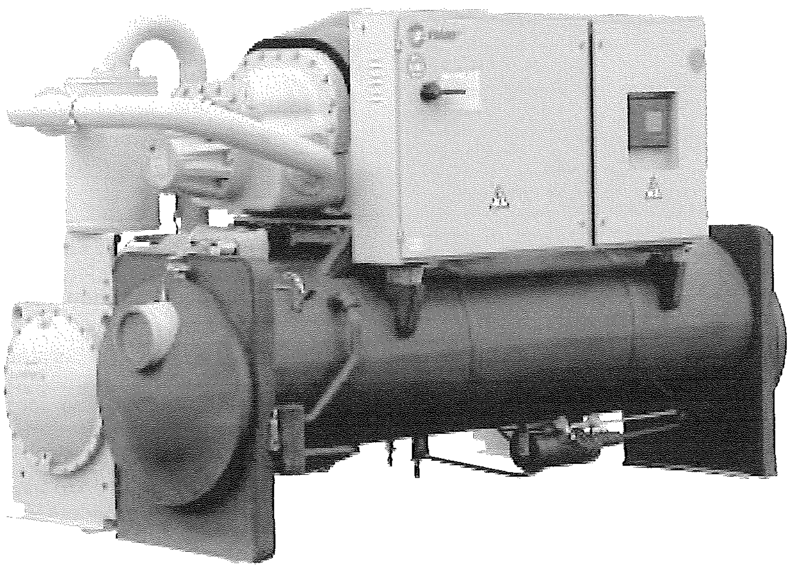
TRANE®

Series R™ Helical Rotary Liquid Chillers

Model RTHD
Water cooled
500-1500 kW



RLC-PRC023-E4

Introduction

Trane introduces the next generation of water-cooled helical rotary compressor chillers, the RTHD.

Continued RTHC features:

- High energy efficiency
- High reliability
- Bolt together construction
- R134a refrigerant
- "Adaptive Control™"

With more than 10 years of screw compressor development and manufacturing experience, Trane presents a new chiller with a higher efficiency and reliability than the units available on today's market.

New features:

- CH.530 controls enable:
  - Scrolling access to inputs and operating information via the LCD touch-screen display
  - Freedom from interoperability concerns with LonMark® communications
  - Job-specific communication options that allow greater reporting flexibility
- Improved startup temperature capabilities and reduced sensitivity to condenser water temperatures alleviate the most common startup concerns
- Removed Liquid Vapor Separator, providing lighter unit weight and simplified refrigerant piping, for less expensive handling, separation, and installation

The industrial-grade design of the Series R helical rotary chiller is ideal for both industrial and commercial markets, in applications such as office buildings, hospitals, schools, retail buildings, and industrial facilities. The linear unloading compressor, wide operating temperature range, advanced controls, electronic expansion valve, short anti-recycle timers, and industry-leading efficiencies mean that this latest Trane Series R chiller is the perfect choice for tight temperature control in almost any application temperatures, and under widely varying loads.

Contents

Features and Benefits

Application Versatility and High Performance

- Screw compressor technology and the electronic expansion valve provide reliable performance in an expanded range of operating temperatures.
- Tight water temperature control extends to operation of multiple chillers in parallel or series configurations, offering further system design flexibility for maximum efficiency.
- Advanced design enables chilled water temperature control to +/- 0.28°C for flow changes up to 10% per minute, plus handling of flow changes up to 30% per minute for comfort cooling.
- Two-minute stop-to-start and five-minute start-to-start anti-recycle timer allows tight chilled water temperature control in constant or transient low-load applications.
- LonMark communications capability provides excellent, trouble-free interoperability.
- Generic Building Automation System points are available for easy access to operational information.

Industrial/Low Temperature Process Cooling

Excellent operating temperature range and precise control capabilities enable tight control with single chiller or series configuration.

Ice/Thermal Storage - Specifiers and operators benefit from dual setpoint control and industry-leading temperature, efficiency, and control capabilities, that minimize design time and energy costs.

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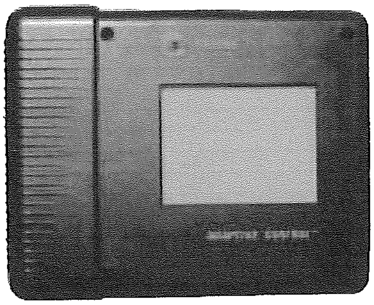
Simple, Economical Installation

- Compact size makes the model RTHD well suited for the retrofit and replacement market.
- All units fit through standard double-width doors.
- Bolt-together construction makes for fast, easy unit disassembly.
- Small RTHD footprint saves valuable equipment room space and alleviates access concerns for most retrofit jobs.
- Light weight design simplifies rigging requirements, further reducing installation time requirements and costs.
- Full factory refrigerant or nitrogen and oil charges reduce required field labor, materials, and installation cost.
- Only evaporator and condenser water piping is required; no starter water cooling (with its associated safety concerns) or field piping is necessary.
- Oil cooler and purge system connections have been eliminated.
- Simple power connection simplifies overall installation.
- Standard unit-mounted starter for Star-Delta and Solid State eliminates additional job site installation considerations and labor requirements.
- Trane has conducted extensive factory testing, and also offers options for in-person and/or documented system performance verification.
- CH.530 controls easily interface with Tracer Summit™ building automation systems through single twisted-pair wire.

Features and Benefits



State-of-the-Art, Precision Control

- Microprocessor-based CH.530 controls monitor and maintain optimal operation of the chiller and its associated sensors, actuators, relays, and switches, all of which are factory-assembled and extensively tested.
- Easy interface with computers hosting Tracer Summit™ building automation/energy management systems allows the operator to efficiently optimize comfort system performance and minimize operating costs.
- PID (proportional integral derivative) control strategy ensures stable, efficient chilled water temperature control, maintaining +/- 0.56°C control by proactively reacting to instantaneous load changes of up to 50%.
- Adaptive Control™ attempts to maintain chiller operation under adverse conditions, when many other chillers might simply shut down.
- Easy-to-use operator interface displays all operating and safety messages, with complete diagnostics information, on a highly readable panel with a scrolling touch-screen display.
- The RTHD features a complete range of chiller safety controls.
- Over 120 diagnostic and operating points are available, with standard displays including chiller current draw, condenser pressure, and evaporator pressure.

