



# Installation, Operation, and Maintenance

## Series R<sup>®</sup> Rotary Liquid Chillers

Water-Cooled Model RTWD — 60 to 250 Tons

Compressor-Chillers Model RTUD — 80 to 250 Tons



**EcoWise**

RTWD chillers are part of the Ingersoll Rand EcoWise™ portfolio of products that are designed to lower the environmental impact with next-generation, low global warming potential (GWP) refrigerants and high efficiency operation.

### **⚠ 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.**



# 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. 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 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.**

## Factory Warranty Information

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

### ***All Unit Installations***

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

### ***Additional Requirements for Units Requiring Disassembly***

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

- Trane, or an agent of Trane specifically authorized to perform startup and warranty of Trane® products, will perform or have direct onsite technical supervision of the disassembly and reassembly work.
- The installing contractor must notify Trane — or an agent of Trane specifically authorized to perform startup and warrant of Trane® products — two weeks in advance of the scheduled disassembly work to coordinate the disassembly and reassembly work.
- Startup must be performed by Trane or an agent of Trane specifically authorized to perform startup and warranty of Trane® products as noted above.

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

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## Revision History

- Added alternate refrigerant R-513A option.
- Removed discontinued marine waterbox option.
- Updated model number information to add new options (alternate refrigerant, final finisher), remove marine waterbox option, and correct errors.
- Updated general data tables to show alternate refrigerant and add oil part number.



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# Model Number Descriptions

## Unit Model Number

### Digits 1-4 – Chiller Model

RTWD= Water-Cooled Series R® Chiller  
RTUD= Series R® Compressor Chiller

### Digits 5-7 – Unit Nominal Tonnage

- 060 = 60 Nominal Tons
- 070 = 70 Nominal Tons
- 080 = 80 Nominal Tons
- 090 = 90 Nominal Tons
- 100 = 100 Nominal Tons
- 110 = 110 Nominal Tons
- 120 = 120 Nominal Tons
- 130 = 130 Nominal Tons
- 140 = 140 Nominal Tons
- 150 = 150 Nominal Tons
- 160 = 160 Nominal Tons
- 180 = 180 Nominal Ton
- 200 = 200 Nominal Tons
- 220 = 220 Nominal Tons
- 250 = 250 Nominal Tons

### Digit 8 – Unit Voltage

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

### Digit 9 – Manufacturing Plant

- 2 = Pueblo, USA

### Digits 10, 11 – Design Sequence

\*\* = Factory Assigned

### Digit 12 – Unit Type

- 1 = Standard Efficiency/Performance
- 2 = High Efficiency/Performance
- 3 = Premium Efficiency/Performance

### Digit 13 – Agency Listing

- 0 = No Agency Listing
- A = UL Listed to US and Canadian Safety Standards
- D = IBC Seismically Rated Unit
- E = UL/Canadian and IBC
- F = OSHPD Seismically Rated Unit
- G = UL/Canadian and OSHPD

### Digit 14 – Pressure Vessel Code

- 1 = ASME Pressure Vessel Code
- 3 = Chinese Code Pressure Vessel
- S = Special

### Digit 15 – Unit Application

- A = Std Condenser <=95°F/35°C Entering Water Temperature
- B = High Temperature Condenser >95°F/35°C Entering Water Temp
- C = Water-to-Water Heat Pump
- D = Remote Condenser by Trane
- E = Remote Condenser by Others

### Digit 16 – Pressure Relief Valve

- 1 = Single Relief Valve
- 2 = Dual Relief Valve with 3-Way Isolation Valve

### Digit 17 – Water Connection Type

- A = Grooved Pipe - Standard

### Digit 18 – Evaporator Tubes

- A = Internal and External Enhanced Evap Tube

### Digit 19 – Evaporator Passes

- 2 = 2-Pass Evaporator
- 3 = 3-Pass Evaporator

### Digit 20 – Evaporator Water Side Pressure

- A = 150 psi/10.5 bar Evaporator Water Pressure

### Digit 21 – Evaporator Application

- 1 = Standard Cooling
- 2 = Low Temperature
- 3 = Ice Making

### Digit 22 – Condenser Tubes

- X = Remote Condenser
- A = Enhanced Fin - Copper
- B = Internally Enhanced 90/10 CuNi Fin

### Digit 23 – Condenser Water Side Pressure

- 0 = Remote Condenser
- 1 = 150 psi/10.5 Bar Condenser Water Pressure

### Digit 24 – Compressor Starter Type

- Y = Wye-Delta Closed Transition Starter
- X = Across-the-Line Starter

### Digit 25 – Incoming Power Line Connection

- 1 = Single Point Power Connection
- 2 = Dual Point Power Connection

### Digit 26 – Power Line Connection Type

- A = Terminal Block
- B = Mechanical Disconnect Switch
- D = Circuit Breaker
- E = High Fault Rated Panel with Circuit Breaker

### Digit 27 – Under/Over Voltage Protection

- 0 = No Under/Over Voltage Protection
- 1 = Under/Over Voltage Protection

### Digit 28 – Unit Operator Interface

- A = DynaView™/English
- B = DynaView/Spanish
- C = DynaView/Spanish-Mexico
- D = DynaView/French
- E = DynaView/German
- F = DynaView/Dutch
- G = DynaView/Italian
- H = DynaView/Japanese
- J = DynaView/Portuguese-Portugal
- K = DynaView/Portuguese-Brazil
- L = DynaView/Korean
- M = DynaView/Thai
- N = DynaView/Simplified Chinese
- P = DynaView/Traditional Chinese
- R = DynaView/Russian
- T = DynaView/Polish
- U = DynaView/Czech
- V = DynaView/Hungarian
- W = DynaView/Greek
- X = DynaView/Romanian
- Y = DynaView/Swedish

### Digit 29 – Remote Interface (Digital Comm)

- 0 = No Remote Digital Comm
- 1 = LonTalk®/Tracer® Summit Interface
- 2 = Time of Day Scheduling
- 4 = BACnet® Interface

### Digit 30 – External Water and Current Limit Setpoint

- 0 = No External Water and Current Limit Setpoint
- A = External Water and Current Limit Setpoint 4-20 mA
- B = External Water and Current Limit Setpoint 2-10 Vdc

### Digit 31 – Ice Making

- 0 = No Ice Making
- A = Ice Making with Relay
- B = Ice Making without Relay

### Digit 32 – Programmable Relays

- 0 = No Programmable Relay
- A = Programmable Relay

### Digit 33 – Condenser Refrigerant Pressure Output

- 0 = No Condenser Refrigerant Output
- 1 = Condenser Water Control Output
- 3 = Differential Pressure Output

### Digit 34 – Outdoor Air Temp Sensor

- 0 = No Outdoor Air Temp Sensor
- A = Outdoor Air Temp Sensor - CWR Low Ambient

### Digit 35 — Condenser Leaving Hot Water Temp Control

- 0 = No Condenser Leaving Hot Water Temp Control
- 1 = Condenser Leaving Hot Water Temp Control

### Digit 36 — Power Meter

- 0 = No Power Meter
- P = Power Meter

### Digit 37 — Motor Current Analog Output (%RLA)

- 0 = No Motor Current Analog Output
- 1 = Motor Current Analog Output

### Digit 38 — A/C Fan Control

- 0 = No Fan Controls (RTWD)
- A = Fan Control By Others
- B = Integral Fan Controls

### Digit 39 — Low Ambient Fan Control

- 0 = No Low Ambient Fan Control (RTWD)
- 1 = Two Speed Fans
- 2 = Variable Speed Fan with Analog Interface
- 3 = Variable Speed Fan with PWM Interface

### Digit 40 — Installation Accessories

- 0 = No Installation Accessories
- A = Elastomeric Isolators
- B = Flanged Water Connection Kit
- C = Isolators and Flanged Water Connection Kit

### Digit 41 — Flow Switch

- 0 = No Flow Switch
- 1 = 150 psi NEMA 1: Flow Switch x 1
- 2 = 150 psi NEMA 1: Flow Switch x 2
- 3 = 150 psi NEMA 4: Flow Switch x 1
- 4 = 150 psi NEMA 4: Flow Switch x 2
- 7 = Factory Installed Proof of Flow (Evap/Cond)
- 8 = Factor Installed Proof of Flow (Evap)

### Digit 42 — 2-Way Water Regulating Valve

- 0 = No 2-Way Water Regulating Valve
- A = 3" 150 psi/88.9 mm 10.5 bar 115V
- B = 3" 150 psi/88.9 mm 10.5 bar 220V
- C = 4" 150 psi/114.3 mm 10.5 bar 115V
- D = 4" 150 psi/114.3 mm 10.5 bar 220V

### Digit 43 — Sound Reduction Package

- 0 = No Sound Reduction Package
- A = Sound Reduction - Factory Installed

### Digit 44 — Insulation

- 0 = No Insulation
- 1 = Factory Insulation
- 2 = Insulation for High Humidity

### Digit 45 — Factory Charge

- 0 = Full Factory Refrigerant Charge (R-134a)
- 1 = Nitrogen Charge
- 5 = Full Factory Refrigerant Charge (R-513A)

### Digit 46 — Base Rail Forklifting

- 0 = No Base Rail Forklifting
- B = Base Rail Forklifting

### Digit 47 — Label and Literature Language

- B = Spanish
- D = English
- E = French
- G = Chinese - Traditional

### Digit 48 — Special

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

### Digits 49-55

- 0 = Not Used

### Digit 56 — Shipping Package

- 0 = No Skid (Standard)
- 1 = Skid
- 2 = Shrink Wrap
- 3 = Skid + Shrink Wrap

### Digit 59 — Performance Test

- 0 = No Performance Test
- C = 1-Point Test with Report
- D = 2-Point Test with Report
- E = 3-Point Test with Report
- F = 4-Point Test with Report
- G = Witness 1-Point Test with Report
- G = Witness 1-Point Test with Report Rapid Restart
- H = Witness 2-Point Test with Report
- J = Witness 3-Point Test with Report
- K = Witness 4-Point Test with Report
- K = Witness 4-Point Test with Report Rapid Restart

### Digit 60 — Evaporator Fluid Type

- 0 = Water
- 1 = Calcium Chloride
- 2 = Ethylene Glycol
- 3 = Propylene Glycol
- 4 = Methanol

### Digit 61 — Condenser Fluid Type

- 0 = Water
- A = Calcium Chloride
- B = Ethylene Glycol
- C = Propylene Glycol
- D = Methanol
- E = Air-Cooled Condenser

## Compressor Model Number

### Digits 1-4 — Compressor Model

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

### Digits 5-7 — Size

- 0N2= 120 Tons
- 0N1= 100 Tons
- 0M2= 85 Tons
- 0M1= 70 Tons
- 0L2 = 60 Tons
- 0L1 = 50 Tons
- 0K2= 40 Tons
- 0K1= 35 Tons

### Digit 8 — Unit Voltage

- A = 200/60/3
- R = 220/50/3
- C = 230/60/3
- D = 380/60/3
- H = 575/60/3
- T = 460/60/3 or 400/50/3

### Digit 9 — Internal Relief

- K = 450 psid

### Digits 10, 11 — Design Sequence

- XX = Factory Assigned

### Digit 12 — Capacity Limit

- N = Standard capacity controls (no capacity limit)

### Digits 13-15 — Motor kW Rating

- 134 = 134 kW (N2/60Hz)
- 112 = 112 kW (N2/50Hz)
- 092 = 092 kW (M2/60Hz)
- 077 = 077 kW (M2/50Hz)
- 069 = 069 kW (L2/60Hz)
- 058 = 058 kW (L2/50Hz)
- 050 = 050 kW (K2/60Hz)
- 041 = 041 kW (K2/50Hz)
- 112 = 112 kW (N1/60Hz)
- 093 = 093 kW (N1/50Hz)
- 077 = 077 kW (M1/60Hz)
- 065 = 065 kW (M1/50Hz)
- 057 = 057 kW (L1/60Hz)
- 048 = 048 kW (L1/60Hz)
- 043 = 043 kW (K1/60Hz)
- 036 = 036 kW (K1/60Hz)

### Digit 16 — Volume Ratio

- A = High volume ratio
- N = Low volume ratio





# General Information

## Unit Description

The RTWD units are helical-rotary type, water-cooled, liquid chillers, designed for installation indoors. The units have 2 independent refrigerant circuits, with one compressor per circuit. The RTWD units are packaged with an evaporator and condenser.

**Note:** *Each RTWD unit is a completely assembled, hermetic package 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 RTWD series features Trane's exclusive Adaptive Control logic with CH530 controls. It monitors 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.

Compressor unloaders are solenoid actuated. Each refrigerant circuit is provided with filter, sight glass, electronic expansion valve, and charging valves on the RTWD.

The evaporator and condenser are manufactured in accordance with ASME standards. The evaporator is fully insulated. Both evaporator and condenser are equipped with water drain and vent connections.

The RTUD units are helical-rotary type compressor chillers, designed to be most effective when used with the Levitor II air-cooled condenser. The RTUD unit consists of an evaporator, two helical rotary compressors (one per circuit), oil separators, oil coolers, liquid line service valves, sightglasses, electronic expansion valves and filter. The discharge line leaving the oil separator and liquid line entering the filters are capped and brazed. The unit ships with a full charge of oil and a nitrogen holding charge.

## Accessory/Options Information

Check all the accessories and loose parts which are shipped with the unit against the original order. Included in these items will be water vessel drain plugs, rigging diagrams, electrical diagrams, and service literature, which are placed inside the control panel and/or starter panel for shipment. Also check for optional components, such as flow switches and isolators.



## General Information

# General Data

## RTWD Units, 60 Hz

**Table 1. General data – RTWD, 60 Hz, standard efficiency**

Size		80	90	100	110	120	130	140
<b>Compressor</b>								
Quantity		2	2	2	2	2	2	2
<b>Evaporator</b>								
<b>2 Pass Arrangement</b>								
Water Conn. Size	NPS	4	4	4	4	5	5	5
	mm	100	100	100	100	125	125	125
Water Storage	gal	11.2	11.2	12.6	14.0	15.2	16.2	17.7
	l	42.2	42.2	47.6	53.0	57.4	61.5	66.8
Minimum Flow	gpm	77	77	89	101	101	110	122
	l/s	4.9	4.9	5.6	6.3	6.3	6.9	7.6
Maximum Flow	gpm	281	281	325	368	368	400	444
	l/s	17.8	17.8	20.5	23.2	23.2	25.3	28.0
<b>3 Pass Arrangement</b>								
Water Conn. Size	NPS	3	3	3	3	4	4	4
	mm	80	80	80	80	100	100	100
Water Storage	gal	11.2	11.2	12.6	14.0	15.2	16.2	17.7
	l	42.2	42.2	47.6	53.0	57.4	61.5	66.8
Minimum Flow	gpm	52	52	59	67	67	73	81
	l/s	3.2	3.2	3.7	4.2	4.2	4.6	5.1
Maximum Flow	gpm	187	187	216	244	244	266	295
	l/s	11.8	11.8	13.6	15.5	15.5	16.8	18.6
<b>Condenser</b>								
Water Conn. Size	NPS	5	5	5	5	5	5	5
	mm	125	125	125	125	125	125	125
Water Storage	gal	12.4	14.2	16.0	16.9	18.5	18.5	20.9
	l	46.8	53.6	60.4	63.8	70.1	70.1	79.2
Minimum Flow	gpm	83	99	115	124	135	135	156
	l/s	5.2	6.2	7.3	7.8	8.5	8.5	9.8
Maximum Flow	gpm	301	361	421	451	491	491	572
	l/s	19.0	22.8	26.6	28.5	31.0	31.0	36.1
<b>General Unit</b>								
Refrigerant Type		R-134a or R-513A						
# Refrig Circuits		2	2	2	2	2	2	2
Refrigerant Charge	lb	114.6/114.6	114.6/114.6	112.4/114.6	112.4/112.4	132.3/132.3	130.1/130.1	127.9/132.3
	kg	52/52	52/52	51/52	51/51	60/60	59/59	58/60
Oil Type		OIL00048						
Oil Charge	qt	7.2/7.2	7.2/7.2	7.2/10.5	10.5/10.5	10.5/10.5	10.5/10.5	10.5/10.5
	l	6.8/6.8	6.8/6.8	6.8/9.9	9.9/9.9	9.9/9.9	9.9/9.9	9.9/9.9

**Notes:**

1. Data containing information on two circuits is shown as circuit 1/circuit 2.
2. Flow limits are for water only.

**Table 2. General data – RTWD, 60 Hz, high efficiency**

Size		80	90	100	110	120	130
<b>Compressor</b>							
Quantity		2	2	2	2	2	2
<b>Evaporator</b>							
<b>2 Pass Arrangement</b>							
Water Conn. Size	NPS	4	4	5	5	5	5
	mm	100	100	100	125	125	125
Water Storage	gal	9.8	11.9	12.8	15.3	16.4	17.3
	l	37.0	45.2	48.3	57.9	62.3	65.4
Minimum Flow	gpm	72	92	100	112	123	130
	l/s	4.5	5.8	6.3	7.0	7.7	8.2
Maximum Flow	gpm	263	336	364	409	448	476
	l/s	16.6	21.2	23.0	25.8	28.3	30.0
<b>3 Pass Arrangement</b>							
Water Conn. Size	NPS	3	3	4	4	4	4
	mm	80	80	80	100	100	100
Water Storage	gal	9.8	11.9	12.8	15.3	16.4	17.3
	l	37.0	45.2	48.3	57.9	62.3	65.4
Minimum Flow	gpm	48	61	67	75	82	87
	l/s	3.0	3.9	4.2	4.7	5.1	5.5
Maximum Flow	gpm	175	223	242	271	298	316
	l/s	11.1	14.1	15.3	17.2	18.8	20.0
<b>Condenser</b>							
Water Conn. Size	NPS	5	5	5	5	5	5
	mm	125	125	125	125	125	125
Water Storage	gal	11.9	12.7	14.9	16.6	17.2	18.0
	l	45.1	48.1	56.3	62.7	65.2	68.3
Minimum Flow	gpm	87	95	117	130	136	145
	l/s	5.5	6.0	7.4	8.1	8.6	9.1
Maximum Flow	gpm	317	347	427	473	498	528
	l/s	20.0	21.9	27.0	29.9	31.4	33.3
<b>General Unit</b>							
Refrigerant Type		R-134a or R-513A					
# Refrig Circuits		2	2	2	2	2	2
Refrigerant Charge	lb	99.2/99.2	97/97	123.5/125.7	123.5/123.5	121.3/121.3	119/119
	kg	45/45	44/44	56/57	56/56	55/55	54/54
Oil Type		OIL00048					
Oil Charge	qt	7.2/7.2	7.2/7.2	7.2/10.5	10.5/10.5	10.5/10.5	10.5/10.5
	l	6.8/6.8	6.8/6.8	6.8/9.9	9.9/9.9	9.9/9.9	9.9/9.9

1. Data containing information on two circuits is shown as circuit 1/circuit 2.  
 2. Flow limits are for water only.



## General Information

**Table 3. General data – RTWD, 60 Hz, high efficiency (continued)**

Size		150	160	180	200	220	250
<b>Compressor</b>							
	Quantity	2	2	2	2	2	2
<b>Evaporator</b>							
<b>2 Pass Arrangement</b>							
Water Conn. Size	NPS	5	5	5	5	6	6
	mm	125	125	125	125	150	150
Water Storage	gal	19.2	20.3	22.3	24.2	28.6	31.8
	l	72.6	77.0	84.5	91.5	108.3	120.3
Minimum Flow	gpm	141	151	170	187	211	240
	l/s	8.9	9.5	10.7	11.8	13.3	15.1
Maximum Flow	gpm	515	554	621	683	772	879
	l/s	32.5	35.0	39.2	43.1	48.8	55.5
<b>3 Pass Arrangement</b>							
Water Conn. Size	NPS	4	4	4	4	4	4
	mm	100	100	100	100	100	100
Water Storage	gal	18.8	20.0	22.0	23.8	27.9	31.0
	l	71.2	75.6	83.2	90.1	105.5	117.5
Minimum Flow	gpm	94	101	113	124	141	160
	l/s	5.9	6.4	7.1	7.8	8.9	10.1
Maximum Flow	gpm	343	369	414	455	515	586
	l/s	21.7	23.3	26.2	28.7	32.5	37.0
<b>Condenser</b>							
Water Conn. Size	NPS	6	6	6	6	6	6
	mm	150	150	150	150	150	150
Water Storage	gal	21.6	22.9	24.6	26.2	31.1	39.2
	l	81.7	86.8	93.0	99.2	117.8	148.3
Minimum Flow	gpm	160	173	190	206	245	326
	l/s	10.1	10.9	12.0	13.0	15.4	20.5
Maximum Flow	gpm	583	634	694	754	895	1192
	l/s	36.8	40.0	43.8	47.6	56.5	75.3
<b>General Unit</b>							
Refrigerant Type		R-134a or R-513A					
# Refrig Circuits		2	2	2	2	2	2
Refrigerant Charge	lb	134.5/143.3	141.1/141.1	138.9/138.9	136.7/136.7	178.6/185.2	180.8/180.8
	kg	61/65	64/64	63/63	62/62	81/84	82/82
Oil Type		OIL00048					
Oil Charge	qt	10.5/12.4	12.4/12.4	12.4/12.4	12.4/12.4	12.4/12.4	12.4/12.4
	l	9.9/11.7	11.7/11.7	11.7/11.7	11.7/11.7	11.7/11.7	11.7/11.7

1. Data containing information on two circuits is shown as circuit 1/circuit 2.
2. Flow limits are for water only.

**Table 4. General data – RTWD, 60 Hz, premium efficiency**

Size		150	160	180	200
<b>Compressor</b>					
	Quantity	2	2	2	2
<b>Evaporator</b>					
<b>2 Pass Arrangement</b>					
Water Conn. Size	NPS	6	6	6	6
	mm	150	150	150	150
Water Storage	(gal)	27.8	27.8	29.3	31.3
	(L)	105.1	105.1	110.9	118.3
Minimum Flow	(gpm)	175	175	187	202
	(L/s)	11.0	11.0	11.8	12.7
Maximum Flow	(gpm)	638	638	683	739
	(L/s)	40.3	40.3	43.1	46.7
<b>3 Pass Arrangement</b>					
Water Conn. Size	NPS	4	4	4	4
	mm	100	100	100	100
Water Storage	(gal)	27.1	27.1	28.6	30.6
	(L)	102.4	102.4	108.3	115.7
Minimum Flow	(gpm)	117	117	125	135
	(L/s)	7.3	7.3	7.8	8.5
Maximum Flow	(gpm)	425	425	455	492
	(L/s)	26.9	26.9	28.7	31.1
<b>Condenser</b>					
Water Conn. Size	NPS	6	6	6	6
	mm	150	150	150	150
Water Storage	(gal)	30.0	30.0	32.9	32.9
	(L)	113.4	113.4	124.4	124.4
Minimum Flow	(gpm)	206	206	231	231
	(L/s)	13.0	13.0	14.6	14.6
Maximum Flow	(gpm)	754	754	845	845
	(L/s)	47.6	47.6	53.3	53.3
<b>General Unit</b>					
Refrigerant Type		R-134a			
# Refrig Circuits		2	2	2	2
Refrigerant Charge	(lb)	174.2/183.0	183.0/183.0	180.8/180.8	178.6/178.6
	(kg)	79/83	83/83	82/82	81/81
Oil Type		OIL00048			
Oil Charge	(qt)	10.5/12.4	12.4/12.4	12.4/12.4	12.4/12.4
	(L)	9.9/11.7	11.7/11.7	11.7/11.7	11.7/11.7

1. Data containing information on two circuits is shown as circuit 1/circuit 2.  
 2. Flow limits are for water only.



## General Information

### RTWD Units, 50 Hz

**Table 5. General data – RTWD, 50 Hz, standard efficiency**

Size		70	80	90	100	110	120	130	140	150
<b>Compressor</b>										
Quantity		2	2	2	2	2	2	2	2	2
<b>Evaporator</b>										
<b>2 Pass Arrangement</b>										
Water Conn. Size	NPS	4	4	4	4	4	5	5	5	5
	(mm)	100	100	100	100	100	125	125	125	125
Water Storage	(gal)	11.2	12.6	14.0	14.0	14.0	16.2	17.7	17.7	19.1
	(L)	42.2	47.6	53.0	53.0	53.0	61.5	66.8	66.8	72.2
Minimum Flow	(gpm)	77	89	101	101	101	110	122	122	133
	(L/s)	4.9	5.6	6.3	6.3	6.3	6.9	7.6	7.6	8.4
Maximum Flow	(gpm)	281	324	368	368	368	400	444	444	487
	(L/s)	17.8	20.5	23.2	23.2	23.2	25.3	28.0	28.0	30.8
<b>3 Pass Arrangement</b>										
Water Conn. Size	NPS	3	3	3	3	3	4	4	4	4
	(mm)	80	80	80	80	80	100	100	100	100
Water Storage	(gal)	11.2	12.6	14.0	14.0	14.0	16.2	17.7	17.7	19.1
	(L)	42.2	47.6	53.0	53.0	53.0	61.5	66.8	66.8	72.2
Minimum Flow	(gpm)	52	59	67	67	67	73	81	81	89
	(L/s)	3.2	3.7	4.2	4.2	4.2	4.6	5.1	5.1	5.6
Maximum Flow	(gpm)	187	216	244	244	244	266	295	295	324
	(L/s)	11.8	13.6	15.5	15.5	15.5	16.8	18.6	18.6	20.5
<b>Condenser</b>										
Water Conn. Size	NPS	5	5	5	5	5	5	5	5	5
	(mm)	125	125	125	125	125	125	125	125	125
Water Storage	(gal)	12.4	14.2	16.0	16.9	16.9	18.5	20.9	20.9	22.4
	(L)	46.8	53.6	60.4	63.8	63.8	70.1	79.2	79.2	84.8
Minimum Flow	(gpm)	83	99	115	124	124	135	156	156	170
	(L/s)	5.2	6.2	7.3	7.8	7.8	8.5	9.8	9.8	10.7
Maximum Flow	(gpm)	301	361	421	451	451	491	571	571	622
	(L/s)	19.0	22.8	26.6	28.5	28.5	31.0	36.1	36.1	39.3
<b>General Unit</b>										
Refrigerant Type		R-134a or R-513A								
# Refrig Circuits		2	2	2	2	2	2	2	2	2
Refrigerant Charge	(lb)	114.6/	112.4/	110.2/	110.2/	112.4/	130.1/	127.9/	127.9/	130.1/
	(kg)	114.6	112.4	110.2	112.4	112.4	130.1	127.9	132.3	130.1
		52/52	51/51	50/50	50/51	51/51	59/59	58/58	58/60	59/59
Oil Type		OIL00048								
Oil Charge	(qt)	7.2/7.2	7.2/7.2	7.2/7.2	7.2/10.5	10.5/10.5	10.5/10.5	10.5/10.5	10.5/10.5	10.5/10.5
	(L)	6.8/6.8	6.8/6.8	6.8/6.8	6.8/9.9	9.9/9.9	9.9/9.9	9.9/9.9	9.9/9.9	9.9/9.9

1. Data containing information on two circuits is shown as circuit 1/circuit 2.  
 2. Flow limits are for water only.



## General Information

**Table 6. General data – RTWD, 50 Hz, high efficiency**

Size		60	70	80	90	100	110	120
<b>Compressor</b>								
	Quantity	2	2	2	2	2	2	2
<b>Evaporator</b>								
<b>2 Pass Arrangement</b>								
Water Conn. Size	NPS	4	4	4	5	5	5	5
	(mm)	100	100	100	125	125	125	125
Water Storage	(gal)	9.8	10.6	11.9	15.3	15.3	16.4	17.3
	(L)	37.0	40.2	45.2	57.9	57.9	62.3	65.4
Minimum Flow	(gpm)	72	80	92	112	112	123	130
	(L/s)	4.5	5.0	5.8	7.0	7.0	7.7	8.2
Maximum Flow	(gpm)	263	291	336	408	408	448	476
	(L/s)	16.6	18.4	21.2	25.8	25.8	28.3	30.0
<b>3 Pass Arrangement</b>								
Water Conn. Size	NPS	3	3	3	4	4	4	4
	(mm)	80	80	80	100	100	100	100
Water Storage	(gal)	9.8	10.6	11.9	15.3	15.3	16.4	17.3
	(L)	37.0	40.2	45.2	57.9	57.9	62.3	65.4
Minimum Flow	(gpm)	48	53	61	75	75	82	87
	(L/s)	3.0	3.3	3.9	4.7	4.7	5.1	5.5
Maximum Flow	(gpm)	175	193	223	271	271	298	316
	(L/s)	11.1	12.2	14.1	17.2	17.2	18.8	20.0
<b>Condenser</b>								
Water Conn. Size	NPS	5	5	5	5	5	5	5
	(mm)	125	125	125	125	125	125	125
Water Storage	(gal)	11.9	11.9	13.8	15.3	16.6	16.6	18.0
	(L)	45.1	45.1	52.2	58.1	62.7	62.7	68.3
Minimum Flow	(gpm)	87	87	106	117	130	130	145
	(L/s)	5.5	5.5	6.7	7.4	8.1	8.1	9.1
Maximum Flow	(gpm)	317	317	387	427	473	473	528
	(L/s)	20.0	20.0	24.5	27.0	29.9	29.9	33.3
<b>General Unit</b>								
Refrigerant Type					R-134a or R-513A			
# Refrig Circuits		2	2	2	2	2	2	2
Refrigerant Charge	(lb)	99.2/99.2	99.2/99.2	97/97	121.3/121.3	121.3/123.5	121.3/121.3	119/119
	(kg)	45/45	45/45	44/44	55/55	55/56	55/55	54/54
Oil Type					OIL00048			
Oil Charge	(qt)	7.2/7.2	7.2/7.2	7.2/7.2	7.2/7.2	7.2/10.5	10.5/10.5	10.5/10.5
	(L)	6.8/6.8	6.8/6.8	6.8/6.8	6.8/6.8	6.8/9.9	9.9/9.9	9.9/9.9

1. Data containing information on two circuits is shown as circuit 1/circuit 2.
2. Flow limits are for water only.



## General Information

**Table 7. General data – RTWD, 50 Hz, high efficiency (continued)**

Size		130	140	160	180	200	220	250
<b>Compressor</b>								
	Quantity	2	2	2	2	2	2	2
<b>Evaporator</b>								
<b>2 Pass Arrangement</b>								
Water Conn. Size	NPS	5	5	5	5	6	6	6
	(mm)	125	125	125	125	150	150	150
Water Storage	(gal)	19.2	20.3	22.3	24.2	28.6	29.9	31.8
	(L)	72.6	77.0	84.5	91.5	108.3	113.3	120.3
Minimum Flow	(gpm)	141	152	170	187	211	224	240
	(L/s)	8.9	9.5	10.7	11.8	13.3	14.1	15.1
Maximum Flow	(gpm)	515	554	621	683	773	817	879
	(L/s)	32.5	35.0	39.2	43.1	48.8	51.6	55.5
<b>3 Pass Arrangement</b>								
Water Conn. Size	NPS	4	4	4	4	4	4	4
	(mm)	100	100	100	100	100	100	100
Water Storage	(gal)	18.8	20.0	22.0	23.8	27.9	29.2	31.0
	(L)	71.2	75.6	83.2	90.1	105.5	110.5	117.5
Minimum Flow	(gpm)	94	101	114	125	141	149	160
	(L/s)	5.9	6.4	7.1	7.8	8.9	9.4	10.1
Maximum Flow	(gpm)	344	370	415	456	515	545	586
	(L/s)	21.7	23.3	26.2	28.7	32.5	34.4	37.0
<b>Condenser</b>								
Water Conn. Size	NPS	6	6	6	6	6	6	6
	(mm)	150	150	150	150	150	150	150
Water Storage	(gal)	21.6	22.9	24.6	26.2	31.1	31.1	35.2
	(L)	81.7	86.8	93.0	99.2	117.8	117.8	133.3
Minimum Flow	(gpm)	160	173	190	206	245	245	286
	(L/s)	10.0	10.9	12.0	13.0	15.4	15.4	18.0
Maximum Flow	(gpm)	583	634	694	755	895	895	1046
	(L/s)	36.8	40.0	43.8	47.6	56.5	56.5	66.1
<b>General Unit</b>								
Refrigerant Type		R-134a or R-513A						
# Refrig Circuits		2	2	2	2	2	2	2
Refrigerant Charge	(lb)	134.5/134.5	132.3/136.7	134.5/134.5	132.3/136.7	178.6/178.6	176.4/183.0	180.8/180.8
	(kg)	61/61	60/62	61/61	60/62	81/81	80/83	82/82
Oil Type		OIL00048						
Oil Charge	(qt)	10.5/10.5	10.5/10.5	10.5/10.5	10.5/12.4	12.4/12.4	12.4/12.4	12.4/12.4
	(L)	9.9/9.9	9.9/9.9	9.9/9.9	9.9/11.7	11.7/11.7	11.7/11.7	11.7/11.7

1. Data containing information on two circuits is shown as circuit 1/circuit 2.  
 2. Flow limits are for water only.



**Table 8. General data – RTWD, 50 Hz, premium efficiency**

Size		160	180	200
<b>Compressor</b>				
Quantity		2	2	2
<b>Evaporator</b>				
<b>2 Pass Arrangement</b>				
Water Conn. Size	NPS	6	6	6
	(mm)	150	150	150
Water Storage	(gal)	29.3	31.3	31.8
	(L)	110.9	118.3	120.3
Minimum Flow	(gpm)	187	202	240
	(L/s)	11.8	12.7	15.1
Maximum Flow	(gpm)	683	739	879
	(L/s)	43.1	46.7	55.5
<b>3 Pass Arrangement</b>				
Water Conn. Size	NPS	4	4	4
	(mm)	100	100	100
Water Storage	(gal)	28.6	30.6	31.0
	(L)	108.3	115.7	117.5
Minimum Flow	(gpm)	125	135	160
	(L/s)	7.8	8.5	10.1
Maximum Flow	(gpm)	455	492	586
	(L/s)	28.7	31.1	37.0
<b>Condenser</b>				
Water Conn. Size	NPS	6	6	6
	(mm)	150	150	150
Water Storage	(gal)	30.0	34.5	39.2
	(L)	113.4	130.6	148.3
Minimum Flow	(gpm)	206	245	326
	(L/s)	13.0	15.4	20.5
Maximum Flow	(gpm)	754	895	1192
	(L/s)	47.6	56.5	75.3
<b>General Unit</b>				
Refrigerant Type		R-134a		
# Refrig Circuits		2	2	2
Refrigerant Charge	(lb)	176.4/176.4	174.2/178.6	176.4/174.2
	(kg)	80/80	79/81	80/79
Oil Type		OIL00048		
Oil Charge	(qt)	10.5/10.5	10.5/12.4	12.4/12.4
	(L)	9.9/9.9	9.9/11.7	11.7/11.7

1. Data containing information on two circuits is shown as circuit 1/circuit 2.  
 2. Flow limits are for water only.



## General Information

### RTUD and Condenser General Data

**Table 9. General data – RTUD, 60 Hz**

Size		80	90	100	110	120	130
<b>Compressor</b>							
	Quantity	2	2	2	2	2	2
<b>Evaporator</b>							
<b>2 Pass Arrangement</b>							
Water Conn. Size	NPS	4	4	4	5	5	5
	mm	100	100	100	125	125	125
Water Storage	(gal)	9.8	10.6	12.0	14.0	15.3	15.3
	(L)	37.1	40.2	45.3	53.0	58.0	58.0
Minimum Flow	(gpm)	77	79	91	99	111	111
	(L/s)	4.9	5.0	5.7	6.2	7.0	7.0
Maximum Flow	(gpm)	281	291	335	363	408	408
	(L/s)	17.7	21.2	23.0	25.8	28.3	30.0
<b>3 Pass Arrangement</b>							
Water Conn. Size	NPS	3	3	3	4	4	4
	mm	80	80	80	100	100	100
Water Storage	(gal)	9.5	10.3	11.6	13.7	15.1	15.1
	(L)	36.0	39.0	44.0	52.0	57.0	57.0
Minimum Flow	(gpm)	51	53	61	66	74	74
	(L/s)	3.2	3.3	3.8	4.2	4.7	4.7
Maximum Flow	(gpm)	187	194	224	242	272	272
	(L/s)	11.8	12.2	14.1	15.3	17.2	17.2
<b>General Unit</b>							
Refrigerant Type		R-134a					
# Refrig Circuits		2	2	2	2	2	2
Refrigerant Charge	(lb)	50/50	49/49	47/47	65/65	64/64	64/64
	(kg)	22.7/22.7	22.2/22.2	21.3/21.3	29.5/29.5	29.0/29.0	29.0/29.0
Oil Type		OIL00048					
Oil Charge	(qt)	7.2/7.2	7.2/7.2	7.2/10.5	10.5/10.5	10.5/10.5	10.5/10.5
	(L)	6.8/6.8	6.8/6.8	6.8/9.9	9.9/9.9	9.9/9.9	9.9/9.9
Discharge Connection Diameter	(inch)	2.1	2.1	2.1	2.6	2.6	2.6
Liquid Connection Diameter	(inch)	1.1	1.1	1.1	1.4	1.4	1.4

1. Data containing information on two circuits is shown as circuit 1/circuit 2.
2. Flow limits are for water only.

**Table 10. General data – RTUD, 60 Hz (continued)**

Size		150	160	180	200	220	250
<b>Compressor</b>							
	Quantity	2	2	2	2	2	2
<b>Evaporator</b>							
<b>2 Pass Arrangement</b>							
Water Conn. Size	NPS	5	5	5	5	5	5
	mm	125	125	125	125	125	125
Water Storage	(gal)	16.5	19.2	19.2	20.3	22.3	24.2
	(L)	62.4	72.6	72.6	77.0	84.5	91.5
Minimum Flow	(gpm)	122	140	140	151	169	186
	(L/s)	7.7	8.8	8.8	9.5	10.7	11.7
Maximum Flow	(gpm)	447	514	514	553	620	681
	(L/s)	28.2	32.4	32.4	34.9	39.1	43.0
<b>3 Pass Arrangement</b>							
Water Conn. Size	NPS	4	4	4	4	4	4
	mm	100	100	100	100	100	100
Water Storage	(gal)	16.1	18.8	18.8	20.0	22.0	23.8
	(L)	61.0	71.2	71.2	75.6	83.2	90.1
Minimum Flow	(gpm)	81	94	94	100	112	124
	(L/s)	5.1	5.9	5.9	6.3	7.1	7.8
Maximum Flow	(gpm)	298	343	343	368	413	454
	(L/s)	18.8	21.6	21.6	23.2	26.1	28.6
<b>General Unit</b>							
Refrigerant Type		R-134a					
# Refrig Circuits		2	2	2	2	2	2
Recommended Refrigerant Charge <sup>1,3</sup>	(lb)	62/62	66/66	66/66	66/66	63/63	61/61
	(kg)	28.1/28.1	29.9/29.9	29.9/29.9	29.9/29.9	28.6/28.6	27.7/27.7
Oil Type		OIL00048					
Oil Charge <sup>1</sup>	(qt)	10.5/10.5	10.5/10.5	10.5/12.4	12.4/12.4	12.4/12.4	12.4/12.4
	(L)	9.9/9.9	9.9/9.9	9.9/11.7	11.7/11.7	11.7/11.7	11.7/11.7
Discharge Connection Diameter	(inch)	2.6	3.1	3.1	3.1	3.1	3.1
Liquid Connection Diameter	(inch)	1.4	1.4	1.4	1.4	1.4	1.6

1. Data containing information on two circuits is shown as circuit 1/circuit 2.

2. Flow limits are for water only.

3. Condenserless chiller is not factory charged, the refrigerant must be purchased and charged in the field.



## General Information

**Table 11. General data – condenser by Trane, 60 Hz**

Size		80	90	100	110	120	130
<b>Condenser</b>							
Condenser Quantity		1	1	1	1	1	1
Fins/Inch		12	10	10	12	8	10
Coil Length	(inch)	162	216	216	216	270	270
	(mm)	4115	5486	5486	5486	6858	6858
Coil Width	(inch)	85	85	85	85	85	85
	(mm)	2159	2159	2159	2159	2159	2159
Number of Rows		3	3	4	4	4	4
<b>Condenser Fans</b>							
Fan Quantity		6	8	8	8	10	10
Diameter	(inch)	30	30	30	30	30	30
	(mm)	762	762	762	762	762	762
Nominal RPM	(rpm)	850	850	850	850	850	850
Air Flow	(cfm)	56,646	78,280	72,248	69,280	94,490	90,310
Tip Speed	(fpm)	6676	6676	6676	6676	6676	6676
Motor HP	(hp)	1.5	1.5	1.5	1.5	1.5	1.5
<b>General</b>							
Recommended Refrigerant Charge <sup>1</sup>	(lbs)	40/40	52/52	68/68	68/68	85/85	85/85
	(kg)	18.1/18.1	23.6/23.6	30.8/30.8	30.8/30.8	38.6/38.6	38.6/38.6
Discharge/Liquid Connection Diameters	(inch)	2.1	2.1	2.1	2.1	2.1	2.1
	(mm)	54	54	54	54	54	54

1. Data containing information on two circuits is shown as circuit 1/circuit 2.

2. Condenser is not factory charged, the refrigerant must be purchased and charged in the field.

**Table 12. General data – condenser by Trane, 60 Hz (continued)**

Size		150	160	180	200	220	250
<b>Condenser</b>							
Condenser Quantity		2	2	2	2	2	2
Fins/Inch <sup>1</sup>		8/12	12/12	12/8	8/8	8/10	10/10
Coil Length <sup>1</sup>	(inch)	162/162	162/162	162/216	216/216	216/216	216/216
		4115/4115	4115/4115	4115/5486	5486/5486	5486/5486	5486/5486
Coil Width <sup>1</sup>	(inch)	85/85	85/85	85/85	85/85	85/85	85/85
		2159/2159	2159/2159	2159/2159	2159/2159	2159/2159	2159/2159
Number of Rows		3/3	3/3	3/3	3/3	3/4	4/4
<b>Condenser Fans</b>							
Fan Quantity <sup>1</sup>		6/6	6/6	6/8	8/8	8/8	8/8
Diameter	(inch)	30	30	30	30	30	30
Nominal RPM	(rpm)	850	850	850	850	850	850
Air Flow <sup>1</sup>	(cfm)	60,954/56,646	56,646/56,646	56,646/81,272	81,272/81,272	81,272/72,248	72,248/72,248
Tip Speed	(fpm)	6676	6676	6676	6676	6676	6676
Motor HP	(hp)	1.5	1.5	1.5	1.5	1.5	1.5
<b>General</b>							
Recommended Refrigerant Charge <sup>2,3</sup>	(lbs)	76/76	76/76	76/101	101/101	101/134	134/134
	(kg)	34.5/34.5	34.5/34.5	34.5/45.8	45.8/45.8	45.8/60.8	60.8/60.8
Discharge/Liquid Connection Diameters	(inch)	2.125	2.125	2.125	2.125	2.125	2.125
	(mm)	54	54	54	54	54	54

1. Data containing information on two condensers is shown as cond 1/cond 2.

2. Data containing information on two circuits is shown as circuit 1/circuit 2.

3. Condenser is not factory charged, the refrigerant must be purchased and charged in the field.



# Pre-Installation

## Inspection Checklist

When the unit is delivered, verify that it is the correct unit and that it is properly equipped. Compare the information which appears on the unit nameplate with the ordering and submittal information. See “Model Number Descriptions,” p. 7.

Inspect all exterior components for visible damage. Report any apparent damage or material shortage to the carrier and make a “unit damage” notation on the carrier's delivery receipt. Specify the extent and type of damage found and notify the appropriate Trane Sales Office.

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

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

- Inspect the individual pieces of the shipment before accepting the unit. Check for obvious damage to the unit or packing material.
- Inspect the unit for concealed damage as soon as possible after delivery and before it is stored. Concealed damage must be reported within 15 days.
- If concealed damage is discovered, stop unpacking the shipment. Do not remove damaged material from the receiving location. Take photos of the damage, if possible. The owner must provide reasonable evidence that the damage did not occur after delivery.
- Notify the carrier's terminal of the damage immediately, by phone and by mail. Request an immediate, joint inspection of the damage with the carrier and the consignee.
- Notify the Trane sales representative and arrange for repair. Do not repair the unit, however, until damage is inspected by the carrier's representative.

## Unit Storage

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 dry, secure area.
- At least every three months, attach a gauge and manually check the pressure in the refrigerant circuit. If the refrigerant pressure is below 71 psig at 70 F (or 46 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 and Contractor responsibilities

A list of the contractor responsibilities typically associated with the unit installation process is provided in Table 13.

**Note:** Unit Start-up must be completed by a qualified Trane service technician.

**Table 13. Installation requirements**

Type of Rqmt	Trane Supplied		Field Supplied Field Installed
	Trane Installed	Field Installed	
Foundation			• Meet foundation requirements
Rigging			• Safety chains Clevis connectors Lifting beam
Isolation		• Isolation pads or neoprene isolators (opt)	• Isolation pads or neoprene isolators (optional)
Electrical	• Circuit breakers or fusible disconnects (optional) • Unit mounted starter	• Flow switches (may be field supplied) • Water regulating valve (optional)	• Circuit breakers or fusible disconnects (opt) • Electrical connections to unit mounted starter (opt) • Electrical connections to remote mounted starter (opt) • Wiring sizes per submittal and NEC • Terminal lugs • Ground connection(s) • BAS wiring (opt) • Control voltage wiring • Chilled water pump contactor and wiring including interlock • Condenser water pump contactor and wiring including interlock • Option relays and wiring
Water piping	• Flow switches (optional)	• Flow switches (may be field supplied) • Water regulating valve (optional)	• Taps for thermometers and gauges • Thermometers • Strainers (as required) • Water flow pressure gauges • Isolation and balancing valves in water piping • Vents and drain on waterbox valves • Pressure relief valves (for waterboxes as required)
Relief	• Single relief valve • Dual relief valves (opt)		• Vent line and flexible connector and vent line from relief valve to atmosphere
Insulation	• Insulation • High humidity insulation (opt)		• Insulation
Water Piping Connection Components	• Grooved pipe • Grooved pipe to flanged connection (opt)		
Other Materials			• R-134a refrigerant (1 lb. max per machine as needed) • Dry nitrogen (20 psig max per machine as needed)



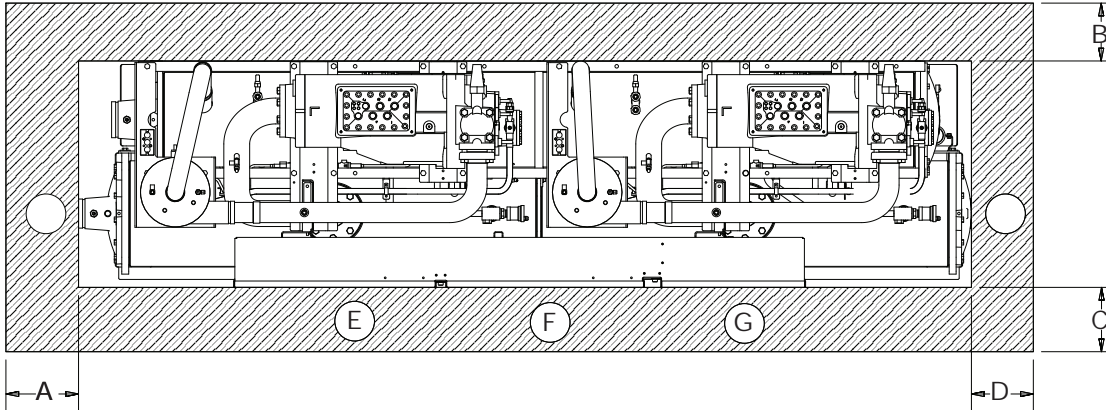
# Dimensions and Weights

## Unit Dimensions

See unit submittals for specific unit dimensions and water connection locations.

## Service Clearances

Figure 4. RTWD/RTUD service clearances



**Notes:**

- See [Table 14](#) for clearance values.
- All unit configurations require 36 inch (914 mm) clearance above the unit.
- All clearance values are taken from the edge of the unit. Actual unit configuration may vary from that shown in figure above.

Table 14. Service clearances

Unit Configuration				Clearance								Door Swing					
				A <sup>(a)</sup>		B		C <sup>(b)</sup>		D <sup>(c)</sup>		E <sup>(d)</sup>		F <sup>(e)</sup>		G <sup>(f)</sup>	
Model	Tons	Efficiency	Hz	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
RTWD	80-140	Standard	60	36	914	36	914	36	914	127	3226	31.3	796.9	31.1	790.1	22.4	568.1
RTWD	70-150	Standard	50														
RTWD/ RTUD	80-130	High	60	36	914	36	914	36	914	115	2921	31.3	796.9	31.1	790.1	22.4	568.1
RTWD	60-120	High	50														
RTWD	150-250	High	60	36	914	36	914	40	1016	114.8	2916	31.3	796.9	31.1	790.1	22.4	568.1
RTUD	150-250	High	60														
RTWD	150-200	Premium	60	36	914	36	914	40	1016	134.5	3416	31.3	796.9	31.1	790.1	22.4	568.1

(a) Condenser supply waterbox end - minimum clearance required for maintenance.  
 (b) Clearance of 42 inches (1067 mm) is required to other ground parts. Clearance of 48 inches (1220 mm) required for two units installed with panels facing each other or other live parts.  
 (c) Condenser return waterbox end - minimum clearance required for tube removal.  
 (d) Door swing - panel power section (left).  
 (e) Door swing - panel power section (middle).  
 (f) Door swing - panel control section door swing.



## Dimensions and Weights

### Weights

#### RTWD

**Table 15. Weights – RTWD – 60 Hz**

Model	Standard Efficiency				High Efficiency				Premium Efficiency			
	Operating		Shipping		Operating		Shipping		Operating		Shipping	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
80	5900	2676	5703	2587	5732	2600	5551	2518	-	-	-	-
90	5933	2691	5721	2595	5792	2627	5587	2534	-	-	-	-
100	6140	2785	5902	2677	6255	2837	6025	2733	-	-	-	-
110	6332	2872	6074	2755	6475	2937	6208	2816	-	-	-	-
120	6530	2962	6248	2834	6510	2953	6230	2826	-	-	-	-
130	6535	2964	6244	2832	6543	2968	6248	2834	-	-	-	-
140	6971	3162	6649	3016	-	-	-	-	-	-	-	-
150	-	-	-	-	7884	3576	7544	3422	8724	3957	8243	3739
160	-	-	-	-	8395	3808	8036	3645	9171	4160	8691	3942
180	-	-	-	-	8490	3851	8098	3673	9290	4214	8772	3979
200	-	-	-	-	8578	3891	8157	3700	9337	4235	8803	3993
220	-	-	-	-	9493	4306	8995	4080	-	-	-	-
250	-	-	-	-	10071	4568	9478	4299	-	-	-	-

**Note:** Weights include optional base rail fork lifting. Subtract 300 lbs (136.1 kg) if this option is not selected.

**Table 16. Weights – RTWD – 50 Hz**

Model	Standard Efficiency				High Efficiency				Premium Efficiency			
	Operating		Shipping		Operating		Shipping		Operating		Shipping	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
60	-	-	-	-	5706	2588	5525	2506	-	-	-	-
70	5874	2664	5677	2575	5724	2596	5534	2510	-	-	-	-
80	6030	2735	5807	2634	5893	2673	5680	2576	-	-	-	-
90	6186	2806	5937	2693	6319	2866	6063	2750	-	-	-	-
100	6268	2843	6010	2726	6412	2908	6145	2787	-	-	-	-
110	6332	2872	6074	2755	6495	2946	6220	2821	-	-	-	-
120	6903	3131	6614	3000	6914	3136	6619	3002	-	-	-	-
130	7337	3328	7015	3182	8188	3709	7848	3555	-	-	-	-
140	7342	3330	7020	3184	8256	3784	7895	3606	-	-	-	-
150	7395	3354	7049	3197	-	-	-	-	-	-	-	-
160	-	-	-	-	8353	3740	7963	3576	9061	4110	8595	3885
180	-	-	-	-	8770	3980	8351	3789	9581	4346	9032	4097
200	-	-	-	-	9740	4426	9242	4200	10060	4563	9467	4294
220	-	-	-	-	9778	4442	9268	4211	-	-	-	-
250	-	-	-	-	9943	4517	9383	4263	-	-	-	-

**Note:** Weights include optional base rail fork lifting. Subtract 300 lbs (136.1 kg) if this option is not selected.



## RTUD

**Table 17. RTUD weights - 60 Hz**

Model	Operating		Shipping	
	lb	kg	lb	kg
80	4874	2211	4793	2174
90	4892	2219	4804	2179
100	5073	2301	4974	2256
110	5326	2416	5221	2368
120	5322	2414	5194	2356
130	5322	2414	5194	2356
150	5917	2684	5781	2622
160	6804	3086	6643	3013
180	6876	3119	6715	3046
200	6980	3166	6810	3089
220	7300	3311	7112	3226
250	7602	3448	7401	3357

**Note:** Weights include optional base rail fork lifting, subtract 300 lbs (136.1 kg) if this option is not selected.

## Air-Cooled Condenser

**Table 18. Air-cooled condenser shipping weights**

RTUD Size	Condenser 1		Condenser 2	
	lb	kg	lb	kg
80	2100	953	-	-
90	2651	1202	-	-
100	2884	1308	-	-
110	2950	1338	-	-
120	4005	1817	-	-
130	4046	1835	-	-
150	2044	927	2100	953
160	2100	953	2100	953
180	2100	953	2526	1146
200	2526	1146	2526	1146
220	2526	1146	2884	1308
250	2884	1308	2884	1308



# Installation - Mechanical

## Location Requirements

### Noise Considerations

- Refer to *Trane Engineering Bulletin -Series R® Chiller Sound Ratings and Installation Guide* for sound consideration applications.
- Locate the unit away from sound-sensitive areas.
- Install the isolation pads under the unit. Refer to "Unit Isolation."
- Install rubber vibration isolators in all water piping.
- 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 chapter "Dimensions and Weights," p. 23 for unit operating weights. Once in place, the unit must be level within 1/4" (6.4 mm) over its length and width. 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. Refer to submittal drawings for the unit dimensions, to provide sufficient clearance for the opening of control panel doors and unit service. Refer to the chapter on "Unit Dimensions/Weights" for minimum clearances. In all cases, local codes which require additional clearances will take precedence over these recommendations.

**Note:** Required vertical clearance above the unit is 36" (914.4 mm). There should be no piping or conduit located over the compressor motor. If the unit configuration requires a variance to the clearance dimensions, contact your Trane Sales Office Representative. Also refer to Trane Engineering Bulletins for application information on RTWD/RTUD chillers.

### Rigging

The Model RTWD/RTUD chiller should be moved by lifting, unless the unit is ordered with the Base Rail Forklifting option. Refer to the unit model number, digit 46, for more details.

See Table 15, p. 24 thru Table 17, p. 25 for typical unit lifting weights and Table 23, p. 33 thru Table 27, p. 35 for center of

gravity dimensions. Refer to the rigging label attached to the unit for further details.

**⚠ WARNING**

### Heavy Objects!

Failure to follow instructions below or properly lift unit could result in unit dropping and possibly crushing operator/technician which could result in death or serious injury, and equipment or property-only damage.

- Equipment is top heavy. Use caution when lifting/moving equipment to prevent unit from tipping.
- 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.
- The high center of gravity on this unit requires the use of an anti-rolling cable (chain or sling). To prevent unit from rolling, attach cable (chain or sling) with no tension and minimal slack around compressor suction pipe as shown.
- Do not use fork lift to move or lift unit unless unit has lifting base with locations marked by caution labels installed.

Figure 5. Equipment is top heavy (see warning above)



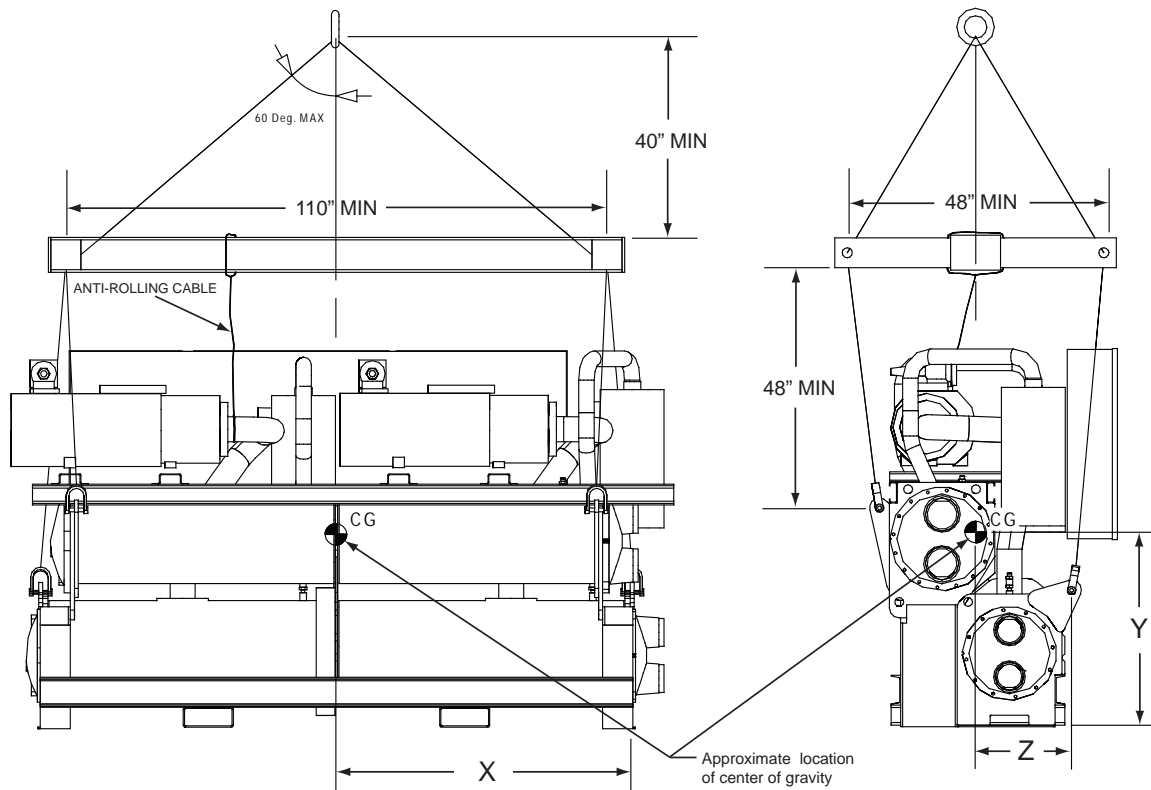
**⚠ WARNING**

### Improper Unit Lift!

Failure to properly lift unit 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 to verify proper center of gravity lift point. To avoid dropping of unit, reposition lifting point if unit is not level.

### Lifting Procedure

Attach chains or cables to lifting beam, as shown in Figure 6. Lifting beam crossbars **MUST** be positioned so lifting cables do not contact the sides of the unit. Attach the anti-rolling cable to the circuit 2 compressor suction pipe. Adjust as necessary for even level lift.

**Figure 6. RTWD/RTUD rigging**


## Unit Isolation and Leveling

### Mounting

Construct an isolated concrete pad for the unit or provide concrete footings at each of the four 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" over the entire length and width. Use shims as necessary to level the unit.

### Isolation Pads

**Note:** The elastomeric pads shipped (as standard) are adequate for most installations. For additional details on isolation practices, refer to Trane Engineering Bulletin -Series R<sup>®</sup> Chiller Sound Ratings and Installation Guide, or consult an acoustical engineer for sound-sensitive installations.

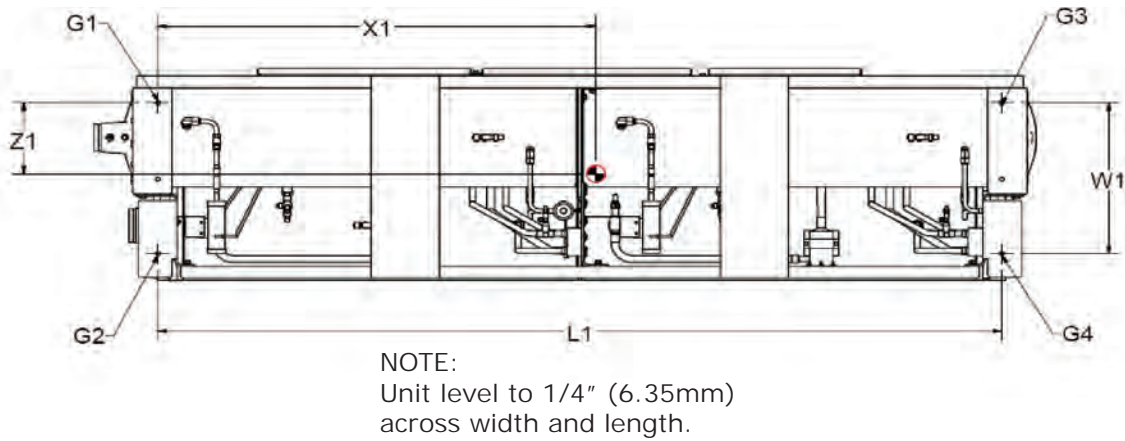
During final positioning of the unit, place the isolation pads under the evaporator and condenser tube sheet supports as shown in Figure 7, p. 28. Level the unit as described in the next main paragraph.

