

# Hoshizaki America, Inc.

## Commercial Series Refrigerated Kitchen Equipment

Models  
Reach-In B-Series



“A Superior Degree  
of Reliability”

[www.hoshizaki.com](http://www.hoshizaki.com)

## SERVICE MANUAL



Number: 73183  
Issued: 3-23-2011  
Revised: 8-5-2014

**⚠ WARNING**

Only qualified service technicians should install and service the appliance. To obtain the name and phone number of your local Hoshizaki Certified Service Representative, visit [www.hoshizaki.com](http://www.hoshizaki.com). No service should be undertaken until the technician has thoroughly read this Service Manual. Failure to service and maintain the appliance in accordance with this manual will adversely affect safety, performance, component life, and warranty coverage. Proper installation is the responsibility of the installer. Product failure or property damage due to improper installation is not covered under warranty.

Hoshizaki provides this manual primarily to assist qualified service technicians in the service and maintenance of the appliance.

Should the reader have any questions or concerns which have not been satisfactorily addressed, please call, send an e-mail message, or write to the Hoshizaki Technical Support Department for assistance.

Phone: 1-800-233-1940; (770) 487-2331

Fax: 1-800-843-1056; (770) 487-3360

E-mail: [techsupport@hoshizaki.com](mailto:techsupport@hoshizaki.com)

HOSHIZAKI AMERICA, INC.

618 Highway 74 South

Peachtree City, GA 30269

Attn: Hoshizaki Technical Support Department

Web Site: [www.hoshizaki.com](http://www.hoshizaki.com)

**NOTE:** To expedite assistance, all correspondence/communication **MUST** include the following information:

- Model Number \_\_\_\_\_
- Serial Number \_\_\_\_\_
- Complete and detailed explanation of the problem.

## **IMPORTANT**

This manual should be read carefully before the appliance is serviced. Read the warnings and guidelines contained in this manual carefully as they provide essential information for the continued safe use, service, and maintenance of the appliance. Retain this manual for any further reference that may be necessary.

## **CONTENTS**

Important Safety Information .....	5
I. General Information .....	8
A. Construction .....	8
B. Refrigeration Flow Chart .....	9
II. Sequence of Operation and Service Diagnosis .....	10
A. Sequence of Operation Flow Charts .....	10
1. Refrigerator .....	10
2. Freezer .....	11
B. Service Diagnosis .....	12
1a. Refrigerator-Control Module with Remote Display Module .....	14
1b. Refrigerator-Control Module with Integrated Display .....	16
2a. Freezer-Control Module with Remote Display Module .....	18
2b. Freezer-Control Module with Integrated Display .....	22
C. Control Module Check .....	26
1. Control Module with Remote Display Module .....	26
2. Control Module with Integrated Display .....	27
D. Thermistor Check .....	28
E. Diagnostic Tables .....	29
1. Not Cooling .....	29
2. Evaporator Frozen Up .....	30
3a. Defrost: Control Module with Remote Display Module .....	30
3b. Defrost: Control Module with Integrated Display .....	31
III. Controls and Adjustments .....	32
A. Control and Display Modules .....	32
1. Control Module with Remote Display Module .....	32
a) Remote Display Module Layout .....	32
b) Control Module with Remote Display Module Connections .....	33
2. Control Module with Integrated Display .....	34
a) Display Icons .....	34
b) Display Layout .....	34
c) Control Module with Integrated Display Connections .....	35
B. Temperature .....	36
1. Default Settings .....	36
2. Temperature Setpoint .....	36
3. Changing the Temperature Display Scale (°F or °C) .....	36
a) Control Module with Remote Display Module .....	36
b) Control Module with Integrated Display .....	37
C. Defrost .....	37
1. Control Module with Remote Display Module .....	37
2. Control Module with Integrated Display .....	37

D. Alarm Safeties .....	38
1. Control Module with Remote Display Module.....	38
2. Control Module with Integrated Display .....	39
E. Safety Devices .....	40
F. Mullion/Perimeter Heater .....	40
IV. Replacement of Components .....	41
A. Service for Refrigerant Lines.....	41
1. Refrigerant Recovery .....	41
2. Brazing .....	42
3. Evacuation and Recharge .....	42
B. Important Notes for Component Replacement.....	44
C. Door Reversal .....	44
V. Maintenance .....	45
1. Condenser.....	45
2. Power Supply Connection.....	45
VI. Preparing the Appliance for Periods of Non-Use .....	46
VII. Disposal.....	47
VIII. Technical Information.....	48
A. Electrical and Refrigerant Data .....	48
B. Wiring Diagrams .....	49

---

## Important Safety Information

Throughout this manual, notices appear to bring your attention to situations which could result in death, serious injury, or damage to the appliance or damage to property.

**⚠ WARNING** Indicates a hazardous situation which could result in death or serious injury.

**NOTICE** Indicates a situation which could result in damage to the appliance or property.

**IMPORTANT** Indicates important information about the use and care of the appliance.


### **⚠ WARNING**

The appliance should be destined only to the use for which it has been expressly conceived. Any other use should be considered improper and therefore dangerous. The manufacturer cannot be held responsible for injury or damage resulting from improper, incorrect, and unreasonable use. Failure to service and maintain the appliance in accordance with this manual will adversely affect safety, performance, component life, and warranty coverage.

**To reduce the risk of death, electric shock, serious injury, or fire, follow basic precautions including the following:**


- Only qualified service technicians should install and service the appliance.
- The appliance must be installed in accordance with applicable national, state, and local codes and regulations.
- The appliance requires an independent power supply of proper capacity. See the nameplate for electrical specifications. Failure to use an independent power supply of proper capacity can result in a tripped breaker, blown fuse, or damage to existing wiring. This could lead to heat generation or fire.
- To reduce the risk of electric shock, do not touch the plug or power switch with damp hands.
- Make sure the power switch is in the "OFF" position before plugging in or unplugging the appliance to reduce the risk of electric shock.
- Before servicing, move the power switch to the "OFF" position. Unplug the appliance from the electrical outlet.

#### **For 115VAC Models**

- **THE APPLIANCE MUST BE GROUNDED:** The appliance is equipped with a NEMA 5-15 three-prong grounding plug  to reduce the risk of potential shock hazards. It must be plugged into a properly grounded, independent 3-prong wall outlet. If the outlet is a 2-prong outlet, it is your personal responsibility to have a qualified electrician replace it with a properly grounded, independent 3-prong wall outlet. Do not remove the ground prong from the plug and do not use an adapter plug. Failure to follow these instructions may result in death, electric shock, or fire.

## **⚠ WARNING, continued**

### **For 208-230VAC Models**

- **THE APPLIANCE MUST BE GROUNDED:** The appliance is equipped with a NEMA L14-20 four-prong locking, grounding plug  to reduce the risk of potential shock hazards. It must be plugged into a properly grounded, independent 4-prong wall outlet. If the outlet is a 3-prong outlet or a 4-prong non-locking outlet, it is your personal responsibility to have a qualified electrician replace it with a properly grounded, independent 4-prong locking wall outlet. Do not remove the ground prong from the plug and do not use an adapter plug. After plugging in, twist the plug clockwise to lock it into place. Failure to follow these instructions may result in death, electric shock, or fire.

### **For All Models**

- The GREEN ground wire in the factory-installed power cord is connected to the appliance. If it becomes necessary to remove or replace the power cord, be sure to connect the power cord's ground wire.
- Do not use an extension cord.
- Do not use an appliance with a damaged power cord. The power cord should not be altered, jerked, bundled, weighed down, pinched, or tangled. Such actions could result in electric shock or fire. To unplug the appliance, be sure to pull the plug, not the cord, and do not jerk the cord. Before unplugging a 4-prong plug, rotate the plug counter-clockwise to unlock it.
- Do not splash, pour, or spray water directly onto or into the appliance. This might cause short circuit, electric shock, corrosion, or failure.
- Do not make any alterations to the appliance. Alterations could result in electric shock, injury, fire, or damage to the appliance.
- The appliance is not intended for use by persons (including children) with reduced physical, sensory, or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be properly supervised around the appliance.
- Do not climb, stand, or hang on the appliance or door or allow children or animals to do so. Do not climb into the appliance or allow children or animals to do so. Death or serious injury could occur or the appliance could be damaged.
- Be careful not to pinch fingers when opening and closing the door. Be careful when opening and closing the door when children are in the area.
- Open and close the doors with care. Doors opened too quickly or forcefully may cause injury or damage to the appliance or surrounding equipment.
- Do not use combustible spray or place volatile or flammable substances near the appliance. They might catch fire.
- Keep the area around the appliance clean. Dirt, dust, or insects in the appliance could cause harm to individuals or damage to the appliance.
- Do not throw anything onto the shelves or load any single shelf with more than 120 lb. (54.5 kg) of product. They might fall off and cause injury.

**⚠ WARNING, continued**

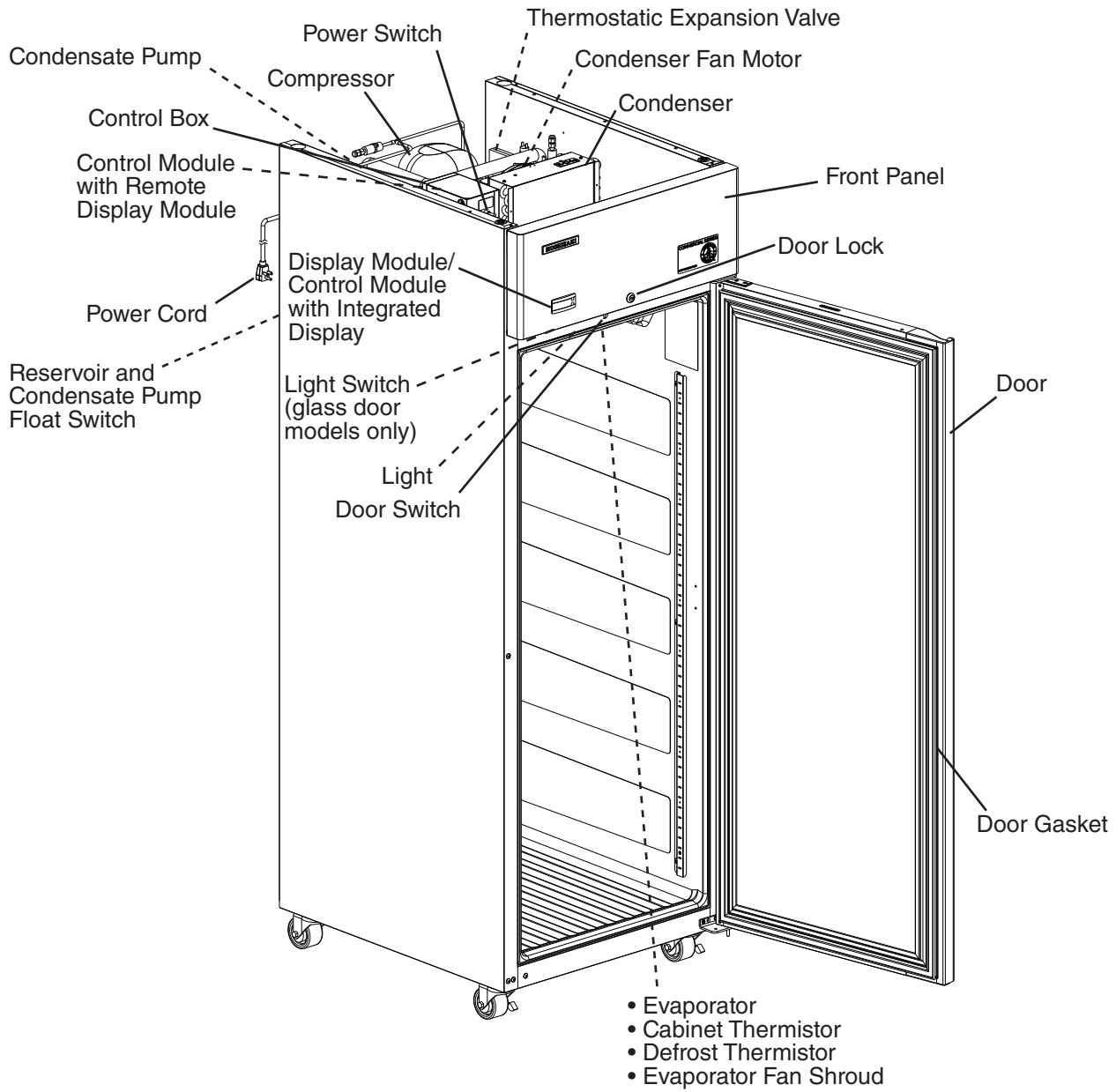
- Do not place anything on top of the appliance. Foreign objects or moisture could enter the appliance and result in electric shock or fire.
- The appliance is designed only for temporary storage of food. Employ sanitary methods. Use for any other purposes (for example, storage of chemicals or medical supplies such as vaccine and serum) could cause deterioration of stored items.
- Do not block air inlets or outlets, otherwise cooling performance may be reduced.
- Do not tightly pack the cabinet. Allow some space between items to ensure good air flow. Also allow space between items and interior surfaces.
- Do not put warm or hot foods in the cabinet. Let them cool first, or they will raise the cabinet temperature and could deteriorate other foods in the cabinet or overload the appliance.
- All foods should be wrapped in plastic film or stored in sealed containers. Otherwise foods may dry up, pass their smells onto other foods, cause frost to develop, result in poor appliance performance, or increase the likelihood of cross-contamination. Certain dressings and food ingredients, if not stored in sealed containers, may accelerate corrosion of the evaporator, resulting in failure.
- Do not store items near the air outlet. They might freeze up and crack or break causing a risk of injury or contamination of other food.

***NOTICE***

- Protect the floor when moving the appliance to prevent damage to the floor.
- Keep ventilation openings, in the appliance enclosure or in the built-in structure, clear of obstruction. Do not place anything on top of the appliance. Blockage of airflow could negatively affect performance and damage the appliance.
- To prevent deformation or cracks, do not spray insecticide onto the plastic parts or let them come into contact with oil.
- To avoid damage to the gasket, use only the door handle when opening and closing.

# I. General Information

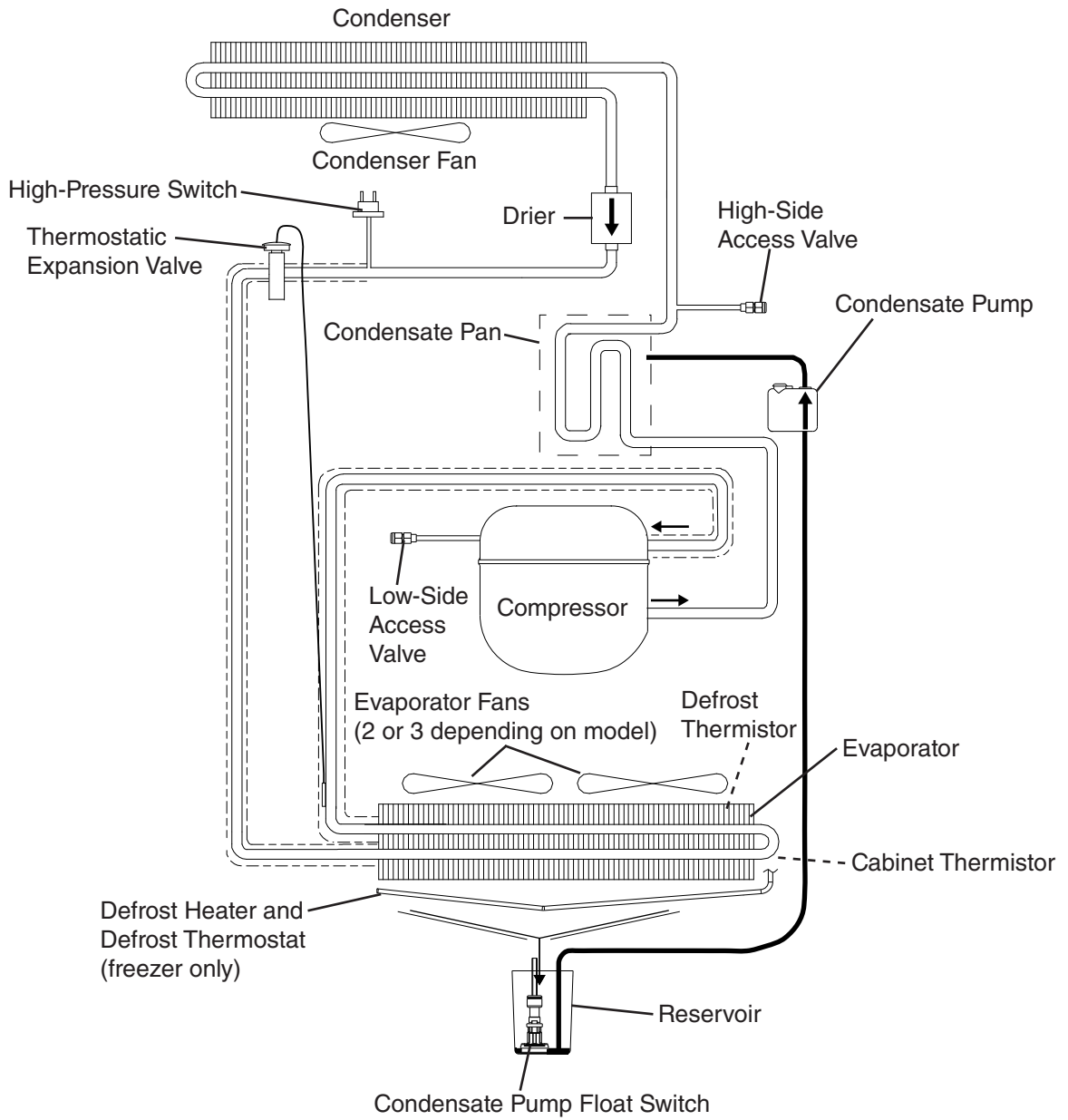
## A. Construction



Model Shown: CR1B-FS



## B. Refrigeration Flow Chart

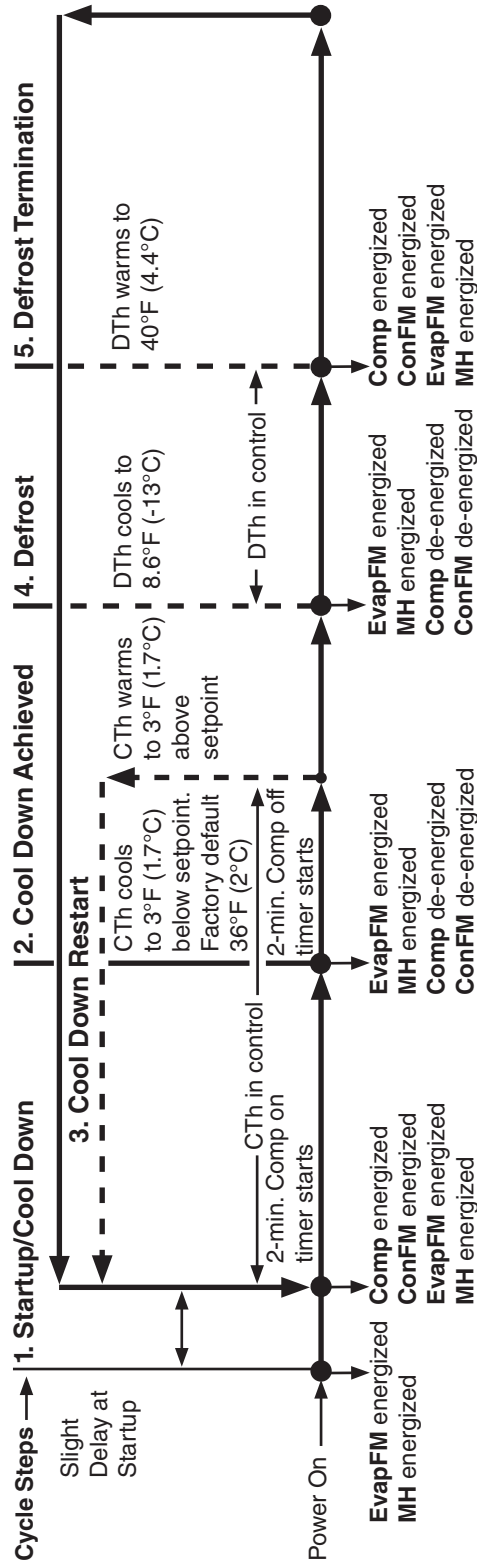


## II. Sequence of Operation and Service Diagnosis

### A. Sequence of Operation Flow Charts

#### 1. Refrigerator

Refrigerator Sequence Flow Chart



Note:

- a) EvapFM de-energizes when door is opened on -FS models and when upper door is opened on -HS models.
- b) 2-min. minimum Comp on timer starts when Comp energizes.
- c) 2-min. minimum Comp off timer starts when Comp de-energizes.
- d) 20-min. minimum defrost time.
- e) 1-hr. maximum defrost time.

**Control Module with Remote Display Module**

- f) 2-min. temperature display timer starts when defrost termination temperature is met.

**Control Module with Integrated Display**

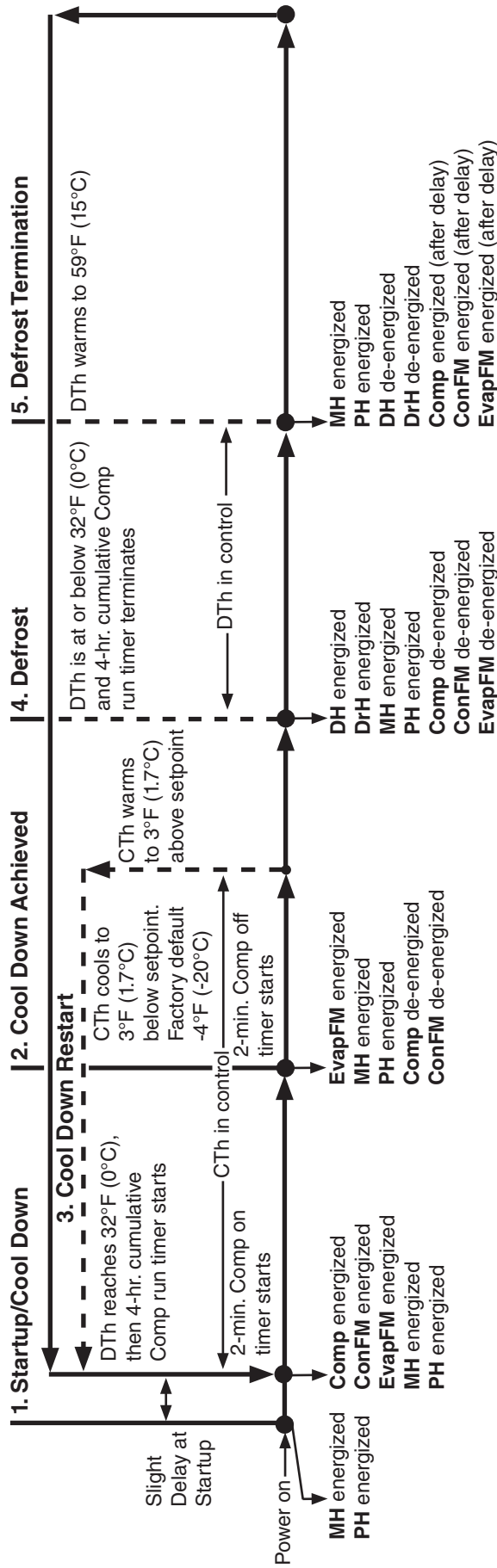
- f) Temperature displayed during defrost.

