Installation, Operation, and Maintenance

Ascend™ Air-Cooled Chiller Model ACR

150 to 550 Nominal Tons

⚠ 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.

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TRANE TECHNOLOGIES™

Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠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 accidents.

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 and HCFCs such as saturated or unsaturated HFCs and HCFCs.

Important 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 according to local rules. For the USA, 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!

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

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/national electrical codes.

⚠ WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury.

Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate SDS and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

⚠ WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- **All Trane personnel must follow the company's Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Trane personnel should always follow local regulations.**

⚠ WARNING

Refrigerant under High Pressure!

Failure to follow instructions below could result in an explosion which could result in death or serious injury or equipment damage.

System contains 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.

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

Factory Training

Factory training is available through Trane University™ to help you learn more about the operation and maintenance of your equipment. To learn about available training opportunities contact Trane University™.

Online: www.trane.com/traneuniversity

Phone: 855-803-3563

Email: traneuniversity@trane.com

Revision History

- Added 374, 440, 500 and 550 ton unit configurations.
- Added direct free-cooling information for units larger than 300 tons.
- Various minor updates and corrections.

Table of Contents

Model Number Information

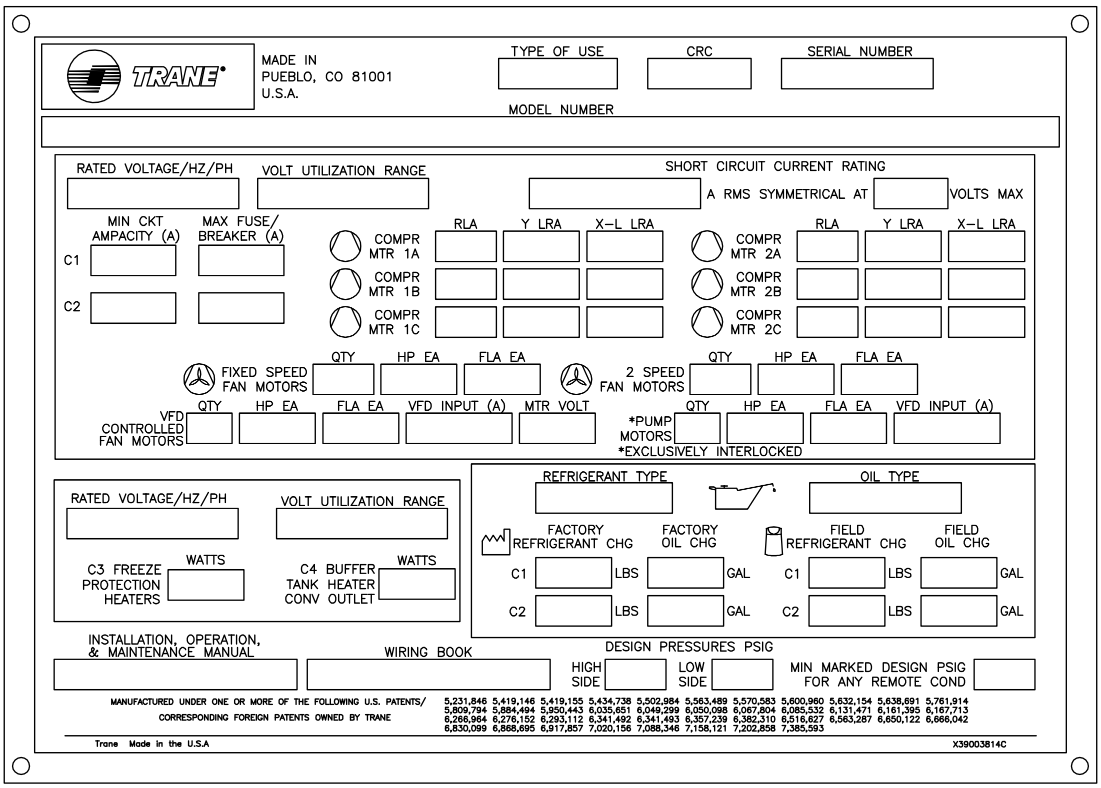
Nameplates

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.

Unit Nameplate

See figure below for a typical unit nameplate. The outdoor unit nameplate provides the following information:

- Unit model and size description.
- Unit serial number.
- Unit electrical requirements.
- Operating charges of R-134a and refrigerant oil (Trane OIL00311).
- Unit design pressures.
- Installation, operation and maintenance and service data literature.
- Drawing numbers for unit wiring diagrams



Model Number Coding System

Model numbers are composed of numbers and letters that represent features of the equipment. Shown below is a sample of typical unit model number.

ACRB 2005 EUAA EUUC XNC2 XCNX BDEV 1HAC BDXA A1TX XX0N

Each position, or group of positions, in the model number is used to represent a feature. Unit model number digits are selected and assigned in accordance with the definitions as listed in Model Number Descriptions chapter. For example, position 09 of the unit model number above contains the letter “E” which indicates the unit voltage is 460/60/3.

Compressor Nameplate

The compressor nameplate provides the following information:

- Compressor model number.
- Compressor serial number.
- Compressor electrical characteristics
- Utilization range.
- Recommended refrigerant

See Model Number Descriptions chapter for compressor model and serial number descriptions.

Model Number Descriptions

Unit Model Number

Digit 1, 2, 3, 4 — Unit Model

ACRB = Air-Cooled Screw Chiller

Digit 5, 6, 7 — Nominal Tonnage

150 = 150 Tons
165 = 165 Tons
180 = 180 Tons
200 = 200 Tons
225 = 225 Tons
250 = 250 Tons
275 = 275 Tons
300 = 300 Tons
375 = 375 Tons
380 = 380 Tons
440 = 440 Tons
450 = 450 Tons
500 = 500 Tons
550 = 550 Tons

Digit 8 — Compressor Type

4 = Mixed screw types
5 = Screw with Variable Volume Ratio

Digit 9— Unit Voltage

A = 200/60/3
B = 230/60/3
C = 380/60/3
D = 400/60/3
E = 460/60/3
F = 575/60/3
G = 400/50/3
H = 380/50/3

Digit 10 — Manufacturing Location

U = Trane Commercial Systems, Pueblo, CO USA

Digits 11, 12 — Design Sequence

****** = Factory assigned

Digit 13 — Unit Sound Package

X = InvisiSound™ Standard
L = InvisiSound™ Superior
E = InvisiSound™ Ultimate
R = InvisiSound™ Standard with Noise Reduction Request
Q = InvisiSound™ Superior with Noise Reduction Request

Digit 14 — Agency Listing

C = No Agency Listing
U = UL/cUL Listing

Digit 15 — Pressure Vessel Code

U = ASME Pressure Vessel Code
C = CRN or Canadian Equivalent Pressure Vessel Code
A = Australia Pressure Vessel Code

Digit 16 — Factory Charge

C = Refrigerant Charge R-134a
D = Nitrogen Charge, R-134a Field Supplied

Digit 17 — Auxiliary Items

X = No Auxiliary Items

Digit 18 — Evaporator Application

N = Standard Cooling
P = Low Temp Process Cooling
C = Ice Making

Digit 19, 20 — Evaporator Type

C1 = CHIL 1-pass
C2 = CHIL 2-pass
C3 = CHIL 3-pass
D1 = CHIL 1-pass with ALT tube
D2 = CHIL 2-pass with ALT tube

Digit 21 — Water Connection

X = Grooved Pipe
A = Grooved Pipe + Flange

Digit 22 — Flow Switch

C = Flow Switch Set Point 15 cm/sec
D = Flow Switch Set Point 25 cm/sec
F = Flow Switch Set Point 35 cm/sec
H = Flow Switch Set Point 45 cm/sec

Digit 23 — Insulation

N = Factory Insulation — All Cold Parts 0.75”
H = Evaporator-only Insulation for High Humidity/Low Evap Temp 1.25”

Digit 24 — Unit Application

X = Standard Ambient
L = Low Ambient
E = Extreme Low Ambient
H = High Ambient
W = Wide Ambient

Digit 25 — Condenser Length

A = 4V Condenser Coil Modules
B = 5V Condenser Coil Modules
C = 6V Condenser Coil Modules
D = 7V Condenser Coil Modules
E = 8V Condenser Coil Modules
F = 9V Condenser Coil Modules
H = 11V Condenser Coil Modules

Digit 26 — Condenser Fin Options

A = Aluminum Round Tube, Aluminum Plate Fin
C = Coated Microchannel
D = CompleteCoat™ Epoxy Coated Aluminum Fins, Aluminum Round Tube
K = Coated Copper Round Tube, Aluminum Plate Fin
M = Aluminum Microchannel
R = Copper Round Tube, Aluminum Plate Fin

Digit 27 — Fan Type

E = EC Condenser Fan Motors

Digit 28 — Compressor Starter

V = Variable Frequency Drive (1 compressor/circuit)

Digit 29 — Incoming Unit Power Line Connection
1 = Single Point Power
2 = Dual Point Unit Power Connection

Digit 30 — Power Line Connection Type
T = Terminal Block
C = Circuit Breaker
H = Circuit Breaker with High Fault Rated Control Panel

Digit 31 — Short Circuit Current Rating
A = Default Short Circuit Amp Rating
B = High Short Circuit Amp Rating

Digit 32 — Electrical Accessories

X = None
B = Convenience Outlet and Under/Over Voltage Protection
C = 15A 115V Convenience Outlet (Type B)
U = Under/Over Voltage Protection

Digit 33 — Remote Communication Option

X = None
L = LonTalk® Interface
B = BACnet® TP Interface
M = Modbus™ Interface
P = BACnet® Interface (IP)

Digit 34 — Hard Wire Communication

X = None
A = Hard Wired Bundle - All
B = Remote Leaving Water Temp Setpoint
C = Remote Leaving Temp and Demand Limit Setpoints
D = Unit Status Programmable Relay
E = Programmable Relay and Leaving Water and Demand Limit Setpoint
F = Percent Capacity
G = Percent Capacity and Leaving Water and Demand Limit Setpoint
H = Percent Capacity and Programmable Relay

Digit 35 — Smart Flow Control

X = None

Digit 36 — Structural Options

A = Standard Unit Structure

Digit 37 — Appearance Accessories

X = No Appearance Options
A = Architectural Louvered Panels

Digit 38 — Unit Isolation

X = None
1 = Elastomeric Isolators

Digit 39 — Shipping Package

X = None
A = Containerization
T = Shipping Tarp Covering Full Unit
B = Containerization and Tarp

Digit 40 — Pump Package

X = None

Digit 41 — Heat Recovery

X = None

Digit 42 — Free-Cooling

X = None
T = Total Direct Free-Cooling

Digit 43 — Special

0 = None
S = Special
F = Ship to Final Finisher

Digit 44 — Line Voltage Harmonic Mitigation

X = DC Reactors (~30% TDD)
L = 5% TDD (IEEE519 Compliant)

Compressor Information

CHHS MODEL NUMBER

Digit 1, 2, 3, 4 — Compressor Type

CHHS = Positive displacement, helical rotary (twin screw) hermetic compressor

Digit 5 — Frame Size

R = R Frame: 70 - 100 tons
S = S Frame: 112 - 165 tons

Digit 6 — Motor Length

B = 145 mm
C = 170 mm
E = 165 mm
F = 190 mm

Digit 7— Motor Winding Characteristics
***** = Factory assigned

Digit 8 — Volume Ratio

E = Variable Volume Ratio

Digit 9— Refrigerant

1 = R-134a

Digits 10, 11 — Design Sequence

****** = Factory assigned

CHHW MODEL NUMBER

Digit 1, 2, 3, 4 — Compressor Family

CHHW = Positive displacement, helical rotary. hermetic compressor

Digit 5 — Economizer Port Detail

0 = No Economizer Port

Digit 6 — Frame Size

N = N Frame

Digit 7— Compressor Capacity

6 = GP2.5 Larger capacity (major)

Digit 8 — Motor Voltage

D = 380/60/3
H = 575/60/3
K = 460 /60/3 (N6 only)
J = 460 /50/3 (N6 only)

Digit 9— Internal Relief

K = 450 psid

Digits 10, 11 — Design Sequence

****** = Factory assigned

Digit 12 — Capacity Limit

N = Standard capacity

Digits 13, 14, 15 — Motor kW Rating

112 = N6 50 Hz
134 = N6 60 Hz

Digit 16 — Capacity Limit

A = High Volume Ratio

SERIAL NUMBER

Digit 1, 2 — Year

YY = Last two digits of year of manufacture

Digit 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

Digit 6, 7, 8 — Coded Time Stamp

TTT = Used to ensure uniqueness of serial number

Digit 9 — Assembly Line

Assembly line compressor was built on. Varies with facility.

Digit 10 — Build Location

A = Monterrey

General Information

Unit Description

The Ascend™ ACR units are helical-rotary type, air-cooled chillers designed for outdoor installation. The refrigerant circuits are factory-piped, leak tested and dehydrated. Every unit is electrically tested for proper control operation before shipment.

Chilled water inlet and outlet openings are covered for shipment. The chiller 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. Each circuit utilizes at least one compressor driven by an Adaptive Frequency Drive. Each refrigerant circuit is provided with filter, sight glass, electronic expansion valve, and charging valves. The shell-and-tube evaporator is manufactured in accordance with the ASME standards or other international codes. Each evaporator is fully insulated and equipped with water drain and vent connections.

Units are shipped with full oil charge and can be ordered with either a factory refrigerant charge, or optional nitrogen charge.

Unit Length

For unit sizes 300 tons and smaller, units are EXTENDED length if either of the following are selected:

- Voltage: 200, 230 or 575V (model number digit 9 = A, B, or F)
- Harmonic Filtration Option: Filter circuit (model number digit 44 = L)

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, electrical diagrams, and service literature, which are placed inside the control panel for shipment.

If optional elastomeric isolators are ordered with unit (model number digit 38 = 1), they are shipped either mounted on diagonal supports on the end of the unit opposite control panel (for 150 to 300 ton units), or on the horizontal support frame of the chiller (for units larger than 300 tons).

General Data

Table 1. General data — 150 to 300 ton units

Unit Size (tons)		150	165		180		200		225		250		275		300	
Condenser Length[a]		**4V**	**4V**	**5V**	**4V**	**5V**	**5V**	**6V**	**5V**	**6V**	**5V**	**6V**	**6V**	**7V**	**7V**	**8V**
Compressor Model		CHHSR	CHHSR		CHHSR		CHHSR		CHHSS		CHHSS		CHHSS		CHHSS	
Quantity	#	2	2		2		2		2		2		2		2	
Evaporator																
Water Storage	(gal)	17.5	18.7		21.9		23.9		26.6		28.7		33.0		36.0	
	(L)	66.1	70.9		82.8		90.5		100.6		108.8		125.0		136.1	
2 Pass arrangement																
Evap Water Connection Size[b]	(in)	5	5		6		6		6		6		8		8	
	(mm)	125	125		150		150		150		150		200		200	
Minimum Flow[c]	(gpm)	171	187		202		228		261		288		318		354	
	(l/s)	10.8	11.8		12.7		14.4		16.5		18.2		20.1		22.3	
Maximum Flow[c]	(gpm)	626	684		742		835		957		1055		1165		1299	
	(l/s)	39.5	43.1		46.8		52.7		60.4		66.5		73.5		81.9	
3 Pass arrangement																
Evap Water Connection Size[b]	(in)	4	4		5		5		5		5		6		6	
	(mm)	100	100		125		125		125		125		150		150	
Minimum Flow[c]	(gpm)	114	124		135		152		174		192		212		236	
	(l/s)	7.2	7.8		8.5		9.6		11.0		12.1		13.4		14.9	
Maximum Flow[c]	(gpm)	417	456		495		557		638		703		777		866	
	(l/s)	26.3	28.8		31.2		35.1		40.2		44.3		49.0		54.6	
Condenser																
Quanity of Coils		8	8	10	8	10	10	12	10	12	10	12	12	14	14	16
Coil Length	(in)	78.74	78.74		78.74		78.74		78.74		78.74		78.74		78.74	
	(mm)	2000	2000		2000		2000		2000		2000		2000		2000	
Coil Height	(in)	50	50		50		50		50		50		50		50	
	(mm)	1270	1270		1270		1270		1270		1270		1270		1270	
Fins/Ft		192	192		192		192		192		192		192		192	
Rows		3	3		3		3		3		3		3		3	
Condenser Fans																
Quantity of Fans	#	8	8	10	8	10	10	12	10	12	10	12	12	14	14	16
Diameter	(in)	37.5	37.5		37.5		37.5		37.5		37.5		37.5		37.5	
	(mm)	953	953		953		953		953		953		953		953	
Total Airflow	(cfm)	107392	107392	134240	107392	134240	134240	161088	134240	161088	134240	161088	161088	161088	161088	214784
	(m3/ hr)	182460	182460	228075	182460	228075	228075	273690	228075	273690	228075	273690	273690	319305	319305	364920

Table 1. General data — 150 to 300 ton units (continued)

Unit Size (tons)		150	165		180		200		225		250		275		300	
Condenser Length[a]		**4V**	**4V**	**5V**	**4V**	**5V**	**5V**	**6V**	**5V**	**6V**	**5V**	**6V**	**6V**	**7V**	**7V**	**8V**
Tip Speed	(ft/ min)	8700	8700		8700		8700		8700		8700		8700		8700	
	(M/S)	44.2	44.2		44.2		44.2		44.2		44.2		44.2		44.2	
Free-Cooling[d]																
Customer Water Connection Size	(in)	n/a	n/a	6	n/a	6	n/a	6	n/a	6	n/a	6	n/a	n/a	n/a	8
	(mm)	n/a	n/a	152	n/a	152	n/a	152	n/a	152	n/a	152	n/a	n/a	n/a	203
Qty of Coils Ckt 1 - Std Length[e]		n/a	n/a	4	n/a	4	n/a	5	n/a	5	n/a	5	n/a	n/a	n/a	7
Qty of Coils Ckt 1 - Ext Length[e]		n/a	n/a	5	n/a	5	n/a	6	n/a	6	n/a	6	n/a	n/a	n/a	8
Qty of Coils Ckt 2		n/a	n/a	5	n/a	5	n/a	6	n/a	6	n/a	6	n/a	n/a	n/a	8
Coil Length	(in)	n/a	n/a	72.49	n/a	72.49	n/a	72.49	n/a	72.49	n/a	72.49	n/a	n/a	n/a	72.49
	(mm)	n/a	n/a	1841	n/a	1841	n/a	1841	n/a	1841	n/a	1841	n/a	n/a	n/a	1841
Coil Height	(in)	n/a	n/a	40	n/a	40	n/a	40	n/a	40	n/a	40	n/a	n/a	n/a	40
	(mm)	n/a	n/a	1016	n/a	1016	n/a	1016	n/a	1016	n/a	1016	n/a	n/a	n/a	1016
Fins/Ft		n/a	n/a	192	n/a	192	n/a	192	n/a	192	n/a	192	n/a	n/a	n/a	192
Rows		n/a	n/a	3	n/a	3	n/a	3	n/a	3	n/a	3	n/a	n/a	n/a	3
Glycol Storage Volume - Std Length[e]	(gal)	n/a	n/a	123	n/a	123	n/a	145	n/a	145	n/a	145	n/a	n/a	n/a	212
	(l)	n/a	n/a	467	n/a	467	n/a	550	n/a	550	n/a	550	n/a	n/a	n/a	801
Glycol Storage Volume - Ext Length[e]	(gal)	n/a	n/a	129	n/a	129	n/a	151	n/a	151	n/a	151	n/a	n/a	n/a	218
	(l)	n/a	n/a	489	n/a	489	n/a	572	n/a	572	n/a	572	n/a	n/a	n/a	823
Ambient Temperature Range																
Standard Ambient	°F (°C)	32 to 105 (0 to 40.6)														
Low Ambient	°F (°C)	0 to 105 (-17.7 to 40.6)														
Extreme Low Ambient	°F (°C)	-16 to 105 (-26.7 to 40.6)														
High Ambient	°F (°C)	32 to 125 (0 to 52)														
Wide Ambient	°F (°C)	0 to 125 (-17.7 to 52)														
General Unit																
Refrigerant		HFC-134a														
Refrigerant Ckts	#	2														
Minimum Load	%	20	18	18	17	17	15	15	20	20	18	18	16	16	15	15
Refrigerant Charge/ckt	(lbs)	172	171	181	200	210	208	218	251	265	255	261	308	318	315	325
	(kg)	78	78	82	91	95	94	99	114	120	116	118	140	144	143	148
Oil		Trane OIL00311														

Table 1. General data — 150 to 300 ton units (continued)

Unit Size (tons)		150	165		180		200		225		250		275		300	
Condenser Length[a]		4V	4V	5V	4V	5V	5V	6V	5V	6V	5V	6V	6V	7V	7V	8V
Oil Charge/ckt	(gal)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
	(L)	11.4	11.4	11.4	11.4	11.4	11.4	11.4	15.1	15.1	15.1	15.1	15.1	15.1	15.1	15.1

(a) Condenser length defined by model number digit 25: 4V = A; 5V = B; 6V = C; 7V = D; 8V = E
(b) Sizes are for units without free-cooling option (model number digit 42 = X). See free-cooling section of table for water connections sizes for units with model number digit 42 = T.
(c) Minimum and maximum flow rates apply to constant-flow chilled water systems running at AHRI conditions, without freeze inhibitors added to the water loop.
(d) Units with free-cooling option are indicated by model number digit 42 = T.
(e) See Unit Length section.

Table 2. General data — unit larger than 300 tons

Unit Size (tons)		375	380	440	450	500	550
Condenser Length[a]		**9V**	**11V**	**9V**	**11V**	**11V**	**11V**
Compressor Model (ckt 1/2)		CHHSS-120 / CHHSS	CHHSS-120 / CHHSS	CHHSS-120 / CHHSS	CHHSS-120 / CHHSS	CHHSS - 120 / CHHSS - 120	CHHSS - 120 / CHHSS - 120
Quantity (ckt 1/2)	#	2 / 1	2 / 1	2 / 1	2 / 1	2 / 2	2 / 2
Evaporator							
Water Storage	(gal)	36.3	36.3	39.5	39.5	45.0	49.3
	(L)	137.3	137.3	149.6	149.6	170.3	186.8
1 Pass arrangement							
Evap Water Connection Size[b]	(in)	8	8	8	8	8	8
	(mm)	200	200	200	200	200	200
Minimum Flow[c]	(gpm)	398	398	450	450	523	591
	(l/s)	25.1	25.1	28.4	28	33.0	37.3
Maximum Flow[c]	(gpm)	1750	1750	1981	1981	2303	2603
	(l/s)	110.4	110.4	125.0	125	145.3	164.2
2 Pass arrangement							
Evap Water Connection Size[b]	(in)	8	8	8	8	8	8
	(mm)	200	200	200	200	200	200
Minimum Flow[c]	(gpm)	198	198	224	224	260	294
	(l/s)	12.5	12.5	14.0	14.1	16.4	18.5
Maximum Flow[c]	(gpm)	871	871	986	986	1146	1295
	(l/s)	55.0	55.0	62.2	62.2	72.3	81.7
Condenser							
Quantity of Coils (ckt 1/2)		12 / 6	14 / 8	12 / 6	14 / 8	12 / 10	12 / 10
Coil Length	(in)	78.22	78.22	78.22	78.22	78.22	78.22
	(mm)	1987	1987	1987	1987	1987	1987
Coil Height	(in)	49	49	49	49	49	49
	(mm)	1252	1252	1252	1252	1252	1252
Fins/Ft		276	276	276	276	276	276
Condenser Fans							
Quantity of Fans (ckt 1/2)	#	12 / 6	14 / 8	12 / 6	14 / 8	12 / 10	12 / 10
Diameter	(in)	37.5	37.5	37.5	37.5	37.5	37.5
	(mm)	953	953	953	953	953	953
Total Airflow	(cfm)	230630	282140	230630	282140	282140	282140
	(m3/ hr)	391843	479359	391843	479359	479359	479359

Table 2. General data — unit larger than 300 tons (continued)

Unit Size (tons)		375	380	440	450	500	550
Condenser Length[a]		**9V**	**11V**	**9V**	**11V**	**11V**	**11V**
Tip Speed	(ft/ min)	8700	8700	8700	8700	8700	8700
	(M/S)	44.2	44.2	44.2	44.2	44.2	44.2
Free-Cooling[d]							
Customer Water Connection Size	(in)	n/a	8.0	n/a	8.0	8.0	8.0
	(mm)	n/a	203.0	n/a	203.0	203.0	203.0
Qty of Coils Ckt 1		n/a	13.0	n/a	13.0	10	10
Qty of Coils Ckt 2		n/a	7.0	n/a	7.0	10	10
Coil Length	(in)	n/a	72.49	n/a	72.49	72.49	72.49
	(mm)	n/a	1841	n/a	1841	1841	1841
Coil Height	(in)	n/a	40	n/a	40	40	40
	(mm)	n/a	1016	n/a	1016	1016	1016
Fins/Ft		n/a	192	n/a	192	192	192
Rows		n/a	3	n/a	3	3	3
Glycol Storage Volume	(gal)	n/a	231.9	n/a	231.9	231.9	231.9
	(l)	n/a	878.2	n/a	878.2	878.2	878.2
Ambient Temperature Range							
Standard Ambient	°F (°C)	32 to 105 (0 to 40.6)					
Low Ambient	°F (°C)	0 to 105 (-17.7 to 40.6)					
Extreme Low Ambient	°F (°C)	-15 to 105 (-26.1 to 40.6)					
High Ambient	°F (°C)	32 to 125 (0 to 52)					
Wide Ambient	°F (°C)	0 to 125 (-17.7 to 52)					
General Unit							
Refrigerant		HFC-134a					
Refrigerant Ckts	#	2					
Minimum Load	%	15%	15%	15%	15%	10%	10%
Refrigerant Charge (ckt 1/2)	(lbs)	305 / 143	322 / 160	305 / 143	328 / 163	294 / 265	300 / 270
	(kg)	138 / 65	146 / 73	138 / 65	149 / 74	133 / 120	136 / 122
Oil		OIL00311					
Oil Charge (ckt 1/2)	(gal)	5.8 / 4.0	5.8 / 4.0	5.8 / 4.0	5.8 / 4.0	5.8 / 5.8	5.8 / 5.8
	(L)	22.0 / 15.1	22.0 / 15.1	22.0 / 15.1	22.0 / 15.1	22.0 / 22.0	22.0 / 22.0

(a) Condenser length defined by model number digit 25: 4V = A; 5V = B; 6V = C; 7V = D; 8V = E; 9V = F; 11V = H
(b) Sizes are for units without free-cooling option (model number digit 42 = X).
(c) Minimum and maximum flow rates apply to constant-flow chilled water systems running at AHRI conditions, without freeze inhibitors added to the water loop.
(d) Units with free-cooling option are indicated by model number digit 42 = T.

Drive Cooling Fluid

NOTICE

Equipment Damage!

Use of unapproved fluids, or dilution of approved fluid, could result in catastrophic equipment damage.
Use only Trane Heat Transfer Fluid P/N CHM01023. This fluid is a direct use concentration and is not to be diluted. Do not top off with water or any other fluid.

Note: *The use of incorrect compounds in the drive cooling system may result in scaling, erosion, corrosion or freezing. The Trane Company warranty specifically excludes liability for corrosion, erosion, freezing or deterioration of Trane equipment.*

Proper fluid level is important to the operation of the unit. See Drive Cooling Expansion Tank section in Maintenance chapter for fluid level check instructions. The circuit capacities are shown in table below.

If the level is below the recommended minimum levels, contact your local Trane office.

Note: *Drive cooling fluid service life is 5 years. See maintenance chapter for more drive cooling system information.*

Table 3. Drive cooling

Unit Size (tons)	Unit Length[a]	Fluid Volume (gal)		Fluid Volume (l)	
		Ckt1	Ckt2	Ckt 1	Ckt2
150 to 200	Standard	1.4	2.0	5.5	7.7
	Extended	1.5	2.1	5.8	8.1
225 to 300	Standard	1.7	2.2	6.2	8.5
	Extended	1.7	2.3	6.6	8.8
375, 440	n/a	1.7	1.6	6.4	6.0
375, 440 with options[b]	n/a	1.7	1.7	6.4	6.4
380, 450	n/a	1.8	1.7	6.8	6.4
500, 550	n/a	1.8	1.7	6.8	6.4

(a) Extended Length is required for voltages 200V, 230V, 575V model number digit 9 = A, B, F and harmonic filtration model number digit 44 = L.
(b) Option defined by Unit Voltage = 575V (model number digit 9 = F) or Harmonic Filter = Low (model number digit 44 = L)

Pre-Installation

Unit Inspection

To protect against loss due to damage incurred in transit, perform inspection immediately upon receipt of the unit.

Exterior Inspection

If the job site inspection reveals damage or material shortages, file a claim with the carrier immediately. Specify the type and extent of the damage on the bill of lading before signing. Notify the appropriate sales representative.

Important: *Do not proceed with installation of a damaged unit without sales representative's approval.*

- Visually inspect the complete exterior for signs of shipping damages to unit or packing material.
- Verify that the nameplate data matches the sales order and bill of lading.
- Verify that the unit is properly equipped and there are no material shortages.

Note: *Corrosion due to dirt, road grim, road salt, and other contaminates picked up during shipping is not the responsibility of the carrier.*

Inspection for Concealed Damage

Visually inspect the components for concealed damage as soon as possible after delivery and before it is stored.

If concealed damage is discovered:

- Notify the carrier's terminal of the damage immediately by phone and by mail.
- Concealed damage must be reported within 15 days.
- Request an immediate, joint inspection of the damage with the carrier and consignee.
- Stop unpacking the unit.
- Do not remove damaged material from receiving location.
- Take photos of the damage, if possible.
- The owner must provide reasonable evidence that the damage did not occur after delivery.

Repair

Notify the appropriate sales representative before arranging unit installation or repair.

Important: *Do not repair unit until the damage has been inspected by the carrier's representative.*

Storage Requirements

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

- Store the outdoor unit in a secure area.
- For units that have been charged with refrigerant, verify the following valves are closed on each circuit:
  - Suction service valve (butterfly valve)
  - Liquid line angle valve or EXV (EXV is driven closed whenever circuit is powered)
  - Oil line shutoff valves to brazed plate heat exchangers

Note: *Units with factory refrigerant charge (model number digit 16 = C) are shipped with suction, liquid and oil line shutoff valves closed, isolating most of refrigerant charge in the evaporator. If unit goes directly into long term storage, it is recommended that these valve positions be confirmed.*

- For units with nitrogen charge option (model number digit 16 = D), units are shipped with valves open. If unit goes directly into storage prior to refrigerant charge, confirm all service valves are open.

- 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.

Installation Requirements

Type	Trane Supplied Trane Installed	Trane Supplied Field Installed	Field Supplied Field Installed
Foundation			• Meet foundation requirements
Rigging			• Safety chains • Clevis connectors • Lifting beam • Spreader bar
Disassembly/Reassembly (as required)	Trane, or an agent of Trane specifically authorized to perform start-up of Trane® products (contact your local Trane office for pricing)		
Isolation		Elastomeric isolators (optional)	• Elastomeric isolators (optional)
Electrical	• Circuit breakers (optional) • Unit Mounted Starter		• Circuit breakers (optional) • Electrical connections to unit mounted starter • Wiring sizes per submittal and NEC • Terminal lugs • Ground connection(s) • Ground type specified (Center Ground-Y or not) • BAS wiring (optional) • Control voltage wiring • Chilled water pump contactor and wiring • Option relays and wiring
Water piping	Flow switch		• Taps for thermometers and gauges • Thermometers • Water flow pressure gauges • Isolation and balancing valves in water piping • Vents and drain • Waterside pressure relief valves • Water strainer
Insulation	Insulation		Insulation
Water Piping Connection Components	Grooved pipe	Flange kit (optional)	
Other Materials	• R-134a refrigerant • Dry nitrogen (optional)		
Ascend™ Model ACR Installation Completion Check Sheet and Request for Trane Service (AC-ADF001*-EN) See Log and Check Sheet chapter			
Chiller Start-up Commissioning	Trane, or an agent of Trane specifically authorized to perform start-up of Trane® products		
Trane specifically authorized to perform start-up of Trane® products			

Dimensions and Weights

Weights

Table 4. Weights — 150 to 300 ton units

Unit Size (tons)	Condenser Length[a]	Standard Length[b]				Extended Length[b]			
		Shipping		Operating		Shipping		Operating	
		lb	kg	lb	kg	lb	kg	lb	kg
Units without Direct Free-Cooling[c]									
150	4V	12000	5443	12200	5534	14200	6441	14400	6532
165	4V	12100	5489	12200	5534	14200	6441	14400	6532
	5V	13100	5942	13200	5987	15200	6895	15400	6985
180	4V	12200	5534	12400	5625	14600	6623	14800	6713
	5V	13400	6078	13500	6124	15500	7031	15700	7121
200	5V	13400	6078	13600	6169	15600	7076	15700	7121
	6V	14600	6623	14800	6713	16600	7530	16800	7620
225	5V	14800	6713	15000	6804	17000	7711	17200	7802
	6V	15900	7212	16100	7303	18100	8210	18300	8301
250	5V	14900	6759	15100	6849	17000	7711	17200	7802
	6V	16300	7394	16500	7484	18400	8346	18700	8482
275	6V	16300	7394	16600	7530	18500	8392	18800	8528
	7V	17400	7893	17700	8029	19600	8891	19800	8981
300	7V	17500	7938	17700	8029	19600	8891	19900	9027
	8V	18500	8392	18800	8528	20700	9389	20900	9480
Units with Direct Free-Cooling[c]									
150	4V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
165	4V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5V	16000	7258	17200	7802	18800	8528	20100	9117
180	4V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	5V	16800	7620	18000	8165	19700	8936	19900	9027
200	5V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6V	18600	8437	20000	9072	20900	9480	22400	10161
225	5V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6V	19900	9027	21300	9662	22300	10115	23800	10796
250	5V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	6V	20300	9208	21700	9843	22700	10297	24200	10977
275	6V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	7V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
300	7V	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
	8V	24100	10932	26100	11839	26500	12020	28600	12973

Notes:

1. Weights include factory charge of refrigerant and oil, ultimate sound option, and architectural louvered panels.
2. All weights are plus/minus 10%.

(a) Condenser length defined by model number digit 25: 4V = A; 5V = B; 6V = C; 7V = D; 8V = E

(b) See Unit Length section of General Data chapter to determine unit length. Extended Length is required for voltages 200V, 230V, 575V (model number digit 9=A,B, or F) and harmonic filtration (model number digit 44=L) .

(c) Direct Free-Cooling defined by model number digit 42 = T.

Table 5. Weights — units larger than 300 tons

Unit Size (tons)	Standard Unit with SPP[a]				Std Unit with SPP and Options Box[b]				Additional Option Weight[c]	
	Shipping		Operating		Shipping		Operating		Louver	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
Units without Direct Free-Cooling[d]										
375	17300	7847	17676	8018	19554	8869	19931	9040	757 / 839	343 / 381
380	18797	8526	19174	8697	20484	9291	20860	9462	921	418
440	17300	7847	17676	8018	19554	8869	19931	9040	757 / 839	343 / 381
450	18797	8526	19174	8697	20484	9291	20860	9462	921	418
500	20678	9379	21169	9602	22365	10144	22856	10367	921	418
550	20678	9379	21169	9602	22365	10144	22856	10367	921	418
Units with Direct Free-Cooling[d]										
375	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
380	26000	11890	26500	12010	27700	12660	28200	12780	1136	515
440	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
450	26000	11890	26500	12010	27700	12660	28200	12780	1136	515
500	27900	12770	28500	12890	29600	13530	30100	13650	1136	515
550	27900	12770	28500	12890	29600	13530	30100	13650	1136	515

Notes:

1. Weights include factory charge of refrigerant and oil, and Superior sound option.
2. All weights are plus/minus 10%.

(a) Single Point Power (SPP) is indicated by model number digit 29 = 1
(b) Options box is used for units with either 575V (model number digit 9 = F) or Low Harmonics Option (model number digit 44 = L).
(c) Option weight is in addition to standard unit with SPP weight. (Std Unit/Unit with Options Box)
(d) Direct Free-Cooling defined by model number digit 42 = T.

Service Clearance

Figure 1. Unit service clearance requirements — 150 to 300 ton units

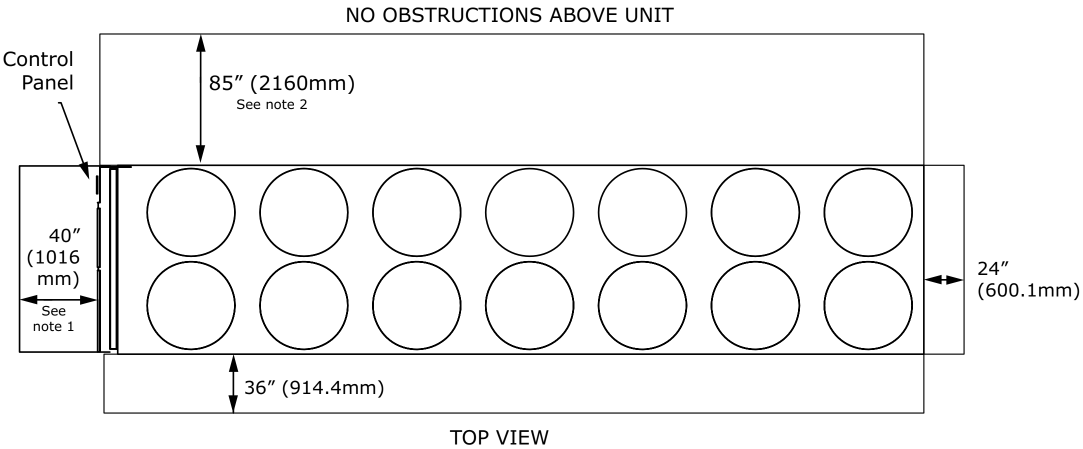
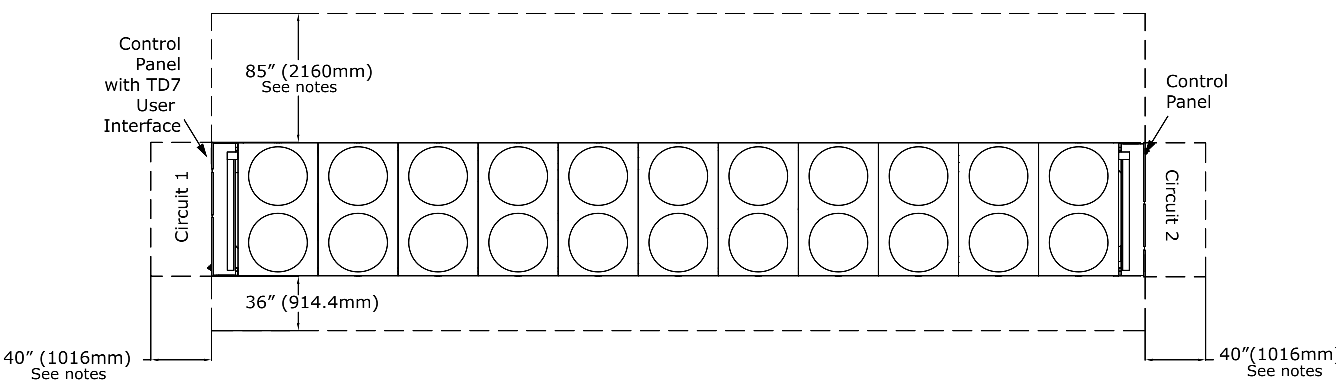


Figure 2. Unit service clearance requirements — units larger than 300 tons



Notes:

1. *A full 40" clearance is required in front of the control panel(s). Must be measured from front of panel, not end of unit base. Installer must also follow NEC and local/state codes for electrical clearance requirements.*
2. *Area above unit is required for operation, maintenance, access panel and air flow. No obstructions above unit.*
3. *Clearance of 85" on the side of the unit is required for coil replacement. Preferred side for coil replacement is shown (left side of the unit, as facing control panel), however either side is acceptable.*
4. *For obstructions or multiple units, refer to close spacing bulletin.*

Unit Dimensions

Unit Sizes 150 to 300 Tons

Figure 3. Dimensions — 150 to 300 ton units, standard length

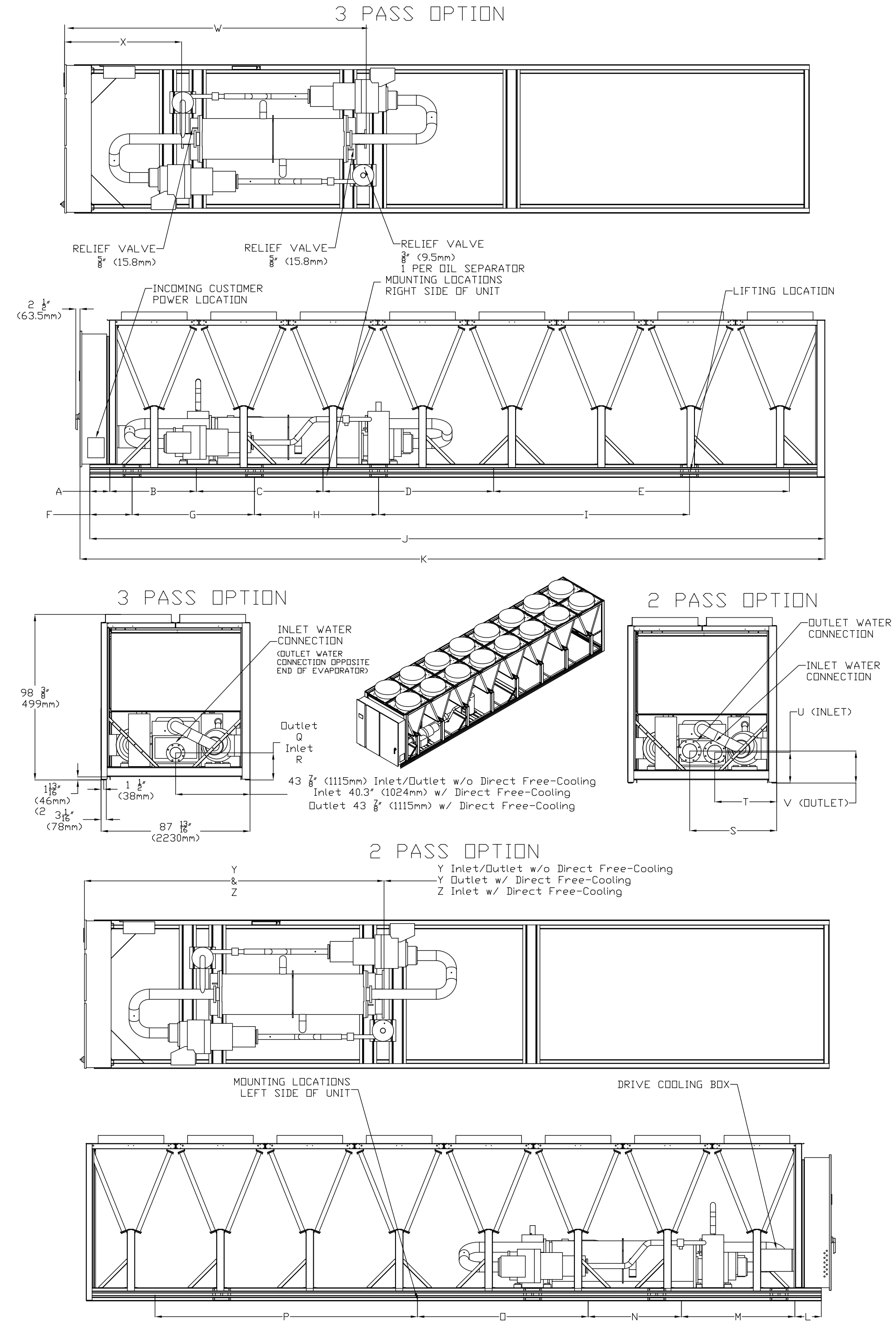


Table 6. Dimensions — 150 to 300 ton units, standard length

Unit Size (tons)	150, 165, 180		165, 180, 200, 225, 250		200, 225, 250, 275		275, 300		300	
Condenser Length[a]	4V		5V		6V		7V		8V	
Dimension	in	mm	in	mm	in	mm	in	mm	in	mm
A	11.8	299.7	11.8	299.7	11.8	299.7	11.8	299.7	11.8	299.7
B	51.2	1300.5	51.2	1300.5	51.2	1300.5	51.2	1300.5	51.2	1300.5
C	78.8	2001.5	74.8	1899.9	74.8	1899.9	61.4	1559.6	74.8	1899.9
D	63.0	1600.2	118.1	2999.7	100.8	2560.3	72.4	1839.0	100.8	2560.3
E	n/a	n/a	n/a	n/a	76.4	n/a	137.8	n/a	174.8	n/a
F	25.0	635.0	25.0	635.0	25.0	635.0	25.0	635.0	25.0	635.0
G	128.1	3253.7	145.6	3698.2	65.9	1673.9	65.9	1673.9	65.9	1673.9
H	n/a	n/a	n/a	n/a	120.5	n/a	158.5	n/a	79.7	n/a
I	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	184.5	n/a
J	223.0	5664.2	275.8	7005.3	328.6	8346.4	381.5	9690.1	434.3	11031.2
K	228.9	5814.1	281.7	7155.2	334.5	8496.3	387.4	9840.0	440.2	11181.1
L	15.8	401.3	15.8	401.3	15.8	401.3	15.8	401.3	15.8	401.3
M	66.9	1699.3	66.9	1699.3	66.9	1699.3	66.9	1699.3	66.9	1699.3
N	59.1	1501.1	55.1	1399.5	55.1	1399.5	41.8	1061.7	55.1	1399.5
O	63.0	1600.2	118.1	2999.7	100.8	2560.3	72.4	1839.0	100.8	2560.3
P	n/a	n/a	n/a	n/a	76.4	n/a	137.8	n/a	155.1	n/a

(a) Condenser length defined by model number digit 25: 4V = A; 5V = B; 6V = C; 7V = D; 8V = E

Table 7. Water connection dimensions — 150 to 300 ton units, standard length, without direct free-cooling option

