

Application Engineering

Copeland™ Package Refrigeration System User Manual

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Safety

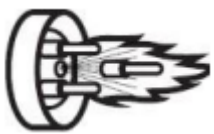
Important Safety Information

Those involved in the design, manufacture, and installation of a system, system purchasers, and service personnel may need to be aware of hazards and precautions discussed in this section and throughout this document. OEMs integrating the compressor into a system should ensure that their own employees follow this bulletin and provide any necessary safety information to those involved in manufacturing, installing, purchasing, and servicing the system.

Responsibilities, Qualifications and Training

- OEMs are responsible for system design, selection of appropriate components, integration of this component into the system, and testing the system. OEMs must ensure that staff involved in these activities are competent and qualified.
- OEMs are also responsible for ensuring that all product, service, and cautionary labels remain visible or are appropriately added in a conspicuous location on the system to ensure they are clear to any personnel involved in the installation, commissioning, troubleshooting or maintenance of this equipment.
- Only qualified and authorized HVAC or refrigeration personnel are permitted to install, commission, troubleshoot and maintain this equipment. Electrical connections must be made by qualified electrical personnel.
- Observe all applicable standards and codes for installing, servicing, and maintaining electrical and refrigeration equipment.

Terminal Venting and Other Pressurized System Hazards



If a compressor's electrical terminal pin loses its seal, pressurized oil, refrigerant, and debris may spray out. This is called "terminal venting".

The ejected debris, oil, and refrigerant can injure people or damage property. The oil and refrigerant spray can be ignited by electrical arcing at the terminal or any nearby ignition source, producing flames that may project a significant distance from the compressor. The distance depends on the pressure and the amount of refrigerant and oil mixture in the system. The flames can cause serious or fatal burns and ignite nearby materials.

Each compressor has a terminal cover or molded plug that covers electrical connections. The cover or plug helps to protect against electric shock and the risks of terminal venting. If terminal venting occurs, the cover or plug helps contain the spray of refrigerant and oil and reduces the risk of ignition. If ignition occurs, the plug or cover helps contain the flames. However, neither the terminal cover nor the molded plug can completely eliminate the risk of venting, ignition, or electric shock.

See [copeland.com/terminal-venting](https://www.copeland.com/terminal-venting) for more details about terminal venting. Additionally, a compressor's refrigerant lines keep refrigerant and oil under pressure. When removing or recharging refrigerant from this component during service, this can pose a pressurized fluid hazard.

Flammable Refrigerant Hazards



If flammable refrigerant is released from a system, an explosive concentration can be present in the air near the system. If there is an ignition source nearby, a release of flammable refrigerant can result in a fire or explosion. While systems using flammable refrigerant are designed to mitigate the risk of ignition if the refrigerant is released, fire and explosion can still occur.

See copeland.com/flammable-refrigerants for more information on flammable refrigerant safety.

Electrical Hazards



Until a system is de-energized, and capacitors have been discharged, the system presents a risk of electric shock.

Hot Surface and Fire Hazards



While the system is energized, and for some time after it is deenergized, the compressor may be hot. Touching the compressor before it has cooled can result in severe burns. When brazing system components during service, the flames can cause severe burns and ignite nearby combustible materials.

Lifting Hazards



Certain system components may be very heavy. Improperly lifting system components or the compressor can result in serious personal injury. Use proper lifting techniques when moving.

POE Oil Hazards

This equipment contains polyol ester (POE) oils. Certain polymers (e.g., PVC/CPVC and polycarbonate) can be harmed if they come into contact with POE oils. If POE oil contacts bare skin, it may cause an allergic skin reaction.

