



















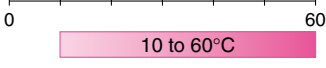


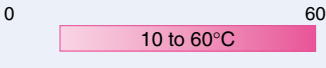





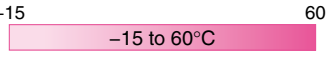


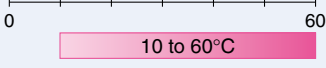


Thermo-chiller Variations

| Series | Features | Cooling method | Temperature stability | Cooling capacity kW | | | | | | | | | | | | | | | | | | | |
|--|---|---|--------------------------|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|---|---|---|---|----|----|----|----|
| | | | | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.8 | 1.0 | 1.2 | 1.8 | 2.4 | 3 | 4 | 5 | 6 | 9 | 10 | 15 | 20 | 25 |
| Thermo-chiller Standard type HRS Series  | <p>p. 24</p> <ul style="list-style-type: none"> 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: | Air-cooled/ Water-cooled refrigeration | ±0.1°C | | | | | | | | | ● | ● | ● | ● | ● | ● | | | | | | |
| Thermo-chiller Standard type HRS-R Series  | <p>p. 76</p> <ul style="list-style-type: none"> Environmentally resistant type Compact: | Air-cooled refrigeration | ±0.1°C | | | | | | | | | ● | | ● | | ● | | | | | | | |
| Thermo-chiller Standard type HRS090 Series  | <p>p. 108</p> <ul style="list-style-type: none"> W 377 x H 615 x D 500 mm, 40 kg (HRS012/018/024) Timer operation function, Low liquid level protection, Power failure auto-restart, Anti-freezing operation function, etc. | Air-cooled/ Water-cooled refrigeration | ±0.5°C | | | | | | | | | | | | | | ● | | | | | | |
| Thermo-chiller Standard type HRS100/150 Series  | <p>p. 136</p> <ul style="list-style-type: none"> 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 dB(A) (HRS100/150) | Air-cooled/ Water-cooled refrigeration | ±1.0°C | | | | | | | | | | | | | | | ● | ● | | | | |
| Thermo-chiller Standard type HRS200 Series  | <p>p. 172</p> <ul style="list-style-type: none"> Low-noise design: 70 dB(A) (HRS100/150) | Air-cooled refrigeration | ±1.0°C | | | | | | | | | | | | | | | | | ● | | | |
| Thermo-chiller Inverter type HRSH090 Series  | <p>p. 192</p> <ul style="list-style-type: none"> Power consumption reduced by 53% Complete with energy-saving triple inverter! Compact, Space saving: W 377 x H 1080 x D 970 mm Low-noise design: Max. 66 dB Max. ambient temperature: 45°C | Air-cooled/ Water-cooled refrigeration | ±0.1°C | | | | | | | | | | | | | | | ● | | | | | |
| Thermo-chiller Inverter type HRSH Series  | <p>p. 222</p> <ul style="list-style-type: none"> Complete with energy-saving triple inverter! Outdoor installation: IPX4 Max. ambient temperature: 45°C Space saving and lightweight: 280 kg (25 kW type) | Air-cooled/ Water-cooled refrigeration | ±0.1°C | | | | | | | | | | | | | | | | ● | ● | ● | ● | ● |
| Thermo-chiller Basic type HRSE Series  | <p>p. 260</p> <ul style="list-style-type: none"> Simple function and performance Thermo-chiller of the basic type Complete with energy-saving triple control! Reduces power consumption by 33% Compact and lightweight: 32 kg (100 VAC) Maintenance-free: Magnet pump Low-noise design: 55 dB(A) | Air-cooled refrigeration | ±2.0°C | | | | | | | | | ● | ● | ● | | | | | | | | | |
| Thermo-chiller Rack mount type HRR Series  | <p>p. 282</p> <ul style="list-style-type: none"> 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 | Air-cooled/ Water-cooled refrigeration | ±0.1°C | | | | | | | | | ● | ● | ● | ● | | | | | | | | |
| Dual Channel Refrigerated Thermo-chiller for Lasers HRL Series  | <p>p. 316</p> <ul style="list-style-type: none"> Temperatures for 2 fluid channel systems can be controlled individually by one chiller. Space saving, Footprint 22% reduction Reduced wiring, One power supply system for 2 channels Energy saving Power consumption reduced by 30% Touch panel | Air-cooled refrigeration | CH1 ±0.1°C CH2 ±0.5°C | | | | | | | | | | | | | | | | ● | | | ● | ● |
| Thermo-chiller High-performance type HRZ Series  | <p>p. 344</p> <ul style="list-style-type: none"> 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 | ±0.1°C | | | | | | | | | ● | | | | ● | | | ● | ● | | | |
| Thermo-chiller High-performance inverter type HRZD Series  | <p>p. 382</p> <ul style="list-style-type: none"> 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 | ±0.1°C | | | | | | | | | | | | | | | | ● | | | | |
| Water-cooled Thermo-chiller High-performance type HRW Series  | <p>p. 384</p> <ul style="list-style-type: none"> 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 type | ±0.3°C | | | | | | | | | | ● | | | | | | ● | | | ● | |

| | Temperature range setting °C | Pump capacity | Pump type | Power supply | Circulating fluid | Environment | International standards |
|--|------------------------------|---------------------------------|---|--|---|------------------------------------|---|
| | | 42 L/min | Magnet pump (Mechanical seal pump for high-pressure pump mounted type) | Single-phase 100 VAC (50 Hz) Single-phase 100 to 115 VAC (60 Hz) Single-phase 200 to 230 VAC (50/60 Hz) | Tap water Deionized water Ethylene glycol aqueous solution (15%) | Indoor use | CE MET (Only 60 Hz) |
| | | 40 L/min | | Single-phase 200 to 230 VAC (50/60 Hz) | Tap water Ethylene glycol aqueous solution (15%) | Indoor use Electrical box: IP54 | CE |
| | | 68 L/min | Mechanical seal pump | 3-phase 200 VAC (50 Hz) 3-phase 200 to 230 VAC (60 Hz) | Tap water Deionized water Ethylene glycol aqueous solution (15%) | Indoor use | CE (400 V as standard) |
| | | 68 L/min | | 3-phase 380 to 415 VAC (50/60 Hz) | | Outdoor installation IPX4 | CE (400 V as standard) |
| | | 130 L/min | Immersion pump | 3-phase 380 to 415 VAC (50 Hz) 3-phase 460 to 480 VAC (60 Hz) | | Outdoor installation IPX4 | CE MET (UL Standards) |
| | | 60 L/min | Mechanical seal pump | 3-phase 200 VAC (50 Hz) 3-phase 200 to 230 VAC (60 Hz) 3-phase 380 to 415 VAC (50/60 Hz) | Tap water Deionized water Ethylene glycol aqueous solution (15%) | Indoor use | CE (400 V as standard, 200 V as an option) ETL (Only 200 V as an option) |
| | | 180 L/min | Immersion pump | 3-phase 200 VAC (50 Hz) 3-phase 200 to 230 VAC (60 Hz) 3-phase 380 to 415 VAC (50/60 Hz) 3-phase 460 to 480 VAC (60 Hz) | Tap water Deionized water Ethylene glycol aqueous solution (15%) | Outdoor installation IPX4 | CE (400 V as standard, 200 V as an option) MET (Only 200 V as an option) |
| | | 25 L/min | Magnet pump | Single-phase 100 VAC (50/60 Hz) Single-phase 200 VAC (50/60 Hz) Single-phase 230 VAC (50/60 Hz) | Tap water Ethylene glycol aqueous solution (15%) | Indoor use | CE (Only 230 VAC type) |
| | | 21 L/min | Magnet pump (Mechanical seal pump for high-pressure pump mounted type) | Single-phase 100 VAC (50/60 Hz) Single-phase 115 VAC (60 Hz) Single-phase 200 to 230 VAC (50/60 Hz) | Tap water Ethylene glycol aqueous solution (15%) | Indoor use | CE MET (Air-cooled: Option U Water-cooled: Standard) |
| | | CH1: 180 L/min CH2: 16 L/min | Immersion pump Canned pump | 3-phase 200 VAC (50 Hz) 3-phase 200 to 230 VAC (60 Hz) | CH1: Tap water CH2: Tap water Deionized water | Indoor use | CE |
| | | 40 L/min | Immersion pump | 3-phase 200 VAC (50 Hz) 3-phase 200 to 208 VAC (60 Hz) | Fluorinated fluid Tap water Deionized water Ethylene glycol aqueous solution (60%) | Indoor use | CE RU SEMATECH S2-93, S8-95 SEMI Standard S2-0703, S8-0701, F47-0200 |
| | | 40 L/min | Immersion pump | 3-phase 200 VAC (50 Hz) 3-phase 200 to 208 VAC (60 Hz) | Fluorinated fluid Ethylene glycol aqueous solution (60%) | Indoor use | CE RU SEMI Standard S2-0706, S8-0308, F47-0706 |
| | | 50 L/min | Immersion pump | 3-phase 200 VAC (50 Hz) 3-phase 200 to 208 VAC (60 Hz) | Fluorinated fluid Tap water Deionized water Ethylene glycol aqueous solution (60%) | Indoor use | CE RU SEMATECH S2-93, S8-95 SEMI Standard S2-0703, S8-1103, F47-0200 |

