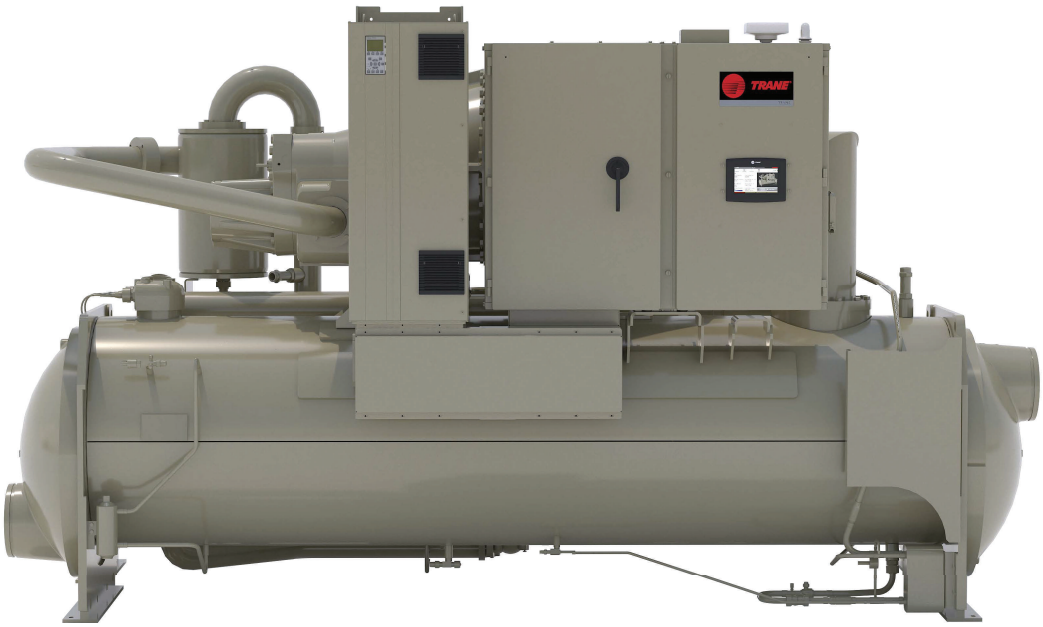
Product Catalog

Optimus™ Water-Cooled Chillers Model RTHD

150 to 430 (60 Hz) Nominal Tons

125 to 430 (50 Hz) Nominal Tons



May 2024

RLC-PRC020L-EN

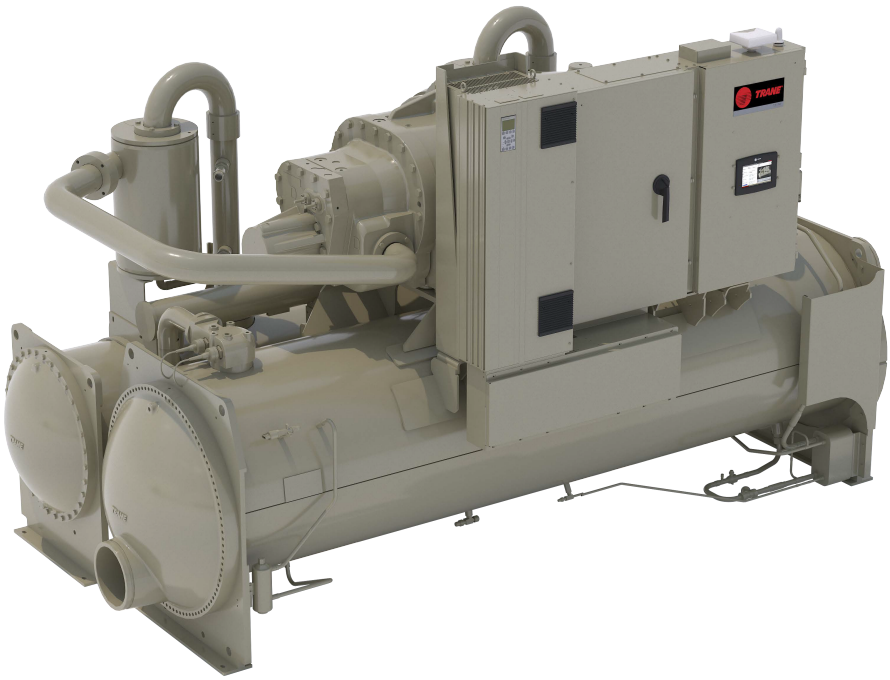
Introduction

To meet a wide range of applications in the medium-tonnage, water-cooled market, Trane is proud to recommend the model RTHD helical-rotary liquid chiller. This chiller provides application versatility, ease of installation, control precision, reliability, energy efficiency, and operational cost effectiveness. The RTHD chiller is designed to deliver proven performance, plus all the benefits of an advanced heat transfer design and a low speed, direct-drive compressor.

Important Features

- High full-load energy efficiency reduces both operating and life-cycle costs.
- Symbio™ 800 controls enable:
  - Access to inputs and operating information via the LCD touch-screen display.
  - Interoperability with LonMark®, BACnet®, and Modbus® communications.
  - Job-specific communication options that allow greater reporting flexibility.
- Improved start-up temperature capabilities and reduced sensitivity to condenser water temperatures alleviate the most common start-up concerns.

The industrial-grade design of the helical-rotary chiller is ideal for both industrial and commercial markets, in applications such as office buildings, hospitals, schools, retail buildings, and industrial facilities. The linear unloading compressor, wide operating temperature range, advanced controls, electronic expansion valve, short anti-recycle timers, and high efficiencies mean that this Trane chiller is the perfect choice for tight temperature control in almost any application temperatures, and under widely varying loads.



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Revision History

- Updated Application Versatility and High Performance topic and Simple, Economical Installation topic in the Features and Benefits chapter.
- Updated the Condenser Water Temperatures section, Series Chiller Arrangements image, and Heat Recovery image in the Application Considerations chapter.
- Updated the Model Number Descriptions chapter.
- Updated the General Data chapter.
- Removed the Electrical Connections chapter.
- Updated the Service Clearance section in the Dimensions and Weights chapter.
- Updated the Unit Controls, Electrical Options, and Controls Options section in the Mechanical Specifications chapter.

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Features and Benefits

Application Versatility and High Performance

- Optional AdaptiSpeed™ technology assures optimal performance at all operating conditions.
  - **Adaptive Frequency™ Drive** – Soft start provided as standard to reduce power in-rush at start-up.
- Screw compressor technology and the electronic expansion valve provide reliable performance in an expanded range of operating temperatures.
- Tight water temperature control extends to operation of multiple chillers in parallel or series configurations, offering further system design flexibility for maximum efficiency.
- Evaporator piping water volumes can be as small as two minutes of loop time minimizing the need for buffer tank capacity.
- Extensive information on professional design selection and layout is available in a highly readable, electronic format.
- **Industrial / Low Temperature Process Cooling** – Excellent operating temperature range and precise control capabilities enable tight control with single chiller or series configuration.
- **Thermal energy storage** – Utilities and owners benefit from reduced cooling energy cost. The Optimus™ chiller's dual setpoint control and industry leading energy storage efficiency assures reliable operation and superior system efficiency. Trane's partnership with CALMAC® brings a proven track record of successful installations across many markets; from churches and schools to sky scrapers and office buildings.
- **Heat Recovery** – Minimizes operating costs for the chilled water plant and boiler/hot water heater, while providing consistent dehumidification.
- Rapid Restart™ capability minimizes downtime.

Simple, Economical Installation

- Compact size makes the model RTHD well suited for the retrofit and replacement market.
- Units with wye-delta starters fit through standard double width doors. Bolt-together construction makes for fast, unit disassembly.
- Small footprint saves valuable equipment room space and alleviates access concerns for most retrofit jobs.
- Lightweight design simplifies rigging requirements, further reducing installation time requirements and costs.
- Full factory refrigerant or nitrogen and oil charges reduce required field labor, materials, and installation cost.
- Only evaporator and condenser water piping is required; no water-cooled starter or drive (with its associated safety concerns) or field piping is necessary.
- Factory-installed and wired control power transformer powers the chiller unit controls. Simple single-point power connection simplifies overall installation.
- Factory installed and tested starter for wye-delta and Adaptive Frequency Drive (AFD) eliminates additional jobsite installation considerations and labor requirements.
- Trane has conducted extensive factory testing, and also offers options for in person and/or documented chiller performance verification.
- Symbio™ 800 and Tracer AdaptiView™ TD7 controls interface with Tracer® SC, LonTalk®, BACnet® or Modbus™ building automation systems.

State-of-the-Art, Precision Control

- 7-inch color touch screen display with graphics.
- Powered by Symbio™ 800 industry-leading control algorithms .

  - Enhanced flow management provides unmatched system performance in variable flow water systems.
- Adaptive Control™ keeps the chiller running in extreme conditions.
  - Tight set point control.
  - Graphical trending.
  - Maximized chiller update.
- BACnet®, Modbus™, LonTalk® communications capability provides excellent, trouble-free interoperability.
- Generic Building Automation System points are available for easy access to operational information.
- Advanced design enables chilled water temperature control to +/- 0.5°F (0.28°C) for flow changes up to 10 percent per minute, plus handling of flow changes up to 30 percent per minute for comfort cooling.
- Two-minute stop-to-start and five-minute start-to-start anti-recycle timer allows tight chilled water temperature control in constant or transient low-load applications.

Reliability and Ease of Maintenance

- Direct drive, low-speed compressor – a simple design with only three moving parts – provides maximum efficiency, high reliability, and low maintenance requirements.
- Electronic expansion valve, with fewer moving parts than alternative valve designs, offers highly reliable operation.
- Suction gas-cooled motor stays uniformly cool at lower temperatures for longer motor life.
- The Trane helical-rotary compressor is a proven design resulting from years of research and thousands of test hours, including extensive testing under extraordinarily severe operating conditions.
- Trane is the world's largest manufacturer of large helical-rotary compressors, with hundreds of thousands of commercial and industrial installations worldwide.

Operating and Life Cycle Cost-Effectiveness

- Industry-leading efficiency.
  - Up to 39% higher part load efficiency than ASHRAE 90.1. Minimizes power usage.
- Robust drive design using film capacitors for longer drive life.
- High power factor at all load points reduce the need for power factor correction capacitors.
- Electronic expansion valve enables exceptionally tight temperature control and extremely low superheat, resulting in more efficient full-load and part-load operation than previously available.
- Precise compressor rotor tip clearance ensures optimal efficiency.
- Condenser and evaporator tubes use the latest heat transfer technology for increased efficiency.
- The chiller includes optional electrical demand limiting.
- Chilled water reset based on return water temperature is standard.
- High compressor lift capabilities and tight chilled water temperature control allow highly efficient system design with minimal operational concerns.
- The falling-film evaporator, developed by Trane, increases energy efficiency and minimizes refrigerant charge.

Design Capabilities

Design capabilities includes:

- Variable-primary flow.
- Series chiller arrangements for evaporator and/or condenser.
- Low evaporator and condenser flow enabling deeper flow turndown and pump energy savings.

Application Considerations

Condenser Water Temperatures

With the model RTHD chiller, condenser head pressure control at unit start is necessary only if the leaving condenser water temperature does not result in a unit pressure differential above a set minimum within a given time period. When needed, a variety of system implementation options are available to control the unit operating conditions for the purpose of refrigerant differential pressure control.

When the application requires start-up temperatures below the prescribed minimums, a variety of system implementation options are available. Here are two recommended methods to control the unit operating conditions for the purpose of refrigerant differential pressure control.

1. Condenser Entering Water Temperature Control
   - Tower bypass may also be a valid control method if the chiller temperature requirements can be maintained and the loop is small.
2. Condenser Water Flow Control
   - To control a 2-way or 3-way valve, select the Condenser Regulating Valve Control option for the Symbio™ 800 controls. This option enables the Symbio 800 controls to send an analog electronic signal for opening and closing the valve as necessary to maintain chiller differential refrigerant pressure.

The minimum acceptable refrigerant pressure differential between condenser and evaporator is 23 psid (158.6 kPa) at all load conditions in order to ensure adequate oil circulation. The condenser and evaporator pressure differential must be 15 psid (103.4 kPa) within 2 minutes of start up. This equates to the condenser leaving water temperature being 14°F (7.8°C) higher than evaporator leaving water temperature within 2 minutes of start-up at typical operating conditions.

