



Your Cold-Chain Partner

INSTRUCTION MANUAL
 Portable Medical Refrigerator Units
 MODEL BFT-20-2

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PLEASE READ ENTIRE INSTRUCTION MANUAL BEFORE USING THE BIOFRIDGE UNIT

SECTION 1

Introduction

The BFT-20-2 has been designed to provide more flexibility, and therefore more options, for those who work within the requirements and protocol of cold-chain transport.

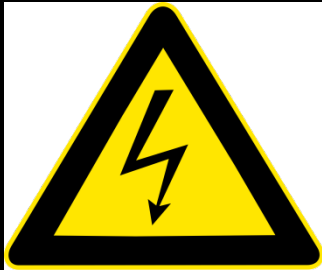
The Units can be used in the following manner and will run 24/7:



In a clinical setting, including temporary clinics or established hospitals, Units can be plugged into a 110VAC 60 Hz/240 VAC 50 Hz supply (a standard wall outlet).

Basic Operation

WARNING



BioFridge portable refrigerators and freezers are powered by electric current; not taking proper steps to ensure safety can potentially injure or kill. ANY installation, cleaning, or troubleshooting must be conducted with the electrical power source disconnected from the BioFridge Unit. (110VAC, 12VDC)

- After receiving the BioFridge unit from the shipper, **please wait 24 hours before turning it on**. The oil in the compressor needs time to settle. Ensure unit is upright and out of the box.
- Never operate the BioFridge unit at a tilt exceeding 30 degrees for an extended period of time. The oil reservoir will not lubricate the compressor motor properly at angles above 30 degrees and damage may result to the compressor.
- BioFridge Cart is equipped with internal batteries. The Unit will operate for up to 18 hours as a portable refrigerator.

Basic Operation Continued

- For stationary use, plug in the 110-volt cable from your AC outlet to the Unit cart. This will simultaneously power up the refrigerator and maintain/charge the internal battery. When connected to a 110-volt wall outlet the unit will run indefinitely, just like any household refrigerator.
- Whenever possible, pre-cool the refrigerator and its contents in advance using a 110-Volt AC power source (a typical wall outlet in the USA and Canada) before taking it off the AC power grid (unplugging it from the wall outlet).
- BioFridge units are equipped with a **GREEN** light indicator located on the control panel. The compressor is running when this light is illuminated.



- At least 4 inches of ventilation space around a BioFridge unit is recommended in order to properly dissipate heat. Keeping the unit well-ventilated will improve performance.
- Whenever possible, avoid operating the BioFridge unit in direct sunlight; doing so will decrease the unit's efficiency.
- For BFT-15-2 and BFT-20-2 models, the individual units operate as separate cooling units. Desired temperature and alarm values must be set for each unit.
- Ensure Basket is in the Unit before placing load into the BioFridge Unit. This will ensure load is not in direct contact with the bottom or wall of the evaporator (cold compartment).

- Many factors can affect the efficiency of the Unit. Factors include:
 - the ambient temperature outside the Unit
 - the ventilation area around the Unit
 - the number of items inside the unit
 - the starting temperature of the items put in the unit.

Placing warm items inside the unit in hot ambient temperatures, and leaving the lid open, will negatively affect the performance.

PORTABLE USE

- When using BioFridge Units in a portable application (ie, Unit powered up by the cart UPS), plug in the 12 volt blue plug into the INPUT DC receptacle. Push plug into the receptacle and twist 30 degrees clockwise to lock.
- You can plug the INPUT DC plug into the BioFridge with the INPUT AC 110 volt lead attach. The BioFridge will be powered up by the INPUT AC supply when in this configuration.

- **Using the Unit is the best way to learn its capabilities.**

SECTION 2

Cleaning

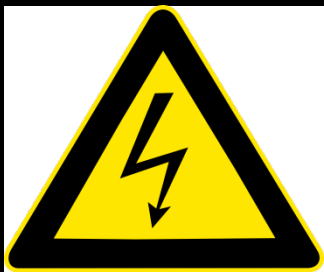
- The recommended way to clean the BioFridge is with a container of warm water, a sponge, and a bottle of all-purpose cleaner. Never submerge a BioFridge unit in water.
- If the BioFridge is used as a freezer for long periods of time (approximately 2-3 months) the Unit should be periodically defrosted with its contents removed.
- Never empty water out of the Unit by turning it upside down. Doing so can cause water to collect in the top of the cowl. Remove excess water with a sponge.

