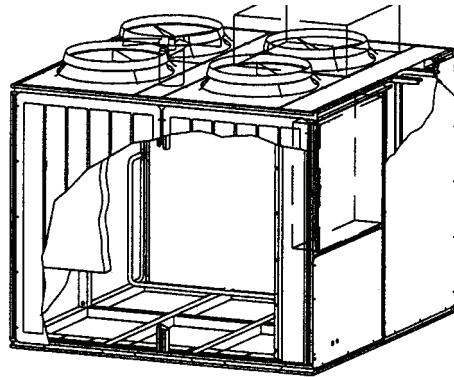




# Installation, Operation, and Maintenance

## Air-Cooled Condenser 20 to 60 Ton

CCRC – 20 to 60 Tons  
CIRC – 20 to 60 Tons



### **▲ 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.



# 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:



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



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.



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/national 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 Material Safety Data Sheets (MSDS)/Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.
- When working with or around hazardous chemicals, **ALWAYS** refer to the appropriate MSDS/SDS and OSHA/GHS (Global Harmonized System of Classification and Labelling 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 Ingersoll Rand personnel must follow Ingersoll Rand Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. All policies can be found on the [BOS site](#). Where local regulations are more stringent than these policies, those regulations supersede these policies.
- Non-Ingersoll Rand personnel should always follow local regulations.

**NOTICE****Use Copper Conductors Only!**

Failure to use copper conductors could result in equipment damage as the equipment was not designed or qualified to accept other types of conductors.

**⚠ WARNING****Hazardous Voltage w/Capacitors!**

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged.

*For additional information regarding the safe discharge of capacitors, see PROD-SVB06\*-EN.*

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**Trademarks**

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**Revision History**

Running changes are included in this version and refrigerant charge data has been removed. Please contact Product Support for specific charge information.



# Table of Contents

Overview .....	5	Unit Wiring Diagrams .....	19
About This Manual .....	5	Unit Voltage .....	19
Related Publications .....	5	Voltage Supply .....	19
Commercial Self-Contained Air-Cooled Condenser .....	6	Voltage Imbalance .....	20
General Data .....	7	Operating Principles .....	21
Unit Description .....	7	Control Sequences of Operation for Units with IntelliPak .....	21
Unit Nameplate .....	7	Typical Unit Operation .....	21
Pre-Installation .....	8	Low Ambient Damper Operation .....	21
Receiving Shipment .....	8	Condenser Fan Operation .....	22
Contractor Installation Responsibilities .....	8	Pre-Start Checklist .....	23
Dimensions and Weights .....	9	Startup and Shutdown .....	24
Service Clearances .....	11	Startup .....	24
Installation - Mechanical .....	13	Normal Unit Shut Down .....	24
Unit Handling Procedure .....	13	Seasonal Shut Down .....	24
Installation Preparation .....	14	Seasonal Startup .....	24
Unit Isolation .....	14	Maintenance .....	25
Spring Isolators .....	14	Refrigerant System .....	25
Leveling the Unit .....	16	Refrigerant Leak Test Procedure .....	25
Refrigerant Piping .....	16	System Evacuation Procedures .....	26
General Refrigerant Recommendations .....	16	Refrigerant Charging .....	27
Interconnecting Piping .....	17	Maintenance Periodic Procedures .....	28
Installation – Electrical .....	19	Periodic Maintenance Checklist .....	28
General Electrical Recommendations .....	19	Annual Maintenance Checklist .....	28
Power Supply Wiring .....	19	Cleaning the Coil .....	28
System Interconnection Wiring .....	19	Low Ambient Damper Adjustment .....	29
		Troubleshooting .....	29
		Wiring Diagrams .....	30



## Overview

### About This Manual

*Note: One copy of this document ships inside the control panel of each unit and is customer property. It must be retained by maintenance personnel.*

This manual describes proper installation, operation, and maintenance procedures for air cooled systems. By carefully reviewing the information within this manual and following the instructions, risk of improper operation and/or component damage will be minimized. It is important that periodic maintenance be performed to help assure trouble free operation. A maintenance schedule is provided at the end of this manual. Should equipment failure occur, contact a qualified service organization with qualified,

experienced HVAC technicians to properly diagnose and repair this equipment.

### Related Publications

- IntelliPak® Self-Contained Programming Guide, PKG-SVP01
- Commercial Self-Contained IntelliPak Signature Series Installation, Owner, and Diagnostic Manual, SCXF-SVX01
- Commercial Self-Contained IntelliPak Modular Series Installation, Owner, and Diagnostic Manual, SCXG-SVX01
- The Trane Air Conditioning Manual



# Commercial Self-Contained Air-Cooled Condenser

## Digit 1 — Unit Model

**C** = Condenser

## Digit 2 — Unit Type

**C** = Commercial  
**I** = Industrial

## Digit 3 — Condenser Medium

**R** = Remote

## Digit 4 — Development Sequence

**C** = C

## Digit 5, 6, 7 — Nominal Capacity

**020** = 20 Tons  
**029** = 29 Tons  
**032** = 32 Tons  
**035** = 35 Tons  
**040** = 40 Tons  
**050** = 50 Tons  
**060** = 60 Tons

## Digit 8 — Unit Voltage

**4** = 460 Volt/60 Hz/3 ph  
**5** = 575 Volt/60 Hz/3 ph  
**6** = 200 Volt/60 Hz/3 ph

## Digit 9 — Control Option

**0** = No Low Ambient, IPak  
**A** = No Low Ambient, T-Stat\*  
**B** = Low Ambient, IPak  
**C** = Low Ambient, T-Stat\*

**Note:** \*T-Stat only available on SCRG.

## Digit 10, 11 — Design Sequence

**\*\*** = Factory Assigned

## Digit 12 — Unit Finish

**1** = Paint — Slate Gray

## Digit 13 — Coil Options

**A** = Non-Coated Aluminum  
**C** = Protective Coating Aluminum

## Digit 14 — Unit Isolators

**0** = None  
**A** = Spring Isolators  
**B** = Isopads

## Digit 15 — Panels

**1** = Louvered Panels

## Digit 16 — Agency

**0** = None  
**U** = With UL Listing



# General Data

## Unit Description

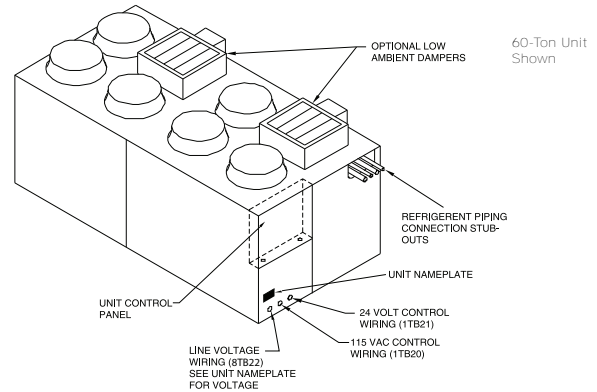
Model CCRC/CIRC units function as the outdoor condenser unit for appropriately sized split refrigeration systems. These units operate in conjunction with a matched indoor compressor/evaporator configuration (Trane models SCRF, SIRF, SCRG, or SIRG) and provide refrigerant condensing for these systems down to a normal ambient temperature of 45° Fahrenheit. Operation to 0°F ambient is possible with the addition of the optional external mount low ambient dampers. Refer to the section, “[Low Ambient Damper Adjustment](#),” p. 29.

**Note:** Refer to the appropriate Indoor Unit (SCRG or SCRF) Installation, Operation, and Maintenance manual for refrigerant charge.

The factory provided unit-mounted control panel contains all required fan cycling controls, compressor interlocks and 115 V control power transformer. Each unit features two independent refrigerant circuits with an integral sub-cooling loop. The slab condenser coils are aluminum fins bonded to copper tubing. Louvered condenser grills are for coil protection and available as an option to order. Direct drive, vertical discharge fans are provided with built-in current and overload protection. Head pressure control dampers are available if low ambient operation is required.

A bag containing the installation/ operation/ maintenance manual, schematics, and other pertaining literature is provided and located in the control panel. Read all literature pertaining to unit before installation and operation. [Figure 1, p. 7](#) illustrates CCRC/CIRC exterior component locations

Figure 1. Model CCRC/CIRC Typical Unit Components



## Unit Nameplate

The nameplate on these units provide valuable identification information for the unit and its components. Provide all pertinent nameplate data when ordering parts or literature and when making other inquires.

The unit nameplate for 20 – 60 ton CCRC/CIRC units is mounted on the unit below the control box (see ). This nameplate specifies unit power requirements and also identifies the order number for the operation and maintenance literature of the unit. The owner should refer to this manual for information regarding the proper equipment operation and maintenance.



