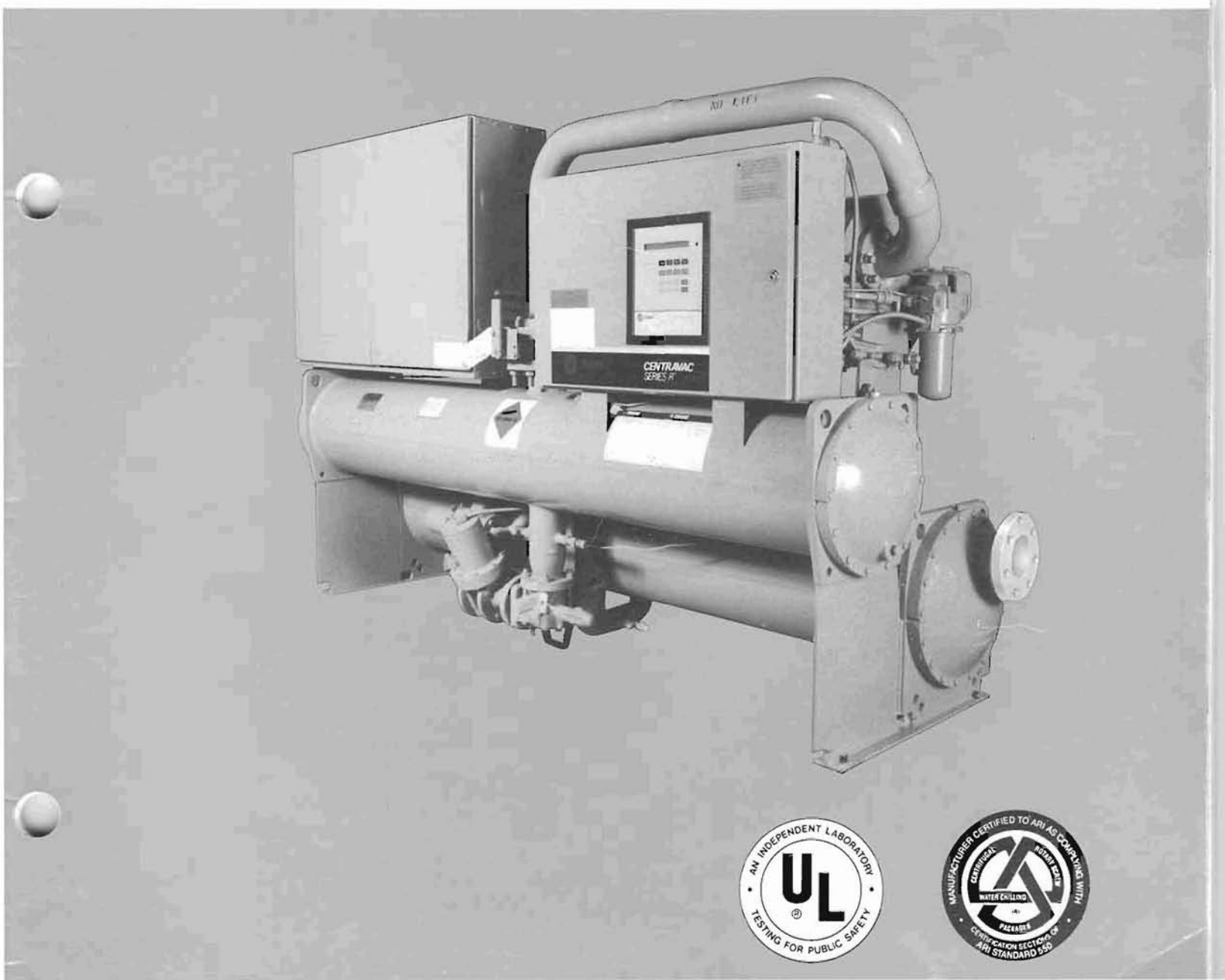
TRANE™

Series R® CenTraVac® Rotary Liquid Chillers

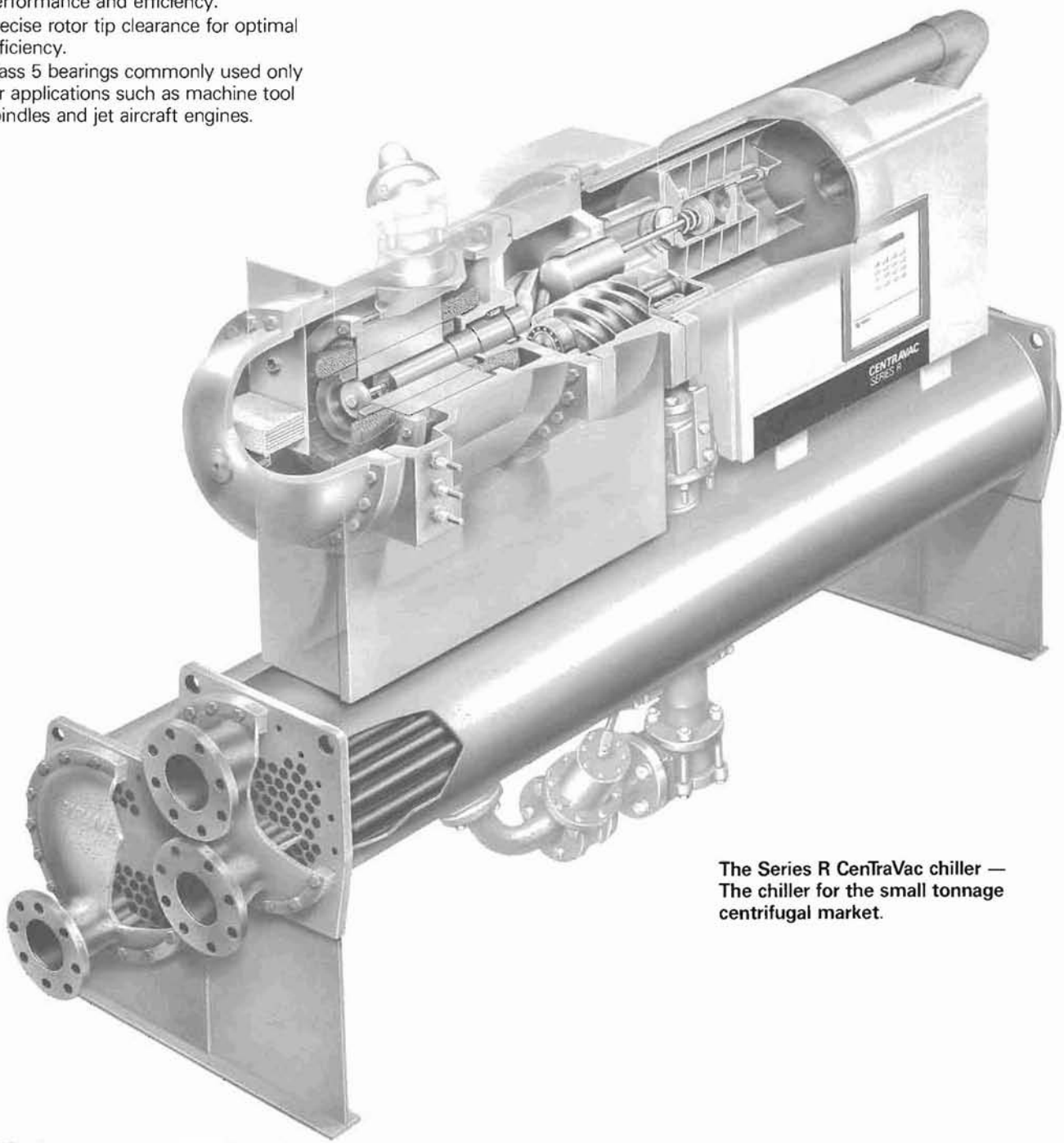
130 to 450 Tons Water Cooled



Features for Efficiency and Reliability Benefits

The Series R® CenTraVac® Helical-Rotary Compressor

- Direct drive, low speed for high efficiency, high reliability.
- Simple design for high reliability; and low maintenance.
- Optimized compressor parts profiles designed specifically for chilled water applications to assure maximum performance and efficiency.
- Precise rotor tip clearance for optimal efficiency.
- Class 5 bearings commonly used only for applications such as machine tool spindles and jet aircraft engines.
- Liquid refrigerant cooled motor. Motor stays uniformly cool at lower temperature for longer motor life.
- Five minute start to start anti-recycle timer allows for closer water temperature control.
- Oil separator reduces need for elaborate oil return system.
- Years of research and testing. The Helirotor™ compressor has amassed thousands of hours of testing, much of it at severe operating conditions beyond normal air conditioning applications.



The Series R CenTraVac chiller — The chiller for the small tonnage centrifugal market.

Contents

Electronic Expansion Valve/Fixed Orifice System

- Fewer moving parts for reliable operation.
- Better part load efficiency.
- Extended operating range.
- Optimized refrigerant metering for more efficient control.

Full Economizer Refrigeration Cycle

- Economizer improves refrigeration cycle efficiency an average of four percent over cycles without an economizer.

Advanced Heat Transfer Surfaces

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

Compact Size

- The small versatile size of the Series R CenTraVac chiller makes it perfect for almost any job; new or renovation.
- R-22 refrigerant allows compact size, high efficiency and reliability.
- Fits through standard size doors and in most freight elevators.
- Small footprint of Series R CenTraVac saves valuable equipment room space.

Simple Installation

- Lightweight design simplifies rigging requirements. Reduces cost and speeds installation.
- Simplified piping; the only water piping required is for the evaporator and condenser.
- Oil cooler and purge system connections eliminated.
- Simple power and control connections.
- Optional Unit Mounted Starter eliminates additional jobsite labor requirements.
- No disassembly or building modification required because of small footprint.
- Factory run tested.
- Full factory refrigerant and oil charge further reducing field labor, materials, and installation cost.

Separable Heat Exchanger Shells (Optional)

- Installation is easy even in the most restricted spaces.

Microprocessor Controls

- Microprocessor based Unit Control Panel (UCP2) monitors and controls chiller operation and associated sensors, actuators, relays and switches; all factory assembled and tested.
- PID (proportional integral derivative) control strategy for stable, efficient chilled water temperature control.
- Standard electrical demand limiting.
- Evaporator limit control and freeze protection.
- Condenser limit control.
- Chilled water reset (optional) for energy savings during part load operation.
- Complete range of chiller safety controls including advanced motor protection as standard.
- Easy to use operator interface. Panel displays all operating and safety messages with complete diagnostics information.

Unit Control Panel (UCP2)

- Clear Language Display is easy to read.
- More generic Building Automation System Points now available.
- Remote Display Panel for remote control.
- Chiller Amp draw, condenser pressure, and evaporator pressure are standard displays.

Sentinel™ Charge Monitoring System

- Allows early detection and warning of refrigerant loss through the unit control panel, UCP2..

Integrated Comfort™ System Interface

- Microprocessor UCP2 easily interfaces with Trane Tracer® building automation/ energy management computer for Integrated Comfort™ system benefits; all with a single twisted pair wire!

Availability

- The Series R CenTraVac chiller is in stock and available now for your ordering convenience.
- Trane offers the fastest ship cycles in the industry on built-to-order units.
- Packed Stock inventory features standard configurations for immediate delivery.

