

CENTRAL WATER CHILLERS

- Complete Central Chiller & Pump Tank Package
- Air-Cooled and Water-Cooled Models
- 20 to 280 Tons of Capacity*
- 20°F - 80°F Process Fluid Temperatures
- For Indoor Installation
- Multiple Refrigerant Zones
- Water Distribution System

* Customized smaller and larger systems available.

TTI SERIES

Air-Cooled (with Remote Condenser)
Water-Cooled



TTI-40W shown. 40 ton water-cooled model with optional standby pump and manifold.



Typical remote air-cooled condenser for use on TTI-A models. Condenser image not shown to scale.

TTI-40W shown. 40 ton air-cooled model with optional standby pump and manifold and optional variable speed drive.



Compressors



Scroll Compressors

The compressor is the heart of a chiller's refrigeration cooling system. The compressor removes the refrigerant vapor from the evaporator to a point where the desired process fluid set point can be maintained and it raises the pressure of the refrigerant vapor to a level high enough so that the available condensing medium can effectively remove the process heat.

TTI Series chillers are equipped with either hermetic scroll compressors or rotary screw compressors. Both compressor styles use rotary technology for smooth, efficient operation with fewer moving parts and low torque variation for better reliability compared to traditional reciprocating compressors. Compressor suppliers are selected for the advanced performance features of their product along with their service history and after market support capabilities.



Screw Compressor

Evaporators

The recirculated process fluid is cooled in the chiller evaporator. Liquid refrigerant boils or evaporates, absorbing heat from the process fluid as it changes into a vapor. This critical component is carefully selected to provide optimum process fluid cooling. Each refrigerant zone is equipped with its own fully independent evaporator which is protected by a process fluid freeze-stat, flow switch and low pressure limit switch. Central chillers use either brazed plate or shell & tube evaporators depending on system capacity and desired duty.

Brazed plate evaporators are made of stainless steel plates brazed together with copper brazing material. This design promotes turbulent flow and high heat transfer rates in a compact, non-ferrous package. A cleanable basket strainer filter is included to protect the brazed plate evaporator from water born contamination.



Brazed plate evaporator



Shell & tube evaporator

Shell & tube evaporators are used on larger capacity systems. Refrigerant is circulated through copper tubes within the carbon steel shell to cool the process fluid that surrounds the tubes. Shell & tube evaporators are fully insulated and provide flexible, efficient heat transfer.

Components



OPTIONAL STANDBY PUMP & MANIFOLD...

Prewired standby pumps and pre-plumbed manifolds are offered for process or evaporator pumps. This feature assures uninterrupted operation when service is required on the primary pump but continued operation is necessary. Costs are higher for systems that must have field supplied manifolds, compared to systems with factory supplied manifolds.

Condensers

TTI Series central chillers are offered with Air-Cooled or Water-Cooled condensers. The selection is influenced by the industrial environment where the TTI Series will be installed including available condensing water supply and plant ambient temperatures. The condenser is a heat exchanger where the heat absorbed by the refrigerant during the evaporating process is given off to the condensing medium. As heat is given off by the high temperature, high pressure refrigerant vapor, its temperature falls and the vapor condenses to a liquid.



Remote Air-cooled condenser

Air-Cooled units use outdoor remote condensers. The air-cooled condenser is constructed of a heat transfer coil that has copper tubes and aluminum fins for full rated performance at 95°F ambient. The coil is housed in a sheet metal enclosure with fans that provide a vertical air discharge. Ambient operation to -20°F is standard. Air-cooled condensers are field installed by the owner. Installation includes refrigerant piping system and charging.



Water-cooled condenser

Water-cooled units use tube and shell condensers with removable heads for cleaning. The condenser is equipped with a water regulator valve that maintains stable refrigerant

pressures under a wide range of condensing water temperatures and pressures. Water-cooled condensers are manifolded to provide a single process connection.

Electrical Cabinet

A single power connection is required for the TTI Series® chiller.* Electrical components are housed in Nema-12 cabinet. A control transformer is mounted and wired to provide 115 volt control power. Compressor contactors and pump motor starters are protected with branch circuit fusing. Wiring from the cabinet to the motors is protected in seal tight conduit. The TTI Series multi-zone display panel, pump operators and operating lights are mounted on the cabinet door.