Precautions

- Always wear personal protective equipment (gloves, eye protection, etc.).
- Keep a fire extinguisher at the jobsite at all times.
- Keep clear of the compressor when power is applied.
- **IMMEDIATELY GET AWAY if you hear unusual sounds in the compressor. They can indicate that terminal pin ejection may be imminent. This may sound like electrical arcing (sizzling, sputtering or popping). However, terminal venting may still occur even if you do not hear any unusual sounds.**

- Never reset a breaker or replace a blown fuse without performing appropriate electrical testing
 - **A tripped breaker or blown fuse may indicate an electrical fault in the compressor. Energizing a compressor with an electrical fault can cause terminal venting. Perform checks to rule out an electrical fault.**
- Disconnect power and use lock-out/tag-out procedures before servicing.
 - Before removing the terminal cover or molded plug, check that ALL electrical power is disconnected from the unit. Make sure that all power legs are open. (Note: The system may have more than one power supply.)
 - Discharge capacitors for a minimum of two minutes
 - Always use control of hazardous energy (lock-out/tag-out) procedures to ensure that power is not reconnected while the unit is being serviced.
- Allow time for the compressor to cool before servicing.
 - Ensure that materials and wiring do not touch high temperature areas of the compressor.
- Keep all non-essential personnel away from the compressor during service.
 - For A3 refrigerants (R290) remove refrigerant from both the high and low sides of the compressor. Use a recovery machine and cylinder designed for flammable refrigerants. Do not use standard recovery machines because they contain sources of ignition such as switches, high- and low-pressure controls and relays. Only vent the R290 refrigerant into the atmosphere if the system is in a well-ventilated area.
- Never install a system and leave it unattended when it has no charge, a holding charge, or with the service valves closed without electrically locking out the system.
- Never use a torch to remove the compressor. Only tubing cutters should be used for both A2L and A3 refrigerants.
- Always wear appropriate safety glasses and gloves when brazing or unbrazing system components. Note that the compressor is to never be removed using a brazing torch (as noted above), only system components that require brazing/unbrazing.
- For systems using flammable refrigerants, extra purging is necessary during brazing. When brazing, proper warnings or instructions should be in place to prevent accidents. It is highly advised that technicians dealing with flammable refrigerants undergo specialized training to fully grasp all safety protocols and procedures.
- Charge the system with only approved refrigerants and refrigeration oils.
- Keep POE oils away from certain polymers (e.g., PVC/CPVC and polycarbonate) and any other surface or material that might be harmed by POE oils. Proper protective equipment (gloves, eye protection, etc.) must be used when handling POE lubricant. Handle POE oil with care. Refer to the Safety Data Sheet (SDS) for further details.
- Before energizing the system:

1. Securely fasten the protective terminal cover or molded plug to the compressor, and
2. Check that the compressor is properly grounded per the applicable system and compressor requirements.

Signal Word Definitions

The signal word explained below are used throughout the document to indicate safety messages.



DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Unit Information

Introduction

The Copeland Package Refrigeration System used with R-290 (Propane) Configurations: Copeland Package Unit is available in different configurations depending on refrigeration temperature range:

- i. Medium Temperature: Evaporating Temperature range from -5F to 25F
- ii. Low Temperature: Evaporating Temperature range from -30F to 0F

Nomenclature

The Copeland Package Refrigeration System follows the Copeland M-Line Condensing Unit Product Line Nomenclature. For additional information on this product, please refer to the Online Product Information accessible on www.copeland.com.

General M-Line Nomenclature

XXXX X X XXX-X X X-XXX
 12 34 5 6 7 8 9 10 11

- 1. Unit Family Series
- 2. Refrigerant
- 3. Type of Design
- 4. Temperature Application
- 5. Standard Unit (-) or Evac and Charge (C)
- 6. Model Variation
- 7. Nominal HP
- 8. Compressor Motor Type
- 9. Compressor Motor Protection
- 10. Typical Electrical Codes
- 11. Bill of Material

