High-precision temperature control type for semiconductor manufacturing equipment, medical equipment, etc.

**Thermo-chillers**

**Standard Type HRS Series/HRS090 Series**
- 1.1 kW to 5.9 kW
- Temperature stability: ±0.18°F (±0.1°C)
- Lightweight/Compact

**Standard Type HRS100/150 Series**
- 10 kW/15 kW
- Temperature stability: ±1.8°F (±1.0°C)
- A large model designed for outdoor use (HRS series)

**Inverter Type HRSH090 Series**
- 9.5 kW to 11 kW
- Temperature stability: ±0.18°F (±0.1°C)
- A model designed for indoor use (HRSH series)

**Inverter Type HRSH Series**
- 10 kW to 28 kW
- Temperature stability: ±0.18°F (±0.1°C)

**Basic Type HRSE Series**
- 1.0 kW to 2.2 kW
- Temperature stability: ±3.6°F (±2.0°C)

**High-performance Type HRZ, HRZD, HRW Series**
- 1.0 kW to 30 kW
- Temperature stability: ±0.018 to 0.054°F (±0.01 to 0.03°C)

**Rack Mount Type HRR Series**
- 1.2 kW to 3.0 kW
- Temperature stability: ±0.18°F (±0.1°C)

Multiple chillers can be mounted to a 19-inch rack.

**Thermo-con HECR/HEC Series**
- 140 W to 1200 W
- Temperature stability: ±0.018 to 0.054°F (±0.01 to 0.03°C)

High-precision temperature control type for semiconductor manufacturing equipment, medical equipment, etc.

**Peltier-type Thermo-cons**

**Peltier-type Thermo-con Variations**
- 140 W to 1200 W
- Temperature stability: ±0.018 to 0.054°F (±0.01 to 0.03°C)

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1. Lightweight, Compact
2. Energy Saving
3. Heating Function
4. Easier Maintenance
5. Global Compatibility
Thermo-chiller Variations

<table>
<thead>
<tr>
<th>Series</th>
<th>Features</th>
<th>Cooling method</th>
<th>Temperature stability</th>
<th>Cooling capacity [kW]</th>
</tr>
</thead>
</table>
| **Thermo-chiller Rack Mount Type** | • Mountable in a 19-inch rack  
• Space can be saved by mounting multiple pieces of equipment together in a single rack.  
• Comes with a built-in bypass valve and particle filter as standard  
• Built-in DI filter (option) specifications  
• Performance and functions: Equivalent to the HRS | Water-cooled refrigeration | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Basic Type** | • Simple function and performance  
Thermo-chiller of the basic type  
• Complete with energy-saving triple control!  
• Reduces power consumption by 33%  
• Compact and lightweight: 70.55 lb (100 VAC)  
• Maintenance-free: Magnet pump  
• Low-noise design: 55 dBA | Water-cooled refrigeration | ± 3.6°F (± 2.0°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Standard Type** | • With this chiller, cooling water can be obtained anywhere it is required because of easy installation and easy operation.  
• For a wide range of applications, such as laser machine tools, analytical equipment, LCD manufacturing equipment, mold temperature control, etc.  
• Compact: W 1.48 x H 24.2 x D 19.7 in,  
88.2 lb (HRS012/018/024)  
• Timer function, Low liquid level protection, Power failure auto-restart, Anti-freezing function, etc.  
• Self diagnosis function  
• No heater is required, as the circulating fluid is heated using only the heat exhausted by the refrigerating circuit.  
• Low-noise design: 70 dBA (HRS100/150)  
• Outdoor installation: IPX4 (HRS100/150) | Water-cooled refrigeration | ± 0.9°F (± 0.5°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Standard Type** | • Power consumption reduced by 53%  
Complete with energy-saving triple inverter!  
• Compact, Space saving:  
W 14.84 x H 42.52 x D 38.2 in  
• Low-noise design: Max. 66 dB  
• Max. ambient temperature: 113°F (45°C) | Water-cooled refrigeration | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Standard Type** | • Complete with energy-saving triple inverter!  