Storing

To store the Unit:

1. Ensure UPS is fully charged.
2. Unplug the DC input (blue plug).
3. Open the lid to defrost and vent the Unit.
4. Once defrosted, remove excess water with a sponge.
5. Store Unit with the lid slightly open.
6. Plug in Unit every 3 to 4 weeks to top up charge in UPS.



WARNING






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SECTION 3

Basic Troubleshooting

Observation	Probable Cause (Work Down the List)	Remedy	Part Description & Number
AC power does not work	1. No Power from 110-volt AC outlet (standard wall outlet)	Confirm that the main Room switch is on, the 110-volt outlet has power, and that AC input is plugged in	
DC power does not work	Blue connector not secured properly 	Twist blue plug clockwise until it snaps into place	
	2. 12-volt DC supply has low voltage	Fix DC voltage to 12.0 volts or higher by changing batteries.	
	3. Blown fuse in Cart's DC circuit	Replace inline fuse	ATC-15 amps E-123
	4. Blown internal fuse in DC circuit inside fridge (inside compressor compartment)	Replace internal fuse	ATC 15 amps E-123
	5. Loose connections at battery terminals in UPS	Tighten all terminals	
Internal Fan not on	1. Fan only turns on when compressor is on	Normal Operations	
	2. Fan Blocked with debris 	Clean Fan	
	3. Fan connections loose (inside compressor compartment)	Replace crimp connectors (inside compressor compartment)	12v internal fan E193

Observation	Probable Cause (Work Down the List)	Remedy	Part Description & Number
Refrigerator not getting cold	1. Incorrect thermostat set-point setting St 1 	Reprogram St 1 (see Section 4)	
	2. Latch not secured completely 	secure	
	3. Ambient temperature too high	Move Unit to lower ambient temperatures, and away from direct sunlight.	
	4. DC power source low voltage	Recharge UPS	
	5. Differential (P1) set too high 	P1=1	
	6. Worn lid seal	Replace lid seal	Seal G-107
	7. Refrigerant Leak	Factory Repair: Call (760) 233-8847	
Refrigerator getting too cold	1. Incorrect thermostat set-point setting St 1	Reprogram St 1 (see Section 4)	

Observation	Probable Cause (Work Down the List)	Remedy	Part Description & Number
Refrigerator getting too cold (cont'd)	2. Very little load inside	Put in 1 to 2 water bottles to help buffer cycling interval	
	3. Differential (PI) too high	P1=1	
	4. Calibrate thermostat	Factory Support: Call (760) 233-8847	
Er4 Message: High Temp Alarm	1. Door is not shut completely	Latch down and secure door	
	2. Using Unit as a refrigerator with alarm set for a freezer	Correct Alarm Settings (see Section 6)	
	3. Temperature set-point St 1 is set above high alarm (P 26) settings	Adjust set-point or high alarm setting (see Section 6)	
	4. If probable cause 1, 2, or 3 is not the issue, relocate the vaccines and call BioFridge	Factory Support: Call (760) 233-8847	
Er5 Message: Low Temp Alarm	1. Using unit as freezer with alarm set for a refrigerator	Correct Alarm settings (see Section 6)	
	2. Temperature set-point ST 1 is set below low alarm (P 25) settings	Adjust set-point or low alarm settings	
	3. If probable cause 1 or 2 is not the issue, relocate the vaccines and call BioFridge	Factory Support: Call (760) 233-8847	
Other Display Messages	Display is stuck on input readings: b1:Probe 1 b2:Probe 2 di1:digital input 1 di2:digital input 2 St1:set point 1 St2:set point 2 no: NO Access	To escape input readings: Scroll down to b1. Hold down the SET button until the blinking b1 disappears. When b1 disappears, the thermostat will display the current internal temperature reading	

Basic Troubleshooting Continued

UPS

Observation	Probable Cause	Remedy	Part Description & Number
UPS capacity status not on	12 volt lead not plugged into Refrigerator Unit	Plug in 12 volt lead into Refrigerator Unit. Recharge UPS plug into 110 V AC.	