**Legend:**

- Comp-compressor
- ConFM-condenser fan motor
- CTh-cabinet thermistor
- DTh-defrost thermistor
- EvapFM-evaporator fan motor
- MH-mullion heater

## 2. Freezer

### Freezer Sequence Flow Chart



**Note:**

- a) EvapFM de-energizes when door is opened on -FS models and when upper door is opened on -HS models.
- b) 2-min. minimum Comp on timer starts when Comp energizes.
- c) 2-min. minimum Comp off timer starts when Comp de-energizes.
- d) 5-min. minimum defrost time.
- e) 1-hr. maximum defrost time.
- f) 3-min. Comp/ConFM delay timer starts when defrost termination temperature is met.

**Control Module with Remote Display Module**

- g) 8-minute EvapFM delay timer starts when defrost termination temperature is met (3-minute delay timer when defrost initiated manually).
- h) 13-minute temperature display delay timer starts when defrost termination temperature is met.

**Control Module with Integrated Display**

- g) 7-minute EvapFM delay timer starts when defrost termination temperature is met (3-minute delay timer when defrost initiated manually)
- h) 18-minute temperature display delay timer starts when defrost termination temperature is met (15-minute delay timer when defrost initiated manually).

<b>Legend:</b>
Comp-compressor
ConFM-condenser fan motor
CTh-cabinet thermistor
DH-defrost heater
DrH-drain heater
DTh-defrost thermistor
EvapFM-evaporator fan motor
MH-mullion heater
PH-perimeter heater

## B. Service Diagnosis

### **⚠ WARNING**

- The appliance should be diagnosed and repaired only by qualified service personnel to reduce the risk of death, electric shock, serious injury, or fire.
- Risk of electric shock. Use extreme caution and exercise safe electrical practices.
- Moving parts (e.g., fan blade) can crush and cut. Keep hands clear.
- Make sure all food zones are clean after the appliance is serviced.

### **NOTICE**

- The appliance is not intended for outdoor use. Normal operating ambient temperature must be within 45°F to 100°F (7°C to 38°C).
- The appliance must not be located next to ovens, grills, or other high heat producing equipment.
- The appliance must not be located in a corrosive environment.
- The appliance must be a minimum of 4" (11 cm) from side walls.
- A minimum of 10" (25 cm) overhead clearance must be provided for proper ventilation.

The diagnostic procedure is a sequence check that allows you to diagnose the electrical system and components. Before proceeding, check for correct installation and proper voltage per nameplate. Always choose a neutral (W) to establish a good neutral connection when checking high voltages. If the display is in alarm, see "III.D. Alarm Safeties."

### **IMPORTANT**

The maximum allowable voltage variation is  $\pm 10$  percent of the nameplate rating. 115VAC is used as a reference voltage when checking voltage to components. Voltage may vary depending on power supply.

1. Factory Default Settings:

- a) Temperature Settings: Refrigerator: 36°F (2°C); Freezer: -4°F (-20°C).
- b) Temperature Display Scale: °F.

For further details, see "II.C. Control Module Check" or "III. Controls and Adjustments."

Note • When exposed to high temperatures, a high-temperature alarm "Hi" may occur at startup. To silence the alarm, press and release the upper button. Alarm automatically resets when temperature drops to an acceptable range.

- There is a minimum 2-min. Comp on time and 2-min. Comp off time.

- 1) Move the power switch to the "OFF" position.
- 2) Unplug the appliance from the electrical outlet.
- 3) Remove the control box cover.
- 4) Plug the appliance back into the electrical outlet.
- 5) Move the power switch to the "ON" position.
- 6) Confirm 115VAC at the power switch. On 3-section models, also confirm proper supply voltage at the receptacle box (115VAC for refrigerator/208-230VAC for freezer).

Continue to the appropriate section:

"II.B.1a. Refrigerator-Control Module with Remote Display Module"

"II.B.1b. Refrigerator-Control Module with Integrated Display"

"II.B.2a. Freezer-Control Module with Remote Display Module"

"II.B.2b. Freezer-Control Module with Integrated Display"

## 1a. Refrigerator-Control Module with Remote Display Module

- 7) **Startup/Cool Down**—EvapFM and MH energize. There is a slight delay, then Comp and ConFM energize. Cabinet temperature appears on DM.
- a) **EvapFM Diagnosis:** Confirm EvapFM energizes. If not, confirm doors are closed and DS engaged. Next, check for 115VAC at DSR #8 (LBU) to #7 neutral (W). If 115VAC is not present, check DS continuity. If DS is engaged and contacts are open, replace DS. If 115VAC is present, check for 115VAC at DSR #4 (DBU) to neutral (W). If 115VAC is not present, check for 115VAC at DSR #6 (BK) to neutral (W). If 115VAC is present at DSR #6 (BK) to neutral (W) and not at DSR #4 (DBU) to neutral (W), replace DSR. If 115VAC is present at DSR #4 (DBU) to neutral (W), check EvapFM blades for binding and EvapFM continuity.
  - b) **MH Diagnosis:** Confirm MH energizes. Check for 115VAC at MH. If 115VAC is not present, confirm power supply and continuity of power switch. If 115VAC is present, check amp draw of MH. If an amp reading is not present, check the continuity of MH. If open, replace MH.
  - c) **CM and DM Diagnosis:** Cabinet temperature appears on DM. If not, check for 115VAC at CM L3 (BK) to CM N5 neutral (W). If 115VAC is not present, check power switch, power cord connections, and breaker/fuse. Confirm wiring connections are secure for both CM L3 (BK) (power supply) and CM N5 (W) (neutral). If 115VAC is present and DM is off, confirm display cable connection is secure. If DM is still off, replace CM and DM with HS kit.
  - d) **Comp and ConFM Diagnosis:** Confirm Comp and ConFM energize. If not, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is not present at CM C1(R) to neutral (W), check CTh status. See "II.D.Thermistor Check." If CTh ohm reading is in proper range, replace CM and DM with HS kit. If 115VAC is present at CM C1 (R) to neutral (W), check continuity of HPS. If open, allow time for HPS to reset. If HPS does not reset, see "e) HPS Activation" below. If HPS is closed, check for 115VAC at CR #5 (GY) to CR #6 neutral (W). If 115VAC is present, check for 115VAC at CR #1 (R) to neutral (W). If 115VAC is not present, replace CR. If 115VAC is present and ConFM is energized but Comp is not, check for 115VAC at Comp protector #14 to neutral (W). If 115VAC is not present, give time for Comp protector to cool and reset. If Comp protector does not reset, replace Comp protector. If 115VAC is present, check Comp start capacitor, start relay, and Comp motor windings. If ConFM is not energized, check ConFM fan blades for binding and motor winding continuity.

If Comp and ConFM are energized and the cabinet does not cool down, check for a restriction in the refrigeration circuit, correct TXV operation, and correct refrigerant charge.

- e) **HPS Activation:** Confirm ConFM is energized and fan blade turns freely. Confirm condenser coil is not clogged or restricted. Confirm there are no restrictions in the refrigeration circuit (TXV and drier). Let refrigeration circuit pressures equalize. If HPS does not reset and pressures are equalized, replace HPS. If pressures are not equalized, reclaim refrigerant and diagnose refrigeration circuit restriction.

- 8) **Cool Down Achieved**—CTh cools to 3°F (1.7°C) below setpoint. EvapFM and MH continue. Comp and ConFM de-energize. **Diagnosis:** Confirm Comp and ConFM de-energize. If not, and Comp and ConFM were energized longer than 2 min., check CTh status. See "II.D. Thermistor Check." If CTh ohm reading is in range and Comp and ConFM continue longer than 2 min., check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is present, replace CM and DM with HS kit. If 115VAC is not present and Comp and ConFM continue, check for 115VAC at CR #1 (R). If 115VAC is present, replace CR.
- 9) **Defrost**—"dEF" is displayed during defrost. There is a 20-min. minimum defrost time, a 1-hr. maximum defrost time, and a 2 hr. minimum defrost interval.
- 1a) **Temperature-Initiated:** DTh cools to 8.6°F (-13°C). EvapFM and MH continue. Comp and ConFM de-energize.
- 1b) **Manually-Initiated:** To initiate a manual defrost, press and hold the lower button for 5 seconds. "dEF" appears in the display. If energized, Comp and ConFM de-energize.
- 2) **Defrost Termination:** DTh warms to 40°F (4.4°C). EvapFM and MH continue. Comp and ConFM energize. 2-min. temperature display delay timer starts. 2 min. later, cabinet temperature appears on DM.

**Defrost Diagnosis:**

- a) **Defrost Initiation:** Has DTh cooled to 8.6°F (-13°C) or lower? Confirm DTh status. See "II.D. Thermistor Check." If DTh is in proper range or manual defrost initiated, confirm Comp and ConFM de-energize. If not, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is present and DTh is within proper range, replace CM and DM with HS kit. If there is no voltage at CM C1 (R) to neutral (W) and Comp and ConFM do not de-energize, check for 115VAC at CR #1 (R) to neutral (W). If 115VAC is present at CR #1 (R) to neutral (W) and DTh is within proper range, replace CR.
- b) **Defrost Termination:** Has DTh warmed to 40°F (4.4°C)? If not yet confirmed, confirm DTh status. See "II.D. Thermistor Check." If DTh is in proper range, have Comp and ConFM energized? If not, see "7d) Comp and ConFM Diagnosis" above. 2-min. temperature delay timer terminates, temperature appears on display. If temperature does not appear on display after 2-min., replace CM and DM with HS kit.

Legend: **CM**—control module; **Comp**—compressor; **ConFM**—condenser fan motor; **CTh**—cabinet thermistor; **DM**—display module; **DS**—door switch; **DSR**—door switch relay; **DTh**—defrost thermistor; **EvapFM**—evaporator fan motor; **HPS**—high-pressure switch; **MH**—mullion heater

## 1b. Refrigerator-Control Module with Integrated Display

- 7) **Startup/Cool Down**—There is a slight delay, cabinet temperature appears on display. Comp, ConFM, EvapFM, and MH energize.
- a) **EvapFM Diagnosis:** Confirm EvapFM energizes. If not, confirm doors are closed and DS engaged. Next, check for 115VAC at DSR #8 (LBU) to #7 neutral (W). If 115VAC is not present, check DS continuity. If DS is engaged and contacts are open, replace DS. If 115VAC is present, check for 115VAC at DSR #4 (DBU) to neutral (W). If 115VAC is not present, check for 115VAC at DSR #6 (BK) to neutral (W). If 115VAC is present at DSR #6 (BK) to neutral (W) and not at DSR #4 (DBU) to neutral (W), replace DSR. If 115VAC is present at DSR #4 (DBU) to neutral (W), check EvapFM blades for binding and EvapFM continuity.
  - b) **MH Diagnosis:** Confirm MH energizes. Check for 115VAC at MH. If 115VAC is not present, confirm power supply and continuity of power switch. If 115VAC is present, check amp draw of MH. If an amp reading is not present, check the continuity of MH. If open, replace MH.
  - c) **CM Diagnosis:** Cabinet temperature appears on display. If not, check for 115VAC at CM L2 (BK) to CM N3 neutral (W). If 115VAC is not present, check power switch, power cord connections, and breaker/fuse. Confirm wiring connections are secure for both CM L2 (BK) (power supply) and CM N3 (W) (neutral). If 115VAC is present and display is off, replace CM.
  - d) **Comp and ConFM Diagnosis:** Confirm Comp and ConFM energize. If not, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is not present at CM C1 (R) to neutral (W), check CTh status. See "II.D.Thermistor Check." If CTh ohm reading is in proper range, replace CM. If 115VAC is present at CM C1 (R) to neutral (W), check continuity of HPS. If open, allow time for HPS to reset. If HPS does not reset, see "e) HPS Activation" below. If HPS is closed, check for 115VAC at CR #5 (GY) to CR #6 neutral (W). If 115VAC is present, check for 115VAC at CR #1 (R) to neutral (W). If 115VAC is not present, replace CR. If 115VAC is present and ConFM is energized but Comp is not, check for 115VAC at Comp protector #14 to neutral (W). If 115VAC is not present, give time for Comp protector to cool and reset. If Comp protector does not reset, replace Comp protector. If 115VAC is present, check Comp start capacitor, start relay, and Comp motor windings. If ConFM is not energized, check ConFM fan blades for binding and motor winding continuity.  
  
If Comp and ConFM are energized and the cabinet does not cool down, check for a restriction in the refrigeration circuit, correct TXV operation, and correct refrigerant charge.
  - e) **HPS Activation:** Confirm ConFM is energized and fan blade turns freely. Confirm condenser coil is not clogged or restricted. Confirm there are no restrictions in the refrigeration circuit (TXV and drier). Let refrigeration circuit pressures equalize. If HPS does not reset and pressures are equalized, replace HPS. If pressures are not equalized, reclaim refrigerant and diagnose refrigeration circuit restriction.



- 8) **Cool Down Achieved**—CTh cools to 3°F (1.7°C) below setpoint. EvapFM and MH continue. Comp and ConFM de-energize. **Diagnosis:** Confirm Comp and ConFM de-energize. If not, and Comp and ConFM were energized longer than 2 min., check CTh status. See "II.D. Thermistor Check." If CTh ohm reading is in range and Comp and ConFM continue longer than 2 min., check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is present, replace CM. If 115VAC is not present and Comp and ConFM continue, check for 115VAC at CR #1 (R). If 115VAC is present, replace CR.
- 9) **Defrost**—Cabinet temperature is displayed during defrost. There is a 20-min. minimum defrost time, a 1-hr. maximum defrost time, and a 2-hr. minimum defrost interval.
- 1a) **Time-Initiated:** When 2-hr. cumulative Comp run timer terminates, defrost starts (off cycle). EvapFM and MH continue. Comp and ConFM de-energize.
- 1b) **Manually-Initiated:** To initiate a manual defrost, press the manual defrost button on display. Defrost icon turns on and, if energized, Comp and ConFM de-energize. Cabinet temperature is displayed during defrost.
- 2) **Defrost Termination:** DTh warms to 40°F (4.4°C). EvapFM and MH continue. Comp and ConFM energize.

**Defrost Diagnosis:**

- a) **Defrost Initiation:** Has DTh cooled to 8.6°F (-13°C) or lower? Confirm DTh status. See "II.D. Thermistor Check." If DTh is in proper range or manual defrost initiated, confirm Comp and ConFM de-energize. If not, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is present and DTh is within proper range, replace CM. If there is no voltage at CM C1 (R) to neutral (W) and Comp and ConFM do not de-energize, check for 115VAC at CR #1 (R) to neutral (W). If 115VAC is present at CR #1 (R) to neutral (W) and DTh is within proper range, replace CR.
- b) **Defrost Termination:** Has DTh warmed to 40°F (4.4°C)? If not yet confirmed, confirm DTh status. See "II.D. Thermistor Check." If DTh is in proper range, have Comp and ConFM energized? If not, see "7d) Comp and ConFM Diagnosis" above.

Legend: **CM**—control module; **Comp**—compressor; **ConFM**—condenser fan motor;  
**CR**—compressor relay; **CTh**—cabinet thermistor; **DS**—door switch; **DSR**—door switch relay; **DTh**—defrost thermistor; **EvapFM**—evaporator fan motors;  
**HPS**—high-pressure switch; **MH**—mullion heater; **TXV**—thermostatic expansion valve

## 2a. Freezer-Control Module with Remote Display Module

- 7) **Startup/Cool Down**—MH and PH energize. There is a slight delay, then Comp, ConFM, and EvapFM energize. Cabinet temperature appears on DM. Once DTh cools to 32°F (0°C), 4-hr. Comp cumulative run timer starts.
- a) **MH and PH Diagnosis:** Confirm MH and PH energize. Check for 115VAC at MH and PH. If 115VAC is not present, confirm power supply and continuity of power switch. If 115VAC is present, check amp draw of MH and PH. If an amp reading is not present, check continuity of MH or PH. If open, replace MH or PH.
  - b) **CM and DM Diagnosis:** Cabinet temperature appears on DM. If not, check for 115VAC at CM L3 (BK) to CM N5 neutral (W). If 115VAC is not present, check power switch, power cord connections, and breaker/fuse. Confirm wiring connections are secure for both CM L3 (BK) (power supply) and CM N5 (W) (neutral). If 115VAC is present and DM is off, confirm display cable connection is secure. If DM is still off, replace CM and DM with HS kit.
  - c) **EvapFM Diagnosis:** Confirm EvapFM energizes. If not, confirm doors are closed and DS engaged. Next, check for 115VAC at DSR #8 (LBU) to #7 neutral (W). If 115VAC is not present, check DS continuity. If DS is engaged and contacts are open, replace DS. If 115VAC is present, check for 115VAC at CM F6 (BK) to neutral (W). If 115VAC is not present, replace CM and DM with new HS kit. If 115VAC is present, check for 115VAC at DSR #4 (DBU) to neutral (W). If 115VAC is not present, check for 115VAC at DSR #6 (BK) to neutral (W). If 115VAC is present at DSR #6 (BK) to neutral (W) and not at DSR #4 (DBU) to neutral (W), replace DSR. If 115VAC is present at DSR #4 (DBU) to neutral (W), check EvapFM blades for binding and EvapFM continuity.
  - d) **Comp and ConFM Diagnosis:** Confirm Comp and ConFM energize. If not, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is not present, check CTh status. See "II.D.Thermistor Check." If CTh ohm reading is in proper range, replace CM and DM with HS kit. If 115VAC is present at CM C1 (R) to neutral (W), check continuity of HPS. If open, allow time for HPS to reset. If HPS does not reset, see "e) HPS Activation" below. If HPS is closed, check for 115VAC at CR #5 (GY) to CR #6 neutral (W). If 115VAC is present, check for 115VAC at CR #1 (R) to neutral (W). If 115VAC is not present, replace CR. If 115VAC is present, and ConFM is energized but Comp is not, check for 115VAC at Comp protector if external (internal on 1-section, external on 2-section) to neutral (W). If 115VAC is not present, give time for Comp protector to cool and reset. If Comp protector does not reset, replace Comp protector. If 115VAC is present, check run capacitor, start capacitor, start relay, and Comp motor windings. If ConFM is not energized, check ConFM fan blades for binding and motor winding continuity.
- If Comp and ConFM are energized and the cabinet does not cool down, check for a restriction in the refrigeration circuit, correct TXV operation, and correct refrigerant charge.
- e) **HPS Activation:** Confirm ConFM is energized and fan blade turns freely. Confirm condenser coil is not clogged or restricted. Confirm there are no restrictions in the refrigeration circuit (TXV and drier). Let refrigeration circuit pressures equalize. If HPS does not reset and pressures are equalized, replace HPS. If pressures are not equalized, reclaim refrigerant and diagnose refrigeration circuit restriction.

- 8) **Cool Down Achieved**—CTh cools to 3°F (1.7°C) below setpoint. EvapFM, MH, and PH continue. Comp and ConFM de-energize. **Diagnosis:** Confirm Comp and ConFM de-energize. If not, and Comp and ConFM were energized longer than 2 min., check CTh status. See "I.D. Thermistor Check." If CTh ohm reading is in range and Comp and ConFM continue longer than 2 min., check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is present, replace CM and DM with HS kit. If 115VAC is not present and Comp and ConFM continue, check for 115VAC at CR #1 (R) to neutral (W). If 115VAC is present, replace CR.
- 9) **Defrost**—"dEF" is displayed during defrost. There is a 5-min. minimum defrost time and a 1-hr. maximum defrost time.
- 1a) **Temperature/Time-Initiated:** DTh cools to 32°F (0°C), 4-hr. cumulative Comp run timer starts. Once DTh is at or below 32°F (0°C) with 4-hr. cumulative Comp run timer satisfied (Comp energized more than 4 hrs.), "dEF" appears on DM. MH and PH continue. DH and DrH energize. Comp, ConFM, and EvapFM de-energize.
- 1b) **Manually-Initiated:** To initiate a manual defrost, press and hold the lower button for 5 seconds. "dEF" appears in the display. MH and PH continue. DH and DrH energize. Comp, ConFM, and EvapFM de-energize.
- 2a) **Temperature/Time Initiated Defrost-Termination:**
- (1) DTh warms to 59°F (15°C). "dEF," MH, and PH continue. DH and DrH de-energize. 3-min. Comp/ConFM delay timer starts, 8-min. EvapFM delay timer starts, and 13-min. temperature display delay timer starts.
  - (2) 3-min. Comp/ConFM delay timer terminates, Comp, ConFM, and EvapFM energize.
  - (3) 5-min. later, EvapFM delay timer terminates and EvapFM energizes.
  - (4) 5-min. after EvapFM energizes, 13-min. temperature display delay timer terminates and cabinet temperature appears on DM.
- 2b) **Manually Initiated Defrost-Termination:**
- (1) DTh warms to 59°F (15°C). MH and PH continue. DH and DrH de-energize. 3-min. Comp delay timer starts, 3-min. EvapFM delay timer starts, and 13-min. temperature display delay timer starts.
  - (2) 3-min. Comp and EvapFM delay timers terminate, Comp, ConFM, and EvapFM energize.
  - (3) 10 min. after that, 13-min. temperature display delay timer terminates and cabinet temperature appears on DM.