Reliability and Ease of Maintenance

- Direct drive, low-speed compressor - a simple design with only 3 moving parts - provides maximum efficiency, high reliability, and low maintenance requirements.
- Electronic expansion valve, with fewer moving parts than alternative valve designs, offers highly reliable operation.
- Suction gas-cooled motor stays uniformly cool at lower temperatures for longer motor life.
- The Trane helical rotary compressor is a proven design resulting from years of research and thousands of test hours, including extensive testing under extraordinarily severe operating conditions.
- Trane is the world's largest manufacturer of large helical rotary compressors, with tens of thousands of commercial and industrial installations worldwide demonstrating a reliability rate of greater than 99% in the first year of operation.

Operating and Life Cycle Cost-Effectiveness

- Electronic expansion valve enables exceptionally tight temperature control and extremely low superheat, resulting in more efficient full-load and part-load operation than previously available.
- Precise compressor rotor tip clearance ensures optimal efficiency.
- Condenser and evaporator tubes use the latest heat transfer technology for increased efficiency.
- RTHD includes standard electrical demand limiting.
- Chilled water reset based on return water temperature is standard.
- High compressor lift capabilities and tight chilled water temperature control allow highly efficient system design with minimal operational concerns.

Design capabilities

- Variable primary flow
- Series chiller arrangements for evaporator and/or condenser
- Low evaporator and condenser flow

Application Considerations

Condenser Water Regulation

The Condenser Head Pressure Control Option provides for a 0-10VDC (maximum range -a smaller range is adjustable) output interface to the customer's condenser water flow device. This option enables the CH530 controls to send a signal for opening and closing a 2-way or 3-way valve as necessary to maintain chiller differential pressure. Methods other than those shown can be employed to achieve the same results. Contact your local Trane office for details.

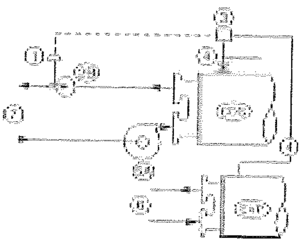
Throttling valve

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

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.

Figure 1



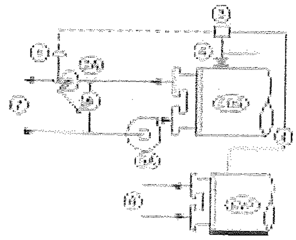
Cooling tower bypass

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

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.

Figure 2

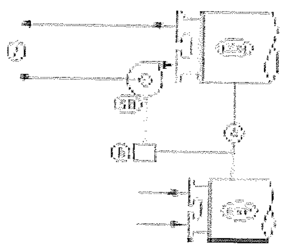


Condenser water pump with variable frequency drive

Advantages:
- Pumping cost can be reduced.
- Good tower temperature control.
- Relatively low first cost.

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

Figure 3



1 = Electric or pneumatic valve actuator
2A = 3-way valve or 2 butterfly valves
2B = 2 butterfly valves
3 = RTHD controller
4 = Refrigerant pressure line
5A = Condenser water pump
5B = Condenser water pump with VFD
6 = To/from cooling load
7 = To/from cooling tower
8 = Electric controller

Application Considerations

Variable Evaporator Flow and Short Evaporator Water Loops

Variable evaporator flow is an energy-saving design strategy which has quickly gained acceptance as advances in chiller and controls technology have made it possible. With its linear unloading compressor design and advanced CH.530 controls, the RTHD has excellent capability to maintain leaving water temperature control within +/- 0.28°C, even for systems with variable evaporator flow and small chilled water volumes.

Some basic rules should be followed whenever using these system design and operational savings methods with the RTHD. The proper location of the chilled water temperature control sensor is in the supply (outlet) water. This location allows the building to act as a buffer, and it assures a slowly changing return water temperature. If there is insufficient water volume in the system to provide an adequate buffer, temperature control can be lost, resulting in erratic system operation and excessive compressor cycling. To ensure consistent operation and tight temperature control, the chilled water loop should be at least 2 minutes. If this recommendation cannot be followed, and tight leaving water temperature control is necessary, a storage tank or larger header pipe should be installed to increase the volume of water in the system.

For variable primary flow applications, the rate of chilled water flow change should not exceed 10% of design per minute to maintain +/- 0.28°C leaving evaporator temperature control.

For applications in which system energy savings is most important and tight temperature control is classified as +/-1.1°C, up to 30% changes in flow per minute are possible. Flow rates should be maintained between the minimum and maximum allowed for any particular chiller configuration.

Series Chiller Arrangements

Another energy-saving strategy is to design the system around chillers arranged in series, on the evaporator, condenser, or both. The actual savings possible with such strategies depends on the application dynamics and should be researched by consulting your Trane Systems Solutions Representative and applying the Trane System Analyzer program. It is possible to operate a pair of chillers more efficiently in a series chiller arrangement than in a parallel arrangement. It is also possible to achieve higher entering-to-leaving chiller differentials, which may, in turn, provide the opportunity for lower chilled water design temperature, lower design flow, and resulting installation and operational cost savings. The Trane screw compressor also has excellent capabilities for "lift", which affords an opportunity for savings on the evaporator and condenser water loops.

Like series arrangements on the evaporator, series arrangements on the condenser may enable savings. This approach may allow reductions in pump and tower installation and operating costs. Maximizing system efficiency requires that the designer balance performance considerations for all system components; the best approach may or may not involve multiple chillers, or series arrangement of the evaporators and/or condensers. This ideal balance of design integrity with installation and operating cost considerations can also be obtained by consulting a Trane representative and applying the Trane System Analyzer program.

