Temperature Control Equipment

Count on SMC for all your temperature control needs.

Chillers are products that control the temperature of heat sources in customers' devices and equipment using temperature-controlled circulating fluid. Maintaining a fixed temperature can improve the quality, reliability and service life of devices or equipment.

Makes cooling water easily available, anytime, anywhere.

When...

There is no cooling tower. Tap water is being used.

Even without a cooling tower, an air-cooled refrigerated chiller can be used to easily supply cooling water.

Less tap water used!

Dripping stops

When...

There is a cooling tower, but high temperatures in summer or low (freezing) temperatures in winter make cooling water temperatures unstable.

Cooling water at a consistent temperature can be supplied regardless of the season.

When...

Equipment is to be used in a laboratory or other small space.

Compact types that can be installed under or on top of desks, etc., are available. Use for physical, chemical, and analytical equipment, etc.

Thermo-cooler

Thermo-chiller

Thermo-con

Thermo-electric Bath

Chemical Thermo-con

Semi-conductors

Machine tools

Food products

Measuring devices

Physical and chemical/analytical equipment

Medical/Pharmaceutical etc.

NP-E10-5B
A Chiller is equipment to control temperature of customers’ heating sources. Chillers control fluid, such as water, and circulate the fluid to customers’ machine using a pump by controlling the output from a cooling source such as a compressor, or a heating source such as a heater. That’s why this equipment can be also called a circulator.

Application Examples

- **Laser machining**
  - Cooling of laser irradiated part

- **Electronic microscope**
  - Temperature control of electron-beam irradiated part

- **Atomizing device** (food and cosmetics)
  - Temperature control of sample and device

- **Cooling of die**
  - Cooling of work pieces

- **Shrink fitting machine**
  - Cooling of work pieces

- **Reagent cooling equipment**
  - Temperature control of reagent

- **UV curing device** (printing, painting, bonding and sealing)
  - Cooling of UV lamp

- **X-ray (digital) instrument**
  - Temperature control of X-ray tube and X-ray light sensing part

- **Ultra sonic wave inspection machine**
  - Temperature control of ultrasonic wave laser part

- **Packaging line** (sealing of film and paper package)
  - Cooling of work pieces for bonding

- **Temperature control of chamber electrode**
  - Temperature control of chamber electrode
Three types of cooling and heating methods (refrigerated, water-cooled, Peltier-type) can be selected for a wide range of applications.

**Refrigerated**

Cooling capacity from **1 kW** to **15 kW**. For a wide range of applications.

Generates low temperatures using a refrigeration cycle.

This equipment cools the circulating fluid by performing heat exchange with low-temperature refrigerant gas, using a built-in refrigeration circuit that circulates refrigerant.

Large-scale heat exchange can be handled compared with the Peltier type.

There are two types of heating sources: high-temperature refrigerant gas, which is generated from the refrigeration circuit, and an electric heater.

Both air-cooled and water-cooled types are available, depending on the condenser’s cooling method.

**Economy type HRG**

- Makes cooling water easily available, anytime, anywhere.
- As a replacement for a cooling tower
- Pump capacity: Max. 62 L/min (1L/min = 0.0353SCFM)

Installing extra cooling towers can be troublesome. The HRG series (air-cooled refrigeration) can be moved easily to wherever you need it, when you need it. Cooling water is supplied from the attached hose.

**Compact type HRS**

- Installation close to a wall is possible on both sides.

**Convenient functions**
- Timer operation function
- Low tank level detecting function
- Power failure auto-restart function
- Anti-freezing operation function

**Self diagnosis function and check display**
- 31 types of alarm codes

**High-performance type HRZ/HRZD**

- Dual Thermo-chiller, HRZD series can control temperature for two systems separately by one chiller.
- Energy-saving thanks to reduced wiring, piping and labor, and double inverter type.

- Temperature stability ±0.18°F (±0.1°C), temperature range from -4 to 194°F (-20 to +90°C). Full array of features and equipment.
- A double inverter type is also available, saving energy more effectively through use of a DC inverter compressor and an inverter pump.