## Defrost Diagnosis:

- 1a) **Temperature/Time-Initiated:** Has DTh cooled to 32°F (0°C) or lower? Before proceeding, confirm DTh status. See "II.D. Thermistor Check." Has 4-hr. Comp cumulative run timer satisfied?
- (1) **DM Diagnosis:** Confirm "dEF" appears on DM. If not, replace CM and DM with HS kit.
  - (2) **DH and DrH Diagnosis:** Confirm DH and DrH energize. If not, check for 115VAC at CM H4 (BK) to neutral (W). If 115VAC is not present, replace CM and DM with HS kit. If 115VAC is present, check DT continuity. If open, let cool and reset. If DT does not close, replace DT. If DT is closed, check DH and DrH amp draw and continuity.
  - (3) **Comp and ConFM Diagnosis:** Confirm Comp and ConFM de-energize. If not, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is present, replace CM and DM with HS kit. If 115VAC is not present and Comp and ConFM continue, check CR#1 (R) to neutral. If 115VAC is present, replace CR.
  - (4) **EvapFM Diagnosis:** Confirm EvapFM de-energizes. If not, check for 115VAC at CM F6 (BK) to neutral (W). If 115VAC is present, replace CM and DM with HS kit.
- 1b) **Manually-Initiated:** After pressing the lower button for 5 sec., check the following:
- (1) **CM and DM Diagnosis:** Confirm "dEF" appears on DM. If not, replace CM and DM with HS kit.
  - (2) **DH and DrH Diagnosis:** Confirm DH and DrH energize. If not, check for 115VAC at CM H4 (BK) to neutral (W). If 115VAC is not present, replace CM and DM with HS kit. If 115VAC is present, check DT continuity. If open, let cool and reset. If DT does not close, replace DT. If DT is closed, check DH and DrH amp draw and continuity.
  - (3) **Comp and ConFM Diagnosis:** Confirm Comp and ConFM de-energize. If not, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is present, replace CM and DM with HS kit. If 115VAC is not present and Comp and ConFM continue, check CR #1 (R) to neutral (W). If 115VAC is present, replace CR.
  - (4) **EvapFM Diagnosis:** Confirm EvapFM de-energizes. If not, check for 115VAC at CM F6 (BK) to neutral (W). If 115VAC is present, replace CM and DM with HS kit.
- 2a) **Temperature/Time Initiated Defrost-Termination:** Has DTh warmed to 59°F (15°C)? If not yet confirmed, confirm DTh status. See "II.D. Thermistor Check." If DTh is in proper range, DH de-energizes and 3 delay timers start. If DTh has not warmed to 59°F (15°C), check DT and DH continuity. Next, check DH amp draw.
- (1) **3-min. Comp delay timer terminates:** 3 min. after DH de-energizes, confirm Comp and ConFM energize. If not, confirm cabinet temperature is warm enough for Comp and ConFM operation. Next, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is not present, check CTh status. See "II.D. Thermistor Check." If CTh ohm reading is in proper range, replace CM and DM with HS kit. If 115VAC is present, check for 115VAC at CR #4 (BK) to neutral (W) and CR #1 (R) to neutral (W). If 115VAC is present at CR #4 (BK) to neutral (W) but not at CR #1 (R) to neutral (W), replace CR. If 115VAC is present at CR #1 (R) and Comp or ConFM are not energized, check Comp start components, Comp protector (internal on 1-section, external on 2-section), and Comp motor winding continuity. If ConFM is not energized, check ConFM fan blades for binding and motor winding continuity.

- (2) **8-min. EvapFM delay timer terminates:** 5 min. after Comp and ConFM energize, confirm EvapFM energizes. If not, confirm doors are closed and DS engaged. Next, check for 115VAC at CM F6 (BK) to neutral (W). If 115VAC is not present, replace CM and DM with HS kit. If 115VAC is present, check for 115VAC at DSR #4 (DBU) to neutral (W).  
If 115VAC is not present, check for 115VAC at DSR #6 (BK) to neutral (W).  
If 115VAC is present on DSR #6 (BK) to neutral (W) and not on DSR #4 (DBU) to neutral (W), replace DSR. If 115VAC is present on DSR #4 (DBU) to neutral (W) and EvapFM is not energized, check EvapFM blades for binding and EvapFM continuity.
- (3) **13-min. temperature display delay timer terminates:** 5 min. after EvapFM energizes, "dEF" is replaced by cabinet temperature on display. If not, replace CM and DM with HS kit.
- 2b) **Manually Initiated Defrost-Termination:** Has DTh warmed to 59°F (15°C)? If not yet confirmed, confirm DTh status. See "II.D. Thermistor Check." If DTh is in proper range, DH de-energizes and 3 delay timers start. If DTh has not warmed to 59°F (15°C), check DT and DH continuity. Next, check DH amp draw.
- (1) **3-min. Comp/ConFM and EvapFM delay timers terminate:** 3 min. after DH de-energizes, confirm Comp, ConFM, and EvapFM energize. If Comp and ConFM do not energize, confirm cabinet temperature is warm enough for Comp and ConFM operation.
- Comp and ConFM:** Check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is not present, check CTh status. See "II.D. Thermistor Check." If CTh ohm reading is in proper range, replace CM and DM with HS kit. If 115VAC is present, check for 115VAC at CR #4 (BK) to neutral (W) and CR #1 (R) to neutral (W).  
If 115VAC is present at CR #4 (BK) to neutral (W) but not at CR #1 (R) to neutral (W), replace CR. If 115VAC is present at CR #1 (R) and Comp or ConFM are not energized, check Comp start components, Comp protector (internal on 1-section, external on 2-section), and Comp motor winding continuity. If ConFM is not energized, check ConFM fan blades for binding and motor winding continuity.
- EvapFM:** Confirm EvapFM energizes. If not, confirm doors are closed and DS engaged. Next, check for 115VAC at CM F6 (BK) to neutral (W). If 115VAC is not present, replace CM and DM with HS kit. If 115VAC is present, check for 115VAC at DSR #4 (DBU) to neutral (W). If 115VAC is not present, check for 115VAC at DSR #6 (BK) to neutral (W). If 115VAC is present on DSR #6 (BK) to neutral (W) and not on DSR #4 (DBU) to neutral (W), replace DSR. If 115VAC is present on DSR #4 (DBU) to neutral (W) and EvapFM is not energized, check EvapFM blades for binding and EvapFM continuity.
- (2) **13-min. temperature display delay timer terminates:** 10 min. after Comp, ConFM, and EvapFM energize, "dEF" is replaced by cabinet temperature on display. If not, replace CM and DM with HS kit.

Legend: **CM**—control module; **Comp**—compressor; **ConFM**—condenser fan motor;  
**CR**—compressor relay; **CTh**—cabinet thermistor; **DH**—defrost heater;  
**DM**—display module; **DrH**—drain heater; **DSR**—door switch relay;  
**DT**—defrost thermostat; **DTh**—defrost thermistor; **EvapFM**—evaporator fan motors;  
**HPS**—high-pressure switch; **MH**—mullion heater; **PH**—perimeter heater;  
**TXV**—thermostatic expansion valve

## 2b. Freezer-Control Module with Integrated Display

- 7) **Startup/Cool Down**– MH and PH energize. There is a slight delay, then Comp, ConFM, and EvapFM energize. Cabinet temperature appears on display. Once DTh cools to 32°F (0°C), 4-hr. Comp cumulative run timer starts.
- a) **MH and PH Diagnosis:** Confirm MH and PH energize. Check for 115VAC at MH and PH. If 115VAC is not present, confirm power supply and continuity of power switch. If 115VAC is present, check amp draw of MH and PH. If an amp reading is not present, check continuity of MH or PH. If open, replace MH or PH.
- b) **CM Diagnosis:** Cabinet temperature appears on display. If not, check for 115VAC at CM L2 (BK) to CM N3 neutral (W). If 115VAC is not present, confirm wiring connections are secure on CM L2 (BK) (power supply) and CM N3 (W) (neutral). If 115VAC is present and display is off, replace CM.
- c) **EvapFM Diagnosis:** Confirm EvapFM energizes. If not, confirm doors are closed and DS engaged. Next, check for 115VAC at DSR #8 (LBU) to DSR #7 neutral (W). If 115VAC is not present, check DS continuity. If DS is engaged and contacts are open, replace DS. If 115VAC is present, check for 115VAC at CM F5 (Y) to neutral (W). If 115VAC is not present, replace CM. If 115VAC is present, check for 115VAC at DSR #4 (DBU) to neutral (W). If 115VAC is not present, check for 115VAC at DSR #6 (Y) to neutral (W). If 115VAC is present at DSR #6 (Y) to neutral (W) and not at DSR #4 (DBU) to neutral (W), replace DSR. If 115VAC is present at DSR #4 (DBU) to neutral (W), check EvapFM blades for binding and EvapFM continuity.
- d) **Comp and ConFM Diagnosis:** Confirm Comp and ConFM energize. If not, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is not present, check CTh status. See "II.D.Thermistor Check." If CTh ohm reading is in proper range, replace CM. If 115VAC is present at CM C1 (R) to neutral (W), check continuity of HPS. If open, allow time for HPS to reset. If HPS does not reset, see "e) HPS Activation" below. If HPS is closed, check for 115VAC at CR #5 (GY) to CR #6 neutral (W). If 115VAC is present, check for 115VAC at CR #1 (R) to neutral (W). If 115VAC is not present, replace CR. If 115VAC is present and ConFM is energized but Comp is not, check for 115VAC at Comp protector if external (internal on 1-section, external on 2-section) to neutral (W). If 115VAC is not present, give time for Comp protector to cool and reset. If Comp protector does not reset, replace Comp protector. If 115VAC is present, check run capacitor, start capacitor, start relay, and Comp motor windings. If ConFM is not energized, check ConFM fan blades for binding and motor winding continuity.
- If Comp and ConFM are energized and the cabinet does not cool down, check for a restriction in the refrigeration circuit, correct TXV operation, and correct refrigerant charge.
- e) **HPS Activation:** Confirm ConFM is energized and fan blade turns freely. Confirm condenser coil is not clogged or restricted. Confirm there are no restrictions in the refrigeration circuit (TXV and drier). Let refrigeration circuit pressures equalize. If HPS does not reset and pressures are equalized, replace HPS. If pressures are not equalized, reclaim refrigerant and diagnose refrigeration circuit restriction.

- 8) **Cool Down Achieved**—CTh cools to 3°F (1.7°C) below setpoint. EvapFM, MH, and PH continue. Comp and ConFM de-energize. **Diagnosis:** Confirm Comp and ConFM de-energize. If not, and Comp and ConFM were energized longer than 2 min., check CTh status. See "I.D. Thermistor Check." If CTh ohm reading is in proper range and Comp and ConFM continue longer than 2 min., check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is present, replace CM. If 115VAC is not present and Comp and ConFM continue, check CR #1 (R) to neutral (W). If 115VAC is present, replace CR.
- 9) **Defrost**—The defrost icon turns on and "dEF" is displayed during defrost. There is a 5-min. minimum defrost time and a 1-hr. maximum defrost time.
- 1a) **Temperature/Time-Initiated:** DTh cools to 32°F (0°C), 4-hr. cumulative Comp run timer starts. Once DTh is at or below 32°F (0°C) with 4-hr. cumulative Comp run timer satisfied (Comp energized more than 4 hrs.), defrost icon turns on and "dEF" is displayed. MH and PH continue. DH and DrH energize. If on, Comp and EvapFM icons turn off. Comp, ConFM, and EvapFM de-energize.
- 1b) **Manually-Initiated:** To initiate a manual defrost, press the manual defrost button on display. Comp and EvapFM icons turn off. Defrost icon turns on and "dEF" is displayed. MH and PH continue. DH and DrH energize, Comp and EvapFM icons turn off, Comp, ConFM, and EvapFM de-energize.
- 2a) **Temperature/Time Initiated Defrost-Termination:**
- (1) DTh warms to 59°F (15°C). Defrost icon, "dEF," MH, and PH continue. DH and DrH de-energize. 3-min. Comp delay timer starts, 7-min. EvapFM delay timer starts, and 18-min. temperature display delay timer starts.
  - (2) 3-min. Comp delay timer terminates. "dEF," MH, and PH continue. Defrost icon turns off and Comp icon turns on and Comp and ConFM energize.
  - (3) 4 min. later, 7-min. EvapFM delay timer terminates. Comp, ConFM, "dEF," MH, and PH continue. EvapFM icon turns on and EvapFM energizes. Note that the 7-min. EvapFM delay time is a maximum; if the defrost thermistor cools to 25°F (-3.9°C) before the 7-min. EvapFM delay timer terminates, EvapFM icon turns on and EvapFM energizes.
  - (4) 11-min. later, 18-min. temperature display delay timer terminates. "dEF" is replaced by cabinet temperature.
- 2b) **Manually Initiated Defrost-Termination:**
- (1) DTh warms to 59°F (15°C). Defrost icon, "dEF," MH, and PH continue. DH and DrH de-energize. 3-min. Comp, ConFM, and EvapFM delay timer starts, and 15-min. temperature display delay timer starts.
  - (2) 3-min. Comp, ConFM, and EvapFM delay timer terminates. "dEF," MH, and PH continue. Defrost icon turns off, Comp and EvapFM icons turn on, and Comp, ConFM, and EvapFM energize.
  - (3) 12-min. later, 15 min. temperature display timer terminates. "dEF" is replaced by cabinet temperature.

## Defrost Diagnosis:

- 1a) **Temperature/Time-Initiation:** Has DTh cooled to 32°F (0°C) or lower? Before proceeding, confirm DTh status. See "II.D. Thermistor Check." Has 4-hr. Comp cumulative run timer satisfied?
- (1) **CM Diagnosis:** Confirm defrost icon turns on, "dEF" is displayed, and Comp and EvapFM icons turn off. If not, replace CM.
  - (2) **DH and DrH Diagnosis:** Confirm DH and DrH energize. If not, check for 115VAC at CM H4 (O) to neutral (W). If 115VAC is not present, replace CM. If 115VAC is present, check DT continuity. If open, let cool and reset. If DT does not close, replace DT. If DT is closed, check DH and DrH amp draw and continuity.
  - (3) **Comp and ConFM Diagnosis:** Confirm Comp and ConFM de-energize. If not, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is present, replace CM. If 115VAC is not present and Comp and ConFM continue, check CR #1 (R) to neutral (W). If 115VAC is present, replace CR.
  - (4) **EvapFM Diagnosis:** Confirm EvapFM de-energizes. If not, check for 115VAC at CM F5 (Y) to neutral (W). If 115VAC is present, replace CM.
- 1b) **Manual-Initiation:** After pressing the manual defrost button, check the following:
- (1) **CM Diagnosis:** Confirm Comp and EvapFM icons turn off, defrost icon turns on, and "dEF" is displayed. If not, replace CM.
  - (2) **DH and DrH Diagnosis:** Confirm DH and DrH energize. If not, check for 115VAC at CM H4 (O) to neutral (W). If 115VAC is not present, replace CM. If 115VAC is present, check DT continuity. If open, let cool and reset. If DT does not close, replace DT. If DT is closed, check DH and DrH amp draw and continuity.
  - (3) **Comp and ConFM Diagnosis:** Confirm Comp and ConFM de-energize. If not, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is present, replace CM. If 115VAC is not present and Comp and ConFM continue, check CR #1 (R) to neutral (W). If 115VAC is present, replace CR.
  - (4) **EvapFM Diagnosis:** Confirm EvapFM de-energizes. If not, check for 115VAC at CM F5 (Y) to neutral (W). If 115VAC is present, replace CM.
- 2a) **Temperature/Time Initiated Defrost-Termination:** Has DTh warmed to 59°F (15°C)? If not yet confirmed, confirm DTh status. See "II.D. Thermistor Check." If DTh is in proper range, DH de-energizes and 3 delay timers start. If DTh has not warmed to 59°F (15°C), check DT and DH continuity. Next, check DH amp draw.
- (1) **3-min. Comp delay timer terminates:** 3 min. after DH de-energizes, confirm defrost icon turns off, Comp icon turns on, and Comp and ConFM energize. If not, confirm cabinet temperature is warm enough for Comp and ConFM operation. Next, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is not present, check CTh status. See "II.D. Thermistor Check." If CTh ohm reading is in proper range, replace CM. If 115VAC is present, check for 115VAC at CR #4 (BK) to neutral (W) and CR #1 (R) to neutral (W). If 115VAC is present at CR #4 (BK) to neutral (W) but not at CR #1 (R) to neutral (W), replace CR. If 115VAC is present at CR #1 (R) and Comp or ConFM are not energized, check Comp start components, Comp protector (internal on 1-section, external on 2-section), and Comp motor winding continuity. If ConFM is not energized, check ConFM fan blades for binding and motor winding continuity.



- (2) **7-min. EvapFM delay timer terminates:** (note that the 7-min. EvapFM delay time is a maximum; if the defrost thermistor cools to 25°F (-3.9°C) before the 7-min. EvapFM delay timer terminates, EvapFM icon turns on and EvapFM energizes): 4 min. after Comp and ConFM energize, confirm EvapFM icon turns on and EvapFM energizes. If not, confirm doors are closed and DS engaged. Next, check for 115VAC at CM F5 (Y) to neutral (W). If 115VAC is not present, replace CM.

If 115VAC is present, check for 115VAC at DSR #4 (DBU) to neutral (W).

If 115VAC is not present, check for 115VAC at DSR #6 (BK) to neutral (W).

If 115VAC is present on DSR #6 (BK) to neutral (W) and not on DSR #4 (DBU) to neutral (W), replace DSR. If 115VAC is present on DSR #4 (DBU) to neutral (W) and EvapFM is not energized, check EvapFM blades for binding and EvapFM continuity.

- (3) **18-min. temperature display delay timer terminates:** 11 min. after EvapFM energizes, "dEF" is replaced by cabinet temperature on display. If not, replace CM.

2b) **Manually Initiated Defrost-Termination:** Has DTh warmed to 59°F (15°C)? If not yet confirmed, confirm DTh status. See "II.D. Thermistor Check." If DTh is in proper range, DH de-energizes and 2 delay timers start. If DTh has not warmed to 59°F (15°C), check DT and DH continuity. Next, check DH amp draw.

- (1) **3-min. Comp/ConFM and EvapFM delay timers terminate:** 3 min. after DH de-energizes, confirm defrost icon turns off, Comp and EvapFM icons turn on, and Comp, ConFM, and EvapFM energize. If not, confirm cabinet temperature is warm enough for Comp and ConFM operation.

**Comp and ConFM:** Check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is not present, check CTh status. See "II.D. Thermistor Check." If CTh ohm reading is in proper range, replace CM. If 115VAC is present, check for 115VAC at CR #4 (BK) to neutral (W) and CR #1 (R) to neutral (W). If 115VAC is present at CR #4 (BK) to neutral (W) but not at CR #1 (R) to neutral (W), replace CR. If 115VAC is present at CR #1 (R) and Comp or ConFM are not energized, check Comp start components, Comp protector (internal on 1-section, external on 2-section), and Comp motor winding continuity. If ConFM is not energized, check ConFM fan blades for binding and motor winding continuity.

**EvapFM:** Confirm EvapFM icon turns on and EvapFM energizes. If not, confirm doors are closed and DS engaged. Next, check for 115VAC at CM F5 (Y) to neutral (W). If 115VAC is not present, replace CM. If 115VAC is present, check for 115VAC at DSR #4 (DBU) to neutral (W). If 115VAC is not present, check for 115VAC at DSR #6 (BK) to neutral (W). If 115VAC is present on DSR #6 (BK) to neutral (W) and not on DSR #4 (DBU) to neutral (W), replace DSR. If 115VAC is present on DSR #4 (DBU) to neutral (W) and EvapFM is not energized, check EvapFM blades for binding and EvapFM continuity.

- (2) **15-min. temperature display delay timer terminates:** 12 min. after Comp, ConFM, and EvapFM energize, "dEF" is replaced by cabinet temperature on display. If not, replace CM.

Legend: **CM**—control module; **Comp**—compressor; **ConFM**—condenser fan motor; **CR**—compressor relay; **CTh**—cabinet thermistor; **DH**—defrost heater; **DrH**—drain heater; **DSR**—door switch relay; **DT**—defrost thermostat; **DTh**—defrost thermistor; **EvapFM**—evaporator fan motors; **HPS**—high-pressure switch; **MH**—mullion heater; **PH**—perimeter heater; **TXV**—thermostatic expansion valve

## C. Control Module Check

### 1. Control Module with Remote Display Module

Before replacing CM that does not show a visible defect and that you suspect is bad, conduct the following check procedure. This procedure will help you verify your diagnosis. Always choose a neutral (W) to establish a good neutral connection when checking high voltages. Also, confirm there is a good power supply and neutral connection to CM: 115VAC at CM L3 (BK) to neutral CM N5 (W).

Alarm Reset: To silence an alarm, press and release the upper or lower button with power on. For alarm information, see "III.D. Alarm Safeties."

**NOTICE! When replacing the display module or control module on appliances with a control module with remote display module, a conversion kit must be ordered: Refrigerator: HS-5079; Freezer: HS-5078.**

#### Startup/Cool Down

- 1) Check all wiring connections. Confirm DM cable, CTh, and DTh are properly connected.
- 2) Move the power switch to the "ON" position.
- 3) Check for 115VAC at CM L3 (BK) to CM N5 neutral (W). If 115VAC is not present, check power supply, wiring connections, and power switch continuity.
- 4) Check that the cabinet temperature is displayed on DM. If not and DM cable is connected, replace DM and CM with HS kit.
- 5) Freezer: Check that EvapFM is energized. Make sure doors are closed and DS engaged. Next, check for 115VAC at CM F6 (BK) to neutral (W). If 115VAC is not present, replace DM and CM with HS kit.
- 6) Check that Comp and ConFM energize. If not, check CTh status. See "II.D.Thermistor Check." If CTh ohm reading is in proper range, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is not present, replace DM and CM with HS kit.

#### Defrost

- 7) **Manual Defrost Check:** Press and hold the lower button until "dEF" appears on DM.
- 8) Confirm Comp, ConFM, and EvapFM (freezer) de-energize. Check for 115VAC at CM C1 (R) to neutral (W) for Comp and ConFM, then at CM F6 (BK) (freezer) to neutral (W) for EvapFM. If "dEF" is displayed and 115VAC is present, replace DM and CM with HS kit.
- 9) Freezer: Confirm DH energizes. Check for 115VAC at CM H4 (BK) to neutral (W). If "dEF" is displayed and 115VAC is not present, replace DM and CM with HS kit.

10) Check that the components restart after defrost termination.

Refrigerator: DTh reaches 40°F (4.4°C), Comp and ConFM (CM C1 (R)) energize. If not, check DTh status. See "II.D.Thermistor Check." If DTh ohm reading is in proper range, and Comp and ConFM do not energize, replace DM and CM with HS kit.

