Carrier®

17/19EX 50/60 Hz Centrifugal Liquid Chillers with HFC-134a

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

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 ASHRAE (American Society of Heating, Refrigeration and Air Conditioning Engineers) 15. The accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation.

PROVIDE adequate ventilation in accordance with 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.

⚠ WARNING

DO NOT WELD OR FLAMECUT any refrigerant line or vessel until all refrigerant *(liquid and vapor)* has been removed from chiller. Traces of vapor should be displaced with dry air or nitrogen and the work area should be well ventilated. *Refrigerant in contact with an open flame produces toxic gases.*

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 deenergized before resuming work.

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

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

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

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

Operation of this equipment with refrigerants other than those cited herein should comply with 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

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.

CONTENTS

INTRODUCTION

General — The 17/19EX machine is factory assembled, wired, and leak tested. Installation consists primarily of establishing water and electrical services to the machine. The rigging, installation, field wiring, field piping and insulation are the responsibility of the contractor and/or customer. See Fig. 1 for model number information.

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 drawings

Equipment Required

- mechanic's tools (refrigeration)
- volt-ohmmeter and clamp-on ammeter
- leak detector (halide or electronic)
- absolute pressure manometer or wet-bulb vacuum indicator
- portable vacuum pumps

INSTALLATION

Receiving the Machine

INSPECT SHIPMENT

⚠ CAUTION

Do not open any valves or loosen any connections. The standard 17/19EX machine may be shipped with a nitrogen holding charge or with the refrigerant charge isolated within the utility vessel.

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 the machine's components during shipping. A full operating oil charge is placed in the oil sump of the compressor before shipment.

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

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

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

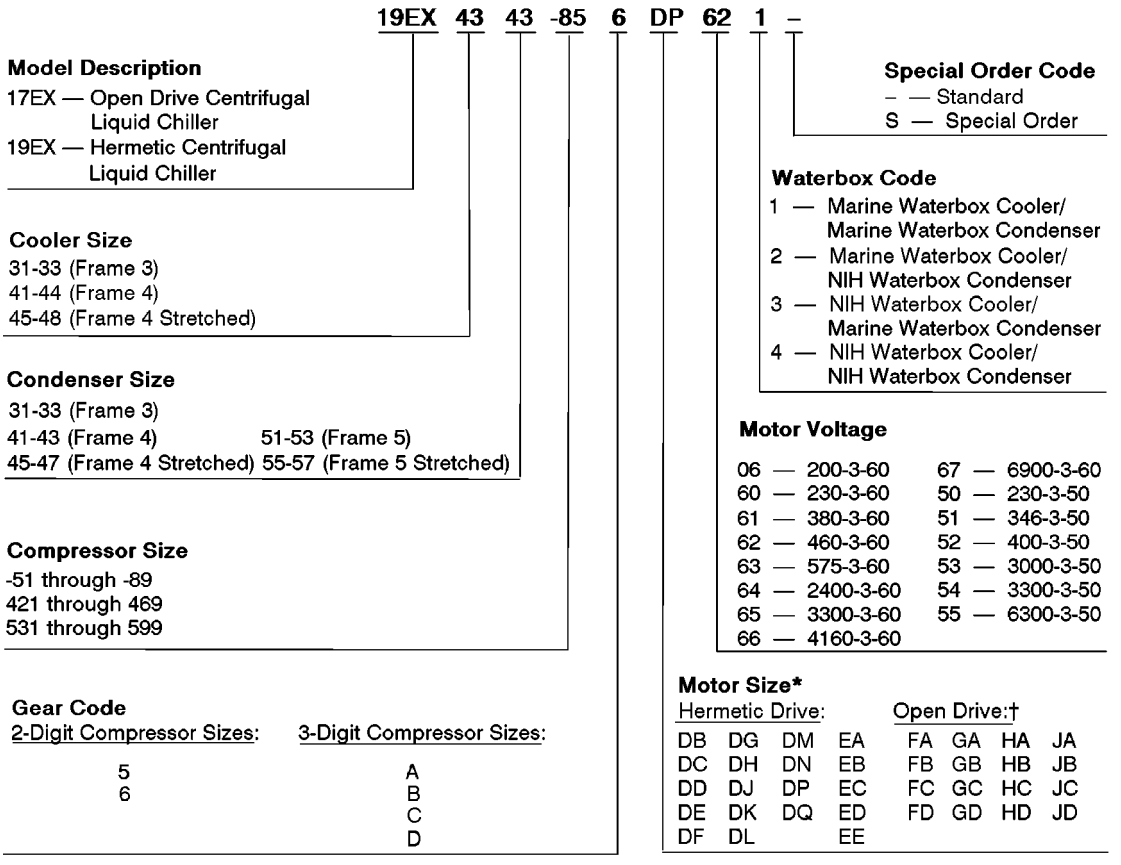
Rigging the Machine — The 17/19EX machine can be rigged as an entire assembly. It also has flanged connections that allow the compressor, utility vessel, cooler, and condenser sections to be separated for ease of installation. Figures 2 and 3 show 17/19EX components.

RIG MACHINE ASSEMBLY — See rigging instructions on label attached to machine. Also refer to the rigging information found in Fig. 4-9 and Tables 1-12. *Lift machine only from the 4 points indicated in rigging guide.* Each lifting cable or chain must be capable of supporting the entire weight of the machine.

⚠ WARNING

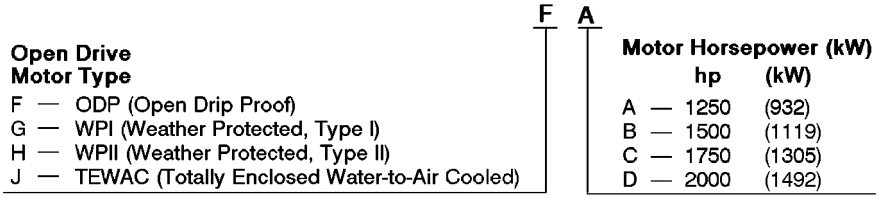
Lifting machine from points other than those specified may result in serious damage to the unit and personal injury. Rigging equipment and procedures must be adequate for machine weight. See Table 1 for machine weights.

NOTE: These weights are broken down into component sections for use when installing the unit in sections. For the complete machine weight, add all component sections and refrigerant charge together. Total machine weight is also stenciled on the cooler and condenser sections.



NIH — Nozzle-In-Head

*Motors beginning with "E" and open drive motors (FA-JD) cannot be used with size 51-89 or 421-469 compressors.
†Open-drive motor codes:



ASME 'U' STAMP

UNDERWRITERS' LABORATORIES

ARI (Air Conditioning and Refrigeration Institute) PERFORMANCE CERTIFIED (60 Hz Only)

Fig. 1 — Model Number Identification

RIG MACHINE COMPONENTS — Refer to instructions on page 5, Fig. 6-8, and Carrier certified drawings for machine component disassembly.

IMPORTANT: Only a qualified service technician should disassemble and reassemble the machine. After reassembly, the machine must be dehydrated and leak tested.

⚠ WARNING

When rigging components separately, the open drive (17EX) motor must be removed to avoid overturning.

⚠ WARNING

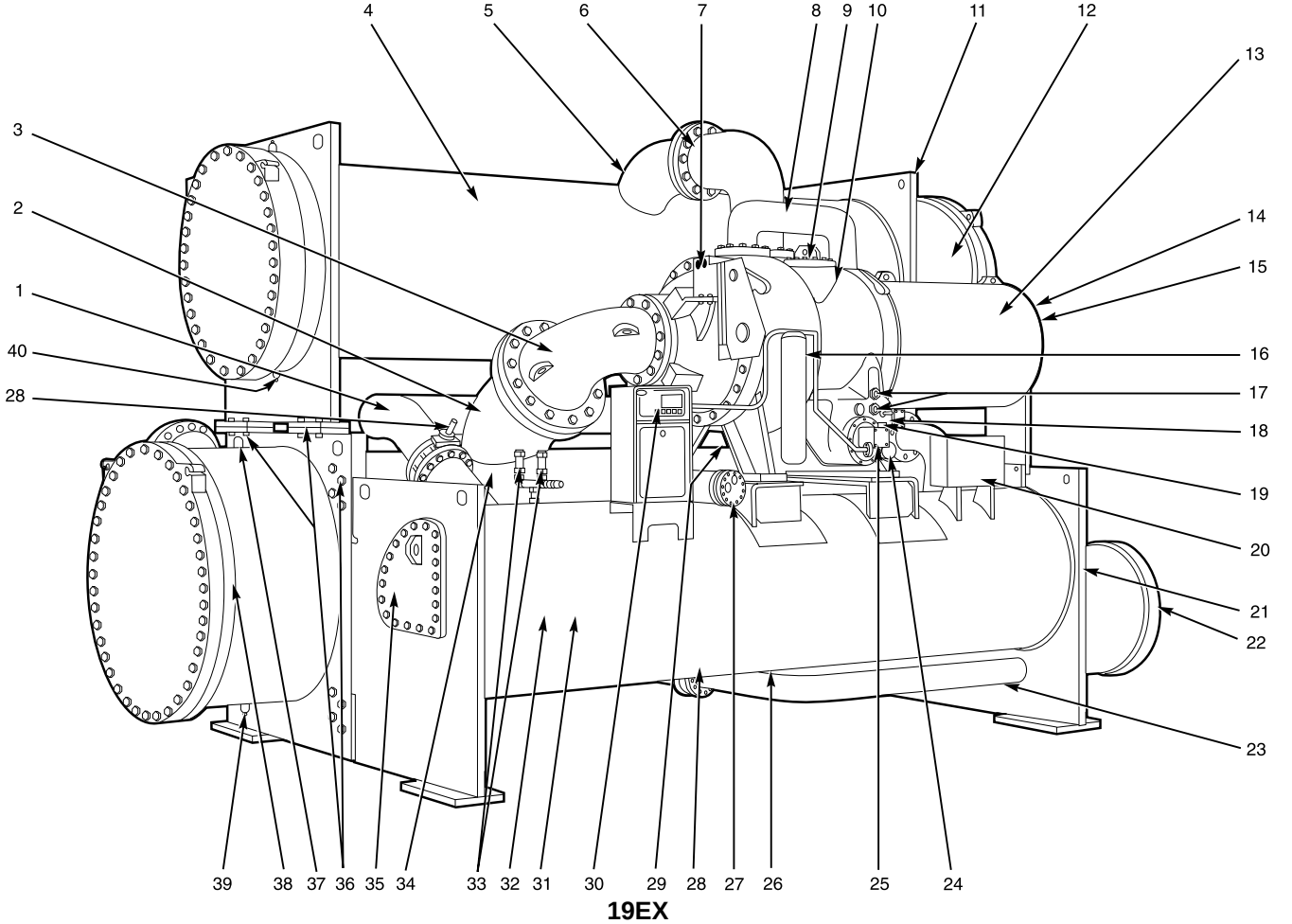
Do not attempt to disconnect flanges while the machine is under pressure. Failure to relieve pressure can result in personal injury or damage to the unit.

⚠ CAUTION

Before rigging the compressor, disconnect the wires leading from the power panel to the control center at the power panel.

NOTE: Wiring for sensors must be disconnected. Label each wire before removal (see Carrier certified drawings).

Detach all transducer and sensor wires at the sensor, then clip all wire ties necessary to remove the wires from the heat exchangers.



19EX

LEGEND

1 — Refrigerant Liquid Line to Economizer/ Storage Vessel
2 — Cooler Suction Pipe
3 — Compressor Suction Elbow
4 — Condenser
5 — Condenser Discharge Pipe
6 — Compressor Discharge Elbow
7 — Guide Vane Actuator
8 — Economizer Gas Line to Compressor
9 — Gear Inspection Cover
10 — 2-Stage Hermetic Compressor
11 — Condenser Waterbox Vent (Not Shown)
12 — Condenser Marine Waterbox
13 — Hermetic Compressor Motor
14 — Compressor Motor Terminal Box (Not Shown)
15 — Motor Sight Glass (Not Shown)
16 — Oil Filter
17 — Oil Level Sight Glasses (2)
18 — Cooler Relief Valves (Not Shown)
19 — Oil Heater (Not Shown)
20 — Auxiliary Power Panel (Field Wiring Terminals)
21 — Pumpdown Unit (Not Shown)
22 — Low-Side Float Box Cover
23 — Refrigerant Liquid Line to Cooler
24 — Oil Drain and Charging Valve
25 — Oil Pump
26 — Refrigerant Charging/Service Valve 10 (Not Shown)
27 — Oil Cooler
28 — Isolation Valves (Not Shown)
29 — Refrigerant Filter Drier
30 — Local Interface Display Control Panel
31 — Economizer/Storage Vessel
32 — Rigging Guide (Not Shown)
33 — Economizer/Storage Vessel Relief Valves
34 — Cooler
35 — High-Side Float Box Cover
36 — Take-Apart Connections
37 — Cooler Waterbox Vent
38 — Cooler Marine Waterbox
39 — Cooler Waterbox Drain
40 — Condenser Waterbox Drain

Fig. 2 — Typical 19EX Installation

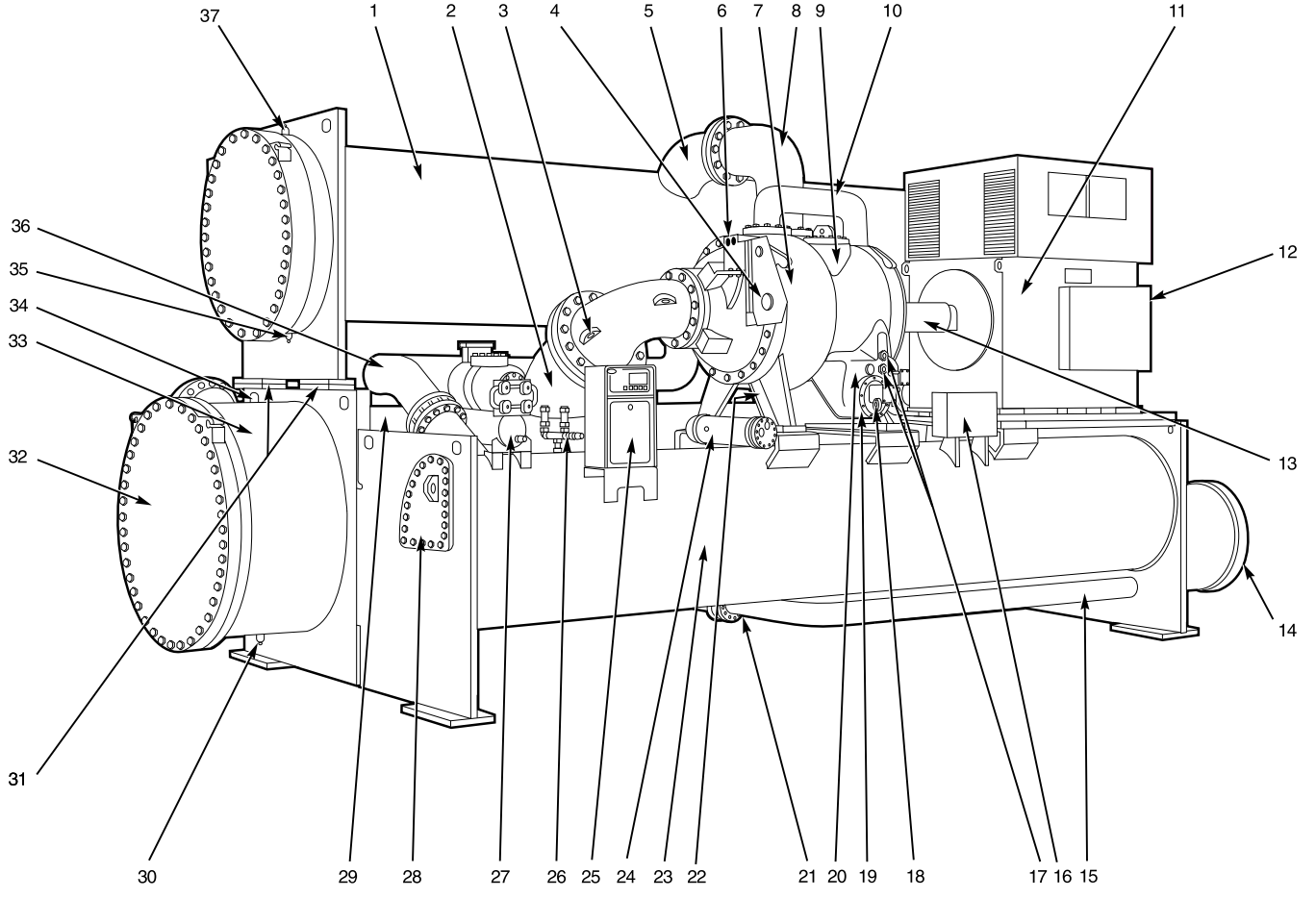
COMPONENT DISASSEMBLY

To Separate Compressor from the Machine

1. Make sure to check that the machine is at atmospheric pressure before disassembly.
2. Since the center of gravity is high on 17EX machines, the motor MUST be removed before rigging the machine.
3. Suction elbow should be rigged separately (Fig. 6, Item 2). Place slings around the elbow and attach to the hoist. Remove bolting at flanges, (Fig. 6, Items 1 and 3). Detach the elbow.
4. Unbolt discharge flange to the condenser at flange (Fig. 8, Item 3). Cut copper lines (Fig. 6, Items 7, 8, and 9).
5. Disconnect and detach the economizer vent line (Fig. 8, Item 4). Unbolt the line at flange (Fig. 8, Item 2).
6. On 19EX machines, disconnect the motor cooling drain line at flange (Fig. 8, Item 5).
7. Disconnect wiring to the control center and power panel.
8. Connect rigging to the compressor.
9. Unbolt compressor from the utility vessel (Fig. 7, Items 2, 4, and 5).
10. Hoist the compressor off of the unit.
11. If the compressor is to be transported or set down, the base should be bolted to sections of 4 in. x 6 in. lumber.