# Pre-Installation

## Receiving Shipment

Upon receiving shipment, complete the following checklist:

- Inspect individual cartons before accepting. Check for rattles, bent carton corners, or other visible indications of shipping damage.
- If a unit appears damaged, inspect it immediately before accepting the shipment. Make specific notations concerning the damage on the freight bill. Do not refuse delivery.
- Inspect the unit for concealed damage before it is stored and as soon as possible after delivery. Report concealed damage to the freight line within the allotted time after delivery. Check with the carrier for their allotted time to submit a claim.
- Do not move damaged material from the receiving location. It is the receiver's responsibility to provide reasonable evidence that concealed damage did not occur after delivery.
- Do not continue unpacking the shipment if it appears damaged. Retain all internal packing, cartons, and crate. Take photos of damaged material if possible.
- Notify the carrier's terminal of the damage immediately by phone and mail. Request an immediate joint inspection of the damage by the carrier and consignee.
- Notify your Trane representative of the damage and arrange for repair. Have the carrier inspect the damage before making any repairs to the unit.

## Contractor Installation Responsibilities

Complete the following checklist before beginning final unit installation.

- Verify the unit size and tagging with the unit nameplate.

- Ensure that the floor or foundation is level, solid, and sufficient to support the unit and accessory weights. Level or repair the floor before positioning the unit if necessary.

**Note:** For a detailed discussion of base and foundation construction see the Trane Air Conditioning Manual. This manual is available through the local Trane sales office.

**Note:** On rooftop applications be certain that the roof structure has sufficient strength to support the unit operating weight. See [Table 1, p. 9](#) or unit shipping weight and operating weight, and [Table 3, p. 15](#) for point loading information.

- Allow minimum recommended clearances for routine maintenance and service. Allow space at end of the unit for shaft removal and servicing. Refer to unit submittal for dimensions. Refer to the section, .
- Allow three (3) fan diameters above the unit for the discharge ductwork. Return air enters the rear of the unit and conditioned supply air discharges through the top.
- Electrical connection knockouts are on the top, left side of the unit.
- Allow adequate space for piping access and panel removal. Condenser water piping, refrigerant piping, and condensate drain connections are on the lower left end panel.

**Note:** Unit height and connection locations will change if using vibration isolators. The unit height may increase up to 5 7/8" with spring-type isolators.

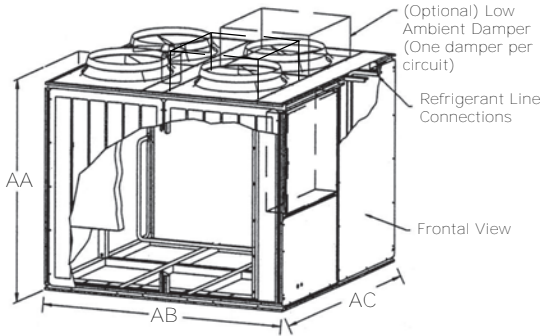
- Electrical supply power must meet specific balance and voltage requirements as described in the section, "Installation – Electrical," p. 19.
- For air-cooled units only:** The installer is responsible for providing and installing the remote air-cooled condenser and refrigerant piping, including filter driers.



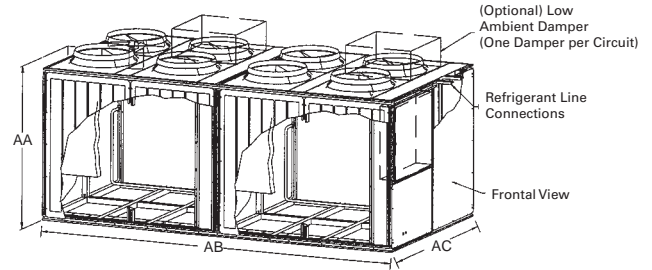


# Dimensions and Weights

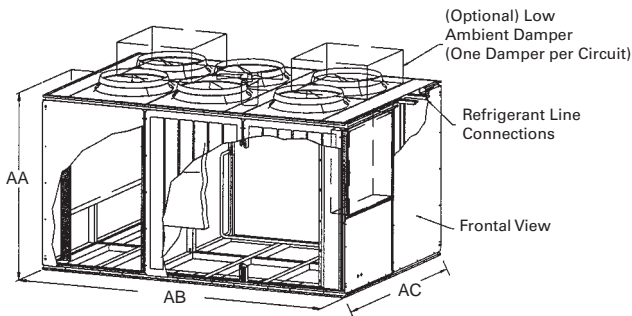
**Figure 2. CCRC/CIRC 20, 29, and 32 Ton**



**Figure 4. CCRC/CIRC 50 and 60 Ton**



**Figure 3. CCRC/CIRC 35 and 40 Ton**



**Table 1. CCRC/CIRC Unit Weights**

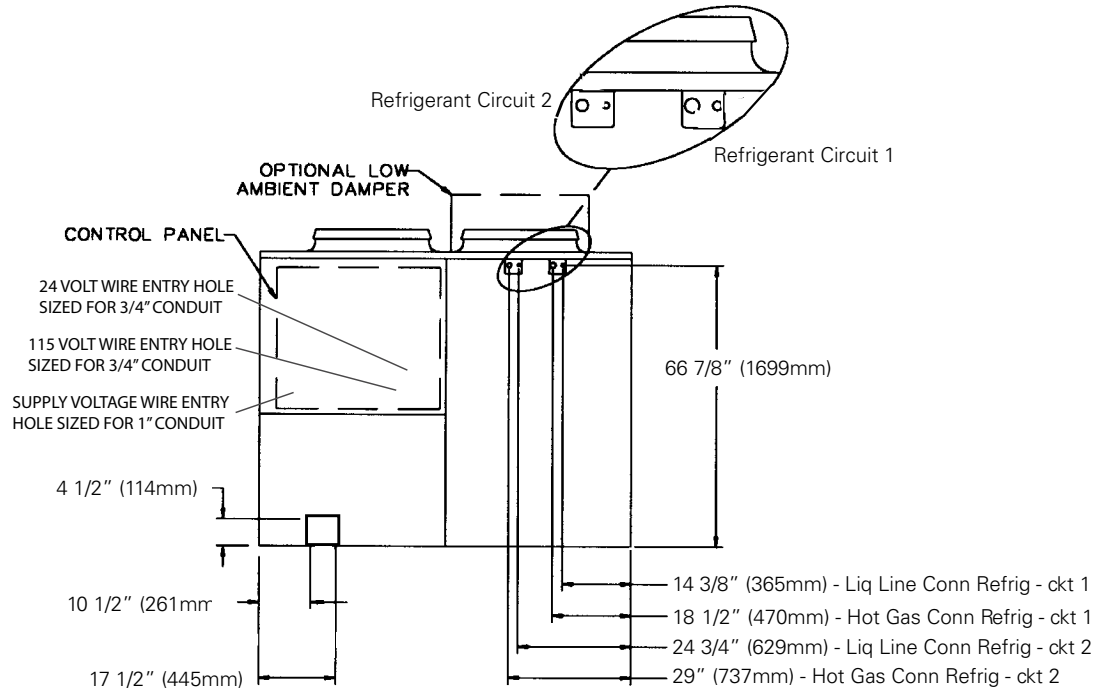
Unit Size	Shipping Weight lbs (kg).	Operating Weight lbs.(kg)
CCRC/CIRC 20	2030 (920)	1906 (865)
CCRC/CIRC 29	2084 (945)	1960 (890)
CCRC/CIRC 32	2138 (970)	2014 (915)
CCRC/CIRC 35	3018 (1370)	2833 (1285)
CCRC/CIRC 40	3072 (1395)	2887 (1310)
CCRC/CIRC 50	3995 (1810)	3695 (1675)
CCRC/CIRC 60	4275 (1940)	3975 (1805)

**Table 2. CCRC/CIRC Unit Dimensions**

Unit Tons	AA	AB	AC
CCRC/CIRC20, 29, 32	70-1/8	7' - 4	7' - 4
	(1781)	(2235)	(2235)
CCRC/CIRC35, 40	70-1/8	10' - 10 3/4	7' - 4
	(1781)	(3321)	(2235)
CCRC/CIRC50, 60	70-1/8	14' - 8	7' - 4
	(1781)	(4470)	(2235)

## Dimensions and Weights

Figure 5. Refrigerant/Electrical Connections (Front View Looking at Control Panel)(a)



**Note:** (a) See [Table 4, p. 17](#) for refrigerant connection and piping sizes.

## Service Clearances

Provide sufficient clearance around the unit to allow unrestricted access to control panel, condenser coils, refrigerant connections and any other service points. Refer to [Figure 2, p. 9](#) through [Figure 4, p. 9](#) for unit dimensions and through [Figure 7, p. 11](#) for recommended clearances for each specific unit. These clearances allow for proper unit operation, airflow, and service access.

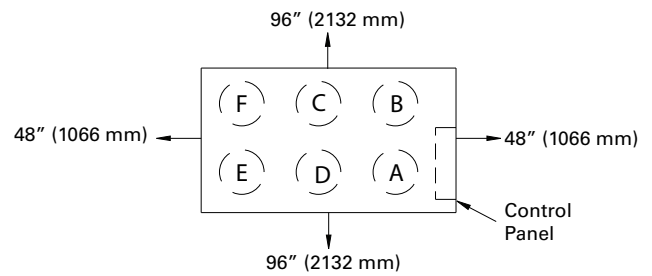
**Note:** To prevent unit capacity reduction, provide recommended operating clearances.

If unit is installed in a pit, the depth of the pit must not exceed 1.5 times the unit height and airflow clearances are doubled. See for specific pit installation clearance instructions.