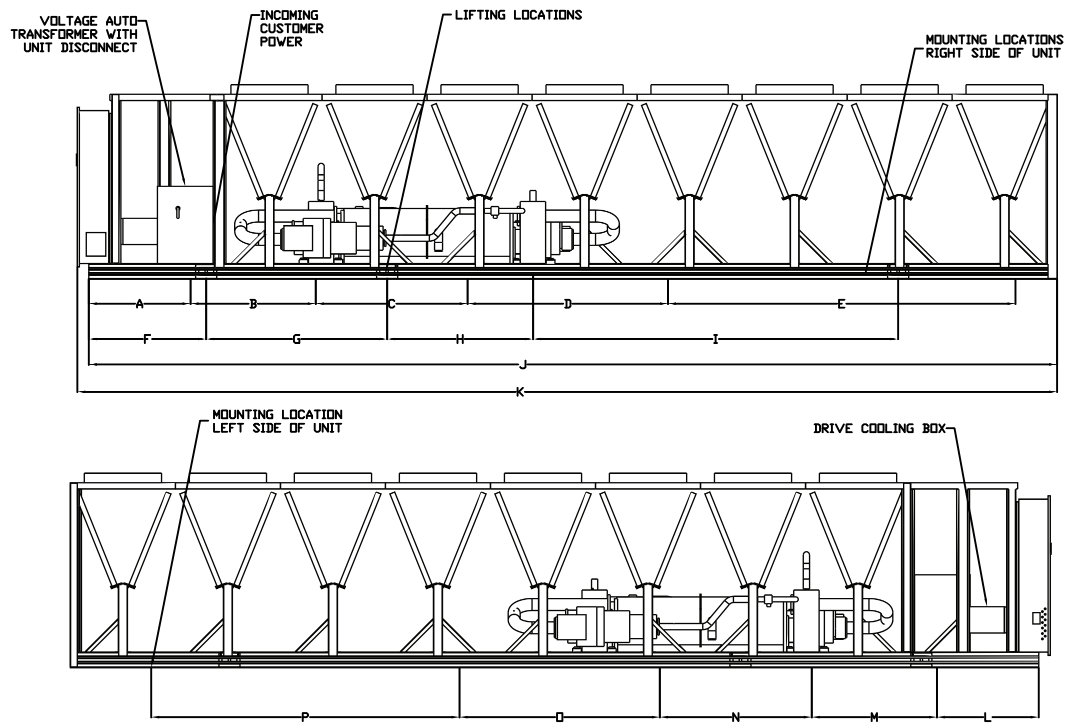
Unit Size (tons)	150		165		180		200		225, 250		275		300	
Dim	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
Q	20.4	518.2	20.4	518.2	19.6	497.8	19.6	497.8	20.4	518.2	20.6	523.2	20.6	523.2
R	17.7	449.6	17.7	449.6	15.4	391.2	15.4	391.2	17.6	447.0	16.1	408.9	16.1	408.9
S	49.3	1252.2	49.3	1252.2	49.9	1267.5	49.9	1267.5	49.9	1267.5	51.3	1303.0	51.3	1303.0
T	38.5	977.9	38.5	977.9	37.9	962.7	37.9	962.7	37.9	962.7	36.5	927.1	36.5	927.1
U	19.3	490.2	19.3	490.2	17.6	447.0	17.6	447.0	19.8	502.9	18.2	462.3	18.2	462.3
V	19.7	500.4	19.7	500.4	18.2	462.3	18.2	462.3	21.8	553.7	18.9	480.1	18.9	480.1
W	176.5	4483.1	176.5	4483.1	178.2	4526.3	178.1	4523.7	178.1	4523.7	178.4	4531.4	178.4	4531.4
X	70.3	1785.6	70.3	1785.6	69.2	1757.7	69.2	1757.7	69.2	1757.7	69.3	1760.2	69.3	1760.2
Y	175.3	4452.6	175.2	4450.1	176.2	4475.5	176.2	4475.5	176.2	4475.5	177.1	4498.3	177.1	4498.3

Table 8. Water connection dimensions — 150 to 300 ton units, standard length, with direct free-cooling option

Unit Size (tons)	165		180		200		225, 250		300	
Dim	in	mm	in	mm	in	mm	in	mm	in	mm
Q	20.4	518.2	19.6	497.8	19.6	497.8	20.4	518.2	20.6	523.2
R	17.5	444.5	17.5	444.5	17.5	444.5	17.5	444.5	16.1	407.7
S	49.3	1252.2	49.9	1267.5	49.9	1267.5	49.9	1267.5	51.3	1303.0
T	40.3	1023.6	40.3	1023.6	40.3	1023.6	40.3	1023.6	39.1	993.9
U	17.5	444.5	17.5	444.5	17.5	444.5	17.5	444.5	16.1	407.7
V	19.7	500.4	18.2	462.3	18.2	462.3	21.8	553.7	18.9	480.1
W	270.9	6881.6	270.9	6880.9	270.9	6880.9	270.6	6873.2	298.8	7588.3
X	70.3	1785.6	69.2	1757.7	69.2	1757.7	69.2	1757.7	69.3	1760.2
Y	175.2	4450.1	176.2	4475.5	176.2	4475.5	176.2	4475.5	177.1	4498.3
Z	270.9	6880.9	270.9	6880.9	270.9	6880.9	270.9	6880.9	298.8	7588.3

Figure 4. Dimensions — 150 to 300 ton units, extended length

VOLTAGE AUTO TRANSFORMER OPTION
USED WITH 200, 230 & 575v



HARMONIC FILTRATION OPTION

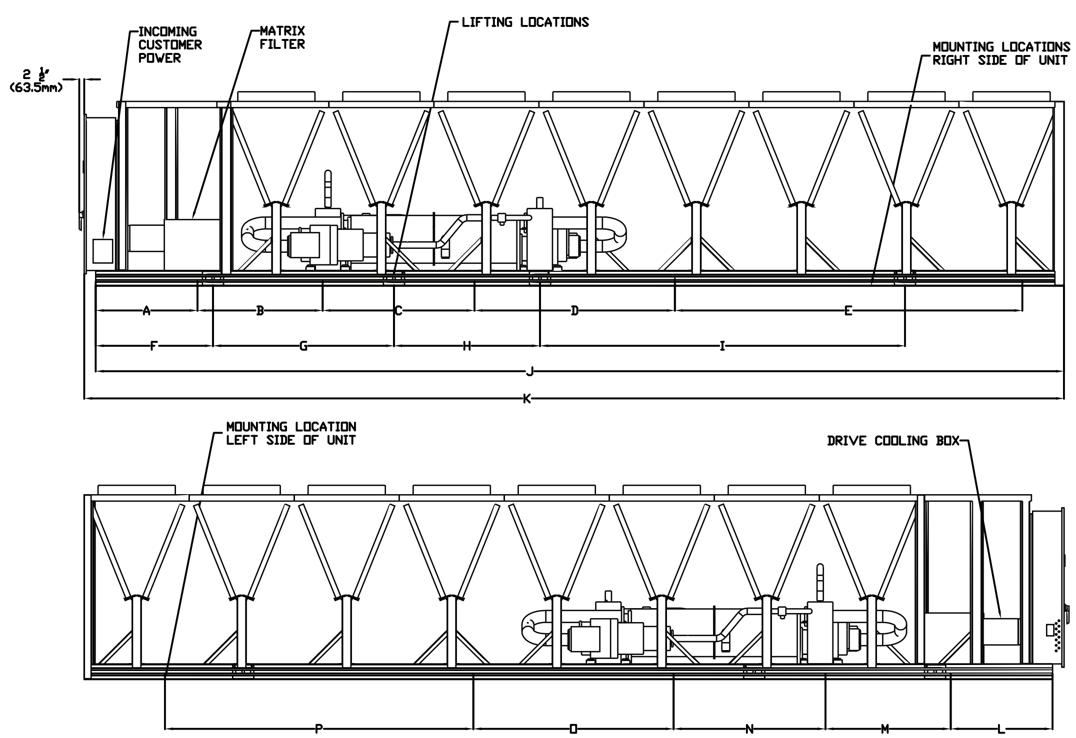


Table 9. Dimensions — 150 to 300 ton units, extended length

Unit Size (tons)	150, 165, 180		165, 180, 200, 225, 250		200, 225, 250, 275		275, 300		300	
Condenser Length[(a)]	4V		5V		6V		7V		8V	
Dimension	in	mm	in	mm	in	mm	in	mm	in	mm
A	27.6	701.0	27.6	701.0	51.2	1300.5	51.2	1300.5	51.2	1300.5
B	86.6	2199.6	86.6	2199.6	63.0	1600.2	63.0	1600.2	63.0	1600.2
C	80.4	2042.2	76.4	1940.6	76.4	1940.6	63.1	1602.7	76.4	1940.6
D	63.0	1600.2	118.1	2999.7	59.1	1501.1	72.4	1839.0	100.8	2560.3
E	n/a	n/a	n/a	n/a	118.1	n/a	137.8	n/a	174.8	n/a
F	55.1	1399.5	55.1	1399.5	58.3	1480.8	58.3	1480.8	58.3	1480.8
G	150.9	3832.9	168.4	4277.4	85.4	2169.2	85.4	2169.2	85.4	2169.2
H	n/a	n/a	n/a	n/a	120.5	n/a	158.5	n/a	79.7	n/a
I	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	184.5	n/a
J	275.8	7005.3	328.6	8346.4	381.5	9690.1	434.3	11031.2	487.1	12372.3
K	281.7	7155.2	334.5	8496.3	387.4	9840.0	440.2	11181.1	493.0	12522.2
L	27.6	701.0	27.6	701.0	51.2	1300.5	51.2	1300.5	51.2	1300.5
M	86.6	2199.6	86.6	2199.6	63.0	1600.2	63.0	1600.2	63.0	1600.2
N	80.4	2042.2	76.4	1940.6	76.4	1940.6	63.1	1602.7	76.4	1940.6
O	63.0	1600.2	118.1	2999.7	59.1	1501.1	72.4	1839.0	63.0	1600.2
P	n/a	n/a	n/a	n/a	118.1	n/a	137.8	n/a	155.1	n/a

(a) Condenser length defined by model number digit 25: 4V = A; 5V = B; 6V = C; 7V = D; 8V = E

Table 10. Water connection dimensions — 150 to 300 ton units, extended length, without direct free-cooling option

Unit Size (tons)	150		165		180		200		225, 250		275		300	
Dim	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
Q	20.4	518.2	20.4	518.2	19.6	497.8	19.6	497.8	21.8	553.7	20.6	523.2	20.6	523.2
R	17.7	449.6	17.7	449.6	15.4	391.2	15.4	391.2	17.6	447.0	16.1	408.9	16.1	408.9
S	49.3	1252.2	49.3	1252.2	49.9	1267.5	49.9	1267.5	49.9	1267.5	51.3	1303.0	51.3	1303.0
T	38.5	977.9	38.5	977.9	37.9	962.7	37.9	962.7	37.9	962.7	36.5	927.1	36.5	927.1
U	19.3	490.2	19.3	490.2	17.6	447.0	17.6	447.0	19.8	502.9	18.2	462.3	18.2	462.3
V	19.7	500.4	19.7	500.4	18.2	462.3	18.2	462.3	20.4	518.2	18.9	480.1	18.9	480.1
W	123.1	3126.7	123.1	3126.7	122.0	3098.8	122.1	3101.3	122.1	3101.3	122.1	3101.3	122.1	3101.3
X	229.3	5824.2	229.3	5824.2	231.0	5867.4	231.0	5867.4	231.0	5867.4	231.2	5872.5	231.2	5872.5
Y	227.9	5788.7	228.0	5791.2	228.9	5814.1	228.9	5814.1	229.1	5819.1	229.9	5839.5	229.9	5839.5

Table 11. Water connection dimensions — 150 to 300 ton units, extended length, with direct free-cooling option

Unit Size (tons)	165		180		200		225, 250		300	
Dim	in	mm	in	mm	in	mm	in	mm	in	mm
Q	20.4	518.2	19.6	497.8	19.6	497.8	21.8	553.7	20.6	523.2
R	17.5	444.5	17.5	444.5	17.5	444.5	17.5	444.5	16.1	407.7
S	49.3	1252.2	49.9	1267.5	49.9	1267.5	49.9	1267.5	51.3	1303.0
T	40.3	1023.6	40.3	1023.6	40.3	1023.6	40.3	1023.6	39.1	993.9
U	17.5	444.5	17.5	444.5	17.5	444.5	17.5	444.5	16.1	407.7
V	19.7	500.4	18.2	462.3	18.2	462.3	20.4	518.2	18.9	480.1
W	323.5	8216.9	323.5	8216.9	323.5	8216.9	323.5	8216.9	351.6	8930.4
X	123.1	3126.7	122.0	3099.8	122.0	3098.8	122.0	3098.8	122.1	3100.8
Y	227.9	5788.7	229.1	5819.1	231.8	5887.7	231.8	5887.7	229.9	5839.5
Z	323.5	8216.9	323.5	8216.9	326.5	8293.1	326.5	8293.1	351.6	8930.4

Unit Sizes — Units Larger than 300 tons

Figure 5. Dimensions — units larger than 300 tons, units without direct-free cooling

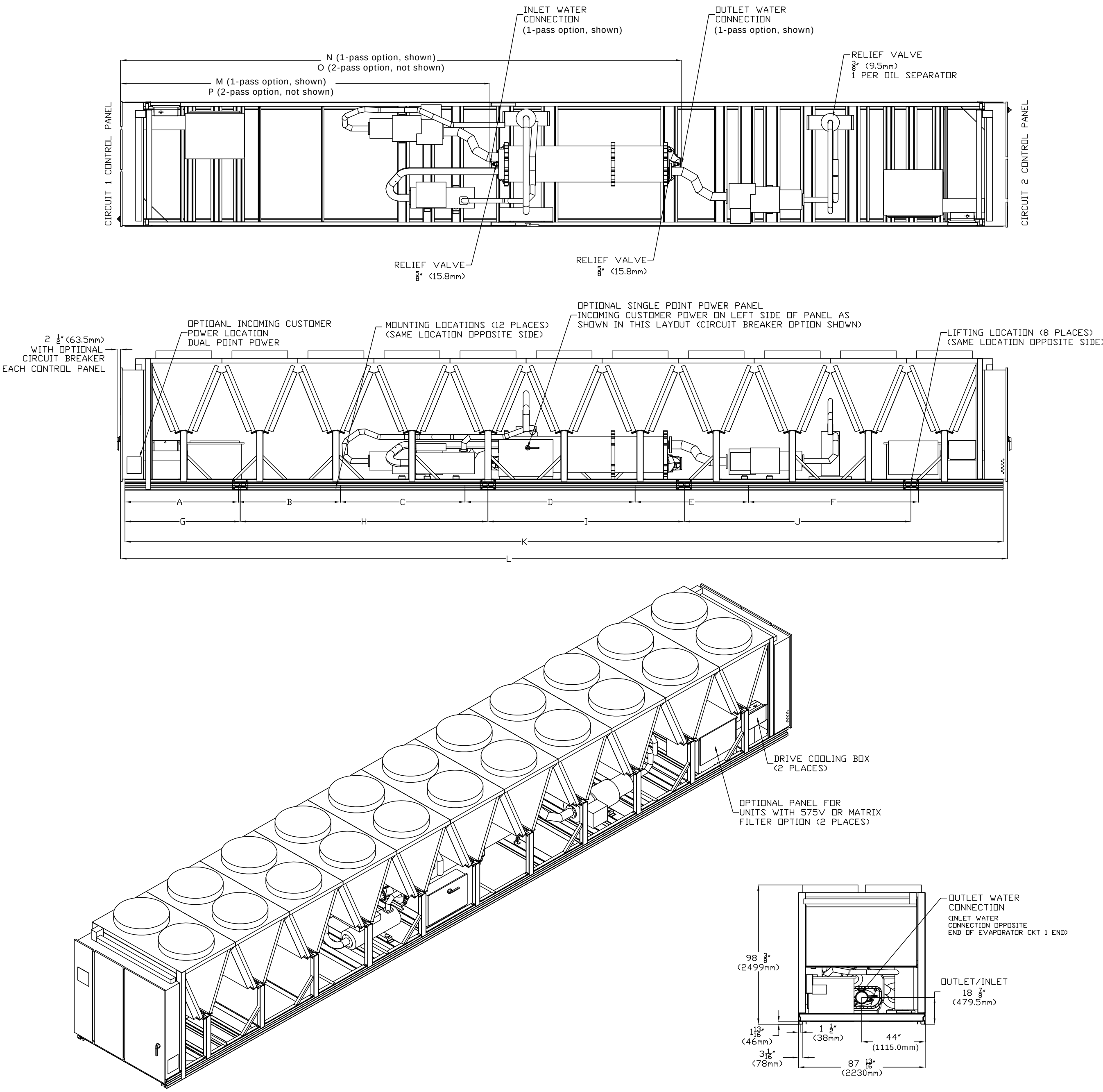
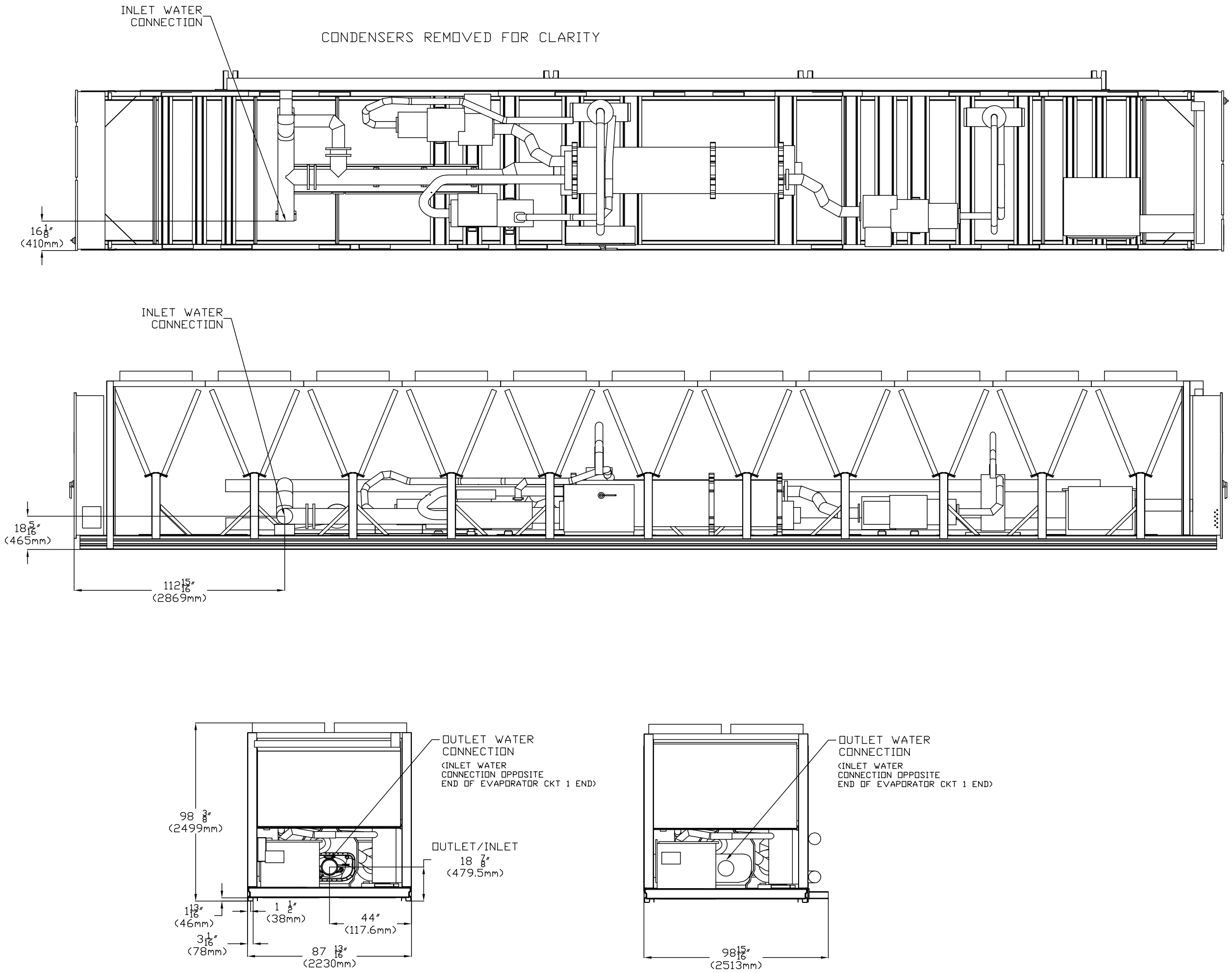


Table 12. Dimensions — units larger than 300 tons

Unit Size (tons)	375, 440		375, 440		380, 450		500, 550	
Unit Voltage[a]	All except 575V		575V		All		All	
Harmonic Filter[b]	Standard		Low		Low & Standard		Low & Standard	
Dimension	in	mm	in	mm	in	mm	in	mm
A	55.1	1400	78.7	2000	78.7	2000	78.7	2000
B	102.4	2600	149.6	3800	149.6	3800	149.6	3800
C	183.4	4658	236.2	6000	236.2	6000	236.2	6000
D	301.5	7658	354.3	9000	354.3	9000	354.3	9000
E	498.3	9658	433.1	11000	433.1	11000	433.1	11000
F	na	na	551.2	14000	551.2	14000	551.2	14000
G	80.0	2032	80.0	2032	80.0	2032	80.0	2032
H	199.2	5060	252.0	6402	252.0	6402	252.0	6402
I	335.6	8525	388.5	9867	388.5	9867	388.5	9867
J	446.9	11350	545.4	13852	545.4	13852	545.4	13852
K	504.3	12810	610.0	15494	610.0	15494	610.0	15494
L	510.4	12965	616.1	15648	616.1	15648	616.1	15648
M	200.7	5098	200.7	5098	253.5	6440	253.5	6440
N	333.9	8480	333.9	8480	386.7	9822	389.8	9902
O	200.7	5098	200.7	5098	253.5	6440	253.5	6440
P	200.7	5098	200.7	5098	253.5	6440	253.5	6440

(a) Unit voltage defined by model number digit 9: 575V = F
(b) Harmonic filter defined by model number digit 44: STANDARD = X; LOW = L

Figure 6. Dimensions — units larger than 300 tons, with direct free-cooling option



***Note:** Dimensions not shown remain the same as units without direct free-cooling option.*

Installation Mechanical

Location Requirements

Sound Considerations

- Locate the unit away from sound-sensitive areas.
- Install the optional elastomeric isolators under the unit. See Isolation and Sound Emission section.
- Chilled water piping should not be supported by chiller frame.
- Install rubber vibration isolators in all water piping.
- Use flexible electrical conduit.
- Seal all wall penetrations.

Note: *Consult an acoustical engineer for critical applications.*

Foundation

Provide rigid, non-warping mounting pads or a concrete foundation of sufficient strength and mass to support the applicable operating weight (i.e., including completed piping, and full operating charges of refrigerant, oil and water). See Dimensions and Weights chapter for unit operating weights. Once in place, the unit must be level within 1/4” (6.4 mm) across the length and width of the unit. The Trane Company is not responsible for equipment problems resulting from an improperly designed or constructed foundation.

Clearances

Provide enough space around the unit to allow the installation and maintenance personnel unrestricted access to all service points. See submittal drawings for the unit dimensions, to provide sufficient clearance for the opening of control panel doors and unit service. See Dimensions and Weights chapter for minimum clearances. In all cases, local codes which require additional clearances will take precedence over these recommendations.

For close spacing information, see AC-PRB001*-EN.

Lifting and Moving Instructions

⚠ WARNING

Heavy Object!

Failure to follow instructions below could result in unit dropping which could result in death or serious injury, and equipment or property-only damage.
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.

⚠ WARNING

Improper Unit Lift!

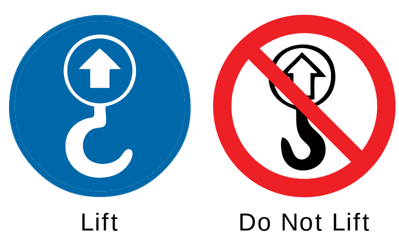
Failure to properly lift unit in a LEVEL position could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage.
Test lift unit approximately 24 inches (61 cm) to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

⚠ WARNING

Proper Lifting Configuration Required!

Failure to follow instructions below could cause the unit to drop which could result in death, serious injury or equipment damage.
Use ONLY lifting locations designated with label shown below. DO NOT use locations marked with do-not-lift label. See following figures for acceptable lifting configuration, and refer to labels on the unit.

Figure 7. Lift/Do Not Lift labels



NOTICE

Equipment Damage!

Moving the chiller using a fork lift could result in equipment or property-only damage.
Do not use a fork lift to move the chiller!

Important:

- *See unit nameplate and/or unit submittal for total shipping weight.*
- *See following figures for unit lifting configuration.*
- *See Dimensions and Weights chapter, or unit submittal, for lifting point locations.*
- *Diagram is generic representation of unit.*
- *The maximum rigging angle at each chiller lift point is 30° from vertical.*
- *Do not allow lifting straps to contact unit during lifting.*

Figure 8. 4–point lift configuration — 4V and 5V units (model number digit 25 = A, B)

Spreader bar/lifting rig width: 96 inch

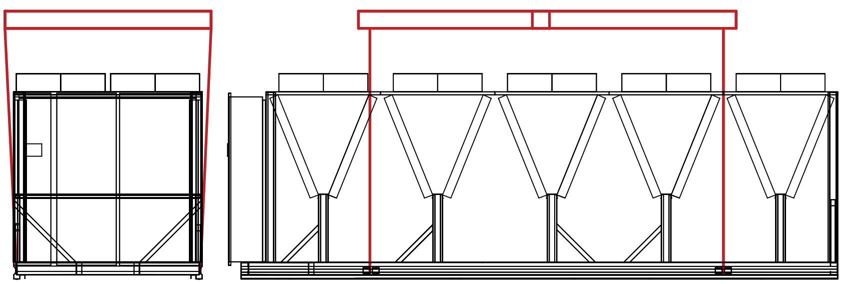


Figure 9. 6–point lift configuration — 6V and 7V units (model number digit 25 = C, D)

Spreader bar/lifting rig width: 96 inch

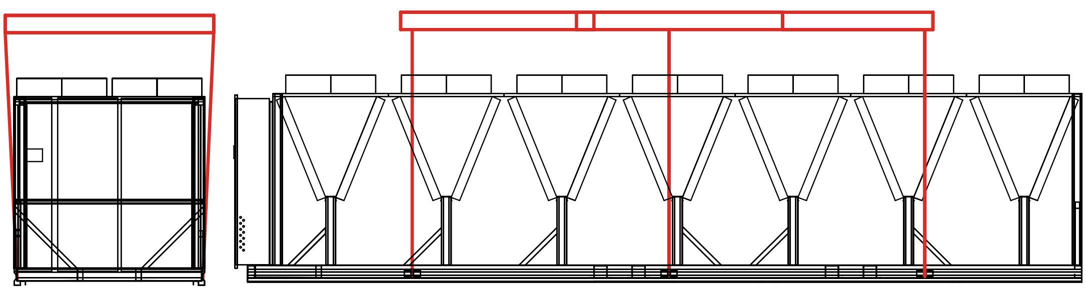
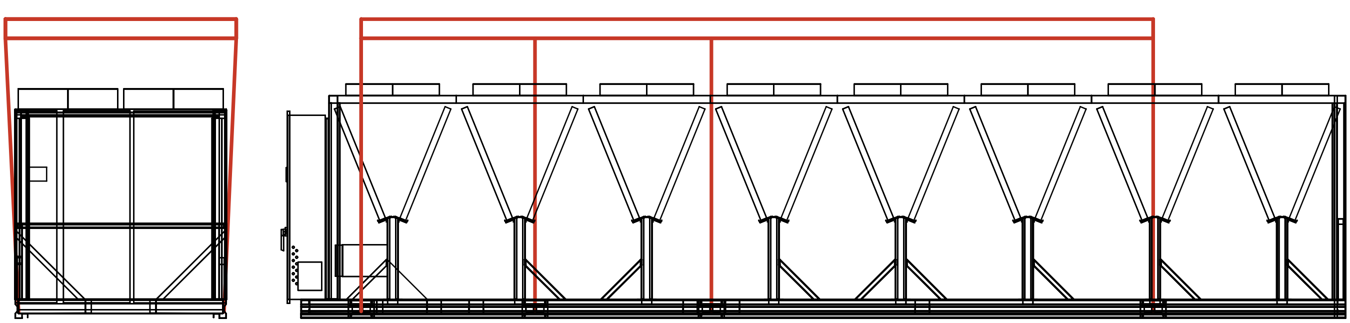


Figure 10. 8–point lift configuration — 8V, 9V, and 11V units (model number digit 25 = E, F, or H)

Spreader bar/lifting rig width:
120 inch (11V units with direct free-cooling option)
96 inch (all other units)



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.

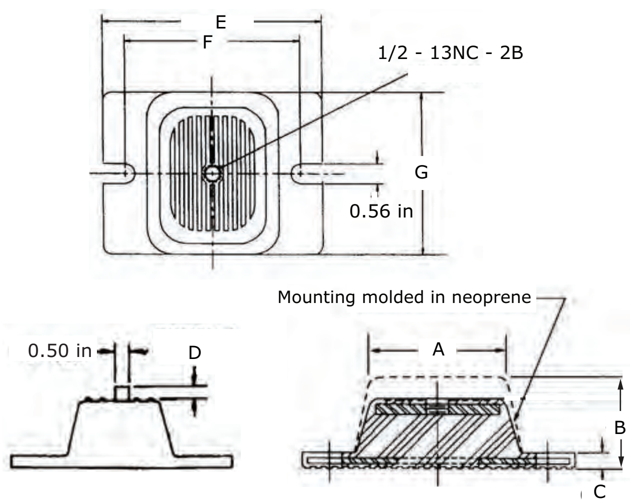
State and local codes on sound emissions should always be considered. Since the environment in which a sound source is located affects sound pressure, unit placement must be carefully evaluated. Sound power levels for Stealth chillers are available on request.

Unit Isolation and Leveling

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

Construct an isolated concrete pad for the unit or provide concrete footings at the unit mounting points.

Figure 11. Elastomeric isolator



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” (6.4 mm) over the entire length and width. Use shims as necessary to level the unit.

Elastomeric Isolators

Note: *See unit submittal, or tables in this section, for point weights, isolator locations and isolator selections.*

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.

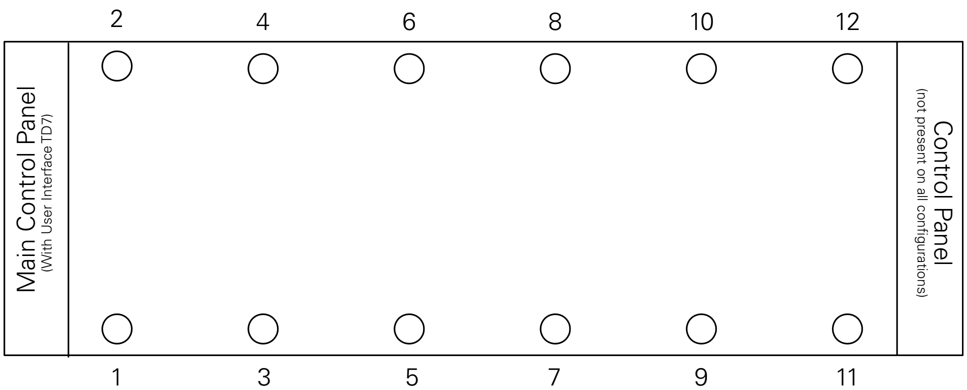
Table 13. Elastomeric isolator specifications

Isolator	Max Load (lbs)	Max Deflection (in)	A	B	C	D	E	F	G	Type
Black 60	1100	0.5	2.5	2.88	0.25	1.13	5.50	4.12	3.38	RDP3-WR
Brown 61	1500	0.5	3.0	2.75	0.38	1.60	6.25	5.00	4.63	RDP4-WR
Red 62	2250	0.5	3.0	2.75	0.38	1.60	6.25	5.00	4.63	RDP4-WR
Green 63	3000	0.5	3.0	2.75	0.38	1.60	6.25	5.00	4.63	RDP4-WR
Black 64	4000	0.5	3.0	2.75	0.38	1.60	6.25	5.00	4.63	RDP4-WR

Mounting Locations, Weights, Isolators

See figure below for mounting point location designations.

Figure 12. Mounting point locations (top view)



Note: *Quantity of isolators varies with unit. See submittal for actual number required for specific unit.*

Point Weights

150 to 300 Ton Units

Table 14. Point weights, 150 to 300 ton units without direct free-cooling option - I-P (lb)

Unit Size	Condenser Length	Point Weights (lb)									
		1	2	3	4	5	6	7	8	9	10
Standard Length Units											
150	4V	1820	1610	1870	1680	1720	1790	740	940	n/a	n/a
165	4V	1820	1620	1870	1690	1730	1800	740	940	n/a	n/a
	5V	1760	1710	1910	1860	1950	1970	950	1100	n/a	n/a
180	4V	1830	1630	1890	1710	1750	1830	750	960	n/a	n/a
	5V	1780	1760	1940	1930	1980	2050	960	1130	n/a	n/a
200	5V	1780	1770	1950	1930	1990	2060	960	1130	n/a	n/a
	6V	1800	1850	1990	1910	1970	1950	1290	1400	280	300
225	5V	1960	1880	2170	2150	2210	2330	1020	1270	n/a	n/a
	6V	2000	1930	2240	2140	2120	2130	1370	1550	280	330
250	5V	1970	1890	2180	2160	2220	2340	1020	1270	n/a	n/a
	6V	2050	1980	2300	2200	2180	2190	1390	1560	280	330
275	6V	2060	2000	2320	2220	2200	2200	1400	1570	280	330
	7V	1950	1850	2120	1990	2040	2010	1840	2030	870	960
300	7V	1950	1850	2130	2000	2050	2020	1840	2030	880	960
	8V	1990	1940	2340	2240	2350	2310	1950	2060	750	870
Extended Length Units											
150	4V	2270	2030	2240	2050	1890	2090	740	1010	n/a	n/a
165	4V	2270	2030	2240	2060	1900	2090	750	1020	n/a	n/a
	5V	2190	1970	2320	2210	2340	2590	770	970	n/a	n/a
180	4V	2150	1940	2390	2250	2430	2780	780	980	n/a	n/a
	5V	2150	1940	2390	2250	2430	2780	780	980	n/a	n/a

Table 14. Point weights, 150 to 300 ton units without direct free-cooling option - I-P (lb) (continued)

Unit Size	Condenser Length	Point Weights (lb)									
		1	2	3	4	5	6	7	8	9	10
200	5V	2150	1940	2390	2250	2440	2790	780	980	n/a	n/a
	6V	2590	2380	2360	2290	2040	2250	740	860	620	700
225	5V	2260	1990	2660	2470	2700	3160	820	1090	n/a	n/a
	6V	2810	2480	2620	2470	2240	2520	790	970	610	750
250	5V	2260	1990	2680	2490	2720	3180	820	1090	n/a	n/a
	6V	2850	2520	2700	2550	2320	2590	810	990	600	730
275	6V	2860	2530	2720	2560	2340	2610	810	990	600	730
	7V	2700	2400	2620	2490	2500	2740	1000	1210	1020	1140
300	7V	2710	2400	2630	2500	2510	2750	1000	1210	1020	1140
	8V	2890	2490	2780	2580	2290	2480	1820	2090	710	810

Notes:

1. Weights include factory charge of refrigerant and oil, ultimate sound, and architectural louvered panels.
2. Condenser length defined by model number digit 25: 4V = A; 5V = B; 6V = C; 7V = D; 8V = E
3. All weights are plus/minus 10%
4. Extended Length is required for voltages 200V, 230V, 575V model number digit 9 = A, B, F and harmonic filtration model number digit 44 = L.

Table 15. Point weights, 150 to 300 ton units without direct free-cooling option - SI (kg)

Unit Size	Condenser Length	Point Weight (kg)									
		1	2	3	4	5	6	7	8	9	10
Standard Length Units											
150	4V	830	730	850	770	780	810	340	430	n/a	n/a
165	4V	830	740	850	770	790	820	340	430	n/a	n/a
	5V	800	780	870	840	890	900	430	500	n/a	n/a
180	4V	840	740	860	780	800	830	340	440	n/a	n/a
	5V	810	800	880	880	900	930	440	510	n/a	n/a
200	5V	810	800	890	880	910	940	440	520	n/a	n/a
	6V	820	840	910	870	890	890	590	640	130	140
225	5V	890	860	990	980	1010	1060	470	580	n/a	n/a
	6V	910	880	1020	970	960	970	630	710	130	150
250	5V	890	860	990	980	1010	1060	470	580	n/a	n/a
	6V	930	900	1050	1000	990	990	630	710	130	150
275	6V	940	910	1060	1010	1000	1000	640	720	130	150
	7V	890	840	960	910	930	920	840	920	400	440
300	7V	890	840	970	910	930	920	840	930	400	440
	8V	910	880	1060	1020	1070	1050	890	940	340	400
Extended Length Units											
150	4V	1030	920	1020	930	860	950	340	460	n/a	n/a
165	4V	1030	920	1020	940	860	950	340	460	n/a	n/a
	5V	990	900	1060	1010	1070	1180	350	440	n/a	n/a
180	4V	980	880	1080	1020	1100	1260	350	450	n/a	n/a
	5V	980	880	1080	1020	1100	1260	350	450	n/a	n/a
200	5V	980	880	1090	1030	1110	1270	360	450	n/a	n/a
	6V	1180	1080	1070	1040	930	1020	340	390	280	320

Table 15. Point weights, 150 to 300 ton units without direct free-cooling option - SI (kg) (continued)

Unit Size	Condenser Length	Point Weight (kg)									
		1	2	3	4	5	6	7	8	9	10
225	5V	1030	900	1210	1120	1230	1440	370	500	n/a	n/a
	6V	1280	1130	1190	1120	1020	1140	360	440	280	340
250	5V	1030	910	1220	1130	1240	1440	370	500	n/a	n/a
	6V	1300	1150	1230	1160	1050	1180	370	450	280	330
275	6V	1300	1150	1240	1170	1060	1190	370	450	280	330
	7V	1230	1090	1190	1130	1140	1250	450	550	460	520
300	7V	1230	1090	1200	1130	1140	1250	460	550	460	520
	8V	1310	1130	1260	1170	1040	1130	830	950	330	370

Notes:

1. Weights include factory charge of refrigerant and oil, ultimate sound, and architectural louvered panels.
2. Condenser length defined by model number digit 25: 4V = A; 5V = B; 6V = C; 7V = D; 8V = E
3. All weights are plus/minus 10%
4. Extended Length is required for voltages 200V, 230V, 575V model number digit 9 = A, B, F and harmonic filtration model number digit 44 = L.

Table 16. Point weights, 150 to 300 ton units with direct free-cooling option - I-P (lb)

Unit Size	Point Weights (lb)									
	1	2	3	4	5	6	7	8	9	10
Standard Length Units-Direct Free Cooling										
165	1910	1960	2010	2070	2620	2880	1200	1530	n/a	n/a
180	1750	1860	2480	2600	2560	2810	1290	1610	n/a	n/a
200	1900	2030	2130	2210	3070	3340	1090	1310	780	930
225	1840	1980	2850	2870	3090	3000	1080	1960	840	720
250	1880	2030	2930	2950	3160	3060	1090	1970	830	710
300	1920	2030	2900	3000	2930	3150	2790	2960	1180	1650
Extended Length Units- Direct Free Cooling										
165	2390	2220	2500	2470	2230	2580	2040	2630	n/a	n/a
180	2350	2220	2980	3040	2880	3290	1120	1560	n/a	n/a
200	2700	2620	2720	2690	2690	2710	1060	2070	1010	980
225	2910	2760	2960	2760	2880	2660	1120	2620	1030	960
250	2950	2810	3050	2840	2960	2740	1140	2650	1010	930
300	2990	2600	3110	3060	2920	3440	2850	3570	1320	1830

Notes:

1. Weights include factory charge of refrigerant and oil, ultimate sound, and architectural louvered panels.
2. All weights are plus/minus 10%
3. Extended Length is required for voltages 200V, 230V, 575V model number digit 9 = A, B, F and harmonic filtration model number digit 44 = L.

Table 17. Point weights, 150 to 300 ton units with direct free-cooling option - SI (kg)

Unit Size	Point Weight (kg)									
	1	2	3	4	5	6	7	8	9	10
Standard Length Units-Direct Free Cooling										
165	870	890	910	940	1190	1300	540	690	n/a	n/a
180	800	840	1120	1180	1160	1280	580	730	n/a	n/a
200	860	920	970	1000	1390	1520	500	600	350	420
225	830	890	1290	1300	1400	1360	490	890	380	360

Table 17. Point weights, 150 to 300 ton units with direct free-cooling option - SI (kg) (continued)

Unit Size	Point Weight (kg)									
	1	2	3	4	5	6	7	8	9	10
250	850	920	1330	1340	1430	1390	500	900	380	320
300	870	920	1310	1360	1330	1430	1270	1350	540	750
Extended Length Units- Direct Free Cooling										
165	1080	1010	1130	1120	1010	1170	930	1190	n/a	n/a
180	1070	1000	1350	1380	1310	1490	510	710	n/a	n/a
200	1220	1190	1230	1220	1220	1230	480	940	460	450
225	1320	1250	1340	1250	1300	1210	510	1190	470	440
250	1340	1270	1380	1290	1340	1240	510	1200	460	420
300	1350	1180	1410	1390	1330	1560	1290	1620	600	830

Notes:

1. Weights include factory charge of refrigerant and oil, ultimate sound, and architectural louvered panels.
2. All weights are plus/minus 10%
3. Extended Length is required for voltages 200V, 230V, 575V model number digit 9 = A, B, F and harmonic filtration model number digit 44 = L.

Units Larger than 300 Tons

Table 18. Point weights, units larger than 300 tons - IP (lb)

Unit Size	Point Weights (lb)											
	1	2	3	4	5	6	7	8	9	10	11	12
	Standard Unit											
375	1430	1736	1525	1753	1764	1834	1975	1688	2305	1667	n/a	n/a
380	1405	1669	1434	1579	1647	1646	1746	1549	1740	1474	1731	1548
440	1430	1736	1525	1753	1764	1834	1975	1688	2305	1667	n/a	n/a
450	1405	1669	1434	1579	1647	1646	1746	1549	1740	1474	1731	1548
500	1616	1470	1634	1743	1855	1906	1987	1905	1978	1819	1860	1860
550	1616	1470	1634	1743	1855	1906	1987	1905	1978	1819	1860	1860
	Unit with 575V or low harmonic filter[(a)]											
375	1947	2433	1929	2264	1960	2048	1658	1412	1412	985	1220	663
380	1577	2102	1497	1774	1638	1669	1769	1527	1885	1506	2181	1728
440	1947	2433	1929	2264	1960	2048	1658	1412	1412	985	1220	663
450	1577	2102	1497	1774	1638	1669	1769	1527	1885	1506	2181	1728
500	1568	2050	1533	1829	1734	1878	1929	1965	2049	2010	2269	2040
550	1568	2050	1533	1829	1734	1878	1929	1965	2049	2010	2269	2040

(a) Units where unit voltage = 575V (model number digit 9 = F) or where harmonic filter = low (model number digit 44 = L)

Table 19. Point weights, units larger than 300 tons - SI (kg)

Unit Size	Point Weight (kg)											
	1	2	3	4	5	6	7	8	9	10	11	12
	Standard Unit											
375	648	787	691	795	800	832	895	765	1045	756	n/a	n/a
380	637	757	650	716	747	746	792	702	789	668	785	702
440	648	787	691	795	800	832	895	765	1045	756	n/a	n/a
450	637	757	650	716	747	746	792	702	789	668	785	702

Table 19. Point weights, units larger than 300 tons - SI (kg) (continued)

Unit Size	Point Weight (kg)											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
500	733	666	741	790	841	864	901	864	897	825	843	843
550	733	666	741	790	841	864	901	864	897	825	843	843
	Unit with 575V or low harmonic filter[a]											
375	883	1103	875	1026	889	929	752	640	640	447	553	301
380	715	953	679	804	743	757	802	692	855	683	989	783
440	883	1103	875	1026	889	929	752	640	640	447	553	301
450	715	953	679	804	743	757	802	692	855	683	989	783
500	711	929	695	829	786	851	875	891	929	911	1029	925
550	711	929	695	829	786	851	875	891	929	911	1029	925

(a) Units where unit voltage = 575V (model number digit 9 = F) or where harmonic filter = low (model number digit 44 = L)

Isolator Selections

150 to 300 Ton Units

See Dimensions and Weights chapter for isolator mounting position dimensions.

Table 20. Elastomeric isolator selections, 150 to 300 ton units without direct free-cooling

Condenser Length	Isolator Position									
	1	2	3	4	5	6	7	8	9	10
	Standard Length Units									
4V	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Brown 61	Brown 61	-	-
5V	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Red 62	Red 62	-	-
6V	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Black 60	Black 60
7V	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Brown 61	Brown 61
8V	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Brown 61	Brown 61
	Extended Length Units									
4V	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Brown 61	Brown 61	-	-
5V	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	Brown 61	Brown 61	-	-
6V	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	Brown 61	Brown 61	Brown 61	Brown 61
7V	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	Brown 61	Brown 61	Brown 61	Brown 61
8V	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	Brown 61	Brown 61

Notes:

1. Condenser length defined by model number digit 25: 4V = A; 5V = B; 6V = C; 7V = D; 8V = E
2. Extended Length is required for voltages 200V, 230V, 575V model number digit 9 = A, B ,F and harmonic filtration model number digit 44 = L.

