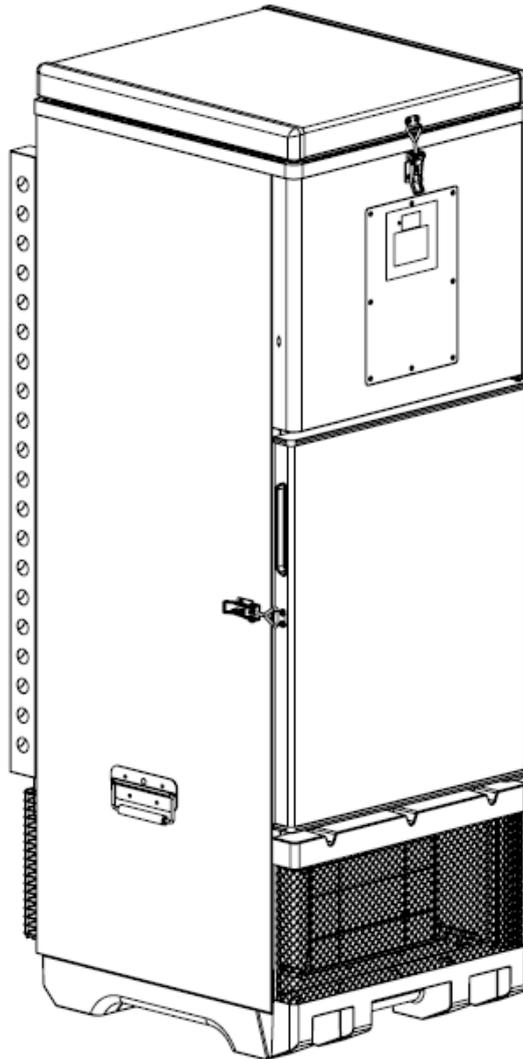


AUCMA

MetaFridge® CFD-50

Maintenance Manual



Please read the manual carefully before use
Keep the manual in a safe place for future reference.

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1 Product Description

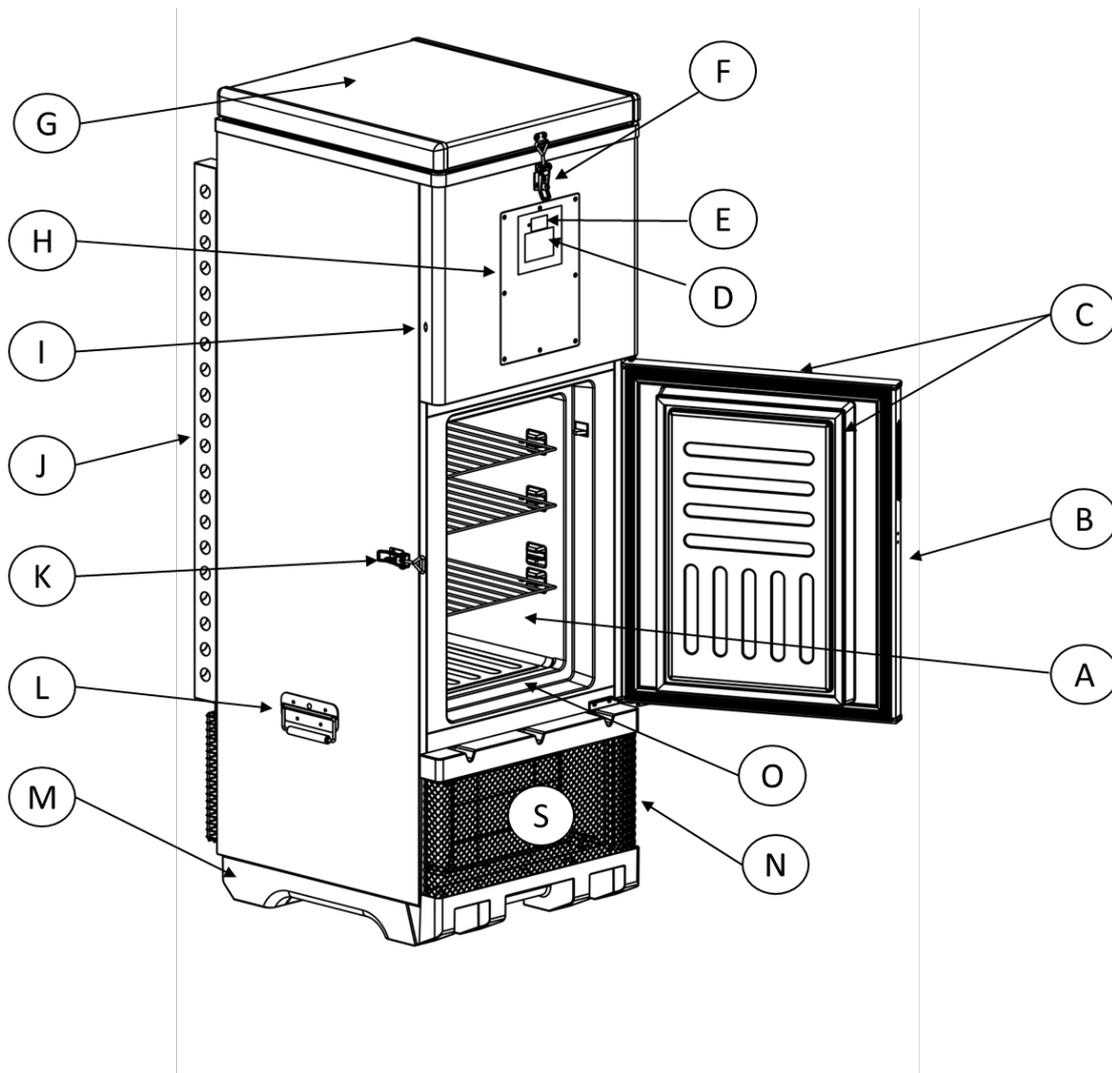
The MetaFridge CFD-50 is a WHO PQS certified vaccine refrigerator that maintains a temperature between 2-8 °C with multi-day holdover during extended power outages. It includes integrated power protection, a display showing 30 days of temperature and alarm history, onboard logging of temperature and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

