



Guide specifications

Series R™ Helical Rotary Liquid Chillers

Model RTHD SE / HE / XE / HSE

Water-cooled 500-1500 kW



January 2014

RLC-PRG028A-E4

General

Chilled water production will be made by a factory-assembled and tested, water-cooled liquid chiller, Trane type RTHD SE / HE / XE / HSE..... which will be shipped with a full operating charge of R134A refrigerant and lubrication oil, screw compressor and electronic expansion valve.

Unit panels, frames and exposed steel surfaces shall be painted with an air-dry RAL 9002 prior to shipment. Molded neoprene isolation pads shall be supplied for placement under all support points. Startup and operator instructions by factory-trained service personnel are included.

Performances summary

- Cooling capacity at full load:..... (kW)
- Unit power input at full load:.....(kW)
- Operating conditions: Evaporator entering/leaving temperature :(°C).
Condenser entering/leaving temperature:.....(°C).
- Energy efficiency at full load EER:..... (kW/kW)
- Seasonal Energy efficiency ESEER:..... (kW/kW)
- Sound power:..... dB(A)

Quality assurance

Chiller will be designed and manufactured under a quality assurance system and environmental management system certified in accordance with ISO 9001 and 14001 standards.

Chiller will be tested according to standard EN14511, hence certified Eurovent. All chillers will follow a production quality plan to ensure proper operation before being shipped to job site.

Unit construction will be in accordance with the following European directives:

- Pressure Equipment Directive (PED) 97/23/CE
- Machinery Directive (MD) 2006/42/CE
- Low Voltage Directive (LV) 2006/95/CE
- ElectroMagnetic Compatibility Directive (EMC) 2004/108/CE
- Electrical Machinery Safety Standard EN 60204-1
- Electromagnetic Emission and Immunity Standard EN 61800-3 category C3

Compressor and Motor

The unit shall have a semi-hermetic direct-drive rotary compressor driven by a Adaptive Frequency Drive to optimize performances at partial load on the version RTHD HSE. Unit shall also be equipped with a capacity control slide valve, oil sump heater and differential pressure refrigerant oil flow system.

Motor shall be a suction gas cooled, hermetically sealed, two poles, squirrel cage induction type, with four pressure lubricated rolling elements. Bearing groups shall support the rotating assembly. Motor bearings will be designed for the whole life of the chiller. Lubricant circuit shall be equipped with oil sump heater, differential pressure refrigerant oil flow system and filter with particles retention capacity of at least 5µm.

Evaporator

Chiller will fit a shell and tube evaporator which is manufactured, tested and stamped in accordance with PED 97/23/CE. Tubes will be cleanable with dismountable water boxes. Tubes will be copper, externally finned, internally enhanced seamless with lands at all tube sheet. Tube diameter of 25.4 mm, mechanically expanded into tube sheets and fastened to tube supports. Each tube shall be individually replaceable.

Evaporator will be designed for a water side working pressure of 10.5 bar (200 psi). Water boxes will be made of cast iron with Victaulic type connections.

Evaporator shell will be insulated with Armaflex II or equivalent of 19 mm (3/4 inches) thickness and K factor of 0.26. Evaporator will be supplied with drains and vents.

Condenser

Unit will fit a unique condenser, tube and shell type, manufactured, tested, and stamped in accordance with PED 97/23/CE. Tubes will be cleanable and individually replaceable with dismountable water boxes. Condenser tubes will be made of copper, externally finned of 19.05 mm in diameter, mechanically expanded into tube sheets and fastened to tube supports. Water boxes will be made of cast iron with drains and vents.

Water connections will be made with Victaulic type connections.

Unit Controls (Tracer UC800)

The microprocessor-based control panel shall be factory-installed and factory-tested. The control system shall be powered by a control power transformer, and will load and unload the chiller through adjustment of the compressor slide valve on series RTHD SE/HE/XE and through a Adaptive Frequency Drive on the model RTHD HSE.

Microprocessor-based chilled water reset based on return water is standard. The UC800 utilizing “Adaptive Control™” microprocessor shall automatically 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. Controller 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. Alarms and diagnostic will be displayed in chronological order, with a color/symbol code: red octagon for immediate shutdown, yellow triangle for normal shutdown and blue circle for warning.

Human interface by Touchable Display Trane TD7

Factory-mounted to the control panel door, the operator interface will have a touchable screen display for operator input and information output. This interface will provide access from the main screen to:

- Chiller Status area, with a minimum of : chiller status button (running), alarm indicator button, manual override button, evaporator leaving water temperature target, set point source target, auto/stop buttons.
- Main display area / Home screen with minimum providing access to: Compressor running status and differential oil pressure, condenser entering/leaving temperature and flow status, evaporator entering/leaving temperature, current set point, and flow status. Motor average % in line current, customized reports and chiller tag.
- Main Menu area with minimum quick access to submenus of: Alarms, Reports, Graphics, Settings, Screen language setting up.

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 EVO system via BACNET.
- Generic BAS (optional points; control source not supplied)
- LonTalk LCI-C (interface optional; control source not supplied)

- Modbus PIC (interface optional; control source not supplied)

Unit-Mounted Star-Delta Starter (RTHD SE, HE, XE)

The starter is available in a Star-Delta configuration closed transition, factory-mounted and fully pre-wired to the compressor motor and control panel. Starter will reduce 33% the RLA inrush current.

A factory-installed, factory-wired 600VA control power transformer provides all unit control power (120 VAC secondary) and UC800 module power (24 VAC secondary). Optional starter features include circuit breaker, fused disconnect switch, non-fused disconnect switch. All the starter elements will be enclosed in a IP54 panel, with hinged door to allow customer power input connection

Adaptive Frequency Drive (RTHD HSE)

RTHD HSE will fit an Adaptive Frequency Drive, factory mounted, tested and wired. Frequency converter will be chosen by the manufacturer based on the present motor current at maximum loading of the unit, and will drive the chiller start and ramp up and the partial load operation.

AFD enclosure will be IP54 as standard, with integrated air cooling system, consisting in a fan below the AFD frame, without no obstacle to the air circulation

Harmonic Filter (optional)

AFD can be equipped with a Harmonic Filter, sized by the manufacturer in accordance with the compressor size, with a minimum capability of 5% THiD (Total Harmonic Distortion). Filter frame will have a minimum protection rate of IP23, and can be built-in on the AFD frame.

Filter must be in compliance with EMC standards EN 55011-1A.

The purpose of the harmonic filter will be to avoid incremental heat losses in the installation (transformers, cables), keeping harmonic currents at low level so as to avoid transformer overload and high cable temperature.

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=0.26), 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 3/4" diameter and 0.035" wall thickness.

Programmable Relays (Alarm and Status)

UC800 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 chiller installation manual.

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.

LonTalk Communication Interface

UC800 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.

Modbus Communication Interface

UC800 provides an optional Modbus Communication Interface (PIC) between the chiller and a Building Automation System (BAS). PIC board shall be used to provide "gateway" functionality between the Modbus protocol and the chiller.

Ice Making Control

UC800 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, UC800 will not allow the chiller to restart until the ice making contact is opened.

Ice Machine Contact

UC800 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 UC800 or the remote interlock. It is used to signal the system changes required to convert to and from ice making.

External Chilled Water Setpoint

UC800 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

UC800 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

UC800 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

UC800 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.



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RLC-PRG028A-E4_0114
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