



Installation, Operation, and Maintenance

Series R Air-Cooled Helical Rotary Liquid Chillers



SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.



Warnings, Cautions and Notices

Warnings, Cautions and Notices. Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provide to alert installing contractors to potential hazards that could result in death or personal injury. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that could result in equipment or property-damage-only accidents.

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

Read this manual thoroughly before operating or servicing this unit.

ATTENTION: Warnings, Cautions and Notices appear at appropriate sections throughout this literature. Read these carefully:

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

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

NOTICE: Indicates a situation that could result in equipment or property-damage only

Important Environmental Concerns!

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs such as HCFCs and HFCs.

Responsible Refrigerant Practices!

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified. The Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that

must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠ WARNING

Proper Field Wiring and Grounding Required!

All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

⚠ WARNING

Refrigerant under High Pressure!

System contains oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do not use non-approved refrigerants, refrigerant substitutes, or refrigerant additives. Failure to recover refrigerant to relieve pressure or the use of non-approved refrigerants, refrigerant substitutes, or refrigerant additives could result in an explosion which could result in death or serious injury or equipment damage.

⚠ WARNING

Proper Field Wiring and Grounding Required!

All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

⚠ WARNING

Personal Protective Equipment (PPE) Required!

Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards.

- Before installing/servicing this unit, technicians **MUST** put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. **ALWAYS** refer to appropriate MSDS sheets and OSHA guidelines for proper PPE.
- When working with or around hazardous chemicals, **ALWAYS** refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations.
- If there is a risk of arc or flash, technicians **MUST** put on all Personal Protective Equipment (PPE) in accordance with NFPA 70E or other country-specific requirements for arc flash protection, **PRIOR** to servicing the unit.

Failure to follow recommendations could result in death or serious injury.

Factory Warranty Information

Compliance with the following is required to preserve the factory warranty:

All Unit Installations

Startup **MUST** be performed by Trane, or an authorized agent of Trane, to **VALIDATE** this WARRANTY. Contractor must provide a two-week startup notification to Trane (or an agent of Trane specifically authorized to perform startup).

Additional Requirements for Units Requiring Disassembly

When a new fully assembled chiller is shipped and received from our Trane manufacturing location, and, for any reason, it requires disassembly or partial disassembly — which could include but is not limited to the evaporator, condenser, control panel, compressor/motor, factory-mounted starter or any other components originally attached to the fully assembled unit — compliance with the following is required to preserve the factory warranty:

- Trane, or an agent of Trane specifically authorized to perform startup and warranty of Trane® products, will perform or have direct on-site technical supervision of the disassembly and reassembly work.
- The installing contractor must notify Trane — or an agent of Trane specifically authorized to perform startup and warrant of Trane® products — two weeks in advance of the scheduled disassembly work to coordinate the disassembly and reassembly work.

- Startup must be performed by Trane or an agent of Trane specifically authorized to perform startup and warranty of Trane® products as noted above.

Trane, or an agent of Trane specifically authorized to perform startup and warranty of Trane® products, will provide qualified personnel and standard hand tools to perform the disassembly work at a location specified by the contractor. The contractor shall provide the rigging equipment such as chain falls, gantries, cranes, forklifts, etc. necessary for the disassembly and reassembly work and the required qualified personnel to operate the necessary rigging equipment.

Revision Summary

RTAC-SVX01L-EN

Removed analog inputs from Table 48 (AI 62, 65, 68) and 53 (AI 60 through 70).

RTAC-SVX01K-EN

Added factory warranty information.

RTAC-SVX01J-EN

Added RTAC Extra Efficiency (XE) units.

RTAC-SVX01H-EN

Revised manual to add 120, 130T 50 Hz units. Updated for W0 design sequence change.

RTAC-SVX01G-EN

Revised manual for 3 pass evaporator option. Updated for V0 design sequence change.

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Table of Contents

Warnings, Cautions and Notices	2	Water Pressure Relief Valves	51
Factory Warranty Information	3	Freeze Protection	51
Model Number Description	7	Low Evaporator Refrigerant Cutout, Glycol Recommendations	52
Outdoor Unit Nameplate	7	Procedure	52
Compressor Nameplate	7	Specials	52
Unit Model Number	8	Installation - Mechanical — Remote Evaporator Option	54
Compressor Model Number	9	System Configuration and Interconnecting Refrigerant Piping	54
Compressor Serial Number	9	Line Sizing	58
General Data	10	Liquid Line Sizing Steps	58
Unit Description	10	Suction Line Sizing Steps	59
Accessory/Option Information	10	Suction Accumulator Sizing	59
Isolator Shipping Location	10	Piping Installation Procedures	60
Pre-installation	21	Refrigerant Sensors	60
Unit Inspection	21	Refrigerant Pressure Relief Valve Venting	60
Inspection Checklist	21	Leak Test and Evacuation	61
Storage	21	Refrigerant and Additional Oil Charge	62
Installation Responsibilities	21	Refrigerant Charge Determination	62
General	21	Oil Charge Determination	62
Dimensions and Weights	22	Installation - Electrical	63
Clearances	22	General Recommendations	63
Dimensions	25	Installer-Supplied Components	84
Weights	37	Power Supply Wiring	84
Installation - Mechanical	40	Control Power Supply	85
Location Requirements	40	Heater Power Supply and Convenience Outlet (Packaged Units Only)	85
Noise Considerations	40	Interconnecting Wiring	86
Foundation	40	Chilled Water Pump Control	86
Clearances	40	Alarm and Status Relay Outputs (Programmable Relays)	87
Rigging	40	Relay Assignments Using TechView	87
Lifting Procedure	40	Low Voltage Wiring	87
Isolation and Sound Emission	43	Emergency Stop	88
Unit Isolation and Leveling	43	External Auto/Stop	88
Drainage	47	External Circuit Lockout – Circuit #1 and #2	88
Evaporator Water Piping	47	Ice Building Option	88
Entering Chilled Water Piping	48	External Chilled Water Setpoint (ECWS) Option	88
Leaving Chilled Water Piping	48		
Evaporator Drain	48		
Evaporator Flow Switch	48		
Water Pressure Gauges	51		

External Current Limit Setpoint (ECLS) Option	89	Setpoint View	117
Chilled Water Reset (CWR)	89	Diagnostics View	118
Communications Interface options	90	Configuration View	118
Optional Tracer Communications Interface	90	Software View	121
LonTalk Communications Interface for		Binding View	121
Chillers (LCI-C)	90	Replacing or Adding Devices	121
BACnet Communications Interface (BCI-C)	91	Pre-Start Checkout	124
Object and Diagnostic Data Points with Corresponding Chiller Models	97	Installation Checklist	124
BCI-C Alarming	103	Receiving	124
Operating Principles	104	Unit Location and Mounting	124
Refrigeration Cycle	104	Unit Piping	124
Refrigerant R-134a	104	Electrical Wiring	124
Compressor	104	General	125
Condenser and Subcooler	105	Unit Voltage Power Supply	126
Expansion Valve	106	Unit Voltage Imbalance	126
Evaporator	106	Unit Voltage Phasing	126
Oil System	106	Water System Flow Rates	127
Controls Interface	107	Water System Pressure Drop	127
Overview	107	CH530 Set-Up	127
Controls Interface	107	Unit Start-Up Procedures	128
DynaView Display	107	Daily Unit Start-Up	128
Key Functions	107	General	128
Display Screens	108	Seasonal Unit Start-Up Procedure	128
Modes Screen	109	System Restart After Extended Shutdown	129
Chiller Screen	113	Shutdown	134
Compressor Screen	113	Temporary Shutdown And Restart	134
Refrigerant Screen	113	Extended Shutdown Procedure	134
Setpoint Screen	114	Maintenance	135
Diagnostic Screen	115	Weekly Maintenance	135
Power-Up	115	Monthly Maintenance	135
Display Formats	115	Annual Maintenance	135
Units	115	Refrigerant and Oil Charge Management	138
Languages	115	R-134a Field Charging Procedure	139
TechView	115	Factory Refrigerant Charging Procedure (Initial)	139
Unit View	117	Field Refrigerant Charging Procedure	139
Compressor Service View	117	Adding Charge	139
Status View	117	Charge Isolation in the high or low side of system	140
		High side charge isolation procedure	140

Low side charge isolation procedure . .	140
Refrigerant Filter Replacement Procedure	141
Lubrication System	141
Oil Charging Procedure	141
Factory (initial) Oil Charging Procedure	143
Field Oil Charging Procedure	143
Evaporator Tube Replacement	144
Compressor Replacement	144
Condenser Maintenance	145
Condenser Coil Cleaning	145
Travel Restraint	145
Diagnostics	146
Legend to Diagnostics Table	146
Starter Diagnostics	146
Main Processor Diagnostics	152
Communication Diagnostics	160
Main Processor Boot Messages and Diagnostics	165
Unit Wiring	166

Model Number Description

Nameplates

The RTAC outdoor unit nameplates are applied to the exterior of the Control Panel. A compressor nameplate is located on each compressor. When the unit arrives, compare all nameplate data with ordering, submittal, and shipping information.

Outdoor Unit Nameplate

See [Figure 1, p. 7](#) for a typical 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 OIL00048).
- Lists unit test pressures.
- Identifies installation, operation and maintenance and service data literature (Pueblo).
- Lists drawing numbers for unit wiring diagrams (Pueblo).

Model Number Coding System

The model numbers for the unit and the compressor are composed of numbers and letters that represent features of the equipment. Shown in the following table is a sample

of typical unit model number 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:

RTAC 350A UA0N NAFN N1NX 1TEN NN0N N01N

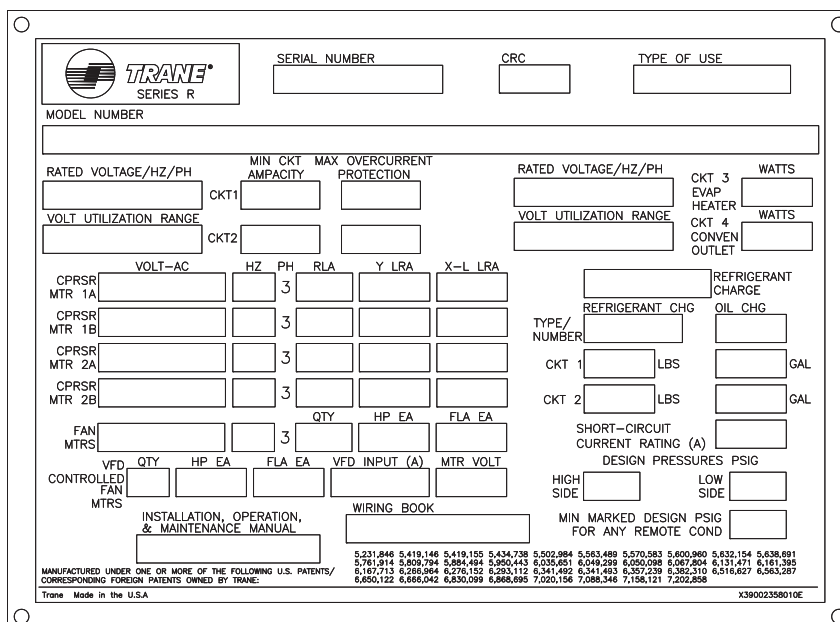
Model number digits are selected and assigned in accordance with the definitions as listed in ["Unit Model Number," p. 8](#).

Compressor Nameplate

The compressor nameplate provides following information:

- Compressor model number. See ["Compressor Model Number," p. 9](#).
- Compressor serial number. See ["Compressor Serial Number," p. 9](#).
- Compressor electrical characteristics.
- Utilization range.
- Recommended refrigerant.

Figure 1. Typical unit nameplate



The nameplate form includes the following sections and fields:

- TRANE SERIES R** logo
- SERIAL NUMBER** (blank box)
- CRC** (blank box)
- TYPE OF USE** (blank box)
- MODEL NUMBER** (blank box)
- RATED VOLTAGE/HZ/PH** (blank box)
- MIN. CKT AMPACITY** (blank box)
- MAX. OVERCURRENT PROTECTION** (blank box)
- RATED VOLTAGE/HZ/PH** (blank box)
- CKT 3 EVAP HEATER WATTS** (blank box)
- VOLT UTILIZATION RANGE** (blank box)
- CKT 4 CONVEN OUTLET WATTS** (blank box)
- VOLT-AC** (blank box)
- HZ** (blank box)
- PH** (blank box)
- RLA** (blank box)
- Y LRA** (blank box)
- X-L LRA** (blank box)
- CPRSR MTR 1A** (blank box)
- CPRSR MTR 1B** (blank box)
- CPRSR MTR 2A** (blank box)
- CPRSR MTR 2B** (blank box)
- QTY** (blank box)
- HP EA** (blank box)
- FLA EA** (blank box)
- VFD INPUT (A)** (blank box)
- MTR VOLT** (blank box)
- VFD** (blank box)
- QTY** (blank box)
- HP EA** (blank box)
- FLA EA** (blank box)
- WIRING BOOK** (blank box)
- INSTALLATION, OPERATION, & MAINTENANCE MANUAL** (blank box)
- REFRIGERANT CHARGE** (blank box)
- OIL CHG** (blank box)
- TYPE/NUMBER** (blank box)
- CKT 1 LBS** (blank box)
- CKT 2 LBS** (blank box)
- SHORT-CIRCUIT CURRENT RATING (A)** (blank box)
- DESIGN PRESSURES PSIG** (blank box)
- HIGH SIDE** (blank box)
- LOW SIDE** (blank box)
- MIN MARKED DESIGN PSIG FOR ANY REMOTE COND** (blank box)
- MANUFACTURED UNDER ONE OR MORE OF THE FOLLOWING U.S. PATENTS/ CORRESPONDING FOREIGN PATENTS OWNED BY TRANE:**
 - 5,231,846 5,419,146 5,419,155 5,434,738 5,502,984 5,563,489 5,570,583 5,600,980 5,632,154 5,638,891
 - 5,761,914 5,809,784 5,884,484 5,950,443 6,035,851 6,049,289 6,050,098 6,067,804 6,131,471 6,161,385
 - 6,167,713 6,265,084 6,276,155 6,283,112 6,341,892 6,341,483 6,357,239 6,380,310 6,516,827 6,563,397
 - 6,650,122 6,666,042 6,630,099 6,668,695 7,020,156 7,086,346 7,156,121 7,202,858
- Trane Made in the U.S.A.**
- X39002358010E**



Model Number Descriptions

Unit Model Number

Digits 1, 2 — Unit Model

RT = Rotary chiller

Digit 3 — Unit Type

A = Air-cooled

Digit 4 — Development Sequence

C = Development Sequence

Digits 5-7 — Nominal Capacity

120 = 120 Nominal tons
130 = 120 Nominal tons
140 = 120 Nominal tons
155 = 120 Nominal tons
170 = 120 Nominal tons
180 = 120 Nominal tons
200 = 120 Nominal tons
225 = 120 Nominal tons
250 = 120 Nominal tons
275 = 120 Nominal tons
300 = 120 Nominal tons
350 = 120 Nominal tons
375 = 120 Nominal tons
400 = 120 Nominal tons
450 = 120 Nominal tons
500 = 120 Nominal tons

Digit 8 — Unit Voltage

A = 200/60/3
C = 230/60/3
J = 380/60/3
D = 400/50/3
4 = 460/60/3
5 = 575/60/3

Digit 9 — Manufacturing Location

U = Trane Commercial Systems,
Pueblo, CO USA

Digits 10, 11 — Design Sequence

XX = Factory assigned

Digit 12 — Unit Basic Configuration

N = Standard efficiency/performance configuration
H = High efficiency/performance configuration
A = Extra efficiency/performance configuration

Digit 13 — Agency Listing

N = No agency listing
U = UL/CUL listing

Digit 14 — Pressure Vessel Code

A = ASME pressure vessel code
C = Canadian code
D = Australian code
L = Chinese code

Digit 15 — Evaporator

Application

F = Standard (40-60°F) leaving temp
G = Low (<40°F) leaving temp
R = Remote (40-60°F) leaving temp

Digit 16 — Evaporator Configuration

N = 2 pass, 0.75" insulation
P = 3 pass, 0.75" insulation
Q = 2 pass, 1.25" insulation
R = 3 pass, 1.25" insulation

Digit 17 — Condenser

Application

N = Standard ambient (25-115°F)
H = High ambient (25-125°F)
L = Low ambient (0-115°F)
W = Wide ambient (0-125°F)

Digit 18 — Condenser Fin Material

1 = Standard aluminum slit fins
2 = Copper fins
4 = Complete Coat epoxy coated fins

Digit 19 — Condenser Fan/Motor Configuration

T = Std fans with TEAO motors
W = Low noise fans

Digit 20 — Compressor Motor Starter Type

X = Across-the-line starter
Y = Wye-delta closed transition starter

Digit 21 — Incoming Power Line Connection

1 = Single point power connection
2 = Dual point power connection

Digit 22 — Power Line Connection Type

T = Terminal block connection
D = Non-fused disconnect switch(es)
C = Circuit breaker(s)

Digit 23 — Unit Operator Interface

D = DynaView operator interface

Digit 24 — Remote Operator Interface

N = No remote interface
C = Tracer Comm3 interface
B = BACnet interface
L = LonTalk compatible (LCI-C) interface

Digit 25 — Control Input Accessories/Options

N = No remote inputs
R = External evaporator leaving water setpoint
C = External current limit setpoint
B = External leaving water and current limit setpoint

Digit 26 — Control Output Accessories/Options

N = No output options
A = Alarm relay options
C = Ice making I/O

D = Alarm relay outputs and ice making I/O

Digit 27 — Electrical Protection Options

0 = No short circuit rating
5 = Default short circuit rating
6 = High amp short circuit rating

Digit 28 — Flow Switch

T = Factory installed flow switch - water
U = Factory installed flow switch - glycol

Digit 29 — Control Panel Accessories

N = No convenience outlet
A = 15A 115V convenience outlet (60Hz)

Digit 30 — Service Valves

1 = With suction service valves

Digit 31 — Compressor Sound Attenuation Option

0 = No compressor sound attenuation
1 = Factory installed compressor sound attenuation

Digit 32 — Appearance Options

N = No appearance options
A = Architectural louvered panels
C = Half louvers

Digit 33 — Installation Accessories

N = No installation accessories
R = Neoprene in shear unit isolators
F = Flange kit for water connections
G = Neoprene isolators and flange kit

Digit 34 — Factory Testing Options

0 = Standard functional test
C = Customer-witnessed performance test with report
E = Non-witnessed performance test with report

Model Number Descriptions

Compressor Model Number

Digits 1-3 — Compressor Family

CHH= Positive displacement, refrigerant, helical rotary, hermetic compressor

Digit 4— Compressor Type

T = GP2+

Digit 5 —

0= All compressors

Digit 6 — Frame Size

K = K Frame
L = L Frame
M = M Frame
N = N Frame

Digit 7 — Compressor Capacity

3 = GP2+ Smaller capacity (minor)
4 = GP2+ Larger capacity (major)

Compressor Serial Number

Digits 1-2 — Year

YY = Last two digits of year of manufacture

Digits 3-4 — Week

WW= Week of build, from 00 to 52

Digit 5 — Day

1 = Monday
2 = Tuesday
3 = Wednesday
4 = Thursday
5 = Friday
6 = Saturday
7 = Sunday

Digits 6-8 — Coded Time Stamp

TTT= Used to ensure uniqueness of serial number

Digit 9 — Assembly Line

L = Varies with facility

Digit 10— Build Location

A = Monterrey



General Data

Unit Description

The 140 - 500 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.

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, sight glass, electronic expansion valve, and charging valves. The shell-and-tube type evaporator is manufactured in accordance with ASME standards or other international codes. 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.

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

Figure 2. Typical RTAC packaged unit and components



Accessory/Option Information

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.

Isolator Shipping Location

If optional neoprene isolators (model number digit 33) are ordered with unit, they are shipped mounted on the unit. See Figure 3 and Figure 4.

Figure 3. Isolator shipping locations 140-250T units

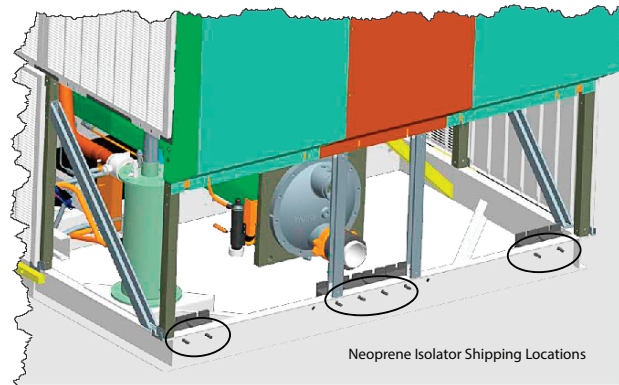
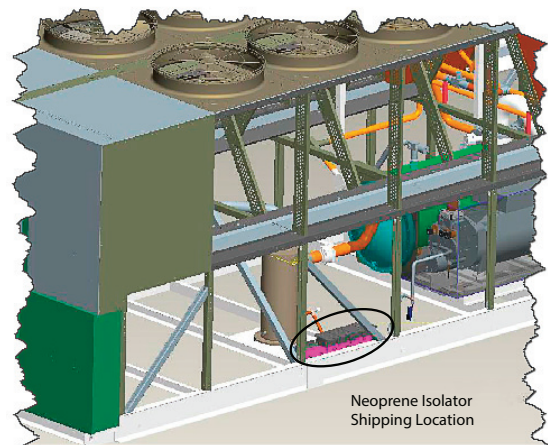


Figure 4. Isolator shipping locations 140-250T units



General Data

Table 1. General Data - 60 hz units - standard efficiency - IP

Size		140	155	170	185	200	225	250	275	300	350	400	450	500
Compressor		Screw												
Quantity	#	2	2	2	2	2	2	2	3	3	3	4	4	4
Nominal size @60Hz	(tons)	70/70	85/70	85/85	100/85	100/100	120/100	120/120	85-85/100	100-100/100	120-120/100	100-100/100-100	120-120/100-100	120-120/120-120
Evaporator		Flooded												
Water storage	(gal)	29	32	34	36	40	39	43	62	67	72	83	86	91
2 pass arrangement														
Min flow	(gpm)	193	214	202	217	241	217	241	309	339	375	404	422	461
Max flow	(gpm)	709	785	741	796	883	796	883	1134	1243	1374	1483	1548	1690
Water conn	(NPS-in)	4	4	6	6	6	6	6	8	8	8	8	8	8
3 pass arrangement														
Min flow	(gpm)	129	143	135	145	161	145	161	206	226	250	270	282	307
Max flow	(gpm)	473	523	494	531	589	531	589	756	829	916	989	1032	1127
Water conn	(NPS-in)	3.5	3.5	4	4	4	4	4	6	6	6	8	8	8
Condenser		Fin and tube												
Qty of coils	#	4	4	4	4	4	4	4	8	8	8	8	8	8
Coil length	(in)	156/156	180/156	180/180	216/180	216/216	252/216	252/252	180/108	216/108	252/108	216/216	252/216	252/252
Coil height	(in)	42	42	42	42	42	42	42	42	42	42	42	42	42
	(mm)	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067
# of rows	#	3	3	3	3	3	3	3	3	3	3	3	3	3
Fins per foot	(fpf)	192	192	192	192	192	192	192	192	192	192	192	192	192
Fan		Direct drive propeller												
Quantity	#	4/4	5/4	5/5	6/5	6/6	7/6	7/7	10/6	12/6	14/6	12/12	14/12	14/14
Diameter	(in)	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Air flow per fan	(cfm)	9625	9394	9209	9209	9209	9210	9210	9209	9209	9208	9209	9210	9214
Power/motor	(hp)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Fan speed	(rpm)	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140
Tip speed	(Ft/min)	8954	8954	8954	8954	8954	8954	8954	8954	8954	8954	8954	8954	8954
General Unit		HFC-134a												
# Refrig ckts	#	2	2	2	2	2	2	2	2	2	2	2	2	2
% min load	%	15	15	15	15	15	15	15	15	15	15	15	15	15
Refrigerant charge	(lb)	165/165	175/165	175/175	215/210	215/215	225/215	225/225	365/200	415/200	460/200	415/415	460/415	460/460
Oil charge	(gal)	1.3/1.3	1.3/1.3	1.3/1.3	1.9/1.3	1.9/1.9	1.9/1.9	1.9/1.9	4.2/1.9	4.6/2.9	4.6/1.9	4.6/4.6	4.6/4.6	4.6/4.6
Min ambient-std	(°F)	25	25	25	25	25	25	25	25	25	25	25	25	25
Min ambient-low	(°F)	0	0	0	0	0	0	0	0	0	0	0	0	0

1. Data containing information on two circuits is shown as follows: ckt 1/ ckt 2.
2. Minimum start-up/operating ambient is based on a 5 mph wind across the condenser.
3. RTAC units must only operate with refrigerant R-134a and Trane Oil 00048.



General Data

Table 2. General Data - 60 hz units - high efficiency - IP

Size		140	155	170	185	200	225	250	275	300	350	400
Compressor		Screw										
Quantity	#	2	2	2	2	2	2	2	3	3	4	4
Nominal size @60Hz	(tons)	70/70	85/70	85/85	100/85	100/100	120/100	120/120	85-85/100	100-100/100	85-85/85/85	100-100/100-100
Evaporator		Flooded										
Water storage	(gal)	34	36	40	39	43	43	43	72	72	83	91
2 pass arrangement												
Min flow	(gpm)	202	217	241	217	241	241	241	375	375	404	461
Max flow	(gpm)	741	796	883	796	883	883	883	1374	1374	1483	1690
Water conn	(NPS-in)	6	6	6	6	6	6	6	8	8	8	8
3 pass arrangement												
Min flow	(gpm)	135	145	161	145	161	161	161	250	250	270	307
Max flow	(gpm)	494	531	589	531	589	589	589	916	916	989	1127
Water conn	(NPS-in)	4	4	4	4	4	4	4	6	6	8	8
Condenser		Fin and tube										
Qty of coils	#	4	4	4	4	4	8	8	8	8	8	8
Coil length	(in)	180/180	216/180	216/216	252/216	252/252	144/144	144/144	216/144	252/144	216/216	252/252
Coil height	(in)	42	42	42	42	42	42	42	42	42	42	42
Number of rows	#	192	192	192	192	192	192	192	192	192	192	192
Fins per foot	(fpf)	3	3	3	3	3	3	3	3	3	3	3
Fan		Direct drive propeller										
Quantity	#	5/5	6/5	6/6	7/6	7/7	8/6	8/8	12/6	14/6	12/12	14/14
Diameter	(in)	30	30	30	30	30	30	30	30	30	30	30
Air flow/fan	(cfm)	9199	9199	9199	9200	9201	9783	9203	9652	9605	9199	9201
Power/motor	(hp)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Fan speed	(rpm)	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140	1140
Tip speed	(Ft/Min)	8954	8954	8954	8954	8954	8954	8954	8954	8954	8954	8954
General unit		HFC-134a										
# Refrig ckts	#	2	2	2	2	2	2	2	2	2	2	2
% min load	%	15	15	15	15	15	15	15	15	15	15	15
Refrigerant charge	(lb)	175/175	215/205	215/215	225/215	225/225	235/235	235/235	415/200	460/200	415/415	460/460
Oil charge	(gal)	1.3/1.3	1.3/1.3	1.3/1.3	1.9/1.3	1.9/1.9	1.9/1.9	1.9/1.9	2.1-2.1/1.9	2.3-2.3/1.9	2.1-2.1/2.1-2.1	2.3-2.3/2.3-2.3
Min ambient-std	(°F)	25	25	25	25	25	25	25	25	25	25	25
Min ambient-low	(°F)	0	0	0	0	0	0	0	0	0	0	0

1. Data containing information on two circuits is shown as follows: ckt 1/ ckt 2.
2. Minimum start-up/operating ambient is based on a 5 mph wind across the condenser.
3. RTAC units must only operate with refrigerant R-134a and Trane Oil 00048.

General Data

Table 3. General Data - 60 hz units - extra efficiency - IP

Size		140	155	170	185	200	250	275	300	350
Compressor		Screw								
Quantity	#	2	2	2	2	2	3	3	4	4
Nominal size @60Hz	(tons)	70/70	85/70	85/85	100/85	100/100	70-70/85	85-85/85	70-70/70-70	85-85/85-85
Evaporator		Flooded								
Water storage	(gal)	40	39	43	43	43	72	72	83	91
2 pass arrangement										
Min flow	(gpm)	241	217	241	241	241	375	375	404	461
Max flow	(gpm)	883	796	883	883	883	1374	1374	1483	1690
Water conn	(NPS-in)	6	6	6	6	6	8	8	8	8
3 pass arrangement										
Min flow	(gpm)	161	145	161	161	161	250	250	270	307
Max flow	(gpm)	589	531	589	589	589	916	916	989	1127
Water conn	(NPS-in)	4	4	4	4	4	6	6	8	8
Condenser		Fin and tube								
Qty of coils	#	4	4	4	8	8	8	8	8	8
Coil length	(in)	216/216	252/216	252/252	144/144	180/180	216/144	252/144	216/216	252/252
Coil height	(in)	42	42	42	42	42	42	42	42	42
Number of rows	#	192	192	192	192	192	192	192	192	192
Fins per foot	(fpf)	3	3	3	3	3	3	3	3	3
Fan		Direct drive propeller								
Quantity	#	6/6	7/6	7/7	8/6	8/8	12/6	14/6	12/12	14/14
Diameter	(in)	30	30	30	30	30	30	30	30	30
Air flow/fan	(cfm)	9199	9200	9201	9783	9203	9652	9605	9199	9201
Power/motor	(hp)	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Fan speed	(rpm)	1140	1140	1140	1140	1140	1140	1140	1140	1140
Tip speed	(Ft/Min)	8954	8954	8954	8954	8954	8954	8954	8954	8954
General unit		HFC-134a								
# Refrig ckts	#	2	2	2	2	2	2	2	2	2
% min load	%	15	15	15	15	15	15	15	15	15
Refrigerant charge	(lb)	215/215	225/215	225/225	235/235	235/235	415/200	460/200	415/415	460/460
Oil charge	(gal)	1.3/1.3	1.9/1.3	1.9/1.9	1.9/1.9	1.9/1.9	2.1-2.1/1.9	2.1-2.1/1.9	2.1-2.1/2.1-2.1	2.1-2.1/2.1-2.1
Min ambient-std	(°F)	25	25	25	25	25	25	25	25	25
Min ambient-low	(°F)	0	0	0	0	0	0	0	0	0

1. Data containing information on two circuits is shown as follows: ckt 1/ ckt 2.
2. Minimum start-up/operating ambient is based on a 5 mph wind across the condenser.
3. RTAC units must only operate with refrigerant R-134a and Trane Oil 00048.



General Data

Table 4. General Data - 60 hz units - standard efficiency - SI

Size		140	155	170	185	200	225	250	275	300	350	400	450	500
Compressor		Screw												
Quantity	#	2	2	2	2	2	2	2	3	3	3	4	4	4
Nominal size (tons) @60Hz		70/70	85/70	85/85	100/85	100/100	120/100	120/120	85-85/100	100-100/100	120-120/100	100-100/100-100	120-120/100-100	120-120/120-120
Evaporator		Flooded												
Water storage	(L)	110.0	121	129	136	151	148	163	235	254	273	314	326	344
2 pass arrangement														
Min flow	(L/s)	12	14	13	14	15	14	15	19	21	24	25	27	29
Max flow	(L/s)	45	50	47	50	56	50	56	72	78	87	94	98	107
Water conn (NPS-in)		4	4	6	6	6	6	6	8	8	8	8	8	8
3 pass arrangement														
Min flow	(L/s)	8	9	9	9	10	9	10	13	14	16	17	18	19
Max flow	(L/s)	30	33	31	34	37	34	37	48	52	58	62	65	71
Water conn (NPS-in)		3.5	3.5	4	4	4	4	4	6	6	6	8	8	8
Condenser		Fin and tube												
Qty of coils	#	4	4	4	4	4	4	4	8	8	8	8	8	8
Coil length	(mm)	3962/3962	4572/3962	4572/4572	5486/4572	5486/5486	6400/5486	6400/6400	4572/2743	5486/2743	6400/2743	5486/5486	6400/5486	6400/6400
Coil height	(mm)	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067
# of rows	#	3	3	3	3	3	3	3	3	3	3	3	3	3
Fins per foot	(fpf)	192	192	192	192	192	192	192	192	192	192	192	192	192
Fan		Direct drive propeller												
Quantity	#	4/4	5/4	5/5	6/5	6/6	7/6	7/7	10/6	12/6	14/6	12/12	14/12	14/14
Diameter	(mm)	726.0	726.0	726.0	726.0	726.0	726.0	726.0	726.0	726.0	726.0	726.0	726.0	726.0
Air flow per fan	(m ³ /hr)	16351	15958	15644	15644	15644	15646	15647	15644	15645	15642	15645	15646	15653
Power/motor	(kW)	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12
Fan speed	(rps)	19	19	19	19	19	19	19	19	19	19	19	19	19
Tip speed	M/S	45	45	45	45	45	45	45	45	45	45	45	45	45
General Unit		HFC-134a												
# Refrig ckts	#	2	2	2	2	2	2	2	2	2	2	2	2	2
% min load	%	15	15	15	15	15	15	15	15	15	15	15	15	15
Refrigerant charge	(kg)	75/75	79/75	79/79	98/95	98/98	102/98	102/102	166/91	188/91	209/91	188/188	209/188	209/209
Oil charge	(L)	5/5	5/5	5/5	7/5	7/7	7/7	7/7	8-8/7	9-9/11	9-9/11	9-9/9-9	9-9/9-9	9-9/9-9
Min ambient-std	(°C)	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9
Min ambient-low	(°C)	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8

1. Data containing information on two circuits is shown as follows: ckt 1/ ckt 2.
2. Minimum start-up/operating ambient is based on a 5 mph wind across the condenser.
3. RTAC units must only operate with refrigerant R-134a and Trane Oil 00048.

General Data

Table 5. General Data - 60 hz units - high efficiency - SI

Size		140	155	170	185	200	225	250	275	300	350	400
Compressor		Screw										
Quantity	#	2	2	2	2	2	3	3	4	4	4	4
Nominal size @60Hz	(tons)	70/70	85/70	85/85	100/85	100/100	70-70/85	85-85/85	70-70/70-70	85-85/85-85	85-85/85-85	100-100/100-100
Evaporator		Flooded										
Water storage	(L)	129	136	151	148	163	163	163	273	273	314	344
2 Pass arrangement												
Min flow	(L/s)	13	14	15	14	15	15	15	24	24	25	29
Max flow	(L/s)	47	50	56	50	56	56	56	87	87	94	107
Water conn	(NPS-in)	6	6	6	6	6	6	6	8	8	8	8
3 Pass arrangement												
Min flow	(L/s)	9	9	10	9	10	10	10	16	16	17	19
Max flow	(L/s)	31	34	37	34	37	37	37	58	58	62	71
Water conn	(NPS-in)	4	4	4	4	4	4	4	6	6	8	8
Condenser		Fin and tube										
Qty of coils	#	4	4	4	4	4	8	8	8	8	8	8
Coil length	(mm)	4572/4572	5486/4572	5486/5486	6400/5486	6400/6400	3657/3657	3657/3657	5486/3657	6400/3657	5486/5486	6400/6400
Coil height	(mm)	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067
Number of rows	#	192	192	192	192	192	192	192	192	192	192	192
Fins per foot	(fpf)	3	3	3	3	3	3	3	3	3	3	3
Fan		Direct drive propeller										
Quantity	#	5/5	6/5	6/6	7/6	7/7	8/6	8/8	12/6	14/6	12/12	14/14
Diameter	(mm)	762	762	762	762	762	762	762	762	762	762	762
Air per fan	(m ³ /hr)	15628	15628	15628	15629	15631	16619	15634	16397	16317	15628	15631
Power/motor	(kW)	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12
Fan speed	(rps)	19	19	19	19	19	19	19	19	19	19	19
Tip speed	M/S	45	45	45	45	45	45	45	45	45	45	45
General unit		HFC-134a										
# refrigerant ckts	#	2	2	2	2	2	2	2	2	2	2	2
% min load	%	15	15	15	15	15	15	15	15	15	15	15
Refrigerant charge	(kg)	79/79	98/93	98/98	102/98	102/102	107/107	107/107	188/91	209/91	188/188	209/209
Oil charge	(L)	5/5	5/5	5/5	7/5	7/7	7/7	7/7	8-8/7	9-9/7	8-8/8-8	9-9/9-9
Min ambient-std	(°C)	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9
Min ambient-low	(°C)	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8

1. Data containing information on two circuits is shown as follows: ckt 1/ ckt 2.
2. Minimum start-up/operating ambient is based on a 5 mph wind across the condenser.
3. RTAC units must only operate with refrigerant R-134a and Trane Oil 00048.



General Data

Table 6. General Data - 60 hz units - extra efficiency - SI

Size		140	155	170	185	200	250	275	300	350
Compressor										
Quantity	#	2	2	2	2	2	3	3	4	4
Nominal size @60Hz	(tons)	85/85	100/85	100/100	120/100	120/120	85-85/100	100-100/100	85-85/85/85	100-100/100-100
Evaporator										
						Flooded				
Water storage	(L)	151	148	163	163	163	273	273	314	344
2 Pass arrangement										
Min flow	(L/s)	15	14	15	15	15	24	24	25	29
Max flow	(L/s)	56	50	56	56	56	87	87	94	107
Water conn	(NPS-in)	6	6	6	6	6	8	8	8	8
3 Pass arrangement										
Min flow	(L/s)	10	9	10	10	10	16	16	17	19
Max flow	(L/s)	37	34	37	37	37	58	58	62	71
Water conn	(NPS-in)	4	4	4	4	4	6	6	8	8
Condenser										
						Fin and tube				
Qty of coils	#	4	4	4	8	8	8	8	8	8
Coil length	(mm)	5486/5486	6400/5486	6400/6400	3657/3657	4572/2743	5486/3657	6400/3657	5486/5486	6400/6400
Coil height	(mm)	1067	1067	1067	1067	1067	1067	1067	1067	1067
Number of rows	#	192	192	192	192	192	192	192	192	192
Fins per foot	(fpf)	3	3	3	3	3	3	3	3	3
Fan										
						Direct drive propeller				
Quantity	#	6/6	7/6	7/7	8/6	8/8	12/6	14/6	12/12	14/14
Diameter	(mm)	762	762	762	762	762	762	762	762	762
Air per fan	(m ³ /hr)	15628	15629	15631	16619	15634	16397	16317	15628	15631
Power/motor	(kW)	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12	1.12
Fan speed	(rps)	19	19	19	19	19	19	19	19	19
Tip speed	M/S	45	45	45	45	45	45	45	45	45
General unit										
						HFC-134a				
# refrig ckts	#	2	2	2	2	2	2	2	2	2
% min load	%	15	15	15	15	15	15	15	15	15
Refrig charge	(kg)	98/98	102/98	102/102	107/107	107/107	188/91	209/91	188/188	209/209
Oil charge	(L)	5/5	7/5	7/7	7/7	7/7	8-8/7	8-8/7	8-8/8-8	8-8/8-8
Min ambient-std	(°C)	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9
Min ambient-low	(°C)	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8

1. Data containing information on two circuits is shown as follows: ckt 1/ ckt 2.
2. Minimum start-up/operating ambient is based on a 5 mph wind across the condenser.
3. RTAC units must only operate with refrigerant R-134a and Trane Oil 00048.

General Data

Table 7. General Data - 50 hz units - standard efficiency - IP

Size		140	155	170	185	200	250	275	300	350	375	400
Compressor		Screw										
Quantity	#	2	2	2	2	2	3	3	3	4	4	4
Nominal size@50Hz	(tons)	70/70	85/70	85/85	100/85	100/100	70-70 / 100	85-85 / 100	100-100/ 100	85-85/ 85-85	100-100/ 85-85	100-100/ 100-100
Evaporator		Flooded										
Water storage	(gal)	29	32	34	36	40	56	62	67	75	79	83
2 pass arrangement												
Min flow	(gpm)	193	214	202	217	241	265	309	339	351	381	404
Max flow	(gpm)	709	785	741	796	883	970	1134	1243	1287	1396	1483
Water conn	(NPS-in)	4	4	6	6	6	8	8	8	8	8	8
3 pass arrangement												
Min flow	(gpm)	129	143	135	145	161	176	206	226	234	254	270
Max flow	(gpm)	473	523	494	531	589	647	756	829	858	930	989
Water conn	(NPS-in)	3.5	3.5	4	4	4	6	6	6	8	8	8
Condenser		Fin and tube										
Qty of coils	#	4	4	4	4	4	8	8	8	8	8	8
Coil length	(in)	156/156	180/156	180/180	216/180	216/216	156/108	180/108	216/108	180/180	216/180	216/216
Coil height	(in)	42	42	42	42	42	42	42	42	42	42	42
Number of rows	#	3	3	3	3	3	3	3	3	3	3	3
Fins per foot	(fpf)	192	192	192	192	192	192	192	192	192	192	192
Fan		Direct drive propeller										
Quantity	#	4/4	5/4	5/5	6/5	6/5	8/6	10/6	12/6	10/10	12/10	12/12
Diameter	(in)	30	30	30	30	30	30	30	30	30	30	30
Air flow per fan	(cfm)	7918	7723	7567	7567	7567	7764	7566	7567	7567	7567	7567
Power per motor	(hp)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Fan speed	(rpm)	950	950	950	950	950	950	950	950	950	950	950
Tip speed	(Ft/min)	7461	7461	7461	7461	7461	7461	7461	7461	7461	7461	7461
General unit		HFC-134a										
# refrigerant	#	2	2	2	2	2	2	2	2	2	2	2
% min load	%	15	15	15	15	15	15	15	15	15	15	15
Refrigerant charge	(lb)	175/175	215/205	215/215	225/215	225/225	235/235	235/235	415/200	460/200	415/415	460/460
Oil charge	(gal)	1.3/1.3	1.3/1.3	1.3/1.3	1.9/1.3	1.9/1.9	2.1-2.1/ 1.9	2.1-2.1/ 1.9	2.3-2.3/ 1.9	2.1-2.1/ 2.1-2.1	2.3-2.3/ 2.1-2.1	2.3-2.3/ 2.3-2.3
Min ambient-std	(°F)	25	25	25	25	25	25	25	25	25	25	25
Min ambient-low	(°F)	0	0	0	0	0	0	0	0	0	0	0

1. Data containing information on two circuits is shown as follows: ckt 1/ ckt 2.
2. Minimum start-up/operating ambient is based on a 5 mph wind across the condenser.
3. RTAC units must only operate with refrigerant R-134a and Trane Oil 00048.



General Data

Table 8. General Data - 50 hz units - high efficiency - IP

Size		120	130	140	155	170	185	200	250	275	300	350	375	400
Compressor		Screw												
Quantity	#	2	2	2	2	2	2	2	3	3	3	4	4	4
Nominal size@50Hz	(tons)	60/60	70/60	70/70	85/70	85/85	100/85	100/100	70-70 / 100	85-85 / 100	100-100/ 100	85-85 / 85-85	100-100/ 85-85	100-100/ 100-100
Evaporator		Flooded												
Water storage	(gal)	29	32	34	36	40	39	43	67	72	72	83	86	91
2 pass arrangement														
Min flow	(gpm)	193	214	202	217	241	217	241	339	375	375	404	422	461
Max flow	(gpm)	709	785	741	796	883	796	883	1243	1374	1374	1483	1548	1690
Water conn	(NPS-in)	4	4	6	6	6	6	6	8	8	8	8	8	8
3 pass arrangement														
Min flow	(gpm)	129	143	135	145	161	145	161	226	250	250	270	282	307
Max flow	(gpm)	473	523	494	531	589	531	589	829	916	916	989	1032	1127
Water conn	(NPS-in)	3.5	3.5	4	4	4	4	4	6	6	6	8	8	8
Condenser		Fin and tube												
Qty of coils	#	4	4	4	4	4	4	4	8	8	8	8	8	8
Coil length	(in)	156/ 156	180/ 156	180/ 180	216/ 180	216/ 216	252/ 216	252/ 252	180/108	216/144	252/144	216/216	252/216	252/252
Coil height	(in)	42	42	42	42	42	42	42	42	42	42	42	42	42
Number of rows	#	3	3	3	3	3	3	3	3	3	3	3	3	3
Fins per foot	(fpf)	192	192	192	192	192	192	192	192	192	192	192	192	192
Fan		Direct drive propeller												
Quantity	#	4/4	5/4	5/5	6/5	6/6	7/6	7/7	10/6	12/6	14/6	12/12	14/12	14/14
Diameter	(in)	30	30	30	30	30	30	30	30	30	30	30	30	30
Air flow per fan	(cfm)	62484	68819	7558	7557	7557	7558	7559	7561	7943	7906	7557	7490	7559
Power/motor	(hp)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Fan speed	(rpm)	950	950	950	950	950	950	950	950	950	950	950	950	950
Tip speed	(Ft/min)	7461	7461	7461	7461	7461	7461	7461	7461	7461	7461	7461	7461	7461
General unit		HFC-134a												
# refrig ckts	#	2	2	2	2	2	2	2	2	2	2	2	2	2
% min load	%	15	15	15	15	15	15	15	15	15	15	15	15	15
Refrig charge	(lb)	165/ 165	175/ 165	175/ 175	215/ 205	215/ 215	225/ 215	225/ 225	365/200	415/ 200	460/ 200	415/ 415	460/ 415	460/ 460
Oil charge	(gal)	1.3/1.3	1.3/1.3	1.3/1.3	1.3/1.3	1.3/1.3	1.9/1.3	1.9/1.9	2.1-2.1/ 1.9	2.1-2.1/ 1.9	2.3-2.3/ 1.9	2.1-2.1/ 2.1-2.1	2.3-2.3/ 2.3-2.3	2.3-2.3/ 2.3-2.3
Min ambient-std	(°F)	25	25	25	25	25	25	25	25	25	25	25	25	25
Min ambient-low	(°F)	0	0	0	0	0	0	0	0	0	0	0	0	0

1. Data containing information on two circuits is shown as follows: ckt 1/ ckt 2.
2. Minimum start-up/operating ambient is based on a 5 mph wind across the condenser.
3. RTAC units must only operate with refrigerant R-134a and Trane Oil 00048.

General Data

Table 9. General Data - 50 hz units - standard efficiency - SI

Size		140	155	170	185	200	250	275	300	350	375	400
Compressor		Screw										
Quantity	#	2	2	2	2	2	3	3	3	4	4	4
Nominal size@50Hz	(tons)	70/70	85/70	85/85	100/85	100/100	70-70 / 100	85-85 / 100	100-100/ 100	85-85/ 85-85	100-100/ 85-85	100-100/ 100-100
Evaporator		Flooded										
Water storage	(L)	110	121	129	136	151	212	235	254	284	299	314
2 pass arrangement												
Min flow	(L/s)	12	14	13	14	15	17	19	21	22	24	25
Max flow	(L/s)	45	50	47	50	56	61	72	78	81	88	94
Water conn	(NPS-in)	4	4	6	6	6	8	8	8	8	8	8
3 pass arrangement												
Min flow	(L/s)	8	9	9	9	10	11	13	14	15	16	17
Max flow	(L/s)	30	33	31	34	37	41	48	52	54	59	62
Water conn	(NPS-in)	3.5	3.5	4	4	4	6	6	6	8	8	8
Condenser		Fin and tube										
Qty of coils	#	4	4	4	4	4	8	8	8	8	8	8
Coil length	(mm)	3962/3962	4572/3962	4572/4572	5486/4572	5486/5486	3962/2743	4572/2743	5486/2743	4572/4572	5486/4572	5486/5486
Coil height	(mm)	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067
Number of rows	#	3	3	3	3	3	3	3	3	3	3	3
Fins per foot	(fpf)	192	192	192	192	192	192	192	192	192	192	192
Fan		Direct drive propeller										
Quantity	#	4/4	5/4	5/5	6/5	6/6	8/6	10/6	12/6	10/10	12/10	12/12
Diameter	(mm)	762	762	762	762	762	762	762	762	762	762	762
Air flow per fan	(m ³ /hr)	13452	13120	12855	12855	12855	13190	12853	12856	12854	12855	12855
Power per motor	(kW)	.74	.74	.74	.74	.74	.74	.74	.74	.74	.74	.74
Fan speed	(rps)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Tip speed	M/S	38	38	38	38	38	38	38	38	38	38	38
General unit		HFC-134a										
# refrigerant ckt	#	2	2	2	2	2	2	2	2	2	2	2
% min load	%	15	15	15	15	15	15	15	15	15	15	15
Refrigerant charge	(kg)	79/79	98/93	98/98	102/98	102/102	107/107	107/107	188/91	209/91	188/188	209/209
Oil charge	(L)	5/5	5/5	5/5	7/5	7/7	8-8/7	8-8/7	8-8/7	8-8/8-8	9-9/8-8	9-9/9-9
Min ambient-std	(°C)	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9
Min ambient-low	(°C)	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8

1. Data containing information on two circuits is shown as follows: ckt 1/ ckt 2.
2. Minimum start-up/operating ambient is based on a 5 mph wind across the condenser.
3. RTAC units must only operate with refrigerant R-134a and Trane Oil 00048.



General Data

Table 10. General Data - 50 hz units - high efficiency - SI

Size		120	130	140	155	170	185	200	250	275	300	350	375	400
Compressor		Screw												
Quantity	#	2	2	2	2	2	2	2	3	3	3	4	4	4
Nominal size@50Hz	(tons)	60/60	70/60	70/70	85/70	85/85	100/85	100/100	70-70 / 100	85-85 / 100	100-100/ 100	85-85 / 85-85	100-100/ 85-85	100-100/ 100-100
Evaporator		Flooded												
Water storage	(L)	110	121	129	136	151	148	163	254	273	273	314	326	344
2 pass arrangement														
Min flow	(L/s)	12	14	13	14	15	14	15	21	24	24	25	27	29
Max flow	(L/s)	45	50	47	50	56	50	56	78	87	87	94	98	107
Water conn	(NPS-in)	4	4	6	6	6	6	6	8	8	8	8	8	8
3 pass arrangement														
Min flow	(L/s)	8	9	9	9	10	9	10	14	16	16	17	18	19
Max flow	(L/s)	30	33	31	34	37	34	37	52	58	58	62	65	71
Water conn	(NPS-in)	3.5	3.5	4	4	4	4	4	6	6	6	8	8	8
Condenser		Fin and tube												
Qty of coils	#	4	4	4	4	4	4	4	8	8	8	8	8	8
Coil length	(mm)	3962/ 3962	4572/ 3962	4572/ 4572	5486/ 4572	5486/ 5486	6400/ 5486	6400/ 6400	4572/ 2743	5486/ 3657	6400/ 3657	5486/ 5486	6400/ 5486	6400/ 6400
Coil height	(mm)	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067	1067
Number of rows	#	3	3	3	3	3	3	3	3	3	3	3	3	3
Fins per foot	(fpf)	192	192	192	192	192	192	192	192	192	192	192	192	192
Fan		Direct drive propeller												
Quantity	#	4/4	5/4	5/5	6/5	6/6	7/6	7/7	10/6	12/6	14/6	12/12	14/12	14/14
Diameter	(mm)	762	762	762	762	762	762	762	762	762	762	762	762	762
Air flow per fan	(m ³ /hr)	62484	68819	12839	12839	12839	12840	12842	12844	13493	13430	12838	12724	12841
Power/motor	(kW)	.74	.74	.74	.74	.74	.74	.74	.74	.74	.74	.74	.74	.74
Fan speed	(rps)	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8
Tip speed	M/S	38	38	38	38	38	38	38	38	38	38	38	38	38
General unit		HFC-134a												
# refrigerant	#	2	2	2	2	2	2	2	2	2	2	2	2	2
% min load	%	15	15	15	15	15	15	15	15	15	15	15	15	15
Refrigerant charge	(kg)	75/75	79/75	79/79	98/93	98/98	102/95	102/ 102	166/91	188/91	209/ 91	188/ 188	209/ 188	209/ 209
Oil charge	(L)	5/5	5/5	5/5	5/5	5/5	7/5	7/7	8-8/ 7	8-8/ 7	8-8/ 7	8-8/ 8-8	9-9/ 9-9	9-9/ 9-9
Min ambient-std	(°C)	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9
Min ambient-low	(°C)	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8	-17.8

1. Data containing information on two circuits is shown as follows: ckt 1/ ckt 2.
2. Minimum start-up/operating ambient is based on a 5 mph wind across the condenser.
3. RTAC units must only operate with refrigerant R-134a and Trane Oil 00048.

Pre-Installation

Unit Inspection

When unit is delivered, verify it is the correct unit and is properly equipped. Compare information on the unit nameplate with ordering and submittal information. Inspect all exterior components for visible damage. Report any apparent damage or material shortage to carrier and make a “unit damage” notation on carrier’s delivery receipt. Specify extent and type of damage found and notify 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 in transit, complete this checklist upon receipt of 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.
- 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 Trane sales representative and arrange for repair. Do not repair unit until damage is inspected by the carrier’s representative.

Storage

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

- Store the outdoor unit in a secure area.
- 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.
- Close the discharge and liquid line isolation valves.

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 and width 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 CH530.
- Where specified, provide and install valves in water piping upstream and downstream of evaporator water connections to isolate evaporator for maintenance, and to balance/trim system.
- 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, and at inlet of evaporator.
- 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.
- Install evaporator drain plug. The plug ships in unit control panel.
- Start unit under supervision of a qualified service technician.

General

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



Dimensions and Weights

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 4 feet (1.2 m) is recommended for compressor service. Provide sufficient

clearance for the opening of control panel doors. See [Figure 5, p. 22](#) through [Figure 9, p. 24](#) for minimum clearances. In all cases, local codes which require additional clearances will take precedence over these recommendations.

Figure 5. Recommended unit clearance — 15 foot bases

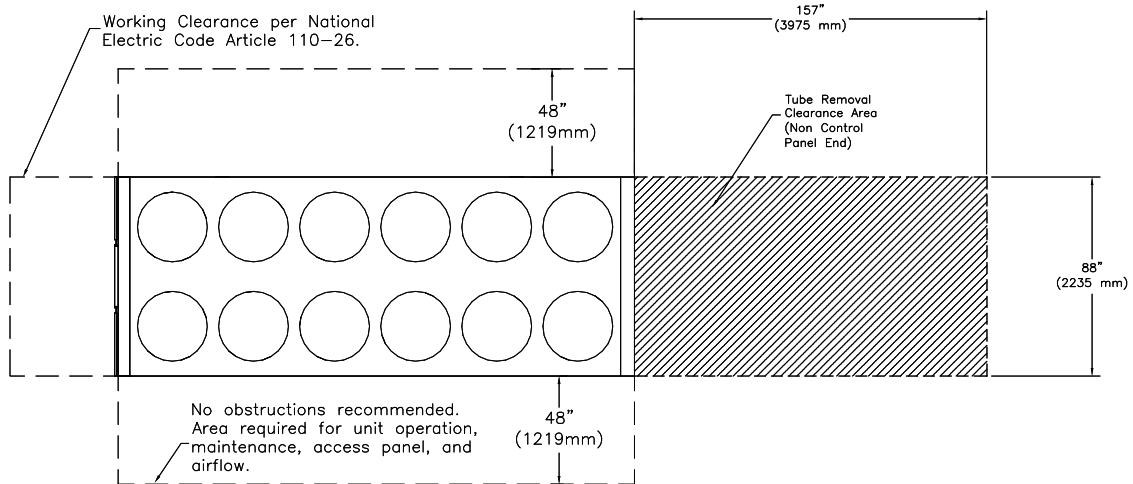
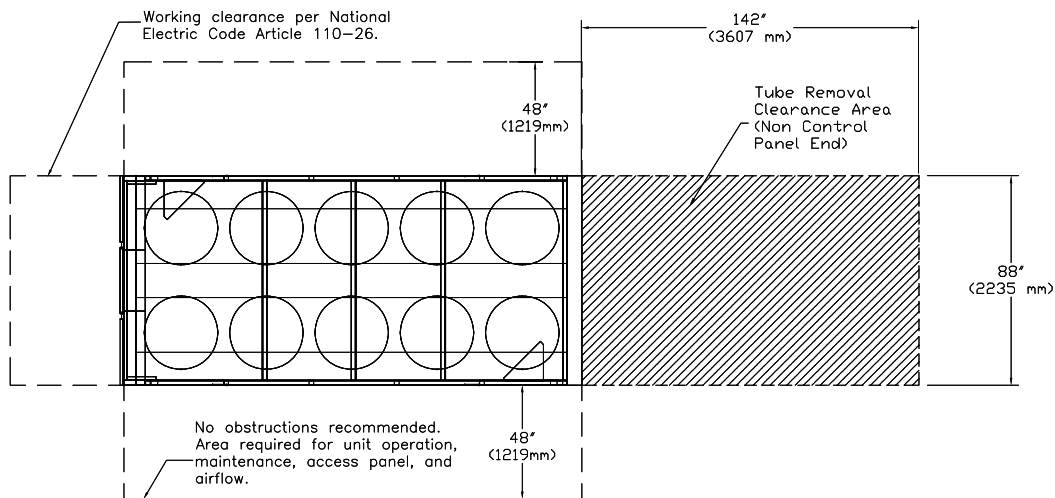


Figure 6. Recommended unit clearances 18-21 foot bases



Dimensions and Weights

Figure 7. Recommended unit clearances 30-45 foot bases

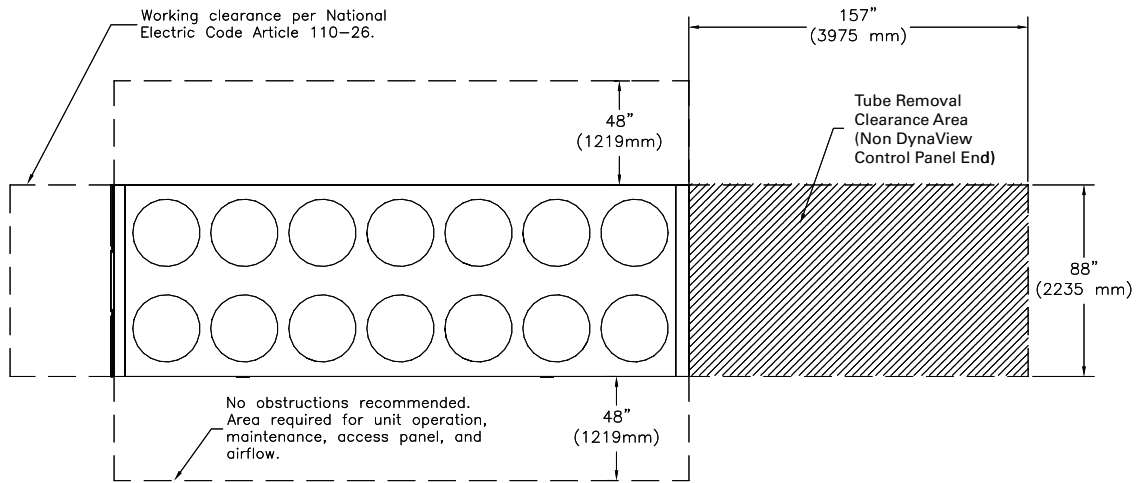


Figure 8. Recommended remote evaporator unit clearances — 15-30 foot bases

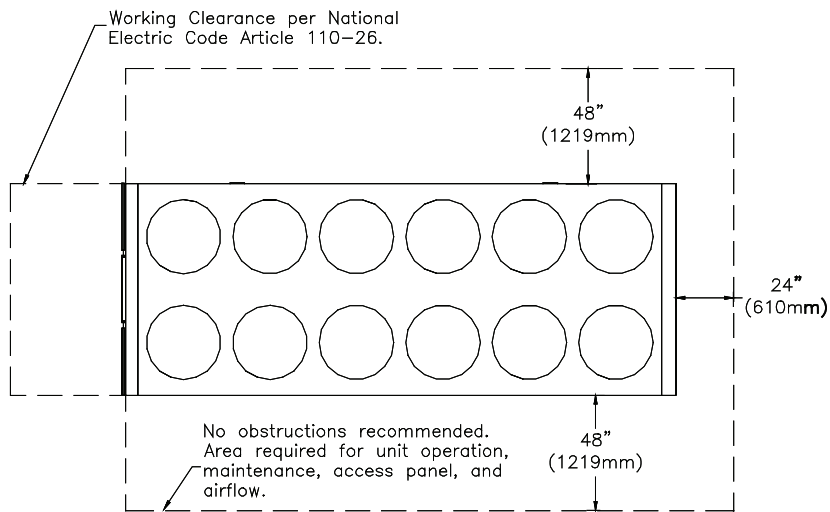
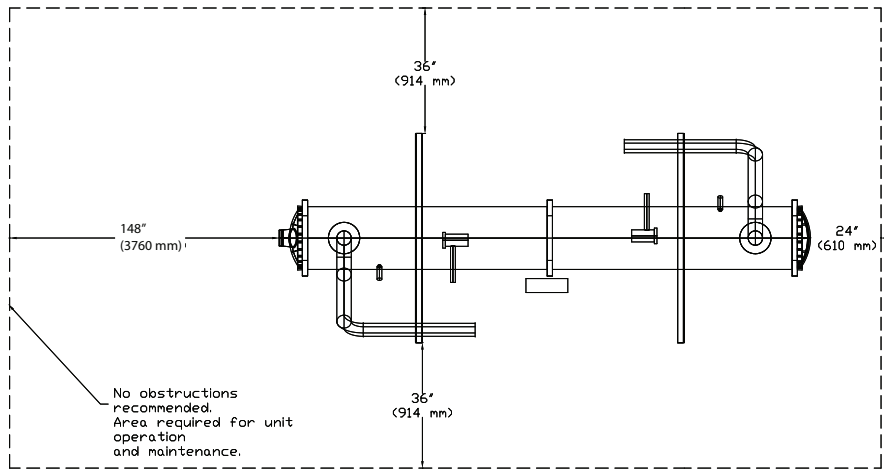


Figure 9. Recommended evaporator clearance



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.

