



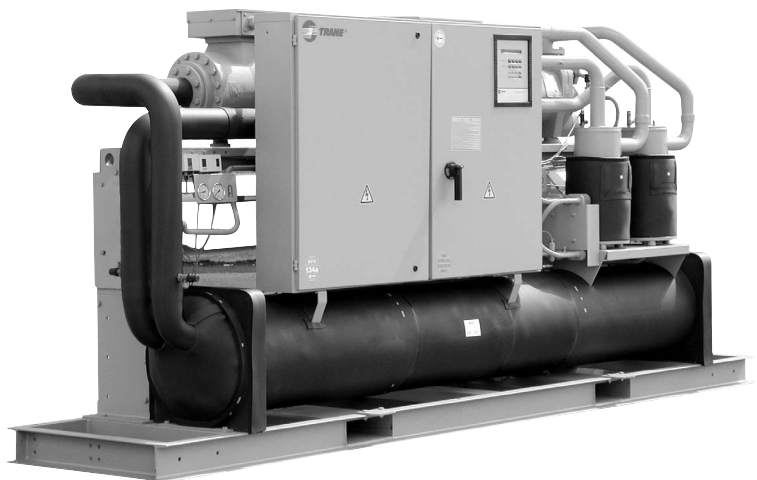
Series R™ Helical-Rotary Liquid Chillers

Model RTWB 207-224

200-700 kW

Condenserless Model RTUB 207-224

200-700 kW



RLC-PRC002-E4



Introduction

The RTWB and RTUB offer high reliability, ease of installation, and energy efficiency due to advanced design, a low speed/direct-drive compressor and proven Series R chiller performance.

The main characteristics are:

- High reliability
- High energy efficiency
- Quiet operation
- Compact size
- Bolted construction
- Dual independent refrigerant circuits
- Adaptive Control™ unit control module

The Series R™ helical-rotary chiller is an industrial-grade design. It is ideal for office buildings, hospitals, retailers, and industrial applications.

Contents

Introduction	2
Features and Benefits	4
Application Considerations	5
Selection Procedure	7
Model Number Description	9
Performance Data	10
General Data	12
Controls	14
Electrical Data and Connections	16
Job Site Connections	17
Dimensions and Weights	20
Mechanical Specifications	22
Options	24

Features and Benefits

Unequaled reliability

The RTWB and RTUB units use the new Trane helical-rotary screw compressors. These compressors were designed, tested, and built to the same rugged standards as the larger Series R™ compressors.

Trane helical-rotary compressor

- Direct-drive, low speed for high efficiency and high reliability.
- Simple design with only four moving parts, resulting in high reliability and low maintenance.
- Precise rotor-tip clearance for optimal efficiency
- Suction-gas-cooled motor. The motor operates at lower temperatures for longer motor life
- Years of research and testing. The Trane helical-rotary compressor has amassed thousands of hours of testing, much of it at severe operating conditions beyond normal air-conditioning applications.
- Proven track record. The Trane Company is the world's largest manufacturer of large helical-rotary compressors. Over 70000 commercial and industrial installations worldwide have proven that the Trane helical-rotary compressor has an average reliability rate of 99.5% in the first year of operation.
- Only four moving parts. Each helical-rotary compressor used has only four moving parts: the two rotor, a variable unloader valve, and a step unloader valve. Capacity control is achieved by modulation of the load/unloader valves. Unlike reciprocating compressors, The Trane helical-rotary compressor does not have pistons, suction and discharge valves or a mechanical oil pump. In fact a typical reciprocating compressor has 15 times as many critical parts as the Series R compressor. Fewer moving parts increases reliability and endurance.
- Resistance to liquid slugging. The robust design of the Series R compressor allows it to ingest amounts of liquid refrigerant that would severely damage reciprocating compressor valves, piston and cylinders.

Superior control

- Unit Control Module. Trane's Adaptive Control™ microprocessor control system enhances the Series R chiller by providing the latest chiller control technology. An improved easy-to-use operator interface panel displays all operating and safety diagnostics. Adaptive Control microprocessor features shut down the chiller only if absolutely necessary. The Unit Control Module (UCM) anticipates potential problems and initiates corrective actions to prevent nuisance tripouts.

Adaptive Control™ microprocessor.

The Adaptive Control microprocessor employs the most advanced microprocessor controls available on any packaged water chiller in the marketplace. How does it operate? The Unit Control Module (UCM) directly senses the control variables that govern the operation of the chiller: motor current draw, evaporator temperature, and condenser temperature. When any of the variables approach a limiting condition where the unit may be shutdown, the UCM takes corrective action to avoid shutdown and keep the chiller operating.

This is achieved through the combined actions of compressor unloader valves and electronic expansion-valve modulation. Additionally, the UCM optimizes total unit power consumption during normal operating conditions. No other chiller control system in the marketplace duplicates this performances.

Compact size

- Designed with the retrofit and replacement market in mind.
- Fits through standard single-width doors.
- Bolt-together construction for easy unit disassembly.
- Small footprint saves valuable equipment-room space.

Easy installation

- Simplified piping; the only piping required is for the evaporator and condenser
- Single power connection.
- Extensive factory testing
- Full factory refrigerant charge and oil charge.

Application Considerations

Condenser Water Limitation (RTWB only)

The RTWB starts and operate satisfactorily over a wide range of load conditions with controlled entering condenser water temperature. Reducing the condenser water temperature is an effective method of lowering the power input to the compressors. The optimum condenser water temperature is related to the leaving chilled water temperature and the percentage of load on the chiller. Nevertheless it is required to maintain a minimum temperature differential of 18°C between the leaving chilled water temperature and the leaving condenser temperature. This minimum temperature differential must be reached within 2 minutes from start-up and maintained thereafter.

Furthermore, the entering condenser water temperature should never drop below 20°C, whatever the other operating conditions of the chiller.

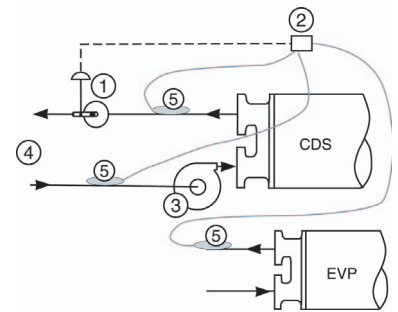
When one of these 2 parameters is expected to drop below the limit stated here above, even at start up, it is required that some form of condenser water temperature control be implemented to satisfy compressor safety and to ensure optimum chiller performance.

