

Двухканальный стабилизатор температуры рефрижераторного типа

HRL

Предназначен для термоконтроля различного оборудования за счет теплового контакта с термостабилизированной циркулирующей жидкостью.

- Потребляемая мощность снижена на 30% благодаря тройному инверторному управлению насосом, компрессором и вентилятором
- Занимаемая площадь уменьшена на 22% (по сравнению с HRSH)
- Нагрев за счет тепла, отданного хладагентом
- Один стабилизатор регулирует температуру теплоносителя сразу по двум независимым каналам
- Управление обоими каналами по одному кабелю



Технические характеристики

Модель	HRL100-A		HRL200-A		HRL300-A		
	CH1*	CH2	CH1	CH2	CH1	CH2	
Способ охлаждения	Воздушный, рефрижераторного типа						
Хладагент	R410A (HFC)						
Количество хладагента в системе	1.4 кг		1.8 кг		2.5 кг		
Метод управления температурой	Автоматическое, PID-контроль						
Температура	Температура 2 ~ 45 °C						
Контур теплоносителя	Теплоноситель: CH1: водопроводная вода, деионизир. вода ⁶⁾ / CH2: водопроводная вода, деионизир. вода ¹⁾						
	Диапазон настройки температуры: CH1: 5 ~ 35 °C / CH2: 10 ~ 40 °C						
	Мощность охлаждения ²⁾		9 кВт	1 кВт ⁵⁾	19 кВт	1 кВт ⁵⁾	26 кВт
	Мощность нагрева ³⁾		1.5 кВт	1 кВт	4 кВт	1 кВт	6.0 кВт
	Точность поддержания температуры ⁴⁾ : CH1: ±0.1 °C / CH2: ±0.5 °C						
	Насос	Номинальный расход (выход), л/мин		45 (0.43 МПа)	10 (0.45 МПа)	45 (0.45 МПа)	10 (0.45 МПа)
		Максимальный расход, л/мин		120	16	130	16
		Максимальный напор насоса, м		50	49	55	49
	Диапазон настройки давления, МПа		0.10 ~ 0.50	0.10 ~ 0.49	0.10 ~ 0.55	0.10 ~ 0.49	0.10 ~ 0.68
	Минимальный расход, л/мин		20	2	25	2	40
	Емкость резервуара, л		42	7	42	7	60
	Байпасный трубопровод (с клапаном): Установлен						
	Настраиваемый диапазон удельной электропроводности теплоносителя, мкСм/см		0.5 ~ 0.45 ⁶⁾	0.5 ~ 0.45	0.5 ~ 0.45 ⁶⁾	0.5 ~ 0.45	0.5 ~ 0.45 ⁶⁾
	Номинальная толщина фильтрации, мкм: 5						
	Отверстие для выхода и возврата теплоносителя: CH1: Rc1 (опция F: G1, опция N: NPT1) / CH2: Rc1/2 (опция F: G1/2, опция N: NPT1/2)						
Дренажный порт резервуара: CH1: Rc3/4 (опция F: G3/4, опция N: NPT3/4) / CH2: Rc1/2 (опция F: G1/2, опция N: NPT1/2)							
Смазываемые поверхности: CH1: нерж. сталь, медный припой (теплообменник) ⁷⁾ , латунь, бронза, фтор-каучук, PP, PBT, POM, PU, PC, PVC, EPDM, NBR; CH2: нерж. сталь, алюмокерамика, углеродный материал, фтор-каучук, PP, PBT, POM, PU, PVC, PPS, AS, PS, EPDM, NBR, ионообменная смола							
Электрическое подключение	Напряжение питания: 3-фазн. 380 ~ 415 VAC (50 Гц) ±10% без продолжительных колебаний						
	Рекомендуемый дифф. автомат	Номинальный ток: 20 А		30 А		40 А	
	Чувствительность: 30 мА		8.5 А		15 А		
	Номинальный ток ⁴⁾ : 5.6 (5.9) кВт (кВА) ⁴⁾		9.4 (10.2)		12.3 (13)		
Потребляемая мощность, кВт (кВА) ⁴⁾		75 дБ		75 дБ		71 дБ	
Уровень шума ⁴⁾ : 75 дБ							
Принадлежности: Фильтр для CH1, фильтр для CH2, крепежные скобы для анкерных болтов 2 шт. (включая 6 болтов M8)							
Вес без теплоносителя		Около 240 кг		Около 260 кг		Около 330 кг	

* CH - канал.

1) Водопроводная вода: должна соответствовать требованиям Стандарта качества японской ассоциации промышленного охлаждения и кондиционирования (JRA GL-02-1994).

Деионизированная вода: электропроводность 1 мкСм/см или выше (удельное электрическое сопротивление 1 МОм·см или ниже).

2) Температура окр. среды 32 °C; теплоноситель - водопроводная вода; темп. теплоносителя: CH1 20 °C, CH2 25 °C; расход теплоносителя - номинальный; напряжение питания 400 VAC.

3) Температура окр. среды 32 °C; теплоноситель - водопроводная вода; расход теплоносителя - номинальный; напряжение питания 400 VAC.

4) Температура окр. среды 32 °C; теплоноситель - водопроводная вода; темп. теплоносителя: CH1 20 °C, CH2 25 °C; нагрузка: как для мощности охлаждения; расход теплоносителя - номинальный; напряжение питания 400 VAC; длина трубопровода - наименьшая.

5) Максимум 1.5 кВт. При мощности охлаждения 1.5 кВт охлаждающая способность CH1 уменьшается на 0.5 кВт.

6) Только при выборе опции D1 - Настраиваемый диапазон удельной электропроводности для обоих каналов.

7) Кроме исполнения с опцией D1.

Номер для заказа

HRL **100** - A **□** - 40 - **□**

1 2 3

1 Мощность охлаждения

	CH1	CH2
100	9 кВт	1 кВт
200	19 кВт	1 кВт
300	26 кВт	1 кВт

2 Присоединительная резьба

-	Rc
F	G (комплект переходников Rc-G)
N	NPT (комплект переходников Rc-NPT)

3 Настраиваемый диапазон удельной электропроводности

-	Только для канала CH2
D1	Для обоих каналов: CH1 и CH2

Circulating Fluid Temperature Controller

Thermo-chiller

Dual Channel Refrigerated Thermo-chiller for Lasers

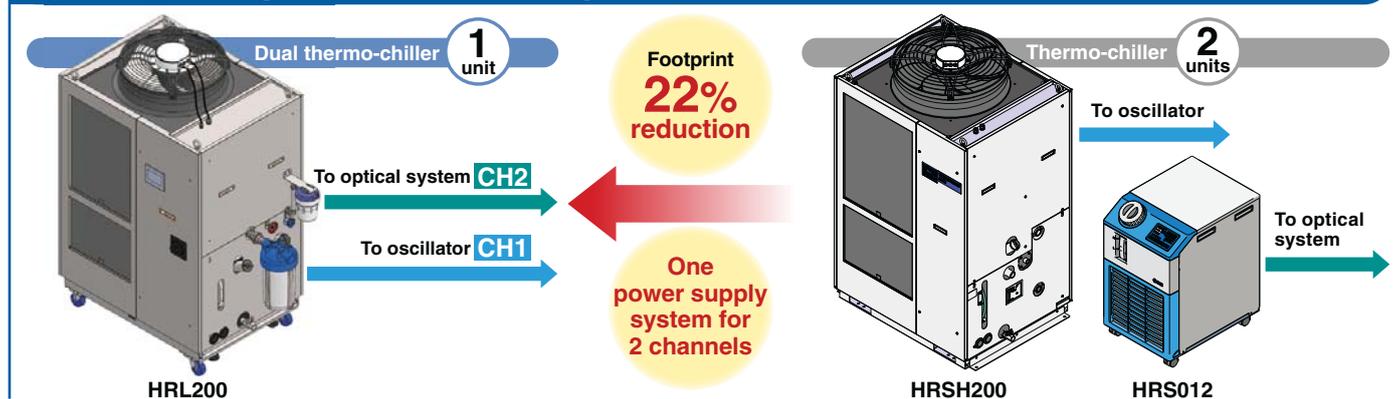
New



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



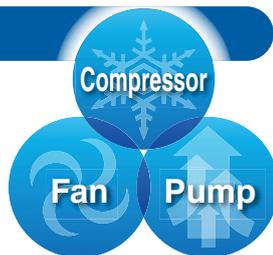
Space saving, Reduced wiring



Energy saving

Power consumption reduced by **30%**

1 compressor, 1 fan and 2 pumps are controlled by inverter.



Touch panel pp. 5, 15

- Numeric keypad inputs
- Notice for alarms and maintenance
- Temperature waveform can be displayed.



Numeric keypad display

HRL Series



CAT.ES40-68A

Space saving

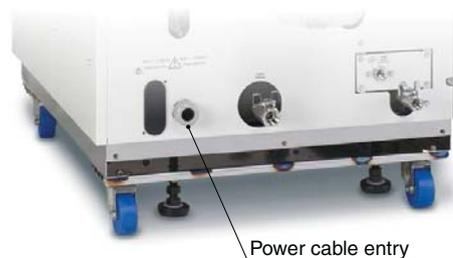
Keeping the size similar to the (HRS series) single chiller, the temperature of 2 fluid channel systems are controlled individually.



	[mm]		
	Height	Width	Depth
HRL100	1538	954	715
HRL200			
HRL300	1839	1079	850

Reduced wiring/labor

One power supply system for temperature control of 2 channels
 Less work-hour for wiring



Energy saving

Inverter control

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

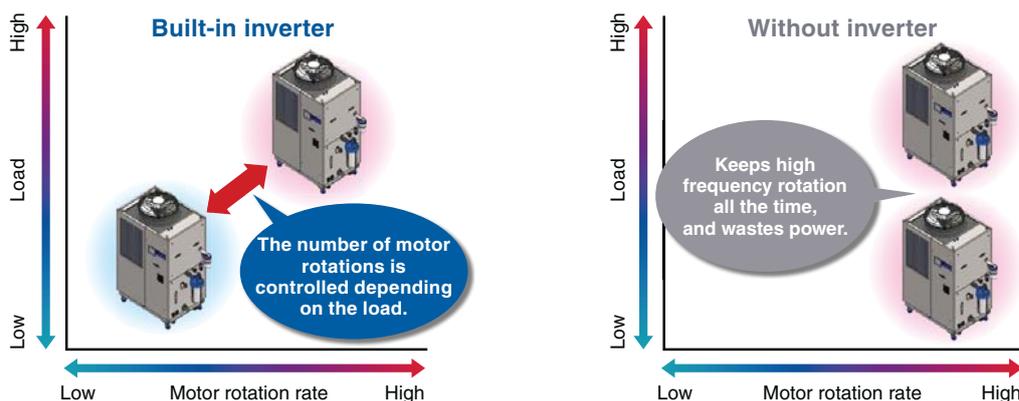
Power consumption reduced by 30%* compared with a thermo-chiller without the inverter

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

*1 For HRL300-A-20

Conditions

- Outdoor air temperature: 32°C
- Circulating fluid temperature setting: 20°C/25°C (CH1/CH2)
- Heat load in the user's equipment: 26 kW/1 kW (CH1/CH2)
- Power supply: 200 V, 60 Hz
- Circulating fluid flow rate: 125 LPM/10 LPM (CH1/CH2) to the user's equipment
- External piping: The shortest distance assumed to the user's equipment
- Values shown in the graph for a thermo-chiller without inverter are found by calculation based on an assumption that a thermo-chiller is operated with a general refrigerant circuit that controls the compressor by turning the power ON/OFF, and with a bypass to the circulating fluid circuit.

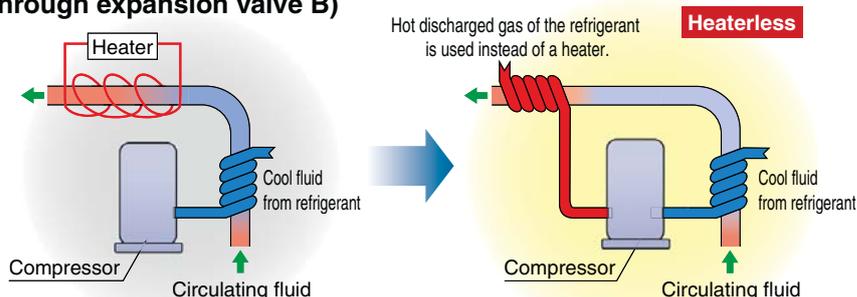


Circulating fluid can be heated without a heater.

(Circulates the hot discharged gas through expansion valve B)

Heaterless heating function

Hot discharge gas is recycled for heating.
 Energy saving by heaterless heating function

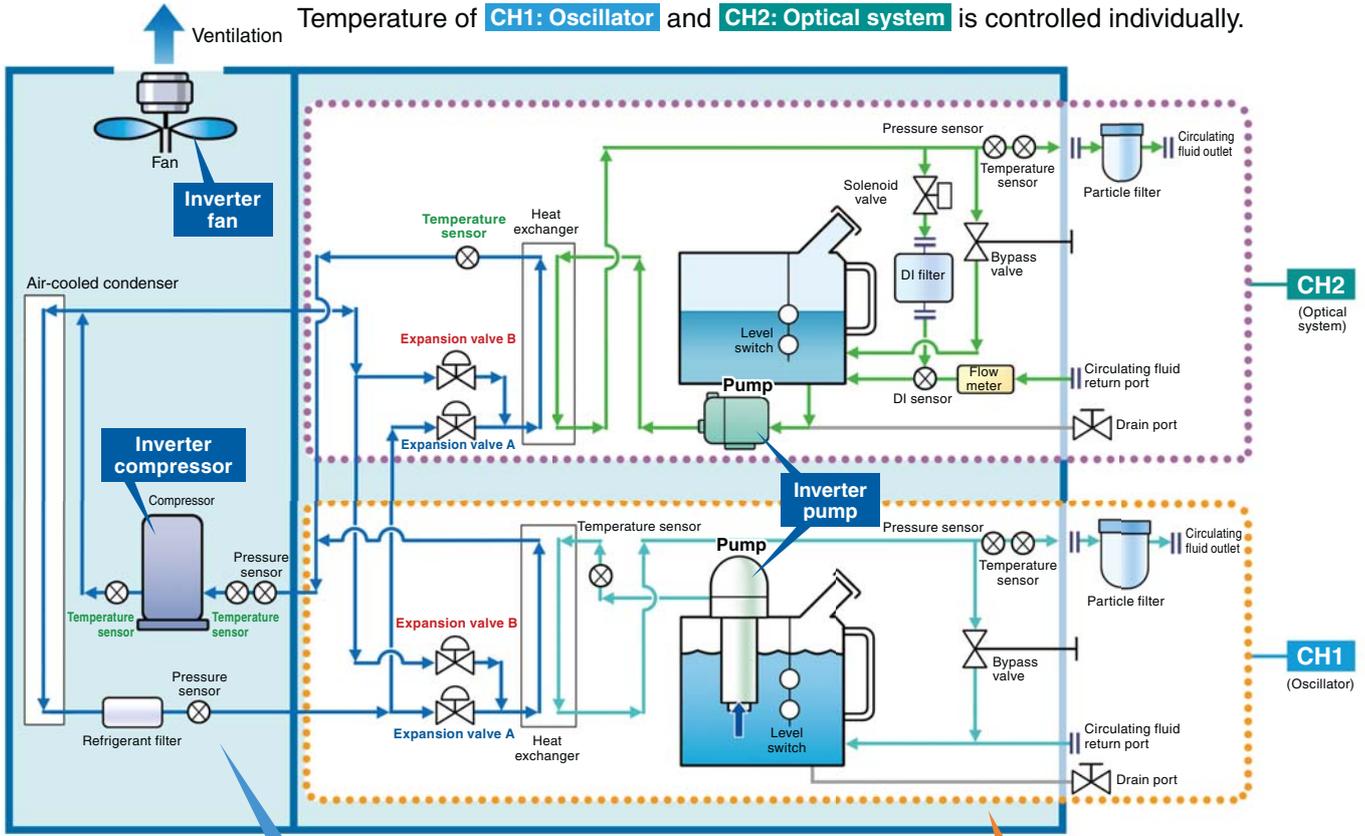


* This is just an example diagram. Existing model

HRL

One compressor controls 2 channels.