Peltier-type Thermo-con Variations

| Series | Features | Cooling method | Temperature stability | Cooling capacity kW | | | | | | | | | |
|--|---|--|--|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|--|
| | | | | 0.1 | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.8 | 1.0 | 1.2 | |
| Thermo-con Rack mount type HECR Series  | p. 414 <ul style="list-style-type: none"> 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 Water-cooled Peltier-type | ± 0.01 to 0.03°C | | ● | | ● | ● | | ● | ● | | |
| Thermo-con HEC Series  | p. 440 <ul style="list-style-type: none"> 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 Water-cooled Peltier-type | ± 0.01 to 0.03°C | | ● | | | | | ● | | | |
| Thermo-electric Bath HEB Series  Made to Order  | p. 474 <ul style="list-style-type: none"> High-precision temperature control bath with a Peltier device Compact and low noise Minimal up-down temperature distribution with a unique agitation method | Round type Peltier-type water-cooled Square type Peltier-type water-cooled Square type Peltier-type air-cooled | $\pm 0.01^{\circ}\text{C}$ $\pm 0.03^{\circ}\text{C}$ | ● | | | | | | | | | |
| Chemical Thermo-con HED Series  | p. 486 <ul style="list-style-type: none"> 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 | $\pm 0.1^{\circ}\text{C}$ | | | | ● | | ● | | ● | | |

| Temperature range setting °C | Pump capacity | Pump type | Power supply | Circulating fluid | Environment | International standards |
|---|---------------|-------------|---|---|-------------|---|
|  | 6 L/min | Magnet pump | Single-phase 100 to 240 VAC (50/60 Hz) 0.2 to 0.8 kW Single-phase 200 to 240 VAC (50/60 Hz) 1 kW, 1.2 kW | Tap water Ethylene glycol aqueous solution (20%) | Indoor use |   |
|  | 10 L/min | Magnet pump | Single-phase 100 to 240 VAC (50/60 Hz) | Tap water Ethylene glycol aqueous solution (20%) | Indoor use |    |
| | 23 L/min | | Single-phase 100 to 240 VAC (50/60 Hz) 0.1 kW, 0.3 kW | Tap water Ethylene glycol aqueous solution (20%) | |   (Excluding HEC006, 012) |
|  | | | Single-phase 100 to 240 VAC (50/60 Hz) | Fluorinated fluid Tap water | Indoor use |   |
| | | | Single-phase 200 to 220 VAC (50/60 Hz) | Tap water | | |
| | | | Single-phase 100 to 240 VAC (50/60 Hz) | Tap water Ethylene glycol aqueous solution (50%) | | |
| | | | | | | |
|  | — | — | Single-phase 200 to 220 VAC (50/60 Hz) | Deionized water Chemical liquid | Indoor use |   |

Accessories List

● : Standard ◆ : Option ★ : Optional accessories

| | | Outline | HRS | HRS-R | HRS090 | HRS100/150 | HRS200 | HRSH090 | HRSH | HRSE | HRR | HRL | HRZ | HRZD | HRW | HECR | HEC |
|---------------------------|---|---|-----|-------|--------|------------|--------|---------|------|------|-----|-----|-----|------|-----|------|-----|
| Temperature Control | PID control | 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. | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● |
| | ON/OFF control | When the discharge temperature (PV value) is higher than the circulating fluid set temperature (SV value), the compressor turns ON (start). And 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. | | | | | | | | ● | | | | | | | |
| | Thermoelectric device (Peltier device) | 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. | | | | | | | | | | | | | | ● | ● |
| | With heater | This product comes equipped with a heater suitable for the user's manufacturing processes (temperature rising processes). | | | | | | | | | | | ●*1 | ● | ● | | |
| Energy Saving | Inverter compressor | This compressor can be used to control the number of rotations according to the heat load, resulting in energy savings. | | | | | | ● | ● | | | ● | ●*1 | ● | | | |
| | Inverter fan | This cooling fan (air-cooled type) can be used to control the number of rotations according to the heat load, resulting in energy savings. | | | | | | ● | ● | | | ● | | | | | |
| | Inverter pump | This pump can be used to control the circulating fluid discharge pressure according to the user's piping resistance, resulting in energy savings. | | | | | | ● | ● | | | ● | ● | ● | ● | | |
| Maintenance | Alarm | 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. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| | With level switch | 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. | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ●/◆ |
| | With fluid fill port | Water can be supplied from the external fluid fill port. | ● | ● | ● | ◆ | ◆ | ● | ◆ | ● | ● | ● | ● | ● | ● | ● | ● |
| | With automatic water fill function | By opening the user's stopcock (for water), water can be supplied automatically via the built-in solenoid valve, ball tap, etc. | ◆ | ◆ | ◆ | ● | ● | ◆ | ● | | | | | | | | |
| Safety | Anti-quake bracket | 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. | ★ | ★ | ● | | ● | ● | ● | ★ | ★*2 | ● | ★ | | ★ | | |
| | With earth leakage breaker with handle | This product comes equipped with an earth leakage breaker with handle which is compliant with international standards (safety standards). | | | | | ● | | ◆ | | | ● | ● | ● | ● | | |
| | Drain pan (With water leakage sensor) | 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. | | | | | | | | | | | ● | ● | ● | | |
| | With earth leakage breaker | 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. | ◆ | ◆ | ◆ | ◆ | ● | ◆ | ◆ | | | ● | | | | | |
| | Drain pan set (With water leakage sensor) | 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. | ★ | | ★ | | | ★ | | | | | | | | | |
| | Particle filter set | This set can be used to filter foreign matter from the circulating fluid. (Nominal filtration rating: 5 μm, 75 μm) | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ● | ● | | | | | |
| | Contaminant filter | This filter (Filtration: 20 μm) can be used to eliminate any dust which is contained in the circulating fluid circuit. | | | | | | | | | | | | | ★ | | |
| | Connector cover | This product can be used for protecting the connector on the rear side. | ★ | | | | | | | | | | | | | | |
| Relief valve set | This product prevents abnormal rises in circulating fluid pressure. | | | | ★ | | | | | | | | | | | | |
| Convenient Functions | Heating function | 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. | ● | | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● |
| | With flow sensor/flow switch | 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. | | | | | | | | ● | ● | ●*3 | ● | ● | ● | ◆ | ◆ |
| | With casters | The casters installed underneath the product allow for it to be easily moved to where cooling is required. | ● | | ● | | | | ● | ● | ● | ● | | | | | |
| | With casters and adjuster feet | This product comes with unfixed casters and adjuster feet. It can be installed level even on slight inclines. | | | | ◆/★ | ◆/★ | | ◆/★ | | | | ● | ● | ● | | |
| | Mountable in a 19-inch rack | Space saving can be realized as multiple chillers can be mounted on a 19-inch rack (EIA Standards). | | | | | | | | | ● | | | | | | ● |
| | With feet and no rack mounting brackets | For use in locations other than racks | | | | | | | | | ◆ | | | | | | ◆ |
| Piping conversion fitting | 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. | ◆/★ | ◆/★ | ◆/★ | ◆/★ | ◆/★ | ◆/★ | ◆/★ | ◆/★ | | ◆/★ | | | | | ◆ | ◆ |

