



# Installation Instructions

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## 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 relief valve or fusible plugs 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. Open the power supply disconnect before touching motor leads or terminals and wait for capacitors to fully discharge.

**⚠ WARNING**

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

**DO NOT USE TORCH** to remove any component. System contains refrigerant which can be under pressure.

To remove a component, wear protective gloves and goggles and other necessary safety equipment, and proceed as follows.

- a. Shut off electrical power to unit.
- b. Recover refrigerant 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.
- e. Carefully unsweat remaining tubing stubs when necessary.

**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, variable frequency drives (VFDs), or compressors until you are sure **ALL POWER IS OFF** and no residual voltage can leak from capacitors or batteries. To turn power off to the chiller, the Main Circuit Breaker (MCB), Service Circuit Breaker (SCB), and Uninterruptible Power Supply (UPS) must be turned off.

**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.

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., with refrigerant in the machine or while machine is running. Be sure pressure is at 0 psig (0 kPa) before breaking any refrigerant connection. Note that at 65°F (18°C) the machine is at near 0 psig (0 kPa) so ensure to properly check for the existence of refrigerant in the machine.

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

**⚠ WARNING**

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

**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.

Prior to installing or servicing this equipment ensure that personal protective equipment (PPE) is worn as required per OSHA or other local regulations.

For servicing or installing components where there is a risk of arc flash the technicians must wear personal protective equipment as identified in NFPA (National Fire Protection Association) 70E or other local country-specific requirements for arc flash protection.

**⚠ WARNING**

**MAGNETIC FIELD HAZARD**

Units equipped with the permanent magnet motor option contain rotors with powerful magnetic fields. Permanent magnet motor rotors, when removed from the stator, expose surrounding personnel and equipment to powerful magnetic fields which may cause serious health hazards to persons with pacemakers or defibrillators, hearing aids, metal implants, or other implanted electronic medical devices, and may impact other electronic devices such as mobile phones or smartwatches, watches, credit cards, etc. Persons in a risk group should consult a physician prior to compressor disassembly. Failure to follow these procedures may result in personal injury or death.

**⚠ WARNING**

The magnetic bearings have UPS power supply that provides control power. Before service or repair work starts disconnect the UPS and verify with voltage meter that there is no power present.

**⚠ WARNING**

Rotation of the shaft can generate voltage potential at the motor terminals. If the shaft is to be rotated the motor terminals should be grounded.

**⚠ CAUTION**

Dispose of refrigerant per local codes and regulations.

**DO NOT** introduce oil to the refrigerant circuit with refrigerant recovery containers, vacuum pump, or other means.

**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 contamination when timely repairs cannot be completed.

**⚠ CAUTION**

Install this equipment in a location which is not available for general public access. General installation altitude is to be 1000 m (3300 ft) or less unless special altitude height is defined at the time of unit selection.

Evaporator water temperature is 0°F (-17.8°C) to 150°F (65.6°C). Allowable water pressure is 0 psig (0 kPa) to 150 psig (1034 kPa) or as indicated on vessel nameplate.

**⚠ 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 VFD, TOWER FAN, OR PUMPS. Open the disconnect *ahead of* the VFD, 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. Ensure to slope piping way from relief device.

**INTRODUCTION**

**General**

The 19MV unit is factory assembled, wired, and leak tested. Installation consists primarily of establishing water and electrical services to the machine. 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. The refrigerant charge will be installed by the Carrier Start-up Technician during the start-up process.

**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

**CHILLER FAMILIARIZATION**

**Chiller Information Nameplate**

The information nameplate is located on the left side of the chiller control panel. Refer to Fig. 1 for model number identification.

**System Components**

The main components include the evaporator and condenser heat exchangers in separate vessels, compressor, PIC6 Touch Screen, power panel, economizer (option), VFD, and magnetic bearing system.

**Evaporator**

This heat exchanger is located underneath the compressor. The evaporator is maintained at lower refrigerant temperature/pressure so evaporating refrigerant can remove heat from water flowing through its internal tubes.

**Condenser**

This heat exchanger operates at a higher refrigerant temperature/pressure than the evaporator and has water flowing through its internal tubes in order to remove heat from the refrigerant.

**Compressor**

This component maintains system temperature and pressure differences and moves the heat carrying refrigerant from the evaporator to the condenser. The 19MV unit has a back to back two-stage, direct drive, and economized compressor.

The image shows two Carrier nameplate forms for a 19MV Refrigeration Machine. The left form is a detailed technical specification sheet with sections for Machine Nameplate Supply Data and Machine Electrical Data. The right form is a summary sheet with sections for Refrigeration Machine details, Test Pressure, and Safety Code Certification.

MACHINE NAMEPLATE SUPPLY DATA	
VOLTS/PHASE-HERTZ	
VFD INPUT AMPS	
OVERLOAD TRIP AMPS	
MAX FUSE/CIRCUIT BREAKER SIZE	
MIN SUPPLY CIRCUIT CAPACITY	

MACHINE ELECTRICAL DATA	
MOTOR NAMEPLATE VOLTAGE	
COMPRESSOR 100% SPEED Hz	
RATED LINE VOLTAGE	
RATED LINE AMPS	
RATED LINE KILOWATTS	
MOTOR RATED LOAD KW	
MOTOR RATED LOAD AMPS	
MOTOR NAMEPLATE AMPS	
MOTOR NAMEPLATE RPM	
MOTOR NAMEPLATE KW	
INVERTER PWM FREQUENCY Hz	
STATOR WINDING RESISTANCE OHMS	
MOTOR D-AXIS INDUCTANCE mH	
MOTOR Q-AXIS INDUCTANCE mH	
MOTOR BACK EMF VOLTS	
SCCR kA	
MOTOR RATED TORQUE N m	

REFRIGERATION MACHINE	
MODEL NUMBER	SERIAL NO.
MACHINE	
COMPRESSOR	
EVAPORATOR	
CONDENSER	
ECONOMIZER	
VFD	N/R
REFRIGERANT R-	LBS. CHARGED
	KGS.
TEST PRESSURE	PSI RPA
MAX. ALLOW. PRESSURE	PSI RPA
CLR. WATER PRESSURE	PSI RPA
COND. WATER PRESSURE	PSI RPA
RATED TONS	
RATED IKW	

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.

**Fig. 1 — 19MV Refrigeration Machine Nameplate**

## PIC6 Touch Screen Panel

This panel is the user interface for controlling the chiller and has the following functions:

- Chiller operation
- Chiller diagnostic
- Chiller status display
- Chiller parameter configuration
- Open protocol interface to outside building management system (BMS)

## Power Panel

This power panel is divided into a high voltage section and a low voltage section. It includes the input and output boards (IOB), control transformers, relays, contactors, and circuit breakers. It provides the power distribution and protection to the electrical component installed on chiller, and has the following functions:

- Communication with PIC6 touch screen
- Communication with VFD
- Communication with magnetic bearing controller (MBC)
- VFD Main Circuit Breaker
- Sensor input and outputs
- Actuators control
- UPS power supply for the magnetic bearing controller (MBC)

## Economizer (Option)

The economizer reduces the refrigerant temperature to an intermediate level between the evaporator and condenser vessels. In the economizer, vapor is led to the inlet of the second stage of the compressor, and the liquid to the evaporator. The energy removed from the vaporized refrigerant in the economizer allows the liquid refrigerant in the evaporator to absorb more heat when it evaporates and benefits the overall cooling efficiency cycle.

## VFD

The VFD provides a pulse width modulated signal that results in variable frequency and voltage to the permanent magnet compressor motor. It is controlled and monitored from the PIC6 control system.

## Magnetic Bearing System

The magnetic bearing system consists of a controller (MBC) which through electromagnetic actuators (active magnetic bearings) controls the levitation of the shaft while the compressor is rotating. Various sensors provide the MBC with information to make corrections to the bearings to keep the shaft at its desired location by adjusting the individual bearings electromagnetic flux. The magnetic bearing system communicates with the PIC6 control system.

## INSTALLATION

### Step 1 — Receive the Machine

#### INSPECT SHIPMENT

#### CAUTION

Do not open any valves or loosen any connections. The 19MV machine may be shipped with a refrigerant or nitrogen holding charge. 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 installation. All openings are closed with covers or plugs to prevent dirt and debris from entering machine components during shipping.

#### IDENTIFY MACHINE

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

#### INSTALLATION REQUIREMENTS

Prior to starting chiller 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. See Fig. 3 for typical compressor chiller components.

#### *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 regulations). General recommendations are included in the Carrier field wiring drawings. Consult drawing for termination lug sizes.

#### *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 any panels. Knockouts are provided on the enclosure. The plate provided to cover the power panel for shipment is to be reused for the tophat conduit entry. The power entry plate is designed to be removed before any holes are made to prevent particulate from entering the cabinet.

#### *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).

#### *Required Airflow Clearances*

Be sure there is adequate clearance for air circulation around the enclosure. Danfoss VFD fans required a minimum clearance of 9 in. (228.6 mm); all other fans require a minimum clearance of 6 in. (152.4 mm) wherever vents are located in an enclosure.

#### *Service Clearances*

Verify that service clearances are adequate as identified in Fig. 4.

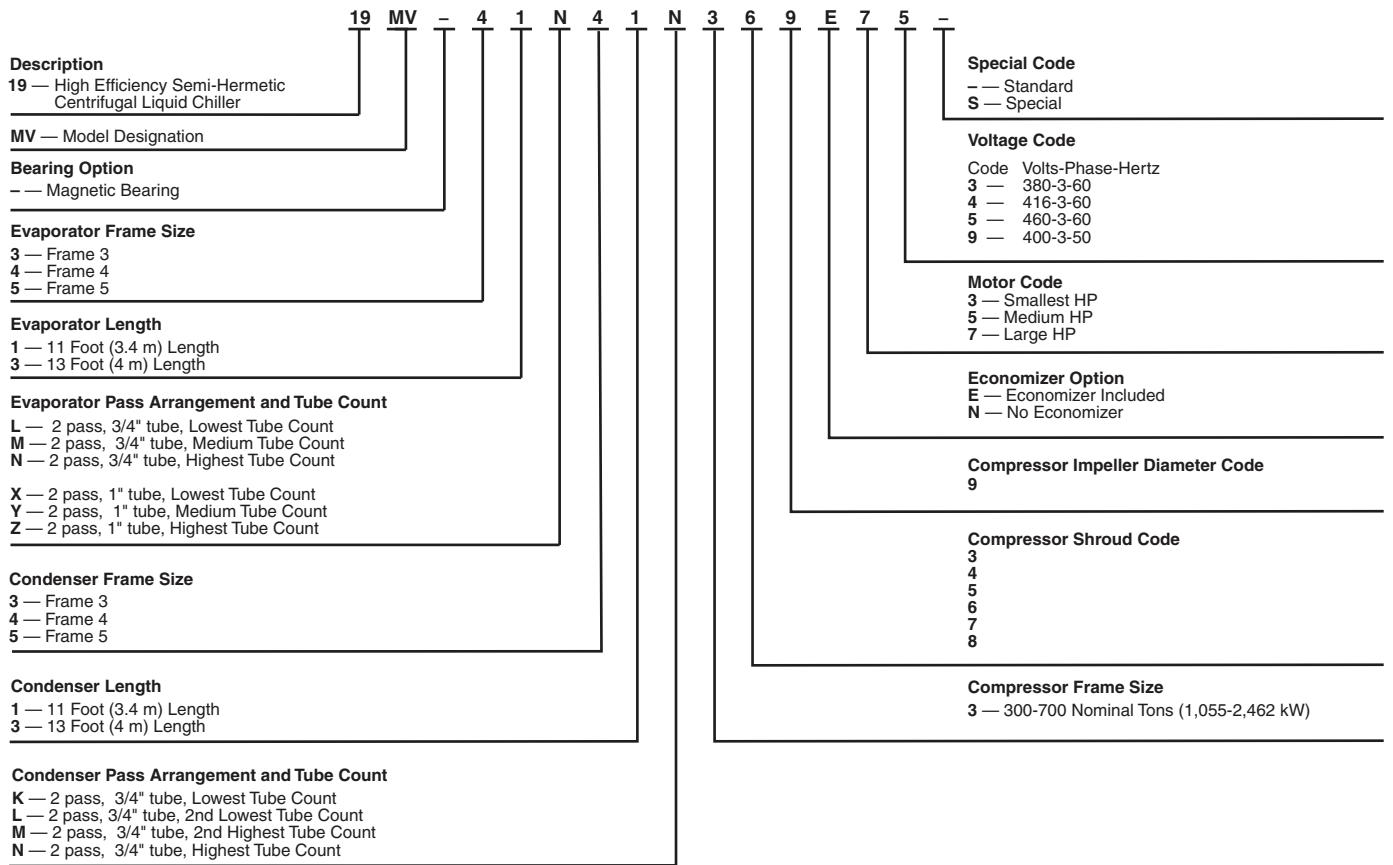
#### *Match Power Module Input and Supply Power Ratings*

It is important to verify that building power will meet the input power requirements of the Machine Electrical Data nameplate input power rating. Be sure the input power to the chiller corresponds to the chiller's nameplate voltage, current, and frequency and to the design data sheet provided by the equipment salesman. Verify all electrical inputs against design data sheets. The electrical data nameplate is located on the right side of the power panel enclosure.

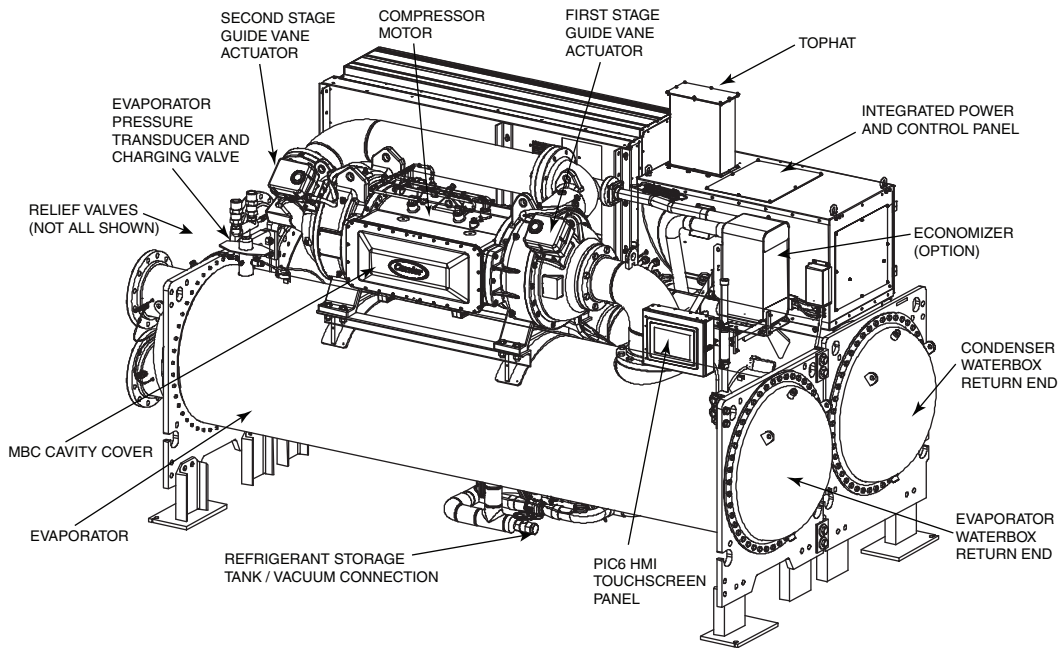
#### PROVIDE MACHINE PROTECTION

Store machine indoors, protected from construction dirt and moisture as identified in the long term storage requirements. 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.