## Neoprene Isolator Installation (optional)

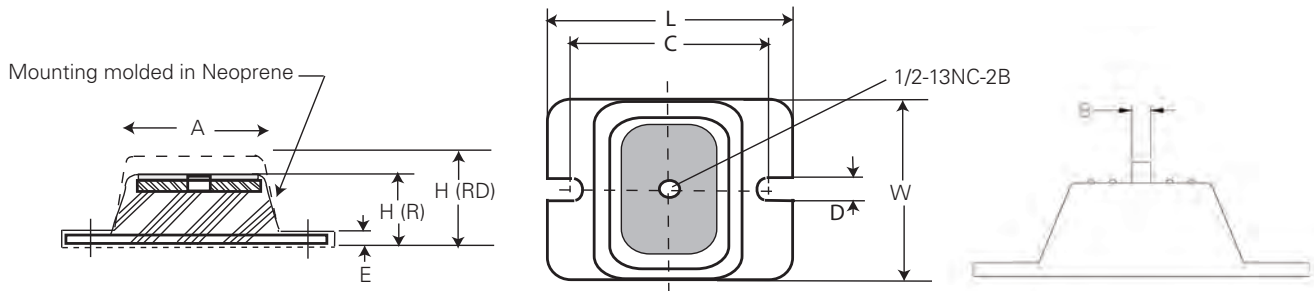
Install the optional neoprene isolators at each mounting location. Isolators are identified by part number and color. Refer to submittal drawing for correct isolators.

1. Secure the isolators to the mounting surface, using the mounting slots in the isolator base plate, as shown in Figure . 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 on to the isolators and secure the isolator to the unit with a nut.
4. Level the unit carefully. Refer to "Leveling". Fully tighten the isolator mounting bolts.

**Figure 7. Isolator pad placement**



**Figure 8. RTWD/RTUD neoprene isolator**

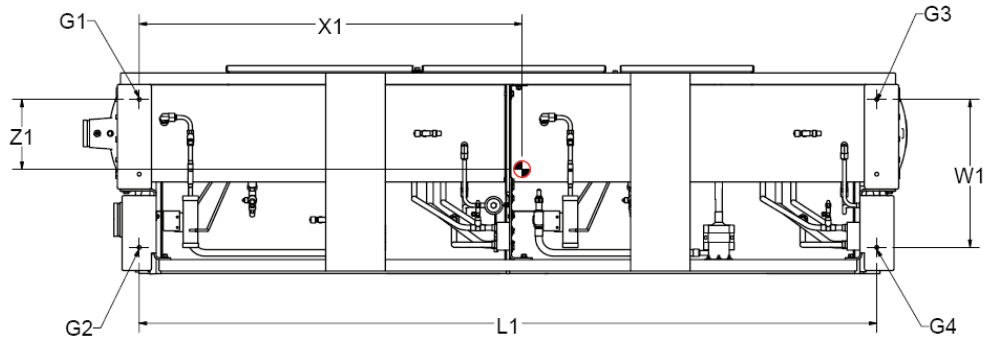


**Table 19. Isolator part numbers and dimensions<sup>(a)</sup>**

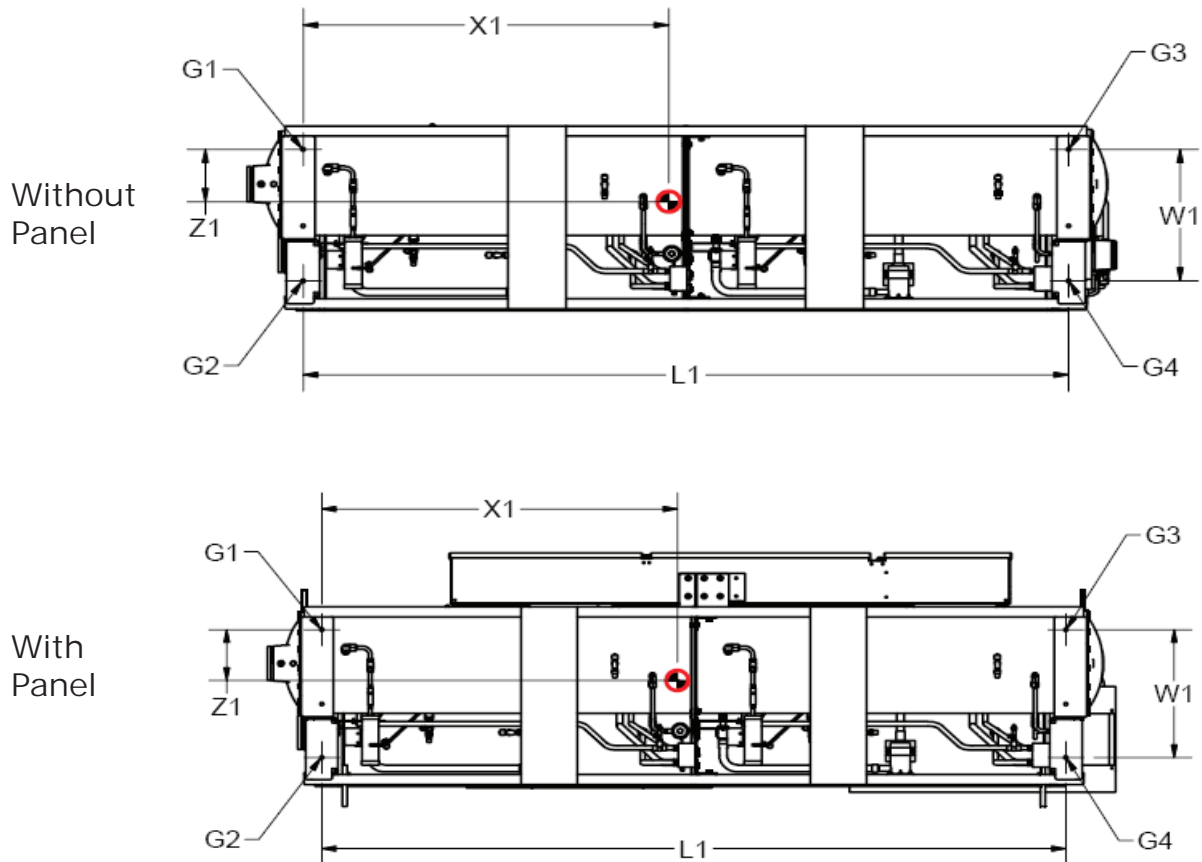
Model	Size	Hz	Effic.	Isolator Type Color [Ext] <sup>(b)</sup> Max Load- lbs (kg)	Maximum Deflection (in)	Dimension - in (mm)								
						A	B	C	D	E	H	L	W	
RTWD	80, 90, 100, 110, 120, 130, 140	60	STD											
RTWD	80, 90, 100, 110, 120, 130	60	HIGH											
RTWD	70, 80, 90, 100, 110, 120, 130, 140, 150	50	STD	RDP-4 Red [62] 2250 (1021)	0.50	3.0 (76.2)	0.50 (12.7)	5.00 (127.0)	0.56 (14.2)	0.38 (9.7)	2.75 (69.8)	6.25 (158.8)	4.63 (117.6)	
RTWD	60,70,80, 90, 100, 110, 120	50	HIGH											
RTUD	80, 90, 100, 110, 120, 130	60	HIGH											
RTWD	150, 160, 180, 200, 220, 250	60	HIGH											
RTWD	150, 160, 180, 200	60	PREM											
RTWD	130, 140, 160, 180, 200, 220, 250	50	HIGH	RDP-4 Green [63] 3000 (1361)	0.50	3.0 (76.2)	0.50 (12.7)	5.00 (127.0)	0.56 (14.2)	0.38 (9.7)	2.75 (69.8)	6.25 (158.8)	4.63 (117.6)	
RTWD	160, 180, 200	50	PREM											
RTUD	150, 160, 180, 200, 220, 250	60	HIGH											

(a) See submittal drawing to verify correct isolators.  
 (b) Part number is X10140305-xx

**Figure 9. Mounting point locations and weights**  
 RTWD - Std efficiency (all)  
 RTWD - High efficiency, 80-120T (60 Hz), 60-120T (50 Hz)  
 RTUD - 80-130T



**Figure 10. Mounting point locations and weights**  
 RTWD - High efficiency, 150-250T (60Hz), 130-250T (50Hz)  
 RTWD - Premium efficiency (all)  
 RTUD - 150-250T





## Installation - Mechanical

### Corner Weights

**Important:** Isolators need to be placed under G1, G2, G3 and G4.

**Table 20. Corner weights, RTWD, 60 Hz**

Unit	G1		G2		G3		G4		Reference
	lb	kg	lb	kg	lb	kg	lb	kg	
<b>Standard Efficiency</b>									
80	1566	710	1566	710	1385	628	1385	628	<a href="#">Figure 9</a>
90	1571	713	1577	715	1390	630	1396	633	<a href="#">Figure 9</a>
100	1599	725	1617	733	1454	660	1471	667	<a href="#">Figure 9</a>
110	1662	754	1690	767	1477	670	1503	681	<a href="#">Figure 9</a>
120	1689	766	1795	814	1477	670	1569	712	<a href="#">Figure 9</a>
130	1688	765	1797	815	1478	670	1573	713	<a href="#">Figure 9</a>
140	1654	750	1905	864	1586	719	1827	829	<a href="#">Figure 9</a>
<b>High Efficiency</b>									
80	1465	664	1595	724	1279	580	1393	632	<a href="#">Figure 9</a>
90	1479	671	1610	730	1294	587	1409	639	<a href="#">Figure 9</a>
100	1602	726	1704	773	1429	648	1521	690	<a href="#">Figure 9</a>
110	1673	759	1789	811	1457	661	1557	706	<a href="#">Figure 9</a>
120	1680	762	1798	816	1465	664	1569	711	<a href="#">Figure 9</a>
130	1685	764	1808	820	1472	668	1580	716	<a href="#">Figure 9</a>
150	1181	853	2010	911	1937	878	2070	939	<a href="#">Figure 10</a>
160	1987	901	2261	1025	1946	883	2215	1004	<a href="#">Figure 10</a>
180	2002	908	2284	1036	1969	893	2246	1019	<a href="#">Figure 10</a>
200	2020	916	2309	1047	1989	902	2273	1031	<a href="#">Figure 10</a>
220	2171	985	2515	1141	2226	1010	2579	1170	<a href="#">Figure 10</a>
250	2256	1023	2728	1237	2296	1041	2776	1259	<a href="#">Figure 10</a>
<b>Premium Efficiency</b>									
150	2089	947	2195	996	2171	985	2281	1035	<a href="#">Figure 10</a>
160	2173	985	2416	1096	2176	987	2420	1097	<a href="#">Figure 10</a>
180	2194	995	2454	1113	2198	997	2458	1115	<a href="#">Figure 10</a>
200	2207	1001	2461	1116	2213	1004	2468	1119	<a href="#">Figure 10</a>

**Table 21. Corner weights, RTWD, 50 Hz**

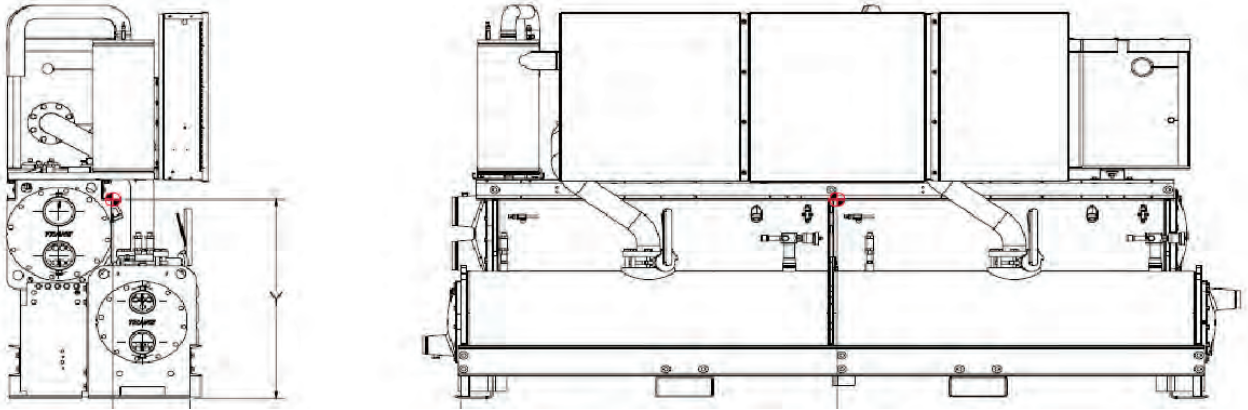
Unit	G1		G2		G3		G4		Reference
	lb	kg	lb	kg	lb	kg	lb	kg	
<b>Standard Efficiency</b>									
70	1555	705	1563	709	1375	624	1382	627	<a href="#">Figure 9</a>
80	1560	708	1595	723	1422	645	1454	659	<a href="#">Figure 9</a>
90	1592	722	1655	751	1442	654	1498	680	<a href="#">Figure 9</a>
100	1621	735	1668	756	1468	666	1511	685	<a href="#">Figure 9</a>
110	1662	754	1690	766	1477	670	1503	681	<a href="#">Figure 9</a>
120	1634	741	1872	852	1578	716	1814	823	<a href="#">Figure 9</a>
130	1692	767	2091	948	1590	721	1965	891	<a href="#">Figure 9</a>
140	1696	769	2092	949	1591	722	1964	891	<a href="#">Figure 9</a>
150	1707	774	2107	956	1603	727	1978	897	<a href="#">Figure 9</a>
<b>High Efficiency</b>									
60	1455	660	1592	722	1270	576	1389	630	<a href="#">Figure 9</a>
70	1461	663	1595	723	1275	578	1392	631	<a href="#">Figure 9</a>
80	1468	666	1632	740	1324	600	1471	667	<a href="#">Figure 9</a>
90	1600	726	1747	792	1421	645	1551	704	<a href="#">Figure 9</a>
100	1631	740	1765	800	1448	657	1567	711	<a href="#">Figure 9</a>
110	1678	761	1793	813	1463	663	1563	709	<a href="#">Figure 9</a>
120	1635	741	1894	859	1569	711	1817	824	<a href="#">Figure 9</a>
130	1889	857	2211	1003	1884	855	2205	1000	<a href="#">Figure 10</a>
140	1904	863	2231	1012	1899	861	2225	1009	<a href="#">Figure 10</a>
160	1927	874	2257	1023	1921	871	2250	1020	<a href="#">Figure 10</a>
180	1931	876	2314	1049	2060	934	2468	1119	<a href="#">Figure 10</a>
200	2195	995	2628	1192	2239	1015	2681	1216	<a href="#">Figure 10</a>
220	2208	1001	2635	1195	2250	1021	2686	1218	<a href="#">Figure 10</a>
250	2241	1016	2686	1218	2281	1035	2735	1240	<a href="#">Figure 10</a>
<b>Premium Efficiency</b>									
160	2106	955	2396	1087	2138	970	2433	1103	<a href="#">Figure 10</a>
180	2127	964	5491	1130	2286	1037	2677	1214	<a href="#">Figure 10</a>
200	2245	1018	2723	1235	2291	1039	2778	1260	<a href="#">Figure 10</a>

**Table 22. Corner weights, RTUD, 60 Hz, high efficiency**

Unit	G1		G2		G3		G4		Reference
	lb	kg	lb	kg	lb	kg	lb	kg	
80	1331	605	1254	570	1173	533	1104	502	<a href="#">Figure 9</a>
90	1338	608	1258	572	1179	536	1109	504	<a href="#">Figure 9</a>
100	1357	617	1280	582	1247	567	1177	535	<a href="#">Figure 9</a>
110	1454	661	1357	617	1296	589	1210	550	<a href="#">Figure 9</a>
120	1468	666	1367	620	1310	594	1219	553	<a href="#">Figure 9</a>
130	1468	666	1367	620	1310	594	1219	553	<a href="#">Figure 9</a>
150	1242	564	1549	704	1386	630	1729	786	<a href="#">Figure 10</a>
160	1522	692	1709	777	1676	762	1881	855	<a href="#">Figure 10</a>
180	1549	704	1714	779	1707	776	1890	859	<a href="#">Figure 10</a>
200	1606	730	1745	793	1731	787	1881	855	<a href="#">Figure 10</a>
220	1582	719	1782	810	1844	838	2077	944	<a href="#">Figure 10</a>
250	1628	740	1901	864	1872	851	2185	993	<a href="#">Figure 10</a>

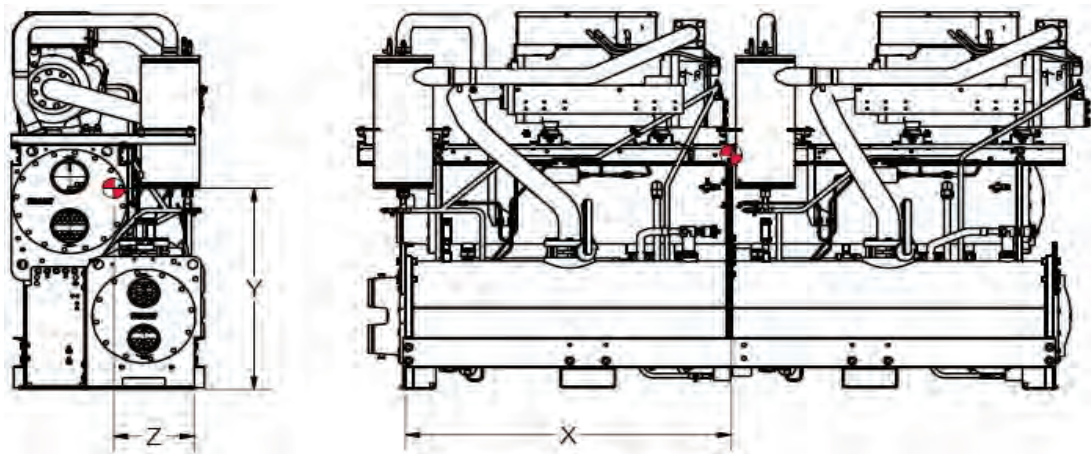
### Center of Gravity

**Figure 11. Center of gravity**  
 RTWD - Std efficiency (all)  
 RTWD - High efficiency, 80-120T (60 Hz), 60-120T (50 Hz)  
 RTUD - 80-130T

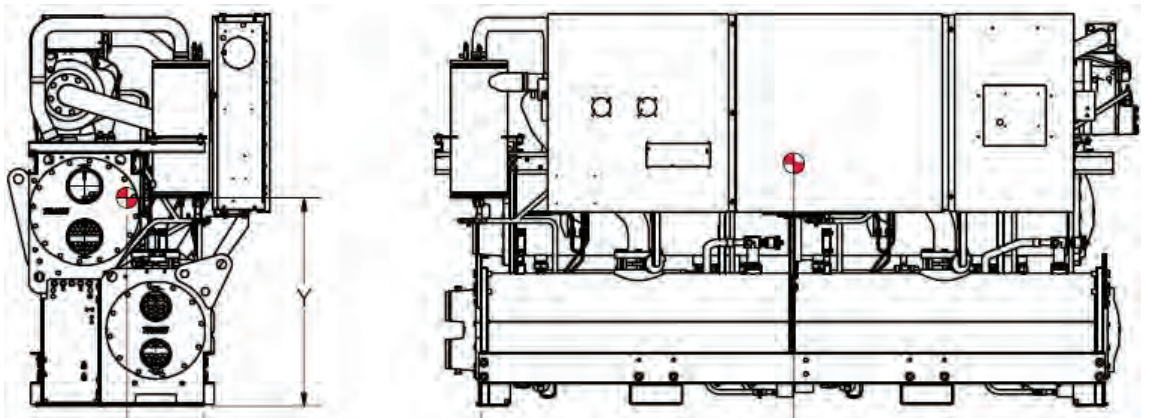


**Figure 12. Center of gravity**  
 RTWD - High efficiency, 150-250T (60Hz), 130-250T (50Hz)  
 RTWD - Premium efficiency (all)  
 RTUD - 150-250T

Without  
Panel



With  
Panel





**RTWD Units**
**Table 23. Center of gravity, RTWD, 60Hz, with panel**

Unit	X		Y		Z		Reference
	in	mm	in	mm	in	mm	
<b>Standard Efficiency</b>							
80	61	1543	34	868	15	381	Figure 11
90	61	1544	34	868	15	381	Figure 11
100	62	1566	35	879	15	382	Figure 11
110	61	1547	35	891	15	383	Figure 11
120	60	1534	34	876	15	390	Figure 11
130	60	1535	35	876	15	391	Figure 11
140	63	1607	36	903	16	403	Figure 11
<b>High Efficiency</b>							
80	55	1393	35	879	16	394	Figure 11
90	55	1395	35	877	16	394	Figure 11
100	55	1409	34	869	15	390	Figure 11
110	55	1391	35	880	15	391	Figure 11
120	55	1393	35	879	15	391	Figure 11
130	55	1394	35	879	15	392	Figure 11
150	59	1511	39	995	15	391	Figure 12
160	58	1475	40	1020	16	401	Figure 12
180	58	1478	40	1018	16	401	Figure 12
200	58	1479	40	1016	16	402	Figure 12
220	59	1508	41	1035	16	404	Figure 12
250	59	1502	41	1046	16	411	Figure 12
<b>Premium Efficiency</b>							
150	70	1772	39	986	15	388	Figure 12
160	68	1741	40	1012	16	397	Figure 12
180	69	1742	40	1010	16	398	Figure 12
200	69	1742	40	1008	16	398	Figure 12

**Table 24. Center of gravity, RTWD, 60Hz, without panel**

Unit	X		Y		Z		Reference
	in	mm	in	mm	in	mm	
<b>High Efficiency</b>							
150	60	1518	38	959	17	441	Figure 12
160	58	1478	39	989	18	449	Figure 12
180	58	1481	39	987	18	449	Figure 12
200	58	1482	39	985	18	449	Figure 12
220	60	1513	40	1006	18	446	Figure 12
250	59	1507	40	1019	18	451	Figure 12
<b>Premium Efficiency</b>							
150	70	1773	37	949	17	434	Figure 12
160	68	1740	39	980	17	441	Figure 12
180	68	1740	38	978	17	442	Figure 12
200	68	1741	38	977	17	441	Figure 12



## Installation - Mechanical

**Table 25. Center of gravity, RTWD, 50Hz, with panel**

Unit	X		Y		Z		Reference
	in	mm	in	mm	in	mm	
<b>Standard Efficiency</b>							
70	61	1543	34	868	15	381	Figure 11
80	62	1567	34	875	15	384	Figure 11
90	61	1562	35	882	15	387	Figure 11
100	61	1562	35	886	15	385	Figure 11
110	61	1547	35	891	15	383	Figure 11
120	63	1612	36	905	16	403	Figure 11
130	63	1591	37	929	16	414	Figure 11
140	63	1590	37	929	16	414	Figure 11
150	63	1590	37	927	16	414	Figure 11
<b>High Efficiency</b>							
60	55	1393	35	879	16	395	Figure 11
70	55	1393	35	878	16	395	Figure 11
80	56	1416	35	885	16	397	Figure 11
90	55	1405	34	871	16	395	Figure 11
100	55	1405	34	876	15	393	Figure 11
110	55	1393	35	879	15	391	Figure 11
120	57	1460	36	907	16	404	Figure 11
130	55	1393	35	879	16	395	Figure 11
150	59	1488	40	1018	16	406	Figure 12
160	59	1488	40	1015	16	406	Figure 12
180	60	1536	41	1031	16	409	Figure 12
200	59	1504	41	1052	16	409	Figure 12
220	59	1504	41	1050	16	409	Figure 12
250	59	1503	41	1047	16	409	Figure 11
<b>Premium Efficiency</b>							
160	69	1752	40	1007	16	401	Figure 12
180	71	1800	40	1023	16	406	Figure 12
200	59	1504	41	1047	16	411	Figure 12

**Table 26. Center of gravity, RTWD, 50Hz, without panel**

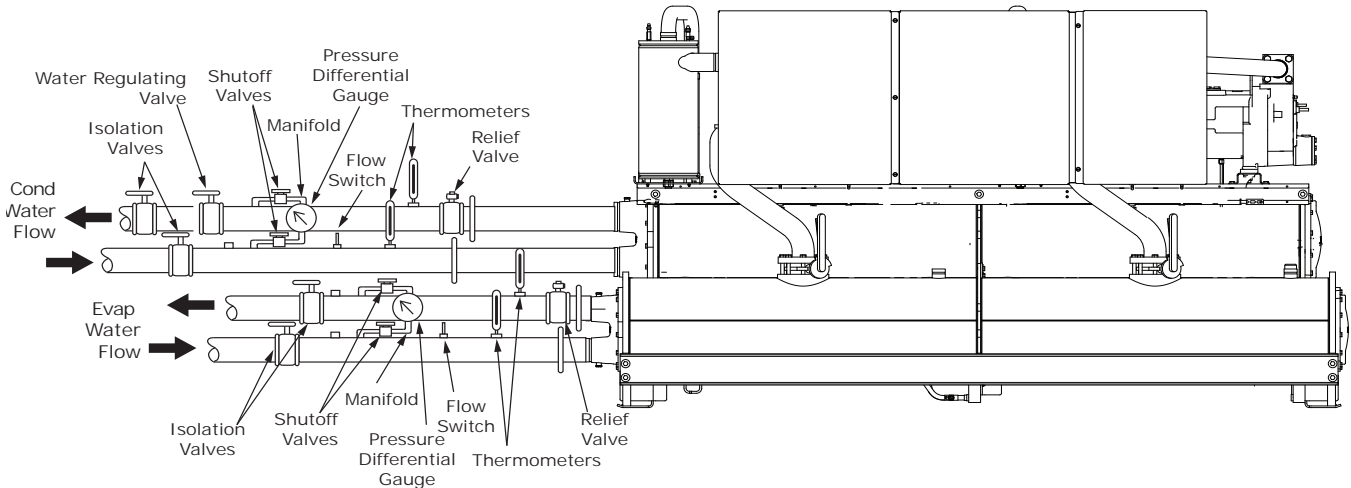
Unit	X		Y		Z		Reference
	in	mm	in	mm	in	mm	
<b>High Efficiency</b>							
150	59	1492	39	986	18	455	Figure 12
160	59	1492	39	983	18	454	Figure 12
180	61	1544	39	1002	18	456	Figure 12
200	59	1509	40	1025	18	451	Figure 12
220	59	1509	40	1023	18	450	Figure 12
250	59	1508	40	1020	18	450	Figure 12
<b>Premium Efficiency</b>							
160	69	1752	38	974	17	446	Figure 12
180	71	1804	39	993	18	448	Figure 12
200	59	1509	40	1021	18	452	Figure 12

**RTUD Units**
**Table 27. Center of gravity, RTUD, 60Hz, high efficiency**

Unit	X		Y		Z		Reference
	in	mm	in	mm	in	mm	
<b>With Control Panel</b>							
80	55	1400	35	895	15	371	<a href="#">Figure 11</a>
90	55	1400	35	894	15	371	<a href="#">Figure 11</a>
100	56	1430	36	906	15	372	<a href="#">Figure 11</a>
110	55	1408	36	909	15	370	<a href="#">Figure 11</a>
120	55	1408	36	908	15	369	<a href="#">Figure 11</a>
130	55	1408	36	908	15	369	<a href="#">Figure 11</a>
150	62	1568	38	973	16	416	<a href="#">Figure 12</a>
160	61	1558	42	1067	16	399	<a href="#">Figure 12</a>
180	61	1559	42	1069	16	397	<a href="#">Figure 12</a>
200	61	1543	42	1069	16	394	<a href="#">Figure 12</a>
220	63	1599	43	1084	16	399	<a href="#">Figure 12</a>
250	63	1589	43	1097	16	405	<a href="#">Figure 12</a>
<b>Without Control Panel</b>							
150	64	1627	38	959	17	439	<a href="#">Figure 12</a>
160	62	1573	41	1034	18	457	<a href="#">Figure 12</a>
180	62	1574	41	1037	18	454	<a href="#">Figure 12</a>
200	61	1557	41	1037	18	450	<a href="#">Figure 12</a>
220	64	1618	42	1055	18	454	<a href="#">Figure 12</a>
250	63	1607	42	1070	18	457	<a href="#">Figure 12</a>

## Evaporator Water Piping

Figure 13. Typical water piping setup



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

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

**NOTICE:**

**Evaporator Damage!**

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

**NOTICE:**

**Equipment Damage!**

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

**NOTICE:**

**Equipment Damage!**

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

**NOTICE:**

**Proper Water Treatment!**

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

Locate the unit near a large capacity drain for water vessel drain-down during shutdown or repair. Condensers and evaporators are provided with drain connections. 0 All local and national codes apply.

A vent is provided on the top of the evaporator at the return end. Be sure to provide additional vents at high points in the piping to bleed air from the chilled water system. Install necessary pressure gauges to monitor the entering and leaving chilled water pressures.

Provide shutoff valves in lines to the gauges to isolate them from the system when they are not in use. Use rubber vibration eliminators to prevent vibration transmission through the water lines.

If desired, install thermometers in lines to monitor entering and leaving water temperatures. Install a balancing valve in leaving water line to control water flow balance. Install shutoff valves on both entering and leaving water lines to isolate evaporator for service.

A pipe strainer must be installed in entering water line to prevent water-borne debris from entering the evaporator.

## Reversing Waterboxes

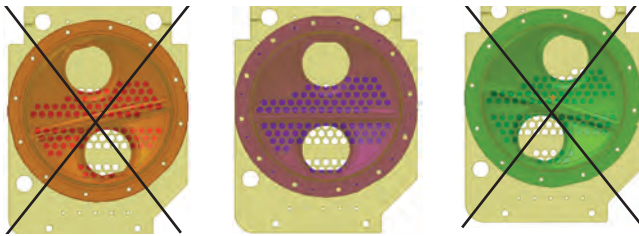
### **NOTICE:**

#### **Equipment Damage!**

Do **NOT** rotate or swap evaporator or condenser water boxes end-for-end. Altering water boxes can affect equipment operation and can cause equipment damage.

Waterboxes on evaporator and condenser can **NOT** be rotated or swapped end for end. Altering waterboxes will lead to poor efficiency, poor oil management and possible freeze-up of evaporator.

**Figure 14. RTWD water boxes**



## 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.

### **Drains and Vents**

### **NOTICE:**

#### **Waterbox Damage!**

Failure of follow these instructions could result in damage to the waterbox. Do not use Teflon<sup>®</sup> pipe tape or overtighten when installing valves, drains, plugs, and vents on cast iron waterboxes.

Drains and vents are located on each evaporator waterbox. When the unit is shipped, the drain plugs are removed and placed in a plastic bag in the control panel, along with the condenser drain plugs. Each drain and vent must be piped with a shutoff valve, or plug reinstalled, prior to water pump operation.

### **Entering Chilled Water Piping - Field Installed**

- Air vents (to bleed air from system)
- Water pressure gauges with shutoff valves
- Vibration eliminators
- Shutoff (isolation) valves
- Thermometers (if desired)
- Cleanout tees
- Relief valve
- Pipe strainer

### **NOTICE:**

#### **Water Born Debris!**

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

### **NOTICE:**

#### **Evaporator Damage!**

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

### **Leaving Chilled Water Piping - Field Installed**

- Air vents (to bleed air from system)
- Water pressure gauges with shutoff valves
- Vibration eliminators
- Shutoff (isolation) valves
- Thermometers
- Cleanout tees
- Balancing valve
- Flow Switch (not required if factory installed flow switch option is selected)

### **Evaporator Flow Switch (Optional)**

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

The flow switch is powered with 24 VAC. Indicators on switch are as follows:

- Green ON — power is applied
- Amber - always off

### **NOTICE:**

#### **Proper Water Treatment!**

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

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

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

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

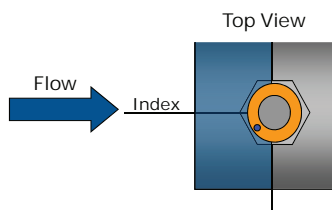
Using untreated or improperly treated water in these units may result in inefficient operation and possible tube damage. Consult a qualified water treatment specialist to determine whether treatment is needed.

### Indexing Flow Switch

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

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

**Figure 15. Proper flow switch indexing**



The flow switch must have the dot in the shaded area to the left of this line for proper indexing ( $\pm 90^\circ$  off Index)

### Flow Proving Devices

#### **NOTICE:**

#### **Evaporator Damage!**

For all RTUD units, chilled water pumps **MUST** be controlled by the Trane CH530 to avoid catastrophic damage to the evaporator due to freezing.

**Important:** If factory installed flow switch option is not selected, installer **must** provide flow switches or differential pressure switches with pump interlocks to prove water flow.

To provide chiller protection, install and wire flow switches in series with the water pump interlocks, for both chilled water and condenser water circuits (see chapter "Installation - Electrical," p. 71). Specific connections and schematic wiring diagrams are shipped with the unit.

Flow switches must prevent or stop compressor operation if either system water flow drops off below the required minimum shown on the pressure drop curves. Follow the manufacturer's recommendations for selection and installation procedures. General guidelines for flow switch installation are outlined below.

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

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

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

**Note:** CH530 provides a 6-sec time delay on flow switch input before shutting down unit on loss-of-flow diagnostic. Contact a qualified service organization if nuisance machine shutdowns persist.

- Adjust switch to open when water flow falls below minimum. See General Data tables for minimum flow recommendations. Flow switch is closed on proof of water flow.

#### **NOTICE:**

#### **Evaporator Damage!**

To prevent evaporator damage, do not use water flow switch to cycle the system.

### Pressure Drop Curves

For overlapping pressure drop curves, see General Data tables in section "General Information," p. 9 for limit values.

