Thermo Scientific Forma

Blood Bank Refrigerators (Vand W Models)

Installation and Operation

34830H58 Rev. B January 2012

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IMPORTANT Failure to follow the instructions in this manual can result in damage to the unit, injury to operating personnel, and poor equipment performance.

CAUTION All internal adjustments and maintenance must be performed by qualified service personnel.

Material in this manual is for informational purposes only. The contents and the product it describes are subject to change without notice. Thermo Fisher Scientific makes no representations or warranties with respect to this manual. In no event shall Thermo be held liable for any damages, direct or incidental, arising from or related to the use of this manual.

Table of Contents

1 Introduction

Blood bank refrigerators are designed to meet strict requirements for stored product safety. The 13.2, 23.0 and 28.7 ft^3 models are compliant with the DIN58371 standard.

This manual provides installation and operation instructions for: Undercounter models (4.8 ft^3), Space Saver models (13.2 ft^3) and Upright models (23.0, 28.7 and 51.1 ft^3). Refer to Table 1 to determine the specifications that apply to your unit.

The control system, standard on all models, includes:

- Key-operated power and alarm switch
- Preset temperature setpoint
- Digital temperature display with 0.1°C resolution
- Graphic temperature display
- Audible and visual power failure indicators
- Adjustable high and low temperature alarms
- Power failure alarm
- Door ajar alarm
- Low backup battery alarm
- High and low temperature logging
- Alarm silence, ringback, and automatic reset functions
- TempTest™ alarm system test

Other standard features include:

- Keyed door locks
- Dry contacts for remote alarm connections
- CFC-free refrigerant
- CFC-free foamed in-place urethane insulation
- Quiet, hermetically sealed refrigeration compressors

Upright models (13.2 ft^3 and larger) also have: fully extendable stainless steel drawers; a sensor selection button for dual sensor readings; and an independent switch for interior cabinet lights.

Seven day chart recorders are standard on all models: free standing for undercounter models, panel mounted for all other models.

2 Specifications

Model	Voltage Code*	Amps/ Breaker	Cu. Ft./ Liters	Cabinet	Door	Drawers/ 450ml bags	Dimensions H x F-B x W in. (cm)		Net Prod. Wt. lbs (kg)
							Interior	Exterior	
FRBB-404	V, W	6.0/15	4.8/135	Under-counter	Single solid	2/48	20 x 20.5 x 20 (50.8 x 52 x 50.8)	33.4 x 26 x 24 (84.8 x 66 x 61)	200 (91)
FRBB-1204	V, W	6.0/15	13.2/374	Space Saver	Single hinged glass	5/165	52.4 x 21.75 x 20 (133.2 x 55.2 x 50.8)	73 x 29.44 x 24 (185.4 x 74.8 x 61)	320 (146)
FRBB-2304	V, W	6.0/15	23.0/650	Upright	Single hinged glass	7/360	58 x 28.5 x 24 (147.3 x 72.3 x 61.0)	78.6 x 36.4 x 28 (199.7 x 92.6 x 71.1)	425 (193)
FRBB-3004	V, W	6.0/15	28.7/813	Upright	Single hinged glass	6/462	58 x 28.5 x 30 (147.3 x 72.3 x 76.2)	78.6 x 36.4 x 34 (199.7 x 92.6 x 86.4)	500 (227)
FRBB-5004	V, W	8.5/15	51.1/1447	Upright	Double hinged glass	14/720	58 x 29 x 52.5 (147.3 x 73.7 x 133.4)	79.2 x 36.2 x 56.5 (201.2 x 92.5 x 143.5)	640 (290)

* **V = 220V, 50Hz; W = 240V, 50 Hz**

Table 1. Blood Bank Refrigerator Specifications

3 Safety Precautions

In this manual and on labels attached to this product, the words WARNING and CAUTION mean the following:

WARNING a potentially hazardous situation which, if not avoided, could result in serious injury or death.

CAUTION a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or damage to the equipment.

Before installing, using or maintaining this product, please be sure to read this manual and product warning labels carefully. Failure to follow these instructions may cause this product to malfunction, which could result in injury or damage.

Below are important safety precautions that apply to this product:

- Use this product only in the way described in the product literature and in this manual. Before using it, verify that this product is suitable for its intended use.
- Do not modify system components, especially the controller. Use OEM exact replacement equipment or parts. Before use, confirm that the product has not been altered in any way.
- Your unit must be properly grounded in conformity with national and local electrical codes. Never connect the unit to overloaded power sources.
- Disconnect the unit from all power sources before cleaning, troubleshooting, or performing other maintenance on the product or its controls.

4 Unpacking and Inspection

At delivery, examine the exterior for physical damage while the carrier's representative is present. If exterior damage is present, carefully unpack and inspect the unit and all accessories for damage.

If there is no exterior damage, unpack and inspect the equipment within five days of delivery. If you find any damage, keep the packing materials and immediately report the damage to the carrier. ***Do not return goods without written authorization.*** When submitting a claim for shipping damage, request that the carrier inspect the shipping container and equipment.

5 Installation

5.1 Location

Install the unit in a level area free from vibration. Units 13.2 cu. ft. and larger require a minimum of 6 inches of space on the sides and rear and 12 inches at the top. Undercounter units require a minimum of 1 inch clearance on all sides.

Do not position the equipment in direct sunlight or near heating diffusers, radiators, or other sources of heat. The ambient temperature range at the location must be 59 to 90°F (15 to 32°C) for 4.8 and 51.1 ft^3 units; 50 to 95°F (10 to 35°C) for all other units.

5.2 Anti-tip brackets

To prevent tipping, be sure to install the brackets provided, following the instructions on the next page.

5.3 Leveling

The unit must be level. If the unit is out of level, you may need to shim the corners with thin sheets of metal.