Freezer: DTh reaches 59°F (15°C). 3-min. later, Comp and ConFM (CM C1 (R)) and EvapFM (CM F6 (BK)) energize. If not, check DTh status. See "II.D.Thermistor Check." If DTh ohm reading is in proper range, and Comp, ConFM, or EvapFM do not energize, replace DM and CM with HS kit. 10 min. after Comp, ConFM, and EvapFM energize, confirm cabinet temperature appears on DM. If components fail to start, replace DM and CM with HS kit.

Legend: **CM**—control module; **Comp**—compressor; **ConFM**—condenser fan motor; **CTh**—cabinet thermistor; **DH**—defrost heater; **DM**—display module; **DS**—door switch  
**DTh**—defrost thermistor; **EvapFM**—evaporator fan motors

## 2. Control Module with Integrated Display

Before replacing CM that does not show a visible defect and that you suspect is bad, conduct the following check procedure. This procedure will help you verify your diagnosis. Always choose a neutral (W) to establish a good neutral connection when checking high voltages. Also, confirm there is a good power supply and neutral connection to CM: 115VAC at CM L2 (BK) to CM N3 (W).

Alarm Reset: To silence the alarm, press and release the up button with power on. For alarm information, see "III.D. Alarm Safeties."

### Startup/Cool Down

- 1) Check all wiring connections. Confirm the CTh and DTh are properly connected.
- 2) Move the power switch to the "ON" position.
- 3) Check for 115VAC at CM L2 (BK) to CM N3 neutral (W). If 115VAC is not present, check power supply, wire connections, and power switch.
- 4) Check that cabinet temperature is displayed. If not, replace CM.
- 5) Freezer: Check that EvapFM is energized. Make sure doors are closed and DS engaged. Next, check for 115VAC at CM F5 (Y) to neutral. If 115VAC is not present, replace CM.
- 6) Check that Comp and ConFM energize. If not, check CTh status. See "II.D.Thermistor Check." If CTh ohm reading is in proper range, check for 115VAC at CM C1 (R) to neutral (W). If 115VAC is not present, replace CM.

### Defrost

- 7) **Manual Defrost Check:** Press the manual defrost button briefly. If on, Comp and EvapFM icons turn off. Defrost icon turns on and "dEF" is displayed.
- 8) Confirm Comp, ConFM, and EvapFM (freezer) de-energize. Check for 115VAC at CM C1 (R) to neutral (W) for Comp and ConFM, then at CM F5 (Y) (freezer) to neutral (W) for EvapFM. If "dEF" is displayed and 115VAC is present, replace CM.
- 9) Freezer: Confirm DH energizes. Check for 115VAC at CM H4 (O) to neutral (W). If "dEF" is displayed and 115VAC is not present, replace CM.

10) Check that the components restart after defrost termination.

Refrigerator: DTh reaches 40°F (4.4°C), Comp and ConFM (CM C1 (R)) energize. If not, check DTh status. See "II.D.Thermistor Check." If DTh ohm reading is in proper range, and Comp and ConFM do not energize, replace CM.

Freezer: DTh reaches 59°F (15°C). 3-min. later, Comp and ConFM (CM C1 (R)) and EvapFM (CM F5 (Y)) energize. If not, check DTh status. See "II.D.Thermistor Check." If DTh ohm reading is in proper range, and Comp, ConFM, or EvapFM do not energize, replace CM. 12 min. after Comp, ConFM, and EvapFM energize, cabinet temperature appears on CM. If components fail to start, replace CM.

Legend: **CM**—control module; **Comp**—compressor; **ConFM**—condenser fan motor; **CTh**—cabinet thermistor; **DH**—defrost heater; **DS**—door switch; **DTh**—defrost thermistor; **EvapFM**—evaporator fan motors

## D. Thermistor Check

The cabinet thermistor is used for cabinet temperature control and the defrost thermistor is used for defrost cycle initiation and termination. Thermistor resistance varies depending on temperature. The control module monitors the thermistors to control system operation. No adjustment is required.

In the event the cabinet thermistor reading is out of range (E1 alarm), the compressor operates on a fixed time basis of 5-min. on and 5-min. off.

In the event the refrigerator defrost thermistor reading is out of range (E2 alarm), defrost initiation occurs every 4-hr. of cumulative compressor run time and terminates on 20-min. minimum defrost timer.

In the event the freezer defrost thermistor reading is out of range (E2 alarm), defrost initiation occurs every 4-hr. of cumulative compressor run time and terminates based on cabinet thermistor temperature.

To check thermistor resistance, follow the steps below.

- 1) Move the power switch to the "OFF" position, then unplug the appliance.
- 2) Remove the control box cover.
- 3) Disconnect and remove the thermistor in question.
- 4) Immerse the thermistor sensor portion in a glass containing ice and water for 2 to 3 min.
- 5) Check the resistance between the wires at the thermistor connector. Normal reading is within 16.0 to 16.7 kΩ. If outside the normal reading, replace the thermistor.
- 6) Reconnect and replace the thermistor in its correct position. See "IV.B. Important Notes for Component Replacement."
- 7) Plug the appliance back in. Move the power switch to the "ON" position.

## E. Diagnostic Tables

Check for correct appliance installation per the instruction manual and proper voltage per appliance nameplate.

### 1. Not Cooling

Not Cooling - Possible Cause	
1. Power Supply	a) Unplugged, off, blown fuse, tripped or defective circuit breaker. On three-section receptacle box, only top receptacles have power.
	b) Loose connection.
	c) Not within specifications.
2. Cord and Plug On three-section model, check receptacle box cord and plug and one-section and two-section cords and plugs.	a) Loose connection.
	b) Defective.
3. Power Switch (control box)	a) "OFF" position.
	b) Defective.
4. Wiring	a) Loose connection.
	b) Faulty.
5. Control Module See "III.D. Alarm Safeties" and "II.C. Control Module Check."	a) In alarm or "- -" shown on display module on models with remote display module.
	b) Defective.
6. Door Switch	a) Not engaged.
	b) Defective.
7. Door Switch Relay	a) Loose connection.
	b) Defective.
8. Evaporator Fan Motor	a) Defective.
9. High-Pressure Switch	a) Dirty condenser.
	b) Ambient temperature too warm.
	c) Condenser fan motor not operating.
	d) Refrigerant overcharge.
	e) Refrigerant lines or components restricted.
	f) Defective.
10. Compressor Relay	a) Defective.
11. Compressor Protector	a) Dirty condenser.
	b) Condenser fan motor not operating.
	c) Compressor capacitor or start relay defective.
	d) Defective.
12. Compressor	a) Defective.
13. Condenser	a) Dirty.
14. Evaporator See "2. Evaporator Frozen Up."	a) Clogged or frozen.
15. Refrigerant/Refrigerant Lines	a) Refrigerant leak.
	b) Refrigerant lines restricted.

## 2. Evaporator Frozen Up

Evaporator Frozen Up - Possible Cause	
1. Evaporator	a) Dirty.
2. Evaporator Fan Motor	a) Fan blades binding.
	b) Defective.
3. Defrost Thermistor	a) Out of position or defective.
4. Control Module	a) Defective.
5. Compressor Relay	a) Defective.
6. Refrigerant Charge/Refrigerant Lines	a) Low.
	b) Component restriction (TXV, cap tube, drier).
7. Defrost Heater (freezer)	a) Defective.
8. Defrost Thermostat Open (freezer)	a) Defective.

### 3a. Defrost: Control Module with Remote Display Module

Refrigerator Defrost Fails to Initiate - Possible Cause	
1. Defrost Thermistor (Confirm DTh status. See "II.D. Thermistor Check.")	a) Defrost initiation temperature 8.6°F (-13°C) not achieved. See "1. Not Cooling."
	b) Out of position or defective.
2. Control Module	a) Defective.
Refrigerator Defrost Fails to Terminate - Possible Cause	
1. Defrost Thermistor (Confirm DTh status. See "II.D. Thermistor Check.")	a) Defrost termination temperature 40°F (4.4°C) not achieved.
	b) Defective.
2. Compressor Relay	a) Defective.
3. Control Module	a) Defrost thermistor connection loose.
	b) Defective.
Freezer Defrost Fails to Initiate - Possible Cause	
1. Defrost Thermistor (Confirm DTh status. See "II.D. Thermistor Check.")	a) Defrost initiation temperature 32°F (0°C) not achieved. See "1. Not Cooling."
	b) Out of position or defective.
2. Compressor 4-hr. cumulative run timer not satisfied.	a) Check compressor operation. See "1. Not Cooling."
3. Control Module	a) Defective.
Freezer Defrost Fails to Terminate - Possible Cause	
1. Defrost Thermistor (Confirm DTh status. See "II.D. Thermistor Check.")	a) Defrost termination temperature 59°F (15°C) not achieved.
	b) Defrost thermistor connection loose.
2. Defrost Heater	a) Defrost thermostat defective.
	b) Defective.
3. Compressor Relay	a) Defective.
4. Control Module	a) Defective.

### 3b. Defrost: Control Module with Integrated Display

<b>Refrigerator Defrost Fails to Initiate - Possible Cause</b>	
1. Defrost Thermistor (Confirm DTh status. See "II.D. Thermistor Check.")	a) Defrost initiation temperature 8.6°F (-13°C) not achieved. See "1. Not Cooling."
	b) Out of position or defective.
2. Compressor Relay	a) Defective.
3. Control Module	a) Defective.
<b>Refrigerator Defrost Fails to Terminate - Possible Cause</b>	
1. Defrost Thermistor (Confirm DTh status. See "II.D. Thermistor Check.")	a) Defrost termination temperature 40°F (4.4°C) not achieved.
	b) Defective.
2. Compressor Relay	a) Defective.
3. Control Module	a) Defrost thermistor connection loose.
	b) Defective.
<b>Freezer Defrost Fails to Initiate - Possible Cause</b>	
1. Defrost Thermistor (Confirm DTh status. See "II.D. Thermistor Check.")	a) Defrost initiation temperature 32°F (0°C) not achieved. See "1. Not Cooling."
	b) Out of position or defective.
2. Compressor 4-hr. cumulative run timer not satisfied.	a) Check compressor operation. See "1. Not Cooling."
3. Control Module	a) Defective.
<b>Freezer Defrost Fails to Terminate - Possible Cause</b>	
1. Defrost Thermistor (Confirm DTh status. See "II.D. Thermistor Check.")	a) Defrost termination temperature 59°F (15°C) not achieved.
	b) Defrost thermistor connection loose.
2. Defrost Heater	a) Defrost thermostat defective.
	b) Defective.
3. Compressor Relay	a) Defective.
4. Control Module	a) Defective.

### III. Controls and Adjustments

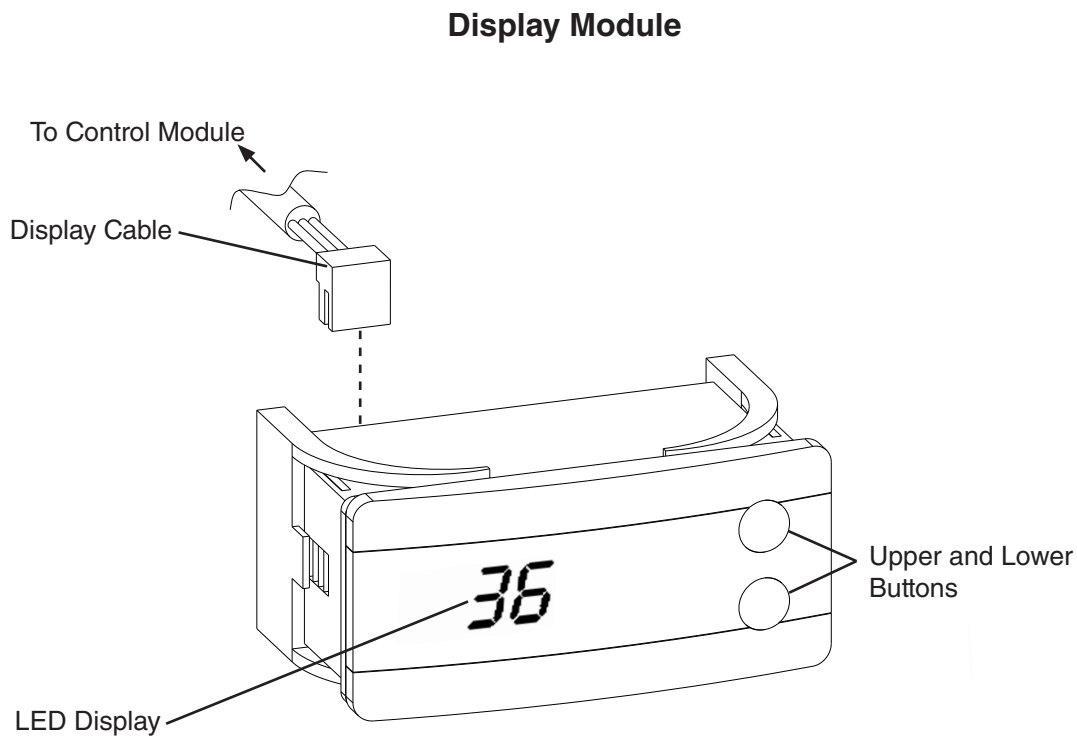
#### A. Control and Display Modules

When the power switch is moved to the "ON" position there is a slight delay, then the current cabinet temperature is displayed. From the display module, the cabinet setpoint and temperature display scale can be changed.

Note: When exposed to high temperatures, a high-temperature alarm "Hi" may occur at start-up. To silence the alarm, press and release the upper button. Alarm clears once temperature is within factory parameters. For details, see "III.D. Alarm Safeties."

#### 1. Control Module with Remote Display Module

##### a) Remote Display Module Layout



**Fig. 2**

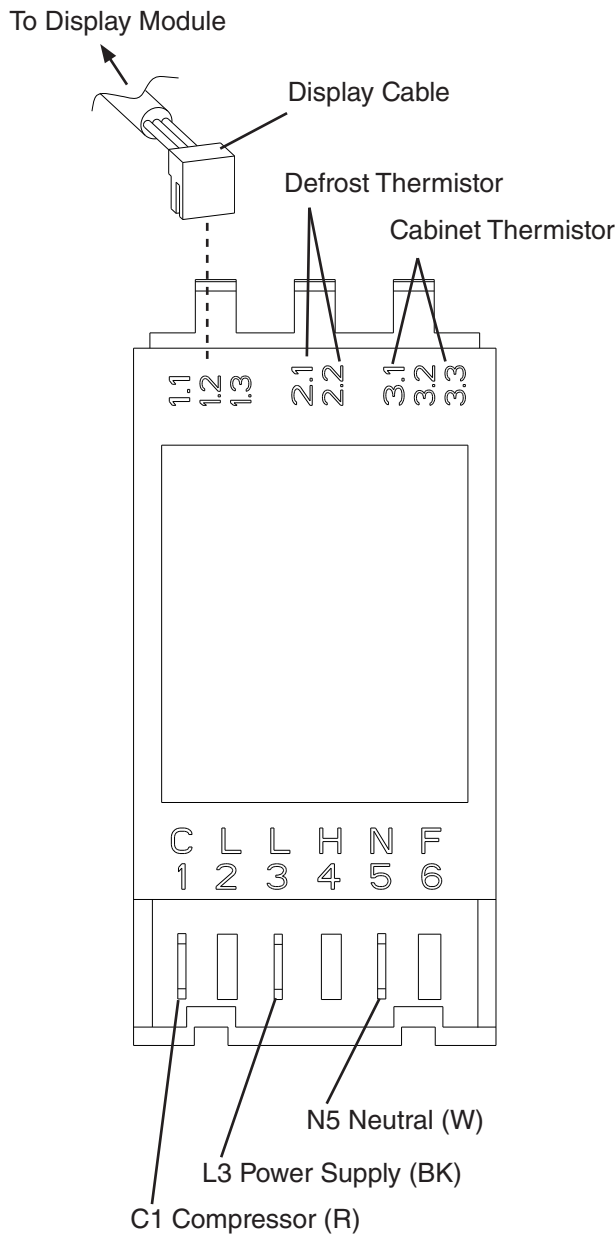


**b) Control Module with Remote Display Module Connections**

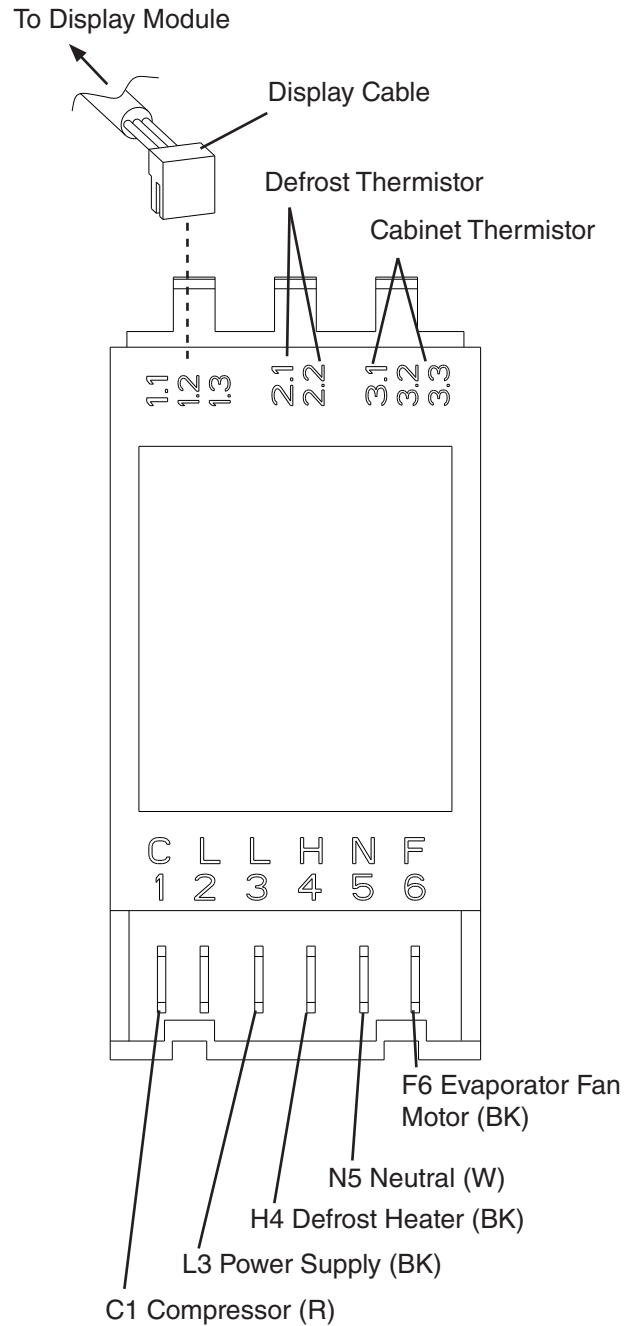
All models are pretested and factory set.

<b>NOTICE</b>	
<ul style="list-style-type: none"> <li>• The control module is fragile, handle very carefully.</li> <li>• Do not change wiring and connections. Never misconnect terminals.</li> <li>• Do not short out power supply to test for voltage.</li> </ul>	

**Refrigerator Control Module**



**Freezer Control Module**



**Fig. 3**





## 2. Control Module with Integrated Display

All models are pretested and factory set.

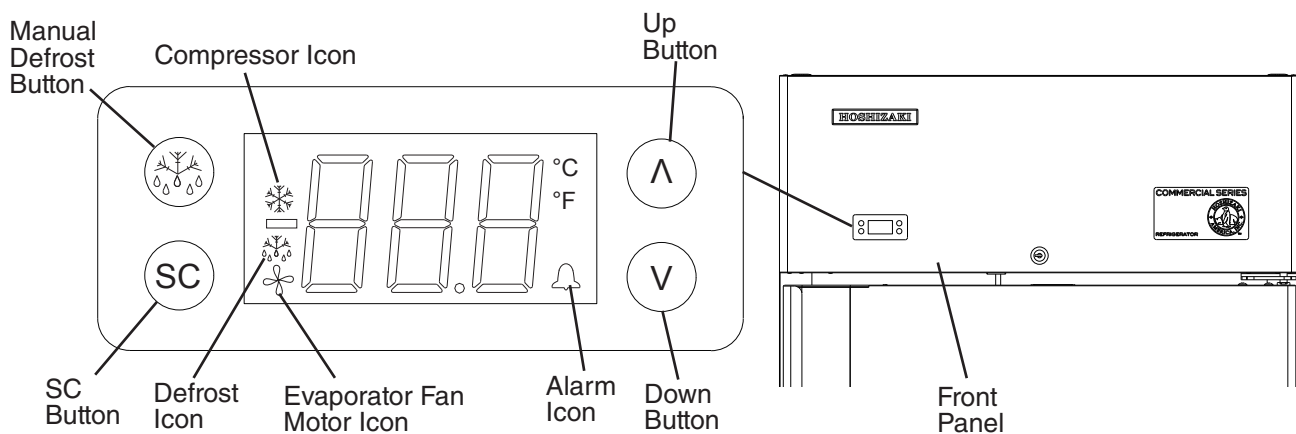
### NOTICE

- The control module is fragile, handle very carefully.
- Do not change wiring and connections. Never misconnect terminals.
- Do not short out power supply to test for voltage.