Low Temperature PRU**PUAL C Q 084-C A A-BOM**

12 34 5 6 7 8 9 10 11

1. P = Package Unit (Hermetic Compressor)
2. U = R290 (Propane)
3. A = Air Cooled Steel Base
4. L = Low Temperature
5. C = Evac and Charge
6. Model Variation
7. Nominal HP
8. C = Single Phase, Capacitor Run – Capacitor Start
9. A = Protection Type: External Inherent Protection – One Protector, (Line Break)
10. A = 60 Hz, 115-1
11. Bill of Materials

Medium Temperature PRU**PUAP C Q 020- I A A-BOM**

12 34 5 6 7 8 9 10 11

1. P = Package Unit (Hermetic Compressor)
2. U = R290 (Propane)
3. A = Air Cooled Steel Base
4. P = Multiple Temperatures
5. C = Evac and Charge
6. Model Variation
7. Nominal HP
8. I = Single Phase, Induction Run – Capacitor Start
9. A = Protection Type: External Inherent Protection – One Protector, (Line Break)
10. A = 60 Hz, 115-1
11. Bill of Materials

Operating Envelope

The operating envelope for the Copeland Package Refrigeration System can be found in AE4-1305 & AE4-1344 by following the compressor model number. The bulletin information can be found in the Online Product Information at www.copeland.com/OPI.

See

[AE4-1305 Copeland “A” Model Compressors.](#)

[AE4-1344 Copeland “R” Model Compressors.](#)

Application

Application and limitation of use:

- a. Intentional use: Copeland Package Refrigeration system is used for indoor commercial refrigeration systems. This system is using air as condensing media.
- b. Unintentional use: Copeland Package Refrigeration system has been designed for all the uses declared in "Intentional Use" section as listed above.
 - It is NOT possible with this Package system:
 - i. Using different refrigerant gas other than listed on unit nameplate.
 - ii. Use the packaged unit without protections.
 - iii. Applying additional labels over the safety or instruction labels.
 - iv. Tamper with the electrical equipment and/or safety devices.
 - v. Running the packaged unit with the values other than recommended envelop from Copeland.
 - vi. Step or climb on to the packaged unit.
- c. Application Conditions: Copeland Package system unit CANNOT be used in following conditions:
 - Ambient temperature outside 40F to 120F
 - i. Note that elevated case temperature is likely at upper end of ambient temperature range
 - Poor ventilations area's
 - Outdoor (installation), exposed to atmospheric agents.
 - Potentially explosive atmosphere
 - Presence of radiation (ionizing and non)

Approved Refrigerants and Oils

The Copeland Package Refrigeration Systems are supplied with an initial oil charge. See [Form 93-11](#) for a complete list of all Copeland approved lubricants based of the compressor information.

CAUTION: POE oil must be handled carefully and the proper protective equipment (gloves, eye protection, etc.) must be used when handling POE lubricant. POE must not come into contact with any surface or material that might be harmed by POE, and spills should be cleaned up quickly with paper towels, soap, and water.

Mounting Information

General installation instructions:

- a. As the compressor from the package system is pre-charged with oil, keep unit in upright position. Never overturn the unit.
- b. Refrigerant is pre-charged in the unit. If there is a leak/loss of charge then call the service technician immediately for service
- c. Mounting locations are predefined by the cabinet manufacturer and should be followed.
- d. Monitor the lifting movement from a safe distance. NEVER stand under the load.
- e. Connect to the recommended power supply (refer unit nameplate data)

Starting Characteristics

The Copeland Package Refrigeration Systems are designed for 115 V single phase power. These units are supplied with the needed start components from production. Please refer to www.copeland.com/OPI for drawings and replacement parts.

For General Copeland Compressor Information

www.copeland.com/OPI (Copeland Online Product Information)

[AE4-1305 Copeland “A” Model Compressors](#)

[AE4-1344 Copeland “R” Model Compressors.](#)

[Form 93-11](#) (Approved Refrigerants & Oils)

[AE-1380 Guide for the Use of R-290 Refrigerant in Copeland Refrigeration](#)

[AE5-1340 Care and Cleaning of Air-Cooled Condensing Units](#)

Service Procedures

New Installation

WARNING: A minimum of two people are required for PRU installation or removal.

