Installation Instructions

SAFETY CONSIDERATIONS

Screw liquid chillers are designed to provide safe and reliable service when operated within design specifications. When operating this equipment, use good judgment and safety precautions to avoid damage to equipment and property or injury to personnel.

Be sure you understand and follow the procedures and safety precautions contained in the machine instructions, as well as those listed in this guide.

⚠ DANGER

Failure to follow these procedures will result in severe personal injury or death.

DO NOT VENT refrigerant relief devices within a building. Outlet from rupture disc or relief valve must be vented outdoors in accordance with the latest edition of ANSI/ ASHRAE 15 (American National Standards Institute/ American Society of Heating, Refrigerating, and Air-Conditioning Engineers). The accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation.

PROVIDE adequate ventilation in accordance with ANSI/ ASHRAE 15, especially for enclosed and low overhead spaces. Inhalation of high concentrations of vapor is harmful and may cause heart irregularities, unconsciousness, or death. Intentional misuse can be fatal. Vapor is heavier than air and reduces the amount of oxygen available for breathing. Product causes eye and skin irritation. Decomposition products are hazardous.

DO NOT USE OXYGEN to purge lines or to pressurize a machine for any purpose. Oxygen gas reacts violently with oil, grease, and other common substances.

DO NOT USE air for leak testing. Use only refrigerant or dry nitrogen.

NEVER EXCEED specified test pressures, VERIFY the allowable test pressure by checking the instruction literature and the design pressures on the equipment nameplate.

DO NOT VALVE OFF any safety device.

BE SURE that all pressure relief devices are properly installed and functioning before operating any machine.

RISK OF INJURY OR DEATH by electrocution. High (or medium) voltage is present on motor leads even though the motor is not running. Open the power supply disconnect before touching motor leads or terminals.

UNIT AND ELECTRICAL CONSTRUCTION is designed for use in a non-hazardous environment (non-flammable and non-explosive). DO NOT install the chiller in a hazardous (flammable or explosive) location or environment.

⚠ WARNING

Failure to follow these procedures may result in personal injury or death.

DO NOT USE TORCH to remove any component. System contains oil and refrigerant under pressure.

To remove a component, wear protective gloves and goggles and proceed as follows:

a. Shut off electrical power to unit.
b. Recover refrigerant to relieve all pressure from system using both high-pressure and low pressure ports.
c. Traces of vapor should be displaced with nitrogen and the work area should be well ventilated. Refrigerant in contact with an open flame produces toxic gases.
d. Cut component connection tubing with tubing cutter and remove component from unit. Use a pan to catch any oil that may come out of the lines and as a gage for how much oil to add to the system.
e. Carefully unsweat remaining tubing stubs when necessary. Oil can ignite when exposed to torch flame.

DO NOT USE eyebolts or eyebolt holes to rig heat exchangers or the entire assembly.

DO NOT work on high (or medium) voltage equipment unless you are a qualified electrician.

DO NOT WORK ON electrical components, including control panels, switches, starters, or oil heater until you are sure ALL POWER IS OFF and no residual voltage can leak from capacitors or solid-state components.

LOCK OPEN AND TAG electrical circuits during servicing. IF WORK IS INTERRUPTED, confirm that all circuits are deenergized before resuming work.

AVOID SPILLING liquid refrigerant on skin or getting it into the eyes. USE SAFETY GOGGLES. Wash any spills from the skin with soap and water. If liquid refrigerant enters the eyes, IMMEDIATELY FLUSH EYES with water and consult a physician.

NEVER APPLY an open flame or live steam to a refrigerant cylinder. Dangerous over pressure can result. When it is necessary to heat refrigerant, use only warm (110 F [43 C]) water.

DO NOT REUSE disposable (nonreturnable) cylinders or attempt to refill them. It is DANGEROUS AND ILLEGAL. When cylinder is emptied, evacuate remaining gas pressure, loosen the collar, and unscrew and discard the valve stem. DO NOT INCINERATE.

CHECK THE REFRIGERANT TYPE before adding refrigerant to the machine. The introduction of the wrong refrigerant can cause machine damage or malfunction.

(Warnings continued on next page.)

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.
Catalog No. 04-53230012-01 Printed in U.S.A. Form 23XRV-6SI Pg 1 319 5-17 Replaces: 23XRV-5SI

⚠ WARNING

Operation of this equipment with refrigerants other than those cited herein should comply with ANSI/ASHRAE 15 (latest edition). Contact Carrier for further information on use of this machine with other refrigerants.

DO NOT ATTEMPT TO REMOVE fittings, covers, etc., while machine is under pressure or while machine is running. Be sure pressure is at 0 psig (0 kPa) before breaking any refrigerant connection.

CAREFULLY INSPECT all relief valves, rupture discs, and other relief devices AT LEAST ONCE A YEAR. If machine operates in a corrosive atmosphere, inspect the devices at more frequent intervals.

DO NOT ATTEMPT TO REPAIR OR RECONDITION any relief valve when corrosion or build-up of foreign material (rust, dirt, scale, etc.) is found within the valve body or mechanism. Replace the valve.

DO NOT install relief devices in series or backwards.

USE CARE when working near or in line with a compressed spring. Sudden release of the spring can cause it and objects in its path to act as projectiles.

SOME MODELS MAY EXCEED 85 dBA. Hearing protection should be worn when working in the vicinity of such chillers.

⚠ CAUTION

Failure to follow these procedures may result in personal injury or damage to equipment.

DO NOT STEP on refrigerant lines. Broken lines can whip about and release refrigerant, causing personal injury.

DO NOT climb over a machine. Use platform, catwalk, or staging. Follow safe practices when using ladders.

USE MECHANICAL EQUIPMENT (crane, hoist, etc.) to lift or move inspection covers or other heavy components. Even if components are light, use mechanical equipment when there is a risk of slipping or losing your balance.

BE AWARE that certain automatic start arrangements CAN ENGAGE THE STARTER, TOWER FAN, OR PUMPS. Open the disconnect ahead of the starter, tower fan, and pumps. Shut off the machine or pump before servicing equipment.

USE only repaired or replacement parts that meet the code requirements of the original equipment.

DO NOT VENT OR DRAIN waterboxes containing industrial brines, liquid, gases, or semisolids without the permission of your process control group.

DO NOT LOOSEN waterbox cover bolts until the waterbox has been completely drained.

DOUBLE-CHECK that coupling nut wrenches, dial indicators, or other items have been removed before rotating any shafts.

DO NOT LOOSEN a packing gland nut before checking that the nut has a positive thread engagement.

PERIODICALLY INSPECT all valves, fittings, and piping for corrosion, rust, leaks, or damage.

PROVIDE A DRAIN connection in the vent line near each pressure relief device to prevent a build-up of condensate or rain water.

DO NOT re-use compressor oil or any oil that has been exposed to the atmosphere. Dispose of oil per local codes and regulations.

⚠ CAUTION

DO NOT leave refrigerant system open to air any longer than the actual time required to service the equipment. Seal circuits being serviced and charge with dry nitrogen to prevent oil contamination when timely repairs cannot be completed.

CONTENTS

INTRODUCTION

General — The 23XRV machine is factory assembled, wired, and leak tested. Installation (not by Carrier) consists primarily of establishing water and electrical services to the machine. The rigging, installation, field wiring, field piping, and insulation of waterbox covers are the responsibility of the contractor and/or customer. Carrier has no installation responsibilities for the equipment.

Job Data — Necessary information consists of:
- job contract or specifications
- machine location prints
- rigging information
- piping prints and details
- field wiring drawings
- starter manufacturer's installation details
- Carrier certified print

INSTALLATION

Step 1 — Receive the Machine

INSPECT SHIPMENT

> ⚠ **CAUTION**
>
> Do not open any valves or loosen any connections. The 23XRV machine may be shipped with a full refrigerant charge. Some machines may be shipped with a nitrogen holding charge as an option.

1. Inspect for shipping damage while machine is still on shipping conveyance. If machine appears to be damaged or has been torn loose from its anchorage, have it examined by transportation inspectors before removal. Forward claim papers directly to transportation company. *Manufacturer is not responsible for any damage incurred in transit.*
2. Check all items against shipping list. Immediately notify the nearest Carrier representative if any item is missing.
3. To prevent loss or damage, leave all parts in original packages until beginning installation. All openings are closed with covers or plugs to prevent dirt and debris from entering machine components during shipping. A full operating oil charge is placed in the oil sump before shipment.

IDENTIFY MACHINE (FIG. 1-8) — Refer to machine nameplate in Fig. 1. The machine model number, serial number, and heat exchanger sizes are stamped on the Refrigeration Machine nameplate located on the side of the VFD (variable frequency drive) enclosure. Check this information against shipping papers and job data.

Identifying Drive by Part Number — The VFD drive can be identified by its part number (Fig. 9). This number appears on the shipping label and on VFD nameplate.

Drive Input Component Location — Figure 10 identifies the control center components for the LiquiFlo 2.0 (LF-2) VFD. Figure 11 identifies the control center components for the Std Tier VFD.

Identifying Power Module by ID Number — Each LF-2 AC power module can be identified by its ID number. See Fig. 9. This number appears on the shipping label and on the power module's nameplate. Power ratings for LF-2 VFDs are provided in Table 1. Power ratings for Std Tier VFDs are provided in Table 2.

INSTALLATION REQUIREMENTS — Certain installation requirements should be checked before continuing with the chiller's electrical installation. Input power wire sizes, branch circuit protection, and control wiring are all areas that need to be evaluated.

Determining Wire Size Requirements — Wire size should be determined based on the size of the conduit openings and applicable local, national, and international codes (e.g., NEC [National Electric Code]/CEC [California Energy Commission] regulations). General recommendations are included in the Carrier field wiring drawing.

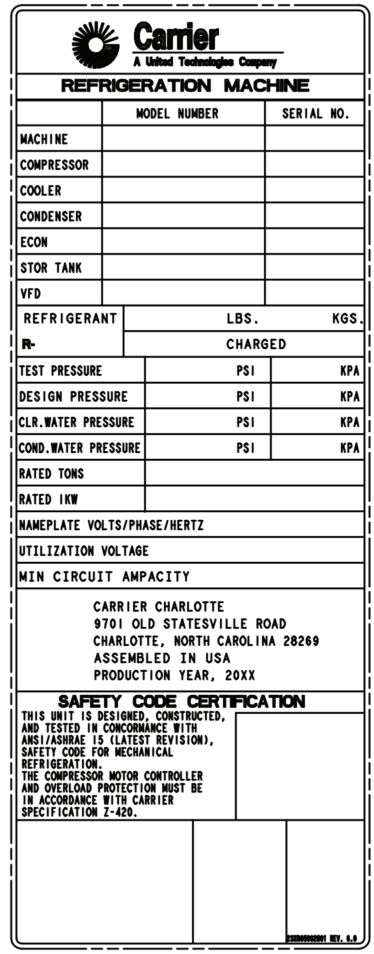


Fig. 1 — Refrigeration Machine Nameplate

Conduit Entry Size — It is important to determine the size of the conduit openings in the enclosure power entry plate so that the wire planned for a specific entry point will fit through the opening. Do NOT punch holes or drill into the top surface of the control center enclosure for field wiring. Knockouts are provided in the back of the control center for field control wiring connections.

Recommended Control and Signal Wire Sizes   The recommended minimum size wire to connect I/O signals to the control terminal blocks is 18 AWG (American Wire Gage). Recommended terminal tightening torque is 7 to 9 in.-lb (0.79 to 1.02 N-m).

Recommended Airflow Clearances — Be sure there is adequate clearance for air circulation around the enclosure. A 6-in. (152.4 mm) minimum clearance is required wherever vents are located in the VFD enclosure.

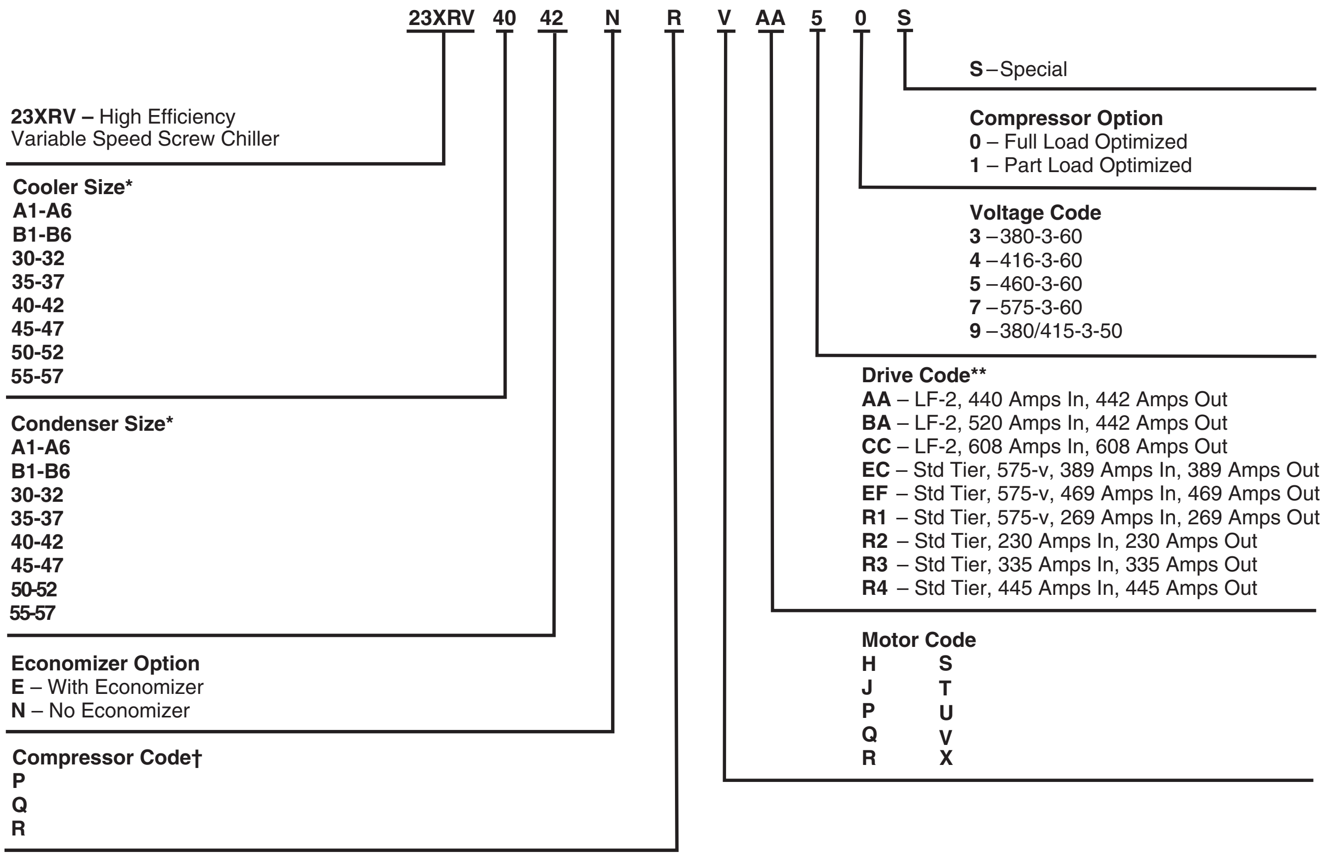
Match Power Module Input and Supply Power Ratings — It is important to verify that building power will meet the input power requirements of the Machine Electrical Data nameplate input power rating. Be sure the input power to the chiller corresponds to the chiller's nameplate voltage, current, and frequency. Refer to machine nameplate in Fig. 12. The machine electrical data nameplate is located on the right side of the control center.

PROVIDE MACHINE PROTECTION — Protect machine and VFD enclosure from construction dirt and moisture. Keep protective shipping covers in place until machine is ready for installation.

If machine is exposed to freezing temperatures after water circuits have been installed, open waterbox drains and remove all water from cooler and condenser. Leave drains open until system is filled.

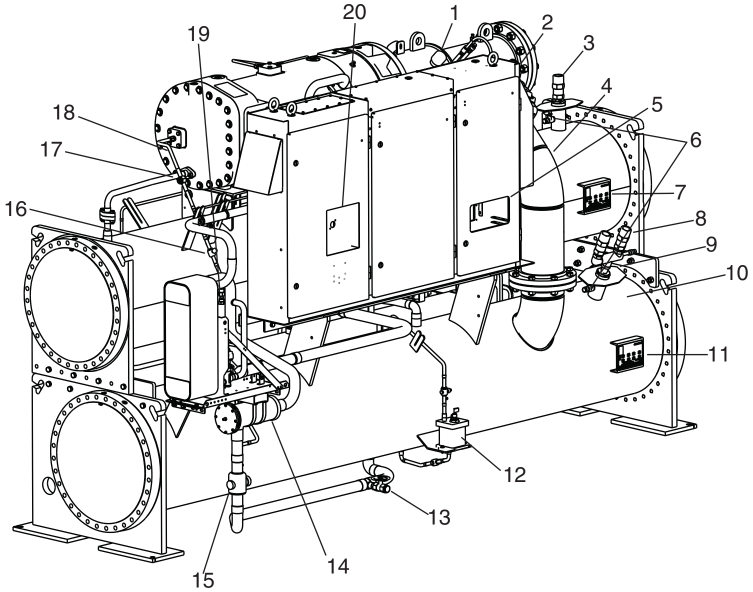
It is important to properly plan before installing a 23XRV unit to ensure that the environment and operating conditions are satisfactory. The installation must comply with all requirements in the certified prints.

Chiller should be installed in an indoor environment where the ambient temperature is between 40 and 104 F (4 and 40 C) with relative humidity of 95% or less.

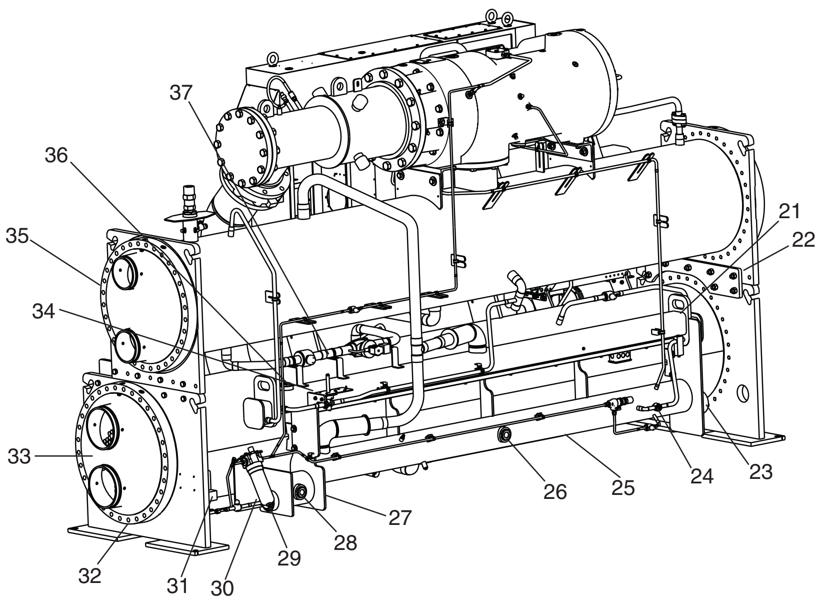


*First character denotes frame size.
†Only H and J motors are used with P compressors. Only type V motors are used with Q compressors.
**Maximum limits only. Additional application limits apply that may reduce these ampacities.

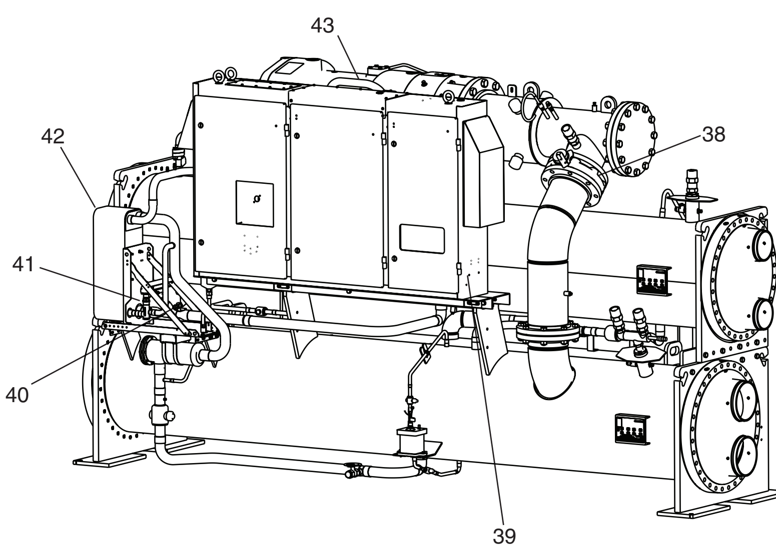
Fig. 2 — Model Number Identification



1 — Discharge Pipe
2 — Variable Frequency Drive
3 — Cooler Relief Valve
4 — Compressor Discharge Pipe
5 — International Chiller Visual Controller (ICVC)
6 — Refrigerant Charging Valve
7 — ASME Nameplate, Evaporator
8 — Condenser Relief Valves
9 — Tubesheet Mounting Brackets
10 — Condenser
11 — ASME Nameplate, Condenser
12 — Level Sensing Chamber
13 — Condenser Refrigerant Pumpout Valve
14 — Refrigerant Strainer
15 — Cooler Inlet Isolation Valve
16 — Motor Cooling Isolation Valve
17 — Motor Cooling Sight Glass
18 — Motor Cooling Supply Line
19 — Motor Cooling Line Filter Drier (Hidden)
20 — VFD Disconnect

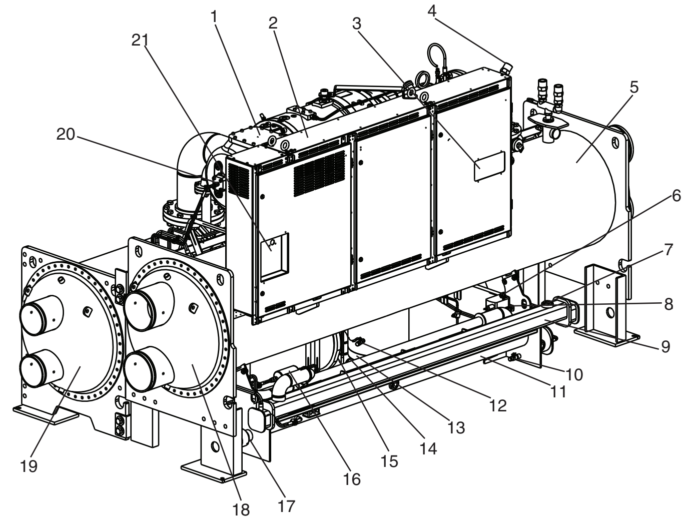


21 — Vaporizer
22 — Tubesheet Mounting Brackets
23 — Oil Sump Heater (Hidden)
24 — Vaporizer Drain Sight Glass
25 — Oil Sump
26 — Oil Sump Sight Glass
27 — Oil Charging Drain Valve (Hidden)
28 — Strainer Housing Sight Glass
29 — Oil Pump Inlet Strainer
30 — Oil Filter Assembly
31 — Oil Pump
32 — Typical Waterbox Drain Coupling (Hidden)
33 — Condenser Supply/Return End Waterbox
34 — Oil Reclaim Actuator
35 — Cooler Supply/Return End Waterbox
36 — Vaporizer Sight Glass
37 — Hot Gass Bypass Line (Option)

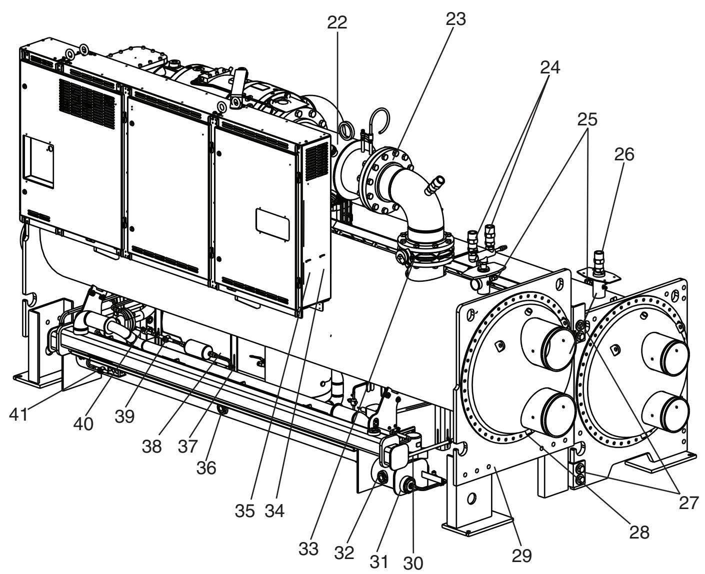


38 — Discharge Isolation Valve Assembly (Option or Accessory)
39 — Machine Electrical Data Nameplate
40 — Main EXV
41 — Economizer Gas EXV (Option)
42 — Economizer (Option)
43 — Economizer Muffler (Hidden)

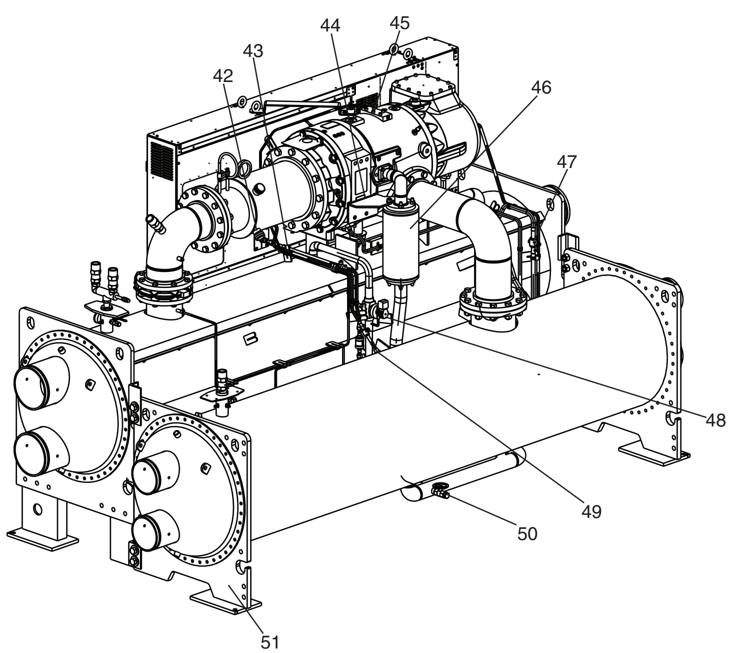
Fig. 3 — Typical 23XRV Components (Units with P Compressor)



1 — Motor Terminal Cover Plate
2 — Variable Frequency Drive
3 — International Chiller Visual Controller (ICVC)
4 — Discharge Pipe Relief Valve
5 — Condenser
6 — Oil Reclaim Actuator
7 — Vaporizer Sight Glass
8 — Oil Filter Assembly (Hidden)
9 — Vaporizer
10 — Oil Charging/Drain Valve
11 — Oil Sump
12 — Condenser Refrigerant Pumpout Valve
13 — Condenser Float Chamber
14 — Cooler Inlet Isolation Valve
15 — ASME Nameplate, Economizer (Hidden)
16 — Filter Drier
17 — Oil Sump Heater
18 — Condenser Supply/Return End Waterbox
19 — Cooler Supply/Return End Waterbox
20 — Motor Cooling Supply Line
21 — VFD Disconnect

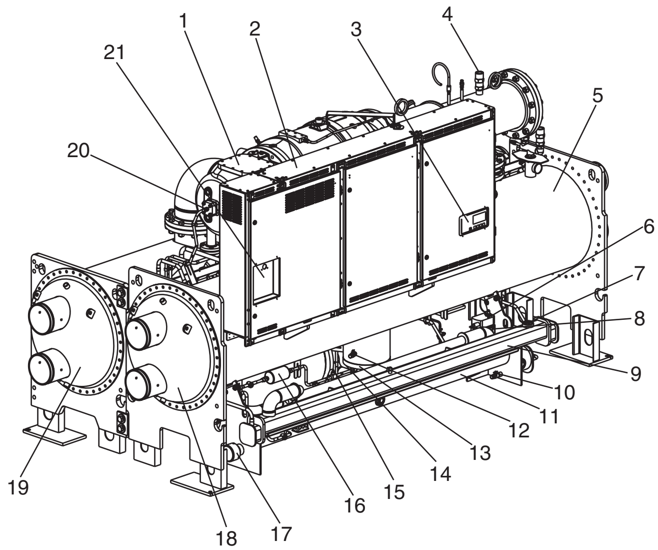


22 — Discharge Pipe
23 — Compressor Discharge Check Valve Access Cover
24 — Condenser Relief Valves
25 — Refrigerant Charging Valves
26 — Cooler Relief Valve
27 — Tubesheet Mounting Brackets
28 — Typical Waterbox Drain Coupling
29 — ASME Nameplate, Condenser
30 — Oil Pump
31 — Oil Pump Inlet Strainer
32 — Strainer Housing Sight Glass
33 — Discharge Isolation Valve (Option or Accessory)
34 — Refrigeration Machine Nameplate
35 — Machine Electrical Data Nameplate
36 — Oil Sump Sight Glass
37 — Filter Drier Isolation Valve with Schrader Valve
38 — Economizer
39 — Motor Cooling Sight Glass
40 — Motor Cooling Isolation Valve
41 — Vaporizer Drain Sight Glass

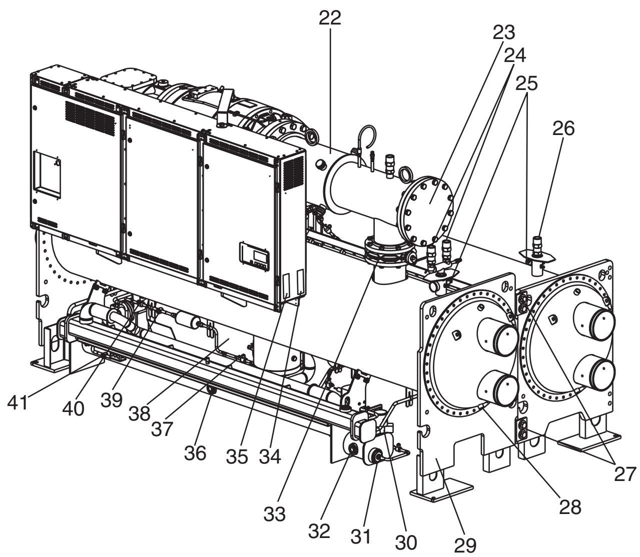


42 — VFD Cold Plate Refrigeration Inlet Connection (Outlet Hidden)
43 — VFD Cold Plate Solenoid
44 — Compressor Nameplate
45 — Compressor Lubrication Block
46 — Economizer Muffler
47 — Vaporizer Condenser Gas Isolation Valve
48 — Hot Gas Bypass Isolation and Trim Valve
49 — VFD Cooling Refrigerant Strainer
50 — Cooler Refrigerant Pumpout Valve
51 — ASME Nameplate, Cooler

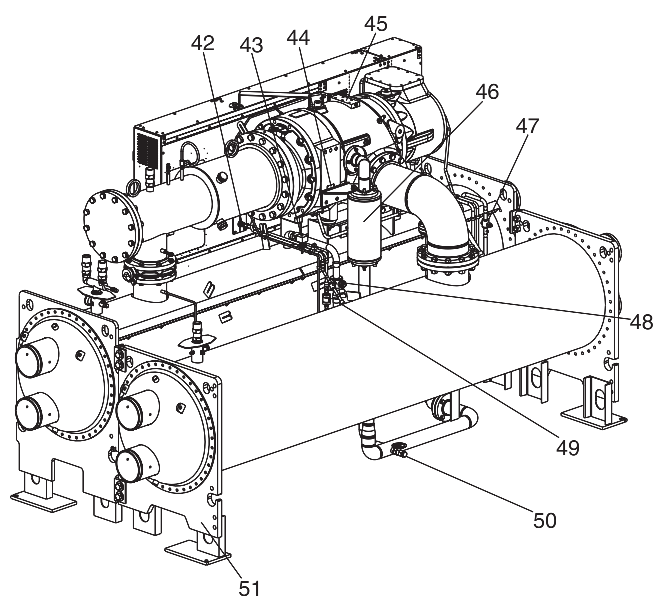
Fig. 4 — Typical 23XRV Components (Units with Q Compressor)



1 — Motor Terminal Cover Plate
2 — Variable Frequency Drive
3 — International Chiller Visual Controller (ICVC)
4 — Discharge Pipe Relief Valve
5 — Condenser
6 — Oil Reclaim Actuator
7 — Vaporizer Sight Glass
8 — Oil Filter Assembly (Hidden)
9 — Vaporizer
10 — Oil Charging/Drain Valve
11 — Oil Sump
12 — Condenser Refrigerant Pumpout Valve
13 — Condenser Float Chamber
14 — Cooler Inlet Isolation Valve
15 — ASME Nameplate, Economizer (Hidden)
16 — Filter Drier
17 — Oil Sump Heater
18 — Condenser Supply/Return End Waterbox
19 — Cooler Supply/Return End Waterbox
20 — Motor Cooling Supply Line
21 — VFD Disconnect

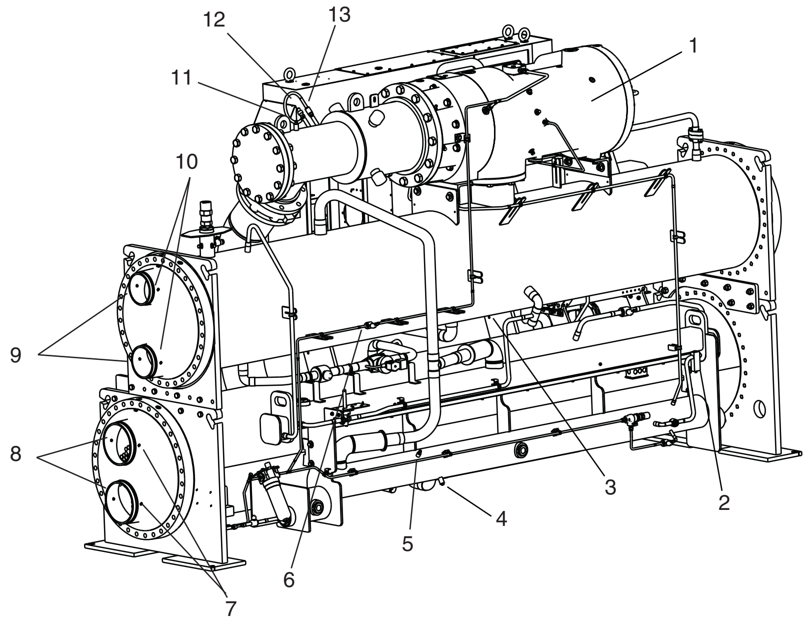


22 — Discharge Pipe
23 — Compressor Discharge Check Valve Access Cover
24 — Condenser Relief Valves
25 — Refrigerant Charging Valves
26 — Cooler Relief Valve
27 — Tubesheet Mounting Brackets
28 — Typical Waterbox Drain Coupling
29 — ASME Nameplate, Condenser
30 — Oil Pump
31 — Oil Pump Inlet Strainer
32 — Strainer Housing Sight Glass
33 — Discharge Isolation Valve (Option or Accessory)
34 — Refrigeration Machine Nameplate
35 — Machine Electrical Data Nameplate
36 — Oil Sump Sight Glass
37 — Filter Drier Isolation Valve with Schrader Valve
38 — Economizer
39 — Motor Cooling Sight Glass
40 — Motor Cooling Isolation Valve
41 — Vaporizer Drain Sight Glass

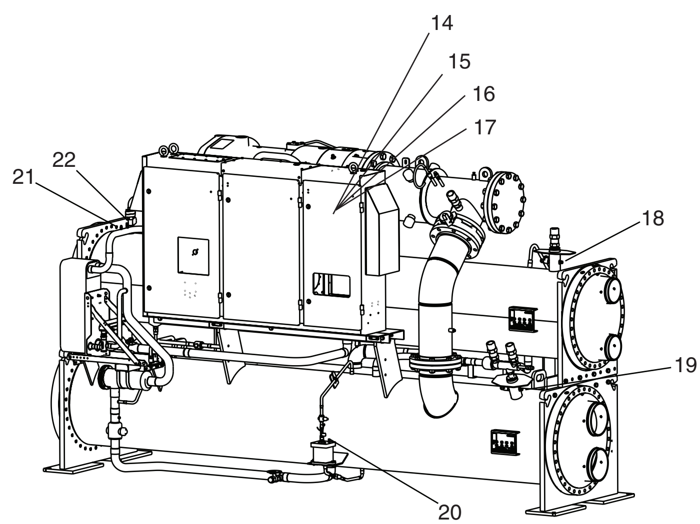


42 — VFD Cold Plate Refrigeration Inlet Connection (Outlet Hidden)
43 — VFD Cold Plate Solenoid
44 — Compressor Nameplate
45 — Compressor Lubrication Block
46 — Economizer Muffler
47 — Vaporizer Condenser Gas Isolation Valve
48 — Hot Gas Bypass Isolation and Trim Valve
49 — VFD Cooling Refrigerant Strainer
50 — Cooler Refrigerant Pumpout Valve
51 — ASME Nameplate, Cooler

Fig. 5 — Typical 23XRV Components (Units with R Compressor)

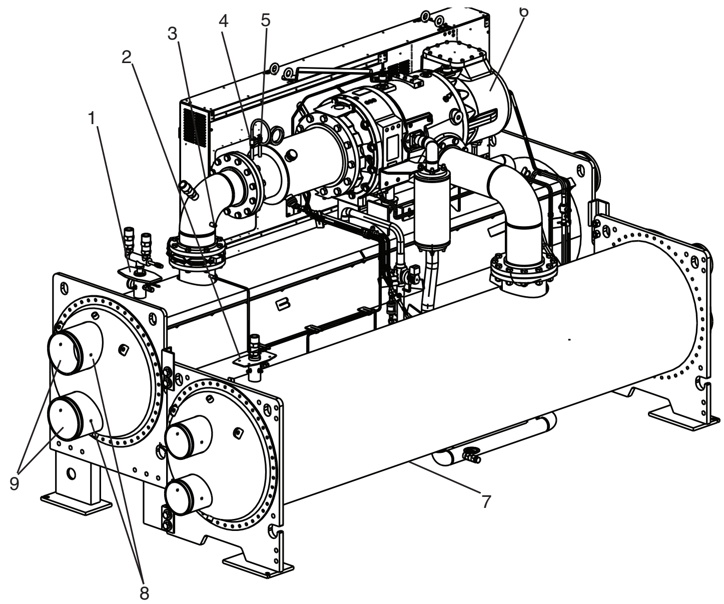


1 — Compressor Motor Winding Temperature (Hidden)
2 — Vaporizer Temperature
3 — Evaporator Return Liquid Temperature (Hidden)
4 — Oil Sump Temperature
5 — Oil Sump Pressure
6 — Supply Oil Pressure
7 — Condenser Liquid Temperature (Hidden)
8 — Condenser Liquid Flow (Optional)
9 — Evaporator Liquid Flow (Optional)
10 — Evaporator Liquid Temperature (Hidden)
11 — Compressor Discharge Temperature
12 — Compressor Discharge Pressure
13 — Compressor Discharge High Pressure Switch

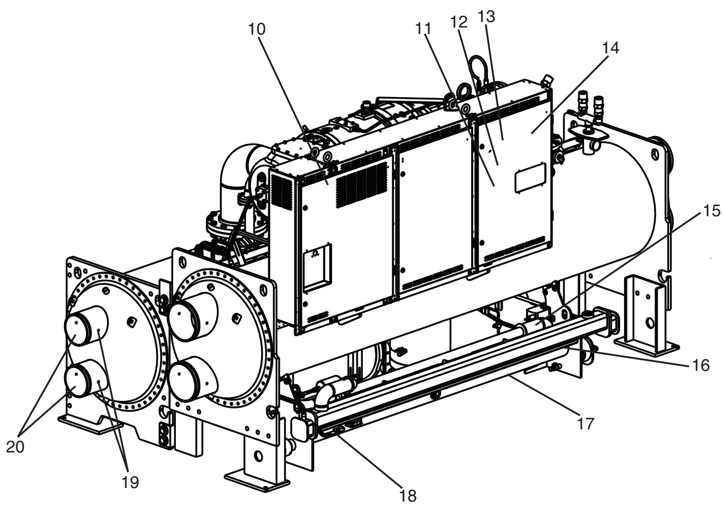


14 — Inductor Temperature Switch (Inside VFD Enclosure)
15 — VFD Rectifier Temperature (Inside Power Module)
16 — VFD Heat Sink Temperature (Inside VFD Enclosure)
17 — VFD Inverter Temperature (Inside Power Module)
18 — Evaporator Temperature
19 — Condenser Pressure
20 — Condenser Liquid Level Sensor
21 — Economizer Pressure (Optional)
22 — Economizer Temperature (Optional)

Fig. 6 — Typical 23XRV Installation — Sensor Locations (Units with P Compressor)

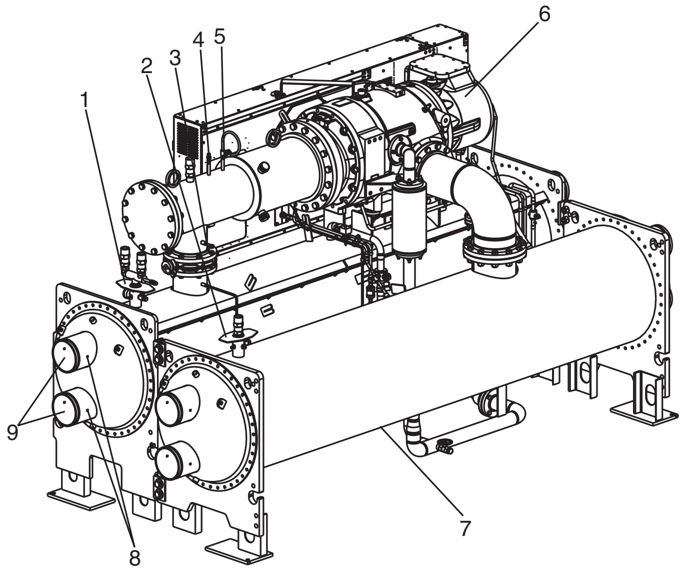


1 — Condenser Pressure
2 — Evaporator Pressure
3 — Compressor Discharge Temperature
4 — Compressor Discharge Pressure
5 — Compressor Discharge High Pressure Switch
6 — Compressor Motor Winding Temperature (Hidden)
7 — Evaporator Refrigerant Liquid Temperature (Hidden)
8 — Condenser Liquid Temperature
9 — Condenser Liquid Flow (Optional)

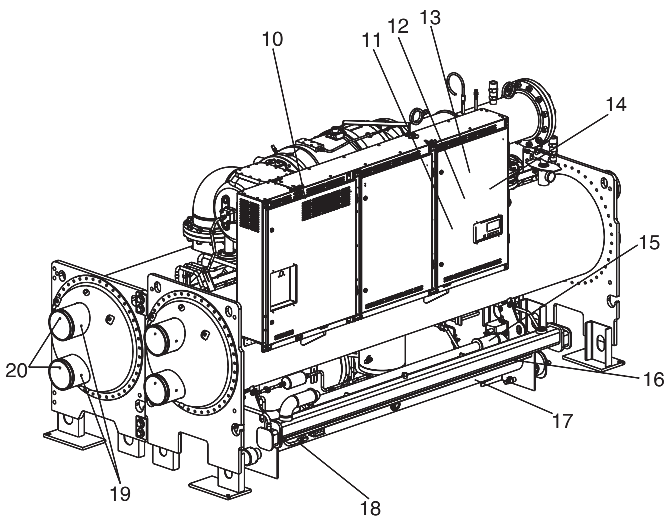


10 — Inductor Temperature Switch (Inside VFD Enclosure)
11 — VFD Rectifier Temperature (Inside Power Module)
12 — VFD Cold Plate Temperature (Inside VFD Enclosure)
13 — VFD Inverter Temperature (Inside Power Module)
14 — Humidity Sensor (Inside VFD Enclosure)
15 — Oil Pressure Leaving Filter (Hidden)
16 — Oil Sump Pressure (Hidden)
17 — Oil Sump Temperature (Hidden)
18 — Vaporizer Temperature
19 — Evaporator Liquid Temperature
20 — Evaporator Liquid Flow (Optional)

Fig. 7 — Typical 23XRV Installation — Sensor Locations (Units with Q Compressor)



1 — Condenser Pressure
2 — Evaporator Pressure
3 — Compressor Discharge Temperature
4 — Compressor Discharge Pressure
5 — Compressor Discharge High Pressure Switch
6 — Compressor Motor Winding Temperature (Hidden)
7 — Evaporator Refrigerant Liquid Temperature (Hidden)
8 — Condenser Liquid Temperature
9 — Condenser Liquid Flow (Optional)



10 — Inductor Temperature Switch (Inside VFD Enclosure)
11 — VFD Rectifier Temperature (Inside Power Module)
12 — VFD Cold Plate Temperature (Inside VFD Enclosure)
13 — VFD Inverter Temperature (Inside Power Module)
14 — Humidity Sensor (Inside VFD Enclosure)
15 — Oil Pressure Leaving Filter (Hidden)
16 — Oil Sump Pressure (Hidden)
17 — Oil Sump Temperature (Hidden)
18 — Vaporizer Temperature
19 — Evaporator Liquid Temperature
20 — Evaporator Liquid Flow (Optional)

Fig. 8 — Typical 23XRV Installation — Sensor Locations (Units with R Compressor)

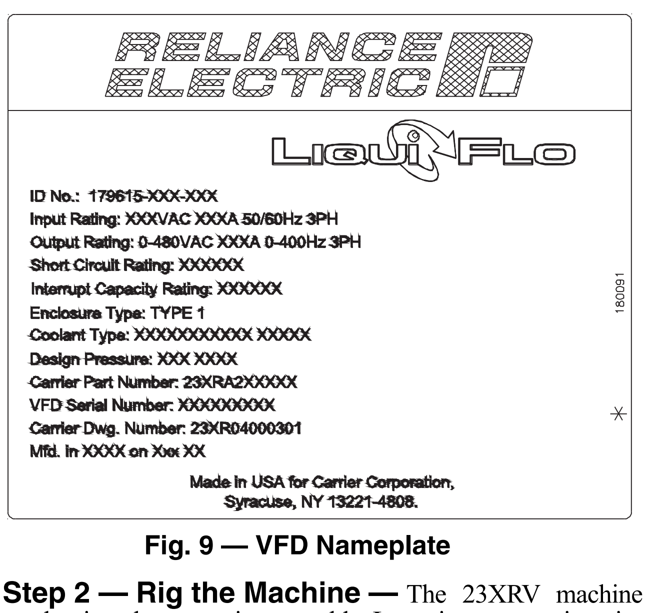


Fig. 9 — VFD Nameplate

Step 2 — Rig the Machine — The 23XRV machine can be rigged as an entire assembly. Large interconnecting piping has flanged connections that allow the compressor, cooler, and condenser sections to be separated and rigged individually. In addition, the VFD can be removed and rigged separately.

