



TRANE®

RTAB 207 - 212 HA

*Design to Perform,
Built to Last*



Features and Benefits

Packaged Air Cooled Helical Rotary Liquid Chiller for High Ambient

- 50 & 60 Hz.
- 55 to 120 Tons.
- R22 refrigerant

Trane 55 through 120-ton air-cooled Rotary chillers are leading the market-place into the 21st century with innovative design features that provide benefits no other chiller can match.

Unequaled Reliability

- Proven rugged Trane Helirotor™ compressor design for longer life and greater dependability.
- Fewer moving parts means less parts to fail. Typical reciprocating compressors have 15 times as many critical parts.
- Dual independent refrigerant circuit design increases overall system reliability.
- Unlike reciprocating compressors, Trane Helirotor compressors can handle liquid slugging.

Optimum Efficiencies

- Unsurpassed full load efficiency (EER)
- Great part-load efficiency due to an electronic expansion valve and Trane Helirotor compressors.
- PID chilled water setpoint control maintains chilled water supply within $\pm 1/2$ °F of setpoint.

Trouble-Free Installation, Start-Up and Operation

- Small operating footprint insures easy retrofit capabilities.
- Factory testing insures trouble-free start-up.
- Factory-installed, fully-tested controls and options keep start-up time and expenses to minimum.
- Adaptive Control™ Microprocessor
 - optimizes efficiencies
 - prevents nuisance trip-outs
 - prevents unnecessary service calls and unhappy tenants
- Superior microprocessor control
 - over 90 diagnostic and operating conditions
 - display chiller temperatures and pressures
 - Trane Integrated Comfort system (ICS) interface

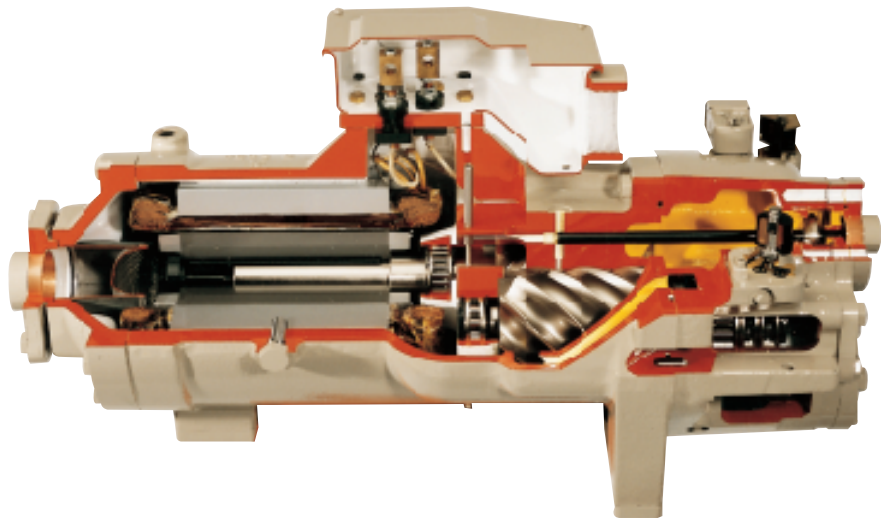


RTAB 210

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Unequaled Reliability



Cutaway of CHHN compressor

Unequaled Reliability

Proven Reliable Design

The air-cooled Rotary chiller utilizes two Trane Helirotor compressors that operate on two refrigeration circuits. The tonnages of these compressors are 35, 40, 50 and 60 ton, and they are grouped together in different configurations to make up the air-cooled product line from 55 to 120 tons.

Trane air-cooled Helirotor compressors were designed, tested and built to the same rugged standards as the CenTraVac chiller compressors. Since the introduction of Trane's Helirotor compressors to air-cooled applications, their reliability has been outstanding. This is proven by the fact that thousands of Rotary compressors have shipped and less than one-half of one percent have failed. The Helirotor compressor design and reliability is outstanding when compared to a typical reciprocating compressor design which historically

has had a failure rate of two to four percent in the first year alone.

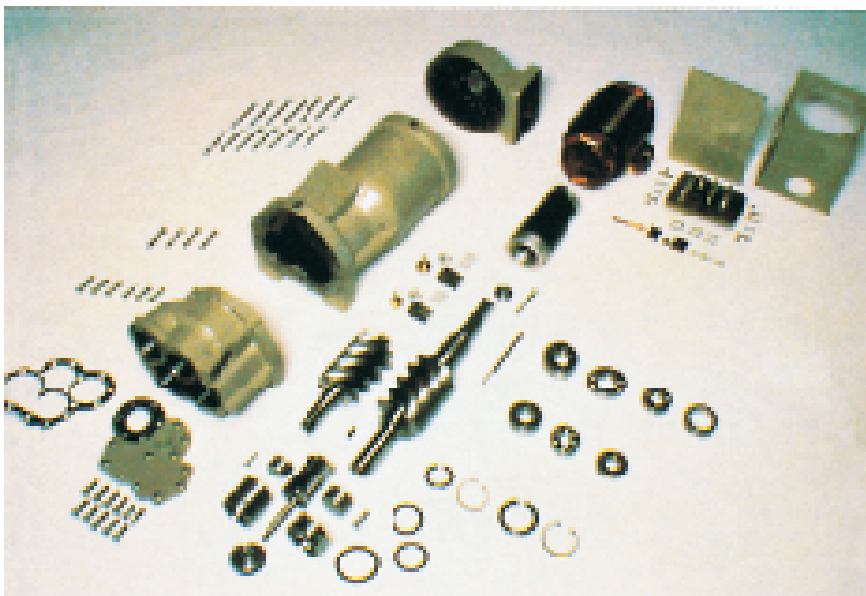
All air-cooled Rotary chillers use the highly reliable Helirotor compressor. Air-cooled Rotary chillers from 55 to 120 tons utilize the CHHN compressor. The capacity control of the TRANE helirotor compressors is achieved by modulation of a loader, unloader mechanism driven by oil pressure actuated piston allowing the compressor to start in an unloaded state for increased reliability. As the load increases or decreases the variable unloader valve modulates the capacity and closely match the required cooling load.

Fewer Moving Parts

CHHN Helirotor compressor has only four moving parts: two rotors assemblies, the variable unloader valve, and the step unloader valve. Unlike reciprocating compressors, the Trane Helirotor compressor has no pistons, connecting rods, suction and discharge valves or mechanical oil pump. In fact, a typical reciprocating compressor has 15 times as many critical parts as the TRANE Helirotor compressor. Fewer moving parts lead to increase reliability and longer life.



Helirotor™ screw compressor parts (above) versus reciprocating compressor components (below)



Rugged design

All potentially fragile components (suction and discharge valves, springs) have been eliminated, the compressors are fitted with class 5 bearings in order to ensure no replacement during the entire life of the compressor. This performance cannot be compared with reciprocating compressors which are fitted with journal bearings which require periodical overhauling to check or replace the bearings.

Unique retour 5/7 lobes profiles

Patented by TRANE : only TRANE provides this specific compressor design. This specific design provides a superior rotor rigidity. The latest evolutions allow in particular an extended capacity control range capability.



Resistance To Liquid Slugging

The robust design of the Rotary compressor can ingest amounts of liquid refrigerant, which in the case of reciprocating compressors would severely damage valves, piston rods and cylinders.

Proven Design Through Testing and Research Test To Failure

It takes a little getting used to, but we MUST fail a lot of compressors in the laboratory so they don't fail in the field. Without failures, there is no way to be certain whether the

final design is conservative or potentially unreliable. The Compressor Accelerated Life Test is proven to induce failure. This test is designed to overstress all parts and quickly identify any weak elements. The test conditions are far more extreme than actual field applications. Our leadership in helical compressor technology is recognized worldwide. It is the basis for the successful introduction of the reliable Trane Helicrotor compressor™ right from the start!

Optimum Efficiencies

Unsurpassed Full Load Efficiency

Precise Rotor Tip Clearances

Higher energy efficiency in a helical rotary compressor is obtained by reducing the rotor tip clearances. This reduces the leakage between high and low pressure cavities during compression. Precise rotor tip clearance is achieved with the latest manufacturing and machining technology. Trane is the first helical rotary compressor manufacturer to electronically check compressor parts machining accuracy as part of the standard production process.

Optimized Compressor Parts Profiles

Rotor and slide valves are unique designs, optimized for the air conditioning application. The rotors are designed for the pressure ranges in the air conditioning application.

Advanced Heat Transfer Surfaces

Condenser and evaporator tubes use the latest heat transfer technology for increased efficiency.

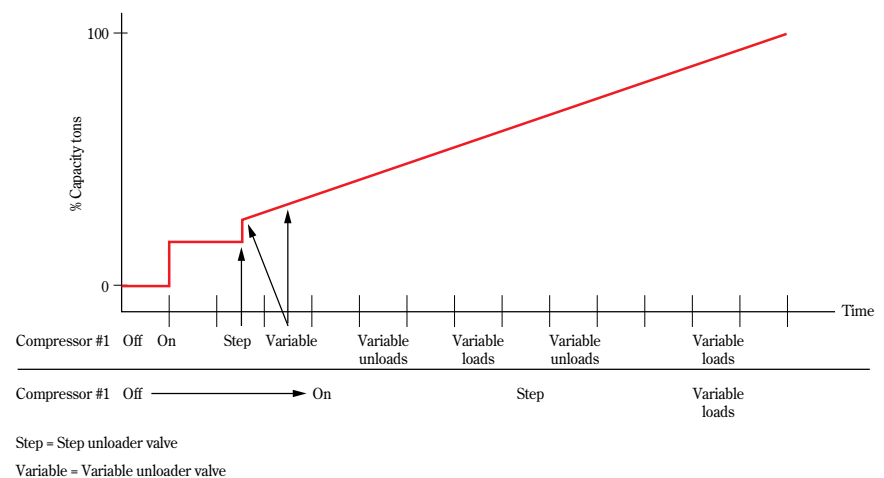
Great Part Load Efficiency With Trane Helicrotor Compressors And Electronic Expansion Valve

Trane Helicrotor Compressor Means Superior Part Load Performance

The combination patented unloading system on the CHHN compressor utilizes the variable unloading valve for the majority of the unloading function.

It also uses a step unloader valve which is a single unloading step to achieve the minimum unloading point of the compressor. The result of both of these designs is optimized part-load performance far superior to single reciprocating compressors.

55-120 Ton RTAB Compressor loading



Electronic Expansion Valve

When coupled with Trane's Adaptive Control™ microprocessor, our electronic expansion valve significantly improves part-load performance of the Rotary chiller by minimizing superheat in the evaporator and allowing the chiller to run at reduced condensing temperatures. Chillers which use conventional TXV's must run at higher head pressures and consume more power than necessary at part-loads. Additionally, the electronic expansion valve and its controls allow much better stability and control over dynamic load and head changes. Under these conditions, a conventional TXV may never achieve control stability.

Capacity Control and Load Matching

Infinitely variable compressor modulation allows the compressor capacity to exactly match the building

cooling load. Reciprocating chillers that rely on step capacity control must run at a capacity equal to or greater than the load. Much of this excess capacity is lost because over-cooling goes toward building latent heat removal, causing the building to be dried beyond normal comfort requirements. The result is an increase in chiller energy costs, particularly at the part-load conditions at which the chiller operates most of the time.

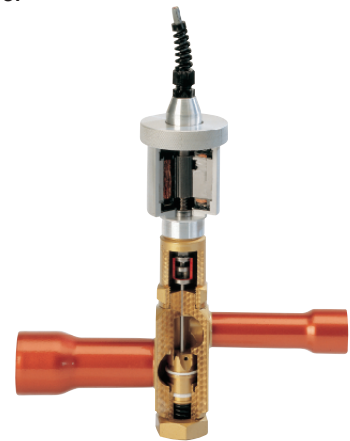
PID Chilled Water Setpoint Control Through Slide Valve Modulation

Maintain Chilled Water Supply Temperature Within $\pm 1/2$ °F of Setpoint

Reciprocating chillers that have step capacity control can typically maintain water temperature to approximately ± 2 °F.