* Water condensed only. Air condensed remote condensers require separate power.



Typical electrical cabinet

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ALARMS... Audible and visual alarms are triggered by process temperature and pressure parameters, factory or operator set.



PRESSURE GAUGES...

- **High Pressure** indicates pressure in the condenser side of the refrigerant circuit.
- **Low Pressure** indicates pressure in the evaporator side of the refrigerant circuit.
- **Coolant Pressure** indicates pump pressure delivered to process.

Reservoir

The standard patented reservoir is a one-piece seamless design, rotationally molded from linear low density polyethylene and insulated with 3/8" dense foam insulation. The rectangular base accepts straight-line pump connections. The cylindrical shape adds structural strength. A tank baffle provides true 'hot-cold' operation. The standard service cover has cut-outs for distribution piping and an inspection opening. The tank volume is adequate to support expansion to 2 times its original chiller capacity (adding MA or MW chilling modules and additional pumps).



Polyethylene reservoir with insulation

Stainless steel and epoxy coated mild steel reservoirs are available as an option.

Coolant Circuit

TTI Series central chillers use a 2 pump system... one pump to deliver coolant flow to process and a second pump to deliver coolant flow through the chiller evaporators. The process and evaporator pumps operate independently of each other, allowing for greater control of coolant temperature, flow and pressure. Each pump is toggled on and off by individual operators.



Temptek provides high efficiency centrifugal pump and motor assemblies from recognized

leaders in their field. Careful consideration to service, efficiency and motor protection are central to the design and selection of the best pump. All pumps include full pump trim including suction and discharge service valves. Schedule 80 PVC or welded steel pump trim may be used depending on pipe size and duty.

Nominal pump flow rates are 2.4 gallons per minute per ton for chilled water systems. Process pumps are selected to provide approximately 45 to 60 pounds per square inch of pressure. Where higher flows rates or higher system pressure is required appropriate pump selections are made.

The **Process Pump** distributes coolant at full capacity through the plant. A coolant pressure sensor produces an alarm if the process water pressure falls below desired levels.

The **Evaporator Pump** circulates coolant at the correct flow through the internal evaporators independent of the process flow.



WATER MAKE-UP...

A level switch activates a solenoid valve to feed water to the reservoir from plant supplies. The level switch is mounted in a small enclosed tank external to the reservoir. Positioned at the proper operating water level, the water inside the level switch tank is not subject to turbulence that may exist in the reservoir. The reservoir level can be visually sighted by the clear sight tube.

LIMIT DEVICES...

- **High Pressure** limits use with excessive refrigerant pressure.
- **Low Pressure** limits use with low refrigerant suction pressure.
- **Evaporator Flow** limits use with inadequate evaporator flow..
- **Motor overloads** limits use with excessive pump amperage.
- **Coolant freezestat** limits use when freeze conditions are present.



Chiller Control

The Temptek Multizone Control Instrument has the experience of over 8 years of field service. The control instrument consists of the cabinet door mounted operator interface display and control instrument and internal cabinet mounted intelligent zone boards.



INTELLIGENT ZONE BOARDS

One intelligent zone board is provided for each refrigeration zone. The control instrument



communicates with the zone boards to stage each refrigeration zone independently. This brings the process temperature in line with the set point quickly and accurately. In the event of a communication failure, the zone boards assume the control of their respective refrigeration zones and will continue to operate.

The instrument provides control of up to 6 refrigeration zones. Although not all are used on the chiller, the extra zone control can be used for future capacity expansion where chilling modules are installed and controlled by the chiller control.

DISPLAY CONTROLS & LIGHTS

Soft key controls are provided for selection of zone displays and setpoint. Two large display windows continuously show temperature for **to process** and **setpoint**.

Temperatures can be shown in Fahrenheit or Celsius. **From process** temperatures can be displayed momentarily when selected by the operator. The display windows also display setup options.



Status lights are provided for seven system components:

probe, low flow, high pressure, low pressure, low oil, compressor and freezestat. The condition is indicated by multi-colored LED's. **Solid green** indicates the component is at the run condition. **Flashing red** indicates that an error condition exists. **Solid red** indicates that an error condition was once present, but is now in an acceptable run condition. Pressing the 'select' button changes a solid red indication into a solid green indication. The instrument provides an alarm status light on the display, as well as an audible and visual alarm beacon. A selectable refrigeration zone lead/lag mode is a standard feature of the instrument.