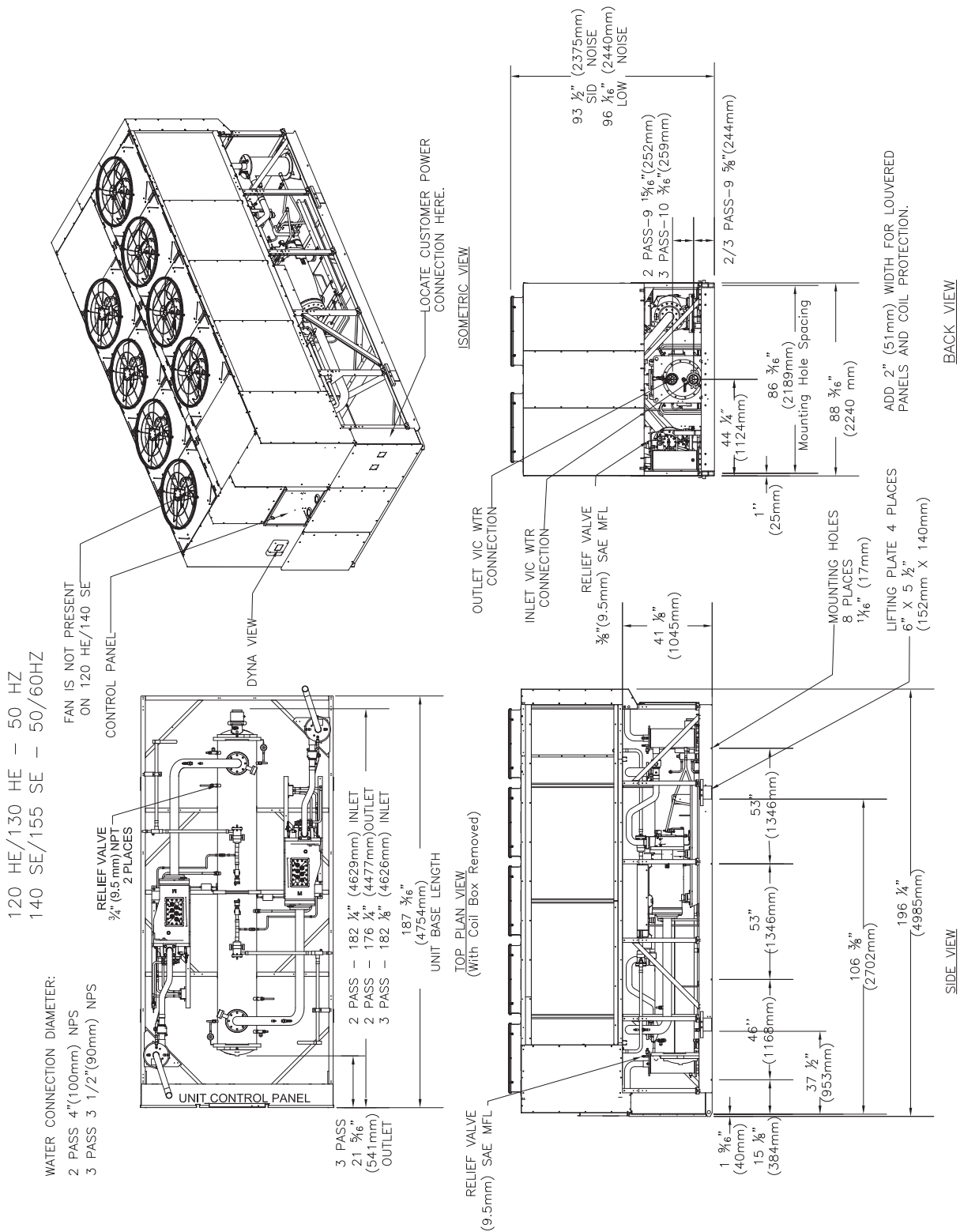
Debris, trash, supplies etc. should not be allowed to accumulate in the vicinity of the unit. Supply air movement may draw debris into the condenser coil, blocking spaces between coil fins and causing coil starvation. Special consideration should be given to low ambient units. Condenser coils and fan 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.

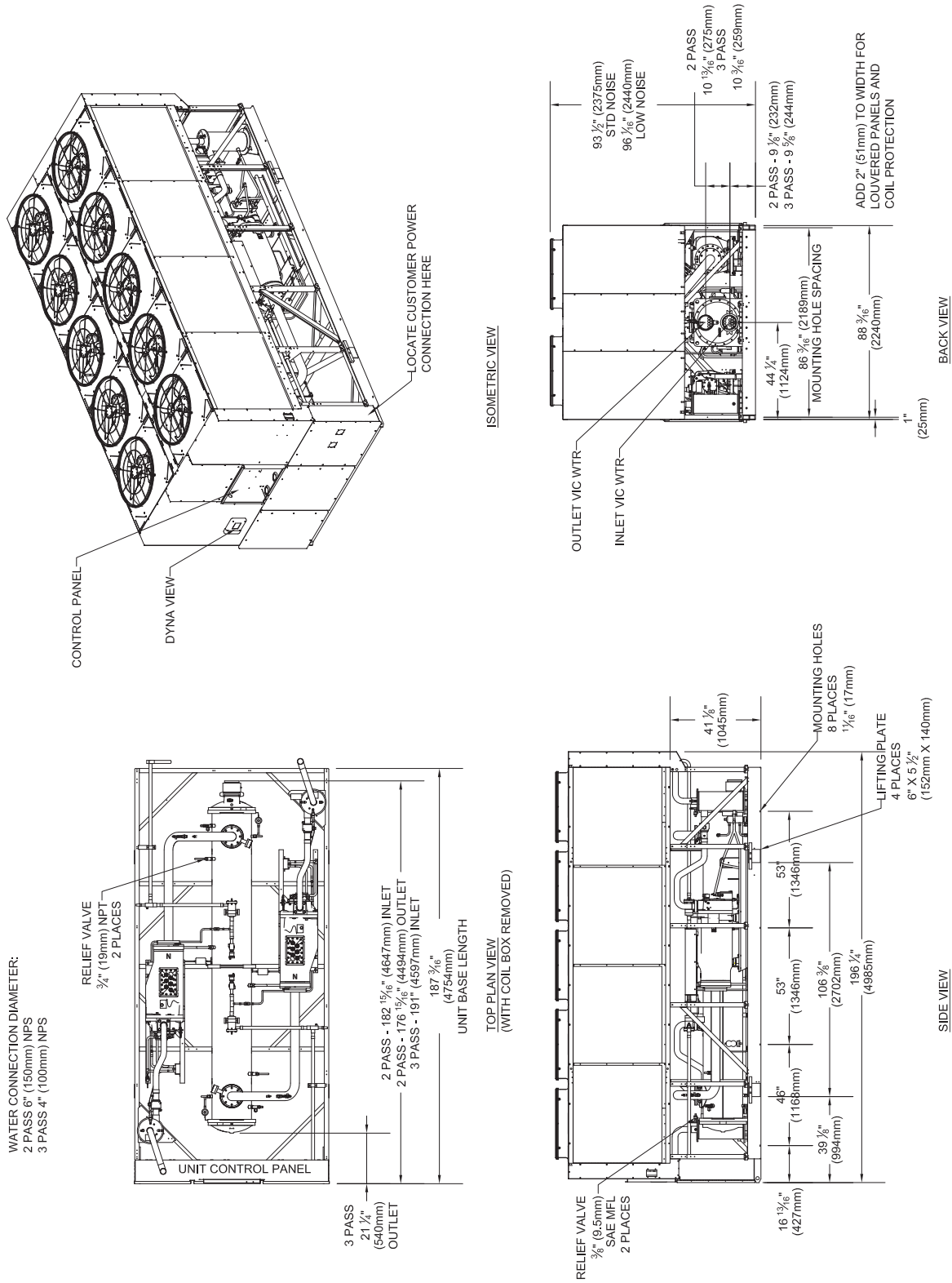
If the outdoor unit configuration requires a variance to the clearance dimensions, contact your Trane Sales Office Representative. Also refer to Trane Engineering Bulletins for application information on RTAC chillers.

Dimensions and Weights

Dimensions

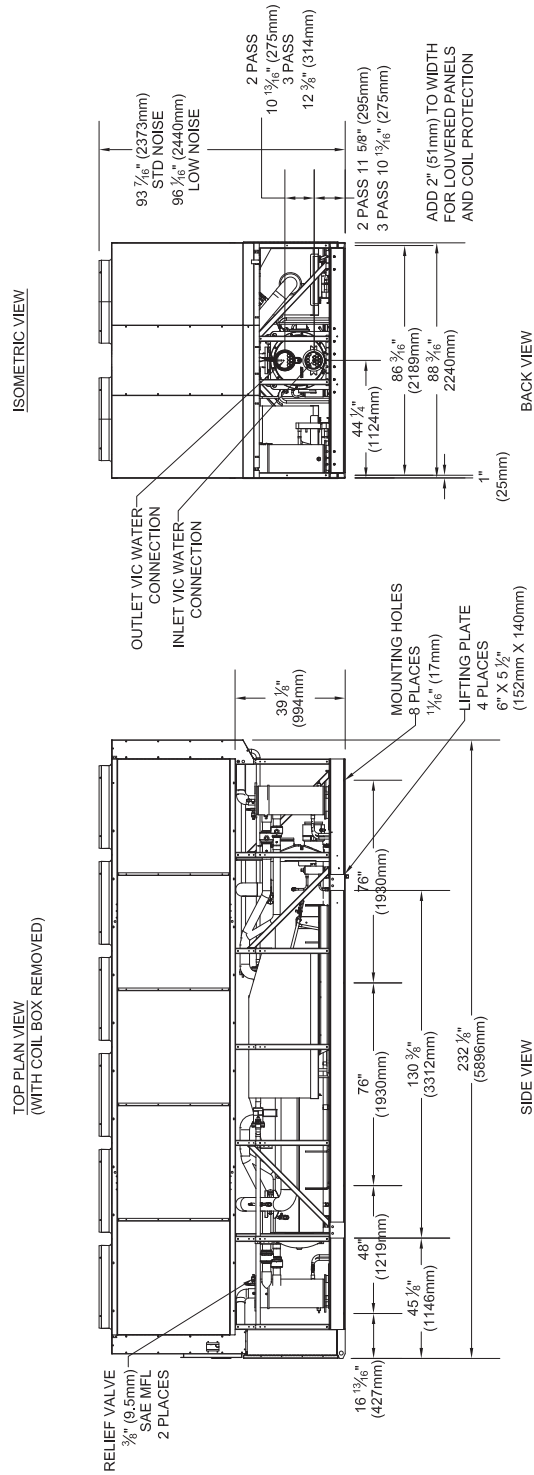
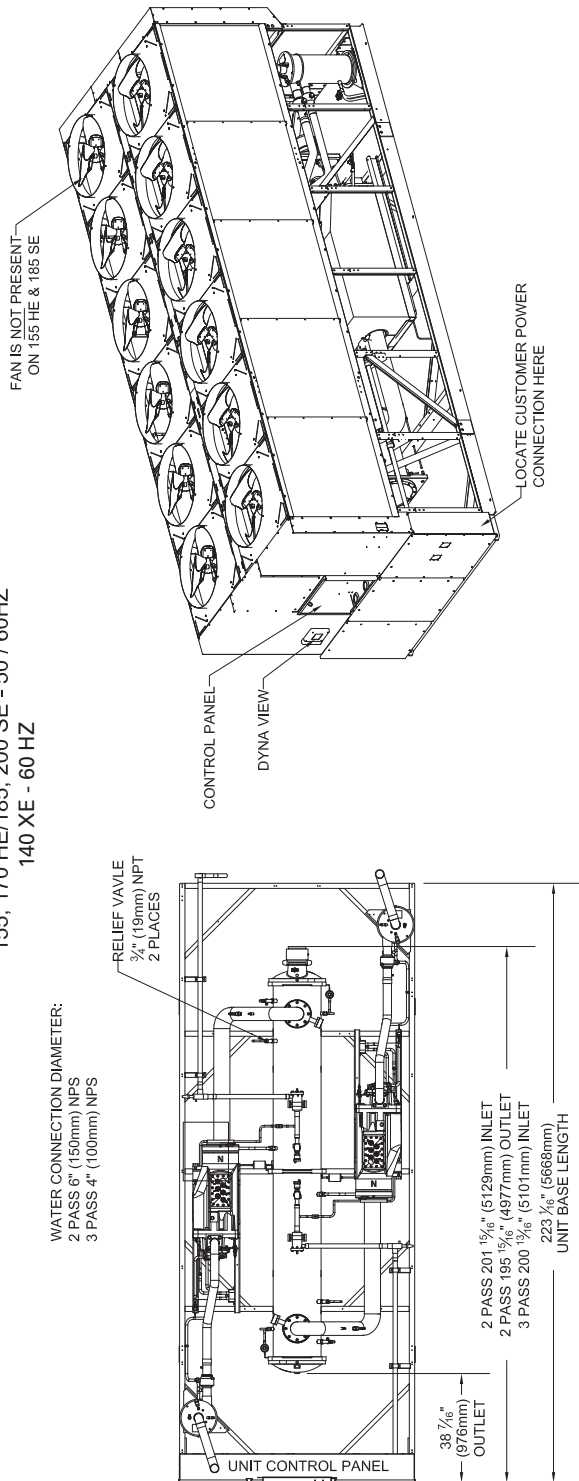


140 HE/170SE - 50 / 60HZ

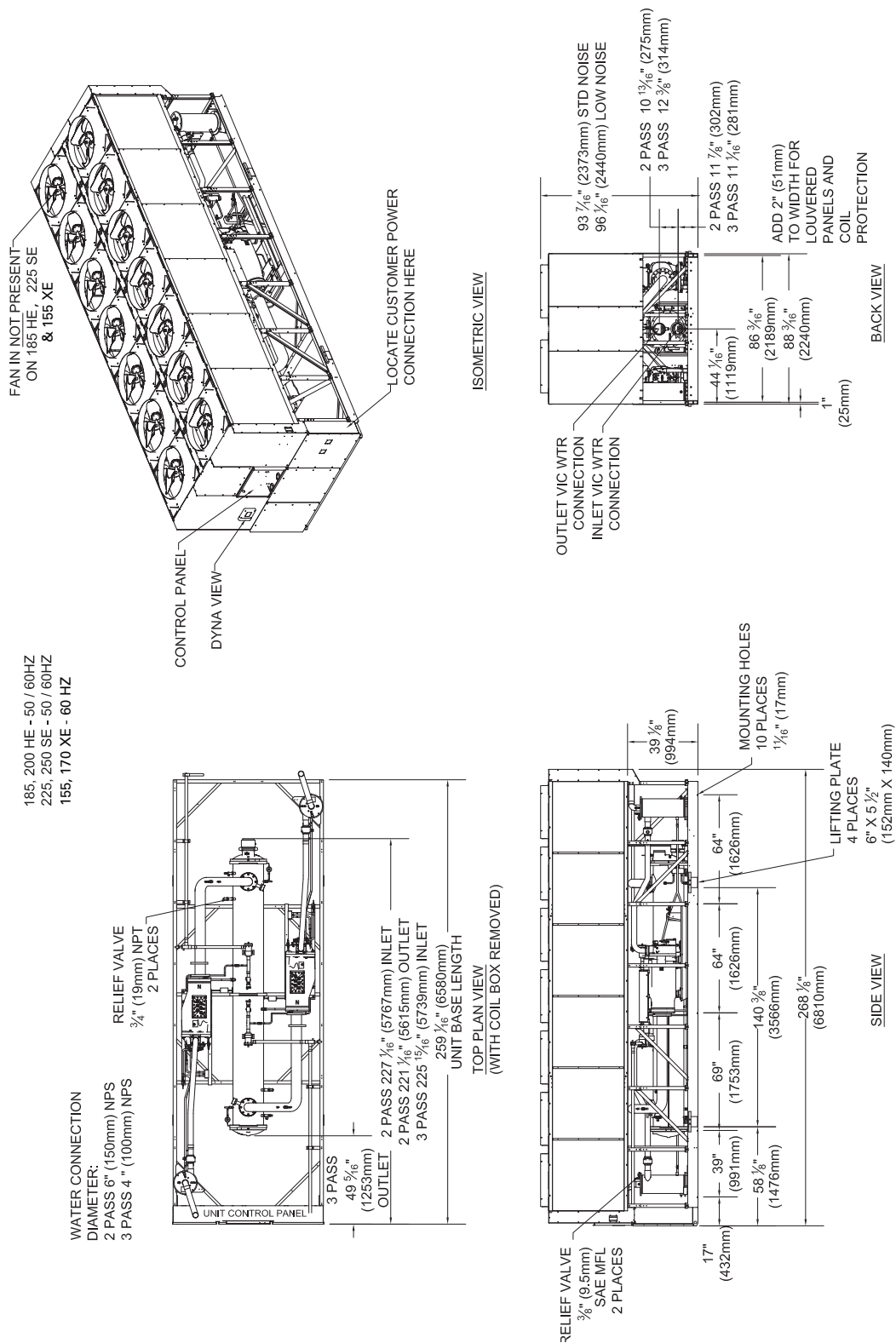


Dimensions and Weights

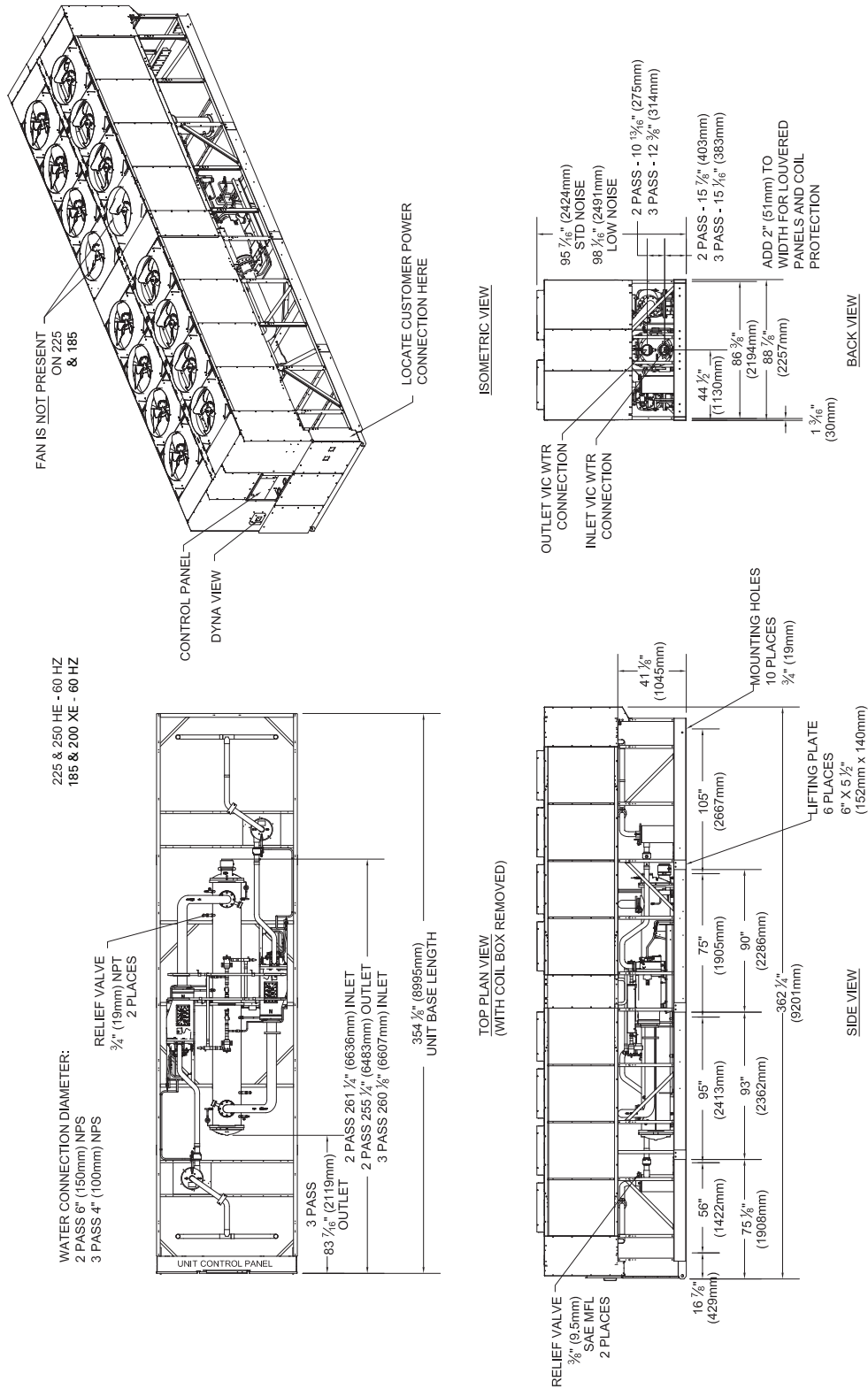
155, 170 HE/185, 200 SE - 50 / 60HZ
140 XE - 60 HZ

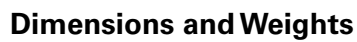


Dimensions and Weights

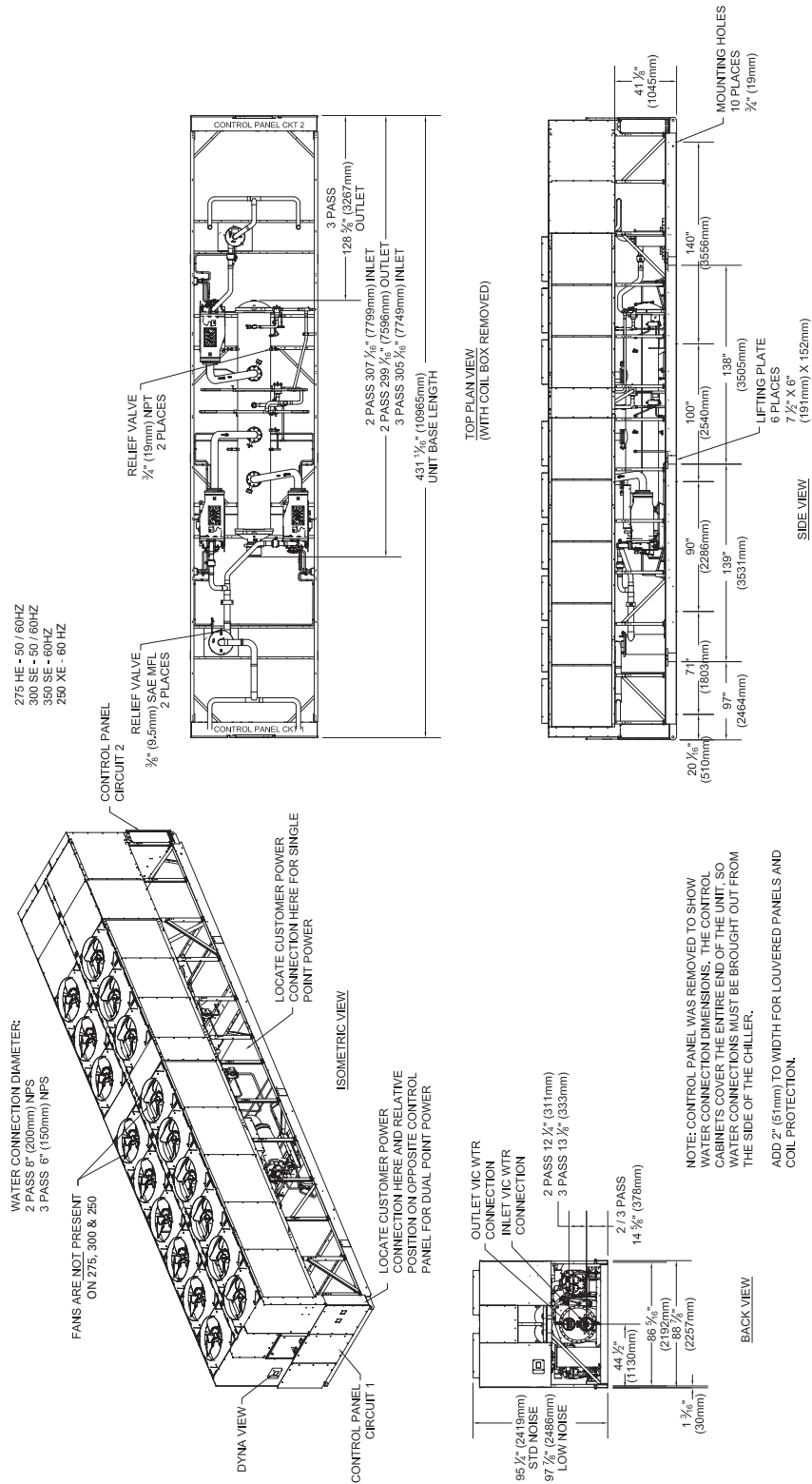


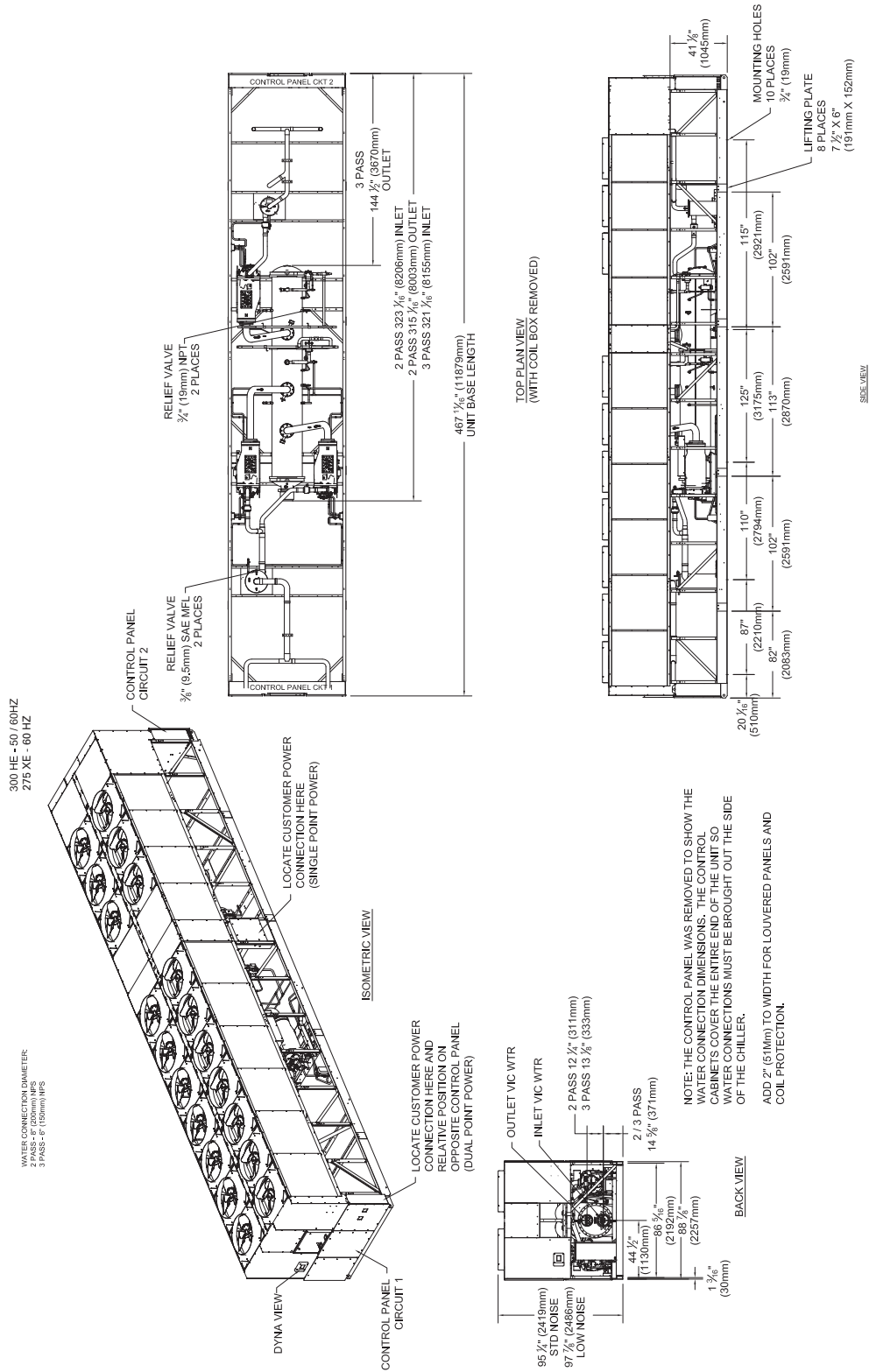
Dimensions and Weights



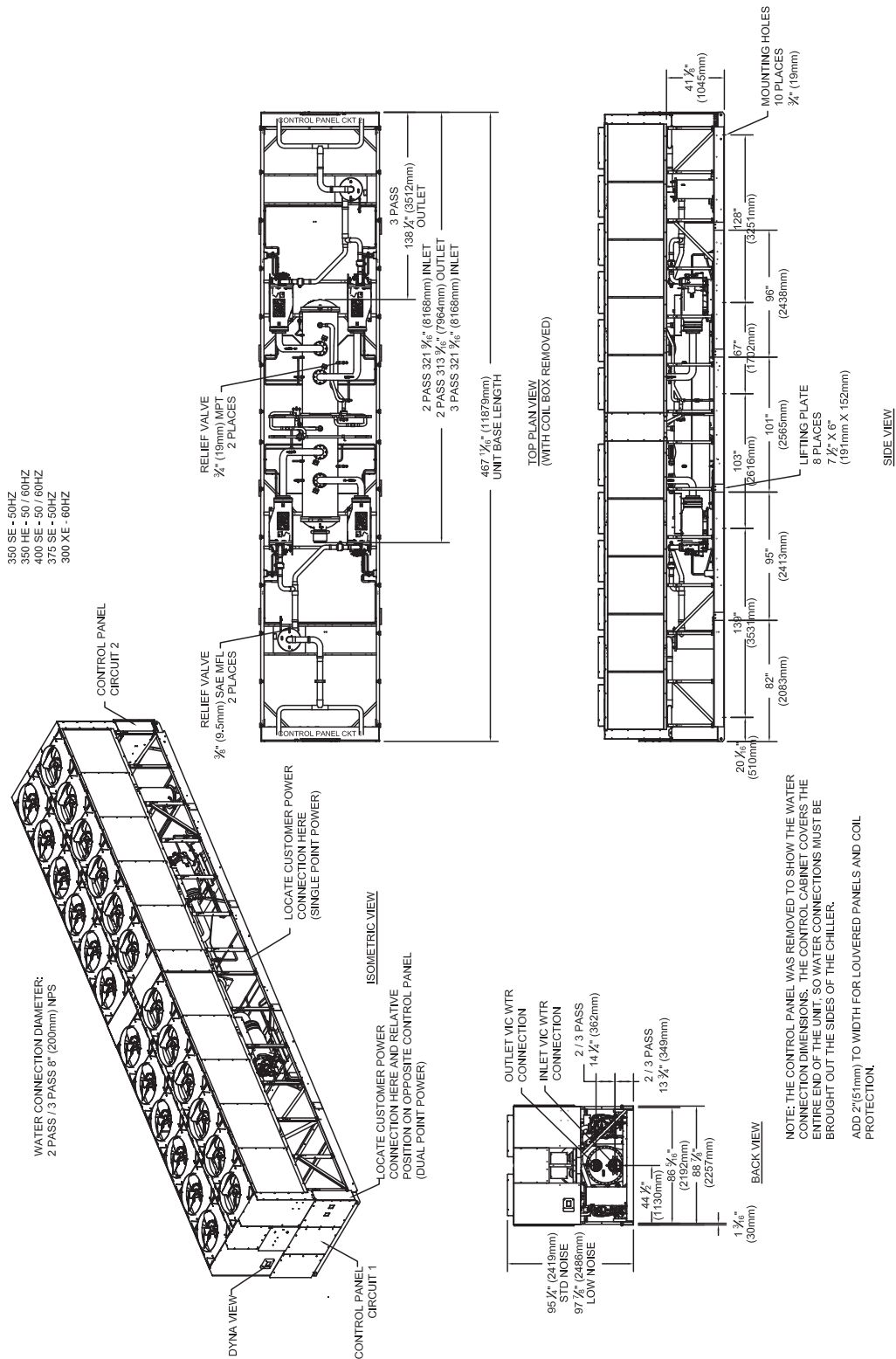


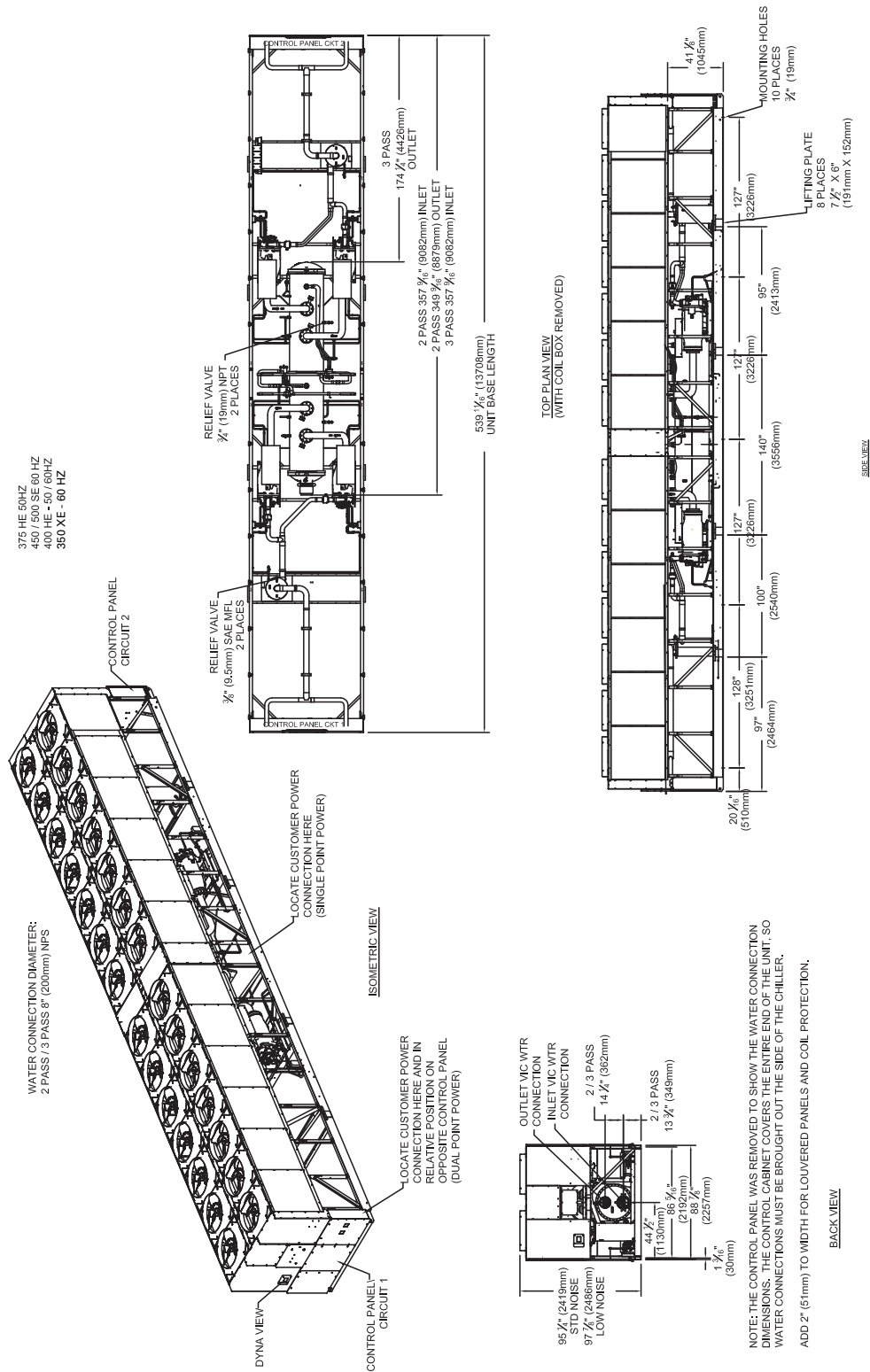
Dimensions and Weights





Dimensions and Weights





Dimensions and Weights

Figure 10. Unit dimensions of condenser/compressor unit for remote evap option

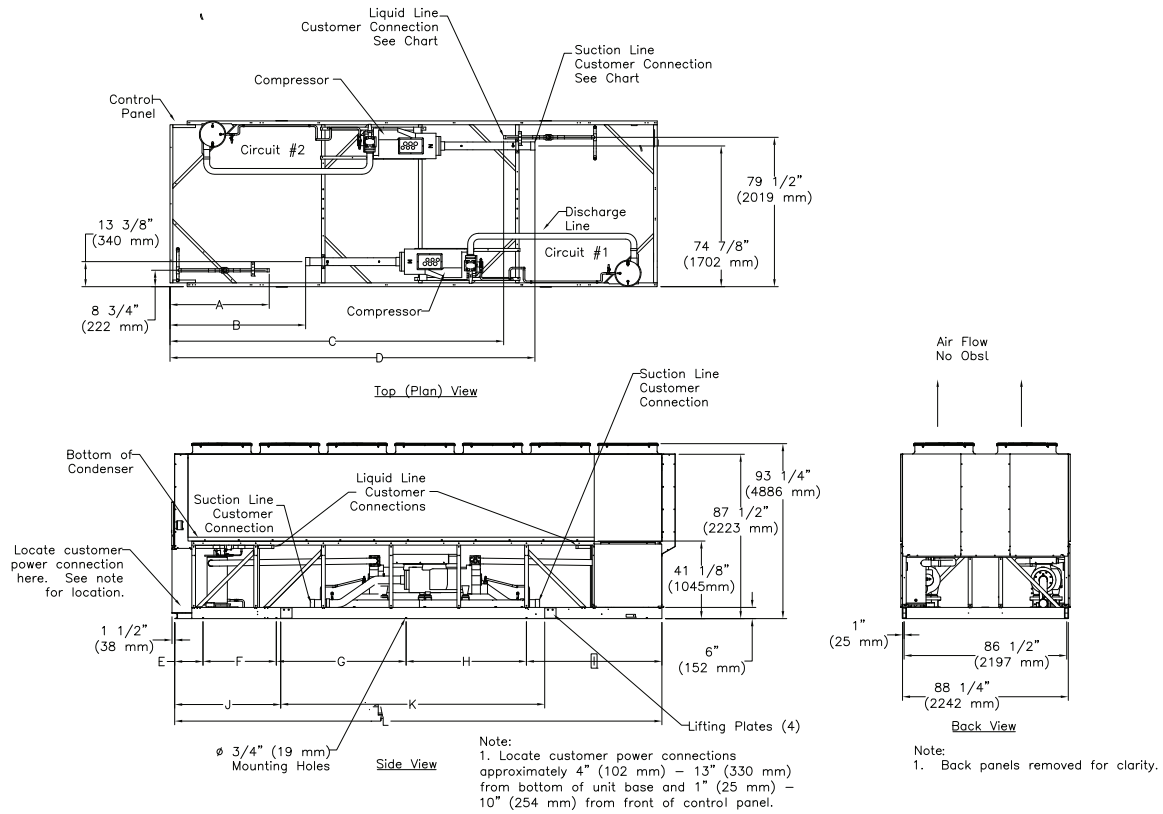


Table 11. Unit dimensions of condenser/compressor unit for remote evap option (in)

Unit Size	A	B	C	D	E	F	G	H	I	J	K	L
140 Std	50.63	52.63	141.63	143.63	15	46	53	53	n/a	40.5	109.5	187
155 Std	50.63	52.63	139.63	143.63	15	46	53	53	n/a	40.5	109.5	187
170 Std	50.63	54.63	139.63	143.63	15	46	53	53	n/a	40.5	109.5	187
140 High	50.63	54.63	139.63	143.63	15	46	53	53	n/a	40.5	109.5	187
185 Std	56.63	64.63	177.5	176	15	48	76	76	n/a	46.5	133.5	223
200 Std	54.25	52.75	177.5	176	15	48	76	76	n/a	46.5	133.5	223
155 High	56.38	64.63	175.63	173.75	15	48	76	76	n/a	46.5	133.5	223
170 High	56.38	54.63	175.63	173.75	15	48	76	76	n/a	46.5	133.5	223
225 Std	72.25	88.75	213.5	194	15	39	69	64	64	59.5	143.5	259
185 High	74.38	90.63	213.5	194	15	39	69	64	64	59.5	143.5	259
250 Std	72.25	52.75	213.5	194	15	39	69	64	64	59.5	143.5	259
200 High	72.25	52.75	213.5	194	15	39	69	64	64	59.5	143.5	259

Dimensions and Weights

Figure 11. Unit dimensions for remote evaporator 140-170T standard efficiency, 140T high efficiency

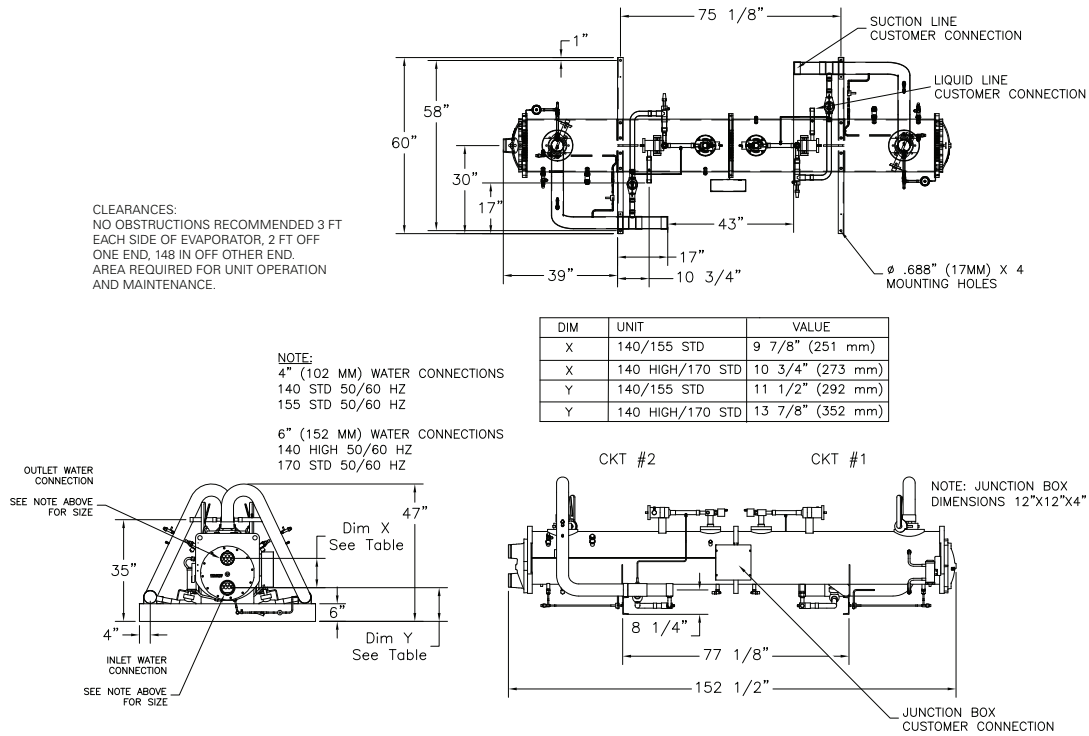
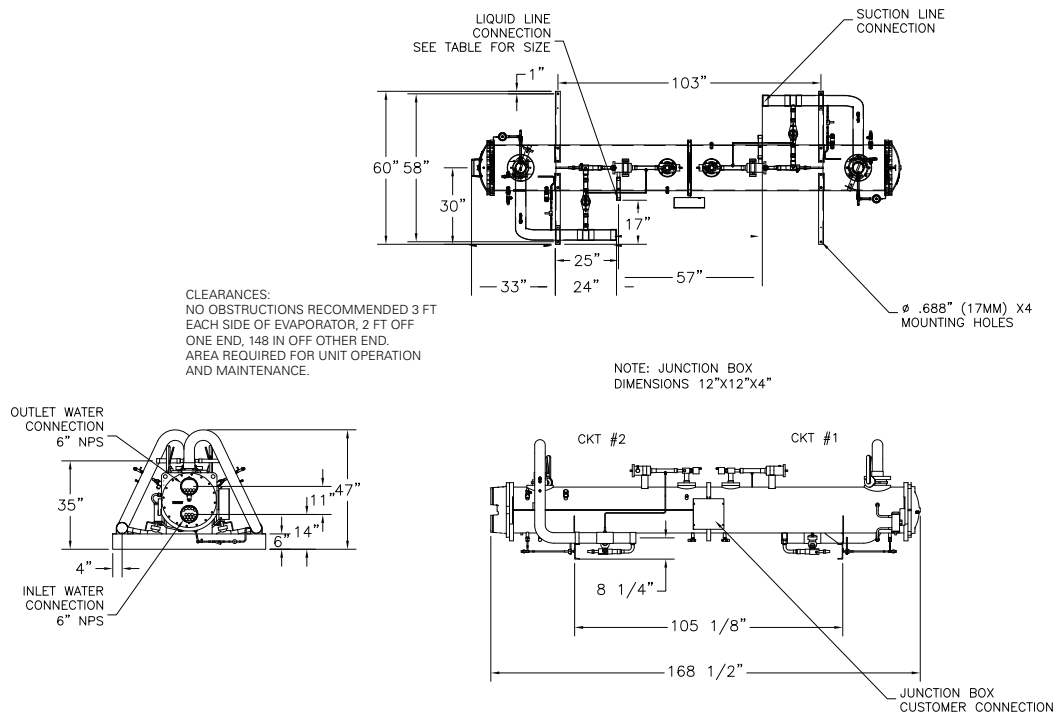


Figure 12. Unit dimensions for remote evaporator 185-250T standard efficiency, 155-200T high efficiency



Dimensions and Weights

Weights

Table 12. Weight - packaged units - 60 Hz - aluminum or CompleteCoat coils

Unit Size (tons)	Standard Efficiency				High Efficiency				Extra Efficiency			
	Shipping		Operating		Shipping		Operating		Shipping		Operating	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
140	10831	4913	11077	5024	10858	4925	11140	5053	12172	5521	12557	5696
155	10910	4949	11113	5041	12114	5495	12414	5631	13983	6343	14306	6489
170	10868	4930	11205	5083	12172	5521	12557	5696	14434	6547	14698	6667
185	12478	5660	12892	5848	13983	6343	14306	6489	15906	7215	16382	7431
200	12885	5845	13208	5991	14434	6547	14698	6667	16006	7260	16351	7417
225	14905	6761	15224	6905	15906	7215	16382	7431	n/a			
250	14549	6599	14896	6757	16006	7260	16351	7417	19881	9018	20558	9325
275	18491	8387	19148	8685	19881	9018	20558	9325	21150	9593	21702	9844
300	20176	9152	20744	9409	21150	9593	21702	9844	23564	10688	24237	10994
350	21030	9539	21485	9745	23564	10688	24237	10994	26605	12068	27342	12402
400	24890	11290	25446	11542	26605	12068	27342	12402	n/a			
450	26310	11934	27005	12249	n/a				n/a			
500	26623	12076	27365	12413	n/a				n/a			

1. Operating weight includes refrigerant and water.
2. Shipping weight includes refrigerant.
3. All weights +/- 3%.

Table 13. Weight - packaged units - 60 Hz - copper coils

Unit Size (tons)	Standard Efficiency				High Efficiency				Extra Efficiency			
	Shipping		Operating		Shipping		Operating		Shipping		Operating	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
140	13406	6081	13656	6194	13432	6093	13716	6221	15591	7072	15985	7251
155	13419	6087	13696	6212	15647	7097	15831	7181	18249	8278	18601	8437
170	13443	6098	13724	6225	15591	7072	15985	7251	18684	8475	18963	8601
185	15869	7198	16256	7374	18249	8278	18601	8437	20783	9427	21256	9642
200	16305	7396	16645	7550	18684	8475	18963	8601	20881	9471	21225	9628
225	18712	8488	19027	8631	20783	9427	21256	9642	n/a			
250	18897	8572	19160	8691	20881	9471	21225	9628	25505	11569	26072	11826
275	23370	10600	24095	10929	25505	11569	26072	11826	27078	12282	27724	12575
300	25681	11649	26212	11890	27078	12282	27724	12575	30341	13762	30968	14047
350	26894	12199	27400	12428	30341	13762	30968	14047	34482	15641	35280	16003
400	31708	14383	32315	14658	34482	15641	35280	16003	n/a			
450	32176	14595	32731	14847	n/a				n/a			
500	34502	15649	35254	15991	n/a				n/a			

1. Operating weight includes refrigerant and water.
2. Shipping weight includes refrigerant.
3. All weights +/- 3%.



Dimensions and Weights

Table 14. Weight - packaged units - 50 Hz - aluminum or CompleteCoat coils

Unit Size (tons)	Standard Efficiency				High Efficiency			
	Shipping		Operating		Shipping		Operating	
	lb	kg	lb	kg	lb	kg	lb	kg
120			n/a		10831	4913	11077	5024
130			n/a		10910	4949	11113	5041
140	10845	4919	11091	5031	10872	4931	11153	5059
155	11130	5048	11399	5170	12465	5654	12761	5788
170	11427	5183	11653	5286	12743	5780	13005	5899
185	12796	5804	13094	5939	14382	6524	14703	6669
200	12962	5879	13286	6026	14554	6602	14906	6761
250	17538	7955	17989	8160	18657	8463	19410	8804
275	19205	8711	19709	8940	20534	9314	21032	9540
300	19721	8945	20491	9295	21112	9576	21649	9820
350	22723	10307	23381	10605	24630	11172	25303	11477
375	23848	10817	24493	11110	25759	11684	26454	11999
400	24662	11187	25342	11495	26501	12021	27228	12350

1. Operating weight includes refrigerant and water.

2. Shipping weight includes refrigerant.

3. All weights +/- 3%.

Table 15. Weight - packaged units - 50 Hz - copper coils

Unit Size (tons)	Standard Efficiency				High Efficiency			
	Shipping		Operating		Shipping		Operating	
	lb	kg	lb	kg	lb	kg	lb	kg
120			n/a		13406	6080	13656	6194
130			n/a		13419	6087	13696	6212
140	13419	6087	13663	6197	13447	6099	13725	6226
155	13706	6217	13964	6334	15771	7154	16181	7340
170	14001	6351	14282	6478	16163	7331	16416	7446
185	16215	7355	16453	7463	18555	8416	18936	8589
200	16381	7430	16689	7570	18811	8533	19170	8695
250	21550	9775	21999	9979	23497	10658	24089	10927
275	24074	10920	24611	11163	26107	11842	26651	12089
300	25187	11425	25800	11703	27037	12264	27646	12540
350	28576	12962	29119	13208	31529	14301	32202	14607
375	29920	13571	30511	13840	31951	14493	32511	14747
400	31604	14335	32275	14640	34378	15594	35077	15911

1. Operating weight includes refrigerant and water.

2. Shipping weight includes refrigerant.

3. All weights +/- 3%.

Dimensions and Weights

Table 16. Weights - remote - 60 Hz - aluminum or CompleteCoat coils

Unit Size (tons)	Standard Efficiency				High Efficiency			
	Shipping		Operating		Shipping		Operating	
	lb	kg	lb	kg	lb	kg	lb	kg
140	8358	3791	8584	3894	8291	3761	8604	3903
155	8299	3765	8599	3901	9497	4308	9868	4476
170	8305	3767	8615	3908	9503	4311	9933	4506
185	9860	4472	10230	4640	11059	5016	11499	5216
200	10217	4634	10646	4829	11417	5179	11865	5382
225	11514	5223	11954	5423	-	-	-	-
250	11613	5268	12061	5471	-	-	-	-

1. Operating weight includes refrigerant and water.
2. Shipping weight includes nitrogen holding charge.
3. All weights +/- 3%.

Table 17. Weights - remote - 60 Hz - copper coils

Nominal Tonnage	Standard Efficiency				High Efficiency			
	Shipping Weight (lb)	Shipping Weight (kg)	Operating Weight (lb)	Operating Weight (kg)	Shipping Weight (lb)	Shipping Weight (kg)	Operating Weight (lb)	Operating Weight (kg)
140	10955	4969	11158	5061	10750	4876	11179	5071
155	10873	4932	11174	5069	12916	5859	13285	6026
170	10878	4934	11189	5075	13452	6102	13354	6057
185	13609	6173	13649	6191	15325	6951	15764	7150
200	13666	6199	14066	6380	15681	7113	16129	7316
225	15780	7158	16217	7356	-	-	-	-
250	15878	7202	16325	7405	-	-	-	-

1. Operating weight includes refrigerant and water.
2. Shipping weight includes nitrogen holding charge.
3. All weights +/- 3%.

Table 18. Weights - remote evaporator - 60 Hz

Nominal Tonnage	Standard Efficiency				High Efficiency			
	Shipping Weight (lb)	Shipping Weight (kg)	Operating Weight (lb)	Operating Weight (kg)	Shipping Weight (lb)	Shipping Weight (kg)	Operating Weight (lb)	Operating Weight (kg)
140	2486	1128	2730	1238	2528	1147	2805	1272
155	2525	1145	2790	1266	2556	1159	2850	1293
170	2528	1147	2805	1272	2600	1179	2920	1325
185	2556	1159	2850	1293	2797	1269	3114	1413
200	2600	1179	2920	1325	2846	1291	3192	1448
225	2797	1269	3114	1413	-	-	-	-
250	2846	1291	3192	1448	-	-	-	-

1. Operating weight includes refrigerant and water.
2. Shipping weight includes nitrogen holding charge.
3. All weights +/- 3%.



Installation - Mechanical

Location Requirements

Noise Considerations

Locate 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

A base or foundation is not required if unit location is level and strong enough to support unit's operating weight as listed in "General Data," p. 10, Table 1, p. 11 through Table 10, p. 20. Provide rigid, non-warping mounting pads or concrete foundation of sufficient strength and mass to support unit operating weight (including piping, and full operating charges of refrigerant, oil and water). Once in place, outdoor unit must be level within 1/4" (6 mm) over its length and width.

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 4 feet (1.2 m) is recommended for compressor service. Provide sufficient clearance for the opening of control panel doors. Refer to Figure 5, p. 22 through Figure 9, p. 24 in "Dimensions and Weights," p. 22 for minimum clearances. In all cases, local

codes which require additional clearances will take precedence over these recommendations.

Rigging

Lifting Procedure

⚠ WARNING

Heavy Objects!

Ensure that all the lifting equipment used is properly rated for the weight of the unit being lifted. Each of the cables (chains or slings), hooks, and shackles used to lift the unit must be capable of supporting the entire weight of the unit. Lifting cables (chains or slings) may not be of the same length. Adjust as necessary for even unit lift. Other lifting arrangements could cause equipment or property damage. Failure to follow instructions above or properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury.

⚠ WARNING

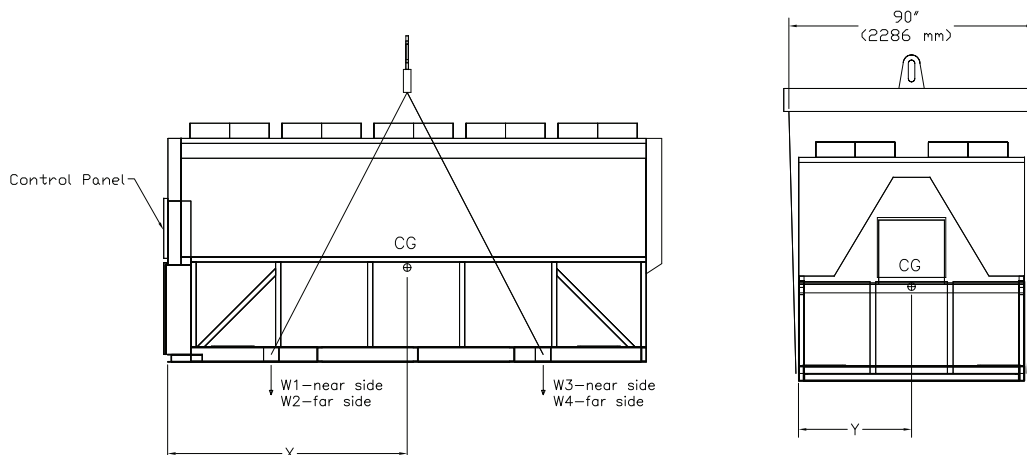
Improper Unit Lift!

Test lift unit approximately 24 inches to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level. Failure to properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury and possible equipment or property-only damage.

Important: Do not fork lift unit.

See Table 12, p. 37 through Table 18, p. 39 for lifting weights and Table 19, p. 42 and Table 20, p. 42 for center of gravity (CG) dimensions.

Figure 13. Lifting the unit (packaged and remote) 15-21 foot base



Installation - Mechanical

Figure 14. Lifting the unit (packaged and remote) 30-36 foot base

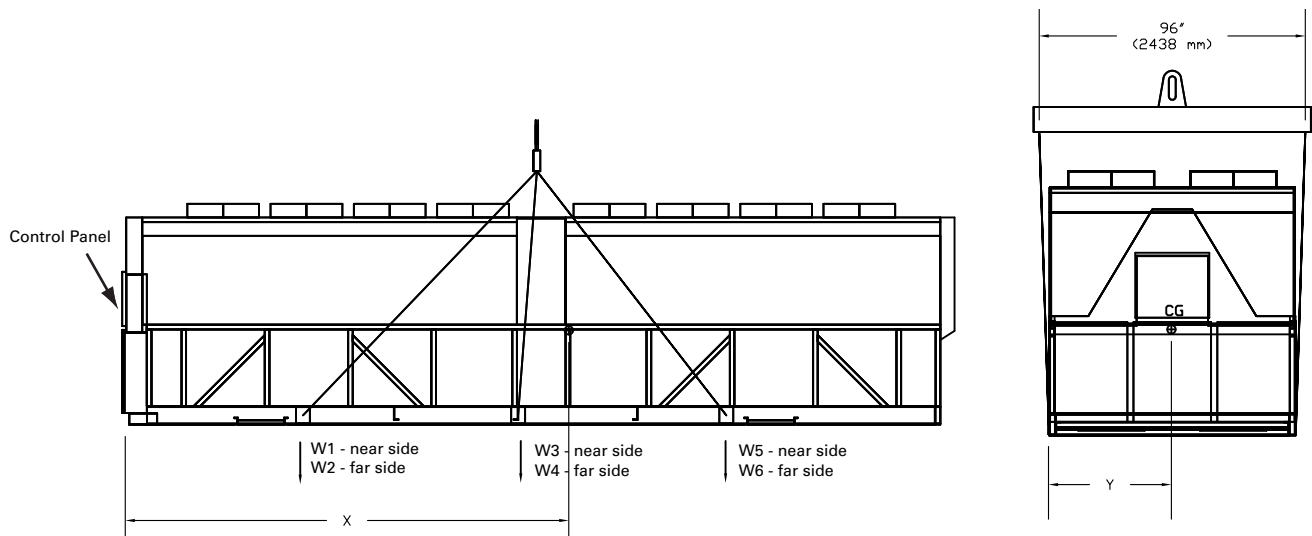
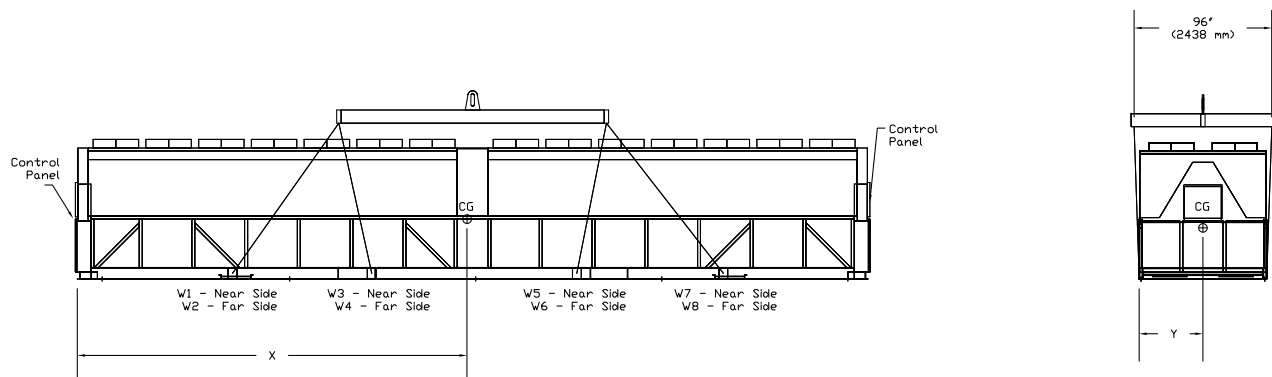


Figure 15. Lifting the unit (packaged and remote) 39-45 foot base





Installation - Mechanical

Table 19. Center of gravity (in) - 60 Hz

Unit Size (tons)	Packaged			Remote			Remote Evap		
	X	Y	Z	X	Y	Z	X	Y	Z
Aluminum Coils - Standard Efficiency									
140	88	45	35.5	85	45	37.25	39	30	25
155	88	45	35.5	85	45	37.25	39	30	25
170	88	45	35.5	85	45	37.25	39	30	25
185	106	44	35.5	103	44	39	53	30	25
200	106	45	35.5	107	45	39	53	30	25
225	124	45	35.5	121	45	41.5	53	30	25
250	124	45	35.5	121	45	41.5	53	30	25
275	176	42	35.5	-	-	-	-	-	-
300	199	42	35.5	-	-	-	-	-	-
350	205	42	35.5	-	-	-	-	-	-
400	234	44	35.5	-	-	-	-	-	-
450	266	44	35.5	-	-	-	-	-	-
500	274	44	35.5	-	-	-	-	-	-
Aluminum Coils - High Efficiency									
140	88	45	35.5	85	45	37.25	39	30	25
155	106	45	35.5	103	45	39	53	30	25
170	106	45	35.5	103	45	39	53	30	25
185	124	46	35.5	122	46	41.5	53	30	25
200	124	45	35.5	121	45	41.5	53	30	25
225	167	45	35.5	-	-	-	-	-	-
250	167	45	35.5	-	-	-	-	-	-
275	203	42	35.5	-	-	-	-	-	-
300	222	42	35.5	-	-	-	-	-	-
350	234	44	35.5	-	-	-	-	-	-
400	274	44	35.5	-	-	-	-	-	-
Aluminum Coils - Extra Efficiency									
140	106	45	35.5	-	-	-	-	-	-
155	124	46	35.5	-	-	-	-	-	-
170	124	45	35.5	-	-	-	-	-	-
185	167	45	35.5	-	-	-	-	-	-
200	167	45	35.5	-	-	-	-	-	-
250	203	42	35.5	-	-	-	-	-	-
275	222	42	35.5	-	-	-	-	-	-
300	234	44	35.5	-	-	-	-	-	-
350	274	44	35.5	-	-	-	-	-	-
Copper Coils - Standard Efficiency									
140	90	45	38	88	45	37.25	39	30	25
155	90	45	38	88	45	37.25	39	30	25
170	90	45	38	88	45	37.25	39	30	25
185	108	44	38	106	44	39	53	30	25
200	108	45	38	107	45	39	53	30	25
225	126	45	38	125	45	41.5	53	30	25
250	126	45	38	125	45	41.5	53	30	25
275	174	42	38	-	-	-	-	-	-
300	195	43	38	-	-	-	-	-	-
350	204	43	38	-	-	-	-	-	-
400	235	44	38	-	-	-	-	-	-
450	261	44	38	-	-	-	-	-	-
500	273	44	38	-	-	-	-	-	-

Table 19. Center of gravity (in) - 60 Hz (continued)

Unit Size (tons)	Packaged			Remote			Remote Evap		
	X	Y	Z	X	Y	Z	X	Y	Z
Copper Coils - High Efficiency									
140	90	45	38	88	45	37.25	39	30	25
155	108	45	38	106	45	39	53	30	25
170	108	45	38	106	45	39	53	30	25
185	126	46	38	125	46	41.5	53	30	25
200	126	45	38	124	45	41.5	53	30	25
225	170	45	38	-	-	-	-	-	-
250	170	45	38	-	-	-	-	-	-
275	201	42	38	-	-	-	-	-	-
300	219	42	38	-	-	-	-	-	-
350	234	44	38	-	-	-	-	-	-
400	273	44	38	-	-	-	-	-	-
Copper Coils - Extra Efficiency									
140	108	45	38	-	-	-	-	-	-
155	126	46	38	-	-	-	-	-	-
170	126	45	38	-	-	-	-	-	-
185	170	45	38	-	-	-	-	-	-
200	170	45	38	-	-	-	-	-	-
250	201	42	38	-	-	-	-	-	-
275	219	42	38	-	-	-	-	-	-
300	234	44	38	-	-	-	-	-	-
350	273	44	38	-	-	-	-	-	-

Table 20. Center of gravity (in) - packaged units - 50 Hz

Unit Size (tons)	Standard Efficiency			High Efficiency		
	X	Y	Z	X	Y	Z
Aluminum Coils						
120	-	-	-	88	45	35.5
130	-	-	-	88	45	35.5
140	88	45	35.5	88	45	35.5
155	88	44	35.5	106	44	35.5
170	89	45	35.5	106	45	35.5
185	106	45	35.5	124	45	35.5
200	106	45	35.5	124	45	35.5
250	182	41	35.5	177	41	35.5
275	172	41	35.5	202	42	35.5
300	201	42	35.5	222	42	35.5
350	235	44	35.5	234	44	35.5
375	229	44	35.5	266	44	35.5
400	234	44	35.5	274	44	35.5
Copper Coils						
120	-	-	-	90	45	38
130	-	-	-	90	45	38
140	90	45	38	90	45	38
155	90	44	38	108	44	38
170	90	45	38	108	45	38
185	108	45	38	126	45	38
200	108	45	38	126	45	38
250	183	42	38	174	42	38
275	171	42	38	200	42	38
300	197	42	38	220	42	38
350	235	44	38	235	44	38
375	227	44	38	261	44	38
400	235	44	38	273	44	38

Installation - Mechanical

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.

