



23XL
50/60 Hz

Hermetic Screw Liquid Chillers With HCFC-22 and HFC-134a

Installation Instructions

SAFETY CONSIDERATIONS

Screw liquid chillers are designed to provide safe and reliable service when operated within design specifications. When operating this equipment, use good judgment and follow 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 ANSI/ASHRAE 15 (American National Standards Institute/American Society of Heating, Refrigeration, and Air Conditioning Engineers). The accumulation of refrigerant in an enclosed space can displace oxygen and cause asphyxiation.

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

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

DO NOT USE air 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 center, 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.

DO NOT syphon refrigerant.

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., 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.

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

CONTENTS

	Page
SAFETY CONSIDERATIONS	1
INTRODUCTION	2
General	2
Job Data	2
Equipment Required	2
INSTALLATION	2-34
Receiving the Machine	2
• INSPECT SHIPMENT	
• IDENTIFY MACHINE	
• PROVIDE MACHINE PROTECTION	
Rigging the Machine	4
• RIG MACHINE ASSEMBLY	
• RIG MACHINE COMPONENTS	
Install Machine Supports	16
• INSTALL STANDARD ISOLATION	
• INSTALL OPTIONAL OR ACCESSORY ISOLATION	
• INSTALL SPRING ISOLATION	
Connect Piping	18
• INSTALL WATER PIPING TO HEAT EXCHANGERS	
• INSTALL VENT PIPING TO RELIEF DEVICES	
Make Electrical Connections	25
• CONNECT CONTROL INPUTS	
• CONNECT CONTROL OUTPUTS	
• CONNECT STARTER	
• INSULATE MOTOR TERMINALS AND LEAD WIRE ENDS	
• CONNECT POWER WIRE TO OIL HEATER CONTACTOR (Frame 1 and 2)	
• CONNECT COMMUNICATION AND CONTROL WIRING FROM STARTER TO POWER PANEL	
• CARRIER COMFORT NETWORK INTERFACE	
Install Field Insulation	30
• FACTORY-INSTALLED INSULATION	
INSTALLATION START-UP REQUEST CHECKLIST	CL-1, CL-2

INTRODUCTION

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

Job Data

Necessary information consists of:

- job contract or specifications
- machine location prints
- rigging information
- piping prints and details
- field wiring drawings
- starter manufacturer's installation details
- Carrier certified prints

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 break any connections. The standard 23XL machine is shipped with a full refrigerant charge. Some machines may be shipped with a nitrogen holding charge as an option.

1. Inspect for shipping damage while the machine is still on shipping conveyance. If the 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 the transportation company. *The 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 during shipping. The 23XL is shipped with a full operating oil charge.

IDENTIFY MACHINE — The machine model number, serial number, and heat exchanger sizes are stamped on machine information plate (Fig. 1, 2, and 3). Check this information against shipping papers and job data.

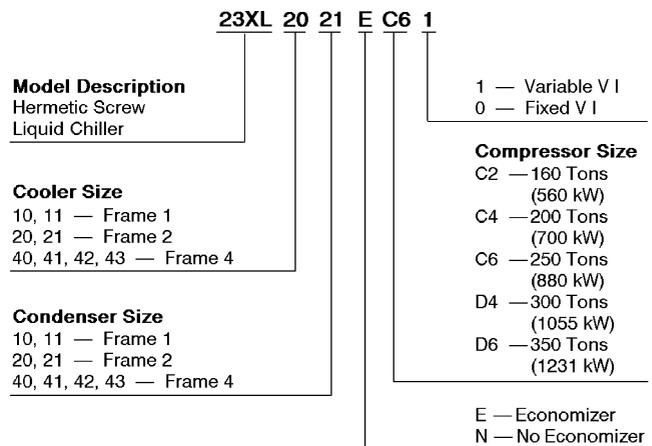
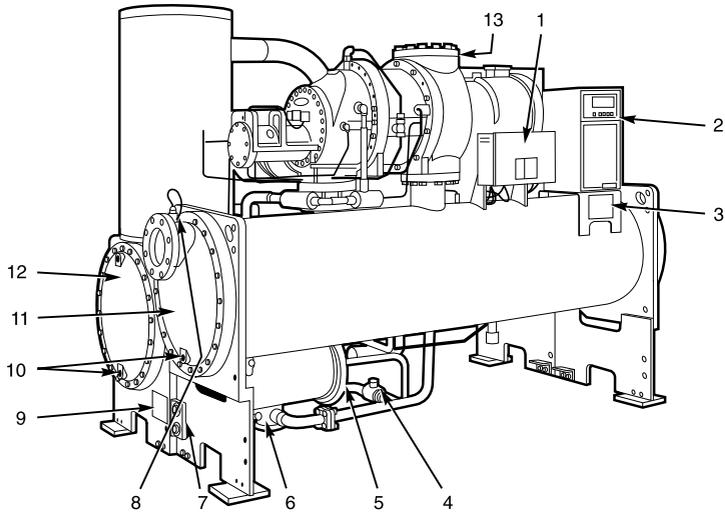


Fig. 1 — Model Number Identification

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

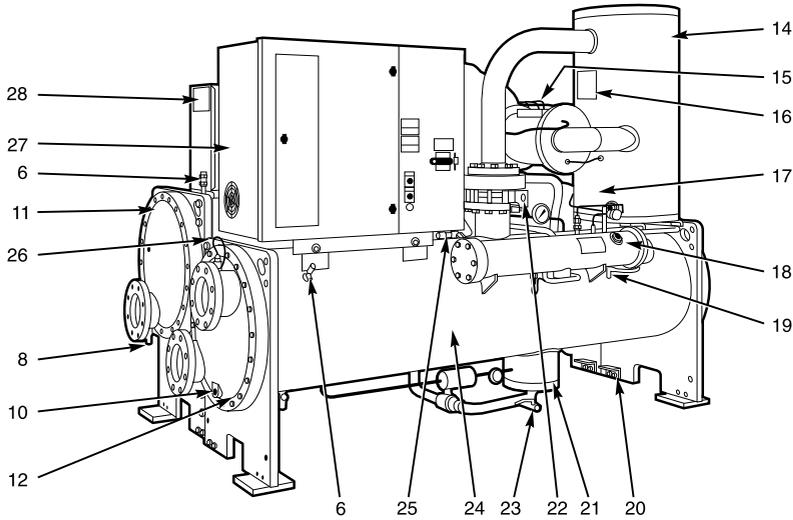
If machine is exposed to freezing temperatures after water circuits have been installed, open waterbox drains and remove all water from cooler and condenser. Leave drains open until system is filled.

FRONT VIEW



- 1 — Power Panel
- 2 — Local Interface Display (LID) Control Center
- 3 — ASME Nameplate, Cooler
- 4 — Cooler Refrigerant Isolation Valve
- 5 — ASME Nameplate, Economizer (Hidden)
- 6 — Service Valve
- 7 — Take-Apart Rabbet Fit Connector (Lower)
- 8 — Cooler Temperature Sensor
- 9 — ASME Nameplate, Condenser
- 10 — Typical Waterbox Drain Port
- 11 — Cooler Supply/Return End Waterbox Cover
- 12 — Condenser Supply/Return End Waterbox Cover
- 13 — Compressor Nameplate (Hidden)

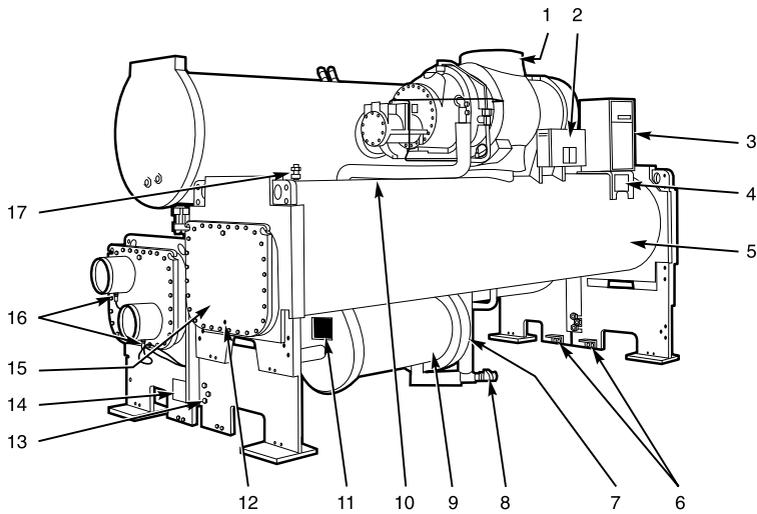
REAR VIEW



- 14 — Oil Separator
- 15 — ASME Nameplate, Muffer (Hidden)
- 16 — ASME Nameplate, Oil Separator
- 17 — Cooler Relief Valves (Hidden)
- 18 — Oil Sump Filter Assembly
- 19 — Oil Charging Valve
- 20 — Vessel Separation Feet
- 21 — Float Chamber
- 22 — Condenser Isolation Valve (Option or Accessory)
- 23 — Refrigerant Charging Valve
- 24 — Condenser
- 25 — Condenser Relief Valves (Hidden)
- 26 — Take-Apart Rabbet Fit Connector (Upper)
- 27 — Unit Mounted Starter (Option)
- 28 — Machine Identification Nameplate

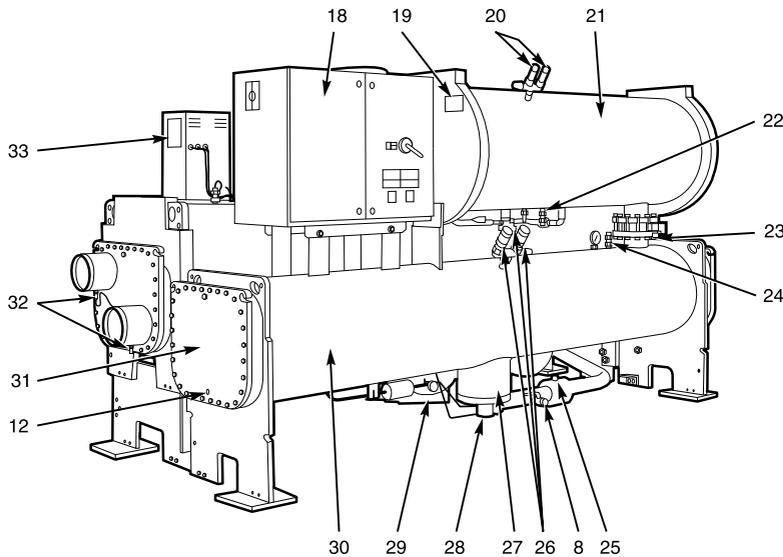
Fig. 2 — Typical 23XL Installation (Frame 1 and 2 Machines)

FRONT VIEW



- 1 — Compressor Nameplate (Hidden)
- 2 — Power Panel
- 3 — Local Interface Display (LID) Control Center
- 4 — ASME Nameplate, Cooler
- 5 — Cooler
- 6 — Vessel Separation Feet
- 7 — Economizer Float Valve Access Cover (Hidden)
- 8 — Refrigerant Charging Valve
- 9 — Economizer
- 10 — Oil Filter Assembly (Hidden)
- 11 — ASME Nameplate, Economizer
- 12 — Typical Waterbox Drain Port
- 13 — Take-Apart Rabbit Fit Connector
- 14 — ASME Nameplate, Condenser
- 15 — Cooler Supply/Return End Waterbox Cover
- 16 — Condenser Temperature Sensors
- 17 — Cooler Relief Valve

REAR VIEW



- 18 — Unit Mounted Starter (Option)
- 19 — ASME Nameplate, Oil Separator
- 20 — Oil Separator Relief Valves
- 21 — Oil Separator
- 22 — Oil Charging Valve
- 23 — Condenser Isolation Valve (Option or Accessory)
- 24 — Service Valve
- 25 — Cooler Refrigerant Isolation Valve
- 26 — Condenser Relief Valves and Oil Filter
- 27 — Float Chamber
- 28 — Poppet Valve Assembly
- 29 — Motor Cooling Isolation Valve
- 30 — Condenser
- 31 — Condenser Supply/Return End Waterbox Cover
- 32 — Cooler Temperature Sensors
- 33 — Machine Identification Nameplate

Fig. 3 — Typical 23XL Installation (Frame 4 Machine)

Rigging the Machine — The 23XL can be rigged as an entire assembly. It also has flanged connections that allow the compressor, cooler, condenser, and oil separator sections to be separated to fulfill specific installation requirements.

RIG MACHINE ASSEMBLY — See rigging instructions in plastic envelope attached to machine. Also refer to rigging guide (Fig. 4 and 5), physical data in Fig. 6 and 7, and Tables 1-6. *Lift machine only from the 3 points indicated in the rigging guide.* Spreader bar must be used. 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 and personal injury. Rigging equipment and procedure must be adequate for machine weight. See Tables 1-6 for machine weights.

NOTE: These weights are broken down into component sections for use when installing the unit in sections. For complete machine weight, add all section components together. Total machine weight (Table 6) is also stenciled on the cooler and condenser sections.

⚠ WARNING

The compressor is heavy. To avoid bodily injury, lift the compressor only by using cables or slings. Do not lift the compressor using threaded eyebolts. Metric threaded eyebolts are provided only for lifting individual compressor castings.

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

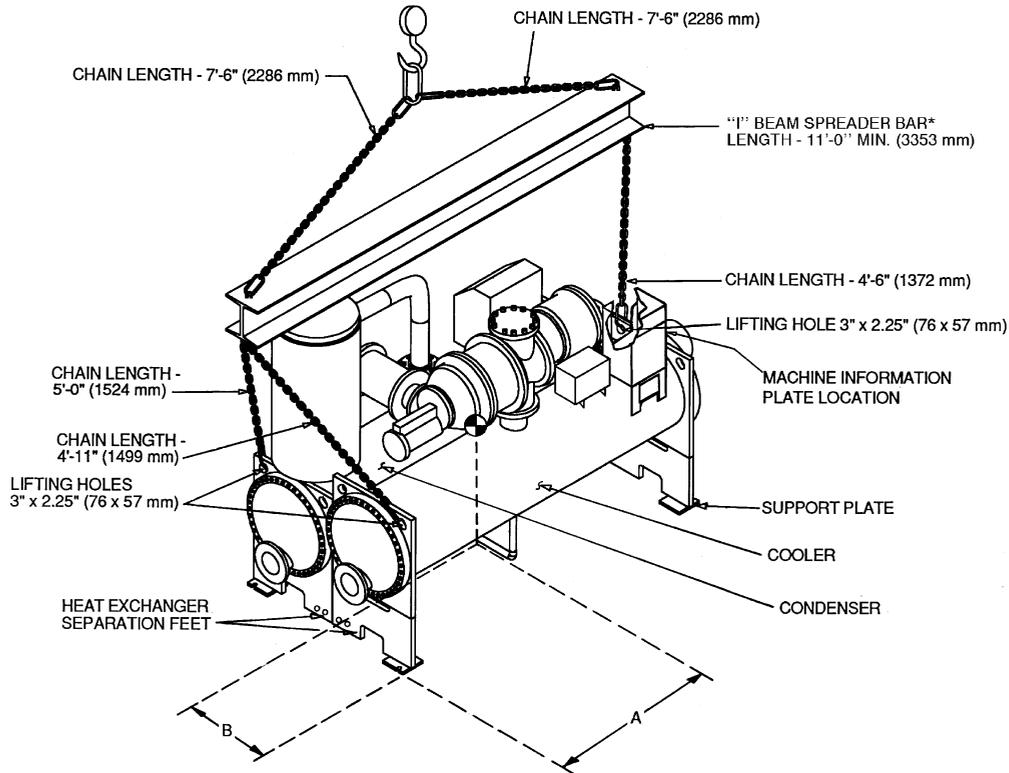
⚠ WARNING

Do not attempt to cut refrigeration lines or disconnect flanges or fittings while machine is under pressure. Cutting lines or disconnecting flanges or fittings can result in personal injury or damage to the unit. Be sure both refrigerant and oil charge are removed from the machine before separating the components.

NOTE: If the cooler and condenser vessels must be separated, the heat exchanger separation feet must be unbolted, rotated, and rebolted in order to keep each heat exchanger level. See Fig. 4, 5, and 8-12.

NOTE: Sensor wiring must be disconnected. Label each wire before removal (see Carrier certified prints). Remove all transducer and thermistor wires at the sensor. Clip all wire ties necessary to remove the wires from the heat exchangers. Remove the control wiring and oil heater wiring (Frame 1 and 2 machines) at the power panel and the main motor leads at the starter lugs before disconnecting the starter from the machine.

RIG MACHINE COMPONENTS — Refer to instructions below, Fig. 8-12, and Carrier certified prints for machine disassembly.



*Carrier recommends that "I" Beam Spreader Bars be field supplied and installed.

