.278
Rated voltage Vmpp [V]	21.744
Short-circuit current Isc [A]	8.562
Open-circuit voltage [V]	26.164
Max. system voltage [V]	1000
Temperature coefficient [% /°C]	**VS-180MO**
Temperature coefficient [Pmax]	- 0.28 %
Temperature coefficient [Isc]	- 0.05 %
Temperature coefficient Voc]	- 0.23 %
Specifications	**VS-180MO**
Cell size	210 x 105 mm N-Type
Number of cells | cell type	36(3*12)| mono
Weight	10.0 kg
Cable length	850 mm
Cable diameter	4 mm2
Diode	2 x 12 A
Junction Box	IP 65

Table 2

VS-180MO



Placing

Solar panels are always to be placed on a stable roof or bar, which is safe and easily accessible (not for the public).

The solar panels are always to be fitted according to the supplier's instructions and with the screws and fittings included or recommended by the manufacturer.

Do not place the solar panels in the shadows of buildings, trees, etc. The surfaces of the solar panels are to be turned directly towards the sun.

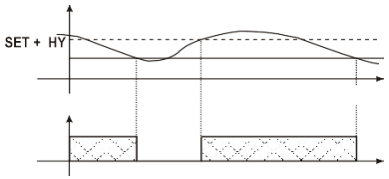
Generale description

The penguin has three temperature controllers with their own setpoint and hysteresis.
Relay 1 is controlled by ice bank sensor.
Relay 2 is controlled by freezer sensor.
Heater is controlled by surface sensor.

Controlling loads

Compressor

The regulation is performed according to the temperature measured by the thermostat probe with a positive differential from the set point: if the temperature increases and reaches set point plus differential the compressor is started and then turned off when the temperature reaches the set point value again.



Heater

The regulation is performed according to the temperature measured by the thermostat probe with a negative differential from the set point: if the temperature decreases and reaches set point minus differential the heater is started and then turned off when the temperature reaches the set point value again.
The heater is PWM controlled to ensure constant power independent of the supplied voltage. The heater PWM percentage is calculated as ( )

Controlling loads

Freezer

There are two different types of freezer control, direct or via change over valve.
In direct mode the freezer compressor is controlled directly by the freezer temperature and hysteresis, independent of other controls.

- In change over valve mode, the freezer is controlled by the same compressor as the ice bank. A change over valve is controlled by the freezer relay output
  - If either ice bank or freezer requires cooling, the compressor is turned on
  - If only the freezer requires cooling, the change over valve relay output is activated.
  -The ice bank always has priority.
- In combi mode, ice bank and freezer have their own compressor and compressor control. Every time the supply voltage goes above the DOV value, both compressors are allowed to start, but the freezer compressor (relay 2) must wait R2D (relay 2 delay) minutes before allowed to start.

Regulation frequency

The measurement frequency of all sensors is 1 Hz. The compressors are also controlled at a 1 Hz rate, but are prevented to start based on the (AC) parameter.

Temperature control

It is recommended to check the inside temperature with an accurate thermometer twice a day. The inside temperature must be checked regularly according to WHO's standards and specifications.

Cool down of the appliance

Before the appliance is loaded with vaccines it is highly IMPORTANT to ensure it has fully stabilized the temperatures. It may take two to seven days to stabilize the temperature in a newly installed or repaired refrigerator and two to three days for a freezer. To ensure that the icelining is frozen and the appliance has stabilized do the following:

1. Let the refrigerator run for at least 48
2. Monitor the vaccine compartment temperatures from the EMS display.
3. Check and record the minimum and maximum temperatures in the vaccine compartment each working day for two to seven days (must be between +2° and +8°C).
   If temperatures cannot be recorded digitally, check and record temperatures a minimum of two times each workday.
4. Once you have two consecutive days of temperatures recorded within the recommended range, your unit is stable and ready for use.

The temperature in the vaccine compartment must always be monitored on the thermometer and be within the range +2° to +8°C.

Datalogger

Datalogger

The controller has a built-in data logger, fulfilling the requirements of WHO/PQS/ E006/DL01.
The logger is primarily tasked with maintaining relative time, recording appliance data
objects, generating and recording logger data objects, and making that data available in a standardized way to other equipment monitoring devices and systems.
All data is logged in a 15-minute interval, except lid sensors which are logged instantly.

Data for the last hour is logged in a separate file in a 10-second interval for troubleshooting.

The data can be accesses by the USB-C port.

Time keeping, stand alone

The logger will keep its own relative time starting from the production date. When the battery is drained or the device is turned off, the time keeping will pause and will automatically restart when the device is turned on.

Time keeping, interanl connection to level 3

When a level 3 device is connected to the internal connector, the time will be set based on the clock from GPS or 4G connection.

Max and min Temperature memorization

It is possible to see that minimum and maximum temperatures for the last 30 days.

How to see the min temperature

1. Press and release the  key.
2. The “Lo” message will be displayed followed by the minimum temperature recorded.
3. By pressing the  key again or by waiting 5s the normal display will be restored.

How to see the max temperature

1. Press and release the  key.
2. The “Hi” message will be displayed followed by the maximum temperature recorded.
3. By pressing the  key again or by waiting 5s the normal display will be restored.

How to reset the max and min temperature recorded

1. Hold press the  key for more than 3s, while the max. or min temperature is displayed. (rSt message will be displayed)
2. To confirm the operation the “rSt” message starts blinking and the normal temperature will be displayed.

Alarms

In case of an alarm, the display will display the alarm code and the buzzer will sound an alarm.
An alarm can be muted by pressing any button. The display shall still display the alarm code.
During alarm, the display will alternate between the alarm code and the temperature.

Pressing the  button after muting, will reset the alarm.
During battery operation, only high and low surface temperature sensor alarms will be set. (if the temperature is high, there is no longer a charged ice bank and the remaining battery capacity can be used to send alarms).

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List of alarms and error codes

The following alarms are monitored and logged:

Alarm type	Thres-hold	Dura-tion	Blanking period	List of Error Codes
LoA (low temperature)	AL1	Ad1	Ab1	A - Vaccine temp. sensor error
HiA (high temperature)	AH1	Ad2	Ab2	B - Ambient temp. sensor error
Lid 1 open	L1T	L1A		C - Ice bank temp. sensor error
Lid 2 open		L2A		D - Surface temp. sensor error
Low battery datalogger	Lbd			E - Freezer temp. sensor error
Low battery EMS	Lbe			F - Vaccine comp. door malfunction
Real time clock battery low				G - Freezer comp. door malfunction
High temperature freezer				H - Power measure-ment error
DC barrel plug fault				I - Compressor 1 malfunction
Heating cable short circuit				J - Compressor 2 malfunction
Heating cable open circuit				K - Fan malfunction
Fan blocked				Z - Missing/incomplete data records

Blanking period is the time from the unit is turned on until the alarm is activated, giving the refrigerator time to cool down. This is done to avoid false alarms.

Battery mode

The controller will run on battery mode when the supply voltage is too low.

When the controller is running on battery, all regulation loops are deactivated. The hold over time calculation is still active.

The displays are turned off.

By pressing the  button, the temperature of the refrigerator is shown for 3 seconds. Pressing the button again within 3 seconds will show the remaining hold over time. The  symbol will also light up.

The battery capacity is only designed to show a minimum number of temperatures/ hold over time. If the display is used excessively during battery mode, the battery might not last long enough to log the vaccine temperature.

Display turn on is logged.

Long press plus confirmation press will put the device on standby/wake the device.

If external power is supplied through the USB-C port, the data logger shall wake up and present its file system. The  symbol will flash to indicate data transfer.

Hold over time

The controller can estimate the time remaining before the vaccine compartment gets too warm. The estimate is conservative, but based on idealized conditions. The estimate will be affected by, among others, how much the refrigerator is filled and the installation location.

Fault handling

If the ice bank sensor is defective (open line or short circuit) the compressor will stop, and the display will show P3A (sensor 3 alarm).

If the surface sensor is defective (open line or short circuit), both the compressor and the heater will stop, and the display will show P1A (sensor 1 alarm).

If the surface sensor is below (LST), the compressor is switched off and the display will show LST.

If all other sensors fail, the display will show PxA (sensor x alarm), but the control will continue.

All faults must be logged.

Safety thermostat

The controller has an analogue safety thermostat on the circuit board. The safety thermostat prevents the compressor from running in case of a fault in the heating circuit. The set-point for the safety thermostat is set by a DIP switch. It is not possible to see if the safety thermostat is active.

Production mode

The controller has an analogue safety thermostat on the circuit board. The safety thermostat prevents the compressor from running in case of a fault in the heating circuit. The set-point for the safety thermostat is set by a DIP switch. It is not possible to see if the safety thermostat is active.