Temperature of **CH1: Oscillator** and **CH2: Optical system** is controlled individually.



Refrigeration circuit

- The inverter 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 inverter fan ventilation in the air-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 inverter 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 inverter control of the compressor and fan, and the precise control of expansion valves A and B realizes energy saving operation without waste and high temperature stability.

POINT One compressor controls 2 channels which realize the independent temperature control of 2 systems.

Circulating fluid circuit

- After the circulating fluid discharged from the inverter pump is heated or cooled by the user's equipment, it returns to the tank.
- The circulating fluid is sent to the evaporator by the inverter pump, and is controlled to a set temperature by the refrigeration circuit, to be discharged to the user's equipment side again by the thermo-chiller.

POINT Adjusting the discharge pressure by pump inverter control eliminates wasteful discharge of the circulating fluid and realizes energy saving operation.

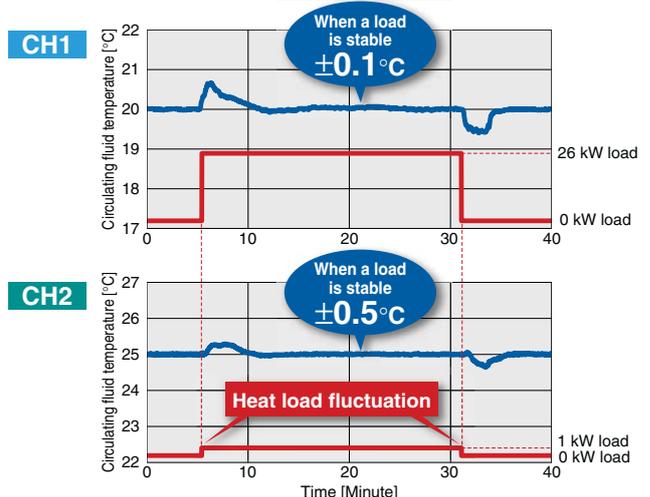
POINT Since the refrigeration circuit is controlled by the signals from 2 temperature sensors (for return and discharge), precise temperature control of the circulating fluid can be achieved. Therefore, there is no need for a tank with a large capacity to absorb the circulating fluid temperature difference,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

Temperature stability: $\pm 0.1^{\circ}\text{C}$ (CH1) When a load is stable

By controlling the inverter compressor, inverter fan, and electronic expansion valve simultaneously, it maintains the good temperature stability when the heat load fluctuates.

* For HRL300-A-20

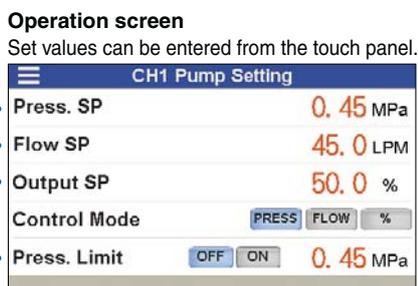
- Conditions**
- Outdoor air temperature: 32°C
 - Circulating fluid temperature setting: 20°C/25°C (CH1/CH2)
 - Heat load in the user's equipment: 26 kW/1 kW (CH1/CH2)
 - Power supply: 200 V 60 Hz
 - Circulating fluid flow rate: 125 LPM/10 LPM (CH1/CH2)
 - External piping: Bypass piping + Heat load



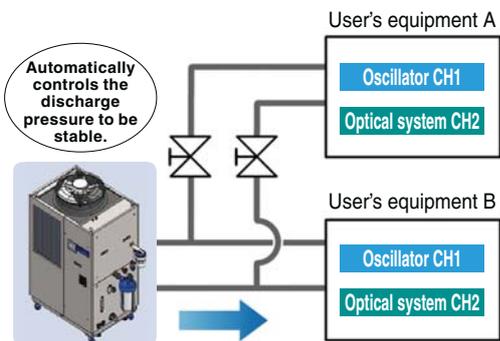
3 operation modes of the circulating fluid pump

The pump operation mode can be selected by the touch panel.

- ① Pressure control mode
 - ② Flow control mode
 - ③ Pump operating frequency (rotation) control mode
- Upper limit of the pressure can be set.



<Example of the pressure control mode>

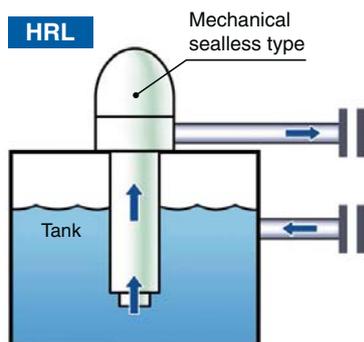


When the product is used with the flow path switched for maintenance, the pressure adjusting function controls the discharge pressure to be stable. (Secure the specified minimum flow for each branch circuit.)

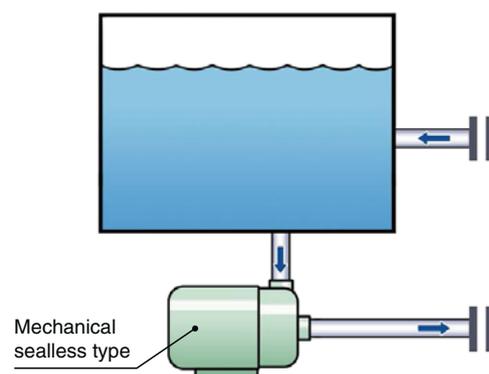
Reduced maintenance hours for the pump

Both channels use the mechanical sealless type pump.

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.



CH1: Vertical pump



CH2: Horizontal pump

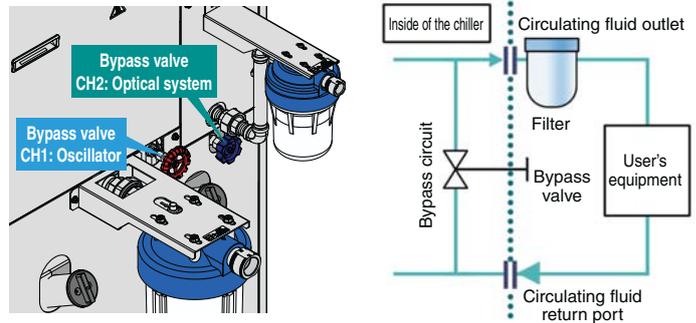
Variations

Model	Cooling method	Cooling capacity		Power supply	Function/Accessories
		CH1	CH2		
HRL100	Air-cooled refrigeration	9 kW	1 kW (Max. 1.5 kW)	3-phase 200 VAC (50 Hz) 3-phase 200 to 230 VAC (60 Hz)	<ul style="list-style-type: none"> · Built-in bypass circuit · Electric conductivity control (DI filter + Solenoid valve for control) · Particle filter · Casters and adjuster feet · Earth leakage breaker
HRL200		19 kW			
HRL300		26 kW			

Options in demand are standardized.



Built-in bypass circuit (CH1: Oscillator and CH2: Optical system) (Standard)



With electric conductivity control (CH2: Optical system)

DI filter + Built-in solenoid valve for control (Standard)
 The electric conductivity of the circulating fluid can be set with the touch panel arbitrarily.

Set control range: 0.5 to 45.0 $\mu\text{S}/\text{cm}$

CH2 DI Setting	
Electric Conductivity SP	25.0 $\mu\text{S}/\text{cm}$
Hysteresis	0.5 $\mu\text{S}/\text{cm}$
Control	AUTO OPEN CLOSE
High Electric Conductivity Alarm	OFF WRN 45.0 $\mu\text{S}/\text{cm}$
DI Valve Status	CLOSE

Set the electrical conductivity to be set by the touch panel.

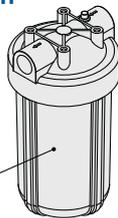
Particle filter set (Standard)

Removes foreign matter in the circulating fluid

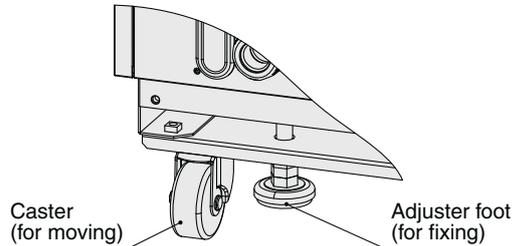
Effective in preventing foreign matter from entering the user's equipment

Transparent bowl

Easy to visually confirm a dirty element

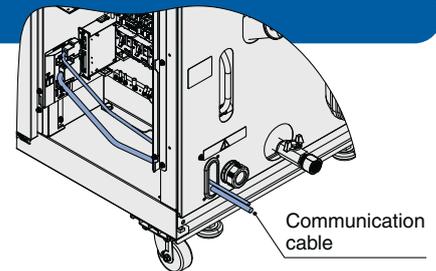


With casters and adjuster feet (Standard)



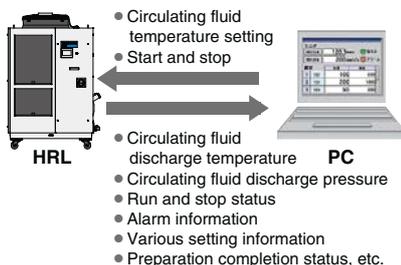
Communication functions p. 16

Serial communication (RS232C/RS485), contact I/Os (3 inputs and 6 outputs), and analog output (2 outputs) are equipped as standard. This allows for communication with the user's equipment and system construction, depending on the application. A 24 VDC output can be also provided and is available for use with flow switches (SMC's PF3W, etc.).



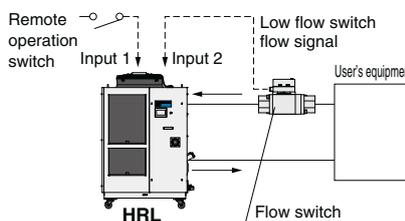
Ex. 1 Remote signal I/O through serial communication

Remote operation is enabled (to start and stop operation) through serial communication.



Ex. 2 Remote operation signal input

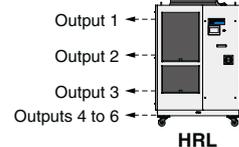
One of the contact inputs is used for remote operation and the other is used to monitor the flow of a flow switch. This is where their alarm outputs are taken in.



Power for flow switches (24 VDC) can be supplied by the thermo-chiller.

Ex. 3 Alarm and operation status (start, stop, etc.) signal output

The alarm and status generated in the product can be output.



Output examples

- Output 1 : Operation status (start, stop, etc.)
- Output 2 : Outputted when alarm "FLT (operation stopped)" is generated
- Output 3 : Outputted when alarm "WRN (operation continues)" is generated
- Outputs 4 to 6 : Assigned for specified type of signals

Touch panel p. 15

Improved usability and visibility

Home screen

Menu screen

- To status screen
- To information screen
- To check operation time screen
- To software version screen
- To temperature waveform display screen
- To home screen
- To CH1 setting screen
- To CH2 setting screen
- To function setting screen
- To communication setting screen

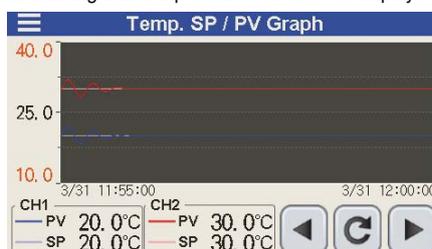
● Numeric keypad display

Numeric data input



● Temperature waveform display screen

Circulating fluid temperature waveform is displayed.



● Status screen

Provides details of the temperatures, flow rates, pressures and status in the chiller

■ "Sufficient" **Blue**
■ "Low" **Yellow**
■ "Insufficient" **Red**

When any alarm is generated, the screen automatically moves to the information screen and displays alarm codes and alarm contents.

● Information screen

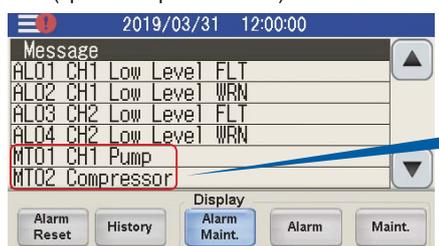


Alarm information details

Notice for maintenance is given when a part reaches its replacement period (operation time).

● Information screen

Message is displayed when the replacement time (specified operation time) comes.



Notice for maintenance

● Check operation time screen

		Run Time		
Pump	CH1	100 / 20000h	RESET	◀ Operating time for pump (CH1)
	CH2	100 / 20000h	RESET	◀ Operating time for pump (CH2)
Compressor		100 / 30000h	RESET	◀ Operating time for compressor
Fan		100 / 30000h	RESET	◀ Operating time of a fan
DI Filter		100 / 500h	RESET	◀ Usage time of a DI filter
Dustproof Filter		100 / 500h	RESET	◀ Usage time of a dustproof filter
Run Time		100h		◀ Operation time of a chiller

Global Supply Network

SMC has a comprehensive network in the global market.