NOTES:

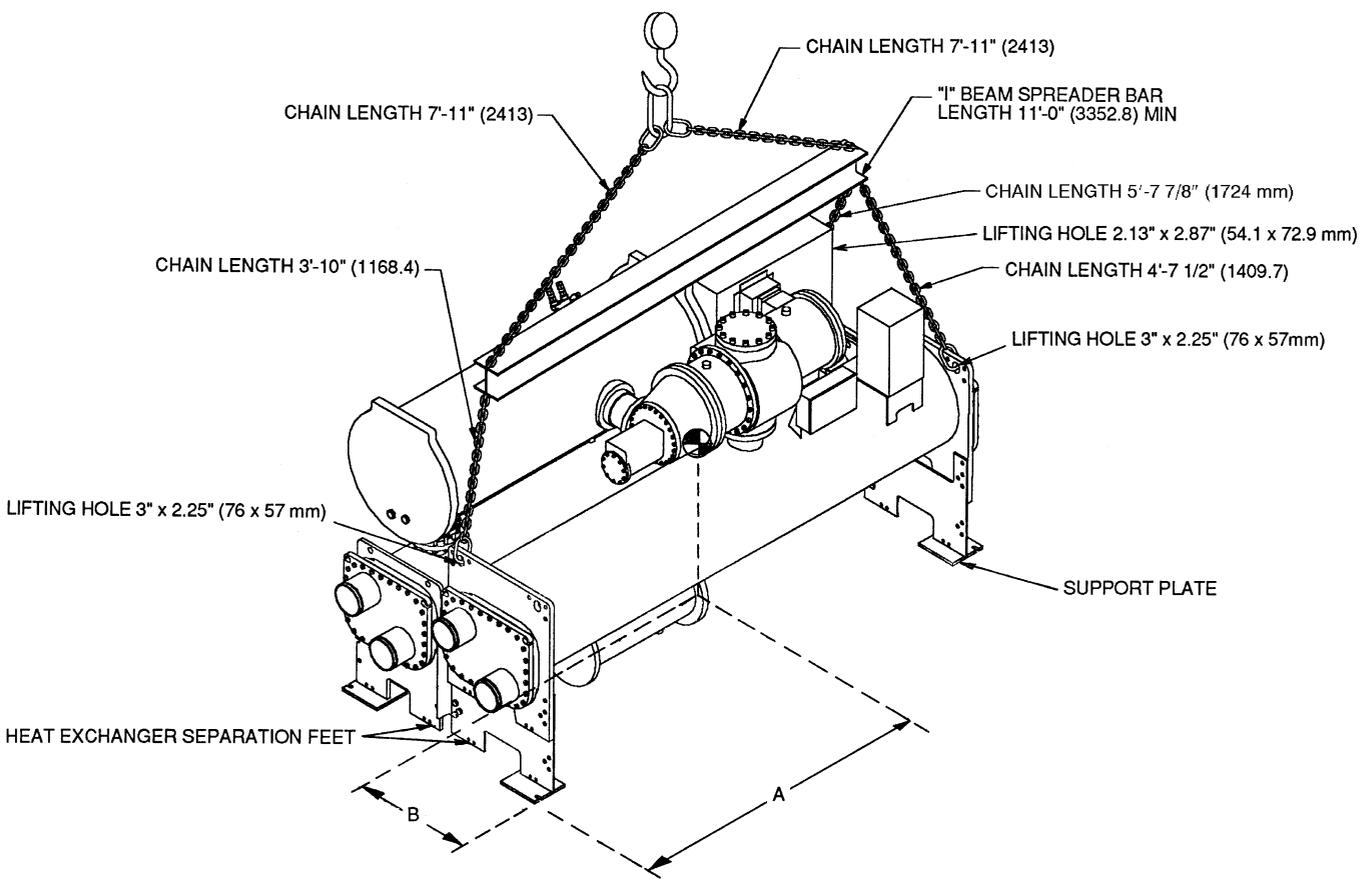
1. Each chain must be capable of supporting the entire weight of the machine. Maximum weight of machine is 13,200 lbs (5940 Kg).
2. Chain lengths shown are typical for 15 ft (4572 mm) lifting height. Some minor adjustment may be required.

Suggested "I" Beam Spreader Bar*

HEAT EXCHANGER SIZE	CENTER OF GRAVITY — APPROXIMATE DIMENSIONS				MAXIMUM WEIGHT	
	A (Length)		B (Width)		lb	Kg
	ft-in.	mm	ft-in.	mm		
10 or 11	3- 8	1117	1-11	572	11,810	5357
20 or 21	3-10	1161	2- 0	600	13,200	5940

OPTIONS	ENGLISH	SI
	in. x lb/ft	cm x N/m
1	S12 x 31.8	S30 x 464
2	S10 x 35	S25.4 x 511
3	W12 x 22	W30 x 321
4	W10 x 25	W25.4 x 365

Fig. 4 — Machine Rigging Guide (Frame 1 and 2 Machines)



NOTES:

1. Each chain must be capable of supporting the entire weight of the machine. Maximum weight of machine is 22,300 lbs (10,116 Kg).
2. Chain lengths shown are typical for 15 ft (4572 mm) lifting height. Some minor adjustment may be required.
3. [] indicates millimeters.

HEAT EXCHANGER SIZE	CENTER OF GRAVITY — APPROXIMATE DIMENSIONS				MAXIMUM WEIGHT*	
	A (Length)		B (Width)		lb	kg
	ft-in.	mm	ft-in.	mm		
40, 41, 42, or 43	6-4	1930	2-8	813	22,300	10,116

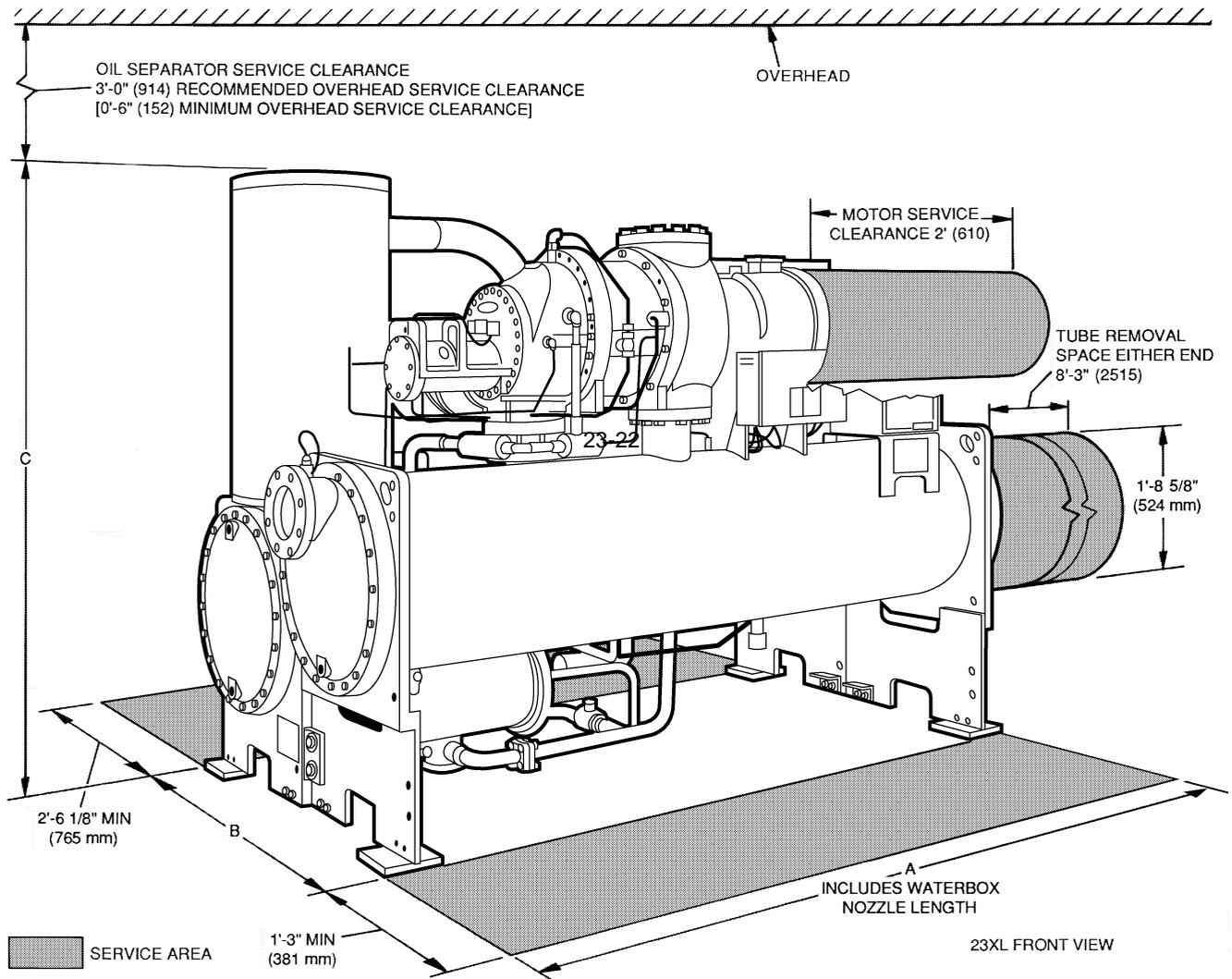
*Includes marine waterboxes and refrigerant charge.

Suggested “I” Beam Spreader Bar†

OPTIONS	ENGLISH	SI
	in. x lb/ft	cm x N/m
1	S12 x 31.8	S30 x 464
2	S10 x 35	S25.4 x 511
3	W12 x 22	W30 x 321
4	W10 x 25	W25.4 x 365

†Carrier recommends that “I” beam spreader bars be field supplied and installed.

**Fig. 5 — Machine Rigging Guide
(Frame 4 Machines)**



HEAT EXCHANGER SIZE	A (LENGTH)				OVERALL B (WIDTH)		OVERALL C (HEIGHT)		NOZZLE PIPE SIZE (in.)	
	1 Pass		2 and 3 Pass*		ft-in.	mm	ft-in.	mm	1-Pass	2 and 3-Pass
	ft-in.	mm	ft-in.	mm						
10 or 11	9-5	2870	9-6½	2908	4- 9¼	1454	6- 9⅝	2073	6	6
20 or 21					4-11	1499	6-11⅜	2118	8	6

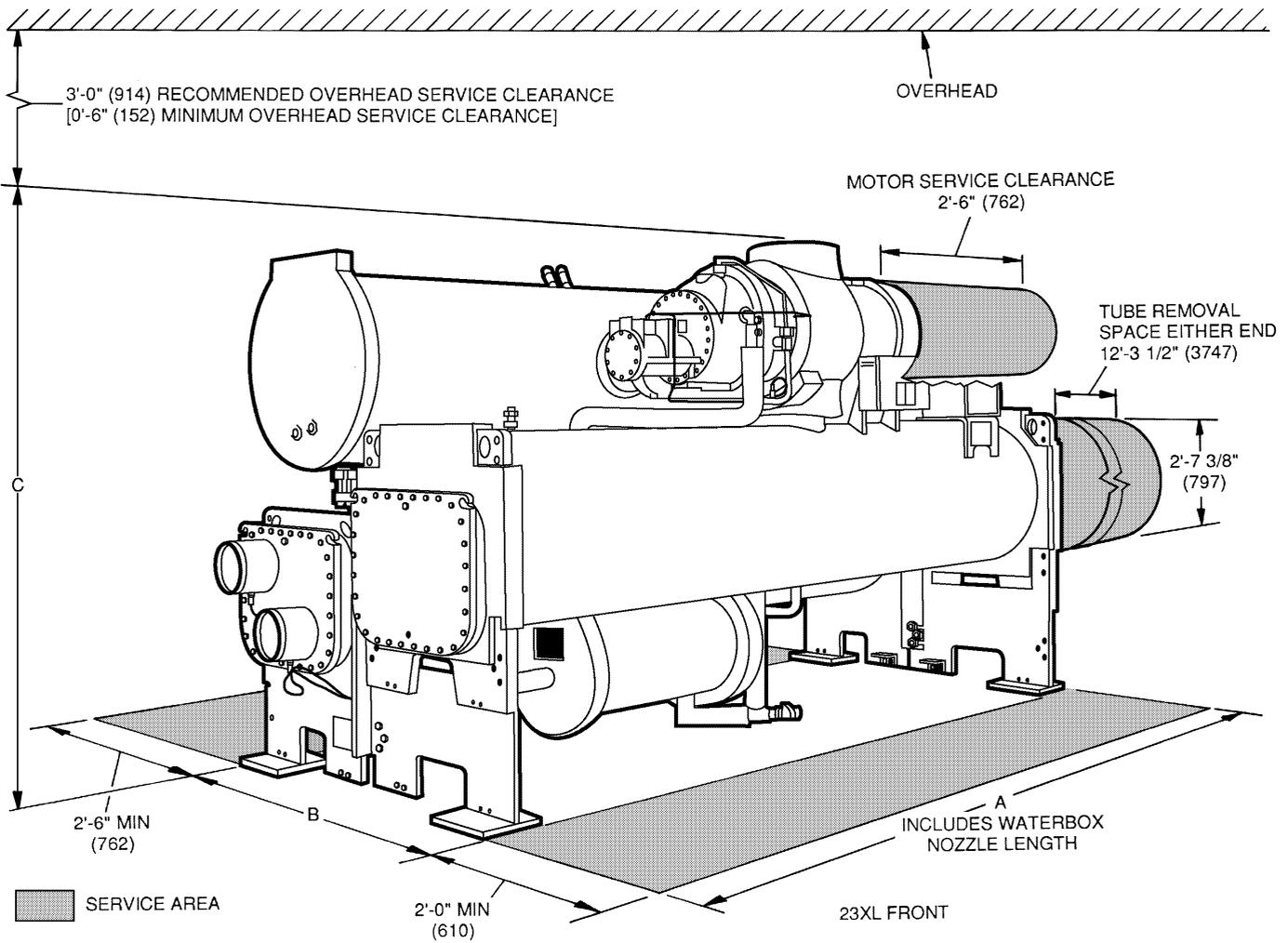
*2 and 3-pass length applies if either (or both) cooler or condenser is a 2 or 3-pass design.

NOTES:

1. Service access should be provided per ANSI/ASHRAE 15 (American National Standards Institute/American Society of Heating Refrigeration and Air Conditioning Engineers), Latest Edition. NFPA (National Fire Protection Association) 70 and local safety codes.
2. Allow at least 6 in. (152 mm) overhead clearance for service rigging.
3. Certified drawings available upon request.



Fig. 6 — 23XL Dimensions (Frame 1 and 2 Machines)



NOTES:

1. For flanged waterbox nozzles, refer to the certified drawings for length addition measurements.
2. Service access should be provided based on American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) 15, latest edition, National Fire Protection Association (NFPA) 70, and local safety codes.
3. A minimum 6 in. (152 mm) overhead clearance for service rigging is recommended.
4. Certified drawings are available upon request.
5. [] indicates millimeters.

HEAT EXCHANGER (Cooler and Condenser Size)	A (LENGTH)				OVERALL B (WIDTH)		OVERALL C (HEIGHT)		NOZZLE PIPE SIZE (in.) (Nominal Pipe Size)		
	2 Pass*		1 or 3 Pass†		ft-in.	mm	ft-in.	mm	1-Pass	2-Pass	3-Pass
	ft-in.	mm	ft-in.	mm							
40-43	13-7/8	4159	14-3/4	4350	5-10 ⁵ / ₈	1800	7-6 ¹¹ / ₁₆	2303	10	8	6

HEAT EXCHANGER (Cooler and Condenser Size)	A (Length With Marine Waterbox — Not Shown)			
	2 Pass*		1 or 3 Pass†	
	ft-in.	mm	ft-in.	mm
40-43	14-9 ⁵ / ₈	4512	16-5 ¹ / ₂	5017

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

†1 or 3 pass length applies if either (or both) cooler or condenser is a 1 or 3 pass design.

Fig. 7 — 23XL Dimensions (Frame 4 Machines)

Table 1 — 23XL Compressor Weights

23XL UNIT	COMPRESSOR SIZE (Tons)	ASSEMBLY (Less Motor)	
		lb	kg
Frame 1	C2	2270	1029
	C4	2300	1043
Frame 2	C6	2400	1088
Frame 4	D4	3300	1497
	D6	3400	1542

Table 2 — 23XL Component Weights

COMPONENT	FRAME 1 AND 2		FRAME 4	
	lb	kg	lb	kg
Oil Separator	1180	535	2880*	1306*
Economizer†	296	134	560	254
Muffler	170	77	*	*
Discharge Piping:				
Pipe	44	20	—	—
Isolation Valve†	30	14	30	14
Adaptor Flange	76	34	76	34
Power Panel	20	9	20	9
Starter†	500	227	500	227
Control Center	31	14	31	14

*The Frame 4 muffler is included in the oil separator weight.
†Optional.

