LAB REFRIGERATORS & FREEZERS

DHF SERIES

INSTRUCTIONS

USER MANUAL

STOP

READ BEFORE CONTINUING

DHF MODELS HAVE BEEN DISCONTINUED AND ARE NO LONGER SUPPORTED

REPLACEMENT PARTS FOR DHF MODELS ARE NO LONGER AVAILABLE

So-Low Environmental Equipment Company
10310 Spartan Drive
Cincinnati, OH 45215-1221
Tel: 513-772-9410
http://www.so-low.com

For customer service:
Email: sales@so-low.com

For parts replacement:
Email: parts@so-low.com

For technical support:
Email: service@so-low.com

Instruction Manual

Laboratory and Chromatography Refrigerators

Chromatography Refrigerator Models
DHF4-27GDCH / 27GDCHA / 27GDCHR
DHF4-33GDCH / 33GDCHA / 33GDCHR
DHF4-38GDCH / 38GDCHA / 38GDCHR
DHF4-45GDCH / 45GDCHA / 45GDCHR
DHF4-49GDCH / 49GDCHA / 49GDCHR
DHF4-72GDCH / 72GDCHA / 72GDCHR

General Purpose
Laboratory Refrigerator Models
DHF4-27GD / 27GDA / 27GDR
DHF4-27SD / 27SDA / 27SDR
DHF4-33SGD / 33SGDA / 33SGDR
DHF4-38SGD / 38SGDA / 38SGDR
DHF4-45SGD / 45SGDA / 45SGDR
DHF4-49GD / 49GDA / 49GDR
DHF4-49SD / 49SDA / 49SDR
DHF4-74GD / 74GDA / 74GDR

SO-LOW Environmental Equipment Co

10310 Spartan Dr.
Cincinnati, Ohio 45215 USA
Phone: (513) 772-9410

Table of Contents

Introduction

Your satisfaction and safety are important to SO-LOW, a complete understanding of this unit is necessary to attain these objectives.

As the ultimate user of this apparatus, it is your responsibility to understand its proper function and operational characteristics. This instruction manual should be thoroughly read and all operators given adequate training before attempting to place this unit in service. Awareness of the stated cautions and warnings, and compliance with recommended operating parameters – together with maintenance requirements – are important for safe and satisfactory operation. The unit should be used for its intended application; alterations or modifications will void the Warranty.

WARNING: As a routine laboratory precaution, always wear safety glasses when working with this apparatus.

This product is not intended, nor can it be used, as a sterile or patient connected device. In addition, this apparatus is not designed for use in Class I, II or III locations as defined by the National Electrical Code, unless otherwise noted.

Unpacking

Save all packing material if apparatus is received damaged. This merchandise was carefully packed and thoroughly inspected before leaving our factory.

Responsibility for its safe delivery was assumed by the carrier upon acceptance of the shipment; therefore, claims for loss or damage sustained in transit must be made upon the carrier by the recipient as follows:

Visible Loss or Damage

Note any external evidence of loss or damage on the freight bill, or express receipt, and have it signed by the carrier's agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier's refusing to honor your damage claim. The form required to file such a claim will be supplied by the carrier.

Concealed Loss or Damage

Concealed loss or damage refers to loss or damage, which does not become apparent until the merchandise has been unpacked and inspected. Should either occur, make a written request to the carrier's agent within 15 days of the delivery date; then file a claim with the carrier since the damage is the carrier's responsibility.

If you follow the above instructions carefully, we will guarantee our full support of your claim to be compensated for loss from concealed damage.

DO NOT – FOR ANY REASON – RETURN THIS UNIT WITHOUT FIRST OBTAINING AUTHORIZATION

Packing List

The following items are packed in the envelope located inside the refrigerator chamber. If any of the following items are not present, report the missing item to your local SO-LOW representative.

1. Chart Recorder Instructions
2. This Instruction Manual
3. Door Lock Key
4. Power Switch Key

Installation

Selecting a Location

Choose a location for the refrigerator that will provide **at least three inches of clearance** between the cabinet and any adjacent vertical surface at the sides and rear. Appropriate electrical power must be available. Locate the refrigerator within 6 feet of the power outlet so that no extension cord is required.

Leveling the Unit

The refrigerator must be level in order to provide adequate condensation drainage as well as proper door alignment and operation. The refrigerator should be in its final operating location and set so that it is firmly positioned on the floor. There are four leveling screws, one on each corner. . Level the cabinet front to rear and side to side using the corner leveling screws. The leveling screws are accessed by removing the base grille, as described below.

1. Remove the lower grille attaching screws.
2. Grasp the grille with both hands.
3. Tilt the lower end of the base grille toward you.
4. Pull grille away from the refrigerator

Door Handles

(Swinging Door Models Only)
Door handles are packed inside each refrigerator. To mount the handle, lift the door gasket behind the two screws on the front of the door. Attach handle with offset away from the cabinet corner and tighten the screws.

Door Removal and Adjustment

(Sliding Door Models Only)
Each door has its own closing spring located at the top of the door track. Each spring is set for proper tension. If adjustment is required:

1. Check for cabinet level (see above).
2. Remove the door(s) by lifting it and sliding about half way open. The roller will fall into a gap in the upper track. While maintaining upward pressure on the door, pull the bottom outward until it clears the bottom track.
3. Adjust the location of the door rollers in the roller brackets (above door) as shown by loosening the lock nut on the back of the roller bracket and moving the roller up or down.