CFD-50 standard features:

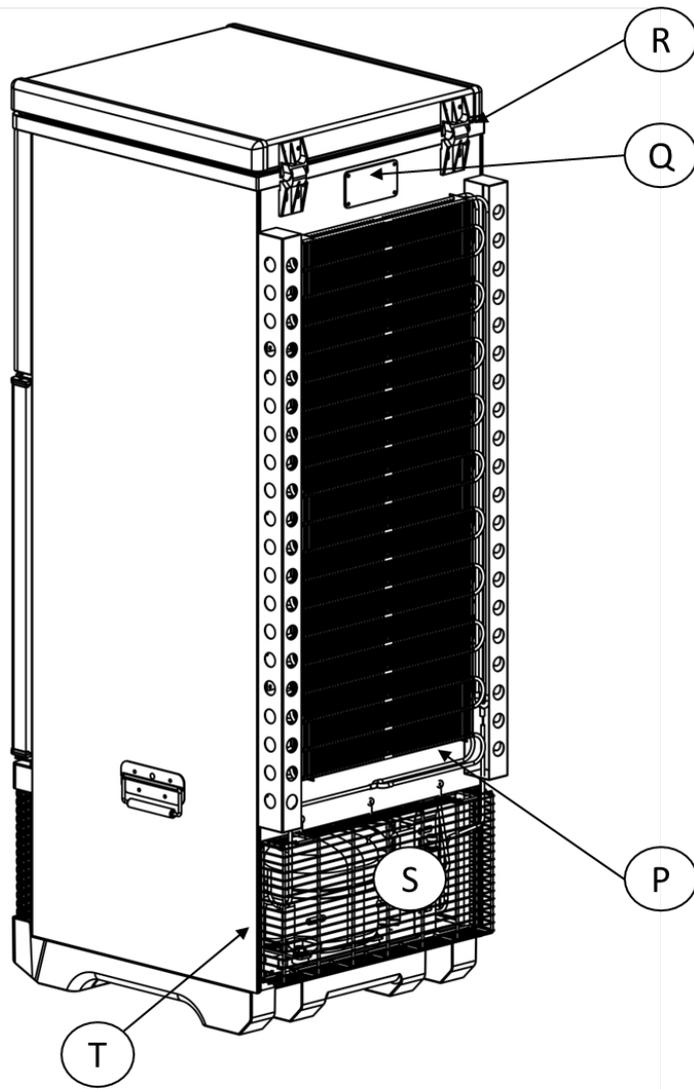
- 50-liter vaccine storage chamber volume
- Front-opening for easy user access to vaccines
- Integrated power protection system defending against voltage spikes and brown-outs
- Integrated voltage stabilization to utilize a wide range of input voltages (110 – 230 VAC)
- Normal operation in a minimal mains grid access environment (maintains temperatures with as little as 3 hours of power a day on average)
- ColdSafe® cooling 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
- Remote temperature monitoring feature is available upon request

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



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



Ⓟ External condensers

Ⓠ Thermal safety shut-off
(mechanical thermostat)

Ⓡ Water tank lid hinge

Ⓢ Compressor compartment

Ⓣ Back ventilation cover

(contains compressor, fan, power enclosure and power board, transformer, drain pan)

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.

4 Installation

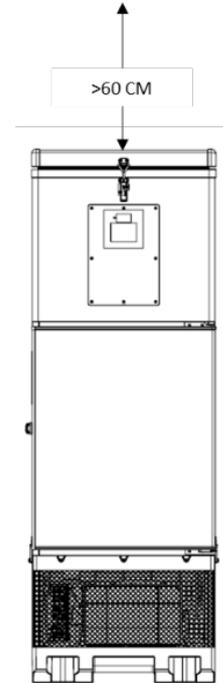
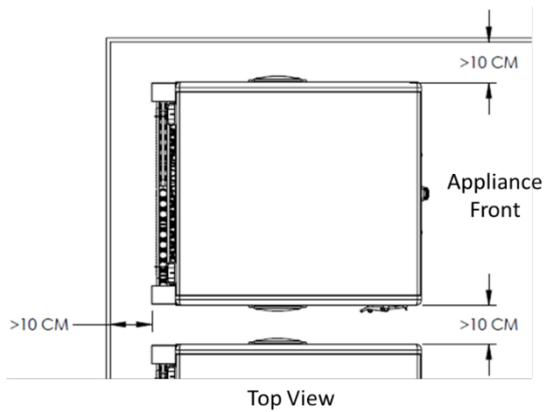
4.1 Preparation

- 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) User manual and maintenance manual
 - (5) 2 sets of lock and key, for the water tank and vaccine chamberIf any parts are missing, please contact the manufacturer or service provider.