5.4 Wiring

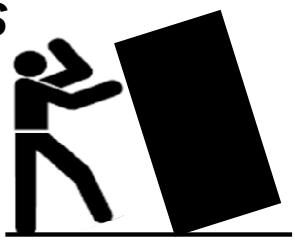
CAUTION : Connect the equipment to a separate, dedicated, power source with the correct voltage. Power fluctuations or incorrect voltage can result in severe damage to the equipment.

WARNING: For personal safety and trouble-free operation, this unit must be properly grounded before it is used. Failure to ground the equipment may cause personal injury or damage to the equipment. Always conform to the National Electrical Code and local codes. Do not connect unit to already overloaded power lines.

Always connect the equipment to a dedicated (separate) circuit. Electrical codes require fuse or circuit breaker protection for branch circuit conductors. Use time delay fuses for #12 AWG circuits.

For all blood bank models, the wiring diagram is attached to the back of the cabinet.

WARNING: SAFETY INSTRUCTIONS



- REFRIGERATOR/FREEZER MUST BE SECURED BY THE ANTI-TIP BRACKET SUPPLIED .
- UNLESS PROPERLY INSTALLED, REFRIGERATOR/FREEZER COULD TIP WHEN SHELVES/ DRAWERS ARE LOADED. INJURY AND DAMAGE TO EQUIPMENT AND CONTENTS MAY RESULT FROM REFRIGERATOR/ FREEZER TIPPING
- THIS REFRIGERATOR/FREEZER HAS BEEN DESIGNED TO MEET ALL RECOGNIZED INDUSTRY TIP STANDARDS FOR ALL NORMAL CONDITIONS.

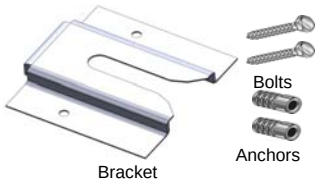
INSTALLATION INSTRUCTIONS:

Installation instructions are provided for wood and concrete floors. Any other type of construction may require special installation techniques as deemed necessary to provide adequate fastening of the Anti-Tip bracket to the floor. For installation on floors other than wood or concrete, please contact technical support.

The use of this bracket does not prevent the tipping of the Refrigerator/Freezer when not properly installed.

Materials Supplied

1. Anti-Tip Bracket (1)
2. 5/16" Lag Bolt (2)
3. Lag Screw Anchor (2), for concrete installation only
4. Bracket location template



Tools Required

Wood Floor	*Concrete Floor*
Flashlight	Flashlight
Tape Measure	Tape Measure
Drill	Hammer Drill
15/64" (6mm) Drill Bit	1/2" (13mm) Masonry Bit
1/2" (13mm) Wrench	1/2" (13mm) Wrench
3/4" (19mm) Wrench	3/4" (19mm) Wrench

Step 1
Locating the Bracket

a. Determine where you want the centerline of the refrigerator/freezer to be
b. Place the included template on the floor lined up with the centerline of the refrigerator/freezer and keep 6"-12" between the wall and the back of the unit
c. On the floor, mark the location of Hole #1 & Hole #2 (also Hole #3 & Hole #4 for 50ft^3 & 75ft^3 models).

Step 2
Anti-Tip Bracket Installation

Wood Construction

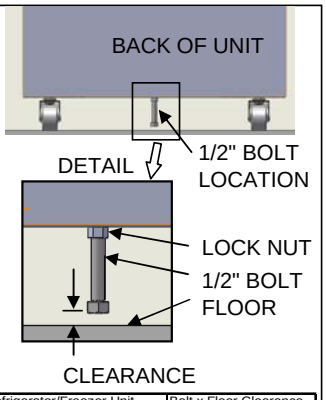
a. Drill 15/64" (6mm) pilot holes in locations marked in step 1
b. Place bracket on floor aligned with holes
c. Use supplied lag bolts to attach bracket to floor

Concrete Construction

a. Drill 1/2" (13mm) holes in locations marked in step 1 with masonry bit
b. Slide Lag Screw Anchors into holes to be flush with floor surface
c. Place bracket on floor aligned with holes
d. Use supplied lag bolts to attach bracket to floor

Step 3
Adjusting Bolt in Refrigerator/Freezer

a. Locate 1/2" bolt attached to bottom of cabinet
b. Unscrew 1/2" bolt until there is the required clearance between floor and head of bolt as shown in Figure 1
c. Tighten lock nut against bottom of unit



Refrigerator/Freezer Unit	Bolt x Floor Clearance
4ft^3, 45ft^3	.25" (6mm)
12ft^3, 23ft^3, 30ft^3, 50ft^3, 75ft^3	.50" (13mm)

FIGURE 1

Step 4
Refrigerator/Freezer Positioning

a. Line up 1/2" bolt installed in Step 3 with anti-tip bracket
b. Roll or slide Refrigerator/Freezer into position until bolt stops against bracket
c. Lock the casters

Step 5
Checking the Installation

a. Complete the installation of the Refrigerator/Freezer per the installation instructions provided with the product.
b. Check to see if the Anti-Tip bracket is installed properly by shining light under cabinet and confirming bolt in cabinet is secured by bracket on floor

5.5 Installing the Temperature Sensor Bottles

The temperature displayed on the control panel and chart recorder is measured by probes inserted in sensor bottles inside the cabinet. **The sensor probes must be inserted in the glycol bottles prior to operation.**

Undercounter models have one factory-installed sensor bottle. In medium-sized models (13.2, 23.0, and 28.7 ft^3) there are two sensor bottles, positioned in the lower right of the side of the cabinet. 51.1 ft^3models have top and bottom sensor bottles, as shown in as shown in Figure 1.

