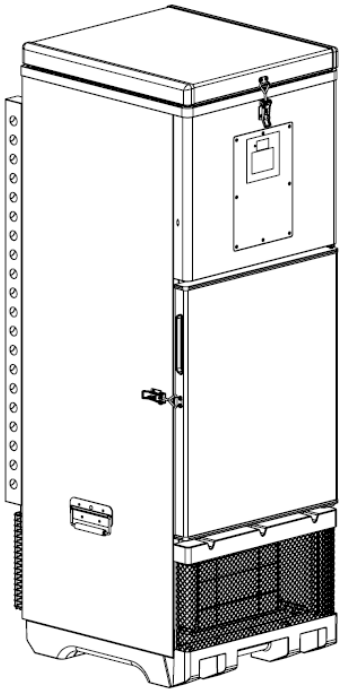
AUCMA

MetaFridge™ CFD-50

Technician Manual



⚠ Please read the manual carefully before use

Keep the manual in a safe place for future reference.

For safety purposes, please remove all package materials before use.

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1 Product Description

The MetaFridge CFD-50 is a WHO PQS certified vaccine refrigerator that maintains a temperature between 2-8 °C with multi-day holdover during extended power outages. It includes integrated power protection, a display showing 30 days of temperature and alarm history, onboard logging of temperature and diagnostic data, and it supports remote monitoring of performance data.

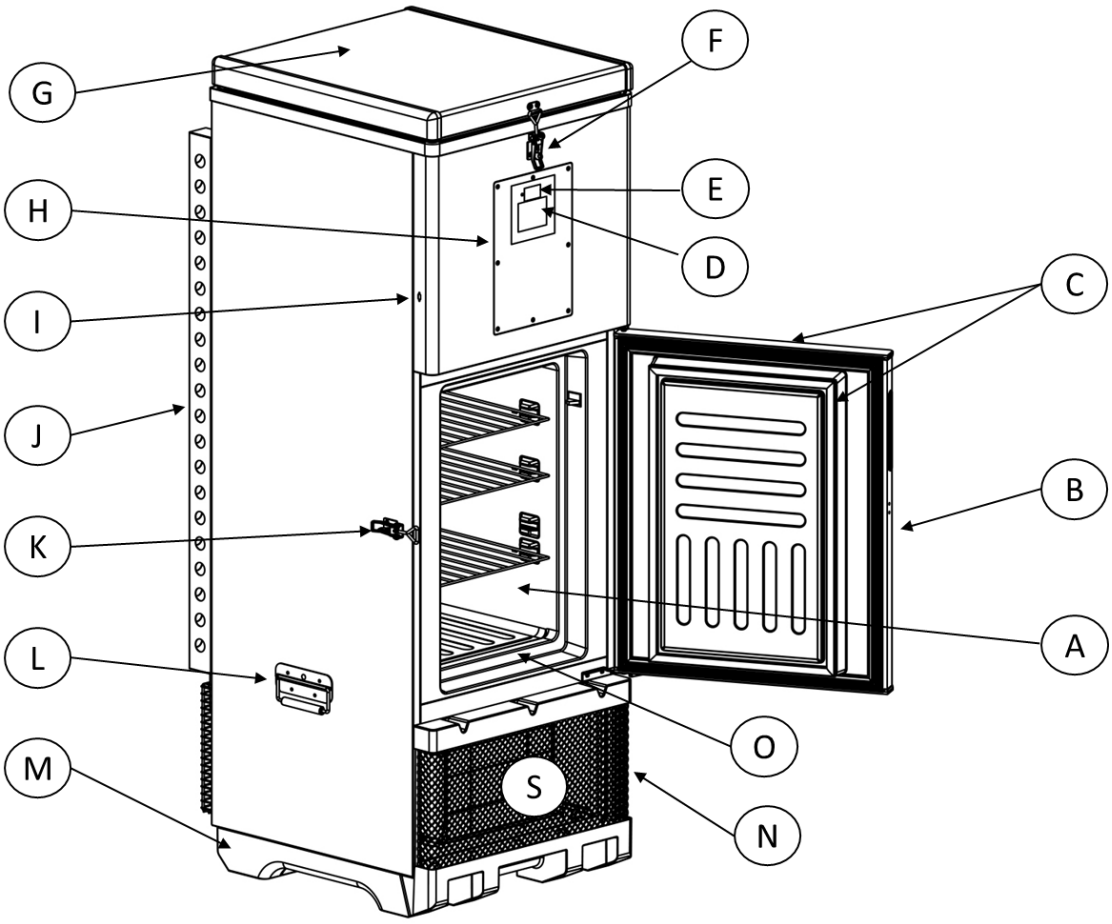
This unit is factory-equipped with the Beyond EMS, an integrated high-precision temperature monitoring and data logging solution designed exclusively for vaccine cold chain equipment. The Beyond EMS consists of Beyond Com Unit （Ice3）, Power module, power cord, sensors, etc. Before leaving the factory, all cables connected to Beyond device box will be pre-installed in place and placed inside a wiring box to avoid inadvertent repositioning, damage, or monitoring disruption.

CFD-50 standard features:

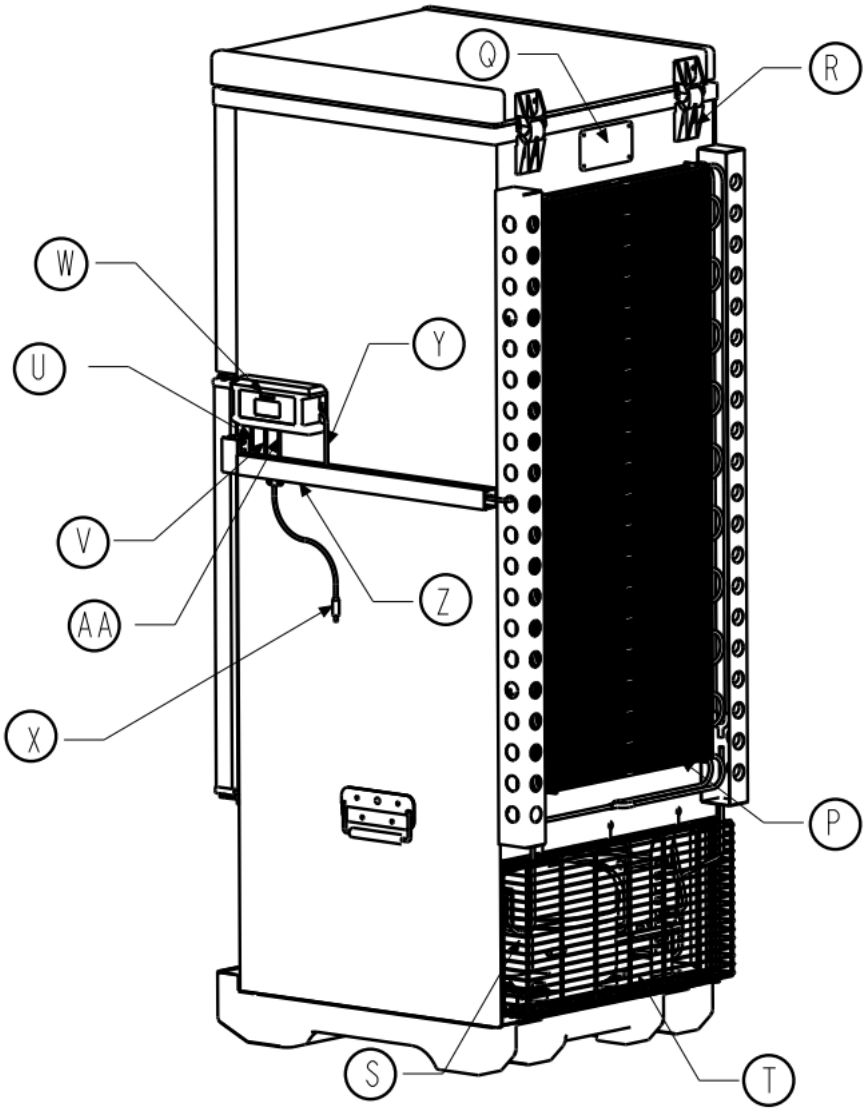
- 50-liter vaccine storage chamber volume
- Front-opening for easy user access to vaccines
- Integrated power protection system defending against voltage spikes and brown-outs
- Integrated voltage stabilization to utilize a wide range of input voltages (110 – 230 VAC)
- Normal operation in a minimal mains grid access environment (maintains temperatures with as little as 3 hours of power a day on average)
- ColdSafe™ technology providing 120 hours of holdover at constant ambient temperature of 43 °C (192 hours at constant ambient temperature of 25 °C)
- Integrated 30-day temperature record (DTR) display and downloadable temperature history
- Integrated plastic base prevents corrosion from damp floor
- M2M interface：Type-C female receptacle be used for data download by external devices and power supply from external devices to the logger in the event the logger’ s energy storage is depleted; The function of a barrel shaped cable is to supply power to external devices，Its rated voltage and current are 5V/1A.

2 CFD-50 Components

Components of the CFD-50 are labeled below. Refer to Chapter 10 for a more detailed view and spare part ordering information



A: Vaccine chamber	B: Vaccine chamber door	C: Vaccine chamber door gaskets
D: 30-DTR display	E: Temperature display	F: Water tank lid latch
G: Water tank lid	H: Electronics enclosure	I: USB port
J: External condenser guards	K: Vaccine chamber door latch	L: Lifting handles
M: Integrated plastic base	N: Front ventilation cover	O: Condensation drain channel



Q: Thermal safety shut-off (mechanical thermostat)	R: Water tank lid hinge	S: Compressor compartment (contains compressor, fan, power enclosure and power board, transformer, drain pan,DC power board, Power module)
T: Back ventilation cover	U: Beyond sensor Door contact_4P4C	V: Compressor switch contact_4P4C
W： Beyond Com Unit (BCU) /Ice3	X: M2M power cable	Y: Beyond Data line
Z: wiring box	AA: Beyond sensor Door contact_4P4C	

3 Transport and Handling Instructions

⚠ Heavy object warning. To avoid injury, use lifting aids and proper lifting techniques when moving the CFD-50

a. **Leave the CFD-50 in its protective packaging** as long as possible to protect from damage
    - Cutouts in the cardboard allow access to the manufacturer's label for inspection and to the handles for lifting without removing the packaging.
b. **Transport the CFD-50 vertically when possible**:
    - If transport on the side is necessary, pay attention to "This side up" markings on the packaging and make sure package is in the correct orientation to prevent damage.
c. **Keep door and top lid closed and latched** when moving the CFD-50
d. If the CFD-50 needs to be moved after initial installation, **remove the water from the water tank using a siphon hose before moving**.
e. **When using the handles for lifting**, keep one hand towards the top of the unit to prevent tipping.
f. **Avoid any excessive force** to prevent damage to the CFD-50.
    - Avoid any excessive force especially towards the door and lid to prevent damage.
    - Do not lift the CFD-50 from the doors, grates, or condenser guards.
    - Do not apply pressure to the Beyond Module enclosure or cable ports during handling.

4 Installation

4.1 Preparation

a. Read the instruction manual carefully.

b. Remove all packaging materials, including foam base and tape.

   (1) Discard plastic wrappers and bags safely, to avoid suffocation of children.

c. Inventory accessories and installation tools to make sure there are no missing parts. Each CFD-50 should include the following parts shipped inside the vaccine chamber:

   (1) 3 shelves

   (2) 2 plastic vaccine trays (additional trays can be ordered)

   (3) 1 funnel for filling the water tank to commission the CFD-50

   (4) 1 BeyonCom Unit(Ice3)

   (5) 1 Backup M2M power cord

   (6) 2 BCU fixing screws+1 screwdriver

   (7) User manual and Technician manual for CFD-50

   (8) Technician Manual and Cold Cloud Administrator Manual for Beyond EMS

   (9) 2 sets of lock and key, for the water tank and vaccine chamber

If any parts are missing, please contact the manufacturer or service provider.

If you need the electronic version, please download the CFD-50 <user manual >、CFD-50< technician manual>,and Beyond <Technician Manual>,Beyond <ColdCloud Administrator Manual> from this website:http://www.aucmamedicalglobal.com.

4.2 Positioning the CFD-50

a. Place the CFD-50 on a flat and solid ground and **ensure the unit is level.**

b. **No pallet is required:** CFD-50 has an integrated plastic base.

c. Position the CFD-50 near an accessible electrical outlet; the power cord length is 2 meters.

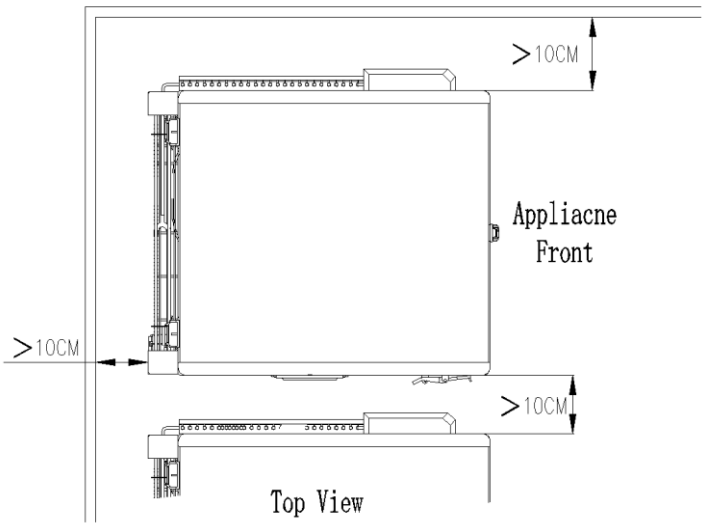
d. Position the CFD-50 **away from direct sunlight and any source of heat** (e.g. gas stove, fireplace, etc.).

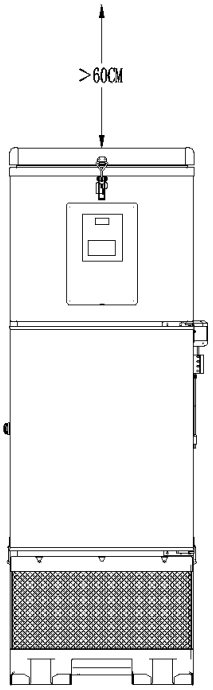
e. CFD-50 must not be placed in or around flammable or corrosive gases that could cause an explosion or electric shock.

f. In order to prevent rust or electrical leakage, the CFD-50 should not be placed in a high humidity environment or in a location where it could be splashed with water or rain.

g. Position the CFD-50 in a **well ventilated area** and **make sure there is a minimum of 10 cm of empty space around the sides and back of the unit. The door latch must be accessible and the door must be able to open freely to at least 90°.**

h. Allow a minimum of 60 cm clearance above the CFD-50 for accessing the water tank lid.

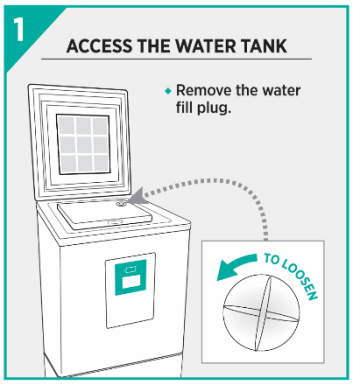
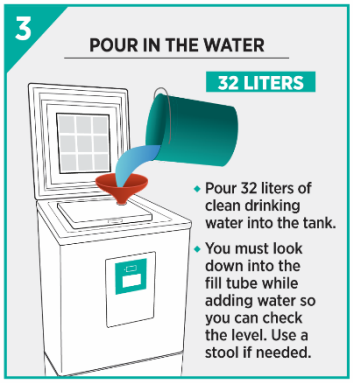

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Top View

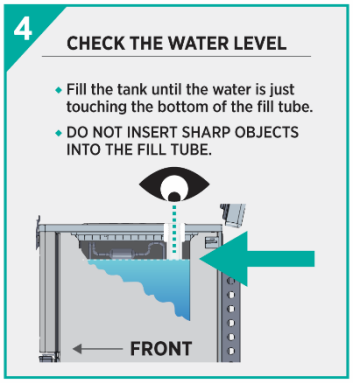
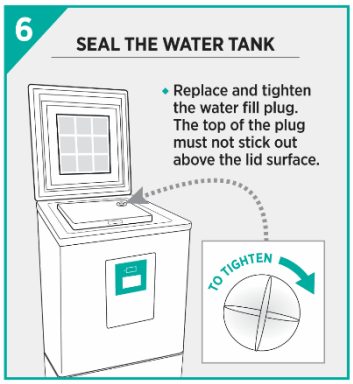

>60CM

4.3 Filling Instructions

⚠ CFD-50 must be properly filled with clean drinking water before operation and use. During the filling process, use care and common sense and follow all local safety precautions

Filling instructions can also be found on the inside of the water tank lid.

	Step 1: Unlatch the water tank latch and fully open the water tank lid. Turn the fill plug counterclockwise to loosen and remove the cap. Keep the plug on top of the water tank while filling so it does not get lost.
	Step 2: A funnel is shipped inside of each CFD-50. Install the funnel securely in the fill hole. Fill a bucket with clean drinking water. If there is no local source of clean drinking water, use bottled water.
	Step 3: Pour 32 L of water into the water tank through the funnel. If needed, use a stool to properly reach the funnel and be able to look down into the fill tube to check the water level.

	Step 4: While filling, stop periodically to check the water level by looking down into the tube with a light. The water should just reach the bottom of the fill tube. Do not insert sharp objects into the tube or you may damage the refrigerator evaporator.
	Step 5: If you accidentally overfill the water tank, remove excess water using a piece of tubing as a siphon. Adjust the water level by adding/removing water until the water level is at the bottom of the fill tube. Too little water will reduce holdover time; too much water may damage the unit.
	Step 6: When water is at the correct level, replace the fill plug and tighten until the plug is entirely within the lid and will not interfere when the top lid is closed.

⚠ Do not overfill the CFD-50 (Figure G).

Remove excess water if overfilling occurs (Figure H).