There are numerous methods to control condenser water temperature. Methods other than those shown can be employed to achieve the same results. Contact your local Trane office for details. Contact the manufacturer of the cooling device for compatibility with variable waterflow.

Throttling valve

This method maintains condensing pressure and temperature by throttling water flow leaving the condenser in response to condenser pressure or system differential pressures.

Figure 1



- 1 = 2-way valve
- 2 = Customer controller
- 3 = Condenser water pump
- 4 = To/from cooling device
- 5 = Temperature sensor

Advantages:

- Good control with proper valve sizing at relatively low cost.
- Pumping cost can be reduced.

Disadvantages:

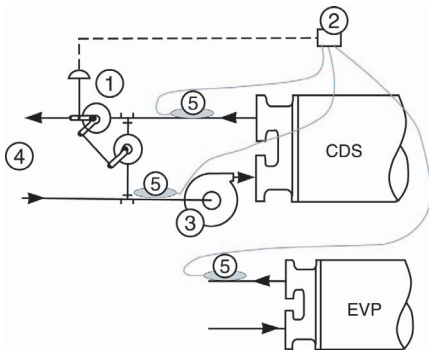
- Increased rate of fouling due to lower condenser water velocity.
- Requires pumps that can accommodate variable flow.

Application Considerations

Cooling device bypass

Cooling device bypass is also a valid control method if the chiller temperature requirements can be maintained.

Figure 2



- 1 = 3-way valve or 2 2-way valves
- 2 = Customer controller
- 3 = Condenser water pump
- 4 = To/from cooling device
- 5 = Temperature sensor

Advantage:

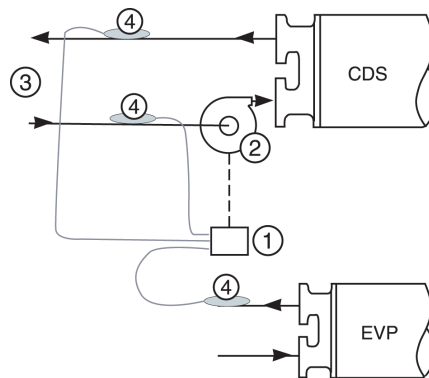
- Excellent control by maintaining constant water flow through the condenser.

Disadvantage:

- Higher cost because of the dedicated pump required for each chiller if condenser pressure is the control signal.

Condenser water pump with variable frequency drive

Figure 3



- 1 = Customer controller
- 2 = Condenser water pump with VFD
- 3 = To/from cooling device
- 4 = Temperature sensor

Advantages:

- Pumping cost can be reduced. Good cooling device temperature control.
- Relatively low first cost.

Disadvantages:

- Increased rate of fouling due to lower water velocity in the condenser.

Water treatment

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

Selection Procedure - RTWB

Performance

The performance examples, on the following pages provide performance information at various capacities for the most common water temperatures. The stated cooling capacity is based on a water-temperature difference between the evaporator inlet and outlet of 5°C and a difference of 5°C between the inlet and the outlet of the condenser. The capacity ratings are applicable to a temperature drop within 4 to 8°C except as limited by the minimum or maximum water-flow rates as indicated by the heat exchanger's hydraulic resistance table. All capacities are based on a fouling factors of 0.044 m²K/kW for both evaporator and condenser-watersides. If a different fouling factor is used, the unit capacity will vary. For conditions that are not directly tabulated, direct interpolation may be used. Extrapolation is not permitted.

For determining, the cooling capacity and the power input the following information is needed:

- the required cooling capacity
- the inlet and outlet evaporator-water temperature
- the inlet and outlet condenser-water temperature

The evaporator-water flow can be determined by using the formula:

Evaporator water flow (liter/second) =

$$\frac{\text{Cooling capacity} \times 0.239}{\text{Evaporator inlet } (^{\circ}\text{C}) - \text{Evaporator outlet } (^{\circ}\text{C})}$$

The condenser-water flow can be determined by using the formula:

Condenser-water flow (liter/second) =

$$\frac{(\text{Cooling capacity} + \text{Power input}) \times 0.239}{\text{Condenser outlet } (^{\circ}\text{C}) - \text{Condenser inlet } (^{\circ}\text{C})}$$

The water pressure-drop tables are available on page 13.

Selection example:

Cooling capacity required: 560 kW

Evaporator temperature: 12/7°C

Condenser temperature: 30/35°C

Fouling factor: 0.044 m²K /kW

By using the selection table it can be determined that the RTWB 220 gives a cooling capacity of 567 kW and a power input of 151 kW.

Determination of the evaporator flow rate:

$$27.1 \text{ liter/second} = \frac{567 \times 0.239}{12 - 7}$$

Determination of the condenser flow rate:

$$34.3 \text{ liter/second} = \frac{(567 + 151) \times 0.239}{35 - 30}$$

After the evaporator and condenser flow rates have been determined, the hydraulic pressure drop can be determined by using the water pressure-drop table.

Selection Procedure - RTUB

Performance

The performance examples, on the following pages, provide performance information at various capacities for the most common evaporator water and saturated condensing temperatures. The stated cooling capacity is based on a water temperature difference between the evaporator inlet temperature and outlet of 5°C and a temperature difference of 9.6°C between the saturated condensing and liquid temperatures (sub-cooling). The capacity ratings are applicable to a temperature drop within 4 to 8°C except as limited by the minimum or maximum water flow rate indicated in the heat exchanger hydraulic resistance table. All capacities are based on a fouling factor of 0.0176 m² K/kW for evaporator water side. If a different sub-cooling or fouling factor is used, the unit capacity will vary. For conditions that are not directly tabulated, direct interpolation may be used. Extrapolation is not permitted.

To determine the cooling capacity and the power input, the following information is needed :

- the required cooling capacity
- the inlet and outlet evaporator temperature
- the saturated condensing temperature

The evaporator flow can be determined by using the formula :

$$\text{Evaporator water flow (liter/second)} = \frac{\text{Cooling capacity} \times 0.239}{\text{Evaporator temperature difference (°C)}}$$

The water pressure drop is available on page 14.

Selection example:

Cooling capacity required: 523 kW

Evaporator temperature: 12/7 °C

Condensing temperature: 45 °C

Fouling factor: 0.0176 m² K/kW

By using the selection table it can be determined that the RTUB 220 gives a cooling capacity of 530 kW and a power input of 175 kW (with a sub-cooling of 9.6°C).

