SINGLE-DECK MERCHANDISER

INSTALLATION & OPERATIONS MANUAL

DLP-R
BAKERY/CHEESE/DELI

Table of Contents

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 Web site at www.hillphoenix.com.

Hillphoenix® / Barker SPECIALTY PRODUCTS

Intertek Intertek

04/16

LIABILITY NOTICE

For Cases with Shelf Lighting Systems

Hillphoenix does NOT design any of its shelf lighting systems or any of its display cases with shelf lighting systems for direct or indirect exposure to water or other liquids. The use of a misting system or water hose on a display case with a shelf lighting system, resulting in the direct or indirect exposure of the lighting system to water, can lead to a number of serious issues (including, without limitation, electrical failures, fire, electric shock, and mold) in turn resulting in personal injury, death, sickness, and/or serious property damage (including, without limitation, to the display itself, to the location where the display is situated [e.g., store] and to any surrounding property). DO NOT use misting systems, water hoses or other devices that spray liquids in Hillphoenix display cases with lighted shelves.

If a misting system or water hose is installed or used on a display case with a shelf lighting system, then Hillphoenix shall not be subject to any obligations or liabilities (whether arising out of breach of contract, warranty, tort [including negligence], strict liability or other theories of law) directly or indirectly resulting from, arising out of or related to such installation or use, including, without limitation, any personal injury, death or property damage resulting from an electrical failure, fire, electric shock, or mold.

P079211M, REV0

R-744 (CO_2) NOTICE

For Systems Utilizing R-744 (CO_2) Refrigerant

For refrigeration units that utilize R-744 (CO_2), pressure relief and pressure-regulating relief valves may need to be installed based on the system capacity. The valves need to be located such that no stop valve is positioned between the relief valves and the parts or section of the system being protected.

When de-energizing refrigeration units containing R-744 (CO_2), venting of the R-744 (CO_2) refrigerant may occur through the pressure regulating relief valves. *These valves are located on the refrigeration system and not on the case model.* If venting does occur, the valve must not be defeated, capped, or altered by any means.

WARNING: Under no circumstances should any component be replaced or added without consulting Hillphoenix Field Service Engineering. Utilizing improper components may result in serious injury to persons or damage to the system.

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.

⚠ 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_12/12
- parts list and dixell operating instructions_01/13
- energy data_03/13
- energy data, endviews and parts list_02/14
- support diagram and parts page_02/15
- warranty_04/16

DLP REMOTE

Electrical Data

Model		Fans per Case	High Efficiency Fans		Anti-Condensate Fans		Drain Heaters		Optional Defrost Heaters	
			120 Volts		120 Volts		120 Volts		208 Volts	
			Amps	Watts	Amps	Watts	Amps	Watts	Amps	Watts
DLP	4’	1	0.3	36	0.52	62.4	- - -[1]	- - -	- - -	- - -
	6’	2	0.6	72	0.78	93.6	- - -	- - -	- - -	- - -
	8’	3	0.9	108	1.04	124.8	- - -	- - -	- - -	- - -
	10’	3	0.9	108	1.3	156	- - -	- - -	- - -	- - -
	12’	4	1.2	144	1.56	187.2	- - -	- - -	- - -	- - -
	EW-90	1	0.3	36	0.26	31.2	- - -	- - -	- - -	- - -
	IW-90	1	0.3	36	0.26	31.2	- - -	- - -	- - -	- - -

Lighting Data

Model		Lights per Row	Light Length (ft)	Fluorescent Lighting (Per Light Row)			Clearvoyant LED Lighting (Per Light Row)					
							Standard Power (Cornice or Shelf)			High Power (Cornice)		
				120 Volts			120 Volts			120 Volts		
				Amps	Watts	Maximum Allowable Rows	Amps	Watts	Maximum Allowable Rows	Amps	Watts	Maximum Allowable Rows
DLP	4’	1	4	0.27	32	2	0.1	12	2	0.22	26	2
	6’	2	3	0.34	41	2	0.14	17	2	0.3	36	2
	8’	2	4	0.47	56	2	0.2	24	2	0.44	52	2
	10’	2	5	0.61	73	2	0.24	29	2	0.54	64	2
	12’	3	4	0.68	83	2	0.3	36	2	0.66	79	2
	EW-90	1	2	0.15	18	2	0.06	7.2	2	0.1	12	2
	IW-90	1	3	0.21	25.2	2	0.09	10.8	2	0.15	18	2

Guidelines & Control Settings (DX)

Model	Conventional BTUH/ft	Parallel BTUH/ft	Superheat Set Point @ Bulb (ºF)	Evaporator[2] (ºF)	Discharge Air (ºF)	Discharge Air[3] Velocity (FPM)
DLP	541	473	6-8	20-6	31	280-310

Defrost Controls

Model	Defrosts per Day	Run-Off Time (min)	Electric Defrost		Timed-Off Defrost		Hot Gas Defrost	
			Fail-Safe (min)	Termination Temp (ºF)	Fail-Safe (min)	Termination Temp (ºF)	Fail-Safe (min)	Termination Temp (ºF)
DLP	6	0	- - -	- - -	30	42	- - -	- - -

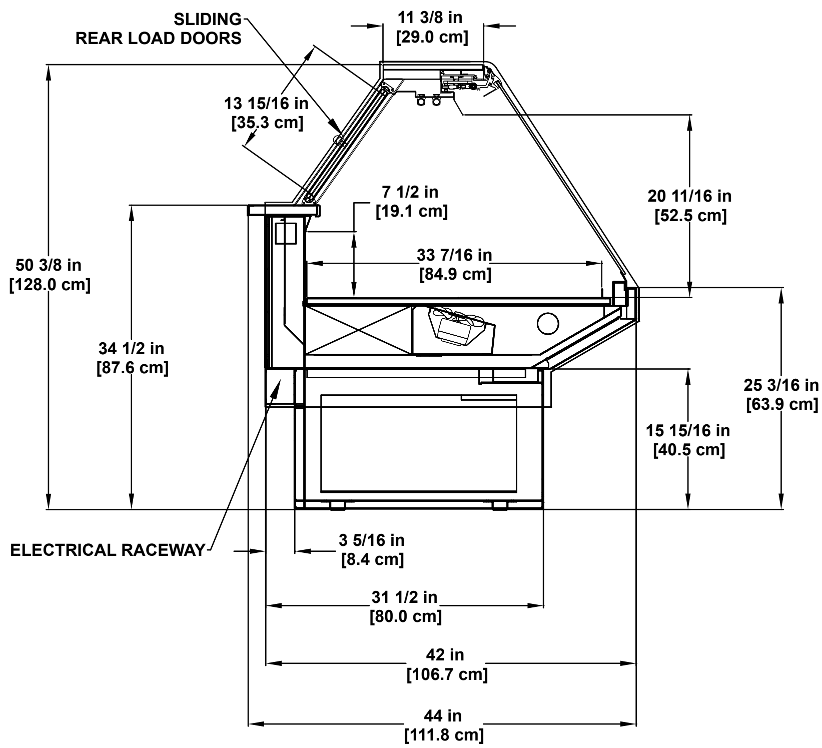
1 NOTE: “- - -” indicates data not applicable.

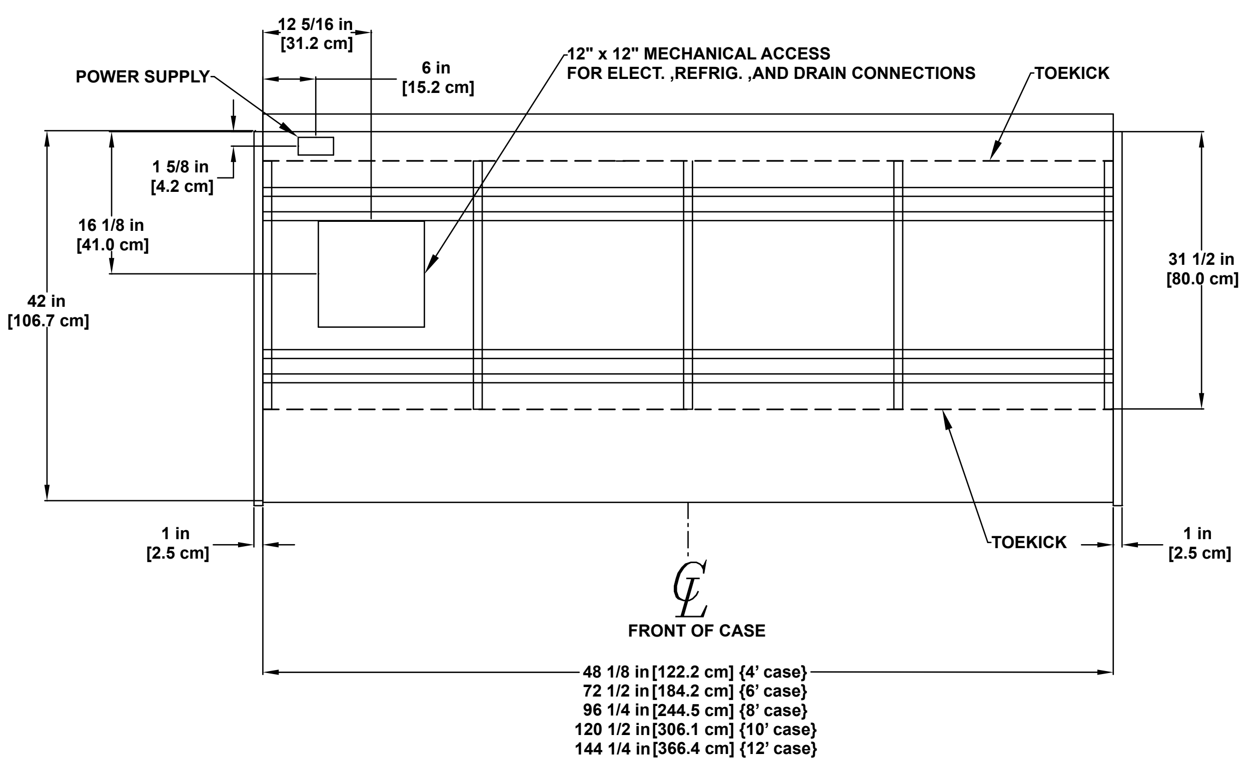
2 Minimum operating evaporator temperature allowed is 20ºF with no changes in the defrost schedule.

3 Average discharge air velocity at peak of defrost.

Engineered for stores with ambient conditions not to exceed 75º and 55% relative humidity.
Due to engineering improvements specifications may change without notice.
All measurements are taken per ARI 1200 - 2002 specifications.
Numbers are based on standard case sizes. Consult engineering.

DLP REMOTE


SLIDING
REAR LOAD DOORS
11 3/8 in
[29.0 cm]
13 15/16 in
[35.3 cm]
7 1/2 in
[19.1 cm]
20 11/16 in
[52.5 cm]
50 3/8 in
[128.0 cm]
33 7/16 in
[84.9 cm]
34 1/2 in
[87.6 cm]
25 3/16 in
[63.9 cm]
15 15/16 in
[40.5 cm]
ELECTRICAL RACEWAY
3 5/16 in
[8.4 cm]
31 1/2 in
[80.0 cm]
42 in
[106.7 cm]
44 in
[111.8 cm]


12 5/16 in
[31.2 cm]
POWER SUPPLY
6 in
[15.2 cm]
12" x 12" MECHANICAL ACCESS
FOR ELECT. ,REFRIG. ,AND DRAIN CONNECTIONS
TOEKICK
1 5/8 in
[4.2 cm]
16 1/8 in
[41.0 cm]
42 in
[106.7 cm]
31 1/2 in
[80.0 cm]
1 in
[2.5 cm]
TOEKICK
1 in
[2.5 cm]
FRONT OF CASE
48 1/8 in [122.2 cm] {4' case}
72 1/2 in [184.2 cm] {6' case}
96 1/4 in [244.5 cm] {8' case}
120 1/2 in [306.1 cm] {10' case}
144 1/4 in [366.4 cm] {12' case}

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 DLP (Synerg-E) bakery and deli application, service single-deck merchandiser.

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. Machine-room temperatures must be maintained at a minimum of 65°F in winter and a maximum of 95°F in summer. Minimum condensing temperatures should be no less than 70°F.

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 & TECHNICAL SUPPORT

For service or technical questions regarding specialty cases, please contact our Specialty Products Division Service Department at 1-319-293-3777. For questions regarding our refrigeration systems or electrical distribution centers, please contact our Systems Division Customer Service Department at 1-770-388-0706.

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 on the top-left interior of the case). When you have this information, call the number below and ask for a Service Parts Representative.

Hillphoenix Barker Specialty Products
703 Franklin Street, PO Box 478
Keosauqua, IA 52565
Tel: (319) 293-3777/Fax: (319) 293-3776
Web site: 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. Carefullly, lift case up and off the pallet. Remove dust cover. Istallation hardware ships in a marked packet located inside the case.
4. 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 appliacble, or shim as necessary under vertical supports as this will help ensure that the case is not settling over time.
5. Locate horizontal support (Fig. 1) positions along the chalk line. Spot properly leveled shim packs at each support location.

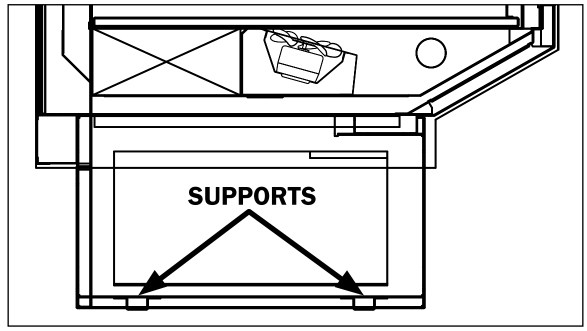


Fig. 1 Horizontal supports

⚠ CAUTION

Locate the horizontal 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.
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 consump-

tion and case performance.