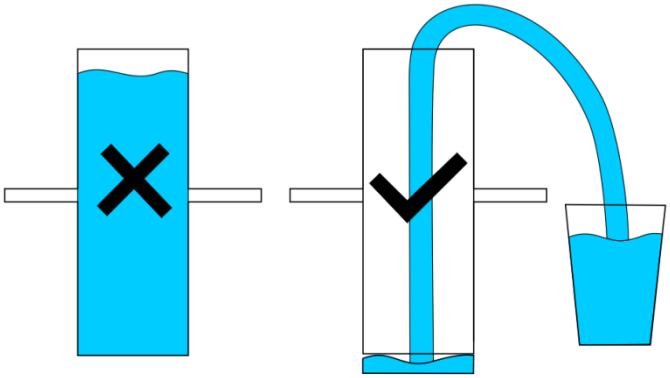


Figure G Figure H

4.4 Installation and wiring of BeyondCom Unit

The hardware of Beyond EMS consists of the device box(Ice3 BCU), Power module, and related cables. There are installation holes reserved on the machine for the Beyond Com Unit.

Before leaving the factory, all cables connected to the Beyond device box (BCU) will be installed in advance and wired out from the BCU attachment. All cables are placed inside the junction box to avoid accidental repositioning, damage, or monitoring interruption.

a. Take the Beyond Com Unit out of the machine,

b. Align the fixing holes on the Beyond Com Unit with the installation holes reserved on the machine, and tighten two screws to fix it.

c. After fixing the Beyond Com Unit, insert the sensor cable and power cable into the corresponding interfaces.





Beyond Com Unit wiring

d. As shown in the figure above, The blue wire is the power cord, the wire with a yellow label is the temperature sensor wire, and the other wire is the door switch sensor wire. Insert the temperature sensor cable into interface ①, insert the door switch sensor cable into interface D1, and insert the data line into the interface on the right side of Beyond Com Unit. Insert the wire(compressor switch) labeled D2 into the D2 interface of Beyond Com Unit.

a. M2M power cable: The M2M power cable is fixed before leaving the factory, users can use it directly.

NOTE: The above is only a schematic diagram. The actual power cord, sensor cord, and M2M power cord are all fixed to the BeyondCom Unit accessory through cable trays.

The other end of the blue power cord is connected to the Power module, which is fixed inside the compressor chamber at the bottom of the machine to supply power to the BeyonCom Unit. The other end of the temperature sensor wire and the door switch sensor wire are pre embedded in the foam box.

4.5 Startup and Cooldown

> ⚠ Ensure that the water tank has been filled to the correct level before plugging in the CFD-50

1. Use a #2 Philips screwdriver to open the front electronics enclosure.
2. Connect the main battery. Once powered on, the temperature display will show the temperature of the vaccine chamber.
3. Plug the CFD-50's power cord into a dedicated outlet. If mains power is available, the compressor will start after a delay of 5 minutes.
4. If telemetry module is installed, also connect battery on the telemetry module.
5. Check all electronics connectors in the electronics enclosure to make sure they are plugged in firmly.
6. Beyond EMS: Long press the  key and the  key for 8 seconds to start Beyond com Unit, It will automatically start recording data.
7. Check that the time shown on the 30 DTR is correct (time zone is UTC). If the time has not been set, the display will show a date in the year 2000. To set time, connect an extra telemetry module to the main board (telemetry module's battery must be plugged in), press the DAQ reset button, and wait up to 1 minute for the 30 DTR display to update with the current date.
8. Open the vaccine cabinet door to check if interior light is on and close the door. By default, an LED light illuminates the vaccine chamber when the door is open and mains power is available. If desired the light can be disabled by removing a black plastic jumper from the main board (#20 on the electronics diagram on the back of the electronics enclosure cover).
9. If mains power is available, wait until compressor has started (indicated by green LED next to the temperature display) and verify that sides of the CFD-50 become warm to the touch after a few minutes of running, before replacing the electronics enclosure lid.
    a. If mains power is not available, close the electronics enclosure and follow up the next day in person or by phone to verify the installation.
10. If compressor run LED does not come on or sides of the unit do not become warm after compressor has run for several minutes, consult troubleshooting section of the technician manual.
11. Do not use the CFD-50 until the display indicates that the vaccine chamber temperature is below 8 °C and the 30 DTR indicates at least 2 days of remaining holdover, which typically takes <6 hours with continuous power availability.

⚠ In the case of intermittent power (≤4 hours of power each day) and high ambient temperature environment, the CFD-50 may require 2 days after initial installation to reach full holdover capability.

⚠ During the initial cooldown, do not use the CFD-50 until the display indicates that the vaccine chamber temperature is below 8 °C and the 30 DTR display indicates at least 2 days of remaining holdover.

5 Working Principles

5.1 ColdSafe Technology

MetaFridge CFD-50 uses patented ColdSafe Technology to cool the vaccine chamber and provide extended cold holdover during power outages. ColdSafe Technology consists of a water tank above the vaccine chamber, and a thermosyphon that moves heat between the two, slowly melting ice built up in the water tank and passively cooling the vaccine chamber to between 2-8 °C.

5.2 Compressor Control Method & Test Mode

CFD-50's compressor is controlled by temperature sensors in the water tank that run the compressor to freeze water until an ice block builds up in the water tank to provide holdover. During regular operation the compressor will run every 6-36 hours (depending on ambient temperature) to keep the ice block fully frozen. In case of control system malfunction, a backup mechanical thermostat will open to turn off the compressor and protect the vaccines from freezing. Both the electronic control system and mechanical thermostat are preset at factory; no user adjustment is necessary to maintain the vaccine chamber temperature within 2 °C – 8 °C.

It is normal for the compressor not to run after a door opening, and for the vaccine chamber to cool slowly after power is first applied. For diagnostic purposes, CFD-50's compressor can be turned on by pressing the 'Run' button on the top right of the main board inside the electronics compartment. The compressor will only run if mains power is available, the vaccine chamber temperature is above 1.8 °C and the water tank sensors are above -0.7 °C. The compressor should turn on immediately and run until normal shutoff conditions are reached. To turn the compressor off, press the control reset button.

6 Use of the CFD-50

- Check the temperature display daily and make sure the chamber temperature is between 2-8 °C before using.
- Both the appliance and Beyond Com Unit can provide high-precision temperature data and 30 DTR reports. If the display data of different displays are different, this is normal, because different sensors have accuracy errors, and the accuracy is theoretically within ±0.5℃. In addition, when the displayed data is different, the value displayed by Beyond EMS should prevail.

• Do not overfill the vaccine chamber. Leave gaps between vials and boxes to enable cold air circulation within the chamber. Use trays to organize vaccines and keep boxes from touching the walls or sitting directly on the floor of the vaccine chamber.

• Keep vaccine chamber door tightly closed and latched when not in use to maintain the storage temperature inside

• There is no user-adjustable thermostat or sensors in the CFD-50.

• Designate a person to inspect and record the daily operation to ensure the safe use of the CFD-50.

• Only approved vaccines or medical supplies should be stored in the refrigerator. Do not store any foods, beverages, or flammable, explosive, volatile items (such as alcohol or gasoline) or other dangerous items in CFD-50.

6.1 Vaccine Chamber

All parts of the vaccine chamber are controlled between 2-8 °C and are suitable for vaccine storage.

Loose vials should be stored in the provided trays on shelves inside the vaccine chamber. Secondary packaging may be placed directly on shelves or in trays. Do not place secondary packaging directly on the bottom of the vaccine chamber to avoid contact with any excess condensation. Also avoid leaving secondary packaging in direct contact with the chamber walls.

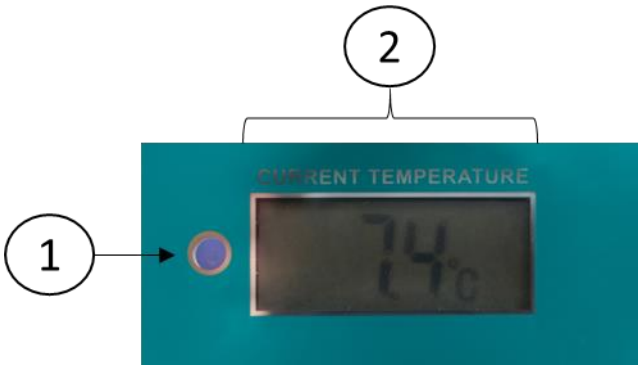
When mains power is available, a LED light will illuminate the vaccine chamber when the door is open. If desired, the light can be disabled so it does not turn on when the door is opened by removing a black plastic jumper from the main board (#20 on the electronics diagram on the back of the electronics enclosure cover).

In humid environments condensation may collect on the sides and back of the vaccine chamber, and run down the walls into the drip channel surrounding the bottom of the chamber. Any accumulated condensation will flow to the back of the chamber and out through the drain hole.

6.2 Use of the CFD-50 SDD built-in Monitoring System

6.2.1 Temperature Display and Status LED

The top display shows the actual temperature in the CFD-50 vaccine chamber. The temperature sensors are factory calibrated and no user adjustable features are available for CFD-50 display. The red LED blinks when an alarm is occurring.



Current temperature and status

1. Status LED	The LED to the left of the display will be: • green while the compressor is running, or • blinking red during alarms
2. Current vaccine chamber temperature	Temperature display showing the coldest point in the vaccine chamber

The temperature display has an independent power source and will continue to display the temperature for 3 days without mains power or a system battery. If power is not restored in that time, the display will go blank until mains power is restored or a charged system battery is installed.

6.2.2 30 DTR (Daily Temperature Record) Display

The larger bottom display shows the temperature and alarm history over the past 30 days, as well as information about currently remaining holdover, current power availability, and ongoing alarms.



30 DTR display and navigation buttons

Navigation buttons

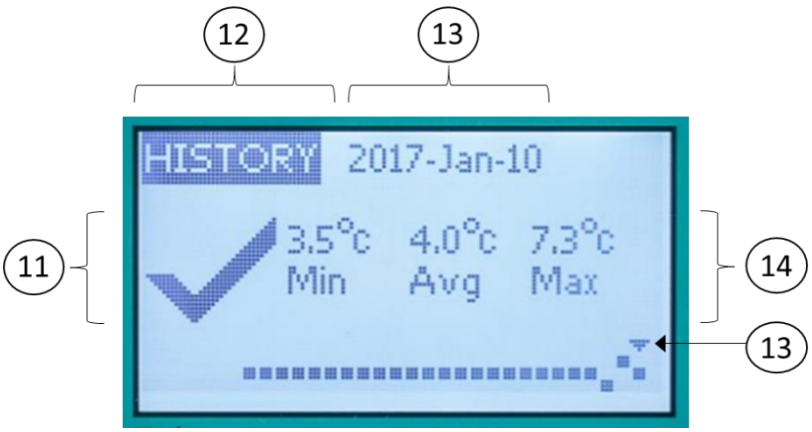
3. Menu button 	Tap the Menu button to move between CURRENT, HISTORY, and ALARM screens.
4. Back and Forward buttons 	Use the back and forward buttons to move backwards and forwards through the HISTORY screens to view temperature and alarm statistics from the past 30 days.



Current Screen: This is the default screen that shows status of the unit during regular operation.

5. Remaining holdover	Calculated remaining holdover time without power. This is an estimate only and not a guarantee of remaining holdover.
6. CURRENT screen	The CURRENT screen is the default screen that displays the CFD-50's status overview.
7. Date	The current date (default time zone is UTC).
8. Replace battery icon	 The CFD-50's monitoring system is powered by a rechargeable battery. This icon will appear if the battery is not plugged in or if it has degraded over time and needs to be replaced.
9. Plug icon button	 The power icon indicates whether mains power in the CFD-50's usable range (82 – 290 V) is currently available. A slash through the plug indicates that power is off or outside of CFD-50's input range.
10. Alarm history indicators	 Dots indicate vaccine chamber temperature range during each of the past 30 days. The current day is the rightmost dot, and the leftmost dot is 30 days ago. A raised dot represents a high temperature excursion on that day, a low dot represents a low temperature excursion, a neutral dot represents no temperature excursion. If no data is available for a day, no dot will be shown.

To view temperature and alarm history, from the CURRENT screen press the MENU button to go to the HISTORY screen



History Screen: Shows temperature and alarm statistics from each of the past 30 days.

11. Check/Alarm icon		The check/OK icon indicates that no temperature excursions occurred on the day being viewed.
		The alarm/X icon indicates that one or more temperature excursions occurred on the day being viewed. Press the back button to view alarm details.
12. HISTORY	HISTORY screens display summary information for each of the past 30 days	
13. Date	The date currently being viewed. An arrow towards the bottom of the screen indicates which of the past 30 days is being viewed.	
14. Temperature history	For each day, the minimum, average, and maximum recorded temperatures are shown.	

To view details for each temperature excursion, use the backwards and forwards buttons to navigate to the day when the excursion occurred. An extra screen will appear for each excursion that occurred on that day. An excursion that spans multiple days will trigger an alarm for each day.



Alarm History Screen: Shows information about each alarm that occurred over the past 30 days.

15. Check/Alarm icon	The alarm/X icon indicates that an alarm is being viewed.
16. ALARM screen / alarm number	ALARM screens show detail on each temperature alarm. Numbers indicate how many excursions occurred on the day being viewed, and which alarm is currently being viewed. “Alarm 1/2” indicates that two alarms occurred on this

	day and details for the first alarm are currently shown. Press the back and forward buttons to move between alarms.
17. Date	The date currently being viewed. An arrow towards the bottom of the screen indicates which of the past 30 days is being viewed.
18. Start time	The time (in 24-hour format, default time zone is UTC) indicates when the temperature excursion began. Note that the alarm time begins after the temperature excursion time threshold is exceeded – if the high temperature excursion threshold is 10 hours above 8 °C, the alarm will begin 10 hours after the temperature first exceeds 8 °C. Separate alarms occur when an alarm spans multiple days – an alarm that begins at 00:00 is likely a continuation of the same excursion as the previous day.
19. Temperature history	For each alarm, the type of excursion, duration of the excursion (excluding time elapsed while triggering the alarm), and average temperature during the excursion.

After 1 minute of inactivity the display will dim and prepare to go to sleep. Pressing any button during this time will wake up the display without changing the visible screen. After an additional minute of inactivity, the display will turn off, and any button press will bring up the CURRENT screen, or if there is an ongoing alarm, the ACTIVE ALARM screen.

Note: The backlight will only operate when mains power is available and battery is fully charged. During extended power outages the display will still function without backlight.

6.2.3 Alarms

CFD-50 has five kinds of alarms:

1) High temperature excursion (defined by WHO PQS): 10 hours above 8 °C
2) Low temperature excursion (defined by WHO PQS): 1 hour below -0.5 °C
3) Close door: Door open for more than 20 minutes
4) Low holdover: 2 days of holdover remaining unless power is restored
5) No holdover remaining: All ice lining has melted and vaccine chamber is beginning to rise

Local alarm settings cannot be changed by the user.

After an alarm condition is triggered the Active Alarm screen will show, the red LED will blink (on for 1 s, off for 4 s) and the audible buzzer will sound (on for 1 s, off for 4 s). Pressing any button will silence the audible alarm and allow the ACTIVE ALARM screen to go to sleep, but the red LED will continue flashing until the alarm condition has ended.

The Active Alarm screen shows the alarm type and associated information.



Active Alarm Screen: Shows information about a currently ongoing alarm.

20. ACTIVE ALARM screen	ACTIVE ALARM indicates that an alarm is currently ongoing. This screen will continue showing until the alarm condition has ended. Touching any button during an active alarm will silence the audible alarm and allow the display to go to sleep.
21. Alarm type	Text indicates which type of alarm is occurring.
22. Alarm information	For temperature excursions, the duration of the excursion is shown. See troubleshooting guide in Chapter 8 for potential causes of temperature excursions and suggested remedies. For door excursions, the duration of the excursion is shown. If additional time is needed for loading or unloading vaccines, the door timer can be reset by briefly closing the door, or the alarm can be silenced by touching any button of the 30 DTR display. For holdover alarms, “RESTORE POWER” is displayed. A low holdover alarm indicates that the estimated remaining holdover is less than 2 days and the user may need to take action to restore power or find backup cold storage for the vaccine payload. A no holdover alarm indicates that all of the CFD-50’s ice lining has melted and the vaccine chamber is warming up. Power should be immediately restored or vaccines should be removed to backup cold storage.

Pressing the Menu button from the ACTIVE ALARM will show the CURRENT and HISTORY screens and allow normal navigation. After the display turns off due to inactivity, the first button touch will again bring up the active alarm screen.

Alarm Acknowledgement

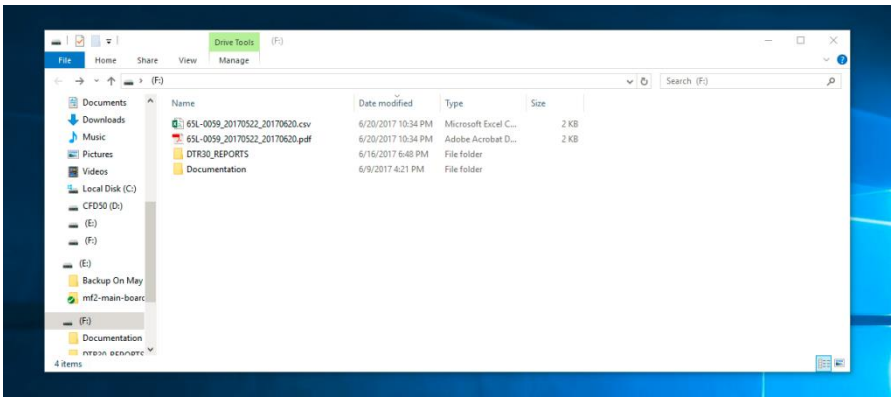
The 30 DTR report shows the time that each temperature excursion begins, ends, and when the alarm was acknowledged. A button press that silences an alarm counts as an acknowledgement. If a high or low temperature excursion alarm occurs, and ends before a buttons is pressed to silence and acknowledge the alarm, the ALARM ENDED screen will show the user which alarms occurred in their absence. The user will be asked to touch any button to acknowledge. Door excursions and holdover alarms do not require acknowledgement after the alarm condition returns to normal. Even if multiple alarms have occurred without being acknowledged, only one ALARM ENDED screen will be shown. Full alarm history can still be viewed through the ALARM HISTORY screens.



Alarm Ended Screen: Displays information about the most recent un-acknowledged temperature alarm.

6.2.4 USB Download and 30 DTR reports

30 DTR reports can be downloaded from the CFD-50 by attaching a micro-USB cable to the outlet to the left of the electronics enclosure and connecting to a laptop computer. The CFD-50 will show up as a mass storage device. In the top directory are .csv and .pdf files showing the temperature and alarm history over the past 30 days. Previous reports are also saved in a history folder. Other folders hold documentation (such as this manual) and 30 DTR reports covering the entire time since the refrigerator was installed.