Trane chillers start and operate successfully and reliably over a range of load conditions with controlled condenser pressure. Reducing the condenser water temperature is an effective method of lowering chiller power input required, but the ideal temperature for optimizing total system power consumption will depend on the overall system dynamics. From a system perspective, some improvements in chiller efficiency may be offset by the increased tower fan and pumping costs required to achieve the lower tower temperatures. Contact your local Trane systems solution provider for more information on optimizing system performance.

Variable Evaporator Flow and Short Evaporator Water Loops

Variable evaporator flow is an energy-saving design strategy which has quickly gained acceptance as advances in chiller and controls technology have made it possible. With its superior unloading compressor design and advanced chiller controls, the chiller has excellent capability to maintain leaving water temperature control within +/-0.5°F (0.28°C), even for systems with variable evaporator flow.

Some basic rules should be followed whenever using these system design and operational savings methods with the chiller. The proper location of the chilled water temperature control sensor is in the supply (outlet) water. This location allows the building to act as a buffer, and it assures a slowly changing return water temperature. If there is insufficient water volume in the system to provide an adequate buffer, temperature control can be lost, resulting in erratic system operation and excessive compressor cycling. To ensure consistent operation and tight temperature control, the chilled water loop should be at least two minutes. If this recommendation cannot be followed, and tight leaving water temperature control is necessary, a storage tank or larger header pipe should be installed to increase the volume of water in the system.

For variable primary flow (VPF) applications, the rate of chilled water flow change should not exceed 10 percent of design per minute to maintain +/-0.5°F (0.28°C) leaving evaporator temperature control. For applications in which system energy savings is most important and tight temperature control is classified as +/-2°F (1.1°C), up to 30 percent change in flow per minute are possible. Flow rates should be maintained between the minimum and maximum allowed for any particular chiller configuration.

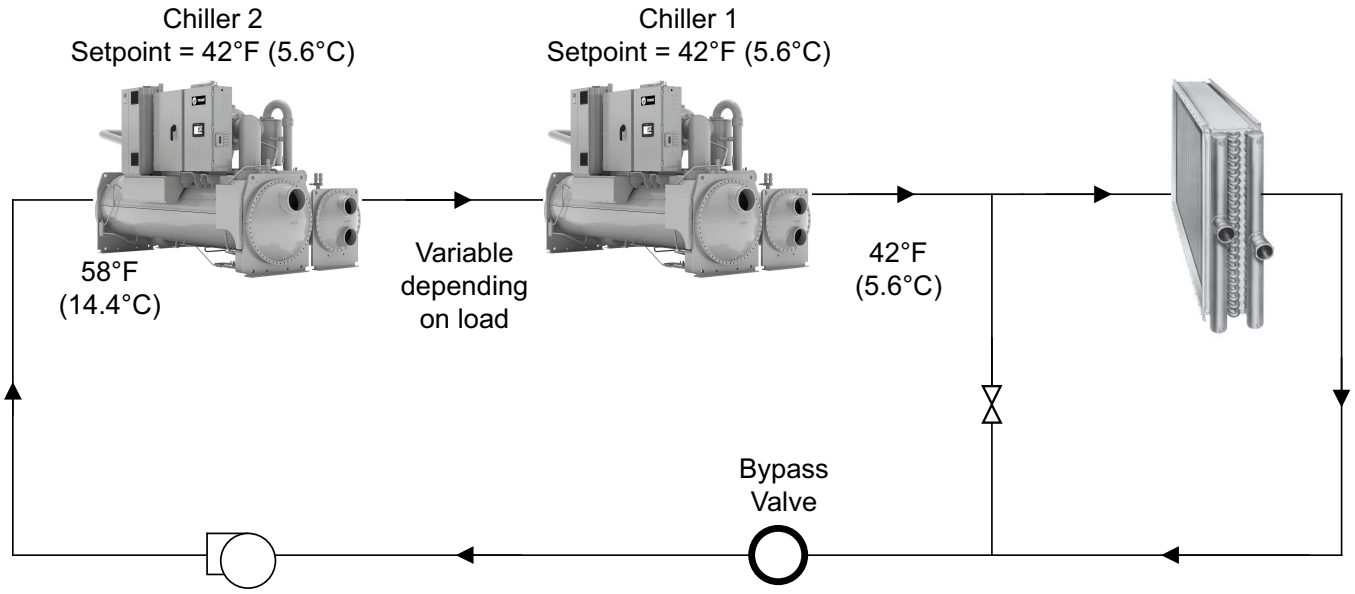
With the help of a software analysis tool such as TRACE® 3D Plus or myPLV®, you can determine whether the anticipated energy savings justify the use of variable primary flow in a particular application. Existing constant flow chilled water systems may be relatively easily converted to VPF and benefit greatly from the inherent efficiency advantages.

Series Chiller Arrangements

Another energy-saving strategy is to design the system around chillers arranged in series, on the evaporator, condenser, or both. It is possible to operate a pair of chillers more efficiently in a series chiller arrangement than in a parallel arrangement. It is also possible to achieve higher entering-to-leaving chiller differentials, which may, in turn, provide the opportunity for lower chilled water design temperature, lower design flow, and resulting installation and operational cost savings (including downsizing a chiller).

The Trane screw compressor also has excellent “lift” capabilities which afford an opportunity for savings on the evaporator and condenser water loops. Like series arrangements on the evaporator, series arrangements on the condenser may enable savings. This approach may allow reductions in pump and tower installation and operating costs.

Maximizing system efficiency requires that the designer balance performance considerations for all system components; the best approach may or may not involve multiple chillers, or series arrangement of the evaporators and/or condensers. This ideal balance of design integrity with installation and operating cost considerations should be researched by consulting a Trane systems solutions provider and applying the Trace® 3D Plus building energy and economic analysis program.



Dry Cooler

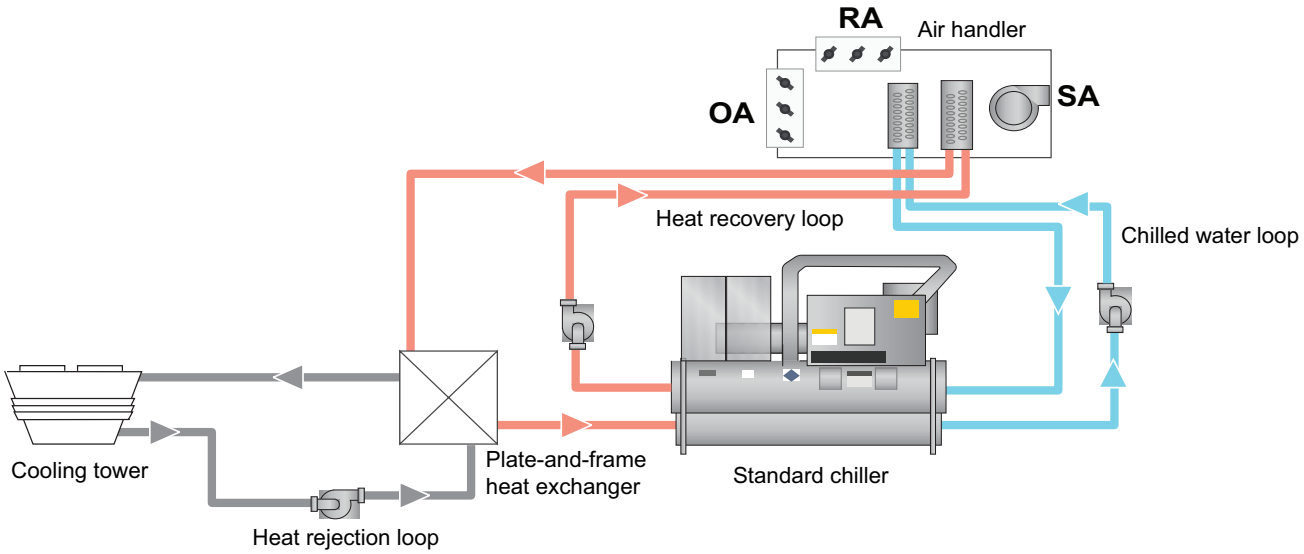
The RTHD can be used with dry coolers. Generally this application is selected to minimize the spread of airborne contaminates associated with open tower systems. In addition, other drawbacks of cooling towers are avoided: water consumption, production of vapor, need of water treatment, etc. Another benefit of dry coolers is the ability to operate in low ambient conditions. With the use of a third party heat exchanger this design can also be used to provide free cooling to the chilled water loop during cold weather.

Heat Recovery

At a time when energy costs are high and continue to rise, reducing energy usage has become increasingly important and in some instances required by building energy codes. By using a RTHD chiller with heat recovery, utilization of energy can be improved by using heat from the condenser that would otherwise be wasted. Leaving condenser water control option provides the ability to control the heating setpoint up to 114°F (45.56°C) for R134a and 111°F (43.88°C) for R513A.

The use of heat recovery should be considered in any building with simultaneous heating and cooling requirements or in facilities where heat can be stored and used at a later time. Buildings with high year-round internal cooling loads are excellent opportunities for heat recovery. Heat recovery can be

accomplished with the RTHD by recovering heat from the water leaving the standard condenser and using it in conjunction with a third party heat exchanger.



Water Treatment

The use of untreated or improperly treated water in chillers may result in scaling, erosion, corrosion, and algae or slime buildup. It is recommended that the services of a qualified water treatment specialist be engaged to determine what treatment, if any, is advisable.

Water Pumps

Where noise limitation and vibration-free operation are important, customers can use 1750-rpm (60 Hz) [1450-rpm (50 Hz)] pumps. Specifying or using fixed speed 3600-rpm (60 Hz) [3000-rpm (50 Hz)] condenser water and chilled water pumps should be avoided, because such pumps may operate with objectionable levels of noise and vibration. It is beneficial to use variable speed water pumps to turn the system into one that uses a lower flow rate some of the time, and a higher flow rate at other times. This strategy is commonly referred to as variable water flow. Trane chiller controls can work in harmony with a building automation system to adjust cooling tower fan speed, water pump speed and chiller speed simultaneously to result in the chiller system working as a whole at the most efficient operating point.

Note: *The chilled water pump must not be used to stop the chiller.*

Acoustic Considerations

For chiller sound ratings, installation tips, and considerations on chiller location, pipe isolation, etc., refer to the Water-Cooled Chillers Sound Ratings and Installation Guide.

Model Number Descriptions

Unit Model Number

Digit 1, 2, 3, 4 — Chiller Model

RTHD = Water-Cooled Optimus™ Chiller

Digit 5 — Manufacturing Location

U = Water Chiller Business Unit, Pueblo, CO USA

Digit 6, 7 — Compressor Frame

B1 = B1 Compressor
B2 = B2 Compressor
C1 = C1 Compressor
C2 = C2 Compressor
D1 = D1 Compressor
D2 = D2 Compressor

Digit 8 — Unit Power Supply

A = 200V/60Hz/3Ph Power
C = 230V/60Hz/3Ph Power
D = 380V/60Hz/3Ph Power
F = 460V/60Hz/3Ph Power
H = 575V/60Hz/3Ph Power

Digit 9 — Specials

X = No Specials

Digit 10, 11 — Design Sequence

** = Factory assigned

Digit 12 — Agency Listing

X = No Agency Listing
U = UL Listed to US and Canadian Safety Standards
A = IBC Seismically Rated
B = UL/Canadian and IBC
C = OSHPD Seismically Rated
D = UL/Canadian and OSHPD

Note: *Digit 12 selections A, B, C, and D are special order only.*

Digit 13 — Pressure Vessel Code

A = ASME Pressure Vessel Code
C = Canadian Code

Digit 14, 15 — Evaporator

B1 = B1 Evaporator
B2 = B2 Evaporator
C1 = C1 Evaporator
C2 = C2 Evaporator
D1 = D1 Evaporator
D2 = D2 Evaporator
D3 = D3 Evaporator
D4 = D4 Evaporator
D5 = D5 Evaporator
D6 = D6 Evaporator
E1 = E1 Evaporator
F1 = F1 Evaporator
F2 = F2 Evaporator
G2 = G2 Evaporator
G3 = G3 Evaporator

Digit 16 — Evaporator Tube Type

A = Enhanced fin copper (all fluids)
W = Enhanced fin copper (water only)

Digit 17 — Evaporator Water Pass Configuration

2 = 2 Pass
3 = 3 Pass
4 = 4 Pass

Digit 18 — Evaporator Water Connection

L = Left Hand
R = Right Hand

Digit 19 — Evaporator Connection Type

A = Standard Grooved Pipe

Digit 20 — Evaporator Water Side Pressure

L = 150 psi (10.5 bar)
H = 300 psi (21 bar)

Digit 21, 22 — Condenser

B1 = B1 Condenser
B2 = B2 Condenser
D1 = D1 Condenser
D2 = D2 Condenser
E1 = E1 Condenser
E2 = E2 Condenser
E3 = E3 Condenser
E4 = E4 Condenser
E5 = E5 Condenser
F1 = F1 Condenser
F2 = F2 Condenser
F3 = F3 Condenser
G2 = G2 Condenser
G3 = G3 Condenser

Digit 23 — Condenser Tube Type

A = Enhanced Fin-Copper - 0.028 in.
B = Smooth Bore Copper
C = Smooth Bore CuNi
D = Enhanced Fin Copper - 0.025 in.