Determination of the evaporator water flow rate:

$$25.3 \text{ liter/second} = \frac{530 \times 0.239}{(12 - 7)}$$

The water pressure drop can be determined by using the water pressure drop table.

Model Number Description

Digit 1-2-3-4-5: Unit model type

ERTWB: Epinal RTWB

ERTUB: Epinal RTUB

Digit 6-7-8: Unit size

207-208-210-211-212-214-216-217-218-220-222-224

Digit 11: Approval

2: Pressure European Directive

D: Australia

V: Poland

Digit 12: Language

C: Spanish

D: German

E: English

F: French

H: Dutch

I: Italian

M: Swedish

U: Greek

V: Portuguese

Digit 15: Main power voltage

C: 380/50/3

D: 400/50/3

E: 415/50/3

S: Special

Digit 17: Electrical codes

A: IEC

S: Special

Digit 18: Compressor starter

H: Unit-mounted star-delta

S: Special

Digit 20: Main electrical disconnect device

X: Without

B: Fused disconnect switch

S: Special

Digit 23: Leaving chilled-water temperature

 A: $-12^{\circ}\text{C} \leq \text{T}^{\circ}\text{C} < -8^{\circ}\text{C}$

 B: $-8^{\circ}\text{C} \leq \text{T}^{\circ}\text{C} < -4^{\circ}\text{C}$

 C: $-4^{\circ}\text{C} \leq \text{T}^{\circ}\text{C} < +4^{\circ}\text{C}$

 D: $+4^{\circ}\text{C} \leq \text{T}^{\circ}\text{C} < +10^{\circ}\text{C}$

 E: $+10^{\circ}\text{C} \leq \text{T}^{\circ}\text{C} \leq +15^{\circ}\text{C}$

S: Special

Digit 25: Condenser size

X: Without (RTUB)

2: Standard (RTWB)

Digit 26: Condenser leaving water temperature (RTWB)
Saturated condenser temperature (RTUB)

 A: $25^{\circ}\text{C} \leq \text{T}^{\circ}\text{C} < 30^{\circ}\text{C}$ (RTWB)

 B: $30^{\circ}\text{C} \leq \text{T}^{\circ}\text{C} < 35^{\circ}\text{C}$ (RTWB/UB)

 C: $35^{\circ}\text{C} \leq \text{T}^{\circ}\text{C} < 40^{\circ}\text{C}$ (RTWB/UB)

 D: $40^{\circ}\text{C} \leq \text{T}^{\circ}\text{C} < 45^{\circ}\text{C}$ (RTWB/UB)

 E: $45^{\circ}\text{C} < \text{T}^{\circ}\text{C} \leq 50^{\circ}\text{C}$ (RTWB/UB)

 F: $50^{\circ}\text{C} \leq \text{T}^{\circ}\text{C} \leq 55^{\circ}\text{C}$ (RTWB/UB)

 G: $55^{\circ}\text{C} \leq \text{T}^{\circ}\text{C} \leq 60^{\circ}\text{C}$ (RTWB/UB)

 H: $60^{\circ}\text{C} < \text{T}^{\circ}\text{C} \leq 65^{\circ}\text{C}$ (RTUB)

S: Special

Digit 27: Condenser tubes

X: Without

5: GEWA C

S: Special

Digit 28: Condenser pass

X: Without (RTUB)

A: 1 pass

B: 2 pass right

C: 2 pass left

S: Special

Digit 31: Operating conditions

A: One only

S: Special

Digit 44: Under-over voltage protection

X: Without

1: With

Digit 45: IP 20 protection

X: Without

1: With

Digit 49: Communication cards

X: Without

1: CSR module

2: 1+ temperature sensor

3: 2+ LWTC control

Digit 52: Compressor sound attenuating enclosure

X: Without

1: With

Digit 53: Pressure gauges

X: Without

1: With

Digit 56: Compressor isolator valve

X: Without

1: Discharge (RTWB only)

Digit 57: Ammeter/voltmeter

X: Without

1: With

Digit 61: Safety devices

X: Standard

1: Germany

3: Netherlands

Digit 64: Packing

1: Domestic

2: SEI Class 3

3: SEI Class 4a

4: SEI Class 4c

S: Special

Digit 65: Isolators

X: Without

1: Pads

S: Special

Digit 66: Flow switch

X: Without

1: Quantity 1

2: Quantity 2

Digit 67: Counterflanges

X: Without

1: With

Digit 71: Temperature sensors

X: Without

1: With

Digit 74: Factory test

X: (RTUB)

A: A (RTWB)

B: B (RTWB/UB)

E: E (RTWB)

S: Special

Digit 75: Other special requirement(s)

X: No

S: Yes

Performance Data

Performance data RTWB

Model RTWB	Leaving chilled-water temperature (°C)	Leaving condenser-water temperature (°C)					
		35		40		45	
		Cooling capacity (kW)	Power input (kW)	Cooling capacity (kW)	Power input (kW)	Cooling capacity (kW)	Power input (kW)
207	5	201	47	189	51	177	55
	7	216	48	204	52	191	56
	9	231	50	218	53	205	57
208	5	236	56	223	61	209	66
	7	253	58	239	62	225	67
	9	271	59	256	64	241	69
210	5	300	75	283	80	265	87
	7	322	77	304	82	285	89
	9	345	79	326	85	306	91
211	5	317	80	299	86	281	93
	7	340	82	321	88	302	95
	9	364	84	344	90	324	97
212	5	340	85	321	92	301	100
	7	364	88	344	94	324	102
	9	390	90	369	97	347	104
214	5	408	97	386	105	362	114
	7	438	100	414	108	389	117
	9	469	103	443	111	416	120
216	5	443	108	418	116	393	126
	7	475	111	448	119	421	129
	9	507	114	480	123	451	132
217	5	478	118	452	128	424	138
	7	512	121	484	131	455	142
	9	547	125	517	135	487	145
218	5	517	130	490	141	461	152
	7	553	134	524	144	494	156
	9	591	138	560	148	528	160
220	5	563	147	533	158	501	171
	7	601	151	570	163	536	176
	9	641	156	608	167	573	180
222	5	652	169	617	181	581	195
	7	697	174	660	187	622	201
	9	744	180	705	193	664	207
224	5	705	186	668	200	629	216
	7	753	193	714	206	673	222
	9	803	199	762	213	719	229

Evaporator deltaT 5°C, condenser deltaT 5°C, fouling factor 0.0176 m²K/kW for the evaporator, fouling factor 0.044 m²K/kW for the condenser, standard heat exchangers, electrical voltage frequency 50Hz, refrigerant R134a.