Table 3 — 23XL Motor Weights*

COMPRESSOR		MAX kW	STATOR		ROTOR		MOTOR CASING AND COVER	
Size	VI Type		lb	kg	lb	kg	lb	kg
C2	0	125	230	104	58	26	310	141
C4	0	155	249	113	63	29	310	141
C4	1	195	276	125	69	31	310	141
C6	0 or 1							
D4	0 or 1	280	460	208	110	49	370	167
D6	0 or 1	280	460	208	110	49	370	167

LEGEND

VI — Volumetric Index

*C2-C6 listed weights are for low-voltage motors (200-600 v). D4-D6 listed weights are for low-voltage motors (320-600 v).

Table 4 — 23XL Heat Exchanger Weights

SIZE	ENGLISH							
	Dry Wt (lb)*		Machine Charge					
	Cooler Only†	Cond Only	Refrigerant (lb)				Water (gal)	
			Economizer		No Economizer		Cooler	Cond
HCFC-22			HFC-134a	HCFC-22	HFC-134a			
10	2480	2890	650	**	600	**	34	39.2
11	2650	3020	650	**	600	**	40	44.4
20	2845	3250	750	**	700	**	45	49.2
21	3000	3445	750	**	700	**	49	56.4
40	5030	4690	1000	850	900	800	49.2	51.6
41	5180	4835	1100	900	1000	850	54	57
42	5345	5005	1200	950	1100	900	60	63
43	5525	5185	1300	1000	1200	950	66	70

SIZE	SI							
	Dry Wt (kg)*		Machine Charge					
	Cooler Only†	Cond Only	Refrigerant (kg)				Water (L)	
			Economizer		No Economizer		Cooler	Cond
HCFC-22			HFC-134a	HCFC-22	HFC-134a			
10	1125	1310	295	**	272	**	130	150
11	1202	1370	295	**	272	**	152	168
20	1291	1474	340	**	318	**	170	186
21	1361	1563	340	**	318	**	186	214
40	2282	2127	454	385	408	363	186	195
41	2350	2193	499	408	454	385	204	216
42	2424	2270	544	431	499	408	227	239
43	2506	2352	590	454	544	431	250	264

LEGEND

NIH — Nozzle-In-Head

*Weight based on: .035 in. wall copper Turbo-B2 tubes in cooler, Turbo chill in condenser.
2-pass, 150 psi NIH waterbox arrangements (sizes 10, 11, 20, 21)
3-pass, 300 psi NIH waterbox arrangements (sizes 40, 41, 42, 43)

†Weight of optional economizer is not included and must be added to cooler weight.

**Not available.

NOTE: Standard shipment is with refrigerant charged, so be sure to add refrigerant charge to dry weight.

Table 5A — 23XL Waterbox Cover Weights (Frame 1 and 2 Machines)*

HEAT EXCHANGER	WATERBOX DESCRIPTION	PSI (kPa)	FRAME 1		FRAME 2	
			lbs	kg	lbs	kg
Cooler or Condenser	NIH, 1 Pass	150 (1034)	118	54	128	58
	NIH, 2 Pass (Plain)		100	46	148	67
	NIH, 2 Pass (With Pipe Nozzles)		185	84	200	91
	NIH, 3 Pass	150 (1034)	166	76	180	82

LEGEND

NIH — Nozzle-In-Head

*These weights are given for reference only. They have been included in heat exchanger weights shown in Table 4.

NOTE: Add 30 lb (14 Kg) for bolts.

Table 5B — 23XL Waterbox Cover Weight (Frame 4 Machines)*

HEAT EXCHANGER	WATERBOX DESCRIPTION	ENGLISH (lb)				SI (kg)			
		Frame 4, Std Nozzles		Frame 4, Flanged		Frame 4, Std Nozzles		Frame 4, Flanged	
		150 psig	300 psig	150 psig	300 psig	1034 kPa	2068 kPa	1034 kPa	2068 kPa
COOLER	NIH, 1 Pass Cover	284	414	324	491	129	188	147	223
	NIH, 2 Pass Cover	285	411	341	523	129	187	155	237
	NIH, 3 Pass Cover	292	433	309	469	133	197	140	213
	NIH, Plain End Cover	243	292	243	292	110	133	110	133
	MWB Cover	CS	621	CS	621	CS	282	CS	282
	Plain End Cover	CS	482	CS	482	CS	219	CS	219
CONDENSER	NIH, 1 Pass Cover	306	446	346	523	139	202	157	237
	NIH, 2 Pass Cover	288	435	344	547	131	197	156	248
	NIH, 3 Pass Cover	319	466	336	502	145	212	153	228
	NIH, Plain End Cover	226	271	226	271	103	123	103	123
	MWB Cover	CS	474	CS	474	CS	215	CS	215
	Plain End Cover	CS	359	CS	359	CS	163	CS	163

LEGEND

CS — Contact Syracuse

MWB — Marine Waterbox

NIH — Nozzle-In-Head

*These weights are given for reference only. The 150 psig (1034 kPa) standard waterbox cover weights have been included in the heat exchanger weights shown in Table 4.

Table 6 — 23XL Machine Rigging Weights

COOLER SIZE	CONDENSER SIZE	ECONOMIZER INDICATOR	COMPRESSOR SIZE	VI TYPE	TOTAL RIGGING WEIGHT*	
					lbs	kg
10 or 11	10 or 11	YES	C2 or C4	0 or 1	11,410	5,175
		NO			11,110	5,039
20 or 21	20 or 21	YES	C6	0 or 1	12,560	5,697
		NO			12,260	5,561
40, 41, 42, or 43	40, 41, 42, or 43	YES	D4 or D6	0 or 1	20,020	9,081
		NO			19,520	8,855

LEGEND

VI — Volumetric Index

*Total rigging weight includes HCFC-22 and water.

NOTE: Starter weight is included in total weights. Subtract 500 lbs (227 kg) if a starter is not used.

NOTE: Before proceeding with disassembly, make sure the machine is at atmospheric pressure.

→ NOTE: The screw compressor uses all metric dimensions and metric fasteners. The heat exchangers and oil separator use American standard dimensions and English fasteners. Metric wrenches are required to remove the compressor.

To Separate Cooler and Condenser (Frame 1 and 2 Machines)

1. Turn vessel separation feet to the lowered position (Fig. 8).
2. Disconnect and/or cut the following lines:
 - a. cooler liquid feed (Fig. 8).
 - b. condenser refrigerant vapor to oil reclaim ejector (Fig. 9).
 - c. motor cooling supply from condenser (Fig. 9).
 - d. optional hot gas bypass and associated solenoid valve wiring (not shown).
3. Separate compressor from oil supply system by disconnecting the following:
 - a. discharge flange from compressor and remove check valve (Fig. 8).
 - b. oil supply line to compressor and associated solenoid valve wiring (Fig. 8).
 - c. oil scavenging/sump vent to compressor (Fig. 8 and 9).
4. Cover all openings.
5. Be sure all wiring is properly marked. Detach all transducers, switches, and sensor wires. Remove all wire ties required to remove wires from the cooler to the condenser. Do not cut the wires.
6. Disconnect the rabbet fit connectors on the tube sheets (Fig. 9).
7. Rig vessels apart.

To Separate Compressor from Cooler (Frame 1 and 2 Machines)

→ **⚠ WARNING**

The compressor is heavy. To avoid bodily injury, lift the compressor only by using cables or slings. Do not lift the compressor using threaded eyebolts. The metric threaded eyebolts are provided only for lifting individual compressor castings.

1. Unbolt the suction flange (Fig. 8).
2. Disconnect the following lines:
 - a. oil reclaim to compressor (Fig. 9).
 - b. motor cooling to motor (Fig. 9).
 - c. motor cooling drain (Fig. 9).
 - d. optional economizer gas line to compressor rotors (Fig. 9).

3. Separate compressor from oil supply system by disconnecting the following:
 - a. discharge flange from compressor and remove check valve (Fig. 8).
 - b. oil supply line to compressor and associated solenoid valve wiring (Fig. 8 and 9).
 - c. oil scavenging/sump vent to compressor (Fig. 8 and 9).
4. Cover all openings.
5. Be sure the following electrical connections are disconnected:
 - a. motor power cables from optional unit-mounted starter lugs (not shown).
 - b. motor winding temperature sensor (Fig. 9).
 - c. slide valve increase and decrease capacity control solenoid valves (Fig. 9).
 - d. optional variable VI solenoid valves (Fig. 9).
 - e. discharge (condenser) pressure transducer (Fig. 8).
6. Unbolt motor support foot (Fig. 8).
7. Rig compressor.

To Separate Oil Separator from Condenser (Frame 1 and 2 Machines)

1. Separate the compressor and oil separator by disconnecting the following:
 - a. discharge flange from compressor and remove check valve (Fig. 8).
 - b. oil feed from separator to sump (Fig. 9).
 - c. oil scavenging/sump vent to compressor (Fig. 8 and 9).
 - d. oil sump relief to separator (Fig. 8).
2. Unbolt the discharge adaptor flange from the condenser (Fig. 9).
3. Cover all openings.
4. Be sure the following electrical connections are disconnected:
 - a. high discharge pressure cutout switch (Fig. 8).
5. Unbolt the four securing bolts from the bottom of the oil separator (Fig. 8 and 9).
6. Rig oil separator.

NOTE: Before proceeding with disassembly, make sure the machine is at atmospheric pressure.

To Separate Cooler and Condenser (Frame 4 Machines)

→ **⚠ WARNING**

The compressor is heavy. To avoid bodily injury, lift the compressor only by using cables or slings. Do not lift the compressor using threaded eyebolts. The metric threaded eyebolts are provided only for lifting individual compressor castings.

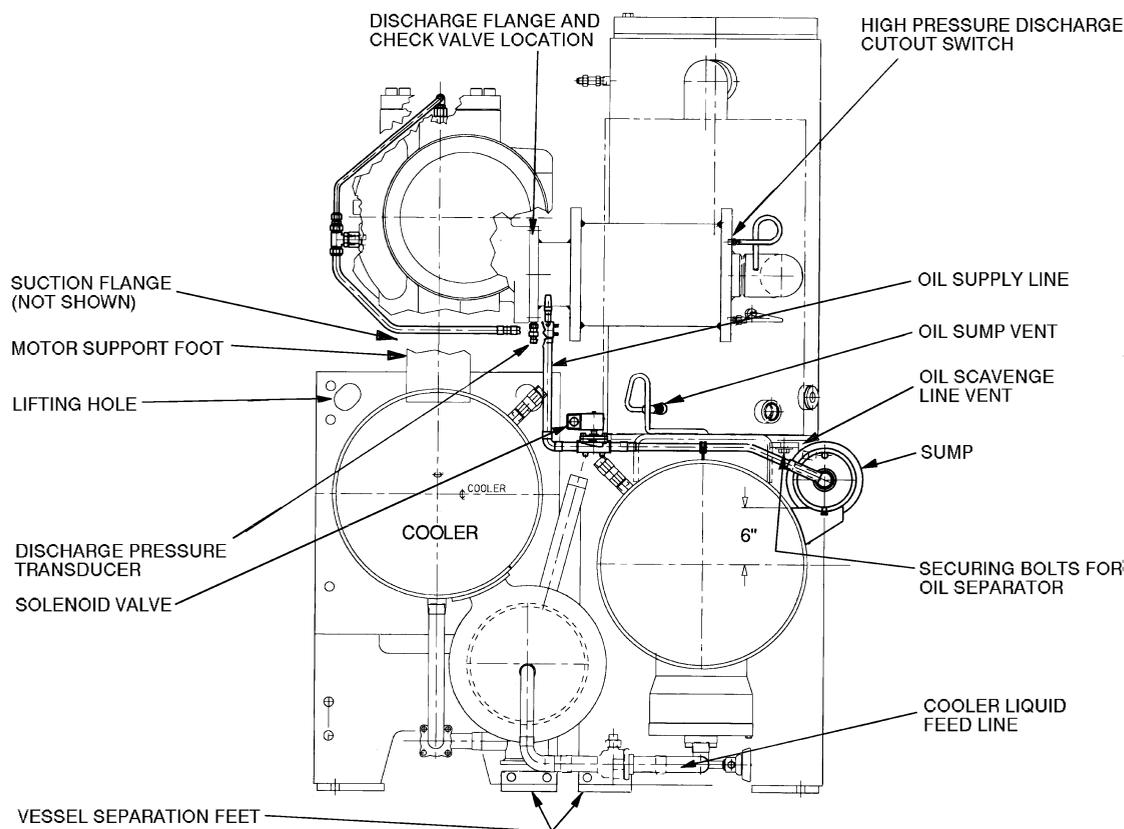


Fig. 8 — 23XL Drive End View (Frame 1 and 2 Machines)

Refer to Fig. 10 unless otherwise specified.

1. Turn all 4 vessel separation feet to the lowered position (Fig. 11).
2. Disconnect and/or cut the following lines, as required:
 - a. cooler liquid feed.
 - b. motor cooling supply from condenser.
 - c. liquid injection to compressor.
 - d. bubble line to float chamber (not shown).
 - e. optional hot gas bypass and associated solenoid valve wiring (not shown).
 - f. motor power cables from optional unit mounted starter lugs (not shown).
3. Separate compressor by disconnecting the following:
 - a. discharge flange from compressor (remove the check valve).
 - b. oil supply line to compressor and associated solenoid valve wiring.
4. Cover all openings.
5. Be sure all wiring is properly marked. Detach all transducers, switches, and sensor wires. Remove all wire ties required to remove wires from the cooler to the condenser. Do not cut the wires.
6. Disconnect the rabbet fit connectors on the tube sheets.
7. Rig vessels apart.

To Separate Compressor from Cooler (Frame 4 Machines)

1. Unbolt the suction flange (Fig. 11).
2. Disconnect the following lines:
 - a. motor cooling to motor (Fig. 10).
 - b. motor cooling drain (Fig. 11).

- c. optional economizer gas line to compressor rotors (Fig. 10).
 - d. liquid injection to compressor (Fig. 10).
3. Separate compressor from oil supply system by disconnecting the following:
 - a. discharge flange from compressor and remove check valve (Fig. 10).
 - b. oil supply line to compressor and associated solenoid valve wiring (Fig. 10).
4. Cover all openings.
5. Be sure the following electrical connections are disconnected:
 - a. motor power cables from optional unit-mounted starter lugs (not shown).
 - b. motor winding temperature sensor (Fig. 10).
 - c. slide valve increase and decrease capacity control solenoid valves (Fig. 10).
 - d. optional variable VI solenoid valves (Fig. 10).
 - e. discharge (condenser) pressure transducer (Fig. 10).
6. Unbolt motor support foot (Fig. 10).
7. Rig compressor.

To Separate Oil Separator from Condenser (Frame 4 Machines)

Refer to Fig. 12 unless otherwise specified.

1. Separate the compressor and oil separator by disconnecting the following:
 - a. discharge flange from compressor (secure the check valve). See Fig. 11.
 - b. oil supply line from separator to compressor.

