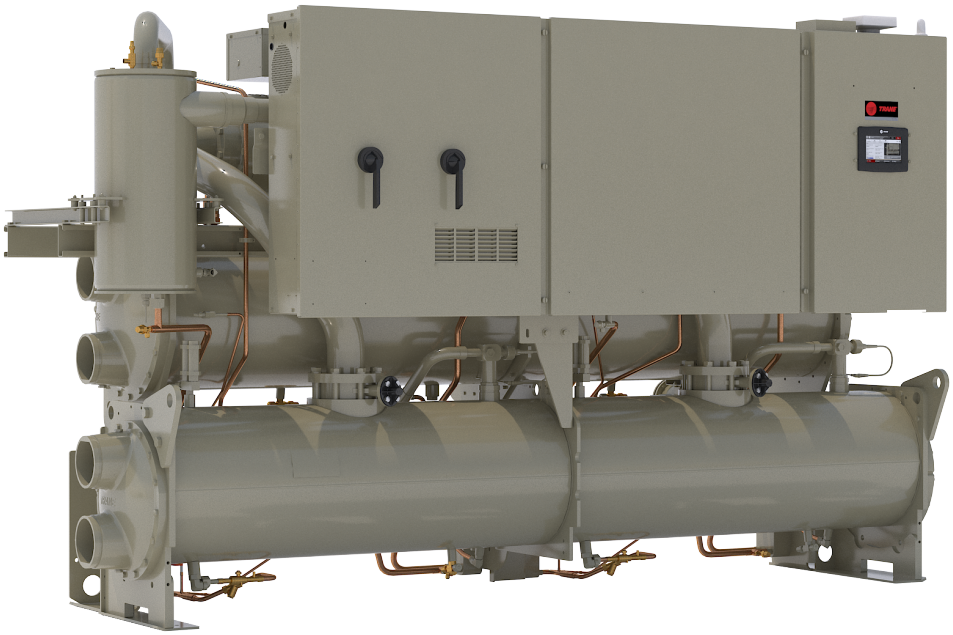
Product Catalog

Series R® Helical Rotary Liquid Chillers
Model RTWD Water-Cooled

80 to 250 Nominal Tons (60 Hz)

Made in USA



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Introduction

To meet a wide range of applications in the 75-240 ton water-cooled market, Trane is proud to offer the model RTWD helical-rotary liquid chiller. This chiller provides application versatility, ease of installation, control precision, reliability, energy-efficiency, and operational cost-effectiveness. The chiller is designed to deliver proven Series R® performance, plus all the benefits of an advanced heat transfer design with two low-speed, direct-drive compressors.

Important Design Advances and Features

RTWD, a member of Trane's EcoWise™ portfolio of products, is designed to lower environmental impact with low global warming potential (GWP) refrigerant and high efficiency operation. RTWD chillers are designed to operate with either R134a, R-515B, or DuPont™ Opteon® (R-513A), a next generation refrigerant with 55 percent lower GWP than R-134a.

- Higher full-load energy efficiency that meets ASHRAE 90.1 and reduces both operating and lifecycle costs.
- Variable evaporator flow compensation for improved control stability with energy saving variable flow applications.
- Dual independent refrigerant circuits.

The industrial-grade design of the Series R 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 reliable compressors, wide operating temperature range, advanced controls, electronic expansion valve, short anti-recycle timers, and industry-leading efficiencies mean that this latest Trane Series R 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

- Removed RTUD and 50 Hz RTWD information throughout the manual.
- Added new features in Features and Benefits chapter.
- Updated Application Considerations chapter.
- Updated model number information.
- Updated general data tables with refrigerant charge and oil type information.
- Added Symbio™ 800 and TD7 information in Controls chapter.
- Updated electrical data.
- Removed air cooled condenser information from Dimensions chapter.
- Updated Mechanical Specifications chapter.

Table of Contents

Features and Benefits

Reliability

- 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 more than 240,000 compressors installed worldwide.
- Direct drive, low-speed compressors—a simple design with only four moving parts—provides maximum efficiency, high reliability, and low maintenance requirements.
- Suction gas-cooled motor stays at a uniformly low temperature for long motor life.
- Electronic expansion valve, with fewer moving parts than alternative valve designs, provides highly reliable operation.

High Performance

- Advanced design enables chilled water temperature control to ±1°F (0.56°C) for flow changes up to 10 percent per minute, plus handling of flow changes up to 30 percent per minute for variable flow applications.
- 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.
- High compressor lift capabilities for use with heat recovery and non-reversible waterside heat pump applications allows highly efficient system design with minimal operational concerns.
- Tight water temperature control extends to operation of multiple chillers in parallel or series configurations, offering further system design flexibility for maximum efficiency.
- Optional LonTalk, BACnet, and Modbus communications interface provides excellent, trouble-free interoperability.

Life Cycle Cost-Effectiveness

- Precise compressor rotor tip clearance ensures optimal efficiency.
- Condenser and evaporator tubes use the latest heat transfer technology for increased efficiency.
- 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.
- Chilled water reset based on return water temperature is standard.
- Electrical current-limiting is available as an option.

Application Versatility

- **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** – Specifiers and operators benefit from dual setpoint control and industry leading temperature, efficiency, and control capabilities, plus outstanding support through partnership with CALMAC®, a strong Trane partner providing proven installation examples, templates, and references that minimize design time and energy costs. Utilities and owners benefit from reduced cooling energy cost. The RTWD 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.
- **Thermal energy storage for heating** — The energy storage system used for cooling can also be used for heating. When the building has cooling and heating loads in a given day, but they occur at different times of the day, the waste energy extracted during cooling periods can be stored and

along with the RTWD, be used to meet the heating loads. Morning warm-up during the shoulder seasons is one example of where this system can be used to reduce building energy consumption.

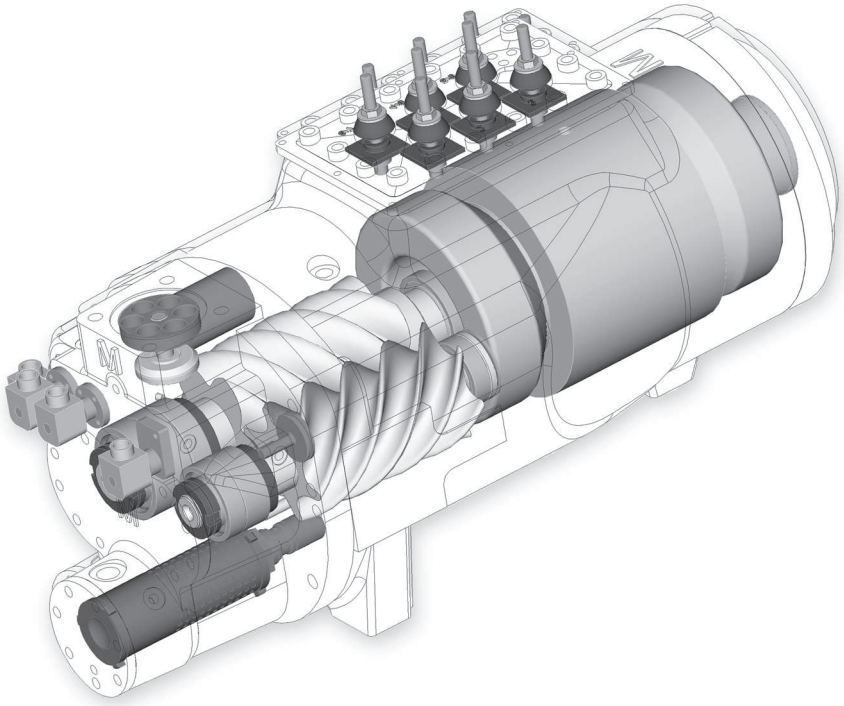
- **Heat recovery** – Maximum condenser temperature exceeds those of previous technologies, providing hot water and tight control that minimizes operating costs for the chilled water plant and boiler/hot water heater, while also providing consistent dehumidification.
- **Non-reversible heat pump** – For chiller-heater systems the RTWD can be used as a non-reversible heat pump (chiller-heater) in a ground source or storage source application. In this configuration, the leaving condenser temperature control option allows for the RTWD to be used and controlled primarily for the heat produced in the condenser.
- **Storage source heat pump** — For chiller-heater systems the RTWD can be used as a non-reversible heat pump (chiller-heater) along with thermal storage tanks as a Storage Source Heat Pump (SSHP). This system can take advantage of non-coincident heating and cooling loads enabling the capture and storage of yesterday's waste energy for tomorrow's heating. When air-source heat pumps (ASHP) are part of the system, SSHPs can reduce the size of the ASHPs and also extend the electrified heating operating range for cold climates and reduce both peak cooling and heating demand charges.
- **Dry cooler** – Allows for use with a closed condenser loop system that minimizes the potential for cross-contamination of the condenser loop.
- Variable primary flow – Variable evaporator flow compensation allows multi-chiller systems to vary the flow of water throughout the entire system (from the evaporator through the cooling coils). This feature also provides additional system efficiency as the number of pumps and the flow rate in the system are reduced. Standard 2 pass or optional 3 pass evaporator allows for a wider range of flow capabilities.
- **Series chiller configuration** – For two-chiller systems all the system water passes through the evaporators and/or condensers of both chillers to take advantage of system efficiency gains due to thermodynamic staging as well as downsizing the upstream chiller.
- **Low water flow system** – Low flow and high temperature differential installations allow for reduced pump and cooling-tower energy by decreasing the amount of water flow pumped through the system. This results in downsizing of all HVAC and ancillary equipment which provides installation and operational savings.

Simple, Economical Installation

- All units fit through standard double-width doors and most units fit through single width doors. Units are designed with bolt-together construction for disassembly to fit through smaller openings.
- 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 and oil charges reduce required field labor, materials, and installation cost (RTWD). An optional nitrogen charge can reduce the time and labor for projects expecting disassembly.
- Optional integrated forklift channels on the unit base allow for easy movement of the chiller at the job site.
- Single or dual point power connection options simplify overall installation.
- Unit-mounted starter eliminates additional job site installation considerations and labor requirements.
- Trane chiller controls easily interface with Tracer SC+, LonTalk™, BACnet™, or Modbus building automation systems through single twisted-pair wire.
- Trane has conducted extensive factory testing during manufacturing, and also offers options for in-person and/or documented system performance verification.

Precision Control

- Symbio™ 800 controls monitor and maintain optimal operation of the chiller and its associated sensors, actuators, relays, and switches, all of which are factoryassembled and extensively tested.
- Easy interface with computers hosting LonTalk/BACnet/Modbus building automation/ energy management systems allows the operator to efficiently optimize comfort system performance and minimize operating costs.
- Proportional Integral Derivative (PID) control strategy ensures stable, efficient chilled water temperature, maintaining ±1°F (0.56°C) by reacting to load changes.
- Adaptive Control™ attempts to maintain chiller operation under adverse conditions, when many other chillers might simply shut down. This is accomplished by unloading the compressor due to high condensing pressure, low suction pressure and/or overcurrent.
- EMC certification ensures trouble-free use of electronic devices around the chiller.
- Easy-to-use operator interface displays all operating and safety messages, with complete diagnostics information, on a easily readable panel with a touch-screen display.
- Variable evaporator flow compensation maintains improved control stability of the leaving water temperature.



Application Considerations

Condenser Water Temperatures

With the model RTWD chiller, condenser head pressure control is necessary only if the unit starts with leaving condenser water temperatures below 45°F (7.2°C) or cannot rise to 55°F (12.8°C) within 10 minutes.

When the application requires startup 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 Smart Flow Control option for the chiller controls. This option enables the controller to send 0 - 10 VDC analog output signal for opening and closing the valve as necessary to maintain chiller differential refrigerant pressure. The 2-way valves are available as a ship-with option.

The minimum acceptable refrigerant pressure differential between condenser and evaporator is 25 psid (172.4 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 17°F (9.5°C) higher than evaporator leaving water temperature within 2 minutes of startup.

Trane Series R 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.

Thermal Battery Cooling System Operations

A Thermal Battery™ cooling system uses the chiller to make ice at night (cooling) when utilities generate electricity more efficiently with lower demand and energy charges. The stored cooling energy reduces or even replaces mechanical cooling during the day when utility rates are at their highest. This reduced electrical demand for cooling results in significant utility cost savings and source energy savings.

Another advantage of an ice energy storage system is its ability to eliminate chiller over sizing. A right-sized chiller plant with ice energy storage operates more efficiently with smaller support equipment while lowering the connected load and reducing operating costs. Best of all, this system still provides a capacity safety factor and redundancy by designing reserve capacity into the ice storage system for practically no cost compared to oversized systems.

Trane air-cooled chillers are uniquely suited to low temperature applications like ice storage because of the ambient relief experienced at night. Chiller ice making efficiencies are typically similar to or even better than standard cooling daytime efficiencies as a result of night-time dry-bulb ambient relief.

Standard smart control strategies for ice storage systems are another advantage of the chiller. The dual mode control functionality is integrated right into the chiller. Trane Tracer® building management systems can measure demand and receive pricing signals from the utility and decide when to use the stored cooling and when to use the chiller.