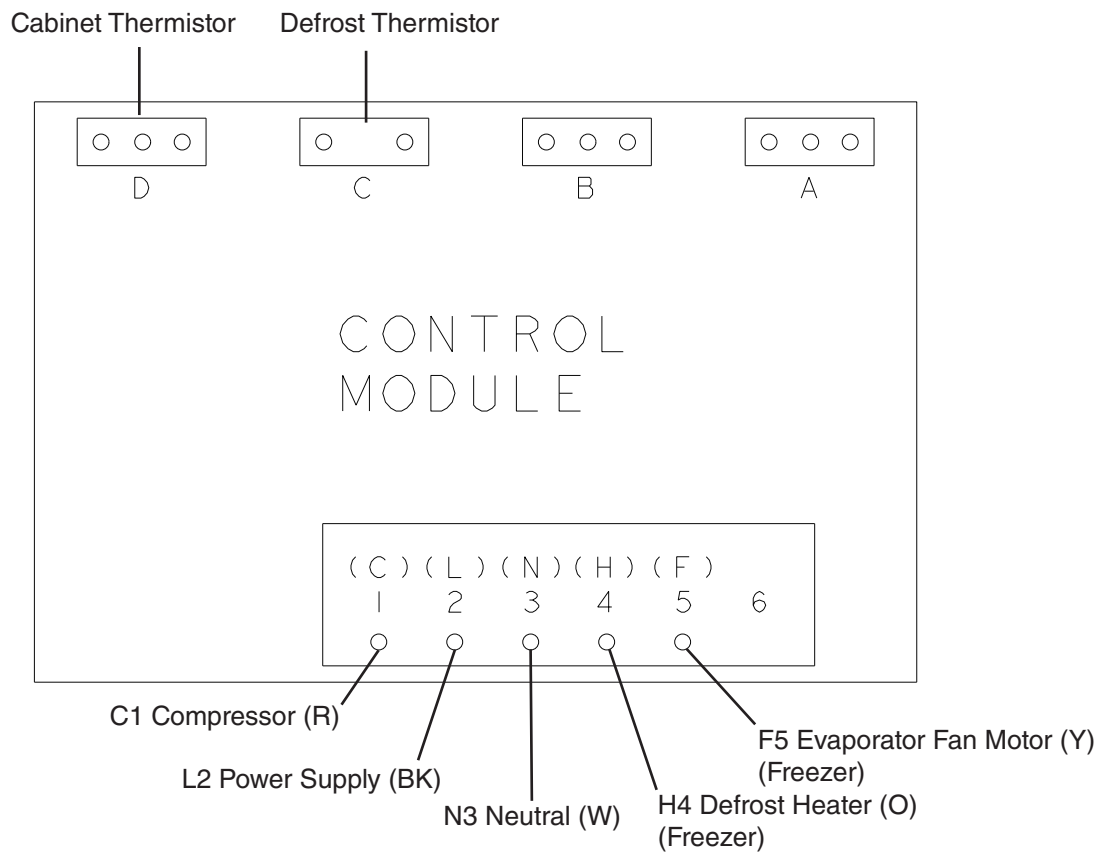
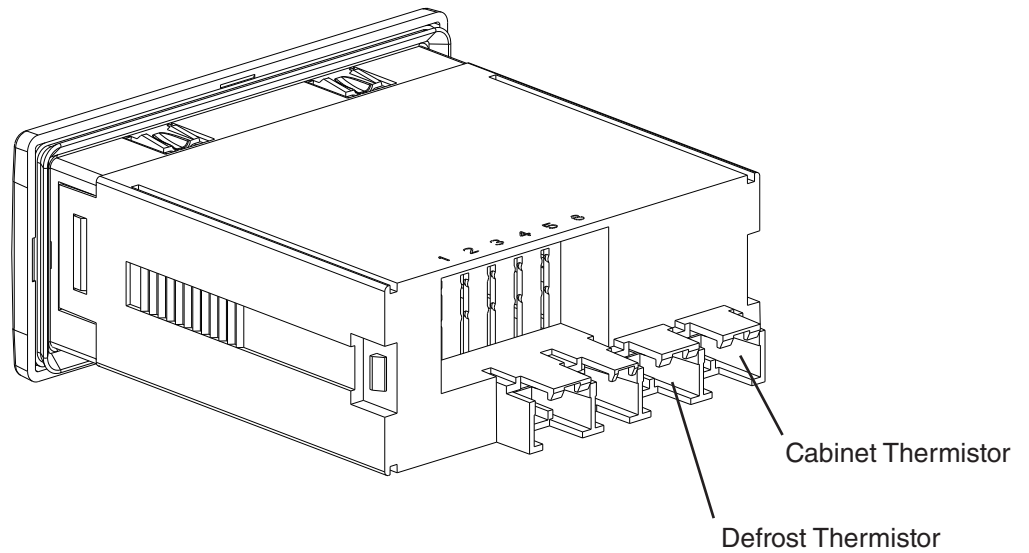
### a) Display Icons

Control Module Icons	
Icon	Meaning
	Compressor Compressor running.
	Defrost Appliance is in defrost cycle. See "II.B. Service Diagnosis" for details.
	Evaporator Fan Motor (Icon is Applicable to Freezers Only) Evaporator fan motor is running. Evaporator fan motor de-energizes when door is open and when appliance is in defrost.
	Alarm Appliance is in alarm. See "III.D. Alarm Safeties" for details.

### b) Display Layout



**c) Control Module with Integrated Display Connections**



## B. Temperature

The temperature default scale is °F, but it can be changed to read °C. To change, see "III.B.3. Changing the Temperature Display Scale (°F or °C)" below.

### 1. Default Settings

- a) Temperature Setting: Refrigerator: 36°F (2°C).  
Freezer: -4°F (-20°C).
- b) Temperature Display Scale: °F.

Note: CM with remote DM: Pressing the upper and lower button at the same time for 5 sec. (or until "- - -" appears on the display module), turns the compressor, condenser fan motor, and evaporator fan motor (freezer) off. To turn the appliance on again, press the upper and lower button together for 5 sec. until the cabinet temperature appears on the display module. **NOTICE! The three dashes must be cleared, otherwise the compressor will not run and product will be lost.**

### 2. Temperature Setpoint

The temperature setpoint is the value for the average cabinet temperature. The temperature differential for the compressor to turn on and off is  $\pm 3^{\circ}\text{F}$  ( $\pm 1.7^{\circ}\text{C}$ ) of the temperature setpoint. For example, for a refrigerator temperature setpoint of 36°F (2°C), the compressor comes on at 39°F (3.7°C), and the compressor goes off at 33°F (0.3°C). If necessary, adjust the temperature setpoint as follows:

- 1) Press and hold the upper or lower button briefly, then release. The current temperature setpoint flashes.
- 2) Press the upper or lower button until the desired value is displayed. After a few sec., the display returns to the current cabinet temperature and the temperature setpoint is saved.
  - For refrigerators, the temperature setpoint is adjustable between 34°F and 52°F (1°C and 11°C). Factory default is 36°F (2°C).
  - For freezers, the temperature setpoint is adjustable between -15°F and +12°F (-26°C and -11°C). Factory default is -4°F (-20°C).

Note: Do not adjust the temperature setpoint outside of the factory-specified range. Adjustment outside of this range may prevent the appliance from operating correctly.

### 3. Changing the Temperature Display Scale (°F or °C)

#### a) Control Module with Remote Display Module

To change the temperature display scale, follow the steps below.

- 1) Press the upper button for 5 sec. The current setting is displayed.
- 2) Press the upper button to change the scale. After a few sec., the display returns to the current cabinet temperature and the setting is saved. The factory default is °F.

### ***b) Control Module with Integrated Display***

To change the temperature display scale, follow the steps below.

- 1) Press and hold both the up and down buttons for 5 sec. "PAS" appears briefly in the display, then "000" appears.
- 2) Press the up button to change the display to "001".
- 3) Press the SC button. "EHE" appears in the display. Press the up or down button until "diS" is displayed.
- 4) Press the SC button. "CFu" appears in the display. Press the SC button again. The current temperature display scale setting appears.
- 5) Press the up or down button to change the temperature display scale.
- 6) Press the SC button to save the setting. Wait 1 min. or press the manual defrost button twice to return to the temperature display.

## **C. Defrost**

### **1. Control Module with Remote Display Module**

To initiate a manual defrost, press and hold the lower button for 5 sec. "dEF" appears in the display.

### **2. Control Module with Integrated Display**

To initiate a manual defrost, press the manual defrost button briefly. The defrost icon and "dEF" appear in the display.

## D. Alarm Safeties

Alarm signals are designed to protect the appliance and food product. These alarms give information or warnings in the event the appliance is operating out of acceptable parameters. Should one of the alarms occur, follow the instructions in the table below to address the alarm. The alarm code flashes once every second with audible alarm. To silence the alarm, press and release the upper button.

### 1. Control Module with Remote Display Module

Alarm Signals		
Alarm Code	Problem	Corrective Action/Reset Details
E1	Cabinet Thermistor Malfunction Alarm Cabinet thermistor has failed.	Cabinet thermistor disconnected, shorted, or open. Check connection and continuity. Reconnect or replace as needed.  Unit cycles 5-min. on, 5-min. off.
E2	Defrost Thermistor Malfunction Alarm Defrost thermistor has failed.	Defrost thermistor disconnected, shorted, or open. Check connection and continuity. Reconnect or replace as needed.  Unit cycles on and off with cabinet thermistor.
UHi	High-Voltage Alarm (135VAC±5% or more)	The compressor de-energizes if voltage protection operates. The voltage safeties automatically reset when voltage is corrected.
ULo	Low-Voltage Alarm (96VAC±5% or less)	
Hi	High-Temperature Alarm Note: When power is turned on, a high-temperature alarm may occur.  <b>Refrigerator:</b> Cabinet temperature has exceeded the setpoint temperature by 10°F (5.6°C) for more than 2 hr.  <b>Freezer:</b> Cabinet temperature has exceeded the setpoint temperature by 27°F (15°C) for more than 2 hr.	First try obvious corrections such as closing doors and cleaning the condenser.  Automatically resets when temperature returns to normal.
Lo	Low-Temperature Alarm  <b>Refrigerator &amp; Freezer:</b> Cabinet temperature has remained below the setpoint temperature by 8°F (4.4°C) for more than 2 hr.	Automatically resets when temperature returns to normal.
E13	Communication Error Alarm  Communication between the control module and the display module has been interrupted or disconnected.	Check the connections at the control module and the display module. If connections are good, the control module and display module must be replaced.  The unit operates on a set 5-min. on, 5-min. off cycle until communication is restored.
"_ _ _ _"	Compressor Off	Unit (compressor) off.  Press and hold the upper and lower buttons until the temperature appears on the display.

## 2. Control Module with Integrated Display

Alarm Signals		
Alarm Code	Problem	Corrective Action/Reset Details
E01	Cabinet Thermistor Malfunction Alarm Cabinet thermistor has failed.	Beeps for 10 sec., then silent for 50 sec.. To silence the alarm, press and release the up button. Appliance cycles 5 min. on, 5 min. off.
E02	Defrost Thermistor Malfunction Alarm Defrost thermistor has failed.	Beeps for 10 sec., then silent for 50 sec. To silence the alarm, press and release the up button. Appliance cycles on and off with cabinet thermistor.
Hi	High Temperature Alarm <b>Refrigerator:</b> Cabinet temperature has remained above 57°F (13.9°C) for more than 2 hr. <b>Freezer:</b> Cabinet temperature has remained above 26°F (-3.3°C) for more than 2 hr.	Beeps for 10 sec., then silent for 50 sec. To silence the alarm and clear "Hi" from the display, press and release the up button. The alarm icon stays on. Automatically resets when temperature returns to normal.
Lo	Low Temperature Alarm <b>Refrigerator:</b> Cabinet temperature has remained below 26°F (-3.3°C) for more than 2 hr. <b>Freezer:</b> Cabinet temperature has remained below -23°F (-30.6°C) for more than 2 hr.	Beeps for 10 sec., then silent for 50 sec. To silence the alarm and clear "Lo" from the display, press and release the up button. The alarm icon stays on. Automatically resets when temperature returns to normal.

## **E. Safety Devices**

### **1. Compressor External or Internal Protector**

If combined temperature/amperage value is above the limit specified by the compressor manufacturer, the compressor external or internal protector operates independently to turn off the compressor. The compressor external or internal protector de-energizes the compressor until the temperature/amperage value returns to an acceptable level.

- If the condenser fan motor is operating and the compressor is off, it is most likely that the compressor external or internal protector opened. If both the compressor and condenser fan motor are off, it is most likely the appliance is off or the high-pressure switch has opened. For further details, see "II.B. Service Diagnosis."
- On refrigerators, the compressor external protector is integrated with the start relay. On 1-section freezers, the compressor protector is an internal protector. On 2-section freezers, the compressor protector is an external protector.

### **2. Short-Cycle Protection**

There is a 2-min. minimum off-time and on-time for the compressor.

Note: Time may vary with compressor protector or high-pressure switch activation.

### **3. High-Pressure Switch**

If pressure on the high-side of the appliance exceeds Hoshizaki specifications, the high-pressure switch activates and interrupts the compressor circuit, de-energizing the compressor until the pressure returns to an acceptable level.

## **F. Mullion/Perimeter Heater**

Refrigerators and freezers with mullions are equipped with mullion heaters. Freezers are also equipped with perimeter heaters. The heaters are energized as soon as the power switch is turned on.



---

## IV. Replacement of Components

### **⚠ WARNING**

- The appliance should be diagnosed and repaired only by qualified service personnel to reduce the risk of death, electric shock, serious injury, or fire.
- Move the power switch to the "OFF" position, then unplug the appliance from the electrical outlet before servicing.
- Make sure all food zones in the appliance are clean after the appliance is serviced.

### A. Service for Refrigerant Lines

#### **⚠ WARNING**

- Repairs requiring the refrigeration circuit to be opened must be performed by properly trained and EPA-certified service personnel.
- Always recover the refrigerant and store it in an approved container. Do not discharge the refrigerant into the atmosphere.
- Use an electronic leak detector or soap bubbles to check for leaks. Add a trace of refrigerant to the system (if using an electronic leak detector), and then raise the pressure using nitrogen gas (140 PSIG). DO NOT use R-134a or R-404A as a mixture with pressurized air for leak testing.

#### **NOTICE**

- Do not leave the system open for longer than 15 min. when replacing or servicing parts. The Polyol Ester (POE) oils used in R-134a and R-404A appliances can absorb moisture quickly. Therefore it is important to prevent moisture from entering the system when replacing or servicing parts.
- Always install a new drier every time the sealed refrigeration system is opened.
- Do not replace the drier until after all other repair or replacement has been made. Install the new drier with the arrow on the drier in the direction of the refrigerant flow.
- When brazing, protect the drier by using a wet cloth to prevent the drier from overheating. Do not allow the drier to exceed 250°F (121°C).

#### 1. Refrigerant Recovery

The appliance is provided with refrigerant access valves. Using proper refrigerant practices recover the refrigerant from the access valves and store it in an approved container. Do not discharge the refrigerant into the atmosphere.

## 2. Brazing

### **⚠ WARNING**

- R-134a and R-404A themselves are not flammable at atmospheric pressure and temperatures up to 176°F (80°C).
- R-134a and R-404A themselves are not explosive or poisonous. However, when exposed to high temperatures (open flames), R-134a and R-404A can be decomposed to form hydrofluoric acid and carbonyl fluoride both of which are hazardous.
- Do not use silver alloy or copper alloy containing arsenic.
- Use an electronic leak detector or soap bubbles to check for leaks. Add a trace of refrigerant to the system (if using an electronic leak detector), and then raise the pressure using nitrogen gas (140PSIG). Do not use R-134a or R-404A as a mixture with pressurized air for leak testing.

1) Braze all fittings while purging with nitrogen gas flowing at a pressure of 3 to 4 PSIG.

### **NOTICE**

- Always install a new drier every time the sealed refrigeration system is opened.
- Do not replace the drier until after all other repair or replacement has been made. Install the new drier with the arrow on the drier in the direction of the refrigerant flow.
- When brazing, protect the drier by using a wet cloth to prevent the drier from overheating. Do not allow the drier to exceed 250°F (121°C).

2) Use an electronic leak detector or soap bubbles to check for leaks. Add a trace of refrigerant to the system (if using an electronic leak detector), and then raise the pressure using nitrogen gas (140 PSIG). Do not use R-134a or R-404A as a mixture with pressurized air for leak testing.

## 3. Evacuation and Recharge

1) Attach a vacuum pump to the system. Be sure the charging hoses are connected to both high and low-side access valves.

### **IMPORTANT**

The vacuum level and vacuum pump may be the same as those for current refrigerants. However, the rubber hose and gauge manifold to be used for evacuation and refrigerant charge should be exclusively for POE oils.

- 2) Turn on the vacuum pump. Open the gauge manifold valves. Never allow the oil in the vacuum pump to flow backwards.
- 3) Allow the vacuum pump to pull down to a 29.9" Hg vacuum. Evacuating period depends on pump capacity.
- 4) Close the low-side valve and high-side valve on the gauge manifold.

- 5) Disconnect the gauge manifold hose from the vacuum pump and attach it to a refrigerant service cylinder. Remember to loosen the connection and purge the air from the hose. See the nameplate for the required refrigerant charge. Hoshizaki recommends only virgin refrigerant or reclaimed refrigerant which meets ARI Standard 700 (latest edition) be used.
- 6) A liquid charge is required when charging an R-404A system (to prevent fractionation) and optional when charging an R-134a system. Place the service cylinder on the scales; if the service cylinder is not equipped with a dip tube, invert the service cylinder, then place it on the scales. Open the high-side valve on the gauge manifold.
- 7) Allow the system to charge with liquid until the proper charge weight is met.
- 8) If necessary, add any remaining charge to the system through the low-side.  
**NOTICE! To prevent compressor damage, use a throttling valve or liquid dispensing device to add the remaining liquid charge through the low-side access valve with the appliance running.**
- 9) Close gauge manifold valves and disconnect the hoses.
- 10) Cap the access valves to prevent a possible leak.

## B. Important Notes for Component Replacement

<b>NOTICE</b>	
<ul style="list-style-type: none"> <li>• When replacing a component listed below, see the notes to help ensure proper operation.</li> <li>• When replacing a control module or display module on an appliance with a control module with remote display module, an HS conversion kit is required. Refrigerator: HS-5079; Freezer: HS-5078</li> </ul>	

Component	Notes
Compressor	Install a new start relay, start capacitor, and compressor protector (compressor protector is integrated with the start relay on refrigerators; internal on 1-section freezers; external on 2-section freezers).
Compressor, Evaporator Fan Motor, Condenser Fan Motor	<b>WARNING! To reduce the risk of electric shock, be sure to reconnect the component's ground wire.</b>
Expansion Valve	<ul style="list-style-type: none"> <li>• Attach the expansion valve bulb to the suction line in the same location as the previous bulb.</li> <li>• Secure the bulb with the clamp and holder, then insulate it.</li> </ul>
Defrost Thermistor	After working with or around the defrost thermistor on a freezer, make sure the defrost thermistor wire is not touching the defrost heater.
Control Module w/Remote Display	If three dashes (- - -) appear on the display module when energized, the compressor and display module are off. To turn the compressor and display module on, press and hold the upper and lower buttons until the temperature appears on the display. <b>NOTICE! The three dashes must be cleared, otherwise the compressor will not run and product will be lost.</b>

## C. Door Reversal

The appliance is provided with a cabinet design which, after being delivered to the installation location, permits changing of the door swing from left to right or right to left. To change the door swing, an HS kit from your local Hoshizaki distributor is required. See the table below. **NOTICE! Improper installation of the HS kit may result in the doors not closing completely and/or the gaskets not sealing correctly.** For further details, contact your local Hoshizaki distributor or Hoshizaki Technical Support at 1-800-233-1940.

Door Type	Convert	HS Kit Number
Full Glass	Right Hinge to Left Hinge	HS-5045
	Left Hinge to Right Hinge	HS-5046
Full Solid, Half Solid	Right Hinge to Left Hinge	HS-3725
	Left Hinge to Right Hinge	HS-3726

---

## V. Maintenance

### **WARNING**

- Move the power switch to the "OFF" position and unplug the appliance before performing maintenance to prevent electric shock or injury by moving parts. To reduce the risk of electric shock, do not touch the power switch or plug with damp hands.
- Before performing maintenance, move all foods into another clean refrigerator or freezer.

#### **1. Condenser**

Check the condenser once a year and use a brush or vacuum cleaner to clean the condenser as required.

#### **2. Power Supply Connection**

If a plug, power cord, or receptacle (three-section models) is damaged, replace it. Be sure to connect the ground wire.

---

## VI. Preparing the Appliance for Periods of Non-Use

### **⚠ WARNING**

- When preparing the appliance for long storage, prevent the doors from closing to reduce the risk of children getting trapped.
- To reduce the risk of electric shock, do not touch the attachment plug or power switch with damp hands.
- When shutting down the appliance for more than one week, move the power switch to the "OFF" position and unplug the appliance.
- Do not plug in/unplug the appliance to start/stop operation. Make sure the power switch is in the "OFF" position before plugging in or unplugging the appliance to reduce the risk of electric shock.

- 1) Before shutting down the appliance, move the stored food into another refrigerator or freezer.
- 2) Reach over the front panel and move the power switch to the "OFF" position. The appliance will shut down.
- 3) Unplug the appliance.

### ***IMPORTANT***

When preparing the appliance for long storage, clean the cabinet interior, door gaskets, and shelves.

---

## VII. Disposal

<b>⚠ WARNING</b>
------------------

When preparing the appliance for disposal, remove the door to reduce the risk of children getting trapped. Leave the shelves in place so that children may not easily climb inside.
---

The appliance contains refrigerant and must be disposed of in accordance with applicable national, state, and local codes and regulations. Refrigerant must be recovered by properly certified service personnel.

## VIII. Technical Information

### A. Electrical and Refrigerant Data

Model	AC Supply Voltage	Amperes	Design Pressure (PSIG)		Refrigerant (oz.)	
			HIGH	LOW	134a	404A
CR1B-FG/FGY/FS/HS	115/60/1	4	240	120	11	-
CF1B-FG/FGY/FS/HS		9	450	250	-	8
CR2B-FG/FS/HS		7	240	120	12	-
CR2B-FGY					14	-
CF2B-FG/FS/HS		11	450	250	-	17
CF2B-FGY		9.8				
CR3B-FS/HS	115/60/1	9	240	120	1-Section 11	-
					2-Section 12	
CF3B-FS/HS	208-230/115/60/1	16	450	250	-	1-Section 8
						2-Section 17

See the nameplate for electrical and refrigerant data. The nameplate is located inside the cabinet.