To Separate Condenser from the Machine

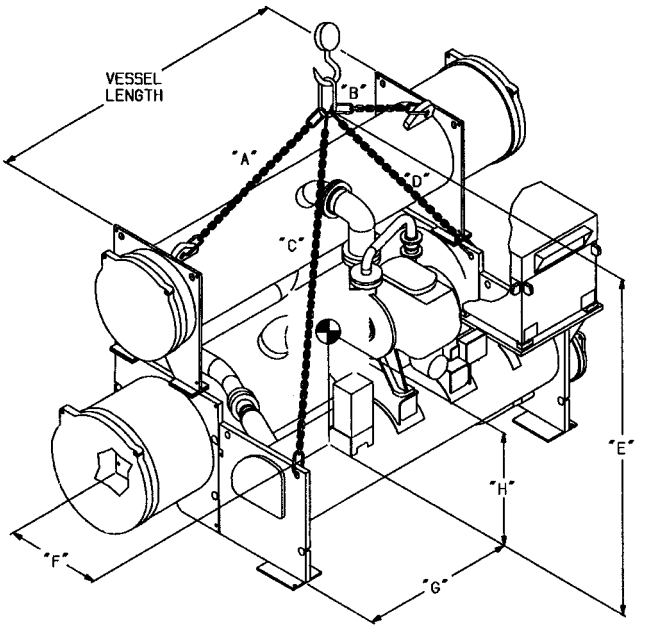
1. Unbolt flange (Fig. 6, Item 3).
2. Unbolt flange (Fig. 6, Item 4).
3. Cut copper pipe (Fig. 6, Item 7).
4. Unbolt hot flange (Fig. 7, Item 1).
5. Connect rigging to all corners of the condenser.
6. Unbolt condenser feet (Fig. 8, Items 1 and 6).



LEGEND

1 — Condenser
2 — Cooler Suction Pipe
3 — Compressor Suction Elbow
4 — Guide Vane Actuator
5 — Condenser Discharge Pipe
6 — Oil Filter (Hidden)
7 — Two-Stage Compressor
8 — Compressor Discharge Elbow
9 — Gear Inspection Cover
10 — Economizer Gas Line to Compressor
11 — Open Drive Compressor Motor
12 — Compressor Motor Terminal Box
13 — Coupling Guard
14 — Low-Side Float Box Cover
15 — Refrigerant Liquid Line to Cooler
16 — Power Panel (Field Wiring Terminals)
17 — Oil Level Sight Glasses
18 — Oil Drain and Charging Valve
19 — Oil Heater (Hidden)
20 — Oil Pump
21 — Refrigerant Charging/Service Valve 10 (Not Shown)
22 — Cooler Relief Valves (Not Shown)
23 — Economizer/Storage Vessel
24 — Oil Cooler
25 — Control Center
26 — Economizer/Storage Vessel Relief Valves
27 — Pumpout Unit
28 — High Side Float Box Cover
29 — Cooler
30 — Cooler Waterbox Drain
31 — Take-Apart Connections (Typical)
32 — Cooler Marine Waterbox Cover
33 — Cooler Waterbox
34 — Cooler Waterbox Vent
35 — Condenser Waterbox Drain
36 — Refrigerant Liquid Line to Economizer/Storage Vessel
37 — Condenser Waterbox Vent

Fig. 3 — Typical 17EX Installation

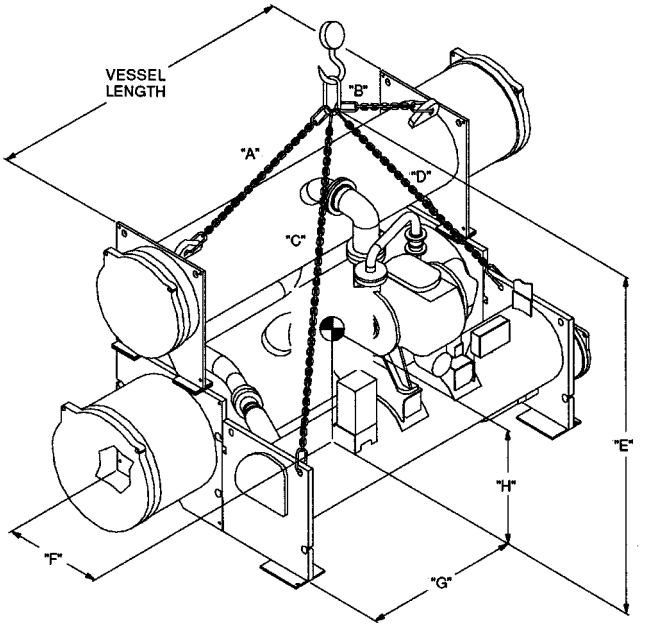


NOTES:
1. Each chain must be capable of supporting the maximum weight of the machine.
2. ◐ = the approximate center of gravity.
3. Maximum possible weight is 88,500 lb (40 166 kg) which includes a maximum of 6,000 lb (2 721 kg) of HFC-134a refrigerant in the storage tank.

17EX FRONT VIEW

COOLER SIZE	VESSEL LENGTH		MAXIMUM WEIGHT		LIFTING ANGLE	CHAIN LENGTH								LIFTING HEIGHT FROM FLOOR "E"		CENTER OF GRAVITY APPROXIMATE LOCATION					
						"A"		"B"		"C"		"D"				"F"		"G"		"H"	
	ft-in.	mm	lb	kg		ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm
45-48	17-0	5182	88,550	40 166	30°	10- 3	3124	9-0	2743	16-1	4902	13-6	4115	16-11	5156	4-1	1245	9-1	2769	4-9	1448
					45°	12- 7	3835	11-7	3531	19-1	5817	16-9	5105	20- 8	6299						
					60°	17-10	5436	17-1	5207	24-9	7544	22-8	6909	27- 3	8306						

Fig. 4 — 17EX Machine Rigging Guide

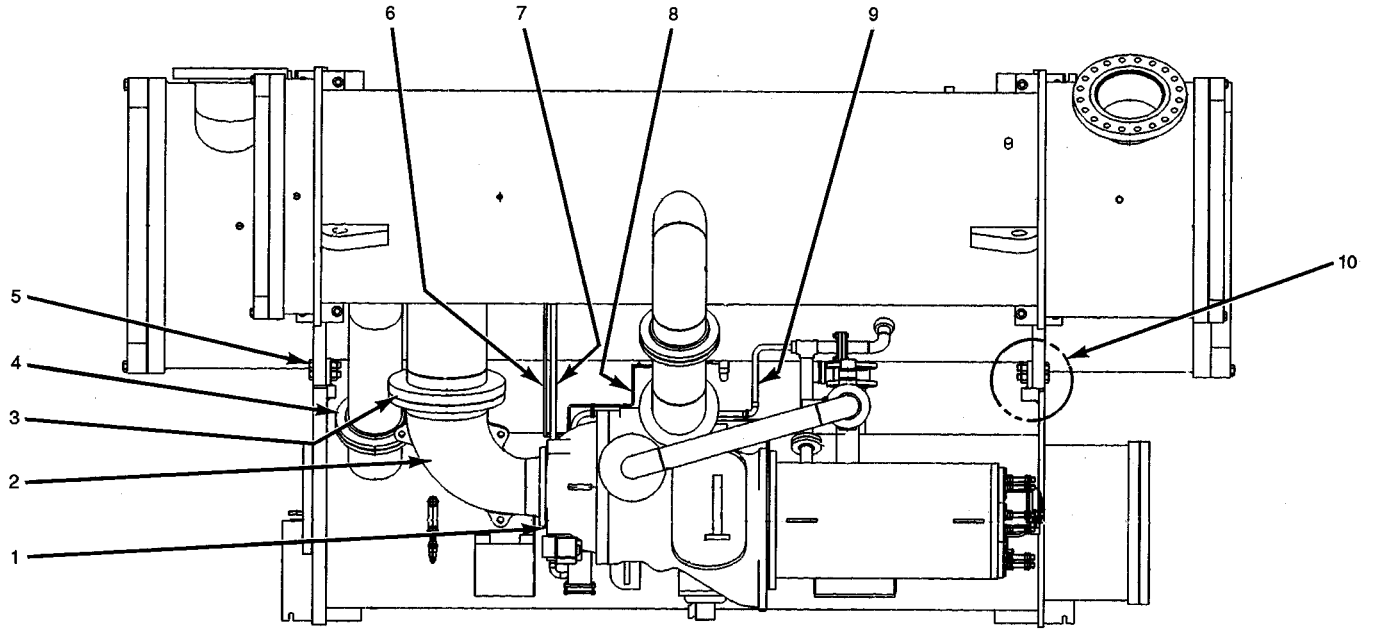


NOTES:
1. Each chain must be capable of supporting the maximum weight of the machine.
2. ◐ = the approximate center of gravity.
3. Maximum possible weight is 78,700 lb (35,698 kg) which includes a maximum of 6,000 lb (2,268 kg) of HFC-134a in the storage tank.

19EX FRONT VIEW

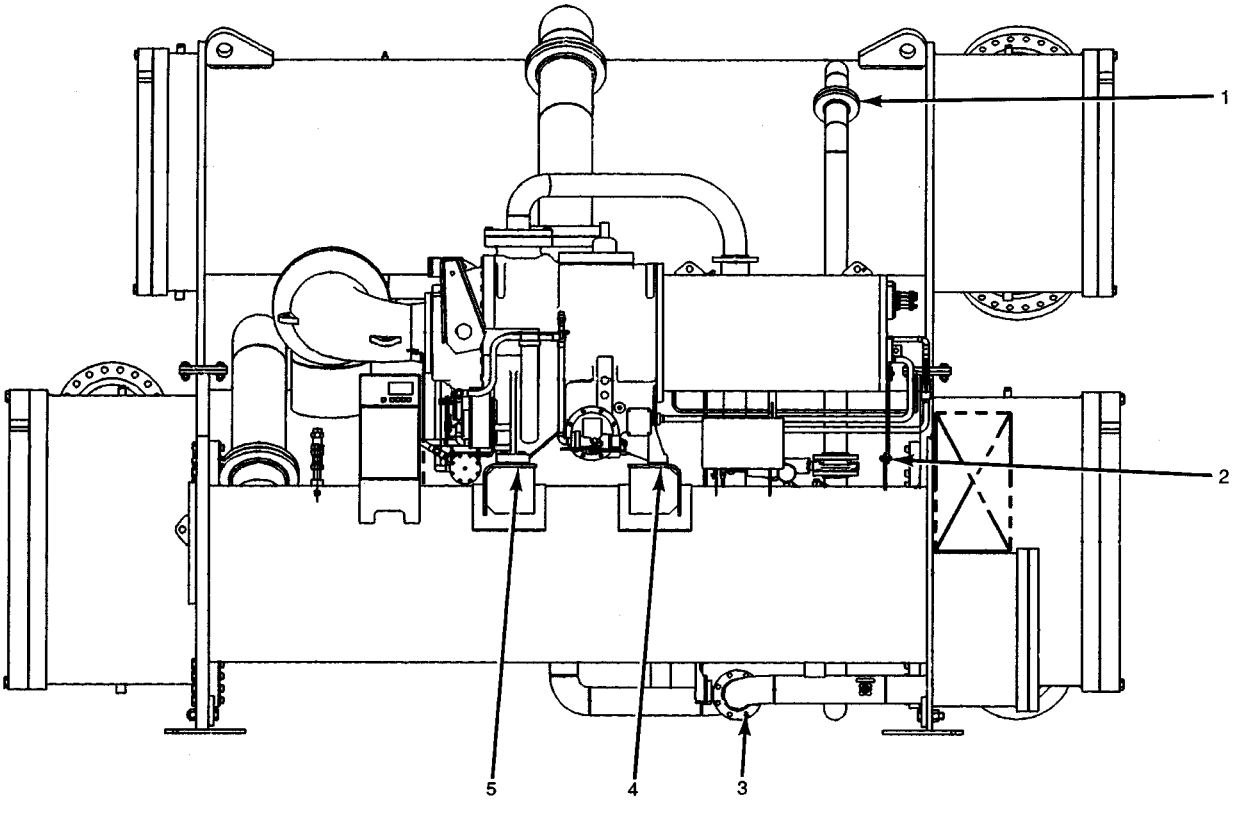
COOLER SIZE	VESSEL LENGTH		MAXIMUM WEIGHT		LIFTING ANGLE	CHAIN LENGTH								LIFTING HEIGHT FROM FLOOR "E"		CENTER OF GRAVITY APPROXIMATE LOCATION					
						"A"		"B"		"C"		"D"				"F"		"G"		"H"	
	ft-in.	mm	lb	kg		ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm
31-33	12-3	3734	55,000	24 948	30°	7-2	1880	7-2	1880	11-11	3632	11-1	3378	13-7	4140	3-10	1168	6-1	1854	4-6	1372
					45°	8-9	2667	8-9	2667	14- 0	4267	13-4	4064	16-2	4928						
					60°	12-5	3785	12-5	3785	18- 0	5486	17-6	5334	20-9	6325						
41-44	12-3	3734	70,000	31 752	30°	6-7	2007	6-9	2057	13- 0	3962	12-2	3708	15-1	4597	4- 0	1219	6-0	1829	4-8	1422
					45°	8-0	2438	8-3	2515	14-11	4547	14-3	4343	17-5	5309						
					60°	11-4	3454	11-6	3505	18- 7	5664	18-0	5486	21-7	6579						
45-48	17-0	5182	78,700	35 698	30°	9-1	2769	9-6	2896	15- 1	4597	14-7	4445	16-4	4978	3-10	1168	8-3	2515	4-8	1422
					45°	11-1	3378	11-6	3505	17- 9	5410	17-4	5283	19-8	5994						
					60°	15-9	4800	16-0	4877	22-10	6960	22-6	6858	25-5	7747						

Fig. 5 — 19EX Machine Rigging Guide



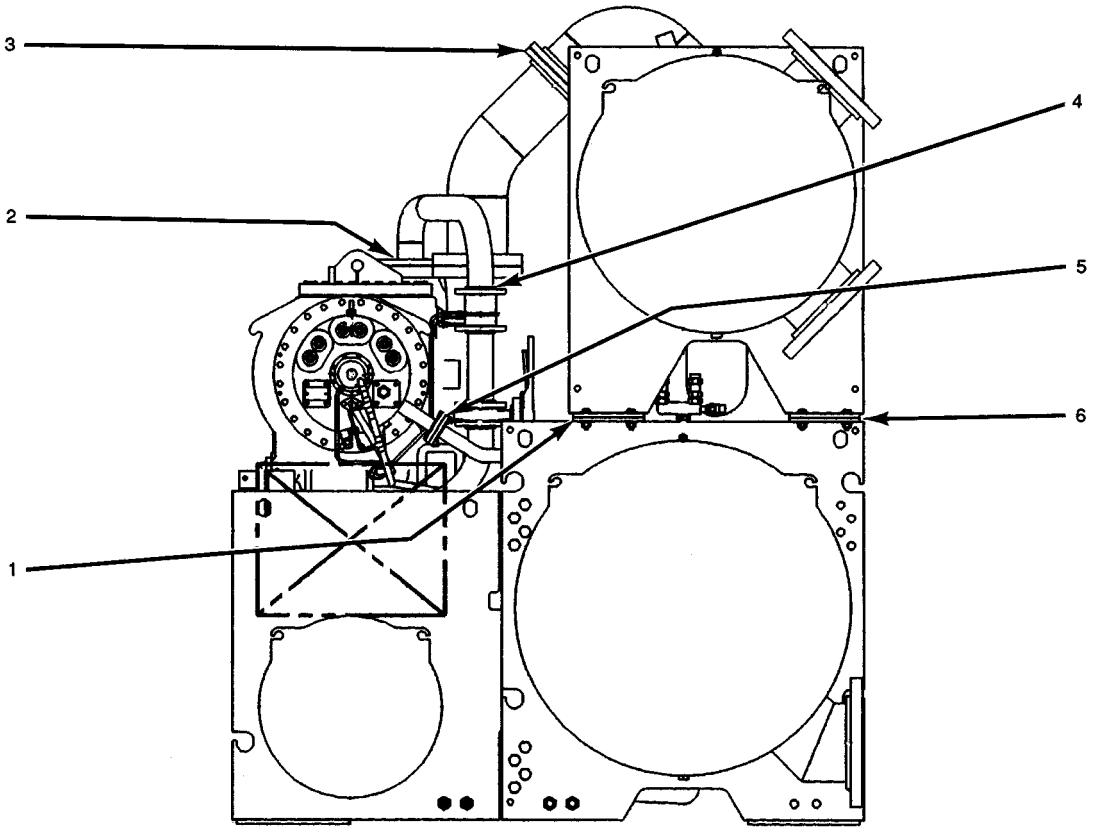
NOTE: Item numbers are referenced in Rigging the Machine, Component Disassembly section.