Those applications in this catalog specifically excluded from the ARI certification program are:

- Low temperature applications, including ice storage.
- Glycol
- 50 Hz Unit Components

RTHB Unit Model Number

Model Nomenclature

RTH	B	150	F	M	A0	0	L	W	P	0	T	0	U	N	N	3	L	F	2	L	F	V	0	Q	U
1,2,3	4	5,6,7	8	9	10,11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31

Digits 01, 02, 03 — Series R® CTV
RTH = Series R CenTraVac®

Digit 04 — Dev Sequence
B = 2nd Major Development

Digits 05,06,07 — Nominal Tons
130 = 130 Nominal Tons
150 = 150 Nominal Tons
180 = 180 Nominal Tons
215 = 215 Nominal Tons
255 = 255 Nominal Tons
300 = 300 Nominal Tons
380 = 380 Nominal Tons
450 = 450 Nominal Tons

Digit 08 — UNIT VOLTAGE
A = 200/60/3
C = 230/60/3
M = 346/50/3
D = 380/60/3
R = 380/50/3
N = 400/50/3
U = 415/50/3
F = 460/60/3
H = 575/60/3
S = SPECIAL

Digit 09
L = Lowest Nominal Kw Motor For Compressor Size
M = Medium Nominal Kw Motor For Compressor Size
H = Highest Nominal Kw Motor For Compressor Size

Digits 10, 11 — Design Sequence
A0 = "First Design, etc. Increment When Parts" Are Affected For Service Purposes.

Digit 12 — Unit Specials
0 = No Unit Specials
C = All Unit Specials Are Denoted By Digits Elsewhere In The Model Number
S = Unit Has An Uncatagorized Special Not Denoted By A Digit Elsewhere In The Model Number

Digit 13 — Shell Length
N = Standard (Short) Shells
L = High Eff. (Long) Shells
E = Extended Shells

Digit 14 — Unit Structure
W = Welded
B = Separable

Digit 15 — Control Options
0 = Without Options Module
P = With Options Module

Digit 16 — Printer Interface
0 = Without Printer Interface
P = With Printer Interface

Digit 17 — ICS Interface
0 = Without Tracer Communications
T = Tracer Communications (COMM 3)
M = Tracer Summit Communications (COMM 4)

Digit 18 — Remote CLD Display Module
0 = Without
R = With

Digit 19 — Starter Type
R = Remote Starter (See Starter Model No.)
U = Unit Mounted Starter (See Starter Model No.)

Digit 20 — Evap Temp Range
N = Standard And Low Temp Range (Above 20 Deg F)
V = Very Low Temp Range (20 Deg F And Below)

Digit 22 — Evap Water Passes
2 = 2 Pass
3 = 3 Pass
4 = 4 Pass
S = Special Customer Option

Digit 23 — Evap Connections
L = 150 Psi Flanged Connections
H = 300 Psi Flanged Connections
M = 300 Psi Marine Grooved Connections
S = Special Customer Option

Digit 24 — Evap Tubes
F = Standard 06A High-Perf Tubes
M = Smooth Bore Copper Tubes
S = Special Customer Option

Digit 25 — Cond Water Passes
2 = 2 Pass
3 = 3 Pass
S = Special Customer Option

Digit 26 — Cond Connections
L = 150 Psi Flanged Connections
H = 300 Psi Flanged Connections
M = 300 Psi Marine Grooved Connections
S = Special Customer Option

Digit 27 — Cond Tubes
F = Standard I-E Finned Tubes
G = Smooth Bore Copper Tubes
H = Smooth Bore 90/10 CU-NI Tubes

Digit 28 — Isolation Valve
0 = No Condenser Isolation Valve
V = With Condenser Isolation Valve

Digit 30 — Thermal Insulation
0 = Without Thermal Insulation
Q = With Thermal Insulation
S = Special Customer Option

Digit 31 — Agency Listing
0 = No Agency Listing
U = UL Listed
C = CSA Listed
B = UL And CSA Listed

Note: Position numbers not shown are currently unassigned. Not all combinations are available on all sizes.

Refrigeration Cycle

The Series R® CenTraVac® chiller, like other Trane CenTraVac chillers, is designed for reliability and efficiency. Features such as direct drive, reliable motor cooling, electronic expansion valve/fixed orifice refrigerant flow control and an economizer cycle have all been incorporated into the design of the Series R CenTraVac chiller.

During operation, liquid refrigerant is distributed along the length of the flooded evaporator uniformly coating each tube. As it cools the system water flowing through the evaporator tubes, the refrigerant absorbs heat causing it to vaporize.

The gaseous refrigerant is then drawn through the suction cavity in the evaporator and into the compressor where the compression process begins.

Partially compressed evaporator refrigerant vapor in the compressor is joined by vapor produced during the motor cooling process and the economizer cycle at an intermediate point in the compression cycle. The combined refrigerant vapor streams are then fully compressed and the hot refrigerant vapor is discharged to the condenser.

Baffles within the condenser shell distribute the compressed refrigerant gas evenly across the condenser tube bundle. Cooling tower water circulates through the condenser tubes and absorbs heat from this refrigerant, causing it to condense.

Once the liquid refrigerant leaves the bottom of the condenser, it passes through an electronic expansion valve. Because of the pressure drop created by the electronic expansion valve, some of the liquid vaporizes. The resulting mixture of liquid and gaseous refrigerant then enters the motor housing, where it uniformly surrounds and cools the motor. Motor heat absorbed by the refrigerant causes more of the liquid refrigerant to "flash" to a gas.

All of the refrigerant vapor available at this point is "economized" — that is, routed directly to the rotor section of the compressor housing. The liquid refrigerant leaves the motor housing, passes through a fixed orifice system and returns to the evaporator continuing the cycle.

Compressor Description

The compressor used in Series R CenTraVac chillers has three distinct sections: the motor, the rotor and the oil separator.

Motor Section
The hermetic 3600 rpm motor is an induction type motor and is cooled by liquid refrigerant.

Rotor Section
Each Series R CenTraVac uses a helirotor type compressor. Each compressor has only three moving parts: two rotors and a slide valve. The male rotor is directly attached to and driven by the motor. The female rotor is, in turn, driven by the male rotor. Separately housed bearing sets are provided at each end of both rotors. The slide valve is located, and moves, along the top of these rotors.

The helirotor compressor is a positive displacement compressor. Refrigerant from the evaporator is drawn into the suction opening at the bottom of the compressor rotor section. After being compressed by the meshing action of the rotor teeth, the high pressure refrigerant gas is discharged from the end of the rotors directly into the oil separator.

Oil sprayed along the top of the compressor rotor section bathes both rotors along with the compressor housing interior. While the oil injected here does provide lubrication for the driving action of the rotors, its primary purpose is to seal the clearance spaces that exist between the rotors and compressor housing. Effective seals between these internal parts enhance compressor efficiency by limiting leakage between the high and low pressure cavities.

Capacity control is accomplished by a slide valve in the rotor section of the compressor. Positioned along the top of the rotors and parallel to the rotors; the slide valve is driven by a piston/cylinder.

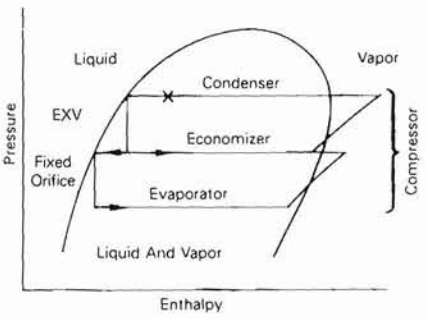
Compressor loading is determined by the position of the slide valve over the rotors. When the slide valve is fully extended over the rotors the compressor is fully loaded. Unloading occurs as the slide valve is drawn towards the discharge side of the compressor since compression no longer occurs over the entire length of the compressor rotor section. Slide valve unloading lowers refrigeration capacity by shortening the effective length of the rotors.

Oil Separator Section
The oil separator section of the compressor is located at the discharge end of the compressor.

Once oil is injected into the interior of the compressor's rotor section, it mixes with compressed refrigerant vapor and is then discharged into the oil separator by the rotors. The oil separator consists of a perforated cylinder that surrounds a helical passageway. As the refrigerant and oil mixture travels through this passageway, centrifugal force forces the oil to collect on the walls of the cylinder and passes through perforations to the cylinder's exterior. Oil that accumulates on this surface then runs off the cylinder and collects in an oil sump located at the bottom of the housing.

Meanwhile, the compressed refrigerant vapor, stripped of oil droplets, continues its passage through the oil separator and enters the discharge line leading to the condenser.

Figure 5-1 — Refrigerant Cycle Diagram



Selection Procedure

The Series R® CenTraVac® chiller performance is rated in accordance with ARI Standard 550 Certification Program.

The Series R CenTraVac chiller product line provides numerous individual unit selections over a capacity range of 100 to 450 tons. This catalog contains performance examples for a number of standard units. Additional chiller selections and performance information can be obtained through the use of the Series R CenTraVac chiller selection program available through local Trane sales offices.

Performance
The performance examples, by product family, on the following pages provide performance information at various tonnages, including capacity in tons, efficiency and water pressure drops. All capacities are net tons and are based on fouling factors of 0.00025 hr-ft^2-deg F/Btu for the evaporator and condenser water sides. For other fouling factors, refer to the paragraph on nonstandard fouling factors on this page.

It should be noted that changing the number of water passes or the water flow rates may significantly alter the performance of a particular chiller. To obtain the maximum benefit from the wide range of selections available, designers are encouraged to develop performance specifications and use the computer selection program to optimize their selections. This will allow the selection of the particular compressor-evaporator-condenser combination which most closely meets the job requirements. All final selections should be made using the computer selection program.

Unit Performance with Nonstandard Fouling Factors
The performance examples contain data based on standard fouling factors of 0.00025 hr-ft^2-deg F/Btu for the evaporator and condenser watersides. Unit performance at nonstandard fouling factors may vary from standard performance. The Series R CenTraVac chiller selection program will calculate the unit performance based on nonstandard fouling factors input.

Unit Performance with Fluid Media Other Than Water
The performance examples contain data using water as cooling and heat rejection media. The selection program will calculate unit performance using ethylene glycol either in the evaporator, condenser or both. For media other than water, contact the local Trane sales office.

Dimensional Drawings
The dimensional drawings illustrate overall measurements of the unit. The recommended service clearances indicate clearances required to easily service the Series R CenTraVac chiller.

All catalog dimensional drawings are subject to change. Current submittal drawings should be referred to for detailed dimensional information. Contact the local Trane sales office for submittal and template information.

Electrical Data Tables
Electrical data is shown in the data section of the appropriate chiller family. A voltage utilization range is tabulated for each voltage listed. Series R CenTraVac compressor motors are designed to operate satisfactorily over a range of ± 10 percent of the standard design voltages of 200 V, 230 V, 460 V and 575 V for 60 cycle, 3 phase motors.

Rated Load Amperes (RLA) and Locked Rotor Amperes (LRA) for standard voltages of all 60 cycle, 3 phase motors are shown. Motors are identified by their maximum Kw rating. The RLA is based on the performance of the motor developing full rated horsepower. The motor will be selected so its Kw rating equals or exceeds the Kw requirement determined by the Series R CenTraVac chiller selection program at design conditions.

To properly size field electrical wiring, the electrical engineer or contractor on a project needs to know the Minimum Circuit Ampacity (MCA) of the Series R CenTraVac chiller. The National Electrical Code (NEC), Article 440-33, defines the method of calculating the minimum circuit ampacity. These values have been calculated and are provided in the electrical data tables.

General Data Tables
General unit data is shown in the data section. General unit information includes refrigerant charge, oil charge, shipping weight and operating weight.

Evaporator and Condenser Data Tables
Located in the data section, evaporator and condenser data includes water storage capacities, minimum and maximum flow limits and water connection size. If the maximum flow limit is exceeded, tube erosion may result. Flow rates less than the minimum result in laminar flow with a resultant reduction in performance and increased fouling and corrosion potential.

Evaporator and Condenser Pressure Drop Curves
Located in the data section, pressure drop data is provided for each available water pass configuration.