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, selecting chillers with evaporator flow that can be turned down to 60% or less of the design flow will enable significant pumping energy savings. In addition, 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.

For applications designed to operate with changes in the water flow rate, the new evaporator waterflow compensation improves the ability of the chiller to respond to increasing or decreasing water flow. This new standard control feature works by varying the leaving evaporator temperature control gains in response to changes in evaporator water flow. By measuring the refrigerant flow in each circuit and using this value to calculate the resulting waterside temperature drop, the controls can estimate the water flow rate through the evaporator.

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. Due to the reduced lift on the compressors, 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).

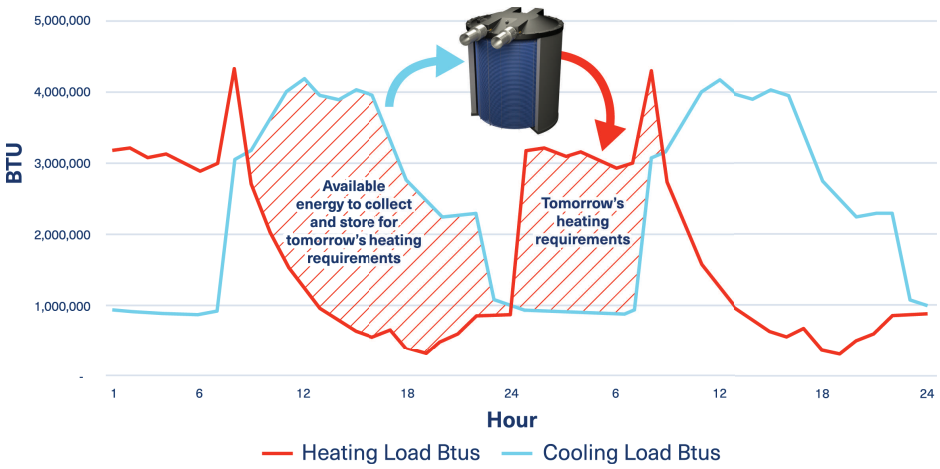
The Trane screw compressor also has excellent “lift” capabilities which afford an opportunity for savings on the evaporator and condenser water loops. Like series arrangements on the evaporator, series arrangements on the condenser may enable savings. This approach may allow reductions in pump and tower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

Storage Source Heat Pump

A storage source heat pump system can balance a building’s non-coincident heating and cooling loads. This enables to capture and store yesterday’s waste energy for tomorrow’s heating.

Figure 1. Winter peak heating and cooling load profile



A storage source heat pump system can balance a building's non-coincident heating and cooling loads. This enables to capture and store today's waste energy for tomorrow's heating. In this chiller-heater system, heating loads are served by RTWD that pumps heat sourced from the building, air, or from energy storage tanks. The energy storage tanks can reclaim energy from the building, and they can dispatch energy when used as a source for the RTWD. This asynchronous energy transfer can significantly reduce the size of other heating equipment and reduce building carbon footprint. Depending on the configuration and operating modes, the system can reduce both peak cooling and heating demand charges. When used for cooling, the system can incorporate outdoor cooling towers and air-to-water heat pumps for load balancing and additional source energy.

In this chiller-heater system, heating loads are served by an RTWD that pumps heat sourced from the building, the air, or from energy storage tanks. The energy storage tanks can reclaim energy from the building, and they can dispatch energy when used as a source for the RTWD. This time independent energy transfer can significantly reduce the size of other heating equipment and reduce the building carbon footprint. Depending on the configuration and operating modes, the system can reduce both peak cooling and heating demand charges. When used for cooling, the system can incorporate outdoor cooling towers and air-to-water heat pumps for load balancing and additional source energy.

Non-Reversible Heat Pump

For chiller-heater systems, the RTWD can be used as a non-reversible heat pump (aka chiller-heater) in a ground source or storage source application. In this configuration the leaving condenser temperature control option allows for the RTWD to be used and controlled primarily for the heat produced in the condenser. Local regulations concerning limitation on minimum/maximum rejected water temperature should be checked before using this method.

Dry Cooler

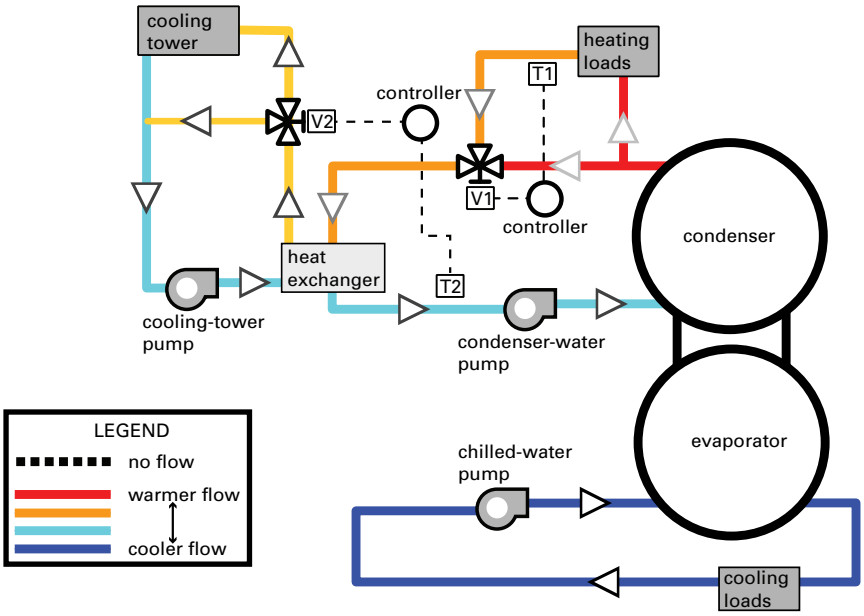
The RTWD can be used with dry coolers. Generally this application is selected to minimize the spread of airborne contaminates associated with open tower systems. In addition, other drawbacks of cooling towers are avoided: water consumption, production of vapor, need of water treatment, etc. Another benefit 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

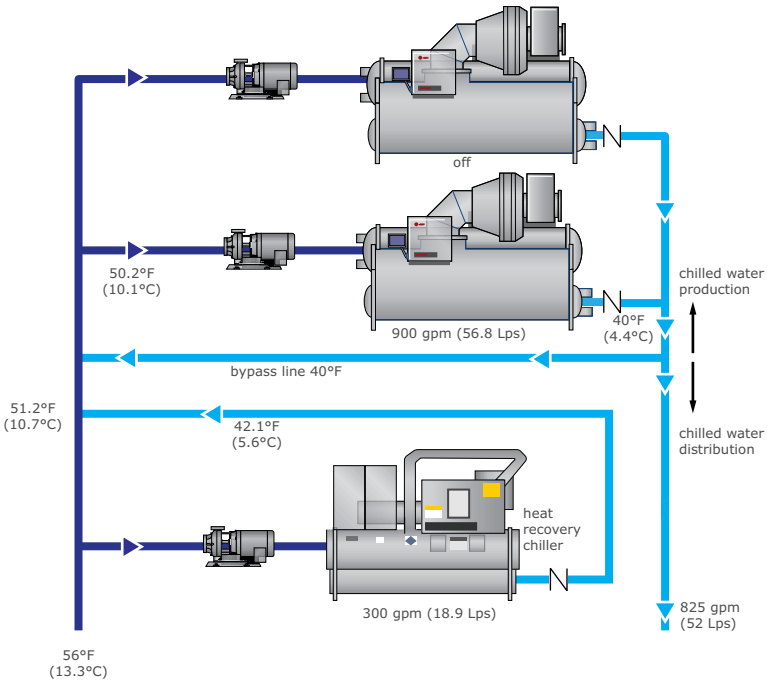
Reducing energy usage with heat recovery not only reduces operating costs but also reduces carbon emissions. Many standards and building codes require heat recovery in specific applications. This has been a requirement of ASHRAE® 90.1 since 2001 which is the basis of almost all local energy codes. Additionally, specific building owners may decide to mandate its use. Facilities that often meet these requirements include hospitals, hotels, dormitories, correctional facilities, and other buildings with

similar service water heating loads. By using RTWD chiller with heat recovery, utilization of energy can be improved by using heat from the condenser that would otherwise be wasted.

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 RTWD by recovering heat from the water leaving the standard condenser along with rejecting any excess heat to a cooling tower via an isolation heat exchanger.



Depending on the plant configuration there are several ways to enhance the heat recovery capacity and efficiency with preferential loading. Refer to *Trane Application Manual* (SYS-SPM005E) for detailed plant configurations and control strategies.



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, Trane strongly encourages the use of 1750-rpm (60 Hz) pumps. Specifying or using 3600-rpm (60 Hz) condenser water and chilled water pumps should be avoided, because such pumps may operate with objectionable levels of noise and vibration. In addition, a low frequency beat may occur due to the slight difference in operating rpm between 3600-rpm (60 Hz) water pumps and Series R chiller motors.

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 Series R Chillers Sound Ratings and Installation Guide.

Model Number Descriptions

Unit Model Number

Digit 1, 2, 3, 4 — Chiller Model

RTWD = Water-Cooled Chiller Series R®

Digit 5, 6, 7 — Unit Nominal Tonnage

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 Tons
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
F = 460/60/3
G = 575/60/3

Digit 9 — Manufacturing Plant

2 = Pueblo, USA

Digit 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

Digit 14 — Pressure Vessel Code

1 = ASME Pressure Vessel Code
2 = Australian Code

Digit 15 — Unit Application

A = Std Condenser <=95°F/35°C Entering Water Temperature
B = High Temperature Condenser >95°F/35°C Entering Water Temperature
C = Non-Reversible Heat Pump

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 Type— Standard

Digit 18 — Evaporator Tubes

A = Internal and External Enhanced Evaporator Copper Tube

Digit 19 — Evaporator Passes

2 = 2–Pass Evaporator
3 = 3–Pass Evaporator

Digit 20 — Evaporator Water Side Pressure

A = 150 psi/10 Bar Evaporator Water Pressure

Digit 21 — Evaporator Application

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

Digit 22 — Condenser Tubes

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

Digit 23 — Condenser Water Side Pressure

1 = 150 psi/10 Bar Condenser Water Pressure

Digit 24 — Compressor Starter Type

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

2 =Symbio™ 800/TD7

Digit 29 — Remote Interface (Digital Comm)

0 = No Remote Digital Communication
5 = Modbus Communication Interface
B = BACnet® Interface (MS/TP)
P = BACnet® Interface (IP)
L = LonTalk® Interface

Digit 30— External Water and Demand Limit Setpoint

0 = No External Water and Demand Limit Setpoint
A = External Water and Demand Limit Setpoint 4-20 mA
B = External Water and Demand 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

Model Number Descriptions

Digit 36 — Power Meter

0 = No Power Meter
E = Energy 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)

Digit 39 — Low Ambient Fan Control

0 = No Low Ambient Fan Control Type

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
2 = 150 psi NEMA 1:Flow Switch x 2
4 = 150 psi NEMA 4:Flow Switch x 2
7 = Factory-Installed Proof of Flow (Evap/Cond)

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 – All Cold Parts
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)
6 = Nitrogen Charge (R-513A Field Supplied)
7 = Full Factory Refrigerant Charge (R-515B)
8 = Nitrogen Charge (R-515B Field Supplied)

Digit 46 — Base Rail Forklifting

0 = No Base Rail Forklifting
B = Base Rail Forklifting

Digit 47 — Label and Literature Language

D = English

Digit 48 — Special

0 = None
F = Ship to Final Finisher

Digit 49 — Wireless Connectivity

0 = None
1 = Wi-Fi
2 = LTE Modem
3 = Air-Fi
4 = Wi-Fi and LTE Modem
5 = Wi-Fi and Air-Fi
6 = LTE Modem and Air-Fi
7 = Wi-Fi, LTE Modem, and Air-Fi

Digit 50–55 — Special

0 = Not Used

Digit 56 — Shipping Package

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 Plus 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 Plus 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

General Data

Table 1. General Data — RTWD, 60 Hz, standard efficiency

Size		80	90	100	110	120	130	140
Compressor								
Size Ckt1/Ckt2		**K1/K1**	**K2/K2**	**K2/L1**	**L1/L1**	**L1/L2**	**L2/L2**	L2/M1 (L2/M3)
Evaporator								
				2 Pass Arrangement				
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	78	78	90	102	102	111	123
	l/s	4.9	4.9	5.7	6.4	6.4	7.0	7.8
Maximum Flow	gpm	286	286	330	374	374	407	451
	l/s	18.0	18.0	20.8	23.6	23.6	25.7	28.5
				3 Pass Arrangement				
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	60	68	68	74	82
	l/s	3.3	3.3	3.8	4.3	4.3	4.7	5.2
Maximum Flow	gpm	191	191	220	249	249	271	301
	l/s	12.1	12.1	13.9	15.7	15.7	17.1	19.0
Condenser								
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	55	66	76	82	89	89	104
	l/s	3.5	4.2	4.8	5.2	5.6	5.6	6.6
Maximum Flow	gpm	300	360	420	450	491	491	571
	l/s	18.9	22.7	26.5	28.4	31.0	31.0	36.0
General Unit								
Refrigerant Type				**R134a or R513A or R515B**				
# 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 (R134a/R513A/ R515B)				**OIL00386**				
Oil Charge_R134a	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