CFD-50 Mass storage device: contains .pdf and .csv versions of the most recent 30 DTR reports. User manuals and older 30 DTR reports are available in subfolders.

The 30 DTR reports are labeled with the last 7 digits of the unit's manufacturers serial number (also on a label on the back of the unit) and the date range covered in the report.

The root directory contains the following files/folders:

File/folder	Contents
65L_0059_20170522_20170620.pdf	Data in PDF format for the past month
65L_0059_20170522_20170620.csv	Data in csv format for the past month
DTR30_REPORTS	Reports every 30 days in the past
Documentation	Operation Guide

Where 65 is to be replaced by the product's volume, 0059 is to be replaced by product's serial number, and 20170522 with the actual time.

6.2.5 Battery of the 30 DTR and display

The 30 DTR and display are powered by a Li-ion battery installed in the electronics enclosure. A new battery will allow the system to continue to monitor and display temperatures for 1 week without mains power.During longer outages, the battery may drain completely and the 30 DTR display will no longer function until mains power is restored or the battery is replaced. Over time, the battery will degrade and lose capacity and will need to be replaced.Replacement batteries are available from Aucma or service providers; refer to Chapter 11.1 for battery replacement instructions.

6.2.6 Remote Temperature Monitoring System (optional)

CFD-50 is compatible with approved third-party remote temperature monitoring systems that can be connected to the main electronics board at the factory or by a trained technician. If your CFD-50 comes with the remote monitoring option, refer to the third-party documentation. For more information, contact the manufacturer or service provider.

6.3 Use of the Beyond EMS and M2M Power cable

The Beyond EMS consists of BeyondCom Unit（Ice^3）, Powersensor, power module, sensors, etc. Before leaving the factory, all cables connected to Beyond device box will be pre-installed in place and placed inside a wiring box to avoid inadvertent repositioning, damage, or monitoring disruption.

The Power Board of the appliance supplies to the Power module, and the Power module supplies power to Ice3 BCU through a Data line and transmits data simultaneously.

The M2M DC power is controlled by an independent M2M power board, which is powered by the appliance's power board. The M2M power board be located in the power enclosure with the appliance's power board.

6.3.1 Connections



Ch.	Input type	Example
D1	Potential free digital input*	Door contact
D2	Potential free digital input**	Relay contact
①	Temperature probe / Potential free digital input***	NTC temperature probe / Door contact
②	Temperature probe / Potential free digital input***	NTC temperature probe / Door contact
③	Temperature probe / Potential free digital input****	NTC temperature probe / Door contact
④	Temperature probe / Potential free digital input***	NTC temperature probe / Door contact

* Either D1 or 1 can be used

** Either D2 or 2 can be used

*** Both inputs are available with the optional splitter unit (see 'Spare parts andaccessories').

**** D3 is internally used to monitor power supplied to the BCU. Should anexternal digital channel be required, then the BCU hardware will need to bemodified.

USB port:

The USB-C port allows the download of data directly from the Ice3 internal memory. Further details can be found in the next section.

Power module:

It is important that the supply voltage and current is within the specification detailed in this document. Make sure all required connections are made before connecting power.

Connect the power module plugging the one side of the ethernet cable into the Power module, and the other side into the RJ45 plug on the side of the of the BCU.

Plug the kettle plug from the other side of the power module into an AC supply plug (100 – 240 VAC).

How to connect / remove sensors:

All channel input sensors have RJ9 modular plugs (commonly used in old telephones). These can only be inserted in one way. With the clip facing the rear of the unit, push the connector in until you hear a click.

To remove, squeeze the clip towards the cable, and while squeezing pull the cable /connector out:

Connect:



Remove:

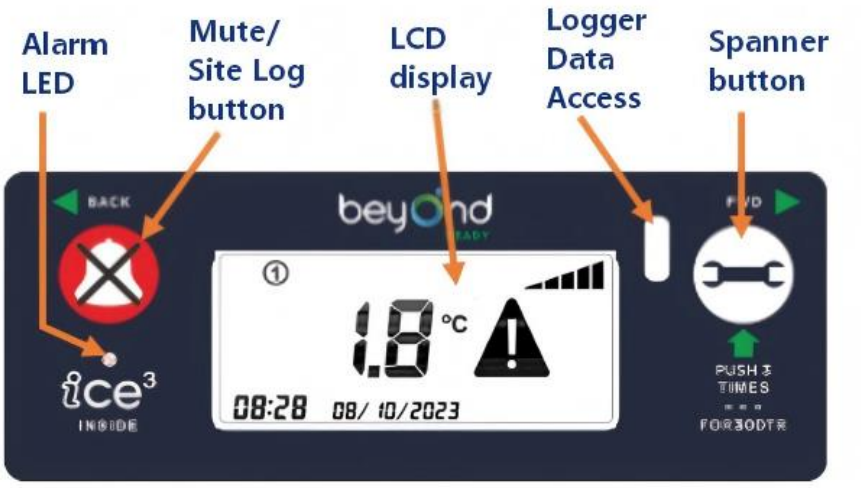


6.3.2 Operating instructions

The following operating instructions pertain solely to the BeyondCom unit hardware. Information regarding the online portal and smartphone application is not included in this document. Certain configurable features are factory-preset prior to delivery and can only be modified via the ColdCloud portal.

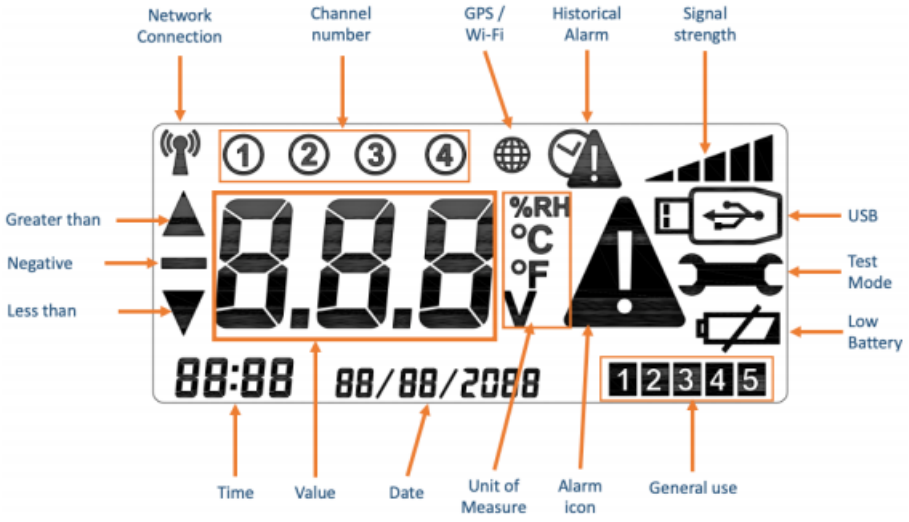
Membrane keypad, USB interface and alarm LED:

There are 2 buttons and a USB interface for downloading data. The Mute button will silence the buzzer for active alarms for the duration set on the ColdCloud portal. It will also log a record as a 'Site Log' proving that someone was at the unit and effectively acknowledged being there. The spanner button has various purposes including 'Test Mode' which is explained below.



LCD Display:

The LCD screen scrolls through different screens, depending on the relevant setup. The following table shows different scenarios with detailed explanations:



Buttons:

FUNCTION	Mute: 	Spanner: 	NOTES:
Buzzer Mute	Push for about 1 second.		• When there is an active alarm and the buzzer is sounding, the Mute function silences the buzzer for the buzzer mute duration. • A site log is created when Mute button is pushed.
Site log	Push for about 1 second.		• If no alarm is active, the unit will record a site log.
Test mode / force upload		Hold for at least 5 seconds (until you hear a beep).	• The spanner icon will display on the LCD to confirm unit is in test mode. • Since this mode forces an upload, the network connection icon will also illuminate.
30 DTR	Requires both buttons. See details below for full operational details.		
Switch unit ON / OFF	Hold both buttons simultaneously for at least 8 seconds.		• When switching on, the greater than and less than arrows will illuminate to indicate the unit is on and booting up. • When switching off, the unit will emit a single beep to confirm the action.
Switch Wi-Fi module on	Push both buttons momentarily and release.		• This function will only be available on units with Wi-Fi capabilities. • A short beep will confirm Wi-Fi has been enabled. • The Wi-Fi will be active for 5 minutes. • The icon flashes to indicate Wi-Fi is active.

Alarms and Mute:

When there is a warning or alarm condition (based on the thresholds setup on the ColdCloud portal), the red LED will flash and the buzzer will sound. The buzzer pattern will be as per the setup on the ColdCloud portal, for which “Disable buzzer” is one of the options.To Mute the buzzer, push the Mute button once. The duration of the Mute will be as per the setup on the ColdCloud portal.When the Mute button is pushed, this will be logged and sent to the ColdCloud portal as an alarm acknowledgement. Should the alarm still be active after the mute duration, the buzzer will resume sounding, unless the mute button is pushed again.

Test Mode:

To test the functionality of the system, it is recommended that alarms are periodically simulated. This is achieved by forcing any of the channels to go into an alarm state by exposing the input to values outside of the alarm threshold values set on the ColdCloud portal e.g. placing a temperature probe into hot water if the alarm is set to activate if temperature goes above say 8°C.When these tests are performed, the system processing the alarm as per the setup BUT data is flagged as being in test mode to highlight that a test was being performed, and that the asset being monitored was not actually in alarm. To activate the Test Mode, push the spanner button for approximately 3 seconds.

The spanner icon will display on the LCD and will remain there for the duration of the Test Mode (which is set on the portal setup for the site. After this duration, the icon will automatically switch off on the display.

6.3.3 30 DTR

The 30DTR feature is a 30-Day Temperature Recorder which allows a user to view historical Min / Max / Ave temperatures and alarms. There are 2 ways to access this information:

Scan QR code:

This provides a chart referred to as a Temperature Monitoring Chart (TMC). The QR code is supplied with the unit, and is also downloadable from the ColdCloud portal.

Most smartphones will automatically open the web link when the QR code is scanned using the camera. If not, a QR scanning app may be required.

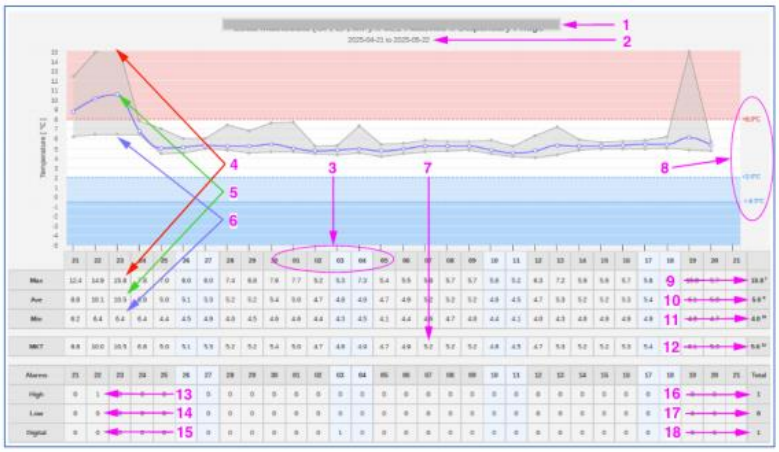
Note:Ensure the serial number on the QR code is the same as that on the BCU.

When this option is selected, a report with the previous 30 days will be downloaded. This includes:

- A graph showing Min/Max/Ave temperatures.
- A table with the same data, along with any alarms that occurred each day.
- Min/Max/Ave and MKT values for the 30-day period.

Note:

- **Only temperature data is available for this report.**
- **If the BCU is configured to monitor multiple assets, a separate chart will be generated for each asset.**



Item	Description
1	Region / Site / Asset name
2	Date range of report
3	Day of month (weekends shaded in light blue)
4	Day Max temperature (highest temperature recorded on that day)
5	Day Average temperature (average temperature for that day)
6	Day Min temperature (lowest temperature recorded on that day)
7	MKT (Mean Kinetic Temperature)
8	Alarm thresholds (as per sensor configuration for the asset)
9	Maximum recorded temperature over 30-day period
10	Average of recorded temperatures over 30-day period
11	Minumum recorded temperature over 30-day period
12	MKT for the month
13	Quantity of High temperature alarms on that day
14	Quantity of Low temperature alarms on that day
15	Quantity of Digital temperature alarms on that day e.g. Door or Power
16	Quantity of High temperature alarms in the 30-day period
17	Quantity of Low temperature alarms in the 30-day period
18	Quantity of Digital temperature alarms in the 30-day period e.g. Door or Power

Read data from LCD screen:

To read this historical temperature data directly from the BCU, an internet connection is not required. Proceed according to the following:

To go into 30DTR mode:

Push spanner button 3 times in succession, a beep will be heard to confirm the unit has successfully acknowledged each button press. The 3-button pushes must be done within 20-seconds. Display shows spanner icon flashing every second to indicate unit is in 30DTR / historical mode.

To exit 30DTR mode:

If no buttons are pressed within 30 seconds, the unit will automatically return to normal mode.

Note:

- **Only once this mode had been exited will the spanner button be available for the normal 'Test mode'.**

Viewing historical data:

To select channel:

Once in 30DTR mode, select channel by pushing the spanner button. The selected channel will be illuminated (not flashing). Press the Mute button to accept your selection.

Note:

- **A number 5 on the bottom right of the screen indicates the built-in ambient temperature sensor (channel A5).**
- **The %RH icon indicates the built-in ambient relative humidity (channel A6).**

To show Previous day(s):

To scroll back through historical data, press the 'Mute/Back' button. Each press moves the display back by one day, up to a maximum of 30 days. Data older than 30 days is not accessible via this method.

To show Next day(s):

To scroll forward through historical data, press the 'Spanner/FWD' button. Each press advances the display by one day. Once the current day is reached, the display will return to the channel selection menu.

Note:

- **The bottom of the display will show Hd:xx where xx is how many days ago you are viewing.**
- **The date will be the specific day that you have navigated to.**

6.3.4 USB port

The USB port facilitates communication with external devices, such as computers, via a USB-C cable. The functionality differs depending on whether the BCU is fitted with an optional Logic board.

For models equipped with the Logic Board:

The Ice3 is recognized as a standard USB Mass Storage device when connected to a computer. To access the USB port, gently remove the protective sticker—applied only to units requiring a higher IP rating—by pulling on the tab that covers the USB port. The sticker must be reapplied after use to maintain the unit's protective rating.The following functionality is available through the USB interface:

- Downloadable 60-day PDF summary report:

Plug one end of the USB-C cable (not supplied) into the USB port, and the other end into a computer. The Ice3 will present itself as a flash drive. Navigate to the root directory from your computer and you will see a PDF file with a 60DTR summary report.

- Historical raw data files:

Up to a year's worth of history is available for active channels in the "DATA HISTORY" folder.

- USB Synchronisation file:

A synchronisation data file can be found in the root folder which will contain the last available data record of certain parameters.

For models without the Logic Board:

Historically logged data from Ice3 (active channels only), can be downloaded onto a computer via a standard USB cable. This requires software available for download on the ColdCloud portal.

The root directory contains the following files/folders:

File/folder	Contents
0123456789_60DTR_SUMMARY_PnDTnHnMnS.pdf	60 day summary report (including temperature, door switch, compressor operation data, etc.)
0123456789_CURRENT_DATA_PnDTnHnMnS.json	The raw data from the past 60 days (in JSON format, compliant with WHO/PQS/E006/DS01 standards).
0123456789_SYNC_PnDTnHnMnS.json	Containing the relative timestamp at time of mount, RTC Wakeup value (RTCW), present door opening data objects
0123456789_DATA_PnDTnHnMnS.json	All historical data

Where 0123456789 is to be replaced by the alphanumeric logger unique identifier, andPnDTnHnMnS is to be replaced by the relative timestamp as of the time of USB mount in ISO 8601 duration format.

6.3.5 M2M interface

The data logger of CFD-50 SDD adopts Beyond EMS, and the BCU has a USB Type-C interface. In addition, there is an M2M power cord arranged near the USB Type-C interface for recording data and interacting with external devices.

The M2M power cord has a quick plug connector, which is plugged into the power board inside the press room at the bottom of the machine. When replacing, unplug the M2M power cord plug from the power board and plug the spare power cord plug into the power board.

The Ice3 has a built in rechargeable Li-Ion battery that will be charged when there is appliance power but will work without appliance power for greater than 2 weeks. In the event the Ice3 internal battery is depleted, the Ice3 can be powered up through the USB-C connection and extarct data.

6.3.5.1 Health and Safety Guidelines

Electrical Safety: Ensure the device is connected to a power supply that complies with local electrical standards. Avoid operating the device in humid environments.

Device Operation: When operating the device, avoid inserting hands or other objects into the device's vents or mechanical components.

Data Access: When connecting external devices (such as laptops or mobile phones) to access logger data, ensure the device is stable and avoid moving it during operation.

6.3.5.2 Basic Operations

Device Startup: Connect the device to the power supply, ensuring the voltage meets the device's requirements. Once powered on, the logger will automatically start recording data.

Data Access:

Use a USB Type-C cable to connect an external device (such as a laptop or mobile phone) to the USB Type-C interface on BCU.

The external device will recognize the logger as a USB Mass Storage device, allowing users to access the data files stored in the logger.

Barrel Power:The M2M barrel power connection plug is for powering monitoring devices and not for the charging of mobile phones or other devices.

NOTE：The barrel-type male plug of power cable is protected by a waterproof cap, which needs to be removed when in use and plugged back in when not in use。

6.3.5.3 Routine Maintenance

The interface has a dust-proof and waterproof design to reduce daily maintenance work, but the following should also be noted.

Cleaning: Regularly clean the interface surface to prevent dust and dirt buildup. Use a soft, dry brush to wipe the interface, avoiding corrosive cleaning agents.

Note：There is a stuttering sensation when inserting the interface correctly.

Inspection: Periodically check the device's power and connection cables to ensure there is no damage or looseness.