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.).

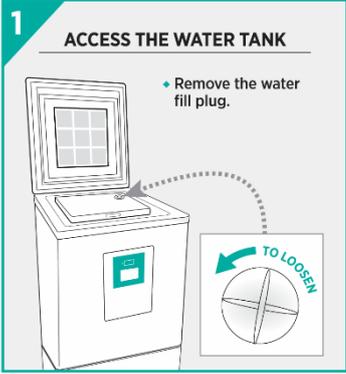
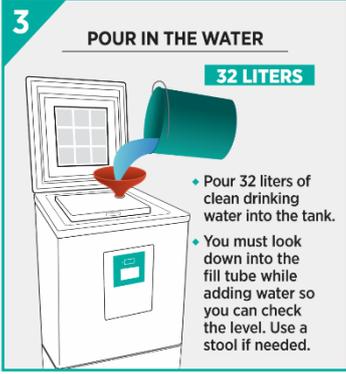
- e. CFD-50 must not be placed in or around flammable or corrosive gases that could cause an explosion or electric shock.
- f. In order to prevent rust or electrical leakage, the CFD-50 should not be placed in a high humidity environment or in a location where it could be splashed with water or rain.
- 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.

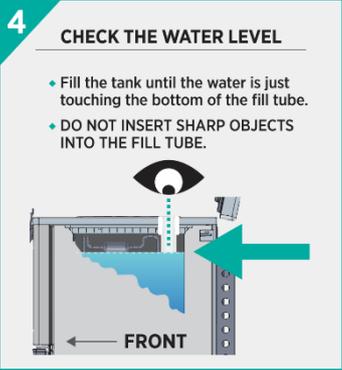
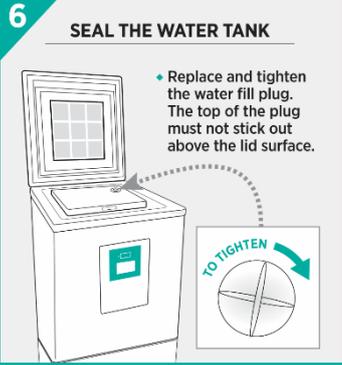


4.3 Filling Instructions

 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.

<p>1 ACCESS THE WATER TANK</p> <ul style="list-style-type: none">Remove the water fill plug. 	<p>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.</p>
<p>2 PREPARE TO FILL</p> <ul style="list-style-type: none">Install the funnel.Fill a bucket with clean drinking water. 	<p>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.</p>
<p>3 POUR IN THE WATER</p> <p>32 LITERS</p> <ul style="list-style-type: none">Pour 32 liters of clean drinking water into the tank.You must look down into the fill tube while adding water so you can check the level. Use a stool if needed. 	<p>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.</p>

<p>4 CHECK THE WATER LEVEL</p> <ul style="list-style-type: none"> ♦ Fill the tank until the water is just touching the bottom of the fill tube. ♦ DO NOT INSERT SHARP OBJECTS INTO THE FILL TUBE. 	<p>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.</p> <p>Do not insert sharp objects into the tube or you may damage the refrigerator evaporator.</p>
<p>5 REMOVING WATER</p> <ul style="list-style-type: none"> ♦ To remove excess water, or to empty the tank, use a siphon hose. 	<p>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.</p> <p>Too little water will reduce holdover time; too much water may damage the unit.</p>
<p>6 SEAL THE WATER TANK</p> <ul style="list-style-type: none"> ♦ Replace and tighten the water fill plug. The top of the plug must not stick out above the lid surface. 	<p>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.</p>

⚠ Do not overfill the CFD-50 (Figure G).
Remove excess water if overfilling occurs (Figure H).

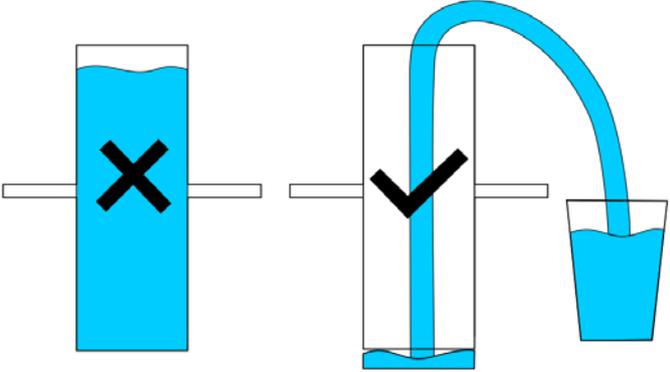


Figure G Figure H

4.4 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. 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.
7. 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).
8. 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.
9. 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 maintenance manual.
10. 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.
- 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.