Figure 16. Evaporator pressure drop curves - 2 pass, 60 Hz - RTWD, RTUD

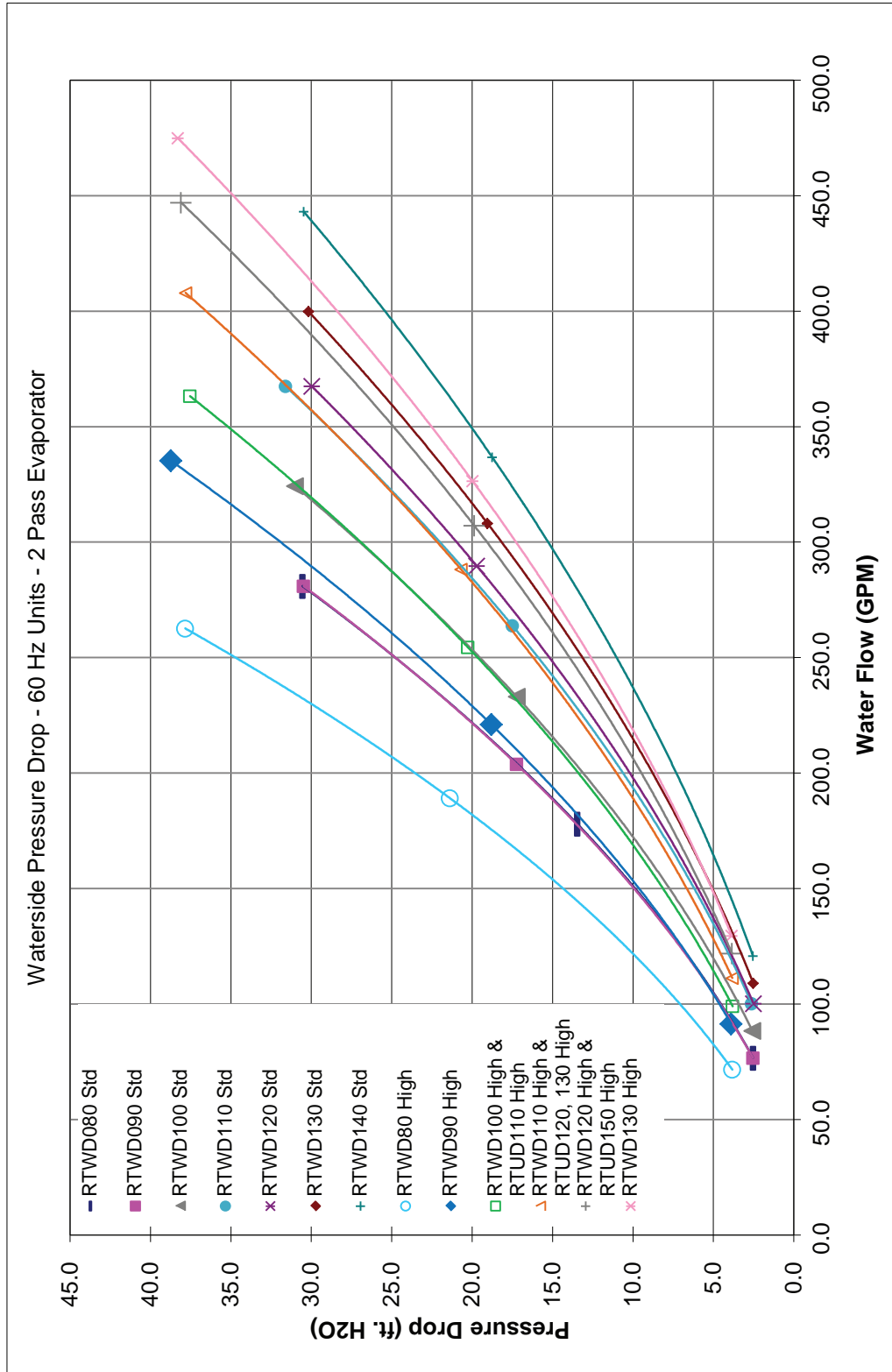


Figure 17. Evaporator pressure drop curves - 2 pass, 60 Hz - RTWD, RTUD

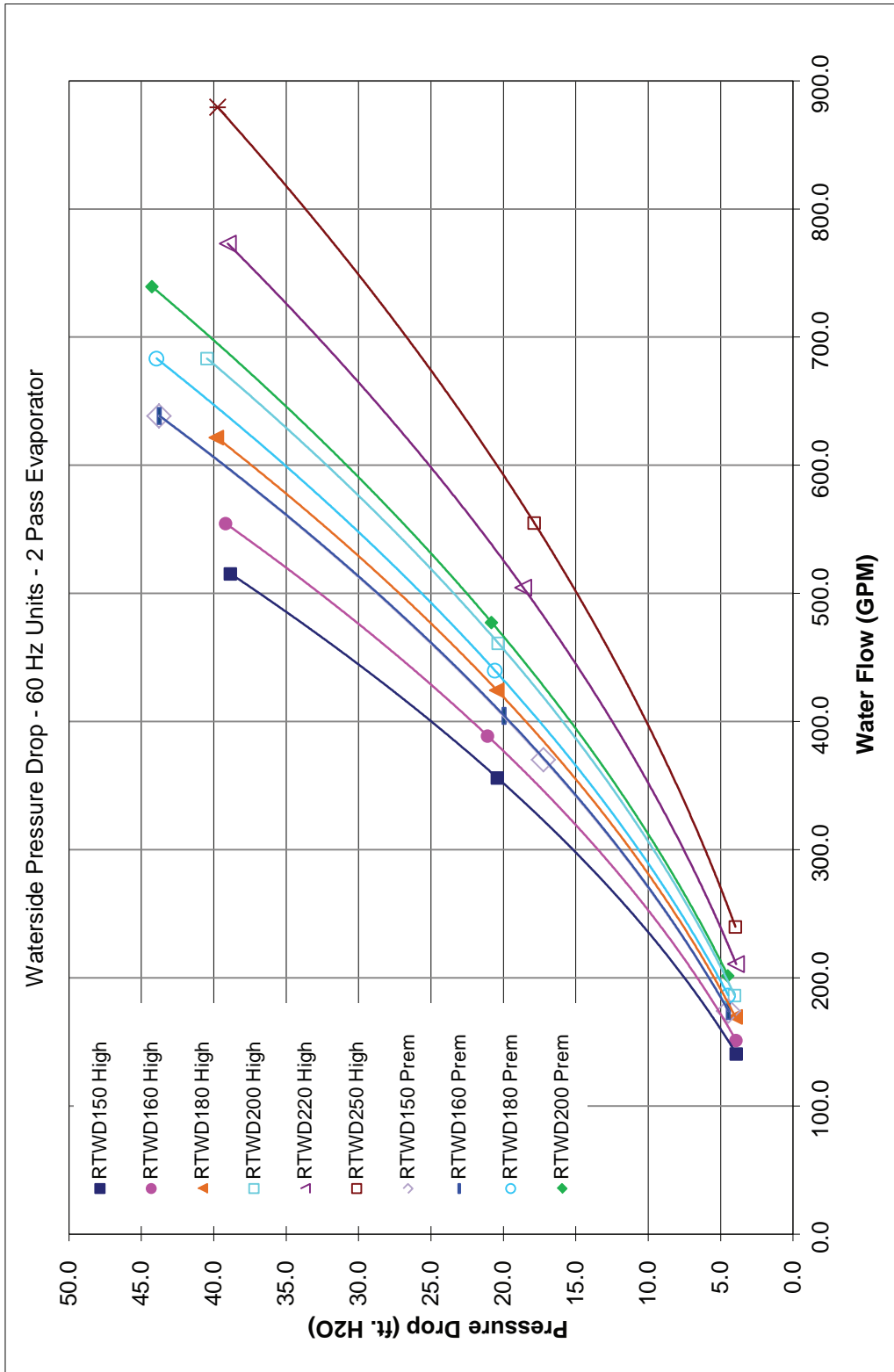




Figure 18. Evaporator pressure drop curves - 2 pass - RTWD 50 Hz, RTUD 60 Hz

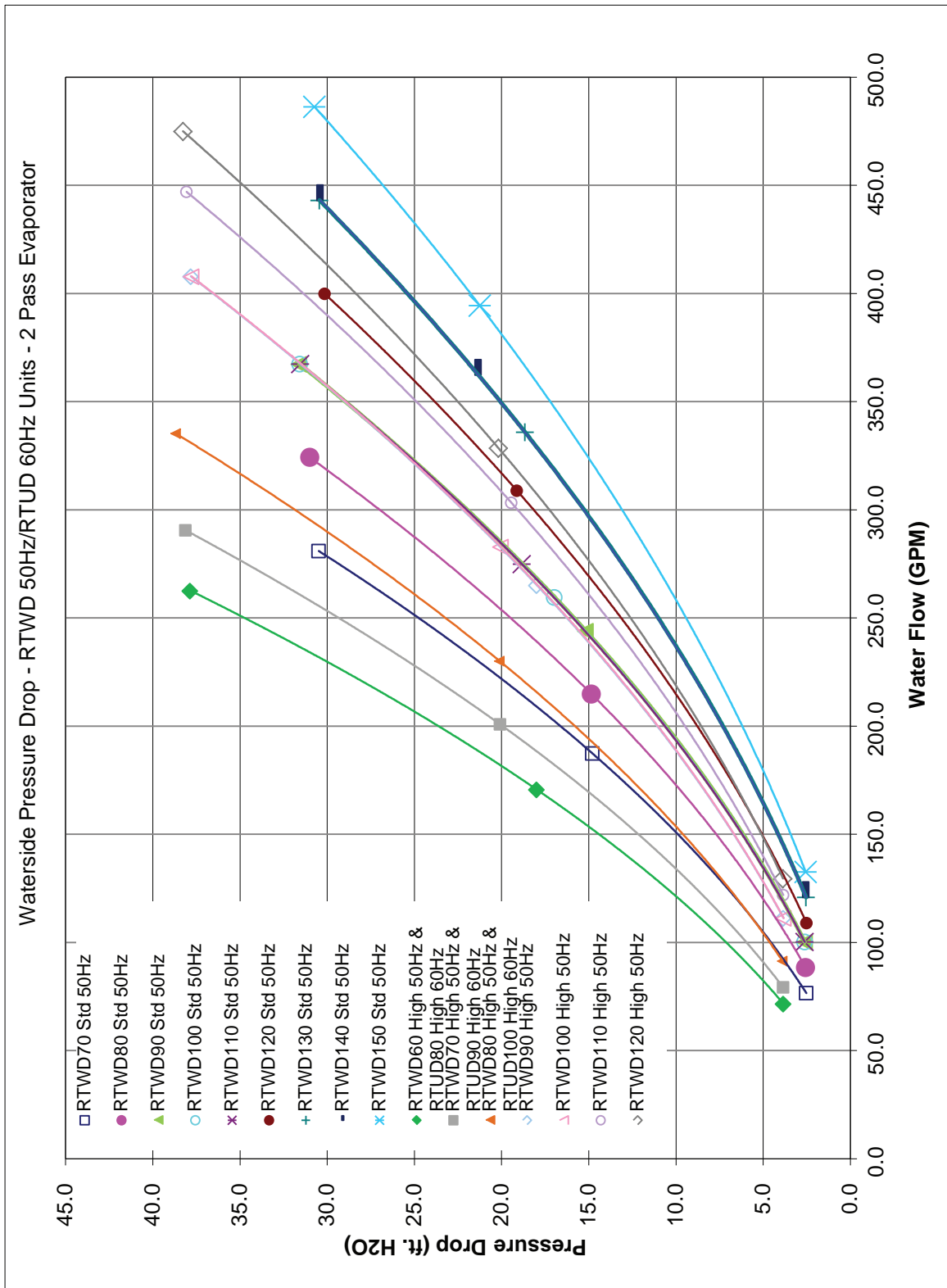


Figure 19. Evaporator pressure drop curves - 2 pass, 50 hz - RTWD

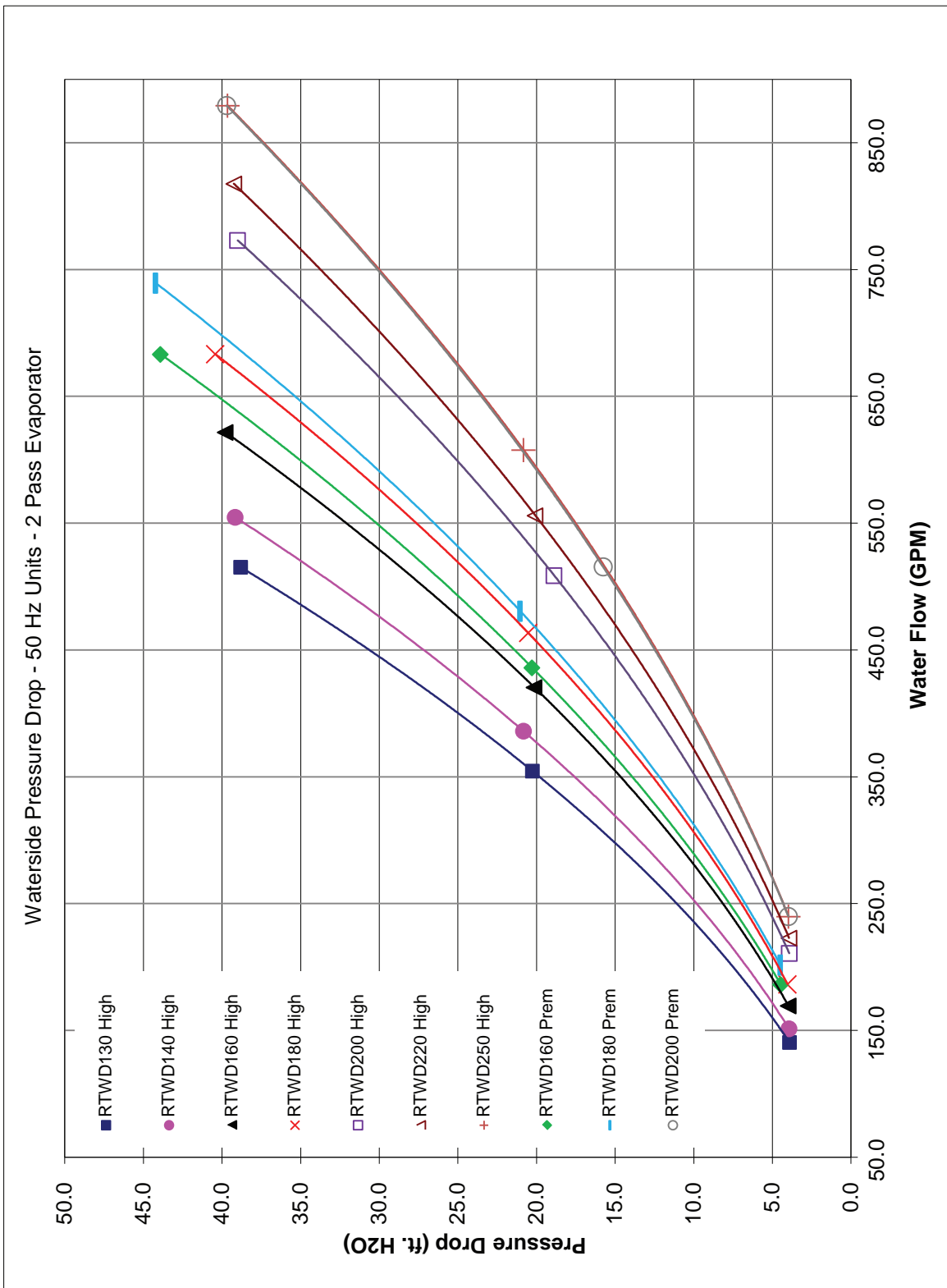


Figure 20. Evaporator pressure drop curves - 3 pass, 60 hz - RTWD, RTUD

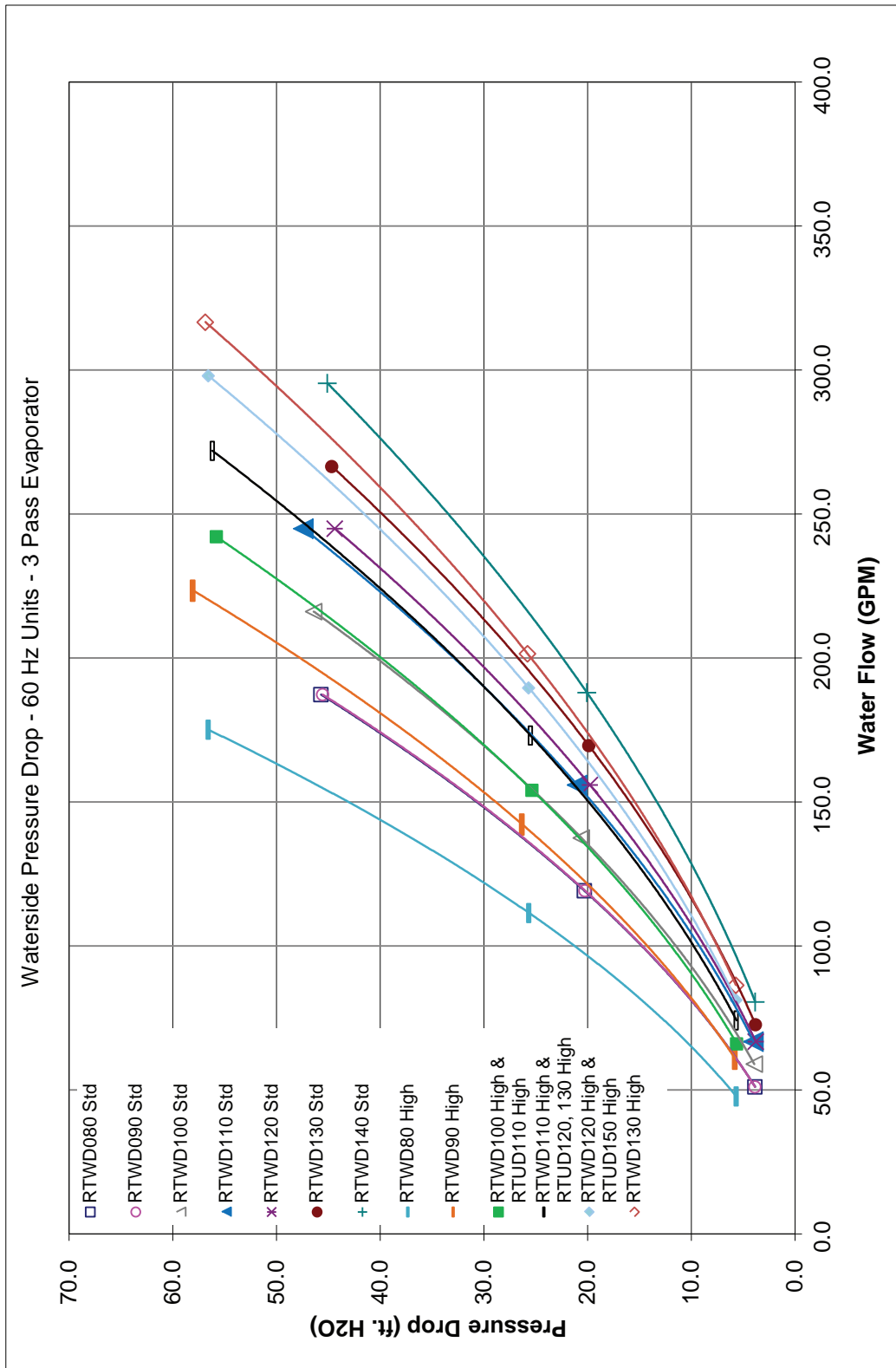


Figure 21. Evaporator pressure drop curves - 3 pass, 60 hz - RTWD, RTUD

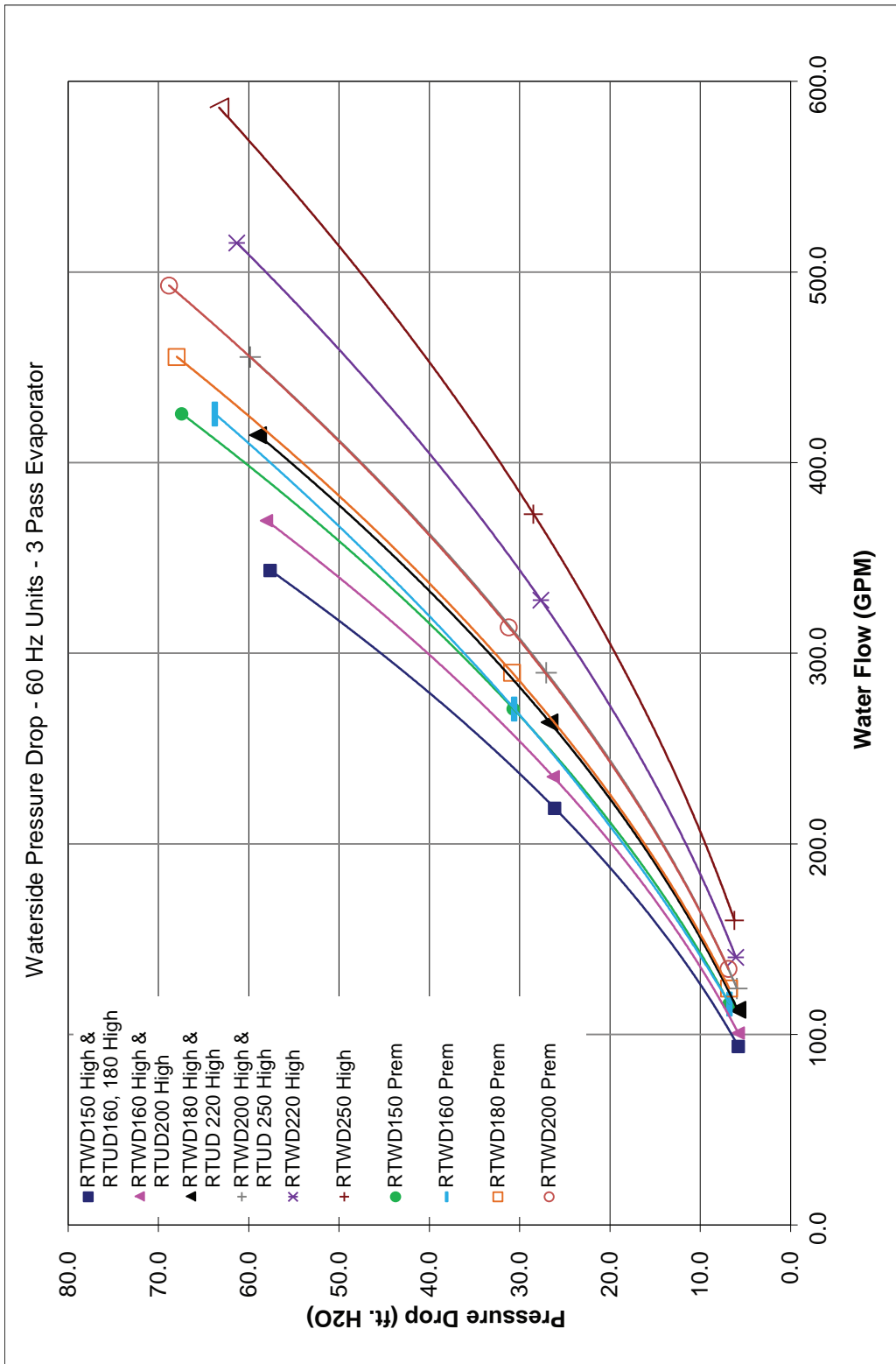


Figure 22. Evaporator pressure drop curves - 3 pass - RTWD 50 Hz, RTUD 60 Hz

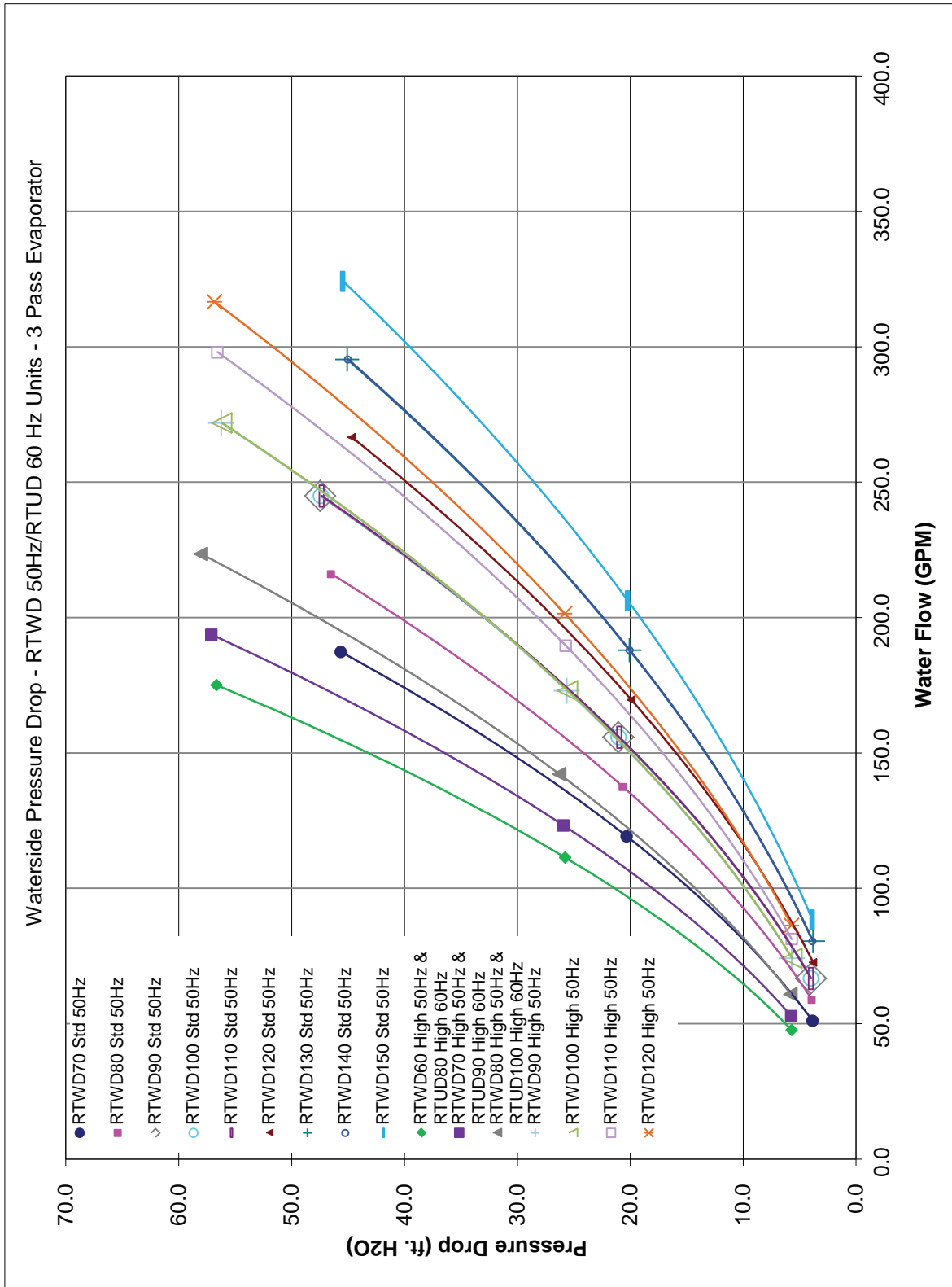


Figure 23. Evaporator pressure drop curves - 3 pass, 50 Hz - RTWD

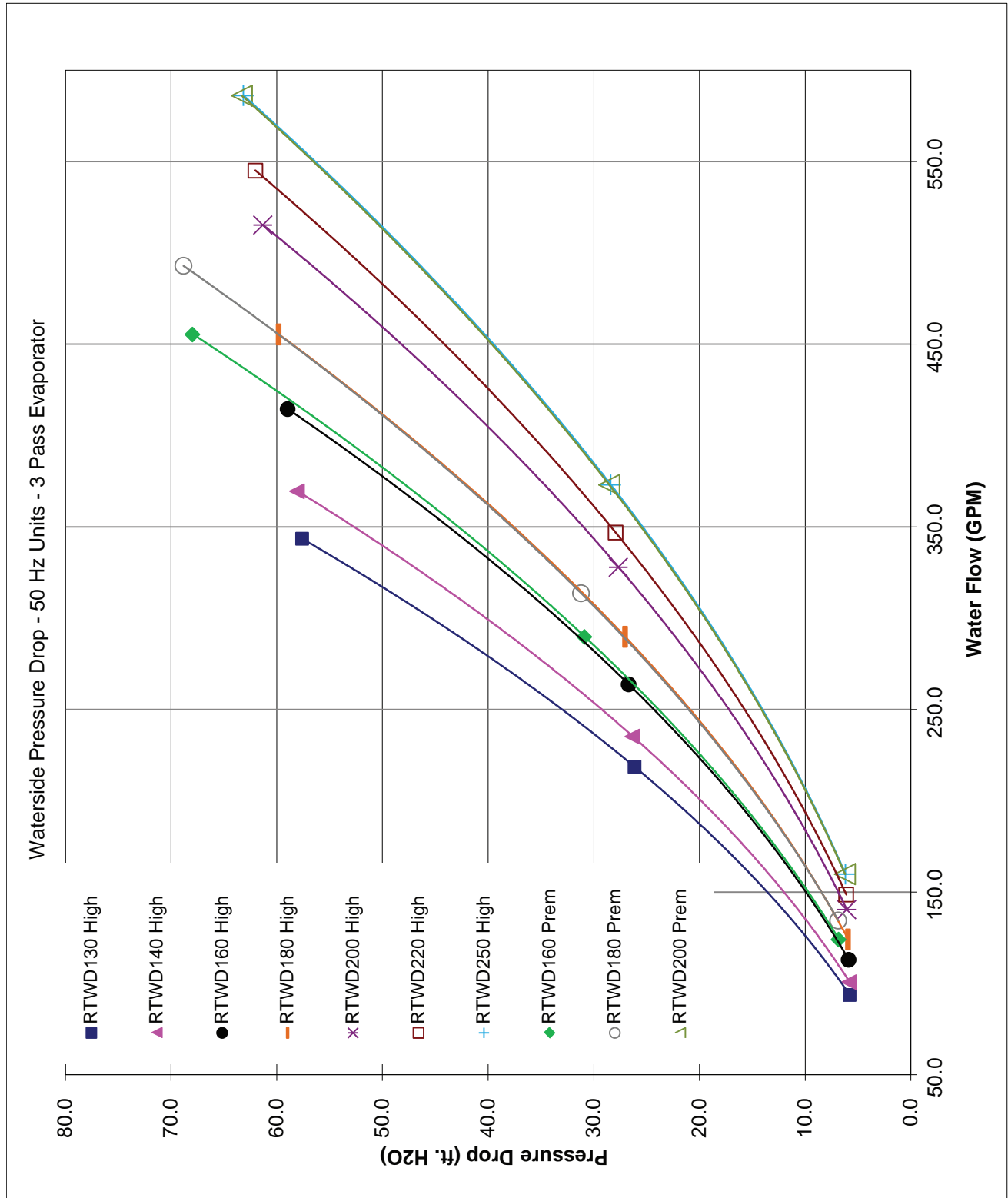


Figure 24. Condenser pressure drop curves - RTWD 60 Hz

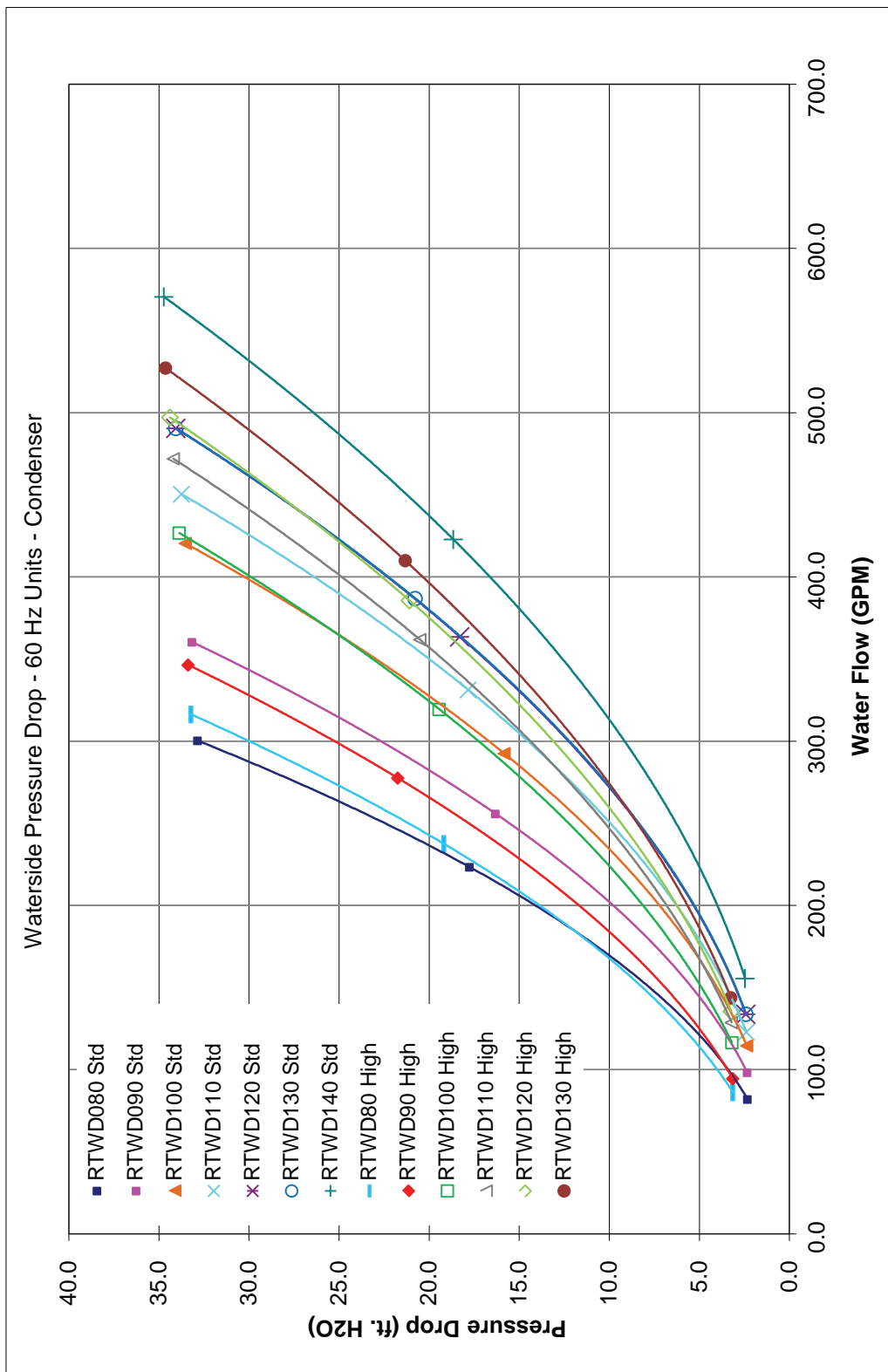


Figure 25. Condenser pressure drop curves - RTWD 60 Hz

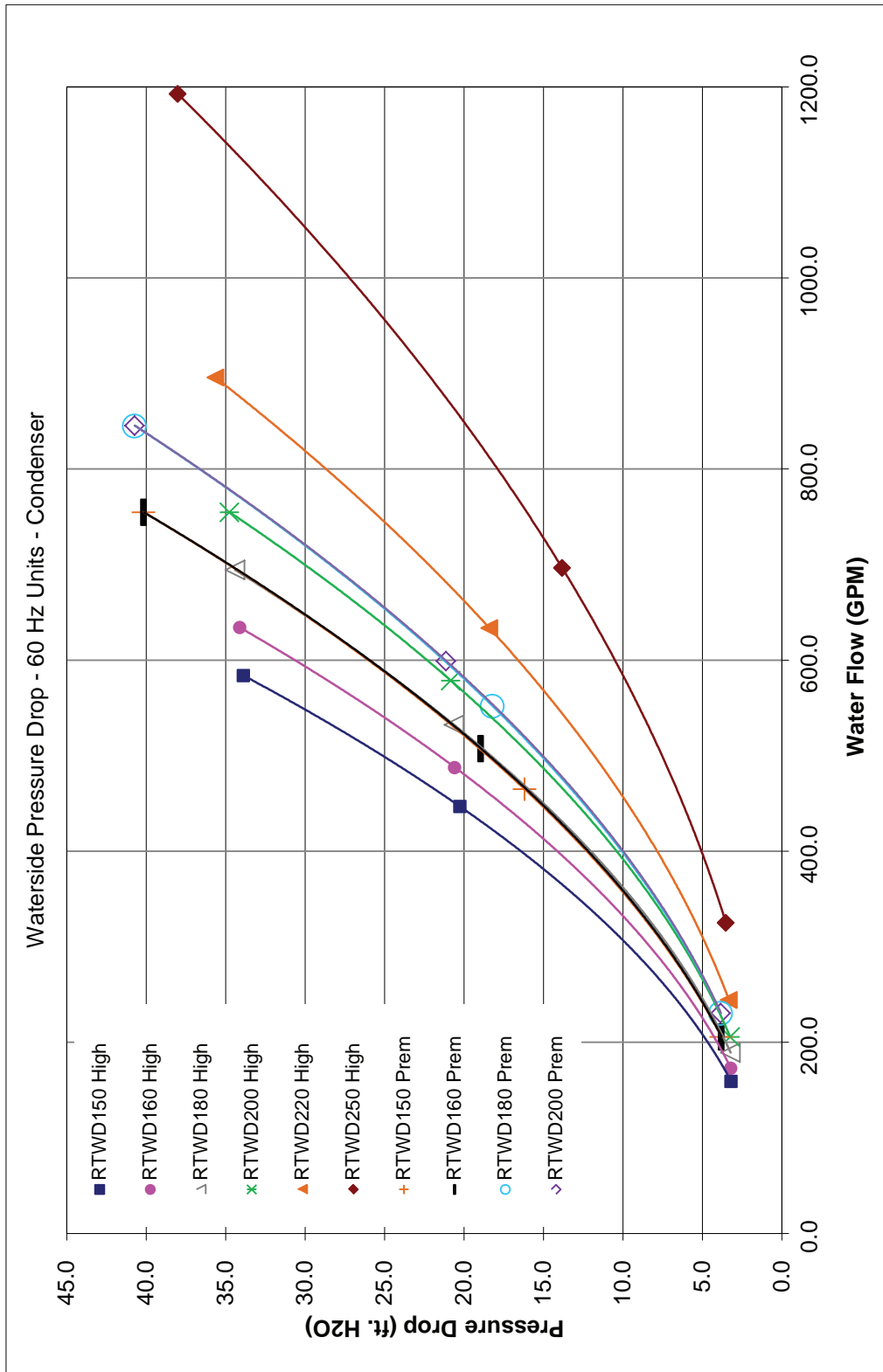




Figure 26. Condenser pressure drop curves - RTWD 50 Hz

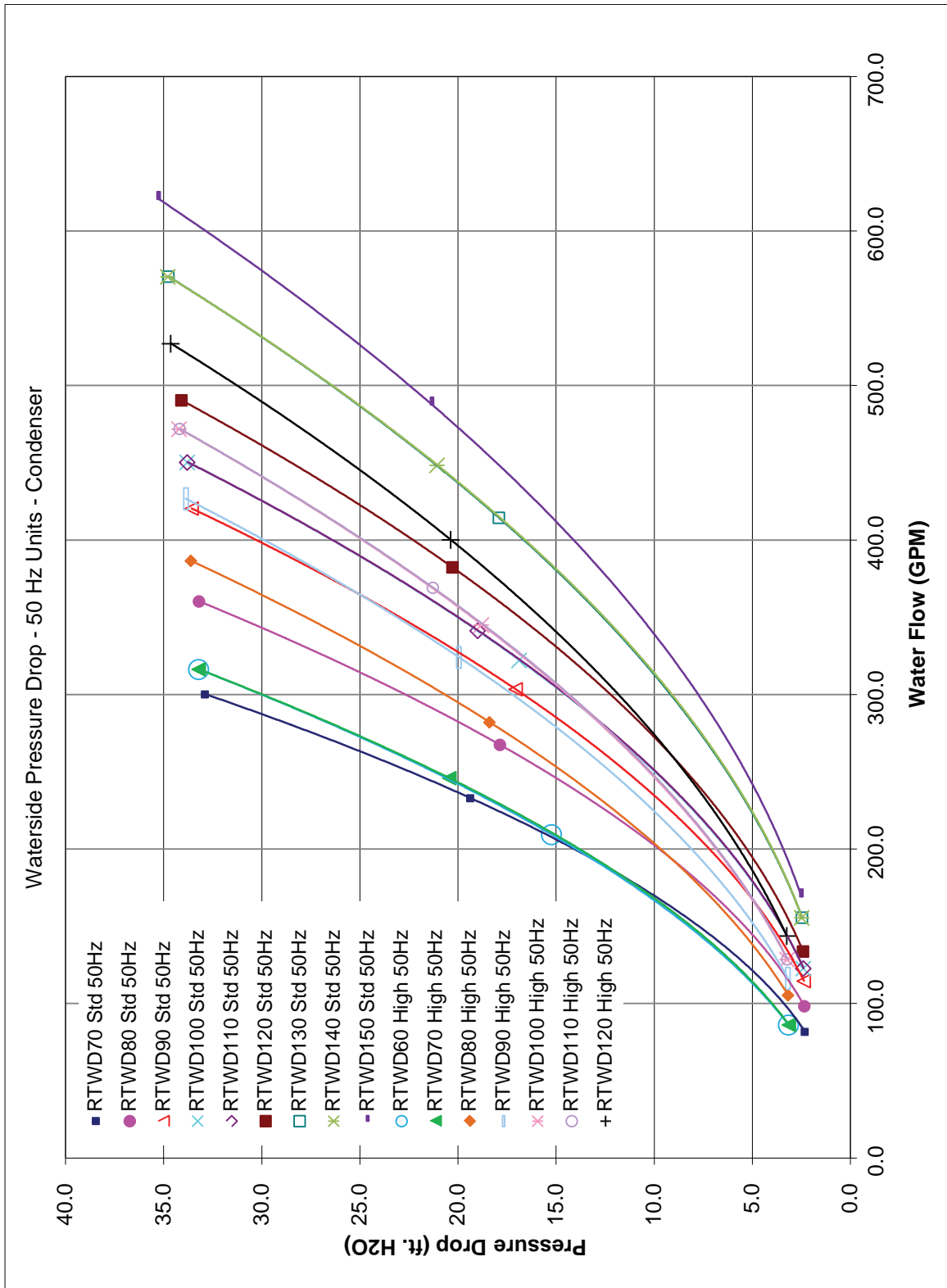
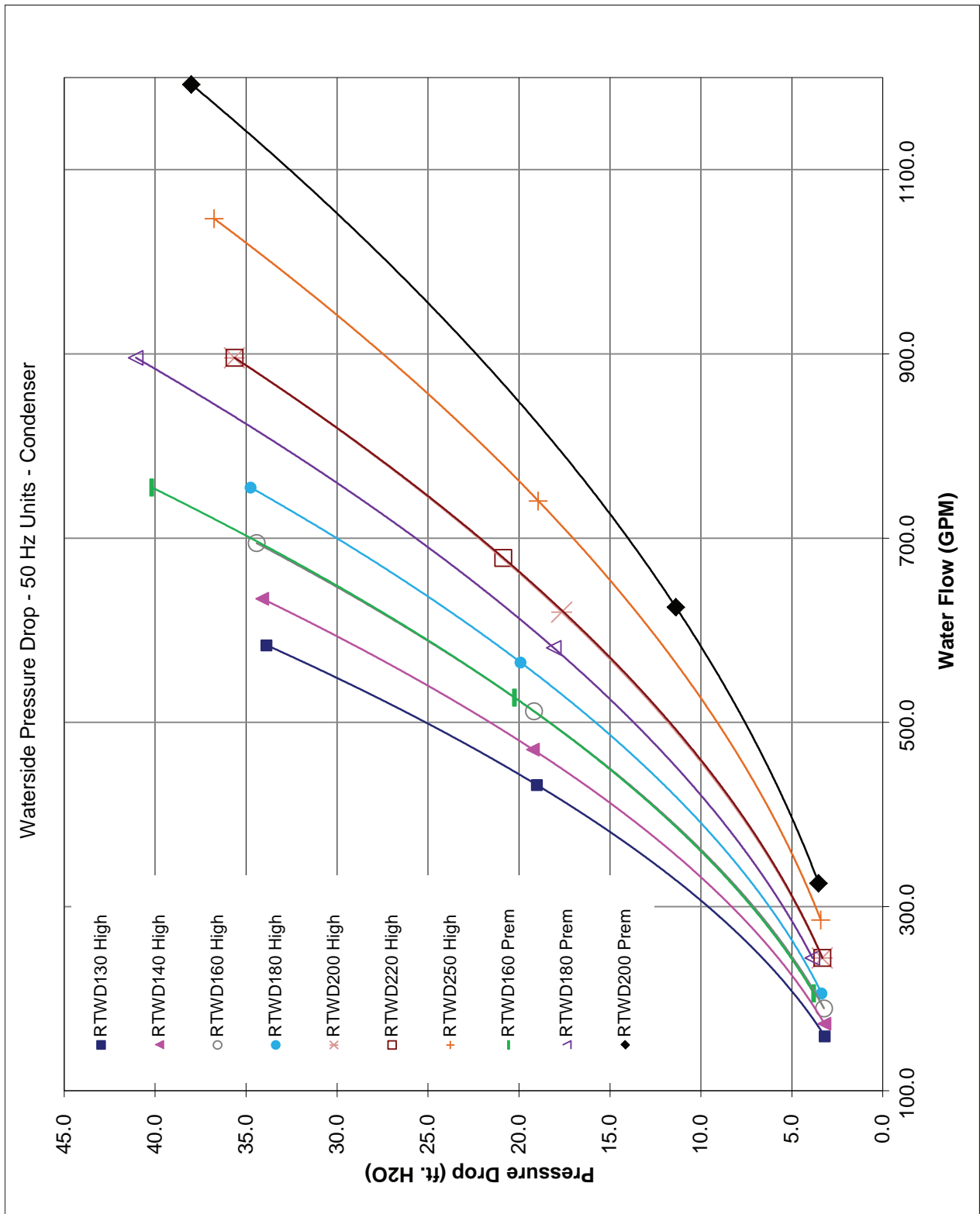


Figure 27. Condenser pressure drop curves - RTWD 50 Hz



## Low Evap Refrigerant Cutout/Percent Glycol Recommendations

Table 28 and Table 29, p. 52 show the low evaporator temperature cutout for various freeze inhibitor options and solution levels.

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

Additional inhibitor 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.

**Table 28. Low evaporator refrigerant temperature cutout (LRTC) and low water temperature cutout (LWTC) — ethylene or propylene glycol**

Ethylene Glycol				Propylene Glycol			
Inhibitor Percentage (%)	Solution Freeze Point (°F)	Minimum Recommended LRTC (°F)	Minimum Recommended LWTC (°F)	Inhibitor Percentage (%)	Solution Freeze Point (°F)	Minimum Recommended LRTC (°F)	Minimum Recommended LWTC (°F)
0	32.0	28.6	35.0	0	32.0	28.6	35.0
2	31.0	27.6	34.0	2	31.0	27.6	34.0
4	29.7	26.3	32.7	4	29.9	26.5	32.9
5	29.0	25.6	32.0	5	29.3	25.9	32.3
6	28.3	24.9	31.3	6	28.7	25.3	31.7
8	26.9	23.5	29.9	8	27.6	24.2	30.6
10	25.5	22.1	28.5	10	26.4	23.0	29.4
12	23.9	20.5	26.9	12	25.1	21.7	28.1
14	22.3	18.9	25.3	14	23.8	20.4	26.8
15	21.5	18.1	24.5	15	23.1	19.7	26.1
16	20.6	17.2	23.6	16	22.4	19.0	25.4
18	18.7	15.3	21.7	18	20.9	17.5	23.9
20	16.8	13.4	19.8	20	19.3	15.9	22.3
22	14.7	11.3	17.7	22	17.6	14.2	20.6
24	12.5	9.1	15.5	24	15.7	12.3	18.7
25	11.4	8.0	14.4	25	14.8	11.4	17.8
26	10.2	6.8	13.2	26	13.8	10.4	16.8
27	9.0	5.6	12.0	27	12.7	9.3	15.7
28	7.7	4.3	10.7	28	11.6	8.2	14.6
29	6.4	3.0	9.4	29	10.5	7.1	13.5
30	5.1	1.7	8.1	30	9.3	5.9	12.3
32	2.3	-1.1	5.3	32	6.8	3.4	9.8
34	-0.7	-4.1	5.0	34	4.1	0.7	7.1
35	-2.3	-5.0	5.0	35	2.7	-0.7	5.7
36	-3.9	-5.0	5.0	36	1.3	-2.1	5.0
38	-7.3	-5.0	5.0	38	-1.8	-5.0	5.0
40	-10.8	-5.0	5.0	40	-5.2	-5.0	5.0
42	-14.6	-5.0	5.0	42	-8.8	-5.0	5.0
44	-18.6	-5.0	5.0	44	-12.6	-5.0	5.0
45	-20.7	-5.0	5.0	45	-14.6	-5.0	5.0
46	-22.9	-5.0	5.0	46	-16.7	-5.0	5.0
48	-27.3	-5.0	5.0	48	-21.1	-5.0	5.0
50	-32.1	-5.0	5.0	50	-25.8	-5.0	5.0
52	-37.1	-5.0	5.0	52	-30.8	-5.0	5.0
54	-42.3	-5.0	5.0	54	-36.1	-5.0	5.0
55	-45.0	-5.0	5.0	55	-38.9	-5.0	5.0
56	-47.8	-5.0	5.0	56	-41.8	-5.0	5.0
58	-53.7	-5.0	5.0	58	-47.8	-5.0	5.0
60	-59.8	-5.0	5.0	60	-54.2	-5.0	5.0



## Installation - Mechanical

**Table 29. Low evaporator refrigerant temperature cutout (LRTC) and low water temperature cutout (LWTC) methanol and calcium chloride**

Methanol				Calcium Chloride			
Inhibitor Percentage (%)	Solution Freeze Point (°F)	Minimum Recommended LRTC (°F)	Minimum Recommended LWTC (°F)	Inhibitor Percentage (%)	Solution Freeze Point (°F)	Minimum Recommended LRTC (°F)	Minimum Recommended LWTC (°F)
0	32.0	28.6	35.0	0	32.0	28.6	35.0
2	29.0	25.6	32.0	2	30.3	26.9	33.3
4	26.4	23.0	29.4	4	28.7	25.3	31.7
5	25.1	21.7	28.1	5	27.8	24.4	30.8
6	23.9	20.5	26.9	6	26.9	23.5	29.9
8	21.5	18.1	24.5	8	24.8	21.4	27.8
10	19.1	15.7	22.1	10	22.2	18.8	25.2
12	16.7	13.3	19.7	12	19.2	15.8	22.2
14	14.4	11.0	17.4	14	15.5	12.1	18.5
15	13.1	9.7	16.1	15	13.4	10.0	16.4
16	11.9	8.5	14.9	16	11.1	7.7	14.1
18	9.4	6.0	12.4	18	5.8	2.4	8.8
20	6.8	3.4	9.8	20	-0.4	-3.8	5.0
22	4.1	0.7	7.1	22	-7.7	-5.0	5.0
24	1.2	-2.2	5.0	24	-16.2	-5.0	5.0
25	-0.3	-3.7	5.0	25	-20.9	-5.0	5.0
26	-1.9	-5.0	5.0	26	-26.0	-5.0	5.0
27	-3.6	-5.0	5.0	27	-31.4	-5.0	5.0
28	-5.2	-5.0	5.0	28	-37.2	-5.0	5.0
29	-7.0	-5.0	5.0	29	-43.4	-5.0	5.0
30	-8.8	-5.0	5.0	30	-50.0	-5.0	5.0
32	-12.7	-5.0	5.0				
34	-16.9	-5.0	5.0				
35	-19.1	-5.0	5.0				
36	-21.4	-5.0	5.0				
38	-26.3	-5.0	5.0				
40	-31.6	-5.0	5.0				
42	-37.3	-5.0	5.0				
44	-43.5	-5.0	5.0				
45	-46.8	-5.0	5.0				
46	-50.2	-5.0	5.0				
48	-57.4	-5.0	5.0				
50	-65.2	-5.0	5.0				

## Condenser Water Piping (RTWD Units Only)

Condenser water inlet and outlet types, sizes and locations are given in the Unit Dimensions and Weights. Condenser pressure drops are shown in [Figure 24, p. 47](#) thru [Figure 27, p. 50](#).

### Condenser Piping Components

Condenser piping components and layout vary, depending on location of connections and water source.

Condenser piping components generally function identically to those in the evaporator piping system, as described in "[Evaporator Water Piping](#)", p. 36. In addition, cooling tower systems should include a manual or automatic bypass valve that can alter the water flow rate, to maintain condensing pressure. Well water (or city water) condensing systems should include a pressure reducing valve and a water regulating valve.

Pressure reducing valve should be installed to reduce water pressure entering the condenser. This is required only if the water pressure exceeds 150 psig. This is necessary to prevent damage to the disc and seat of the water regulating valve that can be caused by excessive pressure drop through the valve and also due to the design of the condenser. Condenser waterside is rated at 150 psi.

#### **NOTICE:**

##### **Equipment Damage!**

To prevent damage to the condenser or regulating valve, the condenser water pressure should not exceed 150 psig.

### Water Regulating Valve (RTWD Only)

The Condenser Head Pressure Control Option provides for a 0-10V (maximum range - a smaller range is adjustable) output interface to the customer's condenser water flow device. See RLC-PRB021-EN for further details regarding condenser water temperature control.

The following guidelines must be met in order to ensure adequate oil circulation throughout the system.

- The RTWD requires a minimum pressure differential of 25 psid (172.1 kPA) at all load conditions in order to ensure adequate oil circulation.
- The entering condenser water temperature must be above 55°F (12.8°C), or between 45°F (7.2°C) and 55°F (12.8°C) with a 1°F (0.6°C) temperature rise per minute up to 55°F (12.8°C).
- The leaving condenser water temperature must be 17°F (9.4°C) degrees higher than leaving evaporator water temperature within 2 minutes of startup. A 25°F (13.9°C) temperature differential must be maintained thereafter. (This differential requirement is lessened by 0.25°F [0.14°C] for every 1°F [0.6°C] that the leaving condenser water temperature is above 55°F [12.8°C].)

If the above guidelines cannot be met, then some form of condenser water temperature control must be used.

**Note:** *Plugged tees are installed to provide access for chemical cleaning of the condenser tubes.*

Condenser piping must be in accordance with all applicable local and national codes.

### Condenser Drains and Vents

#### **NOTICE:**

##### **Waterbox Damage!**

Failure to follow these instructions could result in damage to the waterbox. Do not use Teflon® pipe tape or overtighten when installing valves, drains, plugs, and vents on cast iron waterboxes.

When the unit is shipped, the drain plugs are removed from the condenser and placed in a plastic bag in the control panel, along with the evaporator drain plug. The condenser drains may be connected to suitable drains to permit drainage during unit servicing. If they are not, the drain plugs must be installed prior to water pump operation.

The condenser shells can be drained by removing the drain plugs from the bottom of the condenser heads. Also, remove the vent plugs at the top of the condenser heads to facilitate complete drainage.

### Water Treatment

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

#### **NOTICE:**

##### **Proper Water Treatment!**

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

### Water Pressure Gauges

Install field-supplied pressure gauges (with manifolds, when practical) on the RTWD units. Locate pressure gauges or taps in a straight run of pipe; avoid placement near elbows, etc. Install gauges at the same elevation.

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

## Water Pressure Relief Valves

Install a water pressure relief valve in the condenser and evaporator leaving chilled water piping. Water vessels with close coupled shutoff valves have a high potential for hydrostatic pressure buildup on a water temperature increase. Refer to applicable codes for relief valve installation guidelines.

## Refrigerant Relief Valve Venting

### ⚠ WARNING

#### Refrigerant under High Pressure!

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

### NOTICE:

#### Equipment Damage!

To prevent shell damage, install pressure relief valves in both the evaporator and condenser water systems.

### NOTICE:

#### Equipment Damage!

To prevent capacity reduction and relief valve damage, do not exceed vent piping code specifications.

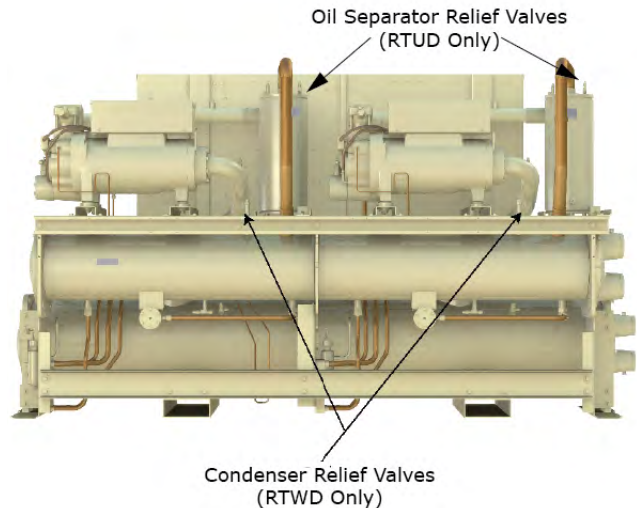
### High Pressure Side Relief Valve Venting (RTWD-Condenser, RTUD-Oil Separator)

All RTWD units utilize a refrigerant-pressure relief valve for each circuit which must be vented to the outdoor atmosphere. The valves are located at the top of the condenser. Relief valve connections are 5/8" MFL. See [Figure 28](#). Refer to local codes for relief valve vent line sizing requirements.

All RTUD units utilize a refrigerant-pressure relief valve for each circuit which must be vented to the outdoor atmosphere. The valves are located at the top of the oil separator. Relief valve connections are 3/8" MFL. Refer to local codes for relief valve vent line sizing requirements.

High side relief valve discharge setpoints are 300 psig for RTWD, and 350 psig for RTUD units. Once the relief valve has opened, it will re-close when pressure is reduced to a safe level.

**Figure 28. High pressure side relief valves**



**Note:** Vent line length must not exceed code recommendations. If the line length will exceed code recommendations for the outlet size of the valve, install a vent line of the next larger pipe size.

Pipe each relief valve on the unit into a common vent line. Provide access valve located at the low point of the vent piping, to enable draining of any condensate that may accumulate in the piping.

If multiple chillers are installed, each unit may have a separate venting for its relief valves. If multiple relief valves are vented together, see ASHRAE 15, and/or local codes for sizing requirements.

**Note:** RTWD units can be ordered with "Dual Relief Valve" options. Model number digit 16 is a "2". Units with this option will have two valves on each circuit for a total of four on the condenser. Only two valves would release at the same time - never all four.

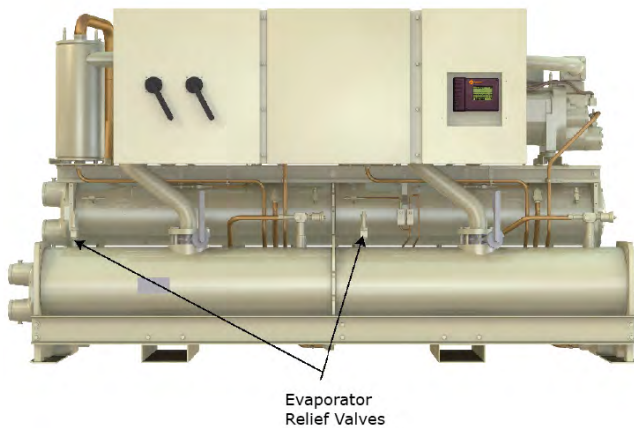
### Low Pressure Side Relief Valve Venting (Evaporator)

Low-side refrigerant-pressure relief valves are located on the top of the evaporator shell, one per circuit. Each must be vented to the outdoor atmosphere. Relief valve connections are 3/4" NPTFI.

**Note:** RTWD units can be ordered with "Dual Relief Valve" option. Model number digit 16 is a "2". Units with this option will have two valves on each circuit for a total of four on the evaporator. Only two valves would release at the same time - never all four.

See [Figure 28, p. 54](#) and [Table 30, p. 55](#). Refer to local codes for relief valve vent line sizing requirements.

**Figure 29. Evaporator relief valves**



**Note:** Vent line length must not exceed code recommendations. If the line length will exceed code recommendations for the outlet size of the valve, install a vent line of the next larger pipe size.

Low side relief valve discharge setpoints are 200 psig. Once the relief valve has opened, it will re-close when pressure is reduced to a safe level.

Pipe each relief valve on the unit into a common vent line. Provide an access valve located at the low point of the vent piping, to enable draining of any condensate that may accumulate in the piping.

**Summary or Relief Valves - RTWD, RTUD**

**Table 30. Relief valve descriptions**

	Condenser	Evaporator	Oil Separator
Units	RTWD High Pressure Side	RTWD, RTUD Low Pressure Side	RTUD High Pressure Side
Relief Setpoint	300 psig	200 psig	350 psig
Quantity (standard)	1 per ckt	1 per ckt	1 per ckt
Quantity (Dual Relief Valves option - RTWD only)	2 per ckt	RTWD - 2 per ckt (n/a - RTUD units)	n/a
Relief Rate (lb/min)	25.4	28.9	13.3
Field Connection Size	5/8" MFL	3/4" NPTFI	3/8" MFL

## RTUD Installation

The installation of a split system offers a good economic alternative to satisfy the chilled water demand for cooling a building, particularly in the case of new construction.

The choice of a complete Trane system, including the compressor chiller and the condenser offers the designer, installer and owner the advantages of an optimized selection and undivided responsibility for the design, the quality and the operation of the complete system.

### Application examples

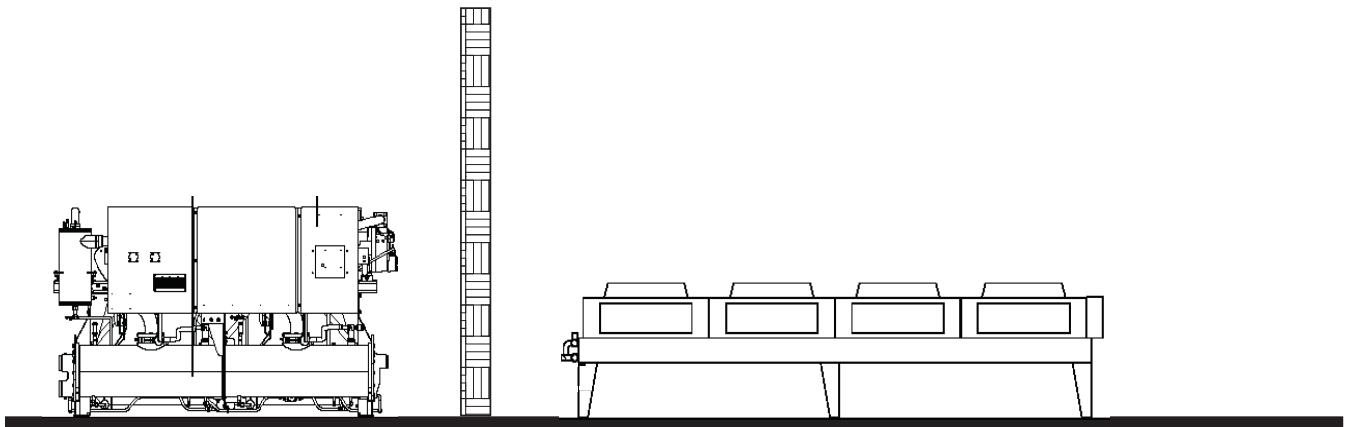
#### No Elevation Difference

See [Figure 30, p. 56](#).

##### **Restrictions**

- Total distance between components should not exceed 200 ft (actual) or 300 ft (equivalent).
- Elevation rise of the liquid line must not be more than 15 ft above the base of the air-cooled condenser.
- Discharge line trap is recommended leaving the oil separator if the discharge piping runs for more than 10 (actual) feet horizontally above the RTUD unit.

**Figure 30. Condenser installed at same elevation as compressor chiller**



#### Condenser Installed Above Compressor Chiller

See [Figure 31, p. 57](#).

##### **Restrictions**

- Total distance between components should not exceed 200 ft (actual) or 300 ft (equivalent).
- Elevation difference greater than 100 ft (actual) will result in at least a 2% efficiency decrease.

#### Condenser Installed Below Compressor Chiller

See [Figure 32, p. 57](#).

##### **Restrictions**

- Total distance between components should not exceed 200 ft (actual) or 300 ft (equivalent).
- Elevation rise of the liquid line must not be more than 15 ft above the base of the air-cooled condenser.



Figure 31. Condenser above the compressor chiller

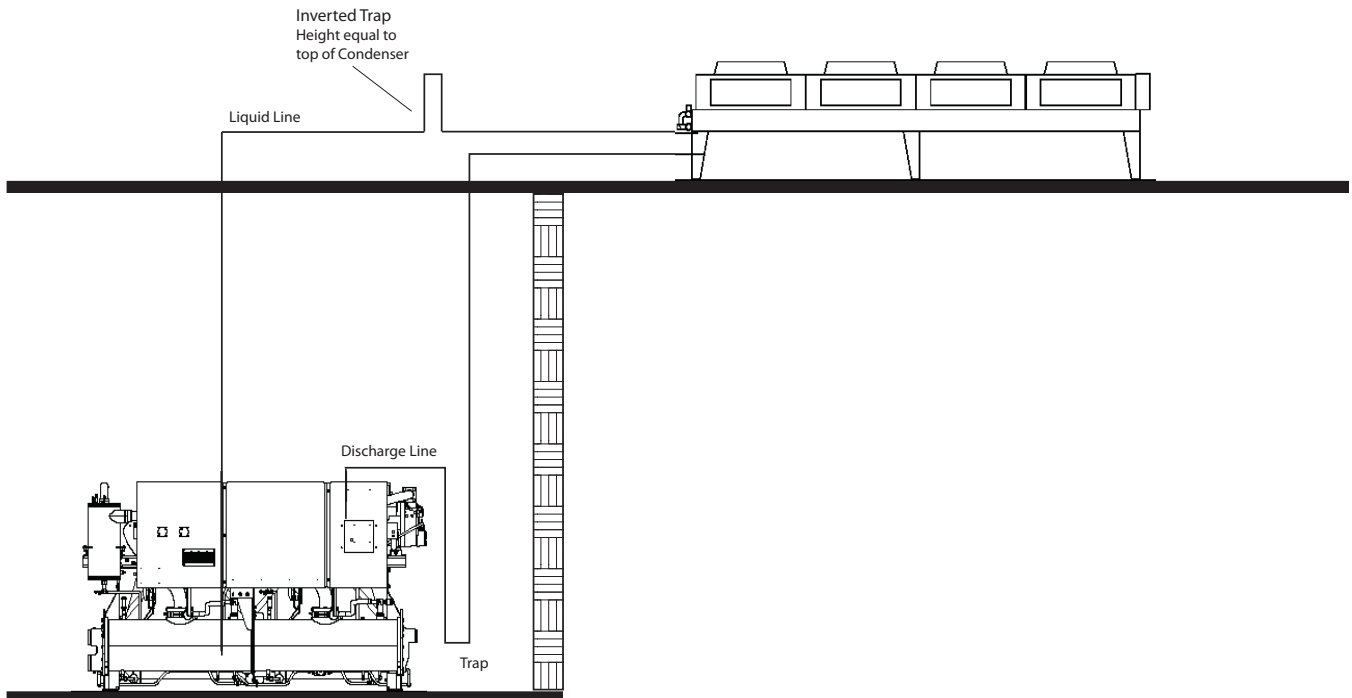
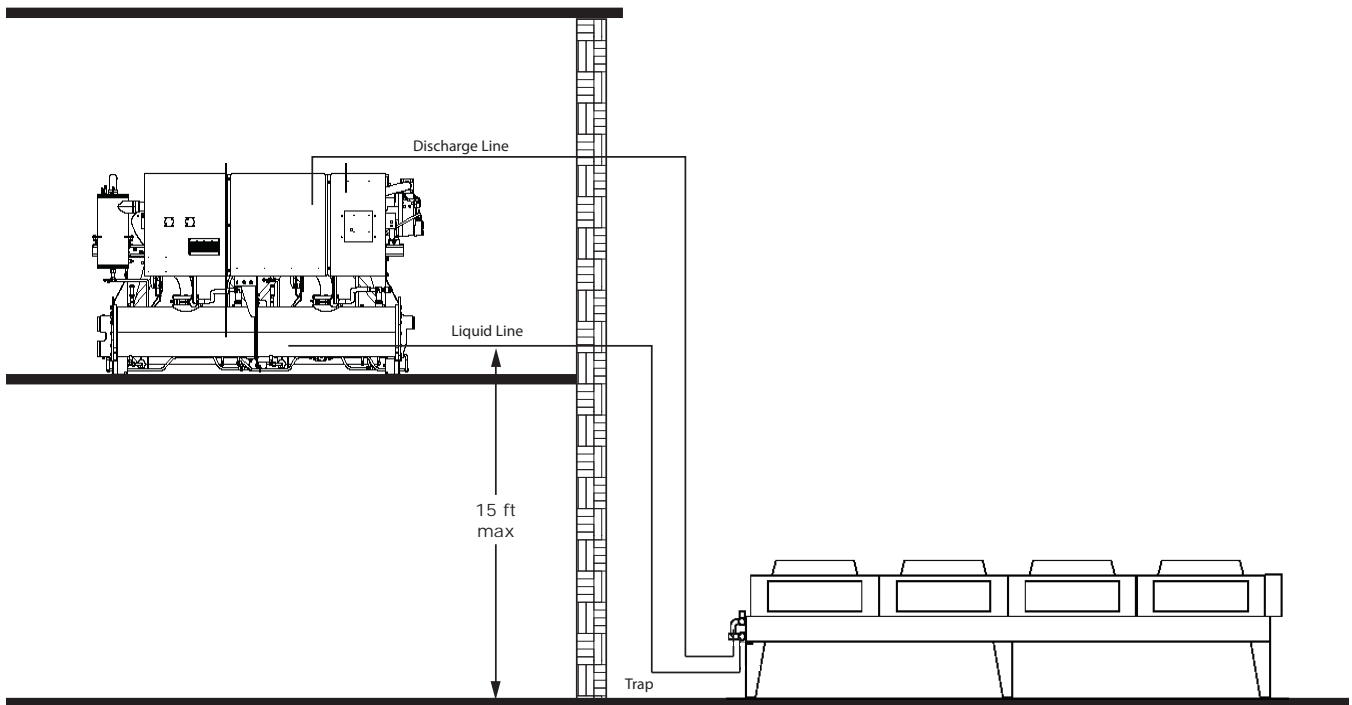


Figure 32. Condenser below the compressor chiller



## Remote Air-Cooled Condenser Interconnection Refrigerant Piping

The RTUD compressor chiller is shipped with a full charge of oil and a nitrogen holding charge. The Levitor II unit is an air-cooled condenser that is designed for use with the RTUD unit. The RTUD unit is designed to be most effective when used with the Levitor II air-cooled condenser. Other air-cooled condensers can be used in place of the Levitor II condenser, but the overall performance of the system may be different from that published in the catalogs. The following section covers the required piping between the RTUD unit and the appropriate air-cooled condenser.

The RTUD unit consists of an evaporator, two helical rotor compressors (one per circuit), oil separators, oil coolers, liquid line service valves (NOT isolation valves), sight glasses, electronic expansion valves and filter. The discharge line leaving the oil separator and liquid line entering the filters are capped and brazed. The installing contractor need only provide the interconnecting piping, including liquid line isolation valves, between the RTUD and the air-cooled condenser.

**Important:** *RTUD units are not shipped with factory installed liquid line isolation valves. Liquid line isolation valves must be field installed.*

Trane does not approve the use of underground refrigerant piping. Potential problems include dirt and moisture in the lines during assembly, condensation of refrigerant in the lines during off-cycle, which creates liquid slugs and potential damage to parts or controllability issues, and vibration/corrosion damage.

For best reliability and performance, the RTUD should be matched with Trane Levitor II. If a non-Levitor II condenser is used, overall performance and reliability of the RTUD may be affected. Depending on the customer's fan control, nuisance trips may occur on the RTUD unit, due to head pressure instability.

If a non-Levitor II condenser is supplied, it must be capable of providing a minimum of 5 F subcooling at the EXV. The RTUD requires subcooled liquid at the expansion valves. Without a minimum of 5 F subcooling, the RTUD will not operate as designed.

Piping should be sized and laid out according to the job plans and specifications. This design should be completed during system component selection.

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

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

**Important:** *Relieve nitrogen pressure before removing end caps.*

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

### **⚠ WARNING**

#### **Hazard of Explosion and Deadly Gases!**

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

See [Table 31, p. 58](#) for the Levitor condenser model number. Units 150 tons and above will have one condenser per circuit. The manifold piping for these condensers is field supplied.

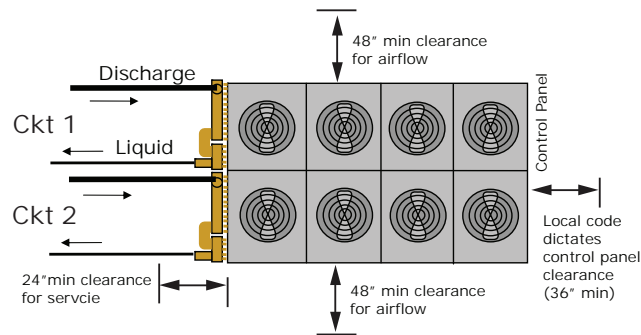
**Table 31. Levitor model numbers**

RTUD Size	Circuit (s)	Levitor Model No.
80 Ton	Ckt 1 & 2	LAVC23312
90 Ton	Ckt 1 & 2	LAVC24310
100 Ton	Ckt 1 & 2	LAVC24410
110 Ton	Ckt 1 & 2	LAVC24412
120 Ton	Ckt 1 & 2	LAVC25408
130 Ton	Ckt 1 & 2	LAVC25410
150 Ton	Ckt 1	LAVC23308
150 Ton	Ckt 2	LAVC23312
160 Ton	Ckt 1	LAVC23312
160 Ton	Ckt 2	LAVC23312
180 Ton	Ckt 1	LAVC23312
180 Ton	Ckt 2	LAVC24308
200 Ton	Ckt 1	LAVC24308
200 Ton	Ckt 2	LAVC24308
220 Ton	Ckt 1	LAVC24308
220 Ton	Ckt 2	LAVC24410
250 Ton	Ckt 1	LAVC24410
250 Ton	Ckt 2	LAVC24410

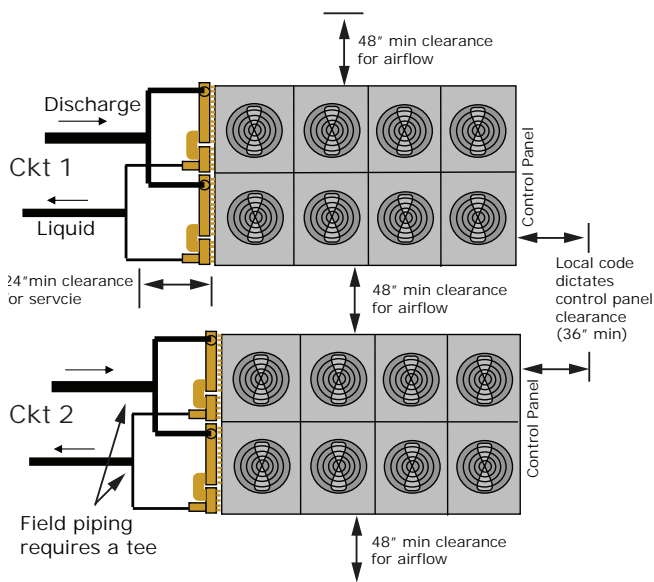
On units with two separate Trane-supplied condensers (150-250 Ton), a field installed tee is required at the condenser connections to combine the two internal halves into a single circuit. See [Figure 34, p. 59](#). In this case, each separate condenser would be a single circuit. If non-Trane condensers with multiple circuits are used, a field installed tee may be required to provide two individual circuits.

**Important:** To prevent excessive pressure drop in tee, connection for the combined stream should not be any smaller than the field run piping.

**Figure 33. Condenser manifolding, 80 to 130 ton**



**Figure 34. Condenser manifolding, 150 to 250 ton**



### Condenser by Others Requirement for Stable fan operation at low ambient temperatures

Each circuit of the RTUD chiller is capable of unloading to approximately 30% of its full load capability at any given operating point. To guarantee no fan cycling at the minimum compressor load and an ambient temperature of 32°, the condenser will require the ability to reduce its minimum capacity with one fan running to roughly ½ of that 30%, which implies at least 6 fans minimum. Some amount of slow fan cycling is acceptable depending on the application. Operating with fewer fans at low ambient temperatures and minimum loads may cause fast and prolonged fan cycling and may result in large excursions in condenser pressure and differential pressures and may lead to either poor leaving water temperature performance or nuisance tripping. To avoid this problem in certain low ambient temperature applications, it may be

necessary to provide that one fan be a variable speed fan to improve stability and minimal cycling.

## System Configuration

The system can be configured in any of the primary arrangements as shown in [Figure 30, p. 56](#), [Figure 31, p. 57](#) and [Figure 32, p. 57](#). The configuration and its associated elevation, along with the total distance between the RTUD and the air-cooled condenser, plays a critical role in determining the liquid line and discharge line sizes. This will also affect the field refrigerant and oil charges. Consequently, there are physical limits which must not be violated if the system is to operate as designed. Please note the following restrictions:

1. The discharge line sizing is different for different leaving evaporator water temperatures.
2. The total distance between the RTUD and the air-cooled condenser must not exceed 200 actual feet or 300 equivalent feet.
3. When the air-cooled condenser is installed at the same level or below the compressor-chiller, liquid line risers must not be more than 15 ft above the base of the condenser.
4. Discharge line risers cannot exceed an elevation difference greater than 100 actual feet without a minimum of 2% efficiency decrease.
5. See [Figure 30](#), [Figure 31](#) and [Figure 32](#). for location of recommended traps.
6. Circuit #1 on the condenser must be connected to Circuit #1 on the RTUD unit.

### **NOTICE:**

#### **Equipment Damage!**

**If circuits are crossed, serious equipment damage may occur.**

### Equivalent Line Length

To determine the appropriate size for field installed liquid and discharge lines, it is first necessary to establish the equivalent length of pipe for each line, including the added flow resistance of elbows, valves, etc. An initial approximation can be made by assuming that the equivalent length of pipe is 1.5 times the actual pipe length.

**Note:** [Table 32, p. 60](#) states the equivalent length, in feet, for various non-ferrous valves and fittings. When calculating the equivalent length, do not include piping of the unit. Only field piping must be considered.



## Installation - Mechanical

**Table 32. Equivalent lengths of non-ferrous valves and fittings**

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

### Liquid Line Sizing

Trane recommends that the liquid line diameter be as small as possible, while maintaining acceptable pressure drop. This is necessary to minimize refrigerant charge. The total length between the components must not exceed 200 actual feet or 300 equivalent feet.

**Table 33. Liquid line sizing RTUD 80 ton**

Total Equivalent Length (ft)	Circuit 1 Line Height (ft)						Circuit 2 Line Height (ft)					
	<0	3	6	9	12	15	<0	3	6	9	12	15
25	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
50	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
75	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
100	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
150	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
175	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
200	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
225	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
250	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
275	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
300	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125

**Table 34. Liquid line sizing RTUD 90 ton**

Total Equivalent Length (ft)	Circuit 1 Line Height (ft)						Circuit 2 Line Height (ft)					
	<0	3	6	9	12	15	<0	3	6	9	12	15
25	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
50	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
75	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
100	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
150	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
175	1.125	1.125	1.125	1.125	1.125	1.375	1.125	1.125	1.125	1.125	1.125	1.375
200	1.125	1.125	1.125	1.125	1.375	1.375	1.125	1.125	1.125	1.125	1.375	1.375
225	1.125	1.125	1.125	1.375	1.375	1.375	1.125	1.125	1.125	1.375	1.375	1.375
250	1.125	1.125	1.375	1.375	1.375	1.375	1.125	1.125	1.375	1.375	1.375	1.375
275	1.125	1.375	1.375	1.375	1.375	1.375	1.125	1.375	1.375	1.375	1.375	1.375
300	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375

The liquid line risers must not exceed 15 feet from the base of the air-cooled condenser. The liquid line does not have to be pitched. Liquid line sizing for these units when installed with a Trane Levitor II air-cooled condenser are shown in [Table 33, p. 60](#) through [Table 44, p. 64](#). Line sizing for other condensers must be done manually not to violate the 5°F subcooling requirement at the EXV.

Liquid lines are not typically insulated. However, if the lines run through an area of high ambient temperature (eg. boiler room), subcooling may drop below required levels. In these situations, insulate the liquid lines.

Use of a liquid line receiver is not recommended because it adds to the overall refrigerant volume of the circuit.

**Note:** In case of power failure to the expansion valve, the amount of liquid refrigerant contained in the refrigerant system must not exceed the holding capacity of the evaporator. See [Table 57, p. 68](#) for the maximum allowable charge in each circuit.

**Note:** Height in [Table 33](#) through [Table 44](#) is the raise in elevation of the RTUD unit above the condensing unit.

**Table 35. Liquid line sizing RTUD 100 ton**

Total Equivalent Length (ft)	Circuit 1 Line Height (ft)						Circuit 2 Line Height (ft)					
	<0	3	6	9	12	15	<0	3	6	9	12	15
25	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
50	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
75	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
100	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
150	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
175	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
200	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.375	1.375
225	1.125	1.125	1.125	1.125	1.125	1.375	1.125	1.125	1.125	1.375	1.375	1.375
250	1.125	1.125	1.125	1.125	1.375	1.375	1.125	1.125	1.375	1.375	1.375	1.375
275	1.125	1.125	1.125	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
300	1.125	1.125	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375

**Table 36. Liquid line sizing RTUD 110 ton**

Total Equivalent Length (ft)	Circuit 1 Line Height (ft)						Circuit 2 Line Height (ft)					
	<0	3	6	9	12	15	<0	3	6	9	12	15
25	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
50	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
75	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
100	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
150	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
175	1.125	1.125	1.125	1.125	1.375	1.375	1.125	1.125	1.125	1.125	1.125	1.375
200	1.125	1.125	1.125	1.375	1.375	1.375	1.125	1.125	1.125	1.375	1.375	1.375
225	1.125	1.375	1.375	1.375	1.375	1.375	1.125	1.125	1.375	1.375	1.375	1.375
250	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
275	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
300	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375

**Table 37. Liquid line sizing RTUD 120 ton**

Total Equivalent Length (ft)	Circuit 1 Line Height (ft)						Circuit 2 Line Height (ft)					
	<0	3	6	9	12	15	<0	3	6	9	12	15
25	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
50	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.375
75	1.125	1.125	1.125	1.125	1.125	1.375	1.125	1.125	1.125	1.375	1.375	1.375
100	1.125	1.125	1.125	1.375	1.375	1.375	1.125	1.375	1.375	1.375	1.375	1.375
125	1.125	1.125	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.625
150	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.625
175	1.375	1.375	1.375	1.375	1.375	1.625	1.375	1.375	1.375	1.375	1.625	1.625
200	1.375	1.375	1.375	1.375	1.375	1.625	1.375	1.375	1.375	1.375	1.625	1.625
225	1.375	1.375	1.375	1.375	1.625	1.625	1.375	1.375	1.375	1.625	1.625	1.625
250	1.375	1.375	1.375	1.375	1.625	1.625	1.375	1.375	1.625	1.625	1.625	1.625
275	1.375	1.375	1.375	1.625	1.625	1.625	1.375	1.375	1.625	1.625	1.625	1.625
300	1.375	1.375	1.375	1.625	1.625	1.625	1.375	1.625	1.625	1.625	1.625	2.125



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**Table 38. Liquid line sizing RTUD 130 ton**

Total Equivalent Length (ft)	Circuit 1 Line Height (ft)						Circuit 2 Line Height (ft)					
	<0	3	6	9	12	15	<0	3	6	9	12	15
25	1.125	1.125	1.125	1.125	1.125	1.375	1.125	1.125	1.125	1.125	1.125	1.375
50	1.125	1.125	1.125	1.375	1.375	1.625	1.125	1.125	1.125	1.375	1.375	1.625
75	1.125	1.375	1.375	1.375	1.625	1.625	1.125	1.375	1.375	1.375	1.375	1.625
100	1.375	1.375	1.375	1.375	1.625	2.125	1.375	1.375	1.375	1.375	1.625	2.125
125	1.375	1.375	1.375	1.625	1.625	2.125	1.375	1.375	1.375	1.625	1.625	2.125
150	1.375	1.375	1.625	1.625	1.625	2.125	1.375	1.375	1.375	1.625	1.625	2.125
175	1.375	1.375	1.625	1.625	2.125	2.125	1.375	1.375	1.625	1.625	1.625	2.125
200	1.375	1.625	1.625	1.625	2.125	2.125	1.375	1.625	1.625	1.625	2.125	2.125
225	1.625	1.625	1.625	1.625	2.125	2.125	1.375	1.625	1.625	1.625	2.125	2.125
250	1.625	1.625	1.625	1.625	2.125	2.125	1.625	1.625	1.625	1.625	2.125	2.125
275	1.625	1.625	1.625	2.125	2.125	2.125	1.625	1.625	1.625	2.125	2.125	2.125
300	1.625	1.625	1.625	2.125	2.125	2.125	1.625	1.625	1.625	2.125	2.125	2.125

**Table 39. Liquid line sizing RTUD 150 ton**

Total Equivalent Length (ft)	Circuit 1 Line Height (ft)						Circuit 2 Line Height (ft)					
	<0	3	6	9	12	15	<0	3	6	9	12	15
25	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
50	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
75	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
100	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125
150	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.375	1.375
175	1.125	1.125	1.125	1.125	1.125	1.125	1.125	1.375	1.375	1.375	1.375	1.375
200	1.125	1.125	1.125	1.125	1.125	1.375	1.375	1.375	1.375	1.375	1.375	1.375
225	1.125	1.125	1.125	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
250	1.125	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
275	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
300	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375

**Table 40. Liquid line sizing RTUD 160 ton**

Total Equivalent Length (ft)	Circuit 1 Line Height (ft)						Circuit 2 Line Height (ft)					
	<0	3	6	9	12	15	<0	3	6	9	12	15
25	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
50	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
75	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
100	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
125	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
150	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
175	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
200	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
225	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
250	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
275	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
300	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375

**Table 41. Liquid line sizing RTUD 180 ton**

Total Equivalent Length (ft)	Circuit 1 Line Height (ft)						Circuit 2 Line Height (ft)					
	<0	3	6	9	12	15	<0	3	6	9	12	15
25	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
50	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
75	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
100	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
125	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
150	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
175	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.625
200	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.625	1.625	1.625
225	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.625	1.625	1.625	1.625
250	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.625	1.625	1.625	1.625	1.625
275	1.375	1.375	1.375	1.375	1.375	1.375	1.625	1.625	1.625	1.625	1.625	1.625
300	1.375	1.375	1.375	1.375	1.375	1.375	1.625	1.625	1.625	1.625	1.625	1.625

**Table 42. Liquid line sizing RTUD 200 ton**

Total Equivalent Length (ft)	Circuit 1 Line Height (ft)						Circuit 2 Line Height (ft)					
	<0	3	6	9	12	15	<0	3	6	9	12	15
25	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
50	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
75	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
100	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
125	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
150	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
175	1.375	1.375	1.375	1.375	1.375	1.625	1.375	1.375	1.375	1.375	1.375	1.625
200	1.375	1.375	1.375	1.375	1.625	1.625	1.375	1.375	1.375	1.375	1.625	1.625
225	1.375	1.375	1.375	1.625	1.625	1.625	1.375	1.375	1.375	1.625	1.625	1.625
250	1.375	1.625	1.625	1.625	1.625	1.625	1.375	1.375	1.625	1.625	1.625	1.625
275	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625
300	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625

**Table 43. Liquid line sizing RTUD 220 ton**

Total Equivalent Length (ft)	Circuit 1 Line Height (ft)						Circuit 2 Line Height (ft)					
	<0	3	6	9	12	15	<0	3	6	9	12	15
25	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
50	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
75	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
100	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
125	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
150	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
175	1.375	1.375	1.375	1.375	1.375	1.625	1.375	1.375	1.375	1.375	1.625	1.625
200	1.375	1.375	1.375	1.375	1.625	1.625	1.375	1.375	1.375	1.625	1.625	1.625
225	1.375	1.375	1.625	1.625	1.625	1.625	1.375	1.625	1.625	1.625	1.625	1.625
250	1.375	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625
275	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625
300	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625



Table 44. Liquid line sizing RTUD 250 ton

Total Equivalent Length (ft)	Circuit 1 Line Height (ft)						Circuit 2 Line Height (ft)					
	<0	3	6	9	12	15	<0	3	6	9	12	15
25	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
50	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
75	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
100	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
125	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
150	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375	1.375
175	1.375	1.375	1.375	1.375	1.625	1.625	1.375	1.375	1.375	1.375	1.625	1.625
200	1.375	1.375	1.625	1.625	1.625	1.625	1.375	1.375	1.625	1.625	1.625	1.625
225	1.375	1.625	1.625	1.625	1.625	1.625	1.375	1.625	1.625	1.625	1.625	1.625
250	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625
275	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625
300	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625	1.625

### Discharge (Hot Gas) Line Sizing

The discharge lines should pitch downward, in the direction of the hot gas flow, at the rate of 1/2 inch per each 10 feet of horizontal run.

Discharge line size is based on the velocity needed to obtain sufficient oil return. Basic discharge line sizing is shown in [Table 45, p. 65](#) through [Table 56, p. 66](#), depending on the unit configuration.

Discharge lines are not typically insulated. If insulation is required, it should be approved for use at temperatures up to 230°F (max discharge temp).

**Note:** The proper column for leaving evaporator water temperature must be used to avoid catastrophic damage to the unit. Column for 10 °F to 37°F can only be used on units designed for low temperature applications. Refer to the design conditions of the unit to determine the correct column that must be used.

**Note:** The discharge line should drop well below the compressor discharge outlet before beginning its vertical rise. This prevents possible refrigerant drainage back to the compressor and oil separator during the unit STOP cycle. See [Figure 30, p. 56](#), [Figure 31, p. 57](#) and [Figure 32, p. 57](#) for details.



