Installation, Operation, and Maintenance

Ascend™ Air-Cooled Chiller — Model ACS

140 to 230 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.

October 2019

AC-SVX002C-EN

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 Material Safety Data Sheets (MSDS)/Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS/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 Ingersoll Rand personnel must follow Ingersoll Rand Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. All policies can be found on the BOS site. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Ingersoll Rand personnel should always follow local regulations.**

⚠ WARNING

R-410A Refrigerant under Higher Pressure than R-22!

Failure to use proper equipment or components as described below, could result in equipment failing and possibly exploding, which could result in death, serious injury, or equipment damage. The units described in this manual use R-410A refrigerant which operates at higher pressures than R-22. Use ONLY R-410A rated service equipment or components with these units. For specific handling concerns with R-410A, please contact your local Trane representative.

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

Copyright

Trademarks

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 model number description information that had been inadvertently deleted in previous revision.

Table of Contents

Model Number Information

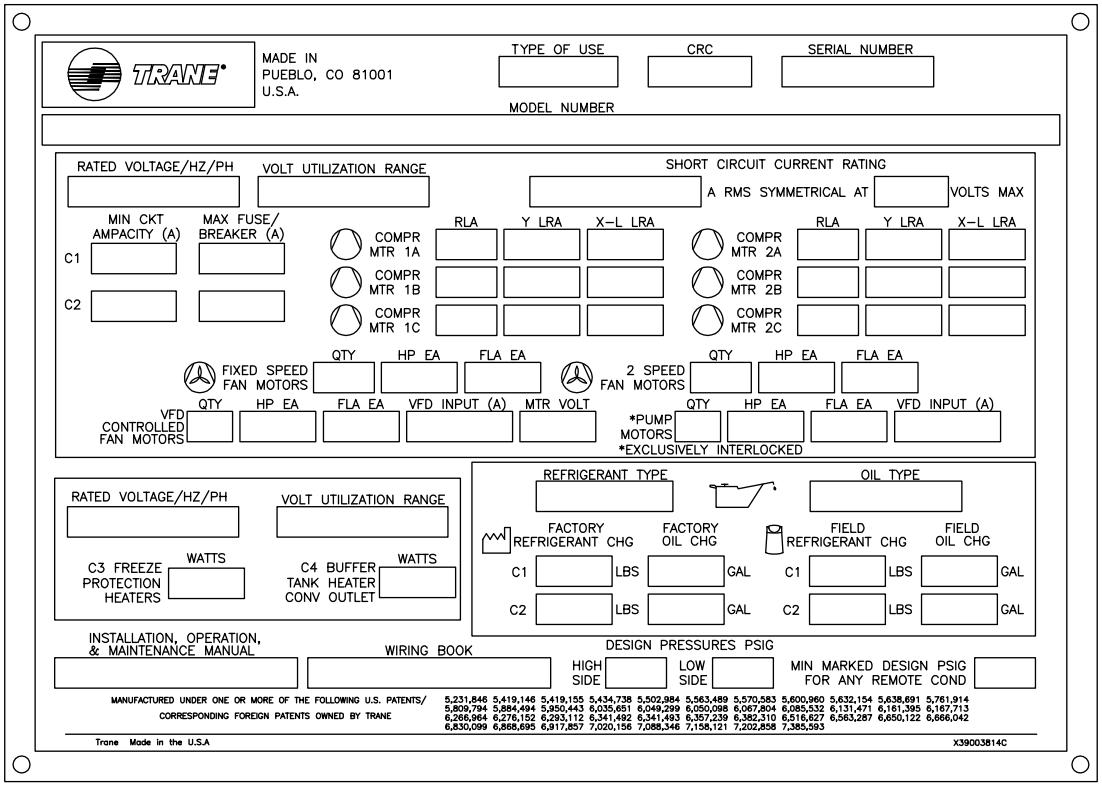
Nameplates

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-410A and refrigerant oil.
- 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.

ACSA 1802 EUA0 XUXA XNB2 ACAH SMEX 1TAB LXTA X1X4 XX0

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 08 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

ACSA = Air-Cooled Scroll Chiller

Digit 5, 6, 7 — Nominal Tonnage

140 = 140 Tons
160 = 160 Tons
180 = 180 Tons
200 = 200 Tons
215 = 215 Tons
230 = 230 Tons

Digit 8 — Compressor Type

2 = Scroll with Variable Volume Ratio

Digit 9— Unit Voltage

A = 200/60/3
B = 230/60/3
E = 460/60/3
F = 575/60/3

Digit 10— Manufacturing Location

U = Trane Commercial Systems, Pueblo, CO USA

Digits 11, 12 — Design Sequence

****** = Factory assigned

Digit 13 — Unit Sound Package

X = Standard Unit
L = Superior
R = Standard with Noise Reduction Request
Q = Superior with Noise Reduction Request

Digit 14 — Agency Listing

U =UL/cUL Listing
C = No Agency Listing

Digit 15 — Pressure Vessel Code

X = Not Applicable

Digit 16 — Factory Charge

A = Refrigerant Charge R-410A
B = Nitrogen Charge

Digit 17 — Auxiliary Items

X = No Auxiliary Items

Digit 18 — Evaporator Application

N = Standard Cooling (above 40°F)
P = Low Temp Process Cooling (below 40°F)
C = Ice Making

Digit 19, 20 — Evaporator Type

B2 = Brazed Plate Heat Exchanger (Standard)

Digit 21 — Water Connection

X = Grooved Pipe
A = Grooved Pipe + Flange Adapter

Digit 22 — Flow Switch Set Point

C = Flow Switch Setpoint 15
F = Flow Switch Setpoint 35
H = Flow Switch Setpoint 45
L = Flow Switch Setpoint 60

Digit 23 — Insulation

A = Factory Insulation — All Cold Parts 0.75 inch
B = Evaporator-Only Insulation for High Humidity/Low Evap Temp 1.25 inch

Digit 24 — Unit Application

X = Standard Ambient (32 to 115°F)
L = Low Ambient (–20 to 115°F)
H = High Ambient (32 to 130°F)
W = Wide Ambient (–20 to 130°F)

Digit 25 — Condenser Length

S = Standard

Digit 26 — Condenser Fin Options

M = Aluminum Microchannel
C = CompleteCoat™ Microchannel

Digit 27 — Fan Type

E = EC Condenser Fan Motors

Digit 28 — Compressor Starter

X = Across-the-Line Starter

Digit 29 — Incoming Unit Power Line Connection

1 = Single Point Unit Power Connection

Digit 30 — Power Line Connection Type

T = Terminal Block
H = Circuit Breaker with High Fault Rated Control Panel

Digit 31 — Short Circuit Current Rating

A = Default Short Circuit Rating
B = High Short Circuit Rating

Digit 32 — Electrical Accessories

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

Digit 33 — Remote Communications Options

X = None
B =BACnet® Interface
M = Modbus™ Interface
L = LonTalk® Interface

Digit 34 —Hard Wire Communication

X = None
A = Hard Wired Bundle — All
D = Unit Status Programmable Relay

Digit 35 — Smart Flow Control

X = None
T = Variable Primary Flow (Constant Delta T)

Digit 36 — Structural Options

A = Standard Unit Structure

Digit 37 — Appearance Options

X = No Appearance Options

Digit 38 — Unit Isolation

X = None
1 = Elastomeric Isolators

Digit 39 — Shipping Package

X = No Shipping Package
T = Tarp Covering Full Unit

Digit 40 — Pump Package

X = No Pump Option
2 = Single Pump, High Pressure, Single VFD
4 = Dual Pump, High Pressure, Dual VFD

Digit 41— Not Used

X = Selection1

Digit 42— Not Used

X = Selection1

Digit 43 — Special Requirement

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

Compressor Information

Model Number

Digit 1, 2, 3 — Compressor Type

DSH = Danfoss

Digit 4, 5, 6 — Capacity

381 = 30 tons
485 = 40 tons

Digit 7 — Agency Approval

A = UL

Digit 8 — Voltage

3 = 200–230V/60Hz/3ph
4 = 460V/60Hz/3ph
7 = 575V/60Hz/3ph

Digit 9, 10 — Custom

AT = Trane Pueblo
AT = Trane Epinal

General Information

Unit Description

Ascend™ Model ACS units are scroll type, air-cooled, liquid chillers, designed for installation outdoors. Each unit has two independent refrigerant circuits, with two or three compressors per circuit. The chillers are packaged with an evaporator and condenser.

Note: *Each unit is a completely assembled, hermetic -compressors packaged unit that is factory-piped, wired, leak-tested, dehydrated, charged and tested for proper control operations prior to shipment. The chilled water inlet and outlet openings are covered for shipment.*

The chiller features Tracer® UC800 controls to monitor the control variables that govern the operation of the chiller unit. Adaptive Control logic can correct these variables, when necessary, to optimize operational efficiencies, avoid chiller shutdown, and keep producing chilled water. Each refrigerant circuit is provided with filter, sight glass, electronic expansion valve, and charging valves. The evaporator is a brazed plate heat exchanger equipped with water drain and vent connections in the water piping. The condenser is an air-cooled slit or serpentine fin coil, arranged in a transverse V layout.

General Data

Table 1. General data (I-P)

Unit Size (tons)		140	160	180	200	215	230
Compressor Model							
Quantity	#	4	4	6	6	6	6
Tonnage/ckt[a]		30+40	40+40	30+30+30	30+30+40	30+40+40	40+40+40
Evaporator							
Water storage	gal	17.4	17.4	17.4	17.4	17.4	21.6
Min. flow[b]	gpm	168	192	216	240	258	276
Max. flow[b]	gpm	504	576	648	720	774	828
Water connection	in	4	4	4	4	4	4
Condenser							
Quantity of coils	#	8	8	10	10	12	12
Coil length	in	75	75	75	75	75	75
Coil height	in	49	49	49	49	49	49
Tube width	in	1	1	1	1	1	1
Fins per foot	fpf	276	276	276	276	276	276
Fan							
Quantity	#	8	8	10	10	12	12
Diameter	in	36	36	36	36	36	36
Airflow per fan	cfm	11337	11334	11336	11334	11337	11335
Power per motor	HP	3.0	3.0	3.0	3.0	3.0	3.0
Motor RPM	rpm	820	820	820	820	820	820
Tip speed	ft/min	7728	7728	7728	7728	7728	7728
General Unit							
Refrigerant circuits	#	2	2	2	2	2	2
Capacity steps	%	21-43-71-100	25-50-75-100	17-33-50-67-83-100	15-30-50-65-80-100	14-32-50-64-82-100	17-33-50-67-83-100
Min ambient - low/wide	°F	-20	-20	-20	-20	-20	-20
Min ambient - std/high	°F	32	32	32	32	32	32
Refrig charge/ckt[a]	lb	63	72	81	90	96.8	103.5
Oil charge/ckt[a]	gal	3.2	3.2	4.8	4.8	4.8	4.8
Pump Package (Single Pump)							

Table 1. General data (I-P) (continued)

Unit Size (tons)		140	160	180	200	215	230
Avail Head Pressure[c]	ft H_20	95	99	89	90	101	91
Power per motor	HP	21.4	22.3	23.2	27.3	27.1	26.3
Pump Package (Twin Pump)							
Avail Head Pressure[c]	ft H_20	91	94	82	82	92	80
Power per motor	HP	20.9	22.6	22.9	27.1	26.3	26.5

(a) Data shown for one circuit only. The second circuit always matches.
(b) Minimum and maximum flow rates apply to constant-flow chilled water system running at AHRI conditions, without freeze inhibitors added to the water loop.
(c) Pump available head pressure is based on 44/54° evaporator water, .0001 hr-ft-°F/Btu, 95°F ambient and 0 ft. elevation.

Table 2. General data (SI)

Unit Size (tons)		140	160	180	200	215	230
Compressor Model							
Quantity	#	4	4	6	6	6	6
Tonnage/ckt[a]		30+40	40+40	30+30+30	30+30+40	30+40+40	40+40+40
Evaporator							
Water storage	l	66.0	66.0	66.0	66.0	66.0	81.8
Min. flow[b]	l/s	10.6	12.1	13.6	15.1	16.3	17.4
Max. flow[b]	l/s	31.8	36.3	40.9	45.4	48.8	52.2
Water connection	mm	101.6	101.6	101.6	101.6	101.6	101.6
Condenser							
Quantity of coils	#	8	8	10	10	12	12
Coil length	mm	1914	1914	1914	1914	1914	1914
Coil height	mm	1252	1252	1252	1252	1252	1252
Tube width	mm	25.4	25.4	25.4	25.4	25.4	25.4
Fins per foot	(fpf)	276	276	276	276	276	276
Fan							
Quantity	#	8	8	10	10	12	12
Diameter	mm	914	914	914	914	914	914
Airflow per fan	m3/h	19262	19257	19260	19257	19262	19258
Power per motor	kW	2.2	2.2	2.2	2.2	2.2	2.2
Motor RPM	rpm	820	820	820	820	820	820
Tip speed	m/s	39.3	39.3	39.3	39.3	39.3	39.3
General Unit							
Refrigerant circuits	#	2	2	2	2	2	2
Capacity steps	%	21-43-71-100	25-50-75-100	17-33-50-67-83-100	15-30-50-65-80-100	14-32-50-64-82-100	17-33-50-67-83-100
Min ambient - low/wide	°C	-29	-29	-29	-29	-29	-29
Min ambient - std/high	°C	0	0	0	0	0	0
Refrig charge/ckt[a]	kg	28.6	32.7	36.8	40.8	43.9	47.0
Oil charge/ckt[a]	l	12	12	18	18	18	18
Pump Package (Single Pump)							
Avail Head Pressure[c]	kPa	284	297	267	270	302	272
Power per motor	HP	21.4	22.3	23.2	27.3	27.1	26.3
Pump Package (Twin Pump)							
Avail Head Pressure[c]	kPa	272	280	247	245	274	240
Power per motor	HP	20.9	22.6	22.9	27.1	26.3	26.5

[a] Data shown for one circuit only. The second circuit always matches.
[b] Minimum and maximum flow rates apply to constant-flow chilled water system running at AHRI conditions, without freeze inhibitors added to the water loop.
[c] Pump available head pressure is based on 44/54° evaporator water, .0001 hr-ft-°F/Btu, 95°F ambient and 0 ft. elevation.

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 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.*

Unit Storage

If the chiller is to be stored in ambients of 32°F or less, evaporator should be blown out to remove any liquid and refrigerant isolation valves should be closed. If the chiller is to be stored for more than one month prior to installation, observe the following precautions:

- Do not remove the protective coverings from the electrical panel.
- Store the chiller in a secure area.
- Units charged with refrigerant should not be stored where temperatures exceed 155°F.
- At least every three months, attach a gauge and manually check the pressure in the refrigerant circuit. If the refrigerant pressure is below 200 psig at 70°F (or 145 psig at 50°F), call a qualified service organization and the appropriate Trane sales office.

Note: *Pressure will be approximately 20 psig if shipped with the optional nitrogen charge.*

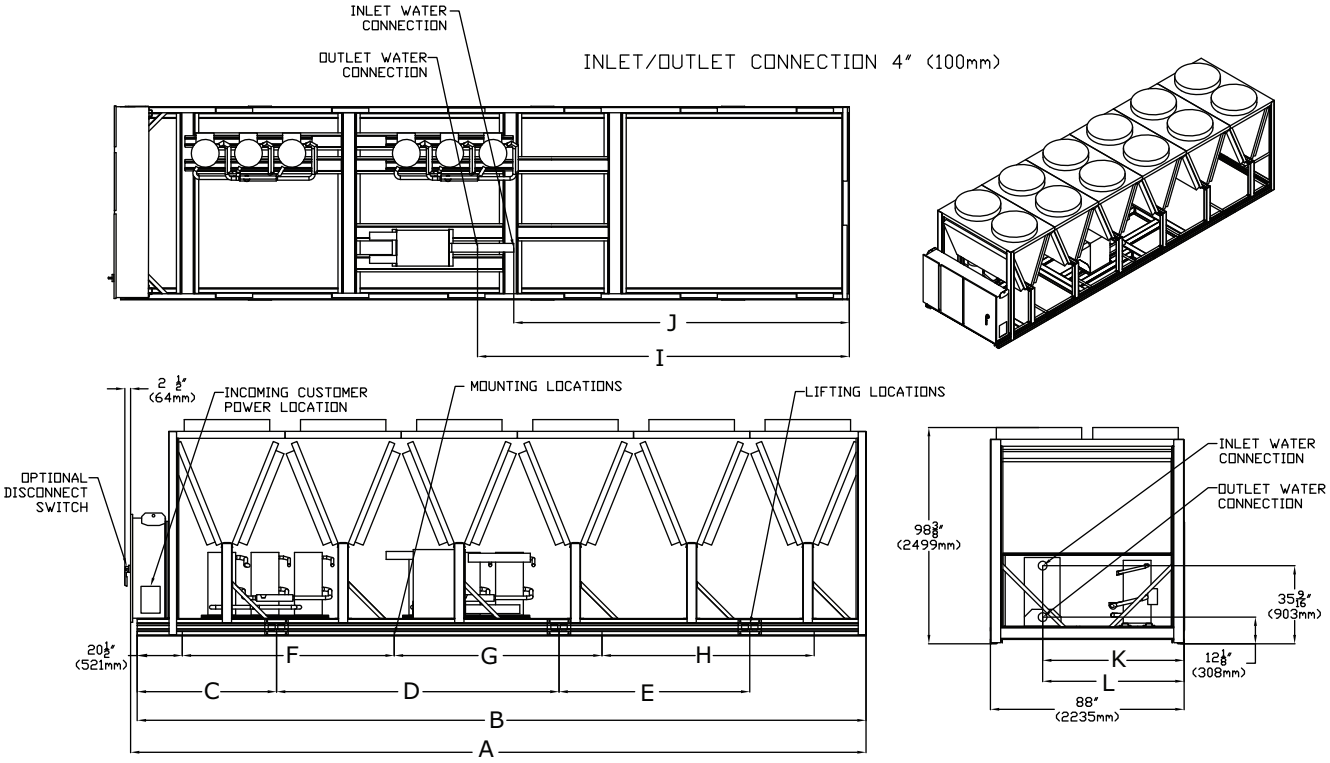
Installation Requirements

Type	Trane Supplied Trane Installed	Trane Supplied Field Installed	Field Supplied Field Installed
Foundation			• Meet foundation requirements
Rigging			• Safety chains • Clevis connectors • Lifting beam
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) • BAS wiring (optional) • Control voltage wiring • Chilled water pump contactor and wiring including interlock • Option relays and wiring
Water piping	• Flow switch • Water strainer		• Taps for thermometers and gauges • Thermometers • Water flow pressure gauges • Isolation and balancing valves in water piping • Vents and drain • Waterside pressure relief valves
Insulation	• Insulation • High humidity insulation (opt)		• Insulation
Water Piping Connection Components	Grooved pipe		
Other Materials	• R-410A refrigerant (1 lb max per unit as needed) • Dry nitrogen (20 psig max per unit as needed)		
Ascend™ Model ACS Installation Completion Check Sheet and Request for Trane Service (AC-ADF003*-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		

Dimensions and Weights

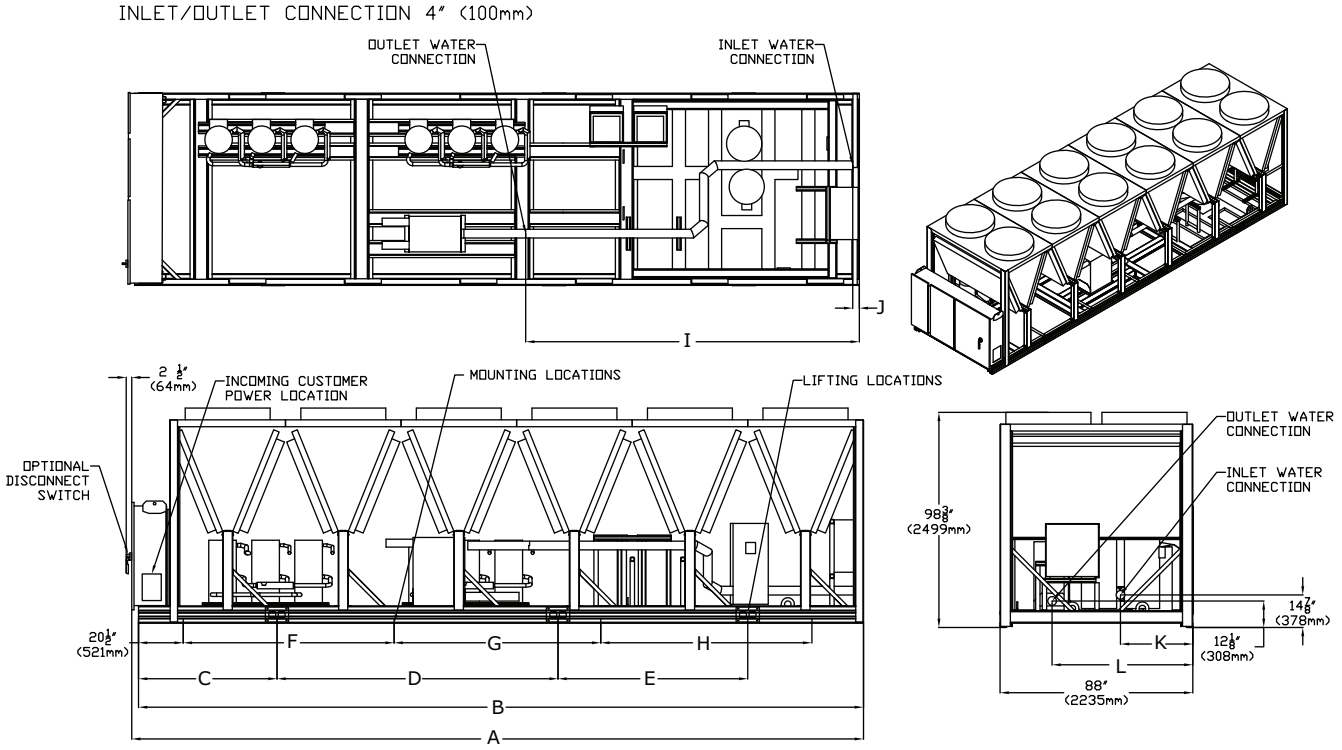
Unit Dimensions

Standard Unit



Dim	Unit Size											
	140		160		180		200		215		230	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
A	228.9	5513	228.9	5513	281.5	7151	281.5	7151	334.4	8495	334.4	8495.0
B	225.7	5734	225.7	5734	278.6	7076	278.6	7076	331.4	8418	331.4	8418
C	48.3	1226	48.3	1226	63.3	1609	63.3	1609	60.4	1535	60.4	1535
D	172.6	4383	172.6	4383	225.4	5725	225.4	5725	189.1	4803	189.1	4803
E	-	-	-	-	-	-	-	-	275.8	7006	275.8	7006
F	75.6	1920	75.6	1920	116.9	2970	116.9	2970	116.9	2970	116.9	2970
G	134.6	3420	134.6	3420	176.0	4470	176.0	4470	211.4	5370	211.4	5370
H	189.8	4820	189.8	4820	246.9	6270	246.9	6270	307.9	7820	307.9	7820
I	64.1	1628	64.1	1628	99.9	2536	99.9	2536	152.7	3878	152.7	3878
J	58.9	1751	58.9	1751	104.7	2689	104.7	2689	157.5	4001	157.5	4001
K	64.3	1633	64.3	1633	64.3	1633	64.3	1633	64.3	1633	64.3	1633
L	64.3	1633	64.3	1633	64.3	1633	64.3	1633	64.3	1633	64.3	1633