We now have a presence of more than 500 branch offices and distributors in 83 countries and regions worldwide, such as Asia, Oceania, North/Central/South America, and Europe. With this global network, we are able to provide a global supply of our substantial range of products and high-quality customer service. We also provide full support to local factories, foreign manufacturing companies, and Japanese companies in each country.



SMC Thermo-chiller Variations

Lots of variations are available according to the users' requirements.

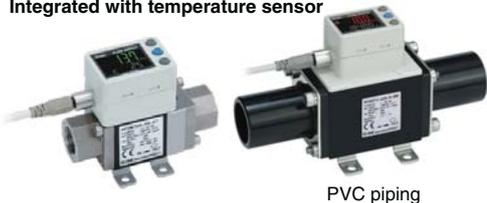
Series	Temperature stability [°C]	Set temperature range [°C]	Cooling capacity [kW]													Environment	International standards		
			1.2	1.8	2.4	3	4	5	6	9	10	15	20	25	28				
 HRSE Basic type	±2.0	10 to 30	●	● 1.6 kW	● 2.2 kW													Indoor use	CE (Only 230 VAC type)
 HRS Standard type	±0.1	5 to 40	●	●	●	●	●	●	●									Indoor use	CE MET (Only 60 Hz)
 HRS-R Environmentally resistant type	±0.1	5 to 40		●		●												Indoor use Electrical box: IP54	CE
 HRS090 Standard type	±0.5	5 to 35								●								Indoor use	CE (400 V as standard)
 HRS100/150 Standard type	±1.0	5 to 35								●	●							Outdoor installation IPX4	CE (400 V as standard)
 HRSH090 Inverter type	±0.1	5 to 40								●								Indoor use	CE (400 V as standard, 200 V as an option) MET (Only 200 V as an option)
 HRSH Inverter type	±0.1	5 to 35									●	●	●	●				Outdoor installation IPX4	CE (400 V as standard, 200 V as an option) MET (Only 200 V as an option)
 HRL Inverter dual type	CH1	±0.1	15 to 25							● 9 kW		● 19 kW	● 26 kW					Indoor use	CE
	CH2	±0.5	20 to 40							1.0 kW (Max. 1.5 kW)									

Circulating Fluid Line Equipment

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

Refer to the [Web Catalog](#) for details.

**3-Color Display
 Digital Flow Switch for Water** *PF3W*
 Integrated with temperature sensor



PVC piping

**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

Refer to the [Web Catalog](#) for details.

**2-Color Display
 High-Precision Digital
 Pressure Switch** *ISE80*



Pressure Sensor for General Fluids *PSE56□*
Pressure Sensor Controller *PSE200, 300, 300AC*



Fittings and Tubing

Refer to the [Web Catalog](#) for details.

S Coupler *KK*



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



Tubing *T□*



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

Metal One-touch Fittings *KQB2*



**Stainless Steel 316
 One-touch Fittings** *KQG2*



Stainless Steel 316 Insert Fittings *KFG2*



Fluoropolymer Fittings *LQ*



Thermo-chiller



Dual Channel Refrigerated Thermo-chiller for Lasers

3-phase 380 to 415 VAC (50/60 Hz)
3-phase 460 to 480 VAC (60 Hz)



RoHS

How to Order

HRL 100 - A - 40 -

Cooling capacity

	CH1	CH2
100	9 kW	1 kW
200	19 kW	1 kW
300	26 kW	1 kW

Cooling method

A	Air-cooled refrigeration
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Pipe thread type

Nil	Rc
F	G (with Rc-G conversion fitting)
N	NPT (with Rc-NPT conversion fitting)

DI option

Nil	CH2 With electric conductivity control
D1	CH1, CH2 With electric conductivity control

Power supply

40	3-phase 380 to 415 VAC (50/60 Hz) 3-phase 460 to 480 VAC (60 Hz)
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Specifications

Model	HRL100-A□-40		HRL200-A□-40		HRL300-A□-40		
	CH1	CH2	CH1	CH2	CH1	CH2	
Cooling method	Air-cooled refrigeration						
Refrigerant	R410A (HFC)						
Refrigerant charge kg	1.4		1.8		2.5		
Control method	PID control						
Ambient temperature °C	2 to 45						
Circulating fluid	CH1: Tap water*1, Deionized water*9/CH2: Tap water*1, Deionized water						
Set temperature range °C	CH1: 5 to 35/CH2: 10 to 40						
Cooling capacity *2 kW	9	1*8	19	1*8	26	1*8	
Heating capacity *3 kW	1.5	1	4.0	1	6.0	1	
Temperature stability *4 °C	CH1: ±0.1/CH2: ±0.5						
Pump capacity	Rated flow (Outlet pressure) L/min	45 (0.43 MPa)	10 (0.45 MPa)	45 (0.45 MPa)	10 (0.45 MPa)	125 (0.45 MPa)	10 (0.45 MPa)
	Maximum flow rate L/min	120	16	130	16	180	16
	Maximum pump head m	50	49	55	49	68	49
Settable pressure range *5 MPa	0.10 to 0.50	0.10 to 0.49	0.10 to 0.55	0.10 to 0.49	0.10 to 0.68	0.10 to 0.49	
Minimum operating flow rate *6 L/min	20	2	25	2	40	2	
Tank capacity L	42	7	42	7	60	7	
Bypass circuit (With valve)	Installed						
Electric conductivity setting range μS/cm	0.5 to 45*9	0.5 to 45	0.5 to 45*9	0.5 to 45	0.5 to 45*9	0.5 to 45	
Particle filter nominal filtration rating (Accessory) μm	5	5	5	5	5	5	
Circulating fluid outlet, circulating fluid return port	CH1: Rc1 (Symbol F: G1, Symbol N: NPT1)/CH2: Rc1/2 (Symbol F: G1/2, Symbol N: NPT1/2)						
Tank drain port	CH1: Rc3/4 (Symbol F: G3/4, Symbol N: NPT3/4)/CH2: Rc1/2 (Symbol F: G1/2, Symbol N: NPT1/2)						
Fluid contact material	CH1: Stainless steel, Copper (Heat exchanger brazing)*10, Brass*10, Fluororesin, PP, PBT, POM, PU, PC, PVC, EPDM, NBR, Ion replacement resin*9 CH2: Stainless steel, Alumina ceramic, Carbon, Fluororesin, PP, PBT, POM, PU, PVC, PPS, AS, PS, EPDM, NBR, Ion replacement resin						
Power supply	3-phase 380 to 415 VAC (50/60 Hz) Allowable voltage range ±10% (No continuous voltage fluctuation) 3-phase 460 to 480 VAC (60 Hz) Allowable voltage range +4%, -10% (Max. voltage less than 500 V and no continuous voltage fluctuation)						
Earth leakage breaker	Rated current A	20	30	40			
	Sensitivity current mA		30				
	Rated operating current*4 A	8.5	15	19			
Rated power consumption *4 kW(kVA)	5.6 (5.9)		9.4 (10.2)		12.3 (13.0)		
Noise level (Front 1 m/Height 1 m) *4 dB(A)	75		75		71		
Accessories	Operation Manual (for installation/operation) 2 pcs. (English 1 pc./Japanese 1 pc.), Particle filter set for CH1, Particle filter set for CH2, Anchor bolt fixing brackets 2 pcs. (including 6 M8 bolts)*7						
Weight (dry state) *11 kg	Approx. 240		Approx. 260		Approx. 330		

*1 Use fluid in condition below as the circulating fluid.
Tap water: Standard of The Japan Refrigeration and Air Conditioning Industry Association (JRA GL-02-1994)
*2 ① Ambient temperature: 32°C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: CH1 20°C/CH2 25°C, ④ Circulating fluid flow rate: Rated flow, ⑤ Power supply: 400 VAC
*3 ① Ambient temperature: 32°C, ② Circulating fluid: Tap water, ③ Circulating fluid flow rate: Rated flow, ④ Power supply: 400 VAC
*4 ① Ambient temperature: 32°C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: CH1 20°C/CH2 25°C, ④ Load: Same as the cooling capacity, ⑤ Circulating fluid flow rate: Rated flow, ⑥ Power supply: 400 VAC, ⑦ Piping length: Shortest

*5 With the pressure control mode by inverter. If the pressure control mode is not necessary, use the flow control function or the pump output setting function.
*6 Fluid flow rate to maintain the cooling capacity. If the actual flow rate is lower than this, adjust the bypass valve.
*7 The anchor bolt fixing brackets (including 6 M8 bolts) are used for fixing to wooden skids when packaging the thermo-chiller. No anchor bolt is included.
*8 Max. 1.5 kW. When 1.5 kW is applied, the cooling capacity of CH1 decreases by 0.5 kW.
*9 For Option D1 (With electric conductivity control) only
*10 Not included for Option D1 (With electric conductivity control)
*11 The product weight increases by 1 kg for Option D1 (With electric conductivity control).

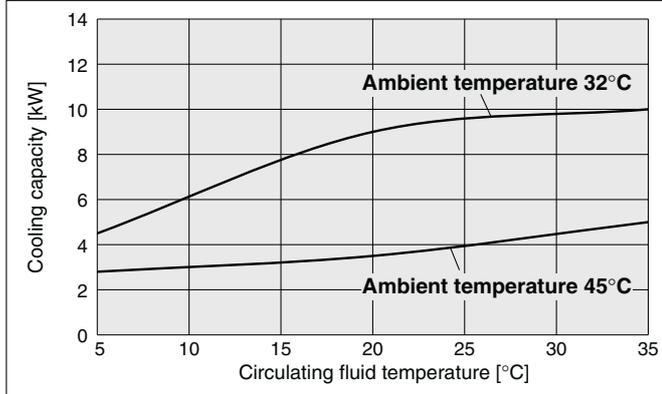
HRL Series



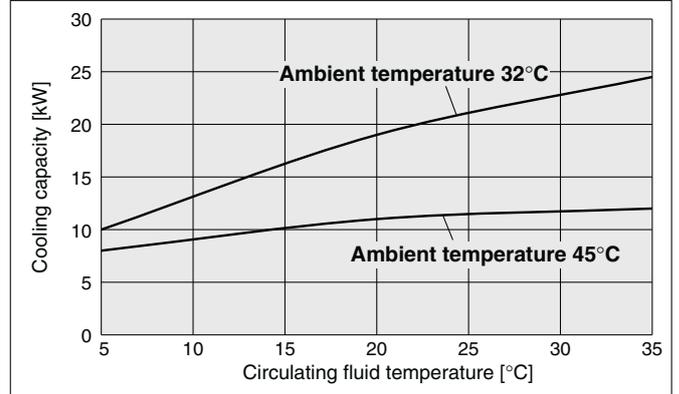
Cooling Capacity

*1 This is the cooling capacity of the CH1 side when 1 kW heat load is applied to the CH2 side.
 *2 Max. 1.5 kW. When 1.5 kW is applied, the cooling capacity of CH1 decreases by 0.5 kW.

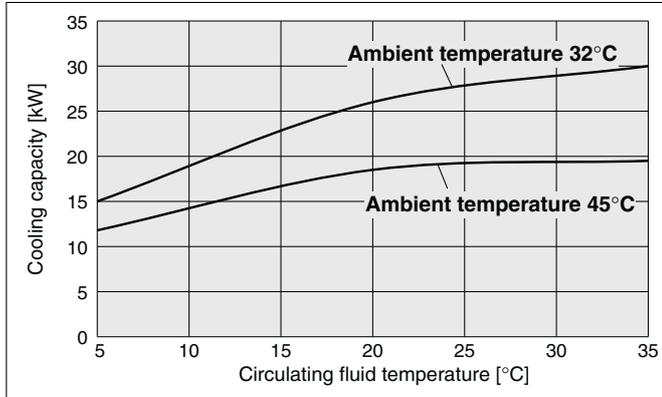
HRL100-A□-40 (CH1)*1



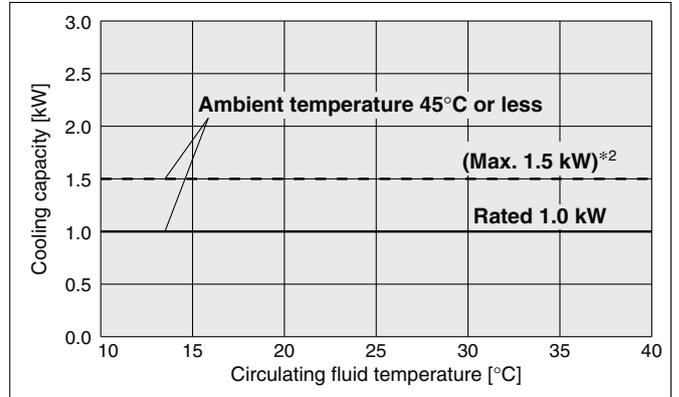
HRL200-A□-40 (CH1)*1



HRL300-A□-40 (CH1)*1

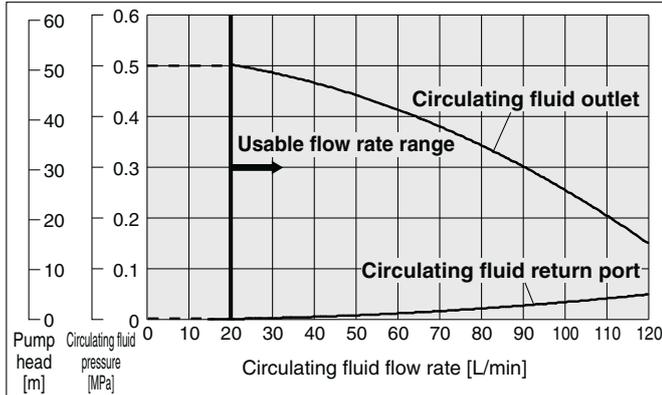


HRL100/200/300-A□-40 (CH2)*2

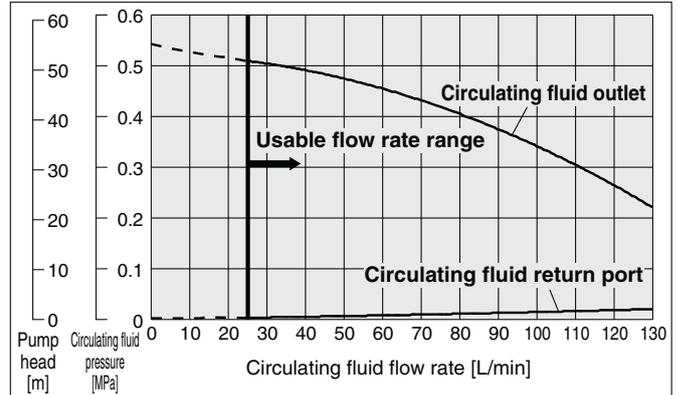


Pump Capacity

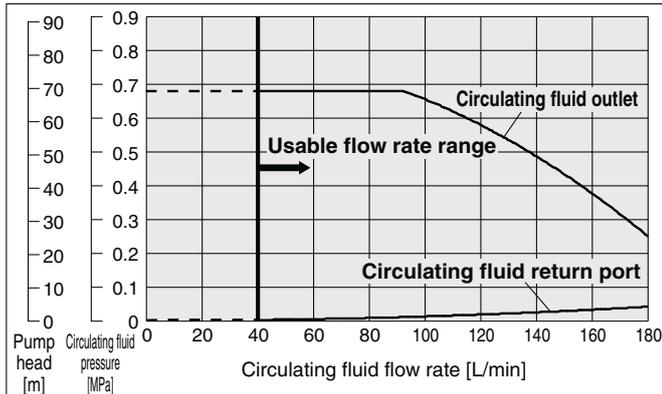
HRL100-A□-40 (CH1)



