



Product Catalog

Stealth™ Air-Cooled Chillers **Model RTAE** 150-300 Nominal Tons





Introduction

Overview of Design

The Stealth™ air-cooled chiller was designed to meet the demanding requirements of today's environment. The design transforms technology into the performance on which you can depend.

Trane engineers brought innovation to every component in the next-generation Trane® Stealth chiller. The result: the highest efficiency, improved system flexibility and performance, and the lowest published sound levels—all while delivering improved reliability and lower maintenance requirements.

At the core of the Stealth air-cooled chiller's performance is AdaptiSpeed™ technology—the integration of an all-new, direct-drive, specific-speed screw compressor; permanent magnet motors and the Trane third-generation Adaptive Frequency™ drive, AFD3.

AdaptiSpeed Technology

AdaptiSpeed technology delivers unmatched efficiency with some of the lowest sound levels in the industry.

- Trane third-generation Adaptive Frequency™ drive (AFD3) –The AFD3 offers a part-load efficiency improvement of more than 40 percent when compared to constant-speed chiller designs.
- Direct-drive, specific-speed screw compressor—Optimized for variable-speed operation, it delivers peak efficiency under all operating conditions.
- Variable Speed, Permanent magnet motors—The compressor's and condenser fans' permanent magnet motor design is up to 4 percent more efficient than conventional induction motors.

Revision Summary

RLC-PRC042-EN (06 Jun 2013). New catalog for RTAE product introduction.

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Features and Benefits

Technology

- AdaptiSpeed technology assures optimal performance at all operating conditions
 - Permanent magnet motor - up to 4% more efficient than an induction motor
 - AFD3 Adaptive Frequency™ Drive
 - Soft start provided as standard to reduce power in-rush at start-up
 - One of the first true 24 pulse drives in the industry
 - Compressor design optimized for variable speed operation
 - Rotor profile designed for maximum efficiency at higher speeds
- Shuttle valve enhances compressor oil management
- Variable speed permanent magnet motors on ALL condenser fans for increased efficiency and lower sound
- Larger diameter condenser fans operate at lower speed with optimized blade design
- Compact, high-efficiency, integrated low refrigerant charge evaporator design
- Integral compressor muffler lowers sound levels by 4-10 dB compared to previous design
- Optional metallic discharge and suction bellows reduce compressor sound by 8-10 dB

Cost of Ownership

- Industry-leading efficiency
 - Over 20% higher full load efficiency than ASHRAE 90.1 – 2010
 - Minimizing kW demand and infrastructure
 - Over 40% higher part load efficiency than ASHRAE 90.1-2010
 - Minimize kW usage
- Drive designed to last the life of the chiller
- High power factor at all load points reducing the need for power factor correction capacitors
- Variable speed drives on all condenser fans save energy at part load operation
- Transverse modular coil design for easy access for coil cleaning
- Up to 40% lower refrigerant charge compared to previous evaporator designs
- Factory-engineered, tested and installed sound control options reduce jobsite time and cost
- Three levels of sound reduction available to meet various job site acoustical requirements

Reliability

- Robust drive design using film capacitors for longer drive life
- Industrial bearing system designed for the life of the chiller
- Shuttle valve reduces the differential oil pressure required for cold weather start-up
- New header design eliminates brazed coil u-bends, significantly reduces potential for refrigerant leaks
- All aluminum alloy coils reduce potential for corrosion
- Enhanced factory-applied corrosion protection available
- Rapid Restart capability minimizes downtime
- Easy hookup to Uninterruptable Power Supply (UPS) for mission critical applications

Precision Control

- New 7 inch color touch screen display with graphics
- Powered by UC800 industry-leading control algorithms
 - Enhanced flow management provides unmatched system performance in variable flow water systems
- Adaptive Control™ keeps the chiller running in extreme conditions
 - Tight set point control
 - Graphical trending
 - Maximized chiller update
- BACnet™, Modbus™, LonTalk™, communications protocol interface available without the need for gateways
- Optional condenser fan speed control to help meet preset nighttime sound requirements



Application Considerations

Certain application constraints should be considered when sizing, selecting and installing Trane RTAE chillers. Unit and system reliability is often dependent upon proper and complete compliance with these considerations. Where the application varies from the guidelines presented, it should be reviewed with your local Trane account manager.

Note: The terms water and solution are used interchangeably in the following paragraphs.

Water Treatment

The use of untreated or improperly treated water in chillers may result in scaling, erosion, corrosion, and algae or slime buildup. This will adversely affect heat transfer between the water and system components. Proper water treatment must be determined locally and depends on the type of system and local water characteristics.

Neither salt nor brackish water is recommend for use in Trane air-cooled RTAE chillers. Use of either will lead to a shortened life. Trane encourages the employment of a qualified water treatment specialist, familiar with local water conditions, to assist in the establishment of a proper water treatment program.

Foreign matter in the chilled water system can also increase pressure drop and, consequently, reduce water flow. For this reason it is important to thoroughly flush all water piping to the unit before making the final piping connections to the unit.

The capacities give in the Performance Data section of this catalog are based on water with a fouling factor of 0.0001°F·ft²·h/Btu (in accordance with AHRI 550/590). For capacities at other fouling factors, see Performance Selection Software.

Effect of Altitude on Capacity

At elevations substantially above sea level, the decreased air density will decrease condenser capacity and, therefore, unit capacity and efficiency.

Ambient Limitations

Trane chillers are designed for year-round operation over a range of ambient temperatures. The air-cooled model RTAE chiller will operate in ambient temperatures of:

- Standard Ambient Range = 32 to 105°F (0 to 40.6°C)
- Low Ambient Range = 0 to 105°F (-17.7 to 40.6°C)
- High Ambient Range = 32 to 125°F (0 to 52°C)
- Wide Ambient Range = 0 to 125°F (-17.7 to 52°C)

Note: The low and wide ambient options add unit controls to allow start and operation down to ambient temperatures of 15°F when water is present in the evaporator. If there is sufficient glycol in the evaporator to prevent freezing, operation down to ambient temperatures of 0°F is acceptable.

The minimum ambient temperatures are based on still conditions (winds not exceeding five mph). Greater wind velocities will result in a drop in head pressure, therefore increasing the minimum starting and operating ambient temperature. The Adaptive Frequency™ microprocessor will attempt to keep the chiller on-line when high or low ambient conditions exist, making every effort to avoid nuisance trip-outs and provide the maximum allowable tonnage.

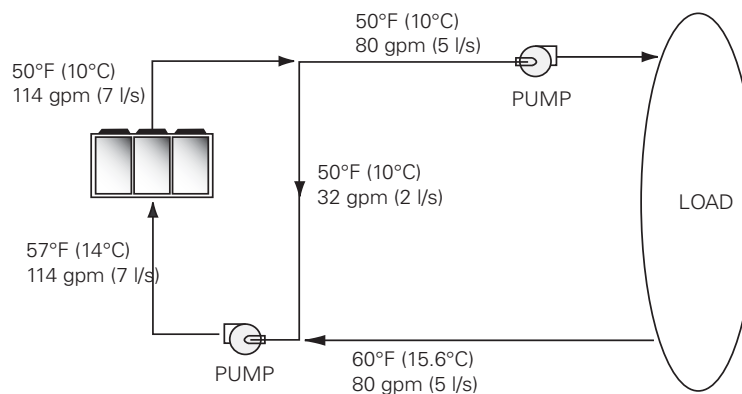
Water Flow Limits

The minimum water flow rates are given in the chapter “General Data,” p. 13 of this catalog. Evaporator flow rates below the tabulated values will result in laminar flow causing freeze-up problems, scaling, stratification and poor control. The maximum evaporator water flow rate is also given. Flow rates exceeding those listed may result in very high pressure drop across the evaporator and/or evaporator tube erosion.

Flow Rates Out of Range

Many process cooling jobs require flow rates that cannot be met with the minimum and maximum published values within the RTAE evaporator. A simple piping change can alleviate this problem. For example: a plastic injection molding process requires 80 gpm (5.0 l/s) of 50°F (10°C) water and returns that water at 60°F (15.6°C). The selected chiller can operate at these temperatures, but has a minimum flow rate of 106 gpm (6.6 l/s). The system layout in [Figure 1](#) can satisfy the process.

Figure 1. Flow rate out of range systems solution



Flow Proving

Trane provides a factory-installed water flow switch monitored by UC800 which protects the chiller from operating in loss of flow conditions.

Water Temperature

Leaving Water Temperature Limits

Trane RTAE chillers have three distinct leaving water categories:

- Standard, with a leaving solution range of 40 to 68°F (4.4 to 20°C)
- Low temperature process cooling, with leaving solution less than 40°F (4.4°C)
- Ice-making, with leaving solution range of 20 to 68°F (-6.7 to 20°C)

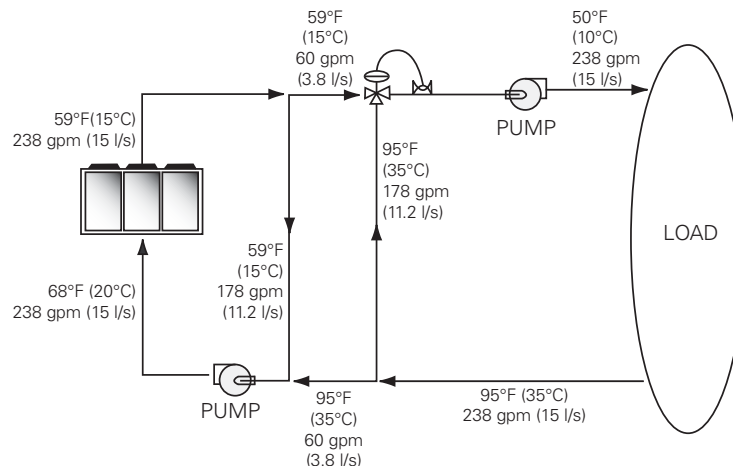
Since leaving solution temperature below 40°F (4.4°C) results in suction temperature at or below the freezing point of water, a glycol solution is required for all low temperature and ice-making machines. Ice making control includes dual setpoint controls and safeties for ice making and standard cooling capabilities. Consult your local Trane account manager for applications or selections involving low temperature or ice making machines.

The maximum water temperature that can be circulated through the RTAE evaporator when the unit is not operating is 125°F (52°C). Evaporator damage may result above this temperature.

Leaving Water Temperature Out of Range

Many process cooling jobs require temperature ranges that are outside the allowable minimum and maximum operating values for the chiller. [Figure 2](#) below shows a simple example of a mixed water piping arrangement change that can permit reliable chiller operation while meeting such cooling conditions. For example, a laboratory load requires 238 gpm (5 l/s) of water entering the process at 86°F (30°C) and returning at 95°F (35°C). The chiller's maximum leaving chilled water temperature of 65°F (15.6°C) prevents direct supply to the load. In the example shown, both the chiller and process flow rates are equal, however, this is not necessary. For example, if the chiller had a higher flow rate, there would simply be more water bypassing and mixing with warm water returning to the chiller.

Figure 2. Temperature out of range system solution



Typical Water Piping

All building water piping must be flushed prior to making final connections to the chiller. To reduce heat loss and prevent condensation, insulation should be applied. Expansion tanks are also usually required so that chilled water volume changes can be accommodated.

Avoidance of Short Water Loops

Adequate chilled water system water volume is an important system design parameter because it provides for stable chilled water temperature control and helps limit unacceptable short cycling of chiller compressors.

The chiller's temperature control sensor is located in the waterbox. This location allows the building to act as a buffer to slow the rate of change of the system water temperature. If there is not a sufficient volume of water in the system to provide an adequate buffer, temperature control can suffer, resulting in erratic system operation and excessive compressor cycling.