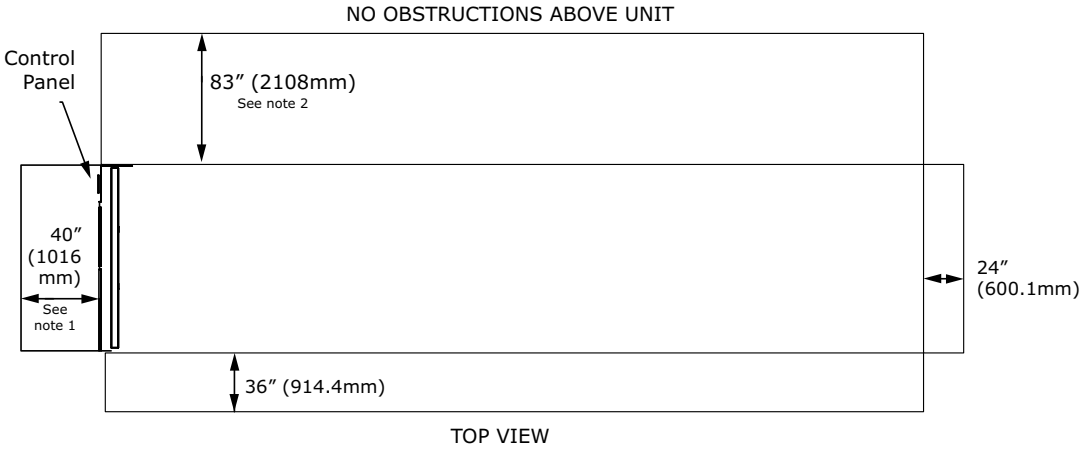
Units with Pump Package Option



Dim	Unit Size											
	140		160		180		200		215		230	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
A	228.9	5513	228.9	5513	281.5	7151	281.5	7151	334.4	8495	334.4	8495.0
B	225.7	5734	225.7	5734	278.6	7076	278.6	7076	331.4	8418	331.4	8418
C	48.3	1226	48.3	1226	63.3	1609	63.3	1609	60.4	1535	60.4	1535
D	172.6	4383	172.6	4383	225.4	5725	225.4	5725	189.1	4803	189.1	4803
E	-	-	-	-	-	-	-	-	275.8	7006	275.8	7006
F	75.6	1920	75.6	1920	116.9	2970	116.9	2970	116.9	2970	116.9	2970
G	134.6	3420	134.6	3420	176.0	4470	176.0	4470	211.4	5370	211.4	5370
H	189.8	4820	189.8	4820	246.9	6270	246.9	6270	307.9	7820	307.9	7820
I	92.4	2346	92.4	2346	104.4	2652	104.4	2652	157.3	3996	157.3	3996
J	5.5	139	5.5	139	3.3	83	3.3	83	5.6	143	5.6	143
K	33.0	838	33.0	838	33.0	838	33.0	838	33.0	838	33.0	838
L	75.4	1915	75.4	1915	33.0	838	33.0	838	64.3	1633	64.3	1633

Service Clearance

Figure 1. Unit service clearance requirements



Notes:

1. *A full 40" clearance is required in front of the control panel. Must be measured from front of panel, not end of unit base.*
2. *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.*

Weights

Table 3. Unit weights

Unit Size (tons)	Standard Unit				Options - Additional Weight	
	Shipping		Operating		Pump Package	
	lb	kg	lb	kg	lb	kg
140	7754	3517	7896	3581	2970	1347
160	7754	3517	7896	3581	2970	1347
180	9434	4278	9576	4343	3205	1454
200	9434	4278	9576	4343	3205	1454
215	10376	4706	10519	4771	3711	1683
230	10523	4772	10700	4853	3711	1683

Note: Weights include factory charge of refrigerant and oil.

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.

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.*
- *See Center of Gravity section for more information.*

Figure 2. 4–point lift configuration — 140, 160, 180, 200 ton units

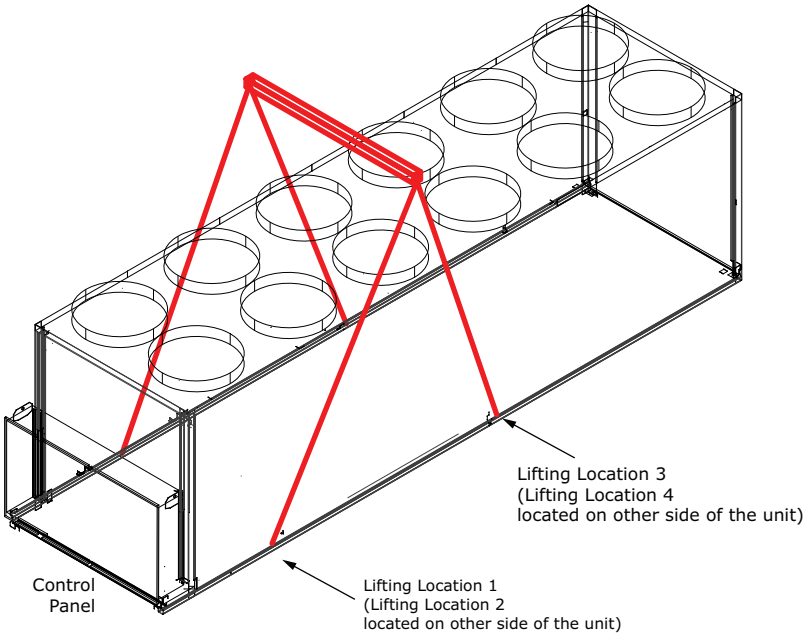
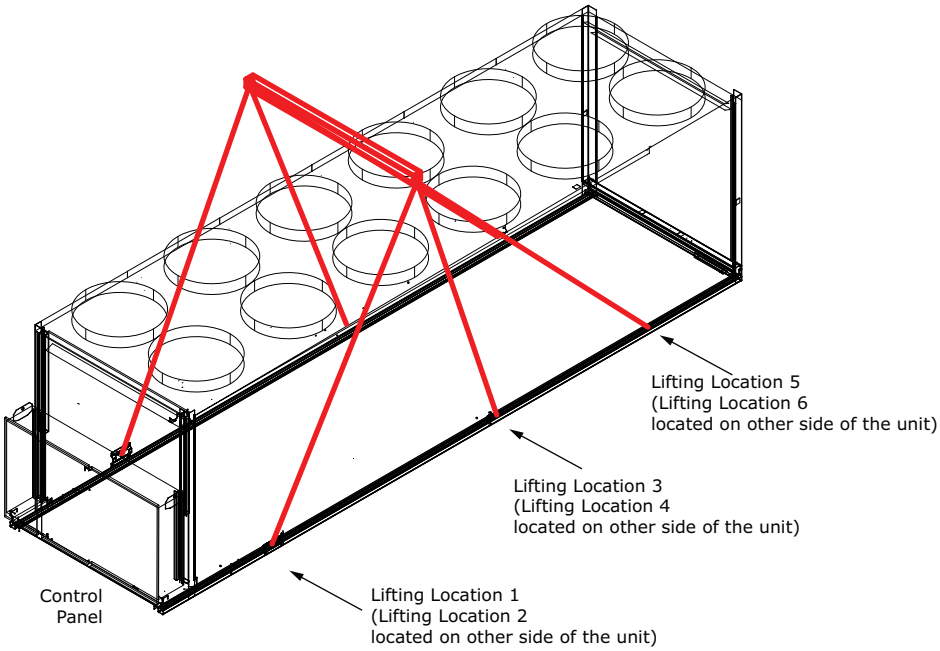


Figure 3. 6–point lift configuration — 215, 230 ton units



Center of Gravity

Figure 4. Center of gravity

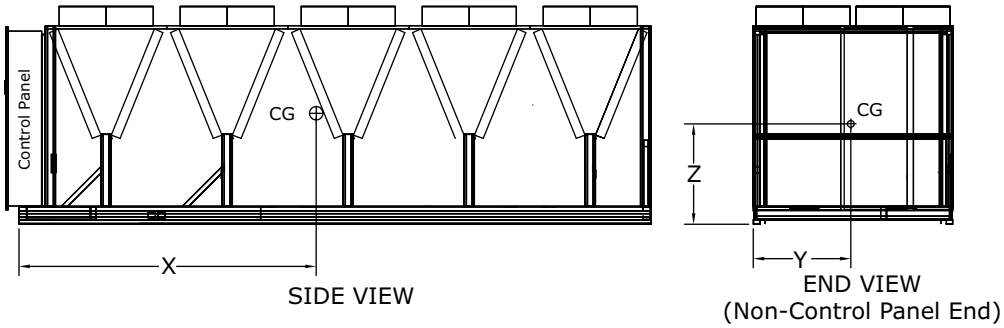


Table 4. Center of gravity — shipping

Unit Size	CGx		CGy		CGz		CGx		CGy		CGz	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	Standard Unit (without Pump Package)						Unit with Pump Package Option					
140	86	2184	46	1168	39	991	107	2718	46	1168	34	864
160	86	2184	46	1168	39	991	107	2718	46	1168	34	864
180	108	2743	47	1194	39	991	132	3353	47	1194	35	889
200	108	2743	47	1194	39	991	132	3353	47	1194	35	889
215	123	3124	47	1194	41	1041	154	3912	47	1194	36	914
230	122	3099	47	1194	41	1041	153	3886	47	1194	36	914

Table 5. Center of gravity — operating

Unit Size	CGx		CGy		CGz		CGx		CGy		CGz	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	Standard Unit (without Pump Package)						Unit with Pump Package Option					
140	87	2210	46	1168	39	991	107	2718	46	1168	34	864
160	87	2210	46	1168	39	991	107	2718	46	1168	34	864
180	109	2769	47	1194	39	991	132	3353	47	1194	35	889
200	109	2769	47	1194	39	991	132	3353	47	1194	35	889
215	123	3124	47	1194	41	1041	154	3912	47	1194	36	914
230	122	3099	46	1168	41	1041	153	3886	47	1194	36	914

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. 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.

Figure 5. Elastomeric isolator

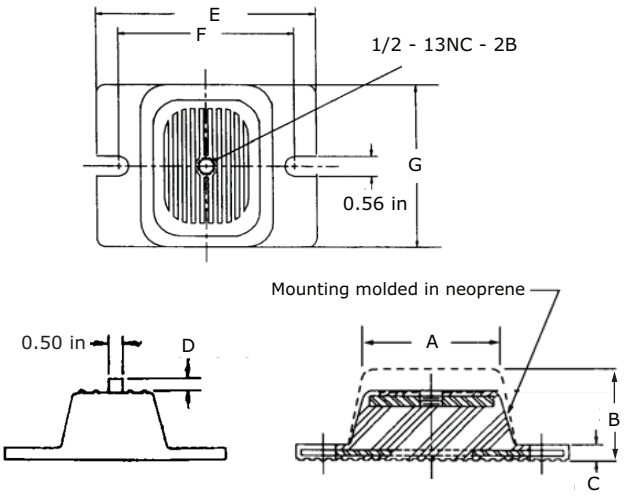


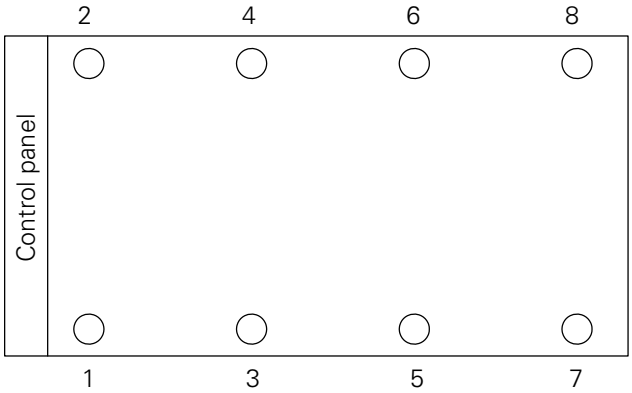
Table 6. Elastomeric isolator specifications

Isolator	Max Load (lbs)	Max Deflection (in)	A	B	C	D	E	F	G	Type
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

Mounting Locations, Weights, Isolators

See figure below for mounting point location designations.

Figure 6. Mounting point locations (top view)



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

Point Weights

Table 7. Point weights (lb) - base unit (without pump package)

Unit Size	Location							
	1	2	3	4	5	6	7	8
140	1329	1170	684	601	1410	1369	671	663
160	1329	1170	684	601	1410	1369	671	663
180	1645	1365	798	663	1832	1717	812	745
200	1645	1365	798	663	1832	1717	812	745
215	1710	1562	911	721	1934	1964	928	790
230	1745	1611	942	741	1945	1983	937	797

Table 8. Point weights (lb) - unit with pump package

Unit Size	Location							
	1	2	3	4	5	6	7	8
140	1317	1283	1289	1336	1277	1487	1322	1554
160	1317	1283	1289	1336	1277	1487	1322	1554
180	1663	1481	1403	1351	1696	1897	1548	1742
200	1663	1481	1403	1351	1696	1897	1548	1742
215	1774	1697	1607	1486	1869	2145	1772	1880
230	1810	1741	1644	1503	1881	2163	1784	1886

Isolator Selections

Table 9. Elastomeric isolator selections - base unit (without pump package)

Unit Size	Location							
	1	2	3	4	5	6	7	8
140	Red 62	Green 63	Red 62	Green 63	Brown 61	Brown 61	Brown 61	Brown 61
160	Red 62	Green 63	Red 62	Green 63	Brown 61	Brown 61	Brown 61	Brown 61
180	Red 62	Green 63	Red 62	Green 63	Brown 61	Brown 61	Brown 61	Brown 61
200	Red 62	Green 63	Red 62	Green 63	Brown 61	Brown 61	Brown 61	Brown 61
215	Red 62	Green 63	Red 62	Green 63	Brown 61	Brown 61	Brown 61	Brown 61
230	Red 62	Green 63	Red 62	Green 63	Brown 61	Brown 61	Brown 61	Brown 61

Table 10. Elastomeric isolator selections - unit with pump package

Unit Size	Location							
	1	2	3	4	5	6	7	8
140	Red 62	Green 63	Red 62	Green 63	Red 62	Red 62	Red 62	Red 62
160	Red 62	Green 63	Red 62	Green 63	Red 62	Red 62	Red 62	Red 62
180	Red 62	Green 63	Red 62	Green 63	Red 62	Red 62	Red 62	Red 62
200	Red 62	Green 63	Red 62	Green 63	Red 62	Red 62	Red 62	Red 62
215	Red 62	Green 63	Red 62	Green 63	Red 62	Red 62	Red 62	Red 62
230	Red 62	Green 63	Red 62	Green 63	Red 62	Red 62	Red 62	Red 62

Evaporator Piping

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

Heat Exchanger Damage!

Failure to follow instructions below could result in heat exchanger damage.

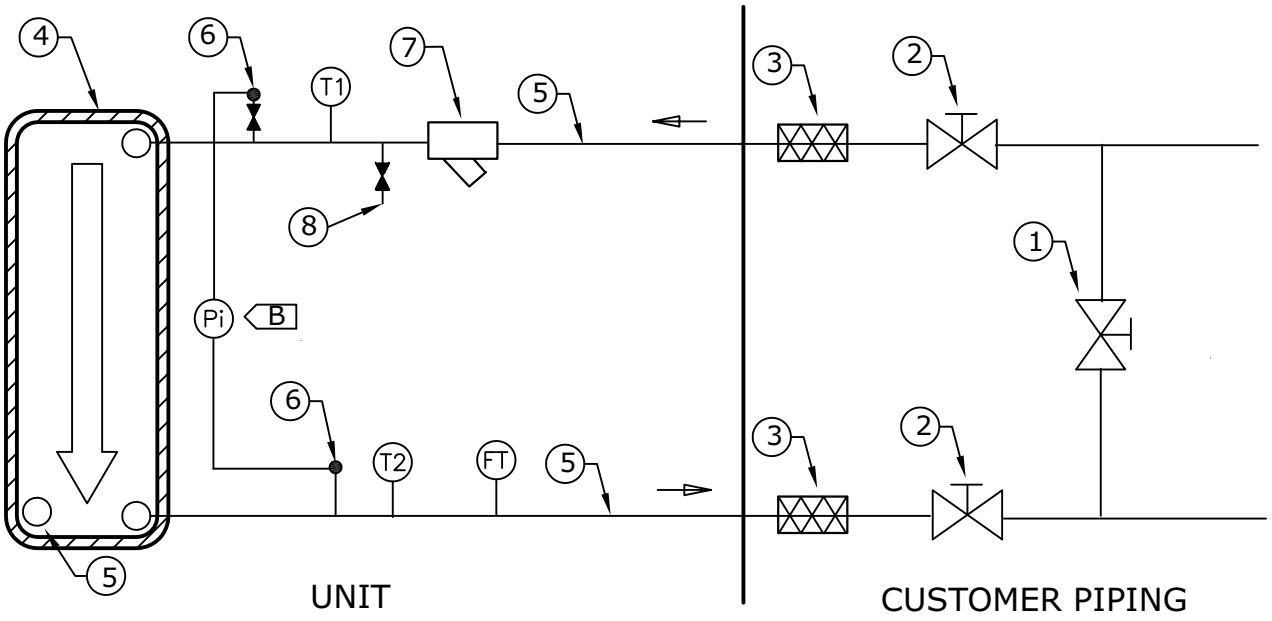
If an acidic commercial flushing solution is used, bypass the EVP chiller to prevent damage .

- 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 at the chilled water inlet line to the evaporator. Additional vents at high points in the piping must be provided 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 7. 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 Heat Exchanger	T2	Evap Water Outlet Temp Sensor
5	Water Heaters	**NOTE**	
6	Valve for Pressure point	B	Brazed plate differential pressure gauge and piping not supplied. Must account for water head height difference when calculating brazed plate pressure differential.
7	Strainer		
8	Water Heater		

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).
- Relief valve.

Leaving Chilled Water Piping

- Air vents (to bleed air from system).
- Water pressure gauges with shutoff valves.
- Vibration eliminators.
- Shutoff (isolation) valves.
- Thermometers.
- Balancing valve.

Water Strainer

The water strainer is factory-installed with taps for the pressure gauges on the inlet and outlet. Install pressure gauges in order to measure differential pressure across the filter. This will help to determine when it is necessary to clean the water strainer

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-SVE002*-EN for more details.

NOTICE

Equipment Damage!

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

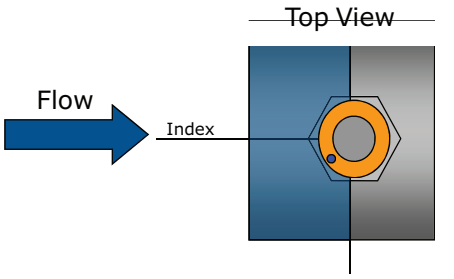
If using auxiliary flow sensing, both yellow LEDs come on initially when flow is stopped. The center yellow LED will turn off after approximately 7 seconds. The LED indicators are otherwise the same as indicated above.

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.

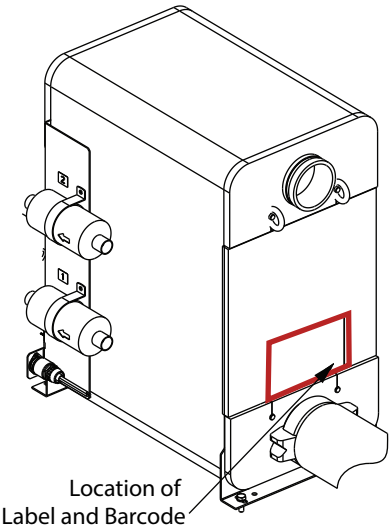
Figure 8. Proper flow switch indexing



The flow switch must have the dot in the shaded area to the left of this line for proper indexing (±90° off Index).

Evaporator Label

The brazed plate heat exchanger (BPHE) label, including barcode, is located under the insulation, in the locations shown below. Insulation backing over this area has not been removed, so it can be rolled back to access the label.