Fig. 6 — Typical Top View (19EX Shown)



NOTE: Item numbers are referenced in Rigging the Machine, Component Disassembly section.

Fig. 7 — Typical Side View (19EX Shown)



NOTE: Item numbers are referenced in Rigging the Machine, Component Disassembly section.

Fig. 8 — Typical Motor End View (19EX Shown)

To Separate Cooler From Utility Vessel

1. Remove condenser (see previous section).
2. Cut copper lines (Fig. 6, Items 6 and 8).
3. Unbolt liquid refrigerant line at flange (Fig. 7, Item 3).
4. Connect rigging to all four corners of the cooler before lifting the unit.
5. Unbolt connections to the utility vessel (Fig. 6, Items 5 and 10).

To Assemble the Machine

1. Follow disassembly instructions (in reverse order) and bolt all flanges back together using a gasket sealant. The following torque requirements are specified:

FIG.	ITEM NO.	TORQUE	
		ft-lb	N-m
6	3	580	786
	1 or 4	170	230
	5 and 10	840*	1139*
7	1	380	515
	4 and 5	250	340
8	1 and 6	280	380
	2	170	230
	3	380	515
	5	71	96

N-m — Newton Meters

*This torque is used to rig the entire machine. Once the machine is in place, if no further rigging is anticipated, the bolt torque can be reduced to 280 ft-lb (380 N-m).

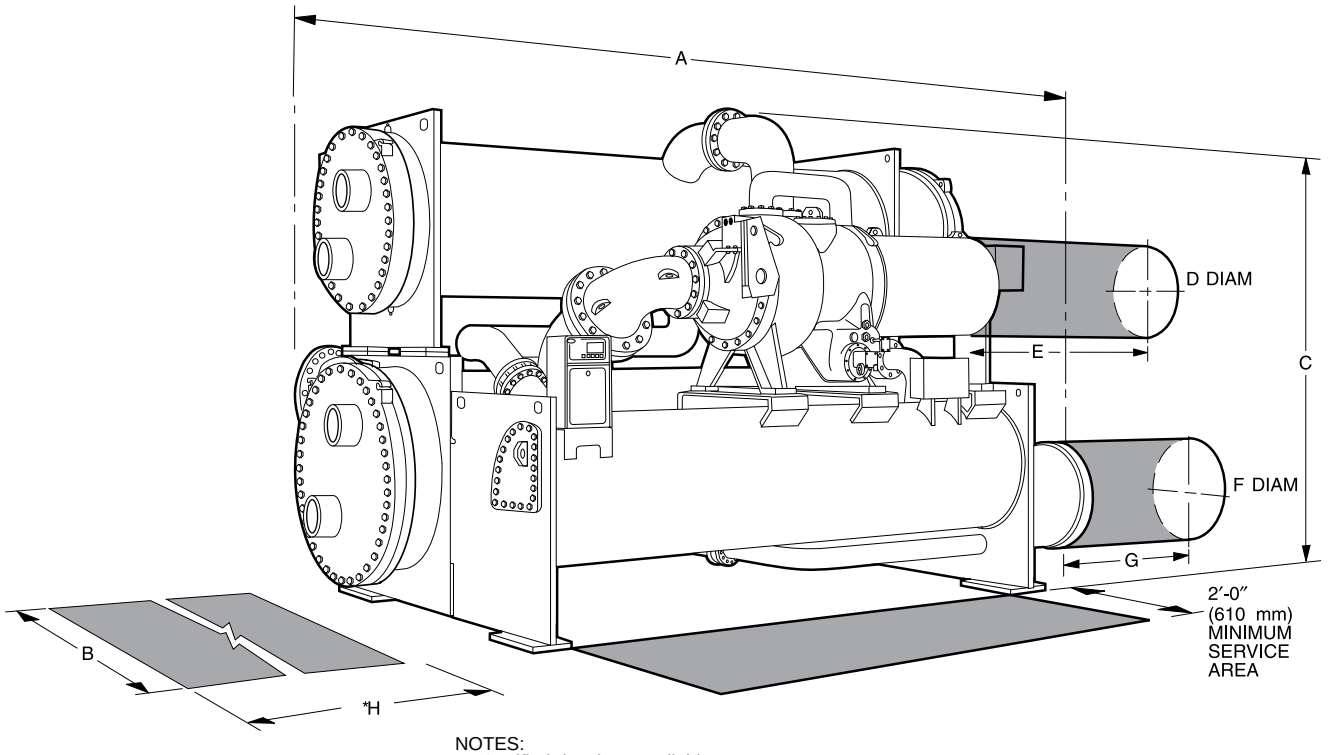
2. All gasketed or O-ring joints which have been disassembled must be assembled using new gaskets and O-rings. These new gaskets and O-rings (along with gasket sealant, O-ring lubricant, and copper line couplings) are available through your Carrier representative.
3. Braze all copper lines back together using a suitable brazing material for copper. Carrier recommends an AWS (American Welding Society) Classification BCuP-2.

⚠ CAUTION

Do not tilt the compressor; oil is contained in the oil sump.

Additional Notes

1. Use silicon grease on new O-rings when refitting.
2. Use gasket sealant on new gaskets when refitting.
3. Cooler, utility, and condenser vessels may be rigged vertically, as separate components. Rigging should be fixed to all four corners of the tube sheet.
4. New gaskets, grease for O-rings, and gasket sealant for a complete take-apart operation are available in a kit. Contact your Carrier representative.



SERVICE AREA

NOTES:
1. Certified drawings available upon request.
2. Service access should be provided per American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) 15, latest edition, National Fire Protection Association (NFPA) 70, and local safety codes.

DIMENSIONS

CONDENSER SIZE	A (LENGTH)†		B (WIDTH)				C (HEIGHT)		H (TUBE PULL)	
	ft-in.	mm	17EX**		19EX		ft-in.	mm	ft-in.	mm
			ft-in.	mm	ft-in.	mm				
31 - 33	15-6	4724	N/A	N/A	8-10	2692	10-8½	3264	12-10	3912
41 - 43	15-6	4724	N/A	N/A	9-4½	2858	12-2	3708	12-10	3912
45 - 47	20-3	6172	12-2	3708					17- 6	5334
51 - 53	15-6	4724	N/A	N/A			12-5	3785	12-10	3912
55 - 57	20-3	6172	12-2	3708					17- 6	5334

SERVICE CLEARANCES

COMPONENT	D (DIAMETER)††		E (LENGTH)††		F (DIAMETER)		G (LENGTH)	
	ft-in.	mm	ft-in.	mm	ft-in.	mm	ft-in.	mm
Motor DB - DQ	1-11¼	591	3- 7½	1105	—	—	—	—
Motor EA - ED	2- 2¾	679	3-10¼	1175	—	—	—	—
Motor EE			4- 1¼	1251	—	—	—	—
Low-Side Float	—	—	—	—	2-6½	775	1-0	305

NOZZLE SIZES

HEAT EXCHANGER	NOZZLE TYPE	NOZZLE SIZES (in.)‖					
		Cooler Passes			Condenser Passes		
		1	2	3	1	2	3
31 - 33	Marine	12	10	10	12	10	10
	NIH	12	10	10	—	10	10
41 - 48	Marine	20	14	12	20	14	12
	NIH	18	14	10	18	12	10
51 - 57	Marine	—	—	—	—	16	—
	NIH	—	—	—	20	16	—

LEGEND

NIH — Nozzle-In-Head

*Distance required for tube removal may be either end.
†Based on 2-pass, nozzle-in-head (NIH) waterboxes with 150 psi (1038 kPa) covers.
**Overall width of units with 17 Series compressors will vary greatly depending upon the application. See the appropriate certified drawings.
††For hermetic motors (19 Series) only.
‖The table at right provides additional information on nozzle sizes. Victaulic grooves are standard for these nozzles. Optional 150 psi (1034 kPa) and 300 psi (2068 kPa) flanges are available.
¶In conformance with ASA B36.10 (American Standards Association).

NOMINAL PIPE SIZE (in.)	SCHEDULE¶	WALL THICKNESS	
		in.	mm
10	40	.365	9.27
12	Std	.375	9.53
14	30	.375	9.53
16	30	.375	9.53
18	Std	.375	9.53
20	20	.375	9.53

Fig. 9 — Typical Dimensions

Table 1 — 17/19EX Heat Exchanger, Economizer/Storage Vessel, Piping, and Pumpout Unit Weights*

COOLER SIZE†	COOLER TOTAL WEIGHT				COOLER CHARGE						ECONOMIZER/ STORAGE VESSEL**		ECONOMIZER REFRIGERANT		MISCELLANEOUS PIPING		PUMPOUT UNIT	
	Dry		Operating††		Refrigerant		Water											
	lb	kg	lb	kg	lb	kg	lb	gal	kg	L	lb	kg	lb	kg	lb	kg	lb	kg
31	14,173	6 429	17,518	7 946	1,540	699	1,810	217	821	821	7,169	3252	610	277	820	372	210	95
32	14,538	6 594	18,117	8 218	1,640	744	1,944	233	882	882								
33	14,904	6 760	18,722	8 492	1,740	789	2,078	249	943	943								
41	21,674	9 831	26,120	11 848	1,900	862	2,441	293	1 107	1 107	7,169	3 252	610	277	1,095	497		
42	22,019	9 988	26,736	12 127	2,000	907	2,575	309	1 168	1 168								
43	22,364	10 144	27,322	12 393	2,100	953	2,709	325	1 229	1 229								
44	23,841	10 814	29,836	13 533	2,190	993	3,285	394	1 490	1 490								
45	25,032	11 354	30,790	13 966	2,260	1 025	3,006	361	1 363	1 363	7,900	3 583	840	381	1,149	521		
46	25,529	11 580	31,658	14 360	2,360	1 070	3,192	383	1 448	1 448								
47	26,025	11 805	32,496	14 740	2,460	1 116	3,378	405	1 532	1 532								
48	28,153	12 770	36,053	16 353	2,540	1 152	4,173	500	1 893	1 893								

CONDENSER SIZE†	CONDENSER TOTAL WEIGHT				CONDENSER CHARGE					
	Dry		Operating††		Refrigerant		Water			
	lb	kg	lb	kg	lb	kg	lb	gal	kg	L
31	10,454	4 742	13,022	5 907	950	431	1,613	193	732	732
32	10,809	4 903	13,514	6 130	950	431	1,750	210	794	794
33	11,164	5 064	14,000	6 350	950	431	1,886	226	855	855
41	13,768	6 245	16,999	7 711	1,090	494	2,146	257	973	973
42	14,118	6 404	17,498	7 937	1,090	494	2,282	274	1 035	1 035
43	14,468	6 563	17,978	8 155	1,090	494	2,419	290	1 097	1 097
45	16,676	7 564	20,800	9 435	1,400	635	2,720	326	1 234	1 234
46	17,172	7 789	21,489	9 747	1,400	635	2,908	348	1 319	1 319
47	17,669	8 015	22,178	10 060	1,400	635	3,096	371	1 404	1 404
51	17,188	7 796	20,993	9 522	1,100	499	2,707	325	1 228	1 228
52	17,848	8 096	21,923	9 944	1,100	499	2,964	355	1 344	1 344
53	18,400	8 346	22,682	10 288	1,100	499	3,178	381	1 442	1 442
55	20,725	9 401	25,598	11 611	1,420	644	3,453	412	1 566	1 566
56	21,663	9 826	26,896	12 199	1,420	644	3,808	457	1 727	1 727
57	22,446	10 181	27,980	12 691	1,420	644	4,105	492	1 862	1 862

*If a machine configuration other than 2-pass, 150 psig (1034 kPa), NIH waterbox configuration is used, refer to Tables 3 and 4 to obtain the additional dry and water weights that must be added to the values shown in this table.

†Cooler and condenser weights shown are based upon 2-pass, nozzle-in-head (NIH) waterboxes with 150 psig (1034 kPa) covers. Includes components attached to cooler, but does not include suction/discharge, elbow, or other interconnecting piping.

**Dry weight includes all components attached to economizer: Covers, float valves, brackets, control center (31 lb [14 kg]), and power panel (20 lb [9 kg]). Dry weight does not include compressor weight, motor weight, or pumpout condensing unit weight. The pumpout condensing unit weight is 210 lb (95 kg). For compressor and motor weights, refer to Tables 6, 7, 8, 10A, and 10B.

††Operating weight includes the sum of the dry weight, refrigerant weight, and water weight.

Table 2 — Refrigerant Charge

HEAT EXCHANGER SIZE		COOLER CHARGE		CONDENSER CHARGE		ECONOMIZER CHARGE		TOTAL REFRIGERANT CHARGE*	
Cooler	Condenser	lb	kg	lb	kg	lb	kg	lb	kg
31	**31**	1540	699	950	431	610	277	3100	1 406
32	**32**	1640	744	950	431			3200	1 452
33	**33**	1740	789	950	431			3300	1 497
41	**41**	1900	862	1090	494			3600	1 633
42	**42**	2000	907	1090	494			3700	1 678
43	**43**	2100	953	1090	494			3800	1 724
44	**51**	2190	993	1100	499			3900	1 769
44	**52**	2190	993	1100	499			3900	1 769
44	**53**	2190	993	1100	499			3900	1 769
45	**45**	2260	1 025	1400	635	844	381	4500	2 041
46	**46**	2360	1 070	1400	635			4600	2 087
47	**47**	2460	1 116	1400	635			4700	2 132
48	**55**	2540	1 152	1420	644			4800	2 177
48	**56**	2540	1 152	1420	644			4800	2 177
48	**57**	2540	1 152	1420	644			4800	2 177

*Total machine refrigerant charge includes the cooler, condenser, and economizer.

NOTE: Regulations mandate that machine shipping charge is limited to 7500 lb (3402 kg).

Table 3 — Additional Cooler Weights*

COOLER FRAME	WATERBOX TYPE	NUMBER OF PASSES	DESIGN MAXIMUM WATER PRESSURE		ADDITIONAL DRY WEIGHT		ADDITIONAL WATER WEIGHT			
			psig	kPa	lb	kg	lb	gal	kg	L
3	NIH	1, 3	150	1034	655	297	—	—	—	—
	NIH	1, 3	300	2068	2226	1010	—	—	—	—
	NIH	2	300	2068	1406	638	—	—	—	—
	Marine	1, 3	150	1034	780	354	3192	383	1448	1448
	Marine	2	150	1034	390	177	1596	191	724	724
	Marine	1, 3	300	2068	3412	1548	3192	383	1448	1448
	Marine	2	300	2068	1706	774	1596	191	724	724
4	NIH	1, 3	150	1034	515	234	—	—	—	—
	NIH	1, 3	300	2068	2941	1334	—	—	—	—
	NIH	2	300	2068	2085	946	—	—	—	—
	Marine	1, 3	150	1034	2100	953	5102	612	2314	2314
	Marine	2	150	1034	792	359	2551	306	1157	1157
	Marine	1, 3	300	2068	3844	1744	5102	612	2314	2314
	Marine	2	300	2068	2536	1150	2551	306	1157	1157

NIH — Nozzle-In-Head

*When using a machine configuration other than 2-pass, NIH waterboxes with 150 psig (1038 kPa) covers, add the weights listed in this table to the appropriate weights in Table 1 to obtain the correct cooler weight.