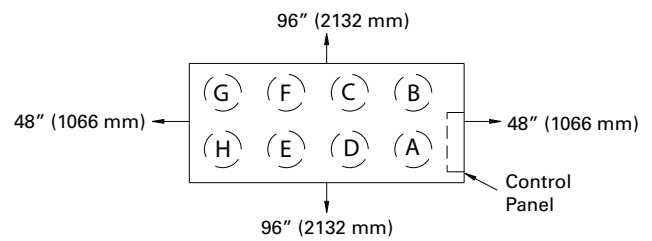
If multiple units are placed side-by-side, the minimum distance between units must be twice the normal recommended side clearances (8' X 2' = 16' between units). See [Figure 10, p. 12](#) for specific side-by-side installation clearance instructions.

Do not install unit under an overhang. Obstructing the fan discharge in this manner can cause recirculation of the warm discharge air and result in coil starvation.

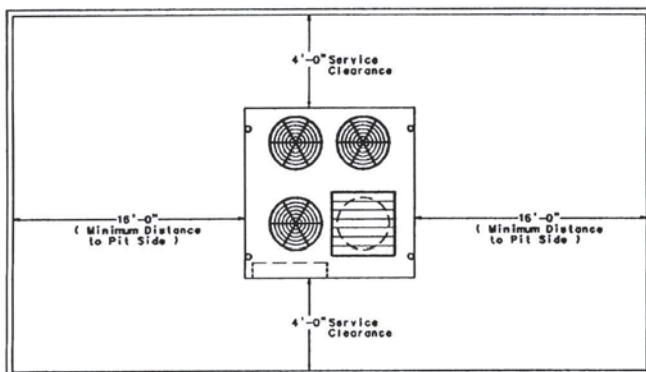
**Figure 6. Top View CCRC/CIRC 35, 40 Ton**



**Figure 7. Top View CCRC/CIRC 50, 60 Ton**



**Figure 8. Typical pit Installation Recommended Clearances**



# Dimensions and Weights

Figure 9. Recommended Clearances for Typical Pit Installation for All Unit Sizes

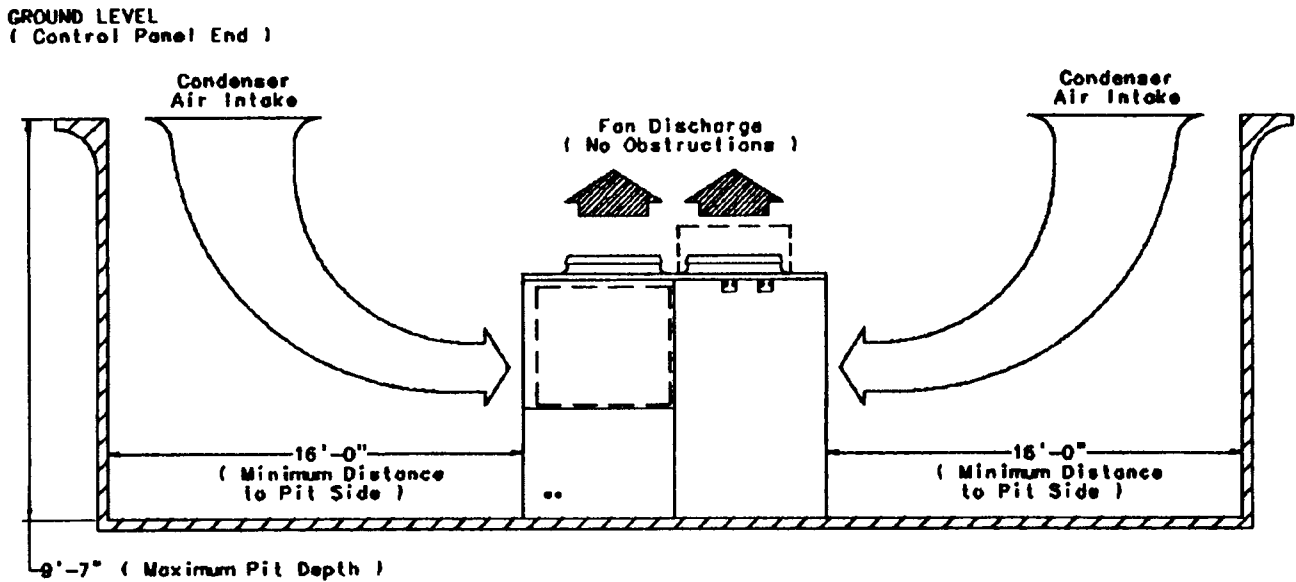
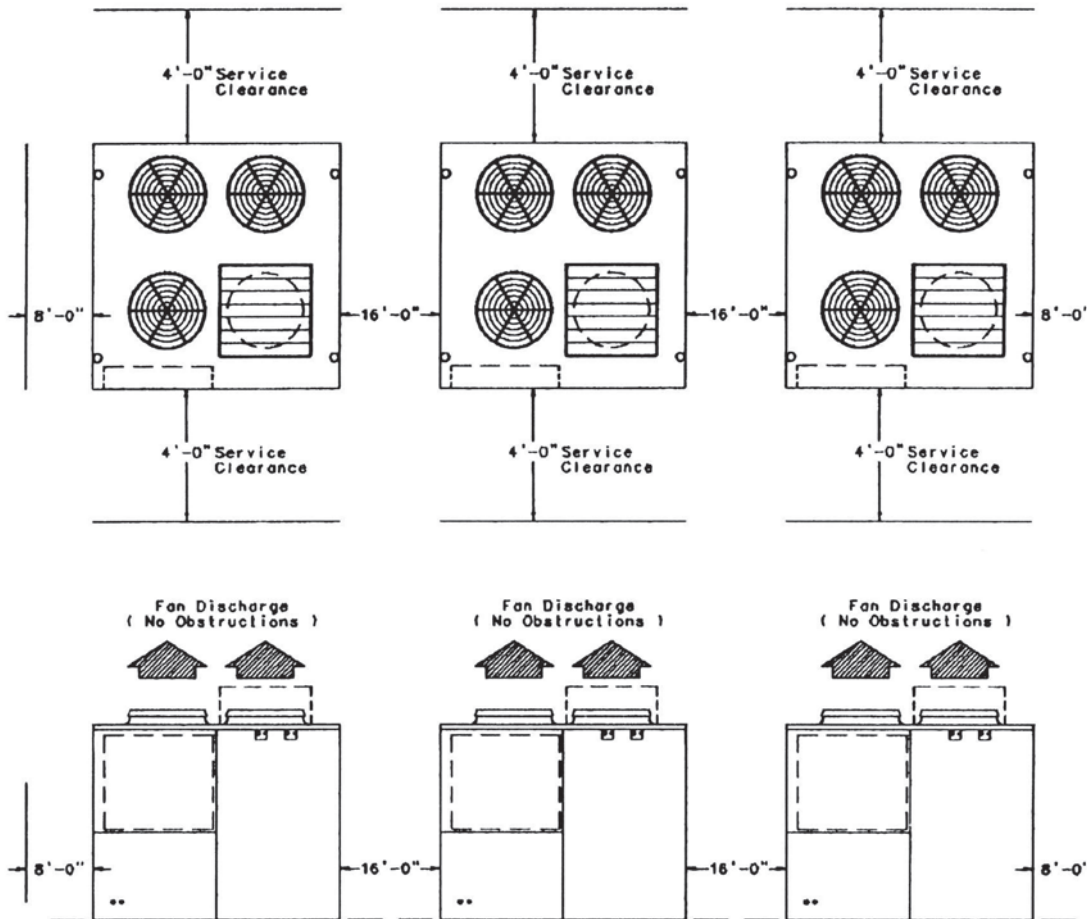


Figure 10. Typical Side-by-Side Installation Recommended Clearances for All Unit Sizes



# Installation - Mechanical

## Unit Handling Procedure

**⚠ WARNING**

**Improper Unit Lift!**

Failure to properly lift unit could result in unit dropping and possibly crushing operator/ technician which could result in death or serious injury, and equipment or property-only damage. Test lift unit approximately 24 inches (61 cm) to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

