



SINGLE-DECK MERCHANDISER

INSTALLATION & OPERATIONS MANUAL

HS SERIES (R-290)

WARNING / FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WARNING

R290 flammable refrigerant in use. Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.

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To ensure proper functionality and optimum performance, it is **STRONGLY** recommended that Hillphoenix specialty cases be installed/serviced by qualified technicians who have experience working with commercial refrigerated display merchandisers and storage cabinets. For a list of Hillphoenix-authorized installation/service contractors, please visit our website at www.hillphoenix.com.

Hillphoenix®

a **DOVER** company

2017
DOE
COMPLIANT



Important

At Hillphoenix[®], the safety of our customers and employees, as well as the ongoing performance of our products, are top priorities. To that end, we include important warning messages in all Hillphoenix installation and operations handbooks, accompanied by an alert symbol paired with the word "DANGER", "WARNING", or "CAUTION".

All warning messages will inform you of the potential hazard; how to reduce the risk of case damage, personal injury or death; and what may happen if the instructions are not properly followed.

This manual must be stored near the display case where it can be easily consulted. If this manual does not provide the information you require please contact Hillphoenix for more information.



DANGER

Indicates an immediate threat of death or serious injury if all instructions are not followed carefully.



WARNING

Indicates a potential threat of death or serious injury if all instructions are not followed carefully.



CAUTION

Indicates that failure to properly follow instructions may result in case damage.

Revision History

- new manual format_04/21
- technical references_01/23
- HS series R-290 and parts lists_04/23
- technical reference and compliance_02/25
- technical references_07/26

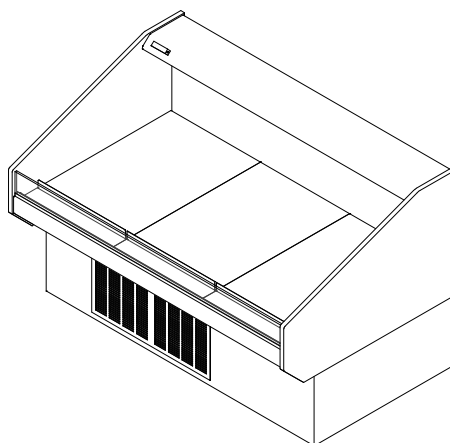
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Self-Service Open Single-Deck Merchandiser
2', 3', 4' & 6' (Bakery/Beverage/Cheese/Deli/Meat/Produce)



GENERAL NOTES:

- "----" Indicates that the feature is not an option on this case model and/or the data is not yet available at this time.



SHIPPING WEIGHT	
Case	Weight
HS-SC	----



ENGINEERED FOR STORES WITH AMBIENT CONDITIONS NOT TO EXCEED 75° AND 55% RELATIVE HUMIDITY. DUE TO ENGINEERING IMPROVEMENTS SPECIFICATIONS MAY CHANGE WITHOUT NOTICE. ALL MEASUREMENTS ARE TAKEN PER ASHRAE-72-2005 SPECIFICATIONS. HILLPHOENIX REFRIGERATED DISPLAY CASES FOR SALE IN THE UNITED STATES MEET OR EXCEED DEPARTMENT OF ENERGY 2017 REQUIREMENTS. NUMBERS ARE BASED ON STANDARD CASE SIZES. CONSULT ENGINEERING.

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Self-Service Open Multi-Deck Merchandiser
2', 3', 4' & 6' (Bakery/Beverage/Cheese/Deli/Meat/Produce)



SYSTEM REQUIREMENTS

Case Height	Case Depth	Case Length	Volts	Phase	Total Amps	Minimum Circuit Ampacity	Maximum Overcurrent Protection
40"	40 11/16"	2'	120	1	4.75	5.7	15
40"	40 11/16"	3'	120	1	6.18	7.5	15
40"	40 11/16"	4'	120	1	7.47	9.0	15
40"	40 11/16"	6'	120	1	12.46	13.8	20
46 1/2"	33 11/16"	2'	120	1	4.75	5.7	15
46 1/2"	33 11/16"	3'	120	1	6.18	7.5	15
46 1/2"	33 11/16"	4'	120	1	7.47	9.0	15
46 1/2"	40 11/16"	2'	120	1	4.75	5.7	15
46 1/2"	40 11/16"	3'	120	1	6.18	7.5	15
46 1/2"	40 11/16"	4'	120	1	7.47	9.0	15
46 1/2"	46"	2'	120	1	4.75	5.7	15
46 1/2"	46"	3'	120	1	6.18	7.5	15
46 1/2"	46"	4'	120	1	7.47	9.0	15
46 1/2"	46"	6'	120	1	12.46	13.8	20
40"	40 11/16"	2'	120/208	1	3.90	4.9	20
40"	40 11/16"	3'	120/208	1	5.30	6.6	20
40"	40 11/16"	4'	120/208	1	6.10	7.6	20
40"	40 11/16"	6'	120/208	1	6.43	7.8	20
46 1/2"	33 11/16"	2'	120/208	1	3.90	4.9	20
46 1/2"	33 11/16"	3'	120/208	1	5.30	6.6	20
46 1/2"	33 11/16"	4'	120/208	1	6.10	7.6	20
46 1/2"	40 11/16"	2'	120/208	1	3.90	4.9	20
46 1/2"	40 11/16"	3'	120/208	1	5.30	6.6	20
46 1/2"	40 11/16"	4'	120/208	1	6.10	7.6	20
46 1/2"	46"	2'	120/208	1	3.90	4.9	20
46 1/2"	46"	3'	120/208	1	5.30	6.6	20
46 1/2"	46"	4'	120/208	1	6.10	7.6	20
46 1/2"	46"	6'	120/208	1	6.43	7.8	20

NOTES:

- "----" Indicates that the feature is not an option on this case model and/or the data is not yet available at this time.
- Listed discharge air velocity represents the average velocity at the peak of defrost.
- LRA - Locked Rotor Amps
- RLA - Running Load Amps
- Listed condensing unit data is only for a single unit.



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ELECTRICAL DATA							
Case Length	Fans Per Case	High Efficiency Fans		Anti-Condensate Fans		Drain Pumps	
		120 Volts		120 Volts		120 Volts	
		Amps	Watts	Amps	Watts	Amps	Watts
2'	1	0.30	25	---	---	---	---
3'	1	0.30	25	---	---	---	---
4'	2	0.60	50	---	---	---	---
6'	2	0.60	50	---	---	---	---

LIGHTING DATA						
Case Length	Lights Per Row	Light Length	Clearvoyant 4 LED Lighting (Per Light Row)			
			Standard Power (Cornice or Shelf)		High Power (Cornice)	
			120 Volts		120 Volts	
			Amps	Watts	Amps	Watts
2'	1	2'	0.03	3.1	0.06	7.8
3'	1	3'	0.04	4.7	0.10	11.9
4'	1	4'	0.05	5.9	0.12	14.9
6'	2	3'	0.08	9.4	0.20	23.8

GUIDELINES AND CONTROL SETTINGS					
Case Height	Case Depth	Case Length	24hr Energy Usage (kWh)	Discharge Air (°F)	Discharge Air Velocity (FPM)
40"	40 11/16"	2'	4.53	28 - 30	203
40"	40 11/16"	3'	7.40	28 - 30	100
40"	40 11/16"	4'	9.82	28 - 30	184
40"	40 11/16"	6'	15.60	28 - 30	158
46 1/2"	33 11/16"	2'	4.53	28 - 30	195
46 1/2"	33 11/16"	3'	7.40	28 - 30	100
46 1/2"	33 11/16"	4'	9.82	28 - 30	206
46 1/2"	40 11/16"	2'	4.53	28 - 30	169
46 1/2"	40 11/16"	3'	7.40	28 - 30	100
46 1/2"	40 11/16"	4'	10.50	28 - 30	135
46 1/2"	46"	2'	6.17	28 - 30	203
46 1/2"	46"	3'	7.70	28 - 30	100
46 1/2"	46"	4'	12.31	28 - 30	184
46 1/2"	46"	6'	15.39	28 - 30	158



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CONDENSING UNIT DATA

Case Height	Case Depth	Case Length	Volts	Phase	BTUHs	RLA (Amps)	LRA (Amps)	Qty	Refrig.	Grams	Condenser Fans	
											Amps	Watts
40"	40 11/16"	2'	120	1	2054	3.9	25.1	1	R290	84	0.43	25
40"	40 11/16"	3'	120	1	2734	5.3	32.0	1	R290	120	0.43	25
40"	40 11/16"	4'	120	1	4495	6.1	42.0	2	R290	116	0.53	30
40"	40 11/16"	6'	120	1	4799	5.3	32.0	1	R290	142	0.43	25
46 1/2"	33 11/16"	2'	120	1	2054	3.9	25.1	1	R290	84	0.43	25
46 1/2"	33 11/16"	3'	120	1	2734	5.3	32.0	1	R290	120	0.43	25
46 1/2"	33 11/16"	4'	120	1	4495	6.1	42.0	1	R290	144	0.53	30
46 1/2"	40 11/16"	2'	120	1	2054	3.9	25.1	1	R290	84	0.43	25
46 1/2"	40 11/16"	3'	120	1	2734	5.3	32.0	1	R290	120	0.43	25
46 1/2"	40 11/16"	4'	120	1	4495	6.1	42.0	1	R290	116	0.53	30
46 1/2"	46"	2'	120	1	2054	3.9	25.1	1	R290	84	0.43	25
46 1/2"	46"	3'	120	1	2734	5.3	32.0	1	R290	120	0.43	25
46 1/2"	46"	4'	120	1	4495	6.1	42.0	1	R290	138	0.53	30
46 1/2"	46"	6'	120	1	4799	5.3	32.0	2	R290	142	0.43	25

DEFROST CONTROLS

Defrosts Per Day	Run-Off Time (Min)	Electric Defrost		Timed-Off Defrost		Hot Gas Defrost	
		Fail-Safe (Min)	Termination Temp (°F)	Fail Safe (Min)	Termination Temp (°F)	Fail-Safe (Min)	Termination Temp (°F)
6	---	---	---	30	45	---	---