RIG MACHINE ASSEMBLY — See rigging instructions on label attached to machine. Also refer to rigging guide (Fig. 13), physical data in Fig. 14 and 15, and Tables 3-19. *Lift machine only from the points indicated in rigging guide.* Each lifting cable or chain must be capable of supporting the entire weight of the machine.

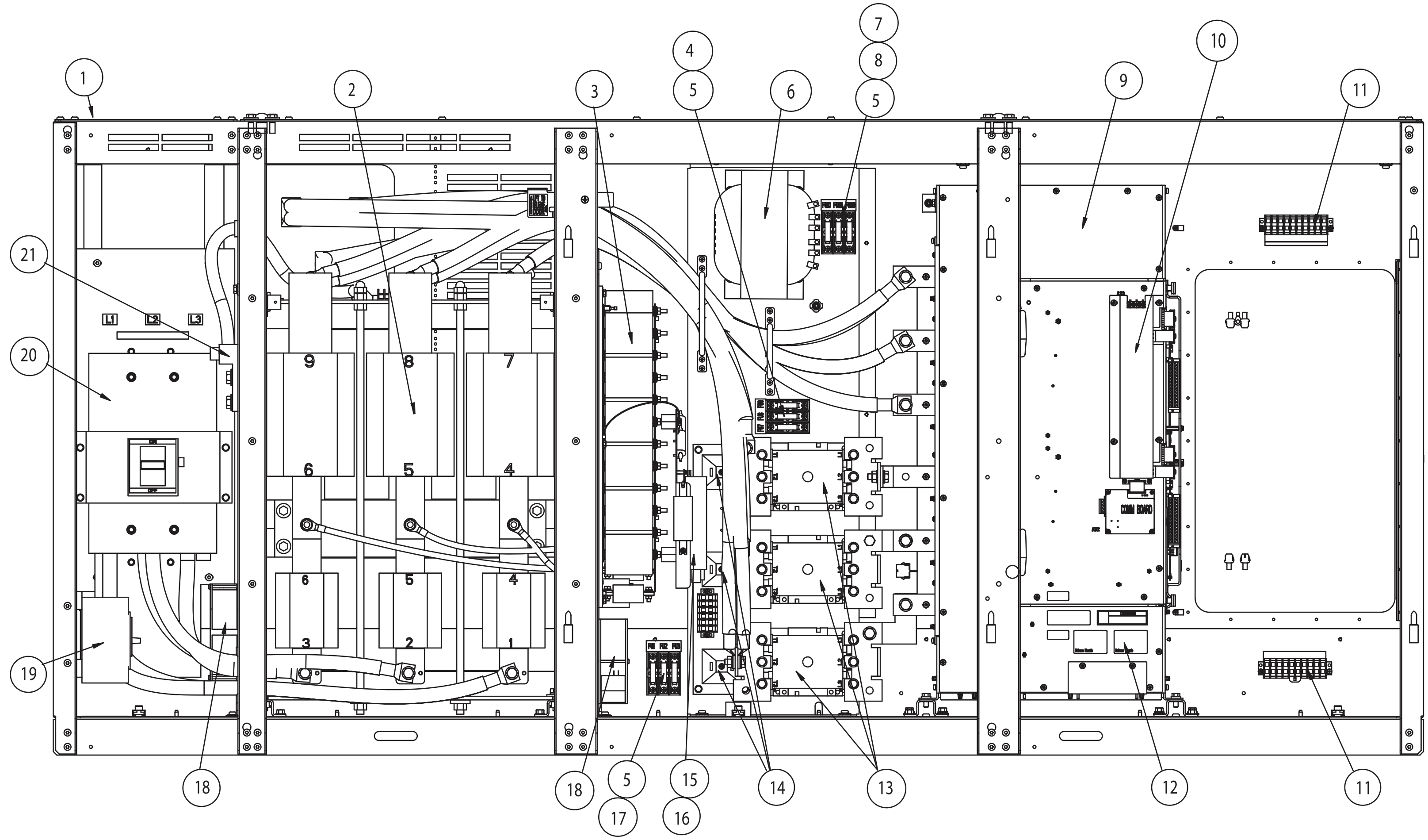
⚠ WARNING

Lifting machine from points other than those specified may result in serious damage to the unit and personal injury. Rigging equipment and procedures must be adequate for machine weight. See Fig. 13 for machine weights.

NOTE: These weights are broken down into component sections for use when installing the unit in sections. For the complete machine weight, add all component sections and refrigerant charge together. See Tables 8-19 for machine component weights.

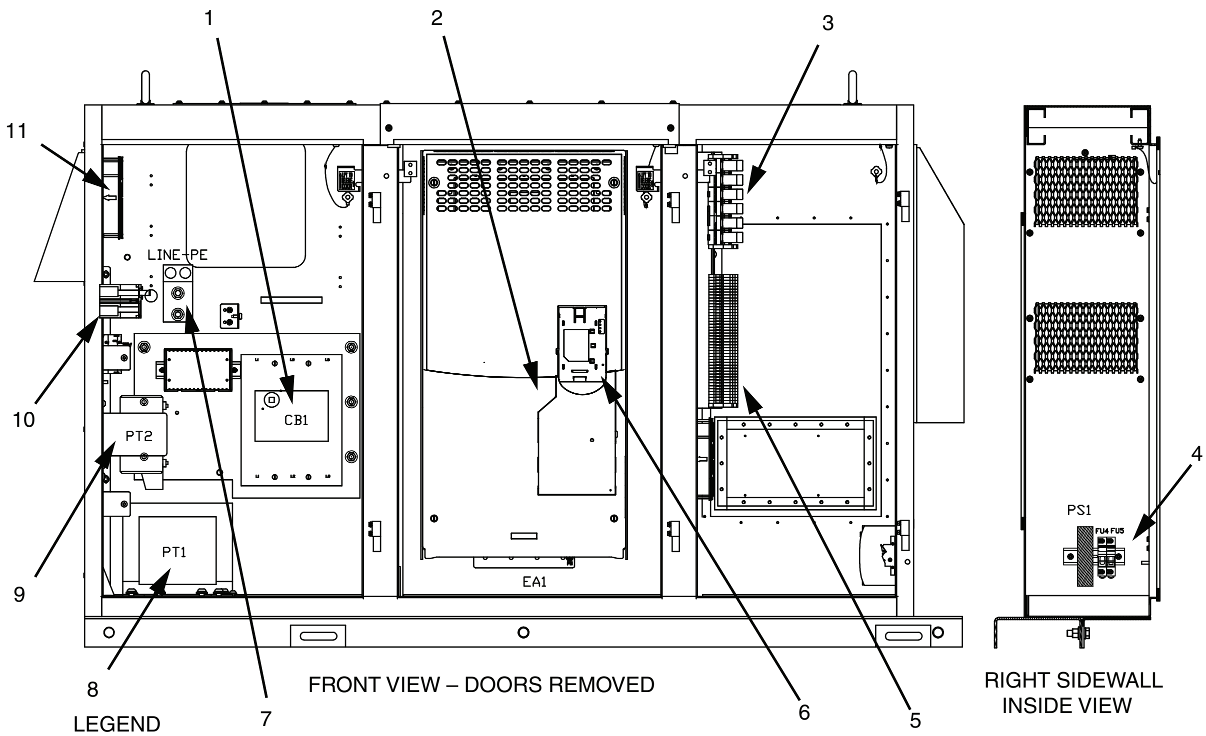
Contractors are not authorized to disassemble any part of the chiller without Carrier's supervision. Any request otherwise must be in writing from the Carrier Service Manager.

NOTE: Carrier suggests that a structural engineer be consulted if transmission of vibrations from mechanical equipment is of concern.



1 — Input Power Wiring Panel
2 — Input Inductor Assembly
3 — Capacitor Bank Assembly
4 — Fuse, Class CC, 600v, 20A (3)
5 — Fuse Black, 30A, 600v, Class CC
6 — Transformer, 3kVA
7 — Fuse, Class CC, 600v, 5A (1)
8 — Fuse, Class CC, 600v, 15A (2)
9 — Power Module Assembly
10 — Communications Interface Board
11 — Terminal Block, 10-Position (2)
12 — Power Module Nameplate
13 — AC Contactor (3)
14 — Pre-Charge Resistor Assembly
15 — Line Sync PC Board Assembly
16 — Line Sync Board Cover
17 — Fuse, Class CC, 600v, 1A (3)
18 — Fan, 115v (2)
19 — Circuit Breaker, 600v, 15A
20 — Circuit Breaker, 600v
21 — Lug, Ground, 2-600 MCM

Fig. 10 — Control Center Components (LF-2 VFD)



LEGEND

1 — Input Circuit Breaker
2 — Power Module
3 — Control Relays (CR1 - CR6)
4 — Control Fuses
5 — Terminal Block
6 — Drive Status Indicator
7 — Ground Lug
8 — 120V Control Transformer
9 — 120V Vaporizer Heater Transformer
10 — 15 Amp Control Circuit Breaker
11 — Cooling Fan

Fig. 11 — Control Center Components (Std Tier VFD)

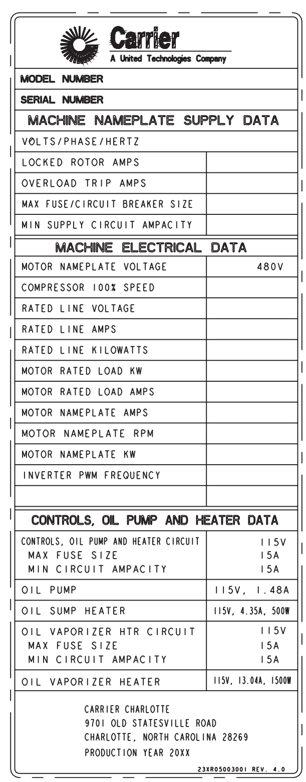


Fig. 12 — Machine Electrical Data Nameplate

Table 1 — Drive Assembly and Power Module Ratings (LF-2 VFD)

CARRIER PART NUMBER	VFD FRAME SIZE	ENCLOSURE TYPE	INPUT VOLTAGE (V) RANGE	MAX INPUT CURRENT (AMPS)	MAX OUTPUT CURRENT* AT 4 kHz (AMPS)
23XRA2AA_ _ _ _ _ _ _ _ _ _ _	Frame 2AA	NEMA 1	380 to 460	440	440
23XRA2BA_ _ _ _ _ _ _ _ _ _ _	Frame 2BA	NEMA 1	380 to 460	520	440
23XRA2BB_ _ _ _ _ _ _ _ _ _ _	Frame 2BB	NEMA 1	380 to 460	520	520
23XRA2CC_ _ _ _ _ _ _ _ _ _ _	Frame 2CC	NEMA 1	380 to 460	608	608

*110% output current capability for one minute, 150% output current for 5 seconds.

Table 2 — Drive Assembly and Power Module Ratings (Std Tier VFD)*

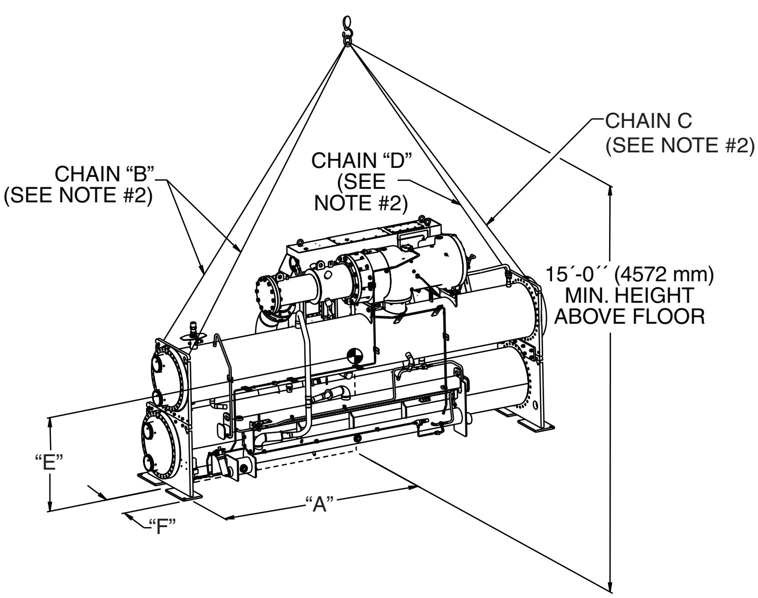
CARRIER PART NUMBER	ENCLOSURE TYPE	INPUT VOLTAGE (DIGIT Y OF PART NUMBER)		MAX INPUT CURRENT (AMPS)	MAX OUTPUT CURRENT† AT 2 kHz (AMPS)
		Y	VOLTAGE/HZ		
23XVR0_ _ _00Y _ _ F0 **(R = ROCKWELL)**	NEMA 1	3 4 5 7 9	380v / 60 Hz 416v / 60 Hz 460v / 60 Hz 575v / 60 Hz 400v / 50 Hz	230 269 335 445	230 269 335 445
23XVE0_ _ _00Y _ _ F0 **(E = EATON)**				485 550 605	485 550 605

*All voltage and current combinations listed may not be available for sale. Please review Carrier Marketing literature for latest offering.
†110% output current capability for one minute, 150% output current for 5 seconds.
** Last character 0 indicates refrigerant-cooled; last digit A indicates air-cooled.

COMPRESSOR TYPE*	HEAT EXCHANGER CODE	MAXIMUM WEIGHT	VESSEL LENGTH	DIM. “A”	CHAIN LENGTH “B”	CHAIN LENGTH “C”	CHAIN LENGTH “D”	DIM. “E”	DIM. “F”
		lb	ft	ft-in.	ft-in.	ft-in.	ft-in.	ft-in.	ft-in.
P	A1-A6	15,582	12’	6’ -7”	12′- 5″	11′-6″	11′-10″	3′-6″	1′ -6″
	B1-B6	16,391	14’	7′- 5″	13′- 0″	12′-0″	12′- 4″	3′-6″	1′ -6″
Q	30-32	17,962	12′	6′-10″	13′- 5″	13′-0″	12′- 5″	3′-11″	3′- 8″
	35-37	19,501	14′	7′- 8″	13′-10″	13′-5″	12′-10″	3′-11″	3′- 8″
	40-42	21,032	12′	6′-10″	13′- 6″	12′-8″	12′- 3″	4′- 1″	3′-11″
	45-47	22,468	14′	7′- 8″	13′-11″	13′-2″	12′- 8″	4′- 1″	3′-11″
	50-52	23,856	12′	6′-10″	13′-10″	12′-7″	12′- 9″	4′- 0″	4′- 4″
	55-57	25,642	14′	7′- 8″	14′- 4″	13′-1″	13′- 1″	4′- 0″	4′- 4″
R	30-32	19,187	12′	6′-10″	13′- 5″	13′-0″	12′- 5″	3′-11″	3′- 8″
	35-37	20,589	14′	7′- 8″	13′-10″	13′-5″	12′-10″	3′-11″	3′- 8″
	40-42	23,928	12′	6′-10″	13′- 6″	12′-8″	12′- 3″	4′- 1″	3′-11″
	45-47	25,167	14′	7′- 8″	13′-11″	13′-2″	12′- 8″	4′- 1″	3′-11″
	50-52	26,950	12′	6′-10″	13′-10″	12′-7″	12′- 9″	4′- 0″	4′- 4″
	55-57	28,479	14′	7′- 8″	14′- 4″	13′-1″	13′- 1″	4′- 0″	4′- 4″

COMPRESSOR TYPE*	HEAT EXCHANGER CODE	MAXIMUM WEIGHT	VESSEL LENGTH	DIM. “A”	CHAIN LENGTH “B”	CHAIN LENGTH “C”	CHAIN LENGTH “D”	DIM. “E”	DIM. “F”
		kg	mm	mm	mm	mm	mm	mm	mm
P	A1-A6	7 068	3658	2007	3785	3505	3607	1067	457
	B1-B6	7 435	4267	2261	3962	3658	3759	1067	457
Q	30-32	8 147	3658	2083	4089	3962	3785	1194	1118
	35-37	8 846	4267	2337	4216	4089	3912	1194	1118
	40-42	9 540	3658	2083	4115	3861	3734	1245	1194
	45-47	10 191	4267	2337	4242	4013	3861	1245	1194
	50-52	10 821	3658	2083	4216	3835	3886	1219	1321
	55-57	11 631	4267	2337	4369	3988	3988	1219	1321
R	30-32	8 703	3658	2083	4089	3962	3785	1194	1118
	35-37	9 339	4267	2337	4216	4089	3912	1194	1118
	40-42	10 854	3658	2083	4115	3861	3734	1245	1194
	45-47	11 416	4267	2337	4242	4013	3861	1245	1194
	50-52	12 224	3658	2083	4216	3835	3886	1219	1321
	55-57	12 918	4267	2337	4369	3988	3988	1219	1321

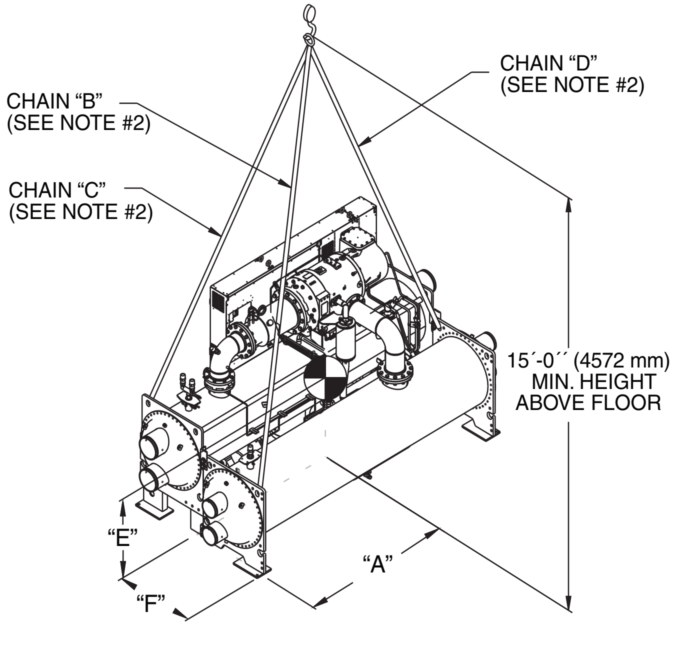
*The 11th character of the chiller model number indicates the compressor type.



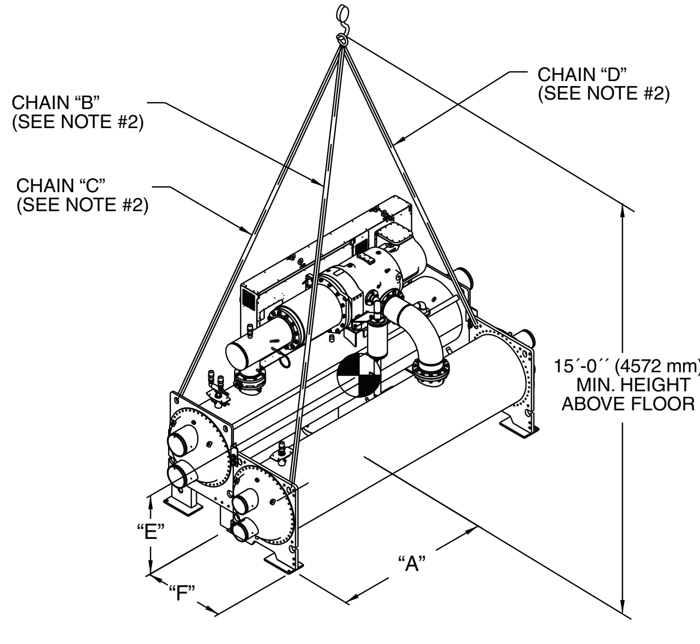
UNITS WITH P COMPRESSOR

NOTES:
1. Each chain must be capable of supporting the entire weight of the machine. See chart for maximum weights.
2. Chain lengths shown are typical for 15′ (4572 mm) lifting height. Some minor adjustments may be required.
3. Units with Q and R compressors are shown on page 15.

Fig. 13 — Machine Rigging Guide



UNITS WITH Q COMPRESSOR



UNITS WITH R COMPRESSOR

NOTES:

1. Each chain must be capable of supporting the entire weight of the machine. See chart for maximum weights.
2. Chain lengths shown are typical for 15′ (4572 mm) lifting height. Some minor adjustments may be required.
3. See weight and chain length charts on page 14.

Fig. 13 — Machine Rigging Guide (cont)

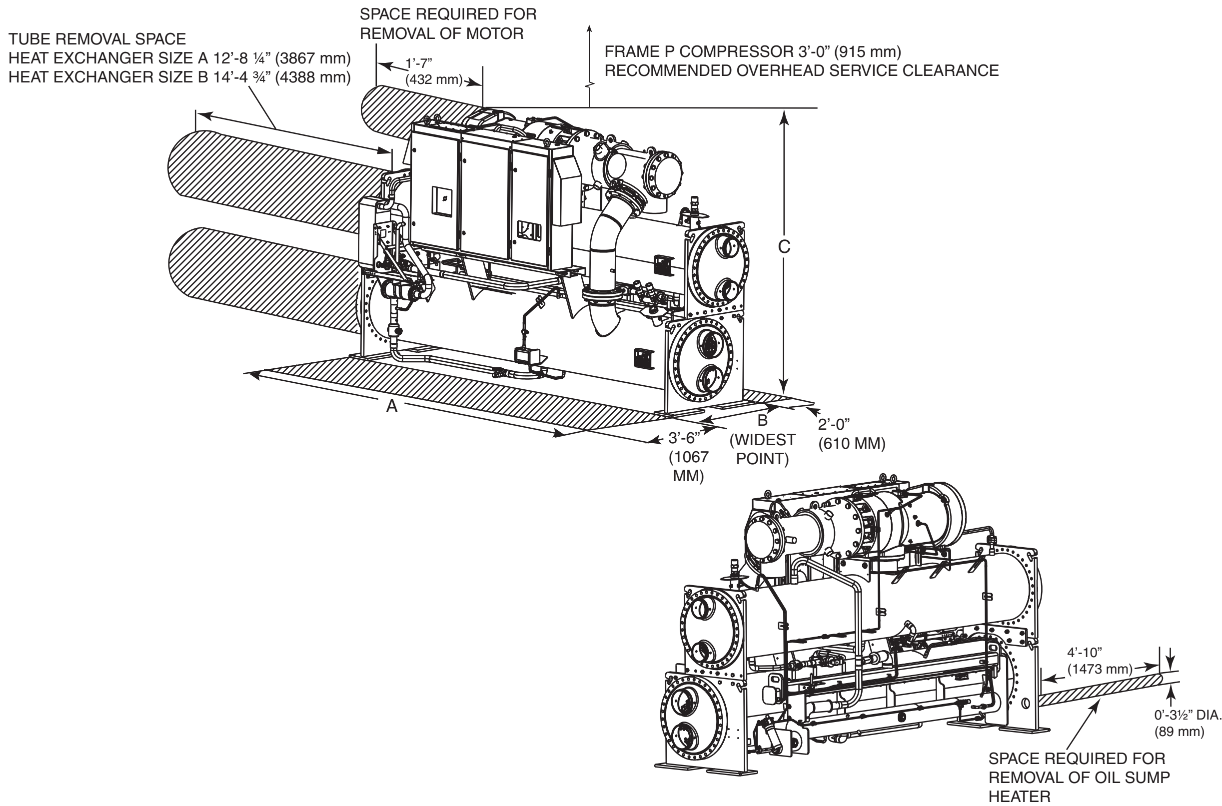


Fig. 14 — 23XRV Heat Exchanger Sizes A,B Dimensions (Unit with P Compressor Shown)

Table 3 — 23XRV Heat Exchanger Sizes A,B Dimensions (Nozzle-in-Head Waterbox)

HEAT EXCHANGER SIZE	A (LENGTH)*						B (WIDTH)	C (HEIGHT)
	1-PASS		2-PASS		3-PASS			
	ft-in.	mm	ft-in.	mm	ft-in.	mm		
A	14- 6$^3/_4$	4439	14- 1$^1/_4$	4301	14- 6$^3/_4$	4439	See unit certified drawings	
B	16- 3$^1/_4$	4959	15- 9$^3/_4$	4822	16- 3$^1/_4$	4959		

*1 or 3 pass length applies if either (or both) cooler or condenser is a 1 or 3 pass design. The 2-pass length assumes both cooler and condenser nozzles on same end of chiller.

NOTES:
1. Service access should be provided per American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 15, latest edition, National Fire Protection Association (NFPA) 70, and local safety code.
2. Allow at least 3 ft (915 mm) overhead clearance for service rigging for compressor.
3. Certified drawings available upon request.
4. Marine waterboxes may add 6 in. (152 mm) to the width of the machine. See certified drawings for details.
5. 'A' length dimensions shown are for standard 150 psig (1034 kPa) design and Victaulic connections. The 300 psig (2068 kPa) design and/or flanges will add length. See certified drawings.
6. Dished head waterbox covers are available only for 2-pass design.

Table 4 — 23XRV Heat Exchanger Sizes A,B Dimensions (Marine Waterbox)

HEAT EXCHANGER SIZE	A (LENGTH)*						B (WIDTH)	C (HEIGHT)
	1-PASS		2-PASS		3-PASS			
	ft-in.	mm	ft-in.	mm	ft-in.	mm		
A	15- 9	4801	14- 6$^1/_2$	4435	15- 5	4699	See unit certified drawings	
B	17- 5$^1/_2$	5322	16- 3	4955	17- 1$^1/_2$	5220		

*1 or 3 pass length applies if either (or both) cooler or condenser is a 1 or 3 pass design. The 2-pass length assumes both cooler and condenser nozzles on same end of chiller.

NOTES:
1. Service access should be provided per American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 15, latest edition, National Fire Protection Association (NFPA) 70, and local safety code.
2. Allow at least 3 ft (915 mm) overhead clearance for service rigging for the compressor.
3. Certified drawings available upon request.
4. Marine waterboxes may add 6 in. (152 mm) to the width of the machine. See certified drawings for details.
5. 'A' length dimensions shown are for standard 150 psig (1034 kPa) design and Victaulic connections. The 300 psig (2068 kPa) design and/or flanges will add length. See certified drawings.

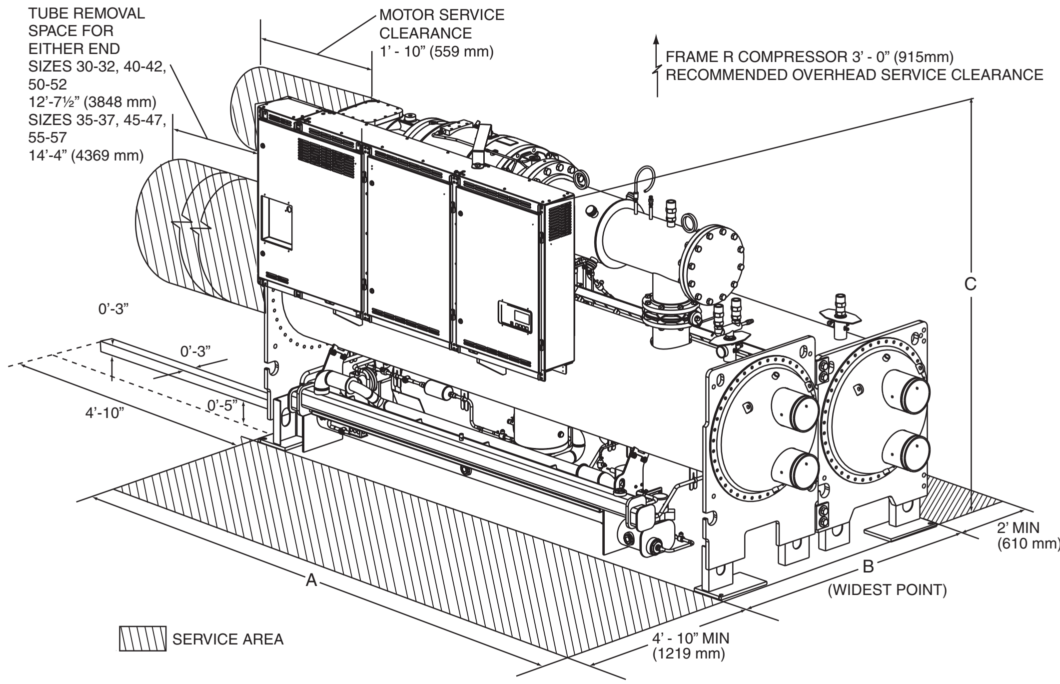


Fig. 15 — 23XRV Heat Exchanger Sizes 30-57 Dimensions (Unit with R Compressor Shown)

Table 5 — 23XRV Dimensions Heat Exchanger Sizes 30-57 (Nozzle-In-Head Waterbox)

HEAT EXCHANGER SIZE	A (LENGTH, WITH NOZZLE-IN-HEAD WATERBOX)						B (WIDTH)	C (HEIGHT)
	1-PASS		2-PASS*		3-PASS			
	ft-in.	mm	ft-in.	mm	ft-in.	mm		
30 TO 32	14- 3 1/4	4350	13- 8 1/4	4172	14- 3 1/4	4350	See unit certified drawings	
35 TO 37	15-11 3/4	4870	15- 4 3/4	4693	15-11 3/4	4870		
40 TO 42	14- 9	4496	14- 3 1/8	4347	14- 6	4420		
45 TO 47	16- 5 1/2	5017	15-11 5/8	4867	16- 2 1/2	4940		
50 TO 52	14-10	4521	14- 4 1/2	4382	14- 6 1/2	4432		
55 TO 57	16- 6 1/2	5042	16- 1	4902	16- 3	4953		

*Assumes both cooler and condenser nozzles on same end of chiller.

NOTES:
1. Service access should be provided per American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 15, latest edition, National Fire Protection Association (NFPA) 70, and local safety code.
2. Allow at least 3 ft (915 mm) overhead clearance for service rigging for frame R compressor.
3. Certified drawings available upon request.
4. Marine waterboxes may add 6 in. (152 mm) to the width of the machine. See certified drawings for details.
5. 'A' length dimensions shown are for standard 150 psig (1034 kPa) design and Victaulic connections. The 300 psig (2068 kPa) design and/or flanges will add length. See certified drawings.
6. Dished head waterbox covers not available for 3 pass design.

Table 6 — 23XRV Heat Exchanger Sizes 30-57 Dimensions (Marine Waterbox)

HEAT EXCHANGER SIZE	A (LENGTH, MARINE WATERBOX)				B (WIDTH)	C (HEIGHT)
	2-PASS*		1 OR 3-PASS†			
	ft-in.	mm	ft-in.	mm		
30 TO 32	14- 9	4496	16- 4 3/4	4997	See unit certified drawings	
35 TO 37	16- 5 1/2	5017	18- 1 1/4	5518		
40 TO 42	15- 2 3/4	4642	16- 3 1/4	5086		
45 TO 47	16-11 3/4	5163	18- 4 3/4	5607		
50 TO 52	15- 3 1/2	4661	16- 8 1/2	5093		
55 TO 57	17- 0	5182	18- 5	5613		

*Assumes both cooler and condenser nozzles on same end of chiller.
†1 or 3 pass length applies if cooler is a 1 or 3 pass design.

NOTES:
1. Service access should be provided per American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 15, latest edition, National Fire Protection Association (NFPA) 70, and local safety code.
2. Allow at least 3 ft (915 mm) overhead clearance for service rigging for frame R compressor.
3. Certified drawings available upon request.
4. Marine waterboxes may add 6 in. (152 mm) to the width of the machine. See certified drawings for details.
5. 'A' length dimensions shown are for standard 150 psig (1034 kPa) design and Victaulic connections. The 300 psig (2068 kPa) design and/or flanges will add length. See certified drawings.

Table 7 — 23XRV Waterbox Nozzle Sizes

FRAME SIZE	NOZZLE SIZE (in.) (NOMINAL PIPE SIZE)					
	COOLER			CONDENSER		
	1-PASS	2-PASS	3-PASS	1-PASS	2-PASS	3-PASS
A1-A3, B1-B3 NIH	8	6	6	8	6	6
A4-A6, B4-B6 NIH	8	6	6	10	8	6
A,B MARINE	8	6	6	N/A	6	N/A
3	10	8	6	10	8	6
4	10	8	6	10	8	6
5	10	8	6	10	10	8

Table 8 — 23XRV Compressor and Motor Weights

COMPRESSOR TYPE	MOTOR SIZE	ENGLISH				SI			
		TOTAL COMPRESSOR WEIGHT (lb)	STATOR WEIGHT (lb)	ROTOR WEIGHT (lb)	MOTOR TERMINAL COVER (lb)	TOTAL COMPRESSOR WEIGHT (kg)	STATOR WEIGHT (kg)	ROTOR WEIGHT (kg)	MOTOR TERMINAL COVER (kg)
P	H,J	3036	110	167	N/A	1377	50	76	N/A
Q	V	4090	370	193	39	1855	168	88	18
R	P,Q,R,S, T,U,V,X	4866	441	229	46	2207	200	104	21

→ Table 9 — 23XRV Maximum Component Weights*

COMPONENT		FRAME 3 HEAT EXCHANGER		FRAME 4 HEAT EXCHANGER		FRAME 5 HEAT EXCHANGER		FRAME A HEAT EXCHANGER		FRAME B HEAT EXCHANGER	
		lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
Isolation Valves		70	32	70	32	115	52	70	32	70	32
Suction Elbow	P Compressor	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Q Compressor	159	72	187	85	184	83	N/A	N/A	N/A	N/A
	R Compressor	179	81	237	108	232	105	N/A	N/A	N/A	N/A
Discharge Elbow/ Muffler	P Compressor	N/A	N/A	N/A	N/A	N/A	N/A	584	265	584	265
	Q Compressor	597	271	597	271	597	271	N/A	N/A	N/A	N/A
	R Compressor	747	339	747	339	747	339	N/A	N/A	N/A	N/A
Vaporizer and Oil Sump		700	318	700	318	700	318	700	318	700	318
Economizer		542	246	542	246	542	246	174	79	174	79

LEGEND

VFD — Variable Frequency Drive

*To determine compressor frame size, refer to Fig. 2.
NOTE: Weights for the items in the above table must be added to obtain the total chiller weight.

Table 10 —VFD (Variable Frequency Drive) Weight Table

DRIVE TYPE	COMPRESSOR	VOLTAGE/Hz	AMPERAGE (A)	WEIGHT (lb)
Std. Tier	P	380/400/415/50 and 480/60	230	998
			335, 445	1200
		575/60	269	1200
	Q/R	380/400/415/50 and 480/60	230	998
			335, 445	1200
		575/60	389, 469	1650
LF2	Q/R	380-415 50/60	440	1400
			520, 608	1800
		440-480 50/60	440	1500
			520, 608	1800

Table 11 — 23XRV Cooler Frame Size A1-A6, B1-B6 Heat Exchanger Weights

FRAME SIZE	ENGLISH							METRIC (SI)						
	STEEL WT (lb)	COPPER WT (lb)	DRY RIGGING WT* (lb)	REFRIG. WT (lb)	SHIP WT (lb)	WATER VOL (Gal.)	OPER. WT (lb)	STEEL WT (kg)	COPPER WT (kg)	DRY RIGGING WT* (kg)	REFRIG. WT (kg)	SHIP WT (kg)	WATER VOL (L)	OPER. WT (kg)
A1	2506	734	3240	270	3510	47	3904	1137	333	1470	122	1592	178	1771
A2	2506	789	3295	290	3585	51	4009	1137	358	1495	132	1627	193	1819
A3	2506	889	3395	310	3705	57	4182	1137	403	1540	141	1681	216	1897
A4	2506	962	3468	330	3798	62	4315	1137	436	1573	150	1723	235	1958
A5	2506	1076	3582	360	3942	69	4520	1137	488	1625	163	1788	261	2050
A6	2506	1190	3696	390	4086	77	4725	1137	540	1677	177	1854	291	2144
B1	2642	839	3481	305	3786	54	4236	1198	381	1579	138	1717	204	1921
B2	2642	901	3543	325	3868	58	4352	1198	409	1607	147	1754	220	1974
B3	2642	1016	3658	355	4013	65	4558	1198	461	1659	161	1820	246	2067
B4	2642	1099	3741	375	4116	71	4706	1198	498	1696	170	1866	269	2134
B5	2642	1229	3871	415	4286	79	4946	1198	557	1755	188	1943	299	2242
B6	2642	1360	4002	445	4447	87	5177	1198	617	1815	202	2017	329	2348

*Dry rigging weight = Steel weight + Copper weight.

Table 12 — 23XRV Condenser Frame Size A1-A6, B1-B6 Heat Exchanger Weights

FRAME SIZE	ENGLISH							METRIC (SI)						
	STEEL WT (lb)	COPPER WT (lb)	DRY RIGGING WT* (lb)	REFRIG. WT (lb)	SHIP WT (lb)	WATER VOL (Gal.)	OPER. WT (lb)	STEEL WT (kg)	COPPER WT (kg)	DRY RIGGING WT* (kg)	REFRIG. WT (kg)	SHIP WT (kg)	WATER VOL (L)	OPER. WT (kg)
A1	3390	734	4124	550	4674	47	5068	1538	333	1871	249	2120	178	2299
A2	3390	844	4234	550	4784	54	5237	1538	383	1921	249	2170	204	2375
A3	3390	944	4334	550	4884	61	5391	1538	428	1966	249	2215	231	2445
A4	3390	1049	4439	550	4989	67	5552	1538	476	2014	249	2263	254	2518
A5	3390	1190	4580	550	5130	77	5769	1538	540	2078	249	2327	291	2617
A6	3390	1345	4735	550	5285	87	6007	1538	610	2148	249	2397	329	2724
B1	3571	839	4410	625	5035	54	5485	1620	381	2001	283	2284	204	2488
B2	3571	964	4535	625	5160	62	5677	1620	437	2057	283	2340	235	2575
B3	3571	1078	4649	625	5274	69	5853	1620	489	2109	283	2392	261	2655
B4	3571	1198	4769	625	5394	77	6037	1620	543	2163	283	2446	291	2738
B5	3571	1360	4931	625	5556	87	6286	1620	617	2237	283	2520	329	2851
B6	3571	1537	5108	625	5733	99	6558	1620	697	2317	283	2600	375	2974

*Dry rigging weight = Steel weight + Copper weight.

Table 13 — 23XRV Code 30-57 Heat Exchanger Weights

CODE	ENGLISH						SI					
	DRY RIGGING WEIGHT (lb)*		MACHINE CHARGE				DRY RIGGING WEIGHT (kg)*		MACHINE CHARGE			
	COOLER ONLY	CONDENSER ONLY	REFRIGERANT WEIGHT (lb)		LIQUID VOLUME (Gal.)		COOLER ONLY	CONDENSER ONLY	REFRIGERANT WEIGHT (kg)		LIQUID VOLUME (L)	
			WITH ECONOMIZER	WITHOUT ECONOMIZER	COOLER	CONDENSER			WITH ECONOMIZER	WITHOUT ECONOMIZER	COOLER	CONDENSER
30	4148	3617	800	650	56	56	1882	1641	363	295	212	212
31	4330	3818	800	650	64	65	1964	1732	363	295	242	246
32	4522	4023	800	650	72	74	2051	1825	363	295	273	280
35	4419	4529	910	760	61	61	2004	2054	413	345	231	231
36	4627	4758	910	760	70	72	2099	2158	413	345	265	273
37	4845	4992	910	760	80	83	2198	2264	413	345	303	314
40	5008	4962	900	750	103	110	2272	2251	408	340	390	416
41	5178	5155	900	750	111	119	2349	2338	408	340	420	451
42	5326	5347	900	750	119	129	2416	2425	408	340	450	488
45	5463	5525	1015	865	112	120	2478	2506	460	392	424	454
46	5659	5747	1015	865	122	130	2567	2607	460	392	462	492
47	5830	5967	1015	865	130	141	2644	2707	460	392	492	534
50	5827	6013	1250	1100	132	147	2643	2727	567	499	500	557
51	6053	6206	1250	1100	143	156	2746	2815	567	499	541	591
52	6196	6387	1250	1100	150	165	2810	2897	567	499	568	625
55	6370	6708	1430	1280	144	160	2889	3043	649	581	545	606
56	6631	6930	1430	1280	156	171	3008	3143	649	581	591	647
57	6795	7138	1430	1280	164	181	3082	3238	649	581	621	685

*Rigging weights are for standard tubes of standard wall thickness (Turbo-B3 and Spikefin 2, 0.025-in. [0.635 mm] wall).

NOTES:
Cooler includes the suction elbow and $^1/_2$ the distribution piping weight.
Condenser includes float valve and sump, discharge stub-out, and $^1/_2$ the distribution piping weight.
For special tubes refer to the 23XRV Computer Selection Program.
All weights for standard 2-pass NIH (nozzle-in-head) design with Victaulic grooves.