*1 Some models *2 Only when option Y is selected *3 Only CH2

| | | Outline | HRS | HRS-R | HRS090 | HRS100/150 | HRS200 | HRSH090 | HRSH | HRSE | HRR | HRL | HRZ | HRZD | HRW | HECR | HEC |
|--------------------------|--|---|-----|-------|--------|------------|--------|---------|------|------|-----|-----------------|-----|------|-----|------|-----|
| Convenient Functions | NPT fitting | An adapter is included to change the connection ports (Rc) of circulating fluid piping and facility water piping to NPT threads. | | | | | | | | | | | ◆ | | ◆ | | |
| | Circulating fluid automatic recovery | 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. | | | | | | | | | | | ◆ | | ◆ | | |
| | Power supply cable | 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). | ★ | | | | | | | | ★ | | | | | ★ | ★ |
| | Replaceable dustproof filter set | 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. | ★ | ★ | | | | | | ★ | | | | | | | |
| Communication Functions | RS-232C | 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. | ● | ● | ● | ● | ● | ● | ● | | ● | ● | | | | ● | ● |
| | RS-485 | 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. | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● |
| | Analog communication | 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. | ★ | | | | | | | | | | ◆ | ● | ◆ | | |
| | DeviceNet communication | 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. | | | | | | | | | | | ◆ | | ◆ | | |
| | Digital I/O (Contact input/output) | 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. | ● | ● | ● | ● | ● | ● | ● | | ● | ● | ● | ● | ● | ● | ● |
| | With external switch inlet | This product comes equipped with an input terminal for the retrieval of the user's sequence control ON/OFF signals (external switch). | ● | ● | ● | ● | ● | ● | ● | | ● | ● | | | | | |
| | Applicable to deionized water piping | 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). | ◆ | | ◆ | | | | ◆ | | ◆ | ● ^{*3} | | | | ● | |
| For Special Applications | High-pressure pump mounted | 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. | ◆ | ◆ | | | | | | ◆ | ◆ | | | | | ◆ | |
| | High-temperature environment specification | This product makes use at ambient temperatures of up to 45°C possible. | ◆ | | | | | | | | | | | | | | |
| | DI control kit/Electric resistance control set | 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. | ★ | | | | | | | | | | ◆ | | ◆ | | |
| | Electric resistance sensor set | | ★ | | | | | | | | | | | | | | |
| | Electric conductivity control set | This set can be used to display and control the electric conductivity of the circulating fluid. | | | ★ | ★ | ★ | ★ | ★ | | ◆ | ● ^{*3} | | | | | |
| | DI filter set | It is possible to retain the level of electric resistance by flowing the circulating fluid through the ion replacement resin (DI filter). | ★ | | | | | | | | ◆ | ● ^{*3} | ★ | | ★ | | |
| | Insulating material for DI filter | Insulating the DI filter helps prevent reduced cooling capacity due to condensation and reduced heating capacity due to radiation. | | | | | | | | | | | ★ | | ★ | | |
| | Bypass piping set | 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. | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ● | ● | ★ | ★ | ★ | | |
| | Separately-installed power transformer | Installing this transformer where the user's power voltage differs will allow for the conversion of the current. | ★ | ★ | | | | | | ★ | | | | | | | |
| | Snow protection hood | 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. | | | | ★ | ★ | | ★ | | | | | | | | |
| 4-port manifold | 4-branching the circulating fluid allows for a maximum of 4 temperature controls with 1 thermo-chiller unit. | | | | | | | | | | | ★ | | ★ | | | |
| Circulating Fluid | 60% ethylene glycol aqueous solution | The ethylene glycol type circulating fluid can be used as is. The fluid can be used even when diluted to 15%. | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | | ★ | ★ | ★ |
| | Ethylene glycol aqueous solution concentration meter | This meter can be used to control the condensation of ethylene glycol solution regularly. | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ | ★ |





*3 Only CH2

SMC's Unique Chiller Control A Challenge to Downsizing

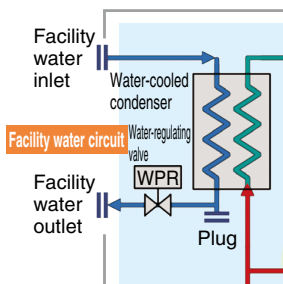
Temperature stability $\pm 0.1^{\circ}\text{C}$ / Compact

A precision temperature control method which utilizes expansion valves and temperature sensors allowed for the realization of a product with a high temperature stability of $\pm 0.1^{\circ}\text{C}$ and a small-size tank.

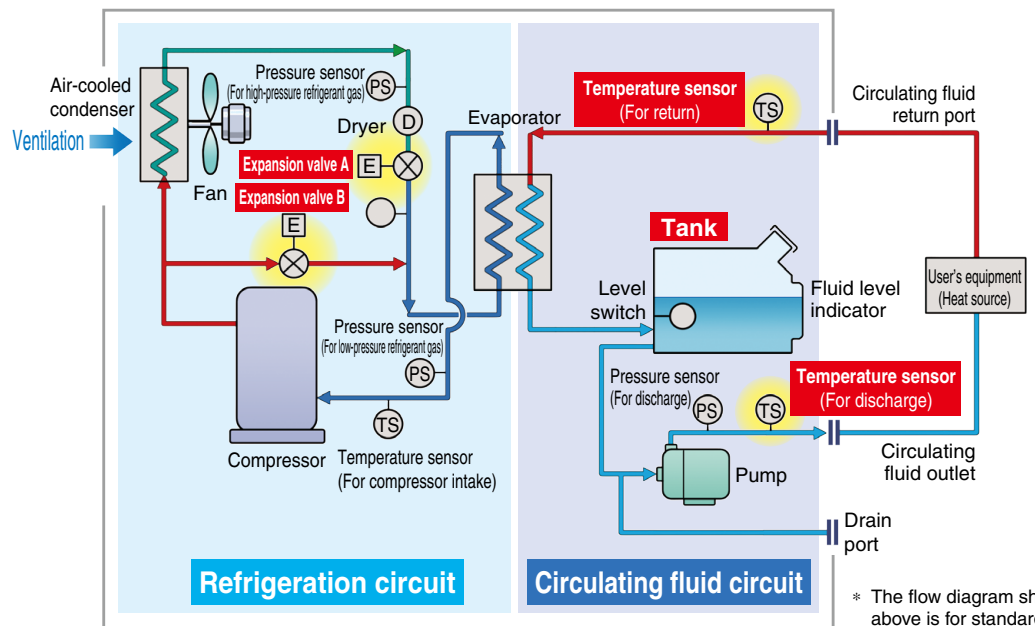
Applicable model

| | |
|--|--|
|  Standard type/ HRS012 to 060 p. 24 |  Standard type/ HRS-R p. 76 |
|  Inverter type/ HRS090 p. 192 |  Inverter type/ HRS100 to 300 p. 222 |

Water-cooled HRS□-W-□



Air-cooled HRS□-A-□



* The flow diagram shown above is for standard type HRS012 to 060.