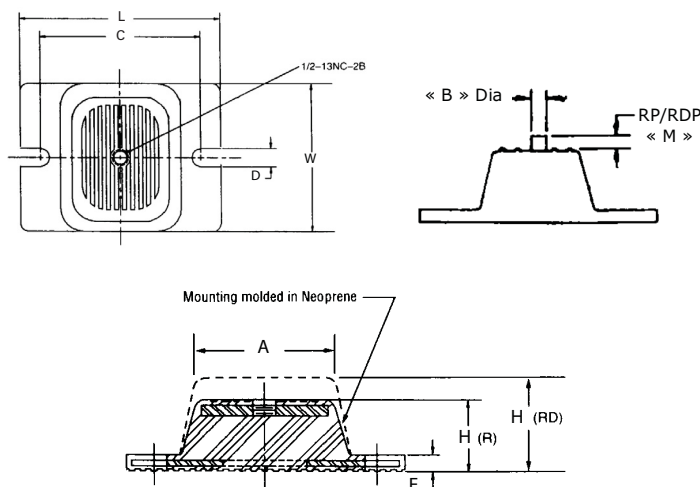
For maximum isolation effect, isolate water lines and electrical conduit. Wall sleeves and rubber isolated piping hangers can be used to reduce the sound transmitted through water piping. To reduce the sound transmitted through electrical conduit, use flexible electrical conduit.

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.

Unit Isolation and Leveling

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

Figure 16. RTAC elastomeric isolator



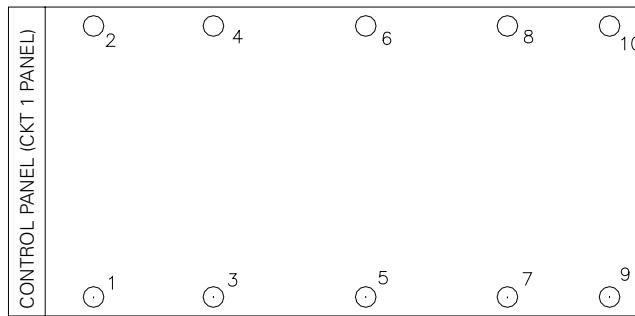
EXT	Max Load Each (lbs)	Color	Maximum Deflection (in)	A	B	C	D	E	H	L	M	W	Type
61	1500	BROWN	0.50	3.00	0.50	5.00	0.56	0.38	2.75	6.25	1.60± .25	4.63	RDP-4
62	2250	RED											
63	3000	GREEN											
64	4000	GRAY											

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 and width. 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.
4. Level the unit carefully. Fully tighten the isolator mounting bolts.

Figure 17. Mounting point locations

Table 21. Isolator selections - packaged units - 60 Hz

Size (tons)	Location									
	1	2	3	4	5	6	7	8	9	10
Standard Efficiency										
140	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
155	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
170	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
185	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
200	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
225	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62
250	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62
275	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
300	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
350	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
400	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
450	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
500	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
High Efficiency										
140	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
155	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
170	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
185	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62
200	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62
225	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62
250	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62
275	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
300	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
350	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
400	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
Extra Efficiency										
140	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
155	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62
170	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62
185	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62
200	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62
250	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
275	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
300	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
350	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64

Installation - Mechanical

Table 22. Isolator selections - packaged units - 50 Hz

Size (tons)	Location									
	1	2	3	4	5	6	7	8	9	10
Standard Efficiency										
140	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
155	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
170	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
185	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
200	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
250	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
275	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
300	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
350	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
400	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
High Efficiency										
120	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
130	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
140	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
155	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
170	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	-	-
185	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62
200	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62	Red 62
250	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
275	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
300	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
350	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64
400	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64	Gray 64

Table 23. Isolator selections - remote units - 60 Hz

Size (tons)	Location									
	1	2	3	4	5	6	7	8	9	10
Standard Efficiency										
140	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	-	-
155	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	-	-
170	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	-	-
185	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	-	-
200	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	-	-
225	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61
250	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61
High Efficiency										
140	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	-	-
155	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	-	-
170	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	-	-
185	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61
200	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61	Brown 61



Installation - Mechanical

Table 24. Point weights (lbs) - packaged units - 60 Hz

Size- tons	Isolator Location									
	1	2	3	4	5	6	7	8	9	10
Aluminum Coils - Standard Efficiency										
140	1402	1450	1383	1430	1361	1408	1333	1379	-	-
155	1402	1450	1383	1430	1361	1408	1333	1379	-	-
170	1461	1450	1383	1430	1361	1408	1339	1386	-	-
185	1657	1673	1734	1638	1564	1584	1510	1530	-	-
200	1674	1733	1646	1701	1604	1658	1561	1616	-	-
225	1539	1601	1522	1584	1493	1555	1465	1527	1438	1500
250	1521	1571	1503	1554	1472	1522	1443	1494	1413	1473
275	1925	2188	1887	2148	1870	2082	1786	2062	1750	1986
300	1936	2173	1974	2198	1994	2230	2029	2266	2080	2334
350	1907	2144	1977	2213	2065	2301	2163	2399	2300	2536
400	2744	2758	2667	2646	2584	2564	2531	2510	2428	2422
450	2812	2774	2791	2753	2770	2733	2750	2712	2729	2569
500	2776	2719	2787	2744	2812	2768	2836	2792	2860	2817
Aluminum Coils - High Efficiency										
140	1402	1450	1383	1430	1361	1408	1339	1387	-	-
155	1588	1648	1565	1609	1505	1558	1465	1507	-	-
170	1657	1652	1565	1622	1515	1579	1465	1530	-	-
185	1419	1523	1405	1510	1381	1496	1358	1466	1335	1400
200	1497	1552	1479	1539	1446	1496	1417	1466	1389	1440
225	1661	1686	1649	1674	1629	1654	1613	1639	1591	1617
250	1661	1686	1649	1674	1629	1654	1613	1639	1591	1617
275	1829	2070	1891	2134	1960	2201	2093	2282	2193	2395
300	2147	2392	2120	2391	2087	2357	2049	2319	2014	2284
350	2647	2629	2535	2517	2452	2434	2512	2380	2294	2300
400	2744	2705	2773	2729	2797	2754	2822	2778	2846	2802
Aluminum Coils - Extra Efficiency										
140	1657	1652	1565	1622	1515	1579	1465	1530	-	-
155	1419	1523	1405	1510	1381	1496	1358	1466	1335	1400
170	1497	1552	1479	1539	1446	1496	1417	1466	1389	1440
185	1661	1686	1649	1674	1629	1654	1613	1639	1591	1617
200	1661	1686	1649	1674	1629	1654	1613	1639	1591	1617
250	1829	2070	1891	2134	1960	2201	2093	2282	2193	2395
275	2147	2392	2120	2391	2087	2357	2049	2319	2014	2284
300	2647	2629	2535	2517	2452	2434	2512	2380	2294	2300
350	2744	2705	2773	2729	2797	2754	2822	2778	2846	2802
Copper Coils - Standard Efficiency										
140	1658	1720	1675	1737	1695	1757	1715	1777	-	-
155	1658	1720	1675	1737	1695	1757	1715	1777	-	-
170	1658	1720	1675	1737	1695	1757	1715	1776	-	-
185	2025	2061	2012	2052	1998	2098	1984	2024	-	-
200	2042	2121	2040	2114	2038	2129	2036	2110	-	-
225	1868	1954	1865	1945	1861	1951	1859	1949	1857	1947
250	1891	1961	1890	1960	1887	1957	1885	1956	1883	1953
275	2505	2768	2458	2700	2358	2589	2215	2501	2130	2384
300	2550	2787	2548	2786	2547	2784	2545	2782	2543	2798
350	2467	2704	2548	2785	2651	2888	2765	3003	2946	3163
400	3474	3498	3372	3350	3272	3207	3207	3184	3082	3077
450	3599	3602	3465	3468	3332	3199	3199	3202	3066	3069
500	3552	3513	3575	3536	3597	3620	3620	3580	3642	3552

Table 24. Point weights (lbs) - packaged units - 60 Hz

Size- tons	Isolator Location									
	1	2	3	4	5	6	7	8	9	10
Copper Coils - High Efficiency										
140	1658	1720	1675	1737	1695	1757	1715	1777	-	-
155	1956	2029	1958	2022	1949	2011	1928	2001	-	-
170	1965	2040	1958	2035	1949	2098	1939	2014	-	-
185	1788	1914	1792	1916	1796	1951	1800	1924	1804	1928
200	1868	1928	1865	1936	1861	1932	1859	1928	1853	1928
225	2077	2125	2090	2135	2105	2152	2118	2166	2137	2185
250	2077	2125	2090	2135	2105	2152	2118	2166	2137	2185
275	2410	2652	2458	2700	2519	2761	2587	2828	2720	2923
300	2825	3097	2766	3037	2690	2962	2605	2876	2526	2798
350	3377	3357	3241	3221	3139	3074	3074	3054	2948	2946
400	3531	3498	3561	3521	3583	3606	3606	3566	3628	3588
Copper Coils - Extra Efficiency										
140	1965	2040	1958	2035	1949	2098	1939	2014	-	-
155	1788	1914	1792	1916	1796	1951	1800	1924	1804	1928
170	1868	1928	1865	1936	1861	1932	1859	1928	1853	1928
185	2077	2125	2090	2135	2105	2152	2118	2166	2137	2185
200	2077	2125	2090	2135	2105	2152	2118	2166	2137	2185
250	2410	2652	2458	2700	2519	2761	2587	2828	2720	2923
275	2825	3097	2766	3037	2690	2962	2605	2876	2526	2798
300	3377	3357	3241	3221	3139	3074	3074	3054	2948	2946
350	3531	3498	3561	3521	3583	3606	3606	3566	3628	3588

Table 25. Point weights (lbs) - packaged units - 50 Hz

Size (tons)	Isolator Location									
	1	2	3	4	5	6	7	8	9	10
Aluminum Coils - Standard Efficiency										
140	1402	1450	1383	1430	1361	1408	1333	1379	-	-
155	1461	1457	1444	1435	1414	1411	1389	1386	-	-
170	1402	1503	1444	1491	1431	1478	1418	1465	-	-
185	1674	1733	1646	1699	1586	1645	1532	1596	-	-
200	1688	1742	1662	1716	1621	1675	1580	1634	-	-
250	1936	1642	1963	1669	1997	1703	2030	1736	2059	1764
275	2059	2353	1973	2266	1870	2164	1787	2062	1683	1986
300	1936	2104	1890	2198	1994	2196	2029	2266	2080	2334
350	2539	2520	2451	2421	2368	2349	2320	2301	2230	2300
375	2437	2386	2491	2440	2519	2478	2562	2511	2620	2569
400	2744	2758	2667	2646	2584	2564	2531	2510	2428	2422
Aluminum Coils - High Efficiency										
120	1402	1450	1383	1430	1361	1408	1339	1387	-	-
130	1402	1450	1383	1430	1361	1408	1339	1387	-	-
140	1402	1450	1383	1430	1361	1408	1339	1387	-	-
155	1657	1648	1617	1622	1585	1579	1541	1537	-	-
170	1597	1712	1629	1684	1586	1645	1541	1596	-	-
185	1468	1552	1455	1539	1446	1522	1417	1494	1389	1472
200	1521	1571	1503	1554	1472	1522	1443	1494	1414	1473
250	1926	2187	1888	2147	1833	2100	1786	2062	2000	2015
275	1907	2174	1973	2209	2022	2273	2093	2244	2193	2444
300	2147	2417	2120	2391	2087	2357	2049	2319	2014	2284
350	2392	2340	2522	2470	2591	2538	2695	2643	2837	2784
375	2755	2718	2735	2698	2715	2678	2695	2658	2674	2637
400	2744	2705	2773	2729	2797	2754	2822	2778	2846	2802

Installation - Mechanical

Table 25. Point weights (lbs) - packaged units - 50 Hz

Size (tons)	Isolator Location									
	1	2	3	4	5	6	7	8	9	10
Copper Coils - Standard Efficiency										
140	1658	1720	1675	1737	1695	1757	1715	1777	-	-
155	1717	1728	1737	1742	1748	1750	1765	1775	-	-
170	1717	1774	1737	1798	1765	1827	1793	1855	-	-
185	2042	2121	2034	2112	2020	2038	2006	2090	-	-
200	2056	2130	2055	2130	2055	2112	2054	2129	-	-
250	2078	2332	2089	2356	2118	2385	2146	2413	2170	2437
275	2638	2933	2529	2805	2358	2653	2215	2501	2079	2384
300	2462	2718	2477	2732	2495	2784	2545	2782	2543	2798
350	3158	3137	3039	3018	2951	2894	2894	2873	2784	2779
375	3576	3579	3291	3255	3083	2948	2948	2912	2689	2690
400	3538	3498	3372	3350	3272	3207	3207	3184	3082	3077
Copper Coils - High Efficiency										
120	1658	1720	1675	1737	1695	1757	1715	1777	-	-
130	1658	1720	1675	1737	1695	1757	1715	1777	-	-
140	1658	1720	1675	1737	1695	1757	1715	1777	-	-
155	2025	2040	2012	2035	2009	2033	2007	2031	-	-
170	2025	2100	2034	2098	2020	2038	2016	2090	-	-
185	1839	1954	1842	1945	1846	1920	1859	1956	1857	1961
200	1891	1961	1890	1960	1887	1957	1885	1956	1883	1953
250	2505	2767	2418	2685	2321	2588	2224	2491	2170	2437
275	2488	2740	2529	2805	2581	2833	2639	2828	2720	2972
300	2825	3097	2766	3037	2690	2962	2605	2876	2526	2798
350	3000	2934	3184	3118	3281	3214	3429	3362	3628	3562
375	3576	3579	3442	3445	3309	3176	3176	3179	3043	3046
400	3445	3396	3516	3467	3587	3538	3658	3609	3730	3681

Table 26. Point weights (lbs) - remote units - 60 Hz

Size (tons)	Isolator Location									
	1	2	3	4	5	6	7	8	9	10
Aluminum Coils - Standard Efficiency										
140	1150	1183	1095	1128	1032	1065	969	1002	-	-
155	1150	1183	1095	1128	1032	1065	969	1002	-	-
170	1150	1183	1095	1128	1032	1065	969	1002	-	-
185	1381	1384	1325	1331	1241	1246	1156	1162	-	-
200	1397	1437	1351	1391	1279	1318	1206	1246	-	-
225	1251	1307	1222	1279	1172	1229	1126	1190	1081	1140
250	1274	1312	1246	1283	1196	1233	1149	1190	1103	1140
Aluminum Coils - High Efficiency										
140	1150	1183	1095	1128	1032	1065	969	1002	-	-
155	1321	1361	1270	1301	1190	1230	1109	1149	-	-
170	1321	1361	1270	1314	1190	1230	1109	1149	-	-
185	1175	1267	1151	1242	1107	1199	1067	1159	1027	1118
200	1251	1295	1222	1259	1172	1207	1122	1159	1081	1118
Copper Coils - Standard Efficiency										
140	1406	1454	1388	1435	1366	1414	1345	1392	-	-
155	1406	1454	1388	1435	1366	1414	1345	1392	-	-
170	1406	1454	1388	1435	1366	1414	1345	1392	-	-
185	1749	1772	1718	1744	1675	1700	1631	1656	-	-
200	1768	1825	1745	1805	1713	1772	1680	1740	-	-
225	1622	1697	1608	1686	1587	1665	1568	1645	1549	1625
250	1645	1702	1633	1690	1611	1668	1591	1648	1571	1628

Table 26. Point weights (lbs) - remote units - 60 Hz

Size (tons)	Isolator Location									
	1	2	3	4	5	6	7	8	9	10
Copper Coils - High Efficiency										
140	1406	1454	1388	1435	1366	1414	1345	1392	-	-
155	1689	1749	1664	1714	1624	1673	1583	1644	-	-
170	1689	1749	1664	1727	1624	1695	1583	1644	-	-
185	1546	1657	1537	1649	1523	1634	1509	1621	1495	1599
200	1622	1686	1608	1666	1587	1642	1568	1621	1549	1607

Drainage

Provide large capacity drain for use during shutdown or repair. Evaporator is provided with drain connection. All local and national codes apply. Vent on top of evaporator waterbox prevents vacuum by allowing air into evaporator for complete drainage.

Evaporator Water Piping

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

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

NOTICE:

Evaporator Damage!

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).

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

NOTICE:

Evaporator Damage!

To prevent evaporator damage, pipe strainers must be installed in the water supplies to protect components from water born debris. Trane is not responsible for equipment-only-damage caused by water born debris.

"Piping components" include all devices and controls used to provide proper water system operation and unit

Installation - Mechanical

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.

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.

Evaporator Drain

A 1/2" drain connection is located under outlet end of evaporator waterbox for drainage during unit servicing. A shutoff valve must be installed on drain line.

Evaporator Flow Switch

The flow switch is factory-installed and programmed based on the operating conditions submitted with the order. The leaving evaporator temperature, fluid type and fluid concentration affect the selected flow switch. If the operating conditions on the job site change, the flow switch may need to be replaced.

The sensor head includes 3 LEDs, two yellow and one green. Wait 15 seconds after power is applied to the sensor before evaluating LEDs for flow status. When wired correctly and flow is established, only the green LED should be lit. Following are the LED indicators:

- Green ON, both yellow OFF — Flow
- Green and outside yellow ON — No Flow
- Center yellow ON continuously — Miss wire

Factory installed jumper wire W3 must be removed if using auxiliary contacts and/or additional proof of flow. See schematics in RTAC-SVE01*-EN for more details.

NOTICE:

Equipment Damage!

Incorrect wiring of auxiliary contacts could result in equipment damage.

Note: Use caution when connecting auxiliary contacts. Terminals 1TB6-3 and 1TB6-5 are to be used for field connections. Inadvertent use of 1TB6-5 and 1TB6-4 will result in a FALSE FLOW indication.

If using auxiliary flow sensing, both yellow LEDs come on initially when flow is stopped. Center yellow LED will turn off after approximately 7 seconds. LED indicators are otherwise same as indicated above.

NOTICE:

Proper Water Treatment!

The use of untreated or improperly treated water in this equipment could result in scaling, erosion, corrosion, algae or slime. It is recommended that the services of a qualified water treatment specialist be engaged to determine what water treatment, if any, is required. Trane assumes no responsibility for equipment failures which result from untreated or improperly treated water, or saline or brackish water.

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

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

Neither salt nor brackish water is recommended. Use of either will lead to a shortened life to an indeterminable degree. The Trane Company encourages the service of a reputable water treatment specialist, familiar with local water conditions, to assist in this determination and in establishment of a proper water treatment program.

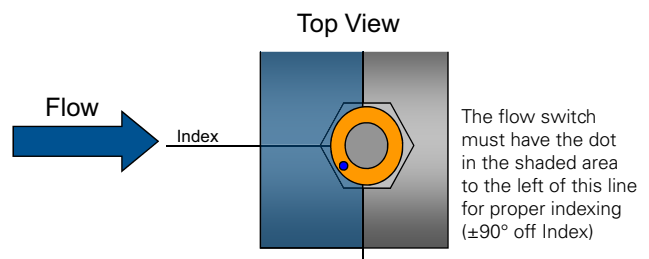
Using untreated or improperly treated water in these units may result in inefficient operation and possible tube damage. Consult a qualified water treatment specialist to determine whether treatment is needed.

Indexing Flow Switch

To properly index flow switch, the following requirements must be met:

- Dot must be at a position no greater than 90° off Index.
- Torque must be between 22 ft-lb min and 74 ft-lb max.
- A minimum distance of 5x pipe diameter must be maintained between flow switch and any bends, valves, changes in cross sections, etc.

Figure 18. Proper flow switch indexing



Installation - Mechanical

Figure 19. Evaporator water pressure drop— 2-pass evaporator — 140-250 ton

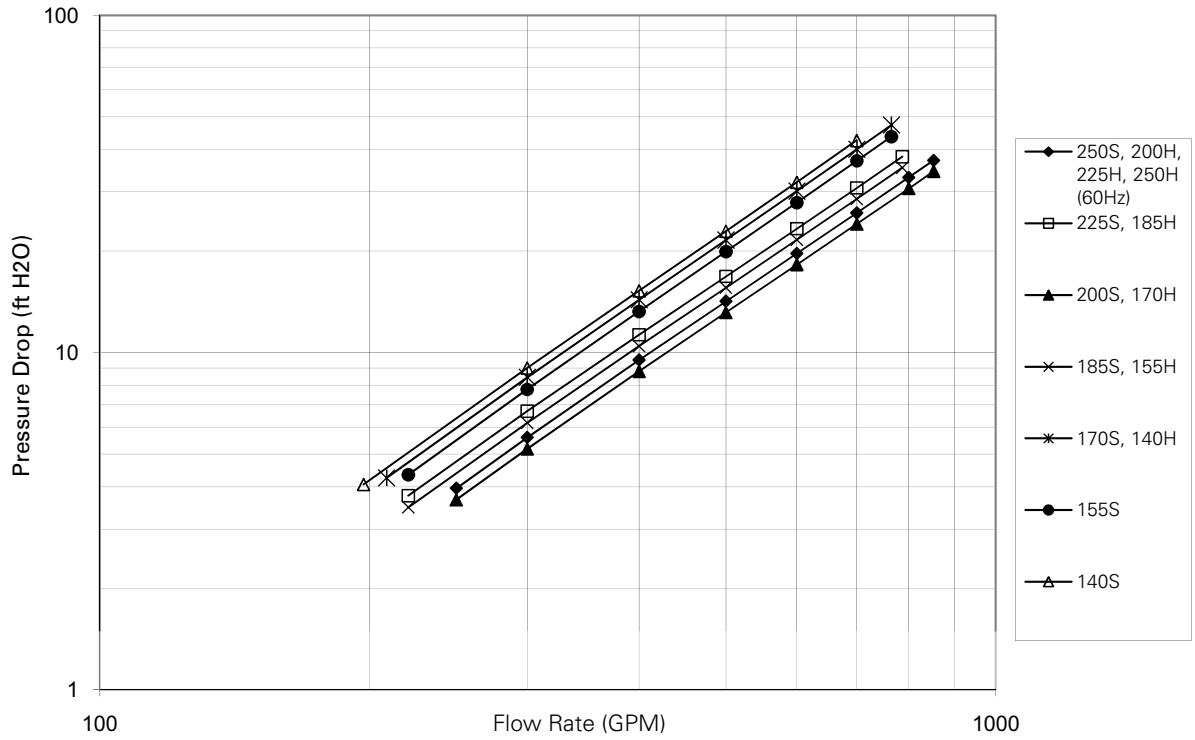


Figure 20. Evaporator water pressure drop — 2-pass evaporator — 250-500 ton

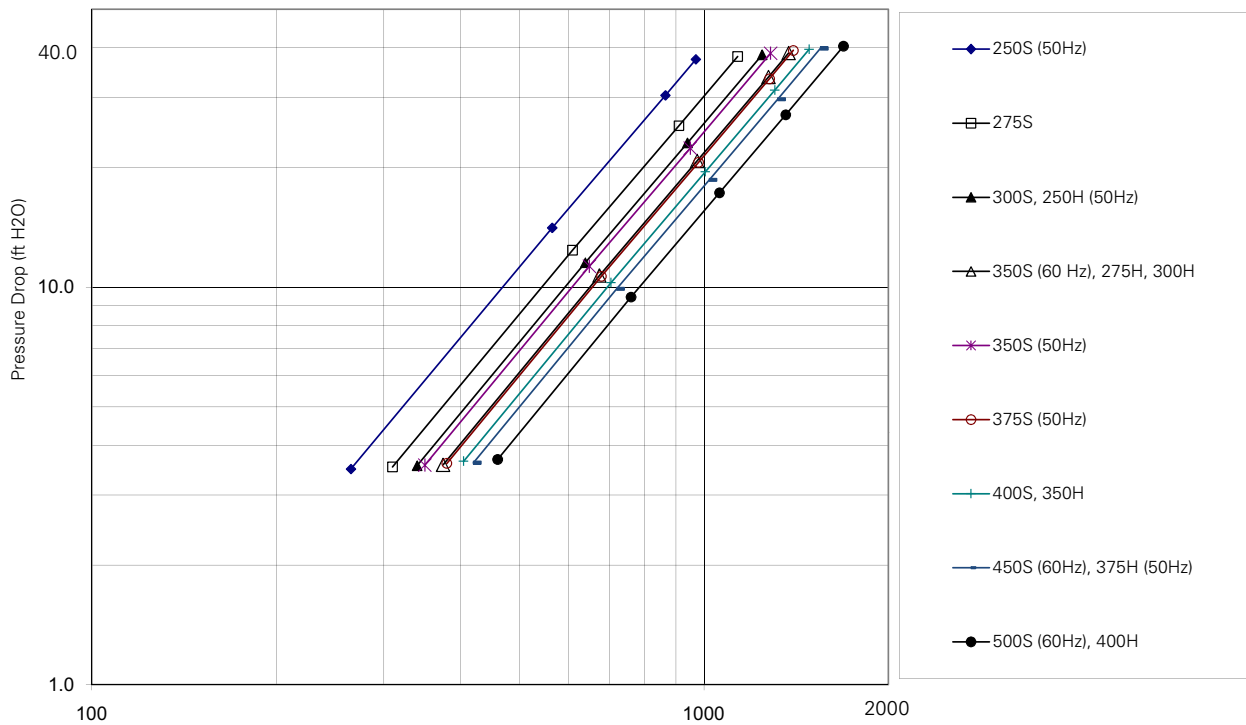
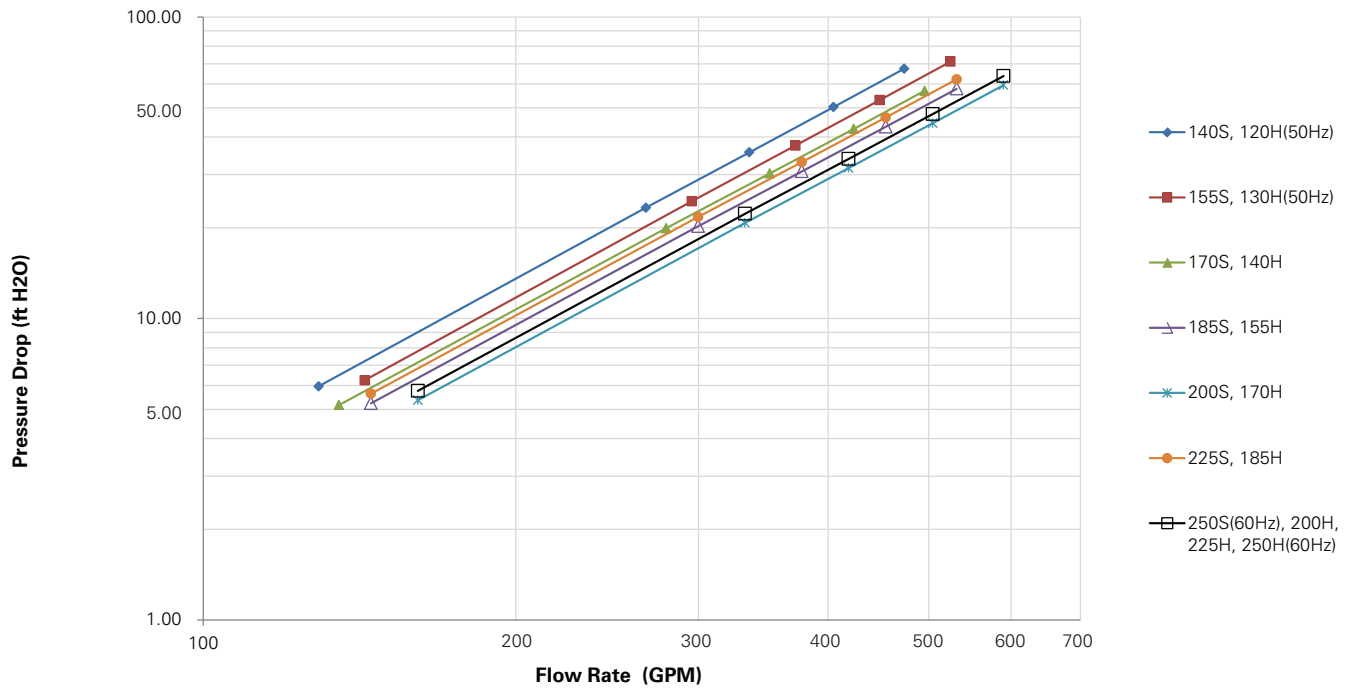
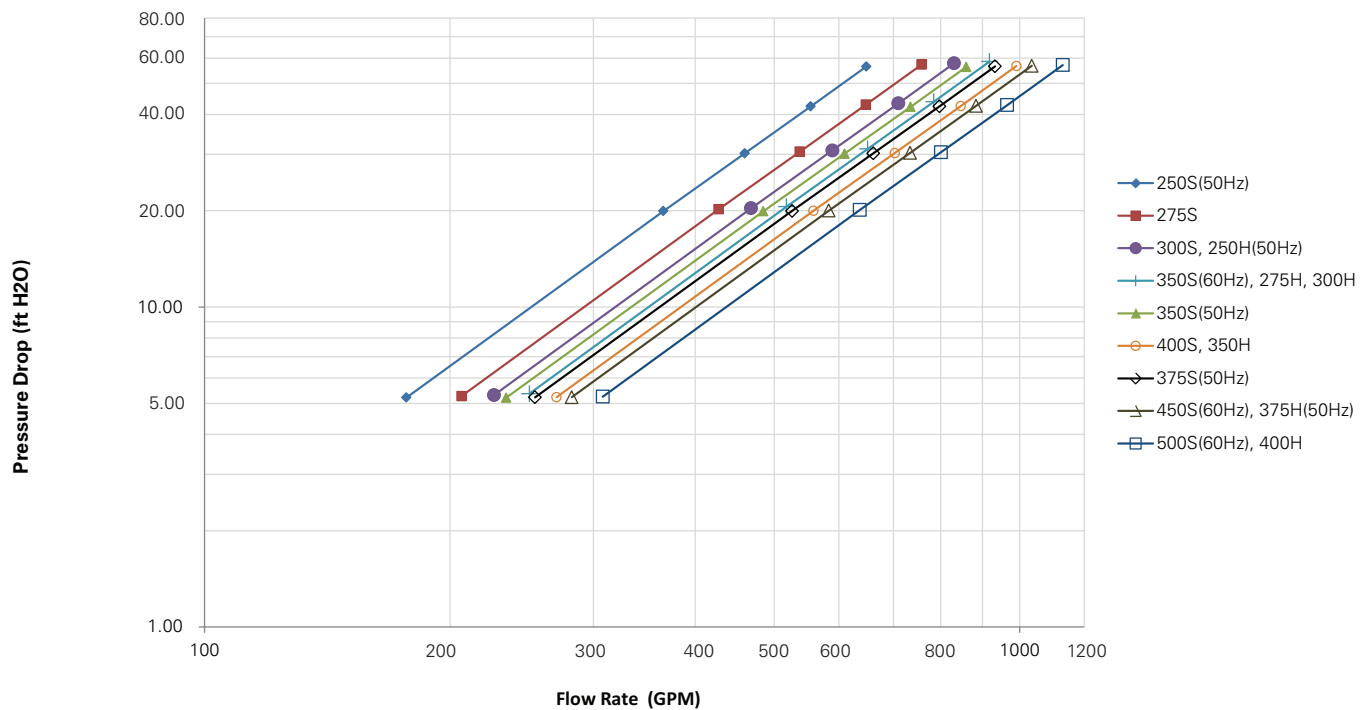
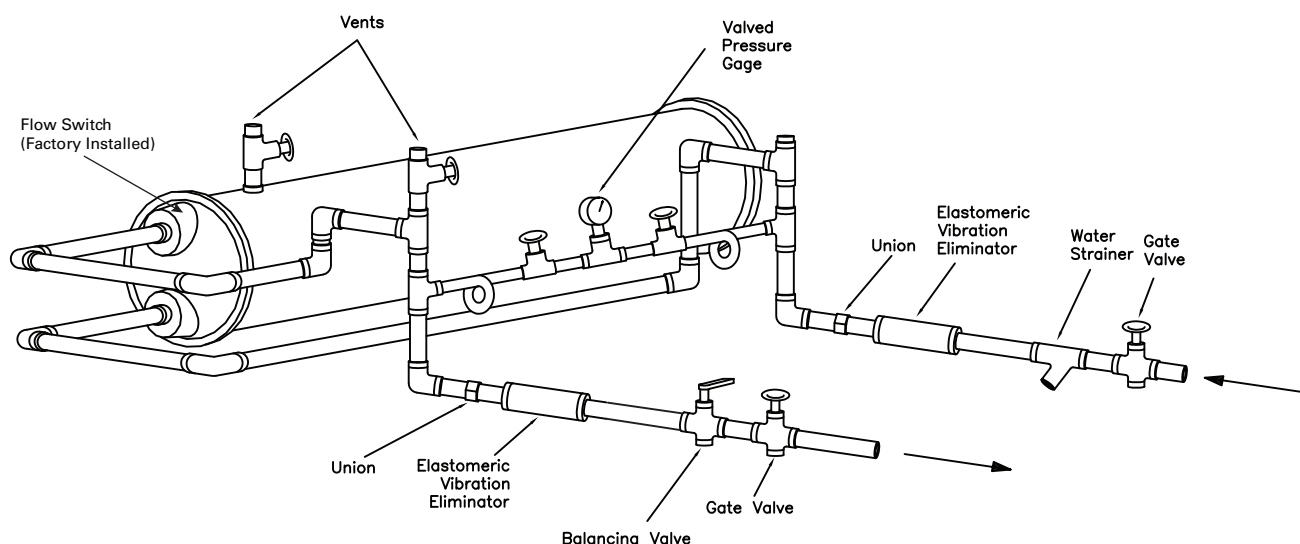


Figure 21. Evaporator water pressure drop — 3-pass evaporator — 140-250T

Figure 22. Evaporator water pressure drop — 3-pass evaporator — 250-500T


Water Pressure Gauges

Figure 23. Suggested piping for typical RTAC evaporator



Install field-supplied pressure components as shown in [Figure 23, p. 51](#). 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.

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

NOTICE:

Evaporator Damage!

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 23, p. 51](#). 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.

Freeze Protection

Depending on ambient temperature the unit may be exposed to, there are multiple options for freeze protection. They are listed in order of highest ambient (least freeze protection) to lowest ambient (most freeze protection).

Note: A secondary set of pump interlock is **strongly recommended**, but not required.

1. Water pump AND heaters
 - a. Heaters are factory-installed on the evaporator and water piping and will protect them from freezing in ambient temperatures down to -20°F (-29°C).
 - b. 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.
- c. CH530 controller can start the pump when freezing conditions are detected. For this option the pump must be controlled by the RTAC unit and this function must be validated.
- d. Water circuit valves need to stay open at all times.
- e. Verify heat tape is installed as noted in [Step b](#).

Note: Water pump control and heater combination will protect the evaporator down to any ambient

temperature provided power is available to the pump and the CH530 controller. This option will NOT protect the evaporator in the event of a power failure to the chiller unless backup power is supplied to the necessary components.

Note: When no chiller operation is possible and the pump is already off, CH530 pump control for freeze protection will command the pump to turn:

- ON if liquid level > -0.83" in AND evaporator saturated temp < Leaving Water Temperature Cutout (LWTC) for 30°F-sec (17°C-sec)
- OFF again if evaporator saturated temperature > LWTC OR liquid level < -0.83" for 30 minutes.
- ON if entering OR leaving water temperature < LWTC for 30°F-sec (17°C-sec)
- OFF again if water temperature > LWTC for 30 min

OR

2. Freeze inhibitor

- a. Freeze protection can be accomplished by adding sufficient glycol to protect against freezing below the lowest ambient expected.
- b. See "Low Evaporator Refrigerant Cutout, Glycol Recommendations," p. 52 for guidance on determining glycol concentrations.

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

OR

3. Drain water circuit (for ambients below -20°F)

- a. Shut off power supply to unit and to all heaters.
- b. Purge the water circuit.
- c. Blow out the evaporator to ensure no liquid is left in the evaporator.

NOTICE:

Evaporator Damage!

If insufficient concentration or no glycol is used, the evaporator water flow must be controlled by the CH530 AND heaters must be used to avoid catastrophic damage to the evaporator due to freezing. It is the responsibility of the installing contractor and/or the customer to ensure that a pump will start when called upon by the chiller controls. Refer to RLC-PRB012-EN. Even with water pump control, a power loss of as little as 15 minutes under freezing conditions can damage the evaporator. Only the proper addition of freeze inhibitor or complete drainage of the water circuit can ensure no evaporator damage in the event of a power failure. See Table 27, p. 53 for correct concentration of glycol.

Low Evaporator Refrigerant Cutout, Glycol Recommendations

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 Table 27, p. 53? If no, see "Specials," p. 52.
2. For leaving fluid temperatures greater than 40 deg F, use settings for 40 deg F.
3. Select operating conditions from Table 27.
4. Read off recommended % glycol.
5. Go to Table 28, p. 53 using the % glycol determined above.

Important: Additional glycol beyond the recommendations will adversely effect unit performance. Unit efficiency and saturated evaporator temperature will be reduced. For some operating conditions this effect can be significant.

6. If additional glycol is used, then use the actual % glycol to establish the low refrigerant cutout setpoint.
7. The minimum low refrigerant cutout setpoint allowed is -5 deg F. The minimum is established by the solubility limits of the oil in the refrigerant.

Specials

Any of the following conditions are considered special applications that must be calculated by engineering:

1. Freeze inhibitor other than ethylene glycol, propylene glycol, calcium chloride or methanol.
2. Fluid delta T outside the range 4 to 16 deg F.
3. Unit configuration other than Standard, Standard with extra pass, and Premium.
4. % Glycol greater than maximum in column in Table 28.

Special should all be calculated by engineering. The purpose of calculating is to make sure that design saturation temperature is greater than 3 deg F. Additionally, the calculation must verify that the fluid freeze point is a minimum of 4 deg. F lower that 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.

Important: When using glycol, Techview Setpoint View setting for "Freeze Inhibitor Present" must be set to "Yes" to prevent nuisance high approach diagnostic.

Installation - Mechanical

Table 27. Glycol recommendations

		Ethylene Glycol						
DT	°F °C	4 15	6 -14	8 -13	10 -12	12 -11	14 -10	16 -9
Leaving Water Temperature °F (°C)	38 (3)	--	5	5	5	5	6	--
	34 (1)	--	11	11	11	12	--	--
	30 (-1)	--	15	16	17	18	--	--
	28 (-2)	--	18	18	19	--	--	--
	26 (-3)	--	20	21	22	--	--	--
	24 (-4)	--	22	23	26	--	--	--
	22 (-6)	--	24	26	--	--	--	--
	20 (-7)	--	26	30	--	--	--	--
	18 (-8)	--	29	--	--	--	--	--
	16 (-9)	--	31	--	--	--	--	--
	14 (-10)	30	--	--	--	--	--	--
	12 (-11)	32	--	--	--	--	--	--
	10.4 (-12)	34	--	--	--	--	--	--
		Propylene Glycol						
DT	°F °C	4 -15	6 -14	8 -13	10 -12	12 -11	14 -10	16 -9
Leaving Water Temperature °F (°C)	38 (3)	--	6	6	7	7	8	--
	34 (1)	--	13	13	15	17	--	--
	30 (-1)	--	19	21	--	--	--	--
	28 (-2)	--	22	--	--	--	--	--
	26 (-3)	--	25	--	--	--	--	--
	24 (-4)	--	--	--	--	--	--	--
	22 (-6)	--	--	--	--	--	--	--
	20 (-7)	--	--	--	--	--	--	--
	18 (-8)	--	--	--	--	--	--	--
	16 (-9)	--	--	--	--	--	--	--
	14 (-10)	--	--	--	--	--	--	--
	12 (-11)	--	--	--	--	--	--	--
	10.4 (-12)	--	--	--	--	--	--	--

Notes:

1. These tables represent the MINIMUM RECOMMENDED glycol percentages for each operating condition
2. Operation is not recommended at certain operating conditions as some chillers may not satisfy maximum or minimum velocity requirements or minimum performance requirements. Contact Trane Sales Representative for more information regarding the operating limits of a particular chiller.

Table 28. Recommended low evaporator refrigerant cutout and percent glycol

% Glycol	Low Refrig. Temp Cutout		Solution Freeze Point	
	°F	°C	°F	°C
Ethylene				
0	28.0	-2.2	32	0
5	25.0	-3.9	29	-1.7
10	21.5	-5.8	25.5	-3.6
15	17.5	-8.1	21.5	-5.8
20	12.8	-10.7	16.8	-8.4
25	7.4	-13.7	11.4	-11.4
30	1.1	-17.2	5.1	-15.0
35	-5.0	-20.6	-2.3	-19.1
40	-5.0	-20.6	-10.8	-23.8
45	-5.0	-20.6	-20.7	-29.3
50	-5.0	-20.6	-32.1	-35.6
54	-5.0	-20.6	-42.3	-41.3
Propylene Glycol				
0	28.0	-2.2	32.0	0
5	25.3	-3.7	29.3	-1.5
10	22.4	-5.3	26.4	-3.1
15	19.1	-7.2	23.1	-4.9
20	15.3	-9.3	19.3	-7.1
25	10.8	-11.8	14.8	-9.6
30	5.3	-14.8	9.3	-12.6
35	-1.3	-19.5	2.7	-16.3
40	-5.0	-20.6	-5.2	-20.7
45	-5.0	-20.6	-14.6	-25.9
50	-5.0	-20.6	-25.8	-32.1
54	-5.0	-20.6	-36.1	-37.8

Chilled Water Temperature Cutout should be set to 5°F below the lowest allowable Chilled Water Set Point bases on the %Glycol.



Installation - Mechanical — Remote Evaporator Option

The **RTAC 140-250 ton** outdoor unit with the Remote Evaporator option is shipped as two pieces: the outdoor unit (condensing) and the evaporator. Short suction line connections are provided with the outdoor condensing unit. The remote evaporator is shipped complete, with factory-mounted electronic expansion valves, water temperature sensors, suction pressure transducers, liquid level control sensors, evaporator flow switch, all factory wired to a ribbon cable. Solenoid valves and drain valves are wired to a relay board in the terminal box. The installing contractor is required to provide and install the following:

- 2-wire, twisted shielded communication line between the remote evaporator terminal box and the Condensing Unit's control panel
- 4-wire connection from evaporator terminal box to condensing unit control panel for flow switch wiring (see [Figure 28, p. 62](#))
- 115 VAC single phase power supply to the remote evaporator terminal box
- 2 liquid lines
- 2 suction lines
- Suction accumulator as specified

Note: A unit ordered as a remote evaporator must also be ordered with either the wide or low ambient option. The fan inverters are necessary for proper control.

System Configuration and Interconnecting Refrigerant Piping

The system may be configured in any of the four arrangements shown in [Figure 24, p. 55](#). The configurations and their associated elevations, along with the total distance between the remote evaporator and the compressor/condenser section, play a critical role in determining suction and liquid line sizes. This will also affect field refrigerant and oil charges. Consequently, there are physical limits which must not be violated if the system is to operate as designed. Please note the following requirements for field installation:

1. The remote evaporator **MUST** be matched with its respective outdoor condensing unit.
2. The circuit number on the outdoor condensing unit must match the circuit number on the evaporator, i.e. circuit #1 on the outdoor condensing unit must be connected with circuit # 1 on the remote evaporator and likewise for circuit #2. RTAC Circuit Capacities are shown in General Data Tables.

NOTICE:

Equipment Damage!

If the circuits are crossed, serious equipment damage could occur.

3. Piping between the evaporator and outdoor unit can not exceed 200 actual feet and/or an equivalent length of 300 feet.

Note: The latter includes the equivalent length of all associated field installed fittings, valves, accessories and straight lengths of interconnecting piping.

4. Horizontal portions of suction lines must be downward sloping toward the compressor at least 1/2 inch for each 10 feet run. This promotes the movement of oil in the direction of gas flow.
5. Suction lines must be insulated.
6. The line sizes defined are to be used only for 40-60 F leaving water temperature and/or full load ice-making applications.
7. [Figure 24, p. 55](#), drawing 1 depicts an installation where the remote evaporator elevation is the same as that of the outdoor condensing unit. The suction and liquid lines are horizontal or down flowing only.

The suction and liquid lines can be put under ground or in a trench. The temperature of the suction lines must never exceed the temperature of the compressor. The line can be below the compressors a maximum of 15 ft.

8. [Figure 24, p. 55](#), drawing 2 shows a variation to drawing 1. The remote evaporator and outdoor condensing unit are at the same elevation but interconnecting piping may be installed up to 15 feet above the base elevation. Refer to [Table 31, p. 58](#) to determine the required length of the suction accumulator line. A full size suction accumulator is required at the evaporator and 50% of the value is required at the condensing unit.
9. A refrigerant drain valve is installed at the bottom of the evaporator for freeze protection. This drain valve is a normally open, pilot operated valve which remains closed unless there is a potential freezing situation detected via low evap temperatures or low water temperatures or a power failure. If the drain valve is opened the installed suction accumulator must be capable of holding the entire evaporator charge. Refer to [Table 31, p. 58](#) for sizing.
10. For installations where the remote evaporator is at a lower elevation than the outdoor condensing unit as shown in [Figure 24, p. 55](#), drawing 3, the elevation difference is not to exceed 100 feet. An inverted liquid line trap at the condensing unit is required to prevent unwanted free cooling. The apex of the liquid line trap

Installation - Mechanical — Remote Evaporator Option

should be at a height above the condenser coils. A suction accumulator must be installed at the evaporator. Refer to [Table 31, p. 58](#) for sizing.

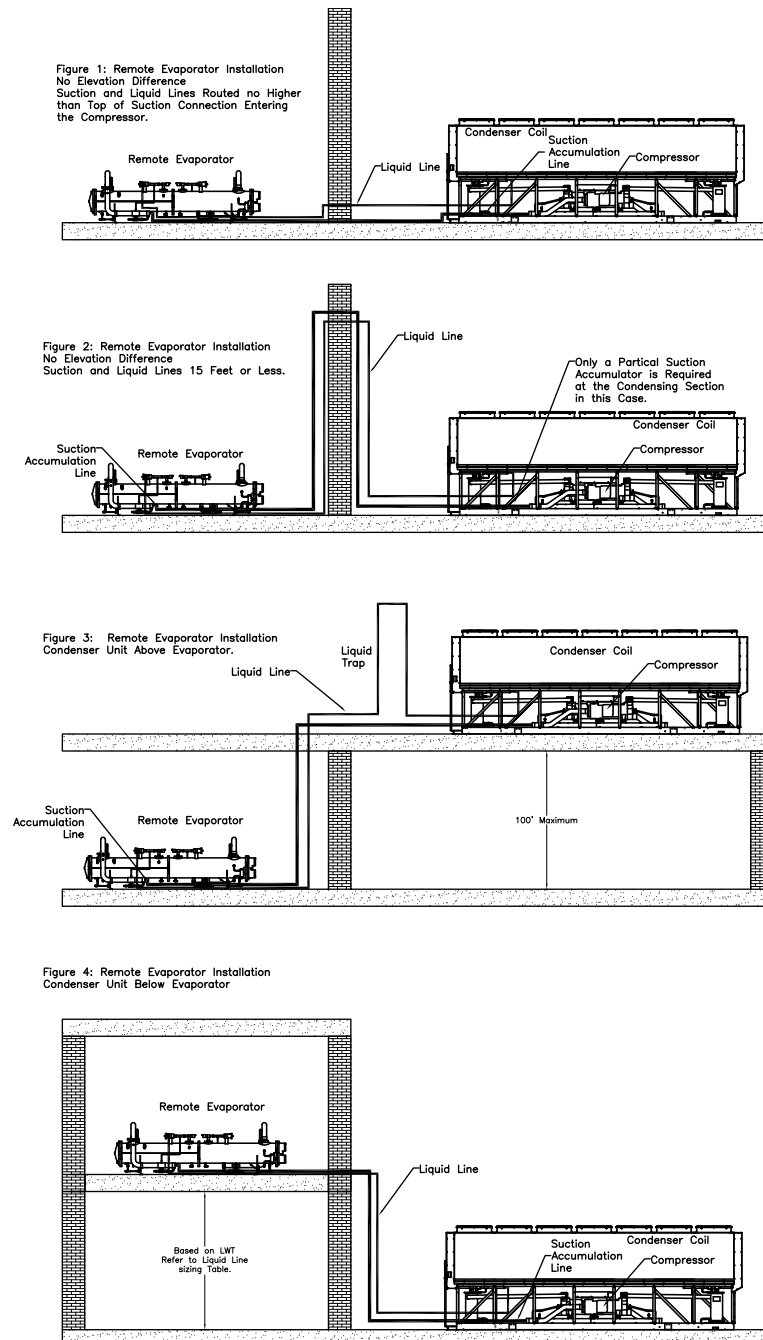
11. When the elevation of the remote evaporator exceeds that of the outdoor condensing unit as shown in [Figure 24, p. 55](#), drawing 4, the elevation difference is determined by [Table 29, p. 57](#). The suction accumulator line must be installed according to [Table 31, p. 58](#). It is very important, for proper control and operation of the chiller, that the elevation

requirements given in [Table 29, p. 57](#) are **not** exceeded. It should also be noted that in this configuration the suction accumulator is installed at the condensing section.

Note: The height is limited by the available sub cooling.

12. Compressor & oil separator heaters must be on at least 24 hours prior to compressor start.

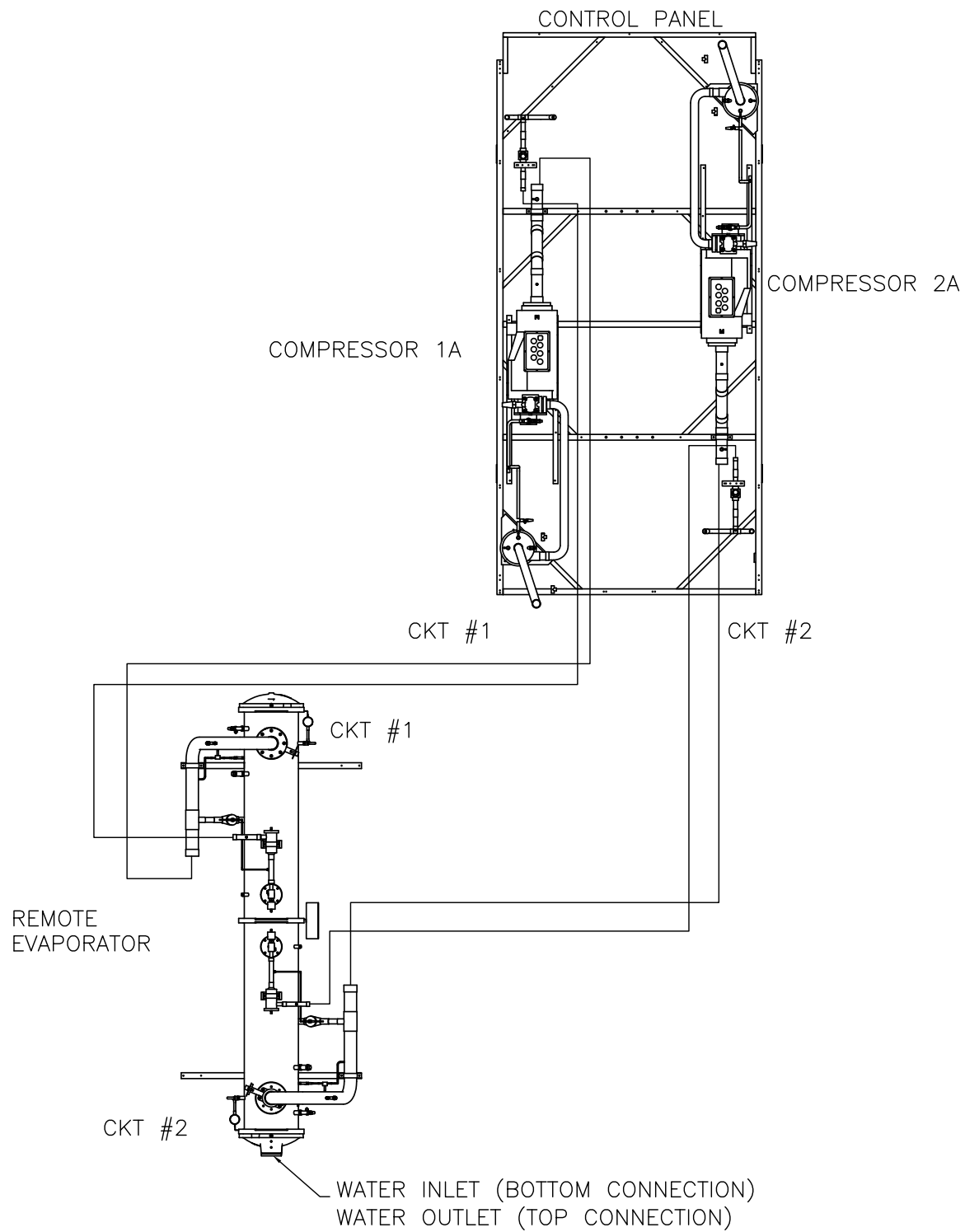
Figure 24. Remote evaporator installations





Installation - Mechanical — Remote Evaporator Option

Figure 25. Circuit identification



Installation - Mechanical — Remote Evaporator Option

Table 29. Liquid line sizing^(a) - 140-250T remote evaporator

Leaving water 40-50°F		Height (ft)								Leaving water 50-60°F		Height (ft)							
		0	1-5	6-10	11-15	16-20	21-25	26-30	31-35			0	1-5	6-10	11-15	16-20	21-25	26-30	
70-ton circuit																			
Total Equivalent Length (ft)	25	1.375	1.375	1.375	1.375	1.375	1.375	1.375	n/a	Total Equivalent Length (ft)	25	1.375	1.375	1.375	1.375	1.375	1.375	2.125	
	50	1.375	1.375	1.375	1.375	1.375	1.375	1.375	n/a		50	1.375	1.375	1.375	1.375	1.375	1.625	2.125	
	75	1.375	1.375	1.375	1.375	1.375	1.375	1.625	n/a		75	1.375	1.375	1.375	1.375	1.375	1.625	n/a	
	100	1.375	1.375	1.375	1.375	1.375	1.375	1.625	n/a		100	1.375	1.375	1.375	1.375	1.625	2.125	n/a	
	125	1.375	1.375	1.375	1.375	1.375	1.625	1.625	n/a		125	1.375	1.375	1.375	1.625	1.625	2.125	n/a	
	150	1.375	1.375	1.375	1.375	1.375	1.625	n/a	n/a		150	1.375	1.375	1.375	1.625	1.625	2.125	n/a	
	175	1.375	1.375	1.375	1.375	1.625	1.625	n/a	n/a		175	1.375	1.375	1.625	1.625	1.625	2.125	n/a	
	200	1.375	1.375	1.375	1.375	1.625	1.625	n/a	n/a		200	1.375	1.625	1.625	1.625	2.125	2.125	n/a	
	225	1.375	1.375	1.375	1.625	1.625	1.625	n/a	n/a		225	1.375	1.625	1.625	1.625	2.125	2.125	n/a	
	250	1.375	1.375	1.375	1.625	1.625	n/a	n/a	n/a		250	1.625	1.625	1.625	1.625	2.125	2.125	n/a	
	275	1.375	1.375	1.625	1.625	1.625	n/a	n/a	n/a		275	1.625	1.625	1.625	2.125	2.125	2.125	n/a	
300	1.375	1.375	1.625	1.625	1.625	n/a	n/a	n/a	300	1.625	1.625	1.625	2.125	2.125	2.125	n/a			
85-ton circuit																			
Total Equivalent Length (ft)	25	1.375	1.375	1.375	1.375	1.375	1.375	2.125	n/a	Total Equivalent Length (ft)	25	1.375	1.375	1.375	1.375	2.125	n/a	n/a	
	50	1.375	1.375	1.375	1.375	1.375	1.625	n/a	n/a		50	1.375	1.375	1.375	1.625	2.125	n/a	n/a	
	75	1.375	1.375	1.375	1.375	1.375	1.625	n/a	n/a		75	1.375	1.375	1.625	1.625	n/a	n/a	n/a	
	100	1.375	1.375	1.375	1.375	1.625	1.625	n/a	n/a		100	1.375	1.625	1.625	2.125	n/a	n/a	n/a	
	125	1.375	1.375	1.375	1.625	1.625	2.125	n/a	n/a		125	1.375	1.625	1.625	2.125	n/a	n/a	n/a	
	150	1.375	1.375	1.375	1.625	1.625	2.125	n/a	n/a		150	1.625	1.625	1.625	2.125	n/a	n/a	n/a	
	175	1.375	1.375	1.625	1.625	1.625	2.125	n/a	n/a		175	1.625	1.625	2.125	2.125	n/a	n/a	n/a	
	200	1.375	1.625	1.625	1.625	2.125	2.125	n/a	n/a		200	1.625	1.625	2.125	2.125	n/a	n/a	n/a	
	225	1.375	1.625	1.625	1.625	2.125	2.125	n/a	n/a		225	1.625	2.125	2.125	2.125	n/a	n/a	n/a	
	250	1.625	1.625	1.625	1.625	2.125	2.125	n/a	n/a		250	1.625	2.125	2.125	2.125	n/a	n/a	n/a	
	275	1.625	1.625	1.625	1.625	2.125	2.125	n/a	n/a		275	1.625	2.125	2.125	2.125	n/a	n/a	n/a	
300	1.625	1.625	1.625	2.125	2.125	2.125	n/a	n/a	300	2.125	2.125	2.125	2.125	n/a	n/a	n/a			
100-ton circuit																			
Total Equivalent Length (ft)	25	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	Total Equivalent Length (ft)	25	1.625	1.625	1.625	1.625	1.625	1.625	1.625	
	50	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625		50	1.625	1.625	1.625	1.625	1.625	1.625	1.625	
	75	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625		75	1.625	1.625	1.625	1.625	1.625	1.625	2.125	
	100	1.625	1.625	1.625	1.625	1.625	1.625	1.625	2.125		100	1.625	1.625	1.625	1.625	1.625	1.625	2.125	
	125	1.625	1.625	1.625	1.625	1.625	1.625	1.625	2.125		125	1.625	1.625	1.625	1.625	1.625	2.125	2.125	
	150	1.625	1.625	1.625	1.625	1.625	1.625	2.125	2.125		150	1.625	1.625	1.625	1.625	1.625	2.125	2.125	
	175	1.625	1.625	1.625	1.625	1.625	1.625	2.125	2.125		175	1.625	1.625	1.625	1.625	2.125	2.125	2.125	
	200	1.625	1.625	1.625	1.625	1.625	2.125	2.125	2.125		200	1.625	1.625	1.625	2.125	2.125	2.125	2.125	
	225	1.625	1.625	1.625	1.625	1.625	2.125	2.125	2.125		225	1.625	1.625	1.625	2.125	2.125	2.125	2.125	
	250	1.625	1.625	1.625	1.625	1.625	2.125	2.125	2.125		250	1.625	1.625	2.125	2.125	2.125	2.125	2.625	
	275	1.625	1.625	1.625	1.625	2.125	2.125	2.125	2.125		275	1.625	1.625	2.125	2.125	2.125	2.125	2.625	
300	1.625	1.625	1.625	1.625	2.125	2.125	2.125	n/a	300	1.625	2.125	2.125	2.125	2.125	2.125	2.625			
120-ton circuit																			
Total Equivalent Length (ft)	25	1.625	1.625	1.625	1.625	1.625	1.625	1.625	2.125	Total Equivalent Length (ft)	25	1.625	1.625	1.625	1.625	1.625	1.625	1.625	
	50	1.625	1.625	1.625	1.625	1.625	1.625	1.625	2.125		50	1.625	1.625	1.625	1.625	1.625	1.625	1.625	
	75	1.625	1.625	1.625	1.625	1.625	1.625	2.125	2.625		75	1.625	1.625	1.625	1.625	1.625	1.625	2.125	
	100	1.625	1.625	1.625	1.625	1.625	1.625	2.125	2.625		100	1.625	1.625	1.625	1.625	1.625	1.625	2.125	
	125	1.625	1.625	1.625	1.625	1.625	2.125	2.125	2.625		125	1.625	1.625	1.625	1.625	1.625	2.125	2.125	
	150	1.625	1.625	1.625	1.625	1.625	2.125	2.125	2.625		150	1.625	1.625	1.625	1.625	1.625	2.125	2.125	
	175	1.625	1.625	1.625	1.625	2.125	2.125	2.125	2.625		175	1.625	1.625	1.625	1.625	2.125	2.125	2.125	
	200	1.625	1.625	1.625	1.625	2.125	2.125	2.125	2.625		200	1.625	1.625	1.625	2.125	2.125	2.125	2.125	
	225	1.625	1.625	1.625	2.125	2.125	2.125	2.125	n/a		225	1.625	1.625	1.625	2.125	2.125	2.125	2.125	
	250	1.625	1.625	1.625	2.125	2.125	2.125	2.625	n/a		250	1.625	1.625	2.125	2.125	2.125	2.125	2.625	
	275	1.625	1.625	2.125	2.125	2.125	2.125	2.625	n/a		275	1.625	1.625	2.125	2.125	2.125	2.125	2.625	
300	1.625	2.125	2.125	2.125	2.125	2.125	2.625	n/a	300	1.625	2.125	2.125	2.125	2.125	2.125	2.625			

(a) Typical type L copper O.D.