**Table 45. Discharge (hot gas) line sizing RTUD 80 ton**

Total Equivalent Length (ft)	Circuit 1		Circuit 2	
	Leaving Water Temp 38 to 65°F 10 to 37°F		Leaving Water Temp 38 to 65°F 10 to 37°F	
25	2.125	2.125	2.125	2.125
50	2.125	2.125	2.125	2.125
75	2.125	2.125	2.125	2.125
100	2.125	2.125	2.125	2.125
125	2.125	2.125	2.125	2.125
150	2.125	2.125	2.125	2.125
175	2.125	2.125	2.125	2.125
200	2.125	2.125	2.125	2.125
225	2.125	2.125	2.125	2.125
250	2.125	2.125	2.125	2.125
275	2.125	2.125	2.125	2.125
300	2.625	2.125	2.625	2.125

**Table 48. Discharge (hot gas) line sizing RTUD 110 ton**

Total Equivalent Length (ft)	Circuit 1		Circuit 2	
	Leaving Water Temp 38 to 65°F 10 to 37°F		Leaving Water Temp 38 to 65°F 10 to 37°F	
25	2.125	2.125	2.125	2.125
50	2.125	2.125	2.125	2.125
75	2.125	2.125	2.125	2.125
100	2.125	2.125	2.125	2.125
125	2.125	2.125	2.125	2.125
150	2.625	2.125	2.625	2.125
175	2.625	2.125	2.625	2.125
200	2.625	2.625	2.625	2.125
225	2.625	2.625	2.625	2.625
250	2.625	2.625	2.625	2.625
275	2.625	2.625	2.625	2.625
300	2.625	2.625	2.625	2.625

**Table 46. Discharge (hot gas) line sizing RTUD 90 ton**

Total Equivalent Length (ft)	Circuit 1		Circuit 2	
	Leaving Water Temp 38 to 65°F 10 to 37°F		Leaving Water Temp 38 to 65°F 10 to 37°F	
25	2.125	2.125	2.125	2.125
50	2.125	2.125	2.125	2.125
75	2.125	2.125	2.125	2.125
100	2.125	2.125	2.125	2.125
125	2.125	2.125	2.125	2.125
150	2.125	2.125	2.125	2.125
175	2.125	2.125	2.125	2.125
200	2.125	2.125	2.125	2.125
225	2.625	2.125	2.625	2.125
250	2.625	2.125	2.625	2.125
275	2.625	2.125	2.625	2.125
300	2.625	2.125	2.625	2.125

**Table 49. Discharge (hot gas) line sizing RTUD 120 ton**

Total Equivalent Length (ft)	Circuit 1		Circuit 2	
	Leaving Water Temp 38 to 65°F 10 to 37°F		Leaving Water Temp 38 to 65°F 10 to 37°F	
25	2.625	2.125	2.625	2.125
50	2.625	2.125	2.625	2.125
75	2.625	2.125	2.625	2.125
100	2.625	2.125	2.625	2.125
125	2.625	2.125	2.625	2.125
150	2.625	2.125	2.625	2.125
175	2.625	2.125	2.625	2.625
200	2.625	2.625	2.625	2.625
225	2.625	2.625	2.625	2.625
250	2.625	2.625	2.625	2.625
275	2.625	2.625	2.625	2.625
300	2.625	2.625	2.625	2.625

**Table 47. Discharge (hot gas) line sizing RTUD 100 ton**

Total Equivalent Length (ft)	Circuit 1		Circuit 2	
	Leaving Water Temp 38 to 65°F 10 to 37°F		Leaving Water Temp 38 to 65°F 10 to 37°F	
25	2.125	2.125	2.125	2.125
50	2.125	2.125	2.125	2.125
75	2.125	2.125	2.125	2.125
100	2.125	2.125	2.125	2.125
125	2.125	2.125	2.125	2.125
150	2.125	2.125	2.625	2.125
175	2.125	2.125	2.625	2.125
200	2.625	2.125	2.625	2.125
225	2.625	2.125	2.625	2.625
250	2.625	2.125	2.625	2.625
275	2.625	2.125	2.625	2.625
300	2.625	2.625	2.625	2.625

**Table 50. Discharge (hot gas) line sizing RTUD 130 ton**

Total Equivalent Length (ft)	Circuit 1		Circuit 2	
	Leaving Water Temp 38 to 65°F 10 to 37°F		Leaving Water Temp 38 to 65°F 10 to 37°F	
25	2.625	2.625	2.625	2.125
50	2.625	2.625	2.625	2.125
75	2.625	2.625	2.625	2.125
100	2.625	2.625	2.625	2.125
125	2.625	2.625	2.625	2.125
150	2.625	2.625	2.625	2.125
175	2.625	2.625	2.625	2.625
200	2.625	2.625	2.625	2.625
225	2.625	2.625	2.625	2.625
250	2.625	2.625	2.625	2.625
275	2.625	2.625	2.625	2.625
300	2.625	2.625	2.625	2.625



**Installation - Mechanical**

**Table 51. Discharge (hot gas) line sizing RTUD 150 ton**

Total Equivalent Length (ft)	Circuit 1		Circuit 2	
	Leaving Water Temp 38 to 65°F 10 to 37°F		Leaving Water Temp 38 to 65°F 10 to 37°F	
25	2.625	2.125	2.625	2.625
50	2.625	2.125	2.625	2.625
75	2.625	2.125	2.625	2.625
100	2.625	2.125	2.625	2.625
125	2.625	2.125	2.625	2.625
150	2.625	2.125	2.625	2.625
175	2.625	2.625	2.625	2.625
200	2.625	2.625	2.625	2.625
225	2.625	2.625	2.625	2.625
250	2.625	2.625	3.125	2.625
275	2.625	2.625	3.125	2.625
300	2.625	2.625	3.125	2.625

**Table 54. Discharge (hot gas) line sizing RTUD 200 ton**

Total Equivalent Length (ft)	Circuit 1		Circuit 2	
	Leaving Water Temp 38 to 65°F 10 to 37°F		Leaving Water Temp 38 to 65°F 10 to 37°F	
25	2.625	2.625	2.625	2.625
50	2.625	2.625	2.625	2.625
75	2.625	2.625	2.625	2.625
100	2.625	2.625	2.625	2.625
125	2.625	2.625	2.625	2.625
150	2.625	2.625	2.625	2.625
175	3.125	2.625	3.125	2.625
200	3.125	2.625	3.125	2.625
225	3.125	2.625	3.125	2.625
250	3.125	3.125	3.125	2.625
275	3.125	3.125	3.125	3.125
300	3.125	3.125	3.125	3.125

**Table 52. Discharge (hot gas) line sizing RTUD 160 ton**

Total Equivalent Length (ft)	Circuit 1		Circuit 2	
	Leaving Water Temp 38 to 65°F 10 to 37°F		Leaving Water Temp 38 to 65°F 10 to 37°F	
25	2.625	2.625	2.625	2.625
50	2.625	2.625	2.625	2.625
75	2.625	2.625	2.625	2.625
100	2.625	2.625	2.625	2.625
125	2.625	2.625	2.625	2.625
150	2.625	2.625	2.625	2.625
175	2.625	2.625	2.625	2.625
200	2.625	2.625	2.625	2.625
225	2.625	2.625	2.625	2.625
250	3.125	2.625	3.125	2.625
275	3.125	2.625	3.125	2.625
300	3.125	2.625	3.125	2.625

**Table 55. Discharge (hot gas) line sizing RTUD 220 ton**

Total Equivalent Length (ft)	Circuit 1		Circuit 2	
	Leaving Water Temp 38 to 65°F 10 to 37°F		Leaving Water Temp 38 to 65°F 10 to 37°F	
25	2.625	2.625	3.125	3.125
50	2.625	2.625	3.125	3.125
75	2.625	2.625	3.125	3.125
100	2.625	2.625	3.125	3.125
125	2.625	2.625	3.125	3.125
150	2.625	2.625	3.125	3.125
175	3.125	2.625	3.125	3.125
200	3.125	2.625	3.125	3.125
225	3.125	2.625	3.125	3.125
250	3.125	3.125	3.125	3.125
275	3.125	3.125	3.125	3.125
300	3.125	3.125	3.625	3.125

**Table 53. Discharge (hot gas) line sizing RTUD 180 ton**

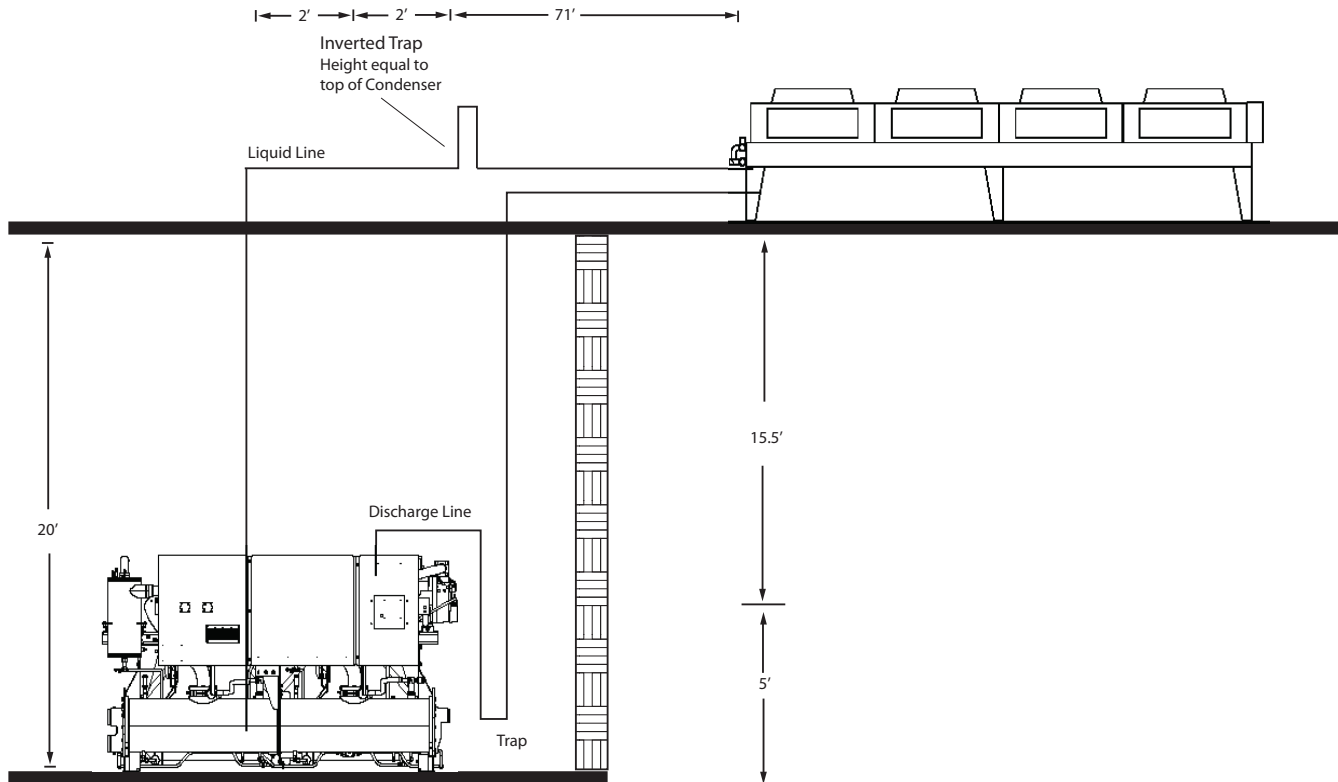
Total Equivalent Length (ft)	Circuit 1		Circuit 2	
	Leaving Water Temp 38 to 65°F 10 to 37°F		Leaving Water Temp 38 to 65°F 10 to 37°F	
25	2.625	2.625	2.625	2.625
50	2.625	2.625	2.625	2.625
75	2.625	2.625	2.625	2.625
100	2.625	2.625	2.625	2.625
125	2.625	2.625	2.625	2.625
150	2.625	2.625	2.625	2.625
175	2.625	2.625	3.125	2.625
200	2.625	2.625	3.125	2.625
225	2.625	2.625	3.125	2.625
250	3.125	2.625	3.125	2.625
275	3.125	2.625	3.125	3.125
300	3.125	2.625	3.125	3.125

**Table 56. Discharge (hot gas) line sizing RTUD 250 ton**

Total Equivalent Length (ft)	Circuit 1		Circuit 2	
	Leaving Water Temp 38 to 65°F 10 to 37°F		Leaving Water Temp 38 to 65°F 10 to 37°F	
25	3.125	3.125	3.125	3.125
50	3.125	3.125	3.125	3.125
75	3.125	3.125	3.125	3.125
100	3.125	3.125	3.125	3.125
125	3.125	3.125	3.125	3.125
150	3.125	3.125	3.125	3.125
175	3.125	3.125	3.125	3.125
200	3.125	3.125	3.125	3.125
225	3.125	3.125	3.125	3.125
250	3.125	3.125	3.125	3.125
275	3.125	3.125	3.125	3.125
300	3.625	3.125	3.625	3.125

## Example

**Figure 35. Example configuration**



Shown in [Figure 35, p. 67](#) are RTUD 100 ton and Trane Levitor II condenser designed for a leaving evaporator water temperature of 42°F. This example will show how to calculate the line sizes for both the liquid and discharge lines. The discharge line consists of one long radius elbow and 4 short radius elbows. The liquid line also consists of one long radius elbow and 4 short radius elbows.

### Discharge Line

Actual length of lines =  $2 + 5 + 71 + 15.5 + 5 = 98.5$  ft.

Total equivalent length =  $1.5 \times 98.5 = 147.75$  ft.

Approximate line size for discharge lines

[Table 47, p. 65](#) = 2 1/8"

Equivalent length of one long radius elbow at 2 1/8"

[Table 32](#) = 3.4 ft.

Equivalent length of 4 short radius elbows at 2 1/8"

[Table 32](#) =  $4 \times 5.2$  ft. = 20.8 ft.

Total equivalent length =  $98.5 + 3.4 + 20.8 = 122.7$  ft.

New line size for discharge lines remains

[Table 47](#)

Ckt 1= 2 1/8"

Ckt 2= 2 1/8"

ALL DISCHARGE LINE SIZES ARE = 2 1/8"

### Liquid Lines

Actual length of liquid lines =  $8 + 75 + 20 + 8 = 111$  ft.

Total equivalent length =  $1.5 \times 111 = 166.5$  ft.

Approximate liquid line size

[Table 35, p. 61](#) = 1 1/8"

Equiv. length of one long radius elbow at 1 1/8"

[Table 32](#) = 1.9

Equiv. length of 4 short radius elbows at 1 1/8"

[Table 32](#) =  $4 \times 2.7$  ft. = 10.8 ft.

Total equivalent length =  $111 + 1.9 + 10.8 = 123.7$  ft.

[Table 35](#)

Ckt 1= 1 1/8"

Ckt 2= 1 1/8"

ALL LIQUID LINE SIZES ARE = 1 1/8"

### Refrigerant Charge Determination

The approximate amount of the refrigerant charge required by the system must be determined by referring to [Table 57](#) and must be verified by running the system and checking the liquid line sightglasses.

**Table 57. System refrigerant charge - lbs**

Ton	Condenser		RTUD		Max. Unit Charge	
	Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
80	40	40	50	50	318	318
90	52	52	49	49	308	308
100	68	68	47	47	308	308
110	68	68	65	65	359	359
120	85	85	64	64	352	352
130	85	85	64	64	352	352
150	76	76	62	62	347	347
160	76	76	66	66	396	396
180	76	101	66	66	396	396
200	101	101	66	66	391	391
220	101	134	63	63	382	382
250	134	134	61	61	373	373

**Note:** The maximum charge can reduce the maximum length of the piping. Due to maximum allowable refrigerant charge not all units can have 200 feet of piping.

To determine the approximate charge, first refer to [Table 57](#) and establish the required charge without the field-installed piping. Then refer to [Table 58](#), to determine the charge required for the field-installed piping. The approximate charge is therefore the sum of the values from [Table 57](#) and [Table 58](#).

**Table 58. Field-installed piping charge**

Pipe O.D.	Discharge Line (lbs)	Liquid Line (lbs)
1 1/8	-	41
1 3/8	-	62
1 5/8	-	88
2 1/8	8	154
2 5/8	13	-
3 1/8	18	-
4 1/8	32	-

**Note:** The amounts of refrigerant listed in [Table 58](#) are based on 100 feet of pipe. Actual requirements will be in direct proportion to the actual length of the piping.

**Note:** [Table 58](#) assumes: Liquid Temperature = 105°F; Saturated Discharge Temperature = 125°F; Discharge Superheat = 30°F.

**NOTICE:**
**Equipment Damage!**

Add initial field refrigerant charge only through the service valve on the liquid line, not the service valves on the evaporator, and insure that water is flowing through the evaporator during the charging process. Failure to do the above could result in equipment damage.

**RTUD Chilled Water Flow Control**
**NOTICE:**
**Equipment Damage!**

ALL RTUD unit chilled water pumps MUST be controlled by the Trane CH530 to avoid catastrophic damage to the evaporator due to freezing

**Oil Charge Determination**

The RTUD unit is factory charged with the amount of oil required by the system. No additional oil is required for field installed piping.

**Outdoor Air Temperature Sensor Installation Requirements**

The outdoor air temperature sensor is optional for the RTWD water cooled units, but is a required sensor for the RTUD compressor chiller units. The sensor is required as an important input to the condenser fan control algorithm as well as for the low outdoor air ambient lockout feature. The temperature sensor probe is shipped separately inside the control panel.

A separate outdoor air sensor probe must be installed at the remote air cooled condenser at a location to sense the coil's entering air temperature, while avoiding direct sunlight. It should be located at least 2" from the coil face and somewhere "in-between" the two refrigerant circuits. Where the condenser installation is such that the two refrigerant circuit's condensers are physically separate from each other, or one circuit is more likely to see re-circulated warmer air, an attempt should be made to locate the probe to see an average temperature of the two separate condensers.

**Important:** The probe provided must not be substituted with another probe, as the probe and the electronics are "matched/calibrated" at the factory for accuracy.

A twisted pair sheathed cable shall be run and connected between probe at remote condenser and its LLID module in chiller control panel. The sensor's circuit is a class II power limited analog circuit and therefore the wire should not be run in close proximity to any power or line voltage wiring. The splices at the condenser end, should be made to be water tight. The wire run should be physically supported at equal intervals with consideration for safety and reliability/durability with wire ties or similar to meet local codes.

## Fan Control for Remote Air Cooled Condenser

The RTUD CH530 controls provide as an option, the flexible and full control of 2-circuit remote air cooled condenser fans. In addition to the option for controlling between 2 to 8 fixed speed fans per circuit (or multiples thereof), a separate additional option includes the ability to control either two speed fans or variable speed fan/drive combinations in conjunction with other fixed speed fans, to provide low ambient outdoor air temperature capability. The controls will also provide an option for a simple per circuit interlock output (in lieu of actual fan control) to use in the scenario in which independent fan head pressure or differential pressure controls (by others) is applied. See [“Fan Control By Others,” p. 116](#) for more information. It is recommended however, that for the best overall unit performance, the integral fan control option is selected.

The controls support control of a remote, air cooled condenser fan deck, from 2 to 8 fans per circuit (1-8 fans for variable speed). It supports options to control the following types of standard ambient outdoor air temperature fan decks: 1) all fans fixed speed, and 2) all fans two speed. It will also support the following low ambient outdoor air temperature fan decks 1) one fan per circuit is Two-Speed, (remaining fans fixed speed), and 2) One fan per circuit is variable speed i.e. variable frequency drive (VFD), (remaining fans fixed speed). In the variable fan low ambient outdoor air option the VFD fan and fixed speed fans are sequenced accordingly to provide continuous control from 0-100% air flow per circuit. Fan staging provides the correct combination of fixed speed fan relay, VFD relay (to enable operation of the VFD), and speed outputs to provide air flow control commanded by the fan algorithm running inside the CH530 Main Processor. The fan deck arrangement is independently configurable per circuit.

Since the condenser is provided separately from the RTUD compressor chiller, the RTUD electrical panel design does not provide for condensing unit's control power requirements. The chiller's control power transformer is not sized to provide the control power for the additional fan contactor loads. The CH530 controls, when properly optioned, will provide for pilot duty rated relays, low voltage binary inputs, and low voltage analog outputs to control the remote contactors and inverters provided by others. The CH530 fan control relays located in the chiller control panel, are intended to control the fan contactors that are located in the remote air cooled condenser panel. The Fan Control Relays are rated for up to 7.2 Amps resistive, 2.88 Amps pilot duty 1/3 HP, 7.2 FLA at 120 VAC, and up to 5 Amps general purpose at 240 VAC. All wiring for the field connections to the condenser, will have screw terminals for termination in the RTUD control panel with the exception of the outdoor air temperature sensor (addressed above). Refer to the wiring diagrams.

Separate fan control algorithms are used for fixed speed and variable speed systems. For the variable speed fan

deck option, the fan control reverts to fixed speed control if an inverter drive fault is detected through a binary input interface with the drive. An informational diagnostic is also provided to indicate the issue.

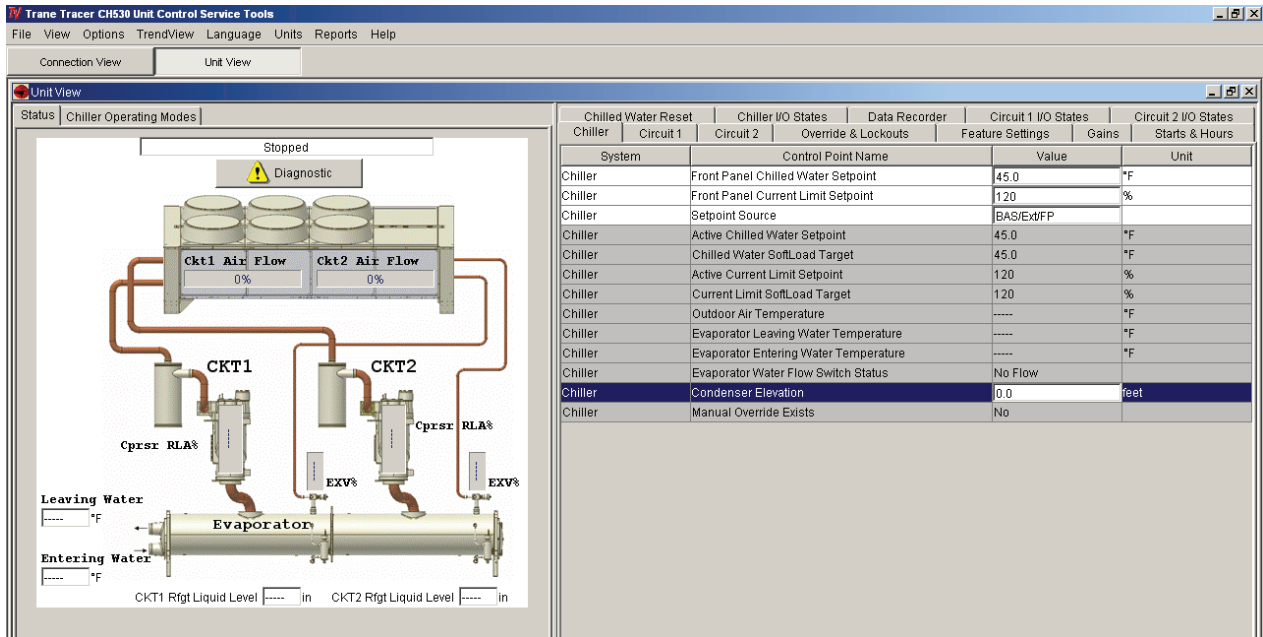
For more fan control information, see chapter sections beginning with [“Fan Configurations,” p. 115](#).

## RTUD Condenser Elevation Setting

Condenser elevation setting is a require input during startup of an RTUD chiller, and is accessible in TechView™, on the Unit View Screen. Go to the Unit View/Chiller Tab, select Condenser Elevation setting and enter condenser elevation in appropriate units. See [Figure 36](#). The shipped default of this setting is 0 and it represents the distance of the bottom of the condenser, relative to the top of the evaporator. Use a positive value for the condenser above the evaporator and a negative value for the condenser below the evaporator. An estimate to within +/- 3 feet is required.

Condenser elevation setting allows proper EXV operation. Failure to properly set the elevation can result in low pressure cutout trips, or low differential pressure trips during startup or large load transients, as well as poor EXV liquid level control during operation.

Figure 36. RTUD Condenser elevation setting



## Shipping Spacers

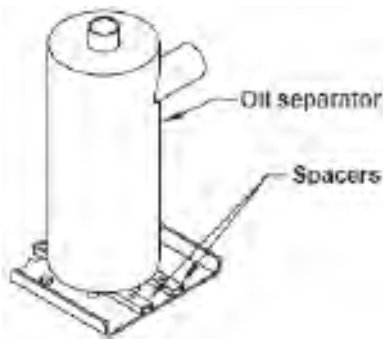
**Important:** Shipping spacers must be removed as instructed. Failure to remove spacers could result in excessive noise and vibration transmission into the building.

For RTWD units listed in table below, and all RTUD 80-130 ton units, remove and discard the two shipping spacers with four bolts, located underneath the oil separator, as shown in Figure 37, p. 70 before starting unit.

Table 59. RTWD units that require oil sep spacer removal

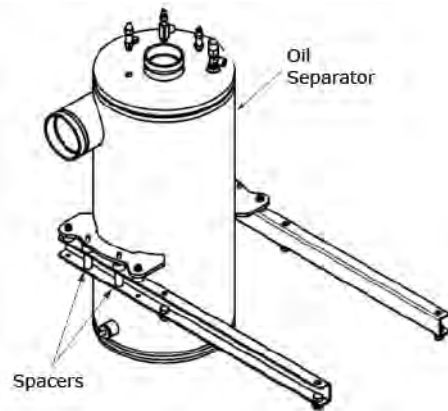
Size	Hz	Efficiency
80, 90, 100, 110, 120, 130, 140	60	STD
80, 90, 100, 110, 120, 130	60	HIGH
70, 80, 90, 100, 110, 120, 130, 140, 150	50	STD
60, 70, 80, 90, 100, 110, 120	50	HIGH

Figure 37. Oil separator spacer removal - RTWD and RTUD 80-130T



For RTUD 150-250 ton units, remove and discard the four sets of shipping spacers (each including two spacers and one bolt), located within the oil separator mounting brackets, as shown in Figure , p. 70 before starting unit. Failure to remove the spacers could result in excessive noise and vibration transmission into the building

Figure 38. Oil sep spacer removal - RTUD 150-250T





# 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 voltage utilization range, rated load amps, locked rotor amps, MCA and MOP) 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!**

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.

### **⚠ 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 electrical codes.

### **NOTICE:**

#### **Use Copper Conductors Only!**

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

**Important:** Do not allow conduit to interfere with other components, structural members or equipment. Control voltage (115V) wiring in conduit must be separate from conduit carrying low voltage (<30V) wiring. To prevent control malfunctions, do not run low voltage wiring (<30V) 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 factor correction capacitors. (See RLC-PRB023-EN)

## Power Supply Wiring

### **⚠ 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.

### **⚠ 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 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.

Knock-outs for wiring are located on the upper left side of the control panel. The wiring is passed through these conduits and connected to the terminal blocks, optional unit-mounted disconnects, or HACR type breakers. Refer to [Figure 38, p. 72](#).

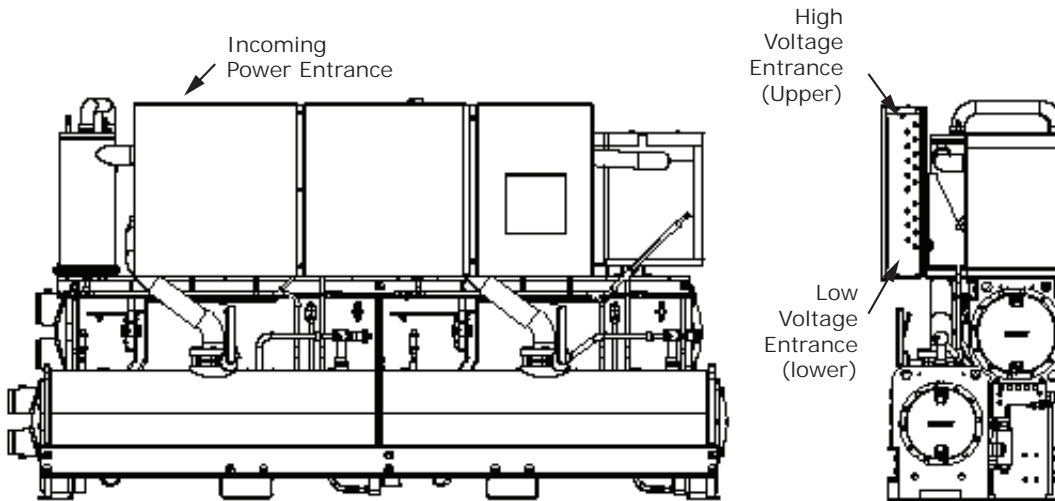
To provide proper phasing of 3-phase input, make connections as shown in field wiring diagrams and as

## Installation - Electrical

stated on the WARNING label in the starter panel. For additional information on proper phasing, refer to "Unit Voltage Phasing." Proper equipment ground must be provided to each ground connection in the panel (one for each customer-supplied conductor per phase).

115 volt field-provided connections (either control or power) are made through knockouts on the right side of the panel (**Figure 38**). Additional grounds may be required for each 115 volt power supply to the unit. Green lugs are provided for 115V customer wiring.

**Figure 38. Power entrance**



### Control Power Supply

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

All units are factory-connected for appropriate labeled voltages.

### Interconnecting Wiring

#### Chilled Water Flow (Pump) Interlock

If paddle option is selected, RTWD/RTUD Series R® chillers **require** a field-supplied control voltage contact input through a flow proving switch 5S5 and an auxiliary contact 5K9 AUX. Connect the proving switch and auxiliary contact to 1A15 J3-1 and 1X4-1. Refer to the field wiring for details. The auxiliary contact can be BAS signal, starter contactor auxiliary, or any signal which indicates the pump is running. A flow switch is still required and cannot be omitted.

#### Condenser Water Flow Interlock

If paddle option is selected, RTWD Series R® chillers **require** a field-supplied control voltage contact input through a flow proving switch 5S6 and an auxiliary contact 5K10 AUX. Connect the proving switch and auxiliary contact to 1A15 J2-1 and 1X4-1. Refer to the field wiring for details. The auxiliary contact can be BAS signal, starter contactor auxiliary, or any signal which indicates the pump is running. A flow switch is still required and cannot be omitted.

### Chilled Water Pump Control

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

#### **NOTICE:**

#### **Evaporator Damage!**

**All RTUD units (systems with a remote condenser) REQUIRE chilled water pumps be controlled by the Trane CH530 to avoid catastrophic damage to the evaporator due to freezing. It is strongly recommended that chilled water pump control also be used on RTWD to provide proper unit operation.**

The relay output from board 1A14 is required to operate the Evaporator Water Pump (EWP) contactor. Contacts should be compatible with 115/240 VAC control circuit. The EWP relay operates in different modes depending on CH530 or Tracer commands, if available, or service pumpdown (See maintenance section). Normally, the EWP relay follows the AUTO mode of the chiller. Whenever the chiller has no diagnostics and is in the AUTO mode, regardless of where the auto command is coming from, the normally open relay is energized. When the chiller exits the AUTO mode, the relay is timed open for an adjustable (using TechView™) 0 to 30 minutes. The non-AUTO modes in which the pump is stopped, include Reset (88), Stop (00), External Stop (100), Remote Display Stop (600), Stopped by Tracer (300), Low Ambient Run Inhibit (200), and Ice Building complete (101).



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

**Table 60. Pump relay operation**

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

**Note:** *Exceptions are listed below.*

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

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

In general, when there is either a non-latching or latching diagnostic, the EWP relay is turned off as though there was

**Table 61. Alarm and status relay output configuration**

	Description
Alarm - Latching	This output is true whenever there is any active diagnostic that requires a manual reset to clear, that affects either the Chiller, the Circuit, or any of the Compressors on a circuit. This classification does not include informational diagnostics.
Alarm - Auto Reset	This output is true whenever there is any active diagnostic that could automatically clear, that affects either the Chiller, the Circuit, or any of the Compressors on a circuit. This classification does not include informational diagnostics.
Alarm	This output is true whenever there is any diagnostic affecting any component, whether latching or automatically clearing. This classification does not include informational diagnostics.
Alarm Ckt 1	This output is true whenever there is any diagnostic effecting Refrigerant Circuit 1, whether latching or automatically clearing, including diagnostics affecting the entire chiller. This classification does not include informational diagnostics.
Alarm Ckt 2	This output is true whenever there is any diagnostic affecting Refrigerant Circuit 2 whether latching or automatically clearing, including diagnostics effecting the entire chiller. This classification does not include informational diagnostics.
Chiller Limit Mode (with a 20 minute filter)	This output is true whenever the chiller has been running in one of the Unloading types of limit modes (Condenser, Evaporator, Current Limit or Phase Imbalance Limit) continuously for the last 20 minutes.
Circuit 1 Running	This output is true whenever any compressors are running (or commanded to be running) on Refrigerant Circuit 1, and false when no compressors are commanded to be running on that circuit.
Circuit 2 Running	This output is true whenever any compressors are running (or commanded to be running) on Refrigerant Circuit 2, and false when no compressors are commanded to be running on that circuit.
Chiller Running	This output is true whenever any compressors are running (or commanded to be running) on the chiller and false when no compressors are commanded to be running on the chiller.
Maximum Capacity (software 18.0 or later)	This output is true whenever the chiller has reached maximum capacity or had reached its maximum capacity and since that time has not fallen below 70% average current relative to the rated AHRI current for the chiller. The output is false when the chiller falls below 70% average current and, since that time, had not reestablished maximum capacity.

a zero time delay. Exceptions (see [Table 60](#)) whereby the relay continues to be energized occur with:

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

OR

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

OR

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

### Alarm and Status Relay Outputs (Programmable Relays)

A programmable relay concept provides for enunciation of certain events or states of the chiller, selected from a list of likely needs, while only using four physical output relays, as shown in the field wiring diagram. The four relays are provided (generally with a Quad Relay Output LLID) as part of the Alarm Relay Output Option. The relay's contacts are isolated Form C (SPDT), suitable for use with 120 VAC circuits drawing up to 2.8 amps inductive, 7.2 amps resistive, or 1/3 HP and for 240 VAC circuits drawing up to 0.5 amp resistive.

The list of events/states that can be assigned to the programmable relays can be found in [Table 61](#). The relay will be energized when the event/state occurs.



## Installation - Electrical

### Relay Assignments Using TechView™

CH530 Service Tool (TechView™) is used to install the Alarm and Status Relay Option package and assign any of the above list of events or status to each of the four relays provided with the option. The relays to be programmed are referred to by the relay's terminal numbers on the LLID board 1A13.

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

**Table 62. Default assignments**

Relay	
Relay 1 Terminals J2 - 12,11,10:	Alarm
Relay 2 Terminals J2 - 9,8,7:	Chiller Running
Relay 3 Terminals J2-6,5,4:	Maximum Capacity (software 18.0 or later)
Relay 4 Terminals J2-3,2,1:	Chiller Limit

If any of the Alarm/Status relays are used, provide electrical power, 115 VAC with fused-disconnect to the panel and wire through the appropriate relays/terminals on 1A13. Provide wiring (switched hot, neutral, and ground connections) to the remote annunciation devices. Do not use power from the chiller's control panel transformer to power these remote devices. Refer to the field diagrams which are shipped with the unit.

### Low Voltage Wiring

#### **⚠ 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 electrical codes.**

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

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

### Emergency Stop

CH530 provides auxiliary control for a customer specified/ installed latching trip out. When this customer-furnished remote contact 5K24 is provided, the chiller will run

normally when the contact is closed. When the contact opens, the unit will trip on a manually resettable diagnostic. This condition requires manual reset at the chiller switch on the front of the control panel.

Connect low voltage leads to terminal strip locations on 1A5, J2-3 and 4. Refer to the field diagrams that are shipped with the unit.

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

### External Auto/Stop

If the unit requires the external Auto/Stop function, the installer must provide leads from the remote contacts 5K23 to the proper terminals on board 1A5 J2-1 and 2.

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

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

### External Circuit Lockout – Circuit #1 and Circuit #2

CH530 provides auxiliary control of a customer specified or installed contact closure, for individual operation of either Circuit #1 or #2. If the contact is closed, the respective refrigerant circuit will not operate. In the schematic, 5K21 is shown as controlling circuit 1 and 5K22 is controlling circuit 2.

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

Connections to board 1A6 are shown in the field diagrams that are shipped with the unit.

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

### Ice Building Option

CH530 provides auxiliary control for a customer specified/ installed contact closure for ice building if so configured and enabled. This output is known as the Ice Building Status Relay. The normally open contact will be closed when ice building is in progress and open when ice building has been normally terminated either through Ice Termination setpoint being reached or removal of the Ice Building command. This output is for use with the ice storage system equipment or controls (provided by others) to signal the system changes required as the chiller mode changes from "ice building" to "ice complete".

When contact 5K20 is provided, the chiller will run normally when the contact is open.

CH530 will accept either an isolated contact closure (External Ice Building command) or a Remote Communicated input (Tracer) to initiate and command the Ice Building mode.

CH530 also provides a "Front Panel Ice Termination Setpoint" through TechView™, adjustable from 20 to 31°F (-6.7 to -0.5°C) in at least 1°F (1°C) increments.

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:

#### Evaporator Damage!

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

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

Upon contact closure, the CH530 will initiate an ice building mode, in which the unit runs fully loaded at all times. Ice building shall be terminated either by opening the contact or based on the entering evaporator water temperature. CH530 will not permit the ice building mode to be reentered until the unit has been switched out of ice building mode (open 5K20 contacts) and then switched back into ice building mode (close 5K20 contacts.)

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

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

Connect leads from 5K20 to the proper terminals of board 1A10. 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 or Hot Water Setpoint (ECWS/EHWS) Option

The CH530 provides inputs that accept either 4-20 mA or 2-10 VDC signals to set the external water setpoint (EWS).

- When the unit is in cooling mode, the EWS will correspond to the chilled water setpoint (ECWS).
- When the unit is in heating mode, the EWS will correspond to the hot water setpoint (EHWS).

This is not a reset function. The input defines the set point. This input is primarily used with generic BAS (building automation systems). The water setpoint set via the DynaView™ or through digital communication with Tracer (Comm3). See [Figure 39, p. 76](#) for wiring diagrams.

The chilled water setpoint may be changed from a remote location by sending either a 2-10 VDC or 4-20 mA signal to the 1A7, J2-5 and 6. The widest range of temperatures available for the 2-10 VDC and 4-20 mA signals each correspond to:

- ECWS of 10 to 65°F (-12.22 to 18.4°C)
- EHWS of 68 to 140°F (20 - 60°C).

The external chilled water setpoint (ECWS) and external hot water setpoint (EHWS) minimum and maximum values are configurable. See [Table 63](#) for default values.

**Table 63. Default minimum and maximum values**

External Water Setpoint	Default Temperature	
	Minimum	Maximum
Chilled (ECWS)	34°F (1.1°C)	65°F (18.4°C)
Hot (EHWS)	86°F (30°C)	122°F (50°C)

The equations in [Table 64](#) apply if using default minimum and maximum values, as shown in above.

**Table 64. EWS equations - default minimum and maximum values<sup>(a)</sup>**

Chilled Water Setpoint	Voltage Signal	Current Signal
As generated from external source	VDC = 0.1455*(ECWS) + 0.5454	mA = 0.2909*(ECWS) + 1.0909
As processed by CH530	ECWS = 6.875*(VDC) - 3.75	ECWS = 3.4375*(mA) - 3.75

Hot Water Setpoint	Voltage Signal	Current Signal
As generated from external source	VDC = 0.2222*(EHWS) - 17.1092	mA = 0.4444*(EHWS) - 34.2184
As processed by CH530	EHWS = 4.5*(VDC) + 77	EHWS = 2.25*(mA) + 77

(a) Temperatures are in units of °F.

If minimum and maximum values have been changed from default values in [Table 63](#), use the following equations:

**Table 65. EWS equations - any minimum and maximum values<sup>(a)</sup>**

<b>For Voltage Input Signal</b>	$EWS = Min + (Max - Min) * (VDC - 2) / 8$
<b>For Current Input Signal</b>	$EWS = Min + (Max - Min) * (mA - 4) / 16$

(a) Temperatures are in units of °F.

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

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

### External Current Limit Setpoint (ECLS) Option

Similar to the above, the CH530 also provides for an optional External Current Limit Setpoint that will accept either a 2-10 VDC (default) or a 4-20 mA signal. The Current Limit Setting can also be set via the DynaView™ or through digital communication with Tracer (Comm 3). The arbitration of the various sources of current limit is described in the flow charts at the end of this section. The External Current Limit Setpoint may be changed from a remote location by hooking up the analog input signal to the board 1A7, J2-2 and 3. Refer to the following paragraph on Analog Input Signal Wiring Details. The following equations apply for ECLS:

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

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

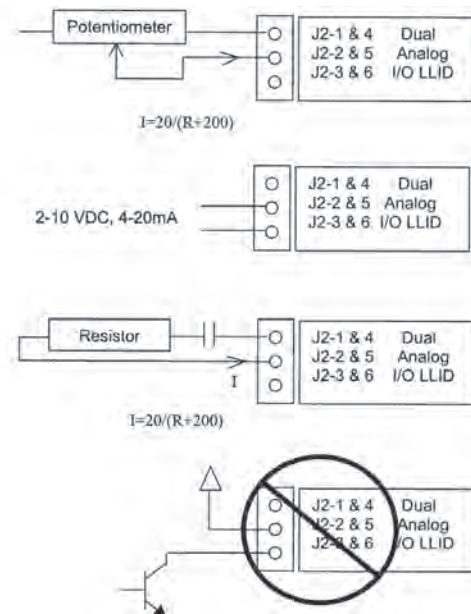
The TechView™ Service Tool must be used to set the input signal type from the factory default of 2-10 VDC to that of 4-20 mA current. TechView™ must be also be used to install or remove the External Current Limit Setpoint Option for field installation, or can be used to enable or disable the feature (if installed).

#### ECLS and ECWS Analog Input Signal Wiring Details:

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

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

**Figure 39. Wiring examples for ECLS and ECWS/EHWS**



### Chilled Water Reset (CWR)

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

The following shall be selectable:

- One of three Reset Types: None, Return Water Temperature Reset, Outdoor Air Temperature Reset, or Constant Return Water Temperature Reset.
- Reset Ratio Set Points.
- For outdoor air temperature reset there shall be both positive and negative reset ratio's.
- Start Reset Set Points.
- Maximum Reset Set Points.

The equations for each type of reset are as follows:

#### Return

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

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

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

#### Outdoor

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

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

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

#### where

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

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

RESET RATIO is a user adjustable gain

START RESET is a user adjustable reference

TOD is the outdoor temperature

TWE is entering evap. water temperature

TWL is leaving evap. water temperature

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

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

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

RATIO = 100%

START RESET = Design Delta Temp.

MAXIMUM RESET = Design Delta Temp.

The equation for Constant Return is then as follows:

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

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

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

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

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

### Outdoor Air Temperature Sensor Installation Requirements

The outdoor air temperature sensor is optional for the RTWD water cooled units, but is a **required** sensor for the RTUD compressor chiller units. The sensor is required as an important input to the condenser fan control algorithm as well as for the low outdoor air ambient lockout feature. The temperature sensor probe is shipped separately inside the control panel.

It is necessary for the chiller installer to locate and install the separate outdoor air sensor probe at the remote air cooled condenser at a location to sense the coil's entering

air temperature, while avoiding direct sunlight. It should be located at least 2" from the coil face and somewhere "in-between" the two refrigerant circuits. Where the condenser installation is such that the two refrigerant circuit's condensers are physically separate from each other, or one circuit is more likely to see re-circulated warmer air, an attempt should be made to locate the probe to see an average temperature of the two separate condensers.

**Important:** *The probe provided must not be substituted with another probe, as the probe and the electronics are "matched/calibrated" at the factory for accuracy.*

A twisted pair sheathed cable shall be run and connected between the probe at the remote condenser and its LLID module in the chiller control panel. The sensor's circuit is a class II power limited analog circuit and therefore the wire should not be run in close proximity to any power or line voltage wiring. The splices at the condenser end, should be made to be water tight. The wire run should be physically supported at equal intervals with consideration for safety and reliability/durability with wire ties or similar to meet local codes.

### Remote Air Cooled Condenser

If using a Levitor II remote air cooled condenser, refer to wiring diagram provided from Krack located in the control panel. If you have additional questions, please contact Pueblo Technical Service.

### Fan Control for the Remote Air Cooled Condenser

The CH530 Controls for the RTUD compressor chiller provide as an option, the flexible and full control of a 2-circuit remote air cooled condenser fans. In addition to the option for controlling between 2 to 8 fixed speed fans per circuit (or multiples thereof), a separate additional option includes the ability to control either two speed fans or variable speed fan/drive combinations in conjunction with other fixed speed fans, to provide low ambient outdoor air temperature capability. The controls will also provide an option for a simple per circuit interlock output (in lieu of actual fan control) to use in the scenario in which independent fan head pressure or differential pressure controls (by others) is applied. It is recommended however, that for the best overall unit performance, the integral fan control option is selected.

The controls support control of a remote, air cooled condenser fan deck, from 2 to 8 fans per circuit (1-8 fans for variable speed). It supports options to control the following types of standard ambient outdoor air temperature fan decks: 1) all fans fixed speed, and 2) all fans two speed. It will also support the following low ambient outdoor air temperature fan decks 1) one fan per circuit is Two-Speed, (remaining fans fixed speed), and 2) One fan per circuit is variable speed i.e. variable frequency drive (VFD), (remaining fans fixed speed). In the variable fan low ambient outdoor air option the VFD fan and fixed

speed fans are sequenced accordingly to provide continuous control from 0-100% air flow per circuit. Fan staging provides the correct combination of fixed speed fan relay, VFD relay (to enable operation of the VFD), and speed outputs to provide air flow control commanded by the fan algorithm running inside the CH530 Main Processor. The fan deck arrangement is independently configurable per circuit.

Since the condenser is provided separately from the RTUD compressor chiller, the RTUD electrical panel design does not provide for condensing unit's control power requirements. The chiller's control power transformer is not sized to provide the control power for the additional fan contactor loads. The CH530 controls, when properly optioned, will provide for pilot duty rated relays, low voltage binary inputs, and low voltage analog outputs to control the remote contactors and inverters provided by others. The CH530 fan control relays located in the chiller control panel, are intended to control the fan contactors that are located in the remote air cooled condenser panel. The Fan Control Relays are rated for up to 7.2 Amps resistive, 2.88 Amps pilot duty 1/3 HP, 7.2 FLA at 120 VAC, and up to 5 Amps general purpose at 240 VAC. All wiring for the field connections to the condenser, will have screw terminals for termination in the RTUD control panel with the exception of the outdoor air temperature sensor (addressed above). Refer to the wiring diagrams.

Separate fan control algorithms are used for fixed speed and variable speed systems. For the variable speed fan deck option, the fan control reverts to fixed speed control if an inverter drive fault is detected through a binary input interface with the drive. An informational diagnostic is also provided to indicate the issue.

Reference "Controls Interface" section for fan control setting information.

## Communications Interface

### Optional Tracer<sup>®</sup> Communications Interface

This option allows the Tracer<sup>®</sup> CH530 controller to exchange information (e.g. operating setpoints and Auto/Standby commands) with a higher-level control device, such as a Tracer<sup>®</sup> Summit or a multiple-machine controller. A shielded, twisted pair connection establishes the bi-directional communications link between the CH530 and the building automation system.

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

### **⚠ 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 electrical codes.**

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

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

**Table 66. Wire size**

Wire Size	Max Length — Communication Wire
14 AWG (2.5 mm <sup>2</sup> )	5,000 ft (1525 m)
16 AWG (1.5 mm <sup>2</sup> )	2,000 ft (610 m)
18 AWG (1.0 mm <sup>2</sup> )	1,000 ft (305 m)

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

### LonTalk<sup>®</sup> Communications Interface for Chillers (LCI-C)

CH530 provides an optional LonTalk<sup>®</sup> 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<sup>®</sup> Functional Chiller Profile 8040.

**Note:** For more information see ACC-SVN25\*-EN.

### BACnet<sup>®</sup> Communications Interface for Chillers (BCI-C)

The optional BACnet<sup>®</sup> Communication Interface for Chillers (BCI-C) is comprised of a Tracer<sup>®</sup> UC400 controller with interface software. It is a non-programmable communications module that allows the RTWD or RTUD unit to communicate on a BACnet communications network.

**Note:** For more information see BAS-SVP05\*-EN.



# Operating Principles

This section contains an overview of the operation of Series R<sup>®</sup> chillers equipped with microcomputer-based control systems. It describes the overall operating principles.

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

## General

### RTWD

The Model RTWD units are dual-compressor, dual circuit, water-cooled liquid chillers. These units are equipped with unit-mounted starter/control panels. The basic components of an RTWD unit are:

- Unit-mounted panel containing starter and Tracer CH530 controller and Input/Output LLIDS
- Helical-rotary compressors
- Evaporator
- Condenser
- Electronic expansion valves
- Water-cooled condenser with integral subcooler
- Oil supply system
- Oil cooler (application dependent)
- Related interconnecting piping.

### RTUD

The Model RTUD units are dual compressor, dual circuit compressor chillers. These units are equipped with unit mounted starter/control panel. The basic components of an RTUD unit are:

- Unit-mounted panel containing starter and tracer CH530 controller and Input/Output LLIDs
- Helical-rotary compressors
- Evaporator
- Electronic expansion valves
- Oil supply system
- Oil cooler
- Related interconnecting piping

Components of a typical unit are identified in [Figure 40](#) and [Figure 41, p. 80](#).

### **⚠ WARNING**

#### **Refrigerant under High Pressure! RTWD Only**

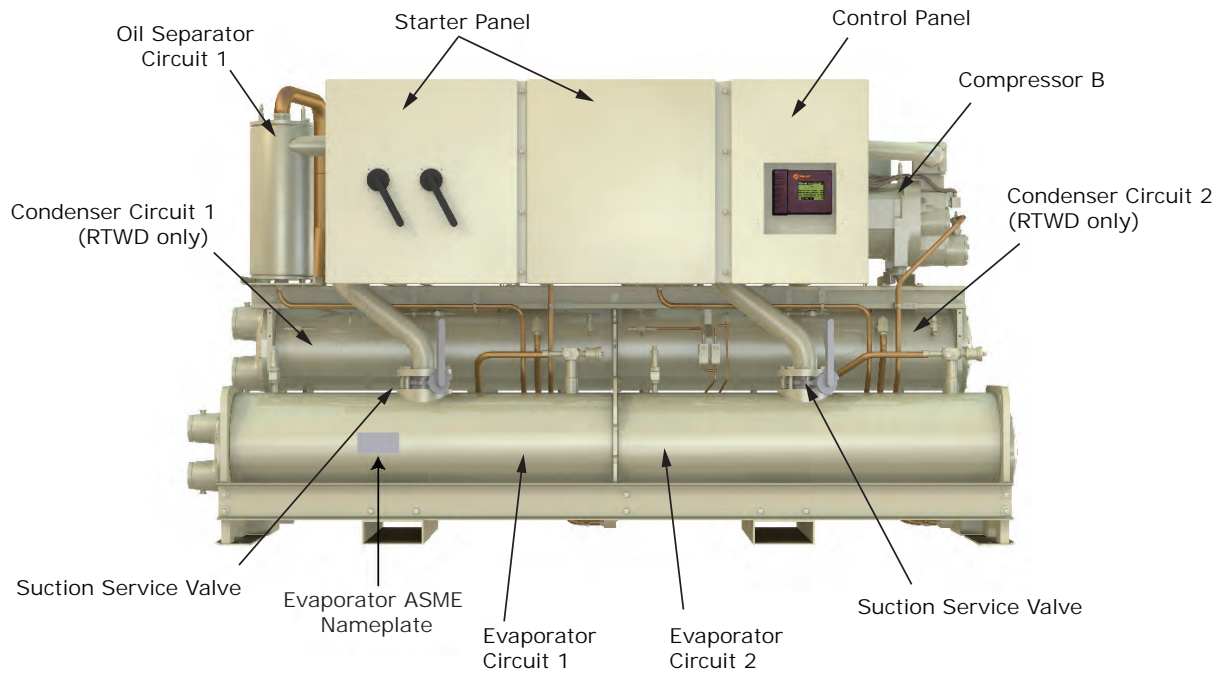
Failure to follow instructions below could result in an explosion which could result in death or serious injury or equipment damage. System contains oil and refrigerant under high pressure. Recover refrigerant to relieve pressure before opening the system. See unit nameplate for refrigerant type. Do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

### **⚠ WARNING**

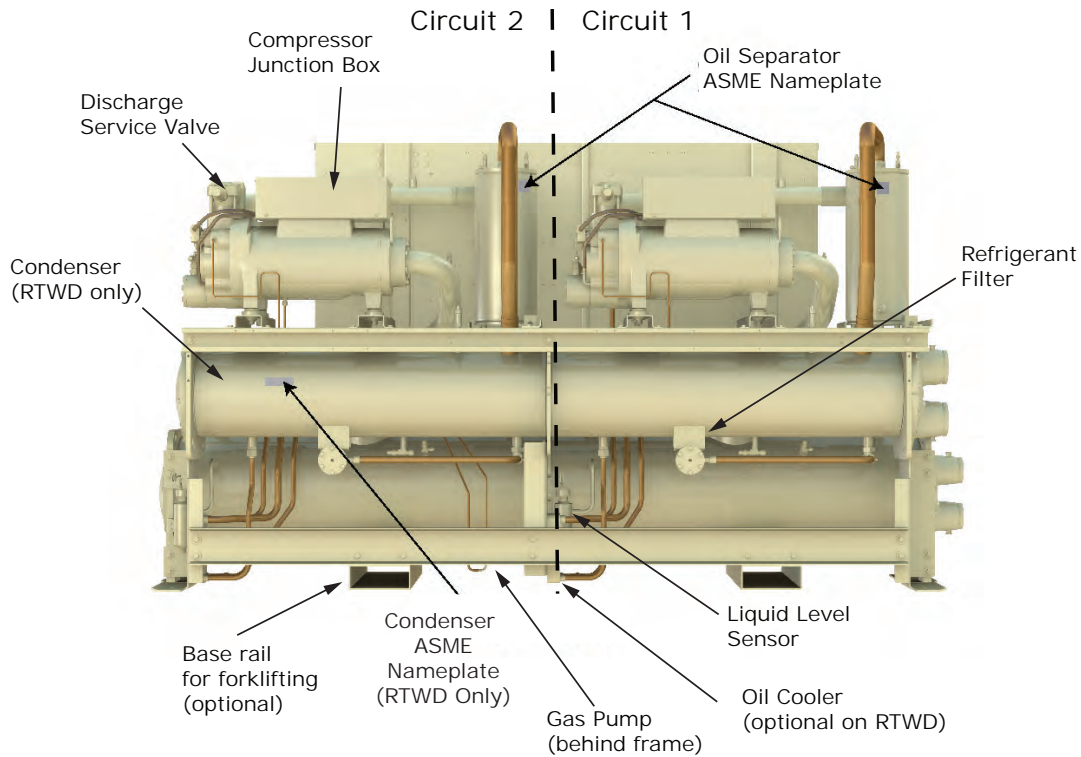
#### **Hazardous Voltage!**

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.

**Figure 40. RTWD/RTUD components (front view)**



**Figure 41. RTWD/RTUD components (back view)**





## Refrigeration (Cooling) Cycle

### Overview

The refrigeration cycle of the Series R chiller is conceptually similar to that of other Trane chiller products. It makes use of a shell-and-tube evaporator design with refrigerant evaporating on the shell side and water flowing inside tubes having enhanced surfaces.

The compressor is a twin-rotor helical rotary type. It uses a suction gas-cooled motor that operates at lower motor temperatures under continuous full and part load operating conditions. An oil management system provides an almost oil-free refrigerant to the shells to maximize heat transfer performance, while providing lubrication and rotor sealing to the compressor. The lubrication system ensures long compressor life and contributes to quiet operation.

For RTWD units, condensing is accomplished in a shell-and-tube heat exchanger where refrigerant is condensed on the shell side and water flows internally in the tubes.

For RTUD units, condensing is accomplished in a remote air-cooled condenser unit. The refrigerant flows through the tubes in the condenser. Air flows over the coils in the condenser, removing the heat and condensing the refrigerant.

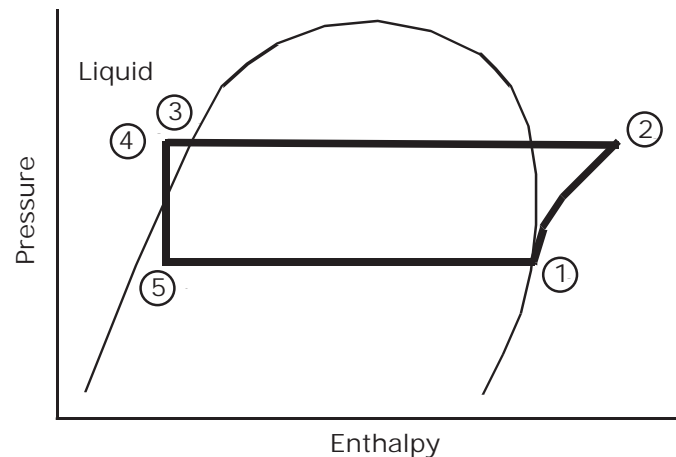
Refrigerant is metered through the flow system using an electronic expansion valve, that maximizes chiller efficiency at part load.

A unit-mounted starter and control panel is provided on every chiller. Microprocessor-based unit control modules (Tracer CH530) provide for accurate chilled water control as well as monitoring, protection and adaptive limit functions. The “adaptive” nature of the controls intelligently prevents the chiller from operating outside of its limits, or compensates for unusual operating conditions, while keeping the chiller running rather than simply tripping due to a safety concern. When problems do occur, diagnostic messages assist the operator in troubleshooting.

### Cycle Description

The refrigeration cycle for the RTWD/RTUD chiller can be described using the pressure-enthalpy diagram shown in [Figure 42, p. 81](#). Key State Points are indicated on the figure and are referenced in the discussion following.

**Figure 42. Pressure enthalpy curve**



Evaporation of refrigerant occurs in the evaporator. A metered amount of refrigerant liquid enters a distribution system in the evaporator shell and is then distributed to the tubes in the evaporator tube bundle. The refrigerant absorbs heat and vaporizes as it cools the water flowing through the evaporator tubes. Refrigerant vapor leaves the evaporator as saturated vapor (State Pt. 1).

The refrigerant vapor generated in the evaporator flows to the suction end of the compressor where it enters the motor compartment of the suction-gas-cooled motor. The refrigerant flows across the motor, providing the necessary cooling, then enters the compression chamber. Refrigerant is compressed in the compressor to discharge pressure conditions. Simultaneously, lubricant is injected into the compressor for two purposes: (1) to lubricate the rolling element bearings, and (2) to seal the very small clearances between the compressor’s twin rotors. Immediately following the compression process the lubricant and refrigerant are effectively divided using an oil separator. The oil-free refrigerant vapor enters the condenser at State Pt. 2. The lubrication and oil management issues are discussed in more detail in the compressor description and oil management sections that follow.

For RTWD units, a discharge baffle within the condenser shell distributes the compressed refrigerant vapor evenly across the condenser tube bundle. Cooling tower water, circulating through the condenser tubes, absorbs heat from this refrigerant and condenses it.

For RTUD units, air flows across the condenser coils, absorbing heat from the refrigerant and condenses it.

As the refrigerant enters the bottom of the condenser (State Pt. 3), it enters an integral subcooler where it is subcooled before traveling to the electronic expansion valve (State Pt. 4). The pressure drop created by the expansion process vaporizes a portion of the liquid refrigerant. The resulting mixture of liquid and gaseous refrigerant then enters the Evaporator Distribution system (State Pt. 5). The flash gas from the expansion process is



## Operating Principles

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internally routed to compressor suction, and while the liquid refrigerant is distributed over the tube bundle in the evaporator.

The RTWD/RTUD chiller maximizes the evaporator heat transfer performance while minimizing refrigerant charge requirements. This is accomplished by metering the liquid refrigerant flow to the evaporator's distribution system using the electronic expansion valve. A relatively low liquid level is maintained in the evaporator shell, which contains a bit of surplus refrigerant liquid and accumulated lubricant. A liquid level measurement device monitors this level and provides feedback information to the CH530 unit controller, which commands the electronic expansion valve to reposition when necessary. If the level rises, the expansion valve is closed slightly, and if the level is dropping, the valve is opened slightly such that a steady level is maintained.

## Compressor

A two-pole, hermetic, induction motor (3600 rpm at 60 hz, 3000 rpm at 50hz) directly drives the compressor rotors. The motor is cooled by suction refrigerant gas from the evaporator, entering the end of the motor housing through the suction line.

## Oil Management

The unit is configured with an oil management system that ensures proper oil circulation throughout the unit. The key components of the system include an oil separator, oil filter, oil sump and oil sump heater. An optional oil cooler is installed when the unit is used for high condensing temperature or low evaporator temperature conditions.



# Controls Interface

## CH530 Communications Overview

The Trane CH530 control system that runs the chiller consists of several elements:

- The main processor collects data, status, and diagnostic information and communicates commands to the starter module and the LLID (for Low Level Intelligent Device) bus. The main processor has an integral display (DynaView™) with a built in serial port.
- Low level intelligent device (LLID) bus. The main processor communicates to each input and output device (e.g. temperature and pressure sensors, low voltage binary inputs, analog input/output) all connected to a four-wire bus, rather than the conventional control architecture of signal wires for each device.
- The communication interface to a building automation system (BAS).
- A service tool to provide all service/maintenance capabilities.

Main processor and service tool (TechView™) software is downloadable from [www.trane.com](http://www.trane.com). The process is discussed later in this section under TechView™ Interface.

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

The CH530 uses the IPC3 protocol based on RS485 signal technology and communicating at 19.2 Kbaud to allow 3 rounds of data per second on a 64-device network. A typical RTWD/RTUD chiller will have around 40 devices, depending upon its configuration.

