AquaEdge™ 19XR,XRV Two-Stage Semi-Hermetic Centrifugal Liquid Chillers with PIC II or PIC III Controls and HFC-134a 50/60 Hz

Installation Instructions

SAFETY CONSIDERATIONS

Centrifugal 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) (Safety Code for Mechanical Refrigeration). 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 to leak test. 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 voltage is present on motor leads even though the motor is not running when a solid state or inside-delta mechanical starter is used. Open the power supply disconnect before touching motor leads or terminals.

⚠ 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 machine sections or the entire assembly.

DO NOT work on high-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 de-energized 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.)

Catalog No. 04-53190021-01 Printed in U.S.A. Form 19XR,XRV-CLT-10SI Pg 1 215 9-13 Replaces: New

⚠ 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.

⚠ 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.

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 19XR, 19XRV 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

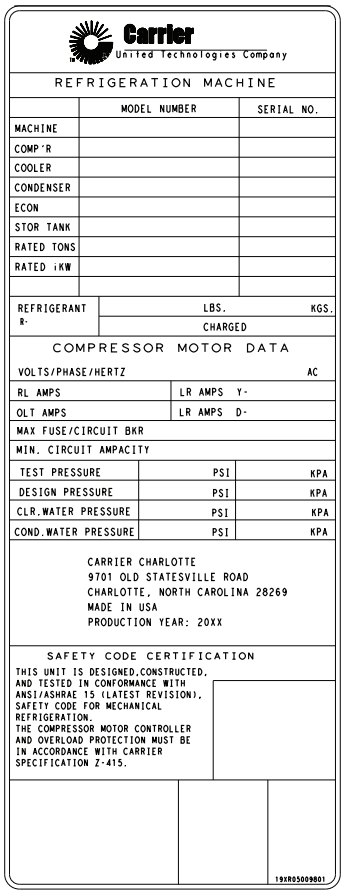
Do not open any valves or loosen any connections. The 19XR, 19XRV machine may be shipped with a nitrogen holding charge in both modules. Damage to machine may result.

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 — The machine model number, serial number, and heat exchanger sizes are stamped on machine identification nameplate (Fig. 1-3). Check this information against shipping papers and job data.


Carrier
United Technologies Company

REFRIGERATION MACHINE

	MODEL NUMBER	SERIAL NO.
MACHINE		
COMP'R		
COOLER		
CONDENSER		
ECON		
STOR TANK		
RATED TONS		
RATED iKW		

REFRIGERANT R-	LBS. CHARGED	KGS.

COMPRESSOR MOTOR DATA

VOLTS/PHASE/HERTZ		AC
RL AMPS	LR AMPS Y-	
OLT AMPS	LR AMPS D-	
MAX FUSE/CIRCUIT BKR		
MIN. CIRCUIT AMPACITY		

TEST PRESSURE	PSI	KPA
DESIGN PRESSURE	PSI	KPA
CLR.WATER PRESSURE	PSI	KPA
COND.WATER PRESSURE	PSI	KPA

CARRIER CHARLOTTE
9701 OLD STATESVILLE ROAD
CHARLOTTE, NORTH CAROLINA 28269
MADE IN USA
PRODUCTION YEAR: 20XX

SAFETY CODE CERTIFICATION

THIS UNIT IS DESIGNED,CONSTRUCTED, AND TESTED IN CONFORMANCE WITH ANSI/ASHRAE 15 (LATEST REVISION), SAFETY CODE FOR MECHANICAL REFRIGERATION.
THE COMPRESSOR MOTOR CONTROLLER AND OVERLOAD PROTECTION MUST BE IN ACCORDANCE WITH CARRIER SPECIFICATION Z-415.

19XR05009801

Fig. 1 — 19XR,XRV Refrigeration Machine Nameplate

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

Determine 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 drawings.

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 starter or drive. Knockouts are provided on the side of the enclosure.

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 starter or drive enclosure.

Service Clearances — Verify that there are adequate service clearances as identified in Fig. 4.

Verify Adequate Power Supply — It is important to verify that the 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.

PROVIDE MACHINE PROTECTION — Store machine and starter indoors, protected from construction dirt and moisture. Inspect under shipping tarps, bags, or crates to be sure that water has not collected during transit. Keep protective shipping covers in place until machine is ready for installation.

⚠ CAUTION

Freezing water can damage equipment. If machine can be or possibly has been 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 19XR, XRV unit to ensure that the environmental and operating conditions are satisfactory and the machine is protected. The installation must comply with all requirements in the certified prints.

Operating Environment — Chiller should be installed in an indoor environment where the ambient temperature is between 40 and 104 F (4 and 40 C) with a relative humidity of 95% or less. To ensure that electrical components operate properly, do not locate the chiller in an area exposed to dust, dirt, corrosive fumes, or excessive heat and humidity.

Step 2 — Rig the Machine — The 19XR, 19XRV machine can be rigged as an entire assembly. It also has flanged connections that allow the compressor, cooler, and condenser sections to be separated and rigged individually.

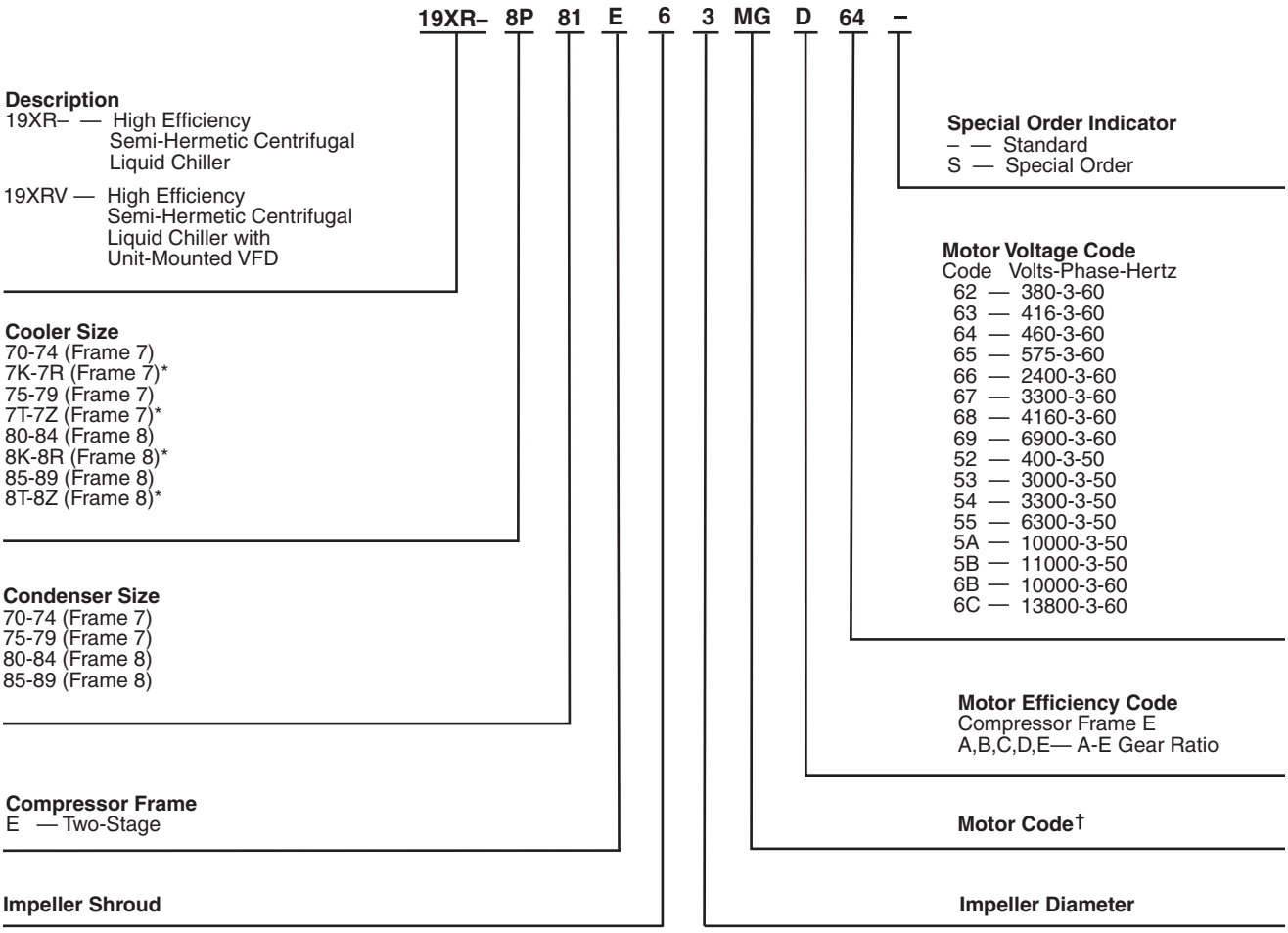
RIG MACHINE ASSEMBLY — See rigging instructions on label attached to machine. Refer to rigging guide (Fig. 5 and 6), dimensions in Fig. 4, and physical data in Tables 1-10. *Lift machine only from the points indicated in rigging guide.* Each lifting cable or chain must be capable of supporting the entire weight of the machine.

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.

⚠ WARNING

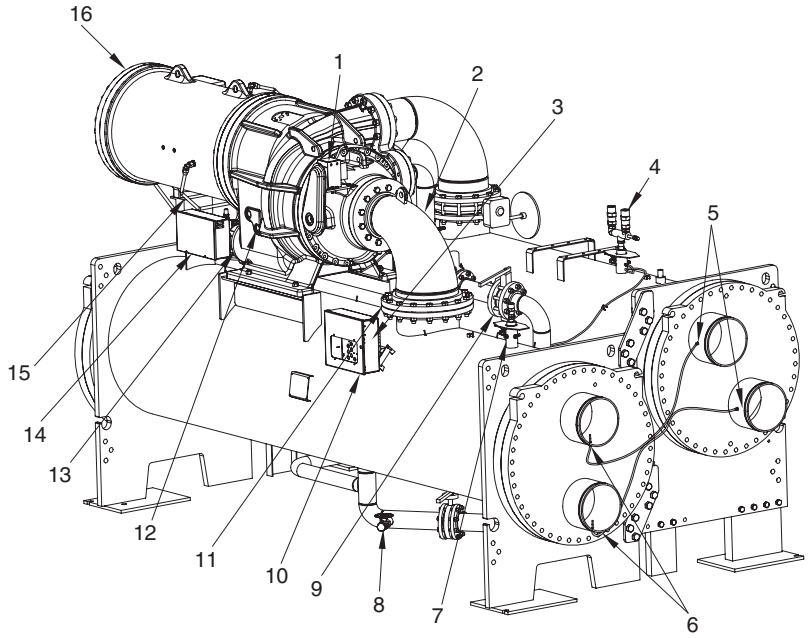
Lifting chiller module from points other than those specified may result in serious damage to the machine or personal injury. Rigging equipment and procedures must be adequate for maximum chiller module weight. See Fig. 5 and 6 for maximum chiller module weights.



* Frame sizes with K-R and T-Z are with 1 in. OD evaporator tubing.
†Refer to the 19XR, 19XRV Computer Selection Program for motor size details.

Fig. 2 — 19XR,XRV Two-Stage Chiller Model Number Identification

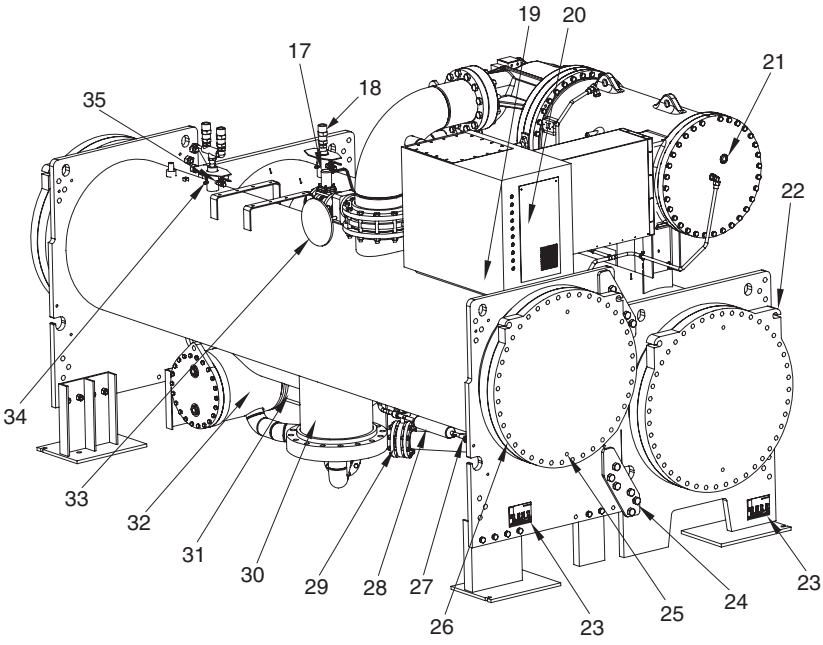
FRONT VIEW



LEGEND

1 — Guide Vane Actuator
2 — Suction Elbow
3 — Chiller Identification Nameplate
4 — Condenser Auto Reset Relief Valves
5 — Condenser In/Out Temperature Thermistors
6 — Cooler In/Out Temperature Thermistors
7 — Cooler Pressure Transducer
8 — Refrigerant Storage Tank Connection Valve
9 — Refrigerant Isolation Valve
10 — Chiller Visual Controller/ International Chiller Visual Control (ICVC)
11 — Typical Flange Connection
12 — Oil Level Sight Glasses
13 — Oil Drain Charging Valve
14 — Auxiliary Power Panel
15 — Refrigerant Oil Cooler (Hidden)
16 — Compressor Motor Housing

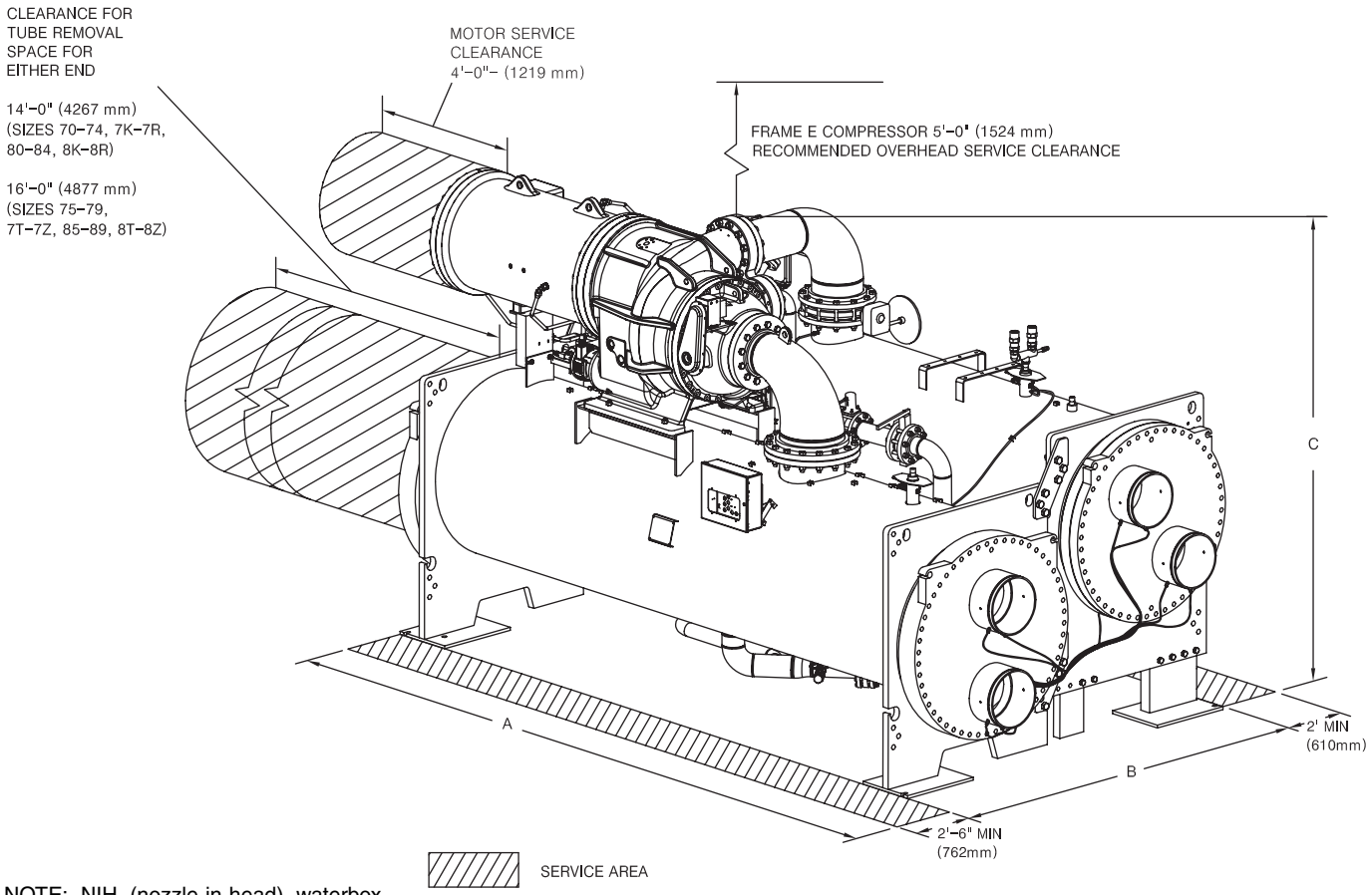
REAR VIEW



LEGEND

17 — Damper Valve
18 — Cooler Auto. Reset Relief Valves
19 — Solid-State Starter Control Display (Optional)
20 — Unit-Mounted Starter (Optional)
21 — Motor Sight Glass
22 — Cooler Return-End Waterbox Cover
23 — ASME Nameplate
24 — Vessel Take-Apart Connector
25 — Typical Waterbox Drain Port
26 — Condenser Return-End Waterbox Cover
27 — Refrigerant Moisture/Flow Indicator
28 — Refrigerant Filter/Drier
29 — Liquid Line Isolation Valve (Optional)
30 — Linear Float Valve Chamber
31 — Economizer Assembly
32 — Economizer Float Ball Valve Assembly (Inside)
33 — Discharge Isolation Valve (Optional)
34 — Condenser Pressure Transducer
35 — Refrigerant Charging Valve/Pumpout Connection

Fig. 3 — Typical 19XR,XRV Two-Stage Compressor Chiller Components



NOTE: NIH (nozzle-in-head) waterbox shown.

Fig. 4 — 19XR,XRV Two-Stage Chiller Dimensions

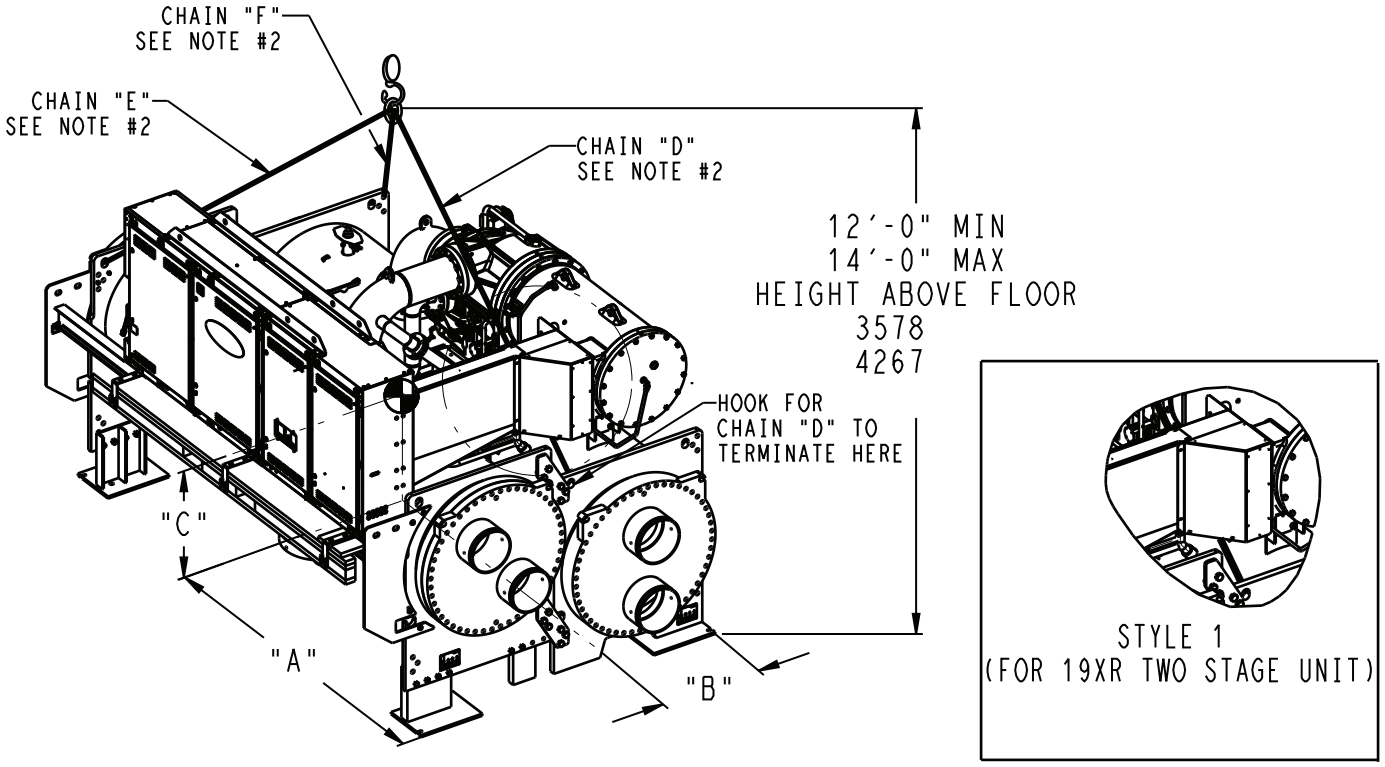
Table 1 — 19XR,XRV Dimensions (Nozzle-In-Head Waterbox)

HEAT EXCHANGER SIZE	A (Length, with Nozzle-in-Head Waterbox)						19XR B (Width)		19XR C (Height)		19XRV B (Width)		19XRV C (Height)
	1-Pass		2-Pass*		3-Pass		ft-in.	mm	ft-in.	mm	ft-in.	mm	
	ft-in.	mm	ft-in.	mm	ft-in.	mm							
70 to 74, 7K to 7R	17- 1 1/2	5219	16-11 1/2	5169	16-10	5131	7-11 1/2	2426	9- 6 1/4	2902	9- 3 5/8	2835	See Note 7
75 to 79, 7T to 7Z	19- 1 1/2	5829	18-11 1/2	5779	18-10	5740	7-11 1/2	2426	9- 6 1/4	2902	9- 3 5/8	2835	
80 to 84, 8K to 8R	17- 4 1/2	5296	17- 1	5207	16- 10 1/2	5143	8-10 3/4	2711	9- 8 1/8	2950	10- 0 9/16	3063	
85 to 89, 8T to 8Z	19- 4 1/2	5905	19- 1	5817	18- 10 1/2	5753	8-10 3/4	2711	9- 8 1/8	2950	10- 0 9/16	3063	

*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. Overhead clearance for service rigging frame E compressor should be 5 ft (1524 mm).
3. Dimensions are approximate. Certified drawings available upon request.
4. Marine waterboxes may add 6 in. to the width of the machine. See certified drawings for details.
5. 'A' length dimensions shown are for standard 150 psig design and victaulic connections. The 300 psig design and/or flanges will add length. See certified drawings.
6. Not all waterbox/pass combinations are available with unit-mounted VFD. Check selection program and Drawing Manager for availability.
7. 19XRV heights can vary depending on the configuration. Check 19XRV certified drawings for height information.

MACHINE CODE	COMPRESSOR FRAME	MAXIMUM MACHINE WEIGHT lb [kg]	VESSEL LENGTH ft [mm]	DIM. “A” ft-in. [mm]	DIM. “B” ft-in. [mm]	DIM. “C” ft-in. [mm]	CHAIN LENGTH		
							“D” ft-in. [mm]	“E” ft-in. [mm]	“F” ft-in. [mm]
70-74, 7K-7R	E	55,926 [25 390]	14 [4267]	6-2 [1880]	4-7 [1397]	4-11 [1499]	9- 9 [2972]	10-9 [3277]	11- 7 [3531]
75-79, 7T-7Z	E	60,073 [27 273]	16 [4877]	7-1 [2519]	4-7 [1397]	4-11 [1499]	10- 4 [3150]	11- 7 [3531]	12- 4 [3759]
80-84, 8K-8R	E	65,750 [29 850]	14 [4267]	6-2 [1880]	4-7 [1397]	4-11 [1499]	9- 9 [2972]	10-9 [3277]	11- 7 [3531]
85-89, 8T-8Z	E	69,835 [31 705]	16 [4877]	7-1 [2519]	4-7 [1397]	4-11 [1499]	10- 4 [3150]	11- 7 [3531]	12- 4 [3759]



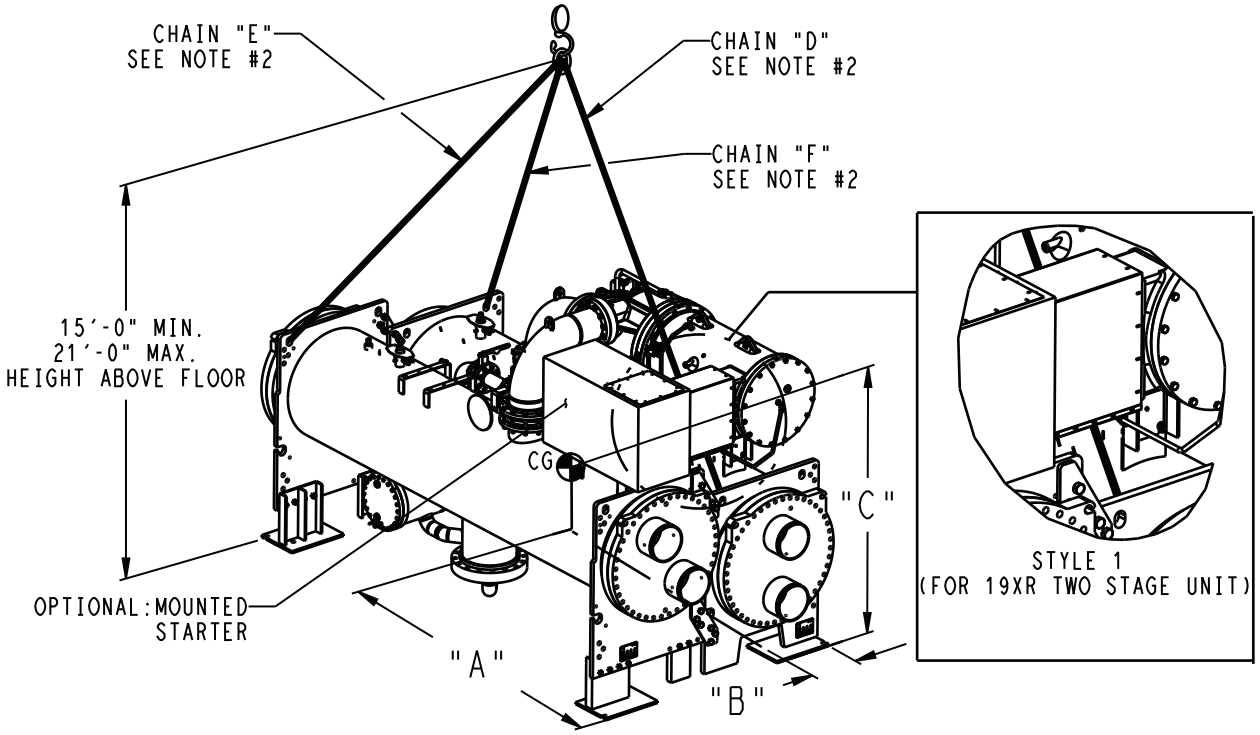
MACHINE RIGGING GUIDE

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 13′ (3962 mm) lifting height. Some minor adjustments may be required.
3. Dimensions “A” and “B” define distance from machine center of gravity to tube sheet outermost surfaces. Dimension “C” defines distance from machine center of gravity to floor.
4. Care must be taken to prevent damage to machine while threading chain “D” between drive, conduit, and piping.