Line Sizing

To determine the appropriate outside diameter for field installed liquid and suction lines, it is first necessary to establish the equivalent length of pipe for each line. It is also necessary to know the capacity (tons) of each circuit. Circuit capacities for each RTAC unit are listed in [Table 1, p. 11](#) through [Table 10, p. 20](#).

Table 30. Equivalent lengths of non-ferrous valves and fittings (feet)

Line Size Inches OD	Globe Valve	Short Angle Valve	Short Radius ELL	Long Radius ELL
1-1/8	87	29	2.7	1.9
1-3/8	102	33	3.2	2.2
1-5/8	115	34	3.8	2.6
2-1/8	141	39	5.2	3.4
2-5/8	159	44	6.5	4.2
3-1/8	185	53	8	5.1
3-5/8	216	66	10	6.3
4-1/8	248	76	12	7.3

Liquid Line Sizing Steps

The steps to compute liquid line size are as follows:

1. Compute the actual length of field installed piping.
2. Multiply the length from step # 1 by 1.5 to estimate the equivalent length.

Table 31. Required length of field installed suction line accumulator (ft)

Actual Feet of field installed liquid line	70 Ton Circuit ^(a)			85 Ton Circuit			100 Ton Circuit			120 Ton Circuit		
	O.D. of Field Installed Liquid Line			O.D. of Field Installed Liquid Line			O.D. of Field Installed Liquid Line			O.D. of Field Installed Liquid Line		
	1 3/8"	1 5/8"	2 1/8"	1 3/8"	1 5/8"	2 1/8"	1 5/8"	2 1/8"	2 5/8"	1 5/8"	2 1/8"	2 5/8"
	Length of 3 5/8" Suction Accumulator			Length of 3 5/8" Suction Accumulator			Length of 4 1/8" Suction Accumulator			Length of 4 1/8" Suction Accumulator		
10	43	44	45	52	52	53	43	44	46	52	53	54
20	45	46	49	53	54	57	45	47	50	53	55	58
30	46	48	52	54	56	60	46	49	53	55	58	62
40	48	50	55	56	58	63	48	52	57	56	60	66
50	49	52	59	57	60	67	49	55	61	58	63	70
60	51	54	62	59	62	70	51	57	65	59	66	74
70	52	56	65	60	64	73	53	60	69	61	68	78
80	53	58	69	62	66	77	54	62	73	62	71	81
90	55	60	72	63	68	80	56	65	77	64	73	85
100	56	62	75	64	70	83	57	68	81	66	76	89
110	58	64	79	66	72	87	59	70	85	67	79	93
120	59	66	82	67	74	90	60	73	89	69	81	97
130	61	68	85	69	76	93	62	75	93	70	84	101
140	62	70	89	70	78	97	63	78	97	72	86	105
150	64	72	92	72	80	100	65	81	101	73	89	109
160	65	74	95	73	82	103	67	83	105	75	92	113
170	66	76	99	75	84	107	68	86	108	76	94	117
180	68	78	102	76	86	110	70	88	112	78	97	121
190	69	79	105	77	88	113	71	91	116	80	99	125
200	71	81	109	79	90	117	73	94	120	81	102	129

(a) Circuit 2 of 155 ton premium unit requires an additional 10 feet of suction accumulator length.

3. See [Table 29, p. 57](#) to determine outside diameter corresponding to equivalent length computed in step 2 for height and leaving water temperature of interest.

Note: If condenser is at same elevation or above evap, use 0 ft. column.

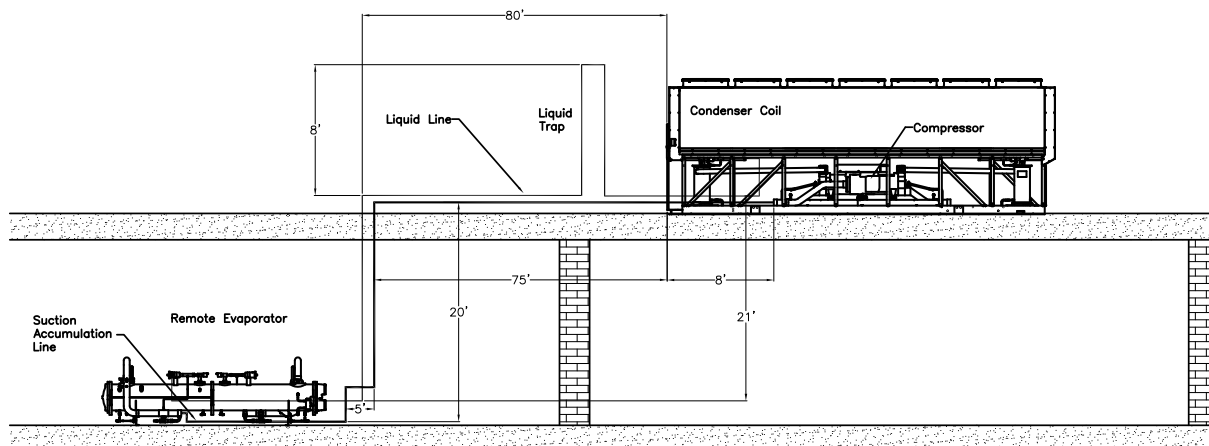
4. With the outside diameter found in step # 3, use [Table 30, p. 58](#) to determine the equivalent lengths of each fitting in the field installed piping.
5. Add equivalent lengths of all field installed elbows and valves.
6. Add the length found in step # 5 to the actual length from step # 1. This is your new equivalent line length.
7. Using [Table 29, p. 57](#) again, find the outside diameter that corresponds to the new equivalent line length from step # 6. If it is the same as step #3, this is the final equivalent length. Otherwise, proceed to the next step.
8. Using [Table 30, p. 58](#) and the new outside diameter found in step # 7, find the equivalent line length of each valve and fitting, and sum them.
9. Add the length found in step # 8 to the actual length from step # 1. This is the new equivalent line length.
10. With the equivalent line length found in step # 9, use [Table 29, p. 57](#) to select the proper outside diameter for the liquid lines. If the same as in step #7, this is your final equivalent line length. Otherwise, repeat step #7.

Note: Location and quantity of suction accumulator is dependent upon the unit configuration.

Installation - Mechanical — Remote Evaporator Option

Example Liquid Line Sizing

Figure 26. Liquid line sizing example



For this example, refer to [Table 29, p. 57](#), [Table 30, p. 58](#) and [Figure 26, p. 59](#). Assume a 70 ton circuit and a leaving water temperature of 49 degrees F.

- From [Figure 26, p. 59](#), the actual length of field installed piping is:

$$80 + 8 + 8 + 21 = 117 \text{ feet}$$

- Estimate equivalent line length:

$$117 \text{ feet} \times 1.5 = 175 \text{ feet}$$

- From [Table 29, p. 57](#) for a 70 ton circuit, for 175 equivalent feet the OD is 1.375 inches.

Note: Use the 0 ft. column since the condenser is above the evap

- In [Figure 26, p. 59](#), there are six long-radius elbows. From [Table 30, p. 58](#), for 1.375 inch elbows, the equivalent feet is:

$$6 \text{ elbows} \times 2.2 \text{ feet} = 13.2 \text{ feet}$$

- Adding equivalent feet from step #4 to step #1 gives:

$$13.2 \text{ feet} + 117 \text{ feet} = 130.2 \text{ feet}$$

- From [Table 29, p. 57](#), for a 70 ton circuit, for 125 equivalent feet (nearest to 130.2), the O.D. is 1- 3/8 inches.

Liquid Line size = 1-3/8 inches

Suction Line Sizing Steps

Table 32. Suction line sizes

Vertical/Upflow and Horizontal/Downflow Suction Lines O.D. (Type L Copper)				
LWT (F)	70 ton circuit	85ton circuit	100 ton circuit	120 ton circuit
40 - 60	3 5/8"	3 5/8"	4 1/8"	4 1/8"

The steps to compute suction line size are as follows:

- Break the suction line into it's Vertical/Up-flow and Horizontal/Down-flow components.
- From [Table 32, p. 59](#), select the appropriate Vertical/Up-flow suction line outside diameter according to the circuit tonnage. This is the diameter of the up-flow suction line and any fittings in the up-flow line.
- From [Table 32](#), select the appropriate Horizontal/Down-flow suction line outside diameter according to the circuit tonnage. This is the diameter of the up-flow suction line and any fittings in the up-flow line.

Note: The diameters of the up-flow, and horizontal or down-flow portions of the suction line may differ depending on the application.

Example Suction Line Sizing

For this example, refer to [Table 32](#) and [Figure 26, p. 59](#) assume a 70 ton circuit and a leaving water temperature of 49 degrees F.

- From [Table 32](#) the vertical/up-flow suction line is: 35/8" O.D.
- From [Table 32](#), the horizontal/down-flow line is: 3 5/8" O.D.

Note: In this example, the horizontal line is pitched downward in the direction of flow.

Suction Accumulator Sizing

Use [Figure 31, p. 58](#) to calculate length and size of the required suction accumulator(s).

Example of Suction Accumulator Line Sizing

Use [Figure 26, p. 59](#) and the same assumptions from the liquid line sizing example to calculate the suction accumulator line size and length.

In this case the accumulator is installed at the evaporator.



Installation - Mechanical — Remote Evaporator Option

1. Use the 70 ton circuit column.
2. From the liquid line sizing example, use a field installed liquid line of:
1.375 (1 3/8") inches
3. The actual feet of liquid line installed is: 117 feet
4. The size of the suction accumulator is: 3 5/8 inches
5. The length of the suction line accumulator is: 59 feet

Piping Installation Procedures

⚠ WARNING

Hazard of Explosion and Deadly Gases!

Never solder, braze or weld on refrigerant lines or any unit components that are above atmospheric pressure or where refrigerant may be present. Always remove refrigerant by following the guidelines established by the EPA Federal Clean Air Act or other state or local codes as appropriate. After refrigerant removal, use dry nitrogen to bring system back to atmospheric pressure before opening system for repairs. Mixtures of refrigerants and air under pressure may become combustible in the presence of an ignition source leading to an explosion. Excessive heat from soldering, brazing or welding with refrigerant vapors present can form highly toxic gases and extremely corrosive acids. Failure to follow all proper safe refrigerant handling practices could result in death or serious injury.

NOTICE:

Equipment Damage!

Do not use a saw to remove end caps, as this may allow copper chips to contaminate the system. Use a tubing cutter or heat to remove the end caps.

The outdoor unit and the evaporator are shipped with a 25 psig holding pressure of dry nitrogen. Do not relieve this pressure until field installation of the refrigerant piping is to be accomplished. This will require the removal of the temporary pipe caps.

Note: Use Type L refrigerant-grade copper tubing only.

The refrigerant lines must be isolated to prevent line vibration from being transferred to the building. Do not secure the lines rigidly to the building at any point.

All horizontal suction lines should be pitched downward, in the direction of flow, at a slope of 1/2 inch per 10 feet of run.

Important: Field installed liquid line service valves are recommended for installation. Liquid line service valves are not provided by the factory.

Note: Although packaged unit condensers and evaporators are sized to hold complete refrigerant

charge, units with a remote evaporator may not have the same capability, due to additional piping requirements.

Refrigerant Sensors

All necessary refrigerant devices, transducers and solenoids are factory installed and wired to the evaporator terminal box.

Refrigerant Pressure Relief Valve Venting

⚠ WARNING

Confined Space Hazards!

Do not work in confined spaces where refrigerant or other hazardous, toxic or flammable gas may be leaking. Refrigerant or other gases could displace available oxygen to breathe, causing possible asphyxiation or other serious health risks. Some gases may be flammable and or explosive. If a leak in such spaces is detected, evacuate the area immediately and contact the proper rescue or response authority. Failure to take appropriate precautions or to react properly to such potential hazards could result in death or serious injury.

Vent pipe size must conform to the ANSI/ASHRAE Standard 15 for vent pipe sizing. All federal, state, and local codes take precedence over any suggestions stated in this manual.

All relief valve venting is the responsibility of the installing contractor.

All RTAC remote evaporator units use evaporator pressure relief valves (see [Figure 27, p. 61](#)) that must be vented to the outside of the building.

Relief valve connection sizes and locations are shown in the unit submittal. Refer to local codes for relief valve vent line sizing information.

NOTICE:

Equipment Damage!

Do not exceed vent piping code specifications. Failure to comply with specifications could result in capacity reduction, unit damage and/or relief valve damage.

Relief valve discharge setpoints and capacities rates are given in [Table 33, p. 61](#). Once the relief valve has opened, it will re-close when pressure is reduced to a safe level.

Once opened, relief valves may have a tendency to leak and must be replaced.

Pressure relief valve discharge capacities will vary with shell diameter and length and also compressor

Installation - Mechanical — Remote Evaporator Option

displacement. Discharge venting capacity should be calculated as required by ASHRAE Standard 15-94. Do not adjust relief valve setting in the field.

Table 33. Pressure Relief Valve Data

Valve Location	Discharge Setpoint (psi)	Qty	Rated Capacity per Valve (lba/min.)	Field Connection Pipe Size (NPT)	Factory Shell Side Connection (in)
Evap	200	2	17.3	5/8	7/8 - 14

Leak Test and Evacuation

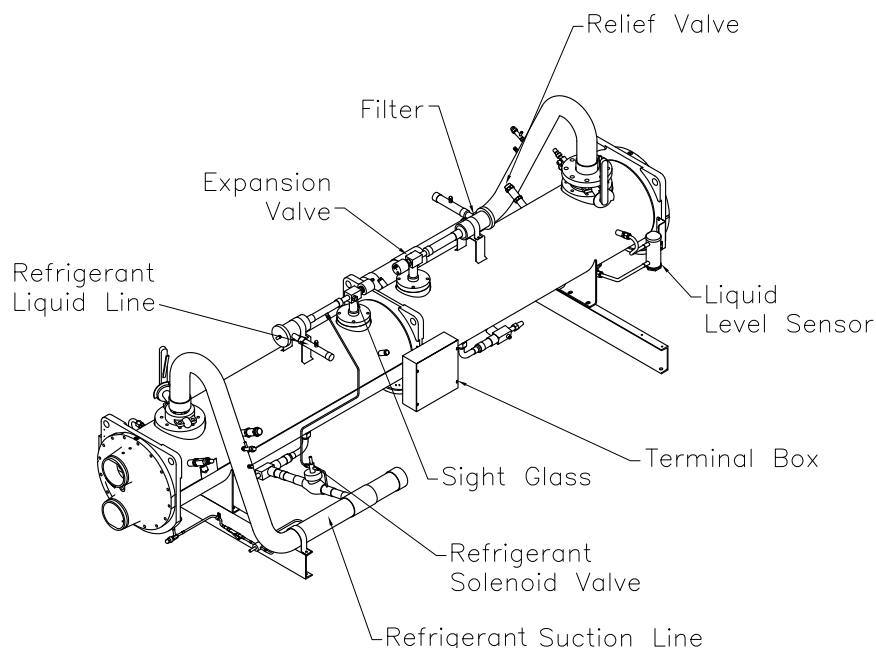
After installation of refrigerant piping, thoroughly test the system for leaks. Pressure test system at pressures required by local codes.

⚠ WARNING

Hazard of Explosion!

Use only dry nitrogen with a pressure regulator for pressurizing unit. Do not use acetylene, oxygen or compressed air or mixtures containing them for pressure testing. Do not use mixtures of a hydrogen containing refrigerant and air above atmospheric pressure for pressure testing as they may become flammable and could result in an explosion. Refrigerant, when used as a trace gas should only be mixed with dry nitrogen for pressurizing units. Failure to follow these recommendations could result in death or serious injury or equipment or property-only damage.

Figure 27. Remote evaporator

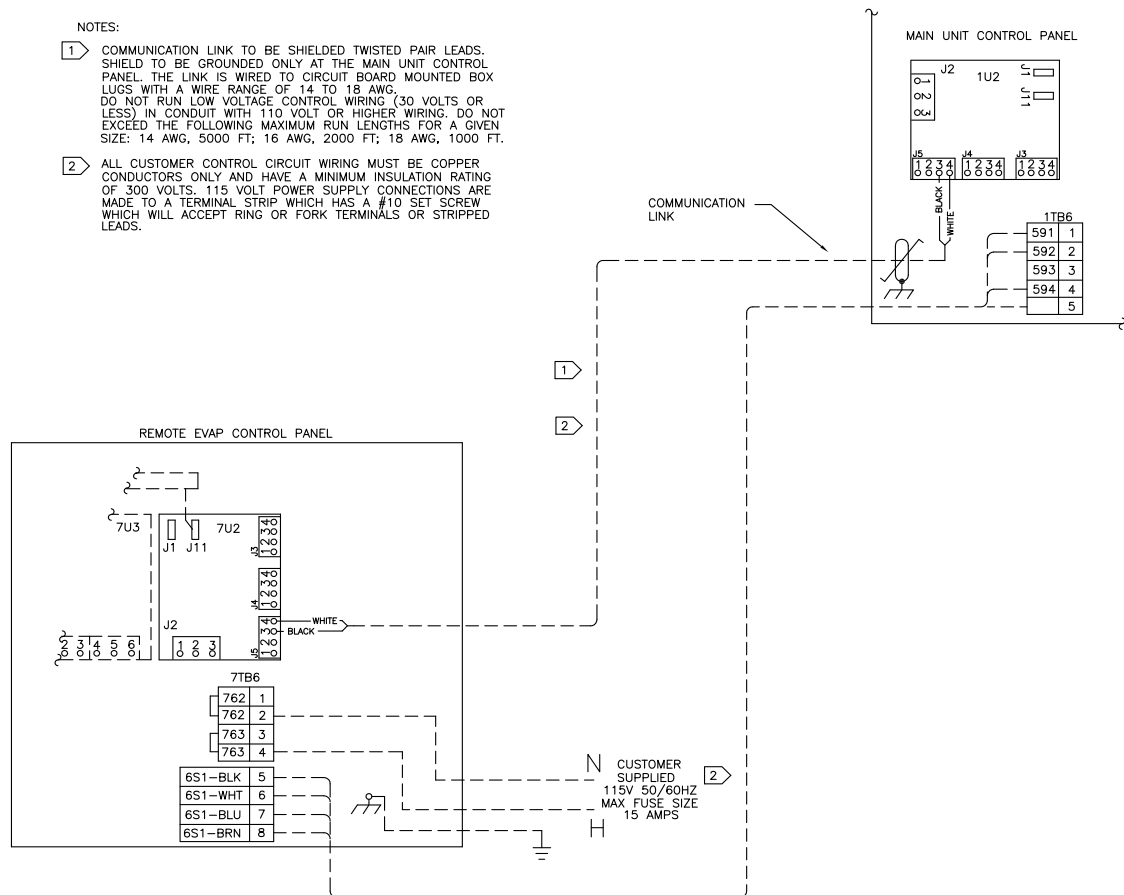


For field evacuation, use a rotary-type vacuum pump capable of pulling a vacuum of 500 microns or less. Follow the pump manufacturer's instructions for proper use of the pump. The line used to connect the pump to the system should be copper and be the largest diameter that can be practically used. A larger line size with minimum flow resistance can significantly reduce evacuation time.

Use the ports on the suction service valves and the liquid line shutoff valves for access to the system for evacuation. Ensure that the suction service valve, the liquid line shutoff valve, the oil line shutoff valve and any field installed valves are open in the proper position before evacuating.

Insulate entire suction line and suction accumulator line. Where line is exposed, wrap with weatherproof tape and seal with weatherproof compound.

Figure 28. Field wiring between remote evaporator and condensing unit



Refrigerant and Additional Oil Charge

Refrigerant Charge Determination

The approximate amount of refrigerant charge required by the system must be determined by referring to [Table 34](#) and must be verified by running the system and checking sub cooling.

Table 34. Field installed piping charge

Pipe O.D. (in)	Suction Line lbs of R134a per 100ft	Liquid Line lbs of R134a per 100ft
1-3/8	N/A	62.4
1-5/8	N/A	88.3
2-1/8	N/A	153.6
2-5/8	N/A	236.9
3-1/8	5.0	N/A
3-5/8	6.8	N/A
4-1/8	8.8	N/A

1. To determine the appropriate charge, first refer to the [Table 1](#), p. 11 through [Table 10](#), p. 20 in section

“General Data,” p. 10 to establish the required charge without the field-installed piping.

2. Next, determine the charge required for the field-installed piping by referring to [Table 34](#), p. 62.
3. Sum the values of step 1 and step 2 to determine the circuit charge.

Note: The amounts of refrigerant listed in [Table 34](#), p. 62 are per 100 feet of pipe. Requirements will be in direct proportion to the actual length of piping.

Oil Charge Determination

The unit is factory charged with the amount of oil required by the system, without the field-installed piping. The amount of the additional oil required is dependent upon the amount of refrigerant that is added to the system for the field installed piping.

Use the following formula to calculate the amount of oil to be added:

Pints of Oil = [lbs of R-134a added for field-installed piping]/100

Installation - Electrical

General Recommendations

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 Ampacity and other unit electrical data are on the unit nameplate. See the unit order specifications for actual electrical data. Specific electrical schematics and connection diagrams are shipped with the unit.

WARNING

Proper Field Wiring and Grounding Required!

All field wiring **MUST** be performed by qualified personnel. Improperly installed and grounded field wiring poses **FIRE** and **ELECTROCUTION** hazards. To avoid these hazards, you **MUST** follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

NOTICE:

Use Copper Conductors Only!

Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors could result in equipment damage.

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



Installation - Electrical

Table 35. Standard efficiency - all ambient options

Unit Size	Rated Voltage ¹	# Pwr Conn ²	# Comp	# Fan Ckt1/Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/Ckt2	MOP ⁷ Ckt1/Ckt2
140	200/60/3	1	2	8	1.5	6.5	7.3	0.83	270/270	1845/1845	600/600	665	800
	200/60/3	2	2	4/4	1.5	6.5	7.3	0.83	270/270	1845/1845	600/600	368/364	600/600
	230/60/3	1	2	8	1.5	6.5	7.3	0.83	235/235	1556/1556	506/506	586	800
	230/60/3	2	2	4/4	1.5	6.5	7.3	0.83	235/235	1556/1556	506/506	324/321	500/500
	380/60/3	1	2	8	1.5	3.5	3.7	0.83	142/142	973/973	316/316	350	450
	380/60/3	2	2	4/4	1.5	3.5	3.7	0.83	142/142	973/973	316/316	194/192	300/300
	460/60/3	1	2	8	1.5	3	3.7	0.83	118/118	774/774	252/252	293	400
	460/60/3	2	2	4/4	1.5	3	3.7	0.83	118/118	774/774	252/252	162/160	250/250
	575/60/3	1	2	8	1.5	2.5	3.7	0.83	94/94	631/631	205/205	235	300
	575/60/3	2	2	4/4	1.5	2.5	3.7	0.83	94/94	631/631	205/205	130/129	200/200
	400/50/3	1	2	8	1.5	2.8	3.7	0.83	138/138	896/896	291/291	337	450
	400/50/3	2	2	4/4	1.5	2.8	3.7	0.83	138/138	896/896	291/291	187/185	300/300
155	200/60/3	1	2	9	1.5	6.5	7.3	0.83	320/270	2156/1845	701/600	734	1000
	200/60/3	2	2	5/4	1.5	6.5	7.3	0.83	320/270	2156/1845	701/600	437/364	700/600
	230/60/3	1	2	9	1.5	6.5	7.3	0.83	278/235	1756/1556	571/506	646	800
	230/60/3	2	2	5/4	1.5	6.5	7.3	0.83	278/235	1756/1556	571/506	384/321	600/500
	380/60/3	1	2	9	1.5	3.5	3.7	0.83	168/142	1060/973	345/316	386	500
	380/60/3	2	2	5/4	1.5	3.5	3.7	0.83	168/142	1060/973	345/316	230/192	350/300
	460/60/3	1	2	9	1.5	3	3.7	0.83	139/118	878/774	285/252	322	450
	460/60/3	2	2	5/4	1.5	3	3.7	0.83	139/118	878/774	285/252	191/160	300/250
	575/60/3	1	2	9	1.5	2.5	3.7	0.83	111/94	705/631	229/205	259	350
	575/60/3	2	2	5/4	1.5	2.5	3.7	0.83	111/94	705/631	229/205	154/129	250/200
	400/50/3	1	2	9	1.5	2.8	3.7	0.83	168/138	1089/896	354/291	377	500
	400/50/3	2	2	5/4	1.5	2.8	3.7	0.83	168/138	1089/896	354/291	227/185	350/300
170	200/60/3	1	2	10	1.5	6.5	7.3	0.83	320/320	2156/2156	701/701	791	1000
	200/60/3	2	2	5/5	1.5	6.5	7.3	0.83	320/320	2156/2156	701/701	437/433	700/700
	230/60/3	1	2	10	1.5	6.5	7.3	0.83	278/278	1756/1756	571/571	696	800
	230/60/3	2	2	5/5	1.5	6.5	7.3	0.83	278/278	1756/1756	571/571	384/381	600/600
	380/60/3	1	2	10	1.5	3.5	3.7	0.83	168/168	1060/1060	345/345	416	500
	380/60/3	2	2	5/5	1.5	3.5	3.7	0.83	168/168	1060/1060	345/345	230/228	350/350
	460/60/3	1	2	10	1.5	3	3.7	0.83	139/139	878/878	285/285	346	450
	460/60/3	2	2	5/5	1.5	3	3.7	0.83	139/139	878/878	285/285	191/189	300/300
	575/60/3	1	2	10	1.5	2.5	3.7	0.83	111/111	705/705	229/229	279	350
	575/60/3	2	2	5/5	1.5	2.5	3.7	0.83	111/111	705/705	229/229	154/152	250/250
	400/50/3	1	2	10	1.5	2.8	3.7	0.83	168/168	1089/1089	354/354	410	500
	400/50/3	2	2	5/5	1.5	2.8	3.7	0.83	168/168	1089/1089	354/354	227/225	350/350
185	200/60/3	1	2	11	1.5	6.5	7.3	0.83	386/320	2525/2156	821/701	880	1200
	200/60/3	2	2	6/5	1.5	6.5	7.3	0.83	386/320	2525/2156	821/701	526/433	800/700
	230/60/3	1	2	11	1.5	6.5	7.3	0.83	336/278	2126/1756	691/571	775	1000
	230/60/3	2	2	6/5	1.5	6.5	7.3	0.83	336/278	2126/1756	691/571	463/381	700/600
	380/60/3	1	2	11	1.5	3.5	3.7	0.83	203/168	1306/1060	424/345	463	600
	380/60/3	2	2	6/5	1.5	3.5	3.7	0.83	203/168	1306/1060	424/345	277/228	450/350
	460/60/3	1	2	11	1.5	3	3.7	0.83	168/139	1065/878	346/285	385	500
	460/60/3	2	2	6/5	1.5	3	3.7	0.83	168/139	1065/878	346/285	230/189	350/300
	575/60/3	1	2	11	1.5	2.5	3.7	0.83	134/111	853/705	277/229	310	400
	575/60/3	2	2	6/5	1.5	2.5	3.7	0.83	134/111	853/705	277/229	185/152	300/250
	400/50/3	1	2	11	1.5	2.8	3.7	0.83	198/168	1089/1089	354/354	450	600
	400/50/3	2	2	6/5	1.5	2.8	3.7	0.83	198/168	1089/1089	354/354	267/225	450/350

Installation - Electrical

Table 35. Standard efficiency - all ambient options (continued)

Unit Size	Rated Voltage ¹	# Pwr Conn ²	# Comp	# Fan Ckt1/Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/Ckt2	MOP ⁷ Ckt1/Ckt2
200	200/60/3	1	2	12	1.5	6.5	7.3	0.83	386/386	2525/2525	821/821	952	1200
	200/60/3	2	2	6/6	1.5	6.5	7.3	0.83	386/386	2525/2525	821/821	526/522	800/800
	230/60/3	1	2	12	1.5	6.5	7.3	0.83	336/336	2126/2126	691/691	839	1000
	230/60/3	2	2	6/6	1.5	6.5	7.3	0.83	336/336	2126/2126	691/691	463/460	700/700
	380/60/3	1	2	12	1.5	3.5	3.7	0.83	203/203	1306/1306	424/424	501	700
	380/60/3	2	2	6/6	1.5	3.5	3.7	0.83	203/203	1306/1306	424/424	277/275	450/450
	460/60/3	1	2	12	1.5	3	3.7	0.83	168/168	1065/1065	346/346	417	500
	460/60/3	2	2	6/6	1.5	3	3.7	0.83	168/168	1065/1065	346/346	230/229	350/350
	575/60/3	1	2	12	1.5	2.5	3.7	0.83	134/134	853/853	277/277	335	450
	575/60/3	2	2	6/6	1.5	2.5	3.7	0.83	134/134	853/853	277/277	185/184	300/300
	400/50/3	1	2	12	1.5	2.8	3.7	0.83	198/198	1089/1089	354/354	483	600
	400/50/3	2	2	6/6	1.5	2.8	3.7	0.83	198/198	1089/1089	354/354	267/265	450/450
225	200/60/3	1	2	13	1.5	6.5	7.3	0.83	459/386	2525/2525	821/821	1050	1200
	200/60/3	2	2	7/6	1.5	6.5	7.3	0.83	459/386	2525/2525	821/821	624/522	1000/800
	230/60/3	1	2	13	1.5	6.5	7.3	0.83	399/336	2126/2126	691/691	924	1200
	230/60/3	2	2	7/6	1.5	6.5	7.3	0.83	399/336	2126/2126	691/691	549/460	800/700
	380/60/3	1	2	13	1.5	3.5	3.7	0.83	242/203	1306/1306	424/424	554	700
	380/60/3	2	2	7/6	1.5	3.5	3.7	0.83	242/203	1306/1306	424/424	329/275	500/450
	460/60/3	1	2	13	1.5	3	3.7	0.83	200/168	1065/1065	346/346	460	600
	460/60/3	2	2	7/6	1.5	3	3.7	0.83	200/168	1065/1065	346/346	273/229	450/350
	575/60/3	1	2	13	1.5	2.5	3.7	0.83	160/134	853/853	277/277	370	500
	575/60/3	2	2	7/6	1.5	2.5	3.7	0.83	160/134	853/853	277/277	220/184	350/300
250	200/60/3	1	2	14	1.5	6.5	7.3	0.83	459/459	2525/2525	821/821	1129	1200
	200/60/3	2	2	7/7	1.5	6.5	7.3	0.83	459/459	2525/2525	821/821	624/620	1000/1000
	230/60/3	1	2	14	1.5	6.5	7.3	0.83	399/399	2126/2126	691/691	994	1200
	230/60/3	2	2	7/7	1.5	6.5	7.3	0.83	399/399	2126/2126	691/691	549/545	800/800
	380/60/3	1	2	14	1.5	3.5	3.7	0.83	242/242	1306/1306	424/424	596	800
	380/60/3	2	2	7/7	1.5	3.5	3.7	0.83	242/242	1306/1306	424/424	329/327	500/500
	460/60/3	1	2	14	1.5	3	3.7	0.83	200/200	1065/1065	346/346	495	600
	460/60/3	2	2	7/7	1.5	3	3.7	0.83	200/200	1065/1065	346/346	273/272	450/450
	575/60/3	1	2	14	1.5	2.5	3.7	0.83	160/160	853/853	277/277	399	500
	575/60/3	2	2	7/7	1.5	2.5	3.7	0.83	160/160	853/853	277/277	220/220	350/350
	400/50/3	1	3	14	1.5	2.8	3.7	1.2	138-138/198	896-896/1089	291-291/354	570	700
	400/50/3	2	3	8/6	1.5	2.8	3.7	1.2	138-138/198	896-896/1089	291-291/354	337/267	450/450
275	200/60/3	1							n/a				
	200/60/3	2	3	10/6	1.5	6.5	7.3	1.2	320-320/386	2156-2156/2525	701-701/821	791/526	1000/800
	230/60/3	1							n/a				
	230/60/3	2	3	10/6	1.5	6.5	7.3	1.2	278-278/336	1756-1756/2126	571-571/691	696/463	800/700
	380/60/3	1							n/a				
	380/60/3	2	3	10/6	1.5	3.5	3.7	1.2	168-168/203	1060-1060/1306	345-345/424	417/277	500/450
	460/60/3	1	3	16	1.5	3	3.7	1.2	139-139/168	878-878/1065	285-285/346	542	700
	460/60/3	2	3	10/6	1.5	3	3.7	1.2	139-139/168	878-878/1065	285-285/346	346/231	450/350
	575/60/3	1	3	16	1.5	2.5	3.7	1.2	111-111/134	705-705/853	229-229/277	436	500
	575/60/3	2	3	10/6	1.5	2.5	3.7	1.2	111-111/134	705-705/853	229-229/277	279/185	350/300
	400/50/3	1	3	16	1.5	2.8	3.7	1.2	168-168/198	1089-1089/1089	354-354/354	635	800
	400/50/3	2	3	10/6	1.5	2.8	3.7	1.2	168-168/198	1089-1089/1089	354-354/354	410/267	500/450



Installation - Electrical

Table 35. Standard efficiency - all ambient options (continued)

Unit Size	Rated Voltage ¹	# Pwr Conn ²	# Comp	# Fan Ckt1/Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/Ckt2	MOP ⁷ Ckt1/Ckt2
300	200/60/3	1							n/a				
	200/60/3	2	3	12/6	1.5	6.5	7.3	1.2	386-386/386	2525-2525/2525	821-821/821	925/526	1200/800
	230/60/3	1							n/a				
	230/60/3	2	3	12/6	1.5	6.5	7.3	1.2	336-336/336	2126-2126/2126	691-691/691	839/463	1000/700
	380/60/3	1							n/a				
	380/60/3	2	3	12/6	1.5	3.5	3.7	1.2	203-203/203	1306-1306/1306	424-424/424	501/277	700/450
	460/60/3	1	3	18	1.5	3	3.7	1.2	168-168/168	1065-1065/1065	346-346/346	606	700
	460/60/3	2	3	12/6	1.5	3	3.7	1.2	168-168/168	1065-1065/1065	346-346/346	417/231	500/350
	575/60/3	1	3	18	1.5	2.5	3.7	1.2	134-134/134	853-853/853	277-277/277	487	600
	575/60/3	2	3	12/6	1.5	2.5	3.7	1.2	134-134/134	853-853/853	277-277/277	335/185	450/300
	400/50/3	1	3	18	1.5	2.8	3.7	1.2	198-198/198	1089-1089/1089	354-354/354	701	800
	400/50/3	2	3	12/6	1.5	2.8	3.7	1.2	198-198/198	1089-1089/1089	354-354/354	483/267	600/450
350	200/60/3	1							n/a				
	200/60/3	2	3	14/6	1.5	6.5	7.3	1.2	459-459/386	2525-2525/2525	821-821/821	1130/526	1200/800
	230/60/3	1							n/a				
	230/60/3	2	3	14/6	1.5	6.5	7.3	1.2	399-399/336	2126-2126/2126	691-691/691	994/463	1200/700
	380/60/3	1							n/a				
	380/60/3	2	3	14/6	1.5	3.5	3.7	1.2	242-242/203	1306-1306/1306	424-424/424	596/277	800/450
	460/60/3	1	3	20	1.5	3	3.7	1.2	200-200/168	1065-1065/1065	346-346/346	684	800
	460/60/3	2	3	14/6	1.5	3	3.7	1.2	200-200/168	1065-1065/1065	346-346/346	495/231	600/350
	575/60/3	1	3	20	1.5	2.5	3.7	1.2	160-160/134	853-853/853	277-277/277	551	700
	575/60/3	2	3	14/6	1.5	2.5	3.7	1.2	160-160/134	853-853/853	277-277/277	399/185	500/300
	400/50/3	1	4	20	1.5	2.8	3.7	1.59	168-168/168-168	1089-1089/1089-1089	354-354/354-354	778	800
	400/50/3	2	4	10/10	1.5	2.8	3.7	1.59	168-168/168-168	1089-1089/1089-1089	354-354/354-354	410/410	500/500
375	400/50/3	1	4	22	1.5	2.8	3.7	1.59	198-198/168-168	1089-1089/1089-1089	354-354/354-354	851	1000
	400/50/3	2	4	12/10	1.5	2.8	3.7	1.59	198-198/168-168	1089-1089/1089-1089	354-354/354-354	483/410	600/500

Installation - Electrical

Table 35. Standard efficiency - all ambient options (continued)

Unit Size	Rated Voltage ¹	# Pwr Conn ²	# Comp	# Fan Ckt1/Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/Ckt2	MOP ⁷ Ckt1/Ckt2
400	200/60/3	1							n/a				
	200/60/3	2	4	12/12	1.5	6.5	7.3	1.59	386-386/ 386-386	2525-2525/ 2525-2525	821-821/ 821-821	952/952	1200/1200
	230/60/3	1							n/a				
	230/60/3	2	4	12/12	1.5	6.5	7.3	1.59	336-336/ 336-336	2126-2126/ 2126-2126	691-691/ 691-6/91	839/839	1000/1000
	380/60/3	1							n/a				
	380/60/3	2	4	12/12	1.5	3.5	3.7	1.59	203-203/ 203-203	1306-1306/ 1306-1306	424-424/ 424-424	501/501	700/700
	460/60/3	1	4	24	1.5	3	3.7	1.59	168-168/ 168-168	1065-1065/ 1065-1065	346-346/ 346-346	492	800
	460/60/3	2	4	12/12	1.5	3	3.7	1.59	168-168/ 168-168	1065-1065/ 1065-1065	346-346/ 346-346	417/417	500/500
	575/60/3	1	4	24	1.5	2.5	3.7	1.59	134-134/ 134-134	853-853/853- 853	277-277/ 277-277	637	700
	575/60/3	2	4	12/12	1.5	2.5	3.7	1.59	134-134/ 134-134	853-853/853- 853	277-277/ 277-277	335/335	450/450
	400/50/3	1	4	24	1.5	2.8	3.7	1.59	198-198/ 198-198	1089-1089/ 1089-1089	354-354/ 354-354	916	1000
	400/50/3	2	4	12/12	1.5	2.8	3.7	1.59	198-198/ 198-198	1089-1089/ 1089-1089	354-354/ 354-354	483/483	600/600
450	200/60/3	1							n/a				
	200/60/3	2	4	14/12	1.5	6.5	7.3	1.59	459-459/ 386-386	2525-2525/ 2525-2525	821-821/ 821-821	1130/952	1200/1200
	230/60/3	1							n/a				
	230/60/3	2	4	14/12	1.5	6.5	7.3	1.59	399-399/ 336-336	2126-2126/ 2126-2126	691-691/ 691-691	994/839	1200/1000
	380/60/3	1							n/a				
	380/60/3	2	4	14/12	1.5	3.5	3.7	1.59	242-242/ 203-203	1306-1306/ 1306-1306	424-424/ 424-424	596/501	800/700
	460/60/3	1	4	26	1.5	3	3.7	1.59	200-200/ 168-168	1065-1065/ 1065-1065	346-346/ 346-346	870	1000
	460/60/3	2	4	14/12	1.5	3	3.7	1.59	200-200/ 168-168	1065-1065/ 1065-1065	346-346/ 346-346	495/417	600/500
	575/60/3	1	4	26	1.5	2.5	3.7	1.59	160-160/ 134-134	853-853/853- 853	277-277/ 277-277	701	800
	575/60/3	2	4	14/12	1.5	2.5	3.7	1.59	160-160/ 134-134	853-853/853- 853	277-277/ 277-277	399/335	500/450



Installation - Electrical

Table 35. Standard efficiency - all ambient options (continued)

Unit Size	Rated Voltage ¹	# Pwr Conn ²	# Comp	# Fan Ckt1/Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/Ckt2	MOP ⁷ Ckt1/Ckt2
	200/60/3	1							n/a				
	200/60/3	2	4	14/14	1.5	6.5	7.3	1.59	459-459/ 459-459	2525-2525/ 2525-2525	821-821/ 821-821	1130/1130	1200/1200
	230/60/3	1							n/a				
	230/60/3	2	4	14/14	1.5	6.5	7.3	1.59	399-399/ 399-399	2126-2126/ 2126-2126	691-691/ 691-691	994/994	1200/1200
	380/60/3	1							n/a				
500	380/60/3	2	4	14/14	1.5	3.5	3.7	1.59	242-242/ 242-242	1306-1306/ 1306-1306	424-424/ 424-424	596/596	800/800
	460/60/3	1	4	28	1.5	3	3.7	1.59	200-200/ 200-200	1065-1065/ 1065-1065	346-346/ 346-346	940	1000
	460/60/3	2	4	14/14	1.5	3	3.7	1.59	200-200/ 200-200	1065-1065/ 1065-1065	346-346/ 346-346	495/495	600/600
	575/60/3	1	4	28	1.5	2.5	3.7	1.59	160-160/ 160-160	853-853/853- 853	277-277/ 277-277	758	800
	575/60/3	2	4	14/14	1.5	2.5	3.7	1.59	160-160/ 160-160	853-853/853- 853	277-277/ 277-277	399/399	500/500

Notes:

1. Voltage Utilization Range: +/- 10% of rated voltage. Rated voltage (use range): 200/60/3 (180-220), 230/60/3 (208-254), 380/60/3 (342-418), 460/60/3 (414-506), 575/60/3 (516-633)
2. As standard, 140-250 ton (60 Hz) units and 140-200 ton (50Hz) units have a single point power connection. Optional dual point power connections are available. As standard, 275-500 ton (60Hz) units and 250-400 ton (50Hz) units have dual point power connections. Optional single point power connections are available on 460V and 575V/60 Hz and 400V/50 Hz units.
3. Control VA includes operational controls only. It does not include evaporator heaters.
4. RLA - Rated Load Amps
5. XLRA - Locked Rotor Amps - based on full winding (x-line) start units. YLRA for Wye-delta starters is ~1/3 of LRA of x-line units.
6. MCA - Minimum Circuit Ampacity - 125 percent of largest compressor RLA plus 100 percent of all other loads.
7. Max fuse or MOPD = 225 percent of the largest compressor RLA plus 100 percent of the second compressor RLA, plus the sum of the condenser fan FLA. (Use FLA per circuit, NOT FLA for the entire unit).
8. A separate 115/60/1, 20 amp or 220/50/1, 15 amp customer provided power connection is required to power the evaporator heaters (1640 watts).
9. Local codes may take precedence.

Installation - Electrical

Table 36. High efficiency - standard and low ambient options

Unit Size	Rated Voltage ¹	# Power Conn ²	# Comp	# Fan Ckt1/Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/Ckt2	MOP ⁷ Ckt1/Ckt2
120	400/50/3	1	8	1.5	2.8	3.7	3.7	0.83	113/113	796/796	259/259	281	400
	400/50/3	2	4/4	1.5	2.8	3.7	3.7	0.83	113/113	796/796	259/259	155/153	250/250
130	400/50/3	1	9	1.5	2.8	3.7	3.7	0.83	132/113	896/796	291/259	307	400
	400/50/3	2	5/4	1.5	2.8	3.7	3.7	0.83	132/113	896/796	291/259	182/153	300/250
140	200/60/3	1	2	10	1.5	6.5	7.3	0.83	259/259	1845/1845	600/600	653	800
	200/60/3	2	2	5/5	1.5	6.5	7.3	0.83	259/259	1845/1845	600/600	361/357	600/600
	230/60/3	1	2	10	1.5	6.5	7.3	0.83	225/225	1556/1556	506/506	576	800
	230/60/3	2	2	5/5	1.5	6.5	7.3	0.83	225/225	1556/1556	506/506	318/315	500/500
	380/60/3	1	2	10	1.5	3.5	3.7	0.83	136/136	973/973	316/316	344	450
	380/60/3	2	2	5/5	1.5	3.5	3.7	0.83	136/136	973/973	316/316	190/188	300/300
	460/60/3	1	2	10	1.5	3	3.7	0.83	113/113	774/774	252/252	287	400
	460/60/3	2	2	5/5	1.5	3	3.7	0.83	113/113	774/774	252/252	159/157	250/250
	575/60/3	1	2	10	1.5	2.5	3.7	0.83	90/90	631/631	205/205	231	300
	575/60/3	2	2	5/5	1.5	2.5	3.7	0.83	90/90	631/631	205/205	128/126	200/200
	400/50/3	1	2	10	1.5	2.8	3.7	0.83	132/132	896/896	291/291	329	450
	400/50/3	2	2	5/5	1.5	2.8	3.7	0.83	132/132	896/896	291/291	182/180	300/300
155	200/60/3	1	2	11	1.5	6.5	7.3	0.83	305/259	2156/1845	701/600	717	1000
	200/60/3	2	2	6/5	1.5	6.5	7.3	0.83	305/259	2156/1845	701/600	425/357	700/600
	230/60/3	1	2	11	1.5	6.5	7.3	0.83	265/225	1756/1556	571/506	633	800
	230/60/3	2	2	6/5	1.5	6.5	7.3	0.83	265/225	1756/1556	571/506	375/315	600/500
	380/60/3	1	2	11	1.5	3.5	3.7	0.83	161/136	1060/973	345/316	378	500
	380/60/3	2	2	6/5	1.5	3.5	3.7	0.83	161/136	1060/973	345/316	225/188	350/300
	460/60/3	1	2	11	1.5	3	3.7	0.83	133/113	878/774	285/252	315	400
	460/60/3	2	2	6/5	1.5	3	3.7	0.83	133/113	878/774	285/252	187/157	300/250
	575/60/3	1	2	11	1.5	2.5	3.7	0.83	106/90	705/631	229/205	254	350
	575/60/3	2	2	6/5	1.5	2.5	3.7	0.83	106/90	705/631	229/205	150/126	250/200
	400/50/3	1	2	11	1.5	2.8	3.7	0.83	160/132	1089/896	354/291	367	500
	400/50/3	2	2	6/5	1.5	2.8	3.7	0.83	160/132	1089/896	354/291	220/180	350/300
170	200/60/3	1	2	12	1.5	6.5	7.3	0.83	305/305	2156/2156	701/701	770	1000
	200/60/3	2	2	12/12	1.5	6.5	7.3	0.83	305/305	2156/2156	701/701	425/421	700/700
	230/60/3	1	2	12	1.5	6.5	7.3	0.83	265/265	1756/1756	571/571	679	800
	230/60/3	2	2	12/12	1.5	6.5	7.3	0.83	265/265	1756/1756	571/571	375/371	600/600
	380/60/3	1	2	12	1.5	3.5	3.7	0.83	161/161	1060/1060	345/345	407	500
	380/60/3	2	2	12/12	1.5	3.5	3.7	0.83	161/161	1060/1060	345/345	225/222	350/350
	460/60/3	1	2	12	1.5	3	3.7	0.83	133/133	878/878	285/285	338	450
	460/60/3	2	2	12/12	1.5	3	3.7	0.83	133/133	878/878	285/285	187/185	300/300
	575/60/3	1	2	12	1.5	2.5	3.7	0.83	106/106	705/705	229/229	272	350
	575/60/3	2	2	12/12	1.5	2.5	3.7	0.83	106/106	705/705	229/229	150/149	250/250
	400/50/3	1	2	12	1.5	2.8	3.7	0.83	160/160	1089/1089	354/354	397	500
	400/50/3	2	2	12/12	1.5	2.8	3.7	0.83	160/160	1089/1089	354/354	220/218	350/350



Installation - Electrical

Table 36. High efficiency - standard and low ambient options (continued)

Unit Size	Rated Voltage ¹	# Power Conn ²	# Comp	# Fan Ckt1/Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/Ckt2	MOP ⁷ Ckt1/Ckt2
185	200/60/3	1	2	13	1.5	6.5	7.3	0.83	373-305	2525/2156	821/701	861	1200
	200/60/3	2	2	7/6	1.5	6.5	7.3	0.83	373/305	2525/2156	821/701	517/421	800/700
	230/60/3	1	2	13	1.5	6.5	7.3	0.83	324-265	2126/1756	691/571	760	1000
	230/60/3	2	2	7/6	1.5	6.5	7.3	0.83	324/265	2126/1756	691/571	455/371	700/600
	380/60/3	1	2	13	1.5	3.5	3.7	0.83	196-161	1306/1060	424/345	454	600
	380/60/3	2	2	7/6	1.5	3.5	3.7	0.83	196/161	1306/1060	424/345	272/222	450/350
	460/60/3	1	2	13	1.5	3	3.7	0.83	162-133	1065/878	346/285	378	500
	460/60/3	2	2	7/6	1.5	3	3.7	0.83	162/133	1065/878	346/285	226/185	350/300
	575/60/3	1	2	13	1.5	2.5	3.7	0.83	130-106	853/705	277/229	305	400
	575/60/3	2	2	7/6	1.5	2.5	3.7	0.83	130/106	853/705	277/229	183/149	300/250
	400/50/3	1	2	13	1.5	2.8	3.7	0.83	189-160	1089/1089	354/354	437	600
	400/50/3	2	2	7/6	1.5	2.8	3.7	0.83	189/160	1089/1089	354/354	259/218	400/350
200	200/60/3	1	2	14	1.5	6.5	7.3	0.83	373/373	2525/2525	821/821	936	1200
	200/60/3	2	2	7/7	1.5	6.5	7.3	0.83	373/373	2525/2525	821/821	517/513	800/800
	230/60/3	1	2	14	1.5	6.5	7.3	0.83	324/324	2126/2126	691/691	825	1000
	230/60/3	2	2	7/7	1.5	6.5	7.3	0.83	324/324	2126/2126	691/691	455/451	700/700
	380/60/3	1	2	14	1.5	3.5	3.7	0.83	196/196	1306/1306	424/424	493	600
	380/60/3	2	2	7/7	1.5	3.5	3.7	0.83	196/196	1306/1306	424/424	272/270	450/450
	460/60/3	1	2	14	1.5	3	3.7	0.83	162/162	1065/1065	346/346	410	500
	460/60/3	2	2	7/7	1.5	3	3.7	0.83	162/162	1065/1065	346/346	226/224	350/350
	575/60/3	1	2	14	1.5	2.5	3.7	0.83	130/130	853/853	277/277	331	450
	575/60/3	2	2	7/7	1.5	2.5	3.7	0.83	130/130	853/853	277/277	183/181	300/300
	400/50/3	1	2	14	1.5	2.8	3.7	0.83	189/189	1089/1089	354/354	468	600
	400/50/3	2	2	7/7	1.5	2.8	3.7	0.83	189/189	1089/1089	354/354	259/257	400/400
225	200/60/3	1	2	14	1.5	6.5	7.3	0.83	447/373	2525/2525	821/821	1028	1200
	200/60/3	2	2	8/6	1.5	6.5	7.3	0.83	447/373	2525/2525	821/821	616/506	1000/800
	230/60/3	1	2	14	1.5	6.5	7.3	0.83	388/324	2126/2126	691/691	905	1200
	230/60/3	2	2	8/6	1.5	6.5	7.3	0.83	388/324	2126/2126	691/691	541/445	800/700
	380/60/3	1	2	14	1.5	3.5	3.7	0.83	235/196	1306/1306	424/424	541	700
	380/60/3	2	2	8/6	1.5	3.5	3.7	0.83	235/196	1306/1306	424/424	324/266	500/450
	460/60/3	1	2	14	1.5	3	3.7	0.83	194/162	1065/1065	346/346	450	600
	460/60/3	2	2	8/6	1.5	3	3.7	0.83	194/162	1065/1065	346/346	269/221	450/350
	575/60/3	1	2	14	1.5	2.5	3.7	0.83	155/130	853/853	277/277	363	500
	575/60/3	2	2	8/6	1.5	2.5	3.7	0.83	155/130	853/853	277/277	216/179	350/300
250	200/60/3	1	2	16	1.5	6.5	7.3	0.83	447/447	2525/2525	821/821	1115	1200
	200/60/3	2	2	8/8	1.5	6.5	7.3	0.83	447/447	2525/2525	821/821	616/612	1000/1000
	230/60/3	1	2	16	1.5	6.5	7.3	0.83	388/388	2126/2126	691/691	982	1200
	230/60/3	2	2	8/8	1.5	6.5	7.3	0.83	388/388	2126/2126	691/691	541/538	800/800
	380/60/3	1	2	16	1.5	3.5	3.7	0.83	235/235	1306/1306	424/424	587	800
	380/60/3	2	2	8/8	1.5	3.5	3.7	0.83	235/235	1306/1306	424/424	324/322	500/500
	460/60/3	1	2	16	1.5	3	3.7	0.83	194/194	1065/1065	346/346	488	600
	460/60/3	2	2	8/8	1.5	3	3.7	0.83	194/194	1065/1065	346/346	269/267	450/450
	575/60/3	1	2	7/4	1.5	2.5	3.7	0.83	155/155	853/853	277/277	393	500
	575/60/3	2	2	8/8	1.5	2.5	3.7	0.83	155/155	853/853	277/277	216/215	350/350
	400/50/3	1	3	16	1.5	2.8	3.7	1.2	132-132/189	896-896/1089	291-291/354	552	700
	400/50/3	2	3	10/6	1.5	2.8	3.7	1.2	132-132/189	896-896/1089	291-291/354	329/256	450/400

Installation - Electrical

Table 36. High efficiency - standard and low ambient options (continued)

Unit Size	Rated Voltage ¹	# Power Conn ²	# Comp	# Fan Ckt1/ Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/ Ckt2	MOP ⁷ Ckt1/ Ckt2
275	200/60/3	1							n/a				
	200/60/3	2	3	12/6	1.5	6.5	7.3	1.2	305-305/373	2156-2156/2525	701-701/821	770/510	1000/800
	230/60/3	1							n/a				
	230/60/3	2	3	12/6	1.5	6.5	7.3	1.2	265-265/324	1756-1756/2126	571-571/691	679/448	800/700
	380/60/3	1							n/a				
	380/60/3	2	3	12/6	1.5	3.5	3.7	1.2	161-161/196	1060-1060/1306	345-345/424	407/268	500/450
	460/60/3	1	3	18	1.5	3	3.7	1.2	133-133/162	878-878/1065	285-285/346	528	600
	460/60/3	2	3	12/6	1.5	3	3.7	1.2	133-133/162	878-878/1065	285-285/346	338/223	450/350
	575/60/3	1	3	18	1.5	2.5	3.7	1.2	106-106/130	705-705/853	229-229/277	426	500
	575/60/3	2	3	12/6	1.5	2.5	3.7	1.2	106-106/130	705-705/853	229-229/277	272/180	350/300
	400/50/3	1	3	18	1.5	3	3.7	1.2	133-133/162	878-878/1065	285-285/346	528	600
	400/50/3	2	3	12/6	1.5	3	3.7	1.2	133-133/162	878-878/1065	285-285/346	338/223	450/350
300	200/60/3	1							n/a				
	200/60/3	2	3	14/6	1.5	6.5	7.3	1.2	373-373/373	2525-2525/2525	821-821/821	936/510	1200/800
	230/60/3	1							n/a				
	230/60/3	2	3	14/6	1.5	6.5	7.3	1.2	324-324/324	2126-2126/2126	691-691/691	825/448	1000/700
	380/60/3	1							n/a				
	380/60/3	2	3	14/6	1.5	3.5	3.7	1.2	196-196/196	1306-1306/1306	424-424/424	493/268	600/450
	460/60/3	1	3	20	1.5	3	3.7	1.2	162-162/162	1065-1065/1065	346-346/346	592	700
	460/60/3	2	3	14/6	1.5	3	3.7	1.2	162-162/162	1065-1065/1065	346-346/346	410/223	500/350
	575/60/3	1	3	20	1.5	2.5	3.7	1.2	130-130/130	853-853/853	277-277/277	479	600
	575/60/3	2	3	14/6	1.5	2.5	3.7	1.2	130-130/130	853-853/853	277-277/277	331/180	450/300
	400/50/3	1							n/a				
	400/50/3	2	3	14/6	1.5	6.5	7.3	1.2	324-324/324	2126-2126/2126	691-691/691	825/448	1000/700
350	200/60/3	1							n/a				
	200/60/3	2	4	12/12	1.5	6.5	7.3	1.2	305-305/305-305	2156-2156/2156-2156	701-701/701-701	770/770	1000/1000
	230/60/3	1							n/a				
	230/60/3	2	4	12/12	1.5	6.5	7.3	1.2	265-265/265-265	1756-1756/1756-1756	571-571/571-571	679/679	800/800
	380/60/3	1							n/a				
	380/60/3	2	4	14/6	1.5	3.5	3.7	1.2	196-196/196-196	1306-1306/1306-1306	424-424/424-424	493/268	600/450
	460/60/3	1	4	20	1.5	3	3.7	1.2	162-162/162-162	1065-1065/1065-1065	346-346/346-346	592	700
	460/60/3	2	4	14/6	1.5	3	3.7	1.2	162-162/162-162	1065-1065/1065-1065	346-346/346-346	410/223	500/350
	575/60/3	1	4	20	1.5	2.5	3.7	1.2	130-130/130-130	853-853/853-853	277-277/277-277	479	600
	575/60/3	2	4	14/6	1.5	2.5	3.7	1.2	130-130/130-130	853-853/853-853	277-277/277-277	331/180	450/300
	400/50/3	1	4	20	1.5	2.8	3.7	1.2	189-189/189-189	1089-1089/1089-1089	354-354/354-354	677	800
	400/50/3	2	4	14/6	1.5	2.8	3.7	1.2	189-189/189-189	1089-1089/1089-1089	354-354/354-354	468/256	600/400
375	400/50/3	1	4	26	1.5	2.8	3.7	1.59	189-189/160-160	1089-1089/1089-1089	354-354/354-354	826	1000
	400/50/3	2	4	14/12	1.5	2.8	3.7	1.59	189-189/160-160	1089-1089/1089-1089	354-354/354-354	468/398	600/500



Installation - Electrical

Table 36. High efficiency - standard and low ambient options (continued)

Unit Size	Rated Voltage ¹	# Power Conn ²	# Comp	# Fan Ckt1/Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/Ckt2	MOP ⁷ Ckt1/Ckt2
	200/60/3	1							n/a				
	200/60/3	2	4	14/14	1.5	6.5	7.3	1.59	373-373/ 373-373	2525-2525/ 2525-2525	821-821/ 821-821	936/936	1200/1200
	230/60/3	1							n/a				
	230/60/3	2	4	14/14	1.5	6.5	7.3	1.59	324-324/ 324-324	2126-2126/ 2126-2126	691-691/ 691-691	825/825	1000/1000
	380/60/3	1							n/a				
	380/60/3	2	4	14/14	1.5	3.5	3.7	1.59	196-196/ 196-196	1306-1306/ 1306-1306	424-424/ 424-424	493/493	600/600
400	460/60/3	1	4	28	1.5	3	3.7	1.59	162-162/162- 162	1065-1065/ 1065-1065	346-346/ 346-346	779	900
	460/60/3	2	4	14/14	1.5	3	3.7	1.59	162-162/ 162-162	1065-1065/ 1065-1065	346-346/3 46-346	410/410	500/500
	575/60/3	1	4	28	1.5	2.5	3.7	1.59	130-130/ 130-130	853-853/ 853-853	277-277/ 277-277	630	700
	575/60/3	2	4	14/14	1.5	2.5	3.7	1.59	130-130/ 130-130	853-853/ 853-853	277-277/ 277-277	331/331	450/450
	400/50/3	1	4	28	1.5	2.8	3.7	1.59	189-189/ 189-189	1089-1089/ 1089-1089	354-354/ 354-354	889	1000
	400/50/3	2	4	14/14	1.5	2.8	3.7	1.59	189-189/ 189-189	1089-1089/ 1089-1089	354-354/ 354-354	468/468	600/600

Notes:

1. Voltage Utilization Range: +/- 10% of rated voltage. Rated voltage (use range): 200/60/3 (180-220), 230/60/3 (208-254), 380/60/3 (342-418), 460/60/3 (414-506), 575/60/3 (516-633)
2. As standard, 140-250 ton (60 Hz) units and 140-200 ton (50Hz) units have a single point power connection. Optional dual point power connections are available. As standard, 275-500 ton (60Hz) units and 250-400 ton (50Hz) units have dual point power connections. Optional single point power connections are available on 460V and 575V/60 Hz and 400V/50 Hz units.
3. Control VA includes operational controls only. It does not include evaporator heaters.
4. RLA - Rated Load Amps
5. XLRA - Locked Rotor Amps - based on full winding (x-line) start units). YLRA for Wye-delta starters is ~1/3 of LRA of x-line units.
6. MCA - Minimum Circuit Ampacity - 125 percent of largest compressor RLA plus 100 percent of all other loads.
7. Max fuse or MOPD = 225 percent of the largest compressor RLA plus 100 percent of the second compressor RLA, plus the sum of the condenser fan FLA. (Use FLA per circuit, NOT FLA for the entire unit).
8. A separate 115/60/1, 20 amp or 220/50/1, 15 amp customer provided power connection is required to power the evaporator heaters (1640 watts).
9. Local codes may take precedence.