Table 4 — Additional Condenser Weights*

COMPONENT	HEAT EXCHANGER SIZE	WATERBOX TYPE	NUMBER OF PASSES	DESIGN MAXIMUM WATER PRESSURE		ADDITIONAL DRY WEIGHT		ADDITIONAL WATER WEIGHT			
				psig	kPa	lb	kg	lb	gal	kg	L
CONDENSER	31 - 33	NIH	3	150	1034	262	119	—	—	—	—
		NIH	3	300	2068	1328	602	—	—	—	—
		NIH	2	300	2068	872	396	—	—	—	—
		Marine	3	150	1034	842	382	2276	273	1032	1032
		Marine	2	150	1034	421	191	1138	136	516	516
		Marine	3	300	2068	1520	689	2276	273	1032	1032
		Marine	2	300	2068	1099	498	1138	136	516	516
	41 - 43 45 - 47	NIH	1, 3	150	1034	344	156	—	—	—	—
		NIH	1, 3	300	2068	1652	749	—	—	—	—
		NIH	2	300	2068	1132	513	—	—	—	—
		Marine	1, 3	150	1034	1692	767	3400	408	1542	1542
		Marine	2	150	1034	674	306	1700	204	771	771
		Marine	1, 3	300	2068	2651	1202	3400	408	1542	1542
		Marine	2	300	2068	1630	739	1700	204	771	771
	51 - 53 55 - 57	NIH	1	150	1034	†	†	—	—	—	—
		NIH	1	300	2068	1588	720	—	—	—	—
		NIH	2	300	2068	1591	721	—	—	—	—
		Marine	2	150	1034	25	11	1734	208	787	787
		Marine	2	300	2068	1225	555	1734	208	787	787

NIH — Nozzle-In-Head

*When using a machine configuration other than 2-pass, NIH waterboxes with 150 psig (1034 kPa) covers, add the weights listed in this table to the appropriate weights in Table 1 to obtain the correct condenser weight.
†Subtract 228 lb (103 kg) from the weight shown in Table 1.

Table 5 — Auxiliary Connection Sizes

SIZE AND STYLE	USAGE
⅜ in. Male Flare	Pumpout Condenser Refrigerant Vapor Connection (Rupture Disc)
½ in. FPT	Pumpout Water Inlet Connection
	Pumpout Water Outlet Connection
½ in. NPT Conduit	Power Panel Oil Pump Power Connection
1 in. NPT	Waterbox Vent Connection
	Waterbox Drain Connection
1¼ in. FPT	Cooler Relief Valve Connection
	Economizer/Storage Vessel Connection

Table 6 — Total 19EX Motor Weights (60 Hz)

MOTOR SIZE	LOW VOLTAGE		MEDIUM VOLTAGE		HIGH VOLTAGE	
	lb	kg	lb	kg	lb	kg
DB	1484	673	1420	644	NA	NA
DC	1496	678	1478	670	NA	NA
DD	1514	687	1503	682	2097	951
DE	1620	728	1536	696	2152	976
DF	1657	752	1635	742	2656	1205
DG	1662	754	1677	761	2741	1243
DH	1749	793	1715	778	2806	1273
DJ	1790	812	1758	797	2876	1305
DK	1823	827	2267	1028	3054	1385
DL	2262	1026	2374	1077	3162	1434
DM	2337	1060	2501	1134	3222	1461
DN	2415	1095	2558	1160	3277	1486
DP	2456	1114	2688	1219	3402	1543
DQ	NA	NA	2721	1234	3467	1573
EA	1968	893	2031	921	2377	1078
EB	2128	965	2233	1013	2427	1101
EC	2241	1017	2358	1070	2602	1180
ED	2366	1073	2514	1140	2827	1282
EE	2664	1208	2989	1356	3258	1478

NA — Not Available

NOTE: Low-voltage motors are rated below 600 v, medium-voltage motors range from 600 v to 6,000 v, and high-voltage motors are rated above 6,000 v.

Table 7 — Total 19EX Motor Weights (50 Hz)

MOTOR SIZE	LOW VOLTAGE		MEDIUM VOLTAGE		HIGH VOLTAGE	
	lb	kg	lb	kg	lb	kg
DB	1662	754	1568	711	NA	NA
DC	1677	760	1628	740	NA	NA
DD	1696	769	1662	754	2312	1049
DE	1710	776	1707	775	2332	1058
DF	1792	813	1807	820	2386	1082
DG	1863	845	2212	1003	2947	1337
DH	1921	871	2283	1036	3022	1371
DJ	2222	1008	2340	1061	3097	1405
DK	2331	1057	2472	1121	3187	1446
DL	2373	1076	2624	1190	3257	1477
DM	2481	1125	2692	1221	3317	1505
DN	2555	1159	2864	1299	3407	1545
DP	2597	1178	2924	1326	3502	1588
DQ	NA	NA	3014	1367	3612	1638
EA	2232	1012	2392	1085	2682	1217
EB	2443	1108	2380	1080	2887	1310
EC	2646	1200	2747	1246	3257	1477
ED	2760	1252	2952	1339	3442	1561
EE	3009	1365	3161	1434	3533	1603

NA — Not Available

NOTE: Low-voltage motors are rated below 600 v, medium-voltage motors range from 600 v to 6,000 v, and high-voltage motors are rated above 6,000 v.

Table 8 — Compressor Weights

COMPONENT	19EX COMPRESSOR		17/19FA5 COMPRESSOR		19FA4	
	lb	kg	lb	kg	lbs	kg
Compressor Weight*	4886	2216	5150	2336	2625	1191
Suction Elbow	500	227	500	227	325	147

*Weight does not include motor.

NOTES:
1. 19EX compressors include sizes −51 through −89.
2. 17/19FA5 compressors include sizes 531 through 599.
3. 19FA4 compressors include sizes 421 through 469.

Table 9 — Total 17EX Drive Component Weights

MOTOR HORSEPOWER (kW) CODE	BASE WEIGHT		COUPLING WEIGHT		GUARD WEIGHT	
	lb	kg	lb	kg	lb	kg
A	1200	544	75	34	25	11
B	1200	544	75	34	25	11
C	1200	544	75	34	25	11
D	1100	499	75	34	25	11

Table 10A — 17EX Motors — Total Weight, Lbs (English)

ENCLOSURE TYPE	HERTZ	VOLTAGE	SIZE (HP)			
			FA (1250)	FB (1500)	FC (1750)	FD (2000)
Open-Drip Proof (ODP)	60 Hz	2400	4836	5721	5900	7160
		3300	4824	5832	5832	7127
		4160	4836	5721	5900	7160
		6900	5596	6577	8776	8990
	50 Hz	3000	5518	5878	7148	9048
		3300	5518	5878	7148	9073
		6300	5596	6577	8875	8976
			GA (1350)	GB (1500)	GC (1750)	GD (2000)
Weather Protected Type I (WPI)	60 Hz	2400	5046	5871	6050	7270
		3300	5034	5982	5982	7237
		4160	5046	5871	6050	7270
		6900	5806	6727	8926	9100
	50 Hz	3000	5728	6028	7298	9158
		3300	5728	6028	7298	9183
		6300	5806	6727	9025	9086
			HA (1250)	HB (1500)	HC (1750)	HD (2000)
Weater Protected Type II (WPII)	60 Hz	2400	5146	6151	6330	7600
		3300	5134	6262	6262	7567
		4160	5146	6151	6330	7600
		6900	5906	7007	9206	9430
	50Hz	3000	5828	6308	7578	9488
		3300	5828	6308	7578	9513
		6300	5906	7007	9305	9416
			JA (1250)	JB (1500)	JC (1750)	JD (2000)
Totally Enclosed Water-To-Air Cooled (TEWAC)	60 Hz	2400	5707	6746	6925	8290
		3300	5694	6857	6857	8257
		4160	5707	6746	6925	8290
		6900	6466	7602	9801	10,120
	50 Hz	3000	6388	6903	8173	10,178
		3300	6388	6903	8173	10,203
		6300	6466	7602	9900	10,106

Table 10B — 17EX Motors — Total Weight, Kg (SI)

ENCLOSURE TYPE	FREQ	VOLTAGE	SIZE (kW)			
			FA (932)	FB (1119)	FC (1305)	FD (1492)
Open-Drip Proof (ODP)	60 Hz	2400	2194	2595	2676	3248
		3300	2188	2645	2645	3233
		4160	2194	2595	2676	3248
		6900	2538	2983	3981	4033
	50 Hz	3000	2503	2666	3242	4104
		3300	2503	2666	3242	4116
		6300	2538	2983	4026	4072
			GA (932)	GB (1119)	GC (1305)	GD (1492)
Weather Protected Type I (WPI)	60 Hz	2400	2289	2663	2744	3298
		3300	2283	2713	2713	3283
		4160	2289	2663	2744	3298
		6900	2634	3051	4049	4128
	50 Hz	3000	2598	2734	3310	4154
		3300	2598	2734	3310	4165
		6300	2634	3051	4094	4121
			HA (932)	HB (1119)	HC (1305)	HD (1492)
Weather Protected Type II (WPII)	60 Hz	2400	2334	2790	2871	3447
		3300	2329	2840	2840	3432
		4160	2334	2790	2871	3447
		6900	2679	3178	4126	4277
	50 Hz	3000	2644	2861	3437	4304
		3300	2644	2861	3437	4315
		6300	2679	3178	4221	4271
			JA (932)	JB (1119)	JC (1305)	JD (1492)
Totally Enclosed Water-To-Air Cooled (TEWAC)	60 Hz	2400	2587	3060	3141	3760
		3300	2583	3110	3110	3745
		4160	2587	3060	3141	3760
		6900	2933	3448	4446	4590
	50 Hz	3000	2898	3131	3707	4617
		3300	2898	3131	3707	4628
		6300	2933	3448	4490	4584

Table 11 — Marine Waterbox Cover Weights*

HEAT EXCHANGER SIZE	DESIGN MAXIMUM WATER PRESSURE		COOLER		CONDENSER	
	psi	kPa	lb	kg	lb	kg
31 - 33	150	1034	1667	756	1092	495
	300	2068	2280	1034	1436	651
41 - 48	150	1034	2236	1015	1275	579
	300	2068	3060	1389	1660	754
51 - 57	150	1034	—	—	1643	746
	300	2068	—	—	2243	1018

*Heat exchangers with marine waterboxes have heavier dry and operating weights than heat exchangers with nozzle-in-head waterboxes.

Table 12 — NIH Waterbox Cover Weights*

HEAT EXCHANGER SIZE	PASSES	DESIGN MAXIMUM WATER PRESSURE		COOLER		CONDENSER	
		psi	kPa	lb	kg	lb	kg
31 - 33	1	150	1034	1880	853	—	—
		300	2068	2748	1247	—	—
	2	150	1034	2168	983	1356	615
		300	2068	3107	1409	1959	889
	3	150	1034	2105	955	1283	582
		300	2068	2991	1357	1828	829
41 - 48	1	150	1034	2997	1361	1735	788
		300	2068	4225	1918	2510	1140
	2†	150	1034	2984	1355	1885	856
		300	2068	4188	1901	2590	1176
	3	150	1034	3035	1378	1777	807
		300	2068	4244	1927	2539	1153
51 - 57	1	150	1034	—	—	2032	923
		300	2068	—	—	2940	1335
	2†	150	1034	—	—	2649	1203
		300	2068	—	—	3640	1653
	3	150	1034	—	—	—	—
		300	2068	—	—	—	—

NIH — Nozzle-in-Head

*The 150 psig (1034 kPa) 2-pass waterbox cover weights are included in the dry weight shown in Table 1.
†Two different waterbox covers are present on 2-pass machines. The weight shown in this table represents the weight of the waterbox cover that contains the nozzles. A blank waterbox cover is also present on 2-pass units. The weight of the blank waterbox cover is identical to the weight of the same size marine waterbox cover. Refer to Table 11.

Install Machine Supports

INSTALL STANDARD ISOLATION — Figures 10 and 11 show the position of support plates and shear flex pads, which together form the standard machine support system.

INSTALL OPTIONAL ISOLATION (if required) — Uneven floors or other considerations may dictate the use of soleplates and leveling pads. Refer to Fig. 10 and 11.

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

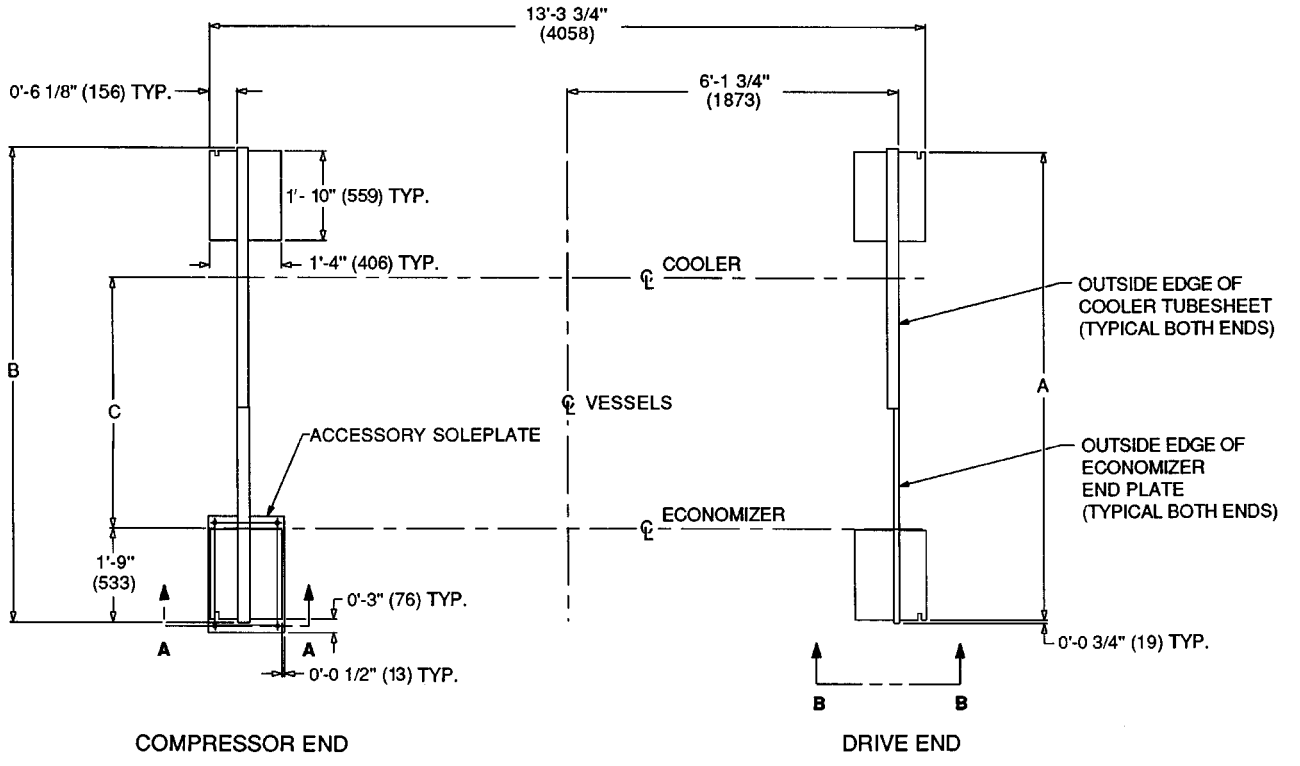
For adequate and long lasting machine support, proper grout selection and placement is essential. Carrier recommends that only pre-mixed, epoxy-type, non-shrinking grout be used for machine installation. Follow manufacturer's instructions in applying grout.

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.

INSTALL SPRING ISOLATION — Field-supplied spring isolators may be placed directly under machine support plates or be located under machine soleplates. Consult job data for specific arrangement. Low profile spring isolation assemblies are recommended so that the machine is kept at a convenient working height inside of the tube sheet.