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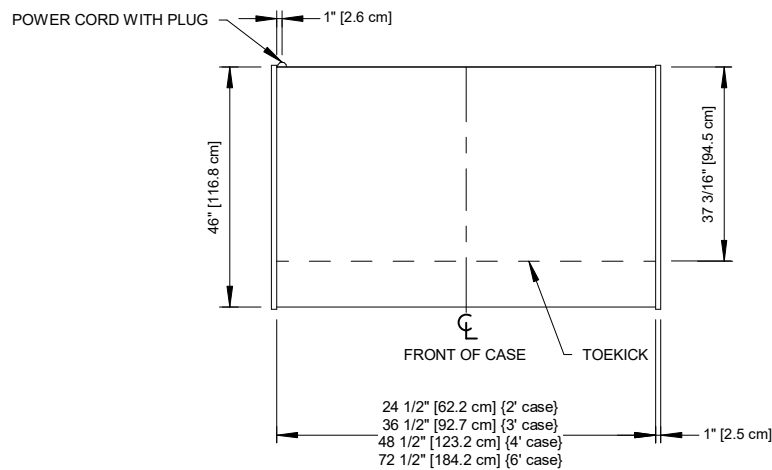
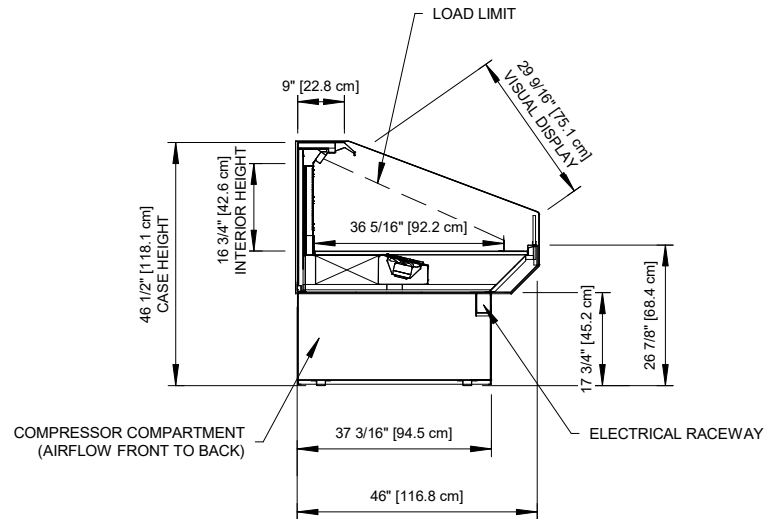
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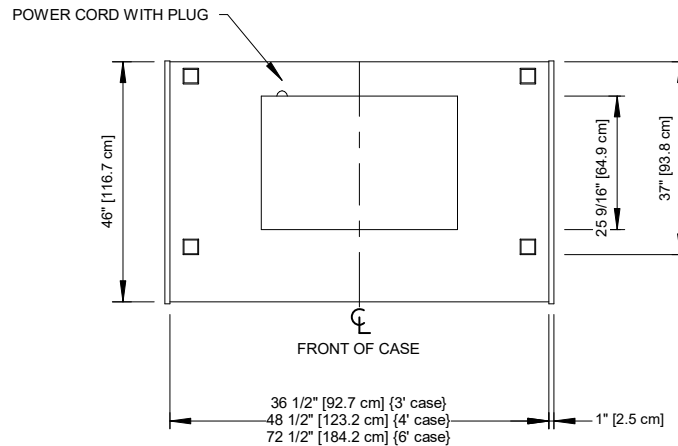
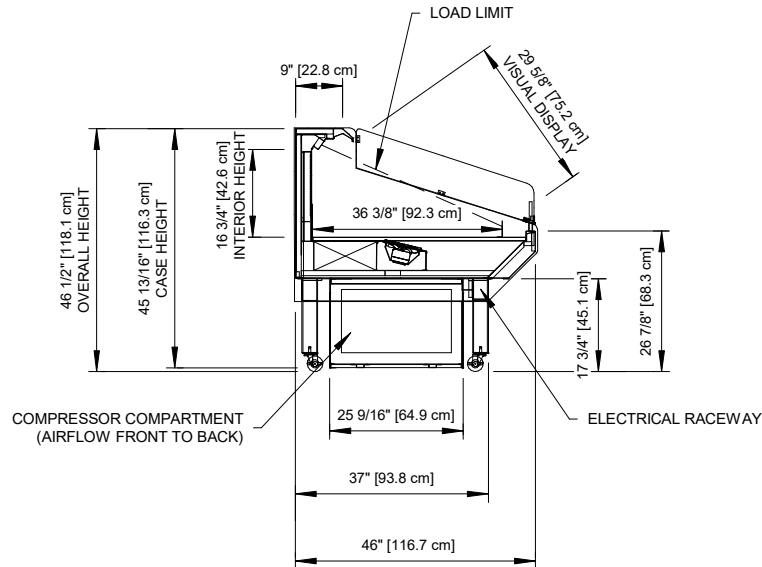
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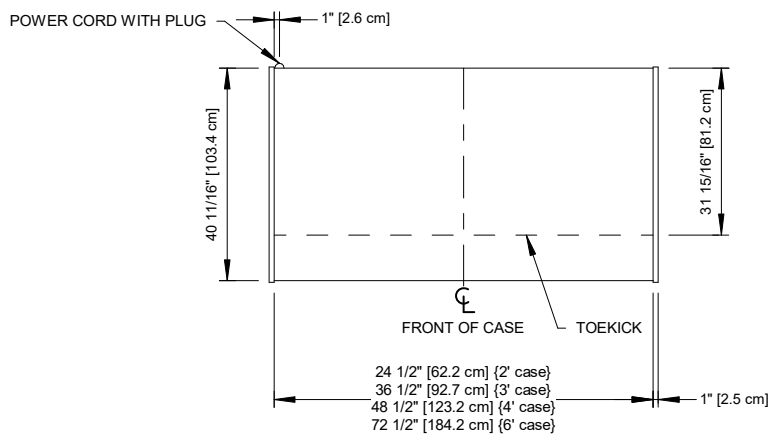
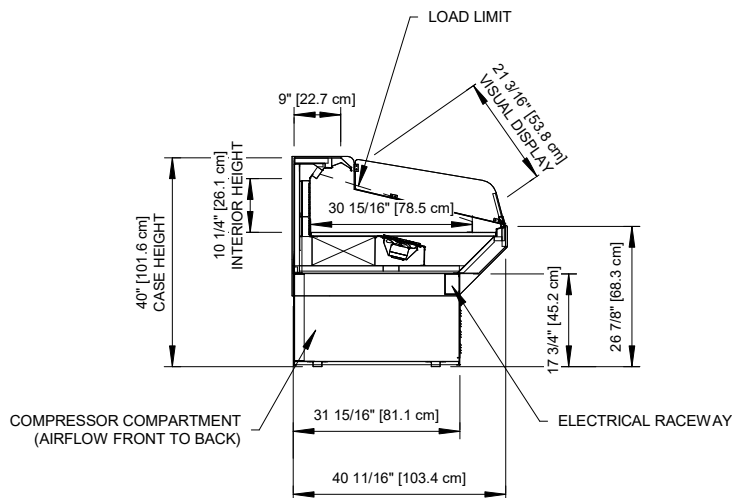
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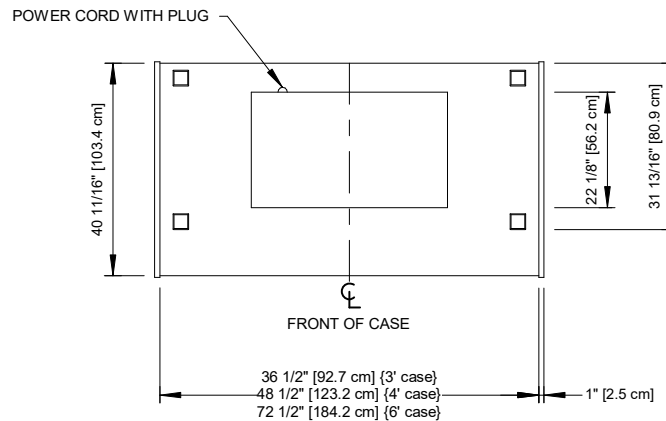
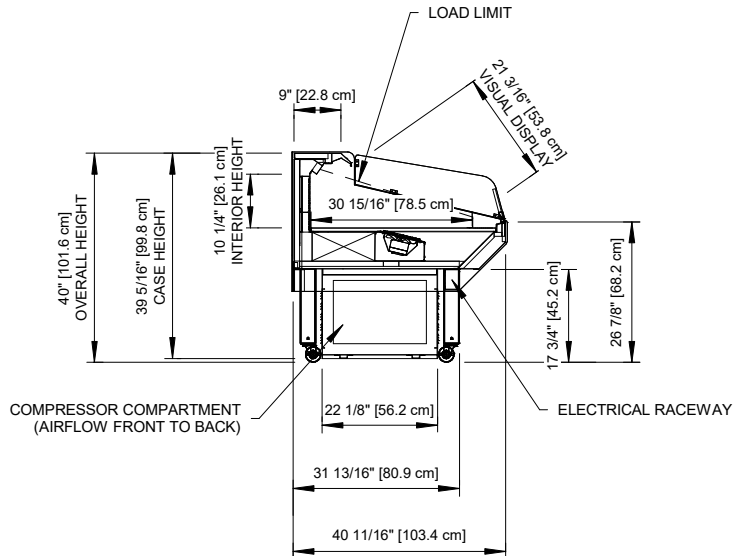
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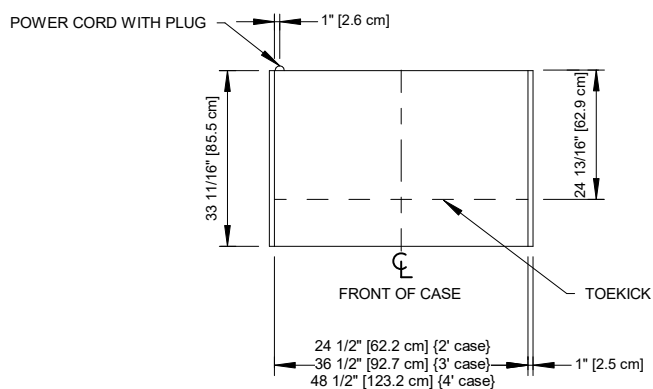
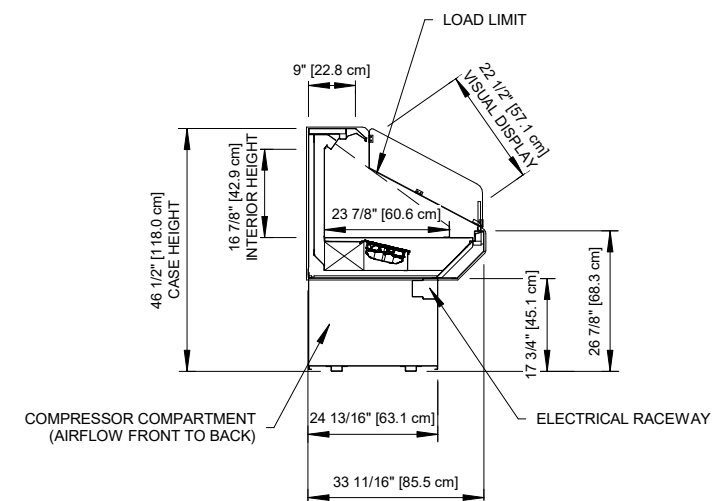
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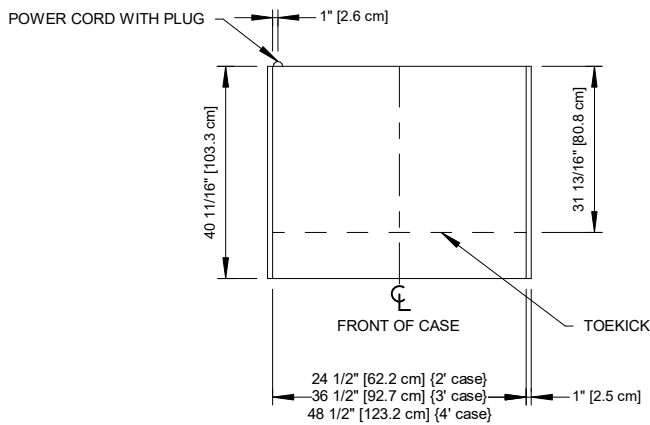
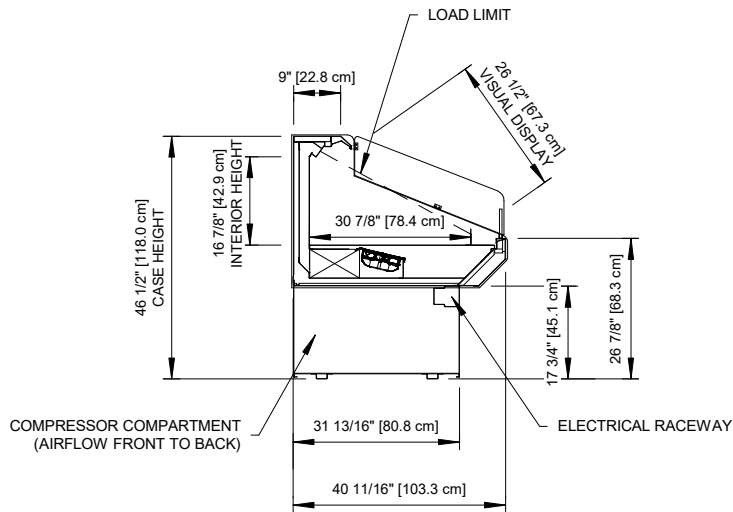
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GENERAL INFORMATION

Thank you for choosing Hillphoenix for your food merchandising needs. This handbook contains important technical information and will assist you with the installation and operation of your new Hillphoenix specialty cases. By closely following the instructions, you can expect peak performance; attractive fit and finish; and long case life.

We are always interested in your suggestions for improvements (e.g. case design, technical documents, etc.). Please feel free to contact our Marketing Services group at the number listed below. Thank you for choosing Hillphoenix, and we wish you the very best in outstanding food merchandising.

CASE DESCRIPTION

This manual specifically covers the HS SERIES (R-290) bakery, beverage, cheese, deli, meat and produce application self-service open multi-deck merchandisers.

STORE CONDITIONS

Hillphoenix cases are designed to operate in an air-conditioned store that maintains a 75°F (24°C) store temperature and 55% (max) relative humidity (ASHRAE conditions). Case operation will be adversely affected by exposure to excessively high ambient temperatures and/or humidity.

REFRIGERATION SYSTEM OPERATION

Air-cooled condensing units require adequate ventilation for efficient performance.

THIS UNIT CONTAINS R-290 FLAMMABLE REFRIGERANT. USE CAUTION WHEN HANDLING, MOVING OR SERVICING THE DISPLAY CASE. AVOID DAMAGING THE REFRIGERANT TUBING WHICH COULD INCREASE THE RISK OF A LEAK.

SHIPPING CASES

Transportation companies assume all liability from the time a shipment is received by them until the time it is delivered to the consumer. Our liability ceases at the time of shipment.

RECEIVING CASES

Examine fixtures carefully and in the event of shipping damage and/or shortages, please contact the Service Parts Department at the number listed below.

CASE DAMAGE

Claims for obvious damage must be 1) noted on either the freight bill or the express receipt and 2) signed by the carrier's

agent; otherwise, the carrier may refuse the claim. If damage becomes apparent after the equipment is unpacked, retain all packing materials and submit a written request to the carrier for inspection within 14 days of receipt of the equipment.

Failure to follow this procedure will result in refusal by the carrier to honor any claims with a consequent loss to the consumer.

If a UPS shipment has been damaged, retain the damaged material, the carton and notify us at once. We will file a claim.

LOST/MISSING ITEMS

Equipment has been carefully inspected to insure the highest level of quality. Any claim for lost/missing items must be made to Hillphoenix within 48 hours of receipt of the equipment. When making a claim please use the number listed below.

SERVICE PARTS & TECHNICAL SUPPORT

For service parts questions regarding our cases, please contact our Service Parts Department at 1-844-HPX-PART (1-844-479-7278) or dfr-ia-parts@doverfoodretail.com

For technical questions regarding our cases, please contact our Technical Support Department at 1-833-280-5714.

CONTACTING THE FACTORY

If you need to contact Hillphoenix regarding a specific fixture, be certain that you have both the case model number and serial number. (This information can be found on the data tag, located at the top-left interior, rear exterior panel or interior rear lower storage of the case. *Location may vary based on case design.*)

Hillphoenix Specialty Products
703 Franklin Street, PO Box 478
Keosauqua, IA 52565
Website: www.hillphoenix.com

LOCATION

This refrigerated display case has been designed for displaying and storing perishable food product. It is engineered for air-conditioned stores with a maximum ambient of 75°F and 55% relative humidity.

When selecting the location for placement of this case, avoid the following conditions:

Excessive Air Movement

1. Doors
2. Air-conditioned vents
3. Other air sources

Excessive Heat

1. Windows
2. Sun
3. Flood lamps 8 feet or less from the product
4. Other heat sources

FLOOR PREP

1. Ask the general contractor if your current copy of the building dimensions are the most recently issued. Also, ask for the points of reference from which you should take dimensions to locate the cases.
2. Using chalk lines or a laser transit, mark the floor where the cases are to be located for the entire lineup. The lines should coincide with the outside edges of the case feet.
3. Move case as close as possible to its permanent location. Remove all crating and shipping braces above the shipping pallet. Loosen the plastic dust cover from the pallet, but leave cover over the case to protect it while removing the case from the pallet.
4. The power cord shipping brace (Fig. 1) can be removed with a screw gun. As for case shipping braces, the same would be applied with sled runner or caster construction. If the braces are metal brackets or locks they can be removed with a screw gun. If they are wood blocks they can be removed with a J-bar. **Note: Shipping braces are normally located at each corner of the case. Some case models with casters will use bracing that surrounds the casters entirely and some will use braces that affix to the toe-kicks at each corner. (Shipping braces used vary and are based on case design for best transport.)**
5. Carefully, if horizontal supports, lift case up and off the pallet. Remove dust cover. Installation hardware ships in a marked packet located inside the case. Remove dust cover. Installation hardware ships in a marked packet located inside the case. (Hillphoenix self-contained display cases are sometimes designed with casters. In most situations, one or two persons can easily move the case into position.) If there are casters simply roll them on to

the store floor to the proper staging area. First remove all crating then all sled runner, caster, and/or power cord shipping braces. (Dependent on case design.)

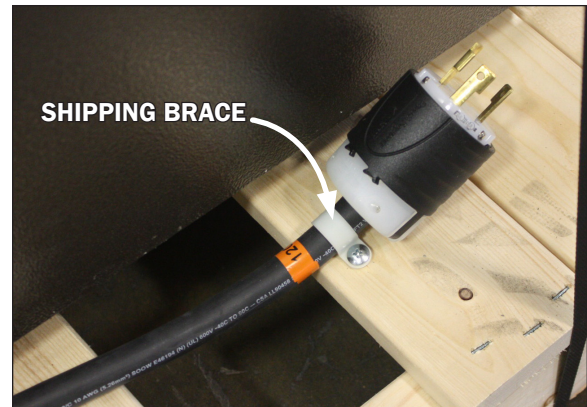


Fig. 1 Power cord shipping brace

6. Leveling is necessary to ensure proper operation of the refrigeration system and drainage of the condensate. Locate the highest point on the positioning lines as a reference for determining the proper height of the shim-pack levelers. A laser transit is recommended for precision and requires just one person. Level adjustable feet by twisting, if applicable, or shim as necessary under vertical stationary or caster supports as this will help ensure that the case is not settling over time.