Digit 24 — Condenser Water Passes

2 = 2 Pass

Digit 25 — Condenser Water Connection

L = Left Hand
R = Right Hand

Digit 26 — Condenser Connection Type

A = Standard Grooved Pipe
C = Marine
S = Special

Digit 27 — Condenser Waterside Pressure

L = 150 psi (10.5 bar)
H = 300 psi (21 bar)

Digit 28 — Condenser Leaving Water Temperature

A = Standard

Digit 29 — Refrigerant Isolation Valves

X = No Refrigerant Isolation Valves
V = With Refrigerant Isolation Valves

Digit 30 — Oil Cooler

X = Without Oil Cooler
C = With Oil Cooler

Digit 31 — Thermal Insulation

X = No Insulation
Q = Factory Installed Insulation

Digit 32 — Acoustic Insulation

X = Acoustic Insulation

Digit 33 — Label and Literature Language

C = Spanish
E = English
F = French

Model Number Descriptions

Digit 34 — Safety Devices

X = Standard

Digit 35 — Factory Charge

A = Refrigerant Charge (R-134a)
B = Nitrogen Charge (R-134a Field Supplied)
C = Refrigerant Charge (R-513A)
D = Nitrogen Charge (R-513A Field Supplied)

Digit 36 — Shipping Package

A = No Skid (Standard)
B = Shrink Wrap
C = Skid
D = Skid + Shrink Wrap

Digit 37 — Flow Switch

X = No Flow Switch
A = Evaporator (NEMA 1)
B = Evaporator and Condenser (NEMA 1)
C = Evaporator (NEMA 4)
D = Evaporator and Condenser (NEMA 4)

Digit 38 — Factory Test

X = No Performance Test
C = Witness Test
D = Performance Test
N = Customer Inspection

Digit 39 — Starter Type

Y = Wye-Delta Closed Transition Starter
V = Premium AFD

Digit 40, 41, 42 — Design RLA (for starter)

*** = Selection Assigned

Digit 43 — Power Line Connection Type

A = Terminal Block
D = Circuit Breaker
F = High Interrupt Circuit Breaker

Digit 44 — Max RLA (Starter)

C = 277 Max RLA (Fixed Speed)
E = 364 Max RLA (Fixed Speed)
G = 126 Max RLA (Drive and Panel)
H = 150 Max RLA (Drive and Panel)
J = 185 Max RLA (Drive and Panel)
K = 234 Max RLA (Drive and Panel)
L = 279 Max RLA (Drive and Panel)
M = 316 Max RLA (Drive and Panel)
N = 366 Max RLA (Drive and Panel)
Q = 397 Max RLA (Fixed Speed)
R = 476 Max RLA (Fixed Speed)
T = 598 Max RLA (Fixed Speed)
U = 779 Max RLA (Fixed Speed)
V = 197 Max RLA (Drive and Panel)
W = 241 Max RLA (Drive and Panel)
X = 292 Max RLA (Drive and Panel)
Y = 367 Max RLA (Drive and Panel)
Z = 446 Max RLA (Drive and Panel)
1 = 549 Max RLA (Drive and Panel)
2 = 176 Max RLA (Drive and Panel)
3 = 223 Max RLA (Drive and Panel)
4 = 280 Max RLA (Drive and Panel)
5 = 335 Max RLA (Drive and Panel)
6 = 411 Max RLA (Drive and Panel)
7 = 455 Max RLA (Drive and Panel)

Digit 45 — Under/Over Voltage Protection

X = None
U = With Under/Over Voltage Protection

Digit 46 — Operator Interface

T = Tracer AdaptiView™ TD7 Display

Digit 47 — Digital Communication Interface

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

Digit 48 — External Water and Demand Limit Setpoint

X = None
2 = 2–10 Vdc Input
4 = 4–20 mA Input

Digit 49 — External Base Loading

X = None
2 = 2–10 Vdc Input
4 = 4–20 mA Input

Digit 50 — Ice Building

X = None
A = Ice Building with Relay
B = Ice Building without Relay

Digit 51 — Programmable Relays

X = None
R = With Programmable Relays

Digit 52 — Chilled Water Reset

X = Chilled Water Reset - Return Water
T = Chilled Water Reset - Outdoor Air Temperature

Digit 53 — Control Outputs

X = None
D = Chiller Differential Pressure and Percent RLA
P = Condenser Pressure (% HPC) and Percent RLA
V = Condenser Regulating Valve Control and Percent RLA

Digit 54 — Refrigerant Monitor Input

X = None
A = 100 ppm / 4-20 mA
B = 1000 ppm / 4-20 mA
C = 100 ppm / 2-10 Vdc
D = 1000 ppm / 2-10 Vdc

Digit 55 — Condenser Leaving Hot Water Temp Control

X = None
H = Hot Water Temp Control

Digit 56, 57, 58 — AFD Output Amps

000 = Not Applicable (Wye-Delta Starter)
*** = Selection Assigned

General Data

Table 1. General data

Description		Units	Unit Configuration[a]							
			B1B1B1	B1C1D1	B2B2B2	B2C2D2	C1D5E4	C1D6E5	C1E1F1	C2D3E3
General										
	Refrigerant Type		R134a or R513A							
	Refrigerant Charge	lb	410	490	410	490	490	490	525	490
		kg	186	222	186	222	222	222	238	222
wye-delta with R134a[b]	Oil Type		OIL48							
	Oil Charge	gal	4.5	4.5	4.5	4.5	6	6	10	6
		L	17	17	17	17	23	23	38	23
wye-delta with R513A[b]	Oil Type		OIL0067E							
	Oil Charge	gal	4.1	4.1	4.1	4.1	5.4	5.4	9.0	5.4
		L	15.3	15.3	15.3	15.3	20.7	20.7	34.2	20.7
AFD with R134a	Oil Type		OIL315							
	Oil Charge	gal	7.5	7.5	7.5	7.5	10	10	11	10
		L	28.5	28.5	28.5	28.5	38	38	42	38
AFD with R513A	Oil Type		OIL0067E							
	Oil Charge	gal	6.8	6.8	6.8	6.8	9.0	9.0	9.9	9.0
		L	25.7	25.7	25.7	25.7	34.2	34.2	37.8	34.2
Evaporator										
	Water Storage	gal	41	55	45	58	52	45	82	78
		L	155	208	170	220	197	170	310	295
2-pass	Connection size	in	8	8	8	8	8	8	8	8
		mm	200	200	200	200	200	200	200	200
	Min Flow - Water	gpm	253	320	288	347	351	293	450	486
		l/s	16	18	22	22	21	18	28	31
	Maximum Flow	gpm	1104	1412	1266	1531	1542	1287	1980	2131
		l/s	70	89	80	97	97	81	125	134
3-pass	Connection size	in	6	6	6	6	8	8	8	8
		mm	150	150	150	150	200	200	200	200
	Min Flow - Water	gpm	168	213	192	232	234	196	300	324
		l/s	11	13	12	15	15	12	19	20
	Maximum Flow	gpm	736	941	844	1022	1028	860	1320	1417
		l/s	46	59	53	65	65	54	83	89

Table 1. General data (continued)

Description		Units	Unit Configuration[a]							
			B1B1B1	B1C1D1	B2B2B2	B2C2D2	C1D5E4	C1D6E5	C1E1F1	C2D3E3
4-pass	Connection size	in	-	-	-	-	-	-	-	-
		mm	-	-	-	-	-	-	-	-
	Min Flow - Water	gpm	-	-	-	-	-	-	-	-
		l/s	-	-	-	-	-	-	-	-
	Maximum Flow	gpm	-	-	-	-	-	-	-	-
		l/s	-	-	-	-	-	-	-	-
Condenser (all are 2-pass)										
	Connection size	in	6	6	6	6	8	8	8	8
		mm	150	150	150	150	200	200	200	200
	Water Storage	gal	28	31	29	34	32	29	60	47
		L	106	117	110	129	121	110	226	178
	Min Flow - Water	gpm	193	193	212	212	245	206	375	325
		l/s	12	12	13	13	15	13	24	21
	Min Flow - Freeze Inhibitor	gpm	230	230	255	255	295	250	450	390
		l/s	15	15	16	16	19	16	28	25
	Max Flow	gpm	850	850	935	935	1080	910	1650	1420
		l/s	54	54	59	59	68	57	104	90

Notes:

1. If oil cooler is installed (model number digit 30 = C), add 0.3 gal (1L) to oil charge value given for B compressor family units. Add 1.0 gal (4L) for all other units.
2. See unit submittal or Trane Select Assist (TSA) report for design/selected minimum flows.

[a] Unit configuration digits 1, 2 - compressor code (also shown in unit model number digits 6, 7); digits 3, 4 - evaporator code (unit model number digits 14, 15); digits 5, 6 - condenser code (unit model number digits 21, 22).

[b] If oil cooler is installed, add 0.3 gal (1L) to oil charge value given for B compressor family units. Add 1.0 gal (4L) for all other units.

Table 2. General data

Description		Units	Unit Configuration[a]							
			C2D4E4	C2F2F3	D1D1E1	D1F1F2	D1G1G1	D1G2G2	D2D2E2	D2F2F3
General										
	Refrigerant Type		R134a or R513A							
	Refrigerant Charge	lb	490	625	475	625	700	700	475	625
		kg	222	284	216	284	318	318	216	284
wye-delta with R134a[b]	Oil Type		OIL48							
	Oil Charge	gal	6	10	6	10	11	11	6	10
		L	23	38	23	38	42	42	23	38
wye-delta with R513A[b]	Oil Type		OIL0067E							
	Oil Charge	gal	5.4	9.0	5.4	9.0	9.9	9.9	5.4	9.0
		L	20.7	34.2	20.7	34.2	37.8	37.8	20.7	34.2
AFD with R134a	Oil Type		OIL315							
	Oil Charge	gal	10	12	9.5	11	13.5	13.5	9.5	11
		L	38	45.5	36	42	51	51	36	42
AFD with R513A	Oil Type		OIL0067E							
	Oil Charge	gal	9.0	10.8	8.6	9.9	12.2	12.2	8.6	9.9
		L	34.2	41.0	32.4	37.8	45.9	45.9	32.4	37.8

Table 2. General data (continued)

Description		Units	Unit Configuration[a]							
			C2D4E4	C2F2F3	D1D1E1	D1F1F2	D1G1G1	D1G2G2	D2D2E2	D2F2F3
Evaporator										
	Water Storage	gal	52	107	69	102	136	144	74	107
		L	197	405	261	386	515	545	280	405
2-pass	Connection size	in	8	10	8	10	-	-	8	10
		mm	200	250	200	250	-	-	200	250
	Min Flow - Water	gpm	351	604	415	563	-	-	450	604
		l/s	21	38	26	36	-	-	28	38
	Maximum Flow	gpm	1542	2667	1812	2478	-	-	1980	2667
		l/s	97	168	114	156	-	-	125	168
3-pass	Connection size	in	8	8	8	8	10	10	8	8
		mm	200	200	200	200	250	250	200	200
	Min Flow - Water	gpm	234	404	275	376	505	550	300	404
		l/s	15	25	17	24	35	35	19	25
	Maximum Flow	gpm	1028	1780	1206	1655	2218	2413	1320	1780
		l/s	65	112	76	104	140	152	83	112
4-pass	Connection size	in	-	-	-	-	8	8	-	-
		mm	-	-	-	-	200	200	-	-
	Min Flow - Water	gpm	-	-	-	-	379	411	-	-
		l/s	-	-	-	-	24	26	-	-
	Maximum Flow	gpm	-	-	-	-	1666	1807	-	-
		l/s	-	-	-		105	114	-	-
Condenser (all are 2-pass)										
	Connection size	in	8	8	8	8	8	8	8	8
		mm	200	200	200	200	200	200	200	200
	Water Storage	gal	32	61	44	57	79	91	47	61
		L	121	231	166	216	299	344	178	231
	Min Flow - Water	gpm	245	355	291	355	444	535	316	385
		l/s	15	22	18	22	28	34	20	24
	Min Flow - Freeze Inhibitor	gpm	295	460	350	430	530	650	380	460
		l/s	19	29	22	27	33	41	24	29
	Max Flow	gpm	1080	1700	1280	1560	1960	2360	1390	1700
		l/s	68	107	81	98	124	149	88	107

Notes:

1. If oil cooler is installed (model number digit 30 = C), add 0.3 gal (1L) to oil charge value given for B compressor family units. Add 1.0 gal (4L) for all other units.

