

RTRA 107-110

Screw compressor liquid chillers, centrifugal fans, air-cooled

- 4 Sizes - Nominal cooling capacity 160 to 270 kW (R22, 50Hz).
- TRANE accessible hermetic screw compressor, direct drive.
- Centrifugal fans: ductable air intake and air exhaust.
- Advanced microprocessor-based “Adaptive Control™” concept.
- Electronic expansion valve.
- Easy integration in a Building Management System.
- Factory tested prior to shipment.
- Designed and manufactured in accordance with the TRANE Quality Management System, approved to ISO 9001.



Centrifugal Fan, Air cooled liquid Chillers: Unique product feature and advantage for installations where a classical air cooled chiller does not fit

Traditionally, air cooled liquid chillers have propeller fans and are designed for outdoor installations with enough space around to ensure a proper air flow through the condenser and also with no constraints on the fan discharge side.

Air cooled liquid chillers with centrifugal fans are designed for installation inside the building. These chillers have several distinct advantages: in particular a wide application flexibility and generally a lower life cycle cost than propeller fan type air cooled chillers.

The RTRA centrifugal fan indoor air cooled chiller is the right solution for:

- Floor-by-floor air conditioning systems with individual metering and billing.
- Critical, noise-sensitive installations allowing

the use of silencers (hidden indoor installation eliminates neighborhood complaints).

- To protect investment by avoiding rapid corrosion, in particular in areas with heavy air pollution.
- A ductable condenser air intake. The condenser air inlet is located on one side of the unit which makes possible to isolate the machine room from low outdoor air temperatures.
- An alternative to a remote evaporator solution. The evaporator is situated out of the condenser air stream. When the unit is shut down during the cold season, the air circulation inside the condenser section is not in contact with the evaporator which is then totally protected from freezing.

Available external static pressure

Available static pressure allows the use of long ducts and the installation of silencers. Units may be used as exhaust fans, taking advantage of the cooler building exhaust air to increase the cooling capacity and/or reducing kW-consumption. During the cold season, the condenser exhaust air can be used for space heating.

TRANE HELIROTOR Screw compressor: Unequaled Reliability - Rugged design

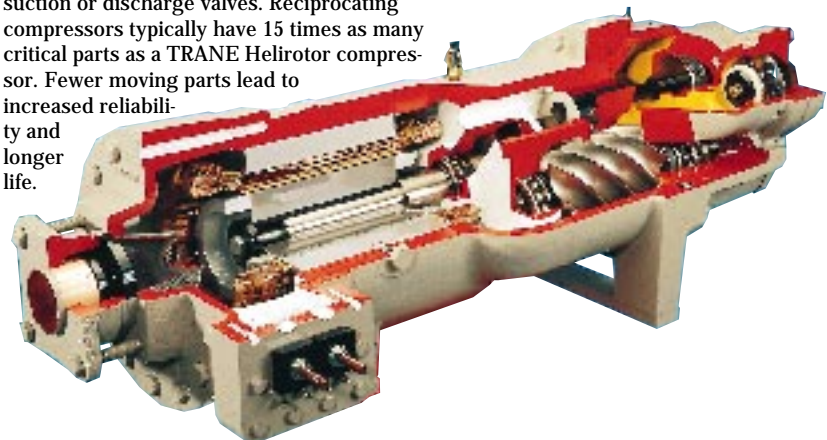
Since the introduction of TRANE's Helirotor compressors to air cooled applications the reliability has been outstanding compared to typical reciprocating compressor designs. Historically, reciprocating compressors have had a failure rate of between two and four percent in the first year alone. Of the thousands of screw compressors shipped to date the number that have experienced failure is less than 1 in 1,000!

All air cooled RTRA liquid chillers use the highly reliable CHHB and CHHN design Helirotor compressor that has been used successfully on larger TRANE air cooled chillers since 1991.

Fewer moving parts

The TRANE Helirotor CHHB compressor has only three moving parts, the rotor assemblies and the capacity controlling slide valve. The CHHN design has only four, the rotor assemblies, the variable unloader valve and the step unloader valve.