Fig. 5 — Machine Rigging Guide (Heat Exchanger Size 70 Through 8Z) LF2, Std Tier, or 575-v VFD

MACHINE CODE	COMPRESSOR FRAME	MAXIMUM MACHINE WEIGHT lb [kg]	VESSEL LENGTH ft [mm]	DIM. "A" ft-in. [mm]	DIM. "B" ft-in. [mm]	DIM. "C" ft-in. [mm]	CHAIN LENGTH		
							"D" ft-in. [mm]	"E" ft-in. [mm]	"F" ft-in. [mm]
70-74	E	46,906 [21 276]	14 [4267]	6-4 [1930]	3-11 [1194]	4-6 [1372]	11-5 [3480]	12-3 [3734]	12-6 [3810]
7K-7R									
75-79	E	50,693 [22 994]	16 [4877]	7-5 [2261]	3-11 [1194]	4-6 [1372]	12-1 [3683]	12-9 [3886]	13-2 [4343]
7T-7Z									
80-84	E	56,870 [25 796]	14 [4267]	6-4 [1930]	3-11 [1194]	4-6 [1372]	11-5 [3480]	12-3 [3734]	12-6 [3810]
8K-8R									
85-89	E	60,560 [27 496]	16 [4877]	7-5 [2261]	3-11 [1194]	4-6 [1372]	12-1 [3683]	12-9 [3886]	13-2 [4343]
8T-8Z									



LEGEND
CG — Center of Gravity

MACHINE RIGGING GUIDE

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. Dimensions "A" and "B" define distance from machine center of gravity to tube sheet outermost surfaces. Dimension "C" defines distance from machine center of gravity to floor.

Fig. 6 — Machine Rigging Guide (Heat Exchanger Size 70 Through 8Z) (Shown with Unit-Mounted Starter)

Table 2 — 19XR,XRV Nozzle Size

FRAME SIZE	NOZZLE SIZE (in.) (Nominal Pipe Size)					
	Cooler			Condenser		
	1-Pass	2-Pass	3-Pass	1-Pass	2-Pass	3-Pass
7	14	12	10	14	12	12
8	14	14	12	14	14	12

Table 3 — 19XR,XRV Dimensions (Marine Waterbox)

HEAT EXCHANGER SIZE	A (Length, Marine Waterbox)				19XR B WIDTH		19XRV B WIDTH		19XR,XRV C HEIGHT
	2-Pass*		1 or 3-Pass†						
	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	
70 to 74, 7K to 7R	18- $3^5/_8$	5579	19- $9^3/_4$	6039	8- $8^1/_8$	2645	9- $6^3/_8$	2905	
75 to 79, 7T to 7Z	20- $3^5/_8$	6188	21- $9^3/_4$	6649	8- $8^1/_8$	2645	9- $6^3/_8$	2905	See Note 6
80 to 84, 8K to 8R	18- 4	5583	19-$10^1/_2$	6058	9- $5^5/_8$	2886	10- 5	3175	
85 to 87, 8T to 8Z	20- 4	6198	21-$10^1/_2$	6668	9- $5^5/_8$	2886	10- 5	3175	

*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. Overhead clearance for service rigging frame E compressor should be 5 ft (1524 mm).
3. Dimensions are approximate. Certified drawings available upon request.
4. Marine waterboxes may add 6 in., to the width of the machine. See certified drawings for details.
5. 'A' length dimensions shown are for standard 150 psig design and Victaulic connections. The 300 psig design and/or flanges will add length. See certified drawings.
6. 19XR,XRV height can vary depending on the configuration. Check 19XR, XRV certified drawings for height information.
7. Not all waterbox/pass combinations are available with unit-mounted VFD (variable frequency drive). Check selection program for availability.

Table 4 — Component Weights

COMPONENT	FRAME E COMPRESSOR	
	lb	kg
Suction Elbow	645	293
Discharge Elbow	290	132
Control Panel*	34	15
Optional Cooler Inlet Isolation Valve	24	11
Optional Discharge Isolation Valve	93	42
Std Tier VFD — 380, 400, and 460-v (855, 960, 1070 A)	1600	726
Std Tier VFD — 380, 400, and 460-v (1275 A)	3000	1361
Std Tier VFD — 380, 400, and 460-v (1530 A)	3000	1361
LiquiFlo™ 2 VFD — 380, 400, and 460-v (900 A)	2800	1270
LiquiFlo 2 VFD — 380, 400, and 460-v (1200 A)	2850	1293
VFD Shelf	1049	476

*Included in total cooler weight.

NOTE: Variable frequency drive (VFD) sizes are available on select heat exchanger models; consult the 19XR,XRV Computer Selection program.

Table 5 — 19XR,XRV Compressor and Motor Weights* — Standard and High-Efficiency Motors Compressor Frame Size E†

MOTOR CODE	ENGLISH						SI					
	Compressor Weight** (lb)	60 Hz		50 Hz		End Bell Cover Weight (lb)	Compressor Weight** (kg)	60 Hz		50 Hz		End Bell Cover Weight (kg)
		Stator Weight†† (lb)	Rotor Weight (lb)	Stator Weight†† (lb)	Rotor Weight (lb)			Stator Weight†† (kg)	Rotor Weight (kg)	Stator Weight†† (kg)	Rotor Weight (kg)	
STANDARD-EFFICIENCY MOTORS / LOW VOLTAGE (380-575 v)												
6H	4873	2843	741	2943	775	414	2212	1290	336	1335	352	188
6J	4873	2826	741	2943	775	414	2212	1281	336	1335	352	188
6K	4873	2943	775	2997	810	414	2212	1335	352	1359	367	188
6L	4873	2932	775	2997	810	414	2212	1330	352	1359	367	188
6M	4873	2986	810	3096	862	414	2212	1354	367	1404	391	188
6N	4873	2986	810	3203	914	414	2212	1354	367	1453	415	188
6P	4873	2986	810	3203	914	414	2212	1354	367	1453	415	188
STANDARD-EFFICIENCY MOTORS / MEDIUM VOLTAGE (2400-4160 v)												
6H	4873	2744	706	2818	741	414	2212	1245	320	1278	336	188
6J	4873	2816	741	2892	775	414	2212	1277	336	1312	352	188
6K	4873	2816	741	2930	775	414	2212	1277	336	1329	352	188
6L	4873	2808	741	3005	810	414	2212	1274	336	1363	367	188
6M	4873	2892	775	3005	810	414	2212	1322	352	1363	367	188
6N	4873	2997	775	3143	879	414	2212	1359	352	1426	399	188
6P	4873	2967	810	3144	879	414	2212	1346	367	1426	399	188
6Q	4873	3081	872	—	—	414	2212	1398	396	—	—	188
HIGH-EFFICIENCY MOTORS / LOW VOLTAGE (380-460 v)												
EH	4873	2939	776	2995	810	414	2212	1333	352	1359	367	188
EJ	4873	2944	776	3002	810	414	2212	1335	352	1362	367	188
EK	4873	2992	810	3110	862	414	2212	1357	367	1411	391	188
EL	4873	2299	810	3099	862	414	2212	1043	367	1406	391	188
EM	4873	2965	810	3210	914	414	2212	1345	367	1456	415	188
EN	4873	3015	855	3293	974	414	2212	1368	388	1494	442	188
EP	4873	3029	855	3289	974	414	2212	1374	388	1492	442	188

*Total compressor weight is the sum of the compressor aerodynamic components (compressor weight column), stator, rotor, and end bell cover weights.
†See Model Number Nomenclature in Fig. 2.

**Compressor aerodynamic component weight only, motor weight not included. Applicable to standard compressors only. For high lift compressors, contact Carrier Chiller Marketing for weights.
††Stator weight includes the stator and shell.

Table 5 — 19XR,XRV Compressor and Motor Weights* — Standard and High-Efficiency Motors Compressor Frame Size E† (cont)

MOTOR CODE	ENGLISH						SI					
	Compressor Weight** (lb)	60 Hz		50 Hz		End Bell Cover Weight (lb)	Compressor Weight** (kg)	60 Hz		50 Hz		End Bell Cover Weight (kg)
		Stator Weight†† (lb)	Rotor Weight (lb)	Stator Weight†† (lb)	Rotor Weight (lb)			Stator Weight†† (kg)	Rotor Weight (kg)	Stator Weight†† (kg)	Rotor Weight (kg)	
HIGH-EFFICIENCY MOTORS / LOW VOLTAGE (400-460 v)												
MB	4873	2795	645	2856	665	414	2212	1268	293	1295	302	188
MC	4873	2873	672	2925	693	414	2212	1303	305	1327	314	188
MD	4873	2906	684	3013	724	414	2212	1318	310	1367	328	188
ME	4873	2956	704	3071	737	414	2212	1341	319	1392	334	188
MF	4873	3034	724	3153	791	414	2212	1376	328	1430	359	188
MG	4873	3071	737	—	—	414	2212	1393	334	—	—	188
HIGH-EFFICIENCY MOTORS / MEDIUM VOLTAGE (2400-4160 v)												
EH	4873	2939	776	2997	810	414	2212	1333	352	1359	367	188
EJ	4873	2999	810	3108	862	414	2212	1360	367	1410	391	188
EK	4873	2988	810	3102	862	414	2212	1355	367	1407	391	188
EL	4873	2981	810	3065	872	414	2212	1352	367	1390	396	188
EM	4873	3031	855	3077	872	414	2212	1375	388	1396	396	188
EN	4873	3075	872	3260	974	414	2212	1395	396	1479	442	188
EP	4873	3081	872	3298	974	414	2212	1398	396	1496	442	188
HIGH-EFFICIENCY MOTORS / MEDIUM VOLTAGE (6300-6900 v)												
EH	4873	2998	810	3097	862	414	2212	1360	367	1405	391	188
EJ	4873	3029	855	3100	862	414	2212	1374	388	1406	391	188
EK	4873	3049	855	3064	872	414	2212	1383	388	1390	396	188
EL	4873	3068	872	3060	872	414	2212	1390	396	1388	396	188
EM	4873	—	—	3072	872	414	2212	—	—	1393	396	188
EN	4873	3075	872	3260	974	414	2212	1395	396	1479	442	188
EP	4873	3081	872	3288	974	414	2212	1398	396	1491	442	188
HIGH-EFFICIENCY MOTORS / HIGH VOLTAGE (10000-11000 v)												
MD	4873	—	—	3956	678	414	2212	—	—	1794	308	188
MF	4873	—	—	4062	719	414	2212	—	—	1842	326	188
MH	4873	3820	657	—	—	414	2212	1733	298	—	—	188
HIGH-EFFICIENCY MOTORS / HIGH VOLTAGE (13800 v)												
MH	4873	3779	646	—	—	414	2212	1714	293	—	—	188

*Total compressor weight is the sum of the compressor aerodynamic components (compressor weight column), stator, rotor, and end bell cover weights.
†See Model Number Nomenclature in Fig. 2.

**Compressor aerodynamic component weight only, motor weight not included. Applicable to standard compressors only. For high lift compressors, contact Carrier Chiller Marketing for weights.
††Stator weight includes the stator and shell.

Table 6 — 19XR,XRV Heat Exchanger Weights — Drive End Entering Cooler Water

Code	English						Metric (SI)					
	Dry Rigging Weight (lb)*		Machine Charge				Dry Rigging Weight (kg)*		Machine Charge			
	Cooler Only	Condenser Only	Refrigerant Weight (lb)		Water Weight (lb)		Cooler Only	Condenser Only	Refrigerant Weight (kg)		Water Weight (kg)	
			Cooler	Condenser	Cooler	Condenser			Cooler	Condenser	Cooler	Condenser
70	9942	10786	1409	840	2008	2225	4514	4897	640	381	912	1010
71	10330	11211	1539	840	2164	2389	4690	5090	699	381	982	1085
72	10632	11622	1646	840	2286	2548	4827	5276	747	381	1038	1157
73	10715	11737	1622	840	2328	2604	4865	5329	736	381	1057	1182
74	10790	11775	1584	840	2366	2622	4899	5346	719	381	1074	1190
75	10840	11859	1599	950	2183	2431	4921	5384	726	431	991	1104
76	11289	12345	1747	950	2361	2619	5125	5605	793	431	1072	1189
77	11638	12814	1869	950	2501	2801	5284	5818	849	431	1135	1272
78	11738	12949	1849	950	2548	2864	5329	5879	839	431	1157	1300
79	11828	12994	1806	950	2592	2885	5370	5899	820	431	1177	1310
7K	8728	—	1047	—	1948	—	3963	—	475	—	884	—
7L	8959	—	1132	—	2094	—	4067	—	514	—	951	—
7M	9161	—	1214	—	2229	—	4159	—	551	—	1012	—
7P	8792	—	1002	—	2010	—	3992	—	455	—	913	—
7Q	9023	—	1087	—	2156	—	4096	—	493	—	979	—
7R	9229	—	1167	—	2295	—	4190	—	530	—	1042	—
7T	9431	—	1194	—	2115	—	4282	—	542	—	960	—
7U	9698	—	1292	—	2282	—	4403	—	587	—	1036	—
7V	9932	—	1403	—	2436	—	4509	—	637	—	1106	—
7X	9510	—	1142	—	2185	—	4318	—	518	—	992	—
7Y	9777	—	1240	—	2352	—	4439	—	563	—	1068	—
7Z	10016	—	1347	—	2511	—	4547	—	612	—	1140	—
80	12664	12753	1700	836	2726	2977	5749	5790	772	380	1238	1352
81	12998	13149	1812	836	2863	3143	5901	5970	823	380	1300	1427
82	13347	13545	1928	836	3005	3309	6060	6149	875	380	1364	1502
83	13437	13872	1877	836	3053	3476	6100	6298	852	380	1386	1578
84	13523	14217	1840	836	3099	3651	6139	6455	835	380	1407	1658
85	13804	14008	1927	945	2951	3238	6267	6360	875	429	1340	1470
86	14191	14465	2054	945	3108	3428	6443	6567	933	429	1411	1556
87	14597	14923	2186	945	3271	3618	6627	6775	992	429	1485	1643
88	14705	15311	2142	945	3325	3608	6676	6951	972	429	1510	1638
89	14808	15721	2099	945	3378	4009	6723	7137	953	429	1534	1820
8K	11153	—	1385	—	2760	—	5063	—	629	—	1253	—
8L	11400	—	1484	—	2926	—	5176	—	674	—	1328	—
8M	11650	—	1589	—	3088	—	5289	—	721	—	1402	—
8P	11219	—	1334	—	2830	—	5093	—	606	—	1285	—
8Q	11470	—	1430	—	2999	—	5207	—	649	—	1362	—
8R	11719	—	1535	—	3161	—	5320	—	697	—	1435	—
8T	12069	—	1580	—	2991	—	5479	—	717	—	1358	—
8U	12357	—	1694	—	3180	—	5610	—	769	—	1444	—
8V	12645	—	1814	—	3365	—	5741	—	824	—	1528	—
8X	12152	—	1522	—	3070	—	5517	—	691	—	1394	—
8Y	12444	—	1632	—	3264	—	5650	—	741	—	1482	—
8Z	12733	—	1752	—	3448	—	5781	—	795	—	1565	—

*Rigging weights are for standard tubes of standard wall thickness (0.025-in. [0.635 mm] wall).

NOTES:

1. Cooler includes the control panel (ICVC), suction elbow, and 1/2 the distribution piping weight.
2. Condenser includes float valve and sump, discharge elbow, and 1/2 the distribution piping weight.
3. For special tubes refer to the 19XR,XRV Computer Selection Program.
4. All weights for standard 2-pass NIH (nozzle-in-head) design.
5. Add 1054 lb (478 kg) steel weight and 283 lb (128 kg) refrigerant weight for economizer assembly.

Table 7 — 19XR,XRV Heat Exchanger Weights — Compressor End Entering Cooler Water

Code	English						Metric (SI)					
	Dry Rigging Weight (lb)*		Machine Charge				Dry Rigging Weight (kg)*		Machine Charge			
	Cooler Only	Condenser Only	Refrigerant Weight (lb)		Water Weight (lb)		Cooler Only	Condenser Only	Refrigerant Weight (kg)		Water Weight (kg)	
			Cooler	Condenser	Cooler	Condenser			Cooler	Condenser	Cooler	Condenser
70	9942	10786	1220	840	2008	2225	4510	4893	553	381	911	1009
71	10330	11211	1340	840	2164	2389	4686	5085	608	381	982	1084
72	10632	11622	1440	840	2286	2548	4823	5278	653	381	1037	1156
73	10715	11737	1440	840	2328	2604	4865	5329	654	381	1057	1182
74	10790	11775	1440	840	2366	2622	4899	5346	654	381	1074	1190
75	10840	11859	1365	950	2183	2431	4917	5379	619	431	990	1103
76	11289	12345	1505	950	2361	2619	5121	5600	683	431	1071	1188
77	11638	12814	1625	950	2501	2801	5279	5812	737	431	1134	1271
78	11738	12949	1625	950	2548	2864	5329	5879	738	431	1157	1300
79	11828	12994	1625	950	2592	2885	5370	5899	738	431	1177	1310
7K	8728	—	1047	—	1948	—	3963	—	475	—	884	—
7L	8959	—	1132	—	2094	—	4067	—	514	—	951	—
7M	9161	—	1214	—	2229	—	4159	—	551	—	1012	—
7P	8792	—	1002	—	2010	—	3992	—	455	—	913	—
7Q	9023	—	1087	—	2156	—	4096	—	493	—	979	—
7R	9229	—	1167	—	2295	—	4190	—	530	—	1042	—
7T	9431	—	1194	—	2115	—	4282	—	542	—	960	—
7U	9698	—	1292	—	2282	—	4403	—	587	—	1036	—
7V	9932	—	1403	—	2436	—	4509	—	637	—	1106	—
7X	9510	—	1142	—	2185	—	4318	—	518	—	992	—
7Y	9777	—	1240	—	2352	—	4439	—	563	—	1068	—
7Z	10016	—	1347	—	2511	—	4547	—	612	—	1140	—
80	12664	12753	1500	836	2726	2977	5744	5785	680	379	1236	1350
81	12998	13149	1620	836	2863	3143	5896	5964	735	379	1299	1426
82	13347	13545	1730	836	3005	3309	6054	6144	785	379	1363	1501
83	13437	13872	1730	836	3053	3476	6100	6298	785	379	1386	1578
84	13523	14217	1730	836	3099	3651	6139	6455	785	379	1407	1658
85	13804	14008	1690	945	2951	3238	6261	6354	767	429	1339	1469
86	14191	14465	1820	945	3108	3428	6437	6561	826	429	1410	1555
87	14597	14923	1940	945	3271	3618	6621	6769	880	429	1484	1641
88	14705	15311	1940	945	3325	3808	6676	6951	881	429	1510	1729
89	14808	15721	1940	945	3378	4009	6723	7137	881	429	1534	1820
8K	11153	—	1385	—	2760	—	5063	—	629	—	1253	—
8L	11400	—	1484	—	2926	—	5176	—	674	—	1328	—
8M	11650	—	1589	—	3088	—	5289	—	721	—	1402	—
8P	11219	—	1334	—	2830	—	5093	—	606	—	1285	—
8Q	11470	—	1430	—	2999	—	5207	—	649	—	1362	—
8R	11719	—	1535	—	3161	—	5320	—	697	—	1435	—
8T	12069	—	1580	—	2991	—	5479	—	717	—	1358	—
8U	12357	—	1694	—	3180	—	5610	—	769	—	1444	—
8V	12645	—	1814	—	3365	—	5741	—	824	—	1528	—
8X	12152	—	1522	—	3070	—	5517	—	691	—	1394	—
8Y	12444	—	1632	—	3264	—	5650	—	741	—	1482	—
8Z	12733	—	1752	—	3448	—	5781	—	795	—	1565	—

*Rigging weights are for standard tubes of standard wall thickness (0.025-in. [0.635 mm] wall).

NOTES:

1. Cooler includes the control panel (ICVC), suction elbow, and 1/2 the distribution piping weight.
2. Condenser includes float valve and sump, discharge elbow, and 1/2 the distribution piping weight.
3. For special tubes refer to the 19XR,XRV Computer Selection Program.
4. All weights for standard 2-pass NIH (nozzle-in-head) design.
5. Add 1054 lb (478 kg) steel weight and 283 lb (128 kg) refrigerant weight for economizer assembly.

Table 8 — Additional Weights for 19XR,XRV Marine Waterboxes*

150 psig (1034 kPa) Marine Waterboxes

FRAME	NUMBER OF PASSES	ENGLISH (lb)				SI (kg)			
		Cooler		Condenser		Cooler		Condenser	
		Rigging Wgt	Water Wgt	Rigging Wgt	Water Wgt	Rigging Wgt	Water Wgt	Rigging Wgt	Water Wgt
7	1&3	3970	2579	N/A	N/A	1801	1170	N/A	N/A
	2	1720	1290	1561	1025	780	585	708	465
8	1&3	5048	3033	N/A	N/A	2290	1376	N/A	N/A
	2	2182	1517	1751	1172	990	688	794	532

300 psig (2068 kPa) Marine Waterboxes

FRAME	NUMBER OF PASSES	ENGLISH (lb)				SI (kg)			
		Cooler		Condenser		Cooler		Condenser	
		Rigging Wgt	Water Wgt	Rigging Wgt	Water Wgt	Rigging Wgt	Water Wgt	Rigging Wgt	Water Wgt
7	1&3	5294	2579	N/A	N/A	2401	1170	N/A	N/A
	2	4140	1219	4652	784	1878	553	2110	356
8	1&3	6222	3033	N/A	N/A	2822	1376	N/A	N/A
	2	4952	1343	4559	783	2246	609	2068	355

*Add to cooler and condenser weights for total weights. Condenser weights may be found in the 19XR,XRV Heat Exchanger Weights table on pages 12 and 13. The first digit of the heat exchanger code (first column) is the heat exchanger frame size.

Table 9 — 19XR,XRV Waterbox Cover Weights — English (lb)

Frames 7 and 8; Cooler

WATERBOX DESCRIPTION	COOLER			
	FRAME 7		FRAME 8	
	Standard Nozzles	Flanged	Standard Nozzles	Flanged
NIH, 1 Pass Cover, 150 psig	329	441	417	494
NIH, 2 Pass Cover, 150 psig	426	541	540	693
NIH, 3 Pass Cover, 150 psig	1250	1291	1629	1687
MWB End Cover, 150 psig	844	844	1125	1125
NIH/MWB Return Cover, 150 psig	315	315	404	404
NIH, 1 Pass Cover, 300 psig	1712	1883	2359	2523
NIH, 2 Pass Cover, 300 psig	1662	1908	2369	2599
NIH, 3 Pass Cover, 300 psig	1724	1807	2353	2516
NIH/MWB End Cover, 300 psig	1378	1378	1951	1951

LEGEND

NIH — Nozzle-in-Head
MWB — Marine Waterbox

NOTE: Weight for NIH 2-pass cover, 150 psig, is included in the heat exchanger weights shown on pages 12 and 13.

Frames 7 and 8; Condenser

WATERBOX DESCRIPTION	CONDENSER			
	Frame 7		Frame 8	
	Standard Nozzles	Flanged	Standard Nozzles	Flanged
NIH, 1 Pass Cover, 150 psig	329	441	417	494
NIH, 2 Pass Cover, 150 psig	404	520	508	662
NIH, 3 Pass Cover, 150 psig	1222	1280	1469	1527
MWB End Cover, 150 psig	781	781	1007	1007
Bolt-on MWB End Cover, 150 psig	700	700	1307	1307
NIH/MWB Return Cover, 150 psig	315	315	404	404
NIH, 1 Pass Cover, 300 psig	1690	1851	1986	2151
NIH, 2 Pass Cover, 300 psig	1628	1862	1893	2222
NIH, 3 Pass Cover, 300 psig	1714	1831	1993	2112
NIH/MWB End Cover, 300 psig	1276	1276	1675	1675

LEGEND

NIH — Nozzle-in-Head
MWB — Marine Waterbox

NOTE: Weight for NIH 2-pass cover, 150 psig, is included in the heat exchanger weights shown on pages 12 and 13.

Table 10 — 19XR,XRV Waterbox Cover Weights — SI (kg)

FRAMES 7 AND 8; COOLER

WATERBOX DESCRIPTION	COOLER			
	Frame 7		Frame 8	
	Standard Nozzles	Flanged	Standard Nozzles	Flanged
NIH, 1 Pass Cover, 1034 kPa	149	200	189	224
NIH, 2 Pass Cover, 1034 kPa	193	245	245	314
NIH, 3 Pass Cover, 1034 kPa	567	586	739	765
MWB End Cover, 1034 kPa	383	383	510	510
NIH/MWB Return Cover, 1034 kPa	143	143	183	183
NIH, 1 Pass Cover, 2068 kPa	777	854	1070	1144
NIH, 2 Pass Cover, 2068 kPa	754	865	1075	1179
NIH, 3 Pass Cover, 2068 kPa	782	820	1067	1141
NIH/MWB End Cover, 2068 kPa	625	625	885	885

FRAMES 7 AND 8; CONDENSER

WATERBOX DESCRIPTION	CONDENSER			
	FRAME 7		FRAME 8	
	Standard Nozzles	Flanged	Standard Nozzles	Flanged
NIH, 1 Pass Cover, 1034 kPa	149	200	189	224
NIH, 2 Pass Cover, 1034 kPa	183	236	230	300
NIH, 3 Pass Cover, 1034 kPa	554	580	666	693
MWB End Cover, 1034 kPa	354	354	457	457
Bolt-on MWB End Cover, 1034 kPa	318	318	593	593
NIH/MWB Return Cover, 1034 kPa	143	143	183	183
NIH, 1 Pass Cover, 2068 kPa	767	840	901	976
NIH, 2 Pass Cover, 2068 kPa	738	845	859	1008
NIH, 3 Pass Cover, 2068 kPa	777	831	904	958
NIH/MWB End Cover, 2068 kPa	579	579	760	760

LEGEND

NIH — Nozzle-in-Head
MWB — Marine Waterbox

NOTE: Weight for NIH 2-pass cover, 1034 kPa, is included in the heat exchanger weights shown on pages 12 and 13.