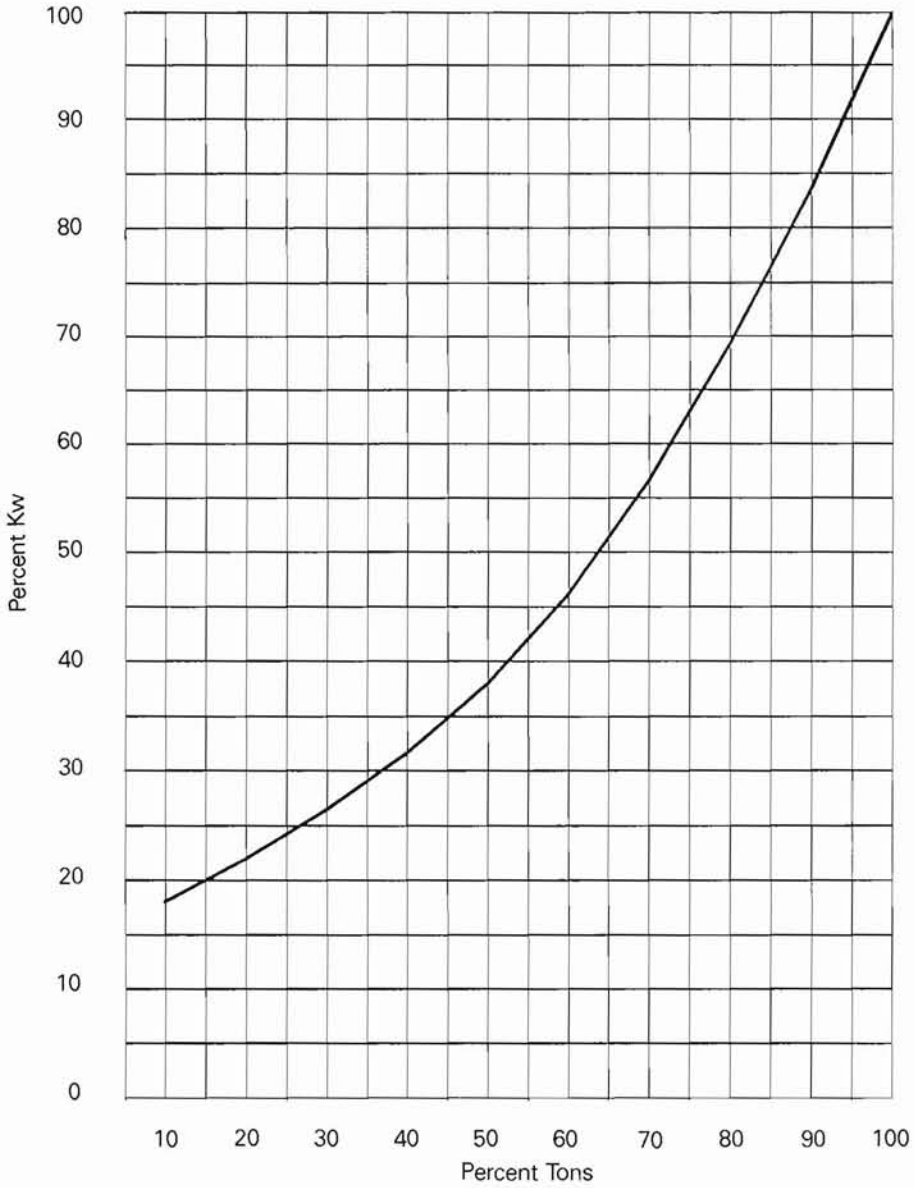
Selection Procedure

Part Load Performance

The Series R CenTraVac chiller possesses excellent part load performance characteristics. Air conditioning system loads are usually significantly less than full load design conditions. Therefore, the chillers operate at full load relatively little of the time. The Series R CenTraVac chiller can provide significant operating savings over centrifugal chillers.

Part load chiller operation is normally associated with reduced condenser water temperatures. At part load operation, the heat rejected to the cooling tower is less than at full load operation. Also, part load operation is typically associated with reduced outside wet bulb temperatures, resulting in improved cooling tower performance. The net result of less heat rejection and lower wet bulb temperature is cooler condenser water entering the chiller and improved unit performance. A representative load line is shown in Figure 7-1, which takes into account condenser water relief per ARI Standard 550 (2½ F per 10 percent unloading). To determine specific unit part load performance, use of the Series R CenTraVac chiller selection program is recommended.

Figure 7-1 — Typical Part Load Performance



Integrated Part Load Performance

The Integrated Part Load Value (IPLV) is a method of measuring total chiller performance over a defined range of part load conditions. This method was established by ARI and is included in ARI Standard 550. IPLV serves as a good method of comparing on equal basis, the part load efficiency of various chillers. The formula for calculating IPLV is defined as:

SI Metric Units

$$\begin{matrix} IPLV \\ or \\ APLV \end{matrix} = 0.17A + 0.39B + 0.33C + 0.11D$$

Where: A = COP at 100%
B = COP at 75%
C = COP at 50%
D = COP at 25%

U.S. Standard Units

$$\begin{matrix} IPLV \\ or \\ APLV \end{matrix} = \frac{1}{\frac{0.17}{A} + \frac{0.39}{B} + \frac{0.33}{C} + \frac{0.11}{D}}$$

Where: A = kW/ton at 100%
B = kW/ton at 75%
C = kW/ton at 50%
D = kW/ton at 25%

To approximate total energy requirements over a period of time, use of a computerized load and performance program that considers air conditioning load, machine performance, cooling tower performance and outside wet bulb temperature is suggested. The Trane TRACE® analysis program is particularly well suited for this type of calculation, as well as for economic evaluation of equipment and system alternatives.

Selection Example

The following selection uses performance examples in the following pages of the catalog. Additional chiller selections and performance information can be obtained through the use of the Series R CenTraVac chiller selection program, available through the local Trane sales office. All final selections should be made using the computer selection program.

Selection Procedure

Given:

Required Capacity	200 tons
Leaving Chilled Water Temperature	45 F
Chilled Water Temperature Drop	12 F
Entering Condenser Water Temperature	85 F
Condenser Water Flow	600 GPM
Condenser/Evaporator Fouling Factor	0.00025
Supply Voltage	460/60/3

1

From Table 14-1 on page 14, an RTHB 215 with standard length shells, 3 pass evaporator and 2 pass condenser at the given conditions will produce 200 tons at 142 Kw (.71 Kw/ton × 200 tons).

2

Evaporator GPM and pressure drop can be determined as follows:

$$GPM = \frac{Tons \times 24}{Chilled\ Water\ \Delta T} =$$

$$\frac{200 \times 24}{12} = 400\ Gpm$$

Evaporator pressure drop for 400 GPM from Chart 17-1 on page 17 is 11 feet of water.

3

Condenser pressure drop for 600 GPM from Chart 17-3 on page 17 is 14 feet of water.

Selection Summary:

Model	RTHB 215
Capacity	200 Tons
Power Input	142 Kw
Entering/Leaving Chilled Water Temperature	57/45 F
Evaporator Flow	400 GPM
Evaporator Pressure Drop	11 Feet
Entering Condenser Water Temperature	85 F
Condenser Water Flow	600 GPM
Condenser Pressure Drop	14 Feet
Condenser/Evaporator Fouling Factor	.00025
Supply Voltage	460/60/3
Rated Load Amps	200 Amps

Application Considerations

Condenser Water Limitations

Trane Series R® CenTraVac® chillers start and operate satisfactorily over a range of load conditions with uncontrolled entering condenser water temperature. Reducing the condenser water temperature is an effective method of lowering power input required. However, beyond certain limits, the effect of further lowering the condenser water temperature is a relative increase in power consumption. This is because as the slide valve closes and the compressor unloads, compressor efficiency is determined by several factors. The leaving chilled water temperature and the percent of load have the most direct impact on the optimum condenser water temperature. In general, continuous machine operation with entering condenser water temperature below 55 F is not recommended. When the entering condenser water temperature is expected to drop below 55 F, it is recommended that some form of condenser water temperature control be used to ensure optimum machine performance.

Water Treatment

The use of untreated or improperly treated water in chillers may result in scaling, erosion, corrosion, algae or slime. It is recommended that the services of a qualified water treatment specialist be engaged to determine what treatment, if any, is advisable. The Trane Company assumes no responsibility for the results of untreated, or improperly treated water.

Water Pumps

Avoid specifying or using 3600 rpm condenser water and chilled water pumps. Such pumps may operate with objectionable noises and vibrations. In addition, a low frequency beat may occur due to the slight difference in operating rpm between water pumps and Series R CenTraVac chiller motors. Where noise and vibration-free operation are important, The Trane Company encourages the use of 1750 rpm pumps.

Installation

Several Trane Engineering Bulletins are available to aid in installation. Refer to Trane Engineering Bulletin RLC-EB-3 for chiller sound ratings. Using the information provided in this engineering bulletin, contact a certified sound consultant to aid in proper mechanical room design and treatment. Refer to Trane Engineering Bulletin RLC-EB-6 for installation tips and considerations on chiller location, pipe isolation, etc.

Table 20-1 — Performance Examples (English)

Capacity Tons	Standard Shell	Long Shell	Extended Shell
250	RTHB 255 STD	RTHB 255 LONG	RTHB 255 EXTD
	.70 kW/ton	.65 kW/ton	.63 kW/ton
	EPD 11 ft.	EPD 14 ft.	EPD 8 ft.
	CPD 15 ft.	CPD 19 ft.	CPD 10 ft.
300	RTHB 300 STD	RTHB 300 LONG	RTHB 300 EXTD
	.68 kW/TON	.63 kW/TON	.61 kW/TON
	EPD 13 ft.	EPD 16 ft.	EPD 8 ft.
	CPD 16 ft.	CPD 21 ft.	CPD 11 ft.

Notes.

1. Performance is based on three-pass evaporator and two-pass condenser, .00025 fouling factor in the evaporator and condenser, 45 F evaporator water (2.0 gpm/ton), 85 F entering condenser water (3.0 gpm/ton).
2. The selections are representative. Chiller selections can be optimized through the use of the Series R CenTraVac selection program available throuhg the local Trane Sales Office.
3. EPD — evaporator pressure drop; CPD — condenser pressure drop
4. Rated in accordance with ARI standard 550-92.

Table 20-2 — Performance Examples (SI)

Capacity kW	Standard Shell	Long Shell	Extended Shell
880	RTHB 255 STD	RTHB 255 LONG	RTHB 255 EXTD
	5.03 COP	5.42 COP	5.59 COP
	EPD 32.9 kPA	EPD 41.9 kPA	EPD 23.9 kPA
	CPD 44.9 kPA	CPD 56.8 kPA	CPD 29.9 kPA
1056	RTHB 300 STD	RTHB 300 LONG	RTHB 300 EXTD
	5.18 COP	5.59 COP	5.77 COP
	EPD 38.9 kPA	EPD 47.8 kPA	EPD 23.9 kPA
	CPD 47.8 kPA	CPD 62.8 kPA	CPD 32.9 kPA

Notes:

1. Performance is based on three-pass evaporator and two-pass condenser, .00025 fouling factor in the evaporator and condenser, 7 C evaporator water (.0358 mL/J), 29 C entering condenser water (.0537 mL/J).
2. The selections are representative. Chiller selections can be optimized through the use of the Series R CenTraVac selection program available through the local Trane Sales Office.
3. EPD — evaporator pressure drop; CPD — condenser pressure drop
4. Rated in accordance with ARI standard 550-92.

