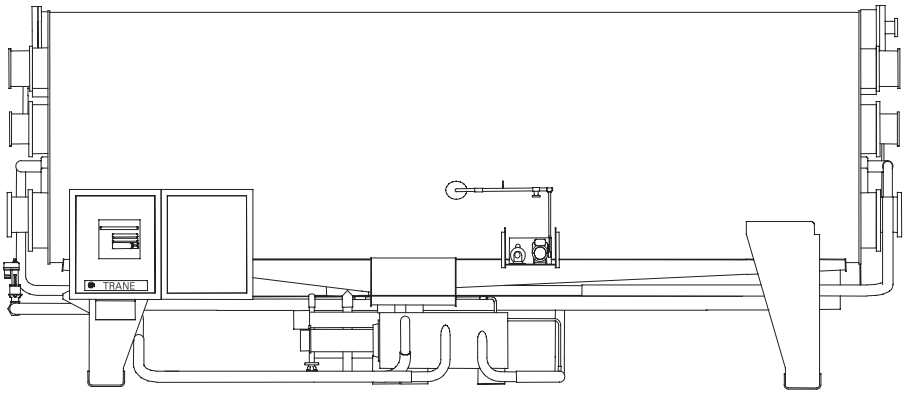
Installation

Single-Stage Absorption Chiller with Microprocessor Control Panel



Unit Models
ABSC-01B-04F

X3971005204

ABS-SVN01A-EN

Warnings and Cautions

Warnings and Cautions

Notice that warnings and cautions appear at appropriate intervals throughout this manual. Warnings are provided to alert installing contractors to potential hazards that could result in personal injury or death, while cautions are designed to alert personnel to conditions that could result in equipment damage.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

NOTICE: Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully.

⚠ **WARNING** – Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ **CAUTION** – Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

CAUTION – Indicates a situation that may result in equipment or property-damage-only accidents.

Literature Change History

ABS-IN-4A - May 1995
Revise Contractor's responsibility chart and prestart checksheet, update Tables 1, 3 & 8. Update Chart 8.

ABS-IN-4B - October 1997
Revise Figure 7 and revise text in steam supply piping. Added Table 5A. Add General External Wiring to Electrical Section.

Contents

Model Number Description

Digits 1 and 2: Unit
AB = Absorption Chiller

Digit 3: Type
S = Single-Stage

Digit 4: Development Sequence
C = Development Sequence

Digits 5, 6, 7: Unit Nominal Tonnage
011 = 112 Nom. Tons (393.7 KW)
012 = 129 Nom. Tons (453.6 KW)
014 = 148 Nom. Tons (520.3 KW)
017 = 174 Nom. Tons (611.8 KW)
020 = 200 Nom. Tons (703.2 KW)
022 = 228 Nom. Tons (801.7 KW)
025 = 256 Nom. Tons (900.1 KW)
029 = 294 Nom. Tons (1033.7 KW)
035 = 354 Nom. Tons (1244.7 KW)
038 = 385 Nom. Tons (1353.7 KW)
042 = 420 Nom. Tons (1476.7 KW)
046 = 465 Nom. Tons (1634.9 KW)

Digit 8: Unit Voltage
A = 200/60/3
E = 230/60/3
F = 460/60/3
G = 575/60/3
H = 190/50/3
J = 220/50/3
K = 380/50/3
L = 415/50/3
S = Special

Digit 9: Energy Source
L = Steam
W= Hot Water
H = Hi-Temp Hot Water
S = Special

Digit 10, 11: Design Sequence
JO = Pneu-Elec Control Panel
KO = UCP II Control Panel

Digit 12: Energy Pressure
1 = 12 PSIG (STEAM)
2 = 150 PSIG (HOTW-HTHW)
3 = 400 PSIG (HOTW-HTHW)
S = Special

Digit 13: Concentrator Tubes
A = .028 Wall CUNI 95/5
B = .035 Wall CUNI 95/5
C = .049 Wall CUNI 95/5
D = 028 Wall CUNI 90/10
E = .035 Wall CUNI 90/10
F = .049 Wall CUNI 90/10
G = .028 Wall CUNI 70/30
H = .035 Wall CUNI 70/30
J = .049 Wall CUNI 70/30
S = Special

Digit 14: Concentrator Construction
A = Standard Construction
B = ASME
C = ISPESL Construction
D = TUV Construction
S = Special

Digit 15: Concentrator Passes
A = 1 Pass Supply
B = 2 Pass Supply
C = 3 Pass Supply
D = 4 Pass Supply
S = Special

Digit 16: Concentrator Connection Size
B = 2 in. Flange (50.8 MM)
C = 2.5 in. Flange (63.5 MM)
D = 3 in. Flange (76.2 MM)
E = 3.5 in. Flange (88.9 MM)
F = 4 in. Flange (101.6 MM)
G = 5 in. Flange (127 MM)
H = 6 in. Flange (152.4 MM)
J = 8 in. Flange (203.2 MM)
K = 10 in. Flange (254 MM)
S = Special

Digit 17: Evaporator Tube Material
A = .022 Wall CU-NI 95/5
B = .028 Wall CU-NI 95/5
C = .035 Wall CU-NI 95/5
D = .049 Wall CU-NI 95/5
E = .022 Wall CU-NI 90/10
F = .028 Wall CU-NI 90/10
G = .035 Wall CU-NI 90/10
H = .049 Wall CU-NI 90/10
J = .022 Wall CU-NI 70/30
K = .028 Wall CU-NI 70/30
L = .035 Wall CU-NI 70/30
M = .049 Wall CU-NI 70/30
S = Special

Digit 18: Evaporator Waterbox Arr
A = 2 Pass 150 PSIG (1,034,250 PA)
B = 3 Pass 150 PSIG (1,034,250 PA)
C = 4 Pass 150 PSIG (1,034,250 PA)
D = 5 Pass 150 PSIG (1,034,250 PA)
E = 6 Pass 150 PSIG (1,034,250 PA)
F = 2 Pass 300 PSIG (2,068,500 PA)
G = 3 Pass 300 PSIG (2,068,500 PA)
H = 4 Pass 300 PSIG (2,068,500 PA)
J = 5 Pass 300 PSIG (2,068,500 PA)
K = 6 Pass 300 PSIG (2,068,500 PA)
S = Special

Digit 19: Condenser Tube Material
A = .022 Wall Copper
B = .028 Wall Copper
C = .035 Wall Copper
D = .049 Wall Copper
E = .022 Wall 95/5
F = .028 Wall 95/5
G = .035 Wall 95/5
H = .049 Wall 95/5
J = .022 Wall 90/10
K = .028 Wall 90/10
L = .035 Wall 90/10
M = .049 Wall 90/10
N = 0.22 Wall 70/30
P = .028 Wall 70/30
Q = .035 Wall 70/30
R = .049 Wall 70/30
S = Special

Digit 20: Condenser Water Connections
A = 1 Pass 150 PSIG (1,034,250 PA)
B = 2 Pass 150 PSIG (1,034,250 PA)
C = 1 Pass 300 PSIG (2,068,500 PA)
D = 2 Pass 300 PSIG (2,068,500 PA)
S = Special

Digit 21: Absorber Tube Material
A = .022 Wall CUNI 95/5
B = .028 Wall CUNI 95/5
C = .035 Wall CUNI 95/5
D = .049 Wall CUNI 95/5
E = .022 Wall CUNI 90/10
F = .028 Wall CUNI 90/10
G = .035 Wall CUNI 90/10
H = .049 Wall CUNI 90/10
J = .022 Wall CUNI 70/30
K = .028 Wall CUNI 70/30
L = .035 Wall CUNI 70/30
M = .049 Wall CUNI 70/30
S = Special

Digit 22: Absorber Water Connections
A = 2 Pass 150 PSIG (1,034,250 PA)
B = 3 Pass 150 PSIG (1,034,250 PA)
C = 4 Pass 150 PSIG (1,034,250 PA)
D = 2 Pass 300 PSIG (2,068,500 PA)
E = 3 Pass 300 PSIG (2,068,500 PA)
F = 4 Pass 300 PSIG (2,068,500 PA)
S = Special

Digit 23: Unit Options
A = Economizer Valve
0 = No Option

Digit 24: Unit Options
B = Orifice Flow
0 = No Option

Digit 25: Unit Options
D = Positive Concentration Limit
0 = No Option

Digit 26: Unit Options
E = Programmable Control Module
0 = No Option

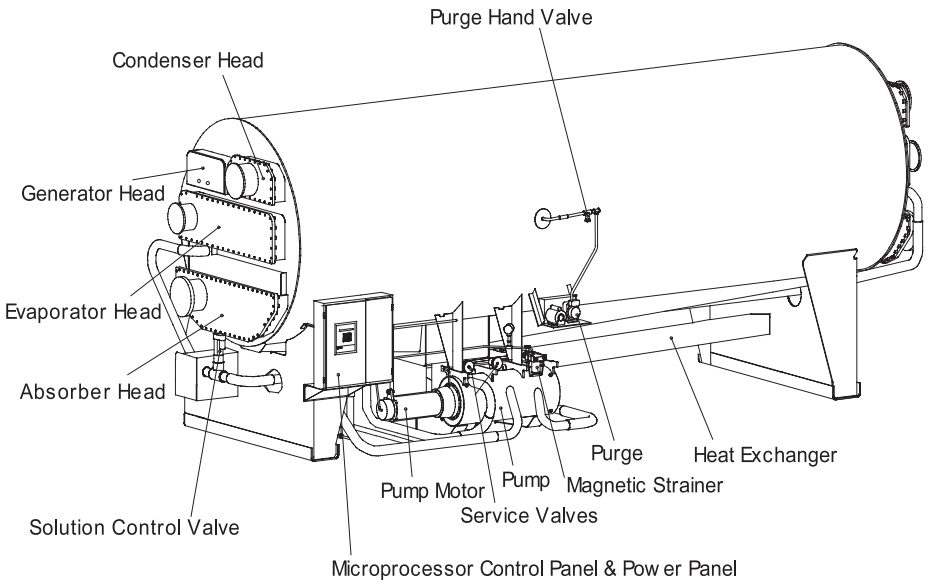
General Information

The information in this manual covers the installation of the Trane Single-Stage Absorption Chiller with the Electronic UCP-2 Control System. The instructions are intended to assist the contractor to rig, set, pipe, and wire the machine. All standard machines are fully assembled and vacuum tested prior to shipment.

The Trane Service Engineer will supervise the check-out of all controls at and the initial start-up. The lithium bromide charge ships to the jobsite in 30 gallon containers. Inhibitors used with the solution are shipped in the lithium bromide. The solution is charged into the machine by the Trane Service Engineer at the machine start-up.

Note: The lithium bromide inhibitor solutions used in other machines are not compatible with this machine.

Figure 1. Typical absorption chiller



General Information

Installation Responsibility Chart (Contractors List)

The purpose of the chart is to aid coordination of the machine installation. The chart indicates the responsibilities of the installing contractor and those of the Trane Company. Each item identifies responsibility for material procurement and material installation.

Contractors Reference List	Material by		Installation by	
Item	Trane	Other	Trane	Other
1. Inspection for Shipping Damage				x
2. Machine Foundation		x		x
3. All Machine Rigging Responsibility		x		x
4. Isolation Pads	x			x
5. Solution Charge	x		x	
6. Connection Piping:		x		x
7. Chilled Water Piping		x		x
8. Absorber/Condenser Water Piping		x		x
9. Steam Supply Piping		x		x
10. Condensate Drain Piping		x		x
11. Hot Water Piping		x		x
12. Auxiliary Water Piping		x		x
13. Rupture Disc Piping		x		x
14. Control Valve-Steam/Hot Water	x			x
15. Electrical Connections: Main Power		x		x
16. Control Sensors	x		x	
17. Remote Wiring		x		x
18. Piping Instrumentation (gauges):		x		x
19. Steam or Hot Water Pressure at Machine		x		x
20. Water Pressure In\Out Evap		x		x
21. Evaporator Flow Switch	x or	x		x
22. Water Pressure In/Out Absorber		x		x
23. Water Pressure In/Out Cond		x		x
24. Condenser Flow Switch	x or	x		x
25. External Optional Control Wiring		x		x
26. Machine Control Check Prestart	x		x	
27. Start-Up and Training	x		x	
28. Machine Insulation		x		x
29. All Water Flow Control Regulating Devices		x		x

General Information

Prestart Check Sheet

The pre-start check sheet must be completed by the installing contractor and submitted prior to requesting Trane service startup support. The check sheet identifies everything needed prior to actual machine start-up.

Absorption Prestart Check Sheet And Request For Serviceman

TO
Trane Service Agency:

Project Name:

1. Absorption Cold Generator
 - Isolator pads in place ☐
 - Unit installed ☐

2. Field Assembled Units
 - Unit assembled and welded per installation instructions ☐
 - Leak checked at 10 psig using dry nitrogen ☐
 - Evacuated to 2mm Hg ☐

3. Piping
 Chilled Water
 - Chilled water piping connected to:
  - Unit ☐
  - Air handling units ☐
  - Pumps ☐
 - Water supply connected for filling system ☐
 - System filled ☐
 - Air bleeds installed ☐
 - Chilled water pump run and air bled from system ☐
 - Strainers cleaned ☐
 - Flow switch installed ☐

 Cooling Water
 - Cooling water piping connected to:
  - Unit ☐
  - Pumps ☐
  - Cooling tower ☐
 - Make-up water connected to tower ☐
 - Water supply connected for filling system ☐
 - System filled ☐
 - Water treatment equipment operational ☐
 - Cooling water pump run and air bled from system ☐
 - Strainers cleaned ☐
 - Flow switch installed ☐

 Throttling Cocks Installed
 - Leaving chilled water ☐
 - Leaving cooling water ☐

Condensate Piping (Steam)
Condensate return system installed and operable

Steam Piping
Control valve installed ☐
Rated steam supply available ☐
Relief valve installed and vented ☐
PRV installed and operational if required ☐

4. Wiring
 - Power available to panel ☐
 - Flow switches connected (evap. and cond.) ☐
 - Steam/Hot water valve wired ☐

Motors Connected
 - Chilled water pump ☐
 - Cooling water pump ☐
 - Ht. Hw. concentrator pump ☐
 - Cooling tower fan ☐
 - Cooling tower fan rotation ok'd ☐

Power available for an auxiliary vacuum pump (110V AC) ☐

All external controls installed and connected (chilled water, condenser water, remote communication & alarm) ☐

All magnetic starters installed and connected (except in unit panel) ☐

5. Solution on job site and located at machine: ☐
 - Lithium bromide solution ☐
 - Purge pump oil ☐
 - Distilled water ☐
 - Additive ☐

6. Gauges and Thermometers (optional):
 - Gauges and thermometers (optional) installed on both sides of evaporator ☐
 - Gauges and thermometers (optional) installed on both sides of concentrator absorber and on condenser outlet ☐
 - Gauge installed on steam header (0-200 psig) ☐

7. Load
 - System can be operated under 75% to 100% load conditions ☐

8. Manpower
 - Electrician, control man and contractor's representative are available to charge and test under supervision of Trane Service Engineer ☐

IMPORTANT

This is to certify that the Absorption unit(s) has been properly and completely installed and the applicable items listed above have been completed.

Additional time required to complete the start-up and adjustment due to incompleteness of the installation will be invoiced at prevailing rates.

Request date of start-up: _____
Advance notification is required to allow scheduling of the start-up as close to the requested start-up date as possible.

Check list completed by: _____

Signed: _____ Date: _____

General Information

Caution:

Do not remove the protective covers on the pipe openings until the water pipes are connected. All valves connected to the vacuum side of the machine should remain closed to protect the internal portions of the machine, until the Trane service engineer is available to supervise the start-up.

Loose Parts

Table 1 is a list of loose parts shipped with each Absorption machine. This list may vary slightly by model and options provided.

Storage

External openings of all components are covered to prevent the entry of dirt and foreign matter during shipment and handling.

When a unit is to be stored outside, protective component coverings should be left intact and the unit covered with a light tarpaulin. Do not use plastic because it will draw and hold moisture which will promote rust. All units stored for an extended period of time, indoors or outdoors, must be completely covered.

It is recommended that the loose parts box be stored in a dry and secure location to prevent loss or damage.

Table 1. Loose parts box

Standard Items:	Location	Quantity
(1) Isolation Pad Material	Strapped to Heat Exchanger	2
(2) Solution Additive	Strapped to Heat Exchanger	1 or more Gallons
(3) Purge Pump Oil	Box on Heat Exchanger	1 Quart
(4) Information Packet Including: • Installation Manual • Operation/Maintenance Manual • Assembly Drawing • Wiring Diagram • Piping Diagram • Print (For Isolation Pads) • Startup Check List	Control Panel-	1 Packet
(5) Outdoor Air Temp Sensor (Furnished when ambient based chilled water reset is specified)	Box on Heat Exchanger	1

* Energy valve BPI connector and wire are coiled up and located in loose parts box.

Nameplate

The Absorption (ABSC) unit nameplate is located on the left side of the unit control panel (UCP). A typical unit nameplate is illustrated on this page for your convenience.