RIG MACHINE COMPONENTS — Refer to instructions below, Fig. 7-10, 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: 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: The compressor oil is hydroscopic and absorbs moisture from the atmosphere. Remove the oil charge from the compressor. Store the oil in a clean dry container designed for the purpose of storing oil; keep the container sealed until it is time for reinstallation of the oil. Or, dispose of the compressor oil and reinstall a new oil charge after dehydration.

NOTE: Wiring must also be disconnected. Label each wire before removal (see Carrier Certified Prints). In order to disconnect the starter from the machine, remove wiring for the oil pump, oil heater, control wiring at the power panel, and the main motor leads at the starter lugs.

Remove all transducer and sensor wires at the sensor. Clip all wire ties necessary to pull heat exchangers apart.

To Separate Cooler and Condenser:

1. Place a support plate under each tube sheet to keep each vessel level (Fig. 7, Item 6).
2. Cut the refrigerant motor cooling line at the location shown (Fig. 7, Item 7).
3. Disconnect the compressor discharge elbow at the compressor (Fig. 8, Item 6).
4. Disconnect the flange of the isolation valve near the damper valve as shown in Fig. 7 (Items 10 and 12).
5. Unbolt the cooler liquid feed line at the location shown (Fig. 7, Item 10).
6. Cover all openings.
7. Disconnect all wires and cables that cross from the cooler side of the machine to the condenser side, including:
   a. temperature sensor cable at the waterbox (Fig. 10, Item 4)
   b. motor power wires at the starter (Fig. 7, Item 4)
   c. wires and cable housings at the power panel that cross from the starter to the power panel (Fig. 8, Item 2).
8. Disconnect the rabbet-fit connectors on the tube sheets (Fig. 7, Item 5).
9. Rig the vessels apart.

To Separate the Compressor from the Cooler:

1. Unbolt the compressor suction elbow at the cooler flange (Fig. 7, Item 2).
2. Cut the refrigerant motor cooling line at the location shown (Fig. 7, Item 7).
3. Disconnect the motor refrigerant return line (Fig. 7, Item 8).
4. Disconnect the following:
   a. compressor oil sump temperature sensor cable (Fig. 9, Item 4)
   b. bearing temperature sensor cable (Fig. 9, Item 2)
   c. motor temperature sensor cable (Fig. 9, Item 1)
   d. wires and cable housings that cross from the power panel to the starter and control panel (Fig. 8, Item 2)
   e. discharge temperature sensor cable (Fig. 9, Item 6)
   f. compressor oil sump pressure cable (Fig. 9, Item 3)
   g. compressor oil discharge pressure cable (Fig. 9, Item 5)
   h. guide vane actuator cable (Fig. 8, Item 1)
5. Disconnect the flared fitting for the oil reclaim line (Fig. 7, Item 3).
6. Unbolt the compressor discharge elbow (Fig. 8, Item 6).
7. Cover all openings.
8. Disconnect motor power cables at the starter lugs (Fig. 7, Item 4).
9. Unbolt the compressor mounting from the cooler (Fig. 7, Item 9).

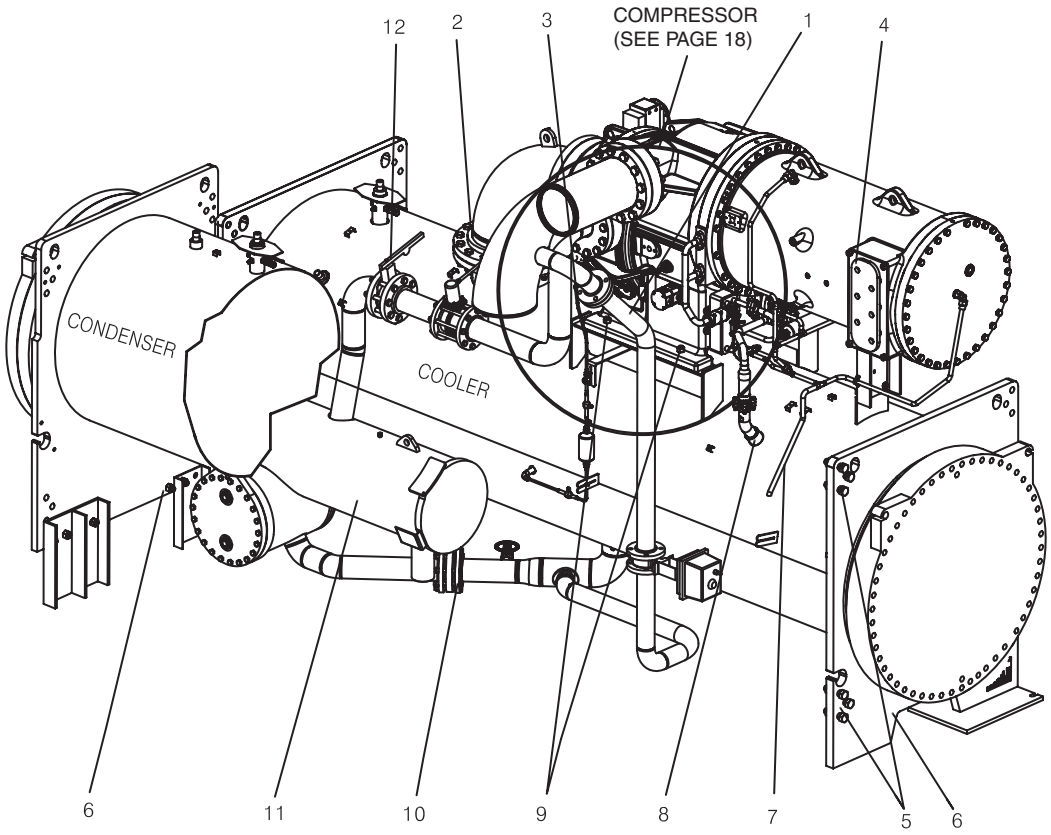
To Rig Compressor:

NOTE: The motor end of the 19XR,XRV compressor is heavy and will tip backwards unless these directions are followed:

1. Cut two 4 in. x 6 in. wooden beams to the same length as the compressor.
2. Drill holes into the beams and bolt them to the base of the compressor.

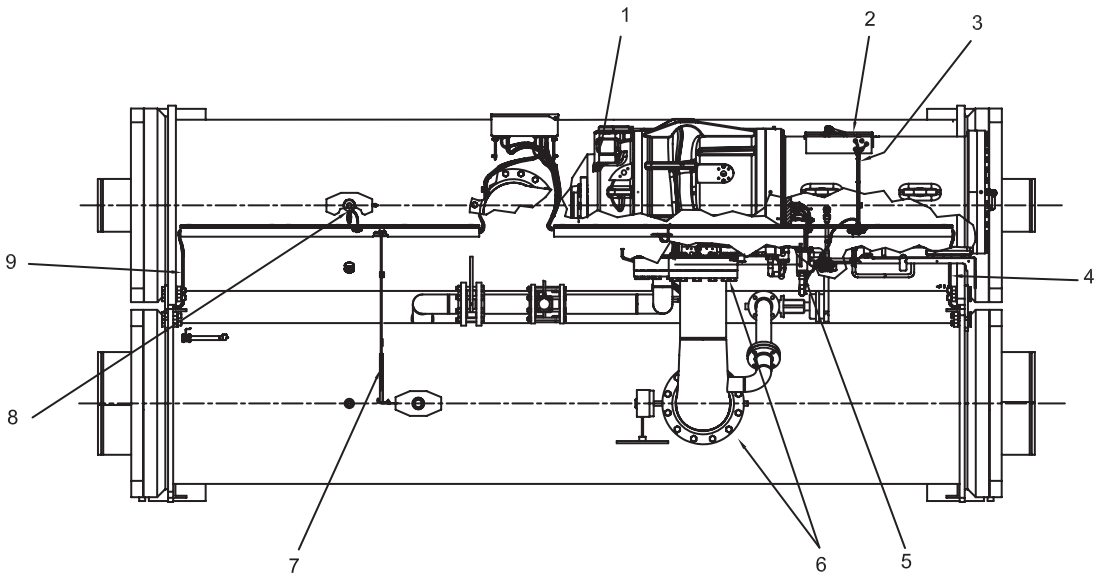
Additional Notes

1. Use silicon grease on new O-rings when refitting.
2. Use gasket sealant on new gaskets when refitting.
3. Cooler and condenser vessels may be rigged vertically. Rigging should be fixed to all 4 corners of the tube sheet.



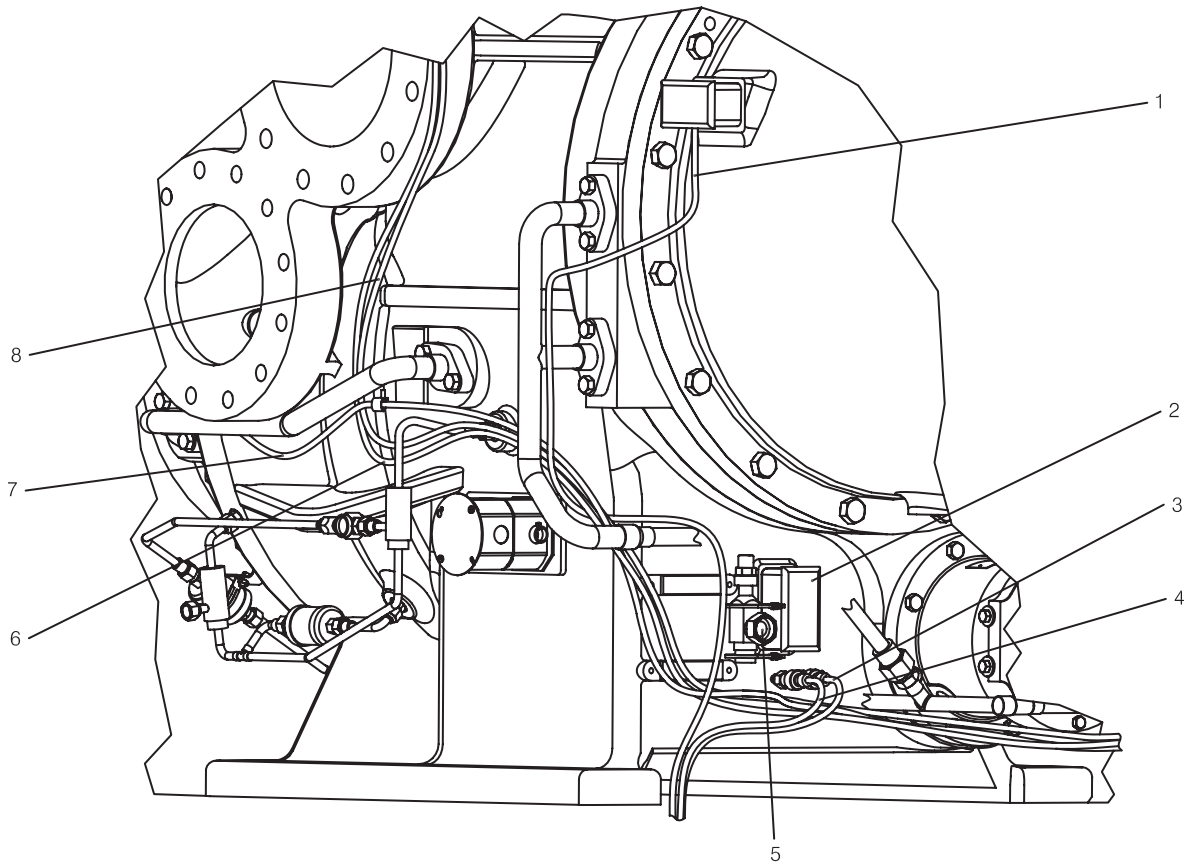
1 — Optional Hot Gas Bypass (Cut)
2 — Compressor Suction Elbow (Unbolt)
3 — Oil Reclaim Line (Unbolt)
4 — Starter Connector (Unbolt)
5 — Vessel Connectors (Unbolt)
6 — Tube Sheet
7 — Refrigerant Motor Cooling Line (Cut)
8 — Motor Drain (Unbolt)
9 — Compressor Mounting (Unbolt)
10 — Cooler Liquid Feed Line (Unbolt)
11 — Economizer
12 — Refrigerant Isolation Valve

Fig. 7 — Cooler, Side View



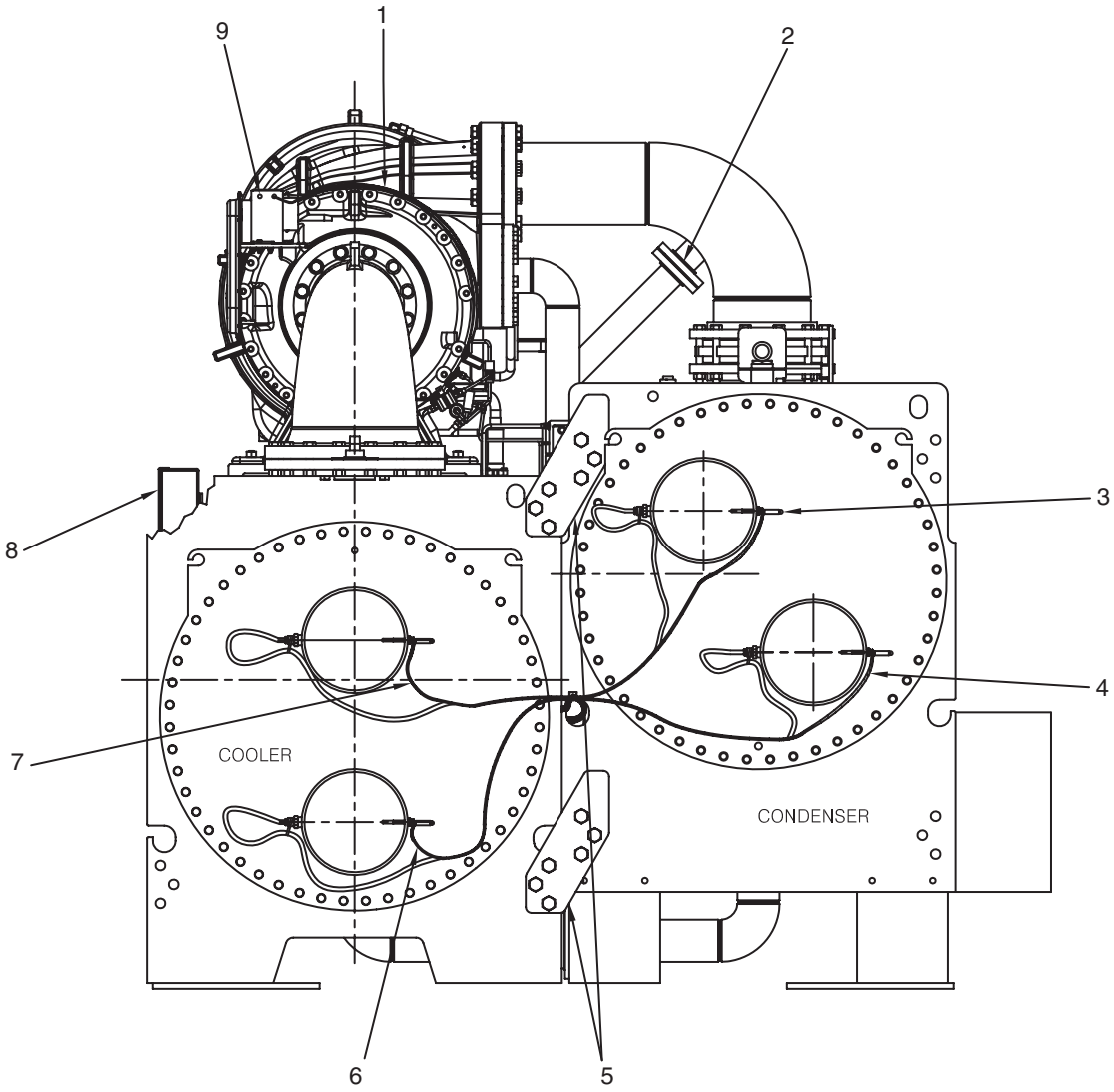
1 — Guide Vane Actuator Cable
2 — Power Panel
3 — Communication Cable
4 — Water Temperature Sensor Cables
5 — Motor Winding Temperature Cable
6 — Compressor Discharge Elbow Joints
7 — Condenser Pressure Cable
8 — Cooler Pressure Connection
9 — Water Temperature Sensor Cables

Fig. 8 — 19XR Chiller Top View



1 — Motor Temperature Sensor Cable
2 — Bearing Temperature Sensor Cable Connection (Inside Box)
3 — Compressor Oil Sump Pressure Cable
4 — Compressor Oil Sump Temperature Sensor Cable
5 — Compressor Oil Discharge Pressure Cable
6 — Discharge Temperature Sensor Cable
7 — Guide Vane Actuator Cable
8 — High Pressure Switch Cable

Fig. 9 — Compressor Detail



1 — Guide Vane Actuator Cables
2 — Hot Gas Bypass Line (Optional)
3 — Condenser Leaving Water Temperature Cable
4 — Condenser Entering Water Temperature Cable
5 — Vessel Take-Apart Connectors
6 — Cooler Entering Water Temperature Cable
7 — Cooler Leaving Water Temperature Cable
8 — International Chiller Visual Controller (ICVC)
9 — Guide Vane Actuator

Fig. 10 — Chiller End View

Step 3 — Install Machine Supports

INSTALL STANDARD ISOLATION — Figures 11 and 12 show the position of support plates and shear flex pads, which together form the standard machine support system.

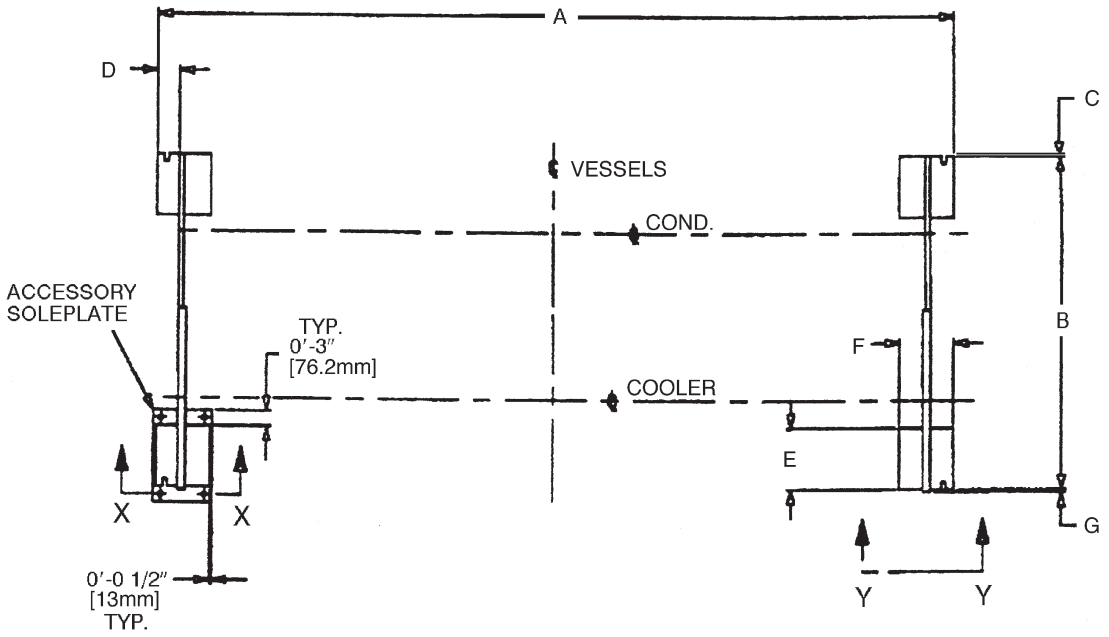
IMPORTANT: Chiller housekeeping pad, anchor bolts, and attachment points that are designed by others must be in accordance with all applicable national and local codes.

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. 11 and 13.

Level machine by using jacking screws in isolation soleplates. Use a level at least 24-in. (600 mm) long.

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.



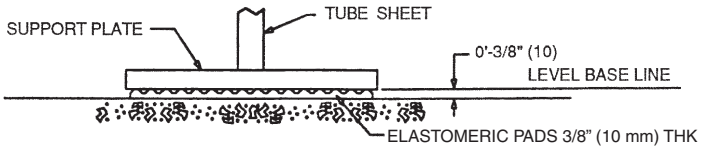
19XR,XRV HEAT EXCHANGER SIZE	DIMENSIONS													
	A		B		C		D		E		F		G	
	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm
70-74, 7K-7R	15- 1 7/8	4620	7-10 1/2	2400	0- 1/4	6	0-6 15/16	176	1-10	559	1-4	406	0- 3/4	19
75-79, 7T-7Z	17- 1 7/8	5229	7-10 1/2	2400	0- 1/4	6	0-6 15/16	176	1-10	559	1-4	406	0- 3/4	19
80-84, 8K-8R	15- 1 7/8	4620	8- 9 3/4	2686	0- 15/16	24	0-6 15/16	176	1-10	559	1-4	406	0- 1/16	2
85-89, 8T-8Z	17- 1 7/8	5229	8- 9 3/4	2686	0- 15/16	24	0-6 15/16	176	1-10	559	1-4	406	0- 1/16	2

Fig. 11 — 19XR,XRV Machine Footprint

INSTALL SPRING ISOLATION — 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. 14. 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: It is recommended that any installation other than the ground floor should have spring isolation for the chiller and piping vibration isolation.

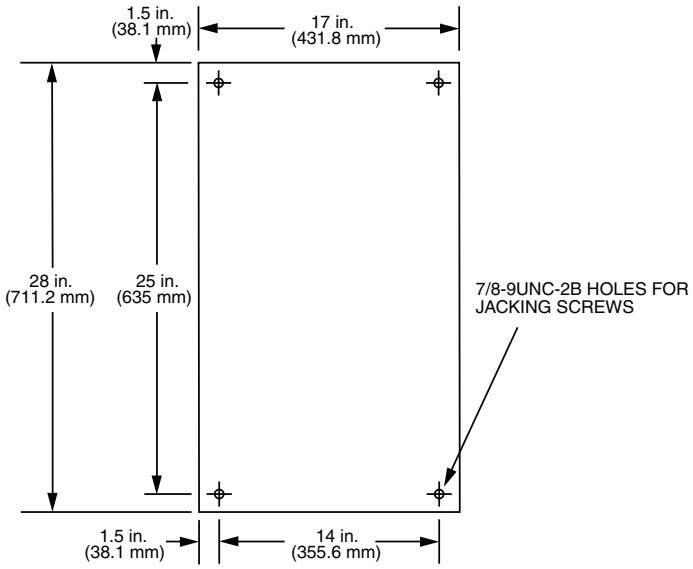


VIEW Y-Y

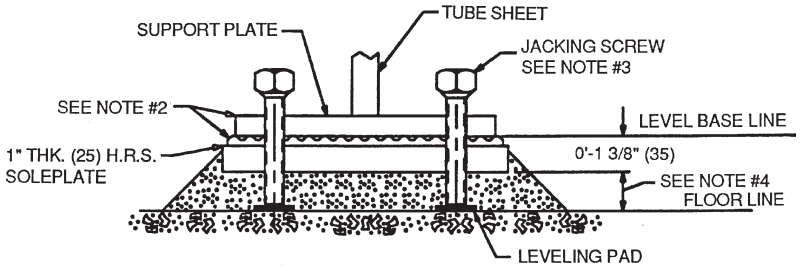
NOTES:
1. Dimensions in ( ) are in millimeters.
2. Isolation package includes 4 elastomeric pads.

Fig. 12 — Standard Isolation

SOLEPLATE DIMENSIONS
HEAT EXCHANGER FRAME SIZE
7 AND 8



ACCESSORY SOLEPLATE DETAIL



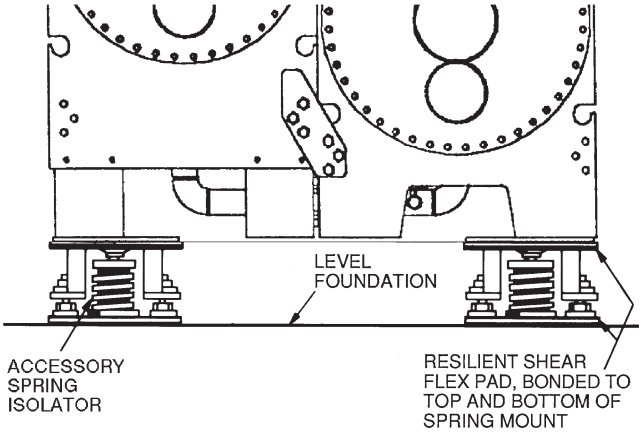
VIEW X-X

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. Isolation package is also required.
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, 1½ in. (38.1 mm) to 2¼ in. (57.2 mm) thick.

Fig. 13 — Accessory Isolation



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

Fig. 14 — 19XR,XRV Accessory Spring Isolation (Shown with Accessory Soleplates)

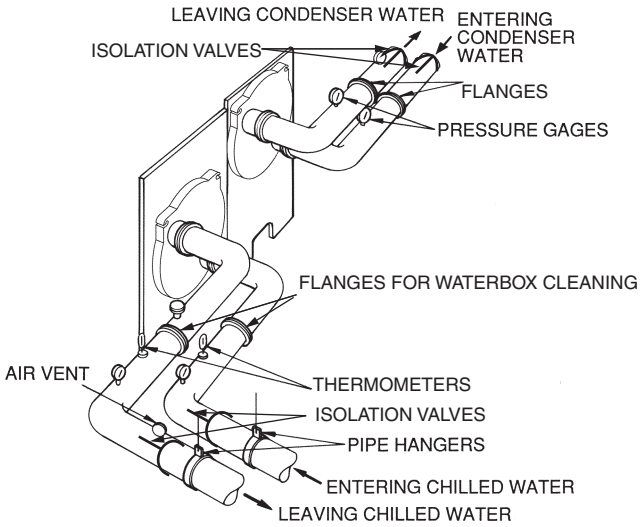


Fig. 15 — Typical Nozzle Piping

Step 4 — Connect Piping

INSTALL WATER PIPING TO HEAT EXCHANGERS — Refer to Table 11 for nozzle sizes. Install piping using job data, piping drawings, and procedures outlined below. A typical piping installation is shown in Fig. 15.

