














Thermo-chiller Variations

Series	Features	Cooling method	Temperature stability	Cooling capacity kW																
				1.0	1.2	1.8	2.4	3	4	5	6	9	10	15	20	25	28	30		
Thermo-chiller Standard type HRS Series  p. 82		Air-cooled/ Water-cooled refrigeration	±0.1°C	●	●	●	●	●	●	●										
Thermo-chiller Standard type HRS090 Series  p. 82	<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. 	Air-cooled/ Water-cooled refrigeration	±0.5°C									●								
Thermo-chiller Standard type HRS100/150 Series  p. 108	<ul style="list-style-type: none"> Compact: 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	±1.0°C									●	●							
Thermo-chiller Standard type HRS200/400 Series  p. 140, 160	<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 refrigeration	±1.0°C											●			●	20.5 kW	38 kW	
Thermo-chiller Environmentally resistant type Standard type HRS-R Series  p. 180		Air-cooled refrigeration	±0.1°C		●		●		●											
Thermo-chiller Basic type HRSE Series  p. 208	<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		●	●	●												1.6 kW	2.2 kW
Thermo-chiller Rack mount type HRR Series  p. 228	<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	●	●	●	●	●		●										
Thermo-chiller Inverter type HRSH090 Series  p. 284	<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. 310	<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 Compact Dual/Basic Type for Lasers HRLE Series  p. 348	<ul style="list-style-type: none"> Temperatures for 2 fluid channel systems can be controlled individually by one chiller. Space saving, Reduced wiring Footprint 21% reduction One power supply system for 2 channels Energy saving Power consumption reduced by 17% 	Air-cooled/ Water-cooled refrigeration	CH1 ±0.1°C CH2 ±0.5°C									●	●						(CH1, 2 total)	(CH1, 2 total)

	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 UK CA MET _{us} (Only 60 Hz)
		68 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) 3-phase 460 to 480 VAC (60 Hz)		Indoor use	CE UK CA (400/460 V as standard) MET _{us} (Only 460 V type)
		68 L/min		Outdoor installation IPX4		CE UK CA (400/460 V as standard) MET _{us} (Only 460 V type)	
		180 L/min	Immersion pump	3-phase 380 to 415 VAC (50 Hz) 3-phase 460 to 480 VAC (60 Hz)		Outdoor installation IPX4	CE UK CA MET _{us} (UL Standards)
		40 L/min	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 Electrical box: IP54	CE UK CA
		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 UK CA (Only 230 VAC type)
		34 L/min	Magnet pump (Mechanical seal pump for high-pressure pump mounted type) Canned pump for the inverter pump type	Single-phase 100 VAC (50/60 Hz) Single-phase 115 VAC (60 Hz) Single-phase 200 to 230 VAC (50/60 Hz) 3-phase 380 to 415 VAC (50/60 Hz) 3-phase 460 to 480 VAC (60 Hz)	Tap water Ethylene glycol aqueous solution (15%)	Indoor use	CE UK CA MET _{us} (Air-cooled: Standard or Option U Water-cooled: Standard Except for some models)
		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 UK CA (400 V as standard, 200 V as an option) MET _{us} (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 UK CA (400 V as standard, 200 V as an option) MET _{us} (Only 200 V as an option)
		65 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) 3-phase 460 to 480 VAC (60 Hz) Single-phase 200 to 230 VAC (50/60 Hz)	Tap water Deionized water	Indoor use Electrical box: IPX4	CE UK CA Scheduled to acquire UL Standards (Only 400 V)







Thermo-chiller Variations

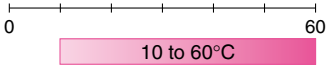
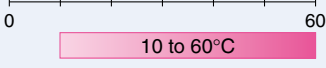

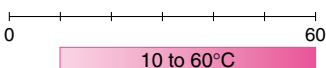

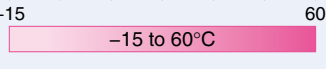
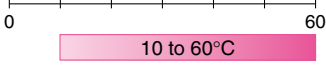
Series	Features	Cooling method	Temperature stability	Cooling capacity kW																				
				1.0	1.2	1.8	2.4	3	4	5	6	9	10	15	20	25	28	30						
<p>Dual Channel Thermo-chiller for Lasers</p> <p>HRL Series</p>  <p>p. 384</p>	<ul style="list-style-type: none"> • Temperatures for 2 systems can be controlled separately by one chiller. • Space saving: Footprint reduced by 22% • Reduced wiring, One power supply system for 2 channels • Energy saving Power consumption reduced by 30% • Touch panel 	Air-cooled/ Water-cooled refrigeration	CH1 ±0.1°C											●			●	●	19 kW	26 kW	37 kW			
			CH2 ±0.5°C	●																				
<p>EU F-Gas Regulation-compliant</p> <p>Thermo-chiller High-performance type High-performance inverter type</p> <p>HRZ-F Series</p>  <p>p. 432</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	●		●							●	●								2 kW	8 kW	
			±0.3°C			●									●								2 kW	8 kW
<p>Water-cooled Thermo-chiller</p> <p>High-performance type High-performance inverter type</p> <p>HRW Series</p>  <p>p. 462</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			●									●									

For details, refer to the **Web Catalog**.

Temperature range setting °C	Pump capacity	Pump type	Power supply	Circulating fluid	Environment	International standards
<p>0 60 [CH1] 5 to 35°C [CH2] 10 to 40°C</p>	<p>CH1: 180 L/min</p> <p>CH2: 16 L/min</p>	<p>Immersion pump</p> <p>Canned pump</p>	<p>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)</p>	<p>CH1: Tap water</p> <p>CH2: Tap water Deionized water</p>	Indoor use	<p>CE UK CA</p> <p>(MET)^{us} (400 V as standard (Except for some models))</p>
<p>-30 90 [High-performance type] -20 to 40°C 20 to 90°C -20 to 90°C [Inverter type] 10 to 60°C -20 to 90°C</p>	40 L/min	Immersion pump	<p>3-phase 200 VAC (50 Hz) 3-phase 200 to 208 VAC (60 Hz)</p>	<p>Fluorinated fluid Tap water Deionized water Ethylene glycol aqueous solution (60%)</p>	Indoor use	<p>CE UK CA</p> <p>SEMATECH S2-93, S8-95</p> <p>SEMI Standard S2-0703, S8-0701, F47-0200</p>
<p>-30 90 20 to 90°C</p>	50 L/min	Immersion pump	<p>3-phase 200 VAC (50 Hz) 3-phase 200 to 208 VAC (60 Hz)</p>	<p>Fluorinated fluid Tap water Deionized water Ethylene glycol aqueous solution (60%)</p>	Indoor use	<p>CE UK CA</p> <p>SEMATECH S2-93, S8-95</p> <p>SEMI Standard S2-0703, S8-1103, F47-0200</p>