Turning the appliance on and off

The appliance is designed to be always on, but can be switched off if necessary.

The controller is designed for both AC and SDD. The user does not need to know the difference as the controller will handle it automatically.

Whenever the appliance is turned on, the controller and datalogger will turn on

AC mode

When the MCB is switched on, the voltage stabilizer will start a delay timer (approximately 5 minutes) before switching on the power. If the MCB is switched off or the supply voltage is out of range, the data logger will continue running on internal battery. When eventually the battery is drained, the datalogger will also turn off.

When the supply voltage is back in range, the controller and datalogger continue running.

SDD mode

The supply voltage from the PV cells needs to be above a certain threshold before the controller is turned on. This is defined on the DOV parameter.

The supply voltage from the PV cells needs to be above a certain threshold before the compressor is turned on. This is defined on the DOV parameter. If the supply voltage drops below the CSV voltage the compressor output is turned off and is not allowed to turn on again before after a blanking time, defined by the CBT parameter.

Turning the appliance off

If the appliance needs to be turned off, it is important to switch off the datalogger.

Level 1 display: Long pressing the  and a short confirmation press

Level 2/3 display:

It is important to switch off the MCB and disconnect the appliance when it is switched off. When power is reapplied, the controller will automatically restart

Parameter menu

The parameter menu Includes all the parameters of the instrument.

How to enter the parameter menu

To enter the parameter menu, you need to have a valid user ID and passcode.

All changes done in the technical menu will be logged with the user ID

1. Enter the hidden menu by pressing the  +  keys for 3s (the “clock” LED starts blinking).
2. The freezer display will show “user”.
3. Use the  and  buttons to select you user ID and press the  button.
4. The freezer display will show “pass”
5. Use the  and  buttons to select the first digit in your passcode and confirm with the  button.
6. Use the  and  buttons to select the send to forth digit in your passcode and confirm with the  button.
7. The freezer display will show the parameter name and the refrigerator display will show the value of the parameter.
8. Select the required parameter.
9. Press the  key to display its value
10. Use  or  to change its value.
11. Press  to store the new value and move to the following parameter.

To exit: Press  or wait 30s without pressing a key.

NOTE: the set value is stored even when the procedure is exited by waiting the time-out to expire.

User ID and passcodes are stored in a file access by the USB port. The default user ID is 1 and the passcode is [1 1 1 1]. It is strongly recommended to change the default passcode.

Techical menu

The technical menu allows the user to check the input values and control the outputs. When entering the technical menu.

How to enter the techical menu

1. Enter the hidden menu by pressing the  +  keys for 3s (the “compressor” LED starts blinking).
2. Released the keys, then push again the  +  keys for more than 7s. The TEC label will be displayed. immediately followed by P1 temperature.
3. The freezer display will show the input/output the refrigerator display will show the value of the input/output.
4. Use  or  to change input/output.
5. The outputs can be turned on/off (toggle) by pressing the  button.
6. The input/outputs are listed in this order: P1, P2, P3, P4, P5, P6, P7, HUM, RE1, RE2, HEA, VOL, BAT,

7. To exit: Press  or wait 15s without pressing a key.
8. All outputs are returned to the same state as before the technical menu was entered.

Parameter

Regulation

- SpH Set point heater: (-25°C/25°C) Set point for the heater, controlled by the surface temperature sensor
- HyH heater Differential: (0,1 / 25,5°C) Intervention differential for heater set point. Heater Cut IN at Set Point. Heater Cut OUT at Set Point – differential (HyH).
- HSV Heater operating voltage: (0/100V) The voltage which the PWM controller will try to reach on the heater output.
- SpC Set point compressor: (-25°C/25°C) Set point for the compressor, controlled by the ice bank temperature sensor
- HyC compressor Differential: (0,1 / 25,5°C) Intervention differential for set point. Compressor Cut IN is SpC + differential (HyC). Compressor Cut OUT is when the temperature reaches the set point.
- SpF Set point freezer compressor: (-25°C/25°C) Set point for the compressor, controlled by the freezer temperature sensor
- HyF freezer compressor Differential: (0,1 / 25,5°C) Intervention differential for set point. Compressor Cut IN is SpF + differential (HyF). Compressor Cut OUT is when the temperature reaches the set point.
- Lpf Low pass filter: (0,01 / 1,00) scales how much of the stored temperature is updated with the measure temperature. T_stored = Lpf x T_meas + (1-Lpf) x T_stored. Temperatures are measured with a sample frequency of 1 Hz.
- O1 Thermostat(surface) probe calibration: (-12.0 / 12.0°C) allows to adjust possible offset of the surface probe.
- P2P Vaccine probe presence (P2): 0= not present:, no alarms 1= present.
- O2 Vaccine probe calibration (P2): (-12.0 / 12.0°C). allows to adjust possible offset of the vaccine probe.
- O3 ice bank probe calibration (P3): (-12.0 / 12.0°C). allows to adjust possible offset of the ice bank probe.
- P4P Ambient probe presence: 0= not present:, no alarms 1= present.
- O4 Ambient probe calibration: (-12.0 / 12.0°C) allows to adjust possible offset of the ambient probe.
- P5P Compressor probe presence: 0= not present, 1= Fan is controlled by FoM
- O5 Compressor probe calibration: (-12.0 / 12.0°C) allows to adjust possible offset of the ambient probe.
- P6P Freezer probe presence: 0= not present:, no alarms, the freezer display is not active 1= present., the freezer control is active.
- O6 Freezer probe calibration: (-12.0 / 12.0°C) allows to adjust possible offset of the freezer probe.

- P7P Humidity probe presence: 0= not present:, no alarms 1= present.
- O7 Humidity probe calibration: (-12.0 / 12.0 %rH) allows to adjust possible offset of the humidity probe.
- AC Anti-short cycle delay: (0÷50 min) minimum interval between the compressor stop and the following restart.
- R2D Relay 2 delay: (0/60 min) Minimum time between relay 1 and relay 2 is activated
- LST Low Surface Temperature: (-12.0 / 12.0°C). If the surface temperature sensor is below this temperature, the compressor is switched off.

Freezer regulation

- FrC Freezer combi: 1= independent freezer control controlled by (SpF) and (HyF). 0 = valve control of freezer. Main compressor is controlled by both ice bank and freezer temperature sensor. Freezer relay is activated if only freezer requires cooling and deactivated if ice bank requires cooling.

Freezer regulation

- FoM Fan operating mode: 0 = no fan; 1 = fan on when compressor is on (On/off control); 2 = fan controlled by compressor temperature sensor (PWM control).
- If (FoM) = 2: If compressor temperature is below (FTi), fan is stopped. If compressor temperature is above (FTa) fan is running at maximum speed (FSa). If compressor temperature is between (FTi) and (FTa) the fan speed is controlled linear between (FSi) and (FSa).
- FTi Fan minimum temperature: (0/100°C)
- FTa Fan maximum temperature: (0/100°C)
- FSi Fan minimum speed: (0/100%)
- FSa Fan maximum speed: (0/100%)

Fan control

- FoM Fan operating mode: 0 = no fan; 1 = fan on when compressor is on (On/off control); 2 = fan controlled by compressor temperature sensor (PWM control).
- If (FoM) = 2: If compressor temperature is below (FTi), fan is stopped. If compressor temperature is above (FTa) fan is running at maximum speed (FSa). If compressor temperature is between (FTi) and (FTa) the fan speed is controlled linear between (FSi) and (FSa).
- FTi Fan minimum temperature: (0/100°C)
- FTa Fan maximum temperature: (0/100°C)
- FSi Fan minimum speed: (0/100%)
- FSa Fan maximum speed: (0/100%)

Alarms

- **Li1 Lid sensor 1:** 0= not present:, no alarms 1= MEMS sensor, 2 = mechanical sensor
- **Li2 Lid sensor 2:** 0= not present:, no alarms 1= present
- **L1A Lid 1 alarm time:** (0/60 min) Time before an open lid alarms is activated
- **L2A Lid 2 alarm time:** (0/60 min) Time before an open lid alarms is activated
- **L1T Lid 1 threshold:** (0/90°) Threshold before the lid is detected open
- **L1p Lid sensor 1 polarity:** 0= lid open when contact is open, 1=lid open when contact is closed.
- **L2p Lid sensor 2 polarity:** 0= lid open when contact is open, 1=lid open when contact is closed.