Typically, a two-minute water loop circulation time is sufficient to prevent short water loop issues. Therefore, as a guideline, ensure the volume of water in the chilled water loop equals or exceeds two times the evaporator flow rate. For systems with a rapidly changing load profile the amount of volume should be increased.

If the installed system volume does not meet the above recommendations, the following items should be given careful consideration to increase the volume of water in the system and, therefore, reduce the rate of change of the return water temperature.

- A volume buffer tank located in the return water piping.
- Larger system supply and return header piping (which also reduces system pressure drop and pump energy use).

Minimum water volume for a process application

If a chiller is attached to an on/off load such as a process load, it may be difficult for the controller to respond quickly enough to the very rapid change in return solution temperature if the system has only the minimum water volume recommended. Such systems may cause chiller low temperature safety trips or in the extreme case evaporator freezing. In this case, it may be necessary to add or increase the size of the mixing tank in the return line.

Multiple Unit Operation

Whenever two or more units are used on one chilled water loop, Trane recommends that their operation be coordinated with a higher level system controller for best system efficiency and reliability. The Trane Tracer system has advanced chilled plant control capabilities designed to provide such operation.

Ice Storage Operation

An ice storage system uses the chiller to make ice at night when utilities generate electricity more efficiently and charge less for electricity with lower demand and energy charges. The stored ice reduces or even replaces mechanical cooling during the day when utility rates are at their highest. This reduced need for cooling results in significant utility cost savings and source energy savings.

Another advantage of an ice storage system is its ability to eliminate chiller over sizing. A "rightsized" chiller plant with ice 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 building it into the ice storage capacity for practically no cost compared to over sized systems.

The Trane air-cooled chiller is 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 RTAE chiller. The dual mode control functionality are 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.

Application Considerations

Unit Placement

Setting The Unit

A base or foundation is not required if the selected unit location is level and strong enough to support the unit's operating weight. (See chapter "Weights," p. 35.)

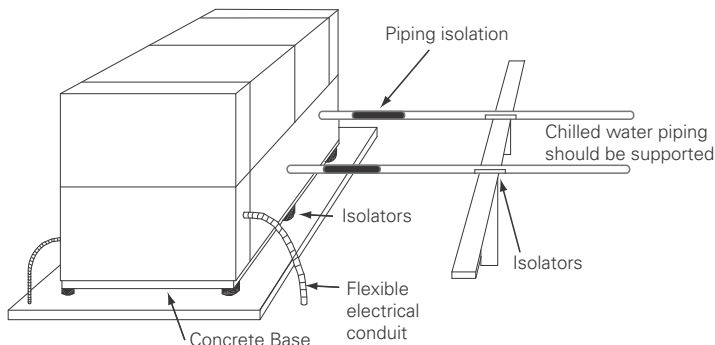
For a detailed discussion of base and foundation construction, see the sound engineering bulletin or the unit IOM. Manuals are available through online product portal pages or from your local office.

HVAC equipment must be located to minimize sound and vibration transmission to the occupied spaces of the building structure it serves. If the equipment must be located in close proximity to a building, it should be placed next to an unoccupied space such as a storage room, mechanical room, etc. It is not recommended to locate the equipment near occupied, sound sensitive areas of the building or near windows. Locating the equipment away from structures will also prevent sound reflection, which can increase sound levels at property lines or other sensitive points.

Isolation and Sound Emission

Structurally transmitted sound can be reduced by elastomeric vibration eliminators. Elastomeric isolators are generally effective in reducing vibratory noise generated by compressors, and therefore, are recommended for sound sensitive installations. An acoustical engineer should always be consulted on critical applications.

Figure 3. Installation example



For maximum isolation effect, water lines and electrical conduit should also be isolated. Wall sleeves and rubber isolated piping hangers can be used to reduce sound transmitted through water piping. To reduce the sound transmitted through electrical conduit, use flexible electrical conduit.

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

Servicing

Adequate clearance for evaporator, condenser and compressor servicing should be provided. Recommended minimum space envelopes for servicing are located in the dimensional data section and can serve as a guideline for providing adequate clearance. The minimum space envelopes also allow for control panel door swing and routine maintenance requirements. Local code requirements may take precedence.

Unit Location

General

Unobstructed flow of condenser air is essential to maintain chiller capacity and operating efficiency. When determining unit placement, careful consideration must be given to assure a sufficient flow of air across the condenser heat transfer surface. Two detrimental conditions are possible and must be avoided: warm air recirculation and coil starvation. Air recirculation occurs when discharge air from the condenser fans is recycled back to the condenser coil inlet. Coil starvation occurs when free airflow to the condenser is restricted.

Condenser coils and fan discharge must be kept free of snow or other obstructions to permit adequate airflow for satisfactory unit operation. Debris, trash, supplies, etc., should not be allowed to accumulate in the vicinity of the air-cooled chiller. Supply air movement may draw debris into the condenser coil, blocking spaces between coil fins and causing coil starvation.

Both warm air recirculation and coil starvation cause reductions in unit efficiency and capacity because of the higher head pressures associated with them. The air-cooled RTAE chiller offers an advantage over competitive equipment in these situations. Operation is minimally affected in many restricted air flow situations due to its advanced Adaptive Control™ microprocessor which has the ability to understand the operating environment of the chiller and adapt to it by first optimizing its performance and then staying on line through abnormal conditions. For example, high ambient temperatures combined with a restricted air flow situation will generally not cause the air-cooled model RTAE chiller to shut down. Other chillers would typically shut down on a high pressure nuisance cut-out in these conditions.

Cross winds, those perpendicular to the condenser, tend to aid efficient operation in warmer ambient conditions. However, they tend to be detrimental to operation in lower ambients due to the accompanying loss of adequate head pressure. Special consideration should be given to low ambient units. As a result, it is advisable to protect air-cooled chillers from continuous direct winds exceeding 10 mph (4.5 m/s) in low ambient conditions.

The recommended lateral clearances are depicted in the close spacing engineering bulletin available on product portal pages or from your local office.

Provide Sufficient Unit-to-Unit Clearance

Units should be separated from each other by sufficient distance to prevent warm air recirculation or coil starvation. Doubling the recommended single unit air-cooled chiller clearances will generally prove to be adequate.

Walled Enclosure Installations

When the unit is placed in an enclosure or small depression, the top of the surrounding walls should be no higher than the top of the fans. The chiller should be completely open above the fan deck. There should be no roof or structure covering the top of the chiller. Ducting individual fans is not recommended.



Model Number Description

Digits 1,2 — Unit Model

RT = Rotary Chiller

Digits 3— Unit Type

A = Air-cooled

Digits 4 — Development Sequence

E = Development Sequence

Digits 5-7 — Nominal Capacity

150 = 150 Nominal Tons
165 = 165 Nominal Tons
180 = 180 Nominal Tons
200 = 200 Nominal Tons
225 = 225 Nominal Tons
250 = 250 Nominal Tons
275 = 275 Nominal Tons
300 = 300 Nominal Tons

Digit 8— Unit Voltage

D = 380/60/3
E = 400/50/3
F = 460/60/3
H = 400/60/3

Digit 9 — Manufacturing Location

U = Trane Commercial Systems,
Pueblo, CO USA

Digits 10, 11— Design Sequence

XX = Factory assigned

Digit 12 — Unit Sound Package

1 = InvisiSound™ Standard Unit
2 = InvisiSound Superior
(Line Wraps, Reduced Fan Speed)
3 = InvisiSound Ultimate
(Compressor Sound Attenuation,
Line Wraps, Reduced Fan Speed)

Digit 13 — Agency Listing

0 = No Agency Listing
A = UL/CUL Listing

Digit 14 — Pressure Vessel Code

A = ASME Pressure Vessel Code
D = Australia Pressure Vessel Code
C = CRN or Canada Equivalent
Pressure Vessel Code

Digit 15 — Factory Charge

1 = Refrigerant Charge HFC-134a
2 = Nitrogen Charge

Digit 16 — Evaporator Application

F = Standard Cooling
(40 to 68°F/5.5 to 20°C)
G = Low Temp Process
(<40°F Leaving Temp)
C = Ice-making (20 to 68°F/-7 to 20°C)
w/ Hardwired Interface

Digit 17 — Evaporator Configuration

N = 2 Pass Evaporator
P = 3 Pass Evaporator

Digit 18 — Evaporator Fluid Type

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

Digit 19 — Water Connection

X = Grooved Pipe
F = Grooved Pipe + Flange

Digit 20 — Flow Switch

1 = Factory Installed - Other Fluid
(15 cm/s)
2 = Factory Installed - Water 2
(35 cm/s)
3 = Factory Installed - Water 3
(45 cm/s)

Digit 21 — Insulation

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

Digit 22 — Unit Application

1 = Standard Ambient
(32 to 105°F/0 to 40.6°C)
2 = Low Ambient
(0 to 105°F/-17.7 to 40.6°C)
4 = High Ambient
(32 to 125°F/0 to 52°C)
5 = Wide Ambient
(0 to 125°F/-17.7 to 52°C)

Digit 23 — Condenser Fin Options

A = Aluminum Fins with Slits
D = CompleteCoat™ Epoxy Coated
Fins

Digits 24, 25 — Not Used

Digit 26 — Power Line Connection Type

A = Terminal Block
C = Circuit Breaker
D = Circuit Breaker w/ High Fault
Rated Control Panel

Digit 27 — Short Circuit Current Rating

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

Digit 28 — Transformer

0 = No Transformer

Digit 29 — Line Voltage Harmonic Mitigation

X = Line Reactors (~30%TDD)

Digit 30 — Electrical Accessories

0 = No Convenience Outlet
C = 15A 115V convenience Outlet
(Type B)

Digit 31 — Remote Communication Options

0 = No Remote Digital
Communication
1 = LonTalk™ Interface LCI-C
(Tracer™ Compatible)
2 = BACnet™ MS/TP Interface
(Tracer compatible)
3 = ModBus™ Interface
4 = Time of Day Scheduling