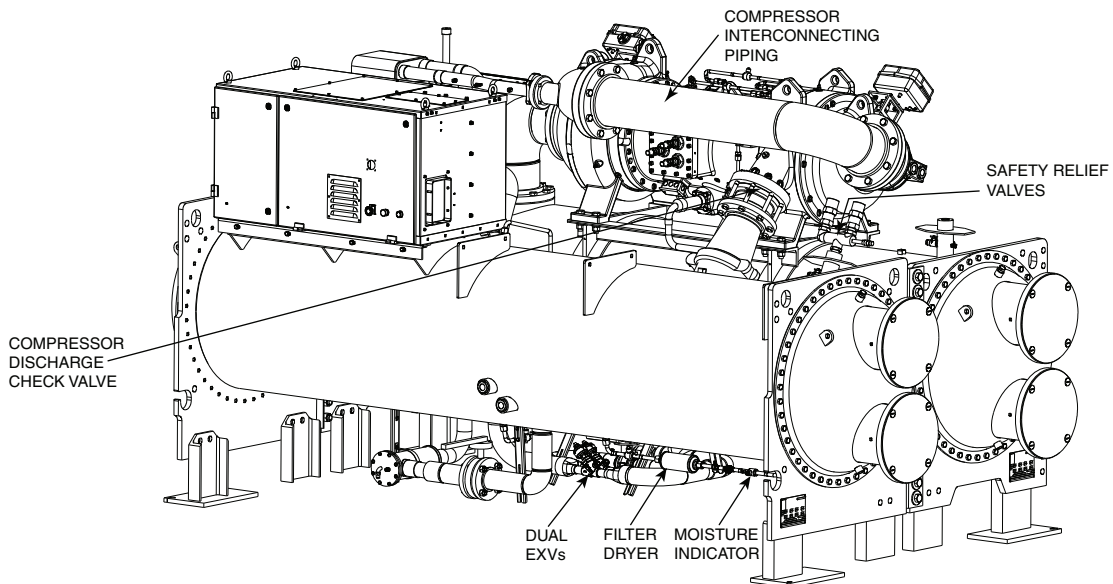
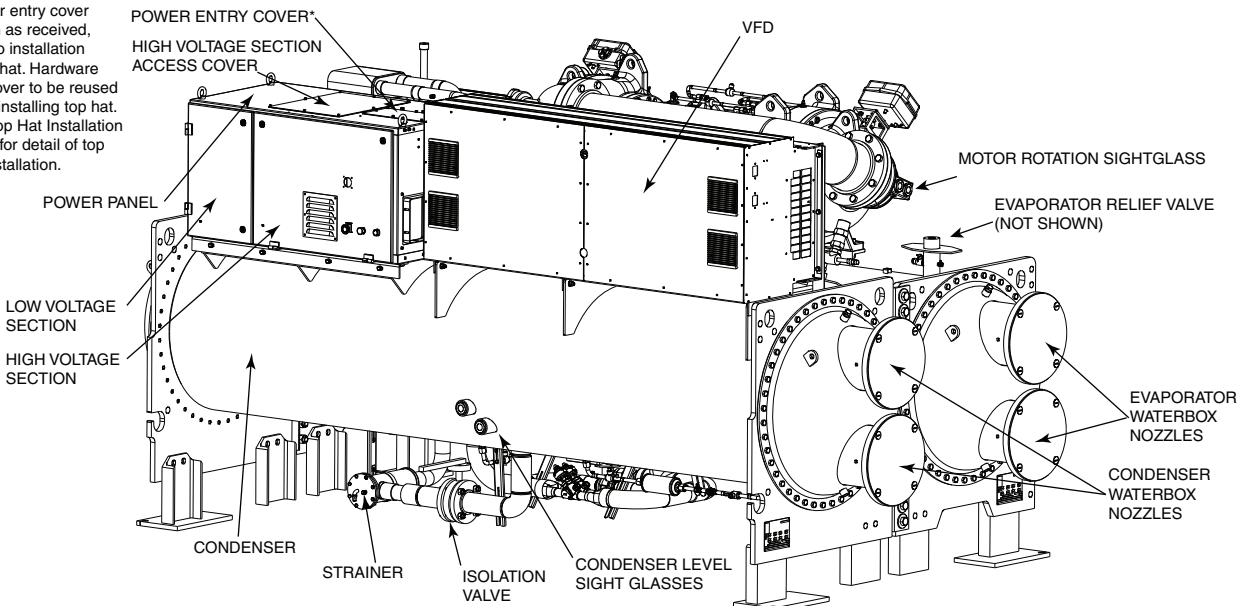




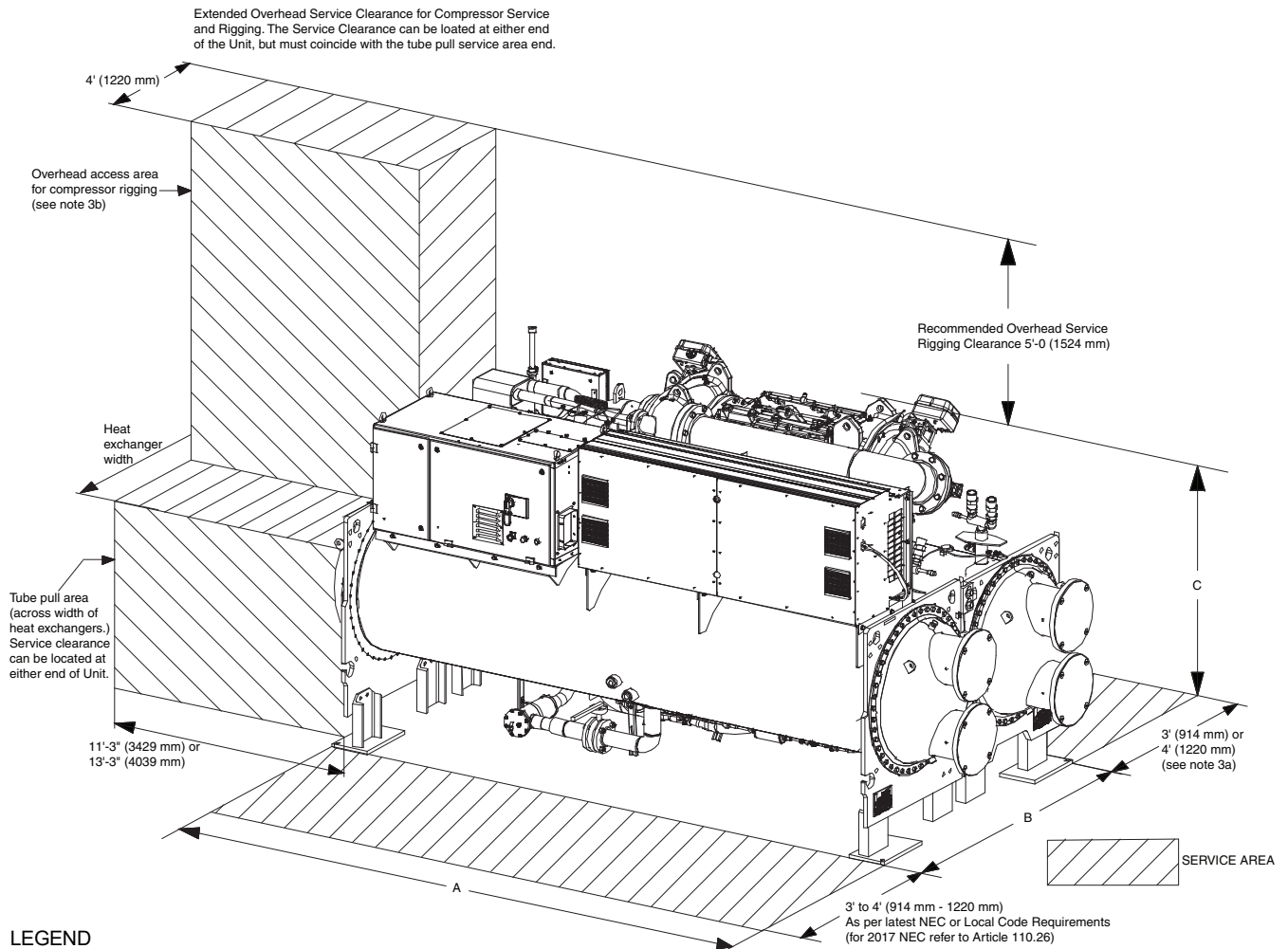
**Fig. 2 — 19MV Chiller Model Number Identification**



\*Power entry cover shown as received, prior to installation of top hat. Hardware and cover to be reused when installing top hat. See Top Hat Installation figure for detail of top hat installation.



**Fig. 3 — Typical 19MV Compressor Chiller Components**



**NOTES:**

1. Dished head (NIH) waterbox shown.
2. Service areas are minimum space required.
3. For compressor service either:
  - a. Allow 4' (1220 mm) on the evaporator side of the chiller.
  - b. Provide free space above the tube pull area equal to the height of chiller plus 5' (1524 mm). The overhead rigging space will allow the tube pull area to be utilized for service and must therefore coincide with the tube pull service area end.
4. For actual unit dimensions, contact your Carrier sales professional for certified drawings.
5. Pressure relief device sizing is based on the assumption that there are no combustible materials within 20 ft (7.7 m) of the pressure vessels.

**Fig. 4 — 19MV Service Clearances**

**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 evaporator and condenser. Leave drains open until system is ready to be filled.

It is important to properly plan before installing a 19MV unit to ensure that the environmental and operating conditions are satisfactory and the machine is protected. The installation must comply with all requirements in this document and 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, non-condensing. 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.

NOTE: NEMA Type 1 power panels are constructed for indoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment and to provide a degree of protection against falling dirt. This type of power panel does not protect against water, dust, moisture or airborne contaminants.

**Step 2 — Rig the Machine**

The 19MV machine can be rigged as an entire assembly. It also has connections that allow the compressor, evaporator, 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), dimensions in Fig. 4, and physical data in Tables 1-10. *Lift machine only from the points indicated in rigging guide.*

**IMPORTANT:** Verify with company performing the rigging that they have access to required spreader beam for 4 point lift. Carrier is not responsible for rigging damage.

Each lifting cable or chain must be capable of supporting the entire weight of the machine.

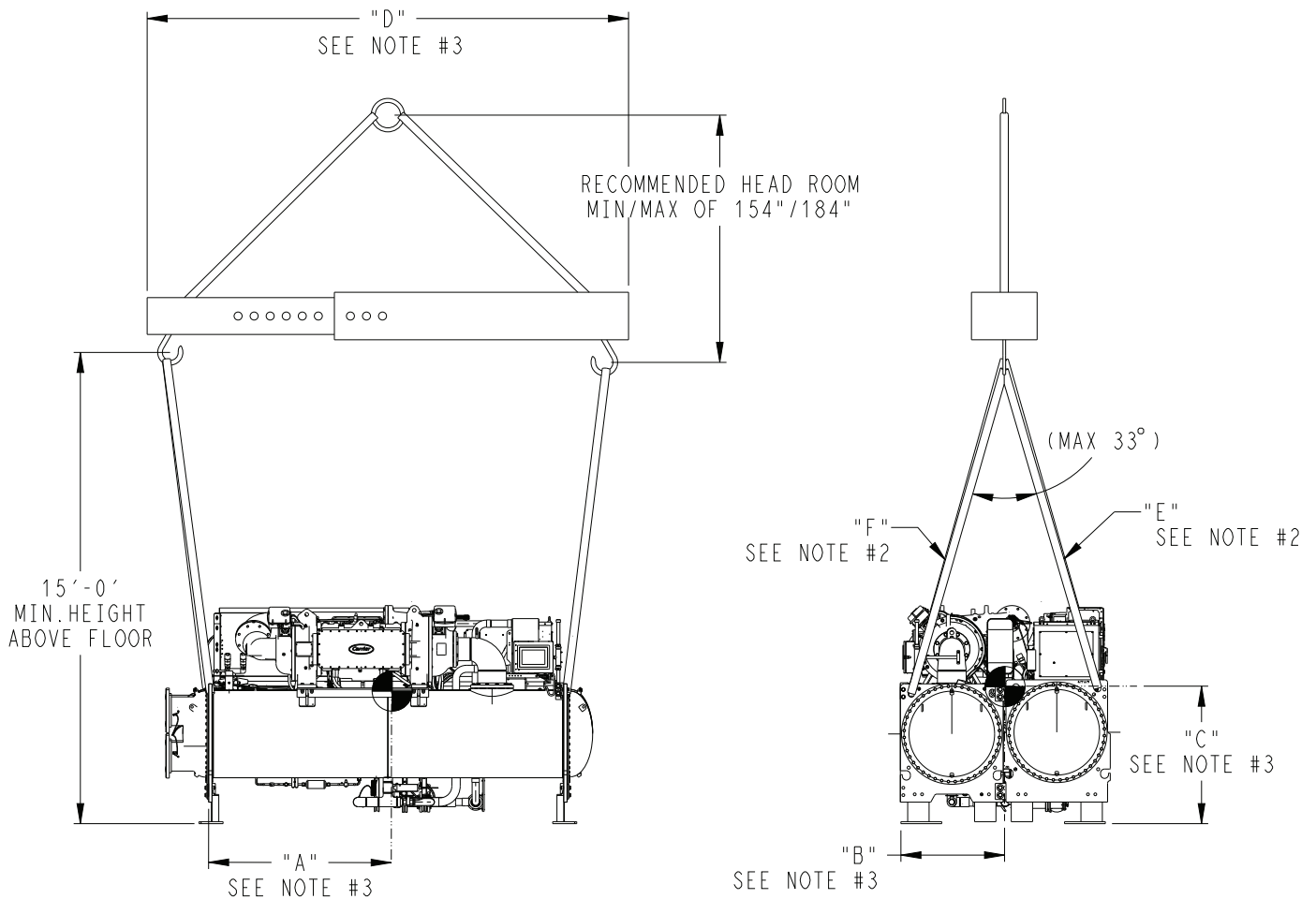
Contractors are not authorized to disassemble any part of the chiller without Carrier's supervision. Any request otherwise must be approved in writing by the Carrier Technical Service Manager.

Non-conformance to this requirement may result in loss of product warranty.

**⚠ WARNING**

Lifting chiller or components 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 weight. See Fig. 5 and Table 4 for maximum chiller and component weights.

COMPRESSOR FRAME	EVAPORATOR CODE	MAX. WEIGHT LB (KG)	VESSEL LENGTH ft	DIM. "A" in.	DIM. "B" in.	DIM. "C" in.	DIM. "D" in.	CHAIN LENGTH	
								"E" in.	"F" in.
MV3	31E-31N, 31R-31Z	19,100 (8662)	11	73	34	37	158	134	136
	33E-33N, 33R-33Z	19,600 (8909)	13	84	33	36	178	137	139
	41E-41N, 41R-41Z	21,700 (9855)	11	75	34	37	158	134	136
	43E-43N, 43R-43Z	23,200 (10503)	13	87	34	37	178	137	139
	51E-51N, 51R-51Z	23,600 (10723)	11	75	37	39	158	134	136
	53E-53N, 53R-53Z	25,300 (11478)	13	87	37	39	178	137	139



19MV34014801 REV A

**LEGEND**

- MWB** — Marine Waterbox
- NIH** — Nozzle in Head

**MACHINE RIGGING GUIDE**

**NOTES:**

1. Each chain must be capable of supporting the entire weight of the machine. See chart for maximum weights. (The maximum weights shown cover weights from steel and copper tubing, insulation, and refrigerant charge, excluding water weight.)
2. Chain lengths shown are typical for 15 ft 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. Dimension "D" defines distance measured between the chain lifting hooks.
4. Marine waterbox values are for 150 PSI rated.

**Fig. 5 — Machine Rigging Guide**

**Table 1 — 19MV Dimensions (Nozzle-In-Head Waterbox)**

HEAT EXCHANGER SIZE	PASSES	A (LENGTH)		B (WIDTH)		C (HEIGHT)	
		in.	mm	in.	mm	in.	mm
3	2	182.5	4636	71	1803	71	1803
4*	2	183	4648	71	1803	74.25	1886
5*	2	183.5	4661	79.25	2013	81.5	2070

\*Assumes both evaporator and condenser nozzles on same end of chiller; nozzle-in-head waterboxes, 150 psi rated.

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, local safety code, and Carrier drawings.
2. Overhead clearance for service rigging compressor should be at minimum 5 feet (1524 mm) with floor space identified adjacent to unit as per service clearance illustration to allow for compressor service.
3. Dimensions are approximate. Certified drawings available upon request.

4. Waterboxes typically add to the width of the machine. See certified drawings for details.
5. 'A' length dimensions shown are for standard 150 psig (1034 kPa) design and flanged connections. See certified drawings.
6. 19MV unit heights can vary depending on the configuration. Check 19MV certified drawings for height information.
7. Table contains heat exchanger dimensions. For arrangements where the compressor motor housing extends past the waterbox, consult the 19MV certified drawings.
8. Consult factory for configurations not listed in the above table.

**Table 2 — 19MV Nozzle Size**

HEAT EXCHANGER FRAME SIZE	NOZZLE SIZE (in.) (Nominal Pipe Size)					
	Evaporator			Condenser		
	1-Pass	2-Pass	3-Pass	1-Pass	2-Pass	3-Pass
3	10	8	6	10	8	6
4	10	8	6	8	8	8
5	10	10	6	10	10	8

**Table 3 — 19MV Dimensions (Marine Waterbox, 150 psig)**

HEAT EXCHANGER SIZE	PASSES	A (LENGTH)		B (WIDTH)		C (HEIGHT)	
		in.	mm	in.	mm	in.	mm
3	2	193	4902	71	1803	71	1803
4*	2	193.5	4915	71	1803	74.25	1886
5*	2	194	4928	79.25	2013	81.5	2070

\*Assumes both evaporator and condenser nozzles on same end of chiller; marine waterboxes, 150 psi rated.

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, local safety code, and Carrier drawings.
2. Overhead clearance for service rigging compressor should be at minimum 5 feet (1524 mm) with floor space identified adjacent to unit as per service clearance illustration to allow for compressor service.
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7. Table contains heat exchanger dimensions. For arrangements where the compressor motor housing extends past the waterbox, consult the 19MV certified drawings.
8. Consult factory for configurations not listed in the above table.

**Table 4 — Component Weights**

STANDARD COMPONENTS		kg	lb
Suction Pipe Assembly (includes flanges)		110	243
Interstage Piping (from flange to flange)		134	295
Discharge Piping		43	94
Non-economized System Copper Tubing		150	331
HMI Panel		22	48
Power Panel		241	531
Danfoss D2H VFD		126	277
Danfoss E1H VFD		295	650
Danfoss E2H VFD		318	701
VFD Cable		50	110
VFD Cable Tray		124	273
Wiring		20	44
Relief Valve		18	40
Expansion Control Valve		19	42
OPTIONAL COMPONENTS		kg	lb
Economizer Bypass and Valve		217	478
Isolation Valve		100	220

**Table 5 — 19MV Compressor and Motor Weights\***

MOTOR CODE	ENGLISH			SI		
	Compressor Weight† (lb)	Stator and Housing Weight (lb)	Rotor and Shaft Weight (lb)	Compressor Weight† (kg)	Stator and Housing Weight (kg)	Rotor and Shaft Weight (kg)
3	2674	963	148	1213	437	67
5	2674	1073	148	1213	487	67
7	2674	1184	148	1213	537	67

\* Total compressor weight is the sum of the compressor aerodynamic components (compressor weight column), stator, and rotor.

† Compressor aerodynamic component weight only; motor weight and interstage piping is not included. Applicable to standard compressors only.

**Table 6 — 19MV Evaporator and Condenser Weights\***

EVAPORATOR FRAME AND BUNDLE SIZE	DRY RIGGING WEIGHT		CONDENSER FRAME AND BUNDLE SIZE	DRY RIGGING WEIGHT	
	lb	kg		lb	kg
31E - 31N	4331	1965	31C - 31N	5518	2503
33E - 33N	4662	2115	33C - 33N	6101	2767
31R - 31Z	4592	2083			
33R - 33Z	4955	2248			
41E - 41N	6353	2882	41C - 41N	7095	3218
43E - 43N	7031	3189	43C - 43N	7863	3567
41R - 41Z	7099	3220			
43R - 43Z	7912	3589			
51E - 51N	7323	3322	51C - 51N	7614	3454
53E - 53N	8150	3697	53C - 53N	8485	3849
51R - 51Z	6306	2860			
53R - 53Z	6907	3133			

\* Dry Rigging Weight includes standard 0.025-in. wall tubes and 150-lb 2-pass NIH covers. No refrigerant charge is included in the weight.