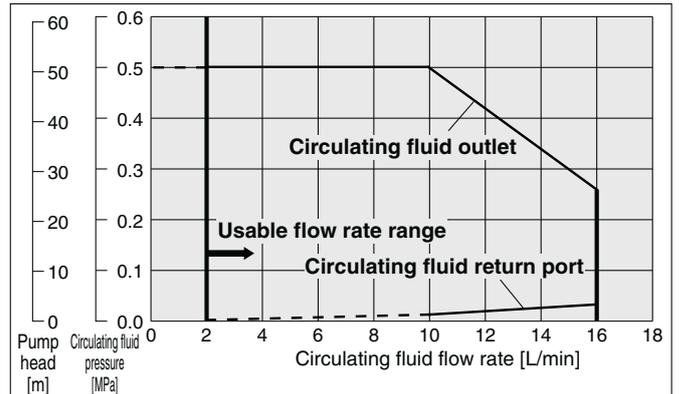
HRL200-A□-40 (CH1)



HRL300-A□-40 (CH1)

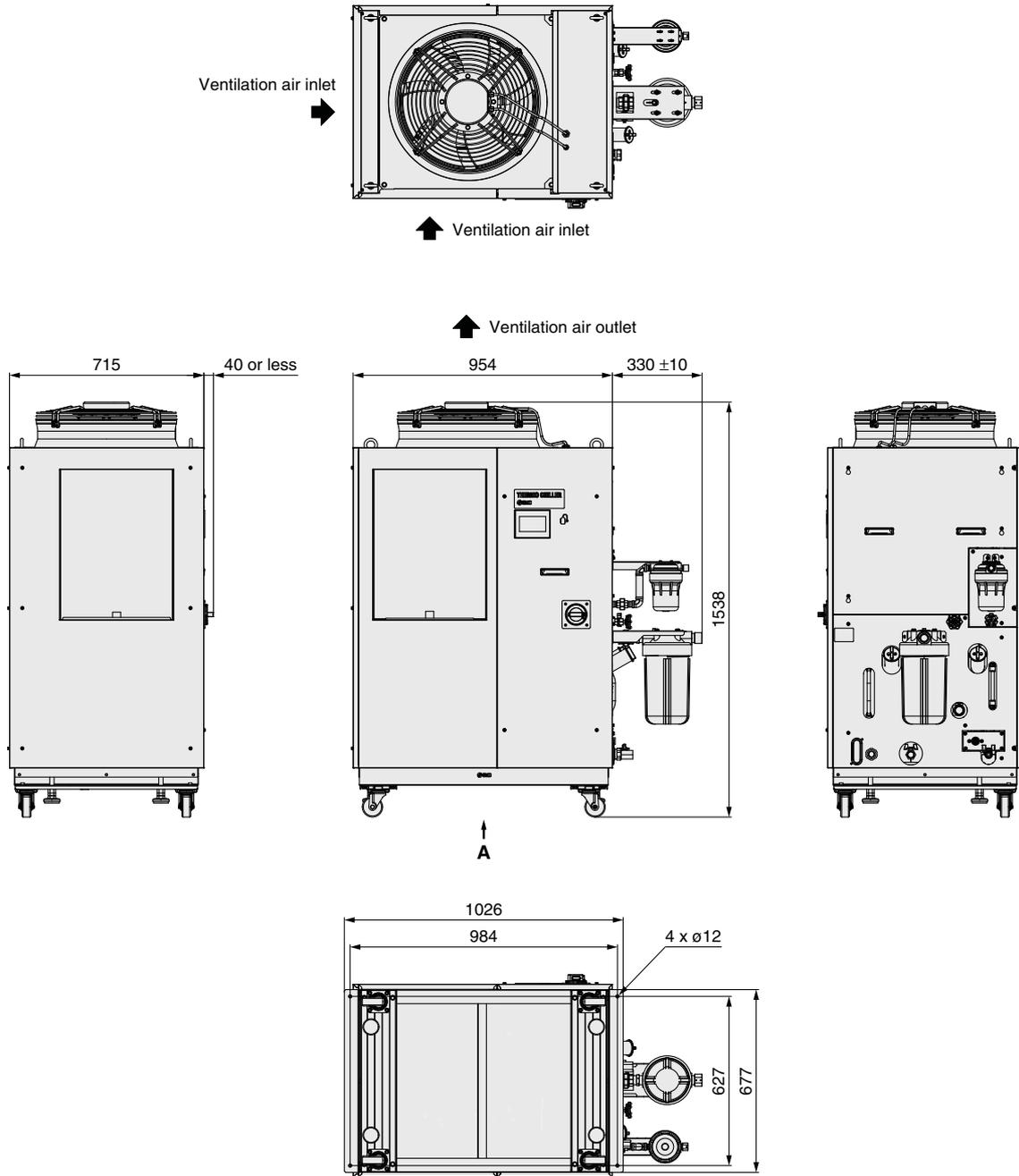


HRL100/200/300-A□-40 (CH2)



Dimensions

HRL100-A□-40

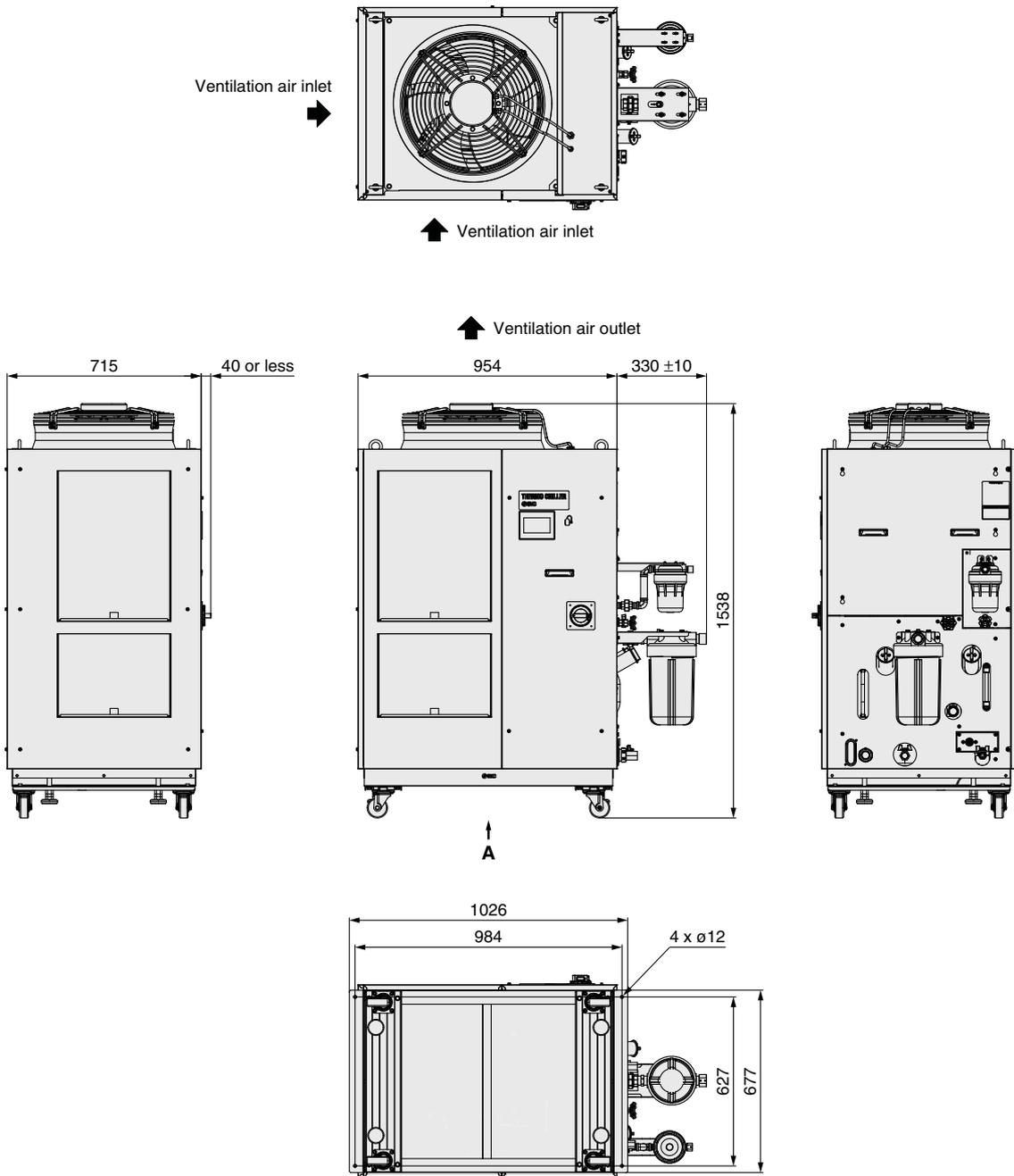


Anchor bolt mounting position (View A)

For piping port sizes, refer to the "Parts Description" on page 5.

Dimensions

HRL200-A□-40

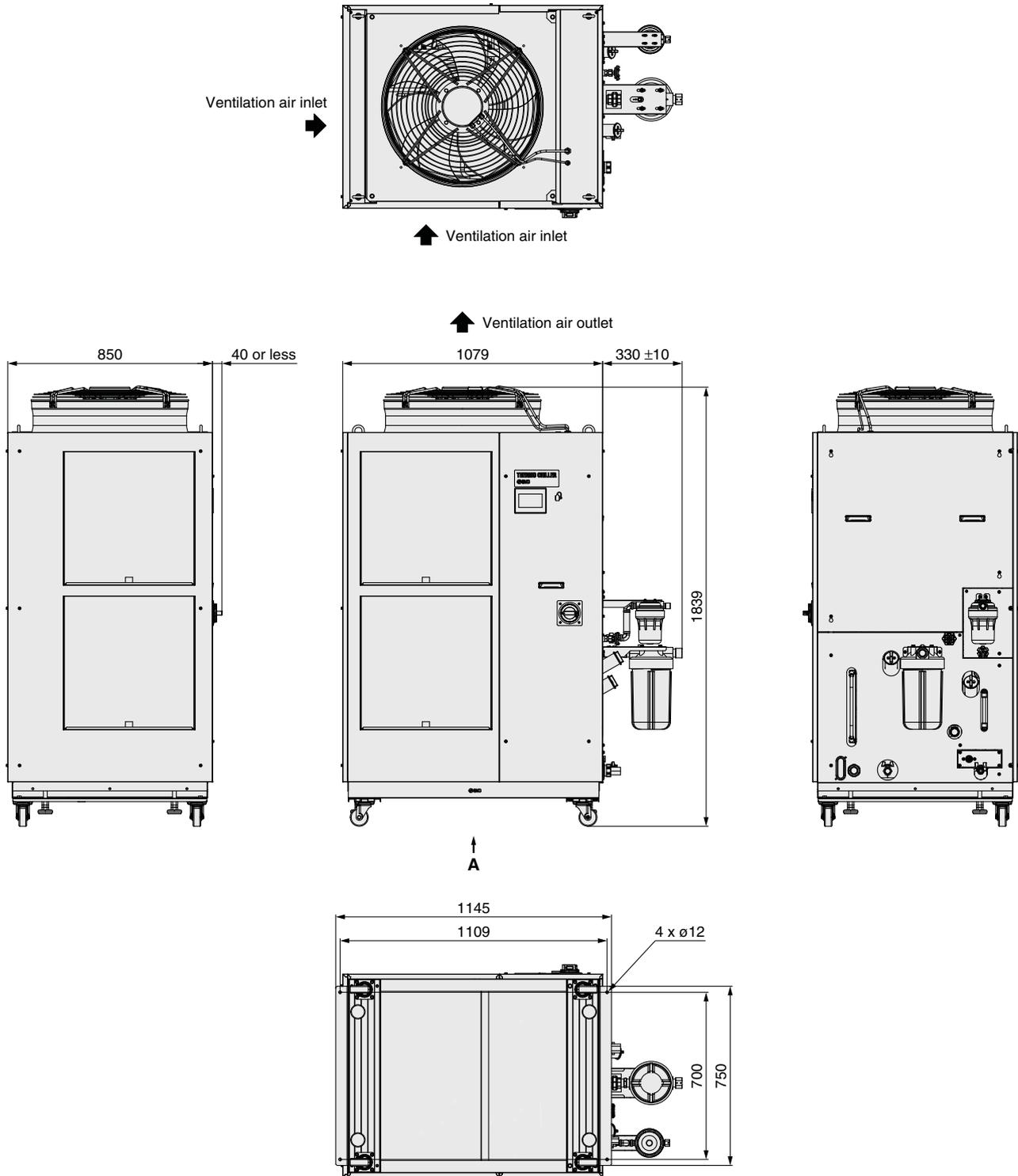


Anchor bolt mounting position (View A)

For piping port sizes, refer to the "Parts Description" on page 5.