Table 14 — 23XRV Additional Data for Cooler Marine Waterboxes*

HEAT EXCHANGER FRAME, PASS	ENGLISH		SI	
	RIGGING WEIGHT (lb) (See Note 2)	WATER VOLUME (Gal.)	RIGGING WEIGHT (kg) (See Note 2)	WATER VOLUME (L)
FRAME A,B, 1 PASS, 150 psig (1034 kPa)	760	64	345	242
FRAME A,B, 2 PASS, 150 psig (1034 kPa)	400	29	181	110
FRAME A,B, 3 PASS, 150 psig (1034 kPa)	752	55	341	208
FRAME 3, 1 AND 3 PASS, 150 psig (1034 kPa)	730	84	331	318
FRAME 3, 2 PASS, 150 psig (1034 kPa)	365	42	166	159
FRAME 4, 1 AND 3 PASS, 150 psig (1034 kPa)	1888	109	856	413
FRAME 4, 2 PASS, 150 psig (1034 kPa)	944	54	428	204
FRAME 5, 1 AND 3 PASS, 150 psig (1034 kPa)	2445	122	1109	462
FRAME 5, 2 PASS, 150 psig (1034 kPa)	1223	61	555	231
FRAME A,B, 1 PASS, 300 psig (2068 kPa)	812	64	368	242
FRAME A,B, 2 PASS, 300 psig (2068 kPa)	436	29	198	110
FRAME A,B, 3 PASS, 300 psig (2068 kPa)	788	55	357	208
FRAME 3, 1 AND 3 PASS, 300 psig (2068 kPa)	860	84	390	318
FRAME 3, 2 PASS, 300 psig (2068 kPa)	430	42	195	159
FRAME 4, 1 AND 3 PASS, 300 psig (2068 kPa)	2162	109	981	413
FRAME 4, 2 PASS, 300 psig (2068 kPa)	1552	47	704	178
FRAME 5, 1 AND 3 PASS, 300 psig (2068 kPa)	2655	122	1204	462
FRAME 5, 2 PASS, 300 psig (2068 kPa)	1965	53	891	201

*Add to heat exchanger data for total weights or volumes.

NOTES:
1. Weight adder shown is the same for cooler and condenser of equal frame size.
2. For the total weight of a vessel with a marine waterbox, add these values to the heat exchanger weights (or volume).

Table 15 — 23XRV Additional Data for Condenser Marine Waterboxes*

HEAT EXCHANGER FRAME, PASS	ENGLISH		SI	
	RIGGING WEIGHT (LB) (SEE NOTE 2)	WATER VOLUME (GAL)	RIGGING WEIGHT (KG) (SEE NOTE 2)	WATER VOLUME (L)
FRAME A,B, 1 PASS, 150 psig (1034 kPa)	N/A	N/A	N/A	N/A
FRAME A,B, 2 PASS, 150 psig (1034 kPa)	454	32	206	121
FRAME A,B, 3 PASS, 150 psig (1034 kPa)	N/A	N/A	N/A	N/A
FRAME 3, 1 AND 3 PASS, 150 psig (1034 kPa)	N/A	N/A	N/A	N/A
FRAME 3, 2 PASS, 150 psig (1034 kPa)	365	42	166	159
FRAME 4, 1 AND 3 PASS, 150 psig (1034 kPa)	N/A	N/A	N/A	N/A
FRAME 4, 2 PASS, 150 psig (1034 kPa)	989	54	449	204
FRAME 5, 1 AND 3 PASS, 150 psig (1034 kPa)	N/A	N/A	N/A	N/A
FRAME 5, 2 PASS, 150 psig (1034 kPa)	1195	60	542	227
FRAME A,B, 1 PASS, 300 psig (2068 kPa)	N/A	N/A	N/A	N/A
FRAME A,B, 2 PASS, 300 psig (2068 kPa)	491	42	223	159
FRAME A,B, 3 PASS, 300 psig (2068 kPa)	N/A	N/A	N/A	N/A
FRAME 3, 1 AND 3 PASS, 300 psig (2068 kPa)	N/A	N/A	N/A	N/A
FRAME 3, 2 PASS, 300 psig (2068 kPa)	430	42	195	159
FRAME 4, 1 AND 3 PASS, 300 psig (2068 kPa)	N/A	N/A	N/A	N/A
FRAME 4, 2 PASS, 300 psig (2068 kPa)	1641	47	744	178
FRAME 5, 1 AND 3 PASS, 300 psig (2068 kPa)	N/A	N/A	N/A	N/A
FRAME 5, 2 PASS, 300 psig (2068 kPa)	1909	50	866	189

*Add to heat exchanger data for total weights or volumes.

NOTES:
1. Weight adder shown is the same for cooler and condenser of equal frame size.
2. For the total weight of a vessel with a marine waterbox, add these values to the heat exchanger weights (or volume).

→ Table 16 — 23XRV Waterbox Cover Weights, Frames 3,4,5 — English (lb)*

WATERBOX DESCRIPTION	COOLER						CONDENSER					
	FRAME 3		FRAME 4		FRAME 5		FRAME 3		FRAME 4		FRAME 5	
	VICTAULIC NOZZLES	FLANGED	VICTAULIC NOZZLES	FLANGED	VICTAULIC NOZZLES	FLANGED	VICTAULIC NOZZLES	FLANGED	VICTAULIC NOZZLES	FLANGED	VICTAULIC NOZZLES	FLANGED
NIH 1 Pass Cover, 150 psig	282	318	148	185	168	229	282	318	148	185	168	229
NIH 2 Pass Cover, 150 psig	287	340	202	256	222	276	287	340	191	245	224	298
NIH 3 Pass Cover, 150 psig	294	310	472	488	617	634	294	310	503	519	628	655
NIH Plain End, 150 psig	243	243	138	138	154	154	225	225	138	138	154	154
MWB End Cover, 150 psig†	243/315	243/315	138/314	138/314	154/390	154/390	225/234	225/234	138/314	138/314	154/390	154/390
NIH 1 Pass Cover, 300 psig	411	486	633	709	764	840	411	486	633	709	764	840
NIH 2 Pass Cover, 300 psig	411	518	626	733	760	867	411	578	622	729	727	878
NIH 3 Pass Cover, 300 psig	433	468	660	694	795	830	433	468	655	689	785	838
NIH Plain End, 300 psig	291	291	522	522	658	658	270	270	522	522	658	658
MWB End Cover, 300 psig†	445/619	445/619	522/522	522/522	658/658	658/658	359/474	359/474	522/522	522/522	658/658	658/658

LEGEND

NIH — Nozzle-in-Head
MWB — Marine Waterbox

*Rows with 2 entries list nozzle end and return end weights.
†Add to heat exchanger data for total weights or volumes.

NOTES:
1. Weight adder shown is the same for cooler and condenser of equal frame size.
2. For the total weight of a vessel with a marine waterbox, add these values to the heat exchanger weights (or volume).
3. Weight for NIH 2-pass cover, 150 psig (1034 kPa), is included in the heat exchanger weights shown in Tables 11-13.

→ Table 17 — 23XRV Waterbox Cover Weights, Frames 3,4,5 — SI (kg)*

WATERBOX DESCRIPTION	COOLER						CONDENSER					
	FRAME 3		FRAME 4		FRAME 5		FRAME 3		FRAME 4		FRAME 5	
	VICTAULIC NOZZLES	FLANGED	VICTAULIC NOZZLES	FLANGED	VICTAULIC NOZZLES	FLANGED	VICTAULIC NOZZLES	FLANGED	VICTAULIC NOZZLES	FLANGED	VICTAULIC NOZZLES	FLANGED
NIH 1 Pass Cover, 1034 kPa	128	144	67	84	76	104	128	144	67	84	76	104
NIH 2 Pass Cover, 1034 kPa	130	154	92	116	101	125	130	154	87	111	102	135
NIH 3 Pass Cover, 1034 kPa	133	141	214	221	280	288	133	141	228	235	285	297
NIH Plain End, 1034 kPa	110	110	63	63	70	70	102	102	63	63	70	70
MWB End Cover 1034 kPa†	110/143	110/143	63/142	63/142	70/177	70/177	102/106	102/106	63/142	63/142	70/177	70/177
NIH 1 Pass Cover, 2068 kPa	186	220	287	322	347	381	186	220	287	322	346	381
NIH 2 Pass Cover, 2068 kPa	186	235	284	332	344	393	186	235	282	331	330	398
NIH 3 Pass Cover, 2068 kPa	196	212	299	315	361	376	196	212	297	313	356	380
NIH Plain End 2068 kPa	132	132	237	237	298	298	122	122	237	237	298	298
MWB End Cover 2068 kPa†	202/281	202/281	237/237	237/237	298/298	298/298	163/215	163/215	237/237	237/237	298/298	298/298

LEGEND

NIH — Nozzle-in-Head
MWB — Marine Waterbox

*Rows with 2 entries list nozzle end and return end weights.
†Add to heat exchanger data for total weights or volumes.

NOTES:
1. Weight adder shown is the same for cooler and condenser of equal frame size.
2. For the total weight of a vessel with a marine waterbox, add these values to the heat exchanger weights (or volume).
3. Weight for NIH 2-pass cover, 150 psig (1034 kPa), is included in the heat exchanger weights shown in Tables 11-13.

→ Table 18 — 23XRV Waterbox Cover Weights, Frames A/B — English (lb)*

WATERBOX DESCRIPTION	COOLER FRAMES A AND B		CONDENSER FRAMES A AND B	
	VICTAULIC NOZZLES	FLANGED	VICTAULIC NOZZLES	FLANGED
NIH,1-Pass Cover 150 psig	217	244	242	274
NIH,2-Pass Cover 150 psig	172	265	191	298
NIH,3-Pass Cover 150 psig	228	245	261	277
NIH/Marine Plain End, 150 psig	157	157	173	173
MWB Cover, 150 psig	296	296	332	332
NIH,1-Pass Cover 300 psig	217	271	242	312
NIH,2-Pass Cover 300 psig	172	301	191	334
NIH,3-Pass Cover 300 psig	228	263	261	295
NIH/Marine Plain End, 300 psig	157	157	173	173
MWB Cover, 300 psig	296	296	332	332

LEGEND

NIH — Nozzle-in-Head
MWB — Marine Waterbox

*Add to heat exchanger data for total weights or volumes.

NOTES:
1. Weight adder shown is the same for cooler and condenser of equal frame size.
2. For the total weight of a vessel with a marine waterbox, add these values to the heat exchanger weights (or volume).
3. Weight for NIH 2-pass cover, 150 psig (1034 kPa), is included in the heat exchanger weights shown in Tables 11-13.

→ Table 19 — 23XRV Waterbox Cover Weights, Frames A/B — SI (kg)*

WATERBOX DESCRIPTION	COOLER FRAMES A AND B		CONDENSER FRAMES A AND B	
	VICTAULIC NOZZLES	FLANGED	VICTAULIC NOZZLES	FLANGED
NIH,1-Pass Cover 1034 kPa	98	111	110	124
NIH,2-Pass Cover 1034 kPa	78	120	87	135
NIH,3-Pass Cover 1034 kPa	103	111	118	126
NIH/Marine Plain End, 1034 kPa	71	71	78	78
MWB Cover, 1034 kPa	134	134	151	151
NIH,1-Pass Cover 2068 kPa	98	123	110	142
NIH,2-Pass Cover 2068 kPa	78	137	87	151
NIH,3-Pass Cover 2068 kPa	103	119	118	134
NIH/Marine Plain End, 2068 kPa	71	71	78	78
MWB Cover, 2068 kPa	134	134	151	151

LEGEND

NIH — Nozzle-in-Head
MWB — Marine Waterbox

*Add to heat exchanger data for total weights or volumes.

NOTES:
1. Weight adder shown is the same for cooler and condenser of equal frame size.
2. For the total weight of a vessel with a marine waterbox, add these values to the heat exchanger weights (or volume).
3. Weight for NIH 2-pass cover, 150 psig (1034 kPa), is included in the heat exchanger weights shown in Tables 11-13.

RIG MACHINE COMPONENTS — Refer to Fig. 16-28 and Carrier Certified Prints for machine component disassembly.

IMPORTANT: Only a qualified service technician should perform this operation.

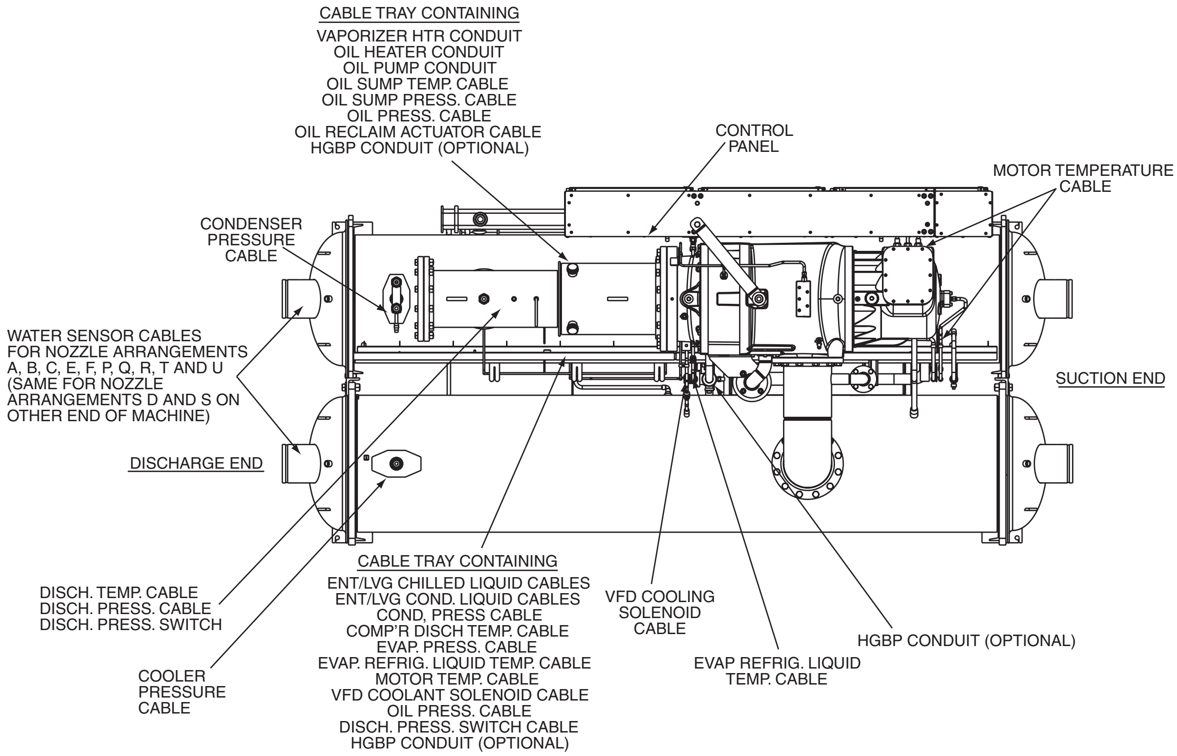
⚠ WARNING

Do not attempt to disconnect flanges while the machine is under pressure. Failure to relieve pressure can result in personal injury or damage to the unit.

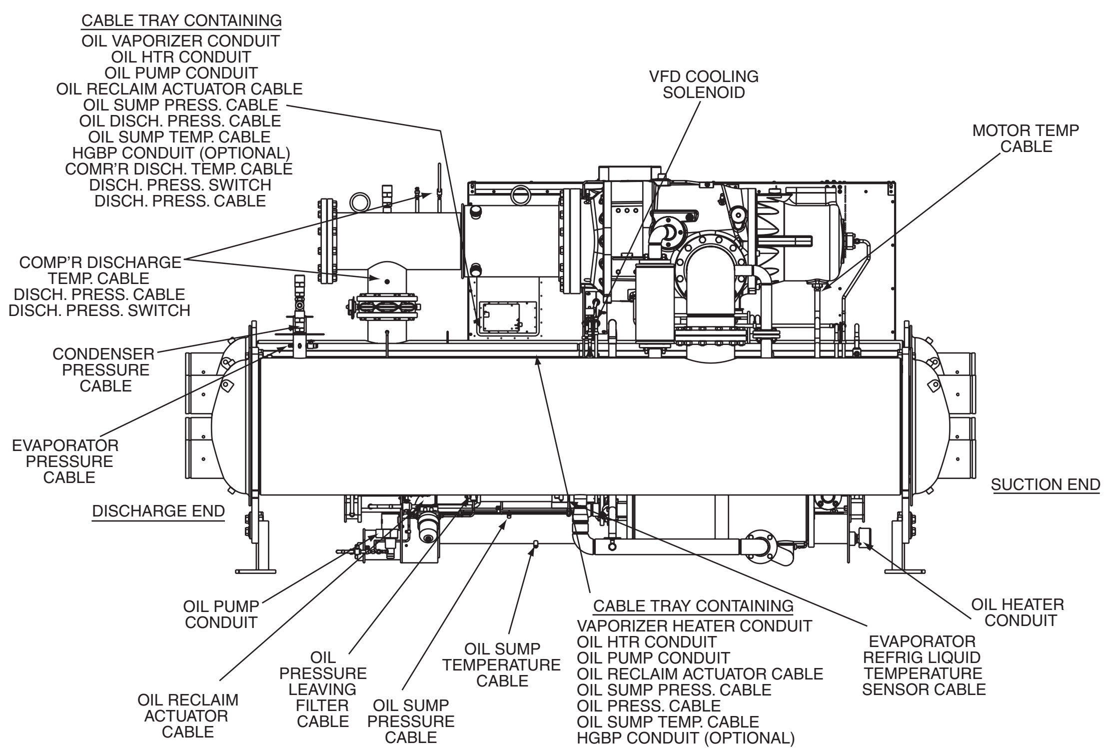
⚠ CAUTION

Before rigging the compressor, disconnect all wires entering the power panel.

NOTE: Label each wire before removal when wiring must be disconnected (see Fig. 16 and 17). Clip all wire ties necessary when removing pressure and temperature sensors. Disconnect all pressure transducer wires at the sensor. Temperature sensors cannot be disconnected from their cables; remove temperature sensors from their thermowells and label as required.



TOP VIEW



LEGEND

ENT/LVG — Entering/Leaving
HGBP — Hot Gas Bypass
HTR — Heater
VFD — Variable Frequency Drive

BACK VIEW

Fig. 16 — Electrical Cable Routing (Unit with R Compressor Shown)

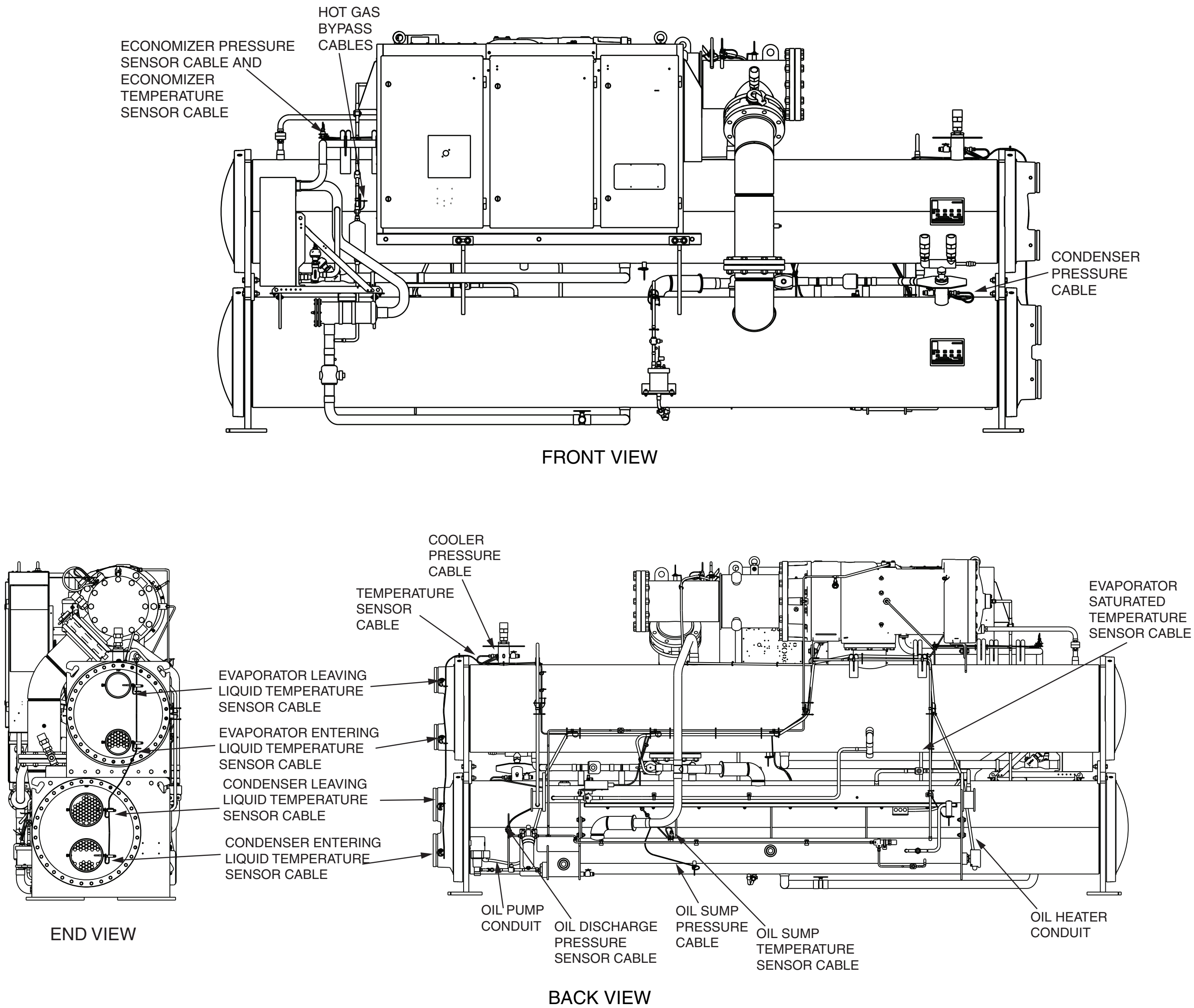


Fig. 17 — Electrical Cable Routing (Unit with P Compressor Shown)

Step 3 — Separate Machine Components — The design of the 23XRVchiller allows for disassembly at the jobsite so that the individual chiller components may be moved through existing doorways. Use the following procedures to separate the machine components.

Suggested locations to cut piping will minimize the width of the condenser/economizer assembly.

SEPARATE COOLER AND CONDENSER

> IMPORTANT: If the cooler and condenser vessels must be separated, the heat exchangers should be kept level by placing a support plate under the tube sheets. The support plate will also help to keep the vessels level and aligned when the vessels are bolted back together.

NOTE: For steps 1 through 13 refer to Fig. 18 for units with Q or R compressors, or Fig. 19 for units with P compressors. The cooler in Fig. 18 has been removed from the picture to show the pipes and lines that must be cut.

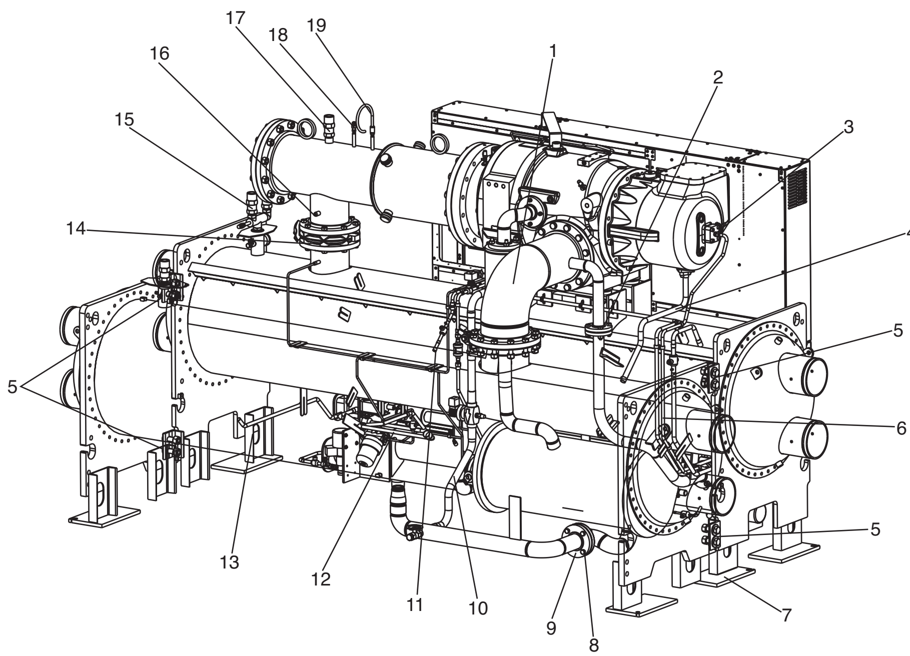
Check that the holding charge has been removed from the chiller.

1. Place a support plate under each tube sheet to keep each vessel level (does not apply to units with P compressor).
2. Remove cooler relief valve and relief valve vent piping (cooler not shown in Fig. 18 or 19, see Fig. 3, 4, or 5).
3. Cut the motor cooling refrigerant drain line (see Fig. 18, item 4) (does not apply to units with P compressor).
4. Unbolt and rig the suction elbow off (does not apply to units with P compressor) and disconnect the compressor suction line at the cooler and compressor. Remove bolts from the vaporizer vent line flange.
5. Cut the VFD cooling drain line (see Fig. 18, item 11) (does not apply to units with P compressor).
6. Cut the oil reclaim line(s) (see Fig. 18, item 12, or Fig. 19, item 10) .
7. Cut the hot gas bypass line between the HGBP (hot gas bypass) solenoid valve and cooler feed line (see Fig. 18, item 10, or Fig. 19, item 11).
8. Cut or unbolt the cooler liquid feed line (see Fig. 18, item 9, or Fig. 19, item 3), near the economizer or condenser float chamber at the flanged connection. For economized

units with Q or R compressors, temporarily secure the in-line economizer orifice plate to the economizer flange.

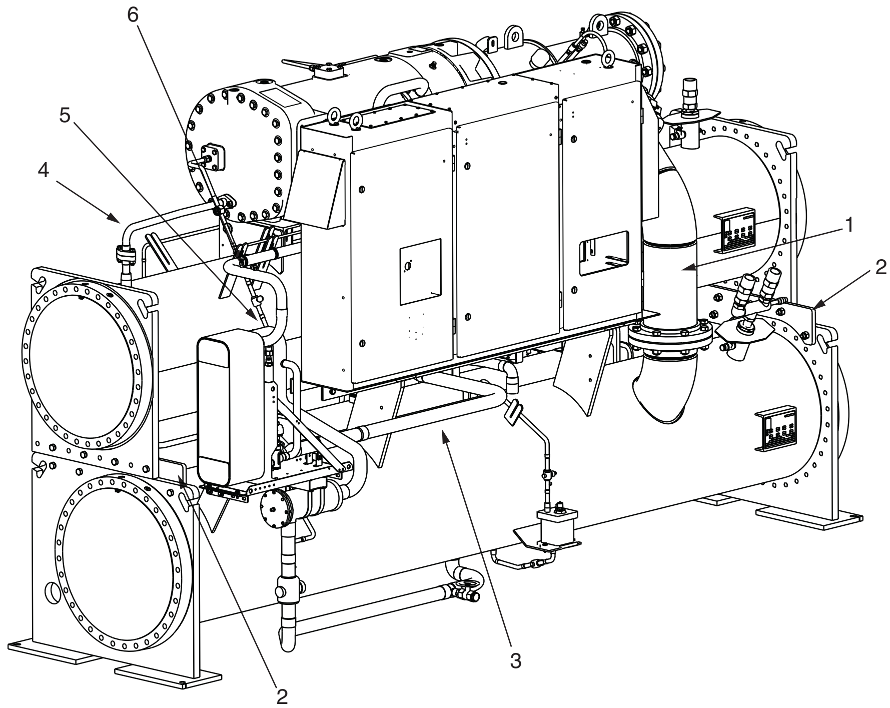
9. Cut the vaporizer refrigerant return line as shown (see Fig. 18, item 13, or Fig. 19, item 8).
10. Disconnect all sensors with cables that cross from the condenser side of the machine to the cooler side including:
    a. Evaporator refrigerant liquid temperature sensor. See Fig. 20.
    b. Entering and leaving chiller liquid temperature sensors. See Fig. 21.
    c. Evaporator pressure sensor (not shown).
11. Disconnect the tubesheet mounting brackets from the vessel connectors on the tube cooler tubesheet.
12. Cover all openings.
13. Rig the cooler away from the condenser/compressor.

NOTE: To reassemble, follow steps in reverse order. Connect sensors and cables after major components have been secured to reduce the risk of damaging them.



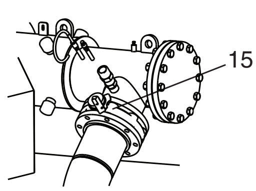
1 — Suction Elbow (Unbolt)
2 — Vaporizer Vent Line (Unbolt)
3 — Motor Cooling Line (Unbolt)
4 — Motor Cooling Drain Line (Cut)
5 — Tubesheet Mounting Bracket
6 — Bearing Oil Drain Line
7 — Support Plate
8 — In-Line Economizer Orifice Plate
9 — Cooler Liquid Feed Line (Unbolt)
10 — Hot Gas Bypass Line (Cut)
11 — VFD Cooling Drain Line
12 — Oil Reclaim Line (Cut)
13 — Vaporizer Hot Gas Return Line (Cut)
14 — Discharge Isolation Valve (Optional)
15 — Condenser Relief Valves
16 — Discharge Temperature Sensor
17 — Discharge Pipe Assembly Relief Valve (Unscrew)
18 — Discharge Pressure Sensor
19 — Discharge Pressure Switch

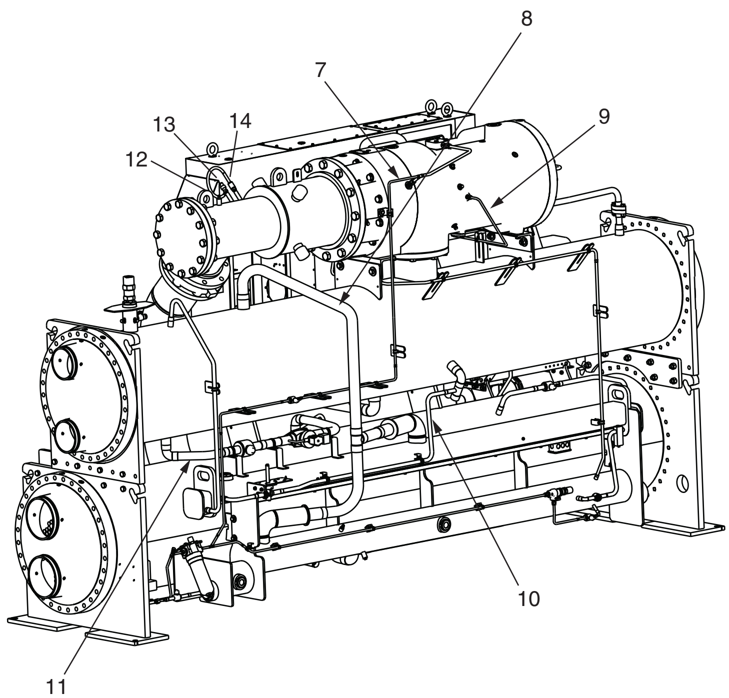
Fig. 18 — Cooler/Discharge Pipe Assembly Removal (Unit with R Compressor Shown)



FRONT VIEW

1 — Discharge Pipe
2 — Tubesheet Mounting Bracket (Inside, Both Ends) (Unbolt)
3 — Cooler Liquid Feed Line (Cut)
4 — Motor Drain Line (Unbolt)
5 — Motor Cooling Line (Cut)
6 — Economizer Line to Compressor (Option) (Cut)
7 — Oil Supply
8 — Vaporizer Vent Line (Cut)
9 — Motor Cooling Line
10 — Oil Reclaim Line (Cut)
11 — Hot Gas Bypass Line (Cut)
12 — Compressor Discharge Temperature
13 — Compressor Discharge Pressure
14 — Compressor Discharge High Pressure Switch
15 — Discharge Pipe Relief Valve (Option or Accessory)





BACK VIEW

Fig. 19 — Cooler/Discharge Pipe Assembly Removal (Unit with P Compressor Shown)

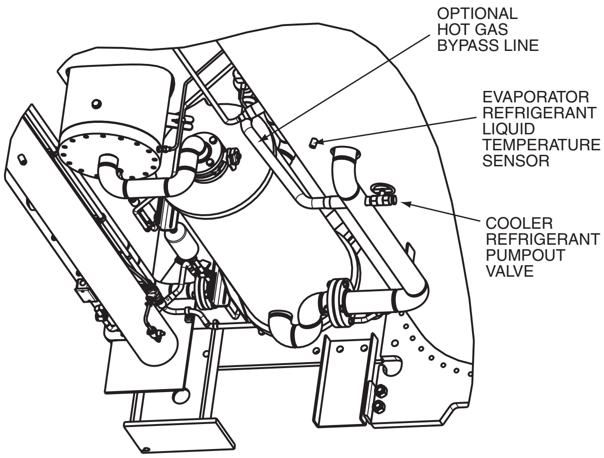


Fig. 20 — Evaporator Refrigerant Liquid Temperature Sensor on Bottom of Cooler (Units with Q,R Compressors Shown)

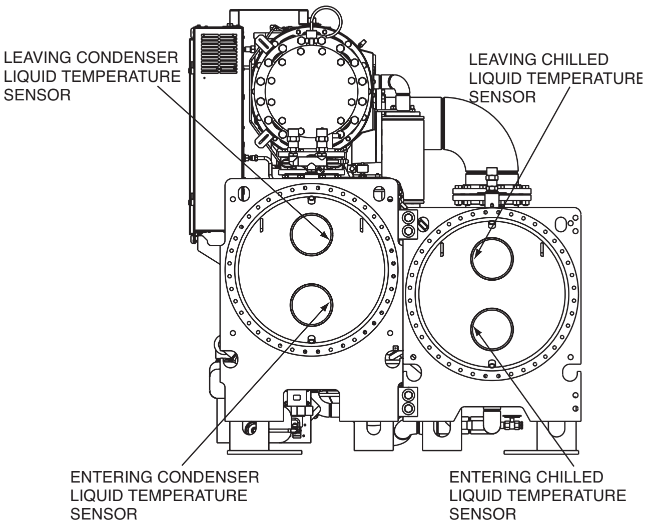


Fig. 21 — Chiller End View (Q,R Compressors Only)

⚠ CAUTION

Do not rig the condenser before the control center and compressor are removed. The condenser/compressor assembly has a high center of gravity and may tip over when lifted at the tubesheet rigging points, which could result in equipment damage and/or serious personal injury.

REMOVE THE CONTROLS/DRIVE ENCLOSURE — Confirm that the power supply disconnect is open and all safety procedures are observed before removing the VFD. This procedure minimizes the number of sensors and cables that need to be disconnected.

⚠ WARNING

Do not attempt to remove the VFD without first closing the refrigerant isolation valves. Failure to do so during VFD removal will result in an uncontrolled refrigerant leak. A refrigerant leak can damage the unit as well as displace oxygen, causing asphyxiation.

1. For Q and R compressors, close the 2 filter drier isolation valves (Fig. 22) and the 2 VFD isolation valves. Isolate the refrigerant charge into the condenser to prevent a refrigerant leak if one of the motor terminals is accidentally damaged during VFD removal or installation. For Q and R compressors, evacuate the VFD coldplate through the Schrader valve (Fig. 22) on the VFD drain isolation valve.
2. Remove the shipping bracket between the VFD and the compressor if it is still in place. See Fig. 23.

   NOTE: For seismic units, do not remove the shipping bracket.

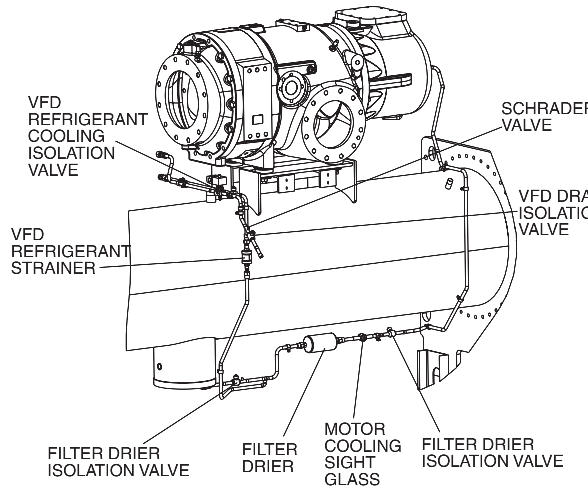


Fig. 22 — VFD Refrigerant Isolation Valves (Q,R Compressors Only)

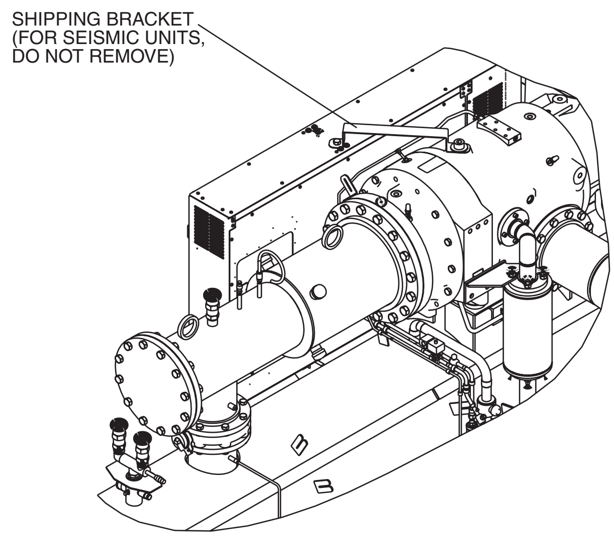


Fig. 23 — VFD Shipping Bracket (Unit with R Compressor Shown)

3. Remove any conduits that bring power to the VFD.
4. Remove the nuts that secure the terminal box transition piece to the motor housing.
5. Disconnect the motor leads from the motor terminals (Fig. 24). Note the position of the motor terminal cable lugs so they can be reinstalled with sufficient clearance away from surrounding structure.

6. Remove the motor temperature sensor leads (Fig. 24), the motor ground lead, and the bolts that secure the VFD enclosure to the terminal box transition piece.
7. Disconnect the communication cables from the back of ICVC (International Chiller Visual Controller) (Fig. 25).
8. Disconnect the high pressure switch leads. Consult the wiring diagrams in the section Make Electrical Connections (page 50) for terminal block and terminals (they are dependent on the drive type).
9. Unplug connectors CN1A, CN1B, CN2, and CN3 (Fig. 26 and 27).
10. Disconnect the control panel ground wire located next to connectors CN1A and CN1B (see Fig. 26 for all compressors).
11. Disconnect the VFD cooling lines (Fig. 28) and cover all openings (does not apply to units with P compressors).
12. Remove the 12 screws that secure the control panel to the VFD enclosure. Tilt the control panel away from the back of the control center.
13. Position the control panel on a safe surface and secure it in place to prevent damage.

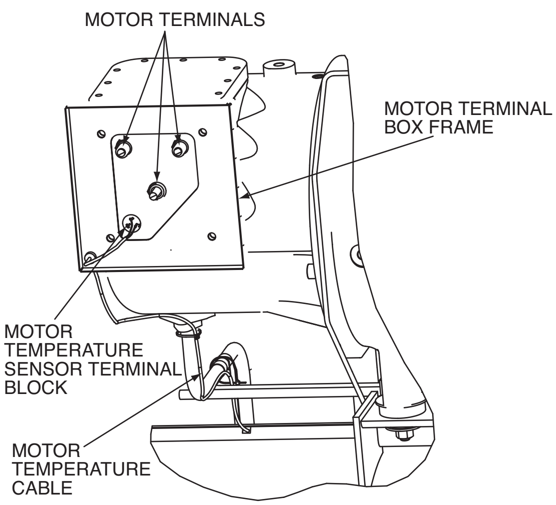


Fig. 24 — Motor Terminals (Units with Q,R Compressors Shown)

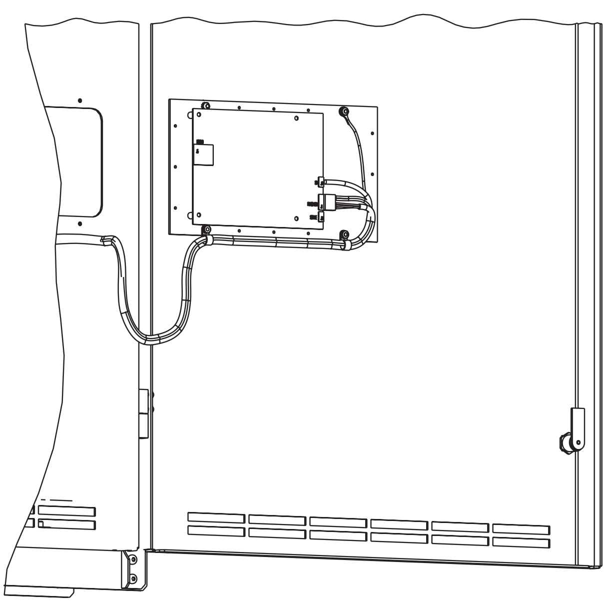


Fig. 25 — ICVC Communication Cables

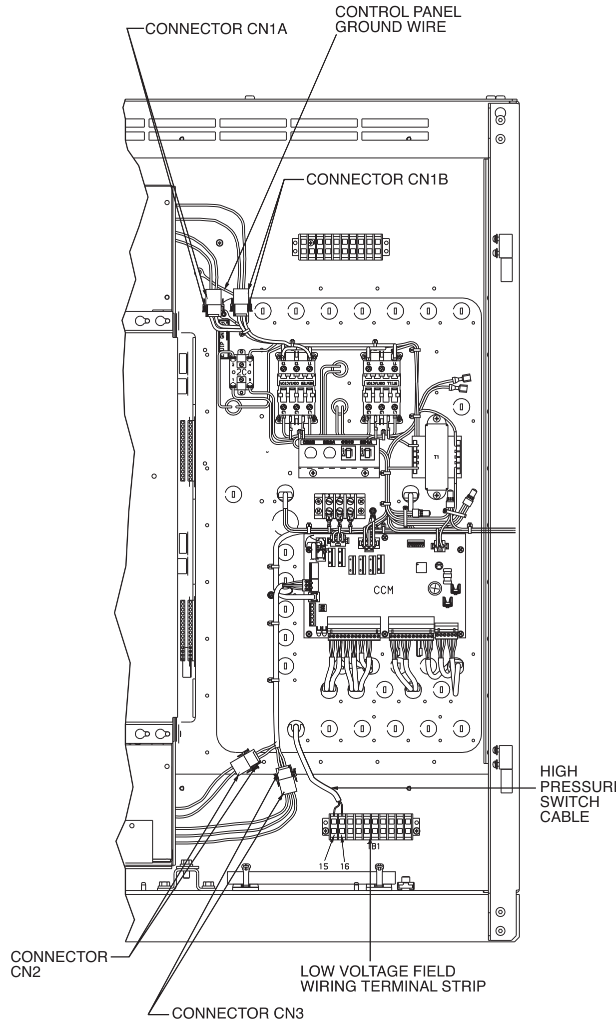


Fig. 26 — Control Panel Connectors (R,Q Units with LF-2 VFD)

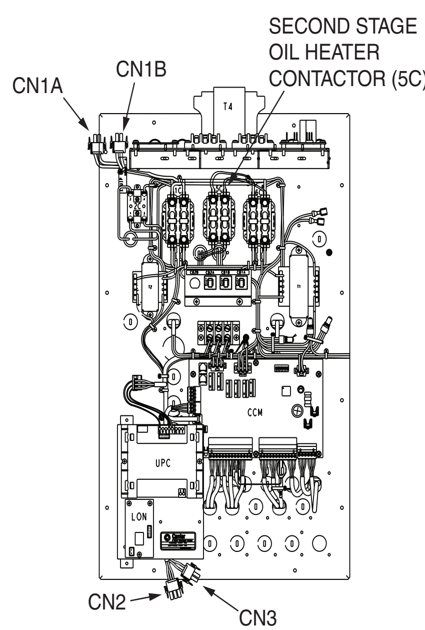
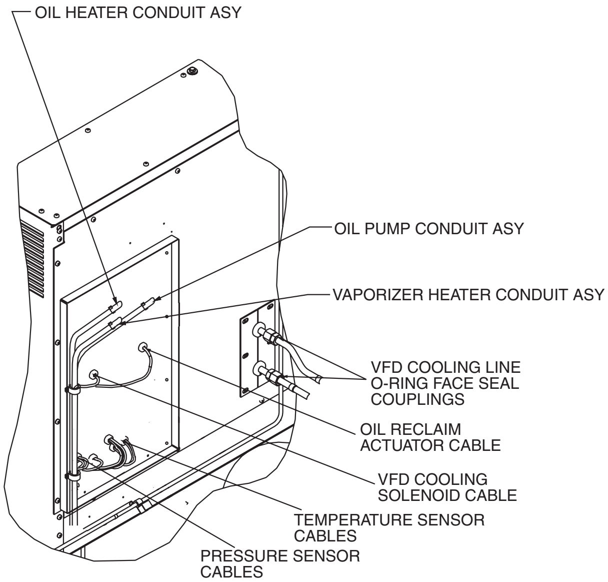


Fig. 27 — Control Panel Connectors (P Units)



NOTE: The P compressor uses drive without VFD cooling lines.