SECTION 4

Programming the Thermostat

Setting the Temperature Set-Point (St1):

1. Press and hold the Set button until the display shows “St1.”



2. Release the Set button and the present thermostat set-point will flash.
3. Press the up ▲ or down ▼ arrows to reach the desired thermostat set-point temperature.
4. Press the Set button to confirm. The display will show the present interior temperature.

RECOMMENDED SET-POINT FOR REFRIGERATION IS 3.5°C TO 5°C

Setting Parameters and Alarms in Celsius Description:

Initiate the Programming Mode by holding down Set and PRG together until 0 appears. Scroll up ▲ to “77” and press Set. The “c0” Parameter will appear. (To view the “c0” value, press Set again.) To reach the next desired Parameter, navigate using the up ▲ and down ▼ arrows. Press Set. Change the setting with the arrows and press Set again. Refer to Table 1 below (Page 11) for Parameters. Once all programming is done, hold down the PRG button for at least 5 seconds to confirm. **To silence an alarm, press PRG.**

Table 1

Parameter	Description	Value
CO	Relay Designation	1
C-18	Unit of Measure	0=Celsius 1=Fahrenheit
P1	Differential of Temperature Set-Point	1
P25	Low Temperature Alarm*	Customer Set
P26	High Temperature Alarm*	Customer Set
P27	Alarm Differential	0
P28	Alarm Time Offset in Minutes	Customer Set

*Low and High Temperature Alarms should be set to Customer's required temperature range.

Thermostat Master Reset:

If there is an error in the programming, or if the programming has been tampered with, reset the thermostat and reinitiate programming again.

To Reset the Digital Thermostat

1. Unplug the BioFridge unit from all power sources.
2. Hold down the PRG button as you power up the unit.
3. Reset is successful when "Std" appears on the display as you power up the unit.



4. If "Std" does not appear, retry again.

5. Initiate the Programming Mode by holding down Set and PRG together until 0 appears. Scroll up ▲ to “77” and press Set. The “c0” Parameter will appear. (To view the “c0” value, press Set again.) To reach the next desired Parameter, navigate using the up ▲ and down ▼ arrows. Press Set. Change the setting with the arrows and press Set again. Refer to Table 2 below for Parameters. Once all programming is done, hold down the PRG button for at least 5 seconds to confirm. **To silence an alarm, press PRG.**

Set Values According to Table 2 Below:

Table 2

Parameter	Refrigerator Value	Function
CO	1	Relay Designation
P1	1	
C22	10	
P25	Customer Set	Low Temp Alarm
P26	Customer Set	High Temp Alarm
P27	0	Alarm Temp Offset
P28	Customer Set	Alarm Delay Minutes

After Thermostat is Reset:

After the Thermostat is reset, ensure the Set-Point is reset to the St1 value. Once the St1 value has been set and the Unit is reading the internal temperature, power cycle the Unit to 10. Unplug from all power sources and plug back in.

SECTION 5

UPS Operation/Procedures

The BFT-Cart has a 40 Amp Hour (BFT-15, BFT-20, BFT-50, BFT-60) or 80 Amp Hour (BFT-15-2, BFT-20-2) UPS System built into the cart. The System has to be replaced every three years. Refer to our website online video of this procedure or call our Escondido, California headquarters at (760) 233-8847. Replacement part number is UPS-T-1240AGM for the 40 Amp Hour or UPS-T-1280AGM for the 80 Amp Hour.

UPS CHARGING

RECHARGE TIME FOR A 100% DRAINED UPS IS 6 HOURS.

UPS CHARGING STATUS

Whenever the Unit is not in use keep plugged in to 110 VAC.

The BioFridge will operate and charge the UPS. Charge status can be observed with Unit plugged in to 110 VAC. Locate the charge status decal on the back side of the cart (**RED** and **GREEN** Lights below Decal).

RED On - Charging in Bulk Mode (Max).

RED / **GREEN** On - Charging in Absorption Mode (Med).

GREEN - Charging in Float Mode Ready for use.

UPS BATTERY CAPACITY STATUS

Plug 12V Blue Connector into the 12VDC Input on the BioFridge (Control End).

This can be plugged in when the 110 VAC lead is plugged in or unplugged.

To the left of the 12VDC receptacle is a large LED with the Decal "UPS Capacity Status." The LED will Flash **GREEN** **RED** and Indicate the Charge level of the UPS System.

GREEN 100%-36%




YELLOW 35%-11%

RED 10%-0%

Ensure Unit is plugged into 110 VAC when **RED** light is on; this will ensure the UPS is being charged.