- **AH1 Alarm high temperature:** (0/10°) activates buzzer and writes “HiA” in display. Acknowled by any button.
- **AL1 Alarm low temperature:** (0/10°) activates buzzer and writes “LoA” in display. Acknowled by any button.
- **Ad1 Alarm delay high temperature:** (0/1000 min) delay before high temperature alarm is acticated
- **Ad2 Alarm delay low temperature:** (0/1000 min) delay before low temperature alarm is acticated
- **Lbd Low battery alarm datalogger:** (0/100%) low battery capacity alarm
- **Lbe Low battery alarm EMS:** (0/100%) low battery capacity alarm

Hold over time calculation

- Cle C_Leackage: Leakage value for hold over calculations
- Cic C_ice: latent heat constant for the ice bank: (0-1000 kilojoules per kg) default 334
- Mic M_ice Mass of ice in kg: (0-1000 kg)
- Phe P_heater power of heater: (0-1000 W)
- COP compressor performance: (0,1/10,0)

Operation condition

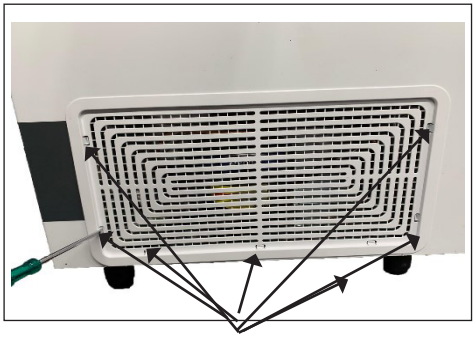
- **DOV Datalogger operating voltage:** (0/100 V) Minimum supply voltage for turning the controller and datalogger on.
- **COV Compressor operating voltage:** (0/100 V) Minimum supply voltage before the compressor is turned on
- **CBT Compressor blanking time:** (0-120 min) If before the compressor can be turned on again if the supply voltage drops.
- **CSV Compressor stop voltage:** (0/100 V) If the supply voltage drops below this value, the compressor must wait for CBT time before it is allowed to start again.

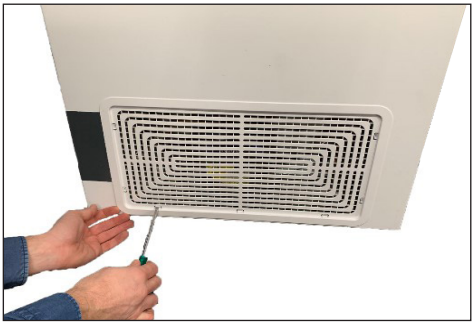
Other

- **EHl Energy harvest low voltage:** (0/100v) The supply voltage must be above this value to activate output
- **EHh Energy harvest high voltage:** (0/100v) The supply voltage must be below this value to activate output
- **EHh Energy harvest high voltage:** (0/100v) The supply voltage must be below this value to activate output

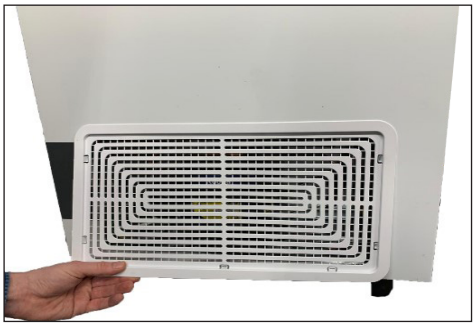
Motor compartment

How to get access to the motor compartment.





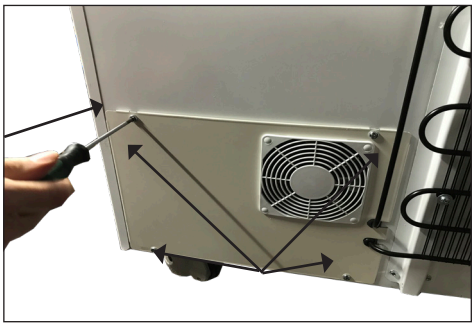
1. Use a screwdriver to unlock all 7 clamps.



2. Unlock all 7 clamps

3.Gently pull the compressor grille.

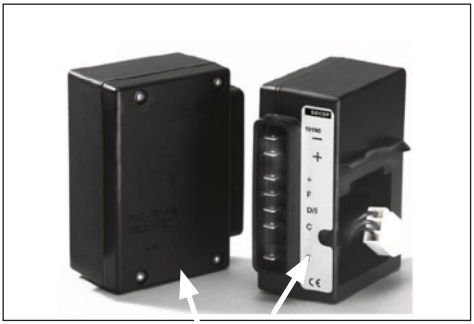
How to get access to the motor compartment on the back



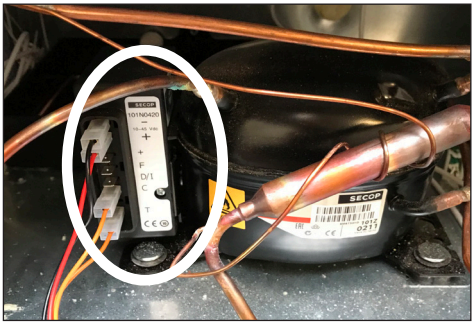
1. Use a screwdriver to loosen all 4 screws.

GB

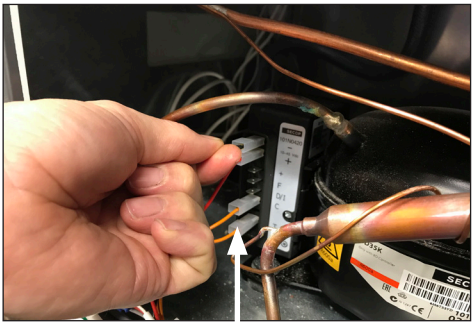
Starting device ECU replacement



Starting device: Back, Front with terminal board.

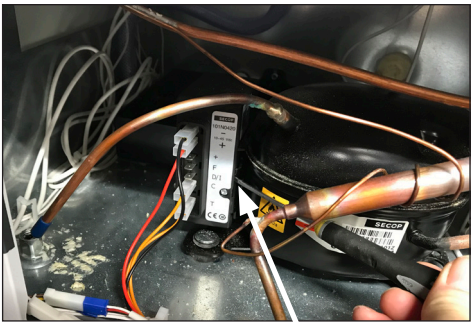


The starting device is mounted to the left side of the compressor.

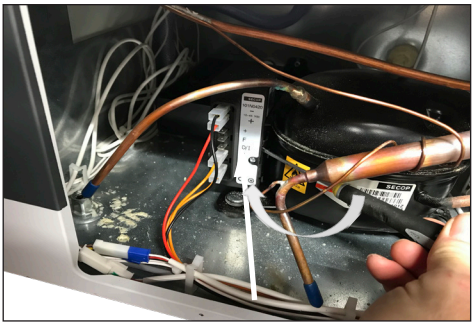


1. Dismount the 4 wires from ECU.
Grab the wire socket and pull gently.

2. Loosen the screw a couple of turns.

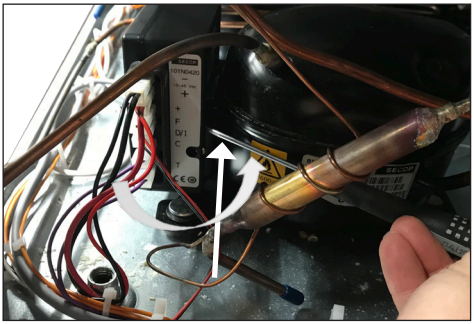


3. Place a screwdriver in the small vent in the plastic cover.

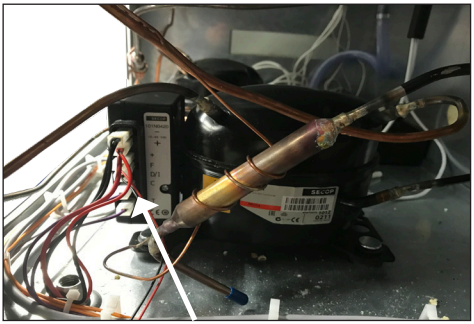


4. Unclick plastic cover/starting device from compressor bracket

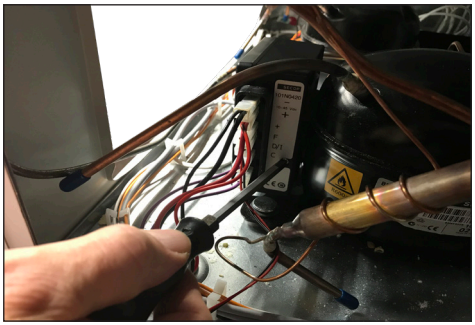
It´s the same procedure that needs to be done for both devices.
The next 4 pictures is for the device the is placed on the side.