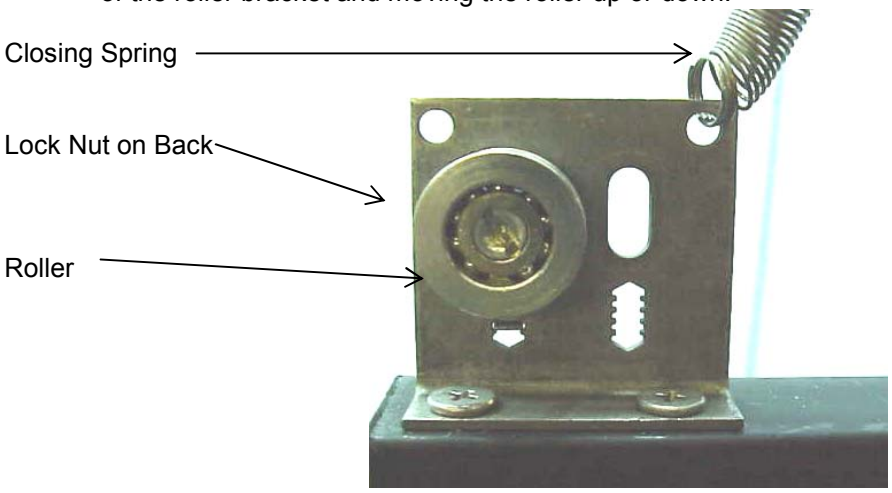


Fig 1

4. The spring tension can be adjusted by moving the spring to the outside hole of the bracket or by snipping a portion of it off and then refastening it to the bracket.

CAUTION: Where safety glasses before snipping spring.

Shelves

Shipped inside each cabinet are shelves packed in plastic and a bag of shelf supports. Two different types of shelf supports are used. The shelf supports have tab lengths of ¼ inch and ½ inch. The ¼ inch versions are used in the front of the shelf (See below) and the ½" shelf supports are used in the rear.

Shelf spacing is adjustable to suit user requirements. Insert four shelf supports for each shelf into the pilasters as shown. Note the numbers on the pilasters. Place supports on the same numbers on each pilaster to ensure the shelf will be level. Place the shelf on the pilasters as shown in Fig's 2 and 3.

NOTE: Chromatography units include additional ½ shelves, which can be used in place of the full shelves.

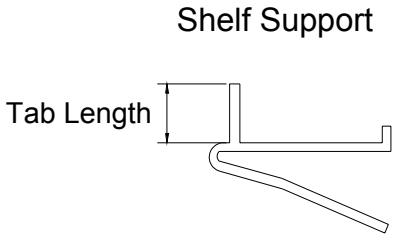


Fig. 2 Use ¼" tab length supports on sides and ½' in back.

Fig. 3 Place shelves at desired height on four shelf supports.

Electrical Connection

NOTICE: **Insufficient line voltage is often the cause of compressor start-up failure. It is strongly recommended that a dedicated circuit, conforming to the National Electrical Code, Article 440, be used for powering the refrigerator.**

CAUTION: Be sure that the power supply is the same voltage that is specified on the refrigerator's data plate.

The frequency and nominal voltage requirements for the unit are specified on the data plate, which is located on the interiors upper left side. Only plug the unit into a power source that meets these requirements. **Low line voltage is often the cause of service complaints. With the unit running, check that the line voltage is within ±10% of that specified on the data plate**.

WARNING: For personal safety this unit must be properly grounded.

The power cord of this instrument is equipped with a three prong (grounding) plug (NEMA 5-15P). This plug mates with a standard three prong (grounding) wall receptacle (NEMA 5-15R) to minimize the potential of an electrical shock hazard. Chromatography models are equipped with a (NEMA 5-20P). This plug must mate with a (NEMA 5-20R).

The customer should have the wall receptacle and circuit checked by a qualified electrician to verify the receptacle is properly grounded and meets power requirements specified on the data plate.

WARNING: DO NOT under any circumstances cut or remove the third (ground) prong from the power cord. DO NOT use a two-prong adapter plug.

Where a two prong wall receptacle is encountered, it is the personal responsibility and obligation of the user to have it replaced with a properly grounded three prong receptacle.

CAUTION: Do not use an extension cord. Use of an ungrounded cord or an overloaded circuit VOIDS the compressor warranty.

Operation

WARNING: If the unit is tilted in excess of 30 degrees, do not apply electrical power for a minimum of 12 hours.

WARNING: This product is NOT approved for storage of flammable or explosive materials. Also, it is NOT approved for use in hazardous locations containing explosive atmospheres.

Control Layout

Before operation, become familiar with the refrigerator controls located on the refrigerator header panel. A layout of the controls is given below.

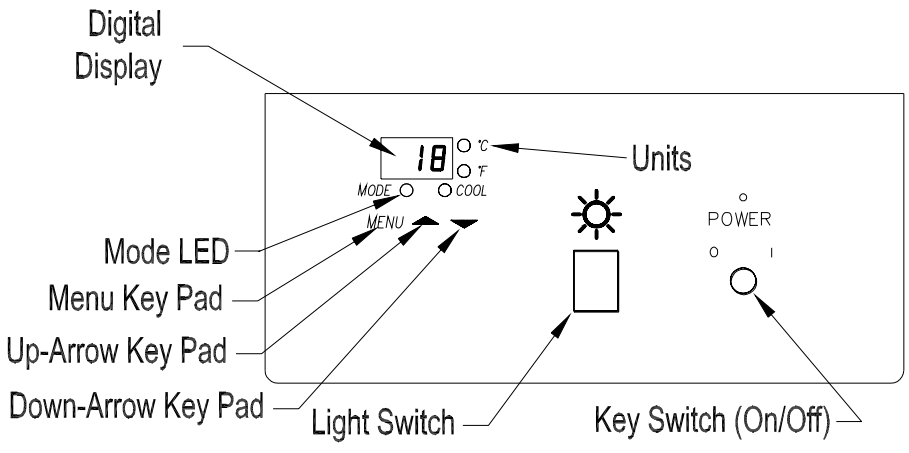


Figure 4

Begin operation by inserting the key into the key switch located on the header panel. The key switch is packed inside the envelope, which is shipped in the refrigerator chamber. Turning the key switch to the ON (|) position will energize the evaporator fans and the digital controller.

Temperature Controller

The digital temperature controller is located on the left side of the header panel (See Figure 4). When the unit is initially turned on, the display will indicate current chamber temperature. The temperature units will be indicated by the °C or °F LED located just to the right of the temperature display. The refrigerator is factory set at 4°C. When the unit is first energized the evaporator fans will operate however it will not immediately cool. A compressor delay is programmed into the controller to provide sufficient time for the evaporator to defrost and to allow the system pressure time to equalize. When the delay time is over, the *Cool* LED will illuminate, the compressor will run and the chamber will cool.