2. See unit submittal or Trane Select Assist (TSA) report for design/selected minimum flows.

(a) Unit configuration digits 1, 2 - compressor code (also shown in unit model number digits 6, 7); digits 3, 4 - evaporator code (unit model number digits 14, 15); digits 5, 6 - condenser code (unit model number digits 21, 22).

(b) If oil cooler is installed, add 0.3 gal (1L) to oil charge value given for B compressor family units. Add 1.0 gal (4L) for all other units.

General Data

Table 3. General data

Description		Units	Unit Configuration[a]								
			D2G2G1	D2G3G3	D3D2E2	D3F2F3	D3G2G1	E3D2E2	E3F2F3	E3G2G1	E3G3G3
General											
	Refrigerant Type		R134a or R513A		R134a						
	Refrigerant Charge	lb	700	700	475	625	700	475	625	700	700
		kg	318	318	216	284	318	216	284	318	318
wye-delta with R134a[b]	Oil Type		OIL48								
	Oil Charge	gal	11	11	6	10	11	6	10	11	11
		L	42	42	23	38	42	23	38	42	42
wye-delta with R513A[b]	Oil Type		OIL0067E								
	Oil Charge	gal	9.9	9.9	-	-	-	-	-	-	-
		L	37.8	37.8	-	-	-	-	-	-	-
AFD with R134a	Oil Type		OIL315								
	Oil Charge	gal	13.5	13.5	9.5	11	13.5	9.5	11	13.5	13.5
		L	51	51	36	42	51	36	42	51	51
AFD with R513A	Oil Type		OIL0067E								
	Oil Charge	gal	12.2	12.2	8.6	9.9	12.2	8.6	9.9	12.2	12.2
		L	45.9	45.9	32.4	37.8	45.9	32.4	37.8	45.9	45.9
Evaporator											
	Water Storage	gal	144	159	74	107	144	74	107	144	159
		L	545	602	280	405	545	280	405	545	602
2-pass	Connection size	in	-	-	8	10	-	8	10	-	-
		mm	-	-	200	250	-	200	250	-	-
	Min Flow - Water	gpm	-	-	450	604	-	450	604	-	-
		l/s	-	-	28	38	-	28	38	-	-
	Maximum Flow	gpm	-	-	1980	2667	-	1980	2667	-	-
		l/s	-	-	125	168	-	125	168	-	-
3-pass	Connection size	in	10	10	8	8	10	8	8	10	10
		mm	250	250	200	200	250	200	200	250	250
	Min Flow - Water	gpm	550	622	300	404	550	300	404	550	622
		l/s	35	39	19	25	35	19	25	35	39
	Maximum Flow	gpm	2413	2732	1320	1780	2413	1320	1780	2413	2732
		l/s	152	172	83	112	152	83	112	152	172

Table 3. General data (continued)

Description		Units	Unit Configuration[a]								
			D2G2G1	D2G3G3	D3D2E2	D3F2F3	D3G2G1	E3D2E2	E3F2F3	E3G2G1	E3G3G3
4-pass	Connection size	in	8	8	-	-	8	-	-	8	8
		mm	200	200	-	-	200	-	-	200	200
	Min Flow - Water	gpm	411	466	-	-	411	-	-	411	466
		l/s	26	29	-	-	26	-	-	26	29
	Maximum Flow	gpm	1807	2050	-	-	1807	-	-	1807	2050
		l/s	114	129	-	-	114	-	-	114	129
Condenser (all are 2-pass)											
	Connection size	in	8	8	8	8	8	8	8	8	8
		mm	200	200	200	200	200	200	200	200	200
	Water Storage	gal	79	97	47	61	79	47	61	79	97
		L	299	367	178	231	299	178	231	299	367
	Min Flow - Water	gpm	444	589	316	385	444	316	385	444	589
		l/s	28	37	20	24	28	20	24	28	37
	Min Flow - Freeze Inhibitor	gpm	530	710	380	460	530	380	460	530	710
		l/s	33	45	24	29	33	24	29	33	45
	Max Flow	gpm	1960	2600	1390	1700	1960	1390	1700	1960	2600
		l/s	124	164	88	107	124	88	107	124	164

Notes:

1. If oil cooler is installed (model number digit 30 = C), add 0.3 gal (1L) to oil charge value given for B compressor family units. Add 1.0 gal (4L) for all other units.

2. See unit submittal or Trane Select Assist (TSA) report for design/selected minimum flows.

(a) Unit configuration digits 1, 2 - compressor code (also shown in unit model number digits 6, 7); digits 3, 4 - evaporator code (unit model number digits 14, 15); digits 5, 6 - condenser code (unit model number digits 21, 22).

(b) If oil cooler is installed, add 0.3 gal (1L) to oil charge value given for B compressor family units. Add 1.0 gal (4L) for all other units.

Controls

AdaptiView™ TD7 Operator Interface

The standard AdaptiView™ TD7 display provided with the Symbio™ 800 controller features a 7-inch LCD touch-screen, allowing access to all operational inputs and outputs. This is an advanced interface that allows the user to access any important information concerning setpoints, active temperatures, modes, electrical data, pressure, and diagnostics. It uses full text display available in 27 languages.

Display Features Include:

- LCD touch-screen with LED backlighting, for scrolling access to input and output operating information.
- Display of all available information on individual components (evaporator, condenser, compressor, etc.)
- Manual override indication.
- Security and authorization system to enable or disable display.
- Automatic and immediate stop capabilities for standard or immediate manual shutdown.
- Fast, easy access to available chiller data including:
  - Easy to view Operating Modes
  - Logical Subcomponent Reports:
    - Evaporator
    - Condenser
    - Compressor
    - Motor
  - 3 User Programmable Custom Reports
  - ASHRAE Report
  - Log Sheet Report
  - Alarms Report
  - 8 pre-defined Standard Graphs
  - 4 User Programmable Custom Graphs
  - Unit Settings
  - Feature Settings
  - Chilled Water Reset
  - Manual Control Settings
  - Support of 27 languages
  - Display Preferences
  - Brightness Setting
  - Cleaning Mode

System Integration

Tracer SC

The Tracer® SC system controller acts as the central coordinator for all individual equipment devices on a Tracer® building automation system. The Tracer®SC scans all unit controllers to update information and coordinate building control, including building subsystems such as VAV and chiller water systems. With this system option, the full breadth of Trane's HVAC and controls experience are applied to offer solutions to many facility issues. The LAN allows building operators to manage these varied components as one system from any personal computer with web access. The benefits of this system are:

- Improved usability with automatic data collection, enhanced data logging, easier to create graphics, simpler navigation, pre-programmed scheduling, reporting, and alarm logs.
- Flexible technology allows for system sizes from 30 to 120 unit controllers with any combination of LonTalk® or BACnet® unit controllers.
- LEED certification through site commissioning report, energy data collection measurement, optimizing energy performance, and maintaining indoor air quality.

Energy savings programs include: fan pressure optimization, ventilation reset, and chiller plant control (adds and subtracts chillers to meet cooling loads).

Hardwire Points

Microcomputer controls allow simple interface with other control systems, such as time clocks, building automation systems, and ice storage systems via hardwire points. This means you have the flexibility to meet job requirements while not having to learn a complicated control system.

Remote devices are wired from the control panel to provide auxiliary control to a building automation system. Inputs and outputs can be communicated via a typical 4–20 mA electrical signal, an equivalent 2–10 Vdc signal, or by utilizing contact closures.

This setup has the same features as a stand-alone water chiller, with the possibility of having additional optional features:

- Ice making control.
- External chilled water setpoint, external demand limit setpoint.
- Chilled water temperature reset.
- Programmable relays - available outputs are: alarm-latching, alarm-auto reset, general alarm-warning, chiller limit mode, compressor running, and Tracer® control.

Building Automation Systems

BACnet Building Automation Control Network

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

Modbus Automation Control Network

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

LonTalk Building Automation Systems

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

Air-Fi® Wireless Communication Interface (WCI Indoor)

Factory installed wireless interface provides wireless communication to Air-Fi® wireless sensors, service tools, equipment controls, and building controller.

Trane Wi-Fi Adapter

The Trane Wi-Fi adapter kit (equipped with a USB cable) enables communication among devices on a Wi-Fi network to facilitate the wireless integration of client devices such as touch-screen displays and technician laptops as an access point.

Electrical

Standard Units with Wye-Delta Starter

See “Electrical Data Table Information,” p. 21. Electrical component sizing should be based on actual jobsite operating conditions. This factor can be obtained through the use of TOPSS™.

Table 4. Compressor motor electrical data (60 Hz) — standard units (wye-delta starter)

Compressor Code[a]	Voltage[b]	Max kW	RLA @ Max kW[c]	LRA (Wye)	LRA (Delta)
B1, B2	200	174	557	970	3103
	230	174	484	818	2617
	380	174	291	488	1561
	460	174	241	400	1280
	575	174	193	329	1053
C1, C2	200	249	812	1173	3634
	230	249	698	936	2901
	380	249	421	558	1727
	460	249	349	469	1453
	575	249	279	375	1162
D1, D2	200	329	1047	1690	5477
	230	329	918	1532	4966
	380	329	549	850	2755
	460	329	455	730	2366
	575	329	367	612	1984

[a] Unit model number digits 6 and 7.
[b] Voltage utilization ranges: 200V (180-220)m 230V (205-254), 380V (342-418), 460V (414-506), 575V (516-633).
[c] The RLA @ Max kW is based on the performance of the motor developing full rated horsepower.

Electrical Data Table Information

Compressor motor electrical data is provided in Table 4, p. 21 for each compressor size. Rated load amperes (RLA), locked rotor wye amperes (LRA) and expected inrush for the Wye-delta configurations are shown.

Although the terms “LRA” and “expected inrush” are often used interchangeably, the distinction applied here is that LRA is the rated inrush for the motor, but expected inrush is that allowed by the starter, based on the specific configuration. Selecting starters in the Wye-delta configuration lowers expected inrush vs. the across-the-line configuration.

The RLA is based on the motor’s performance when reaching full rated horsepower. The kW rating of the motor will equal or exceed the kW requirement indicated by the Trane® Select Assist™ selection program at design conditions. If motor kW draw at design conditions is less than the kW rating of the motor, the RLA at design conditions is determined by multiplying the motor RLA (at the desired voltage) by this ratio: design kW/ motor kW rating. This calculation is performed within the computer selection program, making RLA available as part of the design predictions. Predicted values include power factor variation from point to point.

Optimus™ chillers are designed to operate satisfactorily over a utilization range of ±10 percent of the standard design voltages: 200V, 230V, 380V, 460V, and 575V for 60 Hertz, 3-phase.

Units with AFD Option

Table 5. Electrical data - units with AFD

Voltage	Applied Range[a]	Estimated Power Loss (W)
575V 60 Hz	0 - 126	1739
	127 - 150	2099
	151 - 185	2646
	186 - 234	3071
	235 - 279	3719
	280 - 316	4460
	317 - 366	5023
460V 60 Hz	0 - 176	2257
	177 - 223	2719
	224 - 280	3622
	281 - 335	3561
	336 - 411	4558
	412 - 455	5703
380V 60 Hz	0 - 197	2555
	198 - 241	2949
	242 - 292	3764
	293 - 367	4109
	368 - 446	5129
	447 - 549	6663

Note: AFD input amps are shown in the RLA field of the unit nameplate.

[a] Model number digits 56-58.

Electrical Connections

Table 6. Electrical connections

Starter Panel Connection	Selection RLA	Lug Size[a] L1-L3 (Each Phase)
Terminals Block	000-598	(2) #4 - 500 MCM
	599-779	n/a
Main Circuit Breaker[b]	000-200	(1) 3/0 - 350 MCM
	201-476	(2) 2/0 - 500 MCM
	477-640	(3) 3/0 - 500 MCM
	641-779	(4) 3/0 - 500 MCM
Non-Fused Disconnect Switch	000-277	(1) #1 - 600 MCM
	278-397	(2) 2/0 - 500 MCM
	398-598	(3) 3/0 - 500 MCM
	599-779	(4) 3/0 - 500 MCM

[a] Lug sizes are independent of starter type.