Unlike reciprocating compressors, the TRANE Helirotor compressors have no pistons, connecting rods, mechanical oil pumps, suction or discharge valves. Reciprocating compressors typically have 15 times as many critical parts as a TRANE Helirotor compressor. Fewer moving parts lead to increased reliability and longer life.





Rugged design benefits

All potentially fragile components such as suction and discharge valves and springs have been eliminated from the design of the TRANE Helirotor compressor. The introduction of

Class 5 bearings make TRANE Helirotor compressors superior to reciprocating compressors and a leader in screw compressor technology.

Unique rotor 5/7 lobe design

Profiles patented by TRANE, only TRANE provides this specific compressor design to give superior rotor rigidity and an extended range of capacity control ability.

Electronic Expansion Valve

Precise refrigerant flow metering is assured by use of an electronic expansion valve. Among the benefits of using electronic expansion valves are that they minimize superheat in the evaporator and allow the chiller to run at reduced

condensing pressures. Chillers that use conventional thermostatic expansion valves run at higher head pressures and consume more power than necessary at part-load conditions.



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

Trouble free installation, start-up and operation.

“Adaptive Control™”

The air cooled RTRA chillers utilize the latest and most advanced micro-processor control system developed by TRANE. Adaptive Control™ means that the system takes corrective action when any of the control variables approaches a limit condition at which the protection function of previous control schemes would normally have shut-down the chiller.

Micro-processor control logic

The P.I.D. control, based on the leaving chilled water temperature, monitors and controls the currents drawn by the compressor motors and the evaporating and condensing temperatures; maintains accurate chilled water temperatures and minimizes the drift from set

point to provide better building comfort or process cooling control.

Modulating control

Modulating capacity control offers better compressor reliability by reducing compressor cycling. Cycling reduces life expectancy of compressor components – parts such as the motors and valves in reciprocating compressors do not stand up well to excessive compressor cycling.

Slide valve modulation combined with P.I.D. chilled water control maintains chilled water supply temperatures within +/- 0.3°C of set point. Chillers that have step capacity control can, typically, only maintain water temperature to within +/- 1°C. Never before has maintaining chilled water temperature control been so accurate as it is with the air cooled RTRA chiller.

Improved chiller and compressor motor protection

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

- Chiller protection from oil, water, refrigerant pressure and temperature faults
- Motor protection, by monitoring and controlling the compressor motor current on each phase, from
 - overload at start-up and throughout operation
 - phase loss, unbalance or reversal
 - power loss
 - over voltage or under voltage conditions (optional feature)
 - welded contactors.

If a fault occurs a message identifying the problem is displayed on the control module.

Communication

The Unit Control Module of the RTRA with clear language display (UCM-CLD) offers several communication

levels that considerably simplify remote monitoring of the chiller or its integration in a Building Management

System (BMS) or to TRANE Chiller Plant Manager (CPM).

Remote control panel

TRANE RTRA chiller is available with twisted pair connection to a remote control panel. Chiller operation can be controlled similarly to the control interface on the chiller itself. From a twisted pair of wires, the unit can be turned on or off, the chilled water set-

point can be changed and 90 diagnostic conditions are displayed. Remote control panel can be mounted so that access to chiller information is just one step away, no need to go into the chiller plant room.



Performance and general data

Model	Leaving water temp. (°C)	Ambient air temperature (°C)							
		25 °C		30 °C		35 °C		40 °C	
		Cooling Cap. (kW)	Power Input (kW)	Cooling Cap. (kW)	Power Input (kW)	Cooling Cap. (kW)	Power Input (kW)	Cooling Cap. (kW)	Power Input (kW)
RTRA 107	5.0	172.6	45.6	164.0	49.0	155.0	52.8	145.5	57.1
	7.0	182.6	47.0	173.5	50.4	164	54.2	154.0	58.5
	9.0	192.9	48.5	183.3	51.9	173.3	55.7	162.8	60.0
RTRA 108	5.0	199.7	60.2	189.1	65.9	178.2	72.4	166.8	79.6
	7.0	211.1	62.1	200.0	67.9	188.4	74.4	176.4	81.6
	9.0	222.9	64.0	211.2	69.9	198.9	76.5	186.2	83.8
RTRA 109	5.0	229.7	64.1	218.8	70.2	207.4	77.0	195.4	84.3
	7.0	244.5	66.1	232.9	72.3	220.7	79.0	207.8	86.4
	9.0	259.6	68.1	247.4	74.3	234.3	81.2	220.6	88.7
RTRA 110	5.0	278.9	85.9	265.7	93.3	252.4	101.6	239.0	110.8
	7.0	294.7	88.8	280.8	96.3	266.8	104.6	252.7	114.0
	9.0	310.9	91.8	296.2	99.3	281.5	107.8	266.7	117.3