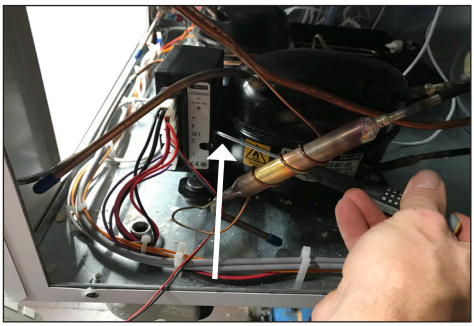
5. Use a screwdriver to disconnect the socket from compressor.



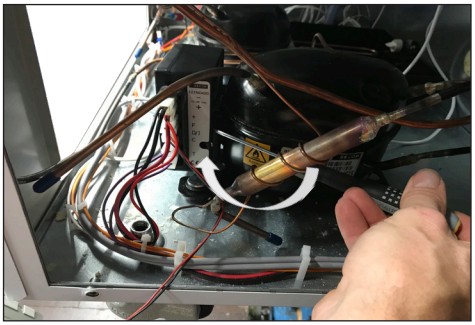
1. Dismount the 6 wires from ECU.
Grab the wire socket and pull gently.



2. Loosen the screw a couple of turns.



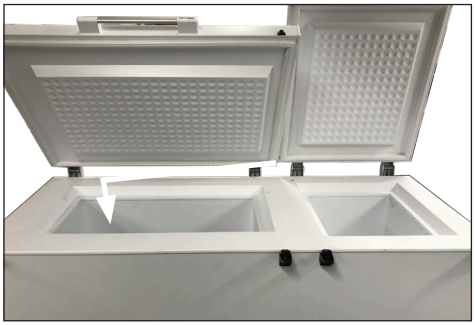
3. Place a screwdriver in the small vent in the plastic cover.



4. Unclick plastic cover/starting device from compressor bracket.

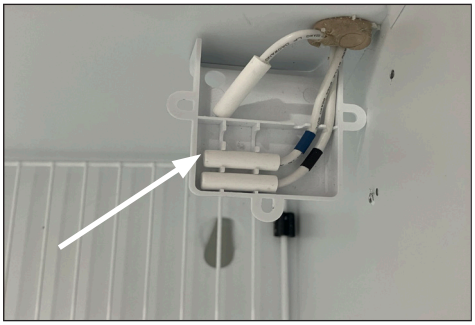
GB

Thermostat sensor replacement for refrigerator



The thermostat sensor is placed inside the compartment of the appliance.

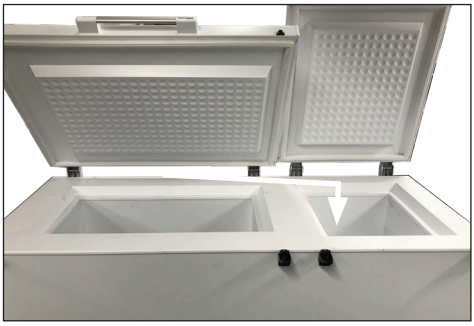
1: Dismount the temperature sensor cover by loosen the 2 x torx screws – size 10.



2. Take it out gently, remove the wire and the sensor from the cover.

3. IMPORTANT!
When re-mounting the new thermometer remember to properly seal the wire feed through

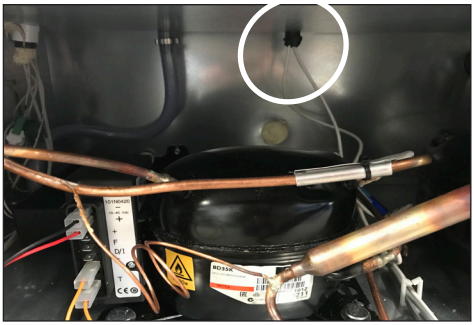
Thermostat sensor replacement for freezer



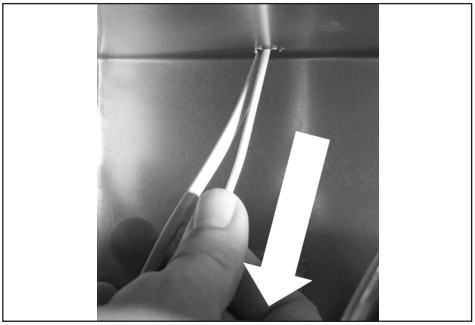
The thermometer sensor is placed inside the compartment of the appliance.

1: Dismount the temperature sensor cover by loosen the 2 x torx screws – size 10.

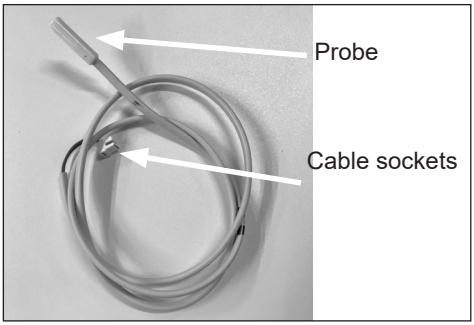
2. Take it out gently, remove the wire and the sensor from the cover.



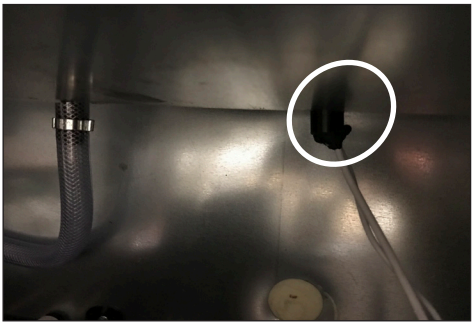
3. In Compressor compartment, gently pull the white wire until the probe is visible.



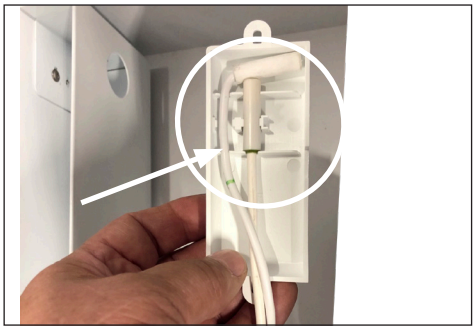
4. Gently pull the white wire until the probe is visible.