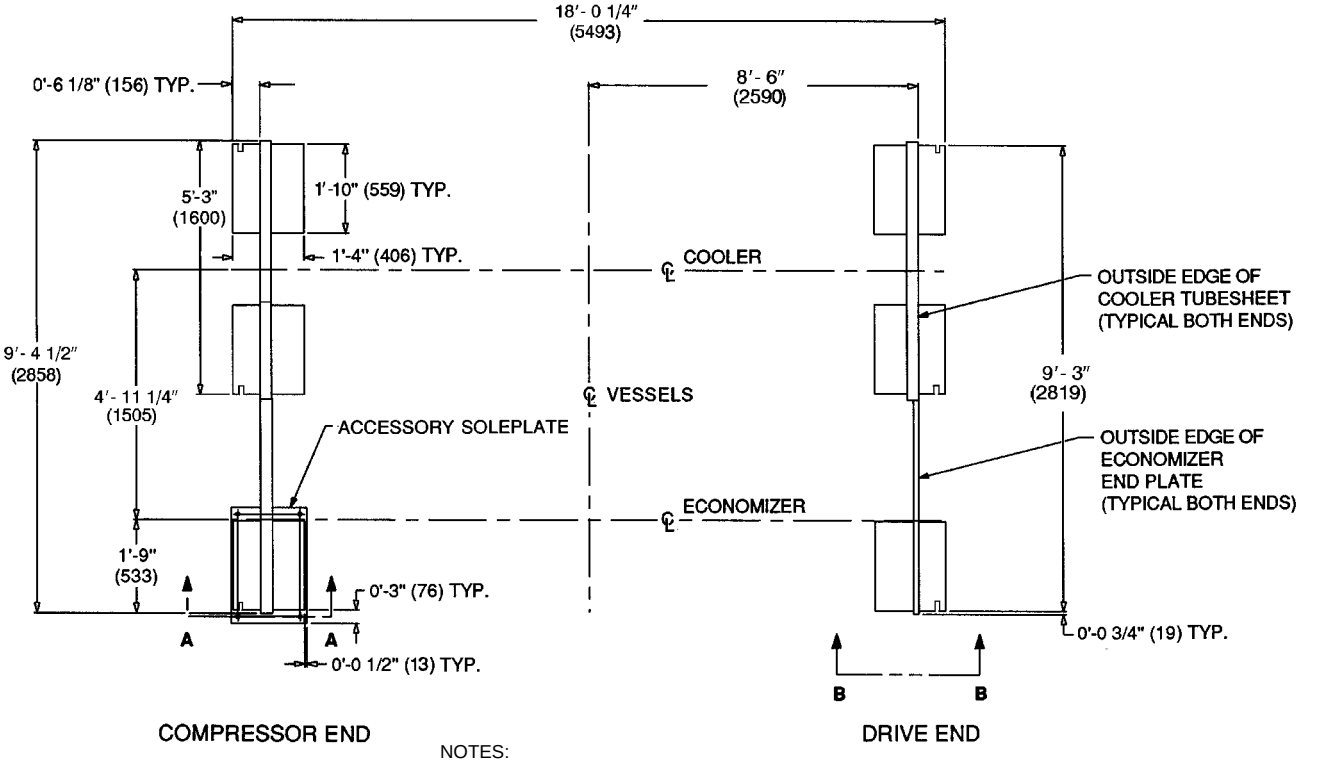
Obtain specific details on spring mounting and machine weight distribution from job data. Also, check job data for methods for supporting and isolating pipes that are attached to the spring-isolated machines.

COOLER SIZES 31-33 AND 41-44



COOLER SIZES	DIMENSIONS					
	A		B		C	
	ft-in.	mm	ft-in.	mm	ft-in.	mm
31-33	8-8½	2654	8-10	2692	4- 8	1422
41-44	9-3	2819	9- 4½	2858	4-11¼	1505

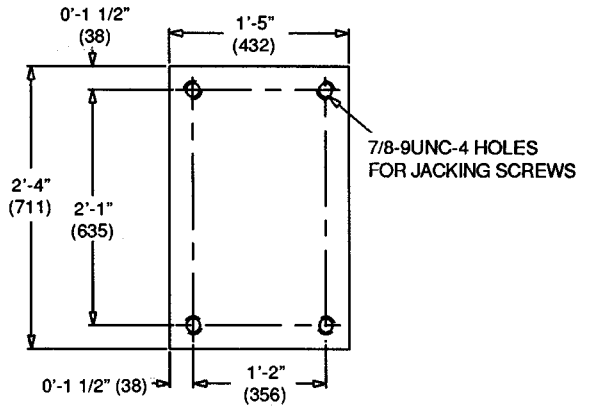
COOLER SIZES 45-48



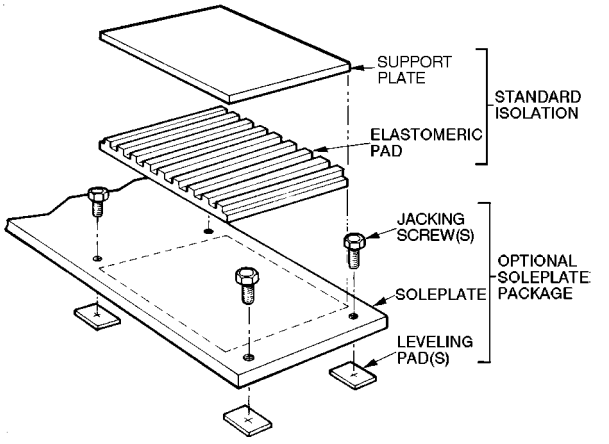
NOTES:
1. Dimensions in ( ) are in mm.
2. 1 inch = 25.4 mm.
3. All dimensions approximately ± ½ inch.

Fig. 10 — Machine Contact Surfaces

SOLEPLATE ISOLATION

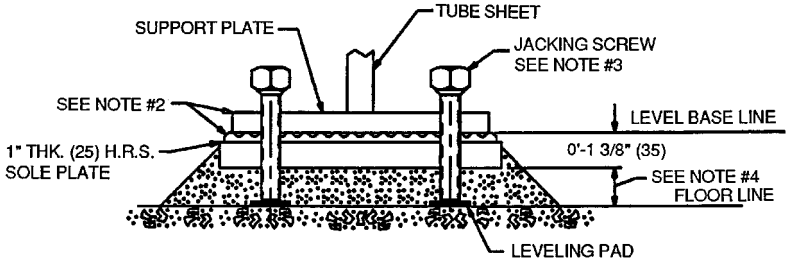


TYPICAL ISOLATION



ACCESSORY ISOLATION

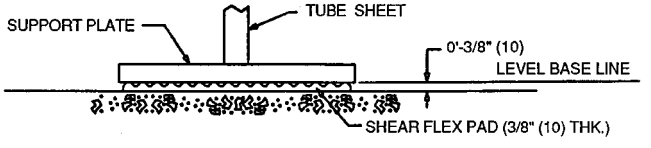
SOLEPLATE DETAIL
SECTION A-A



NOTES:
1. Dimensions in ( ) are in millimeters.
2. Accessory soleplate package includes 4 soleplates, 16 jacking screws and leveling pads. Requires isolation package.
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, Celcote HT-648 or Master Builders 636, 0′-1½″ (38.1) to 0′-2¼″ (57) thick.

STANDARD ISOLATION

VIEW B-B



ISOLATION WITH ISOLATION PACKAGE ONLY
(STANDARD)

NOTE: Isolation package includes 4 shear flex pads.

Fig. 11 — Machine Vibration Isolation

Connect Piping

INSTALL WATER PIPING TO HEAT EXCHANGERS — Install piping using job data, piping drawings, and procedure outlined below. A typical piping installation is shown in Fig. 12.

⚠ CAUTION

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

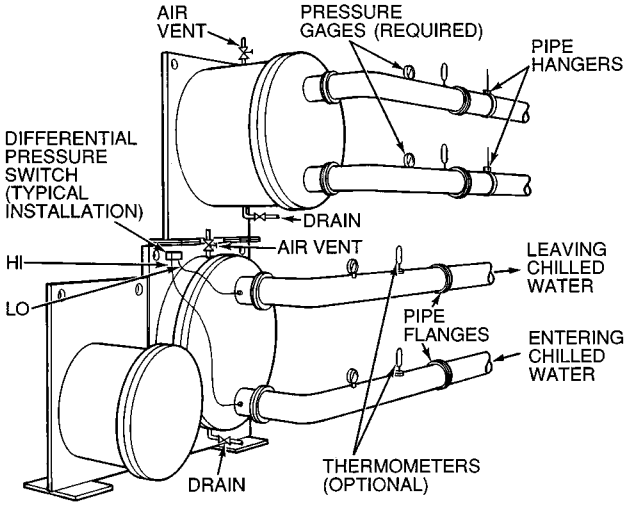
⚠ CAUTION

Remove chilled and condenser water sensors before welding connecting piping to water nozzles. Refer to Fig. 2 and 3. Replace sensors after welding is complete.

1. If the machine is a nozzle-in-head (NIH) arrangement, offset pipe flanges to permit removal of waterbox cover for maintenance and to provide clearance for pipe cleaning. See Tables 11 and 12 for waterbox cover weights. No flanges are necessary with marine waterboxes; however, water piping should not cross in front of the waterbox or access will be blocked off.
2. Provide openings in water piping for required pressure gages and thermometers. Openings should be at least 6 to 10 pipe diameters from the waterbox nozzle. 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. Install pipe hangers where needed. Make sure no weight or stress is placed on waterbox nozzles or flanges.
5. Water flow direction must be as specified in Fig. 13.

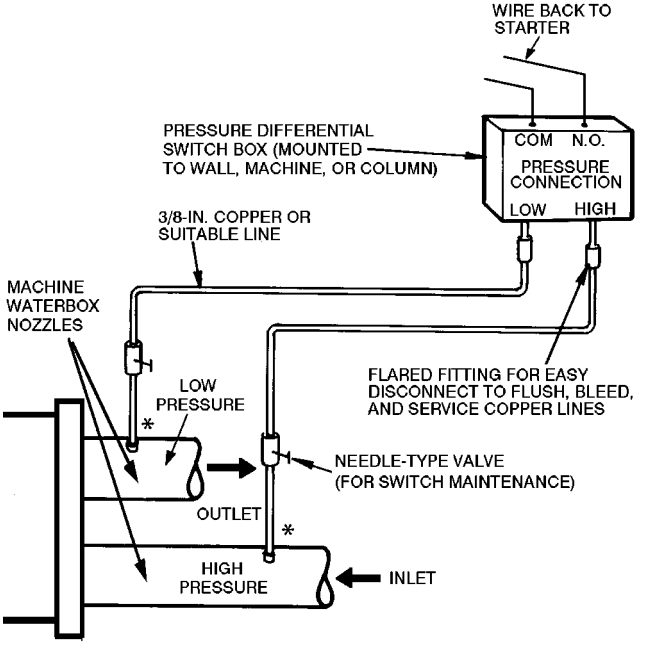
   NOTE: Entering water is always the lower of the 2 nozzles. Leaving water is always the upper nozzle for cooler or condenser.
6. Water flow switches must be of vapor-tight construction and must be installed on top of pipe in a horizontal run and at least 5 pipe diameters from any bend.

   Differential pressure type flow switches may be connected at the nozzle of the waterbox.
7. Install waterbox vent and drain piping in accordance with individual job data. All connections are ¾-in. FPT.
8. Install waterbox drain plugs in the unused waterbox drains and vent openings.
9. Install water piping to the optional pumpout system condenser storage tank as shown in Fig. 14.



LEGEND

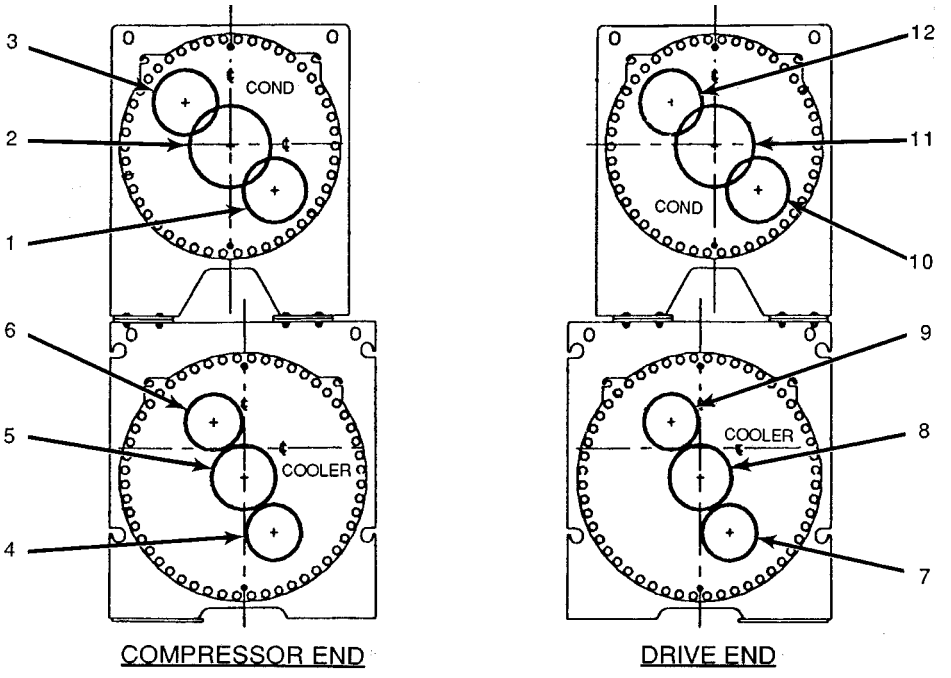
COM — Common
N.O. — Normally Open



*Do not locate pressure connections past the machine isolation valve.

Fig. 12 — Typical Nozzle Piping

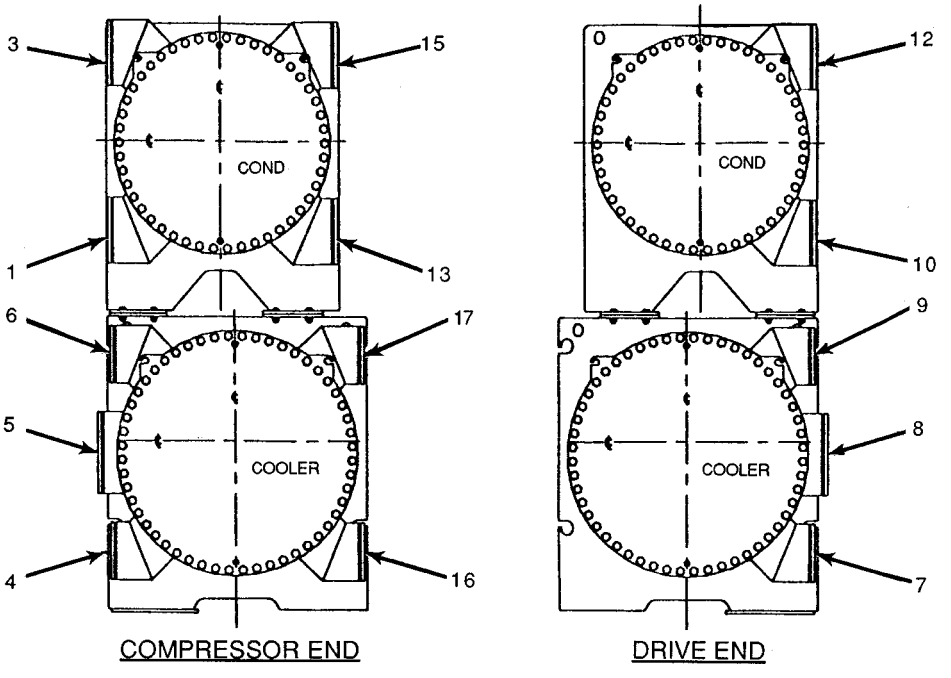
NOZZLE-IN-HEAD WATERBOXES



COOLER WATERBOX			
Pass	**In**	**Out**	**Arr. Code**
1	8	5	A
	5	8	B
2	7	9	C
	4	6	D
3	7	6	E
	4	9	F
CONDENSER WATERBOX			
Pass	**In**	**Out**	**Arr. Code**
1	11	2	P
	2	11	Q
2	10	12	R
	1	3	S
3	10	3	T
	1	12	U

NOTES:
1. Frame 5 condenser available in 1 and 2 pass only. Frame 3 in 2 and 3 pass only.
2. The vents for these waterboxes, located in the covers are 1 in. FPT at the top of each box, and the drains are 1 in. FPT, at the bottom.
3. Victaulic connections are standard.
4. Flanged waterbox connections are optional.