Ratings based on a fouling factor of 0.044 m²K/kW. Interpolation is permitted, extrapolation is not permitted.

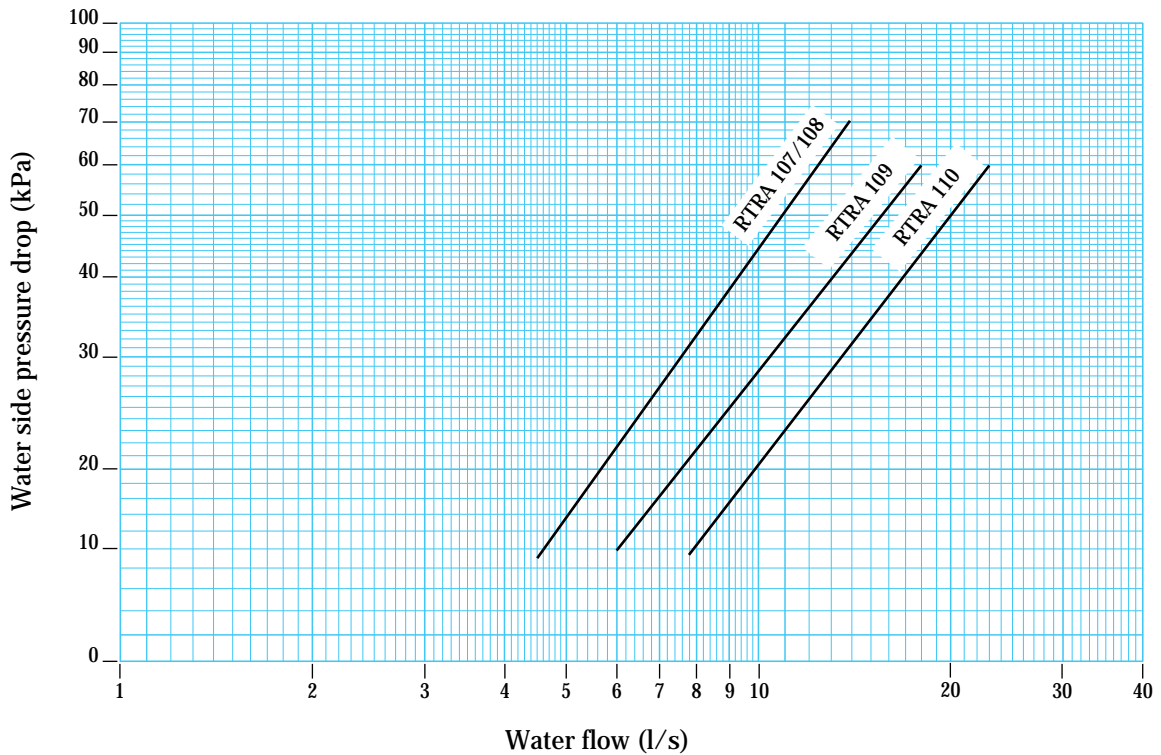
General data

Model	RTRA				
Unit size		107	108	109	110
Nb. of compressor/ circuit		1/1	1/1	1/1	1/1
Number of fans		3	3	4	4
Max. available static pressure	(Pa)	400	350	400	350
Dimensions and weight					
Length	(mm)	3650	3650	4650	4650
Width	(mm)	1300	1300	1300	1300
Height	(mm)	2000	2000	2000	2000
Operating weight	(kg)	2160	2320	2650	2690
Chilled water connections diameter (1)		DN 80	DN 80	DN 125	DN 125
Compressor electrical data 400/3/50					
Maximum FLA	(A)	128	154	177	207
Starting amps (part winding)	(A)	406	458	559	616
Starting amps (star delta)	(A)	190	220	260	285

(1) Flanges PN 16

(2) A complete product selection with detailed dimensions can be obtained from your local TRANE sales office.