[b] Lug sizes are the same for either standard or high interrupt circuit breaker (model number digit 43 = D or F).

Dimensions and Weights

Unit Dimensions — Standard (Wye-Delta Starter)

Note: *Dimensions are based on 3 Pass Evap/2 Pass Cond and LH/LH water connections.*

Figure 1. BBB configuration

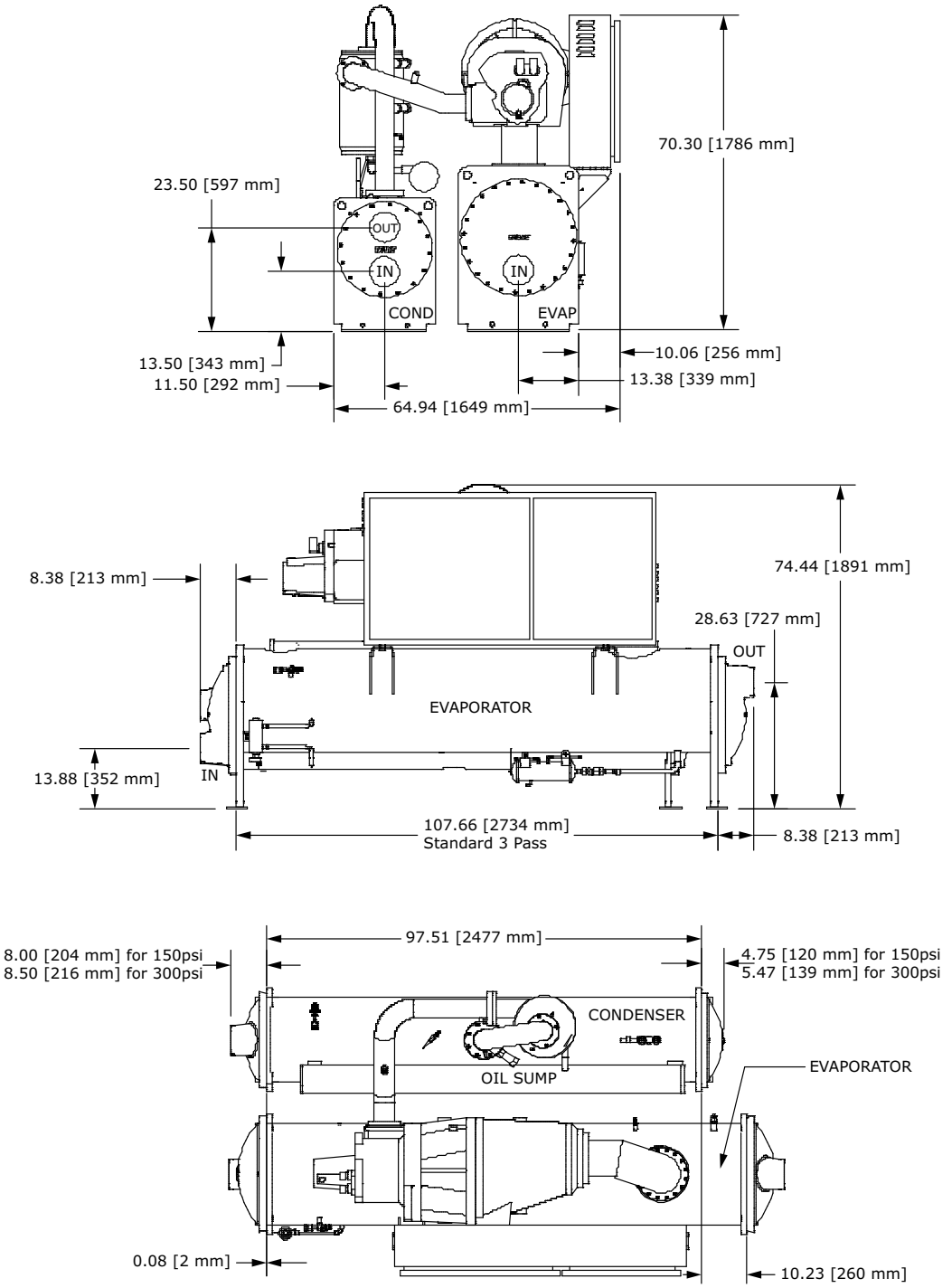


Figure 2. BCD configuration

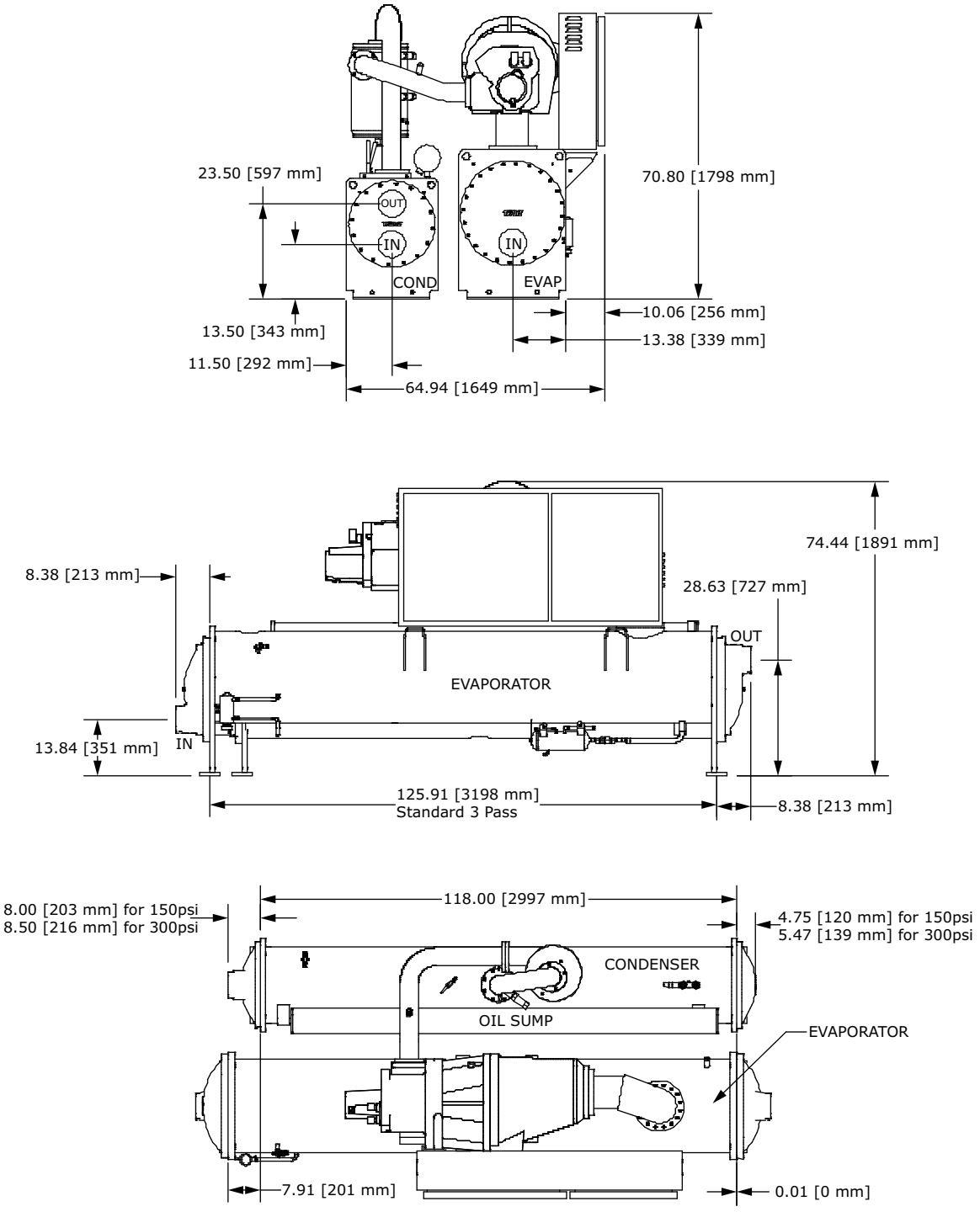


Figure 3. CDE, DDE, EDE configurations

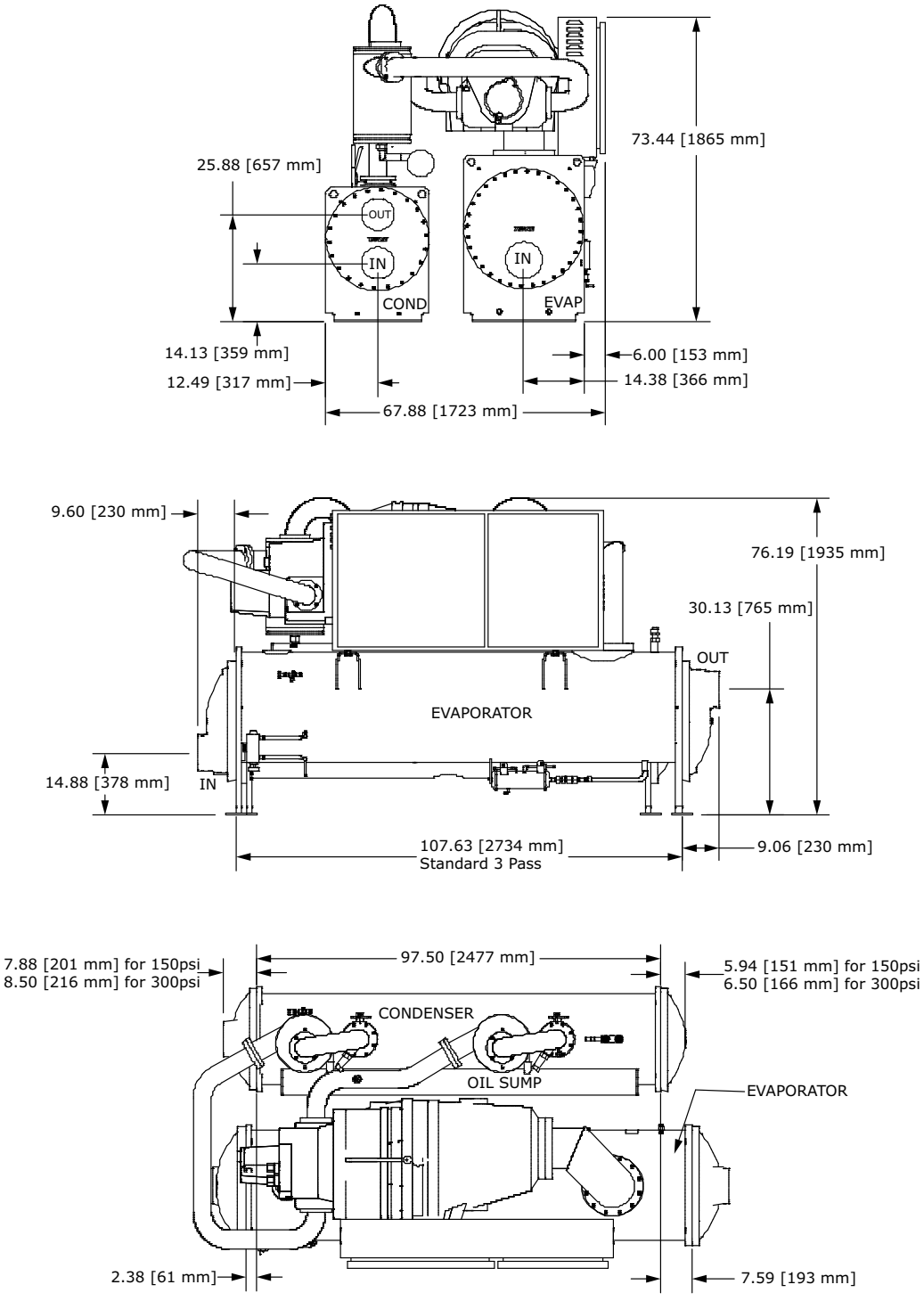