Dimensions

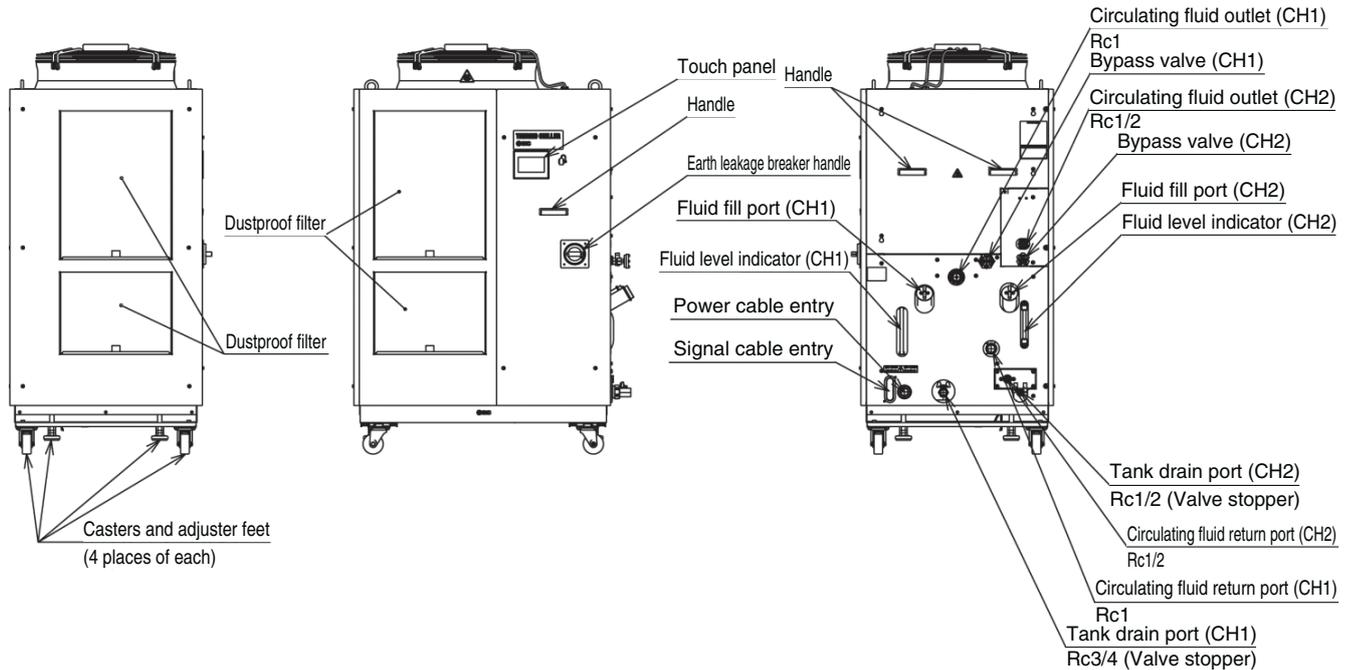
HRL300-A□-40



Anchor bolt mounting position (View A)

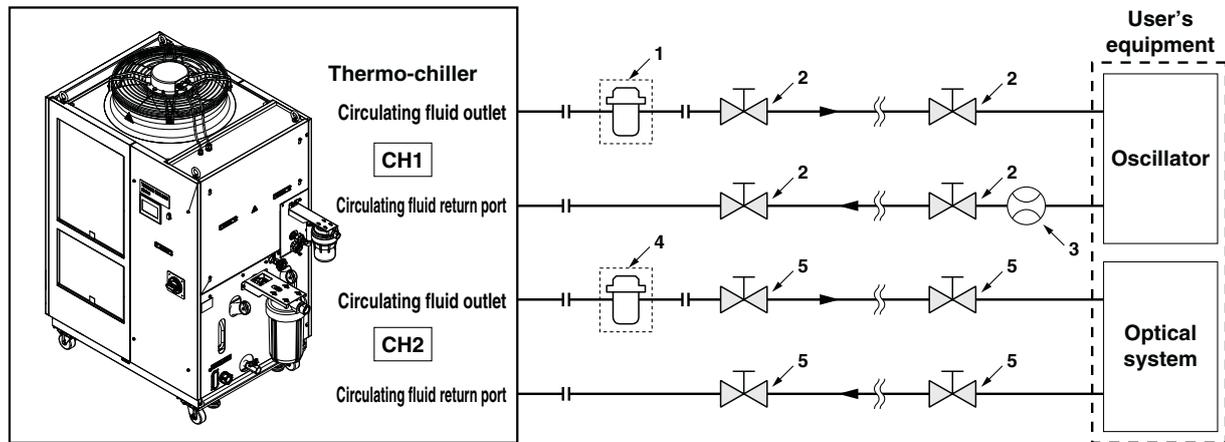
For piping port sizes, refer to the "Parts Description" on page 5.

Parts Description



Recommended External Piping Flow

External piping circuit is recommended as shown below.



No.	Description	Size	Recommended part no.	Note
1	Contaminant filter	Rc1 (5 μm)	Accessory	The value in () shows the nominal filtration accuracy.
2	Valve	Rc1	—	—
3	Flow meter	Rc1	—	Prepare a flow meter with an appropriate range.
4	Contaminant filter	Rc1/2 (5 μm)	Accessory	The value in () shows the nominal filtration accuracy.
5	Valve	Rc1/2	—	—

Cable Specifications

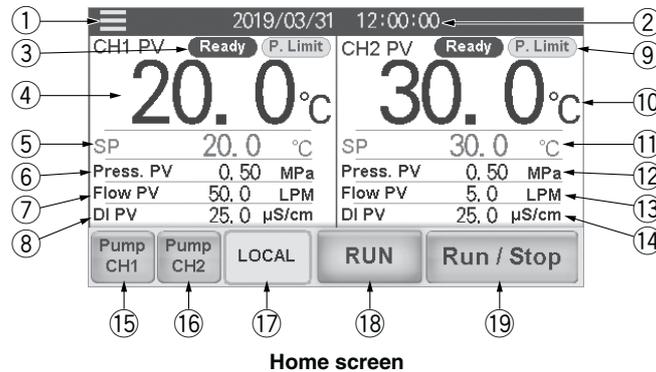
Power Supply Cable and Earth Leakage Breaker (Recommended)

Model	Power supply voltage specifications	Terminal block screw diameter	Recommended crimped terminal	Cable specifications*1	Earth leakage breaker	
					Breaker size [A]	Sensitivity current [mA]
HRL100-A□-40	3-phase 380 to 415 VAC (50/60 Hz) 3-phase 460 to 480 VAC (60 Hz)	M5	R5.5-5	4 cores x 5.5 mm ² (4 cores x AWG 10) * Including grounding cable	20	30
HRL200-A□-40					30	
HRL300-A□-40			R8-5	4 cores x 8 mm ² (4 cores x AWG 8) * Including grounding cable	40	

*1 An example of the cable specifications is when two kinds of vinyl insulated wires with a continuous allowable operating temperature of 70°C at 600 V, are used at an ambient temperature of 30°C. Select the proper size of cable according to an actual condition.

Operation Display Panel

Items displayed on the home screen and setting items are shown in List of check items in inspection monitor menu.



List of Check Items in Inspection Monitor Menu

No.	CH no.	Item	Explanation
①	Common	Menu key	Touch the key to display the menu.
②		Date and time display	Displays the date and time. Press the numeric section to set the date and time.
③	CH1	Operating condition display	Displays TEMP READY status. Displays the control status of the circulating fluid pressure.
④		Circulating fluid present temperature	Displays the current temperature of circulating fluid.
⑤		Circulating fluid set temperature	It indicates the set temperature. Press the numeric section to change the set temperature
⑥		Circulating fluid discharge pressure	It indicates the discharge pressure.
⑦		Circulating fluid flow rate	It indicates the fluid flow rate. This value is not measured by a flow meter. It should be used as a reference value (rough indication). It includes the flow rate in the bypass circuit.
⑧	CH2	Circulating fluid electric conductivity	It indicates the electric conductivity.*1
⑨		Operating condition display	Displays TEMP READY status. Displays the control status of the circulating fluid pressure.
⑩		Circulating fluid present temperature	Displays the circulating fluid temperature.
⑪		Circulating fluid set temperature	It indicates the set temperature. Press the numeric section to change the set temperature.
⑫		Circulating fluid discharge pressure	It indicates the discharge pressure.
⑬	CH1	Circulating fluid flow rate	It indicates the flow rate measured by a flow meter. It does not include the flow rate in the bypass circuit.
⑭		Circulating fluid electric conductivity	It indicates the electric conductivity.
⑮	CH1	Independent pump operation	CH1 pump operates independently while the button is pressed.
⑯	CH2	Independent pump operation	CH2 pump operates independently while the button is pressed.
⑰	Common	Operation mode	To select a operation mode from the touch panel (LOCAL mode), contact input (DIO mode), or serial communication (SERIAL mode).
⑱		Operating condition display	It indicates the run and stop status of the product.
⑲		Run/Stop	To run/stop the product

*1 Displayed for Option D1 (CH1 With electric conductivity control)

Alarm

This unit displays 39 types of alarms.

Alarm No.	Indication	Explanation	Alarm No.	Indication	Explanation
AL01	CH1 Low Level FLT	CH1 abnormal low tank fluid level	AL24	CH2 Low Press.	CH2 circulating fluid discharge pressure drop
AL02	CH1 Low Level WRN	CH1 low tank fluid level	AL25	CH2 Low Press. Error	CH2 abnormal drop in circulating fluid discharge pressure
AL03	CH2 Low Level FLT	CH2 abnormal low tank fluid level	AL26	CH2 Flow Sensor	CH2 failure of circulating fluid discharge flow sensor
AL04	CH2 Low Level WRN	CH2 low tank fluid level	AL27	CH2 High Electric Conductivity	CH2 electric conductivity increase
AL06	Fan Inverter	Fan failure	AL28	CH1 High Electric Conductivity	CH2 electric conductivity increase (Option D1 only)
AL09	CH1 High Temp. FLT	CH1 abnormal rise of circulating fluid temperature	AL30	Digital Input 1	Contact input 1 signal detection
AL10	CH1 High Temp.	CH1 circulating fluid temperature rise	AL31	Digital Input 2	Contact input 2 signal detection
AL11	CH1 Low Temp.	CH1 circulating fluid temperature drop	AL34	Communication	Communication error
AL12	CH1 TEMP READY Alarm	CH1 TEMP READY alarm	AL35	Ambient Temp.	Outside of the ambient temperature range
AL13	CH2 High Temp. FLT	CH2 abnormal rise in circulating fluid temperature	AL36	Maintenance	Maintenance alarm
AL14	CH2 High Temp.	CH2 circulating fluid temperature rise	AL37	Refrigeration Circuit	Compressor circuit failure
AL15	CH2 Low Temp.	CH2 circulating fluid temperature drop	AL38	Sensor	Sensor failure
AL16	CH2 TEMP READY Alarm	CH2 TEMP READY alarm	AL39	Controller	Controller failure
AL17	CH1 HX In High Temp. FLT	CH1 abnormal rise in heat exchanger inlet temperature	AL40	Compressor Inverter	Compressor inverter error
AL18	CH1 Press. Sensor	CH1 failure of circulating fluid discharge pressure sensor	AL41	Compressor Inverter Comm.	Compressor inverter communication error
AL19	CH1 High Press.	CH1 circulating fluid discharge pressure rise	AL42	CH1 Pump Inverter	CH1 pump inverter error
AL20	CH1 Low Press.	CH1 circulating fluid discharge pressure drop	AL43	CH1 Pump Inverter Comm.	CH1 pump inverter communication error
AL21	CH2 Press. Sensor	CH2 failure of circulating fluid discharge pressure sensor	AL44	CH2 Pump Inverter	CH2 pump inverter error
AL22	CH2 High Press. Error	CH2 abnormal rise in circulating fluid discharge pressure	AL45	CH2 Pump Inverter Comm.	CH2 pump inverter communication error
AL23	CH2 High Press.	CH2 circulating fluid discharge pressure rise			

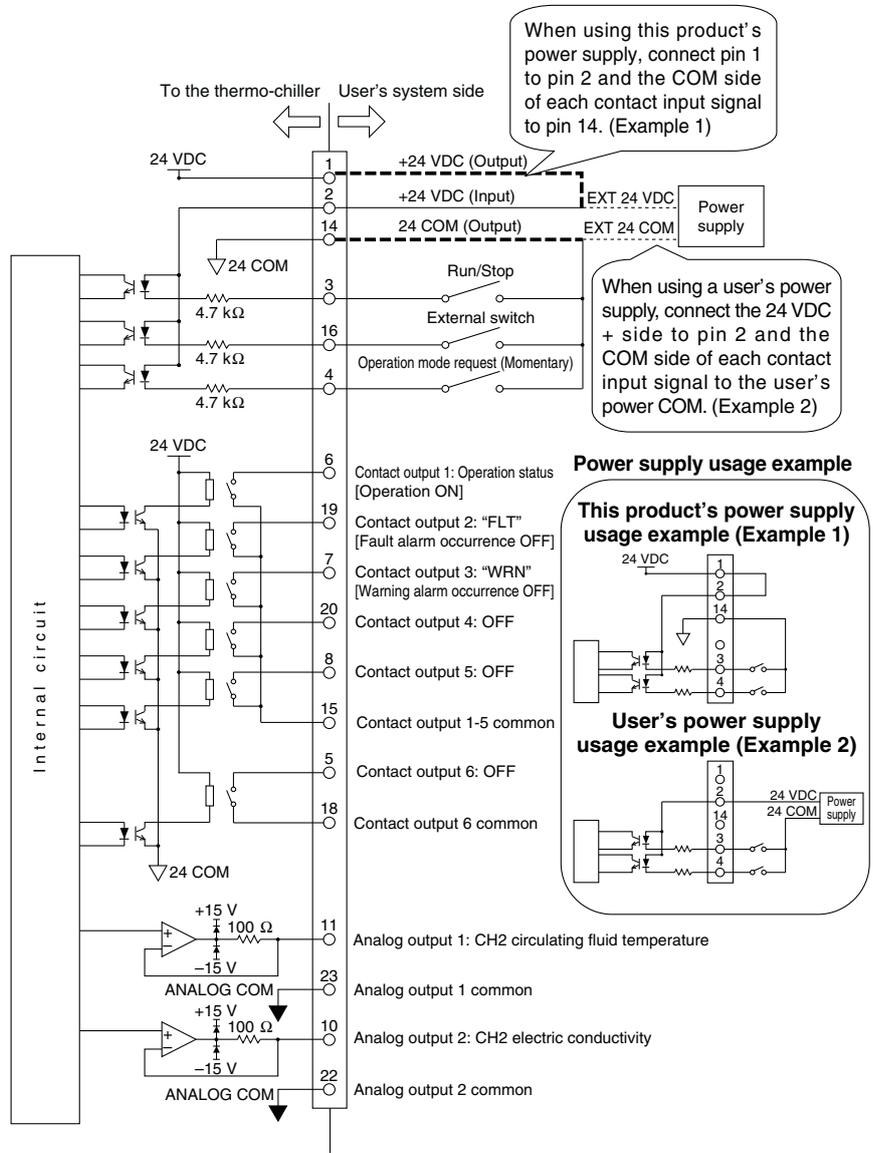
Communication Functions

Contact Input/Output

Contact Input/Output, Analog Output Communication Specifications

Item		Specifications	
Contact input signal 1, 2, 3	Insulation method	Photocoupler	
	Rated input voltage	24 VDC	
	Operating voltage range	21.6 to 26.4 VDC	
	Rated input current	5 mA TYP	
	Input impedance	4.7 kΩ	
Contact output signal 1, 2, 3, 4, 5, 6	Rated load voltage	48 VAC or less/30 VDC or less	
	Maximum load current	800 mA AC/DC or less*1	
	Minimum load current	5 VDC 10 mA	
Analog output signal 1, 2	Output voltage range	0 to +10 V	
	Maximum output current	10 mA	
	Output accuracy	±0.4% F.S. or less	
Output voltage		24 VDC ±10% 200 mA MAX*1 (No inductive load)	

Circuit diagram



*1 Make sure that the total load current is 800 mA or less. When using the power supply of this product, make sure that the total load current is 200 mA or less.