TRANE

ABSORPTION COLD GENERATOR
ABSORPTION LIQUID CHILLER - SINGLE STAGE

CATALOG MODEL NO: ABSC385
SERVICE MODEL NO: ABSC038FLK01AAAFACBAABA0D
SERIAL NO: L93L11656

MAXIMUM CONC INPUT: 348 F 14 PSIG STEAM

ELECTRICAL CHARACTERISTICS:
MAXIMUM FUSE SIZE: 20
MINIMUM CIRCUIT AMPACITY: 14
PUMP OVERLOAD KW: 8.3
TRANSFORMER: .75 KVA

	HP	VOLTAGE	PH	HZ	LRA	FLA
PURGE MOTOR:	.25	115	1	60	23	4.2
PUMP MOTOR:	7.5	460	3	60	58	10.5

SERVICE LITERATURE: INSTALLATION ABS-IN-4
OPERATION ABA-M-4

MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING US PATENTS:

2959931-2983117-2986906-3002359-3005318
3120113-3122002-3126720-3195318-3212570
3264835-3296823-3357202-3553977-3575008
3590593-3604216-3609086-3626710-3626711

PRODUCT DESCRIPTION:

MODL ABSC	DSEQ K0	NTON 385
VOLT 460	HRTZ 60	CNIF UCP2
COPT FDS	ENSR STM	ENPR 12
AGLT NONE	CNTY STD	CNTM SB95
CNTH 28	CNCP 1	CNCS 4
EVTY STD	EVTM SB95	EVTH 22
EVCO FLNG	EVPR 150	EVWP 4
EVWA RERE	CDTY STD	CDTM SBCU
CDTH 28	CDCO FLNG	CDPR 150
CDWP 1	CDWA END	ABTY STD
ABTM SB95	ABTH 22	ABCO FLNG
ABPR 150	ABWP 3	ABWA END
SPKG DOMT	UNOP SEP	OPTI ECON
OPTI PCL	ACCY TV24	

Installation

Receiving

When the unit is delivered, inspect it for any transit damage. Report any damage to the carrier and note on the bill of lading. File all damage claims with the carrier. Trane should be called in, not to accept responsibility for the damaged machine, but to assist in any corrective action. Contact the Trane Sales Engineer for help in correcting any unusual conditions.

Material Shortage

When the machine is delivered, check the information on the delivery receipt against the packing slip. If the shipment is short, note this on the carrier's delivery slip and be as specific as possible about what is missing. Check to insure that the correct amount of lithium bromide solution, shipped separately, was delivered undamaged. The local Trane Sales Office should also be notified about any material shortages.

Unit Location

The machine foundation must be within 1/16" of level on machine length, and on width, and have sufficient structural strength to support the unit weight. Table 2 Illustrates shipping, operating, and floor weights.

Note: *Operating weight is defined as the water boxes and tubes filled with water, and the lithium bromide and water are charged.*

Table 2. Shipping, operating, and floor weights

Machine Size ABSC	Shipping Weight (LBS)	Shipping Weight Kilograms	Operating Weight (LBS)	Operating Weight Kilograms	Floor Loading (PSI)	Floor Loading Pascals	Clearance Dimension "A" *Fig.-2	Clearance *Dim. "A" Millimeters
112	8,900	4,037	11,260	5,108	30	206850	130"	3,302
129	9,000	4,082	12,300	5,579	33	227,535	148"	3,759
148	10,000	4,536	13,440	6,096	36	248,220	166"	4,216
174	11,000	4,990	15,100	6,849	39	268,905	147"	3,734
200	12,000	5,443	16,350	7,416	42	289,590	168"	4,267
228	12,300	5,579	18,150	8,233	47	324,065	188"	4,775
256	15,000	6,804	19,150	8,686	37	255,115	167"	4,242
294	16,000	7,258	22,920	10,397	44	303,380	189"	4,801
354	17,000	7,711	24,700	11,204	47	324,065	224"	5,690
385	19,600	8,891	27,800	12,610	47	324,065	189"	4,801
420	22,000	9,979	30,300	13,744	51	351,645	224"	5,690
465	22,500	10,206	32,250	14,629	55	379,225	224"	5,690

* Ref. Figure-2 — Clearance at one end. Clearance at other end - 36" (914 mm) — clearance at front - 36" (914 mm) and clearance at back - 24" (610 mm)

Installation

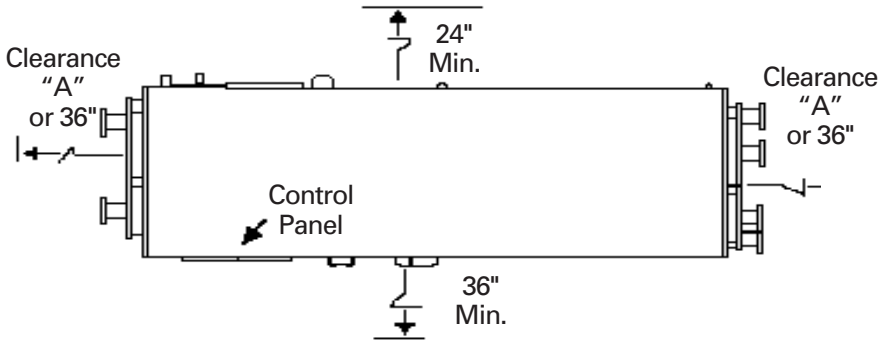
Clearances
(See Figure 2 and Table 2)

Provide sufficient clearance on all sides of the machine for service and maintenance. Pay particular attention to the control panel door clearance and to the clearance at one end of the machine for tube replacement. Figure 2 and Table 2 Illustrates the minimum recommended machine clearances for normal service and tube replacement.

The minimum recommended clearance requirements are:
a. Clearance "A" shown in the last column of Table 2 and in Figure 2 to be provided at one end of the unit for tube removal.
b. Allow 36 inches (914 mm) at the opposite end of the unit for water box entry.
c. Allow 36 inches (914 mm) at the front or control panel side and 24 inches (610 mm) at the rear of the unit.

Do not run wiring or piping across the front or panel side of the unit where most service is performed (The front is that side on which the control panel is mounted.)

Figure 2. Minimum Clearance Top View

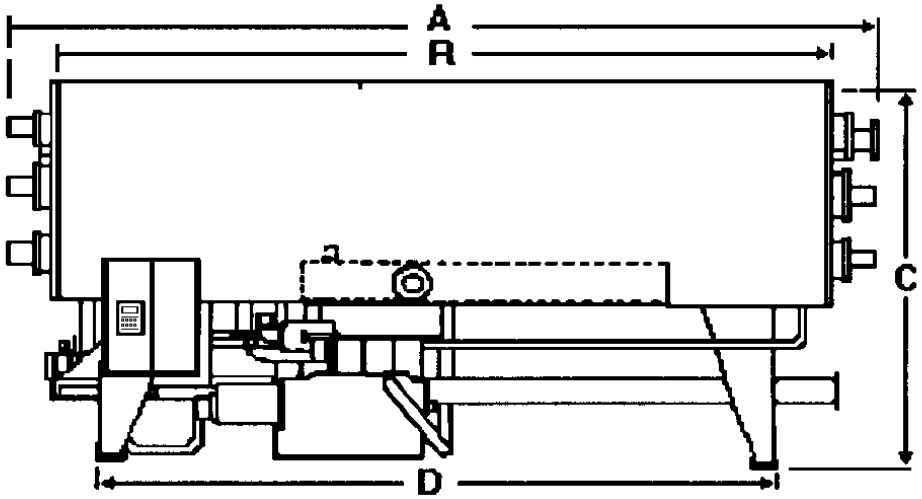


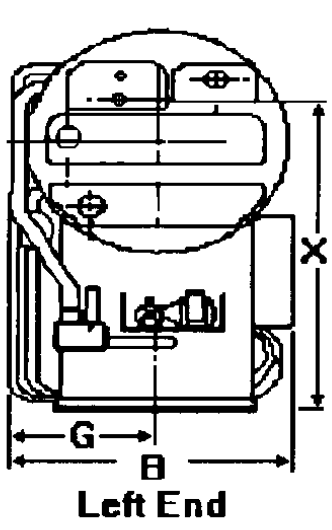
Note: Clearance "A" defined in Table 2 required one end only.

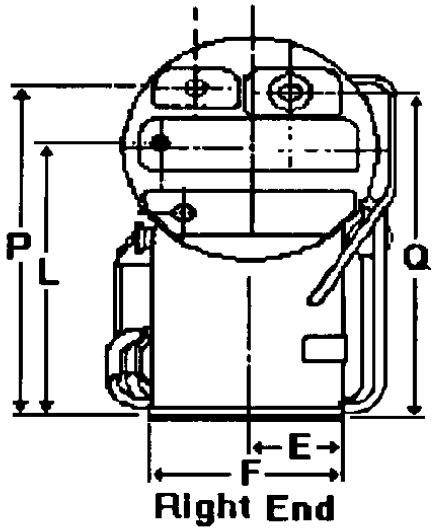
Installation

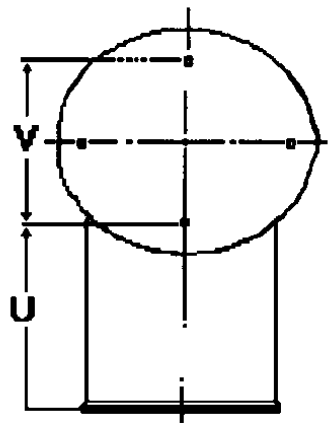
Unit Roughing In Dimensions

Figure 3. Roughing-in dimensions (Reference Table 3)









Installation

Table 3. Unit roughing-in dimensions. Dimensions listed in Inches

Unit ABSC	A	B	C	D	E	F	G	L	P	Q	R	U	V	X
112	133	70	87	95	20	40	29	62	76	74	115	44	33	71
129	150	70	87	112	20	40	29	62	76	74	132	44	33	71
148	169	70	87	131	20	40	29	62	76	74	151	44	33	71
174	150	73	92	105	21	41	33	65	81	76	132	44	38	75
200	169	73	92	124	21	41	33	65	81	76	151	44	38	75
228	192	73	92	147	21	41	33	65	81	76	174	44	38	75
256	173	77	98	120	25	46	37	67	83	79	151	44	42	77
294	196	77	98	142	25	46	37	67	83	79	175	44	42	77
354	231	77	98	177	25	46	37	67	83	79	209	44	42	77
385	199	85	106	143	25	50	41	71	88	87	174	45	46	82
420	234	85	106	178	25	50	41	71	88	87	209	45	46	82
465	234	85	106	178	25	50	41	71	88	87	209	45	46	82

* All dimensions approximate. Certified prints on request.

** Even pass evaporator and absorbers have both water connections on the same end.

*** Clearance at one end. Clearance at other end - 36" - clearance at front - 36" - clearance at back - 24"

Table 3. Unit Roughing-In Dimensions (continued). Dimensions in Millimeters (mm)

Unit (ABSC) Size and Kilowatts	A	B	C	D	E	F	G	L	P	Q	R	U	V	X
112/393.7	3378	1778	2210	2413	508	1016	737	1575	1930	1880	2921	1118	838	1803
129/453.6	3810	1778	2210	2845	508	1016	737	1575	1930	1880	3353	1118	838	1803
148/520.3	4293	1778	2210	3327	508	1016	737	1575	1930	1880	3835	1118	838	1803
174/611.8	3810	1854	2337	2667	533	1041	838	1651	2057	1930	3353	1118	965	1905
200/703.2	4293	1854	2337	3150	533	1041	838	1651	2057	1930	3835	1118	965	1905
228/801.7	4877	1854	2337	3738	533	1041	838	1651	2057	1930	4420	1118	965	1905
256/900.1	4394	1956	2489	3048	635	1168	940	1702	2108	2007	3835	1118	1067	1956
294/1033.7	4978	1956	2489	3607	635	1168	940	1702	2108	2007	4445	1118	1067	1956
354/1244.7	5867	1956	2489	4496	635	1168	940	1702	2108	2007	5309	1118	1067	1956
385/1353.7	5055	2159	2692	3632	635	1270	1041	1803	2235	2210	4420	1143	1168	2083
420/1476.7	5944	2159	2692	4521	635	1270	1041	1803	2235	2210	5309	1143	1168	2083
465/1634.9	5944	2159	2692	4521	635	1270	1041	1803	2235	2210	5309	1143	1168	2083

* All dimensions approximate. Certified prints on request.

** Even pass evaporator and absorbers have both water connections on the same end.

*** Clearance at one end. Clearance at other end - 914 mm - clearance at front - 914 mm - clearance at back - 610 mm.

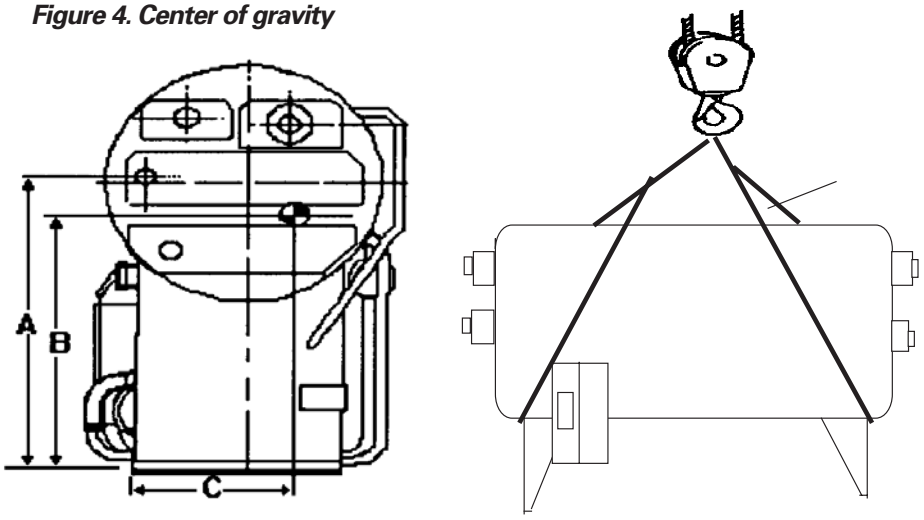
Installation

Rigging

Factory assembled machines ship without skids or pallets.

IMPORTANT: When locating slings, be sure they are not bearing on external piping or equipment. Slings must be adjusted to compensate for center of gravity as indicated in Figure 4.

Figure 4. Center of gravity



	Center of Gravity					
	A		B		C	
Model	Inches	MM	Inches	MM	Inches	MM
112-148	61.5	1562	51	1295	19.5	495
174-228	64	1626	54	1372	21	533
256-354	67	1702	57	1448	24	610
385-465	71.25	1810	62	1575	25.5	648

Notes:

1. ⊕ Indicates approximate center of gravity.
2. Lifting devices must be capable of lifting shipping weight of particular unit size, with adequate safety factor.

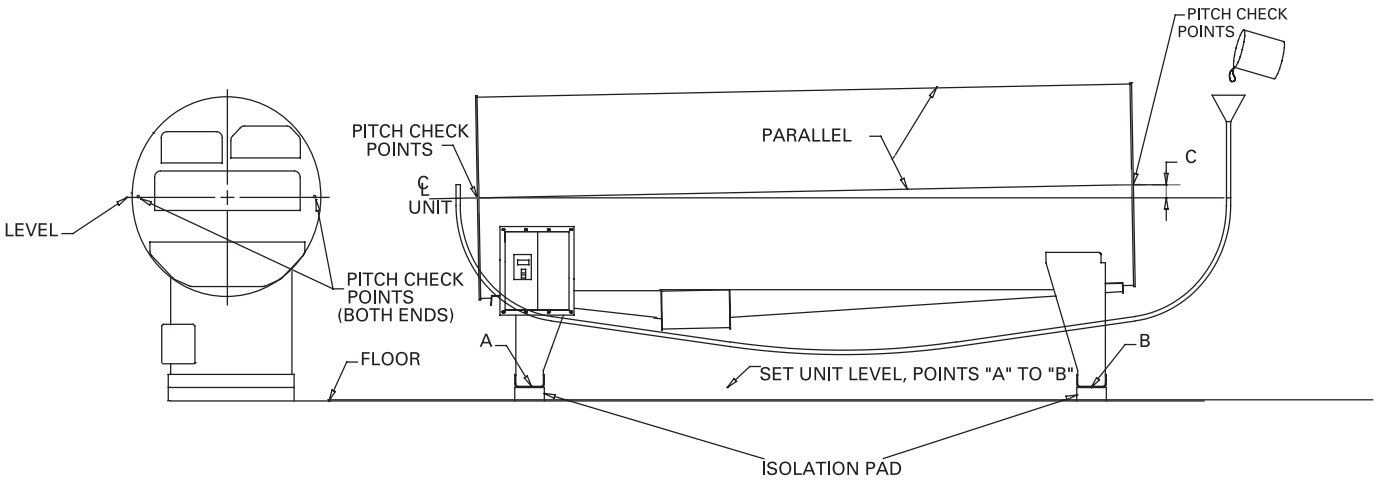
Installation

Setting The Machine

Isolation pads are provided and ship attached to the machine (shipped in loose parts box) at an obvious location. The isolation pads should be positioned under the machine legs on a level pad. The purpose of the isolation pad is to distribute the machine weight. The foundation must be level, smooth, and capable of supporting the machine weight. Figure 5 (ref. points A and B) illustrates the location of the isolation pads.

DO NOT PITCH THE MACHINE. The machine must be installed on a level foundation (within 1/16" length and width) to insure that the built in machine pitch is correct for condensate drainage. The main shell has tube sheet centerline holes that should be used to determine if the built in pitch is correct. Use the method illustrated in Figure 5 to determine the pitch dimension. The steam inlet is the high end of the machine.

Figure 5. Installation of isolation pad and determining pitch



	Factory Built-In Pitch C (± 1/16")	
Unit	Inches	MM
112 - 294	1/2	12.7
354 - 465	3/4	19.05

Installation

Vacuum Testing The Machine Upon Arrival

The machine ships evacuated and should be checked upon arrival. The local Trane Service Company representative should perform the vacuum test. If the vacuum level is above 2mm mercury, a standing vacuum test should be performed. Evacuate the machine to a minimum of 2mm mercury. After waiting two weeks, check the vacuum again. If the machine vacuum cannot be maintained below 2 mm mercury absolute, for two weeks, the entire machine must be pressure tested and inspected with an electronic leak detector.

Leak Testing

Note: *All leak testing must be supervised by the Trane Service Engineer.*

To leak test the machine, pressurize it to 3 psig using a combination of dry nitrogen and helium. The charging line may be attached to one of the access valves on the heat exchangers to introduce the test gas. Inspect the repaired areas with an electronic leak detector. Repair all leaks and repeat leak checking.