CAUTION

Failure to properly level the case could result in lack of proper condensation drainage leading to failure of the unit.

7. Locate horizontal or vertical (caster) support positions along the chalk line (Fig. 2 & 3). Spot properly leveled shim packs at each support location.
8. (SLED RUNNERS) If necessary, drill a hole in each end of every horizontal support (Fig. 4) and fasten to the floor with concrete anchors. **Note: The holes do not need to be in the exact locations specified here. Be sure that the anchors are close to the end of the horizontal supports and at each corner of the case.**

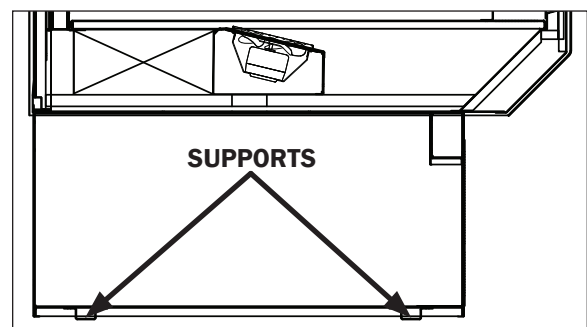


Fig. 2 Horizontal sled runner supports (CLOSED)

CASE INSTALLATION

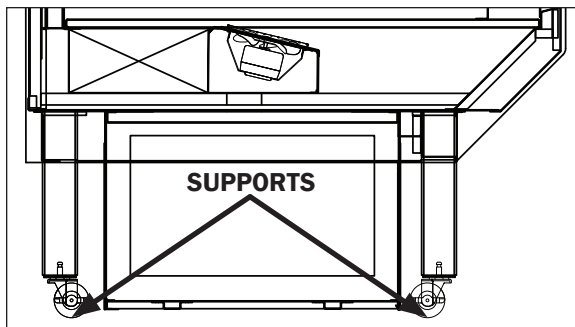


Fig. 3 Horizontal sled runner supports (OPEN)

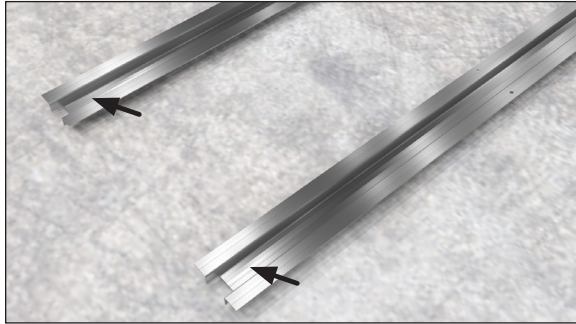


Fig. 4 Seismic anchoring locations (sled runners)

9. (CASTERS) If necessary, attach two brackets at two separate corners of the case (Fig. 5) and fasten to the floor with concrete anchors. **Note: The brackets do not need to be affixed in the exact locations specified here. However, be sure that the anchors are close to the corners and that at least two brackets are used, one at each corner.** You can use more than two brackets for anchoring if you want further support this way.

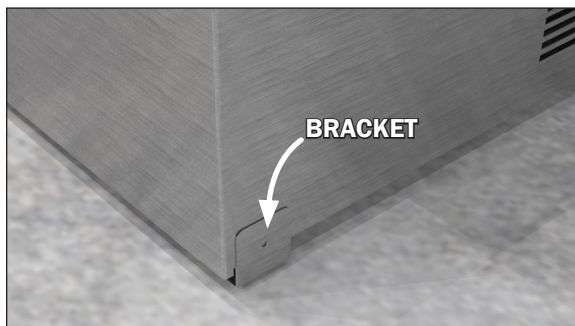


Fig. 5 Seismic anchoring locations (caster brackets)

⚠ CAUTION

Locate the horizontal or vertical (caster) supports under unit before removing from pallet. Failure to do so will damage the finished metal if correct lift points are not identified prior to removal.

⚠ CAUTION

These cases are not designed for excessive external weight. Do not walk on top or inside of cases. Doing so may result in case damage and/or personal injury.

LINE-UP & INSTALLATION

Single Case

1. Move the case into position. Using a "J" bar, raise the end of the case (under cross support), and lower the horizontal support on to the shim packs. Repeat on the other end of the case.

⚠ WARNING

Be certain that your hands and feet are out of the way before lowering the case. Failure to do so may result in serious injury.

2. Once the case is properly placed on the shim packs, check the vertical plumb of the case by placing a bubble level on the rear wall. Add/remove shim packs as needed. For the horizontal level, repeat this process after placing the bubble level on the front sill.
3. Install the bumper, if applicable, into pre-attached bumper track and snap into place. (Most self-contained cases ship with bumper pre-installed.)
4. After sufficient time has passed to allow for bumper shrinkage, cut away the excess bumper for final fit and finish. Be certain to use an appropriate cutting tool (tubing- or PVC-cutter) to ensure a smooth cut.
5. Install case shelves and reconnect lights. Be aware that differing shelf configurations will affect energy consumption and case performance.
6. Install toekick/compressor compartment access panel back onto the base of case, if applicable.
7. Equipment is designed to be sealed to the floor once installed in final location. This is intended to prevent liquid, dirt, debris, etc. from collecting under the case after installation. **Exception: Cases using casters are not required to be sealed to the floor.**

Once case is set in the final location and all panels are attached, run a bead of silicone/sealant around the bottom edge of the case and the floor to create a barrier to prevent liquid, dirt, debris, etc. from collecting underneath the case.

⚠ CAUTION

Do not obstruct ventilation around the base of the display case condensing unit. Obstructing could cause the case to not operate correctly and failure to maintain product temperatures.

Multi-Case

1. Remove any shelves (discard the shelf clips) and/or loose items from the cases that may interfere with case joining. Keep all loose items as they will be used later in the installation process.
2. Follow the single-case installation instructions for the first case, excluding #6, then position the next case in the line-up approximately 3' away.
3. Apply a bead of butyl or silicone sealant to the end of the first case. From the opposite end, push the second case to a position that is approximately 6" from the first case, then position the case on the shim packs.
4. Push the cases tightly together, then lightly bolt them together through the holes provided (Fig. 6 & 7). Tighten all the joining bolts until all margins are equal. Be careful not to over tighten.
5. If applicable, the stub-up location can be found under the tank on the customer left. See *technical references on pages 6-11 for access locations*.
6. Apply case-to-case watershed (supplied) over the end frame seam (Fig. 8). The watershed prevents water from
- settling in the case joint.
7. Repeat steps 3-6 of this sequence for all remaining cases. Be certain to properly level all cases.
8. Properly align the front panels as needed, then install, if applicable, front panel trim (supplied).
9. Install the bumper into pre-attached bumper track and snap into place.
10. After sufficient time has passed to allow for bumper shrinkage, cut away the excess bumper for final fit and finish. Be certain to use an appropriate cutting tool (tubing- or PVC-cutter) to ensure a smooth cut.
11. Install case shelves and reconnect lights. Be aware that differing shelf configurations will affect energy consumption and case performance.
12. Install toekick/compressor compartment access panel back onto the base of case, if applicable.

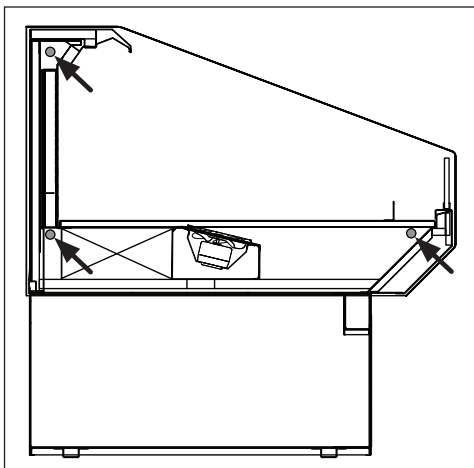


Fig. 6 Bolt locations (CLOSED)

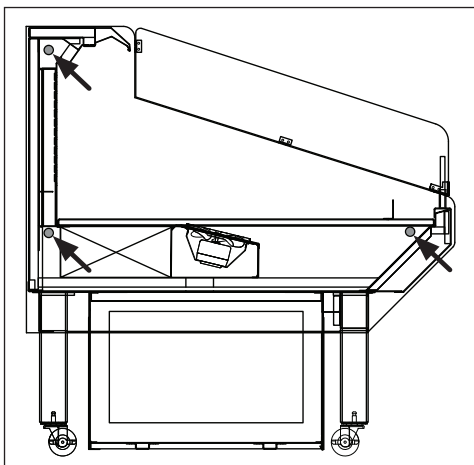


Fig. 7 Bolt locations (OPEN)

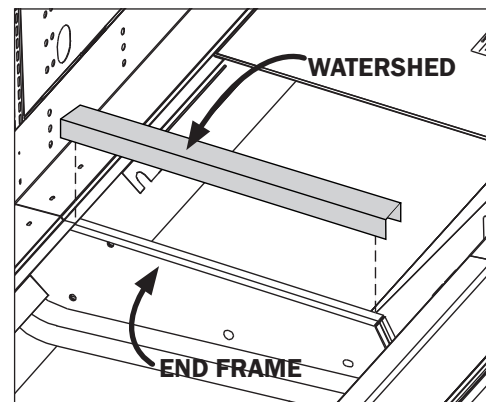


Fig. 8 Sealing the pipe chase



CAUTION

Installation of 3rd-party materials may result in diminished case performance.

CASE CONNECTIONS

ELECTRICAL

Electrical hookups are made through the electrical raceway which can be accessed by removing the lower panel to the compressor compartment.

When connecting to the power supply on the case, field wiring should exit box from the side furthest away from case wiring to allow more room inside for wiring connections. The case must be grounded. *For more detailed electrical wiring information (see Appendix A1).*

Prior to plugging in and starting up the case always check the data tag located on the left end exterior panel or top interior of the case, as well as the voltage label found on the main power cord (Fig. 9) which can be found at the rear base panel. **Note:** **Check that the voltage of the receptacle you are going to use for power and the voltage required for the case match.**

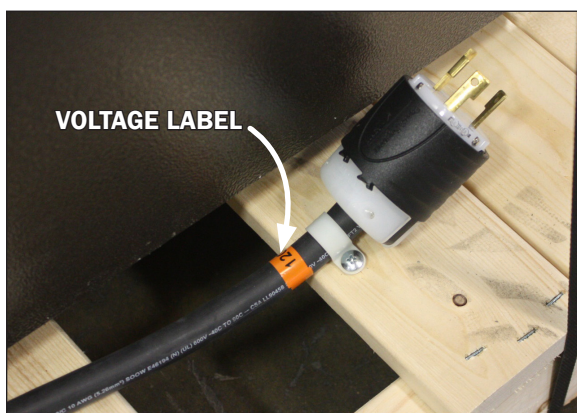


Fig. 9 Main power cord voltage label

⚠ CAUTION

Prior to plugging in and starting up the case.

Be certain that the voltage of the receptacle you are going to use and the voltage required for the case match. Failure to do so may result in case/system damage.

⚠ CAUTION

Be certain that all electrical connections are compliant with local codes.

⚠ DANGER

CAUTION, RISK OF ELECTRIC SHOCK. If the cord or plug becomes damaged, replace only with a cord and plug of the same type.

REFRIGERATION & COMPRESSOR COMPARTMENT

A bottom mounted compressor compartment can be accessed by removing the front or rear panel (Fig. 10). See Appendices

for full instructions on how to program the Carel electronic controller.

Access locations and/or R-290 compartment configurations will vary based on case design. See *technical references on pages 6-11 for access locations and page 17 for a compressor compartment diagram.*

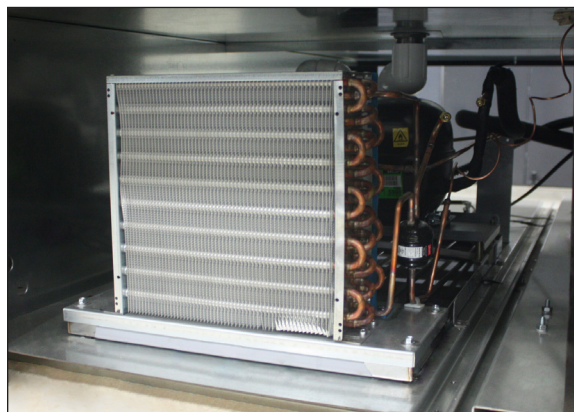


Fig. 10 Compressor compartment

⚠ CAUTION

Be sure to remove all styrofoam shipping blocks from piping and refrigerant lines. Failure to do so may result in case damage.

⚠ DANGER

When carrying out maintenance tasks inside the refrigerated case or compressor compartment, it is essential to disconnect the power source to the case from the main power.

Pressure Switch & Power Supply

1. After the main power cord (Fig. 9) located at the base panel of the case is plugged in and the power switch (Fig. 11) flipped to ON the case should begin normal operations.
2. After establishing power the light control switch (Fig. 12) (if applicable) located in the upper front interior cornice can be flipped to the ON position. The case should now be fully operational and all lights functioning when in the ON position (if applicable).

⚠ DANGER

ALWAYS CHECK THE THERMOSTAT CURRENT RATING. It may have a limited current, as low as 2A. If necessary protect digital thermostat contacts with a contractor.