6. Install toekick back onto the base of case.

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 the foam tape (supplied) to the end breakers of the first case. After this is set apply the sealant to the end of the case. From the opposite end, push the second case to a position that is approximately 6" from the first case, then position case on the shim packs.
4. Push the cases tightly together, then lightly bolt them together through the holes provided (Fig.2). Tighten all the joining bolts until all margins are equal. Be careful not to over tighten.
5. Install PVC fitting between cases with case to case piping. The stub-up location can be found under the tank on the customer left (Fig. 2). It is very important for line ups designed with holes in the pipe chase and equipped with PVC fittings to seal between the joints and protect piping.

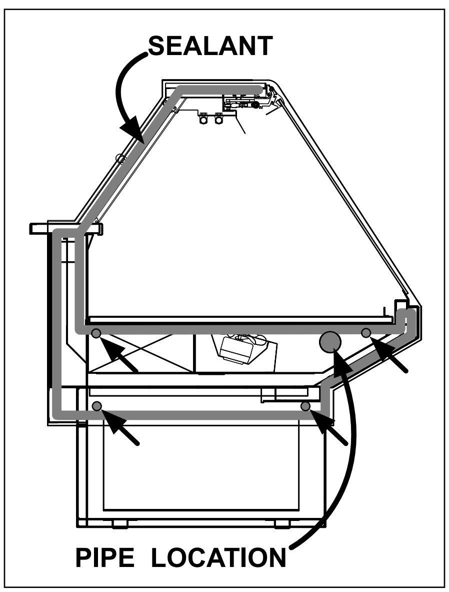


Fig. 2 Sealant, piping, and bolt locations

6. Apply case-to-case watershed (supplied) over the end frame seam (Fig. 3). 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).

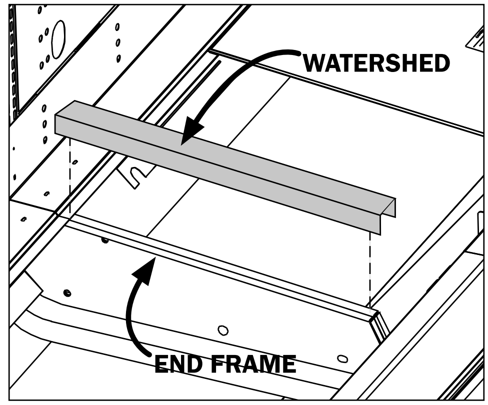


Fig. 3 Sealing the pipe chase

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 back onto the base of case.

⚠ CAUTION

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

REFRIGERATION

Refrigeration connections will be made through the refrigeration stub up location on the customer left side of the case. Refrigeration lines may be headed together for all cases in a line-up, if necessary, by lines through the access holes with a high grade silicon to prevent recirculation. All lines must be correctly sized. *See diagram on page 8 for access locations.*

If it becomes necessary to penetrate the case bottom for any reason, make certain it is sealed afterward with canned-foam sealant and white RTV.

CAUTION

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

CAUTION

If any brazing is necessary, place wet rags around the area to avoid tank damage.

CAUTION

If the shelves are removed from the case or otherwise not utilized, the shelf setpoint (SAA) must be raised to 90 ºF to prevent the pump from running when only the shelves are calling for refrigeration. Failure to do so could result in early pump failure.

PLUMBING

The drain outlet or “P” trap (Fig. 4) is shipped loose with the case and made from a 1 1/2” PVC pipe. Care should be given to ensure that all connections are water-tight and sealed with the appropriate PVC or ABS cement.

Drain lines can be run left or right of the tee with the proper pitch to satisfy local drainage requirements. When connecting the PVC to the existing floor drains be sure to provide as much downhill slope as possible and avoid long runs of drain lines.

Do not install condensate drains in contact with non-insulated suction lines in order to prevent condensate from freezing. Install the 1 1/2" PVC trap, which is provided with the case. All drains must be trapped.

Before operating the case, be certain to remove the styrafoam shipping block that protects the plumbing lines during shipping.

CAUTION

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

Fig. 4 "P" trap / drain outlet

ELECTRICAL

Electrical hookups are made through the power supply box that can be accessed by removing the back panel.

For case-to-case wiring, run conduit between the power supply boxes or run wiring through the raceway. 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. Always check the data tag located on left end exterior panel or top interior of the case. The case must be grounded. *For more detailed electrical wiring information, see Appendices A1-A6.*

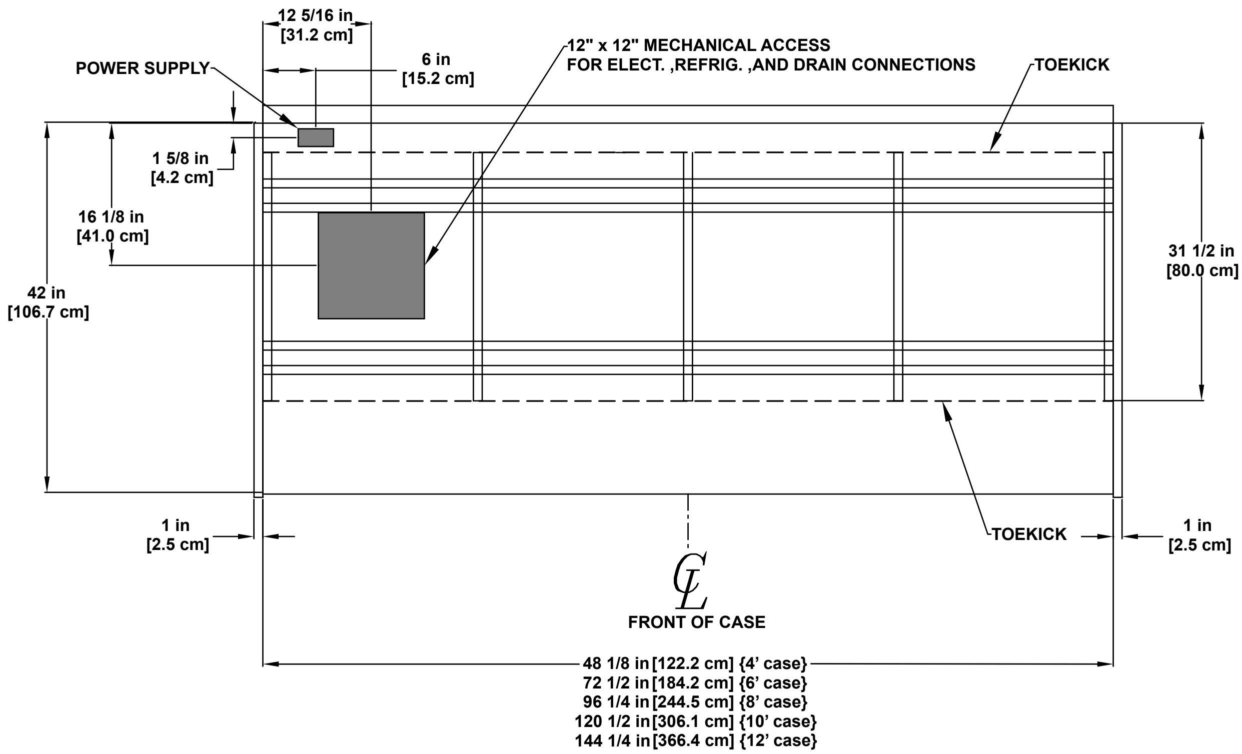
CAUTION

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

CAUTION

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

MECHANICAL ACCESS LOCATIONS



GENERAL LIGHTING INFORMATION

Hillphoenix cases are equipped with either T-8 lights or LED luminaires and feature specially designed light reflectors in the cornice to improve the illumination of products. Depending on case configuration, T-8 electronic ballasts or LED power supplies operate both the cornice and shelf lights and are located above the cornice reflectors.

The lighting system in the electrical raceway has an ON/OFF switch located at the back exterior of the case. Once cases have been properly positioned in the store and an electrician has connected the lighting circuit, 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.

SHELF LUMINAIRES

1. Unplug T-8 lamp power cords located at the inside-back of the case below the lamp being replaced (Fig.5).
2. Carefully seperate the cap from the lamp holder on both ends of the T-8 lamp (Fig. 6). Simultaneously pull down at both ends of the old T-8 lamp to remove.
3. Push and snap the new T-8 lamp into place on the lamp holder. When the T-8 is properly seated, the lamp button - which secures the T-8 to the lamp holder - will be clearly visible through the lamp button hole. The cap should be pushed all the way down (Fig. 7) for positive engagement indicator.

Fig. 5 T-8 light power cords

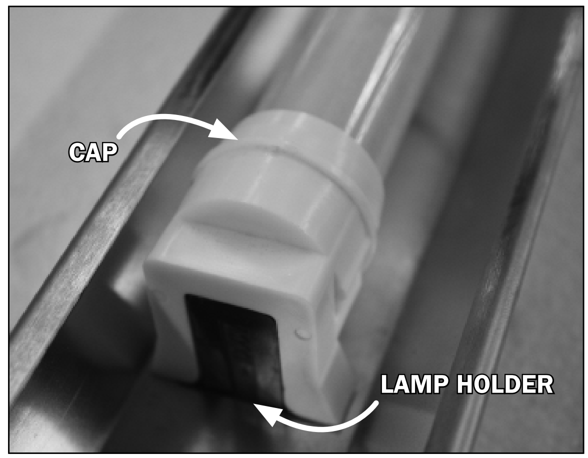


Fig. 6 T-8 cap and lamp holder

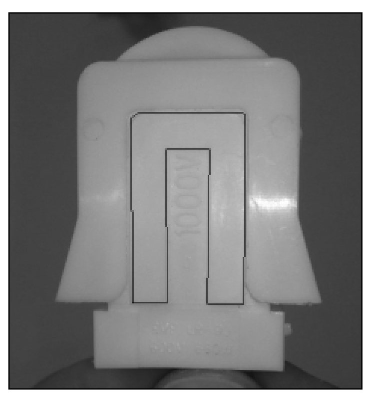


Fig. 7 Positive engagement

BALLAST/POWER SUPPLY ACCESS

To gain access to the ballasts or power supplies remove the panel located above the rear toe kick (Fig. 8).

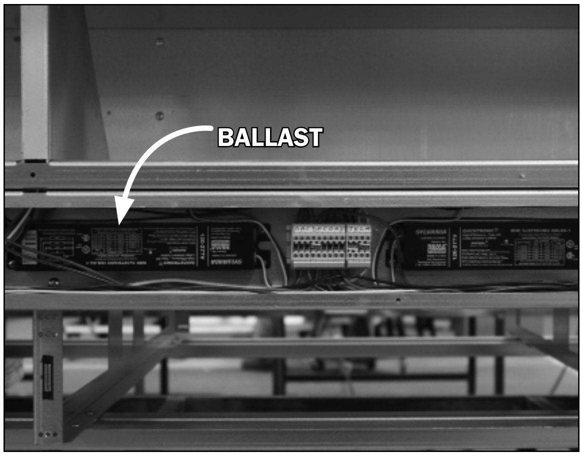


Fig. 8 Clear view of the ballasts

REPLACING LED LIGHTS

Once store power is connected and the light circuit is energized, 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.

⚠ 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.

SHELF LUMINAIRES

Removing shelf luminaires:

1. Unplug the luminaire.
2. Pinching the latching clips inward at the ends of the luminaire, rotate luminaire up at each end until hooks are free, then remove.

Re-installing shelf luminaires:

1. Place hook into shelf roll form at shelf front and rotate rear of luminaire toward the shelf.
2. Depress the rear clip so that luminaire can finish rotation and until clip engages the shelf bracket.

NON-SHELF LUMINAIRES

Removing non-shelf luminaires:

1. Simultaniously squeeze the plastic clips at each end.
2. When the hooks are disengaged, pull the luminaire free.

Re-installing non-shelf luminaires:

1. Align the 4-pole jack with the 4-pole connector on the clip-in luminaire.
2. Push into place - side clips will engage on the sheet metal of the case.
3. Fasten anti-tamper bracket into sheet metal of case with #8 screw at end opposite of the 4-pole in-line connector

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. 4)**
- [ ] **Have you checked the vertical plumb of the case? The horizontal level? (see pg. 5)**
- [ ] **Have you applied the sealant to the end breakers of adjoining cases? (see pg. 6)**
- [ ] **Have you sealed the case-to-case joints by applying caulk and acrylic tape to the end frame seam? (see pg. 6)**
- [ ] **Have you installed the toekick? (see pg. 6)**
- [ ] **Have you removed the shipping blocks from the refrigeration and plumbing lines? (see pg. 7)**

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 all lights to ensure they are all functioning properly.**
2. **Check case temperature and adjust controller as needed.**

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. 9). Overloading will cause malfunction and the loss of proper temperature levels.

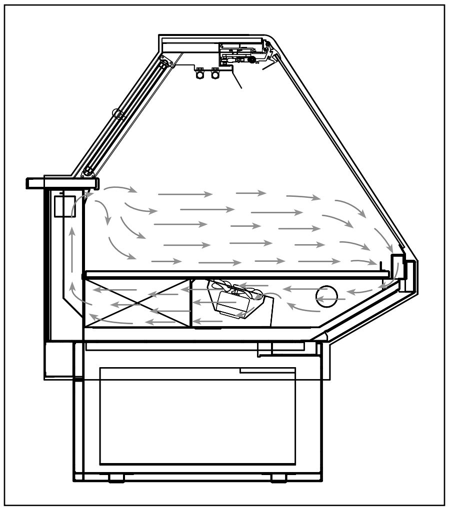


Fig. 9 Airflow pattern

> **⚠ 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.

DEFROST & TEMPERATURE CONTROLS

Cases are equipped with either Electric, Hot Gas or Timed-Off defrost at the owner's option.

The hot gas defrost termination sensor bulb and probe are attached to the dump line which is in the front, left-hand side of the case.