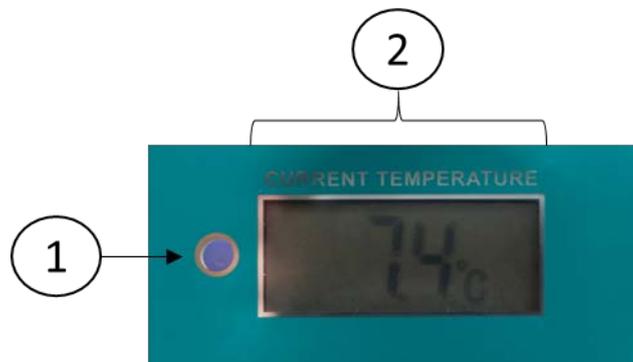
Loose vials should be stored in the provided trays on shelves inside the vaccine chamber. Secondary packaging may be placed directly on shelves or in trays. Do not place secondary packaging directly on the bottom of the vaccine chamber to avoid contact with any excess condensation. Also avoid leaving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



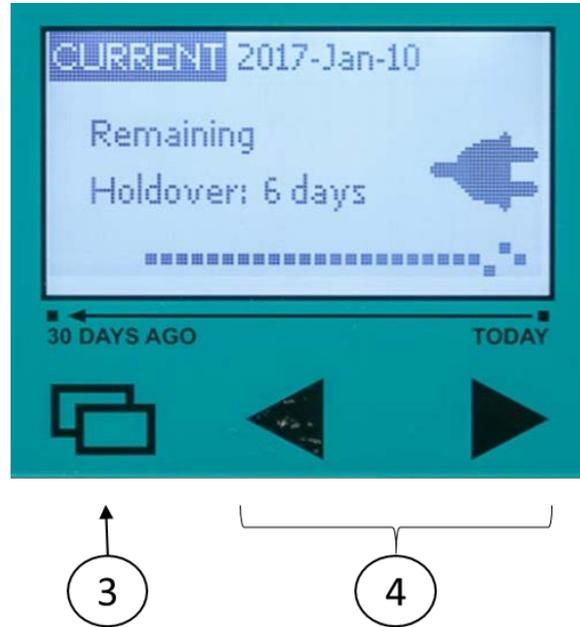
Current temperature and status

1. Status LED	The LED to the left of the display will be: <ul style="list-style-type: none">• 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.

6.3 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

<p>3. Menu button</p> 	<p>Tap the Menu button to move between CURRENT, HISTORY, and ALARM screens.</p>
<p>4. Back and Forward buttons</p> 	<p>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.</p>



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.

6.4 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	<p>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.</p> <p>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.</p> <p>For holdover alarms, “RESTORE POWER” is displayed.</p> <p>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.</p> <p>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.</p>

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

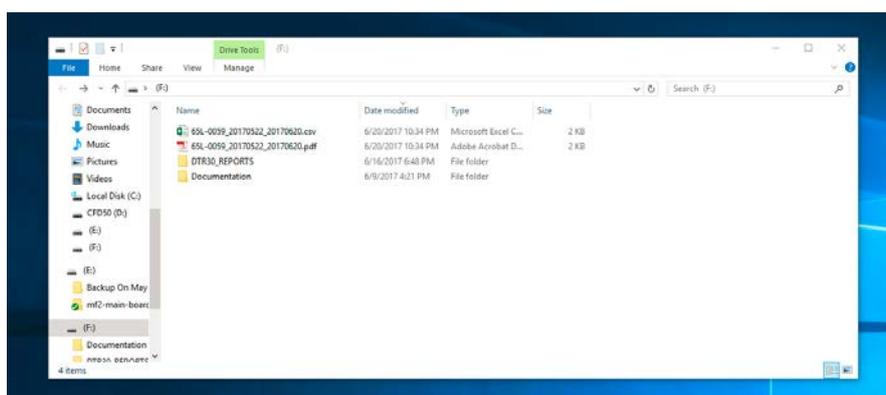
The 30 DTR report shows the time that each temperature excursion begins, ends, and when the alarm was acknowledged. A button press that silences an alarm counts as an acknowledgement. If a high or low temperature excursion alarm occurs, and ends before a button is pressed to silence and acknowledge the 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.

6.5 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 manufacturer's serial number (also on a label on the back of the unit) and the date range covered in the report.

6.6 System Battery

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.

6.7 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.

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.

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.

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.

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.