Refrigeration circuit

- The compressor compresses the refrigerant gas and discharges high-temperature, high-pressure refrigerant gas.
- In the case of air-cooled refrigeration, the high-temperature, high-pressure refrigerant gas is cooled down by fan ventilation in the air-cooled condenser, where it is then liquefied. In the case of water-cooled refrigeration, the refrigerant gas is cooled by the facility water in the facility water circuit in the water-cooled condenser, where it is then liquefied.
- The liquefied high-pressure refrigerant gas expands and its temperature lowers when it passes through expansion valve A, where it vaporizes after receiving heat from the circulating fluid in the evaporator.
- The vaporized refrigerant gas is sucked into the compressor and compressed again.
- When heating the circulating fluid, the high-pressure, high-temperature refrigerant gas is bypassed into the evaporator by expansion valve B to heat the circulating fluid.

Point The combination of the precise control of **expansion valve A** for cooling and **expansion valve B** for heating allows for high temperature stability.

Circulating fluid circuit

- After the circulating fluid discharged from the pump is heated or cooled by the user's equipment, it returns to the thermo-chiller.
- The circulating fluid is controlled to remain at a set temperature by the refrigeration circuit. It will then be discharged to the user's equipment side again by the thermo-chiller.

Point Since the refrigeration circuit is controlled by the signals from **2 temperature sensors (for return and discharge)**, precise temperature control of the circulating fluid can be achieved. Therefore, there is no need for a tank with a large capacity to absorb the circulating fluid temperature difference, as high temperature stability can be achieved even with a **small-size tank**. This also contributes to space saving.

Facility water circuit

For water-cooled refrigeration HRS□-W-□

- The water-regulating valve opens and closes to keep the refrigerant gas pressure consistent. The facility water flow rate is controlled by the water-regulating valve.

5 Advantages of SMC Thermo-chillers

HRS/HRSH/HRR Series

1 Lightweight, Compact



Applicable models



Standard type/
HRS012 to 060
p. 24



Standard type
Environmentally resistant type /
HRS-R
p. 76



Standard type/
HRS090
p. 108



Inverter type/
HRSH090
p. 192



Inverter type/
HRSH100 to 300
p. 222



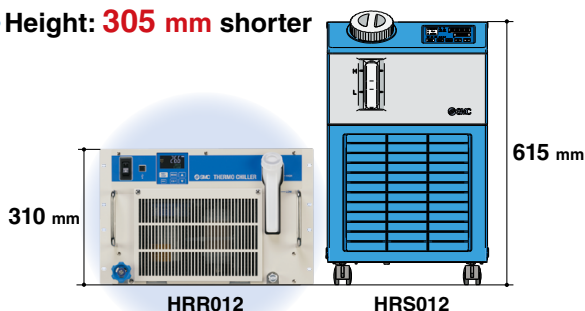
Rack mount type/
HRR
p. 282

Same width for all models: **377 mm**

| Model | Size (mm) | Weight | Cooling capacity (60Hz) |
|--------|------------------------|--------|-------------------------|
| HRS012 | W 377 x H 615 x D 500 | 40 kg | 1300 W |
| HRS018 | | | 1900 W |
| HRS024 | | | 2400 W |
| HRS030 | W 377 x H 660 x D 500 | 47 kg | 3200 W |
| HRS040 | W 377 x H 676 x D 592 | 53 kg | 4200 W |
| HRS050 | W 377 x H 976 x D 592 | 69 kg | 5100 W |
| HRS060 | | 73 kg | 5900 W |
| HRS090 | W 377 x H 1080 x D 970 | 136 kg | 9000 W |

Rack Mount Type HRR Series

• Height: **305 mm** shorter



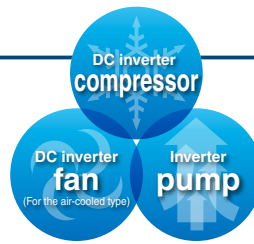
• Volume:
28% reduction



2 Energy Saving

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.



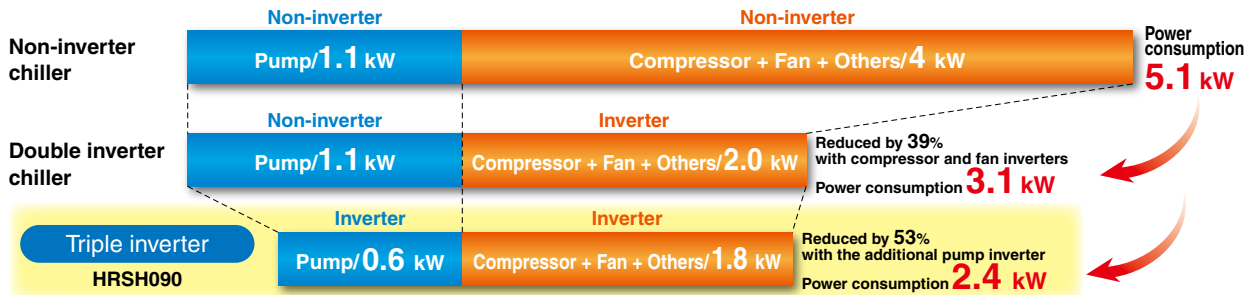
Applicable models

Inverter type/
HRS090
p. 192

Inverter type/
HRS100 to 300
p. 222

Power consumption reduced by 53% compared with a non-inverter (HRS090)

With the inverter, it is possible to operate with the same performance even with the power supply of 50 Hz.



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
 Common conditions for non-inverter and triple inverter:
 • Ambient temperature: 32°C • Circulating fluid temperature: 20°C • Circulating fluid flow rate: 35 L/min at 0.3 MPa (60 Hz) • Heat load: 9.5 kW
 Conditions for non-inverter chiller: Continuous operation of the compressor which can cool down 9.5 kW at 60 Hz. The pump shall be same as that of the HRSH.

Inverter pump

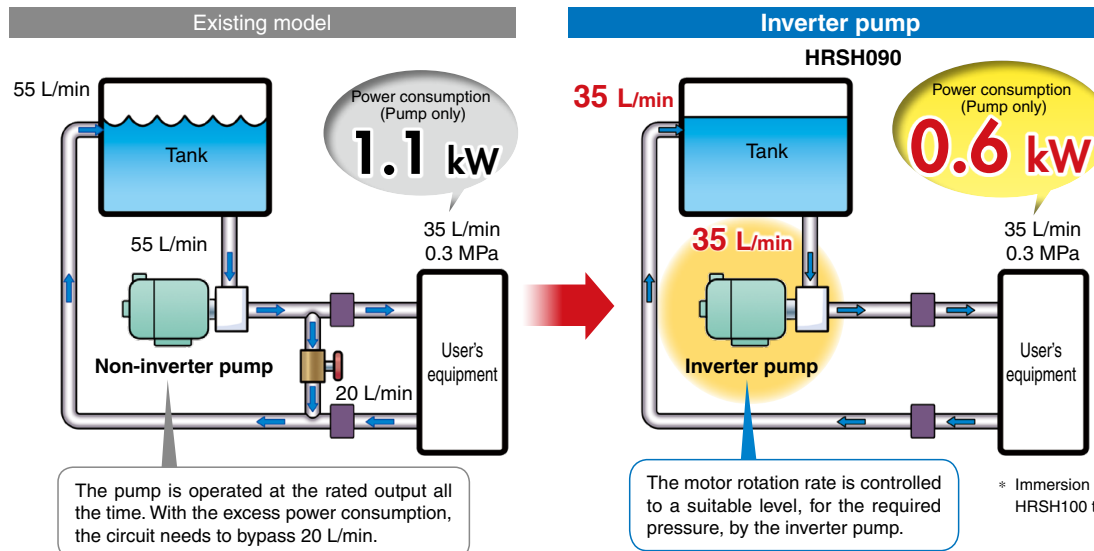
Power reducing effect of the inverter pump



Applicable models

Inverter type/
HRS090
p. 192

Inverter type/
HRS100 to 300
p. 222

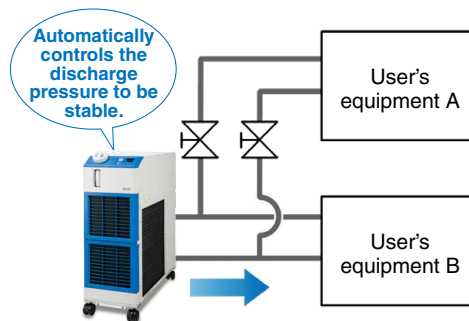


Circulating fluid pressure adjustable

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*1 under various piping conditions. Power consumption can be reduced by this control.