5. The thermostat sensor comes with probe, wire and cable socket.

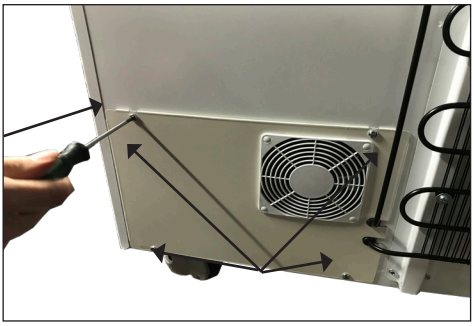


6. IMPORTANT!
When re-mounting the new thermostat sensor remember to properly seal the wire feed through.

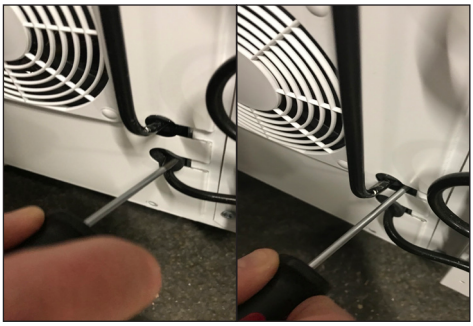


7. IMPORTANT!
When re-mounting the new thermometer make sure the wire sealing plug is placed properly

Fan replacement

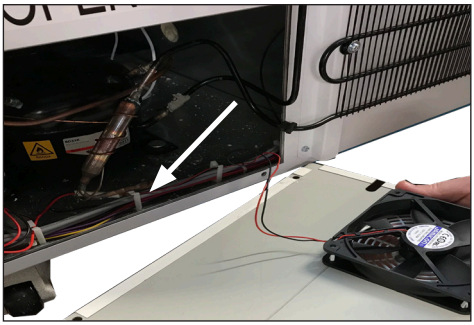


1. Use a screwdriver to loosen all 4 screws.

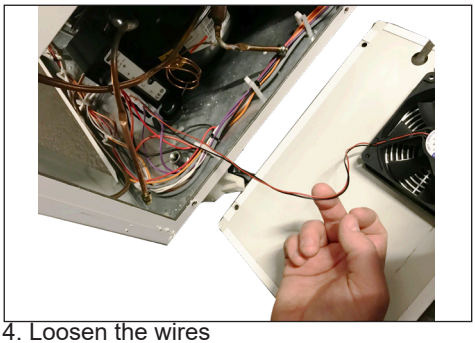


2. push the rubber ring in carefully

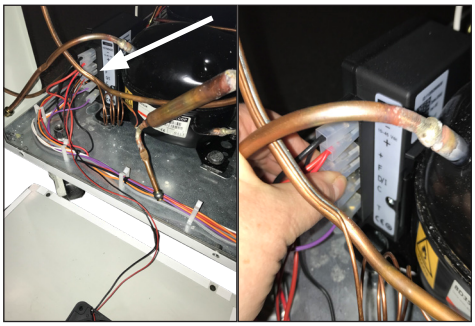
3. Remove the grille



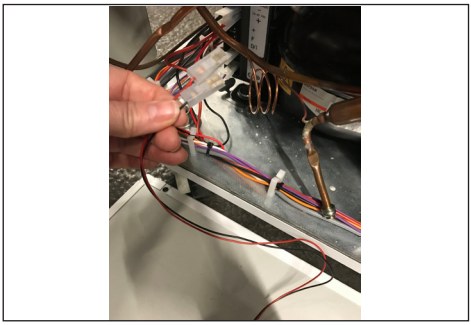
3. Loosen the wires

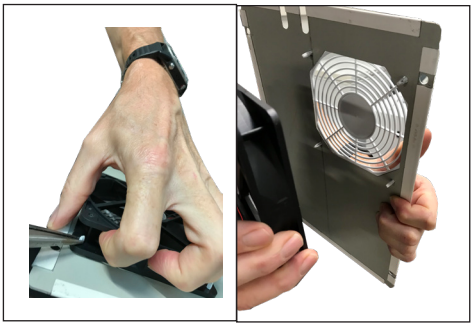


4. Loosen the wires

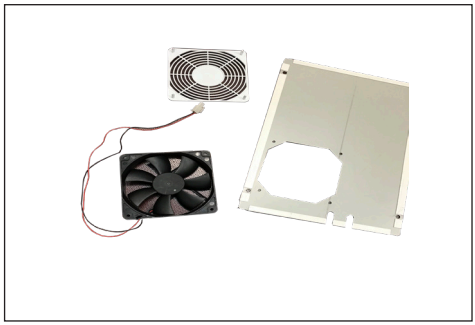


4. Pull the wires carefully out

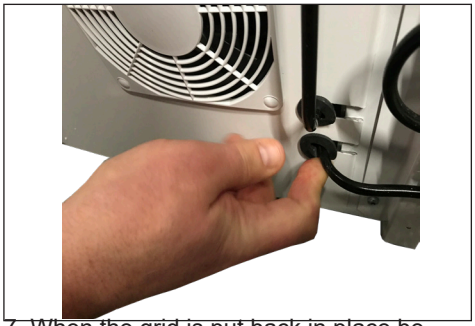




5.Press the spilts and the fan will get loos

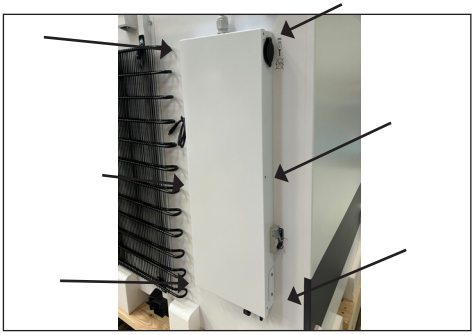


6. Reassemble all parts.

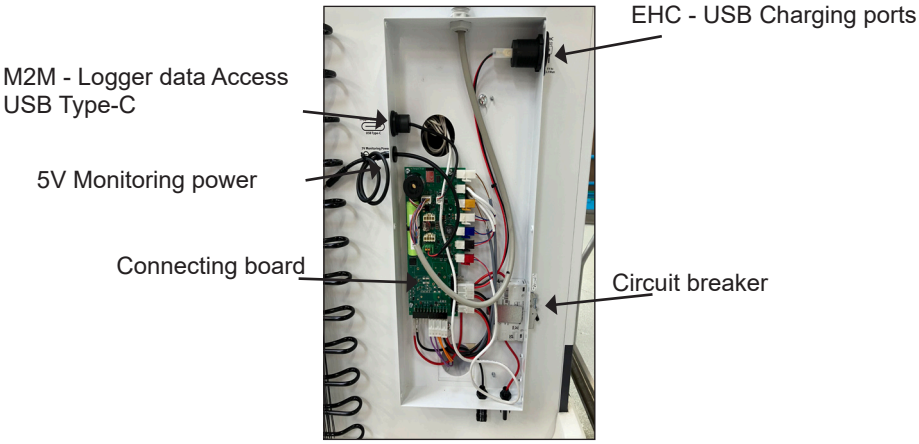


7. When the grid is put back in place,be suer that the rubber ring is placed correctly

How to access the electrical box

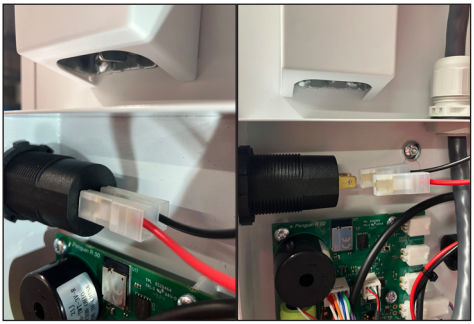


1. Dismount 6 x Torx 20 screws and unmount the junction box lid



GB

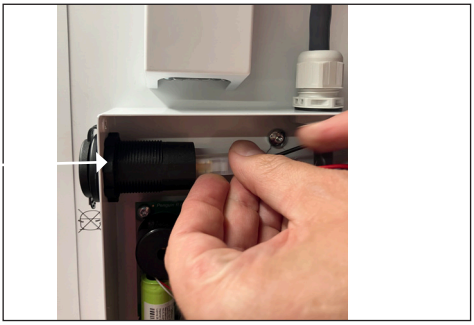
EHC- USB Charging ports replacement



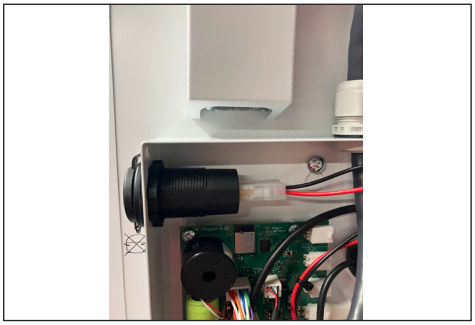
1. Remove the wires.

3. Loosen bolt

4. Take it out and put a new one in.

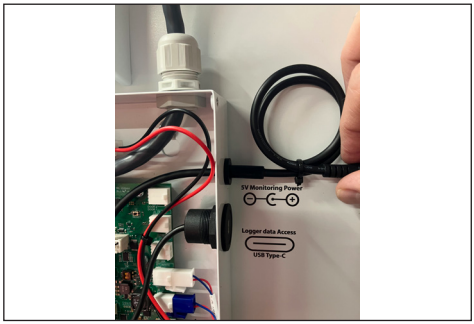


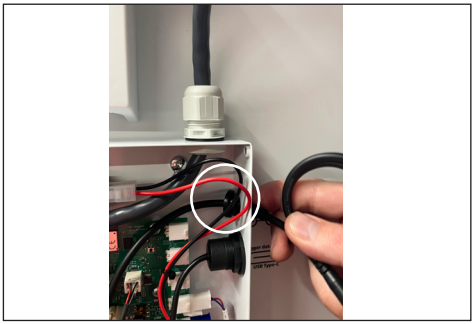
5. Tighten it again and put the wires back and be aware of the red and black postion is placed rigth.



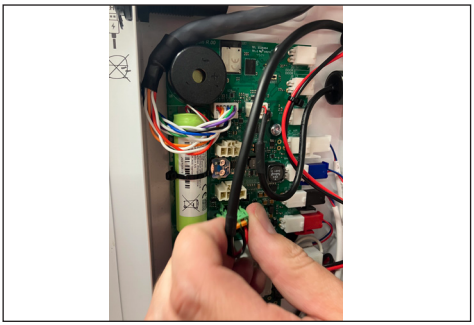
6. It must look that this

5V monitoring power replacement

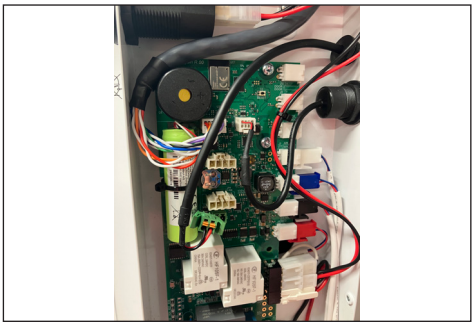




1. Loosen the wire gently



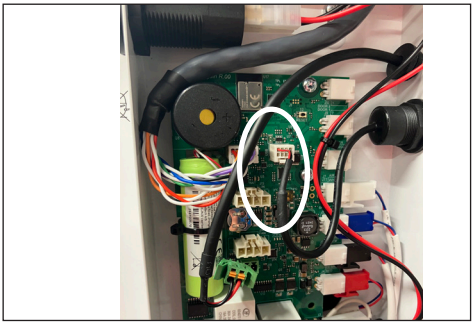
3. Pull gently the wire.