Water Treatment

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

Application Considerations

Water Pumps

Where noise limitation and vibration-free operation are important, Trane strongly encourages the use of 1450-rpm (50 Hz) pumps. Specifying or using 3000-rpm (50 Hz) condenser water and chilled water pumps must be avoided, because such pumps may operate with objectionable levels of noise and vibration. In addition, a low frequency beat may occur due to the slight difference in operating rpm between 3000-rpm (50 Hz) water pumps and Series R chiller motors.

Important Note: The chilled water pump must not be used to stop the chiller.

Acoustic Considerations

Refer to the Engineering Bulletin RLC-PRB006 regarding Sound Data/Installation Guide for Noise-Sensitive Applications for Trane water-cooled helical-rotary chillers. Using the information provided in this bulletin, contact a certified sound consultant to aid in proper mechanical room design and treatment

Sound data given data in accordance with ISO 3746-1996.

Selection Procedure

Chiller selections and performance information can be obtained through the use of the Series R® Chiller selection program.

Performance

The computer selection program provides performance data for each chiller selection.

Dimensional Drawings

The dimensional drawings illustrate overall measurements of the unit. Also shown are the service clearances required to easily service the RTHD chiller. All catalog dimensional drawings are subject to change. Current submittal drawings should be referred to for detailed dimensional information. Contact the sales office for submittal information.

Electrical Data Tables

Compressor motor electrical data is shown in the data section for each compressor size. Rated load amperes (RLA), locked rotor Star-Delta amperes (LRAY), the power factor for standard voltages for all 50 Hz, 3-phase motors are shown. The RLA is based on the performance of the motor developing full rated horsepower. A voltage utilization range is tabulated for each voltage listed.

Evaporator and Condenser Pressure Drop

Pressure drop data is determined by the RTHD selection program.

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Selection Procedure

Digit 1-2-3-4-5: Chiller series
RTHDE: Epinal RTHD

Digit 6-7: Unit size
B1-B2-C1-C2-D1-D2-D3-E3

Digit 8: Main power voltage
R: 380V/50Hz/3Ph +/-5%
T: 400V/50Hz/3Ph +/-10%
U: 415V/50Hz3PH +/-5%
S: Special

Digit 9: Other special requirements
X: No
S: Yes

Digit 13: Pressure vessel approval
P: PED (Pressure equipment directive)
S: Special

Digit 14-15: Evaporator size
B1-C1-D1-D2-D3-D4-D5-D6-E1-F1-F2-G1-G2-G3

Digit 17: Evaporator water passes
2: 2 passes
3: 3 passes
4: 4 passes
6: 6 passes
S: Special

Digit 18: Evaporator water connection
L: Left hand
R: Right hand

Digit 19: Evaporator connection type
A: Victaulic
B: Victaulic + coupling
S: Special

Digit 20: Evaporator waterside pressure
L: EVP 10 bar
H: EVP 21 bar

Digit 21-22: Condenser size
B1-D1-E1-E2-E3-E4-E5-F1-F2-F3-G1-G2-G3

Digit 23: Condenser tube type
A: Enhanced fin - copper
B: Smooth bore - copper
C: Smooth bore - 90/10 Cu/Ni
S: Special

Digit 24: Condenser water passes
2: 2 passes
S: Special

Digit 25: Condenser water connection
L: Left hand
R: Right hand

Digit 26: Condenser connection type
A: Victaulic
B: Victaulic + coupling
S: Special

Digit 27: Condenser waterside pressure
L: CDS 10 bar
H: CDS 21 bar

Digit 28: Condenser leaving water temperature
A: Standard T < or = 45°C
B: HI 45 < T < or = 50°C

Digit 29: Refrigerant specialties
X: Without
G: Gauges
V: Isolation valves
B: V+G

Digit 30: Oil cooler
X: Without
C: With

Digit 31: Thermal insulation
X: Without
Q: Cold parts

Digit 33: Language
C: Spanish
D: German
E: English
F: French
H: Dutch
I: Italian
M: Swedish
P: Polish
T: Czech
U: Greek
V: Portuguese
G: Hungarian

Digit 34: Safety devices
X: Standard
B: Dual safety valves
A: B + rupture disc

Digit 35: Refrigerant charge
A: Full factory charge (R134a)
B: Nitrogen (No oil)
C: Holding charge (R134a)

Digit 36: Shipping package
A: Domestic
C: Domestic + skid
E: SEI class 3
F: SEI class 4a
G: SEI class 4c
S: Special

Digit 37: Flow switch
X: Without
A: Evaporator
B: Evaporator + condenser.

Digit 38: Factory test
A: Functional test
B: Customer inspection
C: Witness test
D: Performance test with report
S: Special

Selection Procedure

Digit 39: Starter type
Y: Star-delta closed transition starter

Digit 43: Power line connection type
A: Terminal block
B: Disconnect switch (No fuses)
D: Circuit breaker
K: Disconnect switch and fuses

Digit 44: Electrical protection
B: Standard
D: IP20 electrical protection

Digit 45: Electrical protection
X: Standard
U: Under/over voltage protection
G: Ground fault protection relay
B: U+G

Digit 46: Unit operator interface (Dynaview)
B: French
C: Italian
D: Spanish
E: German
F: Dutch
G: English
K: Portuguese

Digit 47: Remote interface
X: Without
4: Tracer COMM 4
5: Tracer COMM 5 LCI-C (LonTalk)

Digit 48: External chilled water + current limit setpoint
X: Without
4: 4-20mA input
2: 2-10Vdc input

Digit 49: External base loading
X: Without
4: 4-20mA input
2: 2-10Vdc input

Digit 50: Ice making
X: Without
A: Ice making with relay
B: Ice making without relay

Digit 51: Programmable relays
X: Without
R: Programmable relays

Digit 52: Chilled water reset
X: Standard
T: Chilled water reset - outdoor air temperature

Digit 53: Reg. Valve & RLA
X: Without
D: Chiller differential pressure & %RLA out
P: Condenser pressure (%HPC) & % RLA out
V: Condenser reg. valve out & %RLA out