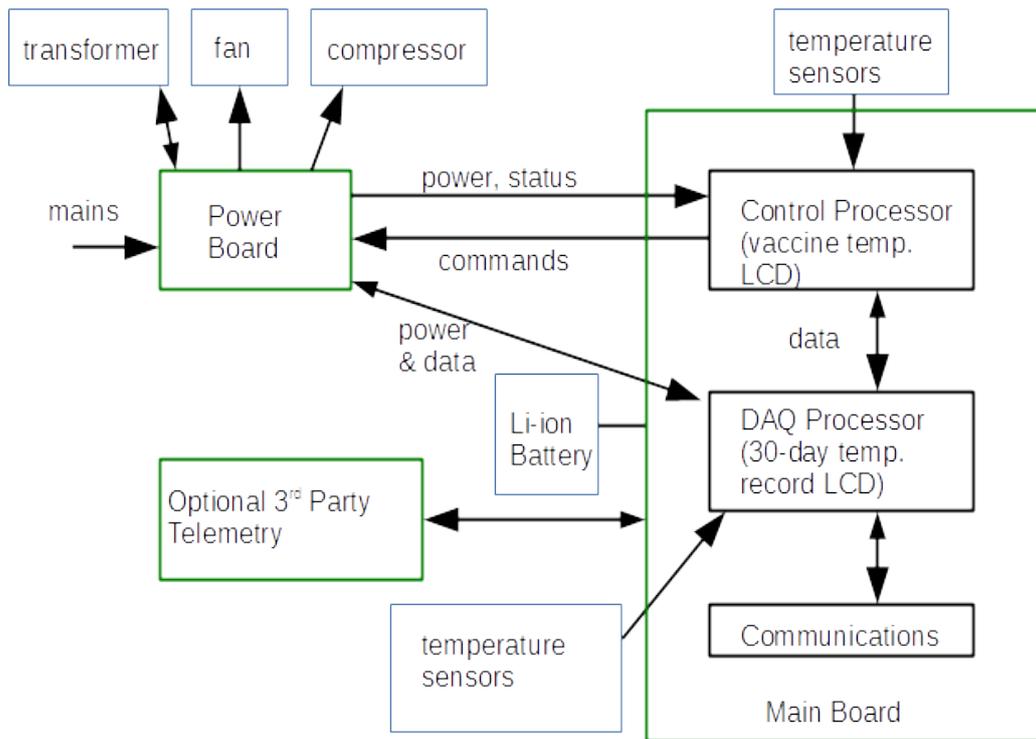
9 Electronics System

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.

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.



System diagram of CFD-50 electronics.

9.1 Electronics Diagrams

Diagrams showing key electronics components that may require technician interaction or that are useful for troubleshooting are located on the backs of the electronics enclosure and power enclosure



Diagrams are located on the backs of the electronics enclosure and power enclosure.

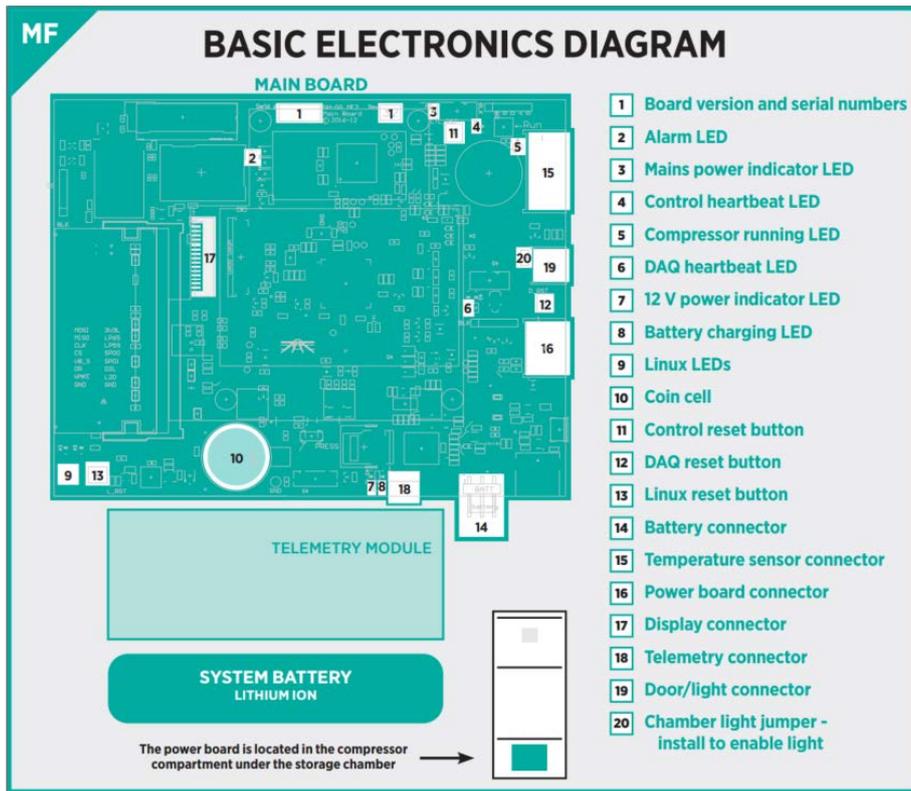


Diagram showing main board and other components in the main electronics enclosure located on the front of the CFD-50 cabinet.