Defrost & Temperature Control Thermostat

The defrost termination control thermostat and the temperature control thermostat are located in one of two places depending on the rear sill. For cases with a standard flat rear sill the thermostat is located in the sliding ballast tray on the bottom. For cases with an extended rear sill the thermostats are located under the rear sill behind an easily removable cover.

To access the thermostats on cases with a standard flat rear sill it requires that the rear panel be removed. For cases with an extended rear sill, access to the thermostats simply by lifting off the ballast cover from under the rear sill.

It is important to consult the control setting guidelines shown on pages 2-4 before setting defrost times. Further adjustment may be required depending on store conditions.

DETERMINING SUPERHEAT

To identify proper superheat settings, complete the following:

1. Obtain suction pressure from access port; obtain suction line temperature from area near TXV bulb at the outlet of evaporator coil.
2. Using the suction pressure reading, convert pressure to temperature using temperature pressure chart (*see Appendix C1*).
3. Finally, subtract the converted temperature reading from the actual temperature reading for superheat setting.

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.

Fans and Pressure Plate

1. Diconnect power to the case and wait for fans to come to a complete stand-still.
2. To access the underside of the fans lift the pressure plate by use of the provided handles. The topside of pressure plate will rest against the topside of the coil cover, exposing the underside of the pressure plate and fans (Fig. 10 & 11).
3. Clean as necessary. Use a spray bottle filled with an approved mild detergent and warm water.
4. 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.

⚠ 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.

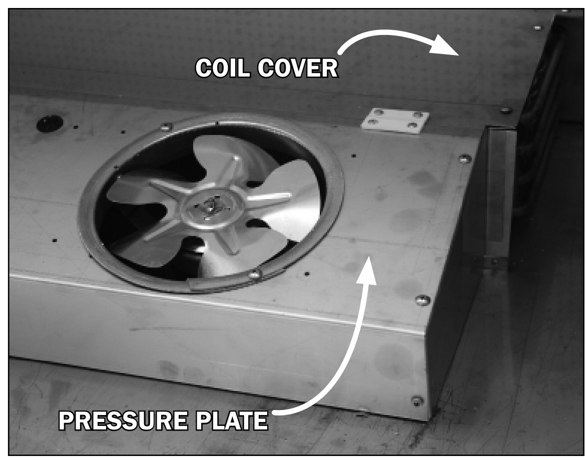


Fig. 10 Pressure plate (topside)

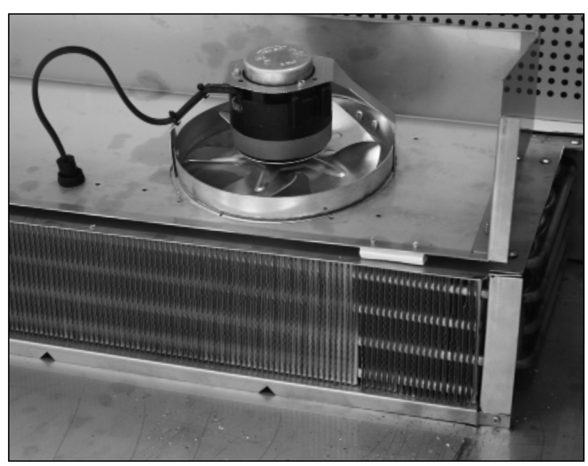


Fig. 11 Pressure plate (underside)

Coil Inspection

1. Diconnect power to the case and wait for fans to stop movement and come to stand-still.
2. Remove the top two screws at both ends of the coil cover. (Fig. 12). **Be sure to save the removed screws for reassembly.**

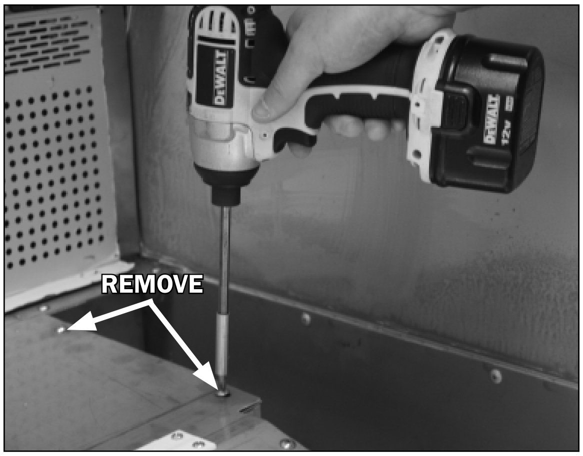


Fig. 12 Coil cover removal

3. Carefully, without bending the sheet metal cover, lift from the back end of panel, and rest the topside of coil cover on pressure plate handles (Fig. 13 & 14).
4. Clean as necessary. Use a spray bottle filled with an approved mild detergent and warm water. **This location should be accessed by qualified personel only.**
5. Be sure to screw the coil cover back to its original position after cleaning and/or inspection is complete.

⚠ 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.

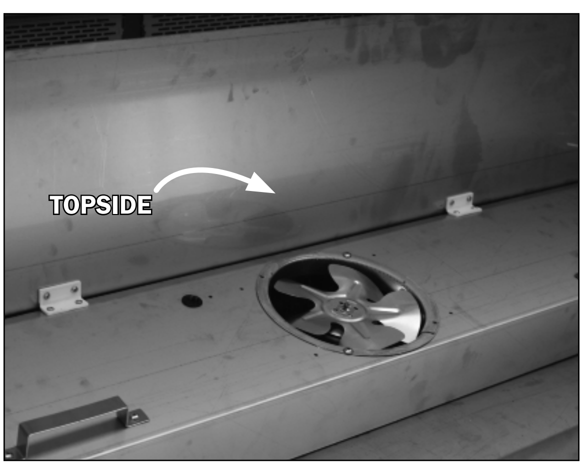


Fig. 13 Coil cover (topside)

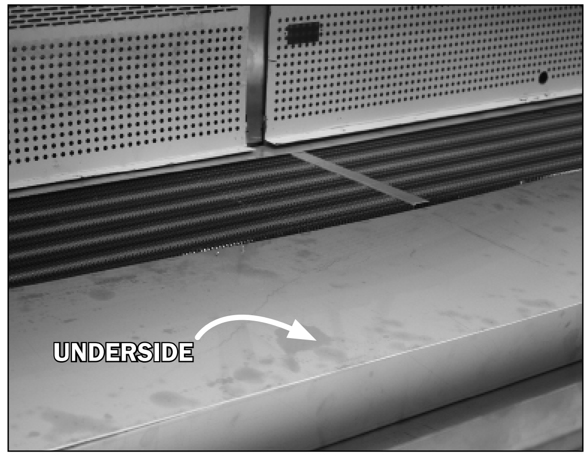


Fig. 14 Coil cover (underside)

⚠ 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.

Rear Load Doors

1. Remove the rear sliding doors on the back of the case and clean. To remove: push up and pull out (Fig. 15).

Fig. 15 Rear load door removal

2. Use a spray bottle filled with an approved mild detergent and warm water.
3. Use a clean, disposable cloth (approved item) to thoroughly clean all areas of the case.
4. Wipe down doors with a clean, disposable cloth (approved item)
5. Place the cleaned doors on a clean sanitized surface until they are dry.

Anthony®

THIS DOCUMENT CONTAINS IMPORTANT INFORMATION ABOUT CLEANING YOUR ULTRAVISION® ANTI-REFLECTIVE GLASS! PLEASE READ AND FOLLOW THESE INSTRUCTIONS TO PREVENT DAMAGE TO THE ANTI-REFLECTIVE COATINGS.

SOVIS ULTRAVISION® tempered glass specialized Anti-Reflective coatings on each surface of the glass. These coatings reduce the glare from lighting so that the products on display are more visible to your customers.

While the Anti-Reflective coatings are durable, they are susceptible to scratching if abrasive materials are used for cleaning. Once the glass surfaces are scratched, it is impossible to restore the original finish. Special care must be taken to prevent damage when cleaning the glass. SOVIS recommends the following products for routine cleaning of ULTRAVISION® Anti-Reflective glass:

Cleaning Cloths – two products are recommended…

- **Scotch-Brite® High Performance Cloth** – manufactured by 3M® and available in most grocery stores under the name *Scotch-Brite® Microfiber Cleaning Cloth* in a 12” x 14” size. This cloth is washable and may be reused as long as it remains clean.
- **Spontex® Microfibre Cleaning Cloth** – distributed by Spontex® and available in most grocery stores under the same name in a 15.75” x 12” size. This cloth is washable and may be reused as long as it remains clean.

Cleaning Fluid – for more difficult cleaning jobs, these products are recommended…

- **Windex®** - standard product only (extra-strength or specialty products may not be suitable)
- **Glass-Plus®** - standard product only (extra-strength or specialty products may not be suitable)
- **Exceed® Multi-Surface & Glass Cleaner** – from Kay Chemical Company, Greensboro, NC
- **Warm Water**

Note: equivalent store-brand glass cleaning products are normally acceptable substitutes to the brand name products listed above.

The cleaning cloths named above will normally remove dust, grease, oil, and fingerprints without the need for cleaning fluids. A light spray of the cleaning fluids listed above will reduce the time required for cleaning. These materials have been tested and proven to clean ULTRAVISION® glass without scratching or damaging the Anti-Reflective coatings. If you need assistance with obtaining these materials, please contact your display case supplier.

Under no circumstances should the following types of materials be used for cleaning glass with ULTRAVISION® Anti-Reflective coatings.

- Coarse Paper Towels
- Scouring Pads or Powders
- Steel Wool or Steel Fiber Materials
- Blades
- Acidic or highly Alkaline detergents
- Fluorine based detergents

⚠ CAUTION

Do not use these materials for cleaning glass.

Contact the Service Parts Department at:

319-293-3777

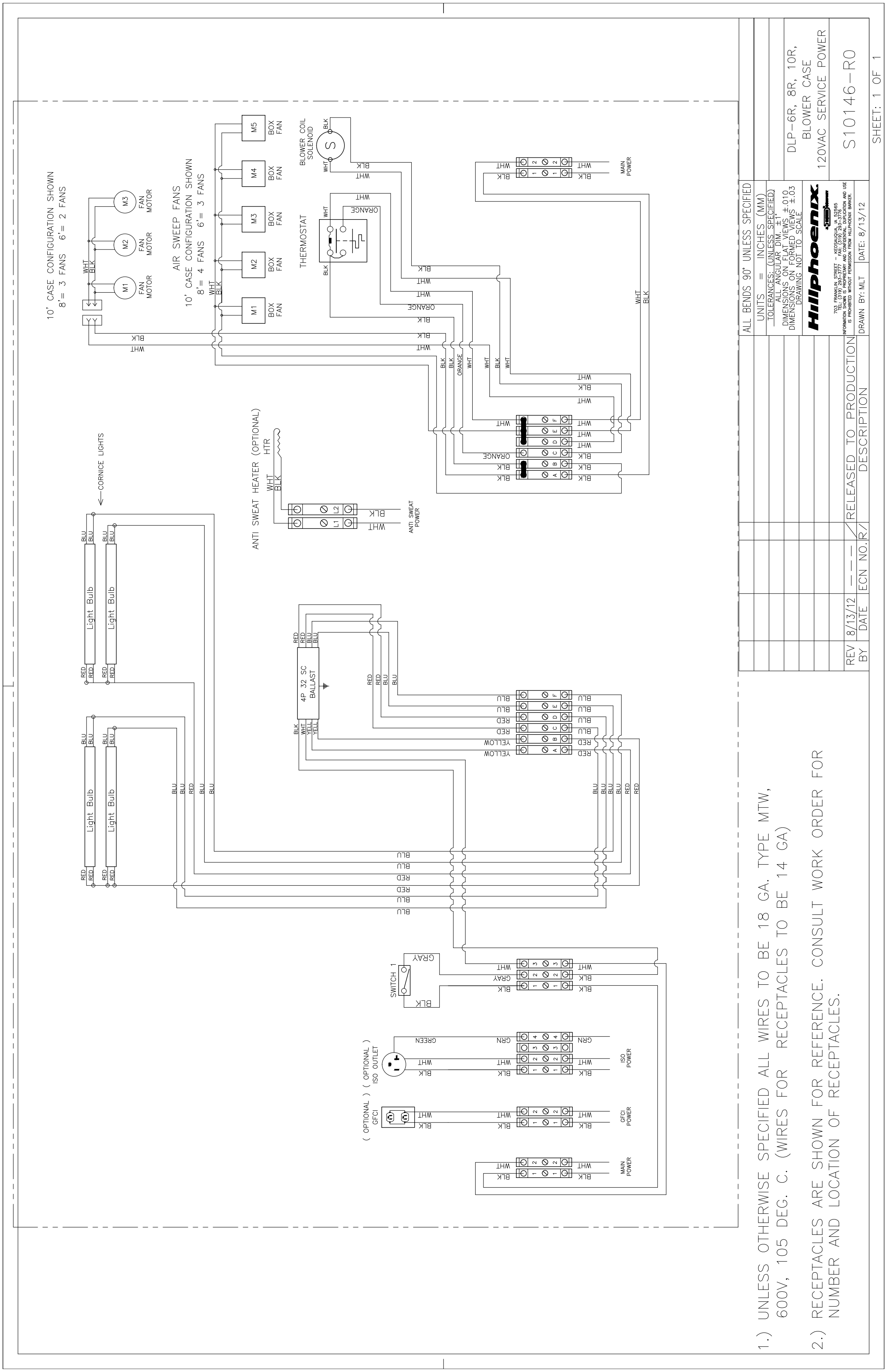
Provide the following information about the part you are ordering:

- **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 DIAGRAM



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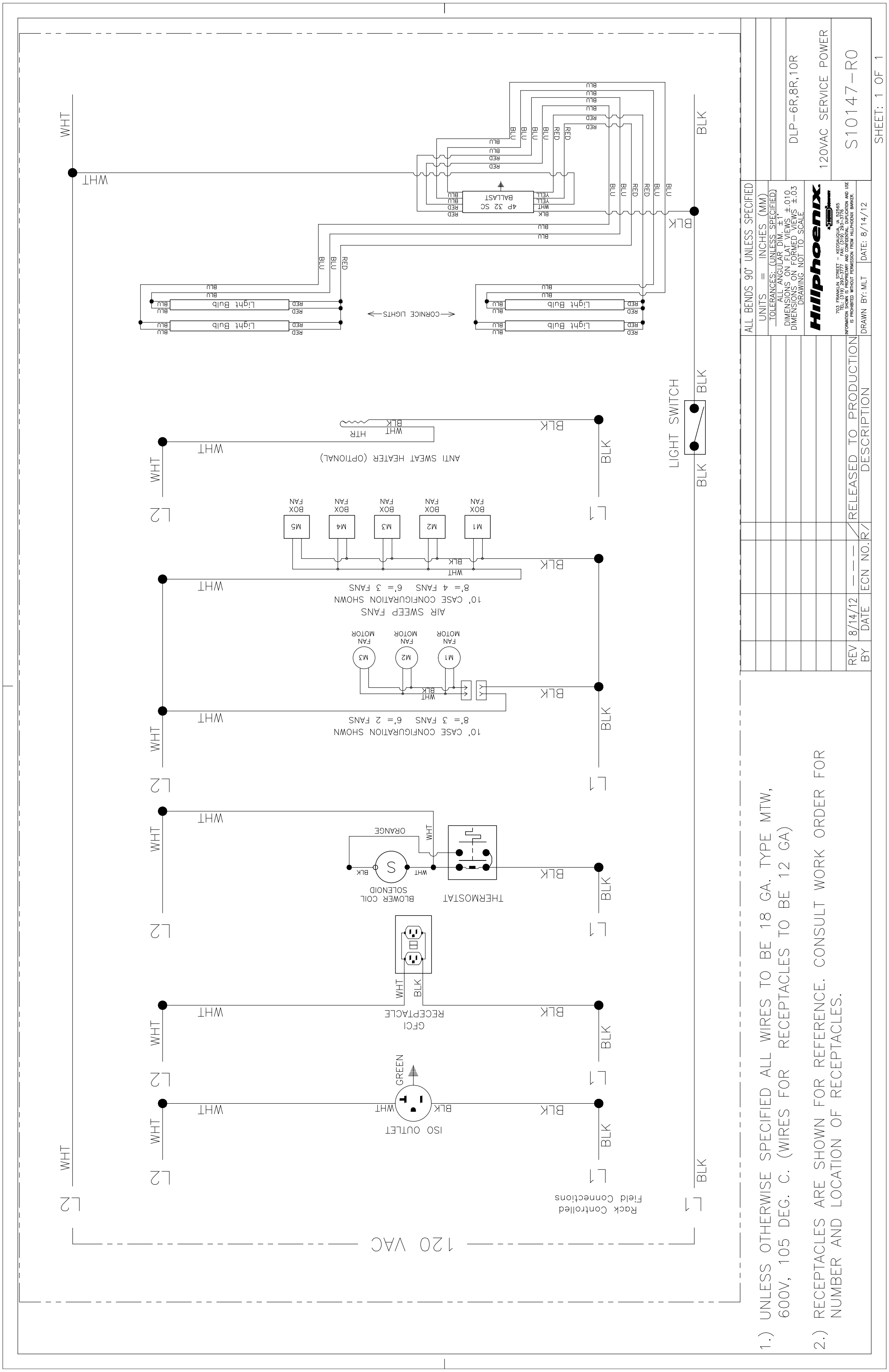

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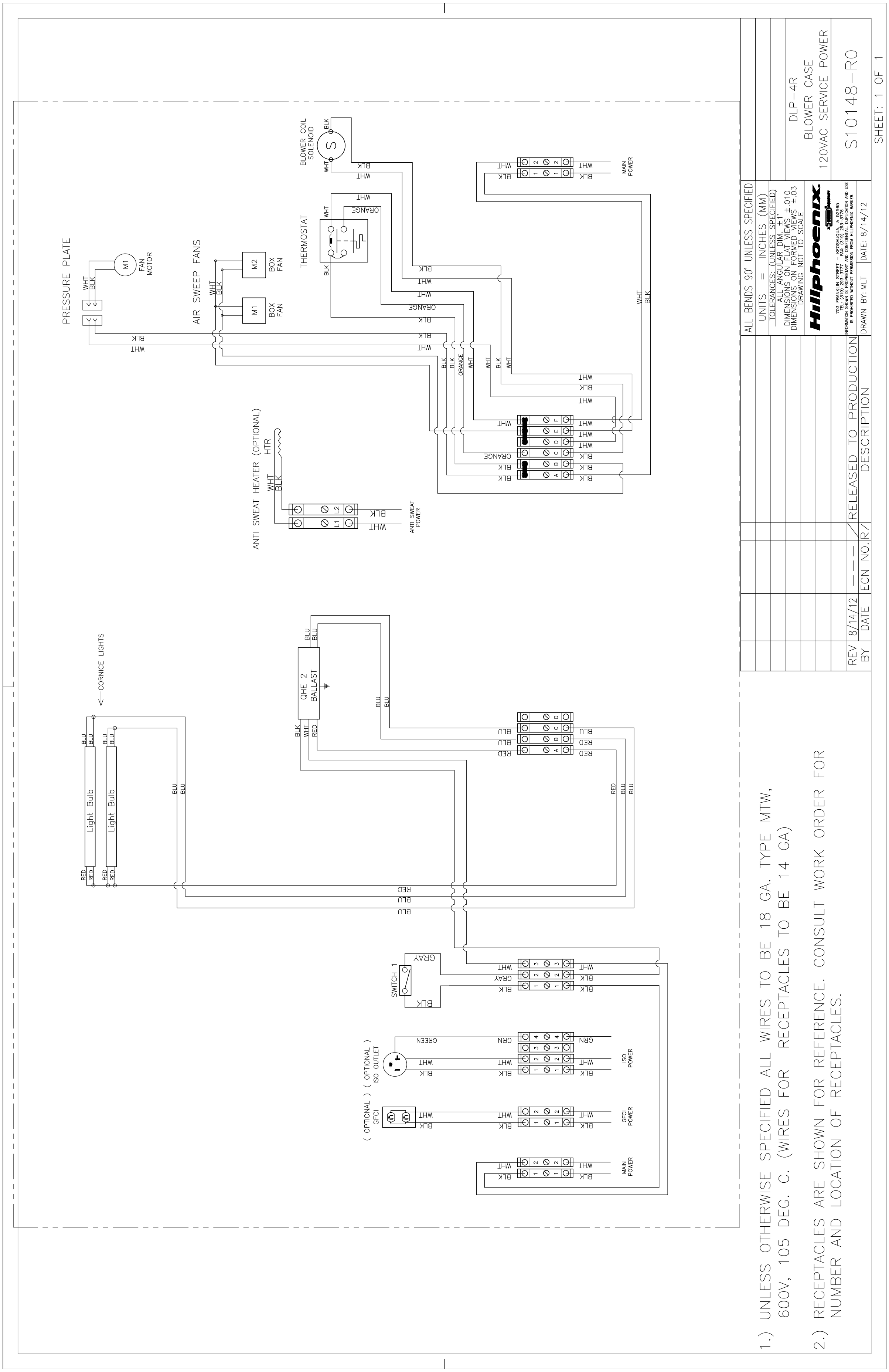

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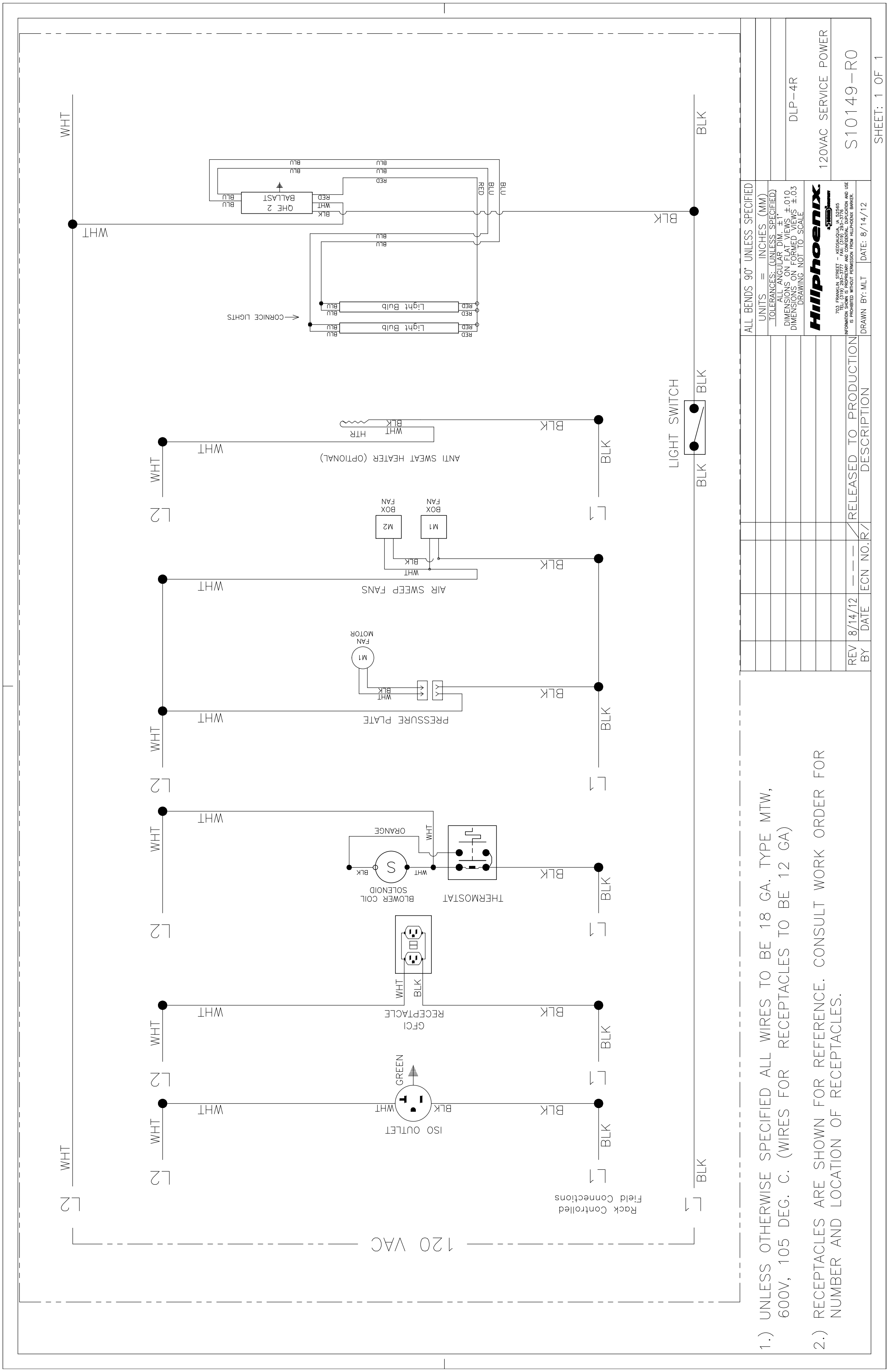
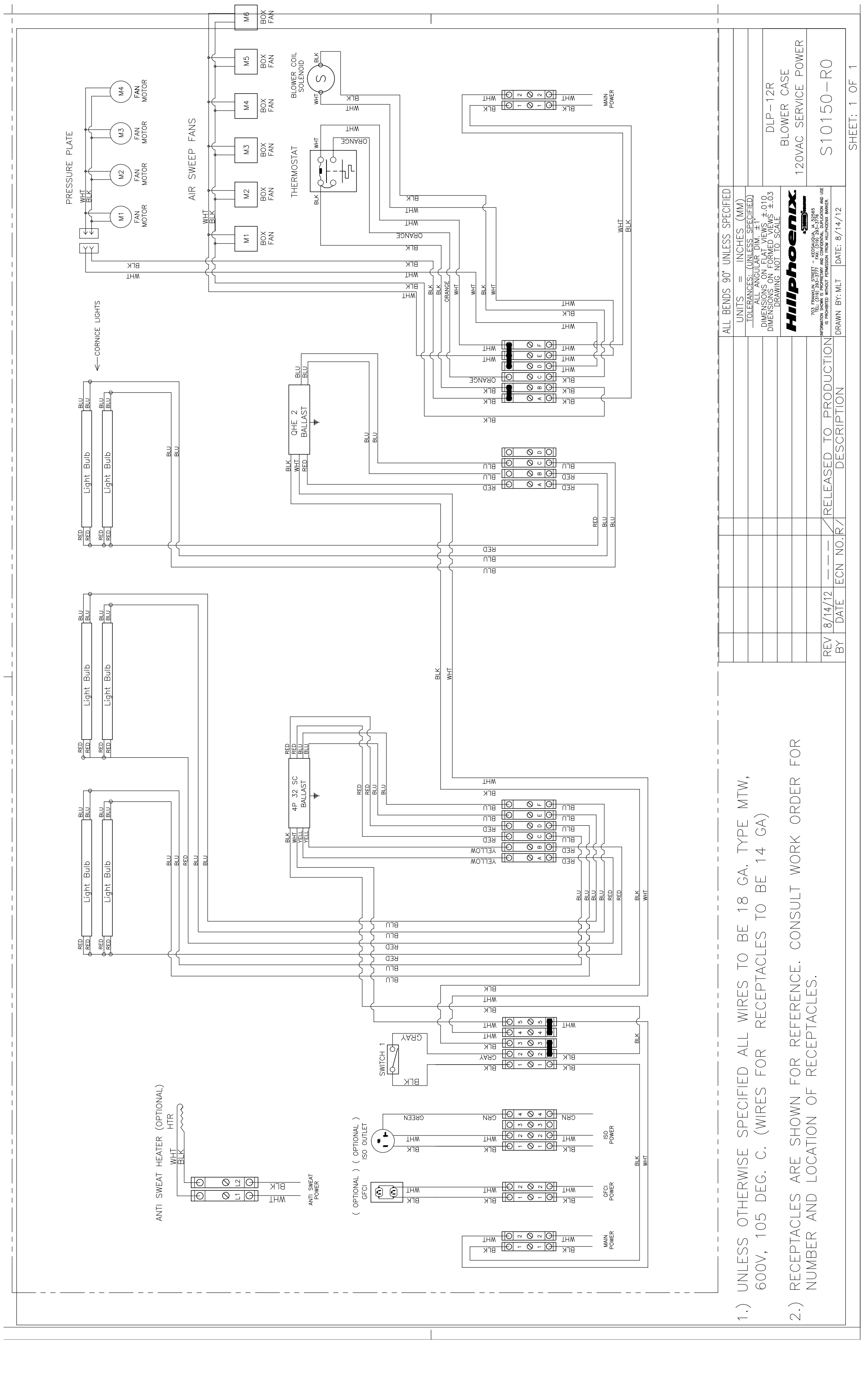
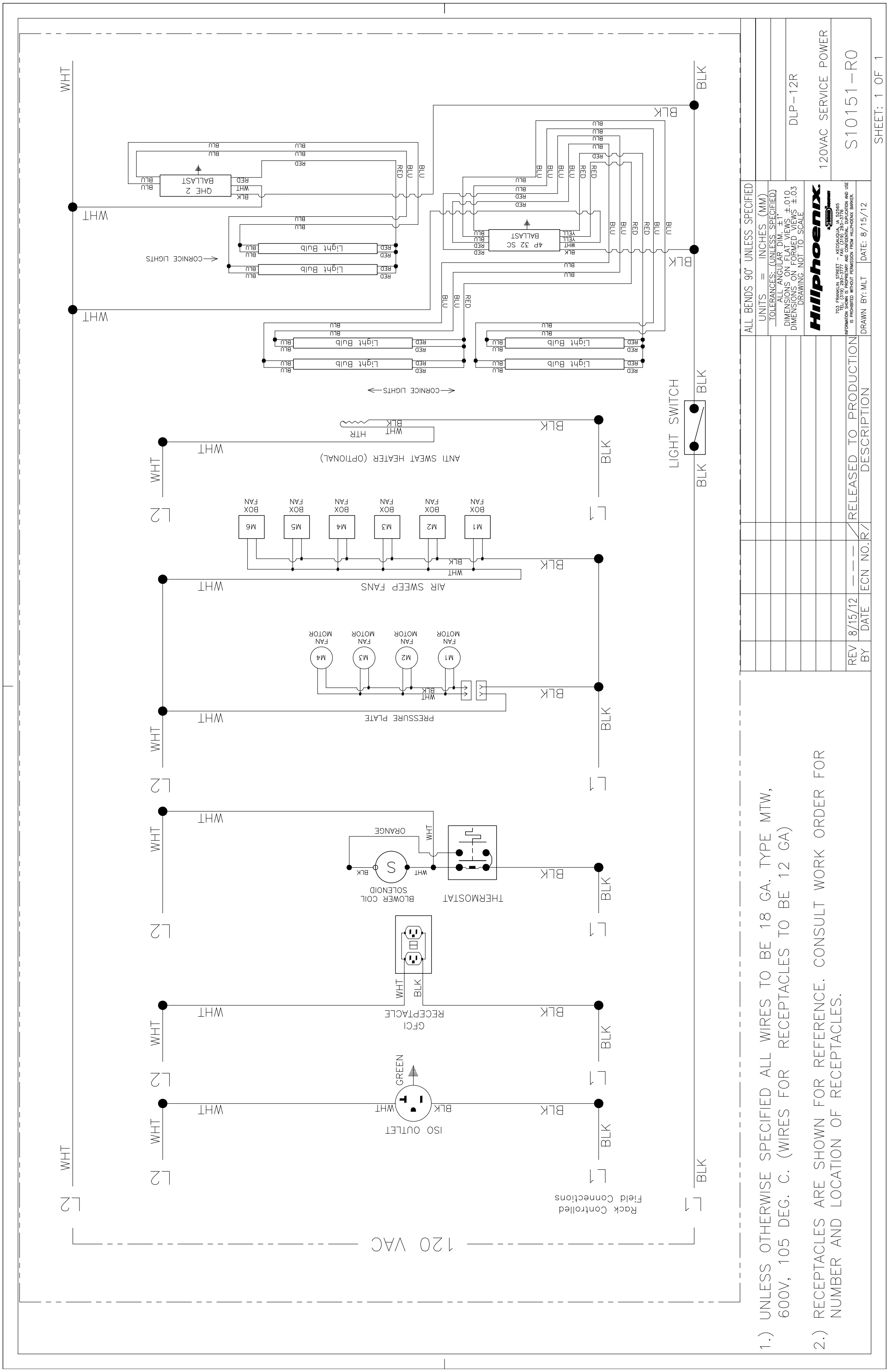