Digit 54: Refrigerant monitor input
X: Without
A: 100ppm / 4-20mA
B: 1000ppm / 4-20mA
C: 100ppm / 2-10Vdc
D: 1000ppm / 2-10Vdc

General Data

Table 1

Compressor Code	Evaporator Code	Condenser Code	Evaporator Water storage (l)	Condenser Water storage (l)	R134a Refrigerant Charge (kg)	Oil Charge (l)
B1	B1	B1	155	106	186	17
B1	C1	D1	208	117	222	17
B2	B1	B1	155	106	186	17
B2	C1	D1	208	117	222	17
C1	D6	E5	170	110	222	23
C1	D5	E4	197	121	222	23
C1	D3	E3	295	178	222	23
C2	D6	E5	170	110	222	23
C2	D5	E4	197	121	222	23
C2	E1	F1	310	226	238	38
D1	D4	E4	197	121	222	23
D1	D3	E3	295	178	222	23
D1	G1	G1	515	299	318	42
D2	D1	E1	261	166	215	23
D2	F1	F2	386	216	284	38
D2	G2	G1	545	299	318	42
D3	D1	E1	261	166	215	23
D3	F1	F2	386	216	284	38
D3	G2	G2	545	344	318	42
E3	D2	E2	280	178	215	23
E3	F2	F3	405	231	284	38
E3	G3	G3	602	367	318	42

Table 2 - Minimum/Maximum Evaporator Flow Rates (l/s)

	Two pass			Three pass			Four pass			Six pass		
Evaporator Code	Min	Max	Nominal Conn. Size (mm)	Min	Max	Nominal Conn. Size (mm)	Min	Max	Nominal Conn. Size (mm)	Min	Max	Nominal Conn. Size (mm)
B1	19	70	200	13	46	150	9	35	100	-	-	-
C1	24	89	200	16	59	150	12	44	100	-	-	-
D1	31	114	200	21	76	200	16	57	150	-	-	-
D2	34	125	200	23	83	200	17	62	150	-	-	-
D3	37	134	200	24	90	200	18	67	150	-	-	-
D4	27	97	200	18	65	200	13	49	150	-	-	-
D5	27	97	200	18	65	200	13	49	150	-	-	-
D6	22	81	200	15	54	200	11	41	150	-	-	-
E1	34	125	200	23	83	200	17	62	150	-	-	-
F1	43	156	250	28	104	250	21	78	150	-	-	-
F2	46	168	250	31	112	250	23	84	150	-	-	-
G1	-	-	-	38	140	250	29	105	200	19	70	150
G2	-	-	-	41	152	250	31	114	200	21	76	150
G3	-	-	-	47	172	250	23	129	200	23	86	150

General Data

Table 3 - Minimum/Maximum Condenser Flow Rates (l/s)

Condenser Code	Two pass Min.	Two pass Max.	Nominal Conn. Size (mm)
B1	15	54	150
D1	15	54	150
E1	22	81	200
E2	24	88	200
E3	25	90	200
E4	19	68	200
E5	16	57	200
F1	28	104	200
F2	27	98	200
F3	29	107	200
G1	33	124	200
G2	41	149	200
G3	45	164	200

Table 4 - Evaporator Water Pressure Drop (kPa)

Evaporator 2 passes	Waterflow (l/s)																												
	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
B1	9	14	20	26	33	40	49	58	68	79	90																		
C1		11	15	20	26	32	38	45	53	61	70	80	90	100															
D1			7	11	15	18	22	27	31	36	41	46	52	58	64	71	78	86	94	102									
D2			7	10	13	16	20	24	28	32	36	41	46	51	57	63	69	75	81	88	95	103							
D3			5	8	10	13	16	19	23	26	30	34	38	42	47	51	57	62	67	73	79	85	92	99					
D4			13	17	21	27	32	38	45	52	60	68	76	86	95	105	116												
D5			13	17	21	27	32	38	45	52	60	68	76	86	95	105	116												
D6	7	11	15	20	26	32	39	46	54	63	72	82	92																
E1			7	10	13	16	20	24	28	32	36	41	45	50	56	61	67	73	79	86	93	100							
F1				7	9	12	15	18	21	24	27	31	35	39	43	47	52	57	62	67	72	78	84	90	96	102	109	115	
F2				7	9	11	14	17	20	23	27	31	35	39	43	48	53	58	64	70	76	82	88	95	102	110	117	125	133

Table 5 - Evaporator Water Pressure Drop (kPa)

Evaporator 3 passes	Waterflow (l/s)																													
	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
B1	15	27	40	55	72	91	113																							
C1	11	20	30	42	55	69	85	103	123	144																				
D1		11	17	24	31	40	49	59	70	81	94	108	122																	
D2		9	15	21	27	35	43	51	61	71	82	94	106	119																
D3			12	17	23	29	36	43	51	60	69	78	89	100	111	124														
D4		15	23	32	42	54	66	80	95	111	129																			
D5		15	23	32	42	54	66	80	95	111	129																			
D6	11	20	31	42	55	70	87	105	125																					
E1		10	16	22	30	38	46	56	66	77	89	101	115	129																
F1			11	15	20	26	32	39	46	54	62	70	79	89	99	110	121	133												
F2				12	17	23	29	35	41	48	55	63	71	79	88	98	107	118	128	139										
G1					12	16	20	24	29	34	39	44	50	56	63	70	77	84	92	100	109	118	127	136	146					
G2					10	14	17	21	25	30	34	39	45	50	56	62	68	75	82	89	97	105	113	122	131	140	149			
G3					8	11	14	17	20	23	27	31	34	39	43	47	52	56	61	66	71	77	82	88	93	99	105	111	117	123

General Data

Table 6 - Evaporator Water Pressure Drop (kPa)