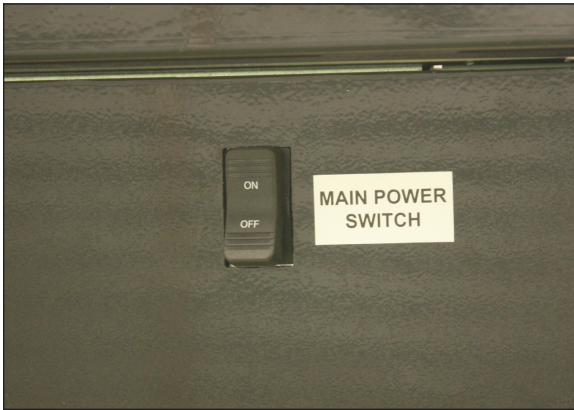
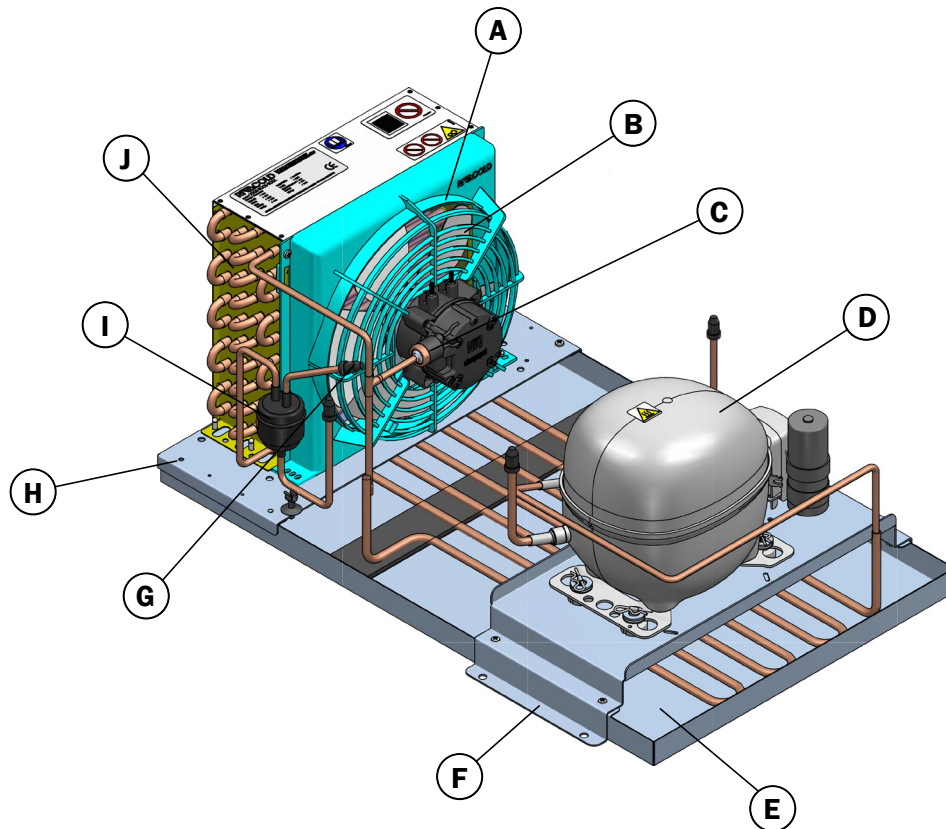


Fig. 11 Lower panel power switch



Fig. 12 Upper cornice light switch

R-290 COMPRESSOR COMPARTMENT DIAGRAM



A	Fan Guard	E	Dissipater Pan	I	Filter Dryer
B	Condenser Fan	F	Compressor Bracket	J	Condenser Coil
C	Pressure Switch				
D	Compressor	G	High Side Access		
		H	Condenser Bracket		

Note: Access locations and/or compartment configurations will vary based on case design.

GENERAL LIGHTING INFORMATION

Hillphoenix cases are equipped with LED luminaires and feature specially designed light reflectors in the cornice to improve the illumination of products. LED power supplies operate both the cornice and shelf lights and are located above the cornice reflectors.

The lighting system has an ON/OFF switch located in the raceway, power box or at the inside back of the case. Once a case has been properly positioned in the store the lights may be turned on to verify that they are connected and functioning properly.

To ensure peak performance, it is advisable to run the lighting systems only when the store climate control is on and case refrigeration is started. **Note: It is highly recommended that the ambient store temperature not exceed 80°F.**



DANGER

SHOCK HAZARD

Always disconnect power to case when cleaning, servicing or configuring components of the lighting system. Failure to do so may result in serious injury or death.



WARNING

Using improper DC power supplies may damage the luminaires, resulting in sub-standard operation and increased chances of safety issues/injury.



WARNING

Never replace a 24V DC power supply with a T8 or T5 ballast of any kind! Ballasts use alternating current (AC) instead of direct current (DC) and operate at a much higher voltage than is used by this LED system. Doing so will damage the LED system and increases the chance of safety issues/injury.

LED DRIVER/POWER SUPPLY ACCESS

To gain access to the LED driver or power supplies remove the raceway cover (Fig. 13). The power supply can be located at the customer left side of the case.

REPLACING LED LIGHTS

Once store power is connected the Clearvoyant LED system should operate without the need for any significant maintenance for several years. Should a power supply need to be removed and/or replaced, turn off the power to the case before proceeding. Be certain to replace the power supply with genuine Hillphoenix parts or a comparable UL-listed Class-2 rated regulated 24V DC power supply with 100W output capacity.

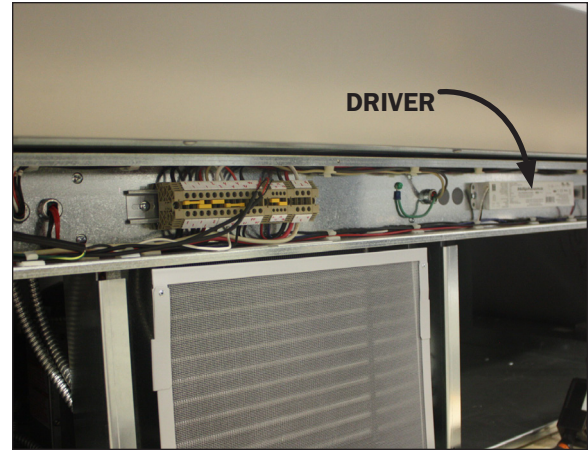


Fig. 13 Clear view of the driver

LED LUMINAIRES

Removing LED luminaires:

1. Unplug the luminaire (Fig. 14).

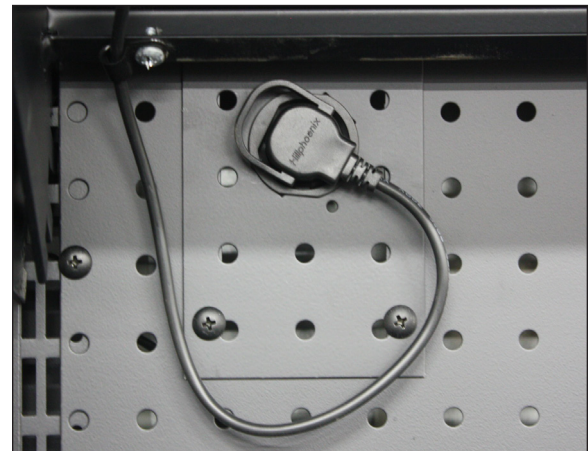


Fig. 14 LED light power cord

2. Remove the screws from the light clamps (Fig. 15) while keeping hold of the light. Once the screws are removed the light rod will come away from the case with the clamps still holding to the light.
3. Remove the closed clamps and inner rings (Fig. 16) by unclipping the clamp ends located above the screw opening. This will release the grip around the inner ring (Fig. 17) and allow for the two pieces to be separated from one another.
4. Carefully remove the inner rings from around the light rod.

⚠ CAUTION

Too much tension on the inner clamp rings while removing them from an LED light rod may cause breakage. Use only enough tension for removal.

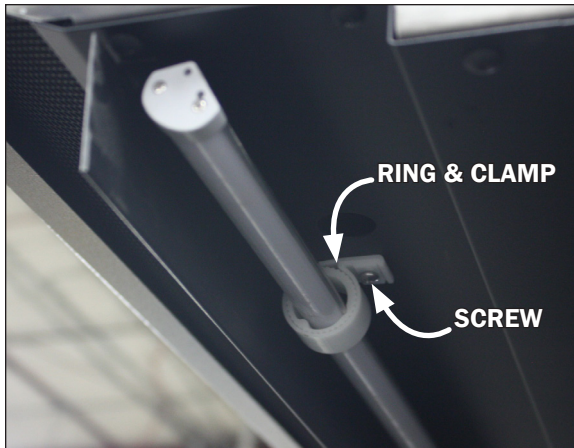


Fig. 15 LED light & ring/clamp



Fig. 18 LED ring and clamp

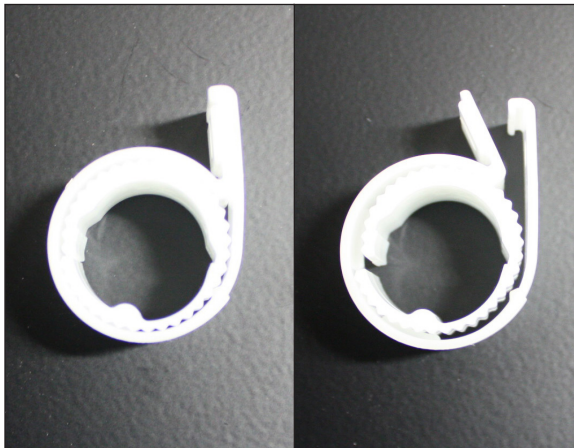


Fig. 16 Closed clamp

Fig. 17 Open clamp

Re-installing LED luminaires:

1. Place a ring (Fig. 18) around each end of the light rod and rotate until both edges of the rod line-up and snap ahold to the ridges in the ring.
2. Slide a clamp (Fig. 18) over each ring and close them tight around the rings by clipping together the clamp ends located above the screw opening.
3. Line-up the closed clamps (Fig. 16) and light rod with the existing screw holes on the case and re-attach.
4. Rotate the light rod into desired position after the clamps are firmly re-attached.

PRE-POWER CHECKLIST

Before powering-up the case, be certain that all of the steps listed below have been completed to ensure proper case functionality, safety and compliance with warranty terms.

- ☐ **Have you thoroughly examined the case for shipping damage? (see pg. 12)**
- ☐ **Have you checked to ensure the case is horizontally level? (see pg. 13)**
- ☐ **Have you checked all exposed refrigeration lines to ensure that they are not kinked, dented or rubbing together and have installed the compressor compartment access panel? (see pg. 16)**
- ☐ **Have you checked and verified the voltage of the receptacle you are going to use for power and the voltage required for the case match? (see pg. 16)**
- ☐ **Have you verified the display case switch is in the OFF position prior to plugging in to the main power source? (see pg. 16)**
- ☐ **Have you reviewed safety warning labels and verified all are present and in good condition?**

After powering-up the case, be certain that all of the steps listed below have been completed to ensure proper case functionality, safety and compliance with warranty terms.

- 1. Check case temperature and adjust controller as needed. All display case connections comply with the information/instructions?**
- 2. Store the installation manual in the vicinity of the display case itself to where it can be accessed and consulted by all members of staff involved in the use of the refrigerator display case.**
- 3. Before placing food in the display case, allow the case to operate for approximately two (2) hours and ensure the case is at the proper temp before loading.**

AIRFLOW & PRODUCT LOAD

Hillphoenix cases provide maximum product capacity within the refrigerated air envelope. Please keep products within the appropriate load limit.

It is important that you do not overload the food product display so that it impinges on the airflow pattern (Fig. 19 & 20). Overloading will cause malfunction and the loss of proper temperature levels. The designed load limit is 3" above the deck for critical temperature products and 6" for non-critical temperature products. *For full technical reference drawings with load limit lines, refer to pages 6-11.*

See (Fig. 21) for the location of the air discharge on the step risers with perforated fronts.

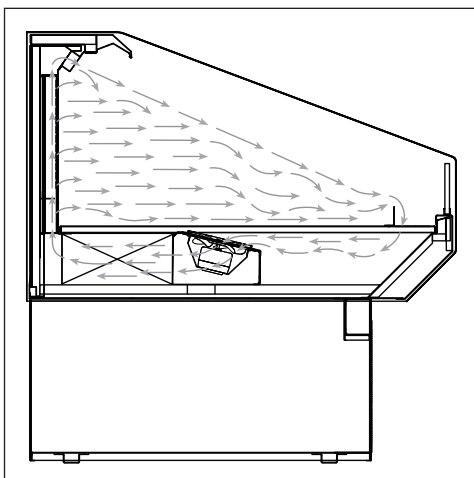


Fig. 19 Airflow pattern (CLOSED)

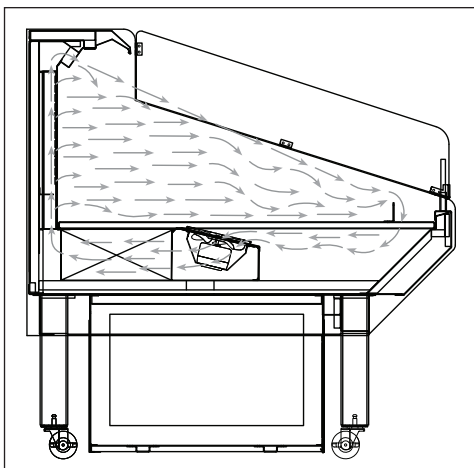


Fig. 20 Airflow pattern (OPEN)

! WARNING

Always keep product within the designated air curtain. Failure to do so may result in case malfunction and product losing proper temperature, resulting in sub-standard operation and increased chances of food contamination.

! CAUTION

Proceed to the loading only once the display case has reached the proper temperature setting.



Fig. 21 Step riser perforated front air discharge

DEFROST

Cases are equipped with Temperature Terminated Off-Time defrost.

The defrost cycle is very important in that it ensures correct operation of the case. It is activated and controlled by the thermostat which temporarily stops the condensing unit, allowing the evaporator to shed the build-up of ice. The controllers synchronize the defrost between condensing units via the auxiliary ports.

! DANGER

FLAMMABLE

DANGER - Risk of Fire or Explosion. Flammable Refrigerant Used. Do Not Use Mechanical Devices To Defrost Refrigerator. Do Not Puncture Refrigerant Tubing.



CASE CLEANING

CASE CLEANING

A periodic cleaning schedule should be established to maintain proper sanitation, insure maximum operating efficiency, and avoid the corrosive action of food fluids on metal parts that are left on for long periods of time. We recommend cleaning once a week. Further suggestions for case cleaning include the following:

- To avoid shock hazard, be sure all electrical power is turned off before cleaning. In some installations, more than one disconnect switch may have to be turned off to completely de-energize the case.
- All surfaces pitch downward to a deep-drawn drain trough, funneling liquids to the center of the case where the waste outlet is located for easy access. Check the waste outlet to insure it is not clogged before starting the cleaning process and avoid introducing water faster than the case drain can carry it away.
- To clean the LED luminaires, shut off the lights in the case, then wipe the luminaires down with a soft, damp cloth. Avoid using harsh or abrasive cleaners as they may damage the lights. Be certain that the luminaires are completely dry before re-energizing.
- Clean from top to bottom when cleaning the display case to avoid cross contamination.
- If any potentially harmful cleaners are used, be certain to provide a temporary separator (e.g., cardboard, plastic wrap, etc.) between those cases that are being cleaned and those that may still contain product.
- Avoid spraying any cleaning liquids directly on the electrical connections.
- Allow cases to be turned off long enough to clean any frost or ice from coil and pans.
- Remove toekick and clean underneath the case with a broom and a long-handled mop. Use warm water and a disinfecting cleaning solution when cleaning underneath the cases.



DANGER

SHOCK HAZARD

Always disconnect power to case when servicing or cleaning. Failure to do so may result in serious injury or death.



CAUTION

Use specific products for disinfection and cleaning: use soft, non-abrasive sponges and rags!