• Outdoor installation: IPX4  
• Max. ambient temperature: 113°F (45°C)  
• Space saving and lightweight: 617.3 lb.  
(25 kW type) | Water-cooled refrigeration | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller High-performance Type** | • Suitable for semiconductor processing equipment with a wide variety of features, such as high-temperature stability, a wide temperature range, failure diagnosis, external communication, etc.  
• Suited to the short innovation cycle of semiconductor equipment, Capable of responding flexibly to changes in the process conditions  
• Compliant with various safety standards  
• It is possible to select the inverter type.  
Energy saving is achieved through use of a DC inverter compressor. | Water-cooled refrigeration | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Dual Thermo-chiller High-performance Inverter Type** | • Temperatures for 2 systems can be controlled separately by one chiller.  
• Double inverter type: Substantially more energy is saved by using a DC inverter refrigerator and inverter pump.  
• Space saving: Footprint reduced by 23%  
• Reduced wiring, piping, and labor: Single power cable, Single facility-water piping system | Water-cooled refrigeration | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Water-cooled Thermo-chiller High-performance Inverter Type** | • Direct heat exchanger for in-plant circulating fluid  
• 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, a wide temperature range, failure diagnosis, external communication, etc.  
• It is possible to select the inverter type. | Water-cooled refrigeration | ± 0.54°F (± 0.3°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Basic Type** | • High-performance Type  
• Dual Thermo-chiller  
HRZ Series | Inverter Type  
Thermo-chiller  
HRZ Series | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Standard Type** | • High-performance Type  
• Standard Type  
HRS Series | Inverter Type  
Thermo-chiller  
HRS Series | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Standard Type** | • High-performance Type  
• Standard Type  
HRS Series | Inverter Type  
Thermo-chiller  
HRS Series | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Standard Type** | • High-performance Type  
• Standard Type  
HRS Series | Inverter Type  
Thermo-chiller  
HRS Series | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Basic Type** | • High-performance Type  
• Basic Type  
HRSE Series | Inverter Type  
Thermo-chiller  
HRSE Series | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Standard Type** | • High-performance Type  
• Standard Type  
HRS Series | Inverter Type  
Thermo-chiller  
HRS Series | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Standard Type** | • High-performance Type  
• Standard Type  
HRS Series | Inverter Type  
Thermo-chiller  
HRS Series | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Basic Type** | • High-performance Type  
• Basic Type  
HRSE Series | Inverter Type  
Thermo-chiller  
HRSE Series | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Standard Type** | • High-performance Type  
• Standard Type  
HRS Series | Inverter Type  
Thermo-chiller  
HRS Series | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Basic Type** | • High-performance Type  
• Basic Type  
HRSE Series | Inverter Type  
Thermo-chiller  
HRSE Series | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
| **Thermo-chiller Standard Type** | • High-performance Type  
• Standard Type  
HRS Series | Inverter Type  
Thermo-chiller  
HRS Series | ± 0.18°F (± 0.1°C) | 1.2 kW  
2 kW  
4 kW  
8 kW |
## Magnet pump
(Mechanical seal pump for high-pressure pump mounted type)

