



INSTRUCTION MANUAL

Portable Refrigerator Units

MODEL 45-LITER

Including the

Standard Battery Backup System (BBS)

<u>SECTION</u>	<u>TITLE</u>	<u>PAGES</u>
1	Introduction and Basic Operation	2-3
2	Cleaning & Storing	4
3	Basic Troubleshooting	5-7
4	Programming the Thermostat	8-10
5	BBS Operation/Procedures	11-12
6	Table of Alarms	13
7	Individual Model Specifications	14-15
8	Electrical Schematics	16

Revised: September 1, 2016


PLEASE READ ENTIRE INSTRUCTION MANUAL BEFORE USING THE FRIDGEFREEZE UNIT


SECTION 1

Introduction

The 45-Liter 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 any mode of transportation, including vehicles, planes, etc., Units can be plugged into a 12VDC to 28VDC supply (for example, vehicle's cigarette lighter).

 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: FridgeFreeze 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 FridgeFreeze Unit. (110VAC, 12-28VDC / BBS)

- After receiving the FridgeFreeze 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 FridgeFreeze 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.
- When the FridgeFreeze is plugged into the Standard Battery Backup System (BBS) and running on the BBS's 12VDC system, the Unit will operate for up to 4-5 days as a portable refrigerator, and for up to 2-2.5 days as a portable freezer.

Basic Operation Continued

- 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).
- FridgeFreeze 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 FridgeFreeze unit is recommended in order to properly dissipate heat. Keeping the unit well-ventilated will improve performance.
- Whenever possible, avoid operating the FridgeFreeze unit in direct sunlight; doing so will decrease the unit's efficiency.
- 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.

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

SECTION 2

Cleaning

- The recommended way to clean the FridgeFreeze is with a container of warm water, a sponge, and a bottle of all-purpose cleaner. Never submerge a FridgeFreeze unit in water.
- If the FridgeFreeze 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. Unplug the Unit.
2. Open the lid to defrost and vent the Unit.
3. Once defrosted, remove excess water with a sponge.
4. Store Unit with the lid slightly open.
5. Cables and baskets can be stored inside.

WARNING: FridgeFreeze 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 the FridgeFreeze Unit. (110VAC, 12-28VDC / BBS)

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 BBS DC circuit (in BBS enclosure)	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 BBS	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 BBS	
	5. Differential (P1) set too high 	P1=2	
	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=2	
	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 FridgeFreeze	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 FridgeFreeze	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	

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

RECOMMENDED SET-POINT FOR FREEZER IS -16°C TO -18°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 10) 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 FridgeFreeze 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	Freezer Value	Function
CO	1	1	Relay Designation
P1	2	2	
C21	-12	-20	
C22	10	10	
P25	Customer Set	Customer Set	Low Temp Alarm
P26	Customer Set	Customer Set	High Temp Alarm
P27	0	0	Alarm Temp Offset
P28	Customer Set	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

Standard Battery Backup System (BBS)

When the BBS and FridgeFreeze are connected to each other and each is connected to the 110VAC (wall outlet), the FridgeFreeze has two power sources to draw from. The primary source will be the 110-Volt AC from the wall outlet. The secondary source will be the 12-Volt DC from the BBS. The FridgeFreeze will run exclusively on 110-Volt AC until the power is interrupted (for example, by black or brown outs). When AC power is interrupted, the FridgeFreeze will *automatically* switch to draw from the BBS.

BBS Capacity:	12 VDC	100 Amp Hours
Output:	11.5 VDC	13.8 VDC
Input:	110V 60Hz	240V 50Hz

Ambient Temperature Range: -18° Celsius to 55° Celsius

Note: The capacity of the BBS may be reduced in extreme low ambient temperatures. For example, -18° Celsius ambient BBS capacity will be reduced by 40%.

Service Life of BBS = 2 years

Installation of Standard Battery Backup System (BBS)

1. Place battery in battery box.
2. Connect (+) terminal on battery to red (+) cable from battery charger in lid.
3. Connect (-) terminal on battery to black (-) cable from battery charger in lid.
4. Tighten terminals with wrench.
5. Put lid on and tighten thumb screws by hand.
6. Plug in 110-volt lead from the BBS into 110-volt supply (wall socket.)
7. Plug 12-volt lead (blue plug) from BBS into the FridgeFreeze. Twist the blue plug clockwise to lock it in.
8. Plug 110-volt lead from FridgeFreeze to 110-volt supply (wall socket.) This lead is supplied with the fridge.
9. BBS is now in operation.




Preventative Maintenance

BBS to be changed out every 2-3 years;

Thermostat and Probe to be changed out every 5-6 years.

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

FridgeFreeze 45-Liter

Refrigerator Model	45-Liter
Primary Electrical Input (AC)	110 Volt AC 60Hz/240 VAC 50 Hz
Secondary Electrical Input (DC)	12 VDC / 24-28 VDC
With connection to the BBS: Runtime at 4°C Set-Point (Refrigerator) Runtime at -18°C Set-Point (Fridge)	Approximately 4-5 Days (Pre-Cooled) Approximately 2-2.5 Days (Pre-Cooled)
Power Consumption	40 Watts Maximum
Payload Capacity	45 Liters
Payload Temperature Range (Programmable)	10°C to -12°C Refrigerator Mode 10°C to -20°C Freezer Mode
Max. Operating Ambient Temperature	40°C (or 104°F) Refrigerator Mode 32°C (or 90°F) Freezer Mode
Dimensions of Storage Space	14" L x 11" W x 18" H
Dimensions of Refrigerator	29" L x 16" W x 24" H

SECTION 7

Individual Model Specifications

Standard Battery Backup System

Charger Model	208106
Electrical Input (AC)	110.VAC -250.VAC 50/60 1-13
Output AMPS	6 Amps 12.VDC
Battery Model	100-12
Battery Capacity	100 Amp Hour
Voltage Output	11.5 v-13.2V
Max. Voltage Cut-In	13.2VDC
Min. Voltage Cut-Out	11.5VDC

SECTION 8

Schematics

