

# VWR General Purpose & Chromatography Refrigerators

## Installation and Operation

329137H04 • Revision C • February 2019



**IMPORTANT** Read this instruction manual. 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. VWR makes no representations or warranties with respect to this manual. In no event shall VWR be held liable for any damages, direct or incidental, arising from or related to the use of this manual.

© 2019 VWR Inc. All rights reserved.

For your future reference and when contacting the factory, please have the following information readily available. It can be found on the dataplate attached to your unit.

Model Number: \_\_\_\_\_

Serial Number: \_\_\_\_\_

The following information, if available, is helpful for contacting the factory.

Date Purchased: \_\_\_\_\_

Purchase order number: \_\_\_\_\_

Source of Purchase: \_\_\_\_\_

(manufacturer or specific agent/rep organization)

# Contents

Model .....	1
Safety Precautions .....	2
Unpacking .....	4
Packing List .....	4
General Recommendations .....	5
Temperature Monitoring .....	5
Intended Use .....	5
Initial Loading .....	5
Operating Standards .....	6
Unit Specifications .....	6
Installation .....	8
Location .....	8
Leveling the Unit .....	8
Castor Installing and Pallet Removal Instructions .....	8
Chromatography Refrigerators .....	10
Wiring .....	10
Shelves .....	13
Installation Instructions .....	13
Door Operation .....	13
Remote Alarm .....	13
Final Checks .....	14
Startup .....	15
Initial Startup .....	15
Chromatography Refrigerators .....	15
Product Loading and Unloading Guidelines .....	15

Operation.....	16
Control Panel .....	16
Temperature Setpoint .....	17
Alarms.....	17
Controller Parameter Settings.....	18
Maintenance .....	21
Cleaning the Cabinet Interior .....	21
Cleaning the Unit (Chromatography Refrigerators) ....	21
Cleaning the Condenser .....	21
Automatic Defrost .....	21
Gasket Maintenance .....	21
Alarm Battery Maintenance .....	22
Preparation for Storage .....	22
Replacing Sensor (Chromatography Refrigerators) ...	22
Sensor Maintenance (	
Chromatography Refrigerators) .....	22
Troubleshooting .....	23
End of Life Care .....	24
Warranty .....	25
Regulatory Compliance .....	26
Product Safety .....	26
Electromagnetic Compatibility .....	26
Energy Efficiency .....	27
Additional Regulations and Markings.....	27

# Model

The table below shows the units covered in this operation and installation manual by model number.

**Table 1. Applicable Models**

Refrigerators	
VWG12RPGA	VWG45RSLA
VWG25RPGA	VWG45CSLA
VWG25RPSA	VWG49RPGA
VWG25RSGA	VWG49CPGA
VWG25RSSA	VWG49RPSA
VWG30RPGA	VWG49RSGA
VWG30CPGA	VWG49CSGA
VWG30RPSA	VWG49RSSA
VWG30RSGA	VWG72RPGA
VWG30CSGA	VWG72CPGA
VWG30RSSA	VWG72RSGA
VWG45RPLA	VWG72CSGA
VWG45CPLA	

The annotation of model numbers is given in the following table:

**Table 2. Model Specification**

Series	VWG (VWR PL)
Size (cu.ft)	12, 25, 30, 45, 49, 72
Type	C = Chromatography
Exterior	P = Painted S = Stainless
Door Type	G = glass L = Sliding glass
Voltage	A = 115 V/60 Hz

# Safety Precautions

In this manual, the following symbols and conventions are used.



**WARNING:** This symbol when used alone indicates important operating instructions which reduce the risk of injury or poor performance of the unit.



**WARNING:** This symbol indicates potentially hazardous situations which, if not avoided, could result in serious injury or death.



**WARNING:** This symbol indicates situations where dangerous voltages exist and potential for electrical shock is present.



**WARNING:** This symbol indicates potentially hazardous situations, which if not avoided could result in fire.



**CAUTION:** This symbol, in the context of a CAUTION, indicates a potentially hazardous situation which if not avoided could result in minor to moderate injury or damage to the equipment. This indicates a situation which may result in property damage.



**CAUTION:** This symbol indicates surfaces which may become hot during use and may cause a burn if touched with unprotected body parts.



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



**CAUTION:** This symbol indicates possible pinch points which may cause personal injury.



**WARNING:** The snowflake symbol indicates low temperatures and risk of frost bite. Do not touch bare metal or samples with unprotected body parts.

Below are important safety precautions that apply to this product.



**CAUTION:** 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. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.



**CAUTION:** 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.



**WARNING:** Your unit must be properly grounded in conformity with national and local electrical codes. Do not connect the unit to overloaded power sources.



**WARNING:** Disconnect the unit from all power sources before cleaning, troubleshooting, or performing other maintenance on the product or its controls.



**WARNING:** This unit is not for storage of flammable materials.



**WARNING:** Units are charged with hydrocarbon refrigerant (R290). Only qualified service personnel should service this unit.



**WARNING:** Unauthorized repair of your unit will invalidate your warranty. Contact Technical Service at 1-866-984-3766 for additional information.



**DANGER:** Risk of fire or explosion. Flammable refrigerant used to be repaired only by trained service personnel. Do not puncture refrigerant tubing.



**WARNING:** No equipment that uses an open flame should be placed inside the refrigerator. This will harm the unit, hamper functionality and compromise your safety.



**WARNING:** Do not use any battery powered or externally-powered equipment in the refrigerator.

Below are additional safety precautions that apply to chromatography refrigerator models:



**CAUTION:** Equipment should only be powered using the internal outlet. In case of a leak the safety circuit will remove power to the outlet in the unit, but shall have no control over equipment power via battery or externally. Do not use instrumentation or equipment that incorporates potential ignition sources, e.g. open contact switching, brushed DC and AC motors, etc.



**CAUTION:** The chromatography safety circuit has slots/holes at the bottom of the plug panel for enabling air to the safety sensor. Do not block the Safety Circuit ventilation holes as this will diminish and defeat the Safety Circuit.



**WARNING:** Do not store or use uncapped reagents, vessels and bottles inside the chromatography equipment. This may diminish functionality of the safety circuit.

# Unpacking

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 to the manufacturer without written authorization.**

When submitting a claim for shipping damage, request that the carrier inspect the shipping container and equipment.

## Packing List

Along with the unit, following things will be packed:

- Installation and Operation manual is placed in the white envelope
- Door Lock Key and Power Key Switch is wire tied to the pilaster on the upper top front.
- Small bag with shelving clips
- Shelves
- Half shelves (with chromatography refrigerators)
- Power cord (with chromatography refrigerators and 25, 30 cu.ft general purpose refrigerators)
- Casters (Applicable for 12, 25, 30 cu.ft models only)
- Wrench (Applicable for 12, 25, 30 cu.ft models only)



# General Recommendations

This section includes some general recommendations for your unit.

## Temperature Monitoring



**IMPORTANT NOTE:** We recommend the use of a redundant and independent temperature monitoring system so that the unit can be monitored continuously for performance commensurate with the value of product stored.

## Intended Use

The refrigerators described in this manual are lab-grade, general purpose units intended to store non-critical samples at operating temperatures between 35.6°F to 50°F (2°C to 10°C).

These units are not registered as medical devices or by a medical device regulatory body (e.g. FDA); that is, they have not been evaluated for the storage of samples for diagnostic use or for samples to be re-introduced to the body.