### Single-phase
- 200 to 230 VAC (50/60 Hz)

### Tap water
- Ethylene glycol aqueous solution (15%)

### Indoor use

#### 200 VAC
- 50 to 95°F (10 to 35°C)
- 0.74 cfm
- 21 L/min

#### 230 VAC
- 50 to 95°F (10 to 35°C)
- 1.48 cfm
- 42 L/min

#### 100 VAC
- 50 to 104°F (5 to 40°C)
- 2.4 cfm
- 68 L/min

#### 200 VAC
- 50 to 104°F (5 to 40°C)
- 2.12 cfm
- 60 L/min

#### 230 VAC
- 50 to 95°F (10 to 35°C)
- 6.36 cfm
- 180 L/min

---

## Mechanical seal pump
(Mechanical seal pump for high-pressure pump mounted type)

### Single-phase
- 100 VAC (50/60 Hz)

### Tap water
- Ethylene glycol aqueous solution (15%)

### Indoor use

#### 200 VAC
- 50 to 96°F (10 to 30°C)
- 0.88 cfm
- 25 L/min

#### 230 VAC
- 50 to 104°F (5 to 40°C)
- 2.4 cfm
- 68 L/min

#### 400 VAC (400 V as standard)
- 50 to 95°F (5 to 35°C)

### Deionized water

### Outdoor installation IPX4

#### 200 VAC
- 50 to 95°F (5 to 35°C)
- 1.41 cfm
- 40 L/min

#### 230 VAC
- 50 to 104°F (5 to 40°C)
- 2.12 cfm
- 60 L/min

#### 400 VAC (400 V as standard)
- 50 to 95°F (5 to 35°C)
- 6.36 cfm
- 180 L/min

---

## Immersion pump
(Mechanical seal pump for high-pressure pump mounted type)

### 3-phase
- 200 to 230 VAC (50/60 Hz)

### Tap water
- Ethylene glycol aqueous solution (15%)

### Indoor use

#### 200 VAC
- 50 to 95°F (10 to 35°C)
- 0.74 cfm
- 21 L/min

#### 230 VAC
- 50 to 95°F (10 to 35°C)
- 1.48 cfm
- 42 L/min

#### 400 VAC (400 V as standard)
- 50 to 95°F (5 to 35°C)
- 2.4 cfm
- 68 L/min

---

## Immersion pump
(Mechanical seal pump for high-pressure pump mounted type)

### 3-phase
- 200 to 208 VAC (60 Hz)

### Tap water
- Ethylene glycol aqueous solution (60%)

### Outdoor installation IPX4

#### 200 VAC
- 50 to 95°F (5 to 35°C)
- 0.74 cfm
- 21 L/min

#### 230 VAC
- 50 to 95°F (5 to 35°C)
- 1.48 cfm
- 42 L/min

#### 400 VAC (400 V as standard)
- 50 to 95°F (5 to 35°C)
- 2.4 cfm
- 68 L/min

---

## Immersion pump
(Mechanical seal pump for high-pressure pump mounted type)

### 3-phase
- 200 to 208 VAC (60 Hz)

### Tap water
- Ethylene glycol aqueous solution (60%)

### Outdoor installation IPX4

#### 200 VAC
- 50 to 95°F (5 to 35°C)
- 0.74 cfm
- 21 L/min

#### 230 VAC
- 50 to 95°F (5 to 35°C)
- 1.48 cfm
- 42 L/min

#### 400 VAC (400 V as standard)
- 50 to 95°F (5 to 35°C)
- 2.4 cfm
- 68 L/min

---

For details, refer to the Web Catalog.
### Peltier-type Thermo-con Variations

<table>
<thead>
<tr>
<th>Series</th>
<th>Features</th>
<th>Cooling method</th>
<th>Temperature stability</th>
<th>Cooling capacity [kW]</th>
</tr>
</thead>
</table>
| **Thermo-con HEC Series**  | • For applications requiring high-precision temperature control  
• High-precision, refrigerant-free temperature control equipment that uses a Peltier device  
• Simple structure and high reliability  
• Can easily be built into equipment due to its compact and low-vibration design | Air-cooled Peltier-type | ±0.01 to 0.03°C       | | 0.1 0.2 0.3 0.4 0.5 0.6 0.8 1.0 1.2 |
|                            |                                                                                                                                                                                                            | Water-cooled Peltier-type |                        |                       |
| **Thermo-con Rack Mount Type HECR Series** | • Mountable in a 19-inch rack  
Saves space by allowing multiple pieces of equipment to be mounted together in a rack.  
• Learning control function  
• Low vibration, Low noise | Air-cooled Peltier-type | ±0.01 to 0.03°C       | | 0.1 0.2 0.3 0.4 0.5 0.6 0.8 1.0 1.2 |
|                            |                                                                                                                                                                                                            | Water-cooled Peltier-type |                        |                       |
| **Chemical Thermo-con HED Series** | • Heat exchanger for direct temperature control that uses a Peltier device  
• Compatible with a wide range of chemical liquids through the use of a fluororesin heat exchanger | Water-cooled Peltier-type | ±0.1°C                | | 0.1 0.2 0.3 0.4 0.5 0.6 0.8 1.0 1.2 |
<table>
<thead>
<tr>
<th>Set temperature range [°C]</th>
<th>Pump capacity</th>
<th>Pump type</th>
<th>Power supply</th>
<th>Circulating fluid</th>
<th>Environment</th>
<th>International standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 to 140°C (50 to 140°C)</td>
<td>100 VAC</td>
<td>Up to 0.35 cfm (10 L/min)</td>
<td>Single-phase</td>
<td>Tap water</td>
<td>Indoor use</td>
<td></td>
</tr>
<tr>
<td>200 VAC</td>
<td>0.81 cfm (23 L/min)</td>
<td>Magnet pump</td>
<td>100 to 240 VAC (50/60 Hz)</td>
<td>Ethylene glycol aqueous solution (20%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 VAC</td>
<td>200 to 220 VAC (50/60 Hz)</td>
<td>0.6 kW, 1.2 kW</td>
<td>Fluorinated fluid</td>
<td>Tap water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 to 140°C (50 to 140°C)</td>
<td>0.21 cfm (6 L/min)</td>
<td>Magnet pump</td>
<td>100 to 240 VAC (50/60 Hz)</td>
<td>Tap water</td>
<td>Indoor use</td>
<td></td>
</tr>
<tr>
<td>200 VAC</td>
<td>200 to 220 VAC (50/60 Hz)</td>
<td>1 kW, 1.2 kW</td>
<td>Ethylene glycol aqueous solution (20%)</td>
<td>Tap water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>32 to 140°C (50 to 60°C)</td>
<td>—</td>
<td>—</td>
<td>200 VAC</td>
<td>Deionized water</td>
<td>Indoor use</td>
<td>SEMI Standard S2-0706, F47-0705 (Excluding HEC006, 012)</td>
</tr>
</tbody>
</table>
## Accessories List