Fig. 28 — Control Panel Back

Lifting the Control Center — Care should be used to prevent damage due to dropping or jolting when moving the control center. A fork truck or similar means of lifting and transporting may be used. Sling in a manner that will equalize the load at the pickup points. Use a spreader bar if the angle of the sling is less than 45 degrees relative to horizontal. Do not jolt while lifting.

Use the following procedure to lift the control center.

1. Remove the rubber hole plugs in the top of the control center and fully thread in 4 eyebolts or swivel hoist rings (see Fig. 29). Lifting hardware must have $^{3}/_{4}$ in.-10 x 2 in. long threads and must have a working load limit of at least 6000 lb (2722 kg). Typical eyebolts are Chicago Hardware (size 28) or Grainger (P/N 5ZA63).
2. Attach a sling to the 4 lifting eyebolts. Make certain that the angle of the sling is not less than 45 degrees relative to horizontal.
3. Using an overhead or portable hoist (minimum 2 ton rated capacity), attach a free-fall chain to the sling secured to the drive. Take up any slack in the chain.
4. Rig the control center and remove the bolts that secure it to the VFD mounting brackets on the condenser (see Fig. 29).
5. Confirm that welding procedures comply with local Pressure Vessel Codes before removing a portion of the VFD support bracket from the condenser. Custom brackets should be fabricated if part of the VFD supports must be cut off of the condenser to reduce the width of the condenser assembly. Clamp ¼-in. plates over both sides of the VFD bracket and drill 2 pairs of holes that straddle the line along which the VFD brackets will be cut. This will allow the VFD brackets to be reinstalled and welded in their original position.

NOTE: To reassemble, follow steps in reverse order. Connect sensors and cables after major components have been secured to reduce the risk damaging them. (See Fig. 30 and 31.)

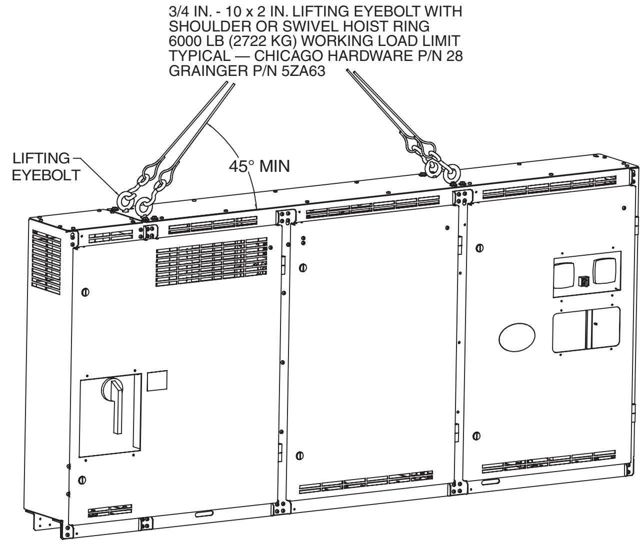


Fig. 29 — Control Center Lifting Points

REMOVE THE DISCHARGE PIPE ASSEMBLY FROM THE CONDENSER

NOTE: For steps 1 through 6 refer to Fig. 18 for units with Q, R compressor, or Fig. 19 for units with P compressor.

The condenser relief valve and relief valve vent piping should be removed if they will interfere with discharge pipe assembly rigging.

1. Remove the discharge pipe assembly relief valve and relief valve vent piping, if applicable.
2. Disconnect the compressor discharge temperature sensor.
3. Disconnect the compressor discharge pressure sensor and remove the high discharge pressure switch.
4. Unbolt and rig the discharge pipe assembly off and remove the bolts from the compressor discharge and condenser inlet flange. Note the position and orientation of the discharge isolation valve on the condenser inlet flange.
5. Remove the discharge pipe assembly.
6. Cover all openings.

NOTE: To reassemble, follow steps in reverse order. Connect sensors and cables after major components have been secured to reduce the risk of damaging them.

SEPARATE THE COMPRESSOR

⚠ CAUTION

Do not rig the heat exchanger before the control center and compressor are removed. The assembly has a high center of gravity and may tip over when lifted at the tubesheet rigging points, which could result in equipment damage and/ or serious personal injury.

The VFD blocks access to the compressor mounting bolts. It must be removed before the compressor can be separated from the condenser. Remove the VFD from the condenser using the Remove the Controls/Drive Enclosure section on page 27. Refer to Table 20.

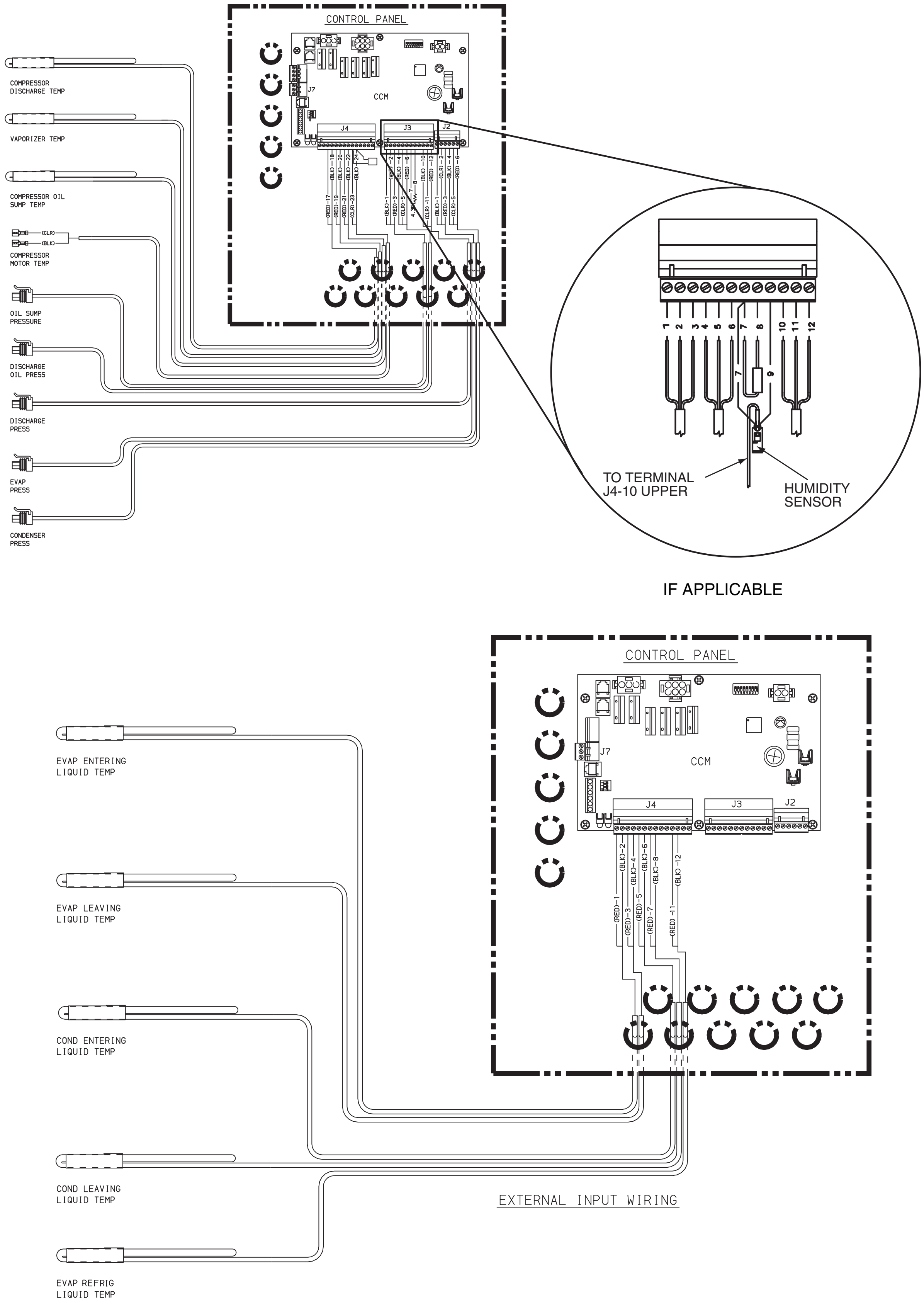


Fig. 30 — Control Panel Inputs (Q, R Compressors)

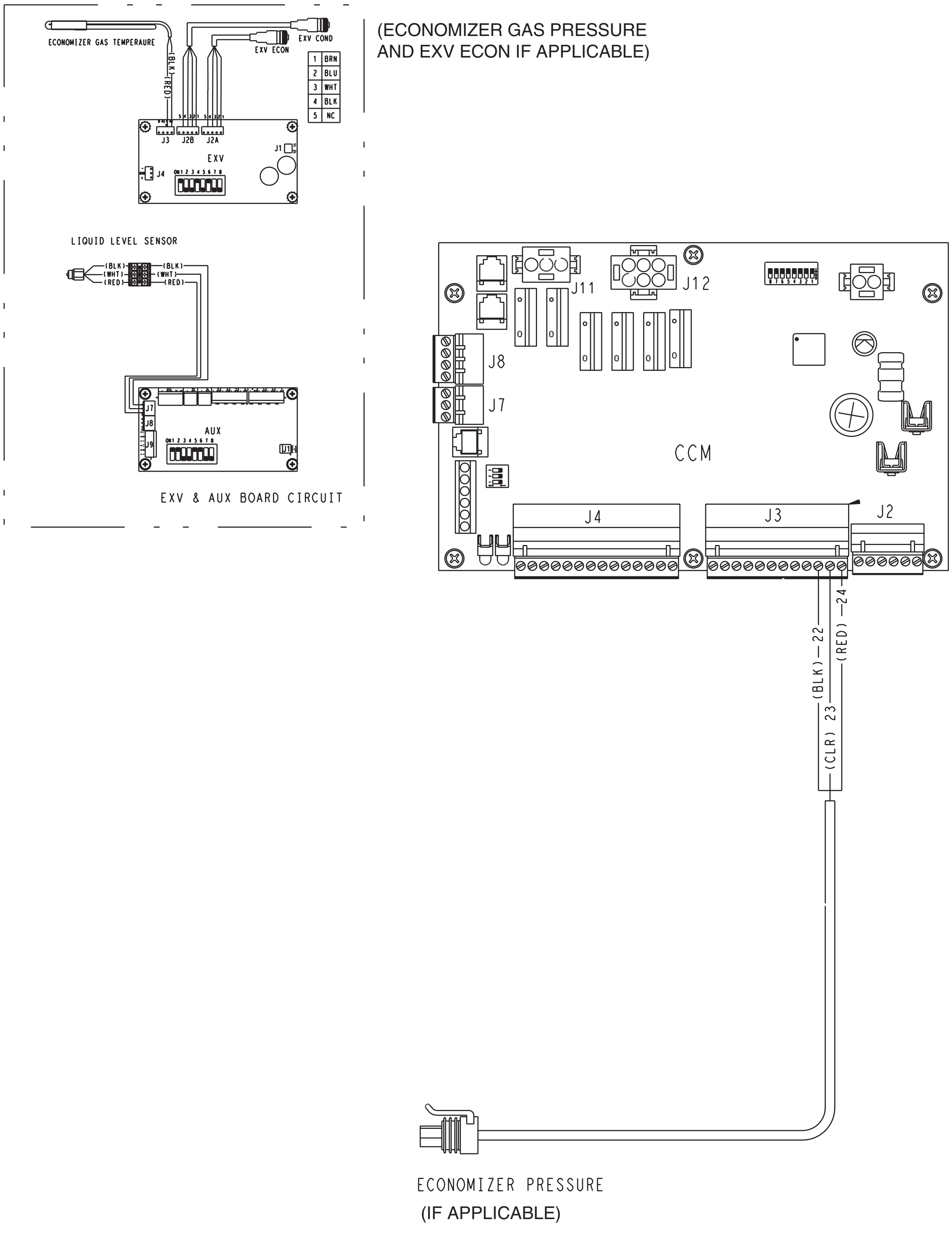


Fig. 31 — Additional Control Panel Inputs (P Compressors)

Table 20 — Compressor Fastener Identification

COMPRESSOR FASTENERS		SIZE
Discharge Pipe Assembly to Compressor Discharge Flange		1 in.-8 Grade 5 Hex Head
Suction Elbow to Compressor Inlet	Q and P Compressor	$^{3}/_{4}$ in.-10 Grade 5 Hex Head
	R Compressor	$^{7}/_{8}$ in.-9 Grade 5 Hex Head
Compressor Mount to Condenser		$^{3}/_{4}$ in.-10 Studs (A-449)
Economizer Line		$^{5}/_{8}$ in.-11 Grade 8 Hex Head
Motor Cooling, Motor Drain, Oil Drain		M12x1.75 Grade 10.9 Socket Head
Compressor Lifting Points (2)		M30x3.5 Threaded Holes
Stator Housing Lifting Point		M30x3.5 Threaded Hole
Discharge Housing Lifting Point		M30x3.5 Threaded Hole

1. Disconnect the oil supply line in 2 places (Fig. 32 or 33). Cap the oil lines and fittings.

NOTE: Compressor oil lines and fittings between the oil filter and compressor must be kept extremely clean to prevent obstruction of the compressor inlet bearing oil orifice. Cap all orifice lines and fittings during disassembly. The compressor inlet bearing oil orifice is located at the lubrication block on top of the compressor.

2. Disconnect the motor cooling inlet flange, the motor cooling drain flange, optional economizer vapor line flange, and bearing oil drain flange (Fig. 32 and Fig. 33). Remove the economizer muffler bracket.
3. Brace the end of the discharge pipe assembly closest to the compressor if it has not already been removed. Place an oil pan under the compressor flange to collect oil that may have accumulated in the discharge pipe assembly. Unbolt the discharge pipe assembly from the compressor. It may also be necessary to loosen the bolts that attach the discharge pipe assembly to the condenser.
4. If the cooler has been removed (not applicable for P compressor), rig the suction elbow and unbolt the suction elbow at the compressor and vaporizer vent line flanges (see Fig. 18). If the cooler is still in place, it may be necessary to loosen the bolts that secure the suction elbow to the cooler.
5. Carefully remove the perforated insulation cutouts that cover the compressor lifting points. See Fig. 32 and 33. Replace the lifting shackle thread protector after the compressor is re-installed to prevent insulation adhesive from fouling the threads.
6. Rig the compressor with lifting eyelets installed in the two M30 threaded holes provided in the top of the compressor housing (Fig. 32 and 33). Use only M30 forged eye bolts or M30 hoist rings with a sufficient working load limit to safely lift the compressor. The rubber vibration isolators may pull out of the compressor mounting bracket when the compressor is lifted off of the condenser. Applying leak detection soap solution to the outside of the vibration isolators will make it easier to press the isolators back into position.
7. Cover all openings.

NOTE: To reassemble, follow steps in reverse order. Connect sensors and cables after major components have been secure to reduce the risk damaging them.

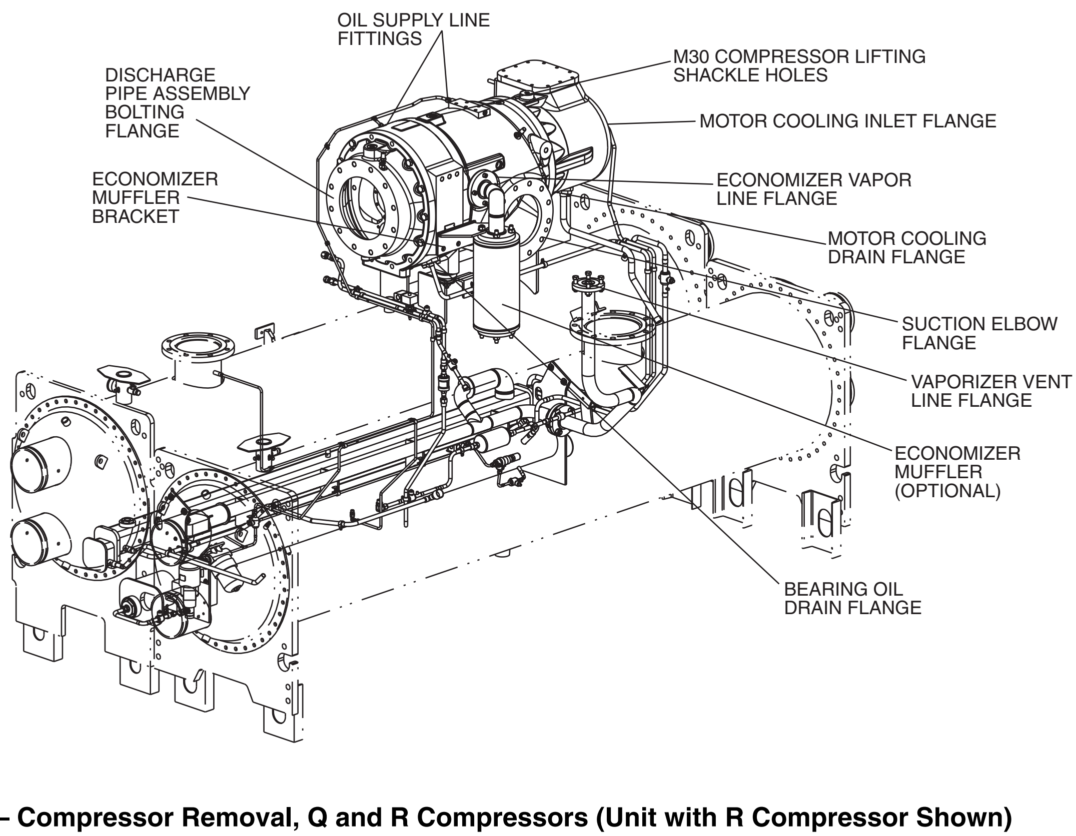


Fig. 32 — Compressor Removal, Q and R Compressors (Unit with R Compressor Shown)

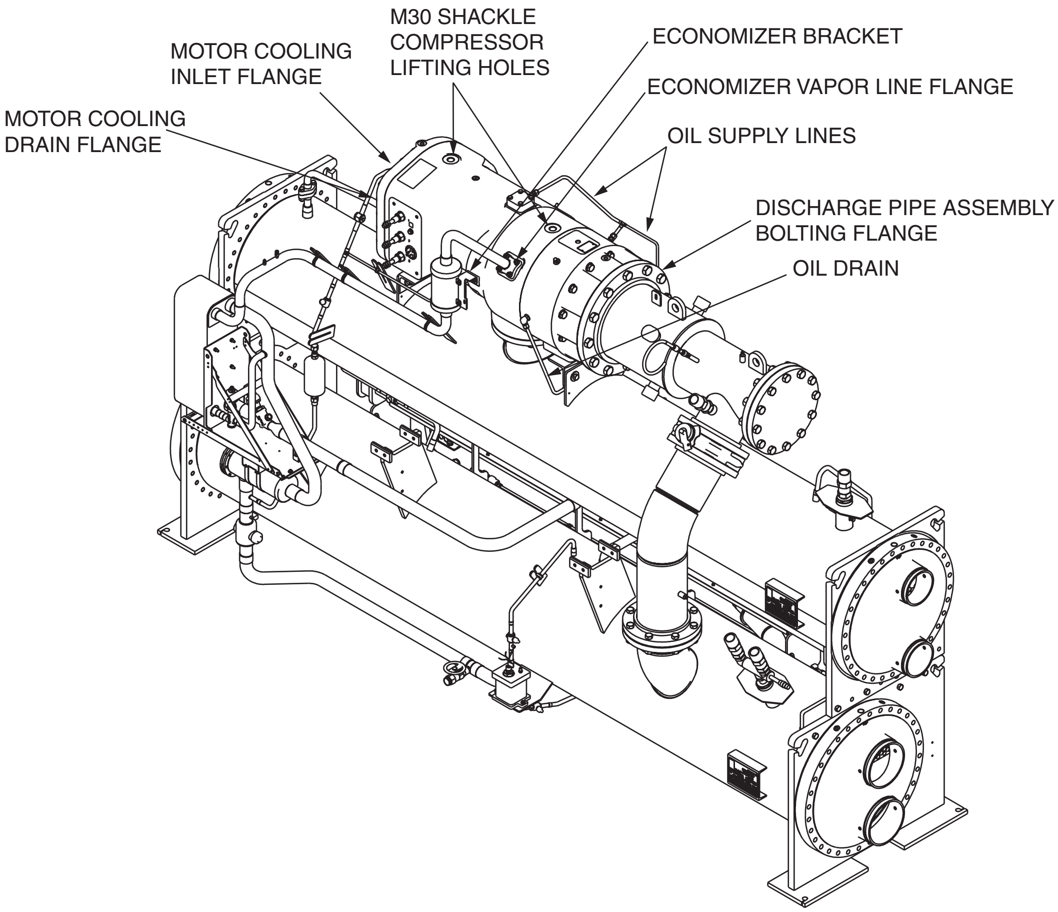


Fig. 33 — Compressor Removal, P Compressor

SEPARATE THE VAPORIZER FROM THE CONDENSER — The VFD mounting brackets (Fig. 34 and 35) extend beyond the outboard edge of the tubesheet. The vaporizer extends beyond the perimeter of the condenser tubesheet.

1. Cut the vaporizer hot gas supply line near the oil concentrator (Fig. 34 and 35).
2. Cut the vaporizer hot gas return line (Fig. 36).
3. Cut the bearing oil drain line near the oil sump (Fig. 36).
4. Unbolt the vaporizer vent line flange shown in Fig. 36. (Cut for P compressor.)
5. Cut the oil supply line as shown in Fig. 36.
6. Cut the oil reclaim line as shown in Fig. 36.
7. Disconnect all wires and cable leads to the vaporizer assembly (see Fig. 37) including:
   a. oil sump temperature sensor
   b. oil sump pressure cable and oil pressure leaving filter cable
   c. oil reclaim cable
   d. vaporizer heater cable in the vaporizer heater junction box (Fig. 34 and 35)
   e. oil pump cable
   f. oil sump heater conduit from its junction box (Fig. 34 and 35)
   g. vaporizer temperature sensor (Fig. 34 and 35)
8. Rig the vaporizer with the lifting points on the vaporizer mounting bracket and remove the 4 bolts that secure it to the condenser (Fig. 34 and 35).
9. Cover all openings.

NOTE: To reassemble, follow steps in reverse order. Connect sensors and cables after major components have been secured to reduce the risk damaging them.

Step 4 — Install VFD

1. Install terminal box frame mounting studs into tapped holes using short threaded end (see section E-E in Fig. 38 and 39). Do not exceed 120 ft-lb (163 N-m).
2. Install thermal insulators, insulation frame assembly, and terminal box frame prior to attaching motor power cables.
3. Torque motor terminals to 45 to 55 ft-lb (61 to 75 N-m).
4. There may be 1 or 2 motor power cables per terminal identified as T1, T2 and T3. Position motor end lugs on terminal studs with Belleville washer located against the front terminal lug with the convex side facing toward the front terminal nut. Clinch the 2 cables together with wire ties before tightening terminal nuts. Install front terminal nut finger tight. Hold front terminal nut stationary while tightening rear terminal nut to 45 to 50 ft-lb (61 to 68 N-m). (See Fig. 40 and 41.)

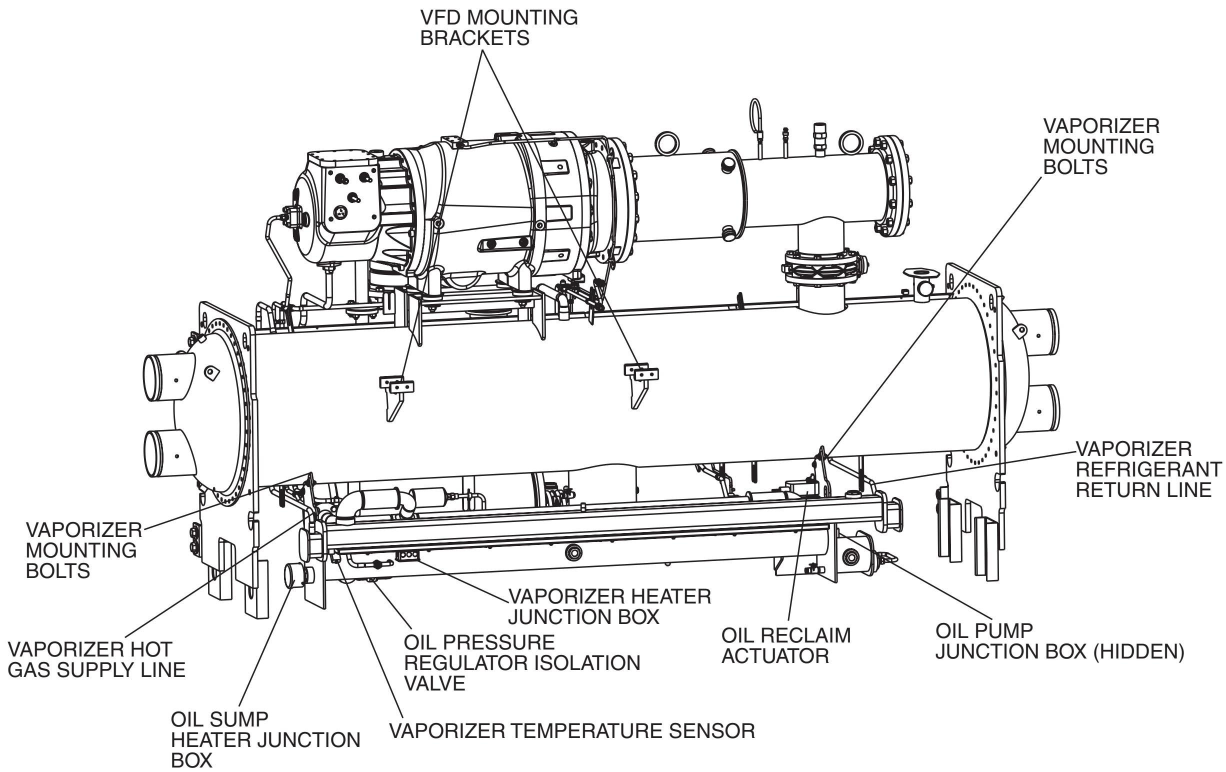


Fig. 34 — Oil Concentrator Removal, Q and R Compressors (Unit with R Compressor Shown)

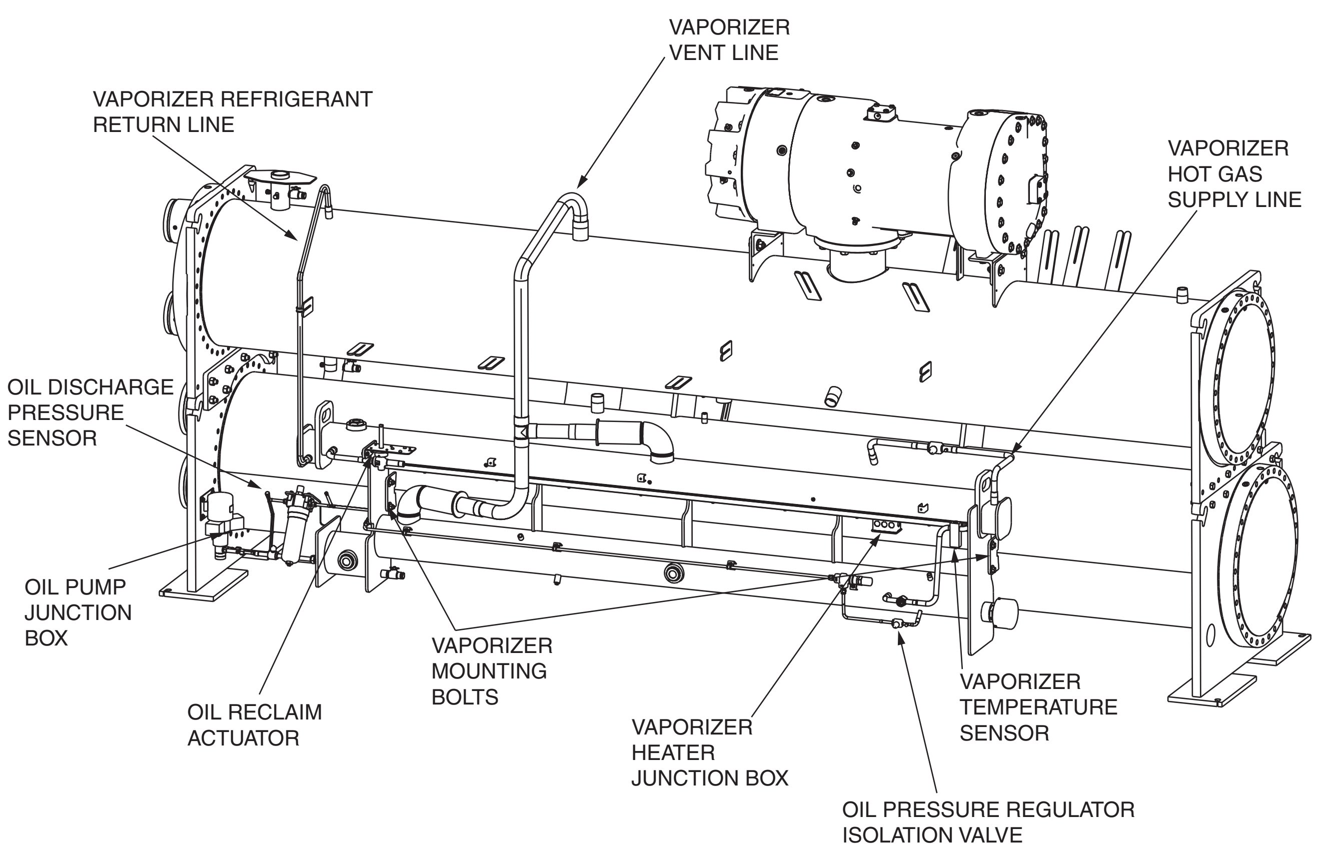


Fig. 35 — Oil Concentrator Removal, P Compressor

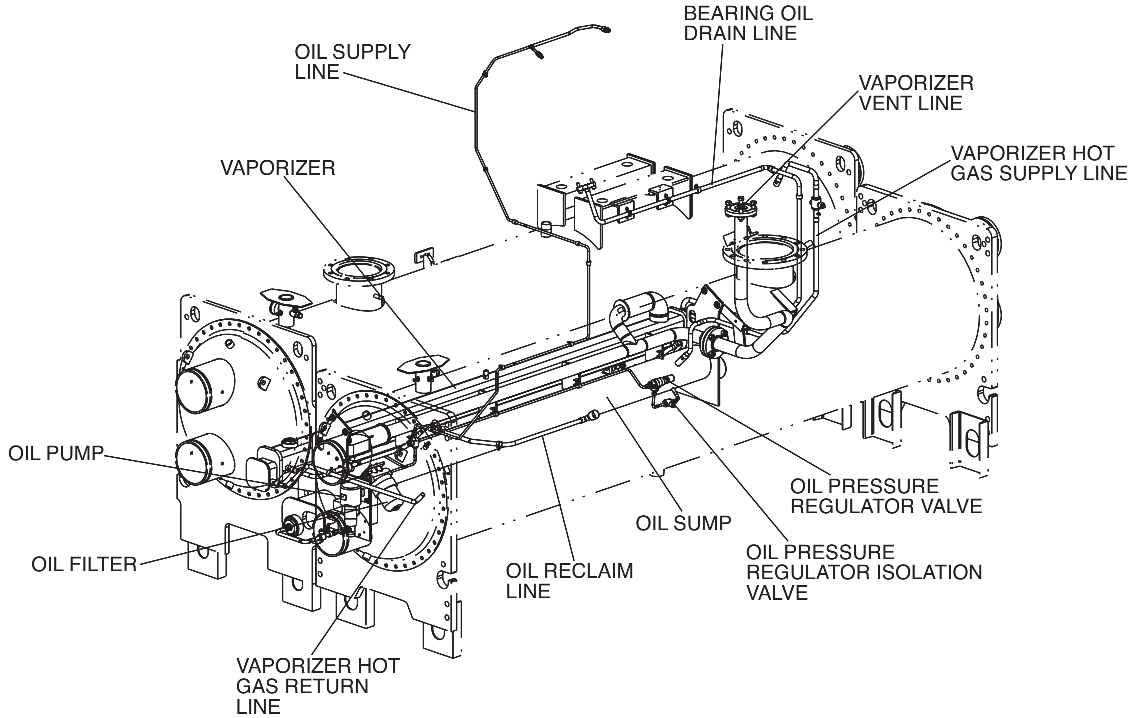


Fig. 36 — Oil Reclaim Piping (Unit with R Compressor Shown)

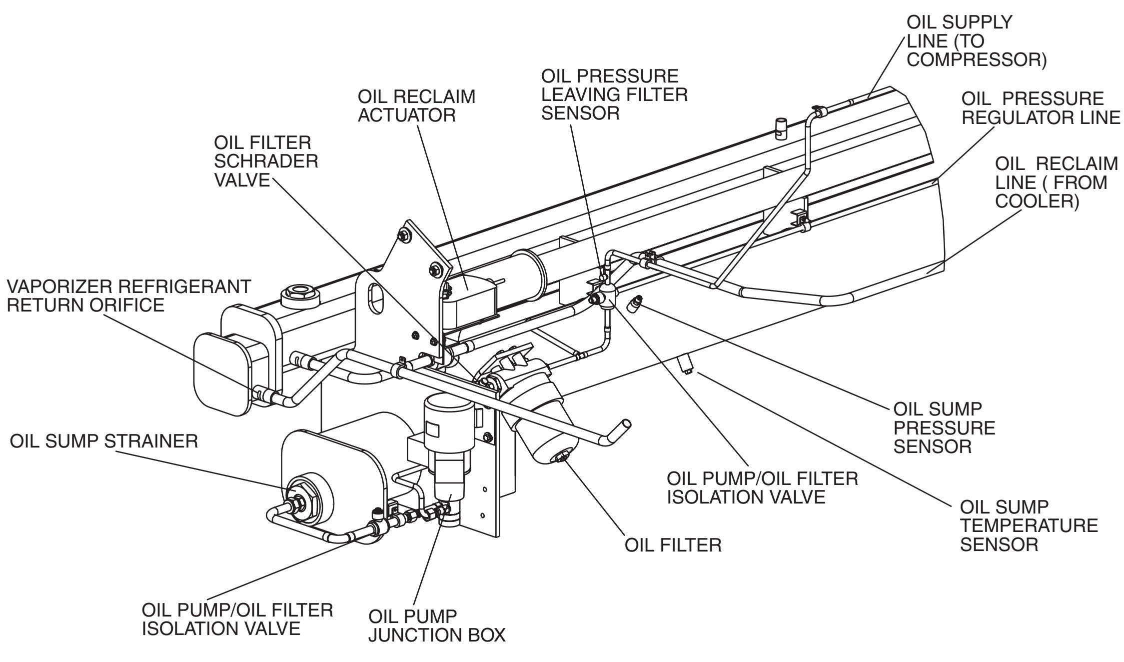


Fig. 37 — Oil Reclaim Components (Unit with R Compressor Shown)

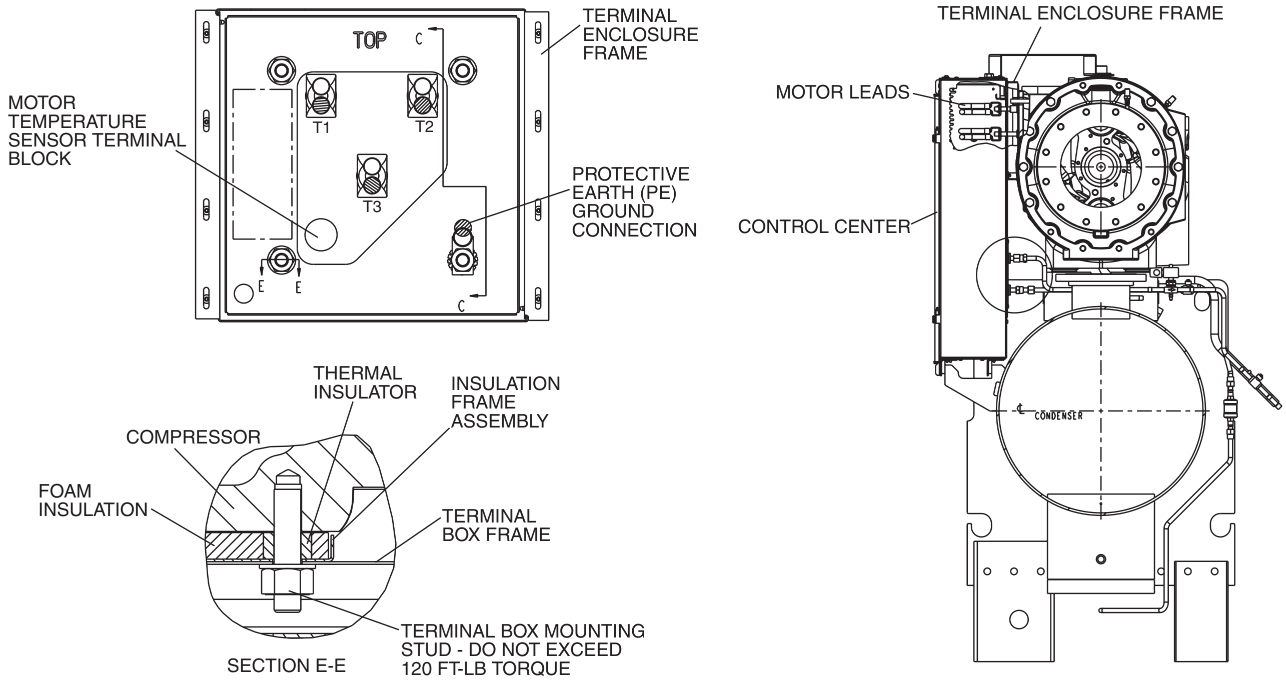


Fig. 38 — Motor Terminal Box (Q and R Compressors)

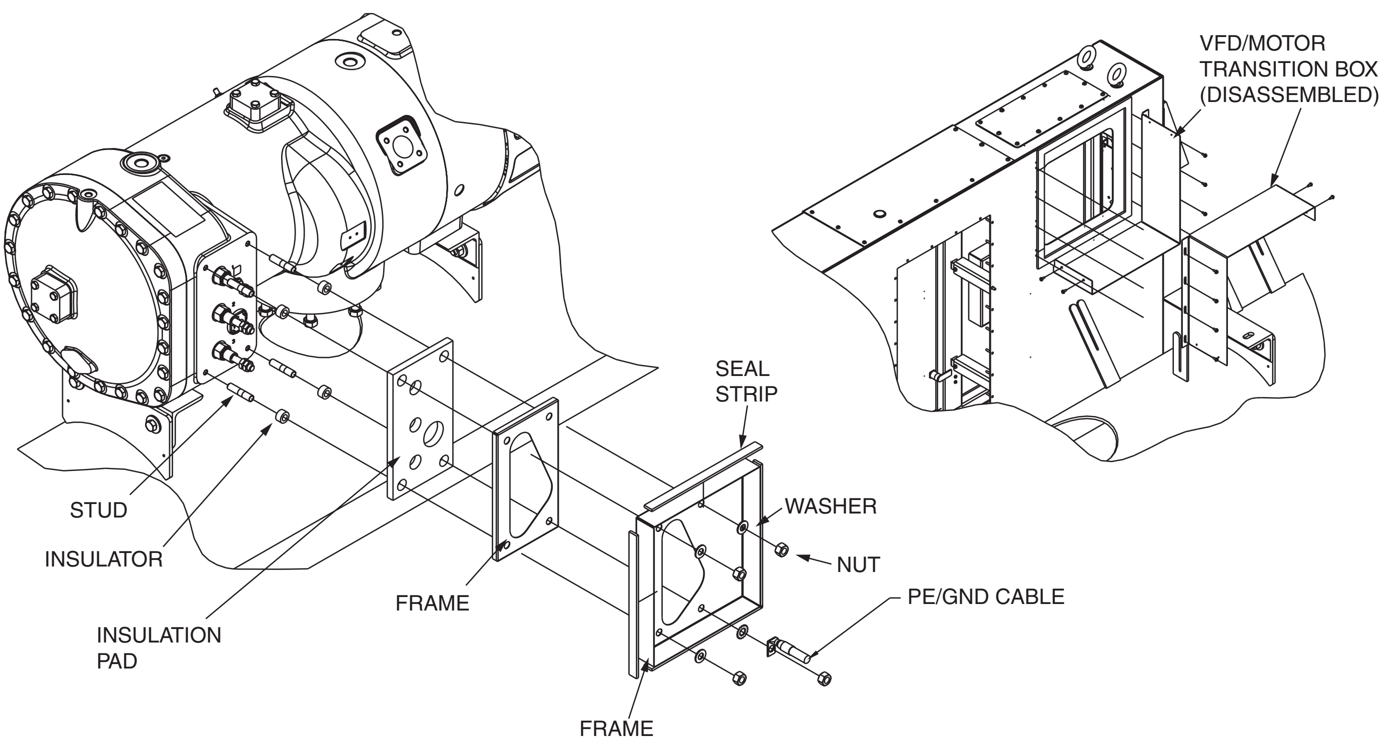


Fig. 39 — Motor Terminal Box (P Compressor)

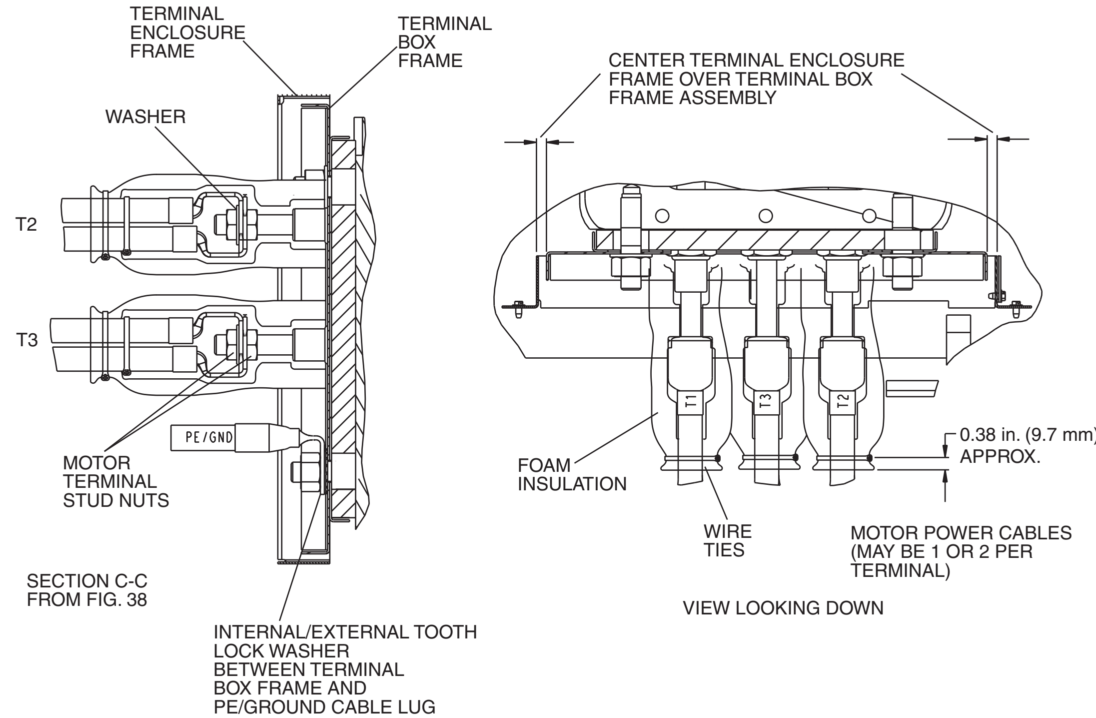


Fig. 40 — Motor Terminal Insulation (Q and R Compressors)

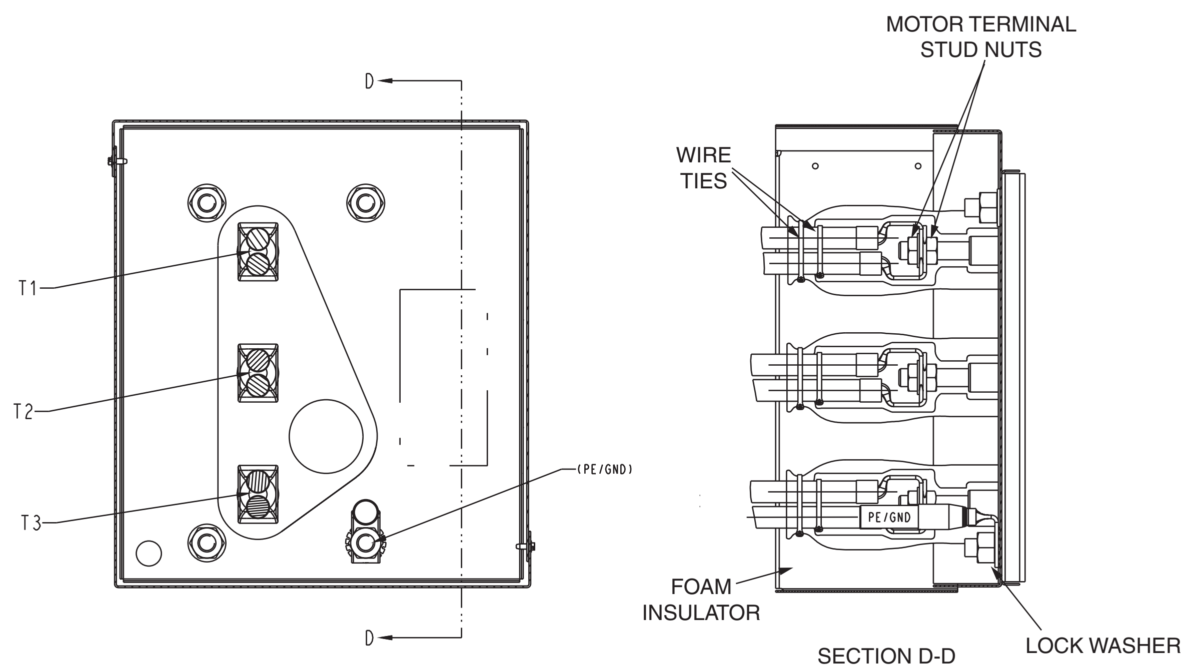


Fig. 41 — Motor Terminal Insulation (P Compressor)

5. Check all terminal connections for proper installation.

IMPORTANT: Do not insulate terminals until wiring arrangement has been checked and approved by Carrier start-up personnel. Motor terminals must be insulated in acceptance with national and local electrical codes.