An alternate method if an electronic leak detector is not available:

Pressurize the unit using dry nitrogen and check all welds with a leak detector soap solution. If leaks are found, relieve test pressure, repair all leaks found, then repeat test. Increase test pressure up to 10 psig using dry nitrogen. Again, apply detector soap to weld connections. If further leaks are found, relieve the test pressure, repair the leak, and retest.

Evacuation

Connect a vacuum pump to the service access valve on the tube sheet. Evacuate the machine to a minimum of 2 mm mercury absolute. An absolute pressure gauge can be connected to the purge tee to determine the level of vacuum. After a two week standing vacuum test, a Trane Service Engineer should verify that the machine is leak free by rechecking the vacuum. Evacuate the machine and coat all welded repairs or connections with Glyptol and paint as required.

Piping-General

To allow for the removal of the steam chest and the water box covers (for tube cleaning purposes), install a victaulic or flanged connection in each connecting pipe near the unit.

To avoid pipe alignment difficulty attach the victaulic or flanged connections to the water boxes and steam chest, prior to the fabrication of other connecting pipe.

Due to installation difficulties, prefabricated piping is not recommended.

Install a vent cock (contractor supplied) in each pass of the absorber, condenser, and evaporator water boxes. Tapped holes are provided for this purpose. See Figures 12 and 14. The vent cocks are used to remove air from the water boxes and to establish water flows.

Suggested steam, condensate, hot water, cooling water, system water and auxiliary water piping arrangements are illustrated in Figures 6-15.

All connecting water piping must be supported such that the connection to the water box is stress free.

All system water (condenser/ absorber, evaporator) flow control regulating devices and the associated water pumps are provided by others.

Pass Combinations

Water box connection arrangements for chilled water and condenser water piping may be connected to either end of the machine. This dual-end piping accessibility permits economical and functional equipment room piping layouts. Variations of inlet and outlet system water piping may require field changes in sensor location and/or wiring by start-up personnel. Inlet steam and hot water connections must be at the right end of the machine. (As viewed from the front of the machine when facing the machine control panel).

Installation

Table 4 lists connection sizes (inches) for the evaporator, absorber, and condenser. Table 5 lists connection sizes (millimeters) for the evaporator, absorber, and condenser.

Figure 6 identifies the variations available for water piping connections.

Note: *View the control panel side to determine right or left end of machine. See Figure 6.*

Table 4. Connection sizes (inches)

Model	Evaporator No. of Passes					ABS.	COND.
ABSC	1	2	3	4	5	Size	Size
112	—	6	5	4	4	4	3 1/2
129	—	6	5	4	4	4	4
148	—	6	5	4	4	4	4
174	—	6	6	5	4	5	5
200	—	6	6	5	4	5	5
228	—	6	6	5	4	5	5
256	—	8	6	5	5	6	6
294	—	8	6	5	5	6	6
354	—	8	6	5	5	6	6
385	10	8	8	6	6	8	8
420	10	8	8	6	6	8	8
465	10	8	8	6	6	8	8

Note: System water piping inlet and outlet variations may require field changes to sensor location and/or wiring by start-up personnel.

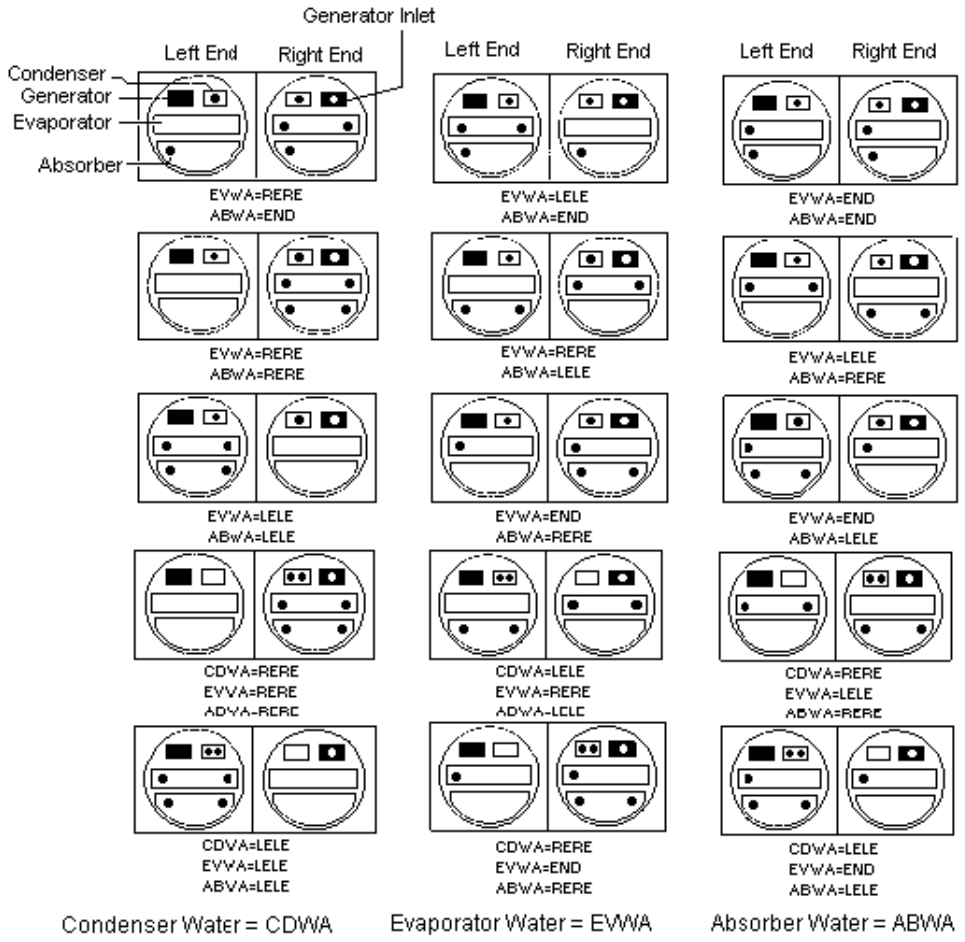
Table 5. Connection sizes (millimeters)

Model	Evaporator No. of Passes					ABS.	COND.
ABSC	1	2	3	4	5	Size	Size
112	—	152	127	102	102	102	89
129	—	152	127	102	102	102	102
148	—	152	127	102	102	102	102
174	—	152	152	127	102	127	127
200	—	152	152	127	102	127	127
228	—	152	152	127	102	127	127
256	—	203	152	127	127	152	152
294	—	203	152	127	127	152	152
354	—	203	152	127	127	152	152
385	254	203	203	152	152	203	203
420	254	203	203	152	152	203	203
465	254	203	203	152	152	203	203

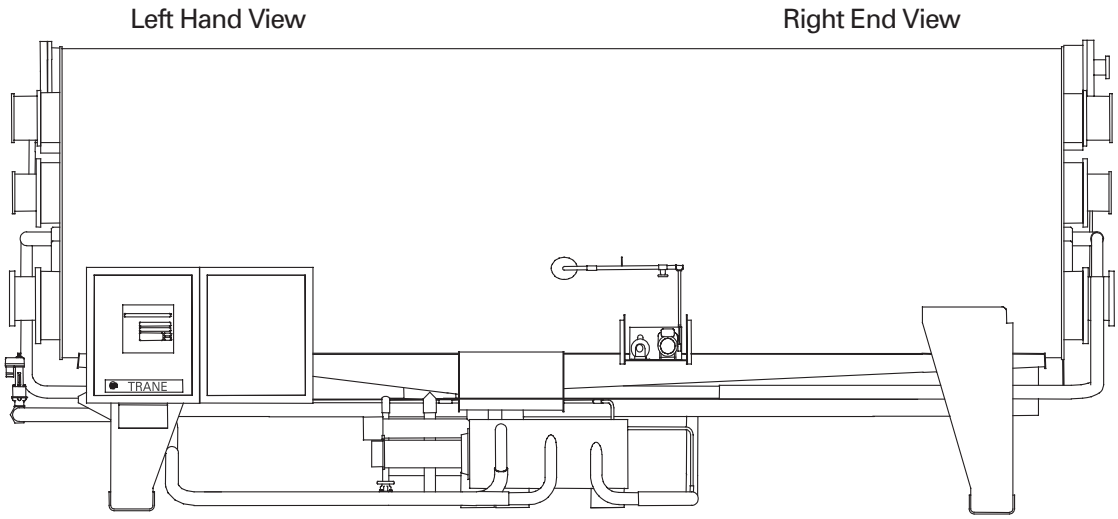
Note: System water piping inlet and outlet variations may require field changes to sensor location and/or wiring by start-up personnel.

Installation

Figure 6. Water and steam box pipe connection combinations (Control panel side is front of machine)



Note: For Hot Water combinations contact La Crosse Marketing Dept.



Installation

Machine Instrumentation

The recommended pressure gauges, vents, and shutoff valves are illustrated in detail on the appropriate system piping illustrations. Thermometers are recommended, however, the unit control panel displays the temperatures as monitored by the factory installed sensors. Factory installed sensors are provided for the following locations: Evaporator inlet and outlet, absorber inlet, condenser inlet and outlet, steam inlet and condensate outlet, or hot water inlet and outlet.

Pressure Drop

The pressure drop thru a section of the machine will vary depending on the design flow and number of passes thru the machine. Therefore, to determine the correct pressure drop for a particular machine at the selected conditions, see the "order write up" which will identify the machine selection and pressure drop values.

Rupture Disc and Piping (Ref. Chart 1)

The rupture disc, when installed, is on the condenser section for machine protection from internal pressures greater than 15 psig.

Remove protective pipe plug on the flange covering the disc and install a 2" pipe with a flexible stress free connector. Connecting piping must be supported preventing stress at the connection. Vent the piping to an appropriate location (floor drain or retention chamber).

Chart 1

Rupture Disc and Piping	Material by		Installation by	
Item	Trane	Other	Trane	Other
1. Rupture Disc & Assembly	X		X	
2. Flexible Connector		X		X
3. Rupture Disc Piping		X		X

Generator (Concentrator) Steam and Condensate Piping (Ref. Chart 2)

Typical steam and condensate piping diagrams are shown in Figures 7 thru 9. The steam pressure at the generator chest cannot exceed the 12 or 14 PSIG design condition. An accurate gauge must be provided to monitor the pressure on the generator inlet box.

The temperature of the steam entering the generator must not exceed 300F. To assure proper valve operation (closure), the supply steam pressure at the inlet of the control valve cannot exceed design by more than 2 PSIG. If supply steam pressure exceeds design limits, a pressure relief valve must be used.

Steam Supply Piping (Not Supplied)

The recommended steam supply pipe and component combination is discussed below and illustrated in Figure 7.

Chart 2 illustrates the scope of Trane responsibilities related to material/ components and the installation of each item within the steam supply piping.

1. The Steam Control Valve (energy valve) is selected and supplied by the Trane Company and is installed by the contractor.

The following guidelines, along with standard practices, will allow proper valve installation.

Caution:

Other orientations can lead to improper operation and can increase the maintenance requirements for the valve and actuator. Refer to manufacturer's installation instructions for correct installation procedure.

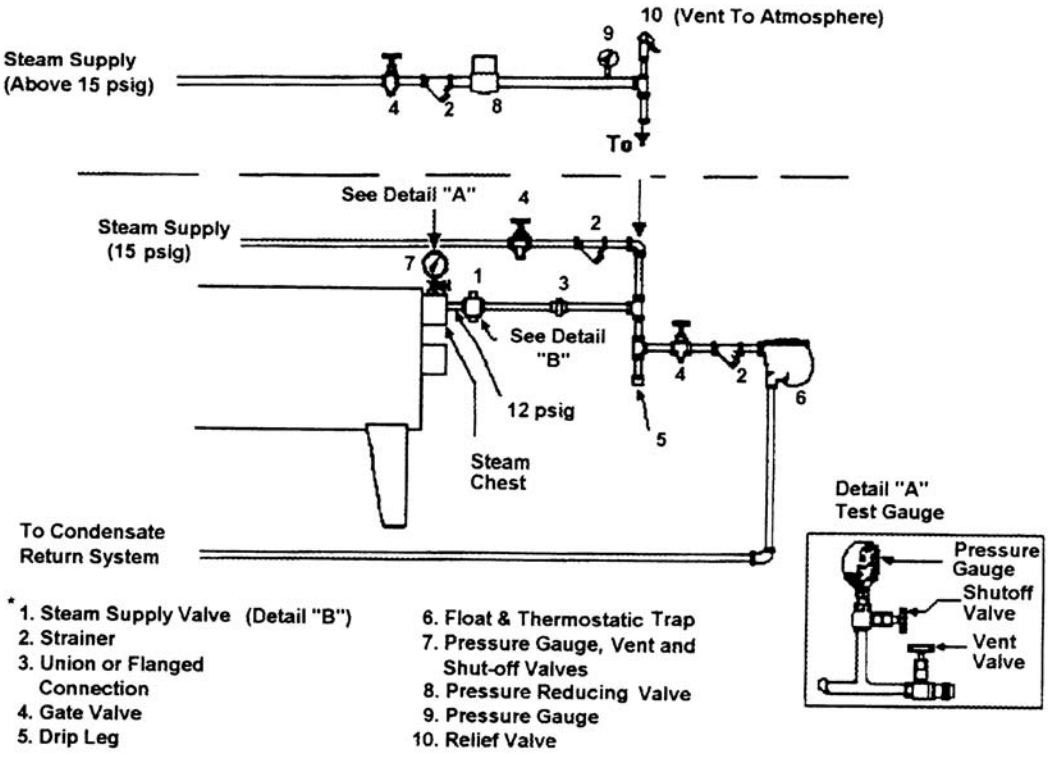
Chart 2

Steam Supply Piping Items	Material by		Installation by	
Item	Trane	Other	Trane	Other
1. Steam Control Valve	X			X
2. T-Type Strainer		X		X
3. Flanged Connections		X		X
4. Gate Valve		X		X
5. Drip Leg w/Dirt Pocket		X		X
6. Float & Thermostatic Trap		X		X
7. Press.Gauge. Vent & Valve		X		X
8. Pressure Reducing Valve *		X		X
9. Pressure Gauge *		X		X
10. Relief Valve *		X		X

* Required when greater than 20 psig.

Installation

Figure 7. High or low pressure concentrator steam

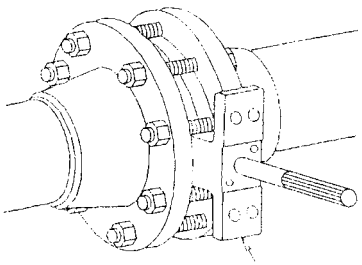


* 1. Steam Supply Valve (Detail "B")
2. Strainer
3. Union or Flanged Connection
4. Gate Valve
5. Drip Leg
6. Float & Thermostatic Trap
7. Pressure Gauge, Vent and Shut-off Valves
8. Pressure Reducing Valve
9. Pressure Gauge
10. Relief Valve

NOTE: Nominal steam valve is selected for a pressure drop of 5 psig. If steam supply pressure exceeds the selected valve pressure drop, a pressure reducing valve (item 8) is required.

* Standard Steam Valve Selection is 3#

Detail "B"
(Referenced in Figure 12)



VALVE BODY
(ACTUATOR NOT SHOWN)

PROPER INSTALLATION OF WAFER-STYLE VALVES

Installation

See Figure 7, Detail "B", for valve installation. The valve actuator assembly should be mounted horizontally, as indicated.

a. Ensure that the valve body interior is clean and that the piping is free of foreign material.

b. The control valve should be at least 36 inches away from the generator flange.

The piping upstream and downstream of the valve must be free of flow disrupting devices. This is needed to minimize pressure drop.

Direction flow stream valves are marked with an arrow indicating flow direction, or have marked inlet connections.

c. Install the valve between the inline flanges. Insert four flange studs or bolts through the flanges to support the valve during installation.

Use standard gaskets (flat gaskets compatible with the flow media) between the valve body and line flanges. Spiral wound gaskets without compression controlling centering rings are NOT recommended for this purpose.

d. Center the valve body by measuring equal distances at the top and bottom, and equal distances at the sides.

e. Use accepted bolting procedures for installing the flange studs and bolts. The bolting or stud material must meet or exceed the requirements of ASME SA-193 Grade B7. Typical threaded rod (for pipe hangers, etc.) does not meet this requirement. Use of improper material will not allow proper torques to be set and allow leaks which could cause material damage or personnel injury. Use Table 5A as a guideline for proper torque requirements for flat gasket installation.

Table 5A. Proper torque requirements

Bolt Size Inch	Torque Min.	Ft. Lbs. Max.
3/8	12	18
7/16	24	32
1/2	37	47
5/8	55	67
3/4	105	155
7/8	150	205

After the unit has been started and steam applied to the valve, the torque should be checked and verified by the installer to insure that the thermal expansion did not loosen the joint. The valve stem packing should also be checked at this time and adjusted as necessary.

2. Y-type Strainer with Blow-Off Valve should be installed upstream of valves to prevent foreign material from damaging the control valve or machine.

3. Flanged connections should be installed such that a section of piping can be removed easily to permit unrestricted access to the tubes for cleaning and inspection.

4. Gate Valve - Install as indicated in Figure 7 to facilitate removal of control valve, traps, and strainers for service and repair.

This valve will also provide a positive shut-off during unit shut-down periods. The steam control valve is not a positive shut-off.

5. Drip Leg with Dirt Pocket-Install upstream from the steam control valve to eliminate passage of condensate through the valve and to trap dirt and scale before it reaches the strainers. Thread a valve into the base of the dirt pocket to facilitate blowing off the dirt and scale.

6. Float and Thermostatic Traps-Install as shown in Figure 7 to remove condensate from the steam main.

7. Pressure Gauge - Install on steam chest to indicate accurately the controlled steam pressure available at the generator. Include a shutoff valve in the connecting pipe to isolate the pressure gauge.