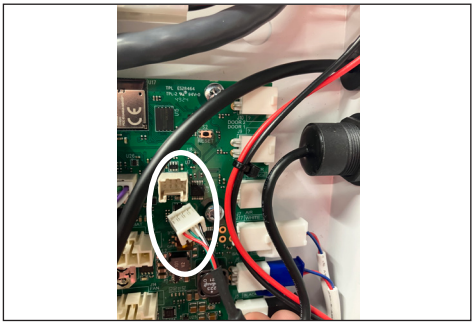
4. Now it is ready to pull out and changes.

GB

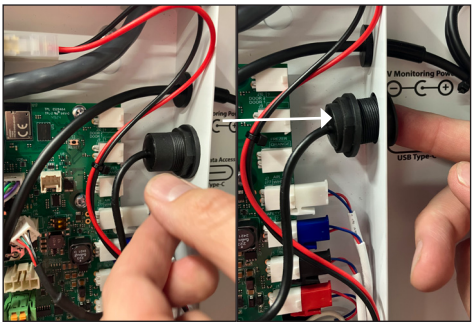
M2M - Logger data stick replacement



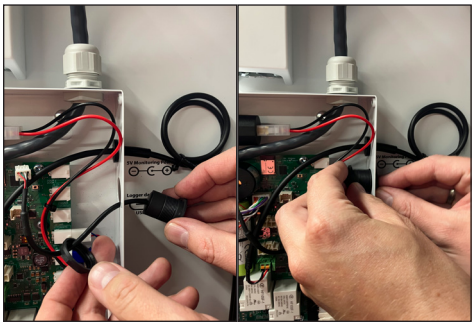
1. Loosen the wire before you loosen the USB stick



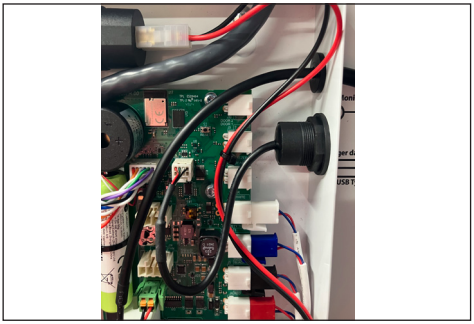
2. Remove the wires.



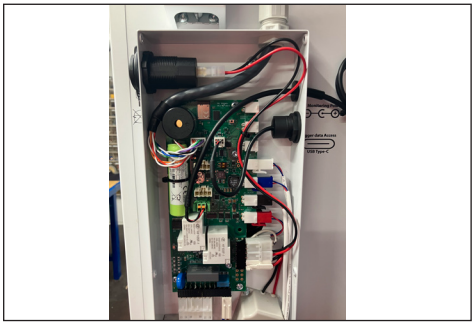
3. Loosen bolt



4. Take it out and put a new one in.

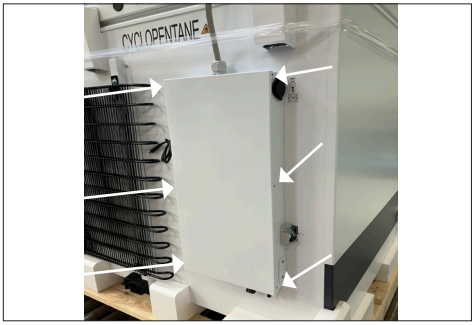


5. Tighten it again and put the wires back and be aware of the red and black postion is placed rigth.

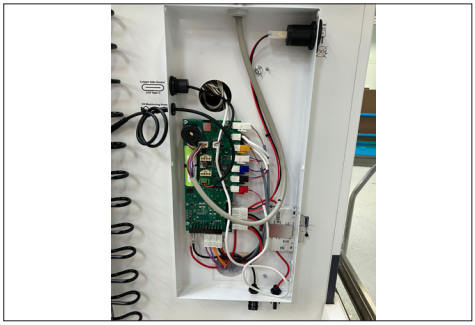


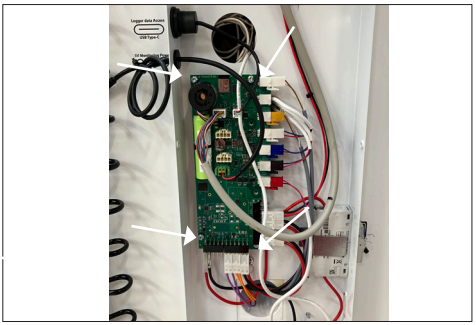
6. It must look that this

Replacement of connecting board

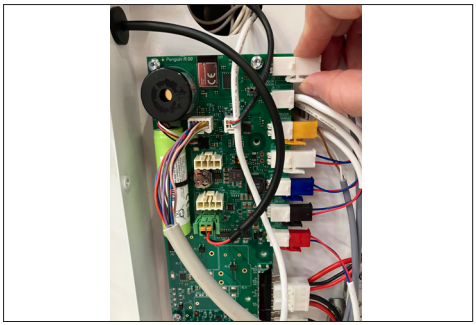


1.Access electrical components Dismount 6 x Torx 20 screws and unmount the junction-box lid

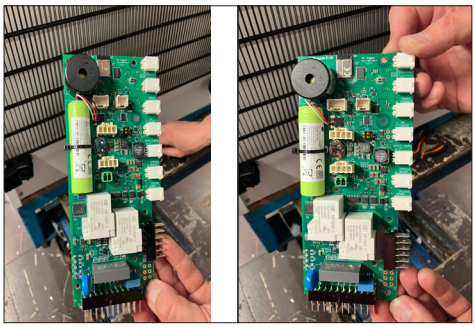




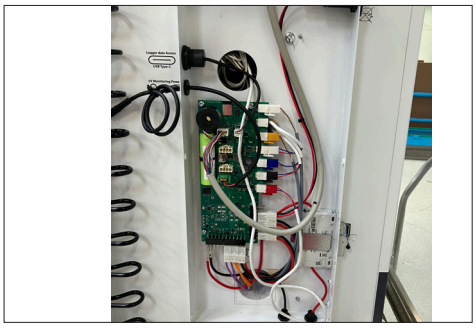
2. Used Torx 20 to loosen the 4 screws



5. By hand gently unplug the wires from connecting board.



4. Switch the power wire plug from the old to the new board wire socket.



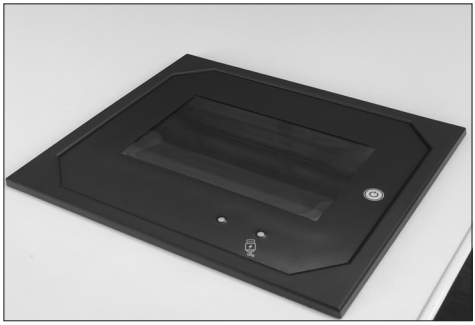
5. Make sure the wire colors is one by one

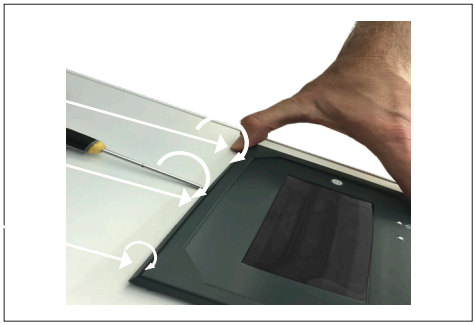
GB

EMS Display

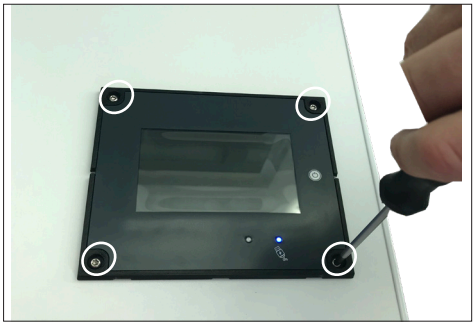
Before any repair job be aware of following!

WARNING:
Before servicing or cleaning the appliance, disconnect it from power source.