Reduce Compressor Cycling

Modulating capacity control offers better compressor reliability. Compressor cycling, typical of reciprocating compressors, will decrease compressor components life.



Cutaway view of Trane's electronic expansion valve.

Trouble-Free Installation, Start-Up and Operation

Adaptive Control™ Microprocessor

The air-cooled Rotary chiller employs Adaptive Control Microprocessor. This is the most advanced microprocessor control available on any packaged water chiller in the marketplace. So what is the Adaptive Control microprocessor? Adaptive Control means the Unit Control Module (UCM) directly senses the control variables that govern operation of the chiller: motor current draw, evaporator temperature, condenser temperature, etc. If any of the variables approaches a limit condition where the unit may be shut down on a safety, the UCM takes corrective action to avoid shutdown and keep the chiller operating. It does this through combined actions of compressor slide valve modulation, electronic expansion valve modulation and fan staging. Additionally, the UCM optimizes total unit power consumption during normal operating conditions. No other chiller control system in the marketplace offers this performance.

Improved chiller and motor protection

The control system integrates all the necessary functions to ensure safe operation of the chiller in all applications and duty conditions:

- System safeties, such as oil, water, refrigerant pressure and temperature faults.
- Motor safeties. By monitoring the motor current on each of the 3 phases, the control system ensures protection against :
 - Overload at start-up and in operation.
 - Phase loss/Power loss.
 - Phase unbalance or reversal.
 - Over/Undervoltage.
 - Welded contactors.

If a fault occurs, one message will be displayed directly on the control module.

The End Of Nuisance Trip-Outs And Unnecessary Service Calls?

Unnecessary service calls are avoided. The unit does not trip in nuisance or unnecessarily shuts down. Only when the UCM has exhausted all the corrective actions it can take and if the unit is still violating an operating limit, the UCM will shut down the unit.

Controls on other chillers will typically shut down the chiller, when chilled water is mostly needed.

For example:

A typical five-year-old chiller with dirty coils might trip-out on high pressure cutout on a hot day in August. A hot day is just when comfort cooling is needed the most. In contrast, the air-cooled Rotary chiller with an Adaptive Control microprocessor will stage fans on, modulate electronic expansion valve, and modulate slide valve as the chiller approaches a high pressure situation. Thereby **keeping the chiller on-line** just when you need it the most.



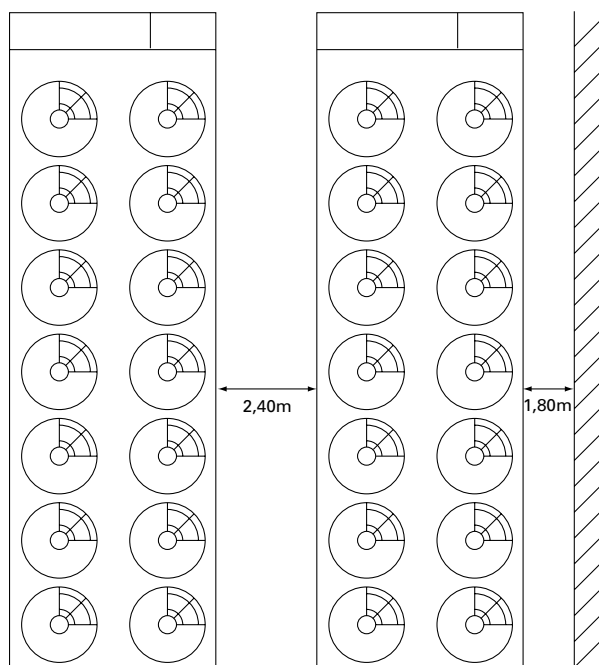
Unit mounted clear language display (UCM).

Close Spacing Of Chiller

The air-cooled Rotary chiller has the tightest recommended side clearances in the industry, 1.8 meters, but that is not all. In situations where equipment must be installed with less clearance than recommended, such as frequently occurs in retrofit and rooftop applications, restricted air flow is common. Conventional chillers may not work at all. However, the air-cooled Rotary chiller with its Adaptive Control microprocessor will simply make as much chilled water as possible given the actual conditions. It will stay on line during any unforeseen abnormal conditions and optimize its performance. Consult your Trane sales engineer for more details.

Lower Service Expense

Nuisance service calls are avoided. When there is a real problem that must be corrected, the UCM's extensive diagnostics help to assure that the problem is quickly identified. Down time and service expense are minimized. And with the ability to communicate with the Trane Integrated Comfort system or a remote display panel, service



problems can be identified and diagnosed remotely from the chiller.

Factory Testing Means Trouble-Free Start-Up

All air-cooled Rotary chillers are given a complete functional test at the

factory. This is over and above the unit individual components tests done prior final assembly of the machine. All the units are fully performance runtested before shipment to verify capacity and power drawn under full load conditions.

Superior Control

Unit Control Module

Trane's new Adaptive Control microprocessor control system enhances the air-cooled Rotary chiller by providing the very latest chiller control technology.

State-of-the-Art Equipment

The new 55 to 120 air-cooled chillers offer the exclusive Trane Adaptive Control logic with the Clear Language Display (UCM). The Clear Language Display has various functions that allow the operator to read unit information and adjust setpoints. The Clear Language Display panel has 16 keys. The readout screen is a two-line, 40 character liquid crystal with a backlight. The backlight allows the operator to read the display in low-light conditions.

Unit Control Module Features

Equal Compressor Sequencing

Trane maximizes both compressor and motor life by equalizing the number of starts and the operating hours. The UCM will start the compressor with the least number of starts and turn off the compressor with the most operating hours. Conventional "auto" lead-lag control will equalize starts, but running hours will typically be unequal. Equalizing starts and running hours will provide equal compressor wear.

Internal "Built-In" Chiller Flow Protection

The UCM automatically detects a no waterflow condition. An external flow switch is not a necessity for the safe operation of the chiller.



Remote Mounted Clear Language Display

Easy Chiller System Logging

The UCM displays data required to log the chiller system. The following information is available either as standard or as an option with the Air-Cooled Rotary Chiller microprocessor:

- Entering and leaving chilled water temperatures
- Ambient air temperature
- Evaporator and condenser refrigerant temperatures and pressures
- Compressor suction temperature
- Percent RLA for each compressor
- Percent line voltage
- Compressor starts and running hours
- Active setpoints:
 - chilled water setpoint
 - current limit setpoint
 - low ambient lockout setpoint
- Over 90 diagnostic and operating conditions
- Part failure diagnostics:
 - water temperature sensors
 - refrigerant temperature sensors
 - compressor contactors

Remote Display Panel

Trane air-cooled Rotary chillers are available with a twisted pair connection to an optional remote display panel. Chiller operation can be controlled similarly to the control interface on the chiller itself. Through a twisted pair of wires the unit can be turned on

or off, change the chilled water setpoint, and display over 90 operating and diagnostic conditions. The remote display panel can be mounted indoors, so, all can be accessed without the need to go to the chillers plant room. Remote clear language display has the ability to control multiple units. In a multiple unit configuration, the Remote Clear Language Display Panel has the capability to communicate with up to four units. Each unit requires a separate communication link with the Remote Display Panel.

Easy Interface To The Building Management System

Interfacing the air-cooled Rotary chiller with building management systems is state-of-the-art, yet simple.

Chiller inputs include:

- Chiller enable/disable
- Circuit enable/disable
- Chilled water setpoint
- Current limit setpoint

Chiller outputs include:

- Compressor running indication
- Alarm indication (CKt 1/CKt2)
- Maximum capacity

Trane Chiller Plant Manager ICS

The Tracer Chiller Plant Manager Building Management System provides building automation and energy management functions through stand-alone control. The Chiller Plant Manager is capable of monitoring and controlling your entire chiller plant system.

Application software available:

- Time-of-day scheduling
- Duty cycle
- Demand limiting
- Chiller sequencing
- Process control language
- Boolean processing
- Zone control
- Reports and logs
- Custom messages
- Run time and maintenance
- Trend log
- Totalizing
- PID control loops

And of course, Trane's Chiller Plant Manager Panel can be used on a stand-alone basis or tied into a complete Building Automation System.

General Data

Table 1 - General Data

RTAB		207		209		210		211		212	
		50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz	50 Hz	60 Hz
Compressor											
Quantity		2	2	2	2	2	2	2	2	2	2
Model	CHHB	350	350	400	400	500/400	500/400	500	500	600	600
Nb of circuits		2	2	2	2	2	2	2	2	2	2
Evaporator											
Model	ES	70	70	70	80	80	100	80	100	100	120
Water capacity	Gallons	38.3	38.3	38.3	35.4	35.4	31.2	35.4	31.2	31.2	28
Min Water Flow	(GPM)	84	84	84	96	96	120	96	120	120	144
Max Water Flow	(GPM)	252	252	252	288	288	360	288	360	360	432
Condenser											
Number of Fans		6	6	6	6	6	6	8	8	8	8
Air Flow	(CFM)	65530	59700	65550	59750	63880	58900	85720	77260	85750	77330
Fan Speed	(RPM)	1390	1110	1390	1110	1390	1110	1390	1110	1390	1110
Fins / Ft		192	192	192	192	192	192	168	168	168	168
N° of Rows		3	3	3	3	4/3	4/3	4	4	4	4
Fan Diameter	(mm)	30	30	30	30	30	30	30	30	30	30
Oil Charge	(Liters)	16	16	16	16	16	16	16	16	16	16
Shipping Weight											
With AL. Cds Fins	(kg)	2445	2445	2445	2465	2495	2520	2855	2880	2880	2905
With CU Cds Fins	(kg)	2725	2725	2725	2745	2795	2820	3265	3290	3290	3315
Operating Weight											
With AL. Cds Fins	(kg)	2590	2590	2590	2600	2630	2640	2990	3000	3000	3010
With CU Cds Fins	(kg)	2870	2870	2870	2880	2930	2940	3400	3410	3410	3420
Dimensions											
Length	(mm)	3335	3335	3335	3335	3335	3335	4217	4217	4217	4217
Width	(mm)	2146	2146	2146	2146	2146	2146	2146	2146	2146	2146
Height	(mm)	2294	2294	2294	2294	2294	2294	2294	2294	2294	2294
Water Connection Diam.											
	(mm)	139.7	139.7	139.7	139.7	139.7	139.7	139.7	139.7	139.7	139.7
Flange type						DN125 PN16					

Note: Data containing information on two circuits shown as follows: Ckt1/Ckt2

Selection procedure

The chiller capacity tables presented on pages 16 to 19 cover the most frequently encountered leaving water temperatures. The tables reflect a 10°F (5,6°C) temperature drop through the evaporator. For temperature drops other than 10°F (5,6°C), refer to Table 2, and apply the appropriate Performance Data Adjustment Factors.

To select a Trane air-cooled Rotary chiller, the following information is required:

1. Design load in tons of refrigeration
2. Design chilled water temperature drop
3. Design leaving chilled water temperature
4. Design ambient temperature

Evaporator flow rates can be determined by using the following formulas:

$$\text{GPM} = \frac{\text{Tons} \times 24}{\text{Temperature Drop (°F)}}$$

OR

$$\text{L/S} = \frac{\text{kW (Capacity)} \times .239}{\text{Temperature Drop (°C)}}$$

NOTE: Flow rates must fall within the limits specified in Tables 1 (for GPM).