Table 1. General Data — RTWD, 60 Hz, standard efficiency (continued)

Size		80	90	100	110	120	130	140
Oil Charge_R513A	qt	7.1/7.1	7.1/7.1	7.1/10.0	10.0/10.0	10.0/10.0	10.0/10.0	10.0/10.0
	l	6.7/6.7	6.7/6.7	6.7/9.5	9.5/9.5	9.5/9.5	9.5/9.5	9.5/9.5
Oil Charge_R515B	qt	6.7/6.7	6.7/6.7	6.7 /9.5	9.5/9.5	9.5/9.5	9.5/9.5	9.5/9.5
	l	6.3/6.3	6.3/6.3	6.3 /9.0	9.0/9.0	9.0/9.0	9.0/9.0	9.0/9.0

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

Table 2. General data – RTWD, 60 Hz, 80 to 130 tons, high efficiency

Size		80	90	100	110	120	130
Compressor							
Size Ckt1/Ckt2		**K1/K1**	**K2/K2**	**K2/L1**	**L1/L1**	**L1/L2**	**L2/L2**
Evaporator							
		2 Pass Arrangement					
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	91	99	111	122	129
	l/s	4.5	5.7	6.2	7.0	7.7	8.1
Maximum Flow	gpm	263	335	363	408	447	475
	l/s	16.6	21.1	22.9	25.7	28.2	30.0
		3 Pass Arrangement					
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	66	74	81	86
	l/s	3.0	3.8	4.2	4.7	5.1	5.4
Maximum Flow	gpm	175	223	242	272	298	317
	l/s	11.0	14.1	15.3	17.2	18.8	20.0
Condenser							
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	58	63	78	86	90	96
	l/s	3.7	4.0	4.9	5.4	5.7	6.1
Maximum Flow	gpm	316	346	427	472	497	527
	l/s	19.9	21.8	26.9	29.8	31.4	33.2
General Unit							
Refrigerant Type		**R134a or R513A or R515B**					
# Refrig Circuits		2	2	2	2	2	2

Table 2. General data – RTWD, 60 Hz, 80 to 130 tons, high efficiency (continued)

Size		80	90	100	110	120	130
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		OIL00386					
Oil Charge_R134a	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
Oil Charge_R513A	qt	7.1/7.1	7.1/7.1	7.1/10.0	10.0/10.0	10.0/10.0	10.0/10.0
	l	6.7/6.7	6.7/6.7	6.7/9.5	9.5/9.5	9.5/9.5	9.5/9.5
Oil Charge_R515B	qt	6.7/6.7	6.7/6.7	6.7 /9.5	9.5/9.5	9.5/9.5	9.5/9.5
	l	6.3/6.3	6.3/6.3	6.3 /9.0	9.0/9.0	9.0/9.0	9.0/9.0

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

Table 3. General data – RTWD, 60 Hz, 150 to 250 tons, high efficiency

Size		150	160	180	200	220	250
Compressor							
Size Ckt1/Ckt2		L2/M1 (L2/M3)	M1/M1 (M3/M3)	M1/M2 (M3/M4)	M2/M2 (M4/M4)	M2/N1 (M4/N5)	N1/N1 (N5/N5)
Evaporator							
		2 Pass Arrangement					
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	140	151	169	186	210	239
	l/s	8.8	9.5	10.7	11.7	13.2	15.1
Maximum Flow	gpm	514	553	620	682	771	877
	l/s	32.4	34.9	39.1	43.0	48.6	55.3
		3 Pass Arrangement					
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	93	101	113	124	140	159
	l/s	5.9	6.4	7.1	7.8	8.8	10.0
Maximum Flow	gpm	343	369	413	454	514	585
	l/s	21.6	23.3	26.1	28.6	32.4	36.9
Condenser							
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	106	115	126	137	162	216
	l/s	6.7	7.3	7.9	8.6	10.2	13.6

Table 3. General data – RTWD, 60 Hz, 150 to 250 tons, high efficiency (continued)

Size		150	160	180	200	220	250
Maximum Flow	gpm	582	633	693	753	894	1190
	l/s	36.7	39.9	43.7	47.5	56.4	75.1
General Unit							
Refrigerant Type	**R134a or R513A or R515B**	**R134a or R513A or R515B**					
# 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		**OIL00386**					
Oil Charge_R134a	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
Oil Charge_R513A	qt	10.0/12	12.0/12.0	12.0/12.0	12.0/12.0	12.0/12.0	12.0/12.0
	l	9.5/11.4	11.4/11.4	11.4/11.4	11.4/11.4	11.4/11.4	11.4/11.4
Oil Charge_R515B	qt	9.5/11.4	11.4/11.4	11.4/11.4	11.4/11.4	11.4/11.4	11.4/11.4
	l	9.0/10.8	10.8/10.8	10.8/10.8	10.8/10.8	10.8/10.8	10.8/10.8

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

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

Size		150	160	180	200
Compressor					
Size Ckt1/Ckt2		**L2/M1 (L2/M3)**	**M1/M1 (M3/M3)**	**M1/M2 (M3/M4)**	**M2/M2 (M4/M4)**
Evaporator					
2 Pass Arrangement					
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	174	174	186	201
	L/s	11.0	11.0	11.7	12.7
Maximum Flow	gpm	637	637	682	737
	L/s	40.2	40.2	43.0	46.5
3 Pass Arrangement					
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	116	116	124	134
	L/s	7.3	7.3	7.8	8.5
Maximum Flow	gpm	425	425	454	492
	L/s	26.8	26.8	28.6	31.0
Condenser					

Table 4. General data – RTWD, 60 Hz, premium efficiency (continued)

Size		150	160	180	200
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	137	137	153	153
	L/s	8.6	8.6	9.7	9.7
Maximum Flow	gpm	753	753	844	844
	L/s	47.5	47.5	53.2	53.2
General Unit					
Refrigerant Type	**R134a or R513A or R515B**				
# 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	**OIL00386**				
Oil Charge_R134a	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
Oil Charge_R513A	qt	10.0/12.0	12.0/12.0	12.0/12.0	12.0/12.0
	l	9.5/11.4	11.4/11.4	11.4/11.4	11.4/11.4
Oil Charge_R515B	qt	9.5/11.4	11.4/11.4	11.4/11.4	11.4/11.4
	l	9.0/10.8	10.8/10.8	10.8/10.8	10.8/10.8

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

Controls

Symbio 800 Controller

Trane chillers offer predictive controls that anticipate and compensate for load changes. Other strategies made possible with the Symbio™ 800 controls are:

Feedforward Adaptive Control

Feedforward is an open-loop, predictive control strategy designed to anticipate and compensate for load changes. It uses evaporator entering-water temperature as an indication of load change. This allows the controller to respond faster and maintain stable leaving-water temperatures.

Soft Loading

The chiller controller uses soft loading except during manual operation. Large adjustments to setpoint changes are made gradually, preventing the compressor from cycling unnecessarily. It does this by internally filtering the setpoints to avoid reaching the differential-to-stop or the demand limit. Soft loading applies to the leaving chilled-water temperature and demand limit setpoints.

Adaptive Controls

Adaptive Controls directly sense the control variables that govern the operation of the chiller: evaporator pressure and condenser pressure. When any one of these variables approaches a limit condition when damage may occur to the unit or shutdown on a safety, Adaptive Controls takes corrective action to avoid shutdown and keep the chiller operating. This happens through combined actions of compressor and/or fan staging. Whenever possible, the chiller is allowed to continue making chilled water. This keeps cooling capacity available until the problem can be solved. Overall, the safety controls help keep the building or process running and out of trouble.

Integrated Rapid Restart

Bringing a chiller back online rapidly after a loss of power is critical to operations in mission critical environments like data centers and hospitals which demand the highest levels of reliability.

A loss of cooling capacity can be costly, which is why Trane chillers are designed and engineered for Rapid Restart™. In the event of a power interruption, the chiller will start a compressor before the front panel display is fully powered up eliminating the need for UPS. This not only helps the chiller get back online faster, but it also provides a simple and reliable solution to minimize the risks of financially devastating damage to assets caused by overheating due to a power loss.

Of course, the truest test of a chiller's restart capabilities is the amount of time it takes to resume full-load cooling, and this is where the chiller really shines – your assurance that the cooling capacity your equipment requires is just a few minutes away.

Rapid Restart Test

After completion of a standard full load witness test, power to the chiller will be cut and then reapplied to demonstrate the chiller's rapid restart capabilities for disaster relief.

AdaptiView™ TD7 Operator Interface

The standard AdaptiView™ TD7 display provided with the Symbio™ 800 controller features a 7" 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, motor)

- Manual override indication.
- Security and authorization system to enable or disable display.
- Automatic and immediate stop capabilities for standard or immediate manual shutdown.
- Fast and 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
  - Service Settings
  - Feature Settings
  - Manual Control Settings
  - Support of 27 Languages
  - Display Preferences
  - Brightness Setting
  - Cleaning Mode

System Integration

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.

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).

Air-Fi Wireless

Conforms to ANSI/ASHRAE Standard 135-2016 (BACnet®/ZigBee®1). Air-Fi® Wireless provides reliable and secure, and location-flexible communication between equipment controls, sensors, and service tools to the system controller.

Air-Fi networks will be setup by a Trane technician. Integration to a Symbio™ 800 controller setup for Air-Fi communications uses BACnet/IP communication through a Tracer SC+ system controller. Contact your local Trane office for additional information if the Symbio 800 controller is setup for Air-Fi Wireless.

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.

Symbio™ 800 Controls

Overview

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

Symbio™ 800 Advantages		Benefits
Connected	Convenient, on-the-go access to advanced monitoring, troubleshooting, and energy management	• Minimum first cost. • Maximum comfort. • Minimized downtime. • Minimum operating costs. • Superior building and occupant productivity.
Flexible	Minimized installation hardware and labor costs – able to use existing devices for maximum convenience, lower controls upgrades and relocation	
Reliable	Maximum equipment uptime and life, minimized maintenance and troubleshooting cost	

Features and Benefits

Symbio™ 800 Feature	Benefits
Multiple, open standard protocol support • BACnet® TP. • BACnet®/IP. • LON (Optional). • Modbus®.	Simplified, lower cost, and more flexible integration with all common open standard protocols using Trane or competitive BAS systems and controllers.
Remote connection to building or equipment	Trane Connect™ provides an easy, secure option to connect remotely to a Tracer® SC+ or directly to your Trane equipment.
Common integration strategies and equipment specific points lists	Simplified, lower cost, and uncompromised integration.
Application specific and configurable	Reduced project costs with superior reliability, comfort, performance - applications specific and configurable system ensures machine continues to run within operating envelope. Ability to upgrade firmware with a simple file transfer.
Smart Analytics	Smart analytics provide superior reliability through the life of the equipment with minimum downtime.
Data logging	Standard, local or remote Intuitive review and analysis of equipment, zone, and building performance.
Local scheduling	Capable of operating in stand-alone operation without a building automation system as a temporary back-up schedule for ongoing comfort and energy savings.
Rugged, 7-inch color touch screen user interface	Easy, touch navigation for viewing data and making operational changes.
Display preferences	Choose how to view dates, times, units (SI, IP), screen brightness, data format, and backlight timeout. A total of 27 built-in languages are supported and selectable for all TD7 screens.
Intuitive navigation	Helps operators access data and alarms for quick and accurate response and resolution.
At-a-glance status	Easily readable color display showing key operating parameters of major equipment components.
Reports	Quickly summarizes data for clear understanding and interpretation to enable local monitoring of expected performance and operating efficiency.
Graphs	Easily visualize trend data for local troubleshooting and fine-tuning.
Multiple language support	Suitable for operation in multiple geographies.
Adaptive Control™ Algorithms	Pre-empts potential equipment disruptions during rapidly changing conditions – providing consistent equipment performance and building comfort.
SD card backup/restore	Faster, lower cost repairs with reduced downtime.
Modbus® device support	Capable of integrating optional Modbus® devices for local or remote diagnostics — provides faster, lower cost troubleshooting and increased equipment performance.