**Space-saving**

Footprint reduced by **23%**
### 2 Water-cooled

For temperature control in room temperature area
Temperature range setting: 68 to 194°F (20°C to 90°C)
Thermo-chiller

Refrigerant-free and energy-saving type using no compressor.

**High-performance type HRW**

- Energy-saving
  - With no compressor, power consumption is drastically reduced. Reduction in power consumption is even greater with inverter type: 0.5 kWh/h.
  - Suitable for temperature control in room temperature areas not requiring compressor.
  - Reduction in facility water volume (1.2 L/min (1 L/min = 0.0335 SCFM)) thanks to direct heat exchange with circulating fluid.
  - Features equivalent to HRZ series.

![In-plant cooling water circulation facility such as cooling tower, etc.](image)

Heat exchanger for cooling circulating fluid

This equipment cools the circulating fluid by directly exchanging it with the cooling water in the plant. This can be used at room temperature or higher, and also used when there is a cooling water circulation facility. Large-scale heat exchange can be performed using less energy, and the device has a compact body since a compressor is not required. An electric heater is used for heating.

### 3 Peltier-type

For high-precision temperature control
Temperature stability: ±0.018 to 0.054°F (±0.01°C to 0.03°C)
Thermo-con

Generates little vibration, and is refrigerant-free and environmentally friendly.
Can control the temperature just in front of the heat source using the external temperature sensor.

**High-precision type HEC**

- A Peltier device is a plate type element, inside which P-type semiconductors and N-type semiconductors are located alternately. Therefore, changing the direction of the current supplied to the Peltier device can achieve heating and cooling operation. Temperature can be controlled very precisely because this method has a fast response and can switch quickly.
This equipment precisely controls the temperature of the fluid in the constant temperature tank. Customers can control the temperature by placing a container in the tank.

**Application Examples**

- **Semiconductor**
  - Evaporation of chemicals for MOCVD, temperature control of diffusion gas

- **Various tests**
  - Thermal test with immersion

- **Physical and chemical analysis**
  - Temperature control of various samples, materials and parts

- **Various chemical processes**
  - Indirect temperature control of chemicals and liquids with high viscosity

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**Chemical Thermo-con**

Fluororesin heat exchanger allows direct temperature control for chemicals!!
Industry-leading withstand pressure 51psi (0.35 MPa)!!

**Type of circulating fluid**
- Deionized water
- Hydrofluoric acid
- Ammonia hydrogen peroxide solution, etc.
## SMC Temperature Control Equipment Guide