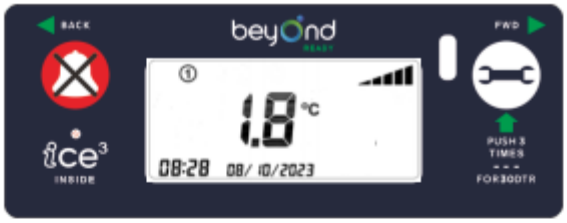
6.3.5.4 Troubleshooting

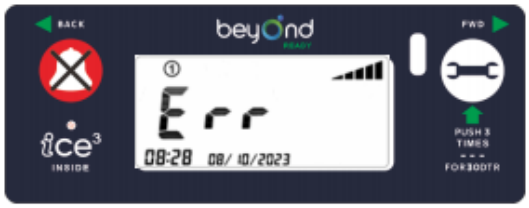
Unable to Access Data: Ensure the external device is properly connected to the M2M interface and check if the USB cable is damaged. If the issue persists, contact technical support.

Abnormal Data Recording: If abnormal data (e.g., inaccurate temperature readings) is found, check if the sensors are functioning properly and contact a technician for replacement if necessary.

6.3.6 Examples of display modes

Note:Not all scenarios are shown and it is possible to have a combination of the below examples.

No.	Display	Meaning
1		Normal operating mode showing current temperature on channel 1. Time: This is the local time based on the timezone set on the ColdCloud portal. Date: This is the local date based on the timezone set on the ColdCloud portal. Signal strength: Full signal (5 bars).
2	 AI识图	Current Alarm on temperature channel 2. The unit is currently uploading to the portal. Red LED is flashing as there is an active alarm.
3		Current Alarm on digital channel D3 (usually power to Ice³) e.g. supply power is OFF.
4		Historical alarm: Unit is no longer in an active alarm state; but a previous alarm on this channel was not acknowledged. Press the **Mute** button to clear the historical alarm indicator and log the event on the portal.

5		Test mode: hold spanner button (for at least 5 seconds) until you hear a beep. **Note**: If a unit is in Test Mode, then ALL channels on the units will be in test mode.
6		Low battery
7		Probe error on channel A1.

6.3.7 List of Error Codes

a. The following is an explanation of the ALRM code:

ALRM Code	Symbol description
HEAT/ HEATACK	Heat alarm/ Confirm
FRZE/ FRZEACK	Freeze alarm/ Confirm
DOOR /DOORACK	Door open alarm/ Confirm
POWR/ POWRACK	Power outage alarm/ Confirm
DCNT /DCNTACK	EMD disconnect alarm/ Confirm

b. See below error codes reported on the 60 day performance report.

Error Code Number	Description
16	Connect to server timeout
17	Failed to connect to IP address
18	Tried to connect to server 3 times without success
19	SIM card not detected
20	SIM card not registered
21	Both SIMs not registered
22	Problem disconnecting from the server
23	Watchdog reset
33	Start/ restart
35	Format EEPROM

36	Brown out restart
38	Power on reset

c. When the temperature sensor experiences an open circuit or a probe error, the code "Err" will be displayed on the screen, as well as in the PDF and JSON files.

6.3.8 Ice3 web server (only available with Logic Board)

The Logic Board includes a built-in Wi-Fi module, enabling the Ice3 to connect to Wi-Fi-enabled devices such as smartphones, computers, and tablets via a web browser. Through its integrated web server, users can access key information including summary KPI (Key Performance Indicator) reports, connectivity status, and battery level. The interface also provides basic configuration options—such as setting the system time and enabling or disabling alarms—and supports firmware updates for the Logic Board.

To access the web server:

- Enable Wi-Fi on the Ice3 by following the button sequence described above.
- On your smartphone, tablet, or computer, open the **Wi-Fi settings** and select the network **ICE3_xxxxx** (where *xxxxx* is the serial number of the Ice³).
- When prompted, enter the password: **Beyond123**.

Note:

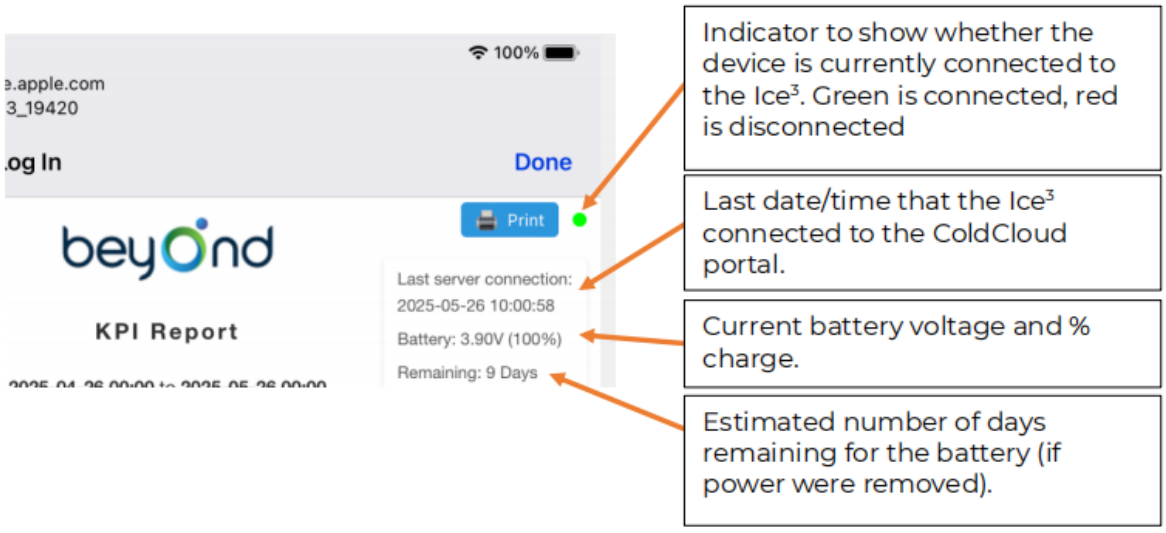
- **You will not be prompted for the password if the device has previously connected to this Ice3 unit.**

- Launch an internet browser. The Ice3 web server interface should automatically open.

Note:

- **Display screens may vary slightly depending on your device.**

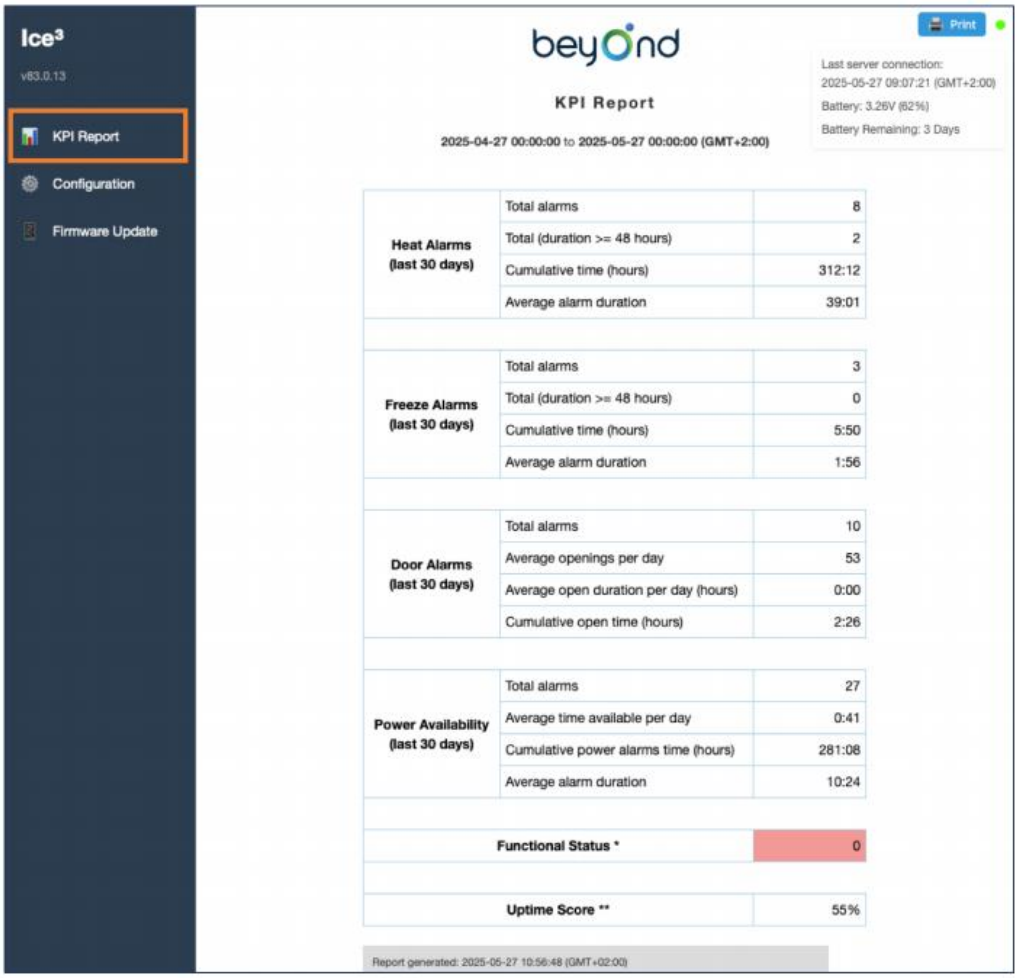
- At the top of the web interface, the following information is displayed:



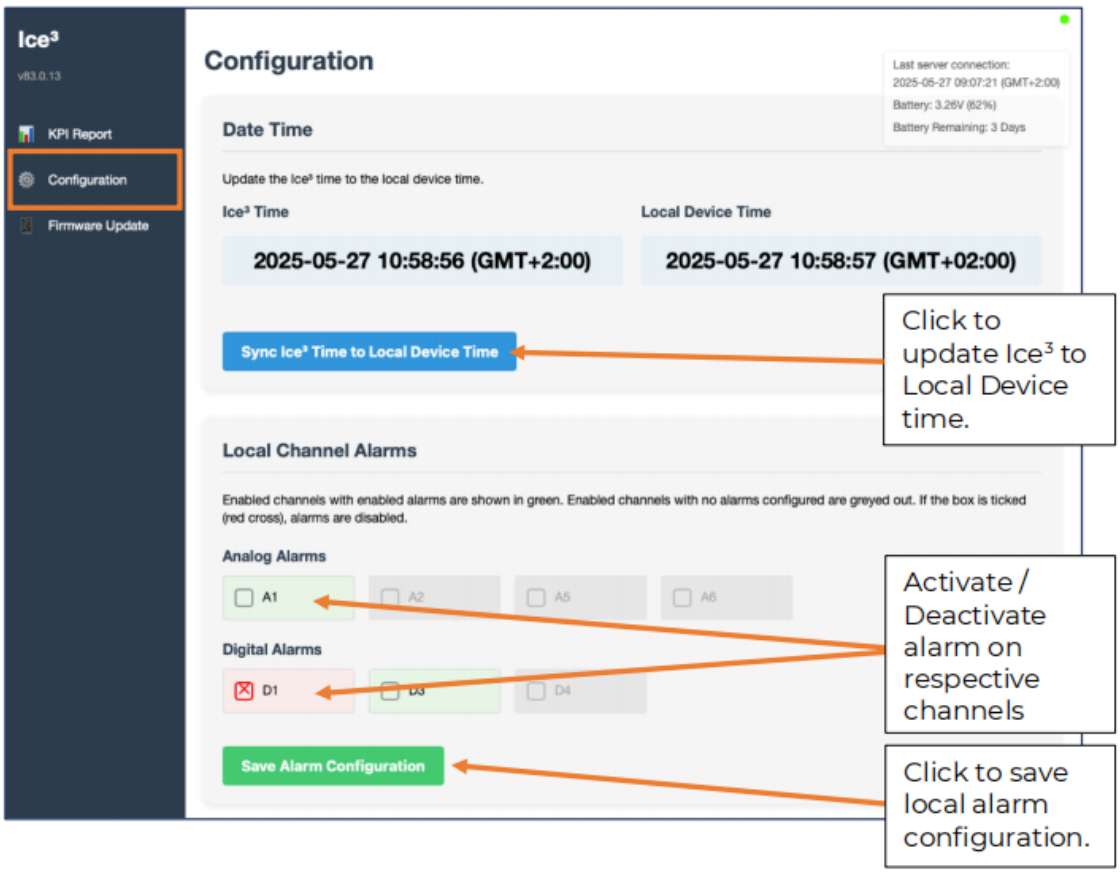
Menu options:

On the left side of the browser page, there are 3 menu items available. Select the menu item by clicking on the respective option:

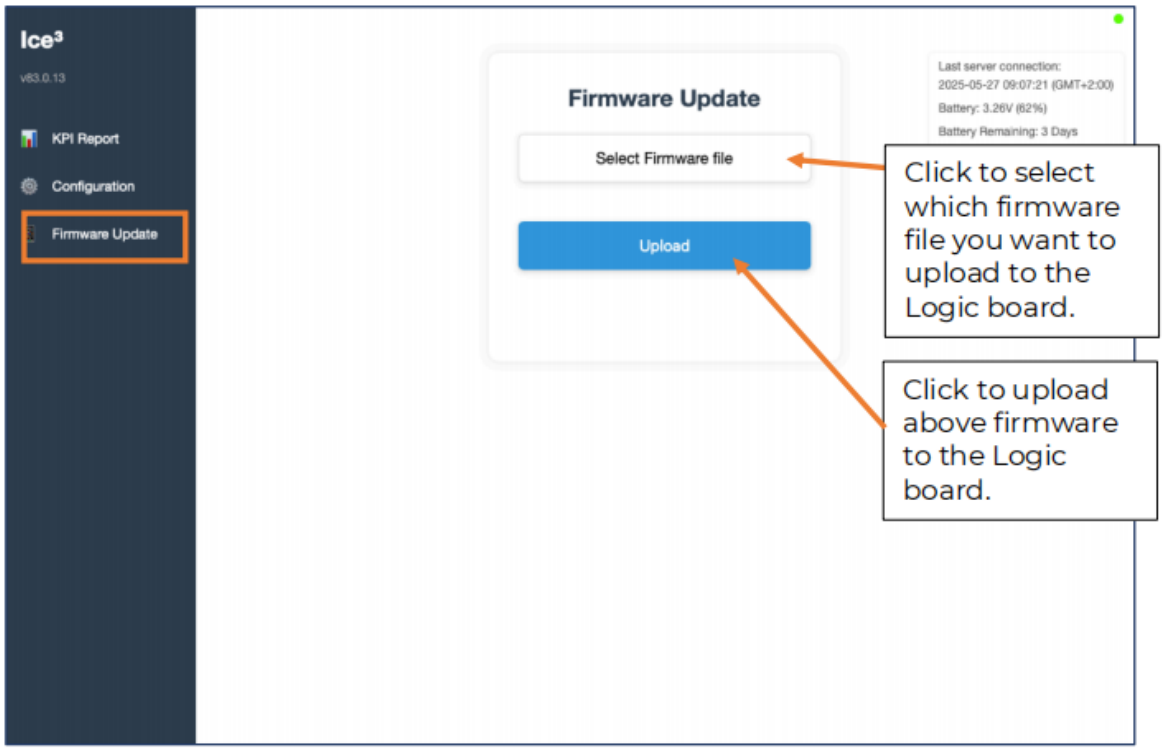
a. KPI (Key Performance Indicator) Report:



b. Configuration:



c. Firmware update:



Note: Users can configure administrative data on-site through the firmware update function, Any firmware file must be provided by the manufacturer. Please do not upgrade it privately unless notified by the manufacturer to upgrade the firmware

Note:If a unit is rebooted, then locally disabled alarms will return to their default setup state i.e. as per ColdCloud initial setup.

Note:For detailed operation, please refer to Technician Manual - Ice3 BC141，or refer to the Beyond Coldcloud Administrator Manual.

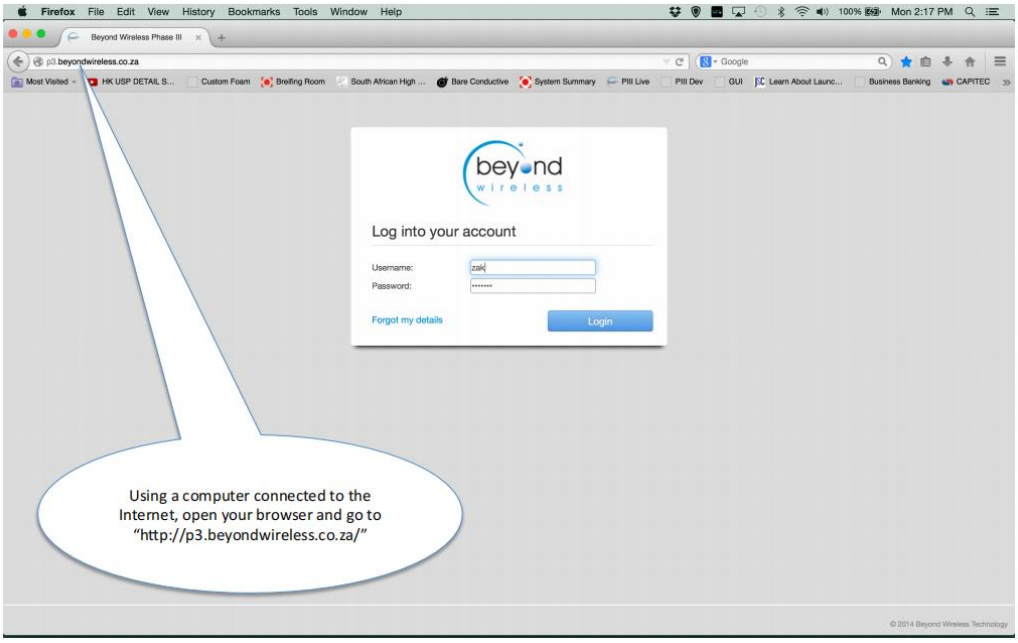
6.3.9 Beyond Coldcloud

Here is only a detailed introduction on how to access your temperature data and alarm data. For other information about Beyond Coldcloud, please refer to the Beyond Coldcloud Administrator Manual.