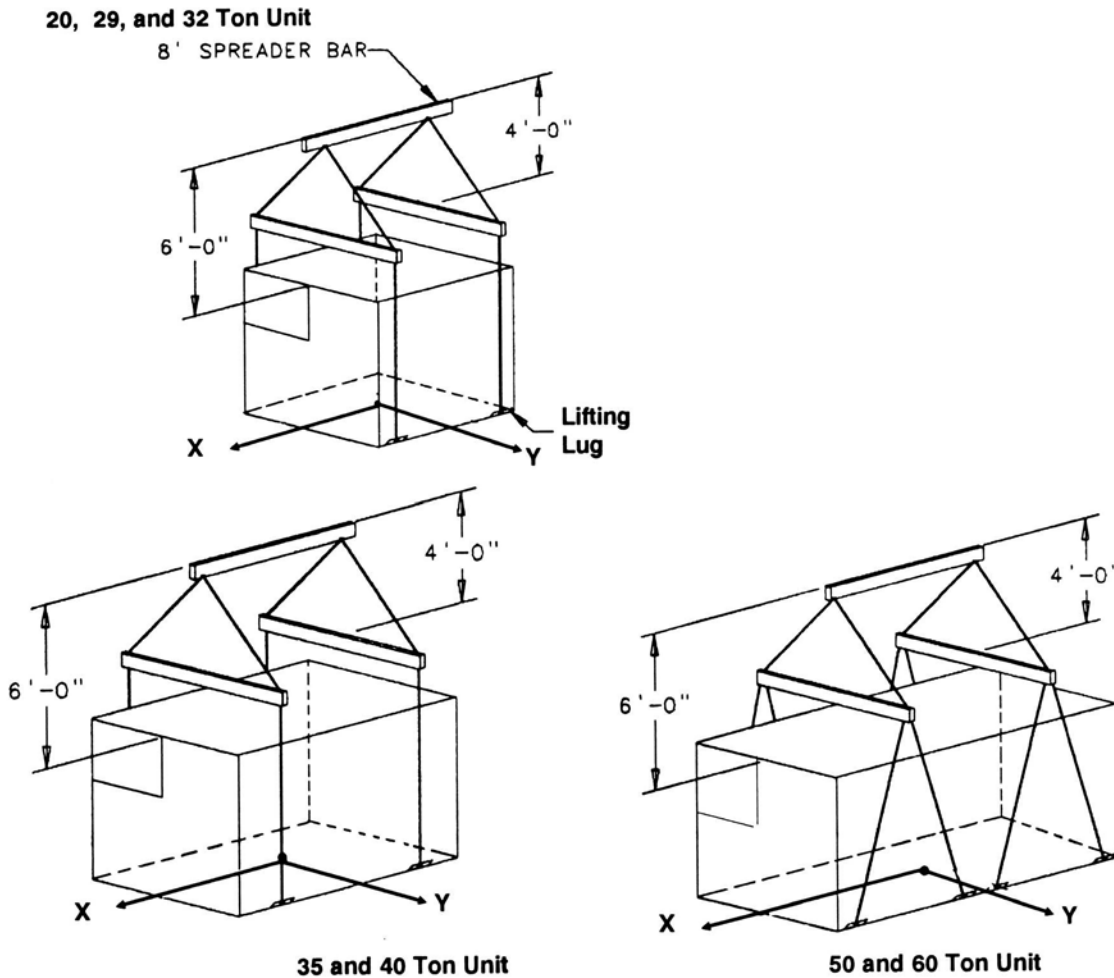
Lifting brackets are provided along the base rail on both sides of the unit. Pass the lifting cables through

the 1.5-inch diameter holes in the brackets and install spreader bars between the cables above unit. A label on the unit base rail illustrates proper lifting procedure. When rigged properly, the unit will balance at its center of gravity.

Perform a test lift to ensure balance, equilibrium, and unit levelness is maintained. Adjust rigging as required based on initial test lift. Test adjusted rigging with second test lift. Continue test lifting unit until satisfactory results are obtained. Do not proceed with final lift until the unit remains static, level and stable during test lift. See [Figure 11, p. 13](#).

**Note:** Maintain unit level throughout the lifting process or structural damage may occur.

**Figure 11. Proper Unit Rigging and Lifting Procedure Using Spreader Bars**





## Installation Preparation

Before installing the unit, perform the following procedure to ensure proper unit operation.

1. Position the unit and skid assembly in its final location.
2. Test lift the unit to determine exact unit balance and stability before hoisting it to the installation location. Refer to the section, "Unit Handling Procedure," p. 13, for proper rigging procedures and cautions.
3. Remove the skids from under the unit. Refer to the section, *Skid Removal* in the Installation, Operation, and Maintenance Manual, SCXF-SVX01. If internal damage is found, file a claim immediately to the delivering carrier.
4. Remove the protective shipping covers from the unit.
5. Verify isolators are properly tightened for operation. Refer to the section, "Unit Isolation," p. 14.

## Unit Isolation

### **NOTICE**

#### **Equipment Damage!**

**Proper isolator clearance and unit level must be achieved or structural damage may occur.**

The standard unit comes with 6" x 6" x 3/8" thick isolator pads. Place these under the unit in the locations shown in [Figure 13, p. 15](#) through [Figure 15, p. 16](#).

## Spring Isolators

Unit mounting locations are shown in [Figure 13, p. 15](#) through [Figure 15, p. 16](#). Operating weights and weight loading at each mounting location are provided in [Table 3, p. 15](#). In addition, isolator placement instructions are placed in the control panel with other unit documentation. Isolators are identified by spring color and by the isolator part number. All units utilize CP-1-28 green isolators (20–32 ton units use 4 isolators per unit, 35–40 ton units use 6, and 50–60 ton units use 8). Install spring isolators at each unit mounting point using the following procedure:

1. Bolt the isolators to the mounting surface using the mounting slots in the isolators base plate. Do not fully tighten the isolators mounting bolts at this time.
2. Set the unit on the isolators. The isolator positioning pins must register in the unit mounting holes. See [Figure 13, p. 15](#) through [Figure 15, p. 16](#) for locations.
3. Ensure clearances between upper and lower isolator housings are between 1/4" to 1/2". Refer to the isolator detail in [Figure 12, p. 15](#). A clearance of over 1/2" requires shims to level the unit. Refer to the section, "Leveling the Unit," p. 16.
4. Make minor clearance adjustments by turning the isolator leveling bolt clockwise to increase clearance and counterclockwise to decrease clearance.

If proper isolator clearance cannot be obtained by turning the leveling bolt, level the isolators themselves. A 1/4" variance in elevation is acceptable.

Figure 12. Typical CCRC/CIRC Unit Isolator CP-1-28

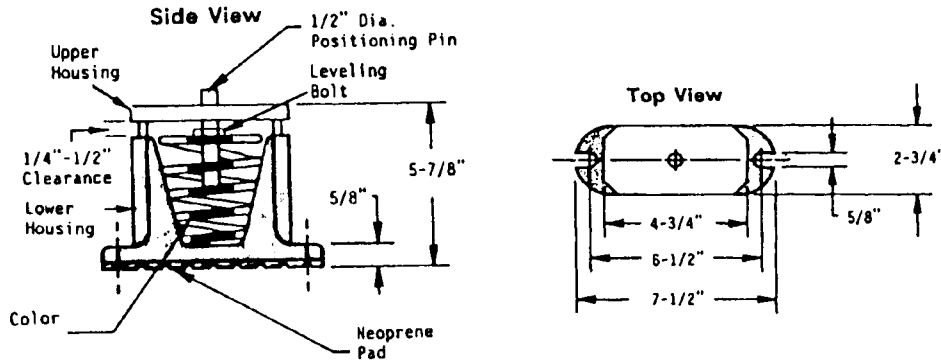


Table 3. Unit Operating Weight Distribution at Mounting Locations

Unit Size	Shipping Weight (lb)	1	2	3	4	5	6	7	8	Total Operating Weight (lb)
20	2030	463	463	463	517					1906
29	2084	490	463	490	517					1960
32	2138	490	490	490	554					2014
35	3018	463	463	463	463	463	518			2833
40	3072	463	463	490	463	463	518			2887
50	3995	490	490	490	490	490	350	490	405	3695
60	4275	490	490	490	490	490	490	490	545	3975

Note: Mounting locations referenced above correlate with mounting location shown in Figure 13, p. 15 through Figure 15, p. 16.

Figure 13. Isolator Locations for CCRC/CIRC 20-32 Ton

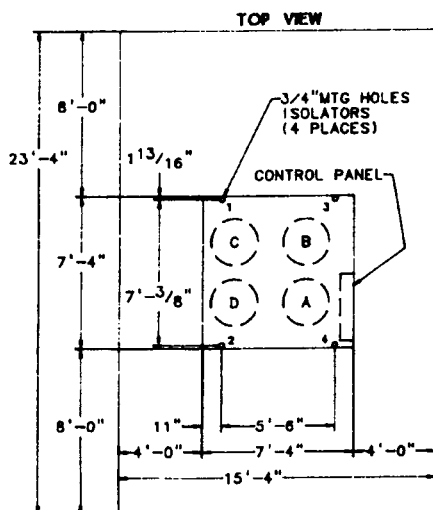
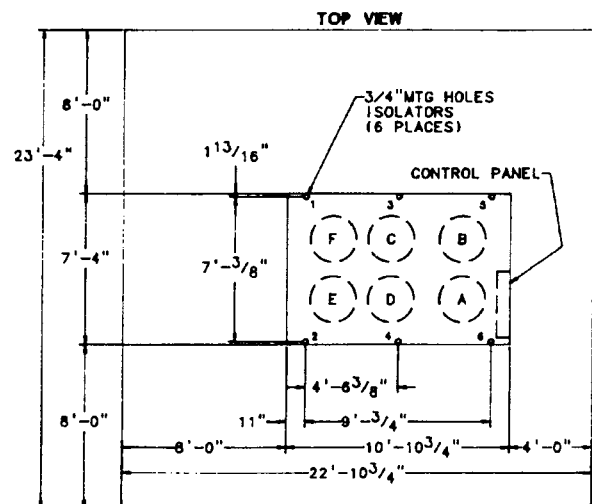
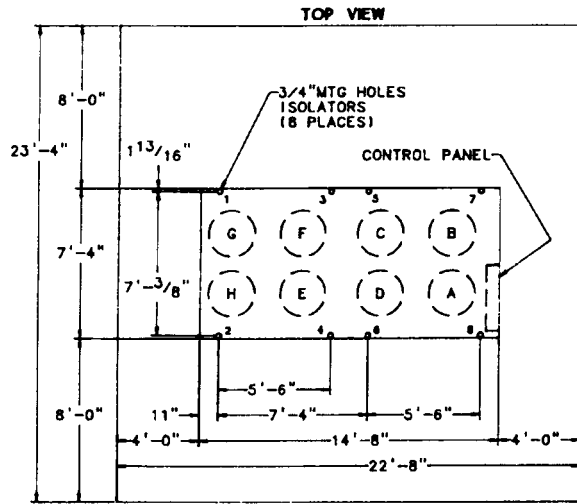


Figure 14. Isolator Locations for CCRC/CIRC 35-40 Ton



**Figure 15. Isolator Locations for CCRC/CIRC 50-60 Ton**



**Leveling the Unit**

Before tightening down the mounting bolts, level the unit carefully. Use the unit base rail as a reference. Level the unit to within 1/4" over its entire length. Use shims if not using adjustable isolators.

