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...
- 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...
- 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.

Can be used not only for cooling, but also for heating applications (max. 90°C)

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.

- Semi-conductors
- Machine tools
- Food products
- Measuring devices
- Physical and chemical/analytical equipment
- Medical/Pharmaceutical
- etc.
What's a Chiller?

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 water

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

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

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

- **Linear motor**
  - Temperature control of moving coil

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

- **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

- **Concentrating equipment**
  - Temperature control of concentration fluid

- **Cleaning tank**
  - Temperature control of cleaning tank

- **Gas cylinder cabinet**
  - Temperature control inside cabinet

- **Temperature control of paint material**

- **Temperature control of chamber electrode**

- **Cooling of vacuum pump**
  - Vacuum pump

- **Dual Thermo-chiller**
  - CH1
  - CH2
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

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

**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.

**Space-saving**
- Footprint reduced by 23%

**Temperature control of chamber electrode**
- CH1
- CH2

**Temperature stability ±0.1°C, temperature range from −20°C 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.**

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

**HRG, HRGC, HRS, HRZ, HRZD**
Heat exchanger for cooling circulating fluid

In-plant cooling water circulation facility such as cooling tower, etc. 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.

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.

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) thanks to direct heat exchange with circulating fluid.
- Features equivalent to HRZ series.

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Peltier-type

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

Air-cooled

- No facility water equipment
- Can install the unit easily without facility water equipment.
- Can reduce the piping installation labor since facility water piping is not required.

Water-cooled

- Need to avoid effects of ambient temperature.
- Want to reduce installation space.
- Since the unit is water-cooled, the ambient temperature will have little effect.
- Can reduce the space since the unit is compact.

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.
Different methods of temperature control are highlighted:

- **Evaporation of chemicals for MOCVD** and **temperature control of diffusion gas**
- **Thermal test with immersion**
- **Temperature control of various samples, materials and parts**
- **Indirect temperature control of chemicals and liquids with high viscosity**

**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

**Chemical Thermo-con**

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

- **Type of circulating fluid**
  - Deionized water
  - Hydrofluoric acid
  - Ammonia hydrogen peroxide solution, etc.

- **Chemical Thermo-con**
  - Temperature controller
  - Peltier device (thermo-module)
  - Fluororesin heat exchanger
  - Chemical fluid tank or chemical bath
  - Pump
  - Facility water

**Thermoelectric Bath**

Accurately controls the temperature of liquid in the bath.
Temperature stability: ±0.01°C
Temperature distribution in the bath: ±0.02°C

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.
## SMC Temperature Control Equipment Guide

### Features

**Temperature range**

**Max. cooling capacity**

**Cooling method**

**Temperature stability**

**Pump capacity**

**Applicable fluid**

<table>
<thead>
<tr>
<th>Economy-type chiller</th>
<th>Thermo-cooler</th>
<th>Series HRG</th>
<th>5-phase power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>w/this chiller, cooling water can be obtained anywhere it is necessary because of easy installation and easy operation.</td>
<td>For a wide range of applications such as laser machine tool, analytical equipment, LCD manufacturing equipment, mold temperature control, etc.</td>
<td>5°C to 35°C</td>
<td>15 kW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Economy-type chiller</th>
<th>Thermo-cooler</th>
<th>Series HRGC</th>
<th>(Single-phase power supply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>w/this chiller, cooling water can be obtained anywhere it is necessary because of easy installation and easy operation.</td>
<td>For a wide range of applications such as mold temperature control, laser machine tool, analytical equipment, LCD manufacturing equipment, etc.</td>
<td>−15°C to 60°C</td>
<td>5 kW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High-performance chiller</th>
<th>Compact type</th>
<th>Thermo-chiller</th>
<th>Series HRS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fits into the space under a laboratory table with a compact design.</td>
<td>615 H x 377 W x 500 D - 40 kg</td>
<td>5°C to 40°C</td>
<td>5 kW</td>
</tr>
</tbody>
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<thead>
<tr>
<th>High-performance chiller</th>
<th>Thermo-chiller</th>
<th>Series HRZ</th>
</tr>
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<tr>
<td>Suitable for semiconductor processing equipment with a wide variety of features such as high temperature stability, wide operating range, failure diagnosis, external communication, etc.</td>
<td>Conforming to UL, SEMI standards, CE marking</td>
<td>−20°C to 40°C</td>
</tr>
</tbody>
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<tr>
<th>High-performance chiller</th>
<th>Thermo-chiller</th>
<th>Series HRSZ</th>
<th>(Built-in inverter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature for two systems can be controlled separately by one chiller.</td>
<td>More effective energy-saving is achieved through use of a DC inverter compressor.</td>
<td>−30°C to 90°C</td>
<td>10 kW</td>
</tr>
</tbody>
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<thead>
<tr>
<th>High-performance chiller</th>
<th>Thermo-chiller</th>
<th>Series HRW</th>
<th>(Water-cooled)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct heat exchanger for in-plant circulating fluid</td>
<td>Refrigerant-free</td>
<td>20°C to 90°C</td>
<td>30 kW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>High-performance chiller</th>
<th>Thermo-chiller</th>
<th>Series HRC</th>
<th>(Water-cooled)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-precision temperature controller with a Peltier device suitable for applications that require high-precision temperature control.</td>
<td>Refrigerant-free</td>
<td>10°C to 60°C</td>
<td>600 W</td>
</tr>
</tbody>
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<table>
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<tr>
<th>High-performance chiller</th>
<th>Thermo-con</th>
<th>Series HEC</th>
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<tbody>
<tr>
<td>High-precision temperature control bath with a Peltier device</td>
<td>Refrigerant-free</td>
<td>−15°C to 60°C</td>
</tr>
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<tr>
<th>High-precision bath</th>
<th>Thermoelectric Bath</th>
<th>Series HEB</th>
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<tr>
<td>Heat exchanger for direct temperature control with a Peltier device</td>
<td>Refrigerant-free</td>
<td>10°C to 60°C</td>
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<tr>
<th>Refrigerant-free</th>
<th>Chemical Thermo-con</th>
<th>Series HED</th>
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<tr>
<td>Heat exchanger for direct temperature control with a Peltier device</td>
<td>Refrigerant-free</td>
<td>10°C to 60°C</td>
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</table>

### Discontinued

- **Discontinued** • **HRG/HRGC** (1 kW) End of March 2011
- **Discontinued** • **HRG/HRGC** (5 kW) End of April 2011

*Furthermore, please select the HRG series.*
Temperature Control Equipment

Related Products

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

Industrial Filter: Filters the circulating fluid and facility water.

Quick Change Filter FQ1
Industrial Filter/ Vessel Series FGD

High-Precision Filter for Fluid FGH

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

Fittings and Tubing

S Coupler KK
S Coupler/Stainless Steel (Stainless Steel 304) KKA

Metal One-touch Fittings KQB2

Stainless Steel 316 One-touch Fittings KQG2
Stainless Steel 316 Insert Fittings KFG2

Fluoropolymer Fittings LQ

Series Material O.D.
T Nylon ø4 to ø16
TU Polyurethane ø4 to ø16
TH FEP (fluoropolymer) ø4 to ø12
TD Modified PTFE (soft fluoropolymer) ø4 to ø12
TL Super PFA ø4 to ø19

Tubing T

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Specifications are subject to change without prior notice and any obligation on the part of the manufacturer.