NOTES:

1. Evaporator weight includes 2-pass Victaulic dished heads.
2. Condenser weight includes the discharge pipe and 2-pass Victaulic dished heads; does not include economizer weight.
3. Actual evaporator refrigerant charge weight is calculated based on pass and nozzle arrangement as well as selected capacity. Therefore charge weight is not included in this publication. Charge weight for condenser and economizer are for reference only. User must consult unit name plate or the as-sold performance sheet or E-Cat selection sheet in order to obtain accurate refrigerant charge information.



**Table 7 — 19MV Economizer Weight**

FRAME	ASSEMBLY WEIGHT (lb)	ASSEMBLY WEIGHT (kg)
3 - 5	379	172

NOTE: Economizer assembly weight includes BPHX, economizer tubing and EXV, economizer mounting bracket, and piping/tubing from liquid line and from economizer to compressor.

**Table 8 — 19MV Nozzle-in-Head Waterbox Weights**

DESIGN PRESSURE [psig]	FRAME SIZE	WATER PASSES	EVAPORATOR NIH				CONDENSER NIH			
			STEEL WEIGHT (RIGGING)				STEEL WEIGHT (RIGGING)			
			kg		lb		kg		lb	
			Flanged	Victaulic	Flanged	Victaulic	Flanged	Victaulic	Flanged	Victaulic
150	3	2	108	85	238	186	108	85	238	186
		2 return	56	—	123	—	56	—	123	—
	4	2	116	93	256	204	108	85	238	186
		2 return	556	—	123	—	56	—	123	—
	5	2	141	107	311	236	141	107	311	236
		2 return	71	—	155	—	71	—	155	—

LEGEND

**NIH** — Nozzle in Head

**Table 9 — 19MV Marine Waterbox Weights**

DESIGN PRESSURE [psig]	FRAME SIZE	WATER PASSES	EVAPORATOR MWB				CONDENSER MWB			
			STEEL WEIGHT (RIGGING)				STEEL WEIGHT (RIGGING)			
			kg		lb		kg		lb	
			Flanged	Victaulic	Flanged	Victaulic	Flanged	Victaulic	Flanged	Victaulic
150	3	2	166	166	159	159	166	166	159	159
		2 return	—	—	—	—	—	—	—	—
	4	2	428	428	205	205	449	449	205	205
		2 return	—	—	—	—	—	—	—	—
	5	2	576	556	242	242	542	542	226	226
		2 return	—	—	—	—	—	—	—	—

LEGEND

**MWB** — Marine Waterbox

NOTE: This table is the additional weight adder compared to 150-lb unit with NIH covers.

## RIG MACHINE COMPONENTS

Refer to instructions below, Fig. 6-7, and Carrier Certified Prints for machine component disassembly.

**IMPORTANT:** Only a qualified service technician should perform this operation. Disassembly is only allowed with Carrier supervision.

### **WARNING**

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

### **CAUTION**

Before rigging the compressor, disconnect all wires connected to the control/ power panel to avoid damage to electrical components.

**NOTE:** If the evaporator, economizer, 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:** Wiring must also be disconnected. Label each wire before removal (see Carrier Certified Prints). In order to disconnect the VFD from the machine, remove wiring and flex cables between the VFD and the control 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 Evaporator and Condenser:**

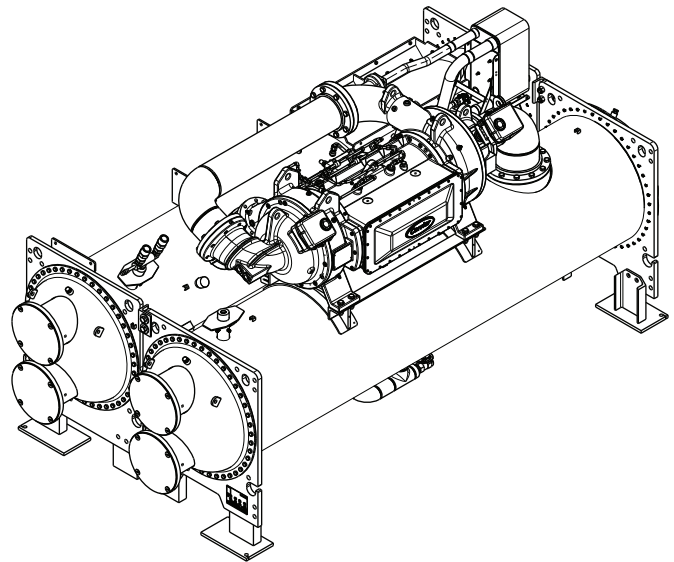
1. Place a support plate under each tube sheet leg to keep each vessel level.
2. Cut liquid line tubing between evaporator and condenser before the EXV valve.
3. Remove discharge pipe from compressor by attaching a lifting eye and rigging chain/strap to check valve; then unbolt discharge pipe flange and remove check valve.
4. Disconnect the O-ring face seal on the compressor end and the O-ring face seal at the filter underneath the condenser.
5. Unbolt economizer vapor line from first stage volute.
6. Cover all openings.
7. Disconnect all wires and cables that cross from evaporator side of the machine to the condenser side.
8. Disconnect the marriage brackets connecting the evaporator and condenser tubesheets (both ends).

#### **To Separate the Compressor from the Evaporator:**

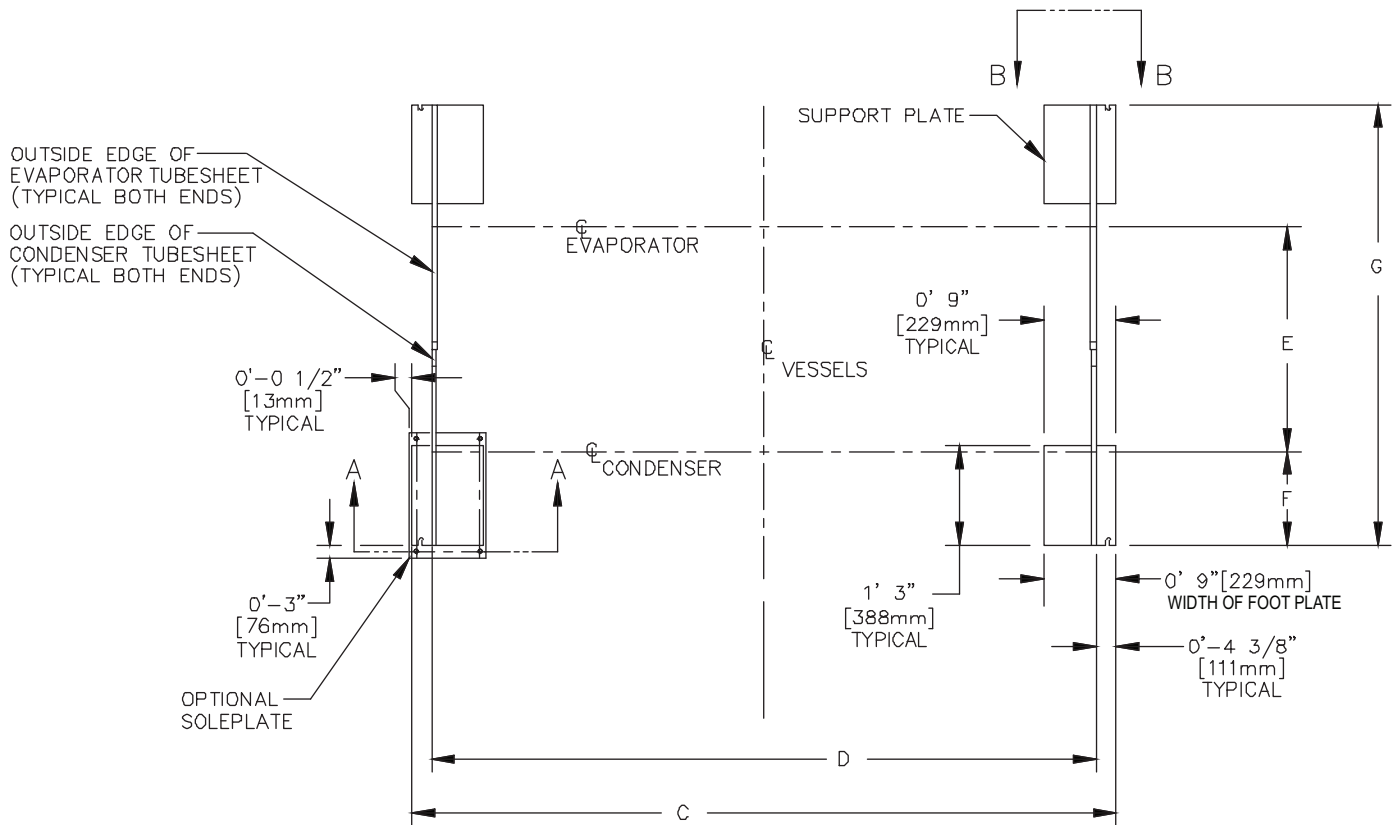
1. Unbolt motor drain flange.
2. Unbolt suction pipe flange.
3. Remove discharge pipe from compressor by attaching a lifting eye and rigging chain/strap to check valve; then unbolt discharge pipe flange and remove check valve.
4. Unbolt economizer vapor line from first stage volute.
5. Disconnect the O-ring face seal on the compressor end and the O-ring face seal at the filter underneath the condenser.
6. Disconnect all power and control wires connected to the compressor.  
**NOTE:** Many wires have connectors that can be easily disconnected from the back of the power panel.
7. Cover all openings.
8. Disconnect compressor motor power cables to motor.
9. Unbolt compressor mounting from the evaporator.

#### **Additional Notes**

1. Use silicone grease on new O-rings when refitting.
2. Use gasket sealant on new gaskets when refitting.
3. Use VicLube on Victaulic coupling gasket on discharge line.
4. Review compressor handling procedure due to permanent magnet rotor.



**Fig. 6 — 19MV, Side View (MV3 Shown)**



19MV HEAT EXCHANGER SIZE										
FRAME	DIMENSION C		DIMENSION D		DIMENSION E		DIMENSION F		DIMENSION G	
	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm
3	11'-9 1/4"	3588	11'-2"	3404	2'-11"	889	1'-5 1/8"	435	5'-10"	1778
	13'-9 1/4"	4198	13'-2"	4013	2'-11"	889	1'-5 1/8"	435	5'-10"	1778
4	11'-9 1/4"	3588	11'-2"	3404	2'-11"	889	1'-4 3/4"	425	5'-10"	1778
	13'-9 1/4"	4198	13'-2"	4013	2'-11"	889	1'-4 3/4"	425	5'-10"	1778
5	11'-9 1/4"	3588	11'-2"	3404	3'-3 1/4"	997	1'-8"	997	6'-6 1/2"	1994
	13'-9 1/4"	4198	13'-2"	4013	3'-3 1/4"	997	1'-8"	997	6'-6 1/2"	1994

**NOTES:**

1. A-A dimension refers to accessory soleplate. See page 14.
2. B-B dimension refers to standard support plate. See page 14.
3. C dimension is measured from actual edge of footplate.
4. D dimension is measured from outside edge to outside edge of tubesheets.
5. E dimension is measured from center line to center line.
6. F dimension is measured from edge of tubesheets (extends past footplate). See certified drawings for actual maximum width.
7. G dimensions are from outermost edge of tubesheets (tubesheet extends slightly past footplate).

**Fig. 7 — 19MV Machine Footprint**

### Step 3 — Install Machine Supports

#### INSTALL STANDARD ISOLATION

Figure 7 shows 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)

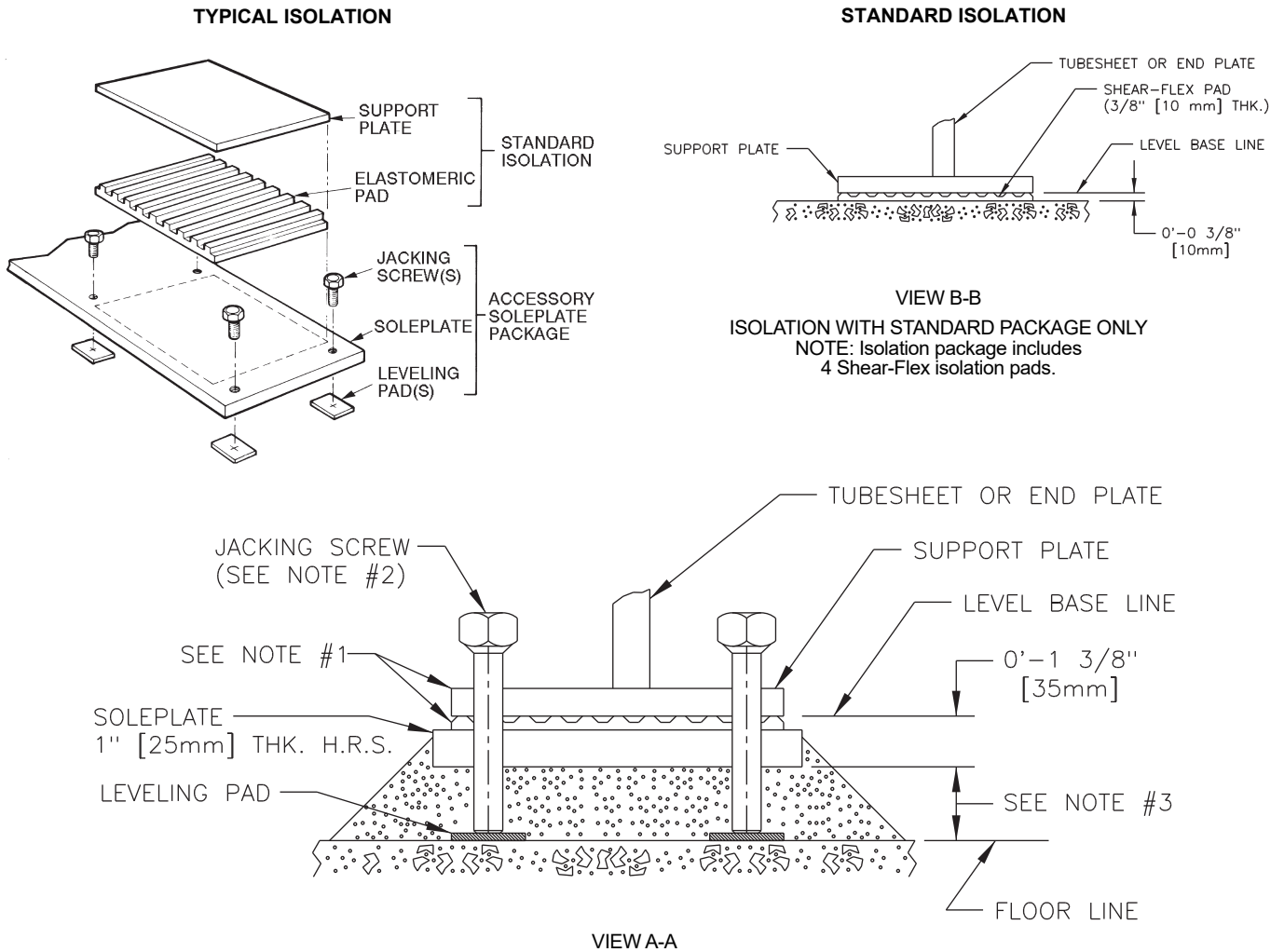
Uneven floors or other considerations may dictate the use of accessory soleplates (supplied by Carrier for field installation) and leveling pads. Refer to Fig. 8.

Chiller support plates must be level within 1/4-in. (6 mm) from one end to the other.

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.



**NOTES:**

1. Optional soleplate package includes 4 soleplates, 16 jacking screws, and 16 leveling pads. Isolation package is also required.
2. Jacking screws to be removed after grout has set.
3. Thickness of grout will vary, depending on the amount necessary to level chiller. Use MasterFlow<sup>1</sup> 885, 0'-1-1/2" (38.1 mm) to 0'-2-1/4" (57 mm) thick.

1. MasterFlow is a registered trademark of BASF.

**Fig. 8 — Accessory Isolation with Soleplate Package**

NOTE: If transmission of vibrations from mechanical equipment is of concern, Carrier suggests that a structural engineer be consulted. Sound transmission from the equipment to the structure is not the responsibility of the manufacturer.