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

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



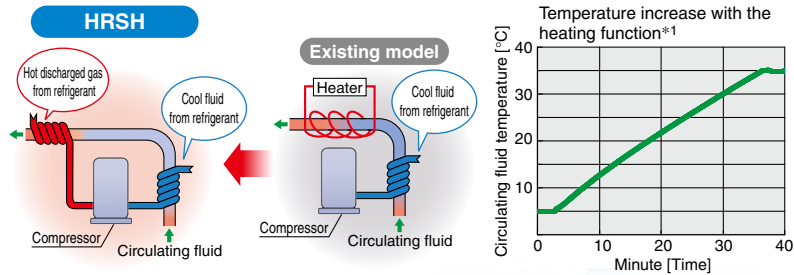
Operation display panel
(Circulating fluid discharge pressure setup screen)

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.)

3 Heating Function

Circulating fluid can be heated without a heater.

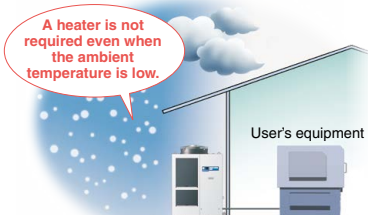
The heating method, which uses discharged heat, makes a heater unnecessary.











* This is just an example diagram

*1 For HRSR250-A-20

- Conditions**
- Ambient temperature: 5°C
 - Power supply: 200 V 60 Hz
 - Circulating fluid flow rate: 125 L/min at 0.5 MPa
 - External piping: Bypass piping

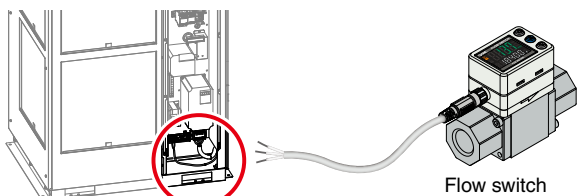


Applicable models

| | | |
|--|---|---|
|  Standard type/ HRS012 to 060 p. 24 |  Standard type HRS-R p. 76 | |
|  Standard type/ HRS090 p. 108 |  Standard type/ HRS100/150 p. 136 |  Standard type/ HRS200 p. 172 |
|  Inverter type/ HRSH090 p. 192 |  Inverter type/ HRSH100 to 300 p. 222 |  Rack mount type/ HRR p. 282 |

Power supply (24 VDC) available

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



Refer to the **Web Catalog** for details.

Applicable models

| | | | |
|--|--|--|---|
|  Standard type/ HRS012 to 060 p. 24 |  Standard type HRS-R p. 76 |  Standard type/ HRS090 p. 108 | |
|  Standard type/ HRS100/150 p. 136 |  Standard type/ HRS200 p. 172 |  Inverter type/ HRSH090 p. 192 |  Inverter type/ HRSH100 to 300 p. 222 |

Outdoor installation 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.

Applicable models

| | | |
|--|---|---|
|  Standard type/ HRS100/150 p. 136 |  Standard type/ HRS200 p. 172 |  Inverter type/ HRSH100 to 300 p. 222 |
|--|---|---|


Protection of the electrical unit: IP54

The board and electric parts are located inside the electrical box, where they can be protected from dust particles and water splashing.

Electrical box
IP54



Applicable models

| |
|--|
|  Standard type HRS-R p. 76 |
|--|

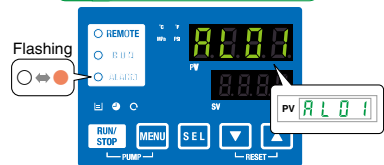
4 Easier Maintenance

Easy maintenance with the check display of the operation panel

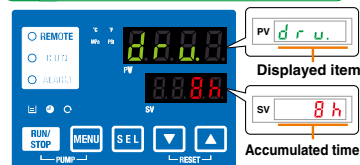
Alarm codes can be used for the notification of upcoming recommended maintenance. The codes notify you when it's time to check the pump and fan. Helpful for facility maintenance

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

Ex. AL01 "Low level in tank"










Ex. drv. "Accumulated operating time"



| Displayed item | | | |
|----------------|--------------------------------------|----------------|--|
| Temperature | Circulating fluid outlet temperature | Pressure | Circulating fluid outlet pressure |
| | Circulating fluid return temperature | | Compressor gas discharge pressure |
| Flow rate | Compressor gas temperature | Operating time | Compressor gas return pressure |
| | Circulating fluid flow rate*1 | | Accumulated operating time |
| | | | Accumulated operating time of pump |
| | | | Accumulated operating time of fan*2 |
| | | | Accumulated operating time of compressor |
| | | | Accumulated operation time of dustproof filter*2 |

*1 This is not measurement value. Use it for reference. (Excluding standard type HRS012 to 060)
*2 These are displayed only for air-cooled refrigeration.

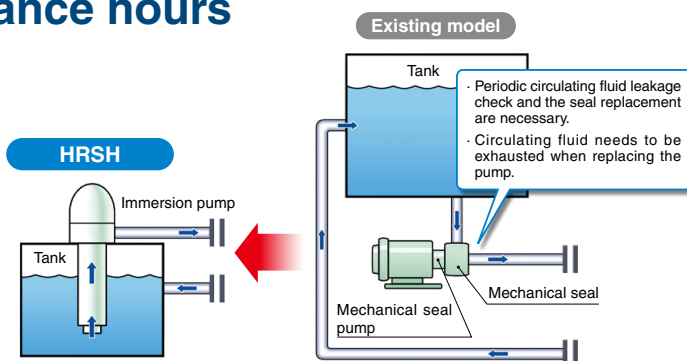
Applicable models

| | |
|---|---|
|  Standard type/ HRS012 to 060 p. 24 |  Standard type HRS-R p. 76 |
|  Standard type/ HRS090 p. 108 |  Standard type/ HRS100/150 p. 136 |
|  Standard type/ HRS200 p. 172 |  Inverter type/ HRSH090 p. 192 |
|  Inverter type/ HRSH100 to 300 p. 222 | |

Reduced 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.



Applicable models

| |
|---|
|  Standard type/ HRS200 p. 172 |
|  Inverter type/ HRSH100 to 300 p. 222 |

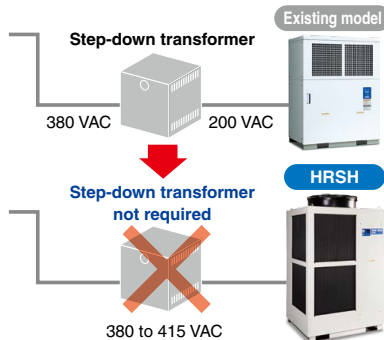
5 Global Compatibility

No transformers required










(Europe, Asia, Oceania, Central and South America)

Power supply Applicable to 200 to 230 VAC, or 380 to 415 VAC

Transformers are not required even when used overseas.