Selection Example

Given:

Required System Load = 90 Tons
Leaving Chilled Water Temperature (LCWT) = 45°F

Chilled Water Temperature Drop = 10°F
Design Ambient Temperature = 95°F
Evaporator Fouling Factor = 0.00025

1. From Table 3 (RTAB Performance Data) 50 Hz, RTAB-211 at the given conditions will produce 92 tons with a compressor power input of 92 kW and a unit EER of 9.6

2. To calculate the required chilled water flow rate we use the formula given below:

$$\text{GPM} = \frac{92 \text{ Tons} \times 24}{10^\circ\text{F}} = 220.8 \text{ GPM}$$

3. To determine the evaporator pressure drop we use the flow rate (GPM) and the evaporator water pressure drop curves, page 15. Entering the curve at 220.8 GPM, the pressure drop for a nominal 80 ton evaporator is 13 feet.

4. For selection of applications where the altitude is significantly greater than sea level or the temperature drop is different than 10°F, the performance adjustment factors from Table 2 should be applied at this point.

5. The final unit selection is:

- QTY (1) RTAB 211
- Cooling Capacity = 92 tons
- Entering/Leaving Chilled Water Temperatures = 55/45°F
- Chilled Water Flow Rate = 220.8 GPM
- Evaporator Water Pressure Drop = 13 ft. H₂O
- Compressor Power Input = 92 kW
- Unit EER = 9.6

Minimum Leaving Chilled Water Temperature Setpoint

The minimum leaving chilled water temperature setpoint for water is 40°F. For those applications requiring lower setpoints, a glycol solution must be used. Contact the local Trane sales office for additional information.

Application Consideration

Application Considerations

Certain application constraints should be considered when sizing, selecting and installing Trane air-cooled Rotary chillers. Unit and system reliability are often dependent upon properly and completely complying with these considerations. Where the application varies from the guidelines presented, it should be reviewed with your local Trane sales office.

Unit Sizing

Unit capacities are listed in the performance data section. Intentionally oversizing a unit to assure adequate capacity is not recommended. Erratic system operation and excessive compressor cycling are often a direct result of an oversized chiller. In addition, an oversized unit is usually more expensive to purchase, install, and operate. If oversizing is desired, consider using two units.

Unit Placement

1. Setting The Unit

A base or foundation is not required if the selected unit location is level and strong enough to support the unit operating weight as listed in Table 15.

2. Isolation and Sound Emission

The most effective form of isolation is to locate the unit away from any sound-sensitive area. Structurally transmitted sound can be reduced by ELASTOMERIC vibration eliminators. Spring isolators have proven to be of little additional benefit when compared to ELASTOMERIC vibration eliminators. An acoustical engineer should always be consulted in critical sound applications. For maximum isolation effect, water lines and electrical conduit should also be isolated. Wall sleeves and rubber isolated pipes hangers can be used to reduce the sound transmitted through water piping. To reduce the sound transmitted through electrical conduit, use flexible electrical conduit.

State and local codes on sound emissions should always be considered. Since the environment in which a sound source is located affects sound pressure, unit placement must be carefully evaluated. Sound power levels for Trane air-cooled Rotary chillers are available on request.

3. Servicing

Adequate clearance for evaporator 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 swing and routine maintenance requirements. Local code requirements may take precedence.

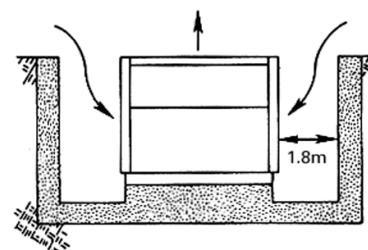
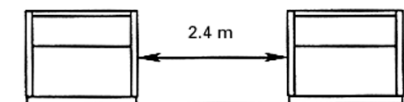
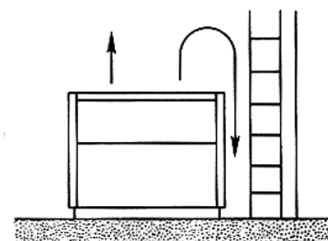
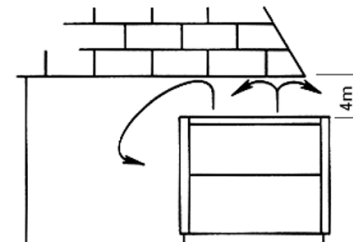
4. Unit Location

a. 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 if optimum performance is to be achieved: warm air recirculation and coil starvation. Warm air recirculation occurs when discharge air from the condenser fans is recycled back to the condenser coil inlet. Coil starvation occurs when free air-flow to the condenser is restricted. Both warm air recirculation and coil starvation cause reductions in unit efficiency and capacity because of the associated higher head pressures. The air-cooled Rotary chiller offers an advantage over competitive equipment in these situations. Performance is minimally affected in many restricted air flow situations due to its unique condensing coil geometry. Also, through its advanced Adaptive Control microprocessor logic, the chiller will stay on-line where competitive chillers would shut down.

Trane's unique Adaptive Control microprocessor has the ability to understand the operating environment of the chiller and adapt to it by first optimizing its performance and second, staying on line during abnormal conditions. For example, high ambient temperatures combined with a restricted air flow situation will generally not lead the air-cooled Rotary chiller to shut down.

Debris, trash, supplies, etc. should not be allowed to accumulate in the vicinity of the air-cooled Rotary chiller. Supply air movement may draw debris into the condenser coil, blocking spaces between coil fins and causing coil starvation.



b. Provide Vertical Clearance

Vertical condenser air discharge must be unobstructed. While it is difficult to predict the degree of warm air circulation, a unit installed as shown on the left would have its capacity and efficiency significantly reduced. Performance data are based on free air discharge.

c. Provide Lateral Clearance

The condenser coil inlet must not be obstructed. A unit installed closer than the minimum recommended distance to a wall or other vertical riser may experience a combination of coil starvation and warm air recirculation, thus causing reduction in unit capacity and efficiency reductions. Once again, the Adaptive Control microprocessor will allow the chiller to stay on line, producing the maximum available capacity, even at less than recommended lateral clearances. The recommended lateral clearances are shown in the dimensional data section.

d. Provide Sufficient Unit-to-Unit Clearance

Units should be separated from each other by a sufficient distance to prevent warm air recirculation or coil starvation. The air-cooled Rotary chiller has the lowest recommended unit-to-unit clearance in the industry, 2.4 meters. Consult the local Trane sales office for applications concerning closer spacings and restricted airflows situations.

e. Walled Enclosure Installations

When the unit is placed in an enclosure or small depression, the top of the fans should be no lower than the top of the enclosure or depression. If they are, consideration should be given to ducting the top of the unit. Such applications should always be reviewed with the local Trane sales office.

Water Treatment

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

Neither salt nor brackish water is recommended for use in Trane air-cooled Rotary chillers. The Trane Company encourages the employment of a reputable water treatment specialist, familiar with local water conditions, to assist in establishing the proper water treatment program. The capacities given in the performance data section of this catalog are based on water with a fouling factor of .00025. For capacities at other fouling factors, see adjustment factors in Table 2.

Effect Of Altitude On Capacity

Air-cooled Rotary chiller capacities given in the performance data tables, (Tables 3 through 6), are at sea level. For elevations substantially higher than sea level, the decreased air density will decrease condenser capacity and, therefore, unit capacity and efficiency. The adjustment factors in Table 2 can be applied directly to the catalog performance data to determine the unit's adjusted performance.

Ambient Limitations

Trane air-cooled Rotary chillers are designed for year-round applications in ambients from 32 °F to 125 °F. The minimum ambient temperatures are based on still weather 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. Once again, the Adaptive Control microprocessor will 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.

Waterflow Limits

The minimum waterflow rates are given in Tables 1. Evaporator flow rates below the tabulated values will result in laminar flow causing freeze-up problems, scaling, stratification and poor control. The maximum evaporator waterflow rate is also given in the general data section. Flow rates exceeding those listed may result in excessive tube erosion.

The evaporator can handle variable flow down to 50 Pct as long as flow is equal or above the minimum requirement.

Temperature Limits

1. Leaving Water Temperature Range

Trane air-cooled Rotary chillers have a standard leaving water temperature range of 40 to 65 °F. The maximum water temperature that can be circulated through an evaporator when the unit is not operating is 108 deg. F. The evaporator reaches its thermal stress limit at this temperature.

2. Supply Water Temperature Drop

The performance data for the Trane air-cooled Rotary chiller are based on a chilled water temperature drop of 10°F. Temperature drops outside this range will result in unit performance that differs from that cataloged. For performance data outside the 10°F range, see Table 2 for adjustment factors. Chilled water temperature drops from 6 to 16°F may be used as long as minimum and maximum leaving water temperature and minimum and maximum flow rates are not violated.

Temperature drops outside the 6 to 16°F range are beyond the optimum range for control and may adversely affect the microcomputer's ability to maintain an acceptable supply water temperature.

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 installed. Expansion tanks are also usually required so that chilled water volume changes can be accommodated. A typical piping arrangement is shown in Figure A-1.

Short Water Loops

The proper location of the temperature control sensor is in the supply (outlet) water. This location allows the building to act as a buffer and assures a slowly changing return water temperature. If there is not a sufficient volume of water in the system to provide an adequate buffer, temperature control can be lost, resulting in erratic system operation. A short water loop (less than two gallons/nominal ton) has the same effect as attempting to control from the building return water.

To prevent the effect of a short water loop, the following items should be given careful consideration: A storage tank or larger header pipe to increase the volume of water in the system and, therefore, reduce the rate of change of the return water temperature.

Multiple Unit Operation

Whenever two or more units are used on one chilled water loop, Trane recommends that their operation be controlled from a single control device, such as a Trane Chiller Plant Manager.

1. Series Operation

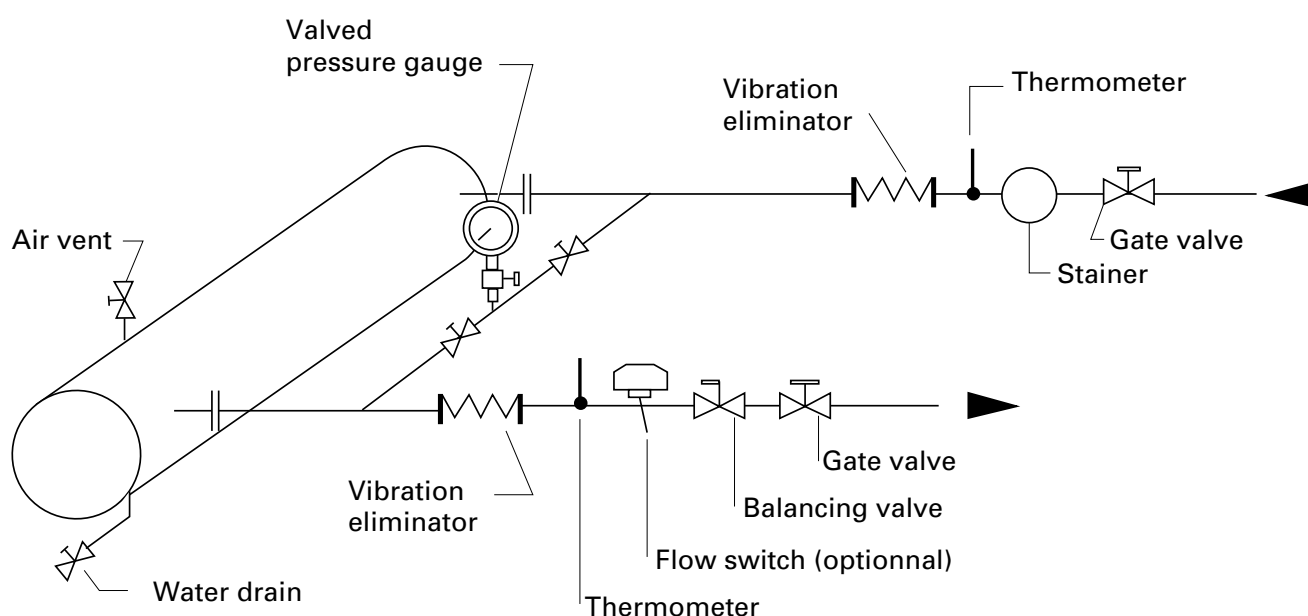
Some systems require large chilled water temperature drops (16 to 24°F). For those installations, two units with their evaporators in series are usually required. Control of the units should be from a common temperature controller to prevent the separate thermostats fighting one another and continually hunting. It is

possible to control from the two individual unit controls, but a common temperature controller provides a positive method for preventing control overlap, more closely matches system load, and simplifies compressor lead-lag capability.