Table 21. Elastomeric isolator selections, 150 to 300 ton units with direct free-cooling

Unit Size	Isolator Position									
	1	2	3	4	5	6	7	8	9	10
	Standard Length Units-Direct Free Cooling									
165	Green 63	Green 63	Green 63	Green 63	Black 64	Black 64	Green 63	Green 63	-	-
180	Green 63	Green 63	Black 64	Black 64	Black 64	Black 64	Green 63	Green 63	-	-
200	Green 63	Green 63	Green 63	Green 63	Black 64	Black 64	Brown 61	Brown 61	Brown 61	Brown 61
225/250	Green 63	Green 63	Black 64	Black 64	Black 64	Black 64	Brown 61	Green 63	Brown 61	Brown 61
300	Green 63	Green 63	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	Brown 61	Green 63
	Extended Length Units-Direct Free Cooling									
165	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	-	-
180	Green 63	Green 63	Black 64	Black 64	Black 64	Black 64	Brown 61	Green 63	-	-
200	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Brown 61	Green 63	Brown 61	Brown 61
225/250	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	Brown 61	Black 64	Brown 61	Brown 61
300	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	Black 64	Red 62	Green 63

Notes:

1. Condenser length defined by model number digit 25: 4V = A; 5V = B; 6V = C; 7V = D; 8V = E
2. Extended Length is required for voltages 200V, 230V, 575V model number digit 9 = A, B ,F and harmonic filtration model number digit 44 = L.

Units Larger than 300 Tons

Table 22. Elastomeric isolator selections, units larger than 300 tons without direct free-cooling

Unit Size	Isolator Position											
	1	2	3	4	5	6	7	8	9	10	11	12
375	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	n/a	n/a
375[a]	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63
380	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63
440	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	n/a	n/a
440[a]	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63
450	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63
500	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63
550	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63	Green 63

(a) Units where unit voltage = 575V (model number digit 9 = F) or where harmonic filter = low (model number digit 44 = L)

Table 23. Elastomeric isolator selections, units larger than 300 tons with direct free-cooling

Unit Size	Isolator Position											
	1	2	3	4	5	6	7	8	9	10	11	12
375	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
375[a]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
380	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64
440	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
440[a]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
450	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64
500	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64
550	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64	Grey 64

(a) Units where unit voltage = 575V (model number digit 9 = F) or where harmonic filter = low (model number digit 44 = L)

Compressor Mounting Bolt Removal

Units with InvisiSound™ Ultimate Option (Model Number Digit 13 = E)

For chillers built with InvisiSound Ultimate option, compressor mounting bolts must be removed to assure minimum noise during operation. Use a 24mm socket to remove the (3) M15 x 75mm mounting bolts for each compressor. They are located under compressor mounting feet. See figure below.

Important:

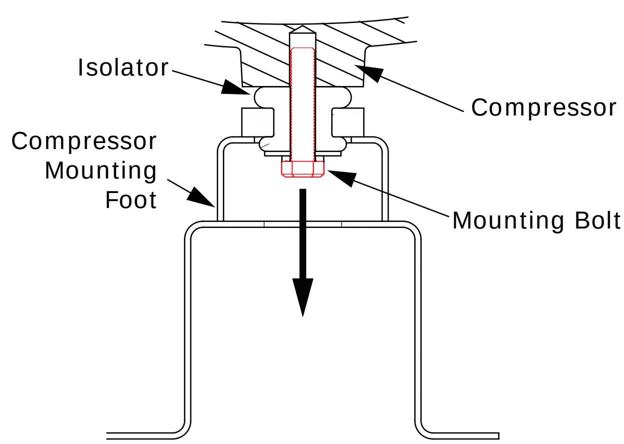
- *DO NOT DISCARD MOUNTING BOLTS. Store bolts in the control panel for future use.*
- *All mounting bolts MUST be reinstalled prior to compressor removal or unit move.*

NOTICE

Equipment Damage!

Failure to reinstall bolts could cause shifting of parts and result in equipment damage.
Do not remove compressor or move unit without reattaching compressor mounting bolts.

Figure 13. Compressor mounting bolt removal



Drainage

Locate the unit near a large capacity drain for water vessel drain-down during shutdown or repair. Evaporators are provided with drain connections. A vent on top of evaporator waterbox prevents vacuum by allowing air into evaporator for complete drainage. All local and national codes apply.

Refrigerant Pressure Relief Valves

Table 24. Refrigerant pressure relief valves — 150 to 300 ton units

Qty	Relief Valve Setting	Rated Capacity (lba/min)	Connection Size (in)	
			Field (Pipe)	Factory (Shell)
Evaporator				
2	200	28.9	3/4	7/8-14
Oil Separator				
2	350	13.3	3/8	1/4-18

Table 25. Refrigerant pressure relief valves — units larger than 300 tons

Qty	Relief Valve Setting	Rated Capacity (lba/min)	Connection Size (in)	
			Field (Pipe)	Factory (Shell)
Evaporator				
2	200	28.9	3/4	7/8-14
Single Inlet Oil Separator				
1 or 0	350	13.3	3/8	1/4-18
Dual Inlet Oil Separator				
1 or 2	350	13.3	3/8	3/8

Evaporator Piping

Available pass configurations:

- 150 to 300 ton units: Two or three passes
- Units larger than 300 tons: One or two passes

Note: *The following figures are top views. Condenser removed for clarity.*

Figure 14. Evaporator pass configurations — 150 to 300 ton units

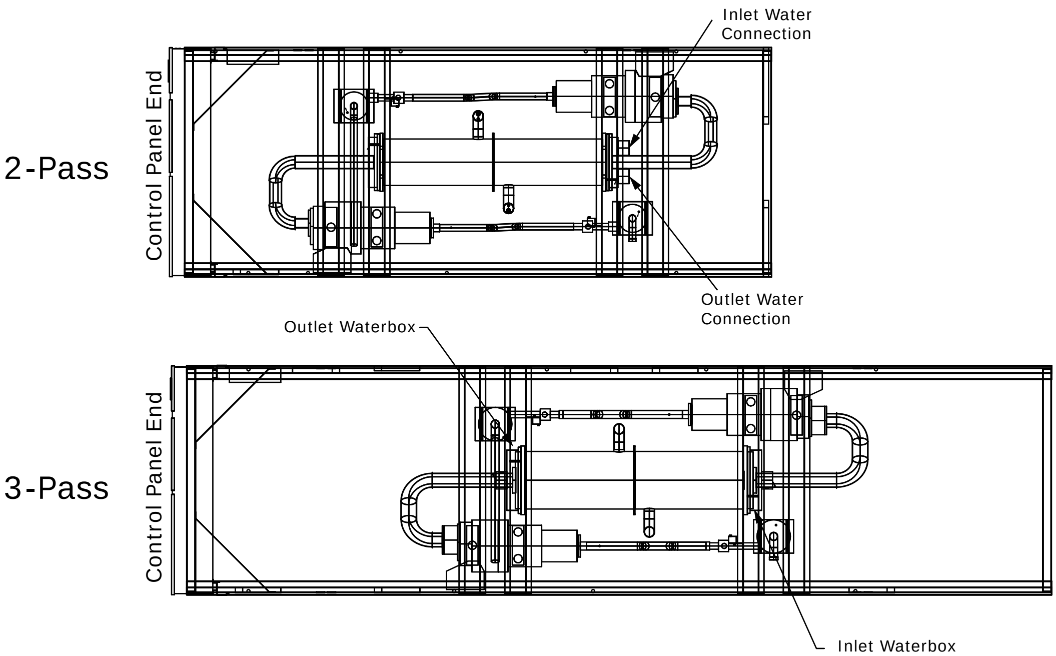
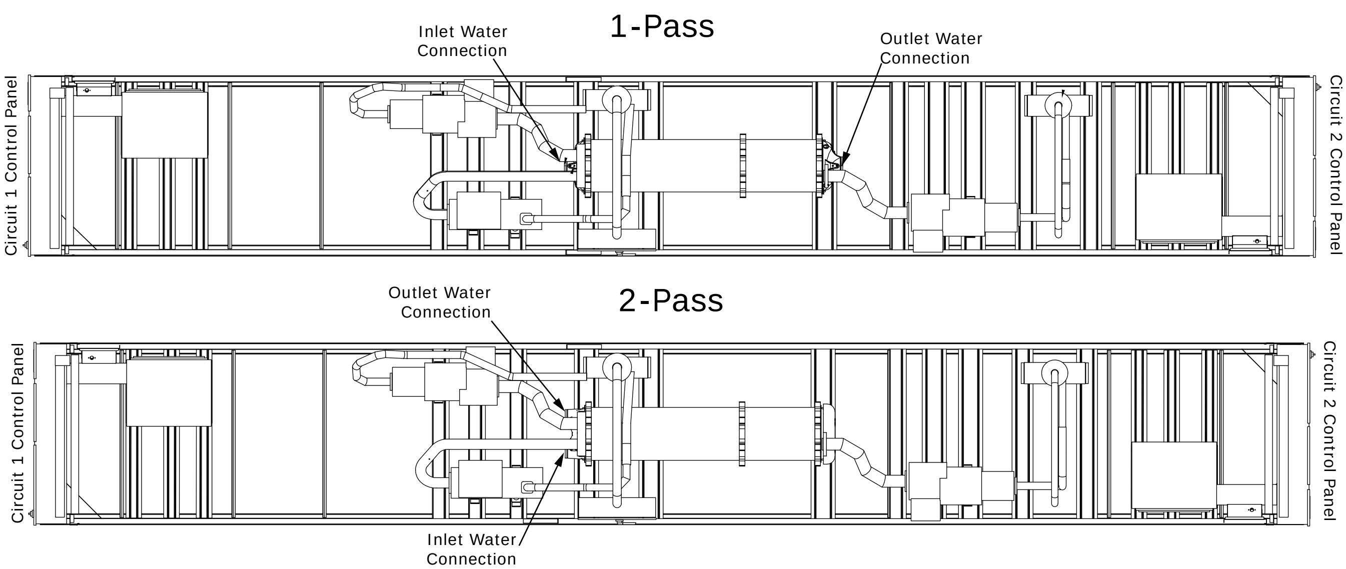


Figure 15. Evaporator pass configurations — units larger than 300 tons



NOTICE

Proper Water Treatment Required!

The use of untreated or improperly treated water could result in scaling, erosion, corrosion, algae or slime.

Use the services of a qualified water treatment specialist 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

Evaporator Damage!

Failure to follow instructions below could cause damage to the evaporator.

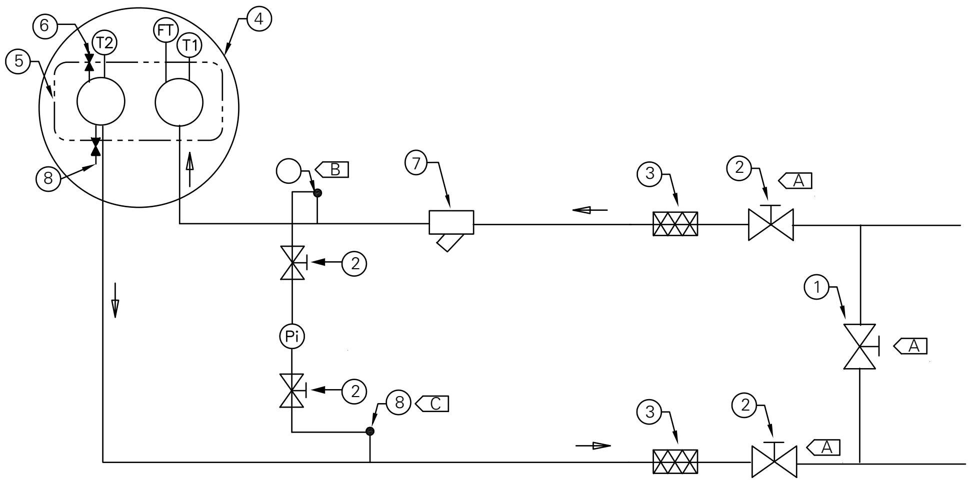
The chilled water connections to the evaporator are to be “victaulic” type connections. Do not attempt to weld these connections, as the heat generated from welding can cause microscopic and macroscopic fractures on the cast iron waterboxes that can lead to premature failure of the waterbox. To prevent damage to chilled water components, do not allow evaporator pressure (maximum working pressure) to exceed 150 psig (10.5 bar).

- Evaporator water connections are grooved.
- 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.
- A vent is provided on the top of the evaporator at the chilled water inlet. Be sure to provide additional vents at high points in the piping to bleed air from the chilled water system. Install necessary pressure gauges to monitor the entering and leaving chilled water pressures.
- Provide shutoff valves in lines to the gauges to isolate them from the system when they are not in use. Use rubber vibration eliminators to prevent vibration transmission through the water lines.
- If desired, install thermometers in the lines to monitor entering and leaving water temperatures.
- Install a balancing valve in the leaving water line to control water flow balance.
- Install shutoff valves on both the entering and leaving water lines so that the evaporator can be isolated for service.

Evaporator Piping Components

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

Figure 16. Typical water piping components



Item	Description	Item	Description
1	Bypass Valve	Pi	Pressure Gauge
2	Isolation Valve	FT	Water Flow Switch
3	Vibration Eliminator	T1	Evap Water Inlet Temp Sensor
4	Evaporator - End View (2-pass)	T2	Evap Water Outlet Temp Sensor
5	Evaporator Waterbox (2-pass)	**NOTES**	
6	Vent	A	Isolate unit for initial water loop cleaning
7	Strainer	B	Vent must be installed at the high point of the line
8	Drain	C	Drain must be installed at the low point of the line

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.

Drains

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.

Pressure Gauges

Install field-supplied pressure components as shown in figure above. 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.

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.

Pressure Relief Valves

NOTICE

Evaporator Damage!

Failure to follow instructions below could cause damage to the evaporator.
To prevent evaporator 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 above. 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.

Evaporator Flow Switch

NOTICE

Flow Switch Damage!

Incorrect voltage application could cause damage to the flow switch.
Flow switch is on a 24V circuit. Do NOT apply 120V to the 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. Contact your local Trane Sales office for more information.

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 — Miswire

Factory installed jumper wire W11 must be removed if using auxiliary contacts and/or additional proof of flow. See schematics in AC-SVE001*-EN for more details.

NOTICE

Equipment Damage!

Incorrect wiring of auxiliary contacts could cause equipment damage.
See schematics for proper wiring.

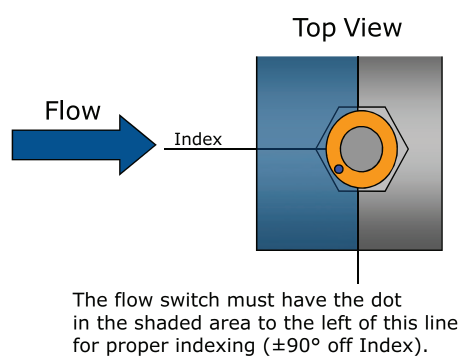
If using auxiliary flow sensing, both yellow LEDs come on initially when flow is stopped. The center yellow LED will turn off after approximately 7 seconds. The LED indicators are otherwise the same as indicated above.

Indexing Flow Switch

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

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

Figure 17. Proper flow switch indexing



Evaporator Waterside Pressure Drop Curves

150 to 300 Ton Units without Direct Free-Cooling Option

Figure 18. Evaporator waterside pressure drop curve — 150 to 300 ton units, 2–pass

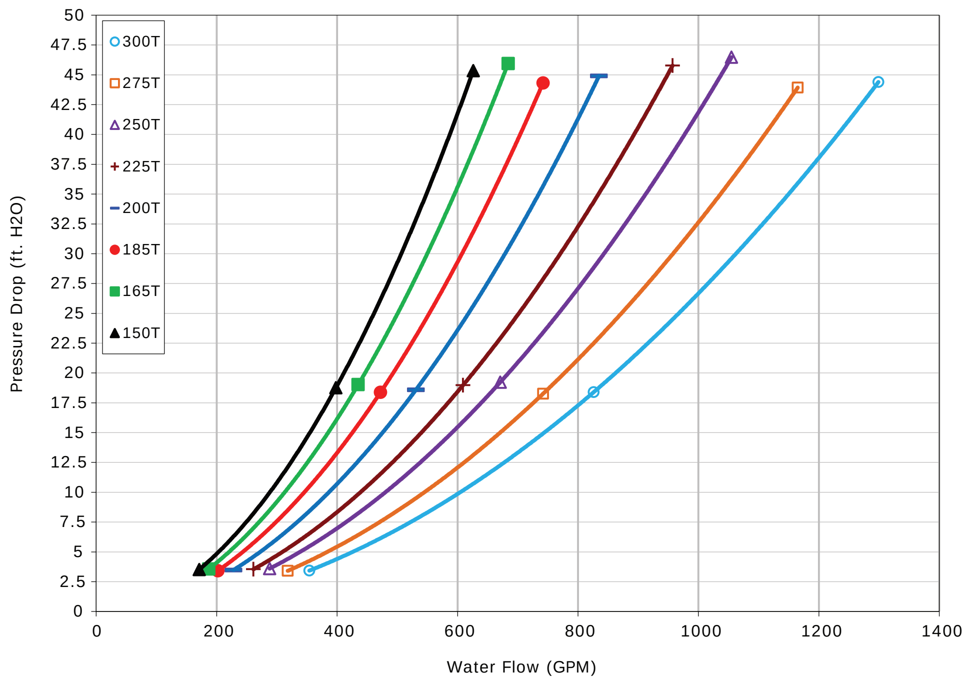
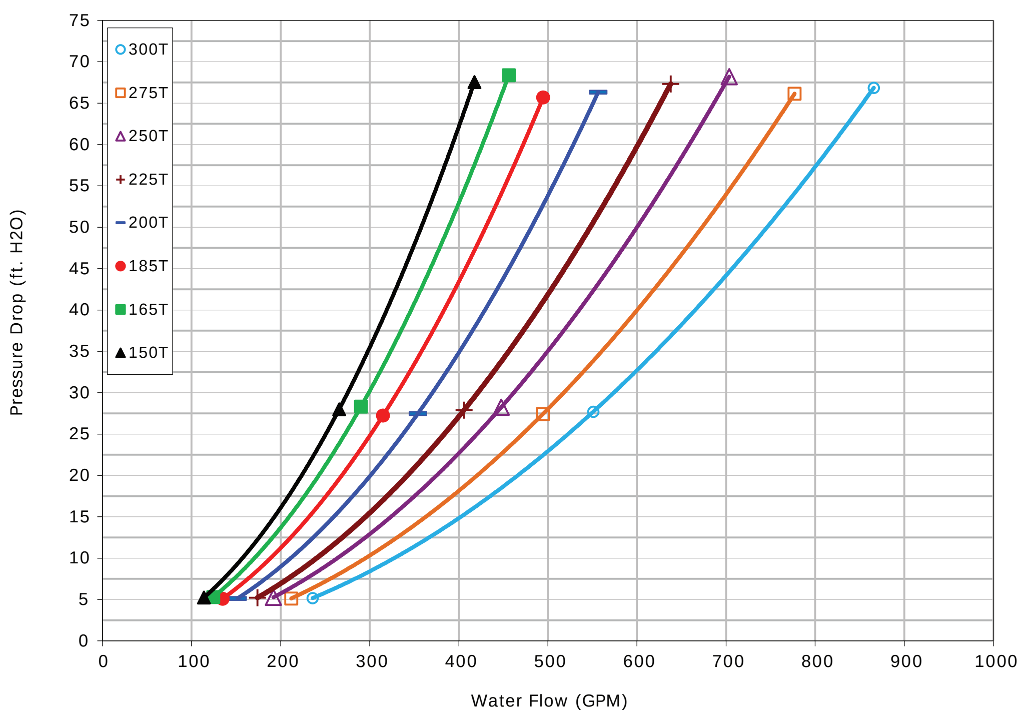


Figure 19. Evaporator waterside pressure drop curve — 150 to 300 ton units, 3–pass



150 to 300 Ton Units with Direct Free-Cooling (DFC) Option

***Note:** All pressure drop curves are for 35% ethylene glycol (EG).*

Direct Free-Cooling: Off

Figure 20. Evaporator waterside pressure drop curve — 150 to 300 ton units, DFC off, 2–pass

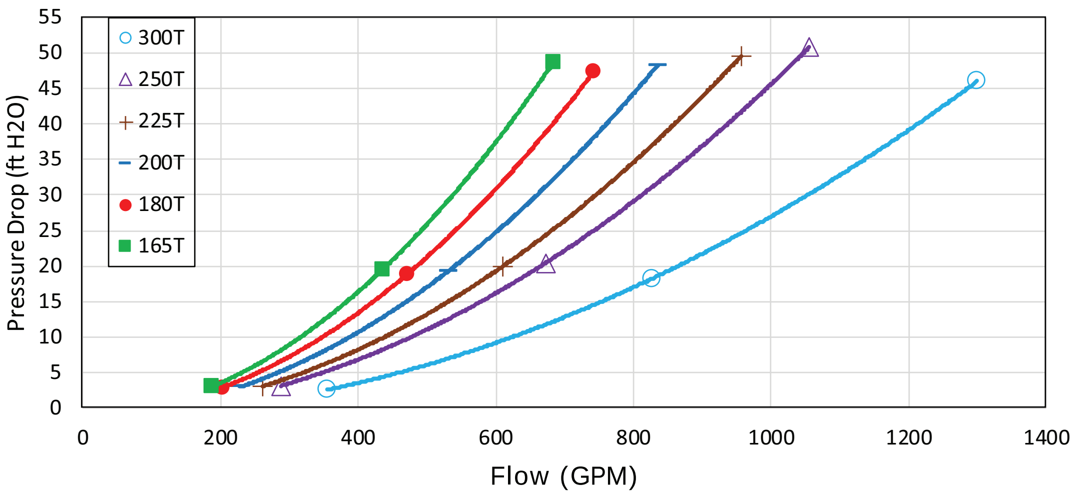
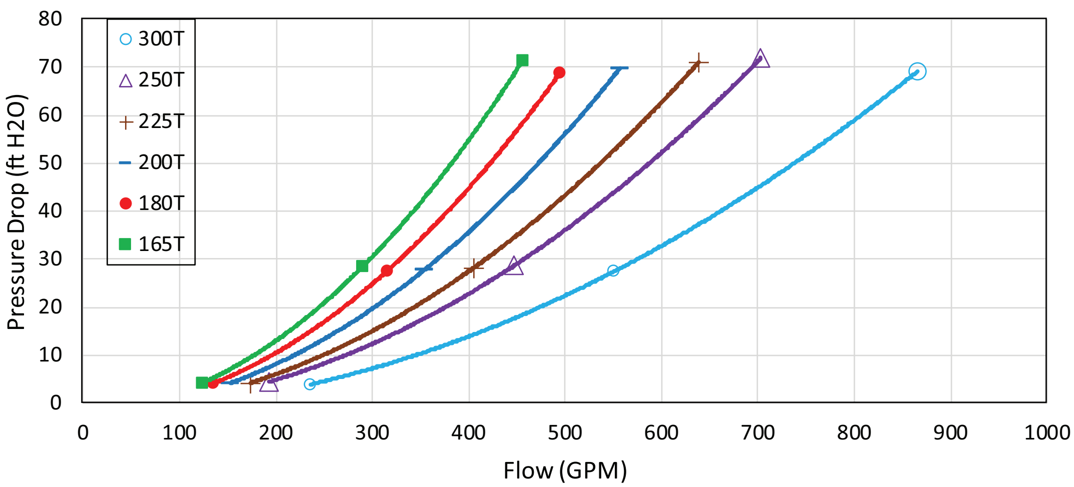


Figure 21. Evaporator waterside pressure drop curve — 150 to 300 ton units, DFC off, 3–pass



Direct Free-Cooling: On

Figure 22. Evaporator waterside pressure drop curve — 150 to 300 ton units, DFC on, standard, 2–pass

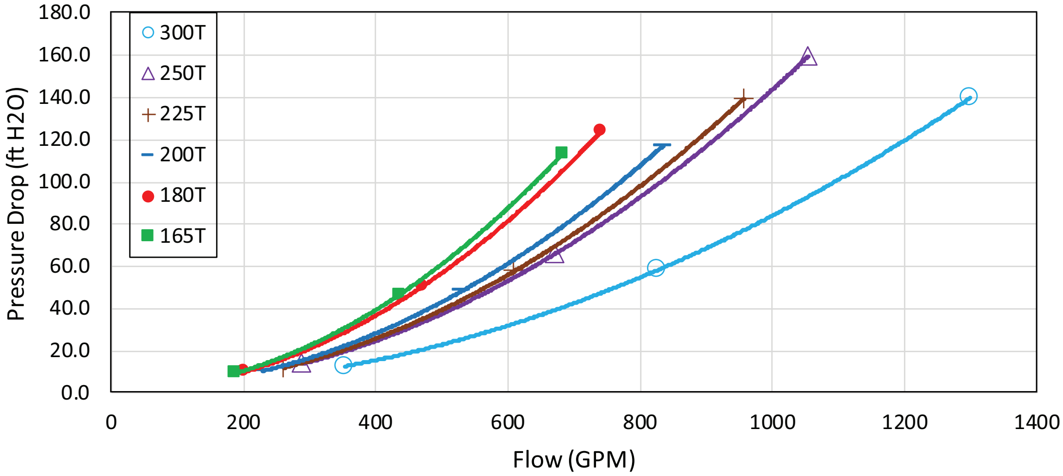


Figure 23. Evaporator waterside pressure drop curve — 150 to 300 ton units, DFC on, standard, 3–pass

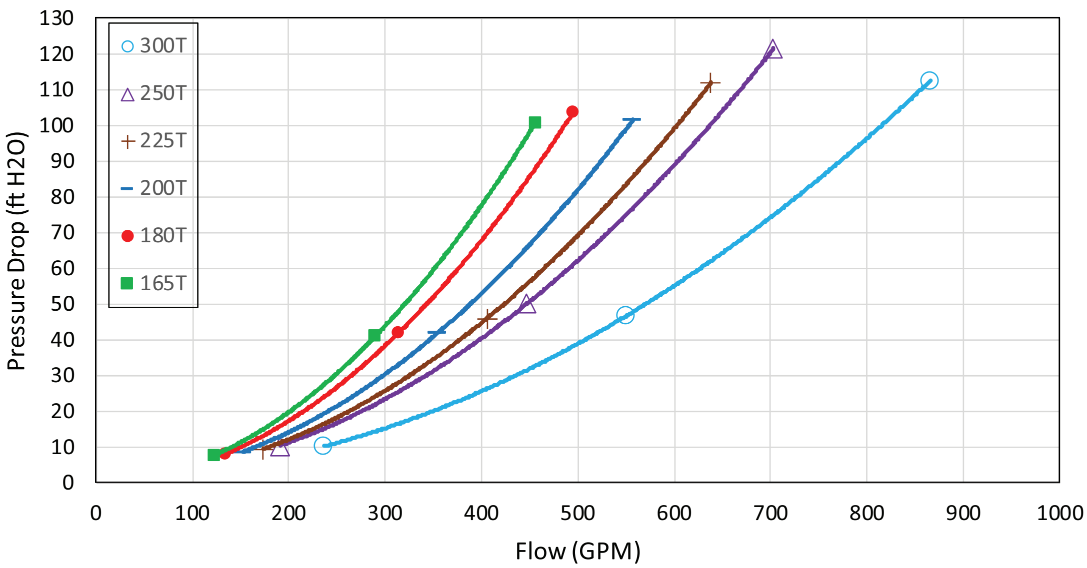


Figure 24. Evaporator waterside pressure drop curve — 150 to 300 ton units, DFC on, extended, 2–pass

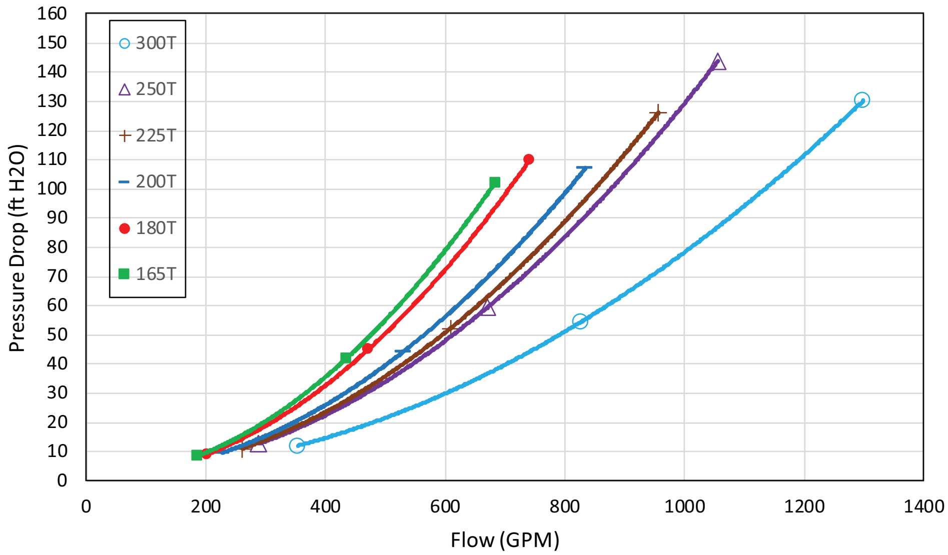
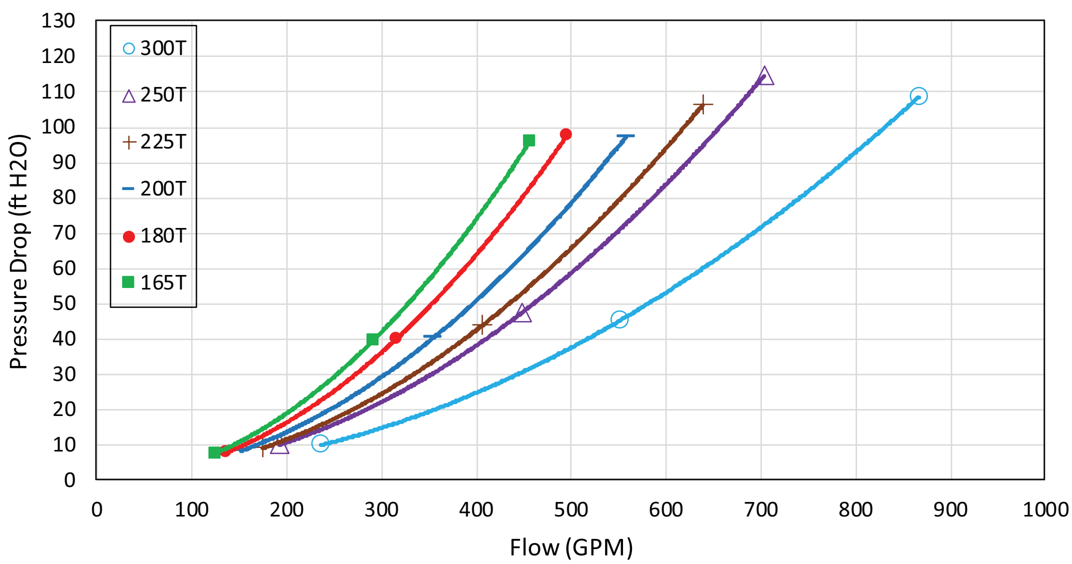


Figure 25. Evaporator waterside pressure drop curve — 150 to 300 ton units, DFC on, extended, 3–pass



Units Larger than 300 Tons without Direct Free-Cooling Option

Figure 26. Evaporator waterside pressure drop curve — units larger than 300 tons, standard tube, 1–pass

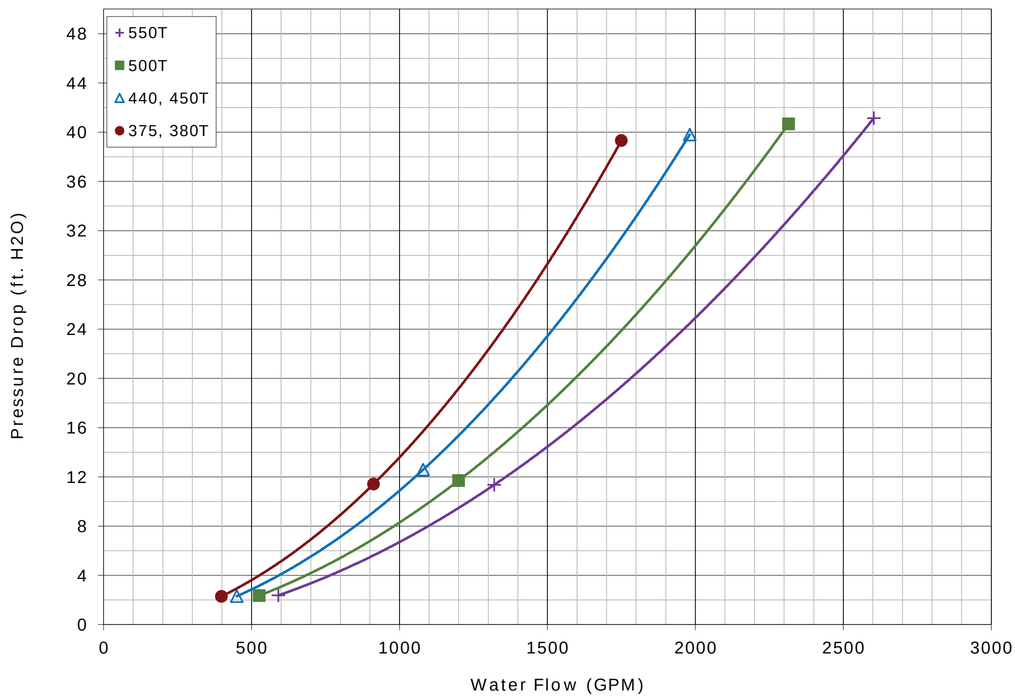


Figure 27. Evaporator waterside pressure drop curve — units larger than 300 tons, standard tube, 2–pass

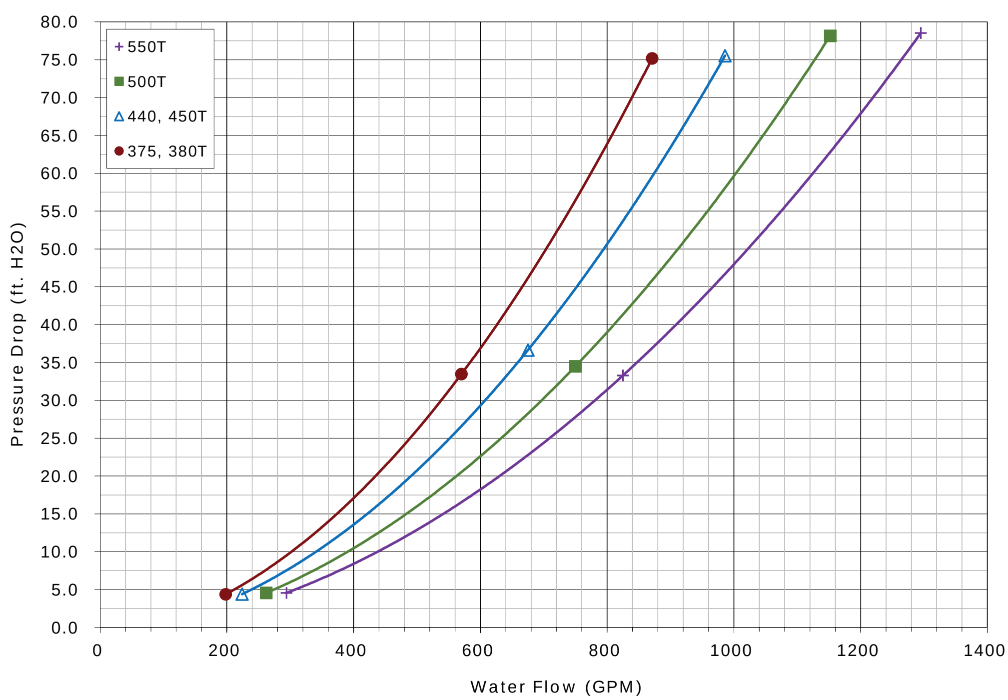


Figure 28. Evaporator waterside pressure drop curve — units larger than 300 tons, alternate tube, 1–pass

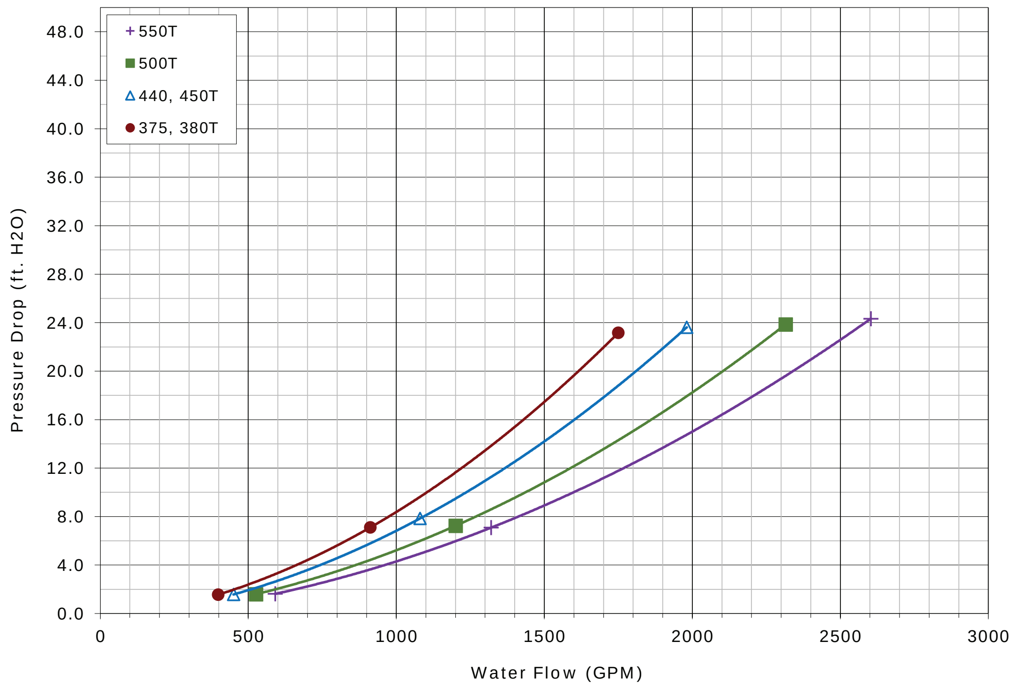
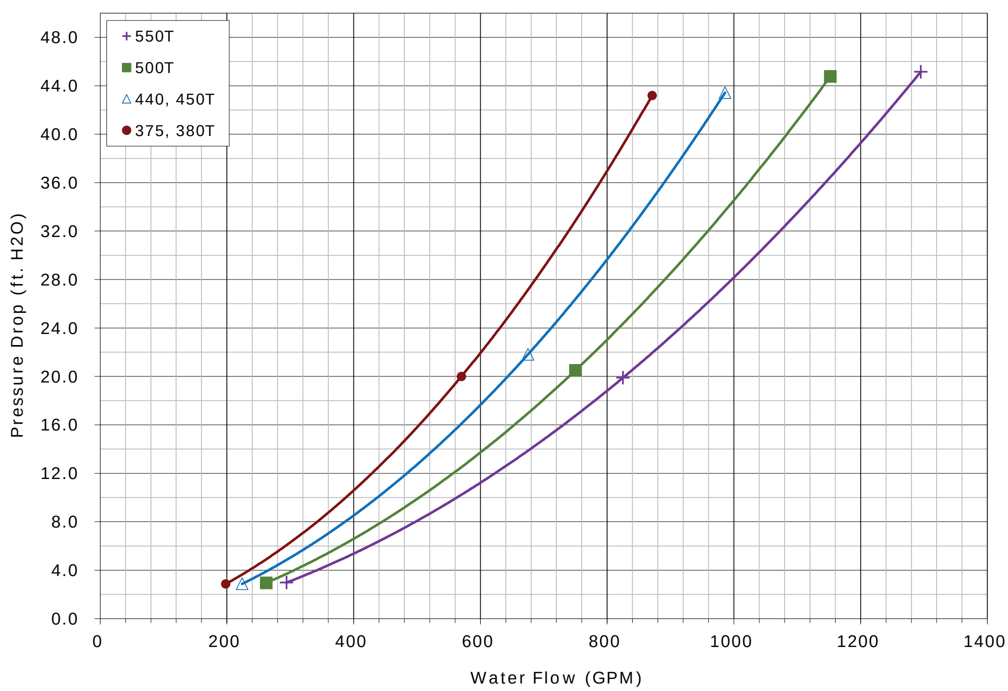


Figure 29. Evaporator waterside pressure drop curve — units larger than 300 tons, alternate tube, 2–pass



Units Larger than 300 Tons with Direct Free-Cooling (DFC) Option

Direct Free-Cooling: Off

Figure 30. Evaporator waterside pressure drop curve — units larger than 300 tons, DFC off, standard tube, 1–pass

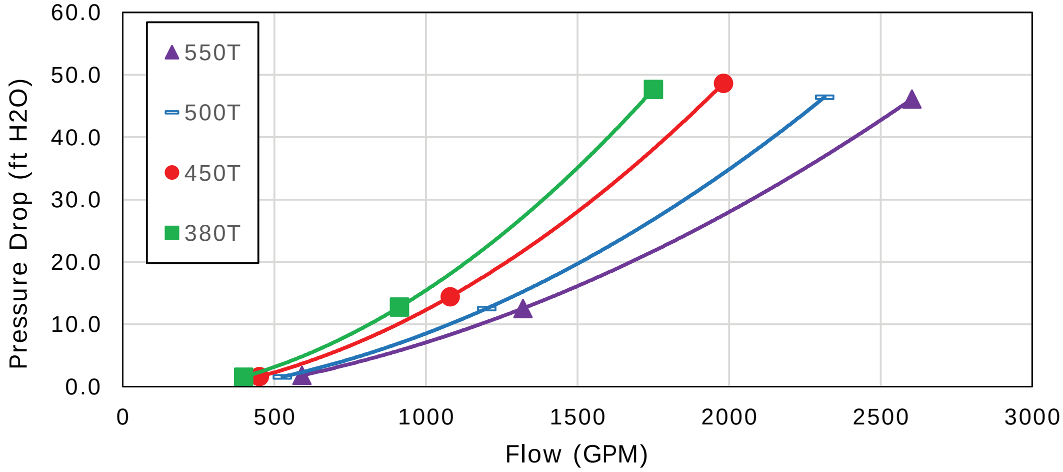


Figure 31. Evaporator waterside pressure drop curve — units larger than 300 tons, DFC off, standard tube, 2–pass

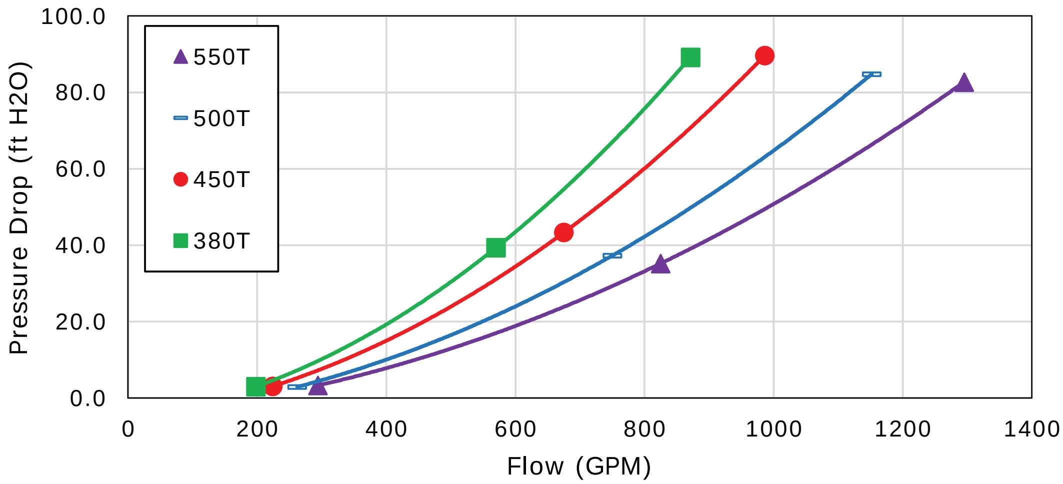


Figure 32. Evaporator waterside pressure drop curve — units larger than 300 tons, DFC off, alternate tube, 1–pass

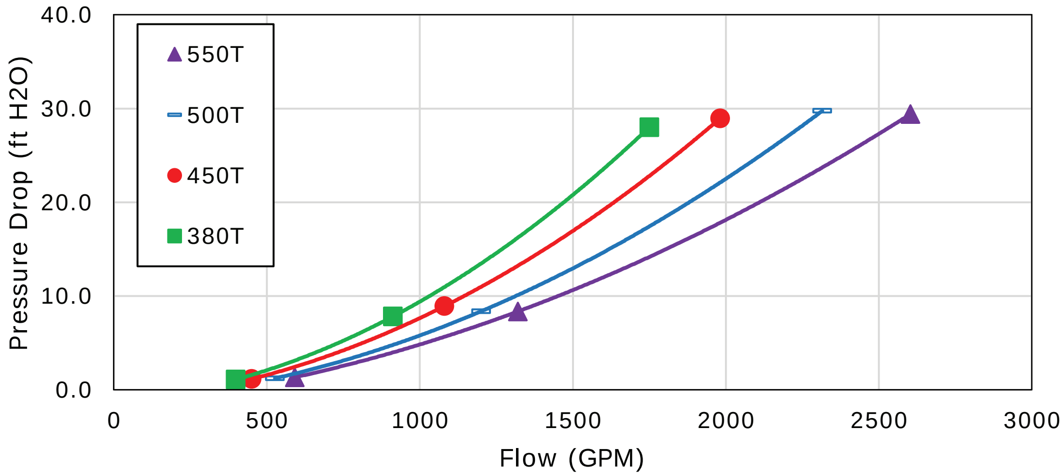
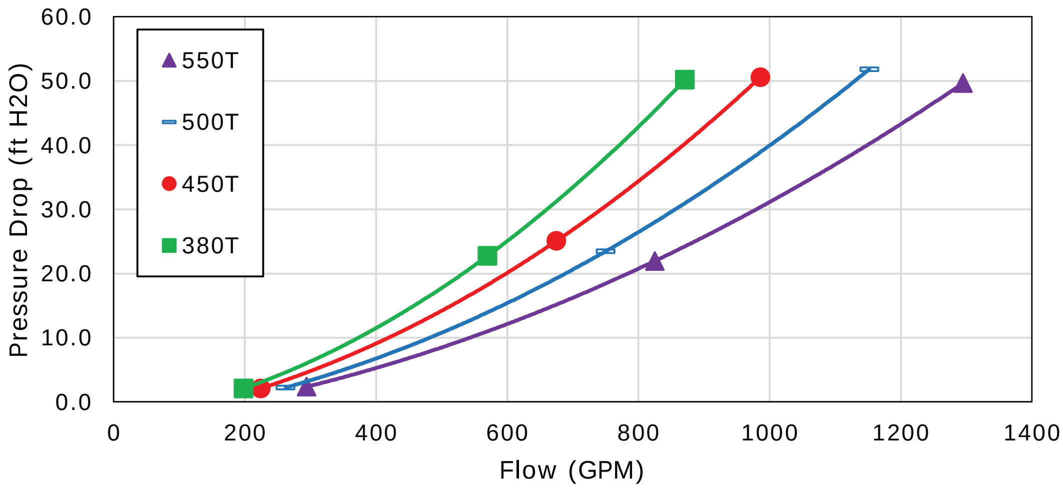