Communication Functions

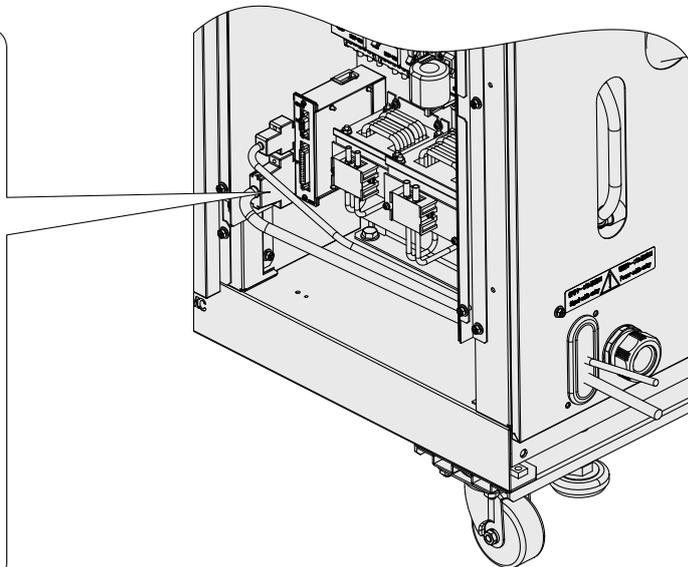
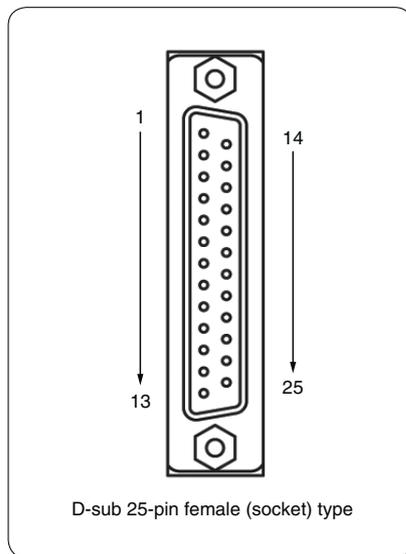
Contact Input/Output, Analog Output Pin Nos.

Pin no.	Application	Division	Default setting
1	24 VDC output	Output	—
2	24 VDC input	Input	—
3	Contact input signal 1	Input	Run/Stop*1
4	Contact input signal 3	Input	Operation mode request signal (fix)*2
5	Contact output signal 6	Output	OFF*1
6	Contact output signal 1	Output	Run status signal [N.O. type] (fix)*2
7	Contact output signal 3	Output	Operation continuation "WRN" alarm signal [N.C. type] (fix)*2
8	Contact output signal 5	Output	OFF*1
9	None	—	Cannot be connected*3
10	Analog output signal 2	Output	CH2 electric conductivity*1
11	Analog output signal 1	Output	CH2 circulating fluid temperature*1
12	None	—	Cannot be connected*3
13	None	—	Cannot be connected*3
14	24 COM output (Common of contact input signal)	Output	—
15	Common of contact output signal 1, 2, 3, 4, 5	Output	—
16	Contact input signal 2	Input	External switch signal*1
17	None	—	Cannot be connected*3
18	Common of contact output signal 6	Output	—
19	Contact output signal 2	Output	Operation stop "FLT" alarm signal [N.C. type] (fix)*2
20	Contact output signal 4	Output	OFF*1
21	None	—	Cannot be connected*3
22	Common of analog output signal 2	Output	—
23	Common of analog output signal 1	Output	—
24	None	—	Cannot be connected*3
25	None	—	Cannot be connected*3

*1 It is possible to change the setting.

*2 It is not possible to change the setting. ("N.O. type/N.C. type" can be changed.)

*3 Do not connect wiring.



Communication Functions

Serial Communication

The following operations can be performed by the serial communication RS-232C/RS-485.

Writing

To run/stop the product
To change the set value of circulating fluid temperature

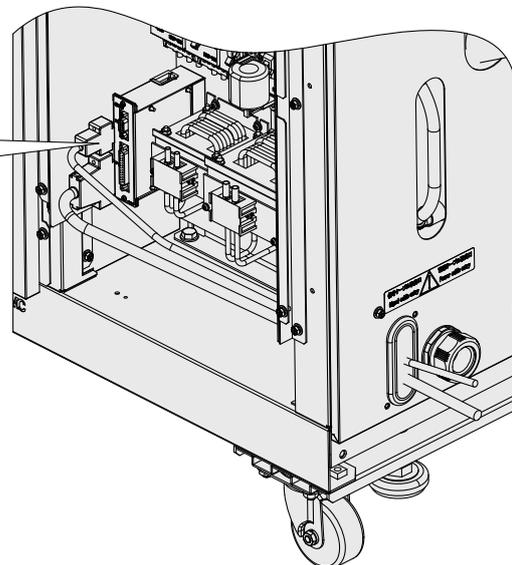
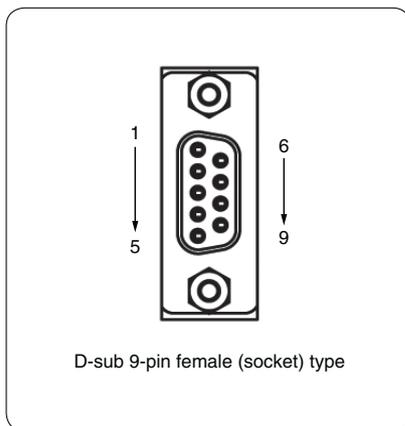
Readout

To readout the circulating fluid temperature, pressure, flow rate and electrical conductivity (CH1*1)
To readout the circulating fluid temperature, pressure, flow rate and electrical conductivity (CH2)
To readout the status of respective parts of the product (e.g., operation status and content of alarm)

*1 For Option D1 (CH1 With electric conductivity control)

Wiring of Interface Cable for Serial Communication

Item	Specifications
Connector type	D-sub 9-pin female (socket) type
Configuration of connection	RS-485
Circuit diagram	<p>One thermo-chiller for one host computer, or multiple thermo-chillers for one host computer. (31 thermo-chillers can be connected at maximum.)</p> <p style="text-align: center;">* Do not connect with other pins.</p>
Standards	RS-232C
Circuit diagram	<p>One thermo-chiller for one master</p> <p style="text-align: center;">* Do not connect with other pins.</p>



Optional Accessories

Consumables List

Part no.	Description	Qty.	Note
HRS-S0213	Dustproof filter (Lower)	1	For HRL200-A: 2 pcs. are used per unit.
HRS-S0214	Dustproof filter (Upper)	1	For HRL100/200-A: 2 pcs. are used per unit.
HRS-S0185	Dustproof filter	1	For HRL300-A: 4 pcs. are used per unit.
HRS-PF006	Particle filter element	1	Common to each model: For CH1
EJ202S-005X11	Particle filter element	1	Common to each model: For CH2
HRR-DF001	DI filter replacement cartridge	1	Common to each model: For CH2
HRR-DF002	DI filter replacement cartridge	1	Common to each model: For CH1 Option D1 only

 **Safety Instructions** Be sure to read the "Handling Precautions for SMC Products" (M-E03-3) and "Operation Manual" before use.

Thermo-chiller



Dual Channel Refrigerated Thermo-chiller for Lasers

3-phase 380 to 415 VAC (50/60 Hz)
3-phase 460 to 480 VAC (60 Hz)



RoHS

How to Order

HRL 100 - A - 40 -

Cooling capacity

	CH1	CH2
100	9 kW	1 kW
200	19 kW	1 kW
300	26 kW	1 kW

Cooling method

A	Air-cooled refrigeration
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Pipe thread type

Nil	Rc
F	G (with Rc-G conversion fitting)
N	NPT (with Rc-NPT conversion fitting)

DI option

Nil	CH2 With electric conductivity control
D1	CH1, CH2 With electric conductivity control

Power supply

40	3-phase 380 to 415 VAC (50/60 Hz) 3-phase 460 to 480 VAC (60 Hz)
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Specifications

Model	HRL100-A□-40		HRL200-A□-40		HRL300-A□-40	
	CH1	CH2	CH1	CH2	CH1	CH2
Cooling method	Air-cooled refrigeration					
Refrigerant	R410A (HFC)					
Refrigerant charge	kg		1.4		1.8	
Control method	PID control					
Ambient temperature	°C					
	2 to 45					
Circulating fluid	CH1: Tap water*1, Deionized water*9/CH2: Tap water*1, Deionized water					
Set temperature range	°C					
	CH1: 5 to 35/CH2: 10 to 40					
Cooling capacity*2	kW		9		1*8	
Heating capacity*3	kW		1.5		1	
Temperature stability*4	°C					
	CH1: ±0.1/CH2: ±0.5					
Pump capacity	Rated flow (Outlet pressure)	L/min	45 (0.43 MPa)	10 (0.45 MPa)	45 (0.45 MPa)	10 (0.45 MPa)
	Maximum flow rate	L/min	120	16	130	16
	Maximum pump head	m	50	49	55	49
Settable pressure range*5	MPa		0.10 to 0.50		0.10 to 0.49	
Minimum operating flow rate*6	L/min		20		2	
Tank capacity	L		42		7	
Bypass circuit (With valve)	Installed					
Electric conductivity setting range	μS/cm		0.5 to 45*9		0.5 to 45	
Particle filter nominal filtration rating (Accessory)	μm		5		5	
Circulating fluid outlet, circulating fluid return port	CH1: Rc1 (Symbol F: G1, Symbol N: NPT1)/CH2: Rc1/2 (Symbol F: G1/2, Symbol N: NPT1/2)					
Tank drain port	CH1: Rc3/4 (Symbol F: G3/4, Symbol N: NPT3/4)/CH2: Rc1/2 (Symbol F: G1/2, Symbol N: NPT1/2)					
Fluid contact material	CH1: Stainless steel, Copper (Heat exchanger brazing)*10, Brass*10, Fluororesin, PP, PBT, POM, PU, PC, PVC, EPDM, NBR, Ion replacement resin*9 CH2: Stainless steel, Alumina ceramic, Carbon, Fluororesin, PP, PBT, POM, PU, PVC, PPS, AS, PS, EPDM, NBR, Ion replacement resin					
Power supply	3-phase 380 to 415 VAC (50/60 Hz) Allowable voltage range ±10% (No continuous voltage fluctuation) 3-phase 460 to 480 VAC (60 Hz) Allowable voltage range +4%, -10% (Max. voltage less than 500 V and no continuous voltage fluctuation)					
Earth leakage breaker	Rated current	A	20		30	
	Sensitivity current	mA	30			
Rated operating current*4	A		8.5		15	
Rated power consumption*4	kW(kVA)		5.6 (5.9)		9.4 (10.2)	
Noise level (Front 1 m/Height 1 m)*4	dB(A)		75		75	
Accessories	Operation Manual (for installation/operation) 2 pcs. (English 1 pc./Japanese 1 pc.), Particle filter set for CH1, Particle filter set for CH2, Anchor bolt fixing brackets 2 pcs. (including 6 M8 bolts)*7					
Weight (dry state)*11	kg		Approx. 240		Approx. 260	

*1 Use fluid in condition below as the circulating fluid.
Tap water: Standard of The Japan Refrigeration and Air Conditioning Industry Association (JRA GL-02-1994)
*2 ① Ambient temperature: 32°C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: CH1 20°C/CH2 25°C, ④ Circulating fluid flow rate: Rated flow, ⑤ Power supply: 400 VAC
*3 ① Ambient temperature: 32°C, ② Circulating fluid: Tap water, ③ Circulating fluid flow rate: Rated flow, ④ Power supply: 400 VAC
*4 ① Ambient temperature: 32°C, ② Circulating fluid: Tap water, ③ Circulating fluid temperature: CH1 20°C/CH2 25°C, ④ Load: Same as the cooling capacity, ⑤ Circulating fluid flow rate: Rated flow, ⑥ Power supply: 400 VAC, ⑦ Piping length: Shortest

*5 With the pressure control mode by inverter. If the pressure control mode is not necessary, use the flow control function or the pump output setting function.
*6 Fluid flow rate to maintain the cooling capacity. If the actual flow rate is lower than this, adjust the bypass valve.
*7 The anchor bolt fixing brackets (including 6 M8 bolts) are used for fixing to wooden skids when packaging the thermo-chiller. No anchor bolt is included.
*8 Max. 1.5 kW. When 1.5 kW is applied, the cooling capacity of CH1 decreases by 0.5 kW.
*9 For Option D1 (With electric conductivity control) only
*10 Not included for Option D1 (With electric conductivity control)
*11 The product weight increases by 1 kg for Option D1 (With electric conductivity control).