Table 37. High efficiency - high and wide ambient options

Unit Size	Rated Voltage ¹	# Power Conn ²	# Comp	# Fan Ckt1/Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/Ckt2	MOP ⁷ Ckt1/Ckt2
120	400/50/3	1	2	8	1.5	2.8	3.7	0.83	118/118	796/796	259/259	292	400
	400/50/3	2	2	4/4	1.5	2.8	3.7	0.83	118/118	796/796	259/259	162/160	250/250
130	400/50/3	1	2	9	1.5	2.8	3.7	0.83	138/118	896/796	291/259	320	450
	400/50/3	2	2	5/4	1.5	2.8	3.7	0.83	138/118	896/796	291/259	189/160	300/250
140	200/60/3	1	2	10	1.5	6.5	7.3	0.83	270/270	1845/1845	600/600	678	800
	200/60/3	2	2	5/5	1.5	6.5	7.3	0.83	270/270	1845/1845	600/600	375/371	600/600
	230/60/3	1	2	10	1.5	6.5	7.3	0.83	235/235	1556/1556	506/506	599	800
	230/60/3	2	2	5/5	1.5	6.5	7.3	0.83	235/235	1556/1556	506/506	331/327	500/500
	380/60/3	1	2	10	1.5	3.5	3.7	0.83	142/142	973/973	316/316	357	450
	380/60/3	2	2	5/5	1.5	3.5	3.7	0.83	142/142	973/973	316/316	197/195	300/300
	460/60/3	1	2	10	1.5	3	3.7	0.83	118/118	774/774	252/252	299	400
	460/60/3	2	2	5/5	1.5	3	3.7	0.83	118/118	774/774	252/252	165/163	250/250
	575/60/3	1	2	10	1.5	2.5	3.7	0.83	94/94	631/631	205/205	240	300
	575/60/3	2	2	5/5	1.5	2.5	3.7	0.83	94/94	631/631	205/205	133/131	225/225
	400/50/3	1	2	10	1.5	2.8	3.7	0.83	138/138	896/896	291/291	342	450
	400/50/3	2	2	5/5	1.5	2.8	3.7	0.83	138/138	896/896	291/291	189/187	300/300

Installation - Electrical

Table 37. High efficiency - high and wide ambient options (continued)

Unit Size	Rated Voltage ¹	# Power Conn ²	# Comp	# Fan Ckt1/Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/Ckt2	MOP ⁷ Ckt1/Ckt2
155	200/60/3	1	2	11	1.5	6.5	7.3	0.83	320/270	2156/1845	701/600	747	1000
	200/60/3	2	2	6/5	1.5	6.5	7.3	0.83	320/270	2156/1845	701/600	444/371	700/600
	230/60/3	1	2	11	1.5	6.5	7.3	0.83	278/235	1756/1556	571/506	659	800
	230/60/3	2	2	6/5	1.5	6.5	7.3	0.83	278/235	1756/1556	571/506	391/327	600/500
	380/60/3	1	2	11	1.5	3.5	3.7	0.83	168/142	1060/973	345/316	393	500
	380/60/3	2	2	6/5	1.5	3.5	3.7	0.83	168/142	1060/973	345/316	233/195	400/300
	460/60/3	1	2	11	1.5	3	3.7	0.83	139/118	878/774	285/252	328	450
	460/60/3	2	2	6/5	1.5	3	3.7	0.83	139/118	878/774	285/252	194/163	300/250
	575/60/3	1	2	11	1.5	2.5	3.7	0.83	111/94	705/631	229/205	264	350
	575/60/3	2	2	6/5	1.5	2.5	3.7	0.83	111/94	705/631	229/205	156/131	250/200
	400/50/3	1	2	11	1.5	2.8	3.7	0.83	168/138	1089/896	354/291	383	500
	400/50/3	2	2	6/5	1.5	2.8	3.7	0.83	168/138	1089/896	354/291	230/187	350/300
170	200/60/3	1	2	12	1.5	6.5	7.3	0.83	320/320	2156/2156	701/701	804	1000
	200/60/3	2	2	6/6	1.5	6.5	7.3	0.83	320/320	2156/2156	701/701	444/440	700/700
	230/60/3	1	2	12	1.5	6.5	7.3	0.83	278/278	1756/1756	571/571	709	800
	230/60/3	2	2	6/6	1.5	6.5	7.3	0.83	278/278	1756/1756	571/571	391/387	600/600
	380/60/3	1	2	12	1.5	3.5	3.7	0.83	168/168	1060/1060	345/345	423	500
	380/60/3	2	2	6/6	1.5	3.5	3.7	0.83	168/168	1060/1060	345/345	233/231	400/350
	460/60/3	1	2	12	1.5	3	3.7	0.83	139/139	878/878	285/285	352	450
	460/60/3	2	2	6/6	1.5	3	3.7	0.83	139/139	878/878	285/285	194/192	300/300
	575/60/3	1	2	12	1.5	2.5	3.7	0.83	111/111	705/705	229/229	284	350
	575/60/3	2	2	6/6	1.5	2.5	3.7	0.83	111/111	705/705	229/229	156/155	250/250
	400/50/3	1	2	12	1.5	2.8	3.7	0.83	168/168	1089/1089	354/354	415	500
	400/50/3	2	2	6/6	1.5	2.8	3.7	0.83	168/168	1089/1089	354/354	230/228	350/350
185	200/60/3	1	2	13	1.5	6.5	7.3	0.83	386/320	2525/2156	821/701	893	1200
	200/60/3	2	2	7/6	1.5	6.5	7.3	0.83	386/320	2525/2156	821/701	533/440	800/700
	230/60/3	1	2	13	1.5	6.5	7.3	0.83	336/278	2126/1756	691/571	788	1000
	230/60/3	2	2	7/6	1.5	6.5	7.3	0.83	336/278	2126/1756	691/571	470/387	800/600
	380/60/3	1	2	13	1.5	3.5	3.7	0.83	203/168	1306/1060	424/345	470	600
	380/60/3	2	2	7/6	1.5	3.5	3.7	0.83	203/168	1306/1060	424/345	281/231	450/350
	460/60/3	1	2	13	1.5	3	3.7	0.83	168/139	1065/878	346/285	391	500
	460/60/3	2	2	7/6	1.5	3	3.7	0.83	168/139	1065/878	346/285	233/192	400/300
	575/60/3	1	2	13	1.5	2.5	3.7	0.83	134/111	853/705	277/229	315	450
	575/60/3	2	2	7/6	1.5	2.5	3.7	0.83	134/111	853/705	277/229	188/155	300/250
	400/50/3	1	2	13	1.5	2.8	3.7	0.83	198/168	1089/1089	354/354	456	600
	400/50/3	2	2	7/6	1.5	2.8	3.7	0.83	198/168	1089/1089	354/354	270/228	450/350
200	200/60/3	1	2	14	1.5	6.5	7.3	0.83	386/386	2525/2525	821/821	965	1200
	200/60/3	2	2	7/7	1.5	6.5	7.3	0.83	386/386	2525/2525	821/821	533/529	800/800
	230/60/3	1	2	14	1.5	6.5	7.3	0.83	336/336	2126/2126	691/691	852	1000
	230/60/3	2	2	7/7	1.5	6.5	7.3	0.83	336/336	2126/2126	691/691	470/466	800/800
	380/60/3	1	2	14	1.5	3.5	3.7	0.83	203/203	1306/1306	424/424	508	700
	380/60/3	2	2	7/7	1.5	3.5	3.7	0.83	203/203	1306/1306	424/424	281/278	450/450
	460/60/3	1	2	14	1.5	3	3.7	0.83	168/168	1065/1065	346/346	423	500
	460/60/3	2	2	7/7	1.5	3	3.7	0.83	168/168	1065/1065	346/346	233/232	400/350
	575/60/3	1	2	14	1.5	2.5	3.7	0.83	134/134	853/853	277/277	340	450
	575/60/3	2	2	7/7	1.5	2.5	3.7	0.83	134/134	853/853	277/277	188/186	300/300
	400/50/3	1	2	14	1.5	2.8	3.7	0.83	198/198	1089/1089	354/354	489	600
	400/50/3	2	2	7/7	1.5	2.8	3.7	0.83	198/198	1089/1089	354/354	270/268	450/450



Installation - Electrical

Table 37. High efficiency - high and wide ambient options (continued)

Unit Size	Rated Voltage ¹	# Power Conn ²	# Comp	# Fan Ckt1/Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/Ckt2	MOP ⁷ Ckt1/Ckt2
225	200/60/3	1	2	14	1.5	6.5	7.3	0.83	459/386	2525/2525	821/821	1056	1200
	200/60/3	2	2	8/6	1.5	6.5	7.3	0.83	459/386	2525/2525	821/821	631/522	1000/800
	230/60/3	1	2	14	1.5	6.5	7.3	0.83	399/336	2126/2126	691/691	931	1200
	230/60/3	2	2	8/6	1.5	6.5	7.3	0.83	399/336	2126/2126	691/691	555/460	800/700
	380/60/3	1	2	14	1.5	3.5	3.7	0.83	242/203	1306/1306	424/424	557	700
	380/60/3	2	2	8/6	1.5	3.5	3.7	0.83	242/203	1306/1306	424/424	333/275	500/450
	460/60/3	1	2	14	1.5	3	3.7	0.83	200/168	1065/1065	346/346	463	600
	460/60/3	2	2	8/6	1.5	3	3.7	0.83	200/168	1065/1065	346/346	276/229	450/350
	575/60/3	1	2	14	1.5	2.5	3.7	0.83	160/134	853/853	277/277	373	500
	575/60/3	2	2	8/6	1.5	2.5	3.7	0.83	160/134	853/853	277/277	223/184	350/300
250	200/60/3	1	2	16	1.5	6.5	7.3	0.83	459/459	2525/2525	821/821	1142	1200
	200/60/3	2	2	8/8	1.5	6.5	7.3	0.83	459/459	2525/2525	821/821	631/627	1000/1000
	230/60/3	1	2	16	1.5	6.5	7.3	0.83	399/399	2126/2126	691/691	1007	1200
	230/60/3	2	2	8/8	1.5	6.5	7.3	0.83	399/399	2126/2126	691/691	555/552	800/800
	380/60/3	1	2	16	1.5	3.5	3.7	0.83	242/242	1306/1306	424/424	603	800
	380/60/3	2	2	8/8	1.5	3.5	3.7	0.83	242/242	1306/1306	424/424	333/331	500/500
	460/60/3	1	2	16	1.5	3	3.7	0.83	200/200	1065/1065	346/346	501	700
	460/60/3	2	2	8/8	1.5	3	3.7	0.83	200/200	1065/1065	346/346	276/275	450/450
	575/60/3	1	2	16	1.5	2.5	3.7	0.83	160/160	853/853	277/277	404	500
	575/60/3	2	2	8/8	1.5	2.5	3.7	0.83	160/160	853/853	277/277	223/221	350/350
	400/50/3	1	3	16	1.5	2.8	3.7	1.2	138-138/198	896-896/1089	291-291/354	575	700
	400/50/3	2	3	10/6	1.5	2.8	3.7	1.2	138-138/198	896-896/1089	291-291/354	342/267	450/450
275	200/60/3	1							n/a				
	200/60/3	2	3	12/6	1.5	6.5	7.3	1.2	320-320/386	2156-2156/2525	701-701/821	804/526	1000/800
	230/60/3	1							n/a				
	230/60/3	2	3	12/6	1.5	6.5	7.3	1.2	278-278/336	1756-1756/2126	571-571/691	709/463	800/700
	380/60/3	1							n/a				
	380/60/3	2	3	12/6	1.5	3.5	3.7	1.2	168-168/203	1060-1060/1306	345-345/424	423/277	500/450
	460/60/3	1	3	18	1.5	3	3.7	1.2	139-139/168	878-878/1065	285-285/346	548	700
	460/60/3	2	3	12/6	1.5	3	3.7	1.2	139-139/168	878-878/1065	285-285/346	352/231	450/350
	575/60/3	1	3	18	1.5	2.5	3.7	1.2	111-111/134	705-705/853	229-229/277	441	500
	575/60/3	2	3	12/6	1.5	2.5	3.7	1.2	111-111/134	705-705/853	229-229/277	284/185	350/300
	400/50/3	1	3	18	1.5	2.8	3.7	1.2	168-168/198	1089-1089/1089	354-354/354	641	800
	400/50/3	2	3	12/6	1.5	2.8	3.7	1.2	168-168/198	1089-1089/1089	354-354/354	416/267	500/450
300	200/60/3	1							n/a				
	200/60/3	2	3	14/6	1.5	6.5	7.3	1.2	386-386/386	2525-2525/2525	821-821/821	965/526	1200/800
	230/60/3	1							n/a				
	230/60/3	2	3	14/6	1.5	6.5	7.3	1.2	336-336/336	2126-2126/2126	691-691/691	852/463	1000/700
	380/60/3	1							n/a				
	380/60/3	2	3	14/6	1.5	3.5	3.7	1.2	203-203/203	1306-1306/1306	424-424/424	508/277	700/450
	460/60/3	1	3	20	1.5	3	3.7	1.2	168-168/168	1065-1065/1065	346-346/346	612	700
	460/60/3	2	3	14/6	1.5	3	3.7	1.2	168-168/168	1065-1065/1065	346-346/346	423/231	500/350
	575/60/3	1	3	20	1.5	2.5	3.7	1.2	134-134/134	853-853/853	277-277/277	492	600
	575/60/3	2	3	14/6	1.5	2.5	3.7	1.2	134-134/134	853-853/853	277-277/277	340/185	450/300
	400/50/3	1	3	20	1.5	2.8	3.7	1.2	198-198/198	1089-1089/1089	354-354/354	706	900
	400/50/3	2	3	14/6	1.5	2.8	3.7	1.2	198-198/198	1089-1089/1089	354-354/354	489/267	600/450

Installation - Electrical

Table 37. High efficiency - high and wide ambient options (continued)

Unit Size	Rated Voltage ¹	# Power Conn ²	# Comp	# Fan Ckt1/ Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/ Ckt2	MOP ⁷ Ckt1/ Ckt2
350	200/60/3	1							n/a				
	200/60/3	2	4	12/12	1.5	6.5	7.3	1.2	320-320/ 320-320	2156-2156/ 2156-2156	701-701/ 701-701	804/804	1000/1000
	230/60/3	1							n/a				
	230/60/3	2	4	12/12	1.5	6.5	7.3	1.2	278-278/ 278-278	1756-1756/ 1756-1756	571-571/ 571-571	709/709	800/800
	380/60/3	1							n/a				
	380/60/3	2	4	12/12	1.5	3.5	3.7	1.2	168-168/ 168-168	1060-1060/ 1060-1060	345-345/ 345-345	423/423	500/500
	460/60/3	1	4	24	1.5	3	3.7	1.2	139-139/ 139-139	878-878/ 878-878	285-285/ 285-285	669	800
	460/60/3	2	4	12/12	1.5	3	3.7	1.2	139-139/ 139-139	878-878/ 878-878	285-285/ 285-285	352/352	450/450
	575/60/3	1	4	24	1.5	2.5	3.7	1.2	111-111/ 111-111	705-705/ 705-705	229-229/ 229-229	539	600
	575/60/3	2	4	12/12	1.5	2.5	3.7	1.2	111-111/ 111-111	705-705/ 705-705	229-229/ 229-229	284/284	350/350
	400/50/3	1	4	24	1.5	2.8	3.7	1.59	168-168/168- 168	1089-1089/ 1089-1089	354-354/ 354-354	789	900
	400/50/3	2	4	12/12	1.5	2.8	3.7	1.59	168-168/ 168-168	1089-1089/ 1089-1089	354-354/ 354-354	416/416	500/500
375	400/50/3	1	4	26	1.5	2.8	3.7	1.59	198-198/ 168-168	1089-1089/ 1089-1089	354-354/ 354-354	862	1000
	400/50/3	2	4	14/12	1.5	2.8	3.7	1.59	198-198/ 168-168	1089-1089/ 1089-1089	354-354/ 354-354	489/416	600/500
400	200/60/3	1							n/a				
	200/60/3	2	4	14/14	1.5	6.5	7.3	1.59	386-386/ 386-386	2525-2525/ 2525-2525	821-821/ 821-821	965/965	1200/1200
	230/60/3	1							n/a				
	230/60/3	2	4	14/14	1.5	6.5	7.3	1.59	336-336/ 336-336	2126-2126/ 2126-2126	691-691/ 691-691	852/852	1000/1000
	200/60/3	1							n/a				
	380/60/3	2	4	14/14	1.5	3.5	3.7	1.59	203-203/ 203-203	1306-1306/ 1306-1306	424-424/ 424-424	508/508	700/700
	460/60/3	1	4	28	1.5	3	3.7	1.59	168-168/ 168-168	1065-1065/ 1065-1065	346-346/ 346-346	804	900
	460/60/3	2	4	14/14	1.5	3	3.7	1.59	168-168/ 168-168	1065-1065/ 1065-1065	346-346/ 346-346	423/423	500/500
	575/60/3	1	4	28	1.5	2.5	3.7	1.59	134-134/ 134-134	853-853/853- 853	277-277/ 277-277	647	700
	575/60/3	2	4	14/14	1.5	2.5	3.7	1.59	134-134/ 134-134	853-853/853- 853	277-277/ 277-277	340/340	450/450
	400/50/3	1	4	28	1.5	2.8	3.7	1.59	198-198/ 198-198	1089-1089/ 1089-1089	354-354/ 354-354	928	1000
	400/50/3	2	4	14/14	1.5	2.8	3.7	1.59	198-198/ 198-198	1089-1089/ 1089-1089	354-354/ 354-354	489/489	600/600

Notes:

1. Voltage Utilization Range: +/- 10% of rated voltage. Rated voltage (use range): 200/60/3 (180-220), 230/60/3 (208-254), 380/60/3 (342-418), 460/60/3 (414-506), 575/60/3 (516-633)
2. As standard, 140-250 ton (60 Hz) units and 140-200 ton (50Hz) units have a single point power connection. Optional dual point power connections are available. As standard, 275-500 ton (60Hz) units and 250-400 ton (50Hz) units have dual point power connections. Optional single point power connections are available on 460V and 575V/60 Hz and 400V/50 Hz units.
3. Control VA includes operational controls only. It does not include evaporator heaters.
4. RLA - Rated Load Amps
5. XLRA - Locked Rotor Amps - based on full winding (x-line) start units). YLRA for Wye-delta starters is ~1/3 of LRA of x-line units.
6. MCA - Minimum Circuit Ampacity - 125 percent of largest compressor RLA plus 100 percent of all other loads.
7. Max fuse or MOPD = 225 percent of the largest compressor RLA plus 100 percent of the second compressor RLA, plus the sum of the condenser fan FLA. (Use FLA per circuit, NOT FLA for the entire unit).
8. A separate 115/60/1, 20 amp or 220/50/1, 15 amp customer provided power connection is required to power the evaporator heaters (1640 watts).
9. Local codes may take precedence.



Installation - Electrical

Table 38. Extra efficiency - high and wide ambient options

Unit Size	Rated Voltage ¹	# Power Conn ²	# Comp	# Fan Ckt1/Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/Ckt2	MOP ⁷ Ckt1/Ckt2
140	200/60/3	1	2	12	1.5	6.5	7.3	0.83	270/270	1845/1845	600/600	691	800
	200/60/3	2	2	6/6	1.5	6.5	7.3	0.83	270/270	1845/1845	600/600	381/381	600/600
	230/60/3	1	2	12	1.5	6.5	7.3	0.83	235/235	1556/1556	506/506	612	800
	230/60/3	2	2	6/6	1.5	6.5	7.3	0.83	235/235	1556/1556	506/506	337/337	500/500
	380/60/3	1	2	12	1.5	3.5	3.7	0.83	142/142	973/973	316/316	364	500
	380/60/3	2	2	6/6	1.5	3.5	3.7	0.83	142/142	973/973	316/316	201/201	300/300
	460/60/3	1	2	12	1.5	3	3.7	0.83	118/118	774/774	252/252	305	400
	460/60/3	2	2	6/6	1.5	3	3.7	0.83	118/118	774/774	252/252	168/168	250/250
	575/60/3	1	2	12	1.5	2.5	3.7	0.83	94/94	631/631	205/205	245	300
	575/60/3	2	2	6/6	1.5	2.5	3.7	0.83	94/94	631/631	205/205	135/135	225/225
155	200/60/3	1	2	13	1.5	6.5	7.3	0.83	320/270	2156/1845	701/600	760	1000
	200/60/3	2	2	7/6	1.5	6.5	7.3	0.83	320/270	2156/1845	701/600	450/381	700/600
	230/60/3	1	2	13	1.5	6.5	7.3	0.83	278/235	1756/1556	571/506	672	800
	230/60/3	2	2	7/6	1.5	6.5	7.3	0.83	278/235	1756/1556	571/506	397/337	600/500
	380/60/3	1	2	13	1.5	3.5	3.7	0.83	168/142	1060/973	345/316	400	500
	380/60/3	2	2	7/6	1.5	3.5	3.7	0.83	168/142	1060/973	345/316	237/201	400/300
	460/60/3	1	2	13	1.5	3	3.7	0.83	139/118	878/774	285/252	334	450
	460/60/3	2	2	7/6	1.5	3	3.7	0.83	139/118	878/774	285/252	197/168	300/250
	575/60/3	1	2	13	1.5	2.5	3.7	0.83	111/94	705/631	229/205	269	350
	575/60/3	2	2	7/6	1.5	2.5	3.7	0.83	111/94	705/631	229/205	159/135	250/225
170	200/60/3	1	2	14	1.5	6.5	7.3	0.83	320/320	2156/2156	701/701	817	1000
	200/60/3	2	2	7/7	1.5	6.5	7.3	0.83	320/320	2156/2156	701/701	450/450	700/700
	230/60/3	1	2	14	1.5	6.5	7.3	0.83	278/278	1756/1756	571/571	722	800
	230/60/3	2	2	7/7	1.5	6.5	7.3	0.83	278/278	1756/1756	571/571	397/397	600/600
	380/60/3	1	2	14	1.5	3.5	3.7	0.83	168/168	1060/1060	345/345	430	500
	380/60/3	2	2	7/7	1.5	3.5	3.7	0.83	168/168	1060/1060	345/345	237/237	400/400
	460/60/3	1	2	14	1.5	3	3.7	0.83	139/139	878/878	285/285	358	450
	460/60/3	2	2	7/7	1.5	3	3.7	0.83	139/139	878/878	285/285	197/197	300/300
	575/60/3	1	2	14	1.5	2.5	3.7	0.83	111/111	705/705	229/229	289	350
	575/60/3	2	2	7/7	1.5	2.5	3.7	0.83	111/111	705/705	229/229	159/159	250/250
185	200/60/3	1	2	14	1.5	6.5	7.3	0.83	386/320	2525/2156	821/701	899	1200
	200/60/3	2	2	8/6	1.5	6.5	7.3	0.83	386/320	2525/2156	821/701	539/444	800/700
	230/60/3	1	2	14	1.5	6.5	7.3	0.83	336/278	2126/1756	691/571	794	1000
	230/60/3	2	2	8/6	1.5	6.5	7.3	0.83	336/278	2126/1756	691/571	476/391	800/600
	380/60/3	1	2	14	1.5	3.5	3.7	0.83	203/168	1306/1060	424/345	473	600
	380/60/3	2	2	8/6	1.5	3.5	3.7	0.83	203/168	1306/1060	424/345	284/233	450/400
	460/60/3	1	2	14	1.5	3	3.7	0.83	168/139	1065/878	346/285	394	500
	460/60/3	2	2	8/6	1.5	3	3.7	0.83	168/139	1065/878	346/285	237/194	400/300
	575/60/3	1	2	14	1.5	2.5	3.7	0.83	134/111	853/705	277/229	317	450
	575/60/3	2	2	8/6	1.5	2.5	3.7	0.83	134/111	853/705	277/229	190/156	300/250

Installation - Electrical

Table 38. Extra efficiency - high and wide ambient options (continued)

Unit Size	Rated Voltage ¹	# Power Conn ²	# Comp	# Fan Ckt1/ Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/ Ckt2	MOP ⁷ Ckt1/ Ckt2
200	200/60/3	1	2	16	1.5	6.5	7.3	0.83	386/386	2525/2525	821/821	978	1200
	200/60/3	2	2	8/8	1.5	6.5	7.3	0.83	386/386	2525/2525	821/821	539/539	800/800
	230/60/3	1	2	16	1.5	6.5	7.3	0.83	336/336	2126/2126	691/691	865	1200
	230/60/3	2	2	8/8	1.5	6.5	7.3	0.83	336/336	2126/2126	691/691	476/476	800/800
	380/60/3	1	2	16	1.5	3.5	3.7	0.83	203/203	1306/1306	424/424	515	700
	380/60/3	2	2	8/8	1.5	3.5	3.7	0.83	203/203	1306/1306	424/424	284/284	450/450
	460/60/3	1	2	16	1.5	3	3.7	0.83	168/168	1065/1065	346/346	429	500
	460/60/3	2	2	8/8	1.5	3	3.7	0.83	168/168	1065/1065	346/346	237/237	400/400
	575/60/3	1	2	16	1.5	2.5	3.7	0.83	134/134	853/853	277/277	345	450
	575/60/3	2	2	8/8	1.5	2.5	3.7	0.83	134/134	853/853	277/277	190/190	300/300
250	200/60/3	1							NA				
	200/60/3	2	3	12/6	1.5	6.5	7.3	1.2	270-270/320	1845-1845/ 2156	600-600/701	693/446	800/700
	230/60/3	1							NA				
	230/60/3	2	3	12/6	1.5	6.5	7.3	1.2	235-235/278	1556-1556/ 1756	506-506/571	614/393	800/600
	380/60/3	1							NA				
	380/60/3	2	3	12/6	1.5	3.5	3.7	1.2	142-142/168	973-973/1060	316-316/345	365/234	500/400
	460/60/3	1	3	18	1.5	3	3.7	1.2	118-118/139	774-774/878	252-252/285	468	600
	460/60/3	2	3	12/6	1.5	3	3.7	1.2	118-118/139	774-774/878	252-252/285	306/195	400/300
	575/60/3	1	3	18	1.5	2.5	3.7	1.2	94-94/111	631-631/705	205-205/229	377	450
	575/60/3	2	3	12/6	1.5	2.5	3.7	1.2	94-94/111	631-631/705	205-205/229	246/157	300/250
275	200/60/3	1							NA				
	200/60/3	2	3	14/6	1.5	6.5	7.3	1.2	320-320/320	2156-2156/ 2156	701-701/701	819/446	1000/700
	230/60/3	1							NA				
	230/60/3	2	3	14/6	1.5	6.5	7.3	1.2	278-278/278	1756-1756/ 1756	571-571/571	723/393	1000/600
	380/60/3	1							NA				
	380/60/3	2	3	14/6	1.5	3.5	3.7	1.2	168-168/168	1060-1060/ 1060	345-345/345	431/234	500/400
	460/60/3	1	3	20	1.5	3	3.7	1.2	139-139/139	878-878/878	285-285/285	516	600
	460/60/3	2	3	14/6	1.5	3	3.7	1.2	139-139/139	878-878/878	285-285/285	359/195	450/300
	575/60/3	1	3	20	1.5	2.5	3.7	1.2	111-111/111	705-705/705	229-229/229	416	500
	575/60/3	2	3	14/6	1.5	2.5	3.7	1.2	111-111/111	705-705/705	229-229/229	289/157	400/250
300	200/60/3	1							NA				
	200/60/3	2	4	12/12	1.5	6.5	7.3	1.2	270-270/ 270-270	1845-1845/ 1845-1845	600-600/ 600-600	693/693	800/800
	230/60/3	1							NA				
	230/60/3	2	4	12/12	1.5	6.5	7.3	1.2	235-235/ 235-235	1556-1556/ 1556-1556	506-506/ 506-506	614/614	800/800
	380/60/3	1							NA				
	380/60/3	2	4	12/12	1.5	3.5	3.7	1.2	142-142/ 142-142	973-973/ 973-973	316-316/ 316-316	365/365	500/500
	460/60/3	1	4	24	1.5	3	3.7	1.2	118-118/ 118-118	774-774/ 774-774	252-252/ 252-252	579	600
	460/60/3	2	4	12/12	1.5	3	3.7	1.2	118-118/ 118-118	774-774/ 774-774	252-252/ 252-252	306/306	400/400
	575/60/3	1	4	24	1.5	2.5	3.7	1.2	94-94/ 94-94	631-631/ 631-631	205-205/ 205-205	466	500
	575/60/3	2	4	12/12	1.5	2.5	3.7	1.2	94-94/ 94-94	631-631/ 631-631	205-205/ 205-205	246/246	300/300



Installation - Electrical

Table 38. Extra efficiency - high and wide ambient options (continued)

Unit Size	Rated Voltage ¹	# Power Conn ²	# Comp	# Fan Ckt1/Ckt2	Fan kW	Fan FLA	VFD Input	Cntrl VA ³	RLA ⁴ Ckt1/Ckt2	XLRA ⁵ Ckt1/Ckt2	YLRA ⁵ Ckt1/Ckt2	MCA ⁶ Ckt1/Ckt2	MOP ⁷ Ckt1/Ckt2
	200/60/3	1										NA	
	200/60/3	2	4	14/14	1.5	6.5	7.3	1.59	320-320/ 320-320	2156-2156/ 2156-2156	701-701/ 701-701	821/821	1000/1000
	230/60/3	1										NA	
	230/60/3	2	4	14/14	1.5	6.5	7.3	1.59	278-278/ 278-278	1756-1756/ 1756-1756	571-571/ 571-571	725/725	1000/1000
	380/60/3	1										NA	
350	380/60/3	2	4	14/14	1.5	3.5	3.7	1.59	168-168/ 168-168	1060-1060/ 1060-1060	345-345/ 345-345	432/432	500/500
	460/60/3	1	4	28	1.5	3	3.7	1.59	139-139/ 139-139	878-878/ 878-878	285-285/ 285-285	681	800
	460/60/3	2	4	14/14	1.5	3	3.7	1.59	139-139/ 139-139	878-878/ 878-878	285-285/ 285-285	360/360	450/450
	575/60/3	1	4	28	1.5	2.5	3.7	1.59	111-111/ 111-111	705-705/ 705-705	229-229/ 229-229	549	600
	575/60/3	2	4	14/14	1.5	2.5	3.7	1.59	111-111/ 111-111	705-705/ 705-705	229-229/ 229-229	290/290	400/400

Notes:

1. Voltage Utilization Range: +/- 10% of rated voltage. Rated voltage (use range): 200/60/3 (180-220), 230/60/3 (208-254), 380/60/3 (342-418), 460/60/3 (414-506), 575/60/3 (516-633)
2. As standard, 140-250 ton (60 Hz) units have a single point power connection. Optional dual point power connections are available. As standard, 275-500 ton (60Hz) units have dual point power connections. Optional single point power connections are available on 460V and 575V/60 Hz units.
3. Control VA includes operational controls only. It does not include evaporator heaters.
4. RLA - Rated Load Amps - rated in accordance with UL Standard 1995.
5. XLRA - Locked Rotor Amps - based on full winding (x-line) start units). YLRA for Wye-delta starters is ~1/3 of LRA of x-line units.
6. MCA - Minimum Circuit Ampacity - 125 percent of largest compressor RLA plus 100 percent of all other loads.
7. Max fuse or MOP = 225 percent of the largest compressor RLA plus 100 percent of the second compressor RLA, plus the sum of the condenser fan FLA. (Use FLA per circuit, NOT FLA for the entire unit). If factory circuit breakers are supplied with the chiller, these values represent Maximum Over-current Protection (MOP).
8. A separate 115/60/1, 20 amp or 220/50/1, 15 amp customer provided power connection is required to power the evaporator heaters (1640 watts).
9. Local codes may take precedence.

Table 39. Customer wire selection - standard and high efficiencies

Single point power				Dual point power - Ckt 1			Dual point power - Ckt 2			
Unit Size	Volt	Term	Disc	Circuit Breaker	Term	Disc	Circuit Breaker	Term	Disc	Circuit Breaker
120	400B	(2) 2 AWG - 600 MCM	(2) 3/0 AWG- 500 MCM	(2) 3/0 AWG- 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
130	400B	(2) 2 AWG - 600 MCM	(2) 3/0 AWG- 500 MCM	(2) 3/0 AWG- 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
140	200A	(3) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	230A	(3) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	380A	(2) 2 AWG - 600 MCM	(2) 3/0 AWG- 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	460A	(2) 2 AWG - 600 MCM	(2) 3/0 AWG- 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	575A	(2) 2 AWG - 600 MCM	(2) 3/0 AWG- 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	400B	(2) 2 AWG - 600 MCM	(2) 3/0 AWG- 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM

[illegible]

Installation - Electrical

Table 39. Customer wire selection - standard and high efficiencies (continued)

Unit Size	Single point power			Dual point power - Ckt 1			Dual point power - Ckt 2			
	Volt	Term	Disc	Circuit Breaker	Term	Disc	Circuit Breaker	Term	Disc	Circuit Breaker
400	200A		n/a		(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM	(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM
	230A		n/a		(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM	(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM
	380A		n/a		(3) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM	(3) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM
	460A	n/a		(4) 2 AWG - 600 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	575A	n/a		(4) 2 AWG - 600 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	400B	n/a		(4) 2 AWG - 600 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
450	200A		n/a		(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM	(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM
	230A		n/a		(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM	(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM
	380A		n/a		(3) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM	(3) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM
	460A	n/a		(4) 2 AWG - 600 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	575A	n/a		(4) 2 AWG - 600 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
500	200A		n/a		(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM	(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM
	230A		n/a		(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM	(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM
	380A		n/a		(3) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM	(3) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM
	460A	n/a		(4) 2 AWG - 600 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	575A	n/a		(4) 2 AWG - 600 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM

1. Non-fused unit disconnect and circuit breaker are optional.
2. Copper wire only, based on nameplate minimum circuit ampacity (MCA).
3. Circuit breaker sizes are for factory mounted only.
4. n/a - not available

[illegible]

Installation - Electrical

Table 40. Customer wire selection - extra efficiency (continued)

Unit Size	Single point power				Dual point power - Ckt 1			Dual point power - Ckt 2		
	Volt	Term	Disc	Circuit Breaker	Term	Disc	Circuit Breaker	Term	Disc	Circuit Breaker
250	200A	n/a	n/a	n/a	(4) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM	(3) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM
	230A	n/a	n/a	n/a	(4) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM	(3) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	380A	n/a	n/a	n/a	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	460A	n/a	n/a	(4) 250 MCM - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	575A	n/a	n/a	(4) 250 MCM - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
275	200A	n/a	n/a	n/a	(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM	(3) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM
	230A	n/a	n/a	n/a	(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM	(3) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	380A	n/a	n/a	n/a	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	460A	n/a	n/a	(4) 250 MCM - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	575A	n/a	n/a	(4) 250 MCM - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
300	200A	n/a	n/a	n/a	(4) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM	(4) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM
	230A	n/a	n/a	n/a	(4) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM	(4) 2 AWG - 600 MCM	(3) 1/0 AWG - 500 MCM	(3) 1/0 AWG - 500 MCM
	380A	n/a	n/a	n/a	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	460A	n/a	n/a	(4) 250 MCM - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	575A	n/a	n/a	(4) 250 MCM - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
350	200A	n/a	n/a	n/a	(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM	(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM
	230A	n/a	n/a	n/a	(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM	(4) 2 AWG - 600 MCM	(4) 250 MCM - 500 MCM	(4) 250 MCM - 500 MCM
	380A	n/a	n/a	n/a	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	460A	n/a	n/a	(4) 250 MCM - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM
	575A	n/a	n/a	(4) 250 MCM - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM	(2) 2 AWG - 600 MCM	(2) 3/0 AWG - 500 MCM	(2) 3/0 AWG - 500 MCM

Notes:

1. Non-fused unit disconnect and circuit breaker are optional.
2. Copper wire only, based on nameplate minimum circuit Ampacity (MCA).
3. Circuit breaker sizes are for factory mounted only.
4. n/a - not available

Installer-Supplied Components

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 circuit breakers.
- Power factor correction capacitors. (optional)

Power Supply Wiring

All power supply wiring must be sized and selected accordingly by the project engineer in accordance with NEC Table 310-16.

WARNING

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

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.

NOTICE:

Use Copper Conductors Only!

Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors could result in equipment damage.

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 29, p. 85](#).

To provide proper phasing of 3-phase input, make connections as shown in field wiring diagrams and as stated on the 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).

115 volt field-provided connections (either control or power) are made through knockouts on the lower left side of the panel ([Figure 29, p. 85](#)). Additional grounds may be required for each 115 volt power supply to the unit. Green lugs are provided for 115V customer wiring.

Single Point Power on Dual Panel Units (Optional)

Units which require two control panels and with single point power option selected, are built with a power connection junction box located in the center of the unit as shown in [Figure 30, p. 85](#). Customer will connect to terminal blocks inside this panel.

Installation - Electrical

Figure 29. Starter panel

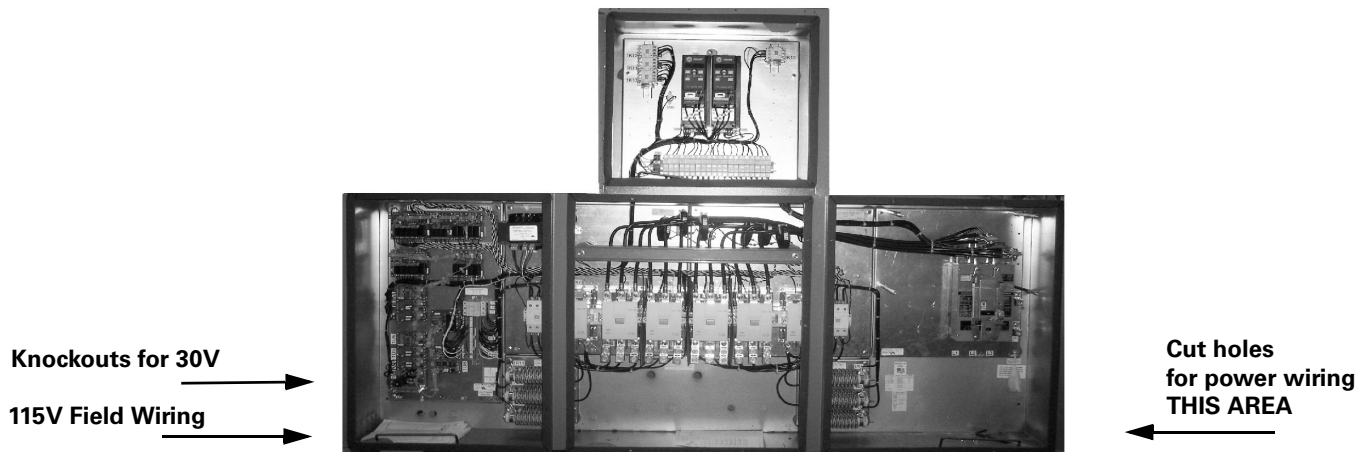


Figure 30. Single point power box - optional on dual panel units



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).*

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 60Hz-20 amp, 220V 50Hz-15 amp), with a fused-disconnect. The heaters are factory-wired back to the unit control panel.

NOTICE:

Equipment Damage!

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 optional, which shares the same power supply as the heaters on 140-250 ton units. Be aware that when the heater is operating, the convenience outlet amperage draw will be reduced accordingly.

Note: *The convenience outlet is optional. The heaters are required.*

Interconnecting Wiring

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.

NOTICE:

Equipment Damage!

If insufficient concentration or no glycol is used, the evaporator water pumps must be controlled by the CH530 to avoid severe damage to the evaporator due to freezing. A power loss of 15 minutes during freezing can damage the evaporator. It is the responsibility of the installing contractor and/or the customer to ensure that a pump will start when called upon by the chiller controls.

Please consult [Table 27, p. 53](#) for correct concentration of glycol.

The warranty will be void, in case of freezing due to the lack of use of either of these protections.

The relay output from 1U10 is required to operate the Evaporator Water Pump (EWP) Contactor. Contacts should be compatible with 115/240 VAC control circuit. The EWP relay operates in different modes depending on CH530 or Tracer commands, if available, or service pump down (See maintenance section). Normally, the EWP 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 (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).

Regardless of whether the chiller is allowed to control the pump on a full-time basis, if the MP calls for a pump to start and water does not flow, the evaporator may be damaged catastrophically. It is the responsibility of the installing contractor and/or the customer to ensure that a pump will start when called upon by the chiller controls.

Table 41. 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

Note: *Exceptions are listed below.*

When going from Stop to Auto, the EWP relay is energized immediately. If evaporator water flow is not established in 20 minutes (for normal transition) or 4 minutes, 15 seconds (for pump commanded ON due to an override safety), the CH530 de-energizes the EWP relay and generates a non-latching diagnostic. If flow returns (e.g. someone else is controlling the pump), the diagnostic is cleared, the EWP is re-energized, and normal control resumed.

If evaporator water flow is lost once it had been established, the EWP 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 EWP 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:

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

or

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

or

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

Installation - Electrical

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 Output LLID) as part of the Alarm Relay Output Option. The relay's 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 events/states that can be assigned to the programmable relays can be found in [Table 42..](#) The relay will be energized when the event/state occurs.

Table 42. 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.

Table 42. Alarm and Status Relay Output Configuration Table (continued)

	Description
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 (software 18.0 or later)	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.

Relay Assignments Using TechView

CH530 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.

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

Table 43. Default assignments

Relay	
Relay 1 Terminals J2 -12,11,10:	Alarm
Relay 2 Terminals J2 - 9,8,7:	Chiller Running
Relay 3 Terminals J2-6,5,4:	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.

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



Installation - Electrical

Emergency Stop

CH530 provides auxiliary control for a customer specified/ installed latching trip out. When this customer-furnished remote contact 5K14 is provided, the chiller will run normally when the contact is closed. When the contact opens, the unit will trip 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. 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.

External Auto/Stop

If the unit requires the external Auto/Stop function, the installer must provide leads from the remote contacts 5K15 to the proper terminals of the LLID 1U4 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. Closure of the contacts will permit the unit to 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 Circuit Lockout – Circuit #1 and #2

CH530 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 5K16 and 5K17.

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

Connections to 1U5 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

CH530 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 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 is provided, the chiller will run normally when the contact is open.

CH530 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.

CH530 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.*

NOTICE:

Equipment Damage!

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 CH530 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. CH530 will not permit the ice building mode to be reentered until the unit has been switched out of ice building mode (open 5K18 contacts) and then switched back into ice building mode (close 5K18 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 freeze stat setting (water or refrigerant), the unit will shut down on a manually resettable diagnostic, just as in normal operation.

Connect leads from 5K18 to the proper terminals of 1U7. 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 (ECWS) Option

The CH530 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

Installation - Electrical

set via the DynaView or through digital communication with Tracer (Comm3). The arbitration of the various chilled water setpoint sources is described in the flow charts at the end of the section.

The chilled water setpoint may be changed from a remote location by sending either a 2-10 VDC or 4-20 mA signal to the 1U6, terminals 5 and 6 LLID. 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 CH530	$ECWS = 6.875 * (VDC) - 3.75$	$ECWS = 3.4375 (mA) - 3.75$

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

TechView Service Tool is used to set the input signal type from the factory default of 2-10 VDC to that of 4-20 mA. TechView is also used to install or remove the External Chilled Water Setpoint option as well as a means to enable and disable ECWS.

External Current Limit Setpoint (ECLS) Option

Similar to the above, the CH530 also provides for an optional External Current Limit Setpoint that will accept either a 2-10 VDC (default) or a 4-20 mA signal. The Current Limit Setting can also be set via the DynaView or through digital communication with Tracer (Comm 3). The arbitration of the various sources of current limit is described in the flow charts at the end of this section. The External Current Limit Setpoint may be changed from a remote location by hooking up the analog input signal to the 1 U6 LLID terminals 2 and 3. Refer to the following paragraph on Analog Input Signal Wiring Details. The following equations apply for ECLS:

	Voltage Signal	Current Signal
As generated from external source	$VDC = 0.133 * (\%) - 6.0$	$mA = 0.266 * (\%) - 12.0$
As processed by UCM	$\% = 7.5 * (VDC) + 45.0$	$\% = 3.75 * (mA) + 45.0$

If the ECLS input develops an open or short, the LLID will report either a very high or very low value back to the man processor. This will generate an informational diagnostic and the unit will default to using the Front Panel (DynaView) Current Limit Setpoint.

The TechView Service Tool must be used to set the input signal type from the factory default of 2-10 VDC to that of 4-20 mA current. TechView must be also be used to install or remove the External Current Limit Setpoint Option for

field installation, or can be used to enable or disable the feature (if installed).

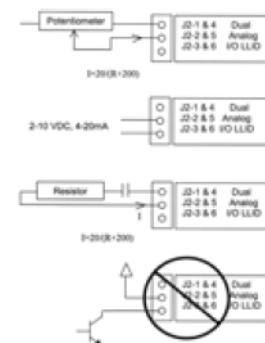
ECLS and ECWS Analog Input Signal Wiring Details:

Both the ECWS and ECLS can be connected and setup as either a 2-10 VDC (factory default), 4-20 mA, or resistance input (also a form of 4-20mA) as indicated below. Depending on the type to be used, the TechView Service Tool must be used to configure the LLID and the MP for the proper input type that is being used. This is accomplished by a setting change on the Custom Tab of the Configuration View within TechView.

Important: For proper unit operation, BOTH the ECLS and ECWS settings MUST be the same (2-10 VDC or 4-20mA), even if only one input is to be used.

The J2-3 and J2-6 terminal is chassis grounded and terminal J2- 1 and J2-4 can be used to source 12 VDC. The ECLS uses terminals J2-2 and J2-3. ECWS uses terminals J2-5 and J2-6. Both inputs are only compatible with high-side current sources.

Figure 31. Wiring examples for ECLS and ECWS



Chilled Water Reset (CWR)

CH530 resets the chilled water temperature set point based on either return water temperature, or outdoor air temperature. Return Reset is standard, Outdoor Reset is optional.

The following shall be selectable:

- One of three Reset Types: None, Return Water Temperature Reset, Outdoor Air Temperature Reset, or Constant Return Water Temperature Reset.
- Reset Ratio Set Points.

For outdoor air temperature reset there shall be both positive and negative reset ratio's.

- Start Reset Set Points.

Installation - Electrical

- Maximum Reset Set Points.

The equations for each type of reset are as follows:

Return

$$CWS' = CWS + \text{RATIO} (\text{START RESET} - (\text{TWE} - \text{TWL}))$$

and $CWS' > \text{or} = CWS$

and $CWS' - CWS < \text{or} = \text{Maximum Reset}$

Outdoor

$$CWS' = CWS + \text{RATIO} * (\text{START RESET} - \text{TOD})$$

and $CWS' > \text{or} = CWS$

and $CWS' - CWS < \text{or} = \text{Maximum Reset}$

where

CWS' is the new chilled water set point or the "reset CWS"

CWS is the active chilled water set point before any reset has occurred, e.g. normally Front Panel, Tracer, or ECWS

RESET RATIO is a user adjustable gain

START RESET is a user adjustable reference

TOD is the outdoor temperature

TWE is entering evap. water temperature

TWL is leaving evap. water temperature

MAXIMUM RESET is a user adjustable limit providing the maximum amount of reset. For all types of reset, $CWS' - CWS < \text{or} = \text{Maximum Reset}$.

Reset Type	Range		Increment			
	Reset Ratio	Start Reset	Max Reset	IP Units	SI Units	Factory Default
Return	10 to 120%	4 to 30 F	0 to 20 F	1%	1%	50%
		(2.2 to 16.7 C)	(0.0 to 11.1 C)			
Outdoor	80 to -80%	50 to 130 F	0 to 20 F	1%	1%	10%
		(10 to 54.4 C)	(0.0 to 11.1 C)			

In addition to Return and Outdoor Reset, the MP provides a menu item for the operator to select a Constant Return Reset. Constant Return Reset will reset the leaving water temperature set point so as to provide a constant entering water temperature. The Constant Return Reset equation is the same as the Return Reset equation except on selection of Constant Return Reset, the MP will automatically set Ratio, Start Reset, and Maximum Reset to the following.

RATIO = 100%

START RESET = Design Delta Temp.

MAXIMUM RESET = Design Delta Temp.

The equation for Constant Return is then as follows:

$$CWS' = CWS + 100\% (\text{Design Delta Temp.} - (\text{TWE} - \text{TWL}))$$

and $CWS' > \text{or} = CWS$

and $CWS' - CWS < \text{or} = \text{Maximum Reset}$

When any type of CWR is enabled, the MP will step the Active CWS toward the desired CWS' (based on the above equations and setup parameters) at a rate of 1 degree F every 5 minutes until the Active CWS equals the desired CWS'. This applies when the chiller is running.

When the chiller is not running, CWS is reset immediately (within one minute) for Return Reset and at a rate of 1 degree F every 5 minutes for Outdoor Reset. The chiller will start at the Differential to Start value above a fully reset CWS or CWS' for both Return and Outdoor Reset.

Communications Interface options

Optional Tracer Communications Interface

This option allows the Tracer CH530 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 CH530 and the building automation system.

Important: 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:

- All wiring must be in accordance with the NEC and local codes.
- Communication link wiring must be shielded, twisted pair wiring (Belden 8760 or equivalent). See the table below for wire size selection:

Table 44. Wire Size

Wire Size	Maximum Length of Communication Wire
14 AWG (2.5 mm ²)	5,000 FT (1525 m)
16 AWG (1.5 mm ²)	2,000 FT (610 m)
18 AWG (1.0 mm ²)	1,000 FT (305 m)

- The communication link cannot pass between buildings.
- All units on the communication link can be connected in a "daisy chain" configuration.

LonTalk Communications Interface for Chillers (LCI-C)

CH530 provides an optional LonTalk Communication Interface (LCI-C) between the chiller and a Building Automation System (BAS). An LCI-C LLID shall be used to provide "gateway" functionality between a LonTalk compatible device and the Chiller. The inputs/outputs

Installation - Electrical

include both mandatory and optional network variables as established by the LonMark Functional Chiller Profile 8040.

Installation Recommendations

- 22 AWG Level 4 unshielded communication wire recommended for most LCI-C installations
- LCI-C link limits: 4500 feet, 60 devices
- Termination resistors are required
- 105 ohms at each end for Level 4 wire
- 82 ohms at each end for Trane “purple” wire
- LCI-C topology should be daisy chain
- Zone sensor communication stubs limited to 8 per link, 50 feet each (maximum)
- One repeater can be used for an additional 4500 feet, 60 devices, 8 communication stubs

Table 45. LonTalk points list

LonTalk Communications Interface			
Inputs	Variable type		SNVT_Type
Chiller Enable/Disable	binary	start(1)/stop(0)	SNVT_switch
Chilled Water Setpoint	analog	temperature	SNVT_temp_p
Current Limit Setpoint	analog	% current	SNVT_lev_percent
Chiller Mode	See note 1		SNVT_hvac_mode
Outputs	Variable type		SNVT_Type
Outputs	Variable type		SNVT_Type
Chiller On/Off	binary	on(1)/off(0)	SNVT_switch
Active Chilled Water Setpoint	analog	temperature	SNVT_temp_p
Percent RLA	analog	% current	SNVT_lev_percent
Active Current Limit Setpoint	analog	% current	SNVT_lev_percent
Leaving Chilled Water Temperature	analog	temperature	SNVT_temp_p
Entering Chilled Water Temperature	analog	temperature	SNVT_temp_p
Entering Condenser Water Temperature	analog	temperature	SNVT_temp_p

Notes:

1. Chiller Mode is used to place the chiller into an alternate mode; Cool or Ice Build
2. Alarm description denotes alarm severity and target: Severity: no alarm, warning normal shutdown, immediate shutdown. Target: chiller, platform, ice building (chiller is refrigerant circuit and platform is control circuit)
3. Chiller status describes chiller run mode and chiller operating mode. Run Mode: off, starting, running shutting down. Operating Modes: cool, ice build. States: alarm, run enabled, local control, limited, CHW flow, cond flow.

Table 45. LonTalk points list (continued)

LonTalk Communications Interface			
Leaving Condenser Water Temperature	analog	temperature	SNVT_temp_p
Alarm Description	See note 2		SNVT_str_asc
Chiller Status	See note 3		SNVT_chlr_status

Notes:

1. Chiller Mode is used to place the chiller into an alternate mode; Cool or Ice Build
2. Alarm description denotes alarm severity and target: Severity: no alarm, warning normal shutdown, immediate shutdown. Target: chiller, platform, ice building (chiller is refrigerant circuit and platform is control circuit)
3. Chiller status describes chiller run mode and chiller operating mode. Run Mode: off, starting, running shutting down. Operating Modes: cool, ice build. States: alarm, run enabled, local control, limited, CHW flow, cond flow.

BACnet Communications Interface (BCI-C)

Optional BACnet Communication Interface for Chillers (BCI-C) is comprised of a Tracer UC400 controller with interface software. It is a non-programmable communications module that allows units to communicate on a BACnet communications network.

BACnet Data Points and Configuration Property Definitions

The BCI-C device allows certain models of Trane chillers with CH530 controls to communicate with BACnet systems and devices using BACnet MS/TP. This section includes information about:

- BACnet protocol implementation conformance statement (PICS)
- Object types: descriptions and configuration (refer to [Table 46, p. 93](#))
- BACnet protocol: data link layers, device address binding, networking options, and character sets
- Object data points and configurations

BACnet Protocol Implementation Conformance Statement (PICS)

Standardized Device Profile (Annex L)

Profile Description	Supported Profile
BACnet Advanced Application Controller (B-AAC)	
BACnet Application Specific Controller (B-ASC)	ü
BACnet Building Controller (B-BC)	
BACnet Operator Workstation (B-OWS)	
BACnet Smart Actuator (B-SA)	
BACnet Smart Sensor (B-SS)	



Installation - Electrical

Interoperability Building Blocks (Annex K)

Data Sharing Description	Supported BIBB
Data Sharing-COV-B (DS-COV-B)	
Data Sharing-ReadProperty-A (DS-RP-A)	ü
Data Sharing-ReadProperty-B (DS-RP-B)	ü
Data Sharing-ReadPropertyMultiple-B (DS-RPM-B)	ü
Data Sharing-WriteProperty-A (DS-WP-A)	ü
Data Sharing-WriteProperty-B (DS-WP-B)	ü
Data Sharing-WritePropertyMultiple-B (DS-WPM-B)	ü
Alarm and Event Management Description	Supported BIBB
Alarm and Event-ACKI-B (AE-ACK-B)	ü
Alarm and Event-Alarm Summary-B (AE-ASUM-B)	ü
Alarm and Event-Enrollment Summary-B (AE-ESUM-B)	ü
Alarm and Event-Information-B (AE-INFO-B)	ü
Alarm and Event-Notification Internal-B (AE-N-I-B)	ü
Trending Description	Supported BIBB
Trending-Automated Trend Retrieval-B (T-ATR-B)	ü
Trending-viewing and Modifying Trends Internal-B (T-VMT-I-B)	ü
Device Management Description	Supported BIBB
Device Management-Backup and Restore-B (DM-BR-B)	ü
Device Management-Device Communication Control-B (DM-DCC-B)	ü
Device Management-Dynamic Device Binding-A (DM-DDB-A)	ü
Device Management-Dynamic Device Binding-B (DM-DDB-B)	ü
Device Management-Dynamic Object Binding-B (DM-DOB-B)	ü
Device Management-List Manipulation-B (DM-LM-B)	ü
Device Management-Object Creation and Deletion-B (DM-OCD-B)	ü
Device Management-Private Transfer-A (DM-PT-A)	ü
Device Management-Private Transfer-B (DM-PT-B)	ü
Device Management-Reinitialize Device-B (DM-RD-B)	ü
Device Management-TimeSynchronization-B (DM-TS-B)	ü

Segmentation Capability

Segmentation Description	Supported Segment
Segmented Requests/ Window Size: 1	ü
Segmented Responses/ Window Size: 1	ü

Installation - Electrical

Object Types

Table 46. Descriptions and configurations

Object Type	Required Properties Read	Properties Written ^(a)	Optional Properties Read	Ability to Create	Ability to Delete
Analog Input	<ul style="list-style-type: none"> Object_Identifier Object_Name Object_Type Present_Value Status_Flags Event_State Out_Of_Service Units 	<ul style="list-style-type: none"> Object_Name Description Out_Of_Service Present_Value Reliability Min_Pres_Value Max_Pres_Value COV_Increment Time_Delay Notification_Class High_Limit Low_Limit Deadband Limit_Enable Event_Enable Notify_Type 	<ul style="list-style-type: none"> Description Reliability Min_Pres_Value Max_Pres_Value COV_Increment Time_Delay Notification_Class High_Limit Low_Limit Deadband Limit_Enable Event_Enable Acked_Transitions Notify_Type Event_Time_Stamps 	Yes	Yes, only user created objects
Analog Output	<ul style="list-style-type: none"> Object_Identifier Object_Name Object_Type Present_Value Status_Flags Event_State Out_Of_Service Units Priority_Array Relinquish_Default 	<ul style="list-style-type: none"> Object_Name Description Out_Of_Service Present_Value Reliability Min_Pres_Value Max_Pres_Value Relinquish_Default COV_Increment Time_Delay Notification_Class High_Limit Low_Limit Deadband Limit_Enable Event_Enable Notify_Type 	<ul style="list-style-type: none"> Description Reliability Min_Pres-Value Max_Pres_Value COV_Increment Time_Delay Notification_Class High_Limit Low_Limit Deadband Limit_Enable Event_Enable Acked_Transitions Notify_Type Event_Time_Stamps 	Yes	Yes, only user created objects
Analog Value	<ul style="list-style-type: none"> Object_Identifier Object_Name Object_Type Present_Value Status_Flags Event_State Out_Of_Service Units 	<ul style="list-style-type: none"> Object_Name Description Out_Of_Service Present_Value Reliability Relinquish_Default COV_Increment Time_Delay Notification_Class High_Limit Low_Limit Deadband Limit_Enable Event_Enable Notify_Type 	<ul style="list-style-type: none"> Description Reliability Priority_Array Relinquish_Default COV_Increment Time_Delay Notification_Class High_Limit Low_Limit Deadband Limit_Enable Event_Enable Acked_Transitions Notify_Type Event_Time_Stamps 	Yes	Yes, only user created objects

Table 46. Descriptions and configurations (continued)

Object Type	Required Properties Read	Properties Written ^(a)	Optional Properties Read	Ability to Create	Ability to Delete
Binary Input	<ul style="list-style-type: none"> Object_Identifier Object_Name Object_Type Present_Value Status_Flags Event_State Out_Of_Service Polarity 	<ul style="list-style-type: none"> Object_Name Description Out_Of_Service Inactive_Text Active_Text Present_Value Reliability Change_Of_State_Count Elapsed_Active_Time Time_Delay Notification_Class Alarm_Value Event_Enable Acked_Transitions Notify_Type 	<ul style="list-style-type: none"> Description Inactive_Text Active_Text Change_Of_State_Time Change_Of_State_Count Time_Of_State_Count_Reset Elapsed_Active_Time Time_Of_Active_Time_Reset Time_Delay Notification_Class Alarm_Value Event_Enable Acked_Transitions Notify_Type Event_Time_Stamps Reliability 	Yes	Yes, only user created objects
Binary Output	<ul style="list-style-type: none"> Object_Identifier Object_Name Object_Type Present_Value Status_Flags Event_State Out_Of_Service Polarity Priority_Array Relinquish_Default 	<ul style="list-style-type: none"> Object_Name Description Out_Of_Service Inactive_Text Active_Text Present_Value Reliability Change_Of_State_Count Elapsed_Active_Time Minimum_On_Time Minimum_Off_Time Relinquish_Default Time_Delay Notification_Class Event_Enable Acked_Transitions Notify_Type 	<ul style="list-style-type: none"> Description Inactive_Text Active_Text Change_Of_State_Time Change_Of_State_Count Time_Of_State_Count_Reset Elapsed_Active_Time Time_Of_Active_Time_Reset Minimum_On_Time Minimum_Off_Time Time_Delay Notification_Class Feedback_Value Event_Enable Acked_Transitions Notify_Type Event_Time_Stamps Reliability 	Yes	Yes, only user created objects
Binary Value	<ul style="list-style-type: none"> Object_Identifier Object_Name Object_Type Present_Value Status_Flags Event_State Out_Of_Service Polarity 	<ul style="list-style-type: none"> Object_Name Description Out_Of_Service Inactive_Text Active_Text Present_Value Reliability Change_Of_State_Count Elapsed_Active_Time Minimum_On_Time Minimum_Off_Time Relinquish_Default Time_Delay Notification_Class Alarm_Value Event_Enable Acked_Transitions Notify_Type 	<ul style="list-style-type: none"> Description Inactive_Text Active_Text Change_Of_State_Time Change_Of_State_Count Time_Of_State_Count_Reset Elapsed_Active_Time Time_Of_Active_Time_Reset Priority_Array Relinquish_Default Minimum_On_Time Minimum_Off_Time Time_Delay Notification_Class Alarm_Value Event_Enable Acked_Transitions Notify_Type Event_Time_Stamps Reliability 	Yes	Yes, only user created objects

Installation - Electrical

Table 46. Descriptions and configurations (continued)

Object Type	Required Properties Read	Properties Written ^(a)	Optional Properties Read	Ability to Create	Ability to Delete
Device	<ul style="list-style-type: none"> Object_Identifier Object_Name Object_Type System_Status Vendor_Name Vendor_Identifier Model_Name Firmware_Revision Application_Software_Version Protocol_Version Protocol_Revision Protocol_Services_Supported Protocol_Object_Types_Supported Object_List Max_APDU_Length_Accepted Segmentation_Supported APDU_Timeout Number_Of_APDU_Retries Device_Address_Binding Database_Revision 	<ul style="list-style-type: none"> Object_Name Location Description APDU_Segment_Timeout APDU_Timeout Number_Of_APDU_Retrieves Backup_Failure_Timeout 	<ul style="list-style-type: none"> Location Description Max_Segments_Accepted APDU_Segment_Timeout Max_Master Max_Info_Frames Local_Time Local_Date Configuration_Files Last_Restore_Time Backup_Failure_Timeout Active_COV_Subscriptions 	None	None
Event Enrollment Object	<ul style="list-style-type: none"> Object_Identifier Object_Name Object_Type Event_Type Notify_Type Event_Parameters Object_Property_Reference Event_State Event_Enable Acked_Transitions Notification_Class Event_Time_Stamps 	<ul style="list-style-type: none"> Object_Name Notify_Type Event_Parameters Object_Property_Reference Event_Enable Notification_Class 	<ul style="list-style-type: none"> None 	Yes	Yes, only user created objects
Multistate Input	<ul style="list-style-type: none"> Object_Identifier Object_Name Object_Type Present_Value Status_Flags Event_State Out_Of_Service Number_Of_States 	<ul style="list-style-type: none"> Object_Name Description State_Text Out_Of_Service Present_Value Reliability Time_Delay Notification_Class Alarm_Values Fault_Values Event_Enable Notify_Type 	<ul style="list-style-type: none"> State_Text Reliability Time_Delay Notification_Class Alarm_Values Fault_Values Event_Enable Acked_Transitions Notify_Type Event_Time_Stamps 	Yes	Yes, only user created objects
Multistate Output	<ul style="list-style-type: none"> Object_Identifier Object_Name Object_Type Present_Value Status_Flags Event_State Out_Of_Service Number_Of_States Priority_Array Relinquish Default 	<ul style="list-style-type: none"> Object_Name Description State_Text Out_Of_Service Present_Value Reliability Time_Delay Notification_Class Event_Enable Notify_Type 	<ul style="list-style-type: none"> State_Text Reliability Relinquish_Default Time_Delay Notification_Class Feedback_Values Event_Enable Acked_Transitions Notify_Type Event_Time_Stamps 	Yes	Yes, only user created objects

Table 46. Descriptions and configurations (continued)

Object Type	Required Properties Read	Properties Written ^(a)	Optional Properties Read	Ability to Create	Ability to Delete
Multistate Value	<ul style="list-style-type: none"> Object_Identifier Object_Name Object_Type Present_Value Status_Flags Event_State Out_Of_Service Number_Of_States 	<ul style="list-style-type: none"> Object_Name Description State_Text Out_Of_Service Present_Value Reliability Priority_Array Relinquish_Default Time_Delay Notification_Class Alarm_Values Fault_Values Event_Enable Notify_Type 	<ul style="list-style-type: none"> State_Text Reliability Relinquish_Default Time_Delay Notification_Class Alarm_Values Fault_Values Event_Enable Acked_Transitions Notify_Type Event_Time_Stamps 	Yes	Yes, only user created objects
Notification Class	<ul style="list-style-type: none"> Object_Identifier Object_Name Object_Type Notification_Class Priority Ack_Required Recipient_List 	<ul style="list-style-type: none"> Object_Name Priority Ack_Required Recipient_List 	None	Yes	Yes, only user created objects
Trend	<ul style="list-style-type: none"> Object_Identifier Object_Name Object_Type Log_Enable Stop_When_Full Buffer_Size Log_Buffer Record_Count Total_Record_Count Event_State 	<ul style="list-style-type: none"> Object_Name Log_Enable Start_Time Stop_Time Log_DeviceObjectProperty Log_Interval Stop_When_Full Buffer_Size Log_Buffer Record_Count Notification_Threshold Notification_Class Event_Enable Notify_Type 	<ul style="list-style-type: none"> Start_Time Stop_Time Log_DeviceObjectProperty Log_Interval Stop_When_Full Buffer_Size Notification_Threshold Records_Since_Notification Last_Notify_Record Notification_Class Event_Enable Acked_Transitions Event_Time_Stamps 	Yes	Yes, only user created objects

(a) Properties written for Present_Value and Reliability only if Out_of_Service is TRUE.