Fans and Pressure Plate

1. Disconnect power to the case and wait for fans to come to a complete stand-still.

2. To reach the fans and pressure plate first remove the base deck with help of the pre-drilled access lift supplied (Fig. 22). **Note: It is recommended that more than one person lift the deck.**

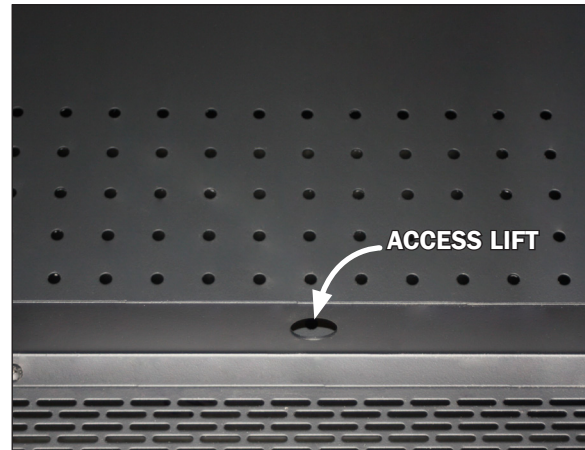


Fig. 22 Base deck pre-drilled access lift

3. To access the underside of the fans first remove the screws on the top ends and front sill of the pressure plate cover (Fig. 23). Lift the pressure plate by use of the provided lift handles (Fig. 23). There are hinges shared between the pressure plate and coil covers. **Note: It is recommended that more than one person lift the pressure plate.** The topside of pressure plate will rest against the topside of the coil cover, exposing the underside of the pressure plate and fans (Fig. 23).
4. Clean as necessary. Use a spray bottle filled with an approved mild detergent and warm water.
5. Be sure to move the pressure plate back to its original position after cleaning and/or inspection is complete.



CAUTION

Only lift the pressure plate and/or coil cover for a qualified inspector or a trained service provider. Failure to do so may result in damage to the refrigerant system.



DANGER

When carrying out cleaning work or maintenance on the condensing unit it is essential to disconnect the machine and all its accessories from the main power.



DANGER

DANGER OF BURNS

Be careful of the elements inside the condensate dissipator pan: this operates at high temperature.

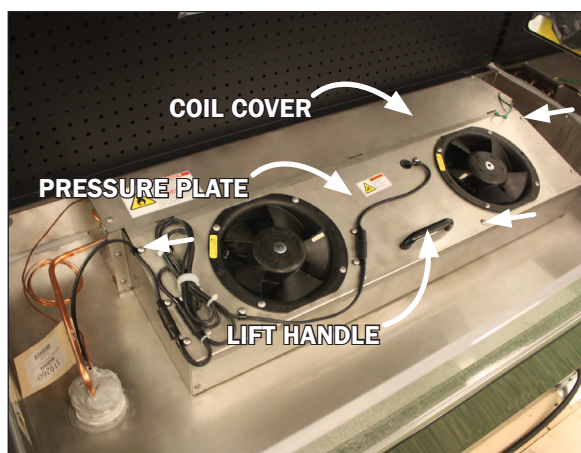


Fig. 23 Pressure plate, coil cover, screws and lift handle

Coil Inspection

1. Disconnect power to the case and wait for fans to come to a complete stand-still.
2. Remove the top two screws at both ends of the coil cover (Fig. 23), as well as the screws from the top ends and front sill of the pressure plate cover (Fig. 23). **Be sure to save the removed screws for reassembly.**
3. Carefully, without bending the sheet metal cover, with the use of the handles provided, gently slide the coil cover with the pressure plate assembly forward to expose the evaporator coil.

WARNING

Exercise extreme caution when working in a case with the pressure plate removed. The coil contains many sharp edges that can result in severe cuts to the hands and arms.

WARNING

Exercise extreme caution when working in a case with the coil cover removed. The coil contains many sharp edges that can result in severe cuts to the hands and arms.

4. Clean as necessary. Use a spray bottle filled with an approved mild detergent and warm water. **This location should be accessed by qualified personnel only.**
5. Be sure to screw the coil cover back to its original position after cleaning and/or inspection is complete.

CAUTION

Always be sure to move the pressure plate and screw the coil cover back to their original position after the cleaning and/or inspection is complete. Failure to do so may result in damage to the refrigerant system.

⚠ DANGER

FLAMMABLE

DANGER - Risk of Fire or Explosion. Flammable Refrigerant Used. Do Not Use Mechanical Devices To Defrost Refrigerator. Do Not Puncture Refrigerant Tubing.



Condenser Air Intake Filter

Clean and remove the debris from the condenser air intake filter monthly. If filter is not cleaned regularly the head pressure will rise and cut all power off to the compressor by means of the pressure switch.

The filter will either have a slide-out screen or pull-off magnetic application. **Note: Prior to cleaning, be sure to remove the filter from the case completely and move to a distance far enough away that no debris will come in to contact with the case or the product inside.** Both can be cleaned with an air hose and/or rinsed with water. Be sure to remove all debris and wait until completely dry before placing back on to the case. (Top mounted compressors will not have an air intake filter.)

⚠ CAUTION

Be sure to clean the condenser air intake filter monthly. Failure to do so may result in loss of normal compressor functions and case damage.

Cleaning Condensate Dissipator Pan

Inspect the dissipator pan (Fig. 24) at least once every six months. Ensure you disconnect the electrical power supply and make sure you DO NOT touch the elements as they reach high temperatures (necessary for evaporation inside the pan).

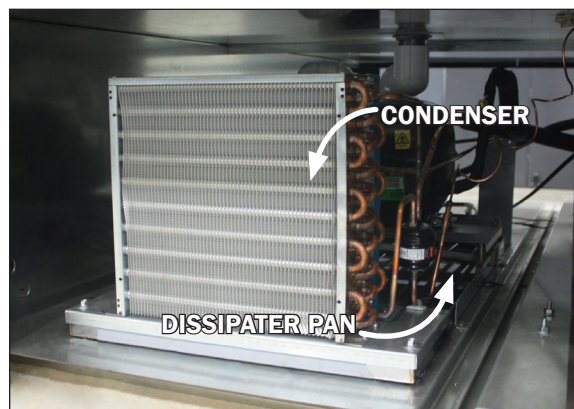


Fig. 24 Cleaning the dissipator pan and condensing unit

CASE CLEANING

Cleaning Condenser

The condensers used on the condensing units gather dust and dirt and must be cleaned regularly. Under normal working conditions this task must be executed at least once a month using a soft-bristled brush and a vacuum cleaner. A dirty condenser will reduce the display case performance: it will also result in increased energy consumption. (Fig. 25)

UNSCHEDULED CASE MAINTENANCE

Unscheduled maintenance concerns all those tasks that cannot normally be carried out by the routine user as specified. Such tasks require qualified personnel with specific technical skills (e.g. refrigeration system specialists, electricians etc.) and must be carried out at least once a year. See the scheduled maintenance table for a list of the main tasks (Fig. 25).

If inspection reveals any rust, cracks and etc...it will be necessary to carry out repairs and/or replacement of parts so that the case meets code and the display case is in prime operating condition.

To enhance safety, it is recommended that you always seek the advice of a specialized technician before carrying out any repair work.

PARTS SUBJECT TO WEAR & SPARE PARTS

Most spare parts carry clear, complete ID information. It is important that the refrigerated case parts be replaced by analogous parts of equivalent safety and quality: to order spare parts please contact Hillphoenix, stating the case model and serial number, found in this manual or on the case ID plate, and provide a description of the component and the desired quantity. Refer to the Parts section in the back of the manual for parts ordering and to identify parts that may need to be replaced.



CAUTION

Do not pressure wash equipment as damage to electrical components may result.

SCHEDULED MAINTENANCE TABLE

Maintenance	Weekly	Monthly	Half Yearly	Yearly
Cleaning case	✓			
Cleaning gas condenser		✓		
Case visual check	✓			
Safety labels visual check	✓			
Check electric system				✓
Check water drainage system.			✓	
Check refrigeration system				✓
General inspection				✓

Fig. 25 Recommended cleaning schedule

INSTRUCTIONS FOR PERSONNEL

In the Event of General Emergency

Immediately inform those in the vicinity of the perceived danger, gesticulating if necessary; cut the electrical power to the cabinet.

In the Event of Fire

In the event that the refrigerated case catches fire or is involved in a fire it is possible to use an extinguisher with a powder-type or CO2 extinguishing agent.

Resetting the Case

To restore normal operation it is necessary to eliminate all the causes of the emergency situation; if necessary repair or replace damaged parts.

Note: If safety devices are tripped it will be necessary to identify the cause before continuing work.

CAUTION

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

CAUTION

R-290 flammable refrigerant in use. Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation operating and maintenance instructions thoroughly before installing or servicing this equipment.

DANGER**FLAMMABLE**

DANGER - Risk of Fire or Explosion. Flammable Refrigerant Used. Do Not Use Mechanical Devices To Defrost Refrigerator. Do Not Puncture Refrigerant Tubing.



TABLE OF FAILURES AND SHOOTING

PROBLEM	POSSIBLE CAUSE	SOLUTION
The refrigerated cabinet does not work.	1) the mains circuit breaker is set to OFF; 2) the power line between refrigerated cabinet and power socket is faulty; 3) the switch on the refrigerated cabinet control panel is not switched on.	1) turn the mains power on; 2) make sure the plug is inserted properly in the socket; 3) turn the power switch on the refrigerated cabinet panel to ON.
The refrigerated cabinet does not cool enough.	1) the temperature thermostat is adjusted incorrectly; 2) the refrigerated cabinet has been filled too much 3) the condensing unit is clogged with dust 4) the evaporator is covered in ice	1) reprogram the temperature thermostat; 2) remove goods and observe the maximum load level; 3) clean the condensing unit with a soft-bristled brush and vacuum cleaner 4) carry out a defrost cycle.
The refrigerated cabinet cools too much.	1) the temperature thermostat is adjusted incorrectly.	1) reprogram the temperature thermostat;
The refrigerated cabinet runs continuously.	1) the temperature thermostat is adjusted incorrectly; 2) the refrigerated cabinet has been filled too much and is preventing correct air circulation.	1) reprogram the temperature thermostat; 2) remove goods and observe the maximum load level.

FAILURES AND SHOOTING

Failures

In the event of a failure of mechanical/electrical/refrigeration parts the initial safety conditions must be restored immediately by replacing or repairing such faulty parts.

SAFETY DEVICES



WARNING

It is absolutely forbidden for the user to tamper with safety devices. Before using the refrigerated case check that mechanical safety covers are properly in place. Any tampering shall render the warranty null and void and exonerate Hillphoenix from any liability with regard to users of the refrigerated case.

Only maintenance personnel may carry out maintenance tasks involving safety devices. These tasks are listed below.

SAFETY DEVICE	SCOPE OF INTERVENTION	ACTION
Incorporated over-pressure cut-out	On incorporated condenser unit compressor	Cuts the electrical power of the compressor if the pressure of the refrigerant rises above the safety limits.
Fixed cover on electrical control panel. Remove only with aid of tools	Electrical control panel	Prevents access to live parts. Electrical danger warning sign applied (see "DESCRIPTION OF DANGERS AND RISKS RESIDUAL")
Fixed safety gratings. Remove only with aid of tools	On evaporator fans.	Prevents access to fans when they are running or slowing down to a stop.

DESCRIPTION OF DANGERS AND RISKS RESIDUAL

Residual Dangers

Dangers that have not been reduced/eliminated with the safety measures adopted on the refrigerated case can nevertheless be reduced/eliminated as long as users apply proper managerial practices. Users must:

- ☐ Ensure that all safety warning and labels are always in good condition; inspect them periodically and have them replaced whenever necessary.
- ☐ Do not install any spare parts that are not identical to the originals or of equivalent performance.
- ☐ Do not carry out any modifications or structural work without approval from Hillphoenix or a qualified field service technician.
- ☐ Should the refrigerated case be dented, inspect the structure visually or have qualified personnel carry out an inspection.

After a long period of disuse have a qualified field service technician carry out an inspection of the case to check that it is in good condition and working properly.

Residual Risks

While the refrigerated case has been designed to ensure maximum safety, there nevertheless remain some residual risks. Hillphoenix has identified the main **dangers and residual risks for users and maintenance personnel** as follows in chart below:

SCHEDULED MAINTENANCE TABLE

DESCRIPTION OF RESIDUAL RISK	CAUSE	SAFETY MEASURES
Danger of falls in area surrounding the cabinet	Presence of: stairs, columns etc. and/or slippery floors and objects and/or work tools	Mark out the relevant zones and highlight them with warning signs and symbols (e.g. yellow/black striped marker tape on stairs etc.) that are visible during both routine use and maintenance.
Danger of objects accidentally falling	Haphazard storage of tools/objects.	Use tool boxes in work areas. Ensure personnel are trained.
Danger of injury to hands, arms, legs and head	During cleaning and maintenance there may be objects or parts of the cabinet protruding from the case itself (e.g. glass covers open during cleaning)	Mark out the work area with appropriate barriers. Always use the recommended personal safety devices.
Risk of refrigerating gas leaks	Accidental damage to pipes	Immediate shutdown of case operation. Disconnect electrical power supply. Contact a service technician.

REFRIGERANT

This piece of equipment uses a R-290 Refrigeration system. This equipment has been clearly marked on the serial tag the type of refrigerant that is being used. There is also a warning labels stating that the unit contains R-290 refrigerant.

No smoking or open flames when servicing this equipment. If needed, use a CO2 or dry=power type fire extinguisher

Only authorized service technician, certified in R-290 system should service this equipment.

MANIFOLD SET

A R-134A manifold set can be used for servicing this equipment.

REFRIGERANT RECOVERY

Follow all national and local regulations for R-290 refrigerant recovery.

LEAKING CHECKING AND REPAIR

Leak check an R-290 system the same way you would an R-134a or R-404A system with the following exceptions.

1. Do not use a Halid leak detector on a R-290 system.
2. Electronic leak detector must be designated specifically for combustibile gas.

Use of a bubble solution or an ultrasonic leak detector are acceptable.

When repairing a leak, it is recommended using oxygen free dry nitrogen with a trace gas not exceeding 200PSI.

When accessing an R-290 system, proper charge is to be weighed into the system and the system is to be leak checked afterwards.

The R-290 equipment must have red process tubes and other devices through which the refrigerant is serviced, such as any service port. This color marking must remain on the equipment. If marking is removed, it must be replace and extend at least 2.5 centimeters (1") from the compressor.

CAUTION

Component parts shall be replaced with like components. Service work shall be done by factory authorized service personnel, so as to minimize the risk of possible ignition due to incorrect parts or improper service.

CHARGING

Follow the charge amount specified on the data tag. It is recommended to use the shortest hoses possible to prevent under-charging.