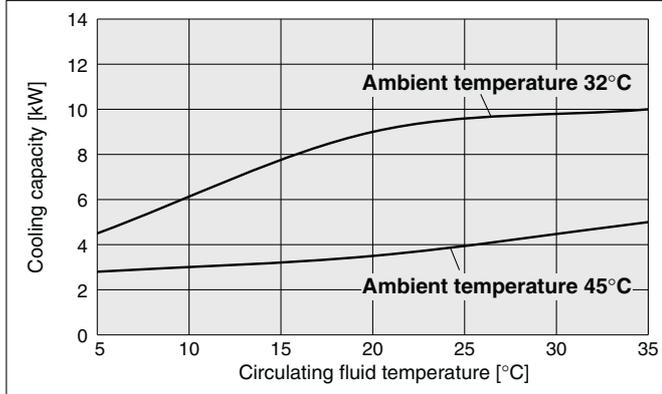
HRL Series



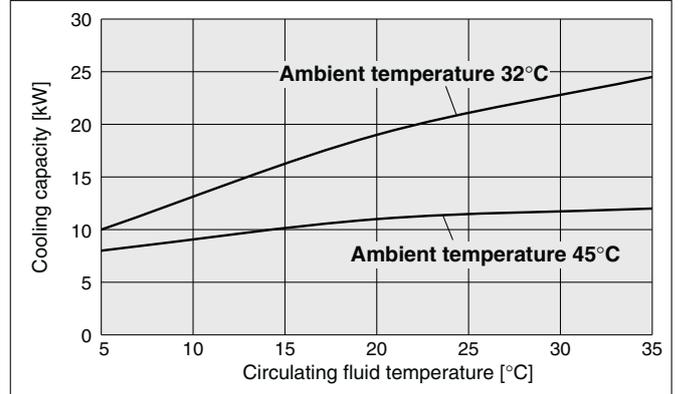
Cooling Capacity

*1 This is the cooling capacity of the CH1 side when 1 kW heat load is applied to the CH2 side.
 *2 Max. 1.5 kW. When 1.5 kW is applied, the cooling capacity of CH1 decreases by 0.5 kW.

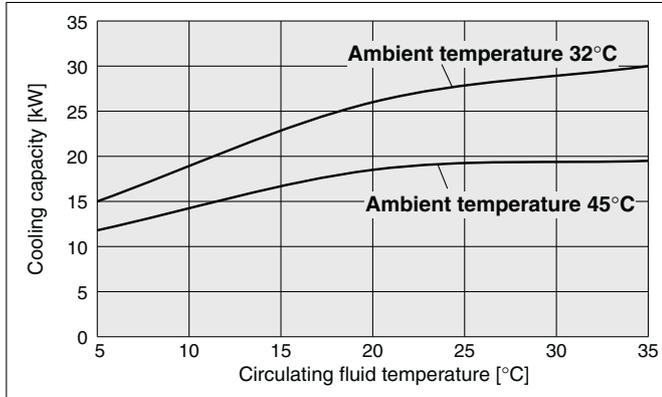
HRL100-A□-40 (CH1)*1



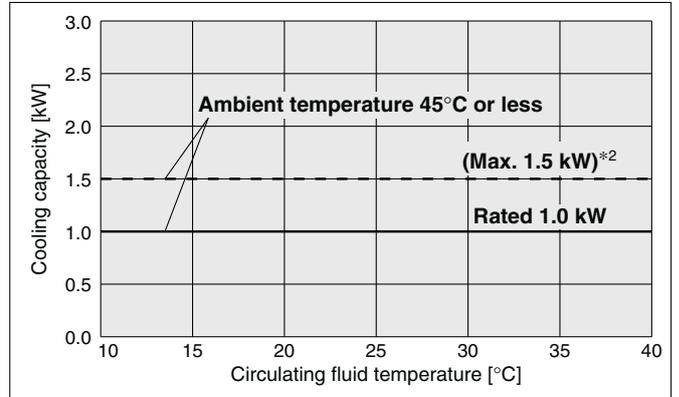
HRL200-A□-40 (CH1)*1



HRL300-A□-40 (CH1)*1

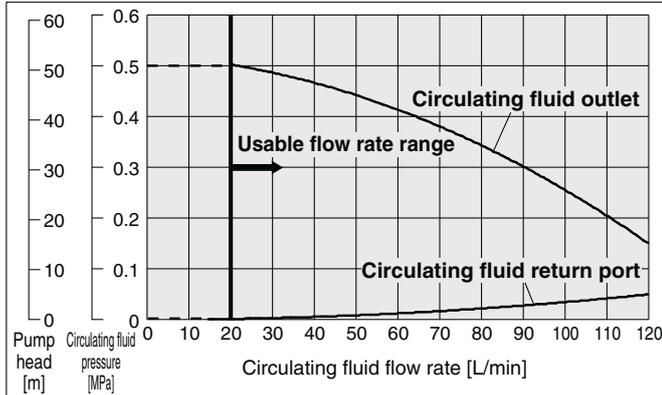


HRL100/200/300-A□-40 (CH2)*2

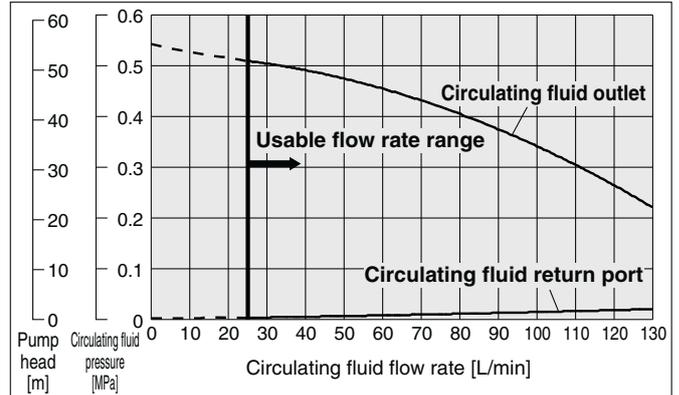


Pump Capacity

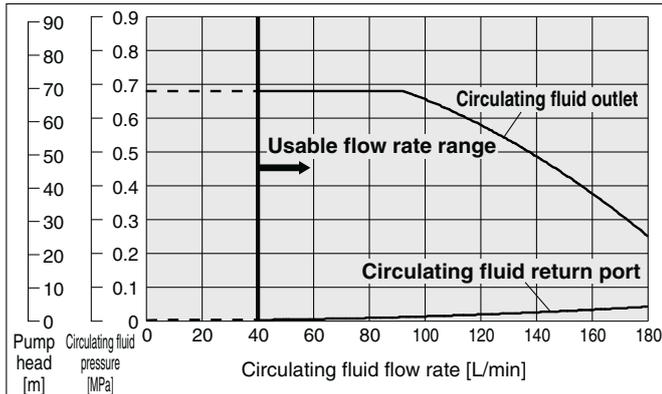
HRL100-A□-40 (CH1)



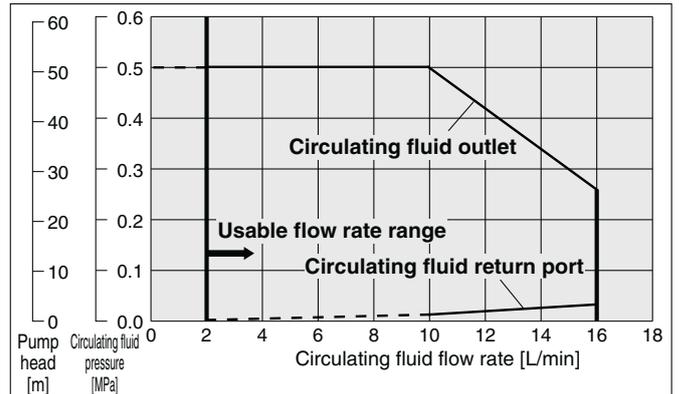
HRL200-A□-40 (CH1)



HRL300-A□-40 (CH1)

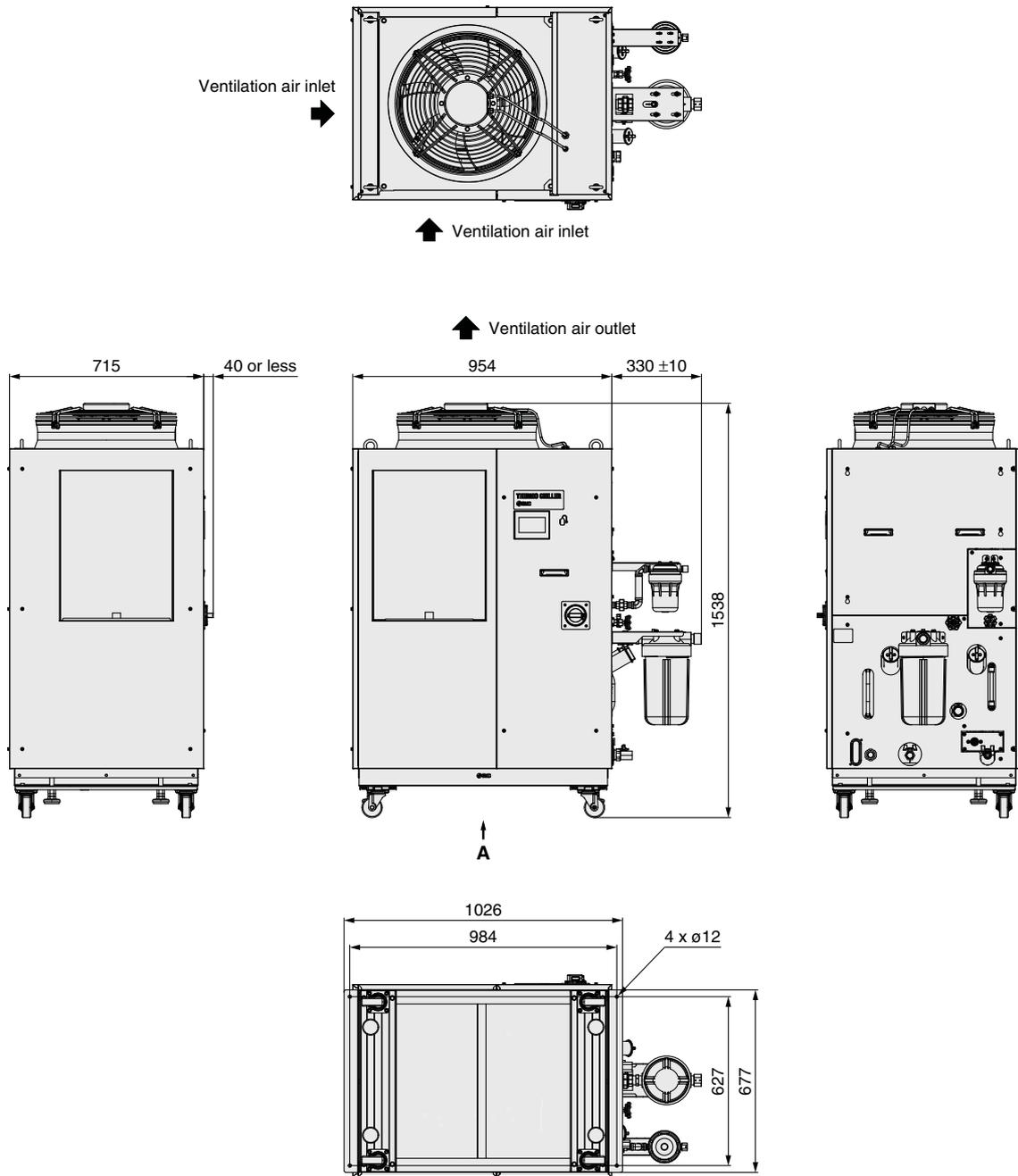


HRL100/200/300-A□-40 (CH2)



Dimensions

HRL100-A□-40

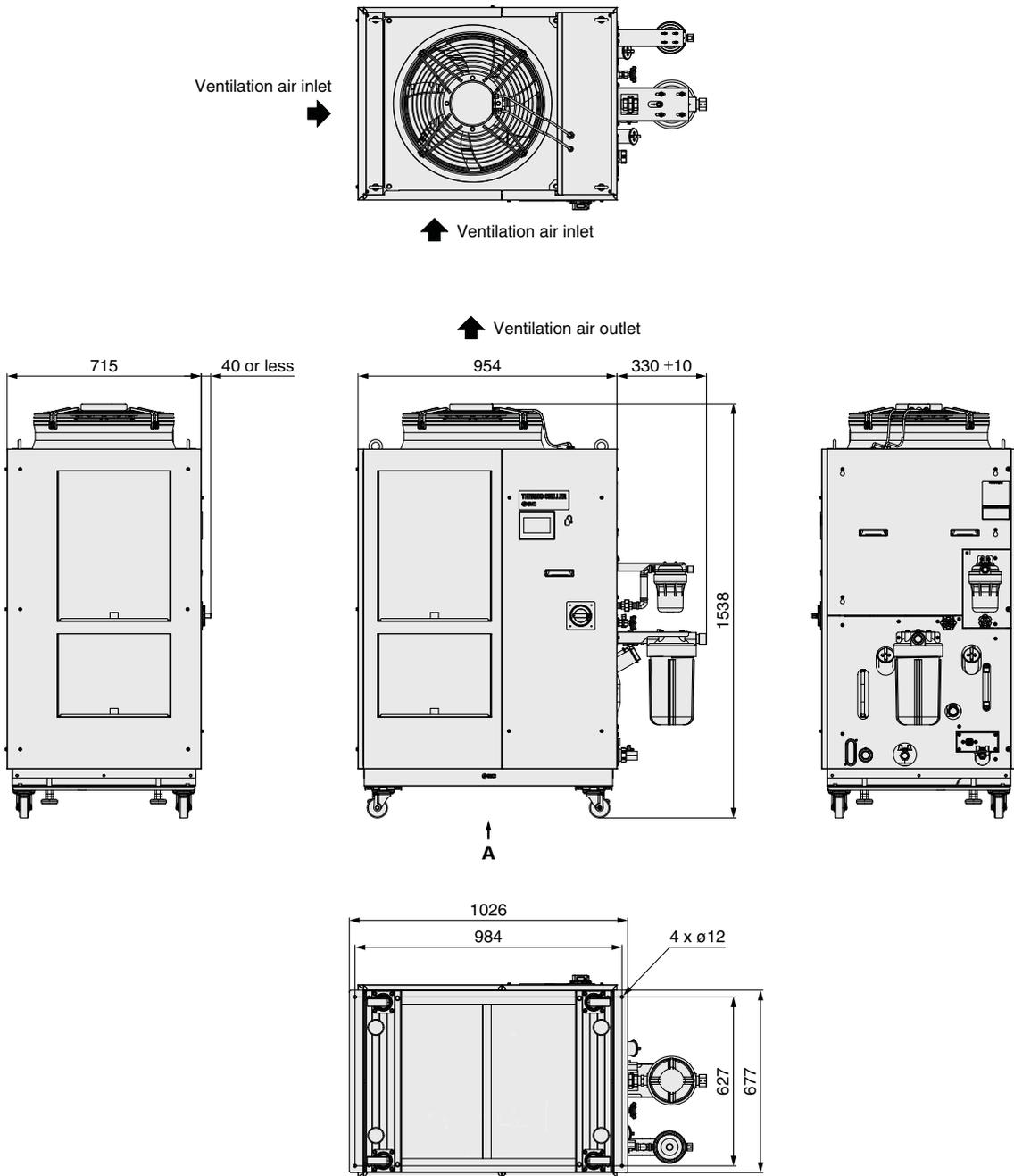


Anchor bolt mounting position (View A)

For piping port sizes, refer to the "Parts Description" on page 5.