Digit 32 — Hard Wire Communication

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

Digit 33 — Not Used

Digit 34 — Structural Options

A = Standard Unit Structure

Digit 35 — Appearance Options

0 = No Appearance Options
A = Architectural Louvered Panels

Digit 36 — Unit Isolation

0 = No Isolation
1 = Elastomeric Isolators

Digit 37 — Not Used

0 = Not Used

Digit 38 — Not Used

0 = Not Used

Digit 39 — Special

0 = None
S = Special

General Data

Table 1. General data table

Unit Size (tons)			150	165	180	200	225	250	275	300
Compressor Model CHHSR										
	Quantity	#	2	2	2	2	2	2	2	2
	Full load RPM	RPM	4281	4661	5106	5642	3477	3915	4289	4711
Evaporator										
	Water Storage	(gal)	17.5	18.7	21.9	23.9	26.6	28.7	33.0	36.0
		(L)	66.1	70.9	82.8	90.5	100.6	108.8	125.0	136.1
2 Pass arrangement										
	Minimum Flow	(gpm)	171	187	202	228	261	288	318	354
		(l/s)	10.8	11.8	12.7	14.4	16.5	18.2	20.1	22.3
	Maximum Flow	(gpm)	626	684	742	835	957	1055	1165	1299
		(l/s)	39.5	43.1	46.8	52.7	60.4	66.5	73.5	81.9
3 Pass arrangement										
	Minimum Flow	(gpm)	114	124	135	152	174	192	212	236
		(l/s)	7.2	7.8	8.5	9.6	11.0	12.1	13.4	14.9
	Maximum Flow	(gpm)	417	456	495	557	638	703	777	866
		(l/s)	26.3	28.8	31.2	35.1	40.2	44.3	49.0	54.6
Condenser										
	Qty of Coils		8	10	10	12	12	12	14	16
	Coil Length	(in)	78.74	78.74	78.74	78.74	78.74	78.74	78.74	78.74
		(mm)	2000	2000	2000	2000	2000	2000	2000	2000
	Coil Height	(in)	50	50	50	50	50	50	50	50
		(mm)	1270	1270	1270	1270	1270	1270	1270	1270
	Fins/Ft		192	192	192	192	192	192	192	192
	Rows		3	3	3	3	3	3	3	3
Condenser Fans										
	Quantity	#	8	10	10	12	12	12	14	16
	Diameter	(in)	37.5	37.5	37.5	37.5	37.5	37.5	37.5	37.5
		(mm)	953	953	953	953	953	953	953	953
	Total Airflow	(cfm)	107,392	134,240	134,240	161,088	161,088	161,088	187,936	214,784
		(m3/hr)	182,460	228,075	228,075	273,690	273,690	273,690	319,305	364,920
	Tip Speed	(ft/min)	8700	8700	8700	8700	8700	8700	8700	8700
		(M/S)	44.2	44.2	44.2	44.2	44.2	44.2	44.2	44.2
Ambient Temperature Range ^(a)										
	Standard Ambient °F (°C)		32 to 105 (0 to 40.6)							
	Low Ambient °F (°C)		0 to 105 (-17.7 to 40.6)							
	High Ambient °F (°C)		32 to 125 (0 to 52)							
	Wide Ambient °F (°C)		0 to 125 (-17.7 to 52)							
General Unit										
	Refrigerant		HFC-134a							
Independent Refrigerant Ckts	#		2							
	Minimum Load	%	21%	19	17	15%	21	19	17	16
Refrigerant Charge/ckt	(lbs)		172	181	210	218	265	261	318	325
		(kg)	78	82	95	99	120	118	144	148
Oil Charge/ckt	(gal)		3.0	3.0	3.0	3.0	4.0	4.0	4.0	4.0
		(L)	11.4	11.4	11.4	11.4	15.1	15.1	15.1	15.1

^(a)The low and wide ambient options add unit controls to allow start and operation down to ambient temperatures of 15°F when water is present in the evaporator. If there is sufficient glycol in the evaporator to prevent freezing, operation down to ambient temperatures of 0°F is acceptable.

General Data

Table 2. Drive cooling

Unit Size (tons)		150	165-200	225-250	275-300
Drive Cooling Fluid					
	Type	Trane Heat Transfer Fluid CHM01023			
	Solution (glycol/water)	50%/50%			
Fluid Volume (gal)					
	Ckt 1	1.82	2.03	2.20	2.40
	Ckt2	2.27	2.47	2.64	2.85
	Total	4.09	4.50	4.84	5.25
Fluid Volume (l)					
	Ckt1	6.89	7.68	8.33	9.08
	Ckt2	8.59	9.35	9.99	10.79
	Total	15.48	17.03	18.32	19.87

Controls

Tracer UC800 Controller

Today's Stealth™ chillers offer predictive controls that anticipate and compensate for load changes. Other control strategies made possible with the Tracer UC800 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 due to load or 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

There are many objectives that the controller must meet, but it cannot satisfy more than one objective at a time. Typically, the controller's primary objective is to maintain the evaporator leaving water temperature.

Whenever the controller senses that it can no longer meet its primary objective without triggering a protective shutdown, it focuses on the most critical secondary objective. When the secondary objective is no longer critical, the controller reverts to its primary objective.

Rapid Restart

The controller allows the Stealth chiller to perform a Rapid Restart. A Rapid Restart is performed after a momentary power loss if it occurs during operation. Similarly, if the chiller shuts down on a non-latching diagnostic and the diagnostic later clears itself, a Rapid Restart will be initiated.

AdaptiSpeed Control

The speed control is now optimized mathematically and controlled simultaneously. The increased performance of the UC800 Controller allows the chiller to operate longer at higher efficiency, and with greater stability.

Variable-Primary Flow (VPF)

Chilled-water systems that vary the water flow through chiller evaporators have caught the attention of engineers, contractors, building owners, and operators. Varying the water flow reduces the energy consumed by pumps, while having limited effect on the chiller energy consumption. This strategy can be a significant source of energy savings, depending on the application.

AdaptiView TD7 Operator Interface

The standard AdaptiView™ TD7 display provided with the Trane UC800 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 26 languages.

Display Features Include:

- LCD touch-screen with LED backlighting, for scrolling access to input and output operating information
- Single-screen, folder/tab-style display of all available information on individual components (evaporator, condenser, compressor, etc.)
- Manual override indication
- Password entry/lockout system to enable or disable display
- Automatic and immediate stop capabilities for standard or immediate manual shutdown
- Fast, easy access to available chiller data in tabbed format, including:
 - Easy to view Operating Modes
 - Logical Sub-Component Reports:
 - Evaporator
 - Condenser
 - Compressor
 - Motor
 - 3 User Programmable Custom Reports
 - ASHRAE report
 - Logsheet Report
 - Alarms Report
 - 8 pre-defined Standard Graphs
 - 4 User Programmable Custom Graphs
 - Chiller Settings
 - Feature Settings
 - Chilled Water Reset
 - Manual Control Settings
 - Globalization Settings
 - Support of 26 languages
 - Brightness Setting
 - Cleaning Mode

Tracer TU Interface

Tracer TU (non-Trane personnel, contact your local Trane office for software) adds a level of sophistication that improves service technician effectiveness and minimizes chiller downtime. The Tracer AdaptiView control's operator interface is intended to serve only typical daily tasks. The portable PC-based service-tool software, Tracer TU, supports service and maintenance tasks.

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

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

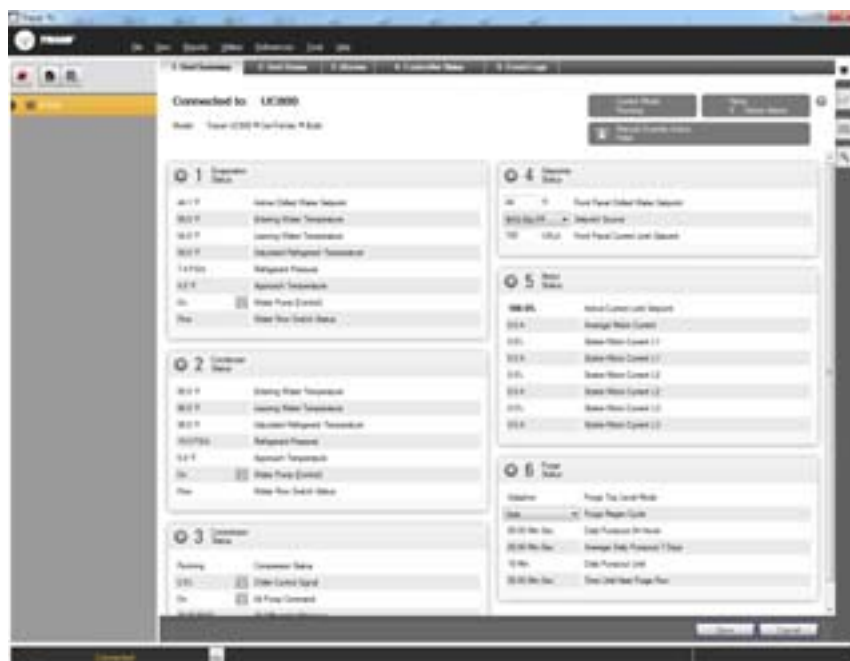
All chiller status, machine configuration settings, customizable limits, and up to 100 active or historic diagnostics are displayed through the service-tool software interface.

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

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

- 1 GB RAM (minimum)
- 1024 x 768 screen resolution
- CD-ROM drive
- Ethernet 10/100 LAN card
- An available USB 2.0 port
- Microsoft® Windows® XP Professional operation system with Service Pack 3 (SP3) or Windows 7 Enterprise or Professional operating system (32-bit or 64-bit)
- Microsoft .NET Framework 4.0 or later

Note: Tracer TU is designed and validated for this minimum laptop configuration. Any variation from this configuration may have different results. Therefore, support for Tracer TU is limited to only those laptops with the configuration previously specified.



System Integration

Stand-Alone Controls

Single chillers installed in applications without a building management system are simple to install and control: only a remote auto/stop for scheduling is required for unit operation. Signals from the chilled-water pump contactor auxiliary, or a flow switch, are wired to the chilled-water flow interlock. Signals from a time clock or some other remote device are wired to the external auto/stop input.

- Auto/Stop - A job-site provided contact closure turns the unit on and off.
- External Interlock - A job-site provided contact opening wired to this input turns the unit off and requires a manual reset of the unit microcomputer. This closure is typically triggered by a job-site provided system such as a fire alarm.

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.

BACnet Interface

Tracer AdaptiView control can be configured for BACnet communications at the factory or in the field. This enables the chiller controller to communicate on a BACnet MS/TP network. Chiller setpoints, operating modes, alarms, and status can be monitored and controlled through BACnet.

Tracer AdaptiView controls conform to the BACnet B-ASC profile as defined by ASHRAE 135-2004.

LonTalk Communications Interface (LCI-C)

The optional LonTalk[®] Communications Interface for Chillers (LCI-C) is available factory or field installed. It is an integrated communication board that enables the chiller controller to communicate over a LonTalk network. The LCI-C is capable of controlling and monitoring chiller setpoints, operating modes, alarms, and status. The Trane LCI-C provides additional points beyond the standard LONMARK[®] defined chiller profile to extend interoperability and support a broader range of system applications. These added points are referred to as open extensions. The LCI-C is certified to the LONMARK Chiller Controller Functional Profile 8040 version 1.0, and follows LonTalk FTT-10A free topology communications.

Modbus Interface

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

Tracer Summit

The chiller plant control capabilities of the Trane Tracer Summit™ building automation system are unequalled in the industry. Trane's depth of experience in chillers and controls makes us a well-qualified choice for automation of chiller plants using air-cooled RTAE chillers. Our chiller plant automation software is fully pre-engineered and tested.

Required features:

- LonTalk/Tracer Summit Interface (selectable option with chiller)
- Building Control Unit (external device required)

Energy Efficiency

- Sequences starting of chillers to optimize the overall chiller plant energy efficiency
 - Individual chillers operate as base, peak, or swing based on capacity and efficiency
 - Automatically rotates individual chiller operation to equalize runtime and wear between chillers.
 - Evaluates and selects the lowest energy consumption alternative from an overall system perspective.

Regulatory Compliance Documentation

- Gathers information and generates the reports mandated in ASHRAE Guideline 3.

Easy Operation and Maintenance

- Remote monitoring and control
- Displays both current operation conditions and scheduled automated control actions
- Concise reports assist in planning for preventative maintenance and verifying performance
- Alarm notification and diagnostic messages aid in quick and accurate troubleshooting

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 30-120 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).

