TRANE®

Installation
Operation
Maintenance

Series R® Air-Cooled Helical Rotary Liquid Chiller

Models

RTAC 140-250 ton units (60 Hz)

RTAC 140-200 ton units (50 Hz)

December 2000

X39640550010 **RTAC-SVX001-EN**

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Literature History

RTAC-SVX001-EN (December 2000)

New manual describes installation, operation, and maintenance of RTAC units.

Unit Identification - Nameplates

When the unit arrives, compare all nameplate data with ordering, submittal, and shipping information. A typical unit nameplate is shown in Figure 1 and Figure 2:

Figure 1
Typical Unit Nameplate (Pueblo)

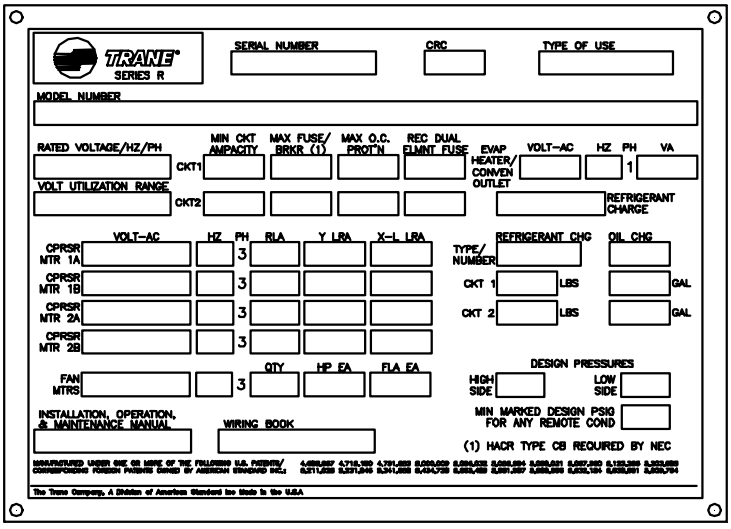

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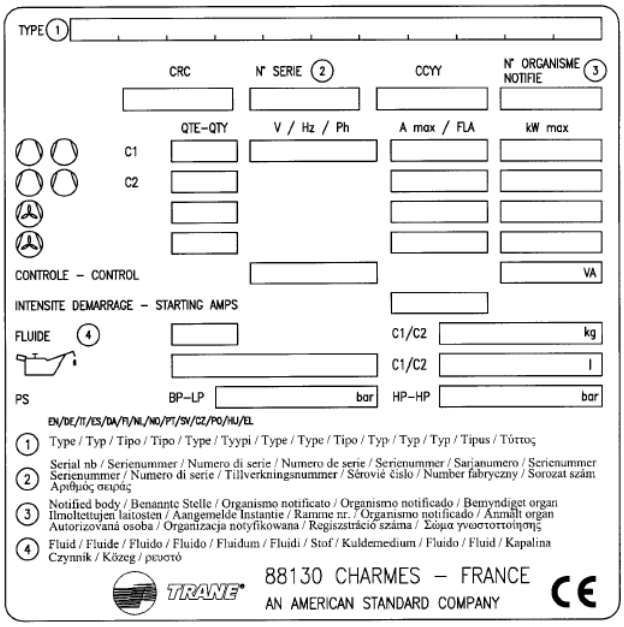
Figure 2
Typical Unit Nameplate (Charmes)



Unit Inspection

When the unit is delivered, verify that it is the correct unit and that it is property equipped. Compare the information which appears on the unit nameplate with the ordering and submittal information. Refer to “Nameplates”.

Inspect all exterior components for visible damage. Report any apparent damage or material shortage to the carrier and make a “unit damage” notation on the carrier’s delivery receipt. Specify the extent and type of damage found and notify the appropriate Trane Sales Office. Do not proceed with installation of a damaged unit without sales office approval.

Inspection Checklist

To protect against loss due to damage incurred in transit, complete the following checklist upon receipt of the unit.

[ ] Inspect the individual pieces of the shipment before accepting the unit. Check for obvious damage to the unit or packing material.

[ ] Inspect the unit for concealed damage as soon as possible after delivery and before it is stored. Concealed damage must be reported within 15 days.

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[ ] If concealed damage is discovered, stop unpacking the shipment. Do not remove damaged material from the receiving location. Take photos of the damage, if possible. The owner must provide reasonable evidence that the damage did not occur after delivery.

[ ] Notify the carrier's terminal of the damage immediately, by phone and by mail. Request an immediate, joint inspection of the damage with the carrier and the consignee.

[ ] Notify the Trane sales representative and arrange for repair. Do not repair the unit, however, until damage is inspected by the carrier's representative.

Loose Parts Inventory

Check all the accessories and loose parts which are shipped with the unit against the shipping list. Included in these items will be water vessel drain plugs, rigging and electrical diagrams, and service literature, which are placed inside the control panel and/or starter panel for shipment.

Commonly Used Abbreviations

Abbreviations and terms used in this manual are defined below.

OAT = Outdoor Air Temperature

BAS = Building Automation System

BCL = Bidirectional Communications Link

CAR = Circuit Shutdown, Auto Reset

CLS = Current Limit Setpoint

CMR = Circuit Shutdown, Manual Reset

CPRS = compressor

CWR = Chilled Water Reset

CWS = Chilled Water Setpoint

DDT = Design Delta-Temperature Setpoint (i.e., the difference between entering and leaving chilled water temperatures)

DPPC = Dual Point Power Connection

ENT = Entering Chilled Water Temperature

ELWT = Evaporator Leaving Water Temperature

EPROM = Electrical Progarmmable Read-Only Memory

General Information

EXV = Electronic Expansion Valve

FLA = Full Load Amps

GFCI = Ground Fault Circuit Interrupt

HACR = Heating, Air Conditioning, and Refrigeration

HVAC = Heating, Ventilating and Air Conditioning

IFW = Informational Warning

I/O = Input and Output Wiring

IPC = Inter-Processor Communications

LLID = Low Level Intelligent Device

LRA = Locked Rotor Amps

MAR = Machine Shutdown, Auto Reset

MMR = Machine Shutdown, Manual Reset

MP = Main Processor

NEC = National Electric Code

PCWS =Front Panel Chilled Water Setpoint

PFCC = Power Factor Correction Capacitors

POE = Polyolester Oil

PSID = Pounds-per-Square-inch Differential (pressure differential)

PSIG = Pounds-per-Square-inch (gauge pressure)

RAS = Reset Action Setpoint

RLA = Rated Load Amps

RCWS =Reset Chilled Water Setpoint

RRS = Reset Reference Setpoint

SCWR = Short Circuit Withstand Rating

SPPC = Single Point Power Connection

SV = Slide Valve

Tracer ™ =Type of Trane Building Automation System

General Information

SCI = Serial Communications Interface

ST = Service Tool

TEAO = Totally Enclosed Air Over

UCLS = Unit Current Limit Setpoint

UCM = Unit Control Module (Microprocessor-based)

UOVM = under/over voltage transformer

Unit Description

The 140 through 250-ton Model RTAC units are helical-rotary type, air-cooled liquid chillers designed for installation outdoors. The compressor circuits are completely assembled, hermetic packages that are factory-piped, wired, leak-tested, dehydrated, and tested for proper control operation before shipment.

Note: Packaged units are factory charged with refrigerant and oil.

Figure 3 shows a typical RTAC packaged unit and its components

Tables 1 and 2 contain general RTAC mechanical specifications.

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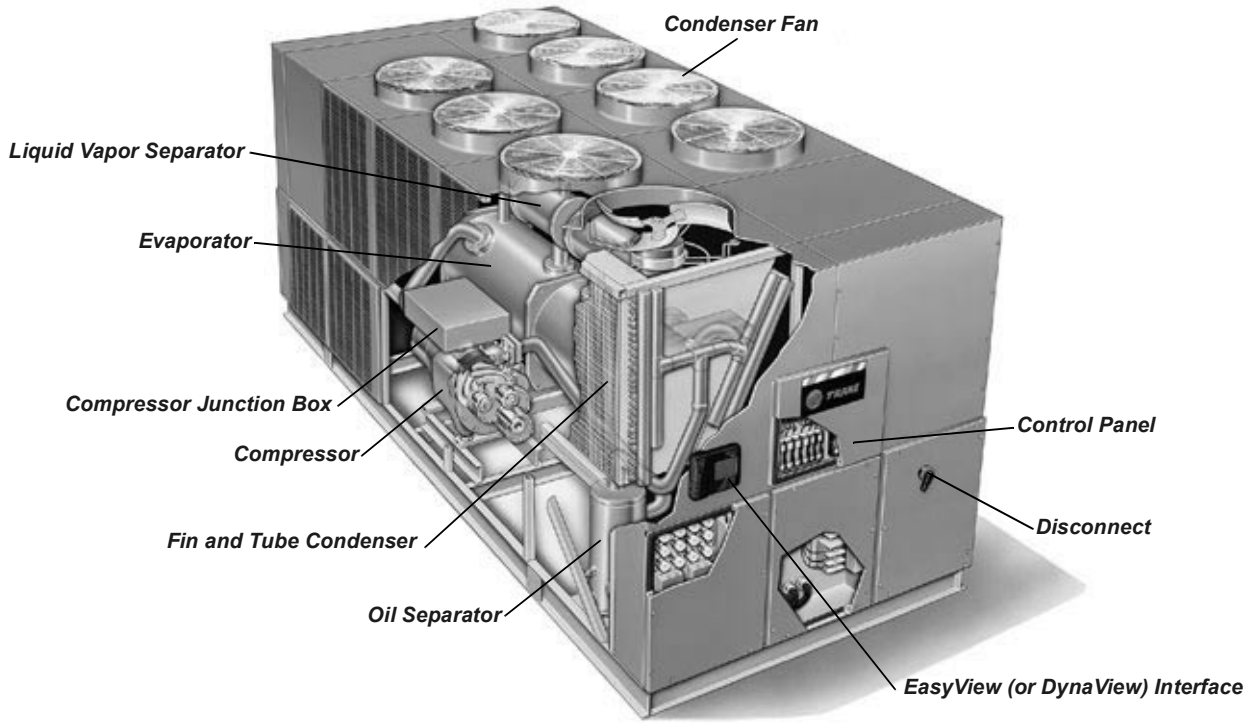
Figure 3
Typical RTAC Unit



Chilled water inlet and outlet openings are covered for shipment. Each compressor has a separate compressor motor starter. The RTAC series features Trane's exclusive Adaptive Control ™ logic, which monitors the control variables that govern the operation of the chiller unit. Adaptive Control logic can adjust capacity variables to avoid chiller shutdown when necessary, and keep producing chilled water. The units feature two independent refrigerant circuits. Compressor unloaders are solenoid actuated and oil pressure operated. Each refrigerant circuit is provided with filter drier, sight glass, electronic expansion valve, and charging valves. The shell-and-tube type evaporator is manufactured in accordance with ASME standards. Each evaporator is fully insulated and is equipped with water drain and vent connections. Packaged units have heat tape protection to -20°F (-28.9°C) as standard. As an option, a convenience outlet can be supplied.

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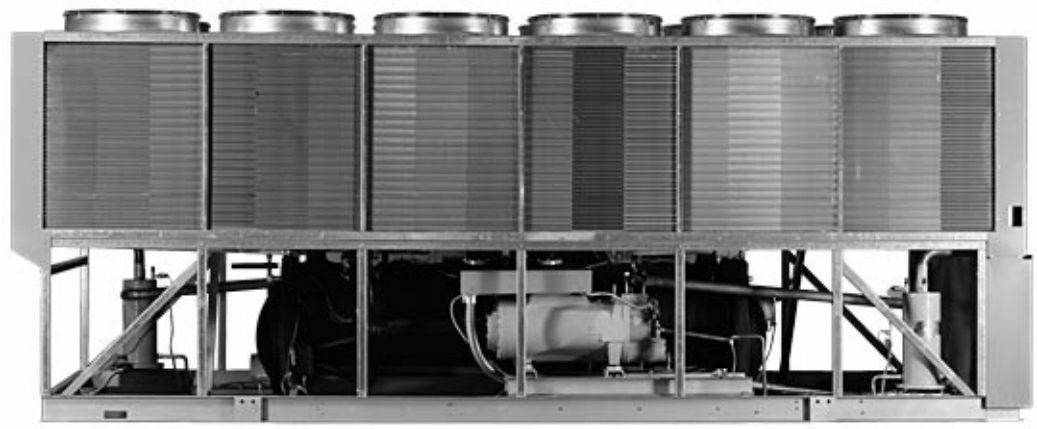
The following photo images show the RTAC in two views.



General Information

Table 1
General Data RTAC 140-240 Tons 60 Hz - Standard Unit (Pueblo)

Size	140	155	170	185	200	225	250
Shipping Weight (lb)	11123	11196	11291	13105	13672	14906	15806
Shipping Weight (kg)	5046	5079	5122	5944	6202	6761	7170
Operating Weight (lb)	11417	11510	11626	13451	14035	15296	16224
Operating Weight (kg)	5179	5221	5274	6101	6366	6938	7359
Compressor							
Quantity	2	2	2	2	2	2	2
Nom. Size (Tons)[1]	70/70	85/70	85/85	100/85	100/100	120/100	120/120
Evaporator							
Water Storage (Gallons)	35.2	37.6	40.1	41.5	43.5	46.8	50.1
(Liters)	132.3	141.3	150.7	156.0	163.5	175.9	188.3
Min. Flow (GPM)	170	182	198	215	215	237	259
(L/sec)	10.7	11.5	12.5	13.6	13.6	14.9	16.3
Max. Flow (GPM)	525	606	687	626	767	848	929
(L/sec)	33.1	38.2	43.3	39.5	48.4	53.5	58.6
Condenser							
Qty of Coils	2/2	2/2	2/2	2/2	2/2	2/2	2/2
Coil Length[2], (inches)	156/ 156	180/ 156	180/ 180	216/180	216/216	252/216	252/252

General Information

Table 1
General Data RTAC 140-240 Tons 60 Hz - Standard Unit (Pueblo)

Size	140	155	170	185	200	225	250
Condenser Fans							
Quantity[1]	4/4	5/4	5/5	6/5	6/6	7/6	7/7
Total Airflow (CFM)	77,000	84,542	92,087	101,296	110,506	119,725	128,946
General Unit							
Refrigerant	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a
Refrigerant Charge (lb)	145/145	155/145	155/155	220/210	220/220	230/220	230/230
(kg)	65.8/65.8	70.3/65.8	70.3/70.3	99.8/95.3	99.8/99.8	104.4/99.8	104.4/104.4
Oil Charge (Gallons)[1]	2.0/2.0	2.0/2.0	2.0/2.0	2.6/2.0	2.6/2.6	2.6/2.6	2.6/2.6
(Liters)	7.6/7.6	7.6/7.6	7.6/7.6	9.9/7.6	9.9/9.9	9.9/9.9	9.9/9.9

[1] *Data containing information on two circuits shown as follows: CKT 1/CKT 2*

[2] *For all units, coil height is 42 inches; 192 Fins/ft; and 3 rows*

Table 2
General Data RTAC 140-200 Tons 50 HZ - Standard Unit (Pueblo)

Size	140	155	170	185	200
Shipping Weight (lb)	11123	11552	11980	13471	13672
Shipping Weight (kg)	5046	5240	5434	6110	6202
Operating Weight (lb)	11417	11866	11626	13817	14035
Operating Weight (kg)	5179	5382	5274	6268	6366
Compressor					
Quantity[1]	2	2	2	2	2
Nom. Size (Tons)[1]	70/70	85/70	85/85	100/85	100/100

General Information

Table 2
General Data RTAC 140-200 Tons 50 HZ - Standard Unit (Pueblo)

Size	140	155	170	185	200
Evaporator					
Water Storage (Gallons)	35.2	37.6	40.1	41.5	43.5
(Liters)	132.3	141.3	150.7	156.0	163.5
Min. Flow (GPM)	171	182	198	215	215
(L/sec)	10.8	11.5	12.5	13.6	13.6
Max. Flow (GPM)	525	606	684	626	767
(L/sec)	33.1	38.2	43.1	39.5	48.4
Condenser					
Qty of Coils	2/2	2/2	2/2	2/2	2/2
Coil Length[1] (inches)	156/156	180/156	180/180	216/180	218/216
Condenser Fans					
Quantity[1]	4/4	5/4	5/5	6/5	6/6
Total Airflow (CFM)	63,346	69,507	75,671	83,236	90,803
General Unit					
Refrigerant	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a
Refrigerant Charge (lb)	145/145	155/145	155/155	220/210	220/220
(kg)	66/66	70/66	70/70	100/95	100/100
Oil Charge (Gallons)[1]	2.0/2.0	2.0/2.0	2.0/2.0	2.6/2.0	2.6/2.6
(Liters)	7.6/7.6	7.6/7.6	7.6/7.6	9.9/7.6	9.9/9.9

[1] *Data containing information on two circuits shown as follows: CKT 1/CKT 2*

General Information

Table 3
General Data RTAC 140-200 Tons 50 HZ - High Efficiency Unit (Pueblo)

Size	140	155	170	185	200
Shipping Weight (lb)	10203	11785	12205	13415	13593
Shipping Weight (kg)	4628	5346	5536	6085	6166
Operating Weight (lb)	10537	12132	12568	13805	14011
Operating Weight (kg)	4780	5503	5701	6262	6355
Compressor					
Quantity	2	2	2	2	2
Nom. Size (Tons)[1]	70/70	85/70	85/85	100/85	100/100
Evaporator					
Water Storage (Gallons)	40.1	41.5	43.5	46.8	50.1
(Liters)	150.7	156.0	163.5	175.9	188.3
Min. Flow (GPM)	198	215	215	237	259
(L/sec)	12.5	13.6	13.6	14.9	16.3
Max. Flow (GPM)	687	626	767	848	929
(L/sec)	43.3	39.5	48.4	53.5	58.6
Condenser					
Qty of Coils	2/2	2/2	2/2	2/2	2/2
Coil Length (inches)[1]	180/180	216/180	216/216	252/216	252/252
Condenser Fans					
Quantity[1]	5/5	6/5	6/6	7/6	7/7
Total Airflow (CFM)	75,575	83,130	90,687	98,256	105,826

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Table 3
General Data RTAC 140-200 Tons 50 HZ - High Efficiency Unit (Pueblo)

Size	140	155	170	185	200
General Unit					
Refrigerant	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a
No. of Independent Rfgt Circuits	2	2	2	2	2
Refrigerant Charge (lb)	155/155	220/210	220/220	230/220	230/230
(kg)	70/70	100/95	100/100	104/100	104/104
Oil Charge (Gallons)[1]	2.0/2.0	2.0/2.0	2.0/2.0	2.6/2.0	2.6/2.6
(Liters)	7.6/7.6	7.6/7.6	7.6/7.6	9.9/7.6	9.9/9.9

[1] *Data containing information on two circuits shown as follows: CKT 1/CKT 2*

Table 4
General Data RTAC 140-200 Tons 60 HZ - High Efficiency Unit (Pueblo)

Size	140	155	170	185	200
Shipping Weight (lb)	10203	11465	11585	13085	13593
Shipping Weight (kg)	4628	5201	5255	5935	6166
Operating Weight (lb)	10537	11812	11948	13475	14011
Operating Weight (kg)	4780	5358	5419	6112	6355
Compressor					
Quantity	2	2	2	2	2
Nominal Size (Tons)[1]	70/70	85/70	85/85	100/85	100/100

General Information

Table 4
General Data RTAC 140-200 Tons 60 HZ - High Efficiency Unit (Pueblo)

Size	140	155	170	185	200
Evaporator					
Water Storage (Gallons)	40.1	41.5	43.5	46.8	50.1
(Liters)	150.8	156.0	163.3	175.8	188.3
Min. Flow (GPM)	198	215	215	237	259
(L/sec)	12.5	13.6	13.6	14.9	16.3
Max. Flow (GPM)	687	626	767	848	929
(L/sec)	43.3	39.5	48.4	53.5	58.6
Condenser					
Qty of Coils	2	2	2	2	2
Coil Length (feet)	15/15	18/15	18/18	21/18	21/21
Condenser Fans					
Quantity[1]	5/5	6/5	6/6	7/6	7/7
Total Airflow (CFM)	91,993	101,190	110,387	119,598	128,812
General Unit					
Refrigerant	HFC-134a	HFC-134a	HFC-134a	HFC-134a	HFC-134a
Refrigerant Charge (lb)	155/155	220/210	220/220	230/220	230/230
(kg)	70/70	100/95	100/100	104/100	104/104
Oil Charge[1] **(Gallons)**	2.0/2.0	2.0/2.0	2.0/2.0	2.6/2.0	2.6/2.6
(Liters)	7.6/7.6 7	7.6/7.6	7.6/7.6	9.9/7.6	9.9/9.9

[1] *Data is for two circuits shown as follows: CKT 1/CKT 2*

General Information

Table 5
General Data *RTAC 140 - 200 Ton Standard Units (Charmes - France)*

Size		140	155	170	185	200
Shipping Weight	kg	5107	5265	5434	6111	6232
Shipping Weight	lb	11767	12131	12521	14081	14359
Operating Weight	kg	5216	5407	5586	6268	6396
Operating Weight	lb	12018	12459	12871	14442	14737
Compressor						
Quantity		2	2	2	2	2
Nominal Size$_1$	Tons	70/70	85/70	85/85	100/85	100/100
Evaporator						
Evap. Model		F140	F155	F170	F185	F200
Water Storage	l	132.3	141.3	150.7	156	163.5
Water Storage	Gallons	35	37.3	39.8	41.2	43.2
Min. Flow	l/s	10.8	11.5	12.5	13.6	13.6
Min. Flow	GPM	171.2	182.3	198.2	215.6	215.6
Max. Flow	l/s	33.1	38.2	43.1	39.5	48.4
Max. Flow	GPM	524.7	605.6	683.2	626.2	767.2
Condenser						
Qty of Coils		4	4	4	4	4
Coil Length	mm	3962/3962	4572/3962	4572/4572	5486/4572	5486/5486
Coil Length	Ft	13/13	15/13	15/15	18/15	18/18
Coil Height	mm	1067	1067	1067	1067	1067
Coil Height	Ft	3.5	3.5	3.5	3.5	3.5
Fin series	Fins/ft	192	192	192	192	192
Number of Rows		3	3	3	3	3
Condenser Fans						
Quantity$_1$		4/4	5/4	5/5	6/5	6/6
Diameter	mm	762	762	762	762	762
Diameter	Inch	30	30	30	30	30
Total Air Flow	m3/s	35.82	39.53	43.22	47.55	51.88

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Table 5
General Data *RTAC 140 - 200 Ton Standard Units (Charmes - France)*

Total Air Flow	*CFM*	*75867*	*83725*	*91540*	*100710*	*109882*
Nominal RPM		*915*	*915*	*915*	*915*	*915*
Tip Speed	*m/s*	*36.48*	*36.48*	*36.48*	*36.48*	*36.48*
Tip Speed	*Ft/s*	*120*	*120*	*120*	*120*	*120*
Motor kW	*kW*	*1.9*	*1.9*	*1.9*	*1.9*	*1.9*
Min Starting/Oper Ambient[2]						
Std Unit	*°C*	*-4*	*-4*	*-4*	*-4*	*-4*
Std Unit	*°F*	*25*	*25*	*25*	*25*	*25*
Low Ambient Unit	*°C*	*-23*	*-23*	*-23*	*-23*	*-23*
Low Ambient Unit	*°F*	*-9*	*-9*	*-9*	*-9*	*-9*
General Unit						
Refrigerant		*HFC 134a*	*HFC 134a*	*HFC 134a*	*HFC 134a*	*HFC 134a*
No. Of independent Refrigerant Circuits		*2*	*2*	*2*	*2*	*2*
% Min. Load		*15*	*15*	*15*	*15*	*15*
Refrigerant Charge[1]	*kg*	*65.8/65.8*	*70.3/65.8*	*70.3/70.3*	*99.8/95.3*	*99.8/99.8*
Refrigerant Charge[1]	*lb*	*145/145*	*155/145*	*155/155*	*220/210*	*220/220*
Oil Charge[1]	*l*	*7.6/7.6*	*7.6/7.6*	*7.6/7.6*	*9.9/7.6*	*9.9/9.9*
Oil Charge[1]	*Gallons*	*2/2*	*2.2*	*2.2*	*2.6/2*	*2.6/2.6*

[1] *Data containing information on two circuits shown as follows: CKT1/CKT2*

[2] *Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser*

General Information

Table 6
General Data RTAC 120 - 200 Ton High Efficiency Units (Charmes - France)

Size		120	130	140	155	170	185	200
Shipping Weight	kg	5089	5129	5122	5916	6159	6378	6569
Shipping Weight	lb	11726	11818	11802	13631	14191	14696	15136
Operating Weight	kg	5198	5271	5274	6073	6323	6555	6759
Operating Weight	lb	11977	12145	12152	13993	14569	15104	15574
Compressor								
Quantity		2	2	2	2	2	2	2
Nominal Size$_1$	Tons	60/60	70/60	70/70	85/70	85/85	100/85	100/100
Evaporator								
Evap. Model		F140	F155	F170	F185	F200	F220	F240
Water Storage	l	132.3	141.3	150.7	156	163.5	175.9	188.3
Water Storage	Gallons	35	37.3	39.8	41.2	43.2	46.5	49.8
Min. Flow	l/s	10.8	11.5	12.5	13.6	13.6	14.9	16.3
Min. Flow	GPM	171.2	182.3	198.2	215.6	215.6	231.4	258.4
Max. Flow	l/s	33.1	38.2	43.3	39.5	48.4	53.5	58.6
Max. Flow	GPM	524.7	605.6	683.2	626.2	767.2	848.1	928.9
Condenser								
Qty of Coils		4	4	4	4	4	4	4
Coil Length	mm	3962/3962	4572/3962	4572/4572	5486/4572	5486/5486	6400/2486	6400/6400
Coil Length	Ft	13/13	15/13	15/15	18/15	18/18	21/18	21/21
Coil Height	mm	1067	1067	1067	1067	1067	1067	1067
Coil Height	Ft	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Number of Rows		3	3	3	3	3	3	3
Condenser Fans								
Quantity$_1$		4/4	5/4	5/5	6/5	6/6	7/6	7/7
Diameter	mm	762	762	762	762	762	762	762
Diameter	Inch	30	30	30	30	30	30	30
Total Air Flow	m3/s	35.82	39.53	43.22	47.55	51.88	56.17	60.47

General Information

Table 6
***G**eneral Data RTAC 120 - 200 Ton High Efficiency Units (Charmes - France)*

Size		120	130	140	155	170	185	200
Total Air Flow	CFM	75867	83725	91540	100710	109882	118968	128075
Nominal RPM		915	915	915	915	915	915	915
Tip Speed	m/s	36.48	36.48	36.48	36.48	36.48	36.48	36.48
Tip Speed	Ft/s	120	120	120	120	120	120	120
Motor kW	kW	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Min Starting/Oper Ambient[2]								
Std Unit	°C	-4	-4	-4	-4	-4	-4	-4
Std Unit	°F	25	25	25	25	25	25	25
Low Ambient Unit	°C	-23	-23	-23	-23	-23	-23	-23
Low Ambient Unit	°F	-9	-9	-9	-9	-9	-9	-9
General Unit								
Refrigerant		HFC 134a	HFC 134a	HFC 134a	HFC 134a	HFC 134a	HFC 134a	HFC 134a
No. Of independent Refrigerant Circuits		2	2	2	2	2	2	2
% Min. Load		15	15	15	15	15	15	15
Refrigerant Charge[1]	kg	65.8/65.8	70.3/65.8	70.3/70.3	99.8/95.3	99.8/99.8	104.4/99.8	104.4/104.4
Refrigerant Charge[1]	lb	145/145	155/145	155/155	220/210	220/220	230/220	230/230
Oil Charge[1]	l	7.6/7.6	7.6/7.6	7.6/7.6	7.6/7.6	7.6/7.6	9.9/7.6	9.9/9.9
Oil Charge[1]	Gallons	2/2	2.2	2.2	2.6/2	2.6/2.6	2.6/2	2.6/2.6

[1] *Data containing information on two circuits shown as follows: CKT1/CKT2*

[2] *Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser*

General Information

Table 7
General Data RTAC 140-200 Ton Low Noise Standard Units (Charmes - France)

Size		140	155	170	185	200
Operating Weight	kg	5306	5497	5676	6358	6486
Operating Weight	lb	12226	12666	13078	14650	14945
Shipping Weight	kg	5197	5355	5524	6201	6322
Shipping Weight	lb	11975	12339	12728	14288	14567
Compressor						
Quantity		2	2	2	2	2
Nominal Size[1]	Tons	70/70	85/70	85/85	100/85	100/100
Evaporator						
Evap. Model		F140	F155	F170	F185	F200
Water Storage	l	132.3	141.3	150.7	156	163.5
Water Storage	Gallons	35	37.3	39.8	41.2	43.2
Min. Flow	l/s	10.8	11.5	12.5	13.6	13.6
Min. Flow	GPM	171.2	182.3	198.2	215.6	215.6
Max. Flow	l/s	33.1	38.2	43.1	39.5	48.4
Max. Flow	GPM	524.7	605.6	683.2	626.2	767.2
Condenser						
Qty of Coils		4	4	4	4	4
Coil Length	mm	3962/3962	4572/3962	4572/4572	5486/4572	5486/5486
Coil Length	Ft	13/13	15/13	15/15	18/15	18/18
Coil Height	mm	1067	1067	1067	1067	1067
Coil Height	Ft	3.5	3.5	3.5	3.5	3.5
Fin series	Fins/ft	192	192	192	192	192
Number of Rows		3	3	3	3	3
Condenser Fans						
Quantity[1]		4/4	5/4	5/5	6/5	6/6
Diameter	mm	762	762	762	762	762
Diameter	Inch	30	30	30	30	30

General Information

Table 7
General Data RTAC 140-200 Ton Low Noise Standard Units (Charmes - France)

Size		140	155	170	185	200
Total Air Flow	m3/s	25.61	28.27	30.93	34.02	37.11
Total Air Flow	CFM	54242	59876	65510	72054	78600
Nominal RPM		680	680	680	680	680
Tip Speed	m/s	27.5	27.5	27.5	27.5	27.5
Tip Speed	Ft/s	90	90	90	90	90
Motor kW	kW	0.85	0.85	0.85	0.85	0.85
Min Starting/Oper Ambient[2]						
Std Unit	°C	-4	-4	-4	-4	-4
Std Unit	°F	25	25	25	25	25
Low Ambient Unit	°C	-23	-23	-23	-23	-23
Low Ambient Unit	°F	-9	-9	-9	-9	-9
General Unit						
Refrigerant		HFC 134a	HFC 134a	HFC 134a	HFC 134a	HFC 134a
No. Of independent Refrigerant Circuits		2	2	2	2	2
% Min. Load		15	15	15	15	15
Refrigerant Charge[1]	kg	65.8/65.8	70.3/65.8	70.3/70.3	99.8/95.3	99.8/99.8
Refrigerant Charge[1]	lb	145/145	155/145	155/155	220/210	220/220
Oil Charge[1]	l	7.6/7.6	7.6/7.6	7.6/7.6	9.9/7.6	9.9/9.9
Oil Charge[1]	Gallons	2/2	2.2	2.2	2.6/2	2.6/2.6

[1] *Data containing information on two circuits shown as follows: CKT1/CKT2*

[2] *Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser*

General Information

Table 8
General Data RTAC 120-200 Ton High Efficiency Low Noise Units (Charmes - France)

Size		120	130	140	155	170	185	200
Operating Weight	kg	5288	5361	5364	6163	6413	6645	6849
Operating Weight	lb	12184	12353	12359	14200	14776	15311	15781
Shipping Weight	kg	5179	5219	5212	6006	6249	6468	6659
Shipping Weight	lb	11933	12025	12009	13839	14399	14903	15343
Compressor								
Quantity		2	2	2	2	2	2	2
Nominal Size[1]	Tons	60/60	70/60	70/70	85/70	85/85	100/85	100/100
Evaporator								
Evap. Model		F140	F155	F170	F185	F200	F220	F240
Water Storage	l	132.3	141.3	150.7	156	163.5	175.9	188.3
Water Storage	Gallons	35	37.3	39.8	41.2	43.2	46.5	49.8
Min. Flow	l/s	10.8	11.5	12.5	13.6	13.6	14.9	16.3
Min. Flow	GPM	171.2	182.3	198.2	215.6	215.6	231.4	258.4
Max. Flow	l/s	33.1	38.2	43.3	39.5	48.4	53.5	58.6
Max. Flow	GPM	524.7	605.6	683.2	626.2	767.2	848.1	928.9
Condenser								
Qty of Coils		4	4	4	4	4	4	4
Coil Length	mm	3962/3962	4572/3962	4572/4572	5486/4572	5486/5486	6400/2486	6400/6400
Coil Length	Ft	13/13	15/13	15/15	18/15	18/18	21/18	21/21
Coil Height	mm	1067	1067	1067	1067	1067	1067	1067
Coil Length	Ft	13/13	15/13	15/15	18/15	18/18	21/18	21/21
Fin series	Fins/ft	192	192	192	192	192	192	192
Number of Rows		3	3	3	3	3	3	3
Condenser Fans								
Quantity[1]		4/4	5/4	5/5	6/5	6/6	7/6	7/7
Diameter	mm	762	762	762	762	762	762	762
Diameter	Inch	30	30	30	30	30	30	30

General Information

Table 8
General Data RTAC 120-200 Ton High Efficiency Low Noise Units (Charmes - France)

Size		120	130	140	155	170	185	200
Total Air Flow	m3/s	25.61	28.27	30.93	34.02	37.11	40.23	43.34
Total Air Flow	CFM	54242	59876	65510	72054	78600	85207	91794
Nominal RPM		680	680	680	680	680	680	680
Tip Speed	m/s	27.5	27.5	27.5	27.5	27.5	27.5	27.5
Tip Speed	Ft/s	90	90	90	90	90	90	90
Motor kW	kW	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Min Starting/Oper Ambient[2]								
Std Unit	°C	-4	-4	-4	-4	-4	-4	-4
Std Unit	°F	25	25	25	25	25	25	25
Low Ambient Unit	°C	-23	-23	-23	-23	-23	-23	-23
Low Ambient Unit	°F	-9	-9	-9	-9	-9	-9	-9
General Unit								
Refrigerant		HFC 134a	HFC 134a	HFC 134a	HFC 134a	HFC 134a	HFC 134a	HFC 134a
No. Of independent Refrigerant Circuits		2	2	2	2	2	2	2
% Min. Load		15	15	15	15	15	15	15
Refrigerant Charge[1]	kg	65.8/65.8	70.3/65.8	70.3/70.3	99.8/95.3	99.8/99.8	104.4/99.8	104.4/104.4
Refrigerant Charge[1]	lb	145/145	155/145	155/155	220/210	220/220	230/220	230/230
Oil Charge[1]	l	7.6/7.6	7.6/7.6	7.6/7.6	7.6/7.6	7.6/7.6	9.9/7.6	9.9/9.9
Oil Charge[1]	Gallons	2/2	2.2	2.2	2.6/2	2.6/2.6	2.6/2	2.6/2.6

[1] *Data containing information on two circuits shown as follows: CKT1/CKT2*

[2] *Minimum start-up/operation ambient based on a 2.22 m/s (5mph) wind across the condenser.*

General Information

Unit Dimensions

Figure 4
Unit Dimensions (Pueblo units) - 140N, 155N, 170N, 140H[1]

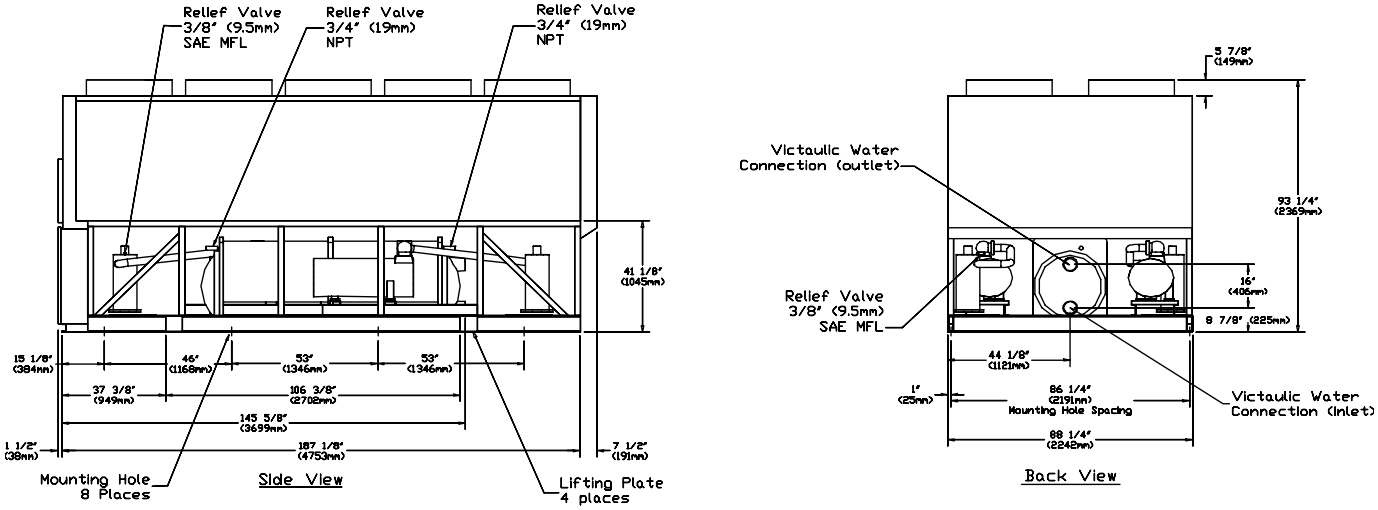
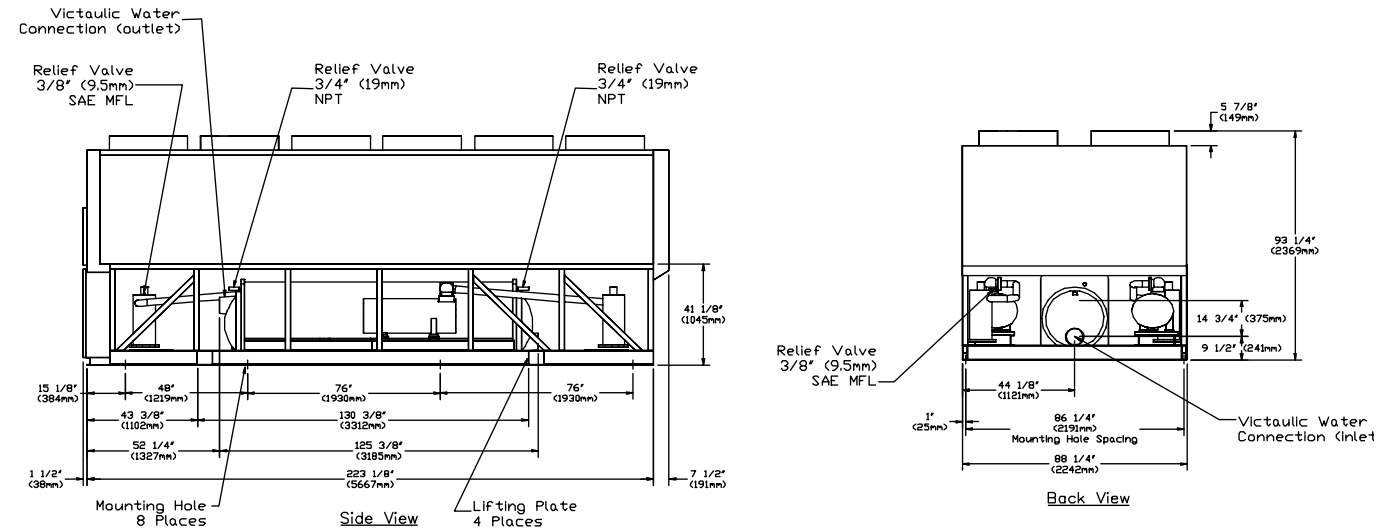


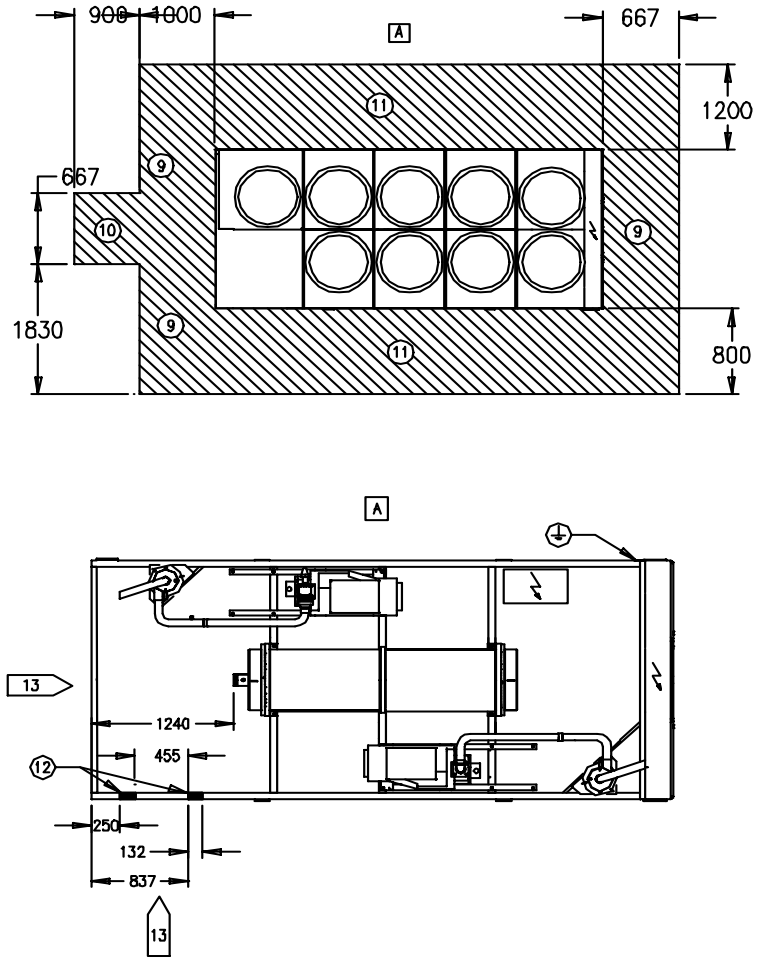
Figure 5
Unit Dimensions (Pueblo Units) - 185N, 200N, 155H, 170H[1]



1. Refers to unit Model Number digits 5-7, 12

General Information

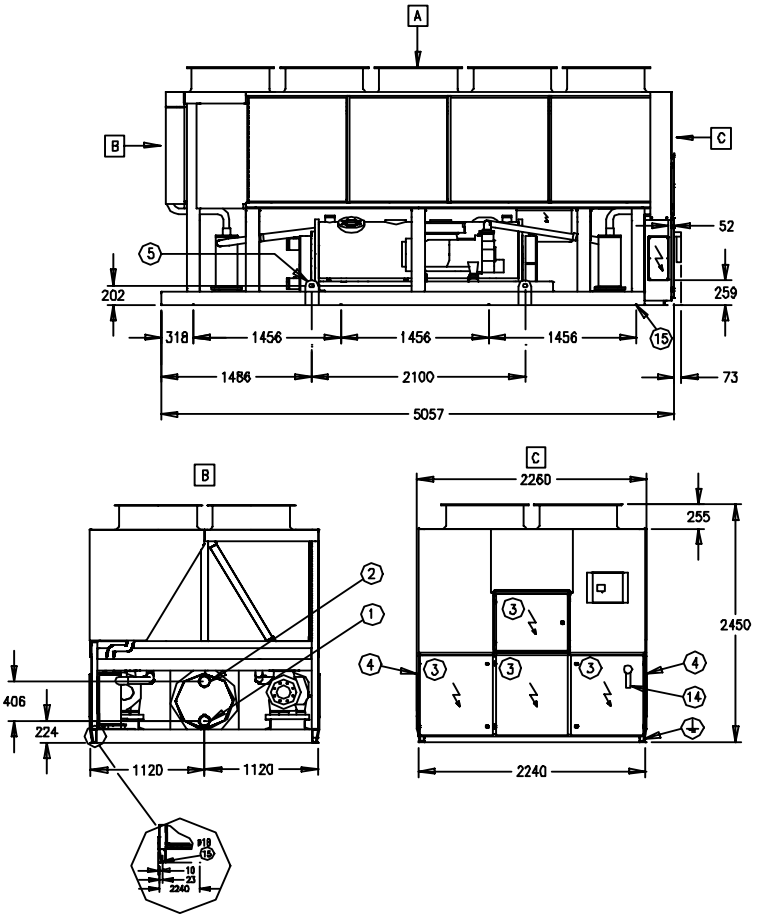
Figure 6
Unit Dimensions (Charmes units) - 140N, 155N, 170N, 120H, 130H, 140H[1]



1. *Refers to unit Model Number digits 5-7, 12*

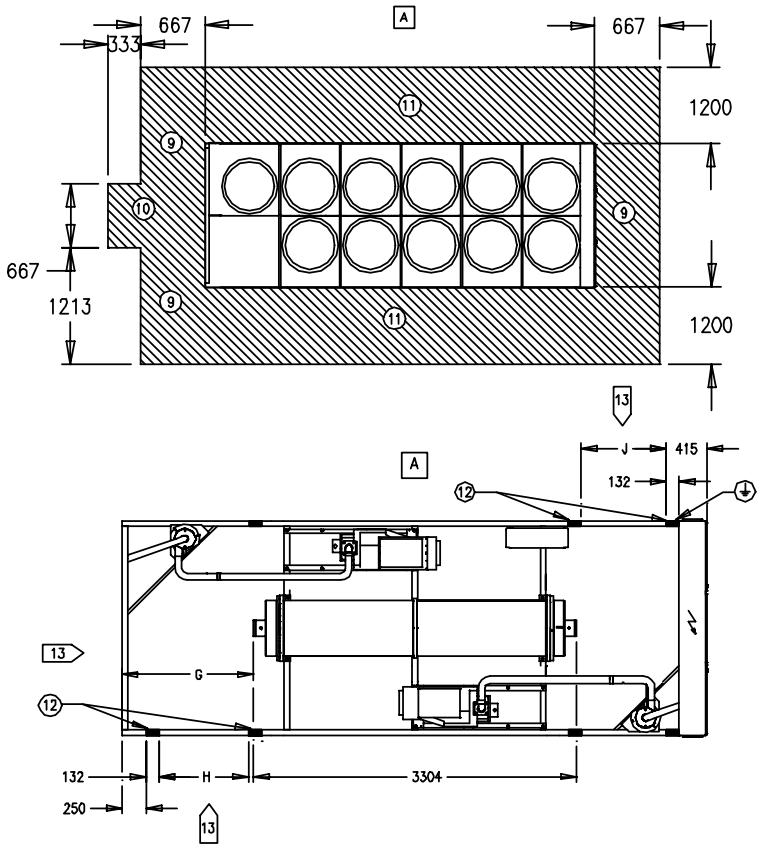
General Information

Figure 7
Unit Dimensions (Charmes units) - 140N, 155N, 170N, 120H, 130H, 140H (continued))



General Information

Figure 8
Unit Dimensions (Charmes units) - 185N, 200N, 155H, 170H, 185H, 200H[1]

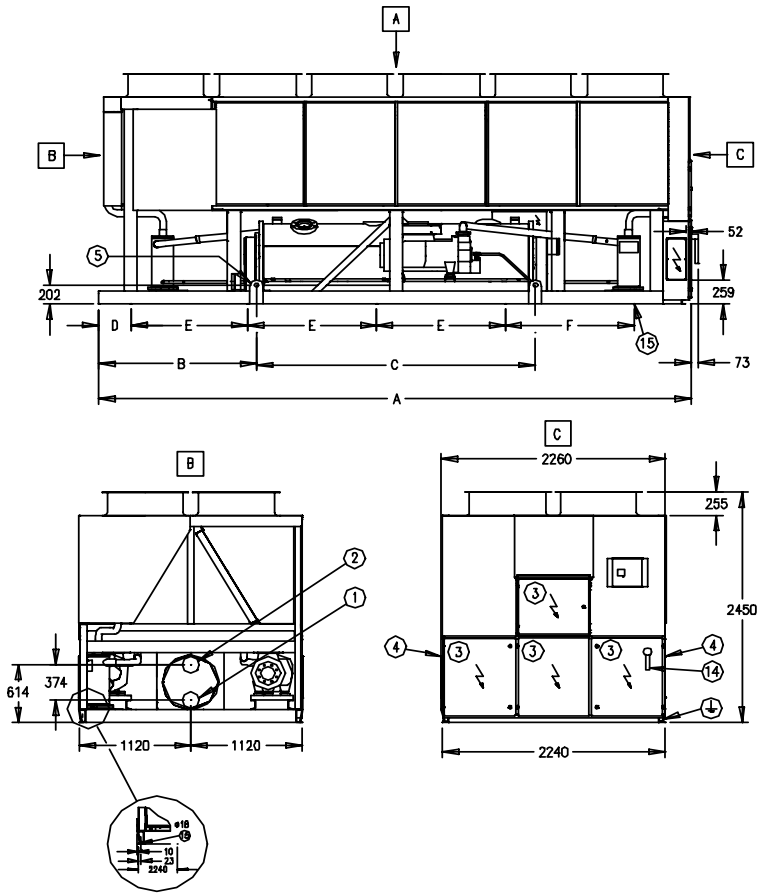


	A	B	C	D	E	F	G	H	J
RTAC 185–200 STD 155–170 HE	5976	1590	2812	320	1761	---	1344	915	864
RTAC 185–200 HE	6895	2044	2812	322	1550	1550	1802	1374	1323

1. *Refers to unit Model Number digits 5-7, 12*

General Information

Figure 9
Unit Dimensions (Charmes units) - 185N, 200N, 155H, 170H, 185H, 200H (Continued)



General Information

Figure 10
Legend for Charmes-manufactured Unit Drawings - Figure 6 through Figure 9

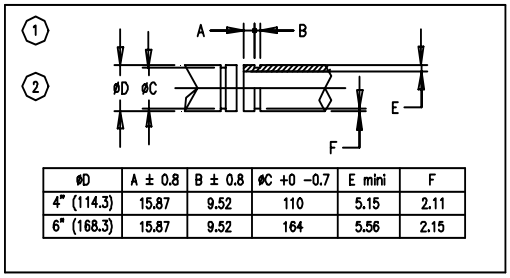
REFROIDISSEURS DE LIQUIDE / WASSERKUEHLMASCHINEN / LIQUID CHILLERS

1. EVAPORATOR WATER INLET CONNECTION
2. EVAPORATOR WATER OUTLET CONNECTION
3. ELECTRICAL PANEL
4. POWER SUPPLY INLET (155 x 400)
5. RINGGING EYES Ø45
6. OPERATING WEIGHT (Kg)
7. REFRIGERANT CHARGE (Kg) R134a
8. OIL CHARGE (Litres)
9. MINIMUM CLEARANCE (FOR MAINTENANCE)
10. MINIMUM CLEARANCE (EVAPORATOR TUBES REMOVAL)
11. MINIMUM CLEARANCE (AIR ENTERING)
12. FRAME POST
13. RECOMMENDED CHILLED WATER PIPEWORK LAYOUT

OPTIONS / ZUBEOER / OPTIONS

14. SECTIONNEUR PUISSANCE — POWER DISCONNECT SWITCH
15. AMORTISSEURS — ISOLATORS

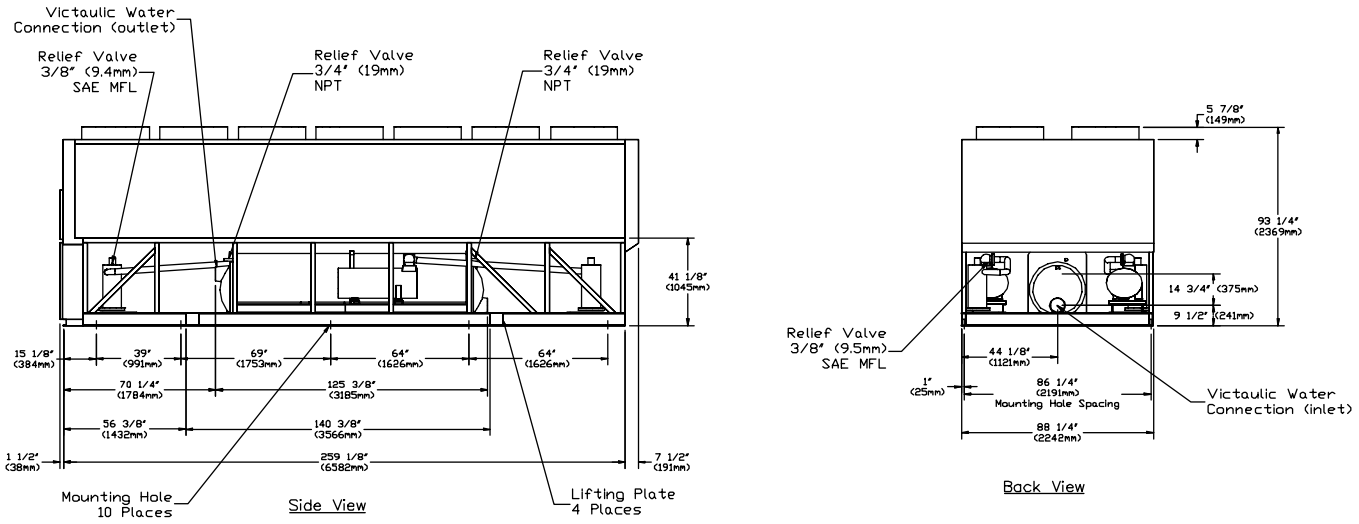
RTAC			⑥	7	⑧	① ②
120	HE	Al	5200	2 x 66	2 x 7,5	4"
		Cu	5680			
130	HE	Al	5270	70 + 66		
		Cu	5790			
140	STD	Al	5220	2 x 66		
		Cu	5700			
	HE	Al	5270	2 x 70		
		Cu	5830			
155	STD	Al	5410	70 + 66		
		Cu	5930			
	HE	Al	6070	100 + 95		6"
		Cu	6690			
170	STD	Al	5590	2 x 70		4"
		Cu	6140			
	HE	Al	6320	2 x 100		6"
		Cu	6990			
185	STD	Al	6270	100 + 95	10 + 7,5	
		Cu	6880			
	HE	Al	6560	104 + 100		
		Cu	7280			
200	STD	Al	6400	2 x 100	2 x 10	
		Cu	7070			
	HE	Al	6760	2 x 104		
		Cu	7540			



ØD	A ± 0.8	B ± 0.8	ØC +0 −0.7	E mini	F
4" (114.3)	15.87	9.52	110	5.15	2.11
6" (168.3)	15.87	9.52	164	5.56	2.15

General Information

Figure 11
Unit Dimensions - 225N, 250N, 185H, 200H[1]



Model Number Coding System

The model numbers for the unit and the starter are composed of numbers and letters that represent features of the equipment. Shown in the following three tables are samples of typical unit and starter numbers and the coding system for each.

Each position, or group of positions, in the model number is used to represent a feature. For example, in the first table, position 08 of the unit model number, Unit Voltage, contains the number “4”. A 4 in this position means that the unit voltage is 460/60/3.

Unit Model Number

An example of a typical unit model number (M/N) is:

RTAC140KUA0NUAFNN1NY1TDNNN5N200CN0EXX

1. Refers to unit Model Number digits 5-7, 12

General Information

Model number digits are selected and assigned in accordance with the following definitions using the model number example shown above.

Table 9
Product Family Structure - RTAC

Name	Code	M/N digit	M/N code	Description
MODL		1-4		Basic Product Line
	RTAC		RTAC	Air Cooled Series R® chiller - Dev Sequence C
NTON		5-7		Unit Nominal Capacity
	120		120	120T nominal capacity (Charmes only)
	130		130	130T nominal capacity (Charmes only)
	140		140	140T nominal capacity
	155		155	155T nominal capacity
	170		170	170T nominal capacity
	185		185	185T nominal capacity
	200		200	200T nominal capacity
	225		225	225T nominal capacity
	250		250	250T nominal capacity
VOLT		8		Unit power supply
	200A		A	200V/60Hz/3Ph power
	220B		K	220V/50Hz/3Ph power
	230A		C	230V/60Hz/3Ph power
	380A		J	380V/60Hz/3Ph power
	400B		D	380-415V/50Hz/3Ph power
	460A		4	460V/60Hz/3Ph power
	575A		5	575V/60Hz/3Ph power
DCTL		9		Design control/Mfg plant
	WCBU		U	Water Chiller Business Unit, Pueblo CO USA
	EPL		E	Epinal Business Unit, Charmes FR
DSEQ		10-11		Design Sequence
	A0		A0	Factory/ABU assigned, start with A0
UNTY		12		Unit basic configuration
	STD		N	Standard configuration
	PREM		H	High efficiency/performance configuration

General Information

Table 9
Product Family Structure - RTAC

Name	Code	M/N digit	M/N code	Description
AGLT		13		Agency listing
	NONE		N	No agency listing
	CUL		U	UL listing (including Canada)
	CE		C	CE listing
CODE		14		Pressure vessel code
	ASME		A	ASME pressure vessel code
	CAN		C	Canadian code
	DLI		D	Australian code
	SQLO		L	Chinese code
	ITI		P	Czech code
	VIET		R	Vietnamese code
	UDT		V	Polish code
	PED		2	Europe standard
	SVDB		Z	Swiss code
	SPL		S	Special
EVLT		15		Evaporator temp range & application type
	STD		C	Standard 40-60 deg F comfort cooling, no freeze protection
	FRZ		F	Standard comfort cooling, with freeze protection
	LOW		L	Low evap temp (process/industrial applications), no freeze protection
	LOWF		G	Low evap temp, with freeze protection
EVWB		16		Evap configuration
	150N		N	Standard pass arrangement, insulated (Pueblo)
	140		X	Standard pass arrangement, insulated
	140B		2	Standard pass arrangement, no evap insulation (Charmes)
CDTY		17		Condenser temp range
	STD		N	Standard temp range
	HA		H	High ambient capability condenser
	LA		L	Low ambient capability condenser
	WIDE		W	Wide ambient capability condenser

General Information

Table 9
Product Family Structure - RTAC

Name	Code	M/N digit	M/N code	Description
CDMT		18		Condenser fin material
	STD		1	Standard aluminum slit fins
	STDX		X	Standard aluminum slit fins
	COP		2	Copper fins
	ECFS		3	Epoxy coated fin stock
	DB		4	Aluminum fins with dipped and baked coating
	PLT		5	Aluminum fins without slits
CDFN		19		Condenser fan/motor configuration
	STDP		N	Standard fans - Pueblo
	STDC		X	Standard fans - Charmes
	LNP		W	Low noise fans - Pueblo
	LNC		L	Low noise fans - Charmes
	SLN		Q	Night noise setback (2-speed) low noise fans
	TEAO		T	Std fans with TEAO motors
	HPD		P	100 high static fans
SRTY		20		Compressor motor starter type
	XLIN		X	Across-the-line starters
	YDEL		Y	Wye-delta closed transition starters
	DDEL		D	Delta-Delta reduced inrush starters
	SST		E	Solid State starters
PLIN		21		Incoming power line connection
	SNGL		1	Single point power connection
	SNGLX		X	Single point power conn w/ integral control power
	DUAL		2	Dual point power connection (1/ckt)
PCON		22		Power line connection type
	TERM		T	Terminal block connection for incoming line(s)
	STD		X	Terminal block with fuses (Charmes)
	DISC		D	Non-fused disconnect switch(es) for incoming line(s)
	DISCB		B	Disconnect switch with fuses (Charmes)
	CB		C	HACR-rated circuit breaker(s) for incoming line(s)

General Information

Table 9
Product Family Structure - RTAC

Name	Code	M/N digit	M/N code	Description
OPIN		*23*		*Controller operator interface*
	EV		*E*	*EasyView operator interface*
	DV		*D*	*DynaView operator interface*
	DVF		*F*	*DynaView interface with French language*
	DVI		*I*	*DynaView interface with Italian language*
	DVS		*S*	*DynaView interface with Spanish language*
	DVG		*G*	*DynaView interface with German language*
	DVH		*H*	*DynaView interface with Dutch language*
	DVA		*A*	*DynaView interface with English language*
REM		*24*		*Remote interface*
	NONE		*N*	*No remote interface*
	NONEX		*X*	*No remote interface*
	COM3		*C*	*Tracer Comm 3 interface*
	COM5		*L*	*Tracer Comm 5 interface*
	DISP		*D*	*Remote display*
CIOP		*25*		*Control input accessories/options*
	NONE		*N*	*No remote input LLIDs*
	NONEX		*X*	*No remote input LLIDs*
	REMS		*R*	*Remote ELWT setpoint input LLID*
	REMC		*C*	*Remote current limit input LLID*
	REMB		*B*	*Remote ELWT setpoint and remote current limit input LLIDs*
COOP		*26*		*Control output accessories/options*
	NONE		*N*	*No output options*
	ALRM		*A*	*Alarm relay output LLID*
	ALRMX		*X*	*No icemaking*
	ICE		*C*	*Icemaking I/O*
	IA		*D*	*I/O and alarm relay*
EPRO		*27*		*Electrical protection options*
	NONE		*0*	*No short circuit withstand rating*
	NONEX		*X*	*No protection options*
	5KA		*5*	*5000 A SCWR*
	35KA		*4*	*35000A SCWR*
	65KA		*6*	*65000A SCWR*
	IP20		*1*	*IP20 power wiring protection (Charmes)*

General Information

Table 9
Product Family Structure - RTAC

Name	Code	M/N digit	M/N code	Description
EACC		28		Electrical accessories
	NONE		N	No electrical accessories
	NONEX		X	No electrical accessories
	EFSF		F	FS-8W flow switch - 150 psi
	EFSN		E	NEMA-3 (sealed) flow switch - 150 psi
	WP		P	Water pump contactors
	WPFS		D	Water pump contactors and NEMA-3 flow switch
CACC		29		Control panel accessories
	NONE		N	No convenience outlet
	NONEX		X	No accessories
	115A		A	W/ 15A 115V convenience outlet
	220B		B	W/ 8A 220V convenience outlet
	UOVM		1	Under/over voltage transformer
	GPRT		2	Ground fault protection relay
	UOGP		3	UOVM and ground fault
SVLV		30		Service valves
	NONE		0	Without suction service valves
	NONEX		X	Without suction or discharge service valves
	WITH		1	With suction service valves
	WITH		2	With suction and discharge service valves (Charmes)
	GAUG		3	With Gauges (Charmes)
	VLVG		4	With service valves and gauges
SATT		31		Compressor sound attenuator package
	NONE		0	Without sound attenuator
	NONEX		X	Without sound attenuator
	FACT		1	With factory installed sound attenuator package
	FIELD		2	With field installed (ship-with) sound attenuator package
AOPT		32		Appearance options
	NONE		N	No appearance options
	NONEX		X	No appearance options
	ALPN		A	Architectural louvered panels
	CPRT		C	Coil protection
	ACGR		G	Access guards
	ACCP		B	Access guards and coil protection

General Information

Table 9
Product Family Structure - RTAC

Name	Code	M/N digit	M/N code	Description
	ACCP		*E*	*Coil, compressor, & evap protection*
	PNT		*P*	*Fully painted unit*
	PALP		*L*	*Fully painted unit with architectural louvered panels*
	PCPR		*H*	*Fully painted unit with coil protection*
	PAGR		*K*	*Fully painted unit with access guards*
	PCGR		*W*	*Fully painted unit with access guards and coil protection*
IACC		*33*		*Installation accessories*
	NONE		*N*	*None*
	NONEX		*X*	*None*
	NISO		*R*	*Neoprene in shear unit isolators*
	SISO		*M*	*Spring unit isolators*
	FLNG		*F*	*Water connection flanges (convert grooved pipe to flange)*
	NIF		*G*	*Neoprene isolators and flanges*
	SIF		*H*	*Spring isolators and flanges*
	SLV		*A*	*Weld sleeve for evap conn*
	CISO		*B*	*Unit isolators (Charmes)*
	SLN		*C*	*Weld sleeves and neoprene isolators*
	SLC		*D*	*Weld sleeves and Charmes isolators*
TEST		*34*		*Factory test*
	NONE		*0*	*No factory run test*
LANG		*35*		*Control, label, and literature language*
	ENG		*E*	*English*
SPEC		*36*		*Special Order*
	NONE		*X*	
	SPL		*S*	
PVS		*37*		*Safety devices*
	STD		*X*	*Standard*
	TUV		*1*	*Germany*
	ISPE		*2*	*Italy*
	DAN		*3*	*Netherlands*
	SA		*4*	*Sweden*

Installation - Mechanical

Warnings and Cautions

Warnings and Cautions appear in boldface type at appropriate points in this manual. Warnings are provided to alert personnel to potential hazards that can result in personal injury or death; they do not replace the manufacturer's recommendations. Cautions alert personnel to conditions that could result in equipment damage. Your personal safety and reliable operation of this machine depend upon strict observance of these precautions.

Installation Responsibilities

Generally, the contractor must do the following when installing an RTAC unit:

[ ] Install unit on a flat foundation, level (within 1/4" [6 mm] across the length of the unit), and strong enough to support unit loading.

[ ] Install unit per the instructions contained in the Installation-Mechanical and Installation-Electrical sections of this manual.

[ ] Install any optional sensors and make electrical connections at the CH.530.

[ ] Where specified, provide and install valves in water piping upstream and downstream of evaporator water connections to isolate the evaporator for maintenance, and to balance/trim system.

[ ] Furnish and install flow switch and/or auxiliary contacts to prove chilled water flow.

[ ] Furnish and install pressure gauges in inlet and outlet piping of the evaporator.

[ ] Furnish and install a drain valve to the bottom of the evaporator waterbox.

[ ] Supply and install a vent cock to the top of the evaporator waterbox.

[ ] Furnish and install strainers ahead of all pumps and automatic modulating valves.

[ ] Provide and install field wiring.

[ ] Install heat tape and insulate the chilled water lines and any other portions of the system, as required, to prevent sweating under normal operating conditions or freezing during low ambient temperature conditions.

[ ] Start unit under supervision of a qualified service technician.

Nameplates

The RTAC outdoor unit nameplates (Figure 1) are applied to the exterior of the Control Panel. A compressor nameplate is located on each compressor.

Installation - Mechanical

Outdoor Unit Nameplate

The outdoor unit nameplate provides the following information:

– Unit model and size description.

– Unit serial number.

– Identifies unit electrical requirements.

– Lists correct operating charges of R-134a and refrigerant oil (Trane OK00048).

– Lists unit test pressures.

– Identifies installation, operation and maintenance and service data literature (Pueblo).

– Lists drawing numbers for unit wiring diagrams (Pueblo).

Compressor Nameplate

The compressor nameplate provides following information:

– Compressor model number.

– Compressor serial number.

– Compressor electrical characteristics.

– Utilization Range.

– Recommended refrigerant.

Storage

Extended storage of the outdoor unit prior to installation requires the following precautionary measures:

1. Store the outdoor unit in a secure area.
2. At least every three months (quarterly), check the pressure in the refrigerant circuits to verify that the refrigerant charge is intact. If it is not, contact a qualified service organization and the appropriate Trane sales office.
3. Close the discharge and liquid line isolation valves.

General

Report any damage incurred during handling or installation to the Trane sales office immediately.

Installation - Mechanical

Location Requirements

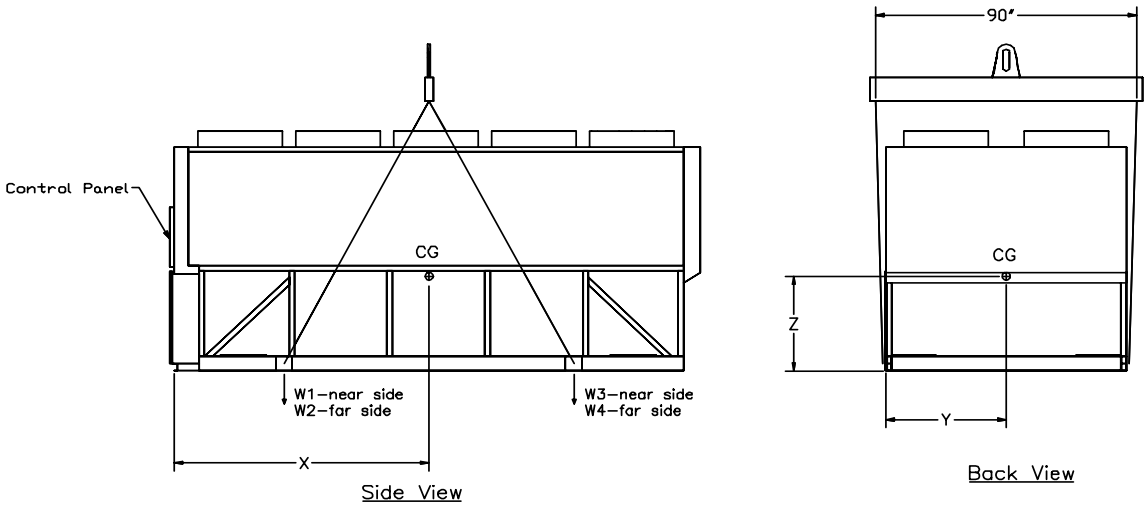
Setting the Unit

A base or foundation is not required if the selected unit location is level and strong enough to support the unit's operating weight as listed in Table 1 through Table 4 in Section 1.