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

**Note:** *It is imperative that the CH530 Service Tool (TechView™) be used to facilitate the replacement of any LLID or reconfigure any chiller component. TechView™ is discussed later in this section.*

**Note:** *For definition of terms, see Service Document section of Techview™, or selection icon button next to setpoint title.*

## Controls Interface

### DynaView™

Each chiller is equipped with a DynaView™ interface. The DynaView™ has the capability to display information to the operator including the ability to adjust settings.

Multiple screens are available and text is presented in multiple languages as factory-ordered or can be easily downloaded from [www.trane.com](http://www.trane.com).

The DynaView™ enclosure design is weatherproof and made of durable plastic for use as a device on the outside of the unit.

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

### Key Functions

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

### Radio Buttons

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

### Spin Value Buttons

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

### Action Buttons

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

### Hot Links

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

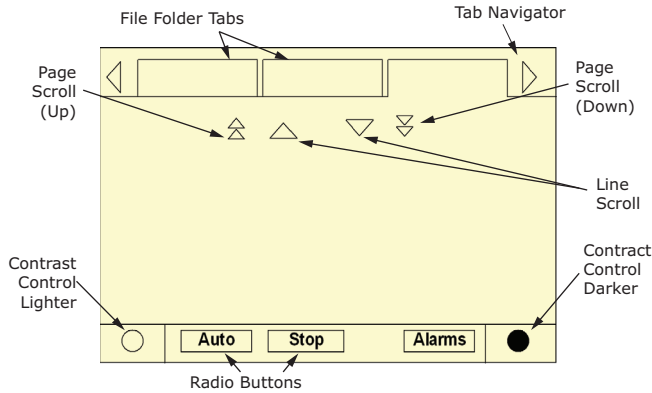
### File Folder Tabs

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

## Display Screens

### Basic Screen Format

The basic screen format appears as:



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

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

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

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

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

The bottom of the screen (Fixed Display) is present in all screens and contains the following functions. The **left circular area** is used to reduce the contrast/viewing angle of the display. **The right circular area** is used to increase the contrast/viewing angle of the display. The contrast may require re-adjustment at ambient temperatures significantly different from those present at last adjustment.

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

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

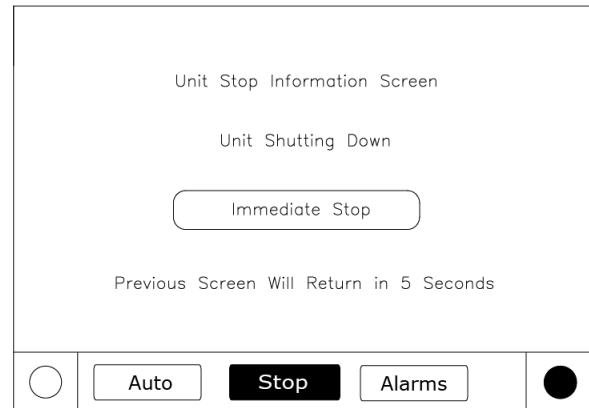
The AUTO and STOP keys, take precedence over the Enter and Cancel keys. (While a setting is being changed, AUTO and STOP keys are recognized even if Enter or Cancel has not been pressed.)

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

### Auto, Stop/Immediate Stop

The Auto and Stop keys will be presented as radio buttons within the persistent key display area. The selected key will be black.

The chiller will stop when the Stop key is touched, entering the Run Unload mode. An informational screen will be displayed for 5 seconds indicating that a second depression of an "Immediate Stop" key during this time period will result in an immediate stop. Pressing the "Immediate Stop" key while the immediate stop screen is displayed, will cause the unit to stop immediately, skipping normal shutdown.



**NOTICE:**

**Equipment Damage!**

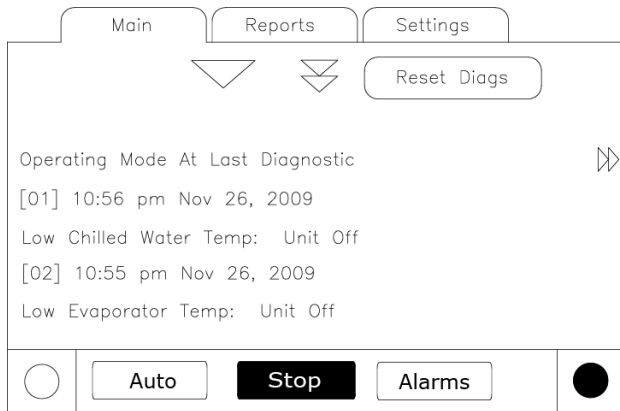
**Do NOT enable/disable the chiller by removing water flow or equipment damage can occur**

Touching the Auto key will arm the chiller for active cooling if no diagnostic is present. As in UCP2, a separate action must be taken to clear active diagnostics.

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

### Diagnostic Annunciation

When an active diagnostic is present, an Alarms key will be added to the persistent display area. This key will serve two purposes. The first purpose will be to alert the operator that a diagnostic exists. The second purpose is to provide navigation to a diagnostic display screen.

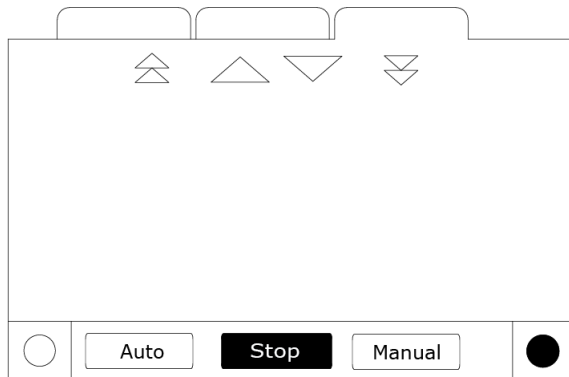
**Figure 43. Diagnostic screen**


**Note:** A complete listing of diagnostics and codes is included in the Diagnostic Section.

### Manual Override Exists

An indicator to present the presence of a manual override will share space with the Alarms enunciator key. While a manual override exists, the space used for the Alarms key will be occupied by a “Manual” icon, that will display solid inverse color similar to the appearance of the Alarms enunciator. An Alarm will take precedence of the Manual, until the reset of active alarms, at which point the Manual indicator would re-appear if such an override exists.

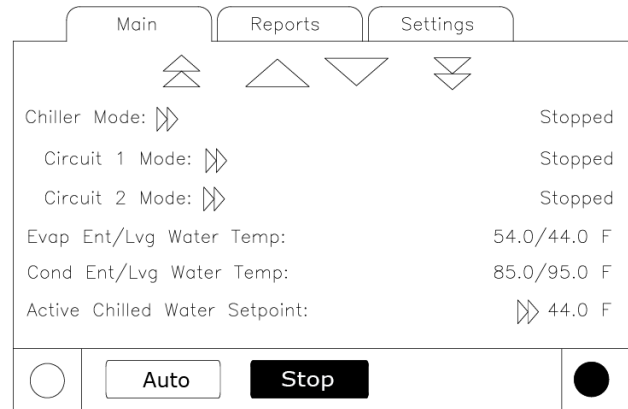
If the Manual indicator is pressed, the Manual Control Settings screen will be displayed.



### Main Screen

The Main screen is a “dashboard” of the chiller. High level status information is presented so that a user can quickly understand the mode of operation of the chiller.

The Chiller Operating Mode will present a top level indication of the chiller mode (i.e. Auto, Running, Inhibit, Run Inhibit, etc.). The “additional info” icon will present a subscreen that lists in further detail the subsystem modes.



The Main screen shall be the default screen. After an idle time of 30 minutes the CH530 shall display the Main screen with the first data fields.

The remaining items (listed in the following table) will be viewed by selecting the up/down arrow icons.

**Table 67. Main screen data fields table**

Description	Units	Resolution
Chiller Mode (>> submodes)	enumeration	
Circuit 1 Mode (>> submodes)	enumeration	
Circuit 2 Mode (>> submodes)	enumeration	
Evap Ent (Lvg Water Temp)	F/C	0.1
Cond Ent (Lvg Water Temp)	F/C	0.1
Active Chilled Water Setpoint (>>source)	F/C	0.1
Active Hot Water Setpoint (>>source)	F/C	0.1
Average Line Current	%RLA	1
Active Current Limit Setpoint (>>source)	F/C	0.1
Active Ice Termination Setpoint (>>front panel setpoint)	F/C	0.1
Outdoor Air Temperature	F/C	0.1
Software Type	enumeration	RTWD/UD
Software Version		X.XX

### Chiller Operating Mode

The machine-operating mode indicates the operational status of the chiller. A subscreen with additional mode summary information will be provided by selection of an additional information icon (>>). The operating mode line will remain stationary while the remaining status items scroll with the up/down arrow keys.



## Controls Interface

**Table 68. Chiller mode**

Chiller Modes	Description
<b>Top Level Mode</b>	<i>Further information is provided by the submode</i>
<b>Sub-modes</b>	
Stopped	The chiller is not running either circuit, and cannot run without intervention.
<b>Stopped Sub-modes</b>	
Local Stop	Chiller is stopped by DynaView™ Stop button command- cannot be remotely overridden.
Immediate Stop	Chiller is stopped by the DynaView™ Immediate Stop (by pressing Stop button then Immediate Stop buttons in succession) - previous shutdown was manually commanded to shutdown immediately without a run-unload or pumpdown cycle - cannot be remotely overridden.
No Circuits Available	The entire chiller is stopped by circuit diagnostics or lockouts that may automatically clear.
Diagnostic Shutdown - Manual Reset	The chiller is stopped by a diagnostic that requires manual intervention to reset.
Cond Pmp Strt Dly (Head Pres Ctrl) min:sec	Only possible when Condenser Head Pressure Control option is enabled and the condenser pump is being manually commanded to run. This wait may be necessary due to the Head Pressure control device's stroke time.
Run Inhibit	The chiller is currently being inhibited from starting (running), but may be allowed to start if the inhibiting or diagnostic condition is cleared.
<b>Run Inhibit Sub-modes</b>	
No Circuits Available	The entire chiller is stopped by circuit diagnostics or lockouts that may automatically clear.
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.
Ice to Normal Transition	The chiller is inhibited from running for a brief period of time if it is commanded from active ice building mode into normal cooling mode via the ice building hardwired input or Tracer. This allows time for the external system load to "switchover" from an ice bank to the chilled water loop, and provides for a controlled pull down of the loop's warmer temperature. This mode is not seen if the ice making is automatically terminated on return brine temperature per the mode below.
Start is Inhibited by BAS (Building Automation System)	Chiller is stopped by Tracer or other BAS system.
Start is Inhibited by External Source	The chiller is inhibited from starting (and running) by the "external stop" hardwired input.
Diagnostic Shutdown - Auto Reset	The entire chiller is stopped by a diagnostic that may automatically clear.
Waiting for BAS Communications (to Establish Operating Status)*	The chiller is inhibited because of lack of communication with the BAS. This is only valid 15 minutes after power up.
Start is Inhibited by Low Ambient Temp	The chiller is inhibited from starting (and running) by an outdoor air ambient temperature lower than a specified temperature - per user adjustable settings and can be disabled.
Start is Inhibited by Low Condenser Temperature	The chiller is inhibited from starting due to the Low Condenser Temperature Start Inhibit function.
Start is Inhibited by Local Schedule	The chiller is inhibited from starting based on the local time of day scheduling (option).
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.
<b>Auto Sub-modes</b>	
Waiting For Evap Water Flow	The unit will wait up to 20 minutes in this mode for water flow to be established per the flow switch hardwired input
Waiting for Need to Cool	The chiller will wait indefinitely in this mode, for a leaving water temperature higher than the Chilled Water Setpoint plus some control dead-band.
Waiting for Need to Heat	The chiller will wait indefinitely in this mode, for a 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.
Waiting to Start	The chiller is not currently running and there is a call for cooling but the lead circuit start is delayed by certain interlocks or proofs.

**Table 68. Chiller mode (continued)**

Chiller Modes	Description
<b>Top Level Mode</b>	<i>Further information is provided by the submode</i>
<b>Sub-modes</b>	
<b>Waiting to Start Sub-modes</b>	
Waiting For Condenser Water Flow	The chiller will wait up to 4 minutes in this mode for condenser water flow to be established per the flow switch hardwired input.
Cond Water Pump PreRun Time min:sec	The chiller will wait up to 30 minutes (user adjustable) in this mode for to allow the condenser water loop to equalize in temperature
Cond Pmp Strt Dly (Head Pres Ctrl) min:sec	Only possible when Condenser Head Pressure Control option is enabled, this wait may be necessary due to the Head Pressure control device's stroke time.
Cprsr Strt Delay (Head Pres Ctrl) min:sec	Only possible when Condenser Head Pressure Control option is enabled, this wait may be necessary due to the Head Pressure control device's stroke time
<b>Running</b>	At least one circuit on the chiller is currently running.
<b>Running Sub-modes</b>	
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.
Current Control Softloading	The chiller is running, and loading of individual compressors may be limited by a gradual filter of the chiller's softloading current limit setpoint. The starting current limit and the settling time of this filter is user adjustable as part of the current control softload feature. The mode will be displayed as long as the Current Control Softloading limit is ramping or "settling".
Running - Limit	At least one circuit on the chiller is currently running, but the operation of any of the circuits on the chiller are being actively limited by the controls chiller level limit. Other sub modes that apply to the Chiller Running top level modes may also be displayed here. Refer to the list of circuit limit modes for circuit limits that will cause display of this Chiller Level Running Limit mode.
Shutting Down	The chiller is still running but shutdown is imminent. The chiller is going through a compressor run-unload of the lag circuit/compressor.
<b>Shutting Down Sub-modes</b>	
Evaporator Water Pump Off Delay: min:sec	The Evaporator water pump is continuing to run past the shutdown of the compressors, executing the pump off delay timer.
Cond Water Pump Off Delay: min:sec	The Condenser water pump is continuing to run past the shutdown of the compressors, executing the pump off delay timer.
Misc.	These sub modes may be displayed in most of the top level chiller modes
<b>Misc. Sub-modes</b>	
Manual Evap Water Pump Override	The Evaporator water pump relay is on due to a manual command.
Diagnostic Evap Water Pump Override	The Evaporator water pump relay is on due to a diagnostic.
Diagnostic Cond Water Pump Override	The Condenser water pump relay is on due to a diagnostic.
Local Schedule Active	The local time of day scheduler (option) is operational and could automatically change modes or setpoints as scheduled. Must be enabled in Configuration menu to be functional.
Manual Condenser Water Pump Override	The condenser water pump relay is on due to a manual command.
Manual Compressor Control Signal	Chiller capacity control is being controlled by DynaView™ or TechView™.
Hot Water Control	These modes are mutually exclusive and they indicate that the chiller is controlling to the active hot water setpoint, the active chilled water setpoint, or the active ice termination setpoint respectively.
Chilled Water Control	
Ice Building	

**Table 69. Circuit modes**

Circuit Modes	Description
<b>Top Level Mode</b>	<i>Further information is provided by the submode</i>
<b>Sub-modes</b>	
Stopped	The given circuit is not running and cannot run without intervention.
<b>Stopped Sub-modes</b>	



## Controls Interface

**Table 69. Circuit modes (continued)**

Circuit Modes	Description
<b>Top Level Mode</b>	<i>Further information is provided by the submode</i>
<b>Sub-modes</b>	
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 either the DynaView™ or TechView™.
External Circuit Lockout	The respective circuit is locked out by the external circuit lockout binary input.
<b>Run Inhibit</b>	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.
<b>Run Inhibit Sub-modes</b>	
Diagnostic Shutdown - Auto Reset	The circuit has been shutdown on a diagnostic that may clear automatically.
Low Oil Flow Cool Down Time min:sec	See oil flow protection spec
Restart Inhibit min:sec	The compressor (and therefore, its circuit) is currently unable to start due to its restart inhibit timer. A given compressor is not allowed to start until 5 minutes (adj) has expired since its last start, once a number of "free starts" have been used up.
<b>Auto</b>	The given circuit is not currently running but can be expected to start at any moment given that the proper conditions and interlocks are satisfied.
<b>Auto Sub-mode</b>	
Calibrating EXV	This submode is displayed when the 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
<b>Waiting to Start</b>	The chiller is going through the necessary steps to allow the lead circuit to start.
<b>Waiting to Start Sub-modes</b>	
Start Inhibited Waiting For Oil	The compressor (and thus its circuit) will wait up to 2 minutes in this mode for oil level to appear in the oil tank.
Waiting For EXV Preposition	The Chiller will wait for the time it takes the EXV to get to its commanded preposition prior to starting the compressor. This is typically a relatively short delay and no countdown timer is necessary (less than 15 seconds)
<b>Running</b>	The compressor on the given circuit is currently running.
<b>Running Sub-modes</b>	
Establishing Min Cap - Low Diff Pressure	The circuit is experiencing low system differential pressure and its compressor is being force loaded, regardless of Chilled Water Temperature Control, to develop pressure sooner.
Establishing Min Cap - High Disch Temp	The circuit is running with high discharge temperatures and its compressor is being force loaded to its step load point, without regard to the leaving water temperature control, to prevent tripping on high compressor discharge temperature.
EXV Controlling Differential Pressure	Liquid level control of the Electronic Expansion Valve has temporarily been suspended. The EXV is being modulated to control for a minimum differential pressure. This control implies low liquid levels and higher approach temperatures, but only as is necessary to provide minimum oil flow for the compressor until the condenser water loop can warm up to approximately 50F. (Future mode display - display of mode not implemented in Phase 1 or 2 although present in algorithms.)
EXV Controlling for Low Evaporator Pressure	Liquid level control of the Electronic Expansion Valve has temporarily been suspended. The EXV is being modulated to control for a minimum evaporator pressure that is based on the pressure of the Low Refrigerant Temperature Cutout. This control will tend to increase the liquid level above the setpoint or to open the valve more quickly than liquid level control can, in order to avoid an LRTC trip. It is most often invoked transiently to help open the EXV in the event of rapidly falling liquid level and rapidly declining evaporator pressures. (Future Mode display - display of mode not implemented in Phase 1 or 2 although present in algorithms.)
<b>Running - Limited</b>	The circuit, and compressor are currently running, but the operation of the chiller/compressor is being actively limited by the controls. * See the section below regarding criteria for annunciation of limit modes
<b>Running-Limited Sub-modes</b>	
Current Limit	The compressor is running and its capacity is being limited by high currents. The current limit setting is 120% RLA (to avoid overcurrent trips) or lower as set by the compressor's "share" of the active current limit (demand limit) setting for the entire chiller.*



**Table 69. Circuit modes (continued)**

Circuit Modes	Description
<b>Top Level Mode</b>	<b>Further information is provided by the submode</b>
<b>Sub-modes</b>	
High Condenser Pressure Limit	The circuit is experiencing condenser pressures at or near the condenser limit setting. Compressors on the circuit will be unloaded to prevent exceeding the limits.*
Low Evaporator Rfgt Temperature Limit	The circuit is experiencing saturated evaporator temperatures at or near the Low Refrigerant Temperature Cutout setting. Compressors on the circuit will be unloaded to prevent tripping. *
Hot Start Limit	This mode will occur if the leaving evaporator water temperature exceeds 75°F (for SW version 6.30 and earlier) or 90°F (for software 7.01 and later) at the point at which the step load for the respective circuit would be desired. This is often the case in a high water temperature pull-down. While in this mode, no compressor on the circuit will be allowed to load past its minimum load capacity step, but it will not inhibit other compressors from staging on. This mode is necessary to prevent nuisance trips due to Compressor Overcurrent or High Pressure Cutout. Reasonable pull-down rates can still be expected despite this limit, since the compressor's capacity even at partial load is much greater at high suction temperatures.
Shutting Down	The circuit is preparing to de-energize the compressor.
<b>Preparing Shutdown Sub-mode</b>	
Operational Pumpdown	The circuit is in the process of shutting down by performing an operational pumpdown just prior to stopping the last running compressor. The EXV is commanded closed. Pumpdown will terminate when both the liquid level and the evap pressure are low (below specific criteria) or after a specific time has expired.
Compressor Unloading: min:sec	The compressor is in its run unload time. The number of seconds remaining in run unload is shown in the submode. The run unload time must expire before the compressor will shut down.
Misc	These sub modes may be displayed in most of the top level circuit modes
<b>Misc. Sub-modes</b>	
Service Pumpdown	The circuit is currently performing a service pumpdown.
Restart Time Inhibit: min:sec	If there is accumulated Restart Inhibit Time, it must expire before a compressor is allowed to start.

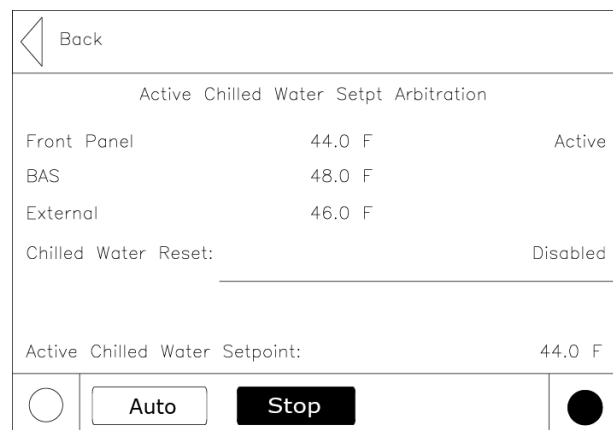
### Active Chilled Water Setpoint

The active chilled water setpoint is the setpoint that is currently in use. It results from the logical hierarchy of setpoint arbitration by the main processor. It will be displayed to 0.1 degrees Fahrenheit or Celsius.

Touching the double arrow to the left of the Active Chilled Water Setpoint will take the user to the active chilled water setpoint arbitration sub-screen.

### Active Chilled Water Subscreen

The active chilled water setpoint is that setpoint to which the unit is currently controlling. It is the result of arbitration between the front panel, BAS, schedule, external, and auxiliary setpoints (schedule and auxiliary not shown in the following diagram), which in turn may be subjected to a form of chilled water reset.



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

- Return
- Constant Return
- Outdoor
- Disabled

The left column text "Front Panel"; "BAS" or "Schedule"; "External"; "Auxiliary"; "Chilled Water Reset"; and "Active

Chilled Water Setpoint” will always be present regardless of installation or enabling those optional items. In the second column “-----” will be shown if that option is Not Installed, otherwise the current setpoint from that source will be shown.

Setpoints that are adjustable from the DynaView™ (Front Panel Chilled Water Setpoint, Auxiliary Chilled Water Setpoint) will provide navigation to their respective setpoint change screen via a double-arrow to the right of the setpoint source text. The setpoint change screen will look identical to the one provided in the Chiller Setpoints screen. The “Back” button on the setpoint change screen provides navigation back to the setpoint arbitration screen.

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

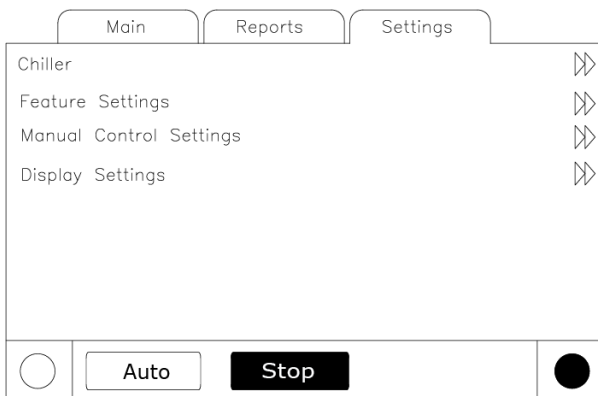
### Other Active Setpoints

The Active Current Limit Setpoint will behave the same was as the Active Chilled Water Setpoint, except that its units are in percent and there is an Ice Building source in place of the Auxiliary source. Front Panel Current Limit Setpoint will provide navigation to its setpoint change screen.

### Settings Screen

The Settings screen provides a user the ability to adjust settings necessary to support daily tasks. The layout provides a list of sub-menus, organized by typical subsystem. This organization allows each subscreen to be shorter in length which should improve the user's navigation.

A sample Settings screen is a list of the subsystems as shown below.



### Settings Sub-Screens - Table of Text, Data, Ranges, etc.

Below is the table of text, resolution, field size, enumerated selections, and data for Settings subscreens.

**Table 70. Chiller**

Description	Resolution or (Enumerations), Default	Units
Front Panel Cool/Heat Command	(Cool, Heat), Cool	Enum
Front Panel Chilled Water Setpt:	+ or - XXX.X	Temperature
Front Panel Hot Water Setpt	+ or - XXX.X	Temperature
Front Panel Current Limit Setpt:	XXX	%RLA
Front Panel Ice Build Cmd	On/Auto	Enum
Front Panel Ice Termination Setpoint	XXX.X	Temperature
Setpoint Source:	(BAS/Ext/FP, Ext/Front Panel, Front Panel), BAS/Ext/FP	Enum
Differential to Start	XX.X	Delta Temperature
Differential to Stop	XX.X	Delta Temperature
Leaving Water Temp Cutout	XX.X	Temperature
Low Refrigerant Temp Cutout	XX.X	Temperature
Staging Sequence	(Bal Starts/Hrs, Fixed), Bal Starts/Hrs	Enum
Condenser Pump Prestart Time	XX, 0	Minutes

**Table 71. Feature settings**

Description	Resolution or (Enumerations), Default	Units
Cooling Low Ambient Lockout	(Enable, Disable), Enable	Enum
<i>Cooling Low Ambient Lockout Subscreen (see below)</i>		
Cooling Low Ambient Lockout	(Enable, Disable), Enable	Enum
Cooling Low Amb Lockout Setpt	XXX.X	Temp
Ice Building:	(Enable, Disable), Disable	Enum
Ext Chilled/Hot Water Setpt	(Enable, Disable), Disable	Enum
Ext Current Limit Setpoint	(Enable, Disable), Disable	Enum
Chilled Water Reset	(Const Return, Outdoor, Return, Disable), Disable	Enum
<i>Chilled Water Reset Subscreens (see below)</i>		

**Table 71. Feature settings (continued)**

Description	Resolution or (Enumerations), Default	Units
Chilled Water Reset	(Const Return, Outdoor, Return, Disable), Disable	Enum
Return Reset Ratio	XXX	%
Return Start Ratio	XXX.X	Temp
Return Maximum Reset	XXX.X	Temp
Outdoor Reset Ratio	XXX	%
Outdoor Start Reset	XXX.X	Temp
Outdoor Maximum Reset	XXX.X	Temp
LCI-C Diag Language	(English, Selection 2, Selection 3) English (0)	Enum
LCI-C Diag Encoding	(Text, Code) Text	Enum

**Table 72. System manual control settings**

Description	Resolution or (Enumerations), Default	Units	Monitor Value
Evap Water Pump	(Auto, On), Auto	Enum	1) Water Flow status 2) Override Time Remaining
Cond Water Pump	(Auto, On), Auto	Enum	1) Water Flow status 2) Override Time Remaining
Head Pressure Control	(Auto, On), Auto	Enum	1) Override status - Auto/Manual
Staging (Stepping Control)	(Auto, Manual) Auto	Enum	1) Override status - Auto/Manual
Capacity Modulation Control	(Auto, Manual) Auto	Enum	1) Override status - Auto/Manual
Clear Energy Consumption	1) Resettable Energy consumption totalization (kWh)	Enum	1) Resettable Energy consumption totalization (kWh)

**Table 73. Circuit manual control settings**

Description	Resolution or (Enumerations), Default	Units	Monitor Value
Compressor Pumpdown	(Continue, Not Available)	Enum	1) Override status: Not Available/Continue/Starting/Pumpdown 2) Suction Pressure
Front Panel Ckt Lockout	(Not Locked Out, Locked Out), Not Locked Out	Enum	
Expansion Valve Control	(Auto, Manual)	Enum	

### Local Time of Day Schedule Screen

To access the optional Local Time of Day Schedule Screen it must be configured in TechView™. This option will then be shown under the Feature Settings screen.

This screen shows the overall feature enable/disable setting, plus a listing of all 10 events, including their event time and active days of the week.

### Local Settings Event Screen

This screen displays the details for a particular event, including the active days, event time, and the Local Schedule arbitrated setpoints. Selecting a given item will allow the user to modify it.

◀ Back		Event X	
Event:		Enable	
		<input type="button" value="Disable"/>	
		<input checked="" type="button" value="Enable"/>	
Press Button to Select			
<input type="radio"/>	<input checked="" type="button" value="Auto"/>	<input type="button" value="Stop"/>	<input type="button" value="Alarms"/>

◀ Back		Event X	
Active Days:			
<input checked="" type="button" value="Monday"/>	<input checked="" type="button" value="Tuesday"/>	<input checked="" type="button" value="Wednesday"/>	
<input type="button" value="Thursday"/>	<input checked="" type="button" value="Friday"/>	<input type="button" value="Saturday"/>	
<input type="button" value="Sunday"/>			
<input type="radio"/>	<input checked="" type="button" value="Auto"/>	<input type="button" value="Stop"/>	<input type="button" value="Alarms"/>

**Event Time Screen**

◀ Back			
Local Time of Day Schedule:		Enable	
		<input type="button" value="v"/> <input type="button" value="v"/>	
Event 1:		10:47 AM	
MON TUE WED THU FRI SAT SUN			
Event 2:		11:50 PM	
----- SAT SUN			
<input type="radio"/>	<input checked="" type="button" value="Auto"/>	<input type="button" value="Stop"/>	<input type="button" value="Alarms"/>

◀ Back		Event X	
Event Time:		10:47 AM	
<input type="button" value="Hours"/>	<input type="button" value="Minutes"/>		
<input type="button" value="Enter"/>	<input type="button" value="Cancel"/>	<input type="button" value="v"/> <input type="button" value="v"/>	
Press Arrows to Change			
Press Enter to Save Change			
Press Cancel to Ignore Change			
<input type="radio"/>	<input checked="" type="button" value="Auto"/>	<input type="button" value="Stop"/>	<input type="button" value="Alarms"/>

**Event Enable/Disable Screen**

◀ Back		Event X	
Event:		Enable	
		<input type="button" value="Disable"/>	
		<input checked="" type="button" value="Enable"/>	
Press Button to Select			
<input type="radio"/>	<input checked="" type="button" value="Auto"/>	<input type="button" value="Stop"/>	<input type="button" value="Alarms"/>

**Event Arbitrated Settings Screens**

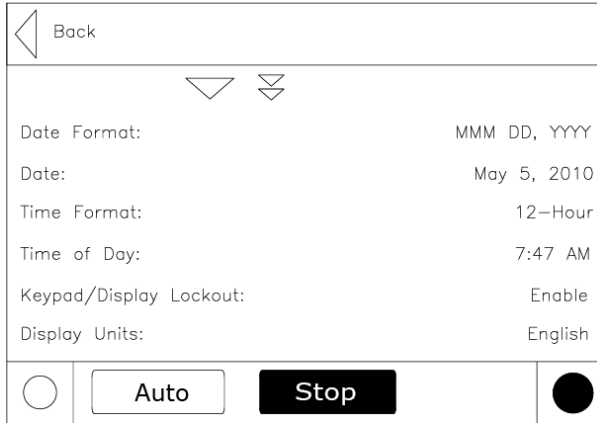
For analog setpoints, the screen is slightly different than the standard screen, because there are two additional buttons - "Enable" and "Disable". Selecting "Used" will make the setting valid and allow the user to change the value. Selecting "Not Used" will make the setting invalid, and will not allow the user to change the value.

**Event Active Days Screen**

This screen is unusual because it does not use radio buttons, which only allow one active selection at a time. These buttons are more like "selection buttons" or check boxes. The user can select any combination of days, or none at all.

◀ Back		Event X	
Chilled Water Setpt:		7 C	
<input checked="" type="button" value="Enable"/>	<input type="button" value="Disable"/>		
<input type="button" value="Enter"/>	<input type="button" value="Cancel"/>	<input type="button" value="v"/> <input type="button" value="v"/>	
Press Arrows to Change			
Press Enter to Save Change			
Press Cancel to Ignore Change			
<input type="radio"/>	<input type="button" value="Auto"/>	<input checked="" type="button" value="Stop"/>	<input type="radio"/>

## Display Settings Screen



**Table 74. Display settings**

Description	Resolution or (Enumerations), Default	Units
Date Format	("mmm dd, yyyy", "dd-mmm-yyyy"), "mmm dd, yyyy"	Enum
Date <sup>3</sup>		
Time Format	(12-hour, 24-hour), 12-hour	Enum
Time of Day <sup>3</sup>		
Keypad (Display Lockout) <sup>2</sup>	(Enable, Disable), Disable	Enum
Display Units	(SI, English), SI	Enum
Pressure Units	(Absolute, Gauge), Gauge	Enum
Language <sup>4</sup>	(English, Selection 2, Selection 3), English <sup>1</sup>	Enum

**Notes:**

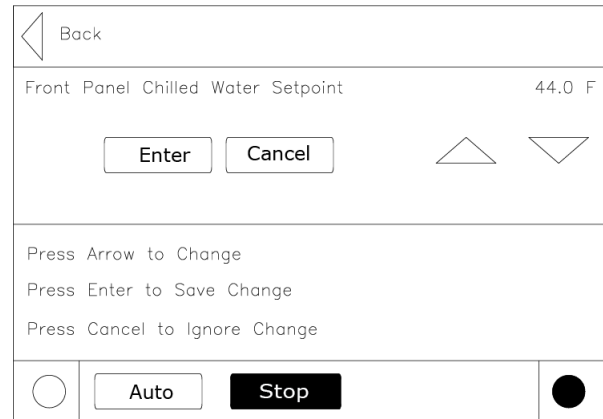
1. Language choices are dependent on what the Service Tool has setup in the Main Processor. Get Radio Button names from Main Processor setups. Language selections will include English and qty 2 alternate as loaded by TechView™.
2. Enables a DynaView™ Lockout screen. All other screens timeout in 30 minutes to this screen. The Lockout Screen will have 0-9 keypad to permit the user to re-enter the other screens with a fixed password (159).
3. The Date and Time setup screen formats deviate slightly from the standard screens defined above. See the alternate screen layouts below.
4. Language shall always be the last setting listed on the Control Settings menu (which will also always be the last item listed on the Settings menu list). This will allow a user to easily find language selection if looking at an unrecognizable language.

Upon selecting a Settings list all setpoints available to change along with their current value will appear. The operator selects a setpoint to change by touching either the verbal description or setpoint value. Doing this causes the screen to switch to either the Analog Settings Subscreen or the Enumerated Settings Subscreen.

### Analog Setting Subscreens

Analog Settings Subscreen displays the current value of the chosen setpoint in the upper ½ of the display. It is displayed in a changeable format consistent with its type.

Binary setpoints are considered to be simple two state enumerations and will use radio buttons. Analog setpoints are displayed as spin buttons. The lower half of the screen is reserved for help screens.

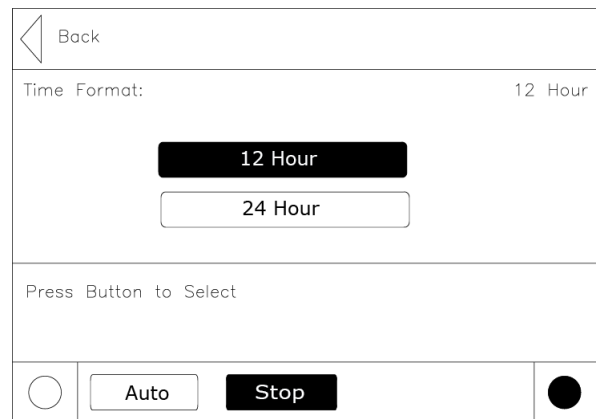


All setpoint subscreens will execute the equivalent of a Cancel key if any display activities cause the subscreen to be left before a new setpoint is entered. E.g. if the Alarms key is pressed before a new setpoint is entered, the new setpoint will be cancelled. The same applies to any time-outs.

Pressing the Auto or Stop keys will not cause a cancel since the setpoint subscreen is not left on this action.

### Enumerated Settings Subscreen

The enumerated setpoint subscreen has no cancel or enter key. Once a radio key is depressed the item is immediately set to the new enumeration value.



### Mode Override Subscreens

The Mode Override subscreen has no cancel or enter key. Once a radio key is depressed that new value is immediately assumed.

## Controls Interface

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Mode Override for Enumerated Settings is shown below:

◀ Back	
Evap Water Pump:	Auto
<input checked="" type="radio"/> Auto	<input type="radio"/> On
Manual Override Time Remaining:	60:00
Evap Water Flow Switch Status:	No Flow
Press Button to Select	
<input type="radio"/>	<input type="radio"/> Auto <input checked="" type="radio"/> Stop <input type="radio"/>

### Date/Time Subscreen

The setpoint screen for setting up the CH530 date is shown below: The user must select Day, Month, or Year and then use the up/down arrows to adjust.

◀ Back	
Date:	Sep 28, 2001
<input checked="" type="radio"/> Day	<input type="radio"/> Month <input type="radio"/> Year
<input type="radio"/> Enter	<input type="radio"/> Cancel
▲ ▼	
Press Arrow to Change	
Press Enter to Save Change	
Press Cancel to Ignore Change	
<input type="radio"/>	<input type="radio"/> Auto <input checked="" type="radio"/> Stop <input type="radio"/>

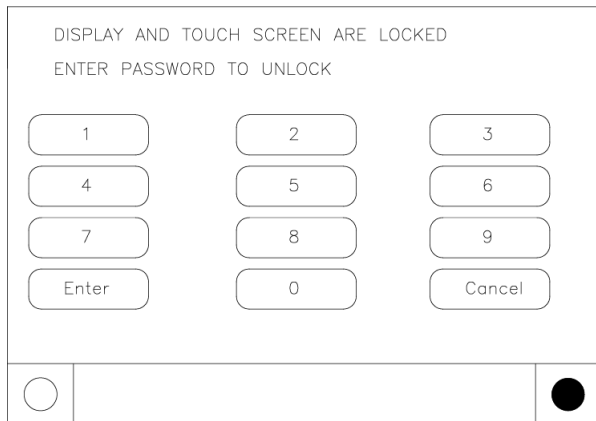
The setpoint screen for setting up the CH530 time with a 12 hour format is shown below: The user must select Hour or Minute and then use the up/down arrows to adjust. Adjusting hours will also adjust am/pm.

◀ Back	
Time of Day:	11:33 AM
<input checked="" type="radio"/> Hour	<input type="radio"/> Minute
<input type="radio"/> Enter	<input type="radio"/> Cancel
▲ ▼	
Press Arrow to Change	
Press Enter to Save Change	
Press Cancel to Ignore Change	
<input type="radio"/>	<input type="radio"/> Auto <input checked="" type="radio"/> Stop <input type="radio"/>

## Lockout Screen

The DynaView™ Display and Touch Screen Lock screen is shown. This screen is used if the Display and Touch Screen Lock feature is Enabled. Thirty minutes after the last key stroke this screen will be displayed and the Display and Touch Screen will be locked out until “159 Enter” is entered.

Until the proper password is entered there will be no access to the screens including all reports, all setpoints, and Auto/Stop/Alarms/Interlocks. The password “159” is not programmable from either DynaView™ or TechView™.



If the Display and Touch Screen Lock feature is Disabled, a similar screen including “Enter 159 to Unlock” will show if the MP temperature is approximately less than 32°F (0°C) and it has been 30 minutes after the last key stroke.

## Reports

The Reports tab will allow a user to select from a list of possible reports headings (i.e. Custom, ASHRAE Chiller Log, Refrigerant, etc.) Each report will generate a list of status items as defined in the tables that follow:



**Table 75. Report name: system evaporator**

Description	Resolution	Units
Evap Entering Water Temp:	+ or - XXX.X	Temperature
Evap Leaving Water Temp:	+ or - XXX.X	Temperature
Evap Water Flow Switch Status:	Flow, No Flow	Enumeration

**Figure 44. Report name: circuit evaporator**

Description	Resolution	Units
Evap Entering Water Temperature	+/- XXX.X	Temperature
Evap Leaving Water Temperature	+/- XXX.X	Temperature
Evap Sat Rfgt Temp	+/- XXX.X	Temperature
Suction Pressure	XXX.X	Pressure
Evap Approach Temp:	+/- XXX.X	Temperature
Evap Water Flow Switch Status	(Flow, No Flow)	Enum
Expansion Valve Position	XXX.X	%
Expansion Valve Position Steps	XXXX	Steps
Evaporator Liquid Level	XX.X	Height

**Table 76. Report name: system condenser**

Description	Resolution	Units
Cond Entering Water Temp	+/- XXX.X	Temperature
Cond Leaving Water Temp	+/- XXX.X	Temperature
Cond Water Flow Switch Status	(Flow, No Flow)	Enum
Outdoor Air Temperature	+/- XXX.X	Temperature
Cond Head Pressure Ctrl	XXX	%

**Table 77. Report name: circuit condenser**

Description	Resolution	Units
Cond Entering Water Temp	+/- XXX.X	Temperature
Cond Leaving Water Temp	+/- XXX.X	Temperature
Condenser Air Flow	XXX	%
Cond Inverter Speed	XXX	%
Outdoor Air Temperature	+/- XXX.X	Temperature
Cond Water Flow Switch Status	(Flow, No Flow)	Enum
Cond Sat Rfgt Temp	+/- XXX.X	Temperature
Cond Rfgt Pressure	XXX.X	Pressure
Differential Pressure	XXX.X	Pressure
Cond Approach Temp	+/- XXX.X	Temperature

**Table 78. Report name: system compressor**

Description	Resolution	Units
Average Line Current	XXX	%RLA
Unit Volts	XXX	Volts
Unit Running Time	XXXX:XX	hr: min
Power Demand		kW
Power Demand Time Period		min
Energy Consump - Resettable		kWh



## Controls Interface

**Table 78. Report name: system compressor (continued)**

Description	Resolution	Units
Time of Last Reset		time-date
Energy Consump - NonReset		kWh

**Table 79. Report name: circuit compressor**

Description	Resolution	Units
Oil Pressure	XXX.X	Pressure
Compressor Rfgt Dschg Temp	+/- XXX.X	Temperature
Cond Sat Rfgt Temp	+/- XXX.X	Temperature
Average Line Current	XXX	%RLA
%RLA L1 L2 L3	XXX.X	%RLA
Amps L1 L2 L3	XXX.X	Amps
Phase Voltages	XXX	Vac
Power Consumption	XXX	kW
Load Power Factor	X.XXX	
Compressor Starts	XXXX	Integer
Compressor Running Time	XXXX:XX	hr: min

**Table 80. Report name: system ASHRAE chiller log**

Description	Resolution	Units
Current Time/Date:	XX:XX mmm dd, yyyy	Date/Time
Chiller Mode:		Enum
Active Chilled Water Setpoint:	XXX.X	Temperature
Active Hot Water Setpoint:	XXX.X	Temperature
Evap Entering Water Temp:	XXX.X	Temperature
Evap Leaving Water Temp:	XXX.X	Temperature
Evap Water Flow Switch Status:		Enum
Outdoor Air Temperature:	XXX.X	Temperature

**Table 81. Report name: circuit ASHRAE chiller log**

Description	Resolution	Units
Circuit Mode:		Enum
Evap Sat Rfgt Temp	XXX.X	Temperature
Suction Pressure	XXX.X	Pressure
Evap Approach Temp	XXX.X	Temperature
Cond Sat Rfgt Temp:	XXX.X	Temperature
Cond Rfgt Pressure	XXX.X	Pressure
Cond Approach Temp	XXX.X	Temperature
Compressor Starts	XXXX	Integer
Compressor Running Time	XX:XX	Hours:Minutes

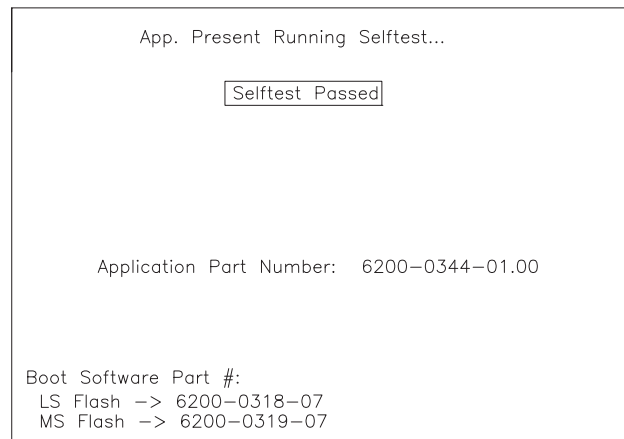
## Power Up and Self Tests

### Power-Up DynaView™

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

First Screen, Application Status, Boot Software P/N, Self Test and Application Time Stamp.

This screen will display for 3-10 seconds. This screen will give the status of the Application software, the Boot Software P/N, display Self Test results and display the Application Part Number. The contrast will also be adjustable from this screen. The message "Selftest Passed" may be replaced with "Err2: RAM Error" or "Err3: CRC Failure"



### Display Formats

Temperature settings can be expressed in F or C, depending on Display Units settings.

Pressure settings can be expressed in psia, psig, kPaa (kPa absolute), or kPag (kPa gauge) depending on Display Units settings.

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

### Languages

The languages for DynaView™ will reside in the main processor. The main processor will hold three languages, English, and two alternate languages. The service tool (TechView™) will load the main processor with user selected languages from a list of available translations.



## TechView™



TechView™ is the PC (laptop) based tool used for servicing Tracer® CH530. Technicians that make any chiller control modification or service any diagnostic with CH530 must use a laptop running the software application “TechView™.” TechView™ is a Trane application developed to minimize chiller downtime and aid the technicians understanding of chiller operation and service requirements.

**Important:** *Performing any Tracer CH530 service functions should be done only by a properly trained service technician. Please contact your local Trane service agency for assistance with any service requirements.*

TechView™ software is available via Trane.com.

<http://www.trane.com/COMMERCIAL/DesignAnalysis/TechView.aspx?i=1435>

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

### TechView™ Software Download, Installation

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

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

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

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

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

**Note:** *Deselecting components reduces the size of the installed application.*
7. Click **Install**. A progress meter dialog box appears. An information file appears when installation is complete.
 

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



## Controls Interface

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### Minimum PC requirements to install and operate TechView

- Microsoft® Windows® XP Professional or Windows Vista Business operating system
- Internet Explorer 6.0 and higher
- USB 2.0 or higher
- Pentium II, III, or higher processor
- 128MB RAM minimum
- 1024 x 768 resolution
- CD-ROM (optional for copying TechView install to CD)
- 56K modem (optional for internet connection)
- 9-pin RS-232 serial connection (optional for connection to DynaView™)

**Note:** *TechView was designed and validated for this specific laptop configuration. Any variation from this configuration may have different results. Therefore, support for TechView is limited to only those laptops configured as described above. Trane will not support TechView on laptops configured differently. There is no support for laptops running Intel Celeron, AMD, Cyrix or processors other than Pentium.*

### Optional Software

- Microsoft Office with Access

TechView™ is also used to perform any CH530 service or maintenance function. Servicing a CH530 main processor includes:

- Updating main processor software
- Monitoring chiller operation
- Viewing and resetting chiller diagnostics
- Low Level Intelligent Device (LLID) replacement and binding
- Main processor replacement and configuration modifications
- Setpoint modifications
- Service overrides

### Unit View

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

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

The Chiller Operating Mode tab displays the unit, circuit and compressor top level operating modes. Upon successful Local Connect, Tech View will display UNIT VIEW. RTWD and RTUD Unit Views are shown below.

Figure 45. Unit view (RTWD)

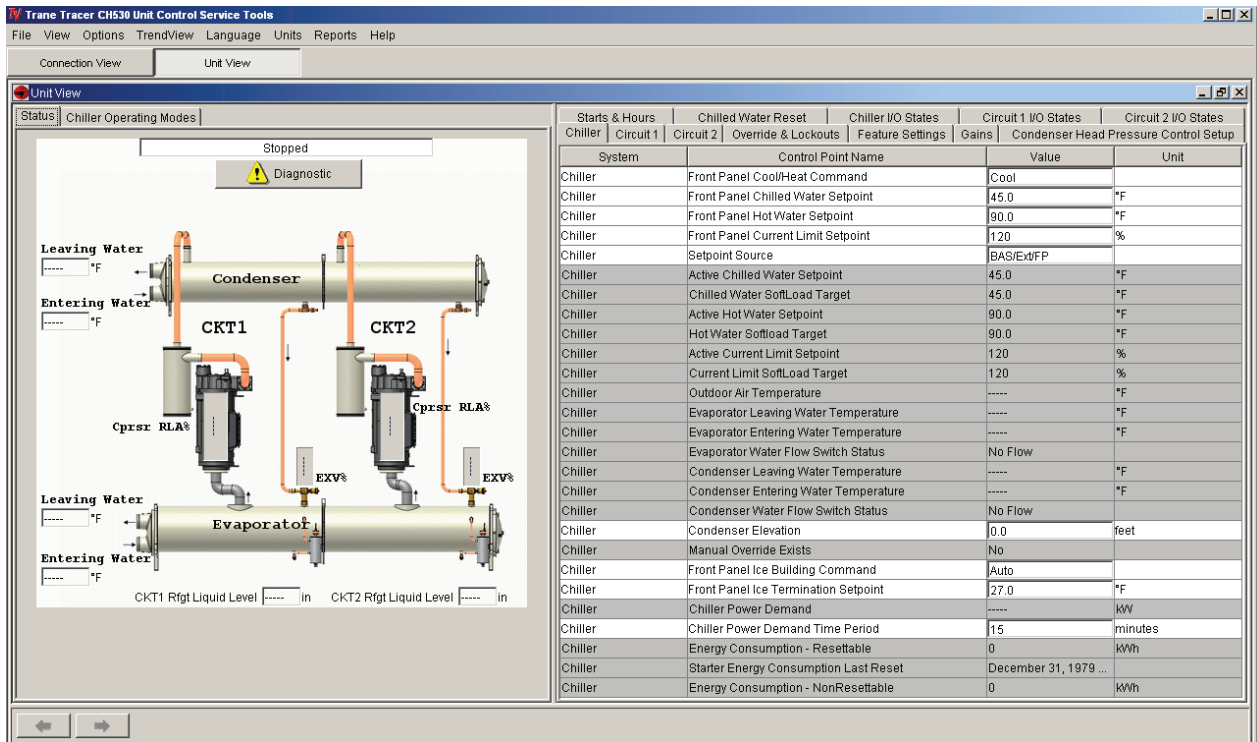
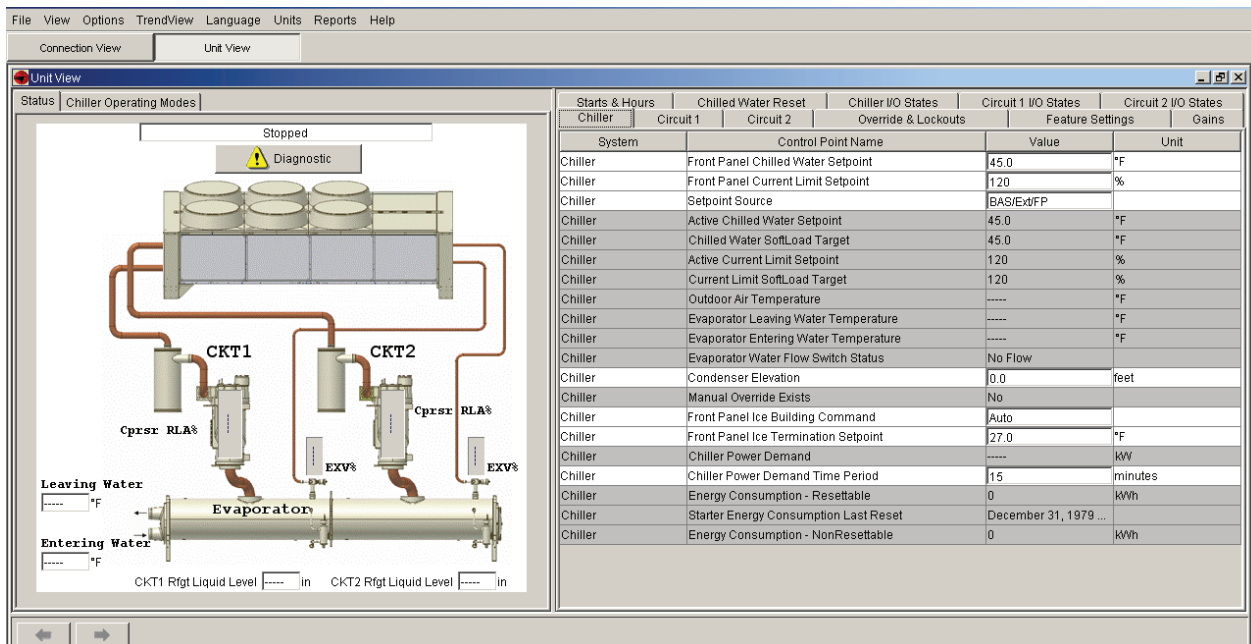


Figure 46. Unit view (RTUD)



The Unit View displays the system, control point name, value and unit of measure. It reflects active setpoints and allows you to make changes.

Unit View also displays, in real time, all non-setpoint data organized by tabs. As data changes on the chiller, it is automatically updated in the Unit View.

## Circuit/Compressor Lockout

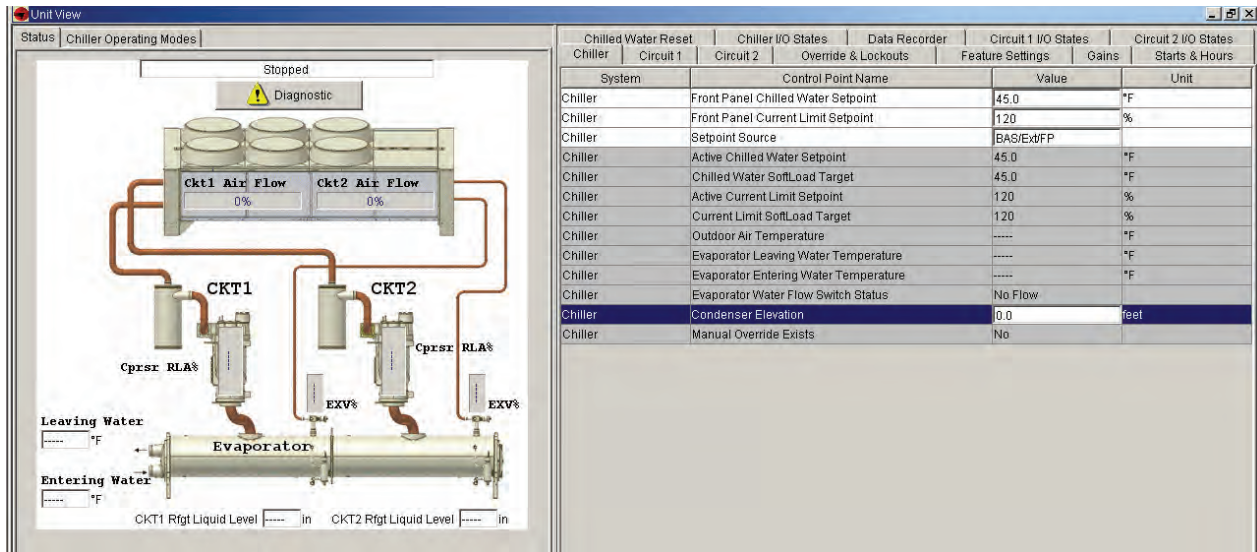
In order to lockout a circuit the user must go to the Unit View/Circuit 1 (or Circuit 2) Tab and then select the Front Panel Lockout for Circuit 1 and/or Circuit 2. The user can select Not Locked Out or Locked Out.

## Condenser Elevation Configuration - RTUD Installations

Condenser elevation setting is a required input during startup of RTUD units. Go to the Unit View/Chiller Tab,

select Condenser Elevation setting and enter condenser elevation in appropriate units. Reference [Figure , p. 100](#). The shipped default of this setting is 0 and it represents the distance of the bottom of the condenser, relative to the top of the evaporator. Use a positive value for the condenser above the evaporator and a negative value for the condenser below the evaporator. An estimate to within +/- 3 feet is required.