Location of Label and Barcode
Roll back the insulation

Pressure Drop Curves

Note: *See General Data tables for limit values for overlapping curves.*

Figure 9. Pressure drop curve, standard unit (without pump package)

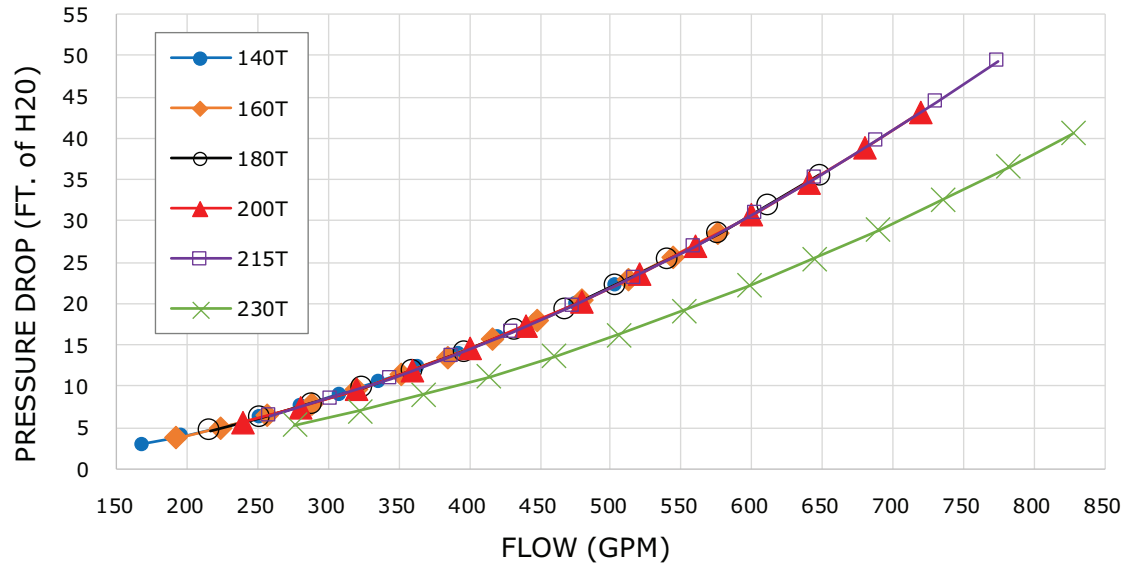


Figure 10. Pressure drop curve, unit with pump package

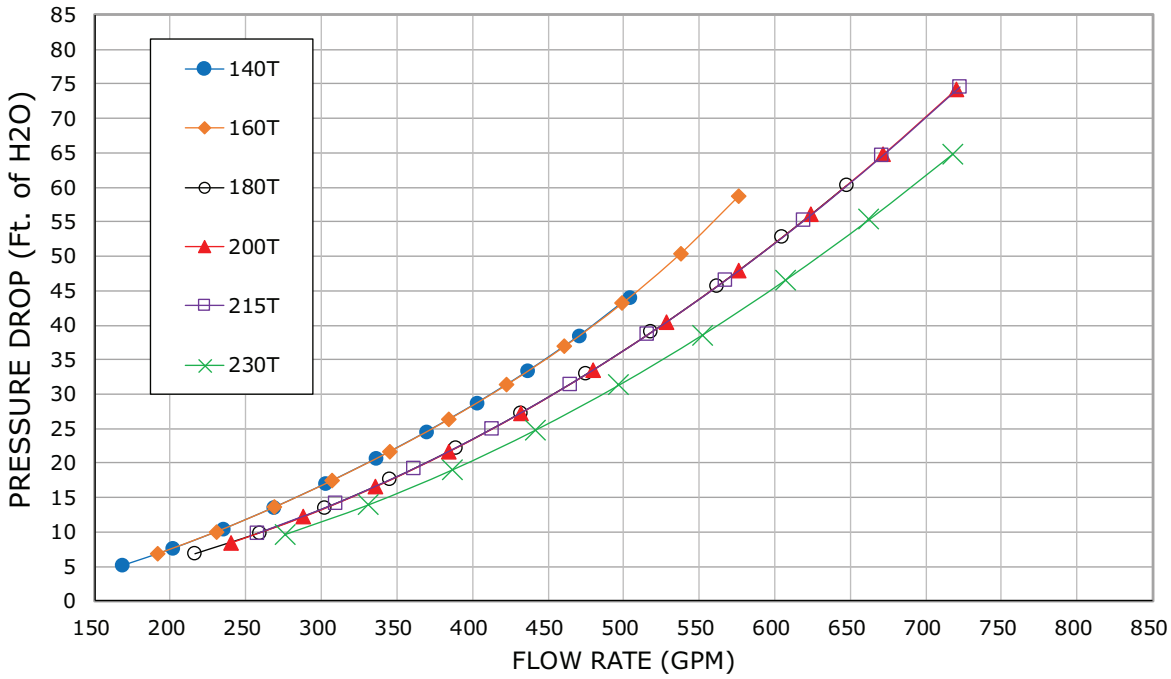


Figure 11. Pump package available head pressure (single pump)

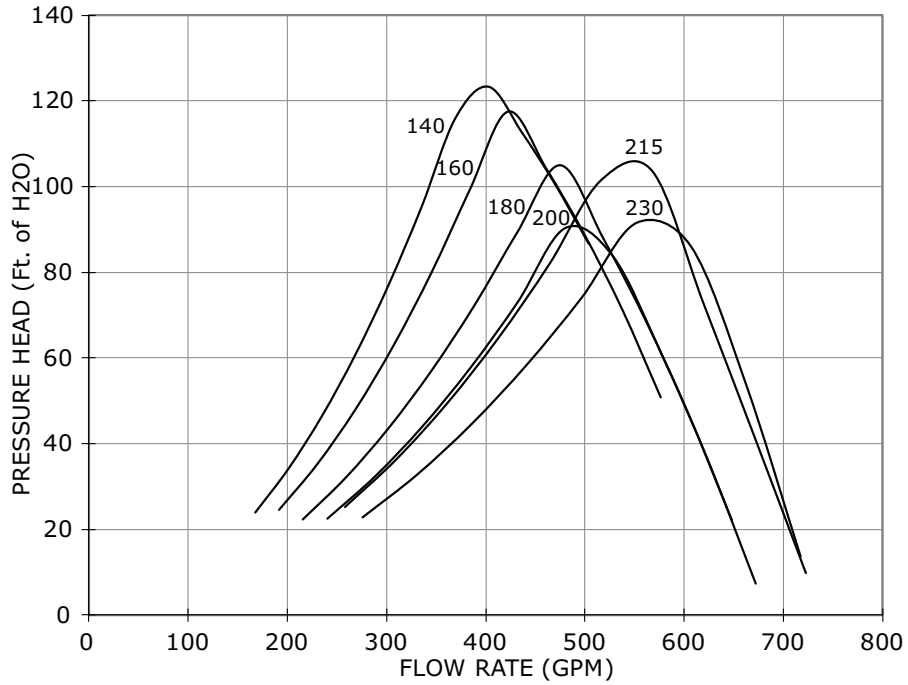
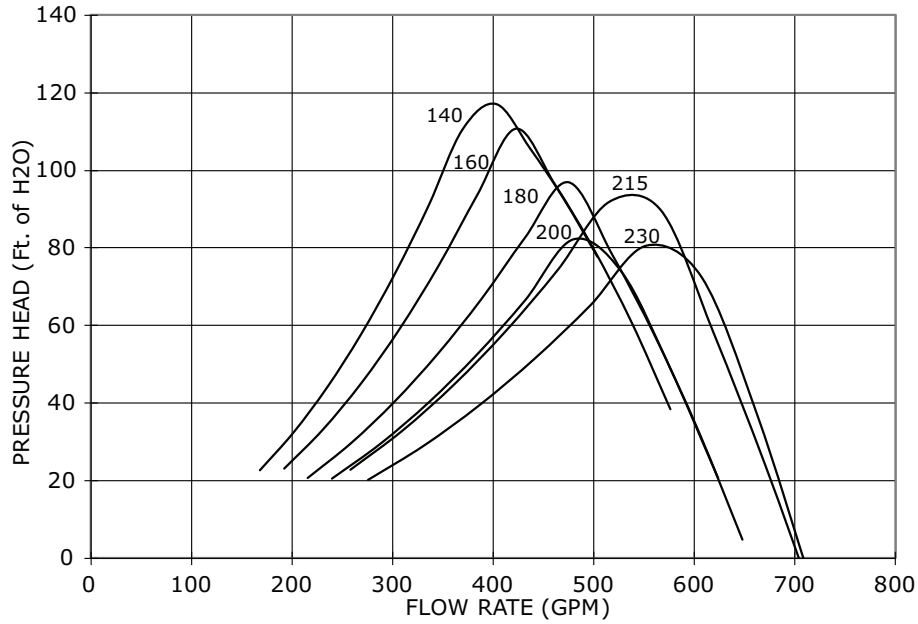


Figure 12. Pump package available head pressure (dual pump)



Pump Curves

Figure 13. Pump curve (series 4380 at 3416 rpm) — 140 to 200 ton units

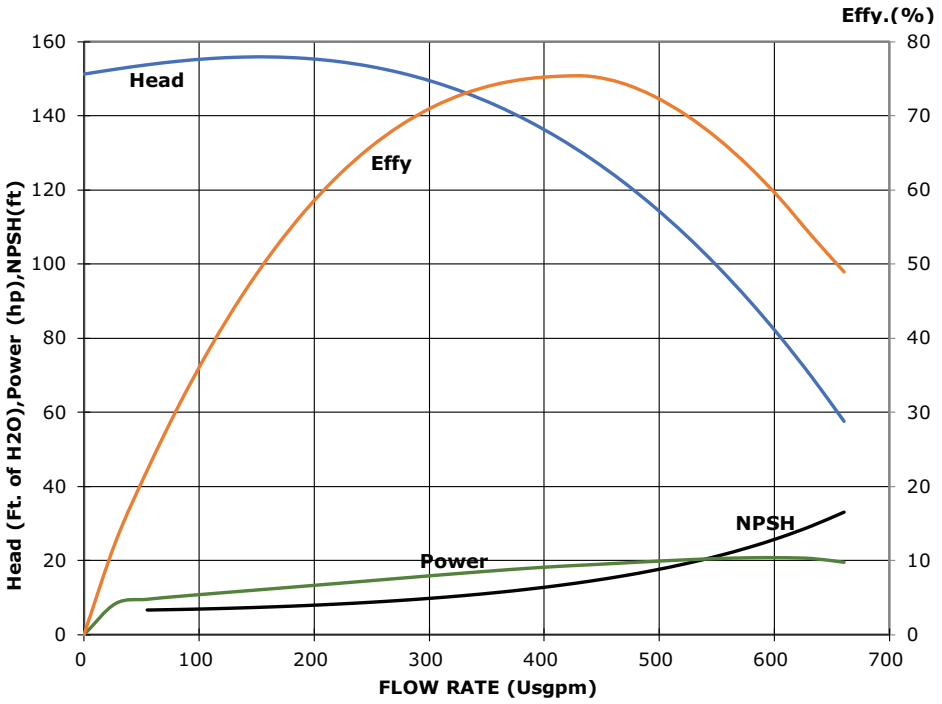


Figure 14. Pump curve (series 4380 at 3291 rpm) — 215 to 230 ton units

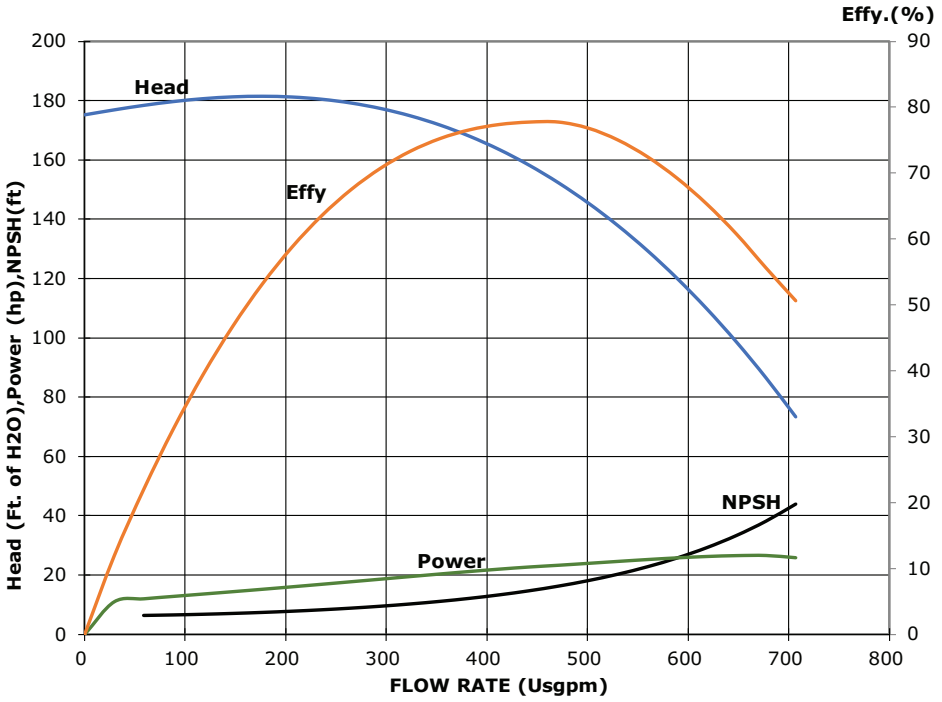


Figure 15. Pump curve (series 4392 at 3496 rpm) — 140 to 200 ton units

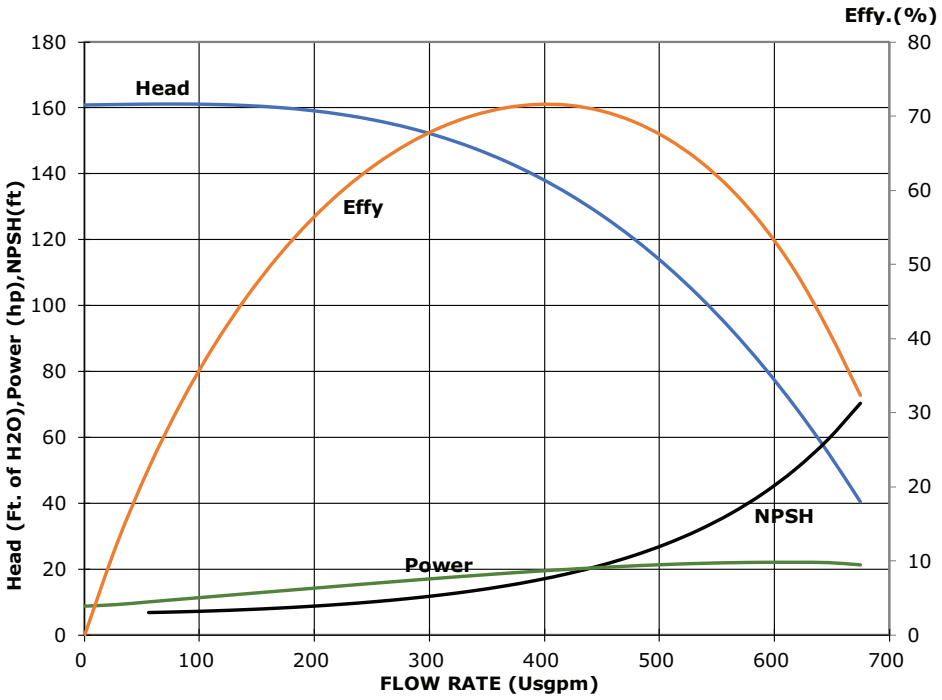
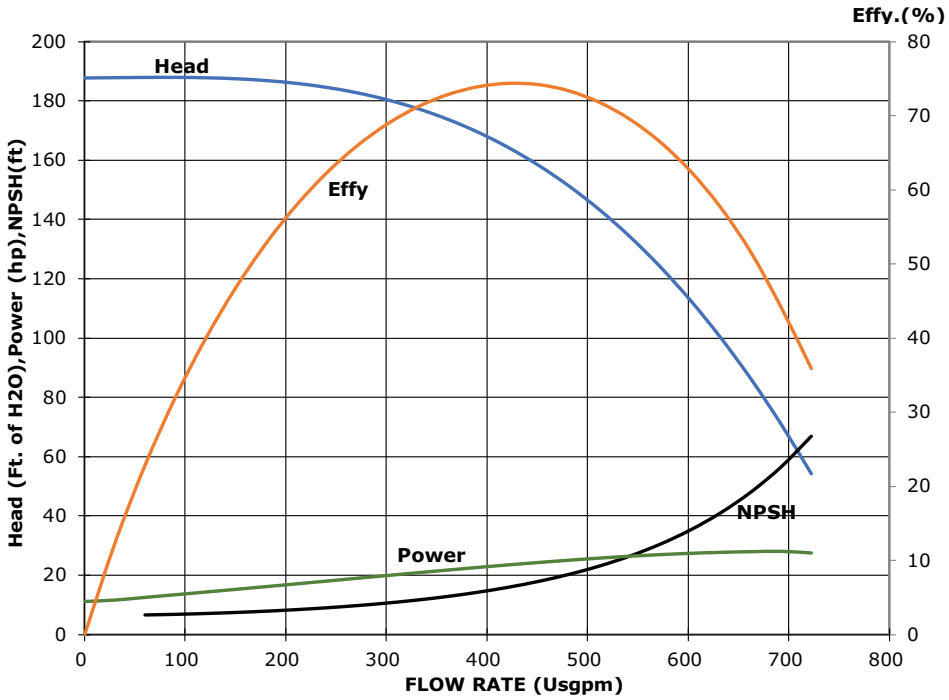


Figure 16. Pump curve (series 4392 at 3373 rpm) — 215 to 230 ton units



Freeze Avoidance

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.

Note: *Ascend™ model ACS chillers use brazed plate heat exchangers which are NOT at risk for refrigerant migration freeze. Chiller must only be protected from freeze due to low ambient conditions.*

Method	Protects to ambient temperature	Notes
Water Pump Control	Down to 0°F	• Unit controller can start the pump when the ambient temperatures drops to prevent freezing. For this option the pump must to be controlled by the chiller unand this function must be validated. • Heaters are factory-installed on the evaporator and water piping and will protect them from freezing. • ***If dual high head pump package option is selected, the chiller MUST control the pumps.***
Heaters	Down to -20°F	• Freeze protection heaters are provided on all chillers as standard. • Heaters are factory-installed on the evaporator and water piping and will protect them from freezing in ambient temperatures down to -20°F (-29°C). ***Note:*** *For units with optional pump package, heaters will protect to -4°F (-20°C) for water, -20°F (-29°C) for ethylene glycol or propylene glycol* • 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. • **See NOTICE below for important information.**
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.
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

Equipment Damage!

Failure to follow these instructions could result in equipment damage.

All heaters have separate power from the unit. All heaters must be energized or the unit controller must control the pumps when the unit is off (unless the water circuit is drained or sufficient glycol is used). In the event of prolonged power loss, neither heaters nor unit control of the pumps will protect the evaporator from catastrophic damage. In order to provide freeze protection in the event of a power loss you MUST drain the evaporator, use sufficient freeze inhibitor in the evaporator or provide back-up power for pump.

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: *Table below is not a substitute for full unit simulation for proper prediction of unit performance for specific operating conditions. For information on specific conditions, contact Trane product support.*

Table 11. Low ambient refrigerant temperature cutout (LERTC) and low water temperature cutout (LWTC) — ethlyene glycol

Glycol Percentage (%)	Solution Freeze Point (°F)	Minimum Recommended LERTC (°F)	Minimum Recommended LWTC (°F)	Minimum Chilled Water Set Point (°F)
0	32.0	26.0	36.0	41.7
1	31.6	25.6	35.6	41.3
2	31.0	25.0	35.0	40.7
3	30.3	24.3	34.3	40.0
4	29.7	23.7	33.7	39.4
5	29.0	23.0	33.0	38.7
6	28.3	22.3	32.3	38.0
7	27.6	21.6	31.6	37.3
8	26.9	20.9	30.9	36.6
9	26.2	20.2	30.2	35.9
10	25.5	19.5	29.5	35.2
11	24.7	18.7	28.7	34.4
12	23.9	17.9	27.9	33.6
13	23.1	17.1	27.1	32.8
14	22.3	16.3	26.3	32.0
15	21.5	15.5	25.5	31.2
16	20.6	14.6	24.6	30.3
17	19.7	13.7	23.7	29.4
18	18.7	12.7	22.7	28.4
19	17.8	11.8	21.8	27.5
20	16.8	10.8	20.8	26.5
21	15.8	9.8	19.8	25.5
22	14.7	8.7	18.7	24.4
23	13.7	7.7	17.7	23.4
24	12.5	6.5	16.5	22.2
25	11.4	5.4	15.4	21.1
26	10.2	4.2	14.2	19.9
27	9.0	3.0	13.0	18.7
28	7.7	1.7	11.7	17.4
29	6.4	0.4	10.4	16.1
30	5.1	-0.9	9.1	14.8
31	3.7	-2.3	7.7	13.4

Table 11. Low ambient refrigerant temperature cutout (LERTC) and low water temperature cutout (LWTC) —ethlyene glycol (continued)

Glycol Percentage (%)	Solution Freeze Point (°F)	Minimum Recommended LERTC (°F)	Minimum Recommended LWTC (°F)	Minimum Chilled Water Set Point (°F)
32	2.3	-3.7	6.3	12.0
33	0.8	-5.2	4.8	10.5
34	-0.7	-6.7	3.3	9.0
35	-2.3	-8.3	1.7	7.4
36	-3.9	-9.9	0.1	5.8
37	-5.6	-11.6	-1.6	4.1
38	-7.3	-13.3	-3.3	2.4
39	-9.0	-15.0	-5.0	0.7
40	-10.8	-16.8	-6.8	0.0
41	-12.7	-18.7	-7.0	0.0
42	-14.6	-20.6	-7.0	0.0
43	-16.6	-21.0	-7.0	0.0
44	-18.6	-21.0	-7.0	0.0
45	-20.7	-21.0	-7.0	0.0
46	-22.9	-21.0	-7.0	0.0
47	-25.1	-21.0	-7.0	0.0
48	-27.3	-21.0	-7.0	0.0
49	-29.7	-21.0	-7.0	0.0
50	-32.1	-21.0	-7.0	0.0
51	-34.5	-21.0	-7.0	0.0
52	-37.1	-21.0	-7.0	0.0
53	-39.7	-21.0	-7.0	0.0
54	-42.3	-21.0	-7.0	0.0
55	-45.0	-21.0	-7.0	0.0

Table 12. Low ambient refrigerant temperature cutout (LERTC) and low water temperature cutout (LWTC) — propylene glycol

Glycol Percentage (%)	Solution Freeze Point (°F)	Minimum Recommended LERTC (°F)	Minimum Recommended LWTC (°F)	Minimum Chilled Water Set Point (°F)
0	32.0	26.0	36.0	41.7
1	31.6	25.6	35.6	41.3
2	31.0	25.0	35.0	40.7
3	30.4	24.4	34.4	40.1
4	29.9	23.9	33.9	39.6
5	29.3	23.3	33.3	39.0
6	28.7	22.7	32.7	38.4
7	28.1	22.1	32.1	37.8
8	27.6	21.6	31.6	37.3
9	27.0	21.0	31.0	36.7
10	26.4	20.4	30.4	36.1

Table 12. Low ambient refrigerant temperature cutout (LERTC) and low water temperature cutout (LWTC) — propylene glycol (continued)

Glycol Percentage (%)	Solution Freeze Point (°F)	Minimum Recommended LERTC (°F)	Minimum Recommended LWTC (°F)	Minimum Chilled Water Set Point (°F)
11	25.7	19.7	29.7	35.4
12	25.1	19.1	29.1	34.8
13	24.4	18.4	28.4	34.1
14	23.8	17.8	27.8	33.5
15	23.1	17.1	27.1	32.8
16	22.4	16.4	26.4	32.1
17	21.6	15.6	25.6	31.3
18	20.9	14.9	24.9	30.6
19	20.1	14.1	24.1	29.8
20	19.3	13.3	23.3	29.0
21	18.4	12.4	22.4	28.1
22	17.6	11.6	21.6	27.3
23	16.7	10.7	20.7	26.4
24	15.7	9.7	19.7	25.4
25	14.8	8.8	18.8	24.5
26	13.8	7.8	17.8	23.5
27	12.7	6.7	16.7	22.4
28	11.6	5.6	15.6	21.3
29	10.5	4.5	14.5	20.2
30	9.3	3.3	13.3	19.0
31	8.1	2.1	12.1	17.8
32	6.8	0.8	10.8	16.5
33	5.5	-0.5	9.5	15.2
34	4.1	-1.9	8.1	13.8
35	2.7	-3.3	6.7	12.4
36	1.3	-4.7	5.3	11.0
37	-0.3	-6.3	3.7	9.4
38	-1.8	-7.8	2.2	7.9
39	-3.5	-9.5	0.5	6.2
40	-5.2	-11.2	-1.2	4.5
41	-6.9	-12.9	-2.9	2.8
42	-8.8	-14.8	-4.8	0.9
43	-10.7	-16.7	-6.7	0.0
44	-12.6	-18.6	-7.0	0.0
45	-14.6	-20.6	-7.0	0.0
46	-16.7	-21.0	-7.0	0.0
47	-18.9	-21.0	-7.0	0.0
48	-21.1	-21.0	-7.0	0.0
49	-23.4	-21.0	-7.0	0.0
50	-25.8	-21.0	-7.0	0.0

Table 12. Low ambient refrigerant temperature cutout (LERTC) and low water temperature cutout (LWTC) — propylene glycol (continued)

Glycol Percentage (%)	Solution Freeze Point (°F)	Minimum Recommended LERTC (°F)	Minimum Recommended LWTC (°F)	Minimum Chilled Water Set Point (°F)
51	-28.3	-21.0	-7.0	0.0
52	-30.8	-21.0	-7.0	0.0
53	-33.4	-21.0	-7.0	0.0
54	-36.1	-21.0	-7.0	0.0
55	-38.9	-21.0	-7.0	0.0

High Head Pump Package

Pump package includes: one or two high head pumps, VFD, drainage valves, shut-off valves at entering and leaving connections. See pump package unit schematic below.