CAUTION: Do not stand on top of a Guardian Merchandiser. The top of the case is not designed to support the weight of a person.

CAUTION: Do not remove the evaporator cover bolts unless servicing evaporator components.. The evaporator cover creates a seal that may leak if reinstalled improperly. See Service Instructions for details on evaporator service.

Note: The following procedure will name specific tasks for technician one and technician two. Technician one will be positioned on the left side of the PRU when facing the front of the PRU. Technician two will be positioned to the right side of the PRU when facing the front of the PRU.

Note: Ensure the PRU being placed matched the cooler or freezer.

1. Remove the packaging from the opening on top of the display case.
2. Place the PRU in front of the display case. The insulated enclosure shall be oriented towards the rear of the display case.
3. Technician one and technician two will lift their respective side of the PRU. Place the rear of the PRU on top of the display case (See Figure 1)
 - a. **CAUTION:** Do not push the PRU completely onto the display case. Pushing the PRU completely on top of the display case can risk in the PRU falling behind the display case and will make alignment more difficult.



Figure 1: Lifting the PRU

4. Both technician one and technician two will slide the PRU towards the rear of the display case until a maximum of 6 inches of the PRU overhangs the front of the display case.
5. Technician one will maneuver toward the front of the PRU while keeping at least one hand on the unit at all times.
6. Technician two will move to the top of a step ladder placed in front of the display case.
 - a. **CAUTION:** never stand on the very top step of a step ladder.

7. Technician two will orient the PRU to align the mounting holes as technician one pushes the PRU toward the rear of the display case (See Figure 2)
 - a. Note: using an 18" socket extension is recommended to reach the center-rear mounting bolt.



Figure 2: Aligning the PRU

8. Attach the PRU to the display case using the 7 mounting bolts provided. Torque the bolts using a cross pattern (See Figure 3)

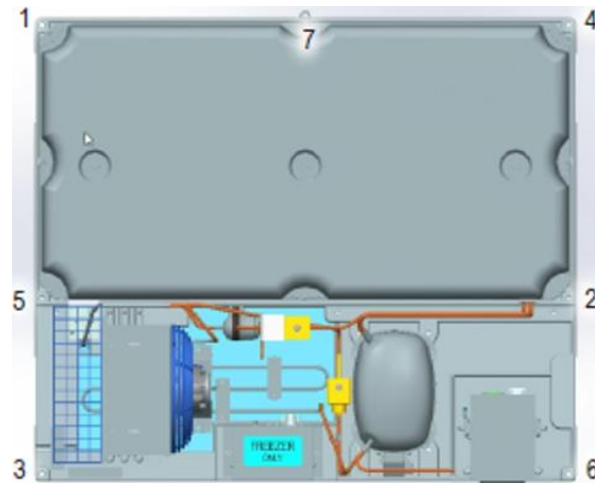


Figure 3: PRU Torque Order

9. Prime the trap on the PRU with 2 fluid ounces of water (See Figure 4)

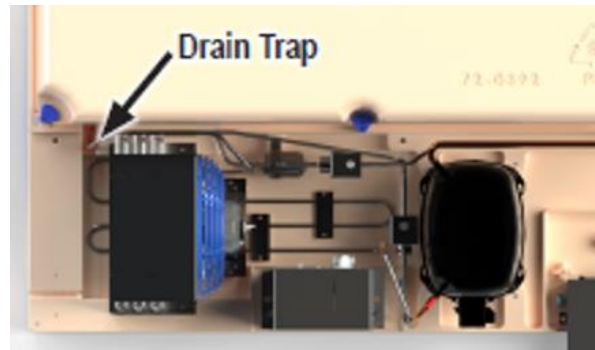


Figure 4: Trap Location

10. Connect and apply power to the display case and PRU.

PRU Removal & Replacement

WARNING: A minimum of two people are required for PRU installation or removal.