Note: *The following items are required only when the available steam pressure is above than 20 PSIG.*

8. Pressure Reducing Valve-Install in the streamline as shown in Figure 7, and set the regulator to control at the design pressure required at the inlet to the steam control valve.

9. Pressure Gauge-Install downstream from the pressure reducing valve to register throttled steam pressure.

10. Relief Valve-Install as shown in Figure 7 to protect the unit if the pressure reducing valve fails. Set the valve to relieve at 10 PSIG above design inlet steam pressure to the control valve.

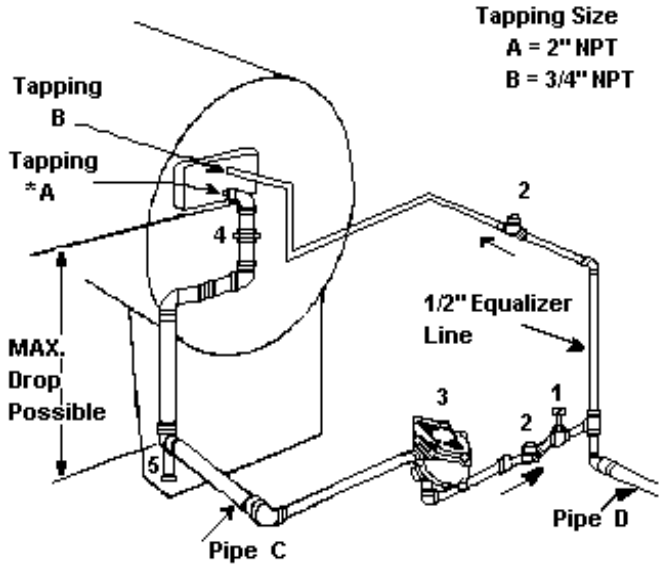
Installation

Condensate Return Piping (Not Supplied)

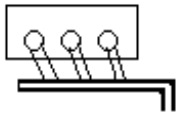
See Figures 8 and 9

A number of different types of condensate return systems may be used with Trane Single-Stage Absorption Machines. Figures 8 and 9 illustrates the recommended condensate return piping. Chart 3 illustrates the scope of Trane responsibilities related to material/ components and the installation of each item within the condensate return piping

Figure 8. Generator condensate return piping (Ref. Table 5)

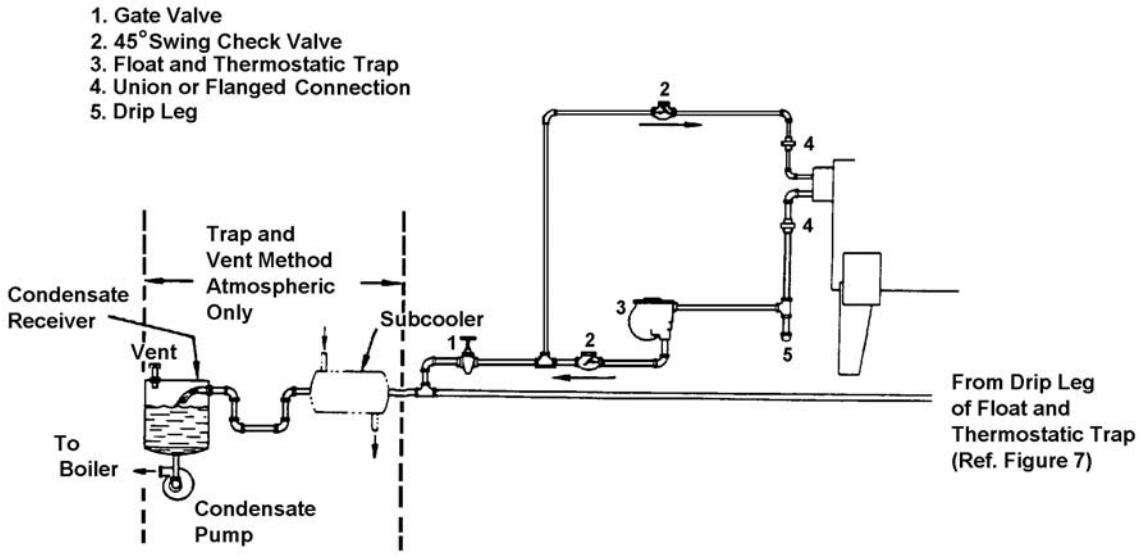


*For Multiple Outlet "A" 2" Tappings Should be Manifolded at Outlet Box.



1.	Gate Valve
2.	45° Swing Check Valve
3.	Float and Thermostat Trap
4.	Union or Flanged Conn.
5.	Drip Leg

Figure 9. Generator condensate return piping — trap and vented receiver method



Installation

Chart 3

Condensate Return Piping	Material By		Material By	
Item	Trane	Other	Trane	Other
1. Gate Valve		X		X
2. 45 Swing Check Valve		X		X
3. Float & Thermostatic Trap		X		X
4. Union or Flanged Connect		X		X
5. Drip Leg		X		X

Regardless of the system used, the following conditions must be considered:

1. The condensate leaving the absorption machine at full load is approximately 230 Degrees F. As the cooling load drops off and the steam valve closes, the pressure and temperature of the condensate leaving the machine drops rapidly. The amount of condensate which may flash when exposed to atmospheric pressure varies from 2.0 percent at full load to none at 70 percent load. A subcooler may be used to eliminate the small amount of flashing which may occur when the machine is operating under heavy load. However, the subcooler must not interfere with the gravity flow of the condensate.

2. The system must allow for gravity flow of condensate from the machine during part load, since the pressure in the generator tube bundle will drop to atmosphere. Figure 9 illustrates a typical condensate piping arrangement. Pipe D shown in Figure 8 must not be elevated above the trap (item 3).

3. The float and thermostatic trap is designed to operate by gravity flow, making it possible to discharge condensate effectively even though, through steam throttling, the pressure at the outlet of the generator has dropped to zero psig. The bucket trap, on the other hand, does not operate effectively under low steam pressure conditions, and is not recommended for this application.

4. If a package condensate handling system is used instead of steam traps, two conditions of operation must be met to insure reliable machine operation. (Ref. Figure 8 or 9). First, the receiver must be able to vent all air from the generator when the machine is started. Second, there must be gravity drain of condensate from the generator during part load operation which means pressure must be equalized between the generator outlet box and the receiver tank vapor space.

Table 6 indicates nominal condensate flow, F and T trap pipe and header pipe sizes for each machine model. Figure 9 illustrates the preferred condensate piping combination.

Note: *A sub cooler is required to eliminate steam flashing with machine operation above 70% of design.*

Table 6. Trap and condensate piping information (Ref. Fig. 8) (inches/millimeters (mm))

		Generator		Piping	
Machine Model Size	Nominal Condensate LBS./HR.	Tapping A Inches/mm	Tapping B Inches/mm	Pipe C Inches/mm	Pipe D Inches/mm
112	2095	1-2"/ 50.8	3/4"/19.05	2"/50.8	3"/76.2
129	2415	1-2"/50.8	3/4"/19.05	2"/50.8	3"/76.2
148	2790	1-2"/50.8	3/4"/19.05	2"/50.8	3"/76.2
174	3255	1-2"/50.8	3/4"/19.05	2"/50.8	3"/76.2
200	3740	1-2"/50.8	3/4"/19.05	2.5"/63.5	3"/76.2
228	4260	1-2"/50.8	3/4"/19.05	2.5"/63.5	4"/101.6
256	4790	1-2"/50.8	3/4"/19.05	2.5"/63.5	4"/101.6
294	5500	1-2"/50.8	3/4"/19.05	3"/76.2	4"/101.6
354	6620	1-2"/50.8	3/4"/19.05	3"/76.2	4"/101.6
385	7210	2-2"/50.8	3/4"/19.05	3"/76.2	4"/101.6
420	7850	2-2"/50.8	3/4"/19.05	4"/101.6	4"/101.6
465	8700	2-2"/50.8	3/4"/19.05	4"/101.6	4"/101.6

Installation

A conventional condensate pump is normally used to return condensate to the boiler. A flash tank (and/or subcooler) is used to cool the condensate for proper operation of the pump.

Generator Hot Water Supply Piping

Piping arrangements for both medium temperature (270°F and below) and high temperature (above 270°F) hot water systems are illustrated in Figures 10 and 11. Chart 4 illustrates the scope of Trane responsibilities related to material/components and the installation of each item within the hot water supply piping.

Note: *Under no circumstances should hot water be introduced into the generator hot water loop when the machine is shut down. The pipes connecting the generator section to the hot water supply main must be filled with tap water before the machine is started. With the gate valves on the supply and return main closed, the secondary loop piping can be checked for leaks prior to start-up. The manual isolation valves should not be opened until the machine is ready for start-up, which will be under the supervision of the Trane Service Engineer.*

Medium Temperature Hot Water

Medium temperature hot water flow through the generator is regulated with changes in machine load. A three way mixing valve, installed in the generator outlet and bypass piping arrangement, (see Figure 10) modulates the flow of hot water through the generator and the remaining flow is bypassed back to the return.

The individual components of the piping arrangement are:

1. Gate Valve - Install as shown to isolate the secondary hot water loop or pump for servicing.

2. Balance Valve - Locate in the piping as shown to control the water flow in the hot water loop.

3. Pressure gauge - Locate on the covers as shown to measuring entering and leaving hot water pressure. The gauges are used to balance the water flow. Include a shutoff valve in the connecting piping.

4. Optional Thermometer - Locate in the pipe connecting to the entering and leaving generator flanges. The sensor should be immersed at least 50 percent of the generator pipe diameter.

5. Y-Type Strainer With Blow-Down Valve - Install upstream of the control valve and circulating pump suction to prevent foreign material from entering the hot water control valve.

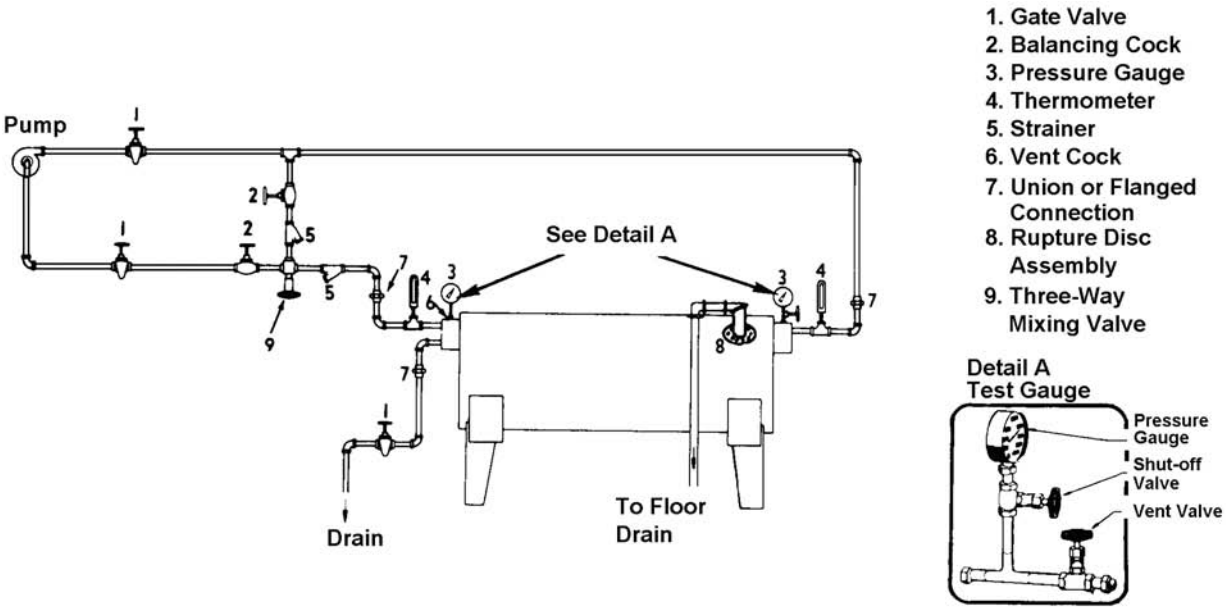
6. Vent Cock and Pressure Gauge - Install on the front of the water box cover. The vent cock is needed to remove air from the water box. The pressure gauge is needed to establish design water flow.

Chart 4

Hot Water Supply Piping	Material By		Installation By	
Item	Trane	Other	Trane	Other
1. Gate Valve		X		X
2. Balance Valve		X		X
3. Pressure Gauge		X		X
4. Thermometer (optional)		X		X
5. Y-Type Strainer		X		X
6. Vent Cock & Pressure Gauge		X		X
7. Union or Flanged Conn.		X		X
8. Rupture Disc Assembly		X		X
9. 2-Way/3-Way Mix. Valve	X			X
10. Circulating Pump		X		X

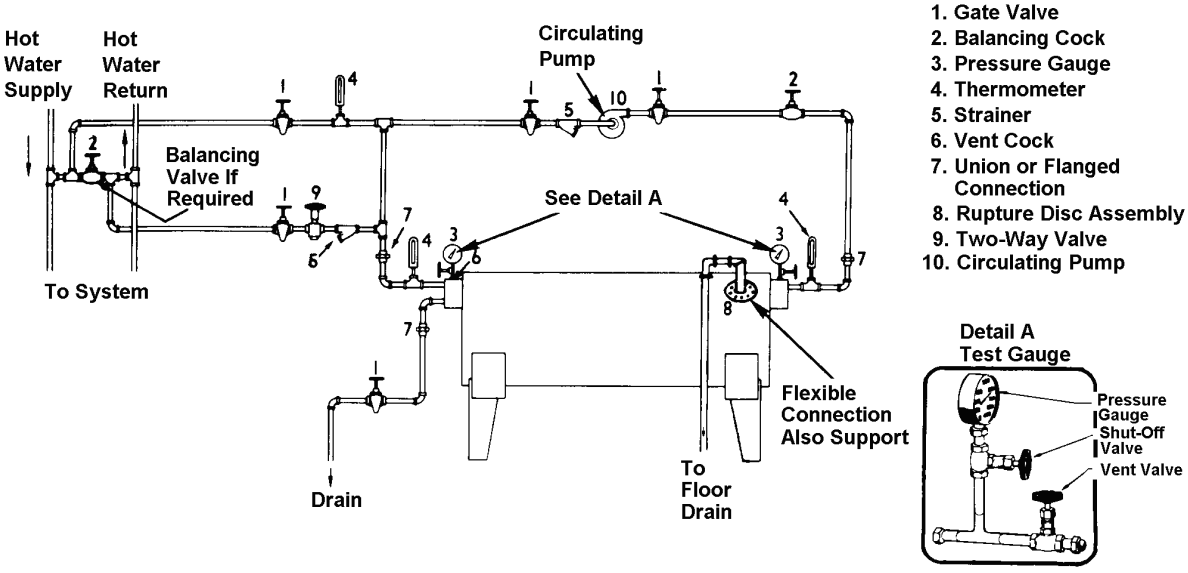
Installation

Figure 10. Concentrator medium temperature hot water piping - 270 degrees and below



Note: The Vent Cock and Pressure Gauge Shown in Detail "A" Should be Used at the Inlet and Outlet of Each Bundle at the Water Box Cover. The Pressure Gauge will be Used to Set the Design Water Flow at Start-Up.

Figure 11. Concentrator high temperature hot water piping - above 270 degrees



Note: The Vent Cock and Pressure Gauge Shown in Detail "A" Should be Used at the Inlet and Outlet of Each Bundle at the Water Box Cover. The Pressure Gauge Will be Used to Set the Design Water Flow at Start-Up.

Installation

7. Union or Flanged Connection- install in the connecting pipe to allow cover removal for the inspecting and cleaning of the tubes.

8. Rupture Disc - See Page 16.

9 Three-Way Mixing Valve (Fig. 10), Two-Way Valve (Fig. 11) - Pipe the generator outlet and bypass piping to the inlet ports of the valve. The outlet port is piped to the return.

High Temperature Hot Water
High temperature hot water to the machine is controlled by regulating the water temperature to the generator. Variations in water temperature control machine capacity with no change in hot water flow.

A pump, installed within a loop (see Figure 11), circulates the water through the generator at a constant rate. The temperature of the water within the loop is controlled by mixing varying proportions of recirculated and hot water from the supply main. A modulating, two-way equal percentage valve, should be sized according to the supply and return system pressures.

The modulating two-way positive shutoff valve controls the amount of water leaving the loop and, therefore, determines the temperature of mixed water entering the generator.

The hot water inlet must always be connected to the right end of the generator.

10. Circulating Pump - The piping includes a circulating pump and a secondary hot water loop. The pump circulates water through the generator at a constant rate.

NOTE: *Under no circumstances should hot water be introduced into the generator secondary loop when the unit is shutdown. Repair or new startup-the pipes connecting the generator section to the hot water supply main must be filled with tap water by closing the gate valve (item 1) on the supply and return to the main, the secondary loop pump and piping must be checked for leaks prior to startup.*

Condenser and Absorber Cooling Water Piping

Figures 12 and 13 illustrate the piping connections and instrumentation for the condenser and absorber. Chart 5 illustrates the scope of Trane responsibilities related to material/components and the installation of each item within the condenser and absorber cooling water piping.

Individual components in the piping to the cooling tower are as follows:

1. Balancing Valve - Locate in the return line to help in balancing the water flow rate in the cooling water loop.

2. Gate Valve - Install in the supply, return and drain lines to facilitate servicing the system.

3. Pressure Gauge - Locate on the water box cover at the inlet as shown in Figure 12 to establish the flow rate. Include a shutoff valve in the connecting piping.