Notes:

1. *Water piping system shall be equipped with an expansion tank, field installed outside of pump package.*
2. *The pump package is single point power integrated into the chiller unit power with a separate factory wired control panel. The control of the pump is integrated into the chiller controller.*

The unit controller displays evaporator pump starts and run-times. Freeze protection down to an ambient of -4°F (-20°C) for water, or -20°F (-29°C) for ethylene glycol or propylene glycol, is included. The cold parts of the pump package will also be insulated. Designed with one redundant pump, the chiller controls both pumps through a lead/lag and failure/recovery functionality. One or two variable speed drives are installed in an additional panel to control the pump.

Note: *Speed command is also available for customer-provided variable flow input.*

Figure 17. Pump package unit — field water piping

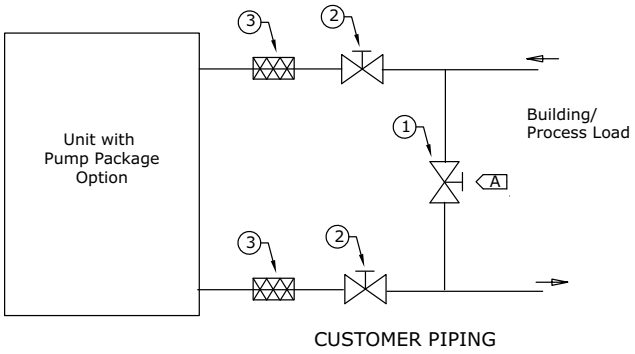


Table 13. Pump package unit — field water piping components

Item	Description
1	Bypass Valve
2	Isolator Valve
3	Vibration Eliminator
A	Isolate unit for initial water loop cleaning

Note: Water piping system shall be equipped with an expansion tank, field installed outside of pump package.

Figure 18. Pump package unit schematic

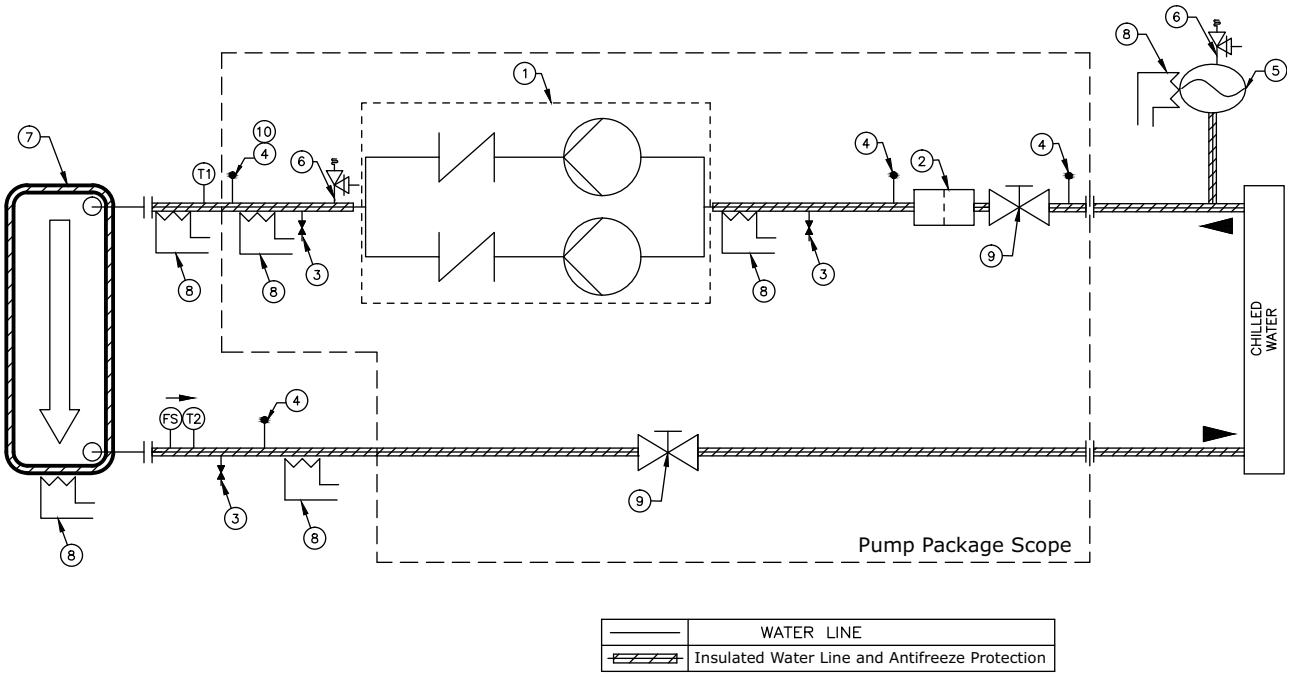


Table 14. Pump package components

Item	Description	Item	Description	Item	Description
1	Pump — Single or Dual	6	Water Pressure Relief Valve	T1	Evap Inlet Temp Sensor
2	Water Strainer	7	BPHE	T2	Evap Outlet Temp Sensor
3	Drain Valve	8	Antifreeze Protection	FS	Flow Switch
4	Valve for Pressure Point	9	Butterfly Valve		
5	Expansion Tank	10	Manual Air Bleed		

Expansion Tank

Water piping system shall be equipped with an expansion tank, field installed outside of pump package. Expansion tank should be capable of the thermal expansion of a loop volume equivalent to three (3) minute loop at rated flow. See volume calculation methods in ASHRAE-Handbook-Equip. 2012, section 13.5.

Table 15. Expansion tank volume selection examples (diaphragm tank type)

Example	Description	Units	Unit Size (tons)					
			140	160	180	200	215	230
1	Maximum Pressure	psi	30	30	30	30	30	30
	Acceptance Expansion Tanks Volume Req.	gal	26	29	33	37	40	42
	Acceptance volume	gal	28	36	36	49	49	49
	Tank Volume Required	gal	33	37	42	46	50	53
2	Maximum Pressure	psi	45	45	45	45	45	45
	Acceptance Expansion Tanks Volume Req.	gal	22	25	28	31	33	36
	Acceptance volume	gal	28	28	36	36	36	36
	Tank Volume Required	gal	28	32	35	39	42	45
3	Maximum Pressure	psi	125	125	125	125	125	125
	Acceptance Expansion Tanks Volume Req.	gal	17	20	22	24	26	28
	Acceptance volume	gal	20	20	28	28	36	36
	Tank Volume Required	gal	22	25	28	31	33	36
4	Maximum Pressure	psi	150	150	150	150	150	150
	Acceptance Expansion Tanks Volume Req.	gal	17	19	21	24	26	27
	Acceptance volume	gal	20	20	28	28	28	28
	Tank Volume Required	gal	21	24	27	30	33	35

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!

Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

⚠ 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.

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.**

For additional information regarding the safe discharge of capacitors, see Adaptive Frequency™ Drive Capacity Discharge section, and PROD-SVB06*-EN.

⚠ 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 310-16.

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 fused disconnect switches.

The type and installation location(s) of the fused disconnects 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.

See Dimensions and Weights chapter for location of incoming customer power locations in the control panel.

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.

The high voltage field-provided connections are made through patch plate on the right side of the main control panel.

To provide proper phasing of 3-phase input, make connections as shown in field wiring diagrams and as stated on the WARNING label in the starter panel. Proper equipment ground must be provided to each ground connection in the panel (one for each customer-supplied conductor per phase).

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.

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.

Heater Power Supply

The evaporator shell is insulated from ambient air and protected from freezing for temperature down to -4°F by two thermostatically-controlled immersion heaters combined with evaporator pumps activation through Tracer® UC800. Whenever the ambient temperature drops below 32°F the thermostat energizes the heaters and the Tracer UC800 activates the pumps. If ambient temperatures below -4°F are expected, contact your local Trane office.

NOTICE

Evaporator Damage!

Failure to follow instructions below could result in evaporator damage.

A qualified technician must frequently verify power to the heat tape and confirm operation of the heat tape thermostat. Control panel main processor does not check for loss of power to the heat tape, nor does it verify thermostat operation.

NOTICE

Equipment Damage!

Failure to follow instructions below could result in evaporator damage.

If evaporator is drained, heaters must be turned off to avoid damage to the heaters or heating elements. Damaged heaters could cause evaporator damage when unit is back in operation.

Water Pump Power Supply

For units without the optional pump package, provide power supply wiring with disconnect for the chilled water pump(s).

For units with the optional pump package, power is provided through a separate factory-wired control panel, integrated into the chiller unit power.

Interconnecting Wiring

Chilled Water Flow (Pump) Interlock

This chiller requires a field-supplied, control-voltage contact input through a flow proving switch (6S51) and an auxiliary contact (6K51). Connect the proving switch and auxiliary contact to terminal 2 connector J2 cards (1A11). Refer to the field wiring diagram for details.

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 16. Pump relay operation

Chiller Mode	Relay Operation
Auto	Instant Close
Ice Building	Instant Close
Tracer Override	Close
Stop	Timed Open
Ice Complete	Instant Open
Diagnostics	Instant Open

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 UC800 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.

Lead/Lag Dual Pump

The running pump is changed each time the unit is switched on.

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 17. 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.
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.

Table 17. Alarm and status relay output configurations (continued)

Description	
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.
None	This selection is desirable to provide an easy way for a customer to defeat the effect of the relay, if it has already been wired. For instance, if the relay was normally programmed as an "alarm" relay, and was wired to a claxon, it may be desirable to temporarily defeat the feature without changing wiring.
Service Request (for unit compressor or water pump)	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.
Hot Water Control	The output is true if capacity control is in Hot Water Control mode (water temperature being controlled to the Active Hot Water Setpoint). The output is false in any other capacity control mode (Chilled Water Control, Ice Making, etc.)

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 LLID board 1A18.

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

Table 18. Default assignments

Relay	Assignment
Relay 1 Terminals J2-1,2,3:	Evaporator Freeze Avoidance Request
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:	Latching Alarm

The eight available relays in the Lead/Lag Chiller Sequence Option are assigned with the following defaults as follows:

Table 19. Lead/lag chiller sequence option default assignments

LLID Name	LLID Software Relay Designation	Output Name	Default
Operating Status Programmable Relays Module 1	Relay 0	Status Relay 1, J2-1,2,3	Evaporator Water Freeze Avoidance Request
	Relay 1	Status Relay 2, J2-4,5,6	Maximum Capacity
	Relay 2	Status Relay 3, J2-7,8,9	Compressor Running
	Relay 3	Status Relay 4, J2-10,11,12	Latching Alarm
Operating Status Programmable Relays Module 2	Relay 4	Status Relay 5, J2-1,2,3	Alarm Ckt 2
	Relay 5	Status Relay 6, J2-4,5,6	Alarm Ckt 1
	Relay 6	Status Relay 7, J2-7,8,9	Alarm (Latching or Non latching)
	Relay 7	Status Relay 8, J2-10,11,12	Non Latching 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 1A10). 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

Emergency Stop

UC800 provides auxiliary control for a customer specified/installed latching trip out. When this customer-furnished remote contact 6S2 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 UC800 to clear.

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 6S1.

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.

Ice Building Option

If Programmable Relay Option is included with Evaporator Application item 'Ice', UC800 provides auxiliary control for a customer specified/installed contact closure for ice building if so configured and enabled. This output is known as the Ice Building Status Relay. The normally open contact will be closed when ice building is in progress and open when ice building has been normally terminated either through Ice Termination setpoint being reached or removal of the Ice Building command. This output is for use with the ice storage system equipment or controls (provided by others) to signal the system changes required as the chiller mode changes from "ice building" to "ice complete". When contact is provided, the chiller will run normally when the contact is open.

UC800 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.

UC800 also provides a "Front Panel Ice Termination Setpoint", settable through Tracer® TU, and adjustable from 20 to 32°F (-6.7 to 0°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 UC800 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. UC800 will not permit the ice building mode to be reentered until the unit has been switched out of ice building mode and then switched back into ice building mode.

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 to the proper terminals. 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/Hot Water Setpoint (ECHWS) Option

The UC800 provides inputs that accept either 4-20 mA or 2-10 VDC signals to set the external chilled/hot water setpoint (ECHWS). This is not a reset function. The input defines the setpoint. This input is primarily used with generic building automation systems (BAS).

When the unit is in cooling mode, the external water setpoint (EWS) corresponds to the chilled water setpoint.

When the unit is in heating mode, the external water setpoint (EWS) corresponds to the hot water setpoint.

The external water setpoint shall have a configurable minimum and maximum set for cooling, and another one for heating.

The setpoints may be changed from a remote location by sending either a 2-10 VDC or 4-20 mA signal that corresponds to an EWS range with a configurable minimum and maximum value.

Table 20. Setpoint/signal relationships

Input Signal	External Water Setpoint
< 1 VDC	Invalid
1 VDC to 2 VDC	min
2 VDC to 10 VDC	min + (max – min) * (Signal – 2) / 8
10 VDC to 11 VDC	max
> 11 VDC	Invalid
< 2 mA	Invalid
2 mA to 4 mA	min
4 mA to 20 mA	min + (max – min) * (Signal – 4) / 16
20 mA to 22 mA	max
> 22 mA	Invalid

If the ECHWS 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, enable or disable, the External Chilled Water Setpoint.

External Demand Limit Setpoint (EDLS) Option

Similar to the above, the UC800 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 with Tracer (Comm4). 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 1A19 LLID terminals 5 and 6. Refer to the following paragraph on Analog Input Signal Wiring Details. The following equations apply for EDLS:

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 420 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).

Figure 19. Demand limit setpoint via 2–10 VDC signal

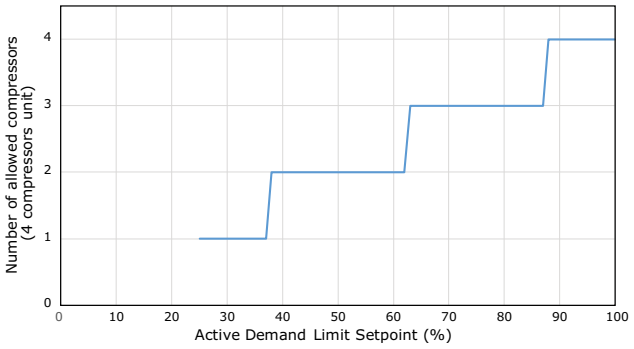
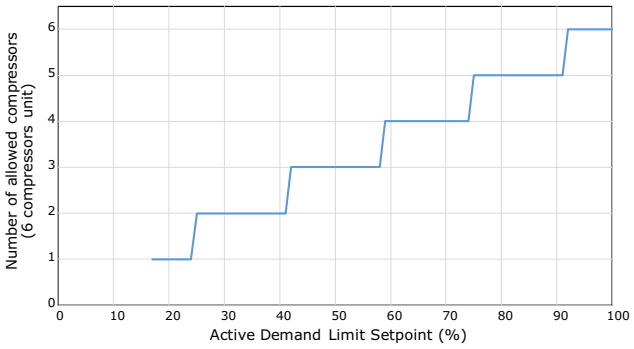


Figure 20. Demand limit setpoint via 4–20 mA signal



EDLS and ECHWS Analog Input Signal Wiring

Both the ECHWS 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 unit controller 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 ECHWS settings MUST be the same (2-10 VDC or 4-20mA), even if only one input is to be used.*

When not Installed, external chilled hot water setpoint analog input, external demand limit setpoint analog input and auxiliary binary input setpoint enable will not be used (Front panel or BAS sources used, depending which one is valid).

Setpoint Source selections are: BAS/Ext/FP, Ext/FP, or Front Panel

When Installed, both analog I/O and binary will be used, with respect of following status:

- **External chilled hot water setpoint:** IF it is the highest priority and it is a valid source THEN use this external setpoint for active chilled water setpoint.
- **External demand limit setpoint:** IF it is the highest priority and it is a valid source THEN use this external setpoint for active demand limit setpoint.
- **External auxiliary chilled hot water setpoint enable input:** IF setpoint source is set to external/ Front Panel or Front Panel THEN:
  - IF input open, use the next highest priority setpoint source (see priority list below)
  - IF input closed, use the auxiliary chilled water setpoint

Priority (from highest to lowest):

- BAS communication (BACnet®, LonTalk® or Modbus™)
- Ice Building
- External setpoints
- Front Panel setpoints

Chilled Water Reset (CWR)

UC800 resets the chilled water temperature setpoint 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.

Variable Definitions

- CWS is the arbitrated chilled water setpoint before any reset has occurred
- CWS' is the active chilled water setpoint, includes the effect of chilled water reset
- CWR is the amount of chilled water reset (also called Degrees of Reset)

The above values are related by the equations:

CWS′ = CWS + CWR

OR

CWR = CWS′ — CWS

With the chiller running and any type pf chilled water reset enabled, CWR is allowed to change at a

maximum rate of 1°F every 5 minutes until the actual CWR equals the desired CWR. When the chiller is not running, actual CWR shall be set equal to the desired CWR within one minute (no maximum rate is in effect).

If Chilled Water Reset is disabled, desired CWR is 0.

Additional Variable Definitions

- RESET RATIO is a user adjustable gain
- START RESET is a user adjustable reference
- TOD is the outdoor air temperature
- TWE is evaporator entering water temperature
- TWL is evaporator leaving 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.

The equations for each type of reset are as follows:

Return

CWR = RESET RATIO * + [START RESET - (TWE - TWL)]

with limits:

- CWR > or = 0
- CWR < or = Maximum Reset

Outdoor

CWR = RESET RATIO * + (START RESET - TOD)

with limits:

- CWR > or = 0
- CWR < or = Maximum Reset

Constant Return Water Temperature Reset

CWR = 100% * [Design Delta Temperature — (TWE-TWL)]

with limits:

- CWR > or = 0
- CWR < or = Maximum Reset

Using Equations for Calculating CWR

Degrees of Reset

- OUTSIDE AIR: Degrees of Reset = Reset Ratio * (Start Reset — TOD)
- RETURN RESET: Degrees of Reset = Reset Ratio * [Start Reset — (TWE-TWL)]
- DEGREES OF RESET = 100% * [Design Delta Temp — (TWE-TWL)]

Active CWS from Degrees of Reset

Active CWS = Degrees of Reset + Arbitrated CWS

Note: *Arbitrated CWS can either be Front Panel, BAS, or External*

Reset Ratio

The Reset Ratio on the User Interface is displayed as a percentage. To use it in the above equation it must be converted to its decimal form:

Reset Ratio percent / 100 = Reset Ratio decimal

Example of converting Reset Ratio:

If the Reset Ratio displayed on the User Interface is 50% then use (50/100) = .5 in the equation.

Diagnostic

If any sensor measurement needed to perform the currently selected chilled water reset type is invalid due to loss of communication or sensor failure, the desired CWR will be set to 0. The actual CWR is subject to maximum rate limits described earlier.

Communications Interface

LonTalk Interface (LCI-C)

UC800 provides an optional LonTalk® Communication Interface (LCI-C) between the chiller and a building automation system (BAS). An LCI-C LLID shall be used to provide "gateway" functionality between a LonTalk® compatible device and the chiller. The inputs/outputs include both mandatory and optional network variables as established by the LonMark® Functional Chiller Profile 8040.

Note: *For more information see ACC-SVN100*-EN.*

BACnet Interface (BCI-C)

Optional BACnet® Communication Interface for Chillers (BCI-C) is comprised of a Tracer® UC800 controller with interface software. It is a non-programmable communications module that allows units to communicate on a BACnet® communications network.

Note: *For more information, see BAS-SVP01*-EN.*

Modbus Remote Terminal Unit Interface

Modicon Communication Bus (Modbus™) enables the chiller controller to communicate as a slave device on a Modbus™ network. Chiller setpoints, operating modes, alarms and status can be monitored and controlled by a Modbus™ master device.

Note: *For more information, see BAS-SVP01*-EN.*

Operating Principles

This section contains an overview of the operation of Ascend™ Model ACS air-cooled liquid chiller equipped with microcomputer-based control system.

Note: *To ensure proper diagnosis and repair, contact a qualified service organization if a problem could occur.*

General

Ascend™ Model ACS units are scroll compressor, dual circuit, air-cooled liquid chillers. These units are equipped with unit-mounted starter/control panels and operate with R–410A refrigerant.