SECTION 6

Table of Alarms

Message on display	Cause of the alarm	Saved to alarm queue (**)	Icon on display	Buzzer	Reset	Control action	Checks/solutions
E01	Probe B1 fault	x		OFF	automatic	Depends on parameter c10	Check probe connections
E04	The temperature measured by the probe has exceeded the threshold P26 for a time greater than P28.	x		ON	automatic	No effect on control	Check parameters P26,P27, P28,P29
E05	The temperature measured by the probe has fallen below threshold P25 for a time greater than P28.	x		ON	automatic	No effect on control	Check parameters P25,P27, P28,P29

(*) exit the working cycle

(**) for IR33 Universal with universal inputs only.

- The alarm relay is activated or not based on the operating mode and/or the DEPENDENCE setting
The alarms that occur during the Auto-Tuning procedure are not put in the alarm queue.

SECTION 7

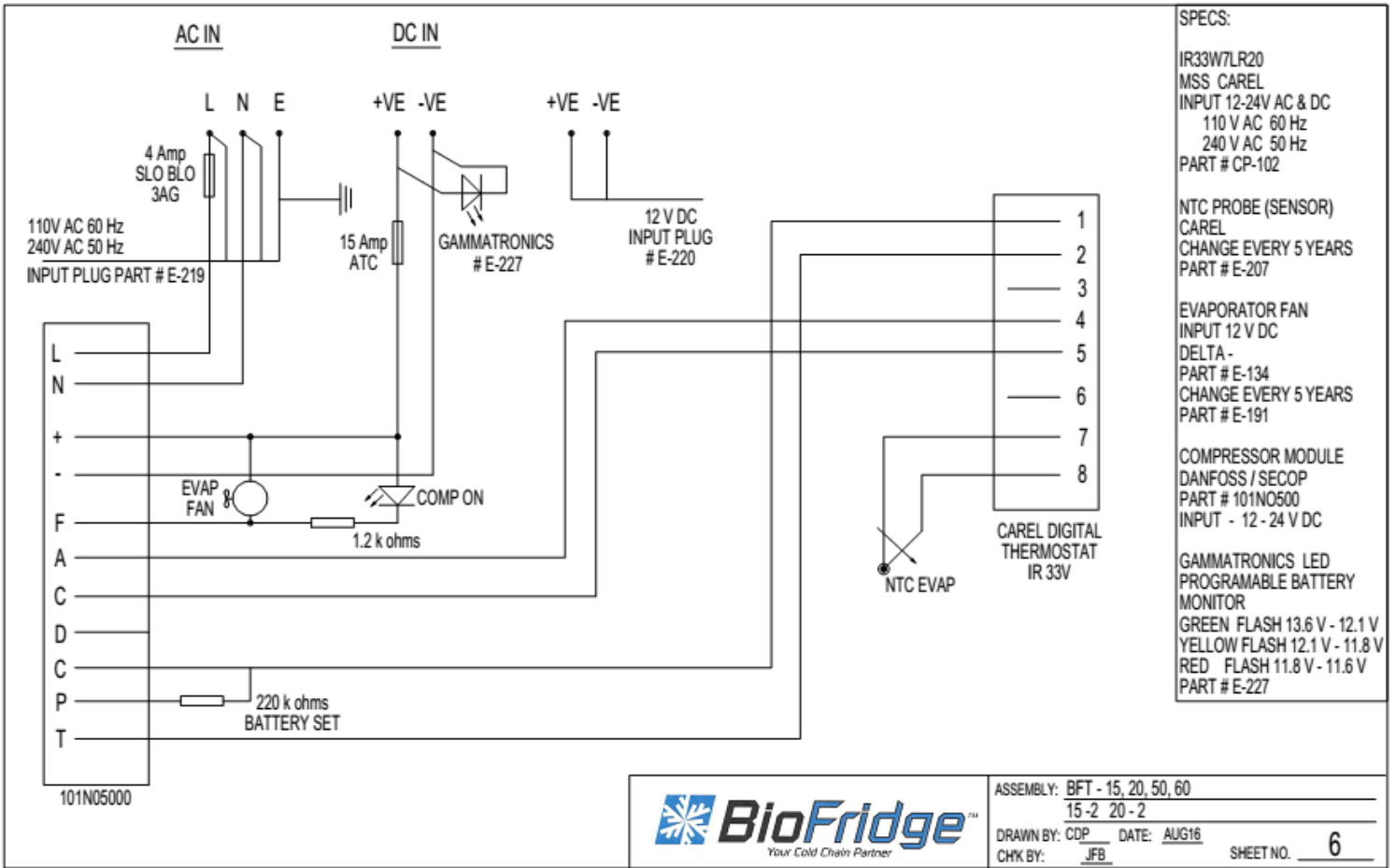
Individual Model Specifications

BioFridge BFT-20-2 Portable Medical Refrigerator

Refrigerator Model	BFT-20-2
Primary Electrical Input (AC)	110 Volt AC
Secondary Electrical Input (DC)	12 V DC
Runtime at 4°C set point	Approximately 18 hrs (pre-cooled)
Power Consumption	70 watts Maximum
Payload Capacity	20 Liters/22-24 Units/500ml x2
Payload Temperature Range (Programmable)	10°C to 12°C 50°F to 10°F
Max. Operating Ambient Temperature	40°C - 105°F
Dimensions of Storage Space	11"Lx8"Wx14"H (x2)
Dimensions of Refrigerator	23"Lx13"Wx18"H (x2)
Dimensions of Refrigerator plus Cart	34"Lx27"Wx44"H
UPS SPECIFICATIONS:	
Charger Model	28210
Electrical Input (AC)	90.VAC -250.VAC 50/60 1-13
Output AMPS	10 Amps 12.VDC
Battery Model	AGM-1280 T
Battery Capacity	80 Amp Hour
Voltage Output	11.5 v-13.2V
Max. Voltage Cut-In	13.2VDC
Min. Voltage Cut-Out	11.5VDC

SECTION 8

Schematics



SECTION 9

Scheduled Maintenance

BioFridge recommends the following be checked, replaced, adjusted, or calibrated if needed.

BIANNUAL Maintenance Checklist (BFT-15, BFT-15-2, BFT-20, BFT-20-2, BFT-50-TMC, BFT-60):