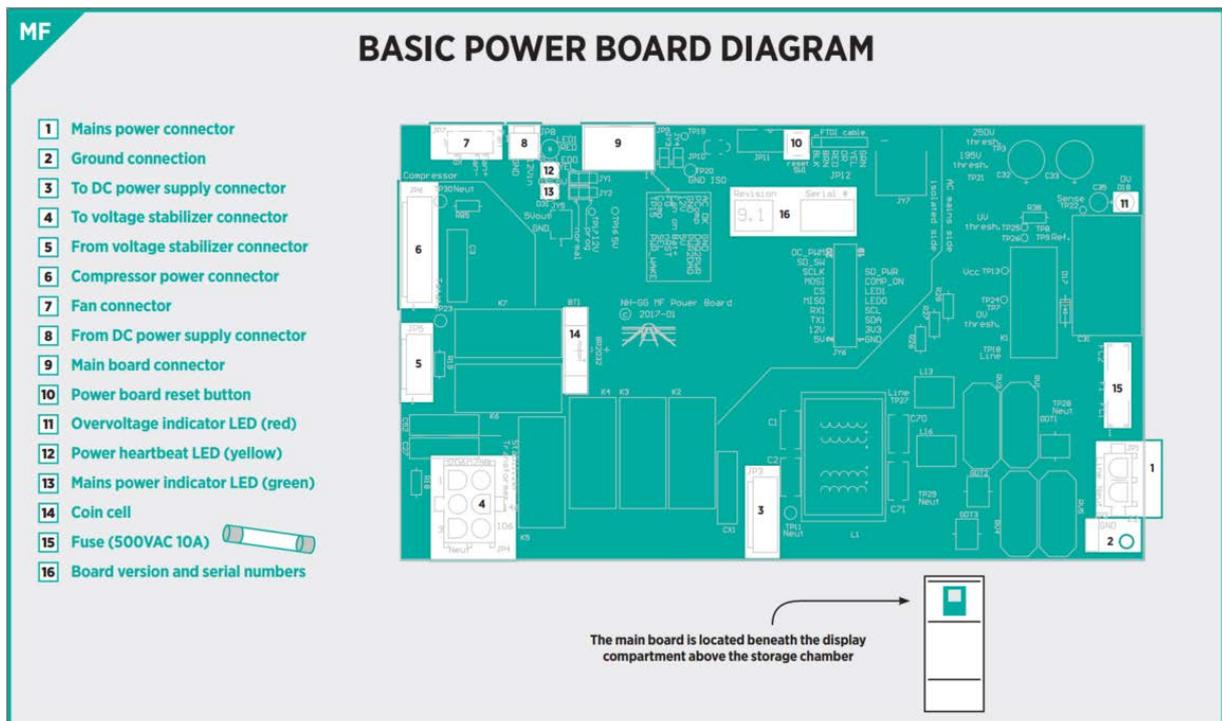
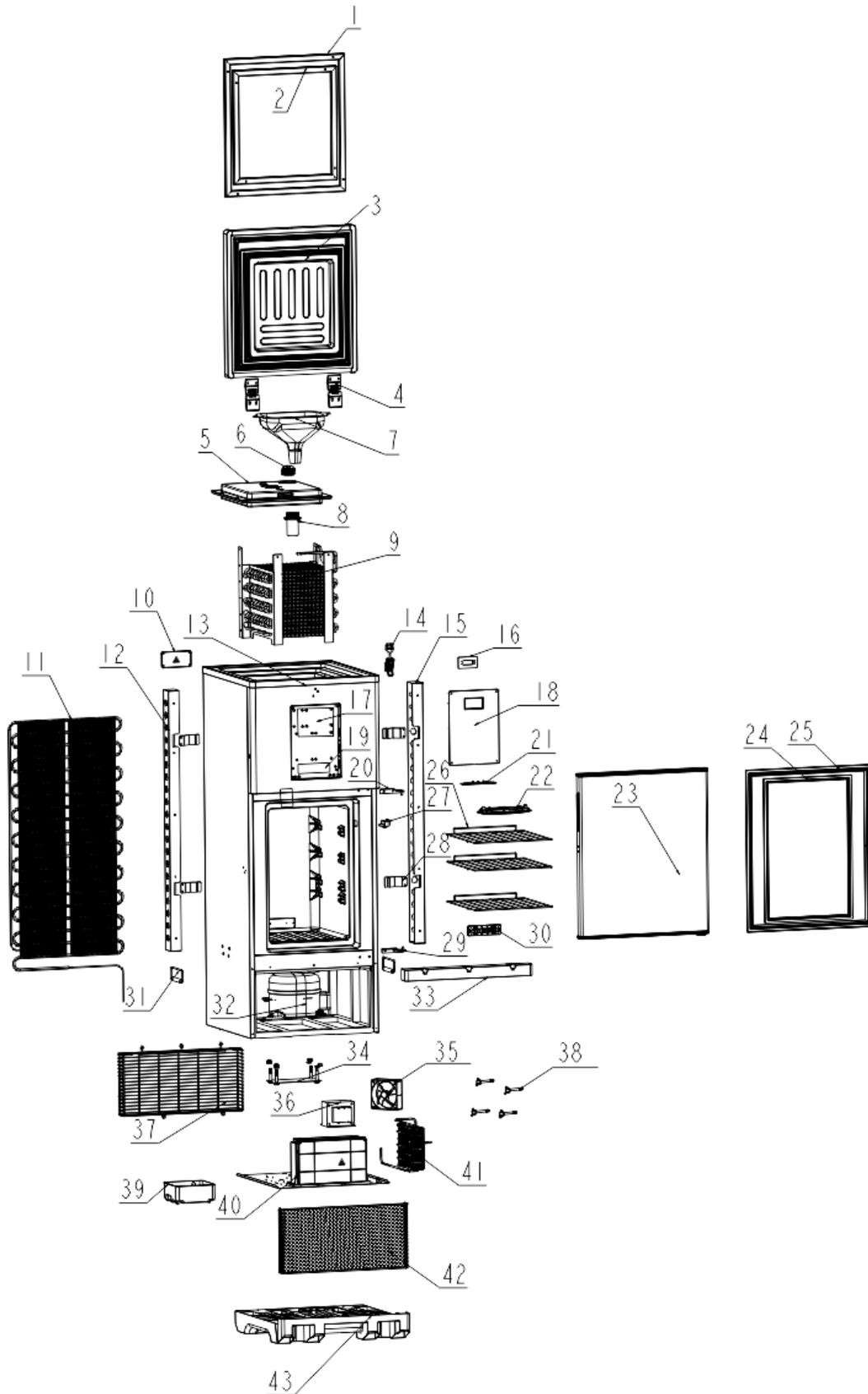