Figure 12
Rigging the Unit - 140N, 155N, 170N, 140H[1] (Pueblo)

Unit Configuration	CG Dimensions (in/mm)			Lifting Weight (lb/kg)				Total Weight (lb/kg)
	X	Y	Z	W1	W2	W3	W4	
140 Ton 50 Hz Std Eff	95.1 (2416)	44.3 (1123)	35.5 (902)	2913 (1321)	2648 (1201)	2914 (1322)	2649 (1202)	11,124 (5,046)
140 Ton 60 Hz Std Eff	95.2 (2418)	44.3 (1123)	35.5 (902)	2947 (1337)	2679 (1215)	2954 (1340)	2685 (1218)	11,265 (5,110)
140 Ton 50 Hz Prem Eff	95.2 (2418)	44.3 (1123)	35.5 (902)	2953 (1340)	2685 (1218)	2961 (1343)	2692 (1221)	11,291 (5,122)
140 Ton 60 Hz Prem Eff	95.2 (2418)	44.3 (1123)	35.5 (902)	2947 (1337)	2679 (1215)	2954 (1340)	2685 (1218)	11,265 (5,110)
155 Ton 50 Hz Std Eff	94.7 (2405)	44.2 (1121)	35.5 (902)	2972 (1348)	2690 (1220)	2928 (1328)	2651 (1203)	11,241 (5,099)
155 Ton 60 Hz Std Eff	94.7 (2405)	44.3 (1123)	35.5 (902)	3369 (1528)	3058 (1387)	2500 (1134)	2269 (1029)	11,196 (5,078)
170 Ton 50 Hz Std Eff	94.7 (2405)	44.3 (1123)	35.5 (902)	3153 (1430)	2867 (1300)	3137 (1432)	2852 (1294)	12,009 (5,447)
170 Ton 60 Hz Std Eff	95.2 (2418)	44.3 (1123)	35.5 (902)	2953 (1340)	2685 (1218)	2961 (1343)	2692 (1221)	11,291 (5,1212)

Notes:
1. Lifting chains/cables will not be the same length. Adjust to keep unit level while lifting.
2. Do NOT fork lift unit.
3. Weights are typical for units with R–134a charge.



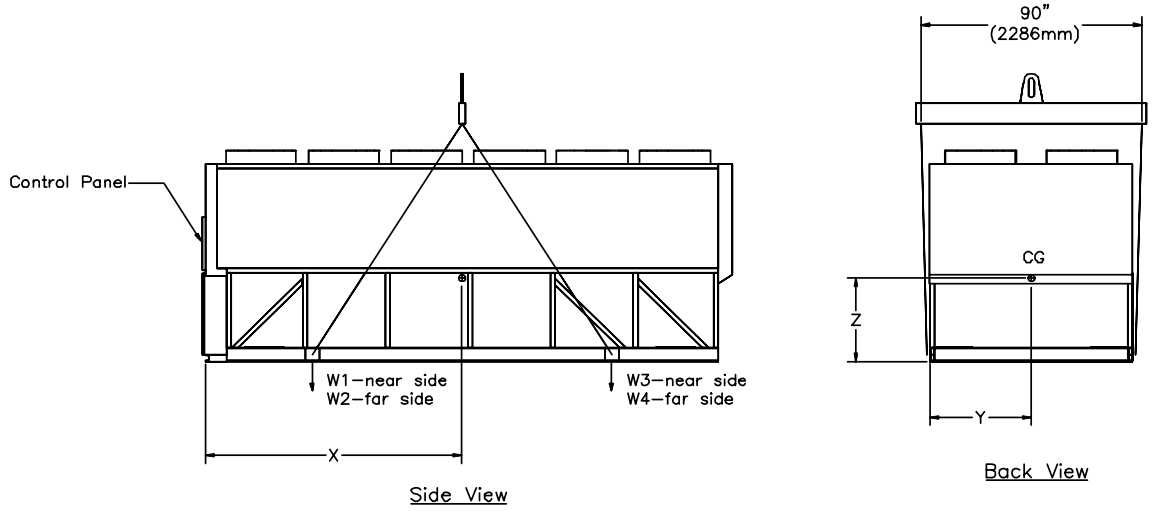
1. *Refers to unit Model Number digits 5-7, 12*

Installation - Mechanical

Figure 13
Rigging the Unit - 185N, 200N, 155H, 170H[1] (Pueblo)

Unit Configuration	CG Dimensions (in/mm)			Lifting Weight (lb/kg)				Total Weight (lb/kg)
	X	Y	Z	W1	W2	W3	W4	
155 Ton 50 Hz Prem Eff	113.0 (2871)	44.2 (1122)	35.5 (902)	3441 (1561)	3117 (1414)	3435 (1558)	3112 (1412)	13,105 (5,994)
155 Ton 60 Hz Prem Eff	112.9 (2868)	44.3 (1124)	35.5 (902)	3335 (1513)	3028 (1374)	3314 (1503)	3009 (1365)	12,686 (5,754)
170 Ton 50 Hz Prem Eff	113.0 (2871)	44.3 (1124)	35.5 (902)	3411 (1547)	3101 (1407)	3402 (1543)	3093 (1403)	13,007 (5,900)
170 Ton 60 Hz Prem Eff	113.0 (2871)	44.3 (1124)	35.5 (902)	3427 (1555)	3115 (1413)	3417 (1550)	3106 (1409)	13,065 (5,926)
185 Ton 50 Hz Std Eff	113.4 (2881)	43.6 (1107)	35.5 (902)	3571 (1620)	3135 (1422)	3603 (1634)	3162 (1434)	13,471 (6,110)
185 Ton 60 Hz Std Eff	113.0 (2871)	44.2 (1122)	35.5 (902)	3441 (1561)	3117 (1414)	3435 (1558)	3112 (1412)	13,105 (5,944)
200 Ton 50 Hz Std Eff	113.2 (2876)	44.3 (1124)	35.5 (902)	3574 (1621)	3249 (1474)	3587 (1627)	3261 (1479)	13,671 (6,201)
200 Ton 60 Hz Std Eff	113.0 (2871)	44.3 (1124)	35.5 (902)	3411 (1547)	3101 (1407)	3402 (1543)	3093 (1403)	13,007 (5,900)

Notes:
1. Lifting chains/cables will not be the same length. Adjust to keep unit level while lifting.
2. Do NOT fork lift unit.
3. Weights are typical for units with R–134a charge.



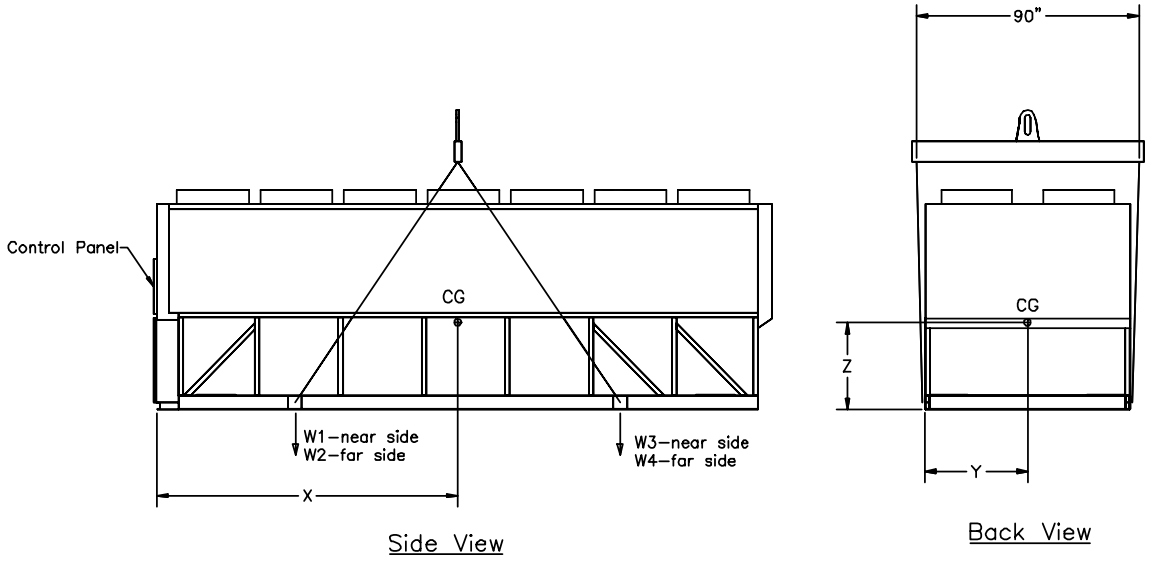
1. *Refers to unit Model Number digits 5-7, 12*

Installation - Mechanical

Figure 14
Rigging the Unit - 225N,250N, 185H, 200H[1] (Pueblo)

Unit Configuration	CG Dimensions (in/mm)			Lifting Weight (lb/kg)				Total Weight (lb/kg)
	X	Y	Z	W1	W2	W3	W4	
185 Ton 50 Hz Prem Eff	131.1 (3330)	43.6 (1107)	35.5 (902)	3882 (1761)	3417 (1550)	3880 (1760)	3415 (1549)	14,594 (6,620)
185 Ton 60 Hz Prem Eff	130.8 (3323)	44.2 (1122)	35.5 (902)	3811 (1729)	3454 (1567)	3783 (1716)	3428 (1555)	14,476 (6,566)
200 Ton 50 Hz Prem Eff	131.0 (3328)	44.3 (1124)	35.5 (902)	3970 (1801)	3609 (1637)	3960 (1796)	3600 (1633)	15,139 (6,867)
200 Ton 60 Hz Prem Eff	131.0 (3328)	44.3 (1124)	35.5 (902)	3935 (1785)	3577 (1623)	3920 (1778)	3563 (1616)	14,995 (6,802)
225 Ton 60 Hz Std Eff	131.1 (3330)	43.6 (1107)	35.5 (902)	3882 (1761)	3417 (1550)	3880 (1760)	3415 (1549)	14,594 (6,620)
250 Ton 60 Hz Std Eff	131.0 (3328)	44.3 (1124)	35.5 (902)	3970 (1801)	3609 (1637)	3960 (1796)	3600 (1633)	15,139 (6,867)

Notes:
1. Lifting chains/cables will not be the same length. Adjust to keep unit level while lifting.
2. Do NOT fork lift unit.
3. Weights are typical for units with R–134a charge.



1. Refers to unit Model Number digits 5-7, 12

Installation - Mechanical

Figure 15
Rigging the Unit (Charmes)

INSTRUCTIONS DE LEVAGE ET DE MANUTENTION

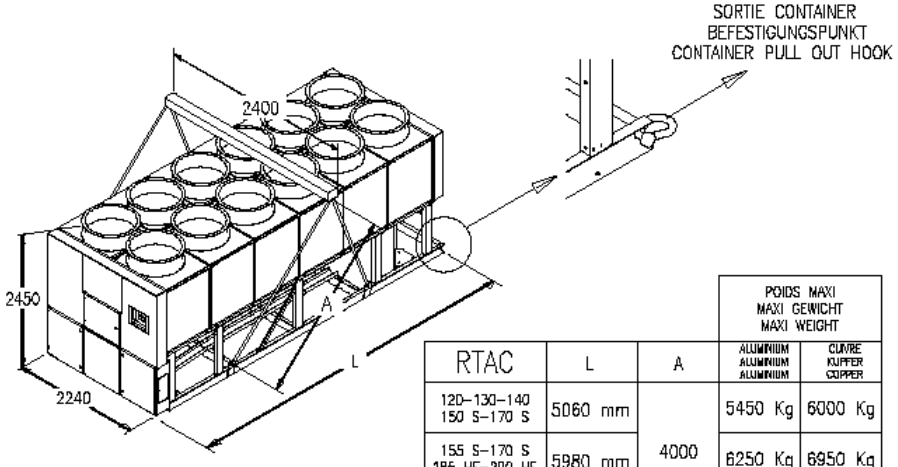
IL EST RECOMMANDE D'UTILISER LES ORGANES DE LEVAGE ET DE MANUTENTION MONTRES PAR LE SCHEMA CI-DESSOUS ET DE SUIVRE LES INSTRUCTIONS SUIVANTES:
1) UTILISER LES 4 POINTS D'ANCRAGE PREVUS SUR L'UNITE.
2) LES ELINGUES ET LE PALONNIER DOIVENT ETRE PREVUS PAR L'INSTALLATEUR.
3) LA CHARGE MINIMUM ADMISSIBLE PAR ELINGUE ET PAR LE PALONNIER UTILISES NE DOIT PAS ETRE INFERIEURE AU POIDS DE LA MACHINE.
4) ATTENTION CETTE UNITE DOIT ETRE LEVEE ET MANUTENTIONNEE AVEC PRECAUTIONS. EVITER LES A-COUPS LORS DU LEVAGE ET DE LA MANUTENTION.

ANWEISUNGEN FUER DEN TRANSPORT MIT HEBEZEUG

ES WIRD EMPFOHLEN, DIE MASCHINE ENTSPRECHEND DER ZEICHNUNG ANZUHEBEN UND DIE FOLGENDEN ANWEISUNGEN ZU BEACHTEN:
1) JEDE MASCHINE WIRD MIT 4 IM WERK MONTIERTEN KRANOESEN GELIEFERT.
2) DAS HEBEZEUG (SEILE,QUERBALKEN) IST BEIZUSTELLEN.
3) DIE TRAGKRAFT JEDES EINZELNEN SEILES SOWIE DES QUERBALKENS MUSS MINDESTENS DEM TRANSPORTGEWICHT DES MASCHINE ENTSPRECHEN.
4) BEIM ANHEBEN VORSICHTIG VORGEHEN, STOESSE UND ERSCHUETTERUNGEN UNBEDINGT VERMEIDEN.

SPECIAL LIFTING AND MOVING INSTRUCTIONS

A SPECIFIC LIFTING METHOD IS RECOMMANDED AS FOLLOWS:
1) FOUR LIFTING POINTS ARE BUILT INTO THE UNIT.
2) SLINGS AND SPREADER BAR TO BE PROVIDED BY RIGGER AND ATTACHED TO THE FOUR LIFTING POINTS.
3) MINIMUM RATED LIFTING CAPACITY (VERTICAL) OF EACH SLING AND SPEADER BAR SHALL BE NO LESS THAN THE TABULATED UNIT SHIPPING WEIGHT.
4) CAUTION THIS UNIT MUST BE LIFTED WITH THE UTMOST CARE. AVOID SHOCK LOAD BY LIFTING SLOWLY AND EVENLY.



RTAC	L	A	POIDS MAXI MAXI GEWICHT MAXI WEIGHT ALUMINIUM ALUMINIUM ALUMINIUM	POIDS MAXI MAXI GEWICHT MAXI WEIGHT CUIVRE KUPFER COPPER
120-130-140 150 S-170 S	5060 mm	4000 mm	5450 Kg	6000 Kg
155 S-170 S 185 HE-200 HE	5980 mm		6250 Kg	6950 Kg
185 HE 200 HE	6900 mm		6600 Kg	7400 Kg

5709-3200-ALX

Installation - Mechanical

CAUTION: Refer to nameplate for unit weight and additional installation instructions contained inside the control panel. Other lifting arrangements may cause equipment damage or serious personal injury.

Isolation and Sound Emission

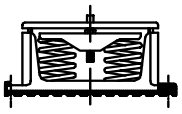
The most effective form of isolation is to locate the unit away from any sound sensitive area. Structurally transmitted sound can be reduced by elastomeric vibration eliminators. Spring isolators are not recommended. Consult an acoustical engineer in critical sound applications.

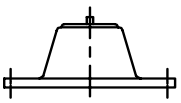
For maximum isolation effect, isolate water lines and electrical conduit. Wall sleeves and rubber isolated piping hangers can be used to reduce the sound transmitted through water piping. To reduce the sound transmitted through electrical conduit, use flexible electrical conduit.

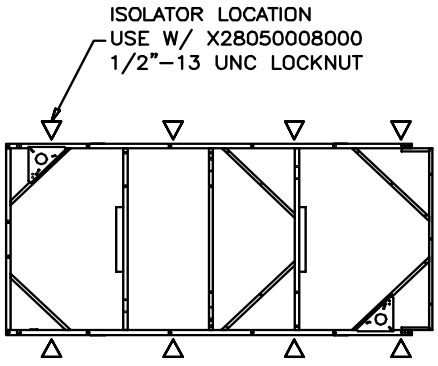
State and local codes on sound emissions should always be considered. Since the environment in which a sound source is located affects sound pressure, unit placement must be carefully evaluated. Sound power levels for Trane air-cooled Series R® chillers are available on request.

Installation - Mechanical

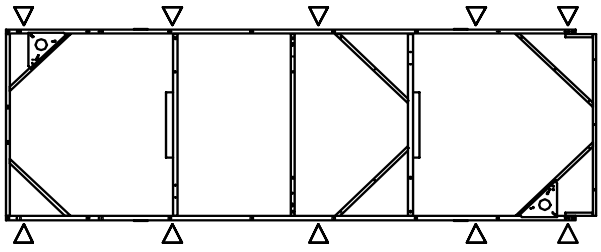
Figure 16
Unit Isolation

SPRING ISOLATOR (CP)					
PKG. UNIT	COND. UNIT				
X1035 0041 160	X1035 0041 140				
EXT		TONS	EFF	Hz	QTY
01	11	140	STD	60	8
				50	
		140	PREM	60	
				50	
		155	STD	60	
				50	
		155	PREM	60	
				50	
		170	STD	60	
				50	
		170	PREM	60	
				50	
		185	STD	60	
				50	
		200	STD	60	
				50	
02	12	185	PREM	60	10
				50	
		200	PREM	60	
				50	
		225	STD	60	
		250	STD	60	

NEOPRENE ISOLATOR (RDP-4)					
PKG. UNIT	COND. UNIT				
X1014 0305 620	X1014 0305 610				
EXT		TONS	EFF	Hz	QTY
03	13	140	STD	60	8
				50	
		140	PREM	60	
				50	
		155	STD	60	
				50	
		155	PREM	60	
				50	
		170	STD	60	
				50	
		170	PREM	60	
				50	
		185	STD	60	
				50	
		200	STD	60	
				50	
04	14	185	PREM	60	10
				50	
		200	PREM	60	
				50	
		225	STD	60	
		250	STD	60	



EXT 01, 03, 11, & 13



EXT 02, 04, 12, & 14

Installation - Mechanical

Noise Considerations

Locate the outdoor unit away from sound sensitive areas. If required, install rubber vibration isolators in all water piping and use flexible electrical conduit. Consult an acoustical engineer for critical applications. Also refer to Trane Engineering Bulletins for application information on RTAC chillers.

Foundation

Provide rigid, non-warping mounting pads or a concrete foundation of sufficient strength and mass to support the outdoor unit operating weight (i.e., including completed piping, and full operating charges of refrigerant, oil and water). Refer to Table 1 though Table 4 in Section 1 for unit operating weights. Once in place, the outdoor unit must be level within 1/ 4" (6 mm) over its length and width.

The Trane Company is not responsible for equipment problems resulting from an improperly designed or constructed foundation.

Note: To allow for cleaning under the condensing coil, it is recommended that an opening be left between the unit base and the concrete pad.

Clearances

Provide enough space around the outdoor unit to allow the installation and maintenance personnel unrestricted access to all service points. Refer to submittal drawings for the unit dimensions. A minimum of four feet is recommended for compressor service. Provide sufficient clearance for the opening of control panel doors. Refer to Figure 17 through Figure 19 for minimum clearances. In all cases, local codes which require additional clearances will take precedence over these recommendations.

Installation - Mechanical

Figure 17
Recommended Unit Clearances: 140N, 155N, 170N, 140H[1]

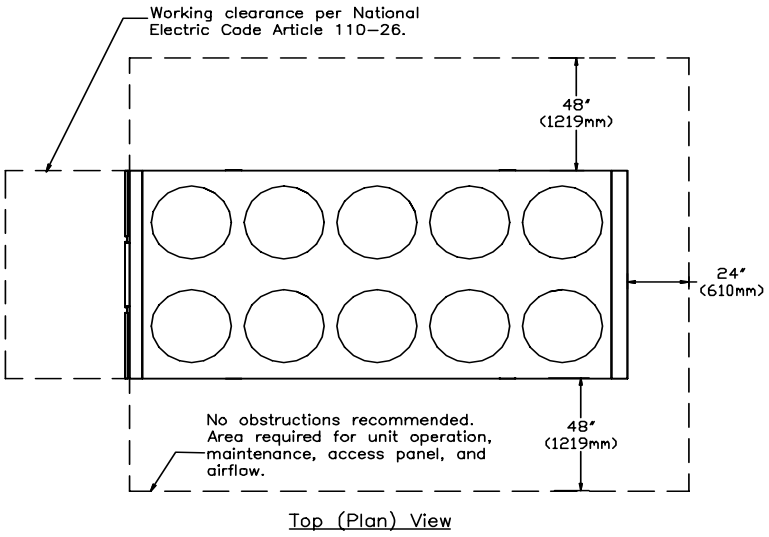
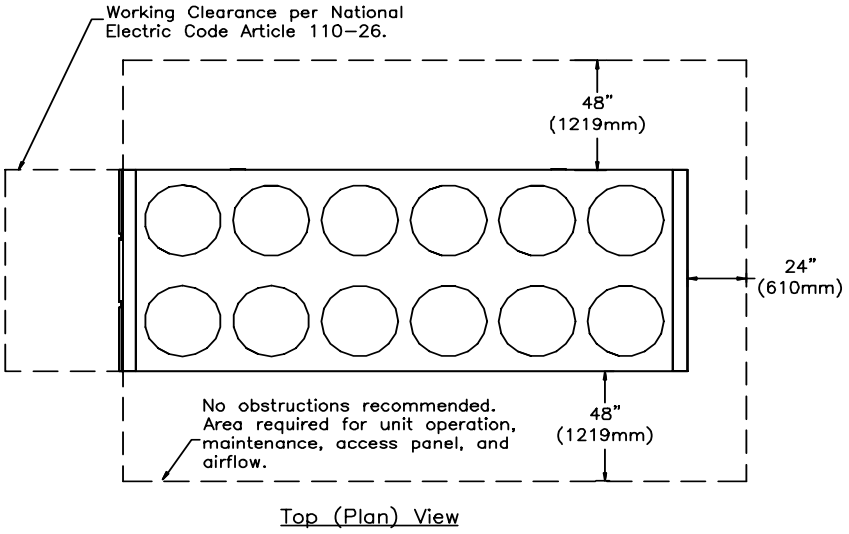


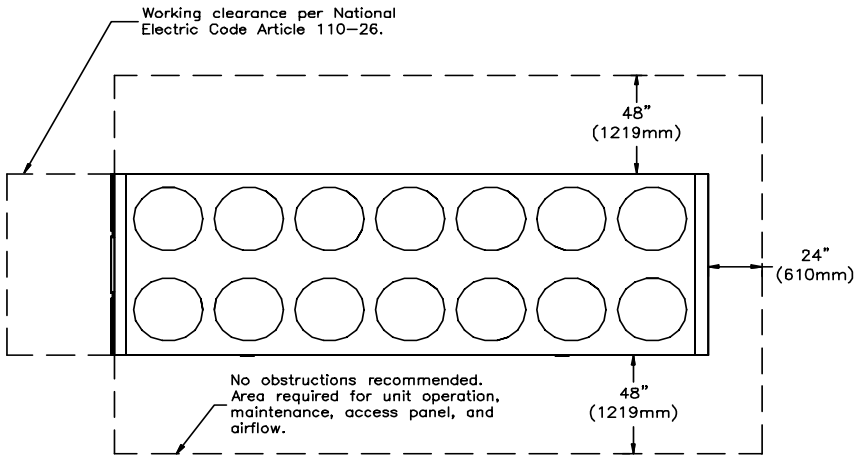
Figure 18
Recommended Unit Clearances: 185N, 200N, 155H, 170H[1]



1. *Refers to unit Model Number digits 5-7, 12*

Installation - Mechanical

Figure 19
Recommended Unit Clearances: 225N, 250N, 185H, 200H[1]



Top (Plan) View

Unobstructed flow of condenser air is essential to maintain chiller capacity and operating efficiency. When determining unit placement, give careful consideration to assuring a sufficient flow of air across the condenser heat transfer surface. Two detrimental conditions are possible and must be avoided if optimum performance is to be achieved: warm air recirculation and coil starvation.

Warm air recirculation occurs when discharge air from the condenser fans is recycled back to the condenser coil inlet. Coil starvation occurs when free airflow to (or from) the condenser is restricted.

Both warm air recirculation and coil starvation cause reduction in unit efficiency and capacity due to the increased head pressures.

Debris, trash, supplies etc. should not be allowed to accumulate in the vicinity of the unit. Supply air movement may draw debris into the condenser coil, blocking spaces between coil fins and causing coil starvation. Special consideration should be given to low ambient units. Condenser coils and fan discharge must be kept free of snow or other obstructions to permit adequate airflow for satisfactory unit operation.

In situations where equipment must be installed with less clearance than recommended, such as frequently occurs in retrofit and rooftop applications, restricted airflow is common. The Main Processor will direct the unit to make as much chilled water as possible given the actual installed conditions. Consult your Trane sales engineer for more details.

Note: If the outdoor unit configuration requires a variance to the clearance dimensions, contact your Trane Sales Office Representative. Also refer to Trane Engineering Bulletins for application information on RTAC chillers.

Installation - Mechanical

Unit Isolation and Leveling

For additional reduction of sound and vibration, install the optional neoprene isolators. See Figure 20.

Construct an isolated concrete pad for the unit or provide concrete footings at the unit mounting points. Mount the unit directly to the concrete pads or footings.

Level the unit using the base rail as a reference. The unit must be level within 1/4-in (6 mm) over the entire length. Use shims as necessary to level the unit.

Neoprene Isolator Installation

1. Secure the isolators to the mounting surface using the mounting slots in the isolator base plate. DO not fully tighten the isolator mounting bolts at this time.
2. Align the mounting holes in the base of the unit with the threaded positioning pins on the top of the isolators.
3. Lower the unit onto the isolators and secure the isolator to the unit with a nut. Maximum isolator deflection should be 1/4 inch (6 mm).
4. Level the unit carefully. Fully tighten the isolator mounting bolts.

Figure 20
Neoprene Isolator Placement (refer to Figure 16 for typical Isolator Placement)

Drainage

Provide a large capacity drain for water vessel drain-down during shutdown or repair. The evaporator is provided with a drain connection. All local and national codes apply. The vent on the top of the evaporator waterbox is provided to prevent a vacuum by allowing air into the evaporator for complete drainage.

Installation - Mechanical

Evaporator Water Piping

Thoroughly flush all water piping to the unit before making the final piping connections to the unit.

Caution: If using an acidic commercial flushing solution, construct a temporary bypass around the unit to prevent damage to internal components of the evaporator.
To avoid possible equipment damage, do not use untreated or improperly treated system water.

Evaporator Piping

Components and layout will vary slightly, depending on the location of connections and the water source.

Installation - Mechanical

Caution: The chilled water connections to the evaporator are to be "victaulic" type connections. Do not attempt to weld these connections, as the heat generated from welding can cause microscopic and macroscopic fractures on the cast iron waterboxes that can lead to premature failure of the waterbox.
To prevent damage to chilled water components, do not allow evaporator pressure (maximum working pressure) to exceed 150 psig (10.5 bar) (or 300 psig (21 bar) if optional high-pressure water box is installed).

Provide shutoff valves in lines to the gauges to isolate them from the system when they are not in use. Use rubber vibration eliminators to prevent vibration transmission through the water lines. If desired, install thermometers in the lines to monitor entering and leaving water temperatures. Install a balancing valve in the leaving water line to control water flow balance. Install shutoff valves on both the entering and leaving water lines so that the evaporator can be isolated for service.

Caution: A pipe strainer must be installed in the entering water line. Failure to do so can allow waterborne debris to enter the evaporator.

"Piping components" include all devices and controls used to provide proper water system operation and unit operating safety. These components and their general locations are given below.

Entering Chilled Water Piping

[ ] Air vents (to bleed air from system).

[ ] Water pressure gauges with shutoff valves.

[ ] Vibration eliminators.

[ ] Shutoff (isolation) valves. Thermometers (if desired).

[ ] Clean-out tees.

[ ] Pipe strainer.

Caution: Install strainer in evaporator water inlet piping. Failure to do so can result in evaporator tube damage.

Installation - Mechanical

Leaving Chilled Water Piping

[ ] Air vents (to bleed air from system).

[ ] Water pressure gauges with shutoff valves. Vibration eliminators.

[ ] Shutoff (isolation) valves.

[ ] Thermometers.

[ ] Clean-out tees.

[ ] Balancing valve.

[ ] Flow Switch

Caution: To prevent evaporator damage, do not exceed 150 psig (10.3 bar) evaporator water pressure.

Evaporator Drain

A 2" (51mm) drain connection is located under the outlet end of the evaporator waterbox. This may be connected to a suitable drain to permit evaporator drainage during unit servicing. A shutoff valve must be installed on the drain line.

Evaporator Flow Switch

Specific connection and schematic wiring diagrams are shipped with the unit. Some piping and control schemes, particularly those using a single water pump for both chilled and hot water, must be analyzed to determine how and or if a flow sensing device will provide desired operation.

Follow the manufacturer's recommendations for selection and installation procedures. General guidelines for flow switch installation are outlined below

1. Mount the switch upright, with a minimum of 5 pipe diameters of straight horizontal run on each side. Do not install close to elbows, orifices or valves.

Note: The arrow on the switch must point in the direction of flow.

2. To prevent switch fluttering, remove all air from the water system.

Note: The CH.530 provides a 6-second time delay after a "loss-of-flow" diagnostic before shutting the unit down. Contact a qualified service representative if nuisance machine shutdowns persist.

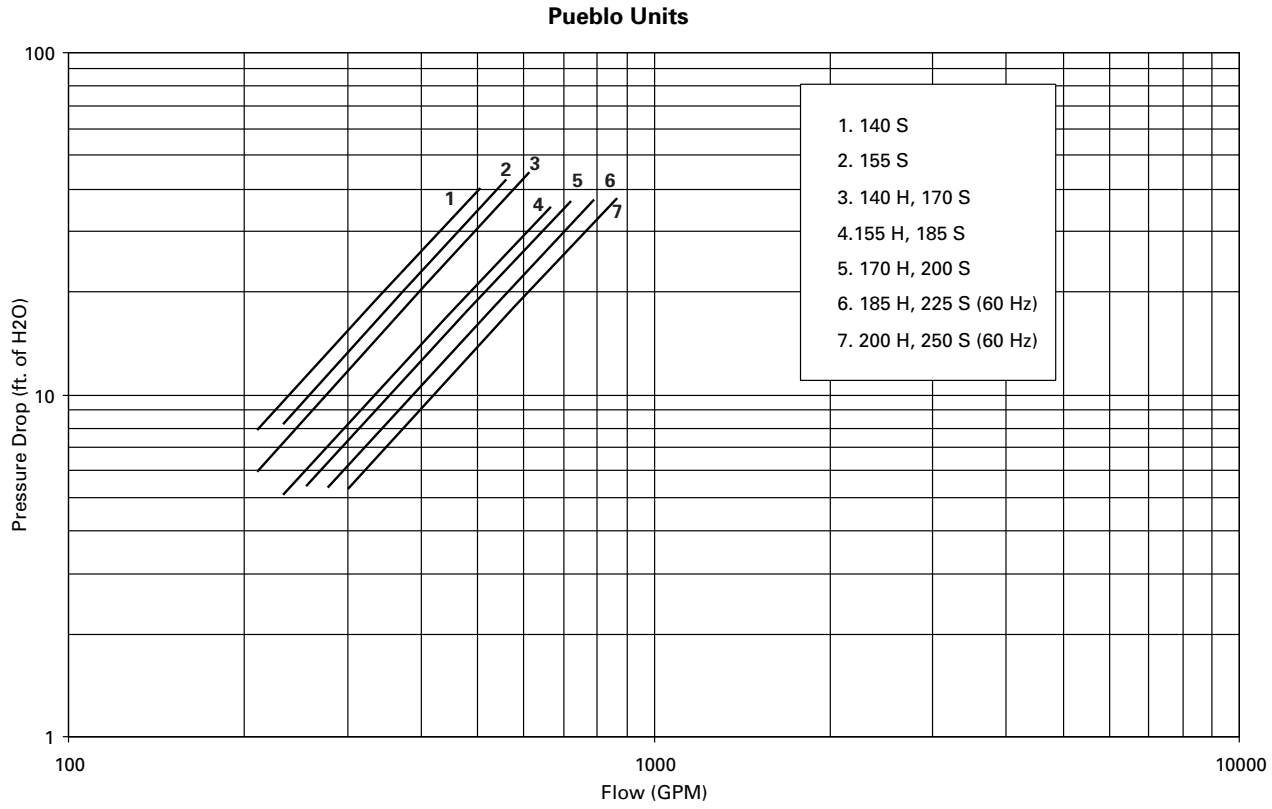
3. Adjust the switch to open when water flow falls below nominal.

Evaporator data is given in Section 1. Flow switch contacts are closed on proof of water flow.

4. Install a pipe strainer in the entering evaporator water line to protect components from waterborne debris.

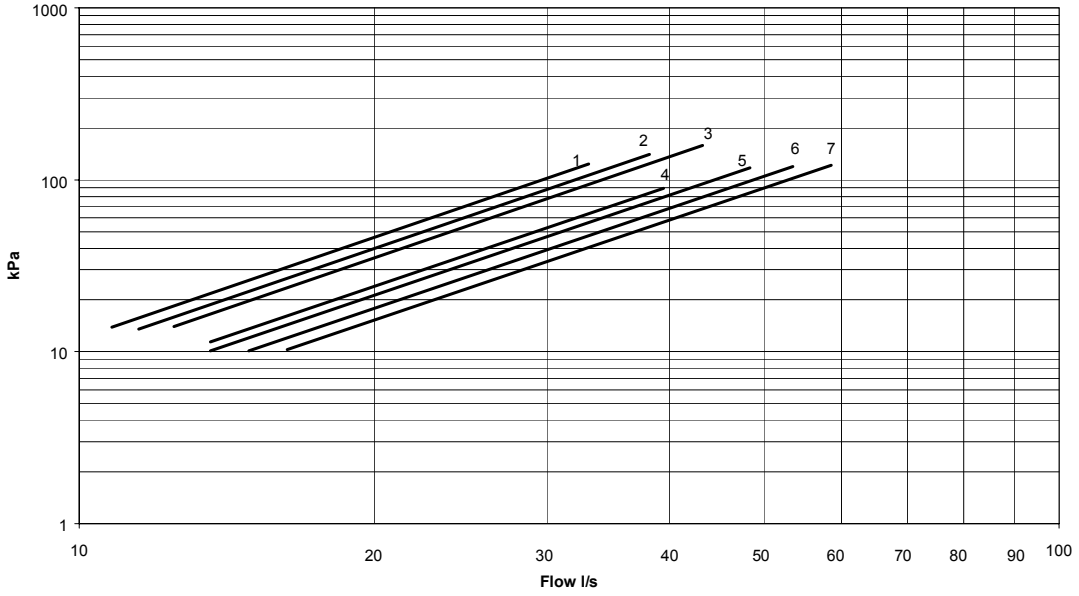
Installation - Mechanical

Evaporator Water Pressure Drop



Installation - Mechanical

Evaporator Water Pressure Drop RTAC 120 - 200 Ton (European Units)



Legend:

1 = RTAC 120 HE – 140 STD

2 = RTAC 130 HE – 155 STD

3 = RTAC 140 HE – 170 STD

4 = RTAC 155 HE – 185 STD

5 = RTAC 170 HE – 200 STD

6 = RTAC 185 HE

7 = RTAC 200 HE

Installation - Mechanical

Water Treatment

CAUTION: If calcium chloride is used for water treatment, an applicable corrosion inhibitor must also be used. Failure to do so may result in damage to system components.

Dirt, scale, products of corrosion and other foreign material will adversely affect heat transfer between the water and system components. Foreign matter in the chilled water system can also increase pressure drop and, consequently, reduce water flow. Proper water treatment must be determined locally, depending on the type of system and local water characteristics.

Neither salt nor brackish water is recommended for use in Trane air-cooled Series R® chillers. Use of either will lead to a shortened life to an indeterminable degree. The Trane Company encourages the employment of a reputable water treatment specialist, familiar with local water conditions, to assist in this determination and in the establishment of a proper water treatment program.

Using untreated or improperly treated water in these units may result in inefficient operation and possible tube damage. Consult a qualified water treatment specialist to determine whether treatment is needed. The following disclamatory label is provided on each RTAC unit:

Note: The use of improperly treated or untreated water in this equipment may result in scaling, erosion, corrosion, algae or slime. The services of a qualified water treatment specialist should be engaged to determine what treatment, if any, is advisable. The Trane Company warranty specifically excludes liability for corrosion, erosion or deterioration of Trane equipment.

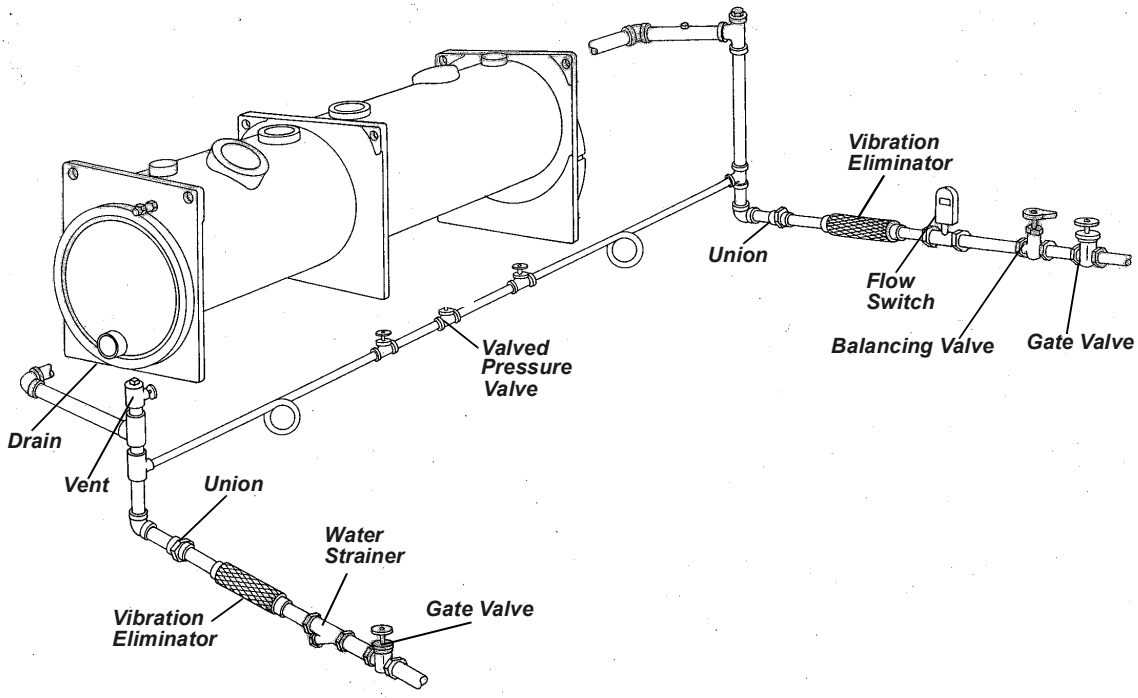
Caution: Do not use untreated or improperly treated water. Equipment damage may occur.

Water Pressure Gauges

Install field-supplied pressure components as shown in Figure 21. Locate pressure gauges or taps in a straight run of pipe; avoid placement near elbows, etc. Be sure to install the gauges at the same elevation on each shell if the shells have opposite-end water connections.

Installation - Mechanical

Figure 21
Suggested Piping for Typical RTAC Evaporator



Note: Once the unit is installed at a site, one vertical or one diagonal unit support can be permanently removed if it creates an obstruction for water piping.

To read manifolded pressure gauges, open one valve and close the other (depending upon the reading desired). This eliminates errors resulting from differently calibrated gauges installed at unmatched elevations.

Water Pressure Relief Valves

Caution: To prevent shell damage, install pressure relief valves in the evaporator water system.

Install a water pressure relief valve in the evaporator inlet piping between the evaporator and the inlet shutoff valve, as shown in Figure 21. Water vessels with close-coupled shutoff valves have a high potential for hydrostatic pressure buildup on a water temperature increase. Refer to applicable codes for relief valve installation guidelines.

Installation - Mechanical

Freeze Protection

If the unit will remain operational at subfreezing ambient temperatures, the chilled water system must be protected from freezing, following the steps listed below

1. As an option, heaters are factory-installed on the packaged unit evaporator and will protect it from freezing in ambient temperatures down to -20°F (-29°C).
2. Install heat tape on all water piping, pumps, and other components that may be damaged if exposed to freezing temperatures. Heat tape must be designed for low ambient temperature applications. Heat tape selection should be based on the lowest expected ambient temperature.
3. Add a non-freezing, low temperature, corrosion inhibiting, heat transfer fluid to the chilled water system. The solution must be strong enough to provide protection against ice formation at the lowest anticipated ambient temperature. Refer to Table 1 through Table 4 in Section 1 for evaporator water storage capacities.

Note: Use of glycol type antifreeze reduces the cooling capacity of the unit and must be considered in the design of the system specifications.

Recommended Low Evaporator Refrigerant Cutout and % Glycol for RTAC Chillers

With Propylene Glycol																
Evaporator Fluid Delta T		Standard Unit					Standard Unit With Extra Pass Evaporator					Premium Unit				
		4	6	8	10	12	4	6	8	10	12	4	6	8	10	12
Chilled Water Setpoint	Leaving water Temp. Cutout	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol
40	35		0	0	0	0			0	0	0		0	0	0	0
39	34		3	3	2	2			2	1	1		1	1	1	1
38	33		4	4	4	4			3	3	3		3	3	3	3
37	32		6	6	6	6			5	5	5		5	5	5	4
36	31		8	8	8	8			7	7	6		7	6	6	6
35	30		10	10	10	10			8	8	8		8	8	8	8
34	29		11	11	12	11			10	10	10		10	10	10	10
33	28		13	13	13	13		Not	12	12	12		12	12	12	12
32	27		14	15	15	15		Available	14	14	14	Not	13	13	13	13
31	26		16	16	16	18			15	15	15	Available	15	15	15	15
30	25	Not	17	18	18	20			17	17	17		16	16	16	17
29	24	Available	19	19	20				18	18	18		18	18	18	18
28	23		20	21	23				19	19	20		19	19	19	20
27	22		21	22	27				21	21	22		20	20	21	22
26	21		23	24					22	22	24		22	22	22	24
25	20		24	27			Not		23	24	26		23	23	24	26
24	19		25	32			Available	24	25	26			24	24	25	29
23	18		27					25	26	28		25	25	25	27	33
22	17		30					26	27	32		26	26	27	29	
21	16		31					27	29			27	27	28	31	
20	15		35			Not		29	31			28	28	29	34	
19	14				Not	Available		30	35			29	29	31		
18	13	31			Available			31				29	30	33		
17	12	33		Not				33			Not	30	31	34		Not
16	11	34		Available				35		Not	Available	31	32	37		Available
15	10		Not						Not	Available		32	33		Not	
14	9		Available						Available			33	35		Available	
13	8	Not						Not				34	36	Not		
12	7	Available						Available				35		Available		
11	6											35	Not			
10	5											36	Available			

Recommended Low Evaporator Refrigerant Cutout and % Glycol for RTAC Chillers

With Ethylene Glycol																
Evaporator Fluid Delta T		Standard Unit					Standard Unit With Extra Pass Evaporator					Premium Unit				
		4	6	8	10	12	4	6	8	10	12	4	6	8	10	12
Chilled Water Setpoint	Leaving water Temp. Cutout	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol	Rec. % Glycol
40	35			2	2	3				1	2		1	1	1	2
39	34		Not Available	4	3	5				3	4		3	2	2	4
38	33			5	5	7			Not Available	4	6		4	4	4	5
37	32			6	6	8				6	7		6	5	5	7
36	31			8	8	10				7	9		7	7	7	9
35	30		9	9	9	12				8	10		8	8	8	11
34	29		11	10	11	13			10	10	12		10	10	10	12
33	28		12	12	12	15			11	11	13		11	11	11	14
32	27		13	13	14	16			12	13	15		12	12	13	15
31	26		14	14	15	17			13	14	16	Not Available	13	13	14	16
30	25		15	15	17	18			15	15	17		15	15	16	18
29	24		16	16	18	20		Not Available	16	17	19		16	16	17	19
28	23		17	18	19	21			17	18	20		17	17	18	20
27	22		19	19	20	22			18	19	21		18	18	20	22
26	21	Not Available	20	20	21	23			19	20	22		19	19	21	23
25	20		21	21	23	25	Not Available		20	22	23		20	20	22	25
24	19		22	22	24	26			21	23	24		21	21	24	27
23	18		22	23	25	28			22	24	25		22	22	25	30
22	17		23	24	26	30			23	25	26		23	23	27	34
21	16		24	25	28	33			24	26	27		24	25	29	
20	15		25	26	29				25	27	28		25	26	31	
19	14		26	27	31				26	28	30	25	26	27	34	
18	13		27	28	33				27	29	31	26	27	29		
17	12		28	30				27	28	30	32	27	28	31		
16	11		28	31				28	29	31	34	28	29	33		Not Available
15	10		29	33		Not Available		28	30	32		28	30		Not Available	
14	9		30		Not Available			29	31	34		29	31			
13	8		31	Not Available				30	32		Not Available	30	32	Not Available		
12	7		32					31	33	Not Available		31	33			
11	6	32	33					32	34			32	34			
10	5	33	N/A					33	N/A			33	N/A			

Recommended Low Evaporator Refrigerant Cutout and % Glycol for RTAC Chillers

% Glycol	Ethylene Glycol		Propylene Glycol	
	Low Refrig. Temp Cutout	Solution Freeze Point	Low Refrig. Temp Cutout	Solution Freeze Point
0	28	32	28	32
1	27.6	31.6	27.6	31.6
2	27.0	31.0	27.0	31.0
3	26.3	30.3	26.4	30.4
4	25.7	29.7	25.9	29.9
5	25.0	29.0	25.3	29.3
6	24.3	28.3	24.7	28.7
7	23.6	27.6	24.1	28.1
8	22.9	26.9	23.6	27.6
9	22.2	26.2	23.0	27.0
10	21.5	25.5	22.4	26.4
11	20.7	24.7	21.7	25.7
12	19.9	23.9	21.1	25.1
13	19.1	23.1	20.4	24.4
14	18.3	22.3	19.8	23.8
15	17.5	21.5	19.1	23.1
16	16.6	20.6	18.4	22.4
17	15.7	19.7	17.6	21.6
18	14.7	18.7	16.9	20.9
19	13.8	17.8	16.1	20.1
20	12.8	16.8	15.3	19.3
21	11.8	15.8	14.4	18.4
22	10.7	14.7	13.6	17.6
23	9.7	13.7	12.7	16.7
24	8.5	12.5	11.7	15.7
25	7.4	11.4	10.8	14.8
26	6.2	10.2	9.8	13.8
27	5.0	9.0	8.7	12.7
28	3.7	7.7	7.6	11.6
29	2.4	6.4	6.5	10.5
30	1.1	5.1	5.3	9.3
31	-0.3	3.7	4.1	8.1
32	-1.7	2.3	2.8	6.8
33	-3.2	0.8	1.5	5.5
34	-4.7	-0.7	0.1	4.1
35	-5.0	-2.3	-1.3	2.7
36	-5.0	-3.9	-2.7	1.3
37	-5.0	-5.6	-4.3	-0.3
38	-5.0	-7.3	-5.0	-1.8
39	-5.0	-9.0	-5.0	-3.5
40	-5.0	-10.8	-5.0	-5.2
41	-5.0	-12.7	-5.0	-6.9
42	-5.0	-14.6	-5.0	-8.8
43	-5.0	-16.6	-5.0	-10.7
44	-5.0	-18.6	-5.0	-12.6
45	-5.0	-20.7	-5.0	-14.6
46	-5.0	-22.9	-5.0	-16.7
47	-5.0	-25.1	-5.0	-18.9
48	-5.0	-27.3	-5.0	-21.1
49	-5.0	-29.7	-5.0	-23.4
50	-5.0	-32.1	-5.0	-25.8
51	-5.0	-34.5	-5.0	-28.3
52	-5.0	-37.1	-5.0	-30.8
53	-5.0	-39.7	-5.0	-33.4
54	-5.0	-42.3	-5.0	-36.1

Notes:
1) Solution freeze point is 4 deg. F below operating point saturation temperature.
2) LRTC is 4 deg. F below freeze point.

Procedure:
1) Is operating condition contained within charts 1&2? If no see "Specials" below.
Ethylene Glycol or Propylene Glycol, Fluid Delta T = 4 to 12 F
Standard Unit, Standard Unit with Extra Pass or Premium Unit
2) For leaving fluid temperatures greater than 40 deg. F, use settings for 40 deg. F.
3) Select operating condition from chart. For example: EG, Standard Unit, 8 deg. Delta T, 20 deg. F lvg. water temp.
Interpolation of results is allowed for Delta T's other than those within the chart.
4) Read off recommended % glycol, for example = 26%.
5) Go to chart 3 (to the left). From % glycol, select low refrigerant temperature cutout setting, for example = 6.2 deg. F.

Cautions:
1) Additional Glycol beyond the recommendations will adversely effect unit performance.
The unit efficiency will be reduced and the saturated evaporator temperature will be reduced.
For some operating conditions this effect can be significant.
2) If additional Glycol is used, then use the actual % glycol to establish the low refrigerant cutout setpoint.
3) The minimum low refrigerant cutout setpoint allowed is -5 deg. F. This minimum is established by the solubility limits of the oil in the refrigerant.

Specials:
1) The following constitute a special that must be calculated by engineering:
Freeze inhibitor other than Ethylene Glycol or Propylene Glycol
Fluid Delta T's outside of the range 4 to 12 deg. F.
Unit configurations other than Standard, Standard with extra pass, and Premium
% Glycol greater than maximum for a column in chart 1 & 2.
For example: on the standard unit, 10 F delta T, Ethylene Glycol the maximum % Glycol is 34%.
2) Specials should be calculated by engineering. The purpose of the calculation is to make sure that the design
saturation temperature is greater than 3 F. Additionally, the calculation must verify that the fluid freeze point is
a minimum of 4 deg. F lower than the design saturation temperature. The low evaporator temperature cutout will
be 4 deg. F below the freeze point or -5 deg. F, whichever is greater.

Installation - Electrical

General Recommendations

WARNING: The Warning Label shown in Figure 22 is displayed on the equipment and shown on wiring diagrams and schematics. Strict adherence to these warnings must be observed. Failure to do so may result in personal injury or death.

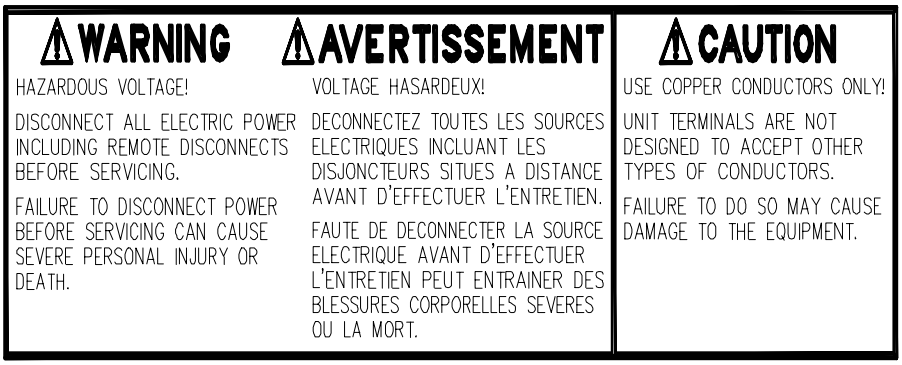
All wiring must comply with local codes and the National Electric Code. Typical field wiring diagrams are included at the end of the manual. Minimum circuit ampacities and other unit electrical data are on the unit nameplate and in Table 10 though Table 12. See the unit order specifications for actual electrical data. Specific electrical schematics and connection diagrams are shipped with the unit.

Caution: To avoid corrosion and overheating at terminal connections, use copper conductors only. Failure to do so may result in damage to the equipment.

Do not allow conduit to interfere with other components, structural members or equipment. Control voltage (115V) wiring in conduit must be separate from conduit carrying low voltage (<30V) wiring.

Caution: To prevent control malfunctions, do not run low voltage wiring (<30V) in conduit with conductors carrying more than 30 volts.

Figure 22
Warning Label - Typical Field Wiring for RTAC Packaged Unit – 140 to 250 Tons (60 Hz)



Installation - Electrical

Table 10
Unit Electrical Data for Std Efficiency at All Ambient Operation

Unit Wiring						Motor Data						
				Max. Fuse, HACR	Rec. Time	Compressor (Each)				Fans (Each)		
Unit Size	Rated Voltage	# of Power Connections (1)	MCA (3) Ckt 1/Ckt 2	Breaker or MOP (11) Ckt 1/Ckt 2	Delay or RDE (4) Ckt 1/Ckt 2	Qty	RLA (5) Ckt 1/Ckt 2	LRA (8) Ckt 1/Ckt 2	Qty. Ckt 1/ Ckt 2	kW	FLA	Control kW (7)
RTAC	380/60/3	1	348	450	400	2	142-142	788-788	8	1.3	3.5	0.8
140	380/60/3	2	192/192	300/300	250/250	2	142/142	788/788	4/4	1.3	3.5	0.8
	460/60/3	1	288	400	350	2	118-118	645-645	8	1.3	2.8	0.8
	460/60/3	2	159/159	250/250	200/200	2	118/118	645/645	4/4	1.3	2.8	0.8
	575/60/3	1	230	300	300	2	94-94	520-520	8	1.3	2.3	0.8
	575/60/3	2	127/127	200/200	175/175	2	94/94	520/520	4/4	1.3	2.3	0.8
	400/50/3	1	333	450	400	2	138-138	774-774	8	1.3	2.8	0.8
	400/50/3	2	184/184	300/300	250/250	2	138/138	774/774	4/4	1.3	2.8	0.8
RTAC	380/60/3	1	380	500	450	2	168-142	947-788	9	1.3	3.5	0.8
155	380/60/3	2	228/192	350/300	300/250	2	168/142	947/788	5/4	1.3	3.5	0.8
	460/60/3	1	317	450	400	2	139-118	758-645	9	1.3	2.8	0.8
	460/60/3	2	188/159	300/250	225/200	2	139/118	758/645	5/4	1.3	2.8	0.8
	575/60/3	1	254	350	300	2	111-94	615-520	9	1.3	2.3	0.8
	575/60/3	2	150/127	250/200	200/175	2	111/94	615/520	5/4	1.3	2.3	0.8
	400/50/3	1	373	500	450	2	168-138	840-774	9	1.3	2.8	0.8
	400/50/3	2	224/184	350/300	300/250	2	168/138	840/774	5/4	1.3	2.8	0.8
RTAC	380/60/3	1	413	500	500	2	168-168	947-947	10	1.3	3.5	0.8
170	380/60/3	2	228/228	350/350	300/300	2	168/168	947/947	5/5	1.3	3.5	0.8
	460/60/3	1	341	450	400	2	139-139	758-758	10	1.3	2.8	0.8
	460/60/3	2	188/188	300/300	225/225	2	139/139	758/758	5/5	1.3	2.8	0.8
	575/60/3	1	273	350	350	2	111-111	615-615	10	1.3	2.3	0.8
	575/60/3	2	150/150	250/250	200/200	2	111/111	615/615	5/5	1.3	2.3	0.8
	400/50/3	1	406	500	450	2	168-168	840-840	10	1.3	2.8	0.8
	400/50/3	2	224/224	350/350	300/300	2	168/168	840/840	5/5	1.3	2.8	0.8
RTAC	380/60/3	1	460	600	600	2	203-168	994-947	11	1.3	3.5	0.8
185	380/60/3	2	275/228	450/350	350/300	2	203/168	994/947	6/5	1.3	3.5	0.8
	460/60/3	1	380	500	450	2	168-139	823-758	11	1.3	2.8	0.8
	460/60/3	2	227/188	350/300	300/225	2	168/139	823/758	6/5	1.3	2.8	0.8
	575/60/3	1	304	400	350	2	134-111	661-615	11	1.3	2.3	0.8

Installation - Electrical

Unit Wiring						Motor Data						
				Max. Fuse, HACR	Rec. Time	Compressor (Each)			Fans (Each)			
Unit Size	Rated Voltage	# of Power Connections (1)	MCA (3) Ckt 1/Ckt 2	Breaker or MOP (11) Ckt 1/Ckt 2	Delay or RDE (4) Ckt 1/Ckt 2	Qty	RLA (5) Ckt 1/Ckt 2	LRA (8) Ckt 1/Ckt 2	Qty. Ckt 1/ Ckt 2	kW	FLA	Control kW (7)
	575/60/3	2	181/150	300/250	225/200	2	134/111	661/615	6/5	1.3	2.3	0.8
	400/50/3	1	446	600	500	2	198-168	1015-840	11	1.3	2.8	0.8
	400/50/3	2	264/224	450/350	350/300	2	198/168	1015/840	6/5	1.3	2.8	0.8
RTAC	380/60/3	1	499	700	600	2	203-203	994-994	12	1.3	3.5	0.8
200	380/60/3	2	275/275	450/450	350/350	2	203/203	994/994	6/6	1.3	3.5	0.8
	460/60/3	1	412	500	500	2	168-168	823-823	12	1.3	2.8	0.8
	460/60/3	2	227/227	350/350	300/300	2	168/168	823/823	6/6	1.3	2.8	0.8
	575/60/3	1	329	450	400	2	134-134	661-661	12	1.3	2.3	0.8
	575/60/3	2	181/181	300/300	225/225	2	134/134	661/661	6/6	1.3	2.3	0.8
	400/50/3	1	479	600	600	2	198-198	1015-1015	12	1.3	2.8	0.8
	400/50/3	2	264/264	450/450	350/350	2	198/198	1015/1015	6/6	1.3	2.8	0.8
RTAC	380/60/3	1	551	700	700	2	242-203	1216-994	13	1.3	3.5	0.8
225	380/60/3	2	327/275	500/450	400/350	2	242/203	1216/994	7/6	1.3	3.5	0.8
	460/60/3	1	454	600	600	2	200-168	993-823	13	1.3	2.8	0.8
	460/60/3	2	270/227	450/350	350/300	2	200/168	993/823	7/6	1.3	2.8	0.8
	575/60/3	1	364	500	450	2	160-134	794-661	13	1.3	2.3	0.8
	575/60/3	2	216/181	350/300	300/225	2	160/134	794/661	7/6	1.3	2.3	0.8
RTAC	380/60/3	1	594	800	700	2	242-242	1216-1216	14	1.3	3.5	0.8
250	380/60/3	2	327/327	500/500	400/400	2	242/242	1216/1216	7/7	1.3	3.5	0.8
	460/60/3	1	489	600	600	2	200-200	993-993	14	1.3	2.8	0.8
	460/60/3	2	270/270	450/450	350/350	2	200/200	993/993	7/7	1.3	2.8	0.8
	575/60/3	1	392	500	500	2	160-160	794-794	14	1.3	2.3	0.8
	575/60/3	2	216/216	350/350	300/300	2	160/160	794/794	7/7	1.3	2.3	0.8

Installation - Electrical

Table 11
Unit Electrical Data for High Efficiency at Std Ambient Operation

Unit Wiring						Motor Data						
				Max. Fuse, HACR	Rec. Time	Compressor (Each)						
Unit		# of Power Connections (1)	MCA (3)	Breaker or MOP (11)	Delay or RDE (4)		RLA (5)	LRA (8)		Fans (Each)		Control
Size	Rated Voltage		Ckt 1/Ckt 2	Ckt 1/Ckt 2	Ckt 1/Ckt 2	Qty	Ckt 1/Ckt 2	Ckt 1/Ckt 2	Qty.	kW	FLA	kW (7)
RTAC	380/60/3	1	341	450	400	2	136-136	788-788	10	1.3	3.5	0.8
140	380/60/3	2	188/188	300/300	225/225	2	136/136	788/788	5/5	1.3	3.5	0.8
	460/60/3	1	282	350	350	2	113-113	645-645	10	1.3	2.8	0.8
	460/60/3	2	155/155	250/250	200/200	2	113/113	645/645	5/5	1.3	2.8	0.8
	575/60/3	1	226	300	250	2	90-90	520-520	10	1.3	2.3	0.8
	575/60/3	2	124/124	200/200	150/150	2	90/90	520/520	5/5	1.3	2.3	0.8
	400/50/3	1	325	450	400	2	132-132	774-774	10	1.3	2.8	0.8
	400/50/3	2	179/179	300/300	225/225	2	132/132	774/774	5/5	1.3	2.8	0.8
RTAC	380/60/3	1	376	500	416	2	161-136	947-788	11	1.3	3.5	0.8
155	380/60/3	2	222/188	350/300	300/225	2	161/136	947/788	6/5	1.3	3.5	0.8
	460/60/3	1	310	400	350	2	133-113	758-645	11	1.3	2.8	0.8
	460/60/3	2	183/155	300/250	225/200	2	133/113	758/645	6/5	1.3	2.8	0.8
	575/60/3	1	248	350	300	2	106-90	615-520	11	1.3	2.3	0.8
	575/60/3	2	146/124	250/200	175/150	2	106/90	615/520	6/5	1.3	2.3	0.8
	400/50/3	1	363	500	450	2	160-132	840-774	11	1.3	2.8	0.8
	400/50/3	2	217/179	350/300	300/225	2	160/132	840/774	6/5	1.3	2.8	0.8
RTAC	380/60/3	1	404	500	450	2	161-161	947-947	12	1.3	3.5	0.8
170	380/60/3	2	222/222	350/350	300/300	2	161/161	947/947	6/6	1.3	3.5	0.8
	460/60/3	1	333	450	400	2	133-133	758-758	12	1.3	2.8	0.8
	460/60/3	2	183/183	300/300	225/225	2	133/133	758/758	6/6	1.3	2.8	0.8
	575/60/3	1	266	350	300	2	106-106	615-615	12	1.3	2.3	0.8
	575/60/3	2	146/146	250/250	175/175	2	106/106	615/615	6/6	1.3	2.3	0.8
	400/50/3	1	394	500	450	2	160-160	840-840	12	1.3	2.8	0.8
	400/50/3	2	217/217	350/350	300/300	2	160/160	840/840	6/6	1.3	2.8	0.8
RTAC	380/60/3	1	452	600	500	2	196-161	994-947	13	1.3	3.5	0.8
185	380/60/3	2	270/222	450/350	350/300	2	196/161	994/947	7/6	1.3	3.5	0.8
	460/60/3	1	372	500	450	2	162-133	823-758	13	1.3	2.8	0.8
	460/60/3	2	222/183	350/300	300/225	2	162/133	823/758	7/6	1.3	2.8	0.8

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Unit Wiring						Motor Data						
				Max. Fuse, HACR	Rec. Time	Compressor (Each)						
Unit		# of Power Connections (1)	MCA (3)	Breaker or MOP (11)	Delay or RDE (4)		RLA (5)	LRA (8)		Fans (Each)		Control
Size	Rated Voltage		Ckt 1/Ckt 2	Ckt 1/Ckt 2	Ckt 1/Ckt 2	Qty	Ckt 1/Ckt 2	Ckt 1/Ckt 2	Qty.	kW	FLA	kW (7)
	575/60/3	1	298	400	350	2	130-106	661-615	13	1.3	2.3	0.8
	575/60/3	2	179/146	300/250	225/175	2	130/106	661/615	7/6	1.3	2.3	0.8
	400/50/3	1	433	600	500	2	189-160	1015-840	13	1.3	2.8	0.8
	400/50/3	2	256/217	400/350	350/300	2	189/160	1015/840	7/6	1.3	2.8	0.8
RTAC	380/60/3	1	490	600	600	2	196-196	994-994	14	1.3	3.5	0.8
200	380/60/3	2	270/270	450/450	350/350	2	196/196	994/994	7/7	1.3	3.5	0.8
	460/60/3	1	404	500	450	2	162-162	823-823	14	1.3	2.8	0.8
	460/60/3	2	222/222	350/350	300/300	2	162/162	823/823	7/7	1.3	2.8	0.8
	575/60/3	1	325	450	400	2	130-130	661-661	14	1.3	2.3	0.8
	575/60/3	2	179/179	300/300	225/225	2	130/130	661/661	7/7	1.3	2.3	0.8
	400/50/3	1	464	600	600	2	189-189	1015-1015	14	1.3	2.8	0.8
	400/50/3	2	256/256	400/400	350/350	2	189/189	1015/1015	7/7	1.3	2.8	0.8

Table 12
Unit Electrical Data for High Efficiency at High Ambient Operation

Unit Wiring						Motor Data						
				Max. Fuse, HACR	Rec. Time	Compressor (Each)						
Unit Size	Rated Voltage	# of Power Connections (1)	MCA (3)	Breaker or MOP (11)	Delay or RDE (4)		RLA (5)	LRA (8)		Fans (Each)		Control
			Ckt 1/Ckt 2	Ckt 1/Ckt 2	Ckt 1/Ckt 2	Qty	Ckt 1/Ckt 2	Ckt 1/Ckt 2	Qty.	kW	FLA	kW (7)
RTAC	380/60/3	1	355	400	400	2	142-142	788-788	10	1.3	3.5	0.8
140	380/60/3	2	195/195	300/300	250/250	2	142/142	788/788	5/5	1.3	3.5	0.8
	460/60/3	1	294	400	350	2	118-118	645-645	10	1.3	2.8	0.8
	460/60/3	2	162/162	250/250	200/200	2	118/118	645/645	5/5	1.3	2.8	0.8
	575/60/3	1	235	300	300	2	94-94	520-520	10	1.3	2.3	0.8
	575/60/3	2	129/129	200/200	175/175	2	94/94	520/520	5/5	1.3	2.3	0.8
	400/50/3	1	339	450	400	2	138-138	774-774	10	1.3	2.8	0.8
	400/50/3	2	187/187	300/300	225/225	2	138/138	774/774	5/5	1.3	2.8	0.8

Installation - Electrical

			Unit Wiring			Motor Data						
				Max. Fuse, HACR	Rec. Time		Compressor (Each)			Fans (Each)		Control
			MCA (3)	Breaker or MOP (11)	Delay or RDE (4)		RLA (5)	LRA (8)				
Unit Size	Rated Voltage	# of Power Connections (1)	Ckt 1/Ckt 2	Ckt 1/Ckt 2	Ckt 1/Ckt 2	Qty	Ckt 1/Ckt 2	Ckt 1/Ckt 2	Qty.	kW	FLA	kW (7)
RTAC	380/60/3	1	391	500	450	2	168-142	947-788	11	1.3	3.5	0.8
155	380/60/3	2	231/195	350/300	300/250	2	168/142	947/788	6/5	1.3	3.5	0.8
	460/60/3	1	323	450	400	2	139-118	758-645	11	1.3	2.8	0.8
	460/60/3	2	191/162	300/250	225/200	2	139/118	758/645	6/5	1.3	2.8	0.8
	575/60/3	1	258	350	300	2	111-94	615-520	11	1.3	2.3	0.8
	575/60/3	2	153/129	250/200	200/175	2	111/94	615/520	6/5	1.3	2.3	0.8
	400/50/3	1	379	500	450	2	168-138	840-774	11	1.3	2.8	0.8
	400/50/3	2	227/187	350/300	300/225	2	168/138	840/774	6/5	1.3	2.8	0.8
RTAC	380/60/3	1	420	500	500	2	168-168	947-947	12	1.3	3.5	0.8
170	380/60/3	2	231/231	350/350	300/300	2	168/168	947/947	6/6	1.3	3.5	0.8
	460/60/3	1	346	450	400	2	139-139	758-758	12	1.3	2.8	0.8
	460/60/3	2	191/191	300/300	225/225	2	139/139	758/758	6/6	1.3	2.8	0.8
	575/60/3	1	277	350	350	2	111-111	615-615	12	1.3	2.3	0.8
	575/60/3	2	153/153	250/250	200/200	2	111/111	615/615	6/6	1.3	2.3	0.8
	400/50/3	1	412	500	500	2	168-168	840-840	12	1.3	2.8	0.8
	400/50/3	2	227/227	350/350	300/300	2	168/168	840/840	6/6	1.3	2.8	0.8
RTAC	380/60/3	1	467	600	600	2	203-168	994-947	13	1.3	3.5	0.8
185	380/60/3	2	278/231	450/350	350/300	2	203/168	994/947	7/6	1.3	3.5	0.8
	460/60/3	1	385	500	450	2	168-139	823-758	13	1.3	2.8	0.8
	460/60/3	2	230/191	350/300	300/225	2	168/139	823/758	7/6	1.3	2.8	0.8
	575/60/3	1	308	450	350	2	134-111	661-615	13	1.3	2.3	0.8
	575/60/3	2	184/153	300/250	225/200	2	134/111	661/615	7/6	1.3	2.3	0.8
	400/50/3	1	445	600	500	2	198-168	1015-840	13	1.3	2.8	0.8
	400/50/3	2	267/227	450/350	350/300	2	198/168	1015/840	7/6	1.3	2.8	0.8
RTAC	380/60/3	1	506	700	600	2	203-203	994-994	14	1.3	3.5	0.8
200	380/60/3	2	278/278	450/450	350/350	2	203/203	994/994	7/7	1.3	3.5	0.8
	460/60/3	1	417	500	500	2	168-168	823-823	14	1.3	2.8	0.8
	460/60/3	2	230/230	350/350	300/300	2	168/168	823/823	7/7	1.3	2.8	0.8
	575/60/3	1	334	450	400	2	134-134	661-661	14	1.3	2.3	0.8
	575/60/3	2	184/184	300/300	225/225	2	134/134	661/661	7/7	1.3	2.3	0.8

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	Unit Wiring					Motor Data						
				Max. Fuse, HACR	Rec. Time		Compressor (Each)					
			MCA (3)	Breaker or MOP (11)	Delay or RDE (4)		RLA (5)	LRA (8)		Fans (Each)		Control
Unit Size	Rated Voltage	# of Power Connections (1)	Ckt 1/Ckt 2	Ckt 1/Ckt 2	Ckt 1/Ckt 2	Qty	Ckt 1/Ckt 2	Ckt 1/Ckt 2	Qty.	kW	FLA	kW (7)
	400/50/3	1	485	600	600	2	198-198	1015-1015	14	1.3	2.8	0.8
	400/50/3	2	267/267	450/450	350/350	2	198/198	1015/1015	7/7	1.3	2.8	0.8

Notes to Table 10, Table 11, and Table 12:

1. *As standard, all units have single point power connection. Optional dual point power connections are available.*
2. *Max Fuse or HACR type breaker = 225 percent of the largest compressor RLA plus 100 percent of the second compressor RLA, plus the sum of the condenser fan FLA per NEC 440-22.*

Use FLA per circuit, NOT FLA for the entire unit).”