Building Automation and Chiller Plant Control

The UC800 controller can communicate with Trane Tracer Summit, Tracer SC and Tracer ES building automation systems, which include pre-engineered and flexible control for chiller plants. These building automation systems can control the operation of the complete installation: chillers, pumps, isolating valves, air handlers, and terminal units. Trane can undertake full responsibility for optimized automation and energy management for the entire chiller plant. The main functions are:

- **Chiller sequencing:** equalizes the number of running hours of the chillers. Different control strategies are available depending on the configuration of the installation.
- **Control of the auxiliaries:** includes input/output modules to control the operation of the various auxiliary equipment (water pumps, valves, etc.)
- **Time-of-day scheduling:** allows the end user to define the occupancy period, for example: time of the day, holiday periods and exception schedules.
- **Optimization of the installation start/stop time:** based on the programmed schedule of occupancy and the historical temperature records. Tracer Summit and Tracer SC calculate the optimal start/stop time of the installation to get the best compromise between energy savings and comfort of the occupants.
- **Soft loading:** the soft loading function minimizes the number of chillers that are operated to satisfy a large chilled-water-loop pull down, thus preventing an overshoot of the actual capacity required. Unnecessary starts are avoided and the peak current demand is lowered.
- **Communication capabilities:** local, through a PC workstation keyboard. Tracer Summit and Tracer SC can be programmed to send messages to other local or remote workstations and or a pager in the following cases:
 - Analog parameter exceeding a programmed value
 - Maintenance warning
 - Component failure alarm
 - Critical alarm messages. In this latter case, the message is displayed until the operator acknowledges the receipt of the information. From the remote station it is also possible to access and modify the chiller plants control parameters.
- **Remote communication through a modem:** as an option, a modem can be connected to communicate the plant operation parameters through voice grade phone lines.

A remote terminal is a PC workstation equipped with a modem and software to display the remote plant parameters.

Integrated Comfort System (ICS)

The onboard Tracer chiller controller is designed to be able to communicate with a wide range of building automation systems. In order to take full advantage of chiller's capabilities, incorporate your chiller into a Tracer Summit or Tracer SC building automation system.

But the benefits do not stop at the chiller plant. At Trane, we realize that all the energy used in your cooling system is important. That is why we worked closely with other equipment manufacturers to predict the energy required by the entire system. We used this information to create patented control logic for optimizing HVAC system efficiency.

The building owners challenge is to tie components and applications expertise into a single reliable system that provides maximum comfort, control, and efficiency. Trane Integrated Comfort systems (ICS) are a concept that combines system components, controls, and engineering applications expertise into a single, logical, and efficient system. These advanced controls are fully commissioned and available on every piece of Trane® equipment, from the largest chiller to the smallest VAV box. As a manufacturer, only Trane offers this universe of equipment, controls, and factory installation and verification.



Electrical

Table 3. Electrical data^(a) — 60 Hz — all ambients^(b)

Unit Size	Rated Voltage ^(c)	# Power Conn	# Comp	Comp VFD Input Amps	Fan			Cntrl VA ^(e)	RLA	MCA	MOP
					Qty ^(d)	kw	FLA				
150	380/60/3	1	2	150.5	8	2.05	3.1	894	329	366	500
	400/60/3	1	2	142.9	8	2.05	3.1	894	313	349	450
	460/60/3	1	2	124.3	8	2.05	3.1	894	276	307	400
165	380/60/3	1	2	157.2	10	2.05	3.1	894	348	388	500
	400/60/3	1	2	149.4	10	2.05	3.1	894	333	370	500
	460/60/3	1	2	129.9	10	2.05	3.1	894	293	326	450
180	380/60/3	1	2	173.1	10	2.05	3.1	894	380	423	500
	400/60/3	1	2	164.5	10	2.05	3.1	894	363	404	500
	460/60/3	1	2	143	10	2.05	3.1	894	319	355	450
200	380/60/3	1	2	186.1	12	2.05	3.1	894	412	459	600
	400/60/3	1	2	176.8	12	2.05	3.1	894	394	438	600
	460/60/3	1	2	153.7	12	2.05	3.1	894	347	385	500
225	380/60/3	1	2	193.7	12	2.05	3.1	934	428	476	600
	400/60/3	1	2	184	12	2.05	3.1	934	408	454	600
	460/60/3	1	2	160	12	2.05	3.1	934	360	400	500
250	380/60/3	1	2	224.7	12	2.05	3.1	934	490	546	700
	400/60/3	1	2	213.4	12	2.05	3.1	934	467	520	700
	460/60/3	1	2	185.6	12	2.05	3.1	934	411	457	600
275	380/60/3	1	2	240.9	14	2.05	3.1	934	528	588	800
	400/60/3	1	2	228.9	14	2.05	3.1	934	504	561	700
	460/60/3	1	2	199.0	14	2.05	3.1	934	444	494	600
300	380/60/3	1	2	259.7	16	2.05	3.1	934	572	637	800
	400/60/3	1	2	246.7	16	2.05	3.1	934	546	608	800
	460/60/3	1	2	214.5	16	2.05	3.1	934	481	535	700

(a) Local codes may take precedence.

(b) Includes standard, low, high and wide ambients.

(c) Voltage Utilization Range: 380/60/3 (342-418), 400/60/3 (360-440), 460/60/3 (414-506)

(d) Number of fans is evenly distributed between the two chiller circuits.

(e) Control VA includes operational controls only. It does not include evaporator heaters. A separate 115/60/1, 15 amp customer provided power connection is required to power the evaporator heaters (150T-165T; 800 watts, 180T-300T; 1200 watts).

Table 4. Electrical data^(a) — 50Hz — all ambients^(b)

Unit Size	Rated Voltage ^(c)	# Power Conn	# Comp	Comp VFD Input Amps	Fan			Cntrl VA ^(e)	RLA	MCA	MOP
					Qty ^(d)	kw	FLA				
150	400/50/3	1	2	142.9	8	2.05	3.1	894			
165	400/50/3	1	2	149.4	10	2.05	3.1	894	330	370	500
180	400/50/3	1	2	164.5	10	2.05	3.1	894	360	404	500
200	400/50/3	1	2	176.8	12	2.05	3.1	894	391	438	600
225	400/50/3	1	2	184	12	2.05	3.1	934	406	454	600
250	400/50/3	1	2	213.4	12	2.05	3.1	934	464	520	700
275	400/50/3	1	2	228.9	14	2.05	3.1	934	502	561	700
300	400/50/3	1	2	246.7	16	2.05	3.1	934	543	608	800

(a) Local codes may take precedence.

(b) Includes standard, low, high and wide ambients.

(c) Voltage Utilization Range: +/- 10% of Rated voltage (use range): 400/50/3 (360-440)

(d) Number of fans is evenly distributed between the two chiller circuits.

(e) Control VA includes operational controls only. It does not include evaporator heaters. A separate 115/60/1, 15 amp customer provided power connection is required to power the evaporator heaters (150T-165T; 800 watts, 180T-300T; 1200 watts).

Table 5. Customer wire selection^(a) - 60 Hz units

Unit Size	Volt	Terminal Block	Circuit Breaker	Circuit Breaker - High Fault
150	380	(2) 4 AWG - 500MCM	(2) 4/0 AWG - 500MCM	(2) 4/0 AWG - 500MCM
	460	(2) 4 AWG - 500MCM	(2) 4/0 AWG - 500MCM	(2) 4/0 AWG - 500MCM
165	380	(2) 4 AWG - 500MCM	(2) 4/0 AWG - 500MCM	(2) 4/0 AWG - 500MCM
	460	(2) 4 AWG - 500MCM	(2) 4/0 AWG - 500MCM	(2) 4/0 AWG - 500MCM
180	380	(2) 4 AWG - 500MCM	(3) 3/0 AWG - 500MCM	(3) 3/0 AWG - 500MCM
	460	(2) 4 AWG - 500MCM	(2) 4/0 AWG - 500MCM	(2) 4/0 AWG - 500MCM
200	380	(2) 4 AWG - 500MCM	(3) 3/0 AWG - 500MCM	(3) 3/0 AWG - 500MCM
	460	(2) 4 AWG - 500MCM	(2) 4/0 AWG - 500MCM	(2) 4/0 AWG - 500MCM
225	380	(2) 4 AWG - 500MCM	(3) 3/0 AWG - 500MCM	(3) 3/0 AWG - 500MCM
	460	(2) 4 AWG - 500MCM	(3) 3/0 AWG - 500MCM	(3) 3/0 AWG - 500MCM
250	380	(2) 4 AWG - 500MCM	-	(4) 3/0 AWG - 500MCM
	460	(2) 4 AWG - 500MCM	(3) 3/0 AWG - 500MCM	(3) 3/0 AWG - 500MCM
275	380	(2) 4 AWG - 500MCM	-	(4) 3/0 AWG - 500MCM
	460	(2) 4 AWG - 500MCM	(3) 3/0 AWG - 500MCM	(3) 3/0 AWG - 500MCM
300	380	(2) 4 AWG - 500MCM	-	(4) 3/0 AWG - 500MCM
	460	(2) 4 AWG - 500MCM	-	(4) 3/0 AWG - 500MCM

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

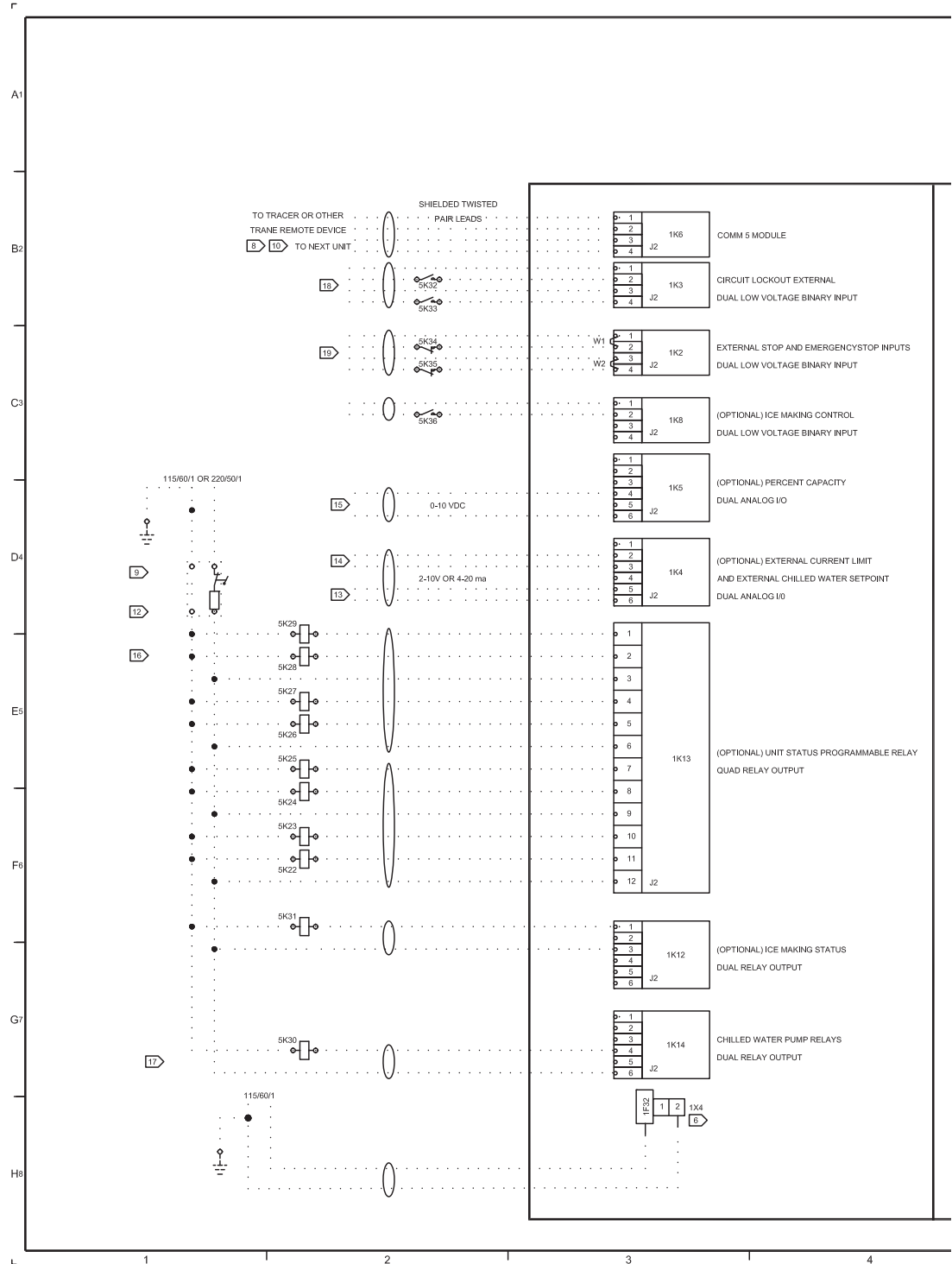
Table 6. Customer wire selection^(a) - 50 Hz units

