Installation Instructions

Model H and L Compressors Mineral and POE Oil

Model CRHH
Model CRHL
Model CRHC
Model CRHD

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

June 2020 **PART-SVN236B-EN**

Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

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

⚠CAUTION Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.

NOTICE Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs and HCFCs such as saturated or unsaturated HFCs and HCFCs.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury. All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes.

⚠WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labeling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

⚠ WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Trane personnel should always follow local regulations.**

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Model Number Descriptions

CRHH and CRHL Compressors

Digit 1— Unit Type

C = Compressor

Digit 2 — Compressor Type

R = Reciprocating

Digit 3 — Motor Type

H = Hermetic

Digit 4 — Compressor Model

H = Model H Compressor
L = Model L Compressor
C = Model H Classic Compressor
D = Model L Classic Compressor

Digit 5, 6, 7 — Nominal Tons

Model H and C
062 = 6.2 Ton, 3 Cylinder, Small Shell
075 = 7.5 Ton, 3 Cylinder, Small Shell
083 = 8.3 Ton, 3 Cylinder, Small Shell
100 = 10 Ton, 3 Cylinder, Small Shell

Model L and D
075 = 7.5 Ton, 3 Cylinder, Large Shell
100 = 10 Ton, 3 Cylinder, Large Shell

Digit 8 — Motor Voltage and Frequency

D = 575-60-3
J = 200/230-60-3
= 200/220-50-3
K = 400-50-3/460-60-3
X = 380-60-3

Digit 9— Number of Cylinders that Unload

0 = No Unloading

Digit 10, 11 — Design Sequence

C1 = AO Smith New

Digit 12 — Unloader Control and Method

0 = No Unloading

Digit 13 — Basic Compressor Variation

0 = Standard Compressor
6 = Compressor with Grade 68 POE Oil

Digit 14— Manufacture Type

N = New Unit (Model C, D, L and H Only)

Digit 15 — Crankshaft

0 = No Selection Available

Digit 16 — Housing

K = No Selection Available

Digit 17 — Valve Cage or Plate

0 = No Selection Available

Digit 18 — Sight Glass

C = No Selection Available

Digit 19 — Seal Type

0 = No Selection Available

Warranty Implications

Trane warranties do not apply if any refrigerant other than Trane design approved refrigerants are used in the product application. For example, a mineral oil compressor must only be used in an R-22 application.

Trane warranties do not apply if the compressor motor failure is caused by a single phase condition.

Single phasing of a motor is caused by conditions external to the compressor motor itself and therefore is not covered under warranty.

General Information

For alternative refrigerant use in R-22 equipment, refer to *What You Need to Know About R-22* (REFR-SLB002-EN).

Equipment operating with R-22 is not required to be changed to an alternative refrigerant. As long as the system has no leaks, it can continue to be used and serviced with R-22. Even with proper precautions in place, using an alternative refrigerant in a system designed for R-22 can result in decreased service life, decreased system efficiency, higher operating costs, and even catastrophic equipment failure.

A concern using an R-22 alternative refrigerant such as R-407C is the compatibility of the refrigerant with the oil used to lubricate the compressor. Most alternative refrigerants for R-22 do not mix well with the mineral oil lubricant used in systems previously charged with R-22. The inability of the alternative refrigerant to effectively mix with and consequently carry the lubricating oil through the system causes compressors to fail in systems that have been converted without a change of oil type. When converting to an alternative refrigerant for R-22, ensure that the lubricant oil is compatible with the replacement refrigerant to ensure proper lubrication and oil return within the compressor.

Trane authorizes the use of Polyolester (POE) oil with R-407C refrigerant in model H and L compressors specifically configured and labeled for R-407C by the factory.

Using the model number data in the "Model Number Descriptions," p. 5, confirm that the compressor being installed has the correct oil for the unit refrigerant.

Trane model H and L compressors are fully hermetic compressors which makes it very difficult to sufficiently drain them of oil as required with a refrigerant change. Trane does NOT recommend or endorse field exchange of oil type in Model H and L compressors.