The basic components are:

- Unit-mounted panel containing starter and Tracer® UC800 controller and Input/Output LLIDs
- Scroll compressors
- Brazed-plate evaporator
- Air-cooled Microchannel (MCHE) condenser with subcooler
- Electronic Expansion Valve (EXV)
- Relating interconnecting piping

Refrigerant Cycle

The refrigeration cycle of the ACS chiller is conceptually similar to other Trane air-cooled chiller products. The chiller uses a brazed plate evaporator and an air-cooled MCHE condenser. The compressors use suction gas cooled motors and an oil management system to provide almost oil-free refrigerant to the condenser and evaporator for maximum heat transfer while lubricating and sealing compressor rotors and bearings. The lubrication system helps to assure long compressor life and contributes to quiet operation.

Refrigerant condenses in the MCHE air-cooled heat exchanger. Liquid refrigerant is metered into the brazed plate evaporator using an electronic expansion valve to maximize chiller efficiency at full and part load operation.

The chiller is equipped with a unit-mounted starter and control panel. Microprocessor based unit control modules (Trane Tracer™ UC800) provide accurate chilled water control and providing monitoring, protection and adaptive limit functions. The adaptive nature of the controls intelligently prevent the chiller from operating outside of its limits, or compensates for unusual operating conditions while keeping the chiller running rather than simply shutting off the chiller. If problems do occur, the UC800 controls provide diagnostic messages to help the operator in troubleshooting.

Oil System

The oil is efficiently separated inside the scroll compressor and will remain in the scroll compressor during all run cycles. Between 1-2% of the oil circulates around with the refrigerant.

See compressor section for oil level information.

Condenser and Fans

The air-cooled microchannel condenser coils use all aluminum brazed fin construction. The coil is composed of three components: the flat microchannel tube, the fins located between the microchannel tubes, and two refrigerant manifolds. Coils can be cleaned with high pressure water. (See Maintenance chapter for instructions.) The condenser coil has an integral subcooling circuit. Condensers are factory proof and leak tested at 650 psig. Direct-drive vertical-discharge airfoil condenser fans are dynamically balanced.

Controls

Overview

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

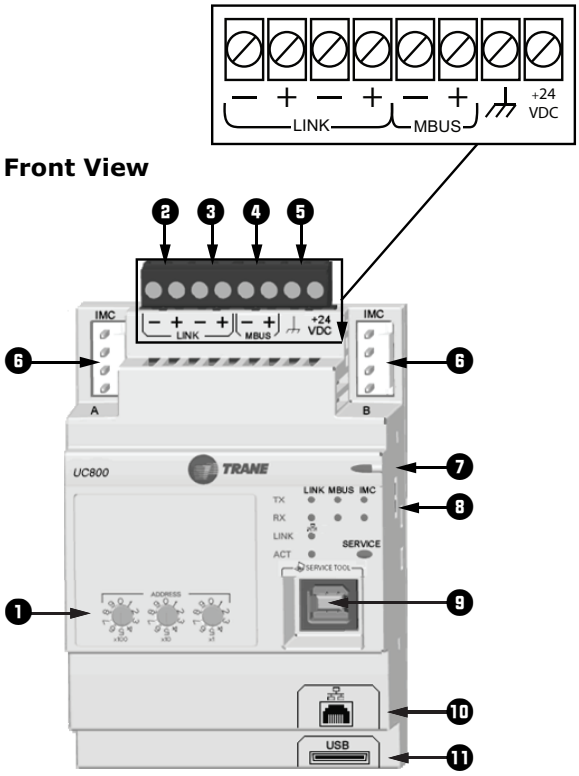
- Tracer® UC800 Controller
- Tracer AdaptiView™ TD7 Operator Interface

UC800 Specifications

Wiring and Port Descriptions

The following figure illustrates the UC800 controller ports, LEDs, rotary switches, and wiring terminals. The numbered list following the figure corresponds to the numbered callouts in the illustration.

Figure 21. UC800 wiring locations and connection ports



1. Rotary Switches for setting BACnet® MAC address or MODBUS® ID.
2. LINK for BACnet® MS/TP, or MODBUS® Slave (two terminals, ±). Field wired if used.
3. LINK for BACnet® MS/TP, or MODBUS® Slave (two terminals, ±). Field wired if used.
4. Machine bus for existing machine LLIDs (IPC3 Tracer bus). *IPC3 Bus: used for LonTalk® using LCI-C.*
5. Power (210 mA at 24 Vdc) and ground terminations (same bus as Item 4). Factory wired.
6. Modbus connection to AFD.
7. Marquee LED power and UC800 Status indicator (refer to the table in "LED Description and Operation," p. 46).
8. Status LEDs for the BAS link, MBus link, and IMC link.
9. USB device Type B connection for the service tool (Tracer® TU).
10. The Ethernet connection can *only* be used with the Tracer® AdaptiView™ display.
11. USB Host (not used).

Communication Interfaces

There are four connections on the UC800 that support the communication interfaces listed. Refer to the figure in "Wiring and Port Descriptions," p. 45 for the locations of each of these ports.

- BACnet® MS/TP
- MODBUS® Slave
- LonTalk® using LCI-C (from the IPC3 bus)

Rotary Switches

There are three rotary switches on the front of the UC800 controller. Use these switches to define a three-digit address when the UC800 is installed in a BACnet® or MODBUS® system (e.g., 107, 127, etc.).

Note: *Valid addresses are 001 to 127 for BACnet® and 001 to 247 for MODBUS®.*

LED Description and Operation

There are ten LEDs on the front of the UC800. The following figure shows the locations of each LED and the following table describes their behavior in specific instances.

Figure 22. LED locations

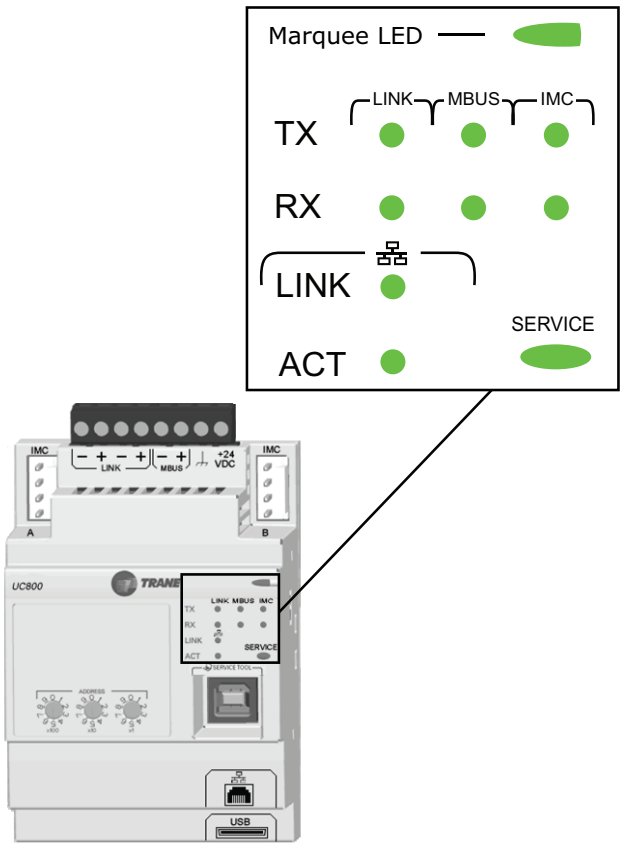


Table 21. LED behavior

LED	UC800 Status
Marquee LED	**Powered.** If the Marquee LED is green solid, the UC800 is powered and no problems exist.
	Low power or malfunction. If the Marquee LED is red solid, the UC800 is powered but there are problems present.
	Alarm. The Marquee LED blinks red when an alarm exists.
LINK, MBUS, IMC	The **TX** LED blinks green at the data transfer rate when the UC800 transfers data to other devices on the link. The **RX** LED blinks yellow at the data transfer rate when the UC800 receives data from other devices on the link.
Ethernet Link	The **LINK** LED is solid green if the Ethernet link is connected and communicating. The **ACT** LED blinks yellow at the data transfer rate when data flow is active on the link.
Service	The **Service** LED is solid green when pressed. For qualified service technicians only. Do NOT use.

Important: *Maintain at least 6 in. (16 cm) between low-voltage (less than 30V) and high voltage circuits.*

Tracer AdaptiView TD7 Display

Operator Interface

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 Tracer® AdaptiView™ TD7 display. Logically organized groups of information— chiller modes of operation, active diagnostics, settings and reports put information conveniently at your fingertips.

Figure 23. TD7 screens

Operator Display Boot Screen | Display Loading Data | Home Screen, Auto Mode

Home Screen

The home screen (see following figure) provides the most frequently needed chiller status information on “touch targets” (the entire white rectangular areas) for each chiller component. Touching any touch target displays a screen containing more chiller status information related to each component.

Figure 24. Home screen

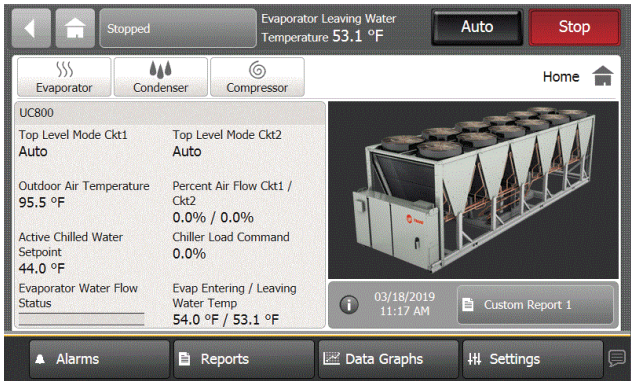


Table 22. Home screen items

Description	Resolution	Units
Top Level Mode Ckt1		
Top Level Mode Ckt2		
Outdoor Air Temperature	XX.X	°F /°C
Percent Air Flow Ckt1/Ckt 2	X.X/X.X	%
Active Chiller Water Setpoint	XX.X	°F /°C

Table 22. Home screen items (continued)

Description	Resolution	Units
Percent Speed 1A/2A	22.2	%
Evaporator Water flow Status	Flow/No Flow	
Evap Entering/Leaving Water Temp	XX.X/XX.X	°F /°C

Viewing Chiller Operating Modes

On the Reports screen, click Chiller Operating Modes to view the current operating status of the chiller in terms of the top-level operating mode and submodes.

Note: *Chiller Operating Modes screen can also be accessed from the chiller status button in the upper left corner of the screen.*

Figure 25. Chiller operating modes

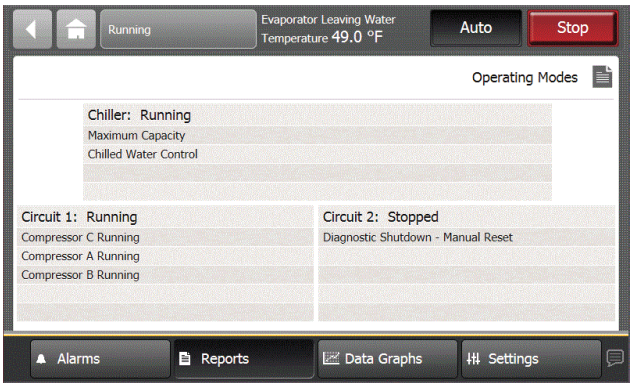


Table 23. Operating modes — chiller

Chiller Modes	Description
MP Resetting	
Stopped	The chiller is not running either circuit, and cannot run without intervention, for instance to place chiller into the "Auto Mode" or to clear a manual reset chiller level diagnostic.
Local Stop	Chiller is stopped by the AdaptiView Stop button command– cannot be remotely overridden.
Immediate Stop	Chiller is stopped by the AdaptiView Immediate Stop (by pressing the Stop then Immediate Stop buttons in succession) – previous shutdown was manually commanded to shutdown immediately.
Diagnostic Shutdown – Manual Reset	The chiller is stopped by a diagnostic that requires manual intervention to reset.
Software Service Lock	Software download is in progress from TU service tool
Run Inhibit	The chiller is currently being inhibited from starting (and running), but may be allowed to start if the inhibiting or diagnostic condition is cleared.
Ice Building Is Complete	The chiller is inhibited from running as the Ice Building process has been normally terminated on the evaporator entering temperature. The chiller will not start unless the ice building command (hardwired input or Building Automation System command) is removed or cycled.
Start Inhibited by BAS	Chiller is stopped by Tracer or other BAS system.
Start Inhibited by External Source	The chiller is inhibited from starting or running by the "external stop" hardwired input.
Start Inhibited by Local Schedule	The chiller is inhibited from starting or running by the Local Schedule.
Diagnostic Shutdown – Auto Reset	The entire chiller is stopped by a diagnostic that may automatically clear.
Waiting for BAS Communications	The chiller is inhibited because of lack of communication with the BAS. This is only valid 15 minutes after power up.
Start Inhibited by Low Ambient Temp	The chiller is inhibited based on the outdoor air temperature.This is a Chiller Level Mode when the chiller is in Chilled Water Control **with Free Cooling not installed**
Start Inhibited by Low Ambient Temp	The chiller is inhibited based on the outdoor air temperature.**This is a Chiller Level Mode when the chiller is in Hot Water Control with Supplemental Heat not installed.**
Start Inhibited by High Ambient Temp	The chiller is inhibited based on the outdoor air temperature.This is a Chiller Level Mode when the chiller is in Hot Water Control
No Evaporator Water Pumps Available	On multiple pump units, pump faults and/or pump lockouts have been identified on each pump, rendering the unit unable to run until the faults and/or lockouts are cleared. Depending on the pump configuration and scenario in which this submode is used, it may have a Run Inhibit or Stopped top level mode.
No Circuits Available	The entire chiller is stopped by circuit diagnostics or lockouts that may automatically clear.
Auto	The chiller is not currently running but can be expected to start at any moment given that the proper conditions and interlocks are satisfied.
Waiting For Evaporator Water Flow	The chiller will wait a user adjustable time in this mode for evaporator water flow to be established per the flow switch hardwired input.
Waiting For A Need To Cool	The chiller will wait indefinitely in this mode, for an evaporator leaving water temperature higher than the Chilled Water Setpoint plus some control dead-band.
Waiting For A Need To Heat	For water cooled the chiller will wait indefinitely in this mode, for a condenser leaving water temperature lower than the Hot Water Setpoint plus some control dead-band. For a reversible unit, the chiller will wait indefinitely in this mode, for an evaporator leaving water temperature lower than the Hot Water Setpoint plus some control dead-band.
Power-Up Delay Inhibit: MIN:SEC	On Power up, the chiller will wait for the Power-Up Delay Timer to expire. The associated customer settable delay time, provides a means to "stagger" the start ups of multiple chillers after a mains power restoration.
Waiting to Start	Generally a transient mode, this indicates the that a demand to run the chiller (cooling or heating) has been established, and the first compressor start is imminent, pursuant to sequential delays e.g. EXV pre-positioning.

Table 23. Operating modes — chiller (continued)

Chiller Modes	Description
Running	At least one circuit on the chiller is currently running.
Maximum Capacity	The chiller is operating at its maximum capacity.
Capacity Control Softloading	The control is limiting the chiller loading due to capacity based softloading setpoints.
Unit is Building Ice	The chiller is building ice, and will terminate on the Ice Termination Setpoint based on the Entering Evap Water Temperature sensor.
Running — Limit	At least one circuit on the chiller is currently running, but the operation of the chiller as a whole is being actively limited by the controls. The sub modes that apply to the Running top modes may also be displayed along with the following limit specific modes.
Demand Limit	The number of compressors allowed to operate is being limited to less than the available number of compressors by either the BAS system, the front panel demand limit setpoint or the external demand limit input.
Shutting Down	The chiller is still running but shutdown is imminent. The chiller is going through a compressor run-unload.
Evaporator Water Pump Off Delay: MIN:SEC	The Evaporator pump is executing the pump off delay timer.
Various	These submodes may be displayed in most of the top level chiller modes.
Hot Water Control	For water cooled the chiller is controlling to the leaving condenser water temperature. For a reversible the reversing valve is in the heating position. This sub-mode is mutually exclusive with the Chilled Water Control mode.
Chilled Water Control	For water cooled the chiller is controlling to the leaving evaporator water temperature. For a reversible the reversing valve is in the cooling position. This sub-mode is mutually exclusive with the Hot Water Control mode
Manual Evaporator Pump Override	The evaporator water pump relay is on due to a manual command.
Diagnostic Evap Pump Override	The evaporator water pump relay is on due to a diagnostic.
Manual Compressor Control Signal	Chiller capacity control is being controlled by AdaptiView.
Evaporator Antifreeze Heater On	The evaporator antifreeze heater is commanded on.
Local Schedule Active – Event X	The Local Schedule is active, and has selected Event X 's values to control the chiller.
Noise Reduction Active	The Noise Reduction Request/Night Noise Setback feature has been activated. If the unit is running, fans will be running at low speed.
Evaporator Water Pump X Locked Out	Evaporator Water Pump X has been locked out by manual override from TD7 or TechView.
Supplemental Heater On	At least one stage of supplemental heat is energized

Table 24. Operating modes — circuit

Circuit Modes	Description
Stopped	The circuit is not running, and cannot run without intervention.
Diagnostic Shutdown – Manual Reset	The circuit has been shutdown on a latching diagnostic.
Front Panel Circuit Lockout	The circuit is manually locked out by the circuit lockout setting – the nonvolatile lockout setting is accessible through AdaptiView™.
Run Inhibit	The given circuit is currently being inhibited from starting (and running), but may be allowed to start if the inhibiting or diagnostic condition is cleared.
Diagnostic Shutdown – Auto Reset	The circuit has been shutdown on a diagnostic that may clear automatically.
No Compressors Available	Based on the configured compressor staging sequence, the circuit cannot run because necessary compressors are being prevented from running.
Start Inhibited by Low Ambient Temp	The chiller is inhibited based on the outdoor air temperature. This is a Circuit Level Mode when the chiller is in Hot Water Control with Supplemental Heat installed.

Table 24. Operating modes — circuit (continued)

Circuit Modes	Description
External Circuit Lockout	The respective circuit is manually locked out by External Circuit Lockout switch.
Remote Circuit Lockout	The respective circuit is manually locked out by a BAS Remote Circuit Lockout command.
Auto	The circuit is not currently running but can be expected to start at any moment given that the proper conditions are satisfied.
Calibrating EXV	This submode is displayed when the circuit EXV is performing a calibration. A calibration is only performed when the chiller is not running and never more frequently than once every 24 hours (note, this mode can occur in other nonrunning top level circuit modes) but shown here as the most likely.
Waiting to Start	The circuit is going through the necessary steps to allow the lead circuit to start.
Running	The compressor on the given circuit is currently running.
Part-Load Efficiency Optimization	The circuit has part-load efficiency optimization that is active. Condenser fan speed will be decreased while evaporator capacity is held constant to improve unit EER.
Running - Limit	The circuit, and compressor are currently running, but the operation of the chiller/ compressor is being actively limited by the controls. Further information is provided by the sub-mode.* See the section below regarding criteria for annunciation of limit modes
Hot Start Limit	Additional stages on a given circuit are being held off based on leaving evaporator temperature.
Condenser Pressure Limit	The circuit is being inhibited from loading due to high discharge pressure. (aka Condenser Pressure)
Low Suction Pressure Limit	The circuit is being inhibited from loading due to low suction pressure.
High Discharge Temp Limit	The circuit is being inhibited from loading due to high discharge temperature.
Compressor Involute Pressure Limit	The circuit is being inhibited from loading due to high compressor involute pressure differential.
Preparing Shutdown	The circuit is preparing to de-energize the compressor.
Operational Pumpdown	The operational pumpdown is enabled and the circuit is shutting down.
Shutting Down	The chiller is going through the necessary steps after de-energizing the compressor.
Miscellaneous	These submodes may be displayed in most of the top level circuit modes.
Next Defrost Allowed In: MIN:SEC	The circuit recently defrosted, but is not being allowed to defrost again until the timer elapses, even if other criteria for defrost have been met.
Service Pumpdown	The circuit is currently performing a service pumpdown.
Compressor X Running	A specific compressor is running where X is A, B, or C.
Restart Time Inhibit Cprsr X: MIN:SEC	If there is accumulated Restart Inhibit Time, it must expire before the compressor is allowed to start. X is denoted as compressor A, B, or C.
Warm-Up Cycle	This circuit is in a warm-up cycle operating mode
Waiting for Warm-Up Cycle	This circuit is in waiting for a warm-up cycle. Has met the criteria for a warm-up cycle but is not allowed to start.
Defrosting	The circuit is in a de-frost operational mode.
Waiting for Defrost	This circuit is in waiting for defrost. Has met the criteria for defrost but is not allowed to start.
Manual Defrost Request	User has commanded a manual defrost cycle.
Compressor X Locked Out	Compressor X (A, B, or C) is manually locked out by its respective compressor lockout setting – the nonvolatile lockout setting is accessible through either the DynaView or TechView.

Table 24. Operating modes — circuit (continued)

Circuit Modes	Description
Compressor Sump Heater On	The circuit compressor sump heaters are commanded to be energized.

Note: Mode strings may or may not include the characters in parentheses.

Alarms

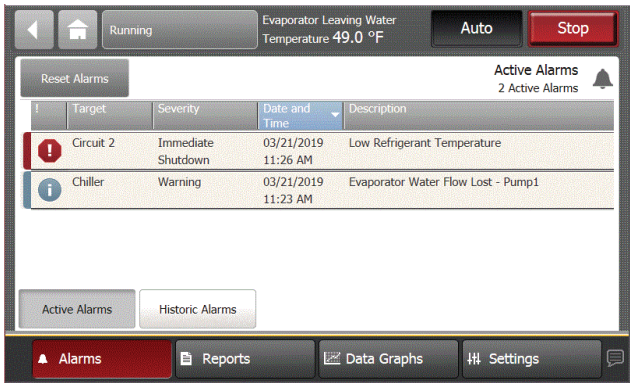
Alarms can be viewed and reset using the TD7 display. Alarms are communicated to the display immediately upon detection.

Viewing the Alarms Screen

Click the Alarms button in the main menu area to view the Alarm screen.

The Alarm screen will display a table of active alarms, listed chronologically, with the most recent first. See the following figure for an example of default view. The alarm list can be sorted by other columns.

Figure 26. Alarm screen



Reports

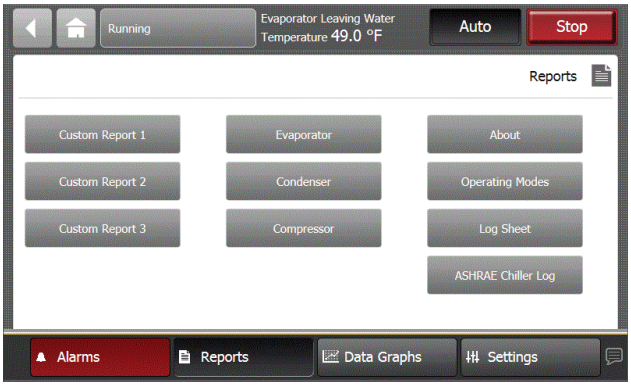
The TD7 provides the a variety of reports and allows the creation and editing of custom reports. All reports contain live data that refreshes every 2–5 seconds.