<table>
<thead>
<tr>
<th>Outline</th>
<th>HRR</th>
<th>HRS</th>
<th>HRS/90</th>
<th>HRS/100/150</th>
<th>HRS/SH</th>
<th>HRZ</th>
<th>HRW</th>
<th>HEC</th>
<th>HECR</th>
</tr>
</thead>
<tbody>
<tr>
<td>PID control</td>
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<tr>
<td>The deviation value between the discharge temperature (PV value) and the circulating fluid set temperature (SV value), the integral value, and the differential value are the minimum values for temperature control. In general, the operation of the refrigeration circuit is complex, but it provides excellent temperature stability.</td>
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<tr>
<td>ON/OFF control</td>
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<tr>
<td>When the discharge temperature (PV value) is higher than the circulating fluid set temperature (SV value), the compressor turns ON (start). When the discharge temperature (PV value) is lower than the circulating fluid set temperature (SV value), the compressor turns OFF (stop). The provided temperature stability is not excellent, but the operation of the refrigeration circuit is simple.</td>
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<tr>
<td>Thermoelectric device (Peltier device)</td>
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<tr>
<td>There may be a slight difference in temperature between the two sides of the Peltier device (plate type) depending on the applied direct current voltage. By controlling the applied voltage, high-precision heating and cooling temperature control is possible.</td>
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<tr>
<td>With heater</td>
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<tr>
<td>This product comes equipped with a heater suitable for the user's manufacturing processes (temperature rising processes).</td>
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<tr>
<td>Inverter compressor</td>
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<tr>
<td>This compressor can be used to control the number of rotations according to the heat load, resulting in energy savings.</td>
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<tr>
<td>Inverter fan</td>
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<tr>
<td>This cooling fan (air-cooled type) can be used to control the number of rotations according to the heat load, resulting in energy savings.</td>
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<tr>
<td>Inverter pump</td>
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<tr>
<td>This pump can be used to control the circulating fluid discharge pressure according to the user's piping resistance, resulting in energy savings.</td>
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<tr>
<td>Alarm</td>
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<tr>
<td>This product is programmed with a more than sufficient number of alarm codes and messages to be used for failure diagnosis. Notifications are made before any major problems occur.</td>
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<tr>
<td>With level switch</td>
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<tr>
<td>Sufficient levels of circulating fluid are necessary for retaining a stable temperature. The built-in level switch can be used to detect the liquid level in the tank and inform you of refills.</td>
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<tr>
<td>With fluid fill port</td>
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<tr>
<td>Water can be supplied from the external fluid fill port.</td>
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<tr>
<td>With automatic water fill function</td>
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<tr>
<td>By opening the user's stopcock (for water), water can be supplied automatically via the built-in solenoid valve, ball tap, etc.</td>
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<tr>
<td>Anti-quake bracket</td>
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<tr>
<td>This bracket can be used to reduce product damage in the case of an earthquake. An anchor bolt suitable for the flooring material should be prepared separately by the user.</td>
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<tr>
<td>With earth leakage breaker with handle</td>
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<tr>
<td>This product comes equipped with an earth leakage breaker with handle which is compliant with international standards (safety standards).</td>
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<tr>
<td>Drain pan (With water leakage sensor)</td>
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<td>The housing of the standard model has a drain pan construction (with a water leakage sensor). The large drain pan helps prevent the overflowing of fluid in the case of leakage.</td>
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<tr>
<td>With earth leakage breaker</td>
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<tr>
<td>This product comes with a leakage breaker which is able to safely and automatically stop the supply power in the case of a short-circuit, over current, or electrical leakage.</td>
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<tr>
<td>Drain pan set (With water leakage sensor)</td>
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<tr>
<td>This drain pan can be used to detect leakage before it happens. [For the HRS (1.1 to 9 kW) and HRSH (9 kW) types] Be sure to install and wire in combination with the attached water leakage sensor.</td>
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<tr>
<td>Particle filter set</td>
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<tr>
<td>This set can be used to filter foreign matter from the circulating fluid. (Nominal filtration rating: 5 µm, 75 µm)</td>
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<tr>
<td>Contaminant filter</td>
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<tr>
<td>This filter (Filtration: 20 µm) can be used to eliminate any dust which is contained in the circulating fluid circuit.</td>
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<tr>
<td>Connector cover</td>
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<tr>
<td>This product can be used for protecting the connector on the rear side.</td>
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<tr>
<td>Relief valve set</td>
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<tr>
<td>This product prevents abnormal rises in circulating fluid pressure.</td>
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<tr>
<td>Heating function</td>
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<tr>
<td>When the circulating fluid temperature is set above room temperature, it has a sufficient heating capacity. However, the heating capacity depends on the temperature. Consider the radiation rate and heat capacity of the user's equipment and check beforehand whether the required capacity can be provided by the product.</td>
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<tr>
<td>With flow sensor/flow switch</td>
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<tr>
<td>Sufficient levels of circulating fluid are necessary for retaining a stable temperature. The built-in flow sensor and flow switch can be used to detect the flow rate, which is then displayed on the display panel. Adjustments can be made after the value has been confirmed.</td>
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<tr>
<td>With casters</td>
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<tr>
<td>The casters installed underneath the product allow for it to be easily moved to where cooling is required.</td>
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<tr>
<td>With casters and adjuster feet</td>
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<tr>
<td>This product comes with unified casters and adjuster feet. It can be installed level even on slight inclines.</td>
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<tr>
<td>Mountable in a 19-inch rack</td>
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<tr>
<td>Space saving can be realized as multiple chillers can be mounted on a 19-inch rack (EIA Standards).</td>
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<tr>
<td>With feet and no rack mounting brackets</td>
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<tr>
<td>For use in locations other than racks</td>
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<tr>
<td>Piping conversion fitting (NPT thread or G thread)</td>
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<tr>
<td>This product can be used to exchange the Rc threads on the circulating fluid outlet and return port as well as the facility water inlet/outlet to G threads or NPT threads.</td>
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</tbody>
</table>