⚠ CAUTION

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

⚠ CAUTION

To prevent damage to sensors, remove chilled and condenser water temperature sensors before welding connecting piping to water nozzles. Refer to Fig. 10. Replace sensors after welding is complete.

⚠ CAUTION

When flushing the water systems, isolate the chiller from the water circuits to prevent damage to the heat exchanger tubes.

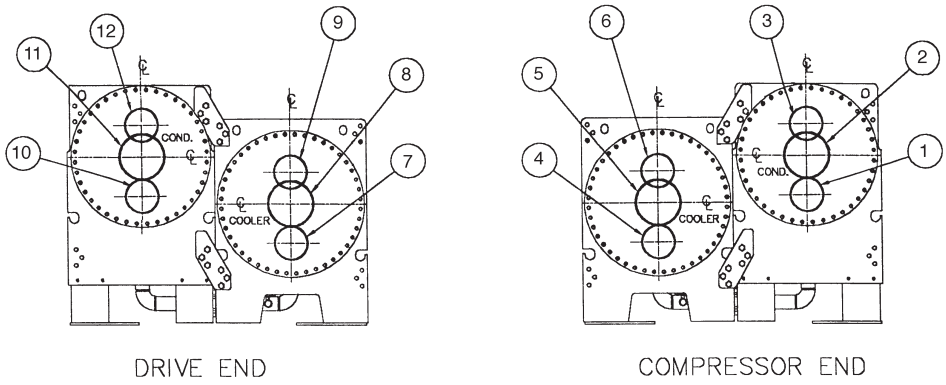
1. Offset pipe flanges to permit removal of waterbox cover for maintenance and to provide clearance for pipe cleaning. No flanges are necessary with marine waterbox option; however, water piping should not cross in front of the waterbox or access will be blocked.
2. Provide openings in water piping for 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. (50 mm).
3. Install air vents at all high points in piping to remove air and prevent water hammer.
4. Field-installed piping must be arranged and supported to avoid stress on the equipment and transmission of vibration from the equipment as well as to prevent interference with routine access for the reading, adjusting, and servicing of the equipment. Provisions should be made for adjusting the piping in each plane and for periodic and major servicing of the equipment.
5. Water flow direction must be as specified in Fig. 16 and 17.

   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. 18-21.
9. Isolation valves are recommended on the cooler and condenser piping to each chiller for service.

Table 11 — 19XR,XRV Waterbox Nozzle Sizes

FRAME SIZE	PRESSURE psig (kPa)	PASS	NOMINAL PIPE SIZE (in.)		ACTUAL PIPE ID (in.)	
			Cooler	Condenser	Cooler	Condenser
7	150 (1034)	1	14	14	13.250	13.250
		2	12	12	12.000	12.000
		3	10	12	10.020	12.000
	300 (2068)	1	14	14	12.500	12.500
		2	12	12	11.376	11.750
		3	10	12	9.750	11.750
8	150 (1034)	1	14	14	13.250	13.250
		2	14	14	13.250	13.250
		3	12	12	12.000	12.000
	300 (2068)	1	14	14	12.500	12.500
		2	14	14	12.500	12.500
		3	12	12	11.376	11.376

NOZZLE-IN HEAD WATERBOXES



FRAMES 7 AND 8

NOZZLE ARRANGEMENT CODES FOR ALL 19XR NOZZLE-IN-HEAD WATERBOXES

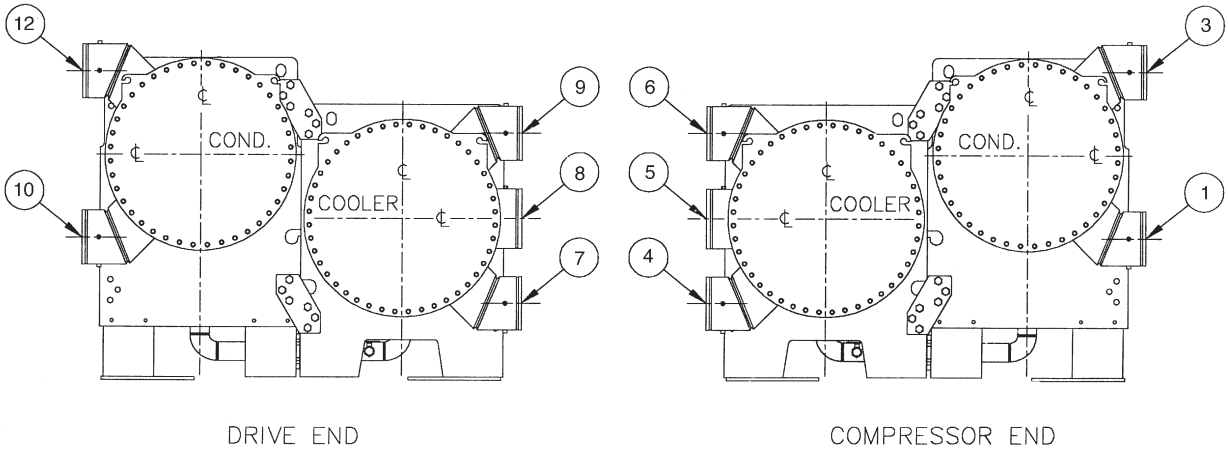
PASS	COOLER WATERBOXES		
	In	Out	Arrangement Code*
1	8	5	A
	5	8	B
2	7	9	C
	4	6	D
3	7	6	E
	4	9	F

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. 16 — Piping Flow Data (NIH, Frames 7 and 8)

MARINE WATERBOXES

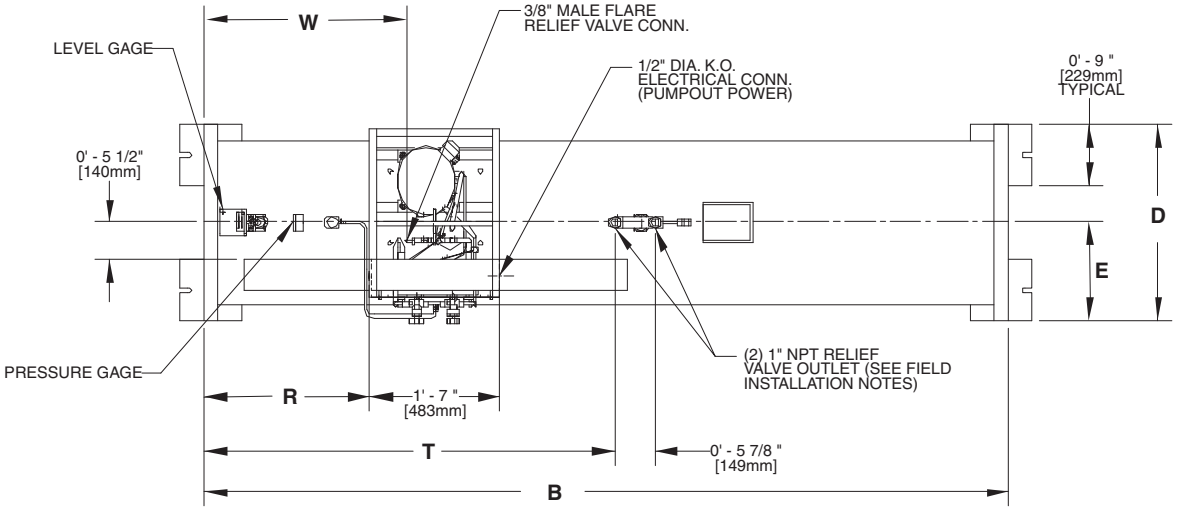


FRAMES 7 AND 8

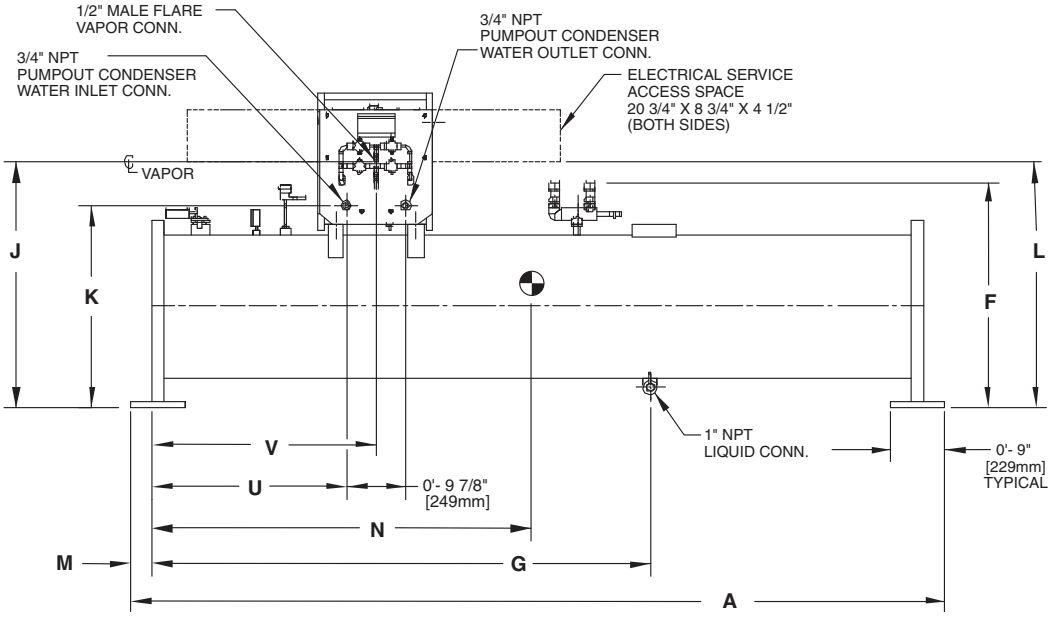
NOZZLE ARRANGEMENT CODES

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	—	—	—

Fig. 17 — Piping Flow Data (MWB, Frames 7 and 8)



TOP VIEW



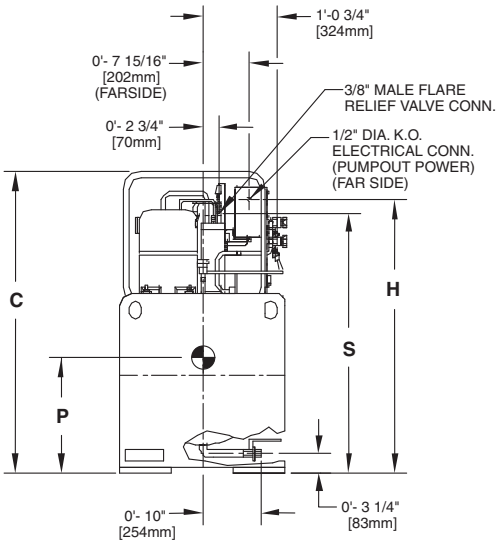
FRONT VIEW

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).

AVAILABLE CONDUIT KNOCKOUT SIZES

TRADE SIZE	QTY	LOCATION
1/2″	1	TOP
3/4″	1	BOTTOM
1″	1	MIDDLE
1 1/4″	1	MIDDLE



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. 18 — Optional Pumpout Unit and Storage Tank

RATED DRY WEIGHT AND REFRIGERANT CAPACITY)

ENGLISH (lb)					SI (kg)				
TANK SIZE	TANK OD (in.)	DRY WEIGHT* (lb)	MAXIMUM REFRIGERANT CAPACITY (lb)		TANK SIZE	TANK OD (mm)	DRY WEIGHT* (kg)	MAXIMUM REFRIGERANT CAPACITY (kg)	
			ANSI/ASHRAE 15	UL 1963				ANSI/ASHRAE 15	UL 1963
0428	24.00	2334	1860	1716	**0428**	610	1059	844	778
0452	27.25	3414	3563	3286	**0452**	692	1549	1616	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. 18 — Optional Pumpout Unit and Storage Tank (cont)

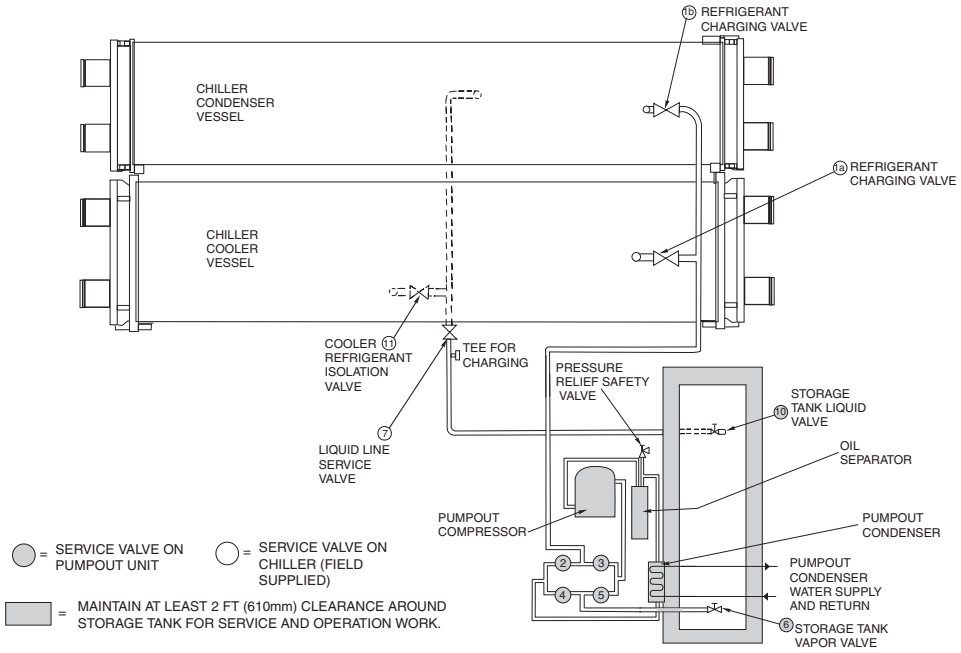


Fig. 19 — Optional Pumpout System Piping Schematic with Storage Tank

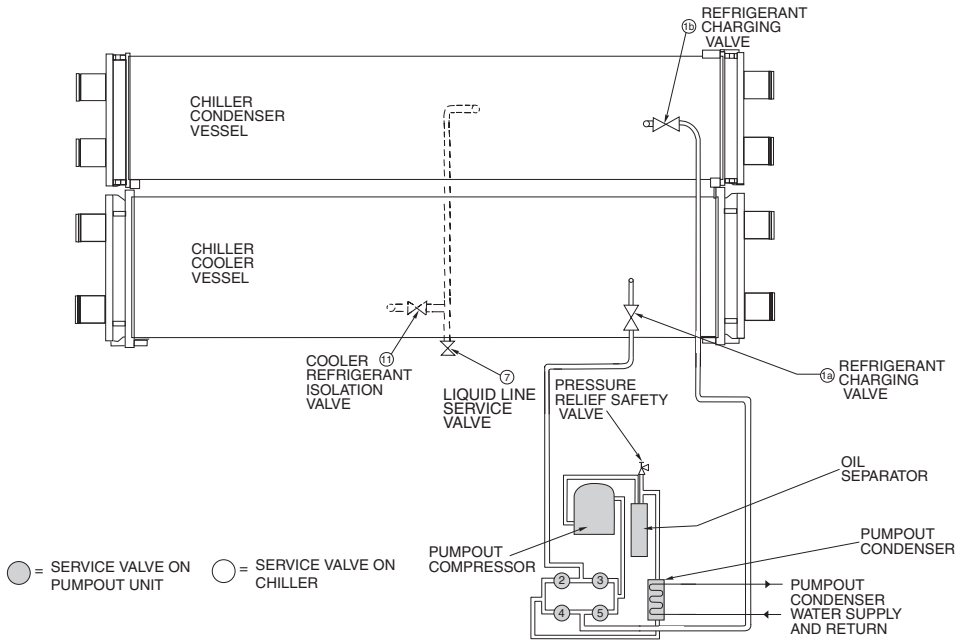


Fig. 20 — Optional Pumpout System Piping Schematic without Storage Tank

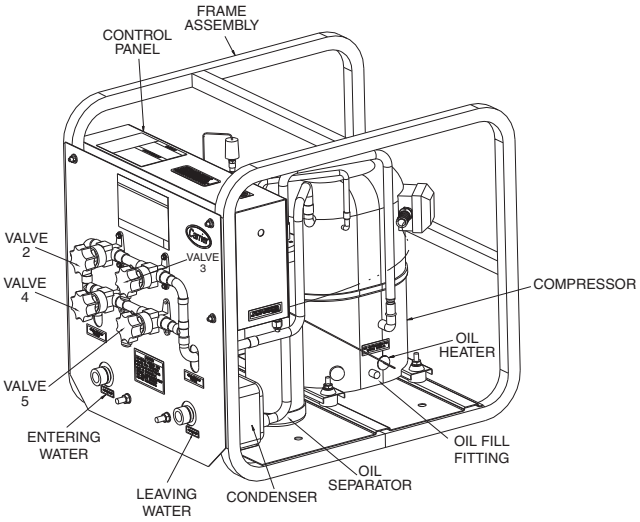


Fig. 21 — Pumpout Unit

INSTALL VENT PIPING TO RELIEF VALVES — The 19XR, 19XRV chiller is factory equipped with relief valves on the cooler and condenser shells. Refer to Fig. 22 and Table 12 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. If relief devices are manifolded, the cross-sectional area of the relief pipe must at least equal the sum of the areas required for individual relief pipes.
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 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.

Table 12 — Relief Valve Locations

LOCATION	FRAME SIZE	RELIEF VALVE OUTLET SIZE
COOLER	7,8	$1^{1}/_{4}$-in. NPT FEMALE CONNECTOR
CONDENSER	7,8	$1^{1}/_{4}$-in. NPT FEMALE CONNECTOR
OPTIONAL STORAGE TANK	N/A	1-in. NPT FEMALE CONNECTOR

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

WITH OPTIONAL ISOLATION OF DISCHARGE AND COOLER (Fig. A)

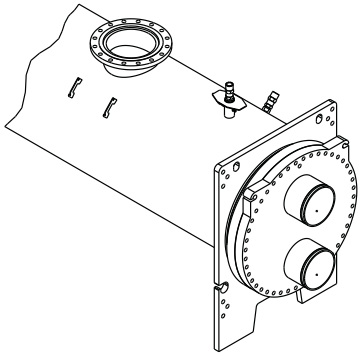


FIG. A

FRAME 7, 8

WITHOUT ISOLATION OPTION OF DISCHARGE AND COOLER (Fig. B)

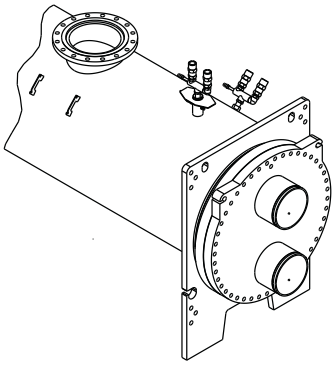


FIG. B

FRAME 7, 8

CONDENSER RELIEF VALVE ARRANGEMENT — WITH OR WITHOUT OPTIONAL ISOLATION (Fig. C)

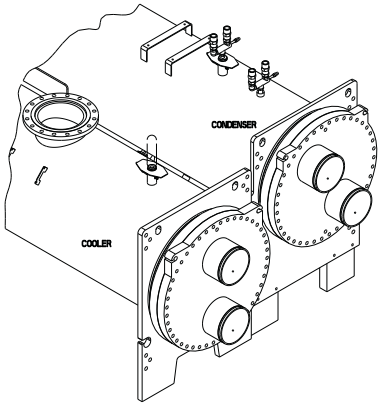


FIG. C

FRAME 7, 8

HEAT EXCHANGER FRAME SIZE	COMPRESSOR FRAME SIZE	WITH/WITHOUT DISCHARGE ISOLATION VALVE	COOLER VIEW	CONDENSER VIEW	COOLER NO. VALVES	CONDENSER NO. VALVES
7, 8	E	With Optional Isolation Valve	A	C	2	4
		Without Optional Isolation Valve	B	C	4	4

Fig. 22 — Relief Valve Arrangements

INSTALL CIRCUIT BREAKER HANDLE EXTENSION (Fig. 23) — Unit-mounted Standard Tier Frame E765-E1530 and LF2 Frame 900-1200 Amp VFDs are shipped with handle extension for the VFD main circuit breaker strapped to the VFD mounting frame. This handle extension must be installed by sliding the clip over the circuit breaker handle (Fig. 24).

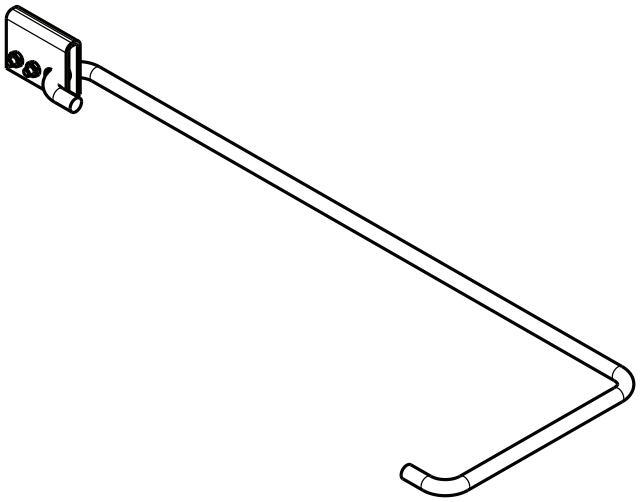


Fig. 23 — Circuit Breaker Handle Extension

Step 5 — Make Electrical Connections — Field wiring must be installed in accordance with job wiring diagrams and all applicable electrical codes.

⚠ CAUTION

Do not run 120-v wiring into the control cabinet. The control cabinet should only be used for additional extra-low voltage wiring (50 v maximum). Damage to machine could result.

Wiring diagrams in this publication (Fig. 25-33) 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 or oil pump (even for a rotation check) or apply test voltage of any kind while either chiller module is under dehydration vacuum. Motor insulation breakdown and serious damage may result.

NOTE: The dry contacts for the inputs should be located as close to the starter as possible. The wiring should be capable of preventing electrical noise or induced voltage and should not be routed with any wires with voltage over 50 v.

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. 25. The PIC II control panel optional wiring and power panel component layout is shown in Fig. 26.

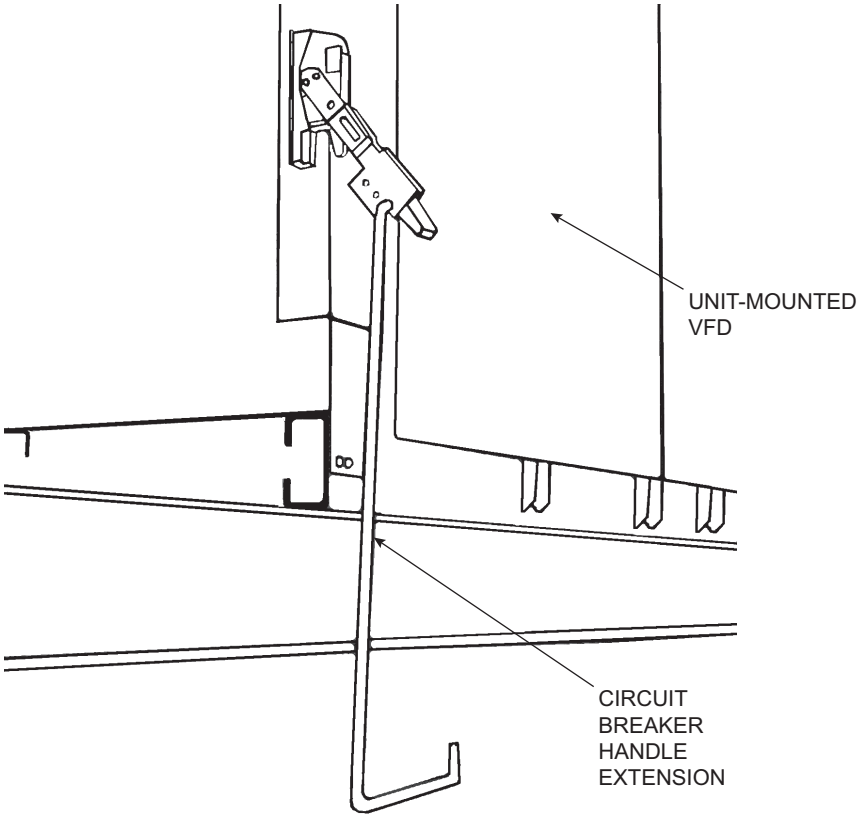
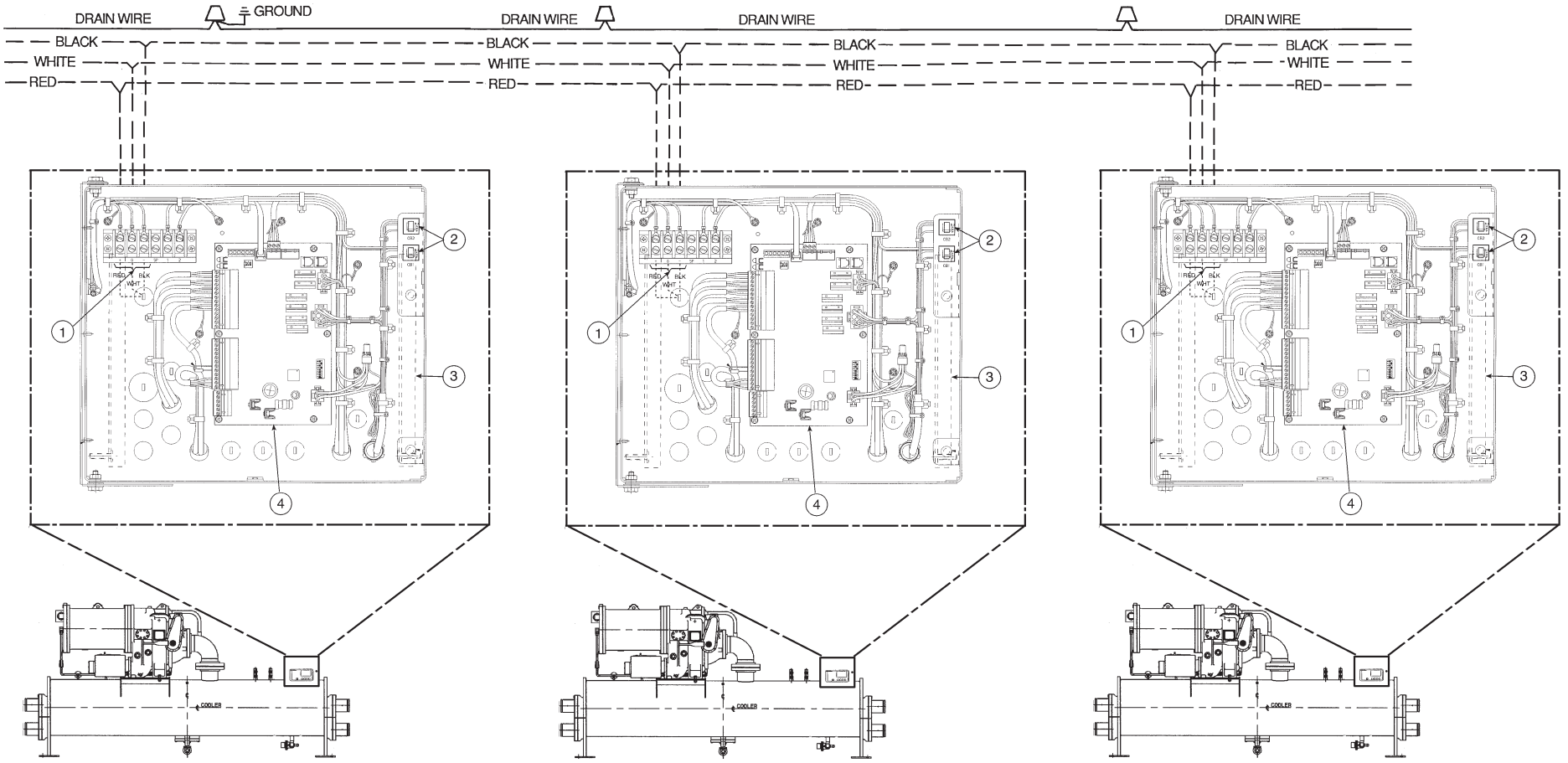