**Figure 47. Unit view - RTUD condenser elevation**



**Table 82. Unit view tabs - detail**

Tab	System	Control Point Name	Status	Unit	Min	Max	Default
<b>Chiller</b>							
	Chiller	Front Panel Cool/heat Command	Setting				
	Chiller	Front Panel Chilled Water Setpoint	Setpoint	deg F (°C)	10 (-12.22)	65 (18.33)	45 (7.22)
	Chiller	Front Panel Hot Water Setpoint	Setpoint	deg F (°C)	80 (26.66)	140 (60)	90 (32.22)
	Chiller	Front Panel Current Limit Setpoint	Setpoint	%RLA	60	120	120
	Chiller	Setpoint Source	Setting				
	Chiller	Active Chilled Water Setpoint	Status	°F (°C)			
	Chiller	Chilled Water Softload Target	Status	°F (°C)			
	Chiller	Active Hot Water Setpoint	Status	°F (°C)			
	Chiller	Hot Water Softload Target	Status	°F (°C)			
	Chiller	Active Current Limit Setpoint	Status	% RLA			
	Chiller	Current Limit SoftLoad Target	Status	% RLA			
	Chiller	Outdoor Air Temperature	Status	°F (°C)			
	Chiller	Evaporator Leaving Water Temperature	Status	°F (°C)			
	Chiller	Evaporator Entering Water Temperature	Status	°F (°C)			
	Chiller	Evaporator Water Flow Switch Status	Status				
	Chiller	Condenser Leaving Water Temperature	Status	°F (°C)			
	Chiller	Condenser Entering Water Temperature	Status	°F (°C)			
	Chiller	Condenser Water Flow Switch Status	Status				

**Table 82. Unit view tabs - detail (continued)**

Tab	System	Control Point Name	Status	Unit	Min	Max	Default
	Chiller	Condenser Elevation	Setting	ft	-26.25	98.43	0
	Chiller	Manual Override Exists	Status				
	Chiller	Front Panel Ice Building Command	Setting				
	Chiller	Front Panel Ice Termination Setpoint	Setting	°F (°C)	20	32	27
	Chiller	Chiller Power Demand	Status				
	Chiller	Chiller Power Demand Time Period	Setting	min	1	60	15
	Chiller	Energy Consumption - Resettable	Status				
	Chiller	Starter Energy Consumption Last Reset	Status				
	Chiller	Energy Consumption - NonResettable	Status				
<b>Circuit 1</b>							
	Circuit 1	Front Panel Circuit Lockout	Setting				Not locked out
	Circuit 1	External Circuit Lockout Status	Status				Not locked out
	Circuit 1	Evaporator Refrigerant Pressure	Status	psi gauge			
	Circuit 1	Evaporator Saturated Refrigerant Temperature	Status	°F (°C)			
	Circuit 1	Evaporator Approach Temperature	Status	°F (°C)			
	Circuit 1	Evaporator Refrigerant Liquid Level	Status	in (mm)			
	Circuit 1	Evaporator Refrigerant Liquid Level Error	Status	in (mm)			
	Circuit 1	EXV Percent Open	Status	%			
	Circuit 1	EXV Position Steps	Status	steps			
	Circuit 1	Differential Refrigerant Pressure	Status	psid			
	Circuit 1	Condenser Refrigerant Pressure	Status	psi gauge			
	Circuit 1	Condenser Saturated Refrigerant Temperature	Status	°F (°C)			
	Circuit 1	Compressor Refrigerant Discharge Temperature	Status	°F (°C)			
	Circuit 1	Condenser Approach Temperature	Status	°F (°C)			
	Circuit 1	Compressor Refrigerant Discharge Superheat	Status	°F (°C)			
	Circuit 1	Compressor 1A Oil Pressure	Status	psi gauge			
	Circuit 1	Compressor 1A Average Line Current	Status	% RLA			
	Circuit 1	Compressor 1A Line 1 Current	Status	% RLA			
	Circuit 1	Compressor 1A Line 2 Current	Status	% RLA			
	Circuit 1	Compressor 1A Line 3 Current	Status	% RLA			
	Circuit 1	Starter 1A Voltage Vab	Status	volts			
	Circuit 1	Starter 1A Voltage Vbc	Status	volts			
	Circuit 1	Starter 1A Voltage Vca	Status	volts			
	Circuit 1	Compressor 1A Power Consumption	Status	kW			
	Circuit 1	Compressor 1A Power Factor	Status				
	Circuit 1	Modulation Unload Steady Command	Status				
	Circuit 1	Condenser Air Flow	Status	% of fan deck			
	Circuit 1	Condenser Inverter Speed	Status	% of inverter full speed			
	Circuit 1	Average Condenser Approach Temperature	Status	Diff Temp °F (°C)			
	Circuit 1	Re-initialize Average Condenser Approach Temperature	Setting				
	Circuit 1	Compressor 1A Average Oil Pressure Drop	Status	% of System DP			
	Circuit 1	Re-initialize Compressor 1A Average Oil Pressure Drop	Setting				
	Circuit 1	Compressor 1A Oil Filter Life Remaining	Status	%			
	Circuit 1	Re-initialize Compressor 1A Oil Filter Life Remaining	Setting				
	Circuit 1	Time Remaining Until Oil Analysis Recommended	Status	Hrs			



## Controls Interface

**Table 82. Unit view tabs - detail (continued)**

Tab	System	Control Point Name	Status	Unit	Min	Max	Default
	Circuit 1	Re-initialize Oil Time Remaining	Setting				
<b>Circuit 2</b>							
	Circuit 2	Front Panel Circuit Lockout	Setting				
	Circuit 2	External Circuit Lockout Status	Status				
	Circuit 2	Evaporator Refrigerant Pressure	Status	psi gauge			
	Circuit 2	Evaporator Saturated Refrigerant Temperature	Status	°F (°C)			
	Circuit 2	Evaporator Approach Temperature	Status	°F (°C)			
	Circuit 2	Evaporator Refrigerant Liquid Level	Status	in (mm)			
	Circuit 2	Evaporator Refrigerant Liquid Level Error	Status	in (mm)			
	Circuit 2	EXV Percent Open	Status	%			
	Circuit 2	EXV Position Steps	Status	steps			
	Circuit 2	Differential Refrigerant Pressure	Status	psid			
	Circuit 2	Condenser Refrigerant Pressure	Status	psi gauge			
	Circuit 2	Condenser Saturated Refrigerant Temperature	Status	°F (°C)			
	Circuit 2	Compressor refrigerant Discharge Temperature	Status	°F (°C)			
	Circuit 2	Condenser Approach Temperature	Status	°F (°C)			
	Circuit 2	Compressor Refrigerant Discharge Superheat	Status	°F (°C)			
	Circuit 2	Compressor 2A Oil Pressure	Status	psi gauge			
	Circuit 2	Compressor 2A Average Line Current	Status	% RLA			
	Circuit 2	Compressor 2A Line 1 Current	Status	% RLA			
	Circuit 2	Compressor 2A Line 2 Current	Status	% RLA			
	Circuit 2	Compressor 2A Line 3 Current	Status	% RLA			
	Circuit 2	Starter 2A Voltage Vab	Status	volts			
	Circuit 2	Starter 2A Voltage Vbc	Status	volts			
	Circuit 2	Starter 2A Voltage Vca	Status	volts			
	Circuit 2	Compressor 2A Power Consumption	Status	kW			
	Circuit 2	Compressor 2A Power Factor	Status				
	Circuit 2	Modulation Unload Steady Command	Status				
	Circuit 2	Condenser Air Flow	Status	% of fan deck			
	Circuit 2	Condenser Inverter Speed	Status	% of inverter full speed			
	Circuit 2	Average Condenser Approach Temperature	Status	Diff Temp °F (°C)			
	Circuit 2	Re-initialize Average Condenser Approach Temperature	Setting				
	Circuit 2	Compressor 2A Average Oil Pressure Drop	Status	% of System DP			
	Circuit 2	Re-initialize Compressor 2A Average Oil Pressure Drop	Setting				
	Circuit 2	Compressor 2A Oil Filter Life Remaining	Status	%			
	Circuit 2	Re-initialize Compressor 2A Oil Filter Life Remaining	Setting				
	Circuit 2	Time Remaining Until Oil Analysis Recommended	Status	Hrs			
	Circuit 2	Re-initialize Oil Time Remaining	Setting				
<b>Override &amp; Lockouts</b>							
	Circuit 1	Restart Inhibit Time - Compressor 1A	Status	mins:secs			
	Circuit 1	Restart Inhibit Time - Compressor 2A	Status	mins:secs			
	Manual Overrides	Clear Restart Inhibit	Setting				
	Manual Overrides	Evaporator Water Pump Override	Setting				Auto
	Chiller	Evaporator Water Pump Override Time Remaining	Status	mins:secs			

**Table 82. Unit view tabs - detail (continued)**

Tab	System	Control Point Name	Status	Unit	Min	Max	Default
Manual Overrides		Condenser Water Pump Override	Setting				Auto
Chiller		Condenser Water Pump override Time Remaining	Status	mins:secs			
Circuit 1		EXV Control override	Setting				
Circuit 1		Manual EXV Position Command	Setting	%	0	100	
Circuit 1		Evaporator Refrigerant Liquid Level	Status	in (mm)			
Circuit 1		EXV Percent Open	Status	%			
Circuit 1		EXV Position Steps	Status	steps			
Circuit 1		Evaporator Approach Temperature	Status	°F (°C)			
Circuit 1		Differential Refrigerant Pressure	Status	psid			
Circuit 2		EXV Control Override	Setting				Auto
Circuit 2		Manual EXV Position Command	Setting	%	0	100	
Circuit 2		Evaporator Refrigerant Liquid Level	Status	in (mm)			
Circuit 2		EXV Percent Open	Status	%			
Circuit 2		EXV Position Steps	Status	steps			
Circuit 2		Evaporator Approach Temperature	Status	°F (°C)			
Circuit 2		Differential Refrigerant Pressure	Status	psid			
Manual Overrides		Compressor 1A Pumpdown Command	Setting				
Manual Overrides		Compressor 1A Pumpdown Status	Status	°F (°C)			
Manual Overrides		Compressor 2A Pumpdown Command	Setting				
Manual Overrides		Compressor 2A Pumpdown Status	Status	°F (°C)			
Circuit 1		Evaporator Refrigerant Pressure	Status	psi gauge			
Circuit 2		Evaporator Refrigerant Pressure	Status	psi gauge			
Chiller		Keypad Lockout	Setting				Normal
Chiller		CHRV Head Pressure Control Override	Setting				Auto
Manual Overrides		Manual Staging (Stepping Control)	Setting				
Chiller		Manual Staging (Stepping Control Command)	Status				
Manual Overrides		Manual Capacity (Modulation Control)	Setting	%			
Chiller		Manual Capacity Modulation Control Command	Status	%	-100	100	
Circuit 1		Compressor 1A Load Step	Status				
Circuit 1		Compressor 1A% Duty Cycle Sent	Status	%			
Circuit 1		Compressor 1A Average Line Current	Status	% RLA			
Circuit 2		Compressor 2A Load Step	Status				
Circuit 2		Compressor 2A% Duty Cycle Sent	Status	%			
Circuit 2		Compressor 2A Average Line Current	Status	% RLA			
Chiller		Evaporator Leaving Water Temperature	Status	°F (°C)			
Chiller		Evaporator Entering Water Temperature	Status	°F (°C)			
Chiller		"Service Recommended" Messages	Setting				
<b>Feature Settings</b>							
Chiller		Cooling Low Ambient Lockout	Setting				Disable
Chiller		Cooling Low Ambient Lockout Temperature	Setpoint	°F (°C)	-9.94 (-23.3)	70 (21.11)	54.86 (12.7)
Chiller		Differential to Start	Setpoint	°F (°C)	0.5 (.278)	10 (5.55)	2 (1.1)
Chiller		Differential to Stop	Setpoint	°F (°C)	0.5 (.278)	10 (5.55)	2 (1.1)
Chiller		Staging Sequence	Setting				Staging Seq



## Controls Interface

**Table 82. Unit view tabs - detail (continued)**

Tab	System	Control Point Name	Status	Unit	Min	Max	Default
	Chiller	Power-Up Start Delay	Setting	sec	0	600	0
	Chiller	Local Stop Delay	Setting	sec	0	30	0
	Chiller	Capacity Control Softload Time	Setting	sec	0	7200	900
	Chiller	Current Limit Control Softload Time	Setting	sec	0	7200	600
	Chiller	Current Limit Softload Start Point	Setting	%	20	100	40
	Chiller	Variable Evaporator Water Flow Compensation	Setting				Disable
	Chiller	Evaporator Pump Off Delay	Setting	minutes	0	30	1
	Chiller	Condenser Pump Off Delay	Setting	minutes	0	30	1
	Chiller	Condenser Water Pump Pre-Run Tim	Setting	minutes	0	30	0
	Chiller	Low Evaporator Leaving Water Temperature Cutout	Setting	°F (°C)	5 (-15)	36 (2.22)	36 (2.22)
	Chiller	Low Refrigerant Temperature Cutout	Setting	°F (°C)	-5 (-20.55)	36 (2.22)	28.6 (-1.89)
	Chiller	High Evaporator Water Temperature Cutout	Setting	°F (°C)	80 (26.67)	150 (65.56)	105 (40.55)
	Chiller	Local Atmospheric Pressure	Setting	psia	68.9	110.3	101.35
	Chiller	Ice Building Feature	Setting				Enable
	Chiller	External Chilled (Hot Water Setpoint Enable)	Setting				Enable
	Chiller	External Current Limit Setpoint Enable	Setting				Enable
	Chiller	Under (Over Voltage Protection Enable)	Setting				Enable
	Chiller	LCI-C Diagnostic Language	Setting				English
	Chiller	LCI-C diagnostic Encoding	Setting				Text
	Chiller	Head Relief Relay Filter Time	Setting	sec	0	1200	600
	Chiller	Limit Relay Filter Time	Setting	sec	0	1200	600
	Chiller	Maximum Capacity Relay Filter Time	Setting	sec	0	1200	600
<b>Gains</b>							
	Chiller	Cooling Design Delta Temperature (Waterside)	Setting	°F (°C)	3.6 (2)	32.4 (18)	10 (5.55)
	Chiller	Heating Design Delta Temperature (Waterside)	Setting	°F (°C)	3.6 (2)	32.4 (18)	10 (5.55)
	Chiller	Condenser Pressure Limit Setpoint	Setting	%	80	120	90
	Chiller	Carryover Maximum Capacity Limit Setpoint	Setpoint	%	50	500	500
	Chiller	Carryover Maximum Capacity Limit Kp	Setting		0.03	2.0	.2
	Chiller	Carryover Maximum Capacity Limit Ti	Setting	sec	0.1	500	3
	Chiller	Carryover Maximum Capacity Limit - Input Type	Setting				
<b>Condenser Head Pressure Control</b>							
	Chiller	Head Pressure Control Override	Setting				Auto
	Chiller	Off State Output Command	Setting	volts	0	10	2
	Chiller	Output Voltage at Desired Minimum Flow	Setting	volts	0	10	2
	Chiller	Desired Minimum Flow	Setting	%	0	100	20
	Chiller	Output Voltage at Desired Maximum Flow	Setting	volts	0	10	10
	Chiller	Actuator Stroke Time	Setting	sec	1	1000	30
	Chiller	Damping Coefficient	Setting		0.1	1.8	0.5
	Chiller	Condenser Water Pump Pre-Run Time	Setting	minutes	0	30	0
	Chiller	Condenser Water Pump Pre-Run Time Remaining	Status	mins:secs			
	Chiller	Head Pressure Control Output	Status	%			
	Chiller	Time Till Actuator at Position	Status	mins:secs			
	Chiller	Time to Safe Start of Cond Wtr Pump	Status	mins:secs			
<b>Starts &amp; Hours</b>							
	Chiller	Chiller Running Time	Status	hrs:mins			
	Circuit 1	Compressor 1A Running Time	Status	hrs:mins			
	Circuit 1	Compressor 1A Starts	Status				
	Circuit 1	Revise Compressor 1A Run Time	Setting	hrs:mins			



**Table 82. Unit view tabs - detail (continued)**

Tab	System	Control Point Name	Status	Unit	Min	Max	Default
Circuit 1		Revise Compressor 1A Starts	Setting	starts	0	4294967295	
Circuit 2		Compressor 2A Running Time	Status	hrs: mins			
Circuit 2		Compressor 2A Starts	Status				
Circuit 2		Revise Compressor 2A Run Time	Setting	hrs: mins			
Circuit 2		Revise Compressor 2A Starts	Setting	starts	0	4294967295	
<b>Date Recorder</b>							
Chiller		Data Recorder Enable/Disable	Setpoint				
Chiller		Data Recorder Change Delta	Setpoint		0	1.0	0.2
Chiller		Data Recorder Sample Period	Setpoint	Sec	1	3600	2
Chiller		Data Recorder Temperature Change Delta	Setpoint	Delta Temp (°C)	0	2.8	0.6
Chiller		Data Recorder Pressure Change Delta	Setpoint	Delta Press (kPa)	0	34.5	13.8
Chiller		Data Recorder Percent Change Delta	Setpoint	%	0	5	1
Chiller		Data Recorder Count Change Delta	Setpoint		0	120	30
<b>Chilled Water Reset</b>							
Chiller		Chilled Water Reset Type	Setpoint				Disable
Chiller		Return Water Reset Ratio	Setpoint	%	10	120	50
Chiller		Return Water Start Reset	Setpoint	°F (°C)	36 (2.22)	62 (16.67)	42 (5.56)
Chiller		Return Water Maximum Reset	Setpoint	°F (°C)	32 (0)	52 (11.11)	37 (2.78)
Chiller		Outdoor Air Reset Ratio	Setpoint	%	-80	80	10
Chiller		Outdoor Air Start Reset	Setpoint	°F (°C)	50 (10)	130 (54.44)	90 (32.22)
Chiller		Outdoor Air Maximum Reset	Setpoint	°F (°C)	32 (0)	52 (11.11)	37 (2.78)
Chiller		Actual Degrees of Chilled Water Reset	Status	°F (°C)			
<b>Chiller I/O States</b>							
Chiller		Evaporator Water Pump Command	Status				
Chiller		Condenser Water Pump Command	Status				
Chiller		Ice Building Active	Status				
<b>Circuit 1 I/O States</b>							
Circuit 1		Compressor 1A Load Step	Status				
Circuit 1		Oil Return Pump Drain	Status				
Circuit 1		Oil Return Pump Drain	Status				
Circuit 1		Optical Oil Sensor Input	Status				
<b>Circuit 2 I/O States</b>							
Circuit 2		Compressor 2A Load Step	Status				
Circuit 2		Oil Return Pump Drain	Status				
Circuit 2		Oil Return Pump Drain	Status				
Circuit 2		Optical Oil Sensor Input	Status				

The items that can be modified show up in white. The items that cannot be modified show up in gray.

**Figure 48. Fields in white**

Starts & Hours		Chilled Water Reset		Chiller I/O States		Circuit 1 I/O States		Circuit 2 I/O States	
Chiller	Circuit 1	Circuit 2	Override & Lockouts	Feature Settings	Gains	Condenser Head Pressure Control Setup			
System	Control Point Name				Value	Unit			
Chiller	Front Panel Cool/Heat Command				Cool				
Chiller	Front Panel Chilled Water Setpoint				45.0	°F			
Chiller	Front Panel Hot Water Setpoint				90.0	°F			
Chiller	Front Panel Current Limit Setpoint				120	%			
Chiller	Setpoint Source				BAS/Ext/FP				
Chiller	Active Chilled Water Setpoint				45.0	°F			
Chiller	Chilled Water SoftLoad Target				45.0	°F			

To change the setpoint, enter a new value for the setpoint into the text field.

**Figure 49. Change setpoint**

Chiller	Front Panel Chilled Water Setpoint	45.0	°F
---------	------------------------------------	------	----

If the entered value is outside the given range, the background turns red.

**Figure 50. Change out of range**

Chiller	Front Panel Hot Water Setpoint	90.0	°F
Chiller	Front Panel Current Limit Setpoint	250	%
Chiller	Setpoint Source	BAS/Ext/FP	

If the value entered is not valid, an error message will display and the change will not occur.

**Figure 51. Setpoint change failed**

Chiller	Front Panel Current Limit Setpoint	120	%
Chiller	Setpoint Source	BAS/Ext/FP	
Chiller	Active Chilled Water Setpoint	45.0	°F
Chiller	Chilled Water SoftLoad Target	45.0	°F
Chiller	Active Hot Water		°F
Chiller	Hot Water Softlo		°F
Chiller	Active Current Li		%
Chiller	Current Limit Sc		%
Chiller	Outdoor Air Terr		°F
Chiller	Evaporator Leav		°F
Chiller	Evaporator Entering Water Temperature	----	°F
Chiller	Evaporator Water Flow Switch Status	No Flow	
Chiller	Condenser Leaving Water Temperature	----	°F
Chiller	Condenser Entering Water Temperature	----	°F
Chiller	Condenser Water Flow Switch Status	No Flow	
Chiller	Condenser Elevation	0.0	feet
Chiller	Manual Override Exists	No	

**Message** [X]

Setpoint Change Failed.

OK

## Status View

Status View displays, in real time, all non-setpoint data organized by subsystem tabs. As data changes on the chiller, it is automatically updated in Status View.

Figure 52. Status view

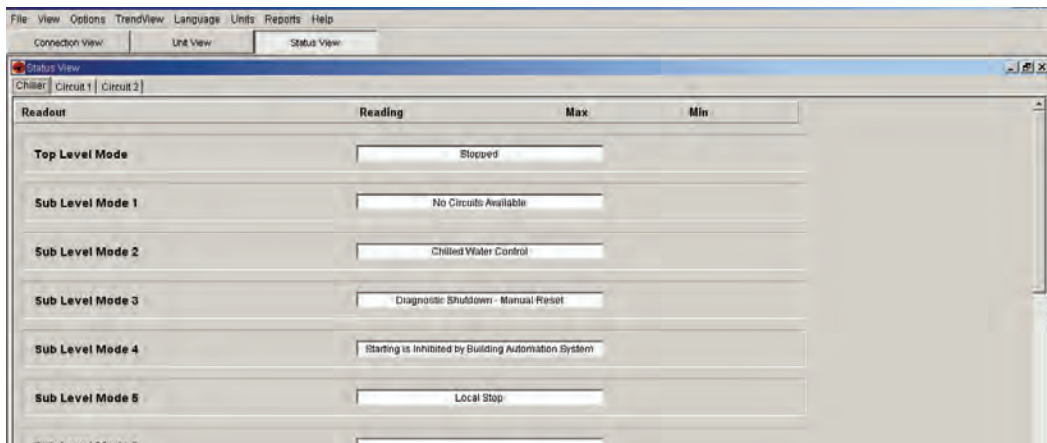


Table 83. Status view tab - detail

Tab	Control Point Name	Units
Chiller	Front Panel Auto Stop Command	
	Local Atmospheric Pressure	psia
	Application Software Revision	
	Keypad Lockout	
	Local Stop Delay	sec
	Top Level Mode	
	Sub Level Mode 1	
	Sub Level Mode 2	
	Sub Level Mode 3	
	Sub Level Mode 4	
	Sub Level Mode 5	
	Sub Level Mode 6	
	Unit Running Powered Indicator	
	MMR	
	MAR	
	IFW	
	Chiller Running Time	hrs:mins
	Active Chiller Auto/Stop Command	
	Setpoint Source Manual Override Exists	
	Power-Up Start Delay	sec
	Outdoor Air Temperature	°F (°C)
	Cooling Low Ambient Lockout	
	Cooling Low Ambient Lockout Temperature	°F (°C)
	Chiller Mode at Time of Last Diagnostic	°F (°C)
	Chiller Sub Mode 1 at Time of Last Diagnostic	
	Chiller Sub Mode 2 at Time of Last Diagnostic	
	Chiller Sub Mode 3at Time of Last Diagnostic	
Chiller Sub Mode 4 at Time of Last Diagnostic		
Chiller Sub Mode 5 at Time of Last Diagnostic		

Table 83. Status view tab - detail (continued)

Tab	Control Point Name	Units
Chiller	Chiller Sub Mode 6 at Time of Last Diagnostic	
	Front Panel Current Limit Setpoint	%
	Active Current Limit Setpoint	%
	Active Current Limit Setpoint Source	
	<b>Current Limit SoftLoad Target</b>	<b>%</b>
	<b>Average Percent RLA</b>	<b>% RLA</b>
	<b>Low Evaporator Leaving Water Temperature Cutout</b>	<b>°F (°C)</b>
	<b>Evaporator Entering Water Temperature</b>	<b>°F (°C)</b>
	<b>Evaporator Leaving Water Temperature</b>	<b>°F (°C)</b>
	<b>Front Panel Cool/Heat Command</b>	
	<b>Staging Sequence</b>	
	<b>Cooling Design Delta Temperature (Waterside)</b>	<b>°F (°C)</b>
	<b>Heating Design Delta Temperature (Waterside)</b>	<b>°F (°C)</b>
	<b>Differential to Start</b>	<b>°F (°C)</b>
	<b>Differential to Stop</b>	<b>°F (°C)</b>
	<b>Start to Start Delay Time</b>	
	<b>Capacity Control Debug State</b>	
	<b>Active Hot Water Command</b>	
	<b>Capacity Control Source</b>	
	<b>Manual Staging/Stepping Control Command</b>	
	<b>Manual Capacity Modulation Control Command</b>	<b>%</b>
	Variable Evaporator Water Flow Compensation	
	Variable Flow Filtered Result	
	Current Limit Control Softload Time	sec
	Current Limit Softload Start Point	%
	Front Panel Chilled Water Setpoint	°F (°C)
	Front Panel Hot Water Setpoint	°F (°C)



## Controls Interface

**Table 83. Status view tab - detail (continued)**

Tab	Control Point Name	Units
	Capacity Control Softload Time	sec
	Arbitrated Chilled Water Setpoint	°F (°C)
	Active Chilled Water Setpoint Source	
	Active Chilled Water Setpoint	°F (°C)
	Chilled Water Setpoint SoftLoad Target	°F (°C)
	Arbitrated Hot Water Setpoint	°F (°C)
	Active Hot Water Setpoint Source	
	Active Hot Water Setpoint	°F (°C)
	Hot Water Setpoint SoftLoad Target	°F (°C)
	Need to Run Cooling	
	Need to Run Heating	
	Chilled Water Reset Type	
	Return Water Reset Ratio	%
	Return Water Start Reset	°F (°C)
	Return Water Maximum Reset	°F (°C)
	Outdoor Air Reset Ratio	%
	Outdoor Air Start Reset	°F (°C)
	Outdoor Air Maximum Reset	°F (°C)
	Desired Degrees of Reset	°F (°C)
	Actual Degrees of Chilled Water Reset	°F (°C)
	Circulating Pump	
	Evaporator Water Flow Switch Status	
	Evaporator Pump Off Delay	mins:secs
	External Auto Stop	
	Emergency Stop	
	Head Relief Relay Filter Time	sec
	External Chilled Water Setpoint	°F (°C)
	Ext Hot Water Setpoint	
	External Chilled/Hot Water Setpoint Enable	
	External Current Limit Setpoint	
	External Current Limit Setpoint Enable	
	Maximum Capacity Relay Filter Time	sec
	Limit Relay filter Time	sec
	External Hot Water Command	
	High Evaporator Water Temperature Cutout	°F (°C)
	Condenser Entering Water Temperature	°F (°C)
	Condenser Leaving Water Temperature	°F (°C)
	Condenser Pump Off Delay	minutes
	Condenser Water Flow Switch Status	
	Front Panel ice Building Command	
	Front Panel Ice Termination Setpoint	°F (°C)
	Ice Building Feature	
	Active Ice Building Command	
	Active Ice Termination Setpoint	°F (°C)

**Table 83. Status view tab - detail (continued)**

Tab	Control Point Name	Units
	Active Ice Termination Setpoint Source	
	Ice Building Current Limit Setpoint	%
	External Ice Building Input	
	Need to run ice	
	Condenser Elevation	
	Starter Energy Consumption Last Reset	
	Chiller Power Demand	kW
	Chiller Power Demand Time Period	minutes
	Under/Over Voltage Protection Enable	
	CWRV Output Voltage at Desired Maximum Flow	volts
	CWRV 'Off State' Output Command	volts
	CWRV Desired Minimum Flow	%
	CWRV Actuator Stroke Time	sec
	CWRV Damping Coefficient	
	CWRV Head Pressure control Output	%
	CWRV Time Till Actuator at Position	mins:secs
	CWRV Time to Safe Start of Cond Wtr Pump	mins:secs
	CWRV Percent Status	%
	<b>Circuit 1</b>	
	EXV Position Steps	steps
	EXV Percent Open	%
	Front Panel Circuit Lockout	
	Evaporator Refrigerant Liquid Level	in (mm)
	Mode	
	Sub Level Mode 1	
	Sub Level Mode 2	
	Sub Level Mode 3	
	Sub Level Mode 4	
	Sub Level Mode 5	
	Sub Level Mode 6	
	Condenser Refrigerant Pressure	psi gauge
	Condenser Saturated Refrigerant Temperature	°F (°C)
	Evaporator Refrigerant Pressure	psi gauge
	Evaporator Saturated Refrigerant Temperature	°F (°C)
	Circuit Running Powered Indicator	
	Circuit Manual Reset Indicator (CMR)	
	Circuit Auto Reset Indicator (CAR)	
	Circuit Informational Warning Indicator (IFW)	
	Circuit Limit Min Command	
	Differential Refrigerant Pressure	psid
	Compressor 1A Service Pumpdown Status	
	Evaporator Approach Temperature	°F (°C)
	Condenser Approach Temperature	°F (°C)
	Compressor Refrigerant Discharge Superheat	°F (°C)

**Table 83. Status view tab - detail (continued)**

Tab	Control Point Name	Units
	Top Level Mode at Last Diagnostic	
	Submode 1 at Last Diagnostic	
	Submode 2 at Last Diagnostic	
	Submode 3 at Last Diagnostic	
	Submode 4 at Last Diagnostic	
	Submode 5 at Last Diagnostic	
	Submode 6 at Last Diagnostic	
	Compressor Lockout	
	Compressor 1A Starts	
	Compressor 1A Running Time	
	Compressor Running Indicator	hrs:mins
	Compressor 1A Load Step	
	Compressor Refrigerant Discharge Temperature	°F (°C)
	Compressor 1A Oil Pressure	psi gauge
	Compressor 1A Line 1 Current	% RLA
	Compressor 1A Line 2 Current	% RLA
	Compressor 1A Line 3 Current	% RLA
	Line 1 Current Amps	amps
	Line 2 Current Amps	amps
	Line 3 Current Amps	amps
	Starter 1A Voltage Vab	volts
	Compressor 1A Average Line Current	% RLA
	Maximum Line Current	%
	Compressor 1A Power Consumption	kW
	Compressor 1A Power Factor	
<b>Circuit 2</b>		
	EXV Command (%)	%
	EXV Position Steps	steps
	EXV Percent Open	%
	Front Panel Circuit Lockout	
	Evaporator Refrigerant Liquid Level	in
	Mode	
	Sub Level Mode 1	
	Sub Level Mode 2	
	Sub Level Mode 3	
	Sub Level Mode 4	
	Sub Level Mode 5	
	Sub Level Mode 6	
	Condenser Refrigerant Pressure	psi gauge
	Condenser Saturated Refrigerant Temperature	°F (°C)
	Evaporator Refrigerant Pressure	psi gauge
	Evaporator Saturated Refrigerant Temperature	°F (°C)
	Circuit Running Powered Indicator	
	Circuit Manual Reset Indicator (CMR)	

**Table 83. Status view tab - detail (continued)**

Tab	Control Point Name	Units
	Circuit Auto Reset Indicator (CAR)	
	Circuit Informational Warning Indicator (IFW)	
	Circuit Limit Min Command	
	Differential Refrigerant Pressure	psid
	Compressor 1A Service Pumpdown Status	
	Evaporator Approach Temperature	°F (°C)
	Condenser Approach Temperature	°F (°C)
	Compressor Refrigerant Discharge Superheat	°F (°C)
	Top Level Mode at Last Diagnostic	
	Submode 1 at Last Diagnostic	
	Submode 2 at Last Diagnostic	
	Submode 3 at Last Diagnostic	
	Submode 4 at Last Diagnostic	
	Submode 5 at Last Diagnostic	
	Submode 6at Last Diagnostic	
	Compressor Lockout	
	Compressor 2A Starts	
	Compressor 2A Running Time	hrs:mins
	Compressor Running Indicator	
	Compressor 2A Load Step	
	Compressor Refrigerant Discharge Temperature	°F (°C)
	Compressor 2A Oil Pressure	psi gauge
	Compressor 2A Line 1 Current	% RLA
	Compressor 2A Line 2 Current	% RLA
	Compressor 2A Line 3 Current	% RLA
	Line 1 Current Amps	amps
	Line 2 Current Amps	amps
	Line 3 Current Amps	amps
	Compressor 2A Average Line Current	% RLA
	Maximum Line Current	%
	Compressor 2A Power Factor	
<b>Manual Overrides</b>		
	Manual Staging/Stepping Control	
	Manual Capacity Modulation Control	
	Evaporator Water Pump Override	
	Condenser Water Pump Override	
	Compressor 1A service Pumpdown Status	
	Compressor 1A Pumpdown Command	

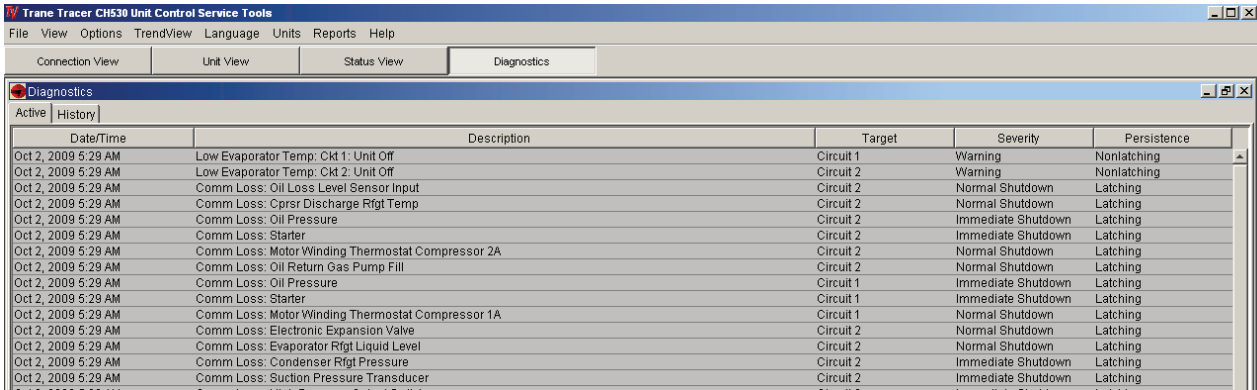
### Diagnosics View

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

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

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

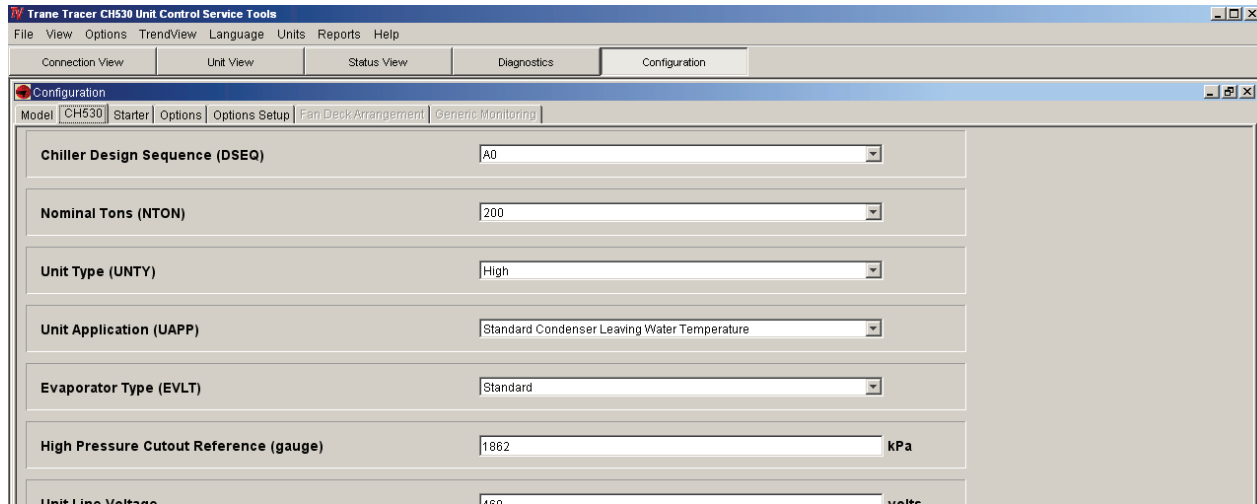
**Figure 53. Diagnostic view**



## Configuration View

This view is under the CH530 tab. It displays the active configuration and allows you to make changes to the unit configuration.

**Figure 54. Configuration view - CH530 tab**



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

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

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

**Table 84. Configuration view items - detail**

Tab	Item	Description
Model	Model Type (MODL)	RTWD
		RTUD
	RTWD/CH530 Configuration Control Sequence	1
CH530		

**Table 84. Configuration view items - detail (continued)**

Tab	Item	Description
	Chiller Design Sequence (DSEQ)	Factory Assigned
	Nominal Tons (NTON)	60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 220 250
	Unit Type (UNTY)	Standard High Premium
	Unit Application (UAAP)	Standard Condenser Leaving Water Temperature High Temperature Condenser Leaving Water Temperature Water-Water Heat Pump Standard Ambient (Air-Cooled Condenser) High Ambient (Air-Cooled Condenser) No Fan Controls (Water Cooled) Fan Control by Others Integral Fan Controls
	Evaporator Type (EVLTY)	Standard Process Ice
	High Pressure Cutout Reference (gauge)	
	Unit Line Voltage	200V 230V 380V 400V 460V 575V
	Line Frequency (HRTZ)	50Hz 60Hz
	Manufacturing Location (DCLT)	Curitiba, Brazil

**Table 84. Configuration view items - detail (continued)**

Tab	Item	Description
		Pueblo, USA Charmes, France Taicang, China
	Line Voltage Sensing (WUVO)	Not Installed Installed
	Power Meter (PWRM)	Not Installed Installed
	Water Flow Proving -Factory Installed (FLOW)	115 VAC Paddle Type Flow Switch Factory Installed Low Voltage Thermal Type Flow Switch
<b>Starter</b>		
	Compressor 1A Rated Load Amps	Range = 1 - 999
	Compressor 2A Rated Load Amps	Range = 1 - 999
	Compressor 1A Current Transformer Meter Scale	37.5 Amps 50 Amps 75 Amps 100 Amps 150 Amps 200 Amps 275 Amps 400 Amps 500 Amps 700 Amps 1000 Amps
	Compressor 2A Current Transformer Meter Scale	37.5 Amps 50 Amps 75 Amps 100 Amps 150 Amps 200 Amps 275 Amps 400 Amps 500 Amps 700 Amps 1000 Amps
	Starter Type (SRTY)	Wye-Delta Closed Transition Across the Line
	Contactors Integrity Test	Enable Disable
	Compressor 1A Frame Size	K1 K2 L1 L2 M1



## Controls Interface

**Table 84. Configuration view items - detail (continued)**

Tab	Item	Description
		M2
		N1
		N2
	Compressor 2A Frame Size	K1
		K2
		L1
		L2
		M1
		M2
		N1
		N2
	Phase Reversal Protection	Enable
		Disable
	Current Unbalance Trip Point	15 to 90
	Current Unbalance Grace Point	30 to 255
	Starter Panel Forced Ventilation (SPFV)	Not Installed
		Installed
<b>Options</b>		
	Outdoor Air Temperature (OATS)	Not Installed
		Installed
	Ice Building Option (ICEB)	Not Installed
		Installed
		Installed With Hardware
		Installed Without Hardware
	ECWS/EHWS and External Current Limit Setpoint (SETP)	4-20mA, 2-10Vdc
		Not Installed
	Motor Current Analog Output (CAOA)	Not Installed
		Installed
	Programmable Status Relays (STAT)	Not Installed
		Installed
	Generic Monitoring Package	None
		Installed
	Refrigerant Pressure Output Type (RPOT)	Not Installed
		Installed
		Condenser Pressure in %HPC
		Differential Pressure
		Condenser Water Regulating Valve Output
	Condenser Leaving Hot Water Temp Control (HWTC)	None
		Hot Water Temperature Control

**Table 84. Configuration view items - detail (continued)**

Tab	Item	Description
	BAS Communication/Local Time of Day Schedule (COMM)	Not Installed
		Lontalk®
		Local Time of Day Scheduling
		BACnet® Interface
<b>Options Set Up</b>		
	ECWS Minimum Temperature	-12.22 to 9.9°C
	ECWS Maximum Temperature	10 to 18.4°C
	EHWS Minimum Temperature	20 - 60°C
	EHWS Maximum Temperature	20 - 60°C
	ECLS Minimum %RLA	60
	ECLS Maximum %RLA	120
	Programmable Status Relay 1 (J2-10,11,12)	None
		Chiller Limit Mode
		Max Capacity
		Compressor Running
		Alarm
		Latching Alarm
		Non-Latching Alarm
		Alarm Circuit 1
		Alarm Circuit 2
		Circuit 1 Running
		Circuit 2 Running
		Head Pressure Relief Request
		Warning
	Programmable Status Relay 2 (J2-7,8,9)	None
		Chiller Limit Mode
		Max Capacity
		Compressor Running
		Alarm
		Latching Alarm
		Non-Latching Alarm
		Alarm Circuit 1
		Alarm Circuit 2
		Circuit 1 Running
		Circuit 2 Running
		Head Pressure Relief Request
		Warning
	Programmable Status Relay 3 (J2-4,5,6)	None
		Chiller Limit Mode
		Max Capacity
		Compressor Running



**Table 84. Configuration view items - detail (continued)**

Tab	Item	Description
		Alarm
		Latching Alarm
		Non-Latching Alarm
		Alarm Circuit 1
		Alarm Circuit 2
		Circuit 1 Running
		Circuit 2 Running
		Head Pressure Relief Request
		Warning
Programmable Status Relay 4 (J2-1,2,3)		None
		Chiller Limit Mode
		Max Capacity
		Compressor Running
		Alarm
		Latching Alarm
		Non-Latching Alarm
		Alarm Circuit 1
		Alarm Circuit 2
		Circuit 1 Running
		Circuit 2 Running
		Head Pressure Relief Request
		Warning
Low Ambient Fan Control Type		None
		Variable Speed Fan with Analog Interface
		Two Speed Fan

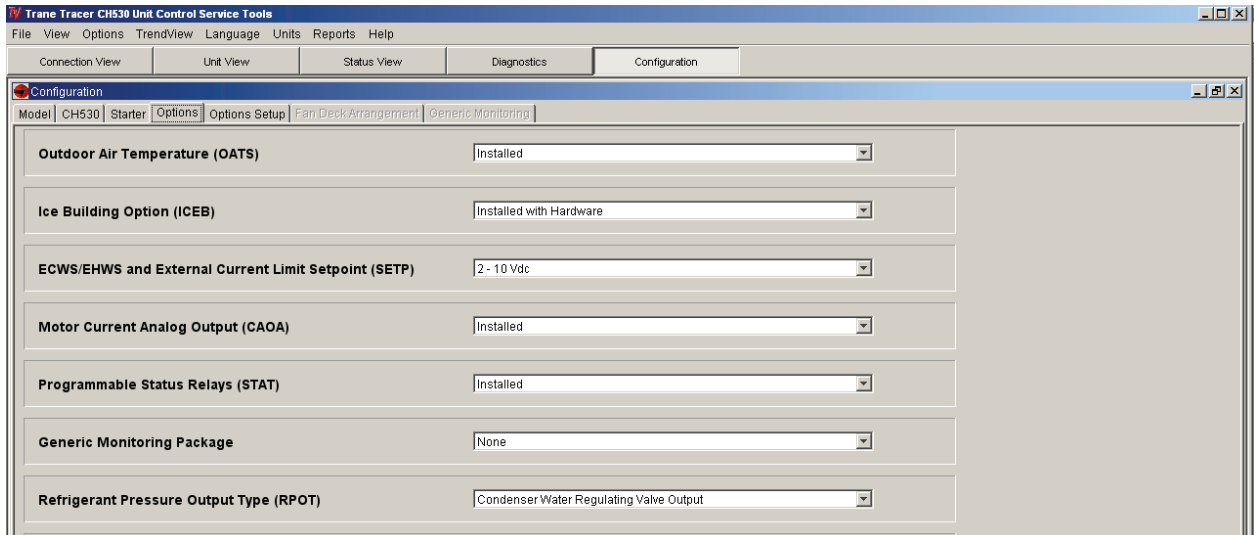
**Fan Deck Arrangement**

Fan Deck Arrangement Circuit 1 (FDA1)	1 Fan (1H00)
	2 Fans (1H10)
	3 Fans (1H11)
	3 Fans-type 2 (1H20)
	4 Fans (1H12)
	5 Fans (1H13)
	5 Fans-type 2 (1112)
	6 Fans (2H22)
	6 Fans-type 2 (1212)
	7 Fans-type 2 (1123)
	8 Fans-type 2 (1124)
Fan Deck Arrangement Circuit 1 (FDA2)	1 Fan (1H00)
	2 Fans (1H10)
	3 Fans (1H11)
	3 Fans-type 2 (1H20)
	4 Fans (1H12)
	5 Fans (1H13)

**Table 84. Configuration view items - detail (continued)**

Tab	Item	Description
		5 Fans-type 2 (1112)
		6 Fans (2H22)
		6 Fans-type 2 (1212)
		7 Fans-type 2 (1123)
		8 Fans-type 2 (1124)
<b>Generic Monitoring</b>		
	Monitoring Temperature Sensors	0 - 8
	Monitoring Pressure Transducers	0 - 8
	Monitoring Dual Current Loop Input Modules	0 - 4
	Monitoring Dual Low Voltage Binary Input Modules	0 - 4
	Monitoring Dual High Voltage Binary Input Modules	0 - 4

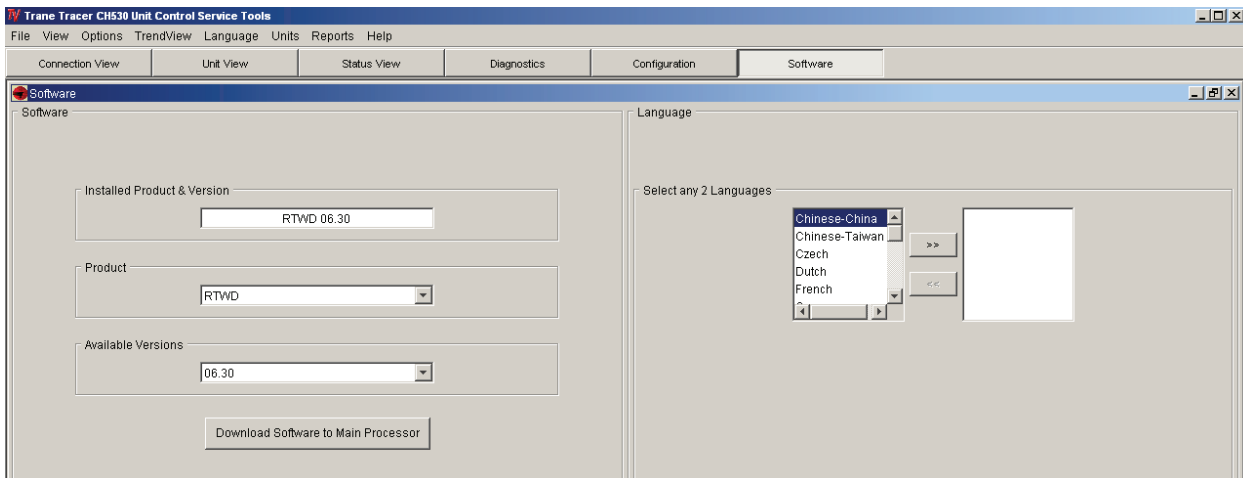
A couple of additional tabs in Configuration View allow you to change other unit configuration options using the Options tab and the Options Setup Tab. The features that are installed on the Options Tab will control what is displayed on the Options Setup Tab.

**Figure 55. Configuration view - options tab**


### Software View

Software view allows you to verify the version of chiller software currently running on the DynaView™ and download a new version of chiller software.

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

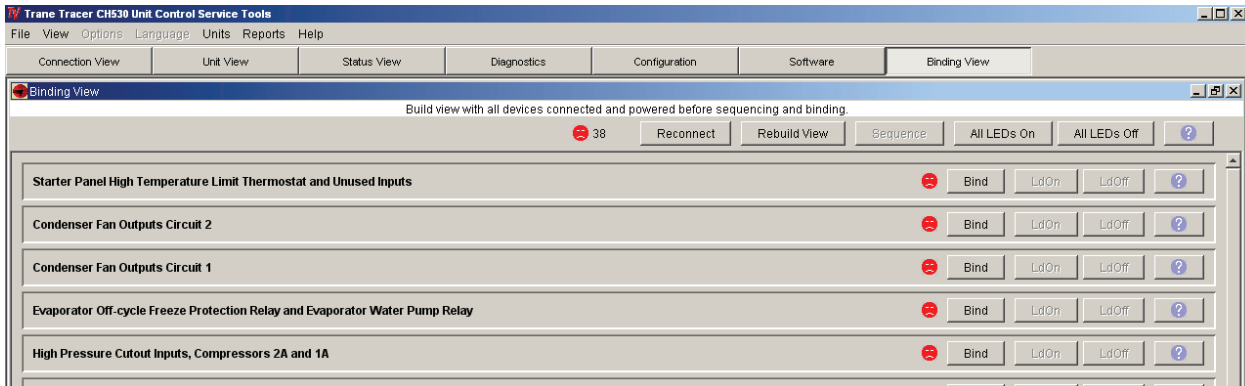
**Figure 56. Software view**


### Binding View

Binding View allows you to assess the status of the network and all the devices connected as a whole, or the status of individual devices by using status icons and function buttons.

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

communicate and to function as intended. This process is called binding. Some features of Binding View are intended to serve a second purpose; that is diagnosing problems with communication among the devices

**Figure 57. Binding view**


### Replacing or Adding Devices

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

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

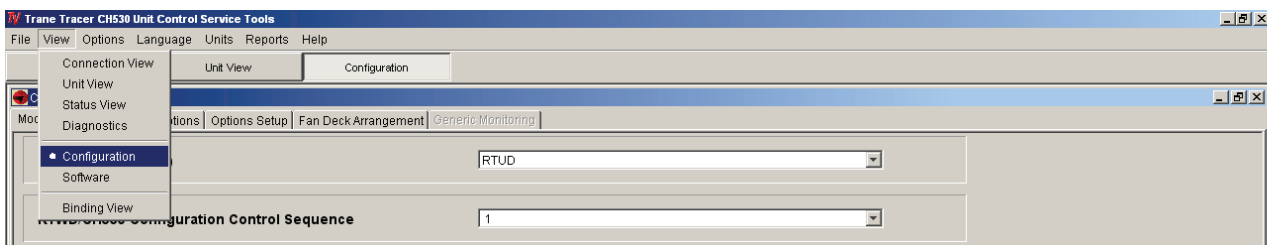
It is good practice to turn the power off while detaching and attaching devices to the CH530 network. Be sure to keep power on the service tool computer. After power is restored to the CH530 network, the reconnect function in Binding View restores communication with the network. If

the service tool computer is turned off, you must restart TechView and Binding View.

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

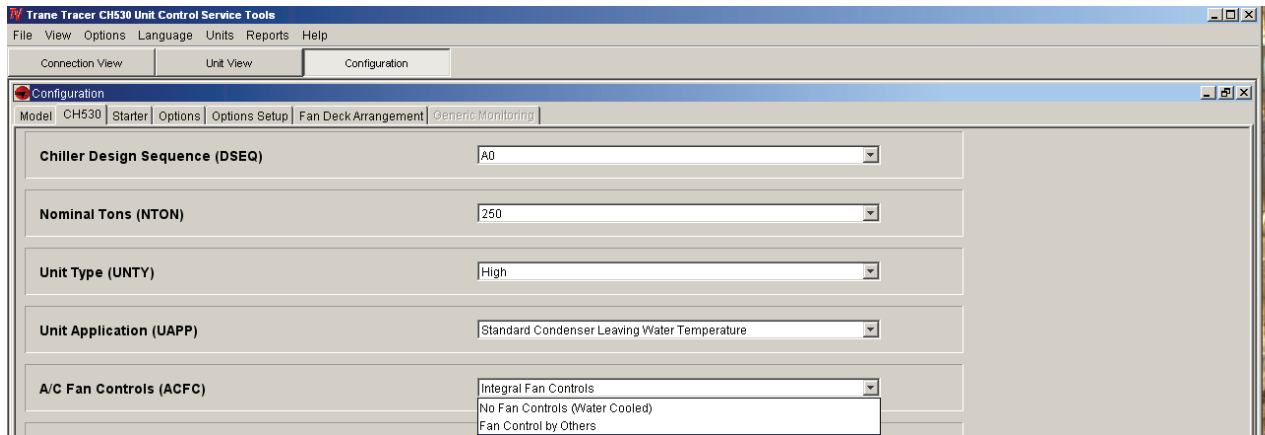
### Fan Configurations

The configurations discussed below are accessible using TechView Service Tool – View - Configurations, and only applicable for Unit Type (MODL) configuration = RTUD. Conversely, the following configuration items are not visible if Unit Type (MODL) is set to = RTWD.

**Figure 58. Fan configurations - RTUD**


### A/C Fan Controls

This configuration item is used to define the RTUD fan control type including alternate operation as a water cooled instead of an air cooled condenser.

**Figure 59. A/C fan controls - RTUD**


### No Fan Controls (Water Cooled)

If this setting is set to “No Fan Controls (Water Cooled)”, the unit shall be controlled exactly the same as an RTWD unit, that is, that the control logic and sequences will assume that there is a water cooled condenser and condenser water pump control, condenser water flow proving, and circuits start delay times associated with condenser water pump pre-run times shall be employed. The DynaView™ (and TechView™) shall display the condenser water temperatures and condenser approach temperatures as defined (although generally a RTUD unit will not ship with condenser water temperature sensors installed and bound) – for proper unit operation as a remote water cooled condenser, the condenser water temperature LLIDs will have to be field installed and bound.

### Fan Control By Others

If this setting is set to “Fan Control By Others”, the first two relays on the “Fan Control Interlock” quad relay output board relays will function as interlock contacts for use as in input to an external pressure or temperature based fan controller on a per circuit basis. Concurrent with the circuit’s EXV pre-position as part of the start sequence of

a given circuit, the respective “fan control interlock” relay for that circuit will energize and close the NO contacts.

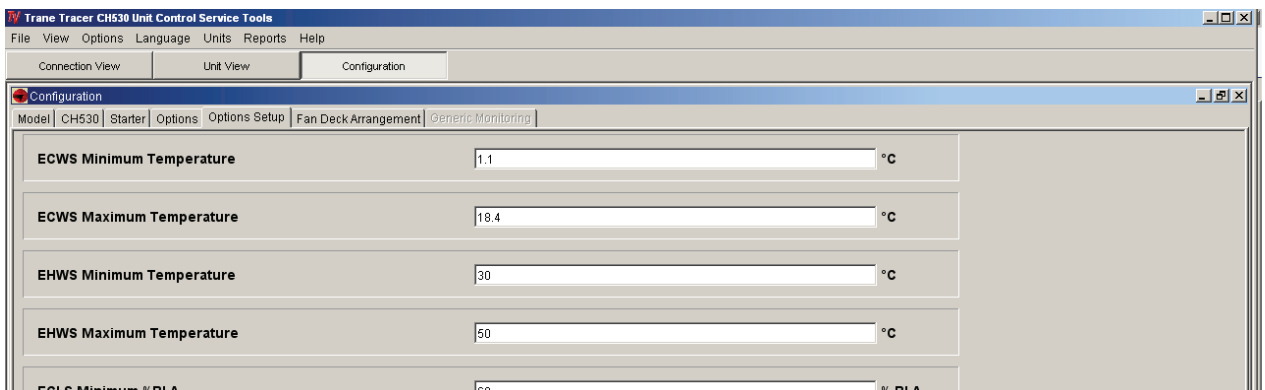
The respective relay shall be de-energized to return to its normal state, once the circuit/compressor has stopped. Note that this means the relay shall stay energized until the compressor state is proven to be off.

### Integral Fan Controls

If this setting is set to “Integral Fan Controls,” the fan controls are integral to the CH530 main processor and (depending on the selection for the other fan control configurations - i.e. Fan Deck Arrangement Circuit 1 (FDA1), Fan Deck Arrangement Circuit 2 (FDA2), Low Ambient Fan Control Type (L AFC)) shall control the appropriate relays (and connected fans) and other outputs (variable speed fan outputs and monitor VFD fault inputs) to control the differential pressure per the chiller’s requirements.

### Low Ambient Fan Control Type

**Note:** Present if A/C Fan Control (ACFC) = Integral Fan Control (INT)

**Figure 60. Low ambient fan control type**


If this setting is set to “None”, fan control shall be per the full speed fixed speed fan tables with each circuit applying

the Fan Deck Arrangement configuration selected below.

If this setting is “Two Speed Fan” (TSPD), fan control shall provide for the first fan to be a two speed fan and control and the first two relays of the quad relay shall be used for low and high speed control of that fan. The Two-speed fan operation, assumes the use of fans and contactors designed for Wye (low speed) and Delta (high speed) motor connections and the ratio of the low to high speed cfm is approximately 80%. For Two-Speed fan configurations, low to high and high to low speed transitions are subject to a 5 second delay with neither the low speed nor the high speed contacts being energized. The low speed contact generally refers to relay 1 and the high speed contact generally refers to relay 2.

**Note:** When selecting two speed fan control for the low ambient option, only the Fan Deck Arrangements with an “H” in the 2nd position of the fan grouping definition are supported.

If this setting is “Variable Speed Fan with Analog Interface” VARA, the fan control shall operate fixed speed fans as well as a single inverter driven fan, and the controls include the enabling and speed command signals to this variable speed inverter. The inverter shall have an analog interface and fault feedback and be similar to the Danfoss TR1 2800 series inverter.

For variable speed fan decks, the first relay controls the variable frequency drive, through an enable/disable input of the inverter. The Variable speed fan option supports an inverter fault input to monitor the fault state of the inverter. An inverter fault or other inverter-related diagnostic causes the fan control to de-energize the inverter relay, command a zero percent speed via the analog speed command interface, and reverts to a special fixed-speed fan control mode.

In normal operation (no inverter diagnostics), the inverter is not commanded to zero-speed unless all other fans are

commanded off. During normal operation, a minimum inverter speed command is enforced to prevent counter-rotation of the inverter driven fan. Counter-rotation can reduce fan deck capacity and negatively affect reliability of inverters and its fans.

## Variable Speed Analog Fans

Each independently controlled variable speed fan has three I/O points:

- A fan deck relay controls the inverter run/stop command state. (Inverter power is continuously applied and not controlled by a contactor.)
- A 0-10 Volt analog output commands the variable frequency drive’s speed.

Output Voltage [V] = Desired VFD Speed [%] /10, with a minimum Desired VFD Speed of 7% (0.7V).

To send a reset command, 0% (0.0V) is sent.

- A binary input senses inverter faults.

The Fan Inverter Fault LLID binary input expects to see and open-circuit (i.e open dry contact) on its respective input terminals when the inverter is de-energized or when an inverter fault is present.

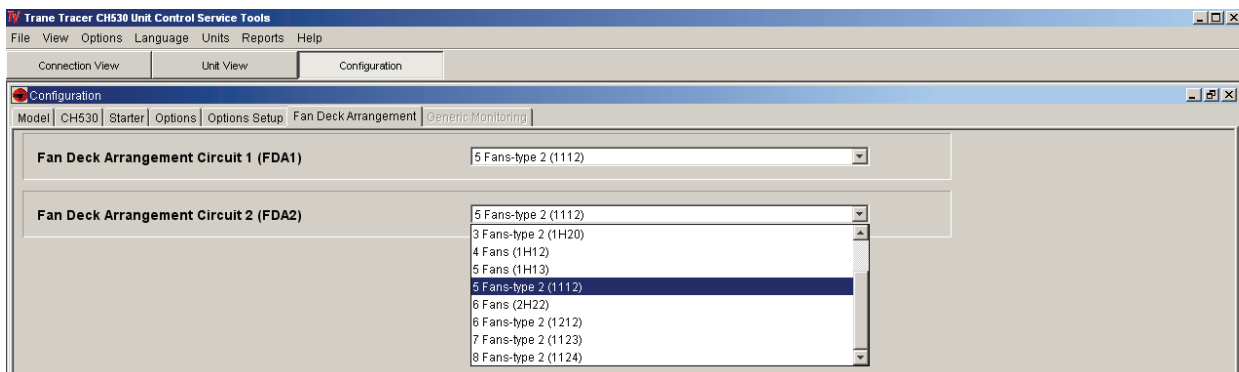
The Fan Inverter Fault LLID binary input expects to see a closed circuit (i.e. closed dry contact) when the inverter is energized and no faults are active.

The inverter fault diagnostic is not activated until 5 seconds after the inverter Run/Stop command relay is energized.

## Fan Deck Arrangement Circuit 1

**Note:** Present if A/C Fan Control (ACFC) = Integral Fan Control (INT)

**Figure 61. Fan deck arrangement**



This setting defines the wiring of the four fan relay outputs of the Fan Control Relay LLID for the respective circuit (circuit 2 setting is shown above). It indicates the fan grouping in terms of how many fans each particular relay is expected to control. The numbers in parentheses refer to the number of fans controlled by each of the 4 relays in order (lowest terminal number designators first). “H” means reserved for high speed of 2 speed fan, if applicable

- if no two-speed fan selected in LAFC, then “H” implies no fans wired to this relay.

## Fan Deck Arrangement Circuit 2

**Note:** Present if A/C Fan Control (ACFC) = Integral

This setting is the same as above, except for circuit 2. Each circuit may have different fan arrangements, but both



## Controls Interface

must use an identical type of low ambient fan control if applicable.

### Example for Fan Configurations

An air cooled condensing unit is selected that properly matches the capacity of the RTUD unit intended for a comfort cooling application. Lets assume the condenser has 5 fixed speed fans per circuit, and no variable speed fans or two speed fans, since operation below 32F outdoor air ambient temperature is not required.

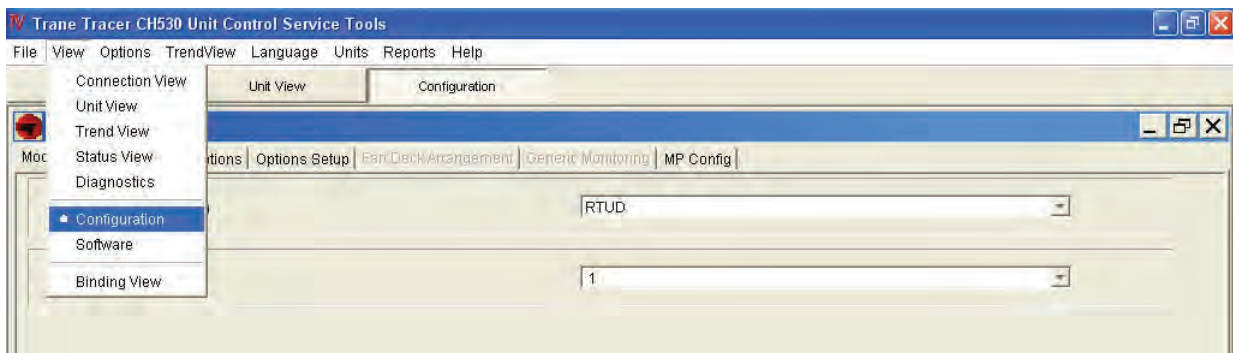
The RTUD chiller should come factory configured as an RTUD chiller, but the fan configurations will generally need

to be set in the field per the condenser selected and installed with the chiller. Using TechView™ PC based service tool running on a laptop PC or similar, power up the controls on the chiller and connect to the PC using an RS232 cable (connection on the bottom of the CH530 Adaptive Control).

### A/C Fan Controls (ACFC)

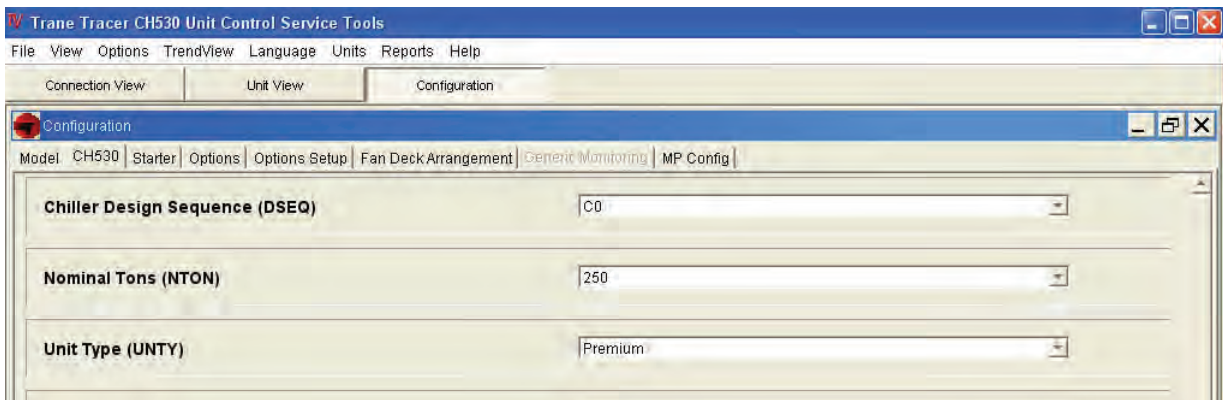
Launch TechView™ and press the “Local Connection” button in the bottom left hand corner. When the connection is completed – proceed to the configurations view

Figure 62. Service tool - view configuration

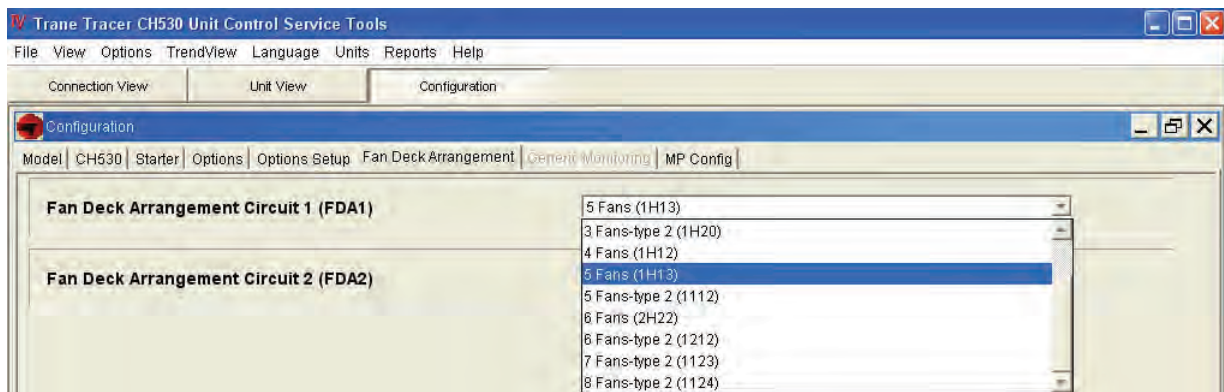


Select tab “CH530” and the “A/C Fan Controls” item from the list, then select “Integral Fan Controls”

Figure 63. Service tool configuration - integral fan control selection



Then proceed to the Tab “Options Setup” and the item Low Ambient Control Type in that list; select “None” for that item. Then proceed to the Fan Deck Arrangement Tab and click on the Fan Deck Arrangement Circuit 1 item. By clicking In the drop down box, you will see a number of supported fan deck arrangements. In the drop down we can see that there are two unique arrangements that support 5 fans total. The first one is designated as “1H13” and the 2nd is “1112”

**Figure 64. Service tool configuration - fan deck arrangement**


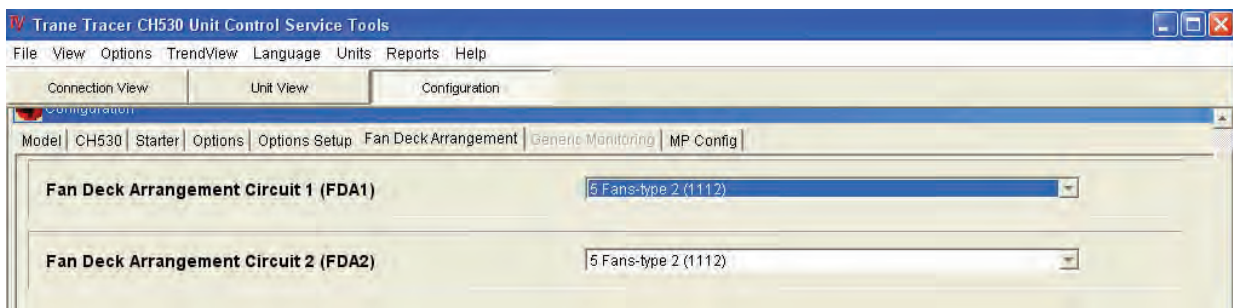
The character in the 4 digit descriptor define the number of fans that are intended to be wired to each of the 4 relays on the respective circuit's quad fan control LLID. The first of the two possible 5 fan arrangements uses sequence 1 H 1 3. This sequence implies there should be 1 fan wired to relay 1 (terminals J2-1,3 of module 1A25 – Circuit 1 Fan Control module, which are internally wired to the 1X11 terminals 1 & 2). Then next digit in the sequence H, is only for use with the High speed of a 2 speed fan configuration and since “none” was selected for low ambient options, this means it is not to be used and nothing should be wired to the 2nd relay (terminals J2-4,6 1X11 terminals 3 & 4). Likewise, the 3rd and 4th digits imply the number of fans that are to be wired to the 3rd and 4th relays, (the relays being internally wired to the terminal strip 1X11 terminals 5 & 6 and 7 & 8 respectively.)