### 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. 9. 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.

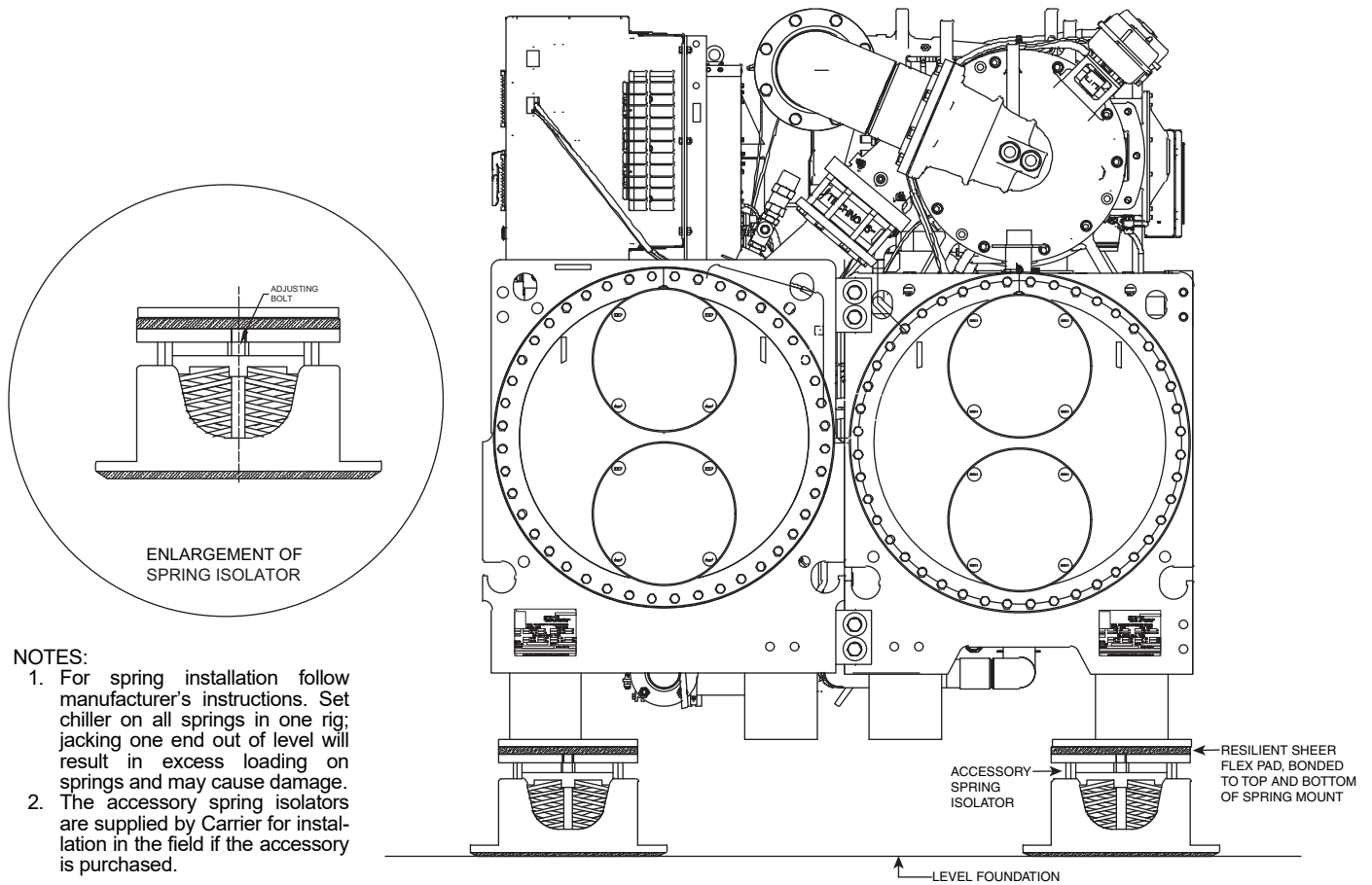
NOTE: The springs are designed to support the weight of the chiller only. Connected piping must be supported independently of the chiller.

NOTE: It is recommended that any installation other than the ground floor should have spring isolation for the chiller and piping vibration isolation.

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

### INSTALL TOP HAT

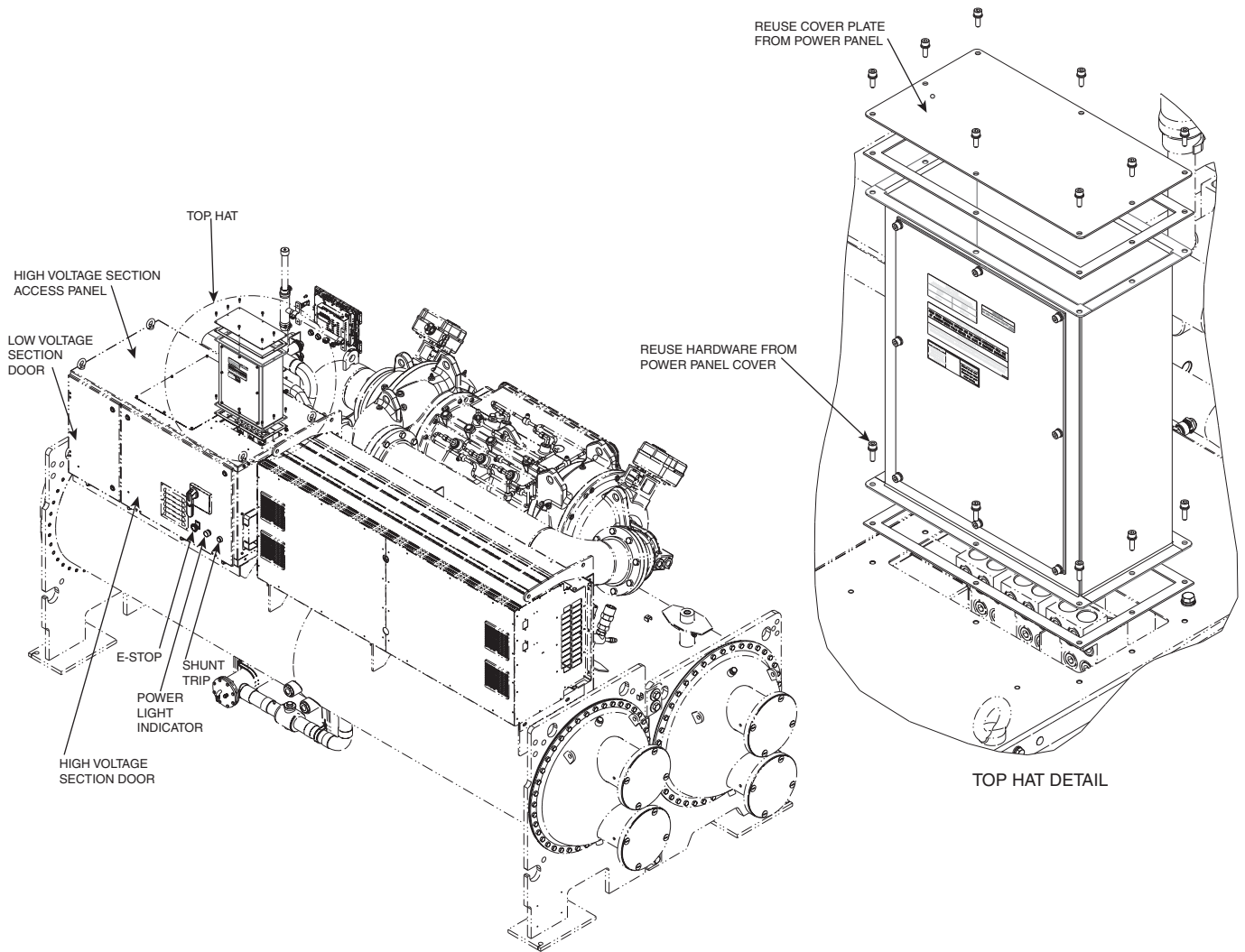
The top hat is shipped separately (strapped HMI near end of cooler). To install, remove existing cover on top of the control panel and install top hat with removable access cover facing outwards. Cut holes in top cover as appropriate for the selected conduit size and run the individual wires to the appropriate termination points. The top hat is required to extend the distance for bending the field installed power wiring before the connection in the power panel. See Fig. 10.



#### NOTES:

1. For spring installation follow manufacturer's instructions. Set chiller on all springs in one rig; jacking one end out of level will result in excess loading on springs and may cause damage.
2. The accessory spring isolators are supplied by Carrier for installation in the field if the accessory is purchased.

**Fig. 9 — 19MV Accessory Spring Isolation (Shown with Accessory Soleplates)**



**Fig. 10 — Top Hat Installation**

## Step 4 — Connect Piping

### INSTALL WATER PIPING TO HEAT EXCHANGERS

Install piping using job data, piping drawings, and procedures outlined below. A typical piping installation is shown in Fig. 11.

#### ⚠ 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 evaporator and condenser water temperature sensors before welding connecting piping to water nozzles. 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.

#### ⚠ CAUTION

Piping design must ensure separation of chiller heat-exchanger water/brine from building potable water.

#### ⚠ CAUTION

Particulate that is large enough to result in damage should be removed by a temporary or permanent screen/strainer before it can enter the heat exchanger.

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 compressor because service 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. Piping must be installed 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 for periodic and major servicing of the equipment.



- Water flow direction must be as specified in Fig. 12 and 13.
- NOTE: Entering water is always the lower of the 2 nozzles. Leaving water is always the upper nozzle for evaporator or condenser for two and three pass arrangements.
- Install waterbox vent and drain piping according to individual job data. Consult certified drawings for connection size.
  - Isolation valves are recommended on the evaporator and condenser piping to each chiller for service.
  - Apply appropriate torque on the retaining bolts in a crisscross pattern for the water box covers before insulating the water box cover. The gasket can relax during transportation and storage and the water box cover requires retightening of the bolts during installation.

### INSTALL VENT PIPING TO RELIEF DEVICES

The 19MV chiller is factory equipped with relief valves on the evaporator and condenser shell. Refer to Table 10 and Fig. 14 for size and location of relief devices.

**⚠ DANGER**

**EXPLOSION HAZARD**

Failure to follow the safety warnings exactly could result in serious injury, death, or property damage.

Pressure relief device sizing is based on the assumption that there are no combustible materials within 20 ft (7.7 m) of the pressure vessels.

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.

- 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.
- Provide a removable fitting 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.
- 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.
- 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.
- If modulating valves are installed on the evaporator or condenser, they should be installed on the outlet piping.

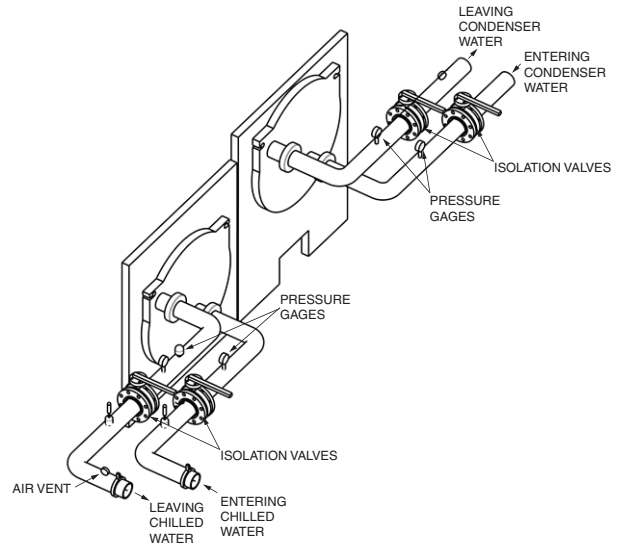
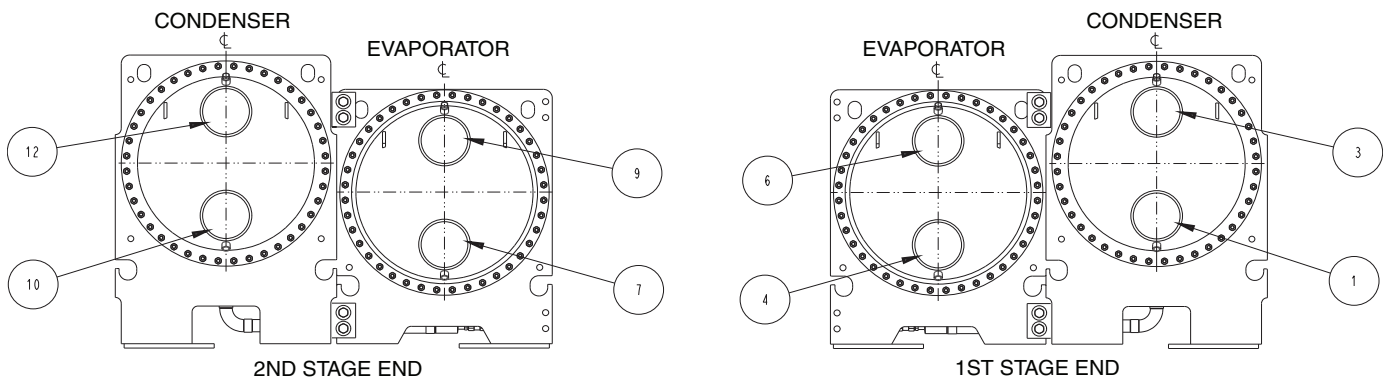


Fig. 11 — Typical Nozzle Piping

### NOZZLE-IN HEAD (NIH) WATERBOXES



NOZZLE ARRANGEMENT CODES FOR NOZZLE-IN-HEAD WATERBOXES

EVAPORATOR WATERBOXES			
PASS	In	Out	Arrangement Code*
2	7	9	C
	4	6	D

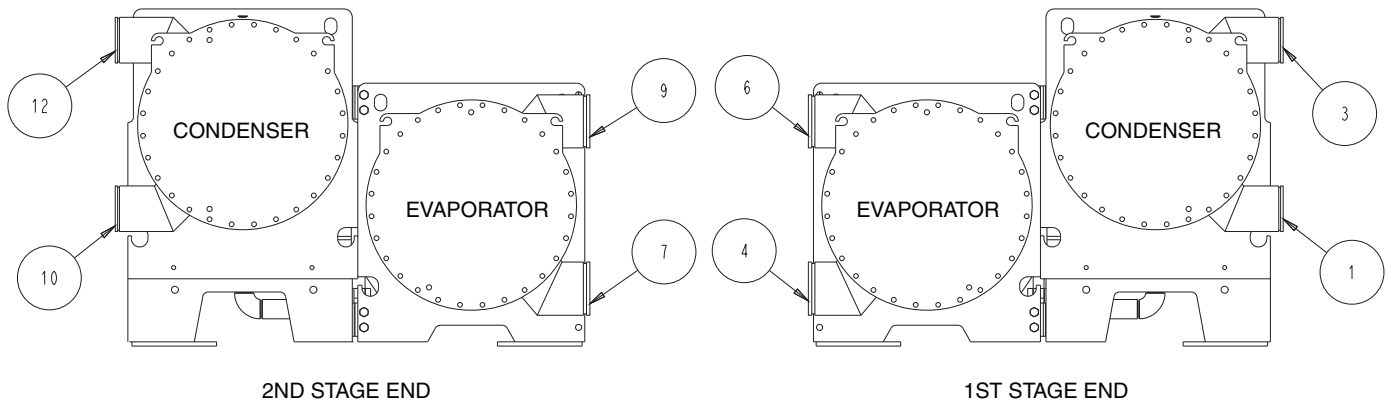
CONDENSER WATERBOXES			
PASS	In	Out	Arrangement Code*
2	10	12	R
	1	3	S

\*Refer to certified drawings.

NOTE: Vents and drains are 3/4 in., FPT, located on waterbox head.

Fig. 12 — Nozzle Arrangement Codes for 19MV Nozzle-in-Head Waterboxes

**MARINE WATERBOXES (MWB)**



NOZZLE ARRANGEMENT CODES FOR MARINE WATERBOXES

EVAPORATOR WATERBOXES			
PASS	In	Out	Arrangement Code*
2	7	9	C
	4	6	D

CONDENSER WATERBOXES			
PASS	In	Out	Arrangement Code*
2	10	12	R
	1	3	S

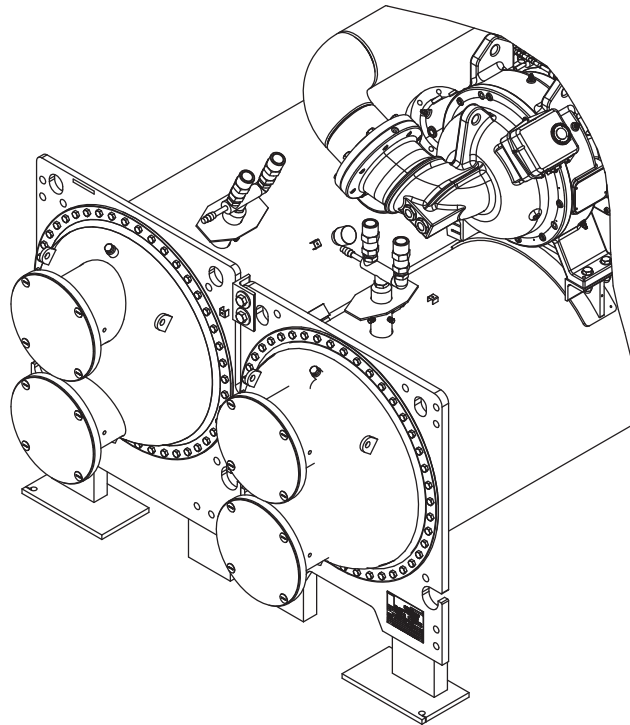
\*Refer to certified drawings.

NOTE: Vents and drains are 3/4 in., FPT, located on waterbox head.

**Fig. 13 — Nozzle Arrangement Codes for 19MV Marine Waterboxes**

**Table 10 — Relief Device Locations**

LOCATION	FRAME SIZE	PRESSURE RELIEF DEVICE OUTLET SIZE
EVAPORATOR	3, 4, 5	2X 1-1/4-in. NPT FEMALE CONNECTOR (installed with transfer valve)
CONDENSER		2X 1-1/4-in. NPT FEMALE CONNECTOR (installed with transfer valve)



**Fig. 14 — Relief Device Arrangements**

## 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 any hazardous voltage wiring in the control panel sections associated with extra-low voltage wiring. Damage to machine could occur as a result.

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

### ⚠ CAUTION

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

NOTE: The dry contacts for the field inputs should be located as close to the unit as possible. The field 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 terminal 4TB in the control panel. Additional spare sensors and control modules may be specified as well. See communication wiring in Fig. 15 and the HMI panel in Fig. 16.

### CONNECT CONTROL OUTPUTS

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

With the optional third and fourth IOB configured, the hydraulic control function will be available; with this function, the tower fan can be controlled through the Carrier controller. It also will support three types of water flow measurement: water flow switch, water flow meter, and water pressure differential sensor. See Fig. 17-29. Control board contact output can control loads rated 1 amp AC RMS steady state and 4 amps surge. Coil voltage of output relay is 24 vac. If equipment is supplied without pilot relays, be sure to install a pilot relay between the IOB and outputs to devices such as evaporator pump, condenser pump, tower fan low, tower fan high, and other outputs with large starters. Suggested rating of pilot relay is 10 amps; for example, 19XV05005503.

### ⚠ CAUTION

Provision for Carrier to start water pumps and establish flows must be provided to assure machine protection. If primary pump and flow are controlled by other means, also provide parallel means for control by Carrier. Failure to do so could result in machine freeze-up or overpressure and loss of warranty.