This unit is not intended for use in classified hazardous locations, nor to be used for the storage of flammable or corrosive inventory.

This refrigerators are not suitable for outdoor location.



**CAUTION:** Storage of unsealed corrosive substances may cause the interior of the unit to corrode.

## Initial Loading

Allow the unit to operate at the desired temperature for a minimum of 12 hours before loading.

Load the unit one shelf at a time, starting from bottom to top shelf. After loading each shelf, allow the unit to recover to the desired set point before loading the next shelf. Repeat this process until the unit is fully loaded. Please refer to the section **Shelves** for shelf load ratings.



**CAUTION:** Failure to follow these procedures or overloading the unit may cause undue stress on the compressors or jeopardize user product safety.

# Operating Standards

The units described in this manual are classified for use as stationary equipment in a Pollution Degree 2 and Over voltage Category II environment.

These units are designed to operate under the following environmental conditions:

- Indoor use
- Altitude up to 6512 feet (2000 m)
- Maximum relative humidity 60% for temperatures from 59°F to 90°F (15°C to 32°C)
- Main supply voltage fluctuations not to drop or exceed by 10% of the nominal voltage
- Do not connect the unit to a GFCI (Ground Fault Circuit Interrupter) protected outlet as it may be subject to nuisance tripping
- Do not run this unit off the extension cords

## Unit Specifications

The data label is located on the left side on top towards front of the unit.

The specifications of refrigerator like voltage, required wall breaker amperage and power plug are same for all the units.

Voltage = 115 V/60 Hz

Breaker Amps = 15 A

Chromatography Power Plug = NEMA 5-15P

General Purpose Refrigerator Power Plug = NEMA 5-15P

This plug must be plugged into/supplied with it's own individual branch circuit.



**CAUTION:** Chromatography units are supplied with two separate power cords. Be careful to unplug both during movement, testing or repair of the product.

Other specifications are listed in the table below.

**Table 3. Unit Specifications**

Unit	Size (Cu.ft.)	Exterior	Door Type	No.of Shelves	Exterior Dimensions (H x W x D)
VWG12RPGA	12	Painted	Glass	4	75.82 x 24.75 x 25.00 in (1925.9 x 628.6 x 635.0 mm)
VWG25RPGA	25	Painted	Glass	4	81.00 x 27.75 x 32.00 in (2057.1 x 704.8 x 812.8 mm)
VWG25RPSA	25	Painted	Solid	4	81.00 x 27.75 x 32.00 in (2057.1 x 704.8 x 812.8 mm)
VWG25RSGA	25	Stainless Steel	Glass	4	81.00 x 27.75 x 32.00 in (2057.1 x 704.8 x 812.8 mm)
VWG25RSSA	25	Stainless Steel	Solid	4	81.00 x 27.75 x 32.00 in (2057.1 x 704.8 x 812.8 mm)
VWG30RPGA	30	Painted	Glass	4	81.00 x 30.75 x 32.00 in (2057.1 x 781.0 x 812.8 mm)
VWG30CPGA	30	Painted	Glass	4 + 3 Half Shelves	81.00 x 30.75 x 32.00 in (2057.1 x 781.0 x 812.8 mm)
VWG30RPSA	30	Painted	Solid	4	81.00 x 30.75 x 32.00 in (2057.1 x 781.0 x 812.8 mm)

**Table 3. Unit Specifications**

<b>Unit</b>	<b>Size (Cu.ft.)</b>	<b>Exterior</b>	<b>Door Type</b>	<b>No.of Shelves</b>	<b>Exterior Dimensions (H x W x D)</b>
VWG30RSGA	30	Stainless Steel	Glass	4	81.00 x 30.75 x 32.00 in (2057.1 x 781.0 x 812.8 mm)
VWG30CSGA	30	Stainless Steel	Glass	4 + 3 Half Shelves	81.00 x 30.75 x 32.00 in (2057.1 x 781.0 x 812.8 mm)
VWG30RSSA	30	Stainless Steel	Solid	4	81.00 x 30.75 x 32.00 in (2057.1 x 781.0 x 812.8 mm)
VWG45RPLA	45	Painted	Sliding Glass	8	81.0 x 52.7 x 32.0 in (2057.1 x 1338.6 x 812.8 mm)
VWG45CPLA	45	Painted	Sliding Glass	8 + 2 Half Shelves	81.0 x 52.7 x 32.0 in (2057.1 x 1338.6 x 812.8 mm)
VWG45RSLA	45	Stainless Steel	Sliding Glass	8	81.0 x 52.7 x 32.0 in (2057.1 x 1338.6 x 812.8 mm)
VWG45CSLA	45	Stainless Steel	Sliding Glass	8 + 2 Half Shelves	81.0 x 52.7 x 32.0 in (2057.1 x 1338.6 x 812.8 mm)
VWG49RPGA	49	Painted	Glass	8	81.0 x 52.7 x 32.0 in (2057.1 x 1338.6 x 812.8 mm)
VWG49CPGA	49	Painted	Glass	8 + 2 Half Shelves	81.0 x 52.7 x 32.0 in (2057.1 x 1338.6 x 812.8 mm)
VWG49RPSA	49	Painted	Solid	8	81.0 x 52.7 x 32.0 in (2057.1 x 1338.6 x 812.8 mm)
VWG49RSGA	49	Stainless Steel	Glass	8	81.0 x 52.7 x 32.0 in (2057.1 x 1338.6 x 812.8 mm)
VWG49CSGA	49	Stainless Steel	Glass	8 + 2 Half Shelves	81.0 x 52.7 x 32.0 in (2057.1 x 1338.6 x 812.8 mm)
VWG49RSSA	49	Stainless Steel	Solid	8	81.0 x 52.7 x 32.0 in (2057.1 x 1338.6 x 812.8 mm)
VWG72RPGA	72	Painted	Glass	12	81.00 x 75.75 x 32.00 in (2057.1 x 1924.0 x 812.8 mm)
VWG72CPGA	72	Painted	Glass	12+ 2 Half Shelves	81.00 x 75.75 x 32.00 in (2057.1 x 1924.0 x 812.8 mm)
VWG72RSGA	72	Stainless Steel	Glass	12	81.00 x 75.75 x 32.00 in (2057.1 x 1924.0 x 812.8 mm)
VWG72CSGA	72	Stainless Steel	Glass	12+ 2 Half Shelves	81.00 x 75.75 x 32.00 in (2057.1 x 1924.0 x 812.8 mm)

# Installation



**WARNING:** Do not exceed the electrical rating printed on the data plate located on the upper left side of the unit.

## Location

Install the unit on a level area free from vibration with minimum 3 inches of clearance on all sides and 4 inches on top. Do not position the equipment in direct sunlight or near heating diffusers, radiators, or other sources of heat.

**Note:** Do not move the unit in fully loaded condition.

## 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. Level the cabinet front to rear and side-to-side using the corner leveling screws. The front leveling screws are accessed by removing the base grill, as described below:

1. Remove the lower grill attachment screws
2. Grasp the grill with both hands
3. Lift the grill approximately 1/2"
4. Pull grill away from the refrigerator

## Castor Installing and Pallet Removal Instructions



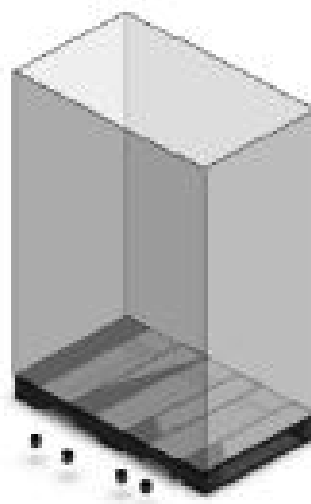
**CAUTION:** Avoid damage to the refrigerant tubing which may cause a refrigerant leak while handling, moving, and operating this unit.