Fig. 24 — Circuit Breaker Handle Extension Installed

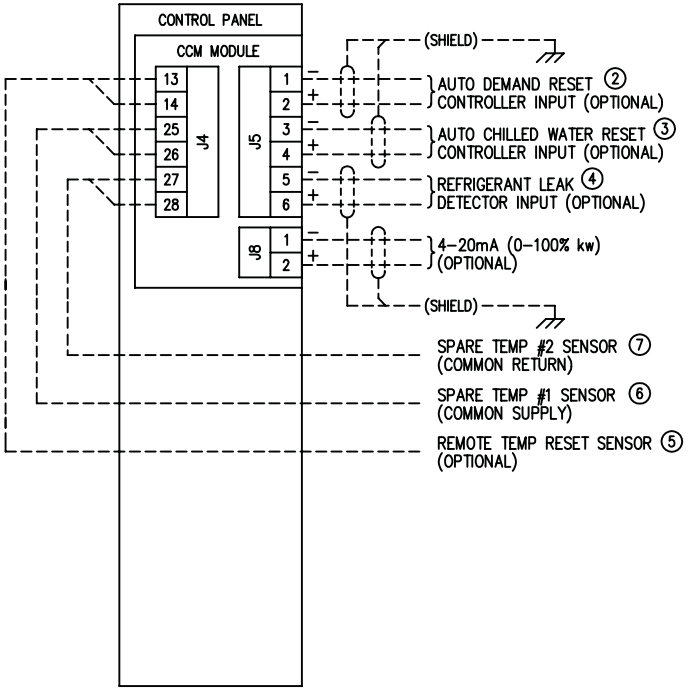


LEGEND

1 — Carrier Comfort Network (CCN) Interface
2 — Circuit Breakers
3 — Control Panel Internal View
4 — Chiller Control Module (CCM)
_____ Factory Wiring
– – – – Field Wiring

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

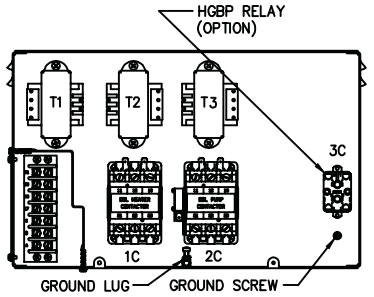
Fig. 25 — CCN Communication Wiring for Multiple Chillers (Typical)



CONTROL PANEL OPTIONAL WIRING

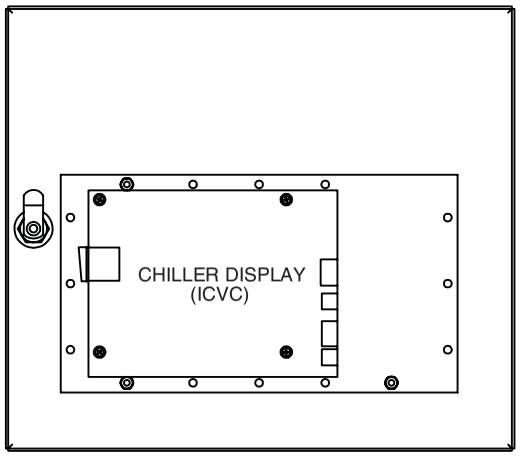
NOTES:

1. THIS FEATURE IS STANDARD IN THE PIC II CONTROLS, BUT REQUIRES A 4–20mA OR 1–5Vdc CONTROLLER, NOT BY CARRIER.
2. THIS FEATURE IS STANDARD IN THE PIC II CONTROLS, BUT REQUIRES AN EXTERNAL 4–20mA CONTROLLER, NOT BY CARRIER.
3. THIS FEATURE IS STANDARD IN THE PIC II CONTROLS, BUT REQUIRES A SENSOR PACKAGE OPTION, BY CARRIER.

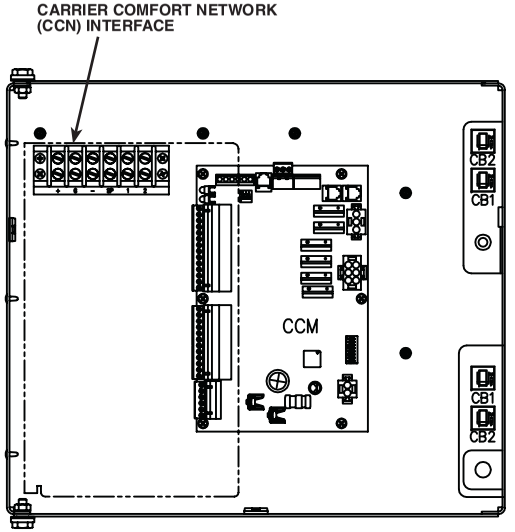


POWER PANEL COMPONENT LAYOUT
(SHOWN WITH COVER REMOVED)

OPTION LISTING			
ITEM	DESCRIPTION	BY CARRIER	
		YES	NO
1A	N/A		
1B	N/A		
2	AUTO DEMAND RESET OPTION (4–20mA CONTROLLER) SEE NOTE 1		
3	AUTO CHILLED WATER RESET OPTION (4–20mA CONTROLLER) SEE NOTE 1		
4	REFRIGERANT LEAK SENSOR SEE NOTE 2		
5	REMOTE TEMP RESET SENSOR SEE NOTE 3		
6	SPARE TEMP 1 (COMMON SUPPLY SENSOR) SEE NOTE 3		
7	SPARE TEMP 2 (COMMON RETURN SENSOR) SEE NOTE 3		



INSIDE PANEL COVER



CONTROL PANEL COMPONENT LAYOUT

Fig. 26 — PIC Control Panel Optional Wiring and Power Panel Component Layout

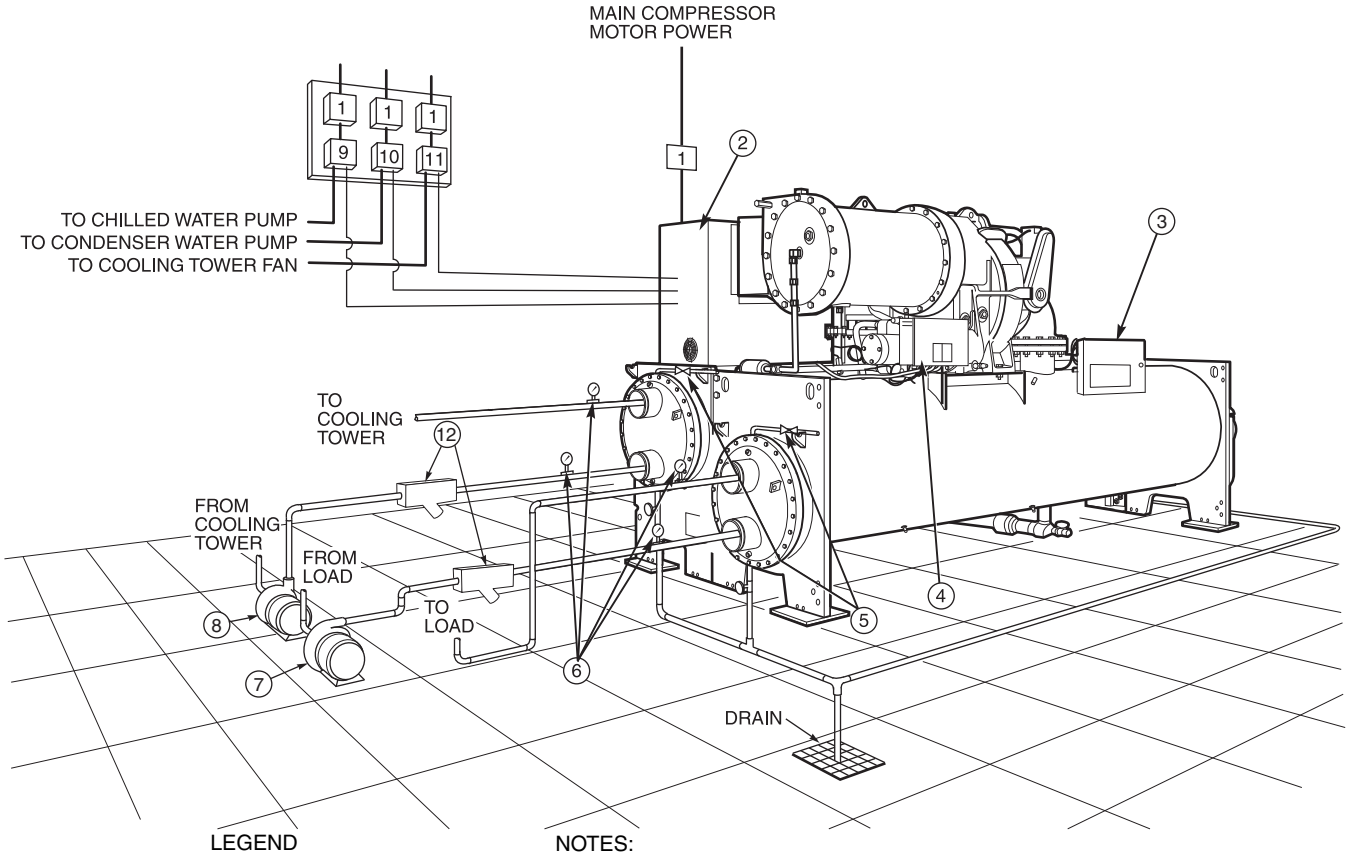
CONNECT CONTROL OUTPUTS — Connect auxiliary equipment, chilled and condenser water pumps, and spare alarms as required and indicated on job wiring drawings.

CONNECT STARTER — The 19XR chiller is available with a unit-mounted, factory-installed starter or VFD (variable frequency drive) or a free-standing, field-installed starter or VFD. For unit-mounted VFD information, refer to the separate instruction book shipped with the chiller.

Unit-Mounted, Factory-Installed Starter — Attach power leads by connecting them from inside the starter cabinet to the line side circuit breaker terminals. See Fig. 27 and 28.

Machines with electro-mechanical starters (wye-delta) will have a top hat shipped with the machine if the RLA (rated load amps) is greater than 935 amps. If the machine is equipped with a solid-state starter, a top hat is provided if the RLA exceeds 740 amps. The top hat is shipped in the knocked-down position and must be assembled and installed on top of the starter cabinet, over the line side circuit breaker. During assembly, remove the access plate and use it as the cover piece of the top hat. The top hat provides additional wire bending space to attach line side power leads to the circuit breaker within the starter.

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.

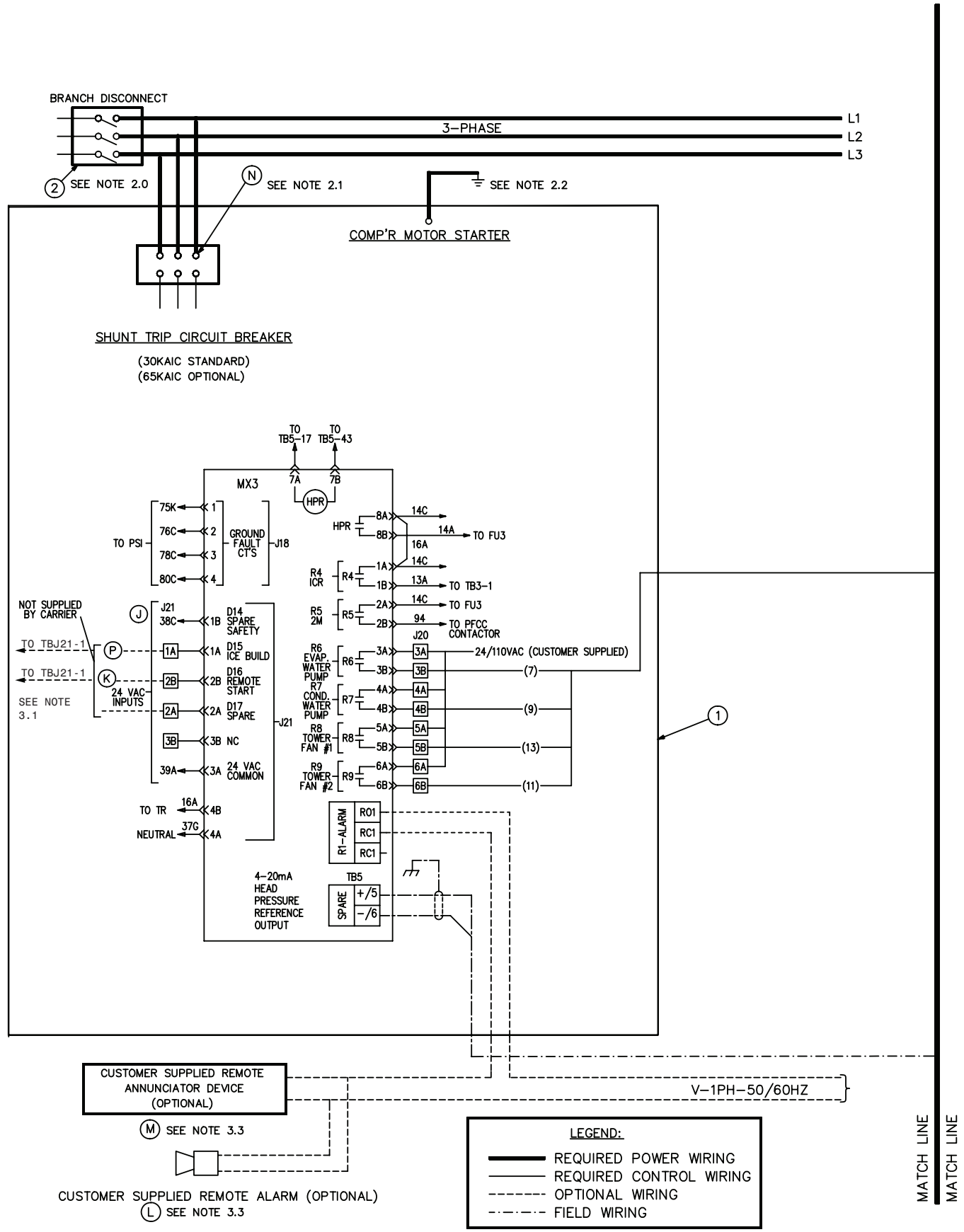


LEGEND

1 — Disconnect
2 — Unit-Mounted Starter or VFD
3 — Control Panel
4 — Power Panel
5 — Vents
6 — Pressure Gages
7 — Chilled Water Pump
8 — Condenser Water Pump
9 — Chilled Water Pump Starter
10 — Condensing Water Pump Starter
11 — Cooling Tower Fan Starter (Low Fan, High Fan)
12 — Strainers
Piping
Control Wiring
Power Wiring

NOTES:
1. 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.
2. All wiring must comply with applicable codes.
3. Wiring not shown for optional devices such as:
   • Remote Start/Stop
   • Remote Alarms
   • Optional Safety Device
   • 4 to 20 mA Resets
   • Optional Remote Sensors
4. IMPORTANT: Carrier suggests that a structural engineer be consulted if transmission of vibrations from mechanical equipment is of concern.
5. Isolation valves are recommended on the cooler and condenser piping to each chiller for service.

Fig. 27 — 19XR with Unit-Mounted Starter



NOTE: See Legend on page 34.

Fig. 28 — 19XR Typical Field Wiring with Unit-Mounted Starter (Benshaw Starter Shown)

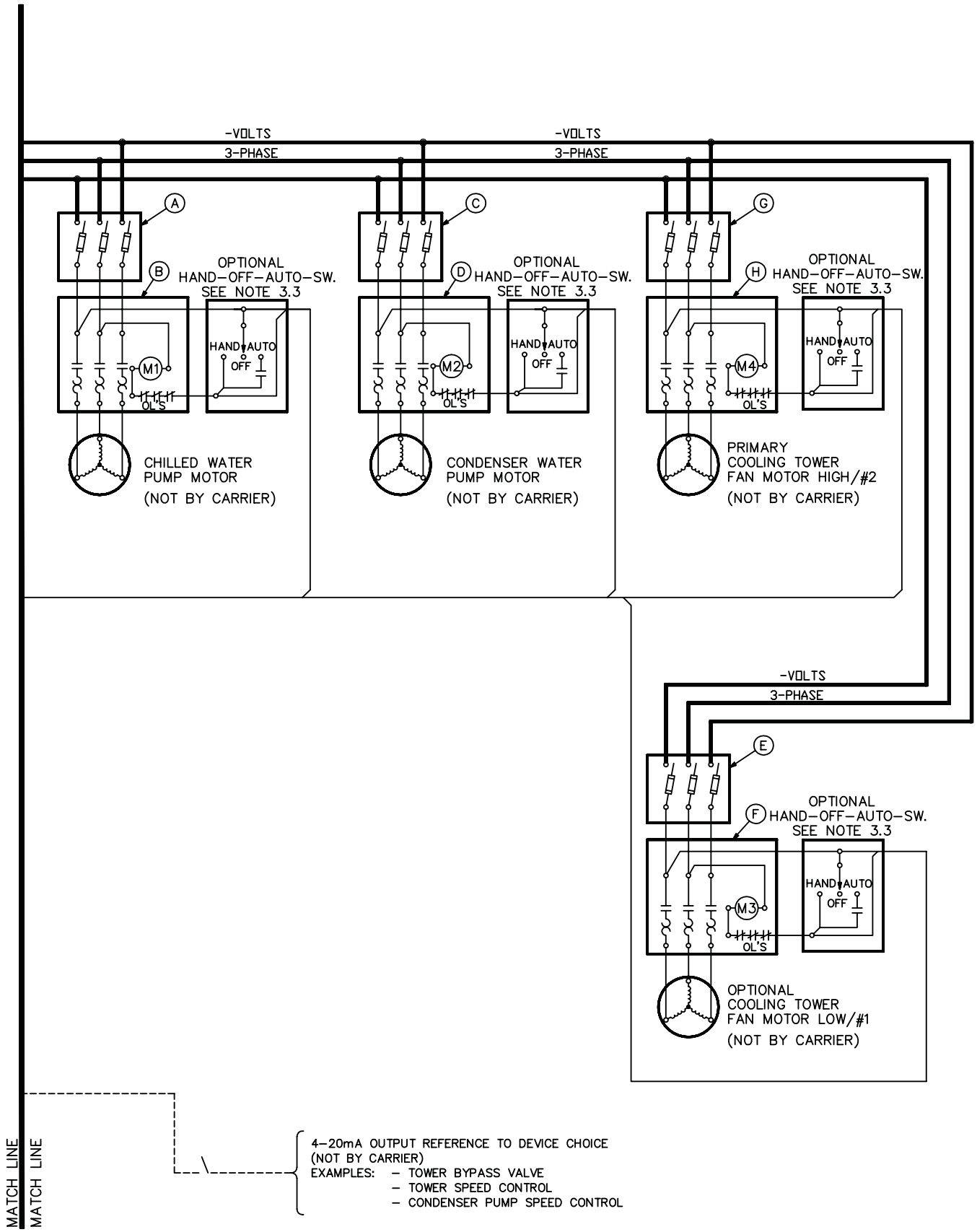


Fig. 28 — 19XR Typical Field Wiring with Unit-Mounted Starter (Benshaw Starter Shown) (cont)

LEGEND FOR FIG. 28
19XR with Unit-Mounted Starter

REFERENCE NUMBER	EXPLANATION
1	3 Phase Under/Over Voltage
	Phase Loss/Imbalance/Reversal
	Motor Overload Protection
	Frequency Shift
	kW Transducer/kW Hours/Demand kW
	Single Cycle Dropout
	Motor/Starter Overcurrent
	Control Power Transformer (3KVA) (Integral)
	Controls and Oil Heater Circuit Breaker (integral)
	Oil Pump Circuit Breaker (Integral)
	4-20ma Head Pressure Reference Output
	3 Phase Analog Volts/Amps Meter Package
	Power Factor Correction Package
	Lightning/Surge Arrestor Package
	Phase to Phase to Ground Fault Detection
	Phase to Ground Fault Detection
2	Compressor Motor Starter Branch Disconnect
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 Motor Starter Disconnect (Low Fan/#1)
F	Cooling Tower Fan Motor Starter (Low Fan/#1)
G	Cooling Tower Fan Motor Starter Disconnect (High Fan/#2)
H	Cooling Tower Fan Motor 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	Lug Adapters See Note 2.1
P	Ice Build Start/Terminate Device See Note 3.1

See Notes on page 35.

NOTES FOR FIG. 28
19XR with Unit-Mounted Starter

I. GENERAL

1.0 Starters shall be designed and manufactured in accordance with Carrier Engineering Requirement Z-415.

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

⚠ CAUTION

To prevent damage to machine, do NOT punch holes or drill into the top surface of the starter enclosure for field wiring. Knock-outs are provided on the side of the starter enclosure for field wiring connections.

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 shut down.

1.5 WARNING — Do not use aluminum conductors.

1.6 Installer is responsible for any damage caused by improper wiring between starter and machine.

II. POWER WIRING TO STARTER

2.0 Provide a means of disconnecting power to starter.

2.1 Power conductor rating must meet minimum unit nameplate voltage and compressor motor FLA (minimum circuit ampacity).

2.2 Lug adapters may be required if installation conditions dictate that conductors be sized beyond the minimum ampacity required. Breaker lugs will accommodate the quantity (#) and size (MCM) cables (per phase) as indicated in tables below.

ALLEN BRADLEY (WYE-DELTA)

Starter RLA	Lug Capacity (Per Phase)	
	# Conductors	Conductor Range
607-888A	4	4/0 AWG — 500 MCM
889-1316A	4	500 — 1000 MCM

BENSHAW (SOLID-STATE)

Starter RLA	Lug Capacity (Per Phase)		
	# Conductors	Conductor Range	Frame Size
641-739A	4	250 — 500 MCM	2, 3
740-979A	5	6 AWG — 350 MCM	4, 5, E
980-1390A	2	3/0 AWG — 500 MCM	4, 5, E

BENSHAW (WYE-DELTA)

Starter RLA	Lug Capacity (Per Phase) Circuit Breaker or Terminal Block (Option)		
	# Conductors	Conductor Range	Frame Size
607-775A	4	250 — 500 MCM	4
776-804A	4	250 — 500 MCM	4, 5, E
805-1138A	5	300 — 600 MCM	4, 5, E
1139-1151	5	300 — 600 MCM	4, 5, E

CUTLER-HAMMER (WYE-DELTA)

Starter RLA	Lug Capacity (Per Phase)	
	# Conductors	Conductor Range
112-185A	1	4 AWG — 350 MCM
186-296A	2	2/0 AWG — 250 MCM
297-444A	2	250 — 350 MCM
445-606A	2	1 AWG — 500 MCM
607-888A	4	4/0 AWG — 500 MCM
889-1316A	4	500 — 1000 MCM

2.3 Power conductors to starter must enter through top of enclosure. Flexible conduit should be used for the last few feet to the enclosure to provide unit vibration isolation.

2.4 Compressor motor and controls must be grounded by using equipment grounding lugs provided inside unit-mounted starter enclosure.

2.5 Starters with "Rated Load Amps" (RLA) greater than 433A require the assembly and the installation of a "Top Hat" (located inside enclosure) to provide the required wire bending space for incoming power leads.

2.6 Metering current transformers (CTs), if present, have an inner diameter of $2^{3}/_{4}$ inches. Caution should be taken when selecting power wiring so that all power cables can pass through the CTs.

III. CONTROL WIRING

3.0 Field-supplied control conductors to be at least 18 AWG 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 J2-1 and J2-2 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 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 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.

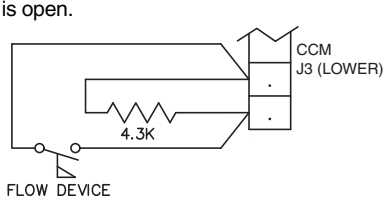
3.4 If one single speed fan is used, connect fan control leads J9-13 and -14, jumper ISM J9-13 to -11, and jumper J9-14 to -12. This will allow the fan to be actuated by closure of either "low fan" or "high fan" ISM channel contact.

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

3.6 Control wiring between starter and power panel must be separate shielded cables with minimum rating of 600 v, 80 C. Ground shield at starter.

3.7 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.

3.8 Flow devices to confirm evaporator or condenser pump flow are not required. However; if flow devices are used, wire as shown in diagram below. 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.



Free-Standing, Field-Installed Starter or VFD — Assemble and install compressor terminal box in desired orientation, and cut necessary conduit openings in conduit support plates. See Fig. 29-33. Attach power leads to compressor terminals in accordance with job wiring drawings, observing caution label in terminal box. Use only copper conductors. The motor must be grounded in accordance with NEC (National Electrical Code), applicable local codes, and job wiring diagrams. Installer is responsible for any damage caused by improper wiring between starter and compressor motor.