Notes:

- *Model H and L compressors designed for R-22 applications ship with OIL00057 (mineral oil).*
- *Model H and L compressors designed for R-407C applications ship with OIL00078 (POE oil).*

Installation

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

R-22 Unit Applications

Figure 1. R-22 compressor, Model H (left) and Model L (right)

Note: *R-22 Model H and L compressors are painted red.*

Using the model number data in the "Model Number Descriptions," p. 5, confirm that the compressor being installed has the correct oil for the unit refrigerant.

Check the model number and confirm for R-22 (digit 13 should be 0), and proceed to "Mounting Isolator Kit," p. 10.

R-407C Unit Applications

Figure 2. R-407C compressor, Model H (left) and Model L (right)

Important: *Prior to installing replacement compressor/s, the system in which the compressor is used must be carefully cleaned and prepared for change to R-407C refrigerant. Converting a system previously lubricated with mineral oil to POE oil is a complex process and therefore, it should be performed by a trained and experienced technician.*

Check model number and confirm POE oil for R-407C (digit 13 should be 6).

If replacing a R-407C compressor in an existing R-407C system, use good service practices. Proceed to "Mounting Isolator Kit," p. 10.

1. While the system is still operating with the original R-22 refrigerant, record the current operating conditions (refrigerating capacity) and the performance data.

   Check the system operating conditions, particularly the suction and discharge absolute pressures (pressure ratio) and suction superheat at the compressor inlet.

2. While the system is still charged with the original R-22 refrigerant, thoroughly check the system for any leaks and identify repairs.

3. Run the compressor for at least half an hour under steady conditions to allow as much oil as possible to return to the compressor.

⚠WARNING

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

4. Reclaim the R-22 refrigerant for reuse.

   Properly recover the R-22 refrigerant from the system using appropriate equipment and an approved refrigerant reclaim cylinder. Weigh the recovered refrigerant. This number can be used to determine the initial new amount to be filled.

5. Replace the filter drier and all elastomer seals.

   Filter driers are usually replaced in the course of regular maintenance. Trane recommends replacing ALL the essential seals in the system (including manual valves, Schrader valves, O-rings, solenoid valves, and anywhere an elastomer seal is used). To prevent refrigerant loss, conduct thorough leak tests before and after the change.

6. Evacuate the system and check for leaks.

   Remove any remaining air or other gases as well as moisture from the system, and draw a vacuum (0.014 psi absolute).

NOTICE

Compressor Failure!

Failure to sufficiently clean and prepare the system could result in poor lubrication and damage to internal components, causing the compressor to fail.

7. Clean the system and make required repairs to leaks.

NOTICE

Compressor Damage!

POE oil is hygroscopic. It absorbs water directly from the air. This water is nearly impossible to remove from the compressor oil and can result in compressor failures. To prevent POE oil from absorbing water, the system should not remain open for longer than necessary. When open, dry nitrogen should flow through the piping. Only new oil containers should be used for service and maintenance. Always use the smallest container size required for the job requirements. Always leave the oil container tightly sealed until time of use. Do not reuse oil that has been opened.

8. Clean the system by removing all mineral oil used with R-22. Then, replace it with the polyolester (POE) oil that is compatible with the new refrigerant.

   When mineral oil has been previously used, the new POE oil acts to release dirt particles and foreign bodies in the system. POE oils are generally more abrasive than mineral oils and may pick up additional foreign material in the system, causing damage to the compressor. Trane recommends using suction line filters to remove dirt particles and foreign material in the system. Residual mineral oil must NOT exceed 3 percent of the total oil charge when cleaning the system for change to POE oil.

   Note: *Several oil and filter changes can be required to sufficiently remove residual mineral oil and contaminants from the system.*

NOTICE

Compressor Damage!

Failure to follow instructions could result in irreparable compressor damage. Do NOT fill any liquid refrigerant into compressor.

9. Blow clean the suction line, liquid line, and evaporator using regulated dry nitrogen.
10. Evacuate and leak check system before adding refrigerant.
11. Charge the system with the new refrigerant.

    Remove the refrigerant from the charging cylinder ONLY in the liquid state. Use a manifold or flow control valve to allow the refrigerant to expand into the system. Normally, the new charge is smaller than the original R-22 charge. In some cases, however, a larger charge may be needed. The optimal charge depends on the design of the system and the operating conditions. The initial charge is about 85 percent of the original R-22 charge; the total charge is about 95 percent.