1. Remove and replace the battery backup module for all units.
 - a. BFT-15, BFT-20, BFT-50-TMC, BFT-60 part#: BFT-BBS-01
 - b. BFT-15-2 and BFT-20-2 part#: BFT-BBS-05

ANNUAL Maintenance Checklist (BFT-15, BFT-15-2, BFT-20, BFT-20-2, BFT-50-TMC, BFT-60):

With the Unit plugged into 110V supply and the 12V supply plugged into the BioFridge from the cart:

1. Battery charger (on cart) LED status: make certain that Red/Green LED are operational
2. UPS capacity status, LED status: make certain that LED is flashing Green/Amber/Red. Flashing will depend on the UPS capacity at time of inspection
3. Check handles are tight and secure
4. Check casters are tight and secure

External Lid Pocket:

1. Check hinges and latches are in good working order; Replace/Repair if necessary
2. Check pocket fasteners to lid are tight and secure
3. Check rubber bumper at bottom of cart to ensure it is secure; Replace/Repair if necessary. All replacement bumper material can be purchased from BioFridge (Part#: Trim Material G-114)

ANNUAL Maintenance Checklist (BFT-15, BFT-15-2, BFT-20, BFT-20-2, BFT-50-TMC, BFT-60) - CONT.:

Refrigeration Unit:

1. With Unit cycled on: make certain internal fan is operational
2. Four mounting machine screws that secure BioFridge to cart: ensure that they are tight & secure
3. Adjust lid over-center latches as required
4. Inspect lid-restraint (located inside BioFridge lid); Ensure that both mounting points are tight and secure
5. Check that the 110V and 12V receptacles and leads are in good working order; replace if necessary

Testing:

1. Calibrate thermostat if needed
2. Check high and low alarms
3. Conduct ground continuity test (unit and cart)

Data Logger:

1. Replace data logger battery (Part#: Coin Battery Deltatrak E-218)

5-YEAR Maintenance Checklist (BFT-15, BFT-15-2, BFT-20, BFT-20-2, BFT-50-TMC, BFT-60):

1. Remove and replace thermostat and probe for all units
 - a. Thermostat controller part#: E-191
 - b. Thermostat probe part#: E-207
2. Replace internal fan for all units
 - a. Internal fan part#: E-134