2. Parallel Operation

Some systems require more capacity or standby capability than a single machine can provide. For those installations, two units with their evaporators in a parallel configuration are typical. The only effective way of controlling two units in parallel is with a single temperature controller. Two individual temperature controllers are not capable of providing reliable system control and will often result in unsatisfactory operation.

Figure A-1 Recommended Piping Components For Typical Evaporator Installation



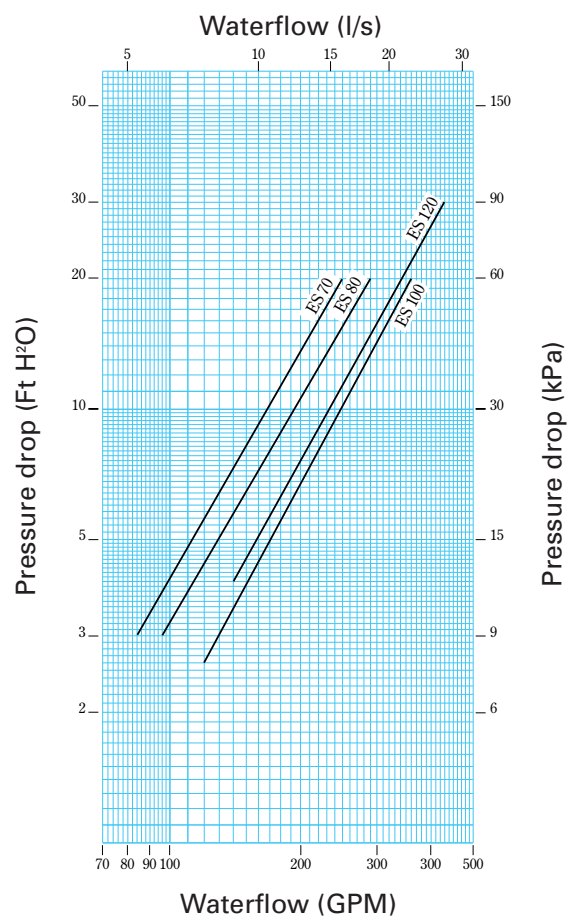
Performance Adjustment Factors

Table 2 - Performance Data Adjustment Factors

Fouling Factor	Chilled Water	Altitude							
	ΔT (°F/°C)	SEA LEVEL		2000 FT (610 m)		4000 FT (1220 m)		6000 FT (1830 m)	
		CAP	kW	CAP	kW	CAP	kW	CAP	kW
0.00025 (0.044)	6 (3.3)	0.987	0.993	0.967	1.003	0.952	1.019	0.932	1.029
	8 (4.4)	0.993	0.997	0.973	1.007	0.956	1.025	0.935	1.035
	10 (5.6)	1.000	1.000	0.980	1.010	0.960	1.030	0.940	1.040
	12 (6.7)	1.007	1.003	0.987	1.013	0.966	1.035	0.945	1.045
	14 (7.8)	1.013	1.007	0.993	1.017	0.972	1.038	0.952	1.048
	16 (8.9)	1.020	1.010	1.000	1.020	0.980	1.040	0.960	1.050
0.00075 (0.132)	6 (3.3)	0.967	0.983	0.958	0.993	0.938	1.002	0.918	1.012
	8 (4.4)	0.973	0.987	0.964	0.997	0.944	1.005	0.925	1.016
	10 (5.6)	0.980	0.990	0.970	1.000	0.950	1.010	0.930	1.020
	12 (6.7)	0.987	0.993	0.975	1.003	0.955	1.015	0.934	1.026
	14 (7.8)	0.993	0.997	0.978	1.007	0.958	1.022	0.937	1.032
	16 (8.9)	1.000	1.000	0.980	1.010	0.960	1.030	0.940	1.040

Performance Data

Figure 1 : Evaporator water pressure drop.



Performance Data 50 Hz

Table 3 - Performance Data
English units

LWT (°F)		AMBIENT TEMPERATURE (°F)																		
		95			100			105			110			115			120			
		CAP	INP		CAP	INP		CAP	INP		CAP	INP		CAP	INP		CAP	INP		
Model		Tons	kW	EER	Tons	kW	EER	Tons	kW	EER	Tons	kW	EER	Tons	kW	EER	Tons	kW	EER	
207	RTAB	40	54	60	8.0	52	63	7.5	51	66	7.0	48.7	69	6.5	46.8	72	6.0	45	76	5.6
		42	56	61	8.3	54	64	7.7	53	67	7.2	50.6	70	6.7	48.6	73	6.2	47	77	5.7
		44	58	61	8.5	56	64	7.9	54	67	7.4	52	71	6.9	51	74	6.4	48	78	5.9
		45	59	62	8.6	57	65	8.0	55	68	7.5	53	71	7.0	52	74	6.6	49	78	6.0
		46	60	62	8.7	58	65	8.1	56	68	7.6	54	71	7.1	52	75	6.6	50	78	6.1
		48	62	63	8.9	60	66	8.4	58	69	7.8	56	72	7.3	54	76	6.7	52	79	6.2
		50	65	64	9.2	62	67	8.6	60	70	8.0	58	73	7.4	56	76	6.9	54	80	6.4
209	RTAB	40	63	70	8.3	61	74	7.7	59	77	7.2	57	81	6.7	55	85	6.2	53	89	5.8
		42	65	71	8.5	63	75	7.9	61	78	7.4	59	82	6.9	57	86	6.4	55	90	5.9
		44	68	73	8.7	66	76	8.1	63	79	7.6	61	83	7.1	59	87	6.6	57	91	6.1
		45	69	73	8.8	67	76	8.2	65	80	7.7	62	83	7.2	60	87	6.7	58	91	6.2
		46	70	74	8.9	68	77	8.3	66	80	7.8	63	84	7.3	61	88	6.7	59	92	6.2
		48	73	75	9.1	70	78	8.5	68	81	8.0	66	85	7.4	63	89	6.9	61	93	6.4
		50	75	76	9.3	73	79	8.7	70	83	8.2	68	86	7.6	66	90	7.1	63	94	6.6
210	RTAB	40	72	83	8.3	69	86	7.8	67	90	7.2	65	95	6.7	62	99	6.2	60	104	5.8
		42	74	84	8.5	72	88	8.0	70	92	7.4	67	96	6.9	65	100	6.4	62	105	5.9
		44	77	85	8.7	75	89	8.1	72	93	7.6	69	97	7.1	67	101	6.6	64	106	6.1
		45	78	86	8.8	76	89	8.2	73	93	7.7	71	98	7.2	68	102	6.6	65	107	6.1
		46	80	86	8.9	77	90	8.3	75	94	7.8	72	98	7.2	69	103	6.7	66	107	6.2
		48	82	88	9.1	80	91	8.5	77	95	8.0	74	99	7.4	72	104	6.9	69	109	6.4
		50	85	89	9.3	83	93	8.7	80	97	8.1	77	101	7.6	74	105	7.0	71	110	6.5
211	RTAB	40	84	90	8.6	81	93	8.1	79	97	7.6	76	101	7.1	73	106	6.6	70	111	6.1
		42	87	90	8.9	84	94	8.3	82	98	7.8	79	102	7.3	76	107	6.8	73	112	6.3
		44	90	92	9.1	87	95	8.5	85	99	8.0	82	104	7.5	79	108	7.0	76	113	6.5
		45	92	92	9.2	89	96	8.6	86	100	8.1	83	104	7.6	80	109	7.0	77	114	6.5
		46	93	93	9.3	90	97	8.7	88	101	8.2	85	105	7.7	82	110	7.1	78	114	6.6
		48	96	94	9.5	94	98	8.9	91	102	8.4	87	106	7.8	84	111	7.3	81	116	6.8
		50	100	96	9.7	97	99	9.1	94	103	8.6	90	108	8.0	87	112	7.5	84	117	7.0
212	RTAB	40	95	109	8.4	92	109	8.1	89	119	7.3	86	124	6.8	83	130	6.3	80	136	5.8
		42	99	111	8.6	96	115	8.0	93	120	7.5	89	126	7.0	86	132	6.5	83	138	6.0
		44	102	112	8.8	99	117	8.2	96	122	7.7	92	127	7.2	89	133	6.6	86	139	6.2
		45	104	113	8.9	101	118	8.3	97	123	7.8	94	128	7.2	91	134	6.7	87	140	6.2
		46	106	114	9.0	102	119	8.4	99	124	7.9	96	129	7.3	92	135	6.8	89	141	6.3
		48	109	116	9.2	106	120	8.6	103	125	8.0	99	131	7.5	95	136	7.0	92	143	6.5
		50	113	117	9.4	110	122	8.8	106	127	8.2	102	132	7.7	99	138	7.1	95	144	6.6

1. Ratings based on sea level altitude and evaporator fouling factor of .00025 per ARI 550-90
2. Interpolation is permissible
3. Extrapolation is not permissible
4. kW input is for compressors only
5. Ratings are based on an evaporator drop of 10 °F
6. EER = Energy Efficiency Ratio (Btu/watt-hour). Power inputs include compressors, condenser fans and control power.

Performance Data 50 Hz

Table 4 - Performance Data
Metric units

LWT (°C)		AMBIENT TEMPERATURE (°C)											
		35			40			43			46		
		CAP	INP	COP	CAP	INP	COP	CAP	INP	COP	CAP	INP	COP
Model	kW	kW	kW		kW	kW		kW	kW		kW	kW	
RTAB 207	5	194	60	2.2	183	66	2.0	175	69	1.8	168	73	1.7
	6	201	61	2.3	189	66	2.0	181	70	1.9	174	74	1.7
	7	208	62	2.3	196	67	2.1	188	71	1.9	181	74	1.8
	8	214	62	2.4	201	68	2.1	193	71	2.0	186	75	1.8
	9	220	63	2.4	207	68	2.2	200	72	2.0	192	76	1.9
	10	227	64	2.5	214	69	2.2	206	73	2.0	198	77	1.9
RTAB 209	5	226	71	2.3	213	77	2.0	205	81	1.9	197	85	1.7
	6	234	72	2.3	220	78	2.1	215	82	2.0	211	86	1.9
	7	240	73	2.4	228	79	2.1	221	83	2.0	215	87	1.9
	8	245	73	2.4	234	80	2.2	226	84	2.0	217	88	1.9
	9	251	74	2.5	242	81	2.2	233	85	2.1	224	89	1.9
	10	264	76	2.6	250	82	2.3	240	86	2.1	231	90	2.0
RTAB 210	5	257	83	2.3	242	90	2.1	233	95	1.9	223	100	1.8
	6	266	85	2.4	250	91	2.1	240	96	1.9	231	101	1.8
	7	273	85	2.4	259	93	2.2	249	97	2.0	239	102	1.8
	8	278	86	2.4	266	94	2.2	256	98	2.0	246	103	1.9
	9	285	87	2.5	274	95	2.2	264	99	2.1	253	104	1.9
	10	300	89	2.6	282	96	2.3	272	101	2.1	261	105	2.0
RTAB 211	5	301	90	2.5	284	97	2.2	273	102	2.1	263	107	1.9
	6	311	91	2.6	293	98	2.3	282	103	2.1	271	108	2.0
	7	319	92	2.6	303	99	2.3	292	104	2.2	281	109	2.0
	8	325	93	2.6	312	100	2.4	301	105	2.2	289	110	2.1
	9	333	94	2.7	322	101	2.4	310	106	2.3	298	111	2.1
	10	351	96	2.8	331	103	2.5	319	107	2.3	307	112	2.1
RTAB 212	5	341	110	2.4	322	118	2.1	310	125	1.9	297	131	1.8
	6	353	111	2.4	332	120	2.2	320	126	2.0	307	132	1.8
	7	363	113	2.5	344	122	2.2	331	128	2.0	318	134	1.9
	8	369	113	2.5	353	123	2.2	340	129	2.1	327	135	1.9
	9	378	115	2.5	364	124	2.3	351	131	2.1	337	137	2.0
	10	398	117	2.6	375	126	2.3	361	132	2.2	347	138	2.0

1. Ratings based on sea level altitude and evaporator fouling factor of .0440 per ARI 550-90

2. Interpolation is permissible

3. Extrapolation is not permissible

4. kW input is for compressors only

5. Ratings are based on an evaporator drop of 5.6 °C

6. COP = Coefficient of performance (kW cooling/kW input). Power inputs include compressors, condenser fans and control power.