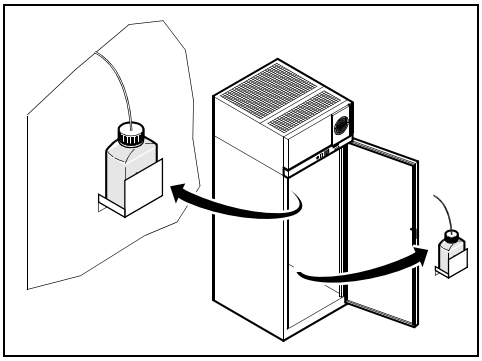


Figure 1. Sensor Bottles (51 ft^3 Models)

To install the sensor bottles:

1. Verify that each bottle is full of liquid.
2. For Spacesaver and Upright units, remove the bottom drawers, following the instructions in Section 11.1 on page 21.
3. Remove the temperature sensor from the wall.
4. Insert it through the hole in the cap.
5. Insert the temperature probe into the bottle.
6. Secure the cap to the bottle.
7. For Upright units, reinstall the bottom drawers, following the instructions in Section 11.2 on page 22.

5.6 Final Checks

Before start up, be sure to complete the following steps:

1. Make sure that the unit is free of all wood or cardboard shipping materials, both inside and outside.

2. Check the positions of the stainless steel drawers. If you want to adjust the drawer slides in an upright unit, follow the instructions in Section 11.3 on page 22.

3. Verify that the unit is connected to a dedicated circuit.

6 Operation

6.1 Start Up

To start up the refrigerator, complete the following steps:

1. Verify that the sensor probes have been installed in the bottles as described in Section 5.5 on page 5.
2. Plug in the power cord.
3. Insert the silver colored key in the switch and turn to the Power On position.The display will show the actual cabinet temperature.
4. Allow the unit to reach operating temperature before loading it with any product. To stabilize the temperature profile, a 24-hour waiting period is recommended.
5. After the unit has pulled down to the desired operating temperature, turn the three position key switch one turn further clockwise to the Alarm On position.
6. If you have a remote alarm, hook it up at this point (refer to Section 9.3 on page 16).
7. Whether you have a built-in alarm or a customer-installed remote alarm, you should test it following the instructions in Section 9.4 on page 16. Alarm setpoints are factory pre-set for 5.5°C (warm) and 1.5°C (cold) for 4.8 and 51.1 ft^3 models; 6°C (warm) and 2°C (cold) for all other models.

6.2 Product Loading and Unloading Guidelines

When loading your blood bank refrigerator, take care to observe the following guidelines:

- Never load the blood bank beyond capacity. Table 1 on page 2 shows the number of 450ml bags that are recommended for your unit.
- Distribute the load as evenly as possible. Temperature uniformity depends on air circulation, which could be impeded if drawers are overfilled, particularly at the top of the cabinet.
- For critical applications such as blood storage, be sure that the alarm systems are working and active before you load any product.
- Stacking the load higher than 8 in. (20.3 cm) from the bottom of the drawer may affect unit performance or impede operation of the drawers.

6.3 Automatic Defrost

The defrosting process on all models is primarily accomplished by air circulated during off-cycle periods. This heat-free process ensures that the temperature is not affected by the defrost cycle. The default defrost cycle runs once per hour and terminates once the target temperature is reached.

7 Control Panel

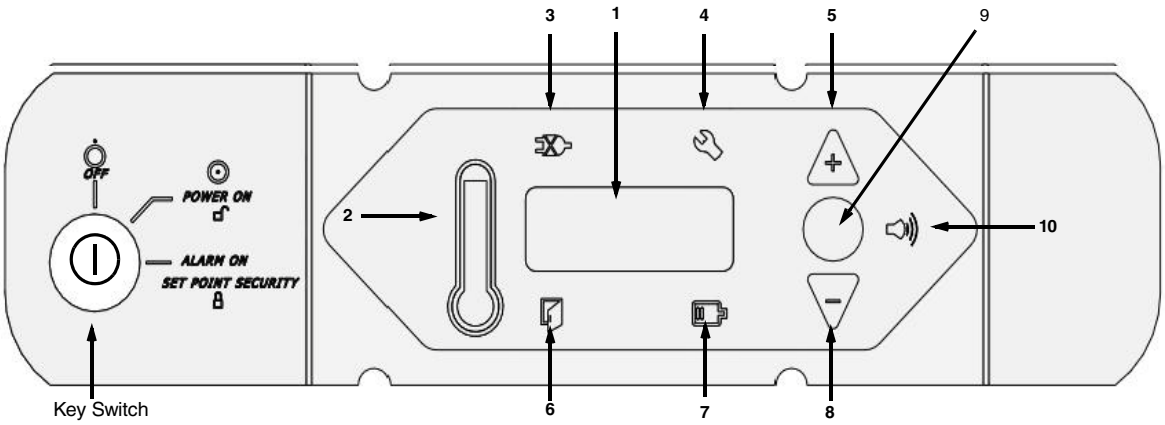


Figure 2. Blood Bank Control Panel

7.1 Control Panel Features

The control panel is located on the top right side of your blood bank refrigerator (underneath the door on Undercounter models). You can use the three pushbuttons (#5, #8, and #9 in Figure 2) to change the temperature display (#1) or to adjust temperature and alarm setpoints. The thermometer display (#2) provides a quick visual indicator of current cabinet temperature and alarm conditions.

1. Main temperature display — during normal operation, shows cabinet temperature in degrees Celsius, as measured by the primary sensor inside the cabinet. The primary sensor is located in the upper glycol bottle in 51.1 ft^3 models, on the lower right in all other models. You can use the buttons to display other values such as setpoints, highest and lowest recorded temperatures, and lower sensor temperature. The number in the main display flashes when the value can be modified.