Figure 4. CEF configuration

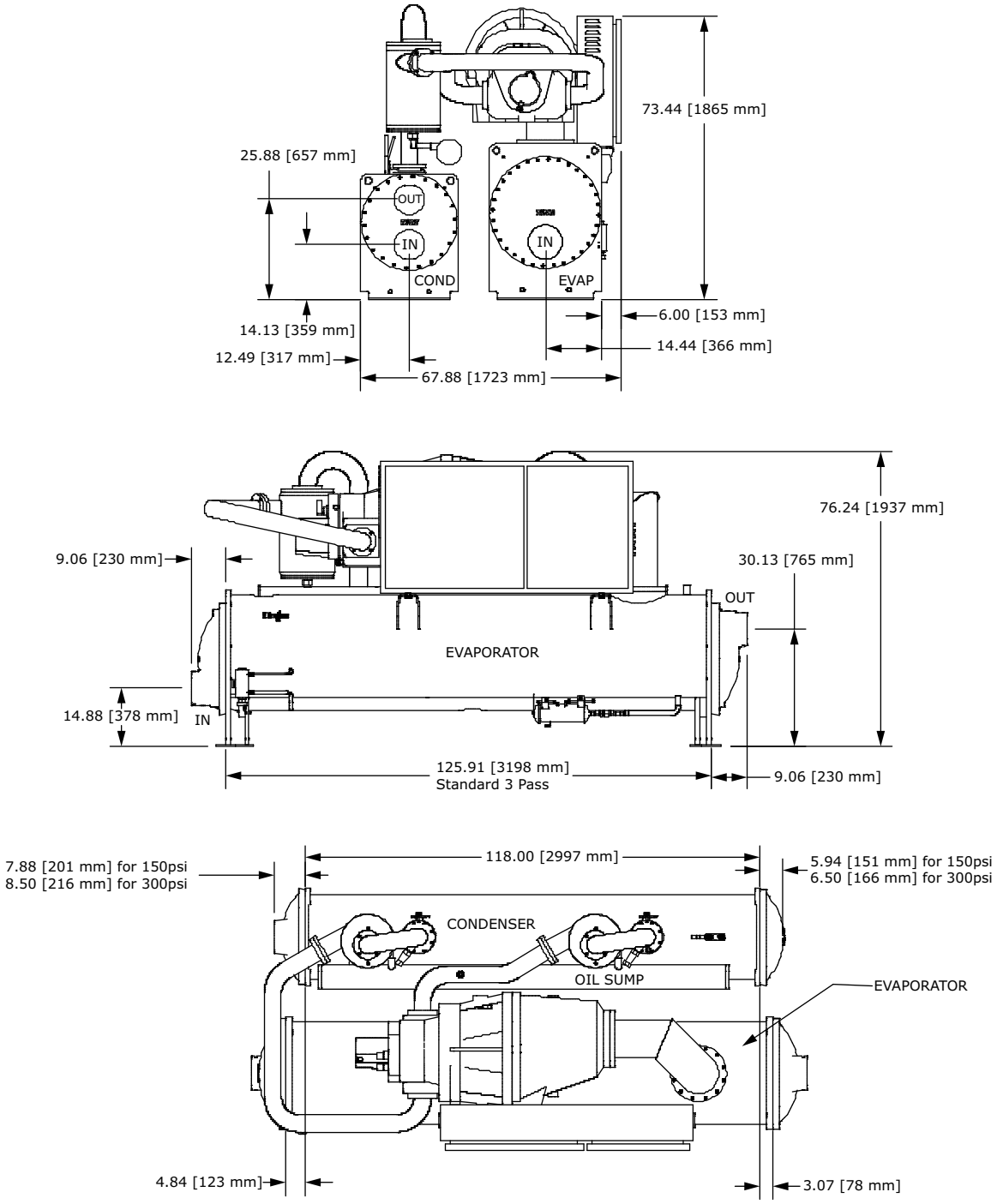


Figure 5. CFF, DFF, EFF configurations

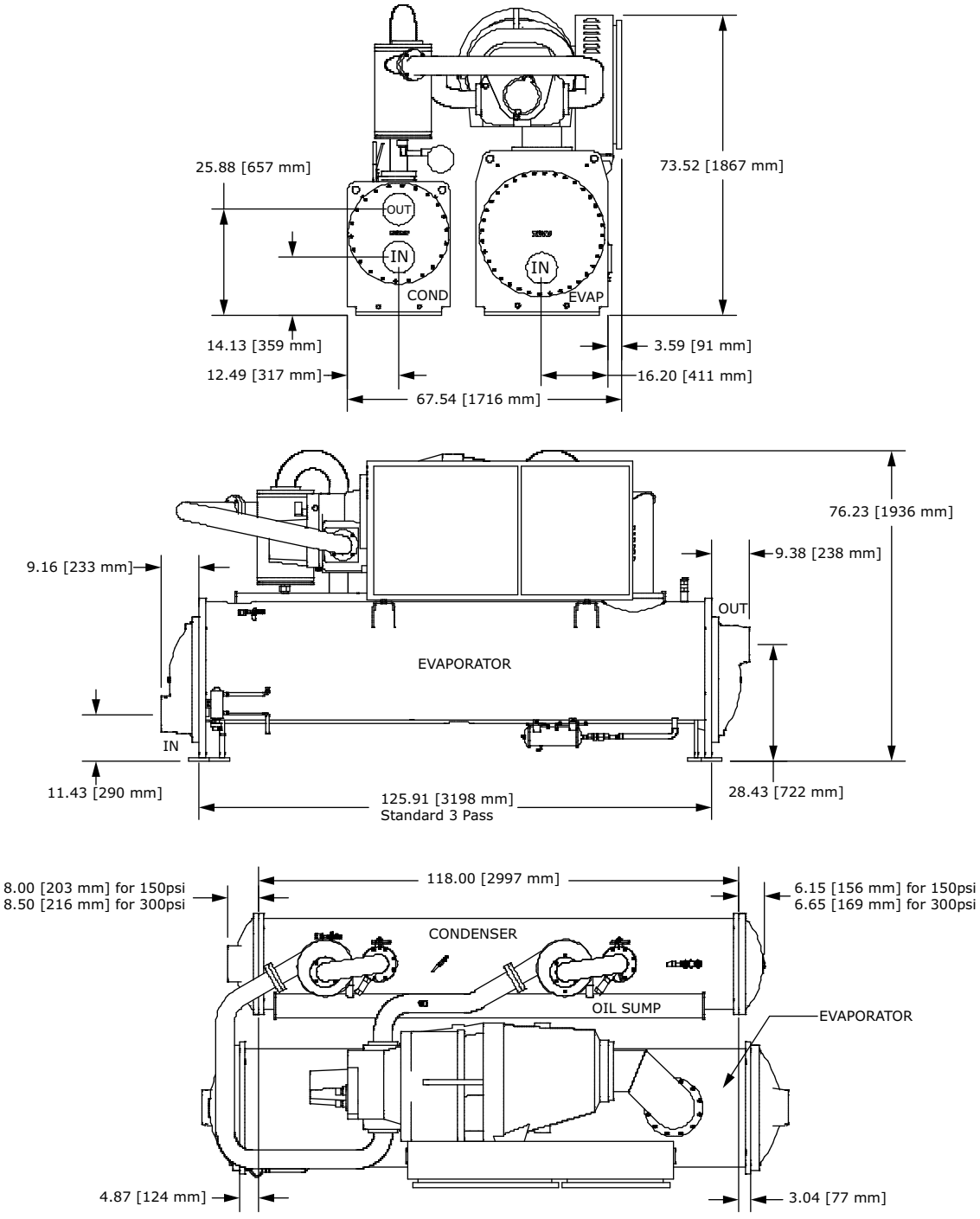
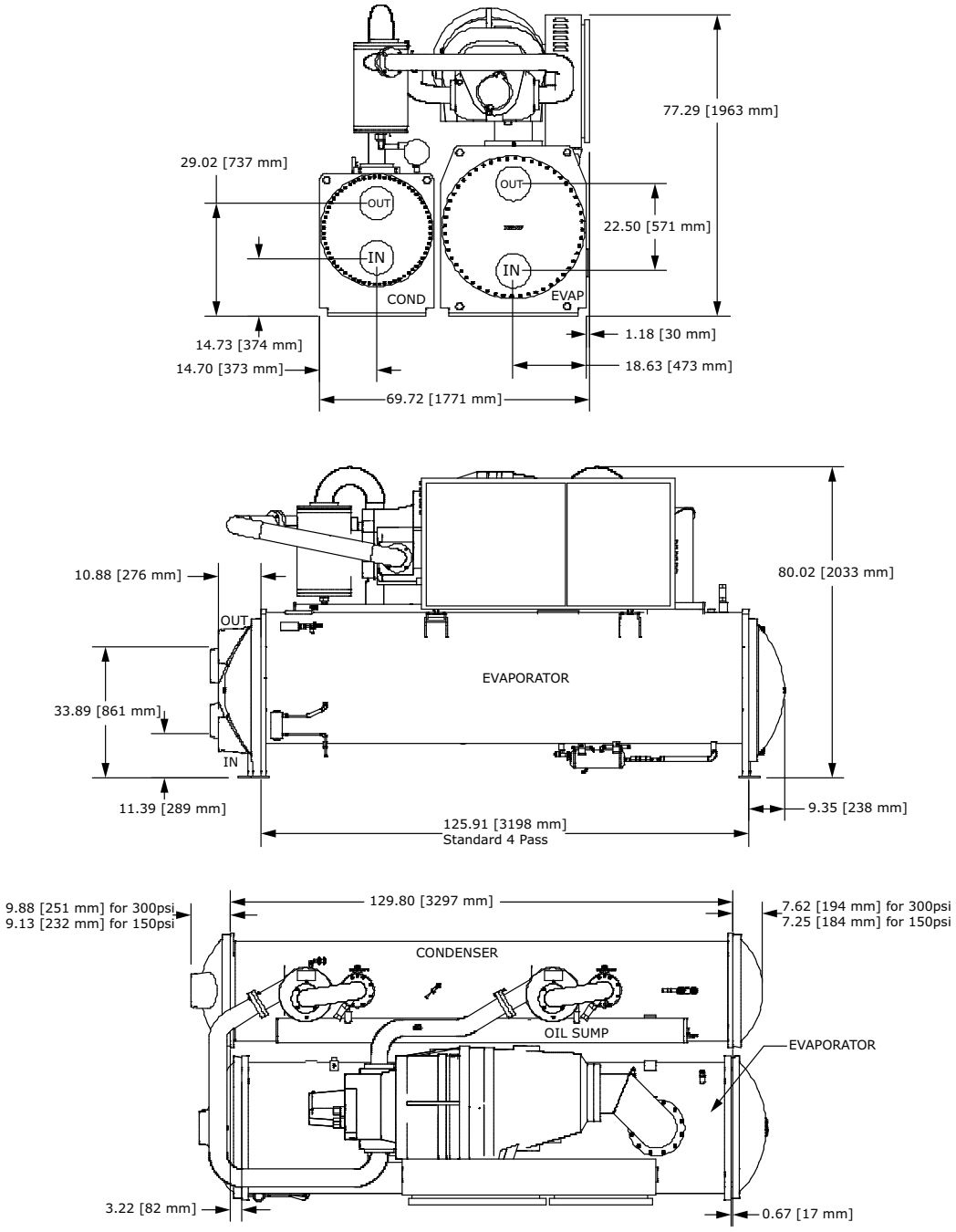


Figure 6. DGG, EGG configurations



Dimensions — Units with AFD Option

Note: *Overall unit dimensions for units with the AFD option are shown in the below table. All other dimensions are the same as standard unit dimensions specified in "Unit Dimensions — Standard (Wye-Delta Starter)," p. 23.*