BACnet Protocol

Data Link Layer Options

Data Link Layer Description	Supported Option
ANSI/ATA 878.1, 2.5 Mb ARCNET (Clause 8)	
ANSI/ATA 878.1, RS-485 ARCNET (Clause 8), Baud Rate(s)	
BACnet IP, (Annex J)	
BACnet IP, (Annex J), Foreign Device	
ISO 8802-3, Ethernet (Clause 7)(10Base2, 10Base5, 10BaseT, Fiber)	
LonTalk, (Clause 11), Medium	
MS/TP Master (Clause 9), Baud Rate(s): 9600, 19200, 38400, 76800, and 115200 @1.5% Nominal Baud Rate	ü
MS/TP Slave (Clause 9), Baud Rate(s)	
Other	

Point-to-Point, EIA 232 (Clause 10), Baud Rate(s): 9600, 19200, 38400

Point-to-Point, Modem (Clause 10), Baud Rate(s): 9600, 19200, 38400

Installation - Electrical

Device Address Binding

Device Address Binding	Supported?
Static Device Binding Supported	ü

Networking Options

Networking Descriptions	Supported Option
Annex H, BACnet Tunneling	
BACnet/IP Broadcast Management Device (BBMD)	
Does the BBMD Support Registrations by Foreign Devices?	
Router	

Character Sets

Indicates support for multiple characters sets, but does not imply that all character sets are supported simultaneously. Maximum supported string length is 64 bytes (any character set).

Character Set Descriptions	Supported
ANSI X3.4	ü

IBM/Microsoft DBCS

ISO 10646 (UCS-4)

ISO 10646 (UCS2)

ISO 8859-1

JIS C 6226

Object and Diagnostic Data Points with Corresponding Chiller Models

For quick reference, the following tables are listed two different ways. [Table 47](#) through [Table 52](#) are listed by input/output type and sorted by object identifier. These tables provide the user with the units type for each object type. [Table 53](#) is sorted by object name and provides a complete list of object names, types, values/ranges, and descriptions. Not all points are available to the user. The available data points are defined during self-configuration and are dependent on the type of equipment.

Table 47. Analog Output

Object Identifier	Object Name	Description	Units	Valid Range	Relinq Default
Analog Output 1	Chilled Water Setpoint	Desired leaving water temperature if chiller is in cooling mode.	Degrees-Fahrenheit (64)	0°F to 75°F	44°F
Analog Output 2	Current Limit Setpoint	Sets the maximum capacity that the chiller can use.	Percent (98)	0% to 120%	100%
Analog Output 4	Hot Water Setpoint	Desired leaving water temperature if chiller is in heating mode.	Degrees-Fahrenheit (64)	80°F to 140°F	120°F

Table 48. Analog Input

Object Identifier ^(a)	Object Name	Description	Units
Analog Input, 1	Active Cool/Heat Setpoint Temperature	Active chiller water or hot water setpoint.	Degrees-Fahrenheit (64)
Analog Input, 2	Active Current Limit Setpoint	Active capacity current limit setpoint.	Percent (98)
Analog Input, 5	Actual Running Capacity	Level of capacity that the chiller is currently running at.	Percent (98)
Analog Input, 7	Suction Pressure- Ckt 1	Circuit 1 suction pressure.	PSI
Analog Input, 10	Suction Pressure- Ckt 2	Circuit 2 suction pressure.	PSI
Analog Input, 12	Evaporator Saturated Refrigerant Temperature- Ckt 1	Circuit 2 evaporator refrigerant temperature.	Degrees-Fahrenheit (64)
Analog Input, 14	Evaporator Saturated Refrigerant Temperature- Ckt 2	Circuit 2 evaporator refrigerant temperature.	Degrees-Fahrenheit (64)
Analog Input, 16	Condenser Refrigerant Pressure- Ckt 1	Circuit 1 condenser refrigerant pressure.	PSI
Analog Input, 18	Condenser Refrigerant Pressure- Ckt 2	Circuit 2 condenser refrigerant pressure.	PSI
Analog Input, 20	Condenser Saturated Refrigerant Temperature- Ckt 1	Circuit 1 condenser refrigerant temperature.	Degrees-Fahrenheit (64)
Analog Input, 22	Condenser Saturated Refrigerant Temperature- Ckt 2	Circuit 2 condenser refrigerant temperature.	Degrees-Fahrenheit (64)
Analog Input, 24	Unit Power Consumption	The power being consumed by the chiller.	Kilowatts

Installation - Electrical

Table 48. Analog Input (continued)

Object Identifier ^(a)	Object Name	Description	Units
Analog Input, 25	Local Atmospheric Pressure	Local atmospheric pressure.	PSI
Analog Input, 26	Starts- Compressor 1A	Number of starts for compressor 1A.	None
Analog Input, 27	Starts- Compressor 1B	Number of starts for compressor 1B.	None
Analog Input, 28	Starts- Compressor 2A	Number of starts for compressor 2A.	None
Analog Input, 29	Starts- Compressor 2B	Number of starts for compressor 2B.	None
Analog Input, 34	Run Time- Compressor 1A	Total run time of compressor 1A.	Hours
Analog Input, 35	Run Time- Compressor 1B	Total run time of compressor 1B.	Hours
Analog Input, 36	Run Time- Compressor 2A	Total run time of compressor 2A.	Hours
Analog Input, 37	Run Time- Compressor 2B	Total run time of compressor 2B.	Hours
Analog Input, 42	Airflow Percentage- Circuit 1	Approximate airflow percentage of circuit 1.	Percent (98)
Analog Input, 43	Airflow Percentage- Circuit 2	Approximate airflow percentage of circuit 2.	Percent (98)
Analog Input, 44	Evaporator Entering Water Temp	Temperature of the water entering the evaporator.	Degrees-Fahrenheit (64)
Analog Input, 45	Evaporator Leaving Water Temp	Temperature of the water leaving the evaporator.	Degrees-Fahrenheit (64)
Analog Input, 46	Condenser Entering Water Temp	Temperature of the water entering the condenser.	Degrees-Fahrenheit (64)
Analog Input, 47	Condenser Leaving Water Temp	Temperature of the water leaving the condenser.	Degrees-Fahrenheit (64)
Analog Input, 48	High Side Oil Pressure- Compressor 1A	Pressure of the oil at the high side of compressor 1A.	PSI
Analog Input, 49	High Side Oil Pressure- Compressor 1B	Pressure of oil at high side of compressor 1B.	PSI
Analog Input, 50	High Side Oil Pressure- Compressor 2A	Pressure of oil at high side of compressor 2A.	PSI
Analog Input, 51	High Side Oil Pressure- Compressor 2B	Pressure of oil at high side of compressor 2B.	PSI
Analog Input, 56	Refrigerant Disch Temp- Ckt 1	Temperature of refrigerant being discharged from Ckt 1.	Degrees-Fahrenheit (64)
Analog Input, 57	Outdoor Air Temperature	Outdoor air temperature.	Degrees-Fahrenheit (64)
Analog Input, 58	Condenser Control Output	Percentage of condenser water flow being requested by the chiller.	Percent (98)
Analog Input, 59	Phase AB Voltage- Compressor 1A	Phase AB voltage, compressor 1A.	Volts
Analog Input, 71	Line 1 Current (in Amps)- Compressor 1A	Line 1 Current (in Amps)- Compressor 1A	Amps
Analog Input, 72	Line 2 Current (in Amps)- Compressor 1A	Line 2 Current (in Amps)- Compressor 1A	Amps
Analog Input, 73	Line 3 Current (in Amps)- Compressor 1A	Line 3 Current (in Amps)- Compressor 1A	Amps
Analog Input, 74	Line 1 Current (in Amps)- Compressor 1B	Line 1 Current (in Amps)- Compressor 1B	Amps
Analog Input, 75	Line 2 Current (in Amps)- Compressor 1B	Line 2 Current (in Amps)- Compressor 1B	Amps
Analog Input, 76	Line 3 Current (in Amps)- Compressor 1B	Line 3 Current (in Amps)- Compressor 1B	Amps
Analog Input, 77	Line 1 Current (in Amps)- Compressor 2A	Line 1 Current (in Amps)- Compressor 2A	Amps
Analog Input, 78	Line 2 Current (in Amps)- Compressor 2A	Line 2 Current (in Amps)- Compressor 2A	Amps
Analog Input, 79	Line 3 Current (in Amps)- Compressor 2A	Line 3 Current (in Amps)- Compressor 2A	Amps
Analog Input, 80	Line 1 Current (in Amps)- Compressor 2B	Line 1 Current (in Amps)- Compressor 2B	Amps
Analog Input, 81	Line 2 Current (in Amps)- Compressor 2B	Line 2 Current (in Amps)- Compressor 2B	Amps
Analog Input, 82	Line 3 Current (in Amps)- Compressor 2B	Line 3 Current (in Amps)- Compressor 2B	Amps
Analog Input, 83	Line 1 Current (%RLA)- Compressor 1A	Line 1 Current (%RLA)- Compressor 1A	Percent (98)
Analog Input, 84	Line 2 Current (%RLA)- Compressor 1A	Line 2 Current (%RLA)- Compressor 1A	Percent (98)
Analog Input, 85	Line 3 Current (%RLA)- Compressor 1A	Line 3 Current (%RLA)- Compressor 1A	Percent (98)
Analog Input, 86	Line 1 Current (%RLA)- Compressor 1B	Line 1 Current (%RLA)- Compressor 1B	Percent (98)
Analog Input, 87	Line 2 Current (%RLA)- Compressor 1B	Line 2 Current (%RLA)- Compressor 1B	Percent (98)
Analog Input, 88	Line 3 Current (%RLA)- Compressor 1B	Line 3 Current (%RLA)- Compressor 1B	Percent (98)
Analog Input, 89	Line 1 Current (%RLA)- Compressor 2A	Line 1 Current (%RLA)- Compressor 2A	Percent (98)
Analog Input, 90	Line 2 Current (%RLA)- Compressor 2A	Line 2 Current (%RLA)- Compressor 2A	Percent (98)
Analog Input, 91	Line 3 Current (%RLA)- Compressor 2A	Line 3 Current (%RLA)- Compressor 2A	Percent (98)

Installation - Electrical

Table 48. Analog Input (continued)

Object Identifier ^(a)	Object Name	Description	Units
Analog Input, 92	Line 1 Current (%RLA)- Compressor 2B	Line 1 Current (%RLA)- Compressor 2B	Percent (98)
Analog Input, 93	Line 2 Current (%RLA)- Compressor 2B	Line 2 Current (%RLA)- Compressor 2B	Percent (98)
Analog Input, 94	Line 3 Current (%RLA)- Compressor 2B	Line 3 Current (%RLA)- Compressor 2B	Percent (98)
Analog Input, 95	Number of Circuits	Number of Circuits	None
Analog Input, 96	Number of Compressors, Ckt 1	Number of Compressors, Ckt 1	None
Analog Input, 97	Number of Compressors, Ckt 2	Number of Compressors, Ckt 2	None

(a) Analog Inputs AI60 through AI70 removed because they are not available for RTAC.

Table 49. Multistate Output

Object Identifier	Object Name	Description	Relinq Default	Object States
Multi-State Output, 1	Chiller Mode Command	Mode of operation of the chiller.	1 = Cool	1 = HVAC_Heat 2 = HVAC_Cool 3 = HVAC_Ice 4 = Not Used

Table 50. Multistate Input

BCI-C Object Identifier	Object Name	Description	Object States
Multi-State Input, 1	Running Mode	Indicates the primary running mode of the chiller.	1 = Chiller Off 2 = Chiller in Start Mode 3 = Chiller in Run Mode 4 = Chiller in Pre-shutdown Mode 5 = Chiller in Service Mode
Multi-State Input, 2	Operating Mode	Indicates the primary operating mode of the chiller.	1 = HVAC_Heat 2 = HVAC_Cool 3 = HVAC_Ice 4 = Not Used
Multi-State Input, 3	MP Communication Status	Communication status.	1 = R-22 2 = Communication 3 = Communication Lost 4 = Failed to Established 5 = Waiting to Establish
Multi-State Input, 4	Refrigerant Type	Refrigerant type.	1 = R-11 2 = R-12 3 = R-22 4 = R-123 5 = R-134A 6 = R407C 7 = R-410A
Multi-State Input, 5	Model Information	Indicates the model type of the chiller.	1 = RTA 2 = CVH 3 = CVG 4 = CVR 5 = CDH 6 = RTH 7 = CGW 8 = CGA 9 = CCA 10 = RTW 11 = RTX 12 = RTU 13 = CCU 14 = CXA 15 = CGC 16 = RAU

Installation - Electrical

Table 50. Multistate Input (continued)

BCI-C Object Identifier	Object Name	Description	Object States
Multi-State Input, 6	Cooling Type	Cooling type of the condenser.	1 = Water Cooled 2 = Air Cooled
			1 = Field Applied 2 = La Crosse 3 = Pueblo 4 = Charmes 5 = Rushville 6 = Macon 7 = Waco 8 = Lexington 9 = Forsyth 10 = Clarksville 11 = Ft. Smith 12 = Penang 13 = Colchester 14 = Curitiba 15 = Taicang 16 = Taiwan 17 = Epinal 18 = Golbey
Multi-State Input, 7	Manufacturing Location	Location where chiller was manufactured.	

Table 51. Binary Output

Object Identifier	Object Name	Description	Relinq Default	Object States
Binary Output, 1	Chiller Auto Stop Command	Allows the chiller to run if conditions for running are met.	True	Inactive = Stop Active = Auto
Binary Output, 2	Remote Diagnostic Reset Command	Resets remotely diagnostics that can be reset.	False	Inactive = No Reset Request Active = Reset Request
Binary Output, 4	Noise Reduction Request	Requests chiller to enter mode to reduce noise.	False	Inactive = Normal Active = Reduced Noise

Table 52. Binary Input

Object Identifier	Object Name	Description	Object States
Binary Input, 1	Run Enabled	Indicates if the chiller is available to run or is currently running.	Inactive = Stop Active = Auto
Binary Input, 2	Local Setpoint Control	Indicates if the chiller is being controlled by local setpoints instead of BAS setpoints.	Inactive = Remote Control Active = Local Control
Binary Input, 3	Capacity Limited	Indicates if conditions may exist that prevent the chiller from reaching setpoint.	Inactive = Not Limited Active = Limited
Binary Input, 4	Chiller Running State	Indicates if the chiller is running or stopped.	Inactive = Off Active = On
Binary Input, 5	Condenser Water Flow Status	Condenser water flow status.	Inactive = No Flow Active = Flow
Binary Input, 6	Maximum Capacity	Indicates if all available chiller capacity is being used.	Inactive = Off Active = On
Binary Input, 7	Head Relief Request	Indicates if the chiller is asking an outside system to provide more heat rejection from the condenser water loop.	Inactive = Off Active = On
Binary Input, 9	Compressor 1A Running	Indicates if compressor 1A is running.	Inactive = Off Active = Running
Binary Input, 10	Compressor 1B Running	Indicates if compressor 1B is running.	Inactive = Off Active = Running
Binary Input, 11	Compressor 2A Running	Indicates if compressor 2A is running.	Inactive = Off Active = Running
Binary Input, 12	Compressor 2B Running	Indicates if compressor 2B is running.	Inactive = Off Active = Running

Installation - Electrical

Table 52. Binary Input (continued)

Object Identifier	Object Name	Description	Object States
Binary Input, 17	Evaporator Water Pump Request	Indicates a request from the chiller to turn on the evaporator water pump.	Inactive = Off Active = On
Binary Input, 19	Condenser Water Pump Request	Indicates a request from the chiller to turn on the condenser water pump.	Inactive = Off Active = On
Binary Input, 20	Noise Reduction Active	Indicates if the chiller is in a state where noise is being reduced.	Inactive = Off Active = On
Binary Input, 22	Evaporator Water Flow Status	Indicates if water is flowing through the evaporator.	Inactive = No Flow Active = Flow
Binary Input, 23	Alarm Present	Indicates if an alarm is active.	Inactive = No Alarm Active = Alarm
Binary Input, 24	Shutdown Alarm Present	Indicates if a shutdown alarm is active.	Inactive = No Alarm Active = None
Binary Input, 25	Last Diagnostic	Indicates last diagnostic for the chiller.	Inactive = Off Active = On

Table 53. All Object Types Sorted by Object Name (Refer to previous tables for detailed descriptions of objects)

Object Identifier ^(a)	Object Name	Description
Analog Output 1	Chilled Water Setpoint	Desired leaving water temperature if chiller is in cooling mode.
Analog Output 2	Current Limit Setpoint	Sets the maximum capacity that the chiller can use.
Analog Output 4	Hot Water Setpoint	Desired leaving water temperature if chiller is in heating mode.
Analog Input, 1	Active Cool/Heat Setpoint Temperature	Active chiller water or hot water setpoint.
Analog Input, 2	Active Current Limit Setpoint	Active capacity current limit setpoint.
Analog Input, 5	Actual Running Capacity	Level of capacity that the chiller is currently running at.
Analog Input, 7	Suction Pressure- Ckt 1	Circuit 1 suction pressure.
Analog Input, 10	Suction Pressure- Ckt 2	Circuit 2 suction pressure.
Analog Input, 12	Evaporator Saturated Refrigerant Temperature- Ckt 1	Circuit 2 evaporator refrigerant temperature.
Analog Input, 14	Evaporator Saturated Refrigerant Temperature- Ckt 2	Circuit 2 evaporator refrigerant temperature.
Analog Input, 16	Condenser Refrigerant Pressure- Ckt 1	Circuit 1 condenser refrigerant pressure.
Analog Input, 18	Condenser Refrigerant Pressure- Ckt 2	Circuit 2 condenser refrigerant pressure.
Analog Input, 20	Condenser Saturated Refrigerant Temperature- Ckt 1	Circuit 1 condenser refrigerant temperature.
Analog Input, 22	Condenser Saturated Refrigerant Temperature- Ckt 2	Circuit 2 condenser refrigerant temperature.
Analog Input, 24	Unit Power Consumption	The power being consumed by the chiller.
Analog Input, 25	Local Atmospheric Pressure	Local atmospheric pressure.
Analog Input, 26	Starts- Compressor 1A	Number of starts for compressor 1A.
Analog Input, 27	Starts- Compressor 1B	Number of starts for compressor 1B.
Analog Input, 28	Starts- Compressor 2A	Number of starts for compressor 2A.
Analog Input, 29	Starts- Compressor 2B	Number of starts for compressor 2B.
Analog Input, 34	Run Time- Compressor 1A	Total run time of compressor 1A.
Analog Input, 35	Run Time- Compressor 1B	Total run time of compressor 1B.
Analog Input, 36	Run Time- Compressor 2A	Total run time of compressor 2A.
Analog Input, 37	Run Time- Compressor 2B	Total run time of compressor 2B.
Analog Input, 42	Airflow Percentage- Circuit 1	Approximate airflow percentage of circuit 1.
Analog Input, 43	Airflow Percentage- Circuit 2	Approximate airflow percentage of circuit 2.
Analog Input, 44	Evaporator Entering Water Temp	Temperature of the water entering the evaporator.
Analog Input, 45	Evaporator Leaving Water Temp	Temperature of the water leaving the evaporator.
Analog Input, 46	Condenser Entering Water Temp	Temperature of the water entering the condenser.
Analog Input, 47	Condenser Leaving Water Temp	Temperature of the water leaving the condenser.
Analog Input, 48	High Side Oil Pressure- Compressor 1A	Pressure of the oil at the high side of compressor 1A.
Analog Input, 49	High Side Oil Pressure- Compressor 1B	Pressure of the oil at the high side of compressor 1B.
Analog Input, 50	High Side Oil Pressure- Compressor 2A	Pressure of the oil at the high side of compressor 2A.
Analog Input, 51	High Side Oil Pressure- Compressor 2B	Pressure of the oil at the high side of compressor 2B.

Table 53. All Object Types Sorted by Object Name (*Refer to previous tables for detailed descriptions of objects*) (continued)

Object Identifier ^(a)	Object Name	Description
Analog Input, 56	Refrigerant Disch Temp- Ckt 1	Temperature of the refrigerant being discharged from Ckt 1.
Analog Input, 57	Outdoor Air Temperature	Outdoor air temperature.
Analog Input, 58	Condenser Control Output	Percentage of condenser water flow being requested by chiller.
Analog Input, 59	Phase AB Voltage- Compressor 1A	Phase AB voltage, compressor 1A.
Analog Input, 71	Line 1 Current (in Amps)- Compressor 1A	Line 1 Current (in Amps)- Compressor 1A
Analog Input, 72	Line 2 Current (in Amps)- Compressor 1A	Line 2 Current (in Amps)- Compressor 1A
Analog Input, 73	Line 3 Current (in Amps)- Compressor 1A	Line 3 Current (in Amps)- Compressor 1A
Analog Input, 74	Line 1 Current (in Amps)- Compressor 1B	Line 1 Current (in Amps)- Compressor 1B
Analog Input, 75	Line 2 Current (in Amps)- Compressor 1B	Line 2 Current (in Amps)- Compressor 1B
Analog Input, 76	Line 3 Current (in Amps)- Compressor 1B	Line 3 Current (in Amps)- Compressor 1B
Analog Input, 77	Line 1 Current (in Amps)- Compressor 2A	Line 1 Current (in Amps)- Compressor 2A
Analog Input, 78	Line 2 Current (in Amps)- Compressor 2A	Line 2 Current (in Amps)- Compressor 2A
Analog Input, 79	Line 3 Current (in Amps)- Compressor 2A	Line 3 Current (in Amps)- Compressor 2A
Analog Input, 80	Line 1 Current (in Amps)- Compressor 2B	Line 1 Current (in Amps)- Compressor 2B
Analog Input, 81	Line 2 Current (in Amps)- Compressor 2B	Line 2 Current (in Amps)- Compressor 2B
Analog Input, 82	Line 3 Current (in Amps)- Compressor 2B	Line 3 Current (in Amps)- Compressor 2B
Analog Input, 83	Line 1 Current (%RLA)- Compressor 1A	Line 1 Current (%RLA)- Compressor 1A
Analog Input, 84	Line 2 Current (%RLA)- Compressor 1A	Line 2 Current (%RLA)- Compressor 1A
Analog Input, 85	Line 3 Current (%RLA)- Compressor 1A	Line 3 Current (%RLA)- Compressor 1A
Analog Input, 86	Line 1 Current (%RLA)- Compressor 1B	Line 1 Current (%RLA)- Compressor 1B
Analog Input, 87	Line 2 Current (%RLA)- Compressor 1B	Line 2 Current (%RLA)- Compressor 1B
Analog Input, 88	Line 3 Current (%RLA)- Compressor 1B	Line 3 Current (%RLA)- Compressor 1B
Analog Input, 89	Line 1 Current (%RLA)- Compressor 2A	Line 1 Current (%RLA)- Compressor 2A
Analog Input, 90	Line 2 Current (%RLA)- Compressor 2A	Line 2 Current (%RLA)- Compressor 2A
Analog Input, 91	Line 3 Current (%RLA)- Compressor 2A	Line 3 Current (%RLA)- Compressor 2A
Analog Input, 92	Line 1 Current (%RLA)- Compressor 2B	Line 1 Current (%RLA)- Compressor 2B
Analog Input, 93	Line 2 Current (%RLA)- Compressor 2B	Line 2 Current (%RLA)- Compressor 2B
Analog Input, 94	Line 3 Current (%RLA)- Compressor 2B	Line 3 Current (%RLA)- Compressor 2B
Analog Input, 95	Number of Circuits	Number of Circuits
Analog Input, 96	Number of Compressors, Ckt 1	Number of Compressors, Ckt 1
Analog Input, 97	Number of Compressors, Ckt 2	Number of Compressors, Ckt 2
Multi-State Input, 1	Running Mode	Indicates the primary running mode of the chiller.
Multi-State Input, 2	Operating Mode	Indicates the primary operating mode of the chiller.
Multi-State Input, 3	MP Communication Status	Communication status.
Multi-State Input, 4	Refrigerant Type	Refrigerant type.
Multi-State Input, 5	Model Information	Indicates the model type of the chiller.
Multi-State Input, 6	Cooling Type	Cooling type of the condenser.
Multi-State Input, 7	Manufacturing Location	Location where chiller was manufactured.
Binary Output, 1	Chiller Auto Stop Command	Allows the chiller to run if conditions for running are met.
Binary Output, 2	Remote Diagnostic Reset Command	Resets remotely diagnostics that can be reset.
Binary Output, 4	Noise Reduction Request	Requests chiller to enter mode to reduce noise.
Binary Output, 1	Chiller Auto Stop Command	Allows the chiller to run if conditions for running are met.
Binary Input, 1	Run Enabled	Indicates if the chiller is available to run or is currently running.
Binary Input, 2	Local Setpoint Control	Indicates if the chiller is being controlled by local setpoints instead of BAS setpoints.
Binary Input, 3	Capacity Limited	Indicates if conditions may exist that prevent the chiller from reaching setpoint.
Binary Input, 4	Chiller Running State	Indicates if the chiller is running or stopped.
Binary Input, 5	Condenser Water Flow Status	Condenser water flow status.
Binary Input, 6	Maximum Capacity	Indicates if all available chiller capacity is being used.
Binary Input, 7	Head Relief Request	Indicates if chiller is asking an outside system to provide more heat.
Binary Input, 9	Compressor 1A Running	Indicates if compressor 1A is running.
Binary Input, 10	Compressor 1B Running	Indicates if compressor 1B is running.

Installation - Electrical

Table 53. All Object Types Sorted by Object Name (Refer to previous tables for detailed descriptions of objects) (continued)

Object Identifier ^(a)	Object Name	Description
Binary Input, 11	Compressor 2A Running	Indicates if compressor 2A is running.
Binary Input, 12	Compressor 2B Running	Indicates if compressor 2B is running.
Binary Input, 17	Evaporator Water Pump Request	Indicates a request from the chiller to turn on the evaporator water pump.
Binary Input, 19	Condenser Water Pump Request	Indicates a request from the chiller to turn on the condenser water pump.
Binary Input, 20	Noise Reduction Active	Indicates if the chiller is in a state where noise is being reduced.
Binary Input, 22	Evaporator Water Flow Status	Indicates if water is flowing through the evaporator.
Binary Input, 23	Alarm Present	Indicates if an alarm is active.
Binary Input, 24	Shutdown Alarm Present	Indicates if a shutdown alarm is present.
Binary Input, 25	Last Diagnostic	Indicates the last diagnostic for the chiller.

(a) AI=Analog Input, AO=Analog Output, AV=Analog Value, BI=Binary Input, BO=Binary Output, MI=Multistate Input, MO=Multistate Output Analog Inputs AI60 through AI70 removed because they are not available for RTAC.

BCI-C Alarming

The BCI-C unit has three binary input points that are used for communicating alarms and one binary output point that is used to reset alarms remotely. Those inputs and output points are:

- **BI 23; Alarm Present**– This object indicates if any alarms are active regardless of severity. A notification will be sent to any recipients of the *Information Notification Class* object when the point transitions from *No Alarm* to *Alarm*.
- **BI 24; Shutdown Alarm Present**– This object indicates if any alarms that result in the shutdown of the chiller are active. A notification will be sent to any recipients of the *Critical Notification Class* object when the point transitions from *No Alarm* to *Alarm*.
- **BI 25; Last Diagnostic**– The active text of this object will reflect the description of the last diagnostic to occur on the chiller.
- **BO 2; Remote Diagnostic Reset Command**– This object is used to remotely reset diagnostics on the chiller. Immediately after commanding this point value to *1*, the BCI-C will send the reset command to the chiller and set this point value back to *0* and clear the priority array.

Note: *Not all diagnostics are able to be reset remotely. Some will require local reset at the chiller front panel.*



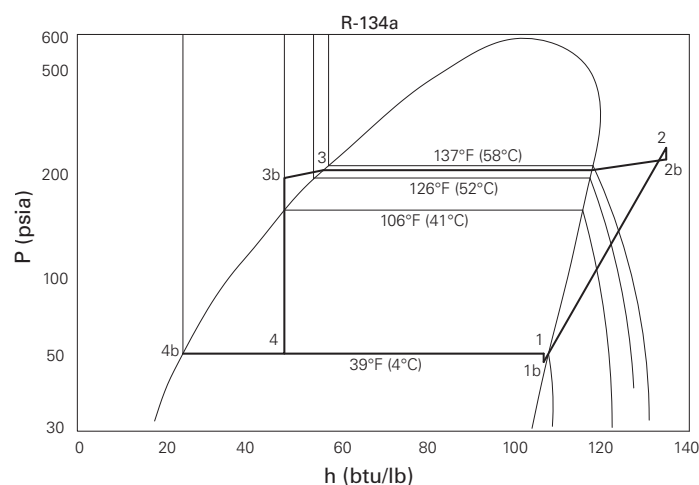
Operating Principles

This section contains an overview of the operation and maintenance of RTAC units equipped with CH530 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 RTAA 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 32. Key state points are indicated on the figure. The cycle for the full load ARI design point is represented in the plot.

Figure 32. Pressure enthalpy (P-h) diagram - RTAC



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 lines and bolt pads are designed to minimize pressure drop (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).

Refrigerant R-134a

The RTAC chiller uses environmentally friendly R134a. Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle

refrigerants must be certified. The Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

R-134a 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.

R-134a requires the use of specific POE oils as designated on the unit nameplate.

Important: Use only R-134a and Trane Oil 00048 in RTAC chillers.

Compressor

The compressor is a semi-hermetic, direct-drive rotary type compressor. Each compressor has only four moving parts: two rotors that provide compression and male and female load-control valves. 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.

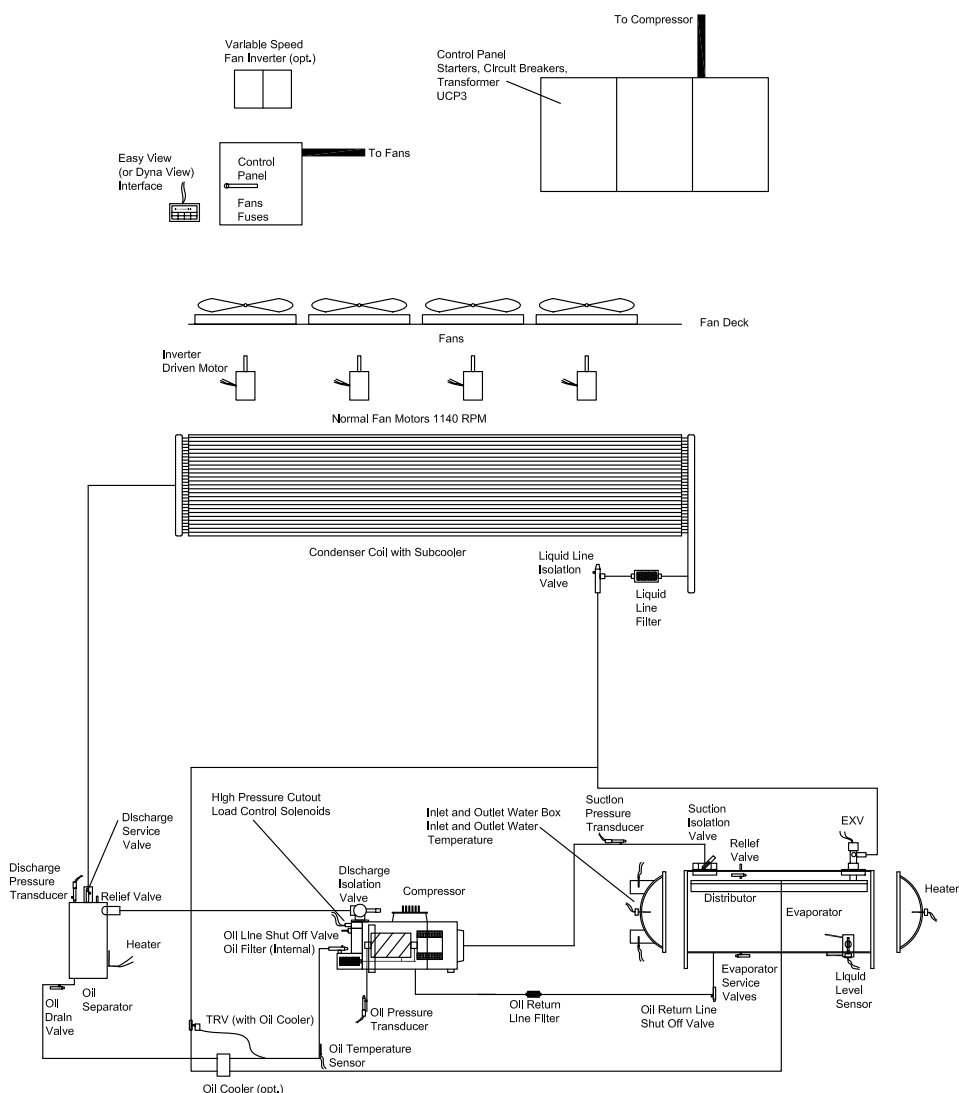
The helical rotary compressor is a positive displacement device. Refrigerant vapor from evaporator is drawn into the suction opening of the compressor (state 1b), through a suction strainer screen across the motor (which provides motor cooling) and into the intake of the compressor rotors. The gas is 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 load-control valve and a male control valve. The female step valve is the first stage of loading after the compressor starts and the last stage of unloading before the compressor shuts down. The male control 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.

Operating Principles

Figure 33. System schematic



Condenser and Subcooler

Condenser and subcooler are similar to the condenser used in RTAA chillers. The heat exchanger consists of 3/8" tubes that contain refrigerant, large fins that are in the air flow and fans that draw air through 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, condensed (states 2b to 3) and finally sub-cooled (states 3 to 3b) to a temperature slightly above the ambient air temperature. The sub-cooled liquid refrigerant is collected in the leaving header where it is transferred to the liquid line (state 3b).

Controls algorithm always runs as many fans as possible without reducing differential pressure (discharge minus suction) below setpoint, 60 psid (4.2 bar). If a warm enough ambient is sensed, all fans will run. If ambient is cooler, some fans are shut off to maintain pressure differential. Fan staging depends on chiller load, evaporator pressure, condenser effectiveness, ambient temperature, and numbers and sizes of fans installed on circuit.

Algorithm pre-starts fans (based on ambient and water temperatures) when a circuit starts the compressor. (For rare conditions such as during some pull-downs, a steady fan state would either violate the 60 psid (4.2 bar) setpoint or cause a high pressure cut-out; in those conditions a fan will cycle on and off.)

For up to two minutes after chiller start-up, the setpoint is 35 psi (2.45 bar) difference, and then before the controls adjust gradually over half a minute up to 60 psi (4.2 bar).

Expansion Valve

Pressure drop occurs in an electronic expansion valve. The unit controller (CH530) 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, sub-cooled 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 distributor and falling film evaporator.

A liquid-vapor refrigerant mixture enters the distributor (state 4). The mixture is distributed over the length of the evaporator tubes (state 4b). Liquid is evenly distributed over the length of the evaporator tubes by the two-phase 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 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 and the evaporator boils the entire refrigerant supply at constant pressure. Refrigerant vapor exits the evaporator through the suction line (state 1).

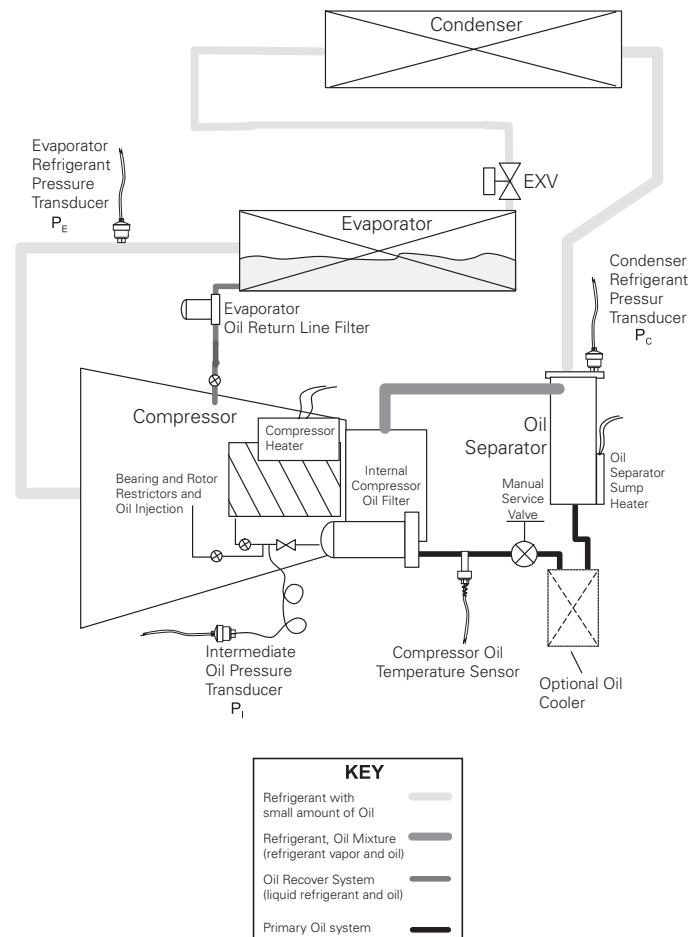
Oil System

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, sub cooler 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.

Figure 34. RTAC oil system



Controls Interface

Overview

RTAC units utilize the Tracer™ CH530 chiller control system which 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 (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. The process is discussed in section “TechView,” p. 115.

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 CH530 uses the IPC3 protocol based on RS485 signal technology and communicating at 19.2 K baud to allow 3 rounds of data per second on a 64-device network. A typical four-compressor RTAC will have around 50 devices.

Most diagnostics are handled by the DynaView. If a temperature or pressure is reported out of range by a LLID, the 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 CH530 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 a DynaView interface. The DynaView has the capability to display information to the operator including the ability to adjust settings. Multiple screens are available and text is presented in multiple

languages as factory-ordered or can be easily downloaded from www.trane.com.

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

DynaView Display

DynaView™ display interface is made of weatherproof and durable plastic for use as a stand-alone device on the outside of the unit or mounted nearby. See Figure 35.

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

Figure 35. DynaView



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 35.) 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

Controls Interface

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

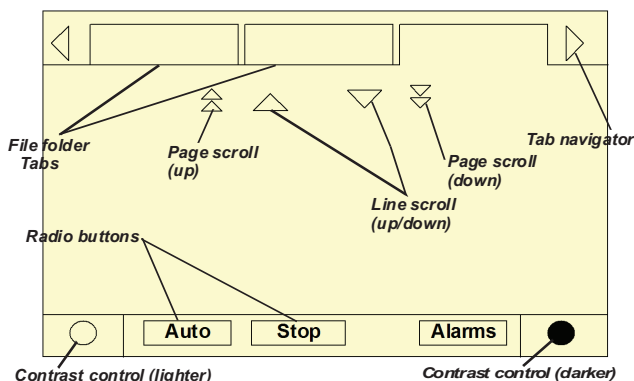
File folder tabs are used to select a screen of data. Just like tabs in a file folder, these serve to title the folder/screen selected, as well as provide navigation to other screens. In DynaView, the tabs are in one row across the top of the display. The folder tabs are separated from the rest of the 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.

Display Screens

Note: Screens shown in this chapter are representative samples only, and may not exactly match the values, selections found on your particular unit.

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 right most 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 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.

A double arrow pointing to the right indicates more information is available about the specific item on that same line. Pressing it will bring you to a sub screen that will present the information or allow changes to settings.

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 contrast may require re-adjustment at ambient temperatures significantly different from those present at last adjustment.

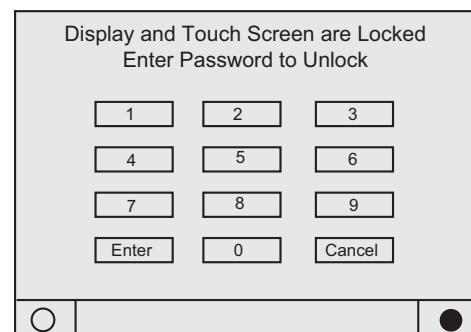
The other functions are critical to machine operation. The AUTO and STOP keys are used to enable or disable the chiller. The key selected is in black (reverse video). The chiller will stop when the STOP key is touched and after completing the Run Unload mode.

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.)

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.

Front Panel Lockout Feature



Note: The DynaView display and Touch Screen Lock screen is shown below. This screen is used if the Display and touch screen and lock feature is enabled. Thirty minutes after the last keystroke, this screen is displayed and the Display and Touch Screen is locked out until the sequence "159 <ENTER>" is pressed.

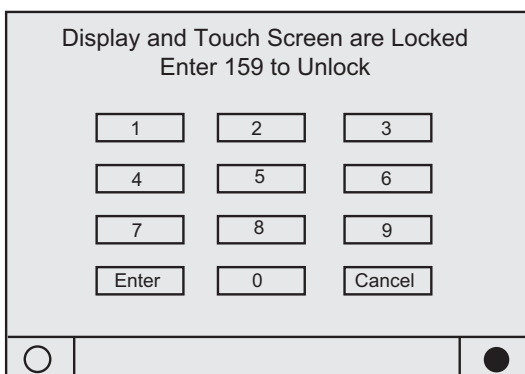
Controls Interface

Until the proper password is entered, there will be no access to the DynaView screens including all reports, setpoints, and Auto/Stop/Alarms/Interlocks.

The password “159” is not programmable from either DynaView or TechView.

Front Panel Display During Cold Ambients

If the Display and Touch Screen Lock feature is disabled, the following screen is automatically displayed if the DynaView Temperature is below freezing and has been 30 minutes after the last keystroke.



Note: This feature is provided to avoid unintended actuations of the keypad, which can occur due to ice build-up on the DynaView's exterior surfaces. Also be aware that at extremes of temperatures, the LCD display screen will change its contrast from the optimal adjustment made at more normal temperatures. It can appear washed out or blacked out. Simply pressing the lower right contrast

control on the screen will return the display to readable condition.

Note: All screens shown in this section are typical. Some screens show all display options available, only one of which may appear on a line.

Modes Screen

The Mode Screen is only found on software revisions 18 and later. This screen provides a display for the top level operating mode for each of the components and sub-components of the chiller (i.e. Chiller, Circuits, and Compressors) that exist on the Chiller as it is configured. The modes are displayed as text only without the hex codes.

In software revisions 17.0 and earlier, the top level mode and the sub mode for each component was displayed on the respective component tab on the first two lines. The mode display of the first three lines of the Compressor and Chiller Screen tabs is eliminated with the addition of the Mode Screen



Table 54. Chiller modes

Chiller Modes	Description
Top Level Mode	
Sub-modes	
Stopped	The chiller is not running and cannot run without intervention. Further information is provided by the sub-mode:
Local Stop	Chiller is stopped by DynaView Stop button command- cannot be remotely overridden.
Panic Stop	Chiller is stopped by the DynaView Panic Stop (by pressing Stop button twice in succession) - previous shutdown was manually commanded to shutdown immediately without a run-unload or pump-down cycle - cannot be remotely overridden.
Diagnostic Shutdown - Manual Reset	The chiller is stopped by a diagnostic that requires manual intervention to reset.
Other sub-modes are possible in conjunction with at least one of the above modes - See items below for their descriptions:	
Diagnostic Shutdown - Auto Reset	
Start Inhibited by Low Cond Temp	
Start Inhibited by Low Ambient Temp	
Start Inhibited by External Source	
Start Inhibited by BAS	
Waiting for BAS Communications	
Ice Building to Normal Transition	
Ice Building is Complete	
Run Inhibit	The chiller is currently being inhibited from starting (and running), but may be allowed to start if the inhibiting or diagnostic condition is cleared. Further information is provided by the sub-mode:
Diagnostic Shutdown - Auto Reset	The entire chiller is stopped by a diagnostic that may automatically clear.

Controls Interface

Table 54. Chiller modes (continued)

Chiller Modes	Description
Top Level Mode	
Sub-modes	
Start Inhibited by Low Cond Temp	The chiller is inhibited from starting by Low Condenser Temperature- Inhibit is active below either 25°F (can be disabled with proper freeze protection) or 0°F (limit set by design, cannot be disabled). As an exception, this will not stop a chiller already running.
Start Inhibited by Low Ambient Temp	The chiller is inhibited from starting (and running) by an outdoor air ambient temperature lower than a specified temperature - per user adjustable settings and can be disabled.
Start Inhibited by External Source	The chiller is inhibited from starting (and running) by the "external stop" hardwired input.
Start Inhibited by BAS	The chiller is inhibited from starting (and running) by command from a Building Automation System via the digital communication link (com 3 or com 5).
Waiting for BAS Communications	This is a transient mode - 15-min. max, and is only possible if the chiller is in the Auto - Remote command mode. After a power up reset, it is necessary to wait for valid communication from a Building Automation System (Tracer) to know whether to run or stay inhibited. Either valid communication will be received from the Building Automation System (e.g. Tracer), or a communication diagnostic ultimately will result. In the latter case the chiller will revert to Local control.
Ice Building to Normal Transition	The chiller is inhibited from running for a brief period of time if it is commanded from active ice building mode into normal cooling mode via the ice building hardwired input or Tracer. This allows time for the external system load to "switchover" from an ice bank to the chilled water loop, and provides for a controlled pull down of the loop's warmer temperature. This mode is not seen if the ice making is automatically terminated on return brine temperature per the mode below.
Ice Building is Complete	The chiller is inhibited from running as the Ice Building process has been normally terminated on the return brine temperature. The chiller will not start unless the ice building command (hardwired input or Building Automation System command) is removed or cycled.
Auto	The chiller is not currently running but can be expected to start at any moment given that the proper conditions and interlocks are satisfied. Further information is provided by the sub-mode:
Waiting For Evap Water Flow	The chiller will wait up to 4 minutes in this mode for evaporator water flow to be established per the flow switch hardwired input.
Waiting for Need to Cool	The chiller will wait indefinitely in this mode, for an evaporator leaving water temperature higher than the Chilled Water Setpoint plus the Differential to Start.
Starting	The chiller is going through the necessary steps to allow the lead circuit and lead compressor to start.
No Sub Modes	
Running	At least one circuit and one compressor on the chiller are currently running. Further information is provided by the sub-mode:
Unit is Building Ice	The chiller is running in the Ice Building Mode, and either at or moving towards full capacity available. Ice mode is terminated either with the removal of the ice mode command or with the return brine temperature falling below the Ice Termination Setpoint.
Running - Limited	At least one circuit and one compressor on the chiller are currently running, but the operation of the chiller as a whole is being actively limited by the controls.
Capacity Limited by High Evap Water Temp	This mode will occur if both the OA temperature is above 40°F and the Evap Leaving Water Temperature is above 75°F as is often the case in a high temperature pull-down. While in this mode, no compressors will be allowed to load past their minimum load capacity step, but it will not inhibit compressor staging. This mode is necessary to prevent nuisance trips due to Compressor Overcurrent or High Pressure Cutout. Reasonable pull-down rates can still be expected despite this limit.

Controls Interface

Table 55. Circuit modes

Circuit Modes	Description
Top Level Mode	
Sub-modes	
Stopped	The given circuit is not running and cannot run without intervention. Further information is provided by the sub-mode:
Front Panel Lockout	The circuit is manually locked out by the circuit lockout setting - the nonvolatile lockout setting is accessible through either the DynaView or TechView.
Diagnostic Shutdown - Manual Reset	The circuit has been shutdown on a latching diagnostic.
Other sub-modes are possible in conjunction with at least one of the above modes - See items below for their descriptions: Diagnostic Shutdown - Auto Reset Start Inhibited by External Source Start Inhibited by BAS	
Run Inhibit	The given circuit is currently being inhibited from starting (and running), but may be allowed to start if the inhibiting or diagnostic condition is cleared. Further information is provided by the sub-mode:
Diagnostic Shutdown - Auto Reset	The circuit has been shutdown on a diagnostic that may clear automatically.
Start Inhibited by External Source	The circuit is inhibited from starting (and running) by its "external circuit lockout" hardwired input.
Start Inhibited by BAS	The circuit is inhibited from starting (and running) by command from a Building Automation System via the digital communication link (com 3 or com 5).
Auto	The given circuit is not currently running but can be expected to start at any moment given that the proper conditions and interlocks are satisfied.
No Sub Modes	
Starting	The given circuit is going through the necessary steps to allow the lead compressor on that circuit to start.
No Sub Modes	
Running	At least one compressor on the given circuit is currently running. Further information is provided by the sub-mode:
Establishing Min. Cap - Low Diff pressure	Circuit is experiencing low system differential pressure and is being force loaded, regardless of Chilled Water Temperature Control, to develop pressure sooner.
Running - Limited	At least one compressor on the given circuit is currently running, but the capacity of the circuit is being actively limited by the controls. Further information is provided by the sub-mode:
Capacity Limited by High Cond Press	Circuit is experiencing condenser pressures at or near the condenser limit setting. Compressors on circuit will be unloaded to prevent exceeding limits.
Capacity Limited by Low Evap Rfgt Temp	The circuit is experiencing saturated evaporator temperatures at or near the Low Refrigerant Temperature Cutout setting. Compressors on the circuit will be unloaded to prevent tripping.
Capacity Limited by Low Liquid Level	The circuit is experiencing low refrigerant liquid levels and the EXV is at or near full open. The compressors on the circuit will be unloaded to prevent tripping.
Shutting Down	The given circuit is still running but shutdown is imminent. The circuit is going through either a compressor run-unload mode or a circuit operational pumpdown to dry out the evaporator (cold OA ambient only). Shutdown is necessary due to one (or more) of the following sub-modes:
Operational Pumpdown	The circuit is in the process shutting down by performing an operational pumpdown just prior to stopping the last running compressor. The EXV is commanded closed. Pumpdown will terminate when both the liquid level and the evap pressure
Front Panel Lockout	The circuit has been manually locked out by the circuit lockout setting and is in the process of shutting down - the nonvolatile lockout setting is accessible through either the DynaView or TechView.
Diagnostic Shutdown - Manual Reset	The circuit is in the process of shutdown due to a latching diagnostic.
Diagnostic Shutdown - Auto Reset	The circuit is in the process of shutdown due to a diagnostic that may automatically clear.
Start Inhibited by External Source	The circuit is in the process of shutdown due to a command from the external circuit lockout hardwired input.

Controls Interface

Table 55. Circuit modes (continued)

Circuit Modes	Description
Top Level Mode	
Sub-modes	
Start Inhibited by BAS	The circuit is in the process of shutdown due to a command from the Building Automation System (e.g. Tracer)
Service Override	The given circuit is in a Service Override mode
Service Pumpdown	The circuit is running with fan control, via a manual command to perform a Service Pumpdown. Its respective EXV is being held wide open, but the manual liquid line service valve should be closed.

Table 56. Compressor modes

Compressor Modes	Description
Top Level Mode	
Sub-modes	
Stopped	The given compressor is not running and cannot run without intervention. Further information is provided by the sub-mode:
Diagnostic Shutdown - Manual Reset	The compressor has been shutdown on a latching diagnostic.
Service Tool Lockout	The compressor has been shutdown due to a command from the TechView Service Tool to be "locked out" and inoperative. This setting is nonvolatile and operation can only be restored by using TechView to "unlock" it.
Other sub-modes are possible in conjunction with at least one of the above modes - See items below for their descriptions:	
Diagnostic Shutdown - Auto Reset	
Restart Inhibit	
Run Inhibit	The given compressor is currently being inhibited from starting (and running*), but may be allowed to start if the inhibiting or diagnostic condition is cleared. Further information is provided by the sub-mode:
Diagnostic Shutdown - Auto Reset	The compressor has been shutdown on a diagnostic that may clear automatically.
Restart Inhibit	The compressor is currently unable to start due to its restart inhibit timer. A given compressor is not allowed to start until 5 minutes has expired since its last start.
Auto	The given compressor is not currently running but can be expected to start at any moment given that the proper conditions occur.
No Sub Modes	
Starting	The given compressor is going through the necessary steps to allow it to start. (This mode is short and transitory)
No Sub Modes	
Running	The given compressor is currently running. Further information is provided by the sub-mode:
Establishing Min. Capacity - High Oil Temp	The compressor is running and is being forced loaded to its step load point, without regard to the leaving water temperature control, to prevent tripping on high oil temperature.
Running - Limited	The given compressor is currently running, but its capacity is being actively limited by the controls. Further information is provided by the sub-mode:
Capacity Limited by High Current	The compressor is running and its capacity is being limited by high currents. The current limit setting is 120% RLA (to avoid overcurrent trips) or lower as set by the compressor's "share" of the active current limit (demand limit) setting for the entire chiller.
Capacity Limited by Phase Unbalance	The compressor is running and its capacity is being limited by excessive phase current unbalance.
Shutting Down	The given compressor is still running but shutdown is imminent. The compressor is going through either a run-unload mode or is the active compressor in the operational pumpdown cycle for its circuit. Shutdown is either normal (no sub-mode displayed) or due the following sub-modes:
Diagnostic Shutdown - Manual Reset	The compressor is in the process of shutdown due to a latching diagnostic.
Diagnostic Shutdown - Auto Reset	The compressor is in the process of shutdown due to a diagnostic that may clear automatically.

Controls Interface

Table 56. Compressor modes (continued)

Compressor Modes	Description
Top Level Mode	
Sub-modes	
Service Tool Lockout	The compressor is in the process of shutdown due to a command from the TechView Service Tool to be "locked out" and inoperative. This setting is nonvolatile and operation can only be restored by using TechView to "unlock" it.

Chiller Screen

The chiller screen is a summary of the chiller activity.

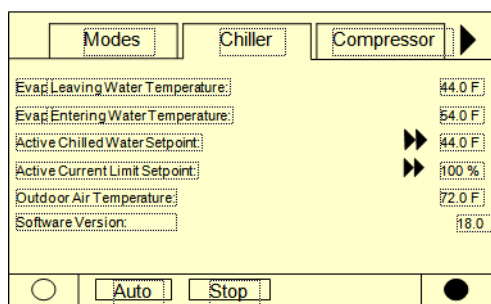


Table 57. Chiller screen

Description	Resolution	Units
Evap Leaving Water Temperature	X.X	F / C
Evap Entering Water Temperature	X.X	F / C
Active Chilled Water Setpoint	X.X	F / C
Active Current Limit Setpoint	X	% RLA
Out Door Temperature	X.X	F / C
Software Type	RTA	Text
Software Version	X.XX	Text

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 show the compressor operating mode. The compressor radio buttons and the compressor operating mode lines don't change as you scroll down in the menu.

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 depending on which radio key is pressed. When toggling between compressor screens, say to compare starts and run time, the same lines

can be seen without additional key strokes. For example, toggling from the bottom of the compressor 1A menu accesses the top of the compressor 2A menu.

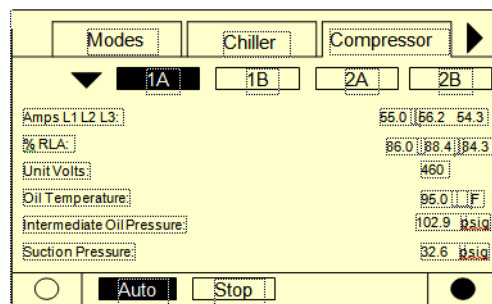


Table 58. Compressor screen

Description	Resolution	Units
Amps L1 L2 L3	XXX	Amps
% RLA L1 L2 L3	X.X	% RLA
Unit Volts	XXX	Volts
Oil Temperature	X.X	F / C
Intermediate Oil Pressure	X.X	Pressure
Suction Pressure	X.X	Pressure
Starts/ Run Hours	X, XX:XX	hr:min

Refrigerant Screen

The refrigerant screen displays those aspects of the chiller related to the refrigerant circuits.

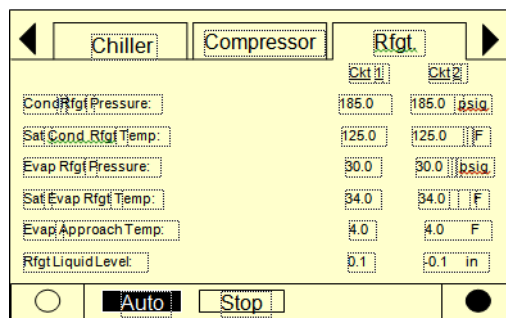


Table 59. Refrigerant screen

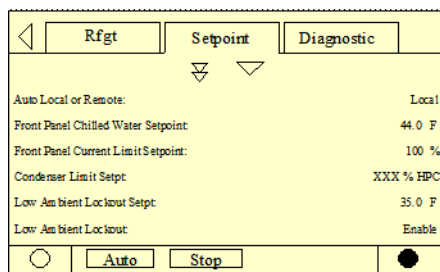
Description	Resolution	Units
Cond Rfgt Pressure Ckt1/Ckt2	X.X	Pressure
Sat Cond Rfgt Temp Ckt1/Ckt2	X.X	F / C
Evap Rfgt Pressure Ckt1/Ckt2	X.X	Pressure
Sat Evap Rfgt Temp Ckt1/Ckt2	X.X	F / C
Evap Approach Temp Ckt1/Ckt2	X.X	F / C
Rfgt Liquid Level Ckt1/Ckt2	X.X	Height

Setpoint Screen

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

In Screen 1 the language setpoint will always be the last setpoint in the list. This will facilitate language changes by placing that control in a standard position across all CH.530 product lines.

Screen 2 displays the current value of the chosen setpoint in the upper ½ of the display. It is displayed in a changeable format consistent with its type. Binary setpoints are considered to be simple two state enumeration and will use radio buttons. Analog setpoints are displayed as spin buttons. The lower half of the screen is reserved for help screens.