2. Thermometer — shows cabinet temperature and alarm conditions. There are 10 horizontal bars: 9 are displayed during normal operation, the tenth (top) bar indicates a warm alarm condition. The number of bars illuminated indicates approximate cabinet temperature. Depending on alarm settings, 4 or 5 bars illuminated indicate that the cabinet is at setpoint. For example, suppose that the cabinet temperature setpoint is +4°C and that the warm and cold alarm setpoints are 8°C and 0°C. Then the number of bars illuminated indicates cabinet temperature as follows:

Bars displayed	Temperature	Bars displayed	Temperature
bulb only	0°C	6 bars	4.8
1 bar	0.8	7 bars	5.6
2 bars	1.6	8 bars	6.4
3 bars	2.4	9 bars	7.2
4 bars	3.2	10 bars	8.0
5 bars	4.0		

Table 2. Thermometer display on control panel (setpoint 4°C)

When cabinet temperature exceeds the warm alarm setpoint, the top bar of the thermometer flashes. When temperature is lower than the cold alarm setpoint, the bulb flashes.When you are in programming mode (described in Table 3) the thermometer shows the setpoint value you are changing.

3. Power failure — illuminated when the main power supply is interrupted. In this case the audible alarm also sounds.

4. Service required — illuminated when the controller is in service programming mode or when simulated warm or cold alarm conditions are failing to occur during an alarm test.

5. Increase — used to increase setpoint values in programming mode and for various display functions.

6. Door ajar — illuminated when the refrigerator door is open, the alarm is activated, and the key switch is turned to the alarm position).

7. Battery low — illuminated when the backup battery is low.

8. Decrease — pushbutton used to decrease setpoint values in programming mode and for various display functions.

9. Scan — pushbutton used to change the main display and for various other functions.

10. Audible alarm — illuminates during warm and cold alarm conditions.

For full descriptions of display, programming, and service functions, refer to Tables 3, 4 and 5 on the following pages.

7.2 Display Functions

Function	Meaning	Sequence	Display
Normal operation	Default display while refrigerator is running	—	Temperature display and control panel thermometer icon show cabinet temperature.
Coldest logged temperature	Show coldest cabinet temperature since last startup or reset	Press ▽	Display shows coldest logged temperature while button is pressed.
Warmest logged temperature	Show warmest cabinet temperature since last startup or reset	Press △	Display shows warmest logged temperature while button is pressed.
Mute	Silence audible alarm for 6 minutes	Press ○ (the Scan button between ▽ and ▽)	Display and thermometer show cabinet temperature, alarm icon continues to flash.
Reset	Return to default display after alarm condition, clears temperature log	Press △ and ▽ simultaneously, hold for five seconds	Excursion values are reset; temperature display shows cabinet temperature.
TempTest Alarm test	Tests alarm system by warming/cooling probe surface; key switch must be in alarm mode	Press △ and ○ simultaneously	Display and thermometer icon show simulated cabinet temperature, alarms flash and sound as appropriate. Alarms clear when test is completed.
Second sensor	Displays second sensor temperature	Press ▽ and ○ simultaneously and hold	Display shows second probe temperature while buttons are held, returns to primary temperature display when buttons are released. ERR is displayed if no lower sensor probe is detected.

Table 3. Control Panel Display Functions

7.3 Programming Functions

Use programming mode to adjust alarm setpoints. You can enter programming mode by pressing and holding for 5 seconds. Pressing repeatedly scrolls through the available setpoint functions: cold alarm and warm alarm.

Function	Programming Sequence
Adjust cold alarm setpoint	Enter programming mode by pressing ○ and holding for 5 seconds. On release, the current cold alarm setpoint value flashes in the temperature display; use ▽ and △ to adjust it. The display automatically returns to normal operating mode 30 seconds after the last key entry or after scrolling through both available functions.
Adjust warm alarm setpoint	Enter programming mode and press ○ repeatedly until the top of the thermometer is illuminated. The current warm alarm setpoint value then flashes in the temperature display; use ▽ and △ to adjust it. The display automatically returns to normal operating mode 30 seconds after the last key entry or after scrolling through both available functions.

Table 4. Setpoint Programming Functions

7.4 Service Parameters

You can access service parameters by entering programming mode with the controller key in the Power On position, then pressing ● for an additional 5 seconds. On release of the button, the display will go blank, then display "SEr" with the service wrench icon illuminated. Then the *firmware checksum* (read-only) will be displayed for about 4 seconds. Pressing ● repeatedly scrolls through the available service functions. While you are in service mode, the wrench icon is illuminated. For any flashing parameter you can use ▽ and △ to adjust the value.

CAUTION : Resetting any of the following parameter values could adversely affect the performance of your blood bank refrigerator. These settings very rarely need to be changed for normal +4°C operation. Be sure to call Technical Service before making any adjustments to service parameter values.

Parameter	Notes
1. Offset	Center air temperature calibration. Default value is 0.
2. Cut On	Cabinet temperature at which compressor starts to cool down to setpoint. Default Cut On value is 6°C for 4.8 and 51.1 ft^3 models; 6.1°C for 13.2ft^3 models; 6.4°C for 23.0 and 28.7 ft^3 models.
3. Differential	Cut On – differential = temperature at which compressor stops after achieving cabinet temperature setpoint. Default Differential value is 3°C for 4.8 and 51.1 ft^3 models; 2°C for 13.2ft^3 models; 1°C for 23.0 and 28.7 ft^3models.
4. Defrost Interval	Range 1 to 12 hours; default value is 1.
5. Defrost Duration	Range 5 to 30 minutes; default value is 15.
6. Defrost Termination	Temperature at evaporator at which defrost cycle terminates; default value is 4°C.
7. Short Cycle Delay	Range 0 to 15 minutes; default value is 2 for 23.0 and 28.7 ft^3 models; 0 for all other models.
8. Control Probe Temperature	Displays control probe temperature.
9. Defrost Probe Temperature	Displays defrost probe temperature.
10. Forced Defrost	Initiates a forced defrost cycle. The cycle can be terminated by briefly turning the key to the Off position.