Options

Symbio™ 800 Feature	Benefits
Remote connection to building or equipment	Trane Connect™ provides an easy, secure option to connect remotely to a Tracer® SC+ or directly to your Trane equipment.
Programmable	Equipment application flexibility and cost-reduced control of nearby equipment.
Expandable I/O	Field or factory installed I/O for programmable feature for reduced installation costs and increased installation flexibility.
User security with audit trail support	Flexible and secure access for multiple users allows monitoring, overriding/releasing points, release of all overrides, custom report editing, and tracking changes by user.
LonTalk®	

Specifications

Controller Specifications	
Input power	24 Vdc +/- 10%, 400mA max.
Storage temperature	-67°F to 185°F (-55°C to 85°C), Humidity: Between 5% to 100% (Condensing).
Operating temperature	-40°F to 158°F (-40°C to 70°C).
Environmental rating (enclosure)	IP3x.
Time clock	On-board real time clock with 10 year battery backup.
Mounting weight	Mounting surface must support 1.3 lb. (0.6 kg).
Overall dimensions	5.65 in. (143.5 mm) wide x 4.00 in. (101.6 mm) high x 2.38 in. (60.6 mm) deep.
Agency Compliance	
• UL PAZX, Energy Management Equipment. • UL94-5V Flammability. • CE. • FCC CFR Title 47, Part 15.109: Class B Limit, (30 MHz—10 GHz). • BTL Listed—Advanced Application Profile (B-AAC).	
User Interface Specifications	
Input power	24 Vdc +/- 10%, 400 mA max
Storage temperature	-67°F to 203°F (-55°C to 95°C), Humidity: Between 5% to 100% (Condensing).
Operating temperature	-40°F to 158°F (-40°C to 70°C), Humidity: Between 5% to 100% (Condensing).
Environmental rating (enclosure)	IP56 (dust and strong water jet protected) with optional sealed Ethernet cable (PN: X19070632020).
Mounting weight	Mounting surface must support 1.6 lb. (0.74 kg).
Overall dimensions	8.3 in. (211.6 mm) wide x 6.3 in. (158.8 mm) high x 2.1 in. (53.2 mm) deep [bezel depth 0.4 in. (11.3 mm)].
Agency Compliance	
• UL PAZX, Energy Management Equipment. • UL94-5V, Flammability. • FCC CFR Title 47, Part 15.109: Class A Limit, (30 MHz—4 GHz). • CE EMC Directive 2004/108/EC.	

Electrical Data

Electrical Data Tables

Table 5. Electrical data — RTWD, 60 Hz, standard efficiency, standard condensing temperature

Unit Size	Rated Voltage	Unit Wiring				Motor Data		
		Single Point Power - 1 Power Connection		Dual Point Power - 2 Power Connections				
		MCA	MOP	MCA	MOP	RLA	LRA YD	LRA XL
80	200/60/3	217	300	123/118	200/200	94/94	276/276	912/912
	230/60/3	189	250	107/103	175/175	82/82	238/238	786/786
	380/60/3	115	150	65/63	110/110	50/50	138/138	456/456
	460/60/3	94	125	53/51	90/90	41/41	114/114	376/376
	575/60/3	76	100	43/41	70/70	33/33	93/93	308/308
90	200/60/3	250	350	141/136	225/225	109/109	304/304	1003/1003
	230/60/3	218	300	123/119	200/200	95/95	262/262	866/866
	380/60/3	131	175	74/71	125/125	57/57	161/161	530/530
	460/60/3	110	150	62/60	100/100	48/48	131/131	433/433
	575/60/3	87	110	49/48	80/80	38/38	105/105	346/346
100	200/60/3	292	400	141/178	225/300	109/142	304/355	1003/1137
	230/60/3	253	350	123/154	200/250	95/123	262/294	866/942
	380/60/3	153	225	74/94	125/150	57/75	161/177	530/566
	460/60/3	128	175	62/78	100/125	48/62	131/147	433/471
	575/60/3	102	150	49/63	80/110	38/50	105/118	346/377
110	200/60/3	325	450	183/178	300/300	142/142	355/355	1137/1137
	230/60/3	281	400	158/154	250/250	123/123	294/294	942/942
	380/60/3	171	225	96/94	150/150	75/75	177/177	566/566
	460/60/3	142	200	80/78	125/125	62/62	147/147	471/471
	575/60/3	114	150	64/63	110/110	50/50	118/118	377/377
120	200/60/3	357	500	183/210	300/350	142/168	355/419	1137/1368
	230/60/3	310	450	158/183	250/300	123/146	294/367	942/1200
	380/60/3	188	250	96/110	150/175	75/88	177/229	566/747
	460/60/3	155	225	80/91	125/150	62/73	147/184	471/600
	575/60/3	125	175	64/74	110/125	50/59	118/148	377/483
130	200/60/3	383	500	215/210	350/350	168/168	419/419	1368/1368
	230/60/3	333	450	187/183	300/300	146/146	367/367	1200/1200
	380/60/3	201	250	113/110	200/175	88/88	229/229	747/747
	460/60/3	166	225	93/91	150/150	73/73	184/184	600/600
	575/60/3	134	175	75/74	125/125	59/59	148/148	483/483
140	200/60/3	426	600	215/253	350/450	168/202	419/487	1368/1498
	230/60/3	369	500	187/219	300/350	146/175	367/427	1200/1314
	380/60/3	223	300	113/133	200/225	88/106	229/260	747/801
	460/60/3	185	250	93/110	150/175	73/88	184/212	600/652
	575/60/3	148	200	75/88	125/150	59/70	148/172	483/528

Table 5. Electrical data — RTWD, 60 Hz, standard efficiency, standard condensing temperature (continued)

Unit Size	Rated Voltage	Unit Wiring				Motor Data		
		Single Point Power - 1 Power Connection		Dual Point Power - 2 Power Connections				
		MCA	MOP	MCA	MOP	RLA	LRA YD	LRA XL

Notes:

1. Voltage Utilization Range: +/- 10% of rated voltage. Rated voltage (use range): 208/60/3 (187.2-228.8), 230/60/3(208-254), 380/60/3 (342-418), 460/60/3 (414-506), 575/60/3 (516-633)
2. MCA–minimum circuit ampacity
3. MOP–maximum overcurrent protection
4. RLA–rated load amps are rated in accordance with UL Standard 1995.
5. LRA–locked rotor amps are based on full winding starts.
6. LRA YD–Locked Rotor Amps in Wye configuration. LRA XL–Locked Rotor Amps in the Delta configuration.
7. Local codes may take precedence.
8. Data containing information on two circuits shown as follows: circuit 1/circuit 2.
9. Standard condensing temperature option refers to entering condenser water temperatures 95°F (35°C) and below.

Table 6. Electrical data — RTWD, 60 Hz, high efficiency, standard condensing temperature

Unit Size	Rated Voltage	Unit Wiring				Motor Data		
		Single Point Power - 1 Power Connection		Dual Point Power - 2 Power Connections				
		MCA	MOP	MCA	MOP	RLA	LRA YD	LRA XL
80	200/60/3	212	300	120/115	200/200	92/92	276/276	912/912
	230/60/3	184	250	104/100	175/175	80/80	238/238	786/786
	380/60/3	113	150	64/61	110/110	49/49	138/138	456/456
	460/60/3	92	125	52/50	90/90	40/40	114/114	376/376
	575/60/3	74	100	42/40	93/93	32/32	93/93	308/308
90	200/60/3	246	350	139/134	225/225	107/107	304/304	1003/1003
	230/60/3	214	300	121/116	200/200	93/93	262/262	866/866
	380/60/3	129	175	73/70	125/125	56/56	161/161	530/530
	460/60/3	108	150	61/59	100/100	47/47	131/131	433/433
	575/60/3	85	110	48/46	80/80	37/37	105/105	346/346
100	200/60/3	285	400	139/173	225/300	107/138	304/355	1003/1137
	230/60/3	247	350	121/150	200/250	93/120	262/294	866/942
	380/60/3	150	200	73/91	125/150	56/73	161/177	530/566
	460/60/3	124	175	61/75	100/125	47/60	131/147	433/471
	575/60/3	99	125	48/60	80/100	37/48	105/118	346/377
110	200/60/3	316	450	178/173	300/300	138/138	355/355	1137/1137
	230/60/3	274	350	154/150	250/250	120/120	294/294	942/942
	380/60/3	167	225	94/91	150/150	73/73	177/177	566/566
	460/60/3	137	175	77/75	125/125	60/60	147/147	471/471
	575/60/3	110	150	62/60	100/100	48/48	118/118	377/377
120	200/60/3	348	500	178/205	300/350	138/164	355/419	1137/1368
	230/60/3	303	400	154/179	250/300	120/143	294/367	942/1200
	380/60/3	184	250	94/109	150/175	73/87	177/229	566/747
	460/60/3	152	200	77/90	125/150	60/72	147/184	471/600
	575/60/3	121	175	62/71	100/125	48/57	118/148	377/483

Table 6. Electrical data — RTWD, 60 Hz, high efficiency, standard condensing temperature (continued)

Unit Size	Rated Voltage	Unit Wiring				Motor Data		
		Single Point Power - 1 Power Connection		Dual Point Power - 2 Power Connections				
		MCA	MOP	MCA	MOP	RLA	LRA YD	LRA XL
130	200/60/3	374	500	210/205	350/350	164/164	419/419	1368/1368
	230/60/3	326	450	183/179	300/300	143/143	367/367	1200/1200
	380/60/3	198	250	111/109	175/175	87/87	229/229	747/747
	460/60/3	164	225	92/90	150/150	72/72	184/184	600/600
	575/60/3	130	175	73/71	125/125	57/57	148/148	483/483
150	200/60/3	414	600	210/245	350/400	164/196	419/487	1368/1498
	230/60/3	361	500	183/214	300/350	143/171	367/427	1200/1314
	380/60/3	218	300	111/129	175/225	87/103	229/260	747/801
	460/60/3	182	250	92/108	150/175	72/86	184/212	600/652
	575/60/3	145	200	73/86	125/150	57/69	148/172	483/528
160	200/60/3	446	600	250/245	400/400	196/196	487/487	1498/1498
	230/60/3	389	500	218/214	350/350	171/171	427/427	1314/1314
	380/60/3	234	300	131/129	225/225	103/103	260/260	801/801
	460/60/3	196	250	110/108	175/175	86/86	212/212	652/652
	575/60/3	157	225	88/86	150/150	69/69	172/172	528/528
180	200/60/3	485	700	250/284	400/500	196/227	487/600	1498/1845
	230/60/3	422	600	218/246	350/400	171/197	427/506	1314/1556
	380/60/3	256	350	131/150	225/250	103/120	260/316	801/973
	460/60/3	213	300	110/125	175/225	86/100	212/252	652/774
	575/60/3	171	250	88/100	150/175	69/80	172/205	528/631
200	200/60/3	516	700	289/284	500/500	227/227	600/600	1845/1845
	230/60/3	448	600	251/247	400/400	197/197	506/506	1556/1556
	380/60/3	273	350	153/150	250/250	120/120	316/316	973/973
	460/60/3	227	300	127/125	225/225	100/100	252/252	774/774
	575/60/3	182	250	102/100	175/175	80/80	205/205	631/631
220	200/60/3	583	800	289/351	500/600	227/281	600/701	1845/2156
	230/60/3	509	700	251/308	400/500	197/246	506/571	1556/1756
	380/60/3	309	450	153/186	250/300	120/149	316/345	973/1060
	460/60/3	256	350	127/154	225/250	100/123	252/285	774/878
	575/60/3	204	300	102/123	175/200	80/98	205/229	631/705
250	200/60/3	637	800	356/351	600/600	281/281	701/701	2156/2156
	230/60/3	558	800	312/308	500/500	246/246	571/571	1756/1756
	380/60/3	338	450	189/186	300/300	149/149	345/345	1060/1060
	460/60/3	279	400	156/154	250/250	123/123	285/285	878/878
	575/60/3	222	300	124/123	200/200	98/98	229/229	705/705

Notes:

1. Voltage Utilization Range: +/- 10% of rated voltage. Rated voltage (use range): 208/60/3 (187.2-228.8), 230/60/3(208-254), 380/60/3 (342-418), 460/60/3 (414-506), 575/60/3 (516-633)
2. MCA–minimum circuit ampacity
3. MOP–maximum overcurrent protection
4. RLA–rated load amps are rated in accordance with UL Standard 1995.
5. LRA–locked rotor amps are based on full winding starts.
6. LRA YD–Locked Rotor Amps in Wye configuration. LRA XL–Locked Rotor Amps in the Delta configuration.
7. Local codes may take precedence.
8. Data containing information on two circuits shown as follows: circuit 1/circuit 2.
9. Standard condensing temperature option refers to entering condenser water temperatures 95°F/35°C) and below.