**Refrigerant Piping**

**General Refrigerant Recommendations**

**Liquid Line Components**

Indoor portion of liquid line should include service valve, charging valve, thermal expansion valve, sight glass/moisture indicator, filter drier and solenoid valve. (Others as required by job specifications.) If the CCRC/CIRC is coupled with either SCRF/SIRF or SCRG/SIRG, these components are factory installed in the indoor unit, except filter driers which are ship-with, for field installation. CCRC/CIRC units also include a charging valve.

- Sight glass/moisture indicators aid in troubleshooting, charging and servicing the system. Locate between filter drier and expansion valve.
- Filter-driers are provided for field installation. Locate near evaporator.
- Solenoid valves should be located near the evaporator.

**Discharge Line Components**

Indoor portion of discharge line should include access valve and check valve. If the CCRC/CIRC is coupled with either SCRF/SIRF or SCRG/SIRG, these components are factory installed on the indoor unit. Install other

discharge line components as required by job specifications (hot gas mufflers, pipe anchors, oil traps, etc.) to provide proper system operation, prevent excessive vibration and assure proper oil return to the compressor. Also recommended are discharge shutoff valves in each hot gas line near the condenser to facilitate refrigerant storage in the condenser during service procedures. When optional discharge line ball valves are present in the indoor section, installation of field supplied discharge line access valves near the indoor unit may aid in installation and service.

**NOTICE**

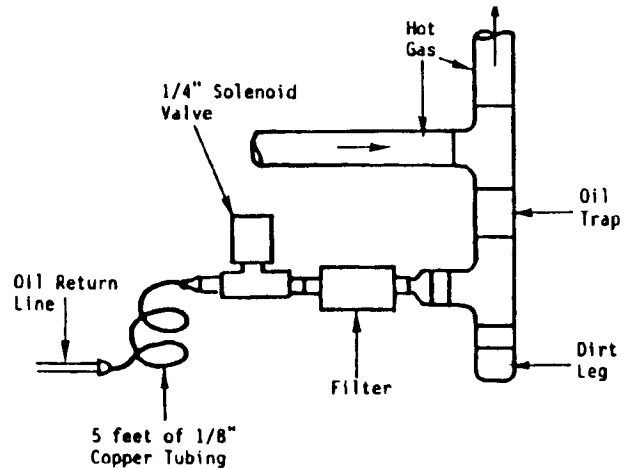
**Compressor Damage!**

Failure to follow instructions below could result in compressor damage.

To prevent possible refrigerant drain back into compressor during off cycle, if no discharge check valve is used, drop discharge line well below compressor discharge level before beginning vertical rise.

*Note: See Figure 16, p. 16 for a typical refrigerant piping configuration that may be used in place of a double riser system (not recommended). This arrangement assures adequate oil return to the suction line, even at partial load conditions. Refer to Trane Air Conditioning Manual for more specific piping recommendations.*

**Figure 16. Typical Configuration for Constant Drain Oil Trap**



**Refrigerant Piping Recommendation**

Isolate refrigerant lines from the building to prevent transferring line vibration to the structure. Do not secure lines rigidly to the structure at any point, as this will defeat the unit isolation system.



## Interconnecting Piping

Refrigerant piping must be properly sized and applied. These two factors have significant effect on both system performance and reliability.

**Important:** Cleanliness is extremely important during system installation to minimize residual contaminants, such as oxidization and scale.

- See [Table 4, p. 17](#) for recommended discharge and liquid line sizes. Table also includes unit connections sizes.
- Verify compressor oil levels are near top of sight glass or above.
- Verify remote condenser system is sealed by momentarily depressing liquid line access port

valve. If holding charge is present, continue piping installation. If not, locate and repair any leaks. Refer to the sections, "[Refrigerant Leak Test Procedure](#)," p. 25 and "[System Evacuation Procedures](#)," p. 26.

- Work on only one circuit at a time to minimize system exposure to moisture in the air.
- Capped discharge and liquid line connections are located near bottom of the indoor unit, left side for SCRF/SIRF, right side for SCRG/SIRG. CCRC/CIRC connections are located in the unit front at the top.
- Remove cap with a tube cutter to minimize risk of getting chips inside piping.

**Table 4. Refrigerant Connection and Piping Sizes**

Connection Size				
CXRC Size	Circuit 1		Circuit 2	
	Liquid	Discharge	Liquid	Discharge
20, 29, 32	5/8 in	7/8 in	5/8 in	7/8 in
35, 40, 50	7/8 in	1-3/8 in	5/8 in	7/8 in
60	7/8 in	1-3/8 in	5/8 in	7/8 in
SXRF Size	Circuit 1		Circuit 2	
	Liquid	Discharge	Liquid	Discharge
20, 25, 29	5/8 in	7/8 in	5/8 in	7/8 in
30, 35, 40, 50	7/8 in	1-3/8 in	5/8 in	7/8 in
60	7/8 in	1-3/8 in	5/8 in	7/8 in
SXRG Size	Circuit 1		Circuit 2	
	Liquid	Discharge	Liquid	Discharge
20, 25, 32	5/8 in	7/8 in	5/8 in	7/8 in
Interconnecting Tube				
SXRF/CXRC Size	Circuit 1		Circuit 2	
	Liquid	Discharge	Liquid	Discharge
20/20	5/8	7/8 in	5/8 in	7/8 in
25/29	5/8	1-1/8 in	5/8 in	7/8 in
29/29	5/8	1-1/8 in	5/8 in	7/8 in
30/35	7/8	1-1/8 in	5/8 in	7/8 in
35/35	7/8	1-1/8 in	5/8 in	7/8 in
40/40	7/8	1-3/8 in <sup>(a)</sup>	5/8 in	7/8 in
50/50	7/8	1-3/8 in	5/8 in	1-1/8 in
60/60	7/8	1 3/8 in	7/8 in	1-3/8 in



## Installation - Mechanical

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**Table 4. Refrigerant Connection and Piping Sizes (continued)**

SXR/CXRC Size	Circuit 1		Circuit 2	
	Liquid	Discharge	Liquid	Discharge
20/20	5/8 in	7/8 in	5/8 in	7/8 in
25/29	5/8 in	1-1/8 in	5/8 in	7/8 in
32/32	5/8 in	1-1/8 in	5/8 in	1-1/8 in

<sup>(a)</sup> Use 1 1/8" for vertical risers.



# Installation – Electrical

## General Electrical Recommendations

### **⚠ WARNING**

#### **Hazardous Service Procedures!**

Failure to follow all precautions in this manual and on the tags, stickers, and labels 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 following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

### **NOTICE**

#### **Use Copper Conductors Only!**

Failure to use copper conductors could result in equipment damage as the equipment was not designed or qualified to accept other types of conductors.

All wiring and disconnects must comply with local and National Electrical Codes™ (NEC). The installer must provide properly sized system interconnection and power supply wiring with appropriate fused disconnect switches.

Electrical connection types, sizes, and locations are shown in [Figure 5, p. 10](#). Refer to [Table 5, p. 20](#) for electrical data (MCA, MFS). This information is also provided on the unit nameplate. Sample wiring diagrams are provided in this manual.

## Power Supply Wiring

Run appropriately sized power wiring and field-supplied conduit through the line voltage access opening provided on the front of the unit. Refer to [Figure 1, p. 7](#) for electrical connection locations. Run wire and field supplied conduit up to the conduit connection point located in the bottom of the control panel. Make appropriate connections to the power terminal block in the control panel. Install fused disconnects as required by local codes. Provide proper equipment ground to the ground connections in the control panel.

## System Interconnection Wiring

Run appropriately sized field supplied conduits, 115 and 24 volt control wiring through the 115 and 24 volt access openings provided on the front of the unit. Refer to [Figure 5, p. 10](#) for electrical connection locations. Run wire and field supplied conduit to the conduit connection points provided on the bottom of the control panel. Make appropriate connections to the terminal blocks in the control panel. Install safety devices if required by local code. Provide proper equipment ground to the ground connections in the control panel. Refer to [Table 5, p. 20](#) for electrical data.