Viewing the Reports Screen

Click the Reports button in the main menu area to view the Reports screen. The Reports screen contains the following buttons to access the selected report:

- Custom Report1
- Custom Report2
- Custom Report3
- Evaporator
- Condenser
- Compressor
- About
- Operating Modes
- Log Sheet
- ASHRAE Chiller Log

Figure 27. Report screen



Editing a Custom Report

A custom report can be edited by adding, removing, or re-ordering data. Click **Edit** to access the Edit Custom Report screen.:

- **Add Items:** Select item to be added. Selected item will change to blue. Use arrows to scroll to additional items, and select all items to be added. Click **Add** to move the selected item to the box on the right side of the screen.
- **Remove Items:** Select item to be removed. Selected item will change to blue.Use arrows to scroll to additional items, and select all items to be removed. Click **Remove** to move the selected item to the box on the left side of the screen.
- **Re-order Items:** Select item to be moved. Selected item will change to blue. Use arrows to change the order of the item.

Touch **Save** to save and view the edited custom report.

Figure 28. Edit custom report screen

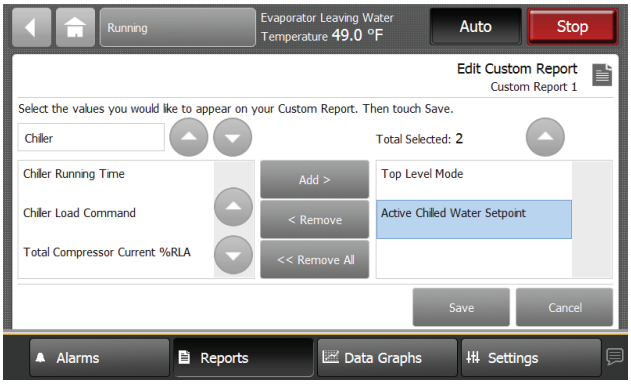


Figure 29. Report — evaporator screen

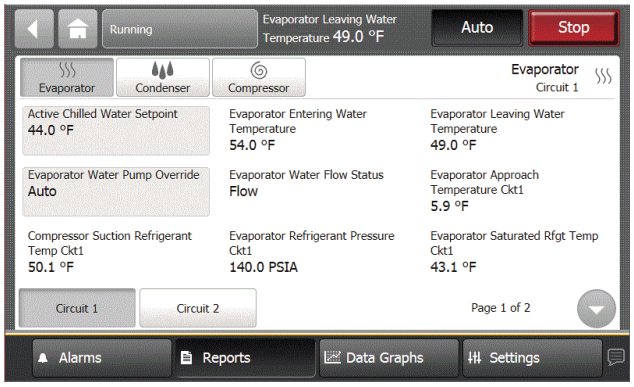


Table 25. Report — evaporator screen items

Description	Resolution	Units
Active Chilled Water Setpoint	X.X	°F / °C
Evaporator Entering Water Temperature	X.X	°F / °C
Evaporator Leaving Water Temperature	X.X	°F / °C
Evaporator Water Flow Status	Flow, No Flow	Text
Evaporator Water Pump Override	Auto, On	Text
Evaporator Approach Temperature	X.X	°F / °C
EXV Position Percent	X.X	%
Evaporator Refrigerant Pressure	XXX.X	PSIA/kPa
Evaporator Saturated Rfgt Temp	X.X	°F / °C
Evaporator Refrigerant Liquid Level	X.XX	in/mm

Figure 30. Report — condenser screen

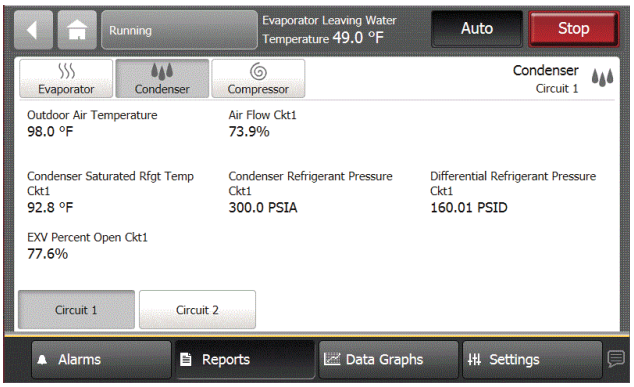


Table 26. Report — condenser screen items

Description	Resolution	Units
Condenser Entering Water Temperature	X.X	F / C
Condenser Leaving Water Temperature	X.X	F / C
Condenser Water Flow Status	Flow, No Flow	Text
Condenser Water Pump Override	Auto, On	Text
Condenser Approach Temperature	X.X	F / C
EXV Position Percent	X.X	%
Condenser Refrigerant Pressure	XXX.X	PSIA/kPa
Condenser Saturated Rfgt Temp	X.X	F / C
Differential Refrigerant Pressure	XXX.X	PSIA/kPa
Outdoor Air Temperature	X.X	F / C

Figure 31. Report — compressor screen

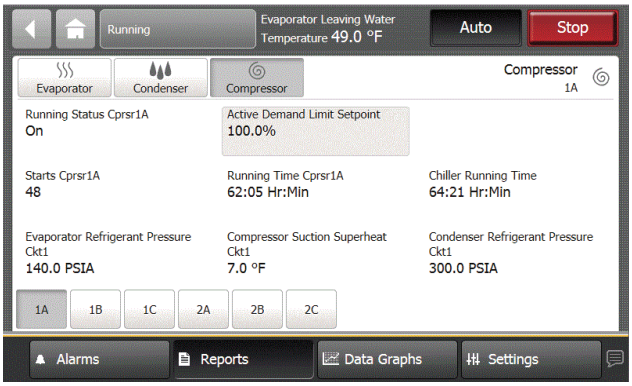


Table 27. Report — compressor screen items

Description	Resolution	Units
Compressor Running Status	On,Off	Text
Average Motor Current % RLA	XX.X%	%RLA
Compressor Starts	XX	Text
Compressor Running Time	XX:XX	Hr:Min
Oil Loss Level Sensor	Wet, Dry	Text
Discharge Temperature	X.X	°F / °C
Discharge Temperature	X.X	°F / °C
Compressor Oil Pressure	XXX.X	PSIA/kPaA
Evaporator Refrigerant Pressure	XXX.X	PSIA/kPaA

Table 27. Report — compressor screen items (continued)

Description	Resolution	Units
Condenser Refrigerant Pressure	XXX.X	PSIA/kPaA
Differential Refrigerant Pressure	XXX.X	PSIA/kPaA
Frequency Command	XX.X	Hz

Equipment Settings

You can use the TD7 display to monitor and change a variety of equipment settings.

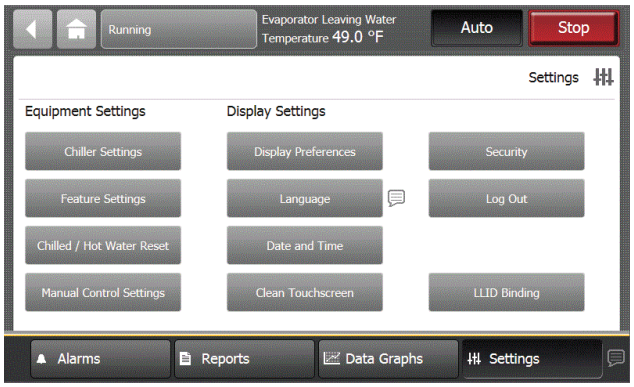
Accessing Equipment Settings

Equipment Settings are found on the left column of the Settings screen as shown in figure below. Included are the following:

- Chiller Settings
- Feature Settings
- Chilled Water Reset
- Manual Control Settings

Each selection will provide access to the detailed settings submenus.

Figure 32. Settings screen

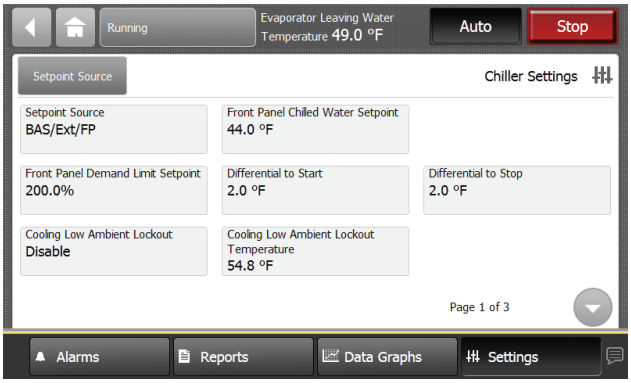


Viewing and Changing Equipment Settings

Each button in the Equipment Settings column on the Settings screen takes you to a submenu which displays the name of a setting and its current value. See figure below. Click any button to select and change the value.

Note: *A page number appears in the lower right corner of the screen. If a screen contains more than one page, up/down arrows also appear for viewing the other pages, as in figure below.*

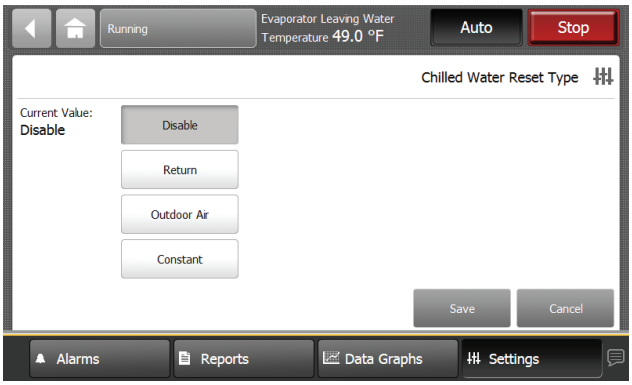
Figure 33. Equipment settings screen — chiller settings



To change an equipment setting, click desired setting from Equipment Settings column on the Settings screen. Click the setting to be changed. The screen to input new data will be one of two types:

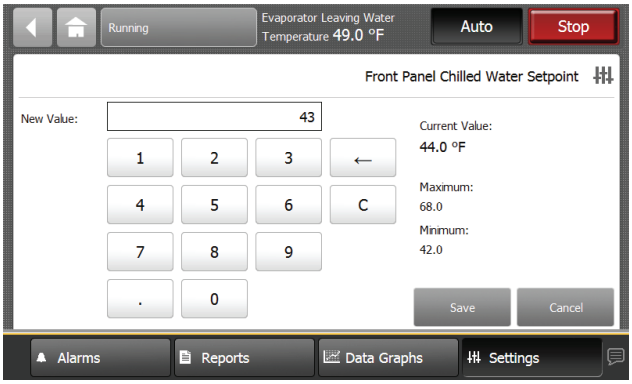
- **Button selections:** When clicked to select, the button becomes shaded, and a Save button appears at the bottom of the screen, as show below.

Figure 34. Chilled water reset screen



- **Numeric keypad screen:** For settings screen with numeric keypads (see example in figure below), enter the current value using the keypad. The new value will appear above the keypad. Keypad features:
  - When a new number is entered, the value in the New Value field is deleted and replaced with the new entry.
  - The backspace (arrow) key deletes the characters previously entered.
  - If the keypad is used to enter a setpoint that is out of range, an error dialog will appear when the **Save** button is selected.
  - Keypads that allow negative numbers have positive and negative number (+/-) keys.

Figure 35. Changed chilled water setpoint screen



Click **Save** to complete the change. The current value is updated in the upper left side of the screen, demonstrating that the change has been communicated to the Tracer® UC800 controller.

Table 28. Settings screen items

Description	Resolution	Units
Chiller Settings		
Active Chilled Water Setpoint	± XXX.X	°F / °C
Active Current Limit Setpoint	XXX %	%RLA
Active Panel Base Load Cmd	On/Auto	Text
Active Base Loading Setpoint	XXX	%
Active Base Loading Command	On/Auto	Text
Differential to Start	XXX.X	°F / °C
Differential to Stop	XXX.X	°F / °C
Setpoint Source		
(BAS/Ext/FP, Ext/Front Panel, Front Panel)	BAS/Ext/FP	Text
Evaporator Water Pump Off Delay	XX	Min
Condenser Pump Prestart Time	XX	Min
High Evap Water Temp Cutout	XXX.X	°F / °C
Evaporator Leaving Water Temp Cutout	XX.X	°F / °C
Low Refrigerant Temperature Cutout	XX.X	°F / °C
Current Limit Softload Start Point	XXX.X	%
Current Limit Control Softload Time	XXXX	Sec

Table 28. Settings screen items (continued)

Description	Resolution	Units
Capacity Control Softload Time	XXXX	Sec
Local Atmospheric Pressure	XXX.X	psi/kPa
Power Up Start Delay	XXX	Min
Feature Settings		
External Chilled/Hot Water Setpoint (Enable/Disable)		Text
External Current Limit Setpoint (Enable/Disable)		Text
LCI-C Diagnostic Encoding (Enable/Disable)		Text
Chilled Water Reset (Constant, Outdoor, Return, Disable)	Disable	Text
Return Reset Ratio	XXX	%
Return Start Reset	XXX.X	°F / °C
Return Maximum Reset	XXX.X	°F / °C
Outdoor Reset Ratio	XXX	%
Outdoor Start Reset	XXX.X	°F / °C
Outdoor Maximum Reset	XXX.X	°F / °C
Mode Overrides		
Evap Water Pump (Auto, On)	Auto	Text
Cond Water Pump (Auto, On)	Auto	Text

Display Settings

Display settings can be customized. The display also includes a function to clean the touch screen.

Viewing the Settings Screen

Display Settings are found on the right column of the Settings screen which includes the following:

- Display Preferences
- Language
- Date and Time
- Clean Display

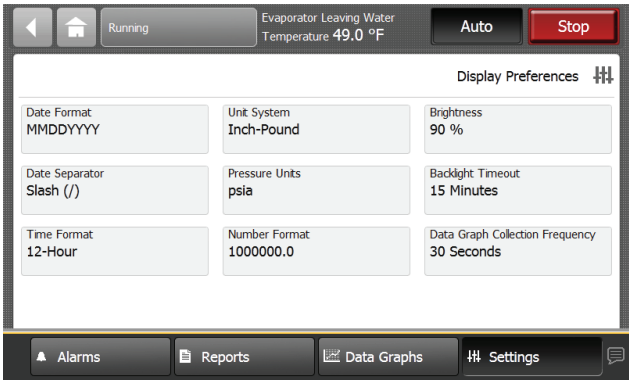
Viewing and Changing Display Preferences

On the Settings screen, click **Display Preferences** which includes the following:

- Date Format
- Date Separator
- Time Format

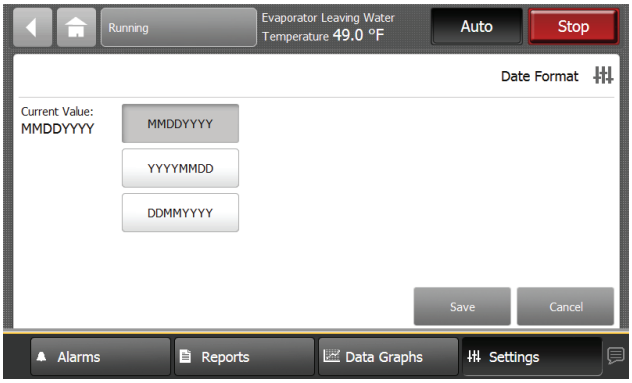
- Unit System
- Pressure Units
- Number Format

Figure 36. Display preference screen



Each of the buttons shows the current value for each selection. Click any of these buttons to change. Select the option to be changed, which will be shaded.. Example in figure below shows a selection of MMDDYYY for the date format.

Figure 37. Date format preference selection



Click **Save** to confirm your selection and return to Display Preferences screen.

Following are the preference options available:

- **Date Format**
  - MMDDYYYY (default)
  - YYYYMMDD
  - DDMMYYYY
- **Date Separator**
  - None
  - Slash (default)
  - Hyphen
- **Time Format**
  - 12 hour (default)
  - 24 hour
- **Units System**
  - SI
  - I-P (default)
- **Pressure Units**
  - kPaA (default if "SI" is chosen for display units)
  - kPaG
  - PSIA (default if "I-P" is chosen for display units)
  - PSIG

  Number Format
  - 1000000.0
  - 1000000,0

Viewing and Changing Language

On the Settings screen, click **Language**. The current setting will be shaded, as shown in figure below. To change the language, click the preferred language to select. Click **Save** to confirm selection.

Figure 38. Language settings

Viewing and Changing Date and Time

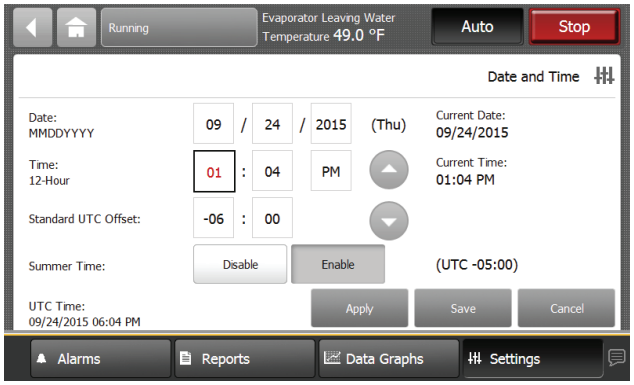
On the Settings screen, click **Date and Time**. The current date and time appear at the bottom of the screen. The following options are available to change on the main screen:

- Month
- Day
- Year
- Hour
- Minute
- AM/PM

To change any settings, click the corresponding button to highligh, then use up/down arrow keys to set desired value. Repeat for any other items to be changed. When complete, click **Save** to confirm selection and return to Settings screen.

Note: *To edit field using keypad entry, click the highlighted button a second time to access the keypad.*

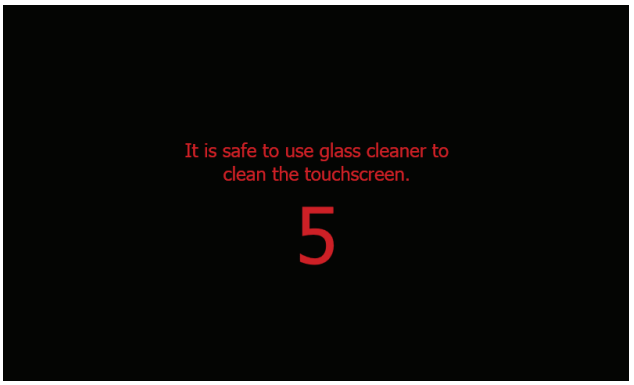
Figure 39. Date and time settings screen



Cleaning the Display

On the Settings screen, click **Clean Display**. The TD7 is disabled for 5 seconds to allow screen cleaning without response to touch. During this time, the screen is black with a number in the center that counts down the seconds. After 5 seconds, the display will return to the Settings screen.

Figure 40. Cleaning the display — countdown screen



Security Settings

Security settings are available to prevent unauthorized changes to the system. To access security, click **Security** button on the Settings screen.

Logging In

All data can be viewed without logging in. However, if security if enabled, the Tracer® AdaptiView™ requires a four-digit security PIN log-in to make changes to any settings protected by security. This feature prevents unauthorized personnel from making changes to the system.Two levels of security are provided.

- **Security Level 1:** Allows users to change a limited group of secure settings. The default security PIN is 1111.
- **Security Level 2**: Allows users to change all secure settings. The default security PIN is 7123.

Tracer® TU service tool is used to set an alternate PIN, or to recall a forgotten pin. When defining a PIN in Tracer® TU, enter a 4-digit PIN to correspond with the desired level of security.

To log in, click **Log In** button, and use the keypad to enter your pin. See figure below.

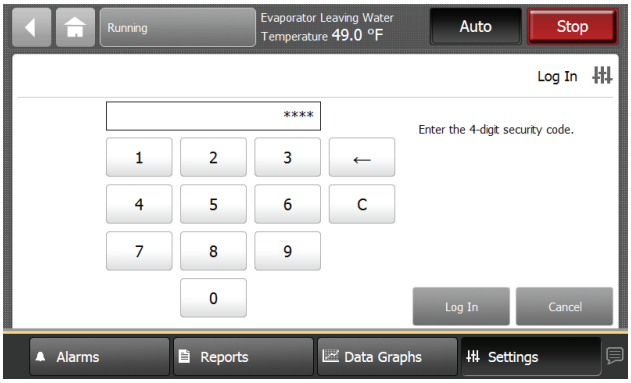
- PIN is a four-digit number, which was configured for your system with the Tracer® TU service tool.
- For security, the PIN is hidden by asterisks during entry.

Note: *If an invalid PIN is entered, an error message will appear.*

Click **Save**. User will be returned to previous screen.

Note: *User will be logged out after 30 minutes of inactivity. To manually log out, see section later*

Figure 41. Log in screen



Disabling/Enabling Security

The security feature that allows a user to log in or out can be disabled or enabled.

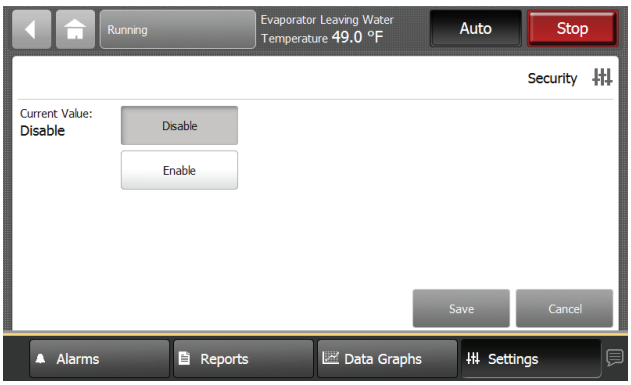
To **disable** security, user must be logged in:

- On Settings screen, click **Security** button.

  Note: *Log in prompt will appear if user is not already logged in.*

- Click **Disable** button, then click **Save**.

Figure 42. Security screen — disable



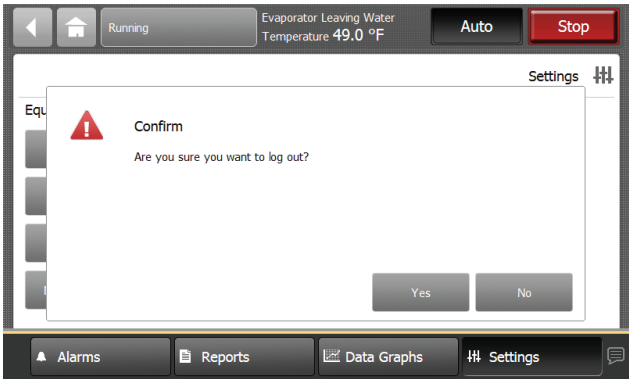
To **enable** security:

- On Settings screen, click **Security** button. The Settings screen will now appear with onlyo the Security button. It will not have a Log In/Log Out buttons
- Click **Enable** button, then click **Save**. The Settings screen will now appear with Log In/Log Out button, in addition to the Security button.