A5: WIRING DIAGRAM



A6: WIRING DIAGRAM



dixell **Installing and Operating Instructions** 1592020070

Digital controller with defrost and fans management

XR70CX

1. GENERAL WARNING

1.1 PLEASE READ BEFORE USING THIS MANUAL

- This manual is part of the product and should be kept near the instrument for easy and quick reference.
- The instrument shall not be used for purposes different from those described hereunder. It cannot be used as a safety device.
- Check the application limits before proceeding.

1.2 ⚠ SAFETY PRECAUTIONS

- Check the supply voltage is correct before connecting the instrument.
- Do not expose to water or moisture: use the controller only within the operating limits avoiding sudden temperature changes with high atmospheric humidity to prevent formation of condensation
- Warning: disconnect all electrical connections before any kind of maintenance.
- Fit the probe where it is not accessible by the End User. The instrument must not be opened.
- In case of failure or faulty operation send the instrument back to the distributor or to "Dixell S.p.A." (see address) with a detailed description of the fault.
- Consider the maximum current which can be applied to each relay (see Technical Data).
- Ensure that the wires for probes, loads and the power supply are separated and far enough from each other, without crossing or intertwining.
- In case of applications in industrial environments, the use of mains filters (our mod. FT1) in parallel with inductive loads could be useful.

2. GENERAL DESCRIPTION

Model **XR70CX**, format 32 x 74 mm, is microprocessor based controller, suitable for applications on medium or low temperature ventilated refrigerating units. It has four relay outputs to control compressor, fan, and defrost, which can be either electrical or reverse cycle (hot gas). The last one can be used as light, for alarm signalling or as auxiliary output. It is also provided with up to four NTC or PTC probe inputs, the first one for temperature control, the second one, to be located onto the evaporator, to control the defrost termination temperature and to managed the fan. The digital input can operate as third temperature probe. The fourth one, to connect to the HOT KEY terminals is used to signal the condenser temperature alarm or to display a temperature..

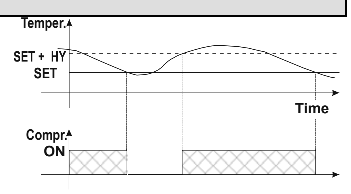
The HOT KEY output allows to connect the unit, by means of the external module XJ485-CX, to a network line **ModBUS-RTU** compatible such as the dixell monitoring units of X-WEB family. It allows to program the controller by means the HOT KEY programming keyboard.

The instrument is fully configurable through special parameters that can be easily programmed through the keyboard.

3. CONTROLLING LOADS

3.1 COMPRESSOR

The regulation is performed according to the temperature measured by the thermostat probe with a positive differential from the set point: if the temperature increases and reaches set point plus differential the compressor is started and then turned off when the temperature reaches the set point value again.



In case of fault in the thermostat probe the start and stop of the compressor are timed through parameters "**COn**" and "**COF**".

3.2 DEFROST

Two defrost modes are available through the "**tdF**" parameter: defrost through electrical heater (**tdF = EL**) and hot gas defrost (**tdF = in**). Other parameters are used to control the interval between defrost cycles (IdF), its maximum length (MdF) and two defrost modes: timed or controlled by the evaporator's probe (P2P).

At the end of defrost dripping time is started, its length is set in the FSt parameter. With FSt =0 the dripping time is disabled.

3.3 CONTROL OF EVAPORATOR FANS

The fan control mode is selected by means of the "**FnC**" parameter:

FnC = C_n: fans will switch ON and OFF with the compressor and **not run** during defrost;
FnC = o_n fans will run even if the compressor is off, and not run during defrost;
After defrost, there is a timed fan delay allowing for drip time, set by means of the "**Fnd**" parameter.
FnC = C_Y fans will switch ON and OFF with the compressor and **run** during defrost;
FnC = o_Y fans will run continuously also during defrost

An additional parameter "**FSt**" provides the setting of temperature, detected by the evaporator probe, above which the fans are always OFF. This is used to make sure circulation of air only if his temperature is lower than set in "FSt".

3.3.1 Forced activation of fans

This function managed by the **Fct** parameter is designed to avoid short cycles of fans, that could happen when the controller is switched on or after a defrost, when the room air warms the evaporator. **Functioning:** if the difference of temperature between the evaporator and the room probes is more than the value of the Fct parameter, the fans are switched on. With Fct=0 the function is disabled.

3.3.2 Cyclical activation of the fans with compressor off.

When Fnc = c-n or c-Y (fans in parallel to the compressor), by means of the Fon and FoF parameters the fans can carry out on and off cycles even if the compressor is switched off. When the compressor is stopped the fans go on working for the Fon time. With Fon =0 the fans remain always off, when the compressor is off.

4. FRONT PANEL COMMANDS

SET: To display target set point; in programming mode it selects a parameter or confirm an operation.

(DEF) To start a manual defrost

(**UP**): To see the max. stored temperature; in programming mode it browses the parameter codes or increases the displayed value.

(**DOWN**) To see the min stored temperature; in programming mode it browses the parameter codes or decreases the displayed value.

To switch the instrument off, if onF = oFF.

To switch the light, if oA3 = Lig.

KEY COMBINATIONS:

UP + DOWN To lock & unlock the keyboard**.**

SET + DOWN To enter in programming mode.

SET + UP To return to the room temperature display.

4.1 USE OF LEDS

Each LED function is described in the following table.

LED	MODE	FUNCTION
	ON	Compressor enabled
	Flashing	Anti-short cycle delay enabled
	ON	Defrost enabled
	Flashing	Drip time in progress
	ON	Fans enabled
	Flashing	Fans delay after defrost in progress.
	ON	An alarm is occurring
	ON	Continuous cycle is running
	ON	Energy saving enabled
	ON	Light on
AUX	ON	Auxiliary relay on
°C/°F	ON	Measurement unit
°C/°F	Flashing	Programming phase

5. MAX & MIN TEMPERATURE MEMORIZATION

5.1 HOW TO SEE THE MIN TEMPERATURE

1. Press and release the DOWN key.
2. The "Lo" message will be displayed followed by the minimum temperature recorded.
3. By pressing the DOWN key again or by waiting 5s the normal display will be restored.

5.2 HOW TO SEE THE MAX TEMPERATURE

1. Press and release the UP key.
2. The "Hi" message will be displayed followed by the maximum temperature recorded.
3. By pressing the UP key again or by waiting 5s the normal display will be restored.

5.3 HOW TO RESET THE MAX AND MIN TEMPERATURE RECORDED

1. Hold press the SET key for more than 3s, while the max. or min temperature is displayed. (rSt message will be displayed)
2. To confirm the operation the "rSt" message starts blinking and the normal temperature will be displayed.

6. MAIN FUNCTIONS

6.1 HOW TO SEE THE SETPOINT

SET

1. Push and immediately release the **SET** key: the display will show the Set point value;
2. Push and immediately release the **SET** key or wait for 5 seconds to display the probe value again.

6.2 HOW TO CHANGE THE SETPOINT

1. Push the **SET** key for more than 2 seconds to change the Set point value;
2. The value of the set point will be displayed and the **"°C" or "°F"** LED starts blinking;
3. To change the Set value push the UP or DOWN arrows within 10s.
4. To memorise the new set point value push the **SET** key again or wait 10s.

B2: DIXELL OPERATING INSTRUCTIONS

6.3 HOW TO START A MANUAL DEFROST

Push the **DEF** key for more than 2 seconds and a manual defrost will start.

6.4 HOW TO CHANGE A PARAMETER VALUE

To change the parameter's value operate as follows:

1. Enter the Programming mode by pressing the **Set** + ⏷ keys for 3s (the "**°C**" or "**°F**" LED starts blinking).
2. Select the required parameter. Press the "**SET**" key to display its value
3. Use "**UP**" or "**DOWN**" to change its value.
4. Press "**SET**" to store the new value and move to the following parameter.

To exit: Press **SET + UP** or wait 15s without pressing a key.
NOTE: the set value is stored even when the procedure is exited by waiting the time-out to expire.

6.5 THE HIDDEN MENU

The hidden menu Includes all the parameters of the instrument.

6.5.1 HOW TO ENTER THE HIDDEN MENU

1. Enter the Programming mode by pressing the **Set** + ⏷ keys for 3s (the "**°C**" or "**°F**" LED starts blinking).
2. Released the keys, then push again the Set+⏷ keys for more than 7s. The Pr2 label will be displayed immediately followed from the HY parameter.
   NOW YOU ARE IN THE HIDDEN MENU.
3. Select the required parameter.
4. Press the "**SET**" key to display its value
5. Use ⏶ or ⏷ to change its value.
6. Press "**SET**" to store the new value and move to the following parameter.

To exit: Press **SET +** ⏶ or wait 15s without pressing a key.
NOTE1: if none parameter is present in Pr1, after 3s the "noP" message is displayed. Keep the keys pushed till the Pr2 message is displayed.
NOTE2: the set value is stored even when the procedure is exited by waiting the time-out to expire.