### Series

<table>
<thead>
<tr>
<th>Features</th>
<th>Temperature range</th>
</tr>
</thead>
<tbody>
<tr>
<td>• With this chiller, cooling water can be obtained anywhere it is necessary because of easy installation and easy operation. • For a wide range of applications such as laser machine tool, analytical equipment, LCD manufacturing equipment, mold temperature control, etc.</td>
<td>41 to 95°F (5 to 35°C)</td>
</tr>
<tr>
<td>• Fits into the space under a laboratory table with a compact design. 615 H x 377 W x 500 D 40 kg • Available for single-phase 100/115 V, 200 to 230 V • UL standards, CE marking</td>
<td></td>
</tr>
<tr>
<td>• Suitable for semiconductor processing equipment with a wide variety of features such as high temperature stability, wide temperature range, failure diagnosis, external communication, etc. • Conforming to various safety standards • Conforming to UL, SEMI standards, CE marking</td>
<td>41 to 104°F (5 to 40°C)</td>
</tr>
<tr>
<td>• In addition to advanced HRZ series, energy-saving is achieved through use of a DC inverter compressor. • A single unit covers a wide temperature range and has a large cooling capacity. • Can respond to change of process conditions flexibly, which is suitable for semiconductor equipment with a short innovation cycle. • Conforming to UL, SEMI standards, CE marking</td>
<td>–4 to 194°F (−20 to 90°C)</td>
</tr>
<tr>
<td>• Temperature for two systems can be controlled separately by one chiller. • More effective energy-saving is achieved through use of a DC inverter compressor and an inverter pump. • Conforming to SEMI standards, CE marking</td>
<td>–22 to 194°F (−30 to 90°C)</td>
</tr>
<tr>
<td>• Direct heat exchanger for in-plant circulating fluid Refrigerant-free • Can control the temperature over a wide range since a compressor is not required. • Suitable for semiconductor processing equipment with a wide variety of features such as high temperature stability, wide temperature range, failure diagnosis, external communication, etc. • Conforming to UL, SEMI standards, CE marking</td>
<td>–4 to 194°F (−20 to 90°C)</td>
</tr>
<tr>
<td>• High-precision temperature controller with a Peltier device suitable for applications that require high-precision temperature control. • Refrigerant-free • Highly-reliable simple construction • Easy installation in equipment with a compact, low-vibration body • Compatible with a wide range of power supply voltage • Conforming to UL standards, CE marking</td>
<td>50 to 140°F (10 to 60°C)</td>
</tr>
<tr>
<td>• High-precision temperature control bath with a Peltier device • Refrigerant-free • Compact and low noise • Minimal up-down temperature distribution with a unique agitation method</td>
<td>5 to 140°F (−15 to 60°C)</td>
</tr>
<tr>
<td>• Heat exchanger for direct temperature control with a Peltier device • Refrigerant-free • Compatible with a wide range of chemicals by use of a fluororesin heat exchanger • Conforming to SEMI standards, CE marking</td>
<td>50 to 140°F (10 to 60°C)</td>
</tr>
<tr>
<td>Max. cooling capacity</td>
<td>Cooling method</td>
</tr>
<tr>
<td>-----------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>15 kW</td>
<td>Air-cooled refrigeration, Water-cooled refrigeration</td>
</tr>
<tr>
<td>5 kW</td>
<td>Air-cooled refrigeration, Water-cooled refrigeration</td>
</tr>
<tr>
<td>15 kW</td>
<td>Water-cooled refrigeration</td>
</tr>
<tr>
<td>10 kW</td>
<td>Water-cooled refrigeration</td>
</tr>
<tr>
<td>9.5 kW x 2</td>
<td>Water-cooled refrigeration</td>
</tr>
<tr>
<td>30 kW</td>
<td>Water-cooled (Without compressor)</td>
</tr>
<tr>
<td>600 W</td>
<td>Peltier-type air-cooled</td>
</tr>
<tr>
<td>1.2 kW</td>
<td>Peltier-type water-cooled</td>
</tr>
<tr>
<td>140 W</td>
<td>Peltier-type water-cooled</td>
</tr>
<tr>
<td>750 W</td>
<td>Peltier-type water-cooled</td>
</tr>
</tbody>
</table>

1L/min = 0.0353SCFM
Manage pressure, flow rate, and temperature: digital display makes these aspects “visible”.

1. Pressure Switch: Monitors pressure of the circulating fluid and facility water.
   - 2-Color Display
   - High-Precision Digital Pressure Switch
     - ISE80
   - Pressure Sensor for General Fluid
     - PSE56
   - Pressure Sensor Controller
     - PSE200, 300
   - Customer’s loading machine
   - Digital display makes these aspects “visible”.

2. Industrial Filter: Filters the circulating fluid and facility water.
   - Quick Change Filter
     - FQ1
   - Industrial Filter/ Vessel Series
     - FGD
   - High-Precision Filter for Fluid
     - FGH
   - Wetted parts: Stainless steel 316L
   - IP65
   - VCR®, Swagelok® compatible fittings can be selected.

3. Flow Switch: Monitors the flow rate and temperature of the circulating fluid and facility water.
   - Digital Flow Switch for Water
     - PF3W
   - Digital Flow Switch for Deionized Water and Chemicals
     - PF2D
   - Material
     - Body sensor: New PFA
     - Tube: Super PFA

4. Fittings and Tubing
   - S Coupler
     - K
     - Port size: M5 to 25A (3/4)
   - S Coupler/Stainless Steel (Stainless Steel 304)
     - KKA
   - Metal One-touch Fittings
     - KQB2
   - Stainless Steel 316 One-touch Fittings
     - KG2
   - Stainless Steel 316 Insert Fittings
     - KFG2
   - Fluoropolymer Fittings
     - LQ
   - Tubing
     - T

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