Figure 33. Evaporator waterside pressure drop curve — units larger than 300 tons, DFC off, alternate tube, 2–pass



Direct Free-Cooling: On

Figure 34. Evaporator waterside pressure drop curve — units larger than 300 tons, DFC on, standard tube, 1–pass

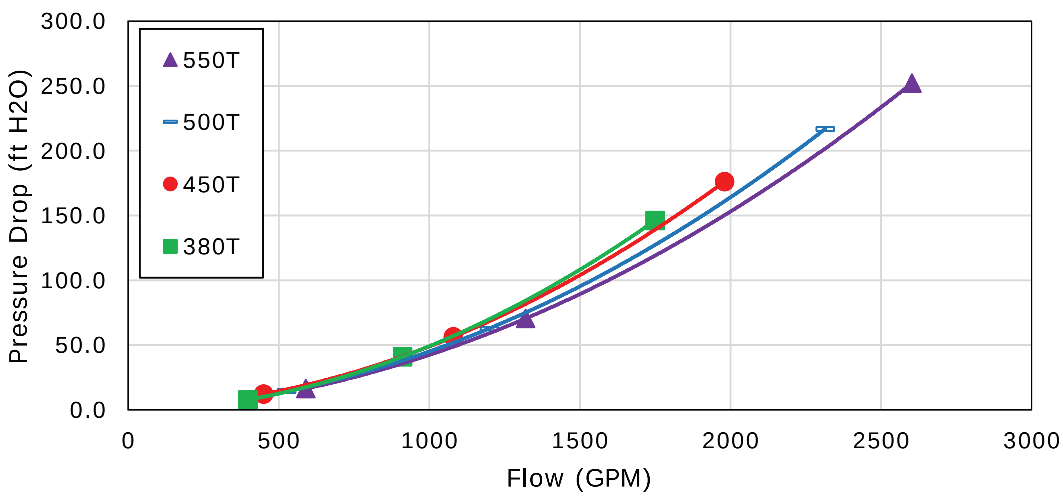


Figure 35. Evaporator waterside pressure drop curve — units larger than 300 tons, DFC on, standard tube, 2–pass

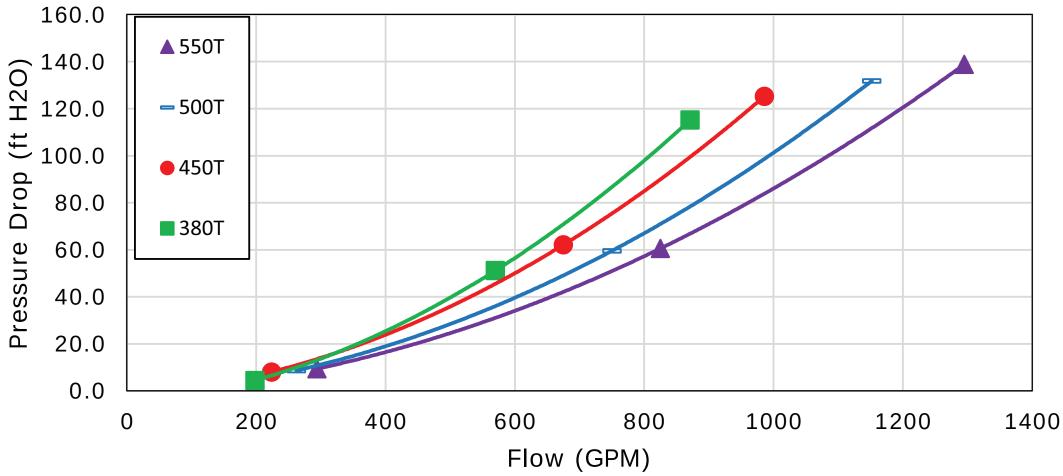


Figure 36. Evaporator waterside pressure drop curve — units larger than 300 tons, DFC on, alternate tube, 1–pass

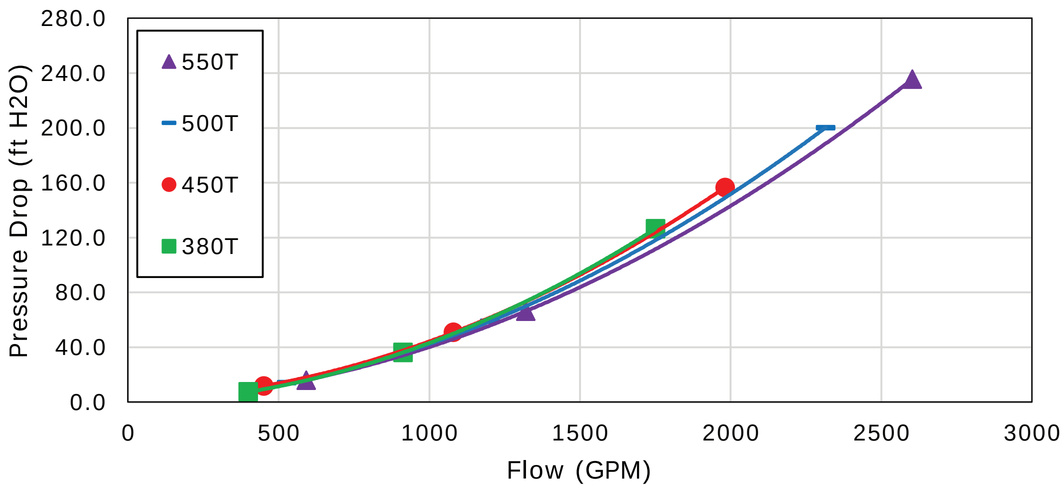
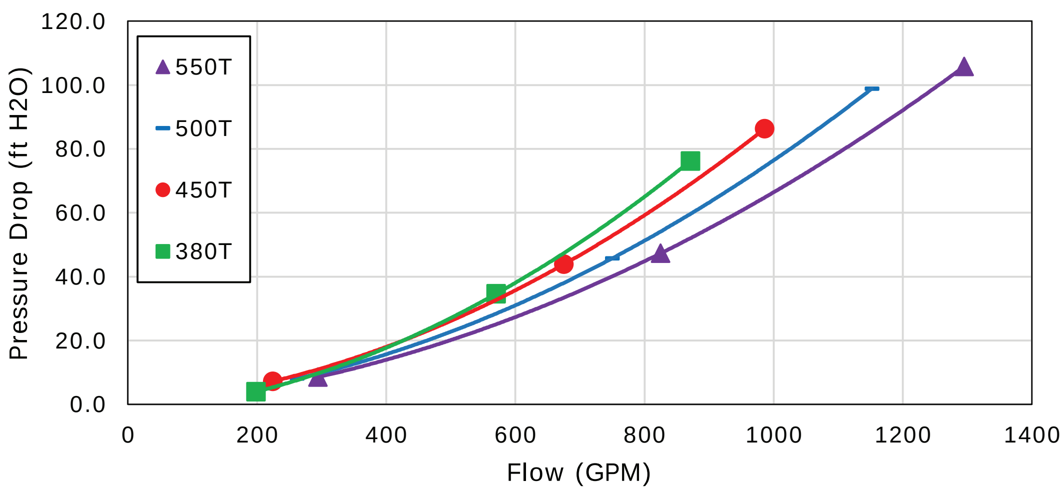


Figure 37. Evaporator waterside pressure drop curve — units larger than 300 tons, DFC on, alternate tube, 2–pass



Freeze Protection

One or more of the ambient freeze avoidance methods in the table below must be used to protect the chiller from ambient freeze damage. See RF-PRB002*-EN for more information.

Method	Protects to ambient temperature	Notes
Water Pump Control AND Heaters	Down to -20°F	• ***Heaters alone will provide low ambient protection down to -20°F (-29°C), but will NOT protect the evaporator from freezing as a result of charge migration. Therefore, it is required that water pump control be used in conjunction with heaters.*** • Heaters are factory-installed on the evaporator and will protect it from freezing • 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. • The controller can start the pump when freezing conditions are detected. For this option the pump must to be controlled by the Stealth unit and this function must be validated. • Water circuit valves need to stay open at all times. • ***Water pump control and heater combination will protect the evaporator down to any ambient temperature provided power is available to the pump and the 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.*** • When no chiller operation is possible and the pump is already off, controller pump control function for freeze protection will command the pump to turn: – **ON** if average of the evaporator entering water temperature, the evaporator leaving water temperature, and the evaporator refrigerant pool temperature is less than Low Evaporator Refrigerant Temperature Cutout (LERTC) + 4°F for a period of time. – **OFF** again if the evaporator refrigerant pool temperature rises above the LERTC + 6°F for a period of time. ***Note:*** *Time period referenced for ON and Off conditions above is dependent on past running conditions and present temperatures measured.* – **ON** if entering OR leaving water temperature< LWTC for 30°F-sec (17°C-sec) – **OFF** again if water temperature > LWTC for 30 min
Freeze Inhibitor	Varies. See Low Evaporator Refrigerant Cutout, Glycol Requirements.	• Freeze protection can be accomplished by adding sufficient glycol to protect against freezing below the lowest ambient expected. • ***Use of glycol type antifreeze reduces the cooling capacity of the unit and must be considered in the design of the system specifications.*** • For units with free-cooling option, glycol solution is REQUIRED. See Free-Cooling Fluid Management section.
Drain Water Circuit	Below -20°F	• Shut off the power supply to the unit and to all heaters. • Purge the water circuit. • Blow out the evaporator to ensure no liquid is left in the evaporator.

NOTICE

Evaporator Damage!

Failure to follow these instructions could result in damage to the evaporator.

If insufficient concentration or no freeze inhibitor is used, the evaporator water flow must be controlled by the unit controller 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. 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.

Low Evaporator Refrigerant Cutout, Glycol Requirements

The table below shows the low evaporator temperature cutout for different glycol levels. Additional glycol beyond the recommendations will adversely effect unit performance. The unit efficiency will be reduced and the saturated evaporator temperature will be reduced. For some operating conditions this effect can be significant.

additional glycol is used, then use the actual percent glycol to establish the low refrigerant cutout setpoint.

Note: *Tables below are not substitutes for full unit simulation for proper prediction of unit performance with specific operating conditions. For information on specific conditions, contact Trane product support.*

Table 26. Low evaporator refrigerant temperature cutout (LERTC) and low water temperature cutout (LWTC) — 150 to 300 ton units

Ethylene Glycol				Propylene Glycol			
Glycol Percentage (%)	Solution Freeze Point (°F)	Minimum Recommended LERTC (°F)	Minimum Recommended LWTC (°F)	Glycol Percentage (%)	Solution Freeze Point (°F)	Minimum Recommended LERTC (°F)	Minimum Recommended LWTC (°F)
0	32	28.6	35	0	32	28.6	35
2	31	27.6	34	2	31	27.6	34
4	29.7	26.3	32.7	4	29.9	26.5	32.9
5	29	25.6	32	5	29.3	25.9	32.3
6	28.3	24.9	31.3	6	28.7	25.3	31.7
8	26.9	23.5	29.9	8	27.6	24.2	30.6
10	25.5	22.1	28.5	10	26.4	23	29.4
12	23.9	20.5	26.9	12	25.1	21.7	28.1
14	22.3	18.9	25.3	14	23.8	20.4	26.8
15	21.5	18.1	24.5	15	23.1	19.7	26.1
16	20.6	17.2	23.6	16	22.4	19	25.4
18	18.7	15.3	21.7	18	20.9	17.5	23.9
20	16.8	13.4	19.8	20	19.3	15.9	22.3
22	14.7	11.3	17.7	22	17.6	14.2	20.6
24	12.5	9.1	15.5	24	15.7	12.3	18.7
25	11.4	8	14.4	25	14.8	11.4	17.8
26	10.2	6.8	13.2	26	13.8	10.4	16.8
28	7.7	4.3	10.7	28	11.6	8.2	14.6
30	5.1	1.7	8.1	30	9.3	5.9	12.3
32	2.3	-1.1	5.3	32	6.8	3.4	9.8
34	-0.7	-4.1	5	34	4.1	0.7	7.1
35	-2.3	-5	5	35	2.7	-0.7	5.7
36	-3.9	-5	5	36	1.3	-2.1	5
38	-7.3	-5	5	38	-1.8	-5	5
40	-10.8	-5	5	40	-5.2	-5	5
42	-14.6	-5	5	42	-8.8	-5	5
44	-18.6	-5	5	44	-12.6	-5	5
45	-20.7	-5	5	45	-14.6	-5	5
46	-22.9	-5	5	46	-16.7	-5	5
48	-27.3	-5	5	48	-21.1	-5	5
50	-32.1	-5	5	50	-25.8	-5	5

Table 27. Low evaporator refrigerant temperature cutout (LERTC) and low water temperature cutout (LWTC) — units larger than 300 tons

Ethylene Glycol				Propylene Glycol			
Glycol Percentage (%)	Solution Freeze Point (°F)	Minimum Recommended LERTC (°F)	Minimum Recommended LWTC (°F)	Glycol Percentage (%)	Solution Freeze Point (°F)	Minimum Recommended LERTC (°F)	Minimum Recommended LWTC (°F)
0	32.0	32.0	37.0	0	32.0	32.0	37.0
2	31.0	29.5	36.0	2	31.0	29.5	36.0
4	29.7	28.2	34.7	4	29.9	28.4	34.9
5	29.0	27.5	34.0	5	29.3	27.8	34.3
6	28.3	26.8	33.3	6	28.7	27.2	33.7
8	26.9	25.4	31.9	8	27.6	26.1	32.6
10	25.5	24.0	30.5	10	26.4	24.9	31.4
12	23.9	22.4	28.9	12	25.1	23.6	30.1
14	22.3	20.8	27.3	14	23.8	22.3	28.8
15	21.5	20.0	26.5	15	23.1	21.6	28.1
16	20.6	19.1	25.6	16	22.4	20.9	27.4
18	18.7	17.2	23.7	18	20.9	19.4	25.9
20	16.8	15.3	21.8	20	19.3	17.8	24.3
22	14.7	13.2	19.7	22	17.6	16.1	22.6
24	12.5	11.0	17.5	24	15.7	14.2	20.7
25	11.4	9.9	16.4	25	14.8	13.3	19.8
26	10.2	8.7	15.2	26	13.8	12.3	18.8
28	7.7	6.2	12.7	28	11.6	10.1	16.6
30	5.1	3.6	10.1	30	9.3	7.8	14.3
32	2.3	0.8	7.3	32	6.8	5.3	11.8
34	-0.7	-2.2	5.0	34	4.1	2.6	9.1
35	-2.3	-3.8	5.0	35	2.7	1.2	7.7
36	-3.9	-5.0	5.0	36	1.3	-0.2	6.3
38	-7.3	-5.0	5.0	38	-1.8	-3.3	5.0
40	-10.8	-5.0	5.0	40	-5.2	-5.0	5.0
42	-14.6	-5.0	5.0	42	-8.8	-5.0	5.0
44	-18.6	-5.0	5.0	44	-12.6	-5.0	5.0
45	-20.7	-5.0	5.0	45	-14.6	-5.0	5.0
46	-22.9	-5.0	5.0	46	-16.7	-5.0	5.0
48	-27.3	-5.0	5.0	48	-21.1	-5.0	5.0
50	-32.1	-5.0	5.0	50	-25.8	-5.0	5.0

Installation Electrical

General Recommendations

As you review this manual, keep in mind that:

- All field-installed wiring must conform to National Electric Code (NEC) guidelines, and any applicable state and local codes. Be sure to satisfy proper equipment grounding requirements per NEC.
- Compressor motor and unit electrical data (including motor kW, voltage utilization range, rated load amps) is listed on the chiller nameplate.
- All field-installed wiring must be checked for proper terminations, and for possible shorts or grounds.

Note: *Always refer to wiring diagrams shipped with chiller or unit submittal for specific electrical schematic and connection information.*

⚠ WARNING

Hazardous Voltage – Pressurized Flammable Fluid!

Failure to follow all electrical safety precautions could result in death or serious injury.

Do not operate compressor without terminal box cover in place.

The motors in the compressors have strong permanent magnet motors and have the capability to generate voltage during situations when the refrigerant charge is being migrated. This potential will be present at the motor terminals and at the output of the variable speed drives in the power panel.

Before removing compressor terminal box cover for servicing, or servicing power side of control panel, CLOSE COMPRESSOR DISCHARGE SERVICE VALVE and disconnect all electric power including remote disconnects. Discharge all motor start/run capacitors. Follow lockout/tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged.

The compressor contains hot, pressurized refrigerant. Motor terminals act as a seal against this refrigerant. Care should be taken when servicing NOT to damage or loosen motor terminals.

⚠ WARNING

Hazardous Voltage w/Capacitors!

Failure to follow these instructions could result in death or serious injury.

Disconnect all electric power, including remote disconnects and discharge all motor start/run and AFD (Adaptive Frequency™ Drive) 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.**
- **DC bus capacitors retain hazardous voltages after input power has been disconnected. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. After disconnecting input power, wait five (5) minutes for the DC capacitors to discharge, then check the voltage with a voltmeter. Make sure DC bus capacitors are discharged (0 VDC) before touching any internal components.**

⚠ WARNING

Proper Field Wiring and Grounding Required!

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

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/national electrical codes.

NOTICE

Use Copper Conductors Only!

Failure to use copper conductors could result in equipment damage as the equipment was not designed or qualified to accept other types of conductors.

Important:

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

Adaptive Frequency™ Drive Capacitor Discharge

After disconnecting input power, wait five (5) minutes for the DC capacitors to discharge.

Using voltmeter, measure voltage on bus at bus access points. See figures below for location of bus access points, and details. Capacitors are fully discharged when voltage across these plus (+) and minus (-) points measures 0 VDC.

Figure 38. AFD dc bus measurement location

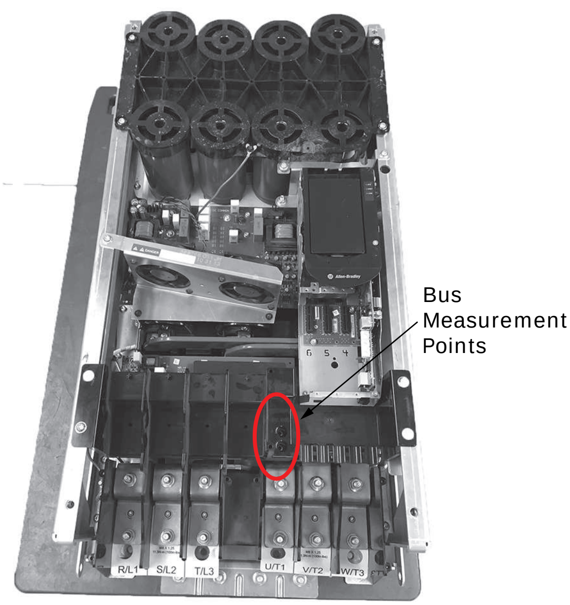
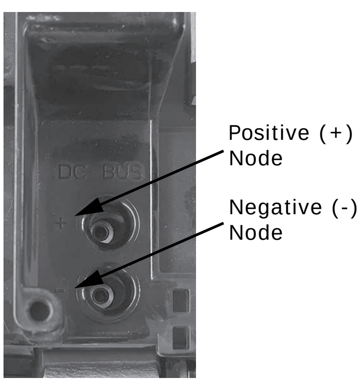


Figure 39. Bus measurement nodes detail



Adaptive Frequency™ Drive Power Jumper Configuration

The Adaptive Frequency Drives (AFDs) on both circuits contain protective MOVs and common mode capacitor circuits that are referenced to ground. To guard against drive damage and/or operation problems, these devices must be properly configured according to the table below.

For jumpers configurations, refer to Figure 40, p. 59 and Figure 41, p. 60. For more information, refer to AFD Service Guide (AFD-SVG002*-EN). Allow for sufficient time after removing power to perform modifications to the AFD power jumpers. Refer to the Adaptive Frequency™ Drive Capacitor Discharge instructions .

Table 28. AFD power jumper configurations

Power Source Type	Jumper PE-A (MOV)	Jumper PE-B (Common Mode Caps)
Solid Ground: • Center Ground-Wye (Y)	Connected[(a)]	Connected[(a)]
Non-Solid Ground: • Any Delta (Δ) • Underground Wye (Y) • High Impedance Ground Wye (Y)	Disconnected	Disconnected

(a) Default configuration shipped from the factory. If grounding type is unknown at customer installation, leave PE-A and PE-B connected.

Figure 40. AFD frame 6 power jumper locations

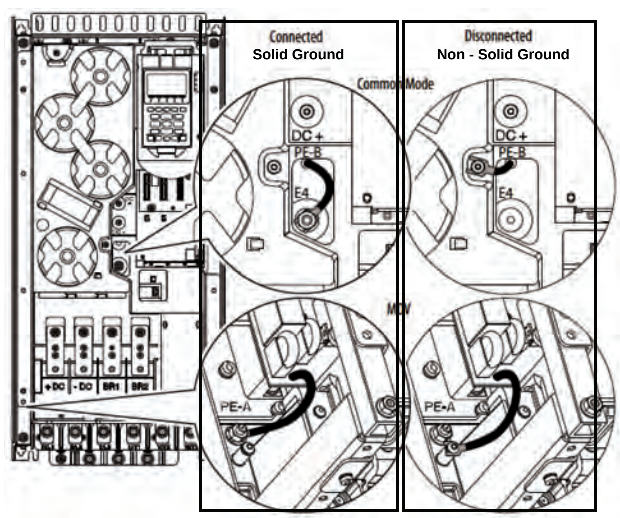
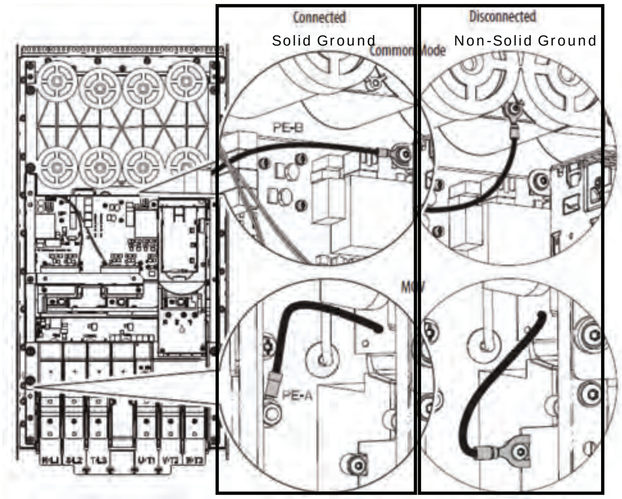
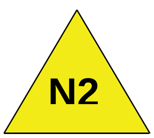


Figure 41. AFD frame 7 power jumper locations



Units with Nitrogen Charge Option



For units with nitrogen charge option (model number digit 16 = D), the unit must NOT have shore power, or unit power applied until the unit has been charged. Applying power will drive EXV valves closed, and will inhibit sufficient vac for unit charging.

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 Supply Wiring

⚠ WARNING

Hazardous Voltage w/Capacitors!

Failure to follow these instructions could result in death or serious injury.

Disconnect all electric power, including remote disconnects and discharge all motor start/run and AFD (Adaptive Frequency™ Drive) 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.**
- **DC bus capacitors retain hazardous voltages after input power has been disconnected. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. After disconnecting input power, wait five (5) minutes for the DC capacitors to discharge, then check the voltage with a voltmeter. Make sure DC bus capacitors are discharged (0 VDC) before touching any internal components.**

⚠ WARNING

Proper Field Wiring and Grounding Required!

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

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/national electrical codes.

All power supply wiring must be sized and selected accordingly by the project engineer in accordance with NEC Table 310.15(B)(16); formerly Table 310-16.

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 overcurrent protection device.

The type and installation location(s) of the overcurrent protection devices must comply with all applicable codes.

NOTICE

Use Copper Conductors Only!

Failure to use copper conductors could result in equipment damage as the equipment was not designed or qualified to accept other types of conductors.

Incoming customer power location varies with unit configurations. See figures below.

For 150 to 300 ton units:

- Control Panel
  - Standard length units (model number digits 9 = C, D, E, G, H or 44 = X)
  - Units with optional harmonic filtration (model number digit 44 = L)
- Transformer: 200, 230 or 575 V units with transformer (model number digit 9 = A, B, F)

Figure 42. Incoming customer power — control panel (right side view)

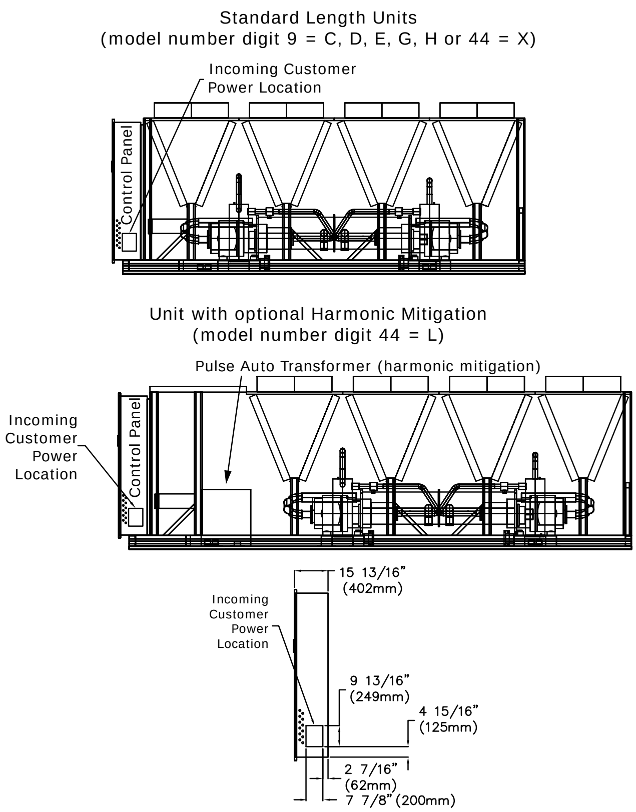
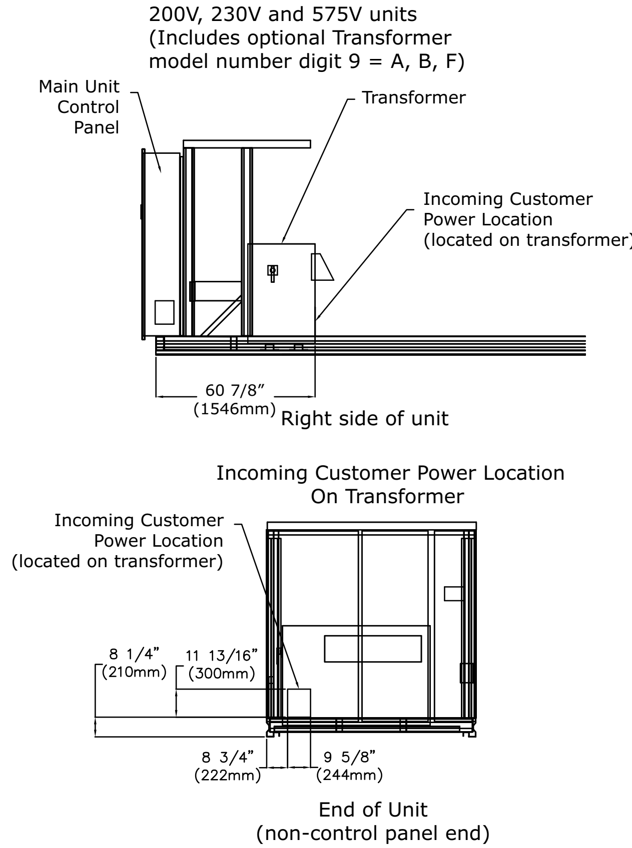


Figure 43. Incoming customer power — transformer



For units larger than 300 tons:

Units with dual power connections will have different spacing between the connections. Units with a single power connection will shift in regards to the unit extents based on tonnage.

- Dual point power (model number digit 29 = 2)
  - 11V units (model number digits 5-7 = 380, 450)
- Single point power (model number digit 29 = 1)
  - 11V units (model number digits 5-7 = 380, 450)

Cut holes into the location indicated for the appropriately-sized power wiring conduits. The wiring is passed through these conduits and connected to the terminal blocks, or circuit breakers.

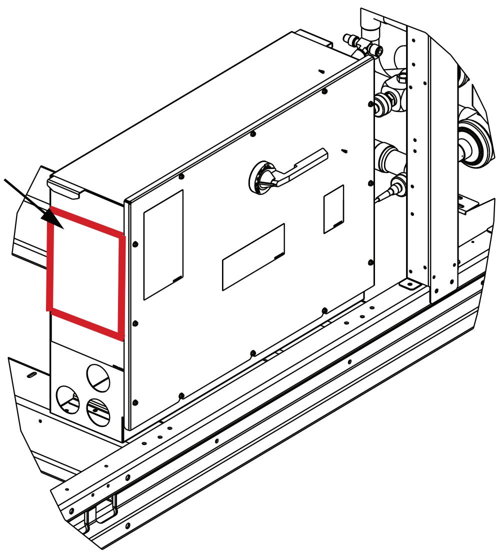
For 150 to 300 ton units:

- The high voltage field-provided connections are made through patch plate on the right side of the main control panel or on the right side of the voltage autotransformer panel.
- The low voltage connections are made through knockouts provided on the left side of the control panel. Additional grounds may be required for each 115 volt power supply to the unit. Green lugs are provided for 115V customer wiring.

For units larger than 300 tons:

- For dual point power units, the high voltage field-provided connections are made through patch plate on the right side of each control panel. Dimensions of incoming power location on each control panel are as shown in Figure 42, p. 61.
- For single point power units, the high voltage field-provided connections are made through the left side of the center enclosure as noted per the labeling on it. See the following figure.

Figure 44. Incoming customer power — single point power



- The low voltage connections are made through knockouts provided on the left side of the circuit one / main control panel.
- Additional grounds may be required for each 115 volt power supply to the unit. Green terminals are provided for 115V customer wiring.

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. No other loads should be connected to the control power transformer.

All units are factory-connected for appropriate labeled voltages.

Service Power Connection

The service power connection is a touch safe procedure to allow for binding the control system and LLIDs. Service power connection allows for a NEMA 5-15 style extension cord to power on Class 2 devices (i.e. Symbio 800, LLIDs, EXVs, and TD7 display) with an external power source, without the need of line voltage applied to the unit. For 150 to 300 ton units, this connection is to be made at 1XJ50. For units larger than 300 tons, two connections are to be made at 1XJ1 / 2XJ1. The extension cord power source is required to have upstream current protection rated at no more than 10A. The required voltage for the service power connection is 115V at 60Hz and 110V at 50Hz.

Heater Power Supply

The evaporator shell is insulated from ambient air and protected from freezing temperatures by thermostatically-controlled immersion heaters. See table below for evaporator heater summary. 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).

NOTICE

Evaporator Damage!

Failure to follow instructions below could result in evaporator damage.
A qualified technician must confirm operation of the thermostat. Control panel main processor does not verify thermostat operation.

Table 29. Evaporator heater summary

Unit Size (tons)	Waterboxes	
	Supply	Return
1–pass Evaporator		
Units larger than 300 tons	400W (Qty 2)	400W (Qty 2)
2-pass Evaporator		
150 to 165	400W	400W
180 to 200	400W (Qty 2)	400W
225 to 300	600W	600W
Units larger than 300 tons	400W (Qty 2)	400W (Qty 2)
3-pass Evaporator		
All sizes	400W (Qty 2)	400W

Chilled Water Pump Control

NOTICE

Evaporator Damage!

If the microprocessor 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 always be running when called upon by the chiller controls.

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

The relay output is required to operate the Evaporator Water Pump (EWP) contactor. The relay's contacts are compatible with 115/240 VAC control circuits. See Programmable Relays section for rating details. 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 relay is energized and the normally-open contact is closed. When the chiller exits the AUTO mode, the relay's normally-open contact is timed to open in an adjustable (using Tracer® TU service tool) 0 to 30 minutes. The non-AUTO modes in which the pump is stopped, include Reset, Stop, External Stop, Remote Display Stop, Stopped by Tracer, Start Inhibited by Low Ambient Temp, and Ice Building complete.

Table 30. 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 Operation[a]
Chiller Shutdown Diagnostics (except freeze protection)	Instant Open
Freeze Protection related chiller shutdown diagnostics	Initially: Remain Closed Then: Delayed/Dependent Open
Chiller Off Cycle Freeze Diagnostics	Instant Close – Dependent Open

(a) Operation can be instant open or instant close, depending on diagnostic.

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 unit controller 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 whereby the relay continues to be energized occur with:

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

OR

- **Interrupt Failure —AFDxA diagnostic** where x is either 1 or 2 to indicate which drive is affected), in which a compressor continues to draw current even after commanded to have shutdown.

OR

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

Programmable Relays

A programmable relay concept provides for enunciation or hardwired interlocking 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 Programmable Relay 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 the following table. The relay will be energized when the event/state occurs.

Table 31. Alarm and status relay output configurations

Description	
Alarm (Latching)	This output is true whenever there is any active latching shutdown diagnostic that targets the Unit, Circuit, or any of the Compressors on a circuit.
Alarm (Non-Latching)	This output is true whenever there is any active non-latching shutdown diagnostic that targets the Unit, Circuit, or any of the Compressors on a circuit.
Alarm	This output is true whenever there is any active latching or non-latching shutdown diagnostic that targets the Unit, Circuit, or any of the Compressors on a circuit.
Alarm Ckt 1	This output is true whenever there is any active latching or non-latching shutdown diagnostic that targets Circuit 1, or any of the Compressors on Circuit 1.
Alarm Ckt 2	This output is true whenever there is any active latching or non-latching shutdown diagnostic that targets Circuit 2, or any of the Compressors on Circuit 2.

Table 31. Alarm and status relay output configurations (continued)

Description	
Unit Limit Mode	This output is true whenever a circuit on the unit has been running in one of the limit modes continuously for the Limit Relay debounce time. A given limit or overlapping of different limits must be in effect continuously for the debounce time prior to the output becoming true. It will become false if no limits are present for the debounce time.
Compressor Running	The output is true whenever any compressor is running.
Circuit 1 Running	The output is true whenever any compressor of Circuit 1 is running.
Circuit 2 Running	The output is true whenever any compressor of Circuit 2 is running.
Ice Making	This output is true when Ice Building status is active.
Maximum Capacity	The output is true whenever the unit has reached maximum capacity continuously for the Max Capacity Relay debounce time. The output is false when the unit is not at maximum capacity continuously for the filter debounce time.
Evaporator Water Freeze Avoidance Request	This relay output is energized any time either the Low Evaporator Water Temperature – Unit Off or the Low Evaporator Temperature Ckt x – Unit Off diagnostics are active. This relay is intended for use as an external interlock for a field engineered and provided solution to mitigate the freeze danger implied by these diagnostics. Generally, this would be used in cases where operation of the evaporator water pump is unacceptable due to the system constraints, (i.e. such as mixing unconditioned warm water with controlled supply water as provided by other parallel chillers. The relay's output can provide the method to close bypass valves so the circulation becomes local to the evap and excludes the load, or can be used to defeat the evap pump override entirely while initiating an independent source of heat / flow to the evap.
Service Request	This relay will be energized when at least one Maintenance alert condition (refer to Service required message specification) occurs, as long as at least one of associated informational diagnostic(s) will be active.
Free-Cooling Status	The output is true (closed) whenever Free Cooling is active and the capacity is > 0%. The output is false (open) whenever Free Cooling is inactive or capacity = 0%. **Note:** *Free-cooling option is not available on all sizes.*
Free-Cooling Maximum Capacity	The output is true (closed) whenever Free Cooling capacity – 100%. The output is false (open) whenever Free Cooling is <100% capacity. **Note:** *Free-cooling option is not available on all sizes.*

Relay Assignments Using Tracer TU

Tracer®TU Service Tool is used to install the Programmable Relay Option package and assign any of the above list of events or status to each of the four relays provided with the option. (See Tracer® TU section of Controls chapter for more information on this service tool.) The relays to be programmed are referred to by the relay's terminal numbers on the Programmable Unit Status LLID board.

The default assignments for the four available relays of the Programmable Relay option are show in the table below.

Table 32. Default assignments

Relay	Assignment
Relay 1 Terminals J2-1,2,3:	Unit Limit Mode
Relay 2 Terminals J2-4,5,6:	Maximum Capacity
Relay 3 Terminals J2 - 7,8,9:	Compressor Running
Relay 4 Terminals J2 -10,11,12:	Alarm

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 the LLID board). 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. See the field wiring diagrams which are shipped with the unit.

Low Voltage Wiring

The remote devices described below require low voltage wiring. All wiring between these remote input devices and the control panel must be made with shielded, twisted pair conductors. Ground the shielding only at the panel.

Important: *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.*

Emergency Stop

The unit controller provides auxiliary control for a customer specified/installed latching trip out. When this customer-furnished remote contact is provided, the chiller will run normally when the contact is closed. When the contact opens, the unit will trip on a latching diagnostic. This latched condition requires either a manual reset at the front of the control panel or a power cycle of the unit controller to clear.

Connect low voltage leads to Emergency Stop terminal strip locations on External Auto-Stop and Emergency Stop Inputs LLID board. 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 to the External Auto-Stop terminals of the External Auto-Stop and Emergency Stop Inputs LLID board in 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

The unit controller provides for an auxiliary input of a customer specified or installed contact closure, for individual inhibition of the operation of either or both circuits. If the contact is closed, the respective refrigerant circuit will not operate.

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

Connections to External Circuit Lockout Inputs LLID inputs are shown in the field diagrams that are shipped with the unit.

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

Ice Building Option

The unit controller 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 Ice Making Control contact is provided, the chiller will run normally when the contact is open.

The unit controller 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.

The unit controller also provides a “Front Panel Ice Termination Setpoint”, settable through Tracer® TU, 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!

Failure to follow instructions could result in damage to system components.
Freeze inhibitor must be adequate for the leaving water temperature.

Tracer® TU 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 unit controller 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. The unit controller will not permit the ice building mode to be reentered until the unit has been switched out of ice building mode (open Ice Making Control contacts) and then switched back into ice building mode (close Ice Making Control 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 5K36 to the proper terminals of 1K8. 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 unit controller 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 setpoint. This input is primarily used with generic building automation systems (BAS). The chilled water setpoint set via the Tracer AdaptiView™ TD7 or through digital communication. 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 External Demand Limit and Chilled Water Setpoint Inputs LLID board, 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	
As generated from external source	VDC=0.1455*(ECWS) + 0.5454
As processed by controller	ECWS=6.875*(VDC) - 3.75
Current Signal	
As generated from external source	mA=0.2909(ECWS) + 1.0909
As processed by controller	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 (TD7) Chilled Water Setpoint.

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

External Demand Limit Setpoint (EDLS) Option

Similar to the above, the unit controller also provides for an optional External Demand Limit Setpoint that will accept either a 2–10 VDC (default) or a 4–20 mA signal. The Demand Limit Setting can also be set via the Tracer AdaptiView™ TD7 or through digital communication. The arbitration of the various sources of demand limit is described in the flow charts at the end of this section. The External Demand Limit Setpoint may be changed from a remote location by hooking up the analog input signal to the External Demand Limit and Chilled Water Setpoint Inputs LLID board terminals 2 and 3. Refer to the following paragraph on Analog Input Signal Wiring Details. The following equations apply for EDLS:

Voltage Signal	
As generated from external source	VDC+0.133*(%)-6.0
As processed by the unit controller	%=7.5*(VDC)+45.0

Current Signal	
As generated from external source	mA=0.266*(%)-12.0
As processed by the unit controller	%=3.75*(mA)+45.0

If the EDLS 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 (Tracer AdaptiView™ TD7) Demand Limit Setpoint.

The Tracer® TU 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. Tracer TU must also be used to install or remove the External Demand Limit Setpoint Option for field installation, or can be used to enable or disable the feature (if installed).

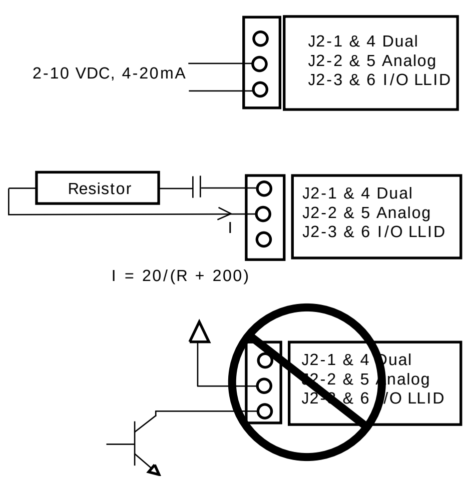
EDLS and ECWS Analog Input Signal Wiring

Both the ECWS and EDLS 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 Tracer® TU Service Tool must be used to configure the LLID and the main processor 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 Tracer® TU.

Important: *For proper unit operation, BOTH the EDLS 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 EDLS uses terminals J2–2 and J2–3. ECWS uses terminals J2–5 and J2–6. Both inputs are only compatible with highside current sources.

Figure 45. Wiring examples for EDLS and ECWS



Chilled Water Reset (CWR)

The unit controller 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 setpoints: For outdoor air temperature reset there shall be both positive and negative reset ratios.
- Start Reset Setpoints.
- Maximum Reset setpints.

The equations for each type of reset are as follows:

Return

CWS' = CWS + RATIO (START RESET - (TWE - TWL))

and CWS' > or = CWS

and CWS' - CWS < or = Maximum Reset

Outdoor

CWS' = CWS + RATIO * (START RESET - TOD)

and CWS' > or = CWS

and CWS' - CWS < or = 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 < or = Maximum Reset.

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

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% (Design Delta Temp. - (TWE - TWL)) and CWS' > or = CWS
- and CWS' - CWS < or = 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.

Transformer Power Rating

See table below for power rating of optional transformer (unit model number digit 9 = A, B, F).

Unit Size	Power Rating
150 to 200 tons	340 kVA
225 to 300 tons	470 kVA

Building Automation Systems

BACnet Building Automation Control Network

The BACnet® control network for Symbio® 800 expands communications from the unit UCM network to the Tracer® Ensemble™ or Tracer SC+ building automation system or third party building automation system. Utilizing BACnet, the BAS allows external setpoint and configuration adjustment and monitoring of status and diagnostics. The Symbio 800 utilizes the BACnet defined TP protocol as defined in ASHRAE standard 135-2004. This controller works in standalone mode, with Tracer® Ensemble™, Tracer SC+ or when connected to a third party building automation system that supports BACnet.

Modbus Automation Control Network

Allows the user to easily interface with Modbus™ RTU communication protocol via a single twisted pair wiring from the Symbio 800 controller to a factory installed device.

LonTalk Building Automation Systems

The LonTalk® communication protocol for the Symbio™ 800 controller expands communications from the unit UCM network to a Tracer® Ensemble™ building automation system or third party building automation system. Utilizing LonTalk®, the BAS allows external setpoint and configuration adjustment and monitoring of status and diagnostics. The Symbio™ 800 utilizes an FTT-10A free topology transceiver, which supports non-polarity sensitive, free topology wiring—which in turn allows the system installer to utilize star, bus, and loop architectures. This controller works in standalone mode, peer-to-peer with one or more other units, or when connected to a Tracer® Ensemble™, Tracer SC+, or a third party building automation system that supports LonTalk®.

Operating Principles

This section contains an overview of the operation and maintenance of units equipped with Symbio™ 800 control systems. It describes the overall operating principles of the Ascend™ ACR design.

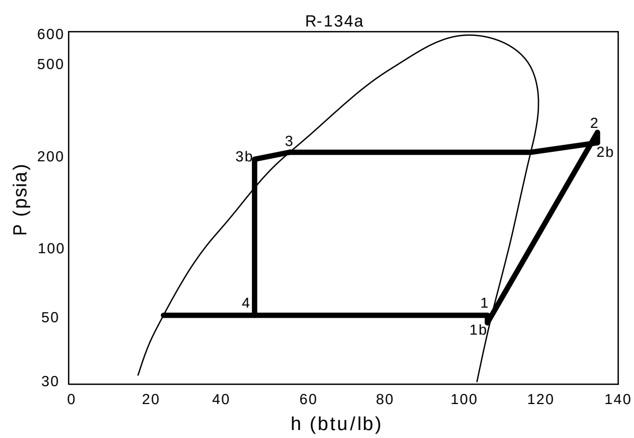
Refrigeration Circuits

Each unit has two refrigerant circuits, with one rotary screw compressor per circuit. Each refrigerant circuit includes compressor suction and discharge service valves, liquid line shutoff valve, removable core filter, liquid line sight glass with moisture indicator, charging port and an electronic expansion valve. Fully modulating compressors and electronic expansion valves provide variable capacity modulation over the entire operating range. Lower condensing temperatures and higher suction temperatures along with more efficient compressors and fans result in the premium efficiency level.

Refrigeration Cycle

The refrigeration cycle of the chiller is represented in the pressure enthalpy diagram shown in figure below. Key state points are indicated on the figure. The cycle for the full load AHRI design point is represented in the plot.

Figure 46. Pressure-enthalpy (P-h) diagram



The 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 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 removes 99.8% of the 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 or microchannel 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 Ascend™ ACR chiller uses environmentally friendly R-134a. Trane believes 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.

Refrigerant 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. Ascend™ ACR is not equipped with a purge system. Therefore, the 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.