NOTE: The compressor requires a time delay between activations. The unit will not cool during this delay. The delay is also activated when the controller is first energized.

Setting the Temperature

To change the set temperature, press and release the *Menu* keypad once. The display will flash *SP* and the Mode LED will be illuminated. The last set temperature will then be shown in the display.
To change the temperature, press the *UP* or *DOWN* arrow key. The adjustable temperature range is 1 to 12°C (34 to 54°F). When the desired set temperature is displayed, press the *Menu* keypad to enter the set temperature and activate the *Units Select* menu.

Units Select

The second menu selects the units. The refrigerator control displays temperature in °C or °F. The factory setting is °C. Starting from the temperature display mode (Mode LED off), press the *Menu* key twice. The current temperature units are displayed. To switch between units, press the UP or DOWN arrow key then press the *Menu* key to select. The unit LED will be displayed on the right of the temperature display.

Calibration Offset

In the event the refrigerator needs to be calibrated, a simple routine is available to adjust the display and control point to a referenced standard. To set a temperature offset, press and hold the *Menu* keypad for 5 seconds. The display will flash **oS** followed by the last temperature offset value. The factory setting is 0. To change the offset value, press the UP or DOWN arrow key, then press the *Menu* key. The value shown in the display will be added to the previous temperature reading.

For Example:
The display indicates 4°C but a reference thermometer in the refrigerator chamber indicates 6°C. The operator presses and holds the *Menu* keypad for 5 seconds, then changes the display value from 0 to +2 by using the UP arrow key. The *Menu* key is pressed again. Now the display indicates a chamber temperature of °6 C and the controller begins to cool (as long as the 3 min. time delay has expired) to the desired temperature of 4°C as shown on the reference thermometer.

Allow an additional 30 to 40 minutes for the refrigerator to again stabilize. If the display is still inaccurate, repeat the calibration offset procedure.

CAUTION: INCREASING the offset value DECREASES the temperature at which the system controls. If the offset is inadvertently set too high, the chamber temperature can fall below zero and cause evaporator freeze-up. This is caused by the evaporator temperature not rising above 0°C and not defrosting during the compressor "off cycle".

Hold-Off Time

Following the offset menu is the hold-off (Ho) menu. The display will momentarily flash "Ho", followed by a number. The number shown is the delay time in minutes between compressor activations. Use the UP/DOWN keypads to change the value.

Increasing the hold-off time will allow additional time for the evaporator to defrost during the off-cycle. This can reduce the chance of evaporator freeze-up during times of high humidity. Pressing the *Menu* keypad while in the Ho mode, enters the hold-off time displayed, and returns controller operation to the temperature display mode.

NOTE: While in any of the controller mode setups (temp set, calibration offset or units), the controller will wait 15 seconds for a new value to be entered. If there is no keypad operation within the 15-second time window, control will automatically revert to the temperature display mode and the *Mode* LED will turn off.

Error Codes

Error codes indicate when the controller is sensing a problem. A description of each is given below. See the **Troubleshooting Table** for additional information on error codes.

E1 Open sensor.
E2 Under temperature. Temperature at sensor is less than –36°C.
E3 Over temperature. Temperature at sensor is greater than 37°C.

Fluorescent Lamps

The interior lamp is controlled by a rocker switch on the header panel. This light may be operated any time the cabinet power is turned on at the keyed power switch.

If the interior lamp fails, replace with the same size and wattage lamp. DO NOT USE REDUCED WATTAGE LAMPS. The reduced wattage lamps generally fail to light below 60 °F (15 °C).

Convenience Outlet

(Chromatography Refrigerators Only)

Chromatography Refrigerators come equipped with a convenience outlet located in the center of the back wall. Model 172G's (three doors) have two convenience outlets. The total power that can be supplied by the outlet (or outlets in 3-door models) is 5A @ 120VAC (4A @ 120VAC for the 3-door models). The outlet(s) is protected by a circuit breaker located just below and to the right of the outlet(s). Pressing the breaker button resets the breaker after a fault.

WARNING: The convenience outlet is LIVE at any time the unit is connected to an electrical power source, regardless of the position of the key switch.

Manual/Automatic Condenser Fan

A rocker switch located on the left side of the top of the inside of the chamber is used to operate the condenser fan automatically or manually. With the switch in the automatic position, the condenser fan operates with the condenser. In the manual position, the condenser fan operates continuously.

During times of high ambient relative humidity conditions, more water is condensed on the evaporator and directed to the condensate pan. The condenser fan will run continuously in the manual setting to better dispose of this water. At times of low relative humidity, the switch can be set to automatic.

Trouble Shooting Table

This table is intended to assist in resolving user-correctable Refrigerator problems by relating symptoms to their likely causes. If service beyond the scope of this table is required, contact service @ 1-800-926-0505.

Symptom	Probable Cause	Action
Does Not Run	Unit Unplugged Blown fuse or tripped circuit breaker	Plug in Unit Check fuse or circuit breaker at breaker box
Runs Continuously	Frost buildup on refrigeration coils	Defrost unit. Increase hold-off (Ho) time.
Clicking Sound	The compressor is equipped with a thermal protector. This device shuts off the compressor when it becomes to hot. A clicking sound occurring about every 30 seconds indicates this protector is working	Disconnect power and call for service.
Insufficient Cooling	Set temp is to high Condenser coil dirty Unit frosted	Reduce temperature setting, verify *Cool* LED is on. Clean condenser coil with a vacuum cleaner Defrost unit
Display shows E1 (error code)	Open sensor	Check sensor connection
Display shows E2 (error code)	Under Temp	Temperature at sensor is less than –36°C or sensor is malfunctioning.
Display shows E3 (error code)	Over Temp	Temperature at sensor is greater than 37°C or sensor is malfunctioning

For future reference, when contacting service have the following information readily available:

Catalog Number: _____

Serial Number: _____

Date of Purchase: _____

The serial and catalog numbers can be found on the data plate, which is located inside the unit on the left side wall.