## Unit Wiring Diagrams

Specific unit wiring diagrams are provided on the inside of the control panel door. Use these diagrams for connections or trouble analysis. Refer to the section, "[Wiring Diagrams,](#)" [p. 30](#), for typical unit wiring diagrams.

## Unit Voltage

Electrical power to the unit must meet stringent requirements for the unit to operate properly. Total voltage supply and voltage imbalance between phases must be within the following tolerances as stated below in the section, "[Voltage Imbalance](#)" .

## Voltage Supply

### **⚠ WARNING**

#### **Live Electrical Components!**

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

### **NOTICE**

#### **Motor Damage!**

Correct phase sequence is critical. If phase sequence of the incoming line voltage is not correct, it could result in motor damage.

Measure each leg of supply voltage at the line voltage disconnect switch. Readings must fall within voltage utilization range shown on the unit nameplate. If voltage of any leg does not fall within tolerance, notify the power company to correct this situation before operating the unit. Inadequate voltage to the unit can



## Installation – Electrical

cause control components to malfunction and shorten the life of relay contacts and condenser fan motors.

$$\frac{221 + 230 + 227}{3} = 2.2\%$$

## Voltage Imbalance

Excessive voltage imbalance between phases in a three-phase system can cause motors to overheat and eventually fail. Maximum allowable imbalance is 2%. Voltage imbalance is defined as 100 times the maximum deviation of the three voltages (three phases) subtracted from the average (without regard to sign) divided by the average voltage.

**Note:** L1 = 221 volts is the maximum deviation of the 3 voltages from the average of the 3 voltages.

Therefore, the imbalance percentage is:

$$\frac{100 (226 - 221)}{226} = 2.2\%$$

### Example

- L1 measured = 221 V
- L2 measured = 230 V
- L3 measured = 227 V

The 2.2 % imbalance that exists in the example above exceeds the maximum allowable imbalance between phases.

**Table 5. CCRC/CIRC Condenser Electrical Data**

Tons	Voltage	# Fans	FLA (ea.)	LRA (ea.)	MCA	MCB
20, 29, 32	200	4	4.1	20.7	17.4	20
	460	4	1.8	9	7.7	15
	575	4	1.4	7.2	5.9	15
35, 40	200	6	4.1	20.7	25.6	30
	460	6	1.8	9	11.2	15
	575	6	1.4	7.2	8.8	15
50, 60	200	8	4.1	20.7	33.8	40
	460	8	1.8	9	14.8	15
	575	8	1.4	7.2	11.5	15

**Note:** All motors for CCRC/CIRC units are rated at 1 hp (0.7457 kW).



# Operating Principles

## Control Sequences of Operation for Units with IntelliPak

### Typical Unit Operation

Sequence of operation will be described for a 60-ton CCRC condenser attached to a 60-ton IntelliPak controlled SCRF. All other configurations should be discernible once the operator understands this sequence.

When evaporator unit calls for mechanical cooling, the compressor starts. The IntelliPak controller then starts reading saturated condenser temperature sensor for the circuit that started. Saturated condenser temperature sensor probes are factory installed on the condensing coils of the CCRC condensing unit.

When condenser temperature rises to a point that condensing is required, the IntelliPak controller initiates a call for condenser operation. Upon initial start-up, the IntelliPak controller pulls in K1 and K2 relays simultaneously, thus pulling on all fans in circuit 1.

Condensing temperatures should then begin to fall as condensing begins. As the temperature falls, the K1 relay drops out, thus dropping out circuit 1A fan 1 and 2 contactors and stopping circuit 1A fans 1 and 2. (The IntelliPak controller will try to maintain a factory default condensing temperature setpoint of 105°F.)

If saturated condenser temperatures continue to fall with only circuit 1B fans 1 and 2 fans running, K2 relay drops out and K1 relay re-engages. (See stages of fan operation on CCRC schematics). K1 relay engages circuit 1A fan 1 contactor, starting circuit 1A fan 1 only. (Circuit 1B fan 1, 2 auxiliary contactor is no longer engaged.)

If saturated temperature continues to drop with only circuit 1A fan 1 running, the low ambient damper (if equipped) begins to throttle the airflow to maintain saturated condensing temperature. The SCRF actuates the damper by way of a 2-10 VDC signal to the low ambient damper actuator, thus maintaining head pressure in a low ambient condition. The unit continues to operate in this low ambient condition until the cooling setpoint is satisfied, at which time, the unit stops and halts all calls for condenser fan operation or until the saturated condenser temperature begins to rise.

If saturated condenser temperature begins to rise, low ambient damper modulates open to allow more airflow. If saturated condenser temperature continues to rise with damper modulated fully open, K1 relay drops out and the IntelliPak controller pulls in K2 relay, subsequently pulling in contactor Circuit 1B fan 1, 2

auxiliary contactor. Upon closure of this contactor, circuit 1B fans 1 and 2 start. (See stages of fan operation on CCRC schematics).

There is no low ambient operation associated with circuit 1B fans 1 and 2 operation. However the saturated condenser temperature sensor continues to monitor condensing temperature in order to make the necessary adjustments to the fan operation. The IntelliPak controller continually samples saturated condenser temperature and stages up or down the fans as required to maintain saturated condensing temperature as read by the saturated condenser temperature sensor probes (see stages of fan operation on CCRC schematics).

If saturated condenser temperature continues to rise with only K2 relay pulled in, the K1 relay re-engages and again pulls in circuit 1A fan 1 contactor.

**Note:** *Circuit 1B fan 1, 2 auxiliary contactor is now pulled in and will pull in circuit 1A fan 2 contactor, starting circuit 1A fan 2.*

K1 and K2 relays are now simultaneously engaged thus starting all fan operation in circuit 1. The unit stages down in the reverse manner based on saturated condensing temperature if and when saturated condenser temperature begins to fall.

This is a detailed sequence of operation for the first circuit to begin operation. If cooling load demands require the second circuit to operate, the same sequence of operation is valid and takes place simultaneously utilizing IntelliPak controller relays K5 and K6.

Similar sequence of operation takes place on other CCRC condensing unit sizes. Refer to the schematics, including stages of fan operation, for specific unit installed.

**Note:** *Low ambient dampers are optional. Not all units may be equipped with low ambient dampers.*

### Low Ambient Damper Operation

Units with low ambient operation have two (2) low ambient dampers. The dampers are used to extend operation from standard low limit temperature to a minimum of 0°F. Dampers modulate airflow across condenser coils to maintain condensing pressure during low ambient operation.

Optional low ambient (LA) dampers are controlled by low ambient damper control module mounted in control panel inside CCRC unit on a thermostat controlled unit, or by the IntelliPak controller of SCRF or SCRG.



## Operating Principles

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### Condenser Fan Operation

All condenser fans are direct-drive, 26" propeller and are driven by one motor horsepower. Fan operation on all units is interlocked with compressor start and stop.

They use customer-provided compressor contactor auxiliary contacts and liquid line pressure if the thermostat-controlled unit is used as the evaporator, or by IntelliPak controller if using a SCRF or SCRG.



## Pre-Start Checklist

After the unit is installed, complete each step in the checklist that follows and check off each step as completed. When all are accomplished, the unit is ready to be started.

- Inspect all wiring connections. Connections should be clean and tight.
- Check voltage to the unit at the line power fused disconnect. Voltage must be within the voltage utilization range given on the unit nameplate. Voltage imbalance must not exceed two percent. Refer to the "[Voltage Imbalance](#)," p. 20.
- Check condenser fans. Condenser fan blades should rotate freely in the fan orifices and should be mounted securely on the motor shafts.
- Check condenser coils. Coil fins should be clean and straight. There should be no restrictions to proper airflow through the condenser.
- Evacuate the refrigerant system. See Maintenance chapter of unit IOM (**SCXF-SVX01\*-EN** or **SCXG-SVX01\*-EN** for evacuation and procedure.
- Once the system is properly evacuated, charge each circuit with proper amount of refrigerant.
- Refer to the Mechanical and Start-up sections in the Installation, Operation, and Maintenance Manuals (**SCXF-SVX01** and or **SCXG-SVX01** for refrigerant charging procedures).
- Prepare remainder of system for operation and coordinate condenser start up with evaporator unit startup.



# Startup and Shutdown

## Startup

### ⚠ WARNING

#### Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

### NOTICE

#### Compressor Damage!

Failure to follow instructions below will cause the compressor to operate in a vacuum and result in compressor damage.

Never manually or automatically pump down system below 7 psig.

### NOTICE

#### Compressor Damage!

Failure to follow instructions could result in compressor damage.

Keep crankcase heaters on whenever refrigerant is in the system.

If crankcase heaters have not been on with refrigerant in the system, turn the crankcase heaters on for a minimum of 24 hours before starting compressors.

When wired properly, the unit cycles condenser fans in response to compressor interlock or the IntelliPak controller output. The IntelliPak controller reads saturated refrigerant temperatures and cycles the fans appropriately. Refer to the section, "[Wiring Diagrams](#)," p. 30.