Table 60. Setpoint screen

Description	Resolution or Text	Units
Auto Local or Remote	Remote/Local	Text
Front Panel Chilled Water Setpoint	X.X	F / C
Front Panel Current Limit Setpoint	XXX	% RLA
Differential to Start	X.X	Temperature
Differential to Stop	X.X	Temperature
Condenser Limit Setpoint	Enable/Disable	Text
Low Ambient Lockout Setpoint	X.X	Temperature
Low Ambient Lockout	Enable/Disable	Text
Ice Build	Enable/Disable	Text
Front Panel Ice Termination Setpoint	X.X	Temperature
Comp 1A Pumpdown	Pumpdown/Abort	Text
Comp 1B Pumpdown	Pumpdown/Abort	Text
Comp 2A Pumpdown	Pumpdown/Abort	Text
Comp 2B Pumpdown	Pumpdown/Abort	Text
EXV Ckt 1 Open	Auto/Open	Text
EXV Ckt 2 Open	Auto/Open	Text
Front Panel Ckt 1 Lockout	Locked Out/Not Locked Out	Text
Front Panel Ckt 2 Lockout	Locked Out/Not Locked Out	Text
Ext Chilled Water Setpoint	X.X	F / C
Ext Current Limit Setpoint	XXX	% RLA
Date Format	mmm dd yyyy, dd mm yyyy	Text
Date		Text
Time Format	12 hr, 24 hr	Text
Time of Day		Text
Keypad/Display Lockout	Enable/Disable	Text
Display Units	SI, English	Text
Pressure Units	Absolute, Gauge	Text
Language Selection	Downloaded from TechView	Text

Table 61 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

Notes:

¹ Pumpdown procedure are discussed in Maintenance section 10.

² Used for liquid level control or to recover from pumpdown

Controls Interface

Table 61 Setpoint options/conditions displayed (continued)

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:

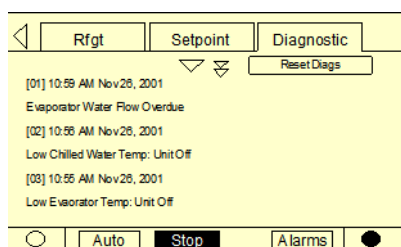
¹ Pumpdown procedure are discussed in Maintenance section 10.

² Used for liquid level control or to recover from pumpdown

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.

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 in the Diagnostic Section.

Power-Up

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

- First Screen, Version # of the Boot, full version # displayed.
 - This screen will display for 5 seconds before moving to second screen. Contrast is adjustable from this screen.
- 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"
- Third Screen, First screen of the Application, the Chiller Tab

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

English plus two alternate languages may be installed with DynaView and will reside in the main processor. English will always be available. Alternate languages must be installed using TechView, Software Download View.

TechView



TechView™ is the PC (laptop) based tool used for servicing Tracer CH530. Technicians that make any chiller control modification or service any diagnostic with Tracer CH530 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.



Controls Interface

Note: Important: Performing any Tracer CH530 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/DesignAnalysis/TechView.aspx?i=1435>)

This download site provides a user the TechView installation software and CH530 main processor software that must be loaded onto your PC in order to service a CH530 main processor. The TechView service tool is used to load software into the Tracer CH530 main processor

Minimum PC requirements to install and operate TechView

- Microsoft Windows XP Professional, Windows Vista Business or Windows 7 Enterprise
- Internet Explorer 6.0 or higher
- USB 2.0 or higher
- Pentium II, III or higher processor
- 128Mb RAM minimum for TechView, 1G recommended for total Windows system
- 1024 x 768 resolution of display
- CD-ROM (optional for copying TechView install to CD)
- 56K modem (optional for Internet connection)
- 9-pin RS-232 serial connection (optional for connection to DynaView)

Note: TechView was designed for the preceding listed laptop configuration. Any variation will have unknown results. Therefore, support for TechView is limited to only those operating systems that meet the specific configuration listed here. Only computers with a Pentium II class processor or better are supported; Intel Celeron, AMD, or Cyrix processors have not been tested.

TechView is also used to perform any CH530 service or maintenance function. Servicing a CH530 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

TechView Software Download, Installation

This information can also be found at <http://www.trane.com/COMMERCIAL/DesignAnalysis/TechView.aspx?i=1435>.

1. Create a folder called "CH530" on your (C:\CH530) on your hard drive. This \CH530 folder is the standard recommended location for the installation file. Storing the installation file in this location helps you remember where it is stored and makes it easier for technical support personnel to assist you.
2. Click the link for the latest version on the TechView Software Download page. Enter your name, e-mail address and other required information. Click **Submit**.
3. A download link will be sent to the e-mail address provided. Before you click the link please note:

- Sent link may only be used one time.
- Internet options must be set correctly to allow download. To verify correct setting:
 - Open Internet Explorer Browser
 - Click **Tools**
 - Select **Internet Options**
 - Select **Security** tab
 - Click on **Internet** zone
 - Click **Custom Level** button
 - Scroll to **Downloads** section
 - Verify/Enable "Automatic prompting for file downloads"
 - Click **OK**
 - Click YES on warning window
 - Click Apply, then OK

Note: If this setting is incorrect, you may or may not receive an error message during download attempt.

4. Click the download link in the e-mail message.
 - If the download window does not open immediately, please look for a yellow highlighted message bar/line near the top of your browser. It may contain a message such as "To help protect your security, Internet Explorer blocked this site from downloading files to your computer. Click here for options..." Click on message line to see options.
 - When dialog box appears, click **Save** and navigate to the CH530 folder created in [Step 1](#). Click OK.
 - If you do not complete the download successfully, you will have to request another download link ([Step 2](#)).
5. Navigate to the CH530 folder created in [Step 1](#). Double-click the installation (.exe) file. The License Agreement dialog box appears.
6. Click **I Agree** after reviewing License Agreement. The **Choose Components** dialog box appears. All components are selected by default. (These are the

Controls Interface

actual MP versions for all units.) Deselect any components you do not want.

Note: *De-selecting components reduces the size of the installed application.*

7. Click **Install**. A progress meter dialog box appears. An information file appears when installation is complete.

Note: *Techview requires a current version of JAVA. If you do not have the current release, TechView installation will be interrupted, and you will be provided with information for required JAVA software download. Once you have completed the JAVA installation, return to [Step 5](#) to restart installation.*

Unit View

Unit view is a summary for the system organized by chiller subsystem. This provides an overall view of chiller operating parameters and gives you an “at-a-glance” assessment of chiller operation.

The Control Panel tab displays important operating information for the unit and allows you to change several key operating parameters. The panel is divided into four or more sub-panels (depending on the number of circuits in the unit).

The Operating Mode tab displays the unit, circuit and compressor top level operating modes.

The Hours and Starts tab displays the number a hours (total) a compressor has run and the number of times the compressor has started. This window plays a key role in evaluating maintenance requirements.

Upon successful Local Connect Tech View will display UNIT VIEW, as shown in [Figure 36, p. 121](#).

Compressor Service View

Compressor View provides convenient access to service functions for pumping down circuits and test starting compressors. Various operational lockouts allow operation of rest of chiller while others are awaiting repair. See [Figure 37, p. 122](#).

Status View

Status View displays, in real time, all non-setpoint data organized by subsystem tabs. As data changes on the chiller it is automatically updated in Status View. See [Figure 38, p. 122](#).

Setpoint View

Setpoint view displays the active setpoints and allows you to make changes. See [Figure 39, p. 122](#).

Setpoint List

The center displays the scrollable list of setpoint panels.

Setpoint Enumeration Panel

A setpoint numeric panel contains a label with the setpoint description and a pull-down list showing the active value and the other selections. The Default button returns the setpoint to the product's factory setting. The text field is updated when the change is complete.

Setpoint Numeric Panel

A setpoint numeric panel contains a label with the setpoint description, a Default button, a text field with a unit label, and a slider.

The Default button changes the setpoint to the product's factory setting. The text field and slider are updated when the change is complete.

You can change a setpoint with the text field or with the slider. When you click on the entry field, the change setpoint dialog displays to coordinate the setpoint change.

You can change the display units for a setpoint by clicking on the unit label next to the entry field.

Change Setpoint

The change setpoint window allows you to enter a new value for the setpoint into a text field. If the entered value is outside the given range, the background turns red.

Table 62. Setpoints view items

Tab	Text	Min Value	Max Value	Default Value	Unit Type
Chiller	Front Panel Display Units	English, SI		English	Display Units
Chiller	Front Panel Chilled Water Setpoint	10 (-12.22)	65 (18.33)	44 (6.67)	Temp Deg F(C)
Chiller	Front Panel Current Limit Setpoint	60	120	120	Percent
Chiller	Differential to Stop	0.5 (0.2777)	2.5 (1.388)	2.0 (1.111)	Differential Temp Deg F(C)
Chiller	Differential to Start	1.0 (0.555)	30 (16.666)	2 (1.111)	Differential Temp Deg F(C)
Chiller	Leaving Water Temp Cutout	0.0 (-17.78)	36.0 (2.22)	36.0 (2.22)	Temp Deg F(C)

Table 62. Setpoints view items (continued)

Tab	Text	Min Value	Max Value	Default Value	Unit Type
Chiller	Low Refrigerant Temp Cutout	-5.0 (-20.56)	36.0 (2.22)	28.0 (-2.22)	Temp Deg F(C)
Chiller	Front Panel Condenser Limit Setpoint	80	120	90	Percent
Chiller	Low Ambient Lockout Setpoint	-10 (-23.333)	70 (21.111)	25 (-3.89)	Temp Deg F(C)
Chiller	Low Ambient Lockout	Enable, Disable		Enable	Enabled / Disabled
Chiller	Front Panel Ice Termination Setpoint	20 (-6.67)	31 (-0.56)	31 (-0.56)	Temp Deg F(C)
Chiller	External Ice Building Input	Enable, Disable		Disable	Enabled / Disabled
Chiller	Under/Over Voltage Protection	Enable, Disable		Disable	Enabled / Disabled
Chiller	Local Atmospheric Pressure	9.93 (68.5)	16.0 (110.3)	14.7 (101.3)	Absolute Pressure psia(Kpa)
Chiller	Design Delta Temperature	4 (2.22)	30 (16.666)	10 (5.6)	Differential Temp Deg F(C)
Chiller	Reset Type	None, Return, Outdoor, Constant Return		None	RstTyp
Chiller	Return Reset Ratio	10	120	50	Percent
Chiller	Return Start Reset	4.0 (2.22)	30.0 (16.666)	10.0 (5.56)	Differential Temp Deg F(C)
Chiller	Return Maximum Reset	0	20 (11.11)	5.0 (2.78)	Differential Temp Deg F(C)
Chiller	Outdoor Reset Ratio	-80	80	10	Percent
Chiller	Outdoor Start Reset	50 (10)	130 (54.44)	90 (32.22)	Temp Deg F(C)
Chiller	Outdoor Maximum Reset	0	20 (11.11)	5 (2.78)	Differential Temp Deg F(C)
Chiller	External Chilled Water Setpoint	Enable, Disable		Disable	Enabled / Disabled
Chiller	External Current Limit Setpoint	Enable, Disable		Disable	Enabled / Disabled
Chiller	Evaporator Water Pump Off Delay	0	30	1	Minutes
Chiller	Chilled Water Setpoint Filter Settling Time	30	1800	200	Seconds
Chiller	Compressor Staging Deadband	0.4 (0.222)	4.0 (2.222)	0.05 (0.2778)	Differential Temp Deg F(C)

Diagnostics View

See [Figure 40, p. 122](#). This window lists the active and inactive (history) diagnostics. There can be up to 60 diagnostics, both active and historic. For example, if there were 5 active diagnostics, the possible number of historic diagnostics would be 55. You can also reset active diagnostics here, (i.e., transfer active diagnostics to history and allow the chiller to regenerate any active diagnostics).

Resetting the active diagnostics may cause the chiller to resume operation.

The Active and History diagnostics have separate tabs. A button to reset the active diagnostics displays when either tab is selected.

Configuration View

See [Figure 41, p. 123](#). This view displays the active configuration and allows you to make changes.

Configuration View allows you to define the chiller's components, ratings, and configuration settings. These

are all values that determine the required installed devices, and how the chiller application is run in the main processor. For example, a user may set an option to be installed with Configuration View, which will require devices to be bound using Binding View. And when the main processor runs the chiller application, the appropriate steps are taken to monitor required inputs and control necessary outputs.

Any changes made in the Configuration View, on any of the tabs, will modify the chiller configuration when you click on the Load Configuration button (located at the base of the window). The Load Configuration button uploads the new configuration settings into the main processor.

Any changes made to the configuration will change the unit model number and the confirmation code (CRC). If changes are made to the unit configuration the new model number and CRC should be recorded.

Selecting the Undo All button will undo any configuration setting changes made during the present TechView connection and since the last time the Load Configuration button was selected.

Controls Interface

Table 63. Configuration View Items

Tab	Item	Default	Description
Feature	Basic Product Line		RTAC - Air Cooled Series R Chiller
			120 Nominal Tons
	Unit Nominal Capacity		130 Nominal Tons
			140 Nominal Tons
			155 Nominal Tons
			170 Nominal Tons
			185 Nominal Tons
			200 Nominal Tons
			225 Nominal Tons
			250 Nominal Tons
			275 Nominal Tons
			300 Nominal Tons
			350 Nominal Tons
			375 Nominal Tons
			400 Nominal Tons
			450 Nominal Tons
			500 Nominal Tons
	Unit Voltage		A - 200V/60Hz/3Ph power
			C - 230V/60Hz/3Ph power
			J - 380V/60Hz/3Ph power
			D - 400V/50Hz/3Ph power
			4 - 460V/60Hz/3Ph power
	Manufacturing Location		5 - 575V/60Hz/3Ph power
			U - Water Chiller Business Unit - Pueblo
	Design Sequence		E - Epinal Business Unit -Charmes
			XX - Factory/ABU Assigned
	Unit Type		N - Standard Efficiency/Performance
			H - High Efficiency/Performance
			A - Extra Efficiency/Performance
	Agency Listing		N - No agency listing
			U - C/UL listing
	Pressure Vessel Code		A - ASME pressure vessel code
			C - Canadian code
			D - Australian code
			L - Chinese code
			R - Vietnamese code
			S - Special
	Evaporator Temperature Range & Application Type		F - Standard Temperature with Freeze Protection
			R - Rem Evap, Std Temp, No Freeze Protection
			G - Low Temp, with Freeze Protection
	Evaporator Configuration		N - Standard 2 pass arrangement, insulated
			P -3 pass arrangement, insulated
	Condenser Temperature Range		N - Standard ambient 25-115°F
			H - High ambient 25-125°F
			L - Low ambient 0-115°F
			W - Wide ambient 0-125°F
	Condenser Fin Material		1 - Standard aluminum slit fins
			2 - Copper fins, non-slit fins
			4 - Complete Coat aluminum fins
Feature	Condenser Fan/Motor Configuration		T - Standard fans, TEAO motors
			W - Low Noise fans
	Compressor Motor Starter Type		X - Across-the-line
			Y - Wye-delta closed transition
	Incoming Power Line Connection		1 -Single point
			2 -Dual point (1/ckt)
Feature	Power Line Connection Type		T - Terminals only
			D - Non-fused disconnect switch(es)
			C - Circuit Breaker(s), HACR-rated
Feature	Unit Operator Interface		D -Dyna-View



Controls Interface

Table 63. Configuration View Items (continued)

Tab	Item	Default	Description
	Remote Interface		N - No remote interface C - Tracer Comm 3 interface B - BACnet communication interface L - Lon Talk Communication interface (LCI)
	Control Input Accessories/Options		N - No remote input R - Remote leaving water temp setpoint C - Remote current limit setpoint B - Remote leaving temp setpoint and remote current limit setpoint
	Control Output Accessories/Options		N - No output options A - Alarm relay C - Icemaking D - Icemaking and alarm relay
	Short Circuit Rating		0 - No short circuit withstand rating 5 - Default short circuit rating 6 - High amp short circuit rating
	Control Panel Accessories		N - No convenience outlet A - 15A 115V convenience outlet (60HZ)
	Refrigerant Service Valves		0 - No suction services valves 1 - Suction service valves
	Compressor Sound Attenuator Option		0 - No sound attenuator 1 - Factory installed sound attenuator
	Appearance Options		N - No appearance options A - Architectural louvered panels C - Half Louvers P - Painted unit L - Painted unit with full louvered panels H - Painted unit with half louvered panels K - Painted unit with access guards W - Painted w/access guards and half louvers
	Features Installation Accessories		N - No installation accessories R - Neoprene Isolators F - Flanged water connection kit G - Neoprene isolators and flange wtr conn kit
	Factory Test		0 - No factory run test
	Control, Label, and Literature Language		E - English G - Chinese
	Special Order		X - Standard catalog configuration S - Unit has special order feature
Custom	Comm 3 ICS address	55	1-64 REM = C
	Status Relay #1 J2-10,11,12	Alarm - Latching	None, Alarm - Latching (Active diagnostic persistence latching), Alarm - Auto reset (Active diagnostic persistence non-latching), Alarm (Active diagnostic persistence latching or non-latching), Alarm Ckt1 (Active diagnostic persistence latching or non-latching), Alarm Ckt2 (Active diagnostic persistence latching or non-latching), Chiller Limit Mode (With 20 minute filter), Circuit 1 Running, Circuit 2 Running, Max Capacity COOP = A, D or X
	Status Relay #2 J2-7,8,9	Chiller Running	
	Status Relay #3 J2-4,5,6	Maximum Capacity	
	Status Relay #4 J2-1,2,3	Chiller Limit Mode	
	Phase Unbalance Trip	30	10-50%
	Phase Unbalance Grace Period	90	30-255 Sec
	Maximum Acceleration Time	3	1-255 Sec
	Starter Feature	All Enabled	Contactors Integrity Test, Phase Reversal Detect, Phase Unbalance Detect
	External Chilled Water Setpoint Detection	2-10 VD	2-10 VDC, 4-20 mA CIOP = C or B
	External Current Limit Water Setpoint Detection	2-10 VDC	2-10 VDC, 4-20 mA CIOP = C or B
	Custom Unit Voltage	400	380,400,415 VOLT = D
Name-plate	<ul style="list-style-type: none"> The Model Number field contains the model number stored in the DynaView. The Confirm Code field contains the confirm code stored in the DynaView. The confirm code is a four-digit hex value that is a mathematical calculation of the model number. This number has one to one correlation to a specific model number and is used to verify that the model was entered properly. The Serial Number field contains the serial number stored in the DynaView. This model number and confirmation code must be know when the main processor requires replacement. 		

Controls Interface

Software View

See [Figure 42, p. 123](#). Software view allows you to verify the version of chiller software currently running and download a new version of chiller software to DynaView.

You can also add up to two available languages to load into the DynaView. Loading an alternate language file allows the DynaView to display its text in the selected alternate language, English will always be available.

Binding View

See [Figure 43, p. 123](#). Binding View allows you to assess the status of the network and all the devices connected as a whole, or the status of individual devices by using status icons and function buttons.

Binding View is essentially a table depicting what devices and options are actually discovered on the network bus (and their communication status) versus what is required to support the configuration defined by the feature codes and categories. Binding View allows you to add, remove, modify, verify, and reassign devices and options in order to match the configuration requirements.

Whenever a device is installed, it must be correctly configured to communicate and function as intended. This process is called binding. Some features of Binding View are intended to serve a second purpose; that is diagnosing problems with communication among the devices.

Replacing or Adding Devices

If a device is communicating but incorrectly configured, it might not be necessary to replace it. If the problem with the device is related to communication, attempt to rebind it, and if the device becomes correctly configured, it will then communicate properly.

If a device that needs to be replaced is still communicating, it should be unbound. Otherwise, it will be necessary to rebuild the CH530 network image for Binding View to discover that it has been removed. An unbound device stops communicating and allows a new device to be bound in its place.

It is good practice to turn the power off while detaching and attaching devices to the CH530 network. Be sure to keep power on the service tool computer. After power is restored to the CH530 network, the reconnect function in Binding View restores communication with the network. If the service tool computer is turned off, you must restart TechView and Binding View.

If a device is not communicating, the binding function displays a window to request manual selection of the device to be bound. Previously-selected devices are deselected when the function starts. When manual selection is confirmed, exactly one device must be selected; if it is the correct type, it is bound. If the desired device cannot be selected or if multiple devices are accidentally selected, you can close the manual selection window by clicking on No and repeat the bind function.

Figure 36. Unit view

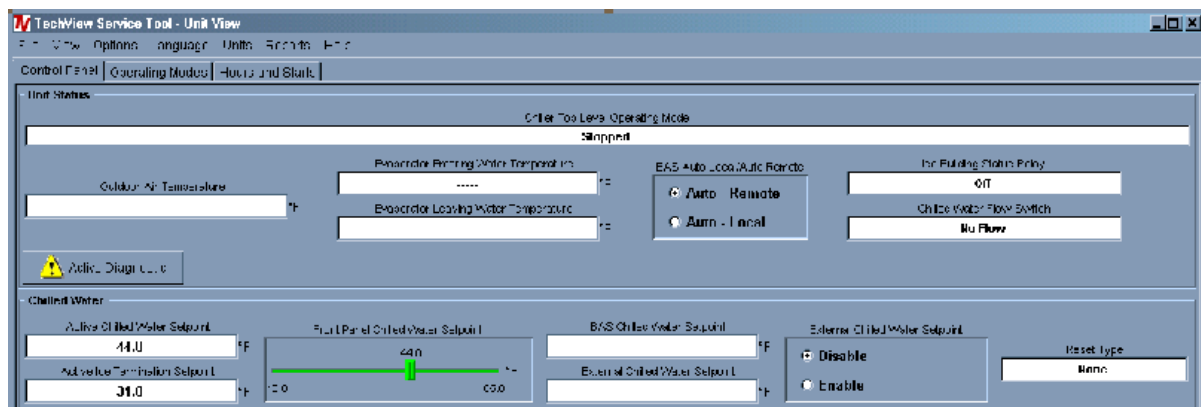


Figure 37. Compressor service view

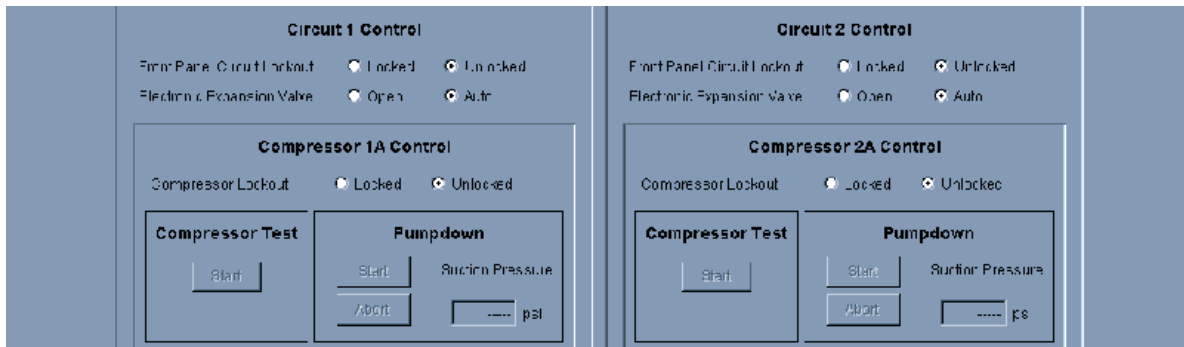


Figure 38. Status view

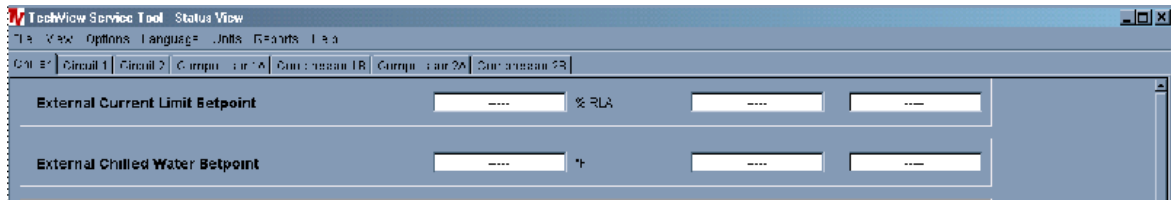
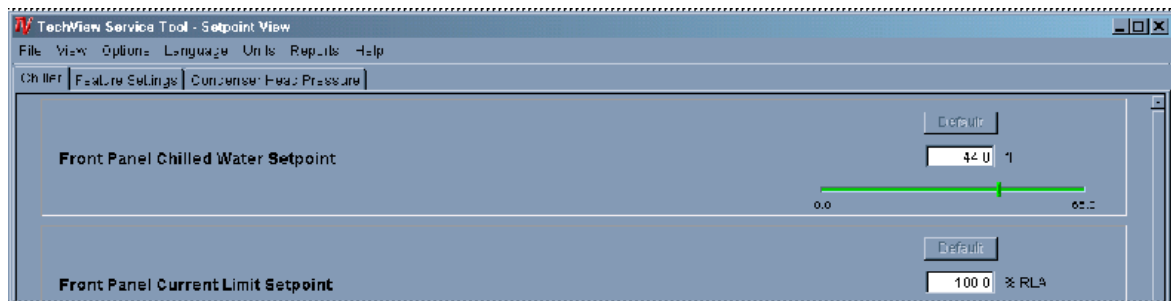
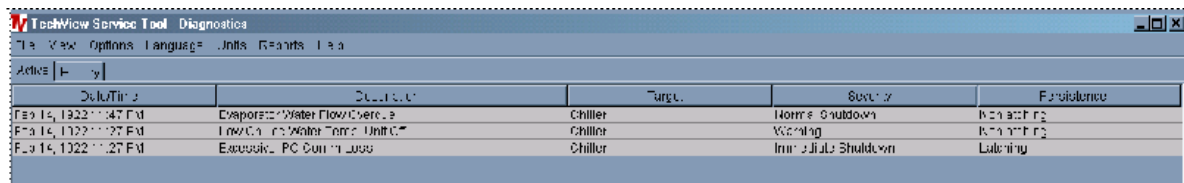


Figure 39. Setpoint view^(a)



(a) Screen shot is representation only. Values shown may not correspond to actual min/max levels in [Table 62, p. 117](#).

Figure 40. Diagnostic view



Date/Time	Description	Target	Status	Prevalence
Fri 14, 10:22:11:47 PM	Evaporator Water Flow Overload	Chiller	Normal Shutdown	Rebooting
Fri 14, 10:22:11:27 PM	Low Chilled Water Temp. Unit C	Chiller	Warning	Rebooting
Fri 14, 10:22:11:27 PM	Evaporator PC Control Loss	Chiller	Internal Shutdown	Waiting

Controls Interface

Figure 41. Configuration view

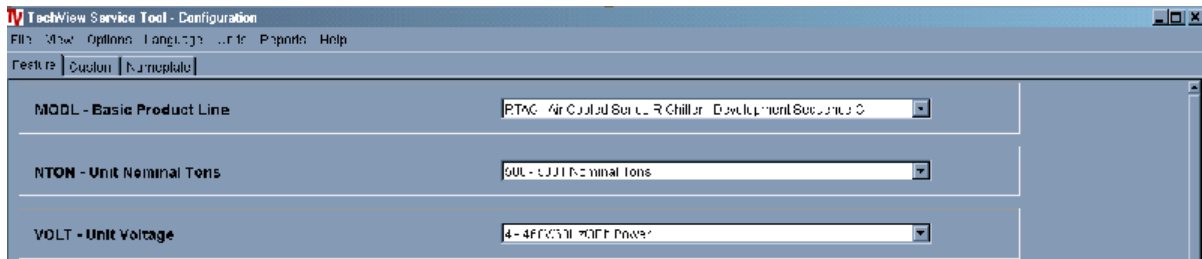


Figure 42. Software view

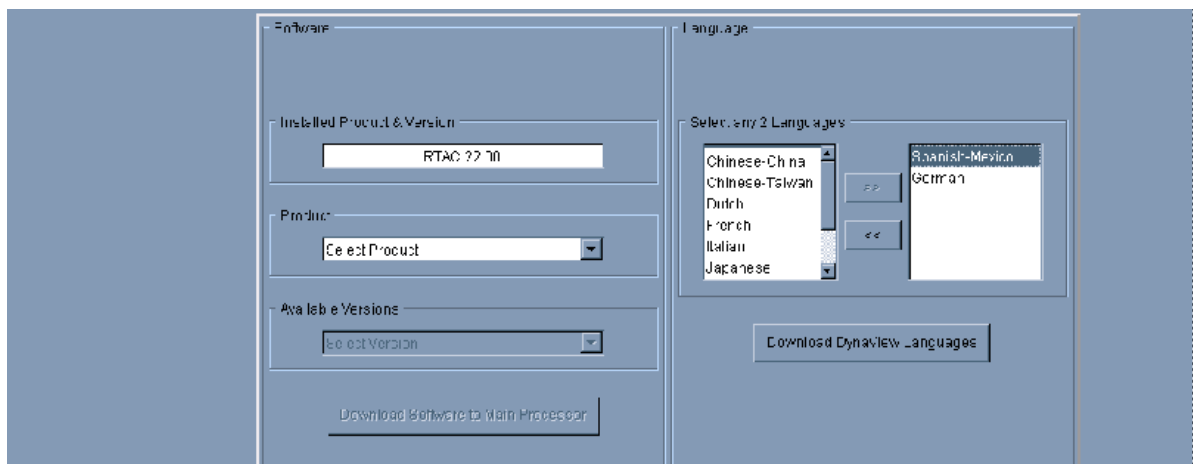


Figure 43. Binding view





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.

Note: For any installation violations of this manual, use Non-Compliance form PROD-ADF001-EN.

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

NOTICE:

Proper Water Treatment!

The use of untreated or improperly treated water in this equipment could result in scaling, erosion, corrosion, algae or slime. It is recommended that the services of a qualified water treatment specialist be engaged to determine what water treatment, if any, is required. Trane assumes no responsibility for equipment failures which result from untreated or improperly treated water, or saline or brackish water.

NOTICE:

Equipment Damage!

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

- Flush all water piping before making final connections to the unit.
- 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.
- Apply heat tape and insulation, as necessary, to protect all exposed piping from freeze-up.

Electrical Wiring

⚠ WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

NOTICE:

Use Copper Conductors Only!

Unit terminals are not designed to accept other types of conductors. Failure to use copper conductors could result in equipment damage.

- 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 evaporator heaters.
- Connect power supply wiring to the chilled water pump.
- Connect power supply wiring to any auxiliary heat tapes.
- Connect the flow switch and then connect to the proper terminals.

Pre-Start Checkout

- Connect the chilled water pump 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.

NOTICE:

Equipment Damage!

Chilled Water Pump Interlock and External Auto/Stop must be adhered to or equipment damage could 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.

General

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

⚠ WARNING

Hazardous Service Procedures!

The maintenance and troubleshooting procedures recommended in this manual could result in exposure to electrical, mechanical or other potential safety hazards. Always refer to the safety warnings provided throughout this manual concerning these procedures. Unless specified otherwise, disconnect all electrical power including remote disconnect and discharge all energy storing devices such as capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been trained in handling live electrical components perform these tasks. Failure to follow all of the recommended safety warnings provided, could result in death or serious injury.

NOTICE:

Equipment Damage!

Verify all connections are made. Loose connections could result in overheating and under-voltage conditions at the compressor motor.

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

NOTICE:

Compressor Damage!

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.

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 2%.
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.

NOTICE:

Compressor Damage!

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.

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.

NOTICE:

Proper Water Treatment!

The use of untreated or improperly treated water in this equipment could result in scaling, erosion, corrosion, algae or slime. It is recommended that the services of a qualified water treatment specialist be engaged to determine what water treatment, if any, is required. Trane assumes no responsibility for equipment failures which result from untreated or improperly treated water, or saline or brackish water.

NOTICE:

Equipment Damage!

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



Pre-Start Checkout

NOTICE:

Water Born Debris!

To prevent evaporator or condenser damage, pipe strainers must be installed in the water supplies to protect components from water born debris. Trane is not responsible for equipment-only-damage caused by water born debris.

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.
10. Check for adequate oil level in oil separator or oil sump.

Note: If no oil is found in the sump, contact Pueblo Technical Service before starting compressor.

11. Reapply power to complete procedures.
12. Prove all Interlock and Interconnecting Wiring Interlock and External as described in the Electrical Installation section.
13. Check and set, as required, all CH530 menu items.
14. Stop the chilled water pump.
15. Energize compressor and oil separator heaters 24 hours prior to unit start-up.

Unit Voltage Power Supply

NOTICE:

Equipment Damage!

Provide adequate voltage to the unit. Failure to do so could result in control components malfunction, and shorten the life of relay contact, compressor motors and contactors.

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.

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 is 2%. Voltage imbalance is determined using the following calculations:

$$\% \text{ Imbalance} = [(V_x - V_{ave}) \times 100] / V_{ave}$$

$$V_{ave} = (V1 + V2 + V3) / 3$$

V_x = 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

NOTICE:

Equipment Damage!

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.

Proper rotation of the compressors must 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.

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. It is determined by the direction of rotation of the alternator. For clockwise rotation, phase sequence is called "ABC"; for 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.

Pre-Start Checkout

⚠ WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

1. Press the STOP key on the CH530.
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).
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."
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). Re-close the main power disconnect and recheck the phasing.

NOTICE:

Compressor Damage!

Do not interchange any load leads that are from the unit contactors or the motor terminals. Doing so could result in damage to 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.

CH530 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.



Unit Start-Up Procedures

Daily Unit Start-Up

The time line for sequence of operation is shown in [Figure 44, p. 130](#) and [Figure 45, p. 132](#) 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 CH530TechView and building automation system are controlling the chilled water pump, the manual unit start sequence is as follows. Operator actions are noted.*

NOTICE:

Compressor Damage!

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

General

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

1. Press the STOP key on the CH530.
2. As necessary, adjust the setpoint values in the CH530 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 (back seated) before starting the compressors.

NOTICE:

Compressor Damage!

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

5. 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.

6. Verify that the chilled water pump runs for at least one minute after the chiller is commanded to stop (for normal chilled water systems).

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 CH530TechView. 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 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 sub-cooling, liquid level control and unit operating pressures.*

3. Measure the system sub cooling.
4. A shortage of refrigerant is indicated if operating pressures are low and sub cooling is also low. If the operating pressures, sight glass, superheat and sub-cooling 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.

NOTICE:

Equipment Damage!

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 could result in overcharging the circuit.

Use only refrigerants specified on the unit nameplate (HFC 134a) and Trane OIL00048. 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.

Unit Start-Up Procedures

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.
7. Check the adjustment and operation of each safety and operating control.
8. Close all disconnect switches.
9. Refer to the sequence for daily unit startup for the remainder of the seasonal startup.
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".

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 (back seated).

NOTICE:

Compressor Damage!

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.

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.

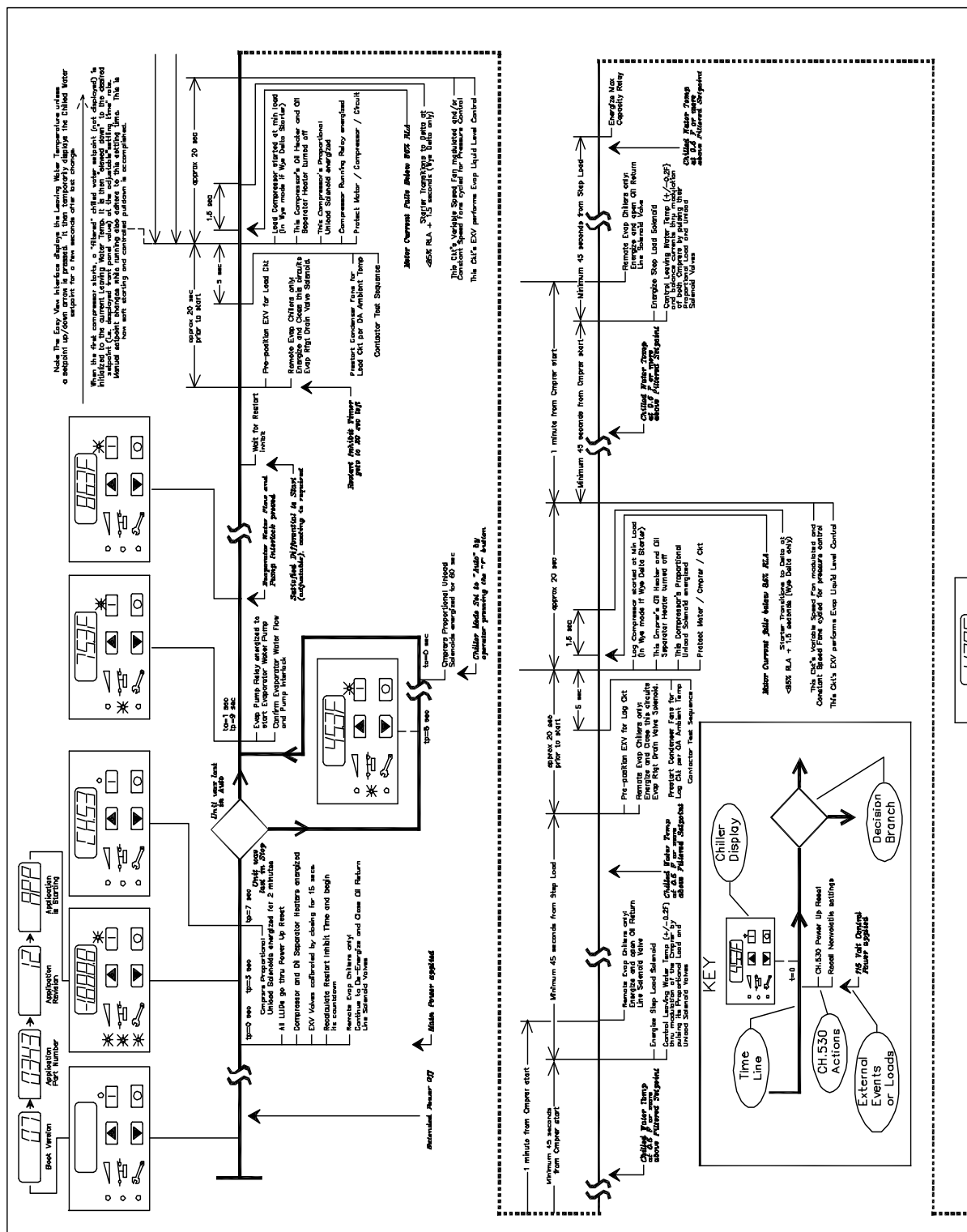
NOTICE:

Proper Water Treatment!

The use of untreated or improperly treated water in this equipment could result in scaling, erosion, corrosion, algae or slime. It is recommended that the services of a qualified water treatment specialist be engaged to determine what water treatment, if any, is required. Trane assumes no responsibility for equipment failures which result from untreated or improperly treated water, or saline or brackish water.

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

Figure 44. Sequence of operations



Unit Start-Up Procedures

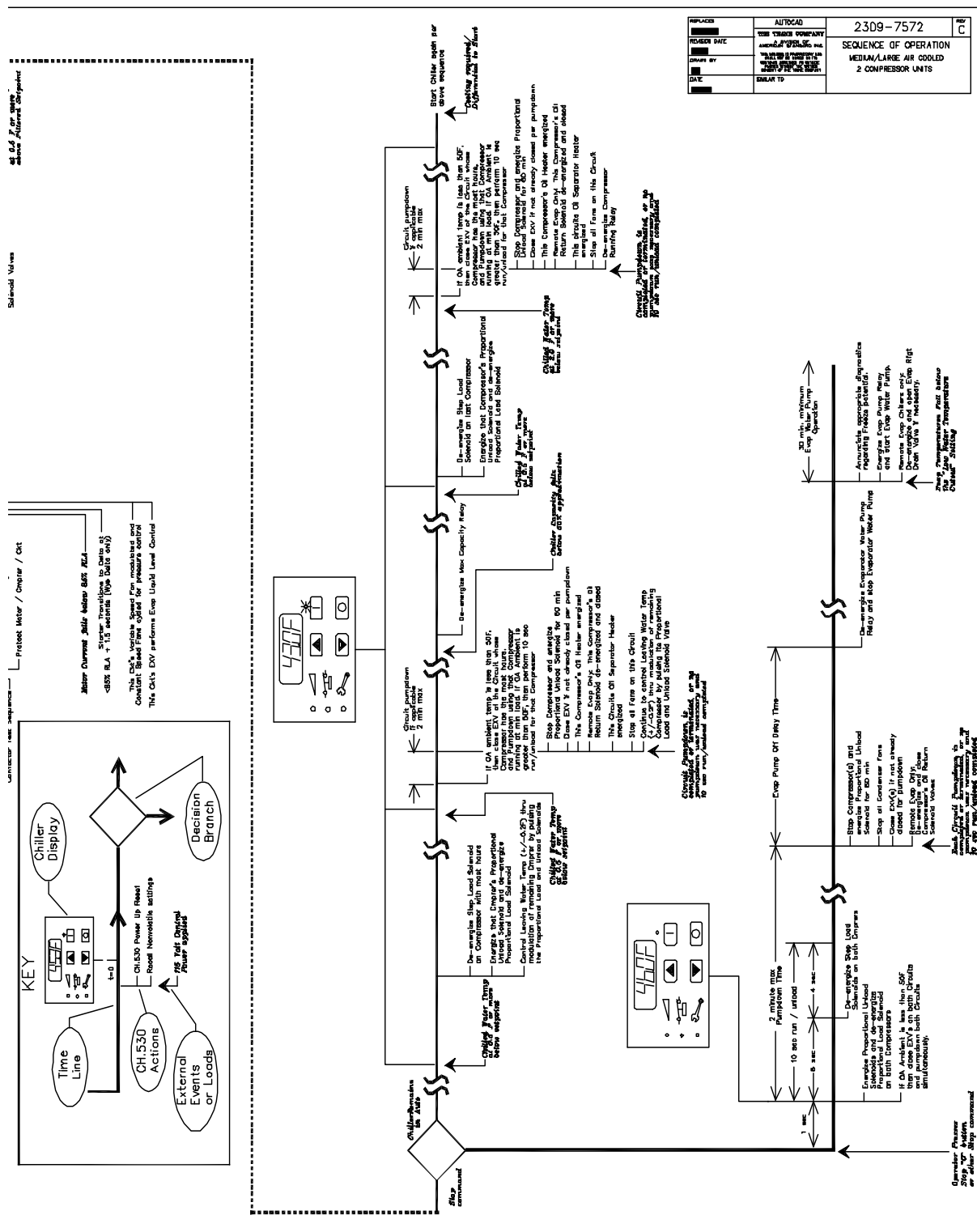
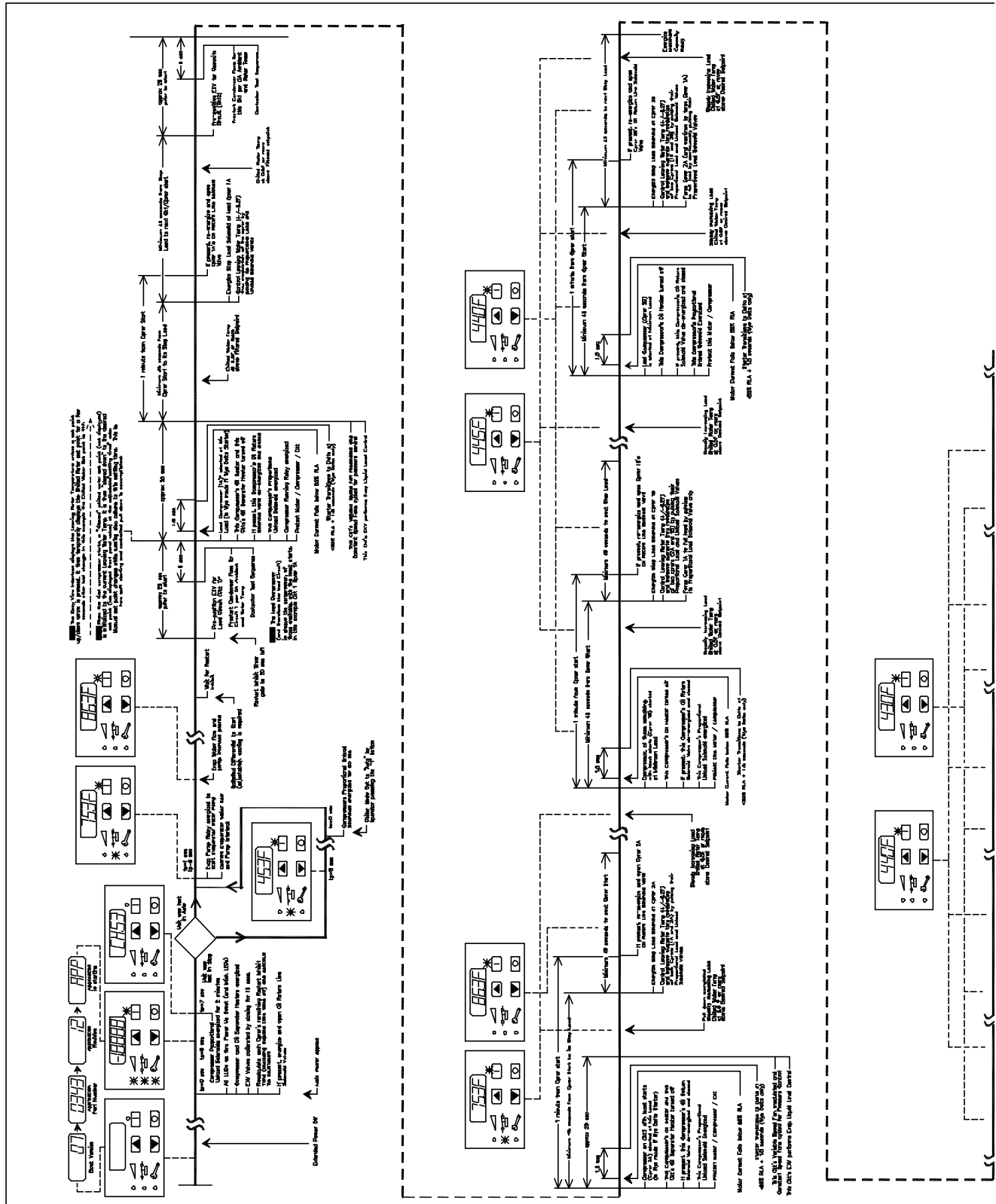
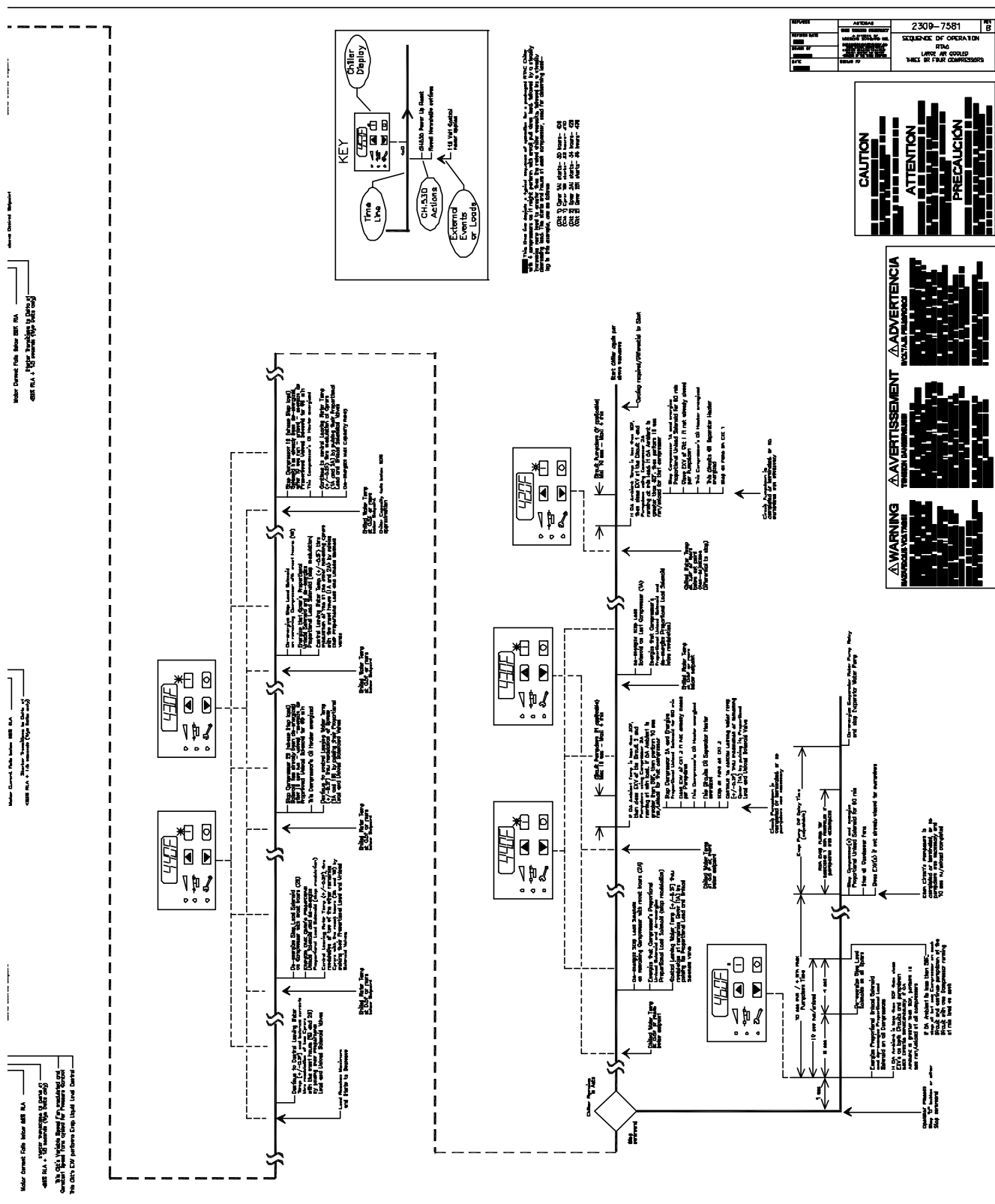


Figure 45. Sequence of operations



Unit Start-Up Procedures





Shutdown

Temporary Shutdown And Restart

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

1. Press the STOP key on the CH530. The compressors will continue to operate and, after an unloading period (which may be followed by pump-down cycle in outdoor ambients below 50°F), will stop when the compressor contactors de-energize.
2. CH530 pump control will turn off the pump (after a minimum 1 min. delay) when the STOP key is pressed and automatically restart the pump when the unit starts normally.
3. The unit will start normally, provided the following conditions exist:
 - a. The CH530 receives a call for cooling and the differential-to-start is above the setpoint.
 - b. 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.

NOTICE:

Equipment Damage!

To prevent pump damage, lock the chilled water pump disconnects open.

3. Close all chilled water supply valves. Drain the water from the evaporator.
4. With the water drained from evaporator, the "customer provided" power for the 120-volt evaporator heaters (terminated at 1TB4...terminals 1 & 2) must be must disconnect.

These heaters consist of 1 well heater in each evaporator end (or water box), and the heat tape, which is wrapped around the bundle itself. They are energized by a Klixon temperature control mounted on the side of the evaporator, which energizes at or below 37°F. outside air temp. If there is no liquid in the evaporator and the temp drops below 37 degrees, both of the well heaters will burn up because they have no liquid to transfer their heat into.

5. 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.

NOTICE:

Equipment Damage!

If insufficient concentration or no glycol is used, the evaporator water pumps must be controlled by the CH530 to avoid severe damage to the evaporator due to freezing. A power loss of 15 minutes during freezing can damage the evaporator. It is the responsibility of the installing contractor and/or the customer to ensure that a pump will start when called upon by the chiller controls.

Please consult [Table 27, p. 53](#) for correct concentration of glycol.

The warranty will be void, in case of freezing due to the lack of use of either of these protections

NOTICE:

Equipment Damage!

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.

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

Maintenance

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 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 unit does not operate properly during maintenance inspections, see "Diagnostics and Troubleshooting".

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

Weekly Maintenance

While unit is running in stable conditions.

1. Check MP 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 sub cooling entering the EXV. The sub cooling should never be less than 4 °F under any circumstances.

Important: *A clear sight glass alone does not mean that the system is properly charged. Also check the rest of the 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 sub cooling.
3. 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 oil is not required. Use an oil analysis to determine condition of 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 safety controls, and to inspect electrical components for deficiencies.
5. Inspect all piping components for leakage and damage. Clean out any in-line strainers.

6. Clean and repaint any areas that show signs of corrosion.
7. Clean the condenser coils.

WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

8. Check and tighten all electrical connections as necessary.



Maintenance

RTAC Start-up Test Log				
Job Name		Job Location		
Model #				
CRC #		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:		ckt1/ckt2
Vendor ID #/ Model #:		Machine CH.530 pressure		ckt1/ckt2
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: _____

Maintenance

RTAC Chiller Log						
Job Name			Job Location			
Model #			Serial #			
Status View: *						
Chiller Tab:	15 min	30 min	45 min	15 min	30 min	45 min
Operating Mode						
Outdoor Air Temperature <i>F or C</i>						
Active Chill Water Setpoint <i>F or C</i>						
Active Current Limit Setpoint						
Evaporator Entering Water Temp. <i>F or C</i>						
Evaporator Leaving Water Temp. <i>F or C</i>						
	Circuit 1 Tab			Circuit 2 Tab		
External Hardwired Lockout	Not Locked out/ Locked out			Not Locked out/ Locked out		
Front Panel Lockout	Not Locked out/ Locked out			Not Locked out/ Locked out		
	15 min	30 min	45 min	15 min	30 min	45 min
AirFlow %						
Inverter Speed %						
Condenser Refrigerant Pressure <i>psig/kPa</i>						
Saturated Condenser Rfqt. Temp. <i>F or C</i>						
Differential Refrigerant Pressure <i>psid/kPa</i>						
Evaporator Refrigerant Pressure <i>psig/kPa</i>						
Saturated Evaporator Rfqt Temp. <i>F or C</i>						
EXV Position %						
Evaporator Rfqt Liquid Level <i>inches/mm</i>						
	Compressor 1A Tab			Compressor 1B Tab		
Operating Mode						
Hours	Hrs/mins			Hrs/mins		
Starts						
	15 min	30 min	45 min	15 min	30 min	45 min
Phase A - B Voltage <i>volts</i>						
Average Line Current <i>%RLA</i>						
Line 1 current <i>amps</i>						
Line 2 current <i>amps</i>						
Line 3 current <i>amps</i>						
Line 1 current <i>%RLA</i>						
Line 2 current <i>%RLA</i>						
Line 3 current <i>%RLA</i>						
Evaporator Oil Return Solenoid	open / closed	open / closed	open / closed	open / closed	open / closed	open / closed
Supply Oil Temperature <i>F or C</i>						
Intermediate Oil Pressure <i>psig/kPa</i>						
Female Step solenoid	load / unload	load / unload	load / unload	load / unload	load / unload	load / unload
High Pressure Cutout switch	Good / Tripped	Good / Tripped	Good / Tripped	Good / Tripped	Good / Tripped	Good / Tripped
Comments:						

	Compressor 2A Tab			Compressor 2B Tab		
Operating Mode						
Hours	Hrs/mins			Hrs/mins		
Starts						
	15 min	30 min	45 min	15 min	30 min	45 min
Phase A - B Voltage <i>volts</i>						
Average Line Current <i>%RLA</i>						
Line 1 current <i>amps</i>						
Line 2 current <i>amps</i>						
Line 3 current <i>amps</i>						
Line 1 current <i>%RLA</i>						
Line 2 current <i>%RLA</i>						
Line 3 current <i>%RLA</i>						
Evaporator Oil Return Solenoid	open / closed	open / closed	open / closed	open / closed	open / closed	open / closed
Supply Oil Temperature <i>F or C</i>						
Intermediate Oil Pressure <i>psig/kPa</i>						
Female Step solenoid	load / unload	load / unload	load / unload	load / unload	load / unload	load / unload
High Pressure Cutout switch	Good / Tripped	Good / Tripped	Good / Tripped	Good / Tripped	Good / Tripped	Good / Tripped
Comments:						

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 personnel should service the chiller.

Some symptoms of a refrigerant under-charged unit:

- Low sub cooling
- Higher than normal discharge superheat
- 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)
- High condenser + sub-cooler pressure drop

Some symptoms of a refrigerant over-charged unit:

- High sub cooling
- 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

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
- Erratic liquid level control
- Low unit capacity
- Low discharge superheat (especially at high loads)
- Low liquid level diagnostics
- 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

R-134a Field Charging Procedure

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

⚠ WARNING

Hazardous Voltage w/Capacitors!

Disconnect all electric power, including remote disconnects and discharge all motor start/run capacitors before servicing. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. For variable frequency drives or other energy storing components provided by Trane or others, refer to the appropriate manufacturer's literature for allowable waiting periods for discharge of capacitors. Verify with an appropriate voltmeter that all capacitors have discharged. Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.

For additional information regarding the safe discharge of capacitors, see PROD-SVB06A-EN

Factory Refrigerant Charging Procedure (Initial)

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 from the entire system in the event of repair.

1. As part of automatic vacuum/charge procedure, verify that the EXVs are OPEN.
2. Attach vacuum hoses to evaporator service valves (one per circuit). Open service valves.

3. Attach charging hoses to the charging port on the liquid line filter (one per circuit). The filters contain a port with a 1/4" (6mm) flare.
4. Begin semi-automatic vacuum procedure.
5. When vacuum is complete (indicated), manually isolate the unit from vacuum.
6. Charge unit through the filter housing port per [Table 1, p. 11](#) through [Table 10, p. 20](#).
7. When charging is complete, shut evaporator service valve and disconnect vacuum and charging hoses.

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.

NOTICE:

Evaporator Damage!

Water must be flowing through the evaporator during the entire charging process to avoid freezing and rupturing of the evaporator tubes. Charge first with vapor to avoid freezing tubes.

If insufficient concentration or no glycol is used, the evaporator water pumps must be controlled by the CH530 to avoid severe damage to the evaporator due to freezing. A power loss of 15 minutes during freezing can damage the evaporator. It is the responsibility of the installing contractor and/or the customer to ensure that a pump will start when called upon by the chiller controls.

Please consult [Table 27, p. 53](#) for correct concentration of glycol.

The warranty will be void, in case of freezing due to the lack of use of either of these protections.

1. Note the weight of the amount of charge removed. Compare it to [Table 1, p. 11](#) through [Table 10, p. 20](#). 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 sub cooling in the liquid line, charge should be added until sufficient sub cooling is achieved.

1. Attach charging hose to evaporator service valve (3/8" (9mm) flare). Open service valve.
2. Add 10 pounds of refrigerant (R-134a) charge.

Maintenance

3. Close valve, remove charging hose and start unit. Monitor sub cooling.
4. If sub cooling is still insufficient, return to step #1.

Note: Proper sub cooling can be determined from run log history, service experience, or by contacting Trane technical service.

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 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. In compressor service view, select pump down for the required circuit.
 - Chilled water pump commanded on
 - All fans will turn on
 - EXV will open 100%
 - Oil return line solenoid (if included) will open
 - Unit will start at minimum load
 - Unit will run until one of the following occurs:
 - Pump down timer registers a maximum of 4 minutes (single compressor circuit) or 8 minutes (manifolded compressor circuit)
 - Suction pressure as read from the transducer on single compressor circuit, or lower of the two transducers on a manifolded circuit, falls below 20 psia
 - Monitor pressure with a suction gauge
5. When unit trips, the discharge check valve will close.
6. Close discharge isolation valve.
7. Close oil line shut off valve.
8. Recover the remainder of the refrigerant.

Note: Remaining vapor can be recovered/stored in the high side of the system. Be certain to follow proper recovery procedures to avoid introduction of non-condensing gases.

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

Table 64. Charge holding capabilities on high side

Nominal Circuit Capacity	Nominal Circuit Charge lb	Condenser Charge Holding Capacity @ 60% full 90° ambient lb	Charge in Oil Separator lb	% Oil Separator Level
70	165	118.1	46.9	97.7
85	175	134.3	40.7	86.0
100	215	163.7	51.3	56.0
120	225	187.9	37.1	41.2
170	365	203.4	161.6	100.0%
200	415	282.0	133	86.1 %
240	460	325.6	134.4	86.9 %

Note: Circuit varies slightly with efficiency and unit configuration

Note: Units with a design sequence of A0 did not have enough capacity in the condenser to hold the entire charge. Table 64. lists the amount of charge that would flood the oil separator if the charge was isolated in the high side. 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 (ensure water is flowing in the evaporator prior to opening the EXV).
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. Ensure the UCM is powered so the pump may be energized if it detects a freeze condition.
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 under some conditions 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

Maintenance

charge in the condenser. It may be connected to the condenser drain port on the liquid line isolation valve.

Notes: *If a pump is to be used, connect it before closing this valve. This port is only isolated when the valve is back seated. If a vacuum pump is used, 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.

Refrigerant Filter Replacement 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 sub cooling 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 hose to service port on liquid line filter flange.
3. Evacuate refrigerant from liquid line and store.
4. Remove 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.

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.