    Note: *These values apply only to systems where no changes to mechanical components affecting the capacity of the system were made during the refrigerant change.*

NOTICE

Compressor Damage!

Liquid refrigerant that reaches the compressor during operation can cause oil level problems in the compressor and rapid compressor failure.

12. Start the system and wait until readings stabilize. Record the operating conditions. Compare operating conditions with the data taken before the change. The pressure ratio should be similar (discharge pressure/ suction pressure, based on absolute pressure measurement). Adjust the refrigerant charge.

    If the charge is insufficient (noticeable as superheating at the compressor discharge or subcooling at the condenser discharge), add refrigerant in small amounts until operating conditions reach desired values. Use appropriate pressure-temperature tables to compare the pressures and temperatures and to calculate the optimal values for superheating and subcooling for R-407C.

    Note: *The superheat at the compressor inlet should be the same as with the original R-22 refrigerant.*

13. Check for leaks and repair them.

Important: *Conduct thorough leak tests. Some leaks may not appear until after the system has been charged with the new refrigerant.*

14. Document the refrigerant change.

    A permanent label clearly identifying the refrigerant and the oil type used in the compressor is attached to the compressor at the Trane factory. Trane recommends attaching a label clearly identifying the refrigerant and the oil type used in the system in a prominent location on the cooling system. This is vital for future service to the system and is a code requirement in the United States. Change of the refrigerant or replacement of other components like the refrigeration oil should also be prominently noted in the on-site documentation of the system.

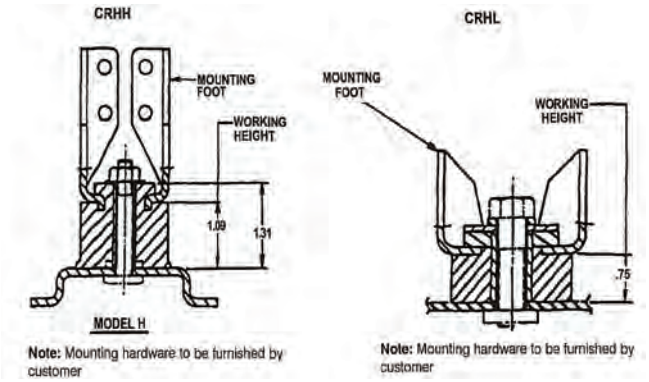
Mounting Isolator Kit

The recommended method of mounting the CRHH and CRHL compressor is to use resilient mounting isolators.

CRHH

The mounting isolator consists of a one-piece isolator and steel sleeve. When installing the isolator, slip each isolator into the mounting hole in the compressor foot. Refer to the following figure.

Figure 3. Isolator installation



Install the metal sleeve inside the isolator. After this, install the customer-supplied mounting hardware, 5/16-in. cap screw and nut used to secure the compressor.

It is recommended that a flat washer be used on top of the isolator to prevent crushing the isolator. The cap screw or nut used to secure the compressor should be tightened up against the metal sleeve. Operating and shipping positions of the isolator are the same.

CRHL

The mounting isolator kit consists of upper and lower isolator and a steel sleeve. When installing the isolator, slip the lower isolator into the mounting hole in the compressor foot. Install the sleeve inside the lower isolator. Finally, install the upper isolator on top.

It is recommended that a flat washer be used on top of the upper isolator to prevent crushing of the isolator. A 7/16-in. cap screw and nut should be used to fasten the compressor to the unit. The cap screw and nut should be tightened up against the steel sleeve. Refer to the previous figure. The operating and shipping positions of the isolator are the same.

Refrigeration Connections

CRHH

The connections are copper tubes suitable for sweat-type braze connections. The compressor data sheets provide connection size information. When brazing the refrigerant piping, always use nitrogen purge to prevent the formation of copper oxides. The presence of copper oxides in the compressor is detrimental to the reliability of the compressor.