Unit Size	Volt	Terminal Block	Circuit Breaker	Circuit Breaker - High Fault
150	400	(2) 4 AWG - 500MCM	(2) 4/0 AWG - 500MCM	(2) 4/0 AWG - 500MCM
165	400	(2) 4 AWG - 500MCM	(2) 4/0 AWG - 500MCM	(2) 4/0 AWG - 500MCM
180	400	(2) 4 AWG - 500MCM	(3) 3/0 AWG - 500MCM	(3) 3/0 AWG - 500MCM
200	400	(2) 4 AWG - 500MCM	(3) 3/0 AWG - 500MCM	(3) 3/0 AWG - 500MCM
225	400	(2) 4 AWG - 500MCM	(3) 3/0 AWG - 500MCM	(3) 3/0 AWG - 500MCM
250	400	(2) 4 AWG - 500MCM	-	(4) 3/0 AWG - 500MCM
275	400	(2) 4 AWG - 500MCM	-	(4) 3/0 AWG - 500MCM
300	400	(2) 4 AWG - 500MCM	-	(4) 3/0 AWG - 500MCM

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

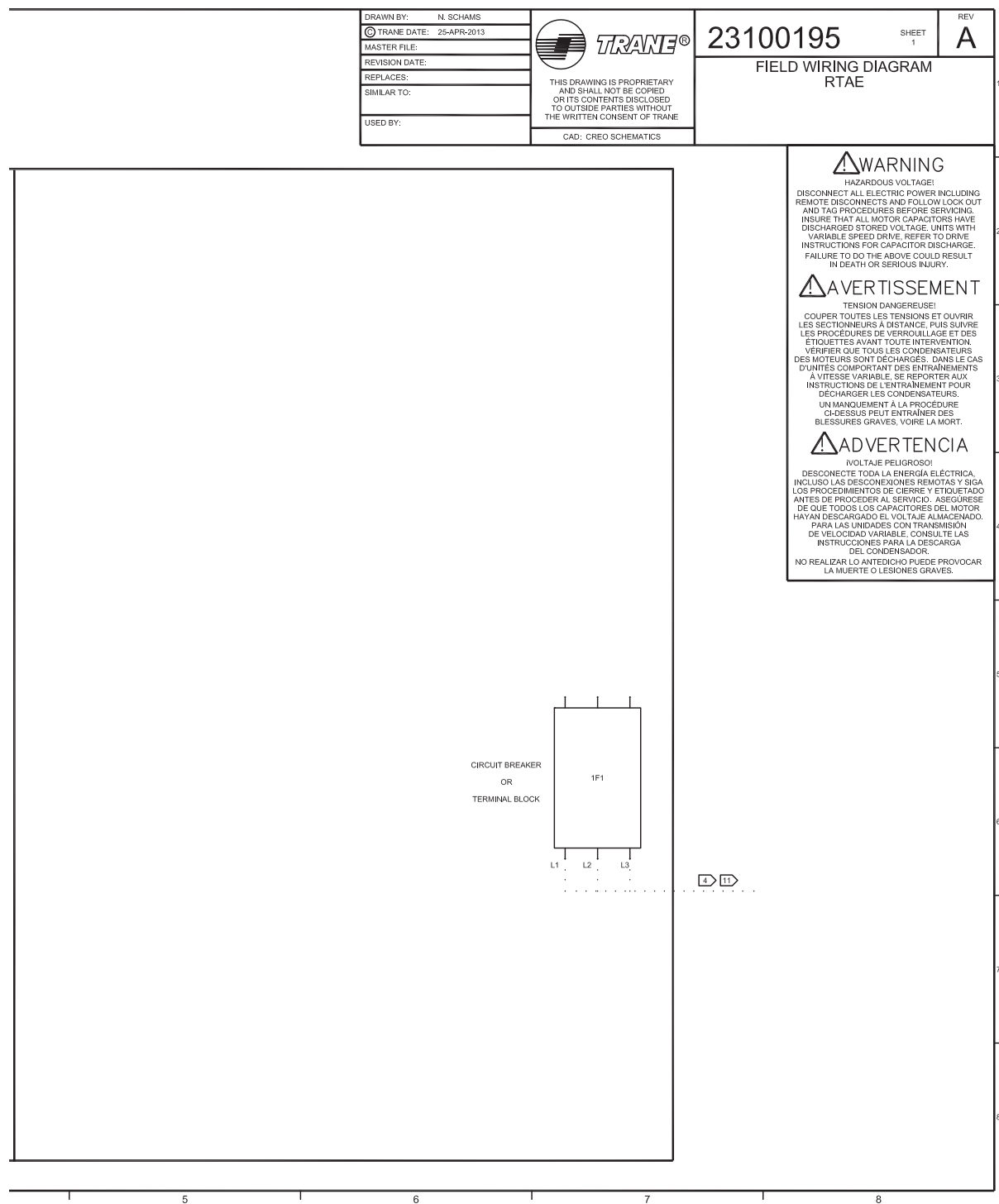
Electrical Connections

Figure 4. Field wiring - sheet 1



Electrical Connections

Figure 5. Field wiring - sheet 1 (continued)




Electrical Connections

Figure 6. Field wiring - sheet 2

A1	<p>GENERAL NOTES</p> <p>1. CAUTION-DO NOT ENERGIZE THE UNIT UNTIL CHECK OUT AND STARTUP PROCEDURES HAVE BEEN COMPLETED.</p> <p>2. ALL MOTORS ARE PROTECTED FROM PRIMARY SINGLE PHASE FAILURES.</p> <p>4. CAUTION-TRANE PUMP CONTROL MUST BE USED TO PROVIDE PUMP CONTROL. EVAPORATOR CHILLED WATER PUMP MUST BE CONTROLLED BY THE CHILLER OUTPUT. FAILURE TO COMPLY WITH THIS REQUIREMENT MAY RESULT IN DAMAGE OT THE UNIT.</p> <p>6. SINGLE SOURCE POWER IS PROVIDED AS STANDARD ON THESE PRODUCTS, FIELD CONNECTIONS ARE MADE TO 1F1.</p>
B2	<p>WIRING REQUIREMENTS</p> <p>8. RECOMMENDED FIELD WIRING CONNECTIONS ARE SHOWN BY DOTTED LINES</p> <p>9. POWER FOR THE EVAPORATOR HEATER AND/OR OPTIONAL CONVENIENCE OUTLET IS SUPPLIED BY A COMMON CUSTOMER PROVIDED POWER SUPPLY. MAX FUSE SIZE IS 30 AMPS. WHEN POWERED, THE HEATERS WILL USE 800VA ON 150-165 TON UNITS AND 1200VA ON 180-300 TON UNITS OF THE TOTAL AVAILABLE SUPPLY.</p> <p>11. DO NOT RUN LOW VOLTAGE CONTROL WIRING (30 VOLTS OR LESS) IN CONDUIT WITH 110 VOLT OR HIGHER WIRING. DO NOT EXCEED THE FOLLOWING MAXIMUM RUN LENGTHS FOR A GIVEN SIZE: 14 AWG, 5000 FT; 16 AWG, 2000 FT; 18 AWG, 1000F.</p>
C3	<p>12. SHIELDED TWISTED PAIR LEADS ARE REQUIRED FOR CONNECTIONS TO THE COMMUNICATIONS INTERFACE MODULE (1K6). THE SHIELD SHOULD BE GROUNDED AT THE RTAE CONTROL PANEL END.</p> <p>13. CUSTOMER SUPPLIED POWER 115/60/1PH OR 220/50/1PH TO POWER RELAYS. MAX. FUSE SIZE IS 20 AMPS. GROUND ALL CUSTOMER SUPPLIED POWER SUPPLIES AS REQUIRED BY APPLICABLE CODES. GREEN GROUND SCREWS ARE PROVIDED IN UNIT CONTROL PANEL.</p> <p>16. WIRED TO NEXT UNIT. 22 AWG SHIELDED COMMUNICATION WIRE EQUIVALENT TO HELIX LF22P0014216 RECOMMENDED. THE SUM TOTAL OF ALL INTERCONNECTED CABLE SEGMENTS NOT TO EXCEED 4500 FEET. CONNECTION TOPOLOGY SHOULD BE DAISY CHAIN. REFER TO BUILDING AUTOMATION SYSTEM (BAS) COMMUNICATION INSTALLATION LITERATURE FOR END OF LINE TERMINATION RESISTOR REQUIREMENTS.</p>
D4	<p>18. ALL UNIT POWER WIRING MUST BE 600 VOLT COPPER CONDUCTORS ONLY AND HAVE A MINIMUM TEMPERATURE INSULATION RATING OF 90 DEGREE C.</p> <p>19. REFER TO UNIT NAMEPLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION DEVICE. PROVIDE AN EQUIPMENT GROUND IN ACCORDANCE WITH APPLICABLE ELECTRIC CODES. REFER TO WIRERANGE TABLE FOR LUG SIZES.</p> <p>ALL FIELD WIRING MUST BE IN ACCORDANCE WITH NATIONAL ELECTRIC CODE AND LOCAL REQUIREMENTS.</p>
	<p>CONTACT RATINGS AND REQUIREMENTS</p> <p>WIRED TO CUSTOMER CHILLED WATER SET POINT 2-10 VDC OR 4-20 mA.</p> <p>WIRED TO CUSTOMER CURRENT LIMIT SET POINT 2-10 VDC OR 4-20 mA.</p>
E6	<p>WIRED TO CUSTOMER COMPRESSOR % RLA OUTPUT 2-10 VDC OR 4-20 mA.</p> <p>ALL CUSTOMER CONTROL CIRCUIT WIRING MUST BE COPPER CONDUCTORS ONLY AND HAVE A MINIMUM INSULATION RATING OF 300 VOLTS. EXCEPT AS NOTED, ALL CUSTOMER WIRING CONNECTIONS ARE MADE TO CIRCUIT BOARD MOUNTED BOX LUGS WITH A WIRE RANGE OF 14 TO 18 AWG OR DIN RAIL MOUNTED SPRING FORCE TERMINALS.</p> <p>UNIT PROVIDED DRY CONTACTS FOR THE CONDENSER/CHILLED WATER PUMP CONTROL. RELAYS ARE RATED FOR 7.2 AMPS RESISTIVE, 2.88 AMPS PILOT DUTY, OR 1/3 HP, 7.2 FLA AT 120 VOLTS 60 HZ. CONTACTS ARE RATED FOR 5 AMPS GENERAL PURPOSE DUTY 240 VOLTS.</p>
F6	<p>CUSTOMER SUPPLIED CONTACTS FOR ALL LOW VOLTAGE CONNECTIONS MUST BE COMPATABLE WITH DRY CIRCUIT 24 VOLTS DC FOR A 12 mA RESISTIVE LOAD. SILVER OR GOLD PLATED CONTACTS RECOMMENDED.</p> <p>THE CONTACTS FOR AUTO STOP AND EMERGENCY STOP SWITCHES ARE JUMPERED AT THE FACTORY BY JUMPERS 1W1 & 1W2 TO ENABLE UNIT OPERATION. IF REMOTE CONTROL IS DESIRED, REMOVED THE JUMPERS AND CONNECT TO THE DESIRED CONTROL CIRCUIT.</p>
	<p>20. SOLID OVALS REPRESENT MAX NUMBER OF CONDUITS AND/OR CABLE GLANDS USED.</p>
G7	
H8	
L	<p>1 2 3 4</p>