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>p. 492</p> <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	±0.01 to 0.03°C		●		●	●		●	●	
		Water-cooled Peltier-type							●		●	
Thermo-con HEC Series 	<p>p. 518</p> <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	±0.01 to 0.03°C		●				●			
		Water-cooled Peltier-type		●		●		●		●		
Thermo-con Compact type HEF Series 	<p>p. 552</p> <ul style="list-style-type: none"> Compact: Width 130 mm x Height 210 mm x Depth 150 mm Low-noise design: 37 dB (at low load) Refrigerant-free Fluid contact material: Stainless steel, Resin, Rubber (Aluminum and copper material-free) 	Air-cooled Peltier-type	±0.1°C		●							
Thermolectric Bath HEB Series  <p>Made to Order</p> 	<p>p. 566</p> <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	±0.01°C	●								
		Square type Peltier-type water-cooled			●		●					
		Square type Peltier-type air-cooled	±0.03°C	●		●						
Chemical Thermo-con HED Series 	<p>p. 578</p> <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	±0.1°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 Single-phase 200 to 220 VAC (50/60 Hz) 0.6 kW, 1.2 kW	Tap water Ethylene glycol aqueous solution (20%) Fluorinated fluid Tap water		
			24 VDC	Tap water Ethylene glycol aqueous solution (20%)	Indoor use	
			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	HRS090	HRS100/150	HRS200	HRS400	HRS-R	HRSE	HRR	HRSH090	HRSH	HRLE	HRL	HRZ-F	HRW	HECR	HEC	HEF002	
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.									●	●		● ^{*5}	● ^{*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).				●	●					◆		●	●	●				
	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 (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.								●					●	●				
	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.	★																	
Convenient Functions	Relief valve set	This product prevents abnormal rises in circulating fluid pressure.		★																
	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 * Only 200 V (-20)

		Outline	HRS	HRS090	HRS100/150	HRS200	HRS400	HRS-R	HRSE	HRR	HRSH090	HRSH	HRLE	HRL	HRZ-F	HRW	HECR	HEC	HEF002
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).	●	●	●	●	●	●		●	●	●	●	●					
For Special Applications	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}		●			
	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	The function differs according to the model. Refer to the Operation Manual for details.	★																
	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).	★			●	◆ ^{*4}			◆				● ^{*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.													★	★			
Ball valve set	This is a set of fittings including a ball valve and a pressure gauge to be used when adjusting the circulating fluid discharge pressure and flow rate at the chiller.											★							
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 *4 Only when option D is selected

SMC's Unique Chiller Control A Challenge to Downsizing

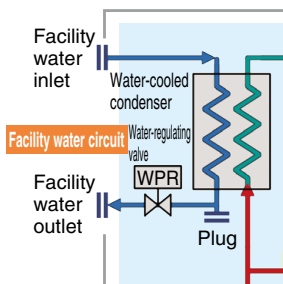
Temperature stability $\pm 0.1^{\circ}\text{C}$ / Compact

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.

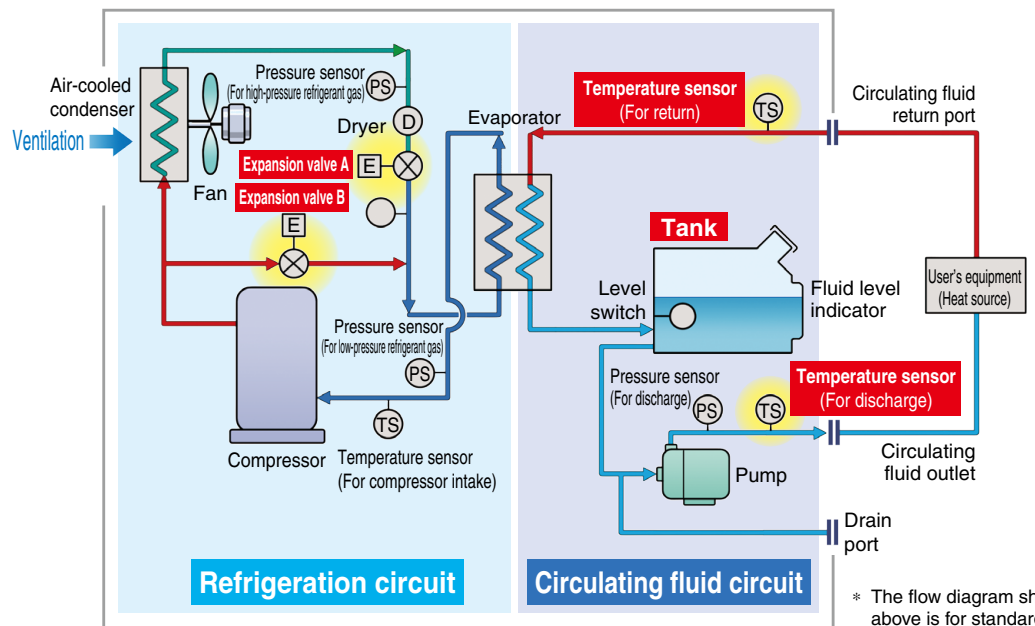
Applicable model

	
Standard type/ HRS012 to 060 p. 32	Standard type / HRS-R <small>Environmentally resistant type /</small> p. 180
	
Inverter type/ HRS090 p. 284	Inverter type/ HRS100 to 300 p. 310
	
	Compact Dual/Basic Type for Lasers/ HRLE p. 348

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. 32



Standard type/
HRS090
p. 32



Standard type
Environmentally resistant type /
HRS-R
p. 180



Rack mount type/
HRR
p. 228



Inverter type/
HRS090
p. 284



Inverter type/
HRS100 to 300
p. 310



Compact Dual/Basic
Type for Lasers/
HRLE
p. 348

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

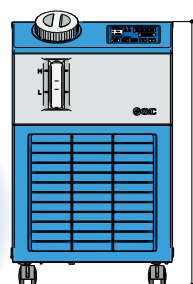
• Height: **305 mm** shorter

• Volume:
28% reduction

310 mm

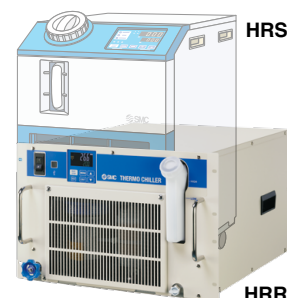


HRR012



HRS012

615 mm



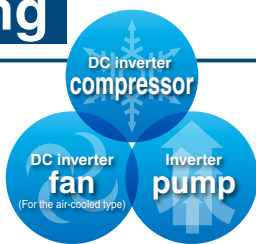
HRS012

HRR012

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.