## CONNECT POWER

The 19MV chiller has a unit-mounted, factory-installed VFD starter. See Fig. 30. The VFD is fully wired to the Carrier control panel and HMI. To apply power, attach power leads by routing them through the top hat to the line side of the chiller main circuit breaker. Connect stranded wire to pressure connectors and torque. For specifics, see Conductor Usage Table in “NOTES FOR FIG. 20-29” on page 34.

NOTE: A Carrier-provided top hat is required to be installed to the top of the power panel for adequate wire installation space (Fig. 10).

**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. The only acceptable power supply to this chiller is a transformer with a wye secondary with solidly grounded neutral configuration. If there is a different type of power supply, the chiller may require an isolation transformer to be installed to prevent damage to the VFD. Contact Carrier Service Engineering or Technical Service Manager.

### ⚠ CAUTION

Use the knockouts provided in the control / power panels for wiring connections. Do not punch holes or drill into the top surface of any control enclosure. Damage to machine could result and could require component replacement.

### ⚠ CAUTION

Do not punch holes or drill into the top surface of power panel. Damage to machine could result. Use knockouts provided in the control / power panels for wiring connections.

### ⚠ WARNING

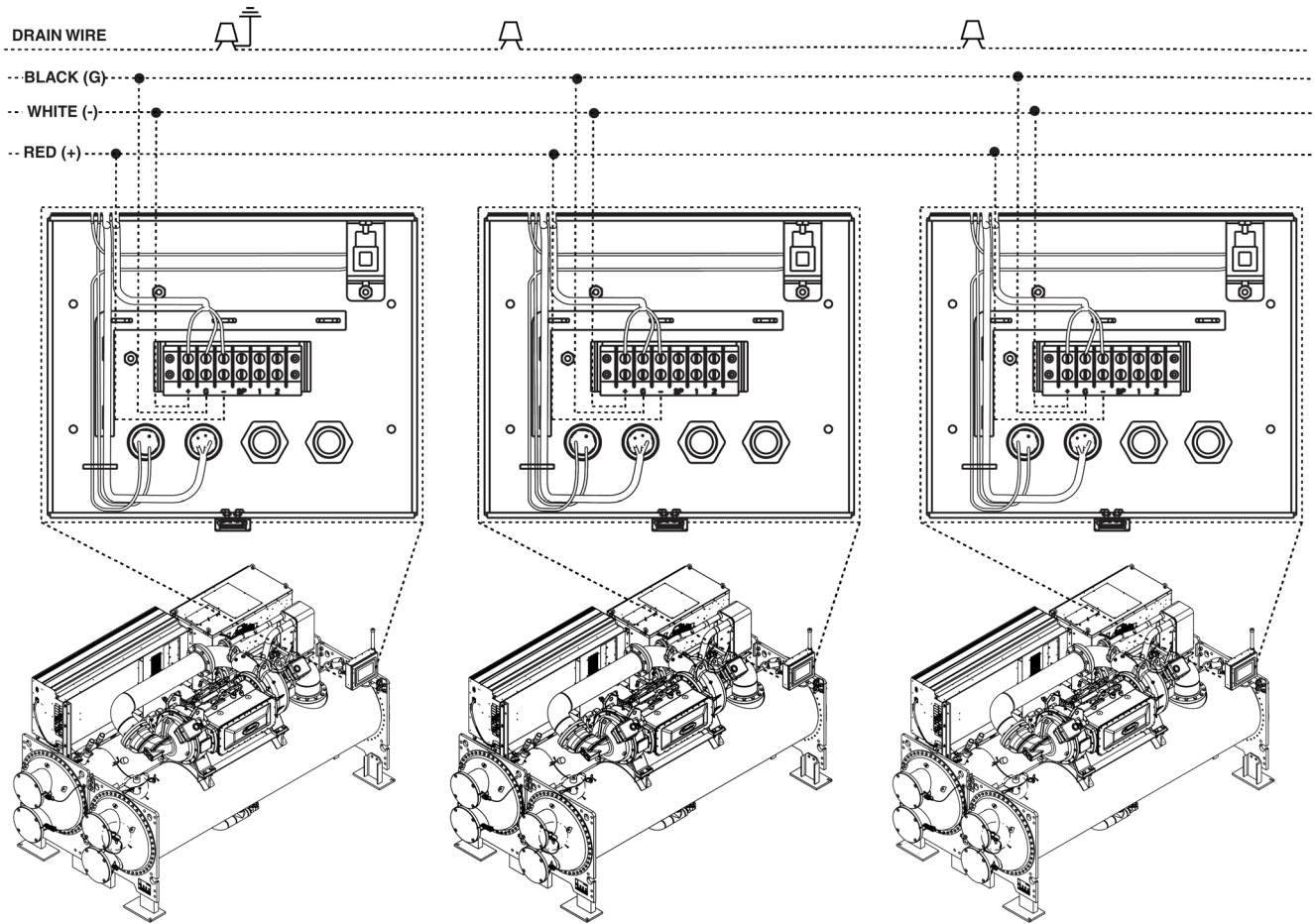
For a control transformer built to Carrier specifications, do not connect an outside source of control power. An outside power source will produce dangerous voltage at the line side of the starter, because supplying voltage at the transformer secondary terminals produces input level voltage at the transformer primary terminals. Severe injury could result.

### ⚠ CAUTION

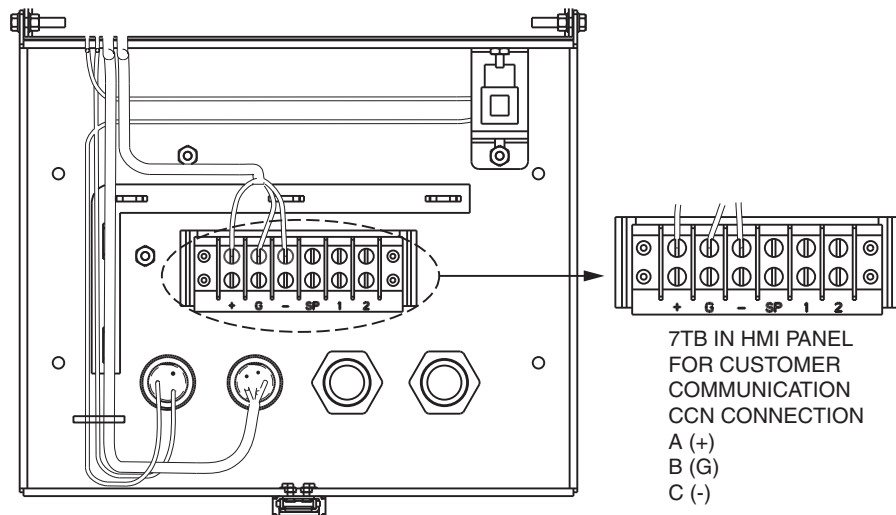
The control transformers are sized for the existing chiller components. Do not connect any external loads such as actuators, solenoid valves, etc., or equipment damage could result.

### ⚠ WARNING

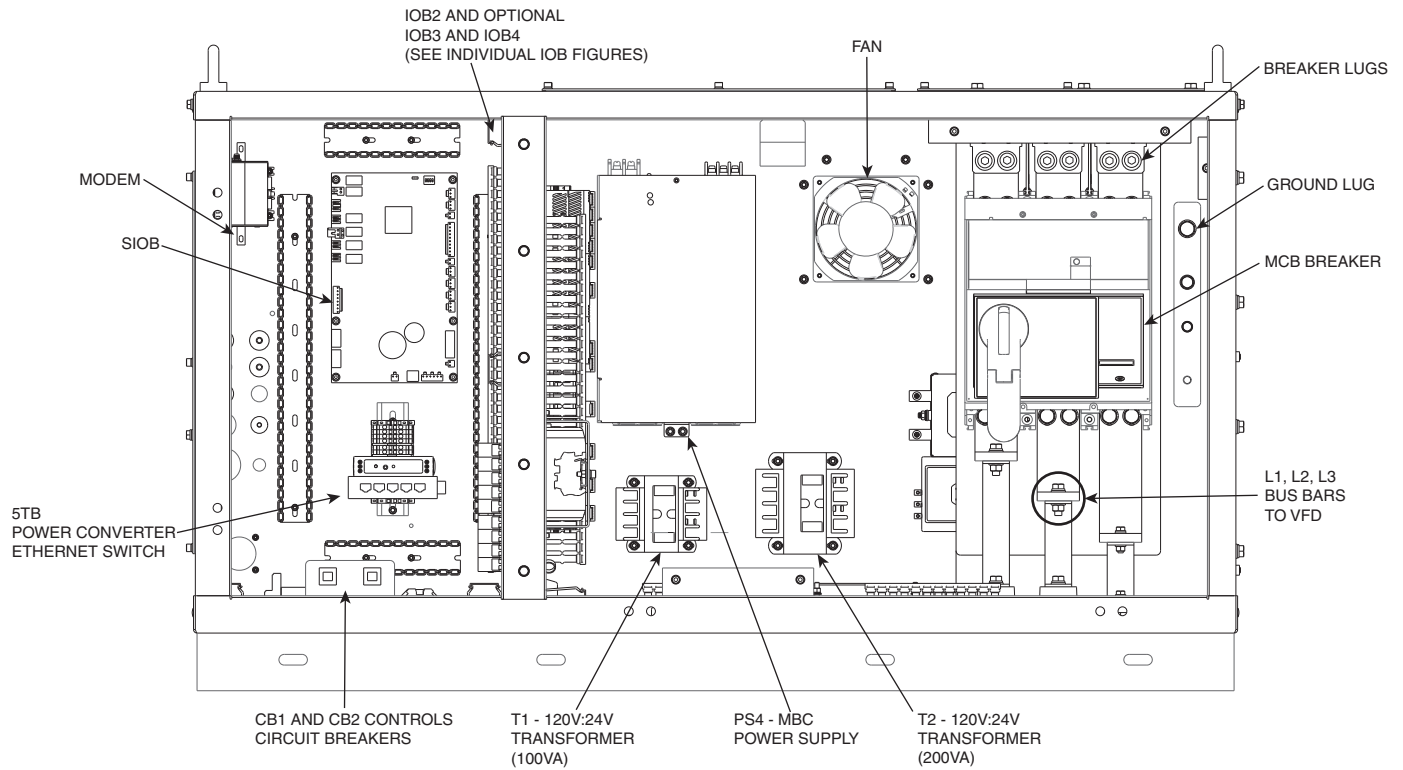
The chiller control power is connected to the primary side of the main breaker inside the power panel. To turn the chiller power off, the Main Circuit Breaker (MCB), Service Circuit Breaker (SCB), and Uninterruptible Power Supply (UPS) are all required to be turned off even when the source of power to the chiller is turned off.



**Fig. 15 — CCN Communication Wiring for Multiple Chillers (Typical)**

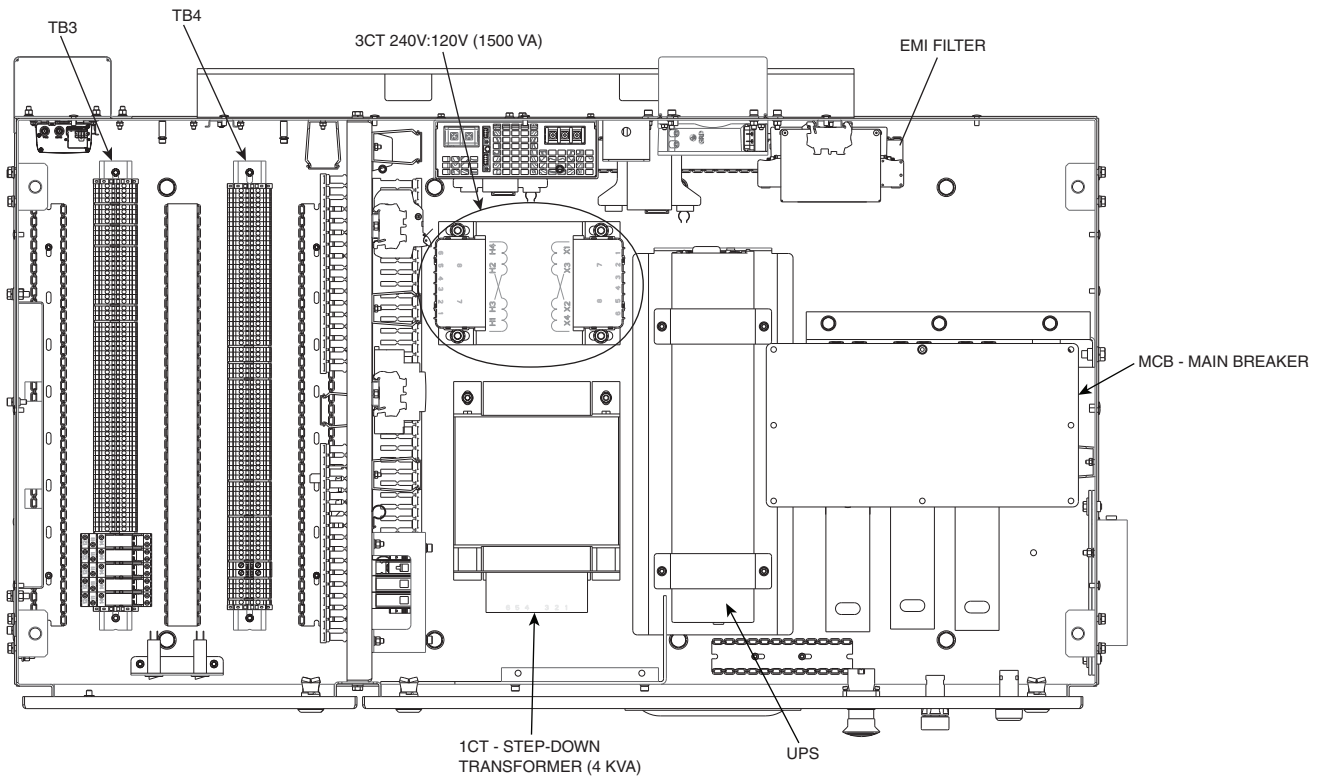


**Fig. 16 — HMI Panel**

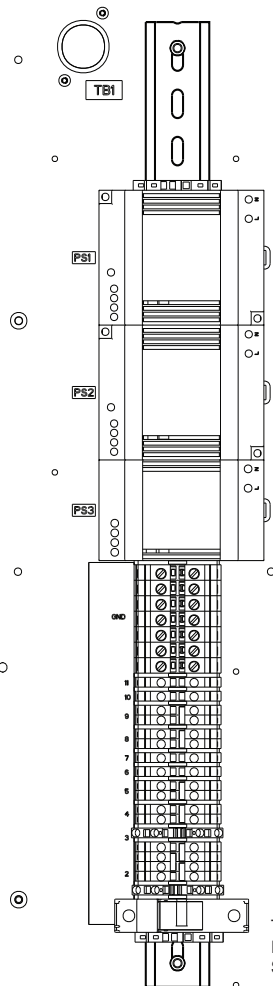
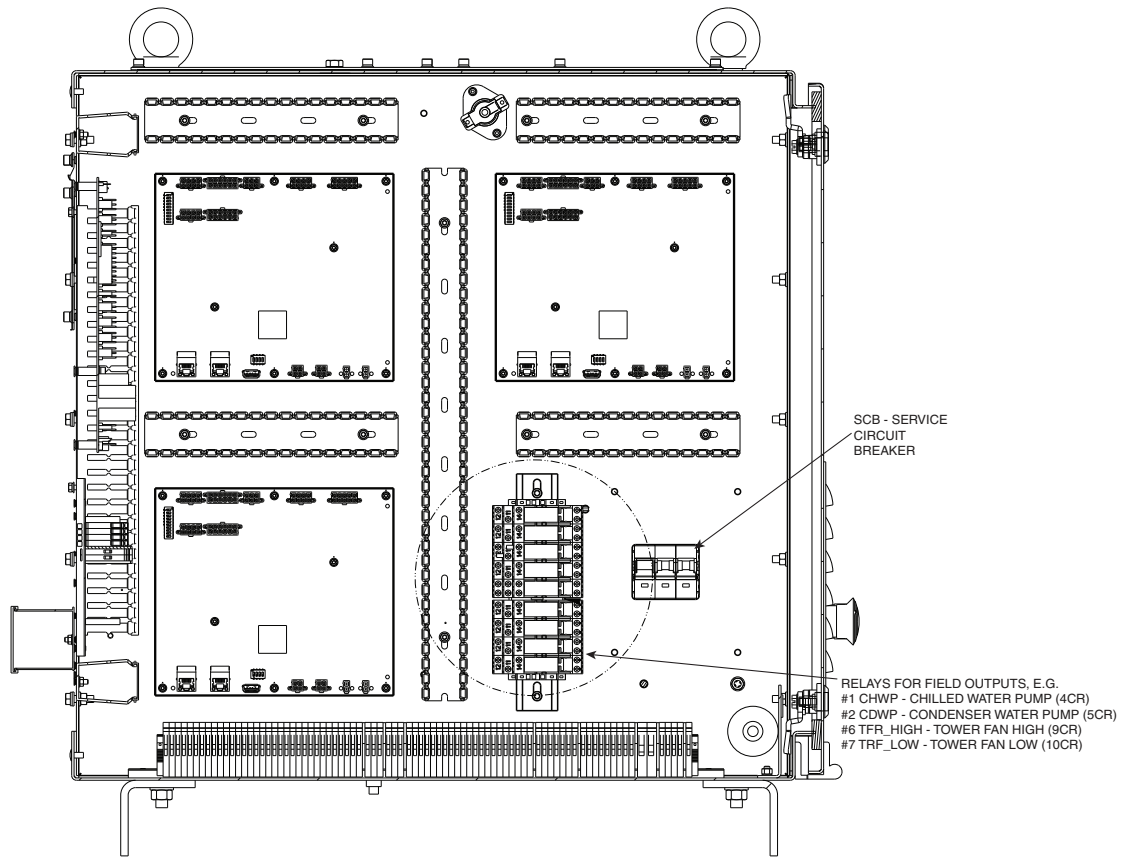