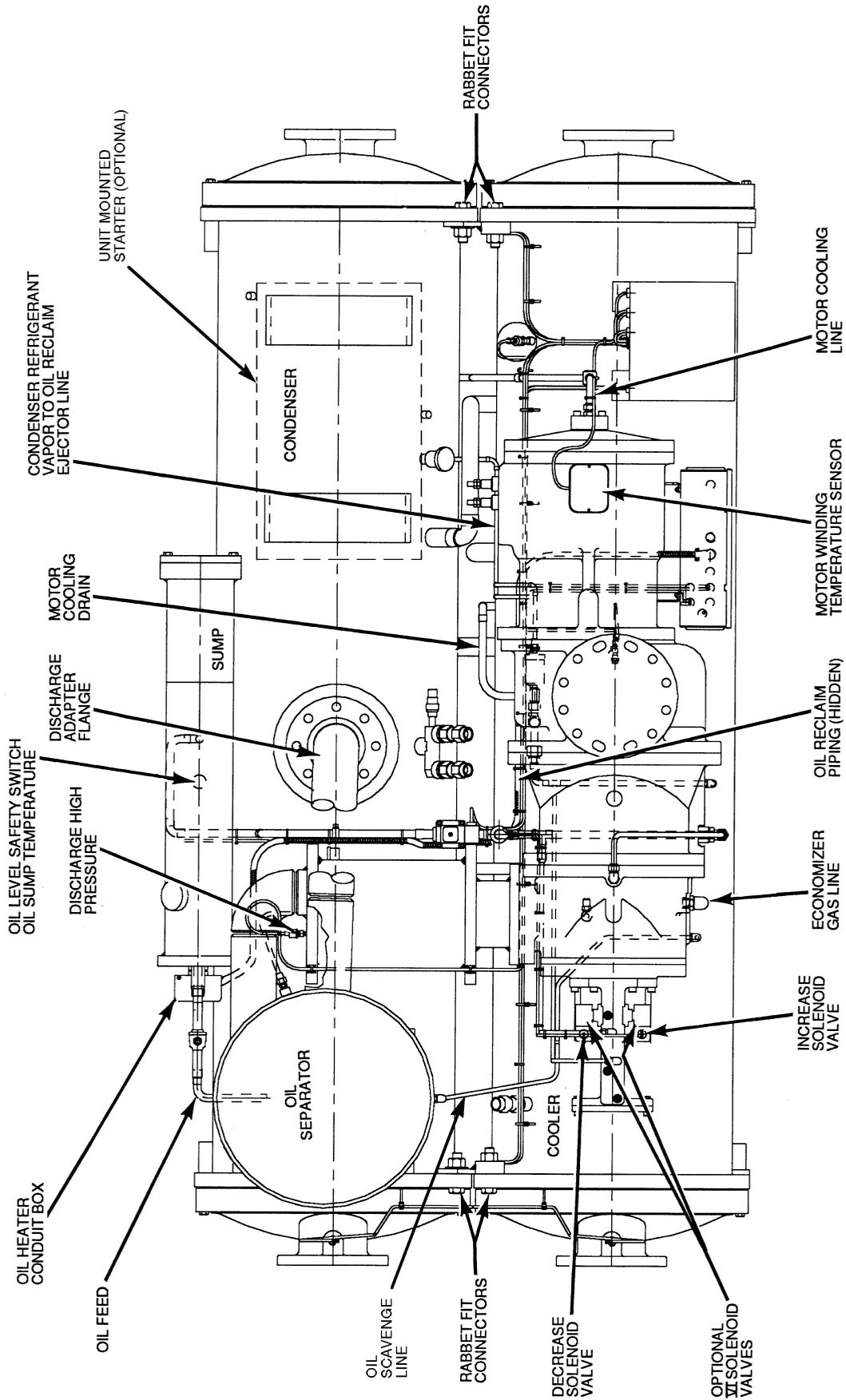
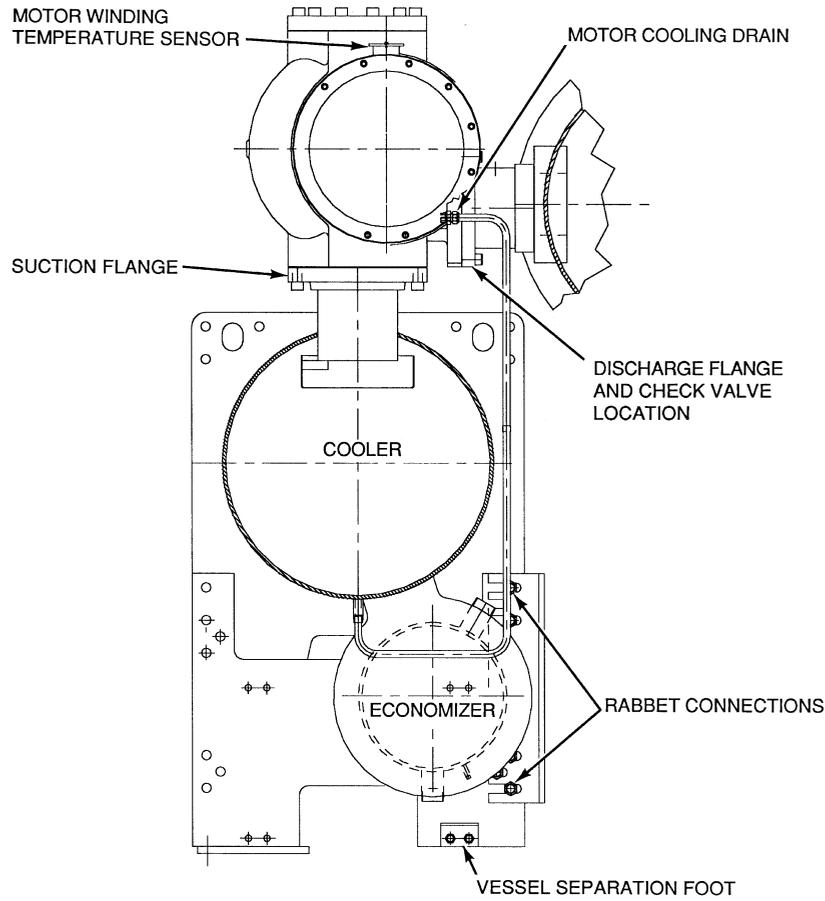


Fig. 9 — 23XL Top View (Frame 1 and 2 Machines)

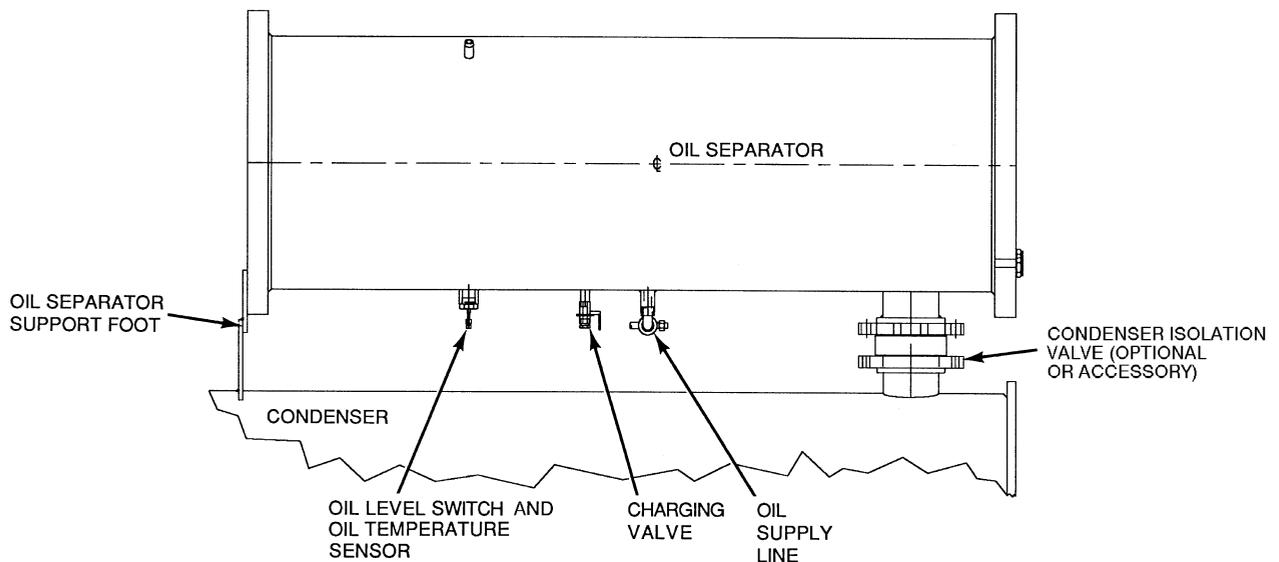
2. Cover all openings.
3. Be sure the switches, sensor, and transducers are disconnected.
4. Cut oil separator from its support foot.
5. Rig oil separator.

Additional Notes For Frame 1, 2, and 4 Machines:

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



**Fig. 11 — Motor Cooling Drain Section
(Frame 4 Machines)**



**Fig. 12 — Oil Separator Section
(Frame 4 Machines)**

→

Install Machine Supports

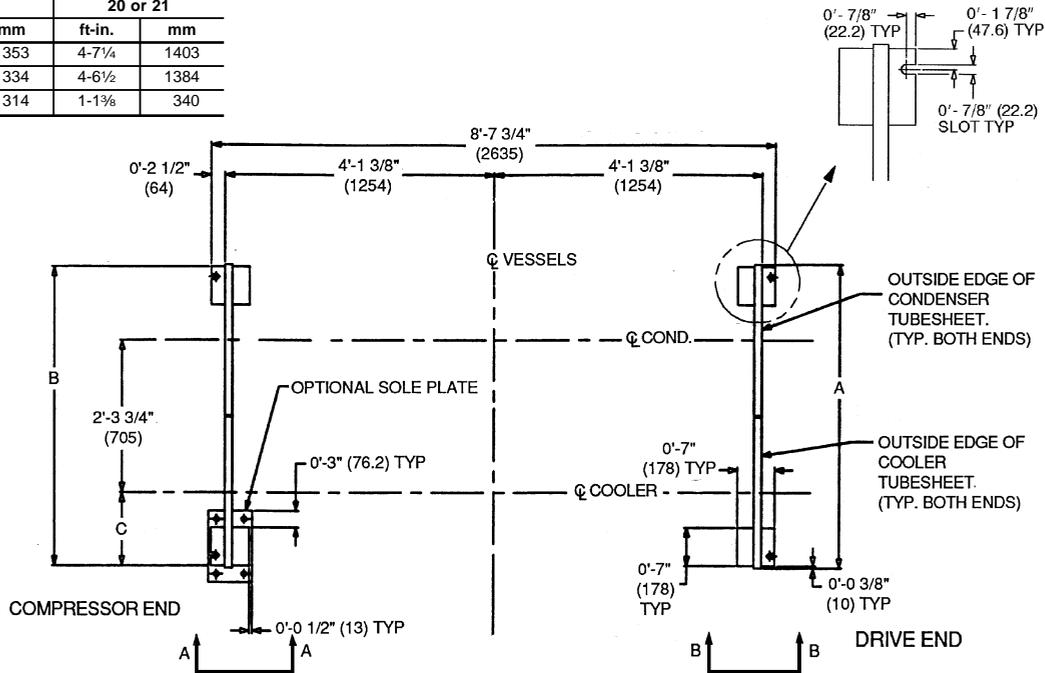
INSTALL STANDARD ISOLATION — Figures 13-18 show the position of support plates and shear flex pads that form the standard machine support system.

INSTALL OPTIONAL OR ACCESSORY ISOLATION (if required) — Uneven floors or other considerations may

dictate the use of soleplates and leveling pads. Refer to Fig. 13-18.

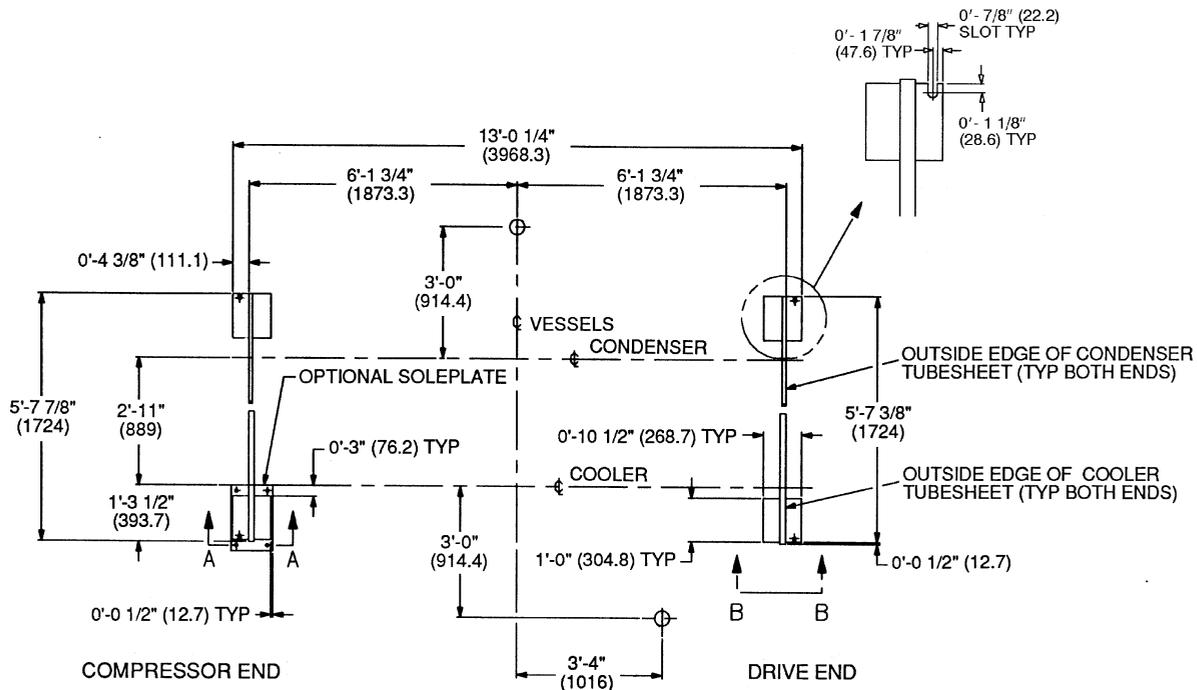
Level machine by using jacking screws in isolation soleplates. Use a level at least 24 in. (600 mm) long.

DIMENSION	HEAT EXCHANGER SIZE			
	10 or 11		20 or 21	
	ft-in.	mm	ft-in.	mm
A	4-5¼	1353	4-7¼	1403
B	4-4½	1334	4-6½	1384
C	1-0¾	314	1-1¾	340



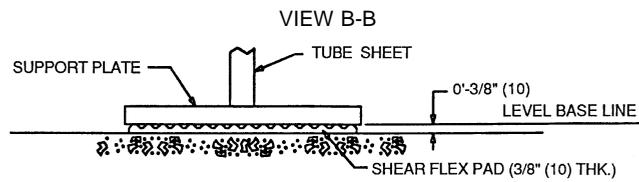
- NOTES:
1. Dimensions in () are in millimeters.
 2. Use grout and package components to establish the level base line.
 3. If chiller is set on concrete pad, electrical contractor is to locate conduit stub-ups outside of pad. *Approximate* location shown.
 4. See Fig. 15 and 16 for additional information.

Fig. 13 — 23XL Machine Footprint (Frame 1 and 2 Machines)



- NOTES:
1. Dimensions in () are in millimeters.
 2. Use grout and package components to establish the level base line.
 3. If chiller is set on concrete pad, electrical contractor is to locate conduit stub-ups outside of pad. *Approximate* location shown.
 4. See Fig. 15 and 16 for additional information.

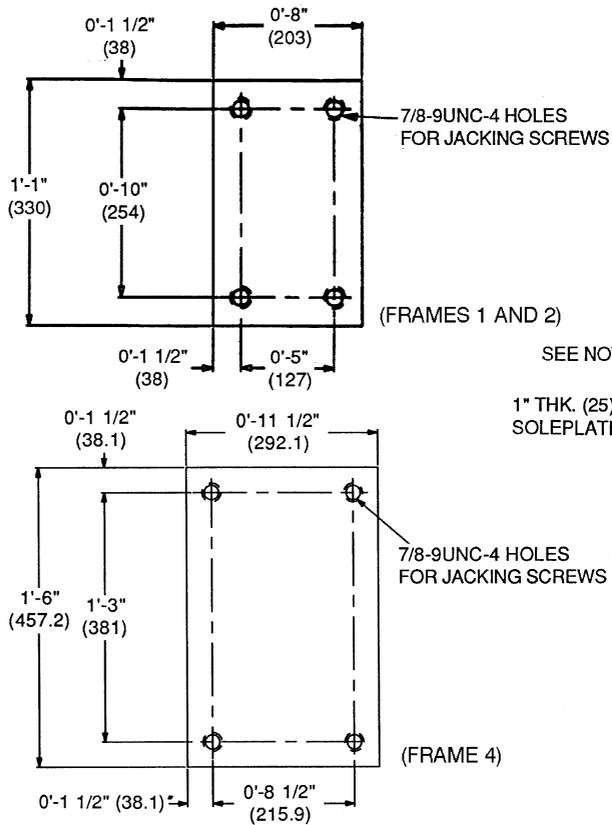
Fig. 14 — 23XL Machine Footprint (Frame 4 Machine)



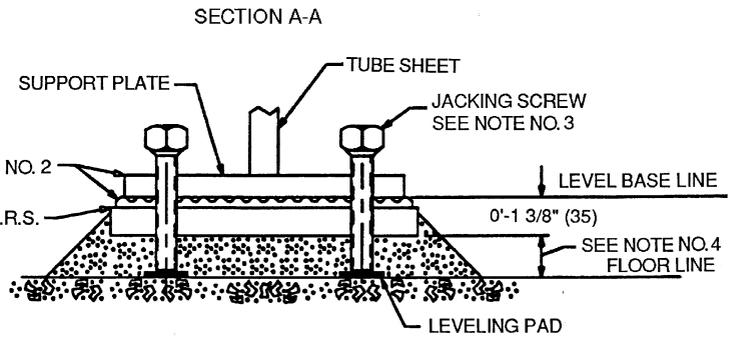
NOTES:

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

Fig. 15 — Standard Isolation



SOLE PLATE DETAIL

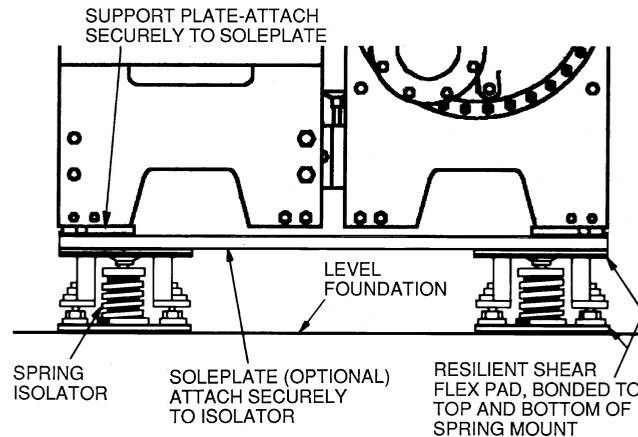


HRS — Hot Rolled Steel

NOTES:

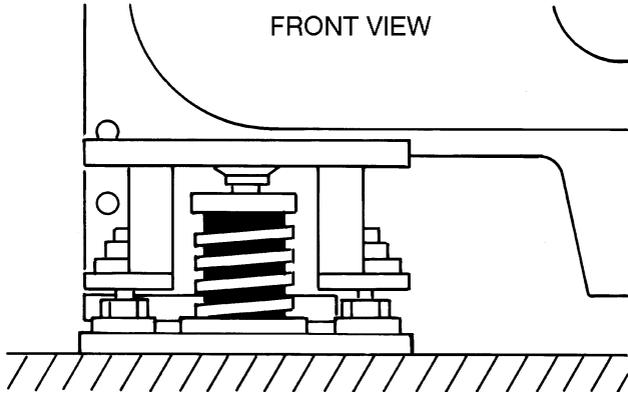
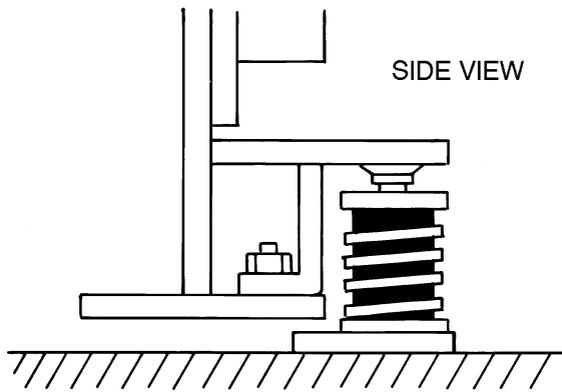
1. Dimensions in () are in millimeters.
2. Accessory (Carrier supplied, field installed) soleplate package includes 4 soleplates, 16 jacking screws and leveling pads. Requires accessory spring vibration isolation package.
3. Jacking screws to be removed after grout has set.
4. Thickness of grout will vary, depending on the amount necessary to level chiller. Use only pre-mixed non-shrinking grout, Celcote HT-648 or Master Builders 636, 0'-1 1/2" (38.1) to 0'-2 1/4" (57) thick.

Fig. 16 — Accessory Isolation



NOTE: The accessory spring vibration isolation package is supplied by Carrier for installation in the field.

Fig 17 — 23XL Accessory Spring Vibration Isolation (Shown With Accessory Soleplates)



NOTE: A field supplied and installed low profile isolation is suggested to keep operation height low.

Fig. 18 — Typical Low Profile Isolation Assembly (Field Supplied and Installed)

For adequate and long-lasting machine support, proper grout selection and placement is essential. Carrier recommends that only epoxy-type 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. Back jacking screws off leveling pads after grout has hardened.

INSTALL SPRING ISOLATION — Field-supplied spring isolators may be placed directly under machine support plates or located under machine soleplates. See Fig. 17. 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.

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. 19.

▲ 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 arrangement, offset pipe flanges to permit removal of waterbox cover for maintenance and to provide clearance for pipe cleaning. 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 information is shown in Fig. 20 and 21.

NOTE: Entering water is always the lower of the two 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 the 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 3/4-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. 20-25.

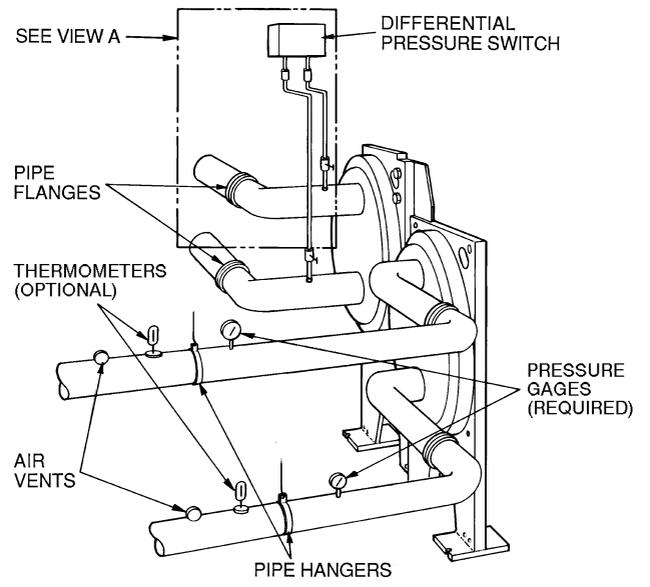
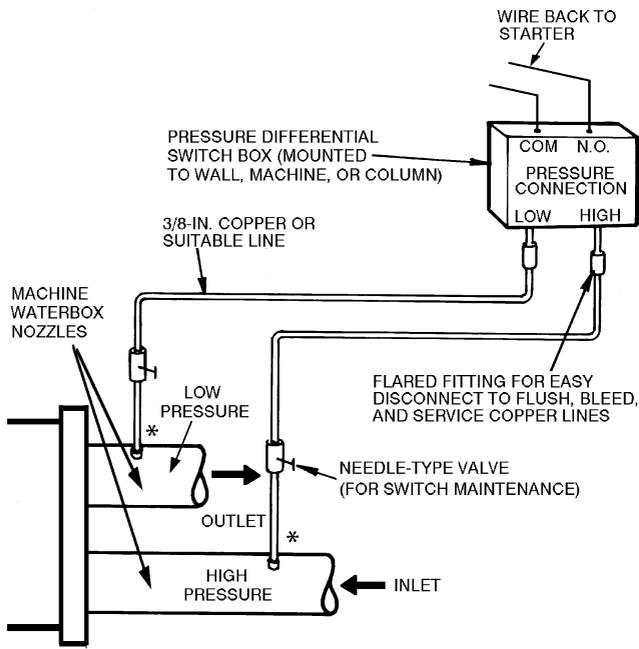
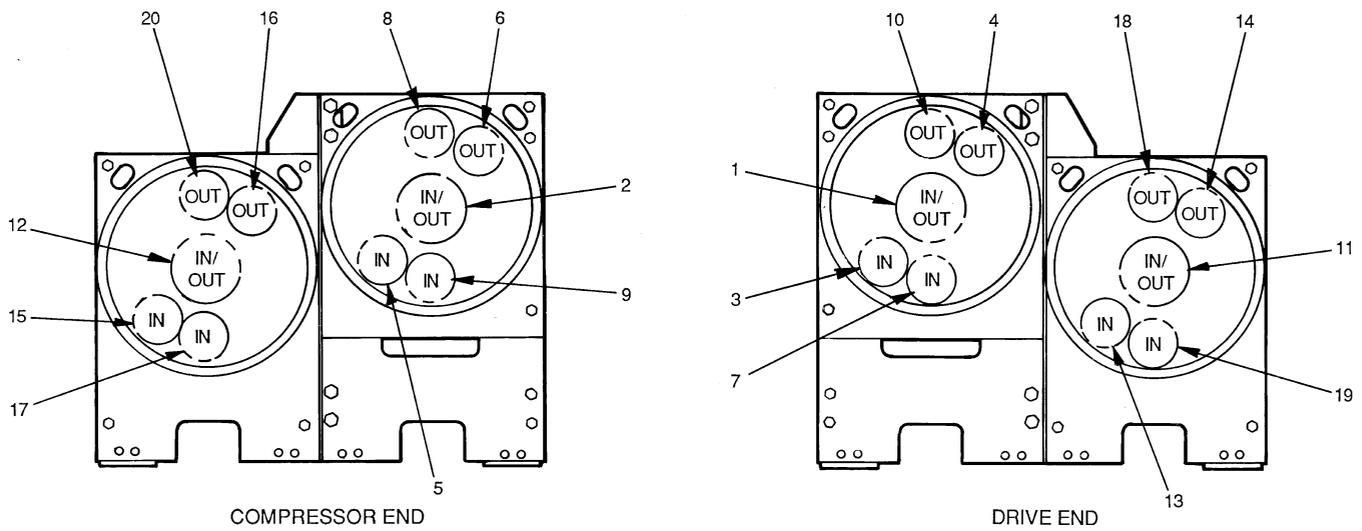


Fig. 19 — Typical Nozzle Piping



Cooler and Condenser Nozzle Arrangements

NOZZLE ARRANGEMENT CODES							
Cooler				Condenser			
Pass	In	Out	Code	Pass	In	Out	Code
1	1	2	A	1	11	12	J
	2	1	B		12	11	K
2	3	4	C	2	13	14	L
	5	6	D		15	16	M
3	7	8	E	3	17	18	N
	9	10	F		19	20	P

Waterbox Nozzle Sizes

FRAME	PASS	NOMINAL PIPE SIZE (in.)	ACTUAL PIPE ID (in.)
		Cooler and Condenser	Cooler and Condenser
1	1	6	6.065
	2	6	6.065
	3	6	6.065
2	1	8	7.981
	2	6	6.065
	3	6	6.065

LEGEND

ID — Inside Diameter

NOTE: All nozzles are nozzle-in-head (NIH) type with 150 psig (1034 kPa) ASA (American Standards Association) flanged connections.

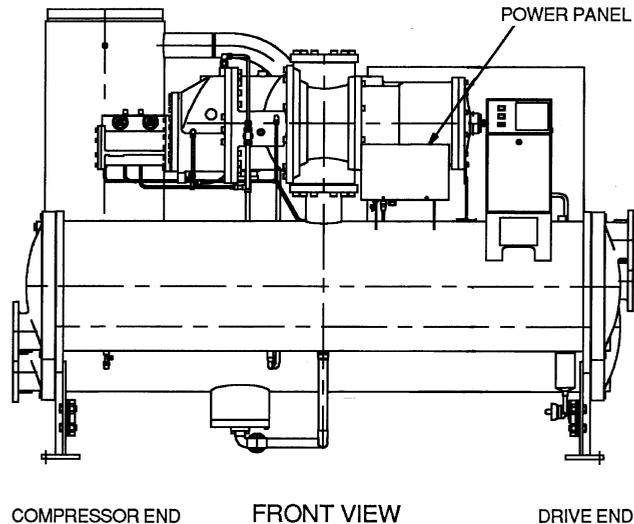
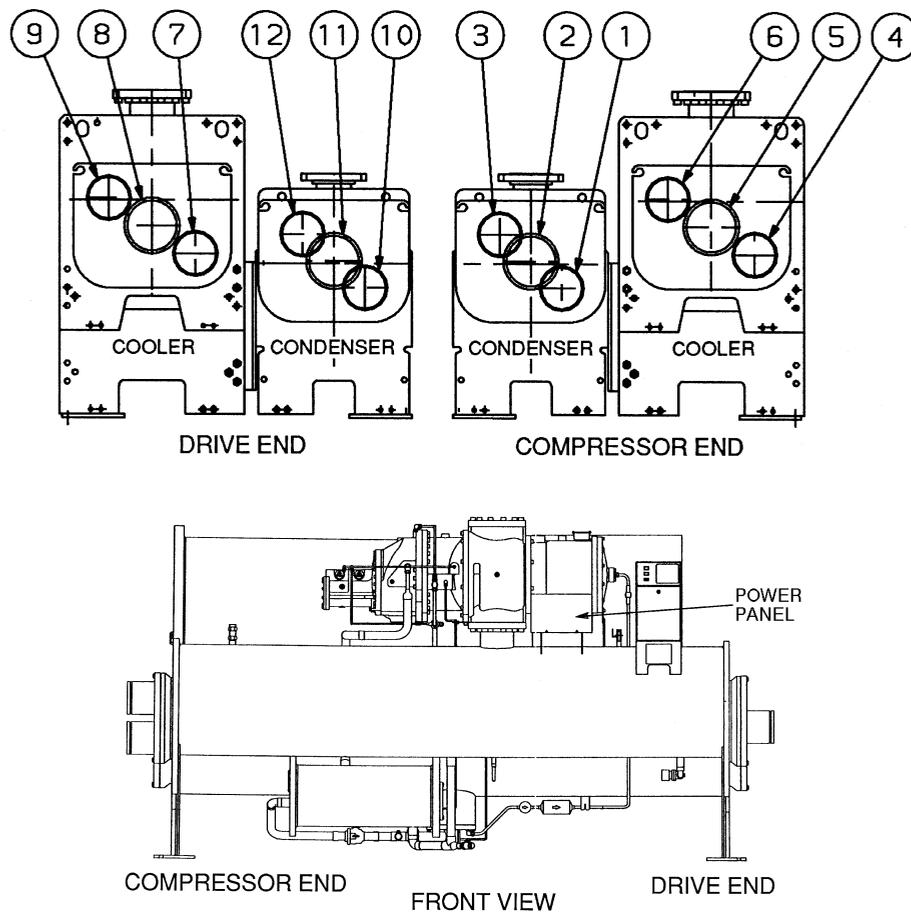


Fig. 20 — Piping Flow Data (Frame 1 and 2)



Cooler and Condenser Nozzle Arrangements

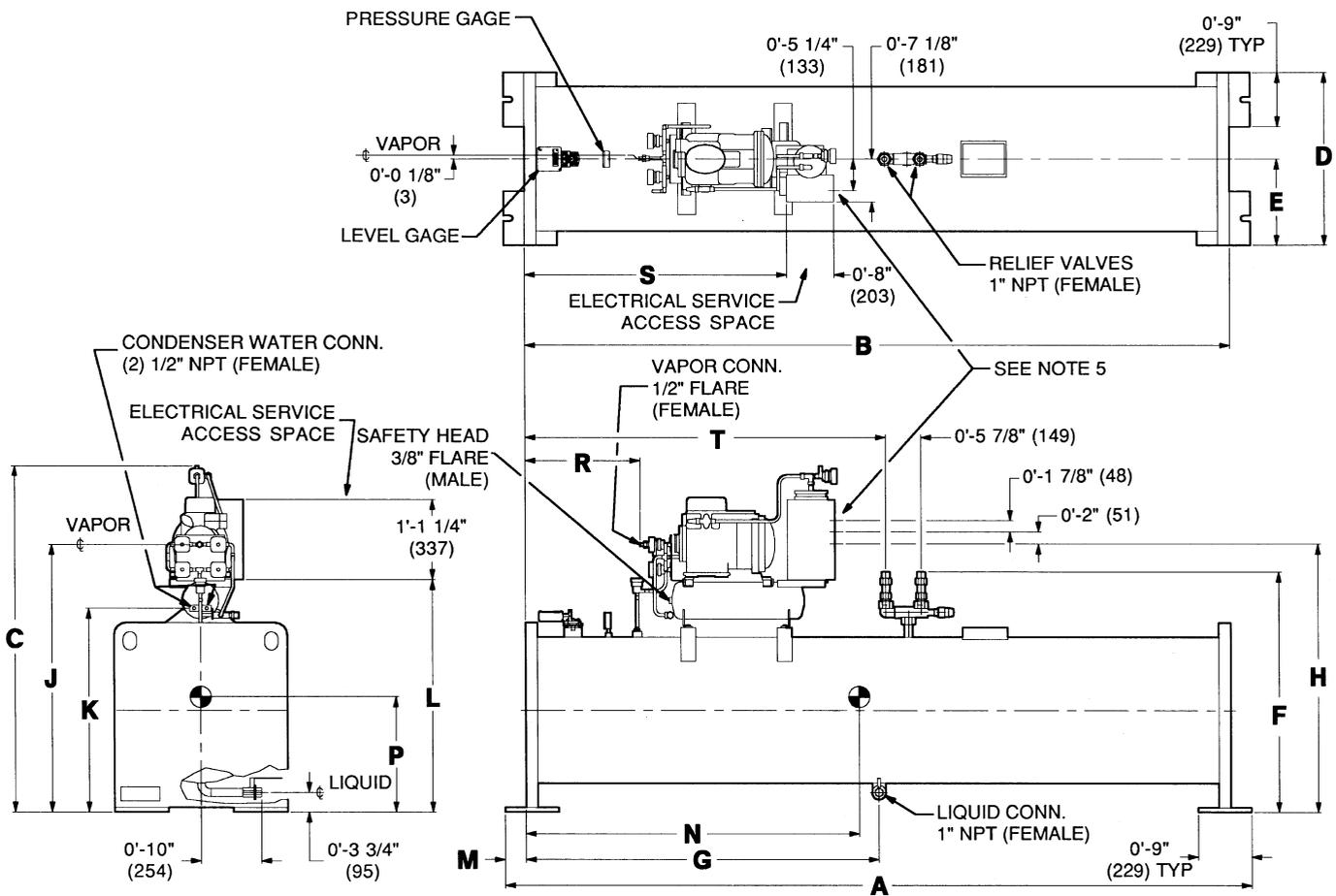
NOZZLE ARRANGEMENT CODES							
Cooler				Condenser			
Pass	In	Out	Code	Pass	In	Out	Code
1	8	5	A	1	11	2	P
	5	8	B		2	11	Q
2	7	9	C	2	10	12	R
	4	6	D		1	3	S
3	7	6	E	3	10	3	T
	4	9	F		1	12	U

Waterbox Nozzle Sizes

FRAME	PASS	NOMINAL PIPE SIZE (in.)	ACTUAL PIPE ID (in.)
		Cooler and Condenser	Cooler and Condenser
4*	1	10	10.020
	2	8	7.981
	3	6	6.065

*Frame 4 waterboxes are factory fabricated with bolt-on covers.