Table 7. Electrical data — RTWD, 60 Hz, premium efficiency, standard condensing temperature

Unit Size	Rated Voltage	Unit Wiring				Motor Data		
		Single Point Power - 1 Power Connection		Dual Point Power - 2 Power Connections				
		MCA	MOP	MCA	MOP	RLA	LRA YD	LRA XL
150	200/60/3	411	600	209/243	350/400	163/194	419/487	1368/1498
	230/60/3	360	500	183/213	300/350	143/170	367/427	1200/1314
	380/60/3	217	300	110/129	175/225	86/103	229/260	747/801
	460/60/3	179	250	91/106	150/175	71/85	184/212	600/652
	575/60/3	145	200	74/85	125/150	58/68	148/172	483/528
160	200/60/3	442	600	248/243	400/400	194/194	487/487	1498/1498
	230/60/3	387	500	217/213	350/350	170/170	427/427	1314/1314
	380/60/3	234	300	131/129	225/225	103/103	260/260	801/801
	460/60/3	193	250	108/106	175/175	85/85	212/212	652/652
	575/60/3	155	200	87/85	150/150	68/68	172/172	528/528
180	200/60/3	482	700	248/283	400/500	194/226	487/600	1498/1845
	230/60/3	421	600	217/246	350/400	170/197	427/506	1314/1556
	380/60/3	256	350	131/150	225/250	103/120	260/316	801/973
	460/60/3	212	300	108/125	175/225	85/100	212/252	652/774
	575/60/3	171	250	87/101	150/175	68/81	172/205	528/631
200	200/60/3	514	700	288/283	500/500	226/226	600/600	1845/1845
	230/60/3	448	600	251/246	400/400	197/197	506/506	1556/1556
	380/60/3	273	350	153/150	250/250	120/120	316/316	973/973
	460/60/3	227	300	127/125	225/225	100/100	252/252	774/774
	575/60/3	184	250	103/101	175/175	81/81	205/205	631/631

Notes:

1. Voltage Utilization Range: +/- 10% of rated voltage. Rated voltage (use range): 208/60/3 (187.2-228.8), 230/60/3(208-254), 380/60/3 (342-418), 460/60/3 (414-506), 575/60/3 (516-633)
2. MCA–minimum circuit ampacity
3. MOP–maximum overcurrent protection
4. RLA–rated load amps are rated in accordance with UL Standard 1995.
5. LRA–locked rotor amps are based on full winding starts.
6. LRA YD–Locked Rotor Amps in Wye configuration. LRA XL–Locked Rotor Amps in the Delta configuration.
7. Local codes may take precedence.
8. Data containing information on two circuits shown as follows: circuit 1/circuit 2.
9. Standard condensing temperature option refers to entering condenser water temperatures 95°F (35°C) and below.

Table 8. Electrical data — RTWD, 60 Hz, high efficiency, high condensing temperature

Unit Size	Rated Voltage	Unit Wiring				Motor Data		
		Single Point Power - 1 Power Connection		Dual Point Power - 2 Power Connections				
		MCA	MOP	MCA	MOP	RLA	LRA YD	LRA XL
80	200/60/3	286	400	161/156	250/250	125/125	276/276	912/912
	230/60/3	236	300	133/129	225/225	103/103	238/238	786/786
	380/60/3	144	200	81/79	150/150	63/63	138/138	456/456
	460/60/3	124	175	70/68	110/110	54/54	114/114	376/376
	575/60/3	101	125	57/55	90/90	44/44	93/93	308/308
90	200/60/3	340	450	191/186	300/300	149/149	304/304	1003/1003
	230/60/3	295	400	166/161	250/250	129/129	262/262	866/866
	380/60/3	178	250	100/98	175/175	78/78	161/161	530/530
	460/60/3	142	200	80/78	125/125	62/62	131/131	433/433
	575/60/3	116	150	65/64	110/110	51/51	105/105	346/346
100	200/60/3	384	500	191/230	300/400	149/184	304/355	1003/1137
	230/60/3	323	450	166/190	250/300	129/152	262/294	866/942
	380/60/3	202	250	100/121	175/200	78/97	161/177	530/566
	460/60/3	164	225	80/100	125/175	62/80	131/147	433/471
	575/60/3	131	175	65/79	110/125	51/63	105/118	346/377
110	200/60/3	419	600	235/230	400/400	184/184	355/355	1137/1137
	230/60/3	346	450	194/190	300/300	152/152	294/294	942/942
	380/60/3	221	300	124/121	200/200	97/97	177/177	566/566
	460/60/3	182	250	102/100	175/175	80/80	147/147	471/471
	575/60/3	143	200	80/79	125/125	63/63	118/118	377/377
120	200/60/3	448	600	235/259	400/450	184/207	355/419	1137/1368
	230/60/3	396	500	194/240	300/400	152/192	294/367	942/1200
	380/60/3	237	300	124/138	200/225	97/110	177/229	566/747
	460/60/3	195	250	102/113	175/200	80/90	147/184	471/600
	575/60/3	161	225	80/96	125/150	63/77	118/148	377/483
130	200/60/3	471	600	264/259	450/450	207/207	419/419	1368/1368
	230/60/3	436	600	244/240	400/400	192/192	367/367	1200/1200
	380/60/3	250	350	140/138	225/225	110/110	229/229	747/747
	460/60/3	205	250	115/113	200/200	90/90	184/184	600/600
	575/60/3	175	250	98/96	150/150	77/77	148/148	483/483
150	200/60/3	525	700	264/313	450/500	207/250	419/487	1368/1498
	230/60/3	463	600	244/266	400/450	192/213	367/427	1200/1314
	380/60/3	283	400	140/170	225/300	110/136	229/260	747/801
	460/60/3	221	300	115/129	200/225	90/103	184/212	600/652
	575/60/3	190	250	98/111	150/200	77/89	148/172	483/528
160	200/60/3	568	800	318/313	500/500	250/250	487/487	1498/1498
	230/60/3	484	600	271/266	450/450	213/213	427/427	1314/1314
	380/60/3	309	400	173/170	300/300	136/136	260/260	801/801
	460/60/3	234	300	131/129	225/225	103/103	212/212	652/652
	575/60/3	202	250	113/111	200/200	89/89	172/172	528/528

Table 8. Electrical data — RTWD, 60 Hz, high efficiency, high condensing temperature (continued)

Unit Size	Rated Voltage	Unit Wiring				Motor Data		
		Single Point Power - 1 Power Connection		Dual Point Power - 2 Power Connections				
		MCA	MOP	MCA	MOP	RLA	LRA YD	LRA XL
180	200/60/3	628	800	318/373	500/600	250/298	487/600	1498/1845
	230/60/3	542	800	271/325	450/500	213/260	427/506	1314/1556
	380/60/3	330	450	173/191	300/300	136/153	260/316	801/973
	460/60/3	271	400	131/166	225/300	103/133	212/252	652/774
	575/60/3	219	300	113/129	200/225	89/103	172/205	528/631
200	200/60/3	676	800	378/373	600/600	298/298	600/600	1845/1845
	230/60/3	589	800	329/325	500/500	260/260	506/506	1556/1556
	380/60/3	347	500	194/191	300/300	153/153	316/316	973/973
	460/60/3	301	400	168/166	300/300	133/133	252/252	774/774
	575/60/3	233	300	130/129	225/225	103/103	205/205	631/631
220	200/60/3	718	1000	378/415	600/700	298/332	600/701	1845/2156
	230/60/3	647	800	329/383	500/600	260/306	506/571	1556/1756
	380/60/3	398	500	194/243	300/400	153/194	316/345	973/1060
	460/60/3	326	450	168/191	300/300	133/153	252/285	774/878
	575/60/3	266	350	130/161	225/250	103/129	205/229	631/705
250	200/60/3	752	1000	420/415	700/700	332/332	701/701	2156/2156
	230/60/3	693	800	387/383	600/600	306/306	571/571	1756/1756
	380/60/3	439	600	245/243	400/400	194/194	345/345	1060/1060
	460/60/3	346	500	193/191	300/300	153/153	285/285	878/878
	575/60/3	292	400	163/161	250/250	129/129	229/229	705/705

Notes:

1. Voltage Utilization Range: +/- 10% of rated voltage. Rated voltage (use range): 208/60/3 (187.2-228.8), 230/60/3(208-254), 380/60/3 (342-418), 460/60/3 (414-506), 575/60/3 (516-633)
2. MCA–minimum circuit ampacity
3. MOP–maximum overcurrent protection
4. RLA–rated load amps are rated in accordance with UL Standard 1995.
5. LRA–locked rotor amps are based on full winding starts.
6. LRA YD–Locked Rotor Amps in Wye configuration. LRA XL–Locked Rotor Amps in the Delta configuration.
7. Local codes may take precedence.
8. Data containing information on two circuits shown as follows: circuit 1/circuit 2.
9. Standard condensing temperature option refers to entering condenser water temperatures 95°F (35°C).

Table 9. Electrical data — RTWD, 60 Hz, premium efficiency, high condensing temperature

Unit Size	Rated Voltage	Unit Wiring				Motor Data		
		Single Point Power - 1 Power Connection		Dual Point Power - 2 Power Connections				
		MCA	MOP	MCA	MOP	RLA	LRA YD	LRA XL
150	200/60/3	525	700	264/313	450/500	207/250	419/487	1368/1498
	230/60/3	463	600	244/266	400/450	192/213	367/427	1200/1314
	380/60/3	283	400	140/170	225/300	110/136	229/260	747/801
	460/60/3	221	300	115/129	200/225	90/103	184/212	600/652
	575/60/3	190	250	98/111	150/200	77/89	148/172	483/528
160	200/60/3	568	800	318/313	500/500	250/250	487/487	1498
	230/60/3	484	600	271/266	450/450	213/213	427/427	1314/1314
	380/60/3	309	400	173/170	300/300	136/136	260/260	801/801
	460/60/3	234	300	131/129	225/225	103/103	212/212	652/652
	575/60/3	202	250	113/111	200/200	89/89	172/172	528/528
180	200/60/3	628	800	318/373	500/600	250/298	487/600	1498/1845
	230/60/3	542	800	271/325	450/500	213/260	427/506	1314/1556
	380/60/3	330	450	173/191	300/300	136/153	260/316	801/973
	460/60/3	271	400	131/166	225/300	103/133	212/252	652/774
	575/60/3	219	300	113/129	200/225	89/103	172/205	528/631
200	200/60/3	676	800	378/373	600/600	298/298	600/600	1845/1845
	230/60/3	589	800	329/325	500/500	260/260	506/506	1556/1556
	380/60/3	347	500	194/191	300/300	153/153	316/316	973/973
	460/60/3	301	400	168/166	300/300	133/133	252/252	774/774
	575/60/3	233	300	130/129	225/225	103/103	205/205	631/631

Notes:

1. Voltage Utilization Range: +/- 10% of rated voltage. Rated voltage (use range): 208/60/3 (187.2-228.8), 230/60/3(208-254), 380/60/3 (342-418), 460/60/3 (414-506), 575/60/3 (516-633)
2. MCA–minimum circuit ampacity
3. MOP–maximum overcurrent protection
4. RLA–rated load amps are rated in accordance with UL Standard 1995.
5. LRA–locked rotor amps are based on full winding starts.
6. LRA YD–Locked Rotor Amps in Wye configuration. LRA XL–Locked Rotor Amps in the Delta configuration.
7. Local codes may take precedence.
8. Data containing information on two circuits shown as follows: circuit 1/circuit 2.
9. Standard condensing temperature option refers to entering condenser water temperatures 95°F (35°C).

Customer Wire Selection

Single Point Power

Table 10. Customer wire selection — RTWD, 60Hz, single point power, standard efficiency, standard condensing temperature

Unit Size	Voltage	Terminal Block	Circuit Breaker	
			Standard	Hi Fault
80	200	4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	3/0-350	3/0-350
	380	14-2/0	4-4/0	4-4/0
	460	14-2/0	8-3/0	8-3/0
	575	14-2/0	8-3/0	8-3/0
90	200	4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	4-4/0	4-4/0
	460	14-2/0	4-4/0	4-4/0
	575	14-2/0	8-3/0	8-3/0
100	200	4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	3/0-350	3/0-350
	460	14-2/0	4-4/0	4-4/0
	575	14-2/0	4-4/0	4-4/0
110	200	4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	3/0-350	3/0-350
	460	14-2/0	3/0-350	3/0-350
	575	14-2/0	4-4/0	4-4/0
120	200	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	3/0-350	3/0-350
	460	4-500	3/0-350	3/0-350
	575	14-2/0	4-4/0	4-4/0
130	200	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	3/0-350	3/0-350
	460	4-500	3/0-350	3/0-350
	575	14-2/0	4-4/0	4-4/0
140	200	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	3/0-350	3/0-350
	575	4-500	3/0-350	3/0-350

Table 10. Customer wire selection — RTWD, 60Hz, single point power, standard efficiency, standard condensing temperature (continued)

Unit Size	Voltage	Terminal Block	Circuit Breaker	
			Standard	Hi Fault

Notes:

1. Optional non-fused disconnect and circuit breaker.
2. Copper wire only, based on nameplate minimum circuit ampacity (MCA).
3. Standard condensing temperature option refers to entering condenser water temperatures 95°F (35°C) and below.