Performance Data

Performance data RTUB

Model RTUB	Leaving chilled-water temperature (°C)	Condensing temperature (°C)					
		40		50		60	
		Cooling capacity (kW)	Power input (kW)	Cooling capacity (kW)	Power input (kW)	Cooling capacity (kW)	Power input (kW)
207	5	205	48	181	57	152	69
	7	221	49	195	58	164	70
	9	237	50	210	59	177	71
208	5	242	57	214	67	181	81
	7	260	58	231	69	195	83
	9	278	60	248	70	210	84
210	5	306	74	270	87	231	104
	7	329	76	291	89	249	106
	9	352	78	312	91	269	107
211	5	323	79	286	93	246	111
	7	347	81	308	95	266	113
	9	372	83	331	97	287	115
212	5	347	85	308	100	265	119
	7	372	87	331	102	287	121
	9	399	89	356	103	309	123
214	5	423	94	376	111	326	133
	7	455	96	405	113	352	135
	9	488	98	436	115	379	137
216	5	461	102	411	121	356	145
	7	495	105	442	123	385	147
	9	531	107	475	125	415	149
217	5	499	111	445	132	387	158
	7	536	113	479	134	418	160
	9	574	116	514	136	450	162
218	5	536	124	480	147	419	175
	7	575	127	515	149	451	178
	9	615	130	553	152	486	181
220	5	585	139	524	163	458	195
	7	627	142	563	167	493	198
	9	671	146	603	170	530	201
222	5	684	157	614	183	537	216
	7	734	161	660	187	579	220
	9	786	165	708	191	623	224
224	5	742	171	668	199	588	236
	7	796	176	718	204	633	240
	9	852	181	770	208	680	244

Evaporator deltaT 5°C, sub-cooling 9.6°C, fouling factor 0.0176 m²K/kW, standard evaporators electrical voltage frequency 50Hz, refrigerant R134a.

General Data

Model RTWB	Evaporator code	Condenser code	Evaporator water content (l)	Condenser water content (l)
207	EG 120	CG 120	105	60
208	EG 120	CG 120	105	60
210	EG 140	CG 140	265	55
211	EG 170	CG 170	220	66
212	EG 170	CG 170	220	66
214	EG 200	CG 200	200	75
216	EG 200	CG 200	200	75
217	EG 200	CG 200	200	75
218	EG 250	CG 230	415	78
220	EG 250	CG 230	415	78
222	EG 340	CG 230	560	78
224	EG 340	CG 230	560	78

Model RTWB	Refrigerant	Number of circuits	Unit refrigerant charge (kg)	Unit oil charge (l)
207	R134a	2	78	12
208	R134a	2	78	12
210	R134a	2	120	14
211	R134a	2	120	14
212	R134a	2	120	14
214	R134a	2	120	16
216	R134a	2	120	16
217	R134a	2	120	16
218	R134a	2	138	16
220	R134a	2	138	16
222	R134a	2	148	19
224	R134a	2	148	22

Model RTUB	Evaporator code	Evaporator water content (l)	Refrigerant	Number of circuits	Unit refrigerant charge (kg)	Unit oil charge (l)
207	EG 120	105	R134a	2	26	12
208	EG 120	105	R134a	2	26	12
210	EG 140	265	R134a	2	40	14
211	EG 170	220	R134a	2	40	14
212	EG 170	220	R134a	2	40	14
214	EG 200	200	R134a	2	40	16
216	EG 200	200	R134a	2	40	16
217	EG 200	200	R134a	2	40	16
218	EG 250	415	R134a	2	46	16
220	EG 250	415	R134a	2	46	16
222	EG 340	560	R134a	2	50	19
224	EG 340	560	R134a	2	50	22

General Data

Minimum and maximum evaporator water flow RTWB/RTUB

Evaporator code	Pass number	Minimum water flow (l/s)	Maximum water flow (l/s)	Connection Diameter (inch)
EG 120	1	4.5	13.4	5
EG 140	1	6.0	18.0	6
EG 170	1	7.0	21.0	6
EG 200	1	9.0	25.0	6
EG 250	1	11.0	33.0	6
EG 340	1	14.0	43.0	6

Minimum and maximum condenser water flow RTWB

Condenser code	Pass number	Minimum water flow (l/s)	Maximum water flow (l/s)	Connection diameter (inch)
CG 120	1	8.4	31.0	5
CG 140	1	9.5	34.9	5
CG 170	1	11.9	43.7	5
CG 200	1	17.0	61.0	5
CG 230	1	17.0	61.0	5

RTWB/RTUB Evaporator water pressure drop (kPa)

Model RTWB/RTUB	Pass Number	Water flow (L/s)								
		5	10	15	20	25	30	35	40	45
207	1	6	24							
208	1	6	24							
210	1		57	122						
211	1		29	61	104					
212	1		29	61	104					
214	1		11	24	41	62				
216	1		11	24	41	62				
217	1		11	24	41	62				
218	1			17	29	45	64			
220	1			17	29	45	64			
222	1				23	35	49	66	85	106
224	1				23	35	49	66	85	106

RTWB Condenser water pressure drop (kPa)

Model RTWB	Pass Number	Water flow (L/s)										
		10	15	20	25	30	35	40	45	50	55	60
207	1	10	20	34	51	71						
208	1	10	20	34	51	71						
210	1	6	12	20	30	42						
211	1		8	14	21	29	38	48				
212	1		8	14	21	29	38	48				
214	1			12	18	24	32	40	48	58	68	79
216	1			12	18	24	32	40	48	58	68	79
217	1			12	18	24	32	40	48	58	68	79
218	1			12	18	24	32	40	48	58	68	79
220	1			12	18	24	32	40	48	58	68	79
222	1			12	18	24	32	40	48	58	68	79
224	1			12	18	24	32	40	48	58	68	79

Controls

The RTWB and RTUB water-cooled Series R chillers employ the most advanced controls on the market today. The two-line forty-character Clear Language Display (CLD) has a backlight for a simple readout.