**Note:** Casters available for 12, 25, and 30 cu. ft. units; leveling feet only on 45, 49, and 72 cu. ft. units.

## Without Forklift

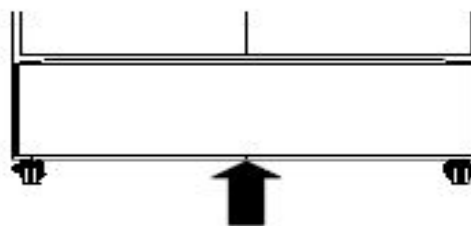
**Required Tools:** Phillips head screwdriver, 7/16" and 3/8" wrenches, and a minimum of 2 people.

All the units are shipped with factory installed feet with rolling casters supplied inside of the unit. The following instructions demonstrate how to remove the cabinet from its shipping base (pallet) and install the casters without use of a forklift.



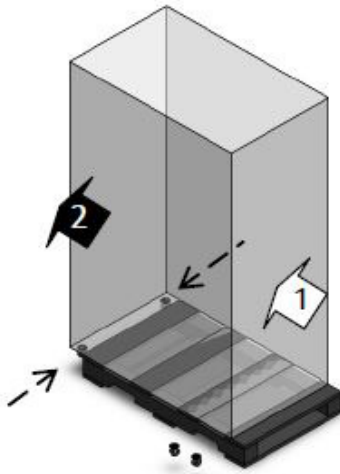
**Note:** The unit should be unpacked near the desired final location.

1. Remove the packaging and kick plates from unit. Remove additional packaging to access the interior of the cabinet. Be sure to keep one cardboard corner for subsequent step.
2. Using a screwdriver, remove the screws holding on the front grill. Lift grill upwards and pull away from unit to remove. Set aside.
3. Remove bolts (4) holding the unit to the pallet using the 7/16" wrench.



**Note:** From this step onward, a minimum of 2 people are required. Use additional people if necessary.

- With one person on each side, gently slide the unit towards the side edge of the pallet. Slide the unit so that there are approximately 3 inches of overhang to allow the removal of the factory installed feet and installation of the casters.

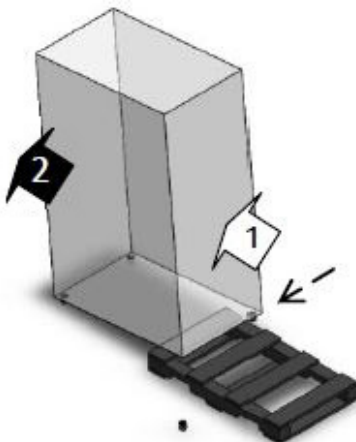


**CAUTION:** Two people are always required to move the unit. Never move or adjust unit when some one is working on the unit (i.e. adjusting casters).

- Person 1:** Remain standing on the side of the pallet and providing additional unit support. **Person 2:** Remove all 4 factory installed feet (using the 3/8" wrench to loosen if necessary). Install 2 casters on the overhang edge. Tighten using caster wrench supplied.

**Note:** Some casters lock and others do not. It is recommended to install the locking casters on the front of the unit.

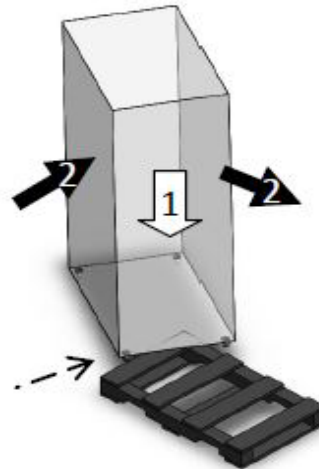
- While supporting the unit, carefully slide the unit until the casters reach the ground. Gently slide the back edge off of the pallet approximately 3 inches to allow for installation of the back caster. **Person 2:** Continue supporting the unit at the floor end. **Person 1:** Install 1 caster on the back of the unit. Tighten using caster wrench supplied.



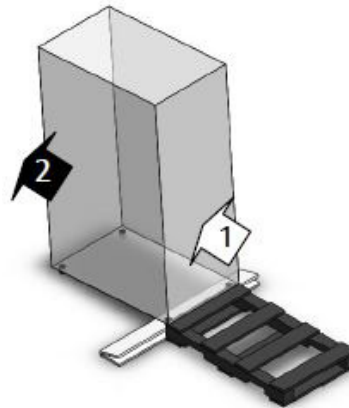
- Gently rotate unit to install the last caster.

**Person 2:** Continue supporting the unit at the floor end.

**Person 1:** Install 1 caster on the front of unit. Tighten using caster wrench supplied.



- Take a cardboard packaging corner, fold in half, and place under the pallet/unit with the fold away from the pallet. Gently position unit parallel with the pallet using the edge of the unit to support the pallet. Once in position, gently roll the unit off of the pallet.



## With Forklift

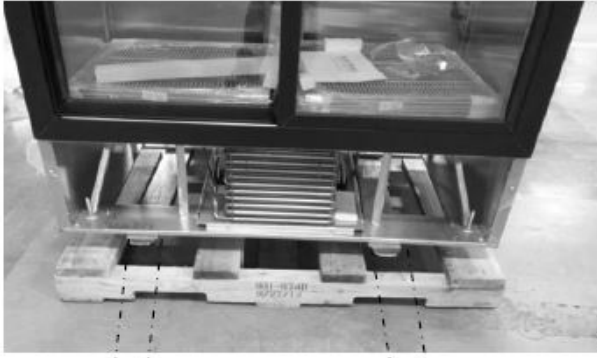
**Required Tools:** Phillips Head Screwdriver, 7/16" and 3/8" Wrenches, and a minimum of 2 people.

The following instructions demonstrate how to remove the cabinet from its shipping base (pallet) and install the casters or lower legs using a fork truck.

- Remove the screws, bolts and caster by following the instructions given in section **Without Forklift**.

**Note:** Always use caution when lifting unit with forklift to ensure not to damage or drop unit.

- Carefully position forks to lift unit from rear. Ensure unit is fully positioned on fork truck prior to raising the forks.



- Raise the unit approximately six inches to allow access to the feet and casters. **Person 1:** Stand at the front of the unit and provide additional support to the unit. **Person 2:** If feet are desired, lower all 4 factory installed feet (using the 3/8" wrench to loosen if necessary). If rolling casters are desired, remove the feet and install the 4 casters and tighten using caster wrench supplied.

**Note:** Some casters lock and others do not. It is advised to install the locking casters on the front of the unit.

- Remove pallet from below the unit and gently lower unit in desired location.

## Chromatography Refrigerators

The chromatography refrigerator is equipped with a safety circuit. In the event the safety circuit is tripped (the safety sensor senses a flammable gas), the power to the internal outlet will be discontinued and the user will need to manually reset the safety circuit assembly using the reset switch at the right side of header panel before power is restored. To do this, toggle the switch located on the top right side of the header panel beside the remote alarm contacts. There will be a power delay to the outlet for approximately 4 minutes where the red LED will be illuminated.

When power is available at the outlet, the red LED will turn off and the green LED will illuminate.