Logging Out

To log out, click **Log Out** button. A confirmation screen appears as shown below. Click **Yes** to confirm.

Figure 43. Log out confirmation screen

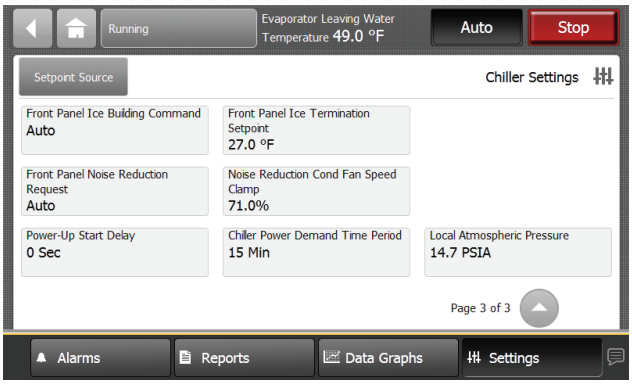


InvisiSound Ultimate — Noise Reduction Mode

When the InvisiSound™ Ultimate option is selected (model number digit 12=3), noise reduction mode can be enabled to adjust fan speed and lower maximum sound levels. Reduced acoustic noise levels can be set for certain times, or on a schedule. The noise reduction feature can be requested by local time of day scheduling, external input or building automation system.

To enable this function at the external display, access the Settings screen on the Tracer® AdaptiView™. See figure below.

Figure 44. Noise reduction mode settings



- Set the Front Panel Noise Reduction Request to ON.
- Adjust the Noise Reduction Condenser Fan Speed Clamp to desired value.
  - Setting for fan speed: Percentage of 920 rpm maximum fan speed (Example: For fan speed of 700 rpm, enter a value of 76%)
  - Acceptable inputs are 60% (552 rpm) to 100% (920 rpm) in 1% increments

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:

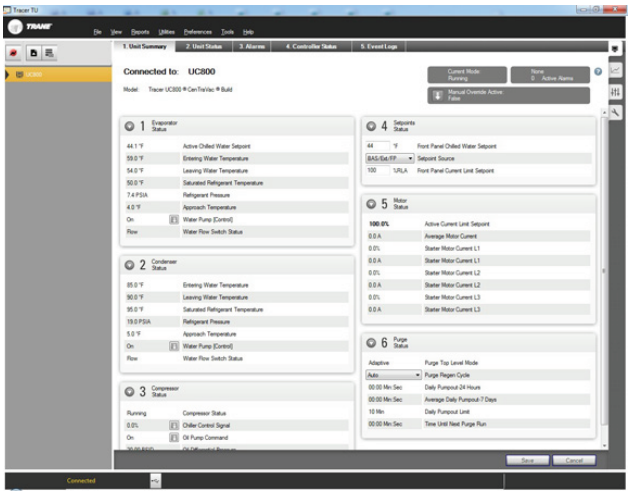
- 1 GB RAM (minimum)
- 1024 x 768 screen resolution
- CD-ROM drive
- Ethernet 10/100 LAN card
- An available USB 2.0 port
- Windows 7 Enterprise or Professional operating system (32-bit or 64-bit)

  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 45. 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.

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 will be initiated.
2. UC800 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 UC800 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. Perform normal unit stop sequence.
2. Verify that compressor oil sump heaters are installed tightly around compressor. Energize and verify heaters are operational using a temperature probe. See table below. Install jumper across thermostat and verify current flow.

NOTICE

Heater Damage!

Failure to follow instructions below could result in damage to the heater.

If the chiller evaporator or evaporator water piping is drained of water, the evaporator immersion heater must be de-energized.

Table 29. Freeze protection heater summary

Heater	Thermostat	Jumper	Heater Description	Heaters
Evap and Water Pipe Heaters	6B52	6X1-2 to 6X1-3	Evaporator	6E50–1
			Evap Entering Water	6E50–3
			Evap Leaving Water	6E50–2
Pump Package (optional)	6B53	6X2-2 to 6X2-4 6X2–3 to 6x2–5	Water Pump Piping	6E51–1, 6E51–2, 6E51–3, 6E51–4, 6E51–5

Note: Not all heaters are present on all unit configurations. See schematics and component locations in AC-SVE002*-EN.`

3. Once unit is secured, perform tasks as outlined in the Maintenance chapter.

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. 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.
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

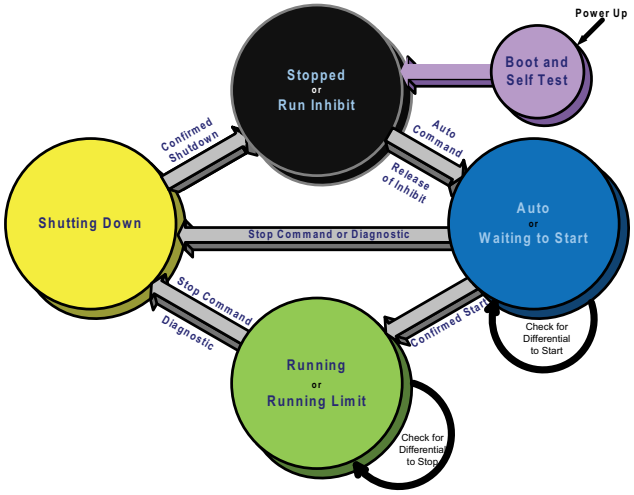


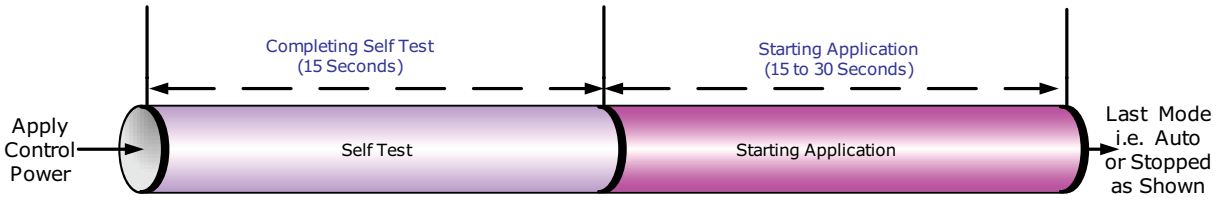
Figure 46. Sequence of operation: power up

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 UC800. 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 UC800 and display. This process takes 25 seconds for the UC800 and 90 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.



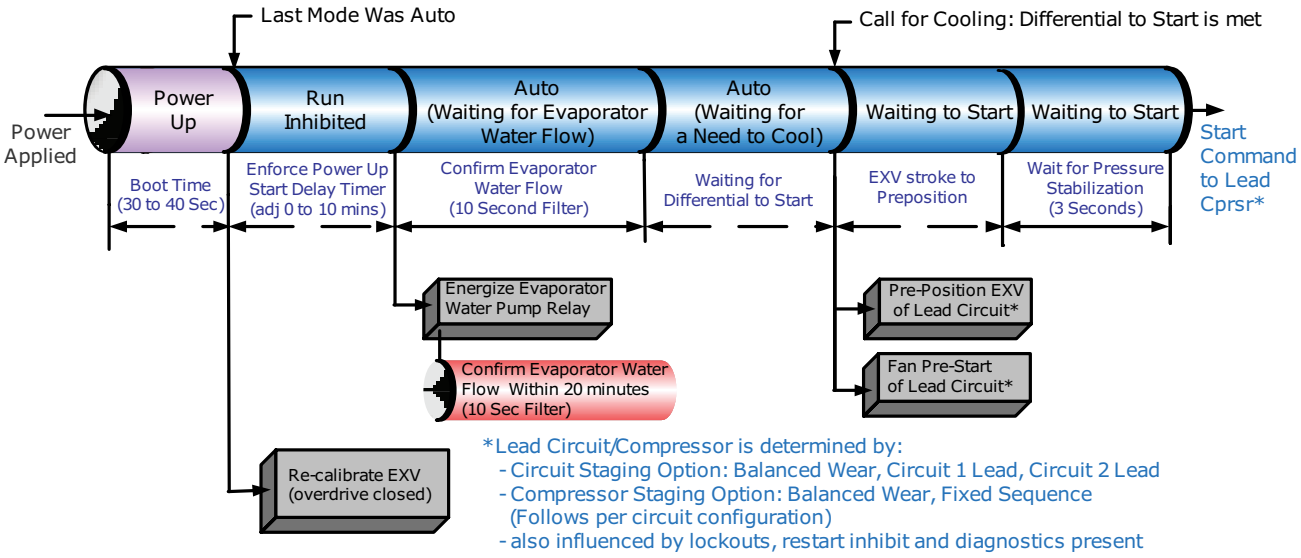
Power Up to Starting

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 that 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 47. Sequence of operation: power up to starting

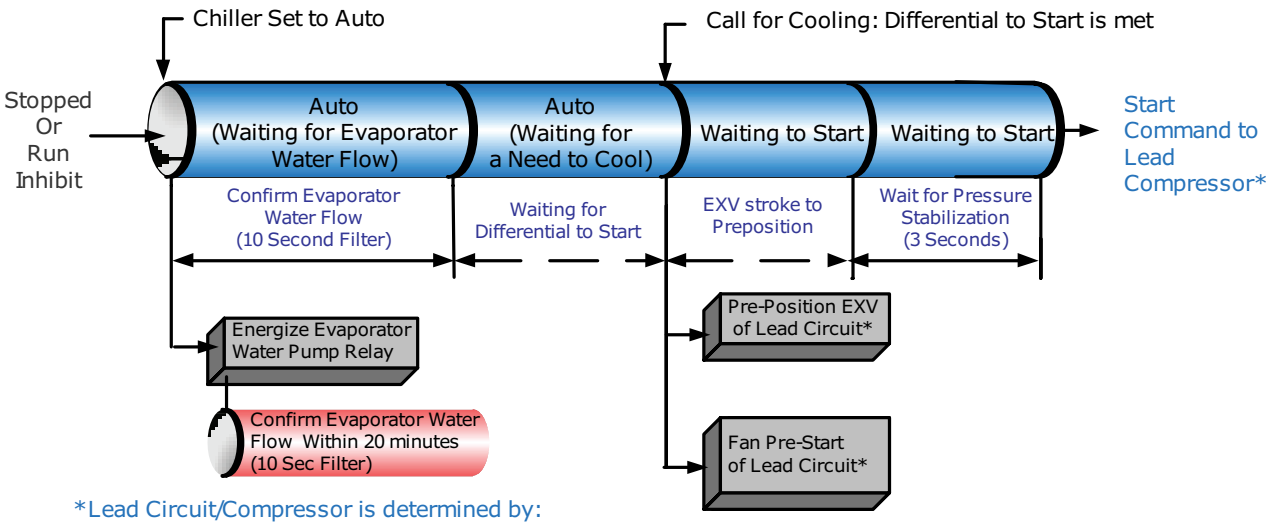


Stopped to Starting

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 48. Sequence of operation: stopped to starting

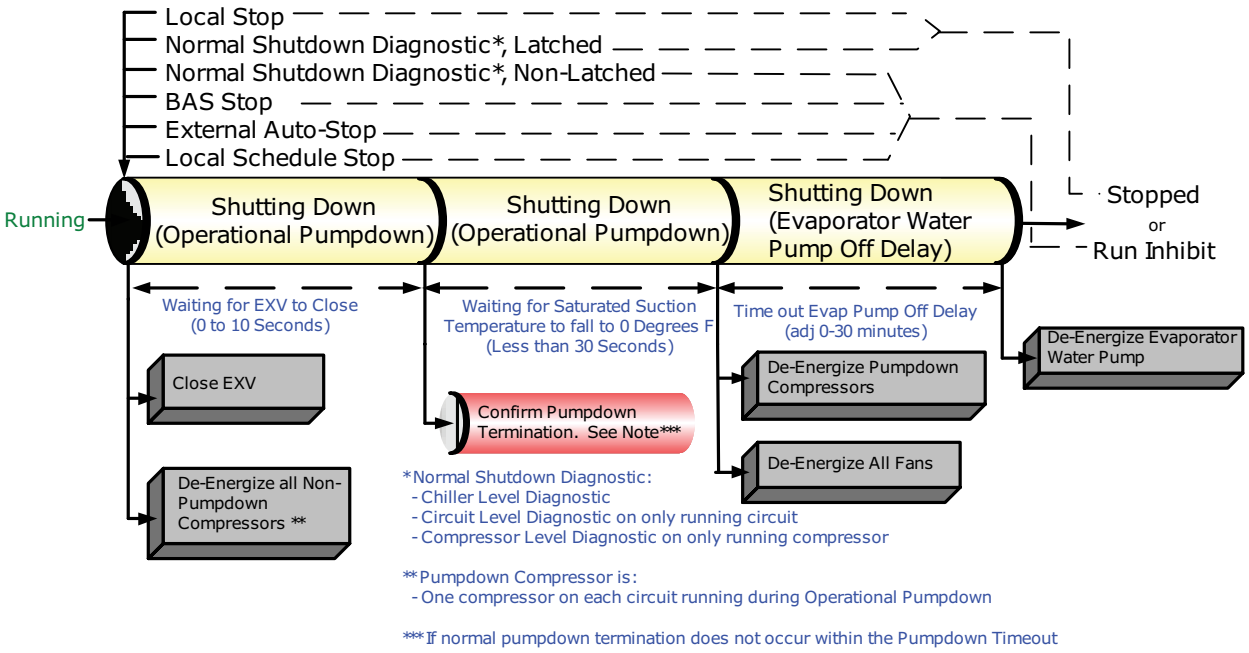


*Lead Circuit/Compressor is determined by:
- Circuit Staging Option: Balanced Wear, Circuit 1 Lead, Circuit 2 Lead
- Compressor Staging Option: Balanced Wear, Fixed Sequence (Follows per circuit configuration)
- also influenced by lockouts, restart inhibit and diagnostics present

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 49. Sequence of operation: normal shutdown to shopped or run inhibit



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

Hazardous Voltage!

Failure to disconnect power before servicing could result in death or serious injury.

Disconnect all electric power, including remote disconnects before servicing. Follow proper lockout/tagout procedures to ensure the power can not be inadvertently energized. Verify that no power is present with a voltmeter.

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.

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. The refrigerant flow through the sight glasses should be clear. Bubbles in the refrigerant indicate either low refrigerant charge or excessive pressure drop in the liquid line. A restriction in the line can sometimes be identified by a noticeable temperature differential between the two sides of the restriction. Frost may often form on the liquid line at this point. Correct refrigerant charges are shown in the General Data Tables.
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.
3. Record the evaporator superheat.

Annual

1. Perform all weekly and monthly procedures.
2. Check oil level while unit is off. See Maintenance chapter.
3. Have a qualified laboratory perform a compressor oil analysis to determine system moisture content and acid level.
4. Contact a Trane service organization to leak test the chiller, to check operating and safety controls, and to inspect electrical components for deficiencies.
5. Clean all water strainers.

NOTICE

Heater Damage!

Failure to follow instructions below could result in damage to the heater.

If the chiller evaporator or evaporator water piping is drained of water, the evaporator immersion heater must be de-energized.

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 30. Typical baselines (AHRI conditions)

Measurement	Baseline
Evaporator Pressure	129 psia
Evaporator Saturation Temperature	38°F
Evaporator Approach	7°F
EXV Position	45% open
Evaporator DT	10°F
Condenser Pressure	435 psia
Condenser Saturation Temperature	121°F
Subcooling	15°F
Discharge Superheat	70°F
Suction Superheat	11°F
Compressor RLA	95%
Compressor RLA	100%

Lubrication System

Oil Level

Oil should also be visible in the sight glass when the compressor is running. When operating, each compressor in a tandem or trio set may have a different oil level.

To check compressor oil level, refer to the label near the compressor sight glass. The compressor(s) must be off. Wait three minutes. With tandem or triple compressors the oil level will equalize after shutdown. Compressor oil level should be clearly visible within the sight glass when the compressors are off

Important: *If oil level is low, contact your local Trane office. Verify that ONLY Trane OIL00080 is used.*

Oil Testing

NOTICE

Compressor Damage!

POE oil is hygroscopic – it absorbs water directly from the air. This water is nearly impossible to remove from the compressor oil and can result in compressor failures.

To prevent POE oil from absorbing water, the system should not remain open for longer than necessary. When open, dry nitrogen should flow through the piping. Only new oil containers should be used for service and maintenance. Always use the smallest container size required for the job requirements. Always leave the oil container tightly sealed until time of use. Do not reuse oil that has been opened.

Use Trane Oil Testing Kit KIT06815 only for testing lubricating oil. Note that:

- The POE oil used in this product is very hygroscopic and easily absorbs and retains moisture. The acceptable moisture content is less than 100 ppm and acceptable acid level is less than 0.5 TAN.
- Refrigerant and moisture is very difficult to remove from this oil using vacuum
- Once the seal on a container of POE oil is opened, the oil must be used

Important: *In the event of a compressor failure, always test the oil with an acid test kit to determine whether the compressor failure was mechanical or electrical. This information is required to determine the correct cleanup procedure.*

Condenser Maintenance

Condenser Coil Cleaning

For information regarding the proper microchannel coil cleaning procedure, refer to RT-SVB83*-EN

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 Coated Coils

⚠ WARNING

Hazardous Chemicals!

Coil cleaning agents can be either acidic or highly alkaline and can burn severely if contact with skin or eyes occurs.

Handle chemical carefully and avoid contact with skin. ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices.

Coated coils may be cleaned using traditional detergents.

Repair/Replacement of Microchannel Coil

Microchannel coils are considerably more robust in design than tube and fin condenser coils, however they are not indestructible. When damage or a leak occurs, contact your local Trane office.

Condenser Coil Corrosion Protection Inspection

Perform coil inspection each time coils are cleaned.

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.*

Evaporator Maintenance

This chiller uses a brazed plate heat exchanger (BPHE) evaporator with factory-installed electronic flow switch (IFM efector) that is positioned in the evaporator water pipe. The evaporator inlet also includes a factory-installed immersion heater for freeze protection and a water strainer that must be kept in place to keep debris out of the evaporator.

Note: *Strainer maintenance is critical to proper operation and reliability. Any particles larger than 1mm entering the BPHE evaporator may cause the evaporator to fail, requiring replacement.*

Acceptable BPHE evaporator water flow rate is 1.2 to 3.6 gpm/ton. To maintain 54-44°F in/ out chilled water temperatures, the nominal water flow rate is 2.4 GPM/ ton.

Minimum water flow rate must be maintained to avoid laminar flow, potential evaporator freezing, scaling and poor temperature control. The microprocessor and capacity control algorithms are designed to take a 10 percent change in water flow rate per minute while maintaining a ±2°F (1.1°C) leaving water temperature control accuracy. The chiller tolerates up to 30 percent per minute water flow variation as long as the flow is equal to or greater than minimum flow requirements.

Maximum water flow is 18 feet per second. Flow rates greater than this will cause excessive erosion.

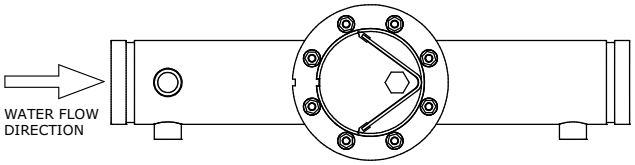
The BPHE evaporator is difficult to clean should it become plugged with debris. Indications of a plugged BPHE evaporator include "wet" suction due to lack of heat exchange, loss of superheat control, depressed discharge superheat, compressor oil dilution and/or starvation and premature compressor failure.

Water Strainer Maintenance

Units without Pump Package

An in-line strainer with a V-shaped sieve is used for units that do not have factory-installed pump package option.

Figure 50. In-line strainer, units without pump package



The strainer is equipped with a blow-down port. The strainer is a 16 mesh (approximately 1 mm) material.

For maximum efficiency, a differential pressure gauge installed across the inlet and outlet will indicate pressure loss due to clogging and may be used as a guide to determine when cleaning is required. The taps

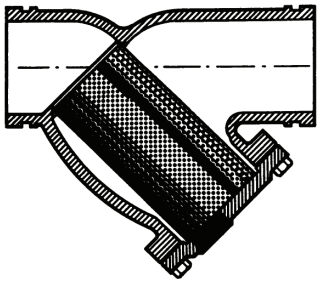
for the pressure gauges are included as standard from the factory.

Normally when differential pressure reaches 5-10psi, the screen must be cleaned. The strainer is equipped with a blow-down port on the cover plate. To clean open and flush out until any sediment is removed

Units with Pump Package

For units with optional pump package, the factory-installed water strainer is a Y-type design with a cylindrical sieve.

Figure 51. Y—type strainer, units without pump package



Pump Package Maintenance

Pumps not immediately placed into service, or removed from service and stored, must be properly prepared to prevent excessive rusting.

- Pump port protection plates must not be removed until the pump is ready to connect to the piping.
- Rotate the shaft periodically (at least monthly) to keep rotating element free and bearings fully functional.
- For long term storage (3 months or longer), prevent internal rust buildup and possibility of freezing by performing the following steps:
  - Remove the plugs at the top and bottom of the casing.
  - If water is to be drained:
    - Disconnect evaporator and piping heaters.
    - Drain or blow out all water.
  - As an optional step, it is acceptable to rustproof or pack the casing with moisture absorbing material and cover the flanges.

When returning pumps to service :

- Remove drying agent from the pump, if used.
- Reinstall plugs at the top and bottom of the casing.
- If water had been drained:
  - Refill water.
  - Reconnect evaporator and piping heaters .

Diagnostics

General Diagnostics Information

Diagnostic Name and Source: Diagnostics may be shown in the spec with a source of “xy”. In this case, letter “x” can be either “1” or “2” (signifying which circuit) and letter “y” can be “A”, “B” or “C” (signifying which compressor on that circuit). Some circuit diagnostics don’t have ‘x’ letter to indicate which circuit is failing. Refer to TD7 alarm display for this information.

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.