Dimensions

	A		B		C		D	
Unit	English	Metric	English	Metric	English	Metric	English	Metric
255/300 Ton Standard	9' 1⅞"	2791 mm	7' 8"	2337 mm	3' 11¼"	1200 mm	6' 3⅞"	1926 mm
255/300 Ton Long	11' 7⅞"	3553 mm	10' 2"	3099 mm	3' 11¼"	1200 mm	6' 3⅞"	1926 mm
255/300 Ton Extd	12' 2½"	3723 mm	10' 2"	3099 mm	4' 11¾"	1519 mm	6' 6½"	1994 mm

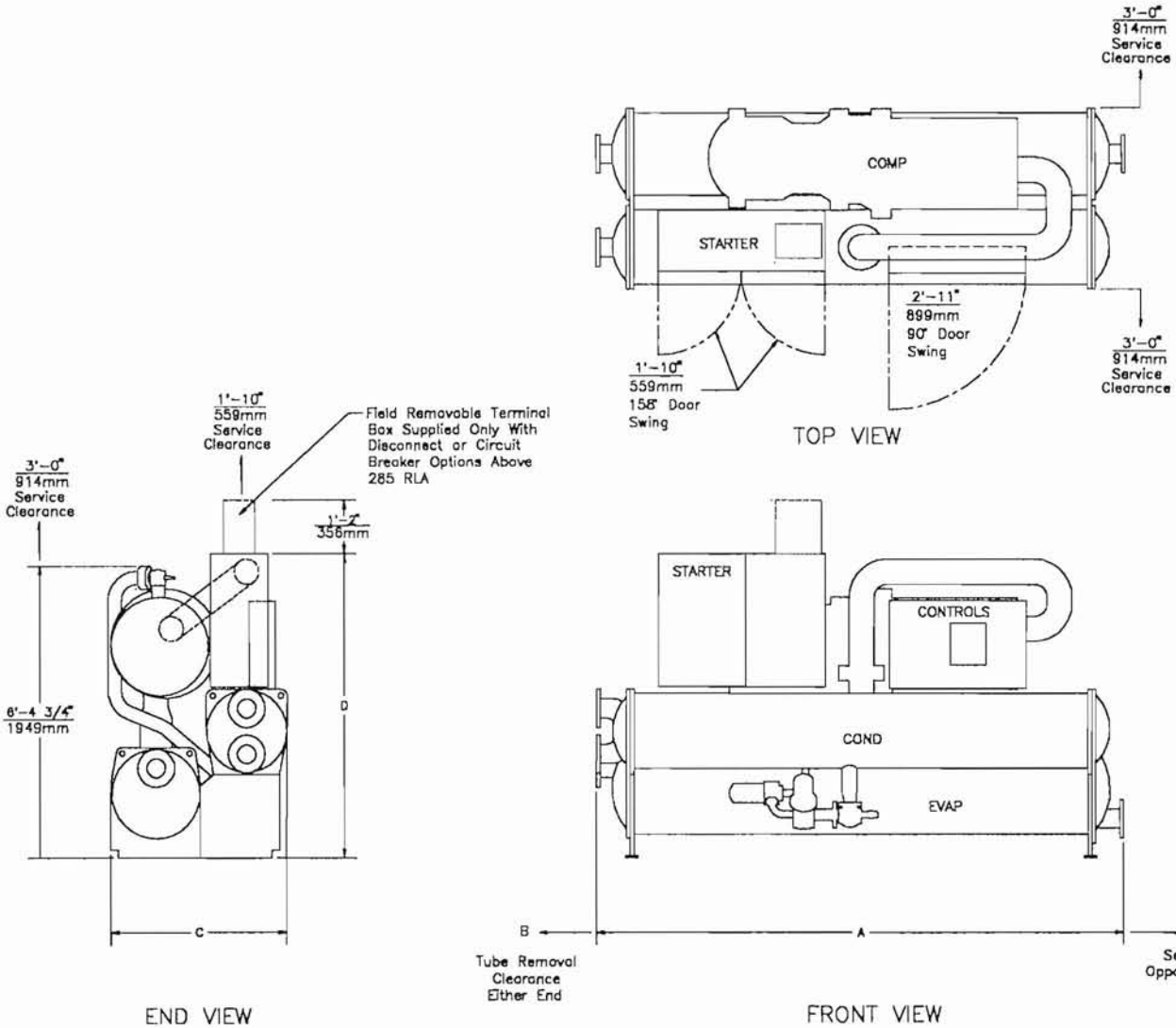


Table 22-1 — Electrical Data

Model	Nominal Motor Rating (kW)	Nominal Voltage / Voltage Utilization Range	60 Hz 200	60 Hz 230	60 Hz 380	60 Hz 460	60 Hz 575	Nominal Motor Rating (kW)	50 Hz 363	50 Hz 380	50 Hz 400	50 Hz 415
			180/220	207/253	342/418	414/506	518/632		327/399	342/418	360/440	374/457
RTHB 255	197	RLA	629	548	333	275	218	194	347	313	314	314
		MCA	787	685	416	342	273		434	392	393	393
		LRA	2969	2614	1645	1272	991		1358	1156	1220	1269
RTHB 300	226	RLA	714	624	378	312	253	224	398	360	361	361
		MCA	893	780	473	390	313		498	450	451	452
		LRA	3473	3197	1920	1590	1314		1735	1483	1565	1627

Notes:

1. RLA = Rated Load Amps.
   MCA = Minimum Circuit Ampacity is 125% of the compressor RLA per NEC 440-32 and 440-33.
   LRA = Locked Rotor Amps.
2. In all cases, the motor to be furnished must have a kW rating equal to or greater than the full load kW determined from the cataloged data or the Series R® CenTraVac® Computer selection Program.

Table 22-2 — General Data

		RTHB 255 Standard Shell	RTHB 255 Long Shell	RTHB 255 Extended Shell	RTHB 300 Standard Shell	RTHB 300 Long Shell	RTHB 300 Extended Shell
Refrigerant Type		R-22	R-22	R-22	R-22	R-22	R-22
Refrigerant Charge	(lb)	475	605	955	475	605	955
	(kg)	216	275	434	216	275	434
Oil Charge	(gal)	9.3	9.3	9.3	9.3	9.3	9.3
	(L)	35.0	35.0	35.0	35.0	35.0	35.0
Operating Weight	(lb)	10560	11815	15523	10652	11931	15615
	(kg)	4800	5370	7056	4842	5423	7098
Shipping Weight	(lb)	9934	10980	14255	9934	10980	14255
	(kg)	4515	4991	6480	4515	4991	6480

Table 22-3 — RTHB 255 Evaporator Data

		RTHB 255 Standard Shell 1 Pass	2 Pass	3 Pass	4 Pass	Long Shell 1 Pass	2 Pass	3 Pass	4 Pass	Extended Shell 1 Pass	2 Pass	3 Pass	4 Pass
Storage Capacity	(gal)	38	38	38	38	51	51	51	51	71	71	71	71
	(L)	144	144	144	144	193	193	193	193	269	269	269	269
Minimum Flow Rate	(GPM)	738	369	246	185	738	369	246	185	1080	540	360	270
	(L/s)	47	25	16	12	47	25	16	12	69	35	23	17
Maximum Flow Rate	(GPM)	2710	1355	903	677	2710	1355	903	677	3955	1978	1318	989
	(L/s)	171	84	57	43	171	84	57	43	253	127	84	63
Connection Size	(IN)	10	6	5	5	10	6	5	5	12	8	6	6

Table 22-4 — RTHB 300 Evaporator Data

		RTHB 300 Standard Shell 1 Pass	2 Pass	3 Pass	4 Pass	Long Shell 1 Pass	2 Pass	3 Pass	4 Pass	Extended Shell 1 Pass	2 Pass	3 Pass	4 Pass
Storage Capacity	(gal)	43	43	43	43	57	57	57	57	81	81	81	81
	(L)	163	163	163	163	216	216	216	216	307	307	307	307
Minimum Flow Rate	(GPM)	858	429	286	215	858	429	286	215	1234	618	412	309
	(L/s)	54	27	18	14	54	27	18	14	79	40	26	20
Maximum Flow Rate	(GPM)	3150	1575	1050	788	3150	1575	1050	788	4525	2262	1507	1130
	(L/s)	199	99	66	50	199	99	66	50	290	145	96	72
Connection Size	(IN)	10	6	5	5	10	5	5	5	12	8	6	6

Table 22-5 — Condenser Data

		RTHB 255 Standard Shell 2 Pass	Long Shell 2 Pass	Extended Shell 2 Pass	Standard Shell 3 Pass	Long Shell 3 Pass	Extended Shell 3 Pass	RTHB 300 Standard Shell 2 Pass	Long Shell 2 Pass	Extended Shell 2 Pass	Standard Shell 3 Pass	Long Shell 3 Pass	Extended Shell 3 Pass
Storage	(gal)	37	49	71	37	49	71	43	57	82	43	57	82
Capacity	(L)	140	185	269	140	185	269	163	216	310	163	216	310
Minimum Flow Rate	(GPM)	297	297	433	198	198	288	347	347	497	234	234	332
	(L/s)	19	19	28	13	13	18	22	22	32	15	15	21
Maximum Flow Rate	(GPM)	1089	1089	1585	731	731	1056	1272	1272	1822	854	854	1215
	(L/s)	69	69	101	46	46	68	80	80	117	54	54	78
Connection Size	(IN)	6	6	8	6	6	6	6	6	8	6	6	6

Water Pressure Drop Data

Chart 23-1 — Standard Length Evaporators

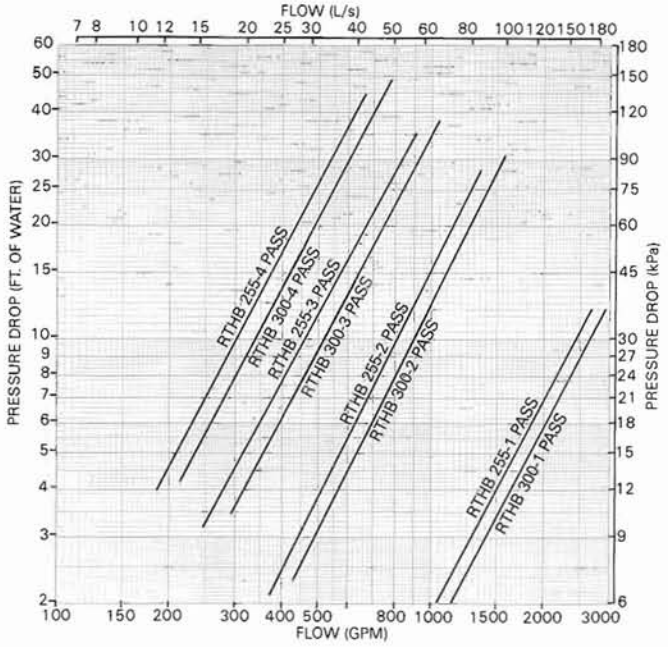
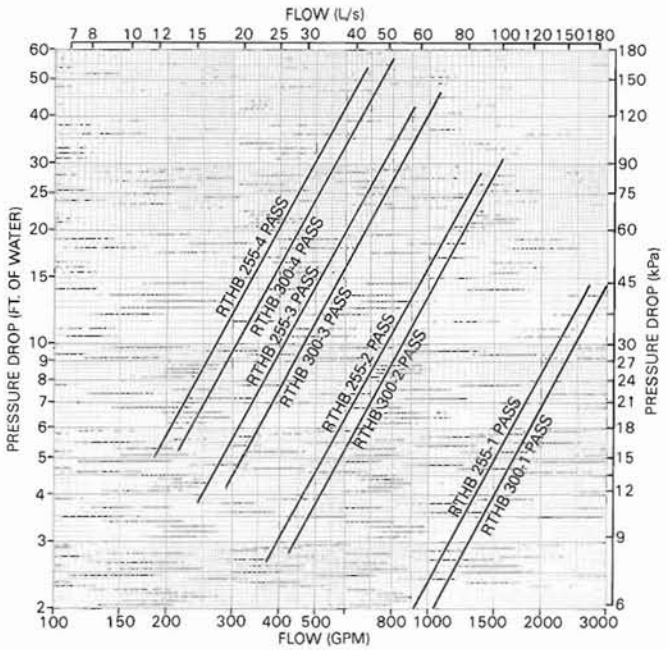