If the circuit trips from RED back to GREEN repeatedly or never turns GREEN, please contact Customer Service.

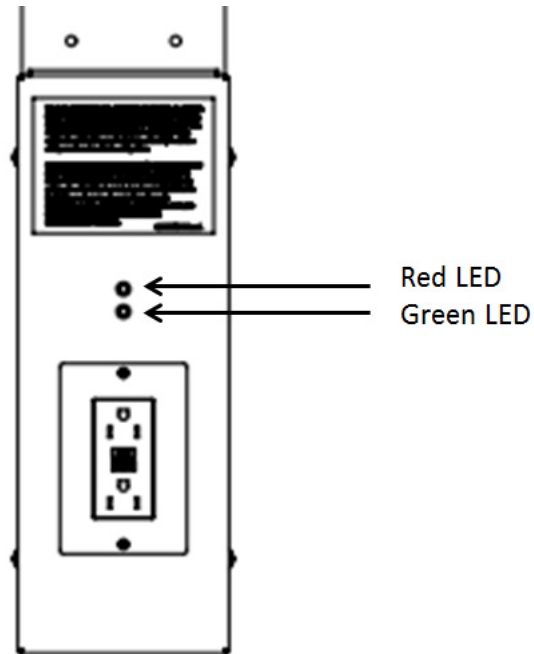
Flammable materials should not be stored in the refrigerator.

## Lights

The GFCI outlet assembly is located inside the unit back in the center.

The outlet assembly has two LEDs:

- RED (on the top) - When the red LED is ON, it indicates there is no power to the AC outlet inside the unit.
- GREEN (on the bottom) - When the green LED is ON, it indicates there is power to the AC outlet inside the unit.



## Switches

The Chromatography refrigerators has a reset switch on the right side of the header panel, above remote alarm contacts.

- Chromatography Manual Reset: This is used to manually reset the safety circuit in the AC receptacle assembly after the LED turns RED from GREEN due to a safety trip event which disengages power to outlet inside the refrigerator. It is present on the right side top front corner next to the remote alarm contacts.

## Wiring

The wiring diagram for the units is shown in **Figure 1**.



**WARNING:** Connect the equipment to the correct power source. Incorrect voltage can result in severe damage to the equipment.



**CAUTION:** For personal safety and trouble-free operation, this unit must be properly grounded while in use. 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 the unit to overloaded power lines.



**WARNING:** Always connect the unit to a dedicated (separate) circuit. Each unit is equipped with a service cord and plug designed to connect it to a power outlet which delivers the correct voltage. Supply voltage must be within  $\pm 10\%$  of the unit rated voltage. If cord becomes damaged, replace with a properly rated power supply cord. Power Cord Specifications: 3-G 12 AWG, NEMA 5-15 P, 15A / 125V.



**WARNING:** Never cut the grounding prong from the service cord plug. If the prong is removed, the warranty is invalidated.