6.5.2 HOW TO MOVE A PARAMETER FROM THE HIDDEN MENU TO THE FIRST LEVEL AND VICEVERSA.

Each parameter present in the HIDDEN MENU can be removed or put into "THE FIRST LEVEL" (user level) by pressing **"SET +** ⏷**"**.
In HIDDEN MENU when a parameter is present in First Level the decimal point is on.

6.6 HOW TO LOCK THE KEYBOARD

1. Keep pressed for more than 3 s the **UP** + **DOWN** keys.
2. The "POF" message will be displayed and the keyboard will be locked. At this point it will be possible only to see the set point or the MAX o Min temperature stored
3. If a key is pressed more than 3s the "POF" message will be displayed.

6.7 TO UNLOCK THE KEYBOARD

Keep pressed together for more than 3s the ⏶ and ⏷ keys, till the **"Pon"** message will be displayed.

6.8 THE CONTINUOUS CYCLE

When defrost is not in progress, it can be activated by holding the "⏶" key pressed for about 3 seconds. The compressor operates to maintain the "**ccS**" set point for the time set through the "**CCt**" parameter. The cycle can be terminated before the end of the set time using the same activation key "⏶" for 3 seconds.

6.9 THE ON/OFF FUNCTION

With "**onF = oFF**", pushing the **ON/OFF** key, the instrument is switched off. The **"OFF"** message is displayed. In this configuration, the regulation is disabled.
To switch the instrument on, push again the ON/OFF key.

WARNING: Loads connected to the normally closed contacts of the relays are always supplied and under voltage, even if the instrument is in stand by mode.

7. PARAMETERS

REGULATION

Hy Differential: (0,1 ÷ 25,5°C / 1÷255 °F) Intervention differential for set point. Compressor Cut IN is Set Point + differential (Hy). Compressor Cut OUT is when the temperature reaches the set point.
LS Minimum set point: (- 50°C÷SET/-58°F÷SET): Sets the minimum value for the set point.
US Maximum set point: (SET÷110°C/ SET÷230°F). Set the maximum value for set point.
Ot Thermostat probe calibration: (-12.0÷12.0°C; -120÷120°F) allows to adjust possible offset of the thermostat probe.
P2P Evaporator probe presence: n= not present: the defrost stops by time; **y=** present: the defrost stops by temperature.
OE Evaporator probe calibration: (-12.0÷12.0°C; -120÷120°F). allows to adjust possible offset of the evaporator probe.
P3P Third probe presence (P3): n= not present:, the terminal operates as digital input.; **y=** present:, the terminal operates as third probe.
O3 Third probe calibration (P3): (-12.0÷12.0°C; -120÷120°F). allows to adjust possible offset of the third probe.
P4P Fourth probe presence: (n = Not present; y = present).
o4 Fourth probe calibration: (-12.0÷12.0°C) allows to adjust possible offset of the fourth probe.
OdS Outputs activation delay at start up: (0÷255min) This function is enabled at the initial start up of the instrument and inhibits any output activation for the period of time set in the parameter.
AC Anti-short cycle delay: (0÷50 min) minimum interval between the compressor stop and the following restart.
rtr Percentage of the second and first probe for regulation (0÷100; 100 = P1, 0 = P2): it allows to set the regulation according to the percentage of the first and second probe, as for the following formula (rtr(P1-P2)/100 + P2).
CCt Compressor ON time during continuous cycle: (0.0÷24.0h; res. 10min) Allows to set the length of the continuous cycle: compressor stays on without interruption for the CCt time. Can be used, for instance, when the room is filled with new products.
CCS Set point for continuous cycle: (-50÷150°C) it sets the set point used during the continuous cycle.
COn Compressor ON time with faulty probe: (0÷255 min) time during which the compressor is active in case of faulty thermostat probe. With COn=0 compressor is always OFF.
COF Compressor OFF time with faulty probe: (0÷255 min) time during which the compressor is OFF in case of faulty thermostat probe. With COF=0 compressor is always active.

DISPLAY

CF Temperature measurement unit: °C=Celsius; **°F**=Fahrenheit. WARNING: When the measurement unit is changed the SET point and the values of the parameters Hy, LS, US, Ot, ALU and ALL have to be checked and modified if necessary).
rES Resolution (for °C): (in = 1°C; dE = 0.1 °C) allows decimal point display.
Lod Instrument display: (P1; P2, P3, P4, SET, dtr): it selects which probe is displayed by the instrument: **P1** = Thermostat probe; **P2** = Evaporator probe; **P3** = Third probe(only for model with this option enabled); **P4** = Fourth probe, **SET** = set point; **dtr** = percentage of visualization.
rEd X- REP display (*optional*): (P1; P2, P3, P4, SET, dtr): it selects which probe is displayed by X- REP: **P1** = Thermostat probe; **P2** = Evaporator probe; **P3** = Third probe(only for model with this option enabled); **P4** = Fourth probe, **SET** = set point; **dtr** = percentage of visualization.
dLy Display delay: (0 ÷20.0m; risul. 10s) when the temperature increases, the display is updated of 1 °C/1°F after this time.
dtr Percentage of the second and first probe for visualization when Lod = dtr (0÷100; 100 = P1, 0 = P2): if Lod = dtr it allows to set the visualization according to the percentage of the first and second probe, as for the following formula (dtr(P1-P2)/100 + P2).

DEFROST

dFP Probe selection for defrost termination: nP = no probe; **P1** =thermostat probe; **P2 =** evaporator probe; **P3** =configurable probe; **P4** = Probe on Hot Key plug.
tdF Defrost type: EL = electrical heater; in = hot gas
dtE Defrost termination temperature: (-50÷50 °C/ -58÷122°F) (Enabled only when EdF=Pb) sets the temperature measured by the evaporator probe, which causes the end of defrost.
IdF Interval between defrost cycles: (0÷120h) Determines the time interval between the beginning of two defrost cycles.
MdF (Maximum) length for defrost: (0÷255min) When **P2P = n**, (not evaporator probe: timed defrost) it sets the defrost duration, when **P2P = y** (defrost end based on temperature) it sets the maximum length for defrost.
dSd Start defrost delay: (0÷99min) This is useful when different defrost start times are necessary to avoid overloading the plant.
dFd Temperature displayed during defrost: (**rt** = real temperature; **it** = temperature at defrost start; **SEt** = set point; **dEF** = "dEF" label)
dAd MAX display delay after defrost: (0÷255min). Sets the maximum time between the end of defrost and the restarting of the real room temperature display.
Fdt Drip time: (0÷120 min) time interval between reaching defrost termination temperature and the restoring of the control's normal operation. This time allows the evaporator to eliminate water drops that might have formed due to defrost.
dPo First defrost after start-up: (y = immediately; n = after the IdF time)
dAF Defrost delay after continuous cycle: (0÷23.5h) time interval between the end of the fast freezing cycle and the following defrost related to it.

FANS

FnC Fans operating mode: **C-n**= runs with the compressor, OFF during defrost;
o-n = continuous mode, OFF during defrost;
C-Y = runs with the compressor, ON during defrost;
o-Y = continuous mode, ON during defrost;
Fnd Fans delay after defrost: (0÷255min) Interval between end of defrost and evaporator fans start.
Fct Temperature differential avoiding short cycles of fans (0÷59°C; Fct=0 function disabled). If the difference of temperature between the evaporator and the room probes is more than the value of the Fct parameter, the fans are switched on.
FSt Fans stop temperature: (-50÷50°C/122°F) setting of temperature, detected by evaporator probe, above which fans are always OFF.
Fon Fan ON time: (0÷15 min) **with** Fnc = C_n or C_y, (fan activated in parallel with compressor). it sets the evaporator fan ON cycling time when the compressor is off. With Fon =0 and FoF ≠ 0 the fan are always off, with Fon=0 and FoF =0 the fan are always off.
FoF Fan OFF time: (0÷15 min) **with** Fnc = C_n or C_y, (fan activated in parallel with compressor). it sets the evaporator fan off cycling time when the compressor is off. With Fon =0 and FoF ≠ 0 the fan are always off, with Fon=0 and FoF =0 the fan are always off.
FAP Probe selection for fan management: nP = no probe; **P1** =thermostat probe; **P2 =** evaporator probe; **P3** =configurable probe; **P4** = Probe on Hot Key plug.

ALARMS

ALC Temperature alarms configuration: (Ab; rE)
Ab= absolute temperature: alarm temperature is given by the ALL or ALU values. rE = temperature alarms are referred to the set point. Temperature alarm is enabled when the temperature exceeds the "SET+ALU" or "SET-ALL" values.
ALU MAXIMUM temperature alarm: (SET÷110°C; SET÷230°F) when this temperature is reached the alarm is enabled, after the "ALd" delay time.
ALL Minimum temperature alarm: (-50.0 ÷ SET°C; -58÷230°F when this temperature is reached the alarm is enabled, after the "ALd" delay time.
AFH Differential for temperature alarm/ fan recovery: (0,1÷25,5°C; 1÷45°F) Intervention differential for recovery of temperature alarm. It's also used for the restart of the fan when the FSt temperature is reached
ALd Temperature alarm delay: (0÷255 min) time interval between the detection of an alarm condition and alarm signalling.
dAO Exclusion of temperature alarm at startup: (from 0.0 min to 23.5h) time interval between the detection of the temperature alarm condition after instrument power on and alarm signalling.

CONDENSER TEMPERATURE ALARM

AP2 Probe selection for temperature alarm of condenser: nP = no probe; **P1** =thermostat probe; **P2 =** evaporator probe; **P3** =configurable probe; **P4** = Probe on Hot Key plug.
AL2 Low temperature alarm of condenser: (-55÷150°C) when this temperature is reached the LA2 alarm is signalled, possibly after the Ad2 delay.

B3: DIXELL OPERATING INSTRUCTIONS

Au2 High temperature alarm of condenser: (-55÷150°C) when this temperature is reached the HA2 alarm is signalled, possibly after the Ad2 delay.
AH2 Differential for temperature condenser alarm recovery: (0,1÷25,5°C; 1÷45°F)
Ad2 Condenser temperature alarm delay: (0÷255 min) time interval between the detection of the condenser alarm condition and alarm signalling.
dA2 Condenser temperature alarm exclusion at start up: (from 0.0 min to 23.5h, res. 10min)
bLL Compressor off with low temperature alarm of condenser: **n = no:** compressor keeps on working**; Y = yes,** compressor is switched off till the alarm is present, in any case regulation restarts after AC time at minimum.
AC2 Compressor off with high temperature alarm of condenser: **n = no:** compressor keeps on working**; Y = yes,** compressor is switched off till the alarm is present, in any case regulation restarts after AC time at minimum.

FOURTH RELAY

tbA Alarm relay silencing (with oA3=ALr):
n= silencing disabled: alarm relay stays on till alarm condition lasts,
y =silencing enabled: alarm relay is switched OFF by pressing a key during an alarm
oA3 Fourth relay configuration: ALr: alarm; **Lig**: light; **AuS**: Auxiliary relay; **onF**: always on with instrument on; **db =** do not select it; **dEF:** do not select it!.**; FAn:** do not select it!.**; dF2:** do not select it.
AoP Alarm relay polarity: it set if the alarm relay is open or closed when an alarm happens. **CL**= terminals 1-2 closed during an alarm; **oP** = terminals 1-2 open during an alarm

DIGITAL INPUT

i1P Digital input polarity: oP: the digital input is activated by opening the contact; **CL:** the digital input is activated by closing the contact.
i1F Digital input configuration: EAL = external alarm: "EA" message is displayed; **bAL** = serious alarm "CA" message is displayed. **PAL** = pressure switch alarm, "CA" message is displayed; **dor** = door switch function; **dEF** = activation of a defrost cycle; **AUS** =not enabled; **Htr** = kind of action inversion (cooling – heating); **FAn = not set it; ES =** Energy saving.
did: (0÷255 min) **with i1F= EAL or i1F = bAL digital input alarm delay:** delay between the detection of the external alarm condition and its signalling.
with i1F= dor: door open signalling delay
with i1F = PAL: time for pressure switch function: time interval to calculate the number of the pressure switch activation.
nPS Pressure switch number: (0 ÷15) Number of activation of the pressure switch, during the "**did**" interval, before signalling the alarm event (I2F= PAL).
If the nPS activation in the did time is reached, switch off and on the instrument to restart normal regulation.
odc Compressor and fan status when open door: no = normal; **Fan** = Fan OFF; **CPr** = Compressor OFF; **F_C** = Compressor and fan OFF.
rrd Outputs restart after doA alarm: no = outputs not affected by the doA alarm; **yES =** outputs restart with the doA alarm;
HES Temperature increase during the Energy Saving cycle : (-30,0°C÷30,0°C/-22÷86°F) it sets the increasing value of the set point during the Energy Saving cycle.

OTHER

Adr Serial address (1÷244): Identifies the instrument address when connected to a ModBUS compatible monitoring system.
PbC Type of probe: it allows to set the kind of probe used by the instrument: **PbC** = PBC probe, **ntc** = NTC probe.
onF on/off key enabling: nu = disabled; **oFF =** enabled; **ES = not set it**.
dP1 Thermostat probe display
dP2 Evaporator probe display
dP3 Third probe display- ***optional***.
dP4 Fourth probe display.
rSE Real set point: it shows the set point used during the energy saving cycle or during the continuous cycle.
rEL Software release for internal use**.**
Ptb Parameter table code: readable only**.**

8. DIGITAL INPUT (ENABLED WITH P3P = N)

The free voltage digital input is programmable in different configurations by the "**i1F**" parameter.