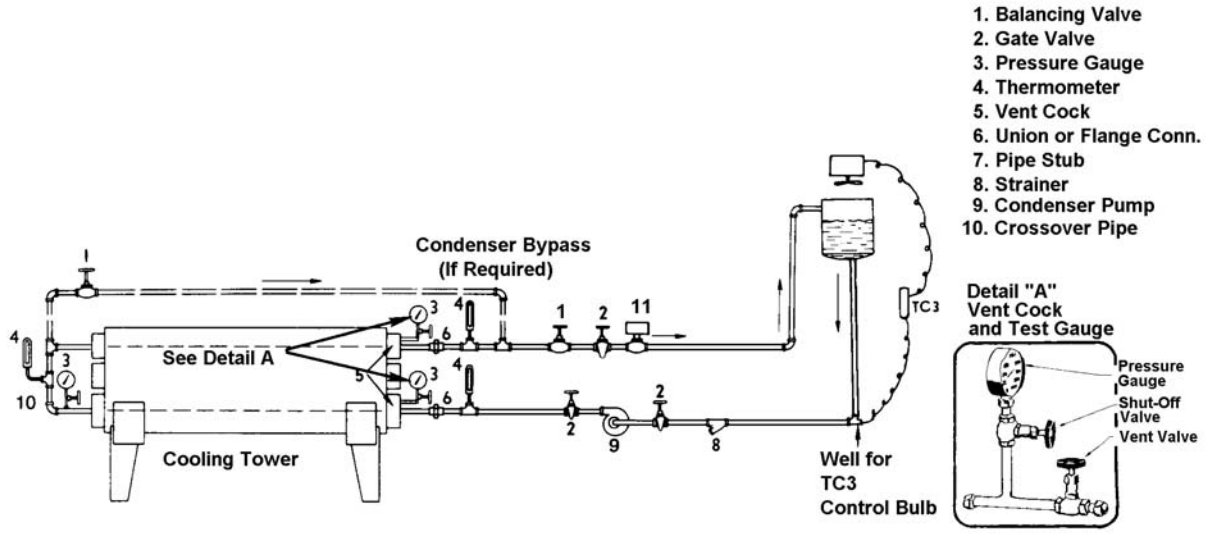
4. Thermometer - Thermometers are optional - they are not required as the chiller factory sensors monitor water temperatures in and out. When installed, locate in the piping leaving condenser, leaving absorber, and entering absorber piping to register temperature changes.

Chart 5

Condenser/Absorber Piping	Material By		Installation By	
Item	Trane	Other	Trane	Other
1. Balancing Valve		X		X
2. Gate Valve		X		X
3. Pressure Gauge In/Mid/Out		X		X
4. Thermometer (Optional)		X		X
5. Vent & Shutoff Valve		X		X
6. Victaulic or Flanged Connection		X		X
7. Pipe Stub Connection		X		X
8. Strainer		X		X
9. Pump		X		X
10. Crossover Pipe		X		X
11. Flow Switch		X		X

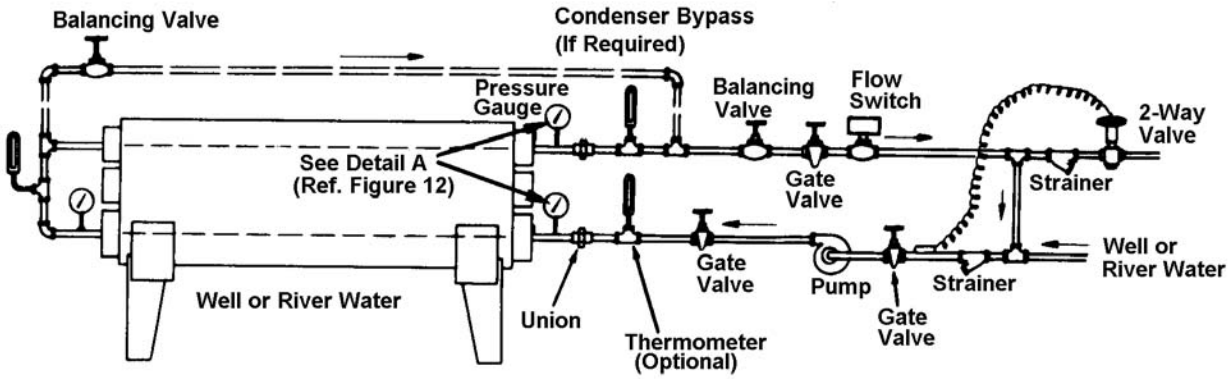
Installation

Figure 12. Condenser and absorber cooling water piping with a cooling tower



Note: The Vent Cock and Pressure Gauge Shown in Detail A Should be Used at the Inlet and Outlet of Each Bundle at the Water Box Cover. The Pressure Gauge will be Used to Set the Design Water Flow at Start-Up.

Figure 13. Condenser and absorber cooling water piping for well or river water



Installation

5. Vent Cock-Install a vent cock in each pass of the absorber and condenser water boxes. Tap holes are provided for this purpose. The vent cock will be used to remove air from the water boxes.

6. Victaulic or Flanged Connection-Install so that the water box cover and section of pipe may be removed for access to the tubes for cleaning and inspection.

7. Pipe Stub-Provide pipe stubs with valves in the supply and return to facilitate chemical cleaning of the tubes.

8. Y-Type Strainer with Blow Off Valve-Install upstream of the pump and valve to prevent foreign material from entering the unit.

9. Pump-Condenser water pump is supplied and installed by others. Must be capable of providing the design pressure drop across the absorber/condenser sections.

10. Crossover pipe (same size as inlet pipe)-construct and install between the absorber and condenser with union or flanged connections to facilitate removal of the water boxes.

11. Flow Switch-The Flow switch must be installed in a straight, horizontal length of pipe according to the manufacturers instructions.

The Contractor will supply and install the above piping components. All isolating valves, vent cocks (threaded outlet), and thermometer wells, gauges, etc., must be accessible after insulation has been installed.

Well or River Water Piping Connections

When well, river or other suitable water source is available for cooling purposes, the piping arrangement illustrated in Figure 13 must be used. A two-way valve determines the temperature of the water supplied to the unit by controlling the rate at which the supply water enters the loop. A pump located within the loop, circulates the water at a constant rate. A temperature sensor at the pump suction controls the position of the two-way valve. Without minimum absorber temperature control, chilled water temperature can be limited by the condenser water override control function.

NOTE: *The Trane Company assumes no responsibility for equipment failure resulting from untreated or improperly treated water.*

It is further recommended that all tubes be tested periodically by qualified non-destructive tube testing service. This testing will confirm tube condition and identify potential problems.

NOTE: Thermometers *are optional.*

Condenser Bypass (Contractor Supplied)

Some machine cooling water flow selections may require condenser bypass piping. The Bypass piping and balancing valve are shown in Figure 12. The Bypass is used to limit water flow to the condenser. Table 7 lists only those units which require the maximum allowable condenser flow rates and corresponding condenser pressure drops. Use this information to size the bypass piping and to adjust the flow rate after the system is in operation.

Chilled Water Piping Connections

The chilled water pipe connections and instrumentations are illustrated in Figures 14.

Note: Thermometers are optional. All other components identified in Figure 13 are required. Chart 6 illustrates the scope of Trane responsibilities as related to material/components and installation. See Chart 6.

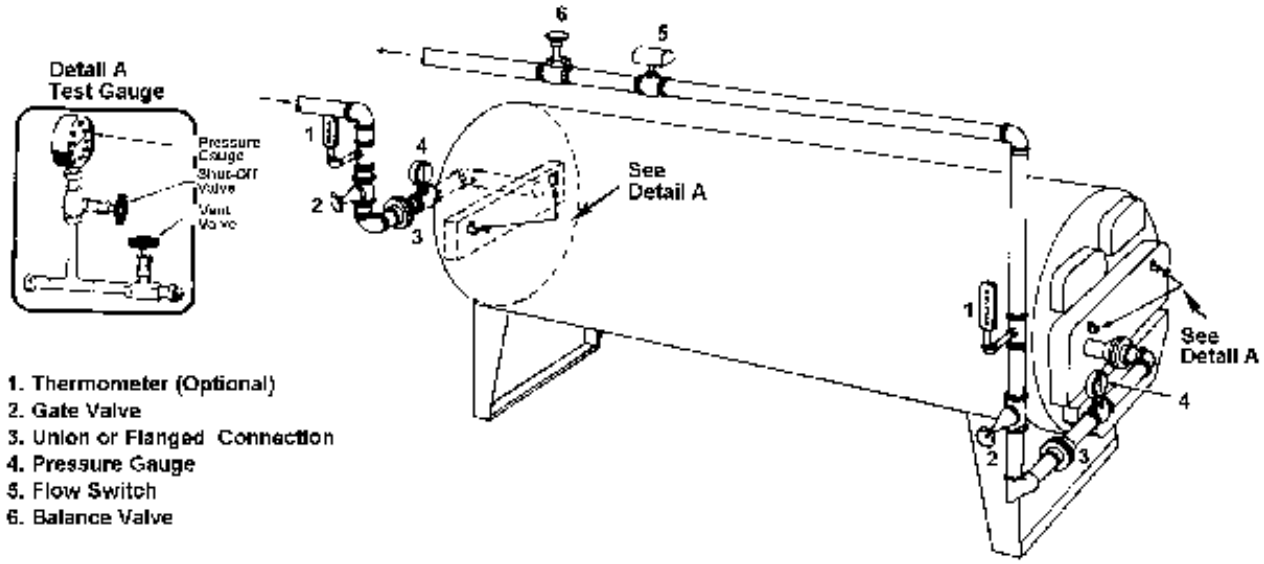
1. Thermometer-Thermometers are optional- they are not required as the chiller factory sensors monitor water temperatures in and out. When installed locate in the piping leaving and entering the piping to the evaporator to register temperature changes.

Table 7. Maximum condenser flow rates

Machine Size	Flow (GPM)	Pressure Drop (Ft. W.G.)			
		1 Pass	2 Pass	3 Pass	4 Pass
011	420	—	—	26	36
046	2050	17	32	—	—

Installation

Figure 14. Chilled water piping connections for a single unit



Note: The Vent Cock and Pressure Gauge Shown in Detail "A" Should be Used at the Inlet and Outlet of each Bundle at the Water Box Cover. The Pressure Gauge will be Used to Set the Design Water Flow at Start-Up.

Chart 6

Chilled Water Piping	Material By		Installation By	
Item	Trane	Other	Trane	Other
1. Thermometer (optional)		X		X
2. Gate Valve		X		X
3. Victaulic, or Flanged Connection		X		X
4. Pressure Gauges In & Out		X		X
Vent & Shut-Off Valve		X		X
5. Flow Switch	**			X
6. Balancing Valve		X		X

** Flow switch is either ordered from Trane or purchased locally by others.

Installation

2. Gate Valve - Install in the supply, return and drain lines to facilitate servicing the system.

3. Victaulic or Flanged connections - Should be installed as shown to provide free access to tubes for cleaning and inspection.

4. Pressure Gauges and Balancing Cocks - (detail) Contractor supplied pressure gauge and balancing cocks are required to balance the water flow. For those units with same-end connections, a single gauge with shutoff valves may be used.

5. Flow Switch - Install the flow switch in a straight, horizontal length of pipe according to the manufacturer's instructions.

6. Balancing Valve - Locate in the return line to help in balancing the flow rate.

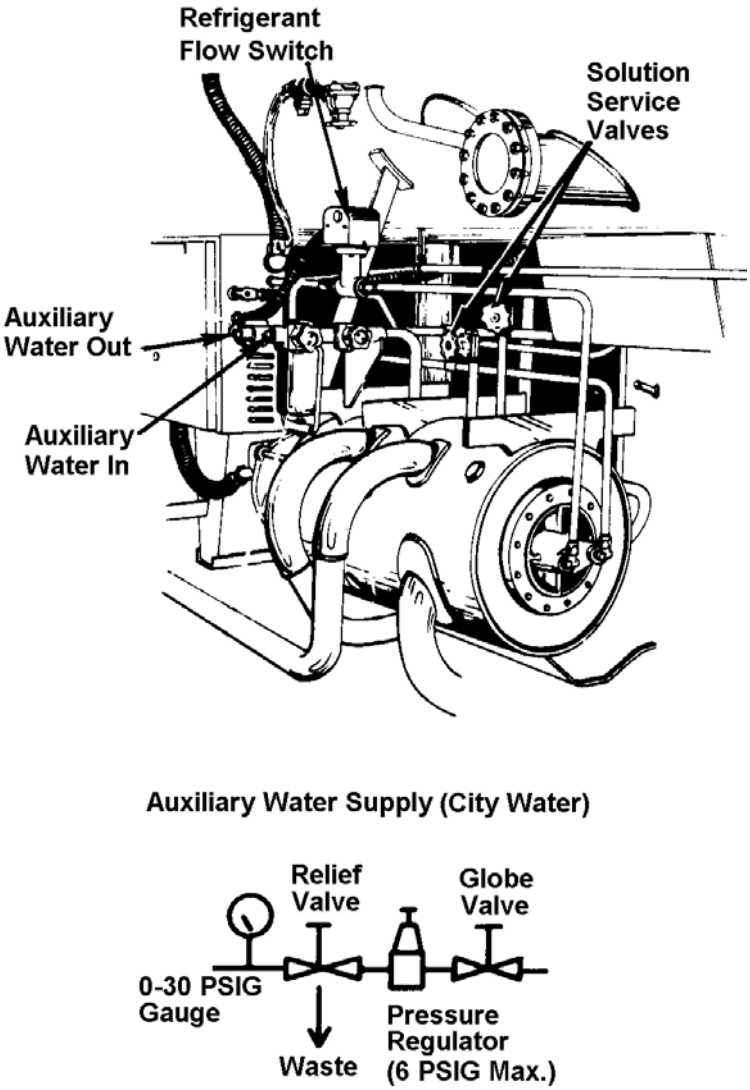
The contractor is responsible to supply and install the piping components as shown. All isolating valves, vent cocks, and thermometer wells must be accessible after insulation has been installed.

Auxiliary Water Piping

Occasionally, it is necessary to supply the pump motor cooling and lubrication circuit from an auxiliary water source during startup. For convenience, it is recommended that a city water supply line be permanently installed near the unit as shown in Figure 15.

When using this auxiliary water source, a pressure regulator set at 6 PSIG and a 0-10 PGIG Gauge must be used. The maximum allowable pressure on the pump cooling circuit is 6 PSIG. Therefore, a pressure regulator must be supplied on the auxiliary water source to control water. Do not attach it to the auxiliary water in connection until required.

Figure 15. Auxiliary water piping



Installation

Electrical Installation Connections

⚠ WARNING:

Open the electrical power disconnect switch and secure in that position before installing or servicing the unit. Failure to do so may result in personal injury or death from electrical shock.

Caution:

The control panel is designed with a contact closure used for control of the water pump operation. The evaporator and condenser water pumps are electrically interlocked and sequenced by the control panel. Proof of both chilled and condenser water flow must be provided to the control panel. Under no conditions can chiller operation be terminated by stopping chilled water flow. Under no situation can condenser water flow exist without chilled water flow**.**

The installing contractor is responsible for providing the field wiring as defined in Chart 7. Figure 16 illustrates the connected contractor devices to the unit control panel. Figure 17 details field wire routing within the unit control panel. Figure 18 illustrates the field wiring connections to the modules and terminal block within the unit control panel. Field connections are listed in Chart 8 and numerically identified and discussed in the following sections.

Figure 18 illustrates complete unit wiring including field wiring (illustrated with dashed lines).

Figure 19 illustrates complete unit connections including field connection points.

Chart 7 illustrates the scope of Trane responsibilities as related to the material or component, and the installation of each component related to the field wiring of the machine. Field wiring hardware (wire, connectors or terminals) are supplied by others.

Table 8 identifies the incoming power wire connection terminal wire range for circuit breaker fused and non-fused disconnects.

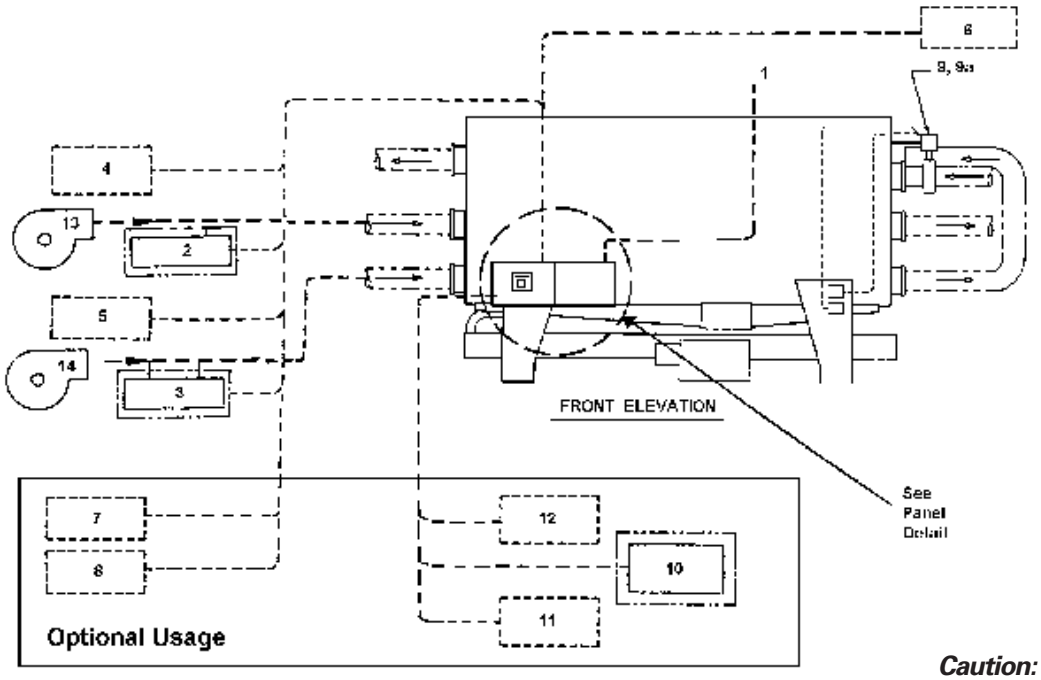
Chart 7

Electrical Field Wiring/Components	Materials By		Installation By	
Main Power	Trane	Other	Trane	Other
1. Nameplate 3 Phase Supply: L1, L2, L3		X		X
High Voltage (Above 30 Volts) (Rating)	**Trane**	**Others**	**Trane**	**Others**
2. Chilled Water Flow Switch	X or	X		X
3. Condenser Water Flow Switch	X or	X		X
4. Chilled Water Pump Starter		X		X
5. Condenser Water Pump Starter		X		X
6. Hot Water Pump Starter		X		X
7. Option: Remote Alarm Relay		X		X
8. Option: Chiller (Pump) Running Relay		X		X
9. Energy Valve (Steam/Hot Water)	X			X
Low Voltage (less than 30 Volts)	**Trane**	**Others**	**Trane**	**Others**
10. Option: Outdoor Temp. Sensor	X			X
11. Option: Emergency Stop: Normal/Trip		X		X
12. Option: External Auto/Stop (Contact)		X		X
13. Energy Valve Position Sensor	X			X

Note: Reference above Chart with Figure 16.