Maintenance

CAUTION: **When servicing the unit, disconnect from the electrical power source**

Cabinet Cleaning

The cabinet interior should be cleaned frequently. Any spilled liquid should be wiped off immediately. Stains resulting from some spills can be permanent if not quickly removed. The most convenient time to clean the interior is after defrosting. The cabinet exterior should be cleaned occasionally. A mild detergent and lukewarm water or a solution of bicarbonate of soda (1 tablespoon per gallon of water) is recommended for cleaning the interior and exterior of the cabinet. All surfaces should be rinsed and thoroughly dried.

CAUTION: Do not use any type of abrasive such as steel wool, or fluids such as gasoline, Naphtha, or thinner. These materials could be harmful to plastic materials, door gasket, and painted surfaces.

Cleaning the Condenser

For efficient operation, it is recommended that the condenser coil and fan be cleaned every 4 to 6 months. The condenser coil is located behind the base grille, at the bottom of the unit. See L*eveling the Unit* for instructions on removing the base grille.

Vacuum clean the front surface of the coil thoroughly, or direct forced air through the condenser from the rear. If necessary, use a stiff bristled brush to loosen any dirt. Failure to keep the condenser clean will void the warranty.

Caution: Accessing and cleaning the condenser coil or evaporator pan should be done by qualified personnel.

Condensate Evaporator Pan

The *condensate evaporator pan* is located behind the base grill between the condenser fan and compressor. This pan should be cleaned at least once a year to prevent foul odors and operate efficiently. Vacuum clean if dry, or sponge clean with soapy water.

Performance Characteristics

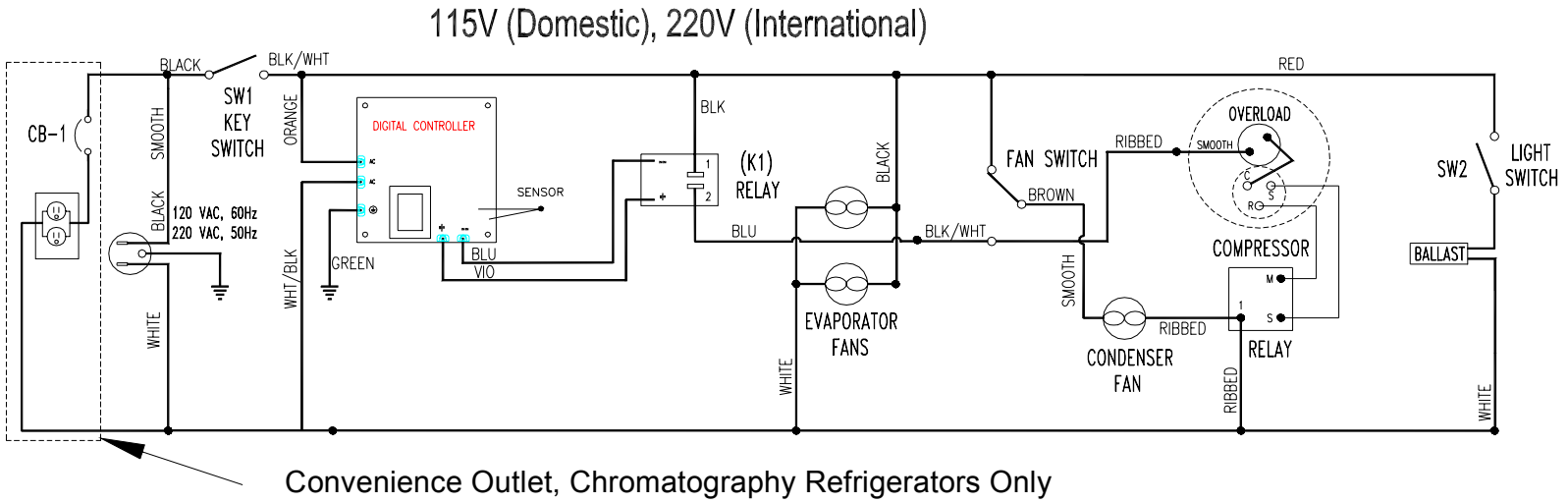
Temperature Range: 1° to 12°C (34° to 54°F)

Temperature Stability: +/- 3°C

Power Requirements

Catalog Number	volts(AC)	Amps	Hz
DHF4-27GDCH/27GDCHA/27GDCHR	115	13.5	60
DHF4-33SGDCH/33SGDCHA/33SGDCHR	115	16.0	60
DHF4-38SGDCH/38SGDCHA/38SGDCHR	115	16.0	60
DHF4-45SGDCH/45SGDCHA/45SGDCHR	115	16.0	60
DHF4-49GDCH/49GDCHA/49GDCHR	115	16.0	60
DHF4-72GDCH/72GDCHA/72GDCHR	115	16.0	60
DHF4-27GD/27GDA/27GDR	115	8.5	60
DHF4-27SD/27SDA/27SDR	115	8.5	60
DHF4-33GD/33GDA/33GDR	115	10.5	60
DHF4-38GD/38GDA/38GDR	115	10.5	60
DHF4-45SGD/45SGDA/45SGDR	115	10.5	60
DHF4-49GD/49GDA/49GDR	115	10.5	60
DHF4-49SD/49SDA/49SDR	115	10.5	60
DHF4-74GD/74GDA/74GDR	115	12.0	60

Wiring Diagram



Instruction Manual

Laboratory Freezers

Freezer Models
DHF29-23SD \ 23SDA \ 23SDR
DHF29-46SD \ 46SDA \ 46SDR
DHF29-74SD \ 74SDA \ 74SDR

SO-LOW Environmental Equipment Co

10310 Spartan Dr.
Cincinnati, Ohio 45215 USA
Phone: (513) 772-9410

Prior to calling for service, have the following information readily available:

Catalog Number: _____

Serial Number: _____

Date of Purchase: _____

The catalog number and serial number can be found on the data plate located on the left interior wall of the unit.