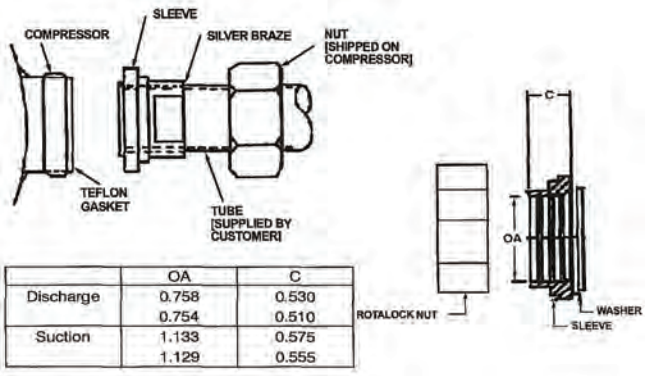
CRHL

The refrigerant connections are rotalock-threaded connections.

Optional sleeves are available to allow refrigerant piping to be connected to the compressor. The optional sleeve package consists of two steel sleeves, a 7/8 in. discharge connection and 1-1/8 in. suction connection, and gaskets, one each for the suction and discharge connections.

The rotalock nuts shipped on the compressor are to be reused to mount the sleeves on the compressor. Refer to the following figure.

Figure 4. Rotalock sleeve installation



	OA	C
Discharge	0.758	0.530
	0.754	0.510
Suction	1.133	0.575
	1.129	0.555

Table 1. Threaded connection sizes (in)

Suction	Discharge
1.75	1.25
1.25 I.D.	0.75 I.D.

Whenever brazing the refrigerant piping, always use a nitrogen purge to prevent the formation of copper oxides. The presence of copper oxides in the compressor is detrimental to the reliability of the compressor.

Evacuate and leak check system before adding refrigerant.

Electrical Connections

⚠WARNING

Hazardous Voltage!

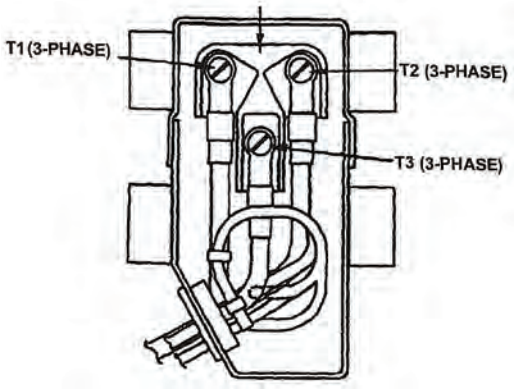
Failure to disconnect power before servicing could result in death or serious injury. Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized.

Power Connections

The electrical connections for both the CRHH and CRHL compressors are screw type and are included with the mounting isolator kit.

The recommended method of making the electrical connections is to use a ring type terminal on the power wire and attach the ring terminal to the compressor using #10-32 by 5/16-in. screws supplied. The maximum torque to be applied to the fastening screws is 25 in·lb. Refer to the following figure.

Figure 5. Power connections



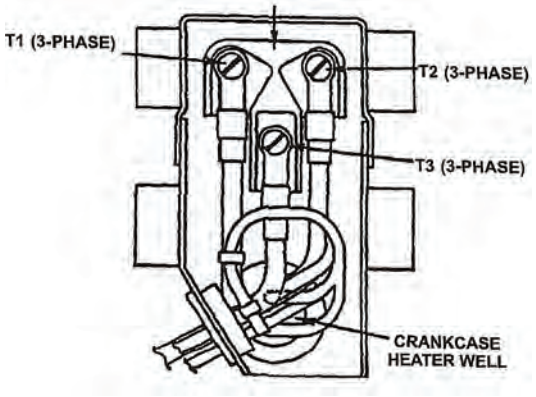
Crankcase Heaters

CRHH

The leads on the crankcase heater are 18-gauge copper wire and are six inches long. The crankcase heater and leads are located inside the compressor terminal junction box. The insulation rating of the wire is 600 volts at 90°C.