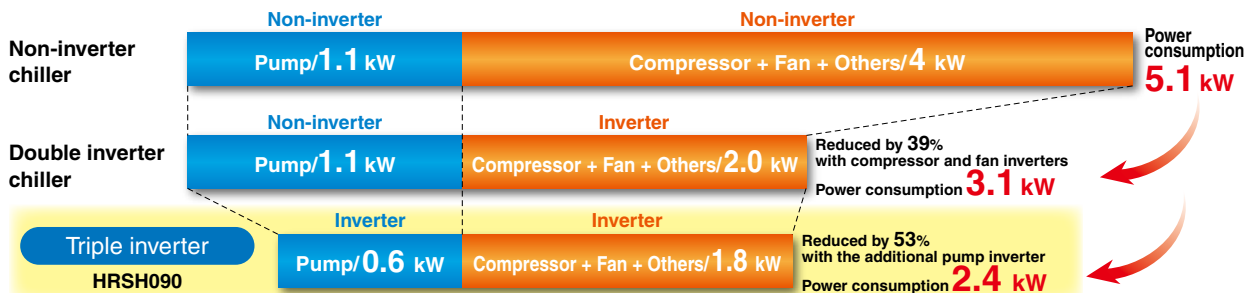
Applicable models

Inverter type/ HRSH090 p. 284	Inverter type/ HRSH100 to 300 p. 310	Compact Dual/ Basic Type for Lasers/ HRLE p. 348	Dual Channel Thermo-chiller for Lasers/ HRL p. 384

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.

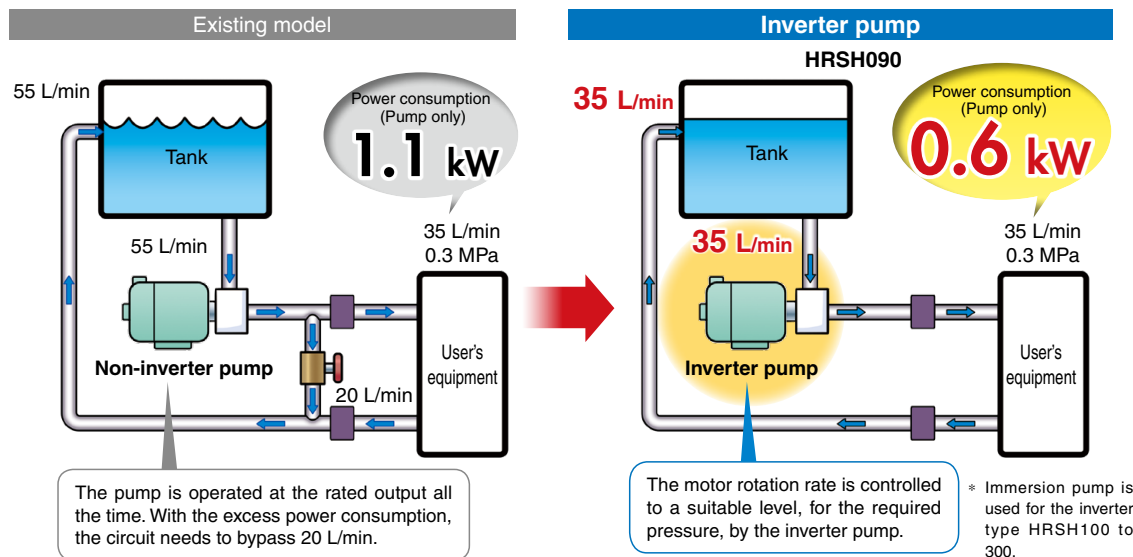


Operating ratio: Ratio of 9.5 kW (with heat load) to 0 kW (without heat load) Operating ratio: 50%, with heat load of 9.5 kW all the time

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

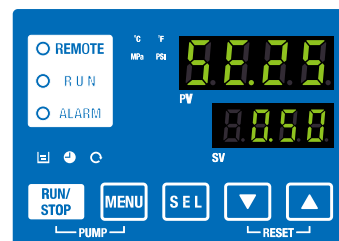
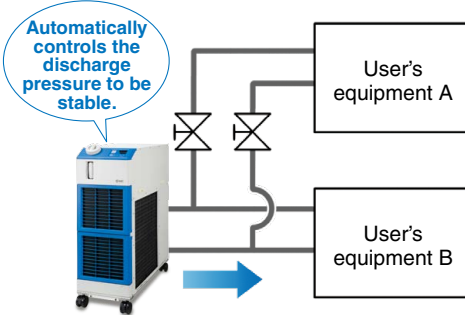
	Inverter type/ HRSH090 p. 284
	Inverter type/ HRSH100 to 300 p. 310
	Compact Dual/Basic Type for Lasers/ HRLE p. 348
	Dual Channel Thermo-chiller for Lasers/ HRL p. 384

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.



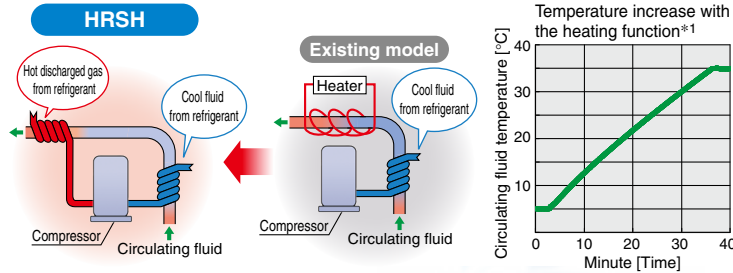
Operation display panel
(Circulating fluid discharge pressure setup screen)

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

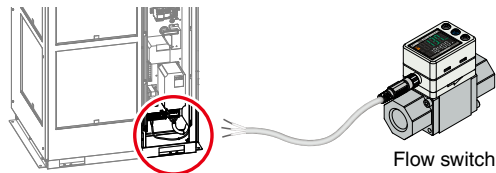


Applicable models

 Standard type/ HRS012 to 060 p. 32	 Standard type/ HRS090 p. 82	 Standard type/ HRS100/150 p. 108
 Standard type/ HRS200 p. 140	 Environmentally resistant type/ HRS-R p. 180	 Rack mount type/ HRR p. 228
 Inverter type/ HRSR100 to 300 p. 310	 Compact Dual/Basic Type for Lasers/ HRLE p. 348	 Inverter type/ HRSR090 p. 284
	 Dual Channel Thermo-chiller for Lasers/ HRL p. 384	

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. 32	 Standard type/ HRS090 p. 82	 Standard type/ HRS100/150 p. 108	 Standard type/ HRS200 p. 140
 Standard type/ HRS-R p. 180	 Inverter type/ HRSR090 p. 284	 Inverter type/ HRSR100 to 300 p. 310	 Compact Dual/ Basic Type for Lasers/ HRLE p. 348
	 Dual Channel Thermo-chiller for Lasers/ HRL p. 384		

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. 108	 Standard type/ HRS200 p. 140	 Inverter type/ HRSR100 to 300 p. 310	 Compact Dual/ Basic Type for Lasers/ HRLE p. 348	 Dual Channel Thermo-chiller for Lasers/ HRL p. 384
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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.



Applicable models

 Standard type/ HRS-R p. 180

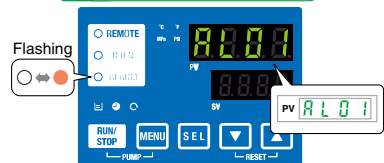
4 Easier Maintenance

Easy maintenance with the check display of the operation panel

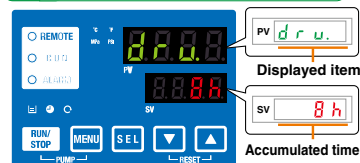
Alarm codes can be used for the notification of upcoming recommended maintenance. The codes notify you when it's time to check the pump and fan. Helpful for facility maintenance

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.