Fig. 21 — Piping Flow Data (Frame 4)



DIMENSIONS
ENGLISH (ft.-in.)

TANK SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T
0428	10- 5	9-10	4-9	2-4 ³ / ₄	1-2 ³ / ₈	3-1 ³ / ₁₆	4-11	3-8 ¹ / ₈	3- 8	2-9 ⁷ / ₁₆	3-2	0-3 ¹ / ₂	4-8 ³ / ₄	1-7 ⁷ / ₈	1-7 ⁹ / ₁₆	3-7 ³ / ₄	5-0 ¹ / ₄
0452	14-11 ¹ / ₄	14- 4 ¹ / ₂	5-0 ⁷ / ₈	2-8 ¹ / ₂	1-4 ¹ / ₄	3-4 ⁷ / ₁₆	7- 2 ¹ / ₄	4-0	3-11 ⁷ / ₈	3-1 ⁵ / ₁₆	3-5 ⁷ / ₈	0-3 ³ / ₈	7-1 ¹ / ₂	1-8 ³ / ₄	1-7 ⁹ / ₁₆	3-8	5-0 ¹ / ₂

SI (mm)

TANK SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T
0428	3175	2997	1448	730	365	945	1499	1121	1118	849	965	89	1442	505	491	1111	1530
0452	4553	4382	1546	826	413	1027	2191	1219	1216	948	1064	86	2172	528	497	1118	1537

NOTES:

- ⊙ Denotes center of gravity.
- Dimensions in () are in millimeters.
- The weights and center of gravity values given are for an empty storage tank.
- For additional information on the pumpout unit, see certified drawings.
- The available conduit knockout sizes are:

TRADE SIZE	QTY	LOCATION
1/2"	1	top
3/4"	1	bottom
1"	1	middle
1 1/4"	1	middle

LEGEND

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

RATED DRY WEIGHT AND REFRIGERANT CAPACITY
ENGLISH (lb)

TANK SIZE	TANK OD (in.)	DRY WEIGHT* (lb)	MAXIMUM REFRIGERANT CAPACITY (lb)			
			ASHRAE/ANSI 15		UL 1963	
			(HCFC-22)	(HFC-134a)	(HCFC-22)	(HFC-134a)
0428	24.00	2380	1842	1860	1704	1716
0452	27.25	3460	3527	3563	3264	3286

SI (kg)

TANK SIZE	TANK OD (mm)	DRY WEIGHT* (kg)	MAXIMUM REFRIGERANT CAPACITY (kg)			
			ASHRAE/ANSI 15		UL 1963	
			(HCFC-22)	(HFC-134a)	(HCFC-22)	(HFC-134a)
0428	610	1080	836	844	773	778
0452	592	1569	1600	1616	1481	1491

*The above dry weight includes the pumpout condensing unit weight of 210 lbs (95 kg).

Fig. 22 — Optional Pumpout System and/or Storage Tank

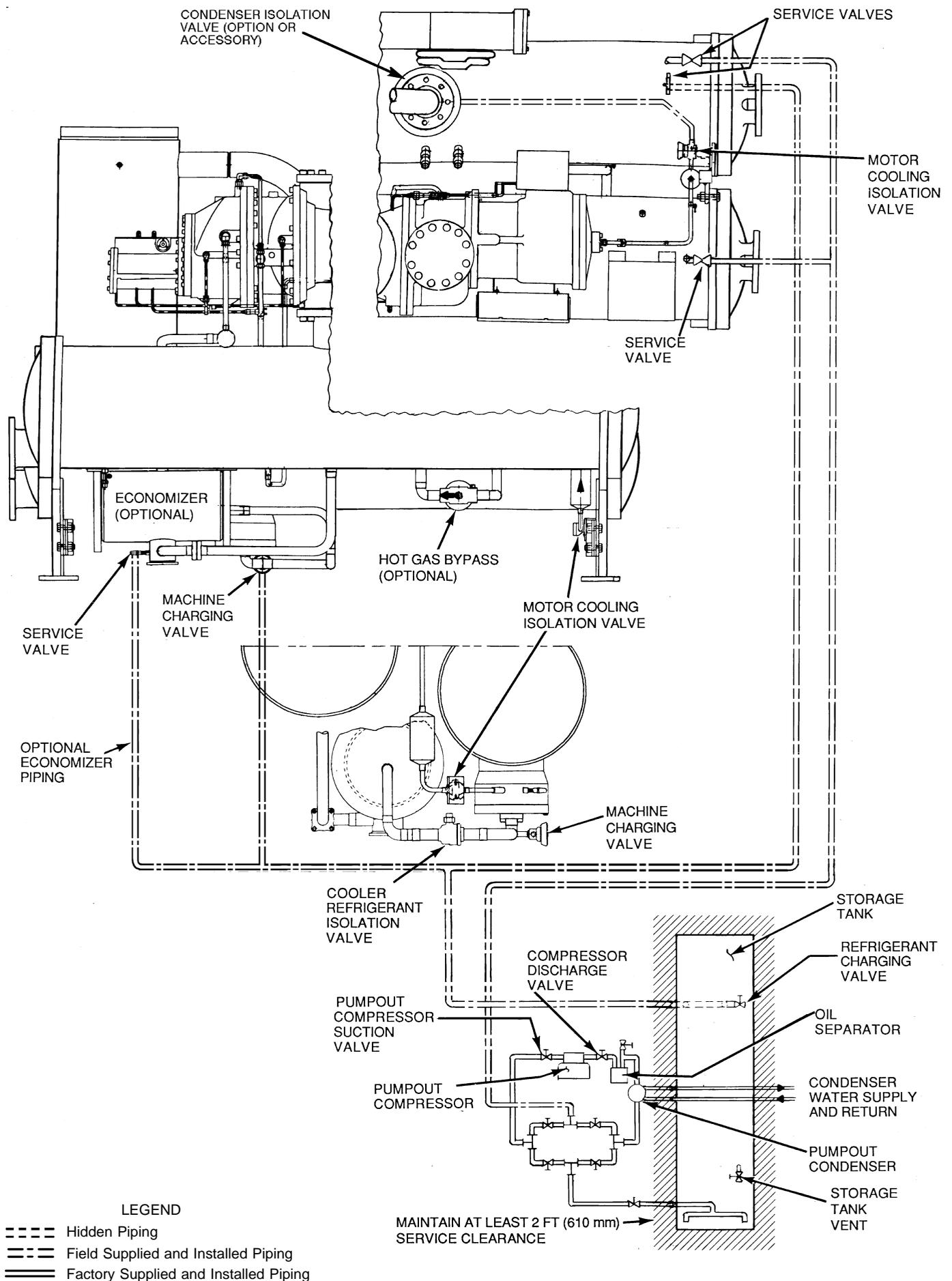


Fig. 23 — Typical Optional Pumpout System Piping Schematic with Storage Tank

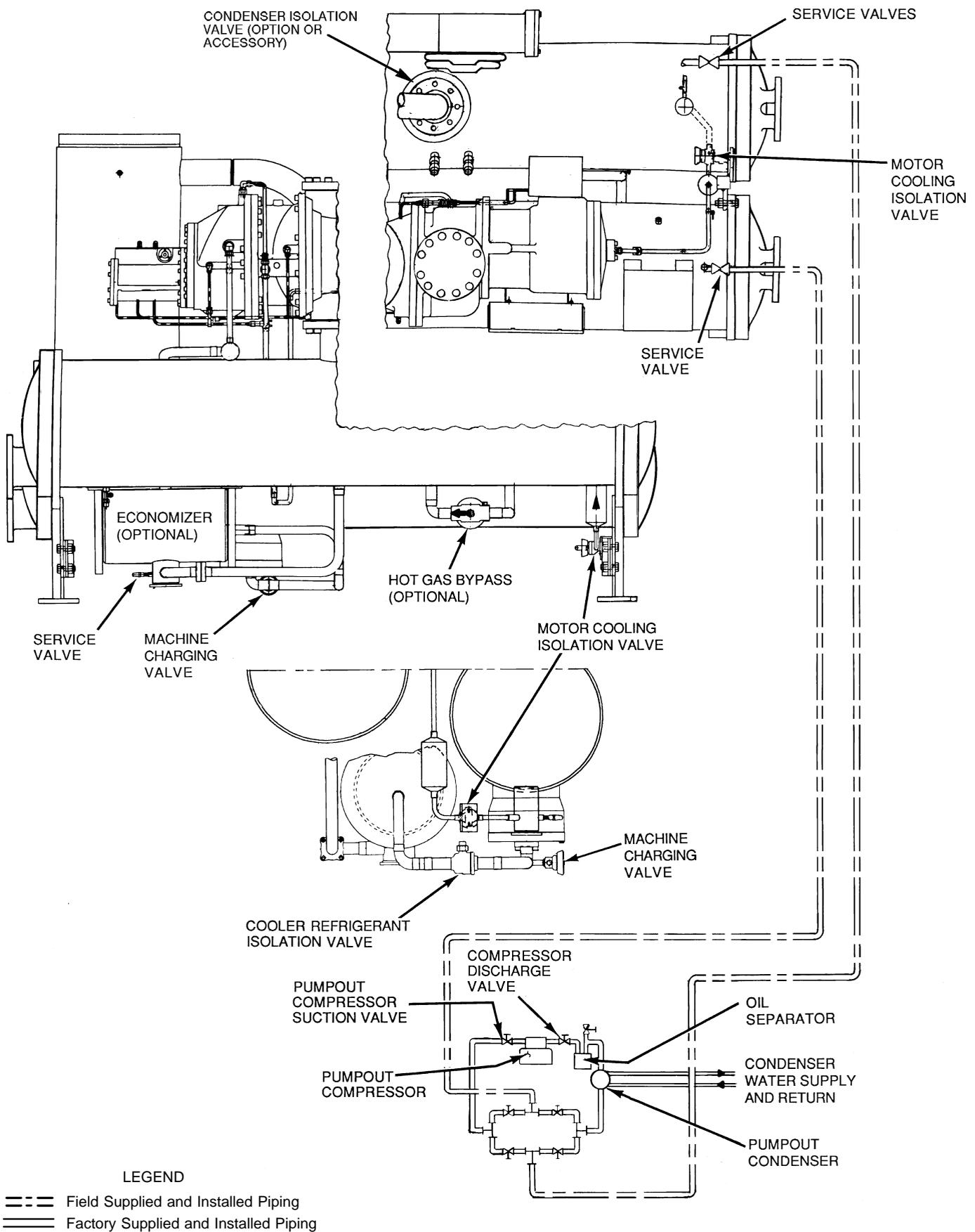


Fig. 24 — Typical Optional Pumpout System Piping Schematic without Storage Tank

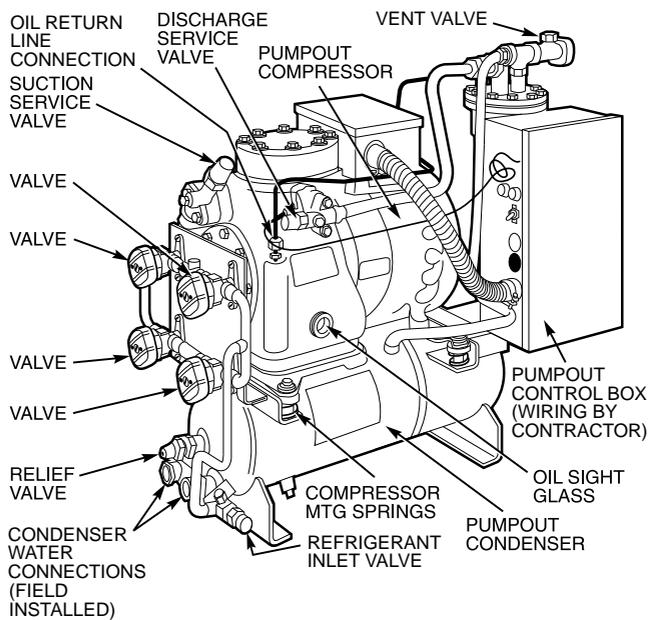


Fig. 25 — Pumpout Unit

INSTALL VENT PIPING TO RELIEF DEVICES — The 23XL chiller is factory equipped with relief devices on the cooler and condenser shells. Refer to Fig. 26 and Table 7. Vent relief devices to the outdoors in accordance with ANSI/ASHRAE-15 (latest addition) Safety Code for Mechanical Refrigeration and all other applicable codes.

To ensure relief valve serviceability and to fulfill ASHRAE 15, latest edition, 3-way valves and redundant relief valves are installed. See Fig. 26. Only one half of the total number of relief valves listed in Table 7 are in service at any time.

⚠ DANGER

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

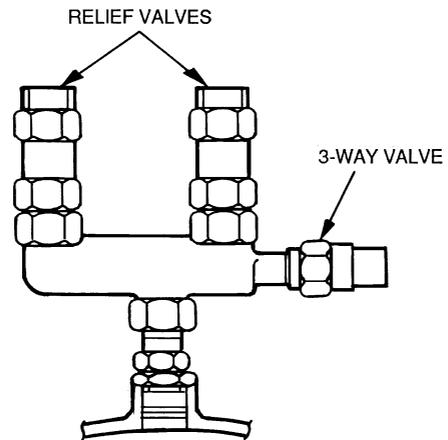
1. If relief devices are manifolded, the cross-sectional area of the relief pipe must at least equal the sum of the areas required for individual relief pipes.
2. Provide a pipe plug near outlet side of each relief device for leak testing. Provide pipe fittings that allow vent piping to be disconnected periodically for inspection of valve mechanism.
3. Piping to relief devices must not apply stress to the device. Adequately support piping. A length of flexible tubing or piping near the device is essential on spring-isolated machines.
4. Cover the outdoor vent with a rain cap and place a condensation drain at the low point in the vent piping to prevent water build-up on the atmospheric side of the relief device.

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

⚠ CAUTION

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

Wiring diagrams in this publication (Fig. 27-31) are for reference only and are not intended for use during actual installation; follow job specific wiring diagrams.



NOTE: The relief valve tree is available on all condensers. It is also applicable to Frame 4 machines with accessory isolation packages.

Fig. 26 — Typical 23XL Relief Valve Tree

Table 7 — Relief Device Locations

FRAME SIZE	LOCATION							
	Cooler		Condenser		Oil Separator		Storage Tank (Optional)	
	Qty	Size (in.)	Qty	Size (in.)	Qty	Size (in.)	Qty	Size (in.)
1 or 2	1	3/4 FPT	2	3/4 FPT	1*	1/2 FL	2	1 FPT
4	1	1 FPT	2	1 1/4 FPT	2*	3/4 FPT	2	1 FPT

LEGEND

FPT — Female Pipe Thread
FL — Flare

*Relief valve is only available when an optional (factory installed) or accessory (field installed) refrigerant isolation package is used.

⚠ WARNING

Do not attempt to start compressor 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. Additional spare sensors and Carrier Control Network modules may be specified as well. These are wired to the machine control center as indicated in Fig. 29-31.

⚠ WARNING

Connect only 24 v wiring to the control center.