Evaporator 4 passes	Waterflow (l/s)																				
	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110
B1	17	35	58	85	118																
C1	11	26	43	65	89	117	148														
D1		13	24	37	51	66	84	103	125	148											
D2		11	21	31	44	57	73	89	108	127	149										
D3		9	18	27	37	49	62	76	92	109	127	146									
D4		19	33	49	68	89	113	139													
D5		19	33	49	68	89	113	139													
D6	12	26	44	65	90	118	151														
E1		13	23	35	49	64	81	100	121	143											
F1			15	24	33	44	56	68	82	98	114	131	150								
F2				21	29	39	49	60	73	86	100	115	132	149							
G1					19	26	33	40	49	58	67	77	88	99	111	123	136				
G2					15	22	29	36	44	53	61	71	81	91	102	114	126	139			
G3					12	17	23	29	35	42	49	57	65	73	82	91	101	112	123	134	147

Table 7 - Evaporator Water Pressure Drop (kPa)

Evaporator 6 passes	Waterflow (l/s)								
	20	25	30	35	40	45	50	55	60
G1	28	43	60	79	99	122	147		
G2	24	37	52	68	86	105	127	150	
G3	18	29	41	55	69	85	103	121	142

Table 8 - Condenser Water Pressure Drop (kPa)

Condenser 2 passes	Waterflow (l/s)																													
	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
B1	9	16	24	34	45	57	71	86	102																					
D1	11	19	29	40	52	66	82	99	119																					
E1		8	12	16	22	28	34	41	49	57	66	76	86	97																
E2		7	10	14	19	24	30	36	43	50	58	66	75	85	95															
E3		6	10	13	18	22	28	34	40	47	54	62	70	79	88	98														
E4		11	17	23	30	39	48	58	69	81	94																			
E5	8	15	22	30	40	51	63	77	92																					
F1			9	12	16	21	26	31	37	43	50	57	65	73	82	91	101	111	122											
F2			10	14	18	23	29	35	42	49	57	65	74	83	93	104	115	126												
F3			9	12	16	20	25	31	37	43	50	57	65	73	81	91	100	110	121											
G1				10	13	17	21	26	31	36	42	48	54	61	69	76	84	93	102	111	121	131								
G2					9	13	16	20	23	27	32	36	41	47	52	58	65	71	78	86	94	102	111	120	129	139	150			
G3					8	11	13	16	20	23	26	30	34	38	43	48	53	58	63	69	75	81	88	95	102	109	116	124	132	139

Electrical Data and Connections

Table 9 - Compressor Motor Electrical Data - 50 Hz -

Compressor Code	Nominal Voltage	380	400	415
	Voltage Utilization Range	361-399	380-420	394-436
B1 - B2	Max motor (kW)	139	145	148
	Max. RLA (A)	233	233	233
	Inrush current in star connection (A)	391	412	428
	Power factor	0.910	0.900	0.880
C1 - C2	Max motor (kW)	201	209	213
	Max. RLA (A)	349	349	349
	Inrush current in star connection (A)	456	480	498
	Power factor	0.875	0.865	0.850
D1 - D2 - D3	Max motor (kW)	271	280	284
	Max. RLA (A)	455	455	455
	Inrush current in star connection (A)	711	748	776
	Power factor	0.905	0.890	0.870
E3	Max motor (kW)	288	301	306
	Max. RLA (A)	488	488	488
	Inrush current in star connection (A)	711	748	776
	Power factor	0.900	0.890	0.870

Table 10 - Electrical Connections

Compressor Code	B1 - B2	C1 - C2	D1 - D2 - D3 - E3
Fuse size (A) (1)	250	400	500
Disconnect switch size (A) (1)	250	400	630
Minimum power cable cross section (1) (2)	95	185	2 * 150
Maximum power cable cross section (1) (2)	240	240	2 * 300

(1) Information for fused disconnect switch option only.

(2) mm²/phase.

Dimensions and Weights

Table 11

Compressor Code	Evaporator Code	Condenser Code	Operating Weight (kg)	Shipping Weight (kg)
B1	B1	B1	4476	4215
B1	C1	D1	4787	4462
B2	B1	B1	4476	4215
B2	C1	D1	4787	4462
C1	D6	E5	6077	5797
C1	D5	E4	6202	5884
C1	D3	E3	6824	6351
C2	D6	E5	6077	5797
C2	D5	E4	6202	5884
C2	E1	F1	7175	6639
D1	D4	E4	6201	5883
D1	D3	E3	6824	6351
D1	G1	G1	8943	8129
D2	D1	E1	6987	6551
D2	F1	F2	7955	7353
D2	G2	G1	8516	9360
D3	D1	E1	6978	6551
D3	F1	F2	7955	7353
D3	G2	G2	9555	8666
E3	D2	E2	7134	6676
E3	F2	F3	8326	7690
E3	G3	G3	9882	8913