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

Important: *Use only R-134a and Trane Oil 00311 (bulk)/ 00315 (1gal)/00317 (5gal) .*

Compressor and Oil System

Each rotary screw compressor is semi-hermetic, direct drive with capacity control via a variable speed drive, rolling element bearings, differential refrigerant pressure oil pump and oil heater. To maximize efficiency, the variable Vi (variable pressur ratio) compressor is controlled to one of two possible states depending on the chiller system operating point and to provide ease of starting. The motor is a suction gas cooled, hermetically sealed, permanent magnet motor. An oil separator is provided separately from the compressor. Oil filtration is provided internal to the compressor. Check valves in the compressor discharge and lube oil system are also provided.

Condenser and Fans

Air-cooled condenser coils have aluminum fins mechanically bonded to internally finned seamless aluminum or copper tubing. The aluminum tubing is a long life alloy designed to deliver corrosion performance that meets or exceeds microchannel coils.

The condenser coil has an integral subcooling circuit. Condensers are factory proof tested and leak tested. Condenser fans are direct-drive vertical discharge. The condenser fan motors are permanent magnet motors with an integrated drive to provide variable speed fan control for all fans and are designed with permanently lubricated ball bearings, internal temperature and current overload protection, and fault feedback as a standard product offering. The fan impeller is a nine bladed-shrouded fan made from heavy-duty molded plastic. Standard units will start and operate between 32 to 105°F (0 to 40°C) ambient.

The unit controller calculates optimum fan speed for maximum efficiency based on compressor load and outdoor air, resulting in high IPLV values

Evaporator

The evaporator is a tube-in-shell heat exchanger design constructed from carbon steel shells and tubesheets. Internally and externally finned seamless copper tubes are mechanically expanded into the tube sheets. The evaporator is designed, tested and marked in accordance with the ASME Boiler and Pressure Vessel Code for a refrigerant side working pressure of 200 psig. The evaporator is designed for a water side working pressure of 150 psig. Standard water connections are grooved for Victaulic style pipe couplings, with flange style connections optionally available. Waterboxes are available in 2– and 3–pass configurations for 150 to 300 ton units, and in 1– and 2–pass configurations for units larger than 300 tons. Waterboxes include a vent, a drain and fittings for temperature control sensors. Evaporators are insulated with 3/4 inch closed cell insulation. Evaporator water heaters with thermostat are provided to help protect the evaporator from freezing at ambient temperatures down to -20°F (-29°C). A factory installed flow switch is installed on the supply water box in the evaporator inlet connection.

Drive Cooling System

Each refrigeration circuit has a compressor drive cooling circuit. Each drive cooling circuit is a closed system, and includes a wet rotor pump that circulates a secondary heat transfer fluid between the adaptive frequency drive components, the heat sinks of the adaptive frequency drive, and a brazed plate heat exchanger. The pump is fed from a thermal expansion tank with a vented-pressure cap, which is also used as the circuit pressure relief. The circuit also includes a particulate strainer and a drain valve for servicing.

Free-Cooling Operating Modes

The advantage of optional chiller integrated free-cooling is the ability to utilize outdoor air temperatures to assist in making chilled water when appropriate. The unit controls direct flow through or around the free-cooling coils to optimize chiller efficiency. Determining the operating mode depends on four temperatures:

- Ambient air temperature
- Evaporator entering fluid temperature
- Evaporator leaving fluid temperature
- Chilled water setpoint

Table 33. Free-cooling operation

Component	Mechanical Cooling	Combined Mechanical and Free-Cooling	Free-Cooling Only	
			Fan Control	Valve Control
Ambient Air	Greater than Fluid	Less than Fluid	Less than Fluid	Less than Fluid
Compressors	On — Modulating	On — Modulating	Off	Off
Fans	On — Modulating	On — Modulating	Modulating	15%
Free-Cooling Coil Flow	Off	100%	100%	Modulating

Mechanical Cooling Mode

In this operating mode, ambient temperature is the same or higher than the temperature of the fluid entering the evaporator. Free-cooling coils are bypassed, compressors are running, and the controls modulate compressors and fans to meet cooling load at optimum efficiency.

Combined Mechanical and Free-Cooling Mode

If the ambient temperature is below the evaporator entering fluid temperature, and free-cooling only cannot satisfy the load, the controls modulate compressors and fans to meet the remaining cooling load at optimum efficiency. Fluid will continue to flow through free-cooling coils, reducing the evaporator entering fluid temperature.

Note: *Depending on load, one or both circuits may engage mechanical cooling.*

Free-Cooling Only Mode

In this operating mode, free-cooling is enabled and capable of meeting the cooling load without the need for mechanical cooling. As ambient falls below the temperature at which full load capacity is provided by freecooling only (or the load drops), fan control modulates fan speed down to a minimum of 15%. If ambient (or load) continues to drop, valve control provides modulation between free-cooling coils.

Controls

Overview

Ascend™ model ACR units utilize the following control/ interface components:

- Symbio™ 800 Controller
- Tracer AdaptiView™ TD7 Operator Interface

Symbio 800

The Symbio™ 800 controller is a factory-installed, application specific and programmable controller designed to control chillers and large packaged HVAC equipment. A 7 inch user interface features a touch-sensitive color screen that provides facility managers at-a-glance operating status, performance monitoring, scheduling changes, and operating adjustments. Other advanced features include automated controller back-up, and optional features such as secure remote connectivity, wireless building communications, mobile device connectivity, and custom programming with expandable I/O.

For more information, see Symbio 800 Installation, Operation, and Maintenance manual BAS-SVX080*-EN.

AdaptiView Display

Information is tailored to operators, service technicians, and owners. When operating a chiller, specific information is needed on a day-to-day basis—setpoints, limits, diagnostic information, and reports. This information is provided through the AdaptiView™ display. Logically organized groups of information—chiller modes of operation, active diagnostics, settings and reports put information conveniently at your fingertips.

For more information, see Ascend Air-Cooled Chiller Model ACR AdaptiView Display User Guide, AC-SVU001*-EN.

Noise Reduction Mode

See the following table for Sound Options available for each chiller sizes as well as options that allow reduced fan speed for noise reduction.

When InvisiSound™ Standard with Noise Reduction, InvisiSouns Superior with Noise Reduction or InvisiSound Ultimate option is selected noise reduction mode can be enabled to adjust fan speed and lower maximum sound levels. The noise reduction feature can be requested by operator display, external input or building automation system. To enable this function at the operator display, access the Settings screen on the Tracer® AdaptiView™.

- Set the Front Panel Noise Reduction Request to ON.
- Adjust the Noise Reduction Condenser Fan Speed Clamp to desired value. See the following table for allowable range and factory default value for each application.

When InvisiSound Superior option is selected, the condenser fan speed is clamped at the fixed 825 RPM for 150 to 300T chillers, see the following table.

Table 34. Sound options

<table>
<tr><th>Sound Options</th><th>150 to 300 Ton Units</th><th>Units Larger than 300 Tons</th></tr>
<tr><td>InvisiSound Standard</td><td>No reduced fan speed for noise reduction. Max condenser fans speed per fan design of 920 RPM.</td><td>Configurable maximum fan speed with 600-1000 RPM range (920 RPM factory default).</td></tr>
<tr><td>InvisiSound Superior</td><td>Max condenser fans speed is reduced from 920 RPM to 825 RPM.</td><td>Configurable maximum fan speed with 600-1000 RPM range (825 RPM factory default).</td></tr>
<tr><td rowspan="2">InvisiSound Standard with Noise Reduction</td><td rowspan="2">Not available</td><td>Configurable maximum fan speed with 600-1000 RPM range (920 RPM factory default).</td></tr>
<tr><td>An additional fan speed clamp setpoint with 70% to 100% of maximum fan speed (80% factory default) when noise reduction is enabled.</td></tr>
<tr><td rowspan="2">InvisiSound Superior with Noise Reduction</td><td rowspan="2">Not available</td><td>Configurable maximum fan speed with 600-1000 RPM range (920 RPM factory default).</td></tr>
<tr><td>An additional fan speed clamp setpoint with 70% to 100% of maximum fan speed (80% factory default) when noise reduction is enabled.</td></tr>
<tr><td>InvisiSound Ultimate</td><td>A fan speed clamp setpoint with 60% to 100% of 920 RPM (71% factory default) when noise reduction is enabled.</td><td>Not available</td></tr>
</table>

Tracer TU

The AdaptiView™ TD7 operator interface allows for daily operational tasks and setpoint changes. However, to adequately service chillers, Tracer® TU service tool is required. (Non-Trane personnel, contact your local Trane office for software purchase information.) Tracer TU adds a level of sophistication that improves service technician effectiveness and minimizes chiller downtime. This portable PC-based service-tool software supports service and maintenance tasks, and is required for software upgrades, configuration changes and major service tasks.

Tracer TU serves as a common interface to all Trane chillers, and will customize itself based on the properties of the chiller with which it is communicating. Thus, the service technician learns only one service interface.

The panel bus is easy to troubleshoot using LED sensor verification. Only the defective device is replaced. Tracer TU can communicate with individual devices or groups of devices.

All chiller status, machine configuration settings, customizable limits, and up to 100 active or historic diagnostics are displayed through the service-tool software interface.

LEDs and their respective Tracer TU indicators visually confirm the availability of each connected sensor, relay, and actuator.

Tracer TU is designed to run on a customer's laptop, connected to the Tracer AdaptiView control panel with a USB cable. Your laptop must meet the following hardware and software requirements:

- 1 GB RAM (minimum)
- 1024 x 768 screen resolution
- CD-ROM drive
- Ethernet 10/100 LAN card
- An available USB 2.0 port
- Windows 7 Enterprise or Professional operating system (32-bit or 64-bit)

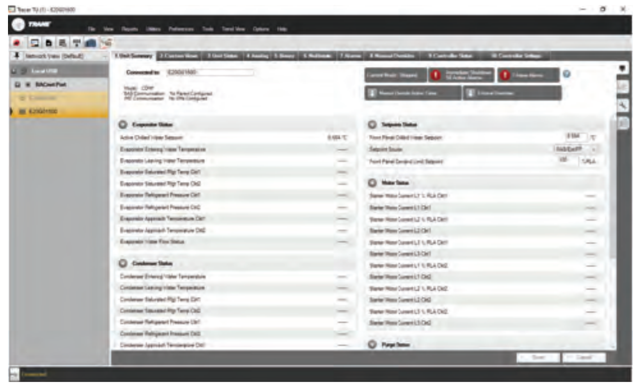
  Note: *Tracer TU versions 8.6 and earlier will also support Microsoft® Windows® XP Professional operation system with Service Pack 3 (SP3) .*

- Microsoft .NET Framework 4.0 or later

Notes:

- *Tracer® TU is designed and validated for this minimum laptop configuration. Any variation from this configuration may have different results. Therefore, support for Tracer TU is limited to only those laptops with the configuration previously specified.*
- *For more information, see TTU-SVN01*-EN Tracer ®TU Getting Started Guide.*

Figure 47. Tracer TU



Integrated Rapid Restart

Chiller controls are designed and engineered for Rapid Restart™. In the event of a power interruption, the chiller will start a compressor before the front panel display is fully powered up, eliminating the need for an uninterrupted power supply (UPS). Advanced features and functionality are built into the chillers. Bringing a chiller back online rapidly after a loss of power is critical to operations in mission critical environments, which demand the highest levels of reliability.

Under optimal conditions, it can restart in as little as 45 seconds with no need for uninterrupted power supply (UPS). An 80 percent cooling load can be achieved in less than 2.5 minutes after power restoration.

Pre-Start

Upon completion of installation, complete the Installation Completion Check Sheet and Request for Trane Service checklist in Log and Check Sheet chapter.

Important: *Start-up must be performed by Trane or an agent of Trane specifically authorized to perform start-up and warranty of Trane products. Contractor shall provide Trane (or an agent of Trane specifically authorized to perform start-up) with notice of the scheduled start-up at least two weeks prior to the scheduled start-up.*

Start-up and Shutdown

Important: *Initial unit commissioning start-up must be performed by Trane or an agent of Trane specifically authorized to perform start-up and warranty of Trane products. Contractor shall provide Trane (or an agent of Trane specifically authorized to perform start-up) with notice of the scheduled start-up at least two weeks prior to the scheduled start-up.*

Unit Start-up

NOTICE

Equipment Damage!

Failure to follow instructions could result in equipment damage.
Ensure that the compressor and oil sump heaters have been operating properly for a minimum of 24 hours before starting.

NOTICE

Equipment Damage!

Snow, ice, or debris build up on fans could cause excessive imbalance and equipment damage.
Clear fans of build up prior to machine start-up.

If required, 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 AdaptiView™ TD7. 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 subcooling, liquid level control and unit operating pressures.*

If chiller is limited by any limiting conditions, contact local Trane service organization for more information.

Temporary Shutdown And Restart

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

1. Press the STOP key on the AdaptiView™ TD7. The compressors will continue to operate and an operational pumpdown cycle may be initiated.
2. Symbio™ 800 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.

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

- The Symbio 800 receives a call for cooling and the differential-to-start is above the setpoint.
- All system operating interlocks and safety circuits are satisfied.

Extended Shutdown Procedure

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

1. Test the unit for refrigerant leaks and repair as necessary.
2. Open the electrical disconnect for the chilled water pump. Lock the switches in the "OPEN" position.

NOTICE

Pump Damage!

Failure to follow instructions could result in pump damage.
Lock the chilled water pump disconnects open and verify pump is off before draining water.

3. Close all chilled water supply valves. Drain the water from the evaporator.
4. With the water drained from evaporator, disconnect 115 power from evaporator heaters at terminals 1X4-1 and 1X4-2.

NOTICE

Heater Damage!

Failure to follow instructions could result in heater damage.
Do not apply power to the evaporator heaters when no water is present.

5. Open the main electrical disconnect and lock in the "OPEN" position.

NOTICE

Equipment Damage!
Failure to follow instructions could result in equipment damage.
Lock the disconnect in the "OPEN" position to prevent accidental start-up and damage to the system when it has been shut down for extended periods.

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

Seasonal Unit Start-up Procedure

1. PRIOR to water being pumped into system, use gauges to verify positive pressure in the evaporator and condenser. Lack of pressure could indicate a system leak. When charging in the factory, approximately 95% of the refrigerant charge is isolated in the evaporator, and the other 5% is contained in the condenser and compressor. In the event that no pressure is present, contact local Trane service.
2. Close all drain valves and re-install the drain plugs in the evaporator.
3. Service the auxiliary equipment according to the start-up/maintenance instructions provided by the respective equipment manufacturers.
4. Close the vents in the evaporator chilled water circuits.
5. Open all the valves in the evaporator chilled water circuits.
6. Open all refrigerant valves or verify they are in the open condition.
7. 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.
8. Check the adjustment and operation of each safety and operating control.
9. Refer to the sequence for daily unit startup for the remainder of the seasonal startup.

System Restart After Extended Shutdown

NOTICE

Equipment Damage!
Failure to follow instructions could result in equipment damage.
Ensure that the compressor and oil sump heaters have been operating properly for a minimum of 24 hours before starting.

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

1. Check refrigerant pressure as noted in Seasonal Unit Start-Up procedure.
2. Verify that the liquid line service valves, oil line, compressor discharge service valves and suction service valves are open (backseated).

NOTICE

Compressor Damage!
Failure to follow instructions below could cause catastrophic damage to the compressor.
Do not leave oil line shut off valve or the isolation valves closed on unit start-up.

3. Check the oil sump level. See instructions in Maintenance chapter.
4. 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 Required!
The use of untreated or improperly treated water could result in scaling, erosion, corrosion, algae or slime.
Use the services of a qualified water treatment specialist 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.

5. Close the fused-disconnect switches that provides power to the chilled water pump.
6. Start the evaporator water pump and, while water is circulating, inspect all piping for leakage. Make any necessary repairs before starting the unit.
7. While the water is circulating, adjust the water flows and check the water pressure drops through the evaporator. See Evaporator Waterside Pressure Drop Curves in Installation Mechanical chapter, and water flow rates in General Data tables..
8. Verify proper operation of flow switch on the

evaporator waterbox.

9. Stop the water pump. The unit is now ready for start-up as described previously

Sequence of Operation

This section provides basic information on chiller operation for common events. Adaptive control algorithms are used on these chillers. This section illustrates common control sequences.

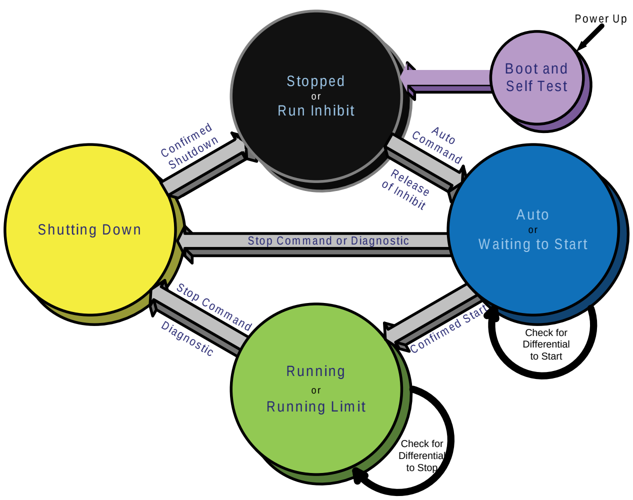
Software Operation Overview

The following figure is a diagram of the five possible software states. This diagram can be thought of as a state chart, with the arrows and arrow text, depicting the transitions between states:

- The text in the circles is the internal software designations for each state.
- The shading of each software state circle corresponds to the shading on the time lines that show the chiller's state.

There are five generic states that the software can be in:

- Power Up
- Stopped
- Starting
- Running
- Stopping



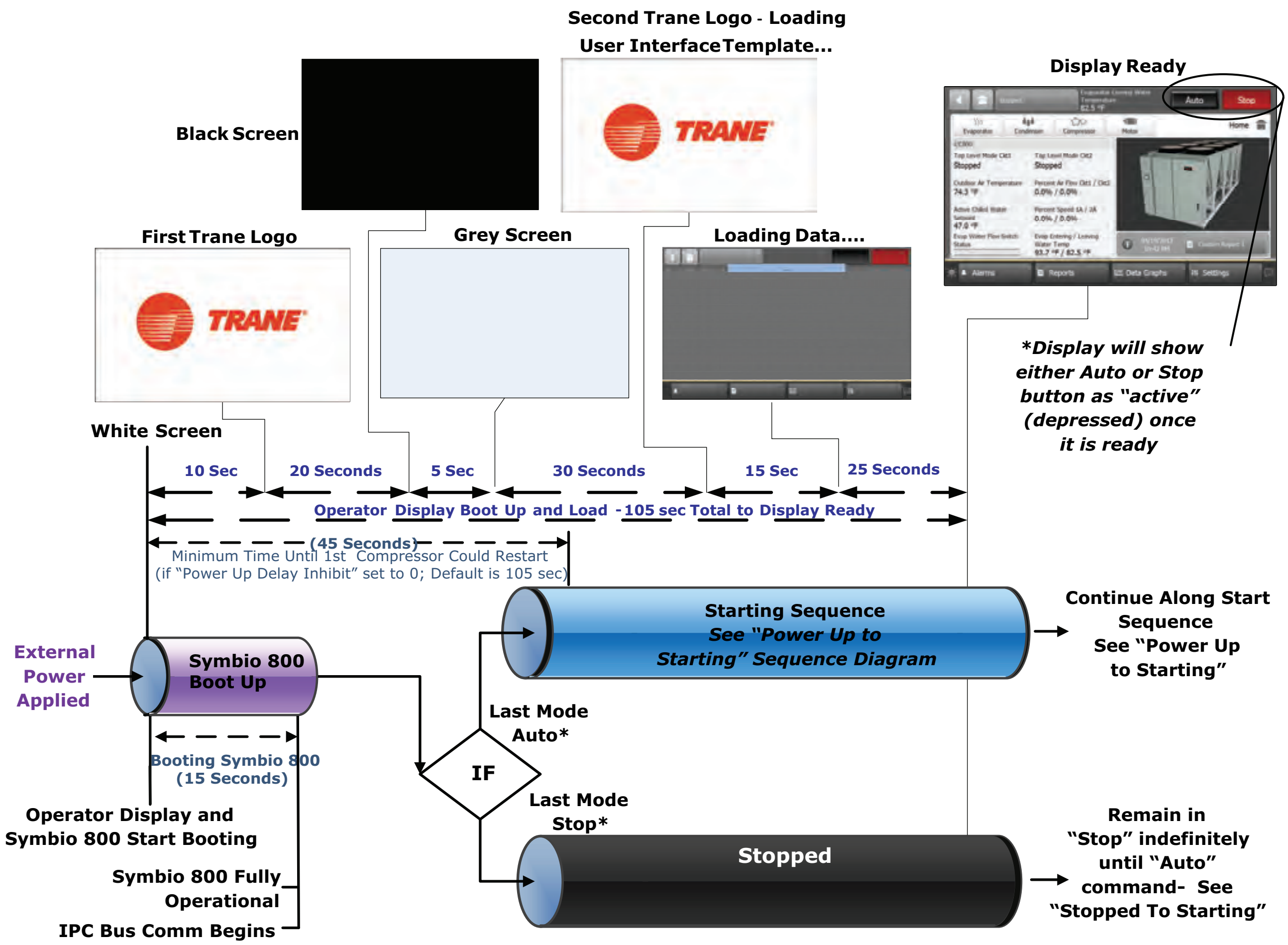
In the following diagrams:

- The time line indicates the upper level operating mode, as it would be viewed in the Tracer® AdaptiView™.
- The shading color of the cylinder indicates the software state.
- Text in parentheses indicates sub-mode text as viewed in the Tracer® AdaptiView™.
- Text above the time line cylinder is used to illustrate inputs to the Symbio 800. This may include user input to the Tracer® AdaptiView™ touch screen, control inputs from sensors, or control inputs from a generic BAS.
- Boxes indicate control actions such as turning on relays, or pulsing compressor load or unload solenoids.
- Smaller cylinders under the main cylinder indicate diagnostic checks.
- Text outside a box or cylinder indicates time-based functions.
- Solid double arrows indicate fixed timers.
- Dashed double arrows indicate variable timers.

Power Up Diagram

The following diagram shows the respective TD7 AdaptiView™ screens during a power up of the Symbio 800 and display. This process takes 15 seconds for the Symbio 800, and 105 seconds for the display. On all power ups, the software model always will transition through the 'Stopped' Software state independent of the last mode. If the last mode before power down was 'Auto', the transition from 'Stopped' to 'Starting' occurs, but it is not apparent to the user.

Figure 48. Sequence of operation: power up diagram



Power Up to Starting

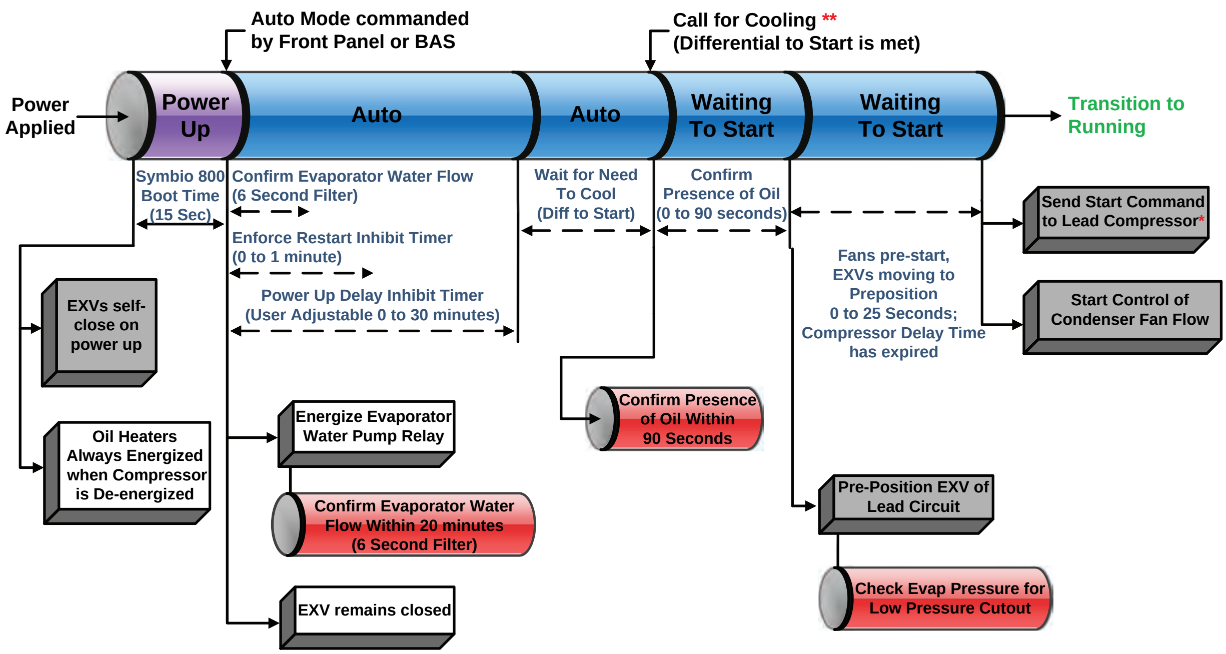
The following diagram shows the timing from a power up event to energizing the first compressor. The shortest allowable time would be under the following conditions:

- No motor restart inhibit time left from subsequent starts
- Evaporator water flow occurs quickly with pump on command
- Power up Start Delay set to 0 minutes
- Need to cool (differential to start) already exists
- Oil level is detected immediately

The above conditions would allow for a minimum power up to starting the first compressor time of about 45 seconds. (Variations may exist due to options installed.)

***Note:** It is not advisable to start a chiller "cold". The oil heaters should be in operation for a sufficient length of time prior to first start.*

Figure 49. Sequence of events: power up to starting



** Lead Compressor (and its lead circuit) is determined by staging algorithm – "Balanced", "Circuit 1 Lead", or "Circuit 2 Lead" selection – also influenced by lockouts, restart inhibit, or diagnostics present.*

On manifolded circuit for ACRB above 300T, GP4 will be the first to start and last to stop; GP2 will not run by itself.

** If Free Cooling is available, it shall be the first level control to start. Total Free Cooling: balanced starts and hours or circuit x lead are available.

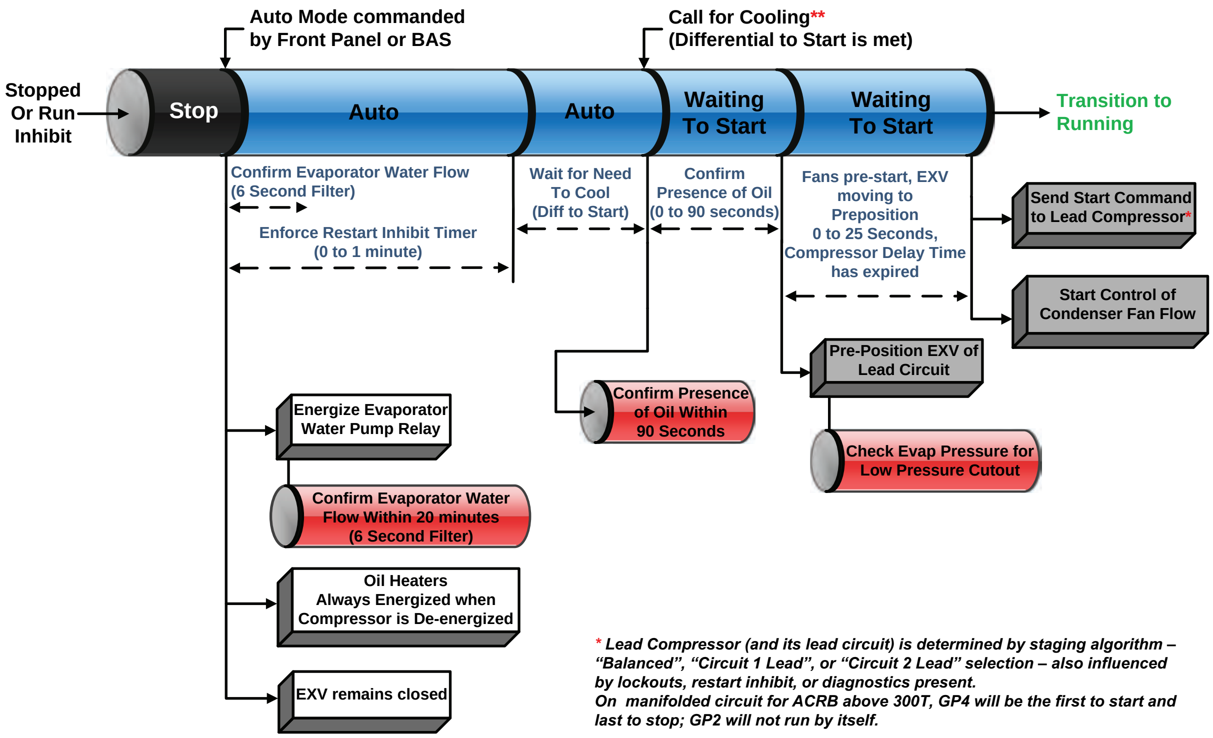
Stopped to Starting

The following diagram shows the timing from a stopped mode to energizing the first compressor. The shortest allowable time would be under the following conditions:

- No motor restart inhibit time left from subsequent starts
- Evaporator water flow occurs quickly with pump on command
- Need to cool (differential to start) already exists

The above conditions would allow a compressor to start in about 20 seconds.

Figure 50. Sequence of events: stopped to starting



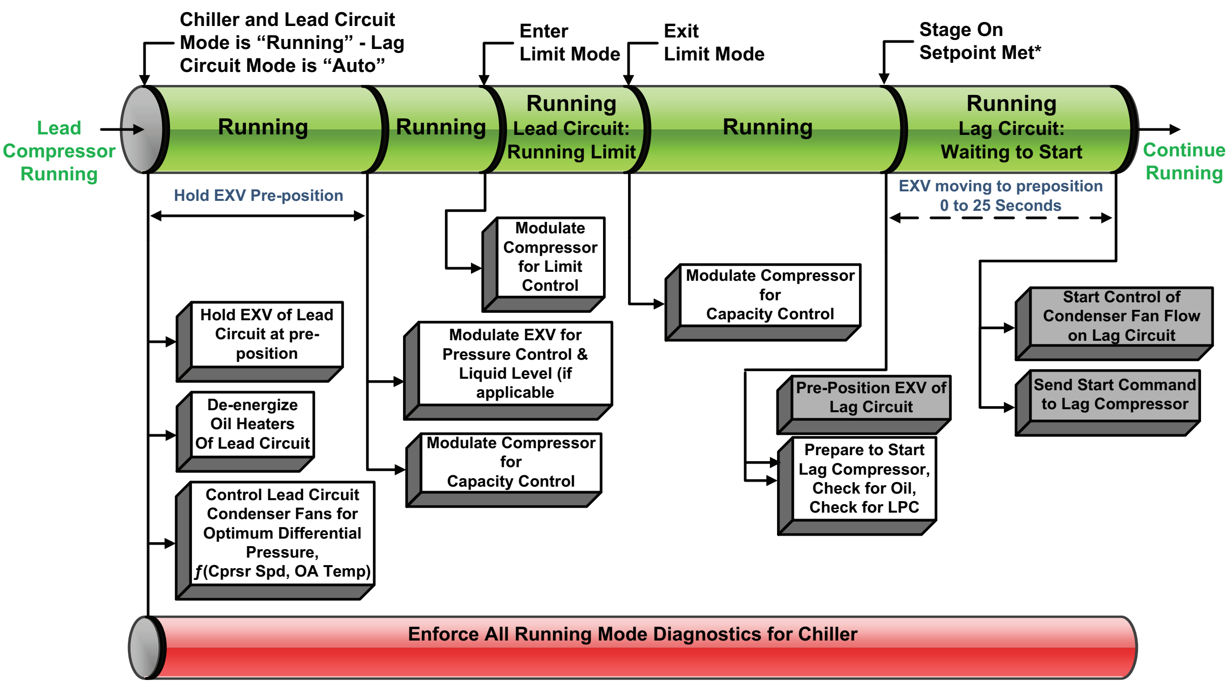
** Lead Compressor (and its lead circuit) is determined by staging algorithm – "Balanced", "Circuit 1 Lead", or "Circuit 2 Lead" selection – also influenced by lockouts, restart inhibit, or diagnostics present.*
On manifolded circuit for ACRB above 300T, GP4 will be the first to start and last to stop; GP2 will not run by itself.

***Note: If Free Cooling is active, it will be the first stage of cooling to stage on.*

Running (Lead Compressor/Circuit Start and Run)

The following diagram shows a typical start and run sequence for the lead compressor and its circuit.

Figure 51. Sequence of events: running (lead compressor/circuit start and run)

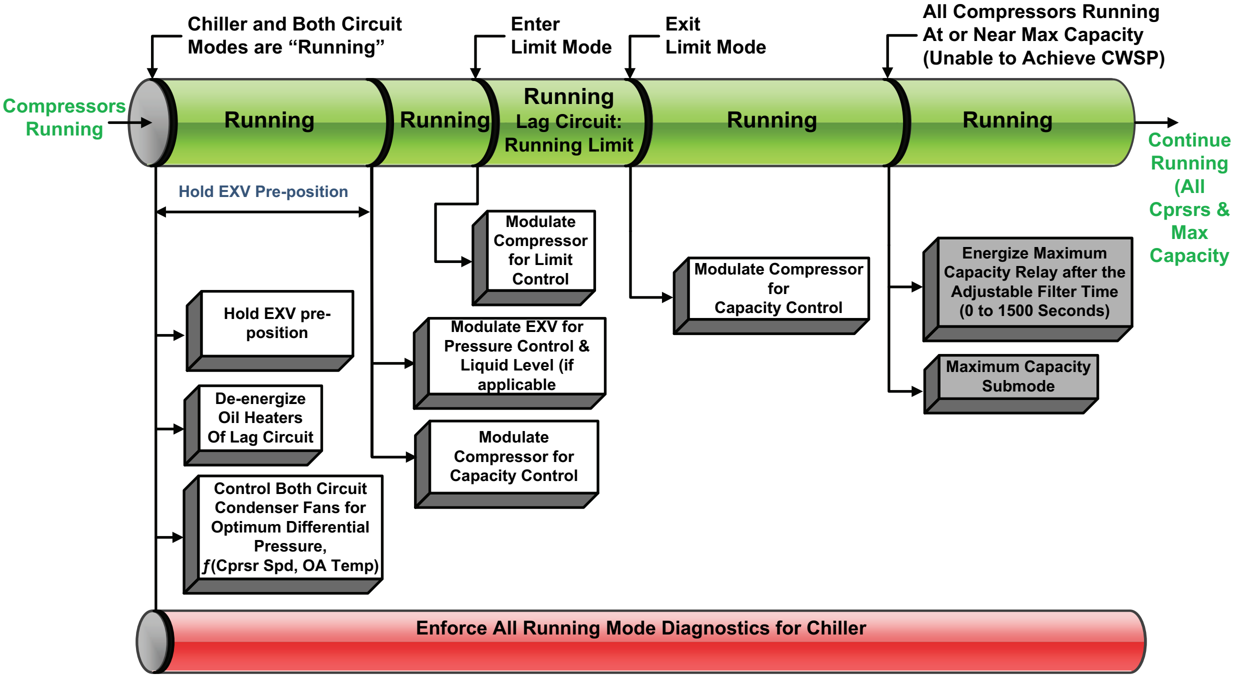


**Note: The decision to stage on or off another compressor is determined by the Average Running Compressor Load Command, Water Temperature Error, and Time Since Last Stage*
Circuit X Lead: XA compressor on the selected circuit will lead followed by a compressor on the alternate circuit, given an appropriately increasing chiller load. Additional compressors will alternate between lead and lag circuits.
On manifolded circuit for ACRB above 300T, GP4 will be the first to start and last to stop; GP2 will not run by itself.

Running (Lag Compressor/Circuit Start and Run)

The following diagram shows a typical start and run sequence for the lag compressor and its circuit.

Figure 52. Sequence of operation: running (lag compressor/circuit start and run)

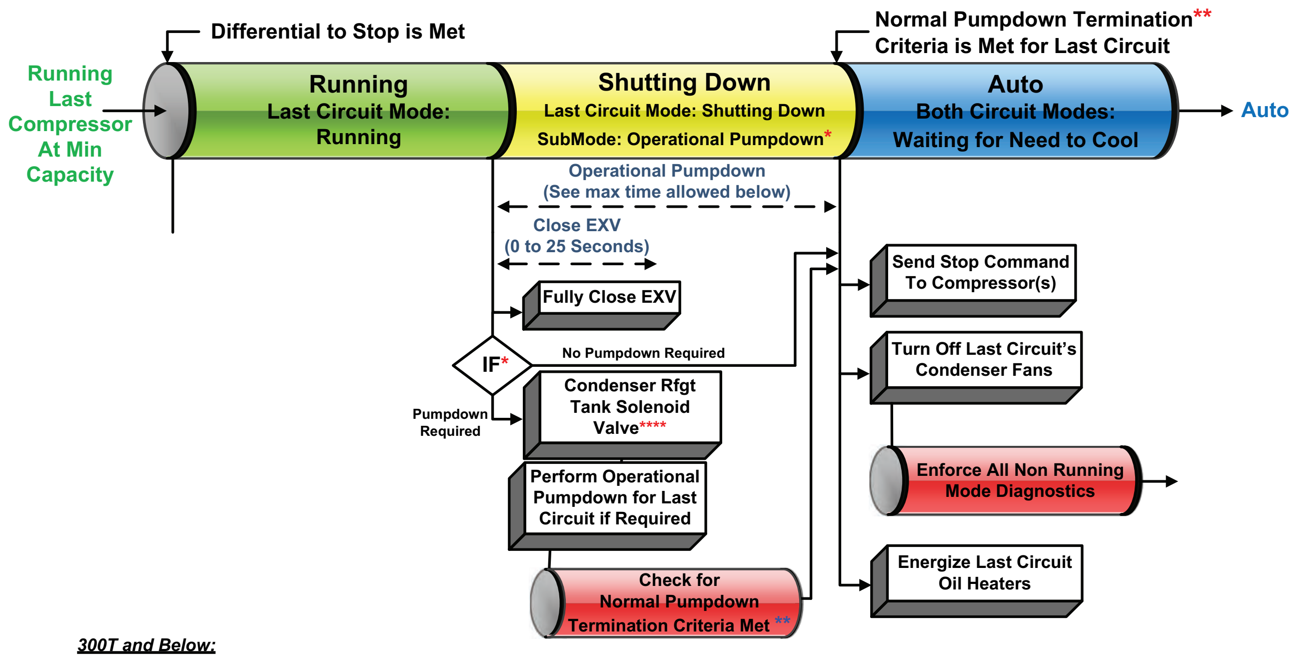


**Note: The decision to stage on or off another compressor is determined by the Average Running Compressor Load Command, Water Temperature Error, and Time Since Last Stage*
On manifolded circuit for ACRB above 300T, GP4 will be the first to start and last to stop; GP2 will not run by itself.

Satisfied Setpoint

The following diagram shows the normal transition from running to shutting down due to the evaporator leaving water temperature falling below the differential to stop setpoint. It also outlines the termination criteria for operational pumpdown.

Figure 53. Sequence of events: satisfied setpoint



300T and Below:

** Operational Pumpdown is required if the Outdoor Air Temperature is less than 50F.*

*** Operational Pumpdown is Terminated Normally when the Evaporator Refrigerant Pressure is at or below 20 PSIA.*

Above 300T:

** Operational Pumpdown is required if the Outdoor Air Temperature is less than 50F, or the Entering Evaporator Water Temperature is greater than (outdoor air temperature – 10°F). With AFD, compressors will be at max speed for operational pumpdown.*

*** Operational pumpdown is terminated normally when:*

- *-The evaporator (suction) pressure is at or below the "Pumpdown Termination Pressure" setting OR LERTC saturated pressure (32F for water [default]; -5F for glycol), which ever is greater*
- *-The condenser (compressor discharge) pressure exceeds 315psia.*
- *-The compressor pressure ratio exceeds 12.3*
- *-The system differential pressure exceeds 265psid*

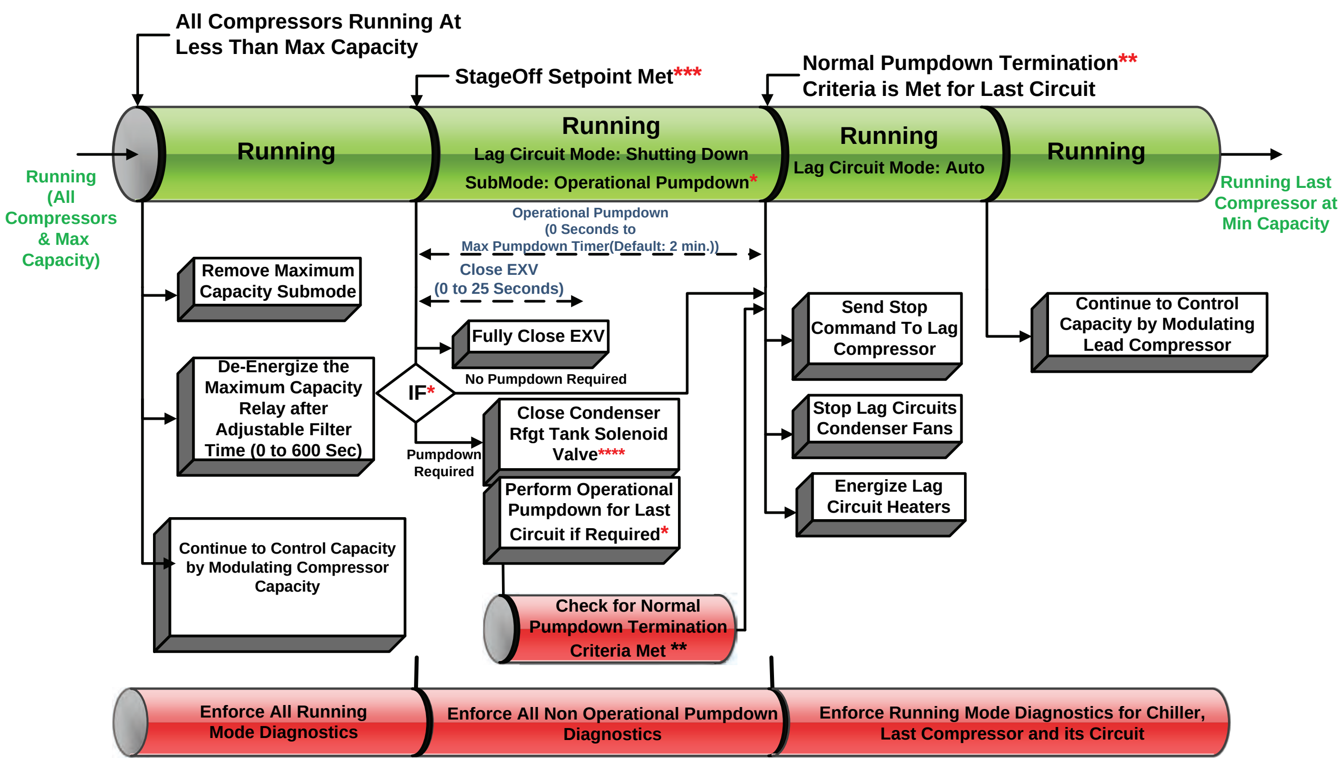
*** The maximum allowed time for Operational Pumpdown is Max Pumpdown Time setting (default to 120 sec.) * number of compressors configured on the circuit.*

***** If Condenser Refrigerant Tanks are installed*

Unloading Unstaging

The following diagram shows the normal transition from full load to minimum load while the chiller is running.

Figure 54. Sequence of events: unloading unstaging



** & ** Operational Pumpdown Requirement and Termination - See Satisfied Setpoint Operational Pumpdown sequence diagram for specific criteria.*

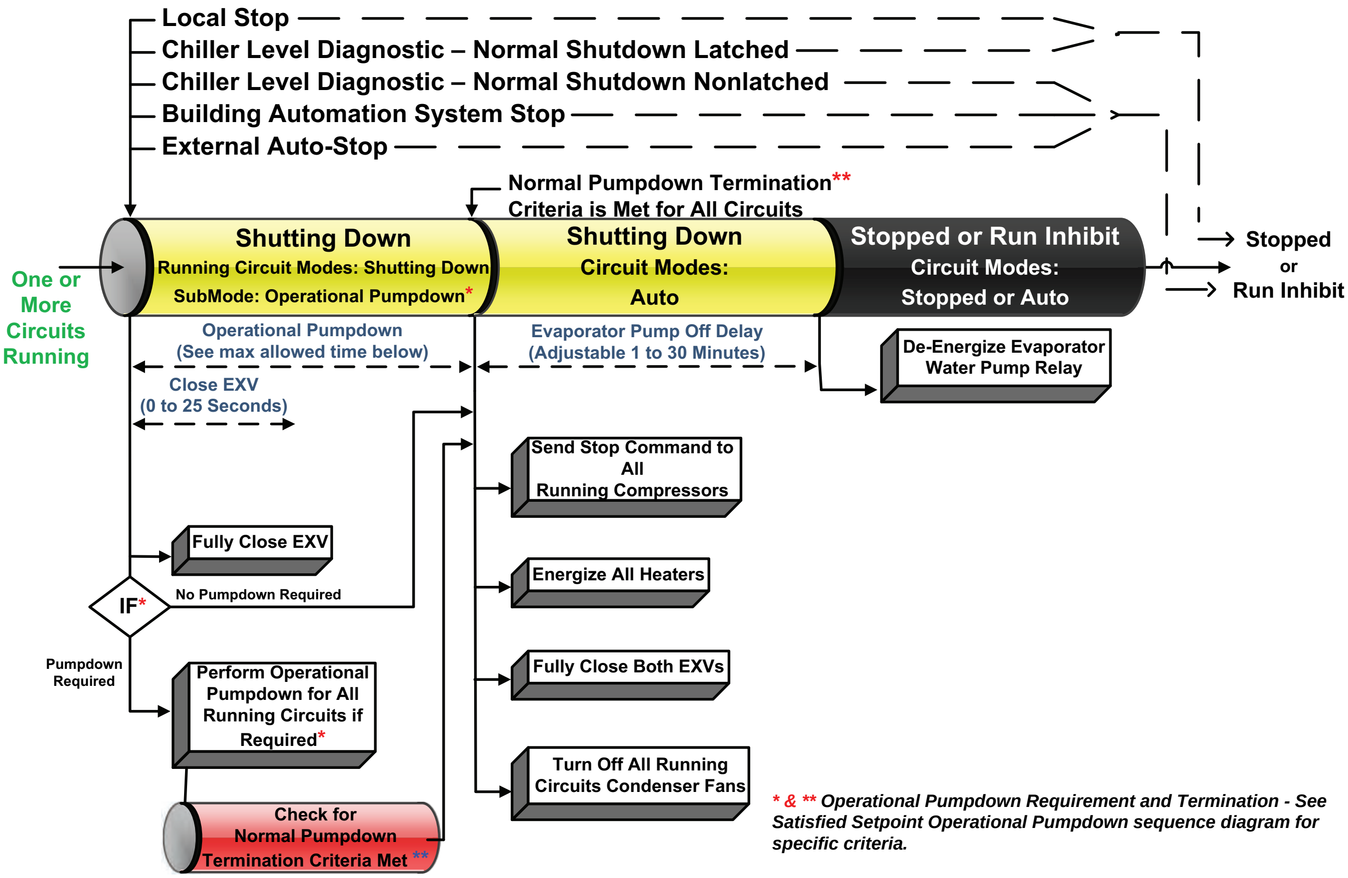
***** If Condenser Refrigerant Tank is installed.*

**** Note: The decision to stage off another compressor is determined by the Average Running Compressor Load Command, Water Temperature Error, and Time since Last Stage. Compressors will stage off in the reverse order they staged on. All fixed speed compressors will stage off before variable speed compressors stage off.*
On manifolded circuit for ACRB above 300T, GP4 will be the first to start and last to stop; GP2 will not run by itself.