FRAME 3 AND 5 MARINE WATERBOXES

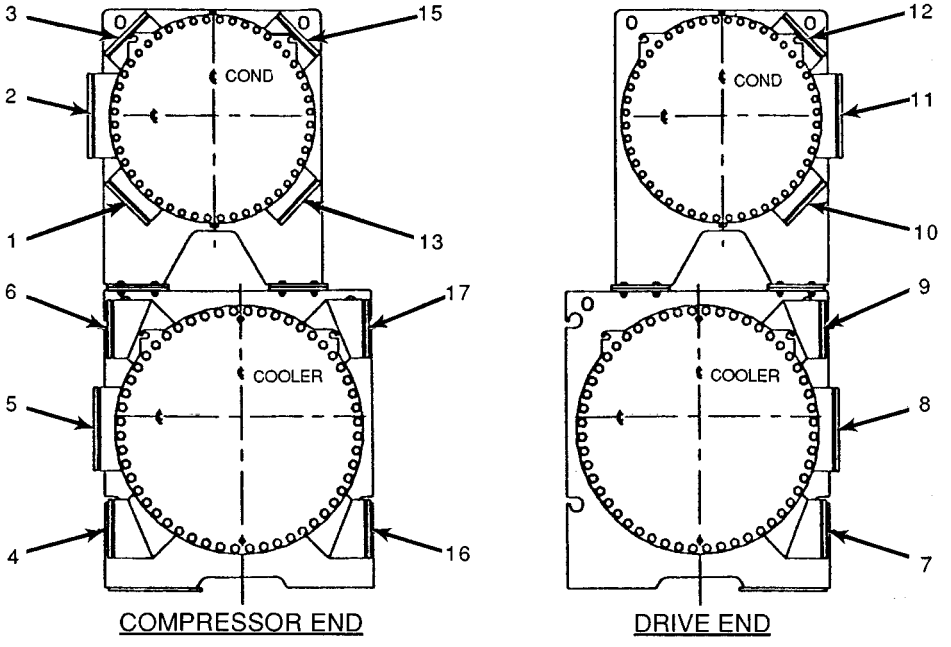


COOLER WATERBOX			
Pass	**In**	**Out**	**Arr. Code**
1	8	5	A
	5	8	B
2	7	9	C
	4	6	D
	16	17	G
3	7	6	E
	4	9	F
CONDENSER WATERBOX			
Pass	**In**	**Out**	**Arr. Code**
2	10	12	R
	1	3	S
	13	15	Y
3	10	3	T
	1	12	U

NOTES:
1. Frame 3 condenser available in 2 and 3 pass only. Frame 5 condenser available in 2 pass only.
2. The vents for these waterboxes are 1 in. FPT at the top of each box, and the drains are 1 in. FPT, at the bottom.
3. Victaulic connections are standard.
4. Flanged waterbox connections are optional.

Fig. 13 — Nozzle Arrangements

FRAME 4 MARINE WATERBOXES



COOLER WATERBOX			
Pass	In	Out	Arr. Code
1	8	5	A
	5	8	B
2	7	9	C
	4	6	D
	16	17	G
3	7	6	E
	4	9	F
CONDENSER WATERBOX			
Pass	In	Out	Arr. Code
1	11	2	P
	2	11	Q
2	10	12	R
	1	3	S
	13	15	Y
3	10	3	T
	1	12	U

NOTES:
1. The vents for these waterboxes are 1 in. FPT at the top of each box. The drains are 1 in. FPT, at the bottom.
2. Victaulic connections are standard.
3. Flanged connections are optional.

Fig. 13 — Nozzle Arrangements (cont)

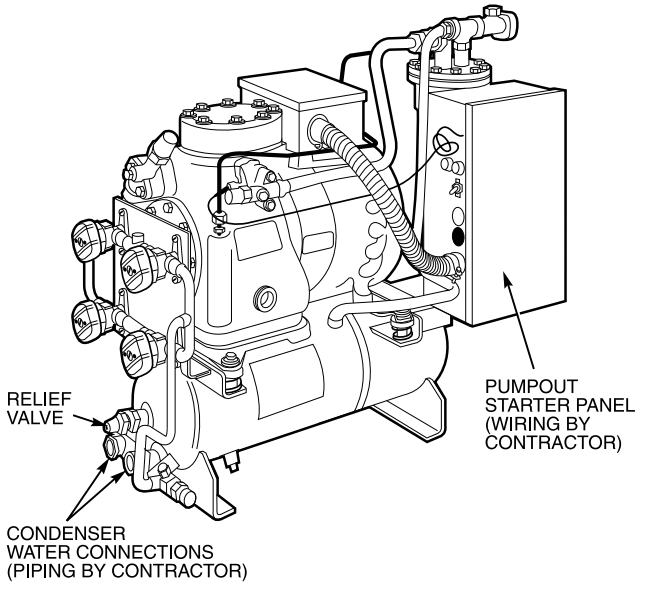


Fig. 14 — Pumpout Unit

INSTALL WATER TO OIL COOLER ON FA COMPRESSORS — On FA compressors, water must be piped to the oil cooler heat exchanger (located under the suction pipe to the compressor). The water supply may be either city water or chilled water. Pipe city water to an open sight drain. Chilled water enters via the cooling entering water intake (Fig. 15).

⚠ CAUTION

City water must be clean and noncorrosive. Water side erosion or corrosion of the oil cooler coil may lead to extensive machine damage not covered by the standard warranty.

If water from the machine chilled water circuit is used for oil cooling, it should enter the oil cooler from the entering water line of the machine cooler. Water leaving the oil cooler should connect to the leaving water line of the machine cooler at a point downstream from the chilled water sensor, so that oil cooler leaving water temperature does not affect the sensor readings.

Locate the oil cooler leaving water connection at some distance from any water temperature indicators. On single-pass machines, water leaving the oil cooler should be connected into the suction side of the chilled water pump so that adequate pressure drop is assured for oil cooling.

The nominal conditions for oil cooler water flow are:

Flow rate . . . . . 30 gpm (1.9 L/s)
Leaving temperature . . . . . 85 to 100 F (29 to 38 C)
Pressure drop at oil cooler . . . . . 7.25 psid (50 kPad)
Max differential pressure across closed solenoid valve . . . . . 150 psid (1034 kPad)

The oil cooler connections are 1¼ in. FPT.

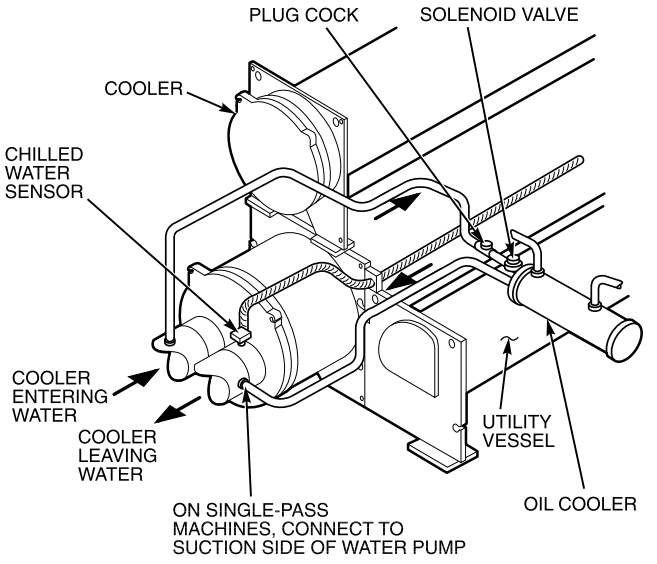


Fig. 15 — Water Piping, Oil Cooler to Chilled Water Circuit (Typical)

INSTALL VENT PIPING TO RELIEF DEVICES — The 17/19EX chiller is factory equipped with relief devices on the cooler and utility vessels. Refer to Fig. 2 and 3, and Table 13 for size and location of relief devices, as well as information that will help determine pipe size. Vent relief devices to the outdoors in accordance with ASHRAE 15 (latest edition) Safety Code for Mechanical Refrigeration and all other applicable codes. To ensure relief valve serviceability, and as required in ASHRAE 15, latest edition, 3-way dual shutoff valves and redundant relief valves are installed on the economizer/storage vessel, refer to Fig. 16.

NOTE: The 3-way dual shutoff valve should be either front seated or back seated. Running the refrigeration system with the valve stem in the center position can reduce total relief capacity and cause valve chattering.

⚠ DANGER

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

1. If relief device piping is 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.

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

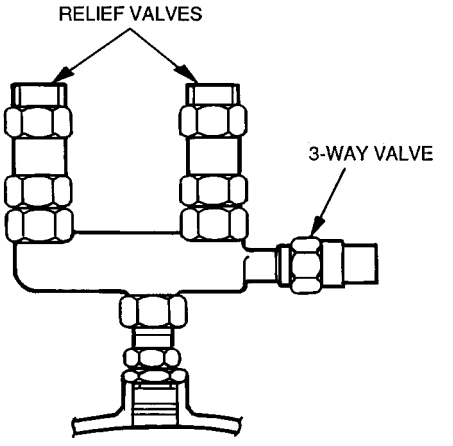


Fig. 16 — Typical 17/19EX Utility Vessel Relief Valve Tee

⚠ CAUTION

Do not run 120-v wiring into the control center. The control center should only be used for additional extra low-voltage wiring (50 v maximum).

Wiring diagrams in this publication (Fig. 17-23) are for reference only and are not intended for use during actual installation; follow job specific wiring diagrams.

Specific electrical ratings for individual components are shown in Table 14.

⚠ WARNING

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

CONNECT CONTROL INPUTS — Connect the control input wiring from the chilled and condenser water flow switches to the starter terminal strip. Wiring may also be specified for a spare safety switch, and a remote start/stop contact can be wired to the starter terminal strip, as shown in Fig. 17 and 18. Additional spare sensors and Carrier Comfort Network modules may be specified as well. These are wired to the machine control center as indicated in Fig. 22 and 23.

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

Connect Starter — Assemble and install compressor terminal box in desired orientation, and cut necessary conduit openings in conduit support plates. 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.

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), insulate the electrical terminals as follows:

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

High-voltage units require special terminal preparation. The vinyl tape is not acceptable; a high voltage tape must be used. Installer is responsible for any damage caused by improper wiring between starter and compressor motor.

Connect Power Wires to Oil Pump Contactor — Connect power wires to oil pump contactor mounted in machine power panel. (See Fig. 19.) Use the electrical disconnect located in the machine starter (if supplied), or a separate fused disconnect as shown on job wiring diagrams. Check that power supply voltage agrees with oil pump voltage. Follow correct phasing for proper motor rotation.

⚠ CAUTION

Do not wire into the top surface of the power panel. Knockouts are provided on the underside of the panel.

Connect Power Wires to Oil Heater Contactor — Connect control power wiring between the oil heater contactor terminals (Fig. 17 and 18) and terminals LL1 and LL2 on the field wiring strip in the compressor motor starter. Refer to Fig. 21 and wiring label on the chiller power panel.

⚠ WARNING

Voltage to terminals LL1 and LL2 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). 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.

Connect Communication and Control Wiring from Starter to Power Panel — Connect control wiring from main motor starter to the chiller power panel. All control wiring must use shielded cable. Also connect the communications cable. Make sure the control circuit is grounded in accordance with applicable electrical codes and instructions on chiller control wiring label.

Table 13 — Relief Valve Locations and Data

RELIEF VALVE LOCATION	HEAT EXCHANGER SIZE		REQUIRED C FACTOR		NOMINAL OUTLET PIPE SIZE (in.)	NUMBER OF VALVES	RATED RELIEF PRESSURE	
	Cooler	Condenser	lb air/min.	kg air/sec.			psig	kPa
Cooler	31-33	31-33	139.7	1.06	1¼ FPT	2	225	1551
	41-43	41-43	158.8	1.20	1¼ FPT	2	225	1551
	44	51-53	164.6	1.24	1¼ FPT	2	225	1551
	45-47	45-47	216.3	1.64	1¼ FPT	3	225	1551
	48	55-57	228.5	1.73	1¼ NPT	3	225	1551
Economizer/Storage Vessel	41-44	ALL	64.2	0.49	1¼ NPT	2*	225	1551
	45-48	ALL	84.3	0.64	1¼ FPT	2*	225	1551
Pumpout Unit Condenser	ALL	ALL	1.5	0.01	⅜ in. Male Flare MPT	1	385	2655

*To ensure relief valve serviceability, and as required in ASHRAE 15, latest edition, three-way valves and redundant relief valves are installed on the storage vessel. Only one half of the "No. of Valves" listed are in service at any time.

NOTES:

1. The cooler relief C-factor is for both cooler and condenser vented through the cooler in accordance with ASHRAE (American Society of Heating, Refrigeration, and Air Conditioning Engineers) 15, latest edition.
2. Relief valve discharge pipe sizing is to be calculated per latest version of ASHRAE 15, using the tabulated C-factors and nominal pipe size listed above. Cooler and economizer/storage vessel rated relief valve pressure is 225 psig (1551 kPa).
3. The pumpout unit condenser contains less than 110 lb (50 kg) of HFC-134a, which is a Group A1 refrigerant. The ASHRAE 15 standard exempts small-volume vessels from the requirement to vent outside. However, Carrier recommends that the pumpout condenser be connected to the rest of the vent system.

Table 14 — Individual Component Ratings

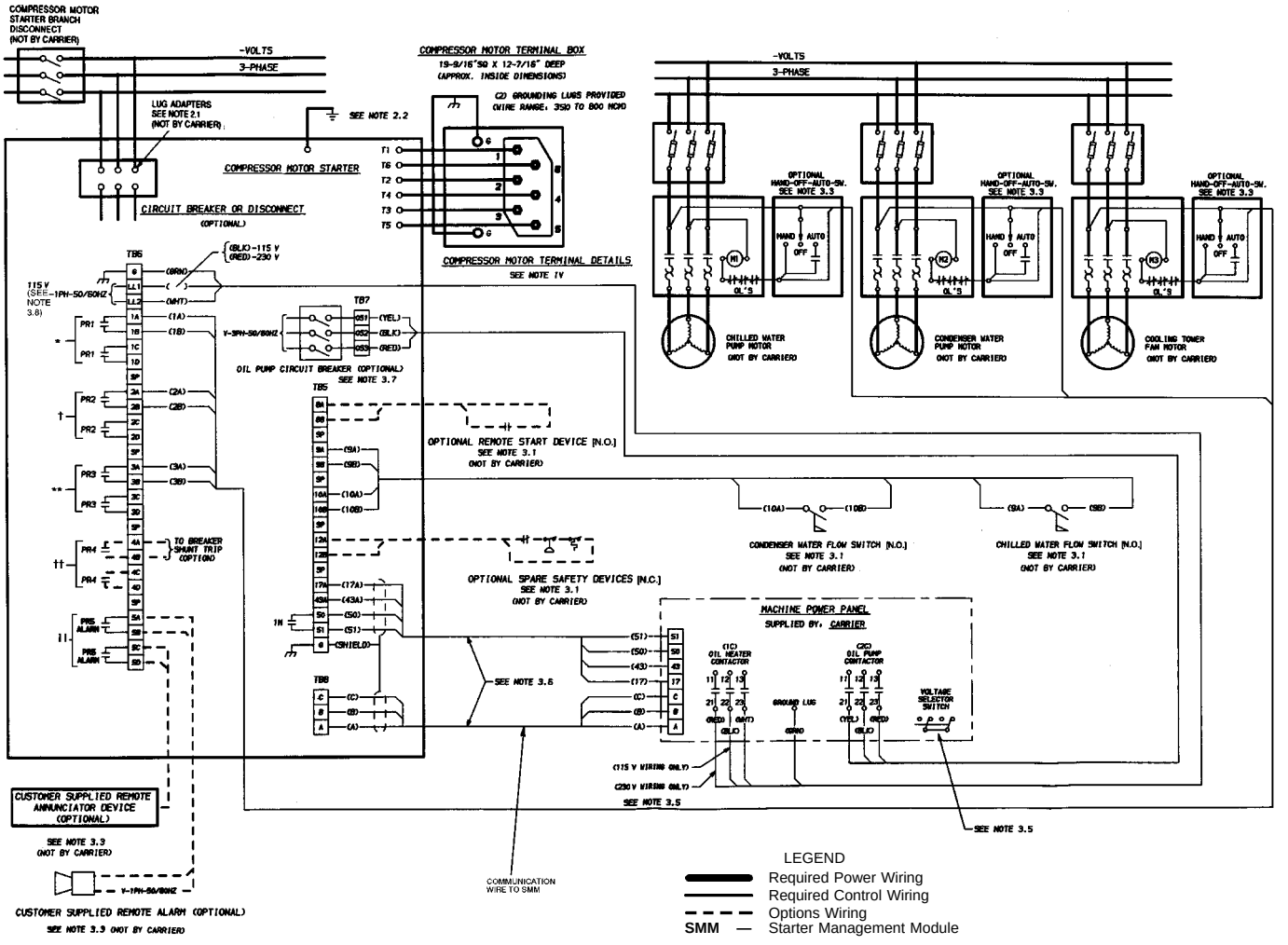
POWER SOURCE	ITEM	AVERAGE kW	DESIGN CENTER VOLTAGE	SUPPLY V-PH-HZ	FLA	LRA
1* (17EX Only)	Seal Leakage Pump	0.23	115	115-1-50/60	4.78	21.7
	Motor Space Heater	0.50	115	115-1-50/60	4.35	4.35
1†	Control Module and Actuator	0.40	115	115-1-60 115-1-50	3.50	—
	Oil Sump Heater	1.00	115	115-1-60 115-1-50	8.70	—
2†	Oil Pump	1.35 1.30 1.37	220 430 563	200/240-3-60 380/480-3-60 507/619-3-60	4.32 2.15 2.13	24.5 12.2 25.0
		1.49 1.49	230 393	220/240-3-50 346/440-3-50	4.83 2.59	28.0 12.2
1**	Hot Gas Bypass	0.20	115	115-1-50/60	2.00	4.75
3 (Optional)**	Pumpout Compressor	3.41	204 230 460 575	200/208-3-60 220/240-3-60 440/480-3-60 550/600-3-60	10.90 9.50 4.70 3.80	63.5 57.5 28.8 23.0
			400	380/415-3-50	4.70	28.8

LEGEND

FLA — Full Load Amps
LRA — Locked Rotor Amps

*Available for 17EX machines only.
†Available for 17/19EX machines.
**Available as an option on 17/19EX machines.