Dimensions and Weights

Figure 4

RTHD B1 B1 B1
RTHD B1 B2 B1

Evaporator 3 pass
Condenser 2 pass

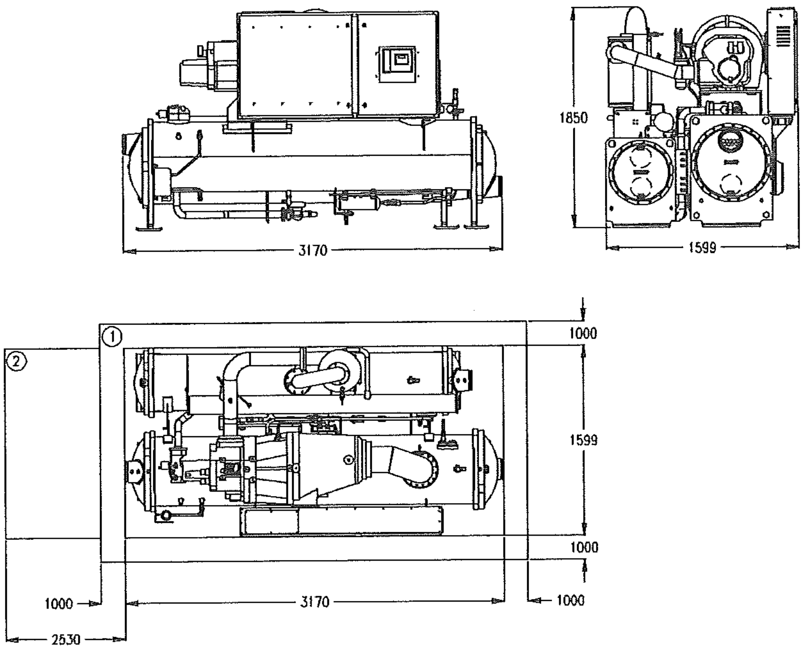
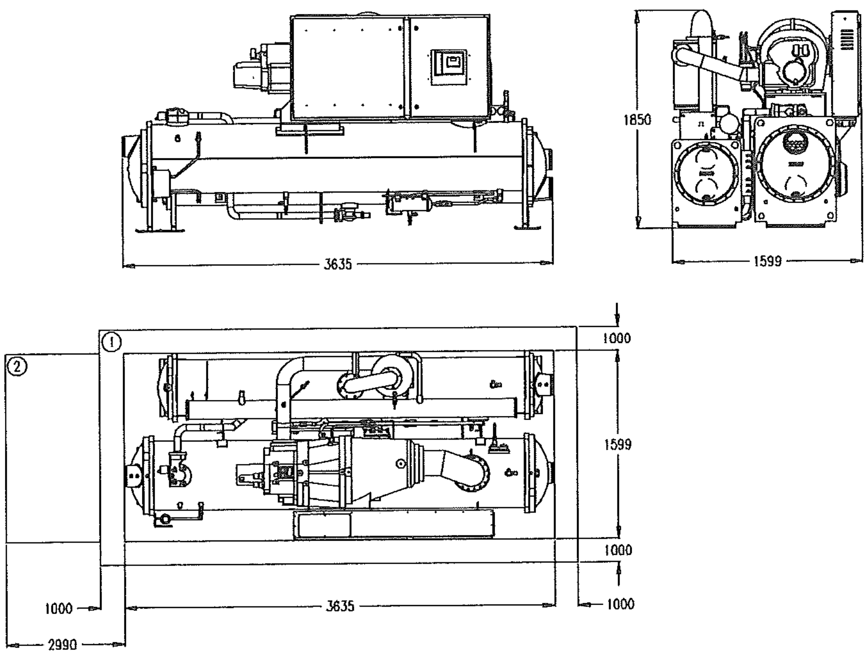


Figure 5

RTHD B1 C1 D1
RTHD B2 C1 D1

Evaporator 3 pass
Condenser 2 pass

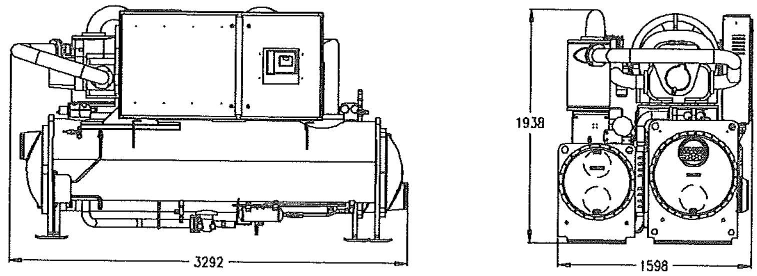


1 = Minimum clearance for maintenance
2 = Minimum clearance for tube removal

Dimensions and Weights

Figure 6

RTHD C1 D6 E5
RTHD C1 D5 E4
RTHD C1 D3 E3
RTHD C2 D6 E5
RTHD C2 D5 E4
RTHD D1 D4 E4
RTHD D1 D3 E3
RTHD D2 D1 E1
RTHD D3 D1 E1
RTHD E3 D2 E2



Evaporator 3 pass
Condenser 2 pass

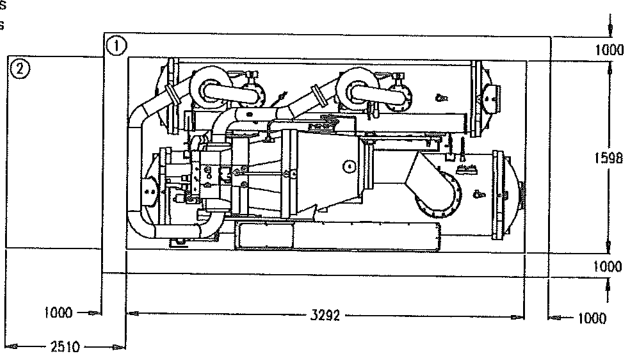
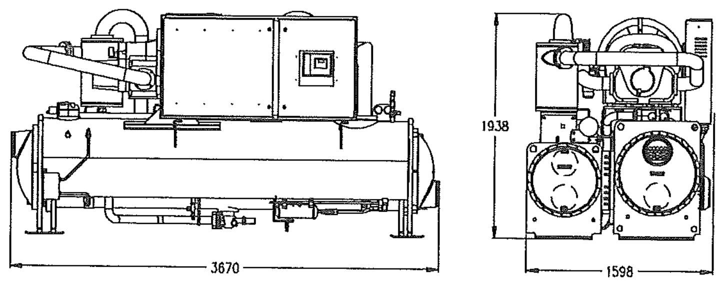
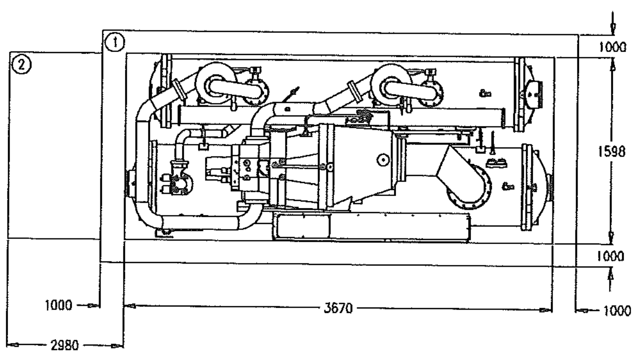