*1 Some models
*2 Only when option Y is selected
<table>
<thead>
<tr>
<th>Optimal Accessory</th>
<th>Outline</th>
<th>HRR</th>
<th>HRS</th>
<th>HRS090</th>
<th>HRS100/150</th>
<th>HRS120</th>
<th>HRS130</th>
<th>HRZ</th>
<th>HRZD</th>
<th>HRRIV</th>
<th>HECR</th>
<th>NEC</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPT fitting</td>
<td>An adapter is included to change the connection ports (Rc) of circulating fluid piping and facility water piping to NPT threads.</td>
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<tr>
<td>Circulating fluid automatic recovery</td>
<td>The circulating fluid inside the piping of the user’s equipment can be recovered into a sub-tank of the thermo-chiller by external communication or the operation display panel.</td>
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<tr>
<td>Power supply cable</td>
<td>An approximately 3 m long cable is available for users who require a cable with a length longer than that of the standard cable. Please use with a retaining clip (HRS-S0074).</td>
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<tr>
<td>Replaceable dustproof filter set</td>
<td>The cleaning of a dirty (standard) dustproof filter is both difficult and time-consuming. To eliminate the need for such labor, disposable type filters can be used instead.</td>
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<tr>
<td>RS-232C</td>
<td>The standard model can be used for one-on-one communication with a PC, etc. Refer to the separate Operation Manual (Communication function) for more details.</td>
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<tr>
<td>RS-485</td>
<td>The standard model can be used to communicate with the master computer together with other terminal devices. Refer to the separate Operation Manual (Communication function) for more details.</td>
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<tr>
<td>Analog communication</td>
<td>This is a method of communicating with external devices using voltage output (0 to 10 V). This enables the output of PV values (measured temperature, etc.) and the reception of SV values (set temperature), etc.</td>
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<tr>
<td>DeviceNet communication</td>
<td>This product has a communication function (With DeviceNet communication function) which allows for the use of open networks owned by Open DeviceNet Vendor Association, Inc.</td>
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<tr>
<td>Digital I/O (Contact input/output)</td>
<td>Input and output signals such as alarm signals, operation signals, etc. can be retrieved by the user’s sequence control device. Refer to the separate Operation Manual (Communication function) for more details.</td>
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<tr>
<td>With external switch inlet</td>
<td>This product comes equipped with an input terminal for the retrieval of the user’s sequence control ON/OFF signals (external switch).</td>
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<tr>
<td>Applicable to deionized water piping</td>
<td>Easy-to-dissolve copper type materials are not used for the wetted parts of the circulating fluid circuit. Select this when using the deionized water with a conductivity of 1 MΩ·cm or more (1 µS/cm or less).</td>
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<tr>
<td>High-pressure pump mounted</td>
<td>A built-in pump with a high lifting height (discharge pressure) is used. Consider the piping resistance of the user’s equipment and check beforehand whether the required flow can be provided by the product.</td>
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<tr>
<td>High-temperature environment specification</td>
<td>This product makes use at ambient temperatures of up to 113°F (45°C) possible.</td>
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<tr>
<td>DI control kit/Electric resistance control set</td>
<td>Electric resistance sensor set</td>
<td>This product can be used to display, maintain, and control the electric resistivity of the circulating fluid (deionized water). The function differs according to the model. Refer to the Operation Manual for details.</td>
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<tr>
<td>Electric conductivity control set</td>
<td>This set can be used to display and control the electric conductivity of the circulating fluid.</td>
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<tr>
<td>DI filter set</td>
<td>It is possible to retain the level of electric resistance by flowing the circulating fluid through the ion replacement resin (DI filter).</td>
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<tr>
<td>Insulating material for DI filter</td>
<td>Insulating the DI filter helps prevent reduced cooling capacity due to condensation and reduced heating capacity due to radiation.</td>
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<tr>
<td>Bypass piping set</td>
<td>Sufficient levels of circulating fluid are necessary for retaining a stable temperature. If the levels are insufficient, open this bypass piping to secure the flow rate.</td>
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<tr>
<td>Separately-installed power transformer</td>
<td>Installing this transformer where the user’s power voltage differs will allow for the conversion of the current.</td>
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<tr>
<td>Snow protection hood</td>
<td>This is a stainless steel snow protection hood for air-cooled chillers. According to the mounting direction of the snow protection hood, four ventilation directions —front, rear, left, and right—can be selected.</td>
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<tr>
<td>4-port manifold</td>
<td>4-branching the circulating fluid allows for a maximum of 4 temperature controls with 1 thermo-chiller unit.</td>
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<tr>
<td>60% ethylene glycol aqueous solution</td>
<td>The ethylene glycol type circulating fluid can be used as is. The fluid can be used even when diluted to 15%.</td>
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<tr>
<td>Ethylene glycol aqueous solution concentration meter</td>
<td>This meter can be used to control the condensation of ethylene glycol solution regularly.</td>
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</tbody>
</table>
5 Advantages of SMC Thermo-chillers

1 Lightweight, Compact

**Applicable models**
- Standard type: HRS012 to 060
- Inverter type: HRS050 to 060
- Inverter type: HRS090
- Rack mount type: HRR