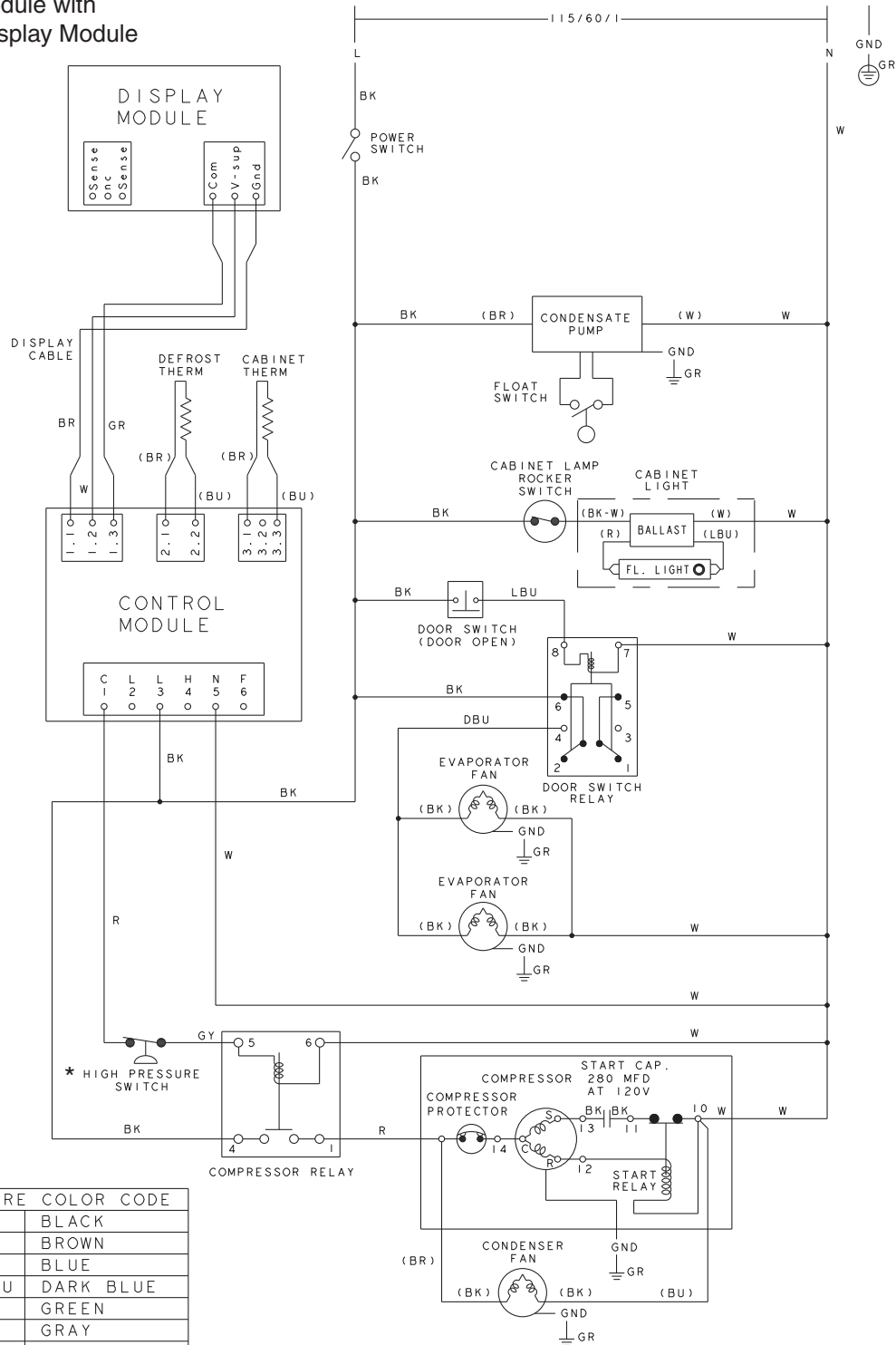
We reserve the right to make changes in specifications and design without prior notice.



## B. Wiring Diagrams

### 1a. CR1B-FG Auxiliary Code A-5 to B-5(A)

Control Module with  
Remote Display Module

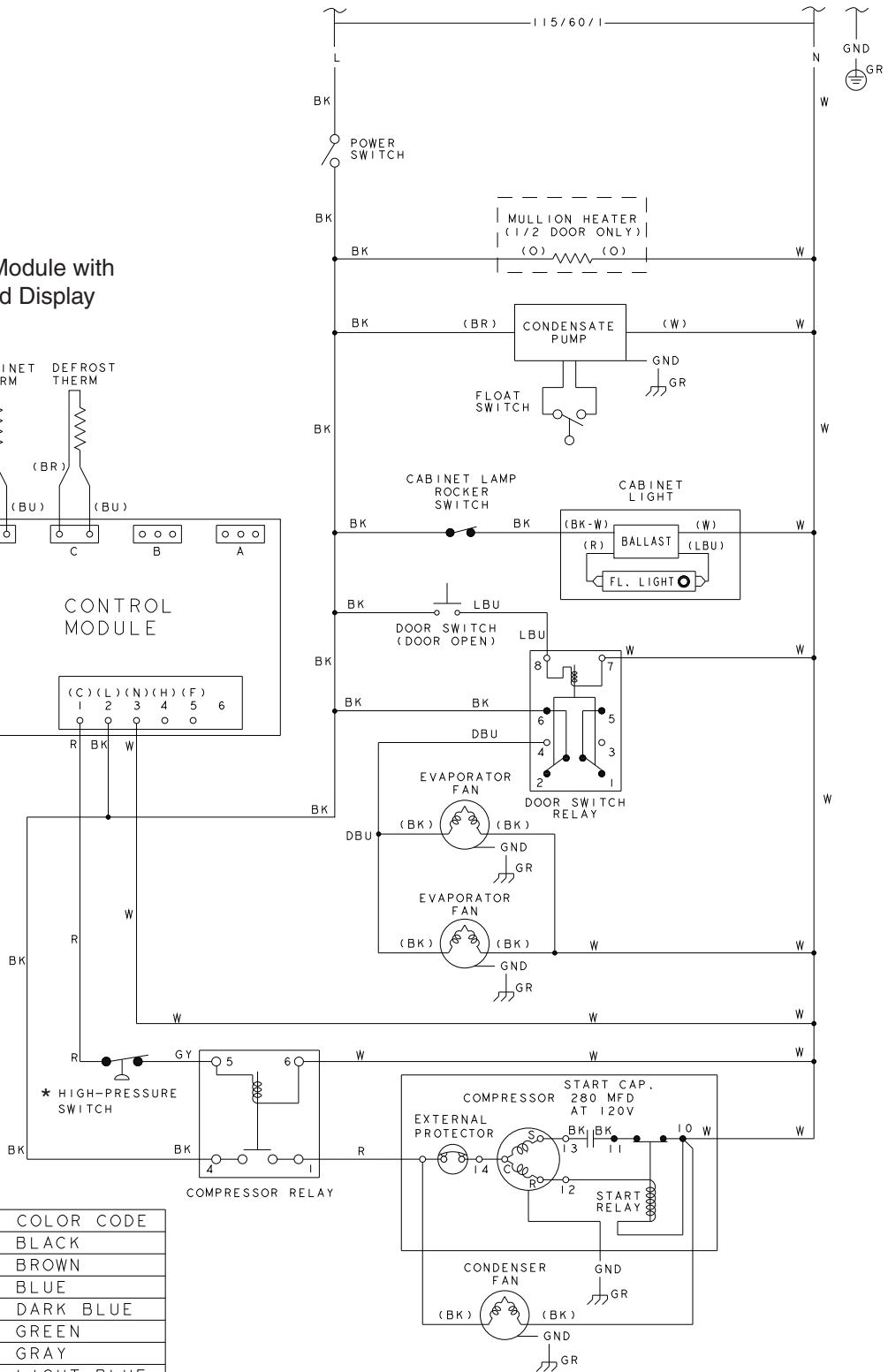
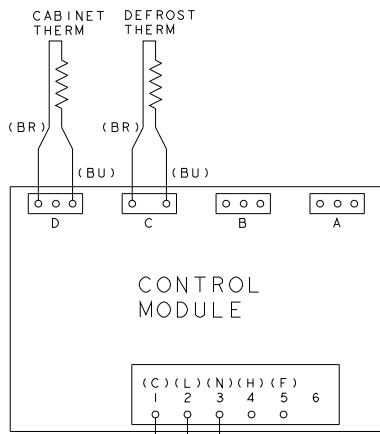


WIRE	COLOR CODE
BK	BLACK
BR	BROWN
BU	BLUE
DBU	DARK BLUE
GR	GREEN
GY	GRAY
LBU	LIGHT BLUE
O	ORANGE
P	PINK
R	RED
V	VIOLET
W	WHITE
Y	YELLOW

* High-Pressure Switch	
Cut-out	270±10 PSIG
Cut-in	190±20 PSIG

# 1b. CR1B-FG/FGY Auxiliary Code B-5(B) and Later

Control Module with Integrated Display

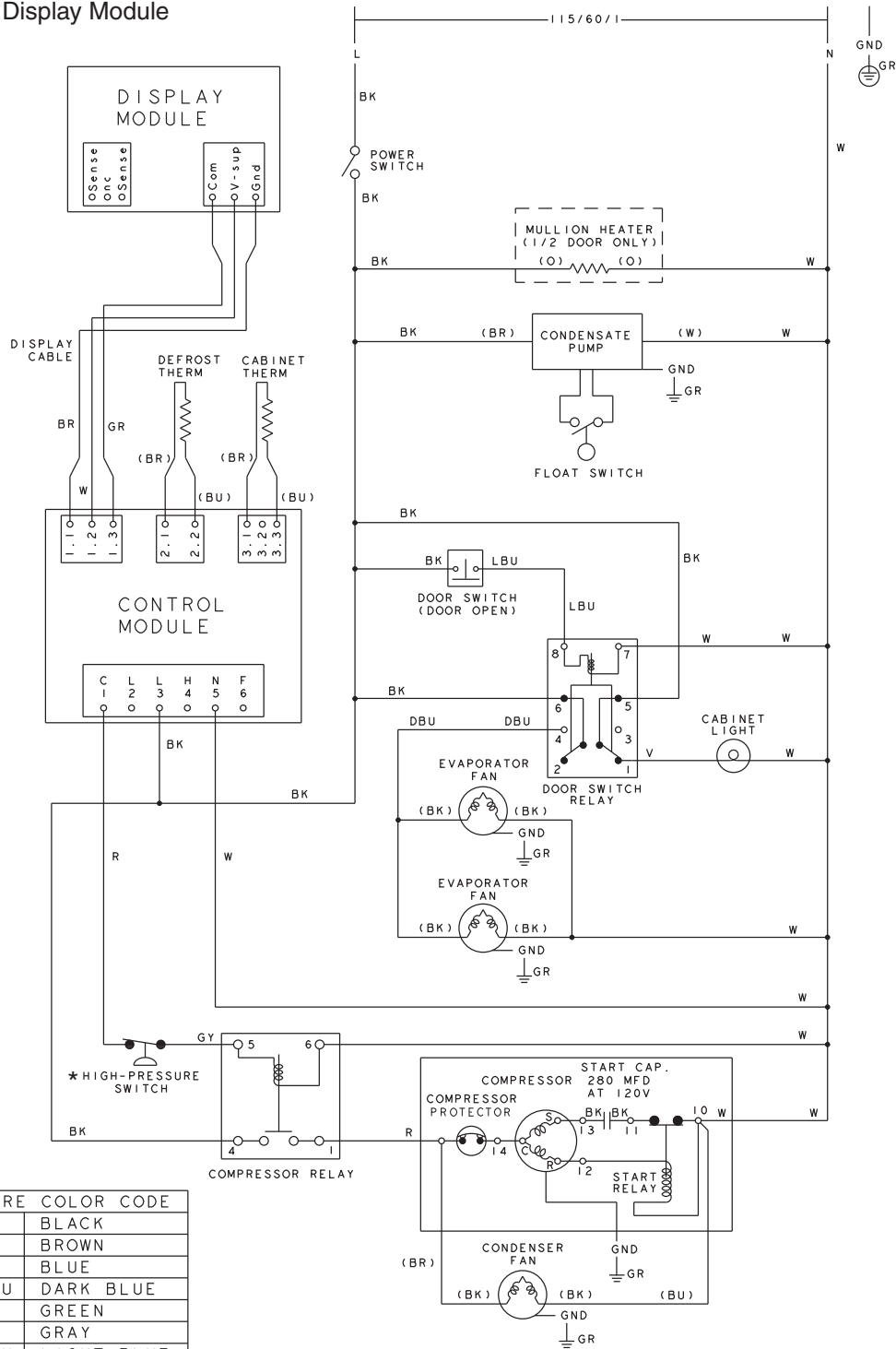


WIRE COLOR CODE	
BK	BLACK
BR	BROWN
BU	BLUE
DBU	DARK BLUE
GR	GREEN
GY	GRAY
LBU	LIGHT BLUE
O	ORANGE
P	PINK
R	RED
V	VIOLET
W	WHITE
Y	YELLOW

* High-Pressure Switch	
Cut-out	300±10 PSIG
Cut-in	190±20 PSIG

## 2a. CR1B-FS/HS, CR3B-FS/HS Auxiliary Code V-5 to B-5(A)

Control Module with  
Remote Display Module

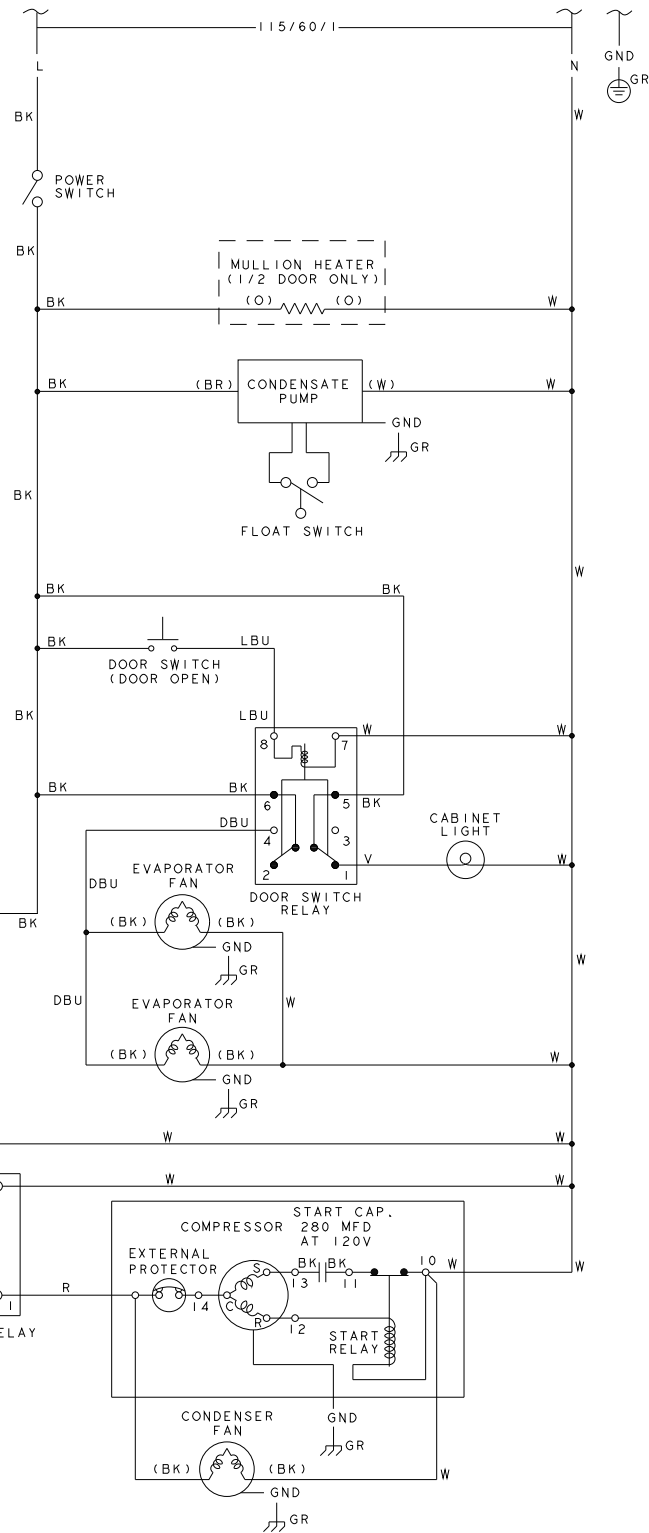
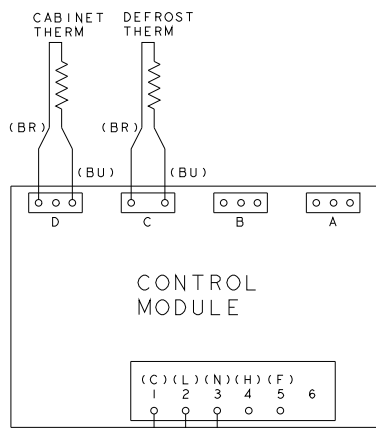


WIRE	COLOR	CODE
BK	BLACK	
BR	BROWN	
BU	BLUE	
DBU	DARK BLUE	
GR	GREEN	
GY	GRAY	
LBU	LIGHT BLUE	
O	ORANGE	
P	PINK	
R	RED	
V	VIOLET	
W	WHITE	
Y	YELLOW	

* High-Pressure Switch	
Cut-out	270±10 PSIG
Cut-in	190±20 PSIG

## 2b. CR1B-FS/HS, CR3B-FS/HS Auxiliary Code B-5(B) and Later

Control Module with Integrated Display

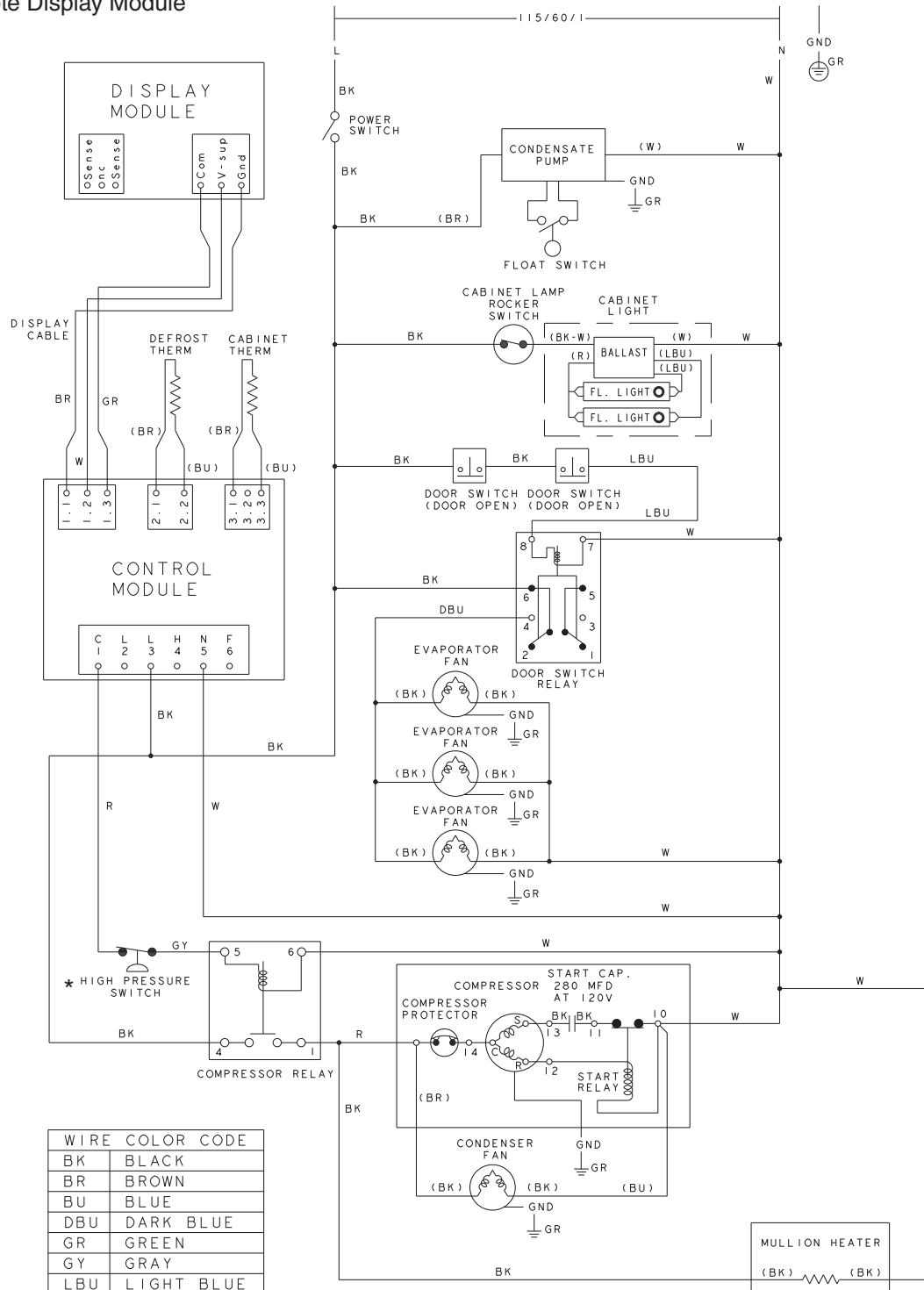


WIRE COLOR CODE	
BK	BLACK
BR	BROWN
BU	BLUE
DBU	DARK BLUE
GR	GREEN
GY	GRAY
LBU	LIGHT BLUE
O	ORANGE
P	PINK
R	RED
V	VIOLET
W	WHITE
Y	YELLOW