Insulate Motor Terminals and Lead Wire Ends — Locate heat shrink tubing (RCD P/N LF33MM114) over power connections so that they are completely covered and tubing is against motor housing. Shrink into position. Slide foam tubing (3 in. inner diameter closed cell vinyl, neoprene, or nitrile foam) part way over the heat shrink tubing. Apply adhesive for closed cell foam insulation to motor side end of the foam tubing and push tubing the rest of the way over the terminal and against the sheet insulation on the motor side. Secure the opposite end of the foam tubing with a wire tie as shown in Fig. 40 and 41.

Alternate Insulation for Motor Terminals and Lead Wire Ends — Insulate compressor motor terminals, lead wire ends, and electrical wires to prevent moisture condensation and electrical arcing. Obtain Carrier approved insulation material from RCD (Replacement Components Division) consisting of 3 rolls of insulation putty and one roll of vinyl tape.

a. Insulate each terminal by wrapping with one layer of insulation putty (RCD P/N 19EA411-1102).
b. Overwrap putty with 4 layers of vinyl tape.

6. Orient PE/ground lug as shown in Fig. 42. Assemble internal/external tooth lock washer between the terminal box frame and the PE/ground cable. Torque PE/ground lug nut to 55 to 65 ft-lb (75 to 89 N-m). See section H-H in Fig. 42 for PE/ground cable routing.
7. Center terminal enclosure frame over terminal box frame assembly so the space between the frames is equal within $^{3}/_{16}$-in. (5 mm) at the top and bottom. Use the slots in the terminal enclosure frame. Adjust spacing between the sides of the terminal enclosure frame and terminal box frame assemblies by moving the control center to the left or right.
8. Install O-rings on VFD refrigerant connections using silicone grease. Tighten connector using 2 wrenches to 27 to 33 ft-lb (37 to 45 N-m). (See Detail A in Fig. 43.) (Does not apply to units with P compressor.)
9. Evacuate all piping between the VFD and the VFD isolation valves after assembly and tightening of VFD fittings. Dehydration/evacuation is complete to equalize VFD piping pressure with machine pressure if machine is charged with refrigerant (see Fig. 43). (Does not apply to units with P compressor.)

Step 5 — Install Machine Supports

IMPORTANT: Chiller housekeeping pad, anchor bolts and attachment points to be designed by others in accordance with all applicable national and local codes.

INSTALL STANDARD ISOLATION — Figures 44-47 and show the position of support plates and shear flex pads, which together form the standard machine support system.

Service clearance under the chiller can be enhanced if the grout is not extended along the entire length of the heat exchangers.

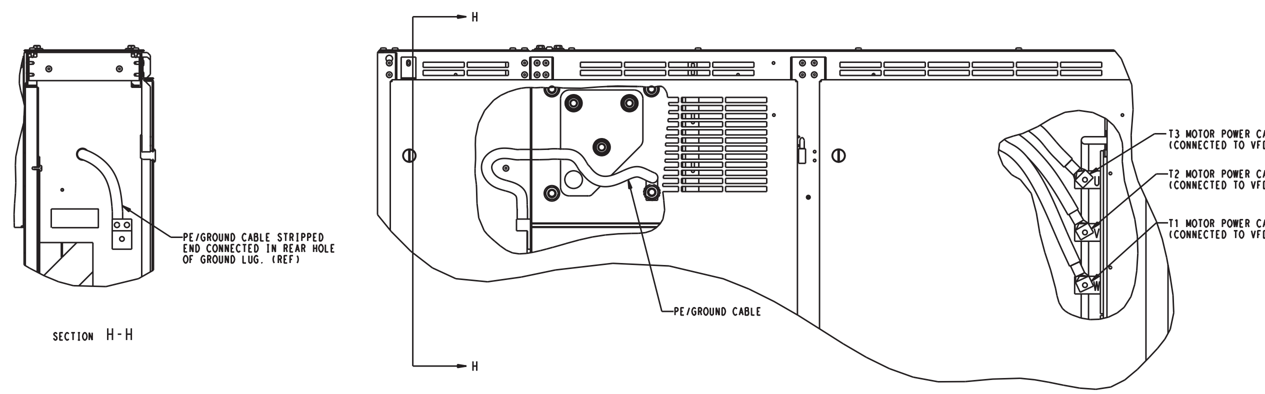
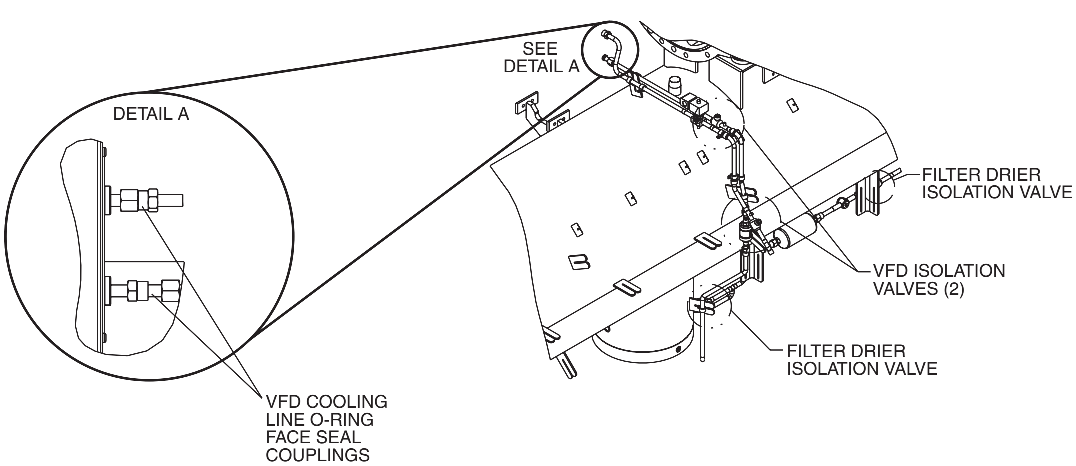
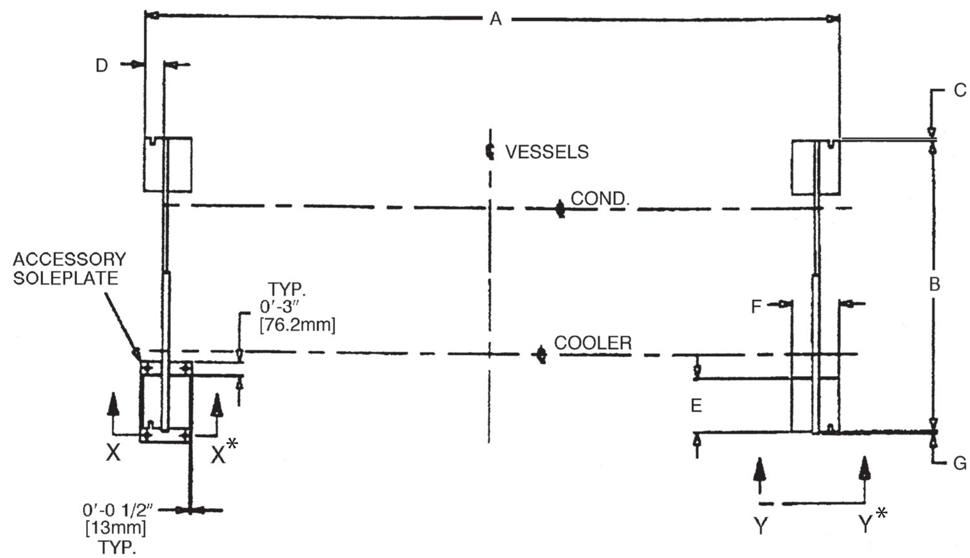


Fig. 42 — Motor Ground Cable



NOTE: Does not apply to VFD supplied with units with P compressors.

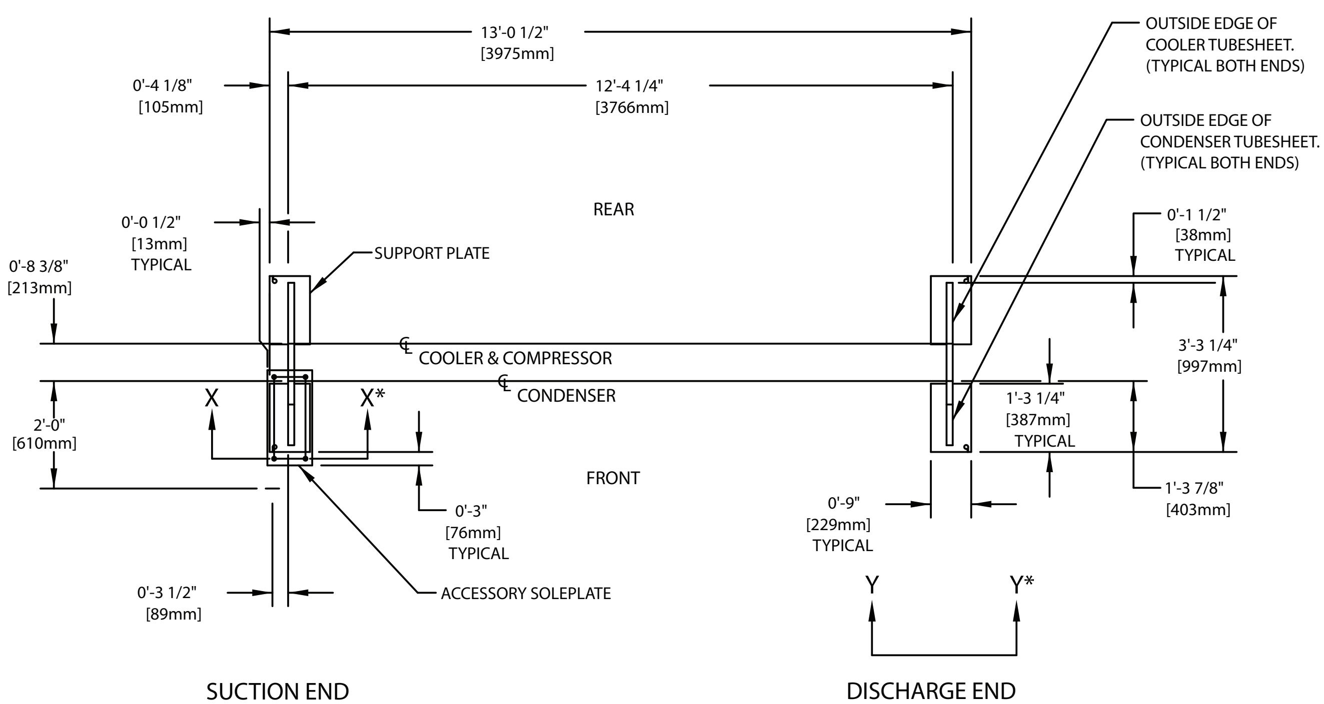
Fig. 43 — VFD Refrigerant Connectors



*See Fig. 47 or 48.

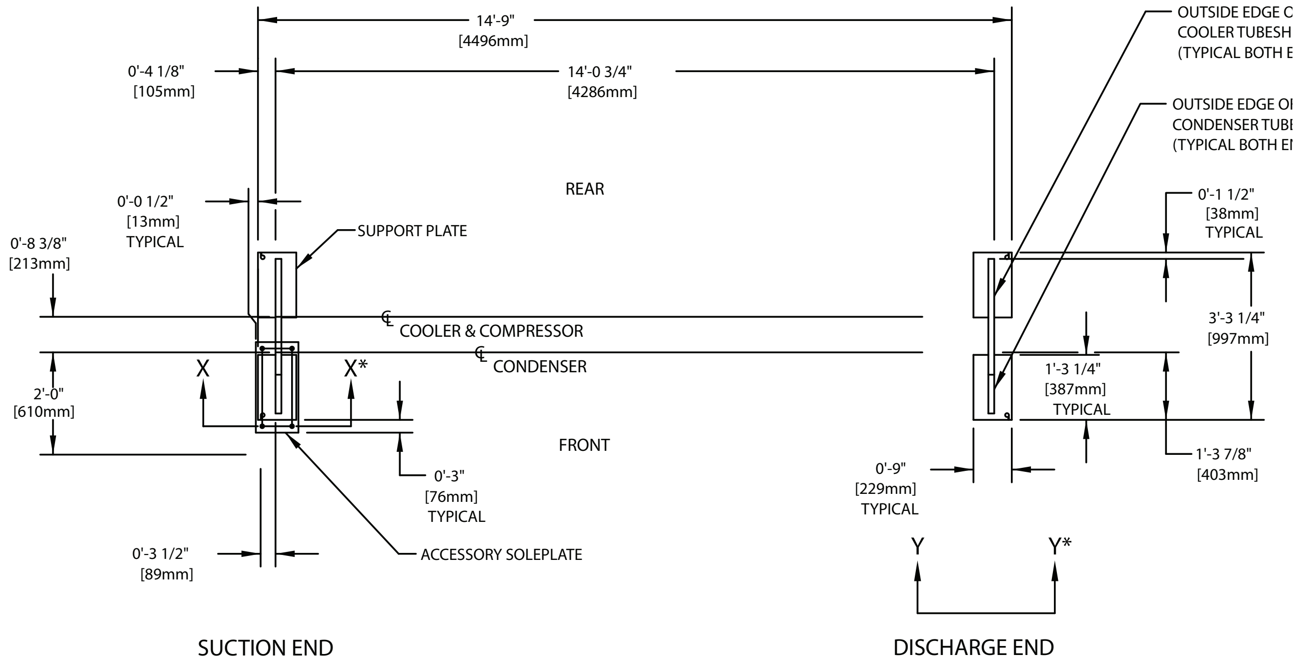
23XRV HEAT EXCHANGER SIZE	DIMENSIONS (ft-in.)						
	A	B	C	D	E	F	G
30-32	12-10 3/4	5-5 1/4	0	0-3 5/8	1-3 1/4	0-9	0-1/2
35-37	14- 7 1/4	5-5 1/4	0	0-3 5/8	1-3 1/4	0-9	0-1/2
40-42	12-10 3/4	6-0	0-1 1/2	0-3 5/8	1-3 1/4	0-9	0-1/2
45-47	14- 7 1/4	6-0	0-1 1/2	0-3 5/8	1-3 1/4	0-9	0-1/2
50-52	12-10 3/4	6-5 1/2	0-1/2	0-3 5/8	1-3 1/4	0-9	0-1/2
55-57	14- 7 1/4	6-5 1/2	0-1/2	0-3 5/8	1-3 1/4	0-9	0-1/2

Fig. 44 — 23XRV30-57 Machine Footprint



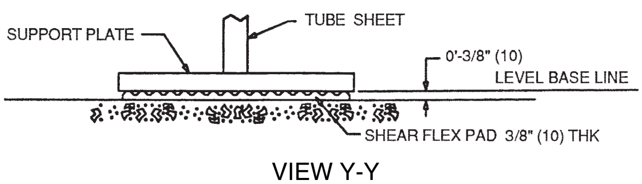
*See Fig. 47 or 48.

Fig. 45 — 23XRV Frame Size A Machine Footprint



*See Fig. 47 or 48.

Fig. 46 — 23XRV Frame Size B Machine Footprint



NOTES:
1. Dimensions in ( ) are in millimeters.
2. Isolation package includes 4 shear flex pads.

Fig. 47 — Standard Isolation

INSTALL ACCESSORY ISOLATION (IF REQUIRED) — Uneven floors or other considerations may dictate the use of accessory soleplates (supplied by Carrier for field installation) and leveling pads. Refer to Fig. 48.

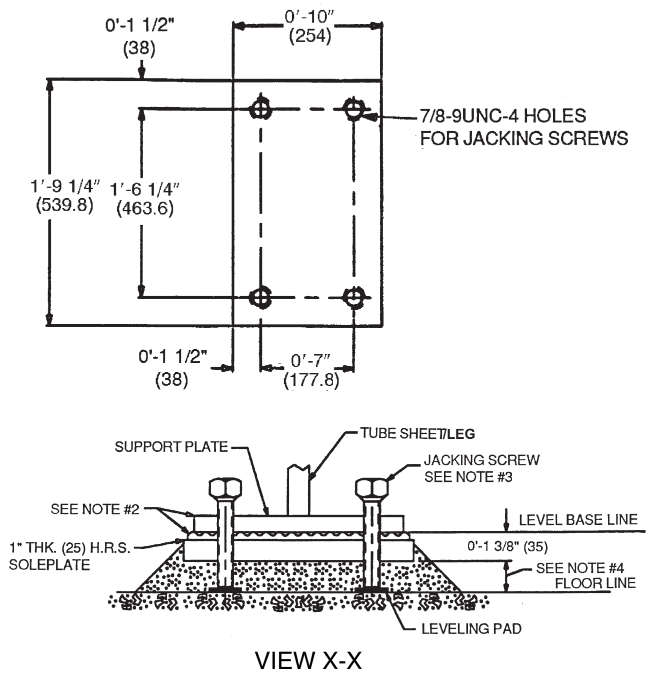
Level machine by using jacking screws in isolation soleplates. Use a level at least 24-in. (610 mm) long.

> IMPORTANT: Chiller support plates must be level within $^1/_2$ in. from one end to the other end of the heat exchangers for effective oil reclaim system operation.

For adequate and long lasting machine support, proper grout selection and placement is essential. Carrier recommends that only pre-mixed, epoxy type, non-shrinking grout be used for machine installation. Follow manufacturer's instructions in applying grout.

1. Check machine location prints for required grout thickness.
2. Carefully wax jacking screws for easy removal from grout.
3. Grout must extend above the base of the soleplate and there must be no voids in grout beneath the plates.
4. Allow grout to set and harden, per manufacturer's instructions, before starting machine.
5. Remove jacking screws from leveling pads after grout has hardened.

ACCESSORY SOLEPLATE DETAIL



LEGEND

HRS — Hot Rolled Steel

NOTES:
1. Dimensions in ( ) are in millimeters.
2. Accessory (Carrier supplied, field installed) soleplate package includes 4 soleplates, 16 jacking screws and leveling pads.
3. Jacking screws to be removed after grout has set.
4. Thickness of grout will vary, depending on the amount necessary to level chiller. Use only pre-mixed non-shrinking grout,
   Ceilcote 748 OR Chemrex Embeco 636 Plus Grout 0′-1½″ (38.1) to 0′-2¼″ (57) thick.

Fig. 48 — Accessory Isolation

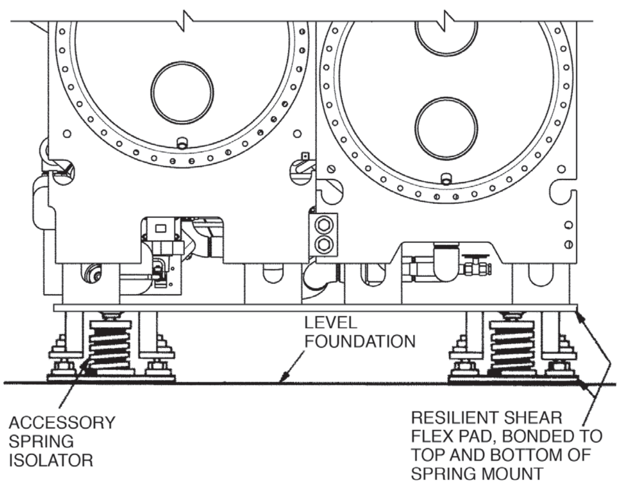
INSTALL SPRING ISOLATION

IMPORTANT: Accessory spring isolation packages are intended solely for non-seismic applications. Seismic applications must be designed by a registered professional in accordance with all applicable national and local codes.

Spring isolation may be purchased as an accessory from Carrier for field installation. It may also be field supplied and installed. Spring isolators may be placed directly under machine support plates or located under machine soleplates. See Fig. 49. Consult job data for specific arrangement. Low profile spring isolation assemblies can be field supplied to keep the machine at a convenient working height.

Obtain specific details on spring mounting and machine weight distribution from job data. Also, check job data for methods to support and isolate pipes that are attached to spring isolated machines.

NOTE: These isolators are not intended for seismic duty, but are intended to reduce the vibration and noise levels transmitted from the chiller to the surrounding environment. For installations adjacent to areas that are sensitive to noise and/or vibration, use the services of a qualified consulting engineer or acoustics expert to determine whether these springs will provide adequate noise/vibration suppression.



NOTE: The accessory spring isolators are supplied by Carrier for installation in the field.

Fig. 49 — 23XRV Accessory Spring Isolation (Shown with Accessory Soleplates)

Step 6 — Connect Piping

IMPORTANT: Chiller water nozzle connections to be designed by others in accordance with all applicable national and local codes.

⚠ CAUTION

Remove cooler and condenser liquid temperature and optional pressure sensors before welding connecting piping to water nozzles. Refer to Fig. 6-8. Replace sensors after welding is complete.

INSTALL WATER PIPING TO HEAT EXCHANGERS — Refer to Table 7 for nozzle sizes. Install piping using job data, piping drawings, and procedures outlined below. A typical piping installation is shown in Fig. 50.

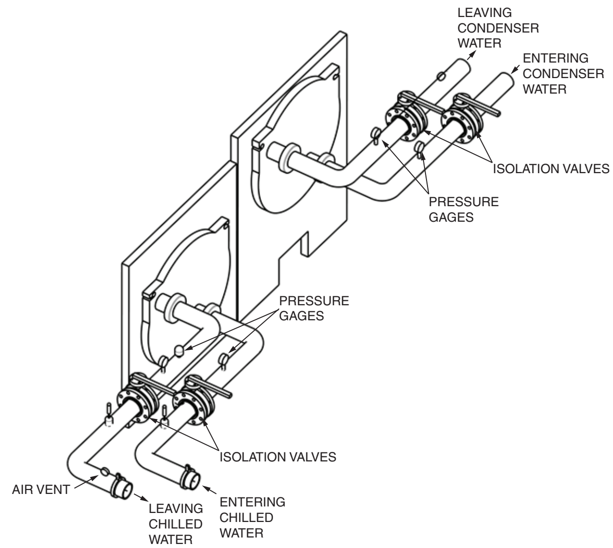


Fig. 50 — Typical Nozzle Piping

⚠ CAUTION

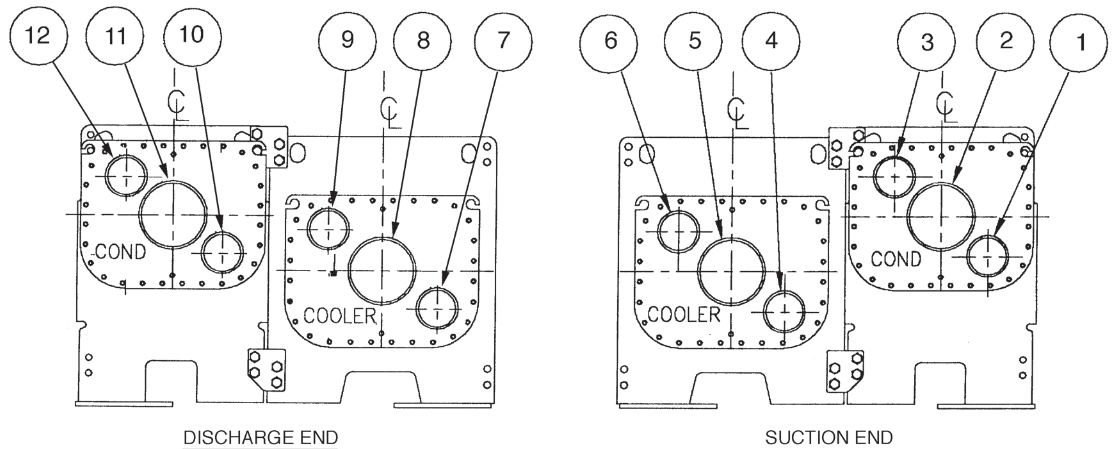
Factory-supplied insulation is not flammable but can be damaged by welding sparks and open flame. Protect insulation with a wet canvas cover.

1. Offset pipe flanges to permit removal of waterbox cover for maintenance and to provide clearance for pipe cleaning. No flanges are necessary with marine waterbox option; however, water piping should not cross in front of the waterbox cover or access will be blocked.
2. Provide openings in water piping for required pressure gages and thermometers. For thorough mixing and temperature stabilization, wells in the leaving water pipe should extend inside pipe at least 2 in. (51 mm).
3. Install air vents at all high points in piping to remove air and prevent water hammer.
4. Install pipe hangers where needed. Make sure no weight or stress is placed on waterbox nozzles or flanges.
5. Water flow direction must be as specified in Fig. 51-53.

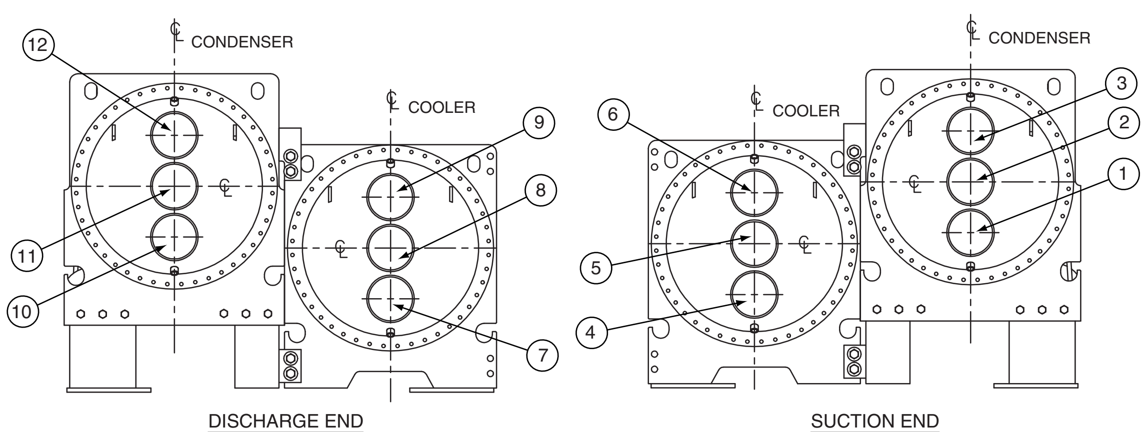
   NOTE: Entering water is always the lower of the 2 nozzles. Leaving water is always the upper nozzle for cooler or condenser.
6. Install waterbox vent and drain piping in accordance with individual job data. All connections are $^{3}/_{4}$-in. FPT.
7. Install waterbox drain plugs in the unused waterbox drains and vent openings.
8. Install optional pumpout system or pumpout system and storage tank as shown in Fig. 54-58.
9. Isolation valves are recommended on the cooler and condenser piping to each chiller for service.
10. Apply appropriate torque on the retaining bolts in a crisscross pattern for the waterbox covers before insulating the waterbox cover. The gasket can relax during transportation and storage, and the waterbox cover requires retightening of the bolts.

> **⚠ CAUTION**
>
> Never charge liquid R-134a refrigerant into the chiller if the pressure is less than 35 psig (241 kPa). Charge as a gas only, with the cooler and condenser pumps running, until 35 psig (241 kPa) is reached using the pumpdown mode on the ICVC. Terminate the pumpdown mode using the ICVC. Flashing of liquid refrigerant at low pressures can cause tube freeze-up and considerable damage.

NOZZLE-IN HEAD WATERBOXES



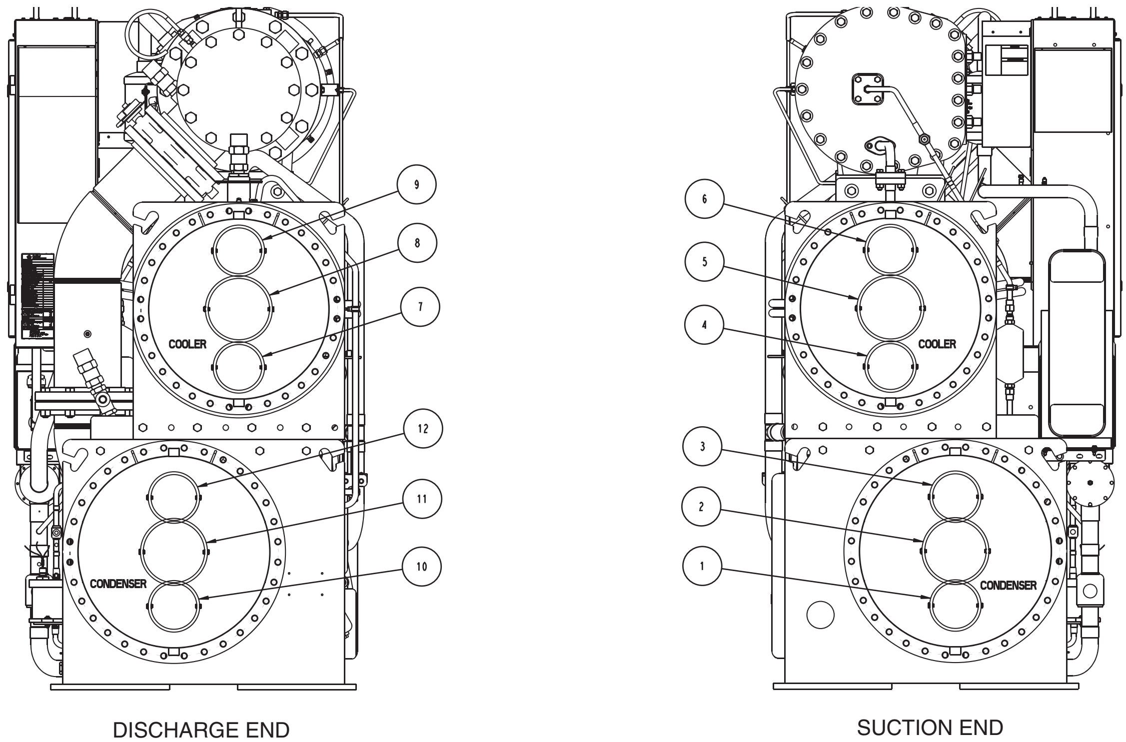
FRAME 3



FRAMES 4 AND 5

NOTE: See next page for nozzle arrangement codes.

Fig. 51 — Piping Flow Data (NIH, Frames 3 Through 5 and A,B)



FRAMES A AND B

NOZZLE ARRANGEMENT CODES FOR ALL 23XRV NOZZLE-IN-HEAD WATERBOXES

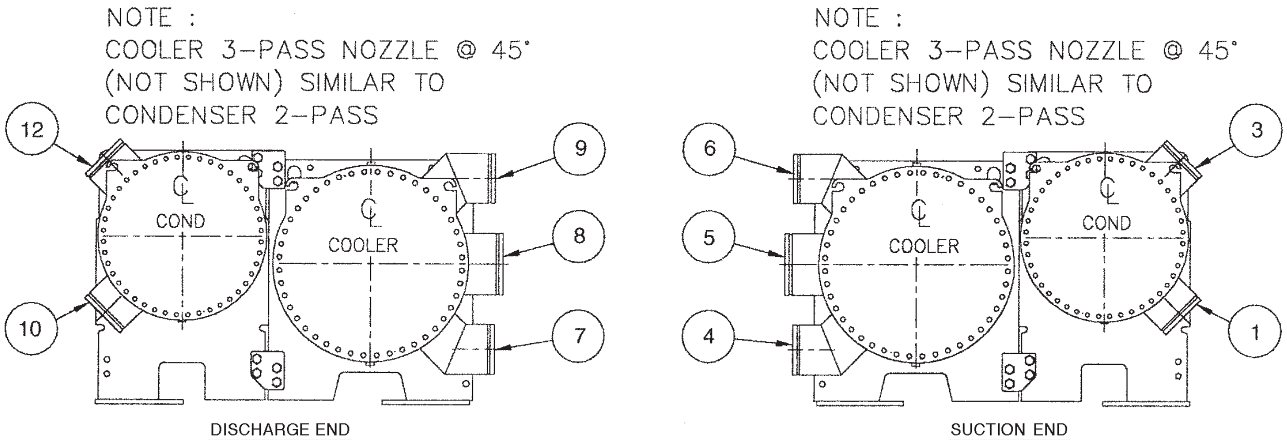
PASS	COOLER WATERBOXES		
	IN	OUT	ARRANGEMENT CODE*
1	8	5	A
	5	8	B
2	7	9	C
	4	6	D
3	7	6	E
	4	9	F

PASS	CONDENSER WATERBOXES		
	IN	OUT	ARRANGEMENT CODE*
1	11	2	P
	2	11	Q
2	10	12	R
	1	3	S
3	10	3	T
	1	12	U

*Refer to certified drawings.

Fig. 51 — Piping Flow Data (NIH, Frames 3 Through 5 and A,B) (cont)

MARINE WATERBOXES



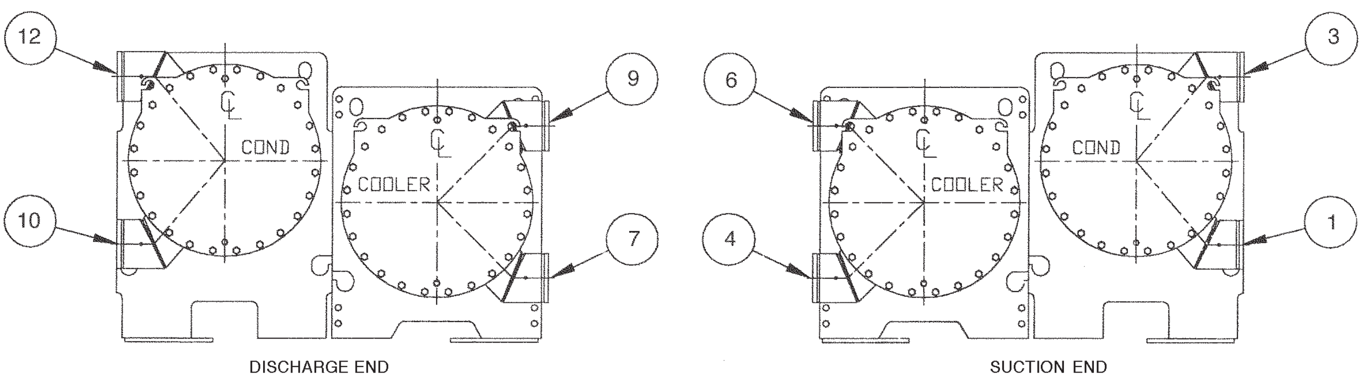
a23-1539

FRAME 3

NOZZLE ARRANGEMENT CODES

PASS	COOLER WATERBOXES			CONDENSER WATERBOXES		
	IN	OUT	ARRANGEMENT CODE	IN	OUT	ARRANGEMENT CODE
1	8	5	A	—	—	—
	5	8	B	—	—	—
2	7	9	C	10	12	R
	4	6	D	1	3	S
3	7	6	E	—	—	—
	4	9	F	—	—	—

MARINE WATERBOXES

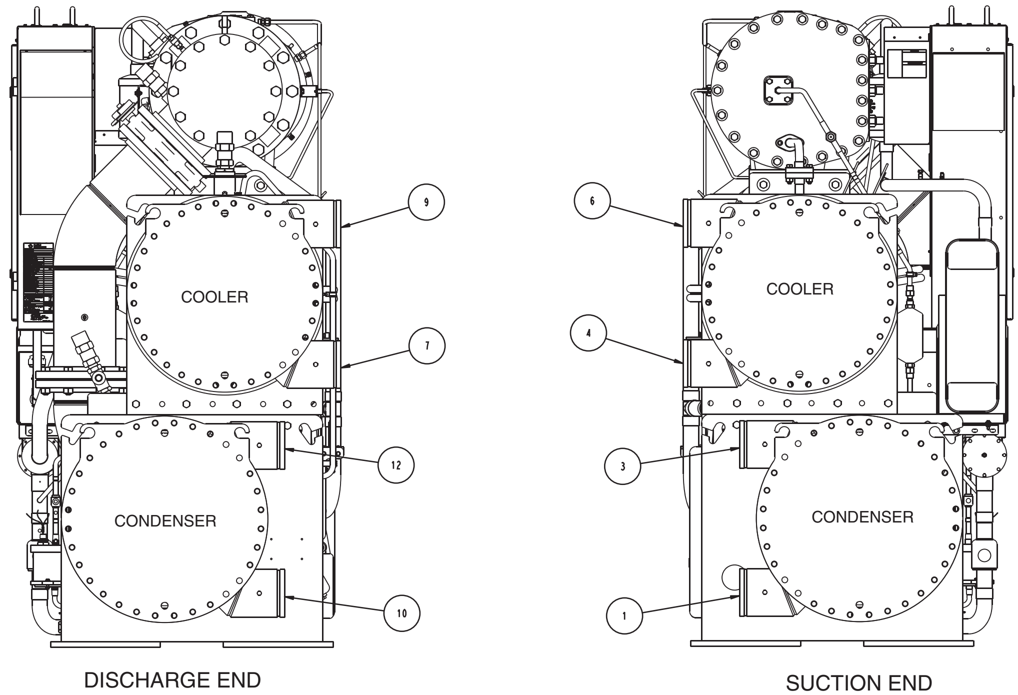


FRAMES 4 AND 5

NOZZLE ARRANGEMENT CODES

PASS	COOLER WATERBOXES			CONDENSER WATERBOXES		
	IN	OUT	ARRANGEMENT CODE	IN	OUT	ARRANGEMENT CODE
1	9	6	A	—	—	—
	6	9	B	—	—	—
2	7	9	C	10	12	R
	4	6	D	1	3	S
3	7	6	E	—	—	—
	4	9	F	—	—	—

Fig. 52 — Piping Flow Data (Marine Waterboxes, Frames 3 Through 5)

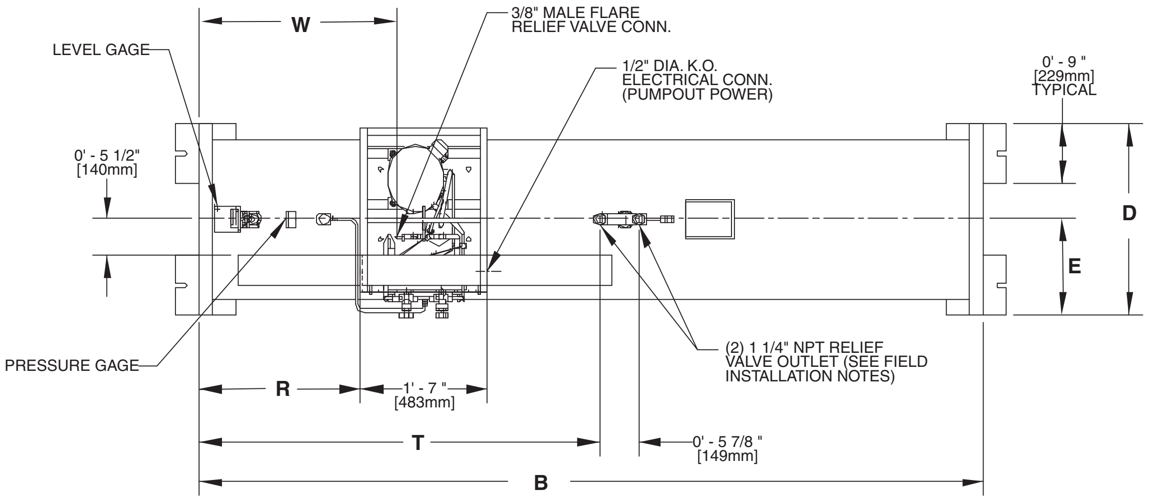


NOZZLE ARRANGEMENT CODES

PASS	COOLER WATERBOXES		
	IN	OUT	ARRANGEMENT CODE
1	9	6	A
	6	9	B
2	7	9	C
	4	6	D
3	7	6	E
	4	9	F

PASS	CONDENSER WATERBOXES		
	IN	OUT	ARRANGEMENT CODE
1	—	—	—
	—	—	—
2	10	12	R
	1	3	S
3	—	—	—
	—	—	—

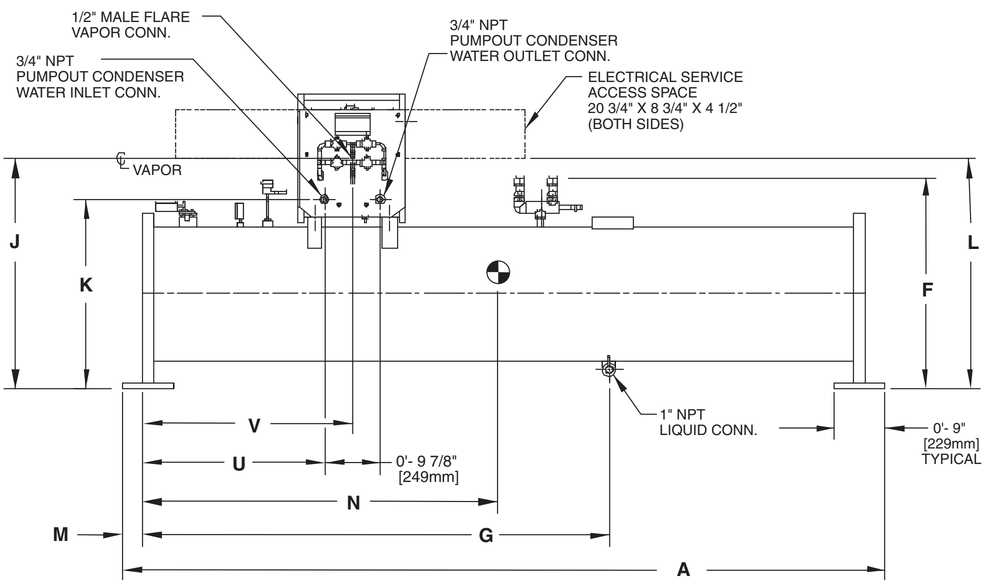
Fig. 53 — Piping Flow Data (Marine Waterboxes, Frames A and B)



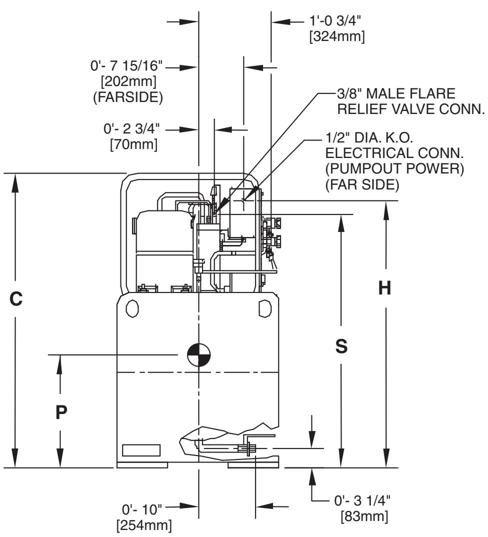
TOP VIEW

NOTES:

1. Denotes center of gravity.
2. Dimensions in [ ] are in millimeters.
3. The weights and center of gravity values given are for an empty storage tank.
4. For additional information on the pumpout unit, see certified drawings.
5. Conduit knockout is located on the side of the control box.
6. 28 cubic ft storage tank weight: 2334 lb (1059 kg).
7. 52 cu ft storage tank weight: 3414 lb (1549 kg).