Adaptive Control™ microcomputer

The microcomputer-based controller optimizes controls around the chiller application and the specific components used in the Series R chiller. For instance, the compressor protection system is specifically designed for the Series R unit. A leaving chilled-water temperature-control algorithm maintains accurate temperature control, minimizes the drift from the setpoint and provides better building comfort. The microprocessor control incorporates improved chiller start-up, load limiting, lead/lag and compressor run-time equalization functions into standard chiller operation. The interface with building automation systems remains flexible and easy.

Safety controls

A centralized microcomputer provides a high level of machine protection. The safety controls are designed to avoid compressor and/or evaporator operation failures and to minimize nuisance shutdowns. The Unit Control Module (UCM) directly senses the control variables that govern the operation of the chiller: motor current draw, evaporator temperature, and condenser temperature. When any one of the variables approaches a limit condition where the chiller may be shutdown to avoid damage, the UCM takes corrective action to avoid shutdown and keep the chiller operating. Corrective action is accomplished through combined actions on the compressor unloader valve and on the electronic expansion valve.

Additionally, the UCM optimizes the total power consumption of the chiller during normal operating conditions. During abnormal operating conditions, the UCM will continue to optimize the chiller performances by taking the necessary corrective action to avoid shutdown. This keeps cooling capacity available until the problem

can be solved. Whenever possible, the chiller is allowed to perform its function: making chilled-water. In addition, microcomputer control provides safety protections such as under/over voltage (option), phase reversal, phase loss, phase imbalance, low voltage and overload protection. These safety controls help the chiller to remain in operation and keep all of the building occupants comfortable.

Monitoring and diagnostics

Because the microcomputer provides all control functions, it can easily indicate such parameters as leaving chilled-water temperature. All of the monitoring and diagnostic information is displayed directly on a clear language microcomputer display. If a failure does occur, one of many Clear Language Display messages will indicate the problem.

Standard features

External Auto/Stop

A job-site-provided contact closure will turn the chiller on and off. Note: do not use the chilled-water pump to stop the chiller.

External interlock

A job-site-supplied contact opening wired to this input will turn the chiller off and will require a manual reset of the chiller microcomputer. This closure is typically triggered by a job-site-supplied system such as a fire alarm.

Chilled-water pump control

Unit control provides output to control the chilled-water pump(s). One contact closure to the chiller is all that is required to initiate the chilled-water system.

Optional features

Communication interface

Capability for communication with the following control device:

Trane Tracer building automation systems

External chilled-water setpoint

Allows the external setting independent of the front panel point by one of the following means: a) a remote resistor input (fixed or

adjustable), b) a 2-10 Vdc input or, c) a 4-20 mA input.

External current limit setpoint

Allows the external setting independent of the front panel point by one of the following means: a) a remote resistor input (fixed or adjustable), b) a 2-10 Vdc input or, c) a 4-20 mA input.

Remote running and alarm indication contacts

The chiller provides three single-pole double-throw contact closures to indicate that a failure has occurred if any compressors are running, or if the compressors are running at maximum capacity. These contact closures may be used to trigger job-site-supplied alarm lights or bells.

Ice-making control

Provides an interface with ice-making controls systems.

Chilled-water temperature reset

Reset can be based on return water temperature or outdoor air temperature.

The next version reviews the recommended interface with the following control systems: Integrated Comfort systems interface, non-Trane building automation systems, stand-alone chillers, and ice-making systems.

Trane Integrated Comfort system (ICS) interface

A single twisted pair of wires ties directly between the chiller and a Tracer™ system. A Tracer system provides elaborate control, monitoring and diagnostic capabilities. When the Series R chillers are used in conjunction with a Trane Tracer system, the chiller can be monitored and controlled from a remote location. The Series R chiller can be controlled to fit into the overall building automation strategy by using time-of-day scheduling, timed override, demand limiting and chiller sequencing. A building owner can completely monitor the Series R chiller from the Tracer system, because all of the monitoring information indicated on the microcomputer can be read on the Tracer system display. In addition, all

Controls

the powerful diagnostic information can be read back at the Tracer system. The Tracer system can provide sequencing control for two to six chillers on the same chilled-water loop. Also, pump sequencing control can be provided by the Tracer.

Required features:

- Communication card

Additional features:

- Chilled-water temperature reset
- Ice-making control

External Trane devices required:

- Trane Tracer system

Stand-alone unit

The interface to stand-alone chillers is very simple; only a remote Auto/Stop for scheduling is required for chiller operation. Signals from the chilled-water pump contactor or a flow switch are wired to the chilled-water flow interlock. Signals from a time clock or another remote device are wired to the external Auto/Stop input. Unit controls provide an output to turn pumps on and off and should remain on for a minimum of one minute to allow the chiller to complete its shutdown cycle.

Note: do not use the chilled-water pump to stop the chiller.

Required features:

- External Auto/Stop (standard)
- Chilledwater flow interlock (standard)

Additional features that may be used:

- Remote running and alarm indications contacts
- External interlock (standard)
- Chilled-water temperature reset

External Trane devices required:

- None

Note: all wiring outside the unit is supplied at the job site.

Interface with non-Trane building automation systems

The Series R chillers can interface with non-Trane building automation systems via hard-wired connections.

Required features:

- External Auto/Stop (standard)

Additional features:

- External interlock (standard)

- External demand-limit setpoint (requires communication card)
- Remote running and alarm indication contacts
- External chilled-water setpoint (require communication card)
- Chilled-water flow interlock

External Trane devices required:

- None

Ice-making system

An ice-making option may be ordered with the chiller. The chiller will have two operating modes, ice-making and normal daytime cooling. In the ice-making mode, the Series R chiller will operate at full compressor capacity until the return chilled fluid temperature entering the evaporator meets the ice-making setpoint. This ice-making setpoint is manually adjusted on the chillers microcomputer. Two input signals are required to the Series R chiller for the ice-making option. The first is an Auto/Stop signal for scheduling and the second is required to switch the unit in between the ice-making mode and normal daytime operation. The signals are provided by a remote jobsite building automation device such as a time clock or a manual switch.

In addition the signals may be provided over the twisted-pair wire from a Tracer system. The chiller provides an output to turn water pumps on and off.