8.1 DOOR SWITCH INPUT (i1F = dor)

It signals the door status and the corresponding relay output status through the "**odc**" parameter: **no** = normal (any change); **Fan** = Fan OFF; **CPr** = Compressor OFF; **F_C** = Compressor and fan OFF. Since the door is opened, after the delay time set through parameter "**did**", the door alarm is enabled, the display shows the message "**dA**" and **the regulation restarts is rtr = yES.** The alarm stops as soon as the external digital input is disabled again. With the door open, the high and low temperature alarms are disabled.

8.2 GENERIC ALARM (i1F = EAL)

As soon as the digital input is activated the unit will wait for "**did**" time delay before signalling the "**EAL**" alarm message. The outputs status don't change. The alarm stops just after the digital input is de-activated.

8.3 SERIOUS ALARM MODE (i1F = bAL)

When the digital input is activated, the unit will wait for "**did**" delay before signalling the "**CA**" alarm message. The relay outputs are switched OFF. The alarm will stop as soon as the digital input is de-activated.

8.4 PRESSURE SWITCH (i1F = PAL)

If during the interval time set by "**did**" parameter, the pressure switch has reached the number of activation of the "**nPS**" parameter, the "**CA**" pressure alarm message will be displayed. The compressor and the regulation are stopped. When the digital input is ON the compressor is always OFF. **If the nPS activation in the did time is reached, switch off and on the instrument to restart normal regulation.**

8.5 START DEFROST (i1F = dFr)

It starts a defrost if there are the right conditions. After the defrost is finished, the normal regulation will restart only if the digital input is disabled otherwise the instrument will wait until the "MdF" safety time is expired.

8.6 INVERSION OF THE KIND OF ACTION: HEATING-COOLING (i1F = Htr)

This function allows to invert the regulation of the controller: from cooling to heating and viceversa.

8.7 ENERGY SAVING (i1F = ES)

The Energy Saving function allows to change the set point value as the result of the SET+ HES (parameter) sum. This function is enabled until the digital input is activated.

8.8 DIGITAL INPUTS POLARITY

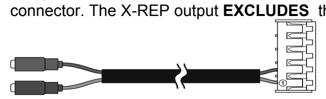
The digital input polarity depends on the "**i1P**" parameter.
i1P=CL: the input is activated by closing the contact.
i1P=OP: the input is activated by opening the contact

9. TTL SERIAL LINE – FOR MONITORING SYSTEMS

The TTL serial line, available through the HOT KEY connector, allows by means of the external TTL/RS485 converter, **XJ485-CX**, to connect the instrument to a monitoring system **ModBUS-RTU** compatible such as the X-WEB500/3000/300.

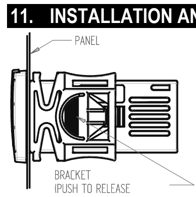
10. X-REP OUTPUT – OPTIONAL

As optional, an X-REP can be connected to the instrument, trough the HOY KEY connector. The X-REP output **EXCLUDES** the serial connection.



To connect the X-REP to the instrument the following connectors must be used CAB-51F(1m), CAB-52F(2m), CAB-55F(5m),

11. INSTALLATION AND MOUNTING



Instrument **XR70CX** shall be mounted on vertical panel, in a 29x71 mm hole, and fixed using the special bracket supplied.
The temperature range allowed for correct operation is 0÷60 °C. Avoid places subject to strong vibrations, corrosive gases, excessive dirt or humidity. The same recommendations apply to probes. Let air circulate by the cooling holes.

12. ELECTRICAL CONNECTIONS

The instrument is provided with screw terminal block to connect cables with a cross section up to 2,5 mm². Before connecting cables make sure the power supply complies with the instrument's requirements. Separate the probe cables from the power supply cables, from the outputs and the power connections. Do not exceed the maximum current allowed on each relay, in case of heavier loads use a suitable external relay.

12.1 PROBE CONNECTION

The probes shall be mounted with the bulb upwards to prevent damages due to casual liquid infiltration. It is recommended to place the thermostat probe away from air streams to correctly measure the average room temperature. Place the defrost termination probe among the evaporator fins in the coldest place, where most ice is formed, far from heaters or from the warmest place during defrost, to prevent premature defrost termination.

13. HOW TO USE THE HOT KEY

13.1 HOW TO PROGRAM A HOT KEY FROM THE INSTRUMENT (UPLOAD)

1. Program one controller with the front keypad.
2. When the controller is ON, insert the "**Hot key**" and push ⏶ key; the **"uPL"** message appears followed a by flashing **"End"**
3. Push "**SET**" key and the **End** will stop flashing.
4. Turn OFF the instrument remove the **"Hot Key",** then turn it ON again.

NOTE: the "**Err**" message is displayed for failed programming. In this case push again ⏶ key if you want to restart the upload again or remove the "**Hot key**" to abort the operation.

13.2 HOW TO PROGRAM AN INSTRUMENT USING A HOT KEY (DOWNLOAD)

1. Turn OFF the instrument.
2. Insert a **programmed "Hot Key" into the 5 PIN receptacle** and then turn the Controller ON.
3. Automatically the parameter list of the **"Hot Key"** is downloaded into the Controller memory, the "**doL**" message is blinking followed a by flashing **"End".**
4. After 10 seconds the instrument will restart working with the new parameters.
5. Remove the **"Hot Key".**.

NOTE the message "**Err**" is displayed for failed programming. In this case turn the unit off and then on if you want to restart the download again or remove the "**Hot key**" to abort the operation.

14. ALARM SIGNALS

Message	Cause	Outputs
"P1"	Room probe failure	Compressor output acc. to par. "Con" and "COF"
"P2"	Evaporator probe failure	Defrost end is timed
"P3"	Third probe failure	Outputs unchanged
"P4"	Fourth probe failure	Outputs unchanged
"HA"	Maximum temperature alarm	Outputs unchanged.
"LA"	Minimum temperature alarm	Outputs unchanged.
"HA2"	Condenser high temperature	It depends on the "Ac2" parameter
"LA2"	Condenser low temperature	It depends on the "bLL" parameter
"dA"	Door open	Compressor and fans restarts
"EA"	External alarm	Output unchanged.
"CA"	Serious external alarm (i1F=bAL)	All outputs OFF.
"CA"	Pressure switch alarm (i1F=PAL)	All outputs OFF

B4: DIXELL OPERATING INSTRUCTIONS

14.1 ALARM RECOVERY

Probe alarms **P1**", "**P2**", "**P3**" and "**P4**" start some seconds after the fault in the related probe; they automatically stop some seconds after the probe restarts normal operation. Check connections before replacing the probe.
Temperature alarms "**HA**", "**LA**" "**HA2**" and "**LA2**" automatically stop as soon as the temperature returns to normal values.
Alarms **"EA"** and **"CA"** (with i1F=bAL) recover as soon as the digital input is disabled.
Alarm "**CA**" (with i1F=PAL) recovers only by **switching off and on** the instrument.

14.2 OTHER MESSAGES

Pon	Keyboard unlocked.
PoF	Keyboard locked
noP	**In programming mode**: none parameter is present in Pr1 **On the display** or in dP2, dP3, dP4: the selected probe is nor enabled

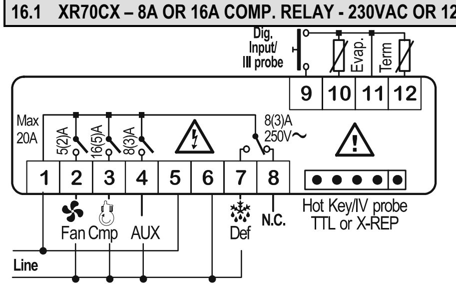
15. TECHNICAL DATA

Housing: self extinguishing ABS.
Case: XR70CX frontal 32x74 mm; depth 60mm;
Mounting: XR70CX panel mounting in a 71x29mm panel cut-out
Protection: IP20; **Frontal protection: XR70CX** IP65
Connections: Screw terminal block ≤ 2,5 mm² wiring.
Power supply: according to the model: 12Vac/dc, ±10%; 24Vac/dc, ±10%; 230Vac ±10%, 50/60Hz, 110Vac ±10%, 50/60Hz
Power absorption: 3VA max
Display: 3 digits, red LED, 14,2 mm high; **Inputs**: Up to 4 NTC or PTC probes.
Digital input: free voltage contact
Relay outputs: compressor SPST 8(3) A, 250Vac; SPST 16(6)A 250Vac
defrost: SPDT 8(3) A, 250Vac or SPST 16(6)A 250Vac
fan: SPST 5A, 250Vac or SPST 16(6)A 250Vac
aux: SPDT 8(3) A, 250Vac or SPST 16(6)A 250Vac
Data storing: on the non-volatile memory (EEPROM).
Kind of action: 1B; **Pollution grade:** 2;**Software class:** A.;
Rated impulsive voltage: 2500V; **Overvoltage Category**: II
Operating temperature: 0÷60 °C;**Storage temperature:** -30÷85 °C.
Relative humidity: 20÷85% (no condensing)
Measuring and regulation range: NTC probe: -40÷110°C (-40÷230°F);
PTC probe: -50÷150°C (-58÷302°F)
Resolution: 0,1 °C or 1°C or 1 °F (selectable); **Accuracy (ambient temp. 25°C)**: ±0,7 °C ±1 digit

16. CONNECTIONS

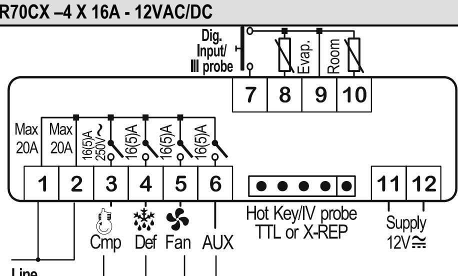
The X-REP output excludes the TTL output.. It's present in the following codes: XR70CX- xx**2**xx, XR70CX –xx**3**xx;

16.1 XR70CX – 8A OR 16A COMP. RELAY - 230VAC OR 120VAC



NOTE: The compressor relay is 8(3)A or 16(6)A according to the model.
24Vac supply: connect to the terminals 5 and 6.

16.2 XR70CX –4 X 16A - 12VAC/DC



17. DEFAULT SETTING VALUES

Labe	Name	Range	°C/°F	Level
Set	Set point	LS÷US	-5.0	- - -
Hy	Differential	0,1÷25.5°C/ 1÷ 255°F	2.0	Pr1
LS	Minimum set point	-50°C÷SET/-58°F÷SET	-50.0	Pr2
US	Maximum set point	SET÷110°C/ SET ÷ 230°F	110	Pr2
Ot	Thermostat probe calibration	-12÷12°C /-120÷120°F	0.0	Pr1
P2P	Evaporator probe presence	n=not present; Y=pres.	Y	Pr1
OE	Evaporator probe calibration	-12÷12°C /-120÷120°F	0.0	Pr2
P3P	Third probe presence	n=not present; Y=pres.	n	Pr2
O3	Third probe calibration	-12÷12°C /-120÷120°F	0	Pr2
P4P	Fourth probe presence	n=not present; Y=pres.	n	Pr2
O4	Fourth probe calibration	-12÷12°C /-120÷120°F	0	Pr2

Labe	Name	Range	°C/°F	Level
OdS	Outputs delay at start up	0÷255 min	0	Pr2
AC	Anti-short cycle delay	0 ÷ 50 min	1	Pr1
rtr	P1-P2 percentage for regulation	0 ÷ 100 (100=P1 , 0=P2)	100	Pr2
CCt	Continuos cycle duration	0.0÷24.0h	0.0	Pr2
CCS	Set point for continuous cycle	(-55.0÷150,0°C) (-67÷302°F)	-5	Pr2
COn	Compressor ON time with faulty probe	0 ÷ 255 min	15	Pr2
COF	Compressor OFF time with faulty probe	0 ÷ 255 min	30	Pr2
CF	Temperature measurement unit	°C ÷ °F	°C	Pr2
rES	Resolution	in=integer; dE= dec.point	dE	Pr1
Lod	Probe displayed	P1;P2	P1	Pr2
rEd²	X-REP display	P1 - P2 - P3 - P4 - SEt - dtr	P1	Pr2
dLy	Display temperature delay	0 ÷ 20.0 min (10 sec.)	0	Pr2
dtr	P1-P2 percentage for disply	1 ÷ 99	50	Pr2
tdF	Defrost type	EL=el. heater; in= hot gas	EL	Pr1
dFP	Probe selection for defrost termination	nP; P1; P2; P3; P4	P2	Pr2
dtE	Defrost termination temperature	-50 ÷ 50 °C	8	Pr1
IdF	Interval between defrost cycles	1 ÷ 120 ore	6	Pr1
MdF	(Maximum) length for defrost	0 ÷ 255 min	30	Pr1
dSd	Start defrost delay	0÷99min	0	Pr2
dFd	Displaying during defrost	rt, it, SEt, DEF	it	Pr2
dAd	MAX display delay after defrost	0 ÷ 255 min	30	Pr2
Fdt	Draining time	0÷120 min	0	Pr2
dPo	First defrost after startup	n=after IdF; y=immed.	n	Pr2
dAF	Defrost delay after fast freezing	0 ÷ 23h e 50'	0.0	Pr2
Fnc	Fan operating mode	C-n, o-n, C-y, o-Y	o-n	Pr1
Fnd	Fan delay after defrost	0÷255min	10	Pr1
Fct	Differential of temperature for forced activation of fans	0÷50°C	10	Pr2
FSt	Fan stop temperature	-50÷50°C/-58÷122°F	2	Pr1
Fon	Fan on time with compressor off	0÷15 (min.)	0	Pr2
FoF	Fan off time with compressor off	0÷15 (min.)	0	Pr2
FAP	Probe selection for fan management	nP; P1; P2; P3; P4	P2	Pr2
ALc	Temperat. alarms configuration	rE= related to set; Ab = absolute	Ab	Pr2
ALU	MAXIMUM temperature alarm	Set÷110.0°C; Set÷230°F	110	Pr1
ALL	Minimum temperature alarm	-50.0°C÷Set/ -58°F÷Set	-50.0	Pr1
AFH	Differential for temperat. alarm recovery	(0,1°C÷25,5°C) (1°F÷45°F)	1	Pr2
ALd	Temperature alarm delay	0 ÷ 255 min	15	Pr2
dAO	Delay of temperature alarm at start up	0 ÷ 23h e 50'	1.3	Pr2
AP2	Probe for temperat. alarm of condenser	nP; P1; P2; P3; P4	P4	Pr2
AL2	Condenser for low temperat. alarm	(-55 ÷ 150°C) (-67÷ 302°F)	-40	Pr2
AU2	Condenser for high temperat. alarm	(-55 ÷ 150°C) (-67÷ 302°F)	110	Pr2
AH2	Differ. for condenser temp. alar. recovery	[0,1°C ÷ 25,5°C] [1°F ÷ 45°F]	5	Pr2
Ad2	Condenser temperature alarm delay	0 ÷ 254 (min.) , 255=nU	15	Pr2
dA2	Delay of cond. temper. alarm at start up	0.0 ÷ 23h 50'	1,3	Pr2
bLL	Compr. off for condenser low temperature alarm	n(0) - Y(1)	n	Pr2
AC2	Compr. off for condenser high temperature alarm	n(0) - Y(1)	n	Pr2
tbA	Alarm relay disabling	n=no; y=yes	y	Pr2
oA3	Fourth relay configuration	ALr = alarm; dEF = do not select it; Lig =Light; AUS =AUX; onF=always on; Fan= do not select it; db = do not select it; dF2 = do not select it	ALr	Pr2
AoP	Alarm relay polarity (oA3=ALr)	oP; cL	cL	Pr2
i1P	Digital input polarity	oP=opening;CL=closing	cL	Pr1
i1F	Digital input configuration	EAL, bAL, PAL, dor; dEF; Htr, AUS	dor	Pr1
did	Digital input alarm delay	0÷255min	15	Pr1
Nps	Number of activation of pressure switch	0 ÷15	15	Pr2
odc	Compress and fan status when open door	no; Fan; CPr; F_C	F-c	Pr2
rrd	Regulation restart with door open alarm	n – Y	y	Pr2
HES	Differential for Energy Saving	(-30°C÷30°C) (-54°F÷54°F)	0	Pr2
PbC	Kind of probe	Ptc; ntc	1	Pr2
Adr	Serrial address	1÷247	1	Pr2
onF	on/off key enabling	nu, oFF; ES	ntc	Pr1
dP1	Room probe display	--	nu	Pr2
dP2	Evaporator probe display	--	--	Pr1
dP3	Third probe display	--	--	Pr1
dP4	Fourth probe display	--	--	Pr1
rSE	Valore set operativo	actual set	--	Pr2
rEL	Software release	--	--	Pr2
Ptb	Map code	--	--	Pr2