**Same width for all models 14.84”**

<table>
<thead>
<tr>
<th>Model</th>
<th>Size in.</th>
<th>Weight lb (kg)</th>
<th>Cooling capacity (60 Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HRS012</td>
<td>W 14.84 x H 24.2 x D 19.7</td>
<td>88.2 (40)</td>
<td>1300 W</td>
</tr>
<tr>
<td>HRS018</td>
<td>W 14.84 x H 24.2 x D 19.7</td>
<td>103.6 (47)</td>
<td>1900 W</td>
</tr>
<tr>
<td>HRS024</td>
<td>W 14.84 x H 26 x D 19.7</td>
<td>152.4 (69)</td>
<td>2400 W</td>
</tr>
<tr>
<td>HRS030</td>
<td>W 14.84 x H 38.4 x D 23.3</td>
<td>161.9 (73)</td>
<td>3200 W</td>
</tr>
<tr>
<td>HRS050</td>
<td>W 14.84 x H 42.52 x D 38.2</td>
<td>300.1 (136)</td>
<td>5100 W</td>
</tr>
<tr>
<td>HRS060</td>
<td>W 14.84 x H 42.52 x D 38.2</td>
<td>300.1 (136)</td>
<td>5900 W</td>
</tr>
<tr>
<td>HRS090</td>
<td>W 14.84 x H 42.52 x D 38.2</td>
<td>300.1 (136)</td>
<td>9000 W</td>
</tr>
</tbody>
</table>

**Rack Mount Type HRR Series**
- Height: **12” shorter**
- Volume: **28% reduction**
## Energy Saving

### 5 Advantages of SMC Thermo-chillers

#### Triple inverter

The inverter respectively controls the number of motor rotations of the compressor, fan and pump depending on the load from the user’s equipment.

<table>
<thead>
<tr>
<th>Power consumption</th>
<th>reduced by 53% compared with a non-inverter (HRS090)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With the inverter, it is possible to operate with the same performance even with the power supply of 50 Hz.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-inverter chiller</th>
<th>Power consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressor + Fan + Others/4 kW</td>
<td>5.1 kW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Double inverter chiller</th>
<th>Power consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressor + Fan + Others/2.0 kW</td>
<td>Reduced by 39% with compressor and fan inverters</td>
</tr>
<tr>
<td></td>
<td>Power consumption 3.1 kW</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Triple inverter HRSH090</th>
<th>Power consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compressor + Fan + Others/1.8 kW</td>
<td>Reduced by 53% with the additional pump inverter</td>
</tr>
<tr>
<td></td>
<td>Power consumption 2.4 kW</td>
</tr>
</tbody>
</table>

**Operating ratio:** Ratio of 9.5 kW (with heat load) to 0 kW (without heat load)  Operating ratio: 50%, with heat load of 9.5 kW all the time

**Conditions**
- Ambient temperature: 89.6°F
- Circulating fluid temperature: 68°F
- Circulating fluid flow rate: 1.24 cfm at 43.5 psi (60 Hz)
- Heat load: 9.5 kW

**Non-inverter chiller**

- Pump/1.1 kW
- Compressor + Fan + Others/4 kW

**Double inverter chiller**

- Pump/1.1 kW
- Compressor + Fan + Others/2.0 kW

**Triple inverter HRSH090**

- Pump/0.6 kW
- Compressor + Fan + Others/1.8 kW

---

### Inverter pump

Power reducing effect of the inverter pump

<table>
<thead>
<tr>
<th>Existing model</th>
<th>Inverter pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tank 55 L/min</td>
<td>Tank 35 L/min</td>
</tr>
<tr>
<td>Pump 1.1 kW</td>
<td>Pump 0.6 kW</td>
</tr>
<tr>
<td>Power consumption (Pump only) 1.1 kW</td>
<td>Power consumption (Pump only) 0.6 kW</td>
</tr>
</tbody>
</table>

The motor rotation rate is controlled to a suitable level, for the required pressure, by the inverter pump.

* Immersion pump is used for the inverter type HRSH100 to 300.

---

### Circulating fluid pressure adjustable

Discharge pressure of the circulating fluid can be set with the operation panel. The inverter pump automatically controls the discharge pressure to the set pressure without adjusting the bypass piping. Under various piping conditions, Power consumption can be reduced by this control.

(Operate to the set pump operating frequency is also possible.)

*1 Bypass piping is required depending on the flow rate.

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When the product is used with the flow path switched for maintenance, the pressure adjusting function controls the discharge pressure to be stable. (Secure the specified minimum flow for each branch circuit.)

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Circulating fluid can be heated without a heater.

Heating method using discharged heat makes a heater unnecessary.

Power supply (24 VDC) available

Power can be supplied from the terminal block on the rear side to external switches, etc.

IPX4

IP (International Protection) is the industrial standard for “Degrees of protection provided by outer defensive enclosures of electric equipment (IP Code)” according to IEC 60529 and JIS C 0920.

IPX4: No harmful influence by water splash is acceptable from every direction.
Easier Maintenance

Easy maintenance with the check display of the operation panel

Alarm codes notify of checking times. Notifies when to check the pump and fan motor. Helpful for facility maintenance.

Check display
The internal temperature, pressure and operating time of the product are displayed.

Reduces the maintenance hours for the pump.

A mechanical sealless immersion pump is used.

As the pump has no external leakage of the circulating fluid, a periodic check of the pump leakage and replacement of the mechanical seal are not necessary. There is no need to exhaust the circulating fluid when removing the pump.