Figure 7. Overall unit dimensions - units with AFD option

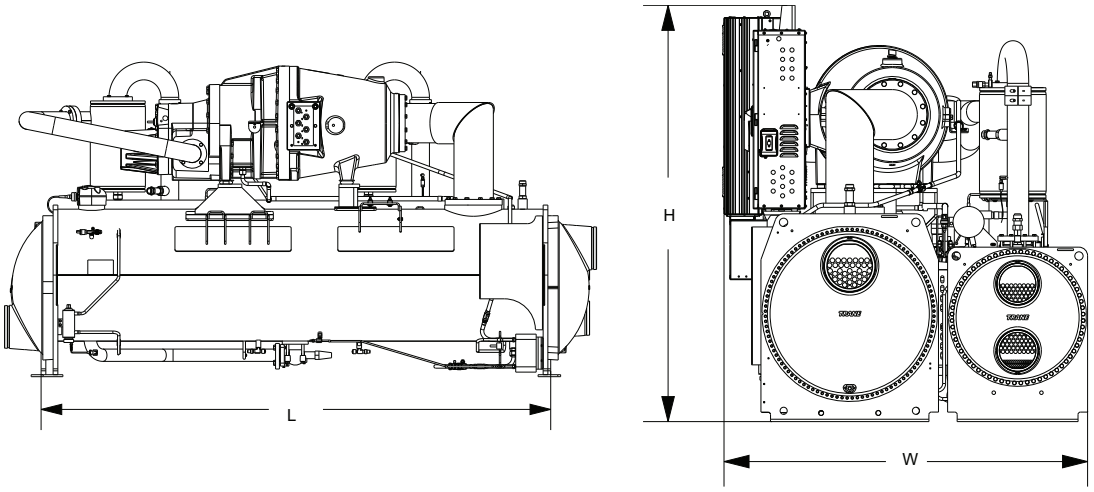


Table 7. Overall dimensions — units with AFD option

Unit Configuration[a]	AFD D1H Frame						AFD D2H Frame					
	Length (L)		Width (W)		Height (H)		Length (L)		Width (W)		Height (H)	
	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
B1B1B1	107.6	2734	71.3	1811	75.6	1920	107.6	2733	71.3	1811	80.8	2052
B1C1D1	125.9	3198	71.3	1811	75.6	1920	125.9	3198	71.3	1811	80.8	2052
B2B2B2	107.6	2734	71.3	1811	75.6	1920	107.6	2733	71.3	1811	80.8	2052
B2C2D2	125.9	3198	71.3	1811	75.6	1920	125.9	3198	71.3	1811	80.8	2052
C1D5E4	107.6	2734	74.5	1893	78.3	1989	107.6	2734	74.5	1893	83.5	2121
C1D6E5	107.6	2734	74.5	1893	78.3	1989	107.6	2734	74.5	1893	83.5	2121
C1E1F1	125.9	3198	74.4	1891	78.3	1989	125.9	3198	74.4	1891	83.5	2121
C2D3E3	107.6	2734	74.5	1893	78.3	1989	107.6	2734	74.5	1893	83.5	2121
C2D4E4	107.6	2734	74.5	1893	78.3	1989	107.6	2734	74.5	1893	83.5	2121
C2F2F3	125.9	3198	74.2	1886	78.7	1999	125.9	3198	74.2	1886	84.3	2141
D1D1E1	-	-	-	-	-	-	107.6	2734	74.5	1893	83.5	2121
D1F1F2	-	-	-	-	-	-	125.9	3198	74.2	1885.7	84.3	2141
D1G1G1	-	-	-	-	-	-	125.9	3289	76.7	1948	87.3	2217
D1G2G2	-	-	-	-	-	-	125.9	3289	76.7	1948	87.3	2217
D2D2E2	-	-	-	-	-	-	107.6	2734	74.5	1893	83.5	2121
D2F2F3	-	-	-	-	-	-	125.9	3198	74.2	1886	84.3	2141
D2G2G1	-	-	-	-	-	-	125.9	3289	76.7	1948	87.3	2217
D2G3G3	-	-	-	-	-	-	125.9	3289	76.7	1948	87.3	2217
D3D2E2	-	-	-	-	-	-	107.6	2734	74.5	1893	83.5	2121
D3F2F3	-	-	-	-	-	-	125.9	3198	74.2	1886	84.3	2141
D3G2G1	-	-	-	-	-	-	125.9	3289	76.7	1948	87.3	2217
E3D2E2	-	-	-	-	-	-	107.6	2734	74.5	1893	83.5	2121
E3F2F3	-	-	-	-	-	-	125.9	3198	74.2	1886	84.3	2141
E3G2G1	-	-	-	-	-	-	125.9	3289	76.7	1948	87.3	2217
E3G3G3							125.9	3289	76.7	1948	87.3	2217

Note: Dimensions vary with AFD frame size. D1H frame size used on units with model number digit 44 = V, W, X, 2, 3, 4, G, H or J. D2H frame size used with model number digit 44 = Y, Z, 1, 5, 6, 7, K, L, M or N.

Table 7. Overall dimensions — units with AFD option (continued)

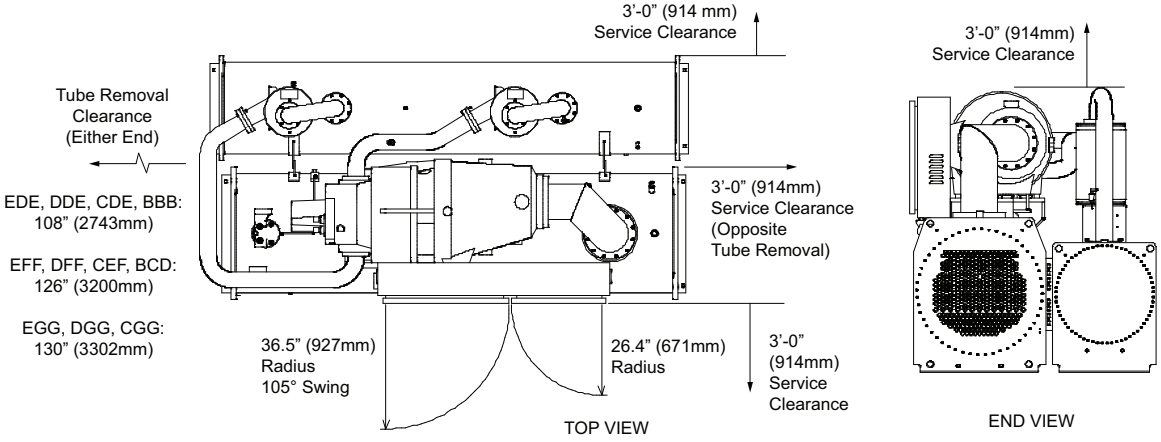
(a) Unit configuration digits 1, 2 - compressor code (also shown in unit model number digits 6, 7); digits 3, 4 - evaporator code (unit model number digits 14, 15); digits 5, 6 - condenser code (unit model number digits 21, 22).

Service Clearances

Notes:

- *Required vertical clearance above unit is 36-inch (914 mm). There should be no piping or conduit located over the compressor motor.*
- *Maximum clearances are given. Some units configurations may require less clearance than others in the same category.*
- *If the room configuration requires a variance to the clearance dimensions, contact your Trane sales office representative.*

Figure 8. Service clearances



Note: *Optional AFD is not shown.*

Table 8. Service clearances

Unit Configuration[a]	Recommended Clearance									
	Front		Back		Either End		Other End[b]		Top	
	in	mm	in	mm	in	mm	in	mm	in	mm
BBB,CDE, DDE, EDE	36.5	927	36	914	36	914	108	2743	36	914
EFF, DFF, CEF, BCD	36.5	927	36	914	36	914	126	3200	36	914
EGG, DGG, CGG	36.5	927	36	914	36	914	130	3302	36	914

(a) Unit configuration digit 1 - compressor code (shown in unit model number digit 6); digit 2 - evaporator code (model number digit 14); digit 3 - condenser code (model number digit 21).

(b) Clearance for tube removal.

Unit Weights

Table 9. Weights — standard units (wye-delta starter)

Unit Configuration[a]	Shipping Weight		Operating Weight	
	lbs	kg	lbs	kg
B1B1B1	9292	4215	9867	4476
B1C1D1	9837	4462	10554	4787
B2B2B2	9402	4265	10019	4545
B2C2D2	9953	4515	10653	4832
C1D5E4	12973	5884	13673	6202

Table 9. Weights — standard units (wye-delta starter) (continued)

Unit Configuration[a]	Shipping Weight		Operating Weight	
	lbs	kg	lbs	kg
C1D6E5	12780	5797	13397	6077
C1E1F1	14718	6676	15818	7175
C2D3E3	14002	6351	15044	6824
C2D4E4	12972	5884	13672	6201
C2F2F3	16168	7334	17560	7965
D1D1E1	14443	6551	15385	6987
D1F1F2	16187	7342	17537	7955
D1G1G1	18600	8437	20500	9299
D1G2G2	19107	8667	21065	9555
D2D2E2	14562	6605	15570	7062
D2F2F3	16820	7629	18220	8264
D2G2G1	18700	8482	20700	9389
D2G3G3	19508	8849	21641	9816
D3D2E2	14562	6605	15570	7062
D3F2F3	16820	7629	18220	8264
D3G2G1	18650	8460	20650	9367
E3D2E2	14720	6677	15728	7134
E3F2F3	16956	7691	18356	8326
E3G2G1	18800	8528	20800	9435
E3G3G3	19653	8915	21786	9882

Notes:

1. All weights +/- 3%
2. Shipping weights include standard 150 psig water boxes, refrigerant charge and oil charge.
3. Operating weights include refrigerant, oil and water charges.

[a] Unit configuration digits 1, 2 - compressor code (also shown in unit model number digits 6, 7); digits 3, 4 - evaporator code (unit model number digits 14, 15); digits 5, 6 - condenser code (unit model number digits 21, 22).

Table 10. Weights — units with AFD option

Unit Configuration[a]	Shipping Weight				Operating Weight			
	AFD D1H Frame		AFD D2H Frame		AFD D1H Frame		AFD D2H Frame	
	lbs	kg	lbs	kg	lbs	kg	lbs	kg
B1B1B1	9526	4321	9664	4384	10101	4582	10239	4645
B1C1D1	10071	4568	10209	4631	10787	4893	10925	4956
B2B2B2	9636	4371	9774	4434	10251	4650	10389	4713
B2C2D2	10187	4621	10325	4684	10886	4938	11024	5001
C1D5E4	13206	5990	13344	6053	13904	6307	14043	6370
C1D6E5	13014	5903	13153	5966	13631	6183	13770	6246
C1E1F1	14949	6781	15088	6844	16801	7621	16940	7684
C2D3E3	14235	6457	14374	6520	15278	6930	15417	6993
C2D4E4	13206	5990	13344	6053	13907	6308	14046	6371
C2F2F3	17055	7736	17194	7799	18446	8367	18585	8430
D1D1E1	–	–	14815	6720	–	–	15756	7147
D1F1F2	–	–	16559	7511	–	–	17910	8124
D1G1G1	–	–	18973	8606	–	–	20873	9468
D1G2G2	–	–	19480	8836	–	–	21438	9724
D2D2E2	–	–	14934	6774	–	–	15944	7232

Table 10. Weights — units with AFD option (continued)

Unit Configuration[a]	Shipping Weight				Operating Weight			
	AFD D1H Frame		AFD D2H Frame		AFD D1H Frame		AFD D2H Frame	
	lbs	kg	lbs	kg	lbs	kg	lbs	kg
D2F2F3	–	–	17194	7799	–	–	18594	8434
D2G2G1	–	–	19072	8651	–	–	21074	9559
D2G3G3	–	–	19881	9018	–	–	22013	9985
D3D2E2	–	–	14934	6774	–	–	15944	7232
D3F2F3	–	–	17194	7799	–	–	18594	8434
D3G2G1	–	–	19023	8629	–	–	21023	9536
E3D2E2	–	–	15093	6846	–	–	16100	7303
E3F2F3	–	–	17337	7864	–	–	18728	8495
E3G2G1	–	–	19173	8697	–	–	21173	9604
E3G3G3	–	–	20036	9088	–	–	22169	10056

Notes:

1. Weights vary with AFD frame size. D1H frame size used on units with model number digit 44 = G, H, J, V, W, X, 2, 3, or 4. D2H frame size used with model number digit 44 = K, L, M, N, Y, Z, 1, 5, 6, or 7.
2. All weights +/- 3%.
3. Shipping weights include standard 150 psig water boxes, refrigerant charge and oil charge.
4. Operating weights include refrigerant, oil and water charges.
5. AFD frame size determined by unit selection. See submittal for information.

[a] Unit configuration digits 1, 2 - compressor code (also shown in unit model number digits 6, 7); digits 3, 4 - evaporator code (unit model number digits 14, 15); digits 5, 6 - condenser code (unit model number digits 21, 22).

Mechanical Specifications

General

Exposed metal surfaces are painted with air-dry beige, direct-to-metal, single-component paint. Each unit ships with full operating charges of refrigerant and oil. Molded elastomeric isolation pads are supplied for placement under all support points.

Certified AHRI Performance

Trane water-cooled chillers are rated within the scope of the Air-Conditioning, Heating & Refrigeration Institute (AHRI) Certification Program and display the AHRI Certified® mark as a visual confirmation of conformance to the certification sections of AHRI Standard 550/590 (I-P) and ANSI/AHRI Standard 551/591 (SI). The applications in this catalog specifically excluded from the AHRI certification program are:

- 50 Hz chillers below 200 tons
- Custom units
- Condenser less chillers
- Evaporatively-cooled chillers

Units with evaporators or condensers that use fluid other than fresh water except units containing freeze protection fluids in the condenser or in the evaporator with a leaving chilled fluid temperature above 32°F (0°C) are certified when rated per the standard with water.