Performance Data 60 Hz

Table 5 - Performance Data
English units

LWT (°F)		AMBIENT TEMPERATURE (°F)																		
		95			100			105			110			115			120			
		CAP	INP		CAP	INP		CAP	INP		CAP	INP		CAP	INP		CAP	INP		
Model		Tons	kW	EER	Tons	kW	EER	Tons	kW	EER	Tons	kW	EER	Tons	kW	EER	Tons	kW	EER	
207	RTAB	40	65	76	7.4	63	80	7.0	60	83	6.5	58	87	6.0	56	91	5.6	53	96	5.1
		42	67	77	7.6	65	80	7.1	63	84	6.7	60	88	6.2	58	93	5.7	56	97	5.3
		44	70	78	7.8	67	81	7.3	65	85	6.8	63	89	6.4	60	94	5.9	58	98	5.5
		45	71	78	7.9	68	82	7.4	66	86	6.9	64	90	6.4	61	94	6.0	59	99	5.5
		46	72	79	8.0	70	82	7.5	67	86	7.0	65	90	6.5	62	95	6.1	60	99	5.6
		48	74	80	8.2	72	84	7.7	70	87	7.2	67	92	6.7	64	96	6.2	62	101	5.7
		50	77	81	8.4	74	85	7.9	72	89	7.4	69	93	6.8	67	97	6.4	64	102	5.9
209	RTAB	40	75	90	7.4	73	94	6.9	70	98	6.4	67	103	6.0	65	108	5.6	62	113	5.2
		42	78	91	7.6	75	95	7.1	73	100	6.6	70	104	6.2	67	109	5.7	65	114	5.3
		44	81	93	7.8	78	97	7.3	75	101	6.8	72	106	6.3	70	111	5.9	67	116	5.4
		45	82	93	7.8	79	98	7.3	77	102	6.9	74	107	6.4	71	111	5.9	68	116	5.5
		46	83	94	7.9	81	98	7.4	78	103	6.9	75	107	6.5	72	112	6.0	69	117	5.6
		48	86	96	8.1	83	100	7.6	81	104	7.1	78	109	6.6	75	114	6.2	72	119	5.7
		50	89	97	8.3	86	101	7.8	83	106	7.3	80	110	6.8	77	115	6.3	74	120	5.8
210	RTAB	40	83	106	7.1	81	110	6.6	78	115	6.2	75	116	5.9	72	126	5.3	69	132	4.9
		42	86	110	7.1	83	112	6.8	80	117	6.3	77	117	6.1	74	122	5.6	71	128	5.2
		44	89	109	7.4	86	114	6.9	83	119	6.5	80	124	6.0	77	130	5.6	74	136	5.2
		45	91	110	7.5	88	114	7.0	84	119	6.5	81	125	6.1	78	130	5.6	75	136	5.2
		46	92	110	7.6	89	115	7.1	86	120	6.6	83	126	6.2	79	131	5.7	76	137	5.3
		48	95	112	7.7	92	117	7.2	89	122	6.8	85	127	6.3	82	133	5.8	79	139	5.4
		50	98	114	7.9	95	119	7.4	92	124	6.9	88	129	6.4	85	135	6.0	81	141	5.5
211	RTAB	40	96	114	7.7	93	119	7.2	90	124	6.7	87	130	6.3	83	136	5.8	80	142	5.4
		42	100	116	7.9	96	121	7.4	93	126	6.9	90	132	6.4	86	138	6.0	83	144	5.5
		44	103	117	8.1	100	122	7.6	96	128	7.1	93	133	6.6	89	139	6.1	86	146	5.7
		45	105	118	8.2	101	123	7.7	98	129	7.2	95	134	6.7	91	140	6.2	87	147	5.7
		46	106	119	8.3	103	124	7.8	100	129	7.2	96	135	6.8	93	141	6.3	89	148	5.8
		48	110	121	8.4	107	126	7.9	103	131	7.4	99	137	6.9	96	143	6.4	92	149	6.0
		50	114	123	8.6	110	128	8.1	106	133	7.6	103	139	7.1	99	145	6.6	95	151	6.1
212	RTAB	40	110	138	7.6	107	144	7.1	103	151	6.6	99	158	6.1	95	165	5.7	91	173	5.2
		42	114	140	7.8	110	146	7.3	106	153	6.8	102	160	6.3	98	167	5.8	94	175	5.4
		44	118	142	7.9	114	149	7.4	110	155	6.9	106	162	6.4	102	170	6.0	99	177	5.6
		45	120	143	8.0	116	150	7.5	112	156	7.0	108	163	6.5	104	171	6.0	99	178	5.6
		46	122	144	8.1	118	151	7.6	114	157	7.1	110	164	6.6	105	172	6.1	101	180	5.6
		48	126	147	8.3	122	153	7.7	117	160	7.2	113	167	6.7	109	174	6.2	104	182	5.8
		50	130	149	8.4	126	155	7.9	121	162	7.4	117	169	6.9	112	176	6.4	108	184	5.9

1. Ratings based on sea level altitude and evaporator fouling factor of .00025 per ARI 550-90
2. Interpolation is permissible
3. Extrapolation is not permissible
4. kW input is for compressors only
5. Ratings are based on an evaporator drop of 10 °F
6. EER = Energy Efficiency Ratio (Btu/watt-hour). Power inputs include compressors, condenser fans and control power.

Performance Data 60 Hz

Table 6 - Performance Data

Metric units

Model	LWT (°C)	AMBIENT TEMPERATURE (°C)											
		35			40			43			46		
		CAP kW	INP kW	COP	CAP kW	INP kW	COP	CAP kW	INP kW	COP	CAP kW	INP kW	COP
RTAB 207	5	232	76	2.2	218	83	2.0	209	88	1.8	200	92	1.7
	6	240	77	2.3	225	84	2.0	216	88	1.8	207	93	1.7
	7	248	78	2.3	233	85	2.1	224	90	1.9	215	94	1.7
	8	255	79	2.4	240	86	2.1	230	90	1.9	221	95	1.8
	9	263	80	2.4	247	87	2.1	237	91	2.0	228	96	1.8
	10	270	81	2.5	254	88	2.2	245	93	2.0	235	97	1.9
RTAB 209	5	269	91	2.3	253	98	2.0	243	103	1.8	233	109	1.7
	6	278	92	2.3	261	99	2.0	255	105	1.9	249	110	1.8
	7	286	93	2.3	270	101	2.1	262	106	1.9	253	111	1.8
	8	291	94	2.4	278	102	2.1	267	107	2.0	256	113	1.8
	9	298	95	2.4	286	103	2.2	275	109	2.0	264	114	1.9
	10	313	97	2.5	295	105	2.2	283	110	2.0	272	115	1.9
RTAB 210	5	298	108	2.2	280	115	1.9	268	120	1.8	257	124	1.7
	6	308	109	2.2	289	117	2.0	277	122	1.8	265	127	1.7
	7	316	109	2.3	298	118	2.0	286	124	1.9	274	129	1.7
	8	321	110	2.3	306	120	2.1	294	126	1.9	281	131	1.8
	9	329	111	2.4	315	121	2.1	303	128	1.9	290	134	1.8
	10	346	114	2.4	324	123	2.1	311	130	2.0	298	136	1.8
RTAB 211	5	344	115	2.3	324	124	2.1	311	131	1.9	299	137	1.8
	6	356	117	2.4	334	126	2.1	321	132	2.0	308	139	1.8
	7	365	118	2.4	346	127	2.2	333	134	2.0	319	140	1.9
	8	371	119	2.5	355	129	2.2	342	135	2.0	328	142	1.9
	9	381	120	2.5	366	130	2.3	352	137	2.1	338	143	1.9
	10	400	123	2.6	377	132	2.3	363	138	2.1	348	145	2.0
RTAB 212	5	394	139	2.3	370	151	2.0	355	159	1.8	341	166	1.7
	6	408	141	2.3	382	153	2.0	367	160	1.9	351	168	1.7
	7	418	143	2.3	395	155	2.1	379	163	1.9	364	170	1.8
	8	425	144	2.4	405	156	2.1	389	164	1.9	373	172	1.8
	9	435	146	2.4	417	158	2.2	401	166	2.0	384	174	1.8
	10	456	149	2.5	429	160	2.2	412	168	2.0	395	176	1.9

1. Ratings based on sea level altitude and evaporator fouling factor of .0440 per ARI 550-90

2. Interpolation is permissible

3. Extrapolation is not permissible

4. kW input is for compressors only

5. Ratings are based on an evaporator drop of 5.6 °C

6. COP = Coefficient of performance (kW cooling/kW input). Power inputs include compressors, condenser fans and control power.

Performance Data

Table 7 - ARI Part-Load Values 50 Hz (English units)

Unit Size	% Load	Capacity Tons	Power Input (kW)			IPLV
			ARI Temp.	Constant Amb. Temp.	EER With Temp.	
			Relief	Temp.	Relief	
RTAB 207	100	58	61	61	9.0	10.7
	75	44	37	46	9.9	
	50	29	21	32	11.8	
	25	15	10	18	9.4	
RTAB 209	100	68	73	73	9.1	11.1
	75	51	45	57	10.1	
	50	34	23	37	12.7	
	25	17	13	20	9.3	
RTAB 210	100	77	85	85	9.1	10.9
	75	58	53	66	10.0	
	50	39	30	45	12.0	
	25	19	14	20	10.3	
RTAB 211	100	90	92	92	9.8	11.7
	75	68	58	73	10.6	
	50	45	32	47	13.2	
	25	23	17	25	10.3	
RTAB 212	100	102	112	112	9.3	11.1
	75	77	71	88	10.1	
	50	51	38	57	12.5	
	25	26	21	29	9.6	

- ARI part load data :
95 °F Ambient Temperature
44 °F Leaving water temperature

- ARI Ambient Temperature relief :
100 % load : 95 °F 50 % load : 65 °F
75 % load : 80 °F 25 % load : 55 °F

60 Hz

Unit Size	% Load	Capacity Tons	Power Input (kW)			IPLV
			ARI Temp.	Constant Amb. Temp.	EER With Temp.	
			Relief	Temp.	Relief	
RTAB 207	100	70	78	78	7.9	9.3
	75	53	46	59	8.4	
	50	35	25	40	10.5	
	25	18	11	18	8.1	
RTAB 209	100	81	93	93	7.8	9.3
	75	61	57	73	8.2	
	50	41	30	47	10.9	
	25	20	17	30	7.7	
RTAB 210	100	89	109	109	7.4	8.5
	75	67	68	85	7.8	
	50	45	37	59	9.6	
	25	22	20	37	7.0	
RTAB 211	100	103	117	117	8.1	9.5
	75	77	74	94	8.5	
	50	52	40	60	10.6	
	25	26	18	27	8.6	
RTAB 212	100	118	142	142	8.0	9.6
	75	89	89	111	8.5	
	50	59	47	72	10.8	
	25	30	21	40	8.9	

- Power kW is for compressors only.