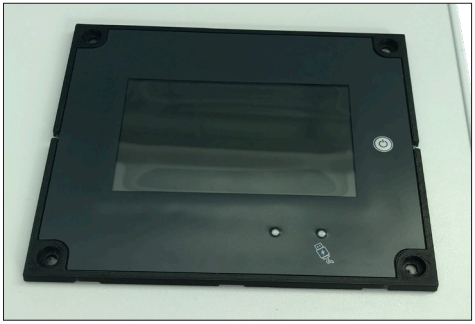




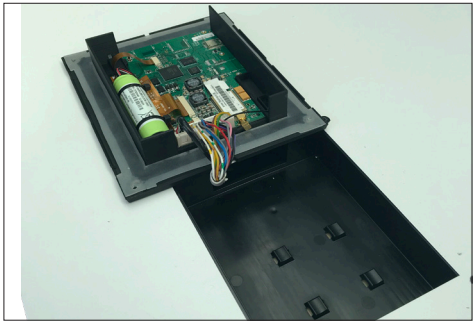
1.Gently place a small screwdriver, under the top part of the display cover and twistthe screwdriver to unlock the 3 fixing points



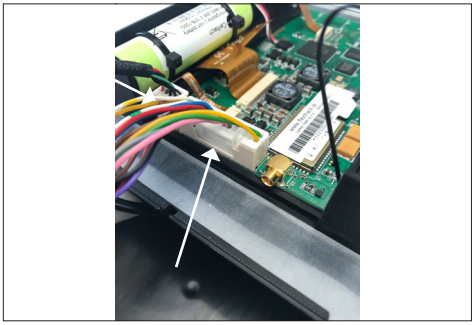
2.To unmount the display unfasten the 4 Torx 20 screws



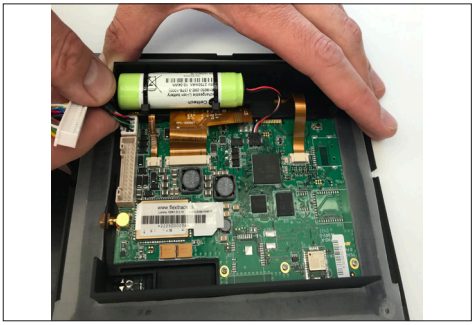
3.By hand gently bring up the display then-tilting it to the left



4. Display is off



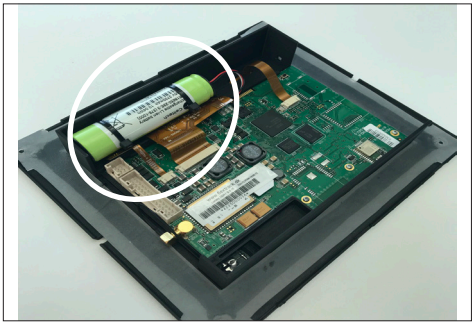
5.Loosen the 2 x wire plugs from the control unit by clicking on the side



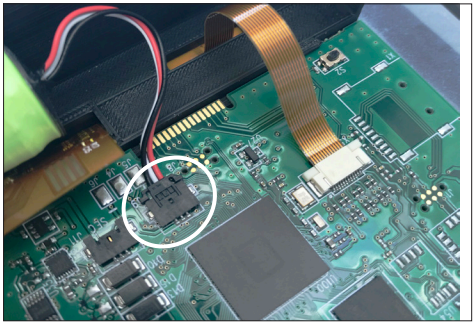
6. Replace the control-unit/display

GB

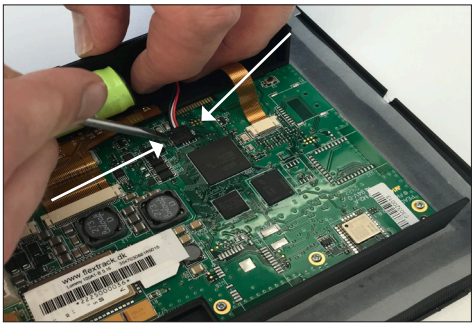
Battery change



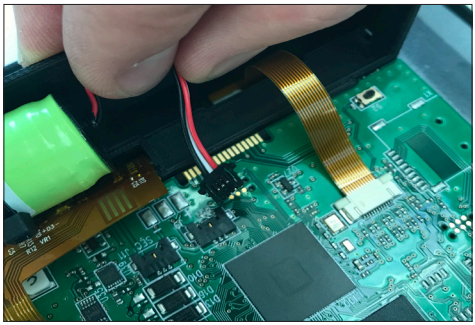
1. Battery position



2. Power wire connection to electronic control unit

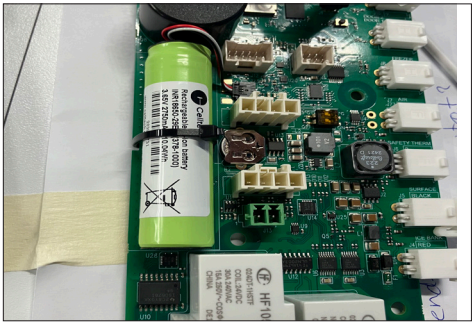


3. By hand gently press the lock function on both sides of the power wire plug and slide backwards

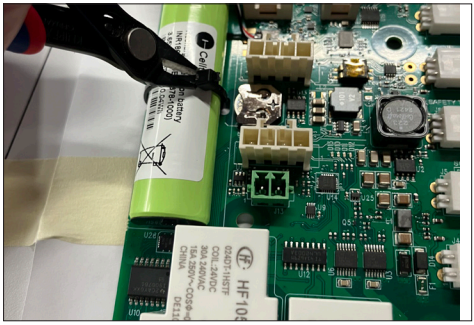


4. The power wire is loose

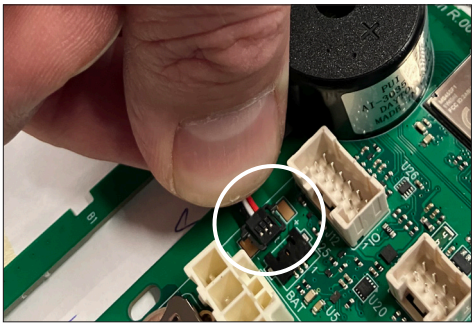
Battery change of connecting board



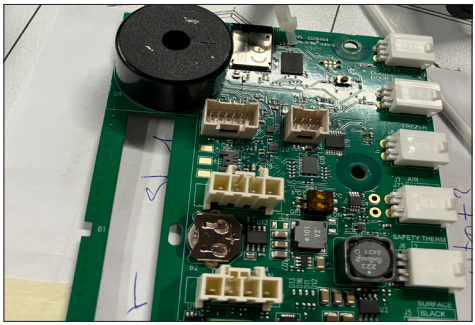
1. Battery position



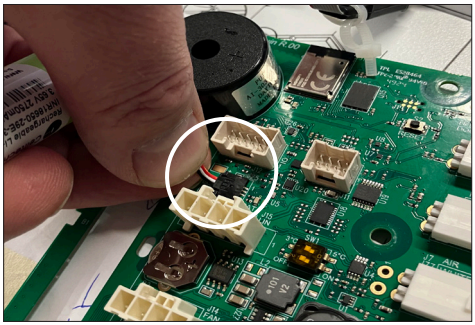
2. Cut the strip off



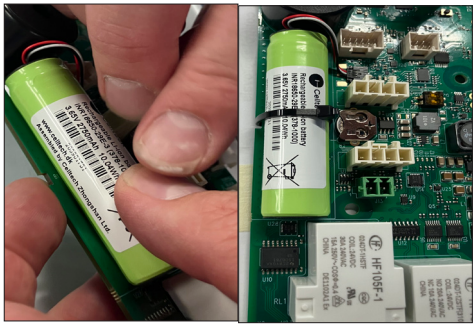
3. By hand gently pull the wire out



4. The battery can be change



3. By hand gently put the wire in place.



4. The battery has been changes make sure to fasten it again

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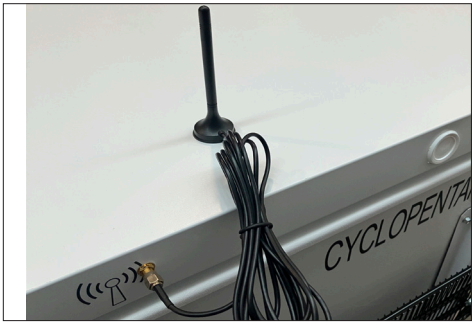
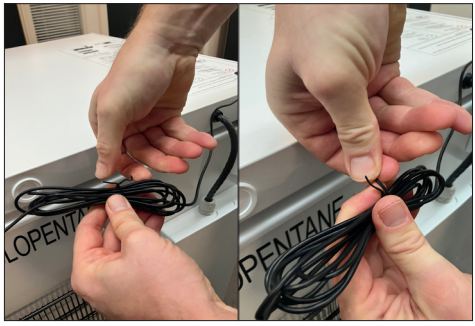
External antenna

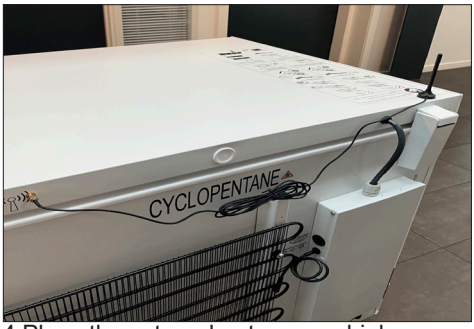
1. Place the cable from the external antenna



2. The external antenna is to be wired from the back of the unit

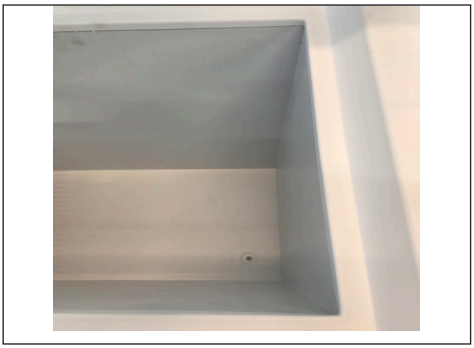


3.The cable is being gathered. The cable tie is being tightened around the bundled cable to keep it organized and fixed in place.