The second alternative wiring for a fixed speed 5 fan deck is the 1112 selection. In this scheme, the first 3 relays (terminals 1X11 1&2, 3&4, 5&6), should all be wired to control one fan, and the last relay should control 2 fans (1X11 terminals 7 & 8)

Repeat the same selection for circuit 2 by click on the Fan Deck Arrangement Circuit 2 item. In the drop down box, you will see a number of supported fan deck arrangements. Select the appropriate fan deck arrangement for circuit 2. The selection of the arrangement would then define the wiring for module 1A26 – Circuit 2 Fan Control Module and it associated field wiring terminals 1X11 terminals 9 & 10, 11 & 12, 13 & 14, and 15 & 16).

**Note:** *The fan deck arrangement does not necessarily have to be the same as Circuit 1, but usually the circuits have the same number of fans and therefore the same arrangement selection is appropriate.*

As a last important step, the configurations need to be downloaded to the CH530 DynaView™ /Main Processor. This is accomplished by clicking on the “Load Configurations” button at the bottom of the configurations screen.

**Figure 65. Load configurations**


Allow a short time for the configuration to be set and both the CH530 DynaView™ and TechView™ to reboot. If new LLIDs and hardware binding for them is required as a result of the configuration just downloaded, TechView will immediately launch the “Binding View” that provides for a list of the required LLIDs and their communication status. Install and bind all new LLIDs as required. Most often, however, the proper LLIDs will already be present

and bound if the options were appropriately ordered with the chiller.



## Pre-Start

Upon completion of installation, complete the Model RTWD or RTUD Installation Completion Check Sheet and Request for Trane Service checklist in chapter [“Log and Check Sheets,” p. 157.](#)

**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

## Unit Start-up

### NOTICE:

#### Equipment Damage!

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

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

1. Press the STOP key on the CH530.
2. As necessary, adjust the setpoint values in the CH530 menus using TechView™.
3. Close the fused-disconnect switch for the chilled water pump. Energize the pump(s) to start water circulation.
4. Check the service valves on the discharge line, suction line, oil line and liquid line for each circuit. These valves must be open (backseated) before starting the compressors.

### NOTICE:

#### Compressor Damage!

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

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

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

7. Check the evaporator refrigerant pressure and the condenser refrigerant pressure under Refrigerant Report on the CH530 TechView™. The pressures are referenced to sea level (14.6960 psia).
8. 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 Data tables.

**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.

## Seasonal Unit Shutdown

1. Perform normal unit stop sequence using <Stop> key.

**Note:** Do not open starter disconnect switch. It must remain closed to provide power from control power transformer to the oil heaters.

2. Verify chilled water and condenser water pumps are off. If desired, open disconnect switches to pumps.
3. Drain condenser piping and cooling tower, if desired.
4. Remove drain and vent plugs from condenser headers to drain the condenser.
5. Verify that the oil heaters are working.
6. Perform maintenance shown below.

## Seasonal Unit Start-Up Procedure

### NOTICE:

#### Equipment Damage!

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

### NOTICE:

#### Compressor Damage!

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

1. Close all valves and re-install the drain plugs in the evaporator and condenser heads.
2. Service the auxiliary equipment according to the start-up/maintenance instructions provided by the respective equipment manufacturers.
3. Vent and fill the cooling tower, if used, as well as the condenser and piping. At this point, all air must be removed from the system (including each pass). Close the vents in the evaporator chilled water circuits.
4. Open all the valves in evaporator chilled water circuits.
5. If the evaporator was previously drained, vent and fill the evaporator and chilled water circuit. When all air is removed from the system (including each pass), install the vent plugs in the evaporator water boxes.
6. Verify condenser coils are clean.

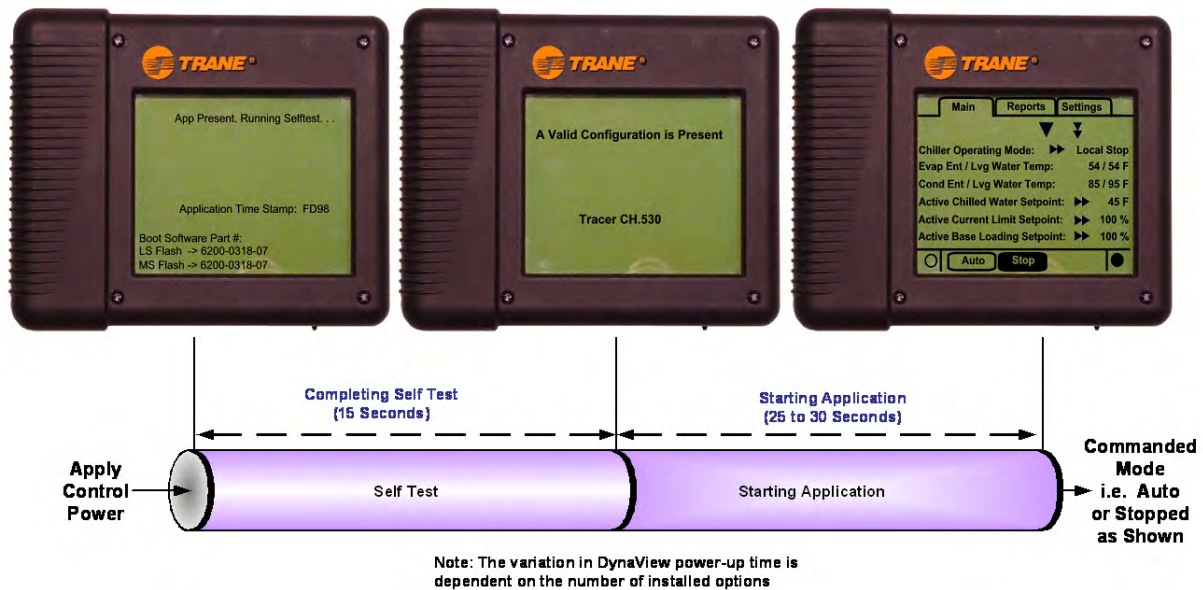
## Sequence of Operation

### Power Up

The Power up chart shows the respective DynaView screens during a power up of the main processor. This process takes from 30 to 50 seconds depending on the number of installed Options. On all power ups, the software model will always transition through the 'Stopped' Software state independent of the last mode. If

the last mode before power down was 'Auto', the transition from 'Stopped' to 'Starting' occurs, but it is not apparent to the user.

**Figure 66. Power up**



### Power Up to Starting

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

1. No motor restart inhibit
2. Evaporator Water flowing
3. Condenser Water flowing (RTWD only)
4. Power up Start Delay setpoint set to 0 minutes
5. Adjustable Stop to Start Timer set to 5 seconds
6. Need to cool

The above conditions would allow for a minimum power up to starting compressor time of 95 seconds.

**NOTICE:**

**Compressor Damage!**

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

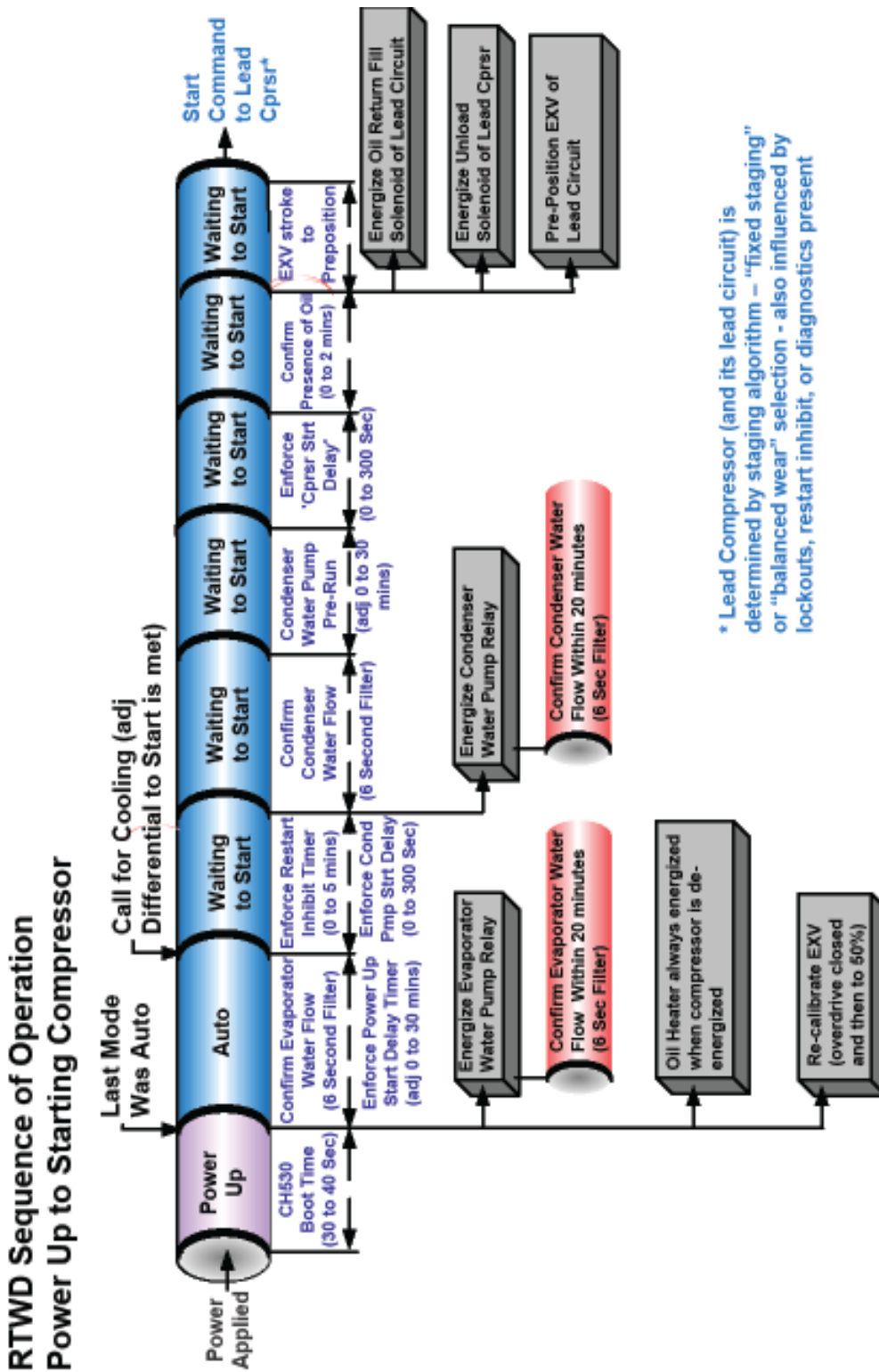
Use only refrigerants specified on the unit nameplate (HFC 134a) and Trane OIL00048. Failure to do so may cause compressor damage and improper unit operation.

**NOTICE:**

**Equipment Damage!**

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

Figure 67. RTWD power up to starting



## Stopped to Starting

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

1. No motor restart inhibit
2. Evaporator and Condenser Water flowing
3. Power up Start Delay Timer has expired

4. Adjustable Stop to Start Timer has expired
5. Need to cool

The above conditions would allow the compressor to start in 60 seconds.

**Figure 68. RTWD stopped to starting**

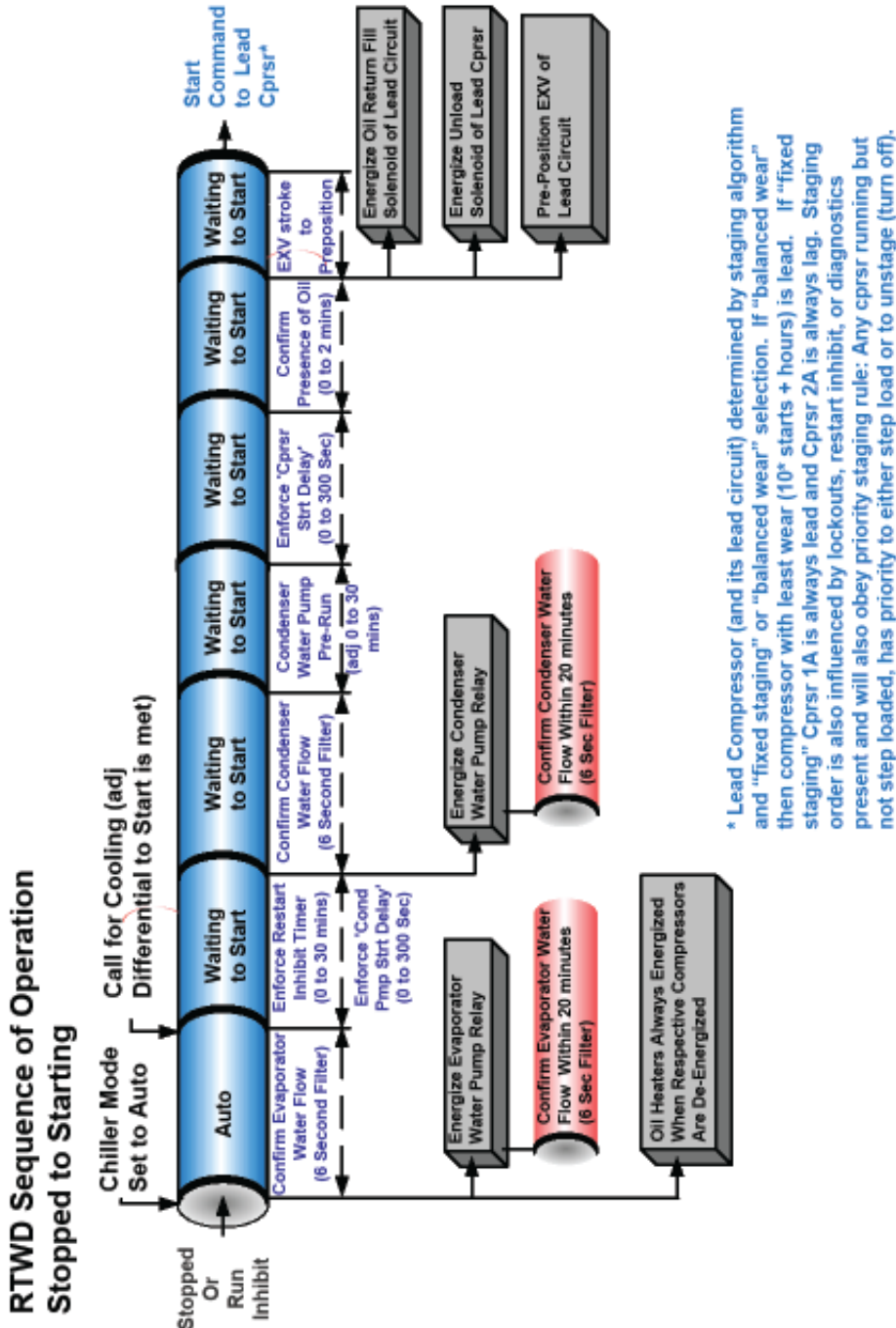


Figure 69. RTUD power up to starting

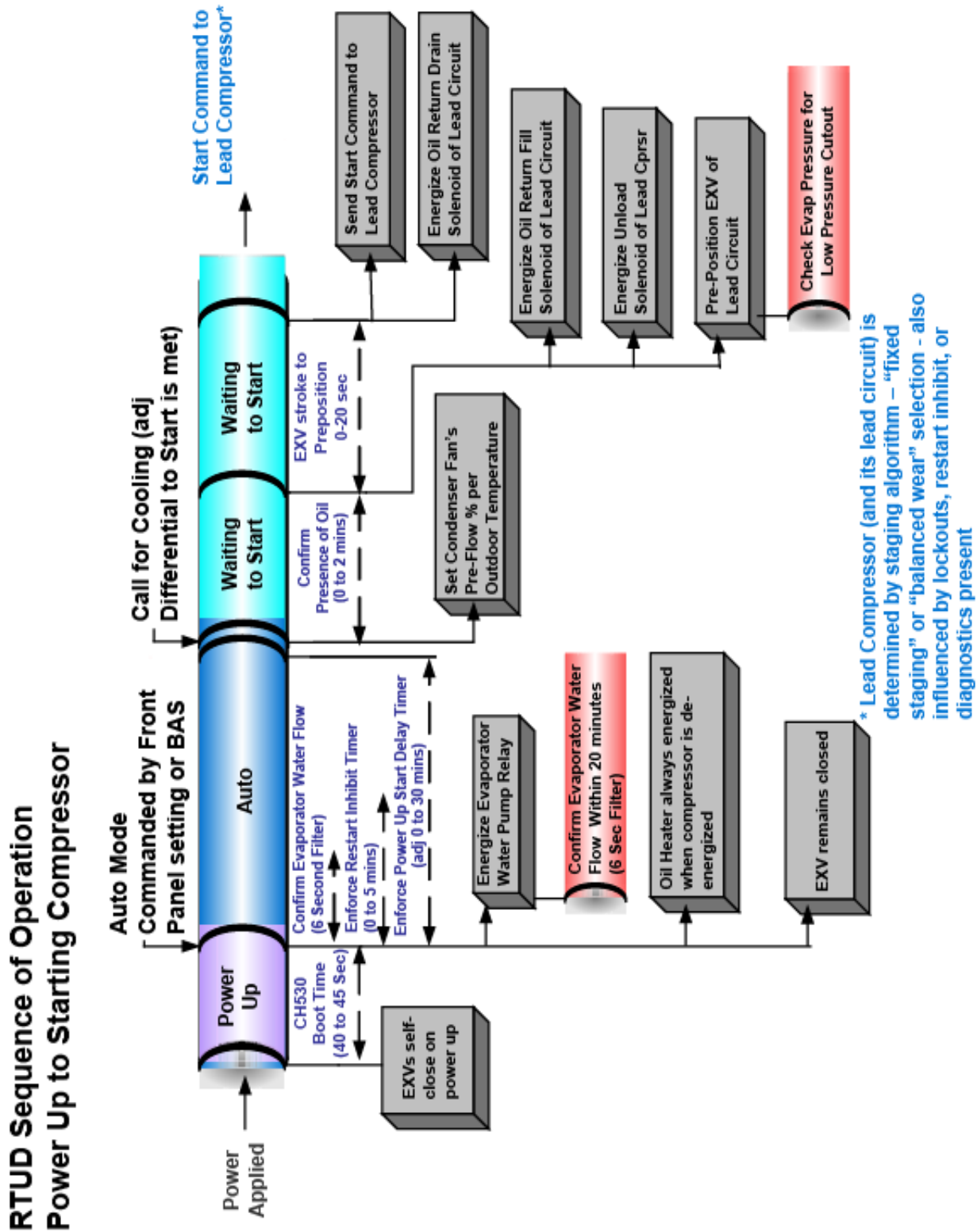
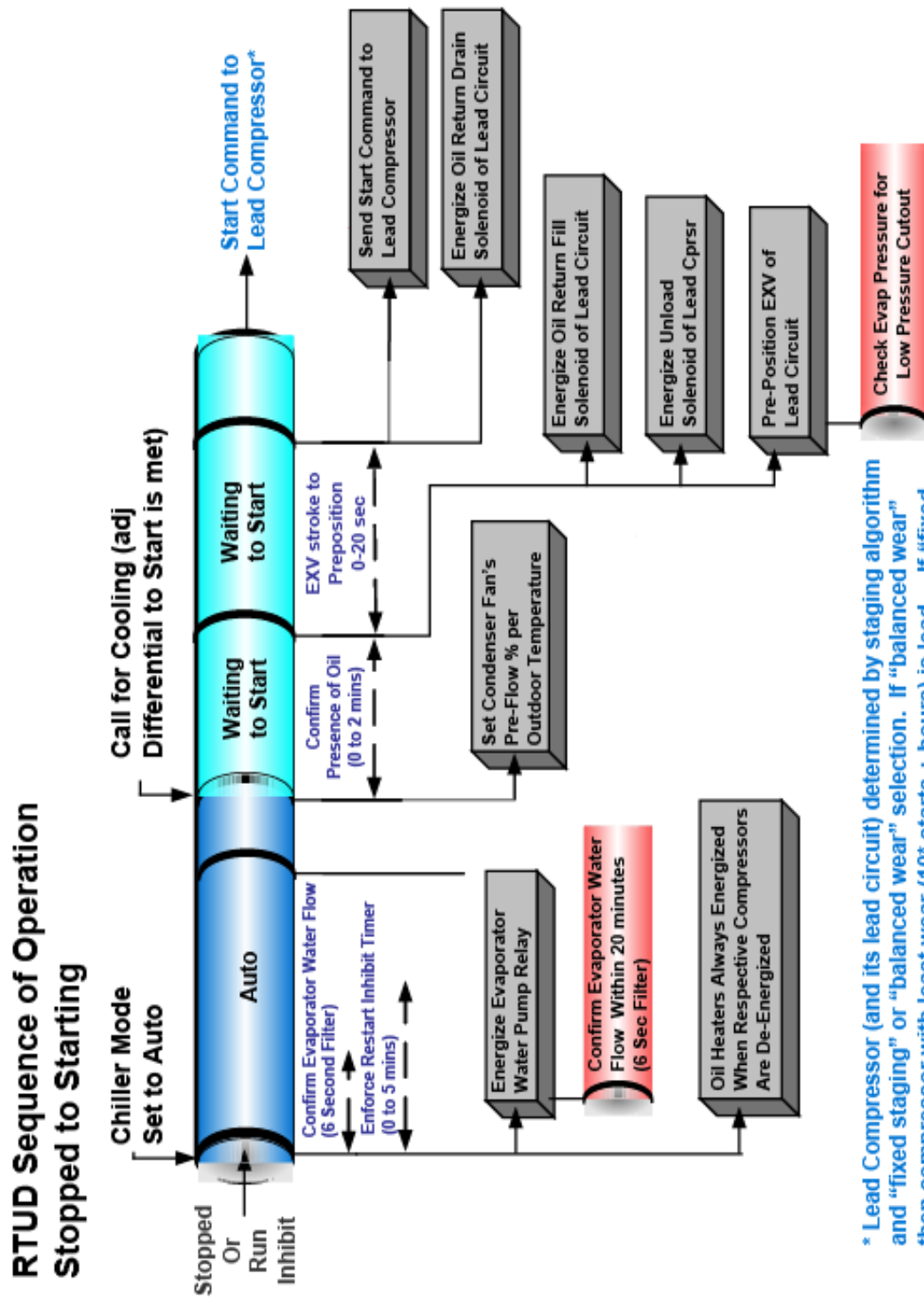


Figure 70. RTUD stopped to starting



\* Lead Compressor (and its lead circuit) determined by staging algorithm and "fixed staging" or "balanced wear" selection. If "balanced wear" then compressor with least wear (10\* starts + hours) is lead. If "fixed staging" Cprsr 1A is always lead and Cprsr 2A is always lag. Staging order is also influenced by lockouts, restart inhibit, or diagnostics present and will also obey priority staging rule: Any cprsr running but not step loaded, has priority to either step load or to unstage (turn off).

### Normal Shutdown to Stopped

The Normal Shutdown diagram shows the Transition from Running through a Normal (friendly) Shutdown. The

Dashed lines on the top attempt to show the final mode if you enter the stop via various inputs.

Figure 71. RTWD normal shutdown

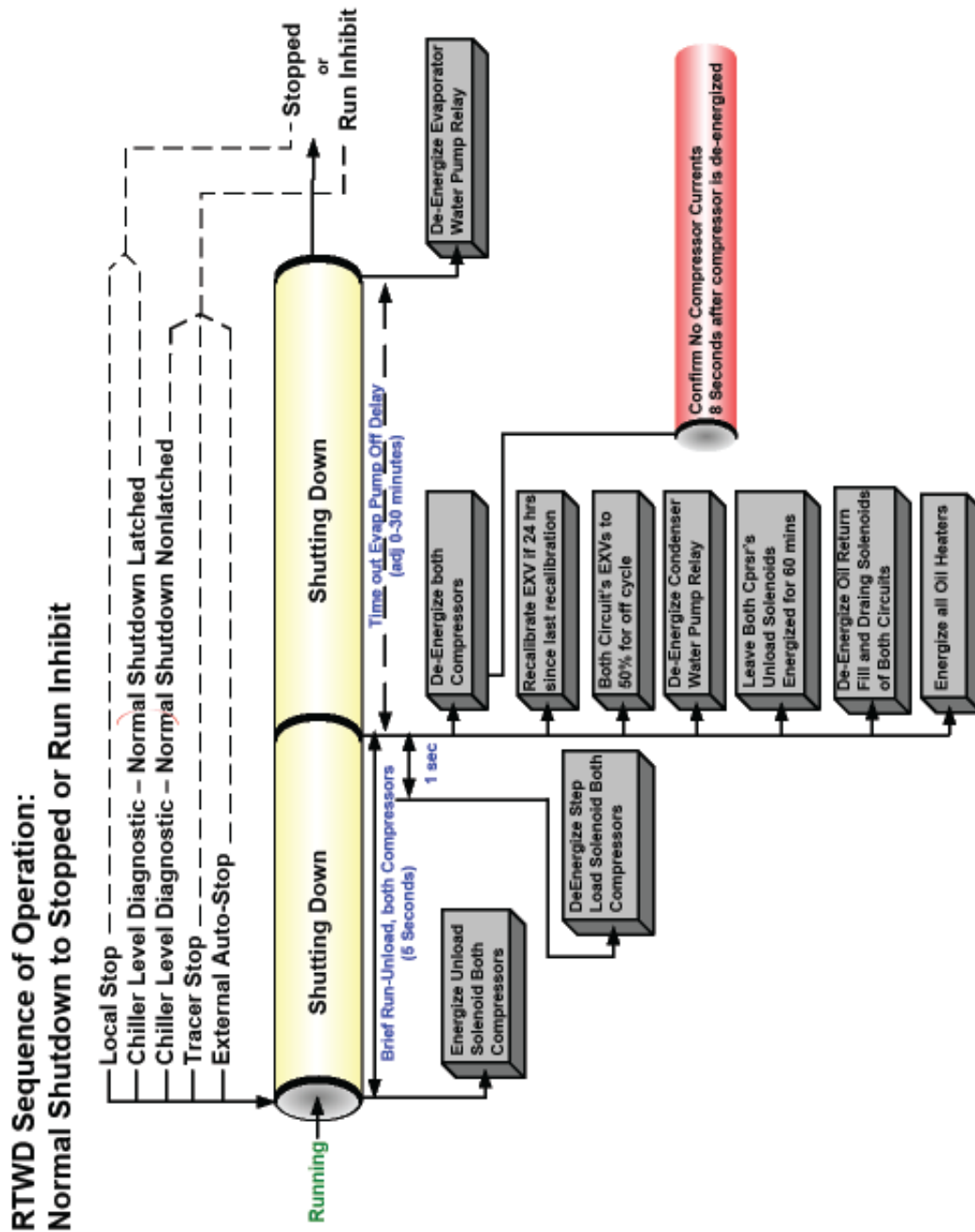
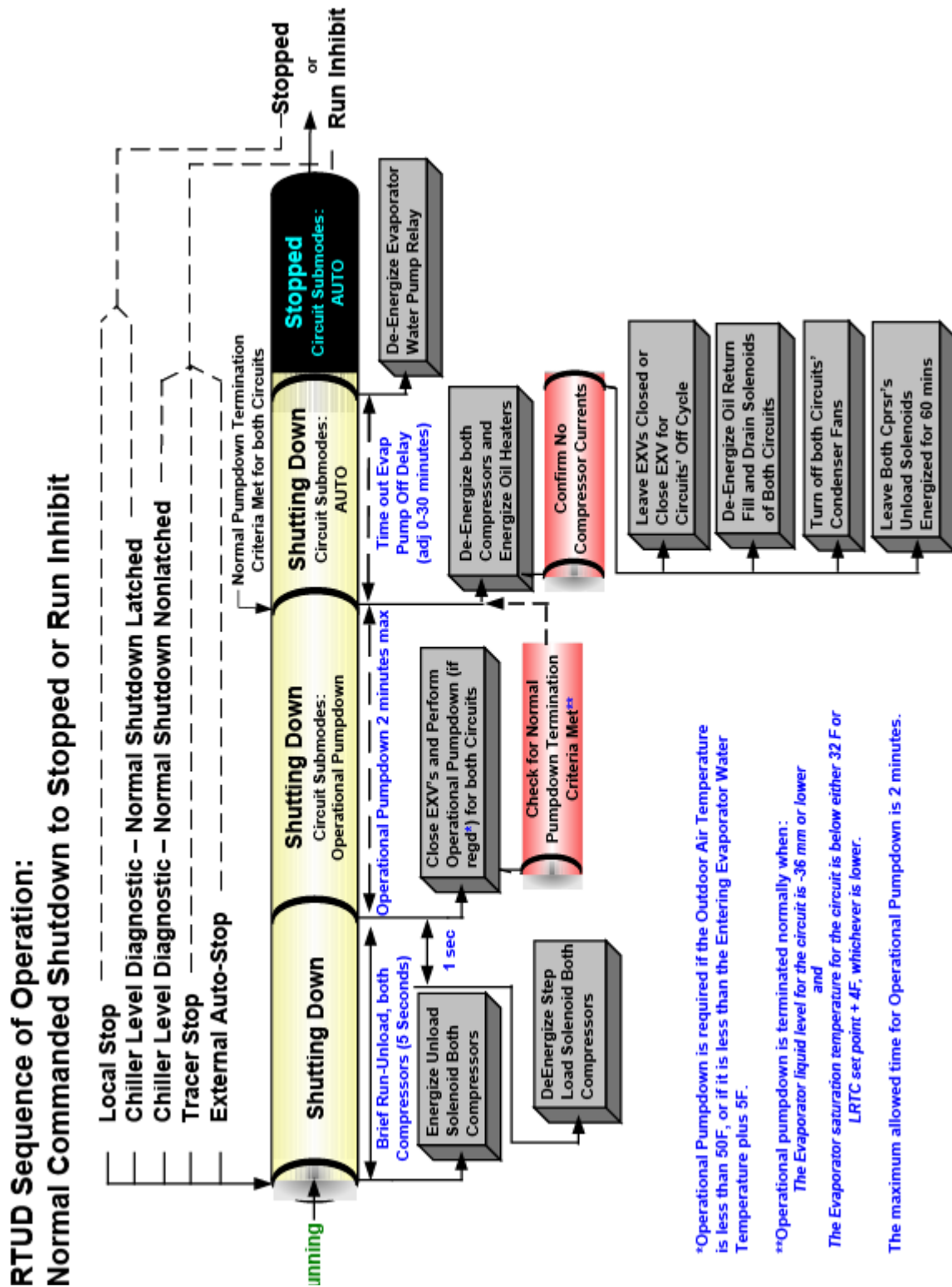


Figure 72. RTUD normal shutdown



\*Operational Pumpdown is required if the Outdoor Air Temperature is less than 50F, or if it is less than the Entering Evaporator Water Temperature plus 5F.

\*\*Operational pumpdown is terminated normally when:

The Evaporator liquid level for the circuit is -36 mm or lower and  
The Evaporator saturation temperature for the circuit is below either 32 F or LRTC set point + 4F, whichever is lower.

The maximum allowed time for Operational Pumpdown is 2 minutes.





# Maintenance

## Overview

This section describes preventative maintenance procedures and intervals. Use a periodic maintenance program to ensure optimal performance and efficiency of the Series R units.

An important aspect of the chiller maintenance program is the regular completion of operator logs. See “[Log and Check Sheets](#),” p. 157 for an example. When filled out properly the completed logs can be reviewed to identify any developing trends in the chiller's operating conditions.

## Maintenance

### ⚠ 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.

### ⚠ WARNING

#### Live Electrical Components!

Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury. When necessary to work with live electrical components, have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks.

## Weekly Maintenance and Checks

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

- Log the chiller.
- Check evaporator and condenser pressures with gauges and compare to the reading on the CH530. Pressure readings should fall within the specified ranges listed in [Table 85](#) and [Table 86](#). If chiller measurements vary significantly from values listed, problems may exist with refrigerant and oil charge levels. Contact local Trane service.

**Note:** For RTWD units, optimum condenser pressure is dependent on condenser water temperature, and should equal the saturation pressure of the refrigerant at a temperature 2 to 5°F above that of leaving condenser water at full load.

## Monthly Maintenance and Checks

- Review operator log.
- Clean all water strainers in both the chilled and condensing water piping systems.
- Measure and log the subcooling and superheat.
- See “[Refrigerant and Oil Charge Management](#),” p. 130. If chiller measurements vary significantly from values listed in [Table 85](#) and [Table 86](#), problems may exist with refrigerant and oil charge levels. Contact local Trane service.

## Annual Maintenance

Shut down the chiller once each year to check the following:

### ⚠ 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.

- Perform all weekly and monthly maintenance procedures.
  - Have a qualified laboratory perform an oil analysis to determine system moisture content and acid level.
- Note:** Due to the hygroscopic properties of the POE oil, all oil must be stored in metal containers. The oil will absorb water if stored in a plastic container.
- Contact Trane service organization to leak check the chiller, to inspect safety controls, and inspect electrical components for deficiencies.
  - Inspect all piping components for leakage and/or damage. Clean out any inline strainers.
  - Clean and repaint any areas that show signs of corrosion.
  - Inspect vent piping of all relief valves for presence of refrigerant to detect improperly sealed relief valves. Contact Trane service if unusual conditions are observed.
  - Inspect the condenser tubes for fouling. Clean if necessary. See “[Cleaning the Condenser \(RTWD Only\)](#),” p. 130.
  - Check to make sure that the crank case heater is working.

## Scheduling Other Maintenance

- Use a nondestructive tube test to inspect the condenser and evaporator tubes at 3-year intervals.

**Note:** *It may be desirable to perform tube tests on these components at more frequent intervals, depending upon chiller application. This is especially true of critical process equipment.*

- Depending on chiller duty, contact a qualified service organization to determine when to conduct a complete examination of the unit to determine the condition of the compressor and internal components.

## 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.

Table 85 and Table 86 list baseline measurements for units 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 Trane service.

**Note:** *AHRI conditions are: condenser water: 85°F and 3 GPM per ton and evaporator water: 54-44°F.*

**Table 85. RTWD operating conditions at full load<sup>(a)</sup>**

Description	Condition
Evaporator pressure	30-45 psig
Condensing pressure	75-125 psig
Discharge superheat	10-15°F
Subcooling	5-10°F

(a) All conditions stated above are based on the unit running fully loaded at AHRI conditions. If full load conditions cannot be met, contact Trane service.

**Table 86. RTWD operating conditions at minimum load<sup>(a)</sup>**

Description	Condition
Evaporator approach	*less than 7°F (non-glycol applications)
Condensing approach	*less than 7°F
Subcooling	2-3°F
EXV percent open	10-20% open

\*  $\cong$  1.0°F for new unit.

(a) *Conditions at minimum must be: entering condenser water: 85°F and entering evaporator water: 55°F*

**Note:** *RTUD operating conditions are the physical configuration of the installation.*

## Heat Exchanger Service

### Cleaning the Condenser (RTWD Only)

#### **NOTICE:**

#### **Proper Water Treatment!**

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

Condenser tube fouling is suspect when the “approach” temperature (i.e., the difference between the refrigerant condensing temperature and the leaving condenser water temperature) is higher than predicted.

Standard water applications will operate with less than a 10°F approach. If the approach exceeds 10°F cleaning the condenser tubes is recommended.

**Note:** *Glycol in the water system may as much as double the standard approach.*

If the annual condenser tube inspection indicates that the tubes are fouled, two cleaning methods can be used to rid the tubes of contaminants.

- Mechanical tube cleaning method is used to remove sludge and loose material from smooth-bore condenser tubes. See “[Mechanical Cleaning Procedure](#),” p. 131.
- Chemical cleaning procedures are used to remove scale deposits. See “[Chemical Cleaning Procedure](#),” p. 133

## Mechanical Cleaning Procedure

**Table 87. RTWD condenser waterbox weights**

Model	Size	Hz	Effic	Waterbox	Weight - kg (lbs)	Lifting Connection
RTWD	80, 90, 100, 110, 120, 130, 140	60	STD	Supply, Return	29 (64)	M12x1.75
	80, 90, 100, 110, 120, 130	60	HIGH	Supply, Return		
	70, 80, 90, 100, 110, 120, 130, 140, 160	50	STD	Supply, Return		
	60, 70, 80, 90, 100, 110, 120	50	HIGH	Supply, Return		
RTWD	150, 160, 180, 200, 220, 250	60	HIGH	Supply	38 (84)	M12x1.75
	150, 160, 180, 200	60	PREM	Supply		
	130, 140, 160, 180, 200, 220, 250	50	HIGH	Supply		
	160, 180, 200	50	PREM	Supply		
RTWD	150, 160, 180, 200, 220, 250	60	HIGH	Return	42 (93)	M12x1.75
	150, 160, 180, 200	60	PREM	Return		
	130, 140, 160, 180, 200, 220, 250	50	HIGH	Return		
	160, 180, 200	50	PREM	Return		

**⚠ WARNING**

**Heavy Objects!**

Failure to properly lift waterbox/cover could result in death or serious injury. Each of the individual cables (chains or slings) used to lift the waterbox/cover must be capable of supporting the entire weight of the waterbox/cover. The cables (chains or slings) must be rated for overhead lifting applications with an acceptable working load limit.

**⚠ WARNING**

**Heavy Objects!**

Failure to properly lift waterbox could result in death or serious injury. The proper use and ratings for eyebolts can be found in ANSI/ASME standard B18.15. Maximum load rating for eyebolts are based on a straight vertical lift in a gradually increasing manner. Angular lifts will significantly lower maximum loads and should be avoided whenever possible. Loads should always be applied to eyebolts in the plane of the eye, not at some angle to this plane.

Review mechanical room limitations and determine the safest method or methods of rigging and lifting the waterboxes.

**Units with Standard Condenser Waterboxes.**

Select the proper waterbox removal procedure method as shown below.

**Waterbox Removal Procedure - Method 1**

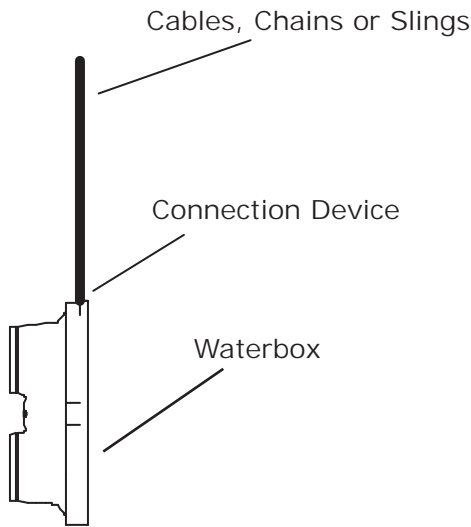
This selection applies to the units and condenser side waterboxes shown in [Table 88](#).

**Table 88. Waterbox removal procedure – method 1**

Size	Hz	Effic	Condenser Waterbox
80, 90, 100, 110, 120, 130, 140	60	STD	Supply, Return
80, 90, 100, 110, 120, 130	60	HIGH	Supply, Return
70, 80, 90, 100, 110, 120, 130, 140, 150	50	STD	Supply, Return
60, 70, 80, 90, 100, 110, 120	50	HIGH	Supply, Return
150, 160, 180, 200, 220, 250	60	HIGH	Supply
150, 160, 180, 200	60	PREM	Supply
130, 140, 160, 180, 200, 220, 250	50	HIGH	Supply
160, 180, 200	50	PREM	Supply

1. Select the proper lift connection device from [Table 91](#). The rated lifting capacity of the selected lift connection device must meet or exceed the published weight of the waterbox. See [Table 87, p. 131](#) for waterbox weights.
2. Ensure the lift connection device has the correct connection for the waterbox. Example: thread type (course/fine, English/metric). Bolt diameter (English/metric).
3. Properly connect the lift connection device to the waterbox. See [Figure 73](#). Ensure lift connection device is securely fastened.

**Figure 73. Water box lifting**



4. Install hoist ring on to the lifting connection on the waterbox. Torque to 28 ft-lbs (37 Nm).
5. Disconnect water pipes, if connected.
6. Remove waterbox bolts.
7. Lift the waterbox away from the shell.

**Waterbox Removal Procedure – Method 2**

This selection applies to the units and condenser side waterboxes shown in [Table 89](#).

**Table 89. Waterbox removal procedure – method 2**

Size	Hz	Effic	Condenser Waterbox
150, 160, 180, 200, 220, 250	60	HIGH	Return
150, 160, 180, 200	60	PREM	Return
130, 140, 160, 180, 200, 220, 250	50	HIGH	Return
160, 180, 200	50	PREM	Return

**⚠ CAUTION**

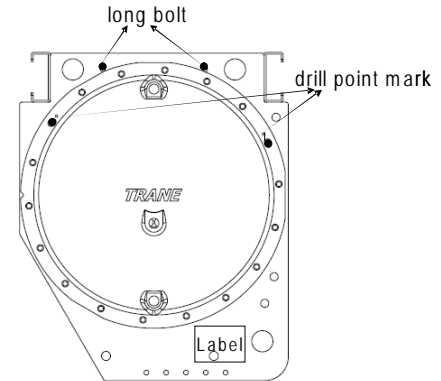
**Risk of Injury!**

To prevent injury, do not place hands or fingers between waterbox and condenser tubesheet.

1. Select the proper lift connection device from [Table 91, p. 133](#). The rated lifting capacity of the selected lift connection device must meet or exceed the published weight of the waterbox. See [Table 87, p. 131](#) for waterbox weights.
2. Ensure the lift connection device has the correct connection for the waterbox.  
Example: Thread type (course/fine, English/metric), Bolt diameter (English/metric).
3. Disconnect water pipes, if connected.

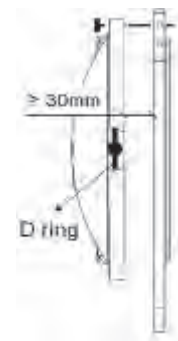
4. Remove the two bolts with drill point mark. Install the long bolts into these two holes until threads are fully engaged, and hand tight. The long bolts are located on the two thread holes just above the waterbox, as shown in [Figure 74](#).

**Figure 74. Waterbox removal - remove bolts**



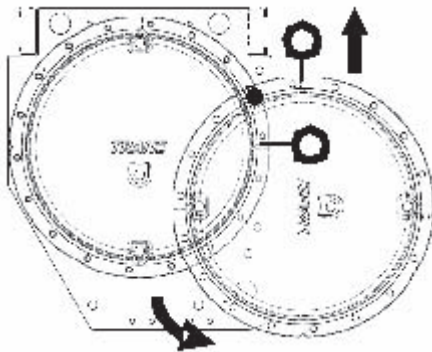
5. Remove the remaining bolts. Slide the waterbox out about 30 mm through two long bolts. Install the Safety Hoist ring (D ring) connection device into the tap drill hole located on waterbox right side (face to waterbox convex). See [Figure 75](#).

**Figure 75. Waterbox removal - slide out, install safety hoist ring**



6. Remove the left long bolt while supporting waterbox from outside of waterbox. Swing the waterbox outboard. Put lifting chain on Safety Hoist ring and remove the remaining long bolt. See [Figure 76](#).

**Figure 76. Waterbox removal - swing out, install lifting chain**



- Lift the waterbox away from the shell.

**⚠ WARNING**

**Overhead Hazard!**

Never stand below or in close proximity to heavy objects while they are suspended from, or being lifted by, a lifting device. Failure to follow these instructions could result in death or serious injuries.

**Condenser Tube Cleaning - Mechanical**

- Store waterbox/cover in a safe and secure location and position.

**Important: Do not leave waterbox/cover suspended from lifting device.**

- Work a round nylon or brass bristled brush (attached to a rod) in and out of each of the condenser water tubes to loosen the sludge.
- Thoroughly flush the condenser water tubes with clean water.

**Note:** To clean internally enhanced tubes, use a bi-directional brush or consult a qualified service.

**Reassembly.** Once service is complete, the waterbox/cover should be reinstalled following all previous procedures in reverse.

- Use new o-rings or gaskets on all joints after thoroughly cleaning each joint. Contact local Trane parts center for information.
- Torque waterbox/cover bolts.

**Note:** Torque bolts in a star pattern. See [Table 90](#) for torque values.

**Table 90. Torque values — ft-lbs (Nm)**

Evaporator	Condenser (RTWD only)
65 (88)	65 (88)

**Parts Ordering Information.**

**Table 91. Lifting hardware**

Unit	Product	Part Number
RTWD/RTUD	Safety Hoist Ring	RNG01886
All units	M12x1.75	

Obtain the required parts from local Trane Parts Center.

**Chemical Cleaning Procedure**

Scale deposits are best removed by chemical means. Consult a qualified water treatment specialist (i.e., one that knows the local water supply chemical/mineral content) for a recommended cleaning solution suitable for the job. (A standard condenser water circuit is composed solely of copper, cast iron and steel.) Improper chemical cleaning can damage tube walls.

All of the materials used in the external circulation system, the quantity of the solution, the duration of the cleaning period, and any required safety precautions should be approved by the company furnishing the materials or performing the cleaning.

**Note:** Chemical tube cleaning should always be followed by mechanical tube cleaning.

## Cleaning the Evaporator

Since the evaporator is typically part of a closed circuit, it does not accumulate appreciable amounts of scale or sludge. However, if cleaning is deemed necessary, use the

same cleaning methods described for the condenser tubes.

See [Table 92, p. 134](#) for evaporator waterbox weights.

**Table 92. RTWD/RTUD evaporator waterbox weights**

Model	Size	Hz	Effic	Waterbox	Weight - kg (lbs)	Lifting Connection
RTWD	80, 90, 100, 110, 120, 130, 140	60	STD	Supply, Return	20.4 (45)	M12x1.75
	80, 90, 100, 110, 120, 130	60	HIGH	Supply, Return		
	70, 80, 90, 100, 110, 120, 130, 140, 150	50	STD	Supply, Return		
	60, 70, 80, 90, 100, 110, 120	50	HIGH	Supply, Return		
RTUD	80, 90, 100, 110, 120, 130	60	HIGH	Supply, Return		
RTWD	150, 160, 180, 200, 220, 250	60	HIGH	Supply	33.6 (74)	M12x1.75
	150, 160, 180, 200	60	PREM	Supply		
	130, 140, 160, 180, 200, 220, 250	50	HIGH	Supply		
	160, 180, 200	50	PREM	Supply		
RTUD	150, 160, 180, 200, 220, 250	60	HIGH	Supply		
RTWD	150, 160, 180, 200, 220, 250	60	HIGH	Return	29.9 (66)	M12x1.75
	150, 160, 180, 200	60	PREM	Return		
	130, 140, 160, 180, 200, 220, 250	50	HIGH	Return		
	160, 180, 200	50	PREM	Return		
RTUD	150, 160, 180, 200, 220, 250	60	HIGH	Return		

## RTUD Air Cooled Condenser Applications

### High Condenser Pressure Limit and High Pressure Cutout Diagnostics

If a circuit experiences significant time in the High Condenser Pressure Limit mode, or if it experiences High Pressure Cutout trip diagnostics, the air cooled condenser may be the root cause and should be inspected.

The condenser coils should be checked for air flow restrictions and cleanliness, as well as the possibility of recirculated air, in which the air entering the coil is significantly higher temperature than the ambient outdoor air temperature (5 °F or more).

All of the fans should also be validated to be operational with the proper fan blade rotation direction. Dirty, or fouled coils, or otherwise limited or restricted air flow through the coils, can significantly degrade the efficiency of the chiller as well as result in unnecessary limits and nuisance trips. See the condenser manufacturers' maintenance and cleaning procedures.

## Lubrication System

### Compressor Oil

**NOTICE:**

**Equipment Damage!**

**To prevent oil sump heater burnout, open the unit main power disconnect switch before removing oil from the compressor.**

Trane Polyolester Oil is the approved oil for the RTWD/RTUD units. Polyolester oil is extremely hygroscopic meaning it readily attracts moisture. The oil can not be stored in plastic containers due to the hygroscopic properties. As with mineral oil, if water is in the system it will react with the oil to form acids. Use [Table 93](#) to determine the acceptability of the oil.

**Table 93. POE oil properties**

Description	Acceptable Levels
Moisture content	less than 300 ppm
Acid Level	less than 0.5 TAN (mg KOH/g)
<b>Note:</b> Mineral oil used in the RTHA and RTHB units has different acceptable levels (< 50 ppm of moisture and < 0.05 mg KOH/g)	

**Note:** Use an oil transfer pump to change the oil regardless of chiller pressure.

## Oil Sump Level Check

Running the chiller at minimum load is the best for the quickest return of oil to the separator and sump. The machine still needs to sit for approximately 30 minutes before the level is taken. At minimum load, the discharge superheat should be highest. The more heat in the oil as it lays in the sump, the more refrigerant will boil off in the sump and leave more concentrated oil.

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

1. Run the unit fully unloaded for approximately 20 minutes.
2. Cycle the compressor off line.

5. The level should be between 4" and 9.5" from the bottom of the oil sump.

**Note:** If oil levels are not between 4" and 9.5", contact Trane service.

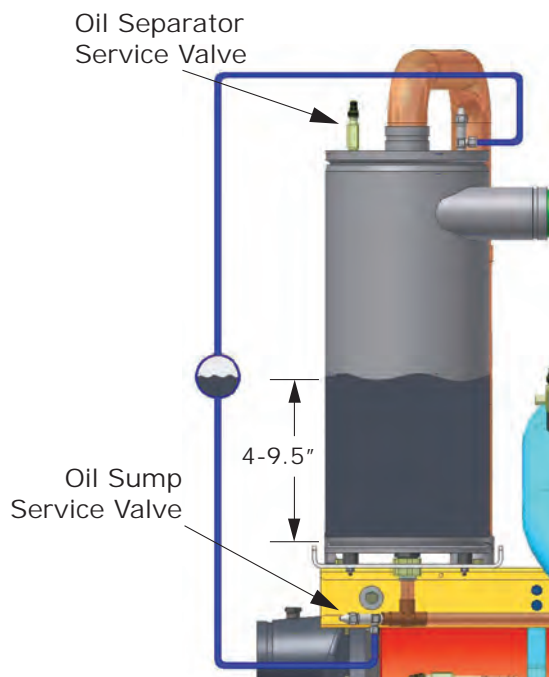
6. After the level is determined, close the service valves and remove the hose/sightglass assembly.

### NOTICE:

#### Equipment Damage!

Never operate the compressor with the sight glass service valves opened. Severe oil loss will occur. Close the valves after checking the oil level. The sump is above the condenser and it is possible to drain the oil.

Figure 77. Determining oil level in the sump



3. Attach a 3/8" or 1/2" hose with a sightglass in the middle to the oil sump service valve (1/4" flare) and the oil separator service valve (1/4" flare).

**Note:** Using high pressure rated clear hose with appropriate fittings can help speed up the process.

4. After the unit is off line for 30 minutes, move the sightglass along the side of the oil sump.



# Diagnostics

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

**Affects Target:** Defines the “target” or what is affected by the diagnostic. Usually either the entire **Chiller**, or a particular **Circuit or Compressor** is affected by the diagnostic (the same one as the source), but in special cases functions are modified or disabled by the diagnostic. **None** implies that there is no direct affect to the chiller, sub components or functional operation.

**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.

**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 announced to any of the formal mode displays.

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

**Reset Level:** Defines the lowest level of manual diagnostic reset command which can clear the diagnostic. The manual diagnostic reset levels in order of priority are: **Local** or **Remote**. For example, a diagnostic that has a reset level of Remote, can be reset by either a remote diagnostic reset command or by a local diagnostic reset command.