**Fig. 17 — Power Panel - Front View**

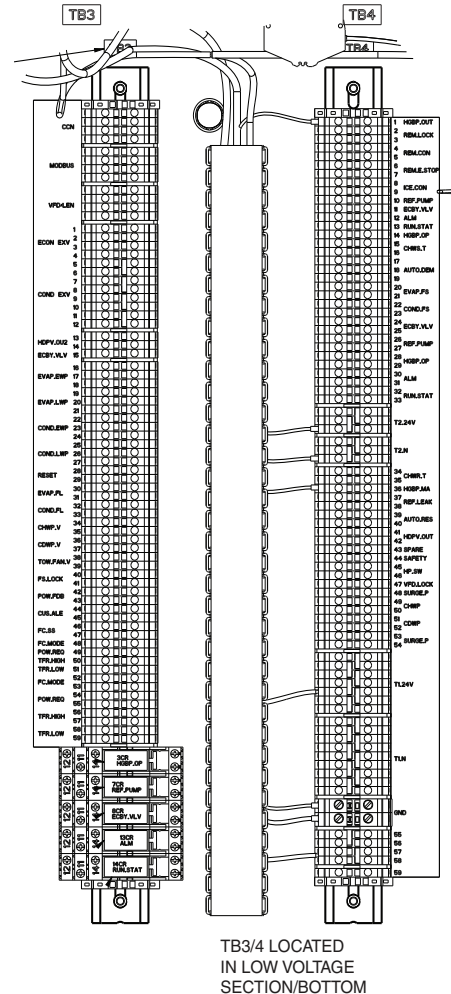
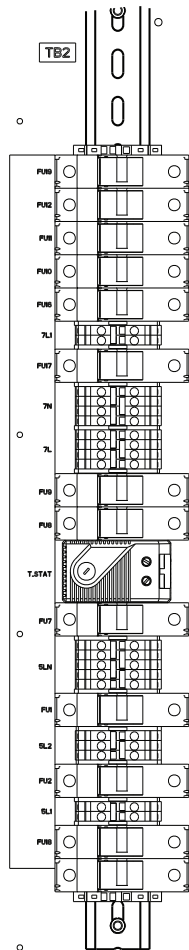
FIELD WIRING CONNECTIONS ARE ALL ON TERMINAL BLOCKS TB3 AND TB4 (LOCATED ON FLOOR OF LOW VOLTAGE SECTION)



**Fig. 18 — Power Panel - Top View**



TB1/TB2 LOCATED IN HIGH VOLTAGE SECTION/LEFT SIDE







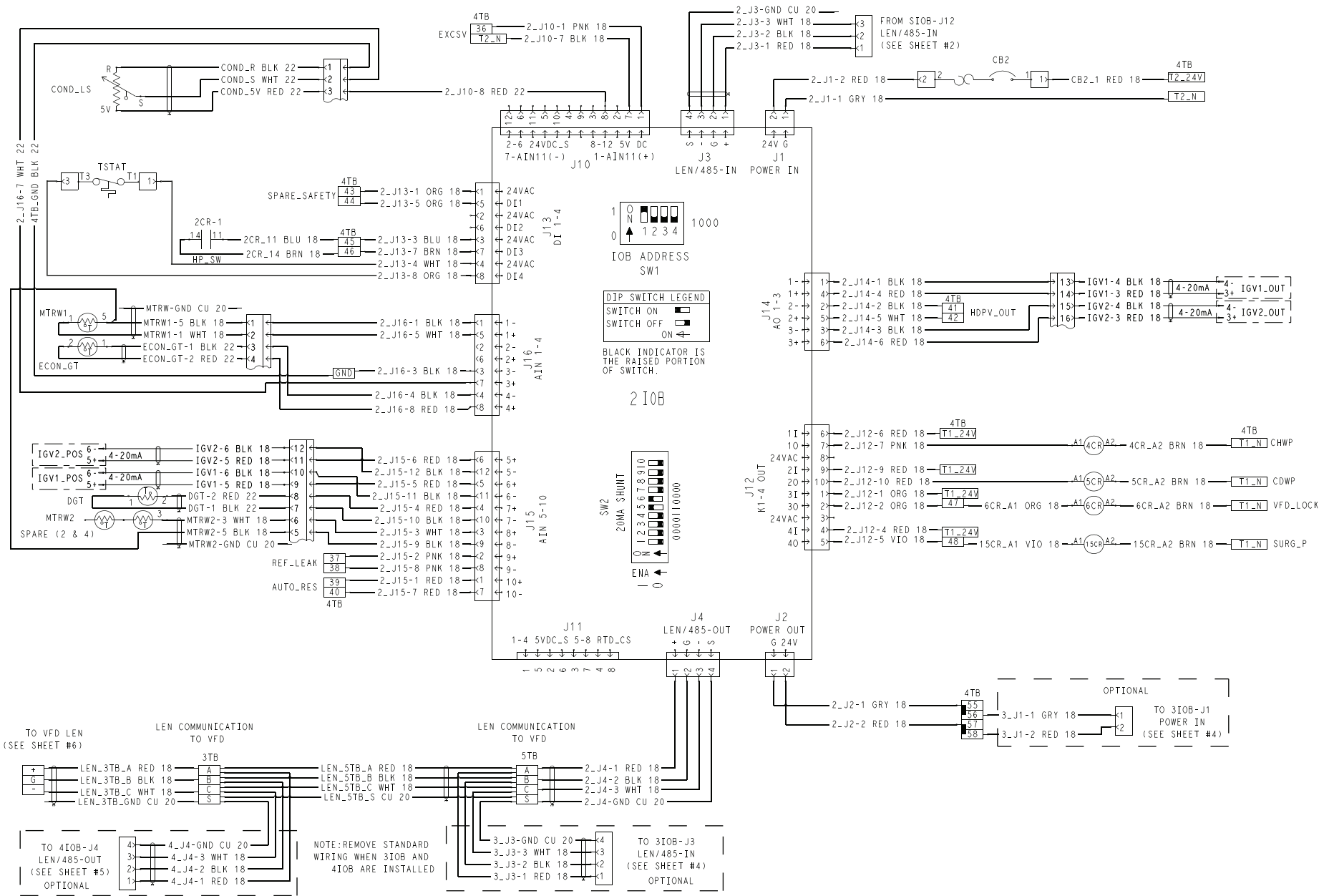


Fig. 21 — IOB2

OPTIONAL

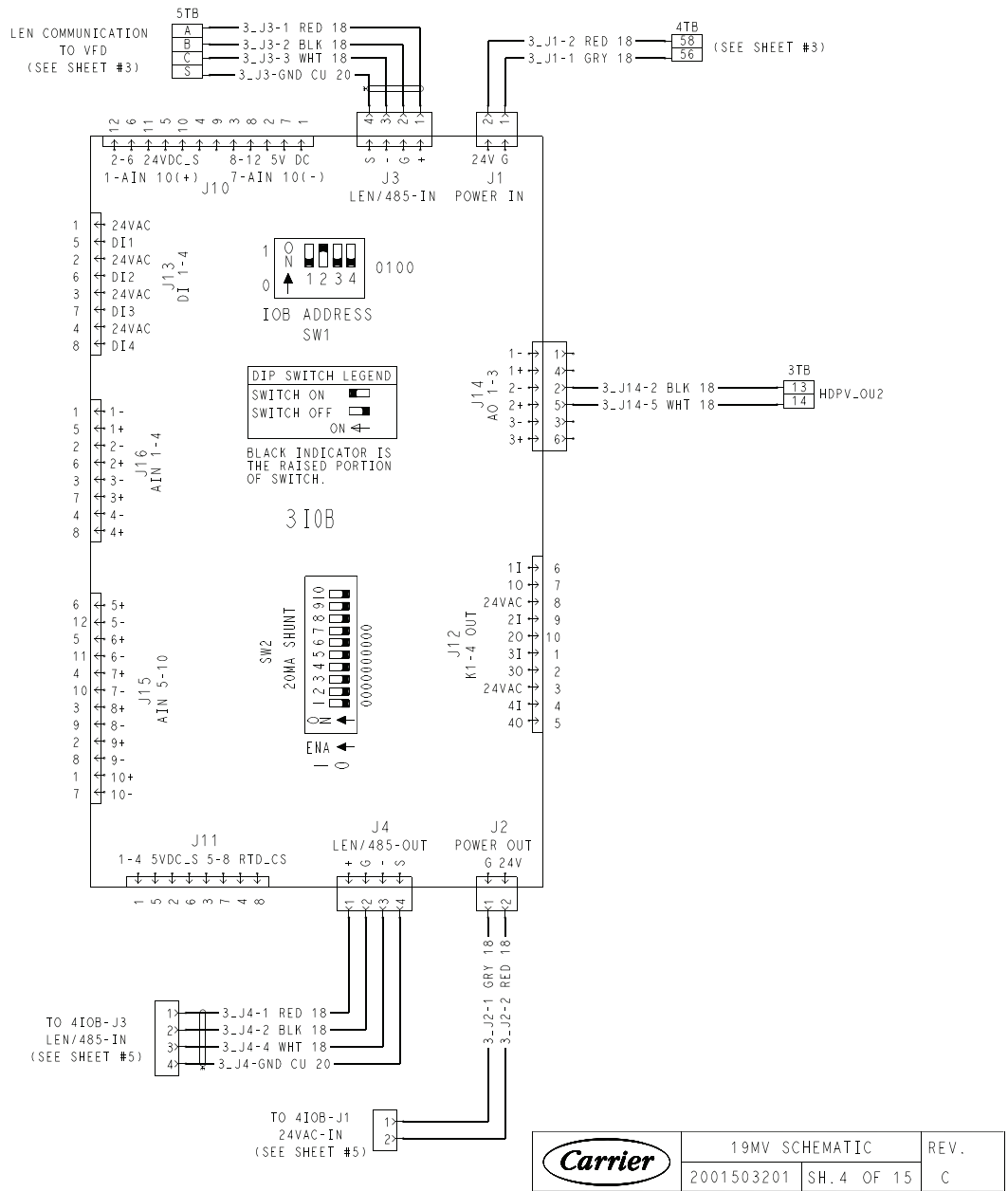


Fig. 22 — IOB3

OPTIONAL

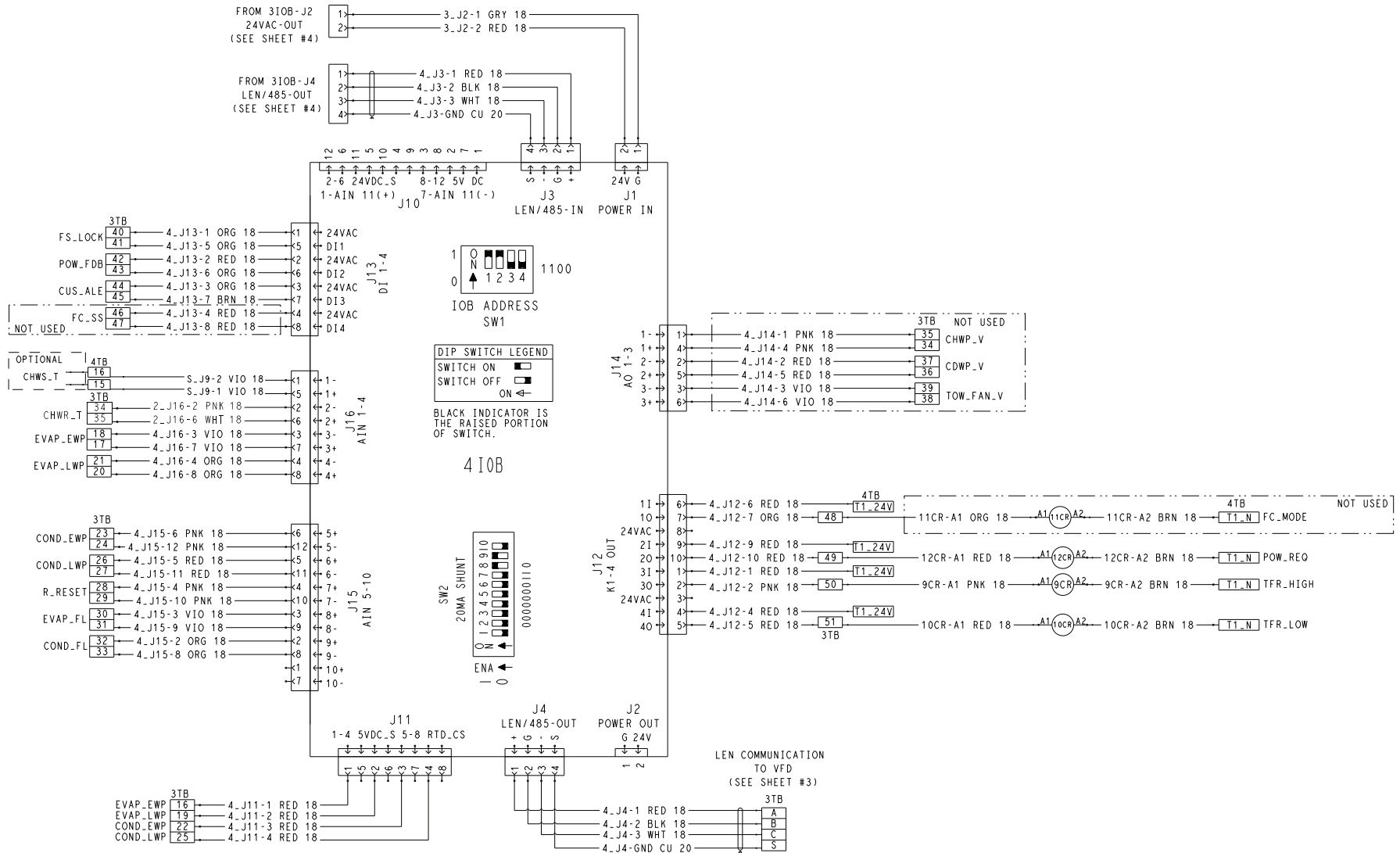
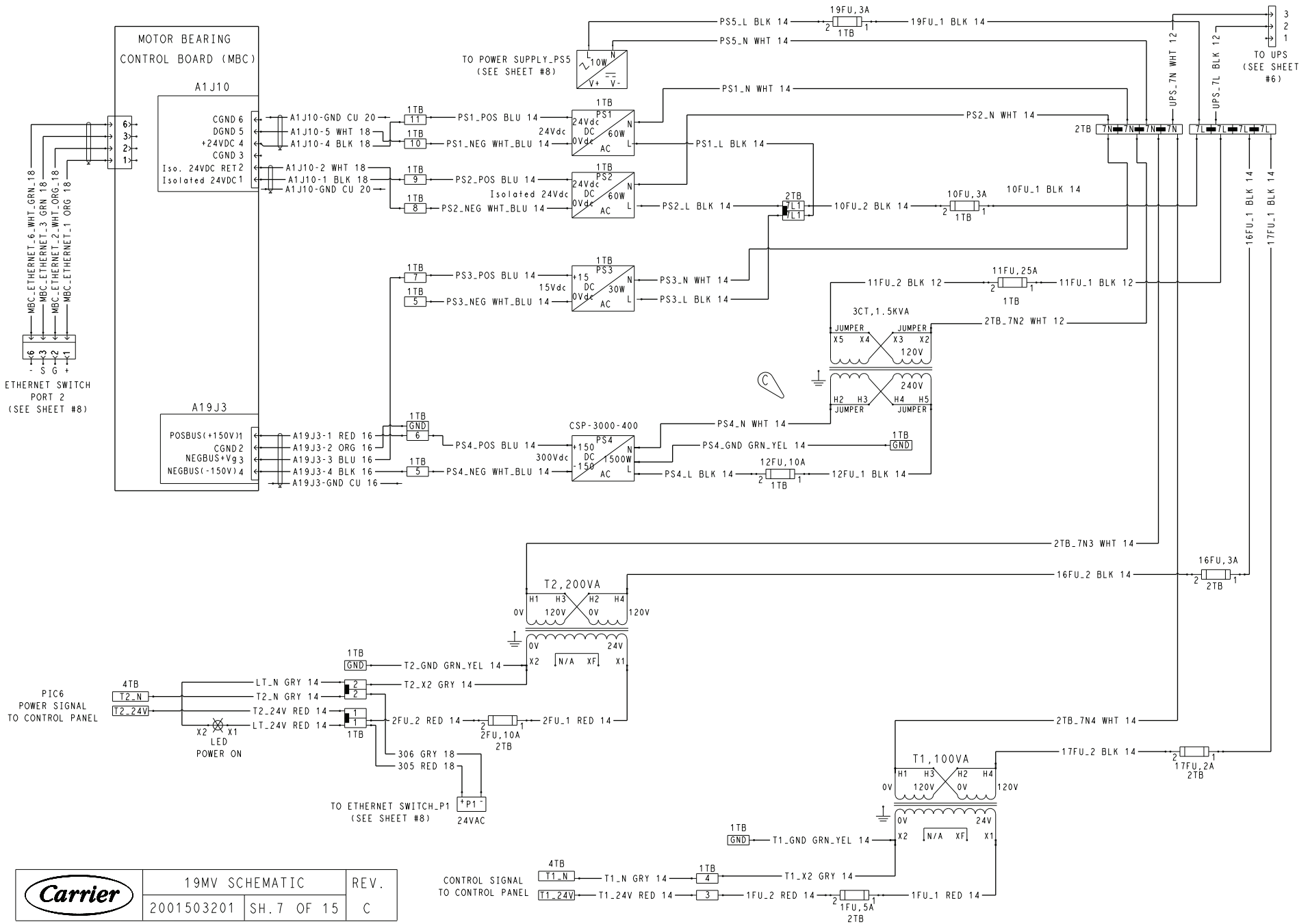