Table 11. Customer wire selection — RTWD, 60Hz, single point power, high efficiency, standard condensing temperature

Unit Size	Voltage	Terminal Block	Circuit Breaker	
			Standard	Hi Fault
80	200	4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	3/0-350	3/0-350
	380	14-2/0	4-4/0	4-4/0
	460	14-2/0	8-3/0	8-3/0
	575	14-2/0	8-3/0	8-3/0
90	200	4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	4-4/0	4-4/0
	460	14-2/0	4-4/0	4-4/0
	575	14-2/0	8-3/0	8-3/0
100	200	4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	3/0-350	3/0-350
	460	14-2/0	4-4/0	4-4/0
	575	14-2/0	8-3/0	8-3/0
110	200	4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	3/0-350	3/0-350
	460	14-2/0	4-4/0	4-4/0
	575	14-2/0	4-4/0	4-4/0
120	200	4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	3/0-350	3/0-350
	460	4-500	3/0-350	3/0-350
	575	14-2/0	4-4/0	4-4/0
130	200	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	3/0-350	3/0-350
	460	4-500	3/0-350	3/0-350
	575	14-2/0	4-4/0	4-4/0

Table 11. Customer wire selection — RTWD, 60Hz, single point power, high efficiency, standard condensing temperature (continued)

Unit Size	Voltage	Terminal Block	Circuit Breaker	
			Standard	Hi Fault
150	200	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	3/0-350	3/0-350
	575	14-2/0	3/0-350	3/0-350
160	200	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	3/0-350	3/0-350
	575	4-500	3/0-350	3/0-350
180	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	3/0-350	3/0-350
200	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	3/0-350	3/0-350
220	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	(2) 2/0-500	(2) 2/0-500
250	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	(2) 2/0-500	(2) 2/0-500

Notes:

1. Optional non-fused disconnect and circuit breaker.
2. Copper wire only, based on nameplate minimum circuit ampacity (MCA).
3. Standard condensing temperature option refers to entering condenser water temperatures 95°F (35°C) and below.

Table 12. Customer wire selection — RTWD, 60Hz, single point power, premium efficiency, standard condensing temperature

Unit Size	Voltage	Terminal Block	Circuit Breaker	
			Standard	Hi Fault
150	200	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	3/0-350	3/0-350
	575	14-2/0	3/0-350	3/0-350
160	200	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	3/0-350	3/0-350
	575	4-500	3/0-350	3/0-350
180	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	3/0-350	3/0-350
200	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	3/0-350	3/0-350

Notes:

1. Optional non-fused disconnect and circuit breaker.
2. Copper wire only, based on nameplate minimum circuit ampacity (MCA).
3. Standard condensing temperature option refers to entering condenser water temperatures 95°F (35°C) and below.

Table 13. Customer wire selection — RTWD, 60Hz, single point power, high efficiency, high condensing temperature

Unit Size	Voltage	Terminal Block	Circuit Breaker	
			Standard	Hi Fault
80	200	4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	3/0-350	3/0-350
	460	14-2/0	3/0-350	3/0-350
	575	14-2/0	8-3/0	8-3/0
90	200	4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	3/0-350	3/0-350
	460	14-2/0	3/0-350	3/0-350
	575	14-2/0	4-4/0	4-4/0

Table 13. Customer wire selection — RTWD, 60Hz, single point power, high efficiency, high condensing temperature (continued)

Unit Size	Voltage	Terminal Block	Circuit Breaker	
			Standard	Hi Fault
100	200	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	3/0-350	3/0-350
	460	4-500	3/0-350	3/0-350
	575	14-2/0	4-4/0	4-4/0
110	200	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	3/0-350	3/0-350
	575	14-2/0	3/0-350	3/0-350
120	200	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	3/0-350	3/0-350
	575	4-500	3/0-350	3/0-350
130	200	-	-	-
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	3/0-350	3/0-350
	575	4-500	3/0-350	3/0-350
150	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	3/0-350	3/0-350
160	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	3/0-350	3/0-350
180	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	(2) 2/0-500	(2) 2/0-500

Table 13. Customer wire selection — RTWD, 60Hz, single point power, high efficiency, high condensing temperature (continued)

Unit Size	Voltage	Terminal Block	Circuit Breaker	
			Standard	Hi Fault
200	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	(2) 2/0-500	(2) 2/0-500
220	200	(2) 4-500	(4) 3/0-500	(4) 3/0-500
	230	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	380	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	(2) 2/0-500	(2) 2/0-500
250	200	(2) 4-500	(4) 3/0-500	(4) 3/0-500
	230	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	380	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	(2) 2/0-500	(2) 2/0-500

Notes:

1. Optional non-fused disconnect and circuit breaker.
2. Copper wire only, based on nameplate minimum circuit ampacity (MCA).
3. High condensing temperature option refers to entering condenser water temperatures above 95°F (35°C).

Table 14. Customer wire selection — RTWD, 60Hz, single point power, premium efficiency, high condensing temperature

Unit Size	Voltage	Terminal Block	Circuit Breaker	
			Standard	Hi Fault
150	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	3/0-350	3/0-350
160	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	3/0-350	3/0-350
180	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	(2) 2/0-500	(2) 2/0-500

Table 14. Customer wire selection — RTWD, 60Hz, single point power, premium efficiency, high condensing temperature (continued)

Unit Size	Voltage	Terminal Block	Circuit Breaker	
			Standard	Hi Fault
200	200	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(3) 3/0-500	(3) 3/0-500
	380	4-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	(2) 2/0-500	(2) 2/0-500

Notes:
1. Optional non-fused disconnect and circuit breaker.
2. Copper wire only, based on nameplate minimum circuit ampacity (MCA).
3. High condensing temperature option refers to entering condenser water temperatures above 95°F (35°C).

Dual Point Power

Table 15. Customer wire selection — RTWD, 60Hz, dual point power, standard efficiency, standard condensing temperature

Unit Size	Voltage	Terminal Block		Circuit Breaker		Ckt Brkr - Hi Fault	
		Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
80	200	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	230	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	380	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	460	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
90	200	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	230	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	380	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	460	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
100	200	14-2/0	4-500	3/0-350	(2) 2/0-500	3/0-350	(2) 2/0-500
	230	14-2/0	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	380	14-2/0	14-2/0	8-3/0	4-4/0	8-3/0	4-4/0
	460	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
110	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	380	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	460	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
120	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	3/0-350	(2) 2/0-500	3/0-350	(2) 2/0-500
	380	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	460	14-2/0	14-2/0	8-3/0	4-4/0	8-3/0	4-4/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0

Table 15. Customer wire selection — RTWD, 60Hz, dual point power, standard efficiency, standard condensing temperature (continued)

Unit Size	Voltage	Terminal Block		Circuit Breaker		Ckt Brkr - Hi Fault	
		Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
130	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	14-2/0	3/0-350	4-4/0	3/0-350	4-4/0
	460	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
140	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	575	14-2/0	14-2/0	8-3/0	4-4/0	8-3/0	4-4/0

Notes:

1. Optional non-fused disconnect and circuit breaker.

2. Copper wire only, based on nameplate minimum circuit ampacity (MCA).

3. Standard condensing temperature option refers to entering condenser water temperatures 95°F (35°C) and below.

Table 16. Customer wire selection — RTWD, 60Hz, dual point power, high efficiency, standard condensing temperature

Unit Size	Voltage	Terminal Block		Circuit Breaker		Ckt Brkr - Hi Fault	
		Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
80	200	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	230	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	380	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	460	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
90	200	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	230	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	380	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	460	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
100	200	14-2/0	4-500	3/0-350	(2) 2/0-500	3/0-350	(2) 2/0-500
	230	14-2/0	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	380	14-2/0	14-2/0	8-3/0	4-4/0	8-3/0	4-4/0
	460	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
110	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	380	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	460	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0

Table 16. Customer wire selection — RTWD, 60Hz, dual point power, high efficiency, standard condensing temperature (continued)

Unit Size	Voltage	Terminal Block		Circuit Breaker		Ckt Brkr - Hi Fault	
		Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
120	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	3/0-350	(2) 2/0-500	3/0-350	(2) 2/0-500
	380	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	460	14-2/0	14-2/0	8-3/0	4-4/0	8-3/0	4-4/0
	575	14-2/0	14-2/0	10-1/0	8-3/0	8-3/0	8-3/0
130	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	460	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
150	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	14-2/0	4-4/0	3/0-350	4-4/0	3/0-350
	460	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	575	14-2/0	14-2/0	8-3/0	4-4/0	8-3/0	4-4/0
160	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	575	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
180	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	4-4/0	3/0-350	4-4/0	3/0-350
	575	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
200	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	575	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
220	200	4-500	(2) 4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	4-500	3/0-350	(2) 2/0-500	3/0-350	(2) 2/0-500
	460	14-2/0	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	575	14-2/0	14-2/0	4-4/0	3/0-350	4-4/0	3/0-350
250	200	(2) 4-500	(2) 4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	575	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350

Table 16. Customer wire selection — RTWD, 60Hz, dual point power, high efficiency, standard condensing temperature (continued)

Unit Size	Voltage	Terminal Block		Circuit Breaker		Ckt Brkr - Hi Fault	
		Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2

Notes:
1. Optional non-fused disconnect and circuit breaker.
2. Copper wire only, based on nameplate minimum circuit ampacity (MCA).
3. Standard condensing temperature option refers to entering condenser water temperatures 95°F (35°C) and below.

Table 17. Customer wire selection — RTWD, 60Hz, dual point power, premium efficiency, standard condensing temperature

Unit Size	Voltage	Terminal Block		Circuit Breaker		Ckt Brkr - Hi Fault	
		Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
150	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	14-2/0	4-4/0	3/0-350	4-4/0	3/0-350
	460	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	575	14-2/0	14-2/0	8-3/0	4-4/0	8-3/0	4-4/0
160	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	575	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
180	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	4-4/0	3/0-350	4-4/0	3/0-350
	575	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
200	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	575	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0

Notes:
1. Optional non-fused disconnect and circuit breaker.
2. Copper wire only, based on nameplate minimum circuit ampacity (MCA).
3. Standard condensing temperature option refers to entering condenser water temperatures 95°F (35°C) and below.

Table 18. Customer wire selection — RTWD, 60Hz, dual point power, high efficiency, high condensing temperature

Unit Size	Voltage	Terminal Block		Circuit Breaker		Ckt Brkr - Hi Fault	
		Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
80	200	4-500	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	230	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	380	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	460	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
90	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	380	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	460	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
100	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	3/0-350	(2) 2/0-500	3/0-350	(2) 2/0-500
	380	14-2/0	14-2/0	4-4/0	3/0-350	4-4/0	3/0-350
	460	14-2/0	14-2/0	8-3/0	4-4/0	8-3/0	4-4/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
110	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
	575	14-2/0	14-2/0	8-3/0	8-3/0	8-3/0	8-3/0
120	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	4-4/0	3/0-350	4-4/0	3/0-350
	575	14-2/0	14-2/0	8-3/0	4-4/0	8-3/0	4-4/0
130	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	575	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
150	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	14-2/0	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	575	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
160	200	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	575	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0

Table 18. Customer wire selection — RTWD, 60Hz, dual point power, high efficiency, high condensing temperature (continued)

Unit Size	Voltage	Terminal Block		Circuit Breaker		Ckt Brkr - Hi Fault	
		Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
180	200	4-500	(2) 4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	4-500	3/0-350	(2) 2/0-500	3/0-350	(2) 2/0-500
	460	14-2/0	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	575	14-2/0	14-2/0	4-4/0	3/0-350	4-4/0	3/0-350
200	200	(2) 4-500	(2) 4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	230	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	575	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
220	200	(2) 4-500	(2) 4-500	(2) 2/0-500	(3) 3/0-500	(2) 2/0-500	(3) 3/0-500
	230	4-500	(2) 4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	4-500	3/0-350	(2) 2/0-500	3/0-350	(2) 2/0-500
	575	14-2/0	4-500	3/0-350	3/0-350	3/0-350	3/0-350
250	200	(2) 4-500	(2) 4-500	(3) 3/0-500	(3) 3/0-500	(3) 3/0-500	(3) 3/0-500
	230	(2) 4-500	(2) 4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	380	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	460	4-500	4-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500	(2) 2/0-500
	575	4-500	4-500	3/0-350	3/0-350	3/0-350	3/0-350

Notes:

1. Optional non-fused disconnect and circuit breaker.
2. Copper wire only, based on nameplate minimum circuit ampacity (MCA).
3. Standard condensing temperature option refers to entering condenser water temperatures 95°F (35°C) and below.

Table 19. Customer wire selection — RTWD, 60Hz, dual point power, premium efficiency, high condensing temperature

Unit Size	Voltage	Terminal Block		Circuit Breaker		Ckt Brkr - Hi Fault	
		Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
150	200	4-500	4-500	(2)2/0-500	(2)2/0-500	(2)2/0-500	(2)2/0-500
	230	4-500	4-500	(2)2/0-500	(2)2/0-500	(2)2/0-500	(2)2/0-500
	380	14-2/0	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	4-4/0	3/0-350	4-4/0	3/0-350
	575	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0
160	200	4-500	4-500	(2)2/0-500	(2)2/0-500	(2)2/0-500	(2)2/0-500
	230	4-500	4-500	(2)2/0-500	(2)2/0-500	(2)2/0-500	(2)2/0-500
	380	4-500	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	460	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350
	575	14-2/0	14-2/0	4-4/0	4-4/0	4-4/0	4-4/0

Table 19. Customer wire selection — RTWD, 60Hz, dual point power, premium efficiency, high condensing temperature (continued)

Unit Size	Voltage	Terminal Block		Circuit Breaker		Ckt Brkr - Hi Fault	
		Ckt 1	Ckt 2	Ckt 1	Ckt 2	Ckt 1	Ckt 2
180	200	4-500	4-500	(2)2/0-500	(2)2/0-500	(2)2/0-500	(2)2/0-500
	230	4-500	4-500	(2)2/0-500	(2)2/0-500	(2)2/0-500	(2)2/0-500
	380	4-500	4-500	3/0-350	(2)2/0-500	3/0-350	(2)2/0-500
	460	14-2/0	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	575	14-2/0	14-2/0	4-4/0	3/0-350	4-4/0	3/0-350
200	200	4-500	4-500	(2)2/0-500	(2)2/0-500	(2)2/0-500	(2)2/0-500
	230	4-500	4-500	(2)2/0-500	(2)2/0-500	(2)2/0-500	(2)2/0-500
	380	4-500	4-500	(2)2/0-500	(2)2/0-500	(2)2/0-500	(2)2/0-500
	460	4-500	4-500	3/0-350	3/0-350	3/0-350	3/0-350
	575	14-2/0	14-2/0	3/0-350	3/0-350	3/0-350	3/0-350

Notes:

1. Optional non-fused disconnect and circuit breaker.
2. Copper wire only, based on nameplate minimum circuit ampacity (MCA).
3. Standard condensing temperature option refers to entering condenser water temperatures 95°F (35°C) and below.