## Normal Unit Shut Down

The unit can be stopped by opening the unit power supply disconnect switch. However, normally the unit operation stops due to interruption of the cooling demand signal by the circuit cooling relays. The CCRC/

CIRC condensing unit should be shutdown by first shutting down the indoor evaporative cooling unit. By stopping the indoor unit, the request for condensing has been terminated, thus stopping all condenser fans. The disconnect switch on the CCRC/CIRC unit power supply should then be opened. By not shutting down the evaporator unit first before the condenser unit results in a high-pressure situation and should be avoided if possible.

## Seasonal Shut Down

If the unit will be inoperative for an extended period, lock out unit operation by disconnecting the compressor interlock circuits and opening and locking the main power disconnect switch.

If desired, large amounts of liquid refrigerant can be isolated and stored in the condenser by closing the liquid line service valves and operating the compressors to pump the refrigerant into the condenser and then valving off the hot gas line near the condenser coil.

## Seasonal Startup

1. Inspect the interior of the unit for debris.
2. Check control panel wiring connections for corrosion and proper security. Check control panel door for proper weather seal.
3. Inspect condenser fans. Blades must be secure on fan shaft and rotate freely.
4. Inspect coil for obstructions and cleanliness. Clean coil if required.
5. Inspect low ambient dampers. Damper blades must be properly aligned, free from obstructions and operate freely. You may have to disconnect actuator linkage to inspect damper movement.
6. Close unit power supply disconnect switch.
7. Allow 24 hours of crankcase operation before starting compressors. Crankcase heaters are energized whenever the unit disconnect is closed and the compressors are off.

The unit should now operate properly in response to cooling demand at the system thermostat.





# Maintenance

Read the following Warnings and Cautions before beginning any maintenance procedures.

**⚠ WARNING**

**Hazardous Service Procedures!**

Failure to follow all precautions in this manual and on the tags, stickers, and labels 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 following instructions: Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks.

## Refrigerant System

### Refrigerant Leak Test Procedure

**⚠ WARNING**

**Confined Space Hazards!**

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

Do not work in confined spaces where refrigerant or other hazardous, toxic or flammable gas may be leaking. Refrigerant or other gases could displace available oxygen to breathe, causing possible asphyxiation or other serious health risks. Some gases may be flammable and or explosive. If a leak in such spaces is detected, evacuate the area immediately and contact the proper rescue or response authority.

**⚠ WARNING**

**Explosion Hazard!**

Failure to follow safe leak test procedures below could result in death or serious injury or equipment or property-only-damage.

Never use an open flame to detect gas leaks. Use a leak test solution for leak testing.

**⚠ WARNING**

**Explosion Hazard!**

Failure to follow these instructions could result in death or serious injury or equipment or property-only damage.

Use only dry nitrogen with a pressure regulator for pressurizing unit. Do not use acetylene, oxygen or compressed air or mixtures containing them for pressure testing. Do not use mixtures of a hydrogen containing refrigerant and air above atmospheric pressure for pressure testing as they may become flammable and could result in an explosion. Refrigerant, when used as a trace gas should only be mixed with dry nitrogen for pressurizing units.

**⚠ WARNING**

**Explosion Hazard!**

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

Do not exceed unit nameplate design pressures when leak testing system.

**⚠ WARNING**

**R-410A Refrigerant under Higher Pressure than R-22!**

Failure to use proper equipment or components as described below, could result in equipment failing and possibly exploding, which could result in death, serious injury, or equipment damage.

The units described in this manual use R-410A refrigerant which operates at higher pressures than R-22. Use **ONLY** R-410A rated service equipment or components with these units. For specific handling concerns with R-410A, please contact your local Trane representative.

*Note: These service procedures require working with refrigerant. Do not release refrigerant to the atmosphere. The service technician must comply with all federal, state, and local laws.*

*Important: When Leak-testing refrigerant systems, observe all safety precautions. Leak test only one circuit at a time to minimize system exposure to potentially harmful moisture in the air. Use R-410A refrigerant gas as a tracer for leak detection and use oil-pumped dry nitrogen to develop required test pressures.*



### Field Piping (Air-Cooled Discharge/Liquid Lines)

1. Ensure all required field installed piping pressure tests are completed in accordance with national and/or local codes.
  2. Close liquid line angle valve.
  3. Connect R-410A refrigerant cylinder to high side charging port (at Remote Condenser or field supplied discharge line access port). Add refrigerant to reach pressure of 12 to 15 psig.
  4. Disconnect refrigerant cylinder. Connect dry nitrogen cylinder to high side charging port and increase pressure to 150 psig. Do not exceed high side (discharge) unit nameplate design pressure. Do not subject low side (suction) components to high side pressure.
  5. Check all piping joints, valves, etc. for leaks. Recommend using electronic detector capable of measuring 0.1 oz/year leak rate.
  6. If a leak is located, use proper procedures to remove the refrigerant/nitrogen mixture, break connections and make repairs. Retest for leaks.
- Ensure all service valves are open.

### System Repair

1. If system is water cooled with service valves, or air cooled, high and low side may be tested independently by closing liquid line angle valve and water cooled unit discharge line ball valve. Otherwise leave all valves open and DO NOT exceed low side design pressure.
  2. Connect R-410A refrigerant cylinder to charging port, add refrigerant to reach pressure of 12 to 15 psig.
  3. Disconnect refrigerant cylinder. Connect dry nitrogen cylinder to high side charging port and increase pressure to 150 psig. DO NOT exceed unit nameplate design pressures. If testing complete system, low side design pressure is maximum.
  4. Check piping and/or components as appropriate for leaks.
  5. Recommend using electronic detector capable of measuring 0.1 oz/year leak rate.
  6. If a leak is located, use proper procedures to remove the refrigerant/nitrogen mixture, break connections and make repairs. Retest for leaks.
- Ensure all service valves are open.

### System Evacuation Procedures

1. Each refrigeration circuit must be evacuated before the unit can be charged and started.
2. Use a rotary type vacuum pump capable of pulling a vacuum of 100 microns or less.
3. Verify that the unit disconnect switch and the

system control circuit switches are off.

4. Oil in the vacuum pump should be changed each time the pump is used with high quality vacuum pump oil. Before using any oil, check the oil container for discoloration which usually indicates moisture in the oil and/or water droplets. Moisture in the oil adds to what must be removed from the system, increasing pump down time.
5. When connecting the vacuum pump to a refrigeration system, it is important to manifold the vacuum pump to both the high and low side of the system (liquid line access valve and suction line access valve). Follow the pump manufacturer's directions for the proper methods of using the vacuum pump.
6. The lines used to connect the pump to the system should be copper and of the largest diameter that can practically be used. Using larger line sizes with minimum flow resistance can significantly reduce evacuation time.

**Important:** Rubber or synthetic hoses are not recommended for system evacuation because they have moisture absorbing characteristics which result in excessive rates of evaporation, causing pressure rise during the standing vacuum test. This makes it impossible to determine if the system has a leak, excessive residual moisture, or a continual or high rate of pressure increase due to the hoses.

7. An electronic micron vacuum gauge should be installed in the common line ahead of the vacuum pump shutoff valve, as shown in . Close Valves B and C, and open Valve A.
8. Start the vacuum pump, after several minutes, the gauge reading will indicate the maximum vacuum the pump is capable of pulling. Rotary pumps should produce vacuums of 100 microns or less.

### NOTICE

#### Motor Winding Damage!

Failure to follow instructions below could result in compressor motor winding damage.

Do not use a megohm meter or apply voltage greater than 50 VDC to a compressor motor winding while it is under a deep vacuum.

9. Open Valves B and C. Evacuate the system to a pressure of 300 microns or less. As the vacuum is being pulled on the system, there could be a time when it would appear that no further vacuum is being obtained, yet, the pressure is high. It is recommended that during the evacuation process, the vacuum be broken to facilitate the evacuation process.
10. To break the vacuum:

Shutoff valves A, B, & C and connect a refrigerant cylinder to the charging port on the manifold. Purge the air from the hose. Raise the standing vacuum pressure in the system to zero (0 psig) gauge pressure. Repeat this process two or three times during evacuation.

**Note:** It is unlawful to release refrigerant into the atmosphere. When service procedures require working with refrigerants, the service technician must comply with all Federal, State, and local laws.

### Standing Vacuum Test

- Once 300 microns or less is obtained, close Valve A and leave valves B and C open. This will allow the vacuum gauge to read the actual system pressure. Let the system equalize for approximately 15 minutes. This is referred to as a standing vacuum test where, time versus pressure rise. The maximum allowable rise over a 15 minute period is 200 microns. If the pressure rise is greater than 200 microns, but levels off to a constant value, this indicates that there is excessive moisture present. If the pressure steadily continues to rise, a leak is indicated. Figure 18, p. 27 illustrates three possible results of the standing vacuum test.
- If a leak is encountered, repair the system and repeat the evacuation process until the recommended vacuum is obtained. Once the system has been evacuated, break the vacuum with refrigerant, and complete the remaining Pre-Start Procedures before starting the unit.