Global Compatibility

No transformers required
(Europe, Asia, Oceania, Central and South America)

Applicable to 200 to 230 VAC, or 380 to 415 VAC
Transformers are not required even when used overseas.

Conforming to international standards
* Refer to the variations table.
Temperature Control Equipment: Applications According to Industry

**Applications**

**Semiconductor**

- **Etching**
  - HEC
  - HECR
  - HRZ
  - HRW

- **CMP**
  - HEC
  - HECR
  - HED
  - HRZ
  - HRW

- **Coater/Developer**
  - HEC
  - HECR
  - HRZ
  - HRW

- **Tester**
  - HRS
  - HRW
  - HRSH
  - HRZ
  - HRR

- **Cleaning machine**
  - Temperature control of cleaning solution
  - HEC
  - HECR
  - HED
  - HRS
  - HRSH

- **Temperature control of chamber electrode**
  - HRW
  - HRZ

- **Cooling of the vacuum pump**
  - HRS
  - HRSH

- **Gas cylinder cabinet**
  - HRS
  - HRSH

- **Cleaning machine (hydrocarbon-based)**
  - HED
Applications

Temperature Control Equipment: Applications According to Industry

### Laser

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laser beam machine/Laser welding machine</td>
<td>Cooling of the laser oscillation part and power source</td>
<td><img src="image1" alt="Laser Beam Machine" /></td>
</tr>
<tr>
<td>Laser oscillator</td>
<td></td>
<td><img src="image2" alt="Laser Oscillator" /></td>
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<tr>
<td>Transmission cable connector for fiber laser</td>
<td></td>
<td><img src="image3" alt="Transmission Cable" /></td>
</tr>
<tr>
<td>Ultrasonic wave inspection machine</td>
<td>Temperature control of the ultrasonic wave laser part</td>
<td><img src="image4" alt="Ultrasonic Wave Inspection Machine" /></td>
</tr>
<tr>
<td>Laser marker</td>
<td>Cooling of the laser irradiated part</td>
<td><img src="image5" alt="Laser Marker" /></td>
</tr>
<tr>
<td>Secondary battery manufacturing process</td>
<td>Laser welding and cutting</td>
<td><img src="image6" alt="Secondary Battery" /></td>
</tr>
<tr>
<td>3D metal printer</td>
<td></td>
<td><img src="image7" alt="3D Metal Printer" /></td>
</tr>
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</table>

### Machine Tools

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Description</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machining center</td>
<td>Cooling of the spindle</td>
<td><img src="image8" alt="Machining Center" /></td>
</tr>
<tr>
<td>Injection molding</td>
<td></td>
<td><img src="image9" alt="Injection Molding" /></td>
</tr>
</tbody>
</table>

HEC, HECR, HRS, HRR
Applications

Temperature Control Equipment: Applications According to Industry

Welding Machines

**Arc welding machine**
Cooling of the torch

**Resistance welding machine**
(spot welding)
Cooling of the welding head electrodes, transformers and transistors (thyristors)

**High-frequency induction heating equipment**
Cooling of the heating coils, high-frequency power source and around inverters

Food Products/Packaging Machines

**Packaging line** (sealing of film and paper package)
Cooling of workpieces for bonding

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

Medical

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

**MRI**

Physical and Chemical

**Temperature control of adhesive and paint material**

Printing

**Printing machine**
Temperature control of the roller
## Semiconductor Thermo-chiller Variations

<table>
<thead>
<tr>
<th>Series</th>
<th>Number of channels</th>
<th>Cooling capacity</th>
<th>Set temperature</th>
<th>Pump capacity</th>
<th>Temperature accuracy</th>
<th>Circulating fluid</th>
<th>Safety standards</th>
<th>Actual equipment</th>
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<tbody>
<tr>
<td><strong>HRZD</strong></td>
<td>2</td>
<td>9.5 kW</td>
<td>−22 to 194°F (−30 to 90°C)</td>
<td>1.41 cfm (40 L/min)</td>
<td>±0.18°F (±0.1°C)</td>
<td>Fluorinated fluid Ethylene glycol aqueous solution (60%)</td>
<td>SEMI</td>
<td>•Etching</td>
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<td>−4 to 194°F (−20 to 90°C)</td>
<td>1.41 cfm (40 L/min)</td>
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<td>Fluorinated fluid Tap water Deionized water Ethylene glycol aqueous solution (60%)</td>
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<td>•Etching •CMP •CVD (MO) •PVD</td>
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<tr>
<td><strong>HRS</strong></td>
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<td>5.9 kW</td>
<td>41 to 104°F (5 to 40°C)</td>
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<td>Tap water Deionized water Ethylene glycol aqueous solution (15%)</td>
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<td>•Dicer •Implant</td>
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<tr>
<td><strong>HEC</strong></td>
<td>1</td>
<td>0.6 kW (Air-cooled) 1.2 kW (Water-cooled)</td>
<td>50 to 140°F (10 to 60°C)</td>
<td>0.35 cfm (10 L/min) Air-cooled 0.81 cfm (23 L/min) Water-cooled</td>
<td>±0.18°F (±0.01°C)</td>
<td>Tap water Ethylene glycol aqueous solution (20%) Fluorinated fluid</td>
<td>SEMI</td>
<td>•Coater/Developer •CMP •Dicer •Cleaning •Exposure</td>
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<td><strong>HED</strong></td>
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<td>Deionized water Chemical liquid</td>
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<td><strong>HRW</strong></td>
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<td>68 to 194°C (20 to 90°C)</td>
<td>1.41 cfm (40 L/min)</td>
<td>±0.54°F (±0.3°C)</td>
<td>Fluorinated fluid Tap water Deionized water Ethylene glycol aqueous solution (60%)</td>
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</table>