Installation

Figure 16. Field wiring to unit control panel



Caution: Do not energize unit until check-out and start-up procedures have been completed.

Component Identification

1) 3 Phase Supply (L1, L2, L3) (200/208/60,440/460/480/60) (575/600/60,190/50,220/50)
2) Chilled Water Flow Switch
3) Cond/Absorber Water Flow Switch
4) Chilled Water Pump Starter
5) Condenser Water Pump Starter
6) Hot Water Pump Starter (High Temp. Hot Water Units Only)
7) Remote Alarm Relay
8) Chiller Running Relay
9) Steam/Hot Water Electric Valve Actuator (Energy Valve) - (4 wires high power)
9a) 2 wires low voltage
10) Outdoor Temp. Sensor
11) Emergency Stop Normal/Trip
12) External Auto/Stop (Contact)
13) Chilled Water Pump
14) Cond/Absorber Water Pump

Table 8. Incoming power supply connection

		Customer Power Supply Connection Terminal Wire Range	
Chiller RLA	Circuit Breaker	Fused Disconnect	Non-Fused Disconnect
1-20	#14 - 2 AWG	#14 - 4 AWG	#14 - 8 AWG
21-24	#14 - 2 AWG	#14 - 4 AWG	#14 - 8 AWG
25-32	#14 - 2 AWG	#14 - 4 AWG	#14 - 8 AWG
33-40	#14 - 2 AWG	#14 - 4 AWG	#14 - 1
41-48	#14 - 2 AWG	#14 - 4 AWG	#14 - 1
49-64	#14 - 2 AWG	#14 - 2/0	#14 - 1
65-72	#14 - 2 AWG	#14 - 2/0	#6 - 2/0
73-80	#14 - 1/0	#14 - 2/0	#6 - 2/0
81-120	#2 - 4/0	#6 - 300 MCM	#6 - 300 MCM

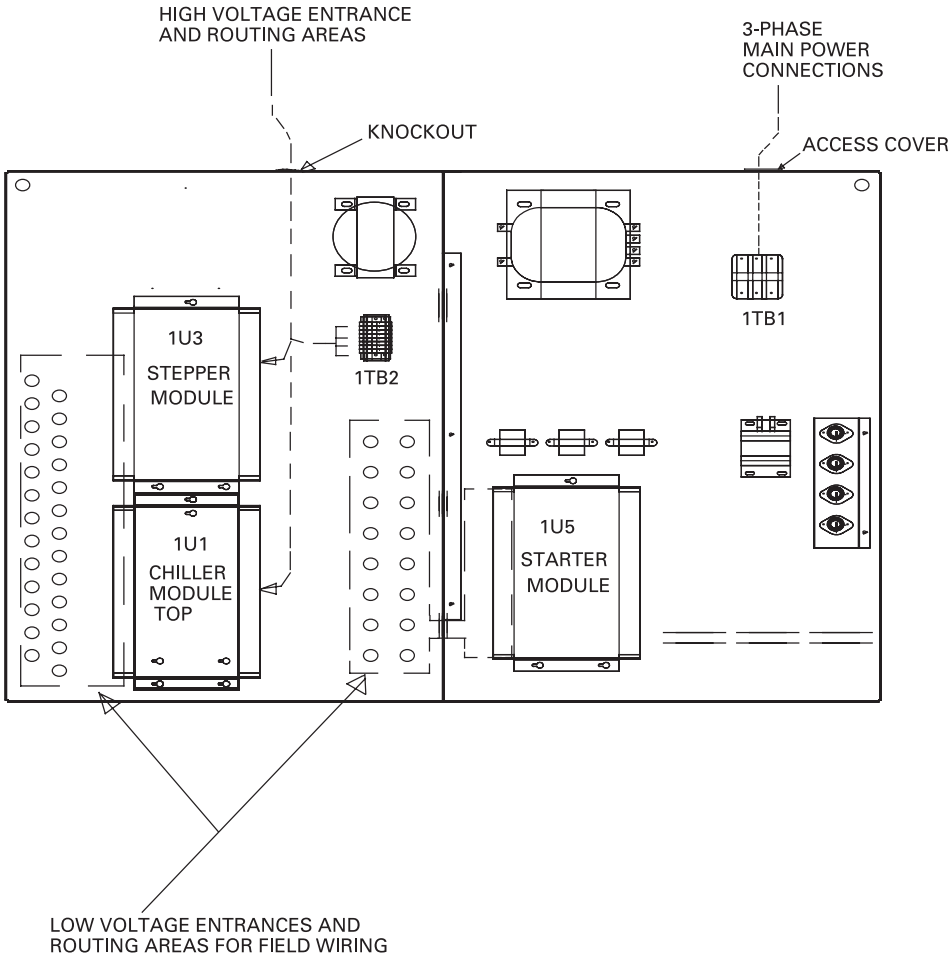
Installation

Figure 17 illustrates the field wiring entrances and routing of field wiring within the control panel. Field wiring of low and high power/voltage wires MUST NOT be routed together, since the possibility of "electrical noise" interference between high voltage circuits and low voltage/power wiring. An induced signal can be misinterpreted by the microprocessor as an incorrect input signal level, causing erroneous chiller operation and/or malfunction.

Low voltage low power circuit connection points are located on the left side of modules and high voltage high power circuit connection points are located on the right side of modules.

Note: *Chilled water pump and flow switch, condenser water pump and flow switch, MUST enter through the panel top or back panel, near the terminal block, avoiding any routing with low voltage, low power wiring.*

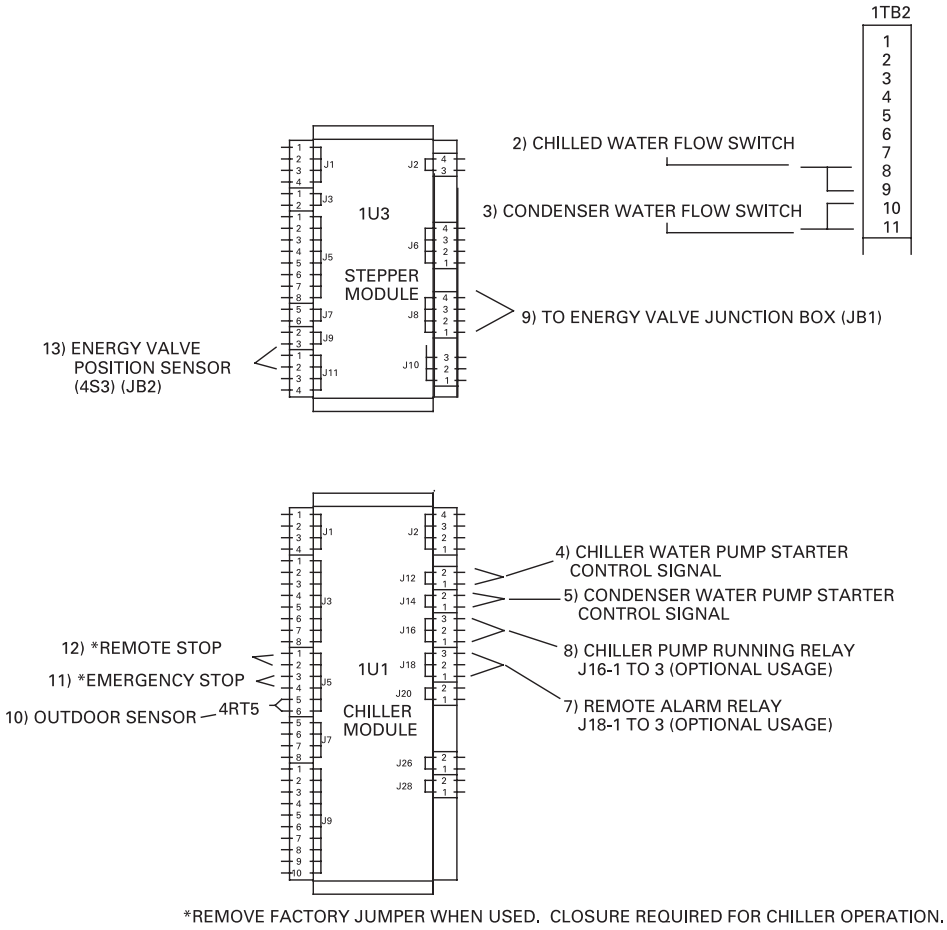
Figure 17. Field wiring entrances and routing within the control panel



Installation

Figure 18 illustrates the field connection points on the 1U1 chiller module, 1U3 stepper module and 1U5 starter module.

Figure 18. 1U1, 1U3 and 1U5 field connection points



Installation

Chart 8 identifies the field wiring connection points for connecting field devices to the unit control panel. Each item is discussed in the following text.

General External Wiring

Required Chilled Water Flow Control
The chiller requires start and stop control of the chilled water flow. The chiller controls also provide a chilled water pump off delay feature. Under no conditions can chiller operation be terminated by stopping chilled water flow. For remote start/stop control, always use the auto/start/stop input of the chiller and allow chilled water flow to continue up to thirty minutes after termination of the machine dilution cycle.

Water Flow Control
The chiller requires start and stop control of the abs/cds water flow. The condenser pump motor starter and water flow control signal must be hard wired in series with the chiller panel output contacts provided. Condenser water flow must start and stop as determined by the control panel. Failure to stop flow risks evaporator freeze-up.

Caution:

Operation without proper water pump and flow sensing interlocking will void unit warranty.

The chiller control panel requires proof of water flow for both evaporator (chilled) and absorber/condenser circuits. A flow switch and motor starter auxiliary contact connections satisfy this requirement. This input must be hard wired to the chiller control system. The flow switch must be set to open at 70% of design evaporator flow.

The above interlocking arrangement assures proper sequence of operation, and provides protection against mechanical failure from improper operation.

Chart 8

Electrical Field Wiring Connections			
Main Power	Connections		
1. Nameplate 3 Phase Supply: L1, L2, L3	1TB1-L1,L2,L3		
High Voltage (Above 30 Volts) (Rating)	Connections		
2. Chilled Water Flow Switch	1TB2-8 to 9		
3. Condenser Water Flow Switch	1TB2-10 to 11		
4. Chilled Water Pump Starter	1U1-P12-1 to 2		
5. Condenser Water Pump Starter	1U1-P14 1 to 2		
6. Hot Water Pump Starter	1U5-P10 1 to 3		
7. Option: Remote Alarm Relay	1U1-P18 1 to 3		
8. Option: Chiller (Pump) Running Relay	1U1-P16 1 to 3		
9. Energy Valve (Steam/Hot Water)	1U3-P8-1-2-3-4		
	From:	JB1 Wire #	To:
Field wiring connections from unit control	1U3-P8-4	123 Red	4L2-3
panel. 1U3 module to the energy valve.	1U3-P8-3	125 Wht.	4L2-5
Energy valve wiring is considered high power and must be	1U3-P8-2	121 Blk.	4L2-1
routed with high voltage wiring not low voltage wiring.	1U3-P8-1	124 Yel.	4L2-4
Low Voltage (less than 30 Volts)	Connections		
10. Option: Outdoor Temp. Sensor	1U1-P5-5 to 6		
11. Option: Emergency Stop: Normal/Trip	1U1-P5-3 to 4		
12. Option: External Auto/Stop (Contact)	1U1-P5-1 to 2		
13. Energy Valve Position Sensor (4S3)	1U3-P11- 1 to 2	JB2 - 166A*	4S3
		JB2 - 167A*	4S3

Note: Field wire goes to plug (P) which is connected to jack (J) on modules

* BPI connector and wires (166A & 167A) are in the loose parts box.

Installation

Required Absorber/Condenser Water Flow Control

Field Wiring Above 30VAC

Input Power

1. Nameplate voltage - Table 9 illustrates electrical data. Supply the specified nameplate 3 phase voltage to the unit control panel circuit breaker or terminal block.

Water Pump Control

This unit is designed to control the chilled water and condenser water pumps. This assures that the sequencing of the pumps occurs properly during normal machine operation, and/or in the event of abnormal operation. If the pumps are controlled by others and machine abnormal conditions occur, or failure due to this control by others, the Trane company cannot be held responsible.

The unit control panel (UCP) provides a contact closure (dry contact , no voltage) for the start signal of the Chilled Water and Condenser Water Pump Starters, and Hot Water (if used) pump motor starter circuits. External field circuitry provides the power for the device however the UCP controls the start and stop functions.

Flow switch inputs are required for the chilled water and condenser/ absorber water circuits.

See Chart 8 and Figure 18 for the connection point(s) where each external circuit connects within the chiller control panel. See specific sales order options to determine which option items are applicable.

Operational Input Signals

2. Chilled Water Flow Switch- The flow switch is connected within the unit control panel 115vac Control circuit. Two wires from the flow switch are field wired to the unit control panel, no external voltage is required. The flow switch must be Normally Open with no flow and Closed with flow. The flow switch should break when flow drops below 70% of design flow.

3. Condenser Water Flow Switch- This flow switch is also within the unit control panel 115vac Control circuit. Two wires from the flow switch are field wired to the unit control panel, no external voltage is required. The flow switch should break when flow drops below 70% of design flow.

Operational Output Signals

Field wiring load is not to exceed: 2.8A inductive 1/3 hp @ 115V, 30VDC. This applies to items 4 thru 8.

4. Chilled Water Pump Starter-A dry set of Normally Open contacts within the unit control panel provides the start signal for the field supplied chilled water pump motor starter and circuit. Two wires from the field supplied motor starter and circuit are wired to the unit control panel, external voltage is required to power the motor starter.

5. Condenser Water Pump Starter- A dry set of Normally Open contacts within the unit control panel provides the start signal for the field supplied condenser water pump motor starter and circuit. Two wires from the field supplied motor starter and circuit are wired to the unit control panel, external voltage is required to power the motor starter.

Note: *If options identified in steps 6, 7, 8 or 10 are not applicable, no additional wiring is required.*

6. Hot Water Option: Hot Water Pump Starter-A dry set of Normally Open contacts within the unit control panel provides the start signal for the field supplied HOT water pump motor starter and circuit. Two wires from the field supplied motor starter and circuit are wired to the unit control panel, external voltage is required to power the motor starter.

7. Remote Alarm Relay Option - A dry set of SPDT (N.O.& N.C.) contacts within the unit control panel provides the signal for a field supplied alarm or device. This can be used to monitor status remotely.

8. Chiller Running Relay Option - A dry set of SPDT (N.O. & N.C.) contacts within the unit control panel provides the signal for field supplied indicator or device. This can be used to monitor status of the with unit operation. These contacts actuate with the solution pump operation.

Installation

9. Energy Valve - The energy valve is either a steam or hot water valve. The valve is provided by Trane for installation by the installing contractor. Confirm wiring is correct (ref. Chart 8 and Fig. 19) between the Stepper Module (1U3) and the Energy Valve.

Do not route energy valve, four wire drive signal, in the same conduit with the energy valve position sensor (BPI) item 13 of Chart 8.

Field Wiring Below 30VAC

NOTE: Do not run low voltage wires in conduit containing high voltage wiring (above 30VAC). If this is found it will be required to be separated. (Control signal interference may result.)

Optional (Ref. Chart 8)
10. Outdoor Temperature Sensor Option — An outdoor temperature sensor (2 wire) input utilized with chilled water reset based on outdoor air temperature. The sensor is supplied by Trane (loose parts box) for field installation by others. Install just inside the buildings fresh air duct, or on the north exterior wall of the building. In either case, shelter the sensor from direct sunlight and the elements.

NOTE: Optional items 11 or 12, if not used, **must** be jumpered. When used, customer supplied contacts must be compatible with dry circuit 24VDC, 12mA resistive. Fine silver or better contacts are recommended.

11. Emergency Stop Option — Allows emergency stop from an external device. This is restricted for mandatory emergency stop. Use item 11 for normal start/stop external control. A Normally closed contact input provides normal operation.

12. External Auto/Stop Option — Allows start/stop from an external device. A Normally closed contact input provides auto mode.

13. Energy valve position sensor (BPI) must be routed separate from the four wire drive signal.

Figures 19 and 20 illustrate typical field wiring, unit wiring and component connections within the control panel for field wiring purposes. Refer to these as required. Table 9 provides electrical data (50 and 60 cycle).

Installation

Table 9. Electrical data (60 cycle)

Unit Size	Phase and Frequency	HP -4	Volts	FLA -5	SFA -6	LRA -7	Min. Ckt. Ampacity (8)	Max. Fuse Size (9)
112	3 Phase		200	18.6	20.9	120	28	45 Amp
thru	60 Hz	5	460	8.1	8.9	46	12	20 Amp
200			575	6.2	6.7	34	9	15 Amp
228	3 Phase		200	24.2	27.6	136	34	50 Amp
thru	60 Hz	7.5	460	10.5	12	58	15	25 Amp
465			575	8.6	9.6	46	12	20 Amp

Notes:

1. Control circuit is 115 volts.
2. Machines have a 0.75 KVA control power transformer with a minimum of 150 volt amperes capacity available for external load.
3. Purge pump and control circuit are fused separately with 10A-125V Fuestrons.
4. HP is motor horsepower.
5. FLA is full load amps.
6. SFA is service factor amps.
7. LRA is locked rotor amps.
8. Minimum circuit ampacity based on NEC 430-24.
9. Dual element fuse (class K5 time delay) based on NEC 430-52.