WARNING: Always disconnect power source before beginning removal of PRU.

CAUTION: never stand on the very top step of a step ladder.

Removal:

Note: The following procedure will name specific tasks for technician one and technician two. Technician one will be positioned on the left side of the PRU when facing the front of the PRU. Technician two will be positioned to the right side of the PRU when facing the front of the PRU.

1. Disconnect power to the display case and PRU.
2. Remove 7 mounting bolts in opposite order as shown in Figure 3, releasing the PRU from the case.
3. Technician one and two will work together to pull the PRU towards the front of the case, with a maximum of 6 inches overhanging off the front of the case.
4. Technician one and technician two will lift their respective side of the PRU, removing the PRU from the top of the case. Set PRU on the ground in front of the case.
5. Plug the PRU connections once removed (on both PRU and case) to prevent excess moisture from being introduced to the system.

Note: When reinstalling a replacement PRU, utilize all instructions from the “New Installation” section. Keep in mind that the case may be cold during re-install, so check the case for free water (on ceiling, shelves, etc.) and remove/wipe away.

Cleaning, Maintenance, and Service

Safety Precautions:

WARNING: Always turn off or disconnect the electrical power source before cleaning the condenser coil or performing any maintenance.

Condenser Fins Cleaning:

- Condenser fins can accumulate dirt over time, which leads to high condensing temperatures and poor unit performance.
- Regular cleaning is recommended, typically at least once every two months, depending on the environment.
- Use a liquid detergent diluted with clean water for the service.
- Before washing use a light brush in the direction with the fins to remove heavy deposits.

Electrical Connections:

- Check the tightness of electrical connections occasionally to ensure safe operation.

Routine Leak Test:

- Inspect all joints for leaks during site visits.
- Perform a leak test on all joints at least once a year using a refrigerant “sniffing” device.

Condenser Fan & Motor

- Annually inspect fans and motors. Fastenings may loosen, bearings may wear, and fans may need cleaning to remove solid deposits that can cause imbalance.

Service Parts and Procedures:

- See Table 1 for list of serviceable parts. For any questions regarding replacement parts, contact your Copeland Application Engineer.

Service Component
Motor-Fan
BLADE - FAN
Controller -XR60CH
RELAY-QUICK CONNECT
COIL
MOTOR-FAN EVAP
BOX-INSULATOR
SEAL-INSULATOR BOX
GASKET-EVAP FAN (2)
GASKET-INLET DUCT
GASKET-INSERT BASE
COVER-TONGUE TRAP
COVER-TRAP TOP
SCREW-FLAT HEAD

Table 1: Low Temp Service Parts

- If servicing a component related to the evaporator or under the insulator box, use the instructions in Figure 5.

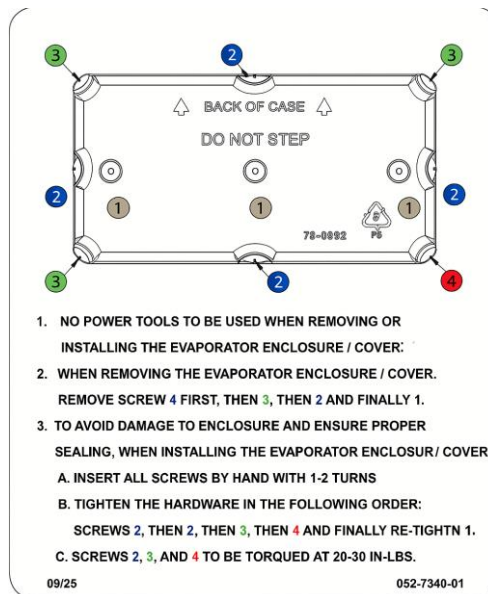


Figure 5: Insulator Box Assembly Instruction

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