Table 8 - ARI Part-Load Values 50 Hz (Metric units)

Unit Size	% Load	Capacity Tons	Power Input (kW)			IPLV
			ARI Temp.	Constant Amb. Temp.	EER With Temp.	
			Relief	Temp.	Relief	
RTAB 207	100	204	61	61	2.6	3.4
	75	153	37	46	2.9	
	50	102	21	32	3.4	
	25	51	10	18	2.7	
RTAB 209	100	239	73	73	2.7	3.5
	75	179	45	57	2.9	
	50	120	23	37	3.7	
	25	60	13	20	2.7	
RTAB 210	100	271	85	85	2.7	3.4
	75	203	53	66	2.9	
	50	135	30	45	3.5	
	25	68	14	20	3.0	
RTAB 211	100	316	92	92	2.9	3.7
	75	237	58	73	3.1	
	50	158	32	47	3.9	
	25	79	17	25	3.0	
RTAB 212	100	359	112	112	2.7	3.5
	75	269	71	88	3.0	
	50	179	38	57	3.7	
	25	90	21	29	2.8	

- ARI part load data :
35 °C Ambient Temperature
6.7 °C Leaving water temperature

- ARI Ambient Temperature relief :
100 % load : 35 °C 50 % load : 18.3 °C
75 % load : 26.7 °C 25 % load : 12.7 °C

60 Hz

Unit Size	% Load	Capacity Tons	Power Input (kW)			IPLV
			ARI Temp.	Constant Amb. Temp.	EER With Temp.	
			Relief	Temp.	Relief	
RTAB 207	100	246	78	78	2.3	2.9
	75	185	46	59	2.5	
	50	123	25	40	3.1	
	25	62	11	18	2.4	
RTAB 209	100	285	93	93	2.3	2.9
	75	214	57	73	2.4	
	50	142	30	47	3.2	
	25	71	17	30	2.2	
RTAB 210	100	313	109	109	2.2	2.7
	75	235	68	85	2.3	
	50	156	37	59	2.8	
	25	78	20	37	2.1	
RTAB 211	100	362	117	117	2.4	3.0
	75	272	74	94	2.5	
	50	181	40	60	3.1	
	25	91	18	27	2.5	
RTAB 212	100	415	142	142	2.3	3.0
	75	311	89	111	2.5	
	50	207	47	72	3.2	
	25	104	21	40	2.6	

- Power kW is for compressors only.

Electrical Data

Table 9 - Electrical Data

50 Hz	RTAB	207	209	210	211	212
Compressor Quantity		2	2	2	2	2
Model (Circuit 1 + 2)	CHHN	350	400	500 + 400	500	600
RLA (1)						
Power Supply (3)	220/3/50	124	141	166/141	166	201
	380/3/50	70	79	93/79	93	111
	415/3/50	67	76	90/76	90	110
Recommended	220/3/50	400	500	630	630	630
Fuse size (A)	380/3/50	250	400	400	400	400
	415/3/50	250	400	400	400	400
Unit inrush Current (2)						
Power Supply (3)	220/3/50	544	659	786	817	965
Starting Mode:	380/3/50	299	359	426	446	523
Part Winding	415/3/50	315	380	453	473	557
Control Power Required (110V)						
	VA	1200	1200	1200	1200	1200
Evaporator Heater	W	200	200	200	200	200
Oil Heater	W	2 x 150	2 x 150	2 x 150	2 x 150	2 x 150
Number Of Fans		6	6	6	8	8
FLA 380/415 V , Each	A	5.8	5.8	5.8	5.8	5.8
Starting Amps 380/415	A	37	37	37	37	37
Shaft power	kW	2.5	2.5	2.5	2.5	2.5
Fan Motor Rated	kW	3.29	3.29	3.29	3.29	3.29
60 Hz	RTAB	207	209	210	211	212
Compressor Quantity		2	2	2	2	2
Model (Circuit 1 + 2)	CHHN	350	400	500 + 400	500	600
RLA (1)						
Power Supply (3)	220/3/60	148	167	197/167	197	238
	380/3/60	85	97	114/97	114	138
	460/3/60	71	80	94/80	94	114
Recommended	220/3/60	500	630	630	630	-
Fuse size (A)	380/3/60	400	400	400	400	500
	460/3/60	250	400	400	400	400
Unit inrush Current (2)						
Power Supply (3)	220/3/60	629	762	908	944	1115
Starting Mode:	380/3/60	372	450	534	557	656
Part Winding	460/3/60	312	375	445	465	547
Control Power Required (110V)						
	VA	1200	1200	1200	1200	1200
Evaporator Heater	W	200	200	200	200	200
Oil Heater	W	2 x 150	2 x 150	2 x 150	2 x 150	2 x 150
Number Of Fans		6	6	6	8	8
FLA 380/3/60 , Each	A	6.2	6.2	6.2	6.2	6.2
Starting Amps 380/3/60	A	34	34	34	34	34
Shaft power	kW	2.6	2.6	2.6	2.6	2.6
Fan Motor Rated	kW	3.42	3.42	3.42	3.42	3.42

NOTES:

(1) Rated Load Amperes - RLA

50 Hz - Rated at 5 Bar suction Pressure and 25 Bar discharge pressure

60 Hz - Rated in accordance to UL Standard 465

(2) Unit Inrush Current = Starting amps of the circuit with the larger compressor circuit including fans plus RLA of the second circuit including fans

(3) Voltage Utilisation Range Electrical Characteristics - 220/3/50 (198 - 242) - 400/3/50 (340 - 460)

200-230/3/60 (180-253) - 380/3/60 (342 - 418)

Microprocessor control module : “Adaptive Control™” protection and communication capabilities

“Adaptive Control™” :

Trouble free operation

The air cooled series RTAB utilizes the most advanced microprocessor control issued from the latest development in micro-electronics.

Control and protection of chiller were the two functions of previous chiller control design. «Adaptive Control» means the system takes corrective action when any of the control variables approaches a limit condition at which the protection function of previous control schemes would normally shut down the chiller. Corrective action is achieved through combined actions of compressor unloader mechanism, and fan staging. Only when the control system has exhausted the corrective actions it can take and the unit is still violating an operating limit, the unit will be shut down.

The control logic of the P.I.D. type based on the leaving chilled water temperature integrates the control of variables (current draw by the motor, evaporating and condensing temperature) maintains accurate control, minimizes the drift from the setpoint and provides better building comfort.

Improved chiller and motor protection

The control system integrates all the functions necessary to ensure safe operation of the chiller in all applications and duty conditions :

- System safeties, such as oil, water, refrigerant pressure and temperature faults.
- Motor safeties. By monitoring the motor current on each of the 3 phases, the control system ensures protection against :
 - Overload at start-up and in operation.
 - Phase loss/Power loss.
 - Phase unbalance or reversal.
 - Over/Undervoltage.
 - Welded contactors.

“Adaptive Control™”, features summary

- Ensures safe operation of the chiller.
- Keeps chiller on line.
- Optimizes total chiller power consumption.
- Ensures total chiller reliability.
- Allows easy interface.
- Minimizes service expense.

Optional features

- Tracer communication interface.
- Hardware interface with BMS system.(External chilled water setpoint).
- External current limit setpoint.
- Chilled water temperature reset.

If a fault occurs, one of 90 individual diagnostic and operating codes will display directly on the control module.



*Unit mounted clear language display
(UCM)*

Communication

The Unit Control Module (UCM-CLD) of the RTAB offers several communication levels which considerably simplify the implementation of a telemonitoring of the chiller or its integration in a Building Management System (BMS).

Operator interface

With easy front panel programmability of daily, service start-up and machine configuration settings and setpoints, the building manager and service technician can customize the use of the UCM-CLD microcontroller to the unique conditions of the chiller plant whether the purpose of the chilled water is comfort cooling or process cooling. All the data that is necessary for the improved operation and easy serviceability of the chiller is called up by simple keypad instructions and presented on a highly readable screen.

Convenience

Enunciation of all information is at the front panel display (including power, voltage, amps, temperatures, pressures, number of starts and operating hours). Messages are displayed using clear language.

Readability

LCD, super twist, double line 40 character display is easy to read. It is backlit so that the display can be read in a variety of equipment room lighting conditions.

Application flexibility

The UCM-CLD is available with the output in six languages and in either English or metric (SI) units.

Telemonitoring through a parallel link

Analog input and output ports allow chiller operation optimization or easy chiller monitoring when the machine is not integrated in a BMS.

Remote running and alarm contacts

The unit provides three single pole/double-throw contact closures to indicate whether :

- a failure has occurred.
- the compressor is running.
- the compressor is running at maximum capacity. This information may be used to authorize the start of an additional chiller.

External chilled water setpoint and current limit setpoint

The UCM allows the external setting independent of the front panel setpoint by one of the following three means :

- a remote resistor (fixed or adjustable)
- 2-10 VDC input
- a 4-20 mA input.

In the same way, the motor current can be limited to optimize the total energy efficiency of the installation.

Integration into a Trane Building Management System through the Serial link

The unit can be equipped upon request with a serial link communication card. All the data and functions available at the UCM front panel can be transmitted or accessed through the serial link. The integration in a Building Management or the chiller operation optimization in order to reduce the overall energy consumption are thus considerably simplified.

Data which can be read

Following parameters can be read by the Trane BMS through the serial link :

- Entering and leaving evaporator water temperature
- Entering and leaving condenser water temperature
- Motor current
- Operating status : compressor stopped or running, compressor running at full load or auto-limitation.

More than 100 data can be accessed or transmitted.

Orders which can be sent to the chiller

The BMS can send following orders:

- Compressor start and stop
- Motor current limit
- Chilled water setpoint reset.



Tracer Summit Chiller Plant Control

Tracer Summit's Chiller Plant Control (CPC) application provides automation and energy optimisation of chiller plant through factory tested sequencing software.

As a manufacturer of chillers for over 60 years, Trane has gained tremendous experience in chiller plant applications. The Tracer Summit Chiller Plant Control application is designed to take advantage of this expertise. This factory tested software is powerful enough to handle such sophisticated applications as decoupled, dual fuel, series, or even swing chiller systems yet is designed to allow even the novice operators to understand its set-up and operation.

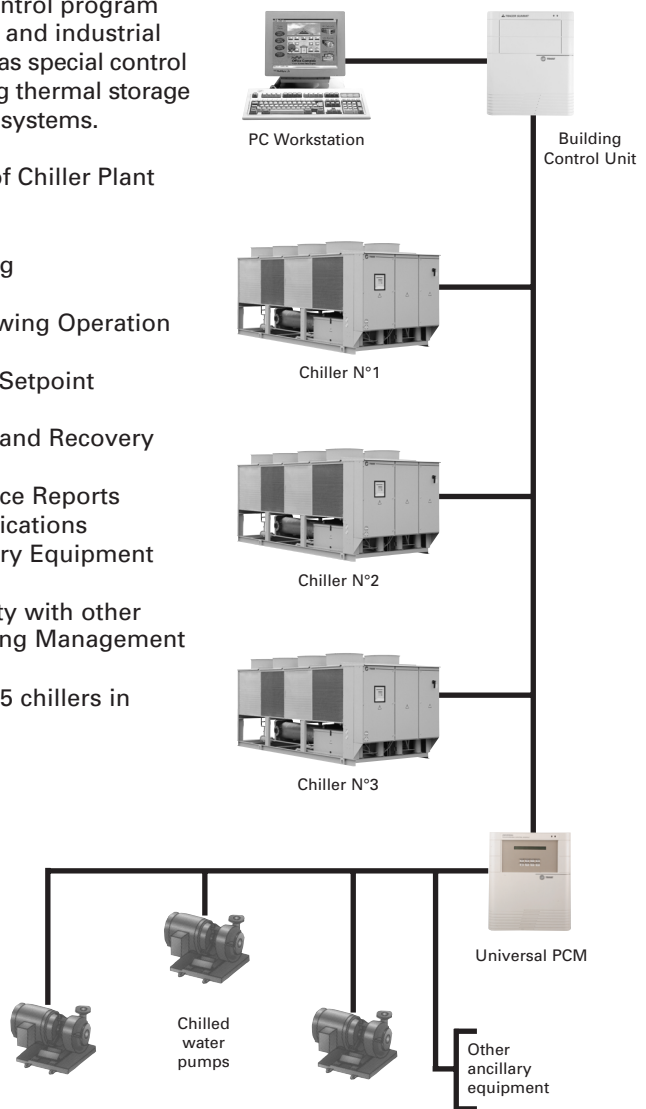
Chiller Plant Control monitors and controls multiple chillers and their related pumps and valves to balance system efficiency and equipment runtime to optimise system performance.