Figure 7

RTHD C2 E1 F1

Evaporator 3 pass
Condenser 2 pass





1 = Minimum clearance for maintenance
2 = Minimum clearance for tube removal

Dimensions and Weights

Figure 8

RTHD D2 F1 F2
RTHD D3 F1 F2
RTHD E3 F2 F3

Evaporator 3 pass
Condenser 2 pass

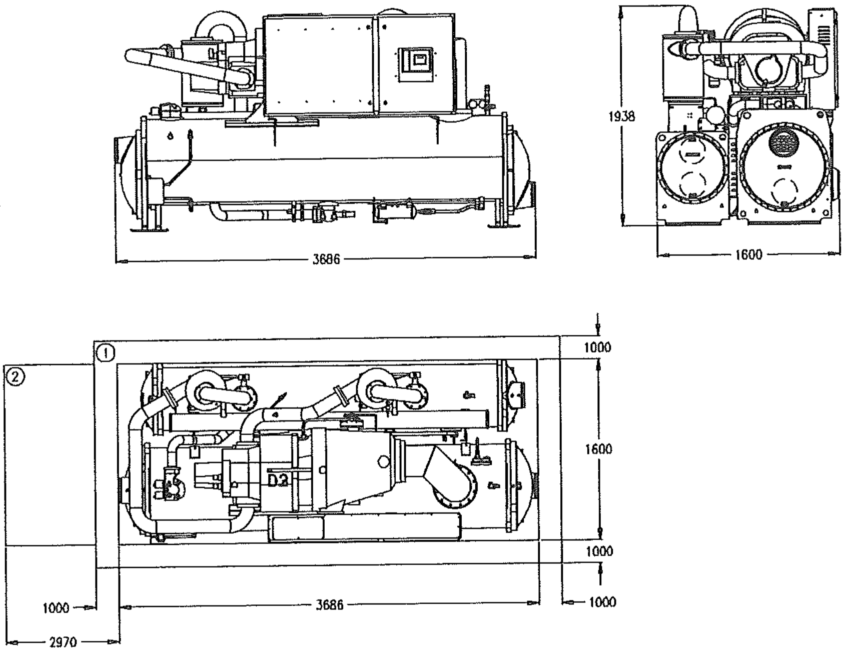
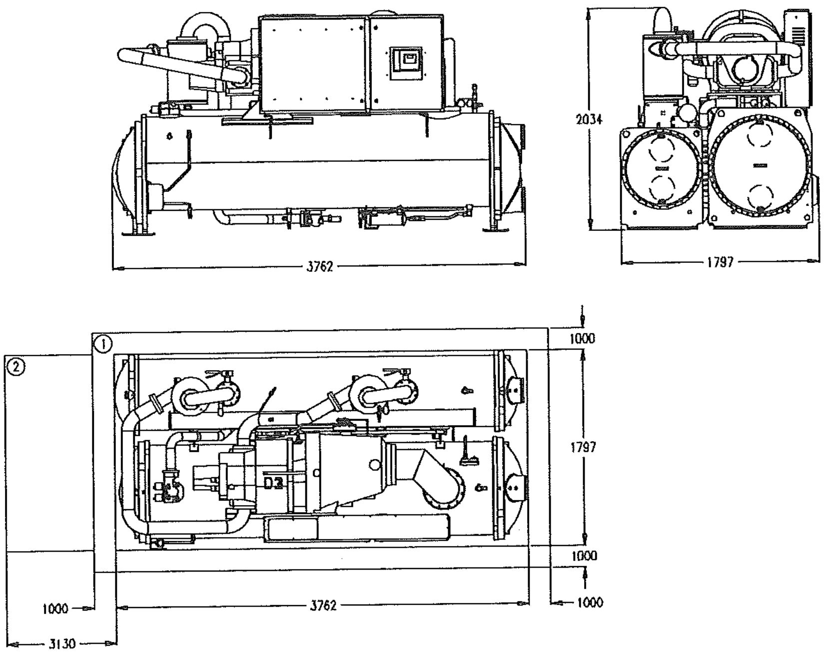


Figure 9

RTHD D1 G1 G1
RTHD D2 G2 G1
RTHD D3 G2 G2
RTHD E3 G3 G3

Evaporator 4 pass
Condenser 2 pass



1 = Minimum clearance for maintenance
2 = Minimum clearance for tube removal

Mechanical Specifications

General
Exposed steel surfaces shall be painted with an air-dry beige paint prior to shipment. Each unit shall ship with a full operating charge of refrigerant and oil. Molded neoprene isolation pads shall be supplied for placement under all support points. Startup and operator instructions by factory-trained service personnel are included.

Compressor and Motor
The unit shall have a semi-hermetic direct- drive, 3000 rpm, rotary compressor with capacity control slide valve, oil sump heater and differential pressure refrigerant oil flow system. Four pressure lubricated rolling element bearing groups shall support the rotating assembly. Motor shall be a suction gas cooled, hermetically sealed, two pole, squirrel cage induction type.

Evaporator-Condenser
All tube sheets shall be carbon steel plate. Evaporator and condenser tubes should be individually replaceable. Standard tubes shall be externally finned, internally enhanced seamless copper with lands at all tube sheets. Evaporator tubes shall be 25.4 mm diameter. Condenser tubes shall be 19.05 mm diameter. Tubes shall be mechanically expanded into tube sheets. Condenser and evaporator tubes shall be mechanically fastened to tube supports. The water boxes shall be cast iron or fabricated steel available with Victaulic connections.

Refrigerant Circuit
An electronically controlled expansion valve shall be provided to maintain proper refrigerant flow.

Unit Controls (CH.530)
The microprocessor-based control panel is factory-installed and factory-tested. The control system is powered by a control power transformer, and will load and unload the chiller through adjustment of the compressor slide valve. Microprocessor-based chilled water reset based on return water is standard. The CH.530 utilizing the "Adaptive Control™ " microprocessor automatically shall take 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 protective limit is reached, the machine will be shut down. The panel shall include machine protection shutdown requiring manual reset for:

- Low evaporator refrigerant Temperature and pressure
- High condenser refrigerant pressure
- Low oil flow
- Critical sensor or detection circuit fault
- Motor current overload
- High compressor discharge temperature
- Communications lost between modules
- Electrical distribution faults: phase loss, phase imbalance, phase reversal
- External and local emergency stop
- Starter transition failure.