FRONT VIEW



LEFT SIDE VIEW

DIMENSIONS

ENGLISH (ft-in.)

TANK SIZE	A	B	C	D	E	F	G	H	J	K
0428	10- 5	9-10	4-4 1/4	2-4 3/4	1-2 3/8	3-1 1/4	6-4 3/16	3-11 3/8	3-4 7/8	2-9 9/16
0452	14-11 1/4	14- 4 1/2	4-8 1/4	2-8 1/2	1-4 1/4	3-4 1/2	7-2 1/4	4- 3 1/4	3-8 3/4	3-1 7/16

TANK SIZE	L	M	N	P	R	S	T	U	V	W
0428	3-4 5/8	0-3 1/2	4- 9 1/2	1-7 7/8	2-0 3/8	3-9	5-0 1/4	2-5	2-9 7/8	2-5 3/4
0452	3-8 1/2	0-3 3/8	6-11 5/8	1-8 3/4	2-0 5/8	4-1	5-0 1/2	2-5 1/4	2-10 1/8	2-6

SI (mm)

TANK SIZE	A	B	C	D	E	F	G	H	J	K
0428	3175	2997	1327	730	365	946	1935	1203	1038	852
0452	4553	4381	1429	826	413	1029	2191	1302	1137	951

TANK SIZE	L	M	N	P	R	S	T	U	V	W
0428	1032	89	1451	505	619	1143	1530	737	860	756
0452	1130	86	2124	527	625	1225	1537	742	867	762

Fig. 54 — Optional Pumpout Unit and Storage Tank

RATED DRY WEIGHT AND REFRIGERANT CAPACITY

TANK SIZE	TANK OD		DRY WEIGHT*		R-134A MAXIMUM REFRIGERANT CAPACITY (ANSI/ASHRAE 15)		R-134A MAXIMUM REFRIGERANT CAPACITY (UL 1963)	
	in.	mm	lb	kg	lb	kg	lb	kg
0428	24.00	610	2334	1059	1860	844	1716	778
0452	27.25	692	3414	1549	3563	1616	3286	1491

LEGEND

ANSI — American National Standard Institute
ASHRAE — American Society of Heating, Refrigerating, and Air-Conditioning Engineers
OD — Outside Diameter
UL — Underwriters Laboratories

*The above dry weight includes the pumpout condensing unit weight of 164 lb (75 kg).

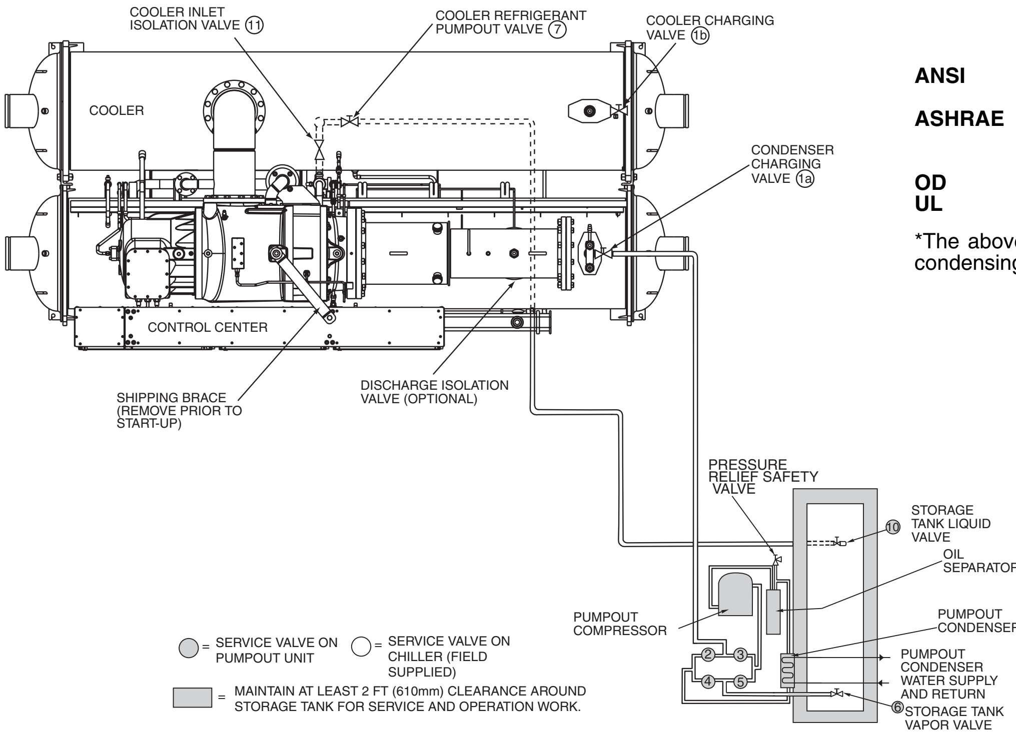


Fig. 55 — Optional Pumpout System Piping Schematic with Storage Tank — Configured to Push Liquid Into Storage Tank (Unit with R Compressor Shown)

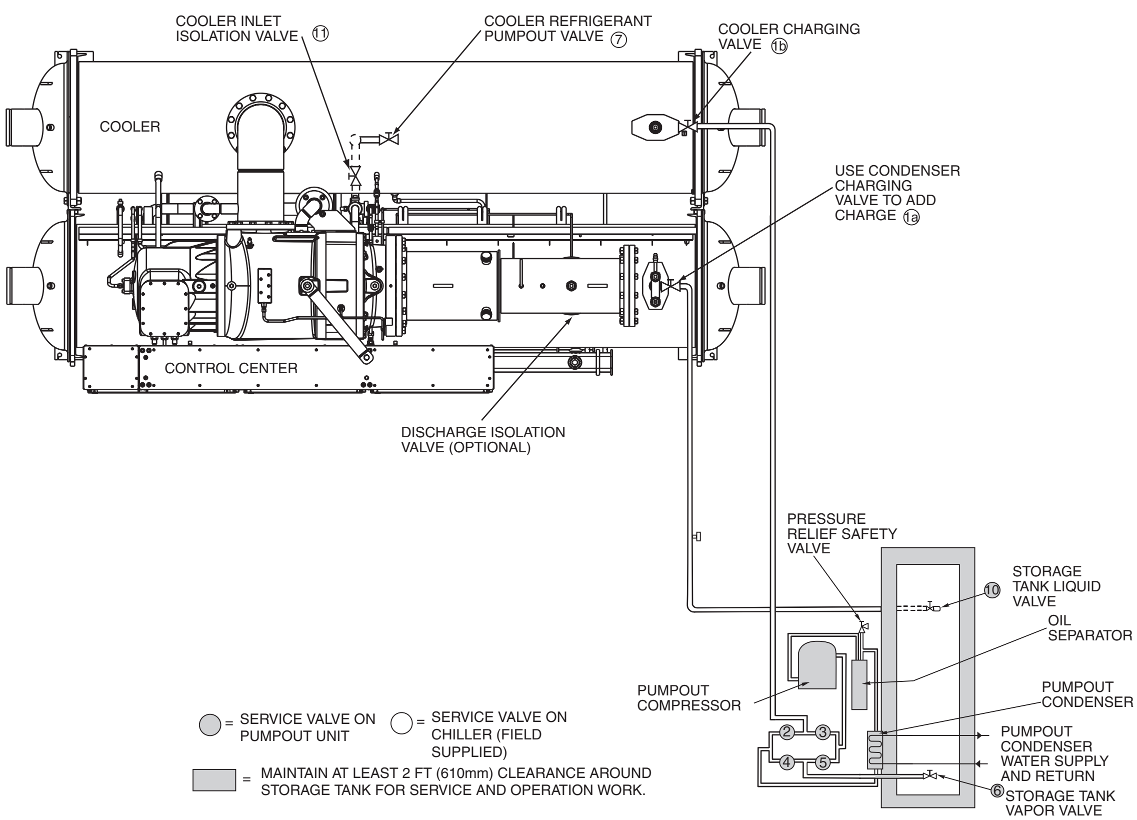


Fig. 56 — Optional Pumpout System Piping Schematic with Storage Tank — Configured to Pull Vapor Out of Chiller or to Charge Chiller from Storage Tank (Unit with R Compressor Shown)

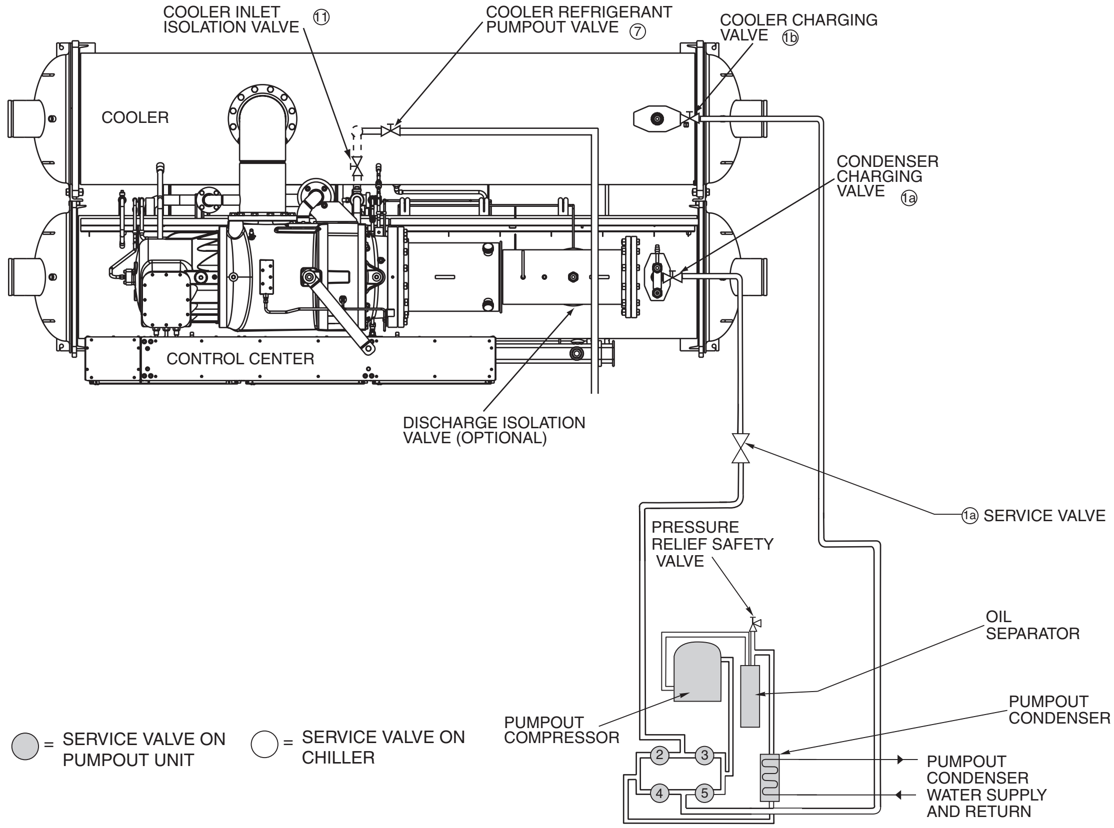


Fig. 57 — Optional Pumpout System Piping Schematic without Storage Tank — Configured to Store Refrigerant in Cooler or Condenser (Unit with R Compressor Shown)

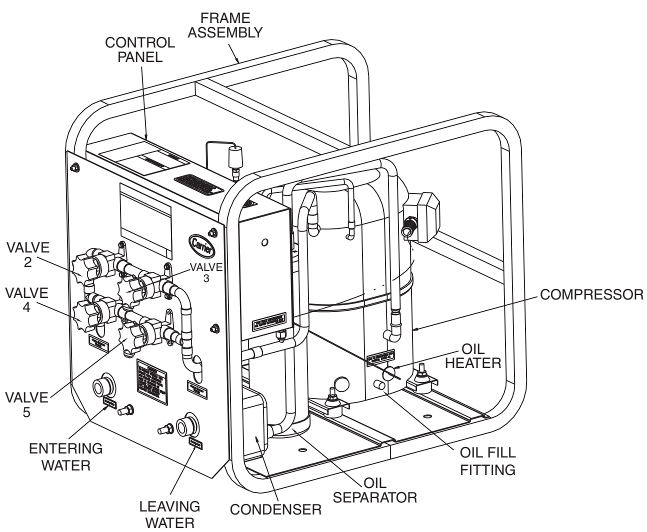


Fig. 58 — Pumpout Unit

INSTALL VENT PIPING TO RELIEF VALVES — The 23XRV chiller is factory equipped with relief valves on the cooler and condenser shells. Refer to Fig. 59 and Table 21 for size and location of relief devices. Vent relief devices to the outdoors in accordance with ANSI/ASHRAE 15 (latest edition) Safety Code for Mechanical Refrigeration and all other applicable codes.

⚠ DANGER

Refrigerant discharged into confined spaces can displace oxygen and cause asphyxiation.

1. Dual pressure relief valves are mounted on the 3-way valves in some locations to allow testing and repair without transferring the refrigerant charge. Three-way valve shafts should be turned either fully clockwise or fully counterclockwise so only one relief valve is exposed to refrigerant pressure at a time.

   The flow area of discharge piping routed from more than one relief valve, or more than one heat exchanger, must be greater than the sum of the outlet areas of all relief valves that are expected to discharge simultaneously. All relief valves within a machinery room that are exposed to refrigerant may discharge simultaneously in the event of a fire. Discharge piping should lead to the point of final release as directly as possible with consideration of pressure drop in all sections downstream of the relief valves.
2. Provide a pipe plug near outlet side of each relief device for leak testing. Provide pipe fittings that allow vent piping to be disconnected periodically for inspection of valve mechanism.
3. Piping to relief devices must not apply stress to the device. Adequately support piping. A length of flexible tubing or piping near the relief device is essential on spring-isolated machines.
4. Cover the outdoor vent with a rain cap and place a condensation drain at the low point in the vent piping to prevent water build-up on the atmospheric side of the relief device.

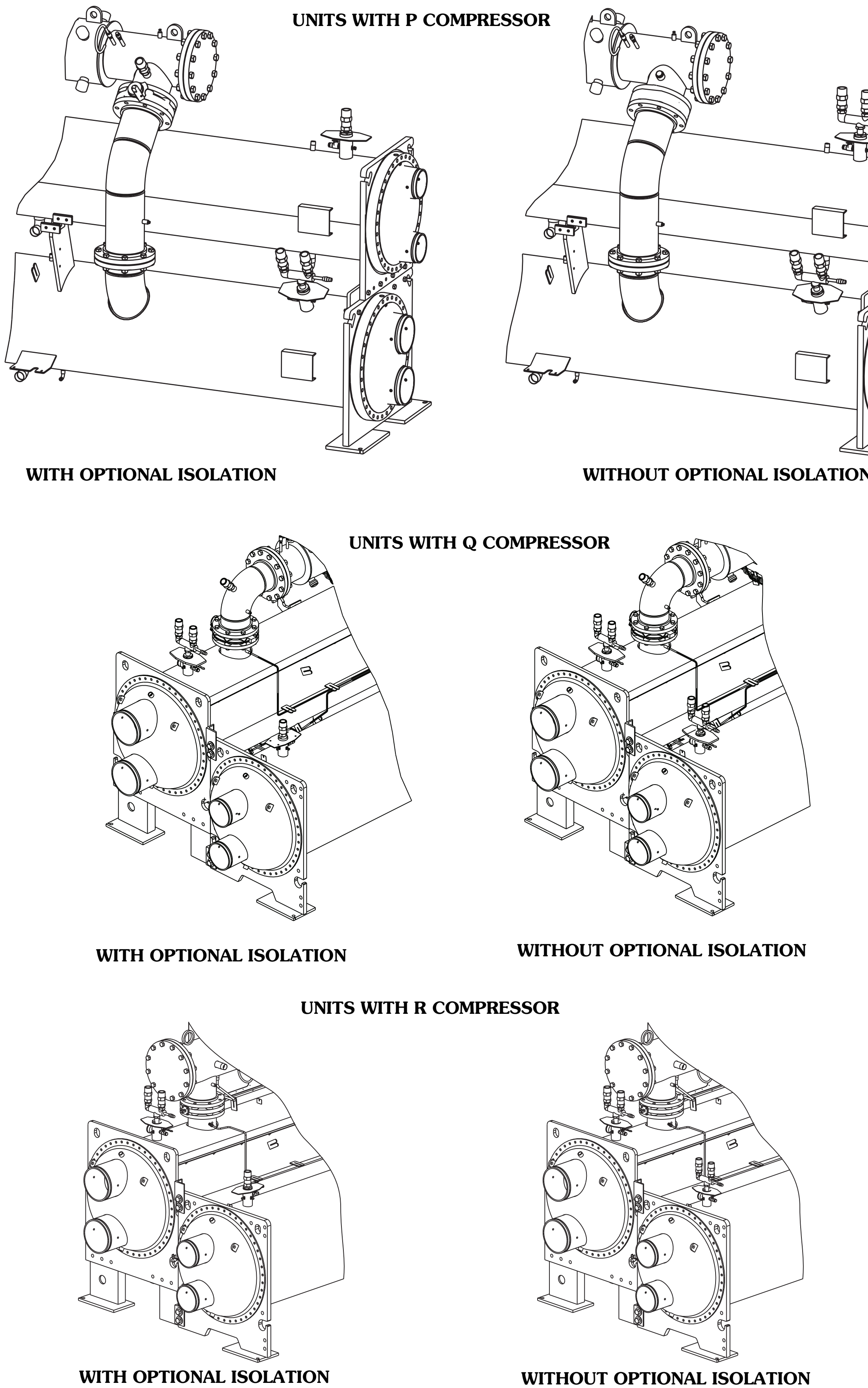


Fig. 59 — Relief Valve Arrangements

Table 21 — Relief Valve Locations

LOCATION	FRAME SIZE	RELIEF VALVE OUTLET SIZE	QUANTITY WITHOUT ISOLATION VALVES	QUANTITY WITH ISOLATION VALVES
DISCHARGE PIPE ASSEMBLY	3-5	$1^1/_4$-in. NPT FEMALE CONNECTOR	1	1
	A,B	$1^1/_4$-in. NPT FEMALE CONNECTOR	N/A	1
COOLER	3-5, A,B	$1^1/_4$-in. NPT FEMALE CONNECTOR	2	1
CONDENSER	3-5, A,B	$1^1/_4$-in. NPT FEMALE CONNECTOR	2	2
OPTIONAL STORAGE TANK	N/A	$1^1/_4$-in. NPT FEMALE CONNECTOR	2	2

NOTE: All valves relieve at 185 psig (1275 kPa).

Step 7 — Make Electrical Connections — Field wiring must be installed in accordance with job wiring diagrams and all applicable electrical codes. Refer to Fig. 60-62 for typical wiring and component layout.

⚠ DANGER

Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

⚠ WARNING

DC bus capacitors in the VFD retain hazardous voltages after input power has been disconnected. After disconnecting input power, wait 5 minutes for the DC bus capacitors to discharge then check both the VFD DPI communications interface board status LEDs and the VFD with a voltmeter to ensure the DC bus capacitors are discharged before touching any internal components. Failure to observe this precaution could result in severe bodily injury or loss of life.

⚠ DANGER

The drive can operate at and maintain zero speed. The user is responsible for assuring safe conditions for operating personnel by providing suitable guards, audible or visual alarms, or other devices to indicate that the drive is operating or may operate at or near zero speed. Failure to observe this precaution could result in severe bodily injury or loss of life.

⚠ DANGER

Do not install modification kits with power applied to the drive. Disconnect and lockout incoming power before attempting such installation or removal. Failure to observe this precaution could result in severe bodily injury or loss of life.

⚠ DANGER

The drive contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing, or repairing the drive. Erratic machine operation and damage to, or destruction of, equipment can result if this procedure is not followed. Failure to observe this precaution could result in bodily injury.

⚠ CAUTION

The user is responsible for conforming with all applicable local, national and international codes. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

These instructions are intended for qualified electrical personnel familiar with servicing and installing AC drives. Any questions or problems with the products described in this manual should be directed to your local Carrier Service Office.

Wiring diagrams in this publication are for reference only and are not intended for use during actual installation; follow job specific wiring diagrams.

⚠ CAUTION

Do not attempt to start compressor (even for a rotation check) or apply test voltage of any kind while machine is under dehydration vacuum. Motor insulation breakdown and serious damage may result.

⚠ CAUTION

Low oil level may result if the oil pump is manually operated for more than a few minutes when the chiller is not running. The oil reclaim system does not return oil to the sump when the compressor is de-energized.

GROUNDING THE CONTROLS/DRIVE ENCLOSURE — Use the following steps to ground the drive.

1. Open the left door of the control center.
2. Run a suitable equipment grounding conductor unbroken from the drive to earth ground. Tighten these grounding connections to the proper torque. See Fig. 10, 11 and 42.
3. Close the door to the control center.

INSTALLING INPUT POWER WIRING — All wiring should be installed in conformance with the applicable local, national, and international codes (e.g., NEC/CEC). Signal wiring, control wiring, and power wiring must be routed in separate conduits to prevent interference with the drive operation. Use grommets, when hubs are not provided, to guard against wire chafing.

Use the following steps to connect AC input power to the main input circuit breaker:

1. Turn off, lock out, and tag the input power to the drive.
2. Remove the input power wiring panel above the VFD circuit breaker and drill the number of openings for the AC input leads (refer to Fig. 10 and 11). Mount all conduit hardware on the input power wiring panel before reinstalling the input power wiring panel on the VFD enclosure. Take care that metal chips and hardware do not enter the enclosure.

3. Wire the AC input leads by routing them through the openings in the input power wiring panel.

> **⚠ CAUTION**
>
> Do not route signal and control wiring with power wiring in the same conduit. This can cause interference with control and drive operation. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

4. Connect the 3-phase AC input power leads (per job specifications) to the appropriate input terminals of the circuit breaker. See Fig. 10 and 11.
5. Tighten the AC input power terminals and lugs to the proper torque as specified on the input circuit breaker.

ITEM		DESCRIPTION
1		UNIT MOUNTED VFD WITH SHUNT TRIP CIRCUIT BREAKER (65K AMPS INTERRUPT/SHORT CIRCUIT)
		UNIT MOUNTED VFD WITH SHUNT TRIP CIRCUIT BREAKER (100K AMPS INTERRUPT/SHORT CIRCUIT)
		INCLUDES: (1) N.O. CHILLED WATER PUMP CONTACT OUTPUT (1) N.O. CONDENSER WATER PUMP CONTACT OUTPUT (1) N.O. TOWER FAN LOW / #1 CONTACT OUTPUT (1) N.O. TOWER FAN HIGH / #2 CONTACT OUTPUT (1) N.O. ALARM CONTACT OUTPUT (1) 4–20mA HEAD PRESSURE REFERENCE OUTPUT (1) N.C. SPARE SAFETY (DRY) CONTACT INPUT (1) N.O. REMOTE START (DRY) CONTACT INPUT (1) N.O. ICE BUILD (DRY) CONTACT INPUT
	PROTECTION	3 PHASE UNDER / OVER VOLTAGE PROTECTION (LINE SIDE)
	PROTECTION	PHASE LOSS / IMBALANCE / REVERSAL PROTECTION (LINE SIDE)
	PROTECTION	FREQUENCY SHIFT PROTECTION (LINE SIDE)
	PROTECTION	OVER CURRENT PROTECTION (LINE AND LOAD SIDE)
	PROTECTION	PHASE TO GROUND FAULT PROTECTION (LINE AND LOAD SIDE)
	METERING	3 PHASE AMPS (CHILLER DISPLAY LINE AND LOAD SIDE)
	METERING	3 PHASE VOLTS (CHILLER DISPLAY LINE SIDE)
	METERING	4–20mA KW TRANSDUCER OUTPUT (LINE SIDE) FROM CHILLER CONTROL MODULE (CCM)
	METERING	KW HOURS / DEMAND KW (CHILLER DISPLAY LINE SIDE)
	METERING	KW METERING (CHILLER DISPLAY LINE AND LOAD SIDE)
	ANCILLARY	CONTROL POWER TRANSFORMER (3KVA)
	ANCILLARY	CONTROLS AND OIL HEATER DISCONNECT
		3 PHASE ANALOG VOLTS / AMPS METER PACKAGE (OPTION)
		CE – MARKING (OPTION)
2		SYSTEM FEEDER (SHORT CIRCUIT, GROUND FAULT & PROTECTION)
A		EVAPORATOR LIQUID PUMP STARTER DISCONNECT
B		EVAPORATOR LIQUID PUMP MOTOR STARTER
C		CONDENSER LIQUID PUMP STARTER DISCONNECT
D		CONDENSER LIQUID PUMP MOTOR STARTER
E		COOLING TOWER FAN STARTER DISCONNECT (LOW FAN/#1)
F		COOLING TOWER FAN STARTER (LOW FAN/#1)
G		COOLING TOWER FAN STARTER DISCONNECT (HIGH FAN/#2)
H		COOLING TOWER FAN STARTER (HIGH FAN/#2)
J		SPARE SAFETY DEVICES [N.C.] SEE NOTE 3.1
K		REMOTE START / STOP DEVICE [N.O.] SEE NOTE 3.1
L		REMOTE ALARM SEE NOTE 3.3
M		REMOTE ANNUNCIATOR SEE NOTE 3.3
N		LINE SIDE LUG ADAPTERS SEE NOTE 2.3
P		ICE BUILD START / TERMINATE DEVICE SEE NOTE 3.1

NOTE: See Notes for Fig. 60 on page 54.

Fig. 60 — Typical Field Wiring Schematic (LF-2 VFD Shown)

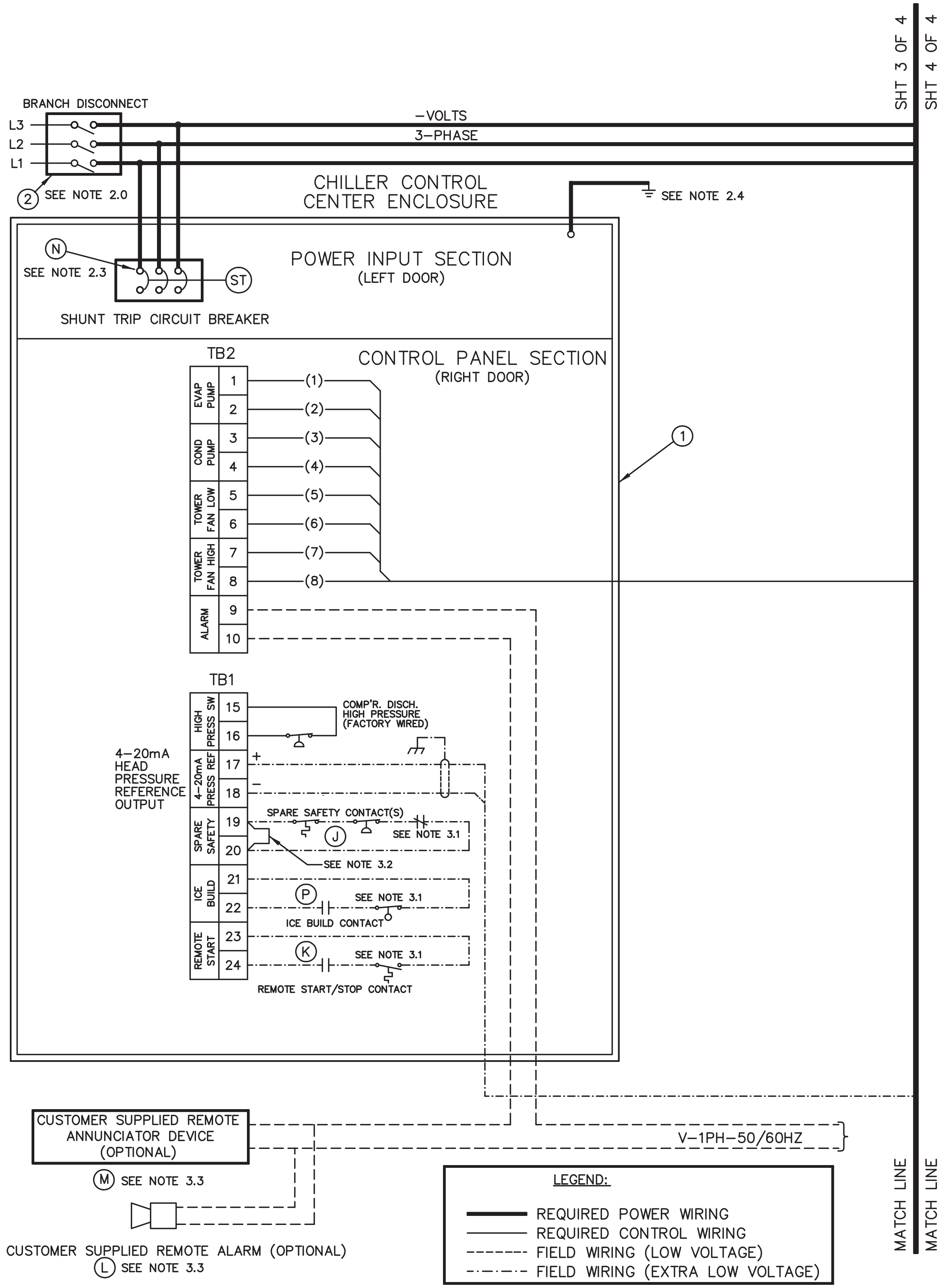


Fig. 60 — Typical Field Wiring Schematic (LF-2 VFD Shown) (cont)

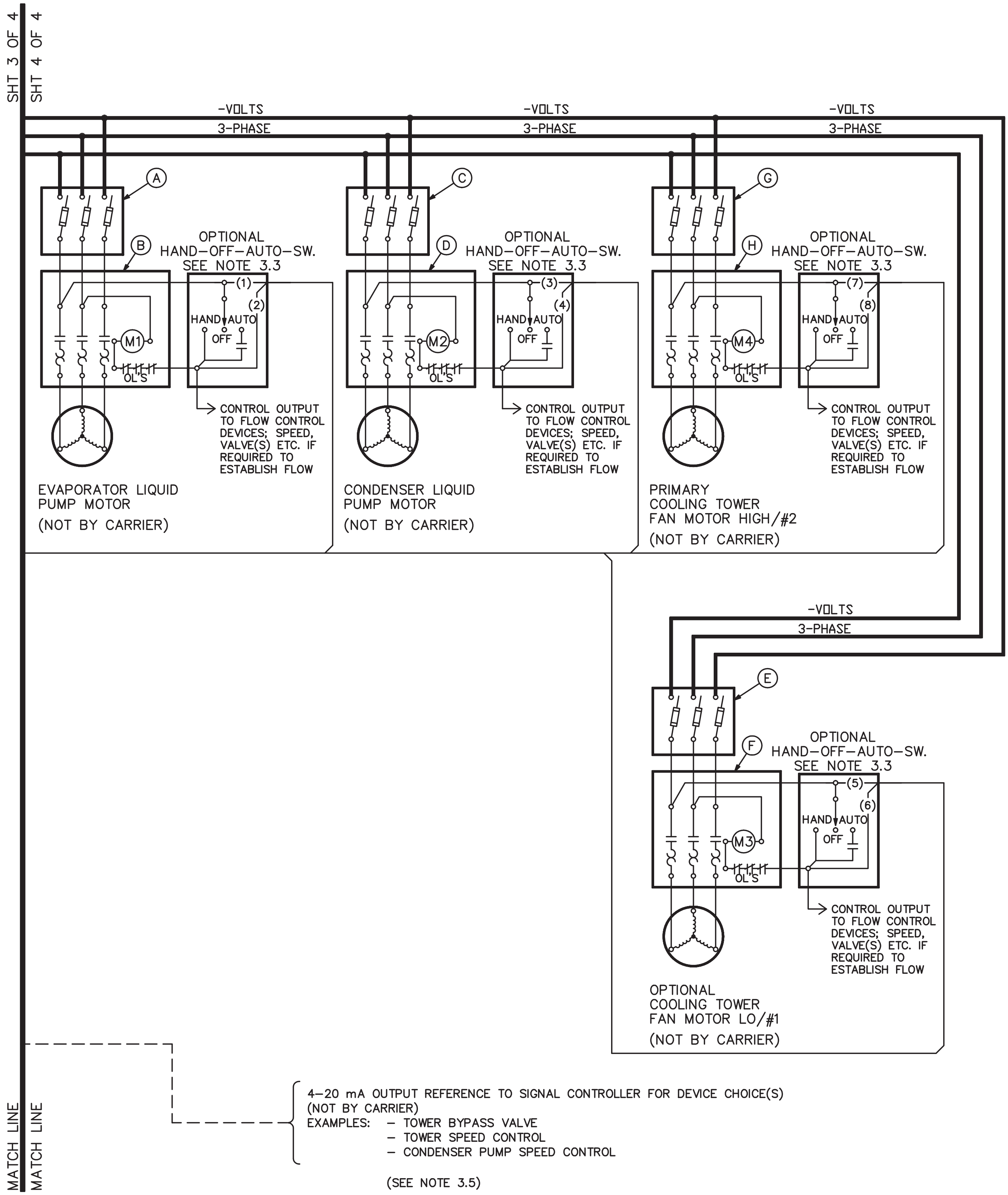


Fig. 60 — Typical Field Wiring Schematic (LF-2 VFD Shown) (cont)

NOTES FOR FIG. 60

GENERAL

1.0 Variable frequency drive (VFD) shall be designed and manufactured in accordance with Carrier engineering requirements.

1.1 All field-supplied conductors, devices and the field-installation wiring, termination of conductors and devices, must be in compliance with all applicable codes and job specifications.

1.2 The routing of field-installed conduit and conductors and the location of field-installed devices, must not interfere with equipment access or the reading, adjusting or servicing of any component.

1.3 Equipment installation and all starting and control devices, must comply with details in equipment submittal drawings and literature.

1.4 Contacts and switches are shown in the position they would assume with the circuit de-energized and the chiller shutdown.

⚠ CAUTION

Do not use aluminum conductors. Contractor/installer assumes all liability resulting from the use of aluminum conductors within the VFD enclosure.

POWER WIRING TO VFD

2.0 Provide a means of disconnecting branch feeder power to VFD. Provide short circuit protection and interrupt capacity for branch feeder in compliance with all applicable codes.

2.1 If metal conduit is used for the power wires, the last 4 feet or greater should be flexible to avoid transmitting unit vibration into the power lines and to aid in serviceability.

2.2 Line side power conductor rating must meet VFD nameplate voltage and chiller minimum circuit ampacity.

2.3 Lug adapters may be required if installation conditions dictate that conductors be sized beyond the minimum ampacity required. Circuit breaker lugs will accommodate the quantity (#) and size cables (per phase) as follows:

VFD MAX INPUT AMPS	STANDARD 65K AIC LUG CAPACITY (PER PHASE)		OPTIONAL 100K AIC LUG CAPACITY (PER PHASE)	
	NO. OF CONDUCTORS	CONDUCTOR RANGE	NO. OF CONDUCTORS	CONDUCTOR RANGE
225A	3	2/0 — 400MCM	2	2/0 — 400MCM
335A	3	2/0 — 400MCM	2	2/0 — 400MCM
440A	3	2/0 — 400MCM	2	2/0 — 400MCM
520A	3	2/0 — 400MCM	3	2/0 — 400MCM
608A	3	2/0 — 400MCM	3	2/0 — 400MCM

NOTE: If larger lugs are required, they can be purchased from the manufacturer of the circuit breaker.

2.4 Compressor motor and controls must be grounded by using equipment grounding lug provided inside unit mounted VFD enclosure.

CONTROL WIRING

3.0 Field-supplied control conductors to be at least 18 AWG (American Wire Gage) or larger.

3.1 Ice build start/terminate device contacts, remote start/stop device contacts and spare safety device contacts, (devices not supplied by Carrier), must have 24 VAC rating. Max current is 60 mA, nominal current is 10 mA. Switches with gold plated bifurcated contacts are recommended.

3.2 Remove jumper wire between TB1-19 and TB1-20 before connecting auxiliary safeties between these terminals.

3.3 Each integrated contact output can control loads (VA) for evaporator pump, condenser pump, tower fan low, tower fan high, and alarm annunciator devices rated 5 amps at 115 VAC and up to 3 amps at 277 VAC.

⚠ CAUTION

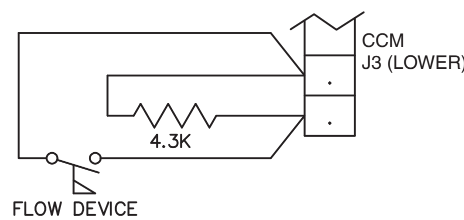
Control wiring required for Carrier to start pumps and tower fan motors and establish flows must be provided to assure machine protection. If primary pump, tower fan and flow control is by other means, also provide a parallel means for control by Carrier. Failure to do so could result in machine freeze-up or overpressure.

Do not use control transformers in the control center as the power source for external or field-supplied contactor coils, actuator motors or any other loads.

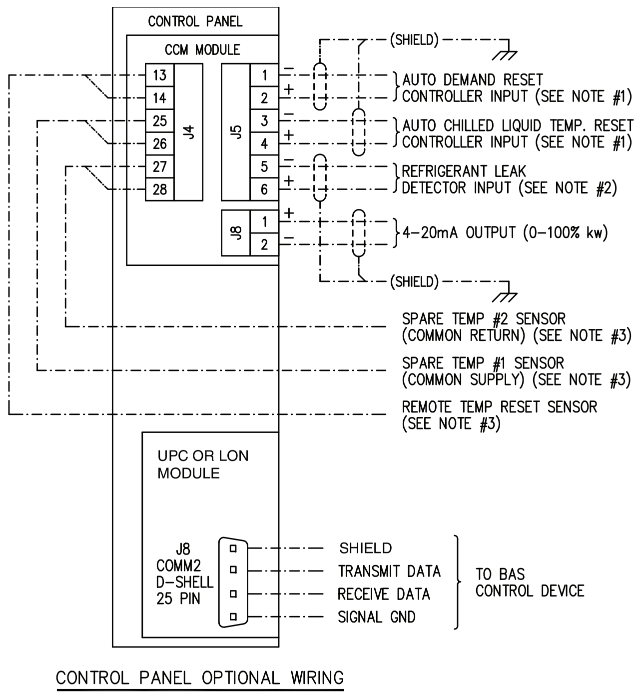
3.4 Do not route control wiring carrying 30 V or less within a conduit or tray which has wires carrying 50 V or higher or along side wires carrying 50 V or higher.

3.5 Spare 4-20 mA output signal is designed for controllers with a non-grounded 4-20 mA input signal and a maximum input impedance of 500 ohms.

3.6 Flow devices to confirm evaporator or condenser pump flow are not required. However; if flow devices are used, wire as shown on drawing 23XRC1-1 (J3 lower). Remove jumper installed at these terminals and wire in a 4.3 K resistor in its place.

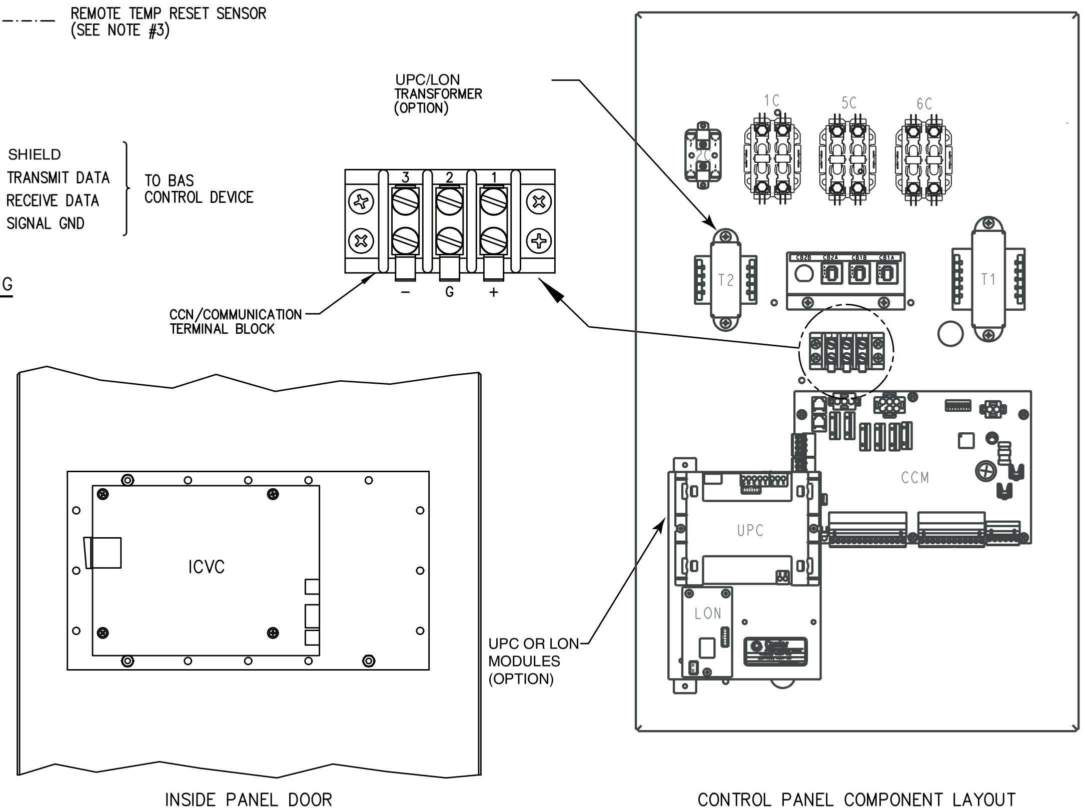


The flow device and resistor must be installed in parallel at these terminals such that the resistor provides a signal when the flow device is open.



NOTES:

1. THIS FEATURE IS STANDARD IN THE 23XR CONTROLS, BUT REQUIRES A CONTROLLER WITH A NON-GROUNDED 4-20mA OR 1-5Vdc OUTPUT SIGNAL, NOT BY CARRIER.
2. THIS FEATURE IS STANDARD IN THE 23XR CONTROLS, BUT REQUIRES AN EXTERNAL CONTROLLER WITH A NON-GROUNDED 4-20mA OUTPUT SIGNAL, NOT BY CARRIER.
3. THIS FEATURE IS STANDARD IN THE 23XR CONTROLS, BUT REQUIRES A SENSOR PACKAGE OPTION, BY CARRIER. (ITEM #3 SEE OPTION LISTING)
4. PINS SHOWN FOR REFERENCE ONLY. ACTUAL PIN LAYOUT NOT SHOWN.