In addition to control and monitoring, the Chiller Plant Control program provides important status information that tells the user what is happening in the chiller plant and what will happen next, based on current operating conditions. This status information is important for troubleshooting purposes.

The Chiller Plant Control program can control comfort and industrial applications as well as special control sequences, including thermal storage and dual fuel chiller systems.

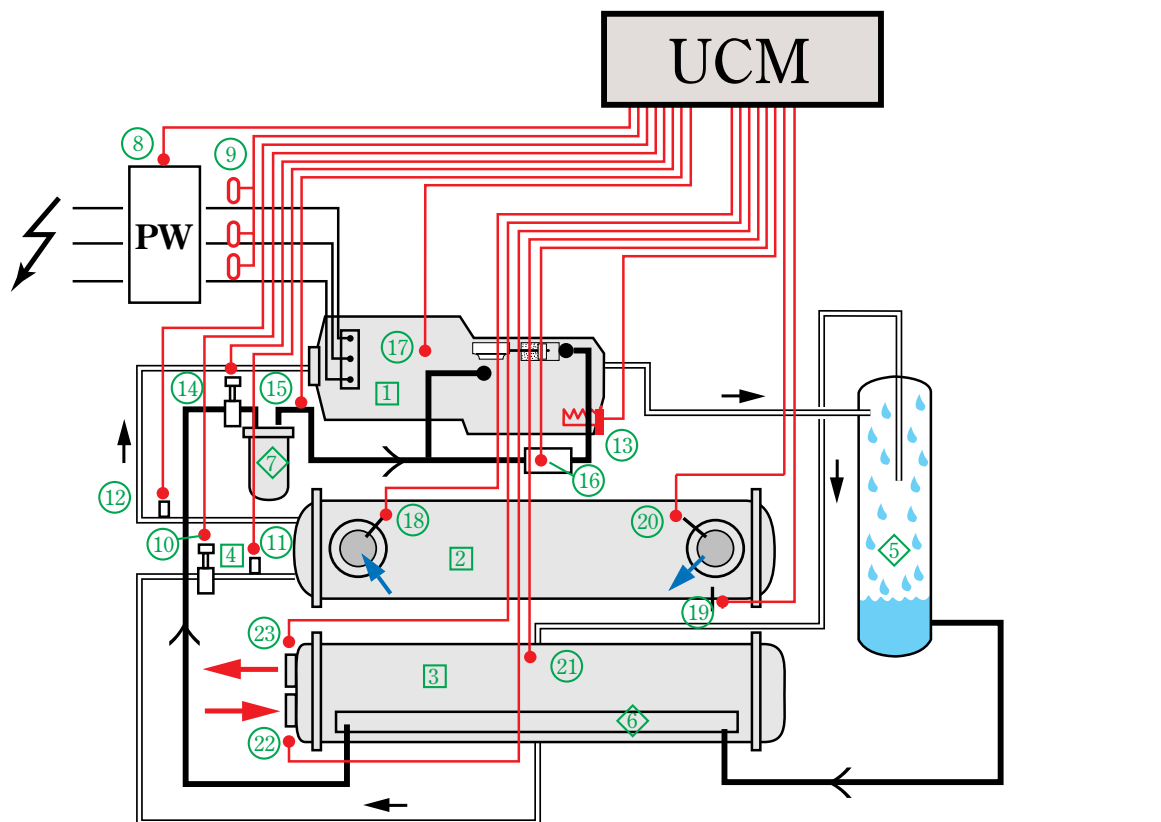
The main features of Chiller Plant Control are:

- Chiller Sequencing
- Rotation Changes
- Base, Peak and Swing Operation
- Soft Loading
- Individual Chiller Setpoint Calculations
- Failure Detection and Recovery
- Manual Override
- Chiller Performance Reports
- Remote Communications
- Pump and Ancillary Equipment Control
- Interoperability with other compatible Building Management Systems
- Control of up to 25 chillers in multiple plants.



Superior control

The diagram indicates the numerous control variables that can be sensed by the Unit Control Module in order to ensure trouble free operation.



Refrigeration circuit

- ① Compressor.
- ② Evaporator.
- ③ Condenser (with integral subcooler).
- ④ Electronic expansion valve.

Lubrication circuit

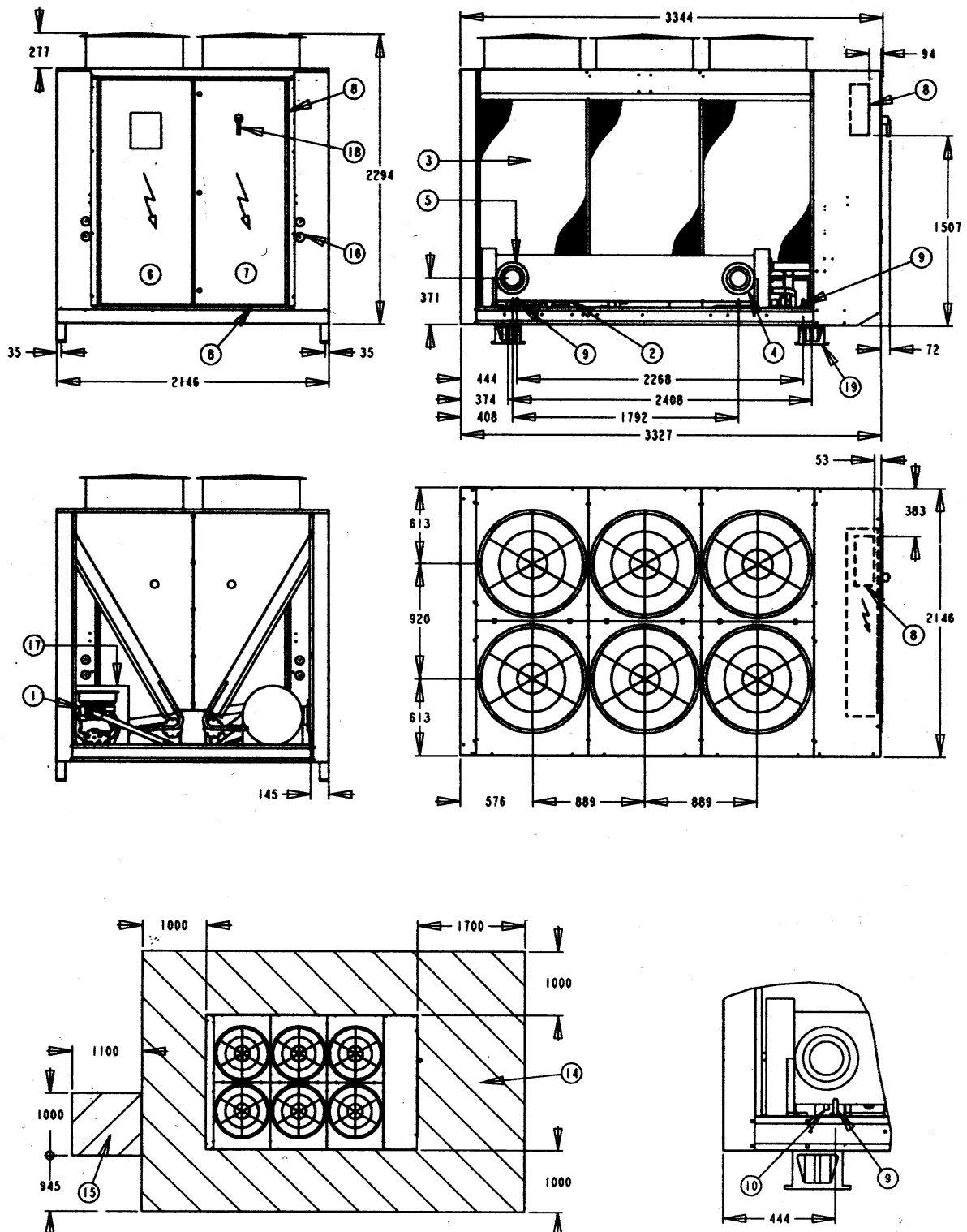
- ⑤ Oil separator.
- ⑥ Oil cooler.
- ⑦ Oil filter.

Control circuit

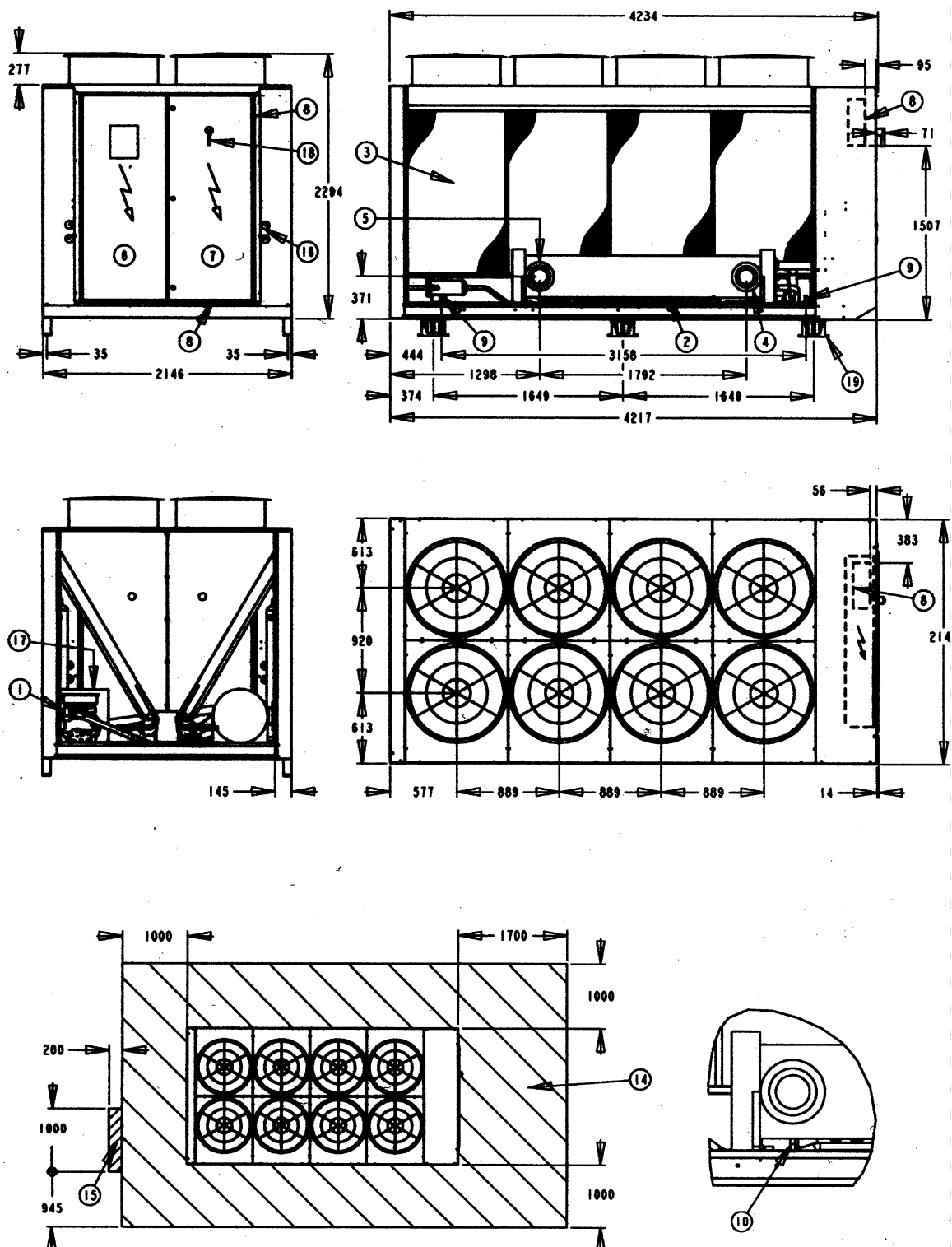
- ⑧ Part - winding starter.
- ⑨ Phase loss/imbalance, under/over voltage protection.
- ⑩ Electronic expansion valve self diagnostic and prepositioning, refrigerant flow metering.
- ⑪ Evaporator entering refrigerant temperature.
- ⑫ Evaporator leaving refrigerant temperature.
- ⑬ Oil tank heating.
- ⑭ Oil circuit solenoid valve.
- ⑮ Oil pressure.
- ⑯ Compressor capacity control.
- ⑰ Motor windings temperature.
- ⑱ Evaporator entering water temperature.
- ⑲ Evaporator leaving water temperature.
- ⑳ Chilled water circuit flow switch (option, field wired).
- ㉑ Condenser refrigerant temperature.
- ㉒ Condenser entering water temperature.
- ㉓ Condenser leaving water temperature.