Applicable models

| | | | |
|---|--|--|---|
|  Standard type/ HRS012 to 060 p. 24 |  Standard type HRS-R p. 76 |  Standard type/ HRS090 p. 108 |  Standard type/ HRS100/150 p. 136 |
|  Standard type/ HRS200 p. 172 |  Inverter type/ HRSH090 p. 192 |  Inverter type/ HRSH100 to 300 p. 222 |  Basic type/ HRSE p. 260 |
| | | |  Rack mount type/ HRR p. 282 |

Conforming to international standards



SEMATECH S2-93, S8-95

SEMI Standard S2-0703, S8-0701, F47-0200

High-performance Type *HRZ/HRZD/HRW Series*

p. 344

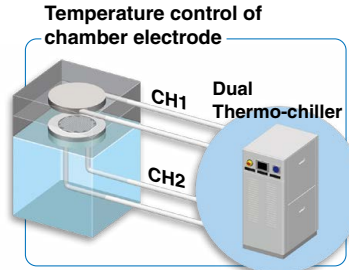


HRZ

HRW

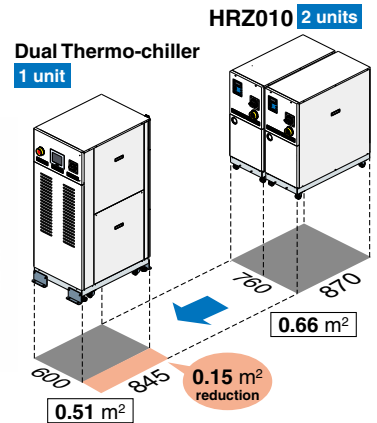
- Temperature stability $\pm 0.1^{\circ}\text{C}$, temperature range from -20°C to $+90^{\circ}\text{C}$. Full array of features and equipment.
- A double inverter type is also available, saving energy more effectively through use of a DC inverter compressor and an inverter pump.
- Circulating fluid: Fluorinated fluid, Ethylene glycol aqueous solution 60%, Tap water/Deionized water
- Water-cooled type: Refrigerant-free and energy saving type using no compressor (HRW)

- Dual Thermo-chiller 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

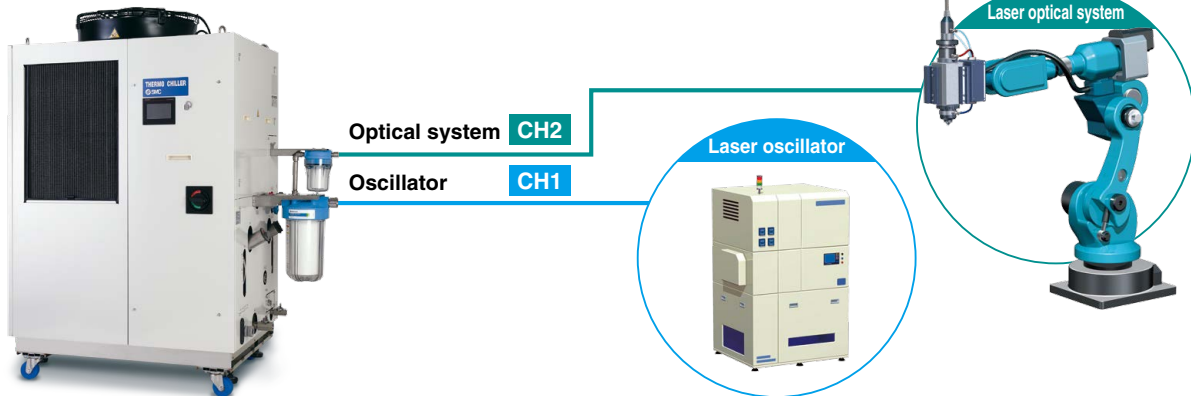
Footprint reduced by **23%**



Dual Channel Refrigerated Thermo-chiller for Lasers *HRL Series*

p. 316

- Temperatures for 2 fluid channel systems can be controlled individually by one chiller.



Peltier-type Thermo-con Lineup

Thermo-con *HECR/HEC Series*

- Temperature stability: ± 0.01 to 0.03°C

p. 414



Rack mount type *HECR Series*

p. 440



HEC Series

Thermoelectric Bath *HEB Series*

HEB Series p. 474

- Accurately controls the temperature of liquid in the bath.
- Temperature stability: $\pm 0.01^{\circ}\text{C}$
- Temperature distribution in the bath: $\pm 0.02^{\circ}\text{C}$



This equipment precisely controls the temperature of the fluid in the constant temperature tank. Users can control the temperature by placing a container in the tank.

Chemical Thermo-con *HED Series*

p. 486

- A fluororesin heat exchanger allows for the direct temperature control of chemical liquids.
- Industry-leading withstand pressure: 0.35 MPa



INR
Made to Order



Applications

Semiconductor

Etching

| | |
|------|--------|
| HEC | p. 440 |
| HECR | p. 414 |
| HRZ | p. 344 |
| HRW | p. 384 |



CMP

| | |
|------|--------|
| HEC | p. 440 |
| HECR | p. 414 |
| HED | p. 486 |
| HRZ | p. 344 |
| HRW | p. 384 |



Coater/Developer

| | |
|------|--------|
| HEC | p. 440 |
| HECR | p. 414 |
| HRZ | p. 344 |
| HRW | p. 384 |



Testers

| | |
|------|--------|
| HRS | p. 24 |
| HRW | p. 384 |
| HRSH | p. 222 |
| HRZ | p. 344 |
| HRR | p. 282 |



Cleaning machines

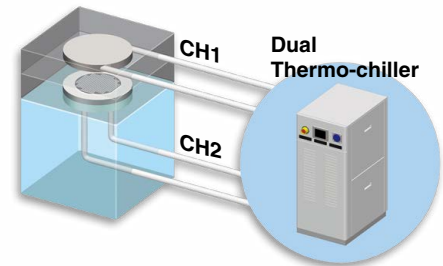
Temperature control of cleaning solution

| | |
|------|--------|
| HEC | p. 440 |
| HECR | p. 414 |
| HED | p. 486 |
| HRS | p. 24 |
| HRSH | p. 222 |



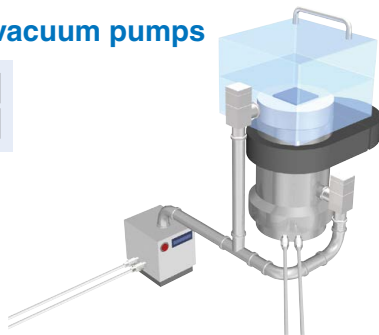
Temperature control of chamber electrode

| | |
|-----|--------|
| HRW | p. 384 |
| HRZ | p. 344 |



Cooling of vacuum pumps

| | |
|------|--------|
| HRS | p. 24 |
| HRSH | p. 222 |



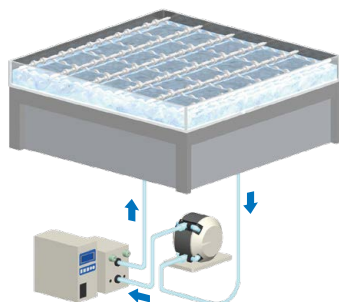
Gas cylinder cabinets

| | |
|------|--------|
| HRS | p. 24 |
| HRSH | p. 222 |



Cleaning machines (Hydrocarbon-based)

| | |
|-----|--------|
| HED | p. 486 |
|-----|--------|



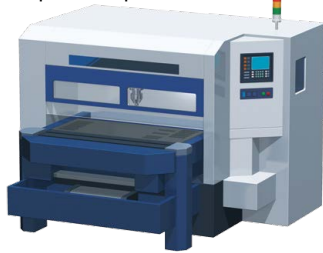
Applications

Laser

Laser beam machines/Laser welding machines

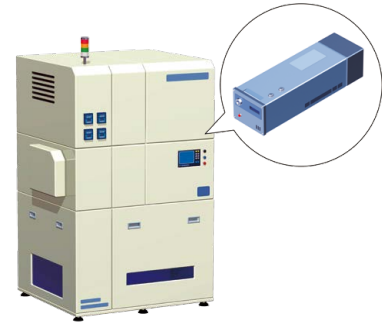
Cooling of the laser oscillation part and power source

| | |
|-------------|--------|
| HRS | p. 24 |
| HRSH | p. 222 |
| HRR | p. 282 |
| HRL | p. 316 |