3. *MCA - Minimum Circuit Ampacity - 125 percent of largest compressor RLA plus 100 percent of the second compressor RLA plus the sum of the condenser fans FLAs per NEC 440-33.*
4. *RECOMMENDED TIME DELAY OR DUAL ELEMENT (RDE) FUSE SIZE: 150 percent of the largest compressor RLA plus 100 percent of the second compressor RLA and the sum of the condenser fan FLAs.*
5. *RLA - Rated Load Amps - rated in accordance with UL Standard 1995.*
6. *Local codes may take precedence.*
7. *Control kW includes operational controls only. Does not include optional evaporator heaters.*
8. *LRA - Locked Rotor Amps - based on full winding (x-line) start units. LRA for wye-delta starters is 1/3 of LRA of x-line units.*
9. *VOLTAGE UTILIZATION RANGE:*

Rated Voltage	Utilization Range
380/60/3	342-418
460/60/3	414-506
575/60/3	516-633
400/50/3	340-460

10. *A separate 115/60/1, 20 amp or 220/50/1, 15 amp customer provided power connection is needed to power the optional evaporator heaters (500 watts) and unit convenience outlet.*
11. *If factory circuit breakers are supplied with the chiller, then these values represent Maximum Overcurrent Protection (MOP).*

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Installer-Supplied Components

Caution: Customer wiring interface connections are shown in the electrical schematics and connection diagrams that are shipped with the unit. The installer must provide the following components if not ordered with the unit:

[ ] Power supply wiring (in conduit) for all field-wired connections.

[ ] All control (interconnecting) wiring (in conduit) for field supplied devices.

[ ] Fused-disconnect switches or HACR type circuit breakers.

[ ] Power factor correction capacitors.

Power Supply Wiring

All power supply wiring must be sized and selected accordingly by the project engineer in accordance with NEC Table 310-16 (EUR = EN 60204)[1].

WARNING: To prevent injury or death, disconnect all electrical power sources before completing wiring connections to the unit.

All wiring must comply with local codes and the National Electrical Code. The installing (or electrical) contractor must provide and install the system interconnecting wiring, as well as the power supply wiring. It must be properly sized and equipped with the appropriate fused disconnect switches.

The type and installation location(s) of the fused disconnects must comply with all applicable codes.

Caution: Use only copper conductors for terminal connections to avoid corrosion or overheating.

Cut holes into the sides of the control panel for the appropriately-sized power wiring conduits. The wiring is passed through these conduits and connected to the terminal blocks, optional unit-mounted disconnects, or HACR type breakers. Refer to Figure 23.

To provide proper phasing of 3-phase input, make connections as shown in field wiring diagrams and as stated on the yellow WARNING label in the starter panel. For additional information on proper phasing, refer to “Unit Voltage Phasing.” Proper equipment ground must be provided to each ground connection in the panel (one for each customer-supplied conductor per phase.

1. EUR = European Manufactured RTAC designation

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115 volt field-provided connections (either control or power) are made through knockouts on the lower left side of the panel (Figure 23). Additional grounds may be required for each 115 volt power supply to the unit. Green lugs are provided for 115V customer wiring.

Figure 23
Starter Panel

Control Power Supply

The unit is equipped with a control power transformer; it is not necessary to provide additional control power voltage to the unit.

All units are factory-connected for appropriate labeled voltages except for the 400V/50Hz units which need the control power transformer (1T1) reconnected as noted below.

Important! As shipped, a normal 400 volt unit control power transformer is wired on the 400 volt tap (H3). Reconnect the appropriate transformer wire lead 126A to the tap (H2) for 380V/50Hz power supply or lead 126A to the tap H4 for the 415V/50 Hz power supply. It is also necessary to adjust the "unit voltage" setting using Techview (Configuration-Custom Tab).
The European units are factory connected for 400V/3/50 with a factory-installed control power transformer.

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Heater Power Supply and Convenience Outlet (Packaged Units Only)

The evaporator shell is insulated from ambient air and protected from freezing temperatures by two thermostatically-controlled immersion heaters and two strip heaters. Whenever the water temperature drops to approximately 37°F (2.8°C), the thermostat energizes the heaters. The heaters will provide protection from ambient temperatures down to -20°F (-29°C).

It is required to provide an independent power source (115V, 15 amp), with a fused-disconnect. The heaters are factory-wired back to the unit control panel.

CAUTION: Control panel main processor does not check for loss of power to the heat tape nor does it verify thermostat operation. A qualified technician must verify power to the heat tape and confirm operation of the heat tape thermostat to avoid catastrophic damage to the evaporator.

A convenience outlet is also provided which shares the same power supply as the heaters. Be aware that when the heater is operating, the convenience outlet amperage draw will be reduced accordingly.

Water Pump Power Supply

Provide power supply wiring with fused disconnect for the chilled water pump(s).

Interconnecting Wiring

Chilled Water Flow (Pump) Interlock

The Model RTAC Series R® chiller requires a field-supplied control voltage contact input through a flow proving switch 5S1 (EUR=6S56) and an auxiliary contact 5K1 AUX (EUR=6K51). Connect the proving switch and auxiliary contact to 1TB5-8 (EUR=6X1) and 1U11 J3-2 (EUR=A7-2). Refer to the field wiring for details.

Chilled Water Pump Control

An evaporator water pump output relay closes when the chiller is given a signal to go into the Auto mode of operation from any source. The contact is opened to turn off the pump in the event of most machine level diagnostics to prevent the build up of pump heat.

The relay output from 1U10 (EUR=A5-2) is required to operate the Evaporator Water Pump (CHWP) contactor. Contacts should be compatible with 115/240 VAC control circuit. The CHWP relay operates in different modes depending on CH.530 or Tracer commands, if available or service pumpdown (See maintenance section). Normally, the CHWP relay follows the AUTO mode of the chiller. Whenever the chiller has no diagnostics and is in the AUTO mode, regardless of where the auto command is coming from, the normally open relay is energized. When the chiller exits the AUTO mode, the relay is timed open for an adjustable

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(using Techview) 0 to 30 minutes. The non-AUTO modes in which the pump is stopped, include Reset (88), Stop (00), External Stop (100), Remote Display Stop (600), Stopped by Tracer (300), Low Ambient Run Inhibit (200), and Ice Building complete (101).

Table 13
Pump Relay Operation

Chiller Mode	Relay Operation
Auto	*Instant close*
Ice Building	*Instant close*
Tracer Override	*Close*
Stop	*TImed Open*
Ice Complete	*Instant Open*
Diagnostics	*Instant Open**

**Exceptions noted in paragraphs following*

When going from Stop to Auto, the CHWP relay is energized immediately. If evaporator water flow is not established in 4 minutes and 15 sec, the CH.530 de-energizes the CHWP relay and generates a non-latching diagnostic. If flow returns (e.g. someone else is controlling the pump), the diagnostic is cleared, the CHWP is re-energized, and normal control resumed.

If evaporator water flow is lost once it had been established, the CHWP relay remains energized and a non-latching diagnostic is generated. If flow returns, the diagnostic is cleared and the chiller returns to normal operation.

In general, when there is either a non-latching or latching diagnostic, the CHWP relay is turned off as though there was a zero time delay. Exceptions (see above table) whereby the relay continues to be energized occur with:

1 A Low Chilled Water Temp. diagnostic (non-latching) (unless also accompanied by an Evap Leaving Water Temperature Sensor Diagnostic)

or

2 A starter contactor interrupt failure diagnostic, in which a compressor continues to draw current even after commanded to have shutdown

or

3 A Loss of Evaporator Water Flow diagnostic (non-latching) and the unit is in the AUTO mode, after initially having proven evaporator water flow.

Alarm and Status Relay Outputs (Programmable Relays)

A programmable relay concept provides for enunciation of certain events or states of the chiller, selected from a list of likely needs, while only using four physical output relays, as shown in the field wiring diagram. The four relays are provided (generally with a Quad Relay

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Output LLID[1]) as part of the Alarm Relay Output Option. The relays contacts are isolated Form C (SPDT), suitable for use with 120 VAC circuits drawing up to 2.8 amps inductive, 7.2 amps resistive, or 1/3 HP and for 240 VAC circuits drawing up to 0.5 amp resistive.

The list of event/states that can be assigned to the programmable relays follows. The relay will be energized when the event/state occurs.

Table 14
Alarm and Status Relay Output Configuration Table

	Description
Alarm - Latching	*This output is true whenever there is any active diagnostic that requires a manual reset to clear, that affects either the Chiller, the Circuit, or any of the Compressors on a circuit. This classification does not include informational diagnostics.*
Alarm - Auto Reset	*This output is true whenever there is any active diagnostic that could automatically clear, that affects either the Chiller, the Circuit, or any of the Compressors on a circuit. This classification does not include informational diagnostics.*
Alarm	*This output is true whenever there is any diagnostic affecting any component, whether latching or automatically clearing. This classification does not include informational diagnostics*
Alarm Ckt 1	*This output is true whenever there is any diagnostic effecting Refrigerant Circuit 1, whether latching or automatically clearing, including diagnostics affecting the entire chiller. This classification does not include informational diagnostics.*
Alarm Ckt 2	*This output is true whenever there is any diagnostic affecting Refrigerant Circuit 2 whether latching or automatically clearing, including diagnostics effecting the entire chiller. This classification does not include informational diagnostics.*
Chiller Limit Mode (with a 20 minute filter)	*This output is true whenever the chiller has been running in one of the Unloading types of limit modes (Condenser, Evaporator, Current Limit or Phase Imbalance Limit) continuously for the last 20 minutes.*
Circuit 1 Running	*This output is true whenever any compressors are running (or commanded to be running) on Refrigerant Circuit 1, and false when no compressors are commanded to be running on that circuit.*
Circuit 2 Running	*This output is true whenever any compressors are running (or commanded to be running) on Refrigerant Circuit 2, and false when no compressors are commanded to be running on that circuit.*
Chiller Running	*This output is true whenever any compressors are running (or commanded to be running) on the chiller and false when no compressors are commanded to be running on the chiller.*
Maximum Capacity	*This output is true whenever the chiller has reached maximum capacity or had reached its maximum capacity and since that time has not fallen below 70% average current relative to the rated ARI current for the chiller. The output is false when the chiller falls below 70% average current and, since that time, had not reestablished maximum capacity.*

1. LLID is Low Level Intelligent Device and is explained in more detail in Section 5 under *CH.530 Communication*.

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Relay Assignments Using Techview

The CH.530 Service Tool (Techview) is used to install the Alarm and Status Relay Option package and assign any of the above list of events or status to each of the four relays provided with the option. The relays to be programmed are referred to by the relay's terminal numbers on the LLID board 1U12 (EUR=A4-5).

The default assignments for the four available relays of the RTAC Alarm and Status Package Option are:

Table 15
Default Assignments

Relay 1 Terminals J2 -12,11,10:	*Alarm*
Relay 2 Terminals J2 - 9,8,7:	*Chiller Running*
Relay 3 Terminals J2-5,4,3:	*Maximum Capacity*
Relay 4 Terminals J2-3,2,1:	*Chiller Limit*

If any of the Alarm/Status relays are used, provide electrical power, 115 VAC with fused-disconnect to the panel and wire through the appropriate relays (terminals on 1U12 (EUR=A4-5)). Provide wiring (switched hot, neutral, and ground connections) to the remote annunciation devices. Do not use power from the chiller's control panel transformer to power these remote devices. Refer to the field diagrams which are shipped with the unit.

Low Voltage Wiring

The remote devices described below require low voltage wiring. All wiring to and from these remote input devices to the Control Panel must be made with shielded, twisted pair conductors. Be sure to ground the shielding only at the panel.

Caution: To prevent control malfunctions, do not run low voltage wiring (<30 V) in conduit with conductors carrying more than 30 volts.

Emergency Stop

The CH.530 provides auxiliary control for a customer specified/installed latching tripout. When this customer-furnished remote contact 5K14 (EUR=6S1) is provided, the chiller will run normally when the contact is closed. When the contact opens, the unit will trip off on a manually resettable diagnostic. This condition requires manual reset at the chiller switch on the front of the control panel.

Connect low voltage leads to terminal strip locations on 1U4 (EUR=A6-1). Refer to the field diagrams that are shipped with the unit.

Silver or gold-plated contacts are recommended. These customer-furnished contacts must be compatible with 24 VDC, 12 mA resistive load.

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External Auto/Stop

If the unit requires the external Auto/Stop function, the installer must provide leads from the remote contacts 5K15 (EUR=6S3) to the proper terminals of the LLID 1U4 (EUR=A6-1) on the control panel.

The chiller will run normally when the contacts are closed. When either contact opens, the compressor(s), if operating, will go to the RUN:UNLOAD operating mode and cycle off. Unit operation will be inhibited. Re-closure of the contacts will permit the unit to automatically return to normal operation.

Field-supplied contacts for all low voltage connections must be compatible with dry circuit 24 VDC for a 12 mA resistive load. Refer to the field diagrams that are shipped with the unit.

External Emergency Stop

If the unit requires the External Emergency Stop function, the installer must provide leads from the remote contacts 5K14 (EUR=6S1) to the proper terminals of the LLID 1U4 (EUR=A6-1) on the control panel.

The chiller will run normally when the contacts are closed. When either contact opens, the compressor(s), if operating, will cycle off immediately. Unit operation will be inhibited until the contacts are re-closed and the “Emergency Stop” diagnostic is manually reset.

Field-supplied contacts for all low voltage connections must be compatible with dry circuit 24 VDC for a 12 mA resistive load. Refer to the field diagrams that are shipped with the unit.

External Circuit Lockout – Circuit #1 and Circuit #2

The CH.530 provides auxiliary control of a customer specified or installed contact closure, for individual operation of either Circuit #1 or #2. If the contact is closed, the refrigerant circuit will not operate (EUR=6S6 and 6S7).

Upon contact opening, the refrigerant circuit will run normally. This feature is used to restrict total chiller operation, e.g. during emergency generator operations.

External Circuit Lockout will only function if it is enabled using Techview.

Connections to 1U5 (EUR=A6-2) are shown in the field diagrams that are shipped with the unit.

These customer-supplied contact closures must be compatible with 24 VDC, 12 mA resistive load. Silver or gold plated contacts are recommended.

Ice Building Option

The CH.530 provides auxiliary control for a customer specified/installed contact closure for ice building if so configured and enabled. This output is known as the Ice Building Status Relay. The normally open contact will be closed when ice building is in progress and open when ice building has been normally terminated either through Ice Termination setpoint being reached or removal of the Ice Building command. This output is for use with the ice storage

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system equipment or controls (provided by others) to signal the system changes required as the chiller mode changes from “ice building” to “ice complete”. When contact 5K18 (EUR=6S55) is provided, the chiller will run normally when the contact is open.

CH.530 will accept either an isolated contact closure (External Ice Building command) or a Remote Communicated input (Tracer) to initiate and command the Ice Building mode.

CH.530 also provides a “Front Panel Ice Termination Setpoint”, settable through Techview, and adjustable from 20 to 31°F (-6.7 to -0.5°C) in at least 1°F (1°C) increments.

Note: When in the Ice Building mode, and the evaporator entering water temperature drops below the ice termination setpoint, the chiller terminates the Ice Building mode and changes to the Ice Building Complete Mode.

CAUTION: Freeze inhibitor must be adequate for the leaving water temperature. Failure to do so will result in damage to system components.

Techview must also be used to enable or disable Ice Machine Control. This setting does not prevent the Tracer from commanding Ice Building mode.

Upon contact closure, the CH.530 will initiate an ice building mode, in which the unit runs fully loaded at all times. Ice building shall be terminated either by opening the contact or based on the entering evaporator water temperature. CH.530 will not permit the ice building mode to be reentered until the unit has been switched out of ice building mode (open 5K18 (EUR=6S55) contacts) and then switched back into ice building mode (close 5K18 (EUR=6S55) contacts.)

In ice building, all limits (freeze avoidance, evaporator, condenser, current) will be ignored. All safeties will be enforced.

If, while in ice building mode, the unit gets down to the freezestat setting (water or refrigerant), the unit will shut down on a manually resettable diagnostic, just as in normal operation.

Connect leads from 5K18 (EUR=6S55) to the proper terminals of 1U7 (EUR=A6-3). Refer to the field diagrams which are shipped with the unit.

Silver or gold-plated contacts are recommended. These customer furnished contacts must be compatible with 24 VDC, 12 mA resistive load.

External Chilled Water Setpoint (CWS):

The CH.530 provides inputs that accept either 4-20 mA or 2-10 VDC signals to set the external chilled water setpoint (ECWS). This is not a reset function. The input defines the set point. This input is primarily used with generic BAS (building automation systems). The chilled water setpoint can also be changed through Tracer.

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The chilled water setpoint may be changed from a remote location by sending either a 2-10vdc or 4-20 mA signal to the 1U6 (EUR=A2-1) module. 2-10 VDC and 4-20 mA each correspond to a 10 to 65°F (-12 to 18°C) external chilled water setpoint.

The following equations apply:

	Voltage Signal	*Current Signal*
As generated from external source	*Vdc=0.1455*(ECWS)+0.5454*	*mA=0.2909(ECWS)+1.0909*
As processed by CH.530	*ECWS=6.875*(VDC)-3.75*	*ECWS=3.4375(mA)-3.75*

The ECWS LLID only reports either current or voltage. The value can be considered either.

If the ECWS LLID develops an open or short, the LLID will report either a very high or very low value back to the controller. This will generate an informational diagnostic and the unit will default to using the Front Panel Chilled Water Setpoint.

Techview is used to install or remove the External Chilled Water Setpoint option as well as a means to enable and disable ECWS.

Optional Tracer Comm 3 Interface

This option allows the Tracer CH.530 controller to exchange information (e.g. operating setpoints and Auto/Standby commands) with a higher-level control device, such as a Tracer Summit or a multiple-machine controller. A shielded, twisted pair connection establishes the bi-directional communications link between the Tracer CH.530 and the building automation system.

CAUTION: To prevent control malfunctions, do not run low voltage wiring (<30 V) in conduit with conductors carrying more than 30 volts.

Field wiring for the communication link must meet the following requirements:

1 All wiring must be in accordance with the NEC and local codes.

2 Communication link wiring must be shielded, twisted pair wiring (Belden 8760 or equivalent). See the table below for wire size selection:

Wire Size	*Maximum Length of Communication Wire*
14 AWG	*5,000 FT*
16 AWG	*2,000 FT*
18 AWG	*1,000 FT*

3 The maximum total wire length for each communication link is 5,000 feet.

4 The communication link cannot pass between buildings.

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5 All units on the communication link can be connected in a “daisy chain” configuration.

Communication Link Connection Procedure

1 Refer to the Tracer installation literature to determine proper communication link termination connections at the Tracer or Summit panel.

2 Connect the shield of the communication link wiring to the designated shield terminal at the Tracer or Summit panel.

3 Install a Tracer Comm 3 Interface LLID in the chiller control panel if one has not already been installed.

4 Connect the twisted pair leads from the BAS or from the previous unit on the “daisy chain” to the proper terminals of the Tracer Comm 3 Interface LLID 1U8 (EUR=XXX) . There is no polarity requirement for this connection.

5 At the CH.530, the shield should be cut and taped to prevent any contact between the shield and ground.

Note: On multiple unit installations, splice the shielding of the two twisted pair wires coming into each unit in the “daisy chain” system. Tape the spliced connections to prevent any contact between the shield and ground. At the last unit in the chain, the shield should be cut and taped off.

6 Connect TechView to the Tracer CH.530 controller.

7 Look at the Feature tab in Configuration View-Custom Tab in TechView and verify that the “REM – Remote Interface” digit of the chiller’s model number has been configured as “C - Tracer Comm 3 Interface”. If the Tracer Comm 3 Interface option is not selected, select it, select the Load Configuration button at the bottom of the screen, and go into Binding View and make sure the Comm 3 Interface LLID is bound and communicating properly.

8 Look at the Configuration View in TechView and verify that the Comm 3 ICS address is set correctly. The Comm 3 ICS address setting can be found under the Custom tab. This selection will only appear under the Custom tab in the Configuration View if the Comm 3 Interface LLID has been correctly installed in step five above.

9 Go to the Unit View in TechView and select the “Auto-Remote” radio button. This will give setpoint priority to the BAS that is connected to the unit.

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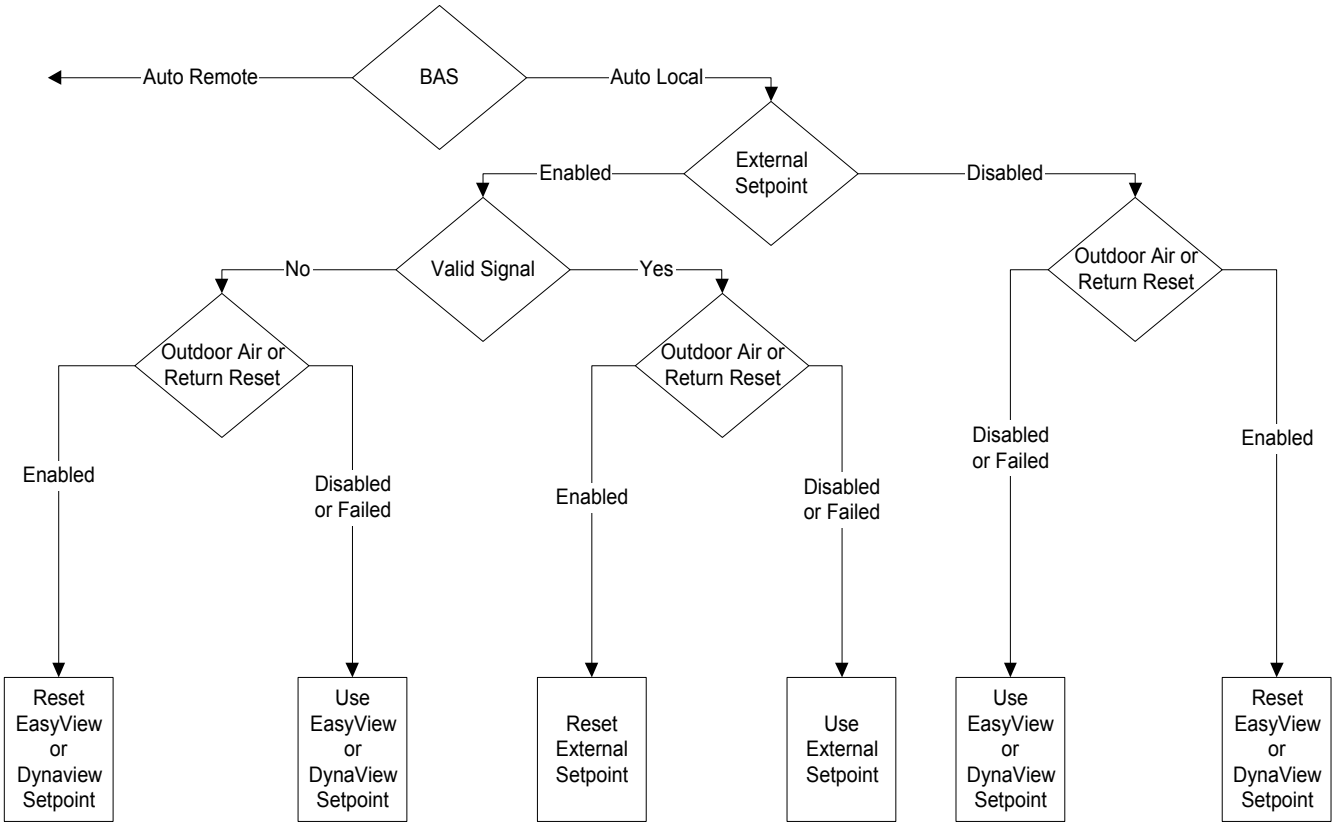
Setpoint and Control Arbitration Flow Charts

Chilled Water Setpoint Arbitration
(Auto Local)



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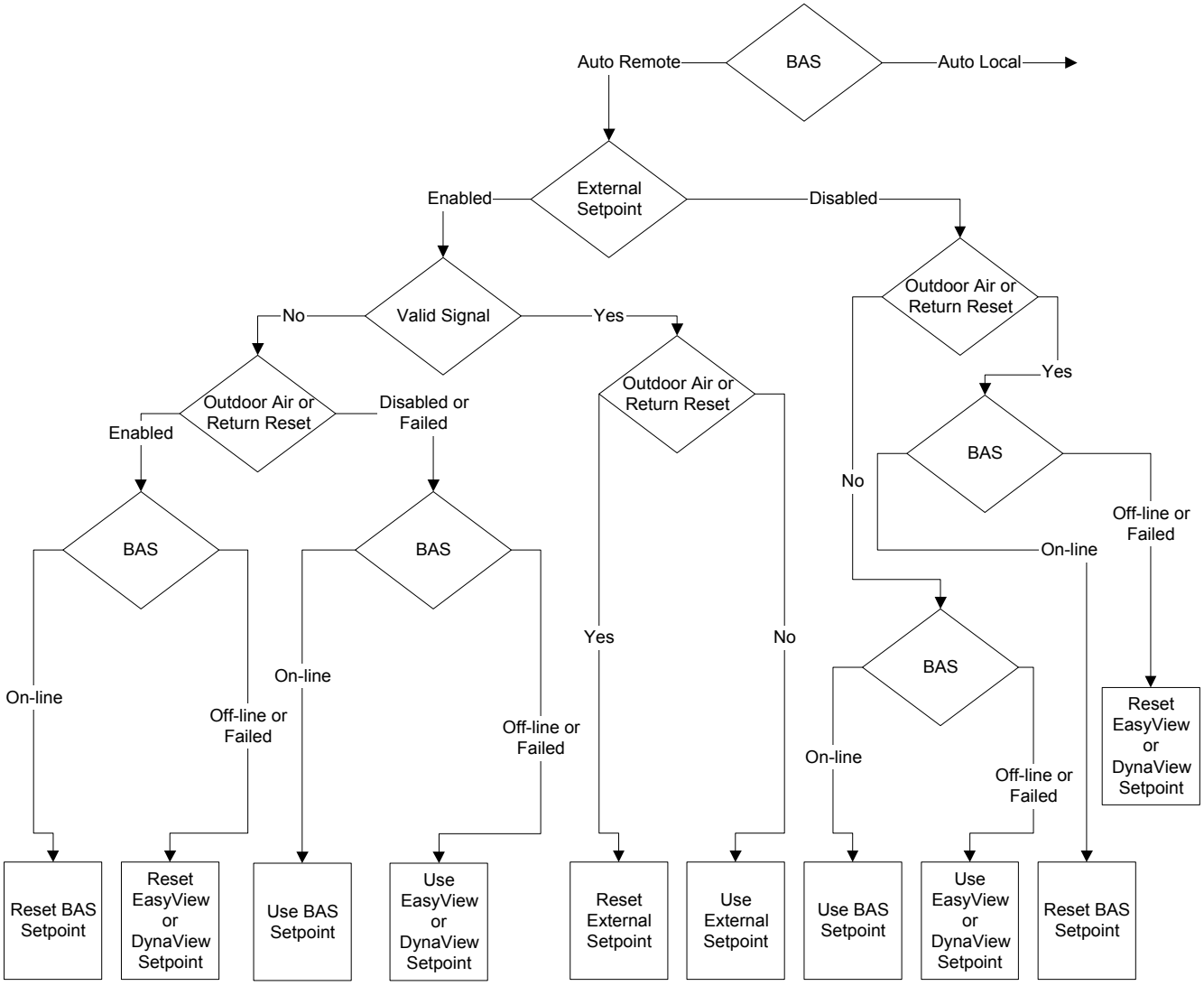
Setpoint Arbitration
(Auto Remote)



Note: If BAS (Auto-Remote) and External Setpoint co-exist, the last source enabled will control the resultant setpoint. The chart above assumes External Setpoint is enabled (or disabled) subsequent to BAS Auto-Remote setting.

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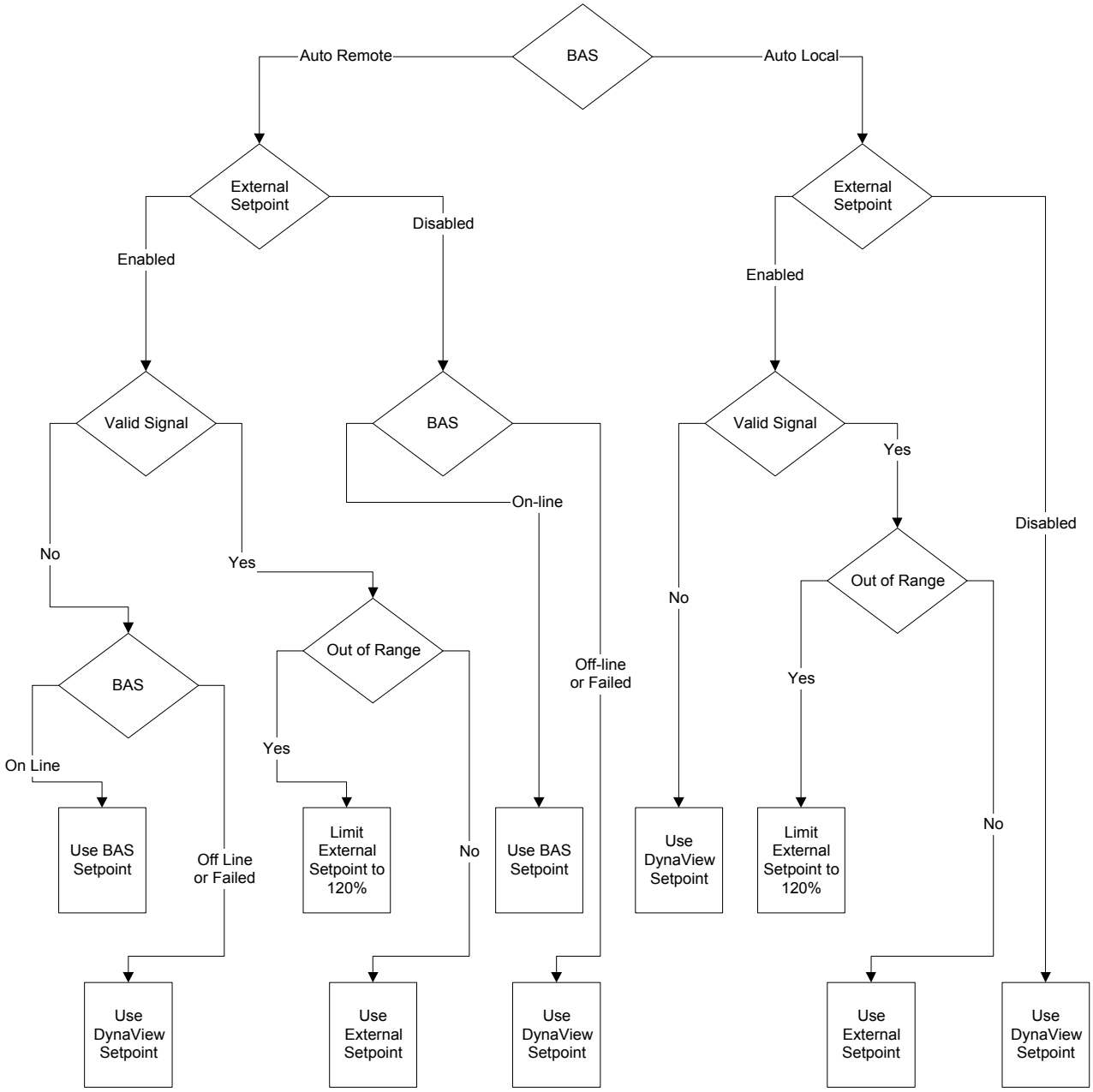
Current Limit Setpoint Arbitration



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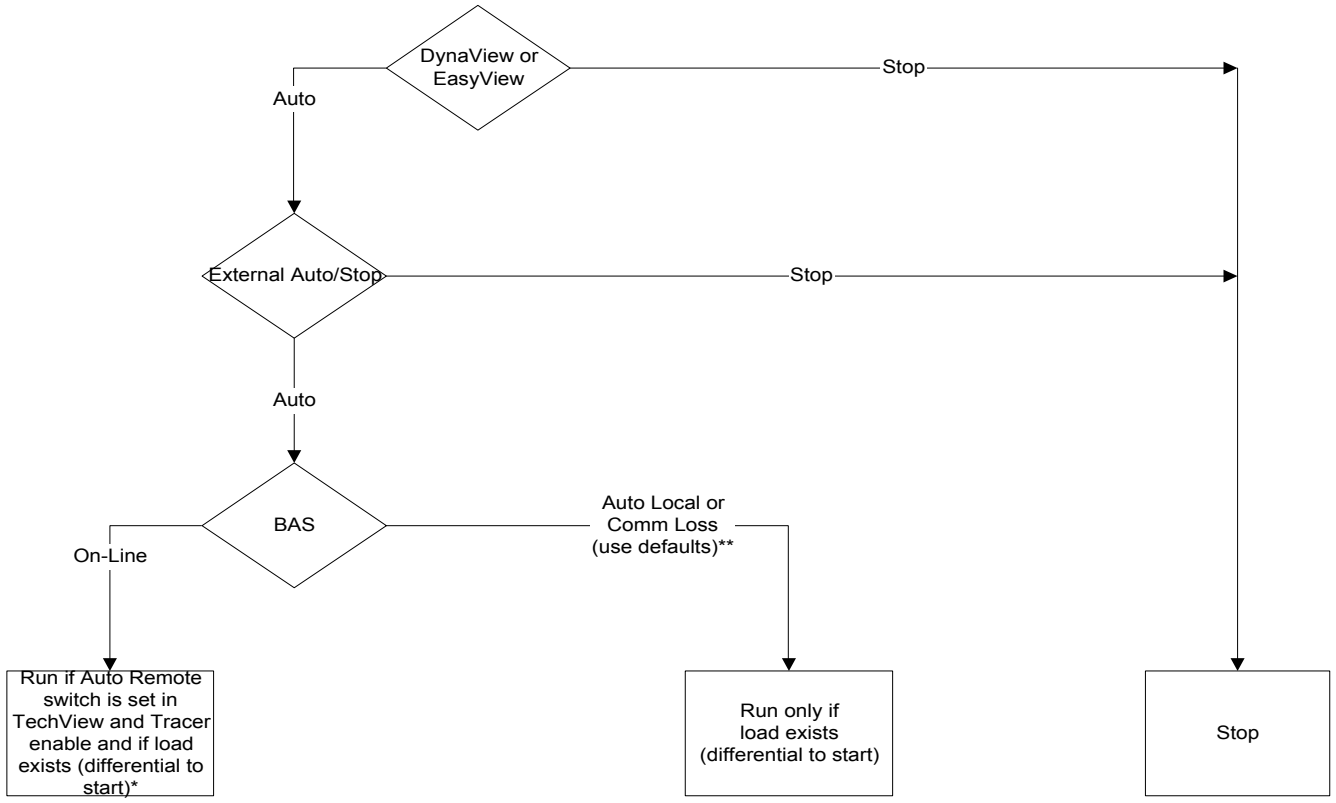
External Auto/Stop
Setpoint Arbitration



Notes:
*Mode transition from disable to enable shall start unit if LWT>CWS regardless of differential to start. Subsequent starts during Tracer enable wi include differential to start criteria.
**if Tracer communication is lost for 15 minutes, the auto/off mode will be determined by a user defined configuration parameter to allow
1) last sent mode
2) off
3) auto

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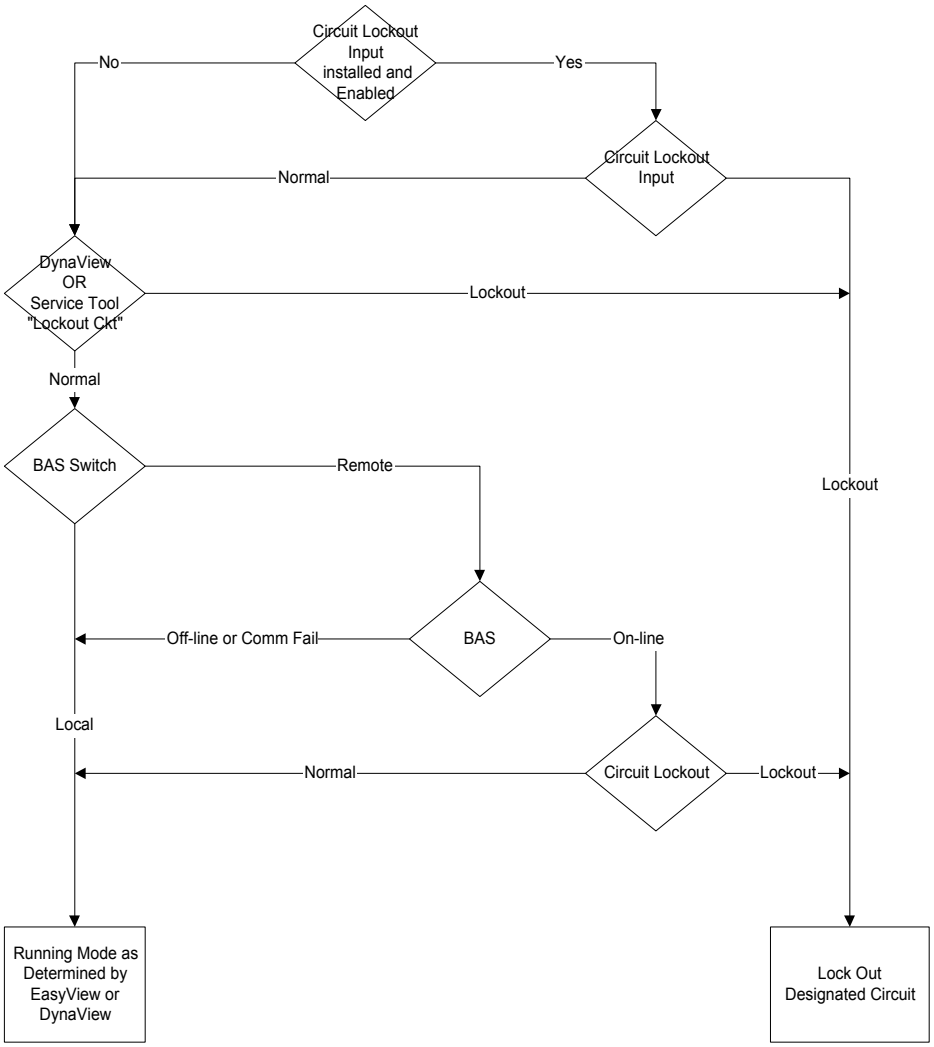
Circuit Lockout Setpoint Arbitration



Notes:
1) If circuit lockout is imposed by service tool, the lockout must remain in effect until removed by service tool, even in the absence of connection to service tool. For example, a technician will be able to initiate a lockout from service tool, disconnect service tool and have the lockout remain.

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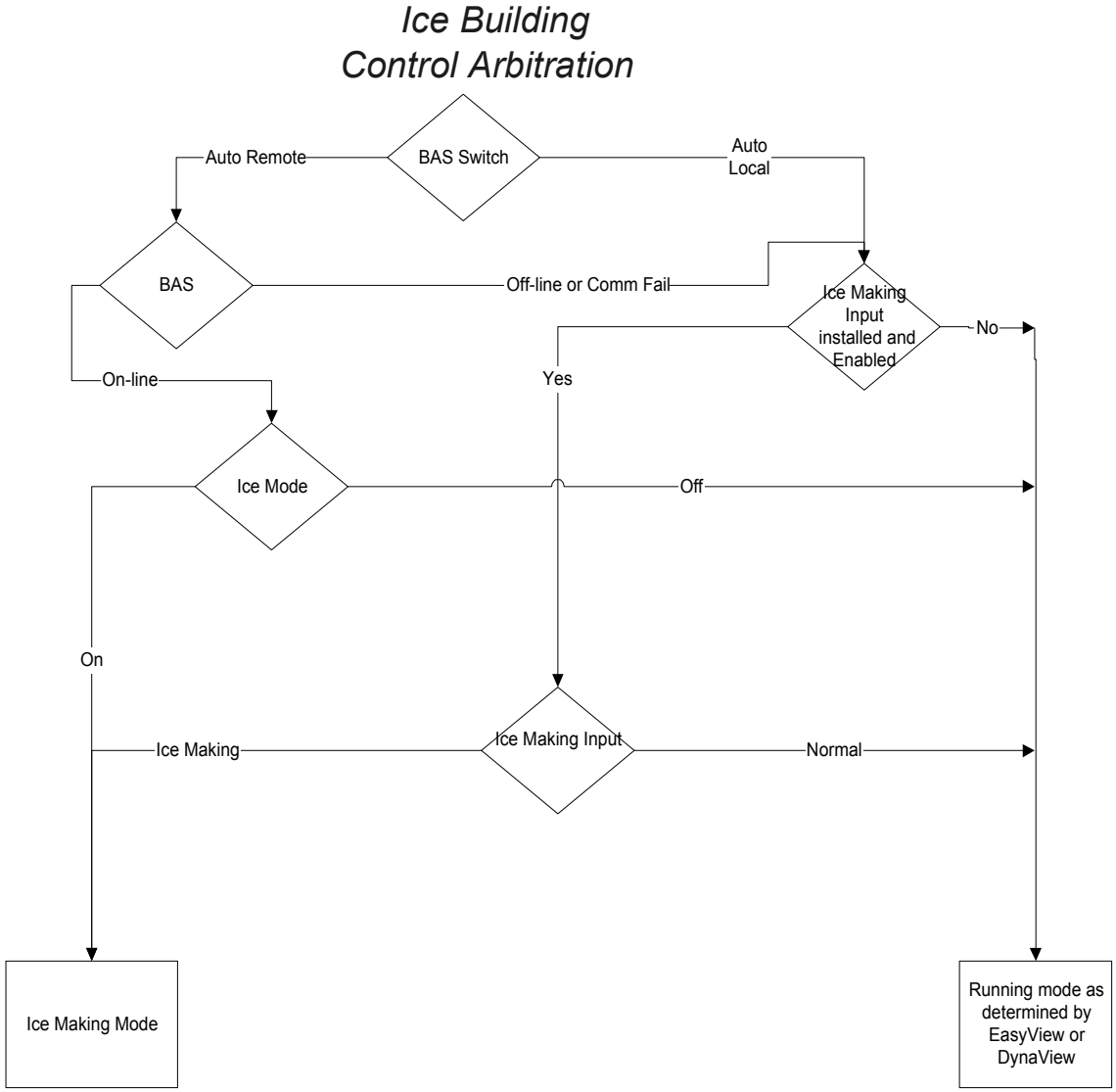

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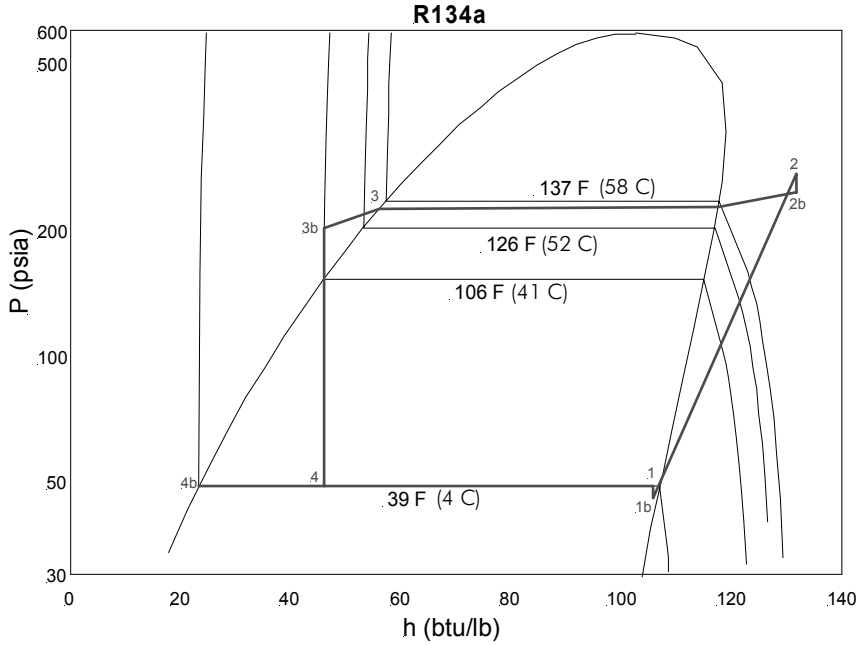
Operating Principles

This section contains an overview of the operation and maintenance of RTAC units equipped with the CH.530 control systems. It describes the overall operating principles of the RTAC design.

Refrigeration Cycle

The refrigeration cycle of the RTAC chiller is similar to that of the RTHC air cooled water chiller. The exception is that the evaporating and condensing temperatures have been increased to allow for optimization of the chiller and reduced foot print. The refrigeration cycle is represented in the pressure enthalpy diagram in Figure 24. Key state points are indicated on the figure. The cycle for the full load ARI design point is represented in the plot.

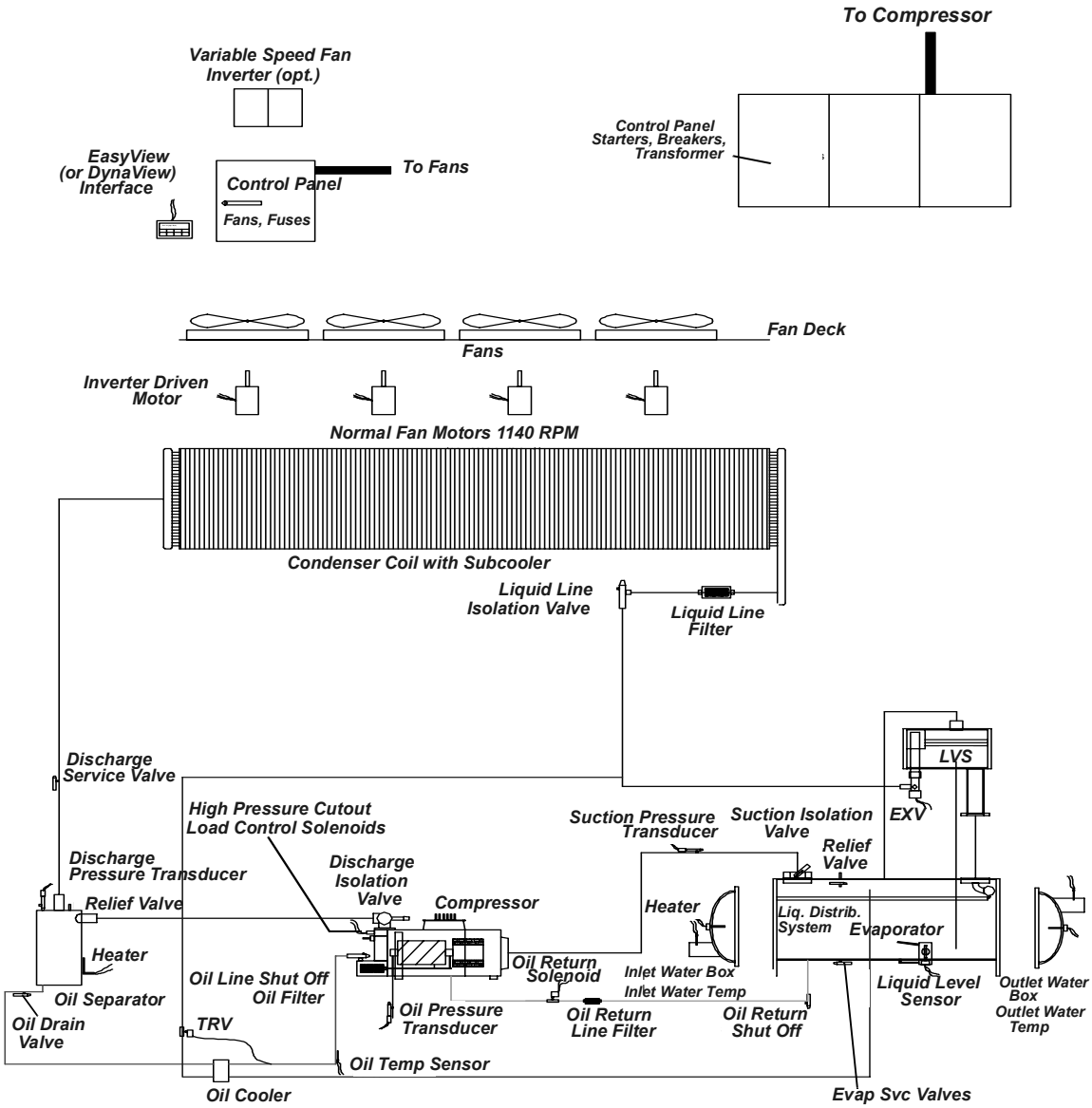
Figure 24
Pressure Enthalpy (P-h) diagram of RTAC chiller



The RTAC chiller uses a shell and tube evaporator design with refrigerant evaporating on the shell side and water flowing inside tubes having enhanced surfaces (states 4 to 1). The suction line pressure drop is minimized through generously-sized lines (states 1 to 1b). The compressor is a twin-rotor helical rotary compressor designed similarly to the compressors offered in other Trane Screw Compressor Based Chillers (states 1b to 2). The discharge lines include a highly efficient oil separation system that virtually removes all oil from the refrigerant stream going to the heat exchangers (states 2 to 2b). De-superheating, condensing and sub-cooling is accomplished in a fin and tube air cooled heat exchanger where refrigerant is condensed in the tube (states 2b to 3b). Refrigerant flow through the system is balanced by an electronic expansion valve (states 3b to 4).

Operating Principles

Figure 25
System Schematic



Refrigerant R134a

The RTAC chiller uses environmentally friendly R134a. Refrigerant issues with R134a are generally common to the use of all refrigerants. Only a licensed technician may handle, maintain and dispose of equipment charged with refrigerant R134a.

Operating Principles

R134a is a medium pressure refrigerant. It may not be used in any condition that would cause the chiller to operate in a vacuum without a purge system. RTAC is not equipped with a purge system. Therefore, the RTAC chiller may not be operated in a condition that would result in a saturated condition in the chiller of –15°F (-26°C) or lower.

R134a requires the use of specific POE oils as designated on the unit nameplate.

Important! The RTAC units must only operate with R-134a and Trane Oil 00048.

Compressor

The compressor is a semi-hermetic, direct-drive rotary type compressor. Each compressor has only four moving parts: two rotors provide compression and male and female control valves. Capacity is additionally controlled by a step unloading valve. The male rotor is attached to the motor and the female rotor is driven by the male rotor. The rotors and motor are supported by bearings.

The helical rotary compressor is a positive displacement device. Refrigerant vapor from the evaporator is drawn into the suction opening of the compressor (state 1b), through a suction strainer screen across the motor, which provides motor cooling, and into the intake of the compressor rotors. The gas is then compressed and discharged through a check valve and into the discharge line (state 2).

There is no physical contact between the rotors and the compressor housing. The rotors contact each other at the point where the driving action between the male and female rotors occurs. Oil is injected into the rotors of the compressor, coating the rotors and the compressor housing interior. Although this oil does provide rotor lubrication, its primary purpose is to seal the clearance spaces between the rotors and compressor housing. A positive seal between these internal parts enhances compressor efficiency by limiting leakage between the high pressure and low pressure cavities.

Capacity control is accomplished by means of a female step unloading valve and a male unloading valve. The female step unloading valve is the first stage of unloading after the compressor starts and the last stage of unloading before the compressor shuts down. The male unloading valve is positioned by a piston cylinder along the length of the male rotor. Compressor capacity is dictated by the position of the loading valve relative to the rotors. When the valve slides toward the discharge end of the rotors compressor capacity is reduced.

Condenser and Subcooler

The condenser and subcooler are similar to the condenser used in RTAA chillers. The heat exchanger consists of 3/8” tubes that contain the refrigerant, large fins that are in the air flow and fans that draw air through the fins. Heat is transferred from the refrigerant through the tubes and fins to the air.

High pressure gas from the compressor enters the tubes of the condenser through a distribution header (state 2b). As refrigerant flows through the tubes, the heat of compression and cooling load are rejected to the air. In this process the refrigerant is de-superheated,

Operating Principles

condensed (states 2b to 3) and finally subcooled (states 3 to 3b) to a temperature slightly above the ambient air temperature. The subcooled liquid refrigerant is collected in the leaving header where it is transferred to the liquid line (state 3b).

A controls algorithm always runs as many fans as possible without reducing the differential pressure (discharge minus suction) below the setpoint (60 psid). If a warm enough ambient is sensed, all the fans will run. If the ambient is cooler, some fans are shut off to maintain the pressure differential. Fan staging depends on the chiller load, evaporator pressure, condenser effectiveness, ambient temperature, and numbers and sizes of fans installed on the circuit.

The algorithm prestarts fans (based on ambient and water temperatures) when a circuit starts the compressor. While the circuit is running, it will always run as many fans as possible without reducing the differential pressure below the setpoint. (For rare conditions such as during some pull-downs, a steady fan state would either violate the 60 psi setpoint or cause a high pressure cut-out; in those conditions a fan will cycle on and off.)

For two minutes after chiller start-up, the setpoint is 35 psi difference, and then controls adjust gradually over half a minute up to 60 psi.

Expansion Valve

Pressure drop occurs in an electronic expansion valve. The unit controller (CH.530) uses the valve to regulate the flow through the liquid line to match the flow produced by the compressor. The valve has a variable orifice that is modulated by a stepper motor.

High pressure, subcooled liquid refrigerant enters the expansion valve from the liquid line. As refrigerant passes through the valve the pressure is dropped substantially, which results in vaporization of some of the refrigerant. The heat of vaporization is supplied by the two phase mixture resulting in low temperature low pressure refrigerant which is supplied to the evaporator (state 4) to provide cooling.

Evaporator

The evaporator is composed of a liquid-vapor separator, liquid distribution system and falling film evaporator.

A liquid-vapor refrigerant mixture enters the liquid vapor separator (state 4). The mixture of refrigerant liquid and flash gas are separated where liquid is directed to the liquid distribution system (state 4b) and vapor is directed to the evaporator suction baffle. Liquid is evenly distributed over the length of the evaporator tubes by the liquid distribution system. A portion of the liquid boils as it falls by gravity from tube to tube, wetting all the tubes of the evaporator. To ensure that the tubes at the bottom of the evaporator do not experience “dry out,” a liquid pool is maintained in the bottom few inches of the bundle. Tubes located in the bottom of the evaporator will evaporate the liquid refrigerant by boiling (pool boiling).

Heat is transferred from the water or glycol inside the tubes to the liquid refrigerant as the film of refrigerant evaporates on the surface of the tube. Thin film heat transfer requires a smaller temperature difference for a given amount of heat transfer than nucleate boiling, which is the

Operating Principles

heat transfer process used in flooded evaporators. Hence, efficiency is enhanced by the use of falling film evaporation. Additionally, the evaporator requires less refrigerant than a comparable flooded evaporator. The overall result is that the evaporator boils the entire refrigerant supply at constant pressure. Refrigerant vapor exits the evaporator through the suction baffle where it mixes with the vapor from the liquid-vapor separator (state 1).

Oil System

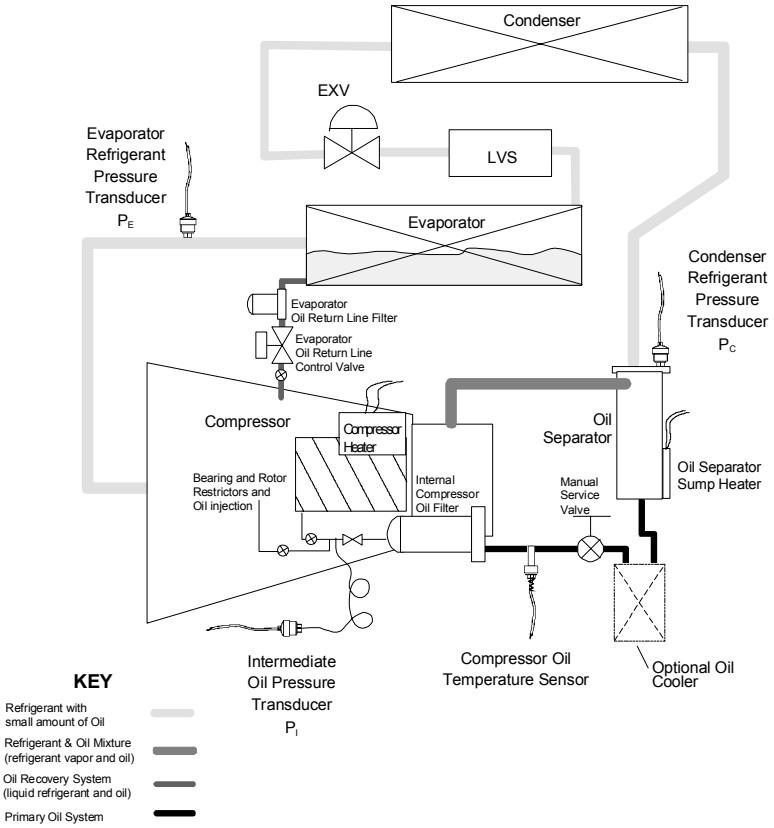
Screw compressors require large quantities of oil for lubricating and sealing the rotors and lubricating the bearings. This oil is mixed with refrigerant at the discharge of the compressor. To enhance the performance of the heat exchanger surfaces an oil separation system is placed into the discharge line. The oil separator is located between the compressor and the condenser. It separates oil using highly efficient centrifugal force. Approximately 99.5% of the oil is removed from the refrigerant in the separator.

Oil that is removed from the refrigerant falls by gravity into the oil sump. This oil is directed back to the compressor through the oil lines. Internal to the compressor is a high efficiency filter to clean the oil before it is delivered to the rotors and bearings. Once oil is injected into the compressor rotors it mixes with the refrigerant again and is delivered back to the discharge line.

Oil that gets past the oil separators flows through the condenser, subcooler and expansion valve into the evaporator. This oil is collected in the pool of refrigerant that is maintained in the bottom of the evaporator. A small amount of oil and refrigerant from this pool (state 4b) is returned through a line that is connected to the compressor down stream of the motor. This oil and refrigerant mixes with the refrigerant vapor that was drawn out of the evaporator, prior to injection into the compressor rotors.

Operating Principles

Figure 26
RTAC Oil System



Controls Interface

CH.530 Communications Overview

The Trane CH.530 control system that runs the chiller consists of several elements:

- The main processor collects data, status, and diagnostic information and communicates commands to the starter module and the LLID (for Low Level Intelligent Device) bus. The main processor has an integral display (EasyView or DynaView).
- Higher level modules (e.g. starter) exist only as necessary to support system level control and communications. The starter module provides control of the starter when starting, running, and stopping the chiller motor. It also processes its own diagnostics and provides motor and compressor protection.
- Low level intelligent device (LLID) bus. The main processor communicates to each input and output device (e.g. temperature and pressure sensors, low voltage binary inputs, analog input/output) all connected to a four-wire bus, rather than the conventional control architecture of signal wires for each device.
- The communication interface to a building automation system (BAS).
- A service tool to provide all service/maintenance capabilities.

Main processor and service tool software is downloadable from www.Trane.com.

EasyView or DynaView provides bus management. It has the task of restarting the link, or filling in for what it sees as “missing” devices when normal communications has been degraded. Use of TechView may be required.

The CH.530 uses the IPC3 protocol based on RS485 signal technology and communicating at 19.2 Kbaud to allow 3 rounds of data per second on a 64-device network. A typical four-compressor RTAC will have around 50 devices, and IPC3 permits a maximum of 255 devices per network.

Most diagnostics are handled by the Easy/DynaView. If a temperature or pressure is reported out of range by a LLID, the Easy/DynaView processes this information and calls out the diagnostic. The individual LLIDs are not responsible for any diagnostic functions. The only exception to this is the Starter module.

Note: It is imperative that the CH.530 Service Tool (TechView)be used to facilitate the replacement of any LLID or reconfigure any chiller component. TechView is discussed later in this section.

Controls Interface

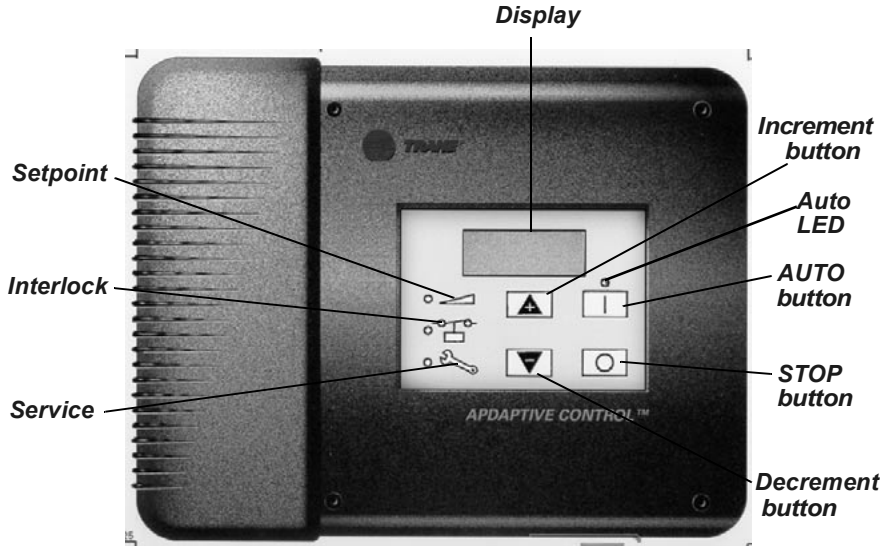
Each chiller is equipped with either the EasyView or DynaView interface to the CH.530. EasyView provides basic monitoring and control functions in a language-independent format with an LED display in an enclosure. DynaView has the capability to display additional information to the advanced operator including the ability to adjust settings. Multiple screens are available and text is presented in multiple languages as ordered.

Controls Interface

TechView can be connected to either the EasyView or DynaView module and provides further data, adjustment capabilities, diagnostics information using downloadable software.

EasyView Interface

Figure 27
EasyView interface



The EasyView interface to the CH.530 consists of a display in a 9.75" wide, 8” high. and 1.6” deep (250mm x 205mm x 41mm) enclosure. The enclosure contains a circuit card and a weather tight connection for the RS232 TechView. Use of TechView is discussed in a separate publication.

The LED display contains basic information for machine monitoring and control. The information presented uses symbols and is language-independent.

Outputs: Display

Default Display: During normal operation Evaporator Leaving Water Temperature is shown.

Setpoint Display: the Evaporator Leaving Water Temperature Setpoint is displayed if the **increment** (+) or **decrement** (-) key is pressed. The Evaporator Leaving Water Setpoint will remain on the screen for three seconds after **increment** or **decrement** is released.

Controls Interface

Diagnostic and Interlock Display: When in a diagnostic or interlock condition, the front panel will continue to show the default or setpoint display as appropriate. When in a diagnostic condition (service wrench LED flashes) or interlock condition (Interlock LED flashes), simultaneously depressing the increment (+) and decrement (-) keys will cause the most severe active diagnostic or interlock to be displayed in code for 3-5 seconds, after which the front panel will revert to the Evaporator Leaving Water Temperature. Only the most recent diagnostic will be retained. The Trane standard 3-digit Diagnostic codes are listed at the end of this section. *The diagnostic readout should be noted and are for the use of Trane service*.

Auto LED

The Auto LED is used to indicate the position of the AUTO/STOP keys just as if they were a physical toggle switch. When the AUTO key is depressed, the Auto LED will be lit. If the unit cannot enter the Auto mode, that information will be carried either by the lighting of the diagnostic or the interlock LED. When the STOP key is depressed, the Auto LED will extinguish.

Setpoint LED ( )

The setpoint LED is on solid when the display is showing "Evaporator Leaving Water Setpoint."

Interlock LED ( )

The interlock LED flashes when there is an interlock condition.

Interlock is used to indicate that the machine is prevented from running due to an external status that the operator could probably correct and is not related to a chiller/component failure. The interlock conditions for RTAC are as follows:

Interlock Condition	*Code*
No Chilled Water Flow	*ED*
External Auto/Stop	*100*
BAS[1] Auto/Stop	*300*
Low Ambient Start Inhibit	*200*

[1] *BAS here and elsewhere in this manual refers to Trane Tracer™ Equipment Controller*

The interlock LED will stop flashing when the condition that prevents machine operation is corrected. No reset is required.

Service LED ( )

The service LED flashes when there is a diagnostic that is *not* an interlock condition.

Controls Interface

This is the standard diagnostic indication of the machine. **Contact a qualified service agency to correct the problem.** Before calling, press the (+) and (-) keys simultaneously to determine the diagnostic code. Record this code and report it to the service agency. If you suspect that a nuisance trip has occurred, the diagnostic can be reset. (See section on diagnostic reset).

Inputs:

Increment Key (+)

Pressing the increment key while the setpoint light is off will cause it to turn on solid and the display the Evaporator Leaving Water Temperature setpoint for three seconds.

Pressing the increment key while the setpoint light is on will increase it by 0.1 degree (F or C).

Holding the increment key down will increase it repeatedly at a rate of 5 °F/sec (2.77°C/sec) until the setpoint is equal to the Evaporator Leaving Water Setpoint Machine maximum.

Decrement Key (-)

Pressing the decrement key while the setpoint light is off will cause it to turn on solid and the display will display the Evaporator Leaving Water Temperature.

Pressing the decrement key while the setpoint light is on will cause the setpoint to decrease by 0.1 degree (F or C).

Holding the decrement key down will decrease the setpoint repeatedly at a rate of 2 °F/sec (0.56°C/sec) until the setpoint is equal to the Evaporator Leaving Water Setpoint Relative minimum.

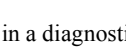
AUTO Key (|)

Pressing the AUTO key will send a request to the chiller to turn on. If no other device or condition is preventing the chiller from starting and *there is a need to cool*, the chiller will attempt a start. (See Auto LED and diagnostic reset for further description.)

STOP Key (O)

Pressing the STOP key will send a request to the chiller to stop. The chiller will then start the shutdown sequence and the Auto LED will extinguish.

Diagnostic Reset

If the machine is in a diagnostic condition () (LED is flashing) a transition from Stop to Auto will reset the diagnostic. If the machine is in the Stop State (Auto LED Off), depressing the AUTO key will reset all diagnostics. If the machine is in the Auto State (Auto LED On), it must be put to the Stop state and transitioned back to Auto to reset.

Controls Interface

SI vs. English

The Leaving Water Setpoint and the Leaving water temperature are displayed in either SI or English units as determined by the appropriate setting within the processor. An F or C right-justified will indicate English or SI.

Power-Up Test

On power-up, a means to test the display and annunciators is required. To demonstrate all segments and LEDs can be lit, EasyView will light all segments and annunciators for approximately 2 seconds. To demonstrate that no elements are stuck on, EasyView will turn off all segments and annunciators for approximately 2 seconds. Normal operation will follow.

DynaView Interface

The DynaView and EasyView share the same enclosure design: weatherproof and durable plastic for use as a stand-alone device on the outside of the unit or mounted nearby.

The display on DynaView is a 1/4 VGA display with a resistive touch screen and an LED backlight. The display area is approximately 4 inches wide by 3 inches high (102mm x 60mm).

Figure 28
DynaView

Controls Interface

Key Functions

In this touch screen application, key functions are determined completely by software and change depending upon the subject matter currently being displayed. The basic touch screen functions are outlined below.

Radio Buttons

Radio buttons show one menu choice among two or more alternatives, all visible. (It is the AUTO button in Figure 28.) The radio button model mimics the buttons used on old-fashioned radios to select stations. When one is pressed, the one that was previously pressed "pops out" and the new station is selected. In the DynaView model the possible selections are each associated with a button. The selected button is darkened, presented in reverse video to indicate it is the selected choice. The full range of possible choices as well as the current choice is always in view.

Spin Value Buttons

Spin values are used to allow a variable setpoint to be changed, such as leaving water setpoint. The value increases or decreases by touching the increment (+) or decrement (-) arrows.

Action Buttons

Action buttons appear temporarily and provide the user with a choice such as **Enter** or **Cancel.**

Hot Links

Hot links are used to navigate from one view to another view.

File Folder Tabs

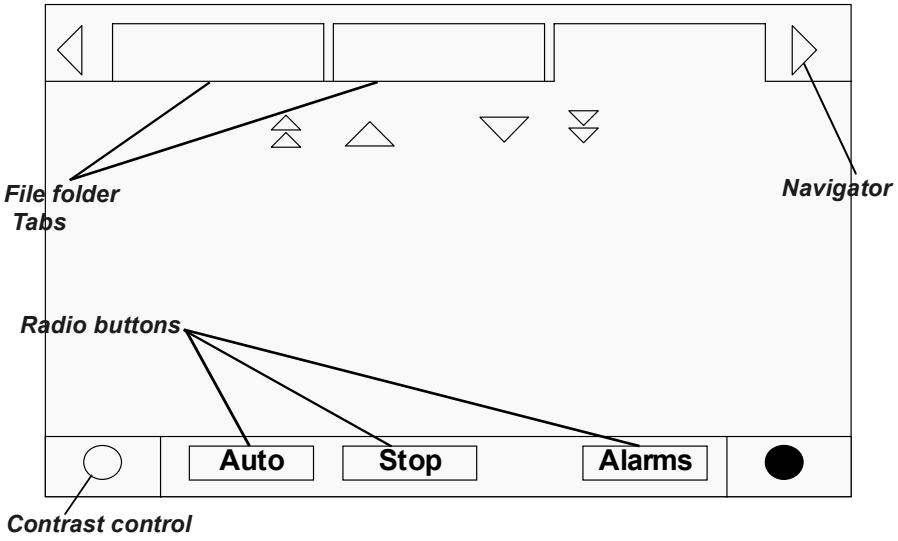
File folder tabs are used to select a screen of data. Just like tabs in a file folder, these serve to title the folder/screen selected, as well as provide navigation to other screens. In DynaView, the tabs are in one row across the top of the display. The folder tabs are separated from the rest of the display by a horizontal line. Vertical lines separate the tabs from each other. The folder that is selected has no horizontal line under its tab, thereby making it look like a part of the current folder (as would an open folder in a file cabinet). The user selects a screen of information by touching the appropriate tab.