- Ensure the system is sealed and leak checked
- Evacuate system to a minimum 500 micron
- Weigh in correct charge
- Leak check the system again
- Bleed the refrigerant from the high side hose to the low side hose
- Disconnect the hoses
- Remove line taps

DANGER

FLAMMABLE

DANGER - Risk of Fire or Explosion. Flammable Refrigerant Used. Do Not Use Mechanical Devices To Defrost Refrigerator. Do Not Puncture Refrigerant Tubing.



CAUTION

It is highly recommended that a technician servicing a case with HC refrigerant is aware of safety considerations and maintenance procedures on how to safely handle flammable refrigerants.

Hillphoenix[®]

a **DOVER** company

Contact the Service Parts Department at:

1-844-HPX-PART (1-844-479-7278)

or

dfr-ia-parts@doverfoodretail.com

Provide the following information about the part you are ordering:

- **Model number and serial number*** of the case for which the part is intended.
- **Length of the part** (if applicable).
- **Color of part** (if painted) or color of polymer part.
- **Whether part is for left or right-hand application.**
- **Quantity**

***Data tag is located on the left end exterior panel or top interior of the case.**

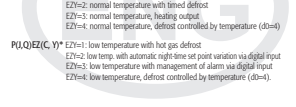
If the parts are to be returned for credit, contact the Parts Department. Do not send parts without authorization.

A1	Wiring Information
B1-B2	Carel Operating Instructions
C1	Sporlan Pressure-Temperature Chart (R290)
D1-D6	Parts List

A1: WIRING DIAGRAM

TBD

EASY (PJEZ* and PQEZ*)



B2: CAREL OPERATING INSTRUCTIONS

ITA Visualizzazione e funzioni				
Durante il normale funzionamento il controllo visualizza a display il valore della sonda impostata con il parametro H (+/-) sonda ambiente di default, +/- seconda sonda (se presente), tra cui il display appaiono i LED che indicano l'attivazione delle funzioni del controllo (vedi Tab. 1), mentre i test permettono di attivare/disattivare alcune funzioni (vedi Tab. 2).				
LED e funzioni associate				
icona	funzione	normale funzionamento		start up
	compressore	ON	OFF	blank
	ventilatore	ON	OFF	blank
	defrost	ON	OFF	blank
	uscita access	ON	OFF	blank
	allarme	ON	OFF	blank
	RTC presente e abilitato, ed è stata impostata almeno 1 fascia oraria	ON	OFF	blank

Tabella attivazione funzioni tramite i tasti - mod. S, X, Y, C				
tasto				
	pressione del tasto	pressione combinata	start up	
	più di 3 s altera stato ON/OFF	Premiti insieme attivo/disattivo continuo		
	più di 3 s attiva/disattiva defrost	Premiti insieme attivo/disattivo continuo		
	1 s: visualizza/permette di impostare set point - più di 3 s: accesso paramenti (intersezione password "22")	-		
	1 s: visualizza/permette di impostare set point - più di 3 s: accesso paramenti (intersezione password "22")	-		

Tabella funzioni tasti - variante mod. M				
tasto				
	selezione rapida sonda visualizzata	Premito insieme a "set" attiva procedura RESET parametri	start up	
	selezione rapida sonda visualizzata	Premito insieme a "set" attiva procedura RESET parametri		

Impostazioni del set point (valore di temperatura desiderato)

- premere per 1 s SET, dopo alcuni istanti il valore impostato lampeggia;
- aumentare o diminuire tale valore con UP o DOWN;
- premere SET per confermare il nuovo valore.

ON/OFF dello strumento

Premere per più di 3 s UP in questa condizione gli algoritmi di regolazione e defrost sono disabilitati e lo strumento alterna la visualizzazione a display tra il messaggio "OFF" e quella della temperatura della sonda impostata.

Sbrinatorio manuale (solo per mod. S, X, Y e C)

Premere per più di 3 s DOWN (si attiva solo se sussistono le condizioni di temperatura).

Ciclo continuo (solo per mod. S, X, Y e C)

Premere contemporaneamente per più di 3 s UP o DOWN.

Selezione rapida sonda visualizzata (solo per mod. M)

Premere rapidamente DOWN per selezionare la sonda da visualizzare temporaneamente.

Accesso e modifica parametri tipo F (frequenti) e tipo C (configurazione)

- premere SET per 3 s (sul display comparirà "P5");
- per accedere al menu parametri di tipo F e digitare la password "22" con UP/DOWN;
- per accedere solo ai menu parametri F premere SET (senza digitare la password);
- navigare all'interno dei menu parametri premendo UP/DOWN;
- per visualizzare/modificare i valori dei parametri visualizzati premere SET, quindi UP/DOWN ed infine SET per confermare la modifica (si ritorna così al menu dei parametri).

Per salvare definitivamente tutti i valori modificati ed uscire dal menu parametri premere SET per 3 s.

Se uscire dal menu senza salvare i valori modificati (scada per time out) non preme alcun tasto per almeno 60 s.

Normative di sicurezza

conforme alle Normative europee in materia. Precauzioni d'installazione:

- 1. cavi da collegamento devono garantire l'isolamento fino a 90 °C;
- 2. per la versione 12 Vac utilizzare trasformatori Classe II. Per i modelli delle normative EN 61000-4-4, EN 61000-4-5, EN 61000-4-11, EN 61000-4-6, EN 61000-4-7, il trasformatore deve essere uno dei modelli indicati (vedi Lista Prezzi CAREL).
- 3. per la versione 12 Vac, non essendo possibile garantire il doppio isolamento tra i condotti di alimentazione e le uscite rete, si raccomanda di utilizzare cavi schermati ad alta resistenza in bassissima tensione di sicurezza (fino a 42 V nominali di valore efficace);
- 4. prevedere almeno 10 mm di distanza tra il contenitore e parti conduttive vicine;
- 5. collegamenti degli impianti elettrici e analoghi riferenti a 30 m di distanza; adottare le adeguate misure di separazione dei cavi per il rispetto delle normative suddette.

Bloccare bene i cavi di connessione delle uscite per evitare contatti con parti in bassissima tensione di sicurezza.

Certificazioni solo per PGEZ

Applicazioni con refrigeranti infiammabili: IEC/EN UL 60335-2-24 (clausole 22.109, 22.110) - IEC/EN UL 60335-2-49 (clausole 22.116, 22.117) - IEC/EN UL 60335-2-89 (clausole 22.108, 22.109, 22.110, 22.111, 22.112, 22.113, 22.114, 22.115, 22.116, 22.117, 22.118, 22.119, 22.120, 22.121, 22.122, 22.123, 22.124, 22.125, 22.126, 22.127, 22.128, 22.129, 22.130, 22.131, 22.132, 22.133, 22.134, 22.135, 22.136, 22.137, 22.138, 22.139, 22.140, 22.141, 22.142, 22.143, 22.144, 22.145, 22.146, 22.147, 22.148, 22.149, 22.150, 22.151, 22.152, 22.153, 22.154, 22.155, 22.156, 22.157, 22.158, 22.159, 22.160, 22.161, 22.162, 22.163, 22.164, 22.165, 22.166, 22.167, 22.168, 22.169, 22.170, 22.171, 22.172, 22.173, 22.174, 22.175, 22.176, 22.177, 22.178, 22.179, 22.180, 22.181, 22.182, 22.183, 22.184, 22.185, 22.186, 22.187, 22.188, 22.189, 22.190, 22.191, 22.192, 22.193, 22.194, 22.195, 22.196, 22.197, 22.198, 22.199, 22.200, 22.201, 22.202, 22.203, 22.204, 22.205, 22.206, 22.207, 22.208, 22.209, 22.210, 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22.961, 22.962, 22.963, 22.964, 22.965, 22.966, 22.967, 22.968, 22.969, 22.970, 22.971, 22.972, 22.973, 22.974, 22.975, 22.976, 22.977, 22.978, 22.979, 22.980, 22.981, 22.982, 22.983, 22.984, 22.985, 22.986, 22.987, 22.988, 22.989, 22.990, 22.991, 22.992, 22.993, 22.994, 22.995, 22.996, 22.997, 22.998, 22.999, 23.000, 23.001, 23.002, 23.003, 23.004, 23.005, 23.006, 23.007, 23.008, 23.009, 23.010, 23.011, 23.012, 23.013, 23.014, 23.015, 23.016, 23.017, 23.018, 23.019, 23.020, 23.021, 23.022, 23.023, 23.024, 23.025, 23.026, 23.027, 23.028, 23.029, 23.030, 23.031, 23.032, 23.033, 23.034, 23.035, 23.036, 23.037, 23.038, 23.039, 23.040, 23.041, 23.042, 23.043, 23.044, 23.045, 23.046, 23.047, 23.048, 23.049, 23.050, 23.051, 23.052, 23.053, 23.054, 23.055, 23.056, 23.057, 23.058, 23.059, 23.060, 23.061, 23.062, 23.063, 23.064, 23.065, 23.066, 23.067, 23.068, 23.069, 23.070, 23.071, 23.072, 23.073, 23.074, 23.075, 23.076, 23.077, 23.078, 23.079, 23.080, 23.081, 23.082, 23.083, 23.084, 23.085, 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C1: SPORLAN PRESSURE-TEMPERATURE CHART