Table 5. Service Parameters

8 Temperature Control

8.1 Setpoint Control

The unit has been set to maintain a temperature of +4°C. For most applications, you will not need to change the temperature setpoint. However, the setpoint can be changed if desired. **Note that changing the setpoint can have adverse effects on unit operation. It is advisable to contact Technical Support before changing the default temperature setpoint.**

Adjusting Temperature Setpoint

Cabinet temperature setpoint is a computed value based on the two service parameters Cut On and Differential. Cut On is the temperature at which cooling starts. Differential is the number of degrees below the Cut On temperature that the unit will continue to cool until cooling stops. Cooling stops at (Cut On minus Differential), as in the figure below, which illustrates the effect of a +6°C Cut On and a 3°C Differential.

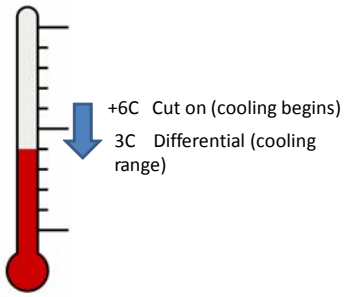


Figure 3. Cut On and Differential

To change the setpoint:

1. Turn the controller key to the "Power On" position.
2. Hold the ○ button down for 5 seconds to reach the Programming Mode. While in the Programming Mode, hold the ○ button O down for an additional 5 seconds to reach the Service Mode.
3. While in the Service Mode, press the ○ button o cycle through the menu to reach the Cut On and Differential settings. "Cut On" and "Def" will display.
4. Adjust the values of Cut On and Differential as needed using the Up and Down Arrows.

8.2 Safety Trip

13.2, 23.0 and 28.7 ft^3 models are equipped with a safety trip which prevents product from freezing in the event of loss of temperature control. The safety trip is designed to turn off the cooling system when the temperature reaches 2°C, according to the left sensor located in the bottom of the unit. The safety trip automatically allows the cooling system to be reactivated based on product temperature.

9 Alarm Systems

9.1 Operating the Alarm

The alarm system is designed to provide visual and audible warning signals for both power failure and rise in temperature. The alarm is equipped with a battery backup.

The factory default warm alarm setpoint is 5.5°C for 4.8 and 51.1 ft^3 models; 6°C for all other models.

The default cold alarm setpoint is 1.5°C for 4.8 and 51.1 ft^3 models; 2°C for all other models.

The alarm system is activated only when the key switch is turned to the Alarm On position. The audible warning signal sounds when there is a power failure or temperature alarm condition, or when the door is ajar for more than 3 minutes. The low battery alarm is visual only.

The Mute function (pressing the ◍ button) allows you to turn off the audio warning without turning off the visual indicators.

To turn off and reset flashing visual alarms, press △ and ▽ simultaneously.

There is also a ringback function after approximately 6 minutes if any alarm condition remains active.

9.2 Local and Remote Alarms

Blood bank units can have either a factory-installed local alarm or an optional user-installed remote alarm. Operating and testing procedures are the same for both types of alarm.

The maximum distance between a blood bank and a remote alarm depends on the wire gauge used. Refer to Table 6 below.

Wire Gauge	Total Wire Length (feet)	Distance to Alarm 1/2 Wire Length (feet)
20	530	265
18	840	420
16	1,330	665
14	2,120	1,060
12	3,370	1,685

Table 6. Wire Gauges and Distance to Remote Alarm

9.3 Installing a Remote Alarm (Optional)

Remote alarm terminals are located at the rear of the machine compartment. The terminals are: Common, Open on Fail (Normally Closed), and Close on Fail (Normally Open).

1. Make the following connections:
   a. Connect the common terminal on the cabinet switch to the Common wire on the alarm.
   b. Connect the normally closed terminal on the cabinet to the Open on Fail wire on the alarm. This connection gives an alarm when the switch contacts open.
2. Plug the alarm system service cord into an electrical outlet.

9.4 Alarm Test

Your blood bank is equipped with a TempTest™ testing system which automatically tests the alarm probe and electronics. This may eliminate the need for other methods of warming or cooling the probe, such as ice baths.

Theory of Operation

During the alarm test, the temperature sensor is artificially heated and cooled by a tiny, built-in thermoelectric heating and cooling unit which simulates both warm and cold conditions. The electronic control module notes the sensor temperature changes and the control panel displays these changes.

While this alarm testing procedure is very accurate and reliable, the temperature of the refrigerated space does not change during the alarm test.

Alarm Test Procedure

Note : This test automatically advances through all steps and stops.

1. Verify that the key position is in the Alarm On mode, and that the current warm and cold alarm setpoints are within normal ranges (the warm and cold simulations may not work if the setpoints are set to extreme values).

2. To start the alarm test, press △ and ○ simultaneously. During the test the main display and thermometer bulb will indicate simulated (not actual) cabinet temperature.

3. When simulated temperature exceeds the warm alarm setpoint, the alarm sounds and the alarm icon on the control panel illuminates (#10 in Figure 2 on page 9).

4. The temperature display begins to drop. After a few seconds, the temperature in the display is back in the operating range.

5. The alarm stops. The temperature on the display drops until the cold alarm sounds.

6. The test is now complete but the alarm continues to sound until the temperature on the display is back in the operating range.