Dimensions

Unit Dimensions

Figure 2. RTWD 80 to 140 tons, 60 Hz

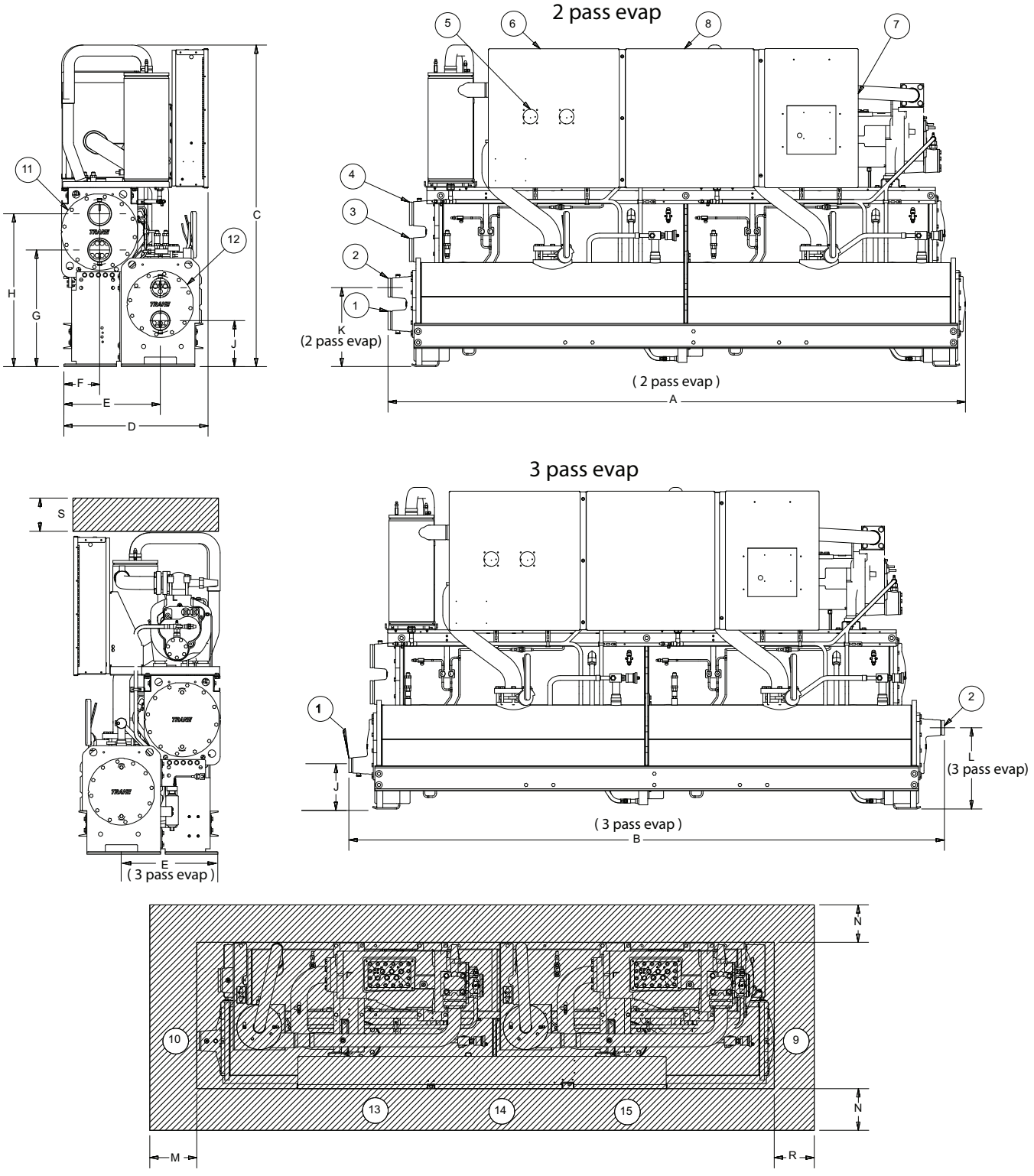


Table 20. RTWD, 80 to 140 tons, 60 Hz – in (mm)

	Standard Efficiency			RTWD - High Efficiency	
	80,90T	100,110T	120,130,140T	80,90T	100,110,120,130T
A (2 pass evap)	138.2 (3510)	138.2 (3510)	138.8 (3525)	126.4 (3210)	126.9 (3225)
B (3 pass evap)	142.6 (3621)	142.6 (3621)	142.6 (3621)	130.8 (3321)	130.7 (3320)
C	75.9 (1929)	76.9 (1955)	76.9 (1955)	76.1 (1933)	76.9 (1955)
D	34.3 (871)	34.3 (871)	34.8 (884)	35.1 (890)	35.1 (890)
E	23.6 (600)	23.6 (600)	23.6 (600)	23.6 (600)	23.6 (600)
F	9.1 (231)	9.1 (231)	9.1 (231)	9.1 (231)	9.1 (231)
G	27.9 (709)	27.9 (709)	27.9 (709)	27.9 (709)	27.9 (709)
H	36.6 (929)	36.6 (929)	36.6 (929)	36.6 (929)	36.6 (929)
J (2 pass evap)	11.0 (280)	11.0 (280)	10.6 (268)	10.8 (273)	11.8 (299)
J (3 pass evap)	10.4 (265)	10.4 (265)	10.1 (256)	10.2 (258)	11.3 (287)
K (2 pass evap)	18.9 (479)	18.9 (479)	19.2 (487)	18.6 (472)	20.4 (519)
L (3 pass evap)	19.5 (495)	19.5 (495)	19.5 (496)	19.2 (488)	19.2 (487)
M	36 (914)	36 (914)	36 (914)	36 (914)	36 (914)
N*	36 (914)*	36 (914)*	36 (914)*	36 (914)*	36 (914)*
R	127 (3226)	127 (3226)	127 (3226)	115 (2921)	115 (2921)
S	36 (914)	36 (914)	36 (914)	36 (914)	36 (914)

Reference

Notes:

1. Evaporator Water Inlet
2. Evaporator Water Outlet
3. Condenser Water Inlet
4. Condenser Water Outlet
5. Power Disconnect
6. Power Wire
7. Control Wire
8. Control Panel
9. Condenser Return Waterbox End - minimum clearance (for tube removal)
10. Condenser Supply Waterbox End - minimum clearance (for maintenance)
11. Condenser
12. Evaporator
13. Panel Power Section - door swing 31.3 inch (796.9 mm)
14. Panel Power Section - door swing 31.1 inch (790.1 mm)
15. Panel Control Section - door swing 22.4 inch (568.14 mm)
16. 42 inch (1067 mm) clearance required to other ground parts, two units with panels facing each other or other live parts require a clearance of 48 inch (1220 mm)
17. Sound attenuator may increase the footprint - submittal should be used.

Figure 3. RTWD, 150 to 250 tons, 60 Hz

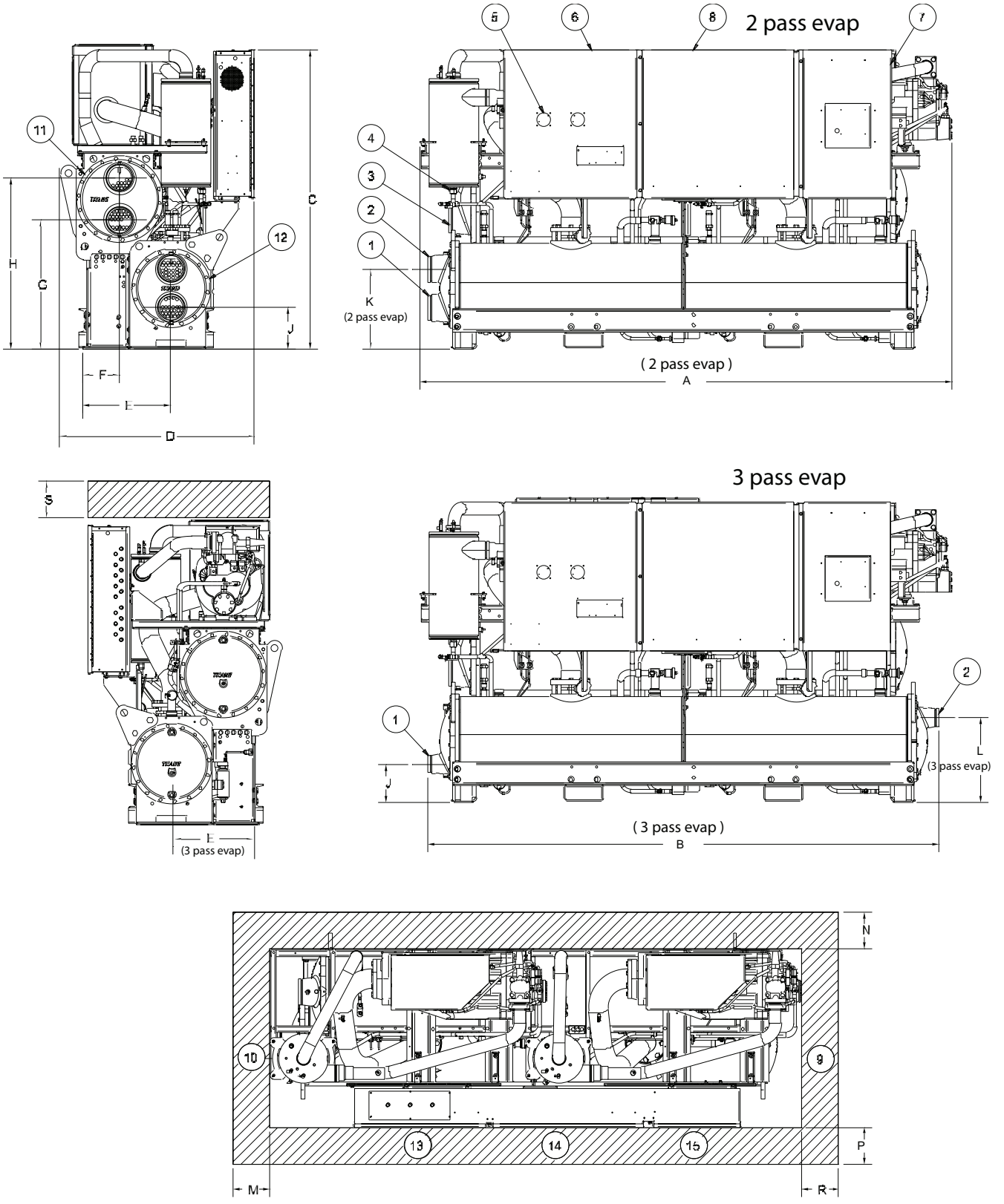


Table 21. RTWD, 150 to 250 tons, 60 Hz — in (mm)

	RTWD		
	High Efficiency		Prem Efficiency
	150-200T	220, 250T	150-200T
A (2 pass evap)	132.3 (3360)	136.1 (3456)	147.9 (3755)
B (3 pass evap)	132.8 (3371)	136.1 (3456)	150.9 (3831)
C	75.6 (1920)	76.9 (1955)	76.8 (1950)
D	47.3 (1202)	47.8 (1213)	47.3 (1202)
E	24.6 (624)	24.8 (630)	24.6 (624)
F	11.1 (282)	11.2 (295)	11.1 (282)
G	32.7 (830)	33.1 (840)	33.8 (860)
H	42.4 (1078)	43.9 (1115)	43.6 (1108)
J (2 pass evap)	10.1 (256)	10.6 (270)	10.6 (270)
J (3 pass evap)	9.5 (241)	9.7 (247)	9.7 (247)
K (2 pass evap)	19.3 (490)	20.6 (524)	20.6 (524)
L (3 pass evap)	19.9 (505)	21.6 (549)	21.6 (549)
M	36.0 (914)	36.0 (914)	36.0 (914)
N	36.0 (914)	36.0 (914)	36.0 (914)
P*	40 (1016)*	40 (1016)*	40 (1016)*
R	114.8 (2916)	114.8 (2916)	134.5 (3416)
S	36.0 (914)	36.0 (914)	36.0 (914)

Reference

Notes:

1. Evaporator Water Inlet
2. Evaporator Water Outlet
3. Condenser Water Inlet
4. Condenser Water Outlet
5. Power Disconnect
6. Power Wire
7. Control Wire
8. Control Panel
9. Condenser Return Waterbox End - minimum clearance (for tube removal)
10. Condenser Supply Waterbox End - minimum clearance (for maintenance)
11. Condenser
12. Evaporator
13. Panel Power Section - door swing 31.3 inch (796.9 mm)
14. Panel Power Section - door swing 31.1 inch (790.1 mm)
15. Panel Control Section - door swing 22.4 inch (568.14 mm)
16. Control panel clearance is 36 or 40 inch (914 or 1016 mm) depending on voltages, starter type, unit application and local code; 42 inch (1067 mm) clearance required to other grounded parts; two units with panels facing each other or other live parts require a clearance of 48 inch (1220 mm).
17. Sound attenuator may increase the footprint - submittal should be used.