Figure 7. Field wiring - sheet 2 (continued)

DRAWN BY: N. SCHAMS	 <p>THIS DRAWING IS PROPRIETARY AND SHALL NOT BE COPIED OR ITS CONTENTS DISCLOSED TO OUTSIDE PARTIES WITHOUT THE WRITTEN CONSENT OF TRANE.</p>	23100195	REV
© TRANE DATE: 25-APR-2013			SHEET
MASTER FILE:			2
REVISION DATE:			A
REPLACES:			
SIMILAR TO:		FIELD WIRING DIAGRAM RTAE	
USED BY:	CAD: CREO SCHEMATICS		

REPLACEMENT FUSE SIZES FOR LINE REACTOR UNITS (HRIN-STD)					
FUSE	VOLTAGE	UNIT TONS	CLASS	AMPS	NOTES
1F8	380/400	150-165		250	VFD SEMICONDUCTOR FUSE, TYPE FWH
1F10		180		275	
1F12		200		300	
1F14		225		325	
1F16		250		350	
1F18		275-300		400	
1F8	460	150		200	VFD SEMICONDUCTOR FUSE, TYPE FWH
1F10		165-180		225	
1F12		200-225		200	
1F14		250		300	
1F16		275		325	
1F18		300		350	
1F20	380/400/460	150-180	CC	10	CONDENSER FAN FUSE
1F21					
1F22					
1F23					
1F24					
1F25		200-275		12	
1F26					
1F27					
1F28					
1F29					
1F30		300		15	
1F31					
1F32	380/400/460	150-165	CC	10	EVAPORATOR HEATERS
				25	EVAPORATOR HEATERS AND OPTIONAL CONVENIENCE OUTLET
				15	EVAPORATOR HEATERS
		180-300		30	EVAPORATOR HEATERS AND OPTIONAL CONVENIENCE OUTLET
1F33	380/400	150-300	CC	4	CPT PRIMARY FUSES
1F34					
1F33	460			3	
1F34					
1F35	380/400/460			10	CPT SECONDARY FUSE

REPLACEMENT FUSE SIZES FOR 12-PULSE AUTOTRANSFORMER UNITS (HRIN=LOW)					
FUSE	VOLTAGE	UNIT TONS	CLASS	AMPS	NOTES
1F2	380/400	150-165	J	250	12-PULSE AUTOTRANSFORMER PRIMARY FUSES
1F3		180-200		300	
1F4		225-250		350	
1F5					
1F6		275-300		400	
1F7					
1F2	460	150	J	200	12-PULSE AUTOTRANSFORMER PRIMARY FUSES
1F3		165-180		225	
1F4		200-225		250	
1F5		250		300	
1F6		275		325	
1F7		300		350	
1F8	380/400	150		125	VFD SEMICONDUCTOR FUSE, TYPE FWH
1F9					
1F10		165-180		150	
1F11					
1F12		200		175	
1F13					
1F14		225-250		200	
1F15					
1F16		275		225	
1F17					
1F18		300		250	
1F19					
1F8	460	150-180		125	VFD SEMICONDUCTOR FUSE, TYPE FWH
1F9					
1F10		200-225		150	
1F11					
1F12		250		175	
1F13					
1F14					
1F15					
1F16					
1F17					
1F18					
1F19					
1F32	380/400/460	150-165	CC	10	EVAPORATOR HEATERS
				25	EVAPORATOR HEATERS AND OPTIONAL CONVENIENCE OUTLET
				15	EVAPORATOR HEATERS
		180-300		30	EVAPORATOR HEATERS AND OPTIONAL CONVENIENCE OUTLET
1F33	380/400	150-300	CC	6	CPT PRIMARY FUSES
1F34					
1F33	460			5	
1F34					
1F35	380/400/460			15	CPT SECONDARY FUSE

Dimensions and Weights

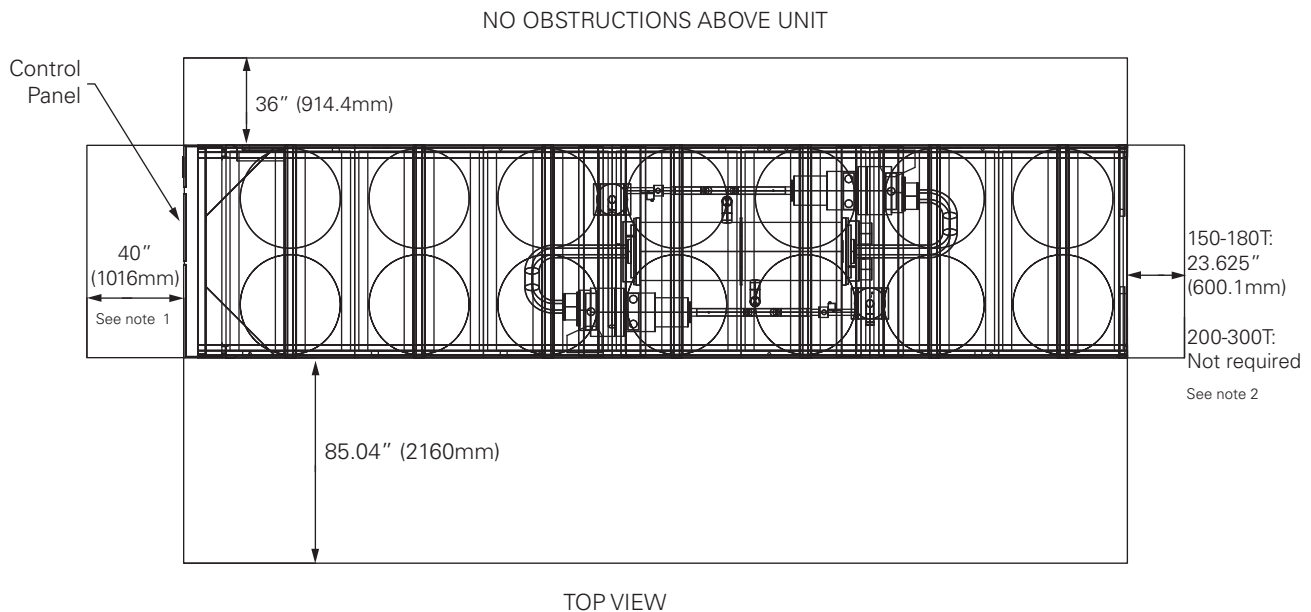
Weights

Table 7. Weights

Unit Size (tons)	Shipping		Operating	
	lbs	kg	lbs	kg
150	9838	4463	9984	4529
165	10723	4864	10880	4935
180	10833	4914	11016	4997
200	11885	5391	12085	5482
225	12765	5790	12987	5891
250	12835	5822	13075	5931
275	13881	6297	14157	6422
300	14387	6526	14688	6662

Service Clearance

Figure 8. RTAE service clearances



NOTES:

1. A full 40" clearance is required in front of the control panel. Must be measured from front of panel, not end of unit base.
2. This dimension is required for tube removal, and is NOT required for 200- 300T units.

Figure 9. 150



Dimensions and Weights

Figure 10. 165-180

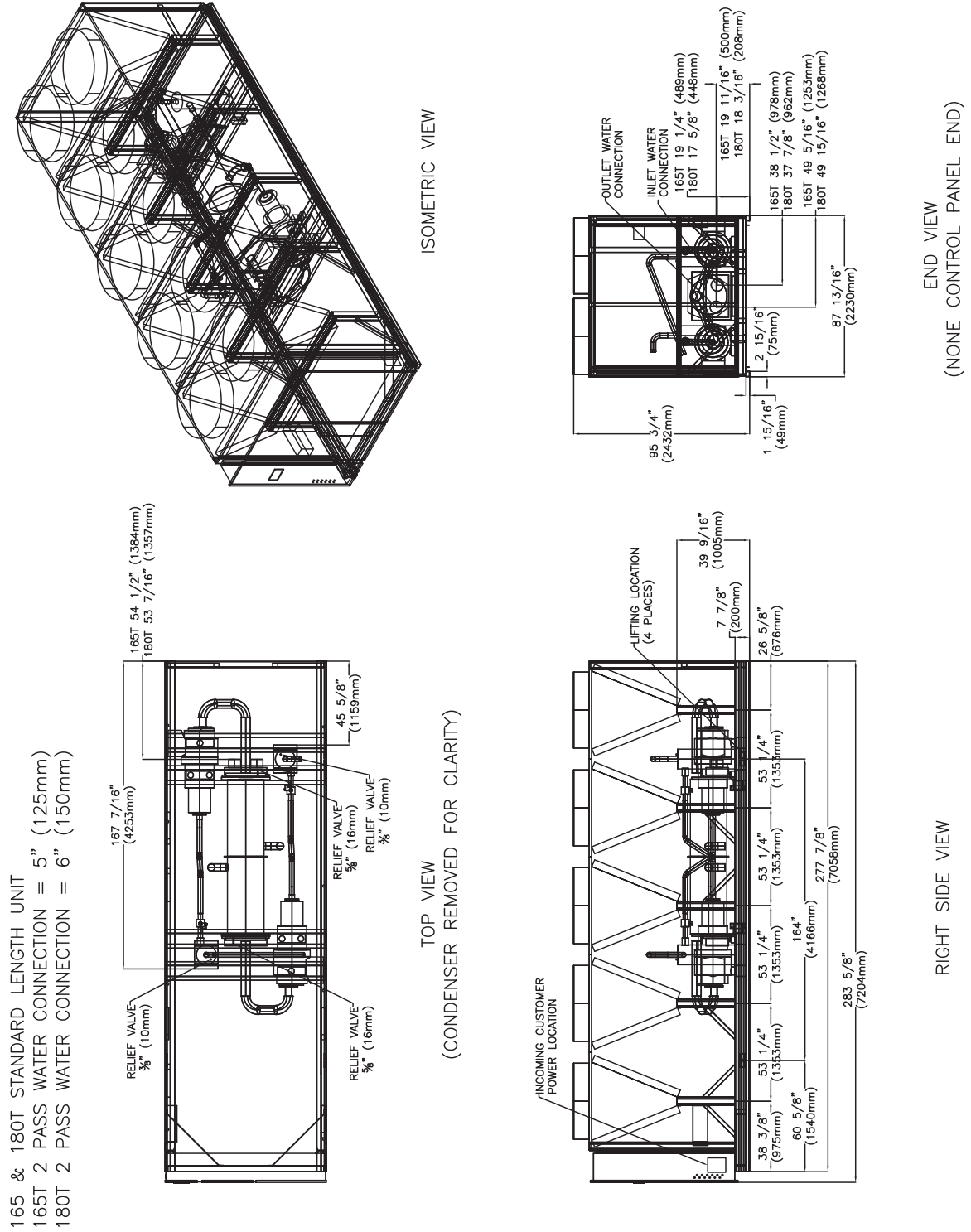
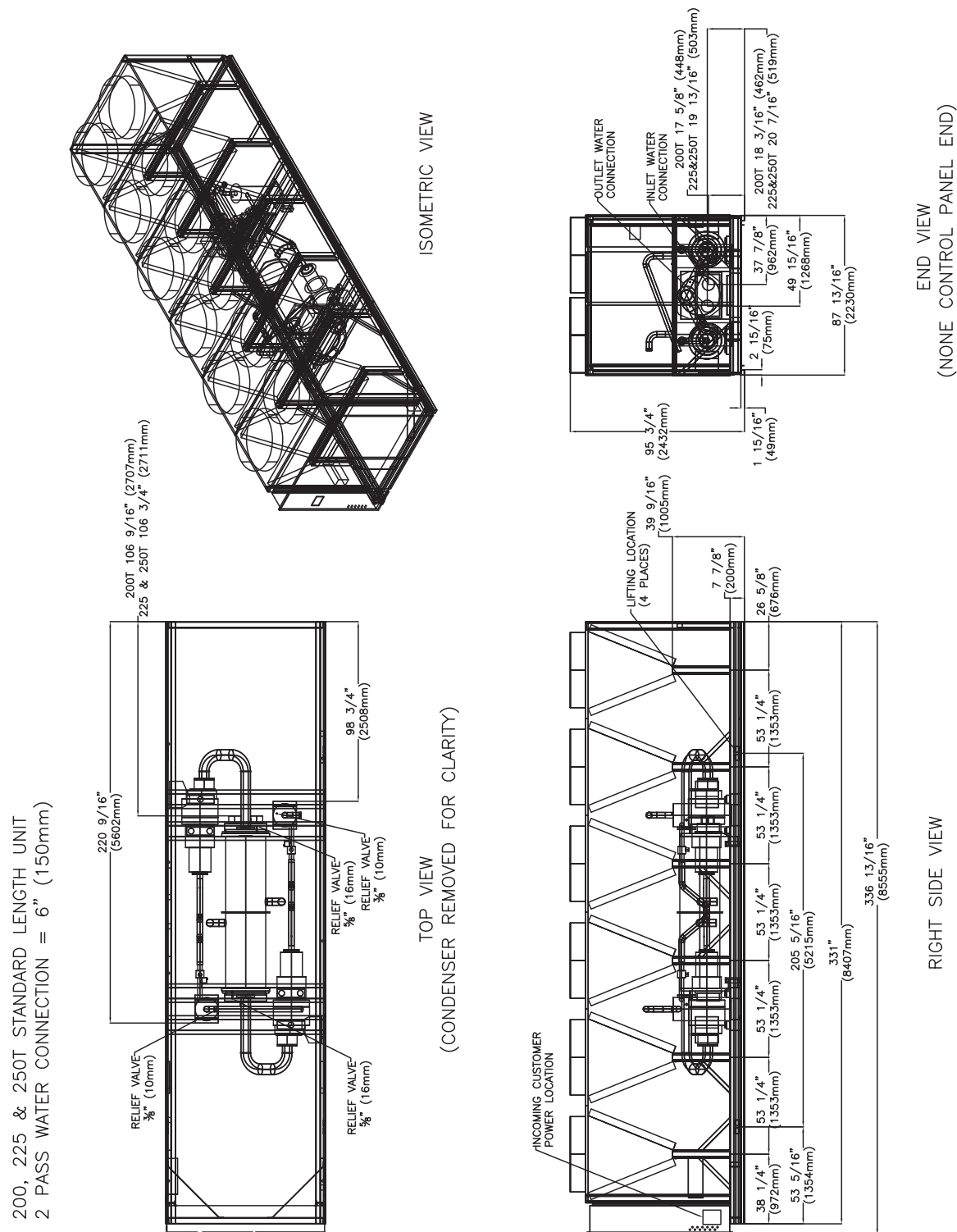