If the simulated alarm conditions do not occur during the first five minutes of the alarm test, the service (wrench) icon illuminates and the test is terminated. You can also terminate the test immediately by turning the key switch to the second (Power On) position. When during the alarm test, the temperature display does not change or the service icon illuminates, check the sensor connections.

After an alarm test has terminated, there is a 10-minute delay before the test can be run again.

10 Chart Recorders

Panel-mounted six inch recorders are standard and factory-installed on all models except for undercounter models, for which free-standing recorders are provided.

Recorder operation begins when the system is powered on.

10.1 Set Up and Operation

To prepare the recorder to function properly, complete the following steps:

1. Open the recorder door to access the recorder.
2. Connect the nine volt DC battery located at the recorder's upper right corner. This battery provides back-up power.
3. Install clean chart paper (refer to Section 10.2 below for important instructions).
4. Close the recorder door.

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Note The recorder may not respond until the system reaches temperatures within the recorder's range.

Note Be careful not to pull up on the chart recorder arm while changing paper. Pulling on the arm may damage the recorder.

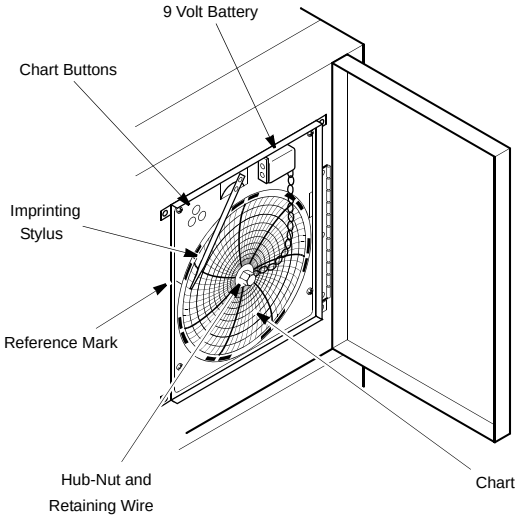


Figure 4. Six Inch Chart Recorder

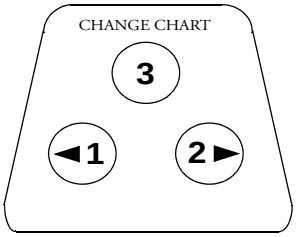


Figure 5. Pressure Sensitive Chart Buttons

10.2 Changing Chart Paper

To change the chart paper, complete the following steps:

1. Locate the pressure sensitive buttons at the front, upper left of the recorder panel.
2. Press and hold the change chart button (#3 on the upper left of the panel) for one second. The pen will move off the scale.
3. Unscrew the center nut, remove the old chart paper, and install new chart paper. Carefully align the day and time with the reference mark on the recorder panel (a small groove on the left side of the panel, shown in Figure 4).
4. Replace the center nut and hand tighten. Press the change chart button again (#3) to resume temperature recording.

10.3 Power Supply

The recorder normally uses AC power when the system is operating. If AC power fails, the LED indicator on the recorder flashes to alert you to a power failure. The recorder continues sensing cabinet temperature and the chart continues turning for approximately 24 hours with back-up power provided by the nine-volt battery.

The LED indicator glows continuously when main power is functioning and the battery is charged.

When the battery is low, the LED flashes to indicate that the battery needs to be changed.

10.4 Calibration Adjustment

This recorder has been accurately calibrated at the factory and retains calibration even during power interruptions. If required, however, adjustments can be made as follows:

1. Run the unit continuously at the control setpoint temperature. Continue steady operation for at least two hours to provide adequate time for recorder response.

2. Measure cabinet solution temperature with a calibrated temperature monitor. (Solution temperature is measured inside the sensor bottles — see Section 8.2.)

3. Compare the recorder temperature to the solution temperature. If necessary, adjust the recorder by pressing the left (#1) or right (#2) chart buttons for five seconds.

Note : The stylus does not begin to move until the button is held for five seconds.

11 Drawers

11.1 Removing the Drawers

Larger models

To remove the drawers in 13.2 ft^3 and larger models, complete the following steps (refer to Figure 6):

1. Pull the drawer toward you until the slides are fully extended.
2. Lift the back of the drawer to disengage the mounting tabs from the slots on the slides.

Note : The drawers fit snugly between the slides. Push the back of the drawer from underneath to remove the drawer.

3. Raise the back of the drawer almost to a vertical position and disengage the front mounting clips from the slides.

5 Cu. Ft. models

To remove the drawers on 5 cu.ft. models, depress the hooks located on both sides of the drawers (about 1/3 of the way back) and slide the drawers up and out.

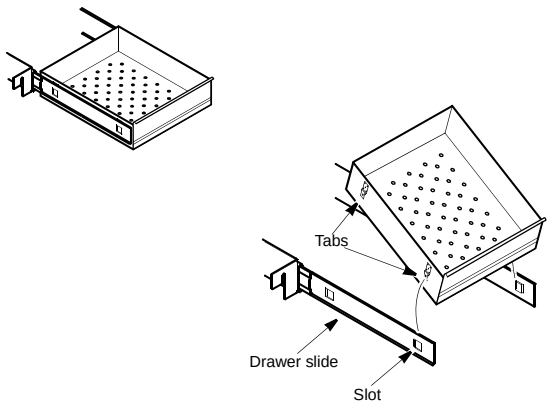


Figure 6. Drawer Removal (Upright Models)

11.2 Reinstalling the Drawers

To reinstall the drawers in 23 cu.ft. models and larger, complete the following steps (refer to Figure 6):

1. Pull both drawer slides toward you until the slides are fully extended.
2. Position the drawer between the slides and with the back facing end raised at a 45 degree angle, insert the front mounting clips into the slots on front of the slides.
3. Push the back of the drawer down between the slides and insert the drawer tabs into the back slots.