Dimensional Data

RTAB 207 to 210 Unit Dimensions



RTAB 211-212 Unit Dimensions



SIZE	1	2	3		4 - 5	11	12	13
207-50 Hz	2 X CHHN35	ES 70	3 ROWS	AL	FLANGED CONNECTION DN 125 PN 16	2590	2 x 23	2 x 8
				CU		2870		
207-60 Hz	2 X CHHN35	ES 70		AL		2590	2 x 23	2 x 8
				CU		2870		
209-50 Hz	2 X CHHN40	ES 70	3 ROWS	AL		2590	2 x 23	2 x 8
				CU		2870		
209-60 Hz	2 X CHHN40	ES 80		AL		2600	2 x 24	2 x 8
				CU		2880		
210-50 Hz	CHHN40 CHHN50	ES 80	3 ROWS + 4 ROWS	AL		2630	2 x 26	2 x 8
				CU		2930		
210-60 Hz	CHHN40 CHHN50	ES 100		AL		2640	2 x 27	2 x 8
				CU		2940		
211-50 Hz	2 X CHHN50	ES 80	4 ROWS	AL		2990	2 x 33	2 x 8
				CU		3400		
211-60 Hz	2 X CHHN50	ES 100		AL		3000	2 x 34	2 x 8
				CU		3410		
212-50 Hz	2 X CHHN60	ES 100	4 ROWS	AL		3000	2 x 34	2 x 8
				CU		3410		
212-60 Hz	2 X CHHN60	ES 120		AL		3010	2 x 35	2 x 8
				CU		3420		

- 1 Compressor
- 2 Evaporator
- 3 Condenser
- 4 Evaporator water inlet connection
- 5 Evaporator water outlet connection
- 6 Control panel
- 7 Starter panel
- 8 Power supply inlet: (150 x 400)
- 9 Rigging eyes (Dia 40 mm)
- 10 Drain evaporator (3/4")
- 11 Operating weight (kg)
- 12 Refrigerant charge (kg)
- 13 Oil charge (Liters)
- 14 Minimum recommended clearance (for maintenance)
- 15 Recommended clearance (Evaporator tube removal and air entering)

Options

- 16 Pressure gauges
- 17 Compressor sound attenuator
- 18 Power disconnect switch
- 19 Vibration isolators locations

Weights

Table 10- Weights

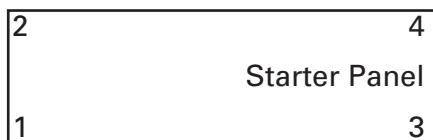
Unit Size				Isolators Location						Operating Weight (kg)
				1	2	3	4	5	6	
RTAB207	50 Hz	AL	kg	555	595	695	745	-	-	2590
	50 Hz	CU	kg	635	665	765	805	-	-	2870
	60 Hz	AL	kg	555	595	695	745	-	-	2590
	60 Hz	CU	kg	635	665	765	805	-	-	2870
RTAB209	50 Hz	AL	kg	555	595	695	745	-	-	2590
	50 Hz	CU	kg	635	665	765	805	-	-	2870
	60 Hz	AL	kg	560	595	700	745	-	-	2600
	60 Hz	CU	kg	640	665	770	805	-	-	2880
RTAB210	50 Hz	AL	kg	560	610	700	760	-	-	2630
	50 Hz	CU	kg	640	690	770	830	-	-	2930
	60 Hz	AL	kg	565	610	705	760	-	-	2640
	60 Hz	CU	kg	645	690	775	830	-	-	2940
RTAB211	50 Hz	AL	kg	345	365	615	670	475	520	2990
	50 Hz	CU	kg	415	440	680	730	545	590	3400
	60 Hz	AL	kg	345	365	620	670	480	520	3000
	60 Hz	CU	kg	415	440	685	730	550	590	3410
RTAB212	50 Hz	AL	kg	345	365	620	670	480	520	3000
	50 Hz	CU	kg	415	440	685	730	550	590	3410
	60 Hz	AL	kg	345	365	625	670	485	520	3010
	60 Hz	CU	kg	415	440	690	730	555	590	3420

Notes:

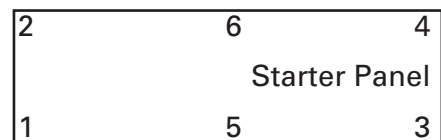
1. Operating weight includes refrigerant and water.

2. Sizes 207 to 210 have 4 isolator locations. Sizes 211-212 have 6 isolator locations.

RTAB 207 to 210



RTAB 211-212





Options

Communication Card

Permits either bi-directional communication to the Trane Integrated Comfort system or permits remote chilled water setpoint reset or demand limiting (mutually exclusive) by accepting a 4-20 mA or 2-10 Vdc analog signal.

Remote Clear Language Display

In addition to controlling chiller operation from a location within the building, the remote clear language display can provide the capability to monitor unit alarms and messages. Only one twisted pair is required between the chiller and the remote display.

Chilled Water Reset

This option provides the control logic and field installed sensors for either load based (return water temperature) or temperature based (ambient or zone) reset of leaving chilled water temperature (requires Communication Card).

Coil Protection

Grids which protect the condenser coils.

Power Disconnect Switch

A fused disconnect switch with through the door handle is provided to disconnect main power.

Discharge Service Valves

Factory installed valves to isolate refrigerant charge.

Vibration Isolators

Spring or rubber isolators help isolate the chiller from the building structure.

Compressor sound attenuating enclosure

Copper fins condenser coils

Pressure gauges

Features summary

Trane RTAB Air-Cooled Rotary Chiller Designed To Perform, Built To Last

Reliability

Proven Helix rotor compressor design for longer life and greater dependability.

Fewer moving parts means less parts to fail. Typical reciprocating compressors have 4 times as many total parts and 15 times as many critical parts.

Adaptive Control protects the chiller when any of the system variables approaches a limit condition that may damage the unit or cause a shutdown. The Unit Control Module takes corrective action to keep the unit running.

Dual circuit design increases overall system reliability.

Unlike reciprocating designs, this compressor can handle liquid slugging.

Suction gas cooling allows the motor to operate at lower temperatures for longer life.

Performance

Superior full load efficiency.

Excellent part load performance.

Use of an electronic expansion valve significantly improves part load performance by minimizing superheat in the evaporator and allowing the chiller to run at reduced condensing temperatures.

Unique compressor sequencing equalizes not only starts, but operating hours as well.

Trouble-free Operation and Start-up

Adaptive Control microprocessor keeps the Rotary chiller on-line when others would shut down.

Fewer nuisance trips means less expense from unnecessary service calls.

Factory installed and tested options keep start-up time and expenses minimized.

Easy interface capability with the Trane Integrated Comfort system via a single twisted pair of wires.

Optional remote display panel simplifies chiller monitoring/control.

Mechanical specification

TRANE Series RTAB packaged air cooled liquid chiller consisting of accessible hermetic, direct-drive screw compressors, with two independent circuits evaporator, condenser, microprocessor-based controls and a unit-mounted motor starter, refrigerant charged, factory runtested and ready for operation. Unit are rated in accordance with ARI 550-90.

Compressor motor assembly

TRANE screw compressors, accessible-hermetic, direct-drive, 2950/3600 rpm (50/60 Hz). Separately housed, pressure-lubricated rolling element bearing groups at each end of both rotors. Fully modulating capacity control.

Squirrel-cage two-pole induction motor, suction gas cooled.

Oil separator and filtration devices provided separate from the compressor.

Evaporator

Shell-and-tube heat exchanger with internally finned copper tubes, roller expanded into the tubes sheets. Refrigerant inside the tubes and water circulating in the shell. Maximum operating pressure refrigerant side 16 Bar (232 psig), water side 14 Bar (203) psig. 19 mm thermal insulation of flexible closed cell foam. Water flanged connections. Heater cable for freeze protection.

Condenser

V-configuration air cooled condenser coils of seamless copper tubes, expanded into aluminium fins. Integral oil cooler and subcooler circuits. Direct drive discharge fans with totally enclosed air over motors, having class "F" insulation and IP 55 protections. Fan guards. Leak tested at 21 Bar (304 psig), pressure rated at 35 Bar (500 psig).

Two refrigerant circuits

Each circuit including removable core filter dryer, liquid line shut-off valve, high pressure relief valve. Electronic expansion valve minimizing superheat in the evaporator and allowing chiller to run at reduced condensing temperature.

Control panel

Microprocessor-based unit control module UCM utilizing the «Adaptive Control» concept. The UCM provides all control and safety functions including start-up and shut down, leaving chilled water control, compressor and electronic expansion valve modulation, fans sequencing, anti-recycle logic, automatic lead/lag compressor starting and load limiting. Unit protective functions include loss of chilled water flow, evaporator freezing, loss of refrigerant, low and high refrigerant pressure, reverse rotation, compressor starting and running overcurrent, phase loss, phase unbalance, phase reversal and loss of oil flow.

Clear language display (2 lines, 40 characters), door mounted, indicates over 20 operating data points including chilled water setpoint, current limit setpoint, leaving chilled water temperature, evaporator and condenser refrigerant pressures and temperatures.

Over 60 messages are displayed when a problem is detected.

Starter panel

Unit mounted starter panel, protection class IP 55.

Panel contains part winding type motor starter, single source power supply, 3-phase current transformer for motor overload protection.

Unit structure

Welded steel base frame, structural steel profiles and panels, made of galvanized sheet steel, protected with a primary coating and finished with an acrylic paint. The paint can withstand 650 hours of salt spray test

Accessories and options

- Compressor sound attenuating enclosure
- Condenser copper fins
- Communication card
- Vibration isolators
- Disconnect switch
- Remote clear language display.
- Pressure gauges
- Flow switch
- Communication card + load based chilled water reset
- Communication card
- Plexiglass door (starter and control panel)
- Under, over voltage protection
- Condenser protection grids
- Discharge service valve

Factory testing

All RTAB chillers are fully run tested under load before shipment. Unit operation and all control functions are factory checked and set.

Shipment

Units ship fully assembled and single point wired ready for operation after field connection of power supply, electric interlocks and chilled water piping. Units ship on a wooden skid with refrigerant and oil operating charges.

Quality assurance

The Quality Management System applied by TRANE has been subject to independent third party assessment and approval to ISO 9001: 1994, EN ISO 9001: 1994, BS EN ISO 9001: 1994. The products described in this catalogue are designed, manufactured and tested in accordance with the approved system requirements as defined in the TRANE Quality Manual.



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Quality Management System Approval



C21 CA 604 E - 1199

Supersedes C21 CA 604 E - 0398

Literature stocking location : Europe

Trane reserves the right to alter any information without prior notice.