NOTE: The oil pump is powered through a field wiring terminal into the power panel. Power to the controls and oil heater via the power panel must be on circuits that can provide continuous service when the compressor starter is disconnected.



*Indicates chilled water pump control contacts or run status contacts.
†Indicates condenser water pump control contacts.
**Indicates tower fan relay contacts.
††Indicates circuit breaker shunt trip contacts.
‖Indicates remote alarm contacts.

NOTES:

I. GENERAL

1.0 Starters shall be designed and manufactured in accordance with Carrier Engineering Requirement Z-375.
1.1 All field-supplied conductors, devices, field-installation wiring, and termination of conductors and devices, must be in compliance with all applicable codes and job specifications.
1.2 The routing of field-installed conduit and conductors and the location of field-installed devices must not interfere with equipment access or the reading, adjusting, or servicing of any component.
1.3 Equipment, installation, and all starting and control devices must comply with details in equipment submittal drawings and literature.
1.4 Contacts and switches are shown in the position they would assume with the circuit deenergized 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 Power conductor rating must meet minimum unit nameplate voltage and compressor motor RLA.
When (3) conductors are used:
Minimum ampacity per conductor = 1.25 x compressor RLA
When (6) conductors are used for Wye-Delta starting:
Minimum ampacity per conductor = 0.721 x compressor RLA
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 lugs provided inside starter enclosure.

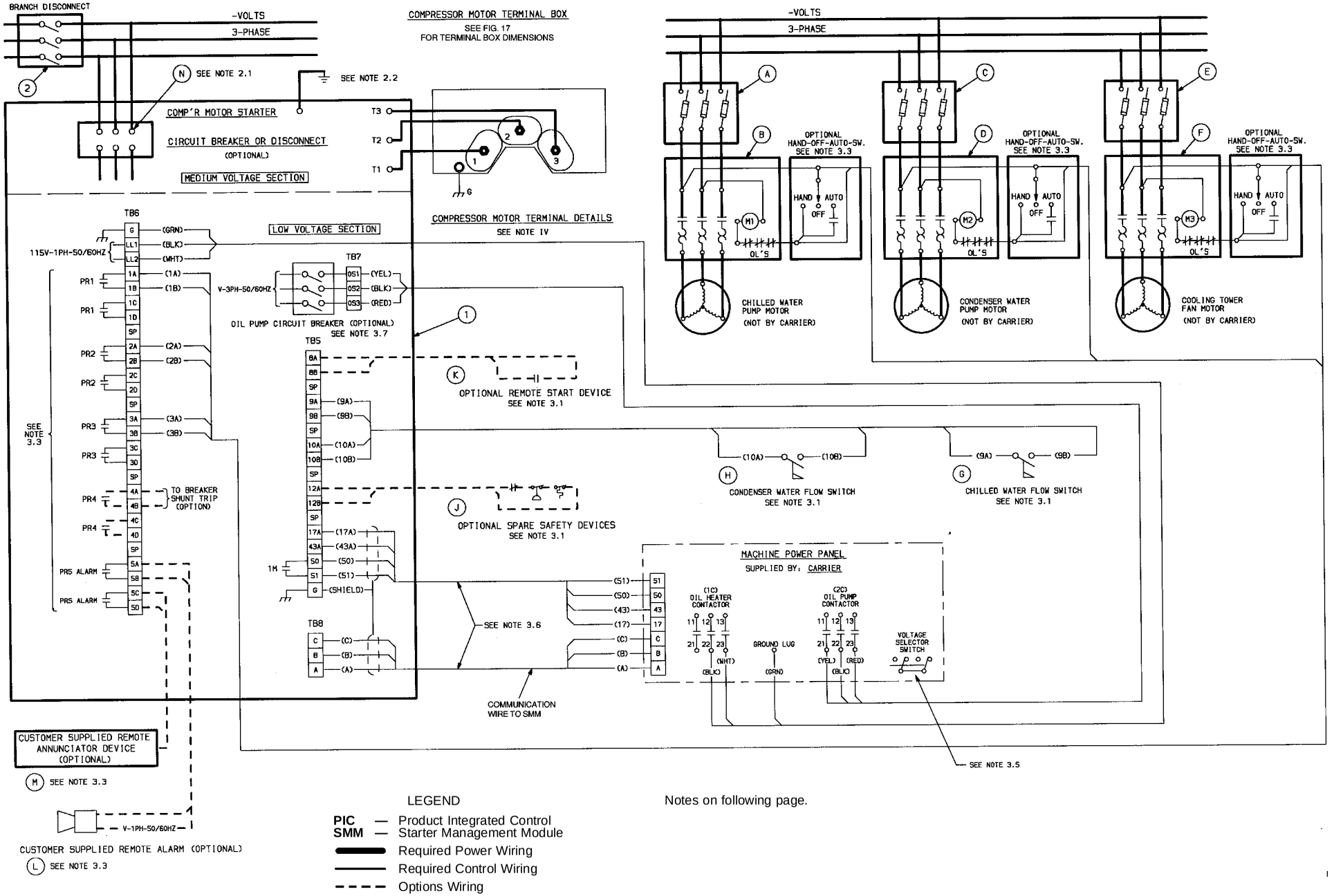
III. CONTROL WIRING

3.0 Field supplied control conductors to be at least 18 AWG or larger.
3.1 Chilled water and condenser water flow switch contacts, optional remote start device contacts and optional spare safety device contacts must have 24 vdc 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 12A and 12B before connecting auxiliary safeties between these terminals.
3.3 Pilot relays can control cooler and condenser pump and tower fan motor contactor coil loads rated 10 amps at 115 vac up to 3 amps at 600 vac. Control wiring required for Carrier to start pumps and tower fan motors must be provided to assure machine protection. If primary pump and tower fan motor are controlled by other means, also provide a parallel means for control by Carrier. Do not use starter control transformer as the power source for pilot relay 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 Voltage selector switch in machine power panel is factory set for 115 v control power source. Do not use the 230 v position. If this switch is set to 230 v position, the oil heater will not operate.
3.6 Control wiring cables between starter and power panel must be shielded with minimum rating of 600 v, 80 C ground shield at starter. Wires A,B, and C are communication wires and must be run in a separate cable.
3.7 If optional oil pump circuit breaker is not supplied within the starter enclosure as shown, it must be located within sight of the machine with wiring routed to suit.
3.8 Voltage to terminals LL1 and LL2 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). 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.

IV. POWER WIRING BETWEEN 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 leads must be run between compressor motor and starter, depending on type of motor starter employed. If only 3 leads are required, jumper motor terminals as follows: 1 to 6, 2 to 4, 3 to 5. Center to center distance between terminals is $2^{15}/_{16}$ inches. Compressor motor starter must have nameplate stamped as to conforming with Carrier requirement Z-375. Medium voltage (over 600 v) compressor motors have (3) terminals. Connections out of terminals are 3 in. long stranded wire pigtails, #4 AWG, strand wire for all medium voltage motor sizes. Distance between terminal is $7^{9}/_{16}$ inches. Use suitable splice 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 requirement Z-375.
4.1 When more than one conduit is used to run conductors from starter to compressor motor terminal box, one conductor from each phase must be in each conduit to prevent excessive heating. (e.g., conductors to motor terminals 1, 2 and 3 in one conduit, and those to 4, 5 and 6 in another.)
4.2 Compressor motor power connections can be made through top, top rear or sides of compressor motor terminal box 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.
4.3 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 pressure connector for #4 to 500 MCM wire, supplied and located in the back lower left side corner of the compressor motor terminal box.
4.4 Do not allow motor terminals to support weight of wire cables. Use cable supports and strain reliefs as required.
4.5 Use backup wrench when tightening lead connectors to motor terminal studs. Torque to 45 lb-ft max.

Fig. 17 — Typical Field Wiring (Low-Voltage Motors) with Free-Standing Starter



Notes on following page.

Fig. 18 — Field Wiring (High Voltage Motors) with Optional Free-Standing Starter

NOTES:

I GENERAL

1.0 Starters shall be designed and manufactured in accordance with Carrier Engineering requirement Z-375.

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

1.2 The routing of field-installed conduit and conductors and the location of field-installed devices, must not interfere with equipment access of 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 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 Power conductor rating must meet minimum unit nameplate voltage and compressor motor RLA (rated load amps). 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.

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 lugs provided inside starter enclosure.

III CONTROL WIRING

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

3.1 Chilled water and condenser water flow switch contacts, optional remote start device contacts, and optional spare safety device contacts must have 24 vdc rating. Maximum current is 60 ma, nominal current is 10 ma. Switches with gold plated bifurcated contacts are recommended.

3.2 Remove jumper wire between 12A and 12B before connecting auxiliary safeties between these terminals.

3.3 Maximum load on pilot relays is 10 amps. Pilot relays can control cooler and condenser pump and tower fan motor contactor coil loads rated up to 10 amps at 115 vac or up to 3 amps at 600 vac. Control wiring required for Carrier to start pumps and tower fan motors must be provided to assure machine protection. If primary pump and tower motor control is by other means, also provide a parallel means for control by Carrier. Do not use starter control transformer as the power source for pilot relay 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 Voltage selector switch in machine power panel is factory set for 115 v control and oil heater power source. The 230 v position is not used. If switch is set to 230 v position, oil heater will not operate.

3.6 Control wiring cables between starter and power panel must be shielded with minimum rating of 600 v, 80 C. Ground shield at starter. Wires A, B, and C are communication wires and must be run in a separate cable.

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

3.8 Voltage to terminals LL1 and LL2 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). 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.

IV POWER WIRING BETWEEN STARTER AND COMPRESSOR MOTOR

4.0 Medium voltage (over 600 volts) hermetic compressor motors have 3 terminals. Use no. 4 AWG strand wires for all medium and high voltage hermetic motors. Distance between terminal is 7$^{9}/_{16}$ inches. Use suitable splice 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 requirement Z-375. Medium voltage open motors have lug terminations (see certified drawings for size).

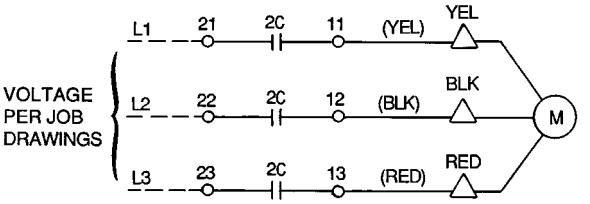
4.1 When more than one conduit is used to run conductors from starter to compressor motor terminal box, one conductor from each phase must be in each conduit, to prevent excessive heating, (e.g., conductors to motor terminals 1, 2, and 3 in one conduit, and those to 1, 2, and 3 in another).

4.2 Compressor motor power connections can be made through top, top rear, or sides of compressor motor terminal box by 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 no. 4 AWG, 500 MCM pressure connector, supplied and located in the lower left side corner of the compressor motor terminal box.

4.4 Do not allow motor terminals to support weight of wire cables, use cable supports and strain reliefs as required.

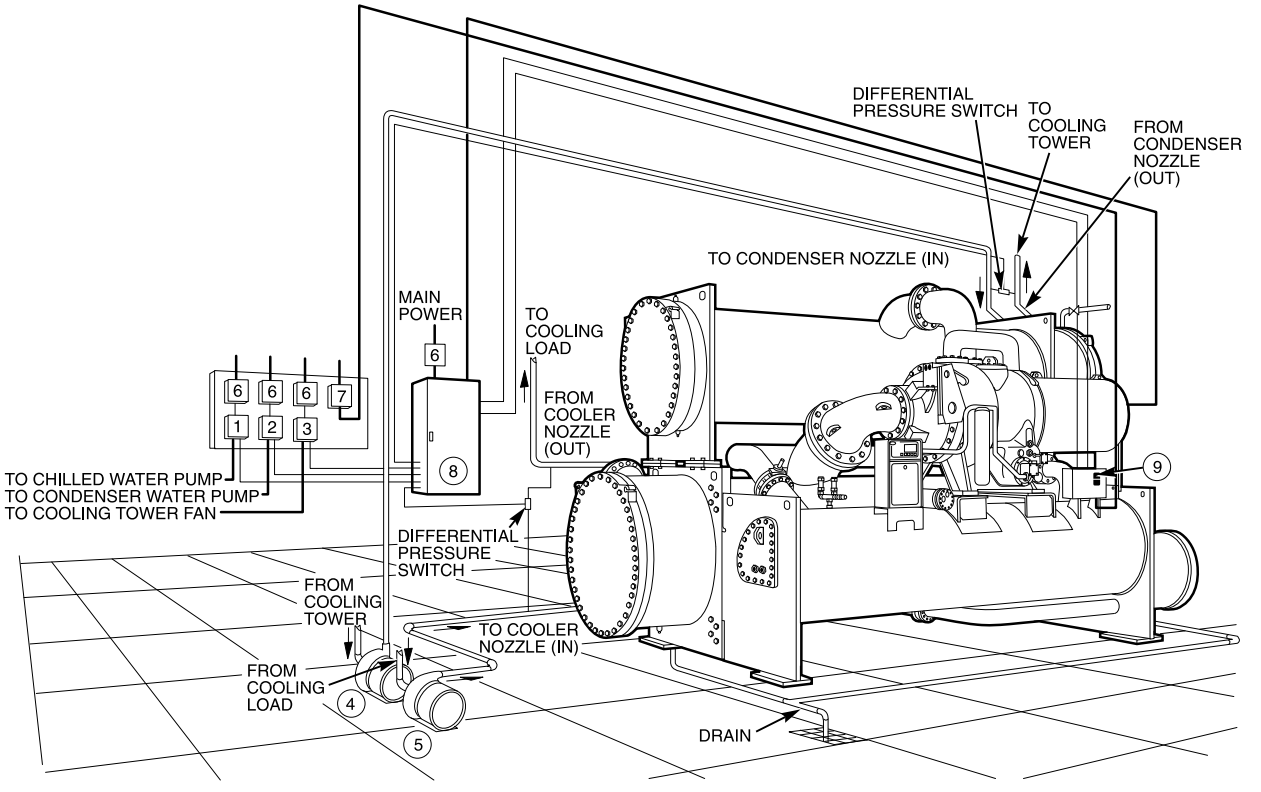
Fig. 18 — Field Wiring (High Voltage Motors) with Optional Free-Standing Starter (cont)



LEGEND

- Factory Wiring
- Field Wiring
- △ Oil Pump Terminal
- ○ Power Panel Component Terminal

Fig. 19 — Oil Pump Wiring



19EX SHOWN

LEGEND

1 — Chilled Water Pump Starter
2 — Condenser Water Pump Starter
3 — Cooling Tower Fan Starter
4 — Condenser Water Pump
5 — Chilled Water Pump
6 — Disconnect
7 — Oil Pump Disconnect (See Note 5)
8 — Free-Standing Compressor Motor Starter
9 — Chiller Auxiliary 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. Refer to Carrier System Design Manual for details regarding piping techniques.
4. Wiring not shown for optional devices such as:
   - Remote Start-Stop
   - Remote Alarms
   - Optional Safety Device
   - 4 to 20 mA Resets
   - Optional Remote Sensors
5. Oil pump disconnect may be located within the enclosure of Item 8 — Free-Standing Compressor Motor Starter.
6. Water piping to the oil cooler is required on FA compressors.

Fig. 20 — 17/19EX with Free-Standing Starter

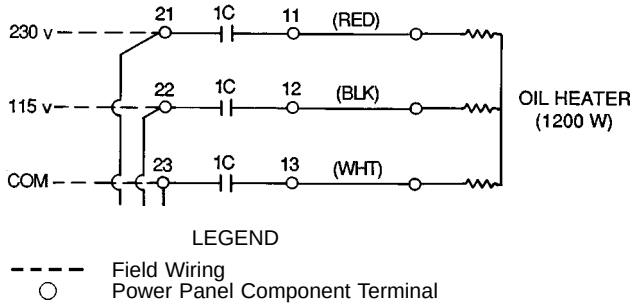


Fig. 21 — Oil Heater and Control Power Wiring

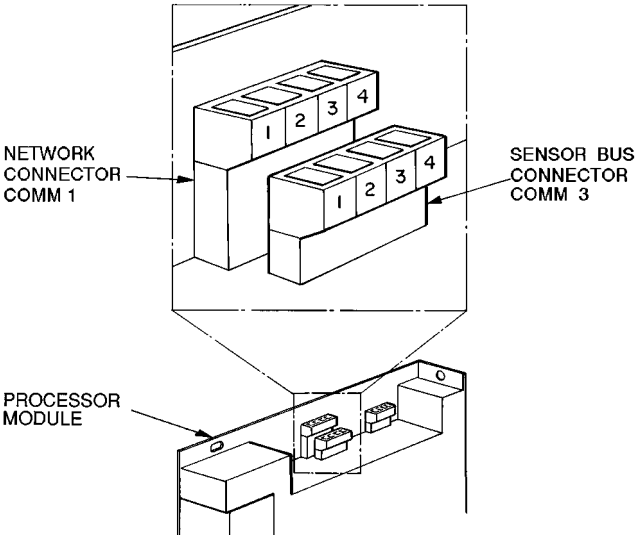


Fig. 22 — Carrier Comfort Network Communication Bus Wiring

CARRIER COMFORT NETWORK INTERFACE — The Carrier Comfort Network (CCN) communication bus wiring is supplied and installed by the electrical contractor (if required by jobsite prints). 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. 23 for location of the CCN network connector (COMM1) on the processor module.