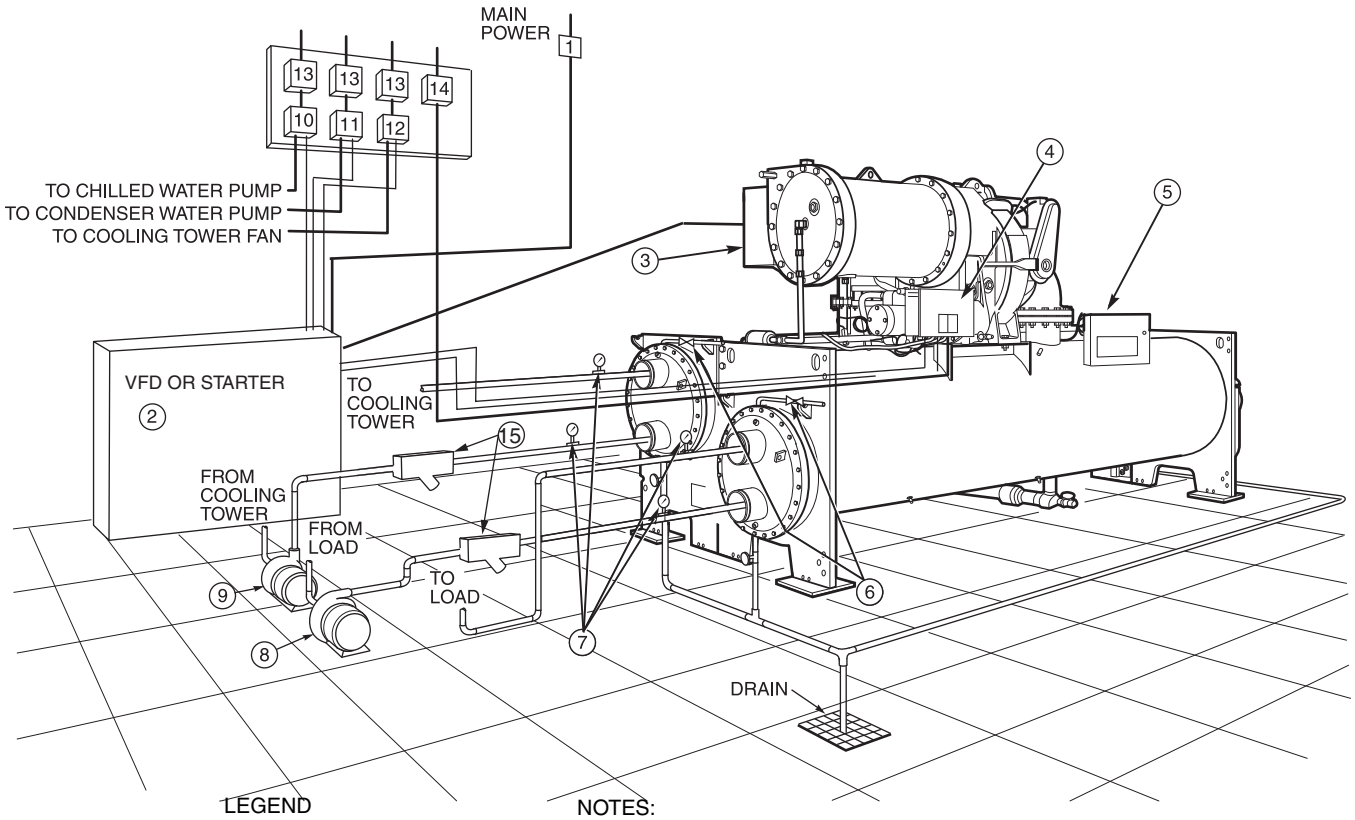
IMPORTANT: Do not insulate terminals until wiring arrangement has been checked and approved by Carrier start-up personnel. Also, make sure correct phasing is followed for proper motor rotation.

Insulate Motor Terminals and Lead Wire Ends — Insulate compressor motor terminals, lead wire ends, and electrical wires to prevent moisture condensation and electrical arcing. For low-voltage units (up to 600 v), obtain insulation material from machine shipping package consisting of 3 rolls of insulation putty and one roll of vinyl tape.

1. Insulate each terminal by wrapping with one layer of insulation putty.
2. Overwrap putty with 4 layers of vinyl tape.

High Voltage Units — High-voltage units require special terminal preparation. Follow local electrical codes for high-voltage installation. Vinyl tape is not acceptable; a high voltage terminal method must be used.

NOTE: Wiring must be installed for the oil pump power supply and oil heater supply, along with interconnecting control wiring from the power panel to the starter.



LEGEND

1 — Disconnect
2 — Free-standing Compressor Motor Starter
3 — Compressor Motor Terminal Box
4 — Power Panel
5 — Control Panel
6 — Vents
7 — Pressure Gages
8 — Chilled Water Pump
9 — Condenser Water Pump
10 — Chilled Water Pump Starter
11 — Condensing Water Pump Starter
12 — Cooling Tower Fan Starter (Low Fan, High Fan)
13 — Disconnect
14 — Oil Pump Disconnect (See Note 4)
15 — Strainer
Piping
Control Wiring
Power Wiring

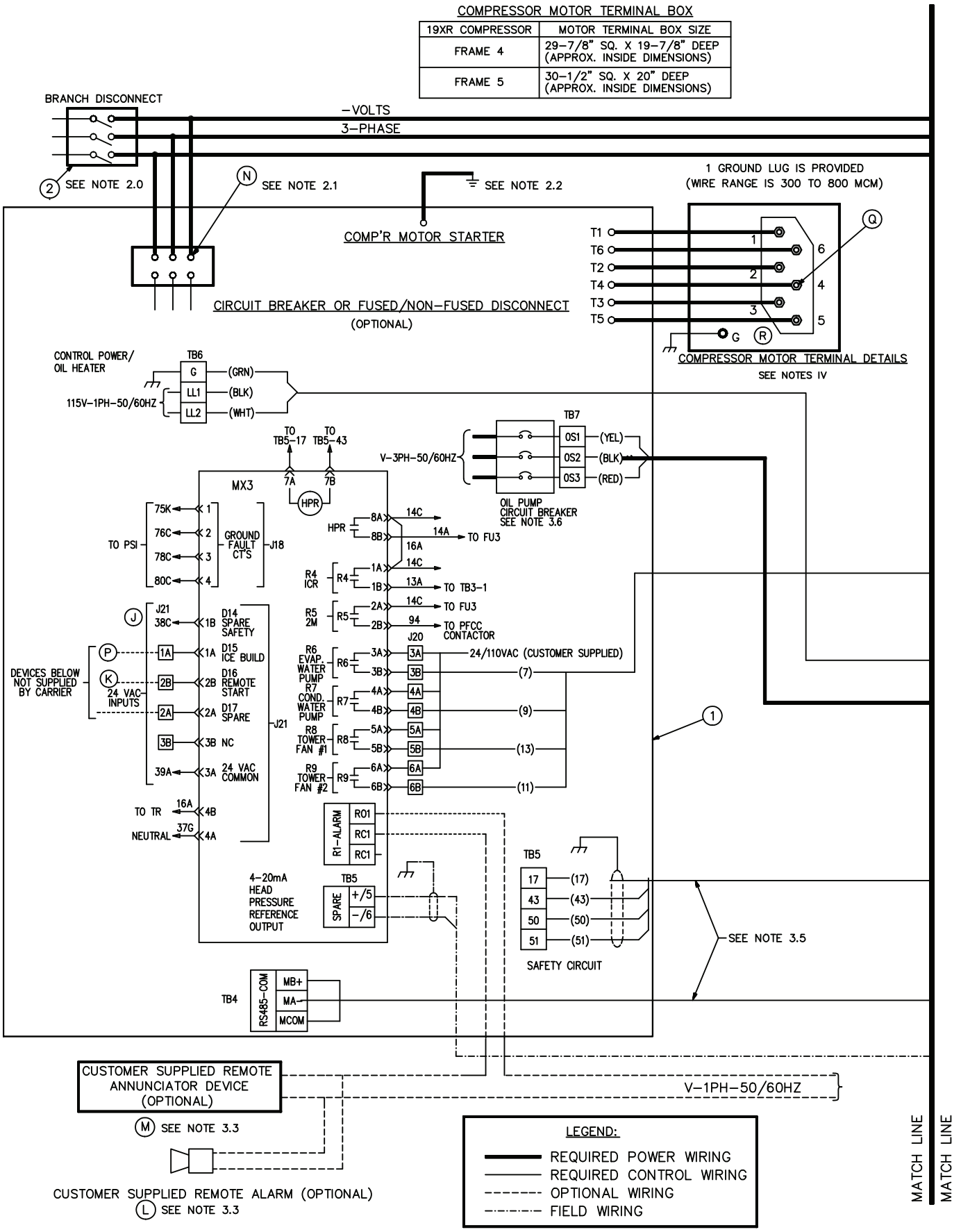
NOTES:
1. Wiring and piping shown are for general point-of-connection only and are not intended to show details for a specific installation. Certified field wiring and dimensional diagrams are available on request.
2. All wiring must comply with applicable codes.
3. Wiring not shown for optional devices such as:
   • Remote Start/Stop
   • Remote Alarms
   • Optional Safety Device
   • 4 to 20 mA Resets
   • Optional Remote Sensors
4. Oil pump disconnect may be located within the enclosure of Item 2 — Free-standing Compressor Motor Starter.
5. IMPORTANT: Carrier suggests that a structural engineer be consulted if transmission of vibrations from mechanical equipment is of concern.
6. Isolation valves are recommended on the cooler and condenser piping to each chiller for service.

Fig. 29 — 19XR with Free-Standing Starter or VFD

LEGEND FOR FIG. 30
19XR with Free-Standing Starter (Low Voltage)

REFERENCE NUMBER	EXPLANATION
1	3 Phase Under/Over Voltage
	Phase Loss/Imbalance/Reversal
	Motor Overload Protection
	Frequency Shift
	kW Transducer/kW Hours/Demand kW
	Single Cycle Dropout
	Motor/Starter Overcurrent
	Control Power Transformer (3KVA) (Integral)
	Controls and Oil Heater Circuit Breaker (integral)
	Oil Pump Circuit Breaker
	3 Phase Analog Volts/Amps Meter Package
	Power Factor Correction Package
	Lightning/Surge Arrestor Package
	Auxiliary Run Status Contacts N.O./N.C.
	Run Indicating Light
	Emergency Stop Switch
	Phase to Phase to Fault Detection
	Phase to Ground Fault Detection
2	Compressor Motor Starter Branch Disconnect
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 Motor Starter Disconnect (Low Fan/#1)
F	Cooling Tower Fan Motor Starter (Low Fan/#1)
G	Cooling Tower Fan Motor Starter Disconnect (High Fan/#2)
H	Cooling Tower Fan Motor 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	Lug Adapters See Note 2.1
P	Ice Build Start/Terminate Device See Note 3.1
Q	Lead Connectors See Note 4.0
R	6 Lead to 3 Lead Jumpers See Note 4.0

See Notes on page 40.



NOTE: See Legend on page 37.

Fig. 30 — 19XR Typical Field Wiring with Benshaw Free-Standing Starter (Low Voltage)

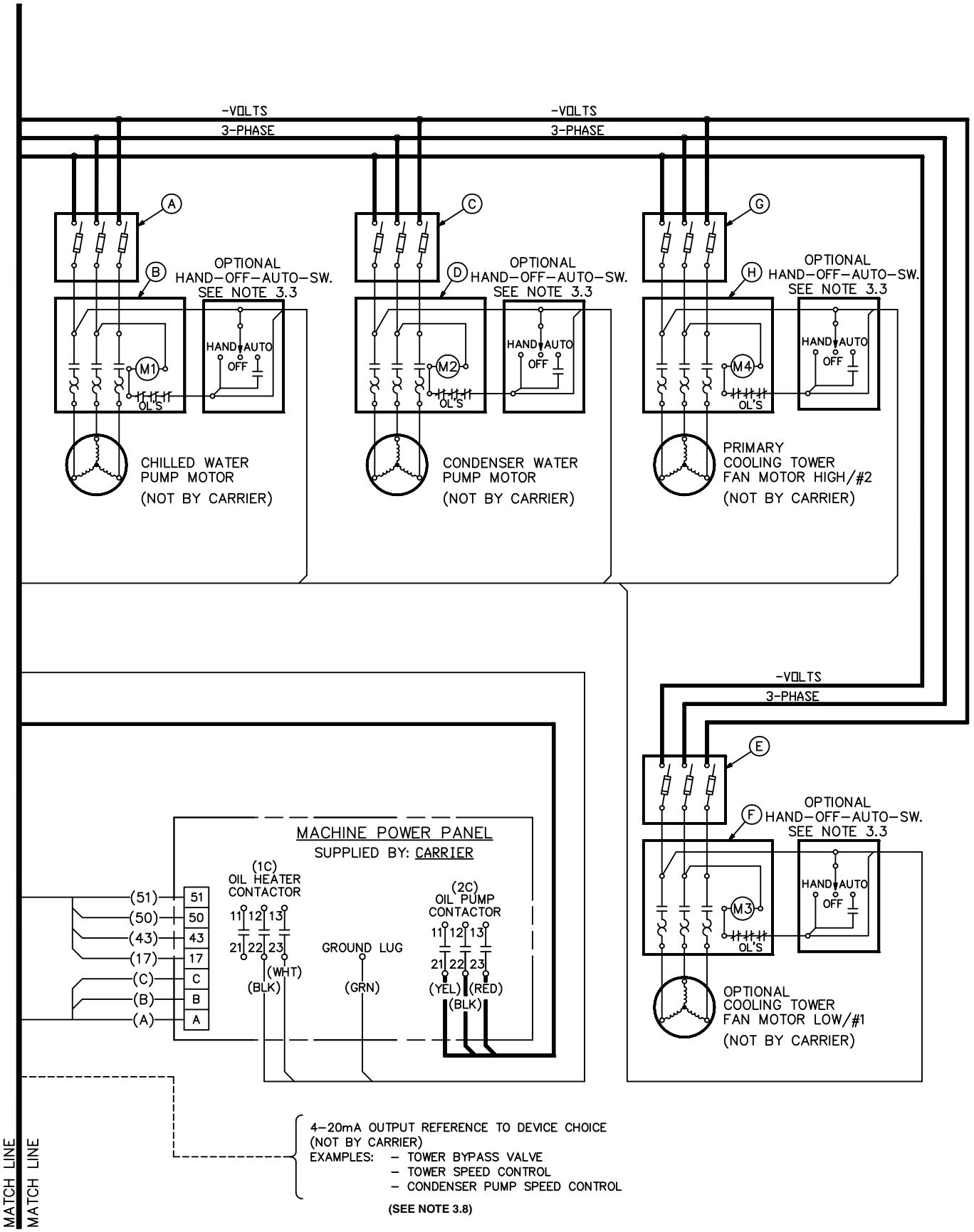


Fig. 30 — 19XR Typical Field Wiring with Benshaw Free-Standing Starter (Low Voltage) (cont)

NOTES FOR FIG. 30
19XR with Free-Standing Starter (Low Voltage)

I. GENERAL

1.0 Starters shall be designed and manufactured in accordance with Carrier Engineering Requirement Z-415.

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.

⚠ CAUTION

To prevent damage to machine, do NOT punch holes or drill into the top surface of the starter enclosure for field wiring. Knockouts are provided on the side of the starter enclosure for field wiring connections.

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 shut down.

1.5 WARNING — Do not use aluminum conductors.

1.6 Installer is responsible for any damage caused by improper wiring between starter and machine.

1.7 All field-installed wiring is field-supplied.

II. POWER WIRING TO STARTER

2.0 Provide a means of disconnecting power to starter.

2.1 Lug adapters may be required if installation conditions dictate that conductors be sized beyond the minimum ampacity required. Contact starter supplier for lug information.

2.2 Compressor motor and controls must be grounded by using equipment grounding lug provided inside starter enclosure.

III. CONTROL WIRING

3.0 Field supplied control conductors to be at least 18 AWG 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 Feed 24 VAC power to safety input terminals. Reference MX3 electrical drawings.

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 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 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 which has wires carrying 50 v or higher or along side wires carrying 50 v or higher.

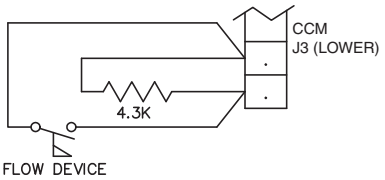
3.5 Control wiring between starter and power panel must be separate shielded cables with minimum rating 600 v, 80 C. Ground shield at starter.

3.6 If optional pumpout/oil pump circuit breaker is not supplied within the starter enclosure, it must be located within sight of machine with wiring routed to suit.

3.7 When providing conductors for oil pump motor and oil heater power, refer to sizing data on label located on the chiller power panel, equipment submittal documentation or equipment product data catalog.

3.8 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.

3.9 Flow devices to confirm evaporator or condenser pump flow are not required. However; if flow devices are used, wire as shown in diagram below. 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.



IV. POWER WIRING BETWEEN FREE-STANDING STARTER AND COMPRESSOR MOTOR

4.0 Low voltage (600 v or less) compressor motors have (6) $^{5}/_{8}$ in. terminal studs (lead connectors not supplied by Carrier). Either 3 or 6 conductors must be run between compressor motor and starter, depending on the size of the conductors or the type of motor starter employed. If only 3 leads are utilized, jumper motor terminals as follows: 1 to 6, 2 to 4, 3 to 5. Center to center distance between terminals is $3^{5}/_{32}$ inches. Compressor motor starter must have nameplate stamped as to conforming with Carrier Engineering requirement "Z-415."

4.1 Power conductor rating must meet minimum unit nameplate voltage and compressor motor RLA. Refer to the label located on the side of the chiller control panel, equipment submittal documentation or equipment product data catalog for conductor sizing data. (Conductor as defined below may be a single lead or multiple smaller ampacity leads in parallel for the purpose of carrying the equivalent or higher current of a single larger lead.)

When (3) conductors are used:

Minimum ampacity per conductor = 1.25 x compressor RLA

When (6) conductors are used:

Minimum ampacity per conductor = 0.721 x compressor RLA

4.2 When more than one conduit is used to run conductors from starter to compressor motor terminal box, an equal number of leads from the following phases (conductor) must be installed in each conduit to prevent excessive heating.
Inside delta starters: 1, 3, or multiples of 3 conduits are required. (For example: conductors to motor terminals 1, 2, 3, 4, 5 and 6 in a single conduit or conductors to motor terminals 1 and 4 in one conduit, conductors to motor terminals 2 and 5 in one conduit and conductors to motor terminals 3 and 6 in one conduit.)
For all other starters: 1, 2, or multiples of 2 are required. (For example: conductors to motor terminals 1, 2, and 3 in one conduit, and conductors to motor terminals 4, 5, and 6 in one conduit).

4.3 Compressor motor power conductors may enter terminal box through top, left side or bottom left using holes cut by contractor to suit conduit. Flexible conduit should be used for the last few feet to the terminal box for unit vibration isolation. Use of stress cones or 12 conductors larger than 500 MCM may require an oversize (special) motor terminal box (not supplied by Carrier). Lead connections between 3-phase motors and their starters must not be insulated until Carrier personnel have checked compressor and oil pump rotations.

4.4 Compressor motor frame to be grounded in accordance with the National Electrical Code (NFPA-70) and applicable codes. Means for grounding compressor motor is pressure connector for #4 AWG to 500 MCM wire, supplied and located in the lower left side corner of the compressor motor terminal box.

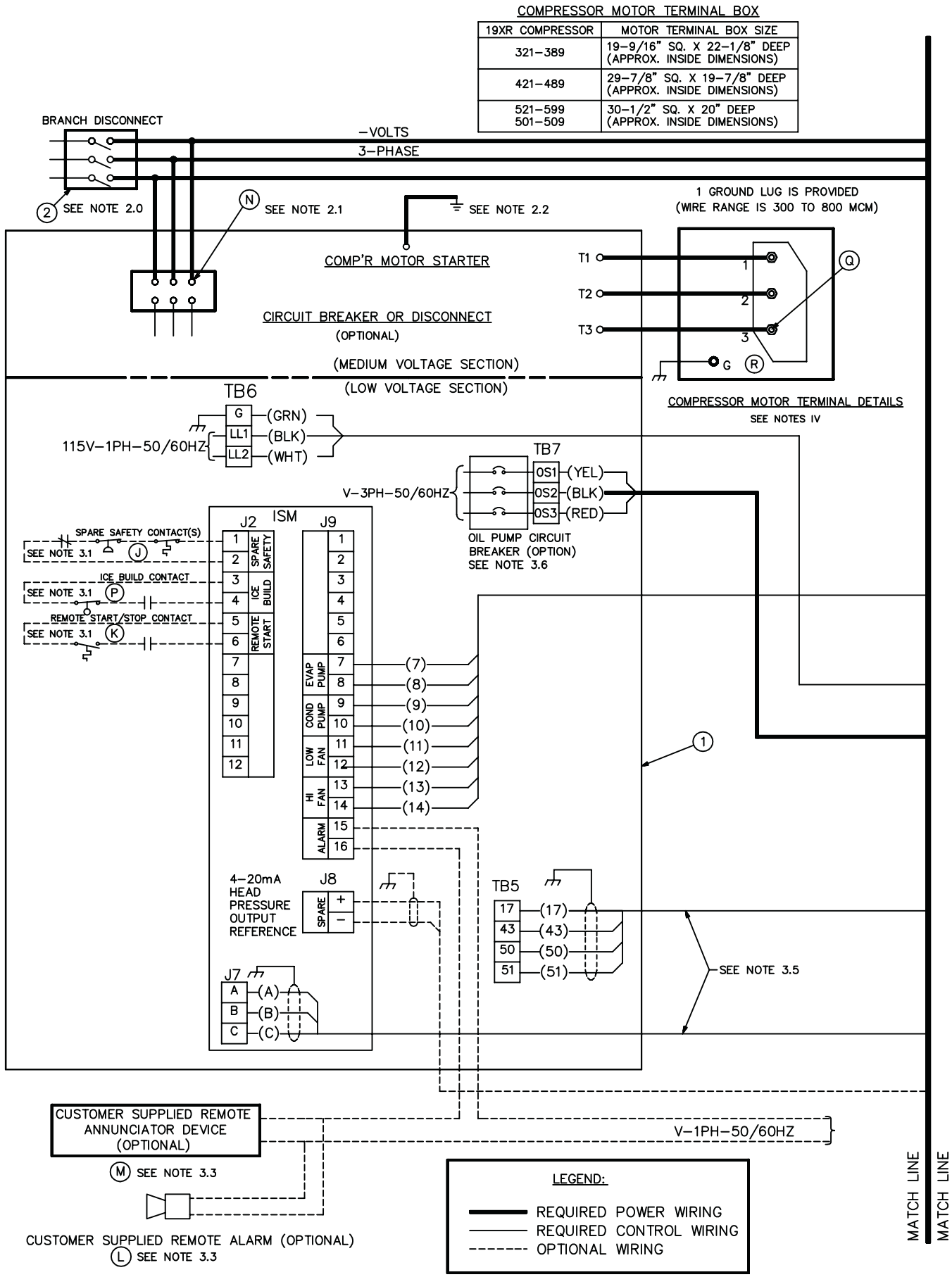
4.5 Do not allow motor terminals to support weight of wire cables. Use cable supports and strain reliefs as required.

4.6 Use backup wrench when tightening lead connectors to motor terminal studs. Torque to 45 lb-ft max.

LEGEND FOR FIG. 31
19XR with Free-Standing Starter (Medium Voltage)

REFERENCE NUMBER	EXPLANATION
1	3 Phase Under/Over Voltage
	Phase Loss/Imbalance/Reversal
	Motor Overload Protection
	Frequency Shift
	kW Transducer/kW Hours/Demand kW
	Single Cycle Dropout
	Motor/Starter Overcurrent
	Control Power Transformer (3KVA) (Integral)
	Controls and Oil Heater Circuit Breaker (integral)
	Oil Pump Circuit Breaker
	Oil Pump Circuit Breaker with Transformer
	3 Phase Analog Volts/Amps Meter Package
	Power Factor Correction Package
	Lightning/Surge Arrestor Package
	Auxiliary Run Status Contacts N.O./N.C.
	Run Indicating Light
	Emergency Stop Switch
	Phase to Ground Fault Detection
2	Compressor Motor Starter Branch Disconnect
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 Motor Starter Disconnect (Low Fan/#1)
F	Cooling Tower Fan Motor Starter (Low Fan/#1)
G	Cooling Tower Fan Motor Starter Disconnect (High/#2)
H	Cooling Tower Fan Motor 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	Lug Adapters See Note 2.1
P	Ice Build Start/Terminate Device See Note 3.1
Q	Lead Connectors See Note 4.0
R	6 Lead to 3 Lead Jumpers See Note 4.0

See Notes on page 44.



NOTE: See Legend on page 41.

Fig. 31 — 19XR Typical Field Wiring with Free-Standing Starter (Medium Voltage)

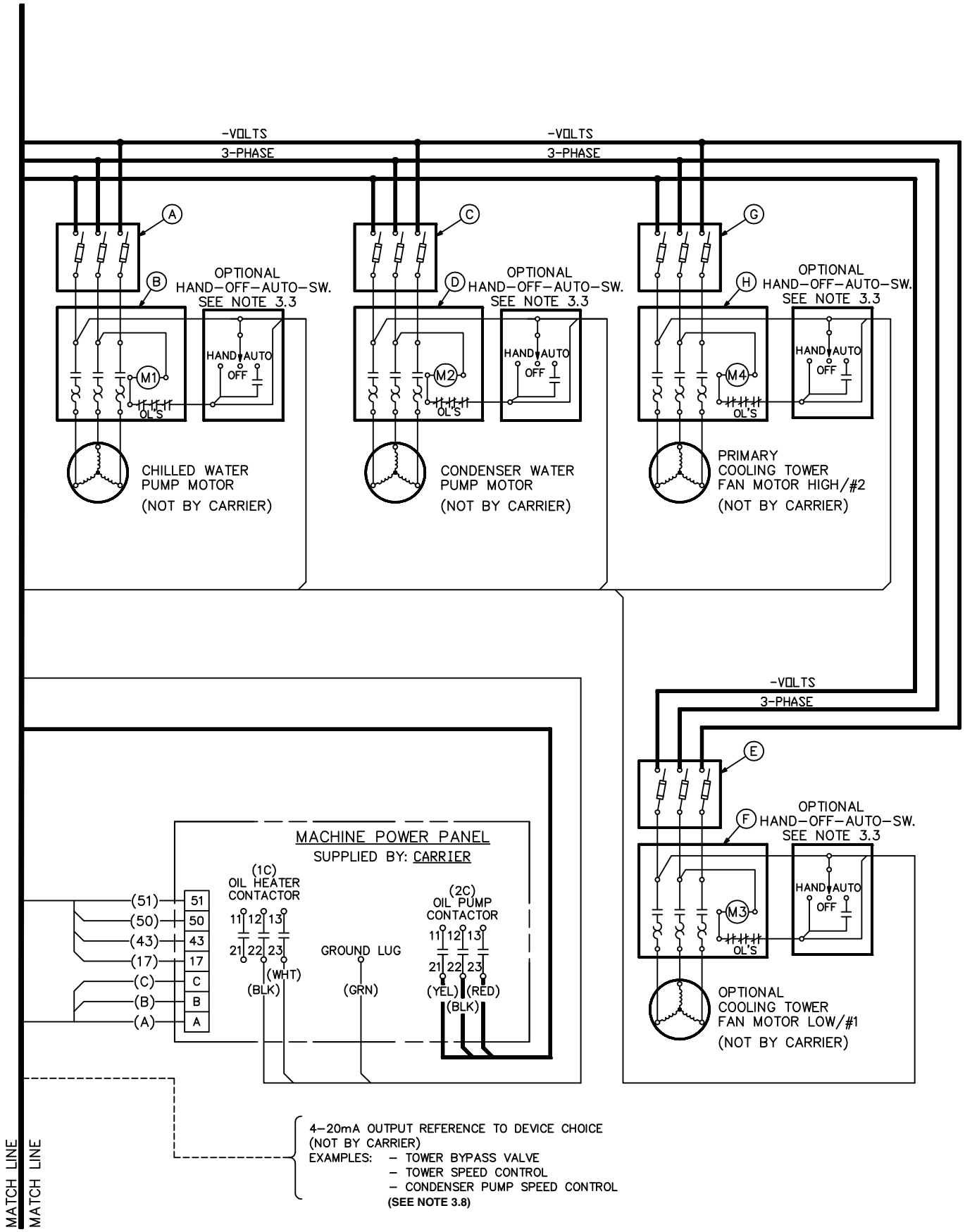


Fig. 31 — 19XR Typical Field Wiring with Free-Standing Starter (Medium Voltage) (cont)

NOTES FOR FIG. 31
19XR with Free-Standing Starter (Medium Voltage)

I. GENERAL

1.0 Starters shall be designed and manufactured in accordance with Carrier Engineering Requirement Z-415.

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.