Controls Interface

Display Screens

Basic Screen Format

The basic screen format appears as:



The file folder tabs across the top of the screen are used to select the various display screens.

Scroll arrows are added if more file tabs (choices) are available. When the tabs are at the left most position, the left navigator will not show and only navigation to the right will be possible. Likewise when the rightmost screen is selected, only left navigation will be possible.

The main body of the screen is used for description text, data, setpoints, or keys (touch sensitive areas). The Chiller Mode (see *Table 16*) is displayed here.

The double up arrows cause a page-by-page scroll either up or down. The single arrow causes a line by line scroll to occur. At the end of the page, the appropriate scroll bar will disappear.

The bottom of the screen (Fixed Display) is present in all screens and contains the following functions. The **left circular area** is used to reduce the contrast/viewing angle of the display. **The right circular area** is used to increase the contrast/viewing angle of the display.

The other functions are critical to machine operation. The AUTO and STOP keys are used to enable or disable the chiller. The key selected is in black (reverse video). The chiller will stop when the STOP key is touched and after completing the Run Unload mode.

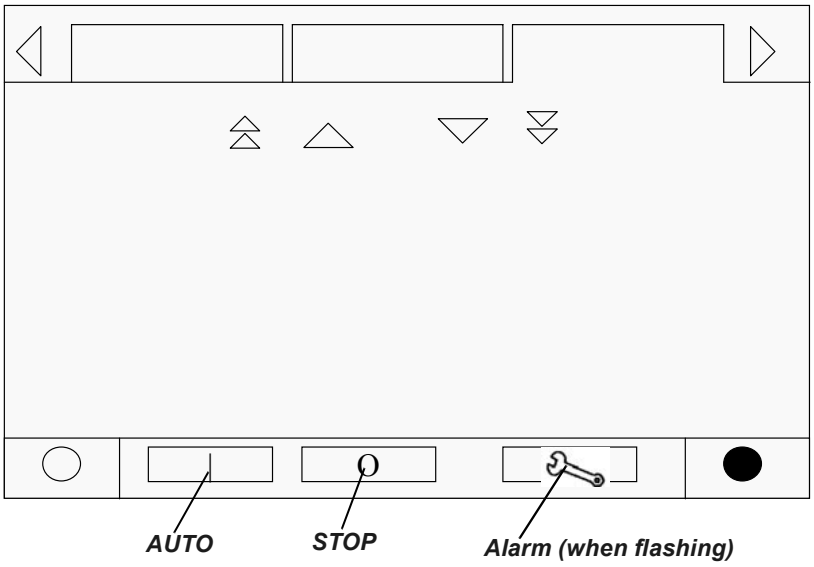
Touching the AUTO key will enable the chiller for active cooling if no diagnostic is present. (A separate action must be taken to clear active diagnostics.)

Controls Interface

The AUTO and STOP keys, take precedence over the Enter and Cancel keys. (While a setting is being changed, AUTO and STOP keys are recognized even if Enter or Cancel has not been pressed.)

The ALARMS button appears only when an alarm is present, and blinks (by alternating between normal and reverse video) to draw attention to a diagnostic condition. Pressing the ALARMS button takes you to the corresponding tab for additional information.

If words are not used on the bottom keys as described (e.g. AUTO, STOP.ALARMS), the following symbols may be used.



The vertical line indicates AUTO.

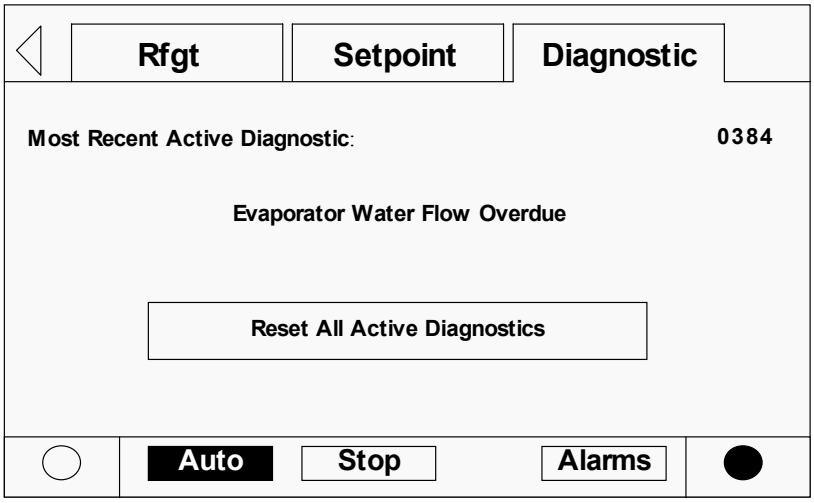
The circle indicates STOP.

The wrench flashes when a diagnostic is detected and is used to navigate to the diagnostic screen.

Diagnostic Screen

The diagnostic screen (shown following) is accessible by either pressing the blinking ALARMS key () or by pressing the **Diagnostic** tab on the screen tab selection.

Controls Interface



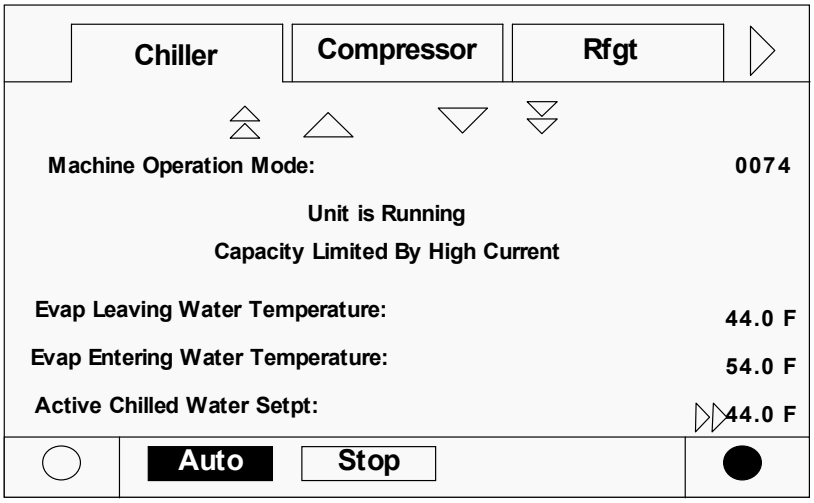
A hex code and a verbal description appears on the display as shown typically above. This is the last active diagnostic. Pressing the "Reset All Active Diagnostics" will reset all active diagnostics regardless of type, machine or refrigerant circuit. Compressor diagnostics, which hold off only one compressor, are treated as circuit diagnostics, consistent with the circuit to which they belong. One circuit not operating will not shut the chiller down. Viewing the "Compressor" screen will indicate whether a circuit is not operating and for what reason.

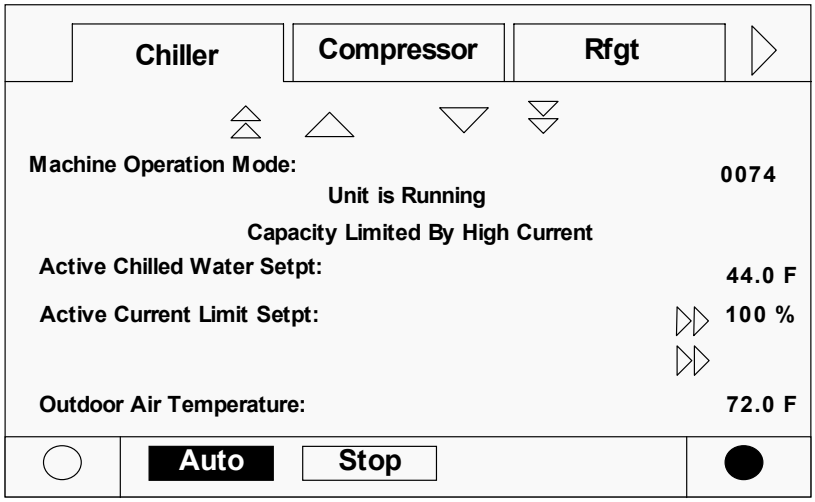
A complete listing of diagnostics and codes is included at the end of this section.

Controls Interface

Chiller Screen

The chiller screen is a summary of the chiller activity as shown below.





The **machine-operating mode** indicates the status of the chiller (see Table 16.

The **leaving water temperature** is displayed to 0.1 °F or °C.

The **entering water temperature** is displayed to 0.1 °F or °C.

The **active chilled water setpoint** is displayed to 0.1 °F or °C. Touching the double arrow to the left of the Active Chilled Water Setpoint will take you to the active chilled water setpoint subscreen.

Controls Interface

The **active current limit setpoint** is displayed. Touching the double arrow to the left of the Active Current Limit Setpoint will take you to the setpoint subscreen.

The following is a list of the Chiller and Compressor operating modes for the RTAC chiller.

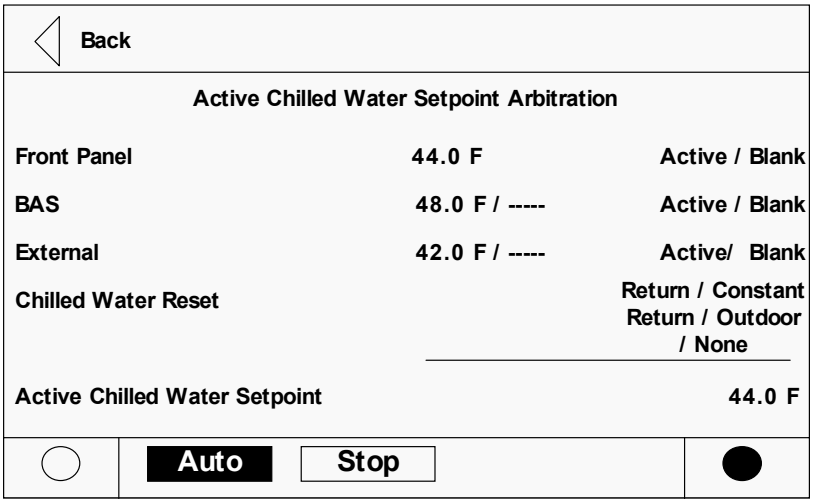
Table 16
Chiller and Compressor Operating Modes

Chiller Modes
Resetting
Local Stop
Auto *Waiting for Evap Water Flow*
Compressors Locked Out
Starting is Inhibited by Remote Device
Starting is Inhibited by External Source
Starting is Inhibited by Low Ambient Temp
Starting is Inhibited by BAS
Diagnostic Shutdown: Stop
Diagnostic Shutdown: Auto
Auto *Waiting for Need to Cool*
Waiting For BAS Communications *To Establish Operating Status*
Starting is Inhibited by Restart Timer
Unit is Starting
Unit Is Running
Unit Is Running *Capacity Limited By High Current*
Unit Is Running *Capacity Limited By Phase Unbalance*
Unit Is Running *Capacity Limited By High Cond Press*
Unit Is Running *Capacity Limited By Low Evap Temp*
Unit is Running *Establishing Minimum Capacity Limit*
Unit Is Preparing To Shutdown
Unit Is Building Ice
Unit Is Building Ice *Capacity Limited By High Current*
Unit Is Building Ice *Capacity Limited By Phase Unbalance*
Unit Is Building Ice *Capacity Limited By High Cond Press*

Unit Is Building Ice *Capacity Limited By Low Evap Temp*
Ice Building Is Complete
Starter Dry Run
Compressor Modes
Stopped
Locked Out
Service Pumpdown
Restart Inhibit
Starting
Running
Running Capacity Limited By High Current
Running Capacity Limited By Phase Unbalance
Running Capacity Limited By High Cond Press
Running Capacity Limited By Low Evap Temp
Running Establishing Minimum Capacity Limit
Preparing to Shutdown
Diagnostic Shutdown

Active Chilled Water Subscreen

The active chilled water setpoint is that setpoint to which the unit is currently controlling. It is determined by the front panel, Tracer, or external setpoints, which in turn may be subject to a form of chilled water reset.



Controls Interface

The chilled water reset status area in the right most column will display one of the following messages

- Return
- Constant Return
- Outdoor
- None

The left column text “Front Panel”, “BAS”, “External”, and “Active Chilled Water Setpoint” will always be present. In the second column, “_ _ _ _” will be shown if that option is not installed.

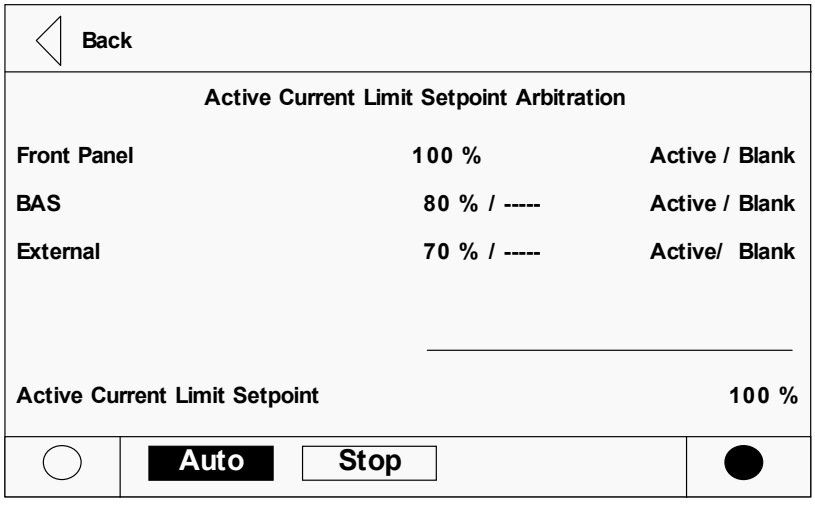
Pressing the “Back” button navigates back to the chiller screen.

Active Current Limit Setpoint

The active current limit setpoint is the setpoint that is currently in use displayed in % RLA. Touching the double arrow to the left of the Active Current Limit Setpoint will change the display to the active current limit setpoint subscreen.

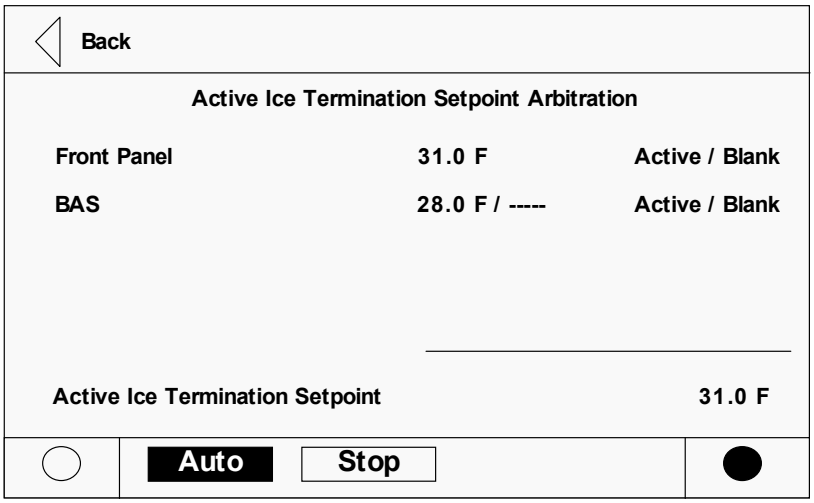
Active Current Limit Subscreen

The active current limit setpoint is that setpoint to which the unit is currently controlling, based on the front panel, Tracer, or external setpoints.



The left column text “Front Panel”, “BAS”, “External”, and “Active Current Limit Setpoint” will always be present. In the second column, “_ _ _ _” will be shown if that option is not installed.

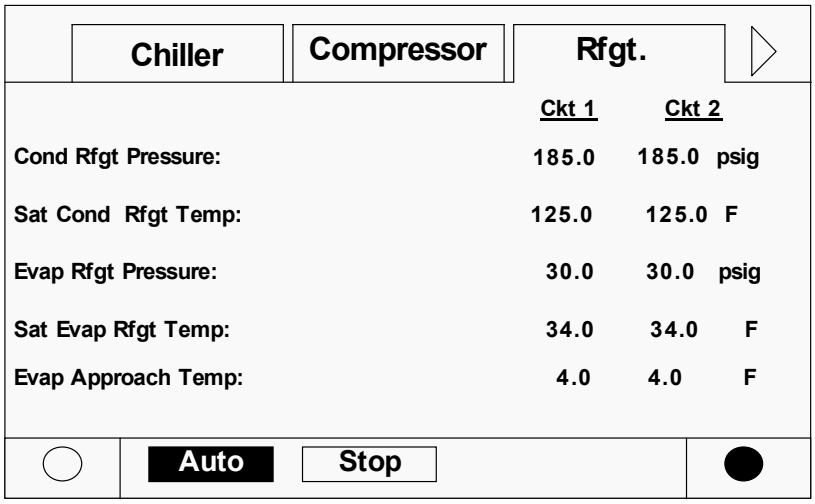
Active Ice Termination Subscreen



The “Back” button provides navigation back to the chiller screen.

Refrigerant Screen

The refrigerant screen displays those aspects of the chiller related to the refrigerant circuits. All pressures are displayed to 0.1 psig or 1 kPa.



Condenser Refrigerant Pressure Circuit 1 and 2

(Gauge pressure)

Condenser Refrigerant Temperature Circuit 1 and 2

Controls Interface

The main processor will read a saturated temperature converted from the appropriate pressure.

Evaporator Refrigerant Pressure Circuit 1 and 2

(Gauge pressure)

Evaporator Refrigerant Temperature Circuit 1 and 2

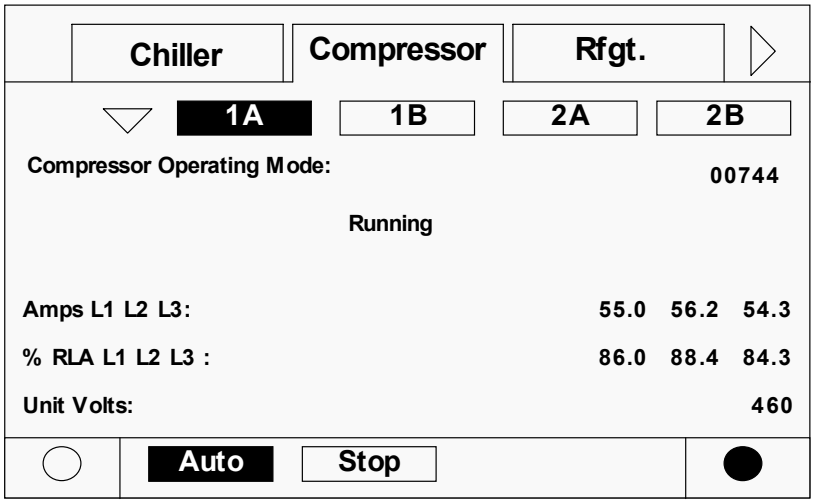
The main processor will read a saturated temperature converted from the appropriate pressure.

Evaporator Approach Temperature Circuit 1 and 2

(Leaving water temperature minus the saturated evaporator temperature)

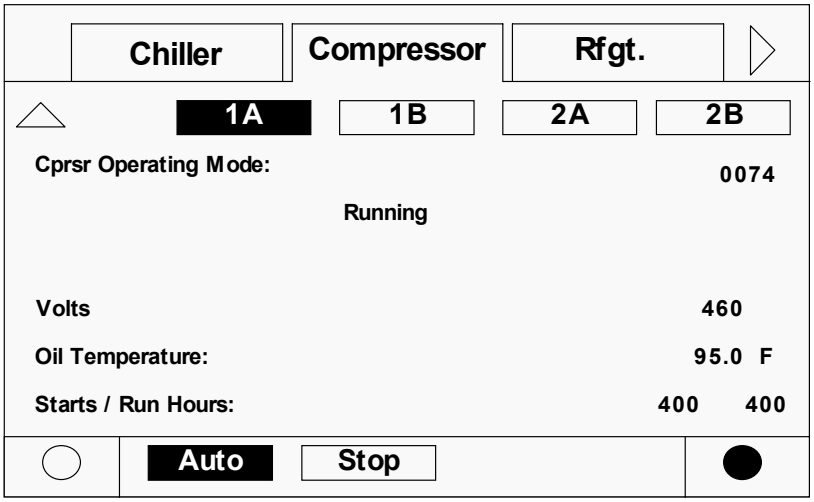
Compressor Screen

The compressor screen displays information for the one, two, three, or four compressors in the format shown. The top line of radio buttons allows you to select the compressor of interest. The next three lines are the compressor operating mode. The compressor radio buttons and the compressor operating mode lines don't change as you scroll down in the menu.



Controls Interface

The top screen has no upward scroll keys. The single arrow down scrolls the screen one line at a time. As soon as the display is one line away from the top, the upward pointing arrow appears.



The last screen has a single arrow to scroll upward one line at a time. When in the last position, the single down arrow disappears.

Each compressor has its own screen dependent on which radio key is pressed. When toggling between compressor screens, say to compare starts and run time, the same lines will be seen without additional key strokes. For example, toggling from the bottom of the compressor 1A menu accesses the bottom of the compressor 2A menu.

Compressor Mode

The compressor mode indicates the status of each compressor independent of unit mode.

See *Table 16* for a complete listing of compressor modes.

Line Currents

Line currents are displayed in amps to the nearest tenth from 0.0 to 999.9.

%RLA

The line% running load amps will be displayed to the nearest tenth from 0.0 to 999.9.

Line-Line Voltages

The single line-to-line voltage displayed is A-B in unit volts.

Controls Interface

Oil Temperature

The oil temperature is displayed for each compressor.

In a two-compressor circuit there are two oil temperature sensors, one per compressor if oil coolers are installed (as required by operating conditions). If oil coolers are not installed, there is only one oil temperature sensor per circuit. In the latter case, one oil temperature is shown for each compressor, each showing the same temperature.

Compressor Starts

Compressor starts are displayed 0 to 999,999.

Compressor Run Hours

Compressor running hours will be rounded to the nearest hour, 0 to 999,999.

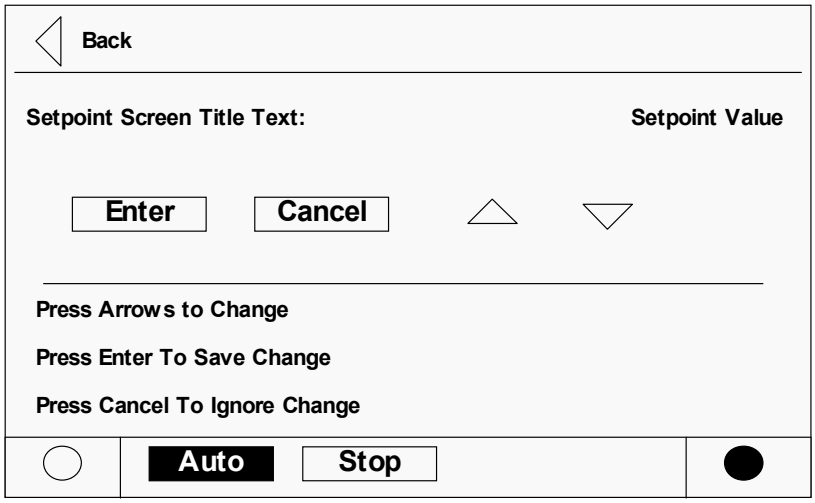
Setpoint Screen

The setpoint screen is a two-part screen. Screen 1 lists all changeable setpoints along with their current value. You can select a setpoint by touching either the verbal description or setpoint value. Doing this causes the screen to switch to Screen 2.

Screen 2 displays the current value of the chosen setpoint in the upper half of the display in a changeable format depending on the type. Binary setpoints use radio buttons. Analog setpoints are displayed as spin buttons. The lower half of the screen is reserved for help screens.

Controls Interface

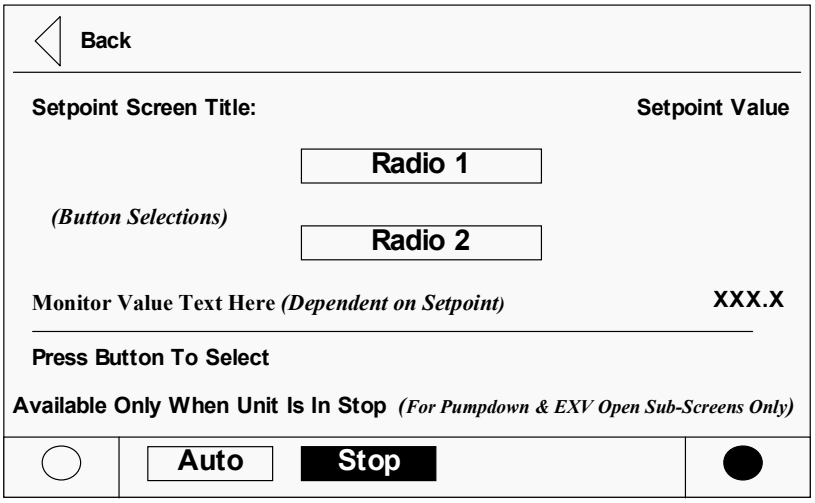
Analog Setpoint Subscreens



All setpoint subscreens will execute the equivalent of a Cancel key if any action or key is pressed before a new setpoint is entered. All setpoint subscreens will have a 10-minute time-out, which is reset when any key activity occurs. After 10 consecutive minutes of inactivity, the setpoint subscreen will return to the first chiller screen.

Enumerated Setpoints Subscreen

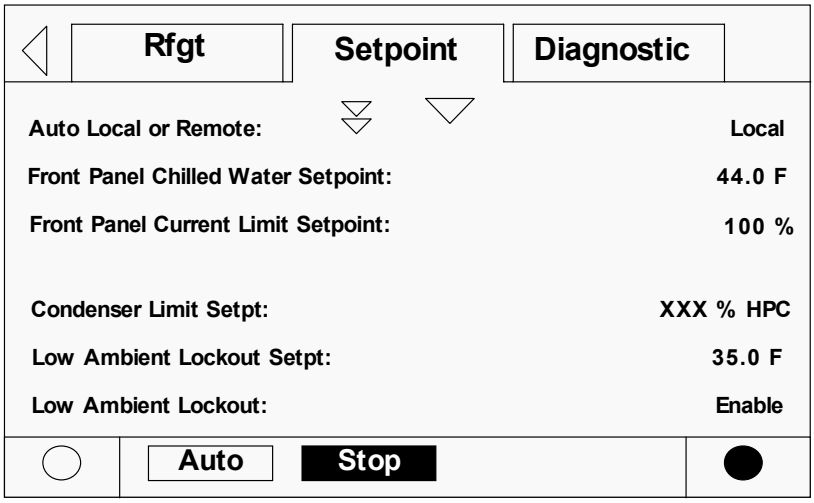
This subscreen is activated by pressing one of the two radio keys:



Controls Interface

Setpoint List Screen

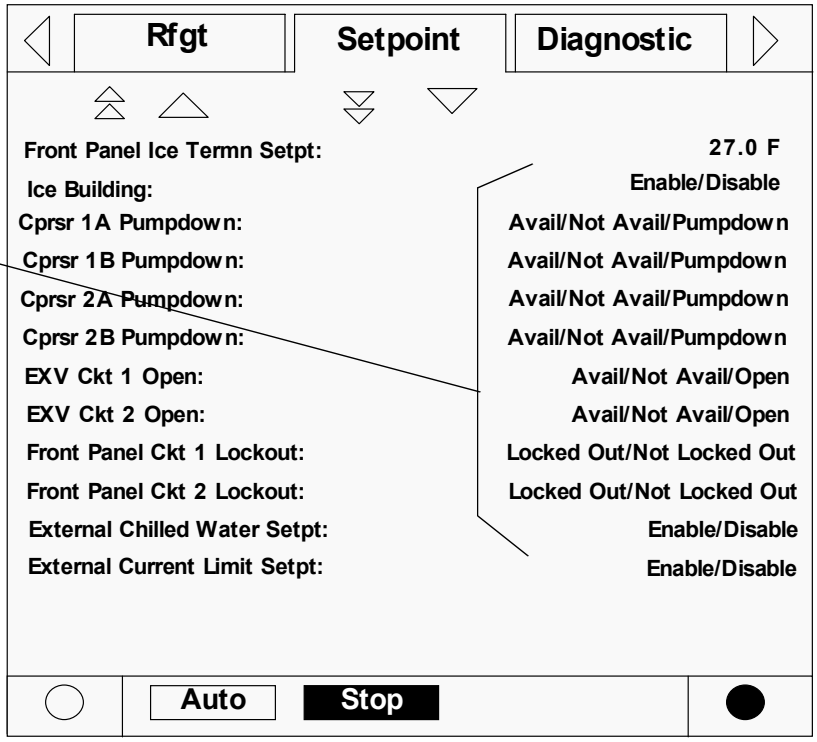
The following setpoints can be reviewed or changed:



Setpoint Screen - Top

Controls Interface

The remote devices identified on the following setpoint screen are discussed in the Electrical Installation section of this manual.



***All** setpoint options shown. Only 1 condition will appear. See Table below*

Setpoint Screen - Middle

Table 17
Setpoint Options/Conditions Displayed

Option	*Condition(s)*	*Explanation*
Ice Building	*Enable/ Disable*	*If feature is installed, operation can be initiated or stopped*
Cprsr Pumpdown[1]	*Avail*	*Pumpdown is allowed: only with unit in Stop or when circuit is locked out*
	Not Avail	*Pumpdown is not allowed because unit is operating or pumpdown has been completed*
	Pumpdown	*State is displayed while pumpdown is in progress*
EXV Ckt Open ***(For Authorized Service USe Only[2])***	*Avail*	*Indicates EXV is closed but can be opened manually since unit is in Stop or circuit is locked out*
	Not Avail	*EXV is closed but cannot be opened manually since unit is operating*

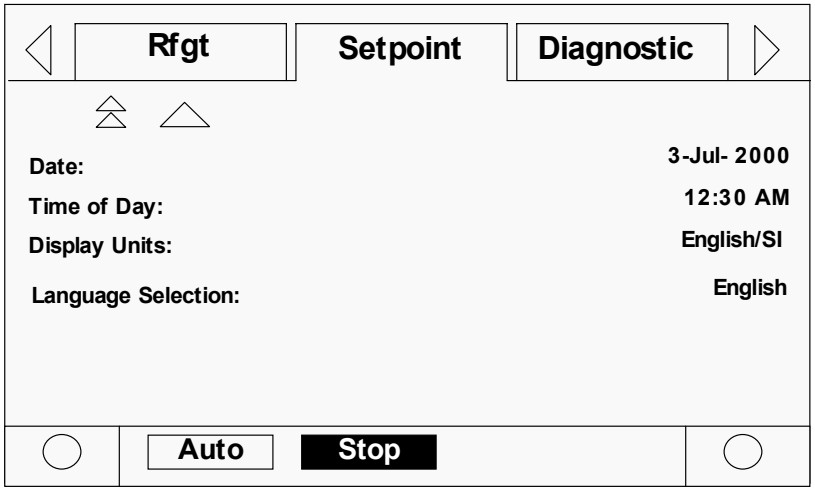
Controls Interface

Option	Condition(s)	Explanation
	Open	State is displayed when EXV is open. Unit will not start with EXV manually set open, but will initiate valve closure first.
Ckt Lockout	Locked Out	Circuit is locked out at Front Panel; other circuit may be available to run
	Not Locked Out	Circuit is not locked out and is available to run
Ext. Chilled Water Setpt	Enable/ Disable	Allows unit to control setpoint; otherwise another loop controller in line will control, as optionally wired.
Ext. Current Limit Setpt	Enable/ Disable	Allows unit to control setpoint; otherwise another loop controller in line will control, as optionally wired.

Notes:

[1] *Pumpdown procedure are discussed in Maintenance section 10.*

[2] *Used for liquid level control or to recover from pumpdown*



Setpoint Screen - Bottom

Controls Interface

Setpoint Subscreens – Table of Text, Data, Ranges, etc.

			Button Selections		
Setpoint Screen Title	**Resolution**	**Setpoint Field**	**Radio 1**	**Radio 2**	**Monitor Value**
Auto Local or Remote			Remote	Local	
Front Panel CWS	(3)	+ or – XX.X			
Front Panel CLS	Integer (4)	XXX			
Condenser Limit Stpt	Integer (4)	XXX			
Low Ambient Lockout Stpt	(3)	+ or – XX.X			
Low Ambient Lockout			Enable	Disable	
Ice Building			Enable	Disable	
Front Panel Ice Term. Setpt	(3)	+ or – XX.X			
Cprsr 1A Pumpdown (7)			Pumpdown (1)	Abort	Comp 1A Suction Pressure
Cprsr 1B Pumpdown (7)			Pumpdown (1)	Abort	Comp 1B Suction Pressure
Cprsr 2A Pumpdown (7)			Pumpdown (1)	Abort	Comp 2A Suction Pressure
Cprsr 2B Pumpdown (7)			Pumpdown (1)	Abort	Comp 2B Suction Pressure
EXV Ckt 1 Open (7)			Open (1)	Auto	Ckt 1 Evaporator Pressure
EXV Ckt 2 Open (7)			Open (1)	Auto	Ckt 2 Evaporator Pressure
Ckt 1 Lockout			Enable	Disable	
Ckt 2 Lockout			Enable	Disable	
External Chilled Water Setpt			Enable	Disable	
External Current Limit Setpoint			Enable	Disable	
Date	(6)	(6)			
Time of Day	(6)	(6)			
Display Units			English	SI	
Language			Selection 1 (2)	Selection 2 (2)	

Notes:

(1) Button is reverse video while the function is active and then returns to normal.

(2) Language choices are dependent on what the Service Tool has setup in the Main Processor. Get Radio Button names from Main Processor setups.

(3) Temperatures will be adjustable to 0.1 °F or °C or 1 deg F or C dependent on the resolution setting adjustable through the Service Tool. The Main Processor will provide the minimum and maximum allowable value.

(4) Adjustable to nearest integer or whole %. The Main Processor will provide the minimum and maximum allowable value.

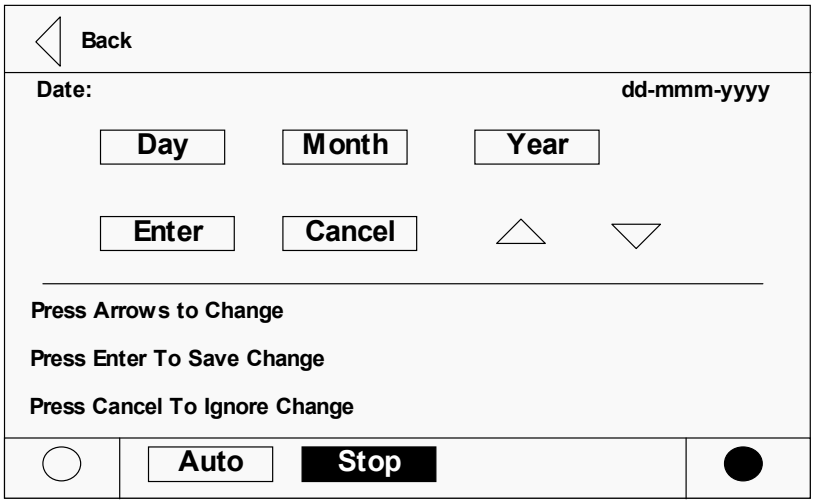
(5) Enables a DynaView Lockout screen. All other screens time out in 30 minutes to this screen. The DynaView Lockout Screen will have 0-9 keypad to permit the user to re-enter the other DynaView screens with a fixed password.

(6) The Date and Time setup screen formats deviate slightly from the standard screens defined above. See the alternate screen layouts below.

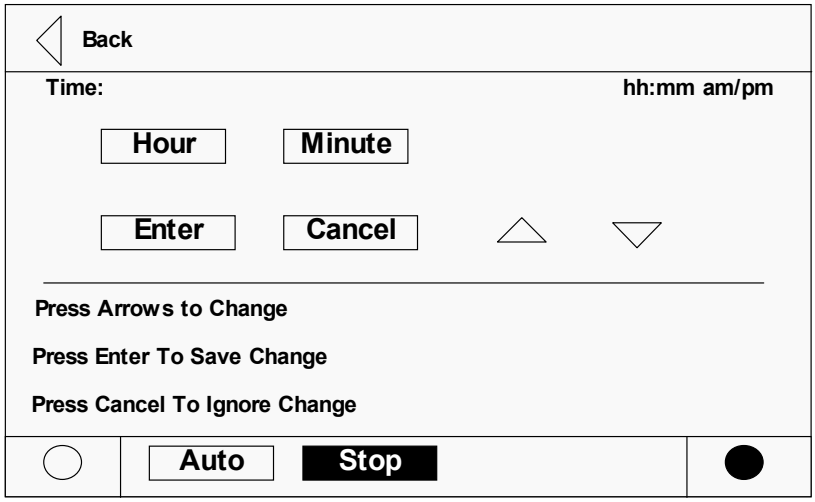
(7) The subscreen for these setpoints will have the additional direction "Available Only When Unit Is In Stop".

Controls Interface

The setpoint screen for setting up the CH.530 date is shown below: Select **Month**, **Day**, or **Year** and then use the up/down arrows to adjust.



The setpoint screen for setting up the CH.530 time with a 12-hour format is shown below: Select **Hour**, **Minute**, or **AM/PM** and then use the up/down arrows to adjust.



Controls Interface

Power Up and Self Tests

On power up a screen will be displayed for 5 seconds giving an operator the ability to enter the test mode or the demo mode.

Controls Interface

Power-Up EasyView

Scenario #1: On Power-Up EasyView will progress through two screens if an application is not present.

First Screen, Version # of the Boot, only the version # extension is displayed.
This screen will display for 3-5 seconds and move on to the second screen.

Second Screen, Application or No Application.
This screen will display "-APP" for as long as it remains powered.

Scenario #2: On Power-Up EasyView will progress through five screens if an application is present.

First Screen, Version # of the Boot, only the version # extension is displayed.
This screen will display for 3-5 seconds and move on to the second screen.

Second Screen, Application or No Application.This screen will display "APP" for 3-5 seconds and move on to the third screen.

Third screen, First screen of the Application, segment and LED test.
This screen will turn on all LED's and segments for 3-5 seconds and move on to the fourth screen.

Fourth Screen, splash screen.
This screen will display CH.530 for 3-5 seconds and move on to the fifth screen.

Fifth Screen, the Leaving Water Temperature.

Power-Up DynaView

On Power-Up, DynaView will progress through three screens:

First Screen, Version # of the Boot, full version # displayed.
This screen will display for 5 seconds and move on to the second screen. The contrast will also be adjustable from this screen.

Controls Interface

Second Screen, Application or No Application.
This screen will display for 5 seconds “A Valid Application Is Present” or “A Valid Application Is Not Present” and move on to the third screen.

Third Screen, First screen of the Application, the Chiller Tab.

Self Tests

On Power-Up, the CH. 530 runs self tests. Error messages that appear should be recorded and reported to a qualified service agency to include “ERR1” or “ERR2” messages on EasyView and a “RAM ERROR” or “Un-Recoverable Error” message on DynaView. Failure may result in flashing of all the LED’s on EasyView and flashing of the back-light on DynaView.

Display Formats

Units

Temperature settings are in °F or °C, depending on Display Units settings. Settings can be entered in tenths or whole degrees depending on a menu setting at the TechView.

Dashes (“-----”) appearing in a temperature or pressure report, indicates that the value is invalid or not applicable.

Languages

Two languages may be used with DynaView and will reside in the main processor. The main processor will hold two languages, English does not have to be one of them. When a complex character language such as Chinese is chosen, an alternate font can be downloaded to the DynaView.

TechView Interface

TechView is the PC (laptop) based tool used for servicing Tracer CH.530. Technicians that make any chiller control modification or service any diagnostic with Tracer CH.530 must use a laptop running the software application “TechView.” *TechView is a Trane application developed to minimize chiller downtime and aid the technicians' understanding of chiller operation and service requirements*.

Important: ***Performing any Tracer CH.530 service functions should be done only by a properly trained service technician. Please contact your local Trane service agency for assistance with any service requirements.***

TechView software is available via Trane .com (http://www.trane.com/commercial/software/tracerch530/) provides a user the TechView installation software and CH.530 main processor software that must be loaded onto your PC in order to service a CH.530 main processor.

Controls Interface

TechView service tool is used to load software into the Tracer CH.530 main processor (DynaView or EasyView). TechView is also used to perform any CH.530 service or maintenance function. Servicing a CH.530 main processor includes:

- updating main processor software
- monitoring chiller operation
- viewing and resetting chiller diagnostics
- Low Level Intelligent Device (LLID) replacement and binding
- main processor replacement and configuration modifications
- setpoint modifications
- service overrides

Software Download Process

Important Installation Instructions: First Time Users:

1. Proceed to "TechView Software Download" page and download the latest version of TechView, Java Runtime Environment, and emGateway installation files. These files should be stored in a folder named "CH.530" so they are easy to locate.
2. Using your PCs file manager, locate the files you just downloaded.
3. Install Java Runtime Environment on your PC by running the loaded "JRE_VXXX.exe" file. For example, locate the "JRE_VXXX.exe" file on your PC, then double left click the file to execute the install program. Then follow the installation prompts.
4. Install emGateway on your PC by running the loaded "*emG_VXXX.exe" file. For example, locate the "emG_VXXX.exe" file on your PC, then double left click the file to execute the install program. Then follow the installation prompts.
5. Install TechView on your PC by running the loaded "TV_VXXX.exe" file. For example, locate the "TV_VXXX.exe" file on your PC, then double left click the file to execute the install program. Then follow the installation prompts.
6. Connect your PC to the CH.530 main processor using a standard 9-pin male/9-pin female RS-232 cable.
7. Run TechView software by selecting the TechView icon placed on your desktop during the installation process. The "Help...About" menu can be viewed to confirm proper installation of latest versions.

Note: An installation of TechView includes the set of chiller main processor software files available upon that date of the TechView release. It would be necessary to select a chiller main processor only if a later version of chiller main processor software were released. The version of chiller main processor software available in TechView can be determined from the Software Download View screen within TechView.

Controls Interface

Controls Interface

Diagnostics

The following Diagnostic Table contains all possible diagnostics possible and arranged alphanumerically by the three-digit code assigned to each diagnostic. Not all data is available unless TechView is installed.

Legend to Diagnostics Table

Hex Code: 3-digit code used to uniquely identify diagnostics.

Diagnostic Name: Name of Diagnostic as it appears at DynaView and/or TechView displays.

Effects: Defines whether the entire Chiller, the Circuit or the Compressor is affected by this diagnostic. *None* implies that there is no direct effect to the chiller operation.

Severity: Defines the action of the above effect. *Immediate* means an instantaneous shutdown of the affected portion. *Normal* means routine or friendly shutdown of the affected portion. *Special Mode* means a particular mode of operation is invoked, but without shutdown, and *Info* means an Informational Note or Warning is generated.

Reset: Defines whether or not the diagnostic and its effects are to be manually reset (Latched), or can be either manually or automatically reset (Nonlatched).

Active Modes [Inactive Modes]: States the modes or periods of operation that the diagnostic is active and, as necessary, those modes or periods that it is specifically not active as an exception to the active modes. The inactive modes are enclosed in brackets [ ].

Criteria: Quantitatively defines the criteria used in generating the diagnostic and, if nonlatching, the criteria for auto reset.

Reset Level: Defines the lowest level of manual diagnostic reset command which can clear the diagnostic. The manual diagnostic reset levels in order of priority are: Local, Remote and Info. For example, a diagnostic that has a reset level of Remote, can be reset by either a remote diagnostic reset command or by a local diagnostic reset command, but not by the lower priority Info Reset command.

Help Text: A brief description of what kind of problems might cause this diagnostic to occur.

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
180 or F0	Starter Did Not Transition - Compressor 1A	Cprsr	Immediate	Latch	On the first check after transition.	The Starter Module did not receive a transition complete signal in the designated time from its command to transition. Design trip time is 2.5 seconds. This diagnostic is active only for Y-Delta, Auto-Transformer, Primary Reactor, and X-Line Starters.	Local
181	Starter Did Not Transition - Compressor 1B	Cprsr	Immediate	Latch	On the first check after transition.	The Starter Module did not receive a transition complete signal in the designated time from its command to transition. The must hold time from the Starter Module transition command is 1 second. The Must trip time from the transition command is 6 seconds. Actual design is 2.5 seconds. This diagnostic is active only for Y-Delta, Auto-Transformer, Primary Reactor, and X-Line Starters.Same as for Compressor 1A	Local
182	Starter Did Not Transition - Compressor 2A	Cprsr	Immediate	Latch	On the first check after transition.	Same as for Compressor 1A	Local
183	Starter Did Not Transition - Compressor 2B	Cprsr	Immediate	Latch	On the first check after transition.	Same as for Compressor 1A	Local
184 or E5	Phase Reversal - Compressor 1A	Cprsr	Immediate	Latch	Compressor energized to transition command [All Other Times]	A phase reversal was detected on the incoming current. On a compressor startup the phase reversal logic must detect and trip within.3 seconds after compressor start.	Local
185	Phase Reversal - Compressor 1B	Cprsr	Immediate	Latch	Compressor energized to transition command [All Other Times]	Same as for Compressor 1A	Local
186	Phase Reversal - Compressor 2A	Cprsr	Immediate	Latch	Compressor energized to transition command [All Other Times]	Same as for Compressor 1A	Local
187	Phase Reversal - Compressor 2B	Cprsr	Immediate	Latch	Compressor energized to transition command [All Other Times]	Same as for Compressor 1A	Local

Controls Interface

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
188	Starter Dry Run Test	Cprsr	Immediate	Latch	Starter Dry Run Mode	While in the Starter Dry Run Mode either 50% Line Voltage was sensed at the Potential Transformers or 10% RLA Current was sensed through the Current Transformers.	Local
19C	Phase Loss - Compressor 1A	Cprsr	Immediate	Latch	Start Sequence and Run modes	a.) No current was sensed on one or two of the current transformer inputs while running or starting. Design trip level is 10% RLA. The design trip time is 2.64 seconds. b.) If Phase reversal protection is enabled and current is not sensed on one or both current transformer inputs, logic will detect and trip in a maximum of 0.3 seconds after compressor start.	Local
19D	Phase Loss - Compressor 1B	Cprsr	Immediate	Latch	Start Sequence and Run modes	Same as for Compressor 1A	Local
19E	Phase Loss - Compressor 2A	Cprsr	Immediate	Latch	Start Sequence and Run modes	Same as for Compressor 1A	Local
19F	Phase Loss - Compressor 2B	Cprsr	Immediate	Latch	Start Sequence and Run modes	Same as for Compressor 1A	Local
1A0	Power Loss - Compressor 1A	Cprsr	Immediate	Non-Latch	All compressor running modes [all compressor starting and non-running modes]	The compressor had previously established currents while running and then all three phases of current were lost. Trip level is less than 10% RLA, trip time is 2.64 seconds. This diagnostic will preclude the Phase Loss Diagnostic and the Transition Complete Input Opened Diagnostic from being called out. To prevent this diagnostic from occurring with the intended disconnect of main power, the minimum time to trip must be greater than the guaranteed reset time of the Starter module. Note: This diagnostic prevents nuisance latching diagnostics due to a momentary power loss – It does not protect motor/compressor from uncontrolled power reapplication. See Momentary Power Loss Diagnostic for this protection. This diagnostic is not active during the start mode before the transition complete input is proven. Thus, a random power loss during a start would result in either a “Starter Fault Type 3” or a “Starter Did Not Transition” latching diagnostic.	Remote

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
1A1	Power Loss - Compressor 1B	Cprsr	Immediate	Non-Latch	All compressor running modes [all compressor starting and non-running modes]	Same as for Compressor 1A	Remote
1A2	Power Loss - Compressor 2A	Cprsr	Immediate	Non-Latch	All compressor running modes [all compressor starting and non-running modes]	Same as for Compressor 1A	Remote
1A3	Power Loss - Compressor 2B	Cprsr	Immediate	Non-Latch	All compressor running modes [all compressor starting and non-running modes]	Same as for Compressor 1A	Remote
1B2	Severe Phase Unbalance - Compressor 1A	Circuit	Immediate	Latch	All Running Modes	A 40% Phase Current Unbalance has been detected on one phase relative to the average of all 3 phases for 90 continuous seconds.	Local
1B3	Severe Phase Unbalance - Compressor 1B	Circuit	Immediate	Latch	All Running Modes	Same as for Compressor 1A	Local
1B4	Severe Phase Unbalance - Compressor 2A	Circuit	Immediate	Latch	All Running Modes	Same as for Compressor 1A	Local
1B5	Severe Phase Unbalance - Compressor 2B	Circuit	Immediate	Latch	All Running Modes	Same as for Compressor 1A	Local
1E9	Starter Fault Type I – Compressor 1A	Cprsr	Immediate	Latch	Starting - Y Delta Starters Only	This is a specific starter test where 1M(1K1) is closed first and a check is made to ensure that there are no currents detected by the CT's. If currents are detected when only the 1M contactor is closed first at start, then one of the other contactors is shorted.	Local
1EA	Starter Fault Type I – Compressor 1B	Cprsr	Immediate	Latch	Starting - Y Delta Starters Only	Same as for Compressor 1A	Local
1EB	Starter Fault Type I – Compressor 2A	Cprsr	Immediate	Latch	Starting - Y Delta Starters Only	Same as for Compressor 1A	Local
1EC	Starter Fault Type I – Compressor 2B	Cprsr	Immediate	Latch	Starting - Y Delta Starters Only	Same as for Compressor 1A	Local

Controls Interface

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
1ED	Starter Fault Type II – Compressor 1A	Cprsr	Immediate	Latch	Starting All types of starters	a. This is a specific starter test where the Shorting Contactor (1K3) is individually energized and a check is made to ensure that there are no currents detected by the CT's. If current is detected when only the 1K3 is energized at Start, then the 1M contactor is shorted. b. This test in a. above applies to all forms of starters (Note: It is understood that many starters do not connect to the Shorting Contactor.).	Local
1EE	Starter Fault Type II – Compressor 1B	Cprsr	Immediate	Latch	Starting – All types of starters	Same as for Compressor 1A	Local
1EF	Starter Fault Type II – Compressor 2A	Cprsr	Immediate	Latch	Starting – All types of starters	Same as for Compressor 1A	Local
1F0	Starter Fault Type II – Compressor 2B	Cprsr	Immediate	Latch	Starting – All types of starters	Same as for Compressor 1A	Local
1F1	Starter Fault Type III – Compressor 1A	Cprsr	Immediate	Latch	Starting [Adaptive Frequency Starter Type]	As part of the normal start sequence to apply power to the compressor, the Shorting Contactor (1K3) and then the Main Contactor (1K1) were energized. 1.6 seconds later there were no currents detected by the CT's for the last 1.2 Seconds on all three phases. The test above applies to all forms of starters except Adaptive Frequency Drives.	Local
1F2	Starter Fault Type III – Compressor 1B	Cprsr	Immediate	Latch	Starting [Adaptive Frequency Starter Type]	Same as for Compressor 1A	Local
1F3	Starter Fault Type III – Compressor 2A	Cprsr	Immediate	Latch	Starting [Adaptive Frequency Starter Type]	Same as for Compressor 1A	Local
1F4	Starter Fault Type III – Compressor 2B	Cprsr	Immediate	Latch	Starting [Adaptive Frequency Starter Type]	Same as for Compressor 1A	Local
5A4	Compressor 1A Did Not Accelerate Normally: Forced Transition	None	Info	Latch	Start Mode	a. The compressor did not come up to speed (get to <85% RLA) in the allotted time defined by the Maximum Acceleration Timer. b. The configuration defined “Transition or Bypass” as the action when the Maximum Acceleration Timer was exceeded.	Info

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
5A5	Compressor 1B Did Not Accelerate Normally: Forced Transition	None	Info	Latch	Start Mode	Same as for Compressor 1A	Info
5A6	Compressor 2A Did Not Accelerate Normally: Forced Transition	None	Info	Latch	Start Mode	Same as for Compressor 1A	Info
5A7	Compressor 2B Did Not Accelerate Normally: Forced Transition	None	Info	Latch	Start Mode	Same as for Compressor 1A	Info
5A8	Compressor 1A Did Not Accelerate Normally: Shutdown	Circuit	Immediate	Latch	Start Mode	a. The compressor did not come up to speed (get to <85%RLA) in the allotted time defined by the Maximum Acceleration Timer. b. The TechView setups defined “Shutdown” as the action to take when the Maximum Acceleration Timer was exceeded.	Local
5A9	Compressor 1B Did Not Accelerate Normally: Shutdown	Circuit	Immediate	Latch	Start Mode	Same as for Compressor 1A	Local
5AA	Compressor 2A Did Not Accelerate Normally: Shutdown	Circuit	Immediate	Latch	Start Mode	Same as for Compressor 1A	Local
5AB	Compressor 2B Did Not Accelerate Normally: Shutdown	Circuit	Immediate	Latch	Start Mode	Same as for Compressor 1A	Local
5AC	Transition Complete Input Shorted – Compressor 1A	Cprsr	Immediate	Latch	Pre-Start	The Transition Complete input was found to be shorted before the compressor was started. This is active for all electromechanical starters.	Local
5AD	Transition Complete Input Shorted – Compressor 1B	Cprsr	Immediate	Latch	Pre-Start	Same as for Compressor 1A	Local
5AE	Transition Complete Input Shorted – Compressor 2A	Cprsr	Immediate	Latch	Pre-Start	Same as for Compressor 1A	Local
5AF	Transition Complete Input Shorted – Compressor 2B	Cprsr	Immediate	Latch	Pre-Start	Same as for Compressor 1A	Local
5B0	Transition Complete Input Opened – Compressor 1A	Cprsr	Immediate	Latch	All running modes	The Transition Complete input was found to be open with the compressor motor running after a successful completion of transition. This is active only for Y-Delta, Auto-Transformer, Primary Reactor, and X-Line Starters. To prevent this diagnostic from occurring as the result of a power loss to the contactors, the minimum time to trip must be greater than the trip time for the power loss diagnostic.	Local

Controls Interface

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
5B1	Transition Complete Input Opened – Compressor 1B	Cprsr	Immediate	Latch	All running modes	Same as for Compressor 1A	Local
5B2	Transition Complete Input Opened – Compressor 2A	Cprsr	Immediate	Latch	All running modes	Same as for Compressor 1A	Local
5B3	Transition Complete Input Opened – Compressor 2B	Cprsr	Immediate	Latch	All running modes	Same as for Compressor 1A	Local
BA or EC	Overload Trip - Compressor 1A	Circuit	Immediate	Latch	Cprsr Energized	Compressor current exceeded overload time vs trip characteristic. For A/C products Must trip = 140% RLA, Must hold=125%, nominal trip 132.5% in 30 seconds	Local
BB	Overload Trip - Compressor 1B	Circuit	Immediate	Latch	Cprsr Energized	Same as for Compressor 1A	Local
BC	Overload Trip - Compressor 2A	Circuit	Immediate	Latch	Cprsr Energized	Same as for Compressor 1A	Local
BD	Overload Trip - Compressor 2B	Circuit	Immediate	Latch	Cprsr Energized	Same as for Compressor 1A	Local
CA	Starter Contactor Interrupt Failure - Compressor 1A	Chiller	Special Action	Latch	Starter Contactor not Energized [Starter Contactor Energized]	Detected compressor currents greater than 10% RLA on any or all phases when the compressor was commanded off. Detection time shall be 5 second minimum and 10 seconds maximum. On detection and until the controller is manually reset: generate diagnostic, energize the appropriate alarm relay, continue to energize the Evaporator Pump Output, continue to command the affected compressor off, fully unload the effected compressor and command a normal stop to all other compressors. For as long as current continues, perform liquid level and fan control on the circuit effected.	Local
CB	Starter Contactor Interrupt Failure - Compressor 1B	Chiller	Special Action	Latch	Starter Contactor not Energized [Starter Contactor Energized]	Same as for Compressor 1A	Local
CC	Starter Contactor Interrupt Failure - Compressor 2A	Chiller	Special Action	Latch	Starter Contactor not Energized [Starter Contactor Energized]	Same as for Compressor 1A	Local
CD	Starter Contactor Interrupt Failure - Compressor 2B	Chiller	Special Action	Latch	Starter Contactor not Energized [Starter Contactor Energized]	Same as for Compressor 1A	Local

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
D7	Over Voltage	Chiller	Normal	Non-Latch	Pre-Start and Any Ckt[s] Energized	a. Line voltage above + 10% of nominal. [Must hold = + 10% of nominal. Must trip = + 15% of nominal. Reset differential = min. of 2% and max. of 4%. Time to trip = minimum of 1 min. and maximum of 5 min.) Design: Nom. trip: 60 seconds at greater than 112.5%, + or - 2.5%, Auto Reset at 109% or less.	Remote
D8	Under Voltage	Chiller	Normal	Non-Latch	Pre-Start and Any Ckt[s] Energized	a. Line voltage below - 10% of nominal or the Under/Over voltage transformer is not connected. [Must hold = - 10% of nominal. Must trip = - 15% of nominal. Reset differential = min. of 2% and max. of 4%. Time to trip = min. of 1 min. and max. of 5 min.) Design: Nom. trip: 60 seconds at less than 87.5%, + or - 2.8% at 200V or + or - 1.8% at 575V, Auto Reset at 90% or greater.	Remote
194 or FB	Low Evaporator Refrigerant Temperature - Circuit 1	Circuit	Immediate	Latch	All Ckt Running Modes [reversible heat pump in heating mode, excluding defrost]	The inferred Saturated Evaporator Refrigerant Temperature (calculated from suction pressure transducer(s)) dropped below the Low Refrigerant Temperature Cutout Setpoint for 60°F-sec (33.3 °C-sec).°	
195	Low Evaporator Refrigerant Temperature - Circuit 2	Circuit	Immediate	Latch	All Ckt Running Modes [reversible heat pump in heating mode, excluding defrost]	Same as for Circuit 1	Remote
198	Low Oil Flow - Compressor 1A	Cprsr	Immediate	Latch	Cprsr Energized and Delta P above 35 PSID (2.45 bar)	The intermediate oil pressure transducer for this compressor was out of the acceptable pressure range for 15 seconds, while the Delta Pressure was greater than 35 PSID (2.45 bar). Acceptable range is 0.50 > (P_C-P_I) / (P_C-P_E) for the first 2.5 minutes of operation, and 0.25 > (P_C-P_I) / (P_C-P_E) thereafter	Local
199	Low Oil Flow - Compressor 1B	Cprsr	Immediate	Latch	Cprsr Energized and Delta P above 35 PSID	Same as for Compressor 1A	Local
19A	Low Oil Flow - Compressor 2A	Cprsr	Immediate	Latch	Cprsr Energized and Delta P above 35 PSID	Same as for Compressor 1A	Local
19B	Low Oil Flow - Compressor 2B	Cprsr	Immediate	Latch	Cprsr Energized and Delta P above 35 PSID	Same as for Compressor 1A	Local

Controls Interface

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
1AE	Low Differential Refrigerant Pressure - Circuit 1	Circuit	Immediate	Latch	Cprsr Energized	The system differential pressure for the respective circuit was below 35 PSID (2.45 bar) for more than 2000 PSID-sec 140 bar-sec).	Remote
1AF	Low Differential Refrigerant Pressure - Circuit 2	Circuit	Immediate	Latch	Cprsr Energized	Same as for Circuit 1	Remote
1C6	High Differential Refrigerant Pressure - Circuit 1	Circuit	Normal	Latch	Cprsr Energized	The system differential pressure for the respective circuit was above 275 PSID (19.25 bar) for two consecutive samples or more than 10 seconds.	Remote
1C7	High Differential Refrigerant Pressure - Circuit 2	Circuit	Normal	Latch	Cprsr Energized	Same as for Circuit 1	Remote
1DD	High Oil Temperature – Circuit 1 or Comp 1A	Circuit	Normal	Latch	All	The respective circuit's oil temperature as supplied to the compressors exceeded 200°F (93°C) for two consecutive samples or for more than 10 seconds. Note: As part of the Compressor High Temperature Limit Mode, the running compressor's female load step will be forced loaded when the respective circuit's oil temperature exceeds 190°F (88°C) and returned to normal control when the oil temperature falls below 180°F(77°C).	
1DE	High Oil Temperature – Comp 1B	Circuit	Normal	Latch	All	Same as for Compressor 1A	
1DF	High Oil Temperature – Circuit 2 or Comp 2A	Circuit	Normal	Latch	All	Same as for Compressor 1A	
1E0	High Oil Temperature – Comp 2B	Circuit	Normal	Latch	All	Same as for Compressor 1A	
1E3	Subcooled Liquid Temperature Sensor - Circuit 1	None	Info	Latch	All	Bad Sensor or LLID	Info
1E4	Subcooled Liquid Temperature Sensor - Circuit 2	None	Info	Latch	All	Bad Sensor or LLID	Info
1E5	Oil Temperature Sensor – Circuit 1 or Cprsr 1A	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
1E7	Oil Temperature Sensor – Circuit 2 or Cprsr 2A	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
1E6	Oil Temperature Sensor – Cprsr 1B	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
1E8	Oil Temperature Sensor – Cprsr 2B	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
27D	Evaporator Liquid Level Sensor – Circuit 1	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
3F9	Evaporator Liquid Level Sensor – Circuit 2	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
2A1	Condenser Fan Variable Speed Drive Fault - Circuit 1 (Drive 1)	Circuit	Special Action	Latch	Pre-start and Running w/ Variable Speed Fan enabled	The MP has received a fault signal from the respective condenser fan Variable Speed Inverter Drive, and unsuccessfully attempted (5 times within 1 minute of each other) to clear the fault. The 4th attempt removes power from the inverter to create a power up reset. If the fault does not clear, the MP will revert to constant speed operation without the use of the inverter's fan. The inverter must be manually bypassed, and fan outputs rebound, for full fixed speed fan operation.	Remote
5B4	Condenser Fan Variable Speed Drive Fault - Circuit 1 Drive 2	Circuit	Special Action	Latch	Pre-start and Running w/ Variable Speed Fan enabled	Same as for Circuit 1 (Drive 1)	Remote
5B5	Condenser Fan Variable Speed Drive Fault - Circuit 2 (Drive 2)	Circuit	Special Action	Latch	Pre-start and Running w/ Variable Speed Fan enabled	Same as for Circuit 1 (Drive 1)	Remote
390	BAS Failed to Establish Communication	None	Info		At power-up	The BAS was setup as "installed" and the BAS did not communicate with the MP within 2 minutes after power-up.	Info
398	BAS Communication Lost	None	Info		All	The BAS was setup as "installed" at TechView and the Comm LLID lost communications with the BAS for 15 continuous minutes after it had been established. Continue to run the chiller with the last valid BAS Setpoints/Mode.	Info
583	Low Evaporator Liquid Level – Circuit 1	None	Info	Non-Latch	Starter Contactor Energized [all Stop modes]	The liquid level sensor is seen to be at or near its low end of range for 80 continuous minutes while the compressor is running	Remote
5B6	Low Evaporator Liquid Level – Circuit 2	None	Info	Non-Latch	Starter Contactor Energized [all Stop modes]	Same as for Circuit 1	Remote
584	High Evaporator Liquid Level – Circuit 1	Circuit	Immediate	Latch	Starter Contactor Energized [all Stop modes]	The liquid level sensor is seen to be at or near its high end of range for 80 continuous minutes while the compressor is running	Remote

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
5B7	High Evaporator Liquid Level – Circuit 2	Circuit	Immediate	Latch	Starter Contactor Energized [all Stop modes]	Same as for Circuit 1	Remote
87	External Chilled Water Setpoint (Or External Hot Water Setpoint On Reversible Heat Pumps In Heating Mode)	None	Info	Non-Latch	All	Input signal out-Of-Range Low or Hi or bad LLID, set diagnostic, default CWS to next level of priority (e.g. Front Panel Setpoint). This Info diagnostic will automatically reset if the input returns to the normal range.	Info
89	External Current Limit Setpoint	None	Info	Non-Latch	All	Input signal out-Of-Range Low or Hi or bad LLID. Set diagnostic, default CLS to next level of priority (e.g. Front Panel Setpoint. This Info diagnostic will automatically reset if the input returns to the normal range.	Info
8E	Evaporator Entering Water Temperature Sensor	None	Info	Latch	All	Bad Sensor or LLID a. Normal operation, no effects on control. b. Chilled Water Reset, Will just run at either normal CWS or will run at maximum reset permitted.	Info
AB	Evaporator Leaving Water Temperature Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID	Remote
B8	Condenser Refrigerant Pressure Transducer - Circuit 1	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
5B9	Condenser Refrigerant Pressure Transducer - Circuit 2	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
5BA	Suction Pressure Transducer – Circuit 1, Compressor 1A	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
5BB	Suction Pressure Transducer – Circuit 1, Compressor 1B	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
5BC	Suction Pressure Transducer – Circuit 2, Compressor 2A	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
5BD	Suction Pressure Transducer – Circuit 2, Compressor 2B	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
5BE	Intermediate Oil Pressure Transducer – Compressor 1A	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
5BF	Intermediate Oil Pressure Transducer – Compressor 1B	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
5C0	Intermediate Oil Pressure Transducer – Compressor 2A	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
5C1	Intermediate Oil Pressure Transducer – Compressor 2B	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
B5	Low Suction Refrigerant Pressure - Circuit 1	Circuit	Immediate	Latch	Cprsr Pre-start and Cprsr Energized	a. The Suction Refrigerant Pressure (or either of the compressor suction pressures) dropped below 10 PSIA (0.7 bar) just prior to compressor start (after EXV preposition). b. The pressure fell below 16 PSIA (1.12 bar) while running after the ignore time had expired, or fell below 5 PSIA (0.35 bar) before the ignore time had expired. The ignore time is function of outdoor air temperature. Note: Part b. is identical to Low Evaporator Refrigerant Temperature diagnostic except for the trip integral and trip point settings.	Local
B6	Low Suction Refrigerant Pressure - Circuit 2	Circuit	Immediate	Latch	Cprsr Pre-start and Cprsr Energized	Same as for Circuit 1	Local
B7	Low Suction Refrigerant Pressure – Cprsr 1B	Circuit	Immediate	Latch	Cprsr Pre-start and Cprsr Energized	a. The Suction Refrigerant Pressure (or either of the compressor suction pressures) dropped below 10 PSIA (0.7 bar) just prior to compressor start (after EXV preposition). b. The pressure fell below 16 PSIA (1.12 bar) while running after the ignore time had expired, or fell below 5 PSIA (0.35 bar) before the ignore time had expired. The ignore time is function of outdoor air temperature. Note: Part b. is identical to Low Evaporator Refrigerant Temperature diagnostic except for the trip integral and trip point settings	Local
B8	Low Suction Refrigerant Pressure – Cprsr 2B	Circuit	Immediate	Latch	Cprsr Pre-start and Cprsr Energized	Same as for Circuit 1	Local

Controls Interface

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
C5	Low Chilled Water Temp: Unit Off	Evap. Pump	Special Action	Non-Latch	Unit in Stop Mode, or in Auto Mode and No Circuits Energized [Any Ckt Energized]	a. The leaving chilled water temp. fell below the leaving water temp cutout setpoint for 30 degree F seconds while the Chiller was in the Stop mode or in Auto mode with no compressors running. Energize Chilled Water pump Relay until diagnostic Auto Resets, then return to normal evap pump control.	Info
C6	Low Chilled Water Temp: Unit On	Chiller	Immediate and Special Action	Non-Latch	Any Ckt[s] Energized [No Circuits Energized]	The chilled water temp. fell below the cutout setpoint for 30 degree F Seconds while the compressor was running. Automatic reset occurs when the temperature rises 2 °F (1.1°C) above the cutout setting for 2 minutes. This diagnostic shall not de-energize the Chilled Water Pump Output.	Remote
384	Evaporator Water Flow Overdue	Chiller	Normal	Non-Latch	Establish Evaporator Water Flow on going from STOP to AUTO.	Evaporator water flow was not proven within 4.25 minutes of the Chilled water pump relay being energized. The diagnostic will de-energize the Chilled Water Pump output. It will be re-energized if the diagnostic clears with the return of flow and the chiller will be allowed to restart normally (to accommodate external control of pump). Note that this diagnostic will not light the red diagnostic light on the EasyView display.	Remote
ED	Evaporator Water Flow Lost	Chiller	Normal	Non-Latch	[All Stop modes]	a. The chilled water flow switch input was open for more than 6-10 continuous seconds. b. This diagnostic does not de-energize the evaporator pump output c. 6-10 seconds of contiguous flow shall clear this diagnostic. d. Even though the pump times out in the STOP modes, this diagnostic shall not be called out in the STOP modes Note that this diagnostic will not light the red diagnostic light on the EasyView display.	N/A

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
F5	High Pressure Cutout - Compressor 1A	Circuit	Immediate	Latch	All	A high pressure cutout was detected on Compressor 1A; trip at 315 ± 5 PSIG 22 bar ±0.35). Note: Other diagnostics that may occur as an expected consequence of the HPC trip will be suppressed from annunciation. These include Phase Loss, Power Loss, and Transition Complete Input Open.	Local
F6	High Pressure Cutout - Compressor 1B	Circuit	Immediate	Latch	All	Same as for Compressor 1A	Local
BE	High Pressure Cutout - Compressor 2A	Circuit	Immediate	Latch	All	Same as for Compressor 1A	Local
BF	High Pressure Cutout - Compressor 2B	Circuit	Immediate	Latch	All	Same as for Compressor 1A	Local
FD	Emergency Stop	Chiller	Immediate	Latch	All	Emergency Stop input is open. An external interlock has tripped. Time to trip from input opening to unit stop shall be 0.1 to 1.0 seconds.	Local
A1	Outdoor Air Temperature Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID	Remote
5C4	Panel High Temperature Limit	Circuit	Special Action	Latch	All	Electrical Panel High Limit Thermostat (170°F or 77°C) trip was detected. Note: Other diagnostics that may occur as an expected consequence of the Panel High Temp Limit trip will be suppressed from annunciation. These include Phase Loss, Power Loss, and Transition Complete Input Open	
5C5	Starter Module Memory Error Type 1-Starter 1A	None	Info	Latch	All	Checksum on RAM copy of the Starter LLID configuration failed. Configuration recalled from EEPROM.	Local
5C6	Starter Module Memory Error Type 1-Starter 1B	None	Info	Latch	All	Same as for Starter 1A	Local
5C7	Starter Module Memory Error Type 1 - Starter 2A	None	Info	Latch	All	Same as for Starter 1A	Local
5C8	Starter Module Memory Error Type 1 - Starter 2B	None	Info	Latch	All	Same as for Starter 1A	Local
5C9	Starter Module Memory Error Type 2 - Starter 1A	Cprsr	Immediate	Latch	All	Checksum on EEPROM copy of the Starter LLID configuration failed. Factor default values used.	
5CA	Starter Module Memory Error Type 2 - Starter 1B	Cprsr	Immediate	Latch	All	Same as for Starter 1A	
5CB	Starter Module Memory Error Type 2 - Starter 2A	Cprsr	Immediate	Latch	All	Same as for Starter 1A	

Controls Interface

Hex Code	Diagnostic Name	Effects	Severity	Reset	Active Modes [Inactive Modes]	Criteria	Reset Level
5CC	Starter Module Memory Error Type 2 - Starter 2B	Cprsr	Immediate	Latch	All	Same as for Starter 1A	
5FF	MP: Invalid Configuration	None	Immediate	Latch	All	Main Processor has an invalid configuration based on the current software installed	NA
1AD	MP Application Memory CRC Error	Chiller	Immediate	Latch	All Modes	Memory error criteria TBD	Remote
69C	MP: Non-Volatile Memory Error	None	Immediate	Latch	All	Main Processor has determined there is a catastrophic error with the Non-Volatile memory.	NA
2E6	Check Clock	Chiller	IFW	Latch	All	The real time clock had an error. Reset the clock or check the battery.	