Chart 23-2 — Long Length Evaporators



Water Pressure Drop Data

Chart 24-1 — Standard Length Condensers

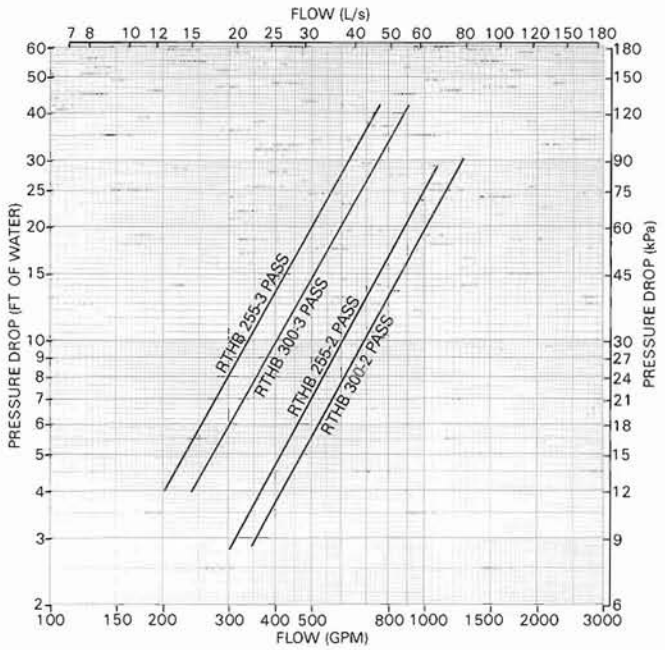
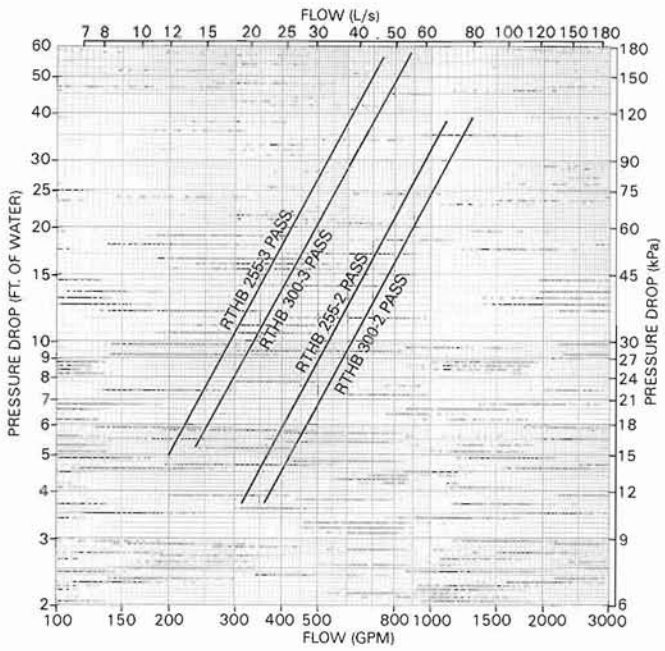


Chart 24-2 — Long Length Condensers



Water Pressure Drop Data

Chart 25-1 — Extended Length Evaporators

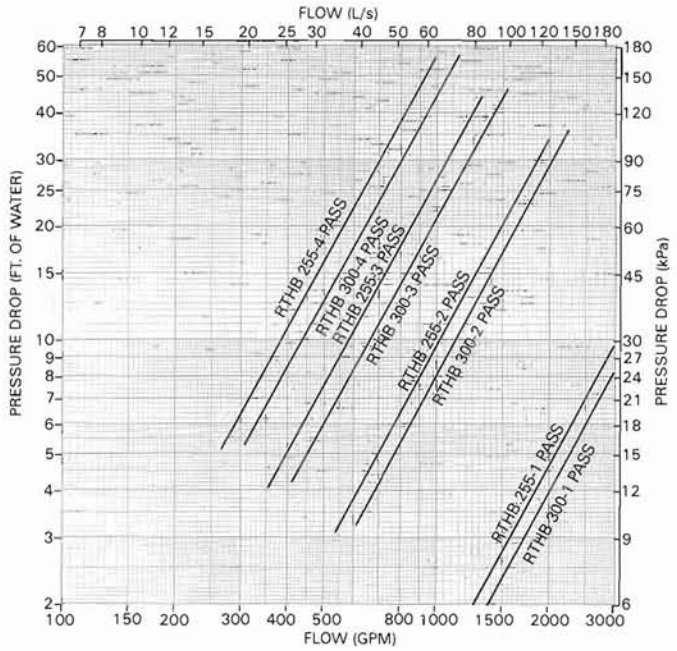
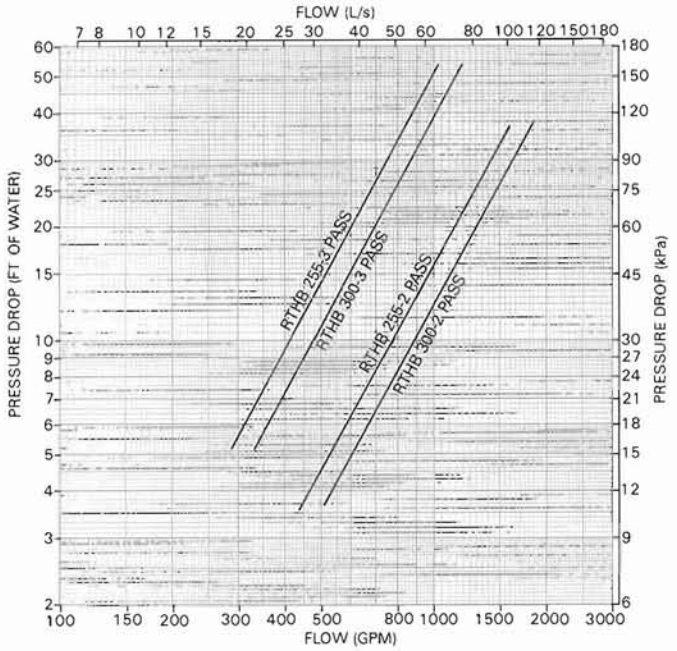


Chart 25-2 — Extended Length Condensers



NOTES:

1. DASHED LINES INDICATE FIELD WIRING BY OTHERS. PHANTOM LINES INDICATE ALTERNATE CIRCUITRY OR AVAILABLE SALES OPTIONS. CHECK SALES ORDER TO DETERMINE IF WIRING IS REQUIRED FOR SPECIFIC OPTIONS.
2. ALL FIELD WIRING SHALL BE IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND NATIONAL ELECTRICAL CODES.

(3) REQUIRED DEVICE AND/OR CIRCUITRY BY OTHERS

(4) REQUIRED DEVICE, AVAILABLE FROM TRANE, FIELD INSTALLED.

5. THE FOLLOWING CAPABILITIES ARE OPTIONAL AND ARE IMPLEMENTED AS REQUIRED FOR A SPECIFIC APPLICATION:

(A) FIELD INSTALLED ACCESSORY AVAILABLE FROM TRANE

(B) FIELD INSTALLED ACCESSORY FROM TRANE; REQUIRES UCP2 OPTIONS MODULE AND EITHER A TRACER OR A TRACER SUMMIT COMMUNICATIONS MODULE

(C) FIELD INSTALLED ACCESSORY AVAILABLE FROM TRANE, REQUIRES UCP2 REMOTE DISPLAY BUFFER.

(D) INTERFACE WITH TRACER SYSTEM REQUIRES UCP2 TRACER COMMUNICATIONS MODULE (COM 3).

(E) INTERFACE WITH TRACER SUMMIT SYSTEM REQUIRES UCP2 TRACER SUMMIT COMMUNICATIONS MODULE (COM 4).

(F) OPTIONAL DEVICE AND/OR CIRCUITRY BY OTHERS

(G) OPTIONAL DEVICE AND/OR CIRCUITRY BY OTHERS; REQUIRES UCP2 OPTIONS MODULE.

(H) OPTIONAL DEVICE AND/OR CIRCUITRY BY OTHERS, REQUIRES UCP2 PRINTER INTERFACE

(6) OPENING THE EXTERNAL AUTO-STOP CONTACT WILL INITIATE A SHUT DOWN SEQUENCE OF THE CHILLER. CLOSURE OF THE CONTACT WILL ALLOW THE CHILLER TO RETURN TO NORMAL AUTOMATIC OPERATION.

(7) AN OPENING OF THE EMERGENCY STOP CONTACT WILL SHUT THE CHILLER DOWN IMMEDIATELY AND TRIGGER AN EMERGENCY STOP INPUT DIAGNOSTIC. CLOSURE OF THE CONTACT AND A MANUAL RESET OF THE UNIT CONTROL DIAGNOSTIC WILL ALLOW THE CHILLER TO RETURN TO NORMAL OPERATION

GENERAL WIRING REQUIREMENTS AND PROVISIONS

8. DO NOT RUN LOW VOLTAGE WIRING (30 VOLT MAX) IN CONDUIT OR RACEWAY WITH HIGHER VOLTAGE WIRING.

(9) THE SEVEN 1/2" CONDUIT KNOCKOUTS AND ONE 1-1/4" KNOCKOUT LOCATED NEAR THE TOP OF THE RIGHT HAND SIDE OF THE CONTROL PANEL ARE FOR USE WITH LOW VOLTAGE, 30 VOLT CIRCUIT WIRING

(10) THE TWELVE 1/2" CONDUIT KNOCKOUTS LOCATED NEAR THE BOTTOM OF THE RIGHT HAND SIDE OF THE CONTROL PANEL ARE FOR USE WITH 115 VOLT CIRCUIT WIRING

REQUIRED WIRING:

(11) REFER TO THE UNIT NAMEPLATE AND TABLE 1 TO DETERMINE WIRE GAUGE, AS WELL AS NUMBER AND ARRANGEMENT OF CONDUCTORS AND CONDUIT. USE 600 VOLT COPPER CONDUCTORS ONLY. 200 TO 600 VOLT CIRCUIT. PROVIDE AN EQUIPMENT GROUND IN ACCORDANCE WITH APPLICABLE ELECTRIC CODES

(12) TWO 14 AWG, 600 VOLT CONDUCTORS, 115 VOLT CIRCUIT

(13) FOUR 14 AWG, 600 VOLT CONDUCTORS, 115 VOLT CIRCUIT, SEPARATE 115 Vac POWER IS REQUIRED TO STARTER.

OPTIONAL WIRING AS REQUIRED FOR A SPECIAL SYSTEM APPLICATION

(14) TWO 14 AWG, 600 VOLT CONDUCTORS, 30 VOLT CIRCUIT

(15) TWO 14-18 AWG,300 VOLT MINIMUM CONDUCTORS, 30 VOLT CIRCUIT MAXIMUM LENGTH IN FEET IS: 5000 FOR 14 AWG, 2000 FOR 16 AWG & 1000 FOR 18 AWG.

(16) TRANE ICS SHIELDED TWISTED PAIR COMMUNICATION CABLE, 14-18 AWG, 600V CABLE, 30 VOLT CIRCUIT. THE SUM TOTAL LENGTH OF ALL INTERCONNECTED CABLE SEGMENTS NOT TO EXCEED 5000 FEET. GROUND THE SHIELD AT THE TRACER END ONLY. REFER TO THE IOM FOR COMPLETE CABLE AND INSTALLATION REQUIREMENTS.