6.3.8.1 How To Access Your Temperature Data

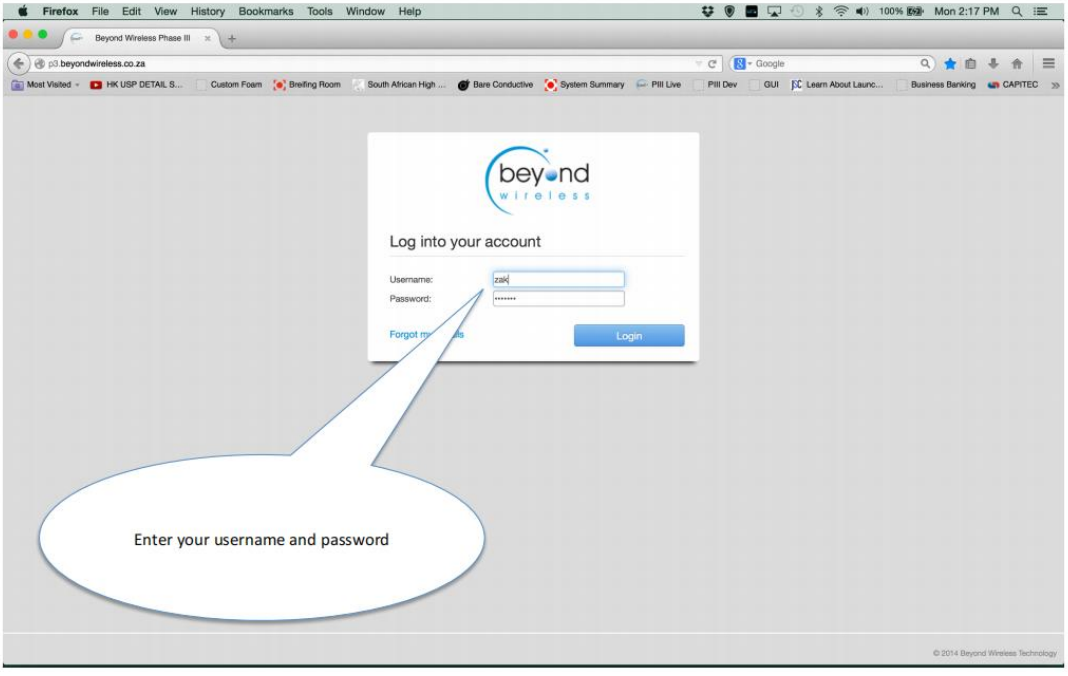
STEP 1:

NB: Portal works best with Google Chrome or Mozilla Firefox!



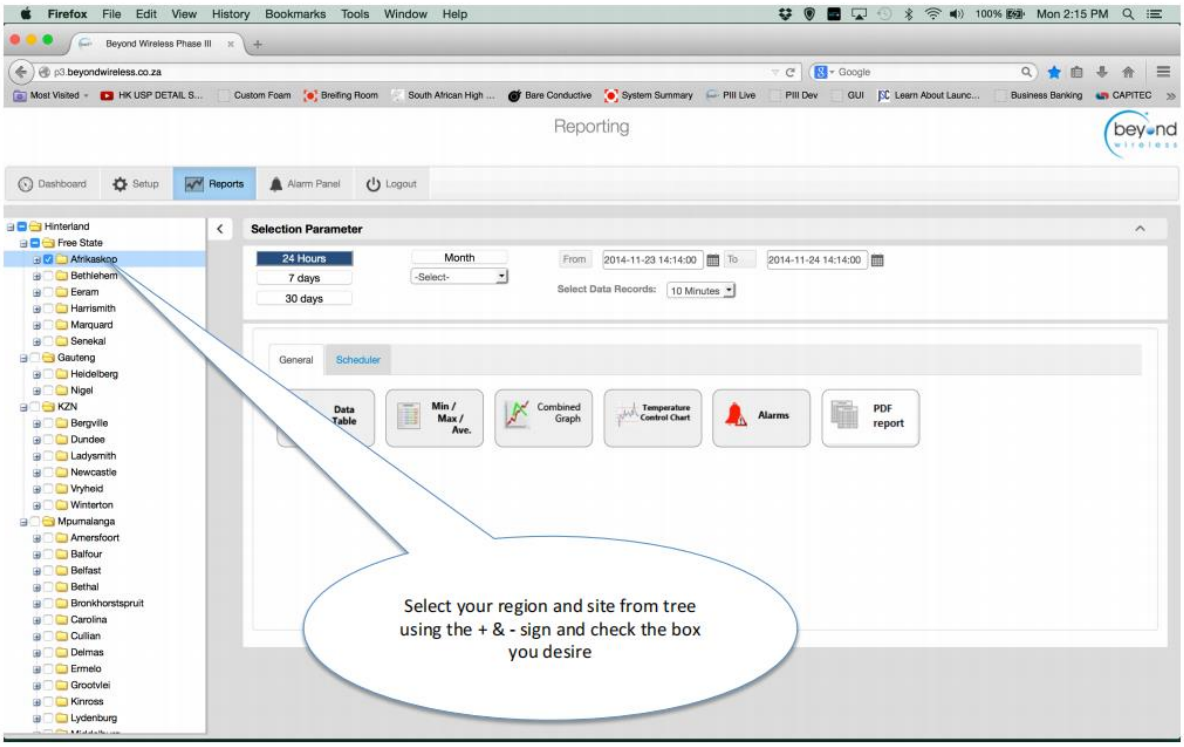
STEP 2:

NB: Portal works best with Google Chrome or Mozilla Firefox!



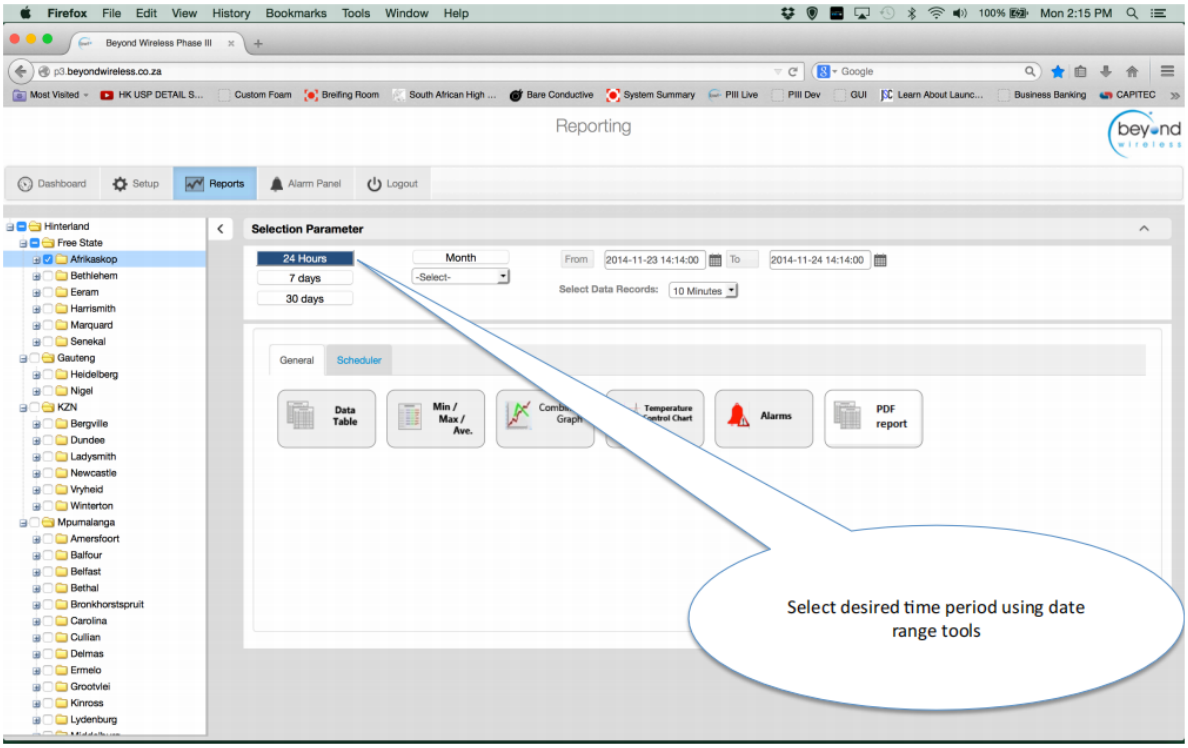
STEP 3:

NB: Portal works best with Google Chrome or Mozilla Firefox!



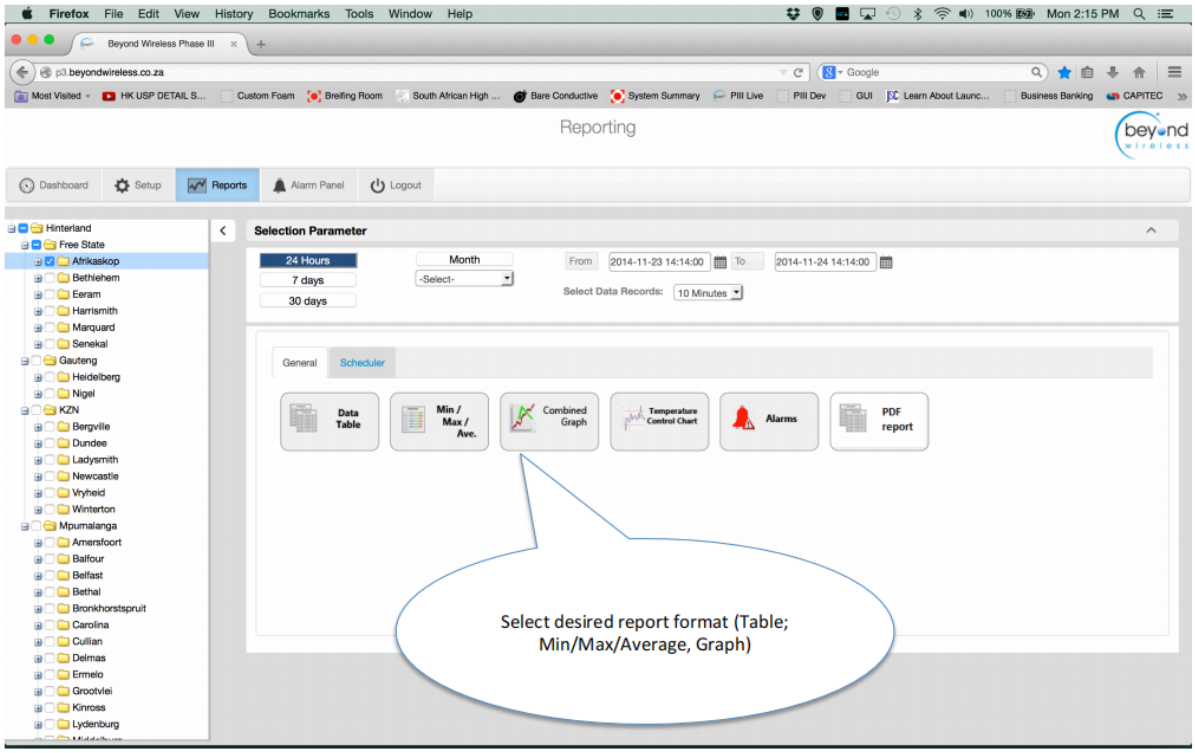
STEP 4:

NB: Portal works best with Google Chrome or Mozilla Firefox!



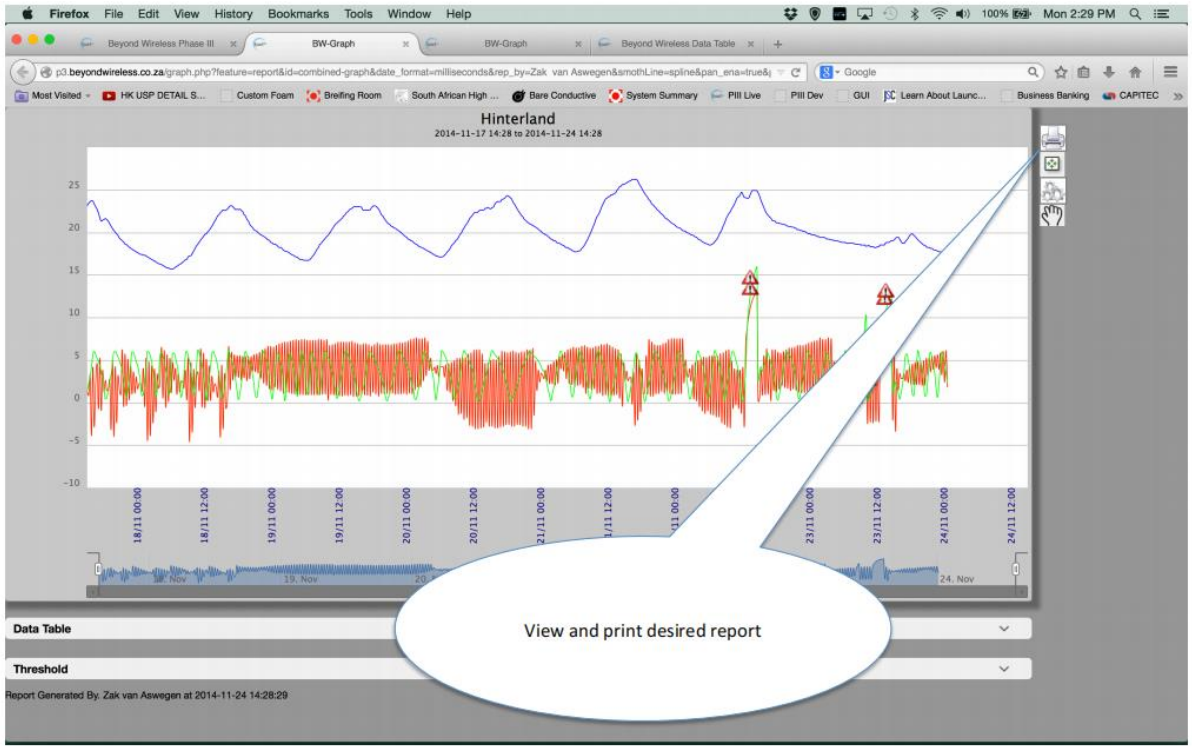
STEP 5:

NB: Portal works best with Google Chrome or Mozilla Firefox!



STEP 6:

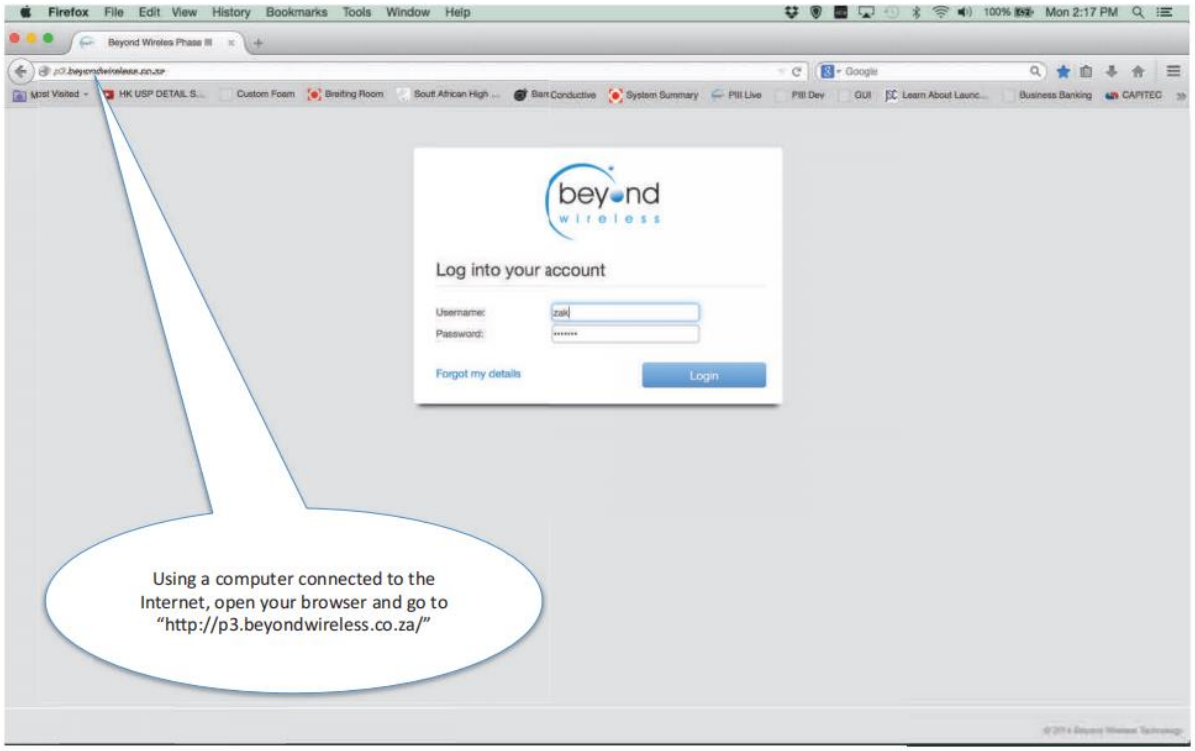
NB: Portal works best with Google Chrome or Mozilla Firefox!



6.3.8.2 How To Access Your Alarm Data

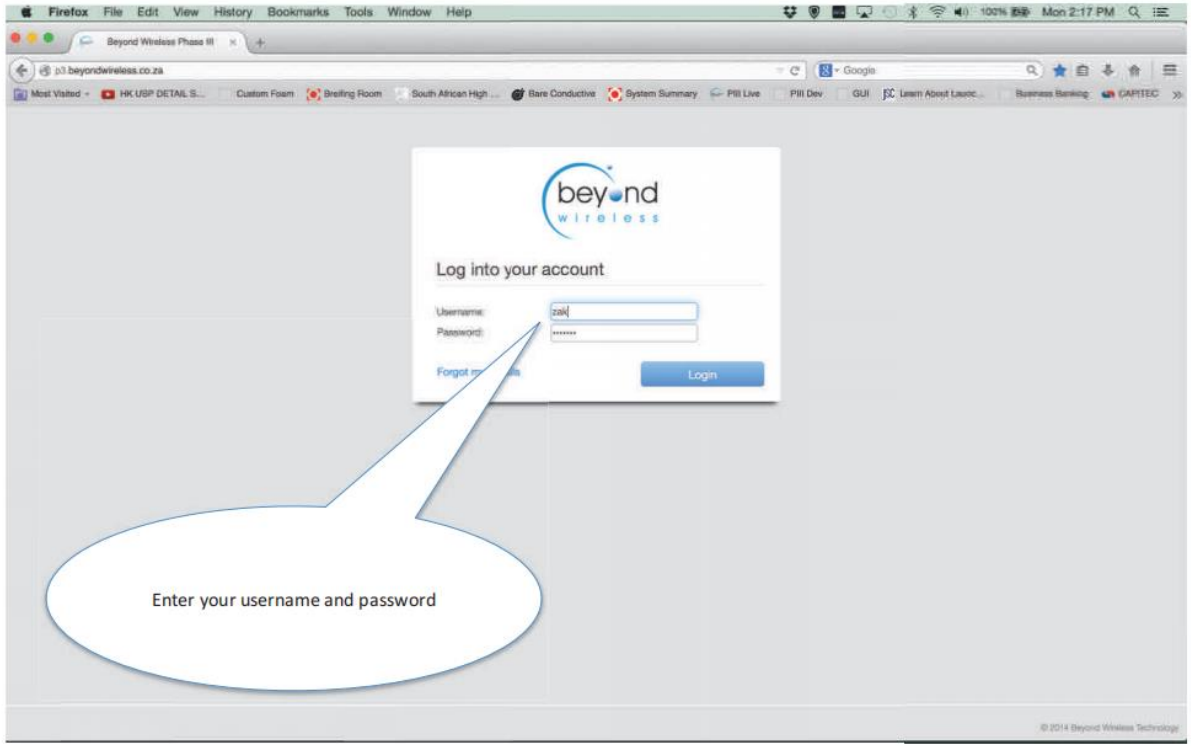
STEP 1:

NB: Portal works best with Google Chrome or Mozilla Firefox!