² Only for models XR70CX–xx**2**xx, XR70CX–xx**3**xx; XR70CX–xx**6**xx; XR70CX–xx**7**xx

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C1: SPORLAN PRESSURE-TEMPERATURE CHART

Vacuum-Inches of Mercury
Bold Italic Figures

TEMPERATURE PRESSURE CHART - at sea level

Pressure-Pounds Per
Square Inch Gauge

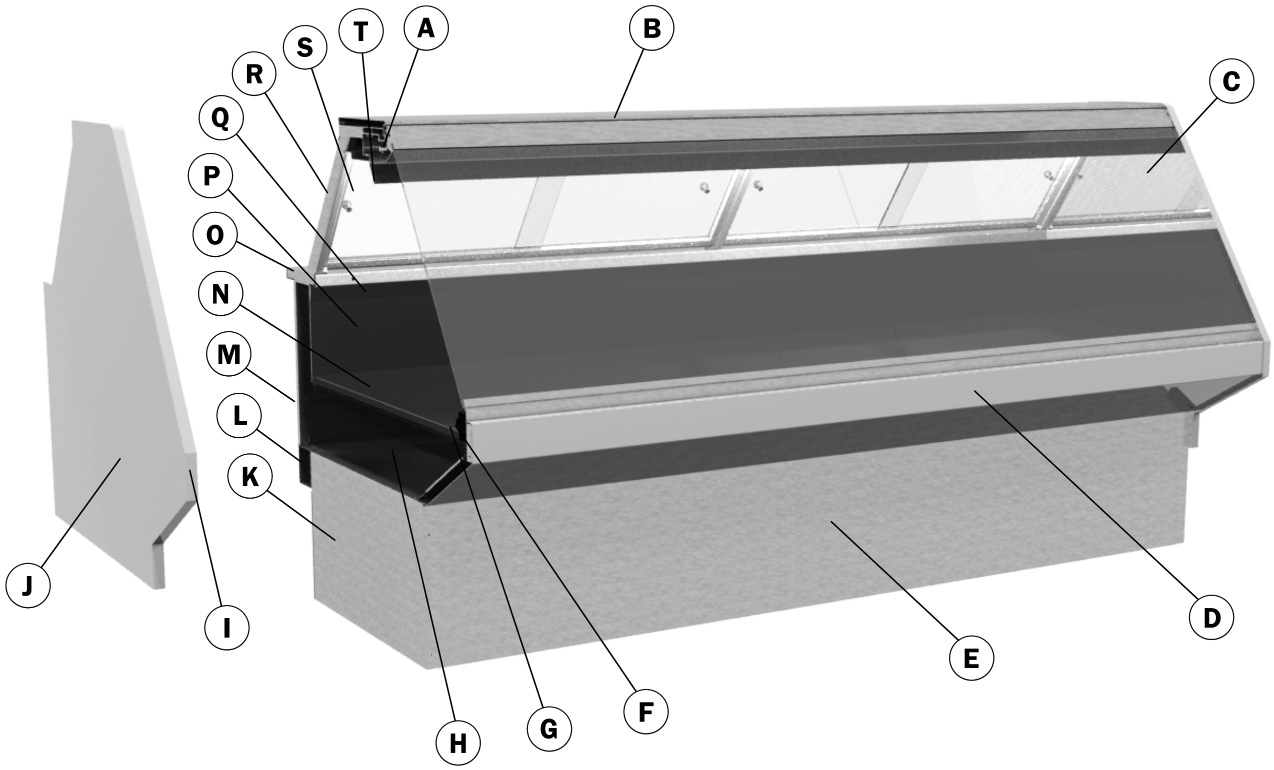
TEMPERATURE		REFRIGERANT (SPORLAN CODE)				
(°F)	(°C)	134a (J)	404A (S)	507 (P)	717 (A)	744 - CO_2
-60	-51.1	21.8	7.3	5.8	18.6	79.9
-55	-48.3	20.3	3.9	2.2	16.6	91.1
-50	-45.6	18.7	0.1	0.9	14.3	103.4
-45	-42.8	16.9	2.0	3.0	11.7	116.6
-40	-40.0	14.8	4.3	5.4	8.8	131.0
-35	-37.2	12.5	6.8	8.1	5.4	146.5
-30	-34.4	9.8	9.6	11.0	1.6	163.1
-25	-31.7	6.9	12.7	14.1	1.3	181.0
-20	-28.9	3.7	16.0	17.6	3.6	200.2
-18	-27.8	2.3	17.4	19.1	4.6	208.3
-16	-26.7	0.8	18.9	20.6	5.6	216.5
-14	-25.6	0.4	20.4	22.2	6.7	225.0
-12	-24.4	1.1	22.0	23.8	7.8	233.8
-10	-23.3	1.9	23.6	25.5	9.0	242.7
-8	-22.2	2.8	25.3	27.3	10.3	251.9
-6	-21.1	3.6	27.0	29.1	11.5	261.3
-4	-20.0	4.6	28.8	30.9	12.9	271.0
-2	-18.9	5.5	30.7	32.8	14.3	280.9
0	-17.8	6.5	32.6	34.8	15.7	291.0
1	-17.2	7.0	33.6	35.8	16.4	296.2
2	-16.7	7.5	34.6	36.9	17.2	301.5
3	-16.1	8.0	35.6	37.9	18.0	306.8
4	-15.6	8.5	36.6	39.0	18.8	312.1
5	-15.0	9.1	37.7	40.1	19.6	317.6
6	-14.4	9.6	38.7	41.1	20.4	323.1
7	-13.9	10.2	39.8	42.3	21.2	328.6
8	-13.3	10.8	40.9	43.4	22.1	334.2
9	-12.8	11.3	42.0	44.5	22.9	339.9
10	-12.2	11.9	43.1	45.7	23.8	345.7
11	-11.7	12.5	44.3	46.9	24.7	351.5

TEMPERATURE		REFRIGERANT (SPORLAN CODE)				
(°F)	(°C)	134a (J)	404A (S)	507 (P)	717 (A)	744 - CO_2
12	-11.1	13.1	45.4	48.1	25.6	357.4
13	-10.6	13.8	46.6	49.3	26.5	363.4
14	-10.0	14.4	47.8	50.5	27.5	369.5
15	-9.4	15.0	49.0	51.8	28.4	375.6
16	-8.9	15.7	50.2	53.0	29.4	381.8
17	-8.3	16.4	51.5	54.3	30.4	388.0
18	-7.8	17.0	52.7	55.6	31.4	394.3
19	-7.2	17.7	54.0	56.9	32.4	400.7
20	-6.7	18.4	55.3	58.3	33.5	407.2
21	-6.1	19.1	56.6	59.6	34.6	413.8
22	-5.6	19.9	58.0	61.0	35.7	420.4
23	-5.0	20.6	59.3	62.4	36.8	427.1
24	-4.4	21.3	60.7	63.8	37.9	433.8
25	-3.9	22.1	62.1	65.3	39.0	440.7
26	-3.3	22.9	63.5	66.7	40.2	447.6
27	-2.8	23.7	64.9	68.2	41.4	454.6
28	-2.2	24.5	66.4	69.7	42.6	461.7
29	-1.7	25.3	67.8	71.2	43.8	468.8
30	-1.1	26.1	69.3	72.7	45.0	476.1
31	-0.6	26.9	70.8	74.3	46.3	483.4
32	0.0	27.8	72.4	75.9	47.6	490.8
33	0.6	28.6	73.9	77.5	48.9	498.3
34	1.1	29.5	75.5	79.1	50.2	505.8
35	1.7	30.4	77.1	80.7	51.6	513.4
36	2.2	31.3	78.7	82.4	52.9	521.2
37	2.8	32.2	80.3	84.1	54.3	529.0
38	3.3	33.1	82.0	85.8	55.7	536.9
39	3.9	34.1	83.7	87.5	57.2	544.8
40	4.4	35.0	85.4	89.2	58.6	552.9
41	5.0	36.0	87.1	91.0	60.1	561.0

TEMPERATURE		REFRIGERANT (SPORLAN CODE)				
(°F)	(°C)	134a (J)	404A (S)	507 (P)	717 (A)	744 - CO_2
42	5.6	37.0	88.8	92.8	61.6	569.3
43	6.1	38.0	90.6	94.6	63.1	577.6
44	6.7	39.0	92.4	96.5	64.7	586.0
45	7.2	40.1	94.2	98.3	66.3	594.5
46	7.8	41.1	96.0	100.2	67.9	603.1
47	8.3	42.2	97.9	102.1	69.5	611.7
48	8.9	43.2	99.8	104.1	71.1	620.5
49	9.4	44.3	101.7	106.0	72.8	629.3
50	10.0	45.4	103.6	108.0	74.5	638.3
55	12.8	51.2	115.3	118.3	83.4	684.4
60	15.6	57.4	126.0	129.2	92.9	733.1
65	18.3	64.0	137.3	140.7	103.2	784.2
70	21.1	71.1	149.3	153.0	114.2	838.1
75	23.9	78.7	162.0	165.9	125.9	894.9
80	26.7	86.7	175.4	179.6	138.4	954.9
85	29.4	95.2	189.5	194.1	151.8	1018
90	32.2	104.3	204.5	209.3	166.1	**
95	35.0	113.9	220.2	225.4	181.2	**
100	37.8	124.2	236.8	242.3	197.3	**
105	40.6	135.0	254.2	260.1	214.4	**
110	43.3	146.4	272.5	278.8	232.5	**
115	46.1	158.4	291.8	298.5	251.6	**
120	48.9	171.2	312.1	319.2	271.9	**
125	51.7	184.6	333.3	340.9	293.3	**
130	54.4	198.7	355.6	363.8	315.8	**
135	57.2	213.6	379.1	387.8	339.6	**
140	60.0	229.2	403.7	413.0	364.7	**
145	62.8	245.7	429.6	439.5	391.0	**
150	65.6	262.9	456.8	467.4	418.7	**
155	68.3	281.0	485.5	497.0	447.8	**

To determine subcooling for R-404A use BUBBLE POINT values (Temperatures above 50°F — Gray Background); to determine superheat for R-404A, use DEW POINT values (Temperatures 50°F and below).
** = exceeds critical temperature

D1: PARTS LIST



A	Lift Glass Hardware
B	Case Top
C	Front Lift Glass
D	Die Board
E	Front Toekick
F	Air Return
G	Product Stop
H	Insulated Drain Pan
I	End Panel Trim
J	End Panel
K	End Toekick
L	Electrical Raceway
M	Outside Back
N	Bottom Deck
O	Rear Sill
P	Inside Back
Q	Air Discharge
R	Strut
S	Sliding Rear Load Doors
T	Light Guard

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
Att'n: Tom Bradshaw
Phone: 770-285-3267
tom.bradshaw@hillphoenix.com

Hillphoenix Display Case Division
1925 Ruffin Mill Road
Colonial Heights, VA 23834
Att'n: Harry Moy
Phone: 804-614-1457
harrymoy@hillphoenix.com

Hillphoenix Specialty Products Division
703 Franklin Street
Keosauqua, IA 52565
Attn Jake Bair
Phone: 319-293-8551
jake.bair@hillphoenix.com

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