Normal Shutdown to Stopped or Run Inhibit

The following diagram shows the transition from Running through a Normal (friendly) Shutdown. The dashed lines on the top attempt to show the final mode if stop is selected via various inputs.

Figure 55. Sequence of events: normal shutdown to stopped or run inhibit



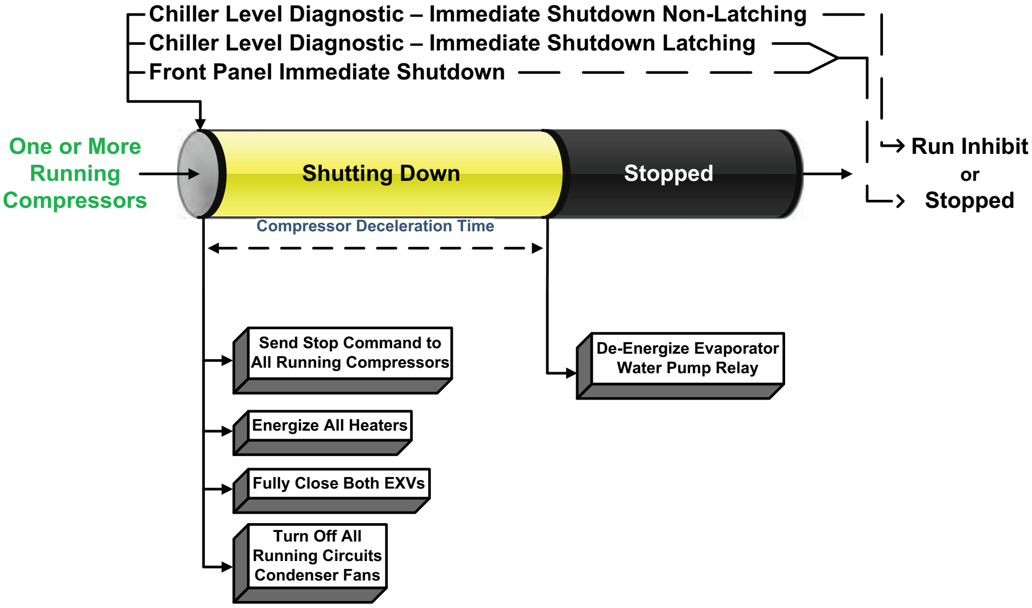
*** & ** Operational Pumpdown Requirement and Termination - See Satisfied Setpoint Operational Pumpdown sequence diagram for specific criteria.***

Note: If Free Cooling is active, the last stage of cooling to turn off will be Free Cooling.

Immediate Shutdown to Stopped or Run Inhibit

The following diagram shows the transition from Running through an Immediate Shutdown. The dashed lines on the top attempt to show the final mode if stop is selected via various inputs.

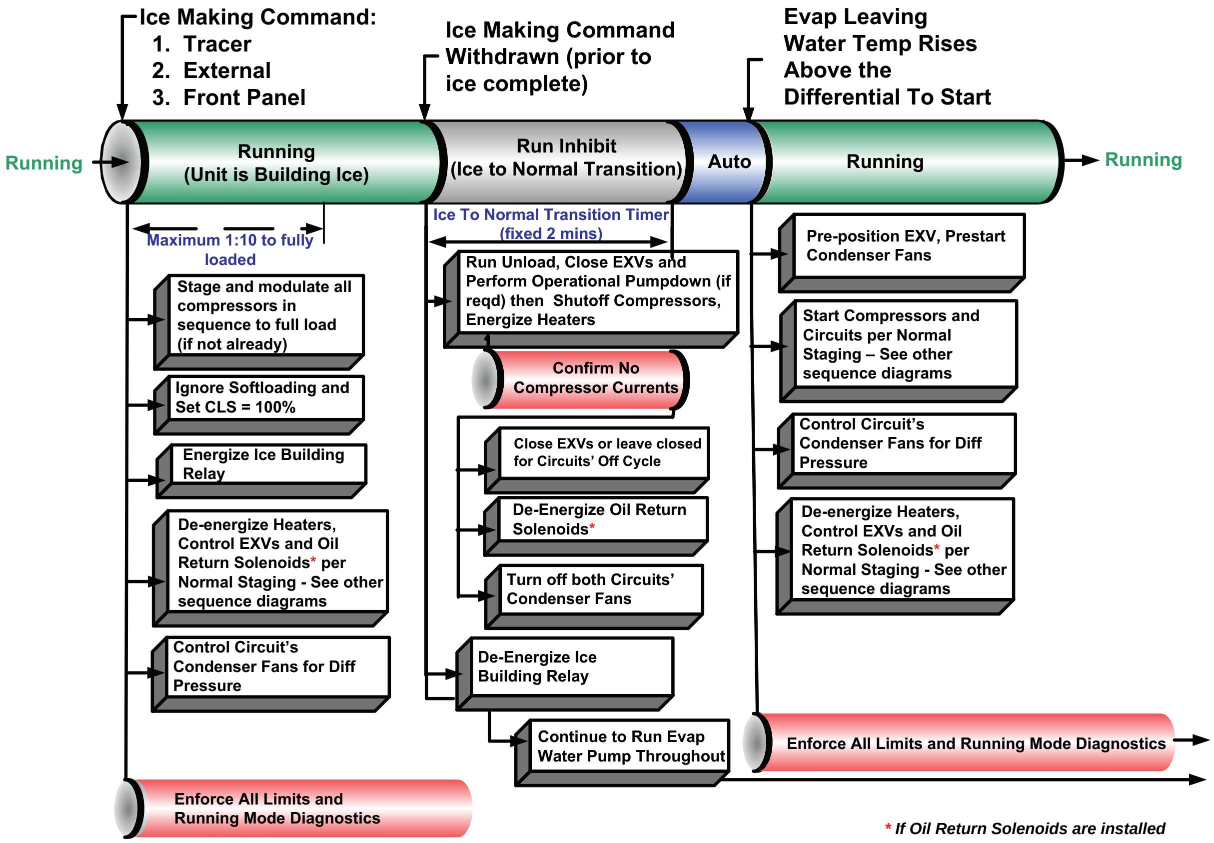
Figure 56. Sequence of events: immediate shutdown to stopped or run inhibit



Ice Making (Running to Ice Making to Running)

The following diagram shows the transition from normal cooling to ice making, and back to normal cooling.

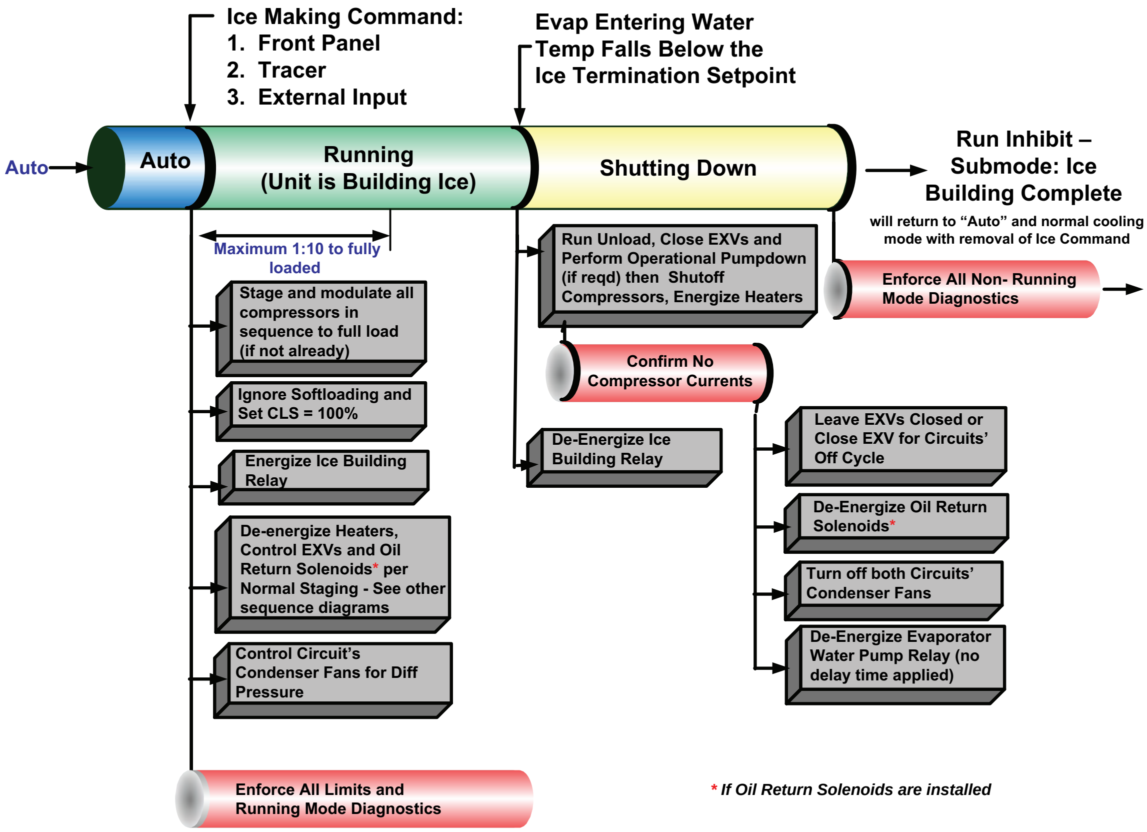
Figure 57. Sequence of events: ice making (running to ice making to running)



Ice Making (Auto to Ice Making to Ice Making Complete)

The following diagram shows the transition from auto to ice making, to ice making complete.

Figure 58. Sequence of events: ice making (auto to ice making to ice making complete)



TRANE

Maintenance

⚠ WARNING

Hazardous Voltage - Pressurized Flammable Fluid!

Failure to follow all electrical safety precautions could result in death or serious injury.

Do not operate compressor without terminal box cover in place.

The motors in the compressors have strong permanent magnet motors and have the capability to generate voltage during situations when the refrigerant charge is being migrated. This potential will be present at the motor terminals and at the output of the variable speed drives in the power panel.

Before removing compressor terminal box cover for servicing, or servicing power side of control panel, CLOSE COMPRESSOR DISCHARGE SERVICE VALVE and disconnect all electric power including remote disconnects. Discharge all motor start/run capacitors. Follow lockout/tagout procedures to ensure the power cannot be inadvertently energized. Verify with an appropriate voltmeter that all capacitors have discharged.

The compressor contains hot, pressurized refrigerant. Motor terminals act as a seal against this refrigerant. Care should be taken when servicing NOT to damage or loosen motor terminals.

⚠ WARNING

Pressurized Burning Fluid!

Failure to follow the instructions below could result in death or serious injury.

Do not operate compressor without terminal box cover in place.

The compressor contains hot, pressurized refrigerant. Motor terminals act as a seal against this refrigerant. Care should be taken when servicing NOT to damage or loosen motor terminals.

⚠ WARNING

Hazardous Voltage w/Capacitors!

Failure to follow these instructions could result in death or serious injury.

Disconnect all electric power, including remote disconnects and discharge all motor start/run and AFD (Adaptive Frequency™ Drive) 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.**
- **DC bus capacitors retain hazardous voltages after input power has been disconnected. Follow proper lockout/tagout procedures to ensure the power cannot be inadvertently energized. After disconnecting input power, wait five (5) minutes for the DC capacitors to discharge, then check the voltage with a voltmeter. Make sure DC bus capacitors are discharged (0 VDC) before touching any internal components.**

This section describes the basic chiller preventive maintenance procedures, and recommends the intervals at which these procedures should be performed. Use of a periodic maintenance program is important to ensure the best possible performance and efficiency.

Use an Operator Log (see Log and Check Sheet chapter) 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 inspections, see Diagnostics chapter.

Recommended Maintenance

Weekly

While unit is running in stable conditions.

1. At AdaptiView™ TD7 or Tracer® TU service tool, check pressure for evaporator, condenser and intermediate oil.
2. Observe liquid line sight glass on EXV. If liquid line sight glass has bubbles measure the subcooling

entering the EXV. Subcooling should always be greater than 10°F for single compressor circuits, and 5°F for dual compressor circuits.

3. Inspect the entire system for unusual operation.
4. Inspect the condenser coils for dirt and debris. If the coils are dirty, see Condenser Coil Cleaning section of Maintenance chapter.

NOTICE

Coil Damage!

Use of detergents could cause damage to coils. Do not use detergents to clean coils. Use clean water only.

Monthly

1. Perform all weekly maintenance procedures.
2. Record the system subcooling.

Annual

1. Perform all weekly and monthly procedures.
2. Check oil level while unit is off. See Maintenance chapter.
3. Perform pH test of drive cooling fluid. See pH Test section of Maintenance chapter.
4. Have a qualified laboratory perform a compressor oil analysis to determine system moisture content and acid level.
5. Contact a Trane service organization to leak test the chiller, to check operating and safety controls, and to inspect electrical components for deficiencies.
6. Clean and repaint any areas that show signs of corrosion.
7. Clean the condenser coils. See Condenser Coil Cleaning section of Maintenance chapter.

NOTICE

Coil Damage!

Use of detergents could cause damage to coils. Do not use detergents to clean coils. Use clean water only.

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.

The following table lists baseline measurements for chillers running at AHRI standard operating conditions. If chiller measurements vary significantly from values listed below, problems may exist with refrigerant and oil charge levels. Contact your local Trane office.

Note: *Low temperature applications units will have values that vary from the following table. Contact your local Trane office for more information.*

Table 35. Typical baselines (AHRI conditions)

Measurement	Baseline
Evaporator Pressure	51 psia
Evaporator Approach	3.4°F average
EXV Position	45-65% open
Evaporator Temp - entering	54°F
Evaporator Temp - leaving	44°F
Discharge Superheat	16.5°F
Condenser Pressure	212 psia
Subcooling	10 to 20°F

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.

Oil Sump Level Check

The oil level in the sump can be measured to give an indication of the system oil charge. Follow the procedures below to measure the level.

1. Run the unit as near to full load as possible for a minimum of 30 minutes. For an accurate reading, 40 or more minutes at full load with normal/steady discharge superheat readings and no limits/ warnings is recommended. Assessing oil charge after running at minimum or low loads may lead to an inaccurate reading.
2. Cycle the compressors off.
3. Let the chiller sit (powered, but off line) to allow the oil separator heater to boil off the refrigerant that may be in the oil separator. An initial assessment of the oil separator level may be made after 30 minutes of heater ON dwell time, but oil charge adjustments should not be made without allowing the oil heaters to run for a minimum of 4 hours.

NOTICE

Equipment Damage!

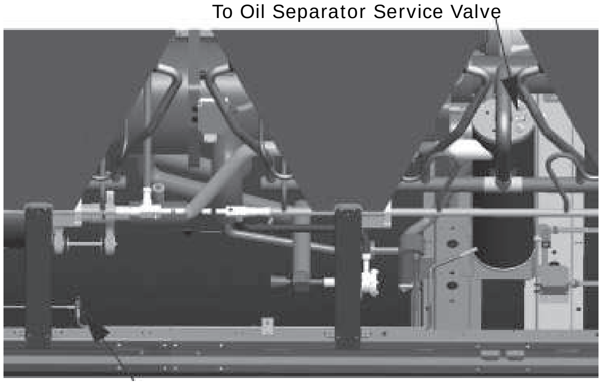
Operating compressors with service valves open will result in severe oil loss and equipment damage.

Never operate the compressor with the sight glass service valves opened. Close the valves after checking the oil level.

4. Attach a 3/8″ or 1/2″ hose with a sightglass in the middle to the oil sump service valve (1/4″ flare) and the oil separator service valve (1/4″ flare). See the following figure for valve locations.

   Note: *High pressure rated clear hose with appropriate fittings can help speed up the process. Hose must be rated to withstand system pressures as found on unit nameplate.*

Figure 59. Oil service valves

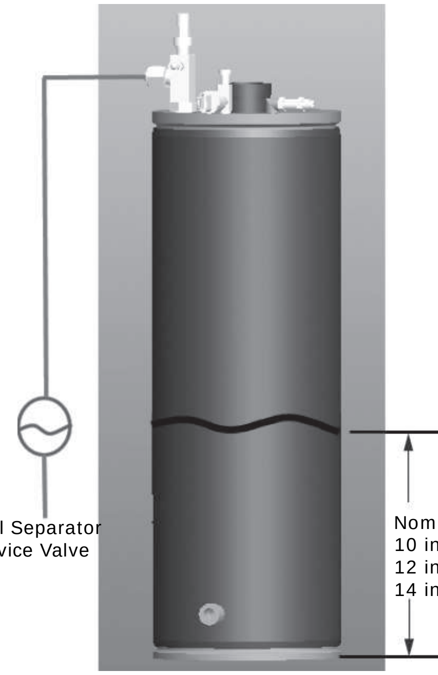


5. After the unit is off line for 30 minutes, move the sightglass along the side of the oil sump.
6. The nominal oil level from the bottom of the oil separator should be as shown in the following table and figure. Depending on running conditions and oil heater dwell time, some deviation from nominal levels is expected.

   Important: *If level is less than 4 inches from the bottom of the oil separator, contact your local Trane office.*

Unit Size (tons)	Oil Separator Size (in)	Nominal Oil Charge Height (in)
150 to 200	10	9.0
225 to 300	12	8.5
375 to 550	12	8.5
	14	9.7

Figure 60. Nominal oil level



Drive Cooling System

NOTICE

Equipment Damage!

Use of unapproved fluids, or dilution of approved fluid could result in catastrophic equipment damage.
Use only Trane Heat Transfer Fluid P/N CHM01023. This fluid is a direct use concentration and is not to be diluted. Do not top off with water or any other fluid.

Service Intervals

NOTICE

Equipment Damage!

Failure to follow instructions could result in equipment damage.
Drive cooling fluid and strainer must be serviced every five (5) years.

- Every (5) years, contact your local Trane office to service drive fluid and strainer.
- On a yearly basis, a fluid pH test should be performed.

Unit Diagnostics

An improperly filled drive cooling system (either low fluid level or entrapped air in the circuit) can result in the AFD drive overheating. This condition may result in the following diagnostic(s):

- AFD xA Over Temperature

A front panel warning of Low Oil Return or AFD Cooling – CktX does not indicate an issue with the drive cooling fluid system, but represents a low refrigerant level reported by the liquid level sensor for a given length of time.

If chiller diagnostics indicated drive cooling system problem, contact your local Trane office.

pH Test

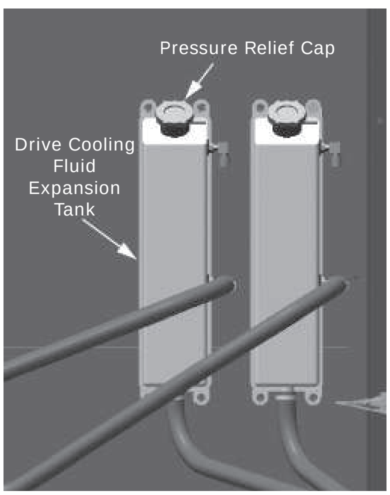
Obtain a sample of fluid from the drive cooling loop via the loop drain located near the oil return heat exchanger. Test for pH level using litmus paper with a 0.5 resolution.

- pH < 8 indicates fluid to be changed
- pH < 7 indicates potential component damage

Pressure Relief Cap

The pressure relief cap is an automotive style pressure-vent radiator cap. See figure below. The setting for the relief spring is 16 lbs. The function of the relief cap can be verified with a standard automotive radiator cap tester.

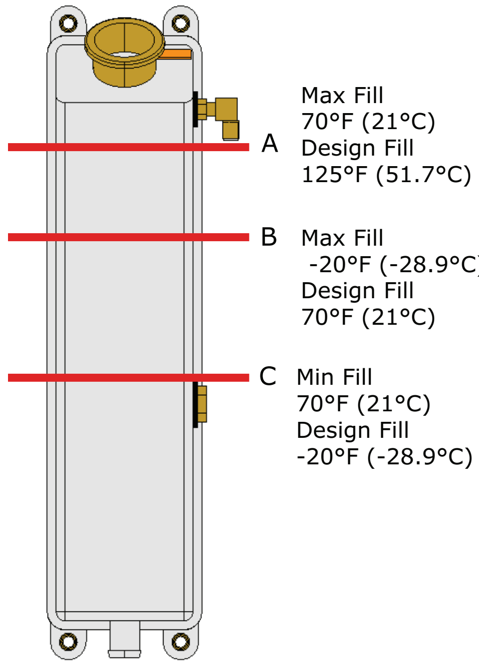
Figure 61. Pressure relief cap



Drive Cooling Expansion Tank

Proper fluid level is important to the operation of the unit. To verify proper level, inspect the liquid level in each of the fluid reservoirs (located behind the chiller control panel). See figure below for fluid levels under various temperature conditions. If levels levels are low, contact your local Trane office.

Figure 62. Drive cooling expansion tank fill



Note: *Fill lines are NOT marked on tank. The A level is just below upper fitting. C level is above lower fitting. B is in the middle of the fittings.*

Condenser Coil Corrosion Protection Inspection

Perform coil inspection each time coils are cleaned.

For units with aluminum manifolds, inspect corrosion protection at each coil refrigerant connection where the copper tube joins the aluminum manifold. If damaged or missing, wrap new Prestite Insulated tar tape (STR01506) on joint to cover area from the aluminum header body to at least 2 inches of the copper tube. Seal insulation using hand pressure. Rubber gloves are suggested when handling insulation.

Note: *Prestite insulated tar tape is required for all units at each copper/aluminum connection. This requirement is NOT associated with the coated coil option.*

Condenser Coil Cleaning

Coil Cleaning Interval

Clean condenser coils at least once a year or more frequently if it is in a "dirty" environment. A clean condenser coil will help maintain chiller operating efficiency.

Cleaning Air Side of Coils

NOTICE

Coil Damage!

Use of coil cleaning agents on uncoated coils could cause damage to coils.
Do not use coil cleaning agents to uncoated clean coils. Use clean water only.

Do not use detergents to clean the air side of coils. Use clean water only. Clean from inside out by removing end panels.

Cleaning Microchannel Coils

For proper operation, microchannel condenser coils must be cleaned regularly. Eliminate pollution and other residual material help to extend the life of the coils and the

Regular coil maintenance, including annual cleaning, enhances the unit's operating efficiency by minimizing compressor head pressure and amperage draw. The condenser coil should be cleaned at minimum once each year, or more if the unit is located in a "dirty" or corrosive environment.

NOTICE

Coil Damage!

Use of detergents could cause damage to coils.
Do not use detergents to clean coils. Use clean water only.

Cleaning with cleansers or detergents is strongly discouraged. Water should prove sufficient. Any breach in the tubes can result in refrigerant leaks.

⚠ WARNING

Hazardous Voltage w/Capacitors!

Failure to disconnect power and discharge capacitors before servicing could result in death or serious injury.
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 a CAT III or IV voltmeter rated per NFPA 70E that all capacitors have discharged.

1. Disconnect power to the unit.

   Use a soft brush or vacuum to remove base debris or surface loaded fibers from both sides of the coil.

Note: *When possible, clean the coil from the opposite direction of normal air flow (inside of unit out) to push debris out.*

Using a sprayer and water ONLY, clean the coil following the guidelines below.

a.

2. Sprayer nozzle pressure should not exceed 580 psi.

b.

3. The maximum source angle should not exceed 25° to the face of the coil. See figure below. For best results spray the microchannel perpendicular to face of the coil.

c.

4. Spray nozzle should be approximately 1 to 3 inches from the coil surface.

d.

5. Use at least a 15° fan type of spray nozzle.

Note: *To avoid damage from the spray wand contacting the coil, make sure the 90° attachment does not come in contact with the tube and fin as abrasion to the coil could result.*

Cleaning the Evaporator

Because the evaporator is typically part of a closed circuit, it does not accumulate appreciable amounts of scale or sludge with properly treated working fluids. However, if cleaning is deemed necessary, chemical and mechanical means are both acceptable. If using chemical means, any and all materials used in the external circulation system, the quantity of the solution, the duration of the cleaning period, and any required safety precautions should be approved by the company furnishing materials or performing the cleaning. When using mechanical means, care must be taken in selecting the cleaning method and equipment, as well as appropriate brush type and size if used. The evaporator utilizes highly enhanced tubes which can be damaged by some cleaning methods, resulting in a loss of system performance.

In particular, evaporators in units larger than 300 nominal tons may be equipped with a highly enhanced "micro" structure that will not behave like a typical helical structure when cleaned mechanically. This may require specialized equipment or methods to force tube cleaning heads through the tubes. In these instances, determination of brush/head type and size is critical, as using an oversized brush/head may damage the tube enhancement, while using a brush/head that is too small could result in incomplete cleaning.

Free-Cooling Coil

Free-Cooling Coil Cleaning

Regular coil maintenance enhances the unit's operating efficiency by optimizing free-cooling heat transfer and amperage draw. The free cooling coil should be cleaned at minimum once each year, or more if the unit is located in a dirty or corrosive environment.

Free-cooling coil cleaning process is the same as condenser coil cleaning.

Free-Cooling Fluid Management

NOTICE

Equipment Damage!

Failure to follow instructions below could result in equipment damage.

DO NOT USE UNTREATED WATER. Glycol solution must be utilized with the Direct Free Cooling option. Glycol percentage should be based on freeze avoidance requirements. The glycol solution requires an inhibitor package to be carefully chosen with the aid of qualified water treatment specialist to abate corrosion in a mixed metal system.

The building glycol loop should not be vented to atmosphere. A closed system is required to limit oxidation potential within the loop.

Make-up water should be avoided.

NOTICE

Coil Damage!

Failure to follow instructions below could result in free-cooling coil freeze.

For units with free-cooling option, introduction of uninhibited water into the system is not recommended, as it could lead to internal corrosion and risk of coil freeze. To avoid free-cooling coil damage:

- **If the building loop needs to be charged with water for testing purposes, isolate free-cooling coils by closing free-cooling service shut-off valve and modulating valve.**
- **Completely drain any water inadvertently introduced into the system, and replace with glycol fluid as required for the free-cooling system.**
- **If water was introduced for hydronic testing, and was not immediately replaced with glycol solution, a glycol (freeze inhibitor) solution must be introduced to the free-cooling system/coils for any long term storage.**

The direct free cooling option circuit consists of copper, carbon steel, cast iron, zinc, EPDM rubber, brass, and Aluminum AA3102, AA3003, AA4045 in addition to other materials that may be in the building loop connected to the chiller. The inhibited glycol solution should be selected at desired concentration to insure adequate inhibitor content. It is not advised to dilute a stronger concentrate due to inhibitor dilution. Glycol fluid should be free from foreign solid particles. A maintenance schedule should be selected per the glycol manufacturer's requirements to insure adequate protection during product usage.

Reinstallation of Compressor Mounting Bolts

Units with InvisiSound™ Ultimate Only (Model Number Digit 13 = E)

If compressor removal or unit move is required on a unit with InvisiSound™ Ultimate option, reinstall compressor mounting bolts which were removed per installation or maintenance instructions.

Servicing Chiller Roof

⚠ WARNING

Do Not Climb on Top of Unit!

Failure to follow these instructions could result in technician falling off the equipment which could result in death or serious injury.

Do not climb on roof to service unit. Use service tools designed to access top of chiller.

Service tools are available to access top of chiller. Entry on chiller roof is not required.

TRANE

Diagnostics

General Diagnostics Information

Diagnostic Name and Source: Name of Diagnostic and its source. The variable “x” in the AFD diagnostic name string denotes a circuit designator (either 1 or 2). With that exception, 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.

Design Note: Functions that are affected by a diagnostic are simply reported as "chiller or circuit x" targets in Tracer TU and on the Alarms page of the AdaptiView™ display, even though only a specific function and not the entire circuit or chiller would be effected.

Severity: Defines the severity of the above effect. Immediate means immediate shutdown of the affected portion, Normal means normal or friendly shutdown of the affected portion, Special Action means a special action or mode of operation (limp along) is invoked, but without shutdown, and Info means an Informational Note or Warning is generated. Design Note: Tracer TU does not support display of "Special Action", on its Diagnostics pages, so that if a diagnostic has a special action defined in the table below, it will be displayed only as "Informational Warning" as long as no circuit or chiller shutdown results. If there is a shutdown and special action defined in the table, then the Tracer® TU Diagnostics Page display will indicate the shutdown type only.

Persistence: Defines whether or not the diagnostic and its effects are to be manually reset (Latched), or can be either manually or automatically reset when and if the condition returns to normal (Nonlatched).

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.

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.

150 to 300 Ton Units

AFD Diagnostics

Table 36. Diagnostics — AFD (150 to 300 ton units)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD 1A Motor Current Overload	Circuit	Immediate (decel)	Latch	Running	Compressor Motor Overload “Time to Trip” vs Current curve exceeded	Local
AFD 2A Motor Current Overload	Circuit	Immediate (decel)	Latch	Running	Compressor Motor Overload “Time to Trip” vs Current curve exceeded	Local
AFD 1A Instantaneous Current Overload	Circuit	Immediate	Latch	Running	The instantaneous current of any of the output phases exceeded the drive capacity	Local
AFD 2A Instantaneous Current Overload	Circuit	Immediate	Latch	Running	The instantaneous current of any of the output phases exceeded the drive capacity	Local
AFD 1A Output Phase Loss	Circuit	Immediate (decel)	Latch	Running	Drive sensed that an output phase is missing. Output phase loss is defined as greater than 15% output current imbalance for more than 5.0 seconds	Local

Table 36. Diagnostics — AFD (150 to 300 ton units) (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD 2A Output Phase Loss	Circuit	Immediate (decel)	Latch	Running	Drive sensed that an output phase is missing. Output phase loss is defined as greater than 15% output current imbalance for more than 5.0 seconds	Local
AFD 1A Ground Fault	Circuit	Immediate (decel)	Latch	Running	Measured ground current exceeds ground current sensitivity	Local
AFD 2A Ground Fault	Circuit	Immediate (decel)	Latch	Running	Measured ground current exceeds ground current sensitivity	Local
AFD 1A Comm Loss: Main Processor	Circuit	Immediate (decel)	Latch	All	The AFD detected a continual loss of communication with the main processor for greater than the Communications Loss Time (bound setpoint)	Local
AFD 2A Comm Loss: Main Processor	Circuit	Immediate (decel)	Latch	All	The AFD detected a continual loss of communication with the main processor for greater than the Communications Loss Time (bound setpoint)	Local
AFD 1A Bus Over Voltage	Circuit	Immediate	NonLatch	Holding, Running	Bus overvoltage indicated the high bus voltage cut out has been exceeded while the AFD is in a non-stopped mode. The diagnostic will auto-reset when the bus voltage returns to its normal range for 1 minute	Local
AFD 2A Bus Over Voltage	Circuit	Immediate	NonLatch	Holding, Running	Bus overvoltage indicated the high bus voltage cut out has been exceeded while the AFD is in a non-stopped mode. The diagnostic will auto-reset when the bus voltage returns to its normal range for 1 minute	Local
AFD 1A Bus Under Voltage	Circuit	Immediate (decel)	NonLatch	Holding, Running	The bus voltage dropped below the Low Bus Cutout threshold and there is not enough voltage to reliably operate the load. The diagnostic will auto-reset when the bus voltage returns to its normal range for 1 minute	Local
AFD 2A Bus Under Voltage	Circuit	Immediate (decel)	NonLatch	Holding, Running	The bus voltage dropped below the Low Bus Cutout threshold and there is not enough voltage to reliably operate the load. The diagnostic will auto-reset when the bus voltage returns to its normal range for 1 minute	Local
AFD 1A General Failure	Circuit	Immediate (decel)	Latch	All	Drive fault other than those supported in this list	Local
AFD 2A General Failure	Circuit	Immediate (decel)	Latch	All	Drive fault other than those supported in this list	Local
AFD 1A DSP Board Over Temp	Circuit	Immediate (decel)	NonLatch	All	DSP board thermal switch indicates a temperature above 85°C	Local
AFD 2A DSP Board Over Temp	Circuit	Immediate (decel)	NonLatch	All	DSP board thermal switch indicates a temperature above 85°C	Local
AFD 1A DSP Board Initialization Failure	Circuit	Immediate (decel)	Latch	Power Up	This results from address bus checking, data bus checking, line sync test, RAM test, each performed during the initialization	Local
AFD 2A DSP Board Initialization Failure	Circuit	Immediate (decel)	Latch	Power Up	This results from address bus checking, data bus checking, line sync test, RAM test, each performed during the initialization	Local

Table 36. Diagnostics — AFD (150 to 300 ton units) (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD 1A DSP Board ID Error	Circuit	Immediate (decel)	Latch	Power Up	Occurs when frame size identification does not match the drive software. May occur upon DSP board replacement. Requires rebinding	Local
AFD 2A DSP Board ID Error	Circuit	Immediate (decel)	Latch	Power Up	Occurs when frame size identification does not match the drive software. May occur upon DSP board replacement. Requires rebinding	Local
AFD 1A Non-Volatile Memory Failure	Circuit	Immediate (decel)	Latch	Power Up	NV Memory does not pass CRC checks during initialization. This fault will normally occur when firmware is upgraded, and can be ignored and reset in that circumstance	Local
AFD 2A Non-Volatile Memory Failure	Circuit	Immediate (decel)	Latch	Power Up	NV Memory does not pass CRC checks during initialization. This fault will normally occur when firmware is upgraded, and can be ignored and reset in that circumstance	Local
AFD 1A A/D Calibration Error	Circuit	Immediate (decel)	Latch	Starting	Before each start, the A/D converters are calibrated against a known zero-voltage measurement. If the measurement reads more than 3% of full scale, the AFD asserts this A/D Calibration Error diagnostic	Local
AFD 2A A/D Calibration Error	Circuit	Immediate (decel)	Latch	Starting	Before each start, the A/D converters are calibrated against a known zero-voltage measurement. If the measurement reads more than 3% of full scale, the AFD asserts this A/D Calibration Error diagnostic	Local
AFD 1A Watchdog Timer Overflow	Circuit	Immediate	Latch	All	Watchdog timer overflowed. Requires power cycle to restore operation	Local
AFD 2A Watchdog Timer Overflow	Circuit	Immediate	Latch	All	Watchdog timer overflowed. Requires power cycle to restore operation	Local
AFD 1A Over Speed	Circuit	Immediate	Latch	All	The compressor motor's speed either exceeded Absolute Maximum Speed, or the drive has lost control.	Local
AFD 2A Over Speed	Circuit	Immediate	Latch	All	The compressor motor's speed either exceeded Absolute Maximum Speed, or the drive has lost control	Local
AFD 1A Low Rotor Flux Feedback	Circuit	Immediate (decel)	Latch	Running	The estimated rotor flux dropped below the minimum threshold.	Local
AFD 2A Low Rotor Flux Feedback	Circuit	Immediate (decel)	Latch	Running	The estimated rotor flux dropped below the minimum threshold.	Local
AFD 1A Bump Failure	Circuit	Immediate	Latch	Bump Mode	During the compressor bump operation, the motor current exceeded Bump Cutout Current	Local
AFD 2A Bump Failure	Circuit	Immediate	Latch	Bump Mode	During the compressor bump operation, the motor current exceeded Bump Cutout Current	Local
AFD 1A Compressor Start Failure	Circuit	Immediate	Latch	Starting	The compressor motor failed to start. This is most likely due to load torque (possibly transients) exceeding the torque capability	Local
AFD 2A Compressor Start Failure	Circuit	Immediate	Latch	Starting	The compressor motor failed to start. This is most likely due to load torque (possibly transients) exceeding the torque capability	Local
AFD 1A IGBT Self Test Failure	Circuit	Immediate	Latch	Starting	Self testing indicates one or more IGBT's is not working	Local

Table 36. Diagnostics — AFD (150 to 300 ton units) (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD 2A IGBT Self Test Failure	Circuit	Immediate	Latch	Starting	Self testing indicates one or more IGBT's is not working	Local
AFD 1A Gate Kill Active	Circuit	Immediate	Latch	All	The respective drive's gate-kill circuitry was activated (open circuit). For RTAE, the respective compressor's High Pressure Cutout Switch is wired into this circuit, and will cause an immediate shutdown of the drive and compressor in the event of an HPC trip. A 2nd separate HPC diagnostic will occur in conjunction with this diagnostic – see details of the Main Processor Diagnostic "High Pressure Cutout" below	Local
AFD 2A Gate Kill Active	Circuit	Immediate	Latch	All	The respective drive's gate-kill circuitry was activated (open circuit). For RTAE, the respective compressor's High Pressure Cutout Switch is wired into this circuit, and will cause an immediate shutdown of the drive and compressor in the event of an HPC trip. A 2nd separate HPC diagnostic will occur in conjunction with this diagnostic – see details of the Main Processor Diagnostic "High Pressure Cutout" below	Local
AFD 1A Inverter Heatsink Over Temp	Circuit	Immediate (decel)	NonLatch	All	The IGBT heatsink temperature exceeded the cut out temperature	Local
AFD 2A Inverter Heatsink Over Temp	Circuit	Immediate (decel)	NonLatch	All	The IGBT heatsink temperature exceeded the cut out temperature	Local
AFD 1A Rectifier Heatsink Over Temp	Circuit	Immediate (decel)	NonLatch	All	The diode heatsink temperature exceeded the cut out temperature	Local
AFD 2A Rectifier Heatsink Over Temp	Circuit	Immediate (decel)	NonLatch	All	The diode heatsink temperature exceeded the cut out temperature	Local
AFD 1A Gate Drive Board Over Temp	Circuit	Immediate (decel)	NonLatch	All	Thermal switch on gate-drive board indicates its temperature exceeds 99°C	Local
AFD 2A Gate Drive Board Over Temp	Circuit	Immediate (decel)	NonLatch	All	Thermal switch on gate-drive board indicates its temperature exceeds 99°C	Local
AFD 1A Bus Voltage Ripple Too High	Circuit	Immediate	Latch	Running	The DC power bus voltage's ripple exceeds the drive's capability to operate reliably	Local
AFD 2A Bus Voltage Ripple Too High	Circuit	Immediate	Latch	Running	The DC power bus voltage's ripple exceeds the drive's capability to operate reliably	Local
AFD 1A DSP Board Low Voltage Failure	Circuit	Immediate	NonLatch	All	One of the AFD internal power supplies' voltage has dropped below a reliable operation threshold	Local
AFD 2A DSP Board Low Voltage Failure	Circuit	Immediate	NonLatch	All	One of the AFD internal power supplies' voltage has dropped below a reliable operation threshold	Local
AFD 1A Current Sensor Self Test Failure	Circuit	Immediate	Latch	Starting	Self testing indicates a current sensor is not working. Either it output is out of range or it significantly deviates from the expected current trajectory on self-test	Local

Table 36. Diagnostics — AFD (150 to 300 ton units) (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD 2A Current Sensor Self Test Failure	Circuit	Immediate	Latch	Starting	Self testing indicates a current sensor is not working. Either it output is out of range or it significantly deviates from the expected current trajectory on self-test	Local
AFD 1A Gate Drive Fault	Circuit	Immediate	NonLatch	Running	Gate-drive board faults - One of the gate drive module power supplies is out of range	Local
AFD 2A Gate Drive Fault	Circuit	Immediate	NonLatch	Running	Gate-drive board faults - One of the gate drive module power supplies is out of range	Local
AFD 1A Load Inductor High Temperature	Circuit	Immediate (decel)	NonLatch	All	Circuitry for respective AFD "Panel Interlock Fault" was activated. For RTAE units, the panel interlock fault input circuitry is used to sense the state of the high limit thermostat of its associated load inductors. A tripped (open) state of the circuit, suggest a high temperature of the load inductors – Check the glycol cooling loop and the control panel ventilation	Local
AFD 2A Load Inductor High Temperature	Circuit	Immediate (decel)	NonLatch	All	Circuitry for respective AFD "Panel Interlock Fault" was activated. For RTAE units, the panel interlock fault input circuitry is used to sense the state of the high limit thermostat of its associated load inductors. A tripped (open) state of the circuit, suggest a high temperature of the load inductors – Check the glycol cooling loop and the control panel ventilation	Local
AFD 1A Voltage Transient Protection Loss	Circuit	Info	NonLatch	All	Circuitry for respective AFD "Panel Interlock Warning" was activated. For RTAE the panel interlock warning input circuitry of AFD1A, is used to monitor the state of the entire unit's Surge Arresters, which is an array of 4 Metal Oxide Varistors intended to protect the entire unit. An open state of the circuit suggests at least one of the MOV's of has opened and the transient suppression protection is thereby compromised. Although the unit is not shutdown from this warning diagnostic, it is highly recommended to replace the protection MOVs as soon as practical, in order to protect from further damage to the drives as a result of incoming line transients. Even though the diagnostic has an AFD 1A prefix, it applies to the entire unit	Local
AFD 2A Voltage Transient Protection Loss	Circuit	Info	NonLatch	All	Circuitry for respective AFD "Panel Interlock Warning" was activated. For RTAE the panel interlock warning input circuitry of AFD2A is unused. and factory wiring has this input shorted. If the input becomes opened, this diagnostic will occur	Local
AFD 1A Gate Drive Module Comm Loss	Circuit	Immediate (decel)	Latch	All	Loss of communication between DSP module and Gate Drive Module	Local
AFD 2A Gate Drive Module Comm Loss	Circuit	Immediate (decel)	Latch	All	Loss of communication between DSP module and Gate Drive Module	Local

Table 36. Diagnostics — AFD (150 to 300 ton units) (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD 1A 12-Pulse or Auto Transf High Temp	Circuit	Immediate	Latch	All	The emergency stop input of the respective AFD was activated (open circuit has been detected). For RTAE units with the Input Harmonic Distortion Option installed, (TDD<5%), the respective drive's Emergency Stop Fault input circuitry is used to monitor and trip on the series connected high limit thermostats of its associated 12-Pulse Autotransformer. For 200, 230 & 575 V units, the same input is used to monitor and trip on the series connected high limit thermostats of the Step-up/ Step-down Voltage Autotransformer. Both circuit diagnostics will occur in the event of a high temperature trip of the Voltage Autotransformer. A tripped (open) state of the circuit, suggests an excessively high temperature of the respective transformer– Check the glycol cooling loop, the control panel ventilation or the Voltage Autotransformer panel ventilation fan as applicable	Local
AFD 2A 12-Pulse or Auto Transf High Temp	Circuit	Immediate	Latch	All	The emergency stop input of the respective AFD was activated (open circuit has been detected). For RTAE units with the Input Harmonic Distortion Option installed, (TDD<5%), the respective drive's Emergency Stop Fault input circuitry is used to monitor and trip on the series connected high limit thermostats of its associated 12-Pulse Autotransformer. For 200, 230 & 575 V units, the same input is used to monitor and trip on the series connected high limit thermostats of the Step-up/ Step-down Voltage Autotransformer. Both circuit diagnostics will occur in the event of a high temperature trip of the Voltage Autotransformer. A tripped (open) state of the circuit, suggests an excessively high temperature of the respective transformer– Check the glycol cooling loop, the control panel ventilation or the Voltage Autotransformer panel ventilation fan as applicable	Local
AFD 1A Desaturation Detected	Circuit	Immediate	Latch	All	Output Short circuit sufficient to drive IGBT transistor gate into desaturation has been detected	Local
AFD 2A Desaturation Detected	Circuit	Immediate	Latch	All	Output Short circuit sufficient to drive IGBT transistor gate into desaturation has been detected	Local
AFD 1A Estimated Junction Over Temp	Circuit	Immediate (decel)	Latch	Running	The AFD has exceeded the allowed IGBT junction temperature. Suspect a problem with the Drive cooling system or if occurring during start acceleration, a damaged and/or locked rotor compressor	Local
AFD 2A Estimated Junction Over Temp	Circuit	Immediate (decel)	Latch	Running	The AFD has exceeded the allowed IGBT junction temperature. Suspect a problem with the Drive cooling system or if occurring during start acceleration, a damaged and/or locked rotor compressor	Local
AFD 1A IMC 24V Low Voltage	Circuit	Immediate (decel)	NonLatch	All	Loss of 24V on the IMC/IPC machine bus has been detected by the AFD	Local
AFD 2A IMC 24V Low Voltage	Circuit	Immediate (decel)	NonLatch	All	Loss of 24V on the IMC/IPC machine bus has been detected by the AFD	Local
AFD 1A AHD Frequency Out of Range	Circuit	Info	NonLatch	Running	The input frequency for the Active Harmonic Damping function of the respective AFD is outside the range 47 Hz < Fin < 63 Hz for more than one minute. This diagnostic is automatically reset when the input frequency returns to the range 47 Hz < Fin < 63 Hz	Local