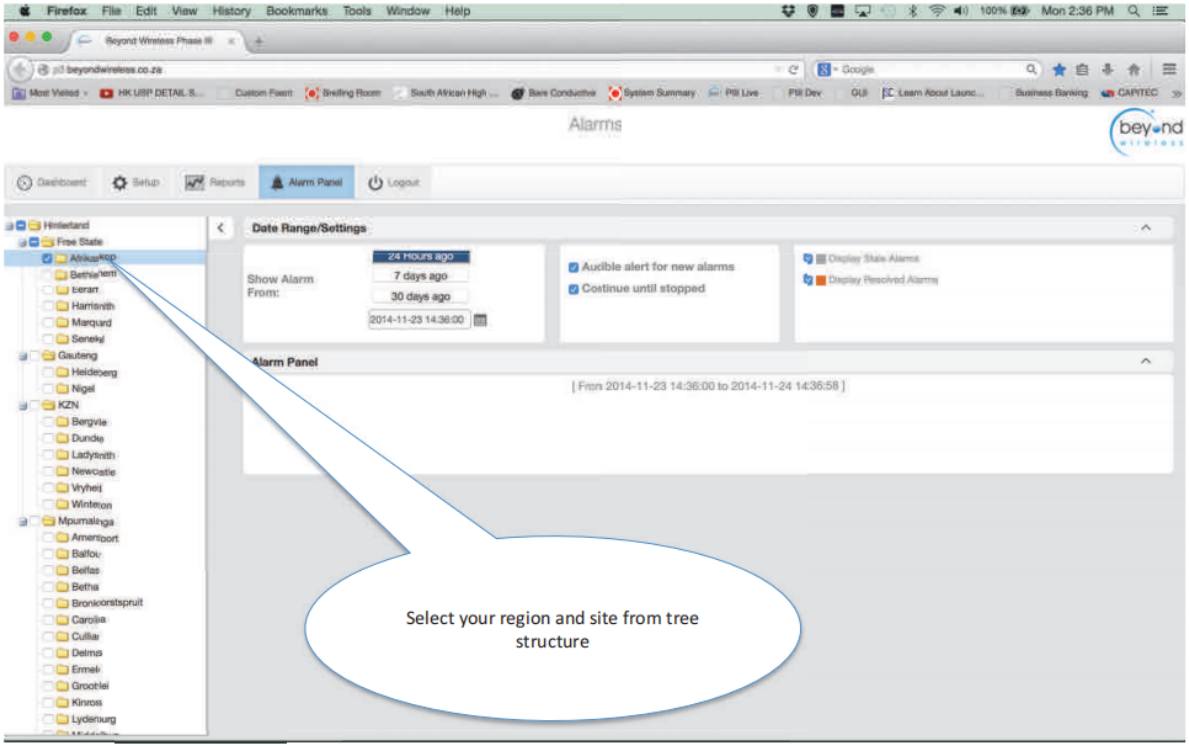
STEP 2:

NB: Portal works best with Google Chrome or Mozilla Firefox!



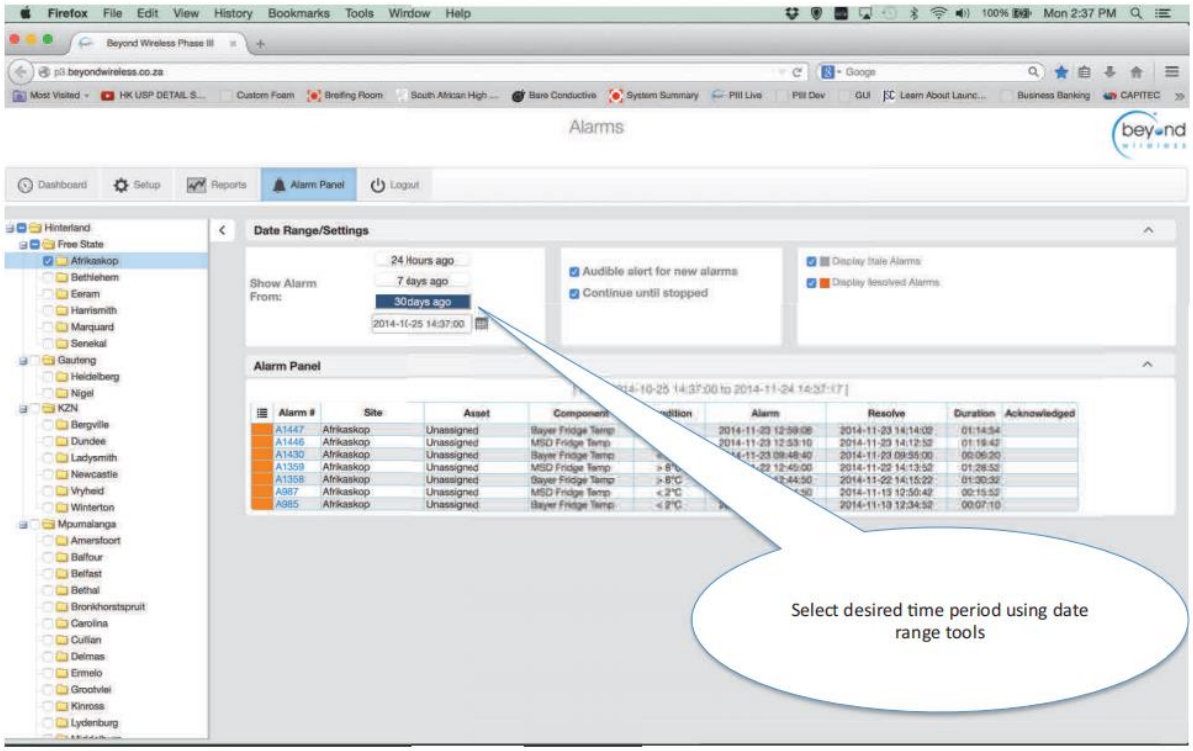
STEP 3:

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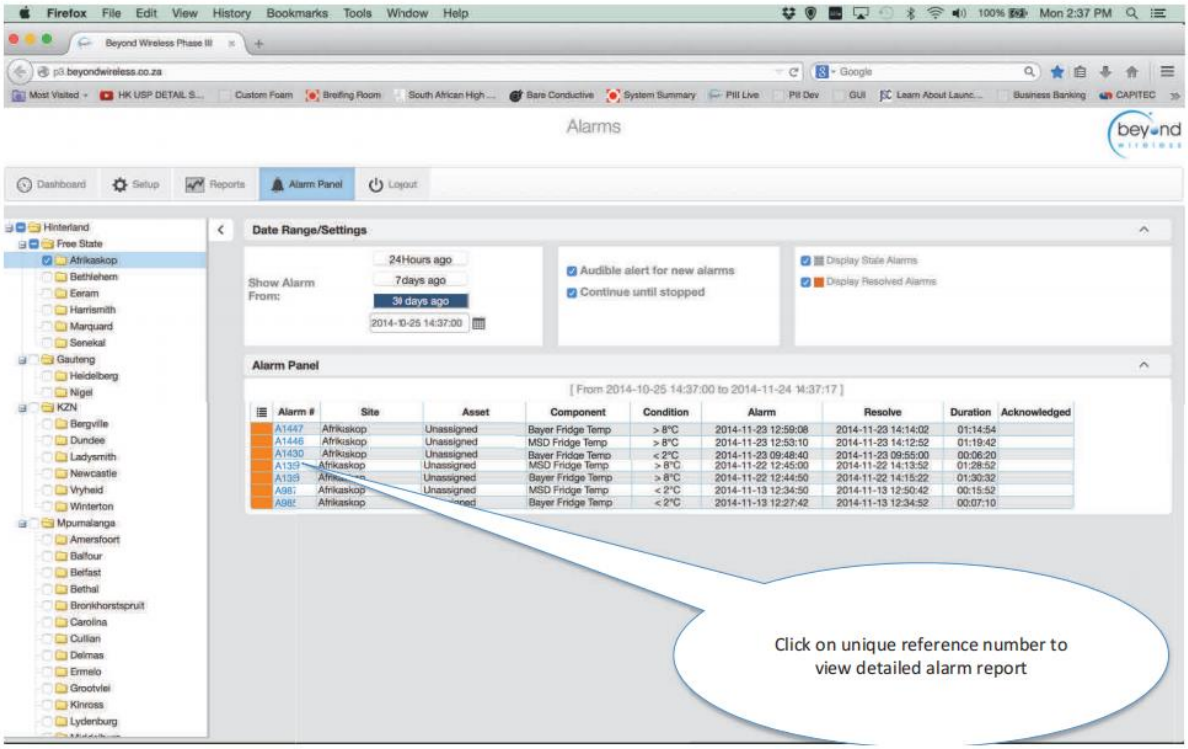
STEP 4:

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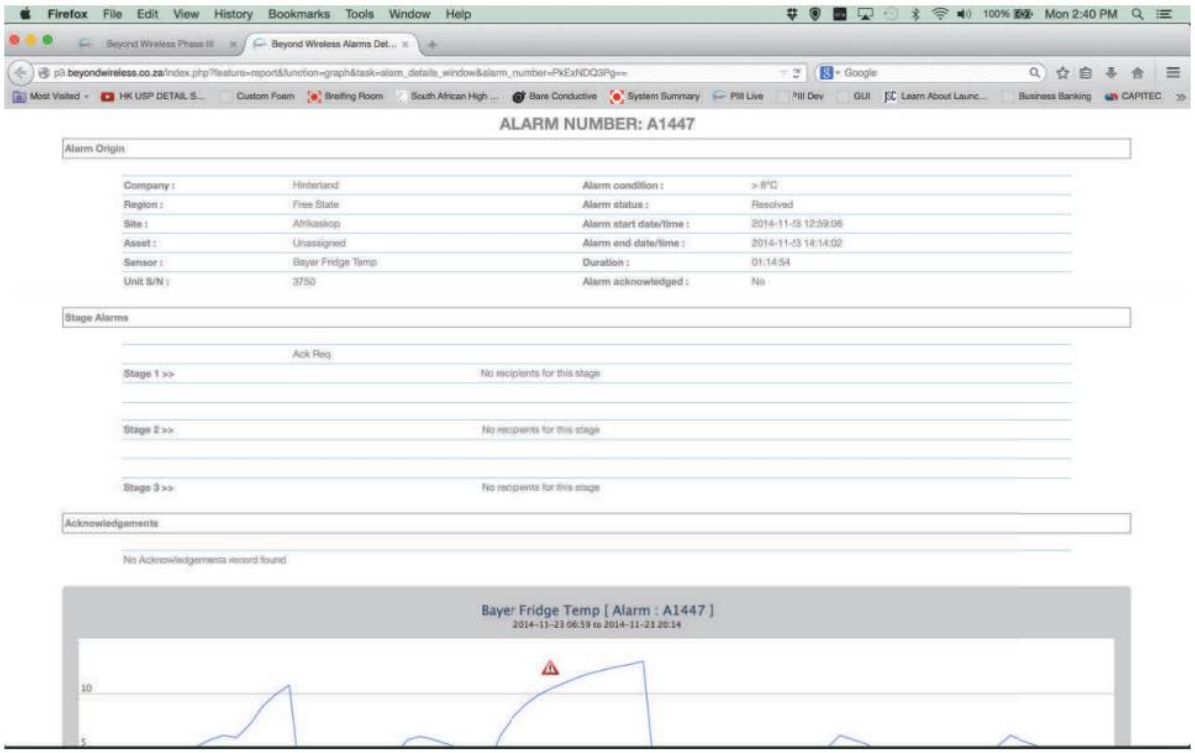
STEP 5:

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STEP 6:

NB: Portal works best with Google Chrome or Mozilla Firefox!



6.3.10 Other

•All spare parts are provided by Aucma. Before the logger recorder leaves the factory, we will reconfigure all administrative information according to the appliance without the need for on-site configuration.

NOTE:If the user needs to configure it themselves, they can refer to the relevant chapters. We do not recommend self-configuration to avoid affecting the normal use of the product. Additionally, the relevant software required for configuration will be provided by Aucma or the local distributor.

•Beyond has passed the WHO prequalification（E006-036e）, As legal manufacturer，AUCMA and Beyond will not share collected datas with any third parties.

•For other instructions or operations related to BCU, please refer to the Technician Manual - Ice3 BC141.

7 Maintenance

7.1 Daily maintenance tasks

- Confirm that the vaccine chamber is within acceptable temperature range (2°C to 8°C) and remaining holdover is at least 2 days. If temperatures are out of range or holdover is low, follow troubleshooting steps in Chapter 8.
- Ensure that door is fully closed and latched. Avoid unnecessary door openings.
- The health worker is responsible for day-to-day maintenance. Their main task is to monitor the CFD-50 MetaFridge temperature for acceptable vaccine storage temperature of +2°C to +8°C. The health worker also will be responsible for keeping the CFD-50 ventilation areas open and clean.

- If the refrigerator is moved they will need to assure the CFD-50 is in a secure, dry, level location out of sunlight and away from rain hazards.
- If equipment problems occur the health worker must know who to contact first (usually a supporting technician with cold chain experience).

7.2 Monthly maintenance tasks

- Wipe down any condensation inside the vaccine chamber
- Remove any surrounding objects around the CFD-50 that might obstruct airflow.
- Clean external condensers at the back of the CFD-50.
- Clean both front and back compressor ventilation covers.
- Clean vaccine chamber door inner and outer gaskets with a soft wet cloth to maintain flexibility and elasticity. Rub the door gasket with talcum powder to prolong its use. Check gaskets for any cracks or gaps that allow airflow through the door. Order spare parts and replace if necessary.

7.3 Annual maintenance tasks

- Inspect water level to ensure that water reaches the bottom of the fill tube; top off with clean drinking water if needed. It is normal for ice to be present in the bottom of the fill tube.
- Look for shading, soiling and damage to the cable. Look for signs of corrosion and clean.
- Check each electrical connection and tighten all grounding parts and tighten mechanical connections.
- Train any new health workers in operations and maintenance and if necessary, retrain veteran health workers.
- See the CFD-50 MetaFridge User Manual for appliance specifics.

7.4 Cautions during maintenance:

- Wipe both inner and outer surfaces using a soft cloth. Do not use any brushes, acidic or alkali detergents.
- In order to avoid water leakage to electric component and damage to the exterior, do not pressure-wash or use any hard scrub to clean the CFD-50.
- Before decommissioning or storing the CFD-50, unplug the unit, drain all water, clean the inside thoroughly, use a dry cloth to wipe the interior and leave the door and top lid open for 2 to 3 days until the inside is completely dry.

7.5 Maintenance for Beyond Com Unit

7.5.1 Cleaning

To clean the BCU, gently wipe the surface with a soft, damp lint free cloth. If required, a small amount of non-abrasive, mild soap solution can be used.

Warning:



- **Do not allow water or any other liquids to get into the equipment.**
- **Ensure mains power is removed before cleaning.**
- **Do not use any chemical detergents, abrasives or other chemical agents to clean the BCU or any peripherals or accessories.**

7.5.2 Preventative maintenance

Weekly checks:

- Check that the BCU is showing readings on its display
- Inspect the BCU for physical damage, and any error indicators
- Inspect the power and sensor cables for physical damage.

Monthly checks:

- Verify data integrity by viewing the LCD screen to see if the values look reasonable, and checking on the portal to see that data is uploading.
- Observe whether the battery indicator is showing 'low battery' and replace the battery if required.
- Check that the unit is clean and dust free. If not, clean with a damp cloth and a mild soap solution if necessary.

7.5.3 Corrective maintenance

The only user serviceable parts are the battery in the Ice3, the fuse in the Power Module, and damaged cables / probes. Any other repairs or damage to the BeyondCom Unit must be done by an authorised supplier.

Battery replacement:

The battery should be replaced if it:

- Discharges rapidly, for example, goes flat within a day of being fully charged.
- Fails to reach full charge within 1–2 days, with sufficient supply power.
- Charges intermittently or not at all, despite a functioning cable and power supply (Power Module or external DC supply).
- Becomes abnormally hot during normal use or while charging.

If battery replacement is required, follow the procedure outlined below:

- Switch the mains power off and unplug the mains kettle plug from the power module.
- Remove the ethernet cable from the BCU by gently squeezing the clip and pulling it straight out.
- Open the back cover by prying open with a flat screwdriver.



- Gently hinge the back cover open, ensuring you don't pull on the looms connecting the PCB on the back cover to the motherboard.
- Cut the cable tie holding the battery with a pair of scissors or wire cutters



- Unplug the battery connector from the PCB on the back cover by firmly pulling on the plug with two fingers. DO NOT pull on the wires.

- Gently pull the battery off the foam and totally remove from the unit.
- Replace the battery with a new one by following the above procedure in reverse.
- Insert a new cable tie under the PCB, and gently hand tighten.
- Replace the back cover and screw the self-tapping screws in.

Warning:

- **Take care to ensure that you don't pierce or damage the battery.**
- **Only use a battery supllied by Beyond or one of their designated agents.**
- **Do not over tighten the cable tie as this could be a safety risk if the battery does not have sufficient space for expansion.**
- **Do not over tighten the screws. Dispose of the battery in accordance with the 'Disposal' details in this manual.**

Fuse replacement (Power Module):

Should the fuse blow and need replacement, follow the steps below:

- Switch the mains power off and unplug the mains kettle plug from the power module.
- Remove the ethernet cable from the BCU by gently squeezing the clip and pulling it straight out.
- Unscrew the screws on either side of the Power Module.
- Open the back cover by prying open with your fingernail and pull the pieces apart.
- Gently pull the fuse cover and remove the fuse by twisting sideways (see below), and replace the fuse with the type and rating of fuse specified in the Technical Specification of this manual. It is recommended that you check the new fuse is not blown before use, by checking for continuity using a multi-meter.