Required features:

- External Auto/Stop
- Communication card

Electrical Data and Connections - RTWB/RTUB

Compressor motor electrical data - 50 Hz-

Model RTWB/RTUB	Nominal voltage (V/Ph/Hz)	Maximum unit kW (kW)	Maximum RLA (1) (A)	Starting amps (2) (A)	Power factor
207	400/3/50	90	147	170	0.91
208	400/3/50	106	170	196	0.92
210	400/3/50	132	215	228	0.90
211	400/3/50	142	235	264	0.89
212	400/3/50	153	255	279	0.88
214	400/3/50	182	297	332	0.89
216	400/3/50	202	329	374	0.90
217	400/3/50	222	360	398	0.90
218	400/3/50	243	396	430	0.89
220	400/3/50	264	432	457	0.89
222	400/3/50	292	477	520	0.89
224	400/3/50	319	521	554	0.89

(1) To take in account for the sizing of power cables

(2) Star-delta start - one compressor at full load, the other starting

General electrical data

Model RTWB/RTUB	Nominal voltage (V/Ph/Hz)	Crankcase heater		Control circuit	Short circuit intensity (kA)	Remaining intensity (1) (A)
		Oil separator (W)	Compressor (W)			
207	400/3/50	2 x 125	2 x 150	Factory-installed transformer	35	100
208	400/3/50	2 x 125	2 x 150		35	80
210	400/3/50	2 x 125	2 x 150		35	40
211	400/3/50	2 x 125	2 x 150		35	90
212	400/3/50	2 x 125	2 x 150		35	60
214	400/3/50	2 x 125	2 x 150		35	122
216	400/3/50	2 x 125	2 x 150		35	97
217	400/3/50	2 x 125	2 x 150		35	72
218	400/3/50	2 x 125	2 x 150		35	132
220	400/3/50	2 x 125	2 x 150		35	92
222	400/3/50	2 x 125	2 x 150		35	179
224	400/3/50	2 x 125	2 x 150		35	136

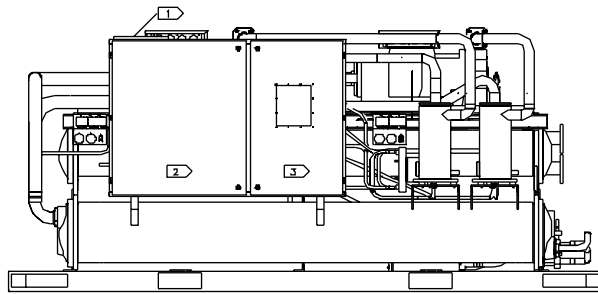
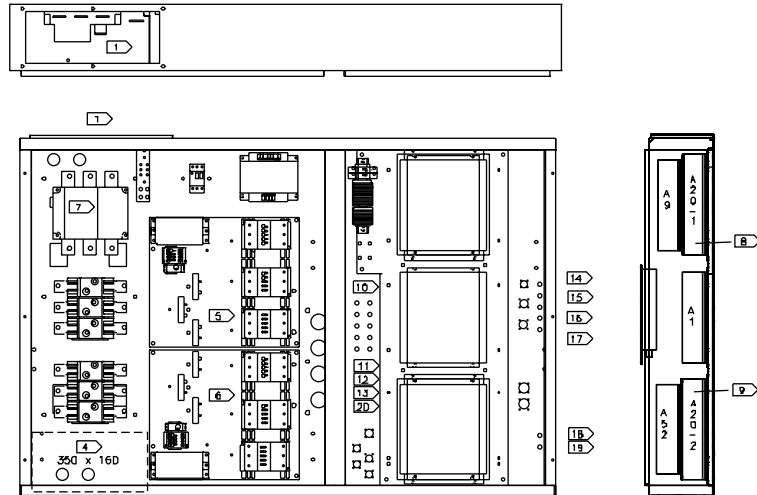
(1) Remaining intensity of the chiller disconnect switch: available to connect auxiliary devices such as water pumps.

Electrical connection

Model RTWB/RTUB	Fuse size (1) (A)	Disconnect switch size (1) (A)	Minimum connecting wire (1) (mm ²)	Maximum connecting wire (1) (mm ²)
207	80	315	150	240
208	100	315	150	240
210	125	315	150	240
211	60+125	400	185	240
212	160	400	185	240
214	2 x 160	400	185	240
216	160+200	630	2x150	2x300
217	2 x 200	630	2x150	2x300
218	250+200	630	2x150	2x300
220	2 x 250	630	2x150	2x300
222	2 x 315	800	2x185	2x300
224	2 x 315	800	2x185	2x300

(1) With disconnect switch option only.

Job Site Connections



- | | | | |
|----|----|-----|-----|
| 1 | 17 | 102 | 106 |
| 2 | 12 | 102 | |
| 3 | 13 | 105 | |
| 4 | 14 | 102 | |
| 5 | 15 | 101 | 102 |
| 6 | 16 | 104 | 106 |
| 7 | 17 | 103 | 109 |
| 8 | 18 | 103 | |
| 9 | 19 | 104 | |
| 10 | 20 | 105 | |

Job Site Connections

- 1 Line voltage entrance (see unit nameplate)
- 2 Power section
- 3 Control section
- 4 Free space for customer's pump control
- 5 Wye-delta closed-transition starter circuit A
- 6 Wye-delta closed-transition starter circuit B
- 7 Unit disconnect, non-fused
- 8 CKT Number 1 Lockout
- 9 CKT Number 2 Lockout
- 10 Emergency stop (Normal / Stop contact) (6S2)
- 11 Zone temperature sensor (6R3) or ice-machine control (6S55) option (6R3 and 6S55 cannot be used together)
- 12 External chilled-water setpoint 4-20 mA or 2-10 Vdc with communication interface option
- 13 Communication serial link
- 14 Leaving condenser-water temperature sensor (5R53-2) option (with PCM) (RTWB only)
- 15 Chilled-water flow switch (6S56)
- 16 External Auto/Stop (6S1)
- 17 Customer output :
Remote alarm indicator (from normally-closed signal)
Maximum capacity indicator
Compressor running indicator
Remote alarm indicator (from normally-open signal)
- 18 Chilled-water pump starter (Trane UCM pump control)
- 19 Chilled-water pump starter (auxiliary interlock)
- 20 Tracer (Option)

Job Site Connections

RTWB/RTUB

Notes :

- All three-phase motors supplied with the unit are protected under primary single-phase failure conditions.
- **Caution** - Do not energize the unit until check-out and start-up procedures have been completed.
- All customer control-circuit wiring must have a minimum rating of 150V.
- All field wiring must be in accordance with the EN60204-1

101 Auxiliary controls for a customer-specified or installed tripout. The chiller will run normally when the contact is closed and trip the chiller off on manually resettable diagnostic when contact opens. Manual reset is accomplished at the local Clear Language Display.