⚠ CAUTION

To prevent damage to machine, do NOT punch holes or drill into the top surface of the starter enclosure for field wiring. Knockouts are provided on the side of the starter enclosure for field wiring connections.

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 chiller shutdown.

1.5 WARNING — Do not use aluminum conductors.

1.6 Installer is responsible for any damage caused by improper wiring between starter and machine.

1.7 All field-installed wiring is field-supplied.

II. POWER WIRING TO STARTER

2.0 Provide a means of disconnecting power to starter.

2.1 Lug adapters may be required if installation conditions dictate that conductors be sized beyond the minimum ampacity required. Contact starter supplier for lug information.

2.2 Compressor motor and controls must be grounded by using equipment grounding lug provided inside starter enclosure.

III. CONTROL WIRING

3.0 Field supplied control conductors to be at least 18 AWG 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 J2-1 and J2-2 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 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 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 which has wires carrying 50 v or higher or along side wires carrying 50 v or higher.

3.5 Control wiring between starter and power panel must be separate shielded cables with minimum rating 600 v, 80 C. Ground shield at starter.

3.6 If optional pumpout/oil pump circuit breaker is not supplied within the starter enclosure, it must be located within sight of machine with wiring routed to suit.

3.7 When providing conductors for oil pump motor and oil heater power, refer to sizing data on label located on the chiller power panel, equipment submittal documentation or equipment product data catalog.

3.8 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.

IV. POWER WIRING BETWEEN FREE-STANDING STARTER AND COMPRESSOR MOTOR

4.0 Medium voltage (over 600 volts) compressor motors have (3) terminals. Connections are $^{9}/_{16}$-in. threaded stud. A compression lug with a single $^{9}/_{16}$-in. diameter hole can be connected directly to the stud or 3 adapters are supplied for connecting a NEMA lug. Use suitable connectors and insulation for high voltage alternating current cable terminations (these items are not supplied by Carrier). Compressor motor starter must have nameplate stamped as to conforming with Carrier Engineering requirement “Z-415.”

4.1 Power conductor rating must meet minimum unit nameplate voltage and compressor motor RLA. Refer to the label located on the side of the chiller control panel, equipment submittal documentation or equipment product data catalog for conductor sizing data. (Conductor as defined below may be a single lead or multiple smaller ampacity leads in parallel for the purpose of carrying the equivalent or higher current of a single larger lead.)

When (3) conductors are used:

Minimum ampacity per conductor = 1.25 x compressor RLA

4.2 When more than one conduit is used to run conductors from starter to compressor motor terminal box, an equal number of leads from each phase (conductor) must be in each conduit to prevent excessive heating. (For example, conductors to motor terminals 1, 2, and 3 in one conduit, and those to 4, 5, and 6 in another).

4.4 Compressor motor power conductors may enter terminal box through top, left side or bottom left using holes cut by contractor to suit conduit. Flexible conduit should be used for the last few feet to the terminal box for unit vibration isolation. Use of stress cones may require an oversize (special) motor terminal box (not supplied by Carrier).

4.3 Compressor motor frame to be grounded in accordance with the National Electrical Code (NFPA-70) and applicable codes. Means for grounding compressor motor is a #4 AWG to 500 MCM pressure connector, supplied and located in the lower left side corner of the compressor motor terminal box.

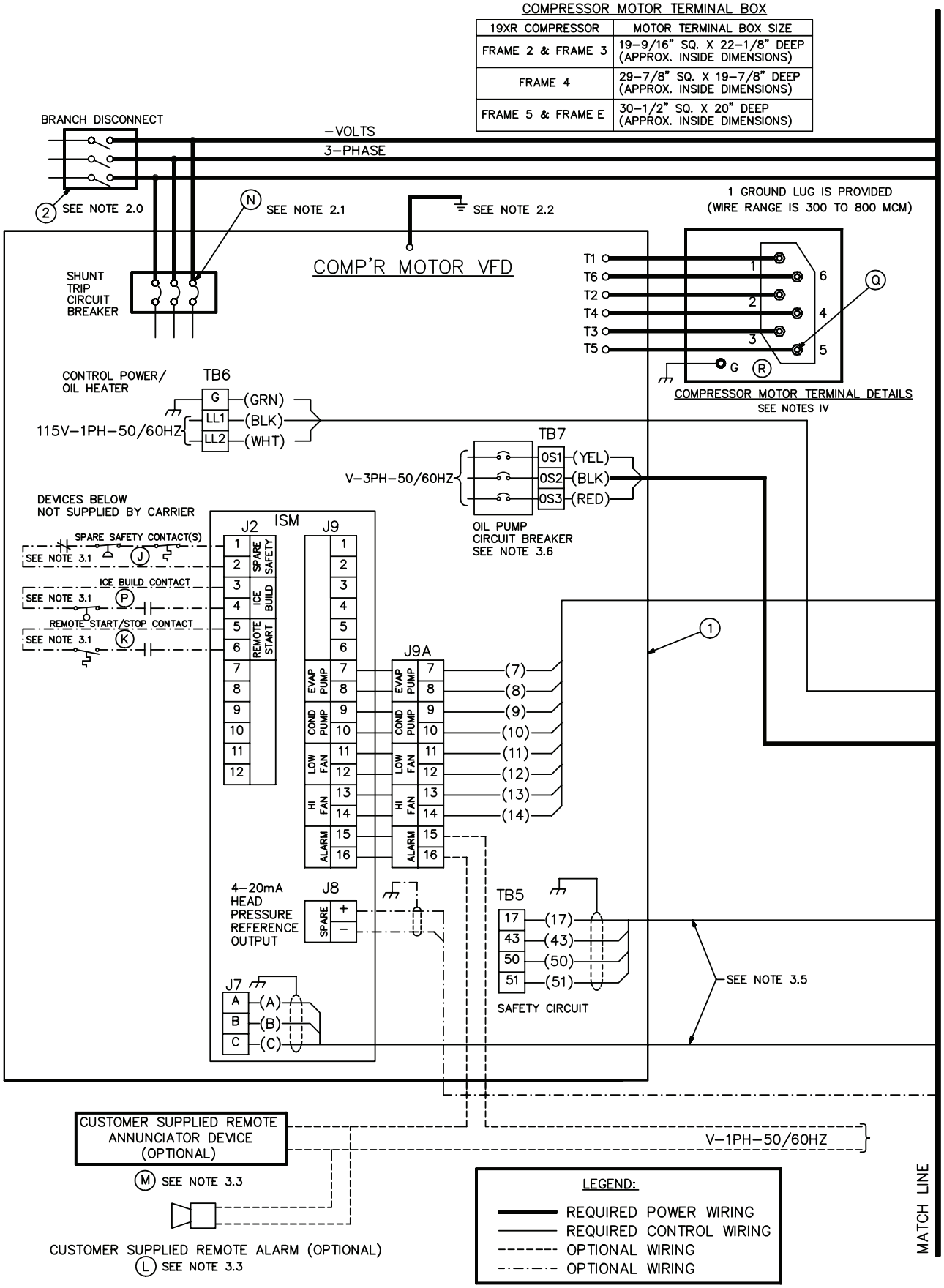
4.5 Do not allow motor terminals to support weight of wire cables. Use cable supports and strain reliefs as required.

4.6 Use backup wrench when tightening lead connectors to motor terminal studs. Torque to 30-35 ft-lb max.

LEGEND FOR FIG. 32
19XR with Free-Standing Low Voltage VFD

REFERENCE NUMBER	EXPLANATION
1	3 Phase Under/Over Voltage
	Phase Loss/Imbalance/Reversal
	Motor Overload Protection
	Frequency Shift
	kW Transducer/kW Hours/Demand kW
	Single Cycle Dropout
	Motor/Starter Overcurrent
	Control Power Transformer (3KVA) (Integral)
	Controls and Oil Heater Circuit Breaker (integral)
	Oil Pump Circuit Breaker (Integral)
	Phase to Ground Fault Protection
	3 Phase Analog Volts/Amps Meter Package
	Power Factor Correction Package
	Lightning/Surge Arrestor Package
	Line Reactor
	Passive Line Filter
	12 Pulse Input Section
	Run Indicating Light
	Emergency Stop Switch
2	Compressor Motor Starter Branch Disconnect
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 Motor Starter Disconnect (Low Fan/#1)
F	Cooling Tower Fan Motor Starter (Low Fan/#1)
G	Cooling Tower Fan Motor Starter Disconnect (High Fan/#2)
H	Cooling Tower Fan Motor 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	Lug Adapters See Note 2.1
P	Ice Build Start/Terminate Device See Note 3.1
Q	Lead Connectors See Note 4.0
R	6 Lead to 3 Lead Jumpers See Note 4.0

See Notes on page 48.



NOTE: See Legend on page 45.

Fig. 32 — 19XR Typical Field Wiring with Free-Standing Low Voltage VFD

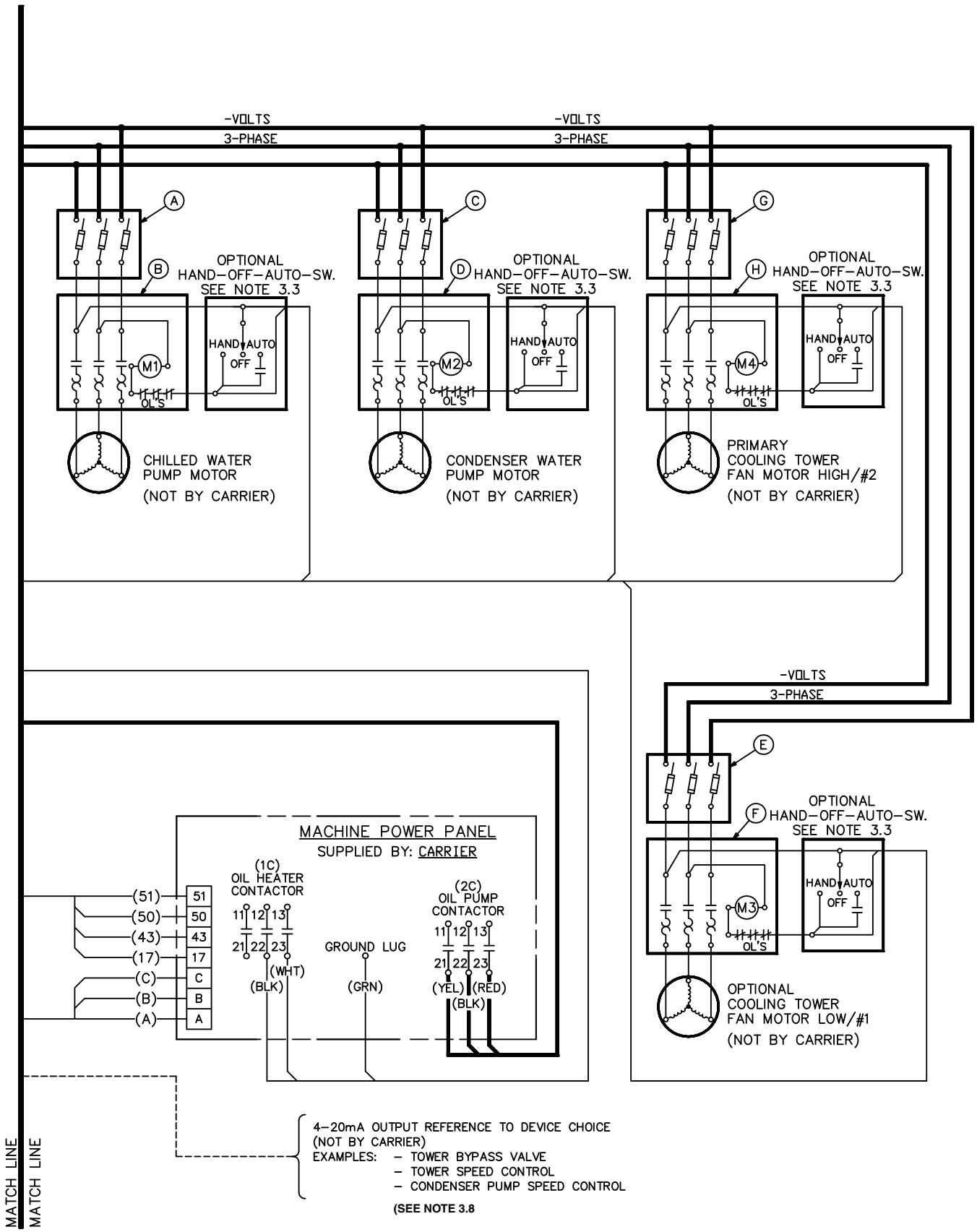


Fig. 32 — 19XR Typical Field Wiring with Free-Standing Low Voltage VFD (cont)

NOTES FOR FIG. 32
19XR with Free-Standing Low Voltage VFD

I. GENERAL

1.0 Variable Frequency Drive (VFD) shall be designed and manufactured in accordance with Carrier Engineering Requirement Z-416.

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.

⚠ CAUTION

To prevent damage to machine, do NOT punch holes or drill into the top surface of the VFD enclosure for field wiring. Knockouts are provided on the side of the VFD enclosure for field wiring connections.

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 shut down.

1.5 WARNING — Do not use aluminum conductors.

1.6 Installer is responsible for any damage caused by improper wiring between VFD and machine.

1.7 All field-installed wiring is field-supplied.

II. POWER WIRING TO VFD

2.0 Provide a local means of disconnecting power to VFD.

2.1 Lug adapters may be required if installation conditions dictate that conductors be sized beyond the minimum ampacity required. Refer to VFD dimensional drawings for lug information.

2.2 Compressor motor and controls must be grounded by using equipment grounding lugs provided inside VFD enclosure.

III. CONTROL WIRING

3.0 Field supplied control conductors to be at least 18 AWG or larger.

3.1 Optional ice build start/terminate device contacts, optional remote start/stop device contacts and optional spare safety device contacts, 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 J2-1 and J2-2 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 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 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 which has wires carrying 50 v or higher or along side wires carrying 50 v or higher.

3.5 Control wiring between VFD and power panel must be separate shielded cables with minimum rating 600 v, 80 C. Ground shield at VFD.

3.6 If optional pumpout/oil pump circuit breaker is not supplied within the starter enclosure, it must be located within sight of machine with wiring routed to suit.

3.7 When providing conductors for oil pump motor and oil heater power, refer to sizing data on label located on the chiller power panel, equipment submittal documentation or equipment product data catalog.

3.8 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.

IV. POWER WIRING BETWEEN FREE-STANDING VFD AND COMPRESSOR MOTOR

4.0 Low voltage (600 v or less) compressor motors have (6) $^{5}/_{8}$ in. terminal studs with 19XR frame 2 and 3 compressor or (6) $^{7}/_{8}$ -in. terminal studs with 19XR frame 4 and 5 compressor (lead connectors not supplied by Carrier). Either 3 or 6 leads must be run between compressor motor and VFD, depending on the size of the conductors or the type of motor starter employed. If only 3 leads are utilized, jumper motor terminals as follows: 1 to 6, 2 to 4, 3 to 5. Center to center distance between frame 2 and 3 compressor terminals is 3-$^{5}/_{32}$ in. Center to center distance between frame 4 and 5 compressor terminals is 4-$^{13}/_{16}$ in. Compressor motor VFD must have nameplate stamped as to conforming with Carrier Engineering requirement "Z-416."

4.1 Power conductor rating must meet minimum unit nameplate voltage and compressor motor RLA. Refer to the label located on the side of the chiller control panel, equipment submittal documentation or equipment product data catalog for conductor sizing data. (Conductor as defined below may be a single lead or multiple smaller ampacity leads in parallel for the purpose of carrying the equivalent or higher current of a single larger lead.)

When (3) conductors are used:

Minimum ampacity per conductor = 1.25 x compressor RLA

When (6) conductors are used:

Minimum ampacity per conductor = 1.25 x compressor RLA / 2.

4.2 When more than one conduit is used to run conductors from VFD to compressor motor terminal box, an equal number of leads from each phase (conductor) must be in each conduit to prevent excessive heating. (For example, conductors to motor terminals 1, 2, and 3 in one conduit, and conductors to motor terminals 4, 5, and 6 in another).

4.3 Compressor motor power conductors may enter terminal box through top, left side or bottom left using holes cut by contractor to suit conduit. Flexible conduit should be used for the last few feet to the terminal box for unit vibration isolation. Use of stress cones or 12 conductors larger than 500 MCM may require an oversize (special) motor terminal box (not supplied by Carrier). Lead connections between 3-phase motors and VFD must not be insulated until Carrier personnel have checked compressor and oil pump rotations.

4.4 Compressor motor frame to be grounded in accordance with the National Electrical Code (NFPA-70) and applicable codes. Means for grounding compressor motor is a pressure connector for #4 AWG to wire, supplied and located in the lower left side corner of the compressor motor terminal box.

4.5 Do not allow motor terminals to support weight of wire cables. Use cable supports and strain reliefs as required.

4.6 Use backup wrench when tightening lead connectors to motor terminal studs. Torque to 45 lb-ft max.

4.7 Do not exceed 100 ft. maximum power cable length between the VFD and motor terminals without consulting Carrier for special requirements.

LEGEND FOR FIG. 33
19XR with Free-Standing Medium Voltage VFD

AWG — American Wire Gage
CBx — Circuit Breaker
DI — Drive Input Contactor
DIC — Drive Input Control Relay
DICR1 — Drive Input Contactor Pilot Relay
DIIS — Drive Input Isolating Switch
DIOLx — Drive Input Overload Auxiliary Relay
DITB — Drive Input Contactor Terminal Blocks
DSx — Disconnect Switch
FLT — Fault Relay
GRD — Ground
HPR — High Pressure Relay
IFM — Interface Module
ISM — Integrated Starter Module
L-C — Locked Closed
L-O — Locked Open
LV — Low Voltage
LVx — External Low Voltage Supply
MSRXx — Monitoring Safety Relay Auxiliary Relay x
MV — Medium Voltage
PE — Earth Ground
PP — Carrier Power Panel
RUN — Run Relay
SS — Surge Suppressor
VFD — Variable Frequency Drive
WRN — Warning Relay

66 Carrier ISM to be programmed by Carrier before start-up. Relay contacts shown without signal power applied.

104 Located in drive low voltage control section. Wire with #12 AWG.

WIRING

Factory Wiring

Field Wiring

Mechanically Connected

Conductor, Crossing of Paths or Conductors Not Connected

Conductor, Junction of Connected Paths, Conductors or Wires

Conductor, Separable or Jacks Engaged

Terminal

Terminal (Rockwell Automation use only)

Terminal Blocks — Barrier

Wired To/From Destination

SWITCHES AND INPUT DEVICES

Contact Normally Open (Make)

Contact Normally Closed (Break)

OUTPUT DEVICES

Fan (3 Phase Induction Motor)

Induction Machine

RESISTORS, CAPS, WINDINGS AND GROUND

Capacitor

Winding

Transformer, Current

PROTECTION

Circuit Breaker, Control/Power

Fuse, Control/Power

Surge Suppressor

POWER ELECTRONIC DEVICES

Symmetrical Gate-Commutated Thyristor and Gate Driver Board

MISCELLANEOUS

Note Number Indicator

Contact Location Description

Relay Location Description

Key Interlock on Isolation Switch

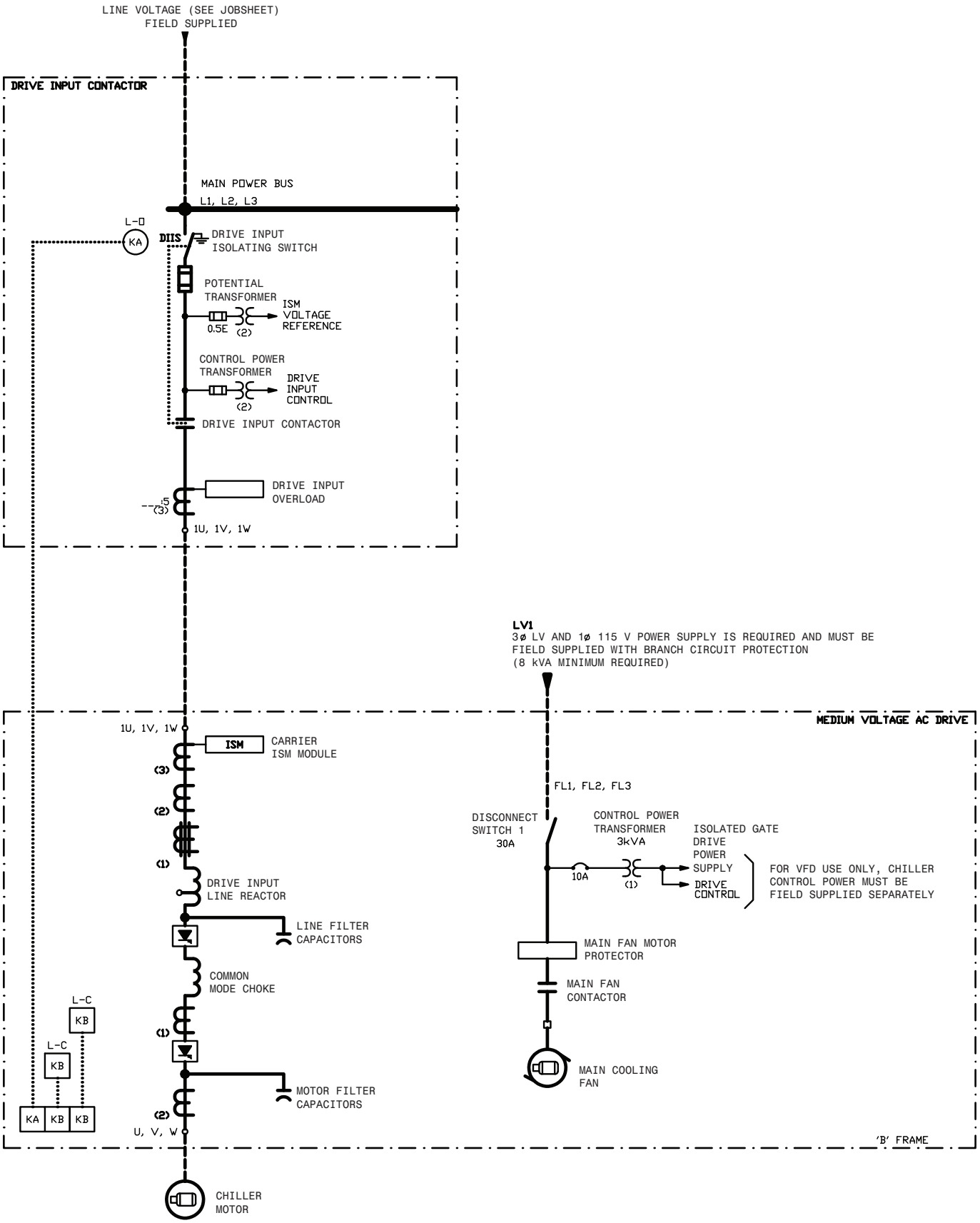
Key Interlock on MV Door

Multiple Barrel Key Interlock on Isolation Switch

Multiple Barrel Key Interlock on MV Door

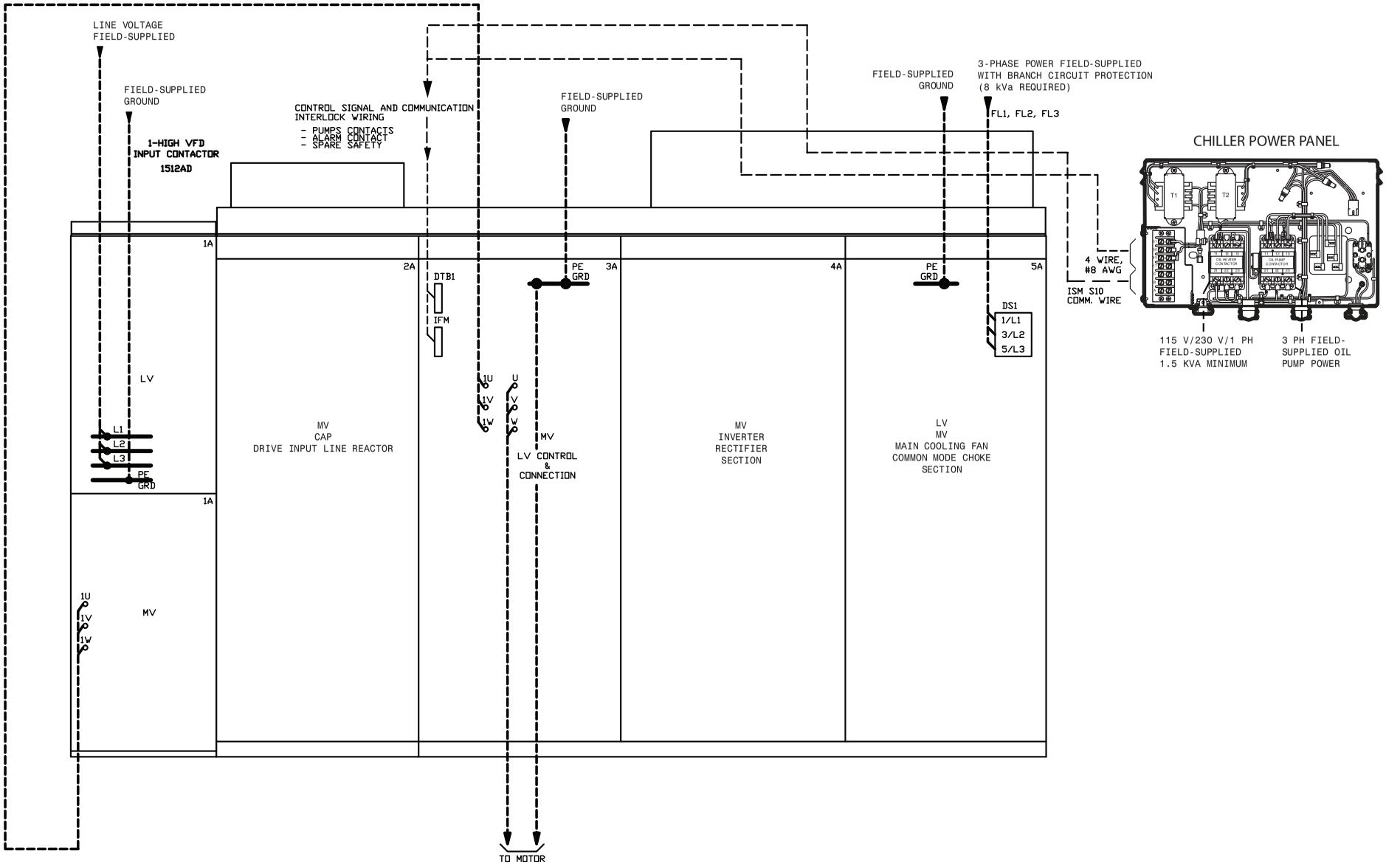
Transfer Block

See Notes on page 53.