- Replace the back cover and screw the screws back in.
- Reconnect the ethernet cable and power cord, switch the mains on, and verify that the power modules power LED is ON.

Damaged probe / cables:

- If the sensors are damaged, these will need to be replaced and cannot be repaired. Cables may be able to be repaired by a technician who has been specifically trained.
- To remove a sensor, unplug the RJ plug at the bottom of the unit by squeezing the tab and gently pulling downwards (see Connections section).
- The plugs on cable extensions can be disconnected in the same way.
- To re-install, push the cable back into the unit until you hear a click.
  (Similarly for extensions).

Note:

- **The removal and reinstallation of sensors and cables may not be covered in this manual, as the routing and method used depend on the specific equipment being monitored.**

Resetting the unit:

- To reset the unit, it needs to be switched off and then back on. To switch off, press and hold the Mute and Spanner buttons at the same time for 10 seconds. Once the unit is switched off, the LCD display will be blank. To switch the unit on, press and hold the Mute and Spanner buttons at the same time for 10 seconds. The LCD display will go on, and once successfully connected to the portal, the date / time on the bottom left of the display will be correct (as per the time zone setup on the portal).

Note:

- **The setup of the time zone that the unit operates in is done on the ColdCloud portal. The correct date and time will only display on the unit following successful communication with the portal.**

Firmware updates:

- Firmware updates are done remotely and can only be done by Beyond or one of their designated suppliers.
- If you suspect that your unit is not working properly, please contact Beyond support, or your account manager or sales representative to assess.

8 Safety Precautions

a. Plug the CFD-50 into a standard electrical socket; appliance is rated for use with either 110-120 V or 220-240 V, 50 or 60 Hz.
b. Use reliable grounding that is tied to the earth; not connected to any grid, heating pipe, gas pipe, etc..
c. Hold the plug firmly and pull to disconnect power. Do NOT pull on the cord to disconnect power.
d. For safety reasons, conduct any repair work by unplugging the unit before starting the work.
e. Do not use wet cloth to wipe any electrical parts.
f. Do not place or operate the CFD-50 near any inflammable, explosive, corrosive materials, any volatile gases, liquids, and any inflammable gases.
g. Do not touch any electrical components (such as plugs, switches, etc.) with wet hands in order to avoid electric shock.
h. Do not damage or break the power cord and power plug or use a plug with a loose cord, in order to prevent fire and electric shock. Replace any damaged power-supply cords or plugs immediately by qualified maintenance personnel.
i. Do not place any water containers or heavy objects on the top of the CFD-50 to avoid any damage to the top, any injury due to falling objects, or any electric leakage or electric shock due to splashing water on any electric components.
j. Do not climb onto or lean on the CFD-50, which may cause injury due to tilting or falling of unit.
k. Do not touch the compressor when the CFD-50 is plugged in to avoid being burned or injured.
l. Do not allow children to play in inside of the CFD-50, which may cause damage or injury.
m. Remove the door when the CFD-50 is no longer in use so children cannot be trapped inside.

9 Electronics System

A block diagram of the CFD-50 electronics is shown in the figure below. There are two primary circuit boards:

1) the Main Board, located in the electronics compartment, that measures, records, and displays temperatures and other refrigerator information, controls the compressor, and can connect to the optional telemetry module.

2) the Power Board, located in the power enclosure under the vaccine chamber, that protects the CFD-50 from over and undervoltage events, stabilizes the compressor voltage using the attached transformer, produces DC power to power the rest of the system, and switches power to the fan and compressor under command from the control board. The Power Board also monitors incoming mains power and sends that data to the DAQ processor.

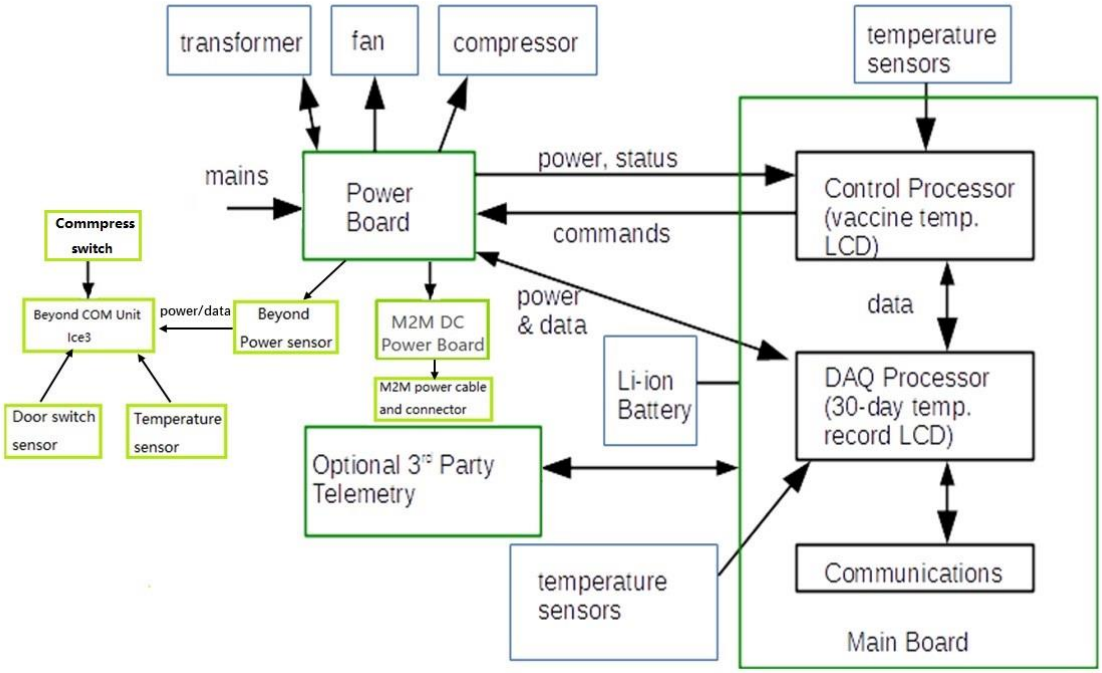
The optional telemetry module can connect to the main board and transmit data and alarms to a third-party remote monitoring service.

3) The M2M DC power is controlled by an independent M2M power board, which is powered by the appliance's power board. The M2M power board be located in the power enclosure with the appliance's power board.

4) The hardware of Beyond EMS consists of the device box(Ice3 BCU), Power module, and related cables. The Power Board of the appliance supplies to the Power module, and the Power module supplies power to Ice3 BCU through a Data line and transmits data simultaneously.

The system is designed to operate normally without the data collection portion, therefore only the control processor and power boards are essential. The Li-ion battery is also not essential for refrigerator operation.

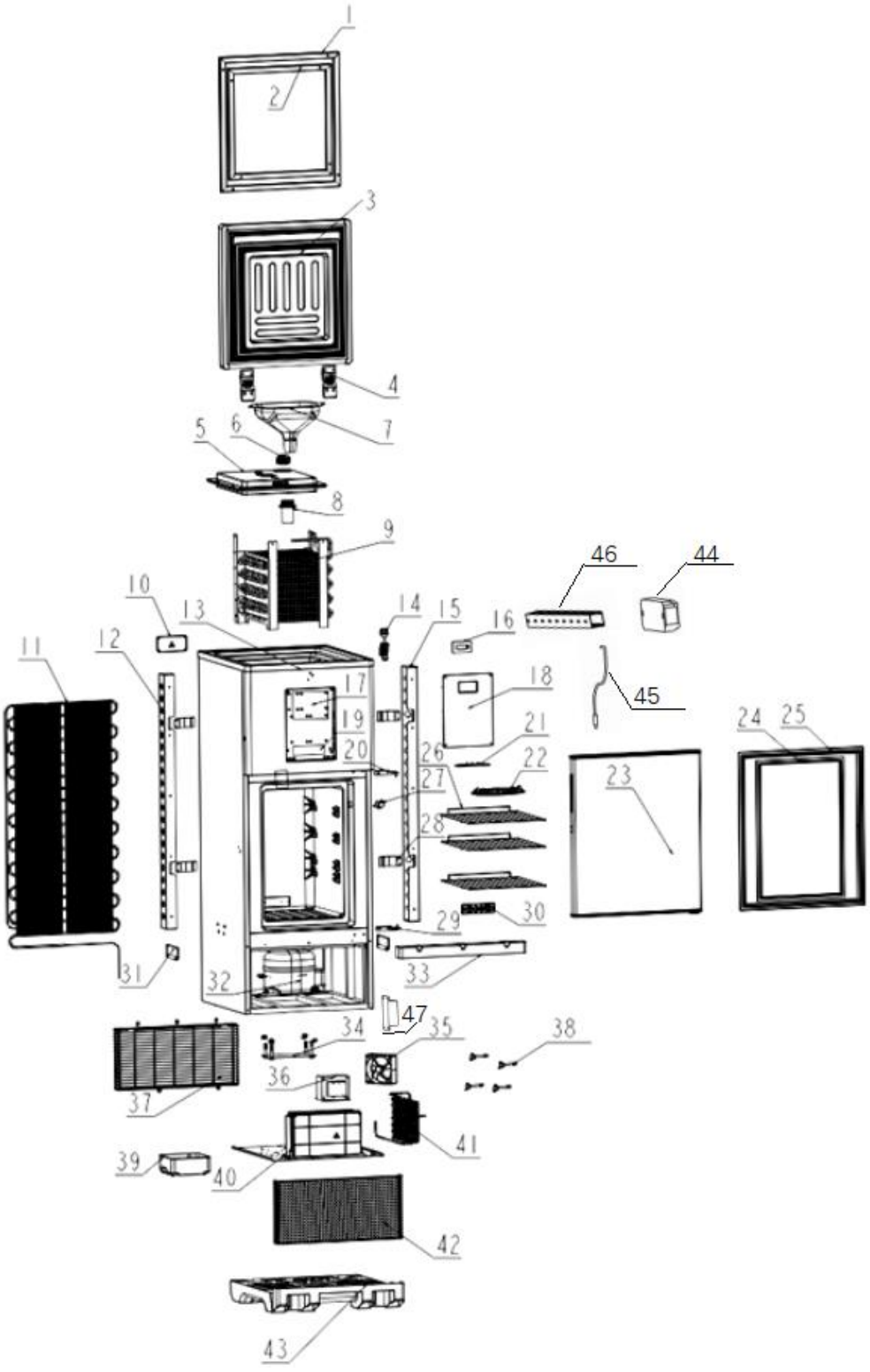
The M2M DC power is controlled by an independent M2M power board, which is powered by the appliance's power board.



System diagram of CFD-50 electronics.

10 CFD-50 Parts and equipment list

10.1 CFD-50 MetaFridge vaccine refrigerator



Item	Component	Item	Component	Item	Component
1	Water tank lid outer gasket	23	Vaccine chamber door	45	M2M power cable(part no. 3000000419)
2	Water tank lid inner gasket	24	Vaccine chamber door inner gasket	46	wiring box(part no. 3000001247)
3	Water tank lid	25	Vaccine chamber door outer gasket	47	DC power board(part no. 3000001247)
4	Water tank lid hinge (x2)	26	Vaccine chamber shelving (x3)	/	Beyond sensor Door contact_4P4C(part no. 3000007454)
5	Water tank inner lid	27	Door sensor/light switch	/	Beyond temperature contact_4P4C(part no. 3000000574)
6	Water tank plug	28	External condenser bracket (x4)	/	Beyond Data line(part no. 8000002541)
7	Funnel (accessory)	29	Vaccine chamber door hinge - bottom	/	Beyond compresspr switch line (part no. 8000002559)
8	Water tank inner lid fill tube	30	Vaccine chamber sensor cover - bottom		
9	Evaporator	31	Cabinet handle (x2)		
10	Safety shut-off mechanical thermostat cover	32	Compressor (part no. 3000000353)		
11	External condenser set	33	Compressor ventilation cover trim – front		
12	External condenser guard – left	34	Compressor screws assembly		
13	Main refrigerator cabinet	35	DC fan (part no. 3000001115)		
14	Water tank latch	36	Transformer (part no. 3006000339)		
15	External condenser guard - right	37	Compressor ventilation cover – back		
16	Temperature display cover	38	DC fan hand screws		
17	Control board	39	Condensation catch tray		
18	Electronics enclosure cover	40	Power enclosure		
19	System battery	41	Bottom external condenser		
20	Vaccine chamber door hinge - top	42	Compressor ventilation cover – front		
21	Vaccine chamber temperature sensor cover - top	43	Integrated plastic base		
22	Vaccine chamber light cover	44	Beyond Com Unit (BCU) /Ice3(part no. 3000004417)		

10.2 User Ordering Instructions for Spare Parts

To ensure the long-term maintainability of the CFD-50 throughout its lifecycle, AUCMA allows users with basic operational skills or on-site technicians to order and replace designated spare parts as needed. Strictly adhere to the following instructions.

10.4.1 Pre-Order Confirmation

1. **Fault Confirmation**: Users are advised to first perform preliminary diagnostics by referring to Chapter 12, Troubleshooting, to confirm that the symptom corresponds to the function of the intended spare part.
2. **Part Number Verification**: Please use the complete part number listed in the "Part numbers" field in the Chapter 10.1 spare parts number table when ordering. This prevents mismatches caused by incorrect model selection.
3. **Version Compatibility**: When replacing electronic components (e.g., thermostat, logger, external display screen), verify the hardware and software version compatibility between the current device and the spare part. If in doubt, contact technical support for confirmation.

10.4.2 Ordering Process

1. **Ordering Channels**:
    - Authorized Aucma distributors.
    - Aucma Biomedical Global Service Hotline: +86-532-86763602.
    - Official website spare parts ordering platform: http://www.aucmamedicalglobal.com.
2. **Order Information Submission**:
    - Provide the device model (CFD-50) and its serial number (SN).
    - Provide the complete part number (Part No.) and quantity of the required spare part(s).
    - Provide the shipping address, contact person, and contact information.

10.4.3 Spare Parts Receiving and Storage Recommendations

- **Inspection upon Receipt**: Upon receiving the spare part(s), inspect the packaging for integrity, verify the model number is correct, and check for any visible transport damage. If any anomalies are found, contact the supplier within 48 hours of receipt.
- **Storage Conditions**: Spare parts not installed immediately should be stored in a dry, cool environment, free from corrosive gases, and protected from high temperatures, humidity, or direct sunlight.
- **Electrostatic Sensitive Devices**: For circuit board components (e.g., power control board, logger), store them in anti-static packaging. Wear an anti-static wrist strap when handling.

11 Replacement Parts Installation Guide

If the CFD-50 is not working properly, you may contact your local service provider (information written on the front of the unit) for assistance, or follow steps in the troubleshooting guide. If needed, replacement parts can be obtained from the local service provider or Aucma. Follow replacement instructions below:

11.1 Battery Replacement

The system battery will degrade over time, especially if there are frequent extended power outages. When the battery capacity has dropped to 50% the 'replace battery' icon will appear at the top right of the 30 DTR display.

It is preferable to replace the battery while the CFD-50 is on mains power, if possible.
To replace the battery, unplug the battery connector from the main board. The battery is attached in the electronics enclosure with a strong double-sided tape that can be slowly peeled off by pulling down on the battery.

⚠ Do not attempt to pry off the battery or use any sharp tools. The battery may be flammable if punctured.

⚠ The battery should be unplugged for at least 30 seconds before plugging in the new battery.