* High-Pressure Switch	
Cut-out	300±10 PSIG
Cut-in	190±20 PSIG

### 3a. CR2B-FG Auxiliary Code A-5

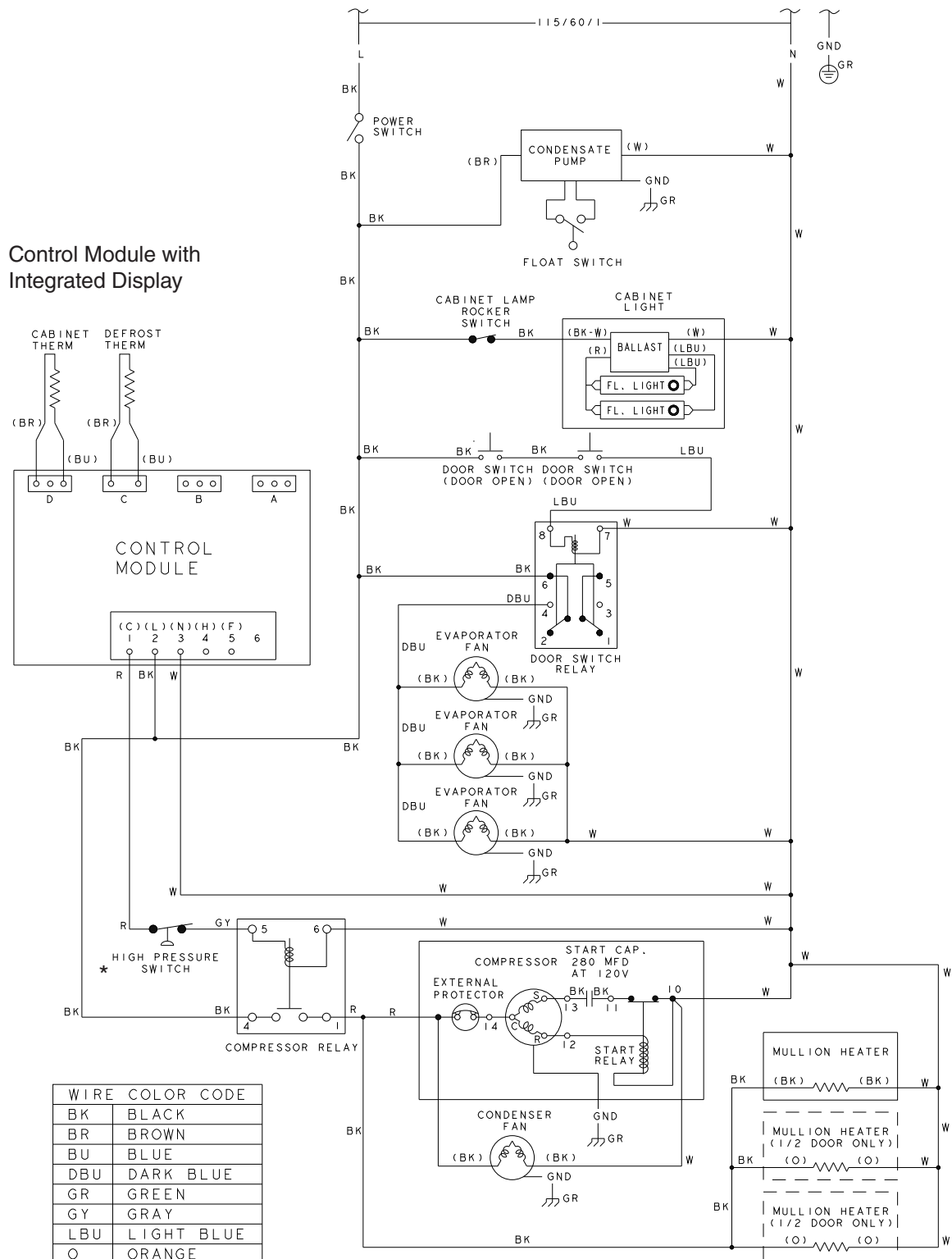
Control Module with Remote Display Module



WIRE	COLOR	CODE
BK	BLACK	
BR	BROWN	
BU	BLUE	
DBU	DARK BLUE	
GR	GREEN	
GY	GRAY	
LBU	LIGHT BLUE	
O	ORANGE	
P	PINK	
R	RED	
V	VIOLET	
W	WHITE	
Y	YELLOW	

* High-Pressure Switch	
Cut-out	270±10 PSIG
Cut-in	190±20 PSIG

### 3b. CR2B-FG/FGY Auxiliary Code B-6 and Later



Control Module with Integrated Display

WIRE COLOR CODE	
BK	BLACK
BR	BROWN
BU	BLUE
DBU	DARK BLUE
GR	GREEN
GY	GRAY
LBU	LIGHT BLUE
O	ORANGE
P	PINK
R	RED
V	VIOLET
W	WHITE
Y	YELLOW

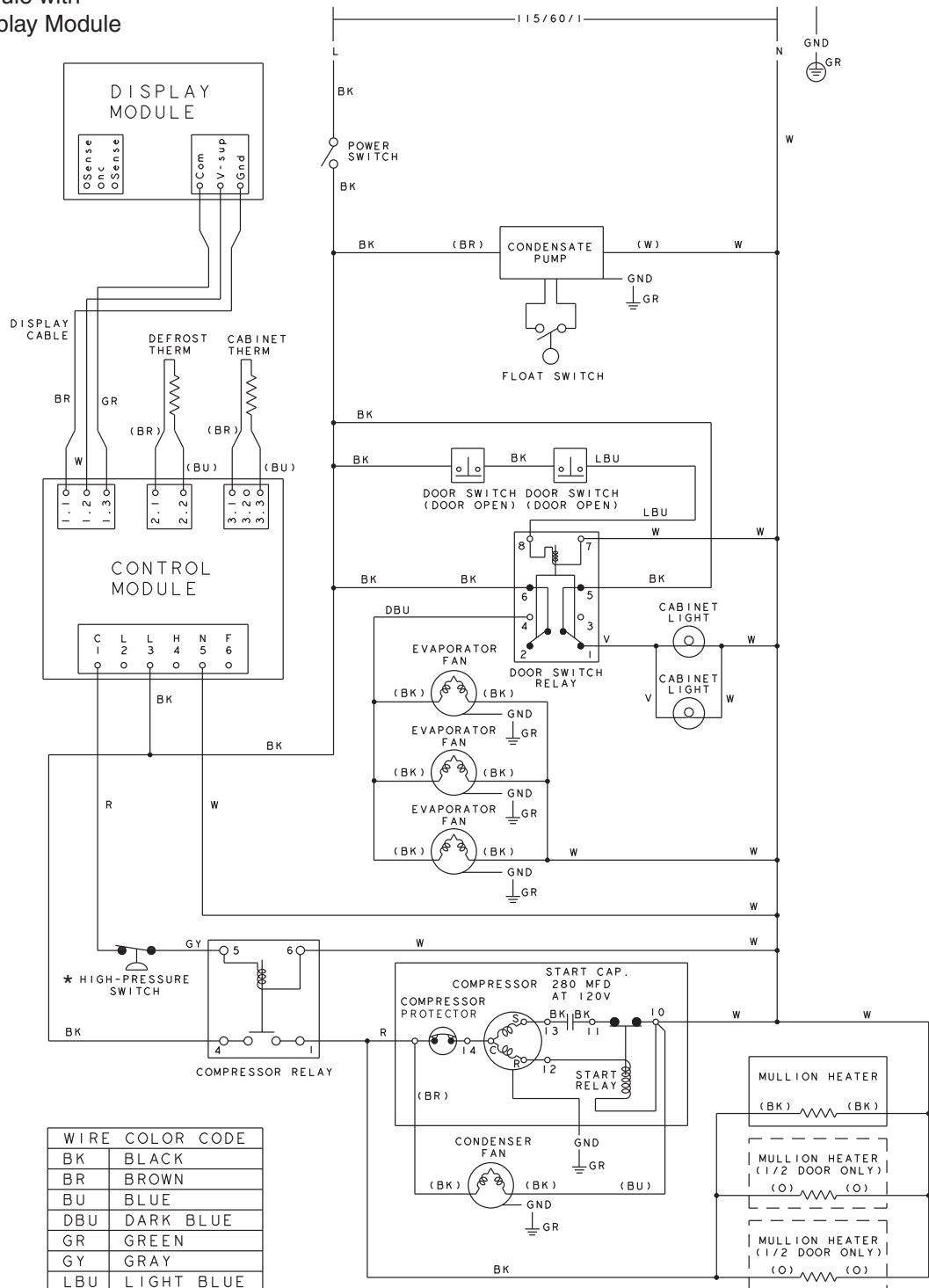
* High-Pressure Switch	
Cut-out	300±10 PSIG
Cut-in	190±20 PSIG

# 4a. CR2B-FS and CR3B-FS Auxiliary Code V-5 to B-5(B)

## CR2B-HS Auxiliary Code A-5 to B-5(A),

## CR3B-HS Auxiliary Code A-5 to B-5(C)

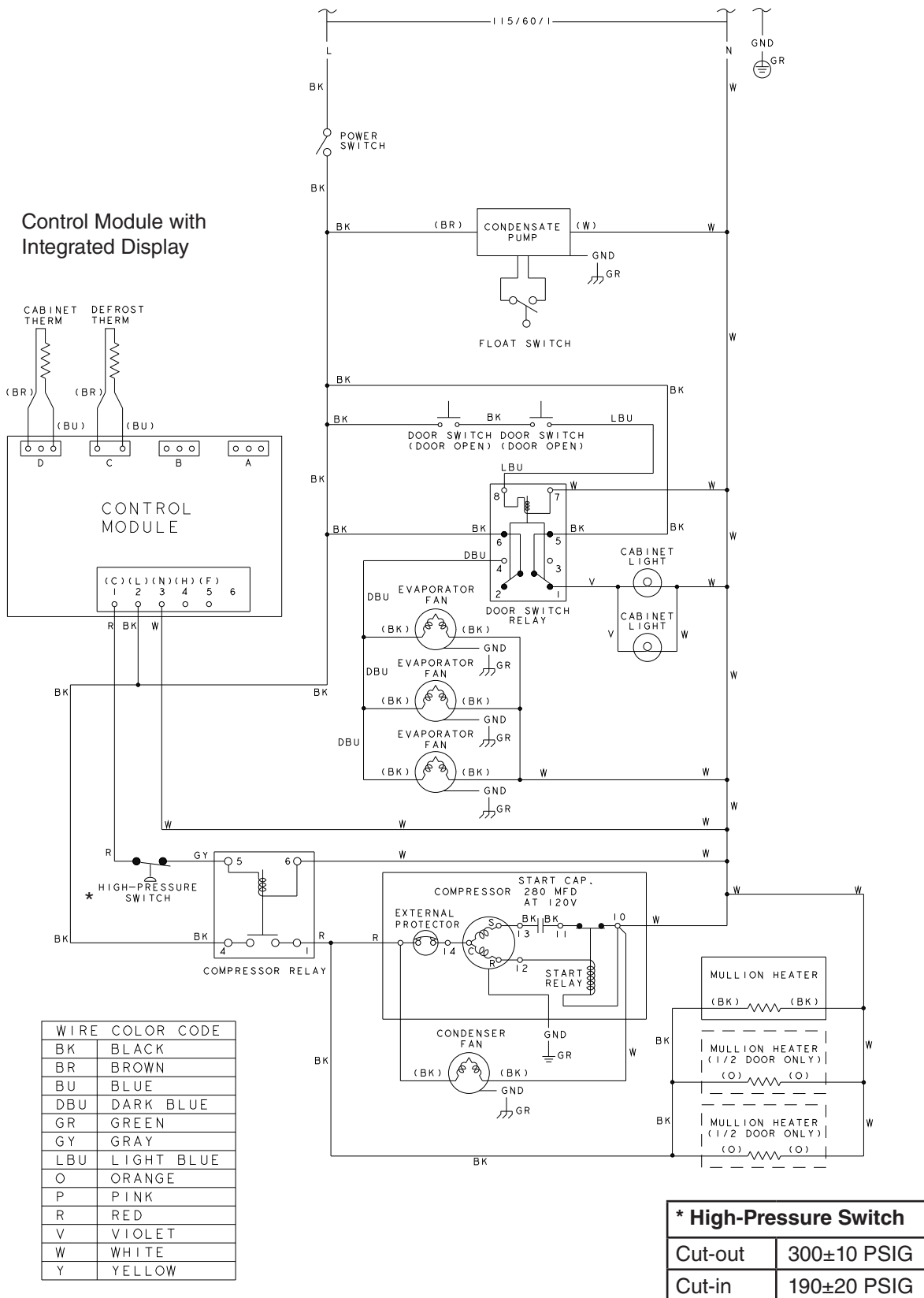
Control Module with Remote Display Module



WIRE COLOR CODE	
BK	BLACK
BR	BROWN
BU	BLUE
DBU	DARK BLUE
GR	GREEN
GY	GRAY
LBU	LIGHT BLUE
O	ORANGE
P	PINK
R	RED
V	VIOLET
W	WHITE
Y	YELLOW

* High-Pressure Switch	
Cut-out	270±10 PSIG
Cut-in	190±20 PSIG

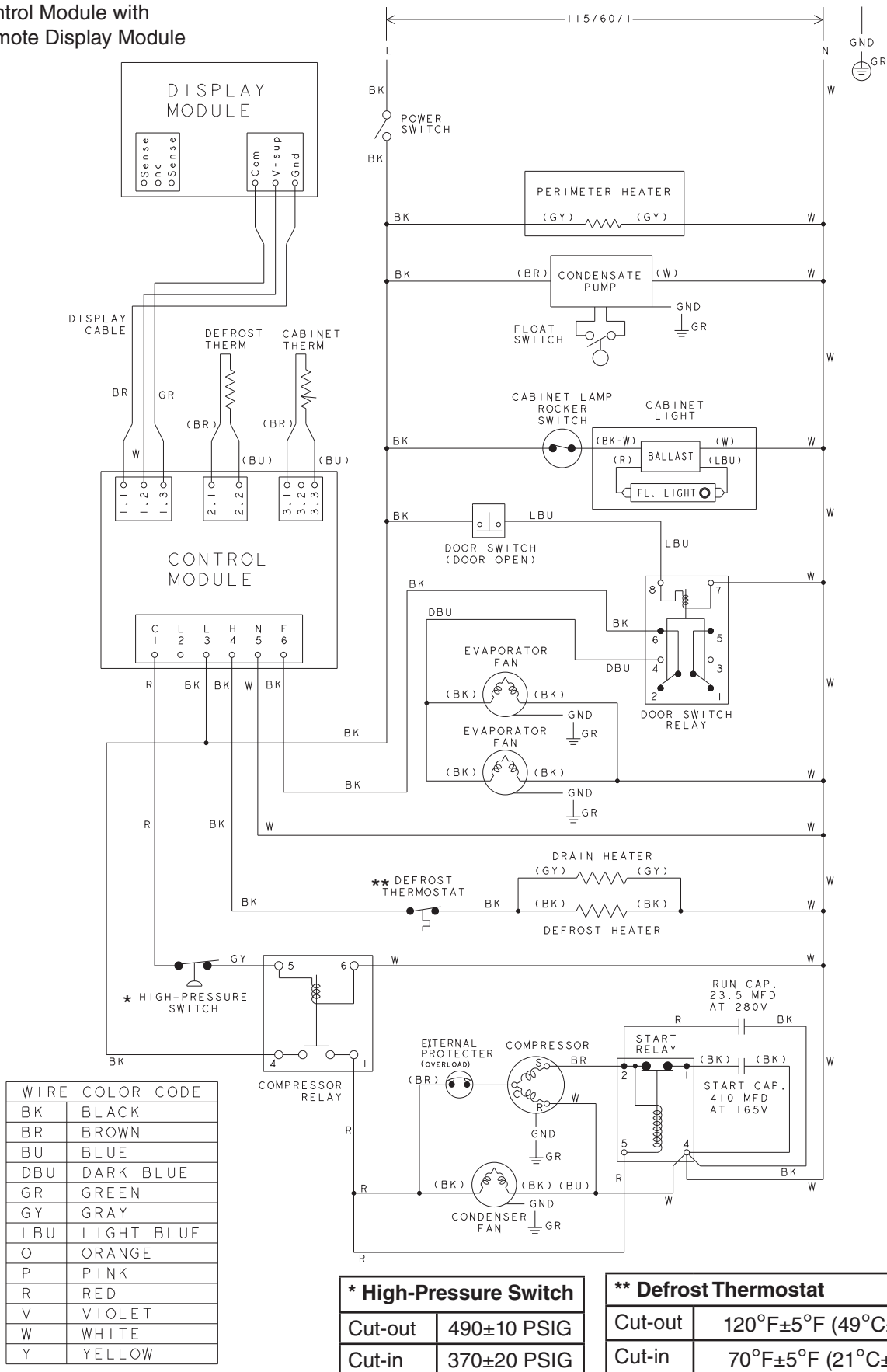
**4b. CR2B-FS and CR3B-FS Auxiliary Code B-5(C) and Later,  
 CR2B-HS Auxiliary Code A-5 to B-5(B) and Later,  
 CR3B-HS Auxiliary Code B-5(D) and Later**





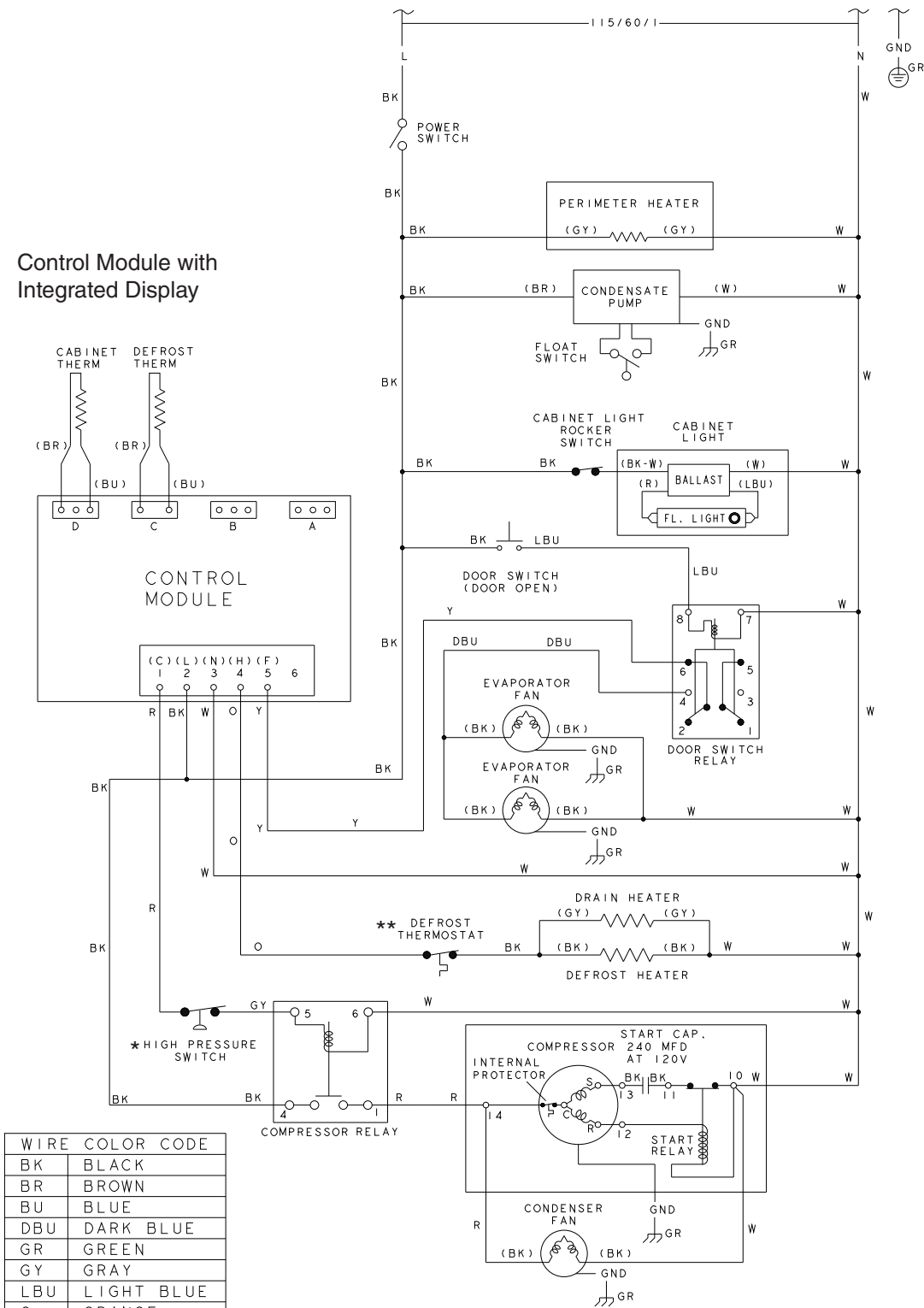
## 5a. CF1B-FG Auxiliary Code B-5(C) and Earlier

Control Module with Remote Display Module



### 5b. CF1B-FG/FGY Auxiliary Code B-5(D) and Later

Control Module with Integrated Display

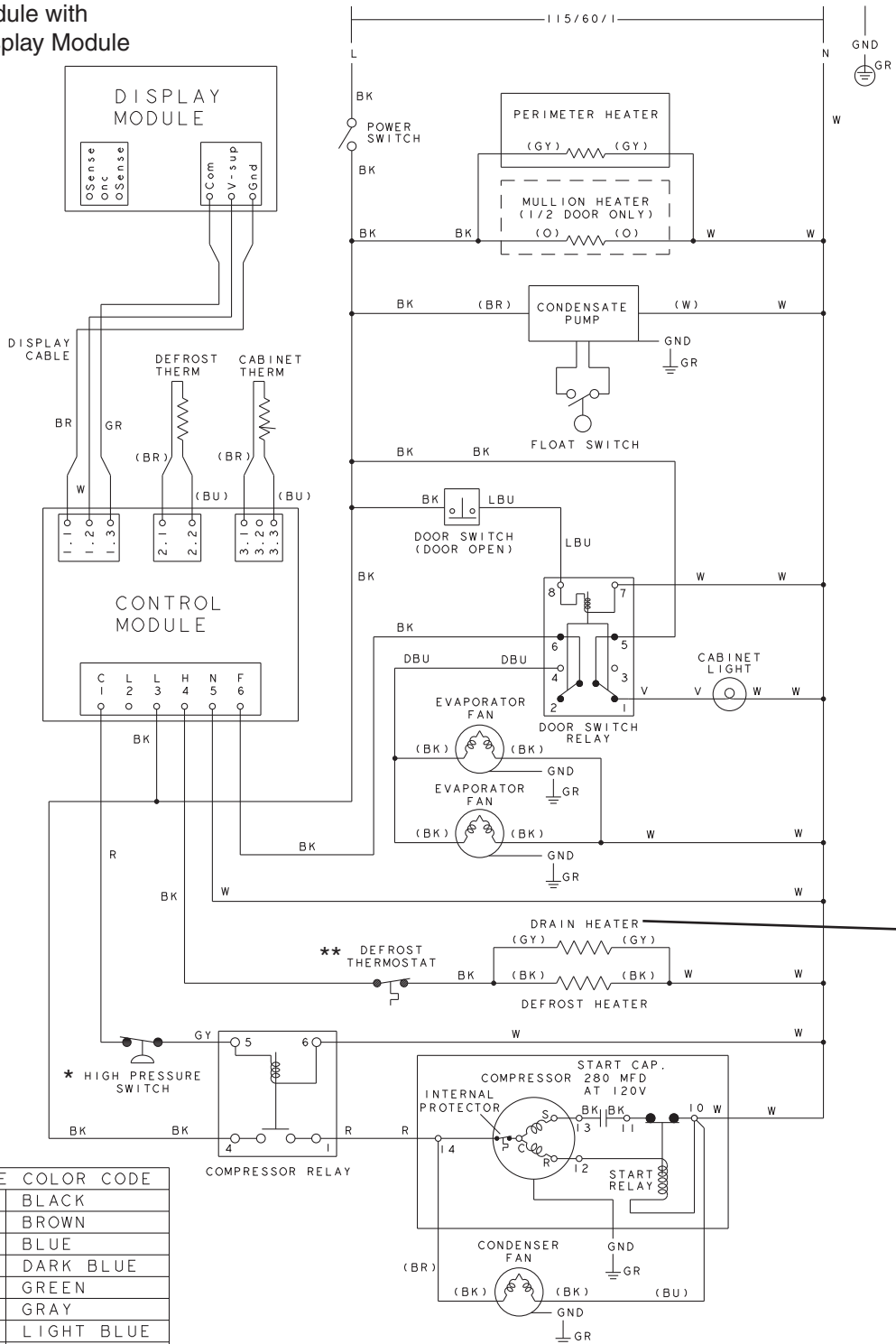


* High-Pressure Switch	
Cut-out	490±10 PSIG
Cut-in	370±20 PSIG

** Defrost Thermostat	
Cut-out	120°F±5°F (49°C±3°C)
Cut-in	70°F±5°F (21°C±3°C)

**6a. CF1B-FS and CF3B-FS (one section side) Auxiliary Code A-5 to B-5(B),  
 CF1B-HS Auxiliary Code A-5 to B-5(A),  
 CF3B-HS (one section side) Auxiliary Code B-6 and Later**