OPTION LISTING		
ITEM	DESCRIPTION	CHECK TO ORDER
1	UPC MODULE	
2	LON MODULE	
3	SENSOR PACKAGE	

Fig. 61 — PIC III Control Component Layout (R,Q Compressor Units)

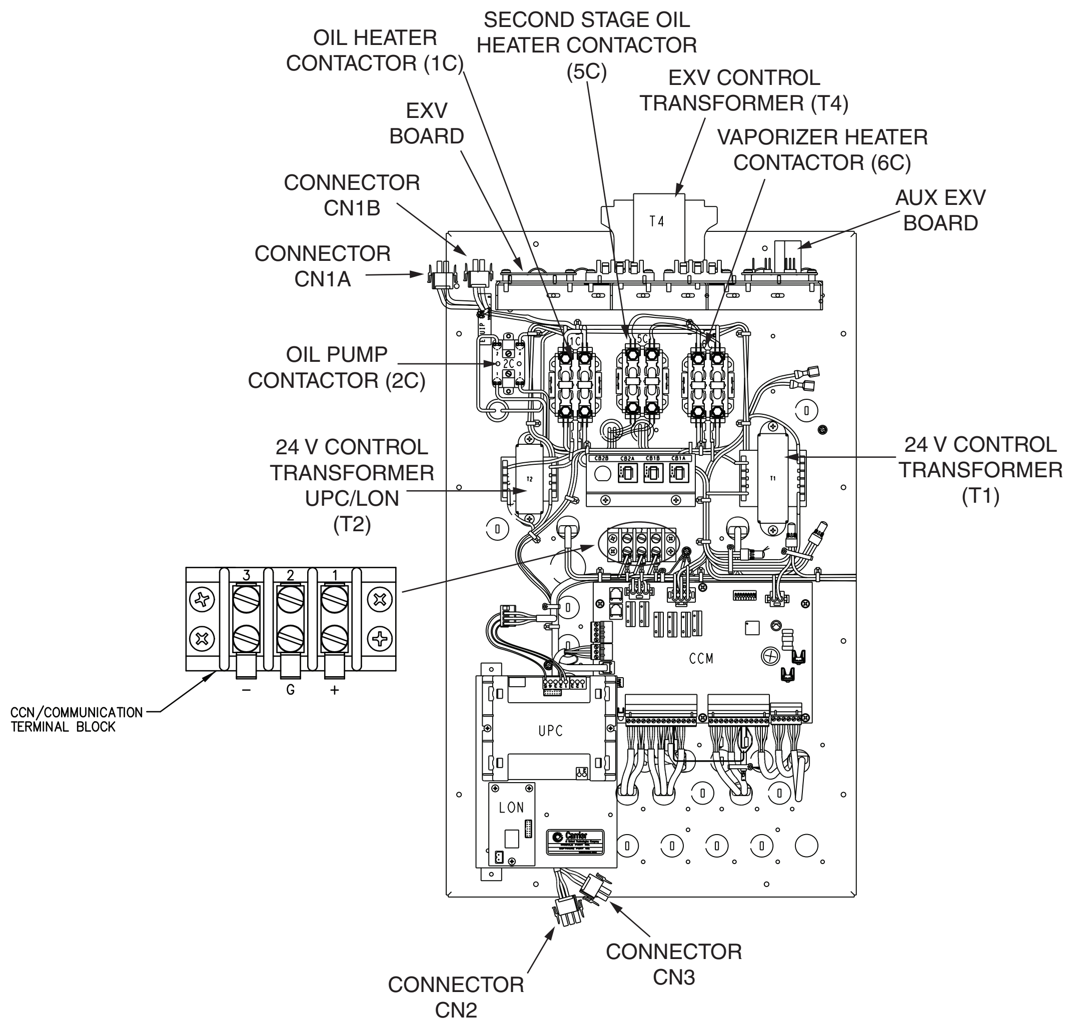


Fig. 62 — PIC III Control Component Layout (P Compressor Units)

WIRING THE FIELD WIRING TERMINAL STRIPS FOR LF-2 VFD — This section describes how to wire the field wiring terminal strips shown in Fig. 63-68. The control terminal blocks are mounted to the inside of the enclosure, above and below the control panel.

NOTE: Up to 30 v may be measured across open contact terminals on the hazardous voltage terminal strip.

1. Turn off, lock out, and tag the input power to the drive. Wait 5 minutes.
2. Verify that there is no voltage at the input terminals (L1, L2, and L3) of the power module.
3. Verify that the status LEDs on the communications interface board are not lit. See Fig. 69. The location of the communications interface board is shown in Fig. 10.
4. Use a screwdriver to remove conduit twist outs in the control panel. Do not punch holes or drill into the top surface of the control center enclosure for field wiring. Knockouts are provided in the back of the control center for field wiring connections.
5. Connect the control wiring as shown in Fig. 61. Tighten all connections to 7 to 9 in.-lb.

WIRING THE FIELD WIRING TERMINAL STRIPS FOR STD TIER VFD — This section describes how to wire the field wiring terminal strips shown in Fig. 65-67. The control terminal blocks are mounted to the inside of the enclosure, on the right side.

NOTE: Up to 30 v may be measured across open contact terminals on the voltage terminal strip.

1. Turn off, lock out, and tag the input power to the drive. Wait 5 minutes.
2. Verify that there is no voltage at the input terminals (L1, L2, and L3) of the power module.
3. Verify that the keypad and drive status indicators (Fig. 69) are not lit. The location of the drive status indicator is shown in Fig. 11.
4. Mount incoming wiring using the knockouts on the panel. Do not drill holes into the top side of the enclosure.
5. Connect the control wiring as shown in Fig. 67. Tighten all connections to 7 to 9 in.-lb.

CONNECT CONTROL INPUTS — Wiring may be specified for a spare safety switch, and a remote start/stop contact can be wired to the starter terminal strip. Additional spare sensors and Carrier Comfort Network® modules may be specified as well. These are wired to the machine control panel as indicated in Fig. 70.

CONNECT CONTROL OUTPUTS — Connect auxiliary equipment, chilled and condenser water pumps, and spare alarms as required and indicated on job wiring drawings.

CONNECT STARTER — The 23XRV chiller is equipped with a unit-mounted VFD starter (Fig. 71).

IMPORTANT: Be sure to ground the power circuit in accordance with the National Electrical Code (NEC), applicable local codes, and job wiring diagrams. Also, make sure correct phasing is observed for proper rotation.

⚠ CAUTION

Do not punch holes or drill into the top surface of the control center, as unit damage could occur. Knockouts are provided in the back of the control center for wiring connections.

Remove the VFD shipping bracket shown in Fig. 23 for typical installations. For seismic units, do not remove the shipping bracket.

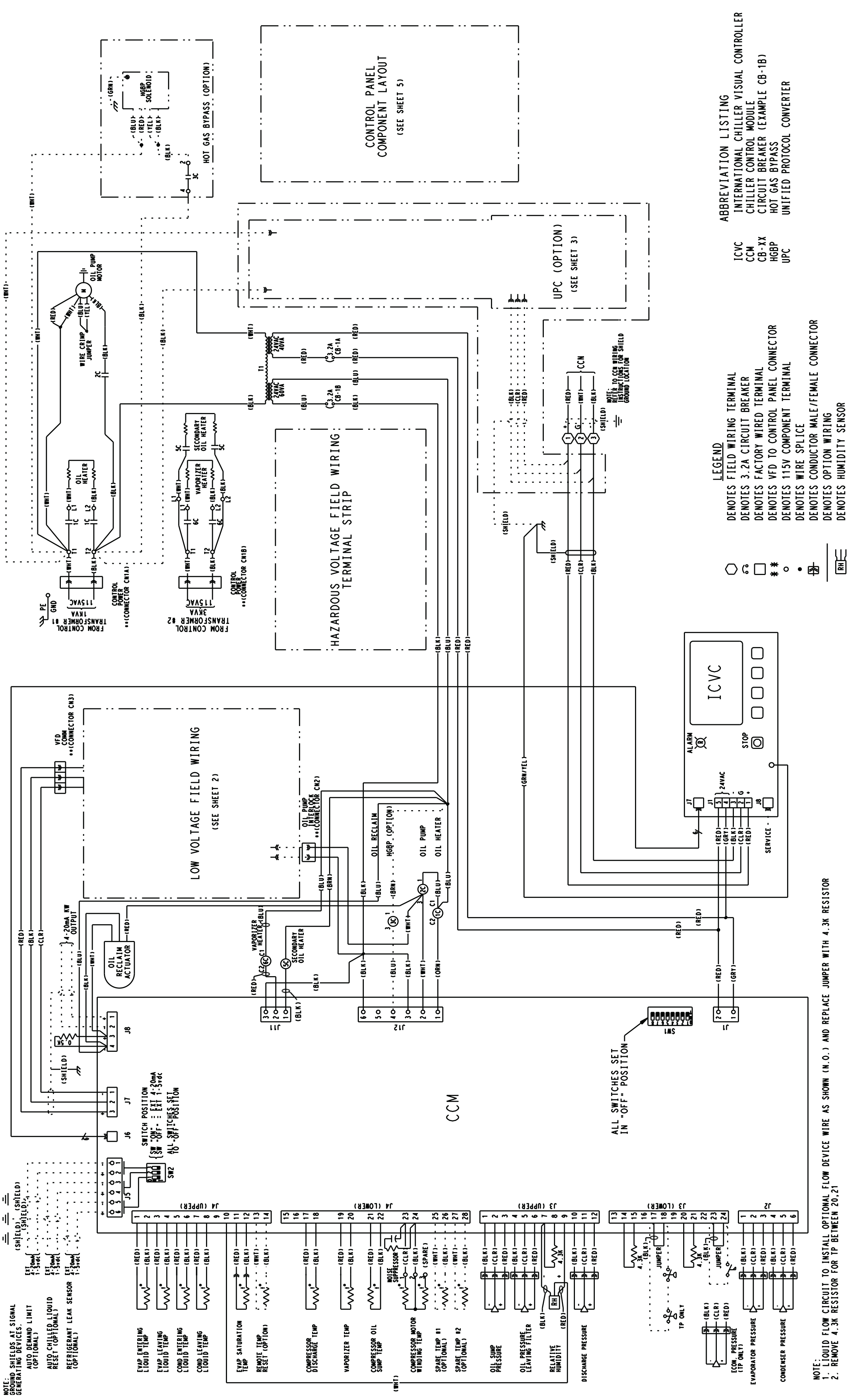
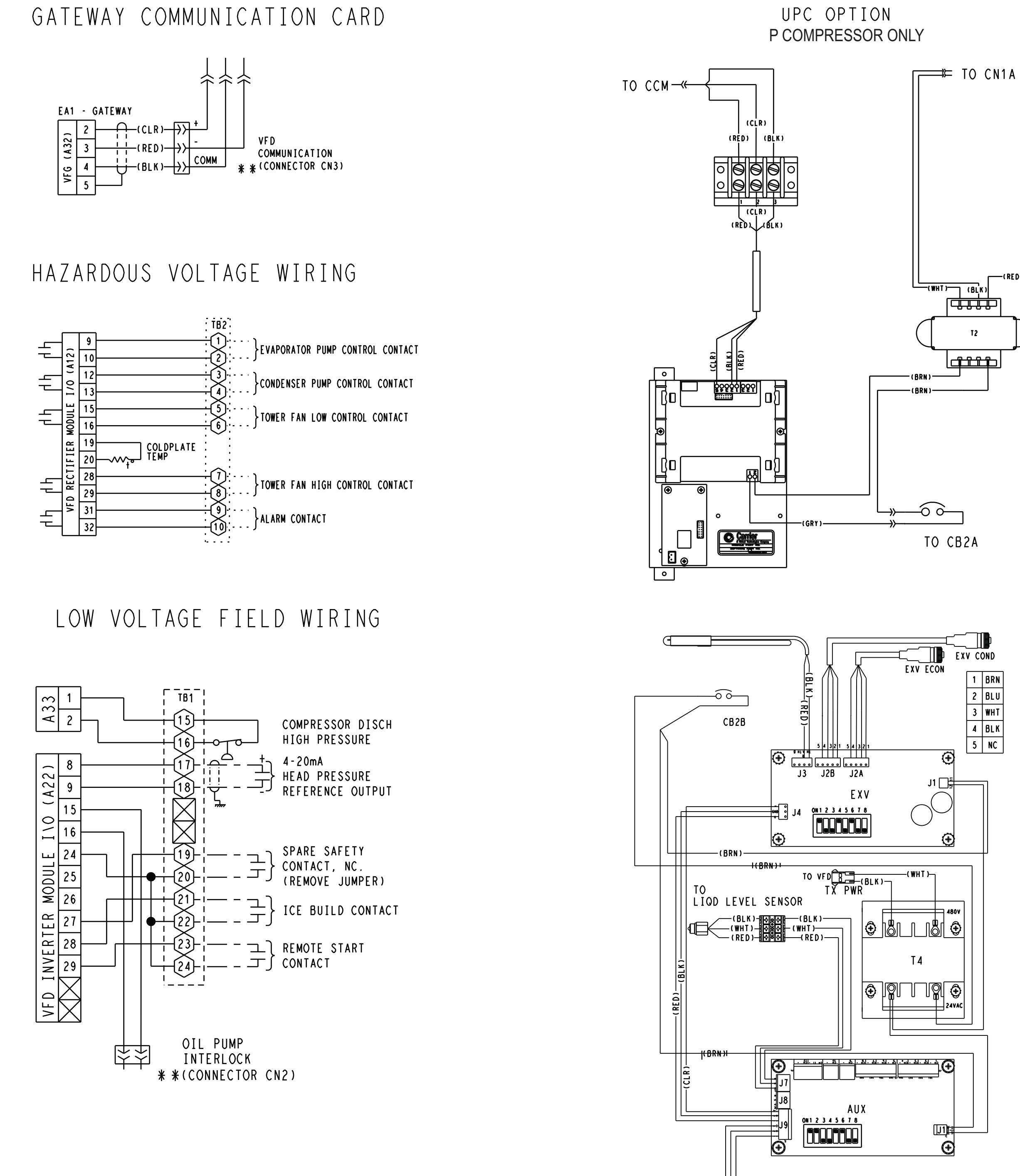


Fig. 63 — 23XRV Controls Schematic (LF-2)



1	BRN
2	BLU
3	WHT
4	BLK
5	NC

LEGEND

- ⬡ DENOTES FIELD WIRING TERMINAL
- DENOTES 3.2A CIRCUIT BREAKER
- □ DENOTES FACTORY WIRED TERMINAL
- ✱✱ DENOTES VFD TO CONTROL PANEL CONNECTOR
- ○ DENOTES 115V COMPONENT TERMINAL
- • DENOTES WIRE SPLICE
- DENOTES CONDUCTOR MALE/FEMALE CONNECTOR
- DENOTES OPTION WIRING
- RH DENOTES HUMIDITY SENSOR

ABBREVIATION LISTING

AXX	VFD TERMINAL BOARD (EXAMPLE A12)
CB-XX	CIRCUIT BREAKER (EXAMPLE CB-1B)
CCM	CHILLER CONTROL MODULE
EXV	ELECTRONIC EXPANSION VALVE
TB	TERMINAL BLOCK
UPC	UNIFIED PROTOCOL CONVERTER
VFD	VARIABLE FREQUENCY DRIVE
VFG	VARIABLE FREQUENCY (DRIVE) GATEWAY

Fig. 64 — 23XRV Controls Schematic Details (Rockwell LF-2 VFD)

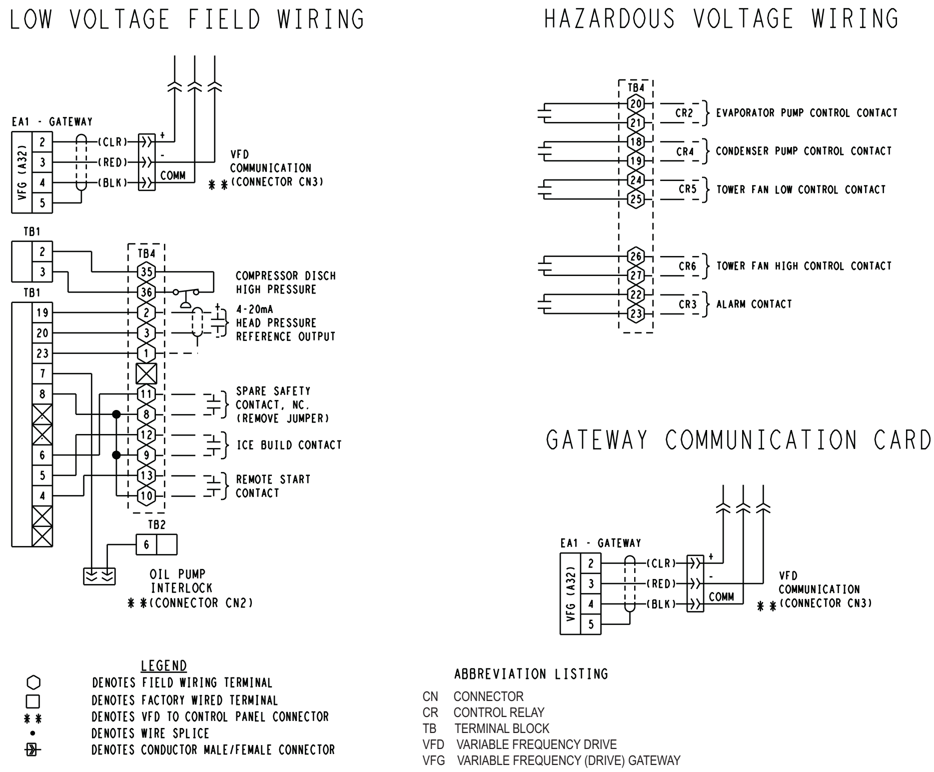


Fig. 65 — 23XRV Controls Schematic Details (Rockwell Standard Tier VFD)

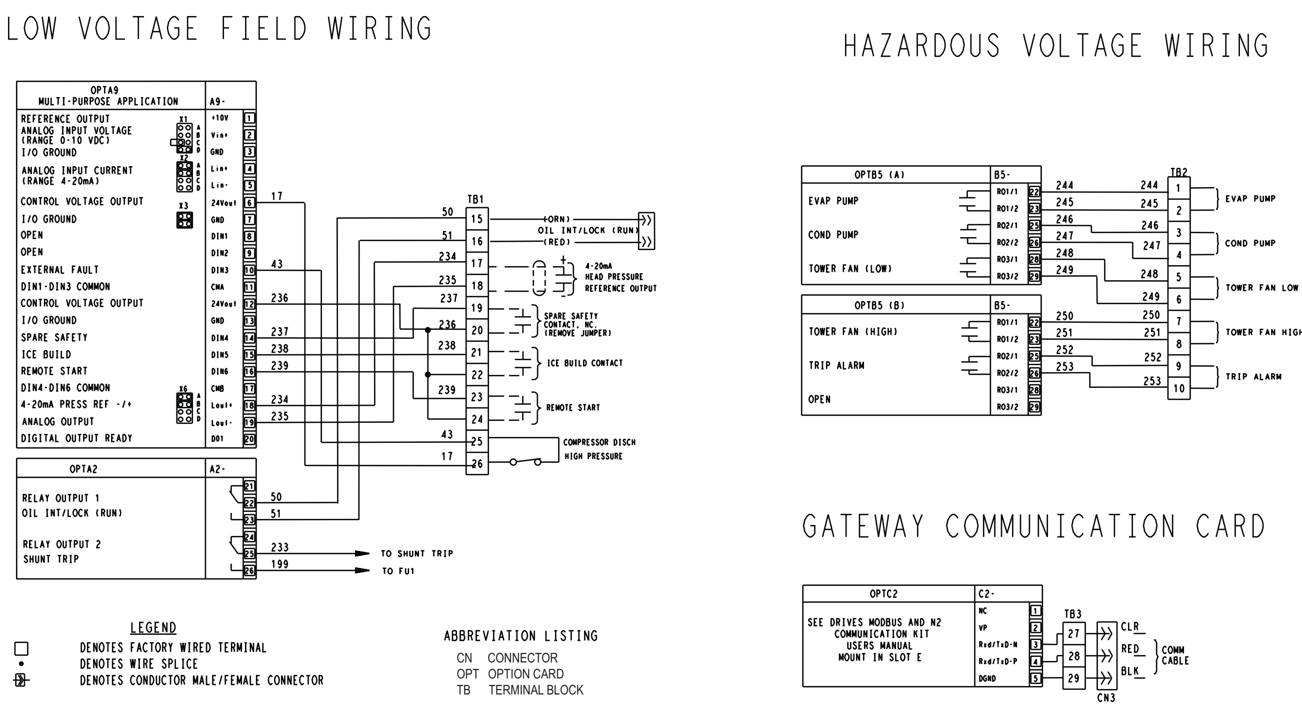


Fig. 66 — 23XRV Controls Schematic Details (Eaton Standard Tier VFD)

MAIN CIRCUIT BREAKER/DRIVE RATING TABLE			
HP	UNIT RATING	MAIN CIRCUIT BREAKER CB1	DRIVE FRAME SIZE
300HP	361A	600A	7
400HP	477A	600A	7

FUSE TABLE		
REF	FUSE DESCRIPTION	SUPPLIER & PART NUMBER
FU1	CLASS CC, 15/25A 600V	LITTEL FUSE CCMR015/CCMR025
FU2	CLASS CC, 10A 600V	LITTEL FUSE, KLDR010
FU3	CLASS CC, 2.5A 600V	LITTEL FUSE, CCMR02.5
FU4	CLASS CC, 1A 600V	LITTEL FUSE, CCMR001

FUSE TABLE		
REF	FUSE DESCRIPTION	SUPPLIER & PART NUMBER
FU5	CLASS CC, 1A 600V	LITTEL FUSE, CCMR001
FU6	CLASS CC, 1A 600V	LITTEL FUSE, CCMR001
FU7	CLASS CC, 1A 600V	LITTEL FUSE, CCMR001
FU8	CLASS CC, 1A 600V	LITTEL FUSE, CCMR001

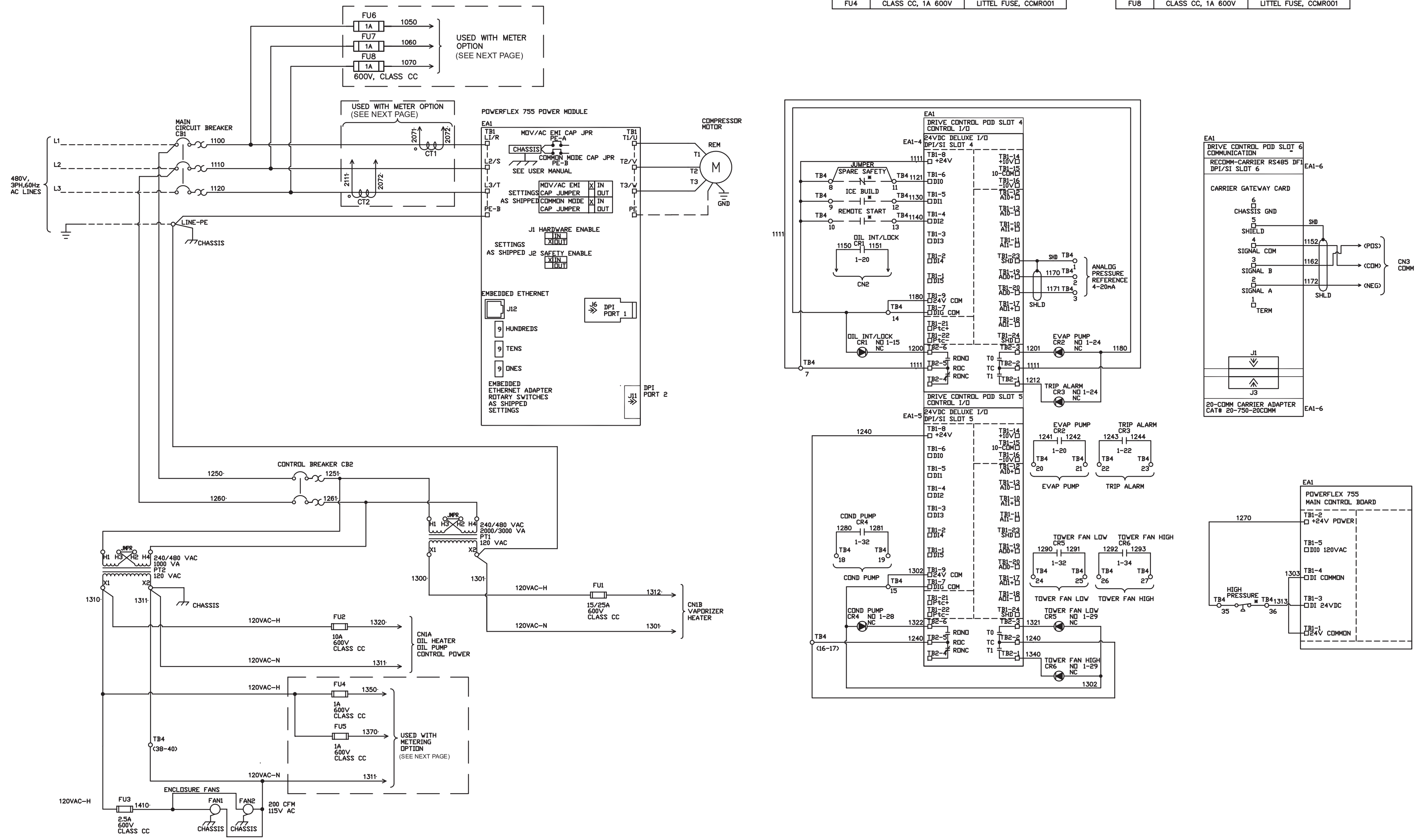


Fig. 67 — 23XRV Controls Schematic (Rockwell Standard Tier VFD Shown)

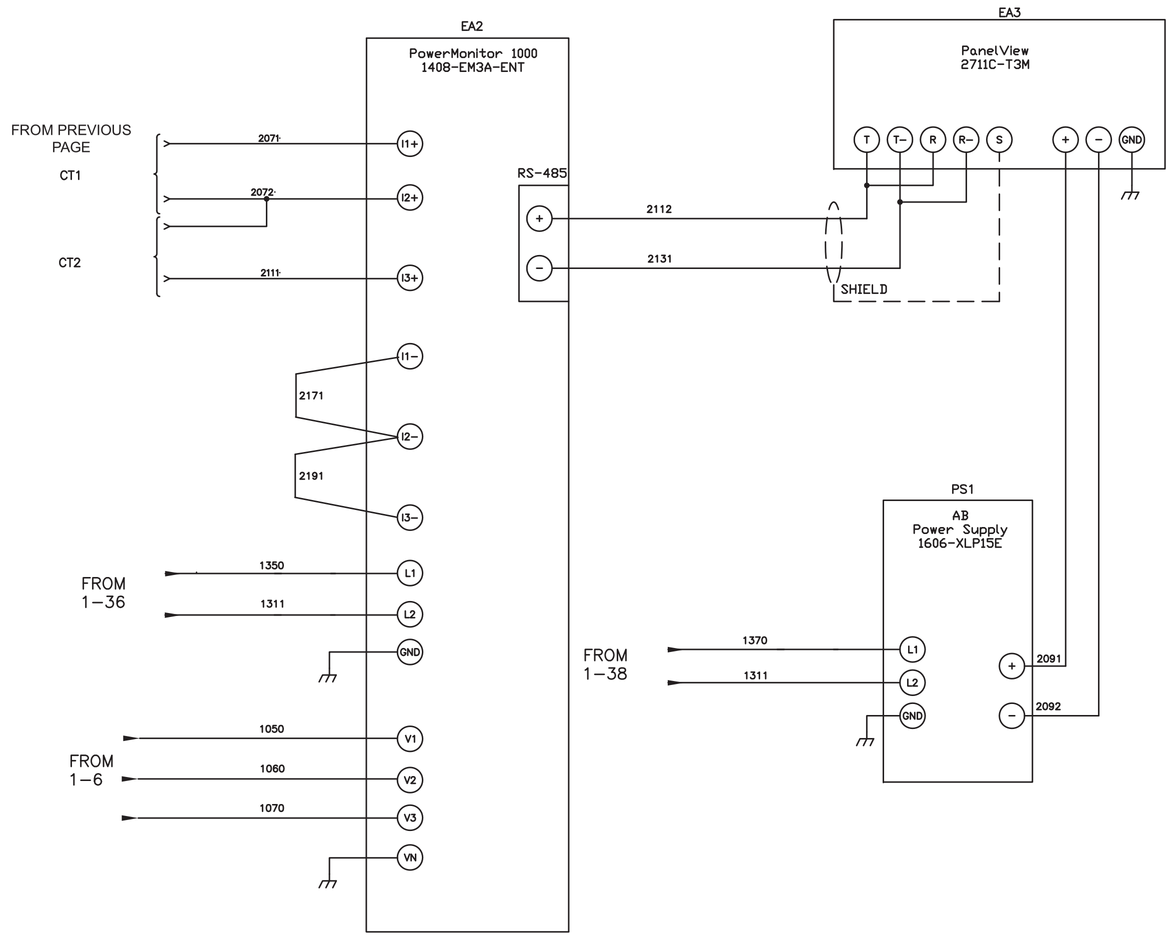


Fig. 67 — 23XRV Controls Schematic (Rockwell Standard Tier VFD Shown) (cont)

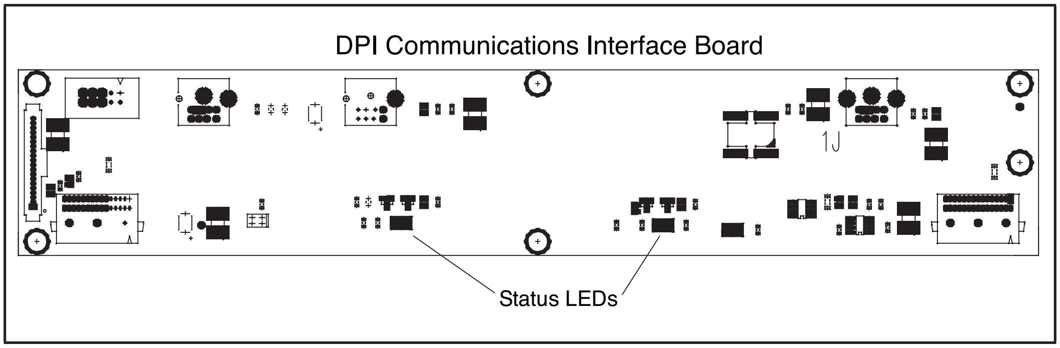
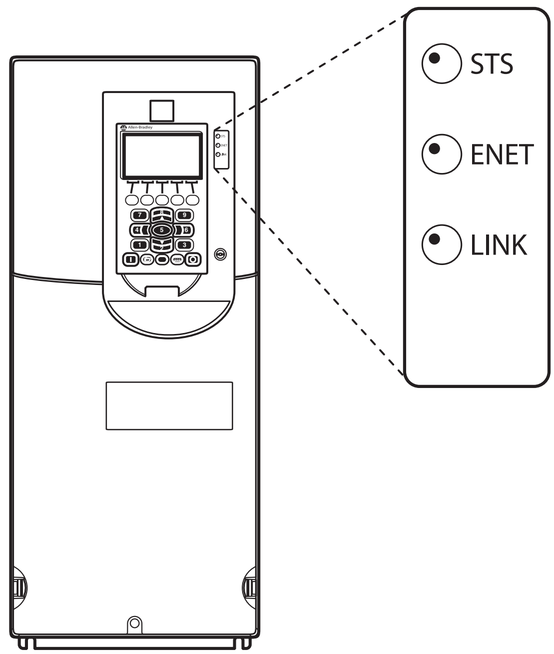


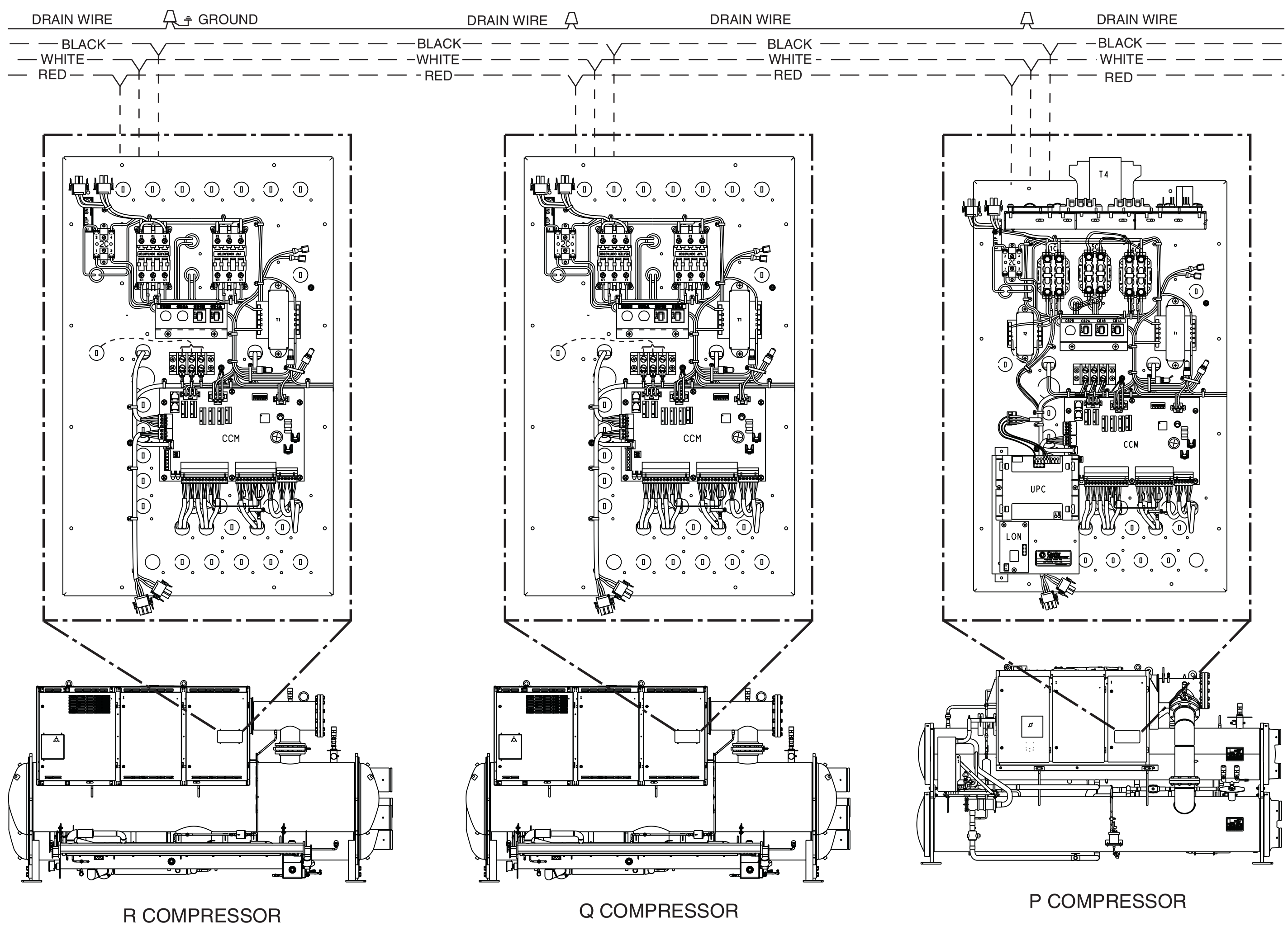
Fig. 68 — Communications Interface Board Status LEDs (LF-2 VFD)



NAME	COLOR	STATE	DESCRIPTION
STS (Status)	Green	Flashing	Drive ready but not running, and no faults are present.
		Steady	Drive running, no faults are present.
	Yellow	Flashing	Drive is not running. A type 2 (non-configurable) alarm condition exists and the drive cannot be started.
		Steady	Drive is not running, a type 1 alarm condition exists. The drive can be started.
	Red	Flashing	A major fault has occurred. Drive cannot be started until fault condition is cleared.
		Steady	A non-resettable fault has occurred.
	Red/Yellow	Flashing Alternately	A minor fault has occurred. When running, the drive continues to run. System is brought to a stop under system control. Fault must be cleared to continue. Use parameter 950 [Minor Flt Config] to enable. If not enabled, acts like a major fault.
	Green/Red	Flashing Alternately	Drive is flash updating.
ENET	None (Unlit)	Off	Adapter and/or network is not powered, adapter is not properly connected to the network, or adapter needs an IP address.
	Red	Flashing	An Ethernet/IP connection has timed out.
		Steady	Adapter failed the duplicate IP address detection test.
	Red/Green	Flashing Alternately	Adapter is performing a self-test.
	Green	Flashing	Adapter is properly connected but is not communicating with any devices on the network.
		Steady	Adapter is properly connected and communicating on the network.
LINK	None (Unlit)	Off	Adapter is not powered or is not transmitting on the network.
	Green	Flashing	Adapter is properly connected and transmitting data packets on the network.
		Steady	Adapter is properly connected but is not transmitting on the network.

NOTES:
1. A Type 1 alarm indicates that a condition exists. Type 1 alarms are user configurable.
2. A Type 2 alarm indicates that a configuration error exists and the drive cannot be started. Type 2 alarms are not configurable.

Fig. 69 — Drive Status Indicator Status LEDs (Std Tier VFD)

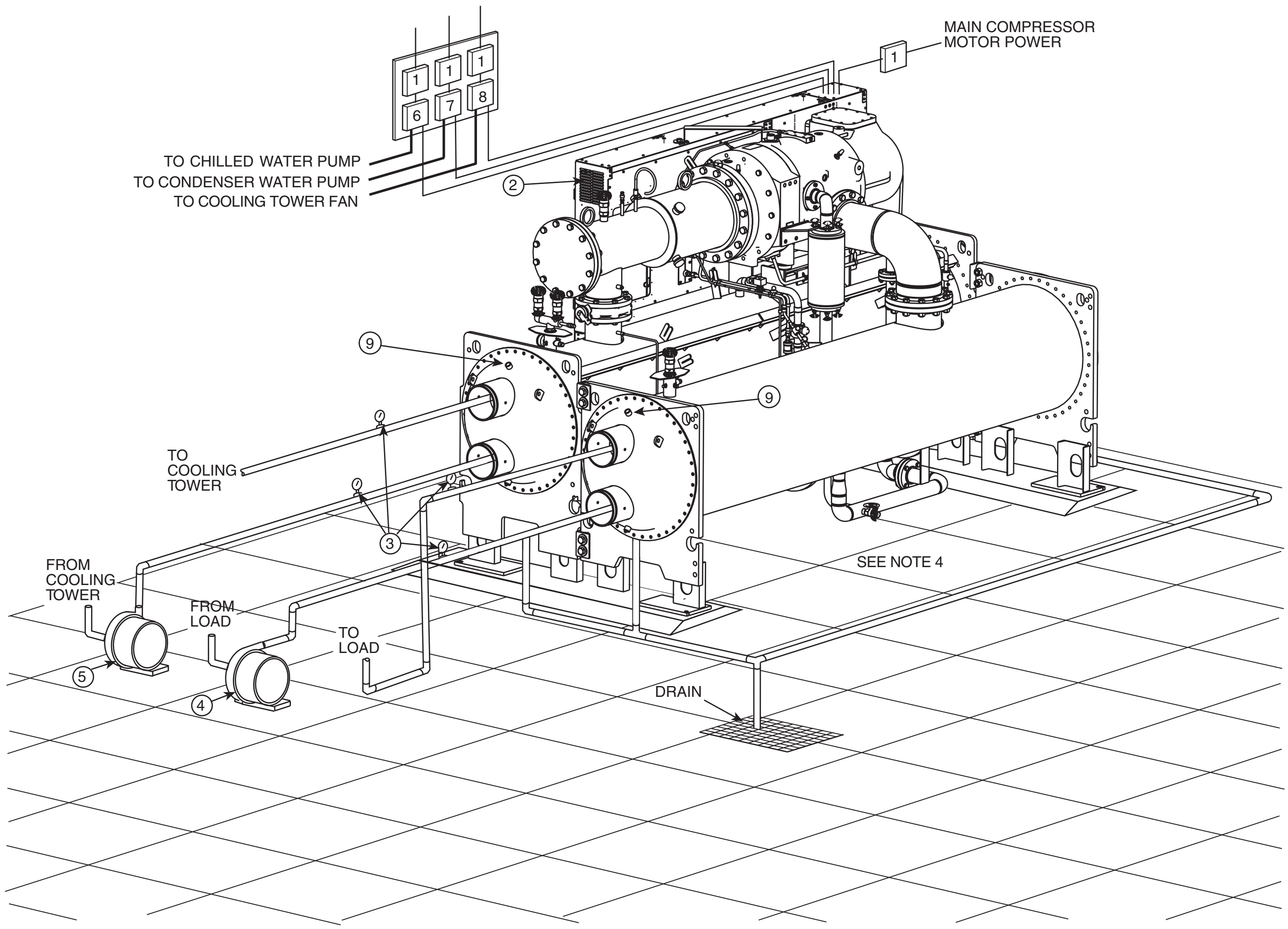


LEGEND

CCM — Chiller Control Module
UPC — Unified Protocol Converter
——— Factory Wiring
– – – – Field Wiring

NOTE: Field-supplied terminal strip must be located in control panel.

Fig. 70 — CCN Communication Wiring for Multiple Chillers (Typical)



LEGEND

1 — Disconnect (Fused on VFD only) NOT by Carrier
2 — Unit Mounted VFD/Control Center
3 — Pressure Gages
4 — Chilled Water Pump
5 — Condenser Water Pump
6 — Chilled Water Pump Starter
7 — Condensing Water Pump Starter
8 — Cooling Tower Fan Starter
9 — Vents
Piping
Control Wiring
Power Wiring

IMPORTANT: Wiring and piping shown are for general point-of-connection only and are not intended to show details for a specific installation. Certified field wiring and dimensional diagrams are available on request.

NOTES:
1. All wiring must comply with applicable codes.
2. Refer to Carrier System Design Manual for details regarding piping techniques.
3. Wiring not shown for optional devices such as:
   - remote start-stop
   - remote alarm
   - optional safety device
   - 4 to 20 mA (1 to 5 VDC) resets
   - optional remote sensors
   - kW output
   - head pressure reference
4. Service clearance under the chiller can be enhanced if the grout is not extended along the entire length of the heat exchangers.
5. Carrier does not recommend pre-fab water piping.
6. Field-installed piping with flexible connections must be arranged and supported to avoid stress on the equipment and transmission of vibrations from the equipment as well as to prevent interference with routine access for the reading, adjusting and servicing of the equipment. Provisions shall be made for adjustment in each plane of the piping and for periodic and major servicing of the equipment.
7. Relief valves on the cooler and condenser must be vented to the outdoors as discharging refrigerant in closed spaces may displace oxygen and cause asphyxiation. All field-supplied refrigerant relief piping and devices must be used in accordance with ANSI/ASHRAE standard 15.

   Dual pressure relief valves are mounted on the 3-way valves in some locations to allow testing and repair without transferring the refrigerant charge. Three-way valve shafts should be turned either fully clockwise or fully counterclockwise so only one relief valve is exposed to refrigerant pressure at a time.

   The flow area of discharge piping routed from more than one relief valve, or more than one heat exchanger, must be greater than the sum of the outlet areas of all relief valves that are expected to discharge simultaneously. All relief valves within a machinery room that are exposed to refrigerant may discharge simultaneously in the event of a fire. Discharge piping should lead to the point of final release as directly as possible with consideration of pressure drop in all sections downstream of the relief valves.
8. Service access should be provided per standards ANSI/ASHRAE 15 and ANSI/NFPA 70 (NEC) and local safety codes. Unobstructed space adequate for inspection, servicing and rigging of all major components of the chiller is required. Shaded service areas are shown on the certified machine assembly drawing plan view and front view. See machine assembly component disassembly drawing for component removal. Space for rigging equipment and compressor removal is not shown. Isolation valves are recommended on the evaporator and condenser piping to each chiller for service.
9. The installation of chilled water and cooling tower water strainers should be considered to prevent debris from collecting in the waterboxes and degrading performance.
10. Flexible conduit should be used for the last few feet to the control center for vibration isolation of power wiring and control wiring.

Fig. 71 — 23XRV with Unit-Mounted VFD/Control Center (Unit with R Compressor Shown)

COMPLETING THE INSTALLATION

This section provides instructions on how to perform a final check of the installation. Do not energize the VFD circuit breaker. This should only be done by qualified Carrier personnel in accordance with the 23XRV Start-Up and Service Manual.

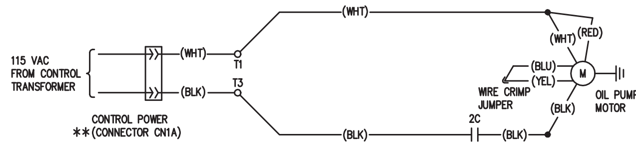
Checking the Installation — Use the following procedure to verify the condition of the installation:

> ⚠ **WARNING**
>
> DC bus capacitors in the VFD retain hazardous voltages after input power has been disconnected. After disconnecting input power, wait 5 minutes for the DC bus capacitors to discharge then check both the VFD DPI communications interface board status LEDs and the VFD with a voltmeter to ensure the DC bus capacitors are discharged before touching any internal components. Failure to observe this precaution could result in severe bodily injury or loss of life.