Figure 11. 200-250



Dimensions and Weights

Figure 12. 275

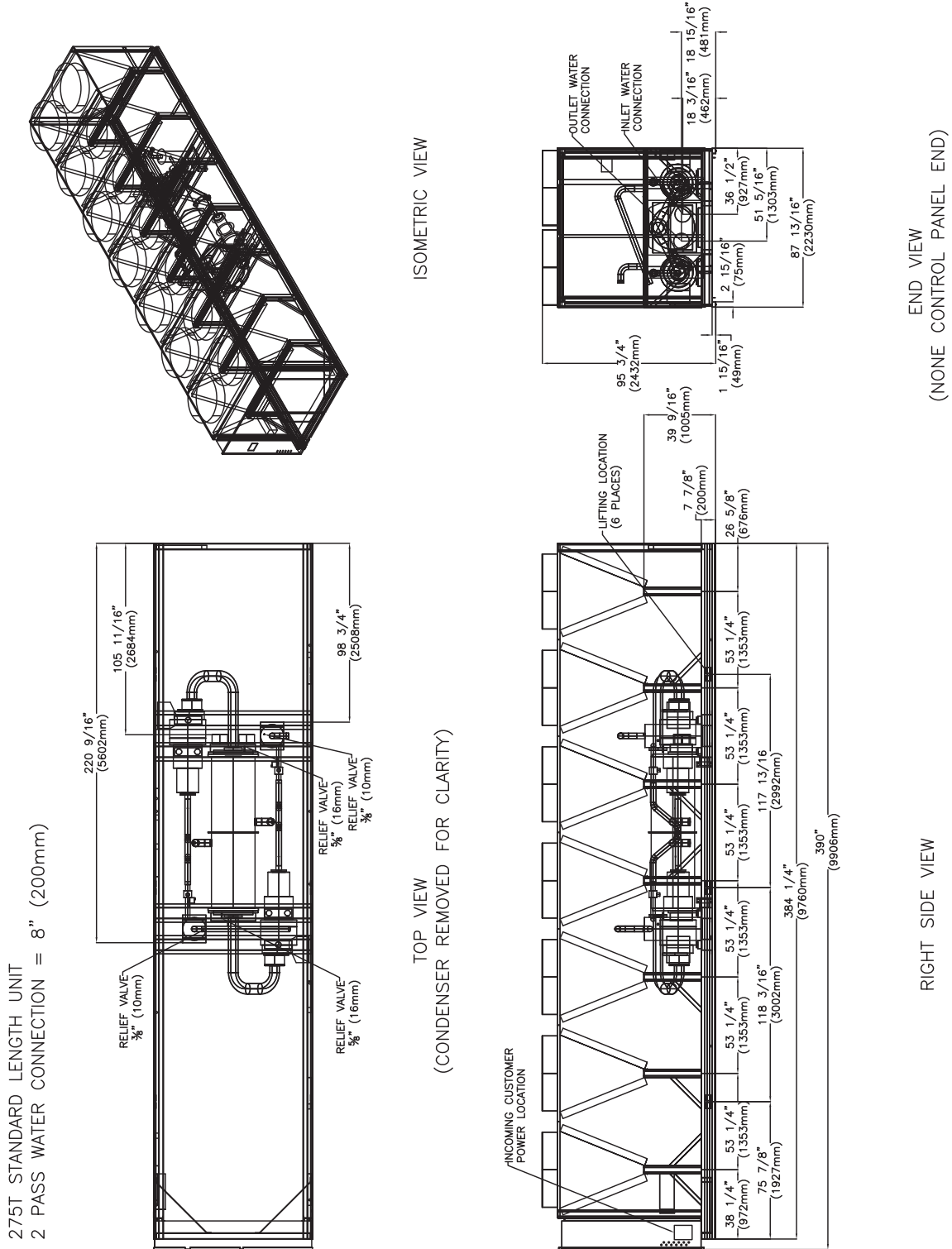
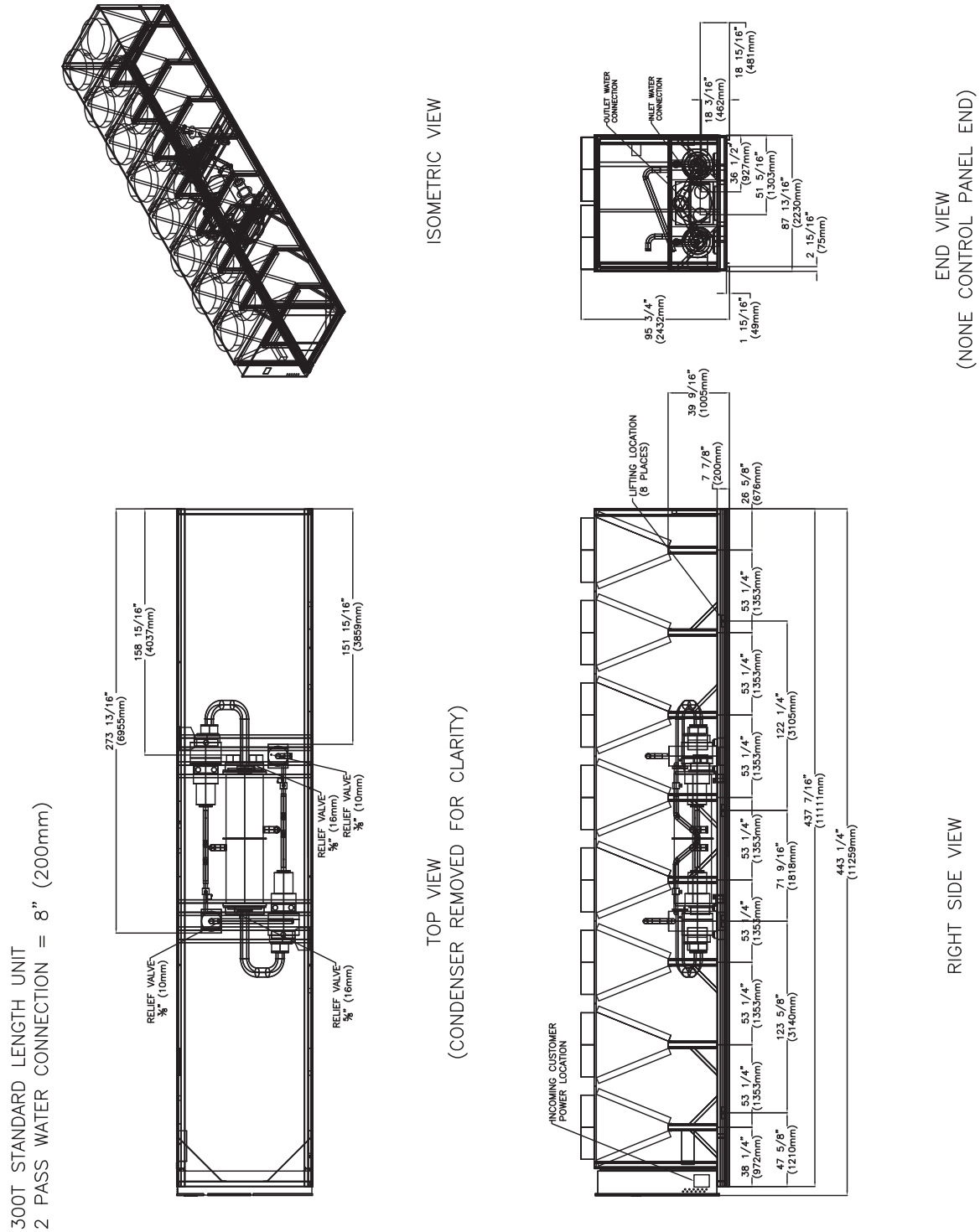
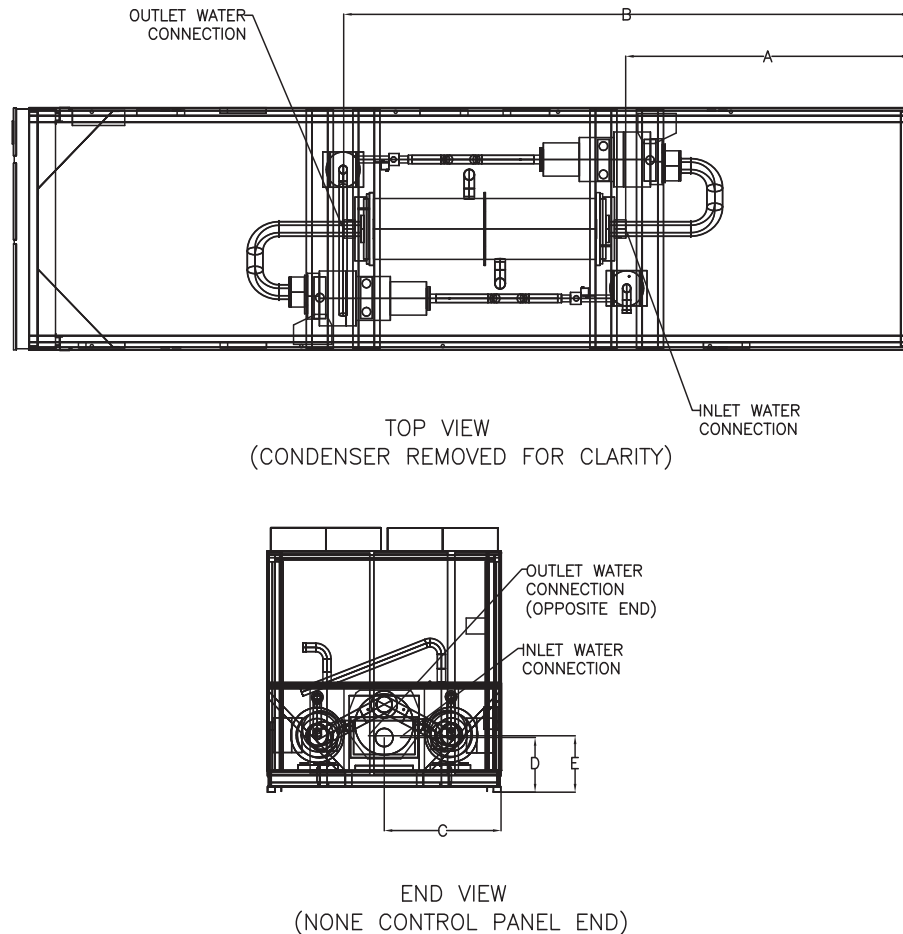