Table of Contents

Introduction

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If you follow the above instructions carefully, we will guarantee our full support of your claim to be compensated for loss from concealed damage.

DO NOT – FOR ANY REASON – RETURN THIS UNIT WITHOUT FIRST OBTAINING AUTHORIZATION

Packing List

The following items are packed in the envelope located inside the refrigerator chamber. If any of the following items are not present, report the missing item to your local SO-LOW representative.

1. Warranty Card
2. This Instruction Manual
3. Door Lock Key
4. Key Switch Key
5. Chart Recorder Instructions (catalog no.'s ending in "A" or "R")
6. Charts

Installation

Selecting a Location

Choose a location for the freezer that will provide **at least three inches of clearance** between the cabinet and any adjacent vertical surface at the sides and rear. Appropriate electrical power must be available. Locate the freezer within 6 feet of the power outlet so that no extension cord is required.

Casters

Each freezer is shipped with four casters, which are packaged separately and fastened inside the cabinet. Threaded legs are available as an option for Laboratory Freezers. Legs and casters screw directly into the weld nut provided in each corner of the base.

Leveling the Unit

The freezers come with four casters, which thread into the base of the unit, one in each corner. Use the wrench provided to thread the casters completely into the base of the unit. Back the casters in or out until the unit is level and resting on all four casters. See figure 1.

NOTE: The freezer must be level in order to provide adequate condensation drainage as well as proper door alignment and operation. The freezer should be in its final operating location and set so that it is firmly positioned on the floor.

Level the cabinet front to rear and side to side using the leg inserts.

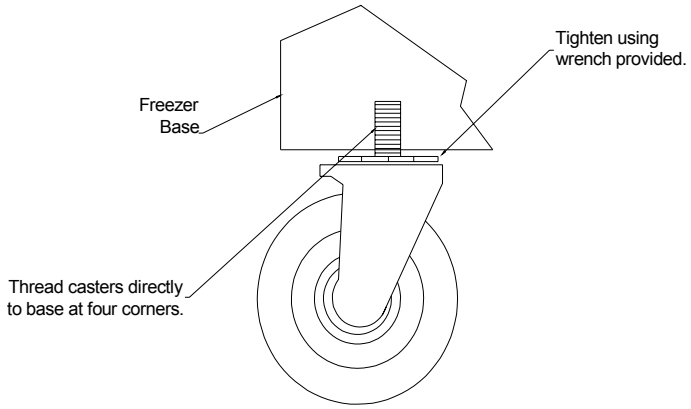


Figure 1

WARNING: If the unit is tilted in excess of 30 degrees, level it and wait 12 hours before applying power.

Shelves

Included are three (3) epoxy coated wire shelves per door opening. Also included are three epoxy coated filler shelves for the two and three door models. Shelf spacing is adjustable on half-inch centers with the enclosed shelf supports to suit requirements. Replacement shelves are available individually. See page 11 for shelf part number.

Shelf Installation

For each shelf, insert four shelf supports at equal heights onto the pilasters as shown in Figure 2 on the following page. Shelf supports (2) with ½" long tabs are placed in the two rear pilasters while the ¼" shelf supports are placed on the two front pilasters. Place shelf on top of the shelf supports as shown on Figure 3.

Chart Recorder

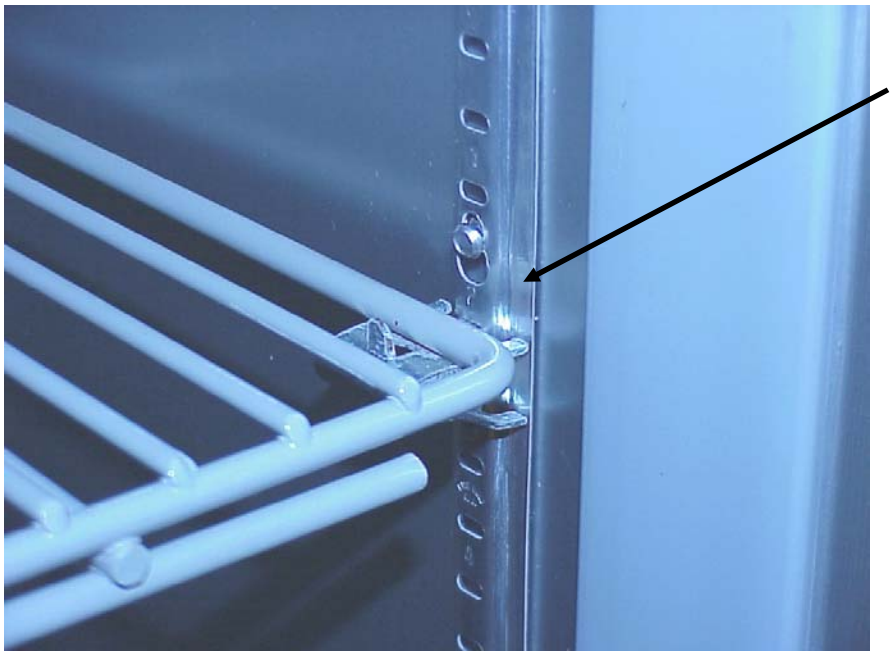
Provided in the packing envelope is a set of instructions for setting up and using the optional chart recorder and alarm (when applicable). Freezer versions ending in A or R will be equipped with the chart recorders. Read the instruction sheet thoroughly before use.

Compressor Mounts

The compressor is secured with steel banding to prevent damage during shipping. Before operating the compressor, remove the banding. Removing the banding will allow free movement of the compressor while the freezer is running. After cutting the banding, verify the drain tube is not on top of the compressor foot.

CAUTION: Remove the banding around the compressor before operation. Verify the drain tube is not on top of the of the compressor foot.

Figure 2



Insert four shelf supports into pilasters for each shelf.