Fig. 23 — IOB 4

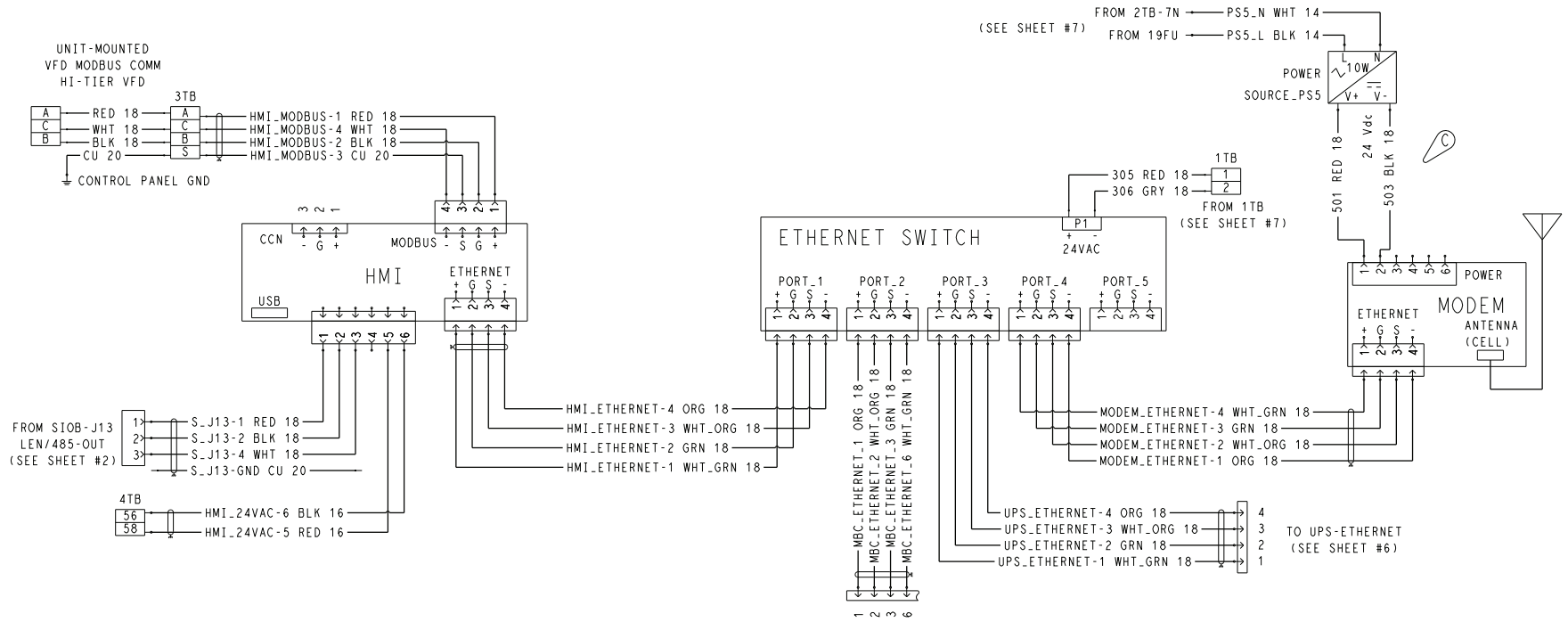




	19MV SCHEMATIC	REV.
	2001503201 SH. 7 OF 15	C

Fig. 25 — Motor Bearing Control Board Wiring

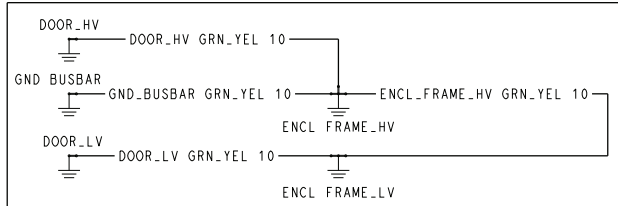




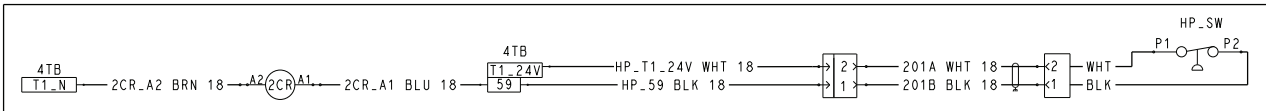
A2T1, 91030-59701,  
ETHERNET

TO BASEBOARD PCBA (A1)  
(#91030-598-01)  
(SEE SHEET #7)

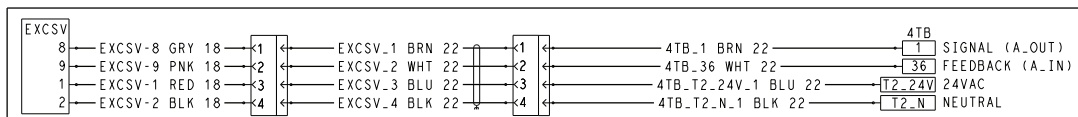
GROUND CONNECTIONS



HIGH-PRESSURE SWITCH CONNECTION



EXPANSION CONTROL SYSTEM VALVE CONNECTIONS



	19MV SCHEMATIC		REV. C
	2001503201	SH.8 OF 15	

Fig. 26 — HMI and Ethernet Switch Wiring

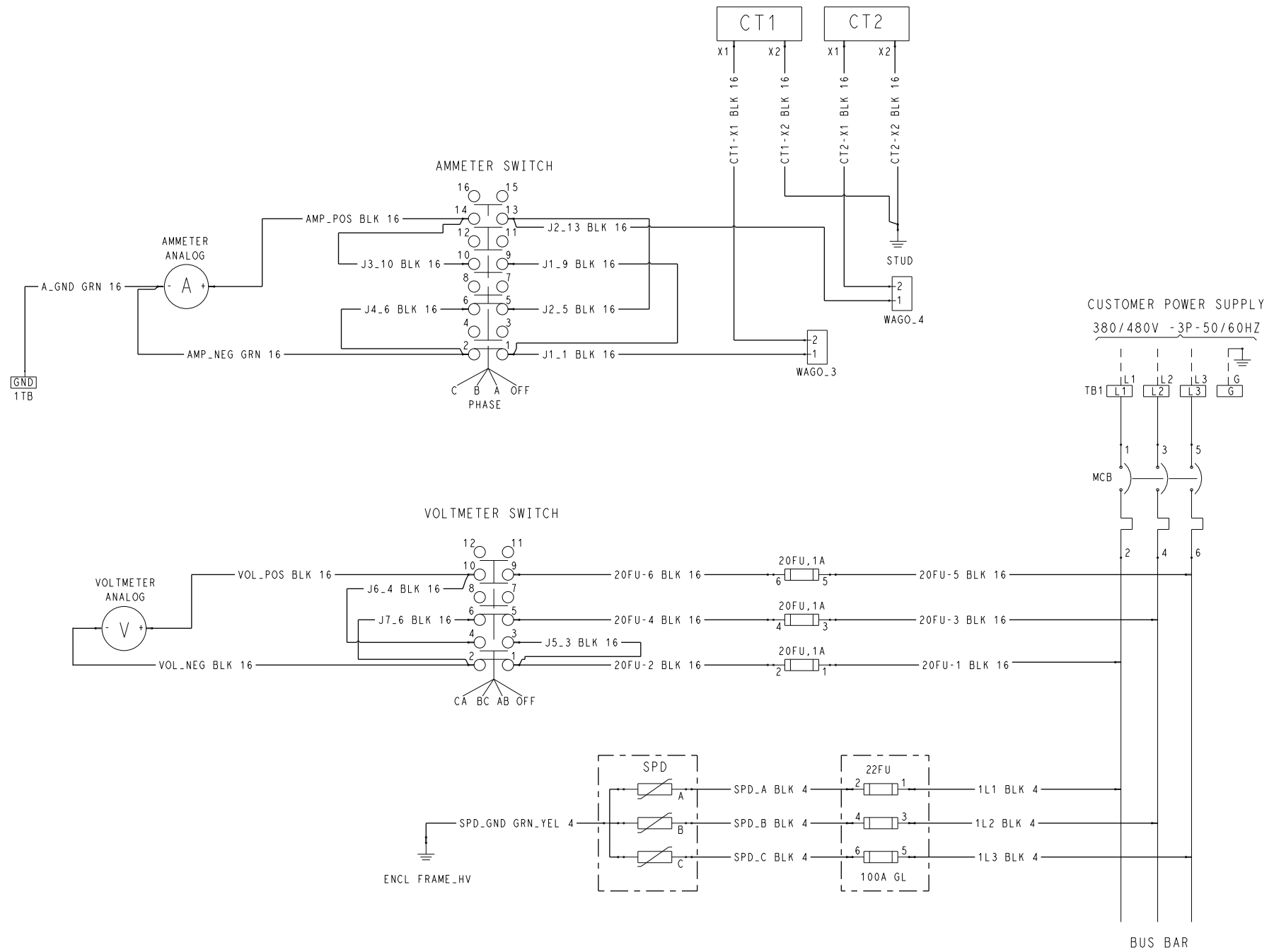
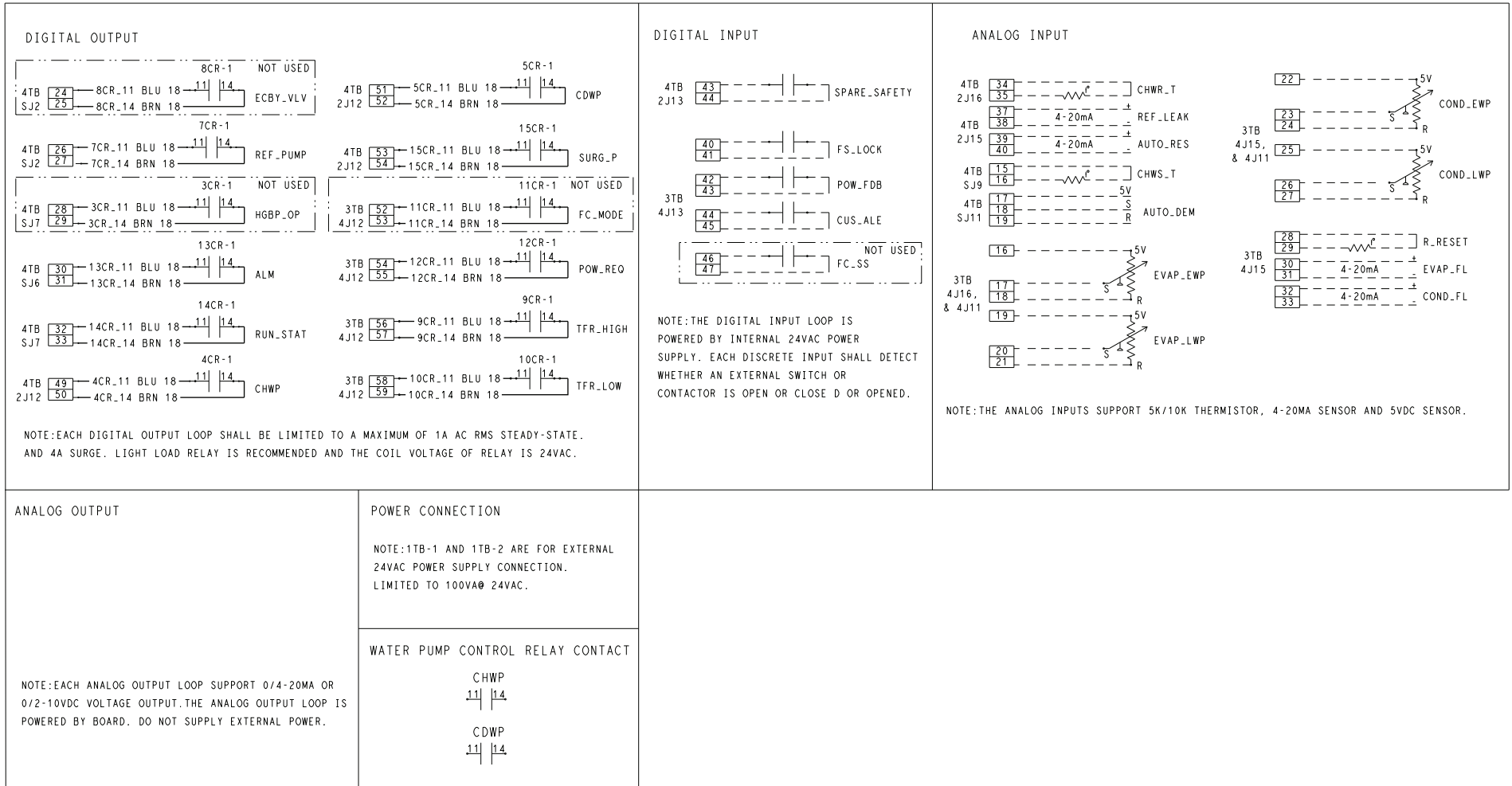


Fig. 27 — Ammeter Switch and Voltmeter Switch Wiring



For details, see Fig. 21-27.


















**Fig. 28 — Field Wiring**

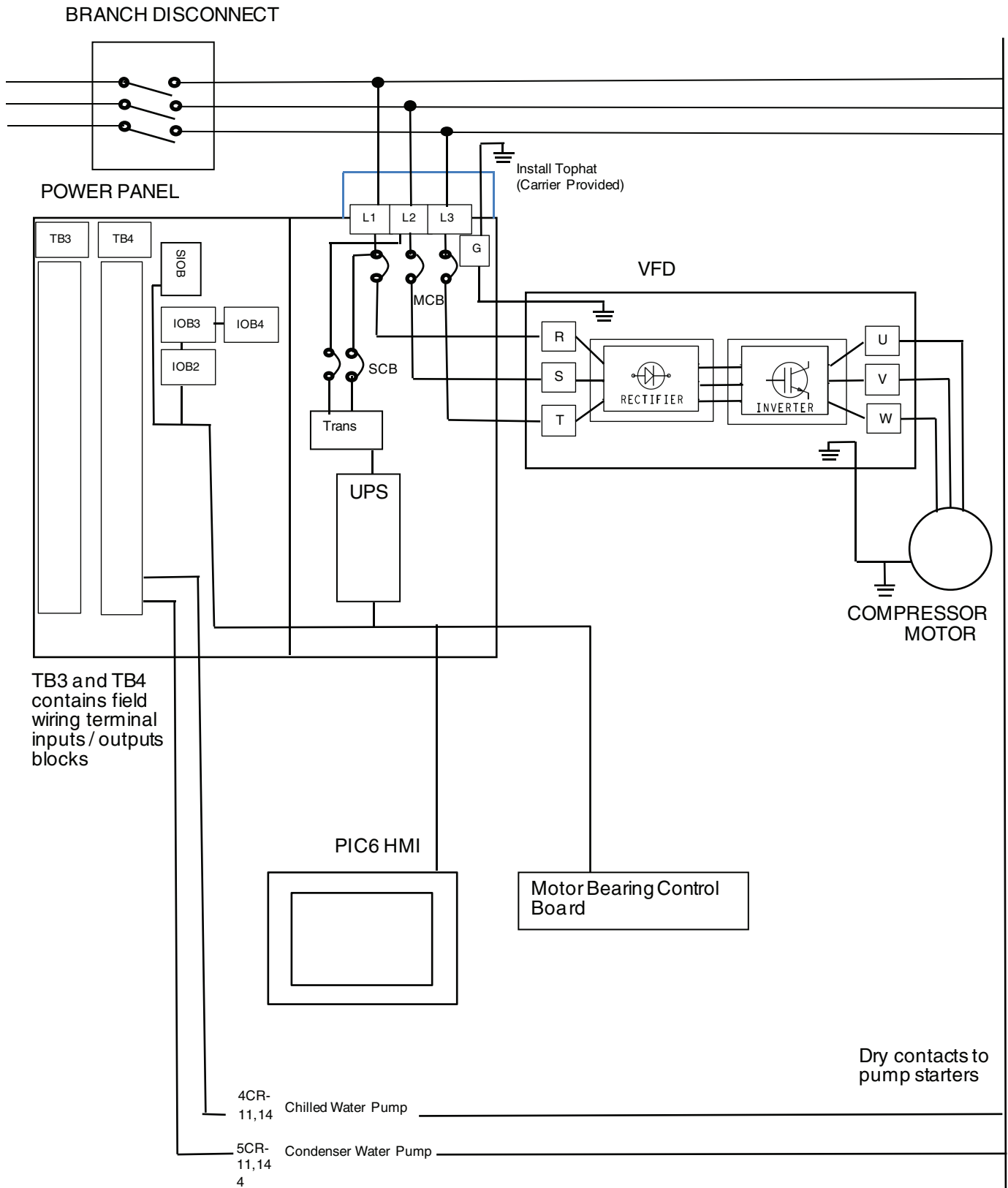
**LEGEND FOR FIG. 20-28**

*Abbreviations*

*Symbols*

1-5TB	— Terminal Block 1-5
2-4IOB	— Carrier Input Output Board 2-4
ALM	— Chiller Alarm Relay
AUTO_DEM	— Auto Demand Limit Input
AUTO_RES	— Auto Water Temp Reset
CB	— Circuit Breaker
CDWP	— Condenser Water Pump
CDWP_V	— Condenser Water Pump (Variable Speed)
CHWP	— Chilled Water Pump
CHWP_V	— Chilled Water Pump (Variable Speed)
CHWR_T	— Common Chilled Water Return Temperature
CHWS_T	— Common Chilled Water Supply Temperature
COND_EWP	— Entering Cond Water Pressure
COND_FL	— Cond Water Flow Measurement
COND_FS	— Cond Water Flow Switch
COND_LS	— Liquid Level Condenser
COND_LWP	— Leaving Cond Water Pressure
COND_P	— Condenser Pressure
CT	— Control Transformer
CUS_ALE	— Customer Alert
DGT	— Compressor Discharge Temperature
E_STOP	— Remote Emergency Stop Input
ECBY_VLV	— Not Used
ECDW	— Entering Condenser Water Temperature
ECON_GT	— Economizer Gas Temperature
ECON_P	— Economizer Pressure
ECW	— Entering Chilled Water Temperature
EVAP_EWP	— Entering Evap Water Pressure
EVAP_FL	— Evap Water Flow Measurement
EVAP_FS	— Evap Water Flow Switch
EVAP_LWP	— Leaving Evap Water Pressure
EVAP_P	— Evaporator Pressure
EVAP_T	— Evap. Refrigerant Liquid Temperature
EXCSV	— Expansion Control System Valve Connections
FC_MODE	— Not Used
FC_SS	— Not Used
FS_LOCK	— Fire Security Interlock
HDPV_OU2	— Head Pressure Output 2
HMI	— Human Machine Interface (Touch Screen)
HP_SW	— High Pressure Switch
ICE_CON	— Ice Build Contact
IGV1_OUT	— Guide Vane 1 Analog Output
IGV1_POS	— Guide Vane 1 Actual Position
IGV2_OUT	— Guide Vane 2 Analog Output
IGV2_POS	— Guide Vane 2 Actual Position
LCDW	— Leaving Condenser Water Temperature
LCW	— Leaving Chilled Water Temperature
MCB	— Main Circuit Breaker
MCB_SOR	— MCB Shunt Trip
MTRW1	— Motor Winding Temperature 1
MTRW2	— Motor Winding Temperature 2
PB	— Push Button
POW_FDB	— Power Request Feedback
POW_REQ	— Power Request Output
PS	— Power Supply
R_RESET	— Remote Reset Sensor
REF_LEAK	— Refrigerant Leak Sensor
REF_PUMP	— Refrigerant Pump
REM_CON	— Remote Contact Input
REM_E_STOP	— Remote E-Stop
REM_LOCK	— Chiller Lockout Input
RUN_STAT	— Chiller Run Status
SCB	— Service Circuit Breaker
SCB_SOR	— SCB Shunt Trip
SIOB	— Standard Input Output Board
SURGE_P	— Surge Proximity
T1/2	— Transformer 1/2
TFR_HIGH	— Tower Fan High
TFR_LOW	— Tower Fan Low
TOW_FAN_V	— Tower Fan (Variable Speed)
VFD_LOCK	— VFD Interlock