Controls Interface

Communication Diagnostics

The following communication loss diagnostics will not occur unless that input or output is required to be present by the particular configuration and installed options for the chiller.

Communication diagnostics are named by the Functional Name of the input or output that is no longer being heard from by the Main Processor. Many LLIDs, such as the Quad Relay LLID, have more than one functional output associated with it. A COMM loss with such a multiple function board, will generate multiple diagnostics. Refer to the Chiller's wiring diagrams to relate the occurrence of multiple COMM diagnostics back to the physical LLID boards that they have been assigned.

For **all** diagnostics, unless noted, the criteria prompting the diagnostic is *continual loss of communication between the MP and the Functional ID occurring for a 30 second period*. Additional action taken by the chiller is noted in the "Action" column.

Table 18
Communication Loss Diagnostics

Hex Code	Diagnostic Name	Effects	Severity	Persistence	Criteria	Reset Level
5D1	Comm Loss: Male Port Unload Compressor 1A	Cprsr	Normal	Latch		Remote
5D2	Comm Loss: Male Port Load Compressor 1A	Cprsr	Normal	Latch		Remote
5D3	Comm Loss: Male Port Unload Compressor 1B	Cprsr	Normal	Latch		Remote
5D4	Comm Loss: Male Port Load Compressor 1B	Cprsr	Normal	Latch		Remote
5D5	Comm Loss: Male Port Unload Compressor 2A	Cprsr	Normal	Latch		Remote
5D6	Comm Loss: Male Port Load Compressor 2A	Cprsr	Normal	Latch		Remote
5D7	Comm Loss: Male Port Unload Compressor 2B	Cprsr	Normal	Latch		Remote
5D8	Comm Loss: Male Port Load Compressor 2B	Cprsr	Normal	Latch		Remote
5D9	Comm Loss: Female Step Load Compressor 1A	Cprsr	Normal	Latch		Remote
5DA	Comm Loss: Female Step Load Compressor 1B	Cprsr	Normal	Latch		Remote
5DB	Comm Loss: Female Step Load Compressor 2A	Cprsr	Normal	Latch		Remote
5DC	Comm Loss: Female Step Load Compressor 2B	Cprsr	Normal	Latch		Remote

Controls Interface

Hex Code	Diagnostic Name	Effects	Severity	Persistence	Criteria	Reset Level
5DD	Comm Loss: External Auto/Stop	Chiller	Normal	Latch		Remote
5DE	Comm Loss: Emergency Stop	Chiller	Normal	Latch		Remote
5DF	Comm Loss: External Circuit Lockout, Circuit #1	Circuit	Special Mode	Latch	MP will nonvolatility hold the lockout state (enabled or disabled) that was in effect at the time of comm loss.	Info
5E0	Comm Loss: External Circuit Lockout, Circuit #2	Circuit	Special Mode	Latch	MP will nonvolatility hold the lockout state (enabled or disabled) that was in effect at the time of comm loss	Info
5E1	Comm Loss: Ice-Machine Control	Ice Making Mode	Special Mode	Latch	Chiller shall revert to normal (non-ice building) mode regardless of last state.	Info
5E2	Comm Loss: Outdoor Air Temperature	Chiller	Normal	Latch		Remote
5E3	Comm Loss: Evaporator Leaving Water Temperature	Chiller	Normal	Latch		Remote
5E4	Comm Loss: Evaporator Entering Water Temperature	Chilled Water Reset	Special Mode	Latch	Chiller shall discontinue Chilled Water Reset by Return Water Temp, if it was in effect.	Info
5E5	Comm Loss: Oil Temperature, Circuit #1 or Comp 1A	Cprsr	Normal	Latch		Remote
5E6	Comm Loss: Oil Temperature, Circuit #2 or Comp 2A	Cprsr	Normal	Latch		Remote
5E7	Comm Loss: Sub-Cooling Liquid Temperature, Circuit #1	Circuit	Special Mode	NonLatch		Info
5E8	Comm Loss: Sub-Cooling Liquid Temperature, Circuit #2	Circuit	Special Mode	NonLatch		Info
5E9	Comm Loss: External Chilled Water Setpoint	External Chilled Water setpoint	Special Mode	NonLatch	Chiller shall discontinue use of the External Chilled Water Setpoint source and revert to the next higher priority for setpoint arbitration	Info
5EA	Comm Loss: External Current Limit Setpoint	External Current Limit setpoint	Special Mode	NonLatch	Chiller shall discontinue use of the External Current limit setpoint and revert to the next higher priority for Current Limit setpoint arbitration	Info
5EB	Comm Loss: High Pressure Cutout Switch, Comp 1A	Circuit	Immediate	Latch		Remote
5EC	Comm Loss: High Pressure Cutout Switch, Comp 1B	Circuit	Immediate	Latch		Remote
5ED	Comm Loss: High Pressure Cutout Switch, Comp 2A	Circuit	Immediate	Latch		Remote
5EE	Comm Loss: High Pressure Cutout Switch, Comp 2B	Circuit	Immediate	Latch		Remote
5EF	Comm Loss: Chilled Water Flow Switch	Chiller	Normal	Latch		Remote

Hex Code	Diagnostic Name	Effects	Severity	Persistence	Criteria	Reset Level
5F0	Comm Loss: Evaporator Rfgt Pressure, Circuit #1	Circuit	Normal	Latch		Remote
5F1	Comm Loss: Evaporator Rfgt Pressure, Circuit #2	Circuit	Normal	Latch		Remote
5F2	Comm Loss: Cond Rfgt Pressure, Circuit #1	Circuit	Normal	Latch		Remote
5F3	Comm Loss: Cond Rfgt Pressure, Circuit #2	Circuit	Normal	Latch		Remote
5F4	Comm Loss: Intermediate Oil Pressure, Comp 1A	Cprsr	Immediate	Latch		Remote
5F5	Comm Loss: Intermediate Oil Pressure, Comp 1B	Cprsr	Immediate	Latch		Remote
5F6	Comm Loss: Intermediate Oil Pressure, Comp 2A	Cprsr	Immediate	Latch		Remote
5F7	Comm Loss: Intermediate Oil Pressure, Comp 2B	Cprsr	Immediate	Latch		Remote
5F8	Comm Loss: Evaporator Water Pump Control	None	Info	Latch		Remote
5F9	Comm Loss: Condenser Water Pump Control	None	Info	Latch		
5FA	Comm Loss: Ice-Making Status	Ice-Machine	Special Mode	Latch	Chiller shall revert to normal (non-ice building) mode regardless of last state.	Info
5FB	Comm Loss: Suction Pressure Comp 1A	Cprsr	Immediate	Latch		Remote
5FC	Comm Loss: Suction Pressure Comp 1B	Cprsr	Immediate	Latch		Remote
5FD	Comm Loss: Suction Pressure Comp 2A	Cprsr	Immediate	Latch		Remote
5FE	Comm Loss: Suction Pressure Comp 2B	Cprsr	Immediate	Latch		Remote
680	Comm Loss: Fan Control Circuit #1, Stage #1	Circuit	Normal	Latch		Remote
681	Comm Loss: Fan Control Circuit #1, Stage #2	Circuit	Normal	Latch		Remote
682	Comm Loss: Fan Control Circuit #1, Stage #3	Circuit	Normal	Latch		Remote
683	Comm Loss: Fan Control Circuit #1, Stage #4	Circuit	Normal	Latch		Remote
684	Comm Loss: Fan Control Circuit #2, Stage #1	Circuit	Normal	Latch		Remote
685	Comm Loss: Fan Control Circuit #2, Stage #2	Circuit	Normal	Latch		Remote
686	Comm Loss: Fan Control Circuit #2, Stage #3	Circuit	Normal	Latch		Remote

Controls Interface

Hex Code	Diagnostic Name	Effects	Severity	Persistence	Criteria	Reset Level
687	Comm Loss: Fan Control Circuit #2, Stage #4	Circuit	Normal	Latch		Remote
688	Comm Loss: Evaporator Rfgt Liquid Level, Circuit #1	Circuit	Normal	Latch		Remote
689	Comm Loss: Evaporator Rfgt Liquid Level, Circuit #2	Circuit	Normal	Latch		Remote
68A	Comm Loss: Fan Inverter Power, Circuit #1 or Circuit #1 Drive 1 and 2	Circuit	Normal	Latch		Remote
68B	Comm Loss: Fan Inverter Speed Command, Circuit #1 or Circuit #1 Drive 1 and 2	Inverter	Special Mode	Latch	Operate the remaining fans as fixed speed fan deck.	Remote
68C	Comm Loss: Fan Inverter Fault, Circuit #1 or Circuit #1, Drive 1	Inverter	Special Mode	Latch	Operate the remaining fans as fixed speed fan deck.	Remote
68D	Comm Loss: Fan Inverter Fault, Circuit #1, Drive 2	Inverter	Special Mode	Latch	Operate the remaining fans as fixed speed fan deck.	Remote
68E	Comm Loss: Evap Oil Return Valve, Circuit #1	Circuit	Normal	Latch		Remote
68F	Comm Loss: Evap Oil Return Valve, Circuit #2	Circuit	Normal	Latch		Remote
690	Comm Loss: Starter 1A	Cprsr	Immediate	Latch		Local
691	Comm Loss: Starter 1B	Cprsr	Immediate	Latch		Local
692	Comm Loss: Starter 2A	Cprsr	Immediate	Latch		Local
693	Comm Loss: Starter 2B	Cprsr	Immediate	Latch		Local
694	Comm Loss: Electronic Expansion Valve, Circuit #1	Circuit	Normal	Latch		Remote
695	Comm Loss: Electronic Expansion Valve, Circuit #2	Circuit	Normal	Latch		Remote
696	Comm Loss: Oil Temperature, Comp 1B	Cprsr	Normal	Latch		Remote
697	Comm Loss: Oil Temperature, Comp 2B	Cprsr	Normal	Latch		Remote
698	Comm Loss: Fan Inverter Power, Circuit #2 or Circuit #2 Drive 1 and 2	Circuit	Normal	Latch		Remote
699	Comm Loss: Fan Inverter Speed Command, Circuit #2 or Circuit #2 Drive 1 and 2	Inverter	Special Mode	Latch	Operate the remaining fans as fixed speed fan deck.	Remote
69A	Comm Loss: Fan Inverter Fault, Circuit #2 or Circuit #2, Drive 1	Inverter	Special Mode	Latch	Operate the remaining fans as fixed speed fan deck.	Remote
69B	Comm Loss: Fan Inverter Fault, Circuit #2, Drive 2	Inverter	Special Mode	Latch	Operate the remaining fans as fixed speed fan deck.	Remote
5CD	Starter 1A Comm Loss: MP	Cprsr	Immediate	Latch	Starter has had a loss of communication with the MP for a 15 second period.	Local

Controls Interface

Hex Code	Diagnostic Name	Effects	Severity	Persistence	Criteria	Reset Level
5CE	Starter 1B Comm Loss: MP	Cprsr	Immediate	Latch	Starter has had a loss of communication with the MP for a 15 second period.	Local
5CF	Starter 2A Comm Loss: MP	Cprsr	Immediate	Latch	Starter has had a loss of communication with the MP for a 15 second period.	Local
5D0	Starter 2B Comm Loss: MP	Cprsr	Immediate	Latch	Starter has had a loss of communication with the MP for a 15 second period.	Local
69D	Comm Loss: Local BAS Interface	None	Special Mode	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
6A0	Comm Loss: Status/ Annunciation Relays	None	Info	Latch	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote

Pre-Start Checkout

Installation Checklist

Complete this checklist as the unit is installed and verify that all recommended procedures are accomplished before the unit is started. This checklist does not replace the detailed Instructions given in the “Installation -Mechanical” and “Installation -Electrical” sections of this manual. Read both sections completely, to become familiar with the installation procedures, prior to beginning the work.

Receiving

[ ] Verify that the unit nameplate data corresponds to the ordering information.

[ ] Inspect the unit for shipping damage and any shortages of materials. Report any damage or shortage to the carrier.

Unit Location and Mounting

[ ] Inspect the location desired for installation and verify adequate service access clearances.

[ ] Provide drainage for evaporator water.

[ ] Remove and discard all shipping materials (cartons, etc.)

[ ] Install optional rubber isolators, if required.

[ ] Level the unit and secure it to the mounting surface.

Unit Piping

[ ] Flush all unit water piping before making final connections to the unit.

CAUTION: If using an acidic commercial flushing solution, construct a temporary bypass around the unit to prevent damage to internal components of the evaporator.

To avoid possible equipment damage, do not use untreated or improperly treated system water.

[ ] Connect the chilled water piping to the evaporator.

[ ] Install pressure gauges and shutoff valves on the chilled water inlet and outlet to the evaporator.

[ ] Install a water strainer in the entering chilled water line.

[ ] Install a balancing valve and flow switch (recommended) in the leaving chilled water line.

[ ] Install a drain with shutoff valve or a drain plug on the evaporator waterbox.

[ ] Vent the chilled water system at high points in the system piping.

Pre-start Checkout

[ ] Apply heat tape and insulation, as necessary, to protect all exposed piping from freeze-up.

Electrical Wiring

WARNING: To prevent injury or death, disconnect electrical power source before completing wiring connections to the unit.

CAUTION: To avoid corrosion and overheating at terminal connections, use copper conductors only.

[ ] Connect the unit power supply wiring with fused-disconnect to the terminal block or lugs (or unit-mounted disconnect) in the power section of the control panel.

[ ] Connect power supply wiring to the evaporator heater.

[ ] Connect power supply wiring to the chilled water pump.

[ ] Connect power supply wiring to any auxiliary heat tapes.

[ ] Connect the auxiliary contact of the chilled water pump (5K1) in series with the flow switch, if installed, and then connect to the proper terminals.

[ ] For the External Auto/Stop function, install wiring from remote contacts (5K14, 5K15) to the proper terminals on the circuit board.

[ ] Connect the power supply for the convenience outlet, if it is separate from the evaporator heater.

CAUTION: Information in Interconnecting Wiring: Chilled Water Pump Interlock and External Auto/Stop must be adhered to or equipment damage may occur.

[ ] If alarm and status relay outputs are used, install leads from the panel to the proper terminals on circuit board.

[ ] If the emergency stop function is used, install low voltage leads to terminals on circuit board.

[ ] Connect separate power for the External Emergency Stop option, if applicable.

[ ] If the ice making-option is used, install leads on 5K18 to the proper terminals on 1U7.

[ ] Connect separate power supply for ice making status circuit, if applicable

Pre-Start Checkout

General

When installation is complete, but prior to putting the unit into service, the following pre-start procedures must be reviewed and verified correct:

Disconnect all electric power including remote disconnects before servicing. Failure to disconnect power before servicing can cause severe personal injury or death.

1 Inspect all wiring connections in the compressor power circuits (disconnects, terminal block, contactors, compressor junction box terminals, etc.). to be sure they are clean and tight.

CAUTION: Verify all connections are made. Loose connections can cause overheating and undervoltage conditions at the compressor motor.

2 Open all refrigerant valves in the discharge, liquid, oil and oil return lines.

CAUTION: CAUTION: Do not operate the unit with the compressor, oil discharge, liquid line service valves and the manual shutoff on the refrigerant supply to the auxiliary coolers "CLOSED". Failure to have these “OPEN” may cause serious compressor damage.

3 Check the power supply voltage to the unit at the main power fused-disconnect switch. Voltage must be within the voltage utilization range and also stamped on the unit nameplate. Voltage imbalance must not exceed 3%.

4 Check the unit power phasing L1-L2-L3 in the starter to be sure that it has been installed in an “ABC” phase sequence.

CAUTION: Improper power phasing can result in equipment damage due to reverse rotation.

CAUTION: Do not use untreated or improperly treated water. Equipment damage may occur.

5 Fill the evaporator chilled water circuit. Vent the system while it is being filled. Open the vents on the top of the evaporator waterbox while filling and close when filling is completed.

Important: The use of improperly treated or untreated water in this equipment may result in scaling, erosion, corrosion, algae or slime. The services of a qualified water treatment specialist should be engaged to determine what treatment, if any, is advisable. The Trane Company warranty specifically excludes

Pre-start Checkout

liability of corrosion, erosion or deterioration of Trane equipment. Trane assumes no responsibilities for the results of the use of untreated or improperly treated water or saline or brackish water.

6 Close the fused-disconnect switch(es) that supplies power to the chilled water pump starter.

7 Start the chilled water pump to begin circulation of the water. Inspect all piping for leakage and make any necessary repairs.

8 With water circulating through the system, adjust water flow and check water pressure drop through the evaporator.

9 Adjust the chilled water flow switch for proper operation.

Warning: Use extreme caution when performing the following procedure with power applied. Failure to do so can result in personal injury or death.

10 Reapply power to complete procedures.

11 Prove all Interlock and Interconnecting Wiring Interlock and External as described in the Electrical Installation section.

12 Check and set, as required, all CH.530 menu items.

13 Stop the chilled water pump.

14 Energize compressor and oil separators 24 hours prior to unit start-up.

Unit Voltage Power Supply

Voltage to the unit must meet the criteria given in the Installation-Electrical Section. Measure each leg of the supply voltage at the unit's main power fused- disconnect. If the measured voltage on any leg is not within specified range, notify the supplier of the power and correct the situation before operating the unit.

CAUTION: Provide adequate voltage to the unit. Failure to do so can cause control components to malfunction and shorten the life of relay contact, compressor motors and contactors.

Unit Voltage Imbalance

Excessive voltage imbalance between the phases of three-phase system can cause motors to overheat and eventually fail. The maximum allowable imbalance 3 percent. Voltage imbalance is determined using the following calculations:

% Imbalance = [(Vx - V ave) x 100]/Vave

V ave = (V1 + V2 + V3)/3

Pre-Start Checkout

Vx = phase with the greatest difference from V ave (without regard to the sign)

For example, if the three measured voltages are 221, 230, and 227 volts, the average would be:

(221+230+227)/3 = 226

The percentage of the imbalance is then:

[100(221-226)]/226 = 2.2%

This exceeds the maximum allowable (2%) by 0.2 percent.

Unit Voltage Phasing

Warning: It is imperative that L1, L2, L3 in the starter be connected in the A-B-C phase sequence to prevent equipment damage due to reverse rotation.

It is important that proper rotation of the compressors be established before the unit is started. Proper motor rotation requires confirmation of the electrical phase sequence of the power supply. The motor is internally connected for clockwise rotation with the incoming power supply phased A, B, C.

Basically, voltages generated in each phase of a polyphase alternator or circuit are called phase voltages. In a three-phase circuit, three sine wave voltages are generated, differing in phase by 120 electrical degrees. The order in which the three voltages of a three-phase system succeed one another is called phase sequence or phase rotation. This is determined by the direction of rotation of the alternator. When rotation is clockwise, phase sequence is usually called "ABC," when counterclockwise, "CBA."

This direction may be reversed outside the alternator by interchanging any two of the line wires. It is this possible interchange of wiring that makes a phase sequence indicator necessary if the operator is to quickly determine the phase rotation of the motor.

Proper compressor motor electrical phasing can be quickly determined and corrected before starting the unit. Use a quality instrument, such as the Associated Research Model 45 Phase Sequence Indicator, and follow this procedure.

1. Press the STOP key on the CH.530.
2. Open the electrical disconnect or circuit protection switch that provides line power to the line power terminal block(s) in the starter panel (or to the unit-mounted disconnect).

Pre-start Checkout

3 Connect the phase sequence indicator leads to the line Power terminal block, as follows:

Phase Seq. Lead	Terminal
Black (Phase A)	L1
Red (Phase B)	L2
Yellow (Phase C)	L3

4 Turn power on by closing the unit supply power fused-disconnect switch.

5 Read the phase sequence on the indicator. The “ABC” LED on the face of the phase indicator will glow if phase is “ABC.”

WARNING: To prevent injury or death due to electrocution, take extreme care when performing service procedures with electrical power energized.

6 If the “CBA” indicator glows instead, open the unit main power disconnect and switch two line leads on the line power terminal block(s) (or the unit mounted disconnect). Reclose the main power disconnect and recheck the phasing.

CAUTION: Do not interchange any load leads that are from the unit contactors or the motor terminals. Doing so may damage the equipment.

7 Reopen the unit disconnect and disconnect the phase indicator.

Water System Flow Rates

Establish a balanced chilled water flow through the evaporator. The flow rates should fall between the minimum and maximum values given on the pressure drop curves. Chilled water flow rates below the minimum values will result in laminar flow, which reduces heat transfer and causes either loss of EXV control or repeated nuisance, low temperature, cutouts. Flow rates that are too high can cause tube erosion in the evaporator.

Water System Pressure Drop

Measure water pressure drop through the evaporator at the field-installed pressure taps on the system water piping. Use the same gauge for each measurement. Do not include valves, strainers fittings in the pressure drop readings.

Pressure drop readings should be approximately those shown in the Pressure Drop Charts in the Mechanical Installation section.

Pre-Start Checkout

Ch.530 Set-up

Use of TechView service tool is required to view and adjust most settings. Refer to the Controls Interface section for instruction on adjustment of the settings.

Pre-Start Checkout

Unit Start-up Procedures

Daily Unit Start-Up

The time line for sequence of operation is shown at the end of this section and depicts the nominal delays and sequences that a chiller would experience during a typical operational cycle. The time line begins with a power up of the main power to the chiller. The sequence assumes a 2 circuit, 2 compressor air-cooled RTAC chiller with no diagnostics or malfunctioning components. External events such as the operator placing the chiller in Auto or Stop, chilled water flow through the evaporator, and application of load to the chilled water loop causing loop water temperature increases are depicted and the chillers responses to those events are shown, with appropriate delays noted. The effects of diagnostics, and other external interlocks other than evaporator water flow proving, are not considered. The response of the EasyView Display is also depicted on the time line.

Note: Unless the CH.530 TechView and building automation system are controlling the chilled water pump, the manual unit start sequence is as follows. Operator actions are noted.

General

If the pre-start checkout, as discussed above, has been completed, the unit is ready to start.

1. Press the STOP key on the CH.530.
2. As necessary, adjust the setpoint values in the CH.530 menus using TechView.
3. Close the fused-disconnect switch for the chilled water pump. Energize the pump(s) to start water circulation.
4. Check the service valves on the discharge line, suction line, oil line and liquid line for each circuit. These valves must be open (backseated) before starting the compressors.

   CAUTION: To prevent compressor damage, do not operate the unit until all refrigerant and oil line service valves are opened.

5. Verify that the chilled water pump runs for at least one minute after the chiller is commanded to stop (for normal chilled water systems).
6. Press the AUTO key. If the chiller control calls for cooling and all safety interlocks are closed, the unit will start. The compressor(s) will load and unload in response to the leaving chilled water temperature.

Once the system has been operating for approximately 30 minutes and has become stabilized, complete the remaining start-up procedures, as follows:

1. Check the evaporator refrigerant pressure and the condenser refrigerant pressure under Refrigerant Report on the CH.530 TechView. The pressures are referenced to sea level (14.6960 psia).
2. Check the EXV sight glasses after sufficient time has elapsed to stabilize the chiller. The refrigerant flow past the sight glasses should be clear. Bubbles in the refrigerant indicate either low refrigerant charge or excessive pressure drop in the liquid line or a stuck open

Unit Start-up Procedures

expansion valve. A restriction in the line can sometimes be identified by a noticeable temperature differential between the two sides of the restriction. Frost will often form on the line at this point. Proper refrigerant charges are shown in the General Information Section.

Important! A clear sight glass alone does not mean that the system is properly charged. Also check system discharge superheat, subcooling, liquid level control and unit operating pressures.

3 Measure the system discharge superheat.

4 Measure the system subcooling.

5 A shortage of refrigerant is indicated if operating pressures are low and subcooling is also low. If the operating pressures, sight glass, superheat and subcooling readings indicate a refrigerant shortage, gas-charge refrigerant into each circuit, as required. With the unit running, add refrigerant vapor by connecting the charging line to the suction service valve and charging through the backseat port until operating conditions become normal.

CAUTION: If both suction and discharge pressures are low but sub-cooling is normal, a problem other than refrigerant shortage exists. Do not add refrigerant, as this may result in overcharging the circuit.

Use only refrigerants specified on the unit nameplate (HFC 134a) and Trane Oil 00048. Failure to do so may cause compressor damage and improper unit operation.

Seasonal Unit Start-Up Procedure

1 Close all valves and re-install the drain plugs in the evaporator.

2 Service the auxiliary equipment according to the start-up/maintenance instructions provided by the respective equipment manufacturers.

3 Close the vents in the evaporator chilled water circuits.

4 Open all the valves in the evaporator chilled water circuits.

5 Open all refrigerant valves to verify they are in the open condition.

6 If the evaporator was previously drained, vent and fill the evaporator and chilled water circuit. When all air is removed from the system (including each pass), install the vent plugs in the evaporator water boxes.

CAUTION: Ensure that the compressor and oil separator heaters have been operating for a minimum of 24 hours before starting. Failure to do so may result in equipment damage.

7 Check the adjustment and operation of each safety and operating control.

Unit Start-up Procedures

8 Close all disconnect switches.

9 Refer to the sequence for daily unit startup for the remainder of the seasonal startup.

System Restart After Extended Shutdown

Follow the procedures below to restart the unit after extended shutdown:

1 Verify that the liquid line service valves, oil line, compressor discharge service valves and suction service valves are open (backseated).

CAUTION: To prevent damage to the compressor, be sure that all refrigerant valves are open before starting the unit.

2 Check the oil separator oil level (see Maintenance Procedures section).

3 Fill the evaporator water circuit. Vent the system while it is being filled. Open the vent on the top of the evaporator and condenser while filling and close when filling is completed.

CAUTION: Do not used untreated or improperly treated water. Equipment damage may occur.

4 Close the fused-disconnect switches that provides power to the chilled water pump.

5 Start the evaporator water pump and, while water is circulating, inspect all piping for leakage. Make any necessary repairs before starting the unit.

6 While the water is circulating, adjust the water flows and check the water pressure drops through the evaporator. Refer to “Water System Flow Rates” and “Water System Pressure Drop”.

7 Adjust the flow switch on the evaporator piping for proper operation.

8 Stop the water pump. The unit is now ready for start-up as described in “Start-Up Procedures”.

Unit Start-up Procedures

Unit Shutdown Procedures

Temporary Shutdown And Restart

To shut the unit down for a short time, use the following procedure:

1 Press the STOP key on the CH.530. The compressors will continue to operate and, after unloading for 20 seconds, will stop when the compressor contactors de-energize.

2 Stop the water circulation by turning off the chilled water pump.

To restart the unit after a temporary shutdown, enable the chilled water pump and press the AUTO key. The unit will start normally, provided the following conditions exist:

- The CH.530 receives a call for cooling and the differential-to-start is above the setpoint.
- All system operating interlocks and safety circuits are satisfied.

Extended Shutdown Procedure

The following procedure is to be followed if the system is to be taken out of service for an extended period of time, e.g. seasonal shutdown:

1 Test the unit for refrigerant leaks and repair as necessary.

2 Open the electrical disconnect switches for the chilled water pump. Lock the switches in the "OPEN" position.

CAUTION: Lock the chilled water pump disconnects open, to prevent pump damage.

3 Close all chilled water supply valves. Drain the water from the evaporator.

4 Open the unit main electrical disconnect and unit-mounted disconnect (if installed) and lock on the "OPEN" position. If the optional control power transformer is not installed, open and lock the 115V disconnect.

CAUTION: Lock the disconnects in the "OPEN" position to prevent accidental start-up and damage to the system when it has been setup for extended shutdown.

5 At least every three months (quarterly), check the refrigerant pressure in the unit to verify that the refrigerant charge is intact.

Unit Shutdown Procedures

Periodic Maintenance

General

Perform all maintenance procedures and inspections at the recommended intervals. This will prolong the life of the chiller and minimize the possibility of costly failures.

Use an "Operator's Log", such as that shown at the end of the section, to record an operating history for the unit. The log serves as a valuable diagnostic tool for service personnel. By observing trends in operating conditions, an operator can anticipate and prevent problem situations before they occur. If the unit does not operate properly during maintenance inspections, refer to "Diagnostics and Troubleshooting".

After the unit has been operating for approximately 30 minutes and the system has stabilized, check the operating conditions and complete the procedures below:

Weekly Maintenance

While unit is running in stable conditions.

1 Check UCM pressure for Evaporator, Condenser and Intermediate Oil.

2 Observe Liquid Line Sight Glass on EXV.

3 If liquid line sight glass has bubbles measure the subcooling entering the EXV. The subcooling should never be less than 4 °F under any circumstances.

CAUTION: A clear sightglass alone does not mean that the system is properly charged. Also check rest of system operating conditions.

4 Inspect the entire system for unusual conditions and inspect the condenser coils for dirt and debris. If the coils are dirty, refer to coil cleaning.

Monthly Maintenance

1 Perform all weekly maintenance procedures.

2 Record the system subcooling.

3 Record the system superheat.

4 Make any repairs necessary.

Annual Maintenance

1 Perform all weekly and monthly procedures.

2 Check oil sump oil level while unit is off.

Note: Routine changing of the oil is not required. Use an oil analysis to determine the condition of the oil.

3 Have a qualified laboratory perform a compressor oil analysis to determine system moisture content and acid level. This analysis is a valuable diagnostic tool.

4 Contact a qualified service organization to leak test the chiller, to check operating and

Periodic Maintenance

safety controls, and to inspect electrical components for deficiencies.

5 Inspect all piping components for leakage and damage. Clean out any inline strainers.

6 Clean and repaint any areas that show signs of corrosion.

7 Clean the condenser coils.

Warning: Position all electrical disconnects in the "Open" position and lock them to prevent injury or death due to electrical shock.

8 Check and tighten all electrical connections as necessary.

RTAC Request For Serviceman

Job Name		Job Location	
Model #		Serial #	
Sales Order #	Ship Date	Job Elevation (ft. above sea level)	

RTAC Unit

	In place and piped. Do not insulate the unit or adjacent piping. The contractor is responsible for any foreign material left in the unit.

Piping

Chilled water piping connected to:

	RTAC unit
	Air handling units
	Pumps

Components installed:

	Flow balancing valves
	Gauges
	Thermometers
	Air vents

Wiring

	Compressor motor starter furnished by or approved by the Trane Company, Pueblo, CO
	Chilled water pump motor connected
	Power available for vacuum pump (115 VAC)
	All controls installed and connected
	External interlocks (flow switches, water pump Auxiliaries, etc)
	All magnetic starters installed and connected.

Testing

	Dry nitrogen available for pressure testing
	R-134a available for leak testing

Refrigerant

	Refrigerant on jobsite.

Owner Awareness of safe refrigerant handling procedures

Yes	No	Has owner been fully instructed on the proper use of the refrigerant used in the RTAC unit?
Yes	No	Was the owner given a copy of the MSDS sheet for the refrigerant used in the chiller?
Yes	No	Was the owner given a copy of Trane publication "CFC-GUIDE-2, Refrigerant Handling Guidelines"?

National Board Numbers

Evaporator	
Liquid Vapor Separator	
Oil Separator	

Start-up Instructions

Completed By

Name Date

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

RTAC Installation Checklist

Job Name		Job Location
Model #		Serial #
Sales Order #	Ship Date	Job Elevation (ft. above sea level)

Receiving

	Verify unit nameplate corresponds to ordering information.
	Inspect the unit for shipping damage and any shortage of materials. Report any damage to the carrier.

Unit Location and Mounting

	Inspect the location desired for installation and verify adequate service access clearances.
	Provide drainage for the evaporator water.
	Remove and discard all shipping materials (cartons, etc.)
	Install optional neoprene isolators, if required. Refer to IOM for details.
	Level unit and secure it to the mounting surface.

Unit Piping

CAUTION: If using an acidic commercial flushing solution, construct a temporary bypass around the unit to prevent damage to the internal components of the evaporator. To avoid possible equipment damage, do not use untreated or improperly treated

	Flush all unit water piping before making final connections to unit.
	Connect water piping to the evaporator.
	Install pressure gauges and shutoff valves on the water inlet and outlet to the evaporator.
	Install water strainers in the entering chilled water lines.
	Install balancing valves (discretionary) and flow switches in the leaving water lines.
	Install drains with shutoff valves and plugs on the evaporator waterbox.
	Vent the chilled water systems at the high points of the system piping.

Electrical Wiring

WARNING: To prevent injury or death, disconnect power before completing wiring connections on the unit.

	Check for tight connections for the unit power supply wiring with the fused disconnect to the terminal block, unit mounted disconnect, or circuit breaker.
	Check for tight 115 volt control wiring connections to the chilled water pump.
	Check Interlock Wiring, chilled water pump control, chilled water flow interlock and external auto stop. For further details refer to the IOM or unit wiring schematics.
	If remote alarm contacts, limit warning contact, emergency stop, ice making, external chilled water setpoint or external current limit setpoint are used, refer to the IOM and the unit wiring for further details.
	Control power wiring isolated in control panel/starter panel enclosure.
	Is the chilled water pump controlled by the CH.530 of others (circle one)?

Pre-start Checkout

	Inspect all wiring connections. Connections should be clean and tight.
	Energize crank case and oil separator heaters 24 hours prior to start-up.
	Confirm all service and isolation valves are open.
	Confirm phase-sequencing "A-B-C"
	Fill the chilled water circuit. Glycol % glycol by weight
	Close fused disconnect switch to chilled water pump starter.
	Start water pumps, check for leaks and repair.
	With water running, adjust water flows, check pressure drops and adjust flow switches.
	Return pumps to automatic position.
	Disable machine start-up with external stop or emergency stop until start-up mechanic arrives.

RTAC Start-up Test Log

Job Name				Job Location	
Model #				Serial #	
Sales Order #		Ship Date		Job Elevation (ft. above sea level)	
Starter Data:				**Start-up Only**	
Manufacturer				Chiller Appearance on arrival:	
Type: (wye-delta or x-line)				Machine gauge pressure:	
Vendor ID #/ Model #:				Machine CH.530 pressure	
Volts	Amps	Hz		Unit R-134a Charge	lbs
Compressor Data:				Unit oil charge (OIL00048)	gal
Compressor A:				**Pressure Test (if required)**	
	Model #:			Vacuum after leak test=	mm
	Serial #			Standing Vacuum test= mm rise in	hrs
	RLA			**Current Transformers**	
	KW			Part number ("X" code and 2-digit extension)	
	Volts			X	
	HZ			X	
Compressor B:				X	
	Model #:			X	
	Serial #			X	
	RLA			X	
	KW			**Summary of Options Installed**	
	Volts			Y N	Tracer Communications Interface
	HZ			Y N	Ice Making
Compressor C:				Y N	Other
	Model #:			Y N	Other
	Serial #			Y N	Other
	RLA			**Evap Design Conditions**	
	KW			GPM	PSID
	Volts			Entering Water:	Leaving Water:
	HZ			% Glycol:	
Compressor D:				Type of Glycol:	
	Model #:				
	Serial #			**Evap Actual Conditions**	
	RLA			GPM	PSID
	KW			Entering Water:	Leaving Water:
	Volts			% Glycol:	
	HZ			Type of Glycol:	

Owner Witness Signature: _____

RTAC Unit Configuration

Job Name		Job Location
Model #		Serial #
Sales Order #	Ship Date	Job Elevation (ft. above sea level)

Setpoint View*

Front Panel Degree Units (circle one)	F or C
Design Delta Temperature	
Differential To Start	
Compressor Staging Deadband	
Front Panel Chilled Water Setpoint	
Chilled Water Setpoint Filtering Settling Time	sec
Leaving Water Temperature Cutout	
Low Rftg Temperature Cutout	
Low Ambient Lockout (circle one)	Enable or Disable
Low Ambient Lockout Setpoint	
Condenser Limit	
Current Limit	
Under/Over Voltage Protection	Enable or Disable
Local Atmospheric Pressure	psi
Reset Type (circle one)	None Return Reset Type Outdoor Air Temp. Constant Return
Return Reset Ratio	%
Return Start Reset	
Return Max Reset	
Outdoor Reset Ratio	%
Outdoor Start Reset	
Outdoor Max Reset	
Chilled Water Pump Delay Time	minutes

Compressor Setpoint View**

Unit Status	
Circuit 1 Control	
Front Panel Circuit Lockout (circle one)	Locked or Unlocked
Electronic Expansion Valve (circle one)	Open or Auto
Circuit 2 Control	
Front Panel Circuit Lockout (circle one)	Locked or Unlocked
Electronic Expansion Valve (circle one)	Open or Auto

Configuration***

Nameplate
Model #
Confirm Code
Serial Number

Note:

* *Using Techview, click on "View" and then click " Setpoint View". Log accordingly.*

** *Using Techview, click on "View" and then click "Compressor Setpoint View". Log accordingly.*

*** *Using Techview, click on "View" and then click " Configuration" then click on the "Nameplate" tab. Log accordingly.*

Maintenance Procedures

All the air-cooled Series R chillers are given a complete functional test at the factory covering sensors, wiring, electrical components, microprocessor function, communication capability, expansion valve performance and fans. Where applicable, each unit is factory preset to the customer's design conditions, including leaving water temperature setpoint, current limit, and reset temperature setpoint.

Refrigerant Emission Control

Evidence from environmental scientists indicates that the ozone in our upper atmosphere is being reduced, due to the release of CFC fully halogenated compounds.

The Trane Company encourages every effort to eliminate, if possible, or vigorously reduce the emission of CFC, HCFC and HFC refrigerants into the atmosphere that result from installation, operation, routine maintenance, or major services on this equipment. Always act in a responsible manner to conserve refrigerants for continued use, even when acceptable alternatives are available.

Conservation and emission reduction can be accomplished by following recommended Trane operation, maintenance and service procedures, with specific attention to the following:

1. Refrigerant used in any type of air conditioning or refrigerating equipment should be recovered for reuse, recovered and/or recycled for reuse, reprocessed (reclaimed), or properly destroyed, whenever it is removed from equipment. Never release refrigerant into the atmosphere.
2. Always determine possible recycle or reclaim requirements of the recovered refrigerant before beginning recovery by any method. Questions about recovered refrigerants and acceptable refrigerant quality standards are addressed in ARI Standard 700.
3. Use approved containment vessels and safety standards. Comply with all applicable transportation standards when shipping refrigerant containers.
4. To minimize emissions while recovering refrigerant, use recycling equipment. Always attempt to use methods which will pull the lowest possible vacuum while recovering and condensing refrigerant into containment.
5. When leak checking with trace refrigerant and nitrogen, use HCFC-134a (R134a), rather than CFC-12 (R-12) or any other fully halogenated refrigerants. Be aware of any new leak test methods which eliminate refrigerant as a trace gas.
6. When cleaning system components or parts, avoid using CFC-11 (R-11) or CFC-113 (R-113). Refrigeration system cleanup methods which use filters and dryers are preferred. Do not use solvents which have ozone depletion factors. Properly dispose of used materials.
7. Take extra care to properly maintain all service equipment that directly supports refrigeration service work, such as gauges, hoses, vacuum pumps and recycling equipment.
8. Stay aware of unit enhancements, conversion refrigerants, compatible parts and manufacturer's recommendations which will reduce refrigerant emissions and increase equipment operating efficiencies. Follow manufacturer's specific guidelines for conversion of existing systems.
9. In order to assist in reducing power generation emissions, always attempt to improve

Maintenance Procedures

equipment performance with improved maintenance and operations that will help conserve energy resources.

Refrigerant and Oil Charge Management

Proper oil and refrigerant charge is essential for proper unit operation, unit performance, and environmental protection. Only trained and licensed service personal should service the chiller.

Some symptoms of a refrigerant under charged unit:

- Low Subcooling
- Bubbles in EXV sight glass
- Low liquid level diagnostic
- Larger than normal evaporator approach temperatures (Leaving Water Temperature - Saturated Evaporator Temperature)
- Low Evaporator Refrigerant Temperature Limit
- Low Refrigerant Temperature Cutout diagnostic
- Fully open expansion valve
- Possible whistling sound coming from liquid line (due to high vapor velocity)
- Possible low discharge superheat at high loads
- High Condenser + Subcooler Pressure drop

Some symptoms of a refrigerant over charged unit:

- High Subcooling
- Evaporator Liquid Level higher than centerline after shut down
- Larger than normal condenser approach temperatures (Entering Condenser Saturated Temperature – Entering Air Temperature)
- Condenser Pressure Limit
- High Pressure Cutout diagnostic
- More than normal number of fans running
- Erratic Fan Control
- Higher than normal compressor power
- Very low discharge superheat at startup
- Compressor rattle or grinding sound at startup

Maintenance Procedures

Some symptoms of an oil over charged unit:

- Larger than normal evaporator approach temperatures (Leaving Water Temperature - Saturated Evaporator Temperature)
- Low Evaporator Refrigerant Temperature Limit
- Low Refrigerant Temperature Cutout diagnostic
- Evaporator Liquid Level higher than centerline after shut down
- Very erratic liquid level control
- Low unit capacity
- Low discharge superheat (especially at high loads)
- Compressor rattle or grinding sound
- High oil sump level after normal shut down

Some symptoms of an oil under charged unit:

- Compressor rattle or grinding sound
- Lower than normal pressure drop through oil system
- Seized or Welded Compressors
- Low oil sump level after normal shut down
- Lower than normal oil concentrations in evaporator

R134a Field Charging Procedure

Be certain that the electrical power to the unit is disconnected before performing this procedure.

Warning: Position all electrical disconnects in the "Open" position and lock them to prevent injury or death due to electrocution.

Factory (initial) Refrigerant Charging Procedure

The initial charging procedure should be followed the first time the unit is charged in the factory, as well as for charging any time after the charge has been completely removed in the event of repair.

1. As part of automatic vacuum/charge procedure, verify that the EXVs are OPEN.
2. Close liquid line isolation valve (to keep charge from backing into condenser).
3. Attach vacuum hoses to evaporator service valves (one per circuit). Open service valves.
4. Attach charging hoses to the charging port on the liquid line filter (one per circuit). The filters contain a port with a ¼" (6mm) flare.

Maintenance Procedures

5 Begin semi-automatic vacuum procedure.

6 When vacuum is complete (indicated), manually isolate the unit from vacuum.

7 Charge unit through the filter housing port per Table 19.

8 When charging is complete, shut evaporator service valve and disconnect vacuum and charging hoses.

Table 19
Refrigerant Charge/Circuit

Unit Size	*60Hz Std*	*60Hz High Efficiency*	*50Hz Std*	*50 Hz High Efficiency*
140	*145/145*	*155/155*	*145/145*	*155/155*
155	*155/145*	*220/210*	*155/145*	*220/210*
170	*155/155*	*220/220*	*155/155*	*220/220*
185	*220/210*	*230/220*	*220/210*	*230/220*
200	*220/220*	*230/230*	*220/220*	*230/230*
220	*230/220*	*240/240*		
240	*230/230*	*240/240*	*305/195*	*335/195*

**Charge is in lb/circuit*

Field Refrigerant Charging Procedure

Follow this procedure when the unit is empty of all refrigerant and under a vacuum. Add the charge through the evaporator service valve.

CAUTION: Water must be flowing through the evaporator during the entire charging process to avoid freezing and rupturing of the evaporator tubes.

1 Note the weight of the amount of charge removed. Compare it to Table 19. A difference in charge may indicate a leak.

2 Attach charging hose to evaporator service valve (3/8” (9mm) flare). Open service valve.

3 Add charge to evaporator to bring total circuit charge up to the level indicated in the above chart.

4 Close service valve and disconnect charging hose.

Adding charge:

This procedure should be followed when adding charge to an undercharged unit. When low charge is indicated by low subcooling in the liquid line, charge should be added until sufficient subcooling is achieved.

1 Attach charging hose to evaporator service valve (3/8” (9mm) flare). Open service valve.

Maintenance Procedures

2 Add 10 pounds of refrigerant (R-134a) charge.

3 Close valve, remove charging hose and start unit. Monitor subcooling.

4 If subcooling is still insufficient, return to step #2.

Note: Proper subcooling can be determined from run log history, service experience, or by contacting Trane technical service.
The service tool may include a calculation module that determines the proper subcooling for any operating condition (Trane Service Only).

Charge Isolation in the high or low side of system

All the refrigerant may be trapped into the high side (condenser) of the unit for maintenance on the compressor or low side. With the suction line service valve option, charge may also be isolated in the evaporator for maintenance on the compressor or the high side. It is much more preferable to isolate the charge in the evaporator, if this option is available.

High side charge isolation procedure:

1 Make sure circuit is off.

2 Shut liquid line service valve.

3 Shut oil return line service valve.

4 Start circuit with the service tool in charge isolation mode:

* All fans will turn on
* EXV will open 100%
* Oil return line solenoid will open
* Unit will start at minimum load
* Unit will run until it cuts out on low pressure (~6 psia) (0.41 bar)

5 When unit trips, the discharge check valve and oil line shut off valve close.

6 Close discharge isolation valve.

7 Close oil line shut off valve.

8 Remove the remainder of the charge with vacuum pump.

Recommendation: Do not pump remaining charge into high side. This may introduce non condensable gasses and other contaminants into the unit.

9 The low side and compressor may be serviced at this time.

Maintenance Procedures

Table 20
Charge Holding Capability on High Side

Nominal Circuit Capacity	Normal Circuit Charge *	Condenser Charge Holding Capacity @ 60% full 95 °F ambient.	Charge in Oil Separator	% Oil Separator Level
70	145	101.7	43.3	90.2%
85	155	116.3	38.7	81.7%
100	220	141.0	79.0	86.1%
120	230	162.8	67.2	74.6%
170	335	203.4	131.6	100.0%
200	385	282.0	103.0	66.7%
240	430	325.6	104.4	67.5%

*Circuit charge varies slightly with efficiency and unit configuration.

As can be seen in Table 20, when the charge is isolated on the high side, the oil separators will be flooded with refrigerant. This is because there is not enough room in the condenser to contain all the charge. For this reason, when getting the unit back to running condition, care must be taken to drive the refrigerant out of the oil separator using the oil separator heaters.

Returning unit to running condition:

1. Open all valves.
2. Manually open EXV for 15 minutes to allow refrigerant to drain to evaporator by gravity.
3. Let unit sit with heaters on to drive refrigerant out of oil and warm up compressor bearings. Depending upon ambient conditions, this may take up to 24 hours.
4. Once the oil level has returned to normal, the unit can be put back into operation.

Low side charge isolation procedure:

After normal shut down most of the charge resides in the evaporator. Running cold water through the evaporator may also drive much of the refrigerant to the evaporator.

1. Make sure circuit is off.
2. Close suction line isolation valve.
3. Close oil return line service valve.
4. Close liquid line service valve.
5. Manually open EXV.
6. Use a liquid pump or vacuum pump to move refrigerant from the condenser to evaporator. The liquid pump will only be effective if there is a lot of charge in the condenser. It may be connected to the condenser drain port on the liquid line isolation valve.

Note: if a pump is to be used, connect it before closing this valve. This port is only isolated when the valve is back seated.

Maintenance Procedures

If a vacuum pump is used, then connect it to the discharge line service valve near the oil separator.

A vacuum pump will be required for part of the procedure.

The evaporator is large enough to hold all the charge for any unit to below the centerline of the shell. Therefore, no special precautions are required to restart the unit after isolating the charge in the evaporator.

Filter replacement procedure

Refrigerant Filter Changing Procedure

A dirty filter is indicated by a temperature gradient across the filter, corresponding to a pressure drop. If the temperature downstream of the filter is 8°F (4.4°C) lower than the upstream temperature, the filter should be replaced. A temperature drop can also indicate that the unit is undercharged. Ensure proper subcooling before taking temperature readings.

1 With the unit off, verify that the EXV is closed. Close liquid line isolation valve. On units with remote evaporators or oil cooling circuits, close ball valve on oil cooler liquid line.

2 Attach vacuum hose to service port on liquid line filter flange.

3 Evacuate refrigerant from liquid line and store.

4 Remove vacuum hose.

5 Depress schrader valve to equalize pressure in liquid line with atmospheric pressure.

6 Remove bolts that retain filter flange.

7 Remove old filter element.

8 Inspect replacement filter element and lubricate o-ring with Trane OIL00048.

Note: do not use mineral oil. It will contaminate the system.

9 Install new filter element in filter housing.

10 Inspect flange gasket and replace if damaged.

11 Install flange and torque bolts to 14-16 lb-ft (19-22 n-m).

12 Attach vacuum hose and evacuate liquid line.

13 Remove vacuum hose from liquid line and attach charging hose.

14 Replace stored charge in liquid line.

15 Remove charging hose.

16 Open liquid line isolation valve. On units with remote evaporators or oil cooler circuits, open oil cooler liquid line ball valve.

Maintenance Procedures

Lubrication System

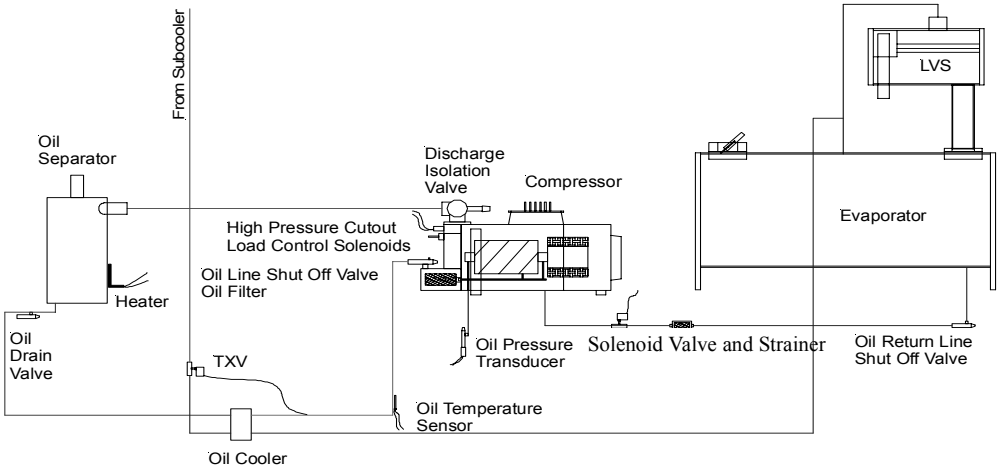
The lubrication system has been designed to keep most of the oil lines filled with oil as long as there is a proper oil level in the oil sump.

The total oil charge can be removed by draining the oil system, oil return line from the evaporator, the evaporator, and the compressor. Very small quantities of oil may be found in other components.

Oil Charging Procedure

Proper charging of the oil system is critical to the reliability of the compressor and chiller. Too little oil can cause the compressor to run hot and inefficient. When taken to an extreme, low oil level may result in infant failure of the compressor. Too much oil will result in high oil circulation rates which will foul the condenser and evaporator performance. This will result in inefficient operation of the chiller. Taken to an extreme, high oil levels may result in erratic expansion valve control or shut down of the chiller due to low evaporator refrigerant temperature. Too much oil may contribute to long term bearing wear. Additionally, excessive compressor wear is probable when the compressor is started with the oil lines dry.

Figure 29
Oil System Schematic



Oil system consists of the following components:

- Compressor
- Oil separator
- Discharge line with service valve

Maintenance Procedures

- Oil line from separator to compressor
- Oil line drain (lowest point in system)
- Oil cooler
- Oil temperature sensor
- Oil line shut off valve with flare service connection
- Oil filter (internal to compressor) with flare fitting service connection and schrader valve
- Oil flow control valve (internal to the compressor after the filter)
- Oil return line from evaporator with shut off valve, strainer and solenoid control valve

The standard oil charge for each circuit size is as follows:

Table 21
Oil Charging Data

Circuit (Tons)	*Oil Charge (lb)*	*Oil Charge (quarts)*	*Approximate sump oil level after running "normal" conditions.*	*Normal quantity of oil in refrigeration system (evaporator/condenser) (lb)*
70	*16*	*8.3*	*7*	*1.1*
85	*16*	*8.3*	*7*	*1.1*
100	*21*	*10.8*	*8*	*1.8*
120	*21*	*10.8*	*8*	*1.8*
170	*36*	*18.6*	*8*	*3.5*
200	*39*	*20.1*	*8*	*3.5*
240	*39*	*20.1*	*8*	*3.5*

Recommendation: check the oil level in the sump using a sight glass or a manometer, attached to charging hoses.

1. To **measure oil level**, use the oil drain valve on the oil line and a service valve on the discharge line. This measurement can only be made when the circuit is not running. Note: the bottom plate of the oil separator is approximately 1" (25mm) thick.
2. The initial oil charge should be approximately at the level in the above chart. This is the approximate oil level if all the oil is in the oil lines, filter and oil sump and the unit is in vacuum so that there is no refrigerant dissolved in the oil.
3. After the unit has run for a while, the oil level in the sump can vary greatly. However, if the unit has run "normal" conditions for a long time the level should resemble the level in the above chart. (+1" to – 4" (25 to -101mm) is acceptable.)

The field charging procedure depends on the circumstances that resulted in the need for oil charge.

1. Some service procedures may result in loss of small quantities of oil which must be replaced (oil analysis, compressor filter replacement, re-tubing the evaporator, etc.).
2. Additionally, some maintenance procedures may result in virtually all of the oil being

removed (compressor motor burn or total removal of the charge to trouble shoot a unit).

3 Finally, leaks may result in a loss of oil that must be replaced.

Factory (initial) Oil Charging Procedure

The initial charging procedure should be followed any time the unit is new or has had all of the oil removed.

1 Add 1 quart (2 lb.) oil to the motor cavity or suction line prior to installing the compressor into the chiller.

2 If the unit is not equipped with suction line isolation valves it should contain no charge. If it has isolation valves then the charge may be trapped in the evaporator. In either case, the high side of the system should not be pressurized.

3 The oil line shut off valve must be open to allow the oil to pass into the oil lines and the oil separator.

4 The oil charging port is a ¼" (6mm) flare fitting with a schrader valve that is on the side of the oil filter housing. This is the port that must be used to add oil into the compressor so that the filter and lines are full at the first start of the compressor.

5 On single compressor circuits all the oil should be put into the circuit through the oil charging port on the compressor filter housing. On two compressor circuits put approximately ½ of the oil into the unit through each of the two oil charging ports on the two compressors.

6 Oil may be put into the unit using either of two methods:

CAUTION: Use only Trane Oil 00048 in the RTAC units to avoid any catastrophic damage to the compressor or unit.

- Have the unit in vacuum. Note that the vacuum connection should be made on the unit at the service valve that is on the discharge line. Hook up the oil charging hose to oil charging fitting and submerse the other end into the oil container. Let the vacuum draw the required amount of oil into the unit.
- Have the unit at the same pressure as the oil. Hook up the oil charging hose to the oil charging fitting and the other end to an oil pump. Use the pump to draw oil out of the oil container and push the required amount of oil into the unit.

Note: the compressor filter has an internal shut off valve that will prevent oil from entering the compressor while the compressor is not running. Therefore, there is no concern about flooding the compressor with oil.

Field Oil Charging Procedure

Use the initial charging procedure under the following circumstances:

- When virtually all of the oil has been removed.
- If the oil charge is removed from the compressor and oil system only but the unit has been run for less than 15 minutes.

Maintenance Procedures

- If the oil charge is removed from the compressor and oil system only and the unit has been run for more than 15 minutes. However, reduce the amount of oil added to the unit by the normal quantity of oil in refrigeration system.

Note: this procedure can be followed even with the refrigerant charge isolated in the evaporating section of the unit.

If small quantities of oil were removed to service refrigeration components, such as the evaporator, simply replace the oil that was removed into the serviced component prior to vacuum and recharge of the refrigerant.

If oil was removed to service a compressor or change the filter follow this procedure:

1. If the compressor is a new compressor or has been removed from the system and reworked, add 1 quart (2 lb.) oil to the motor cavity prior to installing the compressor into the chiller.
2. Install the compressor in the system. Make sure that the filter shut off valve is closed. Other compressor isolation valves may also be closed depending upon the service that was completed. For example, changing the oil filter would require the compressor to be isolated and pulled into vacuum.

Note: Make sure that compressor is not pressurized.

3. Open the flare fitting on the oil line shut off valve.
4. Open the flare fitting on the filter housing. This is the port that must be used to put oil into the compressor.
5. Install charging hose on oil charging port (with schrader valve) and the other on the oil canister.
6. Lift the oil canister, or use a pump, to pour oil into the filter housing.
7. When oil comes out of the flare fitting on the oil line shut off valve the filter is full. Stop adding oil.
8. Put the cap on the flare on the oil line shut off valve, remove the charging hose and put the cap back on the flare on the filter housing.
9. Vacuum the compressor (low side) and prepare it for inclusion in the system. There is a service valve on the suction line and on the evaporator. Use these valves to vacuum the compressor.
10. Open the oil line shut off valve. Severe damage to the compressor can result if the oil line shut off valve is closed when the compressor is started.

WARNING: Catastrophic damage to the compressor will occur if the oil line shut off valve or the isolation valves are left closed on unit start-up.

11. Open the other compressor isolation valves.

Note: this procedure assumes that the oil that is put into the filter housing does not have contaminants such as non-condensable gases. The oil forces these gases out of the filter and oil line shut off valve without the need to pull a vacuum on this small

volume. If the oil has been in an open container or is otherwise contaminated, then this small volume must be subject to vacuum as well. However, the filter cavity is full of oil. Therefore, be sure to use a flash tank in line with the vacuum pump to make sure that oil, that is pulled out of the filter cavity, does not slug the vacuum pump.

Evaporator tube replacement

The units were designed to have adequate spacing between components to remove tubes from one or both ends of the evaporator.

CAUTION: The tubes are rolled at both ends and in the center. When replacing tubes, take care to ensure that the tube is removed and rolled into the center tube sheet properly. Failure to do so could result in damage to the tubes.

Evaporator Heat Tape and Immersion Heater Checkout Procedure

If Evaporator freeze protection fails due to open or short of the heater then there is no protection against freezing the water in the evaporator when the unit is not running.

CAUTION: If either the heat tapes wrapped around the evaporator barrel or the immersion heaters in the waterboxes fail, the evaporator will freeze causing catastrophic damage to the entire unit.

To check the heat tapes wrapped around the barrel follow the procedures below.

1 Locate the two bulges under the evaporator insulation near the bottom of the barrel. There are two heat tapes used on each barrel. Each bulge is a separate thermostat.

2 Carefully cut the insulation away from each thermostat.

CAUTION: Do not cut past the evaporator insulation. Electrical damage to the heat tape wires and thermostat will occur if cutting of the insulation is done improperly.

3 With the thermostat exposed, pack the thermostat with ice.

The resistance can be checked to determine if there is an open or a short. If a heater has failed, replace as follows:

1 Remove the insulation around the heater.

2 Remove the old heater.

3 The factory installed heaters have the wire run under the insulation of the evaporator. This can be copied by cutting a small strip of insulation out and replacing it with tape. Alternatively, the wire may be run through conduit back to the junction box.

Maintenance Procedures

4 Replace any insulation that was removed.

5 Wire the heaters into the system per the wiring diagram.

6 Recheck the resistance to verify that they are wired correctly.

Compressor Replacement

If a compressor needs to be replaced follow the procedures listed below.

1 Isolate the refrigerant charge outside of the compressor and close all four valves leading to the compressor. This includes the oil line service valve located on the oil filter cover of the compressor, the valve on the oil return line from the evaporator, the discharge service valve, and the suction service valve. In the event that the optional suction service valve was not ordered with the unit, insure that the liquid line service valve is closed.

2 Disconnect power to the chiller. Remove the electrical junction box cover and disconnect the wires.

3 Evacuate the compressor through the service fitting provided. If the unit does not have suction service valves, this will include evacuating the low side of the system as well. Disconnect all four lines attached to the compressor, as well as the junction box. Remove three screws from the bottom of the compressor.

4 Remove the compressor by sliding it out of the chiller onto a well supported skid or other platform. The compressor is very heavy, so insure that the support is sturdy. A piece of 1x4 lumber placed between the isolators works well to support the compressor feet as it is pulled from the chiller.

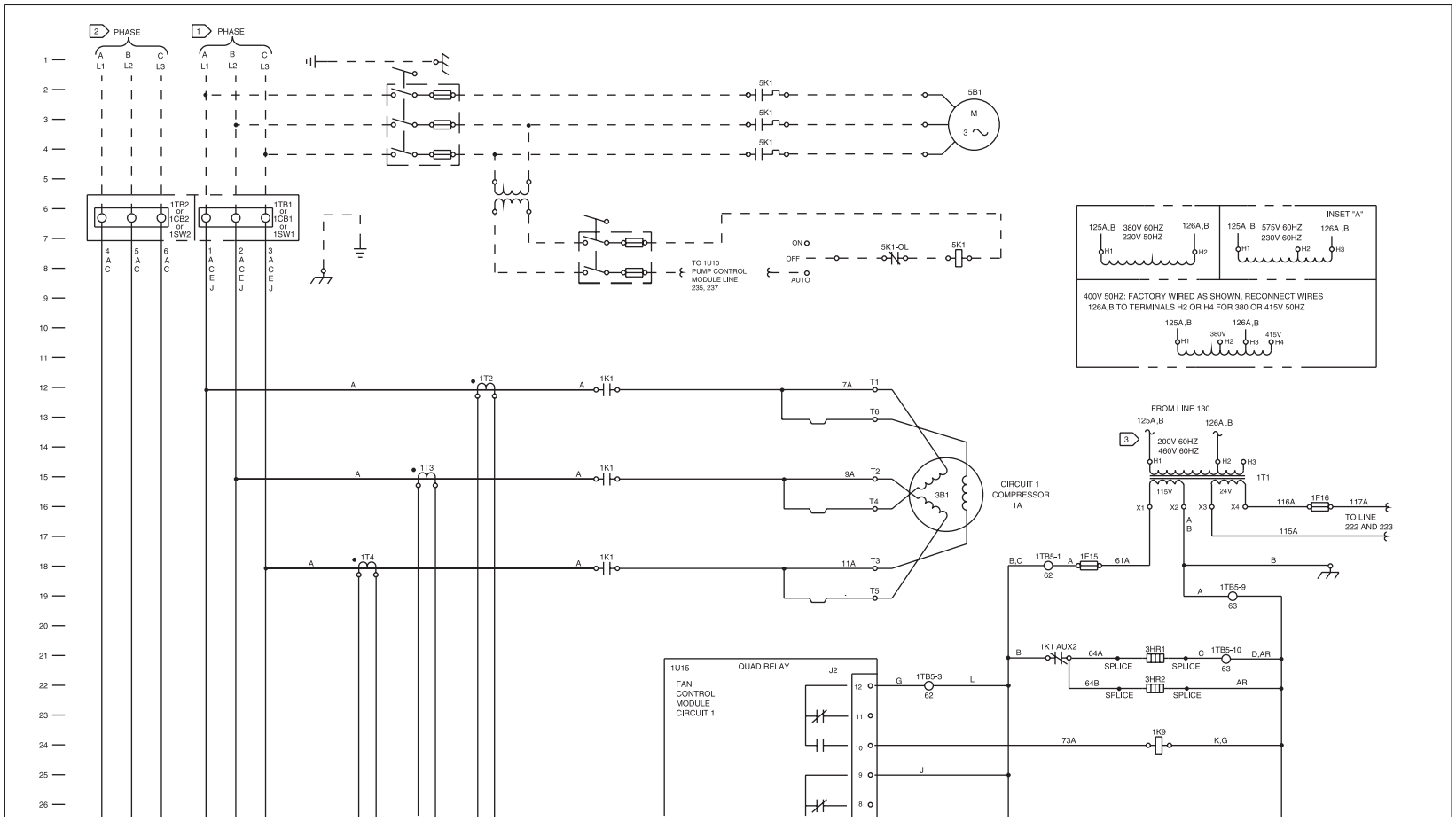
5 Install the new compressor. Reinstall all lines, wires, and screws. Open the service valves, and trim charge as required.

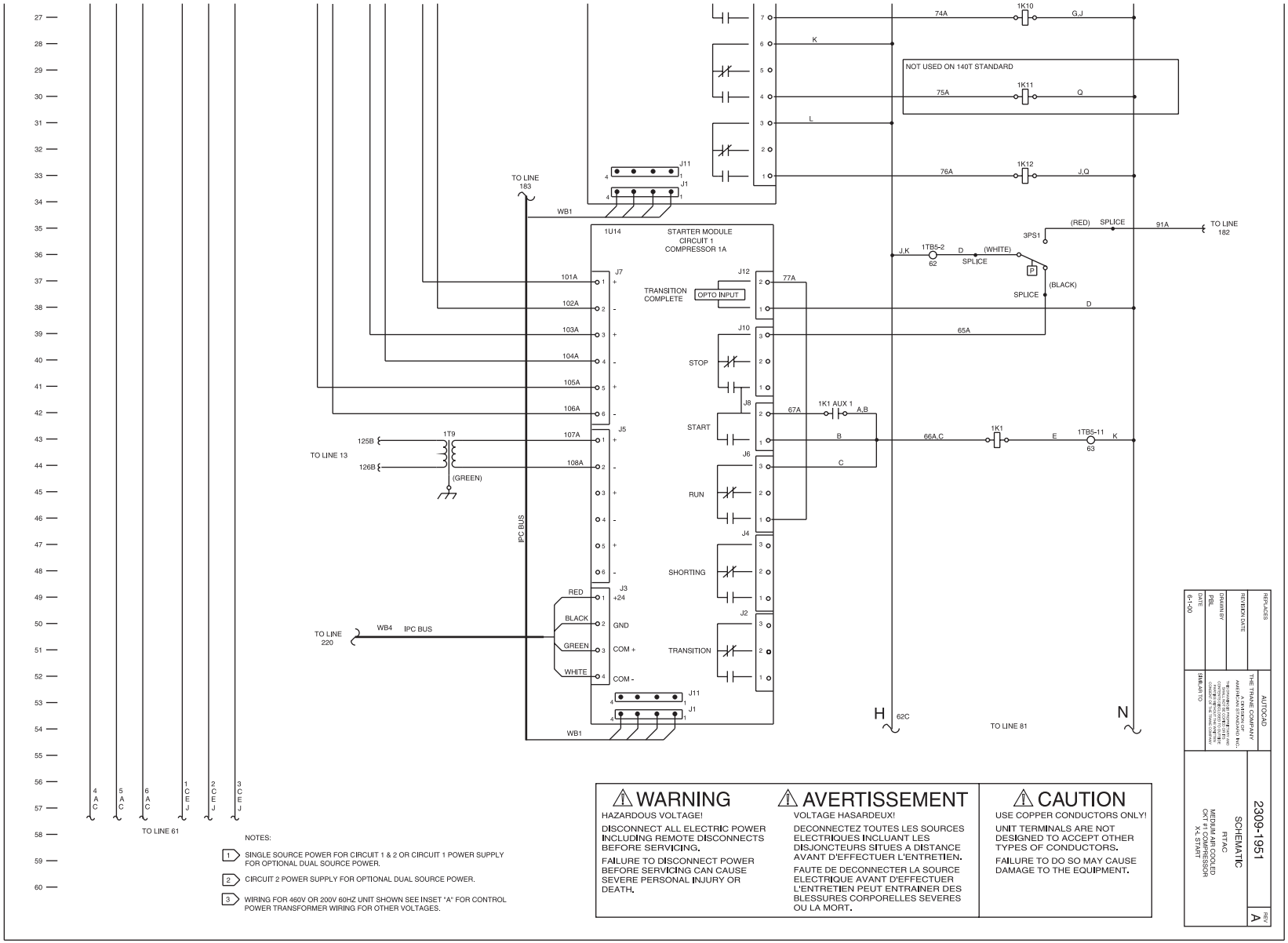
Maintenance Procedures

Wiring Schematics

Following is a set of sample wiring schematics for the RTAC Unit (Pueblo Built). For most accurate information refer to the actual unit submittals and wiring schematics included with the unit.