Main Processor Diagnostics

Table 31. Main process diagnostics

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
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
MP: Invalid Configuration	N/A	N/A	Latch	All	MP has an invalid configuration based on the current software installed.	Remote
Phase Protection Fault	Chiller	Immediate	NonLatch	All	Phase protection module recognized a phase loss, phase reversal or under/over voltage of the line power. Reset automatically after module recognizes good power for 30 continuous seconds.	Local
Low Suction Rfgt Pressure	Circuit	Immediate	Latch	All	The suction refrigerant pressure fell below the low pressure cutout trip point. See the Low Suction Refrigerant Pressure Protection spec for more details.	Local

Table 31. Main process diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Very Low Suction Pressure – ckt x	Chiller	Immediate	Latch	All	The circuit's suction pressure dropped below (Low Pressure Cutout Setpoint (kPa absolute) * 0.5) regardless of whether or not compressors are running on that circuit. This diagnostic was created to prevent compressor failures due to cross-binding by forcing an entire chiller shutdown. See the Very Low Suction Pressure Crossbinding Protection spec for more details.	Local
Suction Temperature Too High	Circuit	Immediate	Latch	Ckt Energized [Ckt Not Energized]	The suction temperature measurement is larger than the entering temperature by more than a threshold value for 5 continuous minutes. The threshold value is 4°C (7.2°F) for cooling-only units, and 20°C for heat pumps. The entering temperature is the evaporator entering water temperature when the reversing valve is in the cooling direction, and the ambient air temperature when the reversing valve is in the heating direction. 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. Note: the threshold was increased to 20°C because of Suction Line Heat Exchanged installed on High Efficiency heatpumps CXAF. Differentiation between units with and without SLHX will be managed in next release (R2b). Downside of this extension to every heatpumps is loose limit to detect that temp sensor is failing, if unit does not have SLHX.	Local
High Discharge Temperature	Circuit	Immediate	NonLatch	Ckt Energized [Ckt Not Energized]	The discharge temperature exceeded the limits for the compressor. See the Discharge Temperature Protection specification for more details	Local
High Discharge Temperature Lockout	Circuit	Immediate	Latch	All	5 high discharge temperature diagnostics occurred over 210 minutes. See the Discharge Temperature Protection specification for more details	
Compressor Fault	Cprsr	Immediate	NonLatch	All	The compressor fault switch input is open.	Local
Compressor Fault Lockout	Cprsr	Immediate	Latch	All	· The compressor fault switch input remained open for more than 35 minutes. (Circuit breaker or CMP Protection Module) · Five compressor fault diagnostics have occurred within the last 210 minutes. See the Compressor Protection specification for more details.	Local
BAS Failed to Establish Communica-tion	Chiller	Warning and Special	NonLatch	At power-up	The BAS was setup as "installed" and the BAS did not communicate with the Lontalk LCIC within 15 minutes after chiller controls power-up. Refer to Section on Setpoint Arbitration to determine how setpoints and operating modes may be affected. Note that this diagnostic is never operational for BacNet Communication interface (BCIC) and only operational with a LonTalk Communication interface (LCIC) if so configured by the BAS or Tracer system.	Remote

Table 31. Main process diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
BAS Communication Lost	Chiller	Special	NonLatch	All	The BAS was setup as "installed" at the MP and the Lontalk LCIC lost communications with the BAS for 15 contiguous minutes after it had been established. Refer to Section on Setpoint Arbitration to determine how setpoints and operating modes may be affected by the comm loss. The chiller follows the value of the Tracer Default Run Command which can be previously written by Tracer and stored nonvolatile by the MP (either use local or shutdown). Note that this diagnostic is never operational for BacNet Communication interface (BCIC) and only operational with a LonTalk Communication interface (LCIC) if so configured by the BAS or Tracer system.	Remote
LCI-C Software Mismatch: Use BAS Tool	Chiller	Warning	NonLatch	All	The neuron software in the LCI-C module does not match the chiller type. Download the proper software into the LCI-C neuron. To do this, use the Rover service tool, or a LonTalk® tool capable of downloading software to a Neuron 3150®.	Remote
External Chilled/Hot Water Setpoint	Chiller	Warning	NonLatch	All	a. Function Not "Enabled": no diagnostics. b. "Enabled ": Out-Of-Range Low or Hi or bad LLID, set diagnostic, default CWS/HWS to next level of priority (e.g. Front Panel SetPoint). This Warning diagnostic will automatically reset if the input returns to the normal range.	Remote
External Demand Limit Setpoint	Chiller	Warning	NonLatch	All	a. Function Not "Enabled": no diagnostics. B. "Enabled ": Out-Of-Range Low or Hi or bad LLID, set diagnostic, default DLS to next level of priority (e.g. Front Panel SetPoint). This Warning diagnostic will automatically reset if the input returns to the normal range.	Remote
Pumpdown Terminated By Time	Circuit	Warning	Latching	Operational/ Service Pumpdown [All Except Operational and Service Pumpdown]	Operational Pumpdown or Service Pumpdown procedure did not terminate normally by reaching the termination pressure within the allotted time.	Remote
Inverted Evaporator Water Temperature	Chiller	Warning/ Normal	NonLatch/ Latch	Any Ckt(s) Energized [No Ckt(s) Energized]	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 temperature by more than 3°F for 100°F-sec while at least one compressor was running. Diagnostic will auto clear if the leaving water temp – entering water temp < 3F. 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 31. Main process diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Inverted Water Temp (Heating)	Chiller	Warning/ Normal	NonLatch/ Latch	Unit energized and all ckts' reversing valves in heating direction [Unit de-energized or any ckt's reversing valve in cooling direction]	Not Enabled (Default): diagnostic is Non-Latching and Warning. Enabled: diagnostic is Latching and Normal Shutdown. The leaving evaporator water temp fell below the entering evaporator water temperature by more than 3°F for 100°F-sec. There is a 60 second ignore time after the condition to enable the diagnostic is met. During the ignore time, the temperature error is not integrated. Diagnostic will auto clear if the entering water temp – leaving water temp < 3F. 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
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
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 evaporator 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 30 minutes, or either circuit starts. This diagnostic even while active, does not prevent operation of either circuit	Remote
Low Refrigerant Temperature	Circuit	Immediate	Latch	Circuit Energized [Service Pumpdown, Operational Pumpdown]	The suction saturated refrigerant temperature dropped below the Low Refrigerant Temperature Cutout Setpoint for 16.67°C-seconds (30°F-seconds). See Low Refrigerant Temperature Protection spec for more details.	Local

Table 31. Main process diagnostics (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) Evaporator Water Flow Overdue 2) Evaporator Water Flow Lost 3) Low Evap Water Temp: Unit Off, diagnostic is active. 4) Heating mode	Either the leaving or the entering water temperature exceeded the high evap water temp setting (TU service menu settable – default 40.5°C (105°F)) for 15 continuous seconds. The evaporator water pump relay will be de-energized to stop the pump, but only if it is running due to one of the diagnostics listed on the left. The diagnostic will auto reset and the pump will return to normal control when both the entering and leaving falls 2.778°C (5°F) below the trip setting. The primary purpose is to stop the evaporator water pump and its associated pump heat from causing excessive water-side temperatures and water-side pressures when the unit is not running but the evap pump is on due to either Evaporator Water Flow Overdue, Evaporator Water Flow Lost , or Low Evap Water Temp – Unit Off diagnostics. This diagnostic will not auto clear solely due to the clearing of the enabling diagnostic. *at unit installation, especially reversible units, high evap water temp setting will need to be written. The value should be approximately 65.5°C (150°F) for heat pumps	Remote
High Suction Rfgt Pressure	Chiller	Immediate	NonLatch	All	Any circuit's suction pressure has risen above 95% of the high pressure cutout setting. 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 circuits' suction pressures fall below 85% of the high pressure cutout setting. The primary purpose is to stop the evaporator water pump and its associated pump heat from causing refrigerant side pressures close to the relief valve setting when the chiller is not running, such as could occur with Evaporator Water Flow Overdue, Evaporator Water Flow Lost, or Low Evap Water Temp – Unit Off diagnostics. This condition is unlikely unless a discharge isolation valve is installed and closed.	Remote
High Pressure Cutout	Circuit	Immediate	Latch	All	The high pressure cutout switch recognized a high pressure. See Condenser High Pressure Protection spec for more details.	Local
High Discharge Refrigerant Pressure	Circuit	Immediate	Latch	All	Discharge pressure exceeded the high pressure cutout setpoint + 100 kPa. Likely cause: failed or incorrectly set high pressure cutout switch. Prevents release of refrigerant through relief valve.	Local
Emergency Stop Feedback Input	Chiller	Immediate	Latch	All	Emergency Stop input is open. See Auto Stop and Immediate Stop spec	Local
Starts/Hours Modified - xy	Cprsr	Warning	NonLatch	All	A counter for a given compressor starts or hours has been modified by TU. This diagnostic is immediately and automatically cleared and thus can only be seen in the historic diagnostic list.	NA
Evaporator Pump 1 Starts/ Hours Modified	Chiller	Warning	NonLatch	All	A counter for evaporator pump 1 starts or hours has been manually modified. This diagnostic is immediately and automatically cleared and thus can only be seen in the historic diagnostic list.	NA

Table 31. Main process diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Evaporator Pump 2 Starts/ Hours Modified	Chiller	Warning	NonLatch	All	A counter for evaporator pump 2 starts or hours has been manually modified. This diagnostic is immediately and automatically cleared and thus can only be seen in the historic diagnostic list.	NA
Evaporator Water Flow Lost	Chiller	Immediate and Special Action	NonLatch	All	After the pump request was activated, water flow was established and then lost. Special action is to keep the evap pump request active in a diagnostic override mode. See Evaporator Water Flow Protection for more details.	Remote
Evaporator Water Flow Lost Lockout	Chiller	Immediate	Latch	All	Four (4) water flow loss events occurred in a moving 4 day time window. Corrective action is needed to identify and eliminate the cause. See Evaporator Water Flow Protection for more details.	Local
Evaporator Water Flow Too Low	Chiller	Immediate	Latch	Cooling Mode [Not Cooling Mode]	Refrigerant side to water side heat balance indicates that water flow has dropped below allowable manufacturer limits. See Evaporator Water Flow Estimation for more details.	Local
Evaporator Water Flow Overdue	Chiller	Immediate and Special Action	NonLatch	All	After the pump request was activated, the evaporator water flow overdue wait time elapsed before water flow was established. Special action is to keep the evap pump request active in a diagnostic override mode. See Evaporator Water Flow Protection for more details.	Remote
Evaporator Water Flow Lost – Pump 1	Chiller	Warning and Special Action	NonLatch	All	For dual evaporator pump configurations only. Evaporator Water Flow Lost diagnostic occurred while Pump 1 was the selected pump. Specific details of special action are described in Evaporator_Water_ Pump_Control.	Remote
Evaporator Water Flow Lost – Pump 2	Chiller	Warning and Special Action	NonLatch	All	For dual evaporator pump configurations only. Evaporator Water Flow Lost diagnostic occurred while Pump 2 was the selected pump. Specific details of special action are described in Evaporator_Water_ Pump_Control.	Remote
Evaporator Water Flow Overdue – Pump 1	Chiller	Warning and Special Action	NonLatch	All	For dual evaporator pump configurations only. Evaporator Water Flow Overdue diagnostic occurred while Pump 1 was the selected pump. Specific details of special action are described in Evaporator_Water_ Pump_Control.	Remote
Evaporator Water Flow Overdue – Pump 2	Chiller	Warning and Special Action	NonLatch	All	For dual evaporator pump configurations only. Evaporator Water Flow Overdue diagnostic occurred while Pump 2 was the selected pump. Specific details of special action are described in Evaporator_Water_ Pump_Control.	Remote
Evaporator Pump 1 Fault	Chiller	Immediate or Warning and Special Action	NonLatch	All	For systems with no evaporator pump, a single evaporator pump, or a single inverter driving dual evaporator pumps, an immediate shutdown shall be performed. For multiple pump systems, detection of a pump fault will generally cause pump control to switch to the redundant pump. For single inverter, dual pump configuration, switching to the redundant pump can only happen after the fault is cleared. Specific details of special action are described in Evaporator_Water_Pump_Control.	Remote

Table 31. Main process diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Evaporator Pump 2 Fault	Chiller	Immediate or Warning and Special Action	NonLatch	All	For systems with no evaporator pump, a single evaporator pump, or a single inverter driving dual evaporator pumps, an immediate shutdown shall be performed. For multiple pump systems, detection of a pump fault will generally cause pump control to switch to the redundant pump. For single inverter, dual pump configuration, switching to the redundant pump can only happen after the fault is cleared. Specific details of special action are described in Evaporator_Water_Pump_Control.	Remote
Low Suction Superheat	Circuit	Immediate	Latch	Ckt Energized [Ckt Not Energized]	Measured suction superheat stays below 2.22 °C for one continuous minute in cooling mode or 3 minutes in heating mode, with a 1 minute ignore time from the start of the circuit. Suction Superheat = suction temp – sat. suction temp.	Local
High Compressor Pressure Differential	Circuit	Immediate	Latch	Ckt Energized [Ckt Not Energized or Operational Pumpdown]	Compressor involute pressure differential exceeded allowable limits. See Compressor Involute Pressure Differential Protection spec for details.	Local
Low Refrigerant Pressure Ratio	Circuit	Normal	Latch	Ckt Energized [Ckt Not Energized]	The refrigerant pressure ratio between compressors outlet and inlet of a given circuit exceeded allowable limits. See Low Refrigerant Pressure Ratio Protection spec for details	Local
Low Discharge Saturated Temperature	Circuit	Normal	Latch	Ckt Energized [Ckt Not Energized]	The discharge saturated temperature for the respective circuit was below 10 °C for more than 2250 °C-sec, with a 10 minutes ignore time from the start of the circuit. Integration starts after the ignore time is completed.	Local
Loss of Charge	Circuit	Immediate	Latch	Ckt Energized [Ckt Not Energized]	For Release 1.0, this feature is factory enabled for glycol applications only. The diagnostic occurs if the EXV (normal cooling mode only) is consistently and significantly more open than internal models predict for the conditions. This would occur with lack of subcooling from the condenser, a condition that generally suggests undercharging or charge loss. Pressure sensor errors or excessive compressor capacity over the commanded capacity could also cause this diagnostic. (Adjustment is available to mitigate nuisance tripping)	Local
Chiller Service Recommended	Chiller	Warning	Latch	Service Messages Enabled	Chiller service interval time has elapsed. Chiller service is recommended.	Remote
Evap Water Pump 1 Svc Recommended	Chiller	Warning	Latch	Service Messages	Pump service recommended as service interval hours have elapsed.	Remote
Evap Water Pump 2 Svc Recommended	Chiller	Warning	Latch	Service Messages Enabled	Pump service recommended as service interval hours have elapsed.	Remote
Mfr Maintenance Recommended - xy	Cprsr	Warning	Latch	Service Messages Enabled	Compressor service recommended as service interval hours have elapsed.	Remote
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

Sensor Failure Diagnostic

Notes:

1. *The following sensor failure 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. *Sensor diagnostics are named by the Functional Name of the input or output that is no longer sending a valid value to the Main Processor, indicating a sensor failure. Some LLIDs may have more than one functional output associated with it. Refer to the unit's wiring diagrams to relate the occurrence of such sensor failure diagnostics back to the physical LLID boards that they have been assigned to (bound).*

Table 32. Sensor failure diagnostics

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Evaporator Entering Water Temp Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID.	Remote
Evaporator Leaving Water Temp Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID	Remote
Outdoor Air Temp Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID.	Remote
Discharge Pressure Transducer	Circuit	Immediate	Latch	All [Ckt/Cprsr lock out]	Bad Sensor or LLID	Remote
Suction Pressure Transducer	Circuit	Immediate	Latch	All [Ckt/Cprsr lock out]	Bad Sensor or LLID	Remote
Suction Temperature Sensor	Circuit	Immediate	Latch	All [Ckt/Cprsr lock out]	Bad Sensor or LLID	Remote
Discharge Temperature Sensor	Circuit	Immediate	Latch	All [Ckt/Cprsr lock out]	Bad Sensor or LLID	Remote
Liquid Line Pressure Transducer	Circuit	Normal	Latch	All [Ckt/Cprsr lock out]	Bad Sensor or LLID	Remote
SLHX Entering Temp Sensor	Circuit	Normal	Latch	All [Ckt lock out]	Bad Sensor or LLID	Remote

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 "Programmable Annunciation Relay modules) 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 33. Communication diagnostics

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 35-40 second period.	Remote
Comm Loss: Emergency Stop	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: External Ice Building Command	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period. Chiller shall revert to normal (non-ice building) mode regardless of last state.	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 35-40 second period.	Remote
Comm Loss: Evap Leaving Water Temp	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Evap Entering Water Temp	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Discharge Pressure Transducer	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Suction Pressure Transducer	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Ext Chilled/Hot Water Setpoint	Chiller	Warning and Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period. Chiller shall discontinue use of the External Chilled/Hot Water Setpoint source and revert to the next higher priority for setpoint arbitration	Remote
Comm Loss: Ext Demand Limit Setpoint	Chiller	Warning and Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period. Chiller shall discontinue use of the External Demand Limit Setpoint source and revert to the next higher priority for setpoint arbitration	Remote
Comm Loss: Auxiliary Setpoint Command	Chiller	Warning and Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period. Chiller shall discontinue use of the Auxiliary Setpoint and revert to the Chilled Water Setpoint based on setpoint arbitration	Remote

Table 33. Communication diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: High Pressure Cutout Switch	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 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 35-40 second period.	Remote
Comm Loss: Local BAS Interface	Chiller	Warning and Special Action	NonLatch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period. Use the last values sent from BAS.	Remote
Comm Loss: Compressor Fault Input	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Run Command Compressor X	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Fan Board 1 Relay X	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Fan Board 2 Relay X	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	
Comm Loss: Fan Speed Select Board Relay X	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Condenser Fan Enable, Shared Circuit 1&2	Circuit	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 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 35-40 second period.	Remote
Comm Loss: Fan Inverter Speed Command	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Fan Inverter Speed Command Shared, Shared Circuit 1&2	Circuit	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 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 35-40 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 35-40 second period.	Remote
Comm Loss: Evaporator Antifreeze Heater	Chiller	Warning and Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote

Table 33. Communication diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Evaporator Water Pump 1 Relay	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Evaporator Water Pump 2 Relay	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Evaporator Pump 1 Fault Input	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Evaporator Pump 2 Fault Input	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Evap Pump Inverter 1 Run Command	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Evap Pump Inverter 1 Fault Input	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Evap Pump Inverter 1 Frequency Feedback	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Evap Pump Inverter 1 Speed	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	
Comm Loss: Suction Temperature	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Electronic Expansion Valve	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: External Noise Reduction Request Input	Chiller	Warning and Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period. External input is excluded from arbitration logic per standard arbitration rules.	Remote
Comm Loss: Energy Meter Pulse Input	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Phase Protection Fault Input	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Discharge Temperature Sensor	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote

Table 33. Communication diagnostics (continued)

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Percent Capacity Output	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: External Ckt Lockout	Circuit	Special Mode	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. MP will nonvolatily hold the lockout state (enabled or disabled) that was in effect at the time of comm loss.	Remote
Comm Loss: External Hot Water Command	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Reversing Valve	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Shared V Coil Isolating Valve	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Supplemental Heater Relay X	Chiller	Warning	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 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 35-40 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 35-40 second period.	Remote
Comm Loss: Dynamic Receiver Fill Valve	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Hot Gas Bypass Valve	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: Sump Heater	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: SLHX Valve	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote
Comm Loss: SLHX Entering Temperature	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 35-40 second period.	Remote

Unit Wiring

The following table provides a list of electrical schematics, field wiring diagrams and connection diagrams. Complete wiring package is documented in AC-SVE002*-EN. A laminated wiring diagram booklet is also shipped with each unit.

Document Number		Description	
5732-0011	Sheet 1	Schematic Wiring	Table of Contents
	Sheet 2		Legend
	Sheet 3		Incoming Power, Circuit 1, Compressors and Transformers
	Sheet 4		Power, Circuit 2 Compressors
	Sheet 5		Controls, Compressor Fault
	Sheet 6		Controls, Transformer and Power Supply
	Sheet 7		Power, Condenser Fans
	Sheet 8		Controls, Condenser Fans
	Sheet 9		Controls, Compressor Control
	Sheet 10		Controls and Power, Pump Package
	Sheet 11		Controls, Customer Connection
	Sheet 12		Controls, Global Bus
5722-9367		Unit Field Wiring	
5722-9368		Field Layout	
5722-9369		Component Location — Control Panel	
5722-9370		Component Location — Unit	

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 ACS Installation Completion Check Sheet and Request for Trane Service (AC-ADF003*-EN)
- Operator Log

Ascend™ Model ACS 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 isolators installed.
   - ☐ Chiller is level to within 1/4" end-to-end and side-to-side.
   - ☐ Record and report any damage to the chiller.
2. **Piping**
   - ☐ Water piping flushed before making final connections to the system
   - ☐ Chilled water piping connected to:
     - ☐ Evaporator
     - ☐ Air handling units
     - ☐ Pumps (no piping to pump required if optional pump package is installed)
   - ☐ Strainer installed and cleaned at entering water connection

     Note: *Do NOT remove strainer mesh to clean the system.*
   - ☐ Verify chilled water inlet vents and chilled water outlet drains are closed or plugs installed
   - ☐ Water supply connected to filling system
   - ☐ Does unit have freeze inhibitor? If unit has freeze inhibitor:
     - ☐ Verify type and concentration 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)
   - ☐ Flow balancing valves installed on leaving chilled water
   - ☐ Gauges, thermometers, and air vents installed on both sides of evaporator
3. **Wiring**
   - ☐ Wire size per submittal and NEC 310-16
   - ☐ Unit is properly grounded
   - ☐ All wiring connections are tight (not limited to field wiring - include factory wiring and connections)
   - ☐ Full power available, and within utilization range
   - ☐ Interconnecting wiring to control panel (as required)
   - ☐ Chilled water pump connected and tested (not required if optional pump package is installed)
   - ☐ Heat recovery condenser water pump (as applicable)
   - ☐ 115 Vac power available for service tools
   - ☐ All controls installed and connected
4. **Testing**
   - ☐ Trace gas amounts of R-410A available for leak testing, if necessary

5. **Refrigerant on job site, if unit shipped with nitrogen charge**
   - ☐ Dry nitrogen available for pressure testing
6. **Systems can be operated under load conditions**

   Important: *Start-up cannot be completed without ability to fully load the unit.*
7. **Heaters**
   - ☐ Verify that the compressor oil sump heaters are installed tightly around the compressor. Energize and verify heaters are operational using a temperature probe.
   - ☐ If unit was factory charged (model number digit 20 = 1), **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 20 = 2), contact Trane Service for unit charging prior to start-up.
8. **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.

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

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:

_____

_____

_____

_____

_____

_____

_____

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

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