4.Place the external antenna as high up as possible in order to receive the best GSM signal available

Keep drain clean

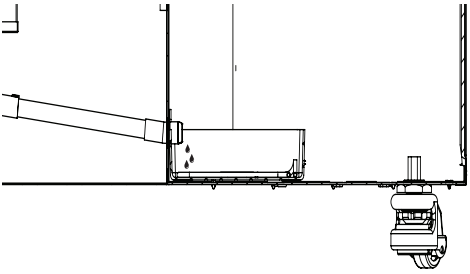


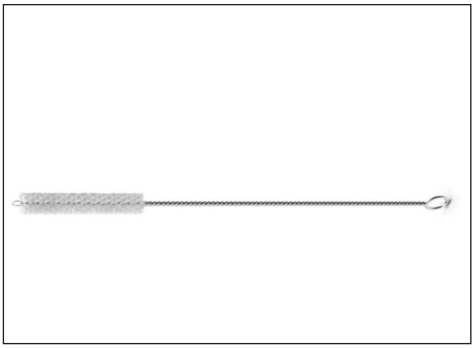
1. The drain is in the bottom

2. Remove the filter if there is getting any problems with the drain.

If the appliance drain becomes blocked by any objects, the water can't drain away as it should from the vacciencompartment, which will result in water accumulating, which further could result in creating issues with the stored vaccine vials, stickers, cardboard boxes, etc.

This is why it is an important SOP procedure, to regularly ensure that the drain filter is clean and free from dirt and waste.
To do the cleaning, use lukewarm water with a mild cleaning agent on a soft cloth, and wipe off the filter along with the surrounding bottom.
Finish off with a dry dishtowel or similar, to ensure all objects are removed and the bottom is dry.





2. Use a very small bottle cleaner, if cleaning becomes necessary in the tube.

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Compressor replacement

Procedure of compressor switch.

1: **WARNING!** Drain coolant R600a from refrigeration system by vacuum suction.

2: **IMPORTANT!** Blow refrigeration system with NO/Nitrogen

3: Cut

A: Suction and pressure tube

B: Capillary tube

C: Dry filter

4: Dismount starting device ECU

5: Dismount old compressor

6: Insert new compressor

7: Solder

A. Suction and pressure tube

B. Capillary tube

C. Dry filter

8: Install starting device ECU

IMPORTANT! When solder copper tubes to iron tubes use silver tin

Filling of new refrigerant

9: Drain refrigeration system by vacuum suction

10: Check type sticker for required amount of R600a to fill on refrigerant system

Fill 50g of R600a refrigerant on the system

⚠Important Safety Note

R600a (isobutane) is highly flammable. Work only if you are a trained technician, in a well-ventilated area, with no ignition sources. Use tools rated for hydrocarbon refrigerants.

Safety First

- Work only in a well-ventilated, spark-free area.
- Use only tools rated for flammable refrigerants.
- Wear goggles, gloves, and anti-static shoes.
- Never overcharge — hydrocarbons are highly sensitive to charge weight.

Service Instruction: Recharging a Vaccine Refrigerator with R600a: Check the Rating label

1. Preparation & Safety

- Tools and equipment needed:
- Manifold gauge set (rated for hydrocarbons)
- Vacuum pump
- Electronic refrigerant scale (±1 g accuracy)
- Recovery pump & recovery cylinder (for hydrocarbons)
- Leak detector (hydrocarbon compatible)
- PPE: gloves, goggles, anti-static shoes
- Confirm system type label: Check the Rating label
- Ensure no sparks, flames, or electrical switches near the work area.

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2. Recovery of Old Refrigerant

1. Connect the manifold gauge set to the service port.
2. Connect the recovery pump and recovery cylinder.
3. Recover all existing refrigerant until system pressure is at 0 bar / 0 psi.
4. Weigh the recovery cylinder to confirm the amount removed.

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3. System Evacuation

1. Connect the vacuum pump to the service port through the manifold.
2. Evacuate to at least 500 microns (0.67 mbar).
3. Hold the vacuum for 10–15 minutes to check for leaks.

- If vacuum rises, locate and repair leaks before continuing.

---

4. Charging the New Refrigerant

1. Place the R600a cylinder on the electronic scale.
2. Connect the cylinder to the manifold gauge set.
3. Purge air from the charging hose (a tiny crack of refrigerant released, in a safe ventilated area).
4. With the cylinder upright (for vapor charging):

- Charge exactly: Check the Rating label of R600a into the system.

5. Close valves and disconnect charging hoses.

⚠ Critical: Do not overcharge. A few grams extra can cause high pressure, poor performance, or compressor failure.

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5. System Start-Up

1. Switch on the refrigerator.
2. Monitor low- and high-side pressures during operation.
3. Check compressor current draw against nameplate data.
4. Allow system to stabilize for 15–20 minutes.

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6. Performance Check

1. Measure cabinet temperature — vaccine refrigerators typically must maintain +2 °C to +8 °C.
2. Verify evaporator temperature and cooling cycle are correct.
3. Check for abnormal noises or excessive frost.

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7. Leak Test & Finalization

1. Use a hydrocarbon leak detector around compressor, service valve, and joints.
2. Seal the service port with a cap or brazed shut.
3. Label the unit with:

- Refrigerant type: R600a
- Charge: Check the Rating label
- Service date and technician ID

Trouble shooting

Fault	Possible cause	Remedy
Compressor is not running.	Be patient, it is most likely that the compressor will start within a few minutes.	If this is not the case, check the following: - Check that power is connected and that the wire from the solar panel to the appliance is intact. - Check the fuse and replace it if necessary. - If the above is OK, call technical supervisor.
Compressor is running, and the temperature is too high.	The ventilation grille is blocked. The lid is not closed properly. The fan in the compressor compartment is blocked or defective. The temperature in the room in which the appliance is installed is too high.	Ensure unhindered air circulation. Ensure that the lid is closed properly. Check that the fan is running, if not it should be replaced. Shield the appliance against direct sun light and ensure more ventilation to the room.
Temperature in VLS SDD is too low.	To low set point on digital controller.	Concact technical supervisor for adjusment.
No temperature is displayed.	There is not enough light for the solar sensor.	Turn on the light.
No light in the indicator light during day time.	Switch is turned OFF Fuse is burned Diode is defect	Turn on the switch. Replace the fuse. Replace diode.

GB

Recycling procedures/Disposal

Information for Users on Collection and Disposal Old Equipment and used Batteries

This symbol on the products, packaging, and/or accompanying documents mean that used electrical and electronic products and batteries should not be mixed with general household waste. For proper treatment, recovery and recycling of old products and used batteries, please take them to applicable collection points, in accordance with your national legislation and the Directives 2012/19/EU and 2006/66/EC.

By disposing of these products and batteries correctly, you will help to save valuable resources and prevent any potential negative effects on human health and the environment which could otherwise arise from inappropriate waste handling.

For more information about collection and recycling of old products and batteries, please contact your local municipality, your waste disposal service or the point of sale where you purchased the items.

Penalties may be applicable for incorrect disposal of this waste, in accordance with national legislation.

For business users in the European Union.
If you wish to discard electrical and electronic equipment, please contact your dealer or supplier for further information.

Information on Disposal in other Countries outside the European Union

These symbols are only valid in the European Union. If you wish to discard this product, please contact your local authorities or dealer and ask for the correct method of disposal.

Disposal

- Empty all contents.
- Defrost completely and clean the interior to prevent odor and mold.
- Remove or destroy locks to avoid risk of child entrapment.
- Remove the 2 batteries as shown in the Technical manual p. 39-40
- The battery must not be disposed of with general household waste.
- Battery and appliance is brought to applicable disposal service.
- Do not attempt to remove refrigerants or compressor oil yourself.

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