NOTE: Wiring diagrams for the European built RTAC - Please refer to the wiring diagrams provided by the Trane Sales Office or the diagrams attached to the inside of the control panel.


2 PHASE
1 PHASE
A L1
B L2
C L3
5K1
5B1
M
3
1TB2 or 1CB2 or 1SW2
1TB1 or 1CB1 or 1SW1
4 A C
5 A C
6 A C
1 A C E J
2 A C E J
3 A C E J
TO 1U10 PUMP CONTROL MODULE LINE 235, 237
ON
OFF
AUTO
5K1-OL
INSET "A"
125A,B 380V 60HZ 220V 50HZ
126A,B
125A,B 575V 60HZ 230V 60HZ
126A,B
H1
H2
H3
400V 50HZ: FACTORY WIRED AS SHOWN. RECONNECT WIRES 126A,B TO TERMINALS H2 OR H4 FOR 380 OR 415V 50HZ
380V
415V
H4
1T2
1T3
1T4
1K1
7A
9A
11A
T1
T2
T3
T4
T5
T6
3B1
CIRCUIT 1 COMPRESSOR 1A
FROM LINE 130
200V 60HZ 460V 60HZ
1T1
115V
24V
X1
X2
X3
X4
116A
1F16
117A
TO LINE 222 AND 223
115A
1TB5-1
62
1F15
61A
1TB5-9
63
1K1 AUX2
64A
3HR1
SPLICE
1TB5-10
D,AR
64B
3HR2
AR
1U15
QUAD RELAY
FAN CONTROL MODULE CIRCUIT 1
J2
1TB5-3
73A
1K9
K,G
J
G
L



NOTES:

1. SINGLE SOURCE POWER FOR CIRCUIT 1 & 2 OR CIRCUIT 1 POWER SUPPLY FOR OPTIONAL DUAL SOURCE POWER.
2. CIRCUIT 2 POWER SUPPLY FOR OPTIONAL DUAL SOURCE POWER.
3. WIRING FOR 460V OR 200V 60HZ UNIT SHOWN SEE INSET "A" FOR CONTROL POWER TRANSFORMER WIRING FOR OTHER VOLTAGES.

⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.

FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

⚠ AVERTISSEMENT

VOLTAGE HASARDEUX!

DECONNECTEZ TOUTES LES SOURCES ELECTRIQUES INCLUANT LES DISJONCTEURS SITUES A DISTANCE AVANT D'EFFECTUER L'ENTRETIEN.

FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.

⚠ CAUTION

USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

REPLACES

REVISION DATE

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DATE
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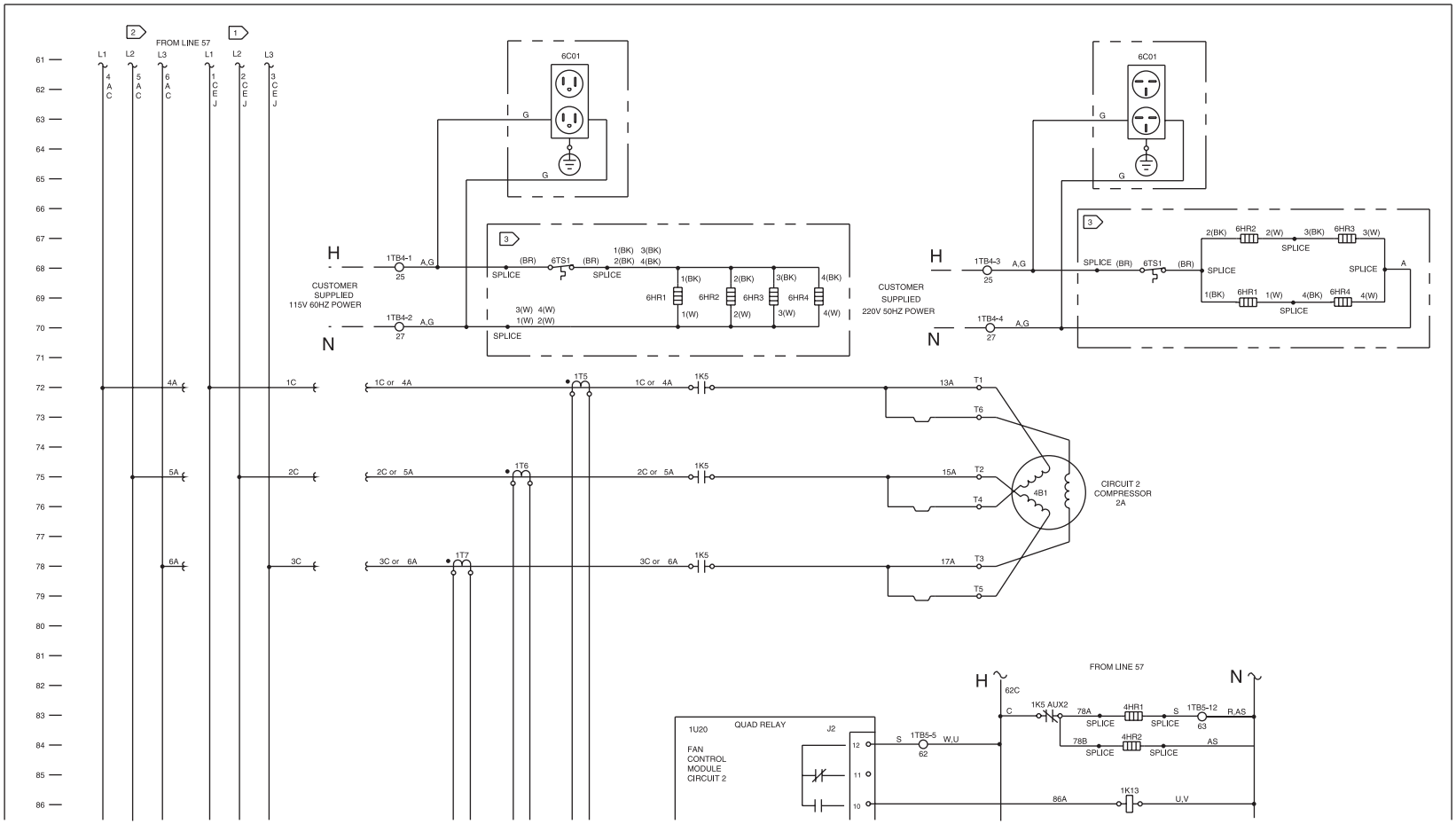
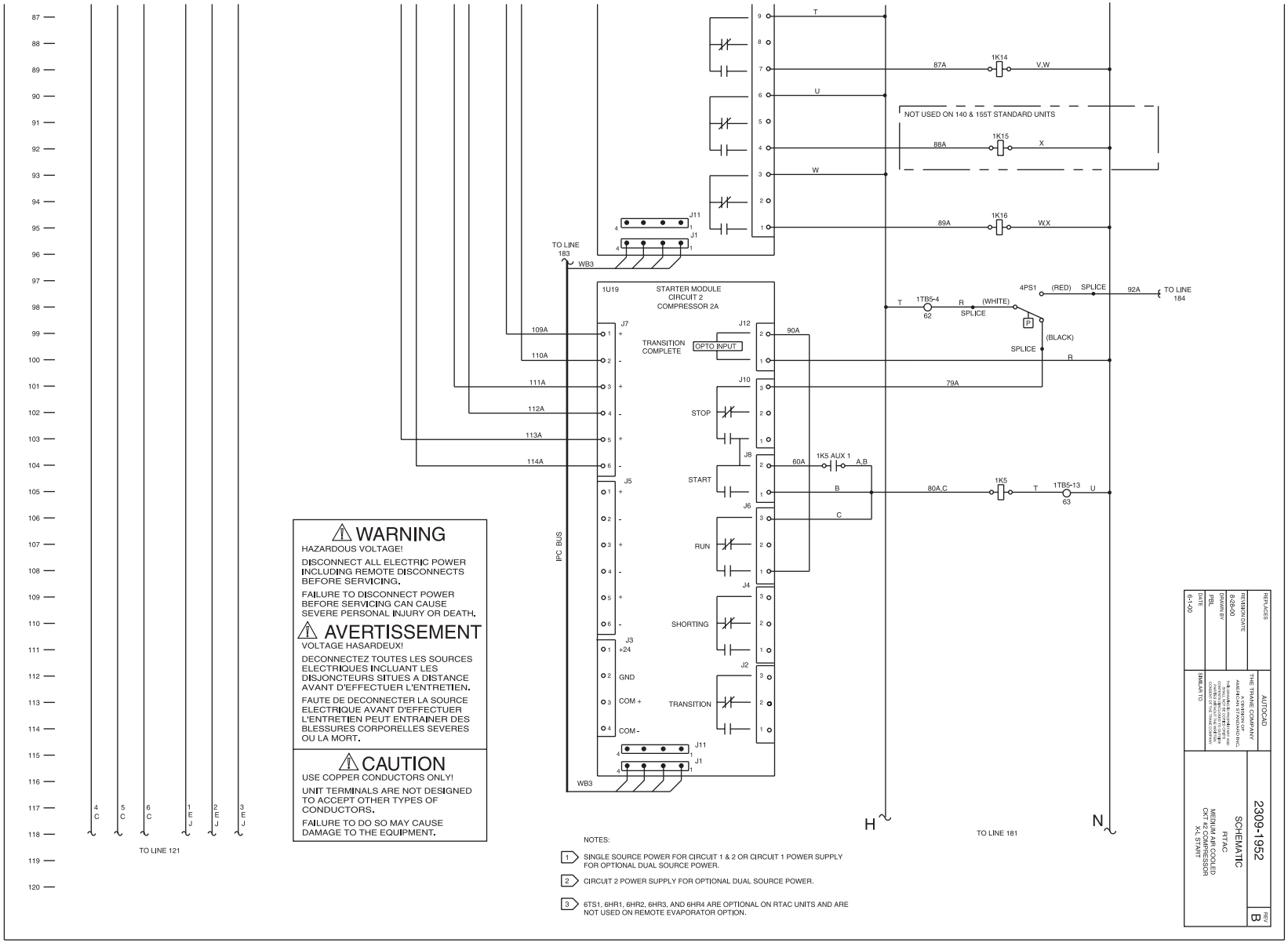
SCHEMATIC
RTAC
MEDIUM AIR COOLED
CKT 1 COMPRESSOR
Y-Δ START

2309-1951

REV
A


FROM LINE 57
L1
L2
L3
4 A C
5 A C
6 A C
1 C M J
2 C M J
3 C M J
6C01
G
H
N
CUSTOMER SUPPLIED 115V 60HZ POWER
1TB4-1
25
1TB4-2
27
A,G
SPLICE
(BR)
6TS1
1(BK) 3(BK)
2(BK) 4(BK)
6HR1
6HR2
6HR3
6HR4
1(BK)
2(BK)
3(BK)
4(BK)
1(W)
2(W)
3(W)
4(W)
CUSTOMER SUPPLIED 220V 50HZ POWER
1TB4-3
1TB4-4
4A
5A
6A
1C
2C
3C
1C or 4A
2C or 5A
3C or 6A
1T5
1T6
1T7
1K5
13A
15A
17A
T1
T2
T3
T4
T5
T6
4B1
CIRCUIT 2 COMPRESSOR 2A
1U20
QUAD RELAY
FAN CONTROL MODULE CIRCUIT 2
J2
1TB5-5
62
W,U
62C
1K5 AUX2
78A
78B
4HR1
4HR2
1TB5-12
63
R,AS
AS
86A
1K13
U,V



⚠ WARNING

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VOLTAGE HASARDEUX!

DECONNECTEZ TOUTES LES SOURCES ELECTRIQUES INCLUANT LES DISJONCTEURS SITUES A DISTANCE AVANT D'EFFECTUER L'ENTRETIEN.

FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.

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NOTES:

1. SINGLE SOURCE POWER FOR CIRCUIT 1 & 2 OR CIRCUIT 1 POWER SUPPLY FOR OPTIONAL DUAL SOURCE POWER.
2. CIRCUIT 2 POWER SUPPLY FOR OPTIONAL DUAL SOURCE POWER.
3. 6TS1, 6HR1, 6HR2, 6HR3, AND 6HR4 ARE OPTIONAL ON RTAC UNITS AND ARE NOT USED ON REMOTE EVAPORATOR OPTION.

REPLACES

REVISION DATE 8-28-00

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DATE 6-1-00

AUTOCAD

THE TRANE COMPANY

SIMILAR TO

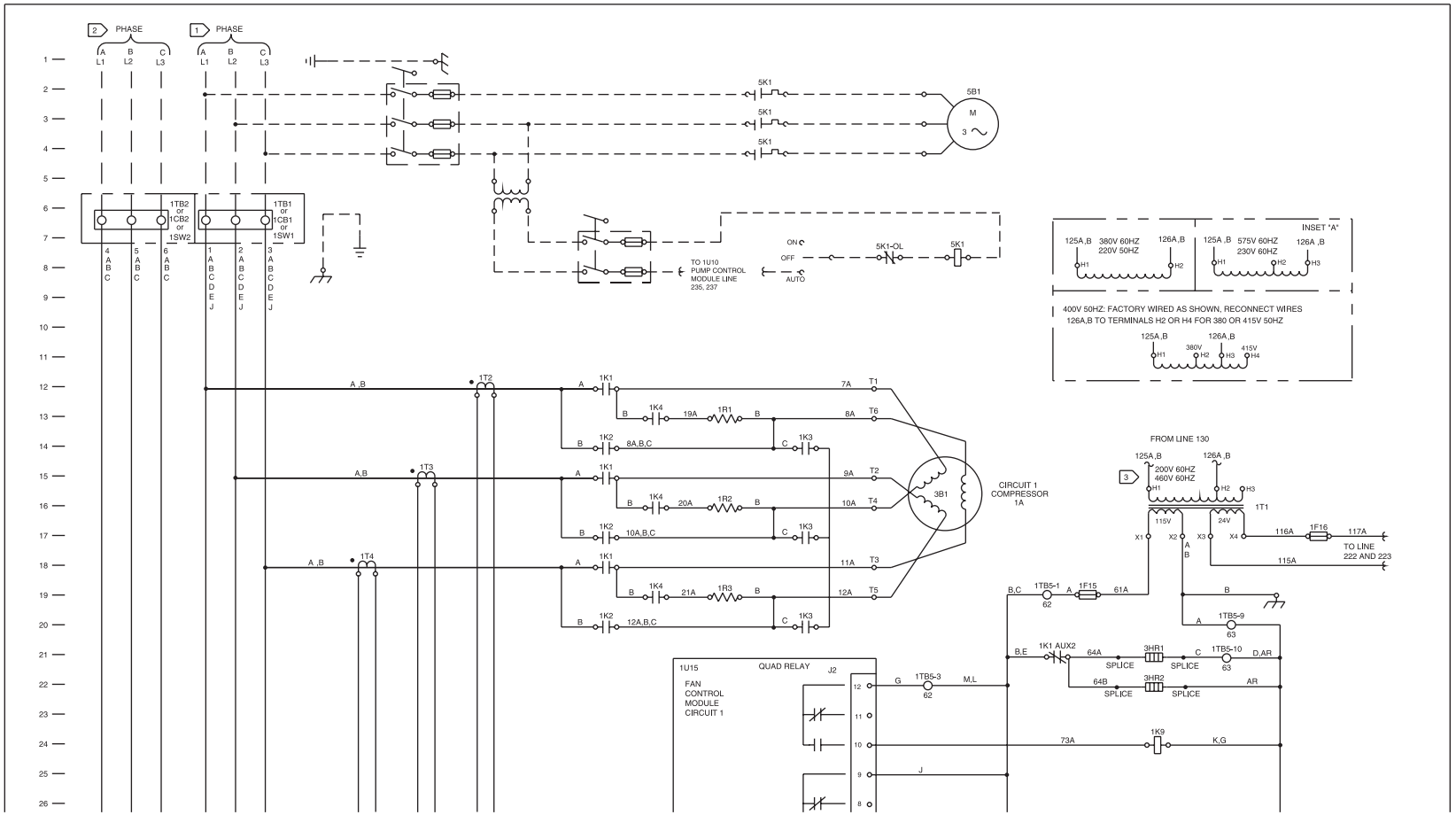
2309-1952

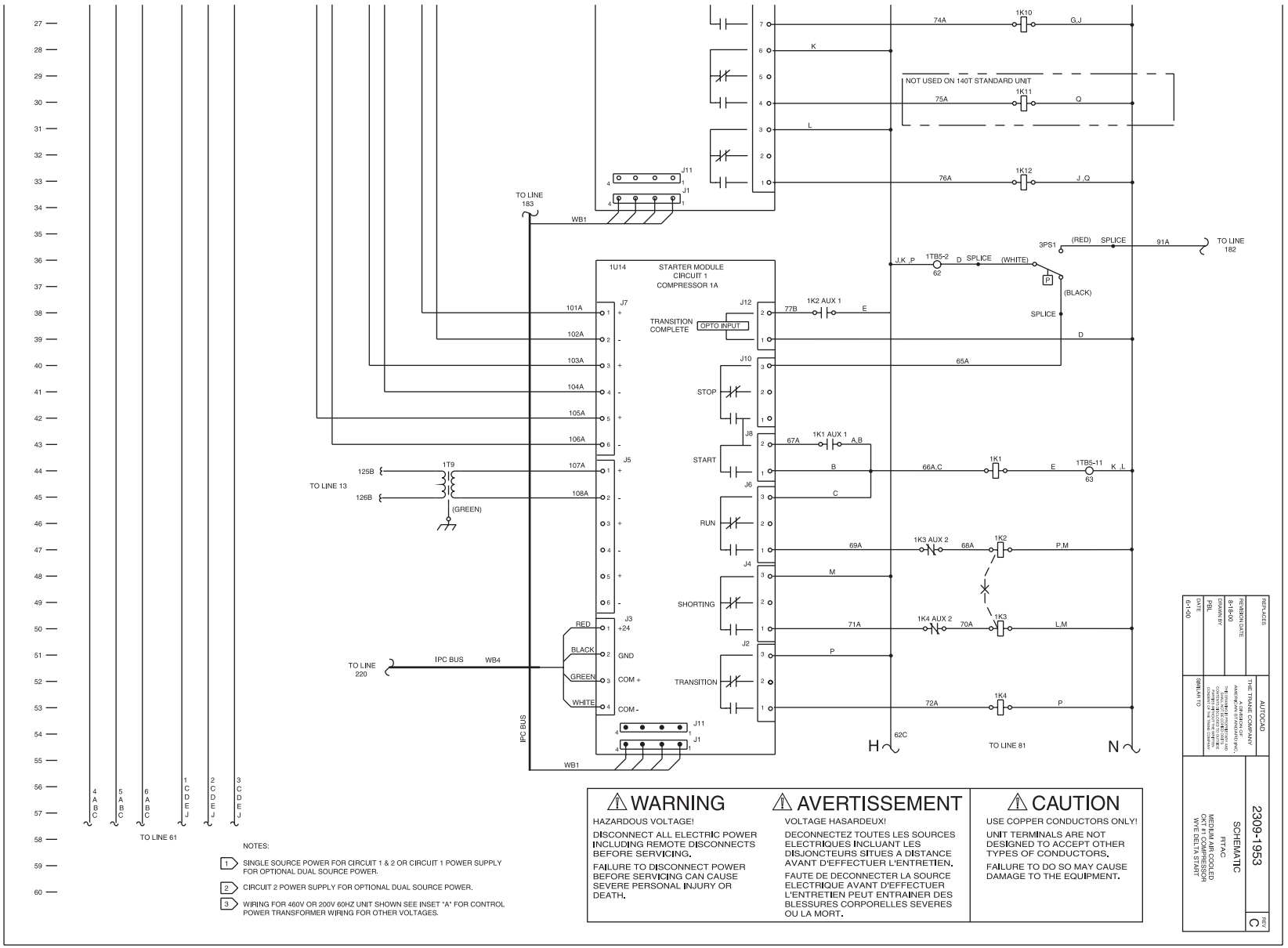
SCHEMATIC

RTAC

MEDIUM AIR COOLED CENTRIFUGAL COMPRESSOR W/L START

REV B


2 PHASE
1 PHASE
A L1
B L2
C L3
5K1
5B1
M
3
1TB2 or 1CB2 or 1SW2
1TB1 or 1CB1 or 1SW1
TO 1U10 PUMP CONTROL MODULE LINE 235, 237
ON
OFF
AUTO
5K1-OL
INSET "A"
125A,B 380V 60HZ 220V 50HZ 126A,B
125A ,B 575V 60HZ 230V 60HZ 126A ,B
400V 50HZ: FACTORY WIRED AS SHOWN, RECONNECT WIRES
126A,B TO TERMINALS H2 OR H4 FOR 380 OR 415V 50HZ
380V
415V
1T2
1T3
1T4
1K1
1K2
1K3
1K4
1R1
1R2
1R3
19A
20A
21A
8A,B,C
10A,B,C
12A,B,C
7A
8A
9A
10A
11A
12A
T1
T2
T3
T4
T5
T6
3B1
CIRCUIT 1 COMPRESSOR 1A
FROM LINE 130
200V 60HZ 460V 60HZ
1T1
115V
24V
116A
1F16
117A
TO LINE 222 AND 223
115A
1TB5-1
1F15
61A
62
1TB5-9
63
1K1 AUX2
64A
64B
3HR1
3HR2
SPLICE
1TB5-10
D,AR
AR
1U15
QUAD RELAY
FAN CONTROL MODULE CIRCUIT 1
J2
1TB5-3
M,L
73A
1K9
K,G
J



NOTES:

1. SINGLE SOURCE POWER FOR CIRCUIT 1 & 2 OR CIRCUIT 1 POWER SUPPLY FOR OPTIONAL DUAL SOURCE POWER.
2. CIRCUIT 2 POWER SUPPLY FOR OPTIONAL DUAL SOURCE POWER.
3. WIRING FOR 460V OR 200V 60HZ UNIT SHOWN SEE INSET "A" FOR CONTROL POWER TRANSFORMER WIRING FOR OTHER VOLTAGES.

⚠ WARNING

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⚠ AVERTISSEMENT

VOLTAGE HASARDEUX!

DECONNECTEZ TOUTES LES SOURCES ELECTRIQUES INCLUANT LES DISJONCTEURS SITUES A DISTANCE AVANT D'EFFECTUER L'ENTRETIEN.

FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.

⚠ CAUTION

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FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

REPLACES

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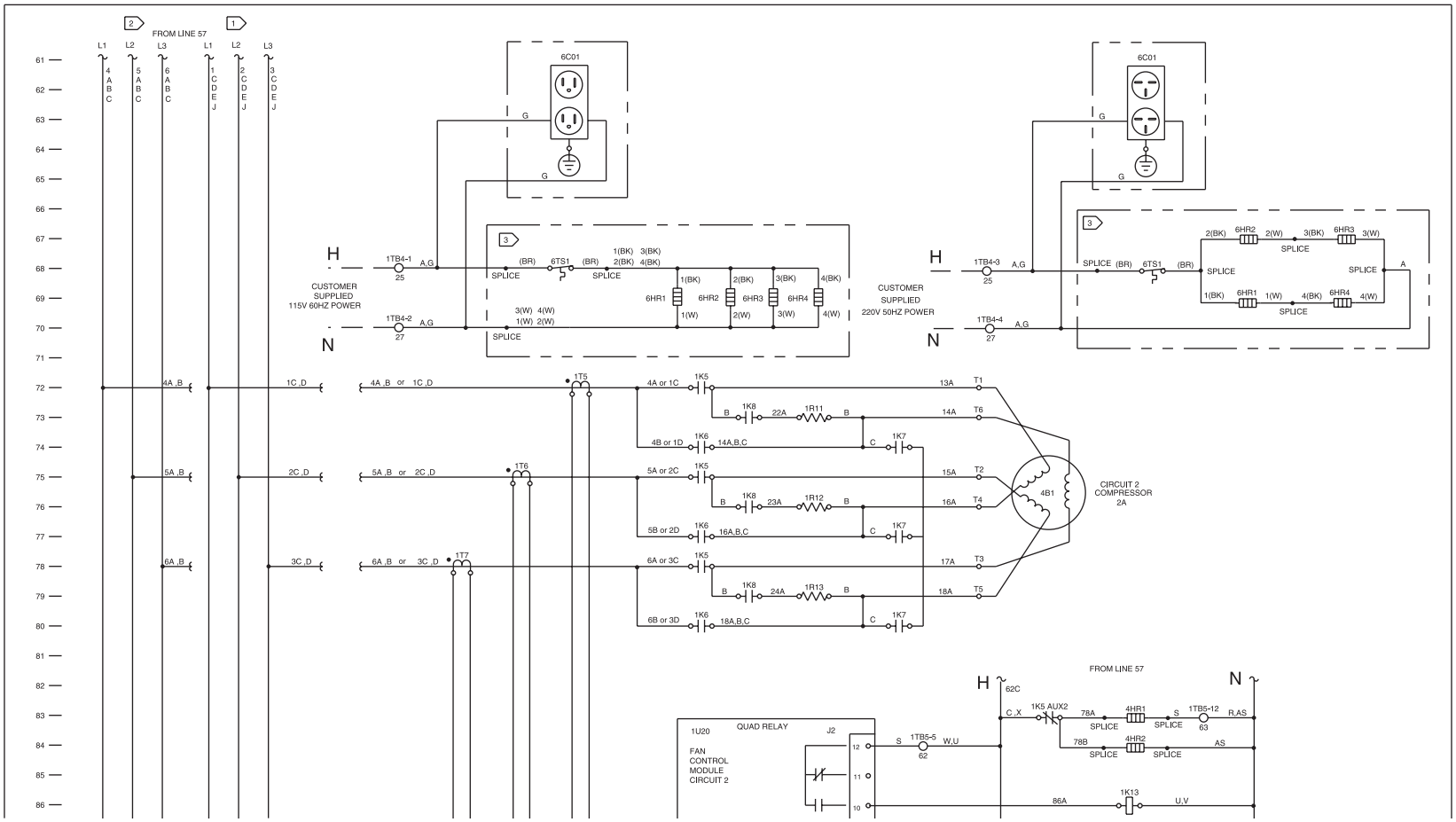
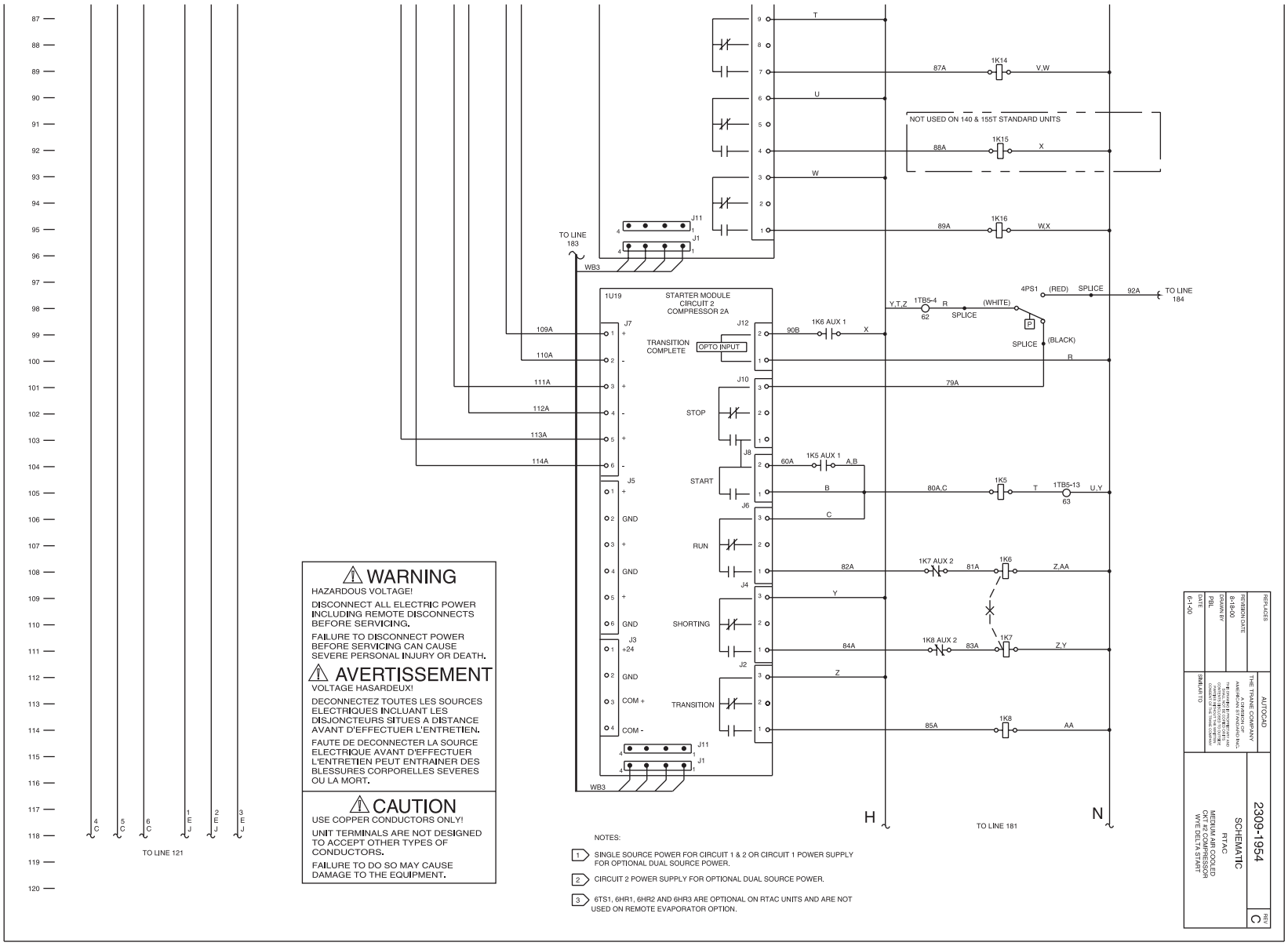
SIMILAR TO

SCHEMATIC
RTAC
MEDIUM AIR COOLED
CENTRIFUGAL CHILLER
WYE DELTA START

2309-1953

REV
C


FROM LINE 57
L1 L2 L3 L1 L2 L3
4 A B C
5 A B C
6 A B C
1 C D E J
2 C D E J
3 C D E J
6C01
G
H
N
CUSTOMER SUPPLIED 115V 60HZ POWER
1TB4-1 A,G 25
1TB4-2 A,G 27
SPLICE
(BR) 6TS1 (BR)
1(BK) 3(BK) 2(BK) 4(BK)
6HR1 6HR2 6HR3 6HR4
3(W) 4(W) 1(W) 2(W)
CUSTOMER SUPPLIED 220V 50HZ POWER
1TB4-3 A,G 25
1TB4-4 A,G 27
2(BK) 6HR2 2(W) 3(BK) 6HR3 3(W)
1(BK) 6HR1 1(W) 4(BK) 6HR4 4(W)
A
4A ,B
1C ,D
5A ,B
2C ,D
6A ,B
3C ,D
4A ,B or 1C ,D
5A ,B or 2C ,D
6A ,B or 3C ,D
1T5
1T6
1T7
4A or 1C
4B or 1D
5A or 2C
5B or 2D
6A or 3C
6B or 3D
1K5
1K6
1K8
1K7
22A
23A
24A
1R11
1R12
1R13
14A,B,C
16A,B,C
18A,B,C
13A
14A
15A
16A
17A
18A
T1
T6
T2
T4
T3
T5
4B1
CIRCUIT 2 COMPRESSOR 2A
FROM LINE 57
62C
C ,X
1K5 AUX2
78A
4HR1
S
1TB5-12
63
R,AS
78B
4HR2
AS
1U20
QUAD RELAY
J2
FAN CONTROL MODULE CIRCUIT 2
12
11
10
1TB5-5
62
W,U
86A
1K13
U,V



⚠ WARNING

HAZARDOUS VOLTAGE!

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FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.

⚠ CAUTION

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FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

NOTES:

1. SINGLE SOURCE POWER FOR CIRCUIT 1 & 2 OR CIRCUIT 1 POWER SUPPLY FOR OPTIONAL DUAL SOURCE POWER.
2. CIRCUIT 2 POWER SUPPLY FOR OPTIONAL DUAL SOURCE POWER.
3. 6TS1, 6HR1, 6HR2 AND 6HR3 ARE OPTIONAL ON RTAC UNITS AND ARE NOT USED ON REMOTE EVAPORATOR OPTION.

REPLACES

ISSUE DATE
8-18-00

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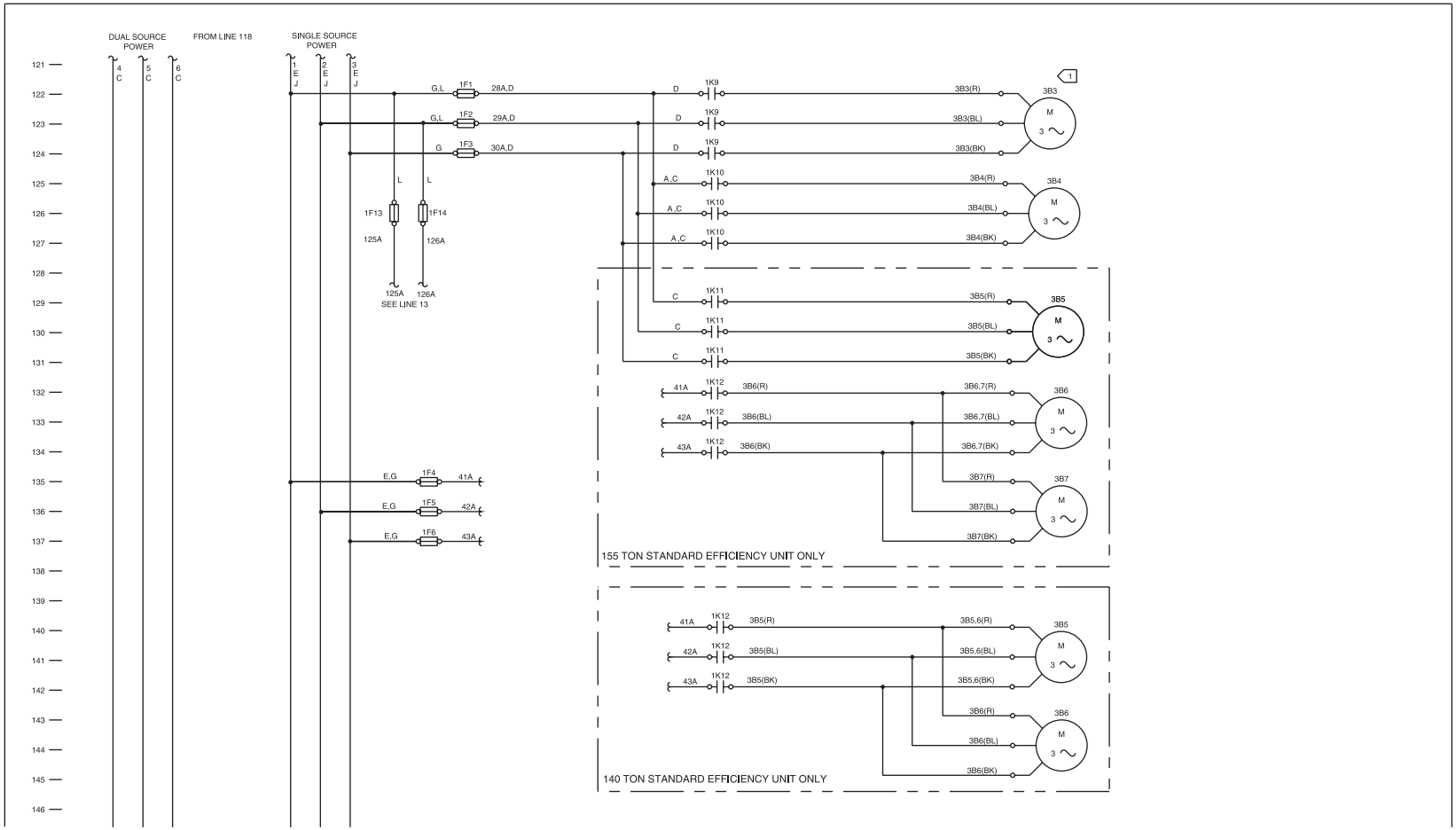
2309-1954

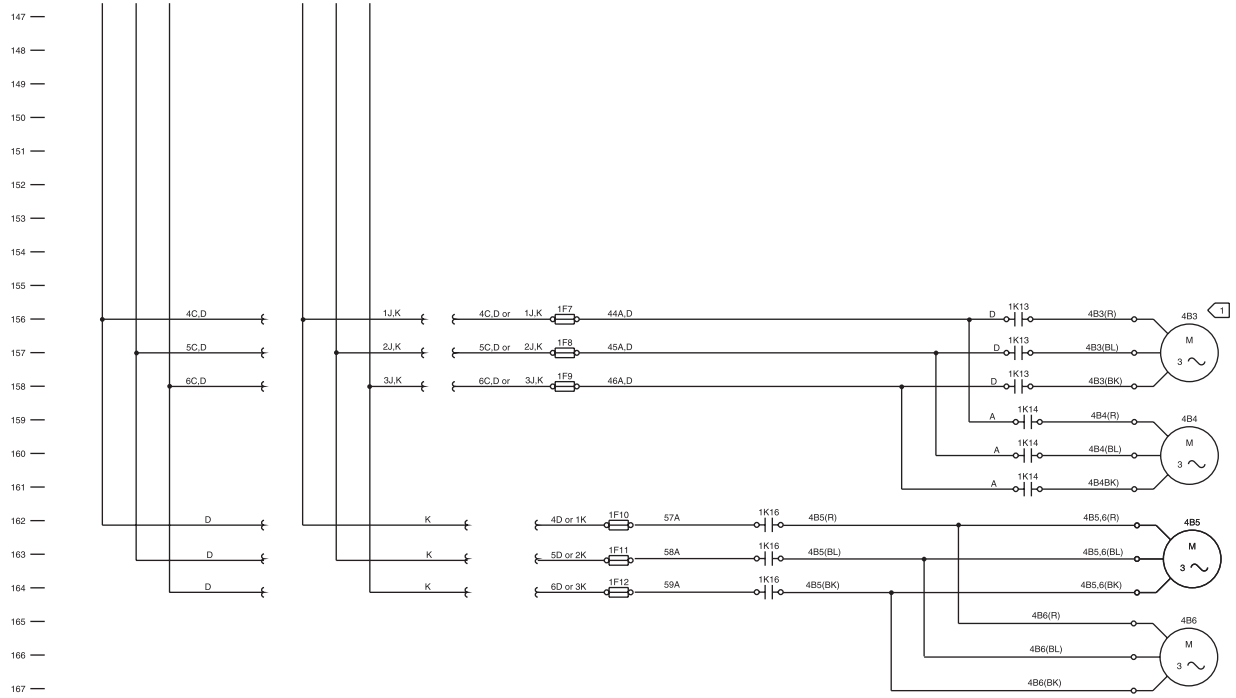
SCHEMATIC

RTAC

MEDIUM AIR COOLED
CKT #2 COMPRESSOR
WYE DELTA START

REV
C


DUAL SOURCE POWER
FROM LINE 118
SINGLE SOURCE POWER
4 C
5 C
6 C
1 SEE LINE 13
2 SEE LINE 13
3 SEE LINE 13
121
122
123
124
125
126
127
128
129
130
131
132
133
134
135
136
137
138
139
140
141
142
143
144
145
146
G,L 1F1 28A,D
G,L 1F2 29A,D
G 1F3 30A,D
L
L
1F13
1F14
125A
126A
125A
126A
SEE LINE 13
E,G 1F4 41A
E,G 1F5 42A
E,G 1F6 43A
D 1K9
D 1K9
D 1K9
A,C 1K10
A,C 1K10
A,C 1K10
C 1K11
C 1K11
C 1K11
41A 1K12 3B6(R)
42A 1K12 3B6(BL)
43A 1K12 3B6(BK)
41A 1K12 3B5(R)
42A 1K12 3B5(BL)
43A 1K12 3B5(BK)
3B3(R)
3B3(BL)
3B3(BK)
3B4(R)
3B4(BL)
3B4(BK)
3B5(R)
3B5(BL)
3B5(BK)
3B6,7(R)
3B6,7(BL)
3B6,7(BK)
3B7(R)
3B7(BL)
3B7(BK)
3B5,6(R)
3B5,6(BL)
3B5,6(BK)
3B6(R)
3B6(BL)
3B6(BK)
3B3
3B4
3B5
3B6
3B7
M
3
1
155 TON STANDARD EFFICIENCY UNIT ONLY
140 TON STANDARD EFFICIENCY UNIT ONLY



⚠ WARNING

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VOLTAGE HASARDEUX!

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FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

NOTES:

1. FANS 3B3 AND 4B3 ARE SHOWN AS WIRED FOR UNITS WITHOUT THE LOW AMBIENT OR WIDE AMBIENT TEMPERATURE OPTION. SEE DRG 2309-1957 FOR 3B3 AND 4B3 FAN WIRING WITH LOW AMBIENT OR WIDE AMBIENT TEMPERATURE OPTIONS. ALL OTHER FANS ARE WIRED AS SHOWN FOR ALL CONDENSER TEMPERATURE RANGES, STANDARD TEMPERATURE, WIDE TEMPERATURE AND/OR LOW AMBIENT TEMPERATURE OPTIONS.

REPLACES

REVISION DATE

DRAWN BY
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DATE
6-1-00

SIMILAR TO

AUTOCAD

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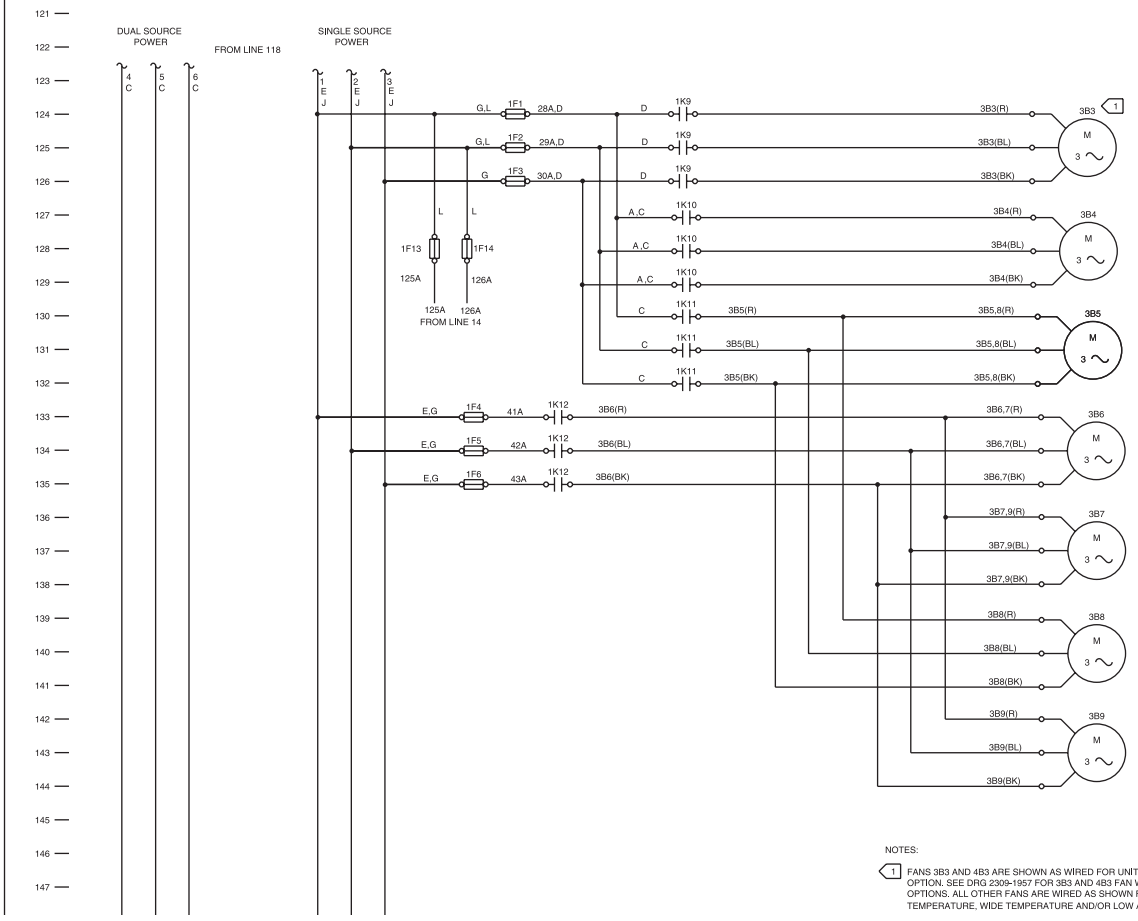
2309-1955

REV
A

SCHEMATIC
RTAC
MEDIUM AIR COOLED
TWO STAGE
STANDARD EFFICIENCY UNITS



THE TABLE BELOW DESCRIBES CIRCUIT 1 FAN USAGE BY TONNAGE AND EFFICIENCY. FANS AND ASSOCIATED WIRING IF USED, ARE ALWAYS WIRED AS SHOWN.

FAN	UNIT TONNAGE						
	140	155	170	185	200	225	250
3B3	P	P	S,P	S,P	S,P	S	S
3B4	P	P	S,P	S,P	S,P	S	S
3B5	P	P	S,P	S,P	S,P	S	S
3B6	P	P	S,P	S,P	S,P	S	S
3B7	P	P	S,P	S,P	S,P	S	S
3B8		P	P	S,P	S,P	S	S
3B9				P	P	S	S

P=PREMIUM EFFICIENCY UNIT FAN USAGE
S=STANDARD EFFICIENCY UNIT FAN USAGE

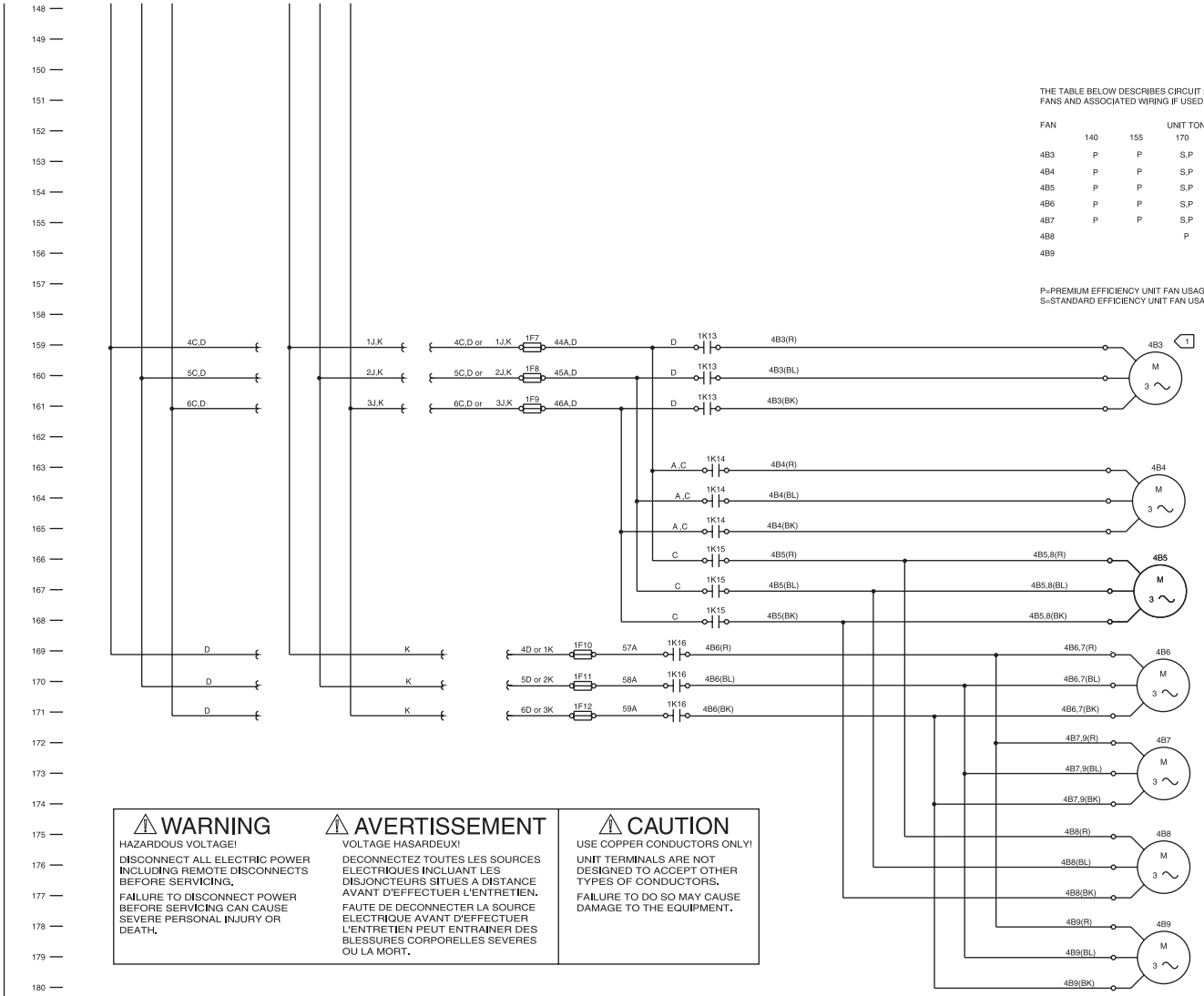
NOTES:

1 FANS 3B3 AND 4B3 ARE SHOWN AS WIRED FOR UNITS WITHOUT THE LOW AMBIENT OR WIDE AMBIENT TEMPERATURE OPTION. SEE DRG 2309-1957 FOR 3B3 AND 4B3 FAN WIRING WITH LOW AMBIENT OR WIDE AMBIENT TEMPERATURE OPTIONS. ALL OTHER FANS ARE WIRED AS SHOWN FOR ALL CONDENSER TEMPERATURE RANGES, STANDARD TEMPERATURE, WIDE TEMPERATURE AND/OR LOW AMBIENT TEMPERATURE OPTIONS.

THE TABLE BELOW DESCRIBES CIRCUIT 2 FAN USAGE BY TONNAGE AND EFFICIENCY. FANS AND ASSOCIATED WIRING IF USED, ARE ALWAYS WIRED AS SHOWN.

FAN	UNIT TONNAGE						
	140	155	170	185	200	225	250
4B3	P	P	S,P	S,P	S,P	S	S
4B4	P	P	S,P	S,P	S,P	S	S
4B5	P	P	S,P	S,P	S,P	S	S
4B6	P	P	S,P	S,P	S,P	S	S
4B7	P	P	S,P	S,P	S,P	S	S
4B8			P	P	S,P	S	S
4B9					P		S

P=PREMIUM EFFICIENCY UNIT FAN USAGE
S=STANDARD EFFICIENCY UNIT FAN USAGE



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⚠ AVERTISSEMENT

VOLTAGE HASARDEUX!

DECONNECTEZ TOUTES LES SOURCES ELECTRIQUES INCLUANT LES DISJONCTEURS SITUES A DISTANCE AVANT D'EFFECTUER L'ENTRETIEN.

FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.

⚠ CAUTION

USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

REPLACES

REVISION DATE

DRAWN BY
PBL

DATE
6-1-00

AUTOCAD

THE TRANE COMPANY
AMERICAN STANDARD INC.

SIMILAR TO

SCHEMATIC
RTAC MEDIUM AIR COOLED
FAN WIRING FOR
170,185,200,225 & 250 STANDARD EFFICIENCY
140,155,170,185 & 200 PREMIUM EFFICIENCY

2309-1956

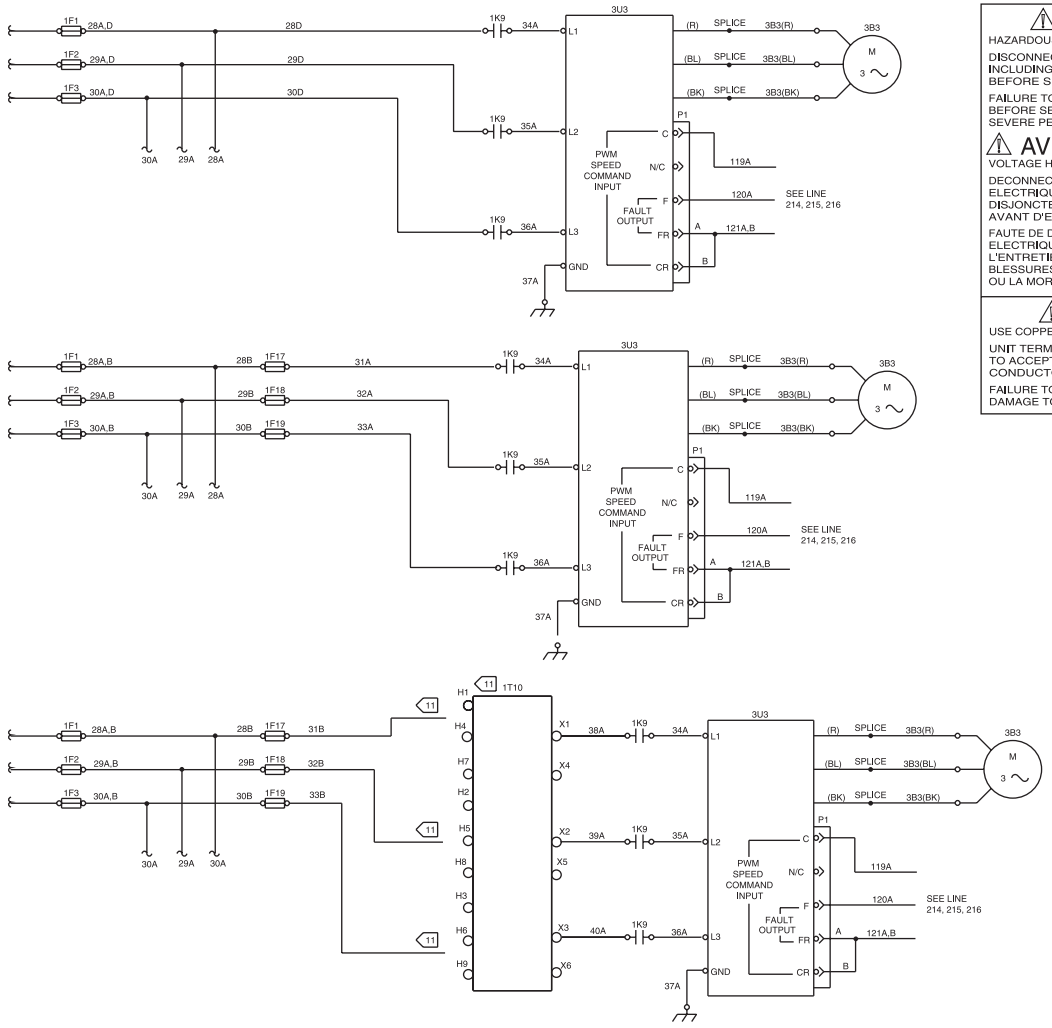
REV
A

CIRCUIT #1

200, 230 VOLTS 60HZ
220 VOLTS 50HZ
SEE SCHEMATICS
2309-1955 OR 2309-
1956 FOR OTHER WIRING

460 VOLTS 60HZ
400 VOLTS 50HZ
SEE SCHEMATICS
2309-1955 OR 2309-
1956 FOR OTHER WIRING

380, 575 VOLTS 60HZ
380 VOLTS 50HZ
SEE SCHEMATICS
2309-1955 OR 2309-
1956 FOR OTHER WIRING



⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.

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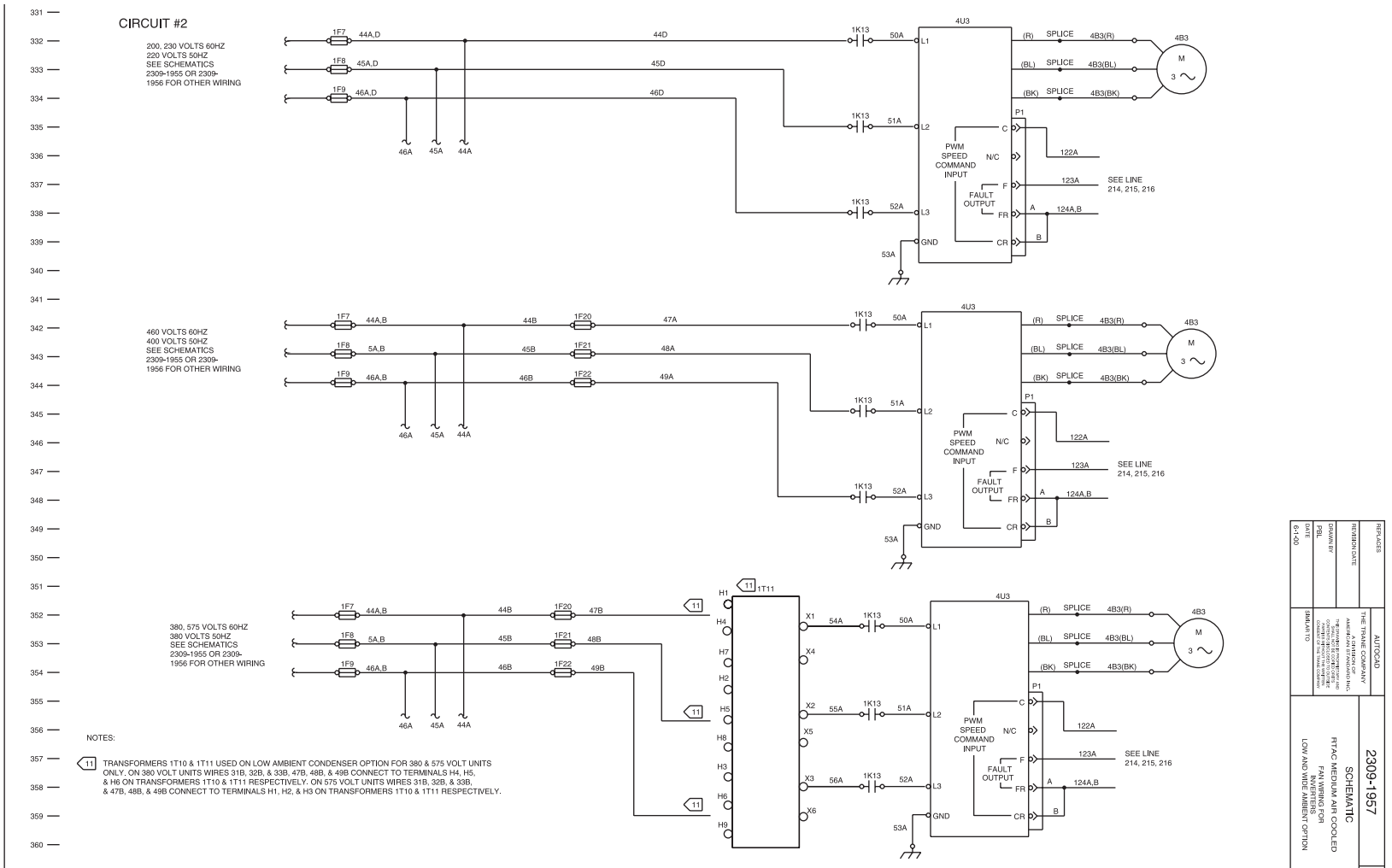
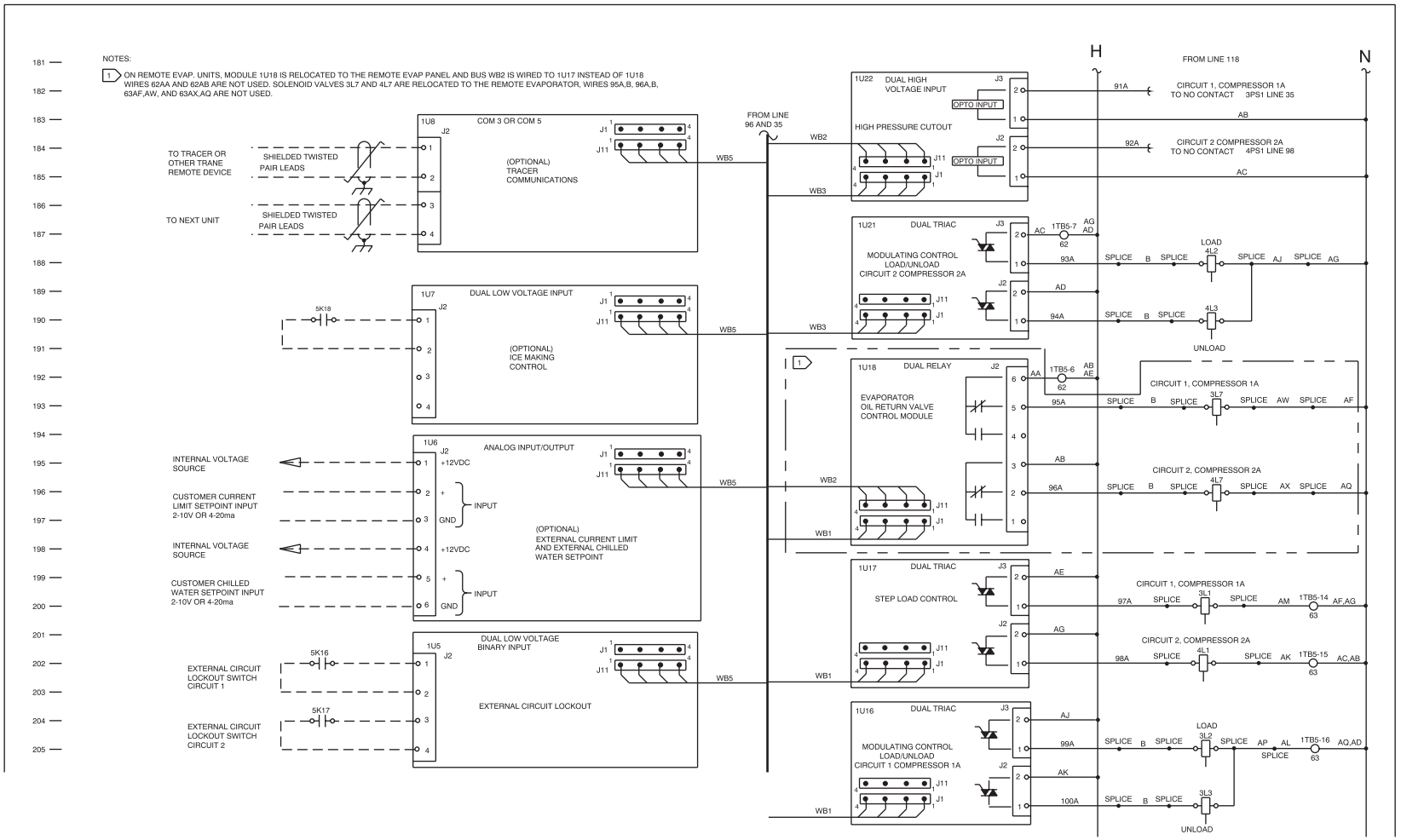
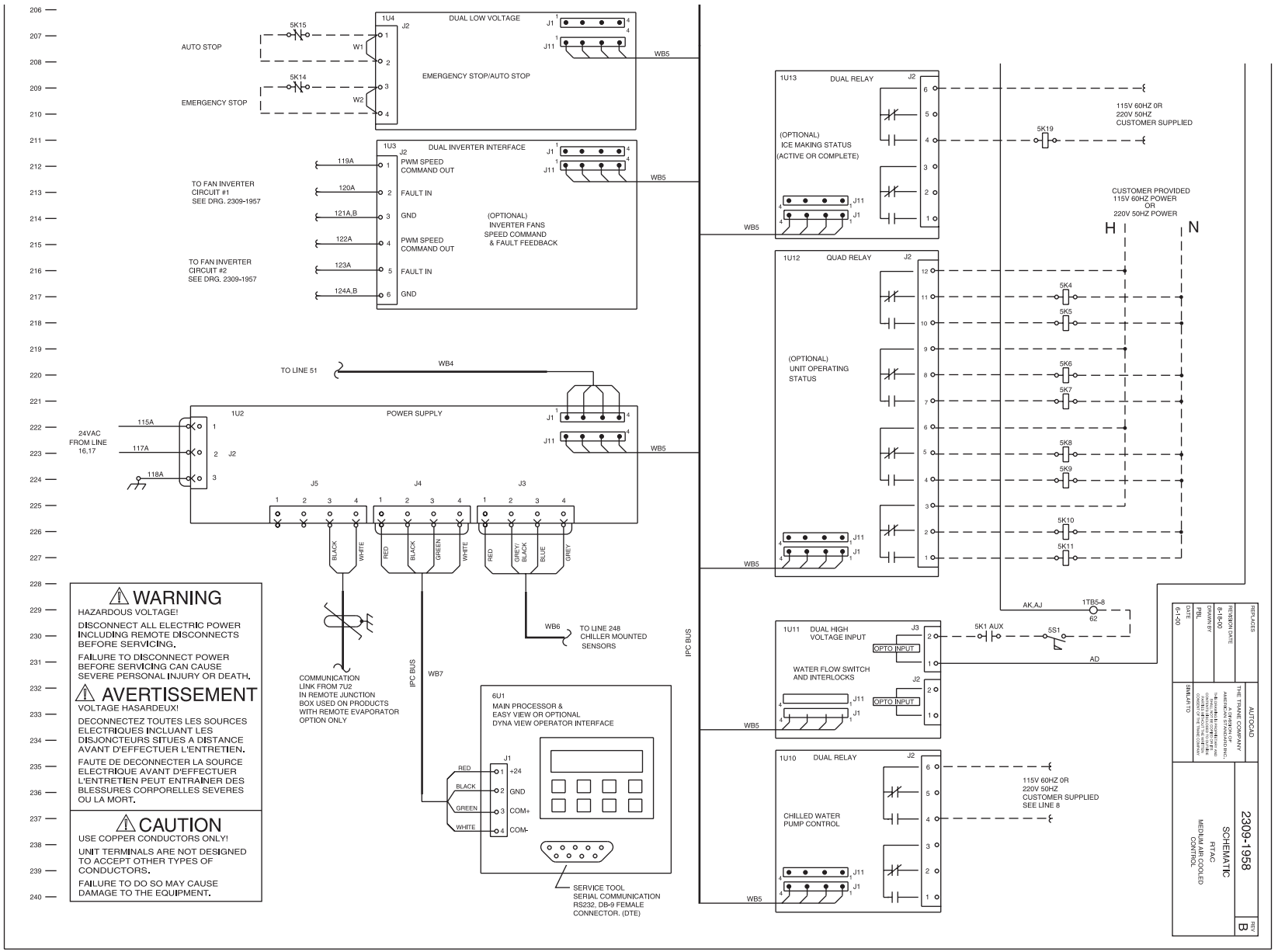

CIRCUIT #2
200, 230 VOLTS 60HZ
220 VOLTS 50HZ
SEE SCHEMATICS
2309-1955 OR 2309-
1956 FOR OTHER WIRING
460 VOLTS 60HZ
400 VOLTS 50HZ
SEE SCHEMATICS
2309-1955 OR 2309-
1956 FOR OTHER WIRING
380, 575 VOLTS 60HZ
380 VOLTS 50HZ
SEE SCHEMATICS
2309-1955 OR 2309-
1956 FOR OTHER WIRING
1F7
1F8
1F9
1F20
1F21
1F22
1K13
1T11
4U3
4B3
M
3
SPLICE
PWM SPEED COMMAND INPUT
FAULT OUTPUT
SEE LINE 214, 215, 216
NOTES:
11 TRANSFORMERS 1T10 & 1T11 USED ON LOW AMBIENT CONDENSER OPTION FOR 380 & 575 VOLT UNITS ONLY. ON 380 VOLT UNITS WIRES 31B, 32B, & 33B, 47B, 48B, & 49B CONNECT TO TERMINALS H4, H5, & H6 ON TRANSFORMERS 1T10 & 1T11 RESPECTIVELY. ON 575 VOLT UNITS WIRES 31B, 32B, & 33B, & 47B, 48B, & 49B CONNECT TO TERMINALS H1, H2, & H3 ON TRANSFORMERS 1T10 & 1T11 RESPECTIVELY.
AUTOCAD
THE TRANE COMPANY
61-100
3MM.A8.1TO
2309-1957
SCHEMATIC
RTAC MEDIUM AIR COOLED
FAN WIRING FOR
INVERTERS
LOW AND WIDE AMBIENT OPTION
A