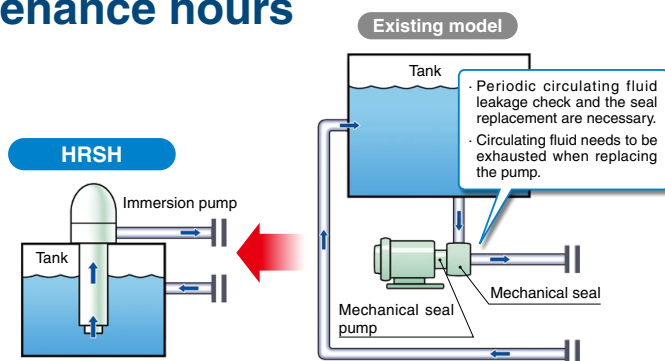
Applicable models

 Standard type/ HRS012 to 060 p. 32	 Standard type/ HRS090 p. 82	 Standard type/ HRS100/150 p. 108
 Standard type/ HRS200 p. 140	 Standard type Environmentally resistant type / HRS-R p. 180	 Inverter type/ HRSH090 p. 284
 Inverter type/ HRSH100 to 300 p. 310	 Compact Dual/Basic Type for Lasers/ HRL p. 348	 Dual Channel Thermo-chiller for Lasers/ HRL p. 384

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. 140	 Dual Channel Thermo-chiller for Lasers/ HRL p. 384
 Inverter type/ HRSH100 to 300 p. 310	

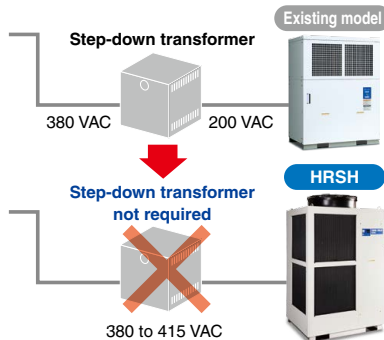
5 Global Compatibility

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. 32	 Standard type/ HRS090 p. 82	 Standard type/ HRS100/150 p. 108	 Standard type/ HRS200 p. 140	 Standard type Environmentally resistant type / HRS-R p. 180
 Basic type/ HRSE p. 208	 Rack mount type/ HRR p. 228	 Inverter type/ HRSH090 p. 284	 Inverter type/ HRSH100 to 300 p. 310	 Compact Dual/ Basic Type for Lasers/ HRL p. 348
				 Dual Channel Thermo-chiller for Lasers/ HRL p. 384

Conforming to international standards

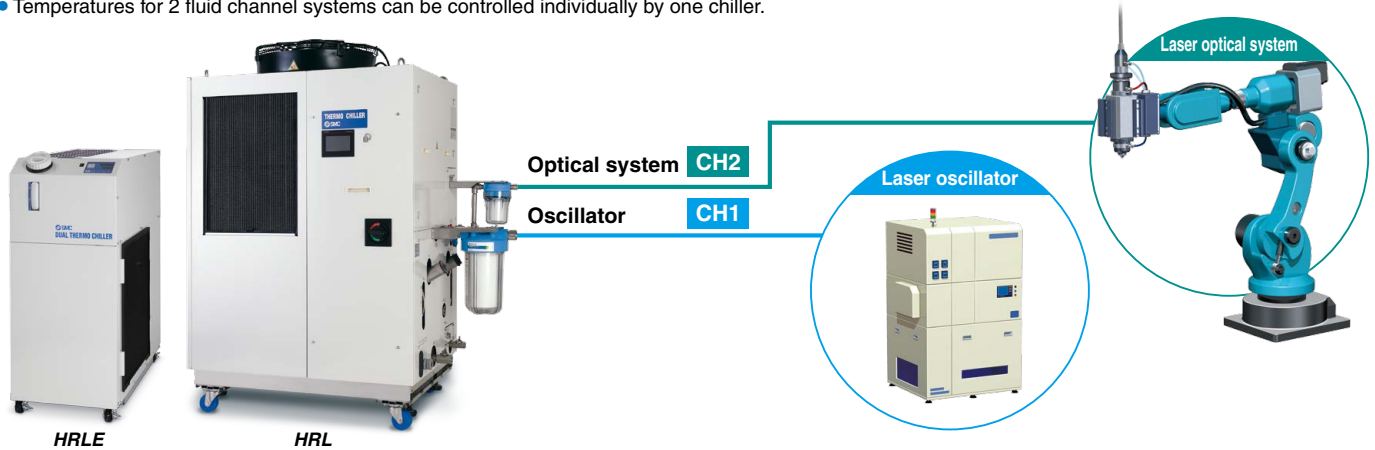


* Refer to the variations table.



Dual Channel Thermo-chiller for Lasers *HRLE/HRL Series* p. 348, 384

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

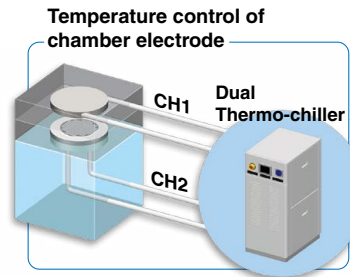


High-performance Type *HRZ-F/HRW Series* p. 432, 462



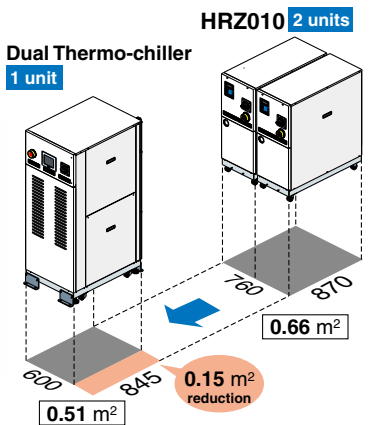
- Temperature stability $\pm 0.1^\circ\text{C}$, temperature range from -20°C to $+90^\circ\text{C}$. Full array of features and equipment.
- A double inverter type is also available, saving energy more effectively through use of a DC inverter compressor and an inverter pump.
- Circulating fluid: Fluorinated 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%**



Peltier-type Thermo-con Lineup

Thermo-con *HECR/HEC/HEF Series*

- Temperature stability: ± 0.01 to 0.03°C



Thermoelectric Bath *HEB Series* p. 566

- 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. 578

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



INR
Made to Order



How about reviewing your cooling methods and trying a thermo-chiller?

Makes cooling water easily available, anytime, anywhere.

When...

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

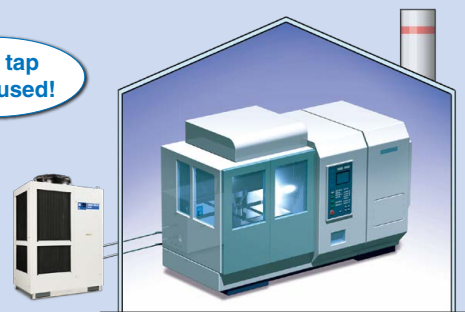


Even without a cooling tower,
an air-cooled refrigerated chiller
can be used to easily supply
cooling water.