Table 36. Diagnostics — AFD (150 to 300 ton units) (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD 2A AHD Frequency Out of Range	Circuit	Info	NonLatch	Running	The input frequency for the Active Harmonic Damping function of the respective AFD is outside the range 47 Hz < Fin < 63 Hz for more than one minute. This diagnostic is automatically reset when the input frequency returns to the range 47 Hz < Fin < 63 Hz.	Local
AFD 1A Loss of AHD Sync Signal	Circuit	Info	NonLatch	Running	The Active Harmonic Damping function of the respective AFD has received no valid input line sync signals for 1 minute	Local
AFD 2A Loss of AHD Sync Signal	Circuit	Info	NonLatch	Running	The Active Harmonic Damping function of the respective AFD has received no valid input line sync signals for 1 minute	Local
AFD 1A AHD Sync Signal Error	Circuit	Info	NonLatch	Running	The Active Harmonic Damping function of the respective AFD is experiencing noise or glitching of the input line sync signal continuously for one minute. This diagnostic is automatically reset when the condition clears	Local
AFD 2A AHD Sync Signal Error	Circuit	Info	NonLatch	Running	The Active Harmonic Damping function of the respective AFD is experiencing noise or glitching of the input line sync signal continuously for one minute. This diagnostic is automatically reset when the condition clears	Local
AFD 1A Excessive AHD Inhibit	Circuit	Info	Latch	All	The Active Harmonic Damping function of the respective AFD is experiencing noise or glitching of the input line sync signal and has experienced 3 inhibits in one minute or 10 inhibits in one hour	Local
AFD 2A Excessive AHD Inhibit	Circuit	Info	Latch	All	The Active Harmonic Damping function of the respective AFD is experiencing noise or glitching of the input line sync signal and has experienced 3 inhibits in one minute or 10 inhibits in one hour.	Local
AFD 1A Gate Drive Low Voltage Failure	Circuit	Immediate	NonLatch	All	The 24Vdc gate drive supply to the gate drive module has dropped below a reliable operation threshold	Local
AFD 2A Gate Drive Low Voltage Failure	Circuit	Immediate	NonLatch	All	The 24Vdc gate drive supply to the gate drive module has dropped below a reliable operation threshold	Local
AFD 1A Temperature Sensor Warning	Circuit	Info	NonLatch – timed reset	All	Any of the 3 IGBT modules (one per phase) has an open or out of range temperature sensor	Local
AFD 2A Temperature Sensor Warning	Circuit	Info	NonLatch – timed reset	All	Any of the 3 IGBT modules (one per phase) has an open or out of range temperature sensor	Local

Table 37. Diagnostics — AFD Rockwell PF755 (150 to 300 ton units)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD 1A Input Phase Loss	Circuit	Immediate	Latch	All compressor starting and running modes	The respective AFD has detected high ripple on the DC bus indicative of an input phase loss. Suspect open phase, check input voltage and current capability on all legs.	Local
AFD 2A Input Phase Loss	Circuit	Immediate	Latch	All compressor starting and running modes	The respective AFD has detected high ripple on the DC bus indicative of an input phase loss. Suspect open phase, check input voltage and current capability on all legs.	Local

Table 37. Diagnostics — AFD Rockwell PF755 (150 to 300 ton units) (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD 1A Bus Under Voltage	Circuit	Immediate (decel)	NonLatch	All	The bus voltage dropped below the Under Voltage Level and there is not enough voltage to reliably operate the load, or input voltage was lost on all phases (Power Loss). The drive shall automatically clear this diagnostic if the undervoltage is corrected within 15s, or if a power loss event, when power is restored at any later time	Local
AFD 2A Bus Under Voltage	Circuit	Immediate (decel)	NonLatch	All	The bus voltage dropped below the Under Voltage Level and there is not enough voltage to reliably operate the load, or input voltage was lost on all phases (Power Loss). The drive shall automatically clear this diagnostic if the undervoltage is corrected within 15s, or if a power loss event, when power is restored.	Local
AFD 1A Bus Over Voltage	Circuit	Immediate	NonLatch	Holding, Running	Bus overvoltage indicated the high bus voltage cut out has been exceeded while the AFD is in a non-stopped mode. The drive shall automatically clear this diagnostic if the dc bus voltage returns to normal range within 15s.	Local
AFD 2A Bus Over Voltage	Circuit	Immediate	NonLatch	Holding, Running	Bus overvoltage indicated the high bus voltage cut out has been exceeded while the AFD is in a non-stopped mode. The drive shall automatically clear this diagnostic if the dc bus voltage returns to normal range within 15s.	Local
AFD 1A Loss Of Motor Control	Circuit	Immediate	NonLatch	All	AFD generated faults that can occur due to external power anomalies or abnormal motor loading that require ability to auto reset. This diagnostic maps to the occurrence of AFD generated faults of: Hardware Over Current, Over Speed Limit, IPM Over Current, Drive Powerup, IPM and Speed Estimate Error.	
AFD 2A Loss Of Motor Control	Circuit	Immediate	NonLatch	All	AFD generated faults that can occur due to external power anomalies or abnormal motor loading that could be a transient or temporary condition. This diagnostic maps to the occurrence of AFD generated faults of: Hardware Over Current, Over Speed Limit, IPM Over Current, Drive Powerup, IPM and Speed Estimate Error.	
AFD 1A Motor Fault	Circuit	Immediate	Latch	All	AFD generated faults that imply internal failures. This diagnostic maps to the occurrence of AFD generated faults of: Motor Overload, Load Loss, and Output Phase Loss. Check output wiring and motor health.	Local
AFD 2A Motor Fault	Circuit	Immediate	Latch	All	AFD generated faults that imply internal failures. This diagnostic maps to the occurrence of AFD generated faults of: Motor Overload, Load Loss, and Output Phase Loss. Check output wiring and motor health.	Local
AFD 1A Over Temperature	Circuit	Immediate	Latch	All	Heatsink Over Temperature (185°F/85°C), Transistor Over Temperature (320°F/160°C) or Control Board Over Temperature. Check drive liquid or air cooling.	Local
AFD 2A Over Temperature	Circuit	Immediate	Latch	All	Heatsink Over Temperature (185°F/85°C), Transistor Over Temperature (320°F/160°C) or Control Board Over Temperature. Check drive liquid or air cooling.	Local
AFD 1A Motor Current Overload	Circuit	Immediate (decel)	Latch	Running	Software Filtered Overcurrent has been detected. Can be loss of control of motor, or hardware failure.	Local
AFD 2A Motor Current Overload	Circuit	Immediate (decel)	Latch	Running	Software Filtered Overcurrent has been detected. Can be loss of control of motor, or hardware failure.	Local

Table 37. Diagnostics — AFD Rockwell PF755 (150 to 300 ton units) (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD 1A Customized Protection Fault	Circuit	Immediate	Latch*	All	One of drive custom protections has occurred (Pump-Out Failed, Low Rotor Flux Feedback, or Bump Failure) OR drive custom protections not enabled or programmed. Contact Trane Service. *This diagnostic is uniquely latched by the AFD, not by the UC800.	Local
AFD 2A Customized Protection Fault	Circuit	Immediate	Latch*	All	One of drive custom protections has occurred (Pump-Out Failed, Low Rotor Flux Feedback, or Bump Failure) OR drive custom protections not enabled or programmed. Contact Trane Service. *This diagnostic is uniquely latched by the AFD, not by the UC800.	Local
AFD 1A Ground Fault	Circuit	Immediate	Latch	All	Measured ground current exceeds ground current sensitivity. Read the specific drive fault value over Tracer TU and refer to drive programming manual to determine which output leg and transistors are indicated.	Local
AFD 2A Ground Fault	Circuit	Immediate	Latch	All	Measured ground current exceeds ground current sensitivity. Read drive fault value over Tracer TU and refer to drive programming manual to determine which output leg and transistors are indicated.	Local
AFD 1A Motor Shorted	Circuit	Immediate	Latch	All	Motor or power stage is shorted line-to-line. Read drive fault value over Tracer TU and refer to drive programming manual to determine which phases are indicated.	Local
AFD 2A Motor Shorted	Circuit	Immediate	Latch	All	Motor or power stage is shorted line-to-line. Read drive fault value over Tracer TU and refer to drive programming manual to determine which phases are indicated	Local
AFD 1A Comm Loss: Main Processor	Circuit	Immediate (decel)	Latch	All	The AFD detected a continual loss of communication with the main processor for greater than 10s.	Local
AFD 2A Comm Loss: Main Processor	Circuit	Immediate (decel)	Latch	All	The AFD detected a continual loss of communication with the main processor for greater than 10s.	Local
AFD 1A Precharge Fault	Circuit	Immediate	Latch	All	The drives internal precharge was commanded to open while the drive was running. This can occur if the DC bus drops to a low level.	Local
AFD 2A Precharge Fault	Circuit	Immediate	Latch	All	The drives internal precharge was commanded to open while the drive was running. This can occur if the DC bus drops to a low level.	Local
AFD 1A General Failure	Circuit	Immediate (decel)	Latch	All	Drive fault other than those supported in this list. Read drive fault value over Tracer TU and refer to drive programming manual.	Local
AFD 2A General Failure	Circuit	Immediate (decel)	Latch	All	Drive fault other than those supported in this list. Read drive fault value over Tracer TU and refer to drive programming manual.	Local
AFD 1A Gate Kill Active	Circuit	Immediate	NonLatch	All	The respective drive's gate-kill circuitry was activated (open circuit). The respective compressor's High Pressure Cutout Switch is wired into this circuit, and will cause an immediate shutdown of the drive and compressor in the event of an HPC trip. A 2nd separate HPC diagnostic will occur in conjunction with this diagnostic – see details of the Main Processor Diagnostic "High Pressure Cutout" below (that is latching).	Local

Table 37. Diagnostics — AFD Rockwell PF755 (150 to 300 ton units) (continued)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD 2A Gate Kill Active	Circuit	Immediate	NonLatch	All	The respective drive's gate-kill circuitry was activated (open circuit). The respective compressor's High Pressure Cutout Switch is wired into this circuit, and will cause an immediate shutdown of the drive and compressor in the event of an HPC trip. A 2nd separate HPC diagnostic will occur in conjunction with this diagnostic – see details of the Main Processor Diagnostic "High Pressure Cutout" below (that is latching).	Local
AFD 1A Input Transformer or Filter High Temp	Circuit	Immediate Shutdown	Latch	All	The AFD is tripped by Input Transformer or Filter High Temperature Cutout.	Local
AFD 2A Input Transformer or Filter High Temp	Circuit	Immediate Shutdown	Latch	All	The AFD is tripped by Input Transformer or Filter High Temperature Cutout.	Local
AFD 1A Low Rotor Flux Feedback	Circuit	Immediate (decel)	Latch*	Running	The estimated rotor flux dropped below the minimum threshold. Suspect motor demagnetization. *This diagnostic is uniquely latched by the AFD, not by the UC800.	Local
AFD 2A Low Rotor Flux Feedback	Circuit	Immediate (decel)	Latch*	Running	The estimated rotor flux dropped below the minimum threshold. Suspect motor demagnetization. *This diagnostic is uniquely latched by the AFD, not by the UC800.	Local

Main Processor Diagnostics

Table 38. Diagnostics — main processor (150 to 300 ton units)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
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 TU or DynaView's "set chiller time" functions	Remote
Condenser Fan Inverter Fault - Ckt1	Circuit	Info	NonLatch	All	A fault signal has been detected from at least one of the Variable Speed Inverter Drive Condenser Fans of Circuit 1 (including the right hand fan of the Shared Fan Module if present). No action is taken	Remote
Condenser Fan Inverter Fault - Ckt2	Circuit	Info	NonLatch	All	A fault signal has been detected from at least one of the Variable Speed Inverter Drive Condenser Fans of Circuit 2 (including the left hand fan of the Shared Fan Module if present). No action is taken	Remote
Condenser Rfgt Pressure Transducer - Ckt1	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Condenser Rfgt Pressure Transducer - Ckt2	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Discharge Rfgt Temp Sensor – Cprsr1A	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote

Table 38. Diagnostics — main processor (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Discharge Rfgt Temp Sensor – Cprsr2A	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Drive Cooling Supply Temperature Sensor	Circuit	Normal	Latch	All	Bad Sensor or LLID.	Remote
Drive Cooling Supply Temperature Sensor – Ckt1	Circuit	Normal	Latch	All	Bad Sensor or LLID.	Remote
Emergency Stop	Chiller	Immediate	Latch	All	EMERGENCY STOP input is open. An external interlock has tripped. Time to trip from input opening to unit stop shall be 0.1 to 1.0 seconds	Local
Evap Rfgt Pool Temp Sensor – Ckt1	Circuit and Chiller	Special Action and Info	NonLatch	All	Bad Sensor or LLID. Note: The Evap Pool Temp Sensors are used for evaporator freeze protection (running and non-running)	Remote
Evap Rfgt Pool Temp Sensor – Ckt2	Circuit and Chiller	Special Action and Info	NonLatch	All	Bad Sensor or LLID. Note: The Evap Pool Temp Sensors are used for evaporator freeze protection (running and non-running)	Remote
Evap Spillover Liquid Level Sensor – Ckt1	Circuit	Normal	Latch	All	Bad Sensor or LLID detected for a minimum of 10 seconds continuously	Remote
Evap Spillover Liquid Level Sensor – Ckt2	Circuit	Normal	Latch	All	Bad Sensor or LLID detected for a minimum of 10 seconds continuously	Remote
Evap Water Flow (Entering Water Temp)	Chiller	Info	NonLatch	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 30 seconds. It can warn of improper flow direction through the evaporator, misbound water temperature sensors, improper sensor installation, partially failed sensors, or other system problems. Note that either entering or leaving water temp sensor or the water system could be at fault	Remote
Evaporator Approach Error – Ckt1	Circuit	Immediate	Latch	Respective circuit running	The Evaporator approach temperature for the respective circuit (ELWT – Evap Sat Temp Ckt 1) is negative by more than 10°F for 1 minute continuously while the circuit / compressor is operating. Either the Evap Leaving Water Temp sensor, or Evap Suction Rfgt Pressure Transducer Ckt 1 is in error	Remote
Evaporator Approach Error – Ckt2	Circuit	Immediate	Latch	Respective circuit running	The Evaporator approach temperature for the respective circuit (ELWT – Evap Sat Temp Ckt 2) is negative by more than 10°F for 1 minute continuously while the circuit / compressor is operating. Either the Evap Leaving Water Temp sensor, or Evap Suction Rfgt Pressure Transducer Ckt 2 is in error	Remote
Evaporator Entering Water Temp Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID. Note: Entering Water Temp Sensor is used in EXV pressure control as well as ice making so it must cause a unit shutdown even if ice or CHW reset is not installed	Remote
Evaporator Leaving Water Temp Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID	Remote

Table 38. Diagnostics — main processor (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Evaporator Refrigerant Pool Temperature Sensor Error – Ckt1	Circuit	Info and Special Action	Latch	Ckt Energized [Ckt Not Energized	The evaporator refrigerant pool temperature sensor is indicating a temperature significantly warmer than the evaporator entering water temperature (by more than 7.2°F for 5 continuous min excluding ckt nonoperation and a 2 min ignore time relative to ckt startup). While this diagnostic is active, it will invalidate the evaporator pool temperature sensor but continue to display the temperature. Freeze protection functions (i.e. freeze diagnostics and Evap Pump Override) will default to the respective evaporator pressure transducer and its calculated saturation temperature.	Local
Evaporator Refrigerant Pool Temperature Sensor Error – Ckt2	Circuit	Info and Special Action	Latch	Ckt Energized [Ckt Not Energized	The evaporator refrigerant pool temperature sensor is indicating a temperature significantly warmer than the evaporator entering water temperature (by more than 7.2°F for 5 continuous min excluding ckt nonoperation and a 2 min ignore time relative to ckt startup). While this diagnostic is active, it will invalidate the evaporator pool temperature sensor but continue to display the temperature. Freeze protection functions (i.e. freeze diagnostics and Evap Pump Override) will default to the respective evaporator pressure transducer and its calculated saturation temperature.	Local
Evaporator Water Flow Lost	Chiller	Immediate	NonLatch	[All Stop modes]	a. The Evaporator water flow switch input was open for more than 6 contiguous seconds (or 15 seconds for thermal dispersion type flow switch). b. This diagnostic does not de-energize the evap pump output. c. 6 seconds of contiguous flow shall clear this diagnostic	Remote
Evaporator Water Flow Overdue	Chiller	Normal	NonLatch	Estab. Evap. Water Flow on going from STOP to AUTO or Evap Pump Override.	Evaporator water flow was not proven within 20 minutes of the Evaporator water pump relay being energized in normal "Stop" to "Auto" transition. If the pump is overridden to "On" for certain diagnostics, the delay on diagnostic callout shall be only 255 seconds. The pump command status will not be affected by this diagnostic in either case	Remote
Excessive Condenser Pressure – Ckt1	Circuit	Immediate	Latch	All	The condenser pressure transducer of this circuit has detected a condensing pressure in excess of the design high side pressure as limited by the particular compressor type	Remote
Excessive Condenser Pressure – Ckt2	Circuit	Immediate	Latch	All	The condenser pressure transducer of this circuit has detected a condensing pressure in excess of the design high side pressure as limited by the particular compressor type	Remote
External Chilled/Hot Water Setpoint	Chiller	Info	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)	Remote
External Demand Limit Setpoint	Chiller	Info	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	Remote
Failure to Arm or Hold - AFD 1A	Circuit	Info	Nonlatch	All	AFD 1A (controlling Compressor 1A) failed to respond in an appropriate time with its status of Armed to Hold or Hold within the allotted time of 1 minute of the sent command. (Arm to Hold command sent; armed to Hold status received; Hold command sent; Hold status received)	Local

Table 38. Diagnostics — main processor (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Failure to Arm or Hold - AFD 2A	Circuit	Info	Nonlatch	All	AFD 2A (controlling Compressor 2A) failed to respond in an appropriate time with its status of Armed to Hold or Hold within the allotted time of 1 minute of the sent command. (Arm to Hold command sent; armed to Hold status received; Hold command sent; Hold status received)	Local
Failure to Arm or Start - AFD 1A	Circuit	Immediate	Latch	All	AFD 1A (controlling Compressor 1A) failed to arm or start within the allotted time of 1 minute. (Arm to Start command sent; armed to Start status received; Start command sent; Started status received)	Local
Failure to Arm or Start - AFD 2A	Circuit	Immediate	Latch	All	AFD 2A (controlling Compressor 2A) failed to arm or start within the allotted time of 1 minute. (Arm to Start command sent; armed to Start status received; Start command sent; Started status received)	Local
Free Cooling Entering Water Temperature	Free Cooling	Normal	Latch	All	Bad Sensor or LLID	Remote
High Differential Rfgt Pressure - Ckt1	Circuit	Normal	Latch	Cprsr Energized [Service/Op Pumpdown]	The differential pressure for the respective circuit was above 275 Psid (1890 kPa) for 2 consecutive samples 5 seconds apart	Remote
High Differential Rfgt Pressure - Ckt2	Circuit	Normal	Latch	Cprsr Energized [Service/Op Pumpdown]	The differential pressure for the respective circuit was above 275 Psid (1890 kPa) for 2 consecutive samples 5 seconds apart	Remote
High Discharge Temperature – Cprsr1A	Circuit	Immediate	Latch	All [compressor run unload or compressor not running]	The compressor discharge temperature exceeded 200°F (without oil cooler) or 230ºF (with oil cooler). This diagnostic will be suppressed during Stopping mode or after the compressor has stopped. Note: As part of the Compressor High Temperature Limit Mode (aka Minimum Capacity Limit), the compressor shall be forced loaded as the filtered discharge temperature reaches 190ºF (without oil coolers), or 220ºF (with oil coolers)	Remote
High Discharge Temperature – Cprsr2A	Circuit	Immediate	Latch	All [compressor run unload or compressor not running]	The compressor discharge temperature exceeded 200°F (without oil cooler) or 230ºF (with oil cooler). This diagnostic will be suppressed during Stopping Mode or after the compressor has stopped. Note: As part of the Compressor High Temperature Limit Mode (aka Minimum Capacity Limit), the compressor shall be forced loaded as the filtered discharge temperature reaches 190ºF (without oil coolers), or 220ºF (with oil coolers)	Remote
High Evaporator Refrigerant Pressure	Chiller	Immediate	NonLatch	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. 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

Table 38. Diagnostics — main processor (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
High Evaporator Water Temperature	Chiller	Info and Special Action	NonLatch	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.	Either the leaving or the entering 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 one of the diagnostics listed on the left . The diagnostic will auto reset and the pump will return to normal control when both the entering and leaving temperatures fall 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 Motor Winding Temperature - Cprsr1A	Circuit	Immediate	Latch	All	Any of the compressor's motor winding temperature sensors is seen to be beyond the windings rated temperature of 265°F (129.4°C)	Local
High Motor Winding Temperature - Cprsr2A	Circuit	Immediate	Latch	All	Any of the respective compressor's motor winding temperature sensors is seen to be beyond the windings rated temperature of 265°F (129.4°C)	Local
High Pressure Cutout - Cprsr1A	Circuit	Immediate	Latch	All	A high pressure cutout was detected by AFD 1A Gate Kill Input ; trip at 315 ± 5 PSIG	Local
High Pressure Cutout - Cprsr2A	Circuit	Immediate	Latch	All	A high pressure cutout was detected by AFD 2A Gate Kill Input ; trip at 315 ± 5 PSIG	Local
High Refrigerant Pressure Ratio – Ckt1	Circuit	Immediate	Latch	Cprsr Energized	The pressure ratio for the respective circuit exceeded 12.3 for 1 contiguous minute while running in any mode. The pressure ratio is defined as Pcond (abs)/ Pevap(abs)	Remote
High Refrigerant Pressure Ratio – Ckt2	Circuit	Immediate	Latch	Cprsr Energized	The pressure ratio for the respective circuit exceeded 12.3 for 1 contiguous minute while running in any mode. The pressure ratio is defined as Pcond (abs)/ Pevap(abs)	Remote
Interrupt Failure – AFD1A	Circuit	Immediate Shutdown and Special Action	Latch	AFD intended to be OFF	Respective AFD is reporting that it is still running the compressor(indicated by AFD running status) when the MP has commanded the drive/compressor to be Off. Detection time shall be 10 seconds minimum and 15 seconds maximum. With build rev 2.13 and later: 22 sec min, 27sec max. On detection and until the controller is manually reset: this diagnostic shall be active and the alarm relay shall be energized, the Evap Pump Output will be energized, the effected compressor will be continually commanded off, and be unloaded., For as long as compressor operation continues, the MP shall continue liquid level, oil return, and fan control on the circuit effected.	Local

Table 38. Diagnostics — main processor (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Interrupt Failure – AFD2A	Circuit	Immediate Shutdown and Special Action	Latch	AFD intended to be OFF	Respective AFD is reporting that it is still running the compressor(indicated by AFD running status) when the MP has commanded the drive/compressor to be Off. Detection time shall be 10 seconds minimum and 15 seconds maximum. With build rev 2.13 and later: 22 sec min, 27sec max. On detection and until the controller is manually reset: this diagnostic shall be active and the alarm relay shall be energized, the Evap Pump Output will be energized, the effected compressor will be continually commanded off, and be unloaded. For as long as compressor operation continues, the MP shall continue liquid level, oil return, and fan control on the circuit effected.	Local
Loss of Oil (Running) - Cprsr1A	Circuit	Immediate	Latch	Starter Contactor Energized	In running modes , Oil Loss Level Sensor detects lack of oil in the oil sump feeding the compressor (distinguishing a liquid flow from a vapor flow)	Local
Loss of Oil (Running) - Cprsr2A	Circuit	Immediate	Latch	Starter Contactor Energized	In running modes , Oil Loss Level Sensor detects lack of oil in the oil sump feeding the compressor (distinguishing a liquid flow from a vapor flow)	Local
Loss of Oil (Stopped) – Cprsr1A	Circuit	Immediate Shutdown and Special Action	Latch	Compressor Pre-start [all other modes]	Oil Loss Level Sensor detects a lack of oil in the oil sump feeding the compressor for 90 seconds after EXV preposition is completed on an attempted circuit start. Note: Compressor start is delayed pending oil detection during that time, but not allowed once the diagnostic occurs	Local
Loss of Oil (Stopped) – Cprsr2A	Circuit	Immediate Shutdown and Special Action	Latch	Compressor Pre-start [all other modes]	Oil Loss Level Sensor detects a lack of oil in the oil sump feeding the compressor for 90 seconds after EXV preposition is completed on an attempted circuit start. Note: Compressor start is delayed pending oil detection during that time, but not allowed once the diagnostic occurs	Local
Low Differential Rfgt Pressure - Ckt1	Circuit	Immediate	Latch	Cprsr Energized	The system differential pressure (P_c-P_e) for the respective circuit was below 15 psid (240.5 kPa) or the pressure ratio (P_c/P_e) was less than 1.1 while the compressor is running for a period of time dependent on the deficit (15 sec ignore time from circuit start) Refer to the Oil Flow Protection specification for the time to trip function.	Remote
Low Differential Rfgt Pressure - Ckt2	Circuit	Immediate	Latch	Cprsr Energized	The system differential pressure (P_c-P_e) for the respective circuit was below 15 psid (240.5 kPa) or the pressure ratio (P_c/P_e) was less than 1.1 while the compressor is running for a period of time dependent on the deficit (15 sec ignore time from circuit start) Refer to the Oil Flow Protection specification for the time to trip function.	Remote
Low Discharge Superheat – Ckt1	Circuit	Normal	Latch	Any Running Mode	While Running Normally, the Discharge Superheat was less than 9 degrees F for more than 4878 degree F seconds. At circuit startup, the Discharge Superheat will be ignored for 5 minutes	Remote
Low Discharge Superheat – Ckt2	Circuit	Normal	Latch	Any Running Mode	While Running Normally, the Discharge Superheat was less than 9 degrees F for more than 4878 degree F seconds. At circuit startup, the Discharge Superheat will be ignored for 5 minutes	Remote

Table 38. Diagnostics — main processor (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Low Drive Cooling Supply Temperature-Ckt1	Circuit	Info	NonLatch	All Ckt Running Modes	The Drive Cooling Supply temperature for the respective circuit is seen to be more than 5F cooler than its setpoint for more than 30 minutes. Auto-reset if temperatures return to Undesirable condensation is possible on the cooled surfaces inside the control panel. Inspect the Drive Cooling System components for misoperation or failure	
Low Drive Cooling Supply Temperature-Ckt2	Circuit	Info	NonLatch	All Ckt Running Modes	The Drive Cooling Supply Temperature for the respective circuit is seen to be more than 5F cooler than its setpoint for more than 30 minutes. Undesirable condensation is possible on the cooled surfaces inside the control panel. Inspect the Drive Cooling System components for misoperation or failure	
Low Evaporator Rfgt Pressure - Ckt1	Circuit	Immediate	Latch	Cprsr Prestart and Cprsr Energized	a. The Evap Refrig Pressure dropped below 10 Psia just prior to compressor start (after EXV preposition). b. During Early Startup Period: the Evap Refrig Pressure fell below a pressure equal to Condenser Pressure ÷ 8 but as limited to not less than 6 or greater than 10 psia. c. After Early Startup Period expires: The Evap Refrig Pressure fell below 16 Psia for 30 seconds or below 10 psia for 5 seconds. (Note: the Early Startup Period is between 1 and 5 min as an inverse function of the Cond Temp measured at time of circuit startup)	Local
Low Evaporator Rfgt Pressure - Ckt2	Circuit	Immediate	Latch	Cprsr Prestart and Cprsr Energized	a. The Evap Refrig Pressure dropped below 10 Psia just prior to compressor start (after EXV preposition). b. During Early Startup Period: the Evap Refrig Pressure fell below a pressure equal to Condenser Pressure ÷ 8 but as limited to not less than 6 or greater than 10 psia. c. After Early Startup Period expires: The Evap Refrig Pressure fell below 16 Psia for 30 seconds or below 10 psia for 5 seconds. (Note: the Early Startup Period is between 1 and 5 min as an inverse function of the Cond Temp measured at time of circuit startup)	Local
Low Evaporator Rfgt Temperature - Ckt1	Circuit	Immediate	Latch	All Ckt Running Modes [Service Pumpdown]	The warmer of either the Evaporator Refrigerant Pool Temperature or the Evaporator Saturated Temperature for the respective circuit, dropped below the Low Refrigerant Temperature Cutout Setpoint for 2250°F-sec (12°F-sec/sec max rate for early circuit startup period) while the circuit was running. The minimum LERTC setpoint is -5°F the point at which oil separates from the refrigerant. The integral is held nonvolatily though power down, is continuously calculated, and can decay or build during the circuit's off cycle as conditions warrant	Remote
Low Evaporator Rfgt Temperature - Ckt2	Circuit	Immediate	Latch	All Ckt Running Modes [Service Pumpdown]	The warmer of either the Evaporator Refrigerant Pool Temperature or the Evaporator Saturated Temperature for the respective circuit, dropped below the Low Refrigerant Temperature Cutout Setpoint for 2250°F-sec (12°F-sec/sec max rate for early circuit startup period) while the circuit was running. The minimum LERTC setpoint is -5°F the point at which oil separates from the refrigerant. The integral is held nonvolatily though power down, is continuously calculated, and can decay or build during the circuit's off cycle as conditions warrant.	Remote

Table 38. Diagnostics — main processor (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Low Evaporator Temp (Unit Off) – Ckt1	Evap Pump	Info and Special Action	NonLatch	Unit in Stop Mode, or in Auto Mode and No Ckt's Energzd [Any Ckt Energzd]	The respective circuit's "Chiller Off Cycle Freeze Protection Integral" was seen to be higher than ½ of its trip value while the chiller is in the Stop mode, or in Auto mode with no compressors running, for one minute and more. The COCFP integral is increased if the Average of the Evap Water Temperature and the Evap Refrigerant Pool Temp is below the value of the Low Evap Rfgt Temp Cutout + 4°F. Energize Evap Water Pump and Off-Cycle Freeze Avoidance Request Relay until diagnostic auto resets, then return to normal evap pump control and de-energize the Freeze Avoidance Request. Automatic reset occurs when the respective Evap Rfgt Pool Temp rises 2°F (1.1°C) above the LERTC cutout setting and the COCFP Integral is less than 1/3 of its trip value. This diagnostic even while active, does not prevent operation of either circuit. (At each circuit shutdown, the COCFP integral is initialized to the LERTC integral)	Remote
Low Evaporator Temp (Unit Off) – Ckt2	Evap Pump	Special Action	NonLatch	Unit in Stop Mode, or in Auto Mode and No Ckt's Energzd [Any Ckt Energzd]	The respective circuit's "Chiller Off Cycle Freeze Protection Integral" was seen to be higher than ½ of its trip value while the chiller is in the Stop mode, or in Auto mode with no compressors running, for one minute and more. The COCFP integral is increased if the Average of the Evap Water Temperatures and the Evap Refrigerant Pool Temp is below the value of the Low Evap Rfgt Temp Cutout + 4°F. Energize Evap Water Pump and Off-Cycle Freeze Avoidance Request Relay until diagnostic auto resets, then return to normal evap pump control and de-energize the Freeze Avoidance Request. Automatic reset occurs when the respective Evap Rfgt Pool Temp rises 2°F (1.1°C) above the LERTC cutout setting AND the COCFP Integral is less than 1/3 of its trip value. This diagnostic even while active, does not prevent operation of either circuit. (At each circuit shutdown, the COCFP integral is initialized to the LERTC integral)	Remote
Low Evaporator Water Temp (Unit Off)	Evap Pump and Freeze Avoidance Request Relay	Info and Special Action	NonLatch	Unit in Stop Mode, or in Auto Mode and No Ckt(s) Energzd [Any Ckt Energzd]	Either the entering or leaving evaporator water temp fell below the leaving water temp cutout setting for 30 °F-seconds while the Chiller is in the Stop mode, or in Auto mode with no compressors running. Energize Freeze Avoidance Request Relay and Evap Water Pump Relay until diagnostic auto resets, then de-energize the Freeze Avoidance Request Relay and return to normal evap pump control. Automatic reset occurs when both temps rise 2°F (1.1°C) above the cutout setting for 5 minutes, or either circuit starts. This diagnostic even while active, does not prevent operation of either circuit	Remote
Low Evaporator Water Temp: Unit On	Chiller	Immediate Shutdown and Special Action	NonLatch	Any Ckt[s] Energzd [No Ckt(s) Energzd]	The evaporator entering or leaving water temp fell below the cutout setpoint for 30° F-seconds while the compressor was running. Automatic reset occurs when both of 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

Table 38. Diagnostics — main processor (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Low Oil Flow - Cprsr 1A	Circuit	Immediate	Latch	Cprsr Energized and Delta P above 15 Psid	The oil pressure transducer for this compressor was indicating an unacceptable oil pressure drop as a % of the available oil pressure to move oil, suggesting significantly reduced oil flow to the compressor. Possible root causes include oil line service valve closed or restricted, dirty or restricted oil filter, or compressor oil line kepner valve malfunction	Local
Low Oil Flow - Cprsr2A	Circuit	Immediate	Latch	Cprsr Energized and Delta P above 15 Psid	The oil pressure transducer for this compressor was indicating an unacceptable oil pressure drop as a % of the available oil pressure to move oil, suggesting significantly reduced oil flow to the compressor. Possible root causes include oil line service valve closed or restricted, dirty or restricted oil filter, or compressor oil line kepner valve malfunction	Local
Low Oil Return or AFD Cooling – Ckt1	Circuit	Info	NonLatch	All Ckt Running Modes	The evaporator's spillover tank refrigerant liquid level, which feeds the oil return and drive cooling heat exchanger, is seen to be less than 90% of its min level for 20 continuous minutes – reset when level gets to 88% of min level. The occurrence of this warning in conjunction with the "Loss of Oil (Running)" or any of the" AFD Over Temp" shutdown diagnostics, suggests either EXV problems or loss of charge is a contributing factor	
Low Oil Return or AFD Cooling – Ckt2	Circuit	Info	NonLatch	All Ckt Running Modes	The evaporator's spillover tank refrigerant liquid level, which feeds the oil return and drive cooling heat exchanger, is seen to be less than 90% of its min level for 20 continuous minutes – reset when level gets to 88% of min level. The occurrence of this warning in conjunction with the "Loss of Oil (Running)" or any of the" AFD Over Temperature" shutdown diagnostics, suggests either EXV problems or loss of charge is a contributing factor	
Motor Winding Temp Sensor - Cprsr1A	Circuit	Info or None	Latch	All	Both of the motor winding temperature sensors are seen to be out of their normal range. (Severity is adjustable via TU Service Tool – default is Info)	Local
Motor Winding Temp Sensor- Cprsr2A	Circuit	Info or None	Latch	All	Both of the motor winding temperature sensors are seen to be out of their normal range. (Severity is adjustable via TU Service Tool – default is Info)	Local
MP: Invalid Configuration	Platform	Immediate	Latch	All	MP has an invalid configuration based on the current software installed	Remote
MP: Reset Has Occurred	**Platform**	Info	NonLatch	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, or a power loss of a minimum or longer duration to cause an MP power down reset, or when installing new software or defining a new configuration. This diagnostic is immediately and automatically cleared and thus can only be seen in the Historic Diagnostic List in TU	Remote
No Differential Rfgt Pressure – Ckt1	Circuit	Immediate	AutoReset on timer – Latch if 3 instances in 30 min	Compressor running on Circuit	The system differential pressure was below 7.7 Psid (53 kPa) for 6 seconds after the 11 seconds ignore time relative to cprsr/circuit startup had expired. Auto Reset on a 3 min timer, 2 retries allowed beginning with RTAE Rev 2.15	Remote
No Differential Rfgt Pressure – Ckt2	Circuit	Immediate	Auto Reset on timer – Latch if 3 instances in 30 min	Compressor running on Circuit	The system differential pressure was below 7.7 Psid (53 kPa) for 6 seconds after the 11 seconds ignore time relative to cprsr/circuit startup had expired. Auto Reset on a 3 min timer, 2 retries allowed beginning with RTAE Rev 2.15	Remote

Table 38. Diagnostics — main processor (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Oil Analysis Recommended – Ckt1	Circuit	Info	Latch	"Service Messages" enabled	Diagnostic occurs when accumulated circuit operating hours since last initialized exceeds 2000 hours. Diagnostic can be manually cleared but will reoccur every month (720 hours on real time clock) as long as accumulator is not re-initialized	Remote
Oil Analysis Recommended – Ckt2	Circuit	Info	Latch	"Service Messages" enabled	Diagnostic occurs when accumulated circuit operating hours since last initialized exceeds 2000 hours. Diagnostic can be manually cleared but will reoccur every month (720 hours on real time clock) as long as accumulator is not re-initialized	Remote
Oil Filter Change Recommended – Cprsr1A	Circuit	Info	Latch	"Service Messages" enabled	Diagnostic occurs only when "service messages" are enabled and when average oil pressure drop exceeds 18%. Diagnostic can be manually cleared but will reoccur every month (720 hours on real time clock) as long as average pressure drop does not fall below 16%	Remote
Oil Filter Change Recommended – Cprsr2A	Circuit	Info	Latch	"Service Messages" enabled	Diagnostic occurs only when "service messages" are enabled and when average oil pressure drop exceeds 18%. Diagnostic can be manually cleared but will reoccur every month (720 hours on real time clock) as long as average pressure drop does not fall below 16%	Remote
Oil Flow Protection Fault – Ck 1	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 Protection Fault – Ckt2	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 Pressure Transducer – Cprsr1A	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Oil Pressure Transducer – Cprsr2A	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Outdoor Air Temperature Sensor	Chiller	Normal Shutdown;	Latch	All	Bad Sensor or LLID. If this diagnostic occurs, operational pumpdown will be performed regardless of the last valid temperature	Remote
Pumpdown Terminated - Ckt1	Circuit	Info	NonLatch	Service Pumpdown	Service Pumpdown cycle for this circuit was terminated abnormally due to excessive time.(RTAE max Service Pumpdown = 4 min)	Local
Pumpdown Terminated - Ckt2	Circuit	Info	NonLatch	Service Pumpdown	Service Pumpdown cycle for this circuit was terminated abnormally due to excessive. (RTAE max Service Pumpdown = 4 min)	Local
Software Error 1001: Call Trane Service	All functions	Immediate	Latch	All	A high level software watchdog has detected a condition in which there was a continuous 1 minute period of compressor operation, with neither Evaporator water flow nor a" contactor interrupt failure" diagnostic active. The presence of this software error message suggests an internal software problem has been detected. The events that led up to this failure, if known, should be recorded and transmitted to Trane Controls Engineering	Local

Table 38. Diagnostics — main processor (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Software Error 1002: Call Trane Service	All functions	Immediate	Latch	All	Reported if state chart misalignment in stopped or inactive state occurred while a compressor was seen to be operating and this condition lasted for at least 1 minute (cmprsr operation due to Service Pumpdown or with Contactor Interrupt Failure diagnostic is excluded). The presence of this software error message suggests an internal software problem has been detected. The events that led up to this failure, if known, should be recorded and transmitted to Trane Controls Engineering	Local
Software Error 1003: Call Trane Service	All functions	Immediate	Latch	All	Reported if state chart misalignment occurred inferred from either Capacity Control, Circuit, or Compressor State Machines remaining in the Stopping state for more than 3 minutes. The presence of this software error message suggests an internal software problem has been detected. The events that led up to this failure, if known, should be recorded and transmitted to Trane Controls Engineering	Local
Starts or Hours Modified – Cprsr1A	**Circuit**	Info	NonLatch	All	The current value for the cumulative starts and or hours for the given compressor have been modified by a write override from TU	NA
Starts or Hours Modified – Cprsr2A	**Circuit**	Info	NonLatch	All	The current value for the cumulative starts and or hours for the given compressor have been modified by a write override from TU	NA
Suction Rfgt Pressure Transducer – Cprsr1A	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Suction Rfgt Pressure Transducer – Cprsr2A	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Unexpected Shutdown – AFD1A	Circuit	Normal	Nonlatch	All Cprsr Running modes, Starting, Running and Preparing to Shutdown	The respective AFD status reported back that it is stopped when the MP thinks it should be running and no AFD shutdown diagnostic exists. This diagnostic will be logged in the active buffer and then automatically cleared. This diagnostic could be caused by intermittent communication problems from the AFD to the MP, or due to misbinding	Remote
Unexpected Shutdown – AFD2A	Circuit	Normal	Nonlatch	All Cprsr Running modes, Starting, Running and Preparing to Shutdown	The respective AFD status reported back that it is stopped when the MP thinks it should be running and no AFD shutdown diagnostic exists. This diagnostic will be logged in the active buffer and then automatically cleared. This diagnostic could be caused by intermittent communication problems from the AFD to the MP, or due to misbinding	Remote

Table 38. Diagnostics — main processor (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Very Low Evaporator Rfgt Pressure – Ckt1	Chiller	Immediate	Latch	All	The respective circuit's evaporator pressure dropped below 80% of the current Low Evap Refrig Press Cutout setting (see above) or 8 psia, whichever is less, regardless of the running state of the circuit's compressor. Note: Unlike previous products, even if the circuit associated with the suction pressure transducer is locked out, it will not defeat the protection afforded by this diagnostic	Local
Very Low Evaporator Rfgt Pressure – Ckt2	Chiller	Immediate	Latch	All	The respective circuit's evaporator pressure dropped below 80% of the current Low Evap Refrig Press Cutout setting (see above) or 8 psia, whichever is less, regardless of the running state of the circuit's compressor. Note: Unlike previous products, even if the circuit associated with the suction pressure transducer is locked out, it will not defeat the protection afforded by this diagnostic	Local

Communication Diagnostics

Notes:

1. *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.*
2. *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 39. Diagnostics — communication (150 to 300 ton units)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: AFD 1A	Circuit	Immediate	NonLatch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period	Remote
Comm Loss: AFD 2A	Circuit	Immediate	NonLatch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period	Remote
Comm Loss: Chiller % Capacity Output	Chiller	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period	Remote

Table 39. Diagnostics — communication (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Cond Fan Enable Shared Ckt1&2	Circuit	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. This is an info warning, as it is conceivable that the circuit may run without the center shared fan deck working if there are many other coils/fans on the circuits	Remote
Comm Loss: Cond Rfgt Pressure Ckt1	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 Rfgt Pressure Ckt2	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: Condenser Fan Enable Ckt1	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: Condenser Fan Enable Ckt2	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: Discharge Temperature Ckt1	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: Discharge Temperature Ckt2	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: Drive Cooling BP Valve Ckt1	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note: The same diagnostic is used for comm loss with the stepper motor driven bypass valve in the Drive Cooling Temp Control = DCTC or DCTW configurations as for comm loss with the "Drive Cooling 3-Way Valve Command Outputs Ckt1 &2" dual analog I/O llid in the TWAV configuration	Remote
Comm Loss: Drive Cooling BP Valve Ckt2	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note: The same diagnostic is used for comm loss with the stepper motor driven bypass valve in the Drive Cooling Temp Control = DCTC or DCTW configurations as for comm loss with the "Drive Cooling 3-Way Valve Command Outputs Ckt1 &2" dual analog I/O llid in the TWAV configuration	Remote
Comm Loss: Drive Cooling IL Valve Ckt1	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: Drive Cooling IL Valve Ckt2	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: Drive Cooling Sply Temp Ckt1	Circuit	Norma	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. While this diagnostic is active, the associated Drive Cooling ByPass Valve shall be commanded fully closed	Remote
Comm Loss: Drive Cooling Sply Temp Ckt2	Circuit	Norma	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. While this diagnostic is active, the associated Drive Cooling ByPass Valve shall be commanded fully closed	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

Table 39. Diagnostics — communication (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Evap Rfgt Pool Temp Ckt1	Circuit and Chiller	Special Action and Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period Note: The Evap Pool Temp Sensors are used for both On and Off -cycle freeze protection. Substitute Suction Pressure to Temperature conversion for freeze protection functions	Remote
Comm Loss: Evap Rfgt Pool Temp Ckt2	Circuit and Chiller	Special Action and Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period Note: The Evap Pool Temp Sensors are used for both On and Off -cycle freeze protection. Substitute Suction Pressure to Temperature conversion for freeze protection functions	Remote
Comm Loss: Evaporator Entering Water Temperature	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note: Entering Water Temp Sensor is used in EXV pressure control as well as ice making & CHW reset, so it must cause a unit shutdown even if Ice or CHW reset is not installed	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 Rfgt Liquid Level Ckt1	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 Rfgt Liquid Level Ckt2	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 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: Evaporator Water Pump Relay	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: Expansion Valve Ckt1	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: Expansion Valve Ckt2	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: Ext Noise Reduction Command	Chiller	Info	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/Hot Water Setpoint	External Chilled Water Setpoint	Special Action	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 Ckt Lockout Ckt1	Chiller	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. MP will hold the last lockout state (enabled or disabled) that was in effect at the time of comm loss	Remote

Table 39. Diagnostics — communication (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: External Ckt Lockout Ckt2	Chiller	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. MP will hold the last lockout state (enabled or disabled) that was in effect at the time of comm loss	Remote
Comm Loss: External Demand Limit Setpoint	External Current Limit setpoint	Special Action	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: External Ice Building Command	Ice Making Mode	Special Action	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: Fan Inverter Fault Ckt1	Circuit	Info	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 Ckt2	Circuit	Info	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 Cmd Ckt1	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 Cmd Ckt2	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 Cmd Shared Ckt1&2	Circuit	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. This is an info warning, as it is conceivable that the circuit may run without the center shared fan deck working if there are many other coils/fans on the circuits	
Comm Loss: FC Entering Water Temp	Free Cooling	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period	Remote
Comm Loss: Free Cooling Bypass Valve	Free Cooling	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period	Remote
Comm Loss: Free Cooling Valve	Free Cooling	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period	Remote
Comm Loss: Ice-Making Status	Ice-Machine	Special Action	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: Off-cycle Freeze Protection Relay	Chiller	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Loss Level Sensor Input – Ckt1	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: Oil Loss Level Sensor Input – Ckt2	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: Oil Pressure Cprsr1A	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period	Remote