The panel shall include machine protection shutdown with automatic reset when the condition is corrected for:

- Momentary power loss
- Over / under voltage
- Loss of evaporator or condenser water flow.

Over 100 diagnostic checks shall be made and displayed when a fault is detected. The display shall indicate the fault, the type of reset required, the time and date the diagnostic occurred, the mode in which the machine was operating at the time of the diagnostic, and a help message. A diagnostic history shall display the last 20 diagnostics with the time and date of their occurrence.

Mechanical Specifications

Clear Language Display Panel

Factory-mounted to the control panel door, the operator interface has an LCD touch-screen display for operator input and information output. This interface provides access to the following information: evaporator report, condenser report, compressor report, operator settings, service settings, service tests, and diagnostics. All diagnostics and messages are displayed in "clear language." Data contained in available reports includes:

- Water and air temperatures
- Refrigerant levels and temperatures
- Oil pressure
- Flow switch status
- EXV position
- Head pressure control command
- Compressor starts and run-time
- Line phase percent RLA, amps, and volts

All necessary settings and setpoints are programmed into the microprocessor-based controller via the operator interface. The controller is capable of receiving signals contemporaneously from a variety of control sources, in any combination, and priority order of control sources can be programmed.
The control source with priority determines active setpoints via the signal it sends to the control panel. Control sources may be:

- the local operator interface (standard)
- a 4-20 mA or 2-10 VDC signal from an external source (interface optional; control source not supplied)
- Trane Tracer Summit™ system (interface optional)
- Generic BAS (optional points; control source not supplied)
- LonTalk LCI-C (interface optional; control source not supplied)

Unit-Mounted Starter

The starter is available in a Star-Delta configuration, factory-mounted and fully pre-wired to the compressor motor and control panel. A factory-installed, factory-wired 600VA control power transformer provides all unit control power (120 VAC secondary) and CH.530 module power (24 VAC secondary). Optional starter features include circuit breaker, fused disconnect switch, non-fused disconnect switch.

Options

Disconnect switch
Optional starter features include circuit breaker, fused disconnect switch, non fused disconnect switch. The disconnect switch is also mechanically interlocked to disconnect line power from the starter before the starter door is open.

Nitrogen Charge
Unit is shipped with a nitrogen holding charge in lieu of refrigerant (No oil charge).

Holding charge
Unit is shipped with a holding R134a charge and full oil charge.

Insulation
All low temperature surfaces are covered with 19 mm of armaflex (K=0.28), including the evaporator and water boxes, suction line and motor housing .

Cupronickel condenser tubes
Cupronickel condenser tubes are available for special applications. 90/10 cupronickel tubes are ¾" diameter and 0.035" wall thickness.

Mechanical Specifications

Programmable Relays (Alarm and Status)
CH.530 provides a flexible alarm or chiller status indication to a remote location through a hard wired interface to a dry contact closure. Four relays are available for this function, and they are provided (generally with a Quad Relay Output LLID) as part of the Alarm Relay Output Option. The events/states that can be assigned to the programmable relays are listed in the installation manual RLC-SVX05A.

External Base Loading
Primarily for process control requirements, base loading provides for immediate start and loading of a chiller up to an externally or remotely adjustable current limit setpoint without regard to differential to start or stop, or to leaving water temperature control. This allows the flexibility to prestart or preload a chiller in anticipation of a large load application. It also allows you to keep a chiller on line between processes when leaving water temperature control would normally cycle the unit.

Summit Interface
CH.530 provides an optional interface between the chiller and a Trane Summit BAS.
A Communications interface LLID shall be used to provide "gateway" functionality between the Chiller and Summit.

LonTalk Communication Interface
CH.530 provides an optional LonTalk Communication Interface (LCI-C) between the chiller and a Building Automation System (BAS). An LCI-C LLID shall be used to provide "gateway" functionality between the LonTalk protocol and the Chiller.

Ice Making Control
CH.530 accepts a contact closure input to initiate Ice Building. When in the ice building mode, the compressor will be fully loaded (not given a low setpoint) and will continue to operate until the ice contacts open or the return water temperature reaches the Ice Termination Setpoint. If terminated on return setpoint, CH.530 will not allow the chiller to restart until the ice making contact is opened.

Ice Machine Contact
CH.530 provides an output contact closure that can be used as a signal to the system that ice building is in operation. This relay will be closed when ice building is in progress and open when ice building has been terminated by either CH.530 or the remote interlock. It is used to signal the system changes required to convert to and from ice making.

External Chilled Water Setpoint
CH.530 will accept either a 2-10 VDC or a 4-20mA input signal, to adjust the chilled water setpoint from a remote location.

External Current Limit Setpoint
CH.530 will accept either a 2-10VDC or a 4-20mA input signal to adjust the current limit setpoint from a remote location.

Percent Condenser Pressure Output
CH.530 provides a 2-10 VDC analog output to indicate percent High Pressure Cutout (HPC) condenser pressure.
Percent HPC = (Condenser Pressure/High Pressure Cutout Setpoint)*100

Compressor Percent RLA Output
CH.530 provides a 0-10 Vdc analog output to indicate %RLA of compressor starter average phase current. 2 to 10 Vdc corresponds to 0 to 120%RLA.

TRANE

Notes

Quality Management System Approval

Literature Order Number	RLC-PRC023-E4
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Supersedes	New
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.

Société Trane – Société Anonyme au capital de 61 005 000 Euros – Siege Social: 1 rue des Amériques – 88190 Golbey – France – Siret 306 050 188-00011 – RSC Epinal B 306 050 188
Numéro d'identification taxe intracommunautaire: FR 83 3060501888

Trane
A business of American Standard Companies
www.trane.com

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