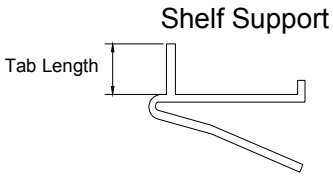


Figure 3

Electrical Connection

NOTICE: **Insufficient line voltage is often the cause of compressor start-up failure, especially in 115V freezers. It is strongly recommended that a dedicated 20A circuit, conforming to the National Electrical Code, be used for powering the freezer.**

CAUTION: Be sure that the power supply is the same voltage that is specified on the refrigerator's data plate.

The frequency and nominal voltage requirements for the unit are specified on the data plate, which is located on the interiors upper left side. Plug the unit into a power source that meets these requirements. Low line voltage is often the cause of service complaints. With the unit running, check that the line voltage is within ±5% of that specified on the data plate.

WARNING: For personal safety this unit must be properly grounded.

The power cord of the single door model is equipped with a **NEMA 5-20P** three-prong (grounding) plug which must mate with a standard **NEMA 5-20R** three-prong (grounding) wall receptacle. The customer should have the wall receptacle and circuit checked by a qualified electrician to verify the receptacle is properly grounded and is connected to 20 amp service minimum.

WARNING: DO NOT under any circumstances cut or remove the third (ground) prong from the power cord. DO NOT use a two-prong adapter plug.

Where a two prong wall receptacle is encountered, it is the personal responsibility and obligation of the user to have it replaced with a properly grounded three prong receptacle.

The power cord for the two and three-door models is equipped with a **NEMA L14-20P** four prong (grounding) plug which must mate with a standard **NEMA L14-20R** four-prong (grounding) receptacle. The customer should have the wall receptacle and circuit breaker checked by a qualified electrician to verify the receptacle is properly grounded and connected to a 20 amp service minimum.

CAUTION: Do not use an extension cord. Use of an ungrounded cord or an overloaded circuit VOIDS the compressor warranty.

Operation

Begin operation by inserting the key into the key switch located on the header panel. The key switch is packed inside the envelope, which is shipped in the freezer chamber. Turning the key switch to the ON (|) position will energize the compressor and condenser fans and the digital controller. All models delay the evaporator fans from starting until the evaporator temperature has pulled down to 25°F. When the evaporator fans begin running, a switch behind each door will stop the fans while the door is opened. This is to minimize loss of cold air while the door(s) are open.

WARNING: This product is not approved for storage of flammable or explosive materials. Also, it is not approved for use in hazardous locations containing explosive atmospheres.

Control Layout

Before operation, become familiar with the freezer controls located on the header panel. A layout of the controls is given below.

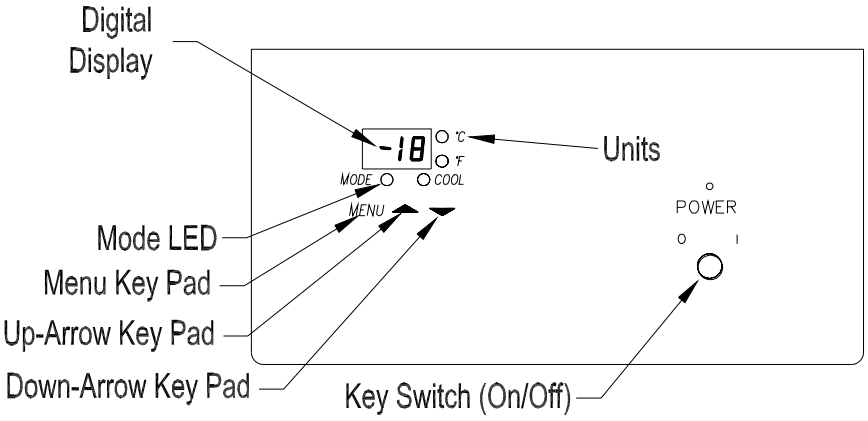


Figure 3

Temperature Controller

The digital temperature controller is located on the center of the header panel (See Figure 3). When the unit is initially turned on, the display will indicate current chamber temperature. The temperature units will be indicated by the °C or °F LED located just to the right of the temperature display. The freezer is factory set to -15°C. A 3-minute compressor delay is programmed into the controller to provide sufficient time for the system pressure to equalize. When the delay time is over, the *Cool* LED will illuminate, the compressor will run and the chamber will cool.

NOTE: The compressor requires a 3-minute delay time between activations. The unit will not cool during this delay.. This delay time will also be in affect immediately after power-up

Setting the Temperature

To change the set temperature, press and release the *Menu* keypad once. The display will flash SP and the Mode LED will be illuminated. The last set temperature will then be shown in the display. To change the temperature, press the *UP* or *DOWN* arrow key. The adjustable temperature range is 0 to -30°C (32 to -22°F). When the desired set temperature is displayed, press the *Menu* keypad to enter the set temperature and activate the *Units Select* menu.

Units Select

The second menu selects the units. The freezer control displays temperature in °C or °F. The factory setting is °C. Starting from the temperature display mode (Mode LED off), press the *Menu* key twice. The current temperature units are displayed. To switch between units, press the UP or DOWN arrow key to change to the desired units, then press the *Menu* key to select. The desired unit LED will be displayed on the right of the temperature display.

Calibration Offset

In the event the freezer needs calibrated, a simple routine is available to adjust the display and control point to a reference standard. To set the temperature offset, press and hold the *Menu* keypad for 5 seconds. The display will flash *oS* (offset) followed by the last temperature offset value. The factory setting is 0. To change the offset value, press the UP or DOWN arrow key, then press the *Menu* key. The value shown in the display will be added to the previous temperature reading. The maximum offset value is +/- 5°C (+/- 9°F).

For Example:
The freezer has been operating at –15°C for 30 minutes. The display indicates -15°C but a reference thermometer in the refrigerator chamber indicates –17°C. The operator presses and holds the *Menu* keypad for 5 seconds and changes the offset value from 0 to -2. The *Menu* key is pressed again. Now the display indicates a chamber temperature of –17°C and the system begins to control to the desired temperature of –15°C (as long as the 3 min. time delay has expired).

Allow an additional 30 to 40 minutes for the refrigerator to again stabilize. If the display is still inaccurate, repeat the calibration offset procedure.