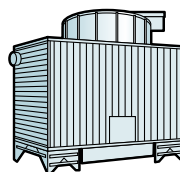
Dripping stops

Less tap
water used!

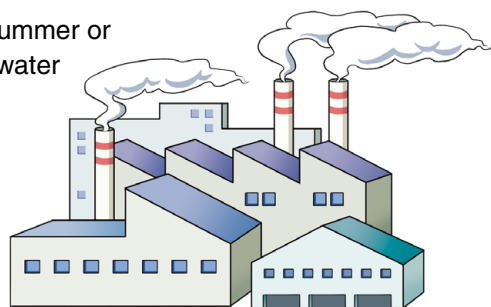


When...

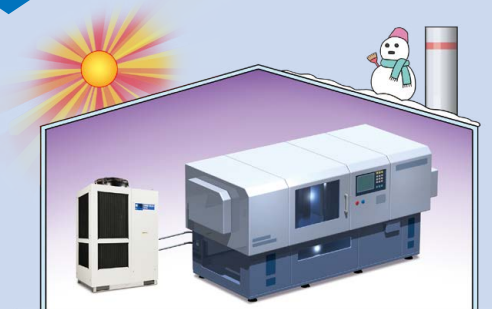
There is a cooling tower, but high temperatures in summer or
low (freezing) temperatures in winter make cooling water
temperatures unstable.



Cooling tower



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



Semiconductor

Etching

HEC	p. 518
HECR	p. 492
HRZ-F	p. 432
HRW	p. 462



CMP

HEC	p. 518
HECR	p. 492
HED	p. 578
HRZ-F	p. 432
HRW	p. 462



Coater/Developer

HEC	p. 518
HECR	p. 492
HRZ-F	p. 432
HRW	p. 462



Testers

HRS	p. 32
HRW	p. 462
HRSH	p. 310
HRZ-F	p. 432
HRR	p. 228



Cleaning machines

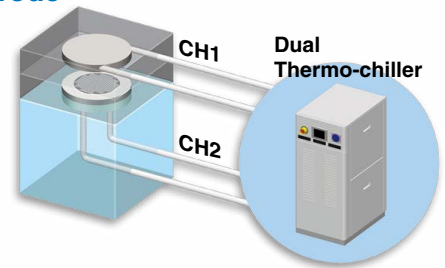
Temperature control of cleaning solution

HEC	p. 518
HECR	p. 492
HED	p. 578
HRS	p. 32
HRSH	p. 310



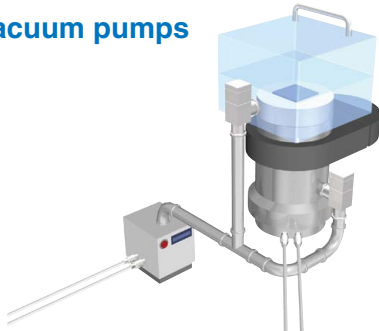
Temperature control of chamber electrode

HRW	p. 462
HRZ-F	p. 432



Cooling of vacuum pumps

HRS	p. 32
HRSH	p. 310



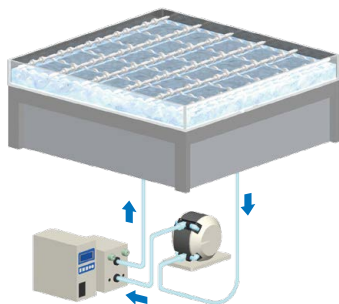
Gas cylinder cabinets

HRS	p. 32
HRSH	p. 310



Cleaning machines (Hydrocarbon-based)

HED	p. 578
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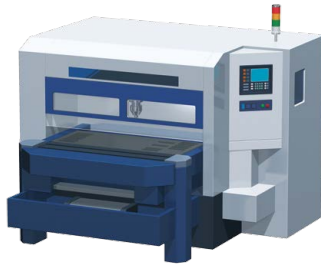


Laser

Laser beam machines/Laser welding machines

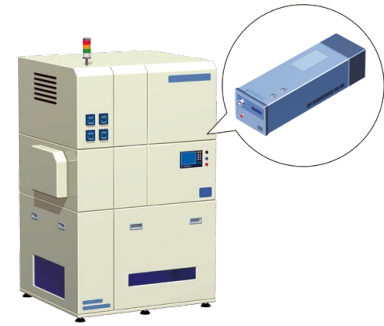
Cooling of the laser oscillation part and power source

HRS	p. 32
HRSH	p. 310
HRR	p. 228
HRL	p. 384
HRLE	p. 348



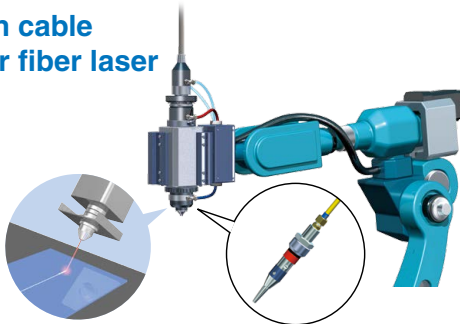
Laser oscillator

HEC	p. 518
HECR	p. 492
HEF	p. 552
HRS	p. 32
HRSH	p. 310
HRR	p. 228
HRL	p. 384
HRLE	p. 348



Transmission cable connector for fiber laser

HEC	p. 518
HECR	p. 492
HEF	p. 552
HRS	p. 32
HRR	p. 228
HRL	p. 384
HRLE	p. 348



Ultrasonic wave inspection machine

Temperature control of the ultrasonic wave laser part

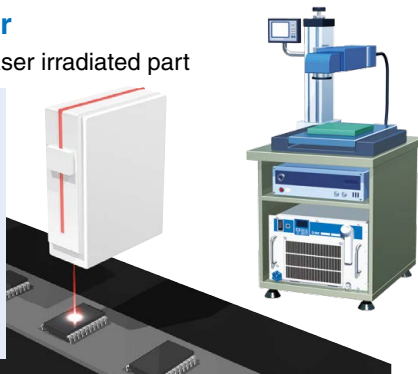
HEC	p. 518
HEF	p. 552
HRS	p. 32
HRR	p. 228
HRLE	p. 348



Laser marker

Cooling of the laser irradiated part

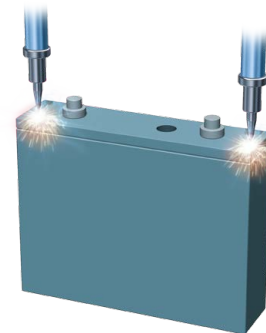
HEC	p. 518
HECR	p. 492
HEF	p. 552
HRS	p. 32
HRR	p. 228
HRL	p. 384
HRLE	p. 348