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

## Starter Diagnostics

Table 94. Starter diagnostics

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Compressor Did Not Accelerate: Transition - Compressor 1A	*Circuit	Info	Latch	Start Mode	The compressor did not come up to speed (fall to <85%RLA) in the allotted time defined by the Maximum Acceleration Timer and a transition was forced (motor put across the line) at that time. This applies to all starter types.	Remote
Compressor Did Not Accelerate: Transition - Compressor 2A	*Circuit	Info	Latch	Start Mode	The compressor did not come up to speed (fall to <85%RLA) in the allotted time defined by the Maximum Acceleration Timer and a transition was forced (motor put across the line) at that time. This applies to all starter types.	Remote
Motor Current Overload - Compressor 1A	Circuit	Immediate	Latch	Cprsr Energized	Compressor current exceeded overload time vs. trip characteristic. Must trip = 140% RLA, Must hold=125%, nominal trip 132.5% in 30 seconds	Local
Motor Current Overload - Compressor 2A	Circuit	Immediate	Latch	Cprsr Energized	Compressor current exceeded overload time vs. trip characteristic. Must trip = 140% RLA, Must hold=125%, nominal trip 132.5% in 30 seconds	Local
Over Voltage	Chiller	Normal	Non Latch	Pre-Start and Any Ckt(s) Energzd	Nom. trip: 60 seconds at greater than 112.5%, ± 2.5%, Auto Reset at 110% or less for 10 cont secs.	Remote
Phase Loss - Compressor 1A	*Circuit	Immediate	Latch	Start Sequence and Run modes	a) No current was sensed on one or two of the current transformer inputs while running or starting (See Nonlatching Power Loss Diagnostic for all three phases lost while running). Must hold = 20% RLA. Must trip = 5% RLA. Time to trip shall be longer than guaranteed reset on Starter Module at a minimum, 3 seconds maximum. Actual design trip point is 10%. The actual design trip time is 2.64 seconds. b) If Phase reversal protection is enabled and current is not sensed on one or more current xformer inputs. Logic will detect and trip in a maximum of 0.3 seconds from compressor start.	Local



**Table 94. Starter diagnostics (continued)**

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Phase Loss - Compressor 2A	*Circuit	Immediate	Latch	Start Sequence and Run modes	a) No current was sensed on one or two of the current transformer inputs while running or starting (See Nonlatching Power Loss Diagnostic for all three phases lost while running). Must hold = 20% RLA. Must trip = 5% RLA. Time to trip shall be longer than guaranteed reset on Starter Module at a minimum, 3 seconds maximum. Actual design trip point is 10%. The actual design trip time is 2.64 seconds. b) If Phase reversal protection is enabled and current is not sensed on one or more current transformer inputs. Logic will detect and trip in a maximum of 0.3 second from compressor start	Local
Phase Reversal - Compressor 1A	*Circuit	Immediate	Latch	Compressor energized to transition command [All Other Times]	A phase reversal was detected on the incoming current. On a compressor startup the phase reversal logic must detect and trip in a maximum of .3 second from compressor start.	Local
Phase Reversal - Compressor 2A	*Circuit	Immediate	Latch	Compressor energized to transition command [All Other Times]	A phase reversal was detected on the incoming current. On a compressor startup the phase reversal logic must detect and trip in a maximum of .3 second from compressor start.	Local
Power Loss - Compressor 1A	*Circuit	Immediate	Non Latch	All compressor running modes [all compressor starting and non-running modes]	The compressor had previously established currents while running and then <u>all three</u> phases of current were lost. Design: Less than 10% RLA, trip in 2.64 seconds. This diagnostic will preclude the Phase Loss Diagnostic and the Transition Complete Input Opened Diagnostic from being called out. To prevent this diagnostic from occurring with the intended disconnect of main power, the minimum time to trip must be greater than the guaranteed reset time of the Starter module. Note: This diagnostic prevents nuisance latching diagnostics due to a momentary power loss. This diagnostic is not active during the start mode before the transition complete input is proven. Thus a random power loss during a start would result in either a "Starter Fault Type 3" or a "Starter Did Not Transition" latching diagnostic.	Remote
Power Loss - Compressor 2A	*Circuit	Immediate	Non Latch	All compressor running modes [all compressor starting and non-running modes]	The compressor had previously established currents while running and then <u>all three</u> phases of current were lost. Design: Less than 10% RLA, trip in 2.64 seconds. This diagnostic will preclude the Phase Loss Diagnostic and the Transition Complete Input Opened Diagnostic from being called out. To prevent this diagnostic from occurring with the intended disconnect of main power, the minimum time to trip must be greater than the guaranteed reset time of the Starter module.	Remote
Severe Current Imbalance - Compressor 1A	Circuit	Immediate	Latch	All Running Modes	A 30% Current Imbalance has been detected on one phase relative to the average of all 3 phases for 90 continuous seconds.	Local
Severe Current Imbalance - Compressor 2A	Circuit	Immediate	Latch	All Running Modes	A 30% Current Imbalance has been detected on one phase relative to the average of all 3 phases for 90 continuous seconds	Local
Starter 1A Dry Run Test	*Circuit	Immediate	Latch	Starter Dry Run Mode	While in the Starter Dry Run Mode either 50% Line Voltage was sensed at the Potential Transformers or 10% RLA Current was sensed at the Current Transformers.	Local
Starter 2A Dry Run Test	*Circuit	Immediate	Latch	Starter Dry Run Mode	While in the Starter Dry Run Mode either 50% Line Voltage was sensed at the Potential Transformers or 10% RLA Current was sensed at the Current Transformers.	Local

## Diagnostics

**Table 94. Starter diagnostics (continued)**

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Starter Contactor Interrupt Failure - Compressor 1A	Chiller	Special Action	Latch	Starter Contactor not Energized [Starter Contactor Energized]	Detected compressor currents greater than 10% RLA on any or all phases when the compressor was commanded off. Detection time shall be 5 second minimum and 10 seconds maximum. On detection and until the controller is manually reset: generate diagnostic, energize the appropriate alarm relay, continue to energize the Evap Pump Output, continue to command the affected compressor off, fully unload the effected compressor and command a normal stop to all other compressors. For as long as current continues, perform liquid level, oil return, and fan control on the circuit effected.	Local
Starter Contactor Interrupt Failure - Compressor 2A	Chiller	Special Action	Latch	Starter Contactor not Energized [Starter Contactor Energized]	Detected compressor currents greater than 10% RLA on any or all phases when the compressor was commanded off. Detection time shall be 5 second minimum and 10 seconds maximum. On detection and until the controller is manually reset: generate diagnostic, energize the appropriate alarm relay, continue to energize the Evap Pump Output, continue to command the affected compressor off, fully unload the effected compressor and command a normal stop to all other compressors. For as long as current continues, perform liquid level, oil return, and fan control on the circuit effected.	Local
Starter Did Not Transition - Compressor 1A	*Circuit	Immediate	Latch	On the first check after transition.	The Starter Module did not receive a transition complete signal in the designated time from its command to transition. The must hold time from the Starter Module transition command is 1 second. The Must trip time from the transition command is 6 seconds. Actual design is 2.5 seconds. This diagnostic is active only for Y-Delta, Auto-Transformer, Primary Reactor, and X-Line Starters.	Local
Starter Did Not Transition - Compressor 2A	*Circuit	Immediate	Latch	On the first check after transition.	The Starter Module did not receive a transition complete signal in the designated time from its command to transition. The must hold time from the Starter Module transition command is 1 second. The Must trip time from the transition command is 6 seconds. Actual design is 2.5 seconds. This diagnostic is active only for Y-Delta, Auto-Transformer, Primary Reactor, and X-Line Starters.	Local
Starter Fault Type I – Compressor 1A	*Circuit	Immediate	Latch	Starting - Y Delta Starters Only	This is a specific starter test where 1M(1K1) is closed first and a check is made to ensure that there are no currents detected by the CTs. If currents are detected when only 1M is closed first at start, then one of the other contactors is shorted.	Local
Starter Fault Type I – Compressor 2A	*Circuit	Immediate	Latch	Starting - Y Delta Starters Only	This is a specific starter test where 1M(1K1) is closed first and a check is made to ensure that there are no currents detected by the CTs. If currents are detected when only 1M is closed first at start, then one of the other contactors is shorted.	Local
Starter Fault Type II – Compressor 1A	*Circuit	Immediate	Latch	Starting All types of starters	a. This is a specific starter test where the Shorting Contactor (1K3) is individually energized and a check is made to ensure that there are no currents detected by the CTs. If current is detected when only S is energized at Start, then 1M is shorted. b. This test in a. above applies to all forms of starters (Note: It is understood that many starters do not connect to the Shorting Contactor.).	Local
Starter Fault Type II – Compressor 2A	*Circuit	Immediate	Latch	Starting – All types of starters	a. This is a specific starter test where the Shorting Contactor (1K3) is individually energized and a check is made to ensure that there are no currents detected by the CTs. If current is detected when only S is energized at Start, then 1M is shorted. b. This test in a. above applies to all forms of starters (Note: It is understood that many starters do not connect to the Shorting Contactor.).	Local

**Table 94. Starter diagnostics (continued)**

Diagnostic Name and Source	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Starter Fault Type III – Compressor 1A	*Circuit	Immediate	Latch	Starting [Adaptive Frequency Starter Type]	As part of the normal start sequence to apply power to the compressor, the Shorting Contactor (1K3) and then the Main Contactor (1K1) were energized. 1.6 seconds later there were no currents detected by the CT's for the last 1.2 Seconds on all three phases. The test above applies to all forms of starters except Adaptive Frequency Drives.	Local
Starter Fault Type III – Compressor 2A	*Circuit	Immediate	Latch	Starting [Adaptive Frequency Starter Type]	As part of the normal start sequence to apply power to the compressor, the Shorting Contactor (1K3) and then the Main Contactor (1K1) were energized. 1.6 seconds later there were no currents detected by the CT's for the last 1.2 seconds on all three phases. The test above applies to all forms of starters except Adaptive Frequency Drives.	Local
Transition Complete Input Opened – Compressor 1A	*Circuit	Immediate	Latch	All running modes	The Transition Complete input was found to be opened with the compressor motor running after a successful completion of transition. This is active only for Y-Delta, Auto-Transformer, Primary Reactor, and X-Line Starters. To prevent this diagnostic from occurring as the result of a power loss to the contactors, the minimum time to trip must be greater than the trip time for the power loss diagnostic.	Local
Transition Complete Input Opened – Compressor 2A	*Circuit	Immediate	Latch	All running modes	The Transition Complete input was found to be opened with the compressor motor running after a successful completion of transition. This is active only for Y-Delta, Auto-Transformer, Primary Reactor, and X-Line Starters. To prevent this diagnostic from occurring as the result of a power loss to the contactors, the minimum time to trip must be greater than the trip time for the power loss diagnostic.	Local
Transition Complete Input Shorted – Compressor 1A	*Circuit	Immediate	Latch	Pre-Start	The Transition Complete input was found to be shorted before the compressor was started. This is active for all electromechanical starters.	Local
Transition Complete Input Shorted – Compressor 2A	*Circuit	Immediate	Latch	Pre-Start	The Transition Complete input was found to be shorted before the compressor was started. This is active for all electromechanical starters.	Local
Under Voltage	Chiller	Normal	Non Latch	Pre-Start and Any Ckt(s) Energzd	Nom. trip: 60 seconds at less than 87.5%, ± 2.8% at 200V ± 1.8% at 575V, Auto Reset at 90% or greater.	Remote

## Main Processor Diagnostics

**Table 95. Main processor diagnostics**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
BAS Communication Lost	None	Special Action	Non Latch	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 effected by the comm loss. The chiller follows the value of the Tracer Default Run Command which can be previously written by Tracer and stored nonvolatily 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
BAS Failed to Establish Communication	None	Special Action	Non Latch	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 effected. 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
Check Clock	Chiller	Info	Latch	All	The real time clock had detected loss of its oscillator at some time in the past. Check/replace battery? This diagnostic can be effectively cleared only by writing a new value to the chiller's time clock using the TechView™ or DynaView's "set chiller time" functions.	Remote
Condenser Entering Water Temperature Sensor	Chiller	Info and Special Action	Latch	All	RTWD only: Bad Sensor or LLID. If chiller running, and condenser water regulating valve option installed, force valve to 100% flow.	Remote
Condenser Leaving Water Temperature Sensor	Chiller	Info or Special Action	Latch	All	RTWD only: Bad Sensor or LLID. If Chiller is running in the heat mode of operation – normal chiller shutdown, otherwise, informational warning only. Discontinue Min Capacity Limit forced cprsr loading due to Low DP in subsequent startups.	Remote
Condenser Refrigerant Pressure Transducer - Circuit 1	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Condenser Refrigerant Pressure Transducer - Circuit 2	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Condenser Water Flow Lost	Chiller	Immediate	Non Latch	Start and All Run Modes	The condenser water flow proof input was open for more than 6 contiguous seconds (or 15 seconds for thermal dispersion type flow switch) after flow had been proven. This diagnostic is automatically cleared once the compressor is stopped by a fixed time out of 7 sec. In Cooling Mode: The Cond Pump shall be commanded off but the Evap pump command will not be effected. – once the diagnostic auto clears, if diff to start is met, the cond pump can be restarted. In Heating Mode: The Cond Pump shall remain on, and the Evap pump shall shut off – once diagnostic auto clears, if diff to start is met, the chiller may restart normally and the evap pump can be restarted.	Remote
Condenser Water Flow Overdue	Chiller	Normal	Non Latch	Estab Cond Water Flow	Condenser water flow was not proven within 20 minutes of the condenser pump relay being energized. The Cond Pump shall be commanded off. Diagnostic is reset with return of flow (although only possible with external control of pump)	Remote
Discharge Temperature Sensor – Compressor 1A	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote

**Table 95. Main processor diagnostics (continued)**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Discharge Temperature Sensor – Compressor 2A	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Emergency Stop	Chiller	Immediate	Latch	All	a. EMERGENCY STOP input is open. An external interlock has tripped. Time to trip from input opening to unit stop shall be 0.1 to 1.0 seconds.	Local
Evaporator Approach Error – Circuit 1	Circuit	Immediate	Latch	Respective circuit running	The Evaporator approach temperature for the respective circuit (ELWT – Evap Sat Temp Ckt x) is negative by 10°F or more, for 1 minute continuously while the circuit/compressor is operating. Either the Evap Leaving Water Temp sensor, or Evap Suction Rfgr Pressure Transducer Ckt 1 is in error.	Remote
Evaporator Approach Error – Circuit 2	Circuit	Immediate	Latch	Respective circuit running	The Evaporator approach temperature for the respective circuit (ELWT – Evap Sat Temp Ckt x) is negative by 10°F or more, for 1 minute continuously while the circuit/compressor is operating. Either the Evap Leaving Water Temp sensor, or Evap Suction Rfgr Pressure Transducer Ckt 2 is in error.	Remote
Evaporator Entering Water Temperature Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID Note: Entering Water Temp Sensor is used in EXV pressure control as well as ice making so it must cause a unit shutdown even if ice or CHW reset is not installed.	Remote
Evaporator Leaving Water Temperature Sensor	Chiller	Normal	Latch	All	Bad Sensor or LLID	Remote
Evaporator Liquid Level Sensor – Circuit 1	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
Evaporator Liquid Level Sensor – Circuit 2	Circuit	Normal	Latch	All	Bad Sensor or LLID	Remote
Evaporator Water Flow (Entering Water Temp)	None	Info	Non Latch	Any Ckt(s) Energzd [No Ckt(s) Energzd]	The entering evaporator water temp fell below the leaving evaporator water temp by more than 2°F for 100F-sec. For falling film evaporators, this diagnostic cannot reliably indicate loss of flow, but 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 could be at fault.	Remote
Evaporator Water Flow Lost	Chiller	Immediate	Non Latch	[All Stop modes]	a. The Evaporator water flow switch input was open for more than 6 contiguous seconds (or 15 seconds for thermal dispersion type flow switch). b. This diagnostic does not de-energize the evap pump output c. 6 seconds of contiguous flow shall clear this diagnostic.	Remote
Evaporator Water Flow Overdue	Chiller	Normal	Non Latch	Estab. Evap. Water Flow on going from STOP to AUTO or Evap Pump Override.	Evaporator water flow was not proven within 20 minutes of the Evaporator water pump relay being energized in normal “Stop” to “Auto” transition. If the pump is overridden to “On” for certain diagnostics, the delay on diagnostic callout shall be only 255 seconds. The pump command status will not be effected by this diagnostic in either case.	Remote
Excessive Condenser Pressure – Circuit 1	Circuit	Immediate	Latch	All	The condenser pressure transducer of this circuit has detected a pressure in excess of the safe high side pressure as limited by the particular compressor type or the evaporator distributor present on this particular chiller. For Air Cooled Condenser, check for dirty coils or any fouling or restrictions as well as proper operation and rotational direction of all fans.	Remote
Excessive Condenser Pressure – Circuit 2	Circuit	Immediate	Latch	All	The condenser pressure transducer of this circuit has detected a pressure in excess of the safe high side pressure as limited by the particular compressor type or the evaporator distributor present on this particular chiller. For Air Cooled Condenser, check for dirty coils or any fouling or restrictions as well as proper operation and rotational direction of all fans.	Remote



## Diagnostics

**Table 95. Main processor diagnostics (continued)**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
External Chilled (Hot Water Setpoint)	None	Info	Latch	All	a. Function Not "Enabled": no diagnostics. B. "Enabled ": Out-Of-Range Low or Hi or bad LLID, set diagnostic, default CWS to next level of priority (e.g. Front Panel SetPoint). This Info diagnostic will automatically reset if the input returns to the normal range.	Remote
External Current Limit Setpoint	None	Info	Latch	All	a. Not "Enabled": no diagnostics. B. "Enabled ": Out-Of-Range Low or Hi or bad LLID, set diagnostic, default CLS to next level of priority (e.g. Front Panel SetPoint). This Info diagnostic will automatically reset if the input returns to the normal range.	Remote
Fan Fault - Circuit 1	Circuit (fan control)	Special Mode (or in single fan deck: Circuit Immediate shutdown	NonLatch (or in single fan deck: Latch)	Prestart and Running w/Low Ambient Variable Spd Fan configured	A fault signal has been detected from the respective condenser's Variable Speed Inverter Drive (fan). Condenser Fan control will revert to constant speed operation without the use of the inverter's fan. If the inverter's fault clears, fan control will switch back to variable speed. For single fan deck configurations, this diagnostic causes a latching circuit shutdown.	
Fan Fault - Circuit 2	Circuit (fan control)	Special Mode (or in single fan deck: Circuit Immediate shutdown	NonLatch (or in single fan deck: Latch)	Prestart and Running w/Low Ambient Variable Spd Fan configured	A fault signal has been detected from the respective condenser's Variable Speed Inverter Drive (fan). Condenser Fan control will revert to constant speed operation without the use of the inverter's fan. If the inverter's fault clears, fan control will switch back to variable speed. For single fan deck configurations, this diagnostic causes a latching circuit shutdown.	
High Differential Refrigerant Pressure - Circuit 1	Circuit	Normal	Latch	Cprsr Energized	<b>High Vi Cprsr:</b> The differential pressure for the respective circuit was above 275 Psid (1890 kPa) for 2 consecutive samples or more than 10 seconds. <b>Low Vi Cprsr:</b> The system differential pressure was above 188 Psid (1296.4 kPa) - for 2 consecutive samples or more than 10 seconds.	Remote
High Differential Refrigerant Pressure - Circuit 2	Circuit	Normal	Latch	Cprsr Energized	<b>High Vi Cprsr:</b> The differential pressure for the respective circuit was above 275 Psid (1890 kPa) for 2 consecutive samples or more than 10 seconds. <b>Low Vi Cprsr:</b> The system differential pressure was above 188 Psid (1296.4 kPa) - for 2 consecutive samples or more than 10 seconds.	Remote
High Discharge Temperature – Compressor 1A	Circuit	Immediate	Latch	All [compressor run unload or compressor not running]	The compressor discharge temperature exceeded 200°F (without oil cooler) or 230°F (with oil cooler). This diagnostic will be suppressed during Run-Unload or after the compressor has stopped. Note: As part of the Compressor High Temperature Limit Mode (aka Minimum Capacity Limit), the compressor shall be forced loaded as the filtered discharge temperature reaches 190°F(without oil coolers), or 220°F (with oil coolers).	Remote
High Discharge Temperature – Compressor 2A	Circuit	Immediate	Latch	All [compressor run unload or compressor not running]	The compressor discharge temperature exceeded 200°F (without oil cooler) or 230°F (with oil cooler). This diagnostic will be suppressed during Run-Unload or after the compressor has stopped. Note: As part of the Compressor High Temperature Limit Mode (aka Minimum Capacity Limit), the compressor shall be forced loaded as the filtered discharge temperature reaches 190°F(without oil coolers), or 220°F (with oil coolers).	Remote
High Evaporator Liquid Level – Circuit 1 (early Phase 1 RTWD production only – eliminated in 2nd Phase 1 release in Sept 08)	Circuit	Normal	Latch	Starter Contactor Energized [all Stop modes]	The liquid level sensor is seen to be at or near its high end of range for 80 contiguous minutes while the compressor is running. (The diagnostic timer will hold, but not clear when the circuit is off). Design: approx 80% or more of bit count corresponding to +30 mm or more liquid level for 80 minutes)	Remote
High Evaporator Liquid Level – Circuit 2 (early Phase 1 RTWD production only – eliminated in 2nd Phase 1 release in Sept 08)	Circuit	Normal	Latch	Starter Contactor Energized [all Stop modes]	The liquid level sensor is seen to be at or near its high end of range for 80 contiguous minutes while the compressor is running. (The diagnostic timer will hold, but not clear when the circuit is off). Design: approx 80% or more of bit count corresponding to +30 mm or more liquid level for 80 minutes)	Remote

**Table 95. Main processor diagnostics (continued)**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
High Evaporator Refrigerant Pressure	Chiller	Immediate	Non Latch	All	The evaporator refrigerant pressure of either circuit has risen above 190 psig. The evaporator water pump relay will be de-energized to stop the pump regardless of why the pump is running. The diagnostic will auto reset and the pump will return to normal control when all of the evaporator pressures fall below 185 psig. The primary purpose is to stop the evaporator water pump and its associated pump heat from causing refrigerant side pressures, close to the evaporator relief valve setting, when the chiller is not running, such as could occur with Evap Water Flow Overdue or Evaporator Water Flow Loss Diagnostics	Remote
High Evaporator Water Temperature	Chiller	Info and Special Action	Non Latch	Only effective if either 1)Evap Wtr Flow Overdue, 2)Evap Wtr Flow Loss, or 3)Low Evap Rfgt Temp,-Unit Off, diagnostic is active.	The leaving water temperature exceeded the high evap water temp limit (TV service menu settable –default 105F) for 15 continuous seconds. The evaporator water pump relay will be de-energized to stop the pump but only if it is running due one of the diagnostics listed on the left. The diagnostic will auto reset and the pump will return to normal control when the temperature falls 5°F below the trip setting. The primary purpose is to stop the evaporator water pump and its associated pump heat from causing excessive waterside temperatures and waterside pressures when the chiller is not running but the evap pump is on due to either Evap Water Flow Overdue, Evaporator Water Flow Loss, or Low Evap Temp – Unit Off Diagnostics. This diagnostic will not auto clear solely due to the clearing of the enabling diagnostic.	Remote
High Motor Temperature - Compressor 1A	Circuit	Immediate	Latch	All	The respective compressor's motor winding thermostat is detected to be open	Local
High Motor Temperature - Compressor 2A	Circuit	Immediate	Latch	All	The respective compressor's motor winding thermostat is detected to be open	Local
High Pressure Cutout - Compressor 1A	Circuit	Immediate	Latch	All	A high pressure cutout was detected on Compressor 1A; trip at 270 ± 5 PSIG. Note: Other diagnostics that may occur as an expected consequence of the HPC trip will be suppressed from annunciation. These include Phase Loss, Power Loss, and Transition Complete Input Open. For Air Cooled Condenser, check for dirty coils or any fouling or restrictions as well as proper operation and rotational direction of all fans.	Local
High Pressure Cutout - Compressor 2A	Circuit	Immediate	Latch	All	A high pressure cutout was detected on Compressor 1A; trip at 270 ± 5 PSIG. Note: Other diagnostics that may occur as an expected consequence of the HPC trip will be suppressed from annunciation. These include Phase Loss, Power Loss, and Transition Complete Input Open. For Air Cooled Condenser, check for dirty coils or any fouling or restrictions as well as proper operation and rotational direction of all fans.	Local
High Refrigerant Pressure Ratio – Circuit 1	Circuit	Immediate	Latch	Service Pumpdown Only	The pressure ratio for the respective circuit exceeded 5.61 for 1 contiguous minute while in service pumpdown. This pressure ratio is a fundamental limitation of the compressor. The pressure ratio is defined as Pcond (abs) (Pevap(abs)).	Remote
High Refrigerant Pressure Ratio – Circuit 2	Circuit	Immediate	Latch	Service Pumpdown Only	The pressure ratio for the respective circuit exceeded 5.61 for 1 contiguous minute while in service pumpdown. This pressure ratio is a fundamental limitation of the compressor. The pressure ratio is defined as Pcond (abs) (Pevap(abs)).	Remote
LCI-C Software Mismatch: Use BAS Tool	Circuit	Info	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
Loss of Oil - Compressor 1A (Running)	Circuit	Immediate	Latch	Starter Contactor Energized	In running modes, Oil Loss Level Sensor detects lack of oil in the oil sump feeding the compressor (distinguishing a liquid flow from a vapor flow)	Local

## Diagnostics

**Table 95. Main processor diagnostics (continued)**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Loss of Oil - Compressor 2A (Running)	Circuit	Immediate	Latch	Starter Contactor Energized	In running modes, Oil Loss Level Sensor detects lack of oil in the oil sump feeding the compressor (distinguishing a liquid flow from a vapor flow)	Local
Loss of Oil – Compressor 1A (Stopped)	Circuit	Immediate and Special Action	Latch	Compressor Pre-start [all other modes]	Oil Loss Level Sensor detects a lack of oil in the oil sump feeding the compressor for 90 seconds just prior to attempted compressor start. Note: Compressor start is delayed while waiting for oil to be detected, and compressor start is not allowed.	Local
Loss of Oil – Compressor 2A (Stopped)	Circuit	Immediate and Special Action	Latch	Compressor Pre-start [all other modes]	Oil Loss Level Sensor detects a lack of oil in the oil sump feeding the compressor for 90 seconds just prior to attempted compressor start. Note: Compressor start is delayed while waiting for oil to be detected, and compressor start is not allowed.	Local
Low Differential Refrigerant Pressure - Circuit 1	Circuit	Immediate	Latch	Cprsr Energized	The system differential pressure for the respective circuit was below 25 Psid (240.5 kPa) while its compressor was unstepped or pressure ratio was below 1.75 if stepped - for a varying period of time – refer to specification for trip time as a function of system DP below the requirement.	Remote
Low Differential Refrigerant Pressure - Circuit 2	Circuit	Immediate	Latch	Cprsr Energized	The system differential pressure for the respective circuit was below 25 Psid (240.5 kPa) while its compressor was unstepped or pressure ratio was below 1.75 if stepped - for a varying period of time – refer to specification for trip time as a function of system DP below the requirement	Remote
Low Discharge Superheat – Circuit 1	Circuit	Normal	Latch	Any Running Mode	While Running Normally, the Discharge Superheat was less than 12 degrees F +- 1F for more than 6500 degree F seconds. At circuit startup the Discharge Superheat will be ignored for 5 minutes.	Remote
Low Discharge Superheat – Circuit 2	Circuit	Normal	Latch	Any Running Mode	While Running Normally, the Discharge Superheat was less than 12 degrees F +- 1F for more than 6500 degree F seconds. At circuit startup the Discharge Superheat will be ignored for 5 minutes.	Remote
Low Evaporator Refrigerant Pressure - Circuit 1	Circuit	Immediate	Latch	Cprsr Prestart and Cprsr Energized	a. The Evap Refrig Pressure dropped below 10 Psia just prior to compressor start (after EXV preposition). b. For RTUD A (C during early startup period: The Evap Refrig Pressure fell below the Condenser Pressure + 8, limited to between 2 and 10 psia. c. For RTWD (or RTUD, ACFC=none) during early startup period: The Evap Refrig Pressure fell below 10 Psia. d. For all chiller types, after early Startup Period expires: The Evap Refrig Pressure fell below 16 Psia. (Note: the Startup Period for RTWD is 3 min; for RTUD it is between 1 and 5 min for as an inverse function of the Cond Temp measured at time of circuit startup).	Local
Low Evaporator Refrigerant Pressure - Circuit 2	Circuit	Immediate	Latch	Cprsr Prestart and Cprsr Energized	a. The Evap Refrig Pressure dropped below 10 Psia just prior to compressor start (after EXV preposition). b. For RTUD A (C during early startup period: The Evap Refrig Pressure fell below the Condenser Pressure + 8, limited to between 2 and 10 psia. c. For RTWD (or RTUD, ACFC=none) during early startup period: The Evap Refrig Pressure fell below 10 Psia. d. For all chiller types, after early Startup Period expires: The Evap Refrig Pressure fell below 16 Psia. (Note: the Startup Period for RTWD is 3 min; for RTUD it is between 1 and 5 min for as an inverse function of the Cond Temp measured at time of circuit startup).	Local



**Table 95. Main processor diagnostics (continued)**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Low Evaporator Refrigerant Temperature - Circuit 1	Circuit	Immediate	Latch	All Ckt Running Modes	The inferred Saturated Evap Refrigerant Temperature (calculated from suction pressure transducer dropped below the Low Refrigerant Temperature Cutout Setpoint for 1125°F-sec (25°F-sec max rate) while the circuit was running. The minimum LRTC setpoint is -5°F (18.7 Psia) the point at which oil separates from the refrigerant. During the time that the trip integral is non zero, the unload solenoid(s) of the running compressors on the circuit, shall be energized continuously and the load solenoid shall be off. Normal load (unload operation will be resumed if the trip integral decays to zero by temps above the cutout setpoint. The integral is held nonvolatily though power down, is continuously calculated, and can decay during the circuit's off cycle as conditions warrant.	Remote
Low Evaporator Refrigerant Temperature - Circuit 2	Circuit	Immediate	Latch	All Ckt Running Modes	The inferred Saturated Evap Refrigerant Temperature (calculated from suction pressure transducer dropped below the Low Refrigerant Temperature Cutout Setpoint for 1125°F-sec (25°F-sec max rate) while the circuit was running. The minimum LRTC setpoint is -5°F (18.7 Psia) the point at which oil separates from the refrigerant. During the time that the trip integral is non zero, the unload solenoid(s) of the running compressors on the circuit, shall be energized continuously and the load solenoid shall be off. Normal load (unload operation will be resumed if the trip integral decays to zero by temps above the cutout setpoint. The integral is held nonvolatily though power down, is continuously calculated, and can decay during the circuit's off cycle as conditions warrant.	Remote
Low Evaporator Temp - Ckt 1: Unit Off	Evap Pump	Special Action	Non Latch	Unit in Stop Mode, or in Auto Mode and No Ckt's Energzd [Any Ckt Energzd]	The respective evap sat temp fell below the water temp cutout setting while the evap liquid level was greater than -36 mm for 150°-sec degree F seconds while Chiller is in the Stop mode, or in Auto mode with no compressors running. Energize small Evap Circulating Pump (RTUD A (C) and Evap Water pump Relay (but only if "Evap Water Pump Diagnostic Override" setting is enabled) until diagnostic auto resets, then de-energize the circ pump and return to normal evap pump control. Automatic reset occurs when the derived evap sat temp rises 2°F (1.1°C) above the cutout setting for 1 minute or the liquid level is below -36.0 mm for 20 minutes, or any compressor restarts. OA temp is substituted for evap sat temp in case of invalidity. This diagnostic even while active, does not prevent operation of either circuit.	Remote
Low Evaporator Temp - Ckt 2: Unit Off	Evap (and circ) Pump	Special Action	Non Latch	Unit in Stop Mode, or in Auto Mode and No Ckts Energzd [Any Ckt Energzd]	The respective evap sat temp fell below the water temp cutout setting while the evap liquid level was greater than -36 mm for 150°-sec degree F seconds while Chiller is in the Stop mode, or in Auto mode with no compressors running. Energize small Evap Circulating Pump (RTUD A (C) and Evap Water pump Relay (but only if "Evap Water Pump Diagnostic Override" setting is enabled) until diagnostic auto resets, then de-energize the circ pump and return to normal evap pump control. Automatic reset occurs when the derived evap sat temp rises 2°F (1.1°C) above the cutout setting for 1 minute or the liquid level is below -36.0 mm for 20 minutes, or any compressor restarts. OA temp is substituted for evap sat temp in case of invalidity. This diagnostic even while active, does not prevent operation of either circuit.	Remote

## Diagnostics

**Table 95. Main processor diagnostics (continued)**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Low Evaporator Water Temp: Unit Off	Evap Pump	Special Action	Non Latch	Unit in Stop Mode, or in Auto Mode and No Ckt(s) Energzd [Any Ckt Energzd]	The leaving Evaporator water temp. fell below the leaving water temp cutout setting for 30 degree F seconds while the Chiller is in the Stop mode, or in Auto mode with no compressors running. Energize small Evap Circulating Pump (RTUD A (C) and Evap Water pump Relay (but only if "Evap Water Pump Diagnostic Override" setting is enabled) until diagnostic auto resets, then de-energize the circ pump and return to normal evap pump control. Automatic reset occurs when the temp rises 2°F (1.1°C) above the cutout setting for 30 minutes. This diagnostic even while active, does not prevent operation of either circuit.	Remote
Low Evaporator Water Temp: Unit On	Chiller	Immediate and Special Action	Non Latch	Any Ckt[s] Energzd [No Ckt(s) Energzd]	The evaporator water temp. fell below the cutout setpoint for 30 degree F Seconds while the compressor was running. Automatic reset occurs when the temperature rises 2 °F (1.1°C) above the cutout setting for 2 minutes. This diagnostic shall not de-energize the Evaporator Water Pump Output.	Remote
Low Oil Flow - Compressor 1A	Circuit	Immediate	Latch	Cprsr Energized and Delta P above 15 Psid	The intermediate oil pressure transducer for this compressor was indicating an unacceptable oil pressure drop as a % of the available oil pressure to move oil, suggesting significantly reduced oil flow to the compressor. Possible root causes include oil line service valve closed or restricted, dirty or restricted oil filter, compressor oil line kepner valve malfunction, or plugged (restricted oil cooler (when present).	Local
Low Oil Flow - Compressor 2A	Circuit	Immediate	Latch	Cprsr Energized and Delta P above 15 Psid	The intermediate oil pressure transducer for this compressor was indicating an unacceptable oil pressure drop as a % of the available oil pressure to move oil, suggesting significantly reduced oil flow to the compressor. Possible root causes include oil line service valve closed or restricted, dirty or restricted oil filter, compressor oil line kepner valve malfunction, or plugged (restricted oil cooler (when present).	Local
MP Application Memory CRC Error	Chiller	Immediate	Latch	All Modes	Memory error criteria TBD	Remote
MP: Could not Store Starts and Hours	None	Info	Latch	All	MP has determined there was an error with the previous power down store. Starts and Hours may have been lost for the last 24 hours.	Remote
MP: Invalid Configuration	None	Immediate	Latch	All	MP has an invalid configuration based on the current software installed	Remote
MP: Non-Volatile Block Test Error	None	Info	Latch	All	MP has determined there was an error with a block in the Non-Volatile memory. Check settings.	Remote
MP: Non-Volatile Memory Reformat	None	Info	Latch	All	MP has determined there was an error in a sector of the Non-Volatile memory and it was reformatted. Check settings.	Remote
MP: Reset Has Occurred	None	Info	Non Latch	All	The main processor has successfully come out of a reset and built its application. A reset may have been due to a power up, installing new software or configuration. This diagnostic is immediately and automatically cleared and thus can only be seen in the Historic Diagnostic List in TechView™	Remote
No Differential Refrigerant Pressure – Circuit 1	Circuit	Immediate	Latch	Compressor running on Circuit	The system differential pressure was below 7.7 Psid (53 kPa) for 6 seconds after the 11 seconds ignore time relative to cprsr (circuit startup had expired).	Remote
No Differential Refrigerant Pressure – Circuit 2	Circuit	Immediate	Latch	Compressor running on Circuit	The system differential pressure was below 7.7 Psid (53 kPa) for 6 seconds after the 11 seconds ignore time relative to cprsr (circuit startup had expired).	Remote
Oil Analysis Recommended – Ckt #1	Circuit	Info	Latch	"Service Messages" enabled	Diagnostic occurs when accumulated circuit operating hours since last initialized exceeds 2000 hours. Diagnostic can be manually cleared but will reoccur every month (720 hours on real time clock) as long as accumulator is not re-initialized.	Remote

**Table 95. Main processor diagnostics (continued)**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Oil Analysis Recommended – Ckt #2	Circuit	Info	Latch	“Service Messages” enabled	Diagnostic occurs when accumulated circuit operating hours since last initialized exceeds 2000 hours. Diagnostic can be manually cleared but will reoccur every month (720 hours on real time clock) as long as accumulator is not re-initialized.	Remote
Oil Filter Change Recommended – Cprsr 1A	Circuit	Info	Latch	“Service Messages” enabled	Diagnostic occurs only when “service messages” are enabled and when Oil Filter Life remaining falls below 5%. Diagnostic can be manually cleared but will reoccur every month real time (720 hours on real time clock) as long as the oil filter life remaining does not rise above 20% (through normal calculations or reinitializing) (Prior to RTUD Release in Fall of 09): Diagnostic occurs only when “service messages” are enabled and when average oil pressure drop exceeds 18%. Diagnostic can be manually cleared but will reoccur every month (720 hours on real time clock) as long as average pressure drop does not fall below 16%.	Remote
Oil Filter Change Recommended – Cprsr 2A	Circuit	Info	Latch	“Service Messages” enabled	Diagnostic occurs only when “service messages” are enabled and when Oil Filter Life remaining falls below 5%. Diagnostic can be manually cleared but will reoccur every month real time (720 hours on real time clock) as long as the oil filter life remaining does not rise above 20% (through normal calculations or reinitializing) (Prior to RTUD Release in Fall of 09): Diagnostic occurs only when “service messages” are enabled and when average oil pressure drop exceeds 18%. Diagnostic can be manually cleared but will reoccur every month (720 hours on real time clock) as long as average pressure drop does not fall below 16%.	Remote
Oil Pressure System Fault – Circuit 1	Circuit	Immediate	Latch	Starter Contactor Energized [all Stop modes]	The Intermediate Oil Pressure Transducer for this cprsr is reading a pressure either above its respective circuit’s Condenser Pressure by 15 Psia or more, or below its respective Suction Pressure 10 Psia or more for 30 seconds continuously.	Local
Oil Pressure System Fault – Circuit 2	Circuit	Immediate	Latch	Starter Contactor Energized [all Stop modes]	The Intermediate Oil Pressure Transducer for this cprsr is reading a pressure either above its respective circuit’s Condenser Pressure by 15 Psia or more, or below its respective Suction Pressure 10 Psia or more for 30 seconds continuously.	Local
Oil Pressure Transducer – Compressor 1A	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Oil Pressure Transducer – Compressor 2A	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Outdoor Air Temperature Sensor	Chiller	RTUD with ACFC?NONE–Normal Shutdown; OATS=INST-Special Action	Latch	All	Bad Sensor or LLID. If the outdoor temperature is used for CHW reset, there shall be no CHW reset. Apply slew rates per Chilled Water Reset spec. RTUD: if this diagnostic occurs, operational pumpdown will be performed regardless of the last valid temperature. For RTWD, if installed for low ambient lockout, there shall be no LA lockout.	Remote
Pumpdown Terminated - Circuit 1	Circuit	Info	NonLatch	Service or Operational Pumpdown	Operational or Service Pumpdown cycle for this circuit was terminated abnormally due to excessive time (op pd only) or due to a specific set of diagnostic criteria – but w (o associated latching diagnostics. (RTWD max Operation Pumpdown = 2 min)	
Pumpdown Terminated - Circuit 2	Circuit	Info	NonLatch	Service or Operational Pumpdown	Operational or Service Pumpdown cycle for this circuit was terminated abnormally due to excessive time (op pd only) or due to a specific set of diagnostic criteria – but w (o associated latching diagnostics. (RTWD max Operation Pumpdown = 2 min)	
Pumpdown Terminated by Time - Circuit 1	Circuit	Info	NonLatch	Service Pumpdown	Service Pumpdown cycle for this circuit was terminated abnormally due to excessive time (RTWD max Service Pumpdown = 4 min).	Local

## Diagnostics

**Table 95. Main processor diagnostics (continued)**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Pumpdown Terminated by Time - Circuit 2	Circuit	Info	NonLatch	Service Pumpdown	Service Pumpdown cycle for this circuit was terminated abnormally due to excessive time (RTWD max Service Pumpdown = 4 min).	Local
Software Error 1001: Call Trane Service	All functions	Immediate	Latch	All	A high level software watchdog has detected a condition in which there was a continuous 1 minute period of compressor operation, with neither Evaporator water flow nor a" contactor interrupt failure" diagnostic active. The presence of this software error message suggests an internal software problem has been detected. The events that led up to this failure, if known, should be recorded and transmitted to Trane Controls Engineering.	Local
Software Error 1002: Call Trane Service	All functions	Immediate	Latch	All	Reported if state chart misalignment in stopped or inactive state occurred while a compressor was seen to be operating and this condition lasted for at least 1 minute (cmprsr operation due to Service Pumpdown or with Contactor Interrupt Failure diagnostic is excluded). The presence of this software error message suggests an internal software problem has been detected. The events that led up to this failure, if known, should be recorded and transmitted to Trane Controls Engineering.	Local
Software Error 1003: Call Trane Service	All functions	Immediate	Latch	All	Reported if state chart misalignment occurred inferred from either the Capacity Control, Circuit, or Compressor State Machines remaining in the Stopping state for more than 3 minutes. The presence of this software error message suggests an internal software problem has been detected. The events that led up to this failure, if known, should be recorded and transmitted to Trane Controls Engineering.	Local
Starter Failed to Arm (Start – Cprsr 1A)	Circuit	Normal	Latch	All	Starter failed to arm or start within the allotted time (15 seconds).	Local
Starter Failed to Arm (Start – Cprsr 2A)	Circuit	Normal	Latch	All	Starter failed to arm or start within the allotted time (15 seconds).	Local
Starter Module Memory Error Type 1 - Starter 2A	None	Info	Latch	All	Checksum on RAM copy of the Starter LLID configuration failed. Configuration recalled from EEPROM.	Local
Starter Module Memory Error Type 1 Starter 1A	None	Info	Latch	All	Checksum on RAM copy of the Starter LLID configuration failed. Configuration recalled from EEPROM.	Local
Starter Module Memory Error Type 2 - Starter 1A	Circuit	Immediate	Latch	All	Checksum on EEPROM copy of the Starter LLID configuration failed. Factory default values used.	Local
Starter Module Memory Error Type 2 - Starter 2A	Circuit	Immediate	Latch	All	Checksum on EEPROM copy of the Starter LLID configuration failed. Factory default values used.	Local
Starter Panel High Temperature Limit - Compressor 1A	Circuit	Immediate and Special Action	Non Latch	All	Starter Panel High Limit Thermostat (170°F) trip was detected. Compressor 1A is shutdown and inoperative until the thermostat resets. Note: Other diagnostics that may occur as an expected consequence of the Panel High Temp Limit trip will be suppressed from annunciation. These include Phase Loss, Power Loss, and Transition Complete Input for Compressor 1A.	Local
Suction Refrigerant Pressure Transducer – Circuit 1	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote
Suction Refrigerant Pressure Transducer – Circuit 2	Circuit	Immediate	Latch	All	Bad Sensor or LLID	Remote

**Table 95. Main processor diagnostics (continued)**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Unexpected Starter Shutdown	Circuit	Normal	Non latch	All Cprsr Running modes, Starting, Running and Preparing to Shutdown	The Starter module status reported back that it is stopped when the MP thinks it should be running and no Starter diagnostic exist. This diagnostic will be logged in the active buffer and then automatically cleared. This diagnostic could be caused by intermittent communication problems from the Starter to the MP, or due to misbinding.	NA
Very Low Evaporator Refrigerant Pressure – Circuit 1	Chiller	Immediate	Latch	All [compressor or circuit in manual lockout]	The respective circuit's evaporator pressure dropped below 80% of the current Low Evap Refrig Press Cutout setting (see above) or 8 psia, whichever is less, regardless of the running state of the circuit's compressor. If a given compressor or circuit is locked out, the suction pressure transducer(s) associated with it, will be excluded from causing this diagnostic.	Local
Very Low Evaporator Refrigerant Pressure – Circuit 2	Chiller	Immediate	Latch	All [compressor or circuit in manual lockout]	The respective circuit's evaporator pressure dropped below 80% of the current Low Evap Refrig Press Cutout setting (see above) or 8 psia, whichever is less, regardless of the running state of the circuit's compressor. If a given compressor or circuit is locked out, the suction pressure transducer(s) associated with it, will be excluded from causing this diagnostic.	Local

# Communication Diagnostics

**Notes:**

1. The following communication loss diagnostics will not occur unless that input or output is required to be present by the particular configuration and installed options for the chiller.
2. Communication diagnostics (with the exception of "Excessive Loss of Comm" are named by the Functional Name of the input or output that is no longer being heard from by the Main Processor. Many

LLIDs, such as the Quad Relay LLID, have more than one functional output associated with it. A comm loss with such a multiple function board, will generate multiple diagnostics. Refer to the Chiller's wiring diagrams to relate the occurrence of multiple communication diagnostics back to the physical LLID boards that they have been assigned to (bound).

**Table 96. Communication diagnostics**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Chiller% RLA Output	Chiller	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Cond Head Press Control Output	Chiller	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Cond Rfgr Pressure, Circuit #1	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Cond Rfgr Pressure, Circuit #2	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Condenser Entering Water Temperature	Chiller	Info and Special Action	Latch	All	RTWD Only: Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. If chiller running, and condenser water regulating valve option installed, force valve to 100% flow.	Remote
Comm Loss: Condenser Leaving Water Temperature	Chiller	Info and Special Action	Latch	All	RTWD Only: Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. If Chiller is running in the heat mode of operation – normal shutdown, otherwise, informational only. Discontinue Min Capacity Limit forced cprsr loading due to Low DP in subsequent startups.	Remote
Comm Loss: Condenser Rfgr Pressure Output	Chiller	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Condenser Water Flow Switch	Chiller	Immediate	Latch	All	RTWD only: Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Condenser Water Pump Relay	Chiller	Normal	Latch	All	RTWD only: Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Discharge Temperature Circuit 1, Cprsr 1A	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Discharge Temperature, Circuit 2, Cprsr 2A	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Electronic Expansion Valve, Circuit #1	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Electronic Expansion Valve, Circuit #2	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Emergency Stop	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Entering Water Temperature	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note: Entering Water Temp Sensor is used in EXV pressure control as well as ice making & CHW reset, so it must cause a unit shutdown even if Ice or CHW reset is not installed.	Remote

**Table 96. Communication diagnostics (continued)**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Evaporator Leaving Water Temperature	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Rfqt Liquid Level, Circuit #1	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Rfqt Liquid Level, Circuit #2	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Water Flow Switch	Chiller	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Evaporator Water Pump Relay	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Ext Noise Setback Command	None	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: External Auto (Stop	Chiller	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: External Chilled (Hot Water Setpoint	External Chilled Water setpoint	Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall discontinue use of the External Chilled Water Setpoint source and revert to the next higher priority for setpoint arbitration	Remote
Comm Loss: External Circuit Lockout, Circuit #1	Circuit	Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. MP will nonvolatily hold the lockout state (enabled or disabled) that was in effect at the time of comm loss.	Remote
Comm Loss: External Circuit Lockout, Circuit #2	Circuit	Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. MP will nonvolatily hold the lockout state (enabled or disabled) that was in effect at the time of comm loss	Remote
Comm Loss: External Current Limit Setpoint	External Current Limit setpoint	Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall discontinue use of the External Current limit setpoint and revert to the next higher priority for Current Limit setpoint arbitration	Remote
Comm Loss: External Ice Building Command	Ice Making Mode	Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall revert to normal (non-ice building) mode regardless of last state.	Remote
Comm Loss: Fan Control Relays, Circuit #1	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Control Relays, Circuit #2	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Fan Inverter Fault, Circuit #1	Circuit (fan control)	Special Mode (or in single fan deck: Circuit Immediate shutdown)	Latch (or in single fan deck: Latch)	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck. For single fan deck configurations, this diagnostic causes a latching circuit shutdown	Remote
Comm Loss: Fan Inverter Fault, Circuit #2	Circuit (fan control)	Special Mode (or in single fan deck: Circuit Immediate shutdown)	Latch (or in single fan deck: Latch)	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck. For single fan deck configurations, this diagnostic causes a latching circuit shutdown	Remote
Comm Loss: Fan Inverter Speed Command, Circuit #1	Circuit (fan control)	Special Mode (or in single fan deck: Circuit Immediate shutdown)	Latch (or in single fan deck: Latch)	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck. For single fan deck configurations, this diagnostic causes a latching circuit shutdown	

## Diagnostics

**Table 96. Communication diagnostics (continued)**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Fan Inverter Speed Command, Circuit #2	Circuit (fan control)	Special Mode (or in single fan deck: Circuit Immediate shutdown)	Latch (or in single fan deck: Latch)	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Operate the remaining fans as fixed speed fan deck. For single fan deck configurations, this diagnostic causes a latching circuit shutdown	
Comm Loss: Female Step Load Compressor 1A	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Female Step Load Compressor 2A	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Heat (Cool Switch)	Heat Mode	Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. The external input shall revert to normal (cooling) request regardless of last state. Chiller mode shall follow "OR" arbitration for heating (cooling mode, i.e. If any of the remaining inputs (front panel of BAS) are requesting heat mode, then the chiller shall be in heat mode.	Remote
Comm Loss: High Pressure Cutout Switch, Cprsr 1A	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: High Pressure Cutout Switch, Cprsr 2A	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Ice-Making Status	Ice-Machine	Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Chiller shall revert to normal (non-ice building) mode regardless of last state.	Remote
Comm Loss: Local BAS Interface	None	Special Action	Non Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Use last valid BAS setpoints. Diagnostic is cleared when successful communication is established with the LonTalk® LLID (LCIC) or BacNet LLID (BCIC).	Remote
Comm Loss: Male Port Load Compressor 1A	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Male Port Load Compressor 2A	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Male Port Unload Compressor 1A	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Male Port Unload Compressor 2A	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Motor Winding Thermostat Compressor 1A	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Motor Winding Thermostat Compressor 2A	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Noise Setback Relay	None	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Loss Level Sensor Input – Circuit #1	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Loss Level Sensor Input – Circuit #2	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Pressure, Cprsr 1A	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Pressure, Cprsr 2A	Cprsr	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Return Gas Pump Drain – Circuit #1	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Return Gas Pump Drain – Circuit #2	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote



**Table 96. Communication diagnostics (continued)**

Diagnostic Name	Affects Target	Severity	Persistence	Active Modes [Inactive Modes]	Criteria	Reset Level
Comm Loss: Oil Return Gas Pump Fill – Circuit #1	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Oil Return Gas Pump Fill – Circuit #2	Circuit	Normal	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Op Status Programmable Relays	None	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Comm Loss: Outdoor Air Temperature	Chiller	RTUD with ACFC?NONE - Normal Shutdown; OATS=INST-Special Action	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. If the outdoor temperature is used for CHW reset, there shall be no CHW reset. Apply slew rates per Chilled Water Reset spec. For RTUD if this diagnostic occurs, operational pumpdown will be performed regardless of the last valid temperature. For RTWD, if installed for low ambient lockout, there shall be no lockout	Remote
Comm Loss: Starter 1A	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Local
Comm Loss: Starter 2A	Circuit	Immediate	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Local
Comm Loss: Starter Panel High Temperature Limit, Compressor 1A	None	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Local
Comm Loss: Suction Rfgr Pressure, Circuit #1	Circuit	Immediate	Latch	All [Ckt (Cprsr lock out)]	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note: This diagnostic is replaced by diagnostic 5FB below with Rev 15.0	Remote
Comm Loss: Suction Rfgr Pressure, Circuit #2	Circuit	Immediate	Latch	All [Ckt (Cprsr lock out)]	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period. Note: This diagnostic is replaced by diagnostic 5FD below with Rev 15.0	Remote
Comm Loss: Evaporator Off-Cycle Freeze Protection Relay	None	Info	Latch	All	Continual loss of communication between the MP and the Functional ID has occurred for a 30 second period.	Remote
Starter 1A Comm Loss: MP	Cprsr	Immediate	Latch	All	Starter has had a loss of communication with the MP for a 15 second period.	Local
Starter 2A Comm Loss: MP	Cprsr	Immediate	Latch	All	Starter has had a loss of communication with the MP for a 15 second period.	Local

## Main Processor (Boot Messages and Diagnostics)

**Table 97. Main processor (boot messages and diagnostics)**

DynaView Display Message	Description Troubleshooting
A Valid Configuration is Present	A valid configuration is present in the MP's nonvolatile memory. The configuration is a set of variables and settings that define the physical makeup of this particular chiller. These include: number (airflow, (and type of fans, number (and size of compressors, special features, characteristics, and control options. //Temporary display of this screen is part of the normal power up sequence.
An Invalid Configuration is Present	An invalid configuration has been detected in the Main Processor's nonvolatile memory and the MP is unable to proceed with the boot up. Communication via the service serial port is supported and the TechView™ service tool, (Configuration View), needs to be employed to correct the configuration.
App Present. Running Selftest... Selftest Passed	An application has been detected in the Main Processor's nonvolatile memory and the boot code is proceeding to run a check on its entirety. 8 seconds later, the boot code had completed and passed the (CRC) test. //Temporary display of this screen is part of the normal power up sequence.
App Present. Running Selftest... Err3: CRC Failure	An application has been detected in Main Processor's nonvolatile memory and the boot code is proceeding to run a check on its entirety. A few seconds later, the boot code had completed but failed the (CRC) test. //Connect a TechView™ Service Tool to the MP's serial port, provide chiller model number (configuration information) and download the configuration if prompted by TechView™. Then proceed to download the most recent RTWD application or specific version as recommended by Technical Service. Note that this error display may also occur during the programming process, if the MP never had a valid application any time prior to the download. If the problem persists, replace the MP.
Boot Software Part Numbers: LS Flash --> 6200-0318-04 MS Flash --> 6200-0319-04	The "boot code" is the portion of the code that is resident in all MPs regardless of what application code (if any) is loaded. Its main function is to run power up tests and provide a means for downloading application code via the MP's serial connection. The Part numbers for the code are displayed in the lower left hand corner of the DynaView during the early portion of the power up sequence and during special programming and converter modes. See below. For the EasyView, the extension of the boot code part number is displayed for approximately 3 immediately following power up. //This is normal, but you should provide this information when contacting Technical Service about power up problems.
Converter Mode	A command was received from the Service Tool (Tech View) to stop the running application and run in the "converter mode". In this mode the MP acts as a simple gateway and allows the TechView™ service computer to talk to all the LLIDS on the IPC3 bus.
Err2: RAM Addr Test #1 Failure	There were RAM errors detected in RAM Address Test #1. //Recycle power, if error persists, replace MP.
Err2: RAM Addr Test #2 Failure	There were RAM errors detected in RAM Address Test #2. //Recycle power, if the error persists, replace MP.
Err2: RAM Pattern 1 Failure	There were RAM errors detected in RAM Test Pattern #1. //Recycle power, if the error persists, replace MP.
Err2: RAM Pattern 2 Failure	There were RAM errors detected in RAM Test Pattern #2. //Recycle power, if the error persists, replace MP.
Err4: UnHandled Interrupt Restart Timer: [3 sec countdown timer]	An unhandled interrupt has occurred while running the application code. This event will normally cause a safe shutdown of the entire chiller. Once the countdown timer reaches 0, the processor will reset, clear diagnostics, and attempt to restart the application and allow a normal restart of chiller as appropriate. //This condition might occur due to a severe electro-magnetic transient such as can be caused by a near lightening strike. Such events should be rare or isolated and if no damage results to the CH530 control system, the Chiller will experience a shutdown and restart. If this occurs more persistently it may be due to an MP hardware problem. Try replacing the MP. If replacement of the MP proves ineffective, the problem may be a result of extremely high radiated or conducted EMI. Contact Technical Service. If this screen occurs immediately after a software download, attempt to reload both the configuration and the application. Failing this, contact Technical Service.
Err5: Operating System Error Restart Timer: [30 sec countdown timer]	An Operating System error has occurred while running the application code. This event will normally cause a safe shutdown of the entire chiller. Once the countdown timer reaches 0, the processor will reset, clear diagnostics, and attempt to restart the application and allow a normal restart of chiller as appropriate. //See Err 4 above
Err6: Watch Dog Timer Error Restart Timer: [30 sec countdown timer]	A Watch Dog Timer Error has occurred while running the application code. This event will normally cause a safe shutdown of the entire chiller. Once the countdown timer reaches 0, the processor will reset, clear diagnostics, and attempt to restart the application allowing a normal restart of chiller as appropriate.
Err7: Unknown Error Restart Timer: [30 sec countdown timer]	An unknown Error has occurred while running the application code. This event will normally cause a safe shutdown of the entire chiller. Once the countdown timer reaches 0, the processor will reset, clear diagnostics, and attempt to restart the application allowing a normal restart of chiller as appropriate
Err8: Held in Boot by User Key Press	The boot detected a key press in the center of the DynaView or both the + and – keys pressed on an EasyView while the MP was in the boot code. Upon seeing this message the user can use Techview™ to connect to the MP to perform a software download or another service tool function.

**Table 97. Main processor (boot messages and diagnostics) (continued)**

DynaView Display Message	Description Troubleshooting
LCI-C Hardware Mismatch	The configuration currently in the nonvolatile memory has the LonTalk® or BACnet® communication option installed and the DynaView™ hardware does not contain adequate memory to support the option. The MP is unable to proceed with the boot up. Communication via the service serial port is supported and the TechView™ service tool, (Configuration View), needs to be employed to correct the configuration to remove the unsupported comm option and return to the previous configuration. The communication option can only be supported with MP hardware version -05 or newer.
No Application Present Please Load Application...	No Main Processor Application is present – There are no RAM Test Errors. //Connect a TechView™ Service Tool to the MP's serial port, provide chiller model number (configuration information) and download the configuration if prompted by TechView™. Then proceed to download the most recent RTWD application or specific version as recommended by Technical Service.
Programming Mode	A command was received by the MP from the Tech View Service Tool and the MP is in the process of first erasing and then writing the program code to its internal Flash (nonvolatile) Memory. Note that if the MP never had a prior application already in memory, the error code "Err3" will be displayed instead of this, during the programming download process.
Software Error 1001: Call Trane Service	See item in Main Processor Diagnostics table above
Software Error 1002: Call Trane Service	See item in Main Processor Diagnostics table above
Software Error 1003: Call Trane Service	See item in Main Processor Diagnostics table above

## Limit Conditions

CH530 will automatically limit certain operating parameters to maintain optimum chiller performance and

prevent nuisance diagnostic trips. These limit conditions are noted in [Table 98](#).

**Table 98. Limit conditions**

<b>Running - Limited</b>	<b>The chiller, 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.</b>
Capacity Limited by High Cond Press	The circuit is experiencing condenser pressures at or near the condenser limit setting. The compressor will be unloaded to prevent exceeding the limits.
Capacity Limited by High Current	The compressor is running and its capacity is being limited by high currents. The current limit setting is 120% RLA (to avoid overcurrent trips).
Capacity Limited by Low Evap Rfgt Temp	The circuit is experiencing saturated evaporator temperatures at or near the Low Refrigerant Temperature Cutout setting. The compressors will be unloaded to prevent tripping.
Capacity Limited by Low Liquid Level	The circuit is experiencing low refrigerant liquid levels and the EXV is at or near full open. The compressor will be unloaded to prevent tripping.
Capacity Limited by Phase Unbalance	The compressor is running and its capacity is being limited by excessive phase current unbalance.



# Wiring

Table 99 provides a list of field wiring diagrams, electrical schematics and connection diagrams for RTWD and RTUD units. The complete wiring package is documented in RLC-SVE01\*-EN. A laminated wiring diagram booklet is also shipped with each unit.

To determine the specific electrical characteristics of a particular chiller, refer to the nameplates mounted on the units.

**Table 99. RTWD/UD wiring diagrams**

Drawing	Description	
2309-7584	Sheet 1	Compressor - Ckt 1 (1A)
	Sheet 2	Compressor - Ckt 2 (2A)
	Sheet 3	Schematic - Wye-Delta Starter
	Sheet 4	Controls
	Sheet 5	Controls/LLID Bus
2309-7585	Sheet 1	Compressor - Ckt 1 (1A)
	Sheet 2	Compressor - Ckt 2 (2A)
	Sheet 3	Schematic - X-line Starters
	Sheet 4	Controls
	Sheet 5	Controls/LLID Bus
2309-7596	Sheet 1	Diagram
	Sheet 2	Legend/Notes
2309-7597	Sheet 1	Diagram
	Sheet 2	Legend
2309-1913	Sheet 1	Diagram
	Sheet 2	Notes/Fuses
2309-1969	Sheet 1	Diagram
	Sheet 2	Notes
2309-7598	Sheet 1	Diagram
	Sheet 2	Notes



## Log and Check Sheets

The operator log and check sheet 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.

- Model RTWD Installation Completion Check Sheet and Request for Trane Service (RLC-ADF007\*-EN)
- Model RTUD Installation Completion Check Sheet and Request for Trane Service (RLC-ADF009\*-EN)
- Chiller Log Sheet



## Log and Check Sheets

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# Model RTWD Chiller 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. **See unit IOM RLC-SVX09\*-EN for detailed installation instructions.**

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 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. Screw Chiller

- Installation meets foundation requirements.
- In place and piped.
- Isolation pads or isolators installed.

### 2. Piping

**Note:** See bulletin RLC-PRB022\*-EN for piping installation considerations affecting sound.

Chilled water piping connected to:

- Evaporator
- Air handling units
- Pumps
- Flow switch or flow proving device installed (if not factory provided)
- Strainer installed and cleaned
- Drain and vents in both evaporator waterboxes are piped with shutoff valve, or plugs have been reinstalled.

Condenser piping connected to:

- Condenser
- Pumps
- Flow switch or flow proving device installed (if not factory provided)
- Condenser water regulating valve
- Cooling tower
- Drain and vents in both condenser waterboxes are piped with shutoff valve, or plugs have been reinstalled.
- Make-up water connected to cooling tower
- 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
- Strainer installed in entering water piping (evaporator and condenser) and cleaned
- Relief valve ventilation piping installed

### 3. Flow balancing valves installed

- Leaving chilled water
- Leaving condenser water
- Proper porting to measure flow and balance

### 4. Gauges, thermometers, and air vents

- Installed on both sides of evaporator
- Installed on both sides of condenser and heat recovery condenser (as applicable)

**5. Wiring**

- Wire size per submittal and NEC 310-16
- Full power available
- External interlocks (flow switch, pumps auxiliary, etc.)
- Chilled water pump (connected and tested)
- Condenser water pump (connected and tested)
- Cooling tower fan rotation checked
- Separate power sources available for 220V water regulating valve, if selected
- 115 Vac power available for service tools as required
- All controls installed and connected

**6. Testing**

- Dry nitrogen available for pressure testing
- Trace gas amounts of R-134a available for leak testing, if necessary

**7. Unit Charging**

- Refrigerant on job site if nitrogen charge option selected

**8.  Systems can be operated under all actual load conditions****9. Heaters**

- Energize oil separator and compressor heaters and verify they are operational using a temperature probe.
- If unit was factory charged (model number digit 45 = 0), **energize heaters for 24 hours prior to 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.**
- If unit has nitrogen charge (model number digit 45 = 1), contact Trane Service for unit charging prior to start-up.

**10. Equipment room**

- Does the equipment room have a refrigerant monitor/sensor capable of monitoring and alarming within the allowable exposure level of the refrigerant?
- Does the installation have properly placed and operating audible and visual refrigerant alarms?
- Does the equipment room have proper mechanical ventilation?
- If it is required by local code, is a self-contained breathing apparatus available?

**11. Owner awareness**

- Does the owner have a copy of the MSDS for refrigerant?



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**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 chiller 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: \_\_\_\_\_

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

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# Model RTUD Compressor-Chiller 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. **See unit IOM RLC-SVX09\*-EN for detailed installation instructions.**

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 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. Screw Chiller

- Installation meets foundation requirements.
- In place and piped.
- Isolation pads or isolators installed.

### 2. Piping

**Note:** See bulletin RLC-PRB022\*-EN for piping installation considerations affecting sound.

Chilled water piping connected to:

- Evaporator
- Air handling units
- Pumps
- Flow switch or flow proving device installed (if not factory provided)
- Strainer installed and cleaned
- Drain and vents in both evaporator waterboxes are piped with shutoff valve, or plugs have been reinstalled.

Piping to air-cooled condenser is completed properly.

- Liquid and suction lines sized properly per guidelines in IOM RLC-SVX09\*-EN
- Refrigerant piping has been pressure and leak tested.
- Make-up water connected to cooling tower
- 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
- Strainer installed in entering water piping (evaporator and condenser) and cleaned
- Relief valve ventilation piping installed

### 3. Flow balancing valves installed

- Leaving chilled water
- Leaving condenser water
- Proper porting to measure flow and balance

### 4. Gauges, thermometers, and air vents

- Installed on both sides of evaporator
- Installed on both sides of condenser and heat recovery condenser (as applicable)

## 5. Wiring

- Wiring between RTUD compressor-chiller and outdoor condenser unit(s) is correct per list on RTUD unit.
- Wire size per submittal and NEC 310-16.
- Full power available
- External interlocks (flow switch, pumps auxiliary, etc.)
- Chilled water pump (connected and tested)
- Condenser water pump (connected and tested)
- Cooling tower fan rotation checked
- Separate power sources available for 220V water regulating valve, if selected
- 115 Vac power available for service tools as required
- All controls installed and connected

## 6. Testing

- Dry nitrogen available for pressure testing
- Trace gas amounts of R-134a available for leak testing, if necessary

## 7. Unit Charging

- Refrigerant on job site
- System vac complete and charged to proper amount for jobsite per IOM guidelines.

## 8. Systems can be operated under all actual load conditions

## 9. Heaters

- Energize oil separator and compressor heaters and verify they are operational using a temperature probe.
- Energize heaters for 24 hours prior to 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.*

## 10. Equipment room

- Does the equipment room have a refrigerant monitor/sensor capable of monitoring and alarming within the allowable exposure level of the refrigerant?
- Does the installation have properly placed and operating audible and visual refrigerant alarms?
- Does the equipment room have proper mechanical ventilation?
- If it is required by local code, is a self-contained breathing apparatus available?

## 11. Owner awareness

- Does the owner have a copy of the MSDS for refrigerant?

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**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 chiller 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: \_\_\_\_\_

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

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**RTWD/RTUD CHILLER LOG SHEET**

<b>Tab</b>	<b>Measurement</b>	<b>15 minutes</b>	<b>30 minutes</b>	<b>1 hour</b>
<b>Main</b>				
	Chiller Mode			
	Evaporator Entering/Leaving Water Temperature			
	Condenser Entering/Leaving Water Temperature			
	Active Chiller Water Setpoint (°F)			
	Average Line Current (%RLA)			
	Active Current Limit Setpoint (%RLA)			
	Software Type			
	Software Version			
<b>Reports</b>				
<b>EVAPORATOR</b>				
	Entering Water Temperature (°F)			
	Leaving Water Temperature (°F)			
	Saturated Refrigerant Temperature (°F)			
	Refrigerant Pressure (psia)			
	Approach Temperature (°F)			
	Water Flow Switch Status			
	EXV Position (%)			
	EXV Position Steps			
	Refrigerant Liquid Level (inch)			
<b>CONDENSER</b>				
	Entering Water Temperature (°F)			
	Leaving Water Temperature (°F)			
	Saturated Refrigerant Temperature (°F)			
	Refrigerant Pressure (psia)			
	Approach Temperature (°F)			
	Water Flow Switch Status			
	Head Pressure Control Command (%)			
<b>COMPRESSOR 1</b>				
	Starts			
	Run Time			
	System Refrigerant Differential Pressure (psid)			
	Oil Pressure (psia)			
	Refrigerant Discharge Temperature (°F)			
	Discharge Superheat (°F)			
	% RLA L1 L2 L3 (%)			
	Amps L1 L2 L3 (amps)			
	Volts AB BC CA			
<b>COMPRESSOR 2</b>				
	Starts			
	Run Time			
	System Refrigerant Differential Pressure (psid)			
	Oil Pressure (psia)			
	Refrigerant Discharge Temperature (°F)			
	Discharge Superheat (°F)			
	% RLA L1 L2 L3 (%)			
	Amps L1 L2 L3 (amps)			
	Volts AB BC CA			



**RTWD/RTUD CHILLER SETTINGS**

<b>Tab</b>	<b>Category</b>	<b>Setting</b>
<b>Settings</b>		
<b>CHILLER</b>		
	Front Panel Water Setpoint (°F)	
	Front Panel Current Limit Setpoint (°F)	
	Differential to Start (°F)	
	Differential to Stop (°F)	
	Setpoint Source	
<b>FEATURE SETTINGS</b>		
	Chilled Water Reset	
	Return Reset Ratio	
	Return Start Reset	
	Return Maximum Reset	
	Outdoor Reset Ratio	
	Outdoor Start Reset	
	Outdoor Maximum Reset	
<b>MODE OVERRIDES</b>		
	Evaporator Water Pump	
	Condenser Water Pump	
	Expansion Valve Control	
	Slide Valve Control	
	Service Pumpdown	
<b>DISPLAY SETTINGS</b>		
	Date Format	
	Date	
	Time Format	
	Time of Day	
	Keypad/Display Lockout	
	Display Units	
	Pressure Units	
	Language Selection	







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