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	COMM1 PLUG PIN NO.
+	Red	1
Ground	White	2
−	Black	3

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. 23. 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 17/19EX chiller to the network, proceed as follows (Fig. 23):

1. Cut power to the PIC (Product Integrated Control) panel.
2. Remove the COMM1 plug from the processor module.
3. Cut a CCN wire and strip the ends of the RED, WHITE, and BLACK conductors.
4. Using a wirenut, connect the drain wires together.
5. Insert and secure the RED wire to Terminal 1 of the COMM1 plug.
6. Insert and secure the WHITE wire to Terminal 2 of the COMM1 plug.
7. Insert and secure the BLACK wire to Terminal 3 of the COMM1 plug.
8. Attach the COMM1 plug back onto the processor module.
9. Mount a terminal strip in a convenient location.
10. Connect the opposite ends of each conductor to separate terminals on the terminal strip.
11. Attach the CCN Network wiring:
    a. Connect the RED wire to the matching location on the terminal strip.
    b. Connect the WHITE wire to the matching location on the terminal strip.
    c. Connect the BLACK wire to the matching location on the terminal strip.

Install Field Insulation

⚠ CAUTION

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

When installing insulation at the job site, insulate the following components (see Fig. 24 and Table 15):

- compressor motor
- cooler shell
- cooler tube sheets
- suction piping
- motor cooling drain
- oil cooler refrigerant side tubing
- utility vessel (low side)

Additional insulation of condenser and compressor components and lines may be necessary to prevent condensation on these components.

NOTE: Carrier does not provide waterbox insulation. Insulation of the waterbox covers must be field supplied at the jobsite. When insulating the waterbox covers, allow enough room for removal of the waterbox covers during servicing.

FACTORY INSULATION (OPTIONAL) — Optional factory insulation is available for the evaporator shell and tube sheets, suction pipe, compressor motors, and refrigerant drain line(s). Insulation applied at the factory is ¾ in. (19.0 mm) thick and has a thermal conductivity K value of 0.28 $\frac{\text{Btu} \bullet \text{in.}}{\text{hr} \bullet \text{ft}^2 \bullet \text{°F}}$ (0.0404 $\frac{\text{W}}{\text{m}}$ °C). Insulation conforms with UL Standard 94, Classification 94 HBF.

Table 15 — Insulation Requirements

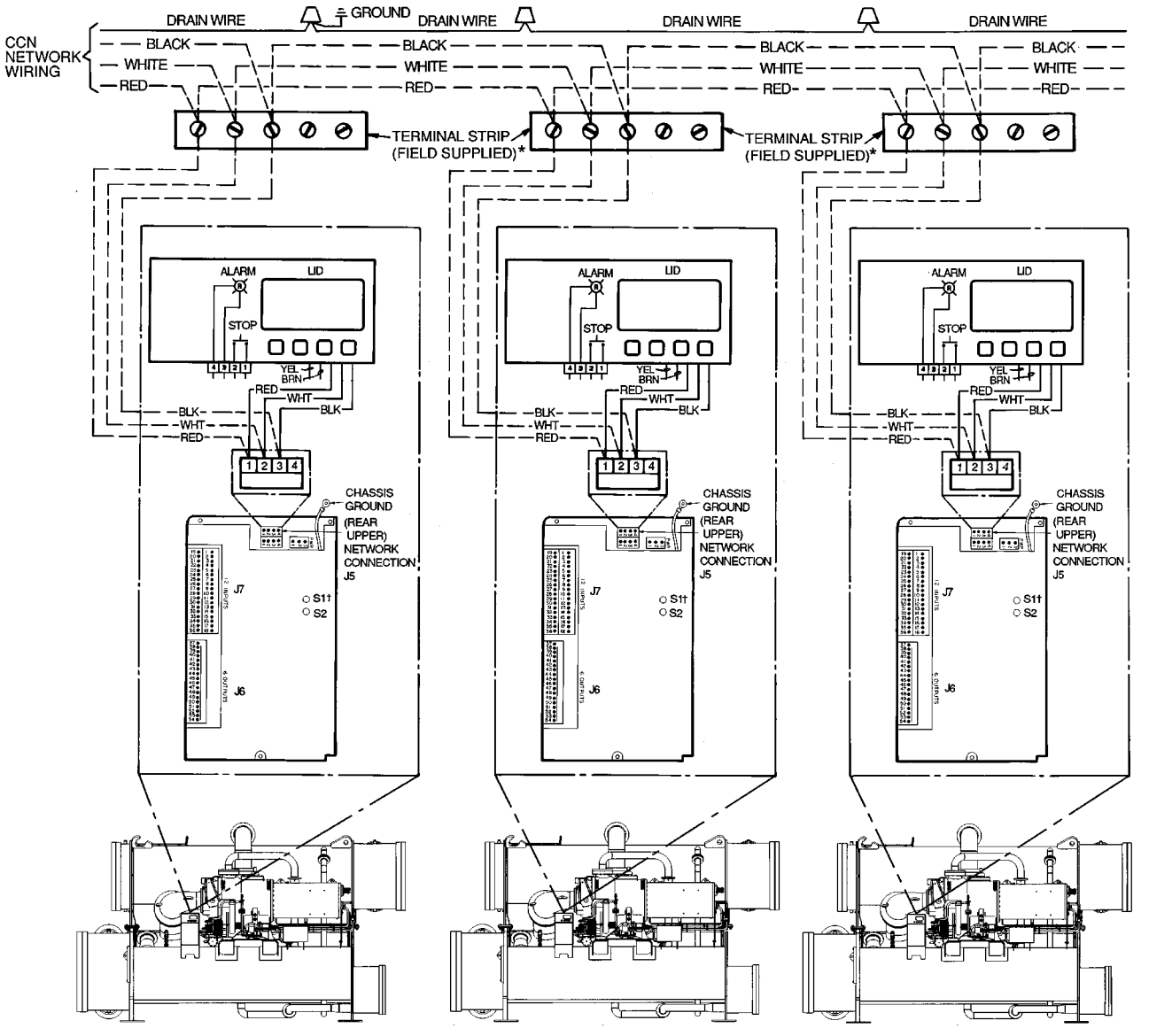
Sheet Foam Insulation

COMPONENT	ft^2	m^2
Cooler Shell (Sizes 31-33)	254	23.6
Cooler Shell (Sizes 41-44)	306	28.4
Cooler Shell (Sizes 45-48)	374	34.7
Economizer Low Side Float Chamber	48	4.5
Economizer Main Shell (with cooler sizes 31-44)	85	7.9
Economizer Main Shell (with cooler sizes 45-48)	115	10.1
Suction Line	25	2.3
Cooler Marine Waterbox (1 or 3 pass, with frame-3 coolers)	126	11.7
Cooler Marine Waterbox (2 pass, with frame-3 coolers)	100	9.3
Cooler Marine Waterbox (1 or 3 pass, with frame-4 coolers)	158	14.7
Cooler Marine Waterbox (2 pass, with frame-4 coolers)	123	11.4
Cooler NIH Waterbox (with frame-3 coolers)	74	6.9
Cooler NIH Waterbox (with frame-4 coolers)	88	8.2
Main Motor Shell (with −51 through −89 compressors)	27	2.5
Main Motor Shell (with 421 through 469 compressors)	27	2.5
Main Motor Shell (with 531 through 599 compressors)	41	3.8

Foam Tubing Insulation

TYPE	Ft	m
1⅛″ Foam Tubing	9	2.7
1⅝″ Foam Tubing	2	0.6
2″ Foam Tubing	9	2.7
5″ Foam Tubing	14	4.3

NOTES:
1. Cooler value includes marine waterbox on one end (even-pass arrangement).
2. Values are approximate.
3. Thermal insulation is available as a factory-installed option. Waterbox insulation must be field supplied.



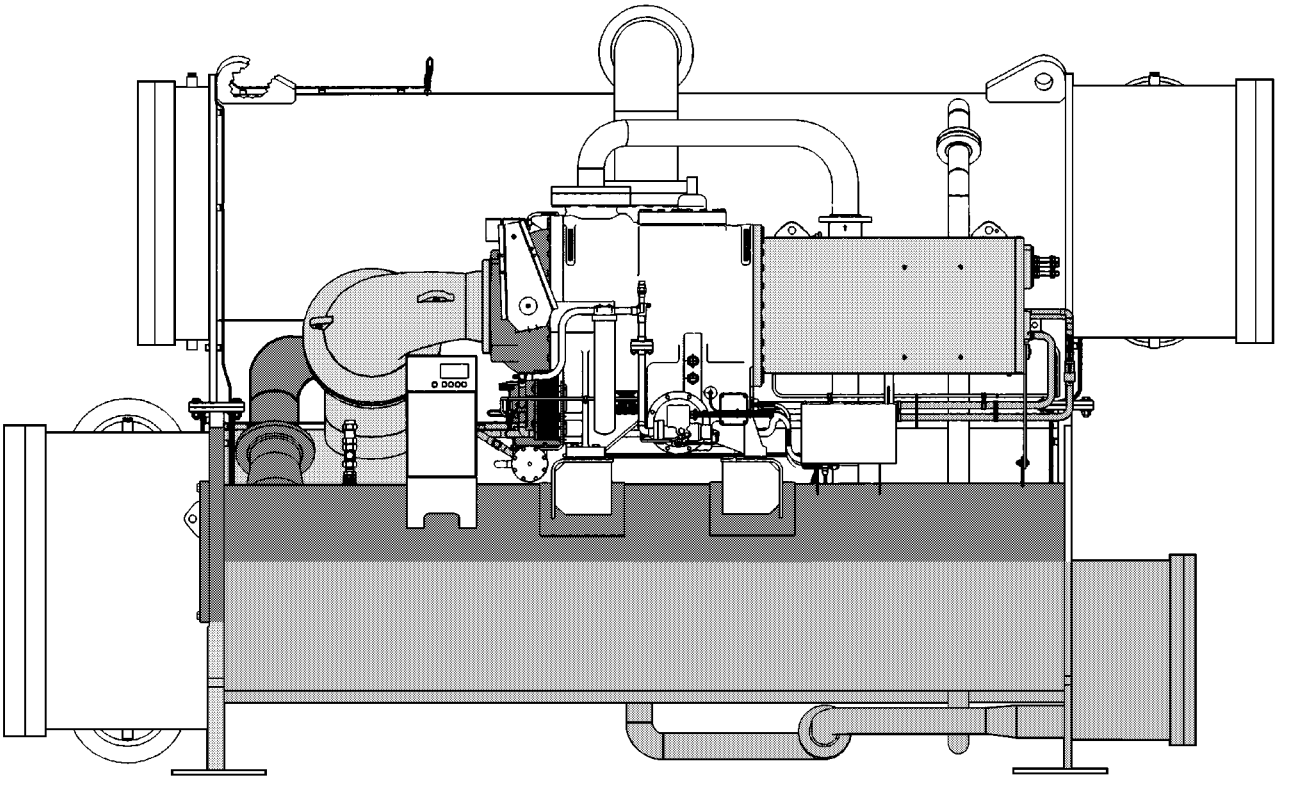
19EX CHILLERS

LEGEND

Factory Wiring
Field Wiring

*Field-supplied terminal strip must be located in the control center.
†Switches S1 and S2 are factory set on PSIO modules. Do not alter the switches.

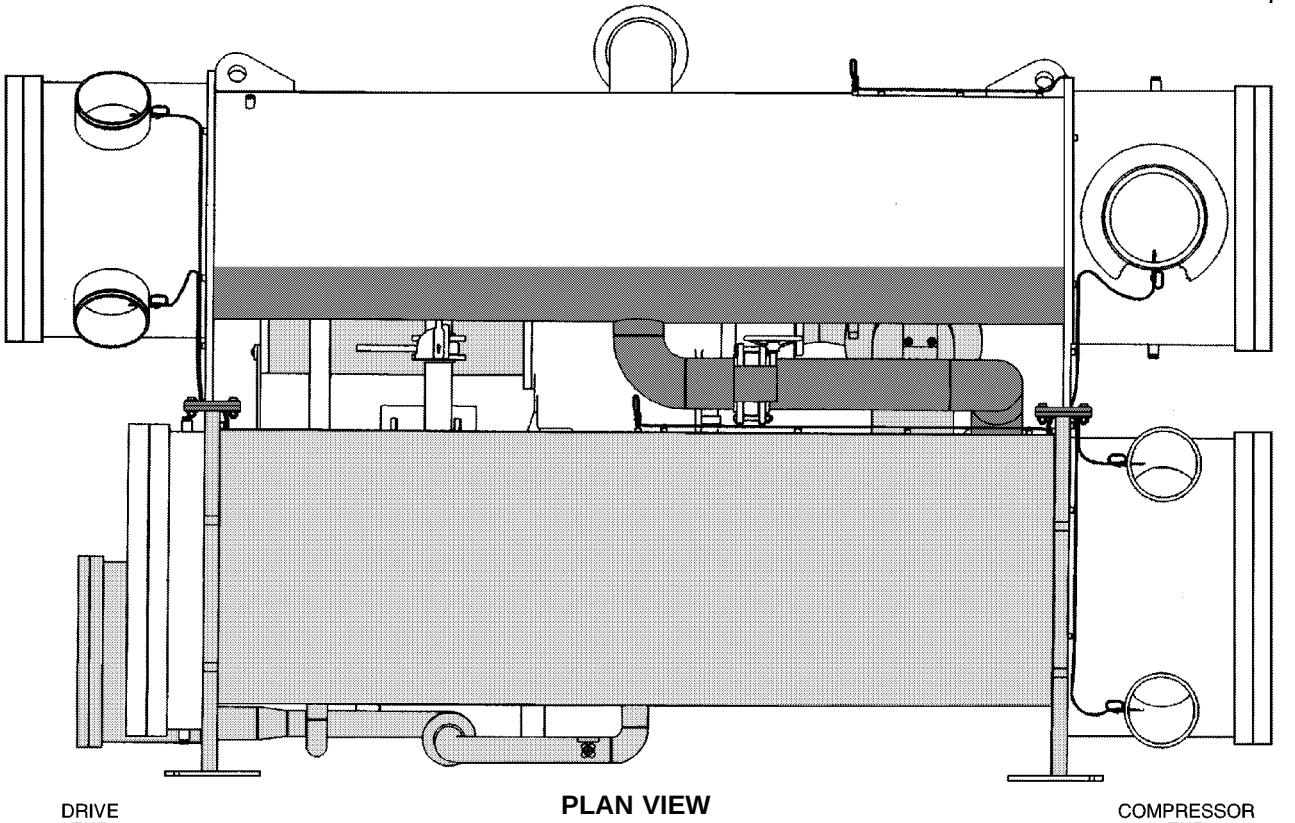
Fig. 23 — COMM1 CCN Communication Wiring for Multiple 17/19EX Chillers (Typical)



COMPRESSOR END

FRONT VIEW

DRIVE END



DRIVE END

PLAN VIEW

COMPRESSOR END

— Area must be factory or field insulated

— Area to be field insulated, if ambient conditions require.

NOTE: Waterbox covers are to be insulated by the contractor.

IMPORTANT: 17EX insulation is identical to the 19EX insulation shown above. 17EX motors do not require insulation.

Fig. 24 — Typical Insulation Area (19EX Shown)

INSTALLATION START-UP REQUEST CHECKLIST

Machine Model Number: 17/19EX Serial Number: _____

To: _____ Date _____

_____

_____ _____
Project Name

Attn: _____ _____
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. Oil cooler water piping (FA compressors only)		
f. 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. 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 job site will be _____

Phone number _____

Beeper number _____

Fax number _____

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

Signature of Purchaser _____

Signature of Job Site Supervisor _____

CUT ALONG DOTTED LINE