Secondary battery manufacturing processes

Laser welding and cutting

HRS	p. 32
HRSH	p. 310
HRR	p. 228
HRL	p. 384
HRLE	p. 348



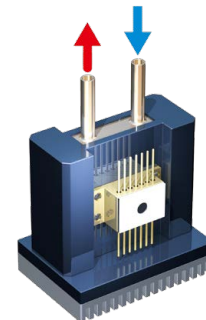
3D metal printers

HRS	p. 32
HRSH	p. 310
HRR	p. 228
HRL	p. 384
HRLE	p. 348



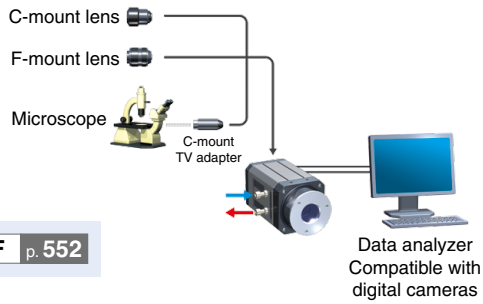
Cool diode laser

HEF	p. 552
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Laser

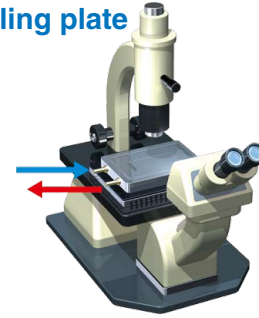
Cool optical camera



HEF p. 552

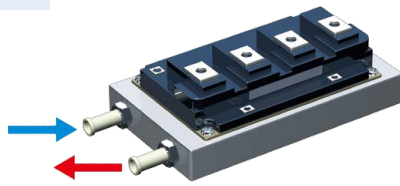
Microscope cooling plate

HEF p. 552



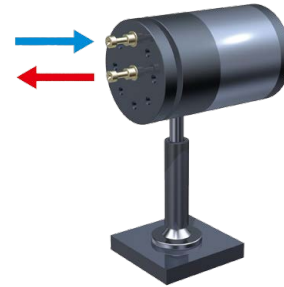
Power device

HEF p. 552



Beam bumper

HEF p. 552



Machine Tools

Machining centers

Cooling of the spindle

HRS p. 32

HRSH p. 310

HRS-R p. 180



Injection molding

HRS p. 32

HRSH p. 310



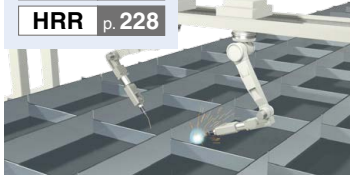
Welding Machines

Arc welding machines

Cooling of the torch

HRS p. 32

HRR p. 228



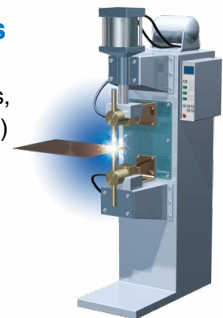
Resistance welding machines (spot welding)

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

HRS p. 32

HRSH p. 310

HRR p. 228



High-frequency induction heating equipment

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

HRS p. 32

HRSH p. 310

HRR p. 228

High-frequency inverter

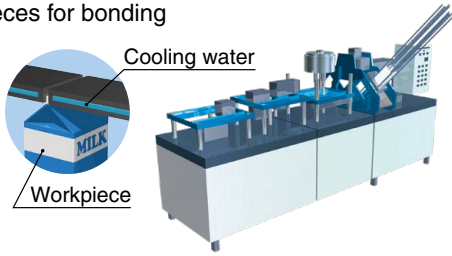


Food Products/Packaging Machines

Packaging lines (sealing of film and paper package)

Cooling of workpieces for bonding

HRS	p. 32
HRS-R	p. 180
HRSH	p. 310
HRR	p. 228



Atomizing devices (food and cosmetics)

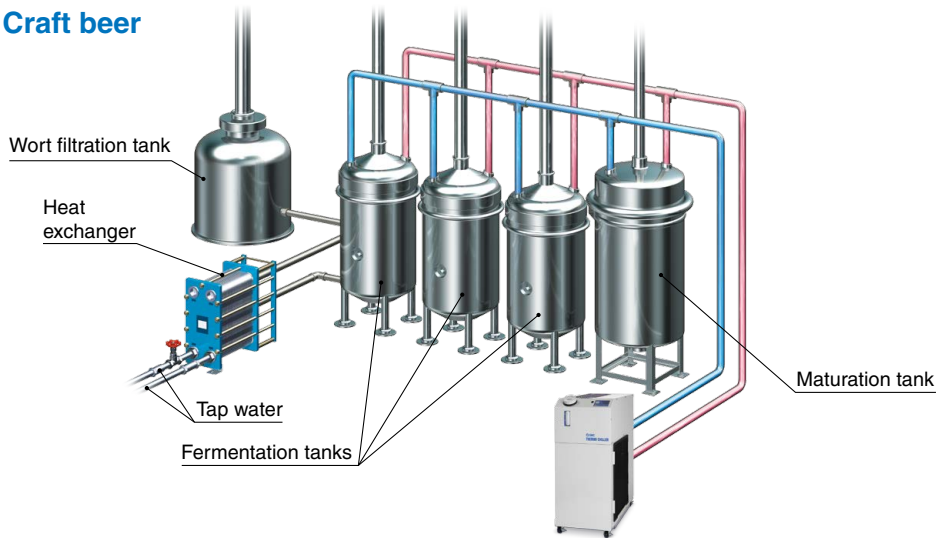
Temperature control of sample and device

HEC	p. 518
HECR	p. 492
HRS	p. 32
HRSH	p. 310
HRR	p. 228



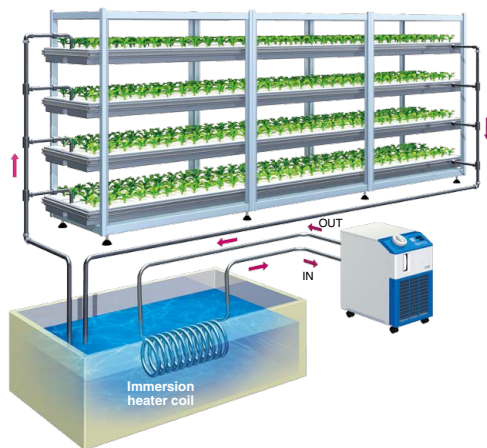
Beverages

Craft beer

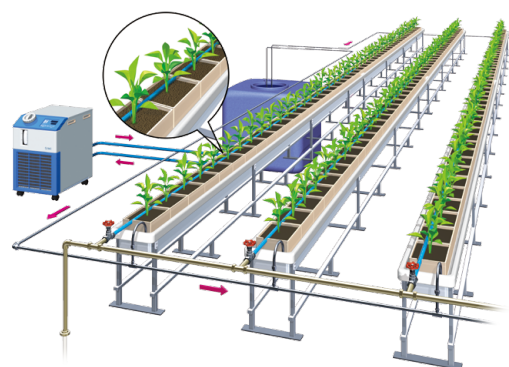


Plant Factory/Facility Cultivation

For the temperature control of nutrient solution in tanks



For the partial temperature control of cultivation areas



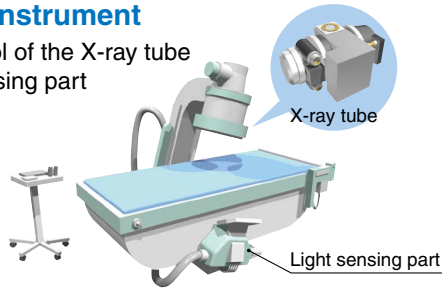
* Not a drip irrigation application

Medical

X-ray (digital) instrument

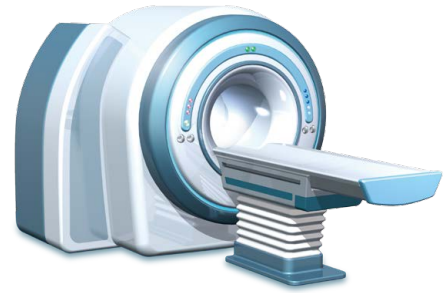
Temperature control of the X-ray tube and X-ray light sensing part