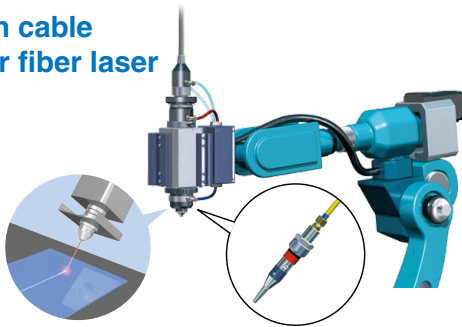
Laser oscillator

| | |
|-------------|--------|
| HEC | p. 440 |
| HECR | p. 414 |
| HRS | p. 24 |
| HRSH | p. 222 |
| HRR | p. 282 |
| HRL | p. 316 |



Transmission cable connector for fiber laser

| | |
|-------------|--------|
| HEC | p. 440 |
| HECR | p. 414 |
| HRS | p. 24 |
| HRR | p. 282 |
| HRL | p. 316 |



Ultrasonic wave inspection machine

Temperature control of the ultrasonic wave laser part

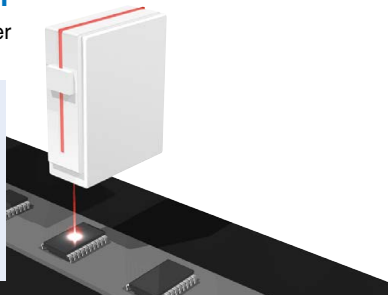
| | |
|------------|--------|
| HEC | p. 440 |
| HRS | p. 24 |
| HRR | p. 282 |



Laser marker

Cooling of the laser irradiated part

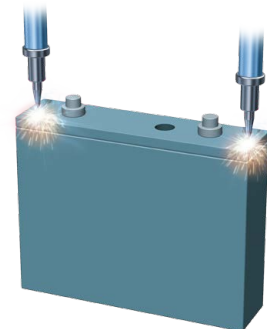
| | |
|-------------|--------|
| HEC | p. 440 |
| HECR | p. 414 |
| HRS | p. 24 |
| HRR | p. 282 |
| HRL | p. 316 |



Secondary battery manufacturing processes

Laser welding and cutting

| | |
|-------------|--------|
| HRS | p. 24 |
| HRSH | p. 222 |
| HRR | p. 282 |
| HRL | p. 316 |



3D metal printers

| | |
|-------------|--------|
| HRS | p. 24 |
| HRSH | p. 222 |
| HRR | p. 282 |
| HRL | p. 316 |



Machine Tools

Machining centers

Cooling of the spindle

| | |
|--------------|--------|
| HRS | p. 24 |
| HRSH | p. 222 |
| HRS-R | p. 76 |



Injection molding

| | |
|-------------|--------|
| HRS | p. 24 |
| HRSH | p. 222 |



Applications

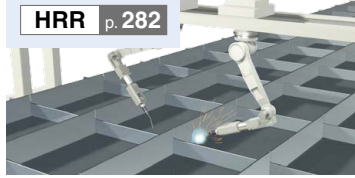
Welding Machines

Arc welding machines

Cooling of the torch

HRS p. 24

HRR p. 282



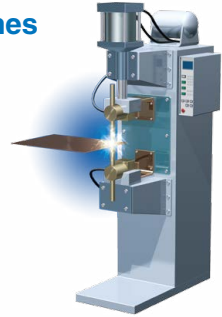
Resistance welding machines (spot welding)

Cooling of the welding head electrodes, transformers and transistors (thyristors)

HRS p. 24

HRSH p. 222

HRR p. 282



High-frequency induction heating equipment

Cooling of the heating coils, high-frequency power source and around inverters

HRS p. 24

HRSH p. 222

HRR p. 282



High-frequency inverter

Food Products/Packaging Machines

Packaging lines (sealing of film and paper package)

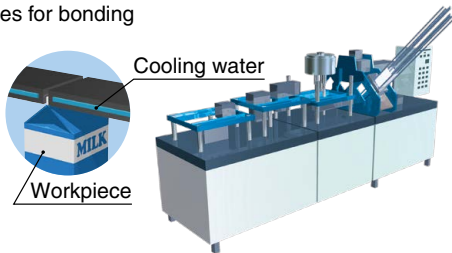
Cooling of workpieces for bonding

HRS p. 24

HRS-R p. 76

HRSH p. 222

HRR p. 282



Cooling water

Workpiece

Atomizing devices (food and cosmetics)

Temperature control of sample and device

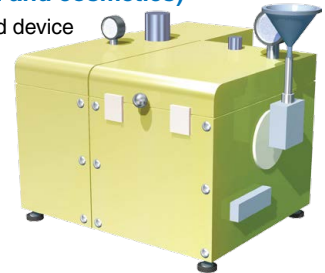
HEC p. 440

HECR p. 414

HRS p. 24

HRSH p. 222

HRR p. 282



Medical

X-ray (digital) instrument

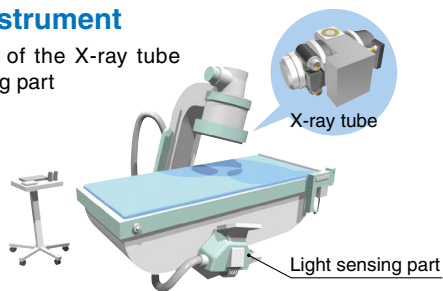
Temperature control of the X-ray tube and X-ray light sensing part