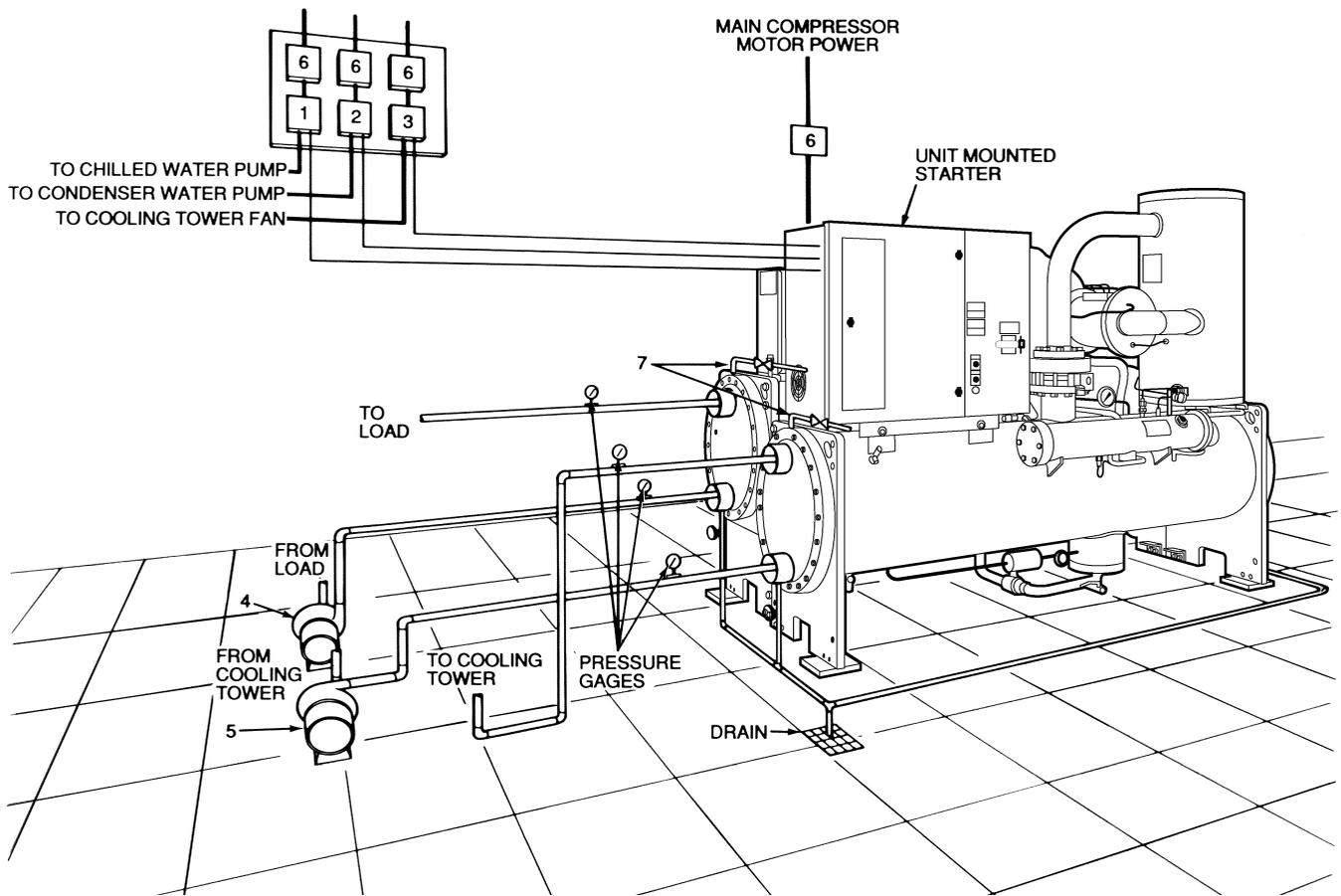
CONNECT CONTROL OUTPUTS — Connect auxiliary equipment, chilled and condenser water pumps, and spare alarms as required and indicated on job wiring drawings.

CONNECT STARTER — The 23XL is available with either a unit-mounted, factory-installed starter or a free-standing, field-installed starter (Fig. 27 and 28).

Unit-Mounted, Factory-Installed Starter — Attach power leads by connecting them from inside the starter cabinet to the line side circuit breaker terminals. Machines with electro-mechanical starters (wye-delta) will have a top hat shipped with the machine if the RLA is greater than 432 amps. The top hat is shipped in the knocked-down position and must be assembled and installed on top of the starter cabinet, over the line side circuit breaker. During assembly, remove the access plate and use it as the cover piece of the top hat. The top hat provides additional wire bending space to attach line side power leads to the circuit breaker within the starter. The solid-state starter does not require a top hat.

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.

Freestanding, Field-Installed Starter — Assemble and install compressor terminal box in desired orientation, and cut necessary conduit openings in conduit support plates. One side of the box has a 45 degree surface next to the 90 degree surface. This additional surface permits the power leads to enter the box at an angle which allows greater lead separation with less bending. In addition, the shape of the base of the terminal box is square with symmetrical screw holes on all sides. This permits the cover assembly of the box to be oriented on the base frame so that the 45 degree surface mentioned above can be positioned on the top, side or bottom for greater adaptation with respect to power lead entry direction. Attach power leads to compressor terminals in accordance with job wiring drawings, observing caution label in terminal box. While holding bottom terminal stationary, torque top nut to 10-15 ft/lb (13.6-20.3 Nm). While holding bottom terminal nut stationary, torque top nut down until washer is flat and dome portion is not recognizable (10-15 ft-lb). Use only copper conductors. The motor must be grounded in accordance with NEC, applicable local codes, and job wiring diagrams.



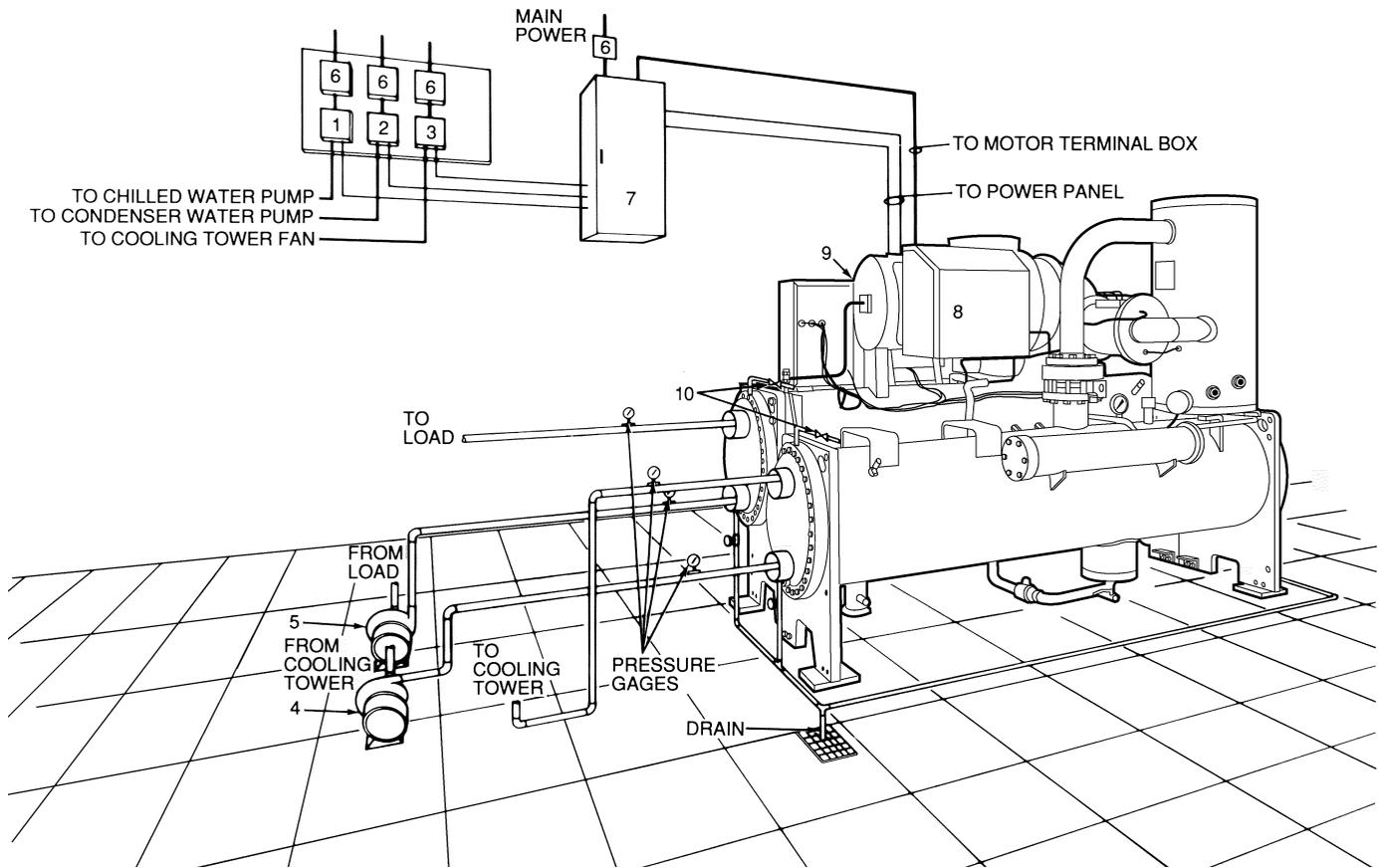
LEGEND

- 1 — Chilled Water Pump Starter
 - 2 — Condenser Water Pump Starter
 - 3 — Cooling Tower Fan Starter
 - 4 — Chilled Water Pump
 - 5 — Condenser Water Pump
 - 6 — Disconnect
 - 7 — Vents
- 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. 23XL machines should be installed using certified drawings.
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 alarm
 - optional safety device
 - 4 to 20 mA resets
 - optional remote sensors

Fig. 27 — Typical 23XL with Optional Unit Mounted Starter (Frame 1 and 2 Machines)



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 — Freestanding Compressor Motor Starter
- 8 — Compressor Motor Terminal Box
- 9 — Power Panel (Hidden)
- 10 — Vents
- 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. 23XL machines should be installed using certified drawings.
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 alarm
 - optional safety device
 - 4 to 20 mA resets
 - optional remote sensors

Fig. 28 — Typical 23XL with Free-Standing Starter (Frame 1 and 2 Machines)

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. Obtain insulation material from machine shipping package (located inside the motor terminal box) consisting of 3 rolls of insulation putty and one roll of vinyl tape.

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

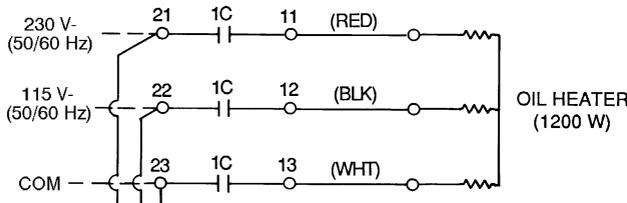
NOTE: Installer is responsible for any damage caused by improper wiring between starter and compressor motor.

→ **CONNECT POWER WIRE TO OIL HEATER CONTACTOR (FRAME 1 AND 2)** — Connect control power wiring between the oil heater contactor terminals (Fig. 29) and terminals LL1 and LL2 on the field wiring strip in the compressor motor starter. Refer to Fig. 29 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.

NOTE: The voltage selector switch in the machine power panel is factory set for 115 v control power source. When a 230 v control power source is used, set the voltage selector switch at 230 v.



LEGEND

- Field Wiring
- Power Panel Component Terminal

Fig. 29 — Oil Heater and Control Power Wiring Diagram (Frame 1 and 2 Machines)

CONNECT COMMUNICATION AND CONTROL WIRING FROM STARTER TO POWER PANEL — Connect control wiring from main motor starter to the machine power panel. All control wiring must use shielded cable. Also, connect the communications cable. Refer to the job wiring diagrams for cable type and cable number. Make sure the control circuit is grounded in accordance with applicable electrical codes and instructions on machine control wiring label.

⚠ CAUTION

The optional hot gas bypass valve is factory wired for 115 volts. If 230 v is used for control voltage, disconnect the red wire from the piggy-back terminal oil heater contactor terminal 23 and yellow wire from the piggy-back on pilot relay 3C terminal No. 4. Then connect the red and yellow wires together with a splice connector.

CARRIER COMFORT NETWORK INTERFACE — The Carrier Comfort Network (CCN) communication bus wiring is supplied and installed by the controls/electrical contractor (if required). The wiring 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. 30 for location of the CCN network connector (COMM1) on the processor module.

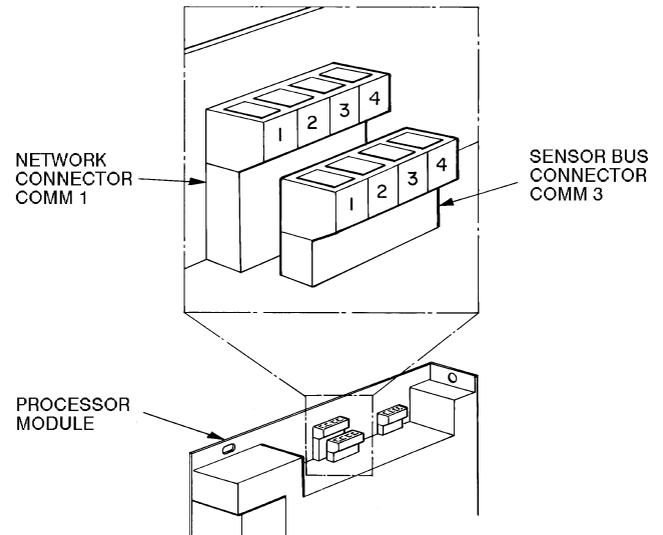


Fig. 30 — Carrier Comfort Network Communication Bus Wiring

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

To connect the 23XL chiller to the network, proceed as follows (Fig. 31):

1. Cut power to the PIC control center.
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. Mount a terminal strip in a convenient location.
9. Connect the opposite ends of each conductor to separate terminals on the terminal strip.

10. Cut another CCN wire and strip the ends of the conductors.
11. Connect the RED wire to the matching location on the terminal strip.
12. Connect the WHITE wire to the matching location on the terminal strip.
13. 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.

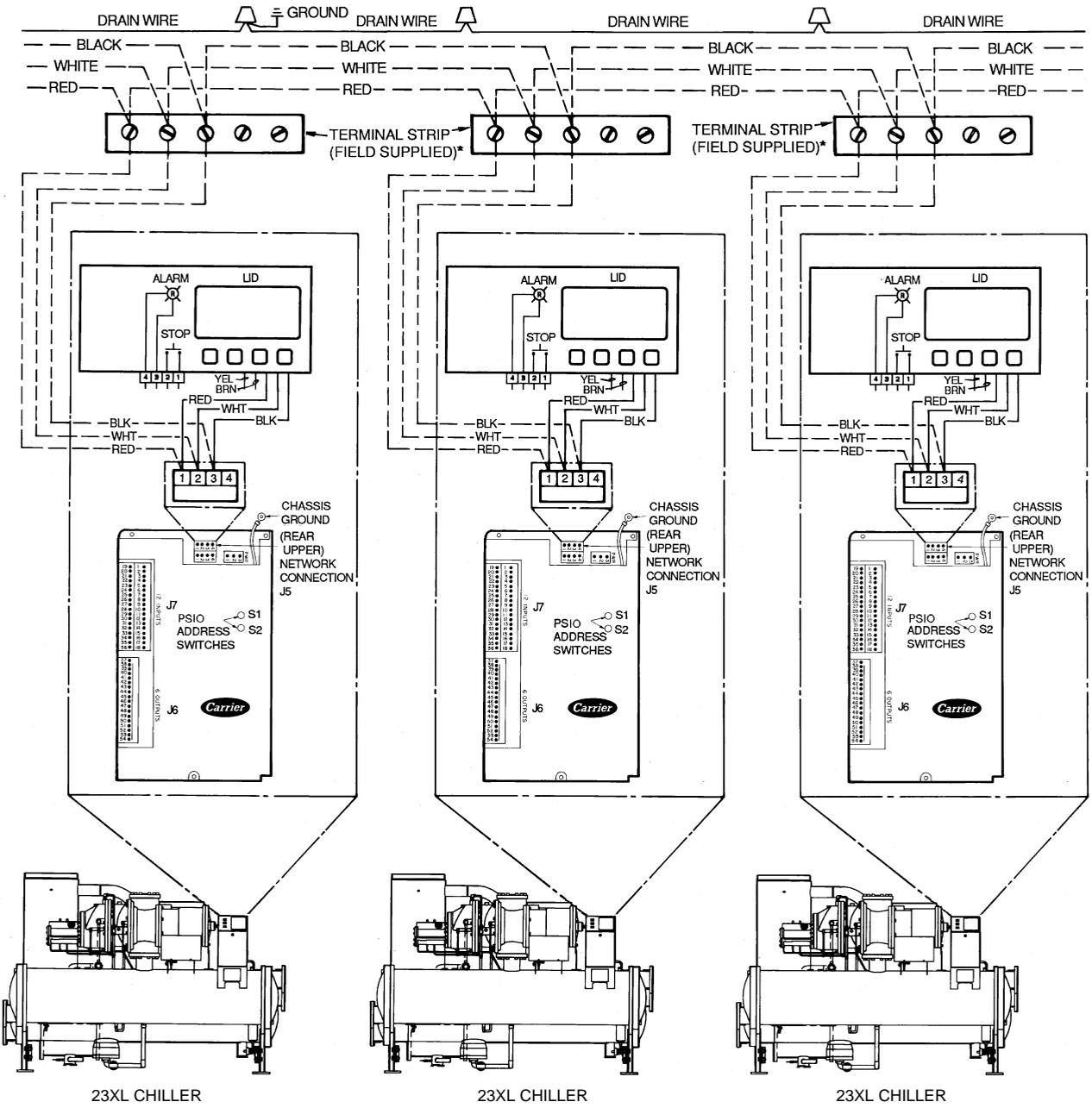
When installing insulation at the job site, insulate the following components:

- compressor motor
- cooler shell
- cooler tube sheets
- suction piping
- motor cooling drain
- oil reclaim piping (Frame 1 and 2 machines only)
- cooler liquid inlet piping
- hot gas bypass piping (if applicable)
- economizer and economizer piping (if applicable)

Insulation of the waterbox covers is applied only at the jobsite. When insulating the covers, make sure there is access for removal of waterbox covers for servicing (Fig. 32 and 33).