Figure 4. RTWD unit footprint

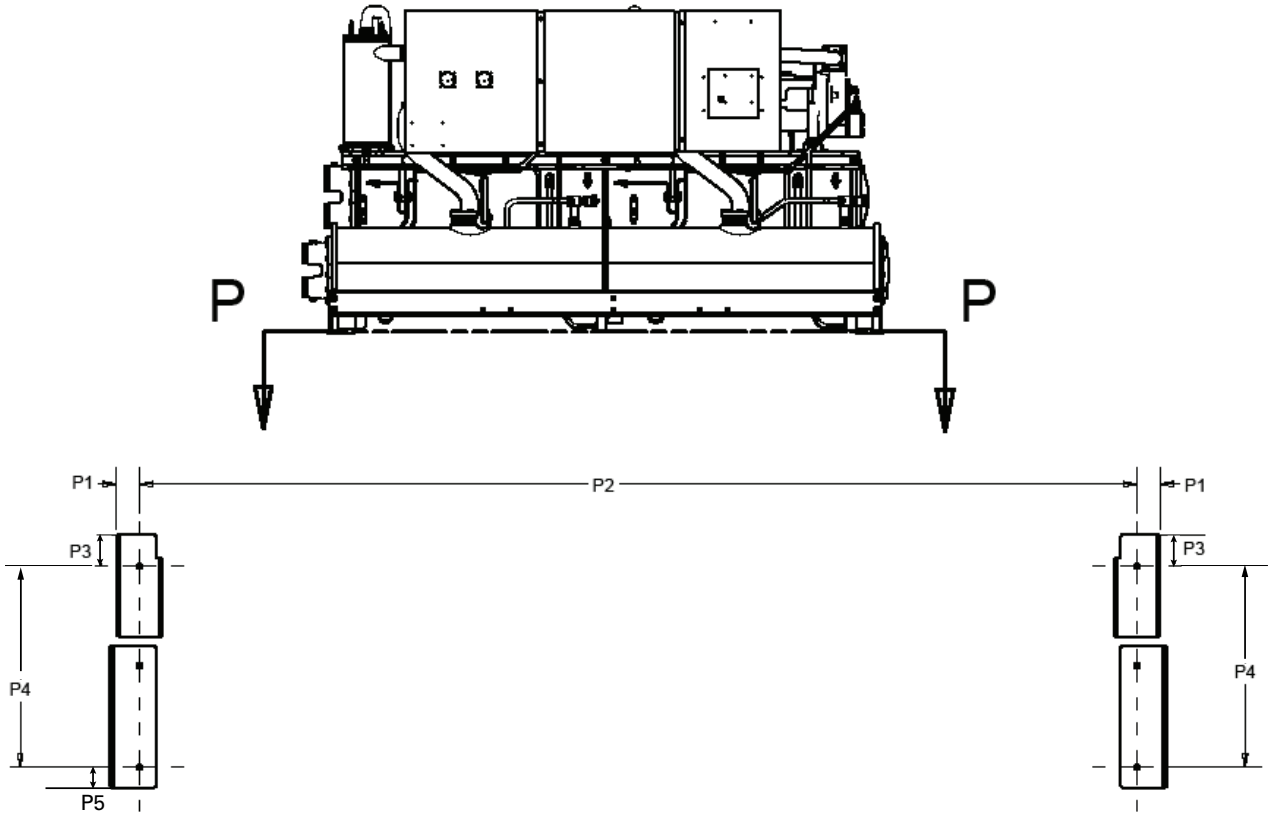


Table 22. RTWD unit footprint

Dimension	Standard Efficiency		High Efficiency 80 - 130T (60Hz)		High Efficiency 150 - 250T (60Hz),		Premium Efficiency 150-200T (60Hz)	
	inch	mm	inch	mm	inch	mm	inch	mm
P1	3.68	93.5	3.68	93.5	3.68	93.5	3.68	93.5
P2	123.78	3144	111.97	2844	111.97	2844	131.65	3344
P3	2.43	61.8	2.43	61.8	4.3	109.3	4.3	109.3
P4	24.93	633.2	24.9	633.2	24.9	633.2	24.9	633.2
P5	2.5	64	2.5	64	2.5	64	2.5	64

Note: Base hole diameters all 0.63 inch (16 mm).

Weights

RTWD Weights

Table 23. Weights — RTWD, 60 Hz

Model	Standard Efficiency				High Efficiency				Premium Efficiency rating			
	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.

Mechanical Specifications

General

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

Compressor and Motor

The unit is equipped with two semi-hermetic, direct-drive, 3600 rpm 60 Hz rotary compressors that include a load/unload valve, rolling element bearings, oil filtration device and heater. The motor is a suction gas-cooled, hermetically sealed, two-pole squirrel cage induction motor. Oil separator device is provided separate from the compressor. Check valves in the compressor discharge and lube oil system are also provided.

Unit-Mounted Starter

The unit is supplied with a UL 1995 indoor type enclosure with top power-wiring access and three-phase, overload protection. The starter is available in a wye-delta or across-the-line configuration, factory-mounted and fully pre-wired to the compressor motor and control panel. A factory-installed, factory-wired 820 VA control power transformer provides all unit control power (120 Vac secondary) and Symbio™ 800 module power (24 Vac secondary). Optional starter features include circuit breaker, high fault panel with circuit breaker, or mechanical, non-fused disconnect.

Evaporator

Dual circuited, shell and tube falling film evaporator design is used. Seamless internally finned, copper tubes are mechanically expanded into tube sheets and mechanically fastened to tube supports. Evaporator tubes are 1.0 inch (25.4 mm) diameter on standard efficiency chillers and 0.75 inch (19.05 mm) diameter on high and premium efficiency chillers. All tubes can be individually replaced.

Shells and tube sheets are made of carbon steel. Designed, tested, and stamped in accordance with ASME code. The evaporator is designed for refrigerant-side/working-side pressure of 200 psig (13.8 bars).

All water pass arrangements are available with grooved connections with 150 psig (1010.5 bars) waterside working pressure. Waterside shall be hydrostatically tested at 225 psig (15.5 bars).

Condenser

Dual circuited, shell and tube condenser designed with seamless internally/externally finned tubes expanded into tube sheets and mechanically fastened to tube supports. Condenser tubes are 1.0 inch (25.4 mm) diameter on standard efficiency chillers and 0.75 inch (19.05 mm) diameter on high and premium efficiency chillers. All tubes can be individually replaced.

Shells and tube sheets are made of carbon steel. Designed, tested, and stamped in accordance with ASME code. The condenser is designed for refrigerant-side/working-side pressure of 300 psig (20.7 bars).

Water side has single inlet and outlet piping connection. All water pass arrangements are available with grooved connections with 150 psig (10.5 bars) waterside working pressure. Waterside shall be hydrostatically tested at 225 psig (15.5 bars).

Standard temperature condenser allows for leaving condenser water temperature up to 105°F (40.6°C) and for entering condenser water temperatures up to 95°F (35°C).

Refrigerant Circuit

Each unit has two refrigerant circuits, with one rotary screw compressor per circuit. Each refrigerant circuit includes compressor suction and discharge service valves, removable core filter, charging port, sight glass and an electronic expansion valve. Modulating compressors and electronic expansion valves provide variable capacity modulation over the entire building load and maintain proper refrigerant flow.

The RTWD also includes liquid line isolation valves and refrigerant pressure relief valves installed on each circuit of both the evaporator and condenser.

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, and oil return system. An optional oil cooler is installed when the unit is used for high condensing temperature or low evaporator temperature conditions. For example: heat recovery, water-to-water heat pump, ice making and low temperature process applications.

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, condenser fan sequencing and speed control, anti-recycle logic, automatic lead/lag compressor starting, and load limiting.

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, compressor current overload, 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.

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 or ModbusTCP over Ethernet.

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 set point,

leaving chilled water temperature, demand limit set point, evaporator and condenser refrigerant temperatures and pressures, compressor and fan speeds, and all pertinent electrical information. The display also provides “on screen” trending graphs of predefined parameters as well as customizable trend 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.

- Outdoor capable:
  - UV Resistant Touchscreen
  - -40°C to 70°C Operating Temperature
  - IP56 rated (Power Jets of Water from all directions)
- RoHS Compliant
- UL PAZX, Open Energy Management Equipment
- 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. 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

Across-the-Line Starter

Across-the-line starter is unit mounted with a UL 1995 enclosure.

Wye-Delta Starter

This option provides a reduced-inrush, unit mounted starter with a UL 1995 enclosure. Wye-delta starters are standard with 200–230 V machines.

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 Fault Rated Control Panel with Circuit Breaker

A molded case 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 control panel has a higher short circuit rating as determined by UL 508.

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.

Dual Point Power Connection

Unit is available with either dual or single point power connections.

Under/Over-Voltage Protection

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

Control Options

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 of 80°F (26.7°C) to 167°F (72°C) with a non-reversible heat pump.

Condenser Differential Pressure Output

Provides a 2-10 Vdc signal based on the system refrigerant differential pressure and time at the differential with customer defined endpoints.

Condenser Smart Flow Control

Provides a highly configured signal designed to control a condenser water regulating valve.

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 Demand Limit

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

Motor Current Analog Output

Control system indicates the active chiller percent of full run load amps, based on a 2-10 Vdc.

Energy Meter

Tracks energy consumption with Trane Enercept Flex Modbus or integrated with voltage transformers.

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.

Other Options

Base Rail Forklifting

Channels built into the base frame allow for easy movement using a forklift.

Dual Relief Valve

Unit comes with dual relief valves on both the high pressure side and low pressure side of each refrigerant circuit. Each dual relief valve configuration includes an isolation valve. Single relief valves are standard.

Flanged Water Connection Kit

Kit to convert all four water connections from grooved pipe to flanged connections. This includes: grooved couplings, pipe offsets, and grooved to flange adapters.

Flow Switches - Factory Installed

Factory-installed IFM effector flow switches for the evaporator and/or condenser.

Flow Switches - Field Installed

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

High-Temperature Condenser

Optimized compressors, copper-nickel tubes, oil cooler, and high condenser temperature control panel allows for leaving condenser water temperatures up to 167°F (75°C). This option is required for entering condenser water temperatures above 95°F (35°C).

Insulation

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

Insulation for High Humidity

The evaporator and water boxes are covered with factory installed 1.5 inch (38.1 mm) insulation. Factory installed foam insulation is used on the motor housing, suction line, liquid level sensor, and oil return system assembly (with its associated piping).

Isolators

Molded elastomeric isolators ship with the unit.

Low-Temperature Evaporator

Optimized compressors and oil cooler enable evaporator operation down to minimum leaving water temperature of 10°F (-12.2°C).

Nitrogen Charge

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

Performance Tests

Performance and witness tests are available, based on requested operating points, to certify chiller performance in accordance with AHRI Standard 550/590.

Rapid Restart™ Test

After completion of a standard full load witness test, power to the chiller will be cut and then reapplied to demonstrate the chiller’s rapid restart capabilities for disaster relief.

Two-Way Condenser Water Regulating Valve

For water regulation, a field-installed, 2-way butterfly-type (lug-style) valve and field-mounted valve actuator, is available. The 2-way valve is field-wired and controlled by the chiller regulating valve control output. The single-phase, dual frequency, 50 or 60 Hz, motor can be selected with 115V (can be powered directly from control power transformer at unit) or 220V power.

Note: *Separate 220 volt power must be field supplied for 220V water regulating valve option.*

Valves are available in 3 and 4 inch (88.9 mm and 114.3 mm) sizes.

Sound Reduction Package

Acoustical treatment for compressors can be factory or field installed.

Non-Reversible Heat Pump

Optimized compressors, oil cooler, and high condenser temperature control panel allows for leaving condenser water temperatures up to 167°F (75°C). This option allows for entering condenser water temperatures above 95°F (35°C). Condenser leaving water temperature control option is required; the setpoint range is 80°F (26.7°C) to 167°F (75°C).

Notes

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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