Diagram showing key power board components.

10 CFD-50 Parts and equipment list



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

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

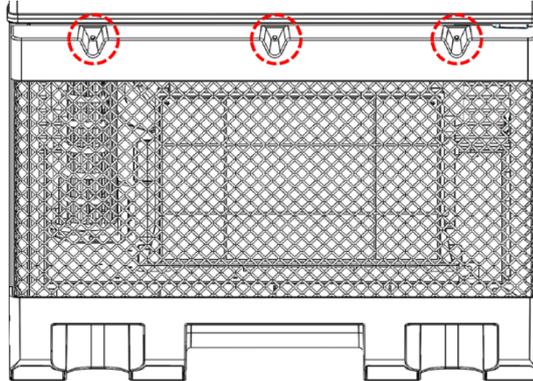
11.3 Power board replacement



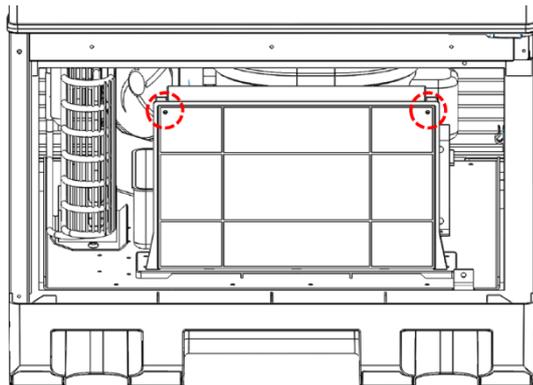
Always unplug the CFD-50 before opening the power enclosure to avoid electrical shock

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

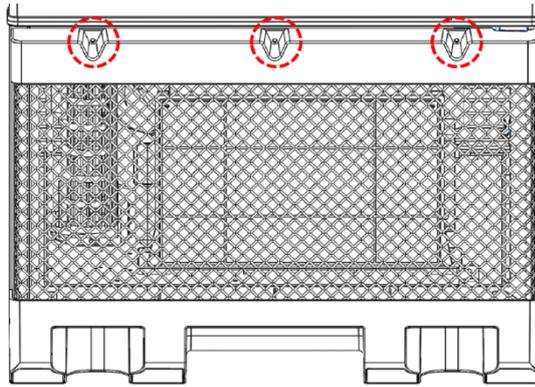
Step 5: Install new power board and reconnect all connectors

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

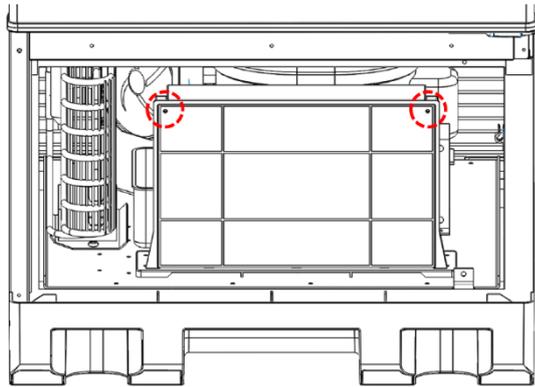
11.4 Transformer replacement

Step 1: Unplug CFD-50

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

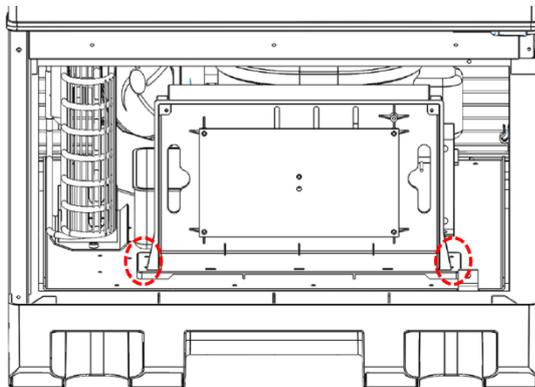


Step 3: Remove 2 screws on power board enclosure cover and remove the cover



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

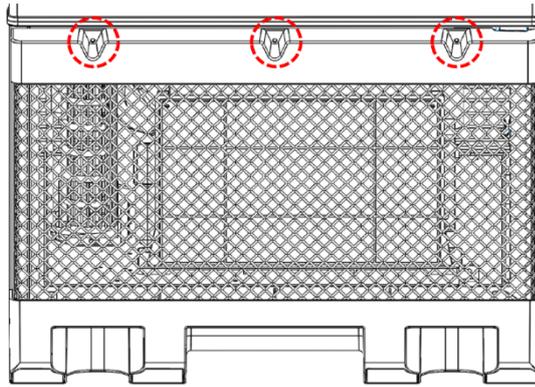
Step 7: Reconnect the "Transformer" connector on the power board (with the newly installed transformer) and replace power board enclosure cover