Installation

Table 9. Electrical data (50 cycle) (continued)

Unit Size	Phase and Frequency	HP -4	Volts	FLA -5	LRA -6	Min. Ckt. Ampacity (7)	Max. Fuse Size (8)
112			190	18.6	88	27	45 Amp
129	3-Phase	5	220	20.0	100	28	45 Amp
148	50-Hz		380	9.3	44	14	20 Amp
			415	10.5	47	15	20 Amp
174			190	26.0	110	37	60 Amp
200			220	23.0	127	32	50 Amp
228	3 Phase	7.5	380	13.0	55	18	30 Amp
256	50 Hz		415	12.0	67	17	25 Amp
294							
354			190	33.0	146	45	70 Amp
385	3 Phase	10	220	30.0	168	41	70 Amp
420	50 Hz		380	16.5	73	23	35 Amp
465			415	16.0	89	23	35 Amp

Notes:

1. Control circuit is 115 volts.
2. Machines have a 0.75 KVA control power transformer with a minimum of 150 volt amperes capacity available for external load.
3. Purge pump and control circuit are fused separately with 10A-125V Fuestrons.
4. HP is motor horsepower.
5. FLA is full load amps.
6. LRA is locked rotor amps.
7. Minimum circuit ampacity based on NEC 430-24.
8. Dual element fuse (class K5 time delay) based on NEC 430-52.

Installation

Figure 19. Typical schematic field wiring

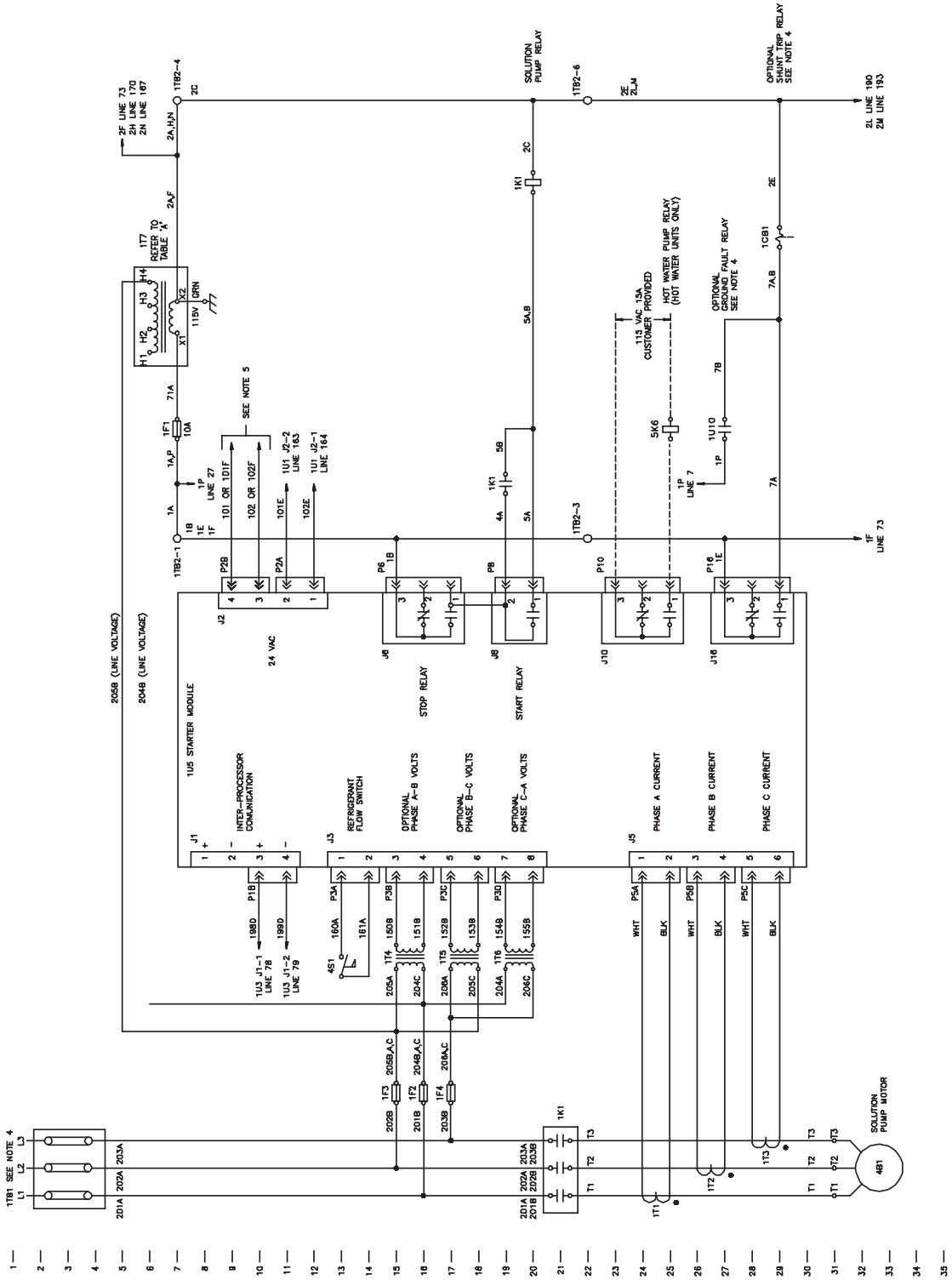


Figure 19. Typical schematic field wiring (continued)

Installation

Figure 20. Typical schematic field wiring

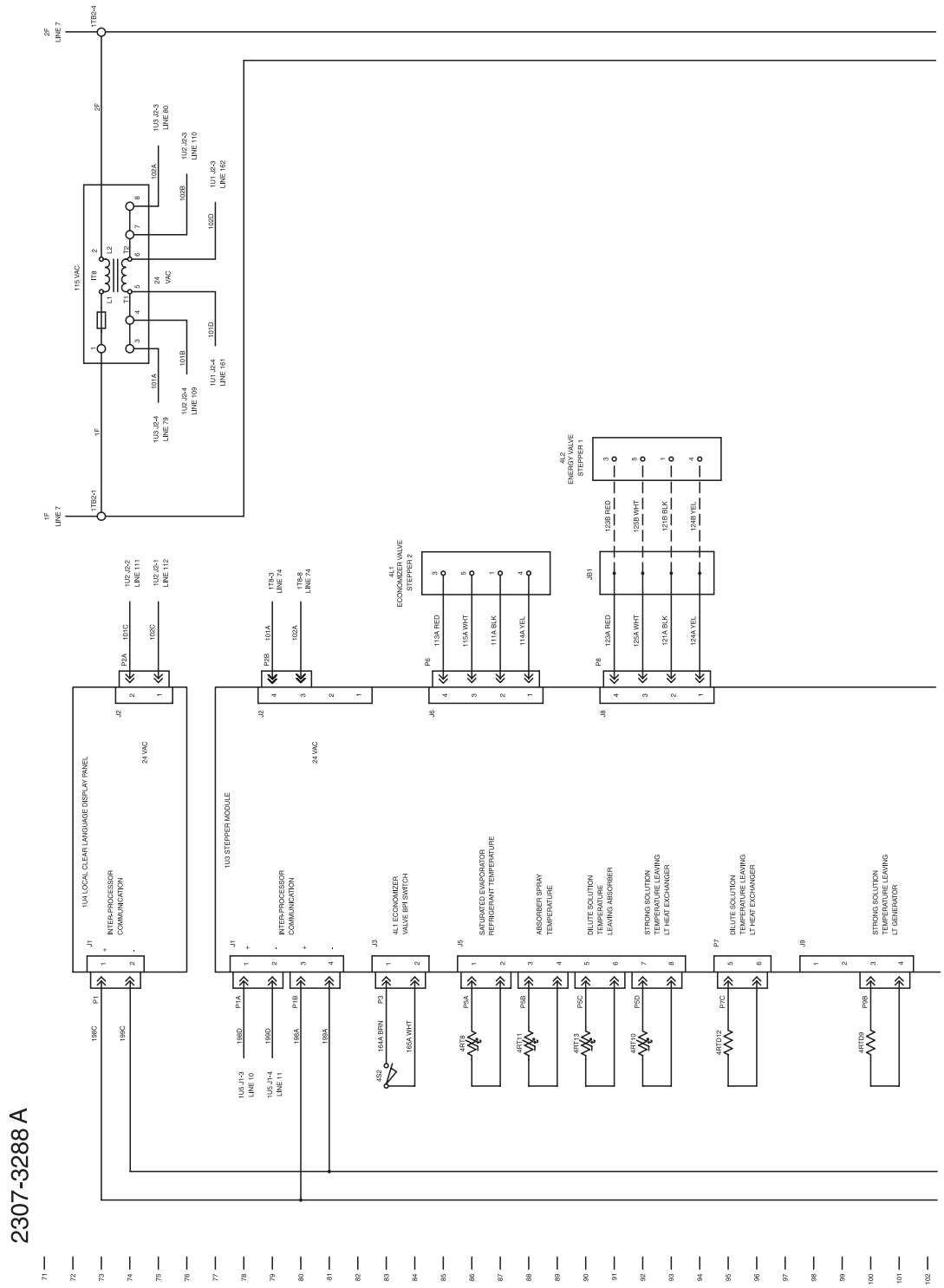
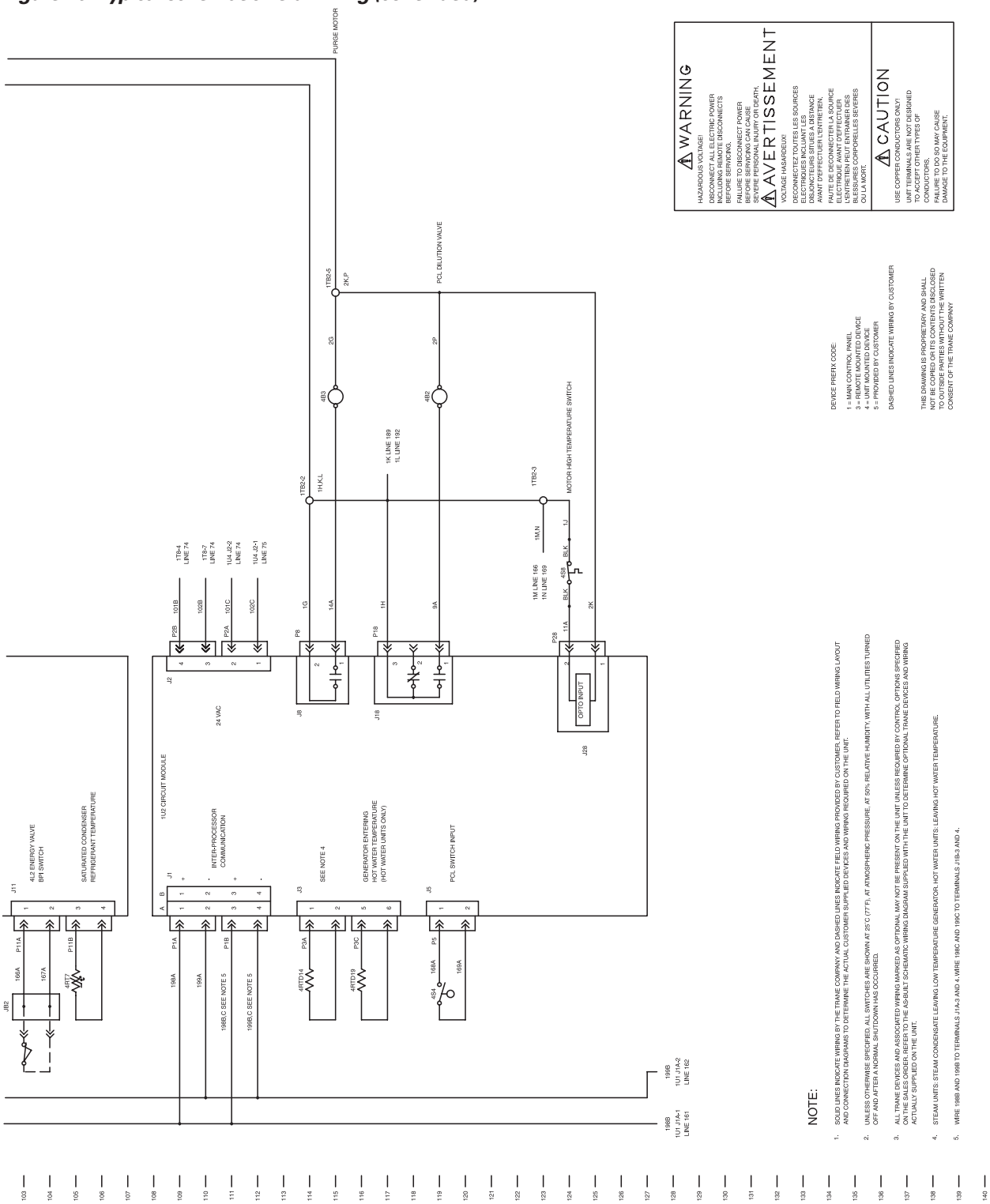


Figure 20. Typical schematic field wiring (continued)



DEVICE PREFIX CODE:
1 = MAIN CONTROL PANEL
3 = REMOTE MOUNTED DEVICE
4 = HEAT RECOVERY MODULE
5 = PROVIDED BY CUSTOMER

DASHED LINES INDICATE WIRING BY CUSTOMER

NOTE:

1. SOLID LINES INDICATE WIRING BY THE TRANE COMPANY AND DASHED LINES INDICATE FIELD WIRING PROVIDED BY CUSTOMER, REFER TO FIELD WIRING LAYOUT AND CONNECTION DIAGRAMS TO DETERMINE THE ACTUAL CUSTOMER SUPPLIED DEVICES AND WIRING REQUIRED ON THE UNIT.
2. UNLESS OTHERWISE SPECIFIED, ALL SWITCHES ARE SHOWN AT 25° C (77° F), AT ATMOSPHERIC PRESSURE, AT 50% RELATIVE HUMIDITY, WITH ALL UTILITIES TURNED OFF AND AFTER A NORMAL SHUTDOWN HAS OCCURRED.
3. ALL TRANE DEVICES AND ASSOCIATED WIRING MARKED AS OPTIONAL MAY NOT BE PRESENT ON THE UNIT UNLESS REQUIRED BY CONTROL OPTIONS SPECIFIED ON THE SALES ORDER, REFER TO THE AS-BUILT SCHEMATIC WIRING DIAGRAM SUPPLIED WITH THE UNIT TO DETERMINE OPTIONAL TRANE DEVICES AND WIRING ACTUALLY SUPPLIED ON THE UNIT.
4. STEAM UNITS, STEAM CONDENSATE LEAVING LOW TEMPERATURE GENERATOR, HOT WATER UNITS, LEAVING HOT WATER TEMPERATURE.
5. WIRE 1988 AND 1998 TO TERMINALS J1A-3 AND 4, WIRE 198C AND 199C TO TERMINALS J1B-3 AND 4.