11.2 Main Board Replacement

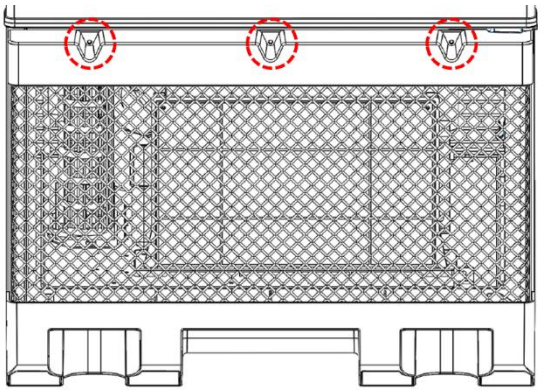
Step 1: Unplug CFD-50
Step 2: Remove 8 screws on the electronics enclosure to remove the enclosure lid and set aside
Step 3: Unplug the system battery
Step 4: Unscrew the old main board and telemetry module, if present
Step 5: Remove all of the connectors from the main board
Step 6: Plug connectors into the new main board, except for the telemetry module and battery
Step 7: Screw the new main board back into the enclosure. Make sure a coin cell battery is installed in the main board.
Step 8: Connect the telemetry module and battery, and screw in the telemetry module
Step 9: Plug the CFD-50 back into mains power

11.3 Power board replacement

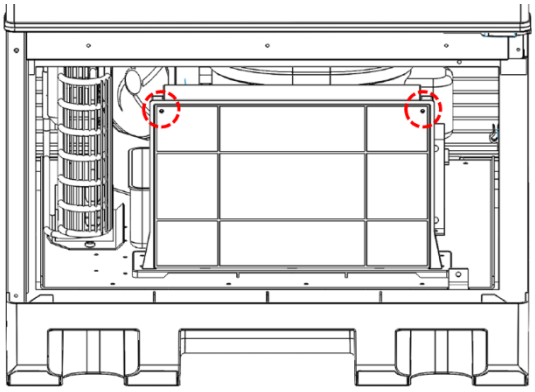
> ⚠ Always unplug the CFD-50 before opening the power enclosure to avoid electrical shock

Step 1: Unplug CFD-50

Step 2: Remove 3 screws on the compressor front ventilation cover trim and remove front ventilation cover



Step 3: Remove 2 screws on power board enclosure cover and remove the cover



Step 4: Disconnect all connectors on power board and remove the power board

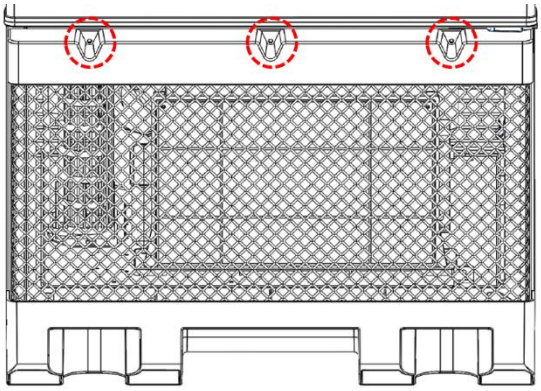
Step 5: Install new power board and reconnect all connectors

Step 6: Replace power board enclosure cover and front ventilation cover and trim

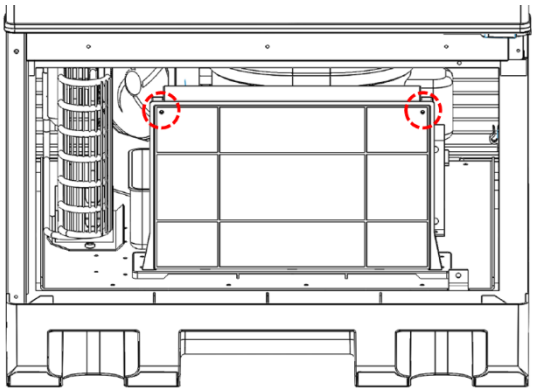
11.4 Transformer replacement

Step 1: Unplug CFD-50

Step 2: Remove 3 screws on the compressor front ventilation cover trim and remove front ventilation cover

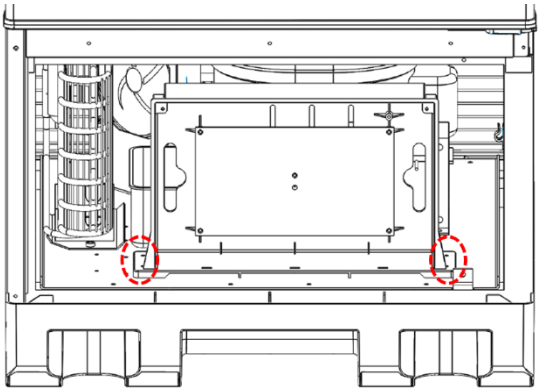


Step 3: Remove 2 screws on power board enclosure cover and remove the cover



Step 4: Disconnect “Voltage Stabilizer” connectors (#4 and #5 on the power board diagram) on the power board

Step 5: Remove 4 screws on power board enclosure and move the enclosure aside to access transformer



Step 6: Remove and replace transformer by removing 4 screws around the transformer base

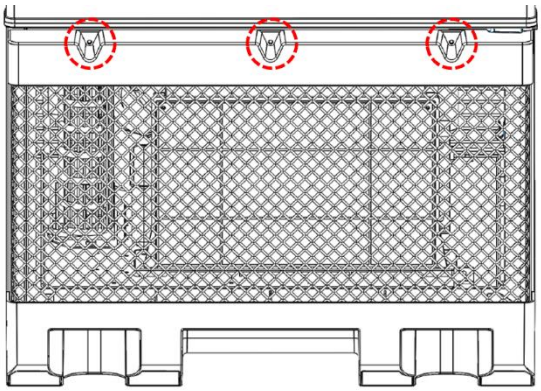
Step 7: Reconnect the “Transformer” connector on the power board (with the newly installed transformer) and replace power board enclosure cover

Step 8: Replace front ventilation cover and trim

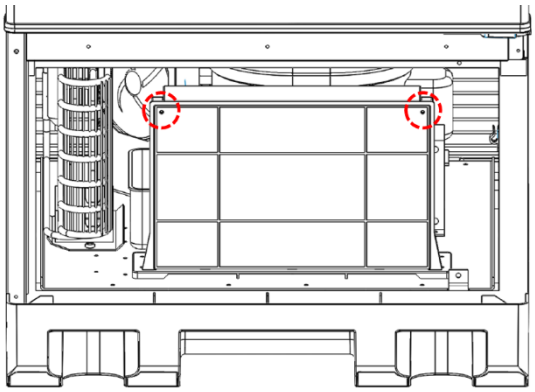
11.5 Fan replacement

Step 1: Unplug CFD-50

Step 2: Remove 3 screws on the compressor front ventilation cover trim and remove front ventilation cover

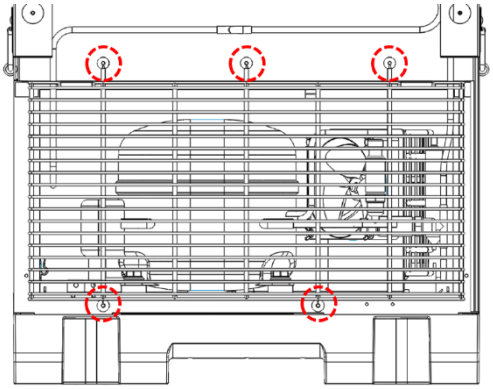


Step 3: Remove 2 screws on power board enclosure cover and remove the cover

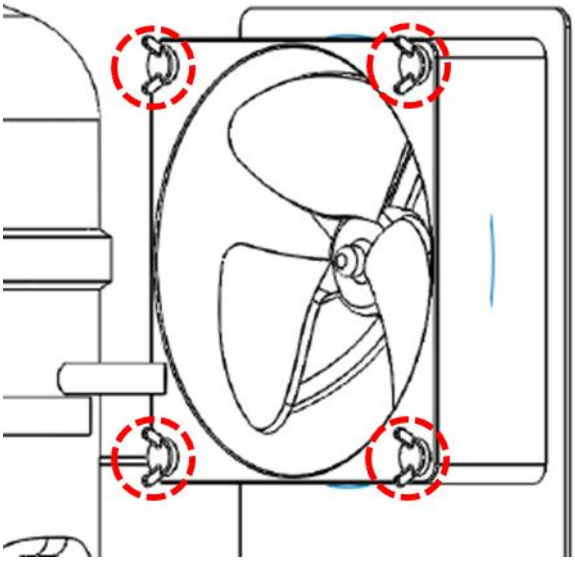


Step 4: Disconnect “Fan” connector (#7 on the power board diagram) on the power board

Step 5: Remove 5 screw on the back compressor ventilation cover to remove the cover



Step 6: Remove and replace the fan by removing 4 wingnuts around the fan



Step 7: Reconnect the “Fan” connector on the power board (with the newly installed fan) and replace the power board enclosure cover

Step 8: Replace front and back ventilation covers and trim

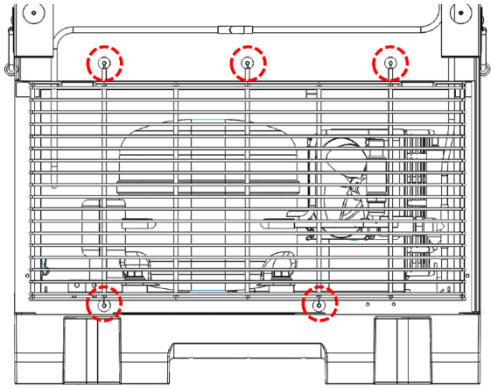
11.6 Compressor replacement

⚠ Refrigeration system work can only be performed by properly trained technicians with proper tools.

⚠ Follow all applicable laws regarding refrigerant recovery and disposal.

Step 1: Unplug CFD-50

Step 2: Remove 5 screw on the back compressor ventilation cover to remove the cover



Step 3: Remove fasteners holding the temperature sensor to the discharge line and move the sensor away from the tubing to avoid damage while working and brazing

Step 4: Remove start components and wiring from the left side of the compressor.

Step 5: Remove nuts holding compressor down onto the compressor mounting bolts.

Step 6: Remove refrigerant from system, disconnect compressor from tubing, and lift compressor off of bolts to remove from the compressor compartment. Follow all applicable laws regarding refrigerant recovery and disposal.

Step 7: Lower new compressor onto mounting bolts and tighten.

Step 8: Evacuate the system and recharge system using the type and amount of refrigerant indicated on the manufacturer's label on the back of the CFD-50.

Step 9: Replace the start components on the compressor.

Step 10: Replace the temperature sensor on the discharge line adjacent to the compressor and fasten in place securely

Step 11: Plug in the unit and make sure compressor starts

Step 12: Replace back ventilation cover

11.7 Beyond EMS and M2M power cord replacement

11.7.1 M2M power cord replacement

Step 1: The M2M power cord comes out of the cable tray, first open the cover of the cable tray.

Step 2: Remove the M2M power cord from the cable tray.

Step 3: Remove the zip ties that secure the M2M power cord to the external condenser guards.

Step 4: Slowly find the other end of the line along the M2M power cord,the other end of the M2M power cord has a quick connect plug.

Step 5: Remove the quick connect plug from the power board in the compressor compartment at the bottom of the refrigerator.

Step 6: Remove the new M2M power cord and insert the quick connect plug into the previous power board socket.

Step 7: The M2M power cord barrel plug extends from the back of the press chamber and rises along the External condenser guards.

Step 8: Secure the wire to the external condenser guards with zip ties.

Step 9: Thread the M2M power cord into the cable tray， If necessary, use zip ties to secure the wire.

Step 10: Cover the lid of this cable tray.

11.7.2 Beyond Com Unit (BCU) replacement

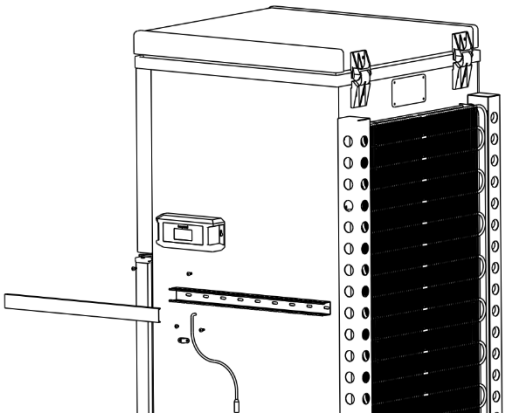
Step 1: Unplug all connection cables on the BCU, including power cables, sensor cables, etc.

Step 2: Insert the two fixing screws of BCU and remove the old BCU.

Step 3: Remove the new BCU, place it in its original position, and secure it with screws.

Step 4: Plug in the power cord, sensor cable, etc.

Step 5: Power on and reconfigure BCU.



12 Troubleshooting Guide

Refer to electronics diagrams to locate electronics components.
If the problem cannot be resolved, please contact the manufacturer or the service provider.

Symptom	Possible Cause	Remedy
Incorrect Time shown on 30 DTR display	Missing or drained coin cell on main board Time has not been set	Replace coin cell. Without a charged coin cell, CFD-50's time will have to reset after each extended outage. To set time, connect a telemetry module to the main board (make sure telemetry module battery is plugged in), press the DAQ reset button, and wait one minute. Use MFToolbox to set time If telemetry module is not available, contact local service provider to reset time
Temperature display is blank or reads ERR	Mains power is unavailable and system battery has drained	Restore power
	Control malfunction	Open electronics compartment and make sure temperature sensor connector is firmly plugged in with no loose wires. Press control reset button
30 DTR display is unresponsive	System is in sleep mode after inactivity	Press menu button to activate display
	Mains power is unavailable and battery has drained	Restore power
	Power error	Check that the power board connector is firmly plugged in with no loose wires. Also check the DC power supply connectors and main board connector on the

		power board.
	System needs reset	Press the DAQ reset button
30 DTR does not show history dots	Unit is newly commissioned and does not yet have history data	Blank daily indicators indicate no data was recorded for that day.
	System time is incorrect, preventing temperature history being calculated correctly	Make sure main board coin cell battery voltage is 2.5 V or above. If not, replace coin cell. If available, plug in telemetry module and press DAQ reset button. If telemetry module is not available, contact local service provider to reset time
	Main board SD storage card is not installed properly	Carefully remove the main board SD card, then reinsert fully and lock holder shut. Push main board reset button.
Compressor is running infrequently	Mains power is unavailable (line through plug icon on 30 DTR display)	Restore power
	Compressor only runs 1-4 times each day during regular operation	If holdover indicator remains over 5 days and vaccine chamber temperature remains below 8 °C, compressor may simply be running at night.
If mains power is available (plug icon on 30 DTR display does not have a line through it), test compressor function by removing the electronics enclosure cover pressing the tall green Run button on the top right of the main board. Compressor should turn on and sides of the CFD-50 should become warm within 5 minutes. If not continue below		
Green 'compressor running' LED to the left of the temperature is lit up although compressor is not running	Fuse is blown	Open power board enclosure and check fuse. Replace if needed.
	Loose connection	Check that the power board connector on the main board is firmly plugged in and that no wires are loose in the connector. Also check the Mains power connector, compressor power connector, and transformer connectors on the power board. **Unplug the CFD-50** before opening the

		power enclosure.
	Check mechanical thermostat	Use a multimeter to check if the blue and black wires of the compressor power connect (#6 on the power board diagram) are connected. (Unplug connector from board to test the connector.) If they are not, the mechanical thermostat has tripped. If they are not, the mechanical thermostat has tripped. If water tank is too cold, compressor will not run, even if vaccine chamber temperature is still in range. If the blue and black wires are not connected when there is no remaining holdover or the water is warm, the thermostat may be stuck – strike the mechanical thermostat cover at the top of the back of the CFD-50 to release it.
Mains power is available and CFD-50 is plugged in, but Mains power indicator LED on power board is not lit	Voltage out of range	Voltage may be out of the CFD-50's operating range, shown by the red overvoltage indicator LED on the power board (#11 on the power board diagram)
	Power board malfunction	Carefully measure the line voltage with a multimeter. If the voltage is between 82 and 290 V AC but the mains power indicator LED does not illuminate and the 30 DTR display's plug icon is crossed out, replace the power board.
Power board's mains power indicator LED is illuminated but 30 DTR plug icon is crossed out or main board's mains power indicator LED is not illuminated	Check jumper configuration	Jumpers should be installed at positions JY3 and JY4 to the right of the main board connector on the power board.
External EMD unable to supply	The polarity of the barrel interface is	1. Check the polarity of the interface (positive inside and

power	reversed or the voltage is insufficient	negative outside) 2. Replace hardware or DC power cord

Beyond EMS Troubleshooting

The following possible problems may be encountered, with suggested remedies. Please contact your supplier should you require any assistance.

Diagnostic procedure:

PROBLEM	POSSIBLE CAUSE and SOLUTION
Display / unit not on:	**Mains circuit has tripped (MAINS units only):** • Check circuit breaker / fuse on mains supply and that power is available from power point. **Battery not connecting properly:** • Open back cover and connect battery. **Battery flat / faulty:** • Verify power supply connected via ethernet cable • Check mains power is available (MAINS units only) • Check fuse in Power Module (MAINS units only) • Check fuse in DC Power cable (SOLAR/TRUCK units only)
Unit not uploading:	**SIM card not communicating:** • Check with your account manager or service provider that the SIM card is activated. **Unit not set up correctly on portal:** • Verify setup on ColdCloud portal as per ColdCloud manual.
Incorrect readings on the display or portal:	**Unit not set up correctly on portal:** • Verify setup on ColdCloud portal as per ColdCloud manual. **Calibration is out:** • Calibrate probes and enter calibration factors on ColdCloud portal.
Electrical interference:	**Screen on cables not used:** • Connect screen on sensor cables. **Electrical interference from mains supply:** • Buy external filter or plug power module into 'clean' power source. **Interference from other equipment:** • Relocate BCU and cables away from equipment.

Display shows "Probe error"	**Probe not connected:** • Plug probe into active channel. **Probe faulty:** • Replace faulty probe.
Display shows "Low battery" indicator	**Battery is less than 80% of the capacity of a fully charged battery:** • Recharge battery by ensuring power is available from power module i.e., Power LED is illuminated, and ethernet cable is connected to both Power Module and BCU. **Power supply is not connected or working:** • Ensure ethernet or DC power cable is connected to both the power module or DC supply, as well as the BCU. • Ensure the mains cable is plugged in to a wall socket and that the wall socket is supplying power as per the specification in this manual. • Ensure there is the specified DC supply voltage and current available for DC and Solar applications.
Unit is beeping	**Unit is in alarm:** • Resolve alarm by rectifying asset alarm condition.
Red alarm LED flashing, but unit is not beeping	**Unit is in alarm but the portal is setup with buzzer disabled:** • Change setting on portal to required conditions for the buzzer. **Buzzer faulty:** • Contact your account manager or sales representative for technical assistance.
Unit does not go into alarm when thresholds are exceeded	**Unit has not received alarm parameters:** • Parameters not received yet – do a forced upload.

13 Advanced Troubleshooting

A software tool called MFToolbox is available for advanced diagnostics and troubleshooting. A laptop computer and 3.3 V FTDI cable are required. To download the software tool and documentation go to http://www.metafridge.com/MFToolbox/ .

14 CFD-50 Specification

Model	CFD-50
Ambient Operating Temperature and Humidity Range	10 ℃ - 43 ℃; Relative Humidity ≤ 95%
Vaccine Chamber Temperature Range	2 ℃ - 8 ℃
Holdover Time @ +43 °C	120-hrs (5 days)
Vaccine Storage Capacity	50 L
Input Voltage Range	110 – 230 V
Input Frequency	50 – 60 Hz
Input Power	290 W (Peak)

Refrigerant	R134a/315g
External Dimensions	545 W * 655 D * 1588 H mm
Net Weight	102 kg

15 CFD-50 Disposal and Recycling Guidelines

- Remove the door and top lid when the CFD-50 is no longer in use.
- Disposal of the CFD-50 must be made according to local appliance disposal and recycling regulation.

16 Warranty

To facilitate inquiries, please copy the model number and serial number in the following table.

Model		SN.	

To avoid losing the invoice, you can affix it to this page.

(Paste or staple your invoice here.)

Warranty Information

Thank you for using the MetaFridge CFD-50. Per the warranty card and invoiced date of sale (refer to the invoice), we will provide the following coverage to you.

1. **Two-year warranty on the device, beginning on the date of shipment from Aucma, included at no extra cost.**
2. Under warranty coverage, the manufacturer will repair or replace device components that have failed in the use of the device for its designed intent.

   Free warranty coverage does not include the following cases:

   (1) Damage caused by improper use or improper maintenance.

   (2) Damage caused by attempted repairs done by a non-designated repair department.

   (3) Damage caused by force majeure.

   (4) *Damage occurring after the warranty period has expired.*

Contact your local CFD-50 distributor and service provider for any questions not covered in this manual.