(17) SHIELDED TWISTED PAIR COMMUNICATION CABLE, 14-18 AWG, BELDON 8760 CABLE, 30 VOLT CIRCUIT, LENGTH NOT TO EXCEED 1500 FEET. GROUND SHIELD AT UNIT CONTROL PANEL END ONLY. REFER TO THE IOM FOR COMPLETE CABLE AND INSTALLATION REQUIREMENTS

(18) REFER TO REMOTE OPERATOR INTERFACE INSTALLATION MANUAL FOR CONNECTION DETAILS FOR TWO OR MORE CHILLERS

(19) RS232 INTERCONNECTION CABLE WITH 9 PIN SUB-D FEMALE CONNECTOR TO MATE WITH 1J7-J4 IN THE CONTROL PANEL AND A PRINTER COMPATIBLE CONNECTOR AT THE OTHER END. 600 VOLT CABLE, 30 VOLT CIRCUIT. LENGTH NOT TO EXCEED 50 FEET. THE CONTROL PANEL 1-1/4" KNOCKOUT IS PROVIDED FOR ENTRANCE OF THIS CABLE WHEN USED

(20) TWO 14 AWG, 600 VOLT CONDUCTORS, 115 VOLT CIRCUIT SEPARATE 115 Vac POWER IS REQUIRED

(21) TWO OR THREE 14 AWG, 600 VOLT CONDUCTORS, 115 VOLT CIRCUIT SEPARATE 115 Vac POWER IS REQUIRED

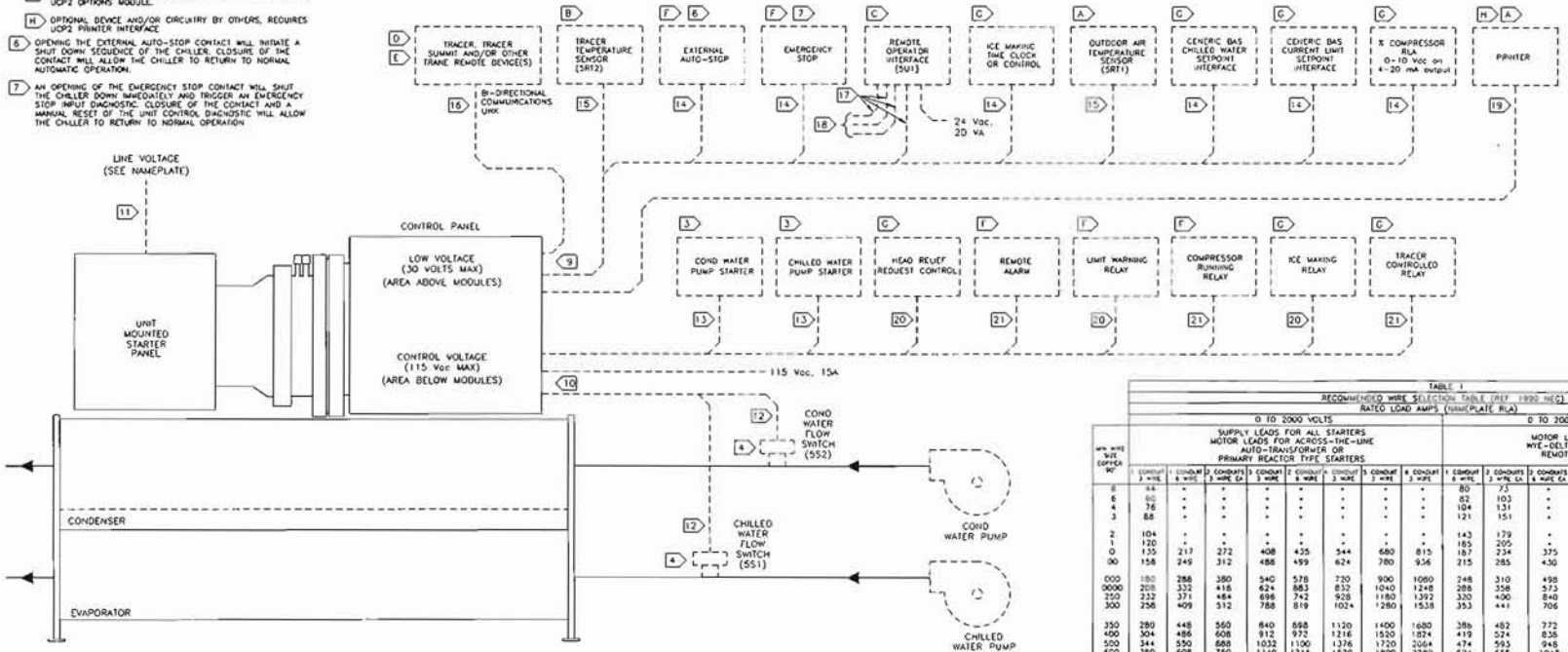


TABLE 1
RECOMMENDED WIRE SELECTION TABLE (REF 1990 NEC)
RATED LOAD AMPS (NAMEPLATE RLA)

MIN WIRE SIZE COPPER WG*	0 TO 2000 VOLTS SUPPLY LEADS FOR ALL STARTERS MOTOR LEADS FOR ACROSS-THE-LINE AUTO-TRANSFORMER OR PRIMARY REACTOR TYPE STARTERS								0 TO 2000 VOLTS MOTOR LEADS FOR WYE-DELTA STARTER REMOTE ONLY					
	1 CONDUIT 3 WIRE	1 CONDUIT 6 WIRE	2 CONDUITS 3 WIRE EA	3 CONDUIT 3 WIRE	2 CONDUITS 6 WIRE	3 CONDUITS 3 WIRE	5 CONDUIT 3 WIRE	6 CONDUIT 3 WIRE	1 CONDUIT 6 WIRE	2 CONDUITS 3 WIRE EA	2 CONDUITS 6 WIRE EA	3 CONDUITS 3 WIRE EA	3 CONDUITS 6 WIRE EA	4 CONDUITS 3 WIRE EA
8	64	*	*	*	*	*	*	*	80	73	*	*	*	*
6	80	*	*	*	*	*	*	*	82	103	*	*	*	*
4	76	*	*	*	*	*	*	*	104	131	*	*	*	*
3	88	*	*	*	*	*	*	*	121	151	*	*	*	*
2	104	*	*	*	*	*	*	*	143	179	*	*	*	*
1	120	*	*	*	*	*	*	*	185	205	*	*	*	*
0	135	217	272	408	435	544	680	815	187	234	375	468	582	703
00	158	249	312	486	499	624	780	936	215	285	430	537	645	806
000	180	288	380	540	578	720	900	1080	248	310	498	620	744	931
0000	208	332	416	624	883	832	1040	1248	288	358	573	717	880	1075
250	232	371	484	698	742	928	1180	1392	320	400	840	800	980	1200
300	256	409	512	788	819	1024	1280	1538	353	441	706	882	1059	1324
350	280	448	560	840	898	1120	1400	1680	386	482	772	965	1138	1448
400	304	486	608	812	972	1216	1520	1824	419	524	838	1048	1257	1572
500	344	550	688	1032	1100	1376	1720	2064	474	593	948	1188	1423	1779
600	380	608	760	1140	1216	1520	1800	2280	524	655	1048	1310	1572	1965

*CONDUCTORS TO THE STARTER AND MOTOR CONNECTED IN PARALLEL (ELECTRICALLY JOINED AT BOTH ENDS TO FORM A SINGLE CONDUCTOR) MUST BE SIZED #0(1/0) OR LARGER (NEC 310-4) EACH PHASE MUST BE EQUALLY REPRESENTED IN EACH CONDUIT

Microcomputer Controls

A microcomputer-based controller controls the Series R® CenTraVac® chiller. The microcomputer controller offers better control than with past types of controls and has new, important benefits.

Adaptive Control Microprocessor
The microcomputer-based controller allows Trane to optimize controls around the chiller application and the specific components used with the Series R CenTraVac chiller. For instance, the compressor protection system is specifically designed for the Series R CenTraVac chiller. A new leaving chilled temperature control algorithm maintains accurate temperature control, minimizes drift from setpoint and provides better building comfort. The microcomputer control incorporates improved chiller start-up and load limiting into standard operation. Interface with outside systems such as building automation controls is flexible and easy.

Unit Control Panel (UCP2)
Most conventional "relay logic" circuits have been replaced by software in the Series R CenTraVac microprocessor. The microprocessor performs unit control functions, limit functions, sequence of operation, compressor motor control, compressor motor protection, and the starter functions. Additionally, the microprocessor accepts external inputs from sensors and adjustment devices.

Adjustments and menus located on the two line by 40 character microprocessor display include three pre-programmed reports (compressor, refrigerant, and chiller) and one custom report that can be tailored to suit the individual owners' requirements. The compressor report displays all the key data necessary to monitor compressor operation. It will display data such as compressor running hours, number of starts, bearing temperatures, currents, voltages, power factor, kw draw , etc. The refrigerant report displays temperatures, pressures, superheats, expansion valve positioning, etc. The chiller report displays status, operating mode, all chiller temperatures and setpoints, current limit setpoints, etc. The custom report can be user-tailored to include any data from any of the three pre-programmed reports that the user feels is important to group together for any specific chiller operation.

Password protection is provided so that only those with authorized access may adjust chiller operating parameters. The operator and service personnel have password access to all the settings and setpoints required for chiller adjustment and maintenance. Service tests may be done on the chiller and allow override capabilities to simulate a test. With easy front panel programmability of Daily, Service Start-up and Machine Configuration settings and setpoints, the operator, service technician, and system designer can customize the use of the microcontroller to unique conditions of the chiller plant — whether the purpose of chilled water is for comfort cooling or for process cooling.

The modular structure of UCP2 makes it possible for the designer to select the system controls and associated interfaces to Tracer® (or other building automation systems) that are required for the chiller plant design. With this modular concept, capability can be added or upgraded at any time — with only temporary interruption of chilled water production. UCP2 is designed to have backward and forward compatibility with all generations of Trane equipment.

All data that is necessary for the safe operation and easy serviceability of the chiller is provided as standard on all CenTraVac® chillers. Options are available that provide additional controls/data that are required for: an industrial process design, applications outside of typical chilled water system design, the need for redundant machine protection, or the desire for more information.

Safety Controls
A centralized microcomputer offers a higher level of machine protection. Since the safety controls are smarter, they limit compressor operation to avoid compressor or evaporator failures, thereby minimizing nuisance shutdown. The unit control module (UCM) directly senses the control variables that govern the operation of the chiller; motor current draw, evaporator temperature, condenser temperature, etc. When any of the variables approaches a limit condition where the unit may be damaged or 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 and electronic expansion valve modulation. The UCM optimizes total chiller power consumption during normal operating conditions. During abnormal operating conditions, the UCM will continue to optimize chiller performance by taking the corrective action necessary to avoid shutdown. This keeps cooling capacity available until the problem can be solved.

Whenever possible, the chiller is allowed to perform its function; make chilled water. In addition, microcomputer controls allow for more types of protection such as under and over voltage. Overall the safety controls help keep the building running and out of trouble.

Monitoring And Diagnostics
Since the microcomputer provides all control functions, it can easily indicate such parameters as leaving chilled water temperature and percent RLA. If a failure does occur, one of over 90 individual diagnostics will indicate the problem, giving more specific information about the failure. All of the monitoring and diagnostic information is displayed directly on the microcomputer display.

Interface With The Trane Integrated Comfort™ System (ICS)
When the Series R CenTraVac Chiller is used in conjunction with a Trane Tracer® system, the unit can be monitored and controlled from a remote location. The Series R CenTraVac Chiller can be controlled to fit into the overall building automation strategy by using time-of-day scheduling, timed override, duty cycling, demand limiting, and chiller sequencing. A building owner can completely monitor the Series R CenTraVac Chiller from the Tracer system, as all of the monitoring information indicated on the microcomputer can be read off the Tracer system display. In addition, all the powerful diagnostic information can be read back at the Tracer system. Best of all, this powerful capability comes over a single twisted pair of wires!

(Continues on page 32)

Typical Wiring Diagrams

Model RTHB Chillers with Unit Mounted Starters

Microcomputer Controls

(Continued from page 31)

Interface With Other Control Systems
Series R® CenTraVac® chillers can interface with many different external control systems, from simple stand-alone units to ice making systems. For basic stand-alone applications, the interface with outside control is no different than for other Trane chillers. However the RTHB units have many features that can be used to interface with building control systems.