HEC	p. 518
HECR	p. 492
HRS	p. 32
HRR	p. 228



MRI

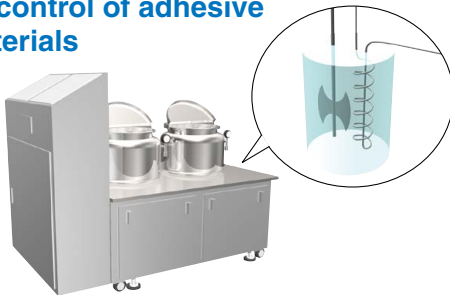
HRS	p. 32
HRR	p. 228



Physical and Chemical

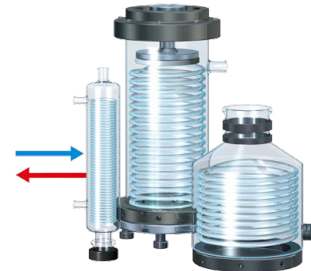
Temperature control of adhesive and paint materials

HEC	p. 518
HECR	p. 492
HEBC	p. 566
HRS	p. 32
HRSH	p. 310
HRR	p. 228



Cooling glass heat exchanger

HEF	p. 552
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Circulation between gas generation analyzer and jacketed vessel

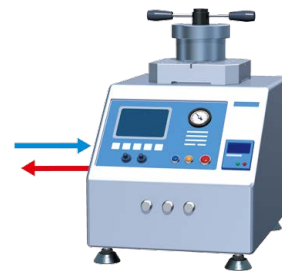
HEF	p. 552
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* Open bath type (Can be connected to a water tank, etc., and the temperature can be directly controlled.)

Cooling sample embedding machine

HEF	p. 552
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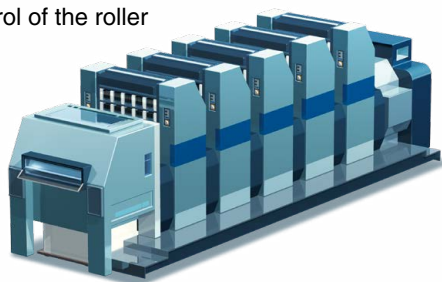


Printing

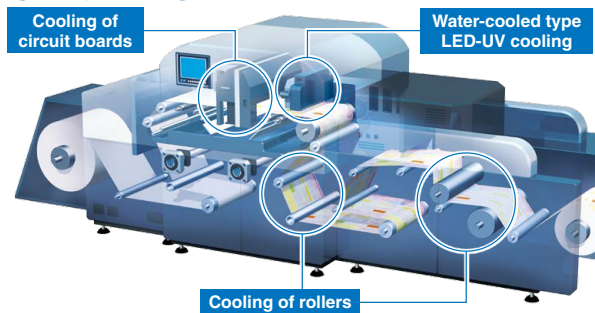
Printing machines

Temperature control of the roller

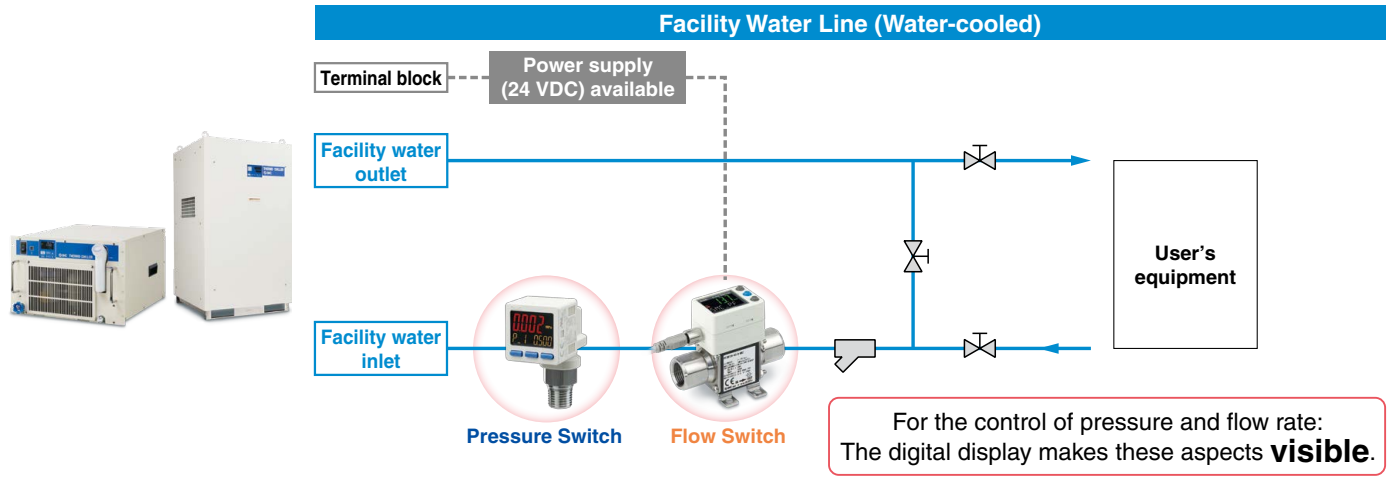
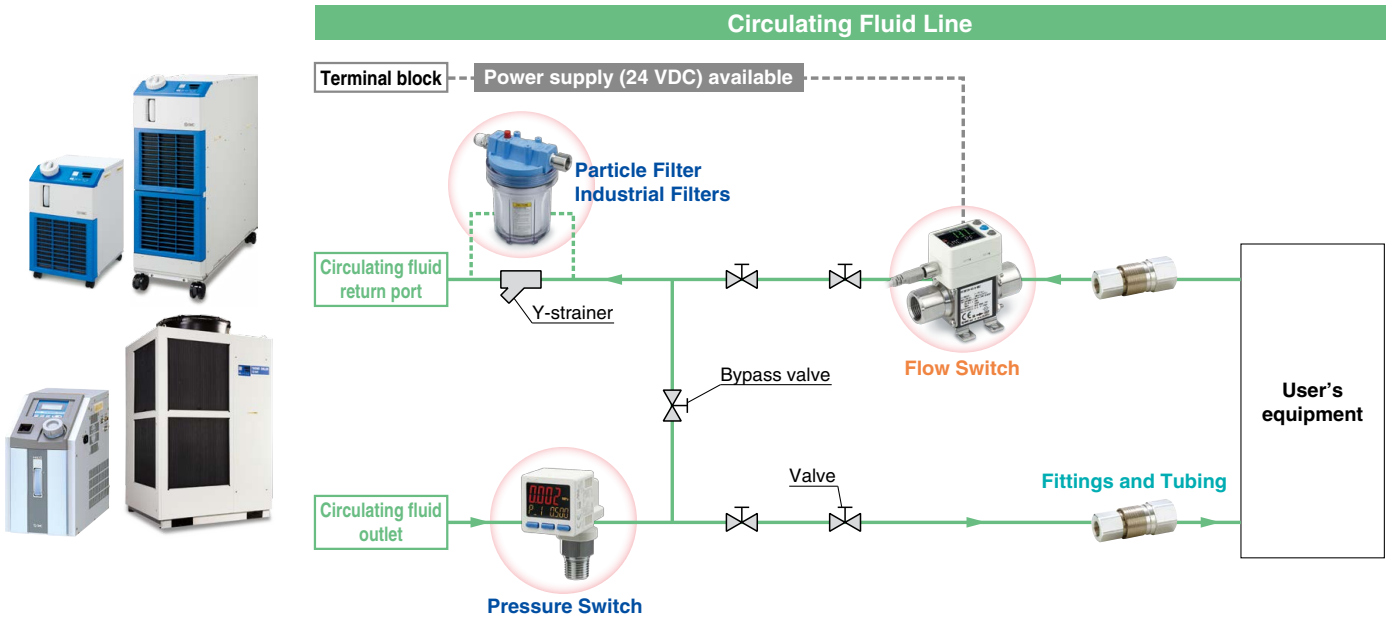
HRS	p. 32
HRSH	p. 310
HRR	p. 228