	Terminal Block Connection
	Female Connector
	Male Connector
---	Optional Wiring
	Normally Open (NO)
	Normally Closed (NC)
	Contact, NO
	Contact, NC
	Thermostat
	Thermistor
	Coil
	Cable
	Pressure Switch
	Pressure Transducer
	Fuse
	Circuit Breaker
	Flow Switch
	Ground
<b>BLK</b>	Black
<b>BLU</b>	Blue
<b>BRN</b>	Brown
<b>CU</b>	Copper
<b>GRN</b>	Green
<b>GRY</b>	Gray
<b>ORG</b>	Orange
<b>RED</b>	Red
<b>WHT</b>	White
<b>YEL</b>	Yellow
<b>Y/G</b>	Yellow/Green



Required Field Wiring

Fig. 29 — Typical 19MV VFD — Factory Unit Mounted

## NOTES FOR FIG. 20-29

### 19MV FIELD WIRING

#### I. General

- 1.0 Variable Frequency Drive (VFD) shall be designed and manufactured in accordance with Carrier engineering requirement.
- 1.1 All field-supplied conductors and devices must be compliant, and be installed in compliance with all applicable codes and job specifications.
- 1.2 The routing of field-installed conduit and conductors and the location of field-installed devices must not interfere with equipment access or the reading, adjusting or servicing of any component.
- 1.3 Equipment installation and all starting and control devices must comply with details in equipment submittal drawings and literature.
- 1.4 Contacts and switches are shown in the position they would assume with the circuit deenergized and the chiller shutdown.
- 1.5 Warning — Do not use aluminum conductors.
- 1.6 Warning — Remove panel above main circuit breaker before drilling. Do not drill into the power panel.

#### II. Power Wiring to Power Panel

- 2.0 Provide a means of disconnecting branch feeder power to chiller. Provide short circuit protection and interrupt capacity for branch feeder in compliance with all applicable codes.
- 2.1 Metal conduit must be used for the power wires, from chiller to branch feeder.
- 2.2 Line side power conductor rating must meet VFD nameplate voltage and chiller full load amps (minimum circuit ampacity).
- 2.3 Lug adapters may be required if installation conditions dictate that conductors be sized beyond the minimum ampacity required. Lugs will accommodate the quantity (#) and size cables (per phase) as follows. If larger lugs are required, they may be purchased from the manufacturer of the circuit breaker. See Conductor Usage table for lug sizes.
- 2.4 Compressor motor and controls must be grounded by using equipment grounding lug provided inside unit-mounted VFD enclosure.

#### III. Control Wiring

- 3.0 Field-supplied control conductors to be at least 18 AWG (American Wire Gage) or larger.
- 3.1 Ice build start/terminate device contacts, remote start/stop device contacts and spare safety device contacts (devices not supplied by Carrier) must have 24 vac rating. At the IOB max current is 60 mA, nominal current is 10 mA. Switches with gold-plated bifurcated contacts are recommended.
- 3.2 Each integrated contact output can control loads (VA) for evaporator pump, condenser pump, tower fan low, tower fan high, and alarm annunciator devices. Coil voltage of relay is 24 vac. IOB outputs are only rated for 1 amp RMS steady state. Carrier provided pilot relays are rated 12 amps.

#### WARNING

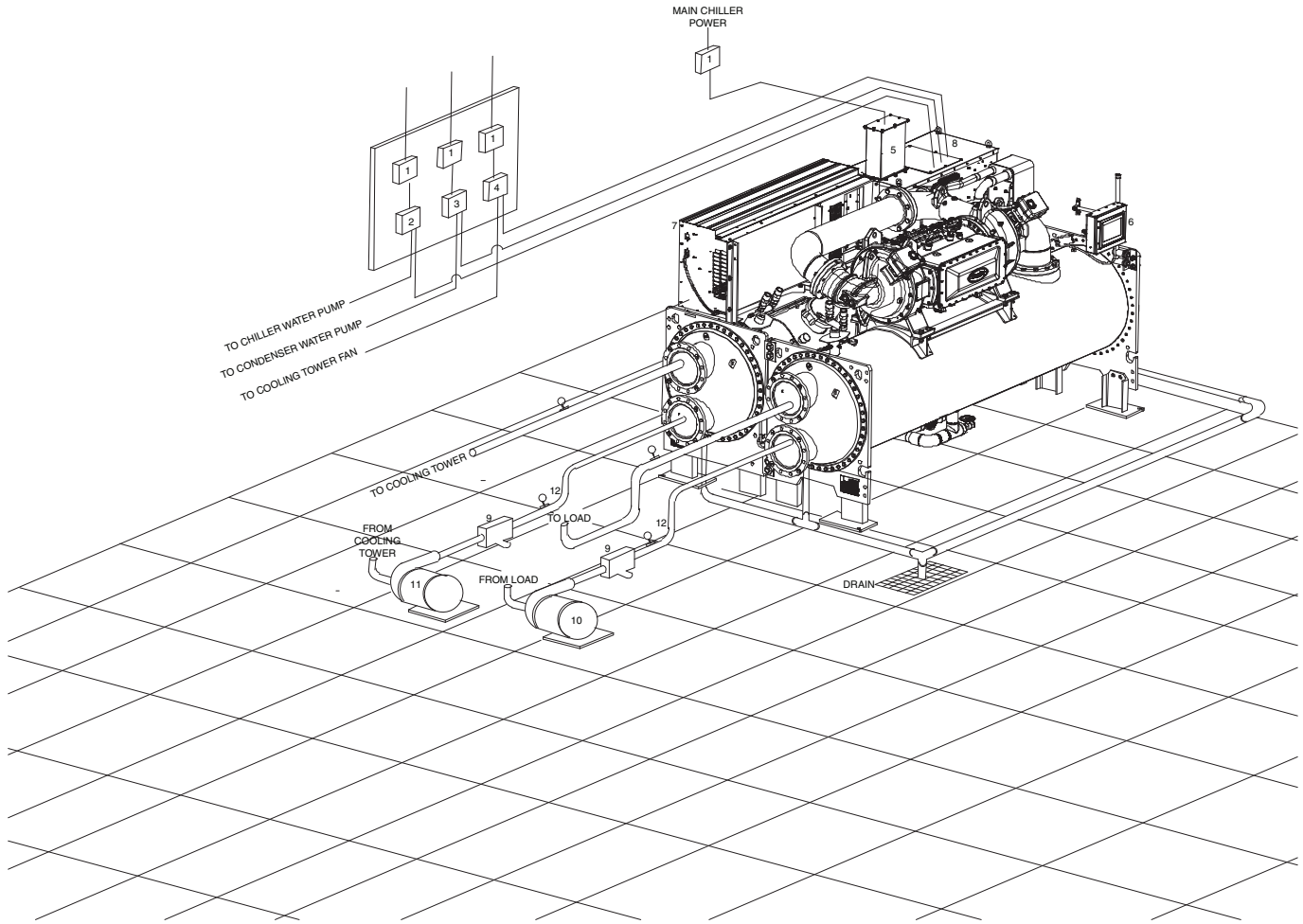
Control wiring required for Carrier to start pumps must be provided to assure machine protection. If primary pump and flow control is by other means, also provide a parallel means for control by Carrier. Failure to do so could result in machine freeze-up or overpressure.

- 3.3 Do not use control transformers in the power panel 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 Head pressure 4 to 20 mA output signal is designed for controllers with a non-grounded 4 to 20 mA input signal and a maximum input impedance of 500 ohms.
- 3.6 Circuit breaker lug accepts stranded wire. Ground connector is to be terminated with compression lug suited for 10 mm stud.




#### CONDUCTOR USAGE

VFD SIZE	STANDARD 100 KAIC LUG CAPACITY (PER PHASE)		
	NO. OF CONDUCTORS	CONDUCTOR RANGE	GROUND CONNECTOR
DD395, DD480, DD588, DE658, DE745, DE800, DE990	3	2/0 AWG - 400 kcmil	2/0*
GREATER THAN DD990	4	4/0 to 500 kcmil	2/0*

\* Two ground lugs each capable of 2x #2-600 kcmil per lug.



**LEGEND**

- 1 — Disconnect
  - 2 — Chilled Water Pump Starter
  - 3 — Condenser Water Pump Starter
  - 4 — Cooling Tower Fan Starter (Low Fan, High Fan)
  - 5 — Tophat
  - 6 — HMI
  - 7 — Unit-Mounted VFD
  - 8 — Power Panel
  - 9 — Strainers
  - 10 — Chilled Water Pump
  - 11 — Condenser Water Pump
  - 12 — Pressure Gages
  - 13 — Local Disconnect (hidden - in power panel)
-  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 evaporator and condenser water piping to each chiller for service.
6. Operating environment — Chiller should be installed in an indoor environment where the ambient temperature is 40 to 104°F (4 to 40°C) with a relative humidity (non-condensing) 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.
7. Disconnection must be incorporated in the fixed wiring in accordance with the local country-specific requirements or NFPA (National Fire Protection Association).
8. Tophat is shipped loose and field assembled.
9. Strainers are typically located on the suction side of the water pumps. It is acceptable to install strainers on either side of the pump.

**Fig. 30 — 19MV Chiller with Unit-mounted VFD**

## 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. 15 for location of the CCN network connections on the terminal strip labeled CCN.

NOTE: Conductors and drain wire must be 20 AWG (American Wire Gage) minimum stranded, tinned copper. Individual conductors must be insulated with PVC, PVC/nylon, vinyl, Teflon<sup>1</sup>, 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)
+ GROUND	Red White Black	+ - G

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

1. Teflon is a registered trademark of DuPont.

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. If the communication bus cable exits from one building and enters another, the shields must be connected to ground at the lightning suppressor in each building where the cable enters or exits the building (one point only).

To connect the 19MV chiller to the network, proceed as follows (see Fig. 15 and 16):

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 black to “G” terminal and white to “-” terminal of CCN Network interface located in the control panel.

### Step 6 — Install Field Insulation

#### CAUTION

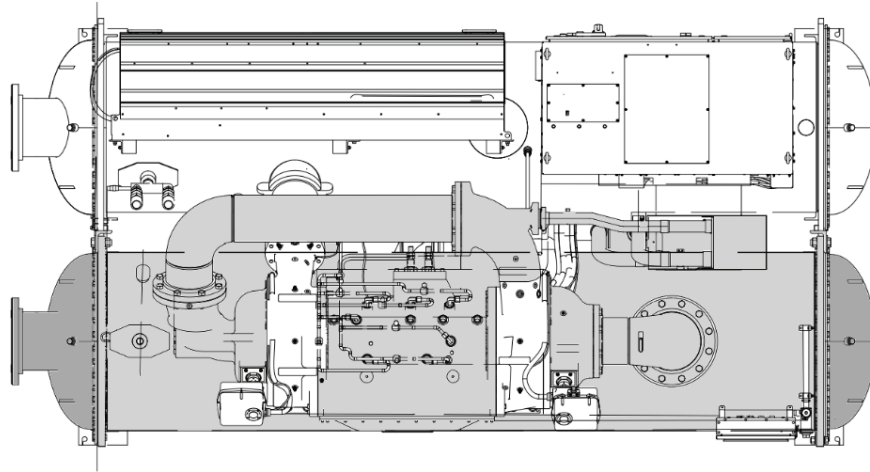
Protect insulation from weld heat damage and weld splatter. Cover with wet canvas cover during water piping installation.

When installing insulation at the jobsite, insulate the following components:

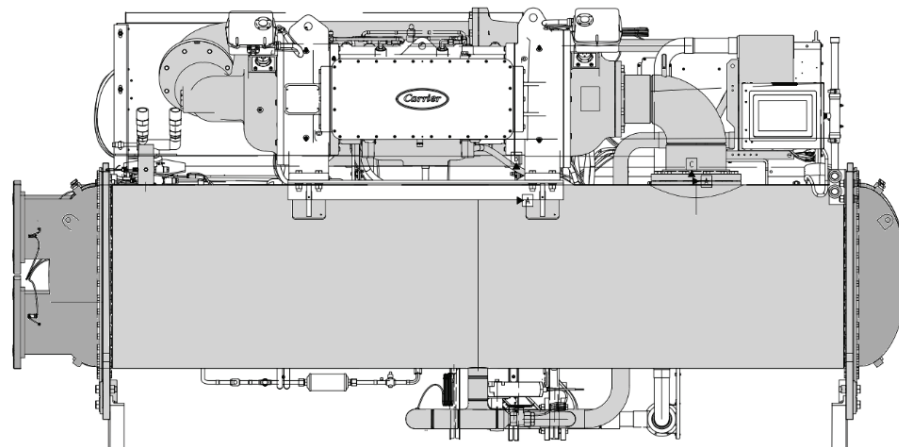
- compressor motor
- economizer
- evaporator shell
- evaporator tube sheets
- suction piping
- motor cooling drain
- refrigerant liquid line to evaporator

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. 31.





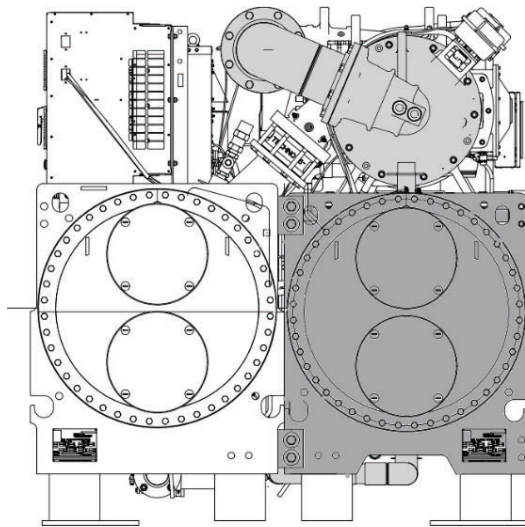
TOP



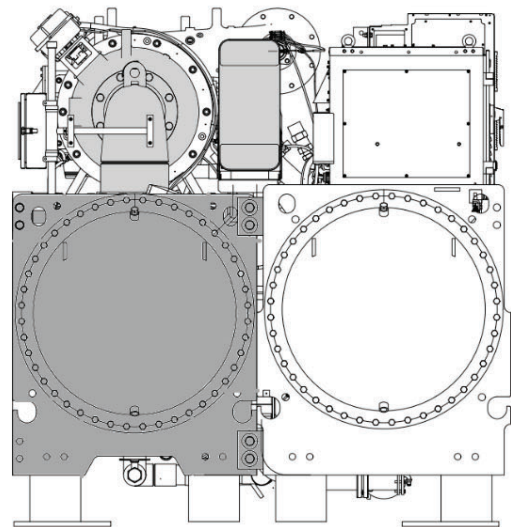
2ND STAGE

FRONT

1ST STAGE



2ND STAGE END



1ST STAGE END

FACTORY INSTALLED

FIELD SUPPLIED AND INSTALLED

**Fig. 31 — 19MV Standard Insulation Area**



# INSTALLATION START-UP REQUEST CHECKLIST

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

Machine Model Number: 19MV: \_\_\_\_\_ Serial Number: \_\_\_\_\_

To: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 Attn: \_\_\_\_\_

Date \_\_\_\_\_  
 \_\_\_\_\_  
 Project Name \_\_\_\_\_  
 \_\_\_\_\_  
 Carrier Sales Order 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 devices 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 piping (if installed)	_____	_____
e. Other _____	_____	_____
6. Gages are installed as called for on the job prints required to establish design flow for the evaporator and condenser.		
a. Water pressure gages IN and OUT	_____	_____
b. Water temperature gages IN and OUT	_____	_____
7. The machine's wiring is complete. The wiring is installed per installation instructions and certified prints.		
a. Power wiring to Carrier Power Panel (line side) completed with Carrier supplied tophat installed. (If chiller was disassembled during installation, motor leads must not be taped until the Carrier technician megger tests the motor.)	_____	_____
b. Carrier controls can independently energize water pumps.	_____	_____
c. The transformer feeding the chiller is confirmed to have a Wye secondary with a solidly grounded Neutral. Immediately contact Carrier Service if this is not the case.	_____	_____
d. Line side voltage is within $\pm 10\%$ of chiller nameplate voltage	_____	_____
e. Other _____	_____	_____
8. Was the chiller disassembled/reassembled during the installation? Was this work supervised by a Carrier Service Representative?	_____ _____	_____ _____

COMMENTS:

\_\_\_\_\_  
 \_\_\_\_\_