Installation

Figure 21. Typical schematic field wiring

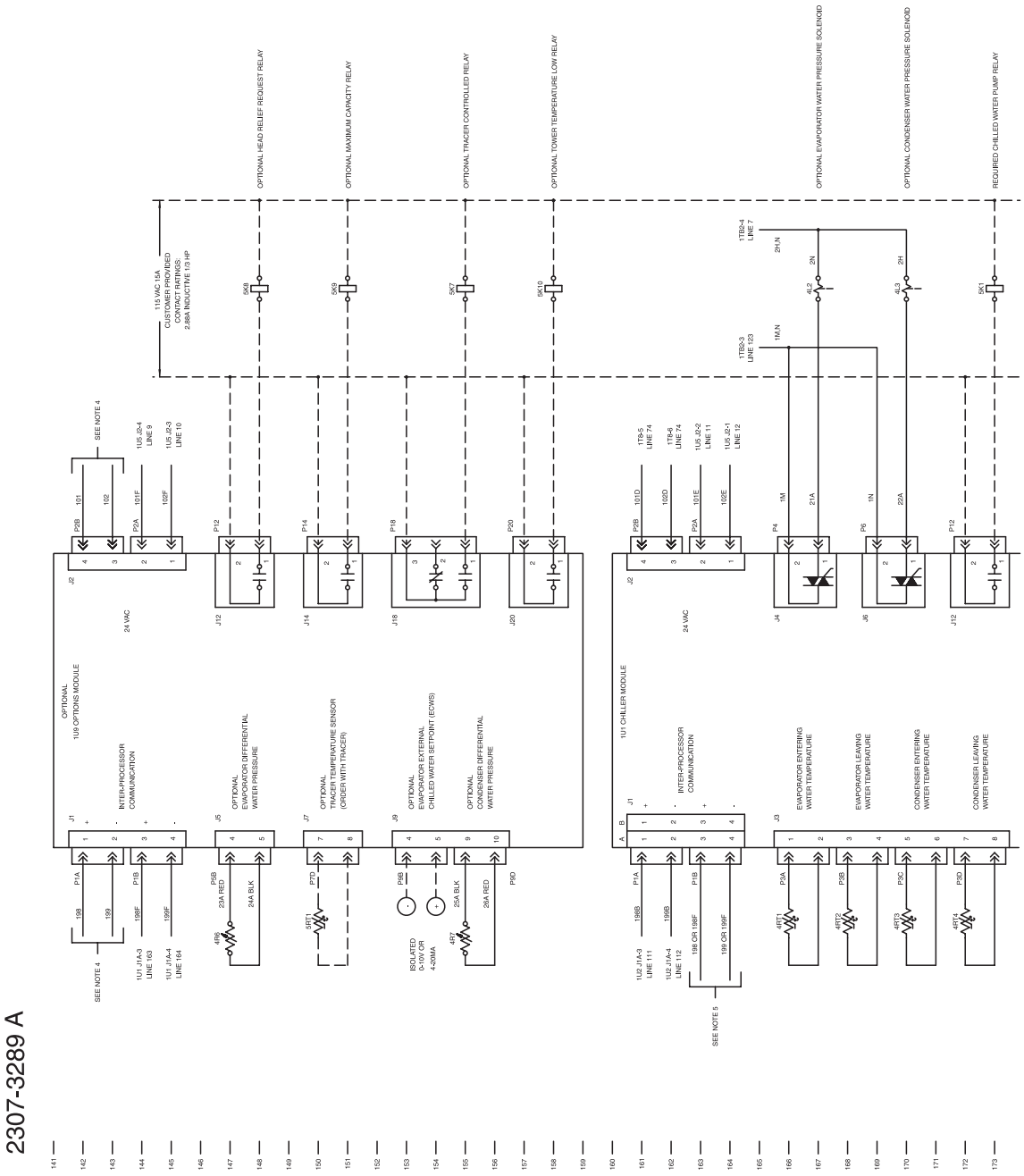
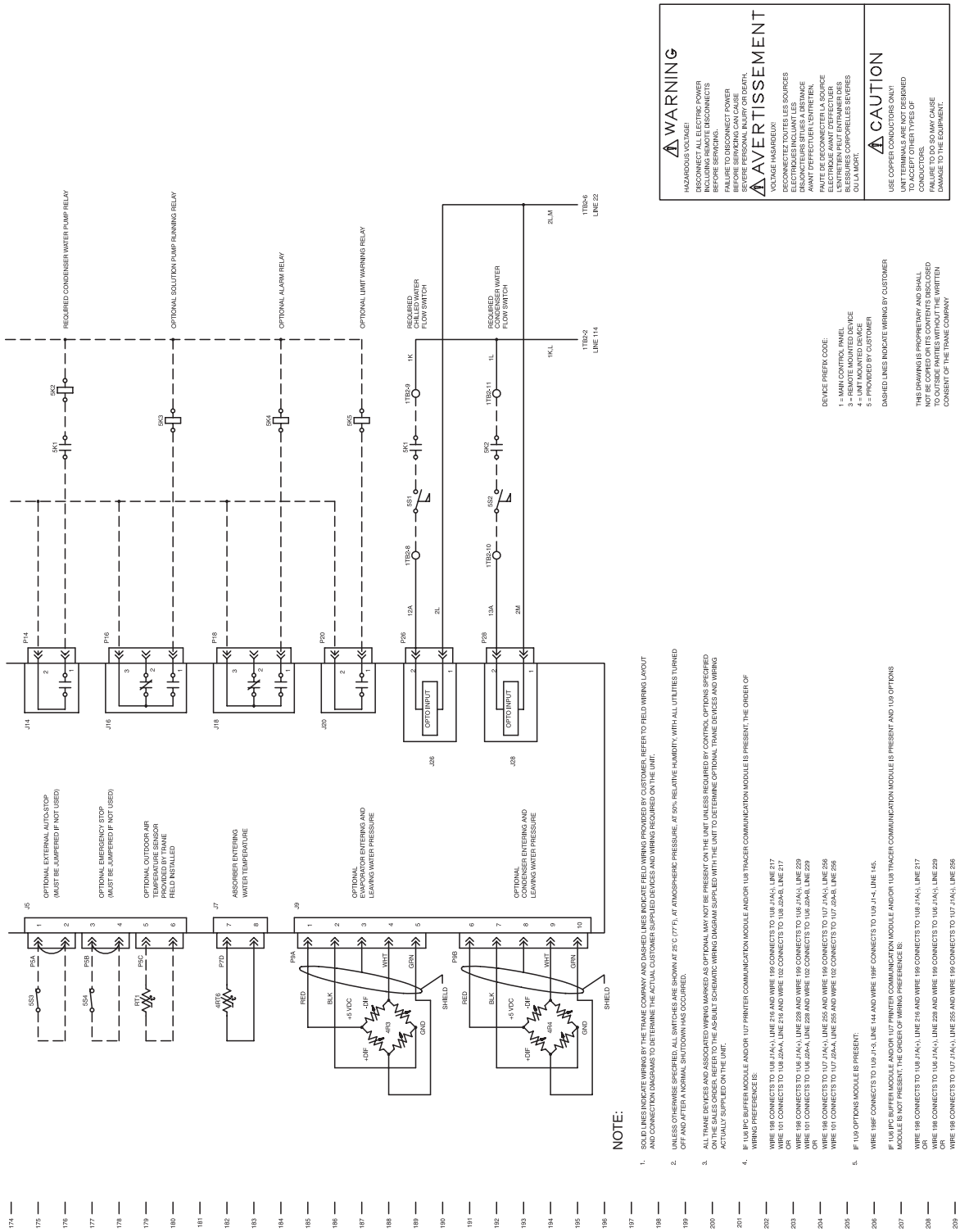
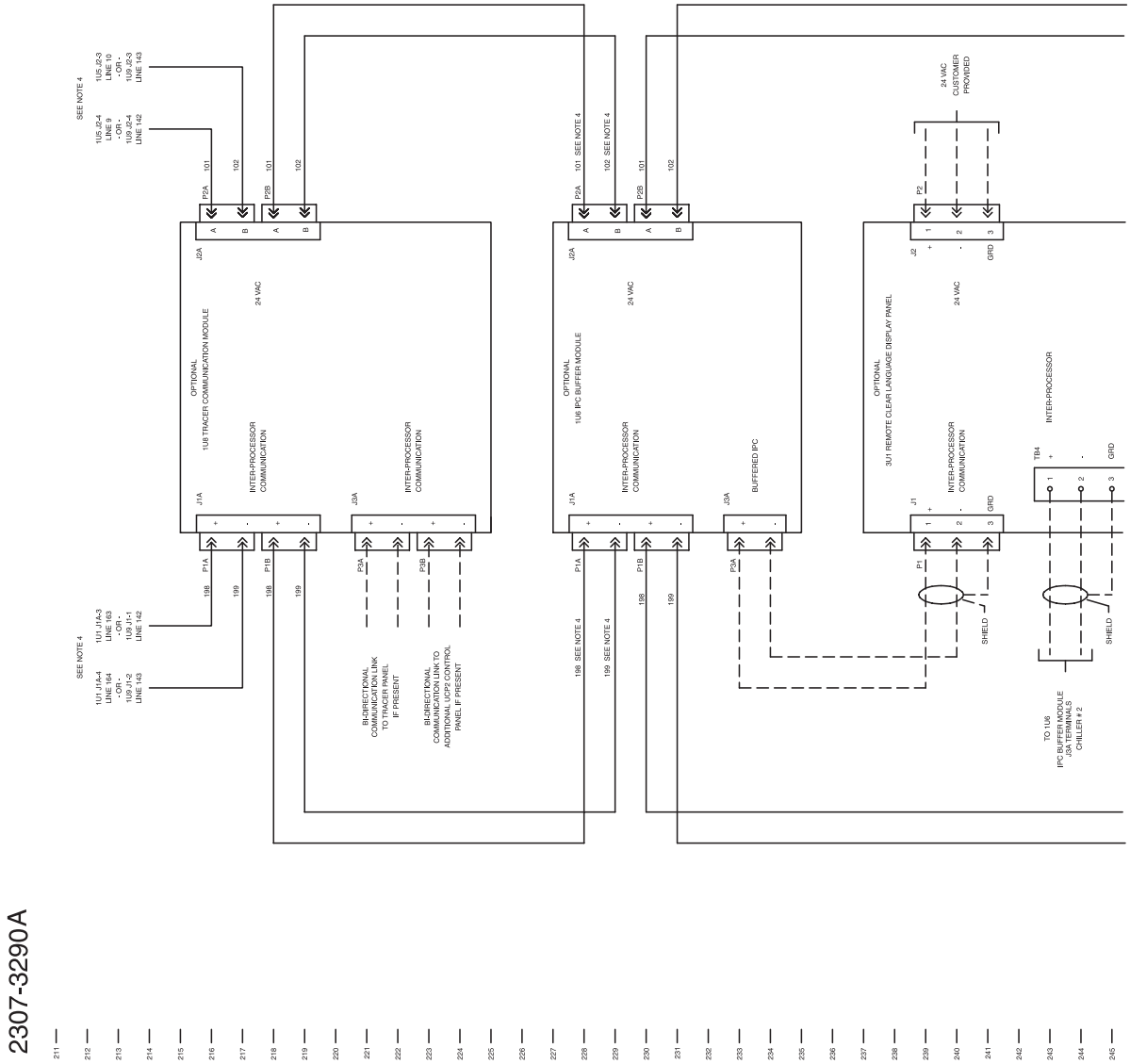


Figure 21. Typical schematic field wiring (continued)



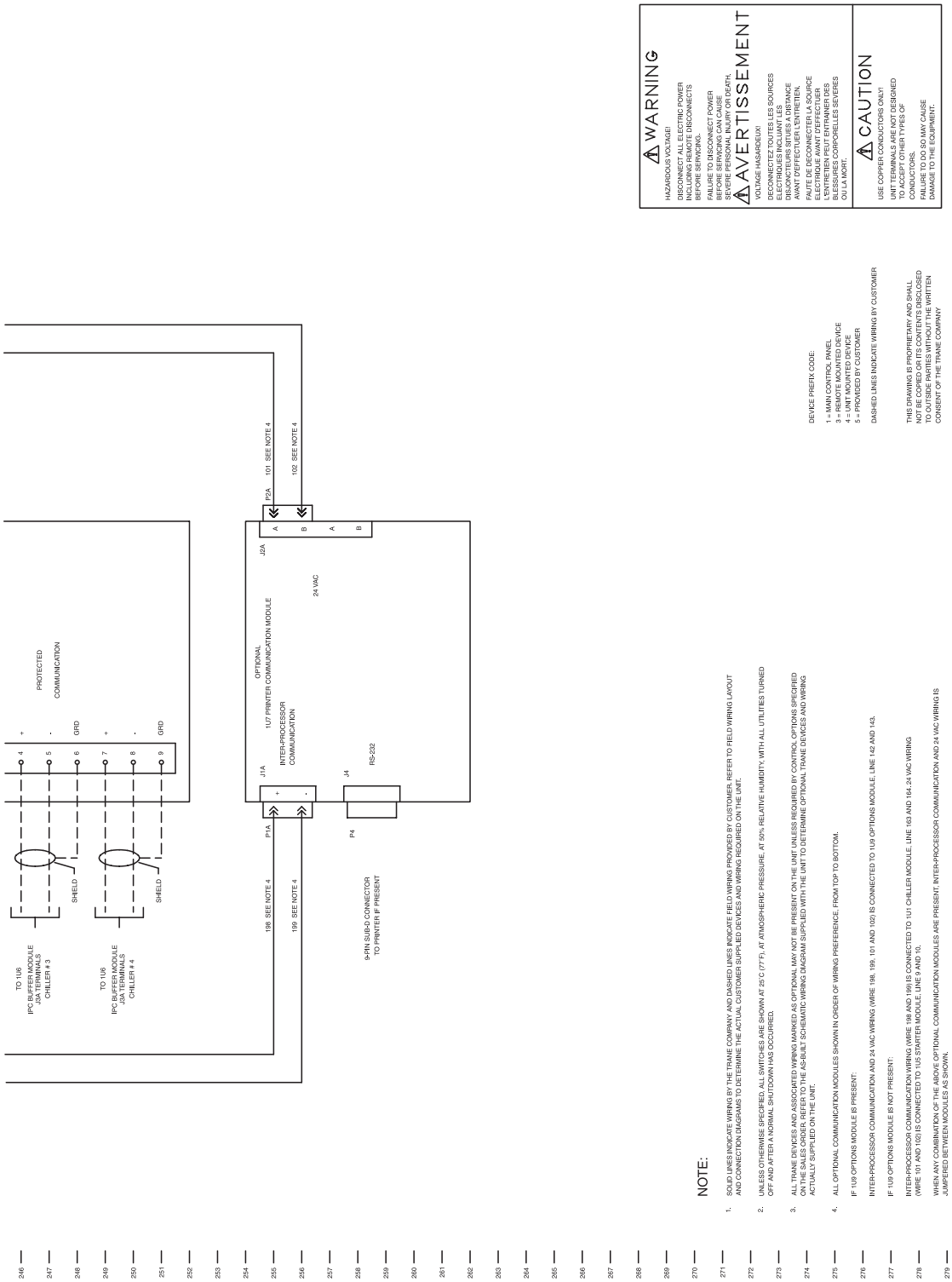
Installation

Figure 22. Typical schematic field wiring



2307-3290A

Figure 22. Typical schematic field wiring (continued)



Installation

Insulation

To prevent sweating of the components and resulting accumulation of water on the equipment room floor, it is recommended that the following areas be insulated:

1. Evaporator water boxes.
2. Pump motor lubrication lines.
3. Refrigerant pump housing.
4. Refrigerant spray tree piping.
5. Evaporator return piping.
6. Evaporator refrigerant storage tank and piping. (If present).

NOTE: There are two condensate weep holes in the bottom of the pump motor housing. To prevent motor damage, make certain these holes remain free and clear. The pump motor does not require insulation.

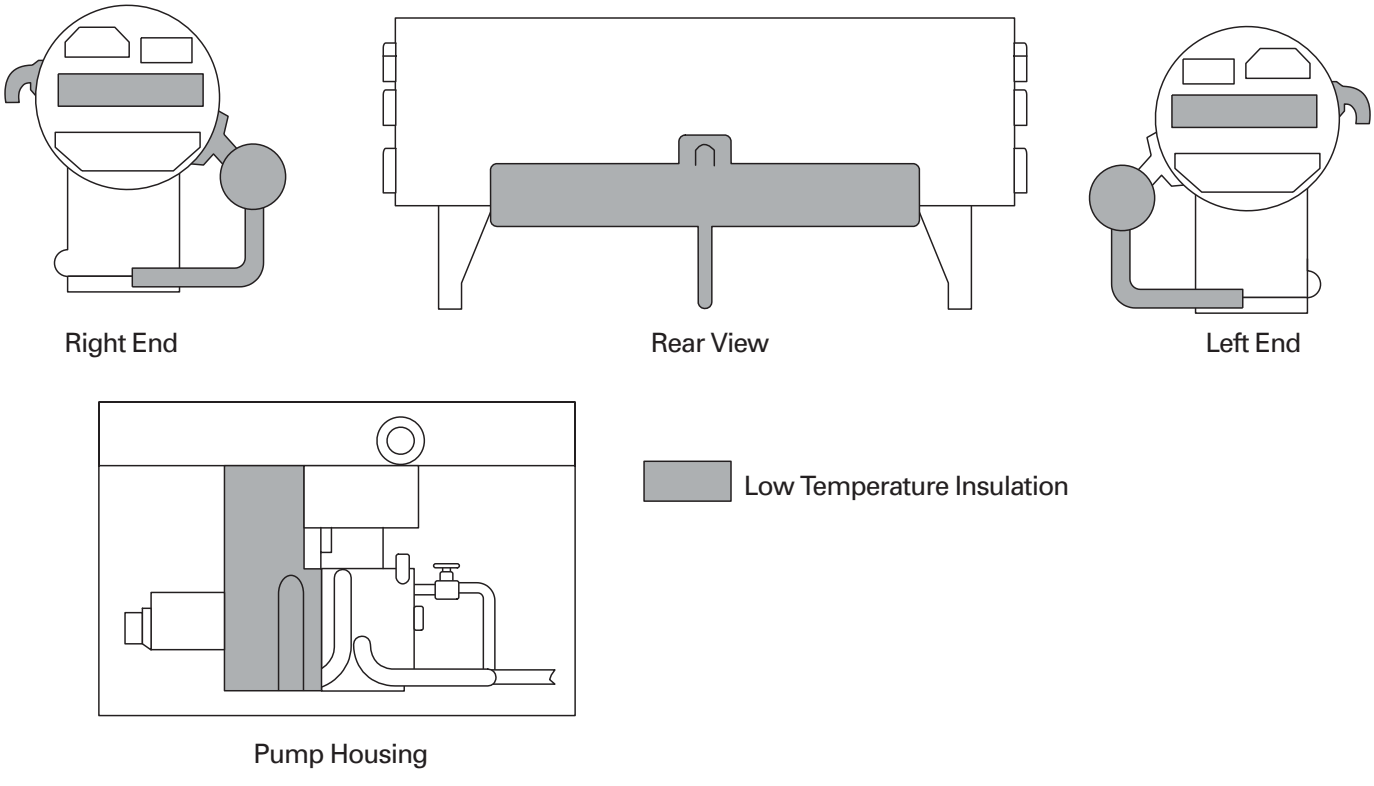
NOTE: When insulation is added to the water box covers, it should be done in such a manner that it can be removed without destroying it when the water box cover is removed for service.

See Figure 23 - Required Insulation Areas, and Table 10 illustrates the insulation requirements.

Table 10. Insulation requirements

Unit Size	Insulation (Sq. Ft.)	Insulation ($m^{2)}$
112, 129, 148	43	3.99
174, 200, 228	46	4.27
256, 294, 354	53	4.92
385, 420, 465	58	5.39

Figure 23. Required Insulation Areas



Start-Up

A Trane Service Engineer will supervise the pre-start check, charging, startup and trim of the absorbent solution when the installation is complete (with the exception of insulation) per the check sheet found on page 6.

Sufficient load must be available to operate and adjust the unit at the time of start-up. Send the completed forms to the local Trane Sales Office at least two weeks in advance of the date a Service Engineer will be required. The contractor is expected to provide manpower to assist the service engineer during the initial start-up period.

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