Digital printing machines



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



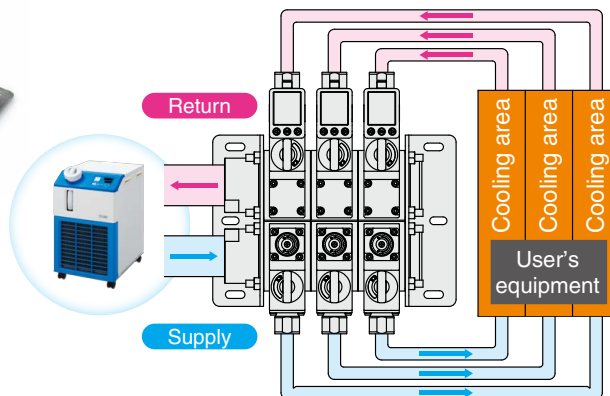
PVC piping

3-Color Display
Electromagnetic Digital Flow Switch

LFE



Manifold



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

3-Screen Display
High-Precision Digital Pressure Switch

ISE20C



Pressure Sensor for General Fluids **PSE56□**

Pressure Sensor Controller
PSE200A, 300A, 300AC



Particle Filter



Fittings

S Coupler

KK



S Coupler/Stainless Steel
(Stainless Steel 304)

KKA



Tubing **T□**



Metal One-touch Fittings

KQB2



Stainless Steel 316 One-touch Fittings

KQG2



Stainless Steel 316 Insert Fittings

KFG2



Fluoropolymer Fittings

LQ

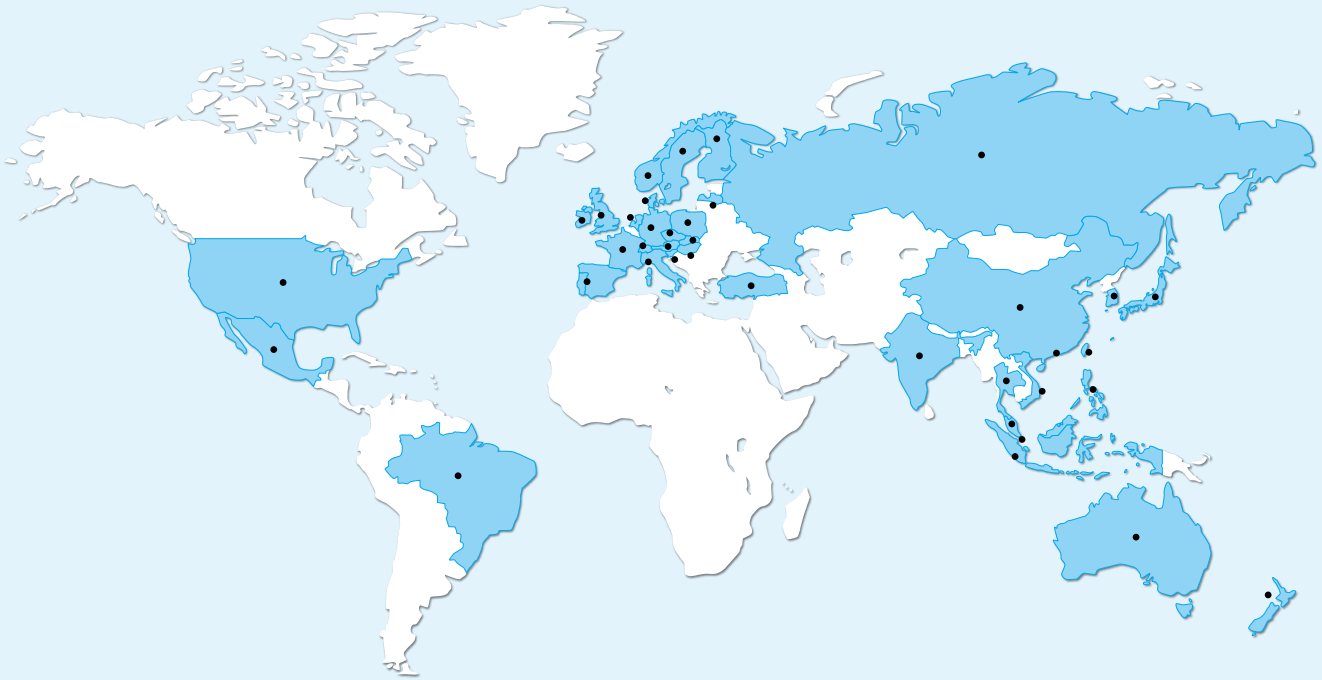


Series	Material
T	Nylon
TU	Polyurethane
TH	FEP (Fluoropolymer)
TD	Modified PTFE (Soft fluoropolymer)
TL	Super PFA
TLM	PFA

SMC's Global Maintenance Network

Thanks to a solid inventory of maintenance parts and an experienced chiller support team capable of conducting repairs and replacements, SMC is able to respond to customers' issues quickly and precisely.

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.



Americas	Europe		Asia and Oceania		
Brazil	Austria	Ireland	Slovakia	Australia	Malaysia
Mexico	Czech Republic	Italy	Slovenia	China	New Zealand
U.S.A.	Denmark	Latvia	Spain/Portugal	Hong Kong	Philippines
	Finland	Netherlands	Sweden	India	Singapore
	France	Norway	Switzerland	Indonesia	Taiwan
	Germany	Poland	Turkey	Japan	Thailand
	Hungary	Russia	U.K.	Korea	Vietnam

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