102 2 wires, 30 volt or less circuit. Do not run in conduit with higher voltage circuits.

103 3 wires. 115 Vac circuit. Separate 115 Vac power is required. Load not to exceed 1150 VA inrush.

104 2 wires. 115 Vac circuit, minimum contact rating at 115 Vac : 6.9 VA inrush, 1.3 VA sealed.

105 Shielded twisted pair, 30 volt or less circuit. Maximum length 1500 m. Do not run in conduit with higher voltage circuits.

106 Customer supplied contacts must be compatible with circuit 12 Vdc, 45 mA resistive load. Silver- or gold-plated contacts are recommended.

107 Auxiliary controls for a customer-specified or installed remote Auto/Stop function. The chiller will run normally when the contact is closed and stop the chiller when the contact is open. Re-closure of the contact will permit the chiller to automatically return to normal operation. To be in series with water pump relay. Note: Do not use the chilled-water pump to stop the chiller.

108 Normally-open contacts for remote shutdown or refrigerant circuit operation. The refrigerant circuit will go through a normal shutdown when the contacts are closed and will automatically resume normal start and run modes when contacts are open.

109 Chiller module relay outputs can be programmed to perform alternate functions.

Dimensions and Weights

Dimensions

The dimensional drawings illustrate the overall measurements of the unit. The recommended service clearances indicate clearances required to easily service the 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 information.

Shipping and operating weight

Model RTWB	Operating weight (kg)	Shipping weight (kg)
207	2470	2350
208	2470	2350
210	3370	3050
211	3450	3150
212	3450	3150
214	3725	3500
216	3725	3500
217	3725	3500
218	4325	3900
220	4500	4050
222	4925	4250
224	5000	4400

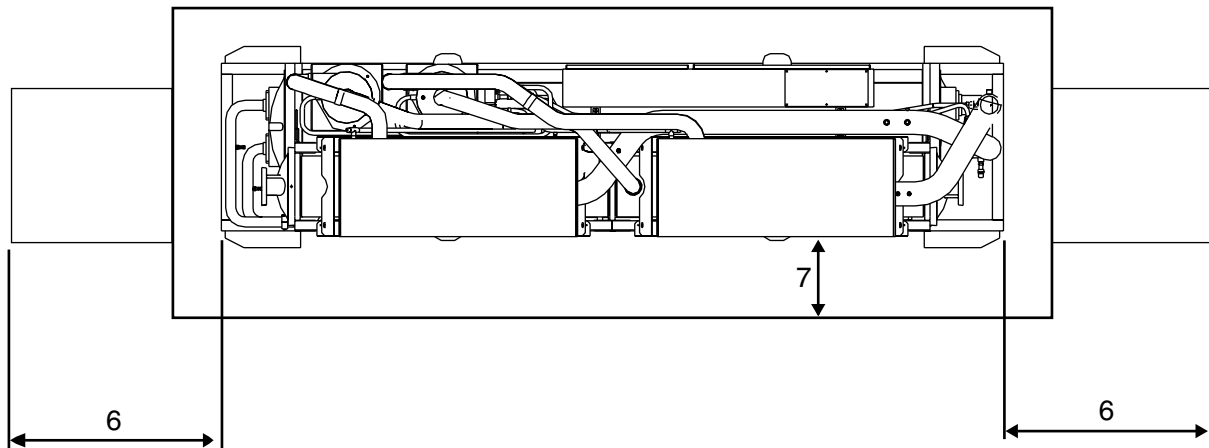
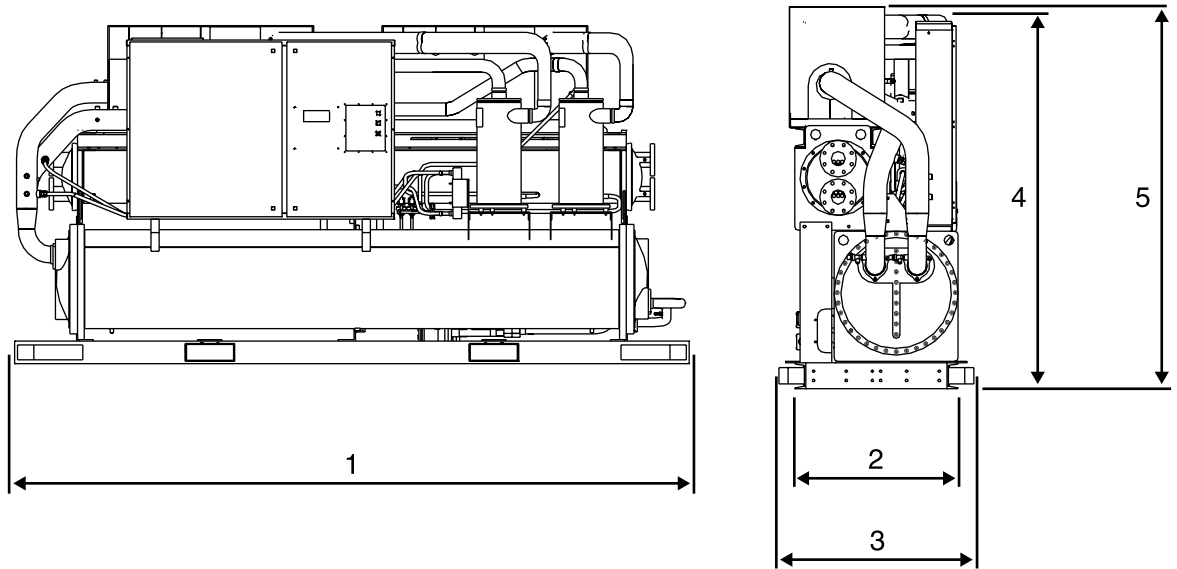
Model RTUB	Operating Weight (kg)	Shipping Weight (kg)
207	2130	1860
208	2130	1860
210	2845	2570
211	2845	2570
212	2845	2570
214	3250	2975
216	3250	2975
217	3250	2975
218	3880	3405
220	4050	3575
222	4480	3855
224	4550	3925

Dimensions and Weights

RTWB/RTUB 207-224

Evaporator 1 pass

Condenser
(RTWB) 1 pass



Model	1	2*	3**	4*	5**	6***	7****
RTWB/RTUB	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
207	2880	890	1010	1800	1810	1800	950
208	2880	890	1010	1800	1810	1800	950
210	4150	890	1010	1850	1900	2750	950
211	4150	890	1010	1850	1900	2750	950
212	4150	890	1010	1850	1900	2750	950
214	4150	890	1010	1850	1900	2750	950
216	4150	890	1010	1850	1900	2750	950
217	4150	890	1010	1850	1900	2750	950
218	4150	890	1010	1940	2000	2750	950
220	4150	890	1010	1940	2000	2750	950
222	4150	890	1010	2040	2100	2750	950
224	4150	890	1010	2040	2100	2750	950

(*) With compressor sound enclosure and disconnect-switch handle removed.