HEC p. 440

HECR p. 414

HRS p. 24

HRR p. 282



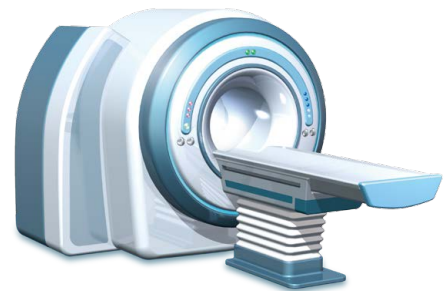
X-ray tube

Light sensing part

MRI

HRS p. 24

HRR p. 282



Physical and Chemical

Temperature control of adhesive and paint materials

HEC p. 440

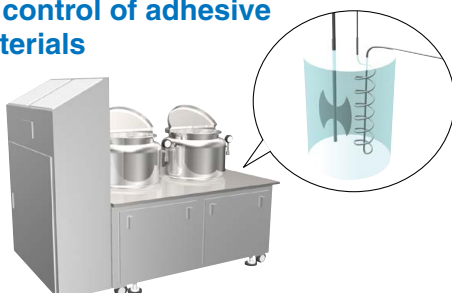
HECR p. 414

HEBC p. 474

HRS p. 24

HRSH p. 222

HRR p. 282



Printing

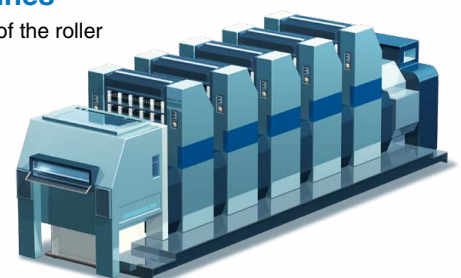
Printing machines

Temperature control of the roller

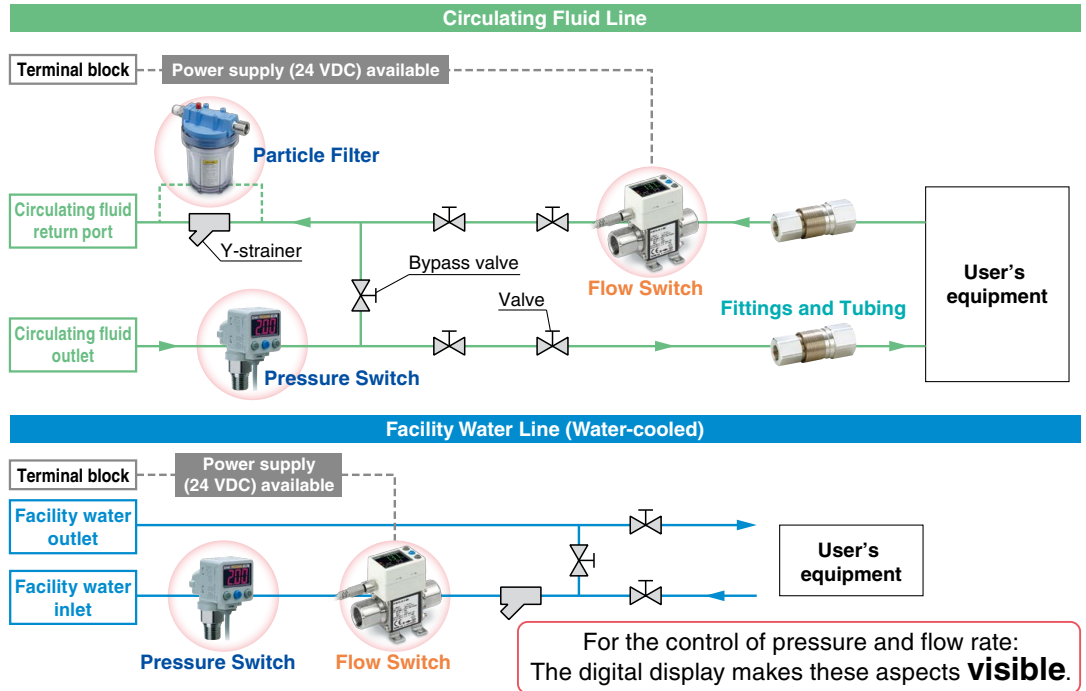
HRS p. 24

HRSH p. 222

HRR p. 282



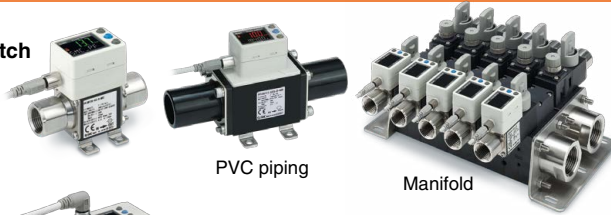
Circulating Fluid/Facility Water Line Equipment



Flow Switch: Monitors the flow rate and temperature of the circulating fluid and facility water

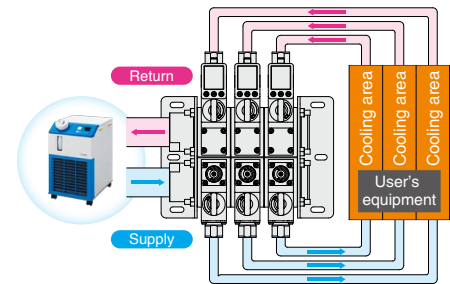
3-Color Display Digital Flow Switch for Water

PF3W



3-Color Display Electromagnetic Digital Flow Switch

LFE



Digital Flow Switch for Deionized Water and Chemical Liquids

PF2D

4-Channel Flow Monitor **PF2□200**



Pressure Switch: Monitors the pressure of the circulating fluid and facility water

2-Color Display High-Precision Digital Pressure Switch

ISE80



Pressure Sensor for General Fluids **PSE56□**

Pressure Sensor Controller **PSE200A, 300A, 300AC**



Particle Filter



p. 64

Fittings

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**



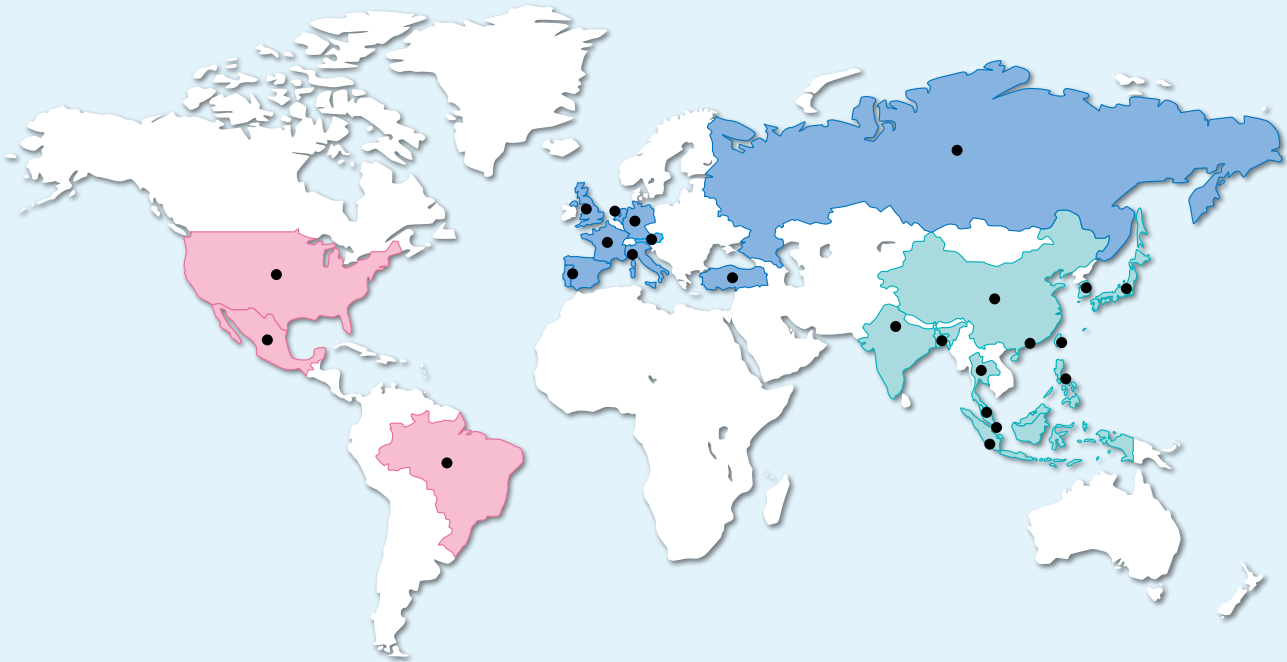
Tubing **T□**



| Series | Material |
|--------|------------------------------------|
| T | Nylon |
| TU | Polyurethane |
| TH | FEP (Fluoropolymer) |
| TD | Modified PTFE (Soft fluoropolymer) |
| TL | Super PFA |
| TLM | PFA |

Global Maintenance Network

Quick, careful response to customers' needs is possible thanks to a solid inventory of maintenance parts and an experienced chiller support team capable of conducting repairs and replacements. As SMC's high-quality services are available to customers all over the world, you can rest assured that you'll have our continued support long after purchase.



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| | | Malaysia Philippines Singapore South Korea Taiwan Thailand |

* The names of countries and regions listed in each area are alphabetically indexed