TEMPERATURE - PRESSURE CHART
NATURAL REFRIGERANTS



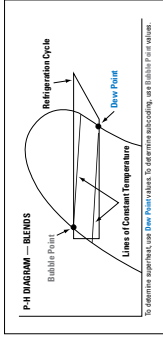
At Sea Level, psig

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REFRIGERANT TYPE (SAFETY CLASS)				REFRIGERANT (SPORLAN LETTER CODE)				REFRIGERANT TYPE (SAFETY CLASS)				REFRIGERANT (SPORLAN LETTER CODE)				REFRIGERANT TYPE (SAFETY CLASS)				REFRIGERANT (SPORLAN LETTER CODE)			
TEMP.				TEMP.				TEMP.				TEMP.				TEMP.				TEMP.			
°F				°C				°F				°C				°F				°C			
HC (A3)				HC (A3)				HC (A3)				HC (A3)				HC (A3)				HC (A3)			
290(O)				441A				290(O)				441A				290(O)				441A			
170(K)				600a(U)				170(K)				600a(U)				170(K)				600a(U)			
AMMONIA (B2L)				717(A)				AMMONIA (B2L)				AMMONIA (B2L)				AMMONIA (B2L)				AMMONIA (B2L)			
CO2 (A1)				744				CO2 (A1)				CO2 (A1)				CO2 (A1)				CO2 (A1)			
744				744				744				744				744				744			
-50	-45.6	78.9	4.3	21.1	23.6	14.3	103.4	-50	-45.6	78.9	4.3	21.1	23.6	14.3	103.4	-50	-45.6	78.9	4.3	21.1	23.6	14.3	103.4
-45	-42.8	88.1	0.9	19.7	22.6	11.7	116.6	-45	-42.8	88.1	0.9	19.7	22.6	11.7	116.6	-45	-42.8	88.1	0.9	19.7	22.6	11.7	116.6
-40	-40.0	98.1	1.4	18.1	21.4	8.8	131.0	-40	-40.0	98.1	1.4	18.1	21.4	8.8	131.0	-40	-40.0	98.1	1.4	18.1	21.4	8.8	131.0
-35	-37.2	108.7	3.4	16.3	20.2	5.4	146.5	-35	-37.2	108.7	3.4	16.3	20.2	5.4	146.5	-35	-37.2	108.7	3.4	16.3	20.2	5.4	146.5
-30	-34.4	120.0	5.7	14.3	18.8	1.6	163.1	-30	-34.4	120.0	5.7	14.3	18.8	1.6	163.1	-30	-34.4	120.0	5.7	14.3	18.8	1.6	163.1
-29	-33.9	122.4	6.1	13.8	18.5	0.8	166.6	-29	-33.9	122.4	6.1	13.8	18.5	0.8	166.6	-29	-33.9	122.4	6.1	13.8	18.5	0.8	166.6
-28	-33.3	124.7	6.6	13.4	18.1	0.0	170.1	-28	-33.3	124.7	6.6	13.4	18.1	0.0	170.1	-28	-33.3	124.7	6.6	13.4	18.1	0.0	170.1
-27	-32.8	127.1	7.1	12.9	17.8	0.4	173.7	-27	-32.8	127.1	7.1	12.9	17.8	0.4	173.7	-27	-32.8	127.1	7.1	12.9	17.8	0.4	173.7
-26	-32.2	129.6	7.6	12.5	17.5	0.8	177.3	-26	-32.2	129.6	7.6	12.5	17.5	0.8	177.3	-26	-32.2	129.6	7.6	12.5	17.5	0.8	177.3
-25	-31.7	132.1	8.1	12.0	17.2	1.3	181.0	-25	-31.7	132.1	8.1	12.0	17.2	1.3	181.0	-25	-31.7	132.1	8.1	12.0	17.2	1.3	181.0
-24	-31.1	134.6	8.6	11.5	16.8	1.7	184.8	-24	-31.1	134.6	8.6	11.5	16.8	1.7	184.8	-24	-31.1	134.6	8.6	11.5	16.8	1.7	184.8
-23	-30.6	137.1	9.1	11.0	16.5	2.2	188.5	-23	-30.6	137.1	9.1	11.0	16.5	2.2	188.5	-23	-30.6	137.1	9.1	11.0	16.5	2.2	188.5
-22	-30.0	139.7	9.6	10.5	16.2	2.6	192.4	-22	-30.0	139.7	9.6	10.5	16.2	2.6	192.4	-22	-30.0	139.7	9.6	10.5	16.2	2.6	192.4
-21	-29.4	142.3	10.2	10.0	15.8	3.1	196.3	-21	-29.4	142.3	10.2	10.0	15.8	3.1	196.3	-21	-29.4	142.3	10.2	10.0	15.8	3.1	196.3
-20	-28.9	144.9	10.7	9.5	15.4	3.6	200.2	-20	-28.9	144.9	10.7	9.5	15.4	3.6	200.2	-20	-28.9	144.9	10.7	9.5	15.4	3.6	200.2
-19	-28.3	147.6	11.3	9.0	15.1	4.1	204.2	-19	-28.3	147.6	11.3	9.0	15.1	4.1	204.2	-19	-28.3	147.6	11.3	9.0	15.1	4.1	204.2
-18	-27.8	150.3	11.8	8.4	14.7	4.6	208.3	-18	-27.8	150.3	11.8	8.4	14.7	4.6	208.3	-18	-27.8	150.3	11.8	8.4	14.7	4.6	208.3
-17	-27.2	153.0	12.4	7.9	14.3	5.1	212.4	-17	-27.2	153.0	12.4	7.9	14.3	5.1	212.4	-17	-27.2	153.0	12.4	7.9	14.3	5.1	212.4
-16	-26.7	155.7	13.0	7.3	13.9	5.6	216.5	-16	-26.7	155.7	13.0	7.3	13.9	5.6	216.5	-16	-26.7	155.7	13.0	7.3	13.9	5.6	216.5
-15	-26.1	158.5	13.6	6.7	13.5	6.2	220.8	-15	-26.1	158.5	13.6	6.7	13.5	6.2	220.8	-15	-26.1	158.5	13.6	6.7	13.5	6.2	220.8
-14	-25.6	161.4	14.2	6.1	13.1	6.7	225.0	-14	-25.6	161.4	14.2	6.1	13.1	6.7	225.0	-14	-25.6	161.4	14.2	6.1	13.1	6.7	225.0
-13	-25.0	164.2	14.8	5.5	12.7	7.3	229.4	-13	-25.0	164.2	14.8	5.5	12.7	7.3	229.4	-13	-25.0	164.2	14.8	5.5	12.7	7.3	229.4
-12	-24.4	167.1	15.4	4.9	12.2	7.8	233.8	-12	-24.4	167.1	15.4	4.9	12.2	7.8	233.8	-12	-24.4	167.1	15.4	4.9	12.2	7.8	233.8
-11	-23.9	170.0	16.1	4.3	11.8	8.4	238.2	-11	-23.9	170.0	16.1	4.3	11.8	8.4	238.2	-11	-23.9	170.0	16.1	4.3	11.8	8.4	238.2
-10	-23.3	173.0	16.7	3.7	11.4	9.0	242.7	-10	-23.3	173.0	16.7	3.7	11.4	9.0	242.7	-10	-23.3	173.0	16.7	3.7	11.4	9.0	242.7
-9	-22.8	176.0	17.4	3.0	10.9	9.6	247.3	-9	-22.8	176.0	17.4	3.0	10.9	9.6	247.3	-9	-22.8	176.0	17.4	3.0	10.9	9.6	247.3
-8	-22.2	179.0	18.0	2.4	10.4	10.3	251.9	-8	-22.2	179.0	18.0	2.4	10.4	10.3	251.9	-8	-22.2	179.0	18.0	2.4	10.4	10.3	251.9
-7	-21.7	182.1	18.7	1.7	10.0	10.9	256.6	-7	-21.7	182.1	18.7	1.7	10.0	10.9	256.6	-7	-21.7	182.1	18.7	1.7	10.0	10.9	256.6
-6	-21.1	185.2	19.4	1.0	9.5	11.5	261.3	-6	-21.1	185.2	19.4	1.0	9.5	11.5	261.3	-6	-21.1	185.2	19.4	1.0	9.5	11.5	261.3
-5	-20.6	188.3	20.1	0.3	9.0	12.2	266.1	-5	-20.6	188.3	20.1	0.3	9.0	12.2	266.1	-5	-20.6	188.3	20.1	0.3	9.0	12.2	266.1
-4	-20.0	191.5	20.8	0.2	8.5	12.9	271.0	-4	-20.0	191.5	20.8	0.2	8.5	12.9	271.0	-4	-20.0	191.5	20.8	0.2	8.5	12.9	271.0
-3	-19.4	194.7	21.5	0.6	8.0	13.6	275.9	-3	-19.4	194.7	21.5	0.6	8.0	13.6	275.9	-3	-19.4	194.7	21.5	0.6	8.0	13.6	275.9
-2	-18.9	197.9	22.2	0.9	7.5	14.3	280.9	-2	-18.9	197.9	22.2	0.9	7.5	14.3	280.9	-2	-18.9	197.9	22.2	0.9	7.5	14.3	280.9
-1	-18.3	201.2	22.9	1.3	7.0	15.0	285.9	-1	-18.3	201.2	22.9	1.3	7.0	15.0	285.9	-1	-18.3	201.2	22.9	1.3	7.0	15.0	285.9
0	-17.8	204.5	23.7	1.7	6.4	15.7	291.0	0	-17.8	204.5	23.7	1.7	6.4	15.7	291.0	0	-17.8	204.5	23.7	1.7	6.4	15.7	291.0
1	-17.2	207.9	24.5	2.1	5.9	16.4	296.2	1	-17.2	207.9	24.5	2.1	5.9	16.4	296.2	1	-17.2	207.9	24.5	2.1	5.9	16.4	296.2
2	-16.7	211.3	25.2	2.5	5.3	17.2	301.5	2	-16.7	211.3	25.2	2.5	5.3	17.2	301.5	2	-16.7	211.3	25.2	2.5	5.3	17.2	301.5
3	-16.1	214.7	26.0	2.9	4.8	18.0	306.8	3	-16.1	214.7	26.0	2.9	4.8	18.0	306.8	3	-16.1	214.7	26.0	2.9	4.8	18.0	306.8
4	-15.6	218.2	26.8	3.3	4.2	18.8	312.1	4	-15.6	218.2	26.8	3.3	4.2	18.8	312.1	4	-15.6	218.2	26.8	3.3	4.2	18.8	312.1
5	-15.0	221.7	27.6	3.7	3.6	19.6	317.6	5	-15.0	221.7	27.6	3.7	3.6	19.6	317.6	5	-15.0	221.7	27.6	3.7	3.6	19.6	317.6
6	-14.4	225.2	28.4	4.1	3.0	20.4	323.1	6	-14.4	225.2	28.4	4.1	3.0	20.4	323.1	6	-14.4	225.2	28.4	4.1	3.0	20.4	323.1
7	-13.9	228.8	29.2	4.5	2.4	21.2	328.6	7	-13.9	228.8	29.2	4.5	2.4	21.2	328.6	7	-13.9	228.8	29.2	4.5	2.4	21.2	328.6
8	-13.3	232.4	30.1	5.0	1.8	22.1	334.2	8	-13.3	232.4	30.1	5.0	1.8	22.1	334.2	8	-13.3	232.4	30.1	5.0	1.8	22.1	334.2
9	-12.8	236.0	30.9	5.4	1.2	22.9	339.9	9	-12.8	236.0	30.9	5.4	1.2	22.9	339.9	9	-12.8	236.0	30.9	5.4	1.2	22.9	339.9

To determine Subcooling for 400-Series blends, use Bubble Point in Gray.
To determine Superheat for 400-Series blends, use Dew Point in Blue.

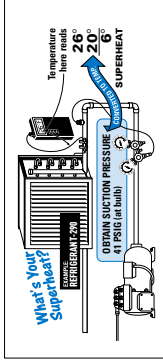
Pressure, psig (pounds per square inch gauge), 80.0
Vacuum, inHg (inches of Mercury), 14.7



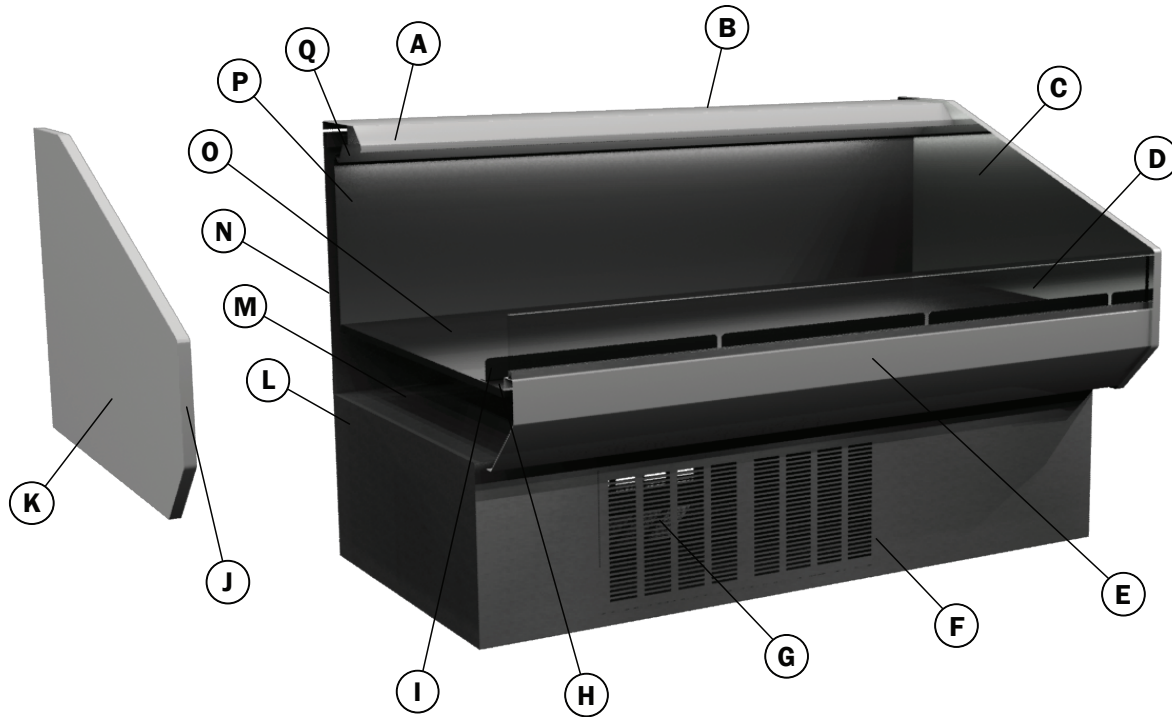
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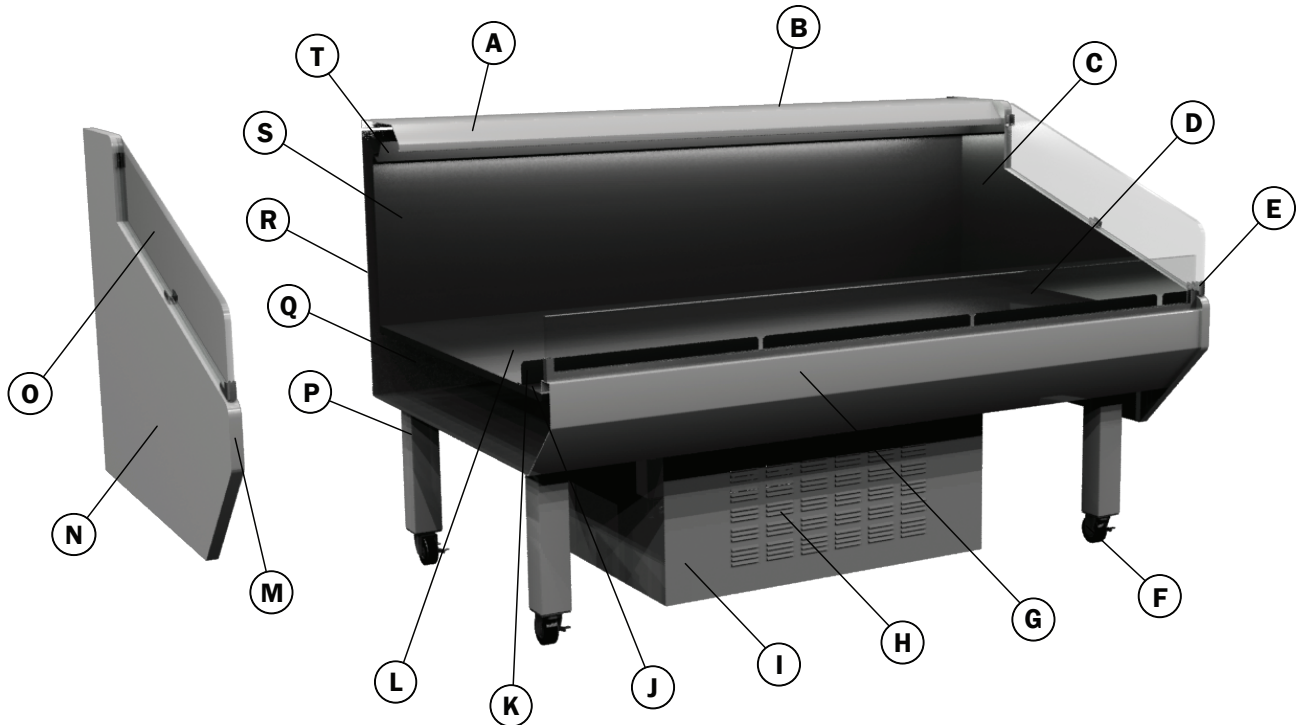


D1: PARTS LIST (HS_46-1/2 H x 46 D_CLOSED_R-290)



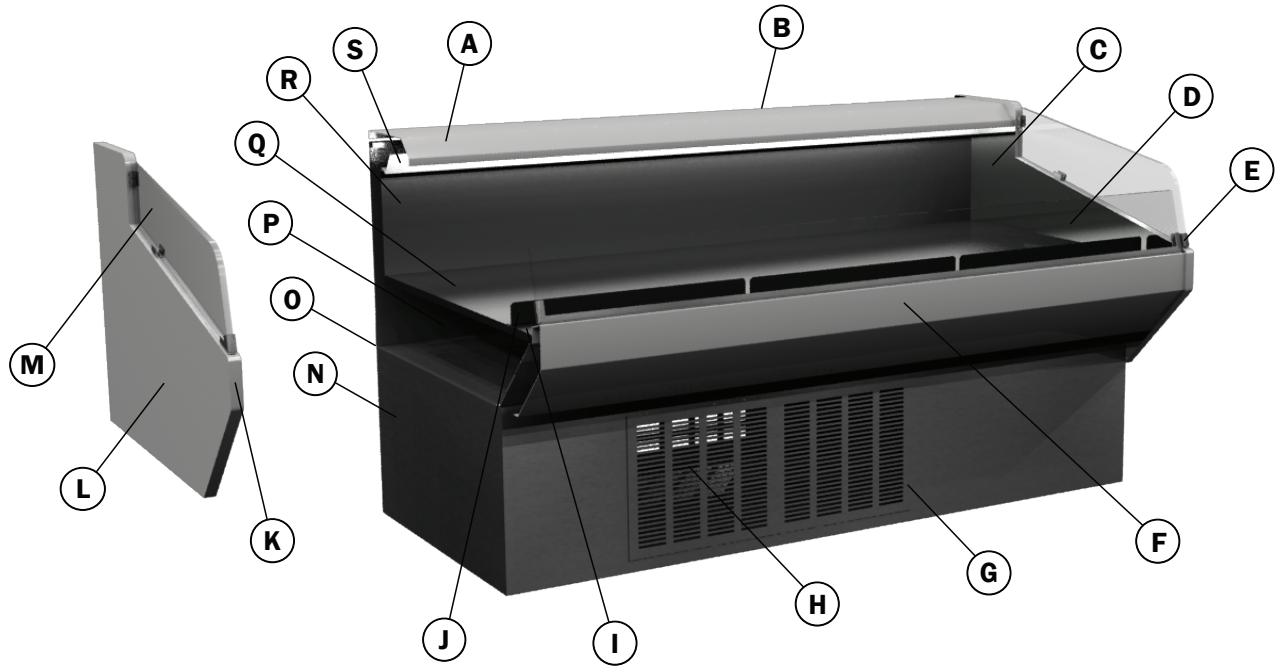
A	Cornice
B	Case Top
C	Interior End Panel
D	Die Board Plex
E	Die Board
F	Front Toekick
G	Condenser Air Intake
H	Air Return
I	Product Stop
J	End Panel Trim
K	End Panel
L	End Toekick
M	Insulated Drain Pan
N	Outside Back
O	Bottom Deck
P	Inside Back
Q	Air Discharge