Note : The drawers fit snugly between the slides. Push on the back of the drawer from the inside to insert the drawer tabs completely into the slots. Make sure both drawer tabs are aligned with the slots on the slides before pushing the drawer down between the slides.

11.3 Changing Drawer Position

The drawer slides are adjustable to higher and lower positions in the cabinet. You can position these slides in the vertical slots which are spaced at one-inch intervals.

Drawer slides have a small wire safety clip at the front pilaster which prevents the slides from falling when the drawers are removed. To change the position of the drawer slides, complete the following steps:

1. Locate the safety clip.
2. Slip a small screwdriver under the bottom of the wire clip and pry the clip out toward the inside of the refrigerator.
3. Lift up the slide at the front. The slide is free to move from the front pilaster.
4. The drawer slide must be removed from the rear pilaster at approximately a 45 degree angle toward the center of the cabinet.
5. Pull the slide toward the front of the cabinet.
6. Reposition the slide to the desired vertical slot.
7. Replace the safety clip.

CAUTION : Drawer slides do *not* require lubrication. Additional lubricant could impede movement of the drawers when the lubricant is cold.

12 Door Operation

Standard glass doors for models larger than the undercounter model stay open if opened 90 degrees. Door spring tension cannot be adjusted.

If the self-closing doors do not work properly, make sure the unit is level.

12.1 Adjustable Hinged Glass Doors (Undercounter Models Only)

On Undercounter models with hinged glass doors, you can use a regular screwdriver to adjust spring tension and center each door on its frame. The adjustment screws ("torque" for tension and "sag" for door placement) are located on the bottom hinge bracket (shown below in Figure 1).

Hinged glass doors can be propped open with metal braces at the bottom hinges. Open the door 90 degrees or until you feel some resistance. Push the door open past the resistance and the metal braces engage. To close the door, push it toward the unit (past the resistance).

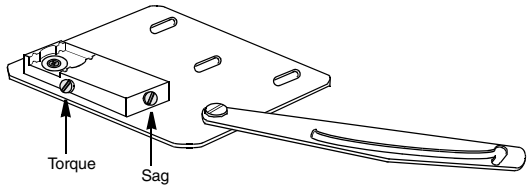


Figure 7. Undercounter Hinge Bracket for Glass Door Adjustments

CAUTION : Do not overtighten the tension as damage to the equipment can result.

WARNING: Disconnect equipment from main power before attempting any maintenance to equipment or its controls.

12.2 Door Seal

To check the door seal, complete the following steps:

1. Open the door.
2. Insert a strip of paper (a couple of inches wide) between the door gasket and the cabinet flange and close the door.
3. Slowly pull the paper strip from the outside. You should feel some resistance.
4. Repeat this test at 4-inch intervals around the door. If the door does not seal properly, you need to either replace the gasket, or adjust the door (see the previous page).

CAUTION : Door seal integrity is critical for blood bank refrigerators. A loose fitting gasket allows moist air to be drawn into the cabinet, resulting in quicker frost buildup on the evaporator coil, longer running time, poor temperature maintenance, and increased operation cost.

13 Cleaning

13.1 Cleaning the Drawers and Cabinet Interior

To clean the drawers and cabinet interior, remove the drawers following the instructions in Section 6. Use a solution of water and a mild detergent. Rinse the drawers and wipe them dry with a soft cloth.

13.2 Cleaning the Condenser

WARNING: Disconnect equipment from main power before attempting any maintenance to equipment or its controls.

CAUTION : Condensers should be cleaned at least every six months. In heavy traffic areas, condensers load with dirt more quickly. Failure to keep the condenser clean can result in equipment warm-up or erratic temperatures.

CAUTION : Never clean near condensers with your fingers. Some surfaces are sharp.

Periodically check the condenser to make sure that it is clean.

In all models, the condenser is located in the top machine compartment. To clean the condenser:

1. Disconnect the power.
2. Remove the top grill.
3. Use a vacuum cleaner with hose and brush attachments to clean the front face of the finned surface.
4. Clean up any loose dust and replace the grill.
5. Reconnect the power.

14 Troubleshooting

WARNING: Troubleshooting procedures involve working with high voltages which can cause injury or death. Troubleshooting should only be performed by trained personnel.

This section is a guide to troubleshooting equipment problems.

Problem	Cause	Solution
Unit does not operate or Power Failure Indicator is on.	Power supply	Check that the cord is securely plugged in. Plug another appliance into the outlet to see if it is live. Test the voltage and verify that it is correct for your unit (refer to Table 1 on page 2). If the outlet is dead, check the circuit breaker or fuses.
Temperature fluctuates.	Temperature control	Make sure that the control is set correctly. Refer to Section 8 on page 14.
	Condenser clogged	Make sure the condenser is clean. Refer to Section 13.2 on page 25.
	Solution bottle	Make sure the solution bottles for the temperature sensors are full. The solution is a 50/50 mixture of glycerine and distilled water.
	Other causes	If the temperature control is set correctly, the condenser is clean, but temperature continues to fluctuate, call an authorized service representative.
Low battery icon is lit.	12V backup battery needs to be replaced.	Replace the battery. On Space Saver models, it is located on the bottom of the cabinet. On larger models, it is located on the top right hand side of the cabinet.

Problem	Cause	Solution
Unit warms up.	Door is open	Make sure the door is completely closed.
	Door seal	Check the door seal, following instructions in Section 5.5 on page 5.
	Warm product recently loaded in unit	Allow ample time to recover from loading warm product.
	Power supply	Check for proper voltage to the unit. If there is no voltage to the unit, call an electrician.
	Compressor	If the compressor is not running and the power failure alarm light is on, have an electrician check for proper voltage to the unit. If the compressor is not running and the power failure alarm light is off, call the technical support hot line. If the compressor is running, open the door and look through the slotted air intake in the bottom of the evaporator cover to see if icing is present on the evaporator. If icing is present and there is no air flow behind evaporator, call technical service for assistance. The evaporator fans may be inoperative. If the compressor is running and there is airflow behind the evaporator, contact an authorized service provider or call the technical support hot line for assistance.
	Setpoints need to be adjusted	To lower the temperature by 1°C, decrease the value of the Cut On parameter by 0.5°C. Refer to Section 8.1 on page 14.
	Faulty safety trip sensor	Replace sensor.