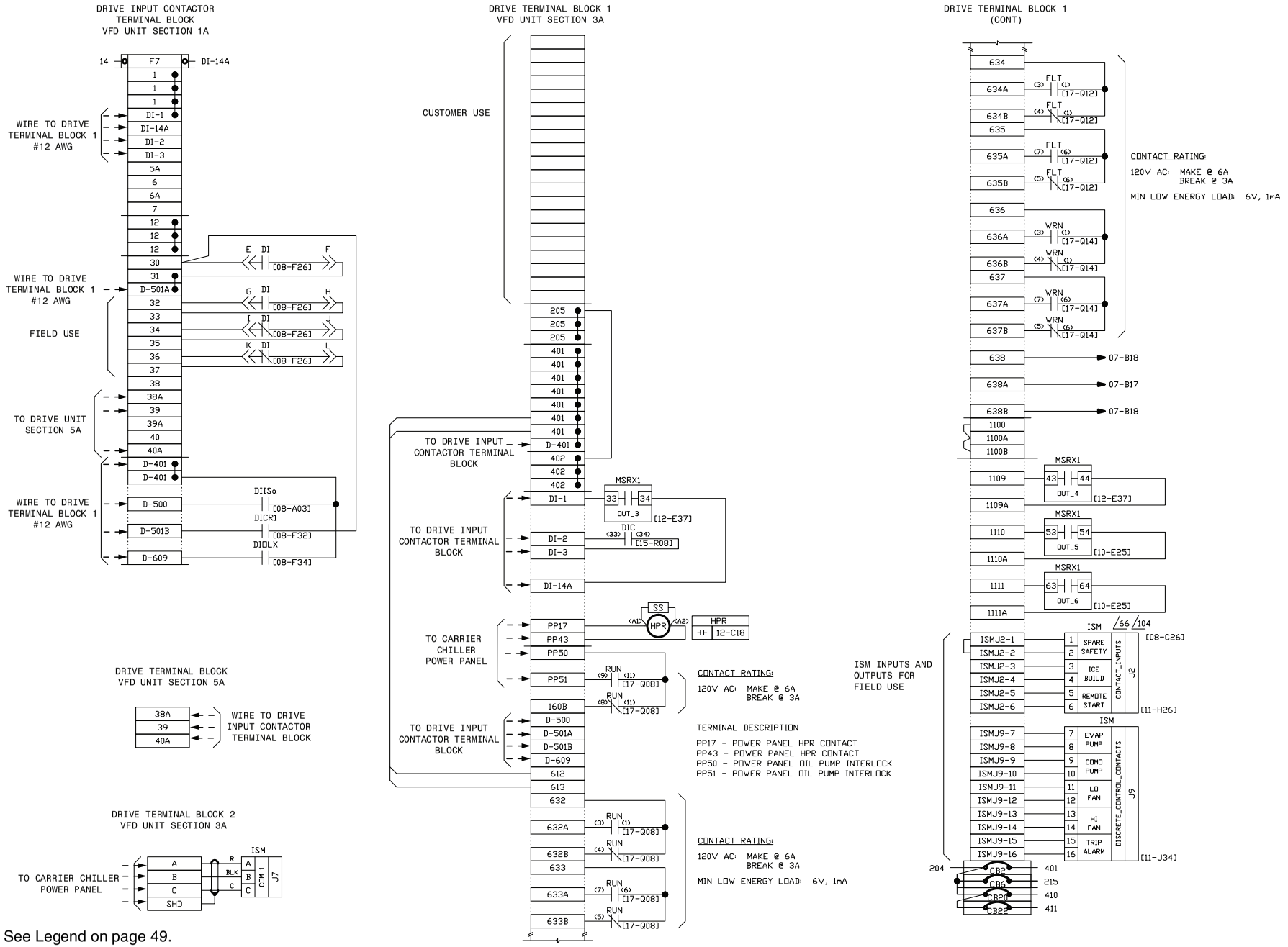
See Legend on page 49.

Fig. 33 — 19XR Typical Field Wiring with Free-Standing Medium-Voltage VFD



See Legend on page 49.

Fig. 33 — 19XR Typical Field Wiring with Free-Standing Medium-Voltage VFD (cont)



See Legend on page 49.

Fig. 33 — 19XR Typical Field Wiring with Free-Standing Medium-Voltage VFD (cont)

NOTES FOR FIG. 33
19XR with Free-Standing Medium Voltage VFD

I. GENERAL

1.0 Variable Frequency Drive (VFD) shall be designed and manufactured in accordance with Carrier Engineering Requirement Z-416.

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.

⚠ CAUTION

To prevent damage to machine, do NOT punch holes or drill into the top surface of the VFD enclosure for field wiring. Field wiring knockouts are provided on the top and side of the VFD enclosure for field wiring connections.

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 chiller shutdown.

1.5 WARNING - Do not use aluminum conductors.

1.6 Installer is responsible for any damage caused by improper wiring between VFD and machine.

1.7 All field-installed wiring is field-supplied.

II. POWER WIRING TO VFD

2.0 Provide a means of disconnecting power to VFD.

2.1 Lug adapters may be required if installation conditions dictate that conductors be sized beyond the minimum ampacity required. Contact VFD supplier for lug information.

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

III. CONTROL WIRING

3.0 Field supplied control conductors to be at least 18 AWG or larger.

3.1 Optional Ice build start/terminate device contacts, optional remote start/stop device contacts and optional 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 ISM J2-1 and ISM J2-2 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 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 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 which has wires carrying 50 v or higher or along side wires carrying 50 v or higher.

3.5 Control wiring between VFD and power panel must be separate shielded cables with minimum rating 600 v, 80 C. Ground shield at VFD

3.6 If optional pumpout/oil pump circuit breaker is not supplied within the starter enclosure, it must be located within sight of machine with wiring routed to suit.

3.7 When providing conductors for oil pump motor and oil heater power, refer to sizing data on label located on the chiller power panel, equipment submittal documentation or equipment product data catalog.

3.8 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.

IV. POWER WIRING BETWEEN FREE-STANDING VFD AND COMPRESSOR MOTOR

4.0 Medium voltage (over 600 volts) compressor motors have (3) terminals. Connections are $^{9}/_{16}$-in. threaded stud. A compression lug with a single $^{9}/_{16}$-in. diameter hole can be connected directly to the stud or 3 adapters are supplied for connecting a NEMA lug. Use suitable connectors and insulation for high voltage alternating current cable terminations (these items are not supplied by Carrier). Compressor motor starter must have nameplate stamped as to conforming with Carrier Engineering requirement "Z-416."

4.1 Power conductor rating must meet minimum unit nameplate voltage and compressor motor RLA. Refer to the label located on the side of the chiller control panel, equipment submittal documentation or equipment product data catalog for conductor sizing data. (Conductor as defined below may be a single lead or multiple smaller ampacity leads in parallel for the purpose of carrying the equivalent or higher current of a single larger lead.)

When (3) conductors are used:

Minimum ampacity per conductor = 1.25 x compressor RLA

When 96) conductors are used:

Minimum ampacity per conductor = 1.25 x compressor RLA/2

4.2 When more than one conduit is used to run conductors from VFD to compressor motor terminal box, an equal number of leads from each phase (conductor) must be in each conduit to prevent excessive heating. (For example, conductors to motor terminals 1, 2, and 3 in one conduit, and to 1, 2, and 3 in another conduit).

4.4 Compressor motor power conductors may enter terminal box through top, left side or bottom left using holes cut by contractor to suit conduit. Flexible conduit should be used for the last few feet to the terminal box for unit vibration isolation. Use of stress cones may require an oversize (special) motor terminal box (not supplied by Carrier).

4.3 Compressor motor frame to be grounded in accordance with the National Electrical Code (NFPA-70) and applicable codes. Means for grounding compressor motor is a #4 AWG to 500 MCM pressure connector, supplied and located in the lower left side corner of the compressor motor terminal box.

4.5 Do not allow motor terminals to support weight of wire cables. Use cable supports and strain reliefs as required.

4.6 Use backup wrench when tightening lead connectors to motor terminal studs. Torque to 30-35 ft-lb max.

4.7 Do not exceed 100 ft. maximum power cable length between the VFD and motor terminals without consulting Carrier for special requirements.

Connect Power Wires to Oil Pump Starter — See Fig. 34. Connect power wires to oil pump starter mounted in machine power panel. Use separate fused disconnect or circuit breaker as shown on job wiring diagrams and Fig. 34. Check that power supply voltage agrees with oil pump voltage. Follow correct phasing for proper motor rotation.

⚠ CAUTION

Do not punch holes or drill into the top surface of either power panel. Knockouts are provided in the bottom of the power panels for wiring connections. Damage to machine could result.

Connect Power Wires to Oil Heater Contactor — Connect control power wiring between the oil heater contactor terminals and terminals LL1 and LL2 on the field wiring strip in the compressor motor starter. Refer to Fig. 35 and wiring label on the machine power panel for units without split ring diffuser. Refer to Fig. 36 for units with split ring diffuser.

⚠ WARNING

Voltage to terminals LL1 and LL2 (of each circuit) comes from a control transformer in a starter built to Carrier specifications. Do not connect an outside source of control power to the compressor motor starter (terminals LL1 and LL2 of each circuit). 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. Severe injury could result.

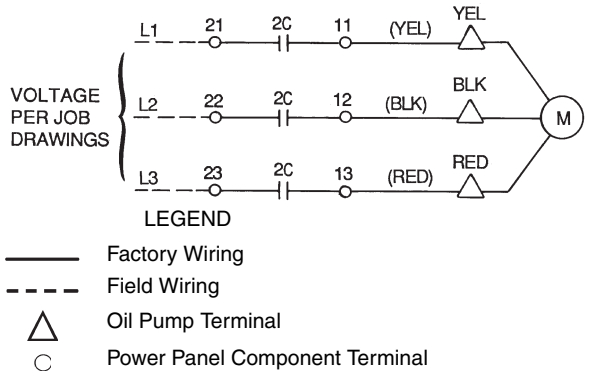


Fig. 34 — Oil Pump Wiring

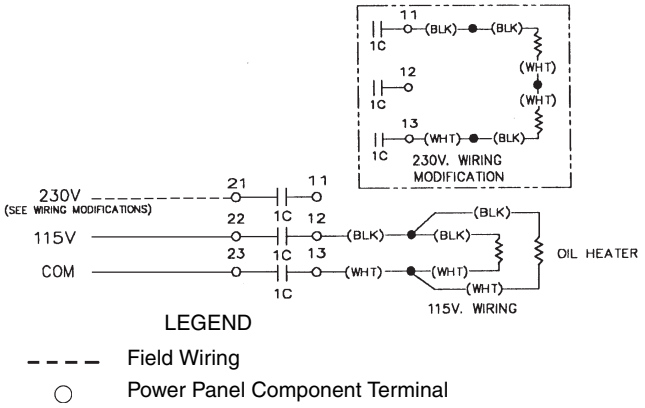


Fig. 35 — Oil Heater and Control Power Wiring (Units without Split Ring Diffuser)

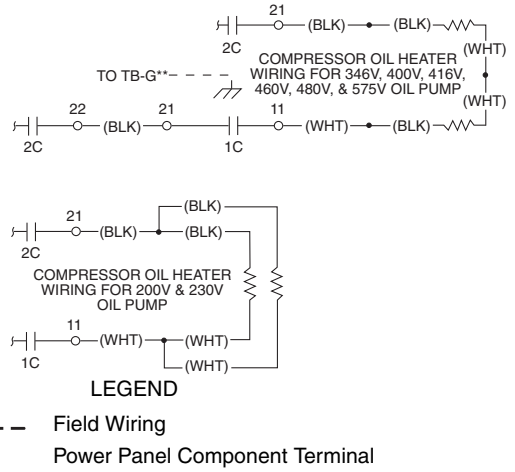


Fig. 36 — Oil Heater and Control Power Wiring (Units with Split Ring Diffuser)

Connect Wiring from Starter to Power Panel — Connect control wiring from main motor starter to the machine power panel. All control wiring must use shielded cable. Also, connect the communications 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. 25 for location of the CCN network connections on the terminal strip labelled 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 below for cables that meet the requirements.

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. The following color code is recommended:

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.

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. 25. 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 19XR chiller to the network, proceed as follows (see Fig. 25):

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.

OPTIONAL UPC OPEN CONTROLLER WIRING — The optional UPC Open 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. 37-39.

To wire the UPC Open controller to the BAS 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 associated polarity.

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

MS/TP Wiring Recommendations — Recommendations are shown in Tables 13 and 14. The wire jacket and UL temperature rating specifications list two 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.

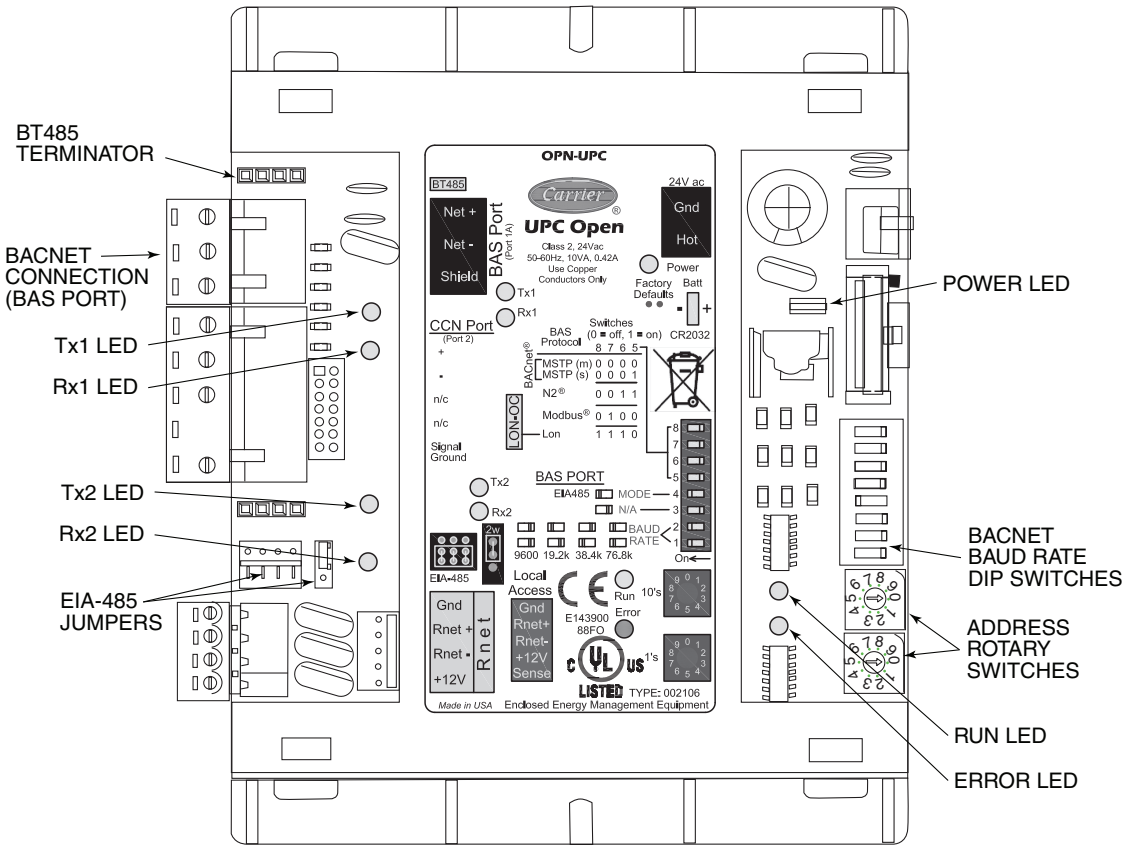


Fig. 37 — UPC Open Controller

* Sponsored by ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers).

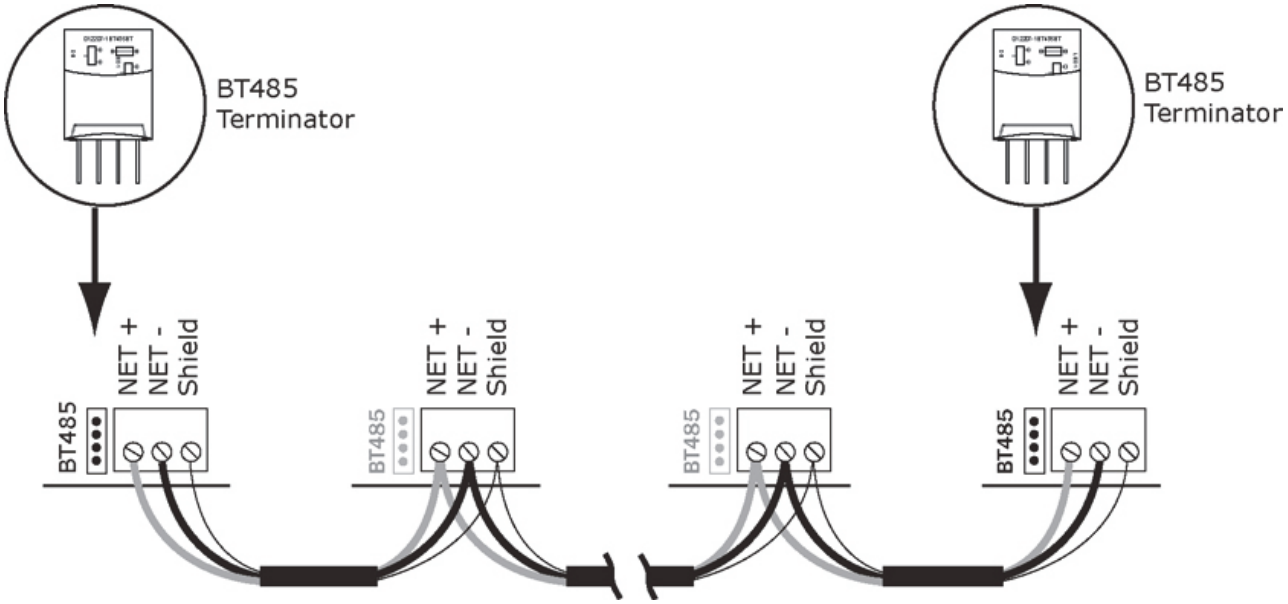


Fig. 38 — Network Wiring

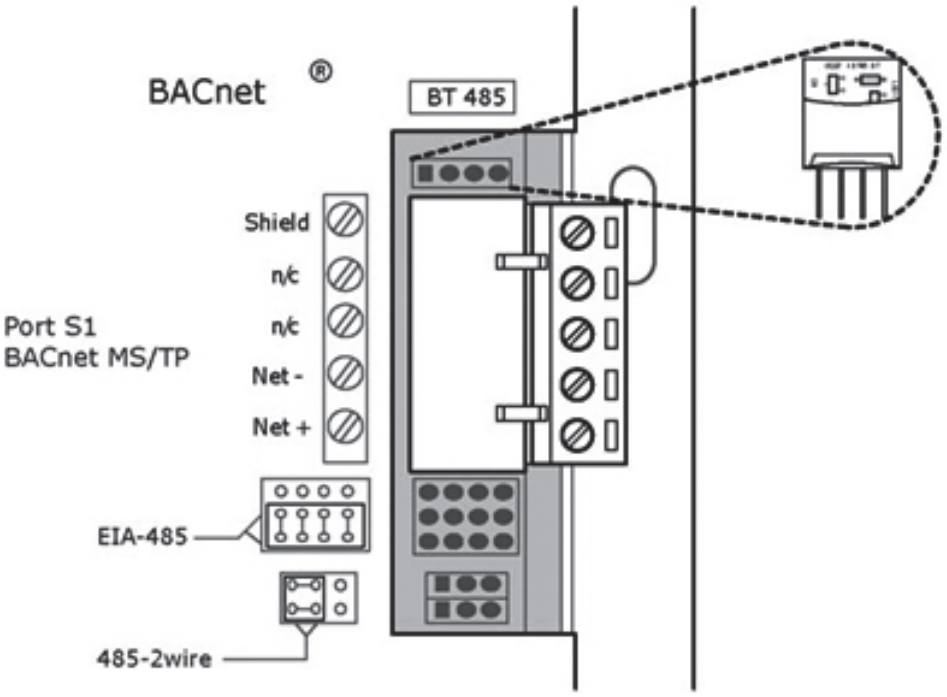


Fig. 39 — BT485 Terminator Installation

Table 13 — 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 14 — 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

Step 6 — 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 jobsite, insulate the following components:

- compressor motor
- cooler shell
- cooler tube sheets
- suction piping
- motor cooling drain
- oil reclaim piping
- oil cooler refrigerant side tubing
- 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. 40.

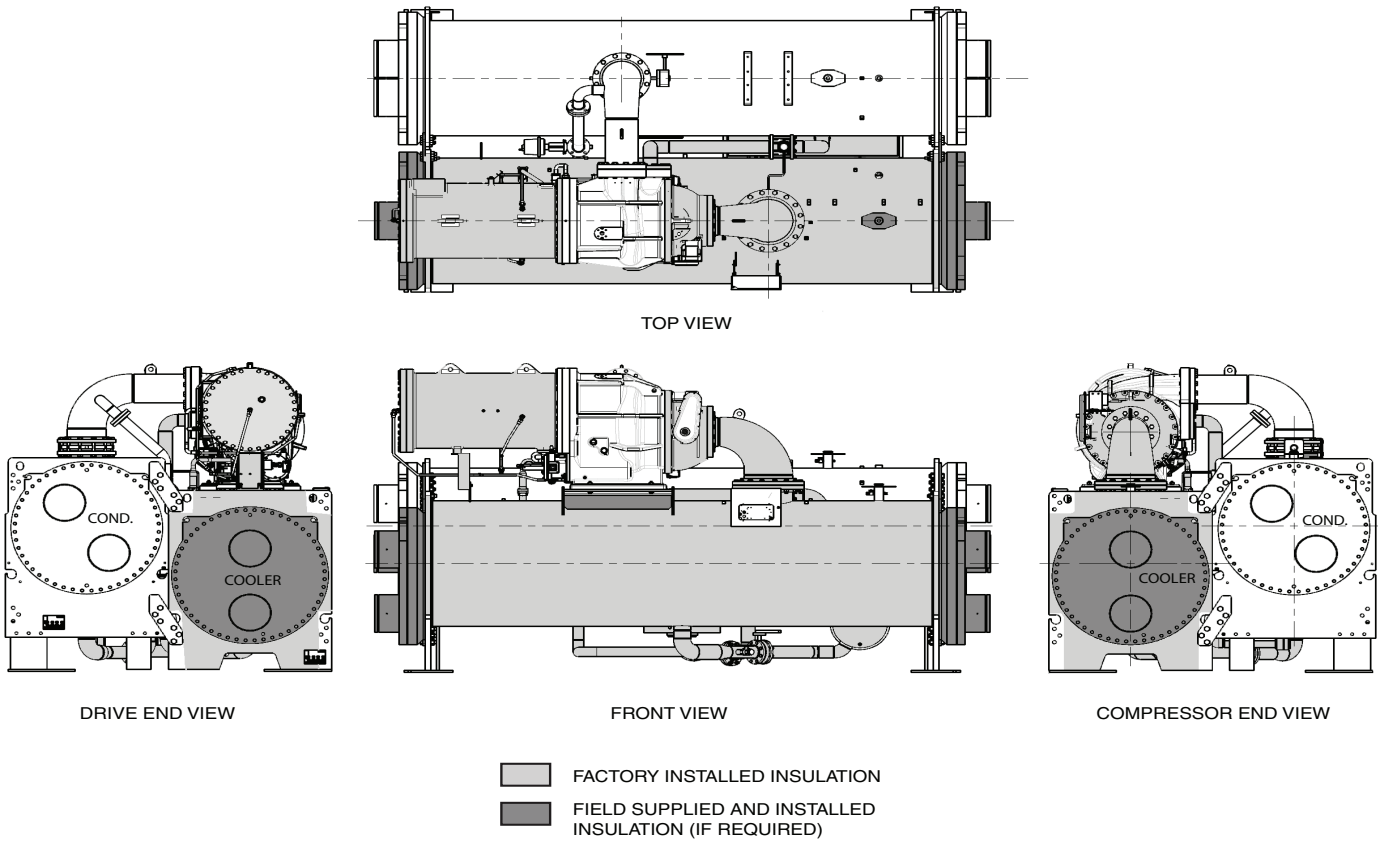


Fig. 40 — 19XR,XRV Insulation Area

INSTALLATION START-UP REQUEST CHECKLIST

Machine Model Number: 19XR Serial Number: _____

To: _____

_____

_____

Attn: _____

Date _____

_____
Project Name

_____
Carrier Job Number

The following information provides the status of the chiller installation.

	YES/NO (N/A)	DATE TO BE COMPLETED
1. The machine is level.		
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 starter wiring is complete. The wiring is installed per installation instructions and certified prints.		
a. Power wiring to compressor motor. (Motor leads will not be taped until the Carrier technician megger tests the motor.)		
b. Oil pump wiring		
c. Oil heater/control wiring		
d. Carrier controls can independently energize water pumps and tower fan.		
e. Line side voltage is within ±10% of chiller nameplate voltage.		
f. Other _____		
8. The motor starter has not been supplied by Carrier. It has been installed according to the manufacturer's instructions.		
9. The motor starter has not been supplied by Carrier and it has been checked for proper operation.		

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 jobsite will be _____

Phone number _____

Pager/cell 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 Jobsite Supervisor _____

CUT ALONG DOTTED LINE

CUT ALONG DOTTED LINE