Depending upon humidity conditions, field insulation of the condenser's bottom half may be required when the machine is not operating.

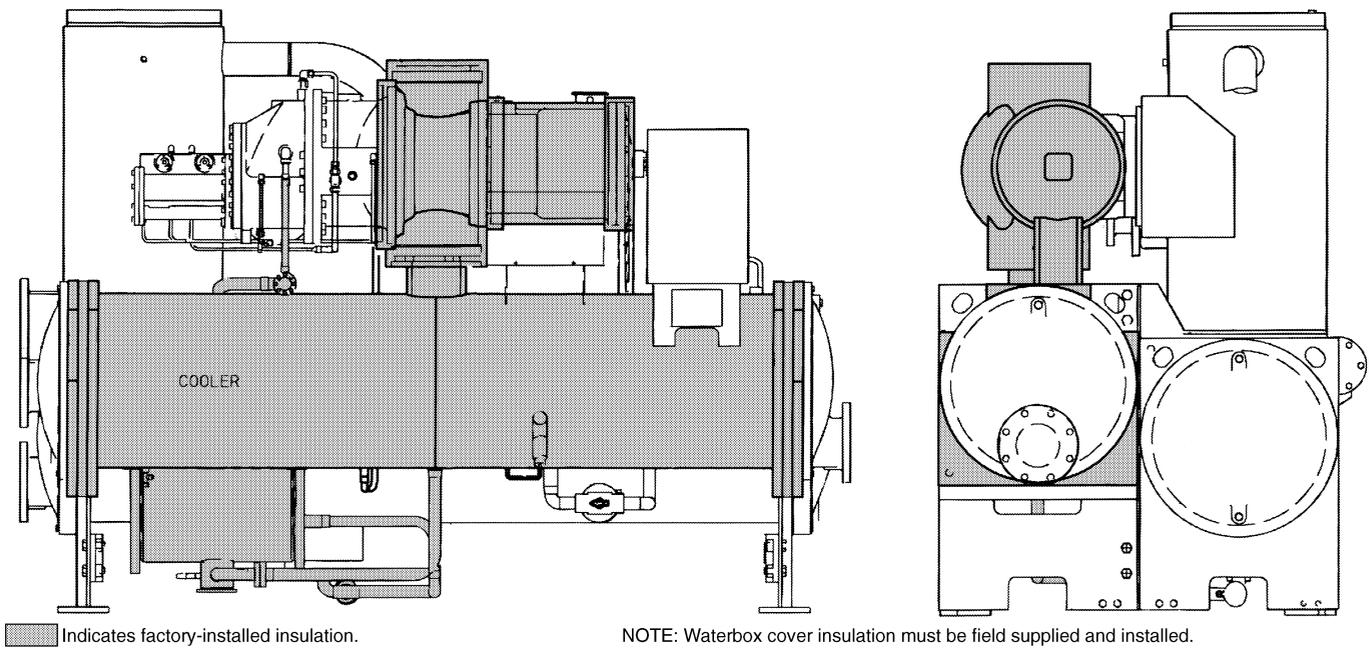
FACTORY-INSTALLED INSULATION (OPTIONAL) — Optional, factory-installed insulation is available for the evaporator shell and tube sheets, suction pipe, compressor motor, refrigerant lines, oil reclaim piping, hot gas bypass (if applicable), and economizer and economizer piping (if applicable). The insulation is 3/4-in. (19 mm) thick.



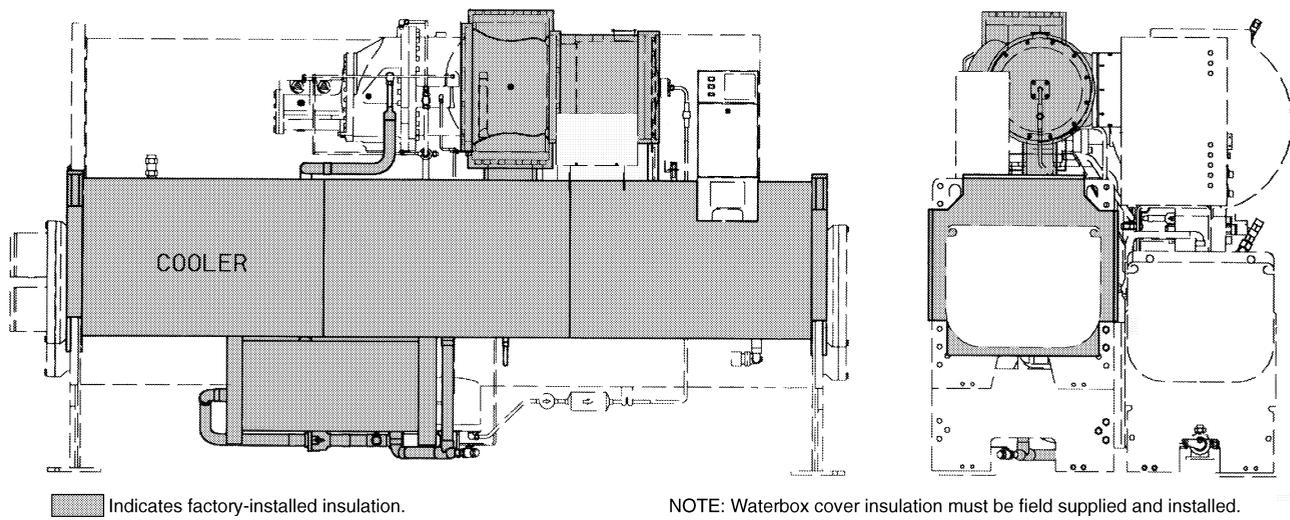
LEGEND
 ——— Factory Wiring
 - - - Field Wiring

*Field supplied terminal strip must be located in the control center.

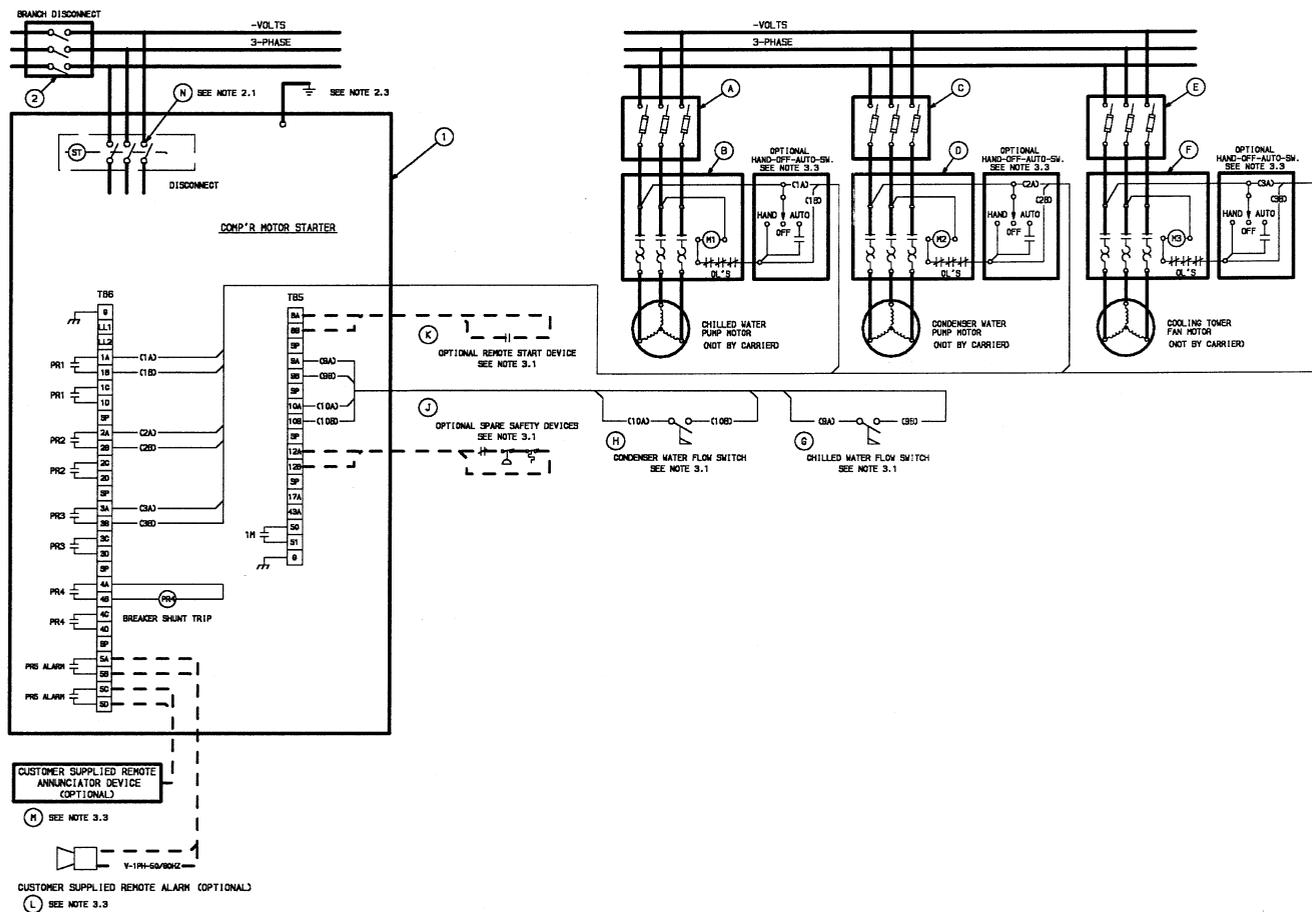
Fig. 31 — Typical COMM1 CCN Communication Wiring for Multiple Chillers



→ **Fig. 32 — 23XL Insulation Area for Frame 1 and 2 Machines**



→ **Fig. 33 — 23XL Insulation Area for Frame 4 Machines**



IMPORTANT: Refer to certified drawings for additional information. Certified drawings are available upon request.

LEGEND

- Required Power Wiring
- Required Control Wiring
- - - Options Wiring

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.

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. Solid-state starters are provided with:

- A. Two (2) 0-250 MCM lugs provided per phase for power conductor terminations when compressor motor RLA is 400 amps or less.
- B. Three (3), 250-500 MCM lugs provided per phase for power conductor terminations when compressor motor RLA is more than 400 amps.

Wye-Delta starters are provided with:

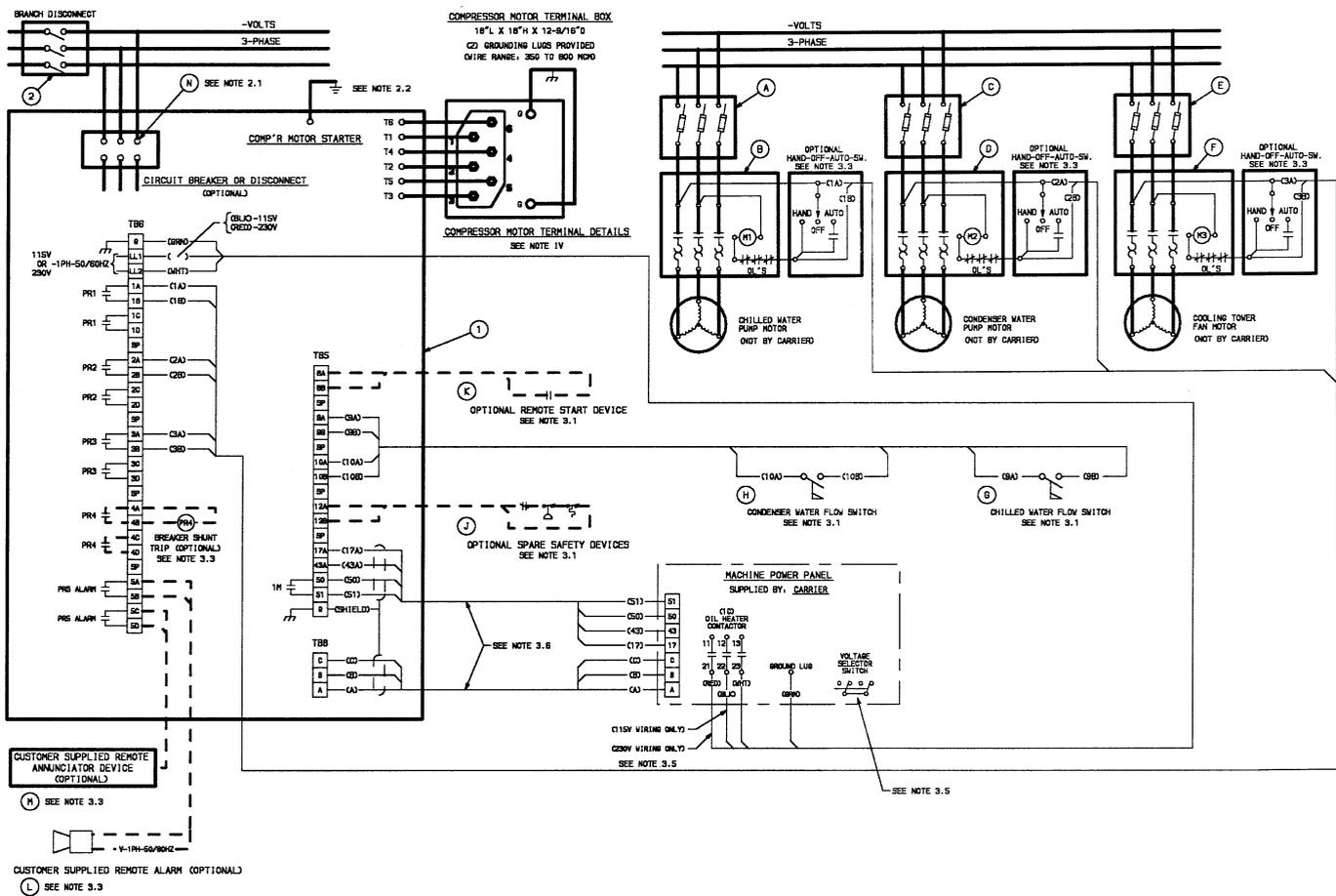
- A. Two (2) 250-500 MCM lugs provided per phase for power conductor terminations when compressor motor RLA is 420 amps or less.
- B. Two (2) #1-500 MCM lugs provided per phase for power conductor terminations when compressor motor RLA is more than 420 amps.

- 2.2 Power conductors to starter must enter through top of enclosure. Flexible conduit should be used for the last few feet to the enclosure to provide unit vibration isolation.
- 2.3 Compressor motor and controls must be grounded by using equipment grounding lugs provided inside starter enclosure.
- 2.4 Wye-Delta starters require the assembly and the installation of a "Top Hat" (located inside enclosure) to provide the required wire bending space for incoming power leads.

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. 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 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.

Fig. 34 — 23XL Typical Field Wiring with Optional Unit-Mounted Starter (Frame 1 and 2 Machines Shown)



IMPORTANT: Wiring shown is typical and **not** intended to show detail for a specific installation. Refer to certified field wiring diagrams for additional information. Certified drawings are available upon request.

LEGEND
 ——— Required Power Wiring
 ——— Required Control Wiring
 - - - - Options Wiring

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 (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. Max current is 60 ma, nominal current is 10 ma. Switches with gold plated biurcated 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 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 power source. When 230 v control power source is used, set switch to 230 v position.

- 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.

- 3.7 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) 1/2 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 2.73 inches. 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 these to 4, 5 and 6 in another.)
- 4.2 Compressor motor power connections can be made through top, bottom, or right side of compressor motor terminal box by rotating the terminal box and 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 rotation.
- 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 (2) Thomas and Betts pressure connectors for 350 to 800 MCM wire, supplied and located in the back upper and lower right side corners 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 back up wrench when tightening lead connectors to motor terminal studs. Torque to 10-15 lb-ft maximum.

→ **Fig. 35 — 23XL Typical Field Wiring with Free-Standing Starter (Frame 1 and 2 Machines Shown)**

INSTALLATION START-UP REQUEST CHECKLIST

Machine Model Number: 23XL 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. 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 heater/control wiring (if applicable)	_____	_____
c. 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:

CUT ALONG DOTTED LINE