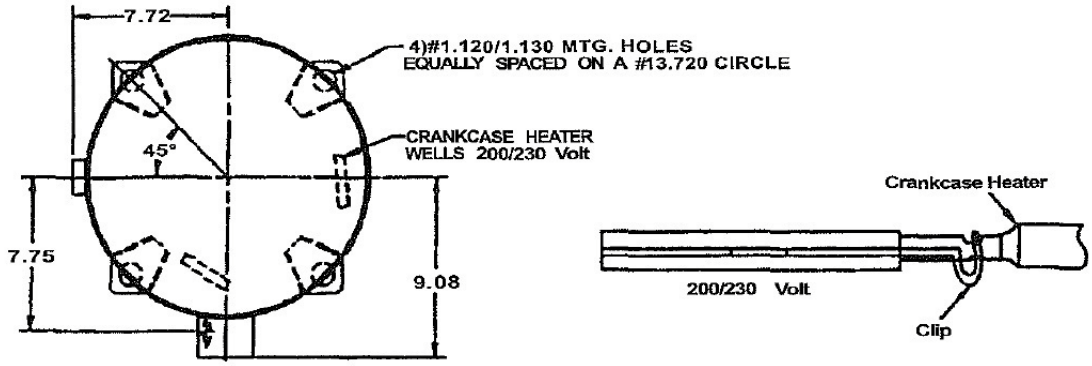
The crankcase heater is 60 watt insertion-type heater. Unless specified otherwise, the crankcase heater voltage is the same as the motor voltage. Refer to the following figure.

Figure 6. Crankcase heater location (insertion heater)



Only copper wire should be used for the power wiring to the compressor terminals. It is recommended that the crankcase heater be energized a minimum of eight hours before starting the compressor.

Figure 7. Crankcase heater installation—insertion type



CRHL

The CRHL uses two different types of crankcase heaters:

- Insertion-type for 200/230 volt compressors (refer to Figure 7, p. 11).
- Belly-band type for 460 and 575 volt compressors (refer to Figure 8, p. 12).

Figure 8. Crankcase heater installation—belly-band type (CRHH 460, 575V)

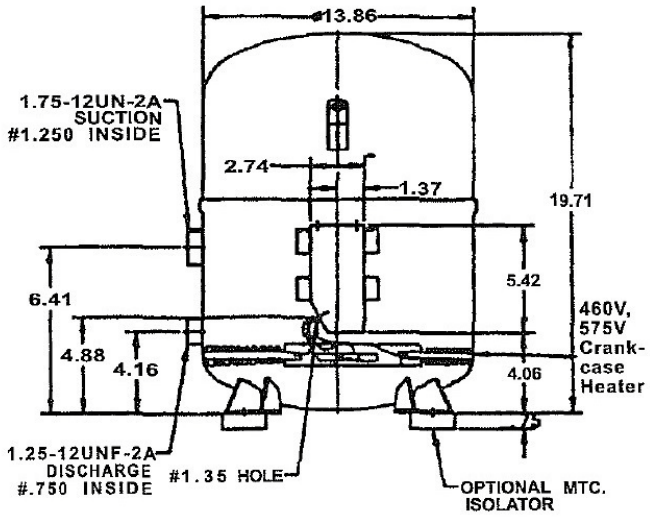
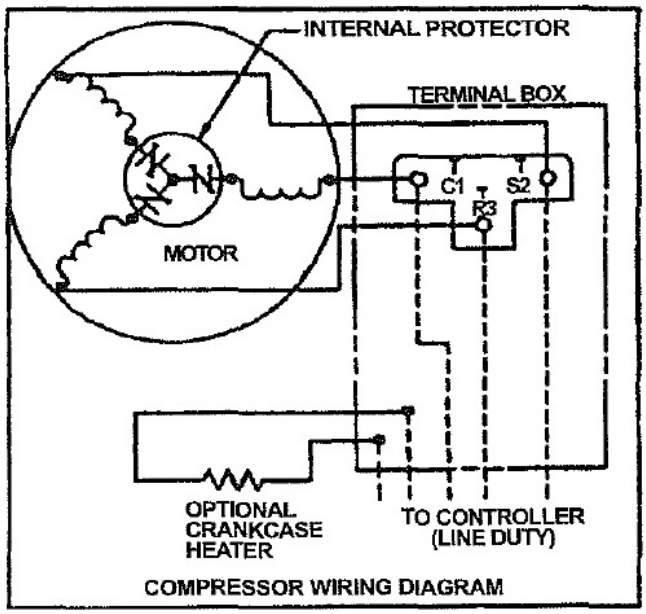


Figure 9. Wiring diagram for optional crankcase heater



The 200/230 volt compressors use two insertion-type heaters mounted on the crankcase heater wells provided on the lower shell of the compressor and held in place with a clip. A heat conductive paste should be used when installing the heaters into the wells to increase the effectiveness of the heaters. The 230 volt insertion heater is rated at 65 watts each. The leads on the insertion heaters are 18-gauge stranded copper wire. The insulation rating of the wire is 600 volts at 90°C.