NOTE: While in any of the controller mode setups (temp set, units or calibration offset), the controller will wait 15 seconds for a value to be entered. If there is no keypad operation within the 15-second time window, control will automatically revert to the temperature display mode and the *Mode* LED will turn off.

Error Codes

Error codes indicate when the controller is sensing a problem. A description of each is given below. See the **Troubleshooting Table** for additional information on error codes.

E1 Open sensor.
E2 Under temperature. Temperature at sensor is less than –36°C.
E3 Over temperature. Temperature at sensor is greater than 37°C.

Interior Light(s)

Each cabinet has interior light(s) activated by a door switch(s). The lights are automatically turned on or off by opening or closing the door(s). Replace with 40 watt refrigerator grade bulb.

Defrost System

The defrost heaters are controlled by a defrost timer. The timer is a 24Hr dial timer located in a galvanized box behind the header panel. The timer is factory set to provide four defrost cycles per 24 hour period. The defrost heaters are deactivated by a thermal switch or by the defrost timer time limit.

WARNING: Changes to the defrost cycle are not recommended and void the warranty.

NOTE: The freezer will not cool while in the defrost mode, even if the *Cool* LED is illuminated.

Trouble Shooting Table

This table is intended to assist in resolving user-correctable refrigerator problems by relating symptoms to their likely causes. If service beyond the scope of this table is required, contact service @ 1-800-395-5442.

Symptom	Probable Cause	Action
Does Not Run	Unit Unplugged Blown fuse or tripped circuit breaker	Plug in Unit Check fuse or circuit breaker at breaker box
Runs Continuously, does not cool.	Frost buildup on refrigeration coils	Defrost unit, try again.
Clicking Sound	The compressor is equipped with a thermal protector. This device shuts off the compressor when it becomes to hot. A clicking sound occurring about every 30 seconds indicates this protector is working	Disconnect power and call for service.
Insufficient Cooling	Set temp is to high	Reduce temperature setting, verify *Cool* LED is on.
	Condenser coil dirty	Clean condenser coil with a vacuum cleaner
	Incorrect calibration offset.	Perform calibration page 9.
	Relay (K1) is not functioning.	Replace relay.

For future reference, when contacting service please have the following readily available:

Catalog Number: _____

Serial Number: _____

Date of Purchase: _____

The serial and catalog numbers can be found on the data plate, which is located inside the unit on the left side wall.

Maintenance

CAUTION: When servicing the unit, disconnect from the electrical power source

Cabinet Cleaning

The exterior of the freezer cabinet should be cleaned with a solution of mild soap and water. Do not use caustic soap or abrasive cleaners since these may damage the cabinet finish. If stainless steel surface becomes discolored, scrub by rubbing only in the direction of the finished grain. The anodized aluminum interior and exterior should be cleaned with mild soap and water. Do not use steel wool

CAUTION: Do not use any type of abrasive such as steel wool, or fluids such as gasoline, Naphtha, or thinner. These materials could be harmful to plastic materials, door gasket, and painted surfaces.

The cabinet interior should be cleaned frequently. Any spilled liquid should be wiped off immediately since stains resulting from some spills could be permanent if not quickly removed.

A mild detergent and lukewarm water or a solution of Bicarbonate of Soda (1 tablespoon per gallon of water) is recommended for cleaning the interior or exterior of the cabinet. Surfaces should be rinsed and dried carefully and thoroughly.

Cleaning the Condenser

For efficient operation, it is recommended that the condenser coil and fan be cleaned every 4 to 6 months. The condenser coil is located behind the vented part of the header panel (left side). Remove the header panel for access. Vacuum clean the front surface of the coil thoroughly, or direct forced air through the condenser from the rear. If necessary, use a stiff bristled brush to loosen any dirt. Failure to clean the condenser will void the warranty.

Caution: Accessing and cleaning the condensate coil or pan should be done by qualified personnel.

Condensate Evaporator Pan

The condensate evaporator pan, located behind and below the condenser fan, must be cleaned periodically to prevent foul odors and to operate efficiently. Vacuum clean if dry or sponge clean with soap and water.

Performance Characteristics

Temperature Range

-30° to 0°C (-22° to 32°F)