Compressor and Motor

Unit is equipped with a semi-hermetic, direct-drive, 3600 rpm 60 Hz (3000 rpm 50 Hz) rotary compressors that includes a capacity control slide valve, oil sump heater, and differential pressure refrigerant oil flow system. Four pressure-lubricated rolling element bearing groups support the rotary assembly. Motor is suction gas-cooled, hermetically sealed, two-pole squirrel cage induction motor.

Unit-Mounted Starter

The unit is supplied with a UL 1995 indoor type enclosure with top power-wiring access and three phase, solid-state overload protection. The starter is factory-mounted and fully pre-wired to the compressor motor and control panel. A factory-installed, factory-wired 600 VA control power transformer provides all unit control power (120 Vac secondary) and Symbio™ 800 module power (24 Vac secondary). Optional power line connections include circuit breaker, high fault panel with circuit breaker, or mechanical, non-fused disconnect.

Evaporator and Condenser

Heat exchangers are shell and tube design. Standard tubes are externally finned, internally enhanced seamless copper with lands at all tube sheets. All tube sheets are made of carbon steel. Tubes are mechanically expanded into tube sheets and mechanically fastened to tube supports. Evaporator tubes are 1.0-inch (25.4 mm) diameter and condenser tubes are 0.75-inch (19.05 mm) diameter. All tubes can be individually replaced.

Shells are carbon steel plate. The evaporator and condenser are designed, tested, and stamped in accordance with ASME Code for refrigerant-side/ working-side pressure of 200 psig (13.8 bars).

All water pass arrangements are available with grooved connections (150 or 300 psig waterside working pressure). All connections may be either right- or left-handed. Waterside shall be hydrostatically tested at 1.5X design working pressure.

Refrigerant Circuit

Each unit has a single refrigerant circuit. Each refrigerant circuit includes optional compressor suction and discharge service valves, removable core filter, charging port, and sight glass. An electronically controlled expansion valve is provided to maintain variable capacity modulation over the entire building load and maintain proper refrigerant flow.

Oil Management

The unit is configured with an oil management system that ensures proper oil circulation throughout the unit. Key components include 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.

Unit Controls

All unit controls are housed in an outdoor rated weather enclosure with removable plates to allow for customer connection of power wiring and remote interlocks. All controls, including sensors, are factory mounted and tested prior to shipment.

Microcomputer controls provide all control functions including start-up and shutdown, leaving chilled water temperature control, evaporator flow proving, compressor staging and speed control, electronic expansion valve modulation.

Symbio™ 800 Controller

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

The Symbio 800 control module, utilizing Adaptive Control™, automatically takes action to avoid unit shutdown due to abnormal operating conditions associated with low refrigerant pressure, high condensing pressure, AFD/Compressor current overload, low oil return or low AFD cooling, low discharge superheat, and high compressor discharge temperature. Should the abnormal operating condition continue until a protective limit is violated, the unit will be shutdown.

Unit protective functions of the controller include: loss of chilled water flow, evaporator freezing, loss of refrigerant, low refrigerant pressure, high refrigerant pressure, high compressor motor temperature, and loss of oil to the compressor.

BACnet® Communication Protocol

The Symbio 800 controller supports standard BACnet communication protocol through a RS485, two-wire communication link or BACnet/IP over Ethernet and BACnet/(MS TP).

Trane LonTalk® Communication Protocol

The LonTalk module provides an interface to a Tracer® building automation system or other control system that supports LonTalk and is factory installed, allowing for control and monitoring of the unit through a RS485, two-wire communication link. Requires an additional LonTalk Communication Kit to be installed.

Modbus® Communication Protocol

The Symbio 800 controller supports standard Modbus RTU communication protocol through an RS485, two-wire communication link.

Controls Expansion Hardware

Symbio 800 includes field applied controls capability. Factory installed expansion hardware (XM70) has 19 inputs/outputs. Additional expansions may be added in the field.

Tracer® AdaptiView™ TD7 Display

A full color Tracer® AdaptiView™ TD7 touch screen display indicates all important unit and circuit parameters, in logical groupings on various screens. The parameters including chilled water setpoint, leaving evaporator temperature, demand limit setpoint, evaporator and condenser refrigerant temperatures and pressures, compressor and fan speeds, and all pertinent electrical information. The display also provides “on screen” data graphs of predefined parameters as well as customizable data graphs based on user defined parameters from a list of all available parameters. The display also provides indication of the chiller and circuits’ top level operating modes with detailed sub-mode reports

available with a single key press, as well as diagnostics annunciation and date and time stamped diagnostic history. The color display is fully outdoor rated, and can be viewed in full daylight without opening any control panel doors.

Standard power connections include main three phase power to the compressors, condenser fans and control power transformer and optional connections are available for the 115 volt/60 Hz single phase power for the thermostatically controlled evaporator heaters for freeze protection.

- Outdoor capable:
  - UV Resistant Touchscreen
  - -40°C to 70°C Operating Temperature
  - IP56 rated (Power Jets of Water from all directions)
- RoHS Compliant
- UL 916 Listed
- CE Certification
- Emissions: EN55011 (Class B)
- Immunity: EN61000 (Industrial)
- Display:
  - 7-inch diagonal
  - 800x480 pixels.
  - TFT LCD @ 600 nits brightness
  - 16 bit color graphic display
- Display Features:
  - Alarms
  - Reports
  - Unit Settings
  - Display Settings
- Graphing
- Global Application with Support for 27 Languages

Quality Assurance

The quality management system applied by Trane has been subject to independent third-party assessment and approval to ISO 9001-2015. The products described in this catalog are designed, manufactured and tested in accordance with the approved system requirements described in the Trane Quality Manual.

Electrical Options

Adaptive Frequency™ Drive

Trane's Adaptive Frequency Drive (AFD) technology for controlling the compressors is available as an option on RTHD chillers. AFD is a family of adaptive frequency drives specifically designed for Trane water chillers. AFD incorporates the Trane communication protocol enabling seamless integration with the unit controller. AFD data such as drive status, temperatures, modes and diagnostic information are accessible to the unit controller and through the Tracer® TU service tool.

AFD contains technology that enables the drive to last the life time of the chiller and with less down time. The technology enables operation on various power systems including alternative energy sources. AFD will protect itself and the compressor motor from over current, low or high line voltage, phase loss, incoming phase imbalance, and over temperature due to loss of drive cooling or loss of panel ventilation.

AFD incorporates improved serviceability and troubleshooting tools to identify the issue quickly and get the chiller back up and running. All AFD control circuits are powered with class 2 low voltage —separate

from main power allowing service on the controls with the panel door open. Additionally, the main electronic control modules can be serviced with the standard Trane screw driver. The AFD further incorporates another Trane service tool to allow for firmware upgrades through Tracer TU.

Wye-Delta Starter

This option provides a reduced-inrush, unit mounted starter with a UL 1995 enclosure.

Circuit Breaker

A molded case standard interrupting capacity circuit breaker, factory pre-wired with terminal block power connections and equipped with a lockable external operator handle, is available to disconnect the chiller from main power.

High Interrupting Capacity Circuit Breaker

A molded case high interrupting circuit breaker, factory pre-wired with terminal block power connections and equipped with a lockable external operator handle, is available to disconnect the chiller from main power. The panel has a higher short circuit rating as determined by UL 1995.

Non-Fused Disconnect

A non-fused molded case disconnect switch, factory pre-wired with terminal block power connections and equipped with a lockable external operator handle, is available to disconnect the chiller from main power.

Under/Over-Voltage Protection

Unit receives protection against variations in voltage (current lag and spike protection is standard).

Energy Meter

Energy meter capable of measuring line current by phase, average current, voltage by phase, average voltage, frequency, unit power consumption, reactive and apparent power, and power factor.

Control Options

Wireless Communication Interface

- WiFi® module is a wireless interface option to service technician to connect the chiller to the service tool interface.
- LTE modem is a wireless interface option to allow the chiller to pass performance and diagnostic information to Trane Intelligent Services without the need for an internal network.
- Air-Fi® module is a wireless interface option to connect the chiller to a Trane Tracer® system.

BACnet® Communications Interface

Allows the user to easily interface with BACnet via a single twisted pair or Ethernet wiring to a factory installed and tested communication board.

LonTalk® Communications Interface

Provides the LonMark® chiller profile inputs/outputs for use with a generic building automation system via a single twisted pair wiring to a factory installed and tested communication board.

Modbus® Communications Interface

Symbio 800™ control can be configured for Modbus communications at the factory or in the field. This enables the chiller controller to communicate as a server device on a Modbus network. Chiller setpoints, operating modes, alarms, and status can be monitored and controlled by a Modbus client device.

Chilled Water Reset – Outdoor Air Temperature

Controls, sensors, and safeties allow reset of chilled water temperature, based on temperature signal, during periods of low outdoor air temperature (chilled water reset based on return chilled water temperature is standard).

Condenser-Leaving Water Temperature Control

Enables the unit to use the leaving condenser water temperature to load and unload the chiller relative to the leaving condenser water setpoint. The control system allows for a condenser leaving temperature range up to 114°F (45.56°C) for R134a and 111°F (43.88°C) for R513A.

Condenser Pressure Output

Provides a 0–10 Vdc signal based on the system refrigerant differential or condenser pressure.

Condenser Regulating Valve Control Output

Provides a PID algorithm to control a condenser water regulating valve via 0-10 Vdc signal.

External Base Loading

External base loading is communicated to a factory-installed, tested communication board through a 2–10 Vdc or 4–20 mA signal.

External Chilled Water or Hot Water Setpoint

External chilled or hot water setpoint signal can be field-wired to a factory-installed, tested interface board through a 2-10 Vdc or 4-20 mA signal.

External Current-Limiting

External current-limit setpoint is communicated to a factory-installed, tested interface board through a 2-10 Vdc or 4-20 mA signal.

Ice Making Control

Controls and safeties allow operation with brine down to 20°F (-6.7°C), and dual setpoints enable both ice making and daytime comfort cooling.

Programmable Relays

Predefined, factory-installed, programmable relays allow the operator to select four relay outputs. Available outputs are: Alarm-Latching, Alarm-Auto Reset, General Alarm, Warning, Chiller Limit Mode, Compressor Running, Head Pressure Relief Request, and Tracer Control.

Refrigerant Monitor Input

Control system indicates refrigerant monitor status of 0-100 or 0-1000 ppm (user selectable), based on a 2-10 Vdc or 4-20 mA signal.

Other Options

Condenser Copper Tubes

Externally fined and internally enhanced copper tubes are available with 0.025-inch or 0.028-inch.

Flow Switches - Field Installed

NEMA 1 or NEMA 4 flow switches with 150 psi or 300 psi ship with the unit.

Insulation

The evaporator, water boxes, suction line, and motor housing are covered with factory installed 0.75 inch (19.05 mm) insulation. Factory installed foam insulation is used on the liquid level sensor and thermosyphone oil return BPHE assembly (with its associated piping).

Nitrogen Charge

Unit is shipped with an optional nitrogen-holding charge in lieu of refrigerant.

Performance and Witness Tests

Performance and witness tests are conducted based on requested operating points, to certify chiller performance.

Refrigerant Isolation Valves

Factory-installed condenser inlet and outlet refrigerant valves allow isolation of the full refrigerant charge in the condenser while servicing the chiller.

Seal Kit for Reassembly

Ideal for situations when the bolt-together construction of the RTHD will be separated for installation, this seal kit provides replacement gaskets and rings for reassembly.

Two-Way Condenser Water Regulating Valve

For water regulation, a field-installed, 2-way butterfly-type (lug-style) valve, with integral electrical operator and factory-mounted valve actuator, is available. The single-phase, dual frequency (50 or 60 Hz) motor can be selected with 115 V (can be powered directly from control power transformer at unit) or 220 V power. The 2-way valve is field-wired and controlled by the chiller regulating valve control output. Valves are available in 6 and 8 inch (152.4 mm and 203.2 mm) sizes.

Water Boxes - 300 psig

Water boxes for the evaporator and condenser are designed for 300 psig maximum waterside working pressure, and grooved pipe water connection are provided for ease of installation.

The AHRI Certified mark indicates Trane U.S. Inc. participation in the AHRI Certification program. For verification of individual certified products, go to ahridirectory.org.

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

Trane has a policy of continuous product and product data improvements and reserves the right to change design and specifications without notice. We are committed to using environmentally conscious print practices.

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