Dimensions

HRL200-A□-40

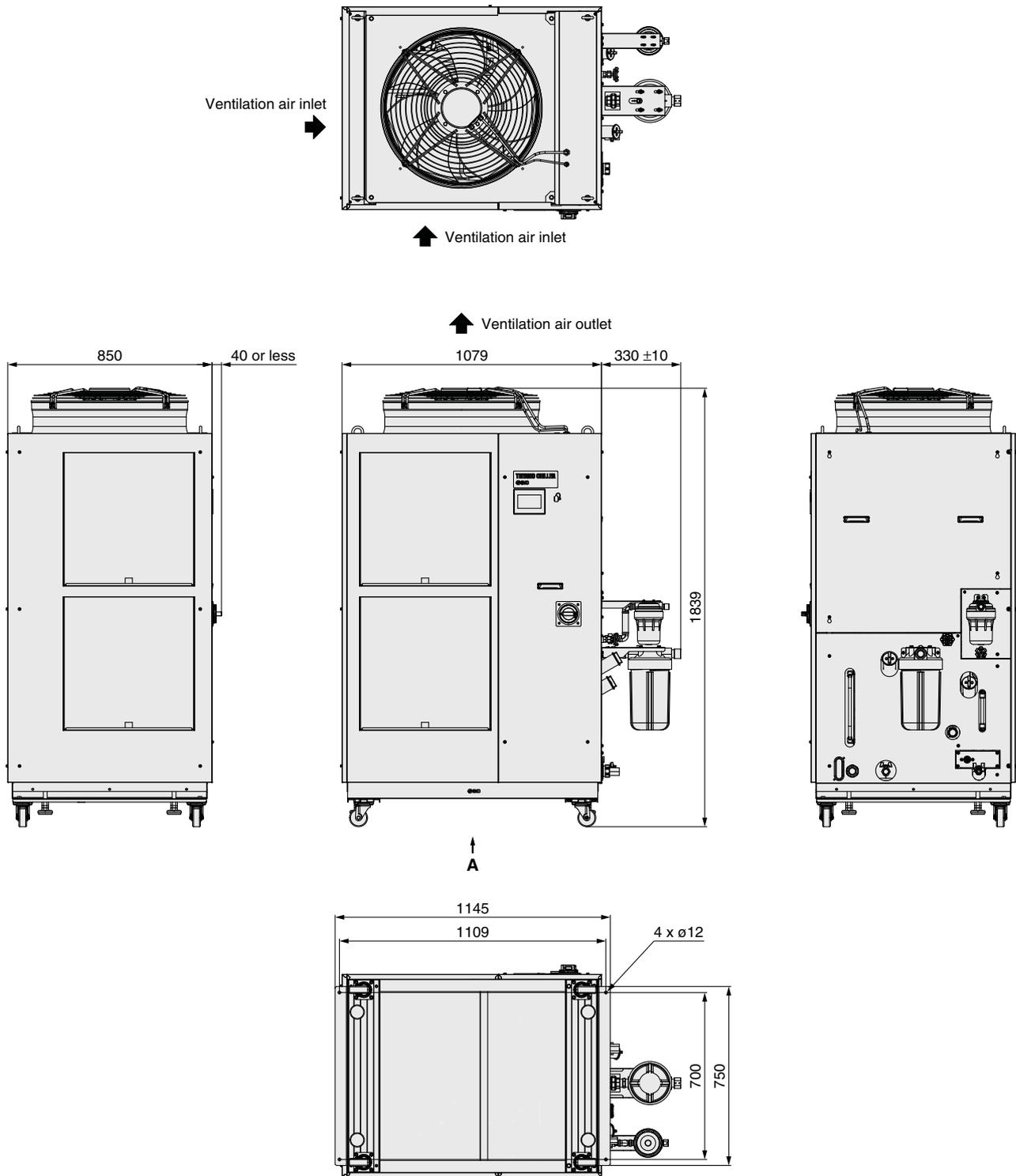


Anchor bolt mounting position (View A)

For piping port sizes, refer to the "Parts Description" on page 5.

Dimensions

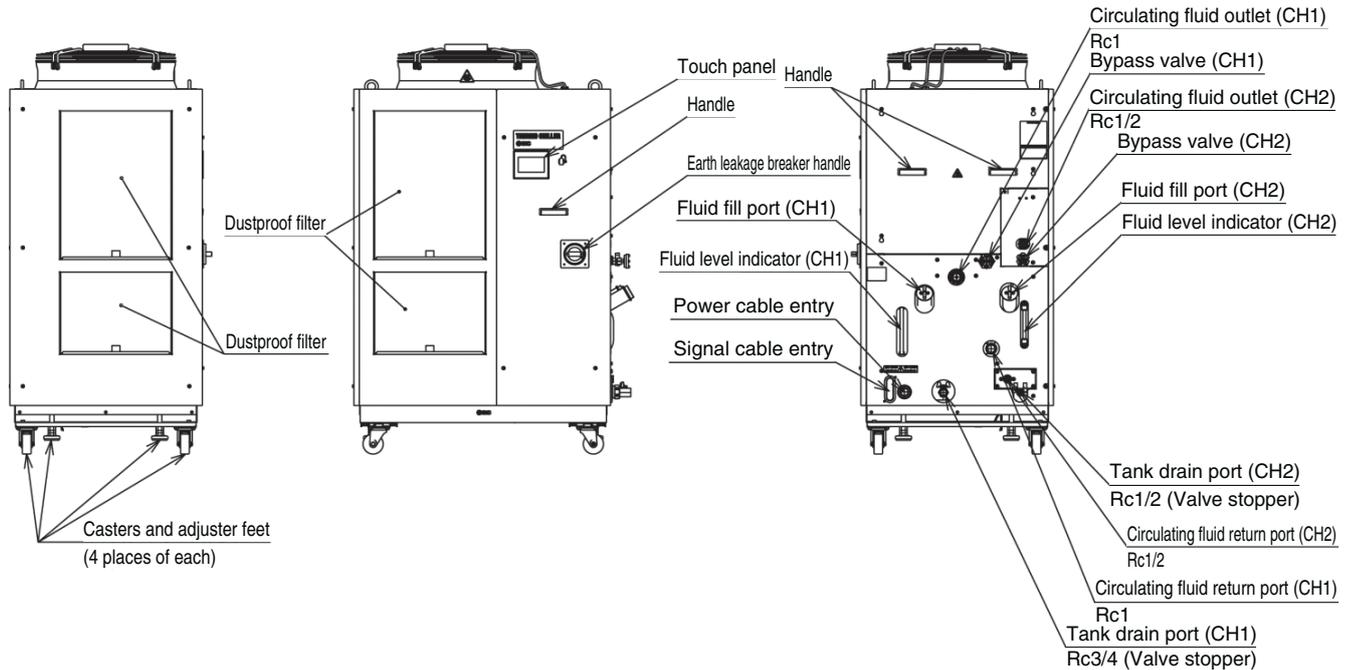
HRL300-A□-40



Anchor bolt mounting position (View A)

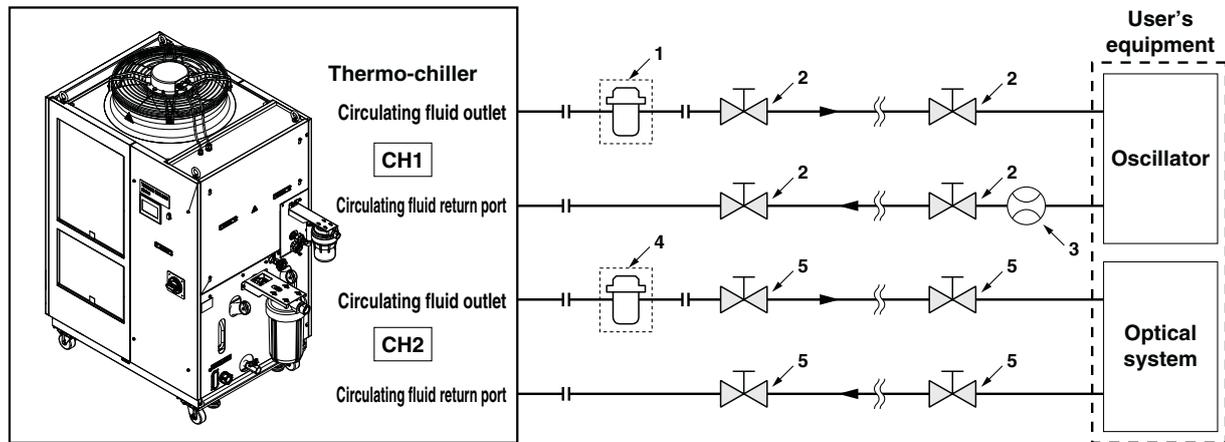
For piping port sizes, refer to the "Parts Description" on page 5.

Parts Description



Recommended External Piping Flow

External piping circuit is recommended as shown below.



No.	Description	Size	Recommended part no.	Note
1	Contaminant filter	Rc1 (5 μm)	Accessory	The value in () shows the nominal filtration accuracy.
2	Valve	Rc1	—	—
3	Flow meter	Rc1	—	Prepare a flow meter with an appropriate range.
4	Contaminant filter	Rc1/2 (5 μm)	Accessory	The value in () shows the nominal filtration accuracy.
5	Valve	Rc1/2	—	—

Cable Specifications

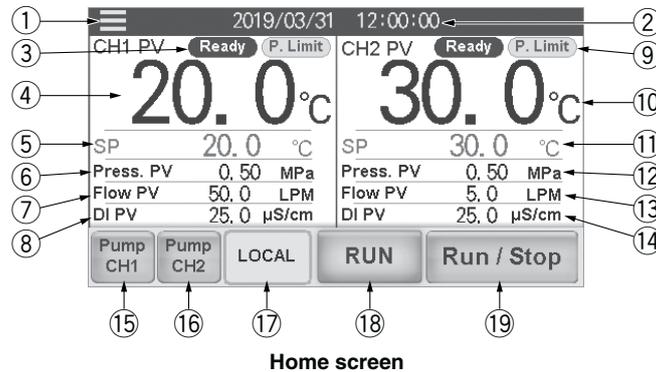
Power Supply Cable and Earth Leakage Breaker (Recommended)

Model	Power supply voltage specifications	Terminal block screw diameter	Recommended crimped terminal	Cable specifications*1	Earth leakage breaker	
					Breaker size [A]	Sensitivity current [mA]
HRL100-A□-40	3-phase 380 to 415 VAC (50/60 Hz) 3-phase 460 to 480 VAC (60 Hz)	M5	R5.5-5	4 cores x 5.5 mm ² (4 cores x AWG 10) * Including grounding cable	20	30
HRL200-A□-40					30	
HRL300-A□-40					40	

*1 An example of the cable specifications is when two kinds of vinyl insulated wires with a continuous allowable operating temperature of 70°C at 600 V, are used at an ambient temperature of 30°C. Select the proper size of cable according to an actual condition.

Operation Display Panel

Items displayed on the home screen and setting items are shown in List of check items in inspection monitor menu.



List of Check Items in Inspection Monitor Menu

No.	CH no.	Item	Explanation
①	Common	Menu key	Touch the key to display the menu.
②		Date and time display	Displays the date and time. Press the numeric section to set the date and time.
③	CH1	Operating condition display	Displays TEMP READY status. Displays the control status of the circulating fluid pressure.
④		Circulating fluid present temperature	Displays the current temperature of circulating fluid.
⑤		Circulating fluid set temperature	It indicates the set temperature. Press the numeric section to change the set temperature
⑥		Circulating fluid discharge pressure	It indicates the discharge pressure.
⑦		Circulating fluid flow rate	It indicates the fluid flow rate. This value is not measured by a flow meter. It should be used as a reference value (rough indication). It includes the flow rate in the bypass circuit.
⑧		Circulating fluid electric conductivity	It indicates the electric conductivity.*1
⑨	CH2	Operating condition display	Displays TEMP READY status. Displays the control status of the circulating fluid pressure.
⑩		Circulating fluid present temperature	Displays the circulating fluid temperature.
⑪		Circulating fluid set temperature	It indicates the set temperature. Press the numeric section to change the set temperature.
⑫		Circulating fluid discharge pressure	It indicates the discharge pressure.
⑬		Circulating fluid flow rate	It indicates the flow rate measured by a flow meter. It does not include the flow rate in the bypass circuit.
⑭		Circulating fluid electric conductivity	It indicates the electric conductivity.
⑮	CH1	Independent pump operation	CH1 pump operates independently while the button is pressed.
⑯	CH2	Independent pump operation	CH2 pump operates independently while the button is pressed.
⑰	Common	Operation mode	To select a operation mode from the touch panel (LOCAL mode), contact input (DIO mode), or serial communication (SERIAL mode).
⑱		Operating condition display	It indicates the run and stop status of the product.
⑲		Run/Stop	To run/stop the product

*1 Displayed for Option D1 (CH1 With electric conductivity control)

Alarm

This unit displays 39 types of alarms.

Alarm No.	Indication	Explanation	Alarm No.	Indication	Explanation
AL01	CH1 Low Level FLT	CH1 abnormal low tank fluid level	AL24	CH2 Low Press.	CH2 circulating fluid discharge pressure drop
AL02	CH1 Low Level WRN	CH1 low tank fluid level	AL25	CH2 Low Press. Error	CH2 abnormal drop in circulating fluid discharge pressure
AL03	CH2 Low Level FLT	CH2 abnormal low tank fluid level	AL26	CH2 Flow Sensor	CH2 failure of circulating fluid discharge flow sensor
AL04	CH2 Low Level WRN	CH2 low tank fluid level	AL27	CH2 High Electric Conductivity	CH2 electric conductivity increase
AL06	Fan Inverter	Fan failure	AL28	CH1 High Electric Conductivity	CH2 electric conductivity increase (Option D1 only)
AL09	CH1 High Temp. FLT	CH1 abnormal