Control Module with  
 Remote Display Module



A-5 (G)  
 and later

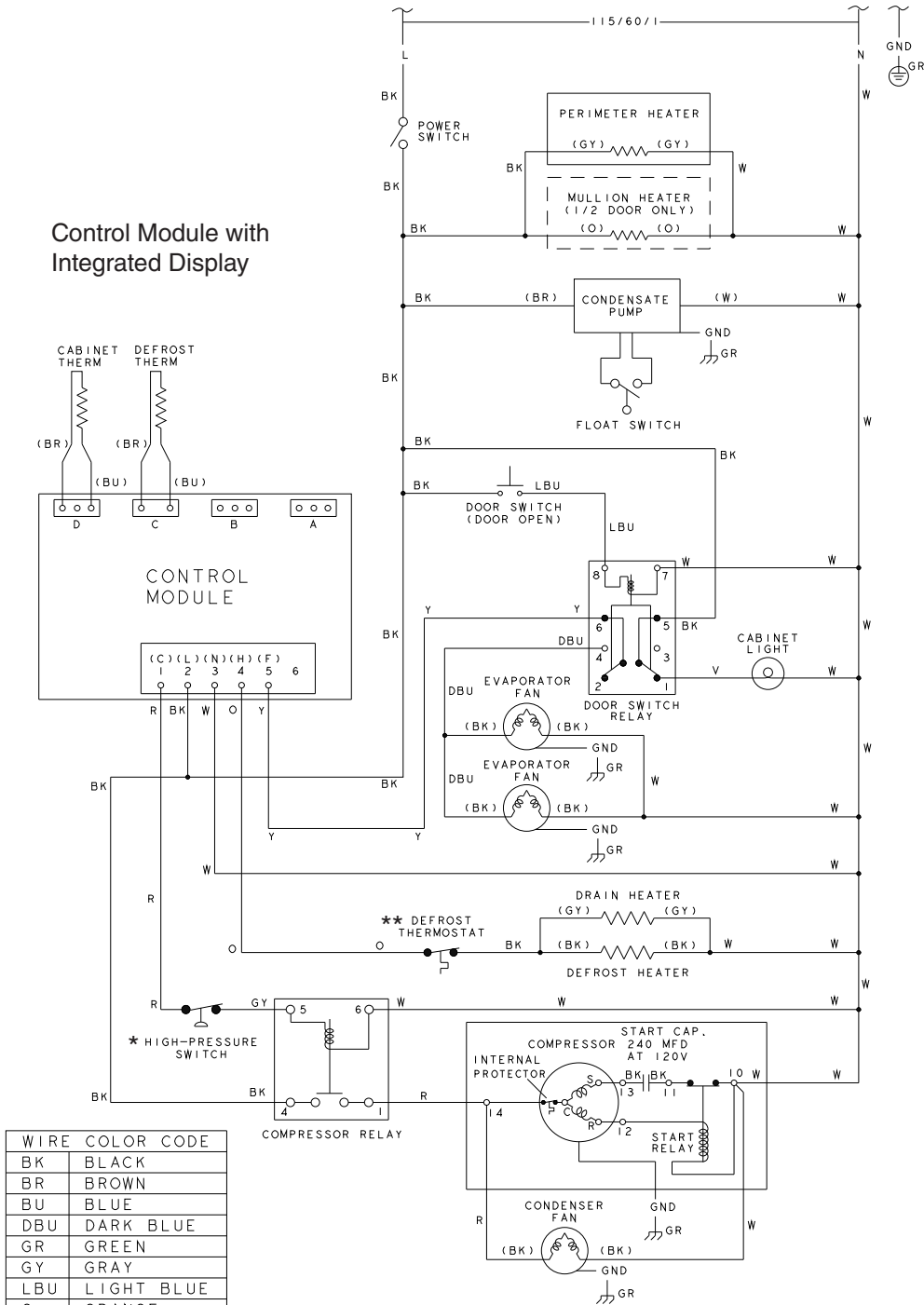
WIRE	COLOR CODE
BK	BLACK
BR	BROWN
BU	BLUE
DBU	DARK BLUE
GR	GREEN
GY	GRAY
LBU	LIGHT BLUE
O	ORANGE
P	PINK
R	RED
V	VIOLET
W	WHITE
Y	YELLOW

* High-Pressure Switch	
Cut-out	490±10 PSIG
Cut-in	370±20 PSIG

** Defrost Thermostat	
Cut-out	120°F±5°F (49°C±3°C)
Cut-in	70°F±5°F (21°C±3°C)

**6b. CF1B-FS and CF3B-FS (one section side) Auxiliary Code A-5 to B-5(B),  
 CF1B-HS Auxiliary Code A-5 to B-5(A),  
 CF3B-HS (one section side) Auxiliary Code B-6 and Later**

**Control Module with Integrated Display**

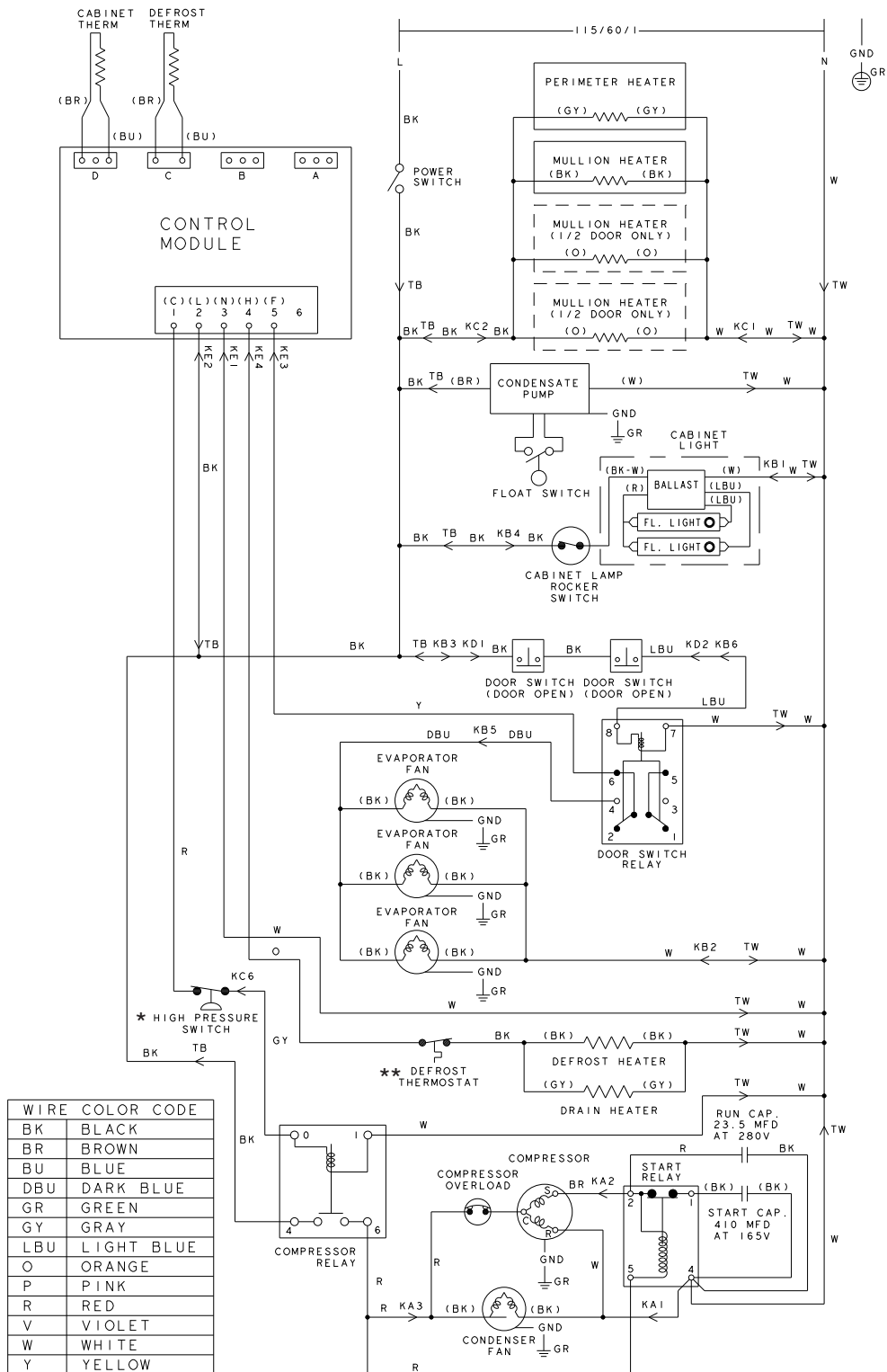


WIRE COLOR CODE	
BK	BLACK
BR	BROWN
BU	BLUE
DBU	DARK BLUE
GR	GREEN
GY	GRAY
LBU	LIGHT BLUE
O	ORANGE
P	PINK
R	RED
V	VIOLET
W	WHITE
Y	YELLOW

* High-Pressure Switch	
Cut-out	490±10 PSIG
Cut-in	370±20 PSIG

** Defrost Thermostat	
Cut-out	120°F±5°F (49°C±3°C)
Cut-in	70°F±5°F (21°C±3°C)

# 7. CF2B-FG/FGY

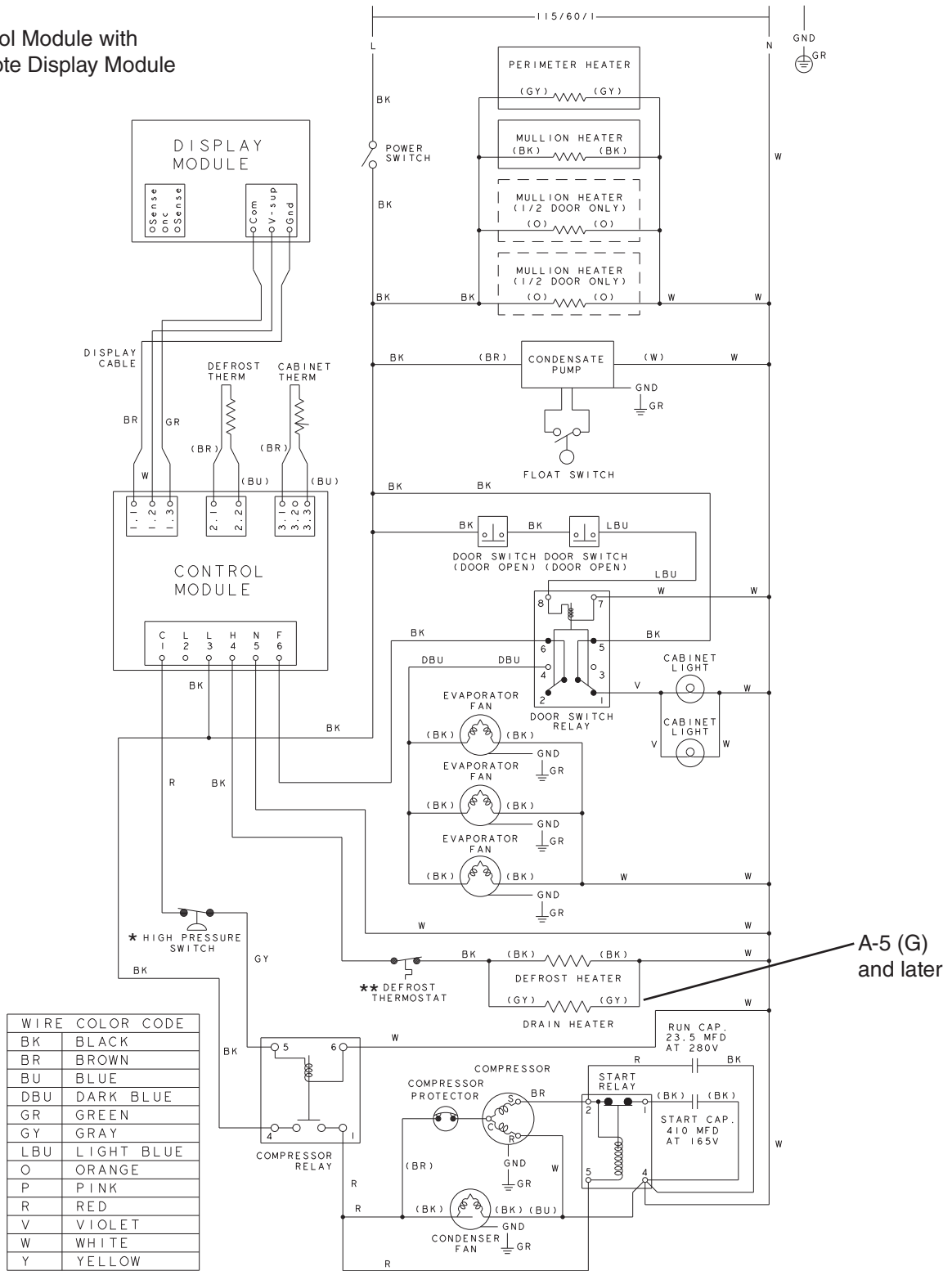


* High-Pressure Switch	
Cut-out	490±10 PSIG
Cut-in	370±20 PSIG

** Defrost Thermostat	
Cut-out	120°F±5°F (49°C±3°C)
Cut-in	70°F±5°F (21°C±3°C)

**8a. CF2B-FS and CF3B-FS (two section side) Auxiliary Code A-5 to B-5(A),  
CF2B-HS Auxiliary Code A-5 to B-5**

Control Module with  
Remote Display Module

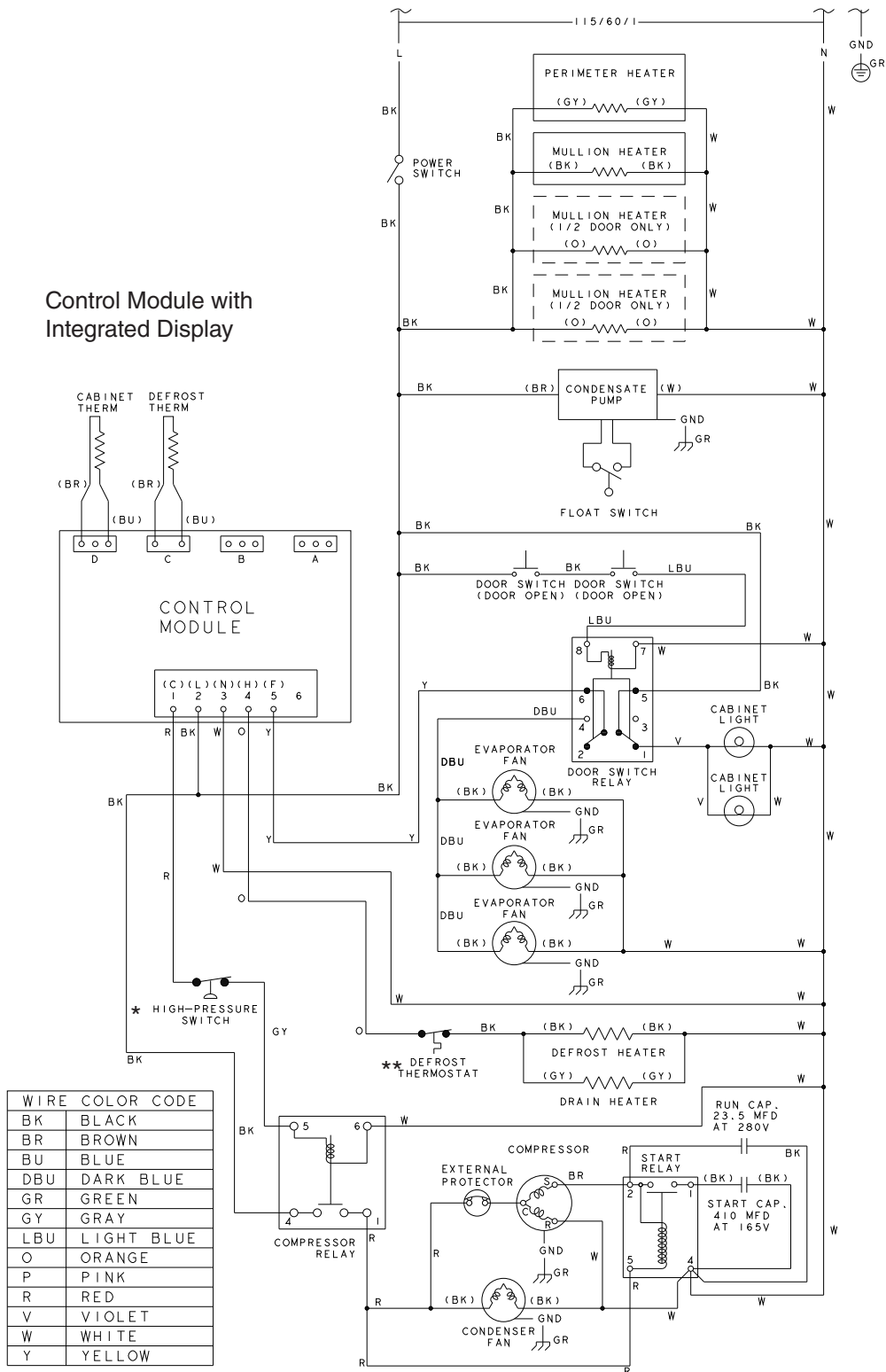


* High-Pressure Switch	
Cut-out	490±10 PSIG
Cut-in	370±20 PSIG

** Defrost Thermostat	
Cut-out	120°F±5°F (49°C±3°C)
Cut-in	70°F±5°F (21°C±3°C)

**8b. CF2B-FS and CF3B-FS (two section side) Auxiliary Code B-5(B) and Later,  
CF2B-HS and CF3B-HS (two section side) Auxiliary Code B-6 and Later**

**Control Module with Integrated Display**

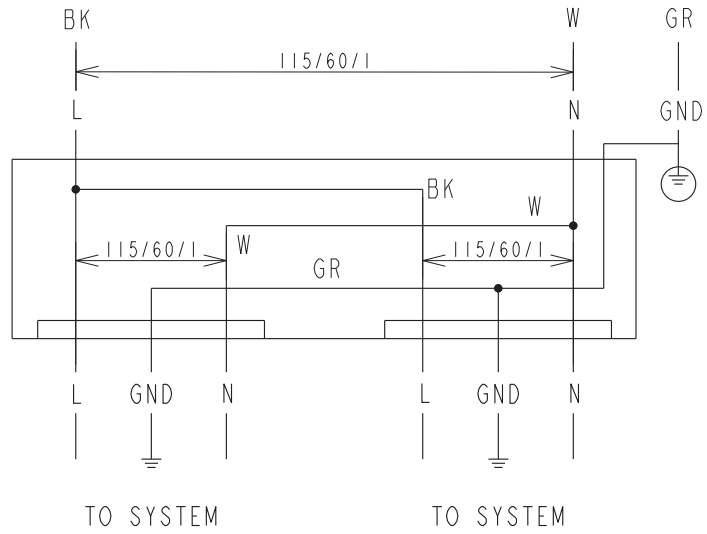
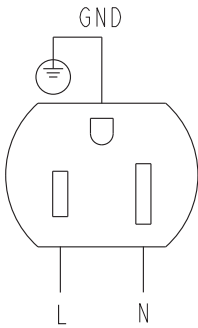


* High-Pressure Switch	
Cut-out	490±10 PSIG
Cut-in	370±20 PSIG

** Defrost Thermostat	
Cut-out	120°F±5°F (49°C±3°C)
Cut-in	70°F±5°F (21°C±3°C)

### 9. CR3B-FS/HS Receptacle Box Connection

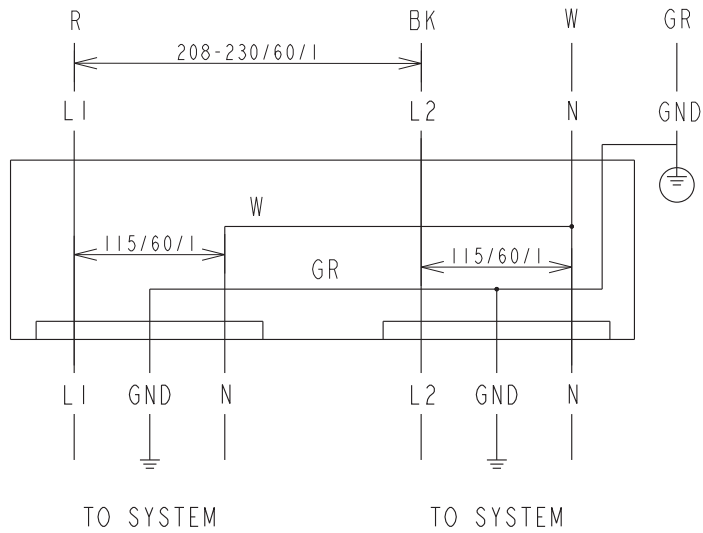
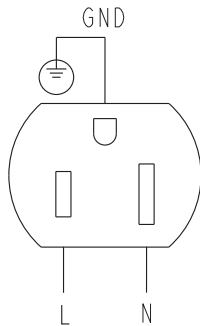
WIRE COLOR CODE	
BK	BLACK
GR	GREEN
W	WHITE



Note: Only the top receptacles have power.

### 10. CF3B-FS/HS Receptacle Box Connection

WIRE COLOR CODE	
BK	BLACK
GR	GREEN
R	RED
W	WHITE



Note: Only the top receptacles have power.