Figure 17. Typical Vacuum pump Hookup

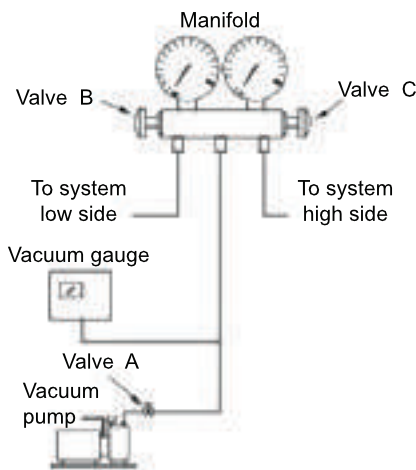
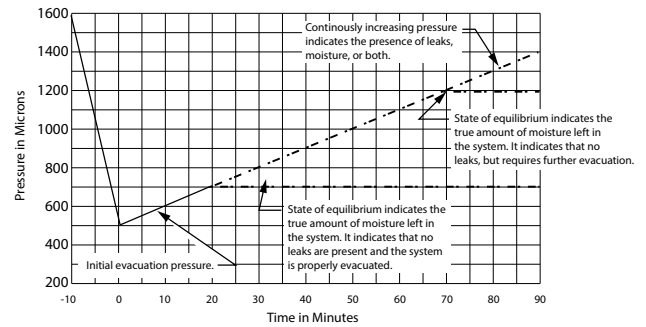


Figure 18. Evacuation Time vs Pressure Rise



### Refrigerant Charging

**⚠ CAUTION**

**Refrigerant at Freezing Temperature!!**  
 Direct contact with liquid refrigerant could result in minor or moderate injury.  
 Avoid contact with skin. If working with refrigerant is necessary, you **MUST** wear all Personal Protective Equipment (PPE) including eye protection, safety gloves, long sleeves, and pants. In case of contact, treat the injury similar to frostbite. Slowly warm the affected area with lukewarm water and seek immediate medical attention.

**NOTICE**

**Compressor Damage!**  
 Excessive liquid accumulation in the suction lines could result in compressor damage. Do not allow liquid refrigerant to enter the suction line.

**Important:** For proper system operation, use only refrigerant type listed on unit nameplate.

Once the system is properly installed, leak tested, and evacuated, refrigerant charging can begin. Charge refrigerant into the system by weight. Approximate operating refrigerant charge capacities for 20 through 60-ton CCRC/CIRC condensing units are given in and . Calculate additional charge required for any other units and additional piping to determine the total system charge.

Use an accurate scale or charging cylinder to determine the exact charge entering the system. Failure to charge the system accurately can lead to under or overcharging and result in unreliable operation.

### Liquid Line Charging

Large amounts of refrigerant should be added through the liquid line service valves. If system is being recharged after evacuating and dehydrating, determine the approximate weight of charge required and charge to that level. If adding less than a full charge, charge to



## Maintenance

between 14°F to 20°F sub-cooling as measured on the liquid lines at the condenser coil refrigerant outlets.

**Table 6. System Compressors**

Unit	Size	Compressors <sup>(a)</sup>	
		Circuit 1	Circuit 2
SXRF/CXRC	20/20	10	10
	25/29	15	10
	29/29	15	10
	30/35	10/10	10
	35/35	10/10	10
	40/40	10/15	10
	50/50	15/15	10
SXRG/CXRC	60/60	15/15	15/15
	20/20	10	10
	25/29	15	10
	32/32	15	15

**Notes:**

1. All units have dual circuits
2. The quantities shown apply to the CCRC/CIRC air-cooled condenser

<sup>(a)</sup> Multiple compressors have manifold.

**Table 7. Charge Add (R-410A)- lbs per 10 ft of line**

Piping Size (in)	Charge (lbs)	
	Liquid Line	Discharge Line
5/8	1.07	-
7/8	2.23	0.31
1 1/8	-	0.53
1 3/8	-	0.80

**Note:** Amounts listed are for 10 ft of pipe above 25'. Actual requirements will be in direct proportion to the actual length of piping.

## Maintenance Periodic Procedures

This section describes specific maintenance procedures that must be preformed as a part of the normal maintenance program for this unit.

### Periodic Maintenance Checklist

- Inspect optional coil guard for debris that may be blocking louvers as clean as required.
- Inspect coil surface for cleanliness and clean as required.
- Manually rotate fan blades to ensure proper orifice clearance. Inspect fan orifices for debris and obstructions. Clean as required.

## Annual Maintenance Checklist

- Perform all monthly maintenance inspections.
- Perform seasonal start up checks.
- Leak test refrigerant circuits. Inspect contacts of fan motor contactors and relays. Replace all worn contacts.
- Clean condenser fans. Check fan assemblies for proper orifice clearance, abnormal end play, and excessive vibration or noise. Fan motor bearings are permanently lubricated and do not require lubrication.
- Have a qualified service technician check condenser fan pressure switches for proper operation (thermostat controlled unit only).
- Clean and repaint any corroded surface.

## Cleaning the Coil

Clean the coil at least annually, or more frequently if located in a dirty environment, to help maintain proper unit operating efficiency. High discharge pressures are a good indication that the coil needs cleaning. Follow the detergent manufacturer instructions as closely as possible to avoid potential damage to the coil.

## ⚠ WARNING

### Hazardous Chemicals!

**Coil cleaning agents can be either acidic or highly alkaline and can burn severely if contact with skin or eyes occurs.**

**Handle chemical carefully and avoid contact with skin. ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices.**

To clean the refrigerant coil, use a soft brush and sprayer, such as a garden pump up or high pressure type. In addition, use a quality detergent; like SPREX AC, OAKITE 161 or OAKITE 166 and COILOX.

**Note:** If detergent is strongly alkaline (i.e. has a pH value greater than 8.5) after mixing, an aluminum corrosion inhibitor must be added.

### Coil Cleaning Procedure

1. Disconnect power to the unit.
2. Remove enough panels and components from the unit to gain access to the coil.
3. Use a soft brush to remove loose dirt and debris from both sides of the coil.
4. Straighten coil fins with fin comb as required.
5. Mix the detergent with water according to the manufacturers instructions.

**Note:** Observe all recommendations of the cleanser manufacturer. The coil cleanser manufacturer's recommendations, warnings and cautions will at all times take precedence to these instructions.

## **⚠ WARNING**

### **Hazardous Pressures!**

Failure to follow instructions below could result in a violent explosion, which could result in death or serious injury.

If a heat source is required to raise the tank pressure during removal of refrigerant from cylinders, use only warm water or heat blankets to raise the tank temperature. Do not exceed a temperature of 150°F. Do not under any circumstances apply direct flame to any portion of the cylinder.

6. Place solution in the sprayer. Use the following guidelines if using a high-pressure sprayer:
  - Minimum nozzle spray angle is 15°.
    - 1.
    2. Spray solution at 90° to the coil face.
    3. Keep sprayer nozzle at least six inches from the coil.
    4. Sprayer pressure must not exceed 600 psi.
7. Spray leaving air side of the coil first then spray the entering air side of the coil. Allow the detergent and water solution to stand on the coil for five minutes.
8. Rinse both sides of the coil with cool, clean water.
9. Inspect the coil. If it still appears dirty, repeat the cleaning procedure.
10. Reinstall all unit components and panels, and restore electrical power to the unit.

## **Low Ambient Damper Adjustment**

### **DDC Controlled Units**

Inspect damper blade for proper alignment and operation. Dampers should be fully closed when positioning signal from controller is 2 volts DC and should be fully open when positioning signal from controller is 10 volts DC. To adjust position remove VDC signal from actuator and check dampers to ensure full closure. Check the 90% position open by applying a

9-volt battery to the positioning signal. Dampers should stroke 90% open when 9 VDC is applied to the positioning signal inputs.

### **Thermostat Controlled Units**

The same procedure can be used to inspect the operation of the low ambient dampers on the thermostat-controlled unit. The difference is that the positioning signal on the thermostat-controlled unit will come from the control panel in the CCRC/CIRC unit not from the IntelliPak controller. Inspect the operation of the pressure switches. The switches should be open when sensing pressures less than 170 psig and should be closed when sensing pressures greater than 265 psig.

## **Troubleshooting**

## **⚠ WARNING**

### **Live Electrical Components!**

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

When it is necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

If operational difficulties are encountered, perform these preliminary checks before calling a service technician:

- Check the system thermostat to ensure that all setpoints are set correctly and that thermostat is getting control power.
- Verify that the unit is receiving electrical supply power and that all fuses are intact.
- Check the condenser for proper air flow and take temperature readings across the condensing coils.

After completing the preliminary checks above, inspect the unit for other obvious problems such as broken or disconnected wires clogged grills or coils. If everything appears to be in proper working order and the unit fails to operate properly, contact a qualified service technician.



# Wiring Diagrams

*Note: Published unit wiring diagrams are available in e-library.*

<b>Drawing Number</b>	<b>Description</b>
2313-1633	Schematic; Power and Controls 20-60T IntelliPak
2313-1632	Schematic; Power and Controls 20-32T Thermostat Controls
2313-1635	Connections - Control Panel w/ Thermostat Controls
2313-1636	Connections - Control Panel w/ v Controls
2313-1637	Connections; Raceway 20-60T
2313-1639	Field Wiring Diagram w/ Thermostat Controls
2313-1640	Field Wiring Diagram w/ IntelliPak controls





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