1. Turn off, lock out, and tag the input power to the drive. Wait 5 minutes.
2. Verify that there is no voltage at the input terminals (L1, L2, and L3) of the power module.
3. a. For LF-2 VFD, verify that the status LEDs on the DPI communications interface board are not lit. See Fig. 68. The location of the communications interface board is shown in Fig. 10.
   b. For Std Tier VFD, verify that the keypad and drive status indicators (Fig. 69) are not lit. The location of the drive status indicator is shown in Fig. 11.
4. Remove any debris, such as metal shavings, from the enclosure.
5. Check that there is adequate clearance around the machine in accordance with the certified print.
6. Verify that the wiring to the terminal strip and the AC input power terminals is correct.
7. Check that the wire size is within terminal specifications and that the wires are tightened properly.
8. Check that specified branch circuit protection is installed and correctly rated.
9. Check that the incoming power is rated correctly.
10. Verify that a properly sized ground wire is installed and a suitable earth ground is used. Check for and eliminate any grounds between the power leads. Verify that all ground leads are unbroken.

Oil Pump and Oil Heater — The oil pump and oil heater are wired at the factory. It is not necessary to connect additional wiring to these components. See Fig. 72-74.

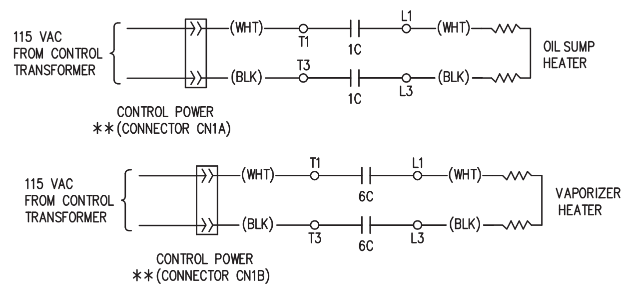
> ⚠ **WARNING**
>
> Voltage to terminals T1 and T3 on the 1C and 6C contactors comes from a control transformer in the starter built to Carrier specifications. Do not connect an outside source of control power to the chiller (terminals T1 and T3). An outside power source will produce dangerous voltage at the line side of the starter, because supplying voltage at the transformer secondary terminals produces input level voltage at the transformer primary terminals (see Fig. 63, 67, and 72-74).



LEGEND

—— Factory Wiring
○ Power Panel Component Terminal
—| |— Contactor

Fig. 72 — Oil Pump Wiring



LEGEND

—— Factory Wiring
○ Power Panel Component Terminal

Fig. 73 — Oil Heater and Control Power Wiring

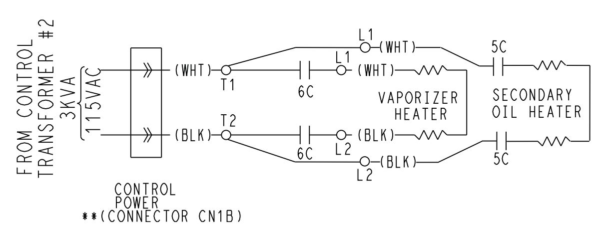


Fig. 74 — Oil Heater and Control Power Wiring, Dual-Stage Oil Heater

Connect Control Wiring — All control wiring must use shielded cable. Refer to the job wiring diagrams for cable type and cable number. Make sure the control circuit is grounded in accordance with applicable electrical codes and instructions on machine control wiring label.

Carrier Comfort Network® Interface — The Carrier Comfort Network (CCN) communication bus wiring is supplied and installed by the electrical contractor. It consists of shielded, 3-conductor cable with drain wire.

The system elements are connected to the communication bus in a daisy chain arrangement. The positive pin of each system element communication connector must be wired to the positive pins of the system element on either side of it. The negative pins must be wired to the negative pins. The signal ground pins must be wired to the signal ground pins. See Fig. 70 for location of the CCN network connections on the terminal strip labeled CCN.

NOTE: Conductors and drain wire must be 20 AWG (American Wire Gage) minimum stranded, tinned copper. Individual conductors must be insulated with PVC, PVC/nylon, vinyl, Teflon*, or polyethylene. An aluminum/polyester 100% foil shield and an outer jacket of PVC, PVC/nylon, chrome vinyl, or Teflon with a minimum operating temperature range of –4 F to 140 F (–20 C to 60 C) is required. See Table 22 for cables that meet the requirements.

*Teflon is a registered trademark of DuPont.

Table 22 — Cable Manufacturers

MANUFACTURER	CABLE NO.
ALPHA	2413 or 5463
AMERICAN	A22503
BELDEN	8772
COLUMBIA	02525

When connecting the CCN communication bus to a system element, a color code system for the entire network is recommended to simplify installation and checkout. See Table 23 for the recommended color codes.

Table 23 — Insulator Codes

SIGNAL TYPE	CCN BUS CONDUCTOR INSULATION COLOR	CCN NETWORK INTERFACE (CONTROL PANEL)
+	Red	+
GROUND	White	G
–	Black	–

If a cable with a different color scheme is selected, a similar color code should be adopted for the entire network.

NOTE: This color scheme does not apply to SIO wiring between the CCM and Gateway module.

At each system element, the shields of its communication bus cables must be tied together. If the communication bus is entirely within one building, the resulting continuous shield must be connected to ground at only one single point. See Fig. 70. If the communication bus cable exits from one building and enters another, the shields must be connected to ground at the lightening suppressor in each building where the cable enters or exits the building (one point only).

To connect the 23XRV chiller to the network, proceed as follows (see Fig. 70):

1. Route wire through knockout in back of control panel.
2. Strip back leads.
3. Crimp one no. 8 size spring spade terminal on each conductor.
4. Attach red to "+" terminal and white to "G" terminal and black to "–" terminal of CCN Network interface located in the control panel.

BACnet* Communication Option Wiring — The BACnet communication option uses the UPC Open controller. The controller communicates using BACnet on an MS/TP network segment communications at 9600 bps, 19.2 kbps, 38.4 kbps, or 76.8 kbps.

Wire the controllers on an MS/TP network segment in a daisy-chain configuration. Wire specifications for the cable are 22 AWG (American Wire Gage) or 24 AWG, low-capacitance, twisted, stranded, shielded copper wire. The maximum length is 2000 ft.

Install a BT485 terminator on the first and last controller on a network segment to add bias and prevent signal distortions due to echoing. See Fig. 75-77.

To wire the UPC Open controller to the BAS (building automation system) network:

1. Pull the screw terminal connector from the controller's BAS Port.
2. Check the communications wiring for shorts and grounds.
3. Connect the communications wiring to the BAS port's screw terminals labeled Net +, Net -, and Shield.

NOTE: Use the same polarity throughout the network segment.

4. Insert the power screw terminal connector into the UPC Open controller's power terminals if they are not currently connected.
5. Verify communication with the network by viewing a module status report. To perform a module status report using the BACview keypad/display unit, press and hold the "FN" key then press the "." key.

To install a BT485 terminator, push the BT485, on to the BT485 connector located near the BACnet connector.

NOTE: The BT485 terminator has no polarity associated with it.

To order a BT485 terminator, consult Commercial Products i-Vu® Open Control System Master Prices.

MS/TP WIRING RECOMMENDATIONS — Recommendations are shown in Tables 24 and 25. The wire jacket and UL temperature rating specifications list 2 acceptable alternatives. The Halar† specification has a higher temperature rating and a tougher outer jacket than the SmokeGard** specification, and it is appropriate for use in applications where the user is concerned about abrasion. The Halar jacket is also less likely to crack in extremely low temperatures.

NOTE: Use the specified type of wire and cable for maximum signal integrity.

Lead-Lag Control Wiring — The 23XRV chiller can be wired for lead-lag operation in either series or parallel. See Fig. 78 and 79 for applicable wiring schematics.

Install Field Insulation

⚠ CAUTION

Protect insulation from weld heat damage and weld splatter. Cover with wet canvas cover during water piping installation.

When installing insulation at the job site, insulate the following components:

- compressor
- discharge pipe assembly
- cooler shell
- cooler tube sheets
- condenser shell
- condenser tubesheets
- suction piping
- economizer
- economizer muffler
- motor cooling drain
- oil reclaim piping
- vaporizer chamber
- refrigerant liquid line to cooler

NOTE: Insulation of the waterbox covers is applied only at the jobsite by the contractor. When insulating the covers, make sure there is access for removal of waterbox covers for servicing. See Fig. 80 for the insulation area for units with the P compressor. See Fig. 81 for the insulation area for units with the Q compressor. See Fig. 82 for the insulation area for units with the R compressor.

*BACnet is a registered trademark of ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers).† Halar is a registered trademark of Solvay Plastics.
**SmokeGard is a trademark of AlphaGary-Mexichem Corp.

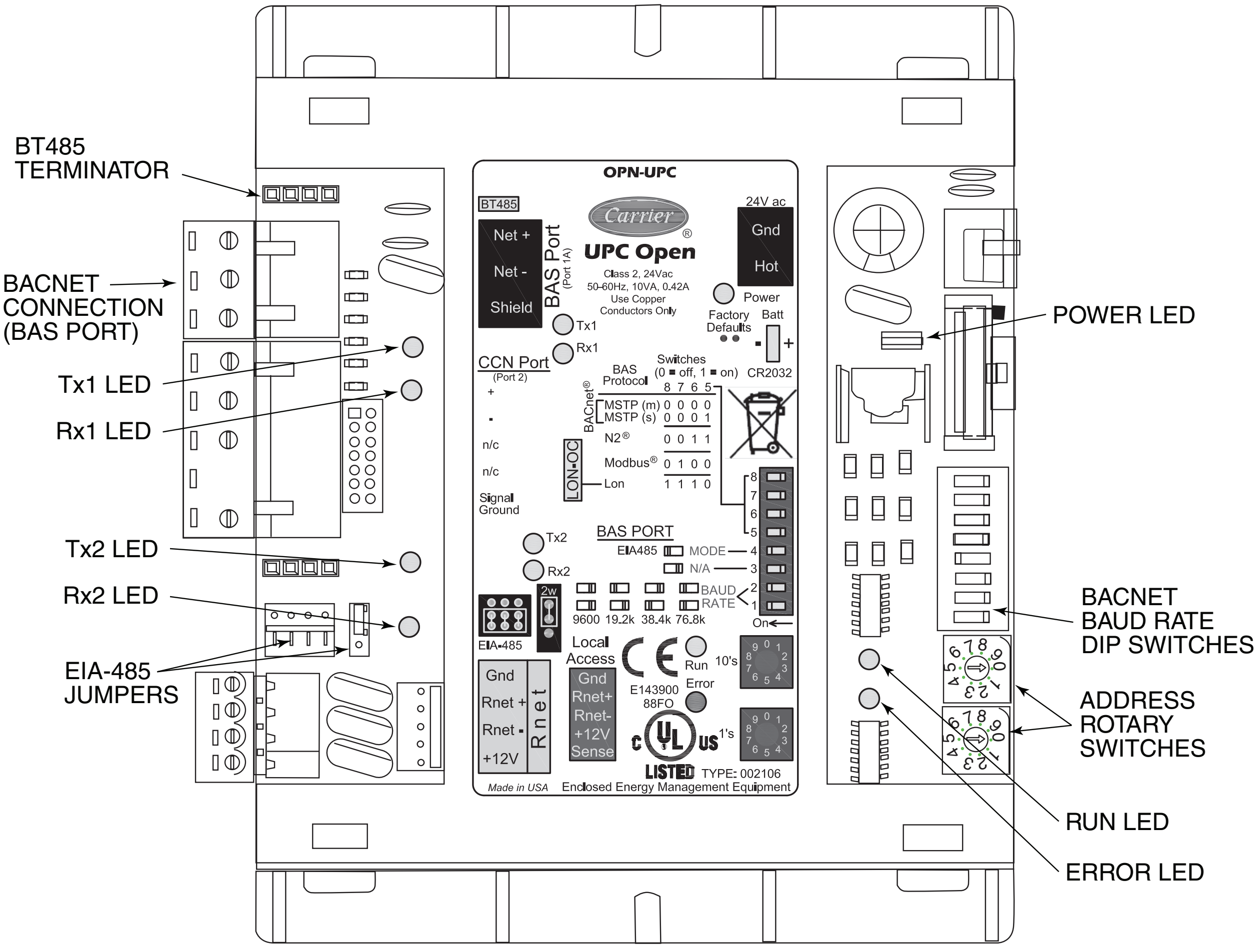


Fig. 75 — UPC Open Controller

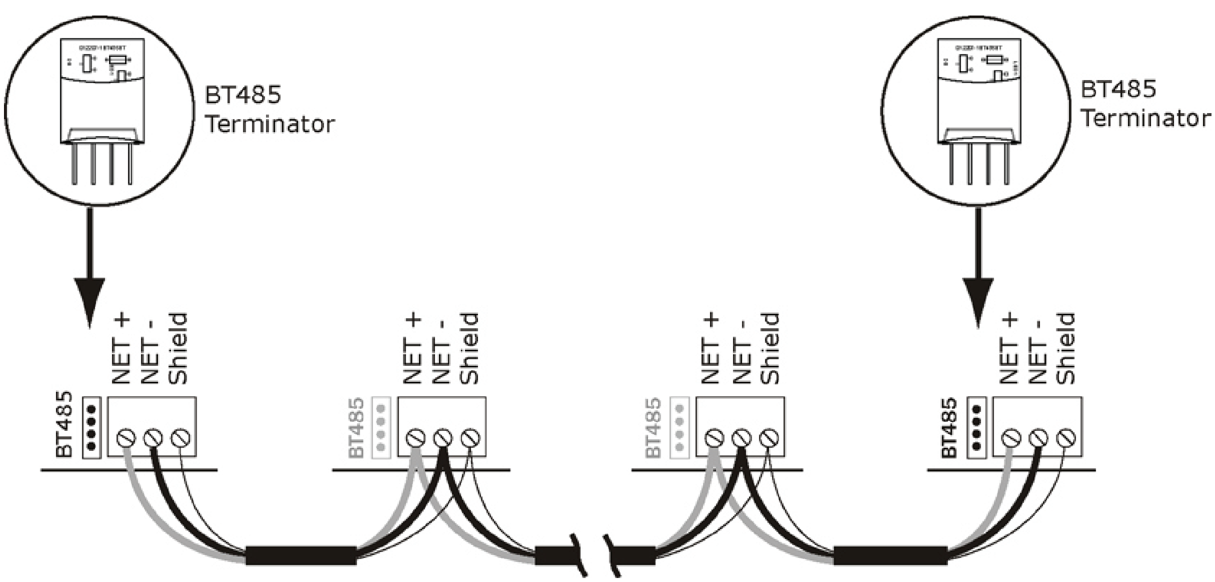


Fig. 76 — Network Wiring

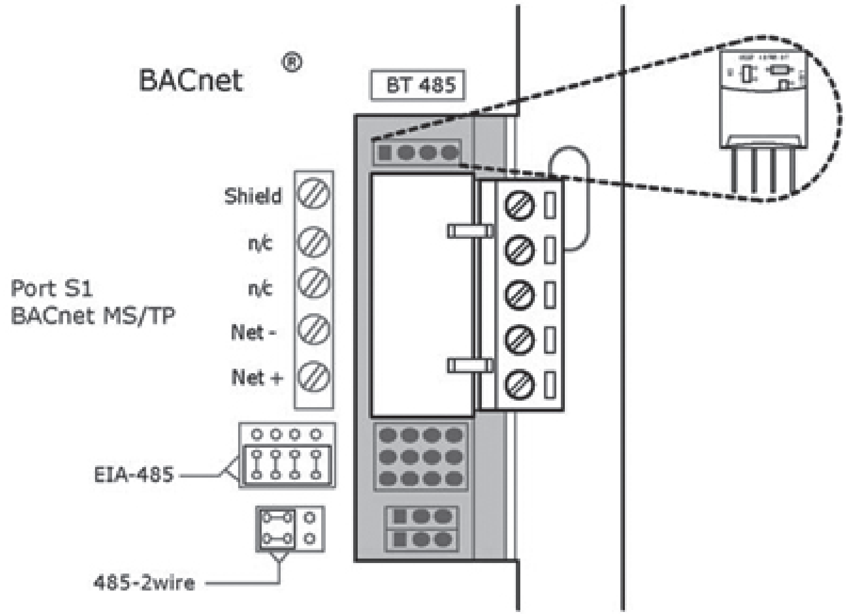


Fig. 77 — BT485 Terminator Installation

Table 24 — MS/TP Wiring Recommendations

SPECIFICATION	RECOMMENDATION
CABLE	Single twisted pair, low capacitance, CL2P, 22 AWG (7x30), TC foam FEP, plenum rated cable
CONDUCTOR	22 or 24 AWG stranded copper (tin plated)
INSULATION	Foamed FEP 0.015 in. (0.381 mm) wall 0.060 in. (1.524 mm) O.D.
COLOR CODE	Black/White
TWIST LAY	2 in. (50.8 mm) lay on pair 6 twists/foot (20 twists/meter) nominal
SHIELDING	Aluminum/Mylar shield with 24 AWG TC drain wire
JACKET	SmokeGard Jacket (SmokeGard PVC) 0.021 in. (0.5334 mm) wall 0.175 in. (4.445 mm) O.D. Halar Jacket (E-CTFE) 0.010 in. (0.254 mm) wall 0.144 in. (3.6576 mm) O.D.
DC RESISTANCE	15.2 Ohms/1000 feet (50 Ohms/km) nominal
CAPACITANCE	12.5 pF/ft (41 pF/meter) nominal conductor to conductor
CHARACTERISTIC IMPEDANCE	100 Ohms nominal
WEIGHT	12 lb/1000 feet (17.9 kg/km)
UL TEMPERATURE RATING	SmokeGard 167°F (75°C) Halar -40 to 302°F (-40 to 150°C)
VOLTAGE	300 Vac, power limited
LISTING	UL: NEC CL2P, or better

LEGEND

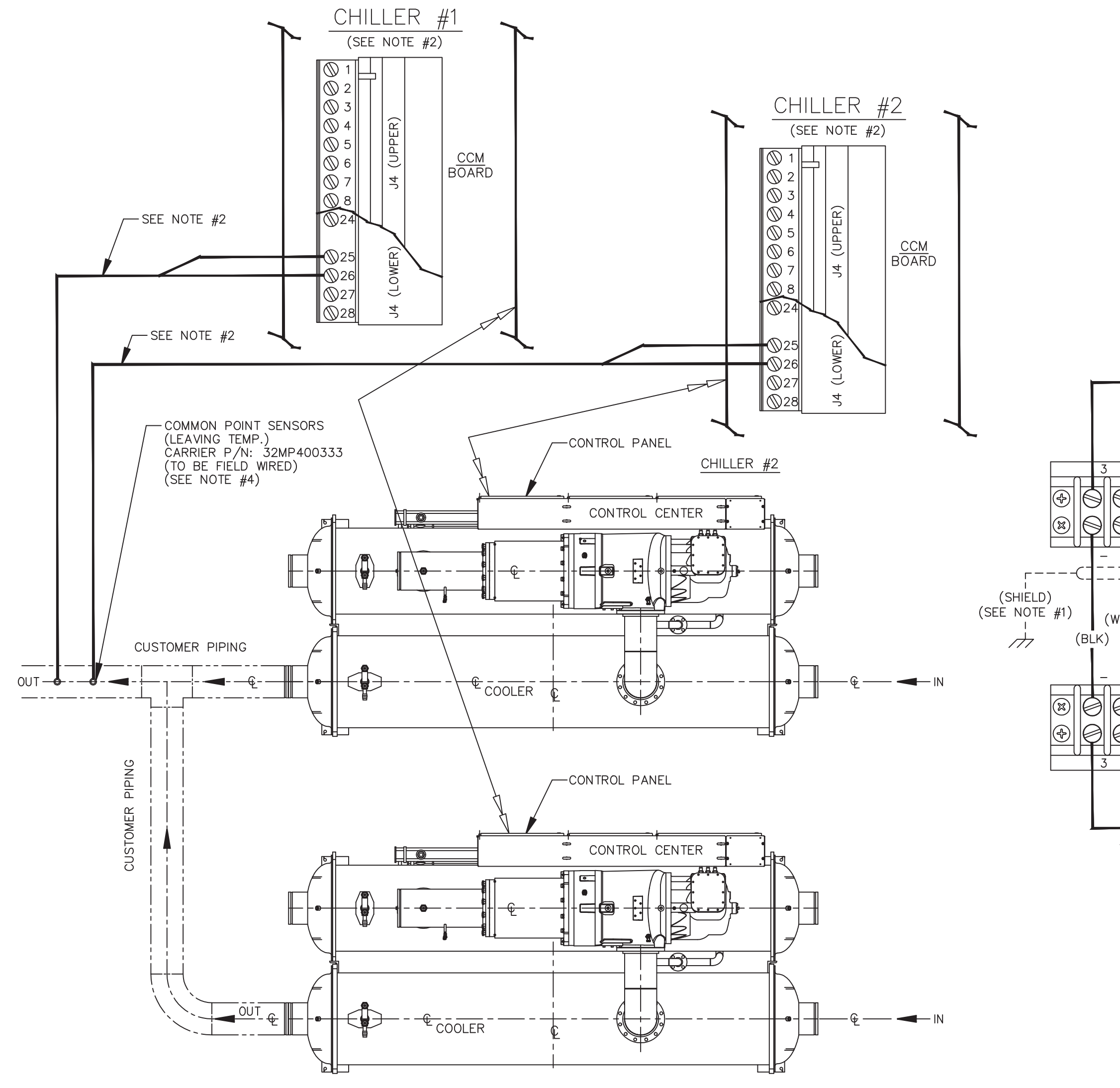
AWG — American Wire Gage
CL2P — Class 2 Plenum Cable
DC — Direct Current
FEP — Fluorinated Ethylene Polymer
NEC — National Electrical Code
O.D. — Outside Diameter
TC — Tinned Copper
UL — Underwriters Laboratories

Table 25 — Open System Wiring Specifications and Recommended Vendors

WIRING SPECIFICATIONS		RECOMMENDED VENDORS AND PART NUMBERS			
WIRE TYPE	**DESCRIPTION**	**CONNECT AIR INTERNATIONAL**	**BELDEN**	**RMCORP**	**CONTRACTORS WIRE AND CABLE**
MS/TP NETWORK (RS-485)	22 AWG, single twisted shielded pair, low capacitance, CL2P, TC foam FEP, plenum rated. See MS/TP Installation Guide for specifications.	W221P-22227	—	25160PV	CLP0520LC
	24 AWG, single twisted shielded pair, low capacitance, CL2P, TC foam FEP, plenum rated. See MS/TP Installation Guide for specifications.	W241P-2000F	82841	25120-OR	—
RNET	4 conductor, unshielded, CMP, 18 AWG, plenum rated.	W184C-2099BLB	6302UE	21450	CLP0442

LEGEND

AWG — American Wire Gage
CL2P — Class 2 Plenum Cable
CMP — Communications Plenum Rated
FEP — Fluorinated Ethylene Polymer
TC — Tinned Copper



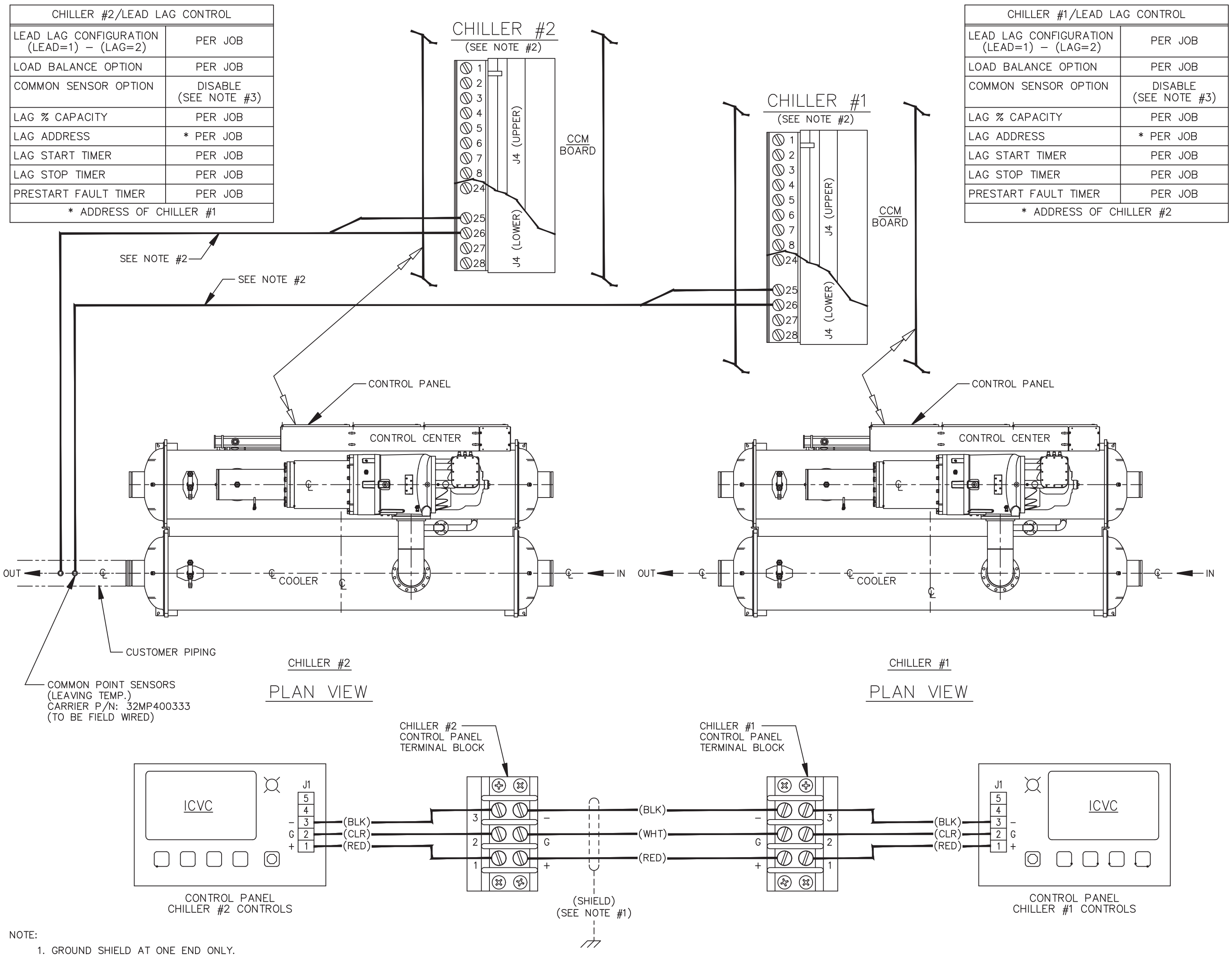
CHILLER #2/LEAD LAG CONTROL	
LEAD LAG CONFIGURATION (LEAD=1) – (LAG=2)	PER JOB
LOAD BALANCE OPTION	PER JOB
COMMON SENSOR OPTION	DISABLE/ENABLE (SEE NOTE #3)
LAG % CAPACITY	PER JOB
LAG ADDRESS	* PER JOB
LAG START TIMER	PER JOB
LAG STOP TIMER	PER JOB
PRESTART FAULT TIMER	PER JOB
* ADDRESS OF CHILLER #1	

CHILLER #1/LEAD LAG CONTROL	
LEAD LAG CONFIGURATION (LEAD=1) – (LAG=2)	PER JOB
LOAD BALANCE OPTION	PER JOB
COMMON SENSOR OPTION	DISABLE/ENABLE (SEE NOTE #3)
LAG % CAPACITY	PER JOB
LAG ADDRESS	* PER JOB
LAG START TIMER	PER JOB
LAG STOP TIMER	PER JOB
PRESTART FAULT TIMER	PER JOB
* ADDRESS OF CHILLER #2	

NOTE:

1. GROUND SHIELD AT ONE END ONLY.
2. COMMON POINT SENSORS ARE REQUIRED IF THE COOLERS ON PARALLEL FLOW MACHINES ARE SUPPLIED BY A SINGLE (COMMON) CHILLED WATER PUMP.
3. IF COMMON CHILLED WATER TEMPERATURE SENSORS ARE INSTALLED, SET COMMON SENSOR OPTION TO ENABLE.
4. INSTALL COMMON POINT SENSORS A MINIMUM OF 10 PIPE DIAMETERS DOWN STREAM OF TEE.

Fig. 78 — Lead/Lag Control Wiring, Parallel Flow Application (Unit with R Compressor Shown)



CHILLER #2/LEAD LAG CONTROL	
LEAD LAG CONFIGURATION (LEAD=1) – (LAG=2)	PER JOB
LOAD BALANCE OPTION	PER JOB
COMMON SENSOR OPTION	DISABLE (SEE NOTE #3)
LAG % CAPACITY	PER JOB
LAG ADDRESS	* PER JOB
LAG START TIMER	PER JOB
LAG STOP TIMER	PER JOB
PRESTART FAULT TIMER	PER JOB
* ADDRESS OF CHILLER #1	

CHILLER #1/LEAD LAG CONTROL	
LEAD LAG CONFIGURATION (LEAD=1) – (LAG=2)	PER JOB
LOAD BALANCE OPTION	PER JOB
COMMON SENSOR OPTION	DISABLE (SEE NOTE #3)
LAG % CAPACITY	PER JOB
LAG ADDRESS	* PER JOB
LAG START TIMER	PER JOB
LAG STOP TIMER	PER JOB
PRESTART FAULT TIMER	PER JOB
* ADDRESS OF CHILLER #2	

NOTE:
1. GROUND SHIELD AT ONE END ONLY.
2. COMMON SENSORS ARE REQUIRED TO ALTERNATE THE LEAD AND LAG CHILLERS IN SERIES FLOW APPLICATIONS.
3. IF COMMON CHILLED WATER TEMPERATURE SENSORS ARE INSTALLED, SET COMMON SENSOR OPTION TO ENABLE.

Fig. 79 — Lead/Lag Control Wiring, Series Flow Application (Unit with R Compressor Shown)

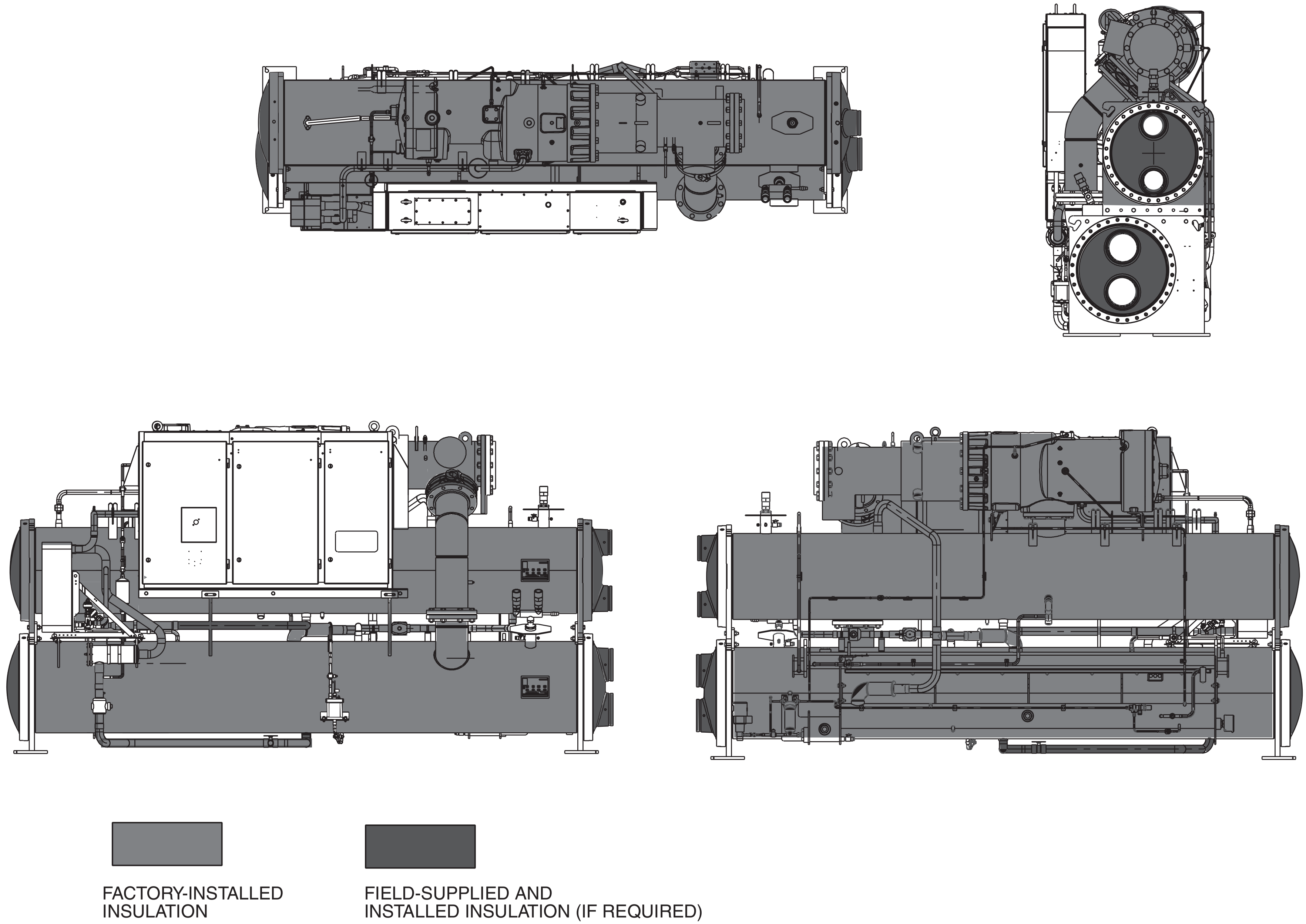


Fig. 80 — 23XRV Insulation Area — Units with P Compressor

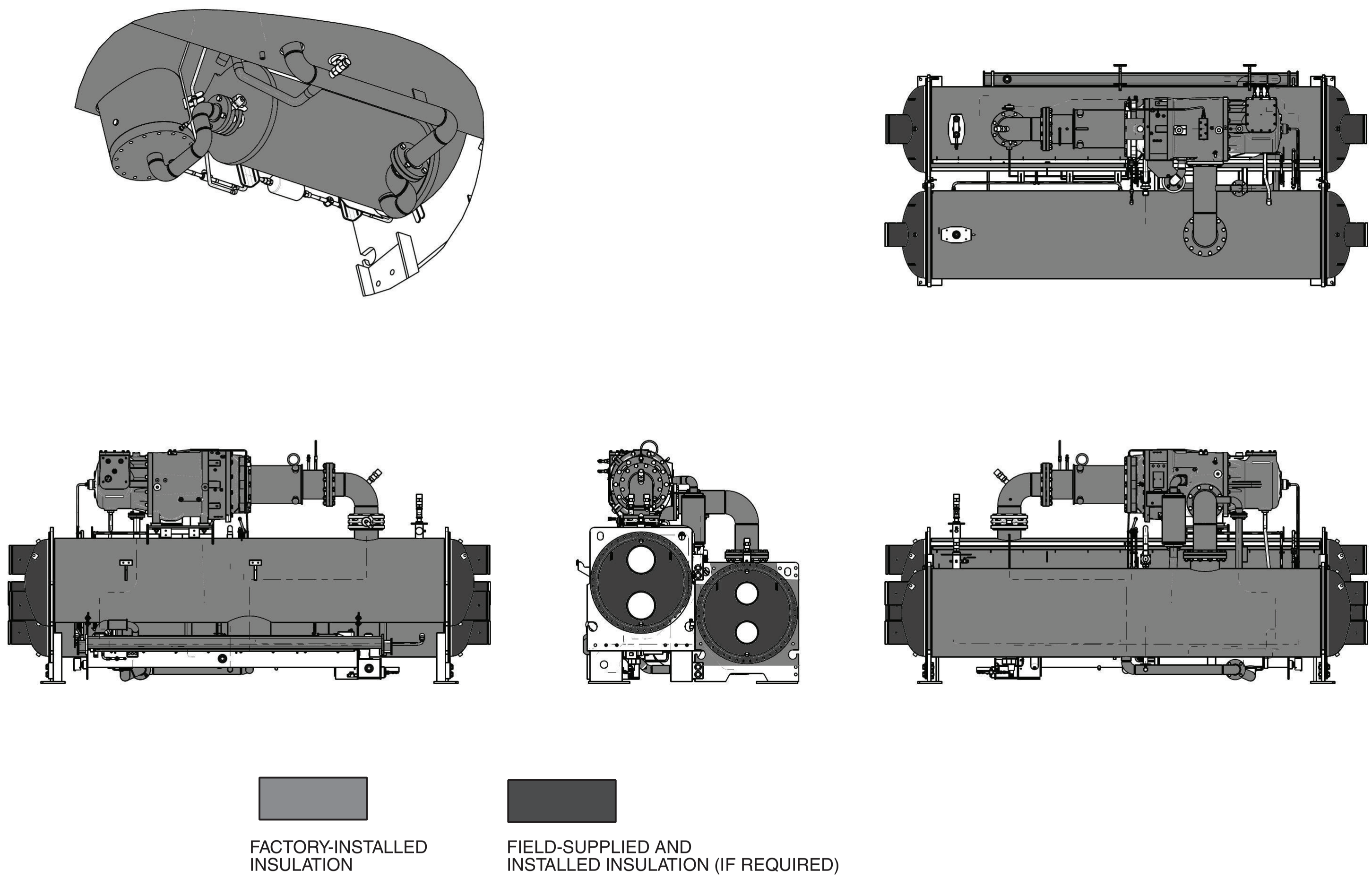


Fig. 81 — 23XRV Insulation Area — Units with Q Compressor

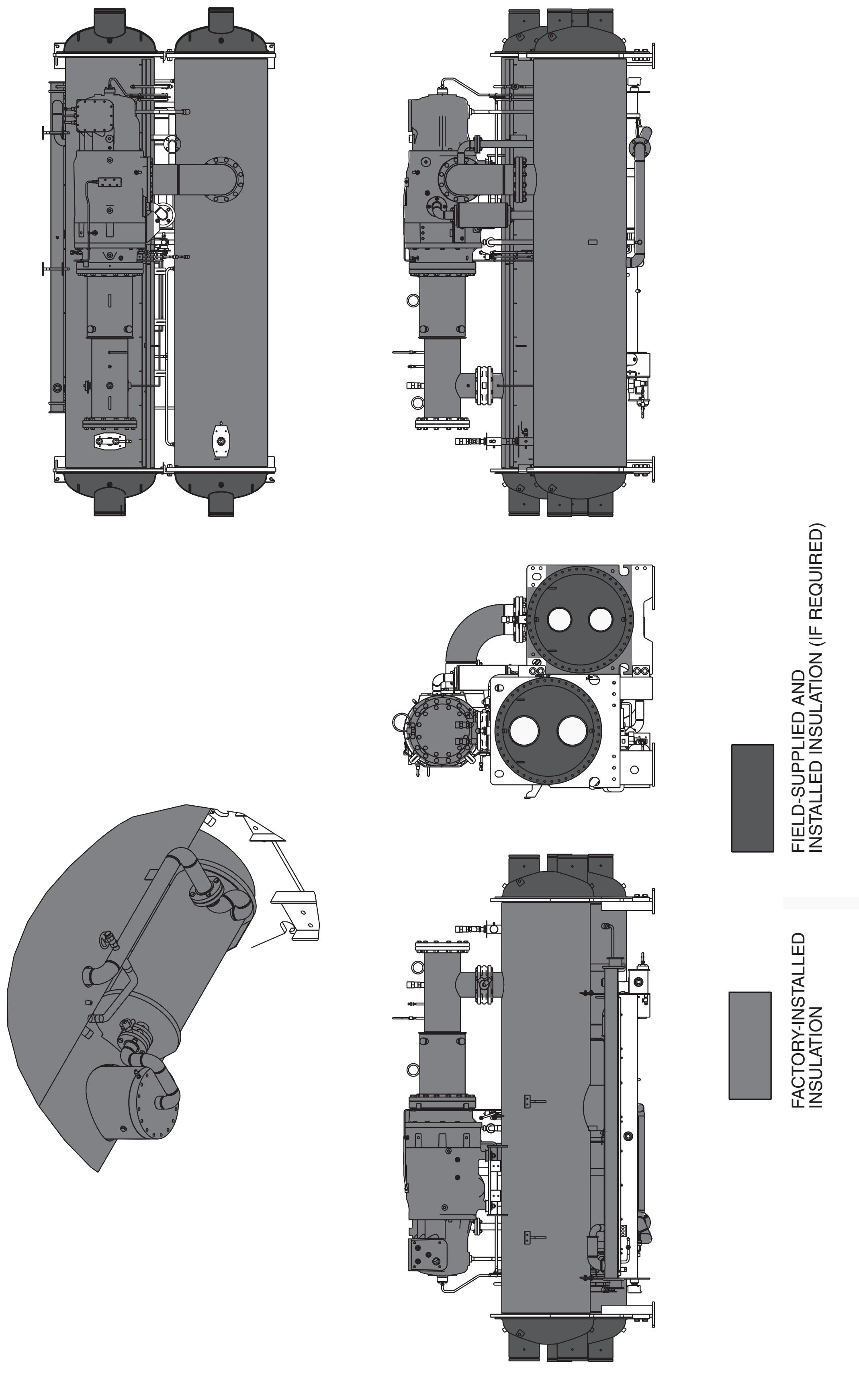


Fig. 82 — 23XRV Insulation Area — Units with R Compressor

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INSTALLATION START-UP REQUEST CHECKLIST

NOTE: To avoid injury to personnel and damage to equipment or property when completing the procedures listed in this start-up checklist, use good judgment, follow safe practices and adhere to the safety considerations/information as outlined in preceding sections of this Installation Instructions document.

Machine Model Number: 23XRV ______________________ Serial Number: ____________________

To: ________________________________
____
____

Attn.: ________________________________

Date ____________________

____
Project Name

____
Carrier Job Number

The following information provides the status of the chiller installation. Send a copy of this checklist to the local Carrier Service office after it has been completed and signed-off by the Purchaser and Job Site Supervisor.

	YES/NO N/A)	DATE TO BE COMPLETED
1. The machine is level within $^1/_2$ in. end to end.	________	________
2. The machine components are installed and connected in accordance with the installation instructions.	________	________
3. The isolation package and grouting (if necessary) are installed.	________	________
4. The relief valves are piped to the atmosphere.	________	________
5. All piping is installed and supported. Direction of flow is indicated in accordance with the installation instructions and job prints.		
a. Chilled water piping	________	________
b. Condenser water piping	________	________
c. Waterbox drain piping	________	________
d. Pumpout unit condenser piping (if installed)	________	________
e. Other ________________	________	________
6. Gages are installed as called for on the job prints required to establish design flow for the cooler and condenser.		
a. Water pressure gages IN and OUT	________	________
b. Water temperature gages IN and OUT	________	________
7. The machine's control center wiring is complete. The wiring is installed per installation instructions and certified prints.		
a. Power wiring to VFD circuit breaker. (If chiller was disassembled during installation, motor leads must not be taped until the Carrier technician megger tests the motor.)	________	________
b. Carrier controls can independently energize water pumps and tower fan.		
c. Line side voltage is within ±10% of chiller nameplate voltage.	________	________
d. Other ________________	________	________

COMMENTS:

____

____

____

TESTING	YES/NO	DATE TO BE COMPLETED
1. The cooling tower fan has been checked for blade pitch and proper operation.	________	________
2. The chilled water and condenser water lines have been:		
a. Filled	________	________
b. Tested	________	________
c. Flushed	________	________
d. Vented	________	________
e. Strainers cleaned	________	________
3. The chilled water and condenser water pumps have been checked for proper rotation and flow.	________	________
4. The following cooling load will be available for start-up:		
a. 25%	________	________
b. 50%	________	________
c. 75%	________	________
d. 100%	________	________
5. The refrigerant charge is at the machine.	________	________
6. Services such as electrical power and control air will be available at start-up.	________	________
7. The electrical and mechanical representatives will be available to assist in commissioning the machine.	________	________
8. The customer's operators will be available to receive instructions for proper operation of the chiller after start-up.	________	________

Concerns about the installation/request for additional assistance:

____

____

____

____

____

I am aware that the start-up time for a Carrier chiller can take between 2 and 6 days depending on the model of the machine and the options and accessories used with it.

Your contact at the job site will be . . . . ______________________________________

Phone number . . . . ______________________________________

Cell/Pager number . . . . ______________________________________

Fax number . . . . ______________________________________

In accordance with our contract, we hereby request the services of your technician to render start-up services per contract terms for this job on ____________ (Date). I understand that the technician's time will be charged as extra services due to correcting items in this checklist that are incomplete.

Signature of Purchaser ____

Signature of Job Site Supervisor ____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE

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