D2: PARTS LIST (HS_46-1/2 H x 46 D_OPEN_R-290)



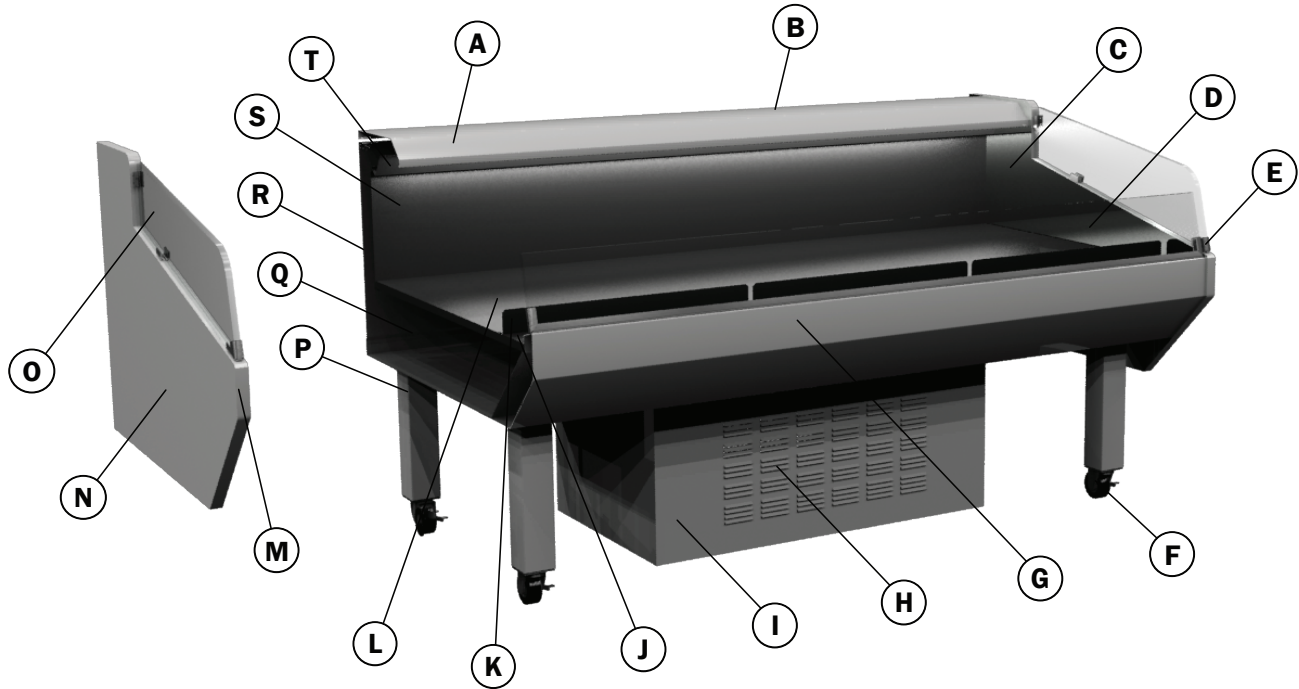
A	Cornice
B	Case Top
C	Interior End Panel
D	Die Board Plex
E	Plex Hardware
F	Caster
G	Die Board
H	Condenser Air Intake
I	Front Toekick
J	Air Return
K	Product Stop
L	Bottom Deck
M	End Panel Trim
N	End Panel
O	End Panel Plex
P	Block Leg Support
Q	Insulated Drain Pan
R	Outside Back
S	Inside Back
T	Air Discharge

D3: PARTS LIST (HS_40 D x 40-11/16 D_CLOSED_R-290)



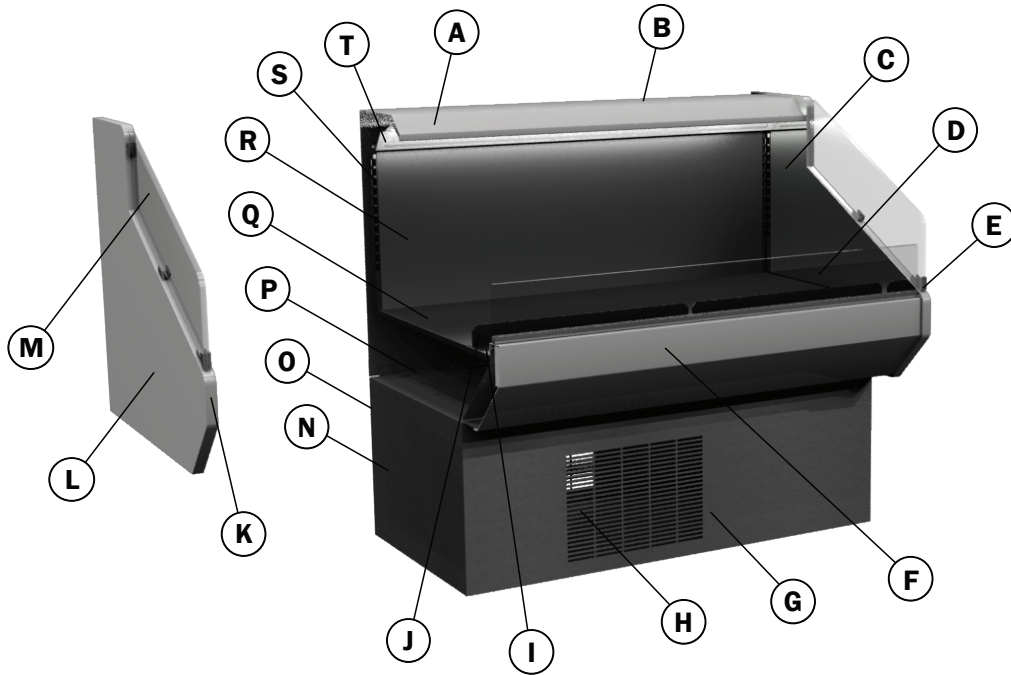
A	Cornice
B	Case Top
C	Interior End Panel
D	Die Board Plex
E	Plex Hardware
F	Die Board
G	Front Toekick
H	Condenser Air Intake
I	Air Return
J	Product Stop
K	End Panel Trim
L	End Panel
M	End Panel Plex
N	End Toekick
O	Outside Back
P	Insulated Drain Pan
Q	Bottom Deck
R	Inside Back
S	Air Discharge

D4: PARTS LIST (HS_40 H x 40-11/16 D_OPEN_R-290)



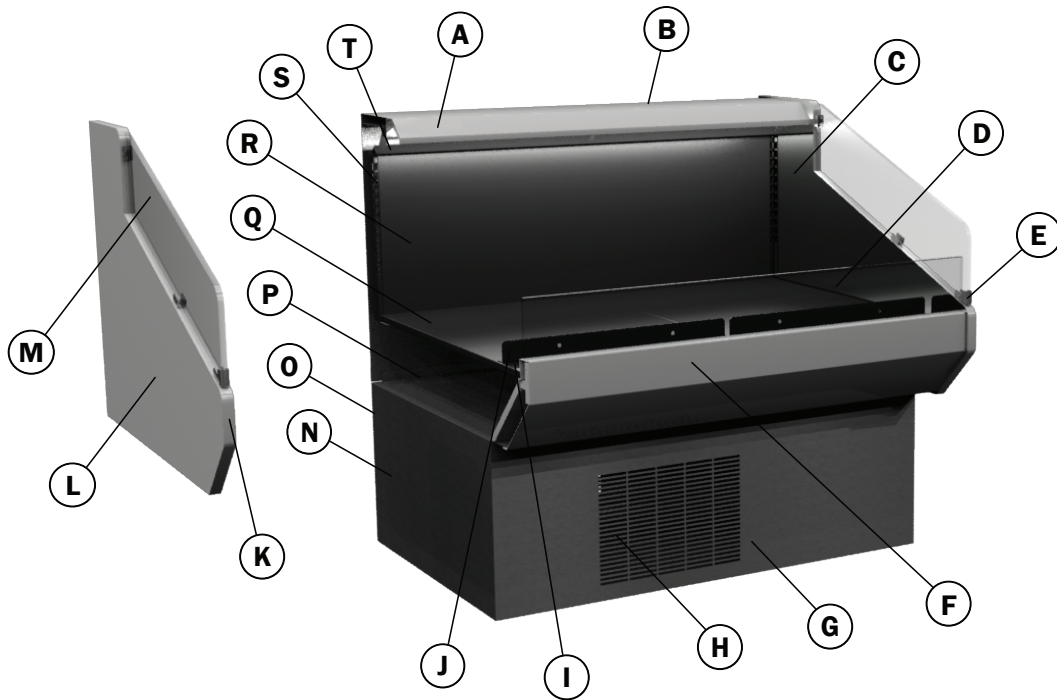
A	Cornice
B	Case Top
C	Interior End Panel
D	Die Board Plex
E	Plex Hardware
F	Caster
G	Die Board
H	Condenser Air Intake
I	Front Toekick
J	Air Return
K	Product Stop
L	Bottom Deck
M	End Panel Trim
N	End Panel
O	End Panel Plex
P	Block Leg Support
Q	Insulated Drain Pan
R	Outside Back
S	Inside Back
T	Air Discharge

D5: PARTS LIST (HS_46-1/2 H X 33-11/16 D_CLOSED_R-290)



A	Cornice
B	Case Top
C	Interior End Panel
D	Die Board Plex
E	Plex Hardware
F	Die Board
G	Front Toekick
H	Condenser Air Intake
I	Air Return
J	Product Stop
K	End Panel Trim
L	End Panel
M	End Panel Plex
N	End Toekick
O	Outside Back
P	Insulated Drain Pan
Q	Bottom Deck
R	Inside Back
S	Shelf Standard
T	Air Discharge

D6: PARTS LIST (HS_46-1/2 H X 40-11/16 D_CLOSED_R-290)



A	Cornice
B	Case Top
C	Interior End Panel
D	Die Board Plex
E	Plex Hardware
F	Die Board
G	Front Toekick
H	Condenser Air Intake
I	Air Return
J	Product Stop
K	End Panel Trim
L	End Panel
M	End Panel Plex
N	End Toekick
O	Outside Back
P	Insulated Drain Pan
Q	Bottom Deck
R	Inside Back
S	Shelf Standard
T	Air Discharge



Hill PHOENIX, Inc.
Hereinafter Referred To As Manufacturer

LIMITED WARRANTY

GENERAL WARRANTY

Manufacturer's products are warranted to be free from defects in materials and workmanship under normal use and maintenance for fourteen months from date of shipment from manufacturer (the "Base Warranty Period"). In the event of a qualifying warranty claim, a new or rebuilt part to replace any defective part will be provided without charge. The replacement part is covered under this warranty for the remainder of the applicable Base Warranty Period. In order to be eligible for warranty coverage, customer must: (i) notify Manufacturer promptly upon discovery of a warrant defect, and (ii) comply with the warranty claim procedures provided by Manufacturer from time to time.

This equipment warranty does not include labor or other costs incurred for diagnosing, repairing, removing, installing, shipping, servicing, or handling of either defective parts or replacement parts.

The warranty shall not apply:

1. To any unit or any part thereof which has been subject to accident, alteration, negligence, misuse or abuse, or which has not been operated in accordance with the manufacturer's recommendations, or in conditions outside of Manufacturer's specifications, or if the serial number of the unit has been altered, defaced, or removed.
2. When the unit, or any part thereof, is damaged by fire, flood, or other act of God.
3. To products that are impaired or damaged due to improper installation.
4. When installation and startup forms are not properly completed or returned within two weeks after startup.
5. If the defective part is not returned to the Manufacturer.
6. To service, maintenance or wear and tear parts (such as lights, starters and ballasts)

MODIFICATIONS TO GENERAL WARRANTY

The following sets forth certain modifications to the General Warranty for specific products of Manufacturer:

DISPLAY CASE AND SPECIALTY PRODUCTS CLEARVOYANT® LED LIGHTING

The warranty period for Clearvoyant LED lighting components within the Clearvoyant lighting system is five years from date of shipment.

REMEDY LIMITATION/DAMAGES EXCLUSION

THE REMEDY OF REPAIR OR PROVISION OF A REPLACEMENT PART WITHOUT CHARGE SHALL BE THE EXCLUSIVE REMEDY FOR ANY WARRANTY CLAIM HEREUNDER. WITHOUT LIMITING THE FOREGOING, MANUFACTURER SHALL NOT BE LIABLE UNDER ANY CIRCUMSTANCES FOR INCIDENTAL, INDIRECT OR CONSEQUENTIAL DAMAGES, INCLUDING LOSS OF PROFIT, LABOR COST, LOSS OF REFRIGERANT OR FOOD PRODUCTS.

EXCLUSIVE WARRANTY

THE FOREGOING WARRANTY IS THE EXCLUSIVE WARRANTY WITH RESPECT TO THE PRODUCTS. ALL OTHER WARRANTIES, WHETHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION, THE WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY DISCLAIMED AND EXCLUDED. NO IMPLIED WARRANTY SHALL BE DEEMED CREATED BY COURSE OF DEALING OR USAGE OF TRADE. NO OTHER PERSON IS AUTHORIZED TO EXPAND OR CREATE ANY OBLIGATION GREATER THAN OR MORE EXPANSIVE THAN THE WARRANTY PROVIDED HEREIN.

Submit warranty claims to:

Hillphoenix Refrigeration & Power

Systems Division

2016 Gees Mill Road

Conyers, GA 30013

Warranty / Service

Phone: 1-833-280-5714

Hillphoenix Display Case Division

1925 Ruffin Mill Road

Colonial Heights, VA 23834

Warranty / Service

Phone: 1-833-280-5714

Hillphoenix Specialty Products Division

703 Franklin Street

Keosauqua, IA 52565

Warranty / Service

Phone: 1-833-280-5714

Warning

Maintenance & Case Care

When cleaning cases the following must be performed PRIOR to cleaning:

To avoid electrical shock, be sure all electric power is turned off before cleaning. In some installations, more than one switch may have to be turned off to completely de-energize the case.

Do not spray cleaning solution or water directly on fan motors or any electrical connections.

All lighting receptacles must be dried off prior to insertion and re-energizing the lighting circuit.

Please refer to the Use and Maintenance section of this installation manual.

Hillphoenix®

a **DOVER** company

Tel: 319-293-3777

703 Franklin Street, PO Box 478, Keosauqua, IA 52565

Due to our commitment to continuous improvement, all specifications are subject to change without notice.

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