Table 7. Troubleshooting Procedures

15 Warranty Statement

Forma Family of Products • Domestic and International Warranty • 24 Months Full Warranty Parts and Labor

During the first twenty four (24) months from shipment, Thermo Fisher Scientific Inc, through its authorized Dealer or service organizations, will at its option and expense repair or replace any part found to be non-conforming in material or workmanship. Thermo Fisher Scientific Inc reserves the right to use replacement parts, which are used or reconditioned. Replacement or repaired parts will be warranted for only the unexpired portion of the original warranty.

This warranty does not apply to damage caused by (i) accident, misuse, fire, flood or acts of God; (ii) failure to properly install, operate or maintain the products in accordance with the printed instructions provided, (iii) causes external to the products such as, but not limited to, power failure or electrical power surges, (iv) improper storage and handling of the products, (v) use of the products in combination with equipment or software not supplied by Thermo Fisher; or (vi) installation, maintenance, repair, service, relocation or alteration of the products by any person other than Thermo Fisher or its authorized representative. To obtain proper warranty service, you must contact the nearest authorized service center or Dealer. Thermo Fisher Scientific, Inc's own shipping records showing date of shipment shall be conclusive in establishing the warranty period. At Thermo Fisher's option, all non-conforming parts must be returned to Thermo Fisher postage paid and replacement parts are shipped FOB Thermo Fisher's location.

Limitation of Liability

THIS WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, WHETHER WRITTEN, ORAL, OR IMPLIED. NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY. THERMO FISHER DOES NOT WARRANT THAT THE PRODUCTS ARE ERROR-FREE OR WILL ACCOMPLISH ANY PARTICULAR RESULT.

THERMO FISHER SHALL NOT BE LIABLE FOR ANY INDIRECT OR CONSEQUENTIAL DAMAGES INCLUDING, WITHOUT LIMITATION, DAMAGES TO LOST PROFITS OR LOSS OF PRODUCTS.

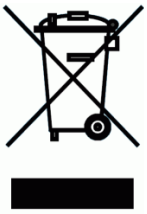
WEEE Compliance

WEEE Compliance. This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96EC. It is marked with the following symbol. Thermo Fisher Scientific has contracted with one or more recycling/disposal companies in each EU Member State, and this product should be disposed of or recycled through them. Further information on our compliance with these Directives, the recyclers in your country, and information on Thermo Scientific products which may assist the detection of substances subject to the RoHS Directive are available at **www.thermo.com/**

Great Britain

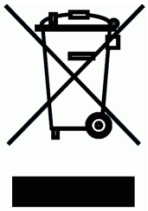
WEEE Konformittät. Dieses Produkt muss die EU Waste Electrical & Electronic Equipment (WEEE) Richtlinie 2002/96EC erfüllen. Das Produkt ist durch folgendes Symbol gekennzeichnet. Thermo Fisher Scientific hat Vereinbarungen getroffen mit Verwertungs-/Entsorgungsanlagen in allen EU-Mitgliederstaaten und dieses Produkt muss durch diese Firmen widerverwetet oder entsorgt werden. Mehr Informationen über die Einhaltung dieser Anweisungen durch Thermo Scientific, dieVerwerter und Hinweise die Ihnen nützlich sein können, die Thermo Fisher Scientific Produkte zu identizfizieren, die unter diese RoHS. Anweisungfallen, finden Sie unter **www.thermo.com/**

Deutschland



Conformità WEEE. Questo prodotto deve rispondere alla direttiva dell' Unione Europea 2002/96EC in merito ai Rifiuti degli Apparecchi Elettrici ed Elettronici (WEEE). È marcato col seguente simbolo.Thermo Fischer Scientific ha stipulato contratti con una o diverse società di riciclaggio/smaltimento in ognuno degli Stati Membri Europei. Questo prodotto verrà smaltito o riciclato tramite queste medesime. Ulteriori informazioni sulla conformità di Thermo Fisher Scientific con queste Direttive, l'elenco delle ditte di riciclaggio nel Vostro paese e informazioni sui prodotti Thermo Scientific che possono essere utili alla rilevazione di sostanze soggette alla Direttiva RoHS sono disponibili sul sito **www.thermo.com**/

Italia



Conformité WEEE. Ce produit doit être conforme à la directive euro-péenne (2002/96EC) des Déchets d'Equipements Electriques et Electroniques (DEEE). Il est marqué par le symbole suivant. Thermo Fisher Scientific s'est associé avec une ou plusieurs compagnies de recyclage dans chaque état membre de l'union européenne et ce produit devraitêtre collecté ou recyclé par celles-ci. Davantage d'informations sur laconformité de Thermo Fisher Scientific à ces directives, les recycleurs dans votre pays et les informations sur les produits Thermo Fisher Scientific qui peuvent aider le détection des substances sujettes à la directive RoHS sont disponibles sur www.thermo.com/

France

Important

For your future reference and when contacting the factory, please have the following information readily available:

Model Number: _____

Serial Number: _____

The above information can be found on the silver dataplate attached to the equipment. If available, please provide the date purchased, the source of purchase, and purchase order number.

IF YOU NEED ASSISTANCE:

Visit www.thermoscientific.com for information on contacts for worldwide sales and technical support.

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