Table 39. Diagnostics — communication (150 to 300 ton units) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Oil Pressure Cprsr2A	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: Op Status Programmable Relays	Chiller	Info	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 Shutdown	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. For RTAE if this diagnostic occurs, operational pumpdown will be performed regardless of the last valid temperature	Remote
Comm Loss: Suction Rfgt Pressure Ckt1	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: Suction Rfgt Pressure Ckt2	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: Var Vi Valve – Cprsr 1A	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: Var Vi Valve – Cprsr 2A	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: Winding Temp 1 Cprsr1A	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: Winding Temp 1 Cprsr2A	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: Winding Temp 2 Cprsr1A	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: Winding Temp 2 Cprsr2A	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period	Remote

Units Larger than 300 Tons

AFD Diagnostics

Table 40. Diagnostics — AFD Rockwell PF755 (units larger than 300 tons)

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD 1A Input Phase Loss	Cprsr	Immediate	Latch	All compressor starting and running modes	The respective AFD has detected high ripple on the DC bus indicative of an input phase loss. Suspect open phase, check input voltage and current capability on all legs.	Local
AFD 2A Input Phase Loss	Cprsr	Immediate	Latch	All compressor starting and running modes	The respective AFD has detected high ripple on the DC bus indicative of an input phase loss. Suspect open phase, check input voltage and current capability on all legs.	Local

Table 40. Diagnostics — AFD Rockwell PF755 (units larger than 300 tons) (continued)

AFD 1A Bus Under Voltage	Cprsr	Immediate (decel)	NonLatch	All	The bus voltage dropped below the Under Voltage Level and there is not enough voltage to reliably operate the load, or input voltage was lost on all phases (Power Loss). The drive shall automatically clear this diagnostic if the undervoltage is corrected within 15s, or if a power loss event, when power is restored at any later time	Local
AFD 2A Bus Under Voltage	Cprsr	Immediate (decel)	NonLatch	All	The bus voltage dropped below the Under Voltage Level and there is not enough voltage to reliably operate the load, or input voltage was lost on all phases (Power Loss). The drive shall automatically clear this diagnostic if the undervoltage is corrected within 15s, or if a power loss event, when power is restored.	Local
AFD 1A Bus Over Voltage	Cprsr	Immediate	NonLatch	Holding, Running	Bus overvoltage indicated the high bus voltage cut out has been exceeded while the AFD is in a non-stopped mode. The drive shall automatically clear this diagnostic if the dc bus voltage returns to normal range within 15s.	Local
AFD 2A Bus Over Voltage	Cprsr	Immediate	NonLatch	Holding, Running	Bus overvoltage indicated the high bus voltage cut out has been exceeded while the AFD is in a non-stopped mode. The drive shall automatically clear this diagnostic if the dc bus voltage returns to normal range within 15s.	Local
AFD 1A Loss Of Motor Control	Cprsr	Immediate	NonLatch	All	AFD generated faults that can occur due to external power anomalies or abnormal motor loading that could be a transient or temporary condition. This diagnostic maps to the occurrence of AFD generated faults of: Hardware Over Current, Over Speed Limit, IPM Over Current, Drive Powerup, IPM and Speed Estimate Error.	Remote
AFD 1A Loss Of Motor Control	Cprsr	Immediate	NonLatch	All	AFD generated faults that can occur due to external power anomalies or abnormal motor loading that could be a transient or temporary condition. This diagnostic maps to the occurrence of AFD generated faults of: Hardware Over Current, Over Speed Limit, IPM Over Current, Drive Powerup, IPM and Speed Estimate Error.	Remote

Table 40. Diagnostics — AFD Rockwell PF755 (units larger than 300 tons) (continued)

AFD 1A Motor Fault	Cprsr	Immediate	Latch	All	AFD generated faults that imply internal failures. This diagnostic maps to the occurrence of AFD generated faults of: Motor Overload, Load Loss, and Output Phase Loss. Check output wiring and motor health.	Local
AFD 2A Motor Fault	Cprsr	Immediate	Latch	All	AFD generated faults that imply internal failures. This diagnostic maps to the occurrence of AFD generated faults of: Motor Overload, Load Loss, and Output Phase Loss. Check output wiring and motor health.	Local
AFD 1A Over Temperature	Cprsr	Immediate	Latch	All	Heatsink Over Temperature (185°F/85°C), Transistor Over Temperature (320°F/160°C) or Control Board Over Temperature. Check drive liquid or air cooling.	Local
AFD 2A Over Temperature	Cprsr	Immediate	Latch	All	Heatsink Over Temperature (185°F/85°C), Transistor Over Temperature (320°F/160°C) or Control Board Over Temperature. Check drive liquid or air cooling.	Local
AFD 1A Motor Current Overload	Cprsr	Immediate (decel)	Latch	Running	Software Filtered Overcurrent has been detected. Can be loss of control of motor, or hardware failure.	Local
AFD 2A Motor Current Overload	Cprsr	Immediate (decel)	Latch	Running	Software Filtered Overcurrent has been detected. Can be loss of control of motor, or hardware failure.	Local
AFD 1A Customized Protection Fault	Cprsr	Immediate	Latch*	All	One of drive custom protections has occurred (Pump-Out Failed, Low Rotor Flux Feedback, or Bump Failure) OR drive custom protections not enabled or programmed. Contact Trane Service. *This diagnostic is uniquely latched by the AFD, not by the UC800.	Local
AFD 2A Customized Protection Fault	Cprsr	Immediate	Latch*	All	One of drive custom protections has occurred (Pump-Out Failed, Low Rotor Flux Feedback, or Bump Failure) OR drive custom protections not enabled or programmed. Contact Trane Service. *This diagnostic is uniquely latched by the AFD, not by the UC800.	Local

Table 40. Diagnostics — AFD Rockwell PF755 (units larger than 300 tons) (continued)

AFD 1A Ground Fault	Cprsr	Immediate	Latch	All	Measured ground current exceeds ground current sensitivity. Read the specific drive fault value over Tracer TU and refer to drive programming manual to determine which output leg and transistors are indicated.	Local
AFD 2A Ground Fault	Cprsr	Immediate	Latch	All	Measured ground current exceeds ground current sensitivity. Read drive fault value over Tracer TU and refer to drive programming manual to determine which output leg and transistors are indicated.	Local
AFD 1A Motor Shorted	Cprsr	Immediate	Latch	All	Motor or power stage is shorted line-to-line. Read drive fault value over Tracer TU and refer to drive programming manual to determine which phases are indicated.	Local
AFD 2A Motor Shorted	Cprsr	Immediate	Latch	All	Motor or power stage is shorted line-to-line. Read drive fault value over Tracer TU and refer to drive programming manual to determine which phases are indicated	Local
AFD 1A Comm Loss: Main Processor	Cprsr	Immediate (decel)	Latch	All	The AFD detected a continual loss of communication with the main processor for greater than 10s.	Local
AFD 2A Comm Loss: Main Processor	Cprsr	Immediate (decel)	Latch	All	The AFD detected a continual loss of communication with the main processor for greater than 10s.	Local
AFD 1A Precharge Fault	Cprsr	Immediate	Latch	All	The drives internal precharge was commanded to open while the drive was running. This can occur if the DC bus drops to a low level.	Local
AFD 2A Precharge Fault	Cprsr	Immediate	Latch	All	The drives internal precharge was commanded to open while the drive was running. This can occur if the DC bus drops to a low level.	Local
AFD 1A General Failure	Cprsr	Immediate (decel)	Latch	All	Drive fault other than those supported in this list. Read drive fault value over Tracer TU and refer to drive programming manual.	Local
AFD 2A General Failure	Cprsr	Immediate (decel)	Latch	All	Drive fault other than those supported in this list. Read drive fault value over Tracer TU and refer to drive programming manual.	Local

Table 40. Diagnostics — AFD Rockwell PF755 (units larger than 300 tons) (continued)

AFD 1A Gate Kill Active	Cprsr	Immediate	NonLatch	All	The respective drive's gate-kill circuitry was activated (open circuit). The respective compressor's High Pressure Cutout Switch is wired into this circuit, and will cause an immediate shutdown of the drive and compressor in the event of an HPC trip. A 2nd separate HPC diagnostic will occur in conjunction with this diagnostic – see details of the Main Processor Diagnostic "High Pressure Cutout" (that is latching).	Local
AFD 2A Gate Kill Active	Cprsr	Immediate	NonLatch	All	The respective drive's gate-kill circuitry was activated (open circuit). The respective compressor's High Pressure Cutout Switch is wired into this circuit, and will cause an immediate shutdown of the drive and compressor in the event of an HPC trip. A 2nd separate HPC diagnostic will occur in conjunction with this diagnostic – see details of the Main Processor Diagnostic "High Pressure Cutout" (that is latching).	Local
AFD 1A Input Transformer or Filter High Temp	Cprsr	Immediate Shutdown	Latch	All	The AFD is tripped by Input Transformer or Filter High Temperature Cutout.	Local
AFD 2A Input Transformer or Filter High Temp	Cprsr	Immediate Shutdown	Latch	All	The AFD is tripped by Input Transformer or Filter High Temperature Cutout.	Local
AFD 1A Low Rotor Flux Feedback	Cprsr	Immediate (decel)	Latch	Running	The estimated rotor flux dropped below the minimum threshold. Suspect motor demagnetization. This diagnostic should reset when cleared on the UC when the diagnostic condition is not active on the AFD.	Local
AFD 2A Low Rotor Flux Feedback	Cprsr	Immediate (decel)	Latch	Running	The estimated rotor flux dropped below the minimum threshold. Suspect motor demagnetization. This diagnostic should reset when cleared on the UC when the diagnostic condition is not active on the AFD.	Local

Starter Diagnostics

Table 41. Diagnostics — starter (units larger than 300 tons)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Motor Current Overload - xB	Circuit	Immediate	Latch	Cprsr Energized	Compressor current exceeded overload time vs. trip characteristic. Must trip = 140% RLA, Must hold= 125%, nominal trip 132.5% in 30 seconds	Local
Over Voltage	Chiller	Normal	NonLatch	Pre-Start and Any Ckt(s) Energized	Nom. trip: 60 seconds at greater than 112.5%, ☐ 2.5%, Auto Reset at 110% or less for 10 continuous seconds.	Remote
Phase Loss - xy	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 Non-latching 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 transformer inputs. Logic will detect and trip in a maximum of 0.3 seconds from compressor start.	Local
Phase Reversal - xy	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
Power Loss - xy	Cprsr	Immediate	NonLatch	All compressor 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
Severe Current Imbalance - xy	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 Comm Loss: Main Processor - xy	Cprsr	Immediate	Latch	All	The Starter module detected a continual loss of communication with the main processor for greater than the Communications Loss Time bound setpoint.	Local

Table 41. Diagnostics — starter (units larger than 300 tons) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Starter Contactor Interrupt Failure - xy	Chiller	Immediate and Special Action	Latch	Starter Contactor not Energized [Starter Contactor Energized]	Detected compressor currents greater than 10% RLA on any or all phases when the compressor was commanded off. Detection time shall be 5 second minimum and 10 seconds maximum. On detection and until the controller is manually reset: generate diagnostic, energize the appropriate alarm relay, continue to energize the Evap Pump Output, and 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, oil return, and fan control on the circuit effected. During contactor interrupt failure, circuit will not be confirmed off, so THR unit sequence should continue running. If THR turns off due to a diagnostic or lockout during contactor interrupt failure, the circuit reverts to air-cooled condenser fan control within 1 second.	Local
Starter Did Not Transition - xy	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 Dry Run Test - xy	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 Failed to Arm/Start - xy	Cprsr	Immediate	Latch	All	Starter failed to arm or start within the allotted time (15 seconds).	Local
Starter Fault Type I - xy	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 - xy	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 - xy	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 Module Memory Error Type 1 - xy	Cprsr	Warning	Latch	All	Checksum on RAM copy of the Starter LLID configuration failed. Configuration recalled from EEPROM.	Local
Starter Module Memory Error Type 2 - xy	Cprsr	Immediate	Latch	All	Checksum on EEPROM copy of the Starter LLID configuration failed. Default configuration loaded into RAM and EEPROM.	Local
Transition Complete Input Opened - xy	Cprsr	Immediate	Latch	All Running Modes	The Transition Complete input was found to be shorted before the compressor was started. This is active for all electromechanical starters.	Local

Table 41. Diagnostics — starter (units larger than 300 tons) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Transition Complete Input Shorted - xy	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	NonLatch	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 for 10 continuous seconds.	Remote

Main Processor Diagnostics

Table 42. Diagnostics — main processor (units larger than 300 tons)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
AFD Comm Loss - xA	Cprsr	Immediate	NonLatch	All	Communication has been lost between the UC800 and the applicable AFD. Once triggered, this diagnostic will auto-reset after 10 continuous minutes of restored communication to the compressor. (Note: The timer only starts once communication to the compressor is restored, which the UC800 will detect. If a manual reset request occurs during the timer period, it shall reset the diagnostic and the 'auto-reset' function will then be bypassed.)	Local
AFD Failure to Arm or Start - xA	Cprsr	Immediate	Latch	Running	The AFD failed to start within the allotted time (1 min). Definition of the "starting" value is the running status of the AFD. Note: This is a Controller diagnostic, not one originating from the AFD.	
AFD Interrupt Failure - xA	Chiller	Immediate Shutdown and Special Action	Latch	AFD Intended to be OFF	Respective AFD is reporting that it is still running the compressor when the MP has commanded the drive/ compressor to be Off. Detection time shall be 10 seconds minimum and 15 seconds maximum. On detection and until the controller is manually reset: this diagnostic shall be active and the alarm relay shall be energized, the Evap Pump Output will be energized, the effected compressor will be continually commanded off, and be unloaded, while a normal stop shall be commanded to all other compressors. For as long as compressor operation continues, the MP shall continue oil return and fan control on the circuit affected. During AFD interrupt failure, circuit will not be confirmed off, so THR unit sequence should continue running. If THR turns off due to a diagnostic or lockout during AFD interrupt failure, the circuit reverts to air-cooled condenser fan control within 1 second.	Local
AFD Unexpected Shutdown - xA	Cprsr	Normal	NonLatch	Running	The AFD status reported back that it is stopped when the MP thinks it should be running and no AFD diagnostic exists. This diagnostic will be logged in the active buffer and then automatically cleared. This diagnostic could be caused by intermittent communication problems from the AFD to the MP or due to mis-binding. Note: This is a Controller diagnostic, not one originating from the AFD.	Local
Chiller Service Recommended	Chiller	Warning	Latch	Service Messages Enabled	Chiller service interval time has elapsed. Chiller service is recommended.	Remote

Table 42. Diagnostics — main processor (units larger than 300 tons) (continued)

Compressor Discharge Refrigerant Temperature Sensor - xy	Cprsr	Immediate	Latch	All	Bad Sensor or LLID	Remote
Condenser Refrigerant Pressure Sensor	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Drive Cooling Supply Temperature Sensor - xA	Circuit	Normal	Latch	All	Bad Sensor or LLID.	Remote
Emergency Stop Feedback Input	Chiller	Immediate	Latch	All	A. Emergency stop feedback 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
Evaporator Approach Error	Circuit	Immediate	Latch	Respective circuit running	The Evaporator approach temperature for the respective circuit (ELWT – Evap Sat Temp Ckt x) is negative by more than 10°F for 1 minute continuously while the circuit / compressor is operating. Either the Evap Leaving Water Temp sensor or Evap Suction Rfgt Pressure Sensor Ckt x is in error.	Remote
Evaporator Entering Water Temperature Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID. Note: Entering Water Temp Sensor is used in EXV pressure control as well as ice making so it must cause a unit shutdown even if ice or CHW reset is not installed.	Remote
Evaporator Leaving Water Temperature Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID	Remote
Evaporator Refrigerant Pool Temperature Sensor Error	Circuit	Warning and Special Action	Latch	Ckt Energized [Ckt Not Energized]	This diagnostic can be triggered in two ways: 1.) The evaporator refrigerant pool temperature measurement is larger than the evaporator entering water temperature by more than 4°C (7.2°F) for 5 continuous minutes. There is an ignore time of 2 minutes following circuit startup. The trip criteria is not evaluated (and time above the threshold is not counted) until the ignore time passes. 2.) If the absolute value of the Actual Evap Pool Temp Correction CktX is greater than the 'Evap Pool Temp Diagnostic Threshold CktX' AND the absolute value of the Pool Temp Error is greater than the 'Evap Pool Temp Diagnostic Threshold CktX', the diagnostic will occur. Continue to display the pool temperature measurement if the diagnostic is active. If evaporator isolation valves are installed, revert to Evaporator Shell Refrigerant Saturated Temperature for freeze protection functions. If evaporator isolation valves are not installed, revert to Evaporator Saturated Temperature for freeze protection functions. Pool Temp Sensor may have failed due to incorrect installation, improper insulation, or an offset pool temperature measurement typically caused by moisture intrusion.	Local

Table 42. Diagnostics — main processor (units larger than 300 tons) (continued)

Evaporator Refrigerant Pool Temperature Sensor	Circuit	Warning and Special Action	Latch	All	Bad Sensor or LLID. Note: The Evap Pool Temp Sensors are used for evaporator freeze protection (running and non-running). Invalidate evaporator pool temperature sensor measurement if this diagnostic is active. If evaporator isolation valves are installed, revert to Evaporator Shell Refrigerant Saturated Temperature for freeze protection functions. If evaporator isolation valves are not installed, revert to Evaporator Saturated Temperature for freeze protection functions.	Remote
Evaporator Water Flow Lost	Chiller	Immediate	NonLatch	[All Stop Modes]	A. The Evaporator water flow switch input was open for more than 6 contiguous seconds (or 20 seconds for thermal dispersion type flow switch). B. This diagnostic does not de-energize the evap pump output. C. 6 seconds of contiguous flow shall clear this diagnostic. (further review needed when implementing thermal dispersion for Pueblo)	Remote
Evaporator Water Flow Overdue	Chiller	Normal	NonLatch	Unit in Stop Mode, or in Auto Mode and No Ckt(s) Energized [Any Ckt Energized]	Evaporator water flow was not proven within 20 minutes of the Evaporator water pump relay being energized in normal "Stop" to "Auto" transition. If the pump is overridden to "On" for certain diagnostics, the delay on diagnostic callout shall be only 255 seconds. The pump command status will not be effected by this diagnostic in either case.	Remote
Excessive Condenser Pressure	Circuit	Immediate	Latch	All	The condenser pressure sensor of this circuit has detected a condensing pressure in excess of the design high side pressure as limited by the particular compressor type.	Remote
External Chilled Water Setpoint	Chiller	Warning	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).	Remote
External Demand Limit Setpoint	Chiller	Warning	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.)	Remote
Free Cooling Entering Water Temperature	Free Cooling	Normal	Latch	All	Bad Sensor or LLID.	Remote
High Compressor Refrigerant Discharge Temp - xy	Cprsr	Immediate	Latch	All [compressor run unload or compressor not running]	The compressor discharge temperature exceeded 199.4°F(without oil cooler) or 230°F (with oil cooler). This diagnostic will be suppressed during Stopping mode or after the compressor has stopped. Note: As part of the Compressor High Temperature Limit Mode (aka Minimum Capacity Limit), the compressor shall be forced loaded as the filtered discharge temperature reaches 190°F (without oil coolers), or 220°F (with oil coolers).	Remote
High Differential Refrigerant Pressure - xy	Cprsr	Normal	Latch	Cprsr Energized	**GP2 Cprsr: The differential pressure for the respective circuit was above 275 Psid (1890 kPa) for 2 consecutive samples 5 seconds apart.**	Remote

Table 42. Diagnostics — main processor (units larger than 300 tons) (continued)

High Evaporator Refrigerant Pressure	Chiller	Immediate	NonLatch	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. 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	Warning and Special Action	NonLatch	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.	Either the leaving or the entering water temperature exceeded the high evap water temp limit (TU service menu settable –default 105°F (65.55°C), range 80°F (26.67°C)-150°F(65.55°C) for 15 continuous seconds. The evaporator water pump relay will be de-energized to stop the pump but only if it is running due one of the diagnostics listed on the left. The diagnostic will auto reset and the pump will return to normal control when both the entering and leaving temperatures fall 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 Motor Winding Temperature - xA	Cprsr	Immediate	Latch	All	The respective compressor's motor winding thermostat is detected to be open. The compressor shall stop within 5 seconds of this diagnostic. For GP4 with triple RTD temperature sensors, a temperature greater than 265°F will generate this diagnostic.	Local
High Pressure Cutout - xy	Cprsr	Immediate	Latch	All	A high pressure cutout was detected; trip at 315 ± 5 PSIG. For AFD compressor configurations, the HPC is connected directly to the AFD and the UC800 will get an AFD Fault – xA diagnostic when the HPC is tripped.	Local
High Refrigerant Pressure Ratio - xy	Cprsr	Immediate	Latch	Cprsr Energized	The pressure ratio for the respective circuit exceeded 12.3 for 1 contiguous minute while any compressor is running or in service pumpdown. This pressure ratio is a fundamental limitation of the HiVi compressor. The pressure ratio is defined as Pcond (abs)/Pevap (abs).	Remote
Inverted Evaporator Water Temperature	Chiller	Warning/ Normal	NonLatch/ Latch	Any Ckt Energized [No Ckts Energized]	*Function: Not Enabled (Default): diagnostic is Non-Latching and Warning. Enabled: diagnostic is Latching and Normal Shutdown. The entering evaporator water temp fell below the leaving evaporator water temp by more than 2°F for 180 °F-sec, minimum trip time 30 seconds. Diagnostic will auto clear if the leaving water temp – entering water temp < 2F. It can warn of improper flow direction through the evaporator, misbound water temperature sensors, improper sensor installation, partially failed sensors, or other system problems. Note that either entering or leaving water temp sensor or the water system could be at fault.	Remote

Table 42. Diagnostics — main processor (units larger than 300 tons) (continued)

Liquid Line Pressure Sensor	Circuit	Normal	Latch	All	Bad Sensor or LLID. Note: This is the subcooled liquid line temp sensor.	Remote
Liquid Line Temperature Sensor	Circuit	Normal	Latch	All	Bad Sensor or LLID. Note: This is the subcooled liquid line temp sensor.	Remote
Loss of Oil for Compressor (Running)	Circuit	Immediate	Latch	Starter Contactor Energized	In running modes, Oil Loss Level Sensor detects lack of oil in the oil sump feeding the compressor (distinguishing a liquid flow from a vapor flow).	Local
Loss of Oil for Compressor (Stopped)	Circuit	Immediate Shutdown and Special Action	Latch	Compressor Pre-Start [all other modes]	In running modes, Oil Loss Level Sensor detects lack of oil in the oil sump feeding the compressor (distinguishing a liquid flow from a vapor flow).	Local
Low Differential Refrigerant Pressure - xy	Cprsr	Immediate	Latch	Cprsr Energized	For startup, please refer to oil flow protection spec. For running, the system differential pressure for the respective circuit was below the greater of 25 psid (240.5 kPa) or the pressure ratio listed in the table in GP2 Compressor Type FSpec while the compressor is running for a period of time dependent on the deficit (15 sec ignore time from circuit start) – refer to the Oil Flow Protection specification for the time to trip function.	Remote
Low Discharge Superheat - xy	Cprsr	Normal	Latch	Any Running Mode	While Running Normally, the Oil Superheat CktX was less than the Low Discharge Superheat Setpoint CprsrXY for more than (650* Low Discharge Superheat Setpoint) degree F seconds, for GP2 or more than (542* Low Discharge Superheat Setpoint) degree F seconds, for GP4. At circuit startup, the Discharge Superheat will be ignored for 5 minutes.	Remote
Low Drive Cooling Supply Temperature - xA	Circuit	Info	NonLatch	All Ckt Running Modes	The Drive Cooling Supply temperature for the respective circuit is seen to be more than 5F cooler than its setpoint for more than 30 minutes. Auto-reset if temperatures return to a value above this setpoint offset. Undesirable condensation is possible on the cooled surfaces inside the control panel. Inspect the Drive Cooling System components for misoperation or failure	Remote
Low Evaporator Refrigerant Temperature Circuit 1: Unit Off	Chiller	Special Action	NonLatch	Unit in Stop Mode, or in Auto Mode and No Ckt(s) Energized [Any Ckt Energized]	The respective circuit's LERTC Integral was seen to be > 0 while the chiller is in the Stop mode, or in Auto mode with no compressors running for at least one minute. The LERTC integral is increased if the Evap Refrigerant Pool Temp is below the value of the Low Evap Rfgt Temp Cutout + 2°F. Energize Evap Water Pump and Off-Cycle Freeze Avoidance Request Relay until diagnostic auto resets, then return to normal evap pump control and de-energize the Freeze Avoidance Request. Automatic reset occurs when the respective Evap Rfgt Pool Temp rises 4°F(1.1°C) above the LERTC cutout setting for 1 minute and the Chiller Off LERTC Integral = 0.. This diagnostic even while active, does not prevent operation of either circuit.	Remote

Table 42. Diagnostics — main processor (units larger than 300 tons) (continued)

Low Evaporator Refrigerant Temperature Circuit 2: Unit Off	Chiller	Special Action	NonLatch	Unit in Stop Mode, or in Auto Mode and No Ckt(s) Energized [Any Ckt Energized]	The respective circuit's LERTC Integral was seen to be > 0 while the chiller is in the Stop mode, or in Auto mode with no compressors running for at least one minute. The LERTC integral is increased if the Evap Refrigerant Pool Temp is below the value of the Low Evap Rfgt Temp Cutout + 2°F. Energize Evap Water Pump and Off-Cycle Freeze Avoidance Request Relay until diagnostic auto resets, then return to normal evap pump control and de-energize the Freeze Avoidance Request. Automatic reset occurs when the respective Evap Rfgt Pool Temp rises 4°F(1.1°C) above the LERTC cutout setting for 1 minute and the Chiller Off LERTC Integral = 0.. This diagnostic even while active, does not prevent operation of either circuit.	Remote
Low Evaporator Water Temperature (Unit Off)	Chiller	Special Action	NonLatch	Unit in Stop Mode, or in Auto Mode and No Ckt(s) Energized [Any Ckt Energized]	Either the entering or 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 Freeze Avoidance Request Relay and Evap Water Pump Relay until diagnostic auto resets, then de-energize the Freeze Avoidance Request Relay and return to normal evap pump control. Automatic reset occurs when both temps rise 2°F(1.1°C) above the cutout setting for 5 minutes, or either circuit starts. This diagnostic even while active, does not prevent operation of either circuit.	Remote
Low Evaporator Water Temperature (Unit On)	Chiller	Immediate Shutdown and Special Action	NonLatch	Any Ckt[s] Energized [No Ckt(s) Energized]	The evaporator entering or leaving water temperature fell below the cutout setpoint for 30 degree F Seconds while the compressor was running. Automatic reset occurs when both of 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 Oil Flow - xy	Cprsr	Immediate	Latch	Cprsr Energized and Delta P above 15 Psid	The intermediate oil pressure sensor for this compressor was out of the acceptable pressure range for 15 seconds, while the Delta Pressure was greater than 15 Psid. See Oil Flow Protection	Local
Low Refrigerant Temperature	Circuit	Immediate	Latch	All Ckt Running Modes	The warmer of either the either the Evaporator Refrigerant Pool Temperature or Active Rfgt Sat Temp for the respective circuit dropped below the Low Refrigerant Temperature Cutout Setpoint for 2250°F-sec (12°F-sec max rate for early circuit startup period) while the circuit was running. The minimum LRTC setpoint is -5°F the point at which oil separates from the refrigerant. The integral is held nonvolatile though power down, is continuously calculated, and can decay or build during the circuit off cycle as conditions warrant.	Remote
Low Suction Refrigerant Pressure	Circuit	Immediate	Latch	Cprsr Prestart and Cprsr Energized	A. The Suction Pressure dropped below 10 Psia just prior to compressor start (after EXV preposition). B. During Early Startup Period: the Suction Pressure fell below a pressure equal to Condenser Pressure ÷ 8 but as limited to not less than 6 or greater than10 psia. C. After Early Startup Period expires: The Suction Pressure fell below 16 Psia.	Local
Mfr Maintenance Recommended - xy	Cprsr	Warning	Latch	Service Messages Enabled	Compressor service recommended as service interval hours have elapsed.	Remote

Table 42. Diagnostics — main processor (units larger than 300 tons) (continued)

Motor Winding Temperature Sensor - xA	Cprsr	Warning (default) or Normal	Latch	All	Bad Sensor or LLID. See High Motor Winding Temperature Protection functional spec for other key details related to setting and the effects of the setting on the Severity.	Remote
MP: Invalid Configuration	Platform	Immediate	Latch	All	MP has an invalid configuration based on the current software installed.	Remote
MP: Reset Has Occurred	Platform	Warning	NonLatch	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 Tracer TU.	Remote
No Differential Refrigerant Pressure - xy	Cprsr	Immediate	Latch	Compressor running on Circuit	The system differential pressure was below 7.7 Psid (53 kPa) for 6 seconds after the 11 seconds ignore time relative to cprsr/circuit startup had expired. In a two compressor circuit, the lower of the two suction pressure is used for circuit DP.	Remote
Oil Flow Protection Fault - xy	Cprsr	Immediate	Latch	Starter Contactor Energized [all Stop modes]	The Intermediate Oil Pressure Sensor for this cprsr is reading a pressure either above its respective circuit's Condenser Pressure by 15 Psid or more, or below its respective compressor Suction Pressure 10 Psid or more for 30 seconds continuously.	Local
Oil Pressure Sensor - xy	Cprsr	Immediate	Latch	All	Bad Sensor or LLID	Remote
Oil Supply Temperature Sensor - xy	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
Outdoor Air Temperature Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID.	Remote
Pumpdown Terminated By Time	Circuit	Warning	Latch	Service Pumpdown	Service Pumpdown cycle for this circuit was terminated abnormally due to excessive time. Reference Service Pumpdown spec for maximum time allowed.	Local
Restart Inhibit Invoked - xy	Cprsr	Warning	NonLatch	All	When restart inhibit warning is enabled, the warning exists when unit has been inhibited from starting and is cleared when a start of a compressor is possible (Start-to-Start Timer expires)	Remote
Software Error 1001: Call Trane Service	Chiller	Immediate	Latch	All	A high level software watchdog has detected a condition in which there was a continuous 1 minute period of compressor operation, with neither Evaporator water flow nor a" contactor interrupt failure" diagnostic active. The presence of this software error message suggests an internal software problem has been detected. The events that led up to this failure, if known, should be recorded and transmitted to Trane Controls Engineering.	Local
Software Error 1002: Call Trane Service	Chiller	Immediate	Latch	All	Reported if state chart misalignment in stopped or inactive state occurred while a compressor was seen to be operating and this condition lasted for at least 1 minute (cprsr operation due to Service Pumpdown or with Contactor Interrupt Failure diagnostic is excluded). The presence of this software error message suggests an internal software problem has been detected. The events that led up to this failure, if known, should be recorded and transmitted to Trane Controls Engineering.	Local

Table 42. Diagnostics — main processor (units larger than 300 tons) (continued)

Software Error 1003: Call Trane Service	Chiller	Immediate	Latch	All	Reported if state chart misalignment occurred inferred from the Capacity Control, Circuit, or Compressor State Machines remaining in the Stopping state for more than 3 minutes. The presence of this software error message suggests an internal software problem has been detected. The events that led up to this failure, if known, should be recorded and transmitted to Trane Controls Engineering. **NOTE:** this diagnostic will only apply to GP2 compressors with starter module.	Local
Starts/Hours Modified - xy	Cprsr	Warning	NonLatch	All	The current value for the cumulative starts and or hours for the given compressor have been modified by a write override from TU in any running mode. The diagnostic will only appear in the Historic Alarms list.	Remote
Suction Refrigerant Pressure Sensor - xy	Cprsr	Immediate	Latch	All	Bad Sensor or LLID	Remote
Unexpected Starter Shutdown - xy	Cprsr	Normal	NonLatch	All Cprsr Running modes, Starting, Running and Preparing to Shutdown	The Starter module status reported back that it is stopped when the MP thinks it should be running and no Starter diagnostic exist. This diagnostic will be logged in the active buffer and then automatically cleared. This diagnostic could be caused by intermittent communication problems from the Starter to the MP or due to mis-binding	Local
Very Low Evaporator Refrigerant Pressure - xy	Chiller	Immediate	Latch	All	The respective circuit's evaporator pressure dropped below 80% of the current Low Evap Refrigerant Press Cutout setting (see above) or 8 psia, whichever is less, regardless of the running state of the circuit's compressor. Note: Unlike previous products, even if the circuit associated with the suction pressure sensor is locked out, it will not defeat the protection afforded by this diagnostic.	Local

Communication Diagnostics

Table 43. Diagnostics — communication (units larger than 300 tons)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: % RLA Indication Output(Vdc)	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Auxiliary SetpointCom-mand	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Compressor Discharge Refrigerant Temperature - xy	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: Condenser Fan Enable	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: Condenser Receiver Tank Valve	Circuit	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote

Table 43. Diagnostics — communication (units larger than 300 tons) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Condenser Refrigerant Pressure	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: Drive Cooling Bypass Valve xA	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: Drive Cooling Supply Temperature	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. While this diagnostic is active, the associated Drive Cooling ByPass Valve shall be commanded fully closed	Remote
Comm Loss: Electronic Expansion Valve	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the EXV Step Status has occurred for a 30 second period, OR EXV Steps Maximum Position has not been received. If EXV Steps Maximum Position has not been received, MP will periodically request EXV Steps Maximum Position, since it is only transmitted upon request.	Remote
Comm Loss: Emergency Stop Feedback Input	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: Energy Meter X	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Power Meter has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Entering Water Temperature	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note: Entering Water Temp Sensor is used in EXV pressure control as well as ice making & CHW reset, so it must cause a unit shutdown even if Ice or CHW reset is not installed.	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 Refrigerant Pool Temperature	Circuit	Special Action and Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Invalidate evaporator pool temperature sensor measurement if this diagnostic is active. If evaporator isolation valves are installed, revert to Evaporator Shell Refrigerant Saturated Temperature for freeze protection functions. If evaporator isolation valves are not installed, revert to Evaporator Saturated Temperature for freeze protection functions.	Remote
Comm Loss: Evaporator 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: Evaporator Water Pump Relay	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: Ext Noise Reduction Request	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote

Table 43. Diagnostics — communication (units larger than 300 tons) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
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	Chiller	Special Action	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 Ckt Lockout	Circuit	Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. MP will nonvolatile hold the lockout state (enabled or disabled) that was in effect at the time of comm loss.	Remote
Comm Loss: External Demand Limit Setpoint	Chiller	Special Action	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 Demand limit setpoint and revert to the next higher priority for Demand Limit setpoint arbitration.	Remote
Comm Loss: External Ice BuildingCom-mand	Chiller	Special Action	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: Fan Inverter SpeedCom-mand	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: Free Cooling Bypass Valve	Free Cooling	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Free Cooling Entering Water Temperature	Free Cooling	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Free Cooling Valve	Free Cooling	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 - xy	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: Liquid Line Pressure	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: Liquid Line Temperature	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note: The Subcooled Liquid Line Temperature Sensors are used for determination of charge and accurate tonnage predictions	Remote
Comm Loss: Motor Winding Temperature 1, CprsrXY	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: Motor Winding Temperature 2, CprsrXY	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote

Table 43. Diagnostics — communication (units larger than 300 tons) (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Oil Loss Level Sensor Input	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: Oil Pressure - xy	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: Oil Return Line Solenoid Valve - xy	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 Return Valve - xy	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. *Design Note: this diagnostic is intended for the GP4 compressors only (Cprsrs 1A and 2A). Some consideration was given to making this a circuit shutdown since without the valve, the GP4 oil return cannot work properly, and if the GP4 can't run, neither can its manifolded GP2 - but if the valve is open somewhere between its min and max, the circuit may be able to run reasonably well – and other diagnostics can protect against oil loss, or low disch SH, or lack of drive cooling that may result.*	Remote
Comm Loss: Oil Supply Temperature	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: 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.	Remote
Comm Loss: Programmable Relay Board 1	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Programmable Relay Board 2	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Slide Valve Load - xy	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: Slide Valve Unload - xy	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: Starter xy	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: Step Load - xy	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: Suction Refrigerant Pressure - xy	Cprsr	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.	Remote
Comm Loss: Variable Vi Valve - CprsrXY	Cprsr	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Write Command Failure Energy Meter X	Chiller	Warning	Latch	All	Loss of communication to the Energy Meter during write command process (Controller writes to Energy Meter). Or Energy Meter X's 'Command Status' returns value that is NOT equal to 0 or 3 (0: successful, 3: in Progress).	Remote

Unit Wiring

The following table provides a list of electrical schematics, field wiring diagrams and connection diagrams. Wiring diagrams can be accessed viaa e-Library. A laminated wiring diagram booklet is also shipped with each unit.

Table 44. Wiring diagrams — 150 to 300 ton units

Document Number		Description	
2311-5509	Sheet 1	Schematic Wiring	Devices, Descriptions, Locations, Notes
	Sheet 2		Adaptive Frequency Drive, Circuit 1
	Sheet 3		Adaptive Frequency Drive, Circuit 2
	Sheet 4		Condenser Fans, Circuit 1
	Sheet 5		Condenser Fans, Circuit 2
	Sheet 6		Circuit Boards
	Sheet 7		Circuit Boards and Unit Sensors
2311-5513		Unit Field Wiring	
2311-5066		Panel Component Location	
5724-2711		Unit Component Location	
5724-2721		Assembly; Sensor Routing	
5724-2731		Fan/Harness Location Diagram	

Table 45. Wiring diagrams — units larger than 300 tons

Document Number		Description	
2311-5186	Sheet 1	Schematic Wiring	Device Designations, Descriptions, Location and Notes
	Sheet 2		Main Unit Disconnect and Drive Circuit 1 - Compressor 1A
	Sheet 3		Starter Circuit 1 - Compressor 1B
	Sheet 4		Drive Circuit 2 - Compressor 2A
	Sheet 5		Starter Circuit 2 - Compressor 2B
	Sheet 6		Condenser Fans and Controls - Circuit 1
	Sheet 7		Condenser Fans and Controls - Circuit 2
	Sheet 8		Unit Controls and Sensors - Circuit 1 and 2
	Sheet 9		Unit Controls and Sensors - Circuit 1 and 2
	Sheet 10		Customer Field Wiring
2311-5360		Unit Field Wiring	
5732–2302		Panel Component Location	
5732–2301		Unit Component Location	

Log and Check Sheets

The following are included for use as appropriate, for installation completion verification before Trane start-up is scheduled, and for reference during the Trane start-up. Where the log or check sheet also exists outside of this publication as standalone literature, the literature order number is also listed.

- Ascend™ Model ACR Installation Completion Check Sheet and Request for Trane Service (AC-ADF001*-EN)
- Operator Log

Ascend™ Model ACR Installation Completion Check Sheet and Request for Trane Service

Important: *A copy of this completed form must be submitted to the Trane service agency that will be responsible for the start-up of the chiller. Start-up will NOT proceed unless applicable items listed in this form have been satisfactorily completed.*

To:	____________________
Trane Service Office:	____________________
S.O. Number:	____________________
Serial Numbers:	____________________
Job/Project Name:	____________________
Address:	____________________
The following items are being installed and will be completed by:	____________________

Important: *Start-up must be performed by Trane or an agent of Trane specifically authorized to perform start-up and warranty of Trane® products. Contractor shall provide Trane (or an agent of Trane specifically authorized to perform start-up) with notice of the scheduled start-up at least two weeks prior to the scheduled start-up.*

Important: ***It is required that heaters are energized for a minimum of 24 hours prior to start up. Therefore, chiller should have power for this amount of time before Trane Service arrives to do start-up.***

Check boxes if the task is complete or if the answer is "yes".

1. **Chiller**
   - ☐ Installation meets foundation requirements.
   - ☐ In place and piped.
   - ☐ Isolation pads or elastomeric pads installed (optional).
   - ☐ For units with InvisiSound™ Ultimate Option (model number digit 13 = E), compressor mounting bolts have been removed.
2. **Refrigerant Pressure Check**
   - ☐ PRIOR to water being pumped into system, use gauges to verify positive pressure in the evaporator and condenser. Lack of pressure could indicate a system leak. When charging in the factory, approximately 95% of the refrigerant charge is isolated in the evaporator, and the other 5% is contained in the condenser and compressor. In the event that no pressure is present, contact local Trane service.

   Note: *Verification must be done by gauges. Do NOT rely only on values from unit controls.*
3. **Piping**
   - ☐ Water piping flushed before making final connections to the system

     Chilled water piping connected to:
     - ☐ Evaporator
     - ☐ Pumps
     - ☐ Flow switch or flow proving device installed (if not factory provided)
     - ☐ Strainer installed and cleaned
   - ☐ Water supply connected to filling system
   - ☐ Does unit have freeze inhibitor? If unit has freeze inhibitor:
     - ☐ Verify type and concentration is correct per unit submittal
     - ☐ Calculate and record freeze point of the solution: __________
   - ☐ Systems filled
   - ☐ Pumps run, air bled from system
   - ☐ Relief valve ventilation piping installed (if applicable)
4. **Flow balancing valves installed**
   - ☐ Leaving chilled water
5. **Gauges, thermometers, and air vents**
   - ☐ Installed on both sides of evaporator
6. **Electrical**
   - ☐ Wire size per submittal and NEC 310-16
   - ☐ Full power available
   - ☐ Interconnecting wiring, starter to panel (as required)
   - ☐ External interlocks (flow switch, pumps auxiliary, etc.)
   - ☐ Chilled water pump (connected and tested)
   - ☐ 115 Vac power available for service tools
   - ☐ All controls installed and connected
   - ☐ Power distribution grounding type identified:
     - ☐ Solidly Grounded (Center Ground Wye)

       -or-
     - ☐ Non-Solidly Grounded (Any Delta, High Impedance Ground, or Ungrounded Wye
7. **Testing**
   - ☐ Dry nitrogen available for pressure testing
   - ☐ Trace gas amounts of R-134a available for leak testing, if necessary

8. **Refrigerant on job site (if nitrogen charge option, model number digit 16 = D, is chosen)**
9. **Systems can be operated under load conditions**
10. **Heaters**
   - ☐ If unit was factory charged (model number digit 16 = C), energize heaters for 24 hours prior to start up.

     Important: ***It is required that chiller heaters are energized for a minimum of 24 hours prior to start up. Therefore, chiller should have power for this amount of time before Trane Service arrives to do start-up.***
   - ☐ If unit has nitrogen charge (model number digit 16 = D), contact Trane Service for unit charging prior to start-up.

   Important: *Do NOT apply shore/service power to unit with nitrogen charge. Shore/service power will drive EXV valves, inhibiting ability to adequately Vac and charge unit.*
11. **Owner Awareness**
   - ☐ Does the owner have a copy of the MSDS for refrigerant?

Note: *Additional time required to properly complete the start-up and commissioning, due to any incompleteness of the installation, will be invoiced at prevailing rates.*

This is to certify that the Trane® equipment has been properly and completely installed, and that the applicable items listed above have been satisfactorily completed.

Checklist completed by: ____________________

Signed: ____________________

Date: ____________________

In accordance with your quotation and our purchase order number ________________, we will therefore require the presence of Trane service on this site, for the purpose of start-up and commissioning, by ________________ (date).

Note: *Minimum two-week advance notification is required to allow scheduling of the chiller start-up.*

Additional Comments/Instructions:

____

____

____

____

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____

Note: *A copy of this completed from must be submitted to the Trane Service Office that will be responsible for start-up of chiller.*

Operator Log

Ascend™ ACR Chiller with Symbio 800 Controller - AdaptiView™ Reports - Log Sheet				
	Start	**15 minutes**	**30 minutes**	**1 hour**
EVAPORATOR				
Active Chilled Water Setpoint				
Entering Water Temperature				
Leaving Water Temperature				
Ckt 1				
Saturated Refrigerant Temperature (°F)				
Refrigerant Pressure (psia)				
Approach Temperature (°F)				
Water Flow Status				
Spillover Tank Liquid Level (in) — only applicable for 150 to 300 ton units				
EXV % Open				
Ckt 2				
Saturated Refrigerant Temperature (°F)				
Refrigerant Pressure (psia)				
Approach Temperature (°F)				
Water Flow Status				
Spillover Tank Liquid Level (in) — only applicable for 150 to 300 ton units				
EXV % Open				
CONDENSER				
Outdoor Air Temperature				
Ckt 1				
Air Flow %				
Saturated Refrigerant Temperature (°F)				
Refrigerant Pressure (psia)				
Ckt 2				
Air Flow %				
Saturated Refrigerant Temperature (°F)				
Refrigerant Pressure (psia)				
COMPRESSOR 1A				
Running Status				
Starts				
Running Time (Hr:Min)				
Oil Pressure (psia)				
COMPRESSOR 1B				
Running Status				
Starts				

Ascend™ ACR Chiller with Symbio 800 Controller - AdaptiView™ Reports - Log Sheet				
	Start	**15 minutes**	**30 minutes**	**1 hour**
Running Time (Hr:Min)				
Oil Pressure (psia)				
MOTOR 1A				
Active Demand Limit Setpoint				
Average Motor Current (%)				
Percent Speed				
AFD Average Input Voltage (Volts)				
AFD Input Power (kW)				
AFD Output Power (kW)				
AFD Speed (rpm)				
MOTOR 1B				
Active Demand Limit Setpoint				
Average Motor Current (%)				
COMPRESSOR 2A				
Running Status				
Starts				
Running Time (Hr:Min)				
Oil Pressure (psia)				
COMPRESSOR 2B				
Running Status				
Starts				
Running Time (Hr:Min)				
Oil Pressure (psia)				
MOTOR 2A				
Active Demand Limit Setpoint				
Average Motor Current (%)				
Percent Speed				
AFD Average Input Voltage (Volts)				
AFD Input Power (kW)				
AFD Output Power (kW)				
AFD Speed (rpm)				
MOTOR 1B				
Active Demand Limit Setpoint				
Average Motor Current (%)				

Date:
Technician:
Owner:

Trane - by Trane Technologies (NYSE: TT), a global innovator - creates comfortable, energy efficient indoor environments for commercial and residential applications. For more information, please visit trane.com or tranetechnologies.com.

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