*1 The maximum capacity is displayed.
### Laser Selection Examples

#### Industrial High-power Laser

**Cooling location**

**Oscillator**

- ![Image of Oscillator](image1)

**Cooling location**

**Fiber connector**

- ![Image of Fiber connector](image2)

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</table>

<table>
<thead>
<tr>
<th>Chiller cooling capacity [W]</th>
<th>SMC chiller model</th>
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</tbody>
</table>

---

**Conditions:**
- Circulating fluid temperature 68°F (20°C), Ambient temperature 104°F (40°C)
- Required cooling capacity = Laser output / Energy conversion efficiency – Laser output x 1.2

---

*HRS HRSH HRR HRSH HRSH HRS*
### Machine Tools

#### Cooling location: Main shaft

<table>
<thead>
<tr>
<th>Machine tools main shaft</th>
<th>Chiller</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main shaft output [W]</strong></td>
<td><strong>Motor efficiency [%]</strong></td>
</tr>
<tr>
<td>22,500</td>
<td>85</td>
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<td>5,000</td>
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</table>

*T: High-pressure pump mounted

**Conditions:** Circulating fluid temperature 68°F (20°C), Ambient temperature 77°F (25°C)

**1** Required cooling capacity = (Main shaft output/Motor efficiency) x 1.2
## Welding Machines

### Chiller Selection Examples

**Cooling location** Transformer/Electrode

**Resistance welding machine (Spot welding)**

<table>
<thead>
<tr>
<th>Max. welding current value [A]</th>
<th>Allowable utilization rate [%]</th>
<th>Required cooling capacity [W](^1)</th>
<th>Chiller cooling capacity [W]</th>
<th>SMC chiller model</th>
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<tbody>
<tr>
<td>6,000</td>
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*Conditions: Circulating fluid temperature 77°F (25°C), Ambient temperature 104°F (40°C)*

\(^1\) Required cooling capacity = Max. welding current value x \(\sqrt{\text{Utilization rate}} \times 1.2\)
## Food Products/Packaging Machines

### Cooling location: Sealing machine

**Cooling water**

**Workpiece**

### Package sealing machine

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<td>HRSH090</td>
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</tbody>
</table>

- **Conditions:** Circulating fluid temperature 68°F (20°C), Ambient temperature 104°F (40°C)
- **Required cooling capacity:** Maximum current x Power supply voltage
- **-T:** High-pressure pump mounted
SMC’s Thermo-chiller Global Service Network

North, Central, and South America Zone Chiller Service System

With more than 60 sales branches and 7 local production facilities—and additional distributors which help provide support to Central and South America as well as the Caribbean region—SMC is able to not only fulfill customer requests for specials but also provide customers with application assistance and locally produced products.

1. Brazil
2. Mexico
3. U.S.A.

Europe Zone Chiller Service System

SMC products and services are available in 46 countries. With major production facilities in Germany, the United Kingdom, and Italy—as well as their European Central Warehouse (ECW) and local subsidiaries that manufacture simple, special-order products—SMC is able to meet the needs of all customers on the European continent.

4. Austria
5. France
6. Germany
7. Italy
8. Netherlands
9. Russia
10. Spain/Portugal
11. Turkey
12. U.K.

* The names of countries and regions listed in each area are alphabetically indexed.
Asian Zone Chiller Service System

Covering 25 countries and regions including the ASEAN countries, Asian NIES, Australia, New Zealand, and 2 of the 4 BRIC countries—India and China—SMC’s Asia service network is made up of 12 local subsidiaries, 10 production facilities, and more than 120 sales offices. Reliable support for countries such as Indonesia, Israel, and Saudi Arabia is provided by major local distributors.

9 China  10 Hong Kong  11 Indonesia  12 Japan  13 Korea  14 Malaysia  15 Philippines  16 Singapore  17 Taiwan  18 Thailand

For more details, refer to the Thermo-chiller Support Guide (PDF) on our website.
Temperature Control Equipment - Useful Info

Access the web pages for the content below from the documents/download pull down menu at the top of the website.
https://www.smcworld.com

Selectable Series
- HRSE: Basic type (Indoor use)
- HRS: Standard type (Indoor use)
- HRS100/150: Standard type (Outdoor installation: IPX4)
- HRSH090: Inverter type (Indoor use)
- HRSH: Inverter type (Outdoor installation: IPX4)
  - Excludes made-to-order specifications and special specifications

With 2 search options
- Search alphabetically
- Search by category
Temperature Control Equipment