MULTI-FUNCTION OPERATORS

Multi-function start / stop operators provide status and control of each pump individually. Pump on / off and overload status are provided. An emergency stop button is also included.



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REFRIGERANT COMPONENTS...

All refrigerant components used in Temptek chillers are selected for historic reliability and performance. Components include high & low pressure limit switches, freezestat, expansion valve, relief valve, filter dryer and sight glass/moisture indicator.

Engineering Design Service

Complete CAD based Engineering Department with Experienced Water System Designers. Working from customer supplied facility and process information, Temptek designers analyze the entire system and will select the correct component combinations to provide the most efficient output. If one of our standard systems does not fit your application requirements, then Temptek will design a custom system from a long list of available options.

Standard Features

RESERVOIR CONSTRUCTION:

- Seamless, rotationally molded, non-rusting polyethylene
- Tank insulation
- Drain valve
- Overflow port
- Hot/cold section partition (baffle)
- Structural base
- Automatic water-level control
- Pump decking
- Spare pump ports
- Hinged tank lid

REFRIGERANT CIRCUITS:

- Hermetic scroll or rotary screw compressors
- Liquid line solenoid valve
- Refrigerant sight glass with moisture indicator
- Thermostatic expansion valve
- Brazed plate or shell & tube evaporator
- Hot gas by-pass or unloading capacity control systems
- Water-cooled Condenser Models
 - Regulator valve
 - Single connection with manifold and isolation valves
- Removable heads
- HFC-407C & HFC-410A refrigerant
- Air-cooled Condenser Models
 - Remote, outdoor condenser
 - Variable speed fan
 - Pressure staging

COOLANT CIRCUIT:

- Large capacity process pump:
 - Suction service valve
 - Discharge service valve
- Evaporator pump:
 - Suction service valve
 - Discharge service valve
 - Discharge basket strainers (on models with brazed plate evaporators)

LIMIT DEVICES: (per zone)

- Refrigerant circuit:
 - High pressure limit
 - Low pressure limit
 - Evaporator flow limit
- Coolant circuit:
 - Pump motor overload relay
 - Coolant freeze-stat
- Instrument control circuit fuse

PRESSURE GAUGES (per zone):

- Refrigerant high pressure
- Refrigerant low pressure
- Coolant pressure

ELECTRICAL:

- Nema rated electrical cabinet
- Fused pump motor starters
- Fused compressor motor starters
- Fused transformer
- Power entry terminal block

WARRANTY:

- 1 year on parts and labor

CHILLER CONTROL INSTRUMENT:

- Microprocessor based multizone controller
- Intelligent zone boards
- Each compressor staged individually
- Large temperature display in °F or °C for *to process* and *from process*
- Large setup display
- Refrigerant circuit indicators per zone: *probe, low flow, high pressure, low pressure, compressor, freeze-stat, capacity*
- Water circuit indicators: *temperature deviation, low pressure, probe, phase*
- SPI communications interface
- Selectable lead/lag mode
- Audible and visual alarm

Capacity Control

Matches cooling output to the process load. As the process water approaches the setpoint, the control instrument stages compressors to reduce cooling capacity. Most units also include hot gas by-pass or other internal compressor unloading features to match the chiller capacity to the process load which results in tighter temperature control and longer component life.

Standard Features

TANK CONSTRUCTION:

- Epoxy coated mild steel
- Stainless steel wetted surfaces

REFRIGERANT CIRCUIT:

- Compressor hour meter
- Oversized condensers for higher efficiency and for higher operating ambients

COOLANT CIRCUIT:

- Larger process pumps
- Standby pumps and manifolding

ELECTRICAL:

- UL listed electrical panel
- Disconnects

INSTRUMENTATION:

- Remote display kit
- PLC instrument with color touch screen
- Modbus RTU or TCP interface

WARRANTIES:

- Extended compressor warranty

REFRIGERANT:

- R410A refrigerant (coming soon in models using scroll compressors)
- R407C refrigerant
- R404A refrigerant for low temperature systems
- R134A refrigerant

Authorized Dealer

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