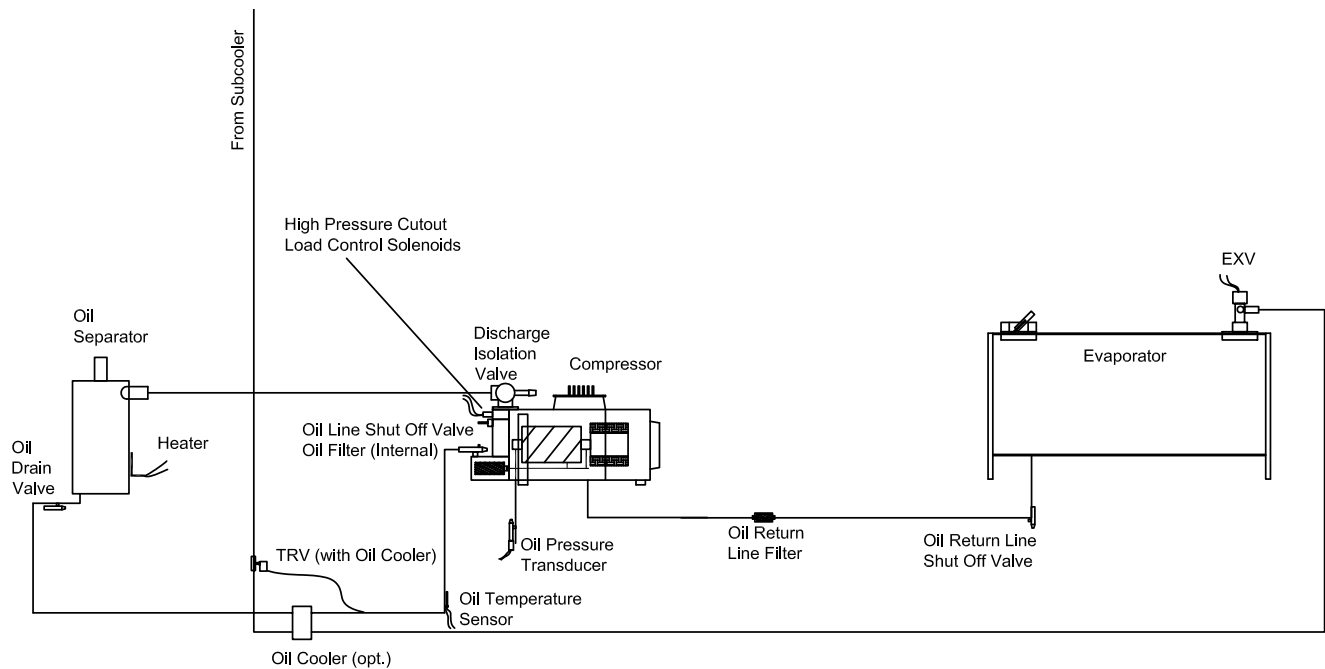
Like many machines, an excessive oil charge can cause operational problems. Special care should always be taken to avoid adding extra oil.

Units that exhibit the symptoms of an oil overcharge at high loads may still run fine at light loads. An oil overcharged unit may result in an evaporator limit warning or even a low liquid level or low evap temp (LRTC) diagnostic. An oil overcharged unit may exhibit increased approach temperatures and decreased overall unit efficiency.

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 instant 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 46. Oil system schematic



Oil system consists of the following components:

- Compressor
- Oil separator
- Discharge line with service valve
- Oil line from separator to compressor
- Oil line drain (lowest point in system)
- Oil cooler - optional
- 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 and strainer

Refer to [Table 1, p. 11](#) through [Table 10, p. 20](#) for the standard oil charge for each circuit.

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

Maintenance

Table 65. Oil charging data

Circuit (Tons)	Approximate sump oil level after running "normal" conditions (in)	Normal quantity of oil in refrigeration system (evaporator/condenser) lb (gal)
70	7	1.1 (0.14)
85	6	1.1 (0.14)
100	7	1.8 (0.23)
120	7	1.8 (0.23)
170	8	3.5 (0.44)
200	8	3.5 (0.44)
240	8	3.5 (0.44)

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 level is measured from the bottom of the separator and 1" must be subtracted for the thickness of the bottom plate.

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, 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.

4. If the isolation valves is closed, then the charge may be trapped in the evaporator. In either case, the high side of the system should not be pressurized.
5. The oil line shut off valve must be open to allow the oil to pass into the oil lines and the oil separator.

6. 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.
7. 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.
8. Oil may be put into the unit using either of two methods:
 - 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 the oil charging fitting and submerge 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.

NOTICE:

Equipment Damage!

Use only Trane OIL00048 in the RTAC units to avoid any catastrophic damage to the compressor or unit.

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.
- 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,



Maintenance

simply replace the oil that was removed into the serviced component prior to vacuum and recharge of the refrigerant.

If oil was removed from the compressor only to service a compressor or change the oil 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.

NOTICE:

Compressor Damage!

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-condensing 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 for installation of the tubes from the end of the evaporator opposite the control panel end.

The following units will need to have the circuit 2 control panel removed to replace tubes in the evaporator.

- 30' Base - 3 compressor units
- 36' Base - 3 compressor units
- 45' Base - 4 compressor units

NOTICE:

Equipment Damage!

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 and improper operation of the system.

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.

⚠ WARNING

Hazardous Voltage!

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Failure to disconnect power before servicing could result in death or serious injury.

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

Maintenance

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.

Condenser Maintenance

Condenser Coil Cleaning

⚠ WARNING

Hazardous Chemicals!

Coil cleaning agents can be either acidic or highly alkaline and can burn severely if contact with skin occurs. Handle chemical carefully and avoid contact with skin. **ALWAYS** wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices. Failure to follow all safety instructions could result in death or serious injury.

Clean the condenser coils at least once a year or more frequently if the unit is in a "dirty" environment. A clean condenser coil will help to maintain chiller operating efficiency. Follow the detergent manufacturer's instructions to avoid damaging the condenser coils.

To clean the condenser coils use a soft brush and a sprayer such as a garden pump type or a high-pressure type. A high quality detergent such as Trane Coil Cleaner (Part No. CHM-00255) is recommended.

Refer to RTAC-SVG01B-EN for maintenance and cleaning procedures.

If detergent mixture is strongly alkaline (pH value greater than 8.5, an inhibitor must be added).

Travel Restraint

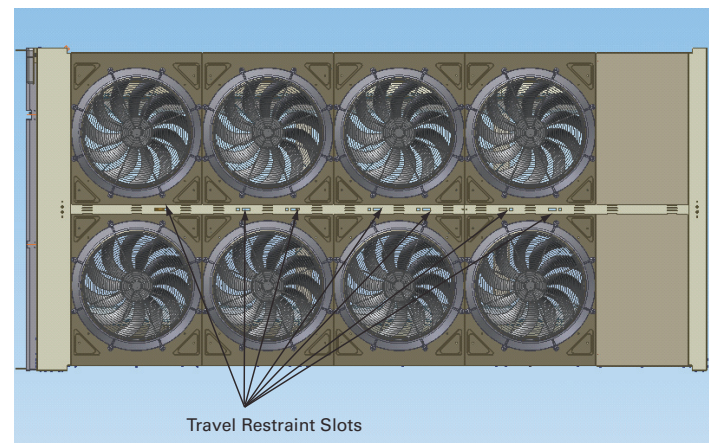
⚠ WARNING

Falling Off Equipment!

This unit is built with fall restraint slots located on unit top that **MUST** be used during servicing. These slots are to be used with fall restraint equipment that will not allow an individual to reach the unit edge. However such equipment will **NOT** prevent falling to the ground, for they are **NOT** designed to withstand the force of a falling individual. Failure to use fall restraint slots and equipment could result in individual falling off the unit which could result in death or serious injury.

This unit is built with travel restraint slots located on unit top that must be used during servicing. See [Figure 47](#).

Figure 47. Roof view - travel restraint slots





Diagnostics

Legend to Diagnostics Table

Legacy Hex Code: 3 digit hexadecimal code used on all past products to uniquely identify diagnostics.

Diagnostic Name and Source: Name of Diagnostic and its source. Note that this is the exact text used in the User Interface and/or Service Tool displays.

Affects Target: Defines the “target” or what is affected by the diagnostic. Usually either the entire **Chiller**, or a particular **Circuit or Compressor** is affected by the diagnostic (the same one as the source), but in special cases functions are modified or disabled by the diagnostic. **None** implies that there is no direct affect to the chiller, sub components or functional operation. If the affects also includes the term **Easy View Interlock**, that implies that this particular item is handled as an “interlock” annunciation in conjunction with the EasyView, instead of a diagnostic.

Severity: Defines the severity of the above effect. **Immediate** means immediate shutdown of the effected portion, **Normal** means normal or friendly shutdown of the effected portion, **Special Mode** means a special mode of operation (limp along) is invoked, but without shutdown, and **Info** means an Informational Note or Warning is generated.

Persistence: Defines whether or not the diagnostic and its effects are to be manually reset (Latched), or can be either manually or automatically reset (Non-latched).

Active Modes [Inactive Modes]: States the modes or periods of operation that the diagnostic is active in and, as necessary, those modes or periods that it is specifically not active in as an exception to the active modes. The inactive modes are enclosed in brackets, []. Note that the modes used in this column are internal and not generally annunciated to any of the formal mode displays

Criteria: Quantitatively defines the criteria used in generating the diagnostic and, if nonlatching, the criteria for auto reset. If more explanation is necessary a hot link to the Functional Specification is used.

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** or **Remote**. 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.

Help Text: Provides for a brief description of what kind of problems might cause this diagnostic to occur. Both control system component related problems as well as chiller application related problems are addressed (as can possibly be anticipated). These help messages will be updated with accumulated field experience with the chillers.

Starter Diagnostics

Table 66. Starter diagnostics

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Motor Current Overload - 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
Motor Current Overload - Compressor 1B	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
Motor Current Overload - Compressor 2A	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
Motor Current Overload - Compressor 2B	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
Over Voltage	Chiller	Normal	Non-latch	Pre-Start and Any Ckt(s) Energzd	Nom. trip: 60 seconds at greater than 112.5%, 2.5%, Auto Reset at 109% or less.	Remote
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 (See Nonlatching Power Loss Diagnostic for all three phases lost while running). Must hold = 20% RLA. Must trip = 5% RLA. Time to trip shall be longer than guaranteed reset on Starter Module at a minimum, 3 seconds maximum. Actual design trip point is 10%. The actual design trip time is 2.64 seconds. b) If Phase reversal protection is enabled and current is not sensed on one or more current x former inputs. Logic will detect and trip in a maximum of 0.3 second from compressor start.	Local

Diagnostics

Table 66. Starter diagnostics (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Phase Loss - Compressor 1B	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 (See Nonlatching Power Loss Diagnostic for all three phases lost while running). Must hold = 20% RLA. Must trip = 5% RLA. Time to trip shall be longer than guaranteed reset on Starter Module at a minimum, 3 seconds maximum. Actual design trip point is 10%. The actual design trip time is 2.64 seconds. b) If Phase reversal protection is enabled and current is not sensed on one or more current x former inputs. Logic will detect and trip in a maximum of 0.3 second from compressor start	Local
Phase Loss - Compressor 2A	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 (See Nonlatching Power Loss Diagnostic for all three phases lost while running). Must hold = 20% RLA. Must trip = 5% RLA. Time to trip shall be longer than guaranteed reset on Starter Module at a minimum, 3 seconds maximum. Actual design trip point is 10%. The actual design trip time is 2.64 seconds. b) If Phase reversal protection is enabled and current is not sensed on one or more current x former inputs. Logic will detect and trip in a maximum of 0.3 second from compressor start	Local
Phase Loss - Compressor 2B	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 (See Nonlatching Power Loss Diagnostic for all three phases lost while running). Must hold = 20% RLA. Must trip = 5% RLA. Time to trip shall be longer than guaranteed reset on Starter Module at a minimum, 3 seconds maximum. Actual design trip point is 10%. The actual design trip time is 2.64 seconds. b) If Phase reversal protection is enabled and current is not sensed on one or more current x former inputs. Logic will detect and trip in a maximum of 0.3 second from compressor start	Local
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 in a maximum of .3 second from compressor start.	Local
Phase Reversal - Compressor 1B	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 in a maximum of .3 second from compressor start.	Local
Phase Reversal - Compressor 2A	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 in a maximum of .3 second from compressor start.	Local
Phase Reversal - Compressor 2B	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 in a maximum of .3 second from compressor start.	Local

Diagnostics

Table 66. Starter diagnostics (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
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. Design: Less than 10% RLA, trip in 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
Power Loss - Compressor 1B	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. Design: Less than 10% RLA, trip in 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.	Remote
Power Loss - Compressor 2A	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. Design: Less than 10% RLA, trip in 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.	Remote
Power Loss - Compressor 2B	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. Design: Less than 10% RLA, trip in 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.	Remote
Severe Current Imbalance - Compressor 1A	Circuit	Immediate	Latch	All Running Modes	A 30% Current Imbalance has been detected on one phase relative to the average of all 3 phases for 90 continuous seconds.	Local
Severe Current Imbalance - Compressor 1B	Circuit	Immediate	Latch	All Running Modes	A 30% Current Imbalance has been detected on one phase relative to the average of all 3 phases for 90 continuous seconds.	Local
Severe Current Imbalance - Compressor 2A	Circuit	Immediate	Latch	All Running Modes	A 30% Current Imbalance has been detected on one phase relative to the average of all 3 phases for 90 continuous seconds.	Local
Severe Current Imbalance - Compressor 2B	Circuit	Immediate	Latch	All Running Modes	A 30% Current Imbalance has been detected on one phase relative to the average of all 3 phases for 90 continuous seconds.	Local
Starter 1A 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 at the Current Transformers.	Local
Starter 1B 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 at the Current Transformers.	Local
Starter 2A 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 at the Current Transformers.	Local
Starter 2B 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 at the Current Transformers.	Local

Diagnostics

Table 66. Starter diagnostics (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Starter Contactor Interrupt Failure - Compressor 2A	Chiller	Special Mode	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 Evap 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
Starter Contactor Interrupt Failure - Compressor 1A	Chiller	Special Mode	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 Evap 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
Starter Contactor Interrupt Failure - Compressor 1B	Chiller	Special Mode	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 Evap 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
Starter Contactor Interrupt Failure - Compressor 2B	Chiller	Special Mode	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 Evap 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
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. 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.	Local
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.	Local
Starter Did Not Transition - Compressor 2A	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.	Local
Starter Did Not Transition - Compressor 2B	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.	Local

Diagnostics

Table 66. Starter diagnostics (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
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 1M is closed first at start, then one of the other contactors is shorted.	Local
Starter Fault Type I - Compressor 1B	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 1M is closed first at start, then one of the other contactors is shorted.	Local
Starter Fault Type I - Compressor 2A	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 1M is closed first at start, then one of the other contactors is shorted.	Local
Starter Fault Type I - Compressor 2B	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 1M is closed first at start, then one of the other contactors is shorted.	Local
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 S is energized at Start, then 1M 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
Starter Fault Type II - Compressor 1B	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 S is energized at Start, then 1M 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
Starter Fault Type II - Compressor 2A	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 S is energized at Start, then 1M 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
Starter Fault Type II - Compressor 2B	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 S is energized at Start, then 1M 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
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
Starter Fault Type III - Compressor 1B	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
Starter Fault Type III - Compressor 2A	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
Starter Fault Type III - Compressor 2B	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

Diagnostics

Table 66. Starter diagnostics (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Transition Complete Input Opened - Compressor 1A	Cprsr	Immediate	Latch	All running modes	The Transition Complete input was found to be opened 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
Transition Complete Input Opened - Compressor 1B	Cprsr	Immediate	Latch	All running modes	The Transition Complete input was found to be opened 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
Transition Complete Input Opened - Compressor 2A	Cprsr	Immediate	Latch	All running modes	The Transition Complete input was found to be opened 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
Transition Complete Input Opened - Compressor 2B	Cprsr	Immediate	Latch	All running modes	The Transition Complete input was found to be opened 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
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
Transition Complete Input Shorted - Compressor 1B	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
Transition Complete Input Shorted - Compressor 2A	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
Transition Complete Input Shorted - Compressor 2B	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
Under Voltage	Chiller	Normal	Non-latch	Pre-Start and Any Ckt(s) Energized	Nom. trip: 60 seconds at less than 87.5%, 2.8% at 200V 1.8% at 575V, Auto Reset at 90% or greater.	Remote

Main Processor Diagnostics

Table 67. Main processor diagnostics

Diagnostic Name	Affects Target	Severity	Persist-ence	Active Modes		Criteria	Reset Level
				[Inactive Modes]			
BAS Communication Lost	None	Special	Non-latch	All		The BAS was setup as "installed" at the MP and the Comm 3 IIld lost communications with the BAS for 15 contiguous minutes after it had been established. Refer to Section on Setpoint Arbitration to determine how setpoints and operating modes may be effected by the comm loss. The chiller follows the value of the Tracer Default Run Command which can be previously written by Tracer and stored as nonvolatile by the MP (either use local or shutdown).	Remote
BAS Failed to Establish Communication	None	Special	Non-latch	At power-up		The BAS was setup as "installed" and the BAS did not communicate with the MP within 15 minutes after power-up. Refer to Section on Setpoint Arbitration to determine how setpoints and operating modes may be effected. Note: The original requirement for this was 2 minutes, but was implemented at 15 minutes for RTAC.	Remote
Check Clock	Chiller	Info	Latch	All		The real time clock had detected loss of its oscillator at some time in the past. Check / replace battery? This diagnostic can be effectively cleared only by writing a new value to the chiller's time clock using the TechView or DynaView's "set chiller time" functions.	Remote
Condenser Fan Variable Speed Drive Fault - Circuit 1 (Drive 1)	All inverters on this circuit	Special Mode	Latch	Prestart and Running w/ Variable Spd 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 4 th 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
Condenser Fan Variable Speed Drive Fault - Circuit 1 Drive 2	All inverters on this circuit	Special Mode	Latch	Prestart and Running w/ Variable Spd 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 4 th 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
Condenser Fan Variable Speed Drive Fault - Circuit 2 (Drive 1)	All inverters on this circuit	Special Mode	Latch	Prestart and Running w/ Variable Spd 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 4 th 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
Condenser Fan Variable Speed Drive Fault - Circuit 2 (Drive 2)	All inverters on this circuit	Special Mode	Latch	Prestart and Running w/ Variable Spd 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 4 th 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
Condenser Refrigerant Pressure Transducer - Circuit 1	Circuit	Immediate	Latch	All		Bad Sensor or LLID	Remote
Condenser Refrigerant Pressure Transducer - Circuit 2	Circuit	Immediate	Latch	All		Bad Sensor or LLID	Remote
Emergency Stop	Chiller	Immediate	Latch	All		a. 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

Diagnostics

Table 67. Main processor diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persist-ence	Active Modes [Inactive Modes]	Criteria	Reset Level
Evaporator Entering Water Temperature Sensor	Chilled Water Reset	Info	Latch	All	Bad Sensor or LLID a. Normal operation, no effects on control. b. Chiller shall remove any Return or Constant Return Chilled Water Reset, if it was in effect. Apply slew rates per Chilled Water Reset spec.	Remote
Evaporator Leaving Water Temperature Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID	Remote
Evaporator Liquid Level Sensor - Circuit 1	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Evaporator Liquid Level Sensor - Circuit 2	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Evaporator Rfgt Drain - Circuit 1	Circuit	NA	Latch	Circuit non-running modes [Drain Valve commanded closed]	This diagnostic is effective only with Remote Evap units. The liquid level of the respective evaporator was not seen to be below the level of -21.2 mm within 5 minutes of the commanded opening of its Drain Valve Solenoid. The diagnostic will not be active if the drain valve is commanded closed.	Remote
Evaporator Rfgt Drain - Circuit 2	Circuit	NA	Latch	Circuit non-running modes [Drain Valve commanded closed]	This diagnostic is effective only with Remote Evap units. The liquid level of the respective evaporator was not seen to be below the level of -21.2 mm within 5 minutes of the commanded opening of its Drain Valve Solenoid Valve. The diagnostic will not be active if the drain valve is commanded closed.	Remote
Evaporator Water Flow (Entering Water Temp)	Chiller	Immediate Shutdown	Latching	Any Ckt Energized [No Ckts Energized]	The entering evaporator water temp fell below the leaving evaporator water temp by more than 2 F for 180 F-sec, minimum trip time 1 minute.	Remote
Evaporator Water Flow (High Approach Temperature)- Circuit 1	Chiller	Immediate Shutdown	Latching	Ckt Energized [Ckt Not Energized]	Large evaporator approach temps, low evap sat temps, and presence of liquid refrigerant, suggest this circuit is running with no or reversed evaporator water flow.	Remote
Evaporator Water Flow (High Approach Temperature)- Circuit 2	Chiller	Immediate Shutdown	Latching	Ckt Energized [Ckt Not Energized]	Large evaporator approach temps, low evap sat temps, and presence of liquid refrigerant, suggest this circuit is running with no or reversed evaporator water flow.	Remote
Evaporator Water Flow Lost	Chiller	Immediate	Non-Latch	Whenever Evap Pump is commanded on due to Auto mode and certain off-cycle diagnostics	a. The Evaporator water flow switch input was open for more than 6-10 sec (HV binary input) or 20-25* sec (for factory mtd low voltage binary input) b. This diagnostic does not de-energize the evap 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, (with the exception of pump override due to certain off-cycle diagnostics). * could be longer if water temps are rapidly changing warmer	Remote
Evaporator Water Flow Overdue	Chiller	Normal	Non-latch	Whenever Evap Pump is commanded on due to Auto mode and certain off-cycle diagnostics	Evaporator water flow was not proven within 4:15 (RTAC Rev 20 and earlier) or 20:00 (RTAC Rev 21) of the Evaporator water pump relay being energized. With SW Rev 17.0 and earlier, the diagnostic will de-energize the Evaporator 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) With SW Rev 18.0 and later, the pump command status will not be effected. In the case of certain "Off-cycle" diagnostics in which the pump is overridden to on, the delay to callout of the diagnostic is shortened to 4:15.	Remote
External Chilled Water Setpoint	None	Info	Non-latch	All	a. Function Not "Enabled": no diagnostics. b. "Enabled ": 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.	Remote
External Current Limit Setpoint	None	Info	Non-latch	All	a. Not "Enabled": no diagnostics. b. "Enabled ": 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.	Remote
High Differential Refrigerant Pressure - Circuit 1	Circuit	Normal	Latch	Cprsr Energized	The system differential pressure for the respective circuit was above 275 Psid for 2 consecutive samples or more than 10 seconds.	Remote

Diagnostics

Table 67. Main processor diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
High Differential Refrigerant Pressure - Circuit 2	Circuit	Normal	Latch	Cprsr Energized	The system differential pressure for the respective circuit was above 275 Psid for 2 consecutive samples or more than 10 seconds	Remote
High Evaporator Liquid Level - Circuit 1	Circuit	Normal	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 contiguous minutes while the compressor is running. (The diagnostic timer will hold, but not clear when the circuit is off). Design: 80% or more of bit count corresponding to +21.2 mm or more liquid level for 80 minutes)	Remote
High Evaporator Liquid Level - Circuit 2	Circuit	Normal	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 contiguous minutes while the compressor is running. (The diagnostic timer will hold, but not clear when the circuit is off). Design: 80% or more of bit count corresponding to +21.2 mm or more liquid level for 80 minutes)	Remote
High Evaporator Refrigerant Pressure	Chiller	Immediate	Non-latch	All	The evaporator refrigerant pressure of either circuit has risen above 190 psig. The evaporator water pump relay will be de-energized to stop the pump regardless of why the pump is running (and the chiller will be prevented from starting) The diagnostic will auto reset and the pump will return to normal control when all of the evaporator pressures fall below 185 psig. The primary purpose is to stop the evaporator water pump and its associated pump heat from causing refrigerant side pressures, close to the evaporator relief valve setting, when the chiller is not running, such as could occur with Evap Water Flow Overdue or Evaporator Water Flow Loss Diagnostics.	Remote
High Evaporator Water Temperature	Chiller	Info and Special Action (Pre RTAC Refresh Rev 39)	Non-Latch	Only effective if either 1)Evap Wtr Flow Overdue, 2)Evap Wtr Flow Loss, or 3)Low Evap Rfgt Temp,-Unit Off, diagnostic is active.	The leaving water temperature exceeded the high evap water temp limit (TV service menu settable -default 105F) for 15 continuous seconds. The evaporator water pump relay will be de-energized to stop the pump but only if it is running due to one of the diagnostics listed on the left. The diagnostic will auto reset and the pump will return to normal control when the temperature falls 5 F below the trip setting. The primary purpose is to stop the evaporator water pump and its associated pump heat from causing excessive waterside temperatures and waterside pressures when the chiller is not running but the evap pump is on due to either Evap Water Flow Overdue, Evaporator Water Flow Loss, or Low Evap Temp - Unit Off Diagnostics. This diagnostic will not auto clear solely due to the clearing of the enabling diagnostic.	Remote
High Evaporator Water Temperature	Chiller	Immediate Shutdown (Beginning with RTAC Refresh Rev 39)	Latch	Only effective if either 1)Evap Wtr Flow Overdue 2)Evap Wtr Flow Loss, or 3)Low Evap Rfgt Temp,-Unit Off, diagnostic is active.	The leaving water temperature exceeded the high evap water temp limit (TV service menu settable -default 105F) for 15 continuous seconds, with one of the three diagnostics on the left already active. The evaporator water pump relay will be de-energized to stop the pump. The diagnostic can only be cleared by a manual reset and will clear regardless of the temperature. (although the diagnostic may reoccur based on the trip criteria). The primary purpose is to stop the evaporator water pump and its associated pump heat from causing excessive waterside temperatures (and waterside pressures) when the chiller is not running but the evap pump is on due to a pump override to "on" (as can be caused by a bad flow switches failure to close and prove flow).	Local
High Oil Temperature - Compressor 1B	Cprsr 1B	Immediate	Latch	All	The respective oil temperature as supplied to the compressor, exceeded 200 F for 2 consecutive samples or for over 10 seconds. Note: As part of the Compressor High Temperature Limit Mode (aka Minimum Limit), the running compressor's female load step will be forced loaded when its oil temperature exceeds 190F and returned to normal control when the oil temperature falls below 170 F.	Remote
High Oil Temperature - Compressor 2B	Cprsr 2B	Immediate	Latch	All	The respective oil temperature as supplied to the compressor, exceeded 200 F for 2 consecutive samples or for over 10 seconds. Note: As part of the Compressor High Temperature Limit Mode (aka Minimum Limit), the running compressor's female load step will be forced loaded when its oil temperature exceeds 190F and returned to normal control when the oil temperature falls below 170 F.	Remote

Diagnostics

Table 67. Main processor diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
High Oil Temperature - Compressor 1A	Cprsr 1A	Immediate	Latch	All	The respective oil temperature as supplied to the compressor, exceeded 200 F for 2 consecutive samples or for over 10 seconds. Note: As part of the Compressor High Temperature Limit Mode (aka Minimum Limit), the running compressor's female load step will be forced loaded when its oil temperature exceeds 190F and returned to normal control when the oil temperature falls below 170 F.	Remote
High Oil Temperature - Compressor 2A	Cprsr 2A	Immediate	Latch	All	The respective oil temperature as supplied to the compressor, exceeded 200 F for 2 consecutive samples or for over 10 seconds. Note: As part of the Compressor High Temperature Limit Mode (aka Minimum Limit), the running compressor's female load step will be forced loaded when its oil temperature exceeds 190F and returned to normal control when the oil temperature falls below 170 F.	Remote
High Pressure Cutout - Compressor 1A	Circuit	Immediate	Latch	All	A high pressure cutout was detected on Compressor 1A; trip at 315 ± 5 PSIG. 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
High Pressure Cutout - Compressor 1B	Circuit	Immediate	Latch	All	A high pressure cutout was detected on Compressor 1A; trip at 315 ± 5 PSIG. 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
High Pressure Cutout - Compressor 2A	Circuit	Immediate	Latch	All	A high pressure cutout was detected on Compressor 1A; trip at 315 ± 5 PSIG. 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
High Pressure Cutout - Compressor 2B	Circuit	Immediate	Latch	All	A high pressure cutout was detected on Compressor 1A; trip at 315 ± 5 PSIG. 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
Intermediate Oil Pressure Transducer - Compressor 1A	Cprsr 1A	Immediate	Latch	All	Bad Sensor or LLID	Remote
Intermediate Oil Pressure Transducer - Compressor 1B	Cprsr 1B	Immediate	Latch	All	Bad Sensor or LLID	Remote
Intermediate Oil Pressure Transducer - Compressor 2A	Cprsr 2A	Immediate	Latch	All	Bad Sensor or LLID	Remote
Intermediate Oil Pressure Transducer - Compressor 2B	Cprsr 2B	Immediate	Latch	All	Bad Sensor or LLID	Remote
Low Chilled Water Temp: Unit Off	Evap Pump	Special Mode	Non-latch	Unit in Stop Mode, or in Auto Mode and No Ckt(s) Energzd [Any Ckt Energzd]	The leaving Evaporator water temp. fell below the leaving water temp cutout setting for 30 degree F seconds while the Chiller is in the Stop mode, or in Auto mode with no compressors running. Energize Evap Water pump Relay until diagnostic auto resets, then return to normal evap pump control. Automatic reset occurs when the temp rises 2 F (1.1 C) above the cutout setting for 30 minutes.	Remote
Low Chilled Water Temp: Unit On	Chiller	Immediate and Special Mode	Non-latch	Any Ckt[s] Energzd [No Ckt(s) Energzd]	The evaporator 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 Evaporator Water Pump Output.	Remote
Low Differential Refrigerant Pressure - Circuit 1	Circuit	Immediate	Latch	Cprsr Energized	The system differential pressure for the respective circuit was below 35 Psid for more than 2000 Psid-sec with either a 1 minute (single cprsr circuit) or 2.5 minute (manifolded cprsr circuit) ignore time from the start of the circuit.	Remote
Low Differential Refrigerant Pressure - Circuit 2	Circuit	Immediate	Latch	Cprsr Energized	The system differential pressure for the respective circuit was below 35 Psid for more than 2000 Psid-sec with either a 1 minute (single cprsr circuit) or 2.5 minute (manifolded cprsr circuit) ignore time from the start of the circuit.	Remote

Diagnostics

Table 67. Main processor diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
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 contiguous minutes while the compressor is running. Design: 20% or less of bit count corresponding to -21.2 mm or less liquid level for 80 minutes)	Remote
Low Evaporator Liquid Level - Circuit 2	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 contiguous minutes while the compressor is running. Design: 20% or less of bit count corresponding to -21.2 mm or less liquid level for 80 minutes)	Remote
Low Evaporator Refrigerant Temperature - Circuit 1	Circuit	Immediate	Latch	All Ckt Running Modes	The inferred Saturated Evap Refrigerant Temperature (calculated from suction pressure transducer dropped below the Low Refrigerant Temperature Cutout Setpoint for 1125 F-sec with a 8 F-sec/sec max integral rate applied during circuit startup transient (or 4°F-s/s if manifolded and only one cprsr running) while the circuit was running early in the circuit's cycle. The minimum LRTC setpoint is -5 F (18.7 Psia) the point at which oil separates from the refrigerant. During the time that the trip integral is non zero, the unload solenoid(s) of the running compressors on the circuit, shall be energized continuously and the load solenoid shall be off. Normal load/unload operation will be resumed if the trip integral decays to zero by temps above the cutout setpoint. The integral is held as nonvolatile though power down, is continuously calculated, and can decay during the circuit's off cycle as conditions warrant.	Remote
Low Evaporator Refrigerant Temperature - Circuit 2	Circuit	Immediate	Latch	All Ckt Running Modes	The inferred Saturated Evap Refrigerant Temperature (calculated from suction pressure transducer dropped below the Low Refrigerant Temperature Cutout Setpoint for 1125 F-sec with a 8 F-sec/sec max integral rate applied during circuit startup transient (or 4°F-s/s if manifolded and only one cprsr running) while the circuit was running early in the circuit's cycle. The minimum LRTC setpoint is -5 F (18.7 Psia) the point at which oil separates from the refrigerant. During the time that the trip integral is non zero, the unload solenoid(s) of the running compressors on the circuit, shall be energized continuously and the load solenoid shall be off. Normal load/unload operation will be resumed if the trip integral decays to zero by temps above the cutout setpoint. The integral is held as nonvolatile though power down, is continuously calculated, and can decay during the circuit's off cycle as conditions warrant.	Remote
Low Evaporator Temp - Ckt 1: Unit Off	Evap Pump	Special Mode	Non-latch	Unit in Stop Mode, or in Auto Mode and No Ckt's Energzd [Any Ckt Energzd]	Any of the evap sat temps fell below the water temp cutout setting while the respective evap liquid level was greater than -21.2mm for 150 degree F seconds while Chiller is in the Stop mode, or in Auto mode with no compressors running. Energize Evap Water pump Relay until diagnostic auto resets, then return to normal evap pump control. Automatic reset occurs when either the evap temp rises 2 F (1.1 C) above the cutout setting or the liquid level falls below -21.2mm for 30 minutes	Remote
Low Evaporator Temp - Ckt 2: Unit Off	Evap Pump	Special Mode	Non-latch	Unit in Stop Mode, or in Auto Mode and No Ckt's Energzd [Any Ckt Energzd]	Any of the evap sat temps fell below the water temp cutout setting while the respective evap liquid level was greater than -21.2mm for 150 degree F seconds while Chiller is in the Stop mode, or in Auto mode with no compressors running. Energize Evap Water pump Relay until diagnostic auto resets, then return to normal evap pump control. Automatic reset occurs when either the evap temp rises 2 F (1.1 C) above the cutout setting or the liquid level falls below -21.2mm for 30 minutes	Remote
Low Oil Flow - Compressor 1A	Cprsr	Immediate	Latch	Cprsr Energized and Delta P above 35 Psid	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.: Acceptable range is 0.50 > (PC-PI) / (PC-PE) for the first 2.5 minutes of operation, and 0.25 > (PC-PI) / (PC-PE) thereafter,	Local
Low Oil Flow - Compressor 1B	Cprsr	Immediate	Latch	Cprsr Energized and Delta P above 35 Psid	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.: Acceptable range is 0.50 > (PC-PI) / (PC-PE) for the first 2.5 minutes of operation, and 0.25 > (PC-PI) / (PC-PE) thereafter,	Local

Diagnostics

Table 67. Main processor diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Low Oil Flow - Compressor 2A	Cprsr	Immediate	Latch	Cprsr Energized and Delta P above 35 Psid	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 35Psid.: Acceptable range is $0.50 > (PC-PI) / (PC-PE)$ for the first 2.5 minutes of operation, and $0.25 > (PC-PI) / (PC-PE)$ thereafter,.	Local
Low Oil Flow - Compressor 2B	Cprsr	Immediate	Latch	Cprsr Energized and Delta P above 35 Psid	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.: Acceptable range is $0.50 > (PC-PI) / (PC-PE)$ for the first 2.5 minutes of operation, and $0.25 > (PC-PI) / (PC-PE)$ thereafter,	Local
Low Suction Refrigerant Pressure - Circuit 1	Circuit	Immediate	Latch	Cprsr Prestart and Cprsr Energized	a. The Suction Refrigerant Pressure (or either of the compressor suction pressures) dropped below 10 Psia just prior to compressor start (after EXV preposition). b. The pressure fell below 16 Psia while running after the ignore time had expired, or fell below 10 Psia (or 5 Psia in sftw prior to Oct'02) 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
Low Suction Refrigerant Pressure - Circuit 2	Circuit	Immediate	Latch	Cprsr Prestart and Cprsr Energized	a. The Suction Refrigerant Pressure (or either of the compressor suction pressures) dropped below 10 Psia just prior to compressor start (after EXV preposition). b. The pressure fell below 16 Psia while running after the ignore time had expired, or fell below 10 Psia (or 5 Psia in sftw prior to Oct'02) 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
Low Suction Refrigerant Pressure - Cprsr 1B	Circuit	Immediate	Latch	Cprsr Prestart and Cprsr Energized	a. The Suction Refrigerant Pressure (or either of the compressor suction pressures) dropped below 10 Psia just prior to compressor start (after EXV preposition). b. The pressure fell below 16 Psia while running after the ignore time had expired, or fell below 10 Psia (or 5 Psia in sftw prior to Oct'02) 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
Low Suction Refrigerant Pressure - Cprsr 2B	Circuit	Immediate	Latch	Cprsr Prestart and Cprsr Energized	a. The Suction Refrigerant Pressure (or either of the compressor suction pressures) dropped below 10 Psia just prior to compressor start (after EXV preposition). b. The pressure fell below 16 Psia while running after the ignore time had expired, or fell below 10 Psia (or 5 Psia in sftw prior to Oct'02) 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
MP Application Memory CRC Error	Chiller	Immediate	Latch	All Modes	Memory error criteria TBD	Remote
MP: Could not Store Starts and Hours	None	Info	Latch	All	MP has determined there was an error with the previous power down store. Starts and Hours may have been lost for the last 24 hours.	Remote
MP: Invalid Configuration	None	Immediate	Latch	All	MP has an invalid configuration based on the current software installed	Remote
MP: Non-Volatile Block Test Error	None	Info	Latch	All	MP has determined there was an error with a block in the Non-Volatile memory. Check settings.	Remote
MP: Non-Volatile Memory Reformat	None	Info	Latch	All	MP has determined there was an error in a sector of the Non-Volatile memory and it was reformatted. Check settings.	Remote
MP: Reset Has Occurred	None	Info	Non-latch	All	The main processor has successfully come out of a reset and built its application. A reset may have been due to a power up, installing new software or configuration. This diagnostic is immediately and automatically cleared and thus can only be seen in the Historic Diagnostic List in TechView	Remote
Oil Flow Fault - Compressor 1A	Circuit	Immediate	Latch	Starter Contactor Energized [all Stop modes]	The Intermediate Oil Pressure Transducer for this cprsr is reading a pressure either above its respective circuit's Condenser Pressure by 15 Psia or more,, or below its respective Suction Pressure 10 Psia or more for 30 seconds continuously.	Local

Diagnostics

Table 67. Main processor diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Oil Flow Fault - Compressor 1B	Circuit	Immediate	Latch	Starter Contactor Energized [all Stop modes]	The Intermediate Oil Pressure Transducer for this cprsr is reading a pressure either above its respective circuit's Condenser Pressure by 15 Psia or more,, or below its respective Suction Pressure 10 Psia or more for 30 seconds continuously.	Local
Oil Flow Fault - Compressor 2A	Circuit	Immediate	Latch	Starter Contactor Energized [all Stop modes]	The Intermediate Oil Pressure Transducer for this cprsr is reading a pressure either above its respective circuit's Condenser Pressure by 15 Psia or more,, or below its respective Suction Pressure 10 Psia or more for 30 seconds continuously.	Local
Oil Flow Fault - Compressor 2B	Circuit	Immediate	Latch	Starter Contactor Energized [all Stop modes]	The Intermediate Oil Pressure Transducer for this cprsr is reading a pressure either above its respective circuit's Condenser Pressure by 15 Psia or more,, or below its respective Suction Pressure 10 Psia or more for 30 seconds continuously.	Local
Oil Temperature Sensor - Cprsr 1B	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
Oil Temperature Sensor - Cprsr 2B	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
Oil Temperature Sensor -Cprsr 1A	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
Oil Temperature Sensor -Cprsr 2A	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
Outdoor Air Temperature Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID. Note that if this diagnostic occurs, operational pump down will be performed regardless of the last valid temperature	Remote
Pump down Terminated - Circuit 1	None	Info	Non-latch	Pump down Mode	The pump down cycle for this circuit was terminated abnormally due to excessive time or due to a specific set of diagnostic criteria - but w/o associated latching diagnostics	Remote
Pump down Terminated - Circuit 2	None	Info	Non-latch	Pump down Mode	The pump down cycle for this circuit was terminated abnormally due to excessive time or due to a specific set of diagnostic criteria - but w/o associated latching diagnostics	Remote
Software Error 1001: Call Trane Service (beginning with Rev 29)				All	Reported if a compressor is found to be running without chilled water flow for three minutes. Previously, this error would be identified after five minutes.	
Software Error 1002: Call Trane Service (beginning with Rev 29)				All	Reported if state chart misalignment in stopped or inactive state occurs.	
Software Error 1003: Call Trane Service (beginning with Rev 29)				All	Reported if state chart misalignment in stopping state occurs.	
Software Error Number: 1001 (Rev 28)	All functions	Immediate	Latch - power down reset is reqd	All	A high level software watchdog has detected a condition in which there was a continuous 5 minute period of compressor operation, with neither chilled water flow nor a" contactor interrupt failure" diagnostic active. The occurrence of this software error message suggests an internal software state chart misalignment has occurred. The events that led up to this failure, if known, should be recorded and transmitted to Trane Controls Engineering - (SW rev 24 and higher)	
Starter Failed to Arm/Start - Cprsr 1A	Cprsr	Info	Latch	All	Starter failed to arm or start within the allotted time (15 seconds).	Local
Starter Failed to Arm/Start - Cprsr 1B	Cprsr	Info	Latch	All	Starter failed to arm or start within the allotted time (15 seconds).	Local
Starter Failed to Arm/Start - Cprsr 2A	Cprsr	Info	Latch	All	Starter failed to arm or start within the allotted time (15 seconds).	Local
Starter Failed to Arm/Start - Cprsr 2B	Cprsr	Info	Latch	All	Starter failed to arm or start within the allotted time (15 seconds).	Local
Starter Module Memory Error Type 1 - Starter 2A	None	Info	Latch	All	Checksum on RAM copy of the Starter LLID configuration failed. Configuration recalled from EEPROM.	Local
Starter Module Memory Error Type 1 - Starter 2B	None	Info	Latch	All	Checksum on RAM copy of the Starter LLID configuration failed. Configuration recalled from EEPROM.	Local

Diagnostics

Table 67. Main processor diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
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
Starter Module Memory Error Type 1-Starter 1B	None	Info	Latch	All	Checksum on RAM copy of the Starter LLID configuration failed. Configuration recalled from EEPROM.	Local
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.	Local
Starter Module Memory Error Type 2 - Starter 1B	Cprsr	Immediate	Latch	All	Checksum on EEPROM copy of the Starter LLID configuration failed. Factor default values used.	Local
Starter Module Memory Error Type 2 - Starter 2A	Cprsr	Immediate	Latch	All	Checksum on EEPROM copy of the Starter LLID configuration failed. Factor default values used.	Local
Starter Module Memory Error Type 2 - Starter 2B	Cprsr	Immediate	Latch	All	Checksum on EEPROM copy of the Starter LLID configuration failed. Factor default values used.	Local
Starter Panel High Temperature Limit - Panel 1, Cprsr 1B	Cprsr 1B	Special Mode	Non-latch	All	Starter Panel High Limit Thermostat (170 F) 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 for Cprsr 1B	Local
Starter Panel High Temperature Limit - Panel 1, Cprsr 2A	Cprsr 2A	Special Mode	Non-latch	All	Starter Panel High Limit Thermostat (170 F) 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 for Cprsr 2A	Local
Starter Panel High Temperature Limit - Panel 2, Cprsr 2B	Cprsr 2B	Special Mode	Non-latch	All	Starter Panel High Limit Thermostat (170 F) 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 for Cprsr 2B	Local
Suction Refrigerant Pressure Transducer - Circuit 1, Compressor 1A	Special	Immediate	Latch	All	Bad Sensor or LLID Circuit target if no isolation valves, Compressor target if isolation valves. Design Note: In the case of manifolded compressors w/o isolation valves, the occurrence of this diagnostic will also generate a comm loss with the nonexistent Suction Press Cprsr 1B in order to accomplish circuit shutdown.	Remote
Suction Refrigerant Pressure Transducer - Circuit 1, Compressor 1B	Cprsr 1B	Immediate	Latch	All	Bad Sensor or LLID. Design Note: For circuits with manifolded compressors w/o isolation valve option, this diagnostic will occur with the preceding diagnostic, even though this transducer is not required or installed.	Remote
Suction Refrigerant Pressure Transducer - Circuit 2, Compressor 2A	Special	Immediate	Latch	All	Bad Sensor or LLID Circuit target if no isolation valves, Compressor target if isolation valves. Design Note: In the case of manifolded compressors w/o isolation valves, the occurrence of this diagnostic will also generate a comm loss with the nonexistent Suction Press Cprsr 2B in order to accomplish circuit shutdown.	Remote
Suction Refrigerant Pressure Transducer - Circuit 2, Compressor 2B	Cprsr 2B	Immediate	Latch	All	Bad Sensor or LLID. Design Note: For circuits with manifolded compressors w/o isolation valve option, this diagnostic will occur with the preceding diagnostic, even though this transducer is not required or installed	Remote
Very Low Evaporator Refrigerant Pressure - Circuit 1	Chiller	Immediate	Latch	All [compressor or circuit in manual lockout]	The evaporator pressure dropped below 8 psia (or 5 psia in sftw prior to Oct '02) regardless of whether or not compressors are running on that circuit. This diagnostic was created to prevent compressor failures due to cross binding by forcing an entire chiller shutdown. If a given compressor or circuit is locked out, the suction pressure transducer with it, will be excluded from causing this diagnostic.	Local

Diagnostics

Table 67. Main processor diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persist-ence	Active Modes [Inactive Modes]	Criteria	Reset Level
Very Low Evaporator Refrigerant Pressure - Circuit 2	Chiller	Immediate	Latch	All [compressor or circuit in manual lockout]	The evaporator pressure dropped below 8 psia (or 5 psia in sftw prior to Oct '02) regardless of whether or not compressors are running on that circuit. This diagnostic was created to prevent compressor failures due to cross binding by forcing an entire chiller shutdown. If a given compressor or circuit is locked out, the suction pressure transducer(s) associated with it, will be excluded from causing this diagnostic.	Local

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 (with the exception of "Excessive Loss of Comm" 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 communication diagnostics back to the physical LLID boards that they have been assigned to (bound).

Table 68. Communication diagnostics

Diagnostic Name	Affects Target	Severity	Persist-ence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Chilled Water Flow Switch	Chiller	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Cond Rfgr Pressure, Circuit #1	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Cond Rfgr Pressure, Circuit #2	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Electronic Expansion Valve, Circuit #1	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Electronic Expansion Valve, Circuit #2	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Emergency Stop	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evap Oil Return Valve, Cprsr 1A	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evap Oil Return Valve, Cprsr 1B	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evap Oil Return Valve, Cprsr 2A	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evap Oil Return Valve, Cprsr 2B	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Entering Water Temperature	Chilled Water Reset	Special Mode	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall remove any Return or Constant Return Chilled Water Reset, if it was in effect. Apply slew rates per Chilled Water Reset spec.	Remote
Comm Loss: Evaporator Leaving Water Temperature	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Rfgr Drain Valve - Ckt 1	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Rfgr Drain Valve - Ckt 2	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote

Diagnostics

Table 68. Communication diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Evaporator Rfqt Liquid Level, Circuit #1	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Rfqt Liquid Level, Circuit #2	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Rfqt Pressure, Circuit #1	Circuit	Immediate	Latch	All [Ckt/Cprsr lock out]	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note: This diagnostic is replaced by diagnostic 5FB below with Rev 15.0	Remote
Comm Loss: Evaporator Rfqt Pressure, Circuit #2	Circuit	Immediate	Latch	All [Ckt/Cprsr lock out]	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note: This diagnostic is replaced by diagnostic 5FD below with Rev 15.0	Remote
Comm Loss: Evaporator Water Pump Control	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: External Auto/Stop	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: External Chilled Water Setpoint	External Chilled Water Setpoint	Special Mode	Non-latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall discontinue use of the External Chilled Water Setpoint source and revert to the next higher priority for setpoint arbitration	Remote
Comm Loss: External Circuit Lockout, Circuit #1	Circuit	Special Mode	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. MP will nonvolatily hold the lockout state (enabled or disabled) that was in effect at the time of comm loss.	Remote
Comm Loss: External Circuit Lockout, Circuit #2	Circuit	Special Mode	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. MP will nonvolatily hold the lockout state (enabled or disabled) that was in effect at the time of comm loss	Remote
Comm Loss: External Current Limit Setpoint	External Current Limit setpoint	Special Mode	Non-latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall discontinue use of the External Current limit setpoint and revert to the next higher priority for Current Limit setpoint arbitration	Remote
Comm Loss: Fan Control Circuit #1, Stage #1	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Control Circuit #1, Stage #2	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Control Circuit #1, Stage #3	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Control Circuit #1, Stage #4	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Control Circuit #2, Stage #1	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Control Circuit #2, Stage #2	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Control Circuit #2, Stage #3	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Control Circuit #2, Stage #4	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Inverter Fault, Circuit #1 or Circuit #1, Drive 1	Inverter	Special Mode	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck.	Remote
Comm Loss: Fan Inverter Fault, Circuit #1, Drive 2	Inverter	Special Mode	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck.	Remote
Comm Loss: Fan Inverter Fault, Circuit #2 or Circuit #2, Drive 1	Inverter	Special Mode	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck.	Remote

Diagnostics

Table 68. Communication diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Fan Inverter Fault, Circuit #2, Drive 2	Inverter	Special Mode	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck.	Remote
Comm Loss: Fan Inverter Power, Circuit #1 or Circuit #1 Drive 1 and 2	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Inverter Power, Circuit #2 or Circuit #2 Drive 1 and 2	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Inverter Speed Command, Circuit #1 or Circuit #1 Drive 1 and 2	Inverter	Special Mode	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck.	Remote
Comm Loss: Fan Inverter Speed Command, Circuit #2 or Circuit #2 Drive 1 and 2	Inverter	Special Mode	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck.	Remote
Comm Loss: Female Step Load Compressor 1A	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Female Step Load Compressor 1B	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Female Step Load Compressor 2A	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Female Step Load Compressor 2B	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: High Pressure Cutout Switch, Cprsr 1A	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: High Pressure Cutout Switch, Cprsr 1B	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: High Pressure Cutout Switch, Cprsr 2A	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: High Pressure Cutout Switch, Cprsr 2B	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Ice-Machine Control	Ice Making Mode	Special Mode	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall revert to normal (non-ice building) mode regardless of last state.	Remote
Comm Loss: Ice-Making Status	Ice-Machine	Special Mode	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall revert to normal (non-ice building) mode regardless of last state.	Remote
Comm Loss: Intermediate Oil Pressure, Cprsr 1A	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Intermediate Oil Pressure, Cprsr 1B	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Intermediate Oil Pressure, Cprsr 2A	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Intermediate Oil Pressure, Cprsr 2B	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Local BAS Interface	None	Special Mode	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote

Diagnostics

Table 68. Communication diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Male Port Load Compressor 1A	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Male Port Load Compressor 1B	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Male Port Load Compressor 2A	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Male Port Load Compressor 2B	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Male Port Unload Compressor 1A	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Male Port Unload Compressor 1B	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Male Port Unload Compressor 2A	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Male Port Unload Compressor 2B	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Temperature, Circuit #1 or Cprsr 1A	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Temperature, Circuit #2 or Cprsr 2A	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Temperature, Cprsr 1B	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Temperature, Cprsr 2B	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Outdoor Air Temperature	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note that if this diagnostic occurs, operational pump down will be performed regardless of the last valid temperature	Remote
Comm Loss: Starter 1A	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Local
Comm Loss: Starter 1B	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Local
Comm Loss: Starter 2A	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Local
Comm Loss: Starter 2B	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Local
Comm Loss: Starter Panel High Temperature Limit - Panel 1, Cprsr 2A	None	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Local
Comm Loss: Starter Panel High Temperature Limit - Panel 1, Cprsr 1B	None	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Local
Comm Loss: Starter Panel High Temperature Limit - Panel 2, Cprsr 2B	None	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Local
Comm Loss: Status/Annunciation Relays	None	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Suction Pressure Cprsr 1A	Special	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Circuit target if no isolation valves, Compressor target if isolation valves or simplex. Design Note: In the case of manifolded compressors w/ isolation valves, the occurrence of this diagnostic will also generate a comm loss with the nonexistent Suction Press Cprsr 1B in order to accomplish circuit shutdown.	Remote

Diagnostics

Table 68. Communication diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persist-ence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Suction Pressure Cprsr 1B	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Design Note: For circuits with manifolded compressors w/o isolation valve option, this diagnostic will occur with the preceding diagnostic, even though this transducer is not required or installed.	Remote
Comm Loss: Suction Pressure Cprsr 2A	Special	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Circuit target if no isolation valves, Compressor target if isolation valves or simplex. Design Note: In the case of manifolded compressors w/ o isolation valves, the occurrence of this diagnostic will also generate a comm loss with the nonexistent Suction Press Cprsr 2B in order to accomplish circuit shutdown.	Remote
Comm Loss: Suction Pressure Cprsr 2B	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Design Note: For circuits with manifolded compressors w/o isolation valve option, this diagnostic will occur with the preceding diagnostic, even though this transducer is not required or installed.	Remote
Excessive Loss of Comm	Chiller	Immediate	Latch	All	Loss of comm with 75% or more (Rev 18 and earlier 10%) of the llids configured for the system has been detected. This diagnostic will suppress the callout of all subsequent comm loss diagnostics. Check power supply(s) and power disconnects - troubleshoot LLIDS buss using TechView	Remote
Starter 1A Comm Loss: MP	Cprsr	Immediate	Latch	All	Starter has had a loss of communication with MP for a 15 second period.	Local
Starter 1B Comm Loss: MP	Cprsr	Immediate	Latch	All	Starter has had a loss of communication with MP for a 15 second period.	Local
Starter 2A Comm Loss: MP	Cprsr	Immediate	Latch	All	Starter has had a loss of communication with MP for a 15 second period.	Local
Starter 2B Comm Loss: MP	Cprsr	Immediate	Latch	All	Starter has had a loss of communication with MP for a 15 second period.	Local

Diagnostics

Main Processor Boot Messages and Diagnostics

Table 69. Main processor boot messages and diagnostics

DynaView Display Message	Description Troubleshooting
A Valid Configuration is Present	A valid configuration is present in the MP's nonvolatile memory. The configuration is a set of variables and settings that define the physical makeup of this particular chiller. These include: number/airflow, and type of fans, number/and size of compressors, special features, characteristics, and control options. // Temporary display of this screen is part of the normal power up sequence.
App Present. Running Self-test.... Self-test Passed	An application has been detected in the Main Processor's nonvolatile memory and the boot code is proceeding to run a check on its entirety. 8 seconds later, the boot code had completed and passed the (CRC) test. // Temporary display of this screen is part of the normal power up sequence.
App Present. Running Self-test... Err3: CRC Failure	An application has been detected in Main Processor's nonvolatile memory and the boot code is proceeding to run a check on its entirety. A few seconds later, the boot code had completed but failed the (CRC) test. //Connect a TechView Service Tool to the MP's serial port, provide chiller model number (configuration information) and download the configuration if prompted by TechView. Then proceed to download the most recent RTAC application or specific version as recommended by Technical Service. Note that this error display may also occur during the programming process, if the MP never had a valid application any time prior to the download. If the problem persists, replace the MP.
Boot Software Part Numbers: LS Flash --> 6200-0318-04 MS Flash --> 6200-0319-04	The "boot code" is the portion of the code that is resident in all MPs regardless of what application code (if any) is loaded. Its main function is to run power up tests and provide a means for downloading application code via the MP's serial connection. The Part numbers for the code are displayed in the lower left hand corner of the DynaView during the early portion of the power up sequence and during special programming and converter modes. See below. For the EasyView, the extension of the boot code part number is displayed for approximately 3 immediately following power up. // This is normal, but you should provide this information when contacting Technical Service about power up problems.
Converter Mode	A command was received from the Service Tool (Tech View) to stop the running application and run in the "converter mode". In this mode the MP acts as a simple gateway and allows the TechView service computer to talk to all the LLIDS on the IPC3 bus.
Err2: RAM Addr Test #1 Failure	There were RAM errors detected in RAM Address Test #1. // Recycle power, if error persists, replace MP.
Err2: RAM Addr Test #2 Failure	There were RAM errors detected in RAM Address Test #2. //Recycle power, if the error persists, replace MP.
Err2: RAM Pattern 1 Failure	There were RAM errors detected in RAM Test Pattern #1. // Recycle power, if the error persists, replace MP.
Err2: RAM Pattern 2 Failure	There were RAM errors detected in RAM Test Pattern #2. //Recycle power, if the error persists, replace MP.
Err4: UnHandled Interrupt Restart Timer: [3 sec countdown timer]	An unhandled interrupt has occurred while running the application code. This event will normally cause a safe shutdown of the entire chiller. Once the countdown timer reaches 0, the processor will reset, clear diagnostics, and attempt to restart the application and allow a normal restart of chiller as appropriate. // This condition might occur due to a severe electro-magnetic transient such as can be caused by a near lightning strike. Such events should be rare or isolated and if no damage results to the CH.530 control system, the Chiller will experience a shutdown and restart. If this occurs more persistently it may be due to an MP hardware problem. Try replacing the MP. If replacement of the MP proves ineffective, the problem may be a result of extremely high radiated or conducted EMI. Contact Technical Service. If this screen occurs immediately after a software download, attempt to reload both the configuration and the application. Failing this, contact Technical Service.
Err5: Operating System Error Restart Timer: [30 sec countdown timer]	An Operating System error has occurred while running the application code. This event will normally cause a safe shutdown of the entire chiller. Once the countdown timer reaches 0, the processor will reset, clear diagnostics, and attempt to restart the application and allow a normal restart of chiller as appropriate. // See Err 4 above
Err6: Watch Dog Timer Error Restart Timer: [30 sec countdown timer]	A Watch Dog Timer Error has occurred while running the application code. This event will normally cause a safe shutdown of the entire chiller. Once the countdown timer reaches 0, the processor will reset, clear diagnostics, and attempt to restart the application allowing a normal restart of chiller as appropriate.
Err7: Unknown Error Restart Timer: [30 sec countdown timer]	An unknown Error has occurred while running the application code. This event will normally cause a safe shutdown of the entire chiller. Once the countdown timer reaches 0, the processor will reset, clear diagnostics, and attempt to restart the application allowing a normal restart of chiller as appropriate
Err8: Held in Boot by User Key Press	The boot detected a key press in the center of the DynaView or both the + and - keys pressed on an EasyView while the MP was in the boot code. Upon seeing this message the user can use Techview to connect to the MP to perform a software download or another service tool function.
No Application Present Please Load Application...	No Main Processor Application is present - There are no RAM Test Errors. // Connect a TechView Service Tool to the MP's serial port, provide chiller model number (configuration information) and download the configuration if prompted by TechView. Then proceed to download the most recent RTAC application or specific version as recommended by Technical Service.
Programming Mode	A command was received by the MP from the Tech View Service Tool and the MP is in the process of first erasing and then writing the program code to its internal Flash (nonvolatile) Memory. Note that if the MP never had a prior application already in memory, the error code "Err3"will be displayed instead of this, during the programming download process.


TRANE®

Unit Wiring

Table 70 provides a list of field wiring diagrams, electrical schematics and connection diagrams for 120-500 ton RTAC units. The complete unit wiring package is documented in RTAC-SVE01*-EN. A laminated wiring diagram kit is also shipped with each RTAC unit.

Table 70. RTAC unit wiring drawing numbers

Drawing Number		Description	
2309-2097	Sheet 1	Schematic - 2 Compressor Units	Table of Contents & Notes
	Sheet 2		Legend
	Sheet 3 (X-Line)		Compressor 1A (X-Line)
	Sheet 3 (Y-Delta)		Compressor 1A (Y-delta)
	Sheet 4 (X-Line)		Compressor 2A (X-Line)
	Sheet 4 (Y-Delta)		Compressor 2A (Y-delta)
	Sheet 5		Fans, Std & Prem, Medium Air Cooled
	Sheet 6		Fans, 140 & 155 Std, 120 & 130 Prem 50 Hz
	Sheet 7		Fans 225, 250 Prem 60 Hz, 185 & 200 Extra 60 Hz
	Sheet 8		VSD Fans - Circuits 1 & 2
	Sheet 9		Controls
	Sheet 10		LLID Bus
	Sheet 11		Remote Evaporator
2309-4621	Sheet 1	Schematic - 3 Compressor Units, X-Line	Table of Contents & Notes
	Sheet 2		Devices, Descriptions & Designations
	Sheet 3		Compressor Power 1A & Fan Control Ckt 1
	Sheet 4		Compressor Power 1B
	Sheet 5		Compressor Power 2A & Fan Control Ckt 2
	Sheet 6		Fan Power Circuit 1
	Sheet 7		Fan Power Circuit 2
	Sheet 8		Common Control - Panel LLIDs
	Sheet 9		Common Control - Panel LLIDs
	Sheet 10		Common Control - Panel LLIDs
2309-4622	Sheet 1	Schematic - 3 Compressor, Units Y-Delta	Table of Contents & Notes
	Sheet 2		Devices, Descriptions & Designations
	Sheet 3		Compressor Power 1A & Fan Control Ckt 1
	Sheet 4		Compressor Power 1B
	Sheet 5		Compressor Power 2A & Fan Control Ckt 2
	Sheet 6		Fan Power Circuit 1
	Sheet 7		Fan Power Circuit 2
	Sheet 8		Common Control - Panel LLIDs
	Sheet 9		Common Control - Panel LLIDs
	Sheet 10		Common Control - Panel LLIDs

Unit Wiring

Table 70. RTAC unit wiring drawing numbers

Drawing Number		Description
2309-4623	Sheet 1	Table of Contents & Notes
	Sheet 2	Devices, Descriptions & Designations
	Sheet 3	Compressor Power 1A & Fan Control Ckt 1
	Sheet 4	Compressor Power 1B
	Sheet 5	Compressor Power 2A & Fan Control Ckt 2
	Sheet 6	Compressor Power 2B
	Sheet 7	Fan Power Circuit 1
	Sheet 8	Fan Power Circuit 2
	Sheet 9	Common Control - Panel LLIDs
	Sheet 10	Common Control - Panel LLIDs
	Sheet 11	Common Control - Panel LLIDs
2309-4624	Sheet 1	Table of Contents & Notes
	Sheet 2	Devices, Descriptions & Designations
	Sheet 3	Compressor Power 1A & Fan Control Ckt 1
	Sheet 4	Compressor Power 1B
	Sheet 5	Compressor Power 2A & Fan Control Ckt 2
	Sheet 6	Compressor Power 2B
	Sheet 7	Fan Power Circuit 1
	Sheet 8	Fan Power Circuit 2
	Sheet 9	Common Control - Panel LLIDs
	Sheet 10	Common Control - Panel LLIDs
	Sheet 11	Common Control - Panel LLIDs
2309-4871	Component Location	2 Compressor Units
2309-4874	Component Location	3 Compressor Units
2309-4873	Component Location	4 Compressor Units
2309-4872	Component Location	2 Compressor - Optional Remote Evaporator
2309-2248	Field Layout	2 Compressor Units
2309-2239	Field Layout	3 or 4 Compressor Units
2309-2208	Field Wiring; RTAC, 2 Compressor Units	2 Compressor Units
2309-2223	Field Wiring	3 or 4 Compressor Units, Single Source Power
2309-2222	Field Wiring	3 or 4 Compressor Units, Dual Source Power
2309-7572	Sequence of Operation	2 Compressor Units
2309-7581	Sequence of Operation	3 or 4 Compressor Units



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