NOTES:
1 ON REMOTE EVAP. UNITS, MODULE 1U18 IS RELOCATED TO THE REMOTE EVAP PANEL AND BUS WB2 IS WIRED TO 1U17 INSTEAD OF 1U18 WIRES 62AA AND 62AB ARE NOT USED. SOLENOID VALVES 3L7 AND 4L7 ARE RELOCATED TO THE REMOTE EVAPORATOR, WIRES 95A,B, 96A,B, 63AF,AW, AND 63AX,AQ ARE NOT USED.
H
N
FROM LINE 118
FROM LINE 96 AND 35
1U8 COM 3 OR COM 5
TO TRACER OR OTHER TRANE REMOTE DEVICE
SHIELDED TWISTED PAIR LEADS
TO NEXT UNIT
SHIELDED TWISTED PAIR LEADS
(OPTIONAL) TRACER COMMUNICATIONS
1U7 DUAL LOW VOLTAGE INPUT
5K18
(OPTIONAL) ICE MAKING CONTROL
1U6 ANALOG INPUT/OUTPUT
INTERNAL VOLTAGE SOURCE
CUSTOMER CURRENT LIMIT SETPOINT INPUT 2-10V OR 4-20ma
INTERNAL VOLTAGE SOURCE
CUSTOMER CHILLED WATER SETPOINT INPUT 2-10V OR 4-20ma
+12VDC
INPUT
GND
(OPTIONAL) EXTERNAL CURRENT LIMIT AND EXTERNAL CHILLED WATER SETPOINT
1U5 DUAL LOW VOLTAGE BINARY INPUT
5K16
EXTERNAL CIRCUIT LOCKOUT SWITCH CIRCUIT 1
5K17
EXTERNAL CIRCUIT LOCKOUT SWITCH CIRCUIT 2
EXTERNAL CIRCUIT LOCKOUT
WB5
WB2
WB3
WB1
1U22 DUAL HIGH VOLTAGE INPUT
OPTO INPUT
HIGH PRESSURE CUTOUT
91A
CIRCUIT 1, COMPRESSOR 1A TO NO CONTACT 3PS1 LINE 35
AB
92A
CIRCUIT 2 COMPRESSOR 2A TO NO CONTACT 4PS1 LINE 98
AC
1U21 DUAL TRIAC
MODULATING CONTROL LOAD/UNLOAD CIRCUIT 2 COMPRESSOR 2A
1TB5-7
62
AC
AG
AD
93A
94A
SPLICE
B
LOAD
4L2
AJ
4L3
UNLOAD
1U18 DUAL RELAY
EVAPORATOR OIL RETURN VALVE CONTROL MODULE
1TB5-6
AA
AB
AE
95A
96A
CIRCUIT 1, COMPRESSOR 1A
3L7
AW
AF
CIRCUIT 2, COMPRESSOR 2A
4L7
AX
AQ
1U17 DUAL TRIAC
STEP LOAD CONTROL
AE
97A
3L1
AM
1TB5-14
63
AF,AG
AG
98A
4L1
AK
1TB5-15
AC,AB
1U16 DUAL TRIAC
MODULATING CONTROL LOAD/UNLOAD CIRCUIT 1 COMPRESSOR 1A
AJ
99A
3L2
AP
AL
1TB5-16
AQ,AD
AK
100A
3L3


1U4
DUAL LOW VOLTAGE
J2
J1
J11
5K15
AUTO STOP
W1
5K14
EMERGENCY STOP
W2
EMERGENCY STOP/AUTO STOP
WB5
1U3
DUAL INVERTER INTERFACE
119A
PWM SPEED COMMAND OUT
120A
FAULT IN
121A,B
GND
122A
PWM SPEED COMMAND OUT
123A
FAULT IN
124A,B
GND
TO FAN INVERTER CIRCUIT #1 SEE DRG. 2309-1957
TO FAN INVERTER CIRCUIT #2 SEE DRG. 2309-1957
(OPTIONAL) INVERTER FANS SPEED COMMAND & FAULT FEEDBACK
TO LINE 51
WB4
1U2
POWER SUPPLY
24VAC FROM LINE 16,17
115A
117A
118A
J5
J4
J3
BLACK
WHITE
RED
BLACK
GREEN
WHITE
RED
GRN/ BLACK
BLUE
GREY
WB6
TO LINE 248 CHILLER MOUNTED SENSORS
COMMUNICATION LINK FROM 7U2 IN REMOTE JUNCTION BOX USED ON PRODUCTS WITH REMOTE EVAPORATOR OPTION ONLY
IPC BUS
WB7
6U1
MAIN PROCESSOR & EASY VIEW OR OPTIONAL DYNA VIEW OPERATOR INTERFACE
RED
BLACK
GREEN
WHITE
+24
GND
COM+
COM-
SERVICE TOOL SERIAL COMMUNICATION RS232, DB-9 FEMALE CONNECTOR. (DTE)
IPC BUS
1U13
DUAL RELAY
(OPTIONAL) ICE MAKING STATUS (ACTIVE OR COMPLETE)
115V 60HZ 0R 220V 50HZ CUSTOMER SUPPLIED
5K19
CUSTOMER PROVIDED 115V 60HZ POWER OR 220V 50HZ POWER
H
N
1U12
QUAD RELAY
(OPTIONAL) UNIT OPERATING STATUS
5K4
5K5
5K6
5K7
5K8
5K9
5K10
5K11
1U11
DUAL HIGH VOLTAGE INPUT
OPTO INPUT
WATER FLOW SWITCH AND INTERLOCKS
AK,AJ
1TB5-8
62
5K1 AUX
5S1
AD
1U10
DUAL RELAY
CHILLED WATER PUMP CONTROL
115V 60HZ 0R 220V 50HZ CUSTOMER SUPPLIED SEE LINE 8
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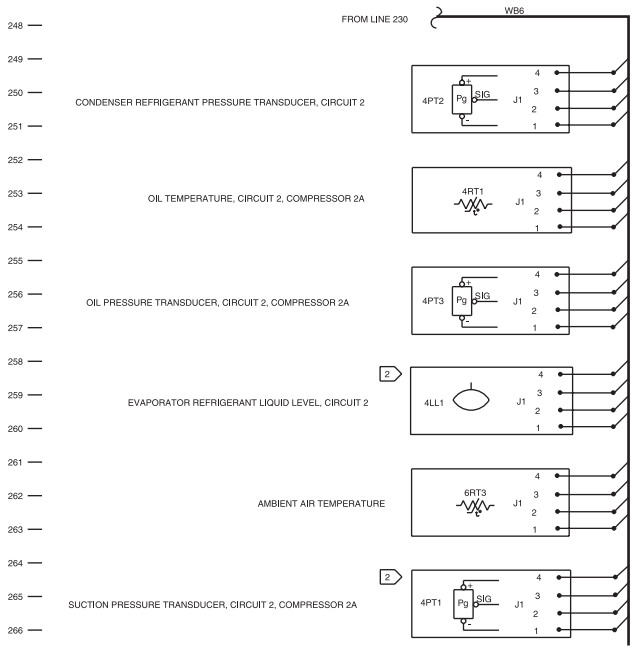
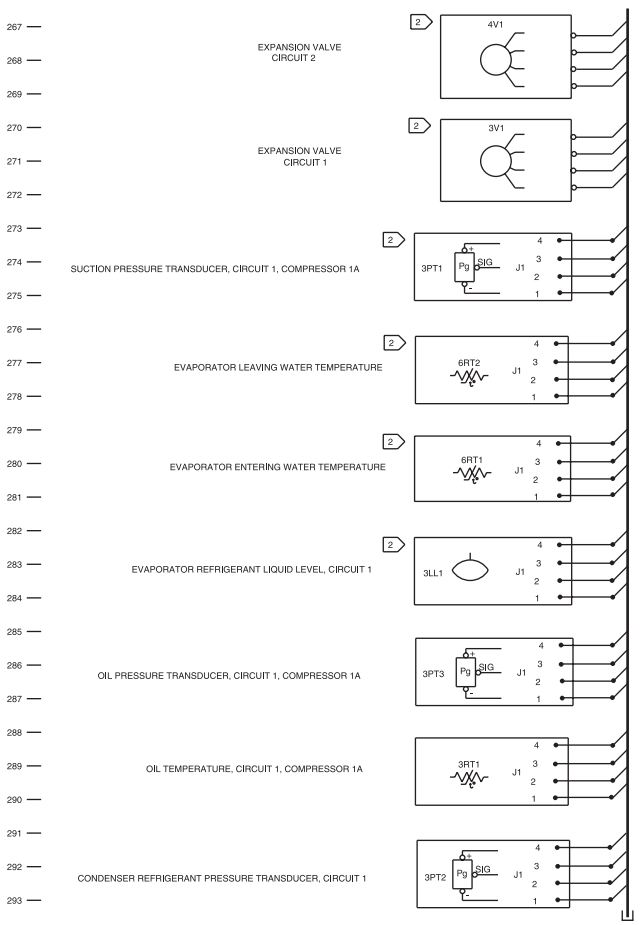
REPLACES
REVISION DATE
DRAWN BY
DATE
6-1-00
PBL
6-16-00
AUTOCAD
THE TRANE COMPANY
SCHEMATIC
RTAC
MEDIUM AIR-COOLED CONTROL
2309-1958
REV
B

DEVICE PREFIX LOCATION CODE	
AREA	LOCATION
1	CONTROL AND STARTER PANEL
3	REFRIGERATION CIRCUIT 1
4	REFRIGERATION CIRCUIT 2
5	CUSTOMER REMOTELY INSTALLED
6	UNIT MOUNTED



LEGEND		
DEVICE DESIGNATION	LINE NUMBER	DESCRIPTION
		RTAC PANEL 1 COMPONENTS, LOCATION 1
1CB1	6	HACR CIRCUIT BREAKER FOR CUSTOMER WIRING, ELECTRICAL CIRCUIT 1
1CB2	6	HACR CIRCUIT BREAKER FOR CUSTOMER WIRING, ELECTRICAL CIRCUIT 2
1F1-6	121-180/301-360	CONDENSER FAN FUSES, CIRCUIT 1
1F7-12	121-180/301-360	CONDENSER FAN FUSES, CIRCUIT 2
1F13-14	126	CONTROL POWER TRANSFORMER PRIMARY FUSES
1F15	19	CONTROL POWER TRANSFORMER SECONDARY FUSE, 115 VOLT CIRCUIT
1F16	17	CONTROL POWER TRANSFORMER SECONDARY FUSE, LOW VOLTAGE CIRCUIT
1F17-19	301-360	INVERTER DRIVE FUSES, CIRCUIT 1
1F20-22	301-360	INVERTER DRIVE FUSES, CIRCUIT 2
1K1	44	START CONTACTOR, COMPRESSOR 1A
1K2	47	YD RUN CONTACTOR, COMPRESSOR 1A
1K3	50	YD SHORTING CONTACTOR, COMPRESSOR 1A
1K4	53	YD TRANSITION CONTACTOR, COMPRESSOR 1A
1K5	105	START CONTACTOR, COMPRESSOR 2A
1K6	108	YD RUN CONTACTOR, COMPRESSOR 2A
1K7	111	YD SHORTING CONTACTOR, COMPRESSOR 2A
1K8	114	YD TRANSITION CONTACTOR, COMPRESSOR 2A
1K9	24	CONDENSER FAN CONTACTOR, CIRCUIT 1
1K10	27	CONDENSER FAN CONTACTOR, CIRCUIT 1
1K11	30	CONDENSER FAN CONTACTOR, CIRCUIT 1
1K12	35	CONDENSER FAN CONTACTOR, CIRCUIT 1
1K13	86	CONDENSER FAN CONTACTOR, CIRCUIT 2
1K14	89	CONDENSER FAN CONTACTOR, CIRCUIT 2
1K15	92	CONDENSER FAN CONTACTOR, CIRCUIT 2
1K16	95	CONDENSER FAN CONTACTOR, CIRCUIT 2
1SW1	6	MOLDED CASE SWITCH FOR CUSTOMER POWER WIRING, ELECTRICAL CIRCUIT 1
1SW2	6	MOLDED CASE SWITCH FOR CUSTOMER POWER WIRING, ELECTRICAL CIRCUIT 2
1T1	15	CONTROL POWER SUPPLY TRANSFORMER
1T2	12	CURRENT TRANSFORMER, COMPRESSOR 1A, LINE A
1T3	15	CURRENT TRANSFORMER, COMPRESSOR 1A, LINE B
1T4	18	CURRENT TRANSFORMER, COMPRESSOR 1A, LINE C
1T5	72	CURRENT TRANSFORMER, COMPRESSOR 2A, LINE A
1T6	75	CURRENT TRANSFORMER, COMPRESSOR 2A, LINE B
1T7	78	CURRENT TRANSFORMER, COMPRESSOR 2A, LINE C
1T9	45	POTENTIAL TRANSFORMER, UNDER / OVER VOLTAGE
1T10	322	INVERTER DRIVE POWER SUPPLY TRANSFORMER, CIRCUIT 1
1T11	352	INVERTER DRIVE POWER SUPPLY TRANSFORMER, CIRCUIT 2
1TB1	6	TERMINAL BLOCK FOR CUSTOMER POWER WIRING, ELECTRICAL CIRCUIT 1
1TB2	6	TERMINAL BLOCK FOR CUSTOMER POWER WIRING, ELECTRICAL CIRCUIT 2
1TB4		CUSTOMER CONTROL WIRING TERMINAL STRIP
1TB5		FACTORY CONTROL WIRING TERMINAL STRIP
1U2	222	POWER SUPPLY MODULE, TRACER CH.530
1U3	212	DUAL INVERTER INTERFACE, FAN SPEED COMMAND AND FAULT FEEDBACK, CIRCUIT 1 AND 2
1U4	206	DUAL LV BINARY INPUT, EXTERNAL EMERGENCY STOP AND EXTERNAL AUTO/STOP
1U5	201	DUAL LV BINARY INPUT, EXTERNAL CIRCUIT LOCKOUT, CIRCUIT 1 AND 2
1U6	194	DUAL ANALOG I/O, EXTERNAL CURRENT LIMIT AND EXTERNAL CHILLED WATER SETPOINT
1U7	189	DUAL LV BINARY INPUT, ICE MAKING CONTROL
1U8	183	COM 3 OR COMM 5 COMMUNICATION INTERFACE, (ECHELON)
1U10	235	DUAL RELAY OUTPUT, CHILLED WATER PUMP CONTROL
1U11	230	DUAL HV BINARY INPUT, CHILLED WATER FLOW AND INTERLOCKS
1U12	216	QUAD RELAY OUTPUT, ALARM AND STATUS RELAYS
1U13	209	DUAL RELAY OUTPUT, ICE MAKING STATUS RELAY
1U14	37	STARTER MODULE, COMPRESSOR 1A
1U15	21	QUAD RELAY OUTPUT, FAN CONTROL, CIRCUIT 1
1U16	204	DUAL TRIAC OUTPUT, MODULATING LOAD / UNLOAD, COMPRESSOR 1A
1U17	199	DUAL TRIAC OUTPUT, STEP LOAD, COMPRESSORS 1A AND 2A
1U18	192	DUAL RELAY EVAPORATOR OIL RETURN CONTROL MODULE, CIRCUIT 1 AND 2
1U19	98	STARTER MODULE, COMPRESSOR 2A
1U20	83	QUAD RELAY OUTPUT, FAN CONTROL, CIRCUIT 2
1U21	187	DUAL TRIAC OUTPUT, MODULATING LOAD / UNLOAD, COMPRESSOR 2A
1U22	182	DUAL HV BINARY INPUT, HIGH PRESSURE CUTOUT, COMPRESSORS 1A AND 2A



		RTAC REFRIGERANT COMPONENTS FOR CIRCUIT 1, LOCATION 3
3B1	15	MOTOR, COMPRESSOR 1A, CIRCUIT 1 (CPRSR 1A)
3B3-10	121-147/301-360	CONDENSER FAN MOTORS, CIRCUIT 1
3HR1	21	COMPRESSOR HEATER, CIRCUIT 1
3HR2	22	OIL SEPARATOR HEATER, CIRCUIT 1
3L1	200	STEP LOAD CONTROL SOLENOID VALVE, COMPRESSOR 1A
3L2	205	PROPORTIONAL LOAD CONTROL SOLENOID VALVE, COMPRESSOR 1A
3L3	207	PROPORTIONAL UNLOAD CONTROL SOLENOID VALVE, COMPRESSOR 1A
3L7	193	EVAP OIL RETURN SOLENOID VALVE CKT 1
3LL1	283	EVAPORATOR REFRIGERANT LIQUID LEVEL SENSOR, CIRCUIT 1
3PFC1		POWER FACTOR CORRECTION CAPACITORS, COMPRESSOR 1A
3PT1	274	SUCTION REFRIGERANT PRESSURE TRANSDUCER, CIRCUIT 1, COMPRESSOR 1A
3PT2	292	CONDENSER REFRIGERANT PRESSURE TRANSDUCER, CIRCUIT 1
3PT3	268	OIL PRESSURE TRANSDUCER, COMPRESSOR 1A
3PS1	36	HIGH PRESSURE CUTOUT SWITCH, COMPRESSOR 1A
3RT1	289	OIL TEMPERATURE SENSOR, CIRCUIT 1, COMPRESSOR 1A
3U3	301,310,322	CONDENSER FAN INVERTER DRIVE, CIRCUIT 1
3V1	271	ELECTRONIC EXPANSION VALVE, CIRCUIT 1
		RTAC REFRIGERANT COMPONENTS FOR CIRCUIT 2, LOCATION 4
4B1	75	MOTOR, COMPRESSOR 2A, CIRCUIT 2 (CPRSR 2A)
4B3-10	155-180/301-360	CONDENSER FAN MOTORS, CIRCUIT 2
4HR1	83	COMPRESSOR HEATER, CIRCUIT 2
4HR2	84	OIL SEPARATOR HEATER, CIRCUIT 2
4L1	202	STEP LOAD CONTROL SOLENOID VALVE, COMPRESSOR 2A
4L2	188	PROPORTIONAL LOAD CONTROL SOLENOID VALVE, COMPRESSOR 2A
4L3	190	PROPORTIONAL UNLOAD CONTROL SOLENOID VALVE, COMPRESSOR 2A
4L7	196	EVAP OIL RETURN SOLENOID VALVE CKT 2
4LL1	259	SUCTION REFRIGERANT LIQUID LEVEL SENSOR, CIRCUIT 2, COMPRESSOR 2A
4PFC1		POWER FACTOR CORRECTION CAPACITORS, COMPRESSOR 2A
4PT1	265	EVAPORATOR REFRIGERANT PRESSURE TRANSDUCER, CIRCUIT 2
4PT2	250	CONDENSER REFRIGERANT PRESSURE TRANSDUCER, CIRCUIT 2
4PT3	256	OIL PRESSURE TRANSDUCER, COMPRESSOR 2A
4PS1	98	HIGH PRESSURE CUTOUT SWITCH, COMPRESSOR 2A
4RT1	253	OIL TEMPERATURE SENSOR, CIRCUIT 2, COMPRESSOR 2A
4U3	332,342,351	CONDENSER FAN INVERTER DRIVE, CIRCUIT 2
4V1	267	ELECTRONIC EXPANSION VALVE, CIRCUIT 2
		RTAC CUSTOMER SUPPLIED COMPONENTS, LOCATION 5
5B1	3	CHILLER WATER PUMP MOTOR
5K1	7	CHILLER WATER PUMP STARTER
5K4	217	UNIT STATUS RELAY, (PROGRAMABLE) DEFAULT IS UNIT ALARM
5K5	218	UNIT STATUS RELAY, (PROGRAMABLE) DEFAULT IS UNIT ALARM
5K6	220	UNIT STATUS RELAY, (PROGRAMABLE) DEFAULT IS UNIT RUNNING
5K7	221	UNIT STATUS RELAY, (PROGRAMABLE) DEFAULT IS UNIT RUNNING
5K8	223	UNIT STATUS RELAY, (PROGRAMABLE) DEFAULT IS MAXIMUM UNIT CAPACITY
5K9	224	UNIT STATUS RELAY, (PROGRAMABLE) DEFAULT IS MAXIMUM UNIT CAPACITY
5K10	226	UNIT STATUS RELAY, (PROGRAMABLE) DEFAULT IS LIMITED UNIT OPERATION
5K11	227	UNIT STATUS RELAY, (PROGRAMABLE) DEFAULT IS LIMITED UNIT OPERATION
5K14	209	EXTERNAL EMERGENCY STOP INPUT RELAY
5K15	207	EXTERNAL AUTO / STOP INPUT RELAY
5K16	202	EXTERNAL LOCKOUT INPUT RELAY FOR REFRIGERANT CIRCUIT 1
5K17	204	EXTERNAL LOCKOUT INPUT RELAY FOR REFRIGERANT CIRCUIT 2
5K18	190	EXTERNAL INPUT RELAY TO ENABLE ICE MAKING
5K19	209	ICE MAKING STATUS OUTPUT
5S1	230	CHILLER WATER FLOW SWITCH
		RTAC UNIT MOUNTED COMMON COMPONENTS, LOCATION 6
6CO1	62	CUSTOMER CONVENIENCE OUTLET (OPTIONAL)
6HR1-4	68-67	EVAPORATOR WATER HEATER (OPTIONAL)
6RT1	280	EVAPORATOR ENTERING WATER TEMPERATURE SENSOR
6RT2	277	EVAPORATOR LEAVING WATER TEMPERATURE SENSOR
6RT3	262	AMBIENT AIR TEMPERATURE SENSOR
6TS1	68	TEMPERATURE CONTROL FOR EVAPORATOR WATER HEATER (OPTIONAL)
6U1	232	EASY VIEW OR DYNA VIEW DISPLAY AND INTERFACE

NOTE

1. COMPONENTS (LLIDS) ARE NOT NECESSARILY WIRED ON THE IPC BUS(WB6) IN THE ORDER SHOWN. ORDER SHOWN IS FOR FOUR PASS EVAPORATOR.

2 ON PRODUCTS WITH REMOTE EVAPORATOR THE FOLLOWING CONTROL MODULES ARE RELOCATED TO THE REMOTE EVAPORATOR: 4LL1, 4PT1, 4V1, 3V1, 3PT1, 6RT1, 6RT2, AND 3LL1.

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REPLACES

REVISION DATE
8-21-00

DRAWN BY
PBL

DATE
6-1-00

SIMILAR TO

THE TRANE COMPANY
A DIVISION OF AMERICAN STANDARD INC.
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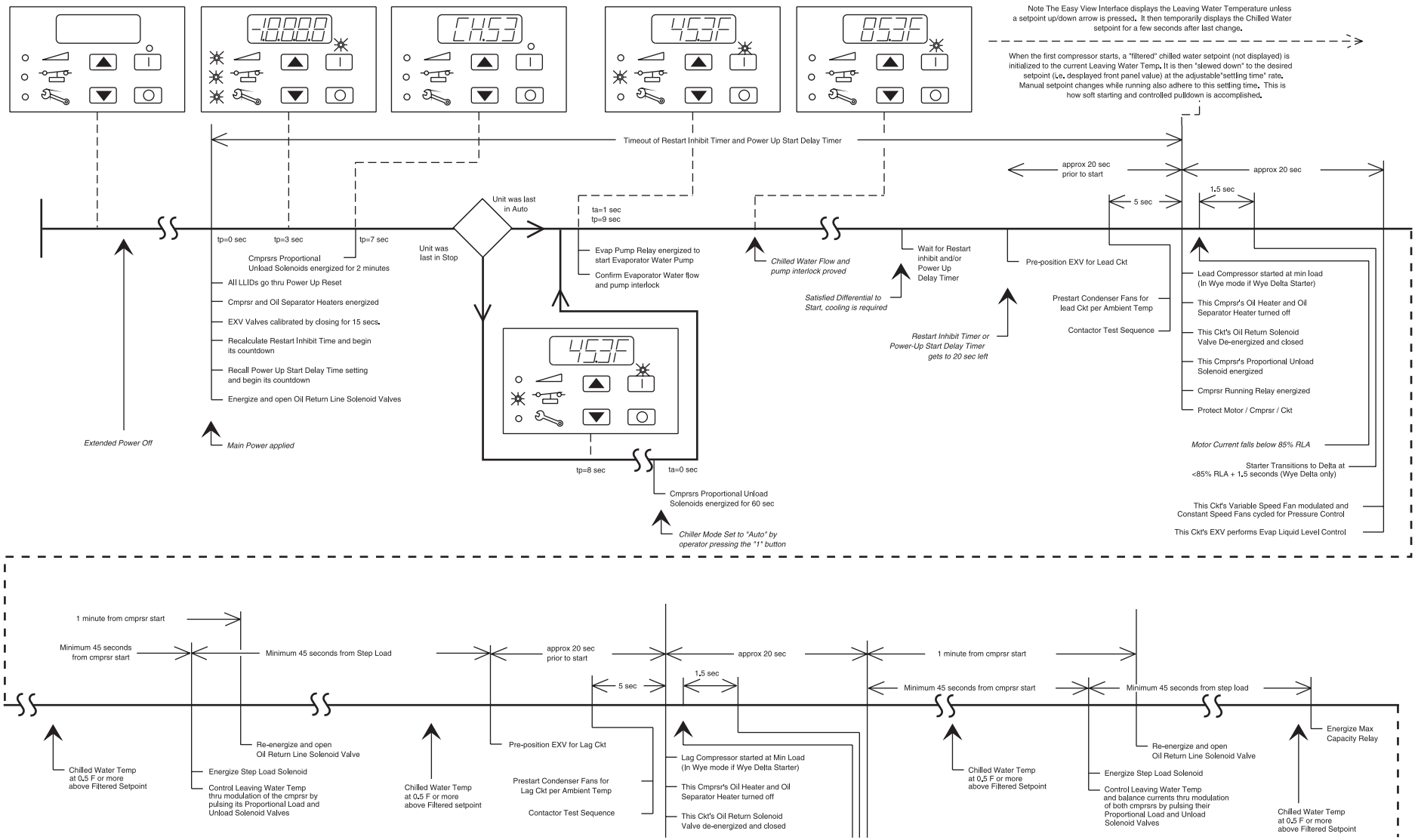
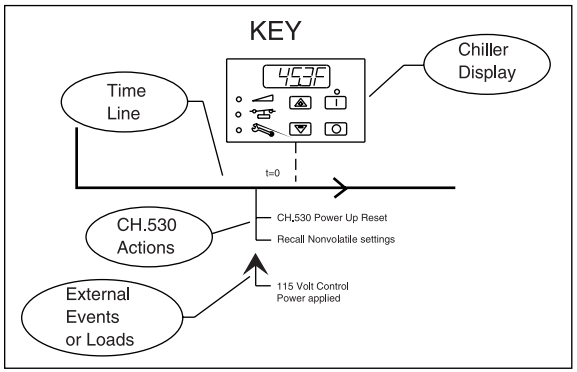
AUTOCAD

2309-1959

SCHEMATIC
RTAC
MEDIUM AIR COOLED
LEGEND LID BUS

REV
B


Note The Easy View Interface displays the Leaving Water Temperature unless a setpoint up/down arrow is pressed. It then temporarily displays the Chilled Water setpoint for a few seconds after last change.
When the first compressor starts, a "filtered" chilled water setpoint (not displayed) is initialized to the current Leaving Water Temp. It is then "slewed down" to the desired setpoint (i.e. desplayed front panel value) at the adjustable"settling time" rate. Manual setpoint changes while running also adhere to this settling time. This is how soft starting and controlled pulldown is accomplished.
Timeout of Restart Inhibit Timer and Power Up Start Delay Timer
approx 20 sec prior to start
approx 20 sec
5 sec
1.5 sec
Unit was last in Auto
Unit was last in Stop
ta=1 sec
tp=9 sec
tp=0 sec
tp=3 sec
tp=7 sec
Cmprsrs Proportional Unload Solenoids energized for 2 minutes
All LLIDs go thru Power Up Reset
Cmprsr and Oil Separator Heaters energized
EXV Valves calibrated by closing for 15 secs.
Recalculate Restart Inhibit Time and begin its countdown
Recall Power Up Start Delay Time setting and begin its countdown
Energize and open Oil Return Line Solenoid Valves
Extended Power Off
Main Power applied
Evap Pump Relay energized to start Evaporator Water Pump
Confirm Evaporator Water flow and pump interlock
Chilled Water Flow and pump interlock proved
Wait for Restart inhibit and/or Power Up Delay Timer
Satisfied Differential to Start, cooling is required
Pre-position EXV for Lead Ckt
Restart Inhibit Timer or Power-Up Start Delay Timer gets to 20 sec left
Prestart Condenser Fans for lead Ckt per Ambient Temp
Contactor Test Sequence
Lead Compressor started at min load (In Wye mode if Wye Delta Starter)
This Cmprsr's Oil Heater and Oil Separator Heater turned off
This Ckt's Oil Return Solenoid Valve De-energized and closed
This Cmprsr's Proportional Unload Solenoid energized
Cmprsr Running Relay energized
Protect Motor / Cmprsr / Ckt
Motor Current falls below 85% RLA
Starter Transitions to Delta at <85% RLA + 1.5 seconds (Wye Delta only)
This Ckt's Variable Speed Fan modulated and Constant Speed Fans cycled for Pressure Control
This Ckt's EXV performs Evap Liquid Level Control
tp=8 sec
ta=0 sec
Cmprsrs Proportional Unload Solenoids energized for 60 sec
Chiller Mode Set to "Auto" by operator pressing the "1" button
1 minute from cmprsr start
Minimum 45 seconds from cmprsr start
Minimum 45 seconds from Step Load
Chilled Water Temp at 0.5 F or more above Filtered Setpoint
Energize Step Load Solenoid
Control Leaving Water Temp thru modulation of the cmprsr by pulsing its Proportional Load and Unload Solenoid Valves
Re-energize and open Oil Return Line Solenoid Valve
approx 20 sec prior to start
approx 20 sec
5 sec
1.5 sec
Chilled Water Temp at 0.5 F or more above Filtered setpoint
Pre-position EXV for Lag Ckt
Prestart Condenser Fans for Lag Ckt per Ambient Temp
Contactor Test Sequence
Lag Compressor started at Min Load (In Wye mode if Wye Delta Starter)
This Cmprsr's Oil Heater and Oil Separator Heater turned off
This Ckt's Oil Return Solenoid Valve de-energized and closed
1 minute from cmprsr start
Minimum 45 seconds from cmprsr start
Chilled Water Temp at 0.5 F or more above Filtered Setpoint
Minimum 45 seconds from step load
Energize Step Load Solenoid
Control Leaving Water Temp and balance currents thru modulation of both cmprsrs by pulsing their Proportional Load and Unload Solenoid Valves
Re-energize and open Oil Return Line Solenoid Valve
Energize Max Capacity Relay
Chilled Water Temp at 0.5 F or more above Filtered Setpoint



This Cmprsr's Proportional Unload Solenoid energized

Cmprsr Running Relay energized

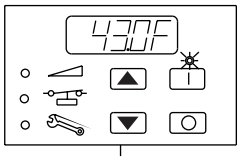
Protect Motor / Cmprsr / Ckt

Motor Current falls below 85% RLA

Starter Transitions to Delta at <85% RLA + 1,5 seconds (Wye Delta only)

This Ckt's Variable Speed Fan modulated and Constant Speed Fans cycled for Pressure Control

This Ckt's EXV performs Evap Liquid Level Control



Stop command

Chiller Remains in Auto

Chilled Water Temp at 0.5 F or more below setpoint

De-energize Step Load Solenoid on Cmprsr with most hours

Energize that cmprsr's Proportional Unload Solenoid for 60 min and de-energize Proportional Load Solenoid

Control Leaving Water Temp thru modulation of remaining Cmprsr by pulsing the Proportional Load and Unload Solenoids

Chilled Water Temp at 0.5 F or more below setpoint

Stop Cmprsr with most hours and whose Step load Solenoid has already been de-energized

Stop all Fans on this Ckt

Close EXV valve of this Ckt

Control Leaving Water Temp thru modulation of remaining Cmprsr by pulsing the Proportional Load and Unload Solenoids

De-energize Max Capacity Relay

Chiller Capacity falls below 50% approximation

De-energize Step Load Solenoid on last Cmprsr

Energize that cmprsr's Proportional Unload Solenoid for 60 min and de-energize Proportional Load Solenoid

Chilled Water Temp at 0.5 F or more below setpoint

Stop Last Compressor

Stop all Fans on this Ckt

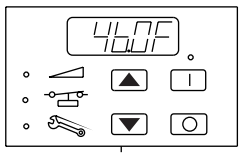
Close EXV valve of this Ckt

De-energize Compressor Running Relay

Chilled Water Temp at 0.5 F or more below setpoint

Start Chiller again per above sequence

Cooling required/Differential to Start



1 sec

10 sec run/unload

2 sec

Evap Pump Off Delay Time

Energize Proportional Unload solenoids and de-energize Proportional Load Solenoid on both Cmprsrs

De-energize Step Load Solenoids on both Cmprsrs

Stop both Compressors

Stop all Condenser Fans

Close both EXV valves

Continue to Energize Proporstional Unload Solenoids for 60 minutes

De-energize Evaporator Water Pump Relay and stop Evaporator Water Pump

Operator Presses Stop "0" button or other Stop command

⚠ WARNING

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FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.

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FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

REPLACES

REVISION DATE 9-8-00

DRAWN BY RO

DATE 6-1-00

AUTOCAD

THE TRANE COMPANY
A DIVISION OF
AMERICAN STANDARD INC.

SIMILAR TO

SEQUENCE OF OPERATION

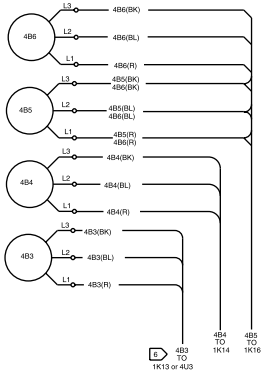
MEDIUM AIR COOLED

2309-1960

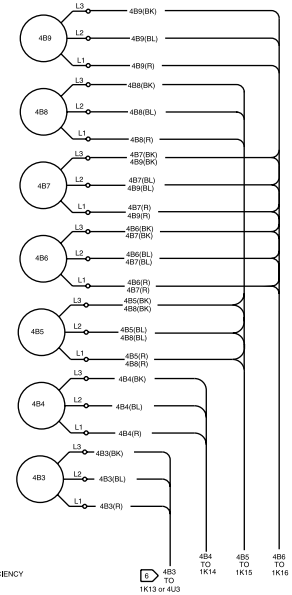
REV B

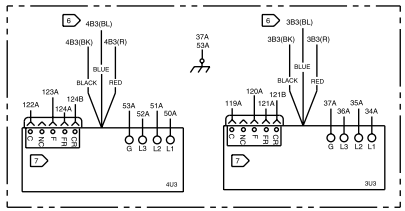
REPLACES	AUTOCAD	2309-1961	REV D
REVISION DATE 8-17-00	THE TRANE COMPANY A DIVISION OF AMERICAN STANDARD INC.	CONNECTION DIAGRAM	
DRAWN BY PBL	THIS DRAWING IS PROPRIETARY AND SHALL NOT BE COPIED OR ITS CONTENTS DISCLOSED TO OUTSIDE PARTIES WITHOUT THE WRITTEN CONSENT OF THE TRANE COMPANY	RTAC MEDIUM AIR COOLED WYE DELTA START 380,460,575/60 400/50	
DATE 6-1-00	SIMILAR TO		

140TON & 155TON
STANDARD EFFICIENCY UNITS ONLY

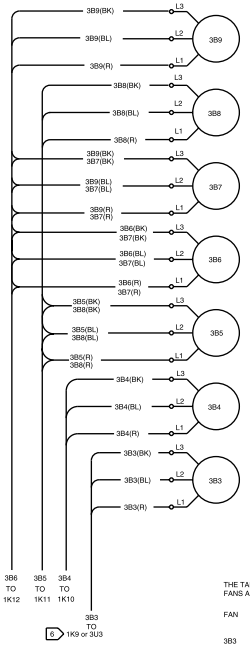


ALL UNITS EXCEPT
140 & 155 TON STANDARD EFFICIENCY

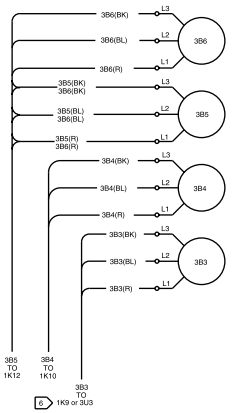




ALL UNITS EXCEPT
140 TON STANDARD EFFICIENCY UNIT



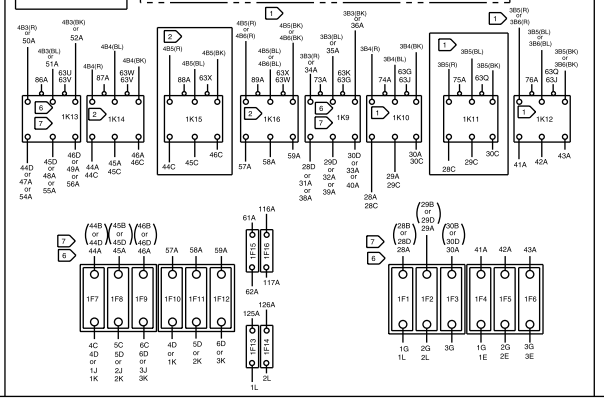
140T STANDARD EFFICIENCY
UNITS ONLY

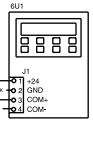


THE TABLE BELOW DESCRIBES CIRCUIT 2 FAN USAGE BY TONNAGE AND EFFICIENCY FANS AND ASSOCIATED WIRING IF USED, ARE ALWAYS WIRED AS SHOWN.

FAN	UNIT TONNAGE						
	140	155	170	185	200	225	250
4B3	S,P	S,P	S,P	S,P	S,P	S	S
4B4	S,P	S,P	S,P	S,P	S,P	S	S
4B5	S,P	S,P	S,P	S,P	S,P	S	S
4B6	S,P	S,P	S,P	S,P	S,P	S	S
4B7	P	P	S,P	S,P	S,P	S	S
4B8			P	P	S,P	S	S
4B9					P		S

P=PREMIUM EFFICIENCY UNIT FAN USAGE
S=STANDARD EFFICIENCY UNIT FAN USAGE

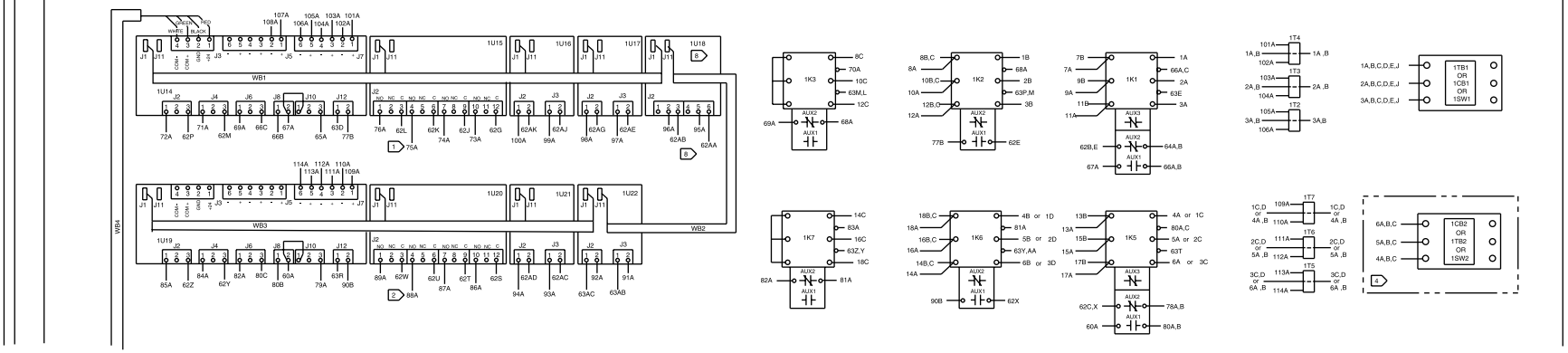


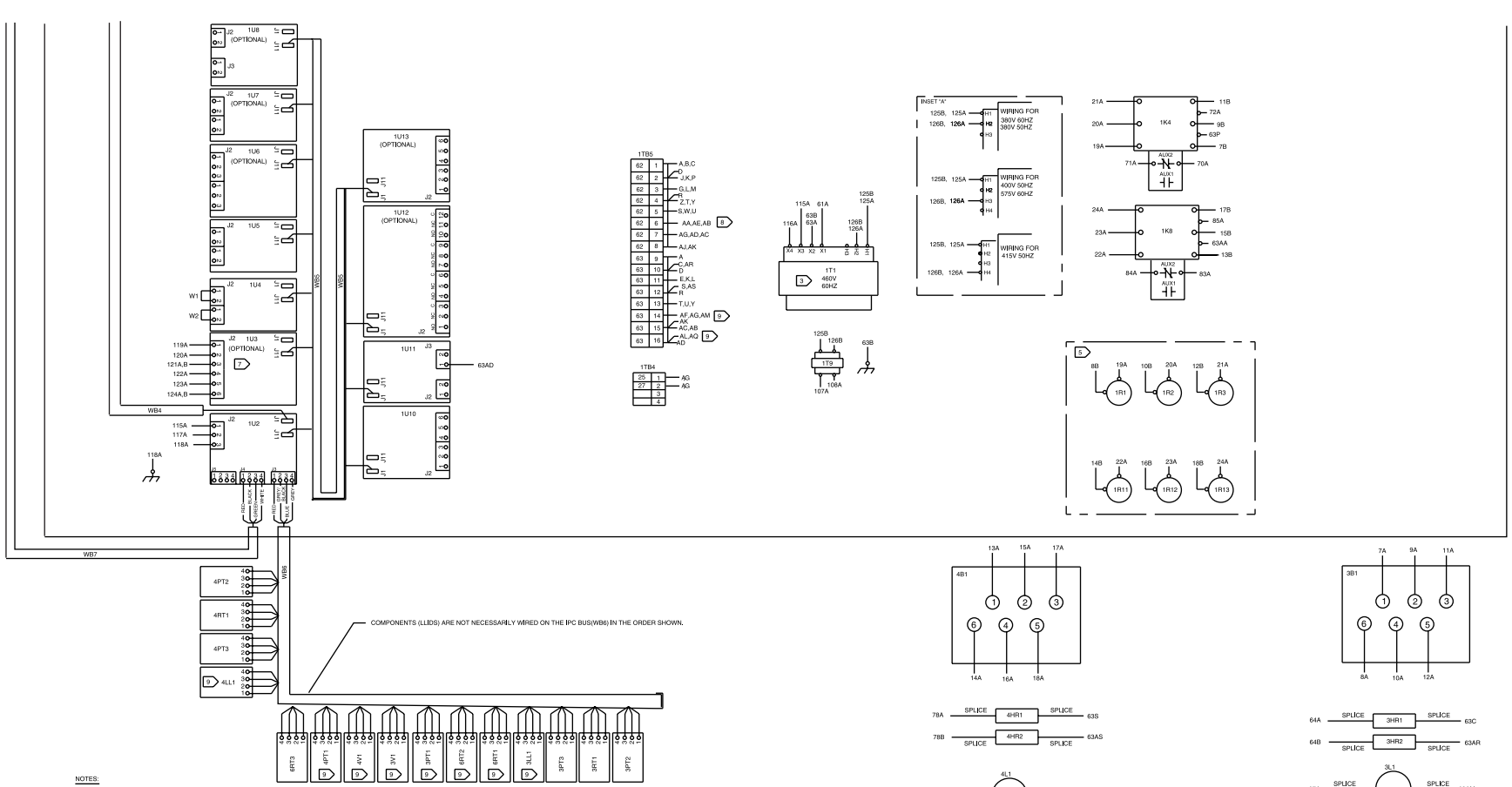


THE TABLE BELOW DESCRIBES CIRCUIT 1 FAN USAGE BY TONNAGE AND EFFICIENCY FANS AND ASSOCIATED WIRING IF USED, ARE ALWAYS WIRED AS SHOWN.

FAN	UNIT TONNAGE						
	140	155	170	185	200	225	250
3B3	S,P	S,P	S,P	S,P	S,P	S	S
3B4	S,P	S,P	S,P	S,P	S,P	S	S
3B5	S,P	S,P	S,P	S,P	S,P	S	S
3B6	S,P	S,P	S,P	S,P	S,P	S	S
3B7	P	S,P	S,P	S,P	S,P	S	S
3B8		P	P	S,P	S,P	S	S
3B9				P	P	S	S

P=PREMIUM EFFICIENCY UNIT FAN USAGE
S=STANDARD EFFICIENCY UNIT FAN USAGE



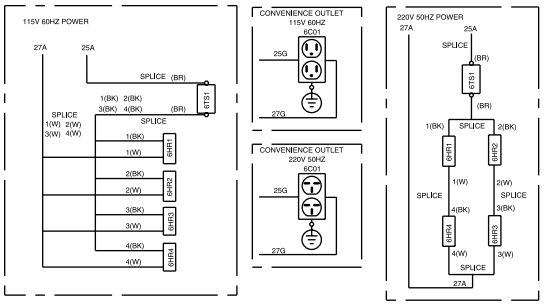


NOTES:

1. 1K11 CONTROLLER NOT REQUIRED ON 140 TON STANDARD UNITS; WHEN 1K11 IS NOT USED FAN MOTOR 3B5 IS WIRED TO 1K12 CONTROLLER AND THE FOLLOWING WIRES ARE NOT REQUIRED. 28C, 29C, 30C FROM 1K11 TO 1K10; 63Q FROM 1K11-COIL TO 1K12-COIL; 75A FROM 1K11-COIL TO 1U15–J2(14).
2. 1K15 CONTROLLER NOT REQUIRED ON 140 OR 155 TON STANDARD UNITS; WHEN 1K15 IS NOT USED FAN MOTOR 4B5 IS WIRED TO 1K16 CONTROLLER AND THE FOLLOWING WIRES ARE NOT REQUIRED. 44C 45C 46C FROM 1K15 TO 1K14; 63X FROM 1K15-COIL TO 1K16-COIL; 88A FROM 1K15-COIL TO 1U20-J2(4).
3. TRANSFORMER 1T1 SHOWN WIRED FOR 460 VOLT OPERATION. SEE INSET "A" FOR OTHER VOLTAGES.
4. NOTED DEVICES USED ONLY ON OPTIONAL DUAL SOURCE POWER.
5. RESISTORS 1R1 THRU 1R13 REPRESENT ONE OR MORE COMBINATIONS SUPPLIED BY EATON.
6. FOR UNITS WITHOUT LOW AMBIENT CONDENSER OPTION FAN MOTORS 3B3 & 4B3 ARE WIRED TO 1K9 & 1K13 RESPECTIVELY. 1K9 & 1K13 ARE WIRED TO 1F1 THRU 1F6 AS FOLLOWS. 28D FROM 1K9 TO 1F1, 29D FROM 1K9 TO 1F2, 30D FROM 1K9 TO 1F3, 44D FROM 1K13 TO 1F7, 45D FROM 1K13 TO 1F8; 46D FROM 1K13 TO 1F9. FOR UNITS WITH LOW AMBIENT CONDENSER OPTION FAN MOTORS 3B3 & 4B3 ARE WIRED TO 3U3 & 4U3 RESPECTIVELY.
7. FOR UNITS WITH LOW AMBIENT CONDENSER OPTION SEE CHART FOR USAGE OF COMPONENTS AND WIRES BY VOLTAGE.
8. ON PRODUCTS WITH REMOTE EVAP. MODULE 1U18 IS RELOCATED TO THE REMOTE EVAP PANEL AND BUS WB2 IS WIRED TO 1U17 INSTEAD OF 1U18. WIRES 62AA AND 62AB ARE NOT USED.
9. ON PRODUCTS WITH REMOTE EVAP, SOLENOID VALVES 3L7 AND 4L7 ARE RELOCATED TO THE REMOTE EVAPORATOR. WIRES 95A,B, 96A,B, 63AF,AW, AND 63AX,AQ ARE NOT USED. CONTROL COMPONENTS (LLIDS) THAT ARE RELOCATED TO THE REMOTE EVAPORATOR ARE 4LL1, 4PT1, 4V1, 3V1, 3PT1, 6RT2, 6RT1 AND 3LL1.

CIRCUIT 1 WIRING & COMPONENTS				
COMPONENTS		VOLTAGE 460/60 400/50	380/60	575/60
1U3		X	X	X
3U3		X	X	X
1F17 THRU 1F19		X	X	X
1T10			X	X
WIRING				
FROM	TO			
1F1	1F17	28B	28B	28B
1F2	1F18	29B	29B	29B
1F3	1F19	30B	30B	30B
1F17	1K9	31A		
1F18	1K9	32A		
1F19	1K9	33A		
1F17	1T10-H4		31B	
1F18	1T10-H5		32B	
1F19	1T10-H6		33B	
1F17	1T10-H1			31B
1F18	1T10-H2			32B
1F19	1T10-H3			33B
1T10-X1	1K9		38A	38A
1T10-X2	1K9		39A	39A
1T10-X3	1K9		40A	40A
1K9	3U3	34A	34A	34A
1K9	3U3	35A	35A	35A
1K9	3U3	36A	36A	36A
3U3	GRD	37A	37A	37A
1U3	3U3	119A	119A	119A
1U3	3U3	120A	120A	120A
1U3	3U3	121A	121A	121A
1U3	3U3	121B	121B	121B

CIRCUIT 2 WIRING & COMPONENTS				
COMPONENTS		VOLTAGE 460/60 400/50	380/60	575/60
1U3		X	X	X
4U3		X	X	X
1F20 THRU 1F22		X	X	X
1T11			X	X
WIRING				
FROM	TO			
1F7	1F20	44B	44B	44B
1F8	1F21	45B	45B	45B
1F9	1F22	46B	46B	46B
1F20	1K13	47A		
1F21	1K13	48A		
1F22	1K13	49A		
1F20	1T11-H4		47B	
1F21	1T11-H5		48B	
1F22	1T11-H6		49B	
1F20	1T11-H1			47B
1F21	1T11-H2			48B
1F22	1T11-H3			49B
1T11-X1	1K13		54A	54A
1T11-X2	1K13		55A	55A
1T11-X3	1K13		56A	56A
1K13	4U3	50A	50A	50A
1K13	4U3	51A	51A	51A
1K13	4U3	52A	52A	52A
4U3	GRD	53A	53A	53A
1U3	4U3	122A	122A	122A
1U3	4U3	123A	123A	123A
1U3	4U3	124A	124A	124A
1U3	4U3	124B	124B	124B



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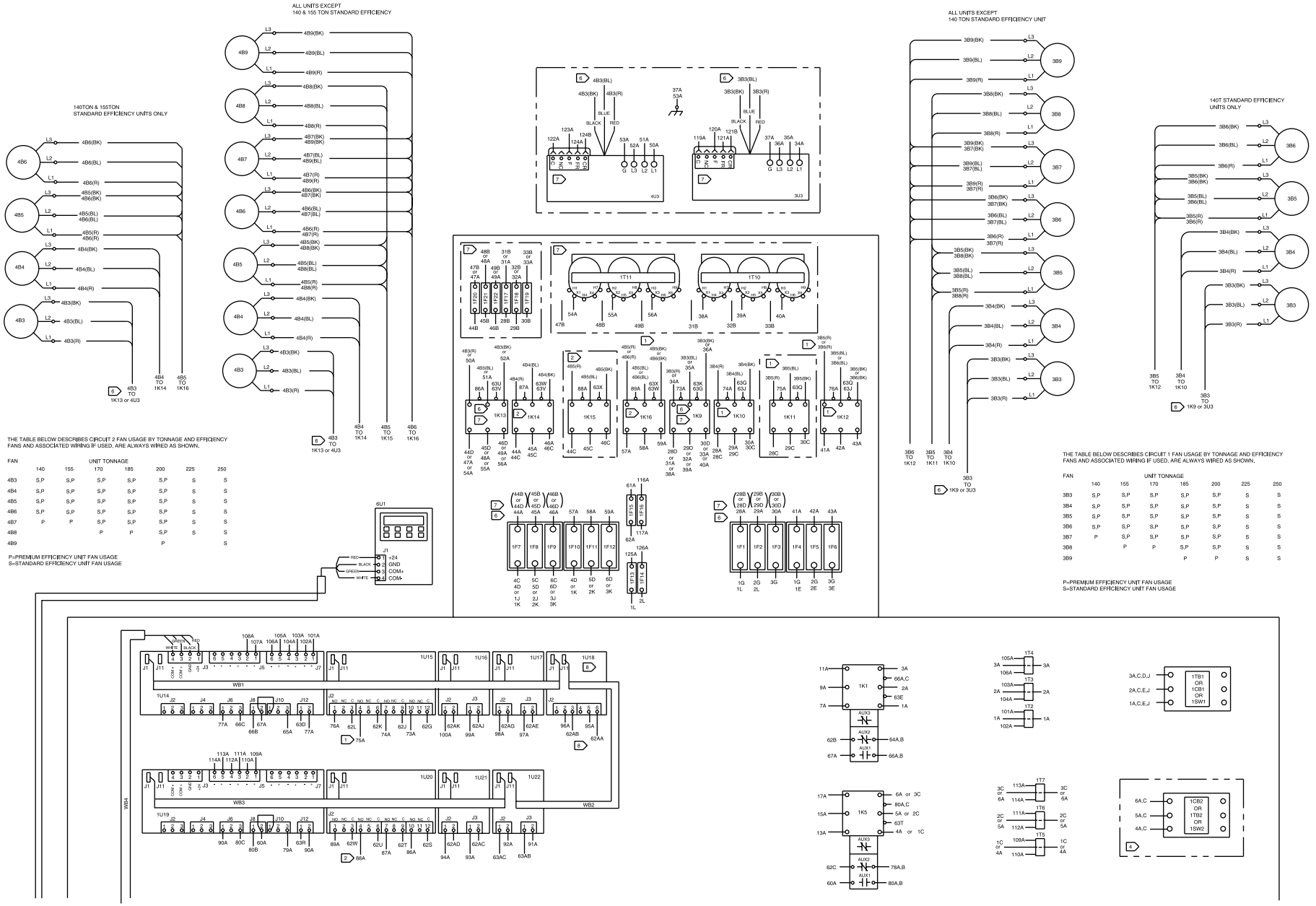
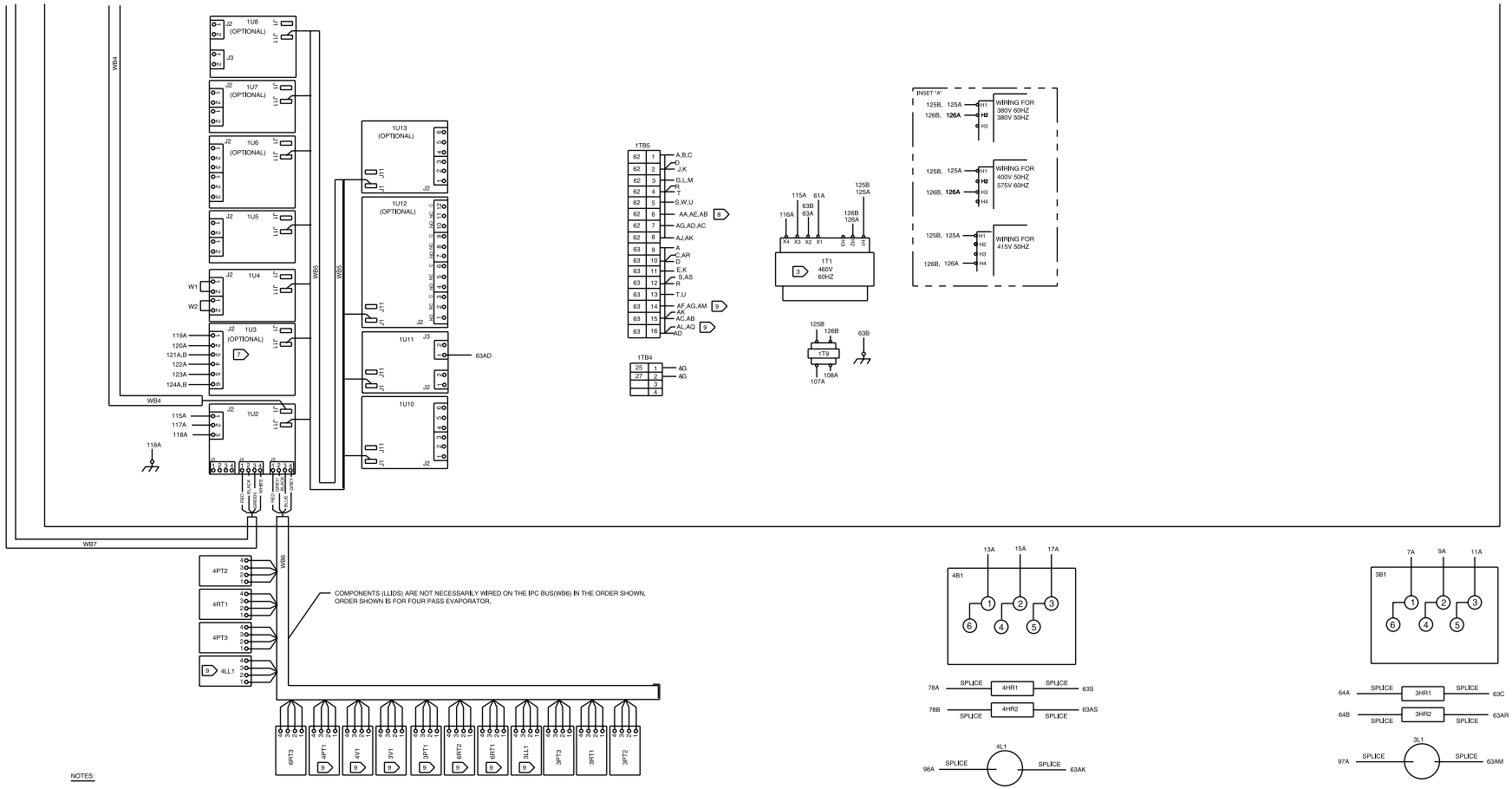
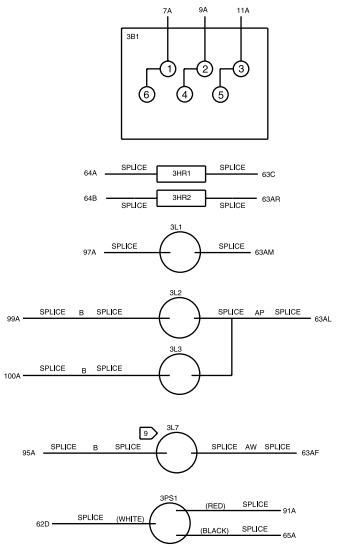
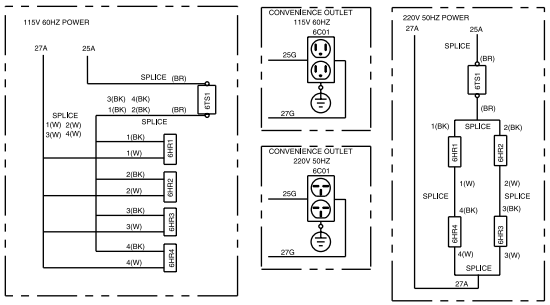
REPLACES	AUTOCAD	2309-1962	REV B
REVISION DATE 8-17-00	THE TRANE COMPANY A DIVISION OF AMERICAN STANDARD INC.	CONNECTION DIAGRAM	
DRAWN BY PBL	THIS DRAWING IS PROPRIETARY AND SHALL NOT BE COPIED OR ITS CONTENTS DISCLOSED TO OUTSIDE PARTIES WITHOUT THE WRITTEN CONSENT OF THE TRANE COMPANY	RTAC MEDIUM AIR COOLED X - L START 380/460/575/60 400/50	
DATE 6-1-00	SIMILAR TO		









NOTES:

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2. 1K15 CONTROLLER NOT REQUIRED ON 140 OR 155 TON STANDARD UNITS; WHEN 1K15 IS NOT USED FAN MOTOR 4B5 IS WIRED TO 1K16 CONTROLLER AND THE FOLLOWING WIRES ARE NOT REQUIRED. 44C 45C 46C FROM 1K15 TO 1K14; 63X FROM 1K15-COIL TO 1K16-COIL; 88A FROM 1K15-COIL TO 1U20-J2(4).
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CIRCUIT 1 WIRING & COMPONENTS				
COMPONENTS		VOLTAGE 460/60 400/50	380/60	575/60
1U3		X	X	X
3U3		X	X	X
1F17 THRU 1F19		X	X	X
1T10			X	X
WIRING				
FROM	TO			
1F1	1F17	28B	28B	28B
1F2	1F18	29B	29B	29B
1F3	1F19	30B	30B	30B
1F17	1K9	31A		
1F18	1K9	32A		
1F19	1K9	33A		
1F17	1T10-H4		31B	
1F18	1T10-H5		32B	
1F19	1T10-H6		33B	
1F17	1T10-H1			31B
1F18	1T10-H2			32B
1F19	1T10-H3			33B
1T10-X1	1K9		38A	38A
1T10-X2	1K9		39A	39A
1T10-X3	1K9		40A	40A
1K9	3U3	34A	34A	34A
1K9	3U3	35A	35A	35A
1K9	3U3	36A	36A	36A
3U3	GRD	37A	37A	37A
1U3	3U3	119A	119A	119A
1U3	3U3	120A	120A	120A
1U3	3U3	121A	121A	121A
1U3	3U3	121B	121B	121B

CIRCUIT 2 WIRING & COMPONENTS				
COMPONENTS		VOLTAGE 460/60 400/50	380/60	575/60
1U3		X	X	X
4U3		X	X	X
1F20 THRU 1F22		X	X	X
1T11			X	X
WIRING				
FROM	TO			
1F7	1F20	44B	44B	44B
1F8	1F21	45B	45B	45B
1F9	1F22	46B	46B	46B
1F20	1K13	47A		
1F21	1K13	48A		
1F22	1K13	49A		
1F20	1T11-H4		47B	
1F21	1T11-H5		48B	
1F22	1T11-H6		49B	
1F20	1T11-H1			47B
1F21	1T11-H2			48B
1F22	1T11-H3			49B
1T11-X1	1K13		54A	54A
1T11-X2	1K13		55A	55A
1T11-X3	1K13		56A	56A
1K13	4U3	50A	50A	50A
1K13	4U3	51A	51A	51A
1K13	4U3	52A	52A	52A
4U3	GRD	53A	53A	53A
1U3	4U3	122A	122A	122A
1U3	4U3	123A	123A	123A
1U3	4U3	124A	124A	124A
1U3	4U3	124B	124B	124B

⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.

FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

⚠ AVERTISSEMENT

VOLTAGE HASARDEUX!

DECONNECTEZ TOUTES LES SOURCES ELECTRIQUES INCLUANT LES DISJONCTEURS SITUES A DISTANCE AVANT D'EFFECTUER L'ENTRETIEN.

FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.

⚠ CAUTION

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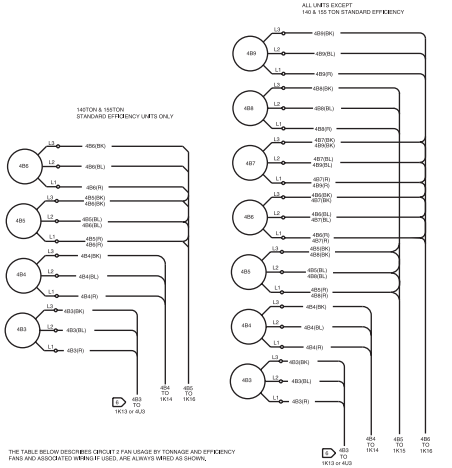
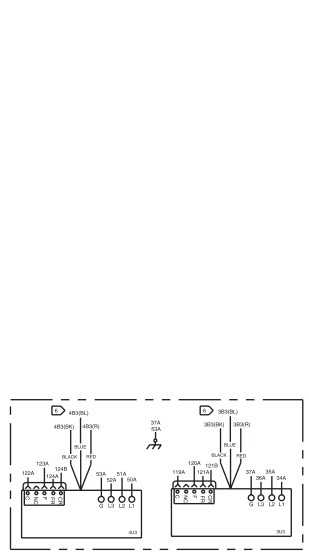
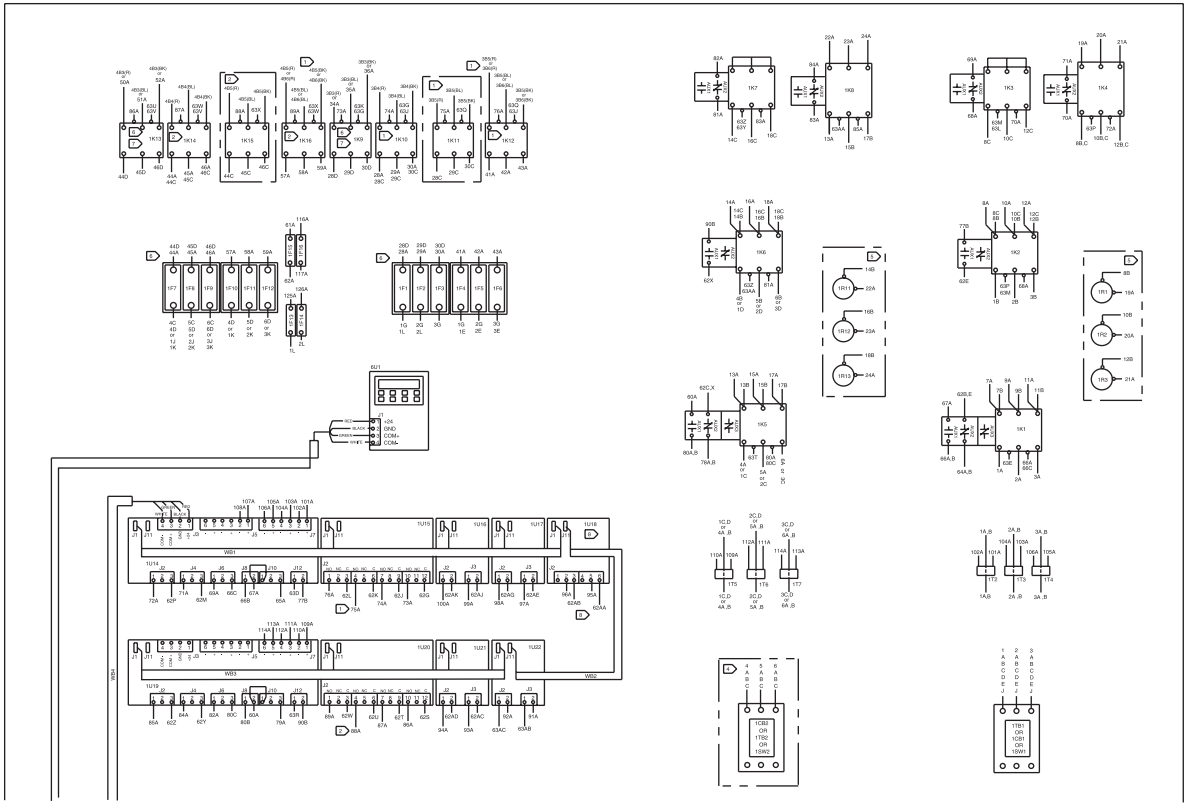
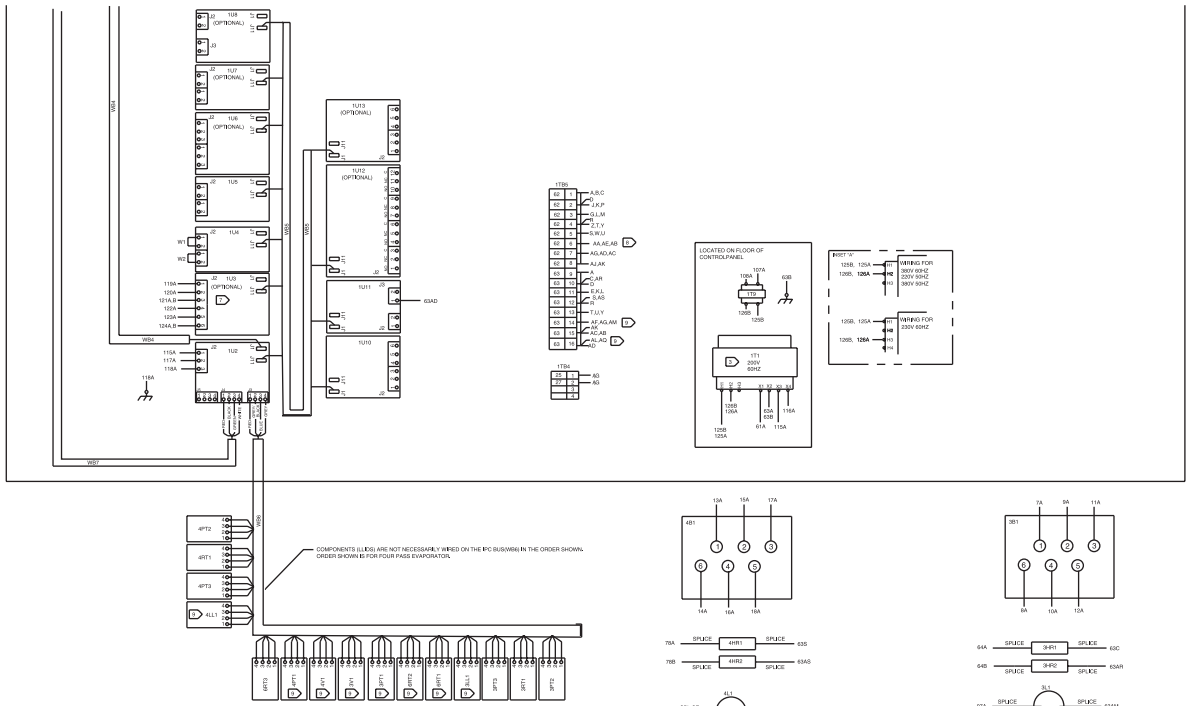
FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

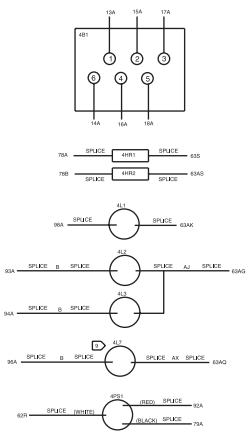
REPLACES	AUTOCAD	2309-1963	REV C
REVISION DATE 8-17-00	THE TRANE COMPANY A DIVISION OF AMERICAN STANDARD INC.	CONNECTION DIAGRAM	
DRAWN BY PBL	THIS DRAWING IS PROPRIETARY AND SHALL NOT BE COPIED OR ITS CONTENTS DISCLOSED TO OUTSIDE PARTIES WITHOUT THE WRITTEN CONSENT OF THE TRANE COMPANY	RTAC MEDIUM AIR COOLED WYE DELTA START 200/230/380/60 220/50	
DATE 6-1-00	SIMILAR TO		

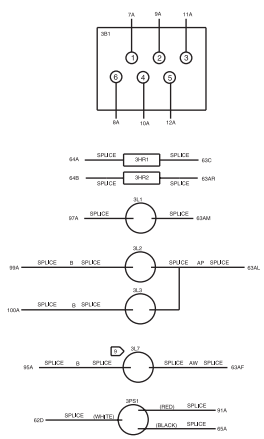










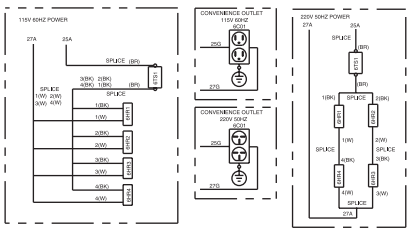


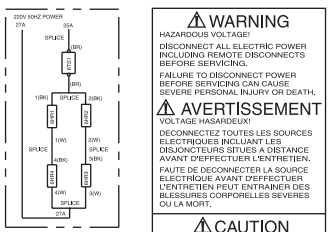
NOTES:

1. 1K11 CONTROLLER NOT REQUIRED ON 140 TON STANDARD UNITS; WHEN 1K11 IS NOT USED FAN MOTOR 3B5 IS WIRED TO 1K12 CONTROLLER AND THE FOLLOWING WIRES ARE NOT REQUIRED.
28C, 29C, 30C FROM 1K11 TO 1K10; 63Q FROM 1K11-COIL TO 1K13-COIL; 75A FROM 1K11-COIL TO 1U15-224).
2. 1K15 CONTROLLER NOT REQUIRED ON 140 OR 155 TON STANDARD UNITS; WHEN 1K15 IS NOT USED FAN MOTOR 4B5 IS WIRED TO 1K16 CONTROLLER AND THE FOLLOWING WIRES ARE NOT REQUIRED.
44C 45C 46C FROM 1K15 TO 1K14; 63X FROM 1K15-COIL TO 1K16-COIL; 88A FROM 1K15-COIL TO 1U20-224).
3. TRANSFORMER 1T1 SHOWN WIRED FOR 460 VOLT OPERATION, SEE INSET 'A' FOR OTHER VOLTAGES.
4. NOTED DEVICES USED ONLY ON OPTIONAL DUAL SOURCE POWER.
5. RESISTORS 1R1 THRU 1R13 REPRESENT ONE OR MORE COMBINATIONS SUPPLIED BY EATON.
6. FOR UNITS WITHOUT LOW AMBIENT CONDENSER OPTION FAN MOTORS 3B3 & 4B3 ARE WIRED TO 1K9 & 1K13 RESPECTIVELY, 1K9 & 1K13 ARE WIRED TO 1P1 THRU 1P6 AS FOLLOWS:
28D FROM 1K9 TO 1P1, 29D FROM 1K9 TO 1P3, 44D FROM 1K13 TO 1P7, 46D FROM 1K13 TO 1P8, 46D FROM 1K13 TO 1P9.
FOR UNITS WITH LOW AMBIENT CONDENSER OPTION FAN MOTORS 3B3 & 4B3 ARE WIRED TO 3U3 & 4U3 RESPECTIVELY.
7. FOR UNITS WITH LOW AMBIENT CONDENSER OPTION SEE CHART FOR USAGE OF COMPONENTS AND WIRES BY VOLTAGE.
8. ON PRODUCTS WITH REMOTE EVAP, MODULE 1U18 IS RELOCATED TO THE REMOTE EVAP PANEL AND BUS WB2IS WIRED TO 1U17 INSTEAD OF 1U18 WIRES 62AA AND 62AB ARE NOT USED.
9. ON PRODUCTS WITH REMOTE EVAP, SOLENOID VALVES 3LY AND 4LY ARE RELOCATED TO THE REMOTE EVAPORATOR, WIRES 95A,B, 96A,B, 63AF,AW, AND 63AX,AQ ARE NOT USED, CONTROL COMPONENTS (LLISS) THAT ARE RELOCATED TO THE REMOTE EVAPORATOR ARE 4LL1, 4PT1, 4V1, 3V1, 3PT1, 6RT2, 6RT1 AND 3LL1.