Water side pressure drop



Mechanical specifications

Air cooled liquid chillers, RTRA series with an accessible hermetic, direct drive helirotor screw compressor, evaporator and condenser, micro-processor based controls and unit mounted starters.

Compressor-motor assembly

The compressor shall be of the accessible, hermetic helirotor screw type with the motor directly coupled to the compressor drive rotor. Pressure lubricated, Class 5 rolling element bearings shall be located at each end of both rotors. The motor shall be two pole, squirrel cage design running at 2950 rpm. Capacity control shall be fully modulating. Oil separator and filtration devices shall be provided separately for the refrigeration circuit.

Evaporator

The direct expansion, shell and tube heat exchanger shall have seamless copper tubes, with internal fins, mechanically expanded into steel tube sheets. A freeze protection heater cable shall be wound around the evaporator shell below the flexible, closed cell, foam insulation cover. The evaporator shall be rated for a maximum working pressure of 1.4 MPa on the liquid side of the heat exchanger. Flanged water connections shall be provided.

Condenser

Air cooled condenser coils shall be with seamless copper tubes expanded into continuous aluminium fins. Integral oil cooler and sub-cooler circuits shall be provided in the coils. The air intake shall be on one side with the possibility to be ducted.

Fan section

The fan section shall have three or four double-width belt-driven centrifugal fans with forward curved blades. The fan wheels will be statically and dynamically balanced and the fan shaft mounted on prelubricated and sealed ball-bearings. The motors will be totally enclosed with integral thermal protection and mounted in such a way for allowing the adjustment of belt tension.

Refrigeration circuit

The refrigeration circuit shall have an oil separator, filter dryer and electronic expansion valve.

Control panel

The control panel shall contain a micro-processor based unit control module with clear language display and Adaptive Control™. The unit control module shall provide all control and operating safety functions. The control functions shall include the start-up and shut-down sequences, leaving chilled water temperature control, compressor and electronic expansion valve modulation, fan sequencing, anti-recycle logic, automatic lead and lag compressor starting and load limiting. Unit protective functions shall include loss of chilled water flow, evaporator freeze protection, loss of refrigerant, low and high refrigerant pressures, compressor running and starting current protection, phase loss, unbalance or reversal, and loss of oil flow.

The clear language display shall be door mounted and indicate over 20 items of operating conditions including chilled water set point, current limit set point, leaving chilled water temperature, evaporator and condenser refrigerant pressures and temperatures. In the event of a problem being detected a diagnostic code from over 60 pre-programmed conditions shall be displayed.

Starter panel

The unit mounted starter panel shall be to Class IP55 protection. The panel shall contain the compressor part-winding starter and current transformers for motor overload protection, and fan motor starters.

Unit construction

The welded steel base frame shall support the galvanised steel structural profiles and panels. The unit casing shall have a corrosion resistant finish of polyurethane paint. Lifting eyes shall be provided in the steel base frame.

Accessories and options

- Low ambient version
- Star-delta compressor starter
- Copper finned condenser coils
- Refrigerant pressure gauges
- Communication card
- Spring, anti-vibration mounts
- Controls for ice making systems
- Unit mounted disconnect switch
- Compressor and evaporator section decorative panelling
- Condenser filter section with permanent or throw away filters with permanent or throw away filters
- Remote, clear language, display

Factory testing

All RTRA air cooled chillers shall be fully run tested before shipment. Unit operation and all control functions shall be programmed prior to shipment.

Shipment

Units shall ship fully assembled and wired, charged with refrigerant and oil, and ready for operation after site connection of the power supply, electric interlocks and chilled water piping. Units shall ship on a wooden skid.

Quality assurance

The Quality Management System applied by TRANE is defined in the TRANE Quality Manual and subject to independent third party assessment and approval to ISO 9001. The products described in this catalogue are designed, manufactured and tested in accordance the requirements of the approved system.

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

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