Figure 13. 300



Dimensions and Weights

Figure 14. 3 pass evap^(a)



(a) See Table 8, p. 34 for corresponding dimension values.

Table 8. 3-pass evaporator dimensions^(a)

Dimension		Unit size (tons)					
		150, 165	180	200	225, 250	275	300
A	in	53.25	51.50	104.63	104.81	104.56	157.75
	mm	1353.00	1308.00	2657.00	2662.00	2656.00	4007.00
B	in	159.44	160.38	213.50	213.69	213.63	266.19
	mm	4050.00	4074.00	5423.00	5428.00	5426.00	6761.00
C	in	44.00	44.00	44.00	44.00	44.00	44.00
	mm	1118.00	1118.00	1118.00	1118.00	1118.00	1118.00
D	in	17.69	15.38	15.38	17.56	16.06	16.06
	mm	449.00	391.00	391.00	446.00	408.00	408.00
E	in	20.44	19.56	19.56	21.81	20.56	20.56
	mm	519.00	497.00	497.00	554.00	522.00	522.00
Water Connection	in	4	5	5	5	6	6
	mm	100	125	125	125	150	150

(a) See Figure 14, p. 34 for corresponding unit graphic.

Mechanical Specifications

General

Units are leak and pressure tested at 390 psig high side, 250 psig low side, then evacuated and charged. All Air-Cooled Series R™ RTAE Chillers are factory tested prior to shipment. Packaged units ship with a full operating charge of oil and refrigerant as standard. Units can also be shipped with a nitrogen charge if required. Unit panels, structural elements and control boxes are constructed of galvanized steel and mounted on a bolted galvanized steel base. Unit panels, control boxes and the structural base are finished with a baked on powder paint. All paint meets the requirement for outdoor equipment of the US Navy and other federal government agencies.

Refrigeration Circuits

Each unit has two refrigerant circuits, with one rotary screw compressor per circuit. Each refrigerant circuit includes a compressor suction and discharge service valve, liquid line shutoff valve, removable core filter, liquid line sight glass with moisture indicator, charging port and an electronic expansion valve. Fully modulating compressors and electronic expansion valves provide variable capacity modulation over the entire operating range.

Evaporator

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

Condenser and Fans

Air-cooled condenser coils have aluminum fins mechanically bonded to internally finned seamless aluminum tubing. The tubing is a long life alloy designed to deliver corrosion performance that meets or exceeds microchannel coils. The condenser coil has an integral subcooling circuit. Condensers are factory proof tested at 525 psig and leak tested with helium in a mass spectrometer chamber at 150 psig. All tube connections are mechanical except the brazed copper to aluminum inlet and outlet connections. Condenser fans are direct-drive vertical discharge. The condenser fan motors are permanent magnet motors with integrated drive to provide variable speed fan control for all fans and are designed with permanently lubricated ball bearings, internal temperature and current overload protection, and customer fault feedback as a standard product offering. The fan impeller is a nine bladed-shrouded fan made from heavy-duty molded plastic. Standard units will start and operate between 25 to 105°F (-4 to 40°C) ambient.

Compressor and Lube Oil System

The rotary screw compressor is semi-hermetic, direct drive with capacity control via a variable speed drive, rolling element bearings, differential refrigerant pressure oil flow and oil heater. The motor is a suction gas cooled, hermetically sealed, permanent magnet motor. An oil separator is provided separate from the compressor. Oil filtration is provided internal to the compressor. Check valves in the compressor discharge and lube oil system are also provided.

Mechanical Specifications

Drive Cooling System

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

TD7 Display

- Outdoor capable:
 - UV Resistant Touchscreen
 - -40C to 70C Operating Temperature
 - IP56 rated (Power Jets of Water from all directions)
- RoHS Compliant
- UL 916 Listed
- CE Certification
- Emissions: EN55011 (Class B)
- Immunity: EN61000 (Industrial)
- Display:
 - 7" diagonal
 - 800x480 pixels
 - TFT LCD @ 600 nits brightness
 - 16 bit color graphic display
- Display Features:
 - Alarms
 - Reports
 - Chiller Settings
 - Display Settings
 - Graphing
 - Global Application
 - Support for 26 Languages

Unit Controls

All unit controls are housed in an outdoor rated weather tight 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 startup and shut down, 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.

The UC-800 unit control module, utilizing Adaptive Control™ microprocessor, automatically takes action to avoid unit shut-down due to abnormal operating conditions associated with low refrigerant pressure, high condensing pressure, AFD/Compressor current overload, low oil return

or low AFD cooling, low discharge superheat, and high compressor discharge temperature. Should the abnormal operating condition continue until a protective limit is violated, the unit will be shut down. Unit protective functions of the UC800, 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.

A full color TD-7 AdaptiView 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.

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

Adaptive Frequency Drive

All RTAE chillers utilize Trane’s Adaptive Frequency™ Drive, 3rd Generation (AFD₃) technology for controlling the compressors. AFD₃ is a family of new generation adaptive frequency drives specifically designed for Trane water chillers. AFD₃ incorporates the Trane communication protocol enabling seamless integration with the unit controller. AFD₃ data such as drive status, temperatures, modes and diagnostic information are accessible to the unit controller and through the TracerTU service tool.

AFD₃ contains technology that enables the drive to last the life time of the chiller and with less down time. The technology enables operation on various power systems including alternative energy sources. AFD₃ will protect itself and the compressor motor from over current, low or high line voltage, phase loss, incoming phase imbalance, and over temperature due to loss of drive cooling or loss of panel ventilation.

AFD₃ incorporates improved serviceability and troubleshooting tools to identify the issue quickly and get the chiller back up and running. All AFD₃ control circuits are powered with class 2 low voltage — separate from main power allowing service on the controls with the panel door open. Additionally, the main electronic control modules can be serviced with the standard Trane screw driver. The AFD₃ further incorporates another Trane service tool to allow for firmware upgrades through TracerTU.

Chilled Water Reset

This provides the control logic and factory installed sensors to reset leaving chilled water temperature. The set point can be reset based on ambient temperature or return evaporator water temperature.

Factory Mounted Flow Proving and Flow Control

The factory installed evaporator water flow switch is provided with the control logic and relays to turn the chilled water flow on and off as the chiller requires for operation and protection. This function is a requirement on the Air-Cooled Series R Chiller.



Options

Applications Options

Ice Making

The ice making option provides special control logic to handle low temperature brine applications (less than 40°F [4.4°C] leaving evaporator temperature) for thermal storage applications.

Low Temperature Brine

The low temperature option provides special control logic to handle low temperature brine applications including part load conditions (less than 40°F [4.4°C] leaving evaporator temperature).

Low Ambient Option

The low ambient options adds unit controls to allow start and operation down to ambient temperatures of 15°F (-9.4°C) when water is present in the evaporator. If there is sufficient glycol in the evaporator to prevent freezing, operation down to ambient temperatures of 0°F (-17.7°C) is acceptable.

High Ambient Option

The high ambient option consists of special control logic, compressor motors, and variable speed drives to permit high ambient (up to 125°F [51°C]) operation. Low side of ambient range remains at 32°F (0°C).

Wide Ambient Option

The low and wide ambient option combines the features of low and high ambient options for an ambient range of 0 to 125°F (-17.7 to 51°C).

Electrical Options

Circuit Breaker

A HACR rated molded case capacity circuit breaker (UL approved) is available. The circuit breaker can also be used to disconnect the chiller from main power with a through the door handle and comes pre-wired from the factory with terminal block power connections. The external operator handle is lockable.

Control Options

BACnet™ Communications Interface

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

LonTalk™ (LCI-C) Communications Interface

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

ModBus™ Communications Interface

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

Remote Input Options

Option permits remote chilled liquid setpoint, remote demand limit setpoint, or both by accepting a 4-20 mA or 2-10 Vdc analog signal.

Remote Output Options

Permits alarm relay outputs, ice making outputs, or both.

Tracer Summit Communication Interface

Interface permits bi-directional communication to the Tracer Summit™, SC, ES system via the BACnet interface above.

Sound Options

InvisiSound™ Standard Unit

Each rotary screw compressor will have a muffler as standard and each condenser fan will be low noise as standard.

InvisiSound Superior Unit

In addition to the sound reducing features on the standard unit, Superior adds insulating sound material to the suction and discharge lines of each refrigerant circuit and reduces the maximum speed of the each condenser fan.

InvisiSound Ultimate Unit

In addition to the sound reducing features on the Superior, the Ultimate unit, adds a flexible, metallic connection at the suction and discharge of each compressor, a pre-formed 'sound box' encapsulating each compressor and reduces the maximum speed of each condenser fan. The fan speed can be set for sound reduction from 100% - 60% of maximum fan speed.

Other Options

Architectural Louvered Panels

Louvered panels cover the complete condensing coil and service area beneath the condenser.

Condenser Corrosion Protection

CompleteCoat™ is available on all size units for corrosion protection. Job site conditions should be matched with the appropriate condenser fin material / coating to inhibit coil corrosion and ensure extended equipment life. The CompleteCoat option provides fully assembled coils with a flexible dip and bake epoxy coating.

Convenience Outlet

Option Provides a 15 amp, 115 volt (60 Hz) convenience outlet on the unit.

Flange Kit

Option provides a raised face flange kit that converts the grooved pipe evaporator water connections to flange connectors.

Insulation for High Humidity

The evaporator is covered with factory-installed 1.25 inch (31.8 mm) Armaflex II or equal (k=0.28) insulation.

Elastomeric Isolators

Isolators provide isolation between chiller and structure to help eliminate vibration transmission. Neoprene isolators are more effective and recommended over spring isolators and are required with the very low noise InvisiSound option.



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