**CAUTION:** Disconnect the power cord in case of emergency.

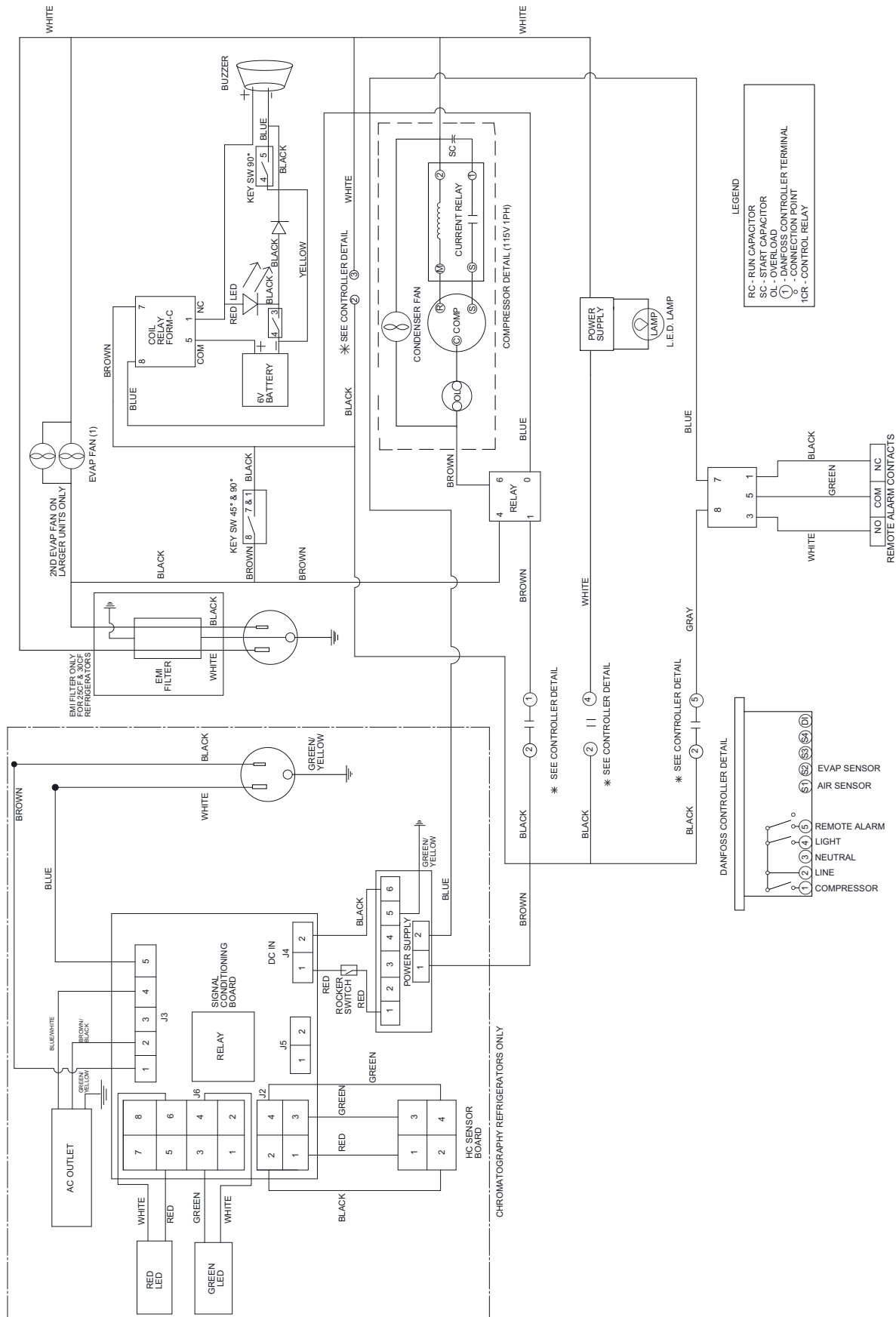


Figure 1. Wiring Diagram

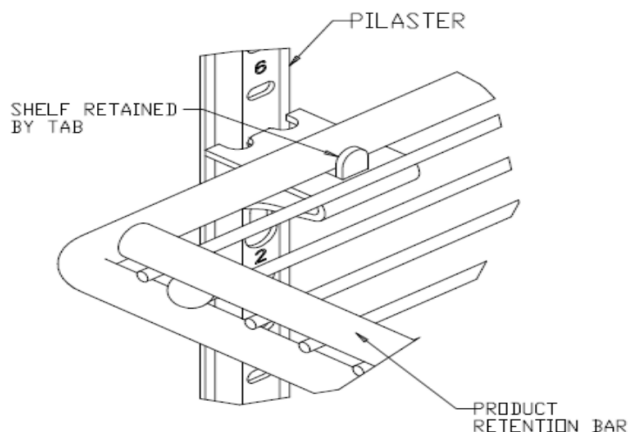


# Shelves

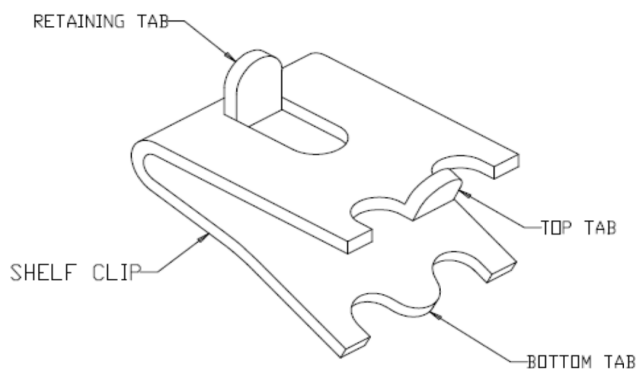
All the units come standard with wire shelves. Each unit has different number of shelves. Refer to **Table 3** for more information.

Maximum shelf capacity is 100 lbs (45 kg) for full shelves and 50 lbs (22.5 kg) for half shelves.

For safety in shipping, the shelves are packaged and secured inside the cabinet. Insert the shelf support hangers (included with the manual inside the unit) into the built-in shelf supports (located on the inside walls of the cabinet interior) at the desired locations.



**Figure 2. Shelf Arrangement**



**Figure 3. Shelf Clip**

## Installation Instructions



**WARNING:** Do not to move this unit while loaded.

1. Determine proper location for shelves clips, the reference number on the pilaster can serve as a guide to ensure all clips are properly located.

2. Insert top of the clip into the desired hole of the pilaster the retaining tab should be facing upwards.
3. Rotate the clip downwards and insert the bottom tab into the appropriate hole, the clip may be squeezed slightly during installation.
4. Install shelves onto clips with the product retention bar facing upwards, be careful not to lodge clips during shelf installation.
5. Prior to loading the shelf, ensure that the shelf is resting on each of 4 clips and the clips are installed.



**CAUTION:** Improper shelf clip installation may cause shelf and/or product damage to the unit.



**CAUTION:** Do not overload the shelves, the unit is designed to utilize all shelves that are supplied in an equally spaced manner.

## Door Operation

The swinging door units are designed to stay open if opened 90 degrees or more. The door spring tension cannot be adjusted.

The Sliding doors can be opened completely towards left or right. If the self-closing door does not work properly, make sure the unit is leveled properly.

## Door Seal



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

## Remote Alarm

All units have factory-installed remote alarm contacts that can be used for remote alarm systems. The maximum distance between a unit and a remote alarm depends on the wire gauge used. Refer to **Table 4** below:

The Remote alarm contacts are located on the right side of the header panel. The three terminals are: COMMON, OPEN ON FAIL (Normally Closed) and CLOSE ON FAIL (Normally Open).

**Table 4. Wire Gauge and Distance to Remote Alarm**

<b>Wire Gauge</b>	<b>Total Wire Length (feet)</b>	<b>Distance to Alarm 1/2 Wire Length (feet)</b>
20	530	265
18	840	420
16	1330	665
14	2120	1060
12	3370	1685

To install the remote alarm, make the following connections:

1. Connect the COMMON terminal on the cabinet switch to the COMMON wire on the alarm.
2. To get an alarm when the switch contacts open, connect the OPEN ON FAIL terminal on the cabinet to the OPEN ON FAIL wire on the alarm.
3. To get an alarm when the switch contacts close, connect the CLOSE ON FAIL terminal on the cabinet to the CLOSE ON FAIL wire on the alarm. The COMMON and CLOSE ON FAIL wires must be tied together in this application.
4. Plug the alarm system service cord into an electrical outlet.
5. The contacts will trip in the event of high temperature alarm or low temperature alarm.

## 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 shelves. If you want to adjust the positions.
3. Verify that the unit is connected to a dedicated circuit.

# Startup

## Initial Startup

To start up the unit, complete the following steps:

1. Connect the AC main power cord. The evaporator fans start when the power cord is plugged in.
2. Insert the silver colored key in the switch and turn to the Power On position.
3. 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.
4. If you desire to enable the power failure alarm, turn the three position key switch one turn further clockwise to the **All Alarm On** position.
5. If you have a remote alarm, hook it up at this point (refer to section **Remote Alarm**).
6. If desired, lock the cabinet door using the silver colored key. Place duplicate key copies in a safe place.

All controls should now be fully operational, the alarm active (if enabled), and all visual indicators active.

Operating equipment inside the refrigerator may shift the temperature profile in the unit. Monitor the refrigerator as needed for any such shift.

## Product Loading and Unloading Guidelines

When loading your unit, take care to observe the following guidelines:

- Distribute the load as evenly as possible. Temperature uniformity depends on air circulation, which could be impeded if the internal storage components are overfilled, particularly at the top of the cabinet.
- For critical applications, be sure that the alarm systems are working and active before you load any product.
- Ensure clearance between the top of the cargo and the bottom of the internal storage components. Lack of clearance may affect unit performance or impede operation of the storage component.

## Chromatography Refrigerators

1. Connect the AC main power cord.
2. Connect the GFCI AC power cord.
3. Make sure the reset switch is in ON position.
4. Insert the silver colored key in the switch and turn to the Power On position. The display will show the actual cabinet temperature.

**Note:** The Chromatography refrigerator is shipped with the manual reset switch at the top right side front of the header panel above the remote alarm contacts (refer to section **Switches**) as ON. The Manual reset switch should always be in ON position.

5. The red LED on the chromatography safety circuit turns ON.
6. After a power delay of 4 minutes the red LED on the chromatography safety circuit turns Off and the green LED on the chromatography safety circuit turns ON.

**Note:** During initial power-up, the GFCI outlet will not be powered until after an approximate 4 minute delay.

# Operation

## Control Panel

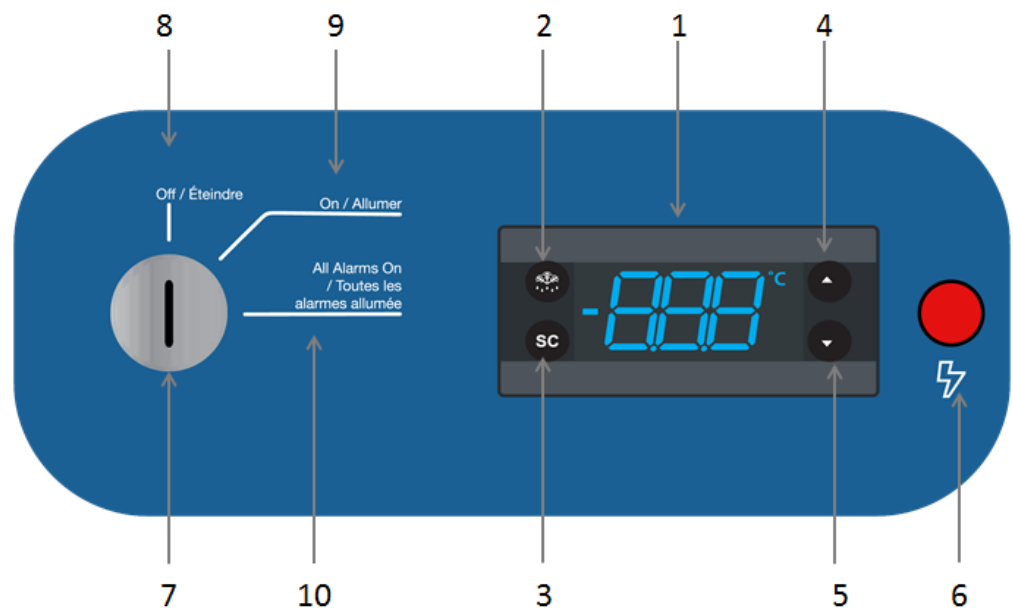


Figure 4. Control Panel

1. **Display:** During normal operation, the display shows cabinet temperature in degree Celsius as measured by the primary sensor. When Alarm and Compressor are active, the respective LED's will be displayed. Refer to the table below for LED display symbols. A display code will also be visible during the functioning based on the type of alarm.