Temperature Stability

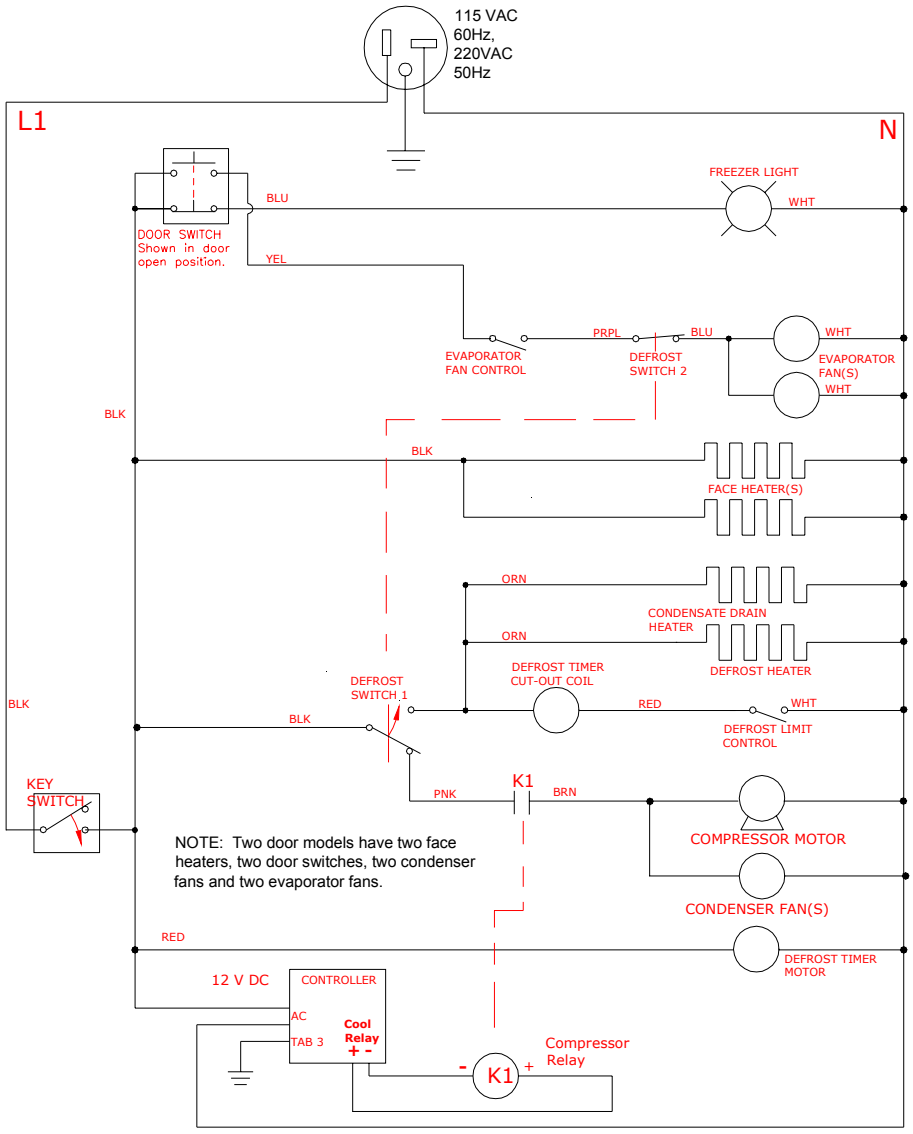
+/- 4°C

Electrical Requirements

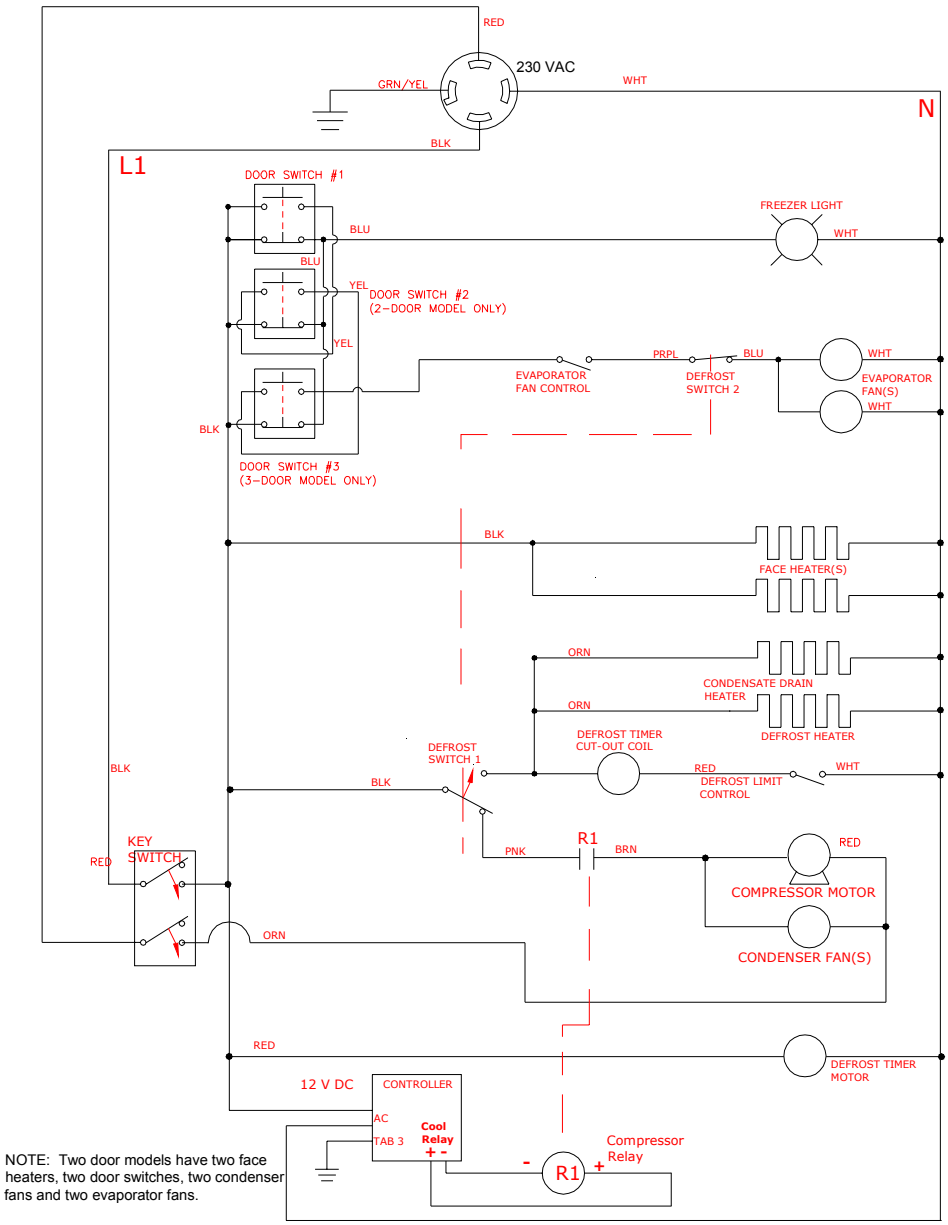
Catalog Number	Volts (+/- 10%)	Amps	Hz
DHF29-23SD\23SDA\23SDR	115	10.0	60
DHF29-46SD\46SDA\46SDR	230	10.5	60
DHF29-74SD\74SDA\74SDR	230	16.0	60

Wiring Diagrams

Catalog Number: DHF29-23SD \ 23SDA \ 23SDR



Catalog Numbers: DHF29-46SD \ 46SDA \ 46SDR
DHF29-74SD \ 74SDA \ 74SDR



NOTE: Two door models have two face heaters, two door switches, two condenser fans and two evaporator fans.

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SO-LOW Environmental Equipment Co., Inc.
10310 Spartan Dr.
Cincinnati, OH USA