Standard Features

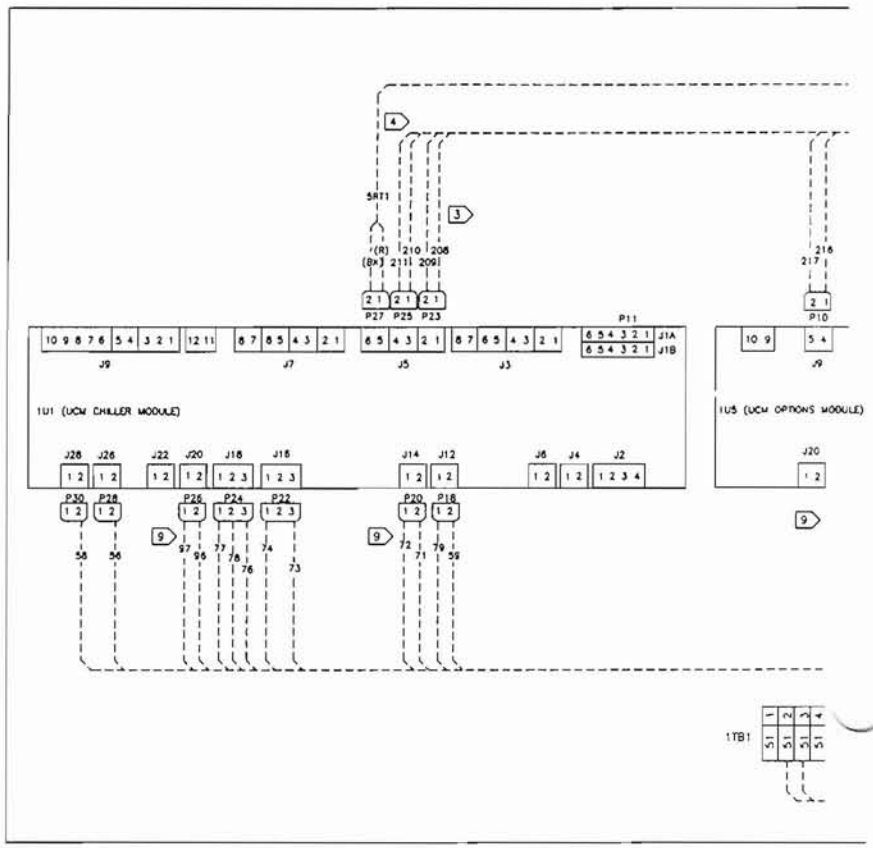
1
External Auto/Stop
A jobsite provided contact closure will turn the unit on and off.

2
Chilled Water and Condenser Water Pump Start
The RTHB has the capability to start both the chilled water and the condenser water pumps.

3
Chilled Water And Condenser Water Pump Interlock
A jobsite provided contact closure from a chilled water pump contactor, condenser water pump contactor or a flow switch will allow unit operation if a load exists. This feature will allow the unit to run in conjunction with the pump system.

4
External Interlock
A jobsite supplied contact opening wired to this input will turn the unit off and require a manual reset of the unit microcomputer. This closure is typically triggered by a jobsite supplied system such as a fire alarm.

5
Chilled Water Reset
Chilled water reset based on return water temperature.



NOTES:

1. DASHED LINES INDICATE RECOMMENDED FIELD WIRING BY OTHERS PHANTOM LINES INDICATE ALTERNATE CIRCUITRY OR AVAILABLE SALES OPTION. CHECK SALES ORDER TO DETERMINE IF WIRING IS REQUIRED FOR SPECIFIC OPTIONS.
2. ALL FIELD WIRING MUST BE IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (NEC). STATE AND LOCAL REQUIREMENTS. OTHER COUNTRIES APPLICABLE NATIONAL AND/ OR LOCAL REQUIREMENTS SHALL APPLY.

(3) P23 TERMINALS 1 & 2 (1U1J5-1 AND -2) MUST BE JUMPERED IF NOT USED.

(4) P25 TERMINALS 1 & 2 (1U1J5-3 AND -4) MUST BE JUMPERED IF NOT USED.

(5) RETIGHTEN TERMINALS A MINIMUM OF 24 HOURS AFTER INITIAL INSTALLATION. DO NOT OVER TIGHTEN.

(6) COPPER WIRE, SIZED PER NEC, BASED ON UNIT NAMEPLATE MCA (MINIMUM CIRCUIT AMPACITY). PHASING OF 3 PHASE INPUT: L1 TO A, L2 TO B, L3 TO C WHERE ABC REPRESENTS STANDARD PHASE ROTATION.

(7) 30V OR LESS #14-18 AWG 600V WIRE. DO NOT RUN IN CONDUIT WITH HIGHER VOLTAGE WIRE.

(8) 115V AC, #14 AWG 600V WIRE.

(9) FIELD WIRED ELECTRICAL LOADS ARE NOT TO EXCEED 120VAC/240VA FOR CONNECTIONS AT TERMINALS 1U1J12-1,2; 1U1J14-1,2; 1U1J16-1,3; 1U1J18-1,2,3; 1U1J20-1,2; 1U5J12-1,2; 1U5J18-1,3; AND 1U5J8-1,2.

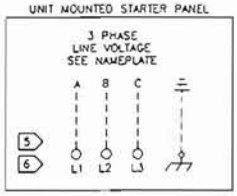
(10) NEGATIVE SIGNAL INPUTS ARE GROUNDED TO UCP2 ENCLOSURE. FOR CORRECT OPERATION, EXTERNAL EQUIPMENT SIGNALS SHALL BE ISOLATED OR FLOATING WITH RESPECT TO UCP2 ELECTRICAL SERVICE GROUND AND ISOLATED FROM EACH OTHER. SPECIAL CONSIDERATION MUST BE GIVEN TO 4-20 MA SIGNALS. IF THE CURRENT SOURCE REGULATES CURRENT FLOW ON THE NEGATIVE LEAD, USE A SEPERATE POWER SUPPLY FOR EACH CHANNEL. IN SOME APPLICATIONS IT MAY BE NECESSARY TO INSTALL A LOOP ISOLATOR IN EACH CHANNEL TO PREVENT LOOP INTERFERENCE.

(11) USE TWISTED SHIELDED PAIR 18 AWG WIRE. CONSULT SALES OFFICE FOR SELECTION.

(12) 9 PIN SUB.D RS 232 CONNECTION. REFER TO IOM FOR ADDED REQUIREMENTS.

(13) CONTACTS TO BE SUITABLE FOR USE WITH 24 Vdc, 12ma CIRCUIT.

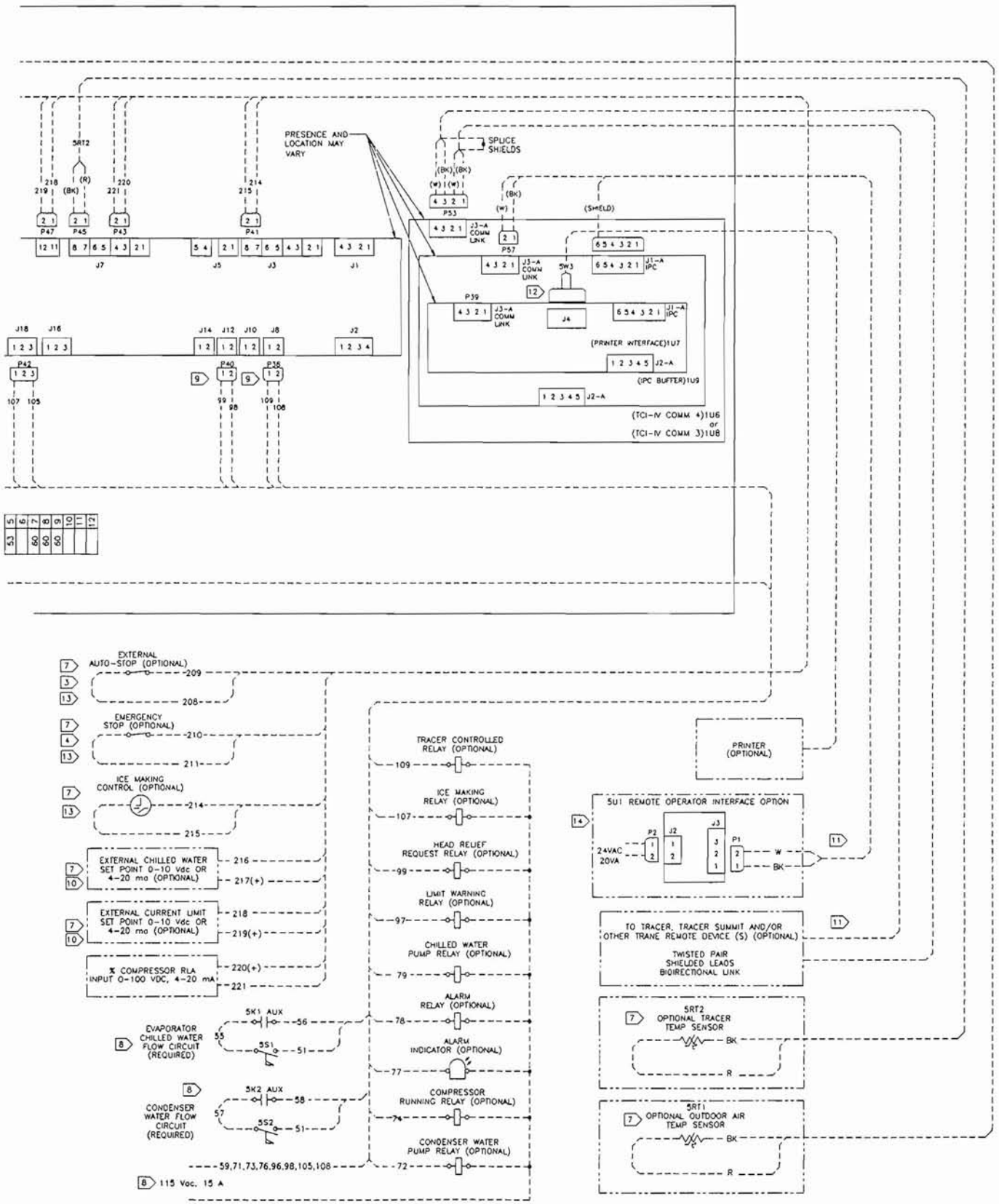
(14) REFER TO REMOTE OPERATOR INTERFACE INSTALLATION MANUAL FOR CONNECTION DETAIL FOR TWO OR MORE CHILLERS.



⚠ WARNING
HAZARDOUS VOLTAGE!
DISCONNECT ALL ELECTRIC POWER INCLUDING REMOTE DISCONNECTS BEFORE SERVICING.
FAILURE TO DISCONNECT POWER BEFORE SERVICING CAN CAUSE SEVERE PERSONAL INJURY OR DEATH.

⚠ AVERTISSEMENT
VOLTAGE HASARDEUX!
DECONNECTEZ TOUTES LES SOURCES ELECTRIQUES INCLUANT LES DISJONCTEURS SITUES A DISTANCE AVANT D'EFFECTUER L'ENTRETIEN.
FAUTE DE DECONNECTER LA SOURCE ELECTRIQUE AVANT D'EFFECTUER L'ENTRETIEN PEUT ENTRAINER DES BLESSURES CORPORELLES SEVERES OU LA MORT.

IMPORTANT
USE COPPER CONDUCTORS ONLY TO PREVENT EQUIPMENT DAMAGE. UNIT TERMINALS ARE NOT DESIGNED TO ACCEPT ANY OTHER WIRING.