CIRCUIT 1 WIRING & COMPONENTS			
COMPONENTS	VOLTAGE		
	200,230/60 230/50		380/60
1U3	X		X
3U3	X		X
1F17 THRU 1F19			X
1T10			X
WIRING			
FROM	TO		
1F1	1K9	28D	
1F2	1K9	29D	
1F3	1K9	30D	
1F1	1F17		28B
1F2	1F18		29B
1F3	1F19		30B
1F17	1K9		
1F18	1K9		
1F19	1K9		
1F17	1T10-H4		31B
1F18	1T10-H5		32B
1F19	1T10-H6		33B
1T10-X1	1K9		38A
1T10-X2	1K9		39A
1T10-X3	1K9		40A
1K9	3U3	34A	34A
1K9	3U3	35A	35A
1K9	3U3	36A	36A
3U3	GRD	37A	37A
1U3	3U3	119A	119A
1U3	3U3	120A	120A
1U3	3U3	121A	121A
1U3	3U3	121B	121B

CIRCUIT 2 WIRING & COMPONENTS			
COMPONENTS	VOLTAGE		
	200,230/60 230/50		380/60
1U3	X		X
4U3	X		X
1F20 THRU 1F22			X
1T11			X
WIRING			
FROM	TO		
1F7	1K13	44D	
1F8	1K13	45D	
1F9	1K13	46D	
1F7	1F20		44B
1F8	1F21		45B
1F9	1F22		46B
1F20	1K13		
1F21	1K13		
1F22	1K13		
1F20	1T1-H4		47B
1F21	1T1-H5		48B
1F22	1T1-H6		49B
1T1-X1	1K13		54A
1T1-X2	1K13		55A
1T1-X3	1K13		56A
1K13	4U3	55A	50A
1K13	4U3	51A	51A
1K13	4U3	52A	52A
4U3	GRD	53A	53A
1U3	4U3	122A	122A
1U3	4U3	123A	123A
1U3	4U3	124A	124A
1U3	4U3	124B	124B





⚠ WARNING

HAZARDOUS VOLTAGE!

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VOLTAGE HASARDEUX!

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FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.

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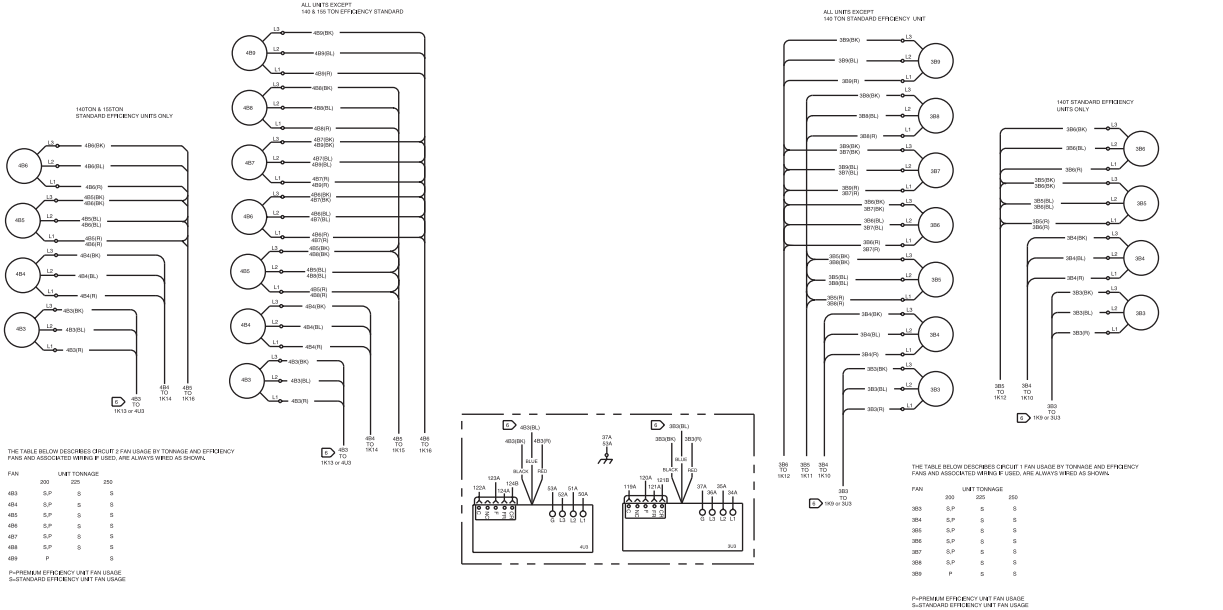
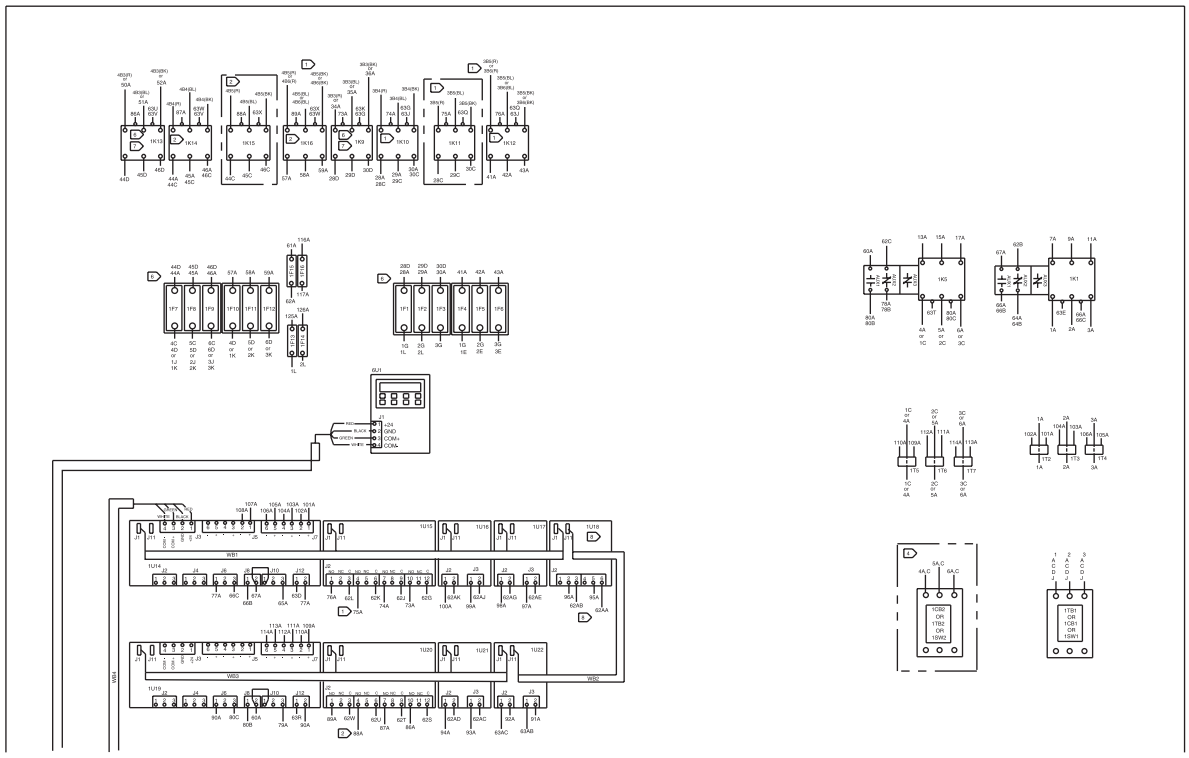
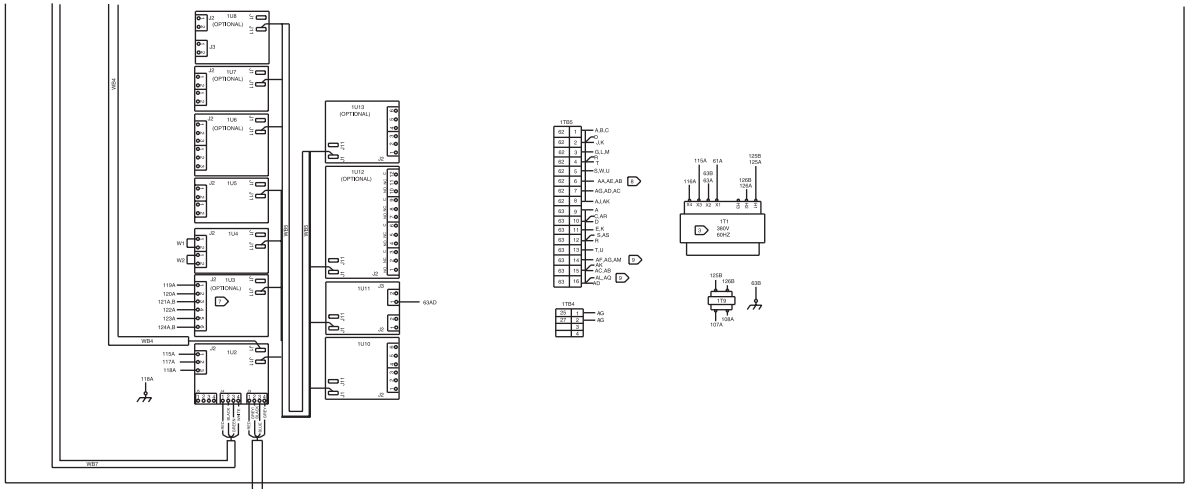
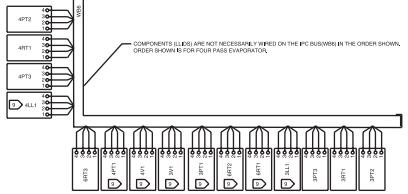
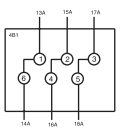
REPLACES	AUTOCAD	2309-1964	REV B
REVISION DATE 8-17-00	THE TRANE COMPANY A DIVISION OF AMERICAN STANDARD INC.	CONNECTION DIAGRAM	
DRAWN BY PBL	THIS DRAWING IS PROPRIETARY AND SHALL NOT BE COPIED OR ITS CONTENTS DISCLOSED TO OUTSIDE PARTIES WITHOUT THE WRITTEN CONSENT OF THE TRANE COMPANY	MEDIUM AIR COOLED X - L START 380V 60Hz	
DATE 6-1-00	SIMILAR TO		

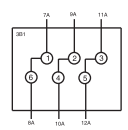


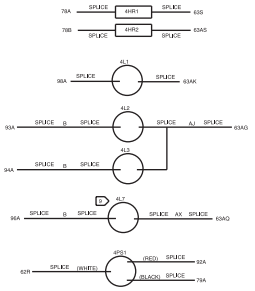


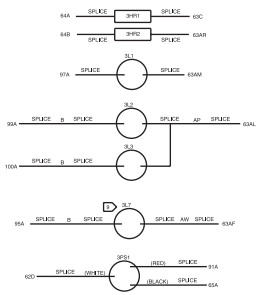










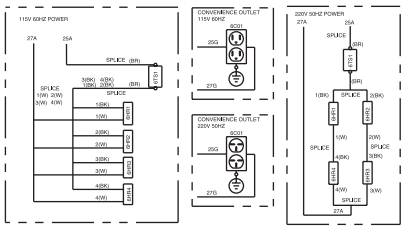


NOTES:

1. 1K11 CONTROLLER NOT REQUIRED ON 140 TON STANDARD UNITS; WHEN 1K11 IS NOT USED FAN MOTOR 3B5 IS WIRED TO 1K12 CONTROLLER AND THE FOLLOWING WIRES ARE NOT REQUIRED. 2BC, 2BC, 3BC FROM 1K11 TO 1K10; 83D FROM 1K1-COIL 75A FROM 1K11-COIL TO 1U15-J2(4).
2. 1K15 CONTROLLER NOT REQUIRED ON 140 OR 155 TON STANDARD UNITS; WHEN 1K15 IS NOT USED FAN MOTOR 4B5 IS WIRED TO 1K16 CONTROLLER AND THE FOLLOWING WIRES ARE NOT REQUIRED. 4AC 4DC 4BC FROM 1K15 TO 1K14; 83X FROM 1K15-COIL TO 1K16-COIL; 86A FROM 1K15-COIL TO 1U20-J2(4).
3. NOTED DEVICES USED ONLY ON OPTIONAL DUAL SOURCE POWER.
4. FOR UNITS WITHOUT LOW AMBIENT CONDENSER OPTION FAN MOTORS 3B3 & 4B3 ARE WIRED TO 1K9 & 1K13 RESPECTIVELY. 1K9 & 1K13 ARE WIRED TO 1F1 THRU 1F8 AS FOLLOWS. 2BD FROM 1K9 TO 1F1, 2BO FROM 1K9 TO 1F3, 44D FROM 1K13 TO 1F7, 45D FROM 1K13 TO 1F8; 46D FROM 1K13 TO 1F9. FOR UNITS WITH LOW AMBIENT CONDENSER OPTION FAN MOTORS 3B3 & 4B3 ARE WIRED TO 3U3 & 4U3 RESPECTIVELY.
5. FOR UNITS WITH LOW AMBIENT CONDENSER OPTION SEE CHART FOR USAGE OF COMPONENTS AND WIRES BY VOLTAGE.
6. ON PRODUCTS WITH REMOTE EVAP., MODULE 1U16 IS RELOCATED TO THE REMOTE EVAP PANEL AND BUS WB2 IS WIRED TO 1U17 INSTEAD OF 1U16, WIRES 63AA AND 63AB ARE NOT USED.
7. ON PRODUCTS WITH REMOTE EVAP., SOLENOID VALVES 3LY AND 4LY ARE RELOCATED TO THE REMOTE EVAPORATOR, WIRES 95A,B, 96A,B, 63AF,AW, AND 63AX,AQ ARE NOT USED, CONTROL COMPONENTS (LLIDS) THAT ARE RELOCATED TO THE REMOTE EVAPORATOR ARE 4LL1, 4PT1, 4V1, 3V1, 3PT1, 6RT2, 6RT1 AND 3LL1.

CIRCUIT 1 WIRING & COMPONENTS		
COMPONENTS		VOLTAGE 380/60
1U3		X
4U3		X
1F17 THRU 1F19		X
1T10		X
WIRING		
FROM	TO	
1F1	1K9	
1F2	1K9	
1F3	1K9	
1F1	1F17	28B
1F2	1F18	29B
1F3	1F19	30B
1F17	1K9	
1F18	1K9	
1F19	1K9	
1F17	1T10=K1	31B
1F18	1T10=K5	32B
1F19	1T10=K6	33B
1F17	1T10=K1	
1F18	1T10=K2	
1F19	1T10=K3	
1T10=K1	1K9	38A
1T10=K2	1K9	39A
1T10=K3	1K9	40A
1K9	3U3	34A
1K9	3U3	35A
1K9	3U3	36A
3U3	GRD	37A
1U3	3U3	119A
1U3	3U3	120A
1U3	3U3	121A
1U3	3U3	121B

CIRCUIT 2 WIRING & COMPONENTS		
COMPONENTS		VOLTAGE 380/60
1U3		X
4U3		X
1F20 THRU 1F22		X
1T11		X
WIRING		
FROM	TO	
1F7	1K13	
1F8	1K13	
1F9	1K13	
1F7	1F20	44B
1F8	1F21	45B
1F9	1F22	46B
1F20	1K13	
1F21	1K13	
1F22	1K13	
1F20	1T11=K4	47B
1F21	1T11=K5	48B
1F22	1T11=K6	49B
1F20	1T11=K1	
1F21	1T11=K2	
1F22	1T11=K3	
1T11=K1	1K13	54A
1T11=K2	1K13	55A
1T11=K3	1K13	56A
1K13	4U3	50A
1K13	4U3	51A
1K13	4U3	52A
4U3	GRD	53A
1U3	4U3	122A
1U3	4U3	123A
1U3	4U3	124A
1U3	4U3	124B



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FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.

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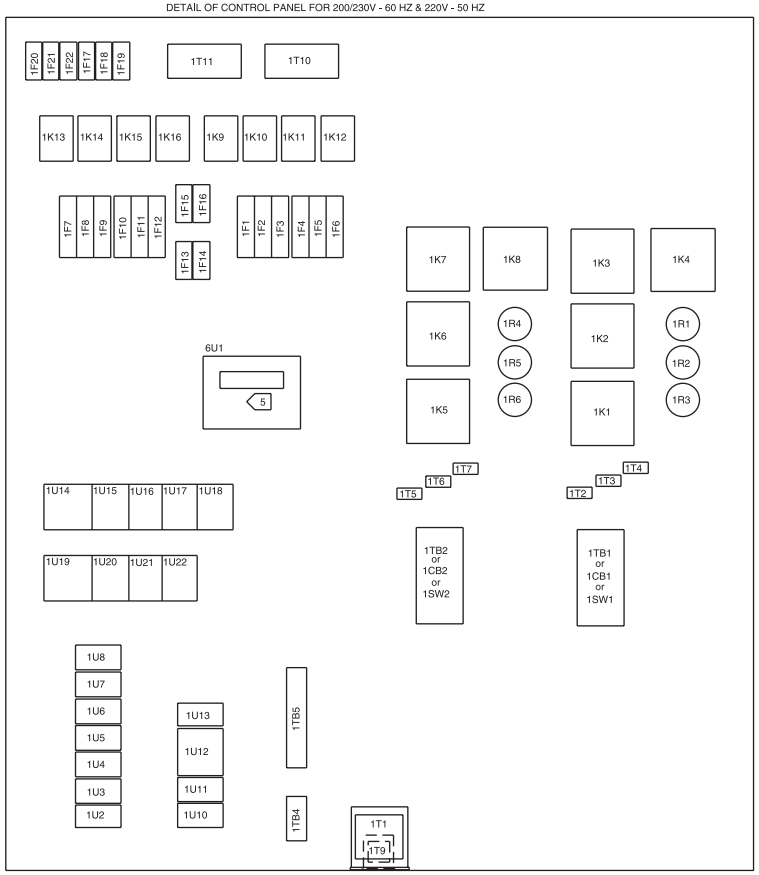
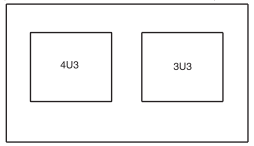
DETAIL OF CONTROL PANEL FOR 200/230V - 60 HZ & 220V - 50 HZ

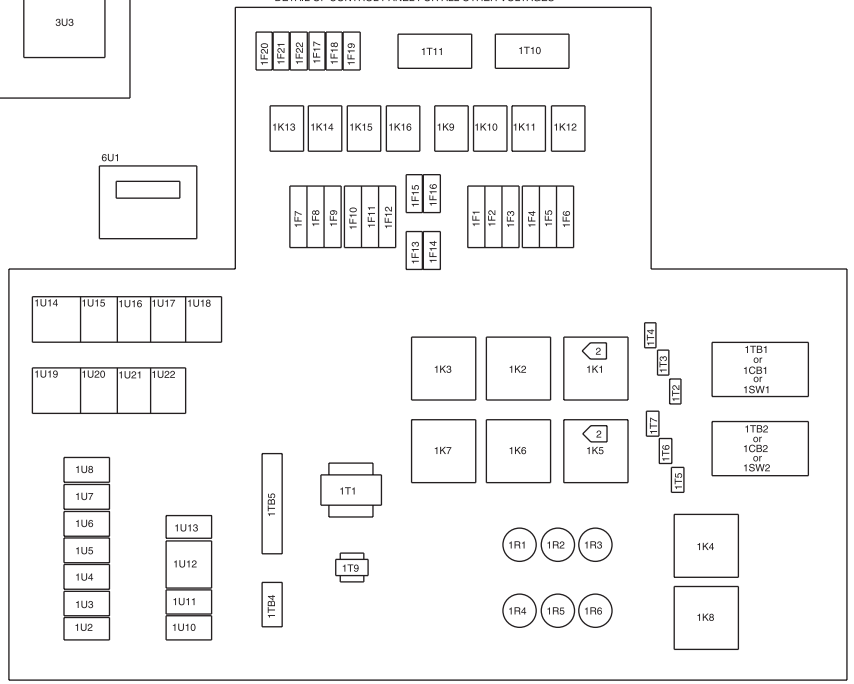


VIEW A_A

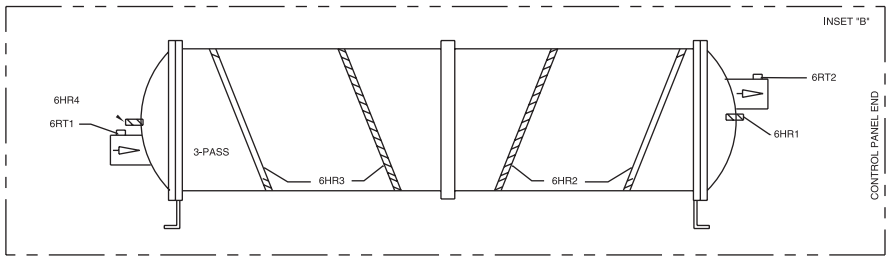
INVERTER CONTROL PANEL
(FACING FRONT OF MAIN CONTROL PANEL)



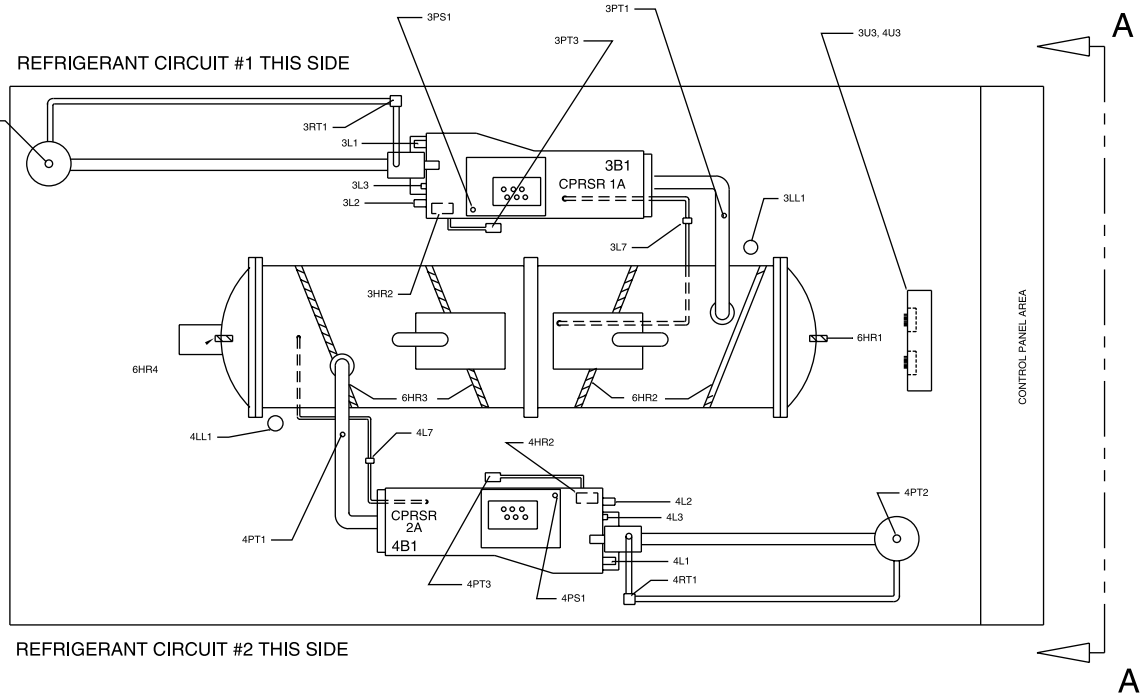
DETAIL OF CONTROL PANEL FOR ALL OTHER VOLTAGES

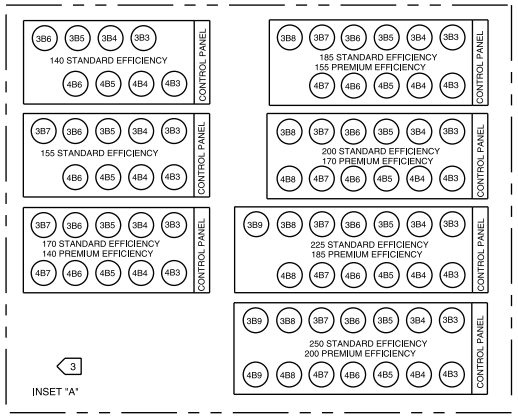


VIEW A_A



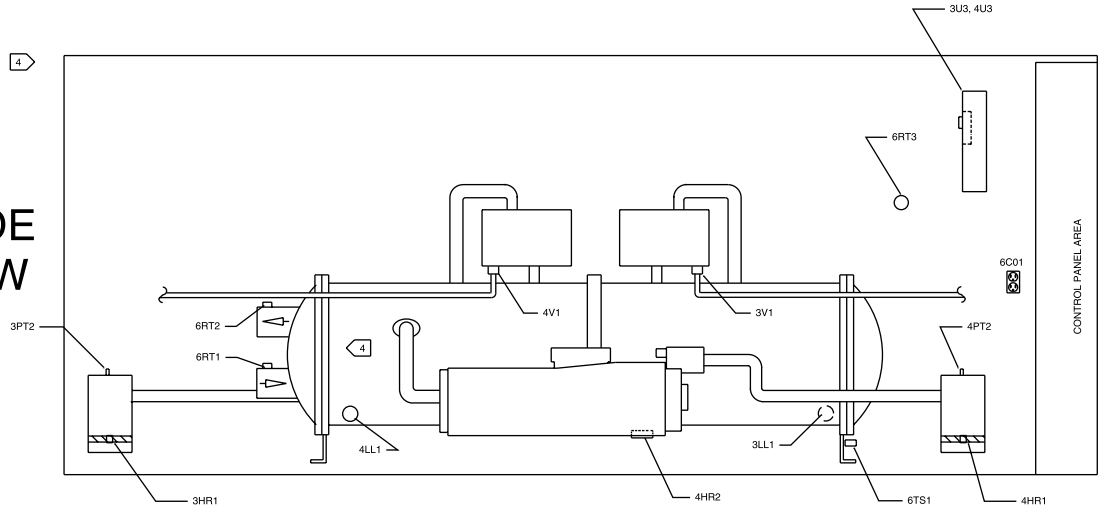
TOP VIEW





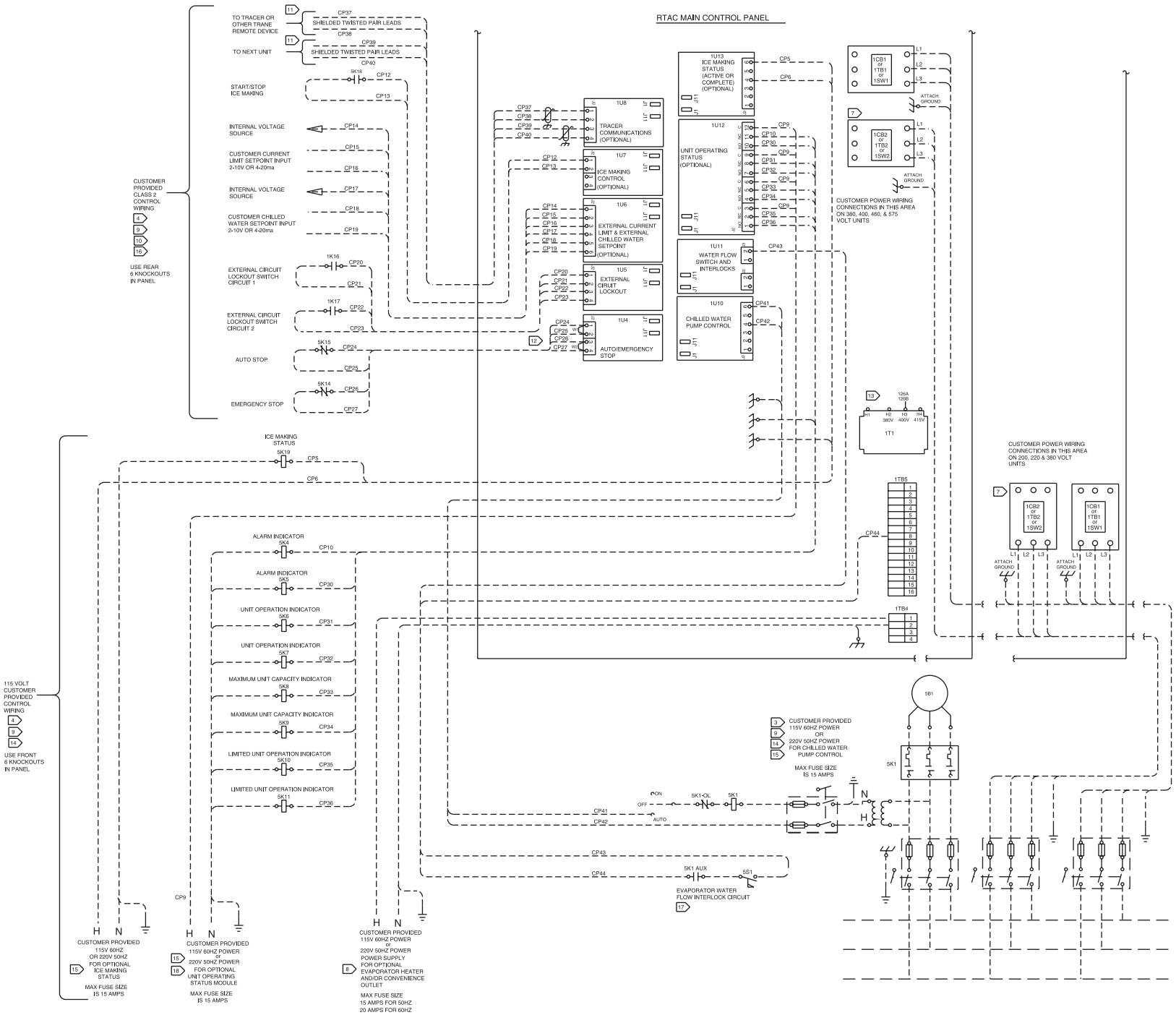
1. ALL COMPONENTS & OPTIONS ARE SHOWN. SOME ITEMS MAY NOT BE PRESENT ON ALL PRODUCTS.
2. PANEL IS SHOWN AS A WYE-DELTA START. ONLY 1K1 AND 1K5 ARE USED WHEN X-L START IS ORDERED. 1R1 THRU 1R6 ARE NOT USED ON X-L START.
3. THE VARIOUS FAN ARRANGEMENTS ARE SHOWN IN INSET "A".
4. 4-PASS EVAPORATOR IS SHOWN. SEE INSET "B" FOR 3-PASS WATER CONNECTION ARRANGEMENT.
5. ON UNITS WITH THE LARGE CONTROL PANEL 6U1 IS LOCATED ON THE LEFT CONTROL PANEL DOOR.

SIDE VIEW



REPLACES			
REVISION DATE	8-29-00		
DRAWN BY	PBL		
DATE	6-1-00		
AUTOCAD	THE TRANE COMPANY A DIVISION OF AMERICAN STANDARD INC.		
SIMILAR TO	THIS DRAWING IS THE PROPERTY OF THE TRANE COMPANY AND SHALL NOT BE COPIED OR ITS CONTENTS DISCLOSED TO OUTSIDE PARTIES WITHOUT THE WRITTEN CONSENT OF THE TRANE COMPANY		
COMPONENT LOCATION	RTAC MEDIUM AIR COOLED SINGLE CONTROL PANEL UNITS	2309-1965	REV. B

REPLACES	AUTOCAD	2309-1966	REV B
REVISION DATE 8-30-00	THE TRANE COMPANY A DIVISION OF AMERICAN STANDARD INC.	FIELD WIRING	
DRAWN BY PBL	THIS DRAWING IS PROPRIETARY AND SHALL NOT BE COPIED OR ITS CONTENTS DISCLOSED TO OUTSIDE PARTIES WITHOUT THE WRITTEN CONSENT OF THE TRANE COMPANY	MEDIUM AIR COOLED	
DATE 6-1-00	SIMILAR TO		



WIRE SIZE RANGE FOR FACTORY PROVIDED LUGS FOR CUSTOMER POWER WIRING CONNECTIONS

DISCONNECT OR CIRCUIT BREAKER OPTION

STARTER TYPE	VOLTAGE	SINGLE SOURCE POWER ELECTRICAL CIRCUIT 1 & 2		ELECTRICAL CIRCUIT 1 DUAL SOURCE POWER		ELECTRICAL CIRCUIT 2 DUAL SOURCE POWER	
		TONNAGE (COVERS STANDARD AND PREMIUM EFFICENCY UNITS)	LUG WIRE SIZE RANGE	TONNAGE (COVERS STANDARD AND PREMIUM EFFICENCY UNITS)	LUG WIRE SIZE RANGE	TONNAGE (COVERS STANDARD AND PREMIUM EFFICENCY UNITS)	LUG WIRE SIZE RANGE
XL & YD	200/60/3	ALL	OPTION NOT AVAILABLE	140	1-4/0 to 600	140, 155	1-4/0 to 600
	200/60/3			155, 170, 185, 200, 225, 250	4-4/0 to 500	170, 185, 200, 225, 250	4-4/0 to 500
	230/60/3	ALL	OPTION NOT AVAILABLE	140, 155, 170	1-4/0 to 600	140, 155, 170, 185	1-4/0 to 600
	230/60/3			185, 200, 225, 250	4-4/0 to 500	200, 225, 250	4-4/0 to 500
	380/60/3	140	1-4/0 to 600	140, 155, 170	1-3 to 350	140, 155, 170, 185	1-3 to 350
	380/60/3	155, 170, 185	4-4/0 to 500	185, 200, 225, 250	1-4/0 to 600	200, 225, 250	1-4/0 to 600
	380/60/3	200, 225,250	OPTION NOT AVAILABLE				
	460/60/3	140, 155, 170	1-4/0 to 600	140, 155, 170, 185, 200	1-3 to 350	155, 170, 185, 200, 225	1-3 to 350
	460/60/3	185, 200, 225, 250	4-4/0 to 500	225, 250	1-4/0 to 600	250	1-4/0 to 600
	575/60/3	140, 155	1-3 to 350	140, 155, 170, 185, 200, 225, 250	1-3 to 350	140, 155, 170, 185, 200, 225, 250	1-3 to 350
	575/60/3	170, 185, 200, 225	1-4/0 to 600				
	575/60/3	250	4-4/0 to 500				
	220/50/3	ALL	OPTION NOT AVAILABLE	140	1-4/0 to 600	140, 155	1-4/0 to 600
	220/50/3			155, 170, 185, 200	4-4/0 to 500	170, 185, 200	4-4/0 to 500
	400/50/3	140, 155	1-4/0 to 600	140, 155, 170, 185, 200	1-3 to 350	140, 155, 170, 185, 200	1-3 to 350
	400/50/3	170, 185, 200	4-4/0 to 500				

TERMINAL BLOCK OR LUG OPTION

STARTER TYPE	VOLTAGE	SINGLE SOURCE POWER ELECTRICAL CIRCUIT 1 & 2		ELECTRICAL CIRCUIT 1 DUAL SOURCE POWER		ELECTRICAL CIRCUIT 2 DUAL SOURCE POWER	
		TONNAGE (COVERS STANDARD AND PREMIUM EFFICENCY UNITS)	LUG WIRE SIZE RANGE	TONNAGE (COVERS STANDARD AND PREMIUM EFFICENCY UNITS)	LUG WIRE SIZE RANGE	TONNAGE (COVERS STANDARD AND PREMIUM EFFICENCY UNITS)	LUG WIRE SIZE RANGE
XL	380/60/3	140	2-4 TO 500	140, 155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	140, 155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250
	380/60/3	155, 170, 185, 200, 225, 250	2-2 TO 600				
	460/60/3	140, 155, 170	1-2 TO 750 & 2-1/0 TO 250	140, 155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	140, 155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250
	460/60/3	185, 200, 225, 250	2-2 TO 600				
	575/60/3	140	2-4 TO 500	140	2-4 TO 500	140, 155	2-4 TO 500
	575/60/3	155, 170, 185, 200, 225	1-2 TO 750 & 2-1/0 TO 250	155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250
	575/60/3	250	2-2 TO 600				
	400/50/3	140	2-4 TO 500				
	400/50/3	155	1-2 TO 750 & 2-1/0 TO 250	140, 155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	140, 155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250
	400/50/3	170, 185, 200	2-2 TO 600				
YD	200/60/3	140, 155	2-2 TO 600	140	1-2 TO 750 & 2-1/0 TO 250	140, 155	1-2 TO 750 & 2-1/0 TO 250
	200/60/3	170, 185, 200, 225, 250	4-2 TO 600	155, 170, 185, 200, 225, 250	2-2 TO 600	170, 185, 200, 225, 250	2-2 TO 600
	230/60/3	140, 155, 170	2-2 TO 600	140, 155, 170	1-2 TO 750 & 2-1/0 TO 250	140, 155, 170	1-2 TO 750 & 2-1/0 TO 250
	230/60/3	185, 200, 225, 250	4-2 TO 600	185, 200, 225, 250	2-2 TO 600	185, 200, 225, 250	2-2 TO 600
	380/60/3	140	2-4 TO 500	140	2-4 TO 500	140, 155	2-4 TO 500
	380/60/3	155, 170, 185, 200, 225, 250	2-2 TO 600	155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250
	460/60/3	140, 155, 170	2-4 TO 500	140, 155, 170	2-4 TO 500	140, 155, 170	2-4 TO 500
	460/60/3	185, 200, 225, 250	2-2 TO 600	185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250
	575/60/3	140, 155, 170, 185, 200	2-4 TO 500	140, 155, 170, 185, 200	2-4 TO 500	140, 155, 170, 185, 200, 225	2-4 TO 500
	575/60/3	225	1-2 TO 750 & 2-1/0 TO 250	225, 250	1-2 TO 750 & 2-1/0 TO 250	250	1-2 TO 750 & 2-1/0 TO 250
	575/60/3	250	2-2 TO 600				
	220/50/3	140, 155, 170	2-2 TO 600	140	1-2 TO 750 & 2-1/0 TO 250	140, 155	1-2 TO 750 & 2-1/0 TO 250
	220/50/3	185, 200	4-2 TO 600	155, 170, 185, 200, 225, 250	2-2 TO 600	170, 185, 200	2-2 TO 600
	400/50/3	140	2-4 TO 500	140	2-4 TO 500	140, 155	2-4 TO 500
	400/50/3	155	1-2 TO 750 & 2-1/0 TO 250	155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	170, 185, 200	1-2 TO 750 & 2-1/0 TO 250
	400/50/3	170, 185, 200	2-2 TO 600				

REPLACEMENT FUSE SIZES

FUSE PROTECT FUNCTION	UNIT SIZE	UNIT VOLTAGE	DESIGNATION	VOLTS	CLASS	AMPS
CONDENSER FANS	140 TO 250	200,230,220	1F1 THRU 1F12	600	R	40
CONTROL POWER TRANSFORMER PRIMARY		200	1F13,1F14	600	CC	6.25
		230		600	CC	6
		380		600	CC	4
		460		600	CC	5
		575		600	CC	3.5
		400		600	CC	5
CONTROL POWER TRANSFORMER 115 VOLT SEC.		ALL	1F15	600	CC	10
CONTROL POWER TRANSFORMER 24 VOLT SEC.		ALL	1F16	600	CC	10
INVERTER DRIVE AND OR INVERTER TRANSFORMER PRI.		380	1F17 THRU 1F22	600	CC	9
		460		600	CC	10
		575		600	CC	6.25

GENERAL NOTES:

1. CAUTION-DO NOT ENERGIZE THE UNIT UNTIL CHECK OUT AND STARTUP PROCEDURES HAVE BEEN COMPLETED.
2. ALL MOTORS ARE PROTECTED FROM PRIMARY SINGLE PHASE FAILURES.
3. IF THE UNIT PROVIDED PUMP CONTROL IS NOT USED THE FIELD ROVIDED PUMP CONTROL LOGIC SHOULD RUN THE EVAPORATOR WATER PUMP FOR ONE MINUTE AFTER A UNIT SHUTDOWN COMMAND IS ISSUED.
4. THE FOLLOWING FEATURES ARE OPTIONAL AND MAY OR MAY NOT BE PROVIDED. CUSTOMER PROVIDED WIRING FOR ALL STANDARD FEATURES AND OPTIONS IS SHOWN ON THIS DIAGRAM. OPTIONAL FEATURES ARE SO NOTED.
   - LOW VOLTAGE OPTIONS (CLASS 2)
     - TRACER COMMUNICATION INTERFACE
     - ICE MAKING START/STOP
     - EXTERNAL CURENT LIMIT AND EXTERNAL CHILLED WATER SETPOINT
   - 115 VOLT OPTIONS
     - ICE MAKING STATUS
     - UNIT OPERATING STATUS MODULE
     - EVAPORATOR HEATER (FREEZE PROTECTION)
     - CONVENIENCE OUTLET
   - LINE VOLTAGE OPTIONS
     - UNIT MOUNTED DISCONNECT OR HCAR CIRCUIT BREAKER
     - SINGLE OR DUAL SOURCE MAIN POWER SUPPLY
       DUAL SOURCE POWER SUPPLY CONNECTIONS ARE SHOWN. IF SINGLE SOURCE POWER IS PROVIDED, 1CB2, 1TB2 OR 1SW2 ARE NOT PROVIDED.

WIRING REQUIREMENTS

5. RECOMMENDED FIELD WIRING CONNECTIONS ARE SHOWN BY DOTTED LINES
6. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND STATE AND LOCAL REQUIREMENTS. EXPORT UNIT WIRING MUST COMPLY WITH LOCAL APPLICABLE CODES.
7. ALL UNIT POWER WIRING MUST BE COPPER CONDUCTORS ONLY AND HAVE A MINIMUM TEMPERATURE INSULATION RATING OF 90 DEGREE C. SEE UNIT NAMEPLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM FUSE SIZE REQUIREMENTS. THE POWER WIRING LUG SIZE PROVIDED ON THE VARIOUS UNITS IS SHOWN IN THE ADJACENT TABLE.
8. POWER FOR THE OPTIONAL EVAP HEATER AND OR CONVENIENCE OUTLET IS SUPPLIED BY A COMMON CUSTOMER PROVIDED POWER SUPPLY. WHEN POWERED, THE HEAT TAPE WILL USE 1640 VA OF THE TOTAL AVAILABLE SUPPLY ON 60 HZ UNITS AND APPROXIMATELY 1390 VA ON 50 HZ UNITS.
9. ALL CUSTOMER CONTROL CIRCUIT WIRING MUST BE COPPER CONDUCTORS ONLY AND HAVE A MINIMUM INSULATION RATING OF 300 VOLTS. EXCEPT AS NOTED ALL CUSTOMER WIRING CONNECTIONS ARE MADE TO CIRCUIT BOARD MOUNTED BOX LUGS WITH A WIRE RANGE OF 14 TO 18 AWG. THE HEAT TAPE AND/OR CONVENIENCE OUTLET AND THE GROUND SIDE OF THE FLOW SWITCH GO TO TERMINAL STRIPS WITH A #10 SET SCREW WHICH WILL ACCEPT RING OR FORK TERMINALS OR STRIPPED WIRE LEADS.
10. DO NOT RUN LOW VOLTAGE CONTROL WIRING (30 VOLTS OR LESS) IN CONDUIT WITH 110 VOLT OR HIGHER WIRING. DO NOT EXCEED THE FOLLOWING MAXIMUM RUN LENGTHS FOR A GIVEN SIZE: 14 AWG, 5000 FT; 16 AWG, 2000 FT; 18 AWG, 1000FT
11. SHIELDED TWISTED PAIR LEADS ARE REQUIRED FOR CONNECTIONS TO THE COMMUNICATIONS INTERFACE MODULE (1U8). THE SHIELD SHOULD BE GROUNDED AT THE RTAC CONTROL PANEL END.
12. THE CONTACTS FOR THESE FEATURES ARE JUMPERED AT THE FACTORY BY JUMPERS W1 & W2 TO ENABLE UNIT OPERATION. IF REMOTE CONTROL IS DESIRED REMOVE THE JUMPERS AND CONNECT TO THE DESIRED CONTROL CIRCUIT.
13. AS SHIPPED THE NORMAL 400 VOLT UNIT CONTROL POWER TRANSFORMERS ARE WIRED ON THE 400 VOLT TAP (H3). TRANSFORMER LEADS 126A & 126B SHOULD BE RECONNECTED TO THE APPROPRIATE TAP FOR THE 380 (H2) OR 415 (H4) VOLT POWER SUPPLIES.
14. GROUND ALL CUSTOMER PROVIDED 115 VOLT POWER SUPPLIES AS REQUIRED BY CODES. GREEN GROUND SCREWS ARE PROVIDED IN THE UNIT CONTROL PANEL.

CONTACT RATINGS AND REQUIREMENTS

15. UNIT PROVIDED DRY CONTACTS FOR THE EVAPORATOR PUMP CONTROL, THE UNIT OPERATING STATUS RELAYS & THE ICE MAKING STATUS RELAY (1U10, 1U12, & 1U13) ARE RATED FOR 7.2 AMPS RESISTIVE, 2.88 AMPS PILOT DUTY, OR 1/3 HP, 7.2 FLA AT 120 VOLTS 60 HZ. CONTACTS ARE RATED FOR 5 AMPS GENERAL PURPOSE DUTY AT 240 VOLTS. THE MAX FUSE SIZE FOR ANY OF THESE CIRCUITS IS 15 AMPS.
16. CUSTOMER SUPPLIED CONTACTS FOR ALL LOW VOLTAGE CONNECTIONS MUST BE COMPATABLE WITH DRY CIRCUIT 24 VOLTS DC FOR A 12 MA RESISTIVE LOAD. SILVER OR GOLD PLATED CONTACTS ARE RECOMMENDED.
17. FLOW SWITCH AND INTERLOCK CONTACTS MUST BE ACCEPTABLE FOR USE IN A 120 VOLT 1mA CIRCUIT. OR A 220 VOLT 2mA CIRCUIT.
18. THE FIELD PROVIDED INDICATORS MAY BE RELAYS (AS SHOWN), LIGHTS OR AUDIBLE DEVICES. FOUR DUPLICATE FUNCTIONS ARE SHOWN. THE DUPLICATE FUNCTIONS MAY BE CONNECTED TO EITHER OR BOTH OF THE NORMALLY OPEN OR NORMALLY CLOSED RELAY CONTACTS OF EACH OF THE 4 SPDT RELAYS ON THE OPTIONAL UNIT OPERATING STATUS MODULE.

THE FUNCTIONS OF THE OPERATING STATUS MODULE RELAYS ARE PROGRAMABLE. DEFAULT FUNCTIONS ARE SHOWN. SEE IOM FOR DETAILS.

⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.

FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

⚠ AVERTISSEMENT

VOLTAGE HASARDEUX!

DECONNECTEZ TOUTES LES SOURCES ELECTRIQUES INCLUANT LES DISJONCTEURS SITUES A DISTANCE AVANT D'EFFECTUER L'ENTRETIEN.

FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.

⚠ CAUTION

USE COPPER CONDUCTORS ONLY!

UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT OTHER TYPES OF CONDUCTORS.

FAILURE TO DO SO MAY CAUSE DAMAGE TO THE EQUIPMENT.

⚠ WARNING

HAZARDOUS VOLTAGE!

DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.

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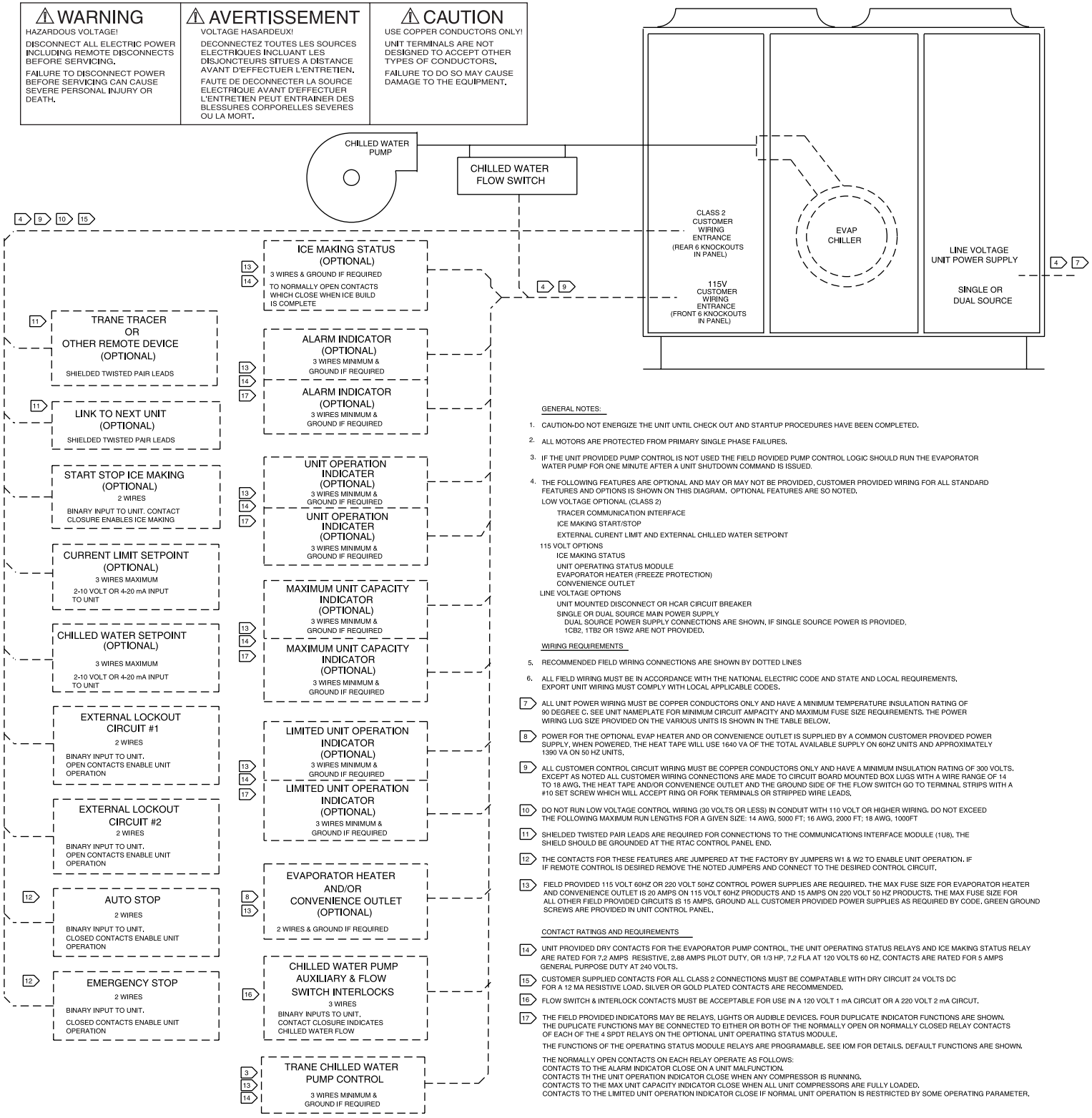

GENERAL NOTES:

1. CAUTION-DO NOT ENERGIZE THE UNIT UNTIL CHECK OUT AND STARTUP PROCEDURES HAVE BEEN COMPLETED.
2. ALL MOTORS ARE PROTECTED FROM PRIMARY SINGLE PHASE FAILURES.
3. IF THE UNIT PROVIDED PUMP CONTROL IS NOT USED THE FIELD ROVIDED PUMP CONTROL LOGIC SHOULD RUN THE EVAPORATOR WATER PUMP FOR ONE MINUTE AFTER A UNIT SHUTDOWN COMMAND IS ISSUED.
4. THE FOLLOWING FEATURES ARE OPTIONAL AND MAY OR MAY NOT BE PROVIDED, CUSTOMER PROVIDED WIRING FOR ALL STANDARD FEATURES AND OPTIONS IS SHOWN ON THIS DIAGRAM. OPTIONAL FEATURES ARE SO NOTED.

   LOW VOLTAGE OPTIONAL (CLASS 2)
   - TRACER COMMUNICATION INTERFACE
   - ICE MAKING START/STOP
   - EXTERNAL CURENT LIMIT AND EXTERNAL CHILLED WATER SETPOINT

   115 VOLT OPTIONS
   - ICE MAKING STATUS
   - UNIT OPERATING STATUS MODULE
   - EVAPORATOR HEATER (FREEZE PROTECTION)
   - CONVENIENCE OUTLET

   LINE VOLTAGE OPTIONS
   - UNIT MOUNTED DISCONNECT OR HCAR CIRCUIT BREAKER
   - SINGLE OR DUAL SOURCE MAIN POWER SUPPLY
     DUAL SOURCE POWER SUPPLY CONNECTIONS ARE SHOWN, IF SINGLE SOURCE POWER IS PROVIDED, 1CB2, 1TB2 OR 1SW2 ARE NOT PROVIDED.

WIRING REQUIREMENTS

5. RECOMMENDED FIELD WIRING CONNECTIONS ARE SHOWN BY DOTTED LINES
6. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND STATE AND LOCAL REQUIREMENTS. EXPORT UNIT WIRING MUST COMPLY WITH LOCAL APPLICABLE CODES.

7. ALL UNIT POWER WIRING MUST BE COPPER CONDUCTORS ONLY AND HAVE A MINIMUM TEMPERATURE INSULATION RATING OF 90 DEGREE C. SEE UNIT NAMEPLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM FUSE SIZE REQUIREMENTS. THE POWER WIRING LUG SIZE PROVIDED ON THE VARIOUS UNITS IS SHOWN IN THE TABLE BELOW.
8. POWER FOR THE OPTIONAL EVAP HEATER AND OR CONVENIENCE OUTLET IS SUPPLIED BY A COMMON CUSTOMER PROVIDED POWER SUPPLY, WHEN POWERED, THE HEAT TAPE WILL USE 1640 VA OF THE TOTAL AVAILABLE SUPPLY ON 60HZ UNITS AND APPROXIMATELY 1390 VA ON 50 HZ UNITS.
9. ALL CUSTOMER CONTROL CIRCUIT WIRING MUST BE COPPER CONDUCTORS ONLY AND HAVE A MINIMUM INSULATION RATING OF 300 VOLTS. EXCEPT AS NOTED ALL CUSTOMER WIRING CONNECTIONS ARE MADE TO CIRCUIT BOARD MOUNTED BOX LUGS WITH A WIRE RANGE OF 14 TO 18 AWG. THE HEAT TAPE AND/OR CONVENIENCE OUTLET AND THE GROUND SIDE OF THE FLOW SWITCH GO TO TERMINAL STRIPS WITH A #10 SET SCREW WHICH WILL ACCEPT RING OR FORK TERMINALS OR STRIPPED WIRE LEADS.
10. DO NOT RUN LOW VOLTAGE CONTROL WIRING (30 VOLTS OR LESS) IN CONDUIT WITH 110 VOLT OR HIGHER WIRING. DO NOT EXCEED THE FOLLOWING MAXIMUM RUN LENGTHS FOR A GIVEN SIZE: 14 AWG, 5000 FT; 16 AWG, 2000 FT; 18 AWG, 1000FT
11. SHIELDED TWISTED PAIR LEADS ARE REQUIRED FOR CONNECTIONS TO THE COMMUNICATIONS INTERFACE MODULE (1U8). THE SHIELD SHOULD BE GROUNDED AT THE RTAC CONTROL PANEL END.
12. THE CONTACTS FOR THESE FEATURES ARE JUMPERED AT THE FACTORY BY JUMPERS W1 & W2 TO ENABLE UNIT OPERATION. IF IF REMOTE CONTROL IS DESIRED REMOVE THE NOTED JUMPERS AND CONNECT TO THE DESIRED CONTROL CIRCUIT.
13. FIELD PROVIDED 115 VOLT 60HZ OR 220 VOLT 50HZ CONTROL POWER SUPPLIES ARE REQUIRED. THE MAX FUSE SIZE FOR EVAPORATOR HEATER AND CONVENIENCE OUTLET IS 20 AMPS ON 115 VOLT 60HZ PRODUCTS AND 15 AMPS ON 220 VOLT 50 HZ PRODUCTS. THE MAX FUSE SIZE FOR ALL OTHER FIELD PROVIDED CIRCUITS IS 15 AMPS. GROUND ALL CUSTOMER PROVIDED POWER SUPPLIES AS REQUIRED BY CODE. GREEN GROUND SCREWS ARE PROVIDED IN UNIT CONTROL PANEL.

CONTACT RATINGS AND REQUIREMENTS

14. UNIT PROVIDED DRY CONTACTS FOR THE EVAPORATOR PUMP CONTROL, THE UNIT OPERATING STATUS RELAYS AND ICE MAKING STATUS RELAY ARE RATED FOR 7.2 AMPS RESISTIVE, 2.88 AMPS PILOT DUTY, OR 1/3 HP, 7.2 FLA AT 120 VOLTS 60 HZ. CONTACTS ARE RATED FOR 5 AMPS GENERAL PURPOSE DUTY AT 240 VOLTS.
15. CUSTOMER SUPPLIED CONTACTS FOR ALL CLASS 2 CONNECTIONS MUST BE COMPATABLE WITH DRY CIRCUIT 24 VOLTS DC FOR A 12 MA RESISTIVE LOAD. SILVER OR GOLD PLATED CONTACTS ARE RECOMMENDED.
16. FLOW SWITCH & INTERLOCK CONTACTS MUST BE ACCEPTABLE FOR USE IN A 120 VOLT 1 mA CIRCUIT OR A 220 VOLT 2 mA CIRCUT.
17. THE FIELD PROVIDED INDICATORS MAY BE RELAYS, LIGHTS OR AUDIBLE DEVICES. FOUR DUPLICATE INDICATOR FUNCTIONS ARE SHOWN. THE DUPLICATE FUNCTIONS MAY BE CONNECTED TO EITHER OR BOTH OF THE NORMALLY OPEN OR NORMALLY CLOSED RELAY CONTACTS OF EACH OF THE 4 SPDT RELAYS ON THE OPTIONAL UNIT OPERATING STATUS MODULE.

    THE FUNCTIONS OF THE OPERATING STATUS MODULE RELAYS ARE PROGRAMABLE. SEE IOM FOR DETAILS. DEFAULT FUNCTIONS ARE SHOWN.

    THE NORMALLY OPEN CONTACTS ON EACH RELAY OPERATE AS FOLLOWS:
    CONTACTS TO THE ALARM INDICATOR CLOSE ON A UNIT MALFUNCTION.
    CONTACTS TH THE UNIT OPERATION INDICATOR CLOSE WHEN ANY COMPRESSOR IS RUNNING.
    CONTACTS TO THE MAX UNIT CAPACITY INDICATOR CLOSE WHEN ALL UNIT COMPRESSORS ARE FULLY LOADED.
    CONTACTS TO THE LIMITED UNIT OPERATION INDICATOR CLOSE IF NORMAL UNIT OPERATION IS RESTRICTED BY SOME OPERATING PARAMETER.

WIRE SIZE RANGE FOR FACTORY PROVIDED LUGS FOR CUSTOMER POWER WIRING CONNECTIONS

DISCONNECT OR CIRCUIT BREAKER OPTION

STARTER TYPE	VOLTAGE	SINGLE SOURCE POWER ELECTRICAL CIRCUIT 1 & 2		ELECTRICAL CIRCUIT 1 DUAL SOURCE POWER		ELECTRICAL CIRCUIT 2 DUAL SOURCE POWER	
		TONNAGE (COVERS STANDARD AND PREMIUM EFFICENCY UNITS)	LUG WIRE SIZE RANGE	TONNAGE (COVERS STANDARD AND PREMIUM EFFICENCY UNITS)	LUG WIRE SIZE RANGE	TONNAGE (COVERS STANDARD AND PREMIUM EFFICENCY UNITS)	LUG WIRE SIZE RANGE
XL & YD	200/60/3	ALL	OPTION NOT AVAILABLE	140	1-4/0 to 600	140, 155	1-4/0 to 600
	200/60/3			155, 170, 185, 200, 225, 250	4-4/0 to 500	170, 185, 200, 225, 250	4-4/0 to 500
	230/60/3	ALL	OPTION NOT AVAILABLE	140, 155, 170	1-4/0 to 600	140, 155, 170, 185	1-4/0 to 600
	230/60/3			185, 200, 225, 250	4-4/0 to 500	200, 225, 250	4-4/0 to 500
	380/60/3	140	1-4/0 to 600	140, 155, 170	1-3 to 350	140, 155, 170, 185	1-3 to 350
	380/60/3	155, 170, 185	4-4/0 to 500	185, 200, 225, 250	1-4/0 to 600	200, 225, 250	1-4/0 to 600
	380/60/3	200, 225,250	OPTION NOT AVAILABLE				
	460/60/3	140, 155, 170	1-4/0 to 600	140, 155, 170, 185, 200	1-3 to 350	155, 170, 185, 200, 225	1-3 to 350
	460/60/3	185, 200, 225, 250	4-4/0 to 500	225, 250	1-4/0 to 600	250	1-4/0 to 600
	575/60/3	140, 155	1-3 to 350	140, 155, 170, 185, 200, 225, 250	1-3 to 350	140, 155, 170, 185, 200, 225, 250	1-3 to 350
	575/60/3	170, 185, 200, 225	1-4/0 to 600				
	575/60/3	250	4-4/0 to 500				
	220/50/3	ALL	OPTION NOT AVAILABLE	140	1-4/0 to 600	140, 155	1-4/0 to 600
	220/50/3			155, 170, 185, 200	4-4/0 to 500	170, 185, 200	4-4/0 to 500
	400/50/3	140, 155	1-4/0 to 600	140, 155, 170, 185, 200	1-3 to 350	140, 155, 170, 185, 200	1-3 to 350
	400/50/3	170, 185, 200	4-4/0 to 500				

TERMINAL BLOCK OR LUG OPTION

STARTER TYPE	VOLTAGE	SINGLE SOURCE POWER ELECTRICAL CIRCUIT 1 & 2		ELECTRICAL CIRCUIT 1 DUAL SOURCE POWER		ELECTRICAL CIRCUIT 2 DUAL SOURCE POWER	
		TONNAGE (COVERS STANDARD AND PREMIUM EFFICENCY UNITS)	LUG WIRE SIZE RANGE	TONNAGE (COVERS STANDARD AND PREMIUM EFFICENCY UNITS)	LUG WIRE SIZE RANGE	TONNAGE (COVERS STANDARD AND PREMIUM EFFICENCY UNITS)	LUG WIRE SIZE RANGE
XL	380/60/3	140	2-4 TO 500	140, 155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	140, 155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250
	380/60/3	155, 170, 185, 200, 225, 250	2-2 TO 600				
	460/60/3	140, 155, 170	1-2 TO 750 & 2-1/0 TO 250	140, 155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	140, 155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250
	460/60/3	185, 200, 225, 250	2-2 TO 600				
	575/60/3	140	2-4 TO 500	140	2-4 TO 500	140, 155	2-4 TO 500
	575/60/3	155, 170, 185, 200, 225	1-2 TO 750 & 2-1/0 TO 250	155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250
	575/60/3	250	2-2 TO 600				
	400/50/3	140	2-4 TO 500				
	400/50/3	155	1-2 TO 750 & 2-1/0 TO 250	140, 155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	140, 155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250
	400/50/3	170, 185, 200	2-2 TO 600				
YD	200/60/3	140, 155	2-2 TO 600	140	1-2 TO 750 & 2-1/0 TO 250	140, 155	1-2 TO 750 & 2-1/0 TO 250
	200/60/3	170, 185, 200, 225, 250	4-2 TO 600	155, 170, 185, 200, 225, 250	2-2 TO 600	170, 185, 200, 225, 250	2-2 TO 600
	230/60/3	140, 155, 170	2-2 TO 600	140, 155, 170	1-2 TO 750 & 2-1/0 TO 250	140, 155, 170	1-2 TO 750 & 2-1/0 TO 250
	230/60/3	185, 200, 225, 250	4-2 TO 600	185, 200, 225, 250	2-2 TO 600	185, 200, 225, 250	2-2 TO 600
	380/60/3	140	2-4 TO 500	140	2-4 TO 500	140, 155	2-4 TO 500
	380/60/3	155, 170, 185, 200, 225, 250	2-2 TO 600	155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250
	460/60/3	140, 155, 170	2-4 TO 500	140, 155, 170	2-4 TO 500	140, 155, 170	2-4 TO 500
	460/60/3	185, 200, 225, 250	2-2 TO 600	185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250
	575/60/3	140, 155, 170, 185, 200	2-4 TO 500	140, 155, 170, 185, 200	2-4 TO 500	140, 155, 170, 185, 200, 225	2-4 TO 500
	575/60/3	225	1-2 TO 750 & 2-1/0 TO 250	225, 250	1-2 TO 750 & 2-1/0 TO 250	250	1-2 TO 750 & 2-1/0 TO 250
	575/60/3	250	2-2 TO 600				
	220/50/3	140, 155, 170	2-2 TO 600	140	1-2 TO 750 & 2-1/0 TO 250	140, 155	1-2 TO 750 & 2-1/0 TO 250
	220/50/3	185, 200	4-2 TO 600	155, 170, 185, 200, 225, 250	2-2 TO 600	170, 185, 200	2-2 TO 600
	400/50/3	140	2-4 TO 500	140	2-4 TO 500	140, 155	2-4 TO 500
	400/50/3	155	1-2 TO 750 & 2-1/0 TO 250	155, 170, 185, 200, 225, 250	1-2 TO 750 & 2-1/0 TO 250	170, 185, 200	1-2 TO 750 & 2-1/0 TO 250
	400/50/3	170, 185, 200	2-2 TO 600				

REPLACEMENT FUSE SIZES

FUSE PROTECT FUNCTION	UNIT SIZE	UNIT VOLTAGE	DESIGNATION	VOLTS	CLASS	AMPS
CONDENSER FANS	140 TO 250	200,230,220	1F1 THRU 1F12	600	R	40
CONTROL POWER TRANSFORMER PRIMARY		200	1F13,1F14	600	CC	6.25
		230		600	CC	6
		380		600	CC	3.5
		460		600	CC	5
		575		600	CC	4
		400		600	CC	5
CONTROL POWER TRANSFORMER 115 VOLT SEC.		ALL	1F15	600	CC	10
CONTROL POWER TRANSFORMER 24 VOLT SEC.		ALL	1F16	600	CC	10
INVERTER DRIVE AND OR INVERTER TRANSFORMER PRI.		380	1F17 THRU 1F22	600	CC	9
		460		600	CC	10
		575		600	CC	6.25

REPLACES

REVISION DATE 8-31-00

DRAWN BY PBL

DATE 6-1-00

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