(**) With compressor sound enclosure and disconnect-switch handle mounted.

(***) Clearance for retubing: can be on either end of the chiller.

(****) Clearance all around the unit in order to perform usual maintenance operations.

Mechanical Specifications

The RTWB and RTUB are packaged liquid chillers, fitted with:

- Two semi-hermetic, direct-drive, helical-rotary compressors
- Shell-and-tube evaporator and condenser ⁽¹⁾
- Microprocessor based Adaptive Control™ module
- Factory-mounted starter panel.

Units are factory run-tested prior to shipment and delivered ready to operate.

General construction

Welded evaporator and condenser fitted on a structural-steel profile frame ⁽¹⁾.

Compressor-supporting plate designed to allow installation of the compressor sound enclosure on site.

Double-door electrical panel.

Compressors and lubrication oil system

Two semi-hermetic, accessible direct-drive, 2950 rpm dual-screw compressors with:

- capacity-control slide valve oil. pressure actuated and unloader-valve gas-pressure actuated.
- pressure-lubricated bearing groups supports the rotor assembly.
- squirrel-cage induction motor, refrigerant suction-gas-cooled and hermetically sealed.

Oil separator and filtration devices are provided. Check valves in the compressor discharge and lube oil system and a solenoid valve in the lube system are provided.

Heat exchangers

Shell-and-tube exchangers. Carbon-steel shell plates and tube sheets. Tubes sheets are drilled reamed and grooved to accommodate tubes. Individually replaceable tubes, mechanically expanded into tube sheets and fastened into intermediate tube supports made of carbon steel (condenser) or plastic (evaporator). Headers of high-strength cast steel bolted to the tube sheets.

Direct-expansion-type evaporator. Factory-insulated with 19 mm Armaflex type foam. Internally finned 5/8-inch-diameter tubes. Maximum operating pressure: water side and refrigerant side = 1.4 MPa.

RTWB only:

Flooded-type condenser with removable water boxes, easily cleanable, integral subcooler and oil cooler. Internally and externally finned 3/4 inch diameter tubes. Maximum operating pressure: water side = 2.5 MPa, refrigerant side = 1.4 MPa.

Refrigerant circuit

Each circuit includes: refrigerant filter, electronic expansion valve minimizing evaporator superheat, liquid-line shutoff valve.

Control panel

All unit controls are housed in an IP45 enclosure. Removable plate on the top of the enclosure to allow customer connection of power wiring and remote interlocks.

Microcomputer control provides all control functions including start-up and shut down, leaving chilled-water temperature control, compressor and expansion valve modulation, anti-recycle logic and load limiting.

Adaptive Control microprocessor prevents unit shutdown due to abnormal operating conditions associated with low refrigerant temperature, high condensing temperature, and motor overload.

(1) Information about condensers applies to the model RTWB only.

Mechanical Specifications

Unit protective functions include loss of chilled-water flow, evaporator freeze protection, low or high refrigerant pressure, reverse rotation, compressor starting and running over current, phase loss, phase imbalance, phase reversal and loss of oil flow.

The Clear Language Display (CLD) eliminates coded information. Information available with the Adaptive Control microprocessor includes: entering and leaving water temperatures, evaporator and condenser refrigerant temperatures and pressures, compressor suction temperature, compressor start and running hours, chilled-water setpoint, and more than 90 diagnostic and operating conditions.

Starter panel

Wye-Delta closed transition is standard.

Rigging

Three or four lifting lugs are provided on the heat-exchanger tube sheets.

The unit base frame allows moving the unit using a forklift.

Factory run tests

Pressure test on each individual component (before assembly) and on the refrigerant circuit (when fully assembled).

All RTWB units are fully runtested prior to shipment. Unit operation and all controls are thoroughly checked.

Shipment

All units are shipped with the refrigerant and operating charge, fully assembled and wired, ready for immediate starting. Commissioning work is limited to electrical and hydraulic connections.

Quality assurance

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

Options

Fused disconnect switch

A fused disconnect switch is provided for disconnecting main power through the starter panel door.

Isolators

Neoprene isolators are available for field installation beneath unit frame.

Low leaving fluid temperature

The unit control can be factory set to handle low-temperature brine applications (-12°C to 0°C).

Ice-making

The unit controls can be factory set to handle ice-making for thermal storage applications.

High-temperature condenser (RTWB only)

Available to handle high leaving condenser-water temperature (50°C to 60°C).

Condenser-water temperature sensors (RTWB only)

Factory-supplied and field-installed and tested condenser entering- and leaving-water temperature sensors.

Building automation system communication interface

Permits either bidirectional communication to the Trane Integrated Comfort system or permits remote chilled-water setpoint and demand limiting by accepting a 4-20 mA or 2-10 Vdc analog signal.

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.

Leaving condenser-water temperature control (RTWB only)

This option allows the control of the leaving condenser-water temperature to permit heat recovery.

High and low pressure gauges

A set of two pressure gauges per refrigerant circuit, one for low pressure and one for high pressure.

Compressor sound attenuating enclosure

Each compressor is enclosed with a casing made of open-cell sound absorbant material which is surrounded by a vinyl jacket.

Notes



Notes

Notes

The manufacturer has a policy of continuous product improvement, and reserves the right to alter any details of the products at any time without notice.

This publication is a general guide to install, use and properly maintain our products. The information given may be different from the specification for a particular country or for a specific order. In this event, please refer to your nearest office.

For additional information, contact:

Distributor/Installer stamp



Quality Management System Approval



Trane
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www.trane.com

For more information contact your local district office or e-mail us at comfort@trane.com

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Date	10/03
Supersedes	RLC-PRC002-E4_1201
Stocking Location	Europe

Trane has a policy of continuous product and product data improvement and reserves the right to change design and specifications without notice. Only qualified technicians should perform the installation and servicing of equipment referred to in this publication.

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