PRESENCE AND LOCATION MAY VARY
SPLICE SHIELDS
5RT2
(TCI-IV COMM 4)1U6 or (TCI-IV COMM 3)1U8
(PRINTER INTERFACE)1U7
(IPC BUFFER)1U9
EXTERNAL AUTO-STOP (OPTIONAL)
EMERGENCY STOP (OPTIONAL)
ICE MAKING CONTROL (OPTIONAL)
EXTERNAL CHILLED WATER SET POINT 0-10 Vdc OR 4-20 ma (OPTIONAL)
EXTERNAL CURRENT LIMIT SET POINT 0-10 Vdc OR 4-20 ma (OPTIONAL)
% COMPRESSOR RLA INPUT 0-100 VDC, 4-20 mA
EVAPORATOR CHILLED WATER FLOW CIRCUIT (REQUIRED)
CONDENSER WATER FLOW CIRCUIT (REQUIRED)
TRACER CONTROLLED RELAY (OPTIONAL)
ICE MAKING RELAY (OPTIONAL)
HEAD RELIEF REQUEST RELAY (OPTIONAL)
LIMIT WARNING RELAY (OPTIONAL)
CHILLED WATER PUMP RELAY (OPTIONAL)
ALARM RELAY (OPTIONAL)
ALARM INDICATOR (OPTIONAL)
COMPRESSOR RUNNING RELAY (OPTIONAL)
CONDENSER WATER PUMP RELAY (OPTIONAL)
115 Vac, 15 A
PRINTER (OPTIONAL)
5U1 REMOTE OPERATOR INTERFACE OPTION
24VAC 20VA
TO TRACER, TRACER SUMMIT AND/OR OTHER TRANE REMOTE DEVICE (S) (OPTIONAL)
TWISTED PAIR SHIELDED LEADS BIDIRECTIONAL LINK
5RT2 OPTIONAL TRACER TEMP SENSOR
5RT1 OPTIONAL OUTDOOR AIR TEMP SENSOR

Features Summary

The Series R® CenTraVac® Helirotor™ Compressor

- Direct drive, low speed for high efficiency, high reliability.
- Simple design for high reliability — only two rotating parts.
- Optimized compressor parts profiles designed specifically for chilled water applications to assure maximum performance and efficiency.
- Precise rotor tip clearance for optimal efficiency.
- Class 5 bearings commonly used only for applications such as machine tool spindles and jet aircraft engines.
- Liquid refrigerant cooled motor. Motor stays uniformly cool at lower temperatures for longer motor life.
- Oil separator with no moving parts eliminates need for elaborate oil return system.
- Years of research and testing. The Helirotor compressor has amassed thousands of hours of testing, much of it at severe operating conditions beyond normal air conditioning operating applications.
- Proven reliable field operation has been shown in thousands of successful installations.

Electronic Expansion Valve/Fixed Orifice Refrigerant Metering System

- Less moving parts for higher reliability and wider range of stable operation.

Full Economizer Refrigerant Cycle

- Economizer improves refrigeration cycle efficiency an average of four percent over cycles without an economizer.

Installation Ease and Flexibility

- Compact size makes the Series R CenTraVac chiller ideal for almost any job; new or renovation.
- Separable shell option enables chiller to be broken down into individual components for the tightest job space requirements.

Microprocessor Controls

- Microprocessor based Unit Control Panel (UCP2) monitors and controls chiller operation and associated sensors, actuators, relays and switches, all factory assembled and tested.
- Easy to read two line by forty character display.

Sentinel™ Charge Monitoring System

- Early detection and warning of refrigerant loss is provided through the unit control panel UCP2.

Other Standard Features Include:

- Full factory refrigerant and oil charge (See note below for separable shell option)
- Flanged evaporator and condenser connections
- Start-up by factory trained service personnel
- Control power transformer
- Individually replaceable evaporator and condenser tubes
- Individual amp draw per phase displayed on UCM
- Sensing and display of all water and refrigerant temperatures and pressures
- Chilled water reset based on return water

Options

- ¾" Armaflex II or equal insulation
- Isolation valve to store the full charge of refrigerant in the condenser
- Trane Integrated Comfort™ system communication
- Generic building automation systems (BAS) interfaces
- Remote Clear Language display
- Chilled water reset based on air temperature
- External current limit setpoint control
- Volts display per phase
- Circuit breaker
- Mechanical disconnect
- Standard ice making
- Low temperature process cooling
- Separable shells (Units ordered without refrigerant isolation valve option will be shipped less refrigerant)
- Marine water boxes
- Spring isolators

Mechanical Specifications

General
Exposed metal surfaces are painted with an air-dry beige primer-finisher prior to shipment. Each unit ships with a full operating charge of refrigerant and oil. (Separable shell units may be shipped with or without refrigerant. See note under options section.) Molded neoprene isolation pads are supplied for placement under all support points. Start-up and operator instruction by factory trained service personnel is included.

Compressor-Motor
Semihermetic, direct-drive, 3600 rpm, rotary compressor with: capacity control slide valve, integral single-stage economizer, oil sump heater and differential pressure refrigerant oil flow system. Four pressure lubricated rolling element bearing groups support the rotating assembly.

Motor is a liquid refrigerant cooled, hermetically sealed, two-pole, squirrel cage induction motor.

Evaporator-Condenser
Shells are carbon steel plate. Evaporator and condenser are designed, tested and stamped in accordance with ASME Code for refrigerant side working pressure of 300 psig.

All tube sheets are carbon steel. Evaporator and condenser tubes are individually replaceable. Standard tubes are externally finned, internally enhanced seamless copper with lands at all tube sheets. Evaporator tubes are 1" diameter. Condenser tubes are ¾" diameter. Tubes are mechanically expanded into tube sheets. Condenser tubes are mechanically fastened to tube supports. Condenser baffle prevents direct impingement of compressor discharge gas upon the tubes.

All water pass arrangements are available in either flat-faced flange (150 or 300 psig waterside) or marine configuration with grooved connections (300 psig waterside). All connections may be either right or left handed. Waterside is hydrostatically tested at 1½ times design working pressure, but not less than 225 psig.

Refrigerant Circuit
A multiple orifice control system consisting of an electronically controlled expansion valve and a fixed orifice, maintains proper refrigerant flow.

Control Panel
Factory mounted microprocessor-based control panel. Automatic shutdown protection with manual reset is provided for low evaporator refrigerant temperature and pressure, high condenser refrigerant pressure, loss of condenser water flow, high motor temperature, low oil flow, motor current overload, phase reversal, phase loss, and severe phase imbalance. Automatic shutdown protection with automatic reset when condition is corrected is provided for loss of chilled water flow, high compressor discharge temperature, under/over voltage, and momentary power loss.

Sentinel™ Charge Monitoring System provides early detection and warning of refrigerant loss.

Microprocessor based chilled water reset based on return water is standard.

The unit control module (UCM) utilizing the Adaptive Control™ microprocessor automatically takes action to prevent unit shutdown due to abnormal operating conditions associated with low evaporator refrigerant temperature, high condensing temperature, and motor current overload. If the abnormal operating condition continues and the protective limit is reached, the machine will be shut down.

Clear Language Display Panel (UCM)
Factory mounted to the door of the control panel, the operator interface has a 16 button keypad for operator input and a two line by 40 character display screen. A chiller report, refrigerant report, compressor report, an operator configurable custom report, operator settings, service settings, service tests, and diagnostics may be accessed by pressing the appropriate button. All diagnostics and messages are displayed in "clear language."

Starter
NEMA 1 enclosure with top power wiring access and three-phase solid-state overload protection. Starters are available in Wye-Delta, Autotransformer (remote mounted only), and Across-the-line configurations. Starters are available in either remote mounted or unit mounted models (some voltage and tonnage restrictions apply to unit mounted starters). Factory installed and wired 1KVA control power transformer provides all unit control power (120 volt secondary). Optional starter features include: Circuit breakers and mechanical non-fused disconnects. Ammeters, three each, mounted on starter door available on remote starters only. (On unit mounted starters, ammeter is part of standard micro display.)

OPTIONS:
Insulation: All low temperature surfaces are covered with ¾ inch Armaflex II or equal (k = 0.28), including the evaporator, water boxes and economizer lines.

Refrigerant Isolation Valve: Provide means of isolating refrigerant charge in the condenser during servicing.

Communications: Tracer® communications are available for Tracer (Comm 3) or Tracer Summit (Comm 4) (Generic building automation system communications requires options module.)

Options Module: Accepts generic Building Automation System inputs for current limit setpoint and chilled water setpoint via 2-10 VDC or 4-20 mA. Outputs a 2-10 VDC or 4-20 mA signal to Generic BAS to monitor compressor % RLA. Outputs a binary signal to Generic BAS for use with condenser limit control. Allows remote enable/disable of ice making operation. (Ice making requires options module.)

Separable Shells: Allow chiller disassembly into individual components for tight installation requirements. (Isolation valves must be ordered separately if refrigerant is required to ship with unit.)

Remote Clear Language Display Panel: Allows chiller enable/disable, chilled water setpoint adjustment, current limit setpoint adjustment and monitoring of microprocessor diagnostics. Certain latching diagnostics must be reset at the chiller control panel. Up to four chillers can function through a single remote clear language display panel. This option requires that a Remote CLD Interface Module be ordered with each chiller.

Remote CLD Interface Module: Required on each chiller for communication between UCP2 and Remote Clear Language Display.

Printer Interface Module: Allows a printer to be directly connected to the UCP2 via an RS-232 port.

Under/over Voltage Protection: Volts display on micro.

Marine Water Boxes: Allow easy access for tube cleaning.

Condenser Tubes: Smooth bore copper, smooth bore 90/10, cupro-nickel.

Evaporator Tubes: Smooth bore copper.

Icemaking Controls: Icemaking thermal storage can be utilized at night for reduced peak electrical demand. (Requires Options Module.)

Chilled water reset based on outdoor air temperature.

OPTIONS:

Insulation
All low temperature surfaces are covered with ¾-inch Armaflex II or equal (K = 0.28), including the evaporator, water boxes, and economizer lines.

Smooth Bore Condenser And Evaporator Tubes
Smooth bore copper tubes are available for high fouling water applications. Smooth bore condenser tubes are ¾" diameter. Smooth bore evaporator tubes are 1" diameter. Both are .035 WOF.

Cupro-Nickel Tubes (Condenser Only)
Cupro-nickel tubes (condenser only) are available for special applications on standard ship cycles. 90/10 cupro-nickel tubes are ¾" diameter and .035 WOF.

Marine Water Boxes
Allows for easy cleaning and maintenance of both the evaporator and condenser tubes by providing an easy access without removal of water piping.

Standard Ice Making
Controls and safeties to allow operation with brine temperatures greater than or equal to 20 F. Includes dual setpoints for ice making capability and daytime comfort cooling. A typical application would include Climatice™ ice storage system with daytime chiller operation above 40 F. (Requires Options Module.)

Separable Shells
This option gives the installer the flexibility of taking apart the unit, reducing the overall weight and size, and making installation much easier. Units ship assembled, with or without refrigerant. Units ordered without refrigerant isolation valve option will be shipped less refrigerant.

Options Module
Accepts generic Building Automation System inputs for current limit setpoint and chilled water setpoint via 2-10 VDC or 4-20 mA. Outputs a 2-10 VDC or 4-20 mA signal to Generic BAS to monitor compressor % RLA. Outputs a binary signal to Generic BAS for use with condenser limit control. Allows remote enable/disable of ice making operation. (Ice making requires options module.)

Communications
Tracer® communications are available for Tracer (Comm 3) or Tracer Summit (Comm 4). (Generic Building Automation System communications requires Options Module.)

Remote Clear Language Display Panel
Allows chiller enable/disable, chilled water setpoint adjustment, current limit setpoint adjustment and monitoring of microprocessor diagnostics. Certain latching diagnostics must be reset at the chiller control panel. Up to four chillers can function through a single remote clear language display panel. This option requires that a Remote CLD Interface Module be ordered with each chiller.

Remote CLD Interface Module
Required on each chiller for communication between UCP2 and Remote Clear Language Display.

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An American-Standard Company

Library	**Product Literature**
Product Section	**Refrigeration**
Product	**Rotary Liquid Chillers**
Model	**000**
Literature Type	**Data Sales Catalog**