Step 8: Replace front ventilation cover and trim

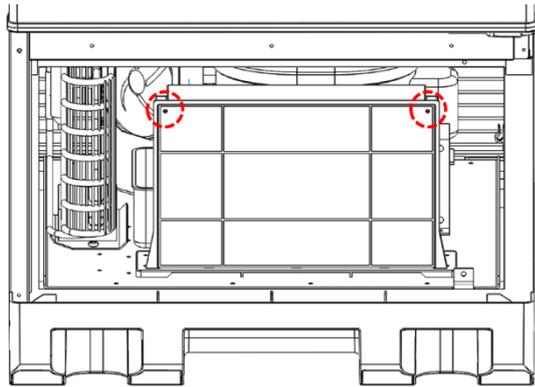
11.5 Fan replacement

Step 1: Unplug CFD-50

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

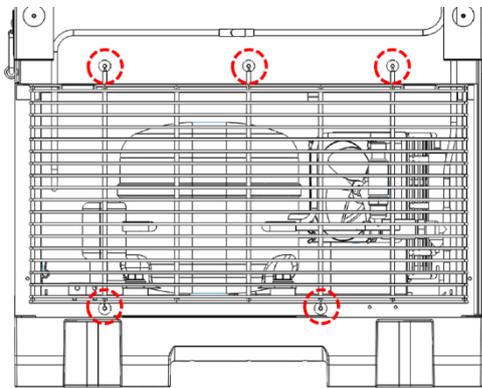


Step 3: Remove 2 screws on power board enclosure cover and remove the cover

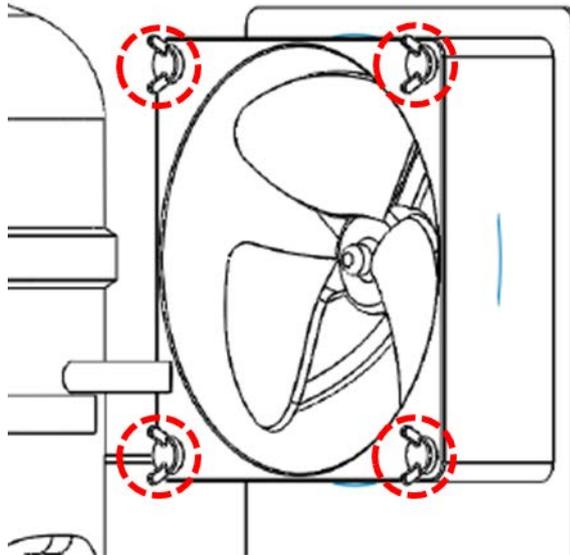


Step 4: Disconnect "Fan" connector (#7 on the power board diagram) on the power board

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



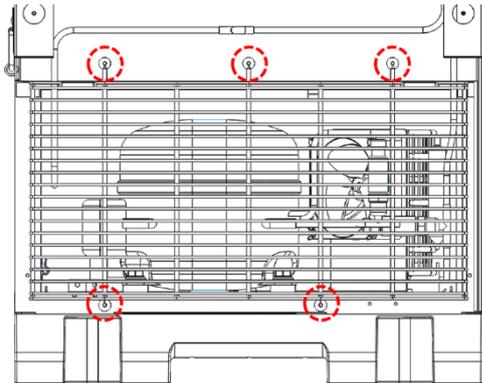
Refrigeration system work can only be performed by properly trained technicians with proper tools.



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

12 Troubleshooting Guide

Refer to electronics diagrams (Chapter 9.1 or on the back of enclosure covers) to locate electronics components

Symptom	Possible Cause	Remedy
Incorrect Time shown on 30 DTR display	Missing or drained coin cell on main board	<p>Replace coin cell. Without a charged coin cell, CFD-50's time will have to reset after each extended outage.</p> <p>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.</p> <p>Use MFToolbox to set time</p> <p>If telemetry module is not available, contact local service provider to reset time</p>
	Time has not been set	
Temperature display is blank or reads ERR	Mains power is unavailable and system battery has drained	Restore power
	Control malfunction	<p>Open electronics compartment and make sure temperature sensor connector is firmly plugged in with no loose wires.</p> <p>Press control reset button</p>
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	<p>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.</p> <p>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.</p>
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.

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 °C - 43 °C; Relative Humidity ≤ 95%
Vaccine Chamber Temperature Range	2 °C - 8 °C
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.	
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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, 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.

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