The 460 and 575 volt crankcase heaters are belly-band heaters (refer to Figure 8, p. 12). The 460 volt heater is rated at 92 watts. The 575 volt heater is rated at 60 watts.

When utilizing a belly-band heater, only one is required. It is recommended that the heater be installed as shown in Figure 9, p. 12. The maximum torque applied to the belly-band heaters tightening screw is 20 in·lb. The leads on the belly-band heater are 10-gauge stranded copper wire. The insulation rating is 600 volts at 150°C. The crankcase heater voltages will be the same as the motor voltage.

Start-Up

Start the compressor and record the result of your work and file for future reference.

Job Name	
Job Address	
Unit Model	
Unit S/N	
Old Compressor S/N **Note:** Make a note of the refrigerant removed from the equipment	
New Compressor S/N **Note:** Make a note of the refrigerant being used in the equipment	
Date Installed	
Installed by	
Voltage at Unit (unit running)	
Amperage Draw of Compressor	
Control Voltage with Unit Operating	
HPC Trip Pressure (if applicable)	
LPC Trip Pressure (if applicable)	
Discharge or Liquid Line Pressure	
Suction Pressure	
Suction Superheat	
Unit Cycled from Thermostat; Function is proper	
Indoor Air Flow Checked	
Outdoor Air Flow Checked	

Troubleshooting

Failure of a compressor after startup is usually the result of system deficiencies. Failure to identify and correct the cause of this failure may lead to a second premature failure.

The following steps are recommended:

1. Determine if the failure is electrical or mechanical. Note that an electrical failure does not rule out the possibility of a mechanical failure.
2. If the failure is electrical, check for system contamination using an acid test kit for oil analysis. This step determines if a suction clean-up filter drier is needed.

   In case of severe burn in a heat pump, the suction line accumulator and 4-way valve should be replaced. Look for defective contactors, loose connections, unbalanced voltage, or defective starting components. Review the external control system including thermostats, night set-back control, time clocks, etc.
3. If the failure is mechanical, there is a good probability that it was caused by loss of refrigerant flow control. Defective expansion valves, restricted air flow, excessively long or oversized liquid line, and defective or improperly selected components such as hot gas bypass or evaporator control devices are the probable reasons.
4. If loss of oil is a problem, tip the old compressor over, drain and measure oil. The approximate operating oil charge should be as follows:
   - CRHH - 6 1/4, 7 1/2, 8.3 and 10; 6 to 7 pints
   - CRHL -7 1/2 and 10; 9 to 10 pints

   The oil types should be as follows:
   - For R-22 applications, use OIL0005 mineral oil.
   - For R-407C applications, use OIL00078 POE oil.

   If the amount of oil is significantly below the approximate oil charges shown above, look for the cause of oil loss. Look for oversize receivers or suction accumulators, oversize suction lines, improperly formed suction line traps, or poorly designed refrigerant piping.
5. Oil appearance indicates the following:
   - Dark and thick oil indicates a general motor burn. Clean up is mandatory.
   - Discolored and slightly odorous oil indicates a possible spot burn or probable dirty system due to copper oxides generated during installation of system without use of inert gas. Suction line filter is suggested.
   - Fine aluminum particles in oil indicates the rod failure or excessive mechanical wear. Look for liquid refrigerant flood back. Compressor is being seriously diluted with refrigerant.
   - Clean and sweet condition of oil indicates that there was no burn out, no system contamination problems, or no excessive wear. In this case, a broken valve or seized main bearing are possibilities depending on other symptoms noted. This suggests loss of refrigerant flow control.
   - New Liquid Line Drier provides insurance for the new compressor against the inclusion of moisture or other contaminants. Trane recommends that a new liquid line filter drier be installed.
6. Use a vacuum pump for evacuation, purging is not enough. Pump down to 2.5 millimeters mercury column absolute pressure (2500 microns).
7. Charge the refrigeration systems accurately. Weigh the charge in. Do not guess.

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