Defrost LED	Alarm LED	Compressor LED
On Fixed: Defrost Active	On Fixed: Alarm Present	On Fixed: Compressor Active
Off: Defrost Off	Flashing: Alarm Silenced	Flashing: Delay, Protection or Activation Blocked
	Off: No Alarm	Off: No Alarm

2. **Defrost:** This button is used to manually defrost the unit as well as to go back from the parameter settings.

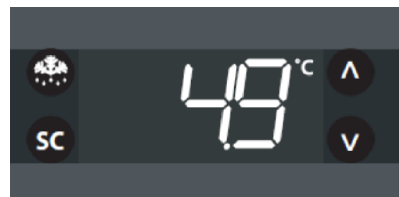
- 3. **SC:** This button is used to turn the cabinet LED light on and off with a single touch. This button is also used for selecting an option in parameters.
- 4. **Up:** Scrolls the menu items and increases the values.
- 5. **Down:** Scrolls the menu items and decrease the values.
- 6. **Power Fail LED:** This LED indicates the power failure situation in the unit. The flash light indicate power failure situation.
- 7. **Key Switch:** Used to turn the power to the controller and power failure alarm on and off.  
**Note:** This is not a primary disconnect device, thus even if the key switch is Off the fan will be On as it is hard wired. Please remove the power cord to completely turn Off the unit.
- 8. **Off:** Turns the power to the controller off.
- 9. **Power On:** Turns On power to the controller and used as to silence the power failure alarm.
- 10. **All Alarm ON:** Turns On the audible power fail alarm.

# Temperature Setpoint

The factory default temperature setpoint is 5°C for all laboratory refrigerators. Adjusting the setpoint is not recommended. In case the setpoint has to be changed, follow the instructions given below.

The display shows the current temperature.

After 30 seconds, the display automatically reverts to the current temperature.



Press Up / Down button to increase / decrease setpoint temperature.



## Alarms

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 power failure alarm system is activated only when the key switch is turned to the Power Failure Alarm ON position.

Low temperature, high temperature and door ajar alarms are set to ON position by default as soon as the controller is turned on. These cannot be turned off.

Default low and high alarm values are 35.6°F (2°C) and 50°F (10°C). These values may be adjusted, following instructions in section **Temperature Setpoint**.

**Note:** There is no door open alarm on sliding door model.

The audible warning signal sounds when there is a power failure, temperature alarm condition, or when the door is ajar for more than 1 minute.

Alarm display codes for high temperature, low temperature, sensor failure, door ajar are mentioned in **Table 5**.

**Table 5. Alarm Codes**

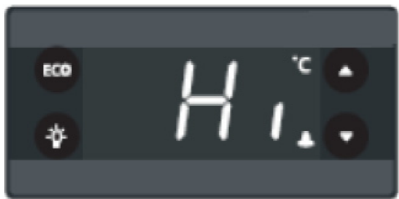
Alarm code	Trigger	Automatic clearance	Outputs	Comments
"Hi"	Air temperature is higher than "ALA->Hat" for "ALA->Htd"	User Configured	Blink "Hi" with the highest temperature; If configured: cut in alarm relay, beep the buzzer	High temperature alarm
"Lo"	Air temperature is less than "LAtd" for "Ltd"	User Configured	Blink "Lo" with the lowest temperature; If configured: cut in alarm relay, beep the buzzer	Low temperature alarm
"dor"	Door open for more than "ALA->dod"	Always	Blink "dor". If configured: cut in alarm relay, beep the buzzer	Door open alarm
"E01"	"S1" error	Always	Blink "E01". If configured: cut in alarm relay, beep the buzzer	"S1" sensor failure = (short or open)
"E02"	"S2" error	Always	Blink "E02". If configured: cut in alarm relay, beep the buzzer	"S2" sensor failure = (short or open)

# Alarm Silencing

To mute the power fail alarm, change the key-switch to Power ON position. The power fail alarm will not be audible but the Red LED will be displayed on the control panel.

The high temperature, low temperature, sensor failure and door ajar alarms can be silenced by pressing any key on the controller.

When the alarm is active, the alarm code flashes alternately with the temperature and the alarm symbol.



Once the alarm is silenced, the code stops flashing but the temperature and the alarm symbol is still displayed.



# Controller Parameter Settings

To access the controller settings you need to enter the password and the access level will determine which parameter you can view and edit.

Table 6. Parameter List

Category	Abv	Description	All Single Doors	All Sliding Doors	All Double and Triple Door Models
tHE		Thermostat settings			
	SEt	Set Point	5°C	5°C	5°C
	SPr	Set Point Adjustment Ratio	0.2°C	0°C	0°C
	diF	Differential	1.1°C	1.1°C	1.1°C
	HSE	High Set Point	6°C	6°C	6°C
	LSE	Low Set point	2°C	2°C	2°C
dEF		Defrost Settings			

# Password Protection

The unit is password protected except the setpoint which can be adjusted without the password. The default password is 0.

To change the parameters, password is required to be entered.

1. Hold “Up / Down” button for 5 seconds.
2. The display will show “PAS” after which brief delay changes to 000.
3. Press SC to confirm.

You have now entered the controller parameters menu.

To change the password, you need to go to parameter settings.

1. Enter the current password as given above and get to the menu.
2. Scroll down to “ASi” group.
3. Press “SC” button to confirm.
4. Scroll to “PS1” parameter and Press “SC” button to confirm.
5. Scroll “Up / Down” buttons to enter the desired password.
6. Press “SC” button to confirm.

After 30 seconds, the display automatically reverts to showing the current temperature. If this does not happen, press the Defrost button twice.

Table 6. Parameter List

Category	Abv	Description	All Single Doors	All Sliding Doors	All Double and Triple Door Models
	dFt	Def. Type	nAt	nAt	nAt
	Add	Adaptive Defrost	Yes	Yes	Yes
	dtT	Def Terminate Temp	4°C	4°C	4°C
	drt	Def Reset Temp	2°C	2°C	2°C
	dii	Def Min Interval	1 hour	1 hour	1 hour
	dAi	Def Max Interval	1 hour	1 hour	1 hour
	dit	Def Min Time	5 min	5 min	5 min
	dAt	Def Max Time	30 min	30 min	30 min
	dot	Drip Off Time	0 min	0 min	0 min
	fdd	Fan Delay After Defrost	0 sec	0 sec	0 sec
	ftd	Fan Start Temp	10°C	10°C	10°C
	dFa	Defrost Fan On	Yes	Yes	Yes
	dCt	Defrost On Compressor Time	No	No	No
	doC	Defrost by Comp. Running Time	1 hour	1 hour	1 hour
	dEt	Defrost Start Evaporator Temp	0°C	0°C	0°C
	ddt	Defrost Delta T	3.0 k	3.0 k	3.0 k
	idi	Initial Defrost Interval	0 hour	0 hour	0 hour
	idd	Initial Defrost Duration	0 cycle	0 cycle	0 cycle
<b>CoP</b>	<b>Compressor Settings</b>				
	uPt	Voltage Protection	No	No	No
	uLi	Minimum Cut-in Voltage	0 VAC	0 VAC	0 VAC
	uLo	Minimum Cut-out Voltage	0 VAC	0 VAC	0 VAC
	uHi	Maximum Voltage	270 VAC	270 VAC	270 VAC
	EHd	Sensor Error Type	SEt	SEt	SEt
	Ert	Error Run Time	10 min	10 min	10 min
	ESt	Error Stop Time	7 min	7 min	7 min
	CSt	Min Stop Time	2 min	2 min	2 min
	crt	Min Run Time	2 min	2 min	2 min
	Cot	Max Off Time	0 min	0 min	0 min
	Cdd	Compressor Door Open Delay	0 min	0 min	0 min
	Srt	System Resume After Door Open	0 min	0 min	0 min

**Table 6. Parameter List**

Category	Abv	Description	All Single Doors	All Sliding Doors	All Double and Triple Door Models
	Pod	Power On Delay	60 sec	60 sec	60 sec
	Pot	Power ON Temperature	16°C	16°C	16°C
<b>diS</b>		<b>Display Settings</b>			
	diC	Display Intensity Auto Control	No	No	No
	din	Display Intensity	8	8	8
	CFu	Display Unit	C	C	C
	trS	Temp Sensor to Display	Sco	Sco	Sco
	rES	Display Resolution	1	1	1
	rLT	Display Range Limit	No	No	No
	ddL	Display Delay	1 min	1 min	1 min
	doF	Display Offset	0.0 K	0.0 K	0.0 K
	dLt	Lock-Time After Defrost	15 min	15 min	15 min
	SEC	Show Economy/Night Mode	No	No	No
	SHo	Show Holiday	No	No	No
	Sdf	Show Defrost	No	No	No
	SCS	Show Compressor Symbol	Yes	Yes	Yes
	SFS	Show Fan Symbol	No	No	No
	SdS	Show Defrost Symbol	No	No	No
	SES	Show ECO Symbol	No	No	No
	idP	Info Menu Display Item	15	15	15
	SSC	Show Pull Down	No	No	No
<b>ALA</b>		<b>Alarm Settings</b>			
	HAt	High Temp Alarm	10°C	10°C	10°C
	LAt	Low Temp Alarm	2°C	2°C	2°C
	Htd	High Alarm Delay	0 min	0 min	0 min
	Ltd	Low Alarm Delay	0 min	0 min	0min
	dod	Door Open Delay	1 min	1 min*	1 min
	ACA	Auto Clearance of Alarm	Yes	Yes	No

**Note:** \*45 cu. ft. sliding door models do not have door ajar alarms.



# Maintenance

## Cleaning the Cabinet Interior



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

To clean the cabinet interior, remove the shelves, use a solution of water and a mild detergent for cleaning. Rinse the interior storage components and wipe them dry with a soft cloth.

## Cleaning the Unit (Chromatography Refrigerators)

Use a solution of water and a mild detergent for cleaning. Lightly spray the interior storage components and wipe them dry with a soft cloth or spray the cloth first and then wipe interior surfaces.

Do not spray or pour directly into holes and gaps in the chromatography safety circuit assembly for cleaning. Use a wet wipe to clean around sensor box and outlet.

If the sensor led turns red after cleaning, manually reset the safety circuit assembly using the manual reset switch at the back of the unit.

## Cleaning the Condenser



**CAUTION:** Condensers should be cleaned at least every six months; more often if the laboratory area is dusty. 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 around the condensers with your fingers. Some surfaces are sharp.

The condenser is located in the bottom front of the unit.

To clean the condenser, complete the following steps:

1. Disconnect the power.
2. Vacuum the condenser and clean up any loose dust.
3. Reconnect power.

## Automatic Defrost

The defrosting process on all the models is primarily accomplished by air circulated during off-cycle. This heat free process ensures that the temperature is not affected by the defrost cycle. Defrost cycle works on adaptive defrost method which is both temperature and time controlled.

When the evaporator sensor reaches below 32°F (0°C), the defrost cycle will be initiated. Initially the defrost cycle continues for a minimum duration of 5 minutes and after that the defrost cycle will be terminated once the evaporator sensor temperature reaches 39.2°F (4°C). In case the evaporator sensor doesn't reach the temperature of 39.2°F (4°C) within 30 minutes from the start of defrost cycle, the defrost cycle will be terminated.

## Gasket Maintenance

Periodically check the gaskets around the door for punctures or tears. Leaks are indicated by condensation or frost which form at the point of gasket failure. Make sure that the cabinet is level.

Keep the door gaskets clean and frost free by wiping gently with a soft cloth.

To check the door seal, complete the following steps:

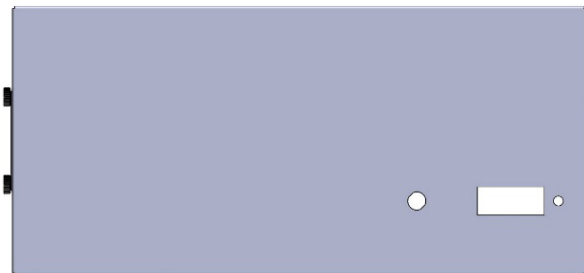
1. Open the door
2. Insert a strip of paper (a couple of inches wide) between the door gasket and the cabinet flange and close the door.
3. Slowly pull the paper strip from the outside. You should feel some resistance.
4. Repeat this test at 4 inch intervals around the door. If the door does not seal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

# Alarm Battery Maintenance

Unit comes with (4) AA Alkaline 1.5 V batteries. The back-up time for the alarm battery system is 60 hours. Battery must be replaced after an active alarm or after every 12 months, whichever is the earliest.

Steps to follow for battery replacement:

1. Locate the knurled / thumb screw on the left side of the header panel.



2. Remove the knurled/thumb screw by hand.



3. Once the screws are removed, wear hand gloves and gently pull the bracket out until you see the batteries completely.



4. Replace the batteries and gently close the bracket. Once the bracket is closed, Align the holes on the bracket and header panel, screw using the knurled / thumb screw.

## Preparation for Storage

If the unit is going to be stored in an off condition, allow the unit to warm up and dry out with the door open before moving into storage.

# Replacing Sensor (Chromatography Refrigerators)

The sensor needs replacement if the temperature goes below freezing in the cabinet. Use system alarms to ensure the temperature inside the unit is always above 32°F (0°C). If exposed to freezing conditions the sensor should be replaced.

If the display shows an error and sounds an alarm (in case of a control, defrost, bottle or ambient probe failure), the sensor needs to be replaced.

## Sensor Maintenance (Chromatography Refrigerators)

The sensor should be replaced every five years by a trained service provider.

# Troubleshooting



**WARNING:** Troubleshooting procedures involve working with high voltages which can cause injury or death. Troubleshooting should only be performed by Factory Authorized Service Personnel.

This section is a guide for troubleshooting equipment problems. Component parts must be replaced only with like components.

**Table 7. Troubleshooting Procedure**

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.
	Unit overloaded	Test the voltage and verify that it is correct for your unit. Check if there is any frost build up on refrigeration coils. Turn unit off and allow it to defrost. Remove contents from top shelf of unit.
Unit runs continuously	Dirty condenser	Clean condenser
Space temperature too high	Control setting too high	Reset control
	Inadequate air circulation	Improve air movement
Temperature fluctuates/insufficient cooling	Temperature control	Make sure that the control is set correctly.
	Condenser clogged	Make sure the condenser is clean.
	Other causes	If the temperature control is set correctly, the condenser is clean, but temperature continues to fluctuate, call an authorized service representative.
The equipment makes too much noise	The equipment is not level	Place the equipment on an even surface or use adjustable feet.
Refrigerator freezing	Temperature control	Reset control
Unit warms up	Door is open	Make sure the door is completely closed.
	Door seal check	Check the door seal.
	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 not functioning	If the compressor is not running and the power audible is on, have an electrician check for proper voltage to the unit. If the compressor is not running and the power failure alarm is off, call the customer service for assistance.
Unit noisy	Loose parts or mountings	Find and tighten

# End of Life Care

Be sure to follow local regulations when disposing of an old unit. Some suggestions are listed below:

1. Remove items and defrost unit. Be sure to clean up any biological safety hazards.
2. Remove the cabinet door to help prevent entrapment inside of a unit.
3. Have a certified technician remove the refrigerant and compressor, then drain the compressor and oil from the system. Dispose of components following local regulations.

# Warranty

Domestic Warranty • 24 Months Parts and Labor, 3 years for compressor

International Warranty • 24 Months Full Warranty Parts

During the first twenty four (24) months from shipment, VWR 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. VWR 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 VWR; or (vi) installation, maintenance, repair, service, relocation or alteration of the products by any person other than VWR or its authorized representative. To obtain proper warranty service, you must contact the nearest authorized service center or Dealer. VWR, Inc's own shipping records showing date of shipment shall be conclusive in establishing the warranty period. At VWR's option, all nonconforming parts must be returned to VWR postage paid and replacement parts are shipped FOB VWR'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. VWR DOES NOT WARRANT THAT THE PRODUCTS ARE ERROR-FREE OR WILL ACCOMPLISH ANY PARTICULAR RESULT.

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

# Regulatory Compliance

## Product Safety

### Product Testing

This product family has been tested to applicable product safety standards by Underwriters Laboratories (UL), which is a Nationally Recognized Test Laboratory (NRTL).



### Hydrocarbon Refrigerants

According to U.S. Code of Federal Regulation 40 Part 82, this refrigerator employs the natural hydrocarbon refrigerant R290. Because of the nature of hydrocarbon refrigerants, for mechanical repair, such as recharge or compressor replacement, should only be carried out by a certified refrigeration technician. The safety of this equipment is listed by Underwriter Laboratory (UL) under Standard UL471, section SB – “natural refrigerant”.

## Electromagnetic Compatibility

### FCC Statement (USA)



Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

**Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

### Canadian ISED IC Notice

This ISM device complies with Canadian ICES-001.

Cet appareil ISM est conforme à la norme NMB-001 du Canada.

# Energy Efficiency

## ENERGY STAR

This product family has been voluntarily evaluated, and found compliant, by an EPA approved certification body to the EPA ENERGY STAR Laboratory Grade Refrigerators and Freezers Specification 1.1.



## Additional Regulations and Markings

This product is not marked with a CE marking, as it does not operate in the voltage range to be sold to the EU Member States or European Economic area (EEA). Please reach out to the manufacturer for questions regarding any additional regulatory conformity.

# WEEE Compliance

**WEEE Compliance.** This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2012/19/EU. It is marked with the following symbol. VWR 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 VWR products which may assist the detection of substances subject to the RoHS Directive are available at [www.VWR.com/](http://www.VWR.com/).

## Great Britain



**WEEE Konformität.** Dieses Produkt muss die EU Waste Electrical & Electronic Equipment (WEEE) Richtlinie 2012/19/EU erfüllen. Das Produkt ist durch folgendes Symbol gekennzeichnet. VWR hat Vereinbarungen getroffen mit Verwertungs-/Entsorgungsanlagen in allen EU-Mitgliederstaaten und dieses Produkt muss durch diese Firmen wiederverwertet oder entsorgt werden. Mehr Informationen über die Einhaltung dieser Anweisungen durch VWR, die Verwerter und Hinweise die Ihnen nützlich sein können, die VWR Produkte zu identifizieren, die unter diese RoHS. Anweisung fallen, finden Sie unter [www.VWR.com/](http://www.VWR.com/).

## Deutschland



## Italia



**Conformità WEEE.** Questo prodotto deve rispondere alla direttiva dell'Unione Europea 2012/19/EU in merito ai Rifiuti degli Apparecchi Elettrici ed Elettronici (WEEE). È marcato col seguente simbolo. VWR 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 VWR con queste Direttive, l'elenco delle ditte di riciclaggio nel Vostro paese e informazioni sui prodotti VWR che possono essere utili alla rilevazione di sostanze soggette alla Direttiva RoHS sono disponibili sul sito [www.VWR.com/](http://www.VWR.com/).

## France



**Conformité WEEE.** Ce produit doit être conforme à la directive européenne (2012/19/EU) des Déchets d'Équipements Électriques et Électroniques (DEEE). Il est marqué par le symbole suivant. VWR s'est associé avec une ou plusieurs compagnies de recyclage dans chaque état membre de l'union européenne et ce produit devrait être collecté ou recyclé par celles-ci. Davantage d'informations sur la conformité de VWR à ces directives, les recycleurs dans votre pays et les informations sur les produits VWR qui peuvent aider la détection des substances sujettes à la directive RoHS sont disponibles sur [www.VWR.com/](http://www.VWR.com/).



## IF YOU NEED ASSISTANCE:

VWR International products are backed by a global technical support team ready to support your applications. We offer cold storage accessories, including remote alarms, temperature recorders, and validation services. Visit [www.vwr.com](http://www.vwr.com) or Call:

Countries	Services
North America	+1 866 984 3766
India toll free	1800 22 8374
India	+91 22 6716 2200
China	+800 810 5118, +400 650 5118
Japan	+81 3 5826 1616
Australia	+61 39757 4300
Austria	+43 1 801 40 0
Belgium	+32 53 73 42 41
France	+33 2 2803 2180
Germany international	+49 6184 90 6000
Germany national toll free	0800 1 536 376
Italy	+32 02 95059 552
Netherlands	+31 76 579 55 55
Nordic/Baltic/CIS countries	+358 9 329 10200
Russia	+7 812 703 4215
Spain/Portugal	+34 93 223 09 18
Switzerland	+41 44 454 12 22
UK/Ireland	+44 870 609 9203
New Zealand	+64 9 980 6700
Other Asian Countries	+852 2885 4613
Countries not listed	+49 6184 90 6000



VWR Corporate Headquarters  
Radnor Corporate Center  
Building One, Suite 200  
100 Matsonford Road  
Radnor, PA  
P.O. Box 6660  
United States  
[www.vwr.com](http://www.vwr.com)

Find out more at [www.vwr.com](http://www.vwr.com)



© 2019 VWR Inc. All rights reserved. All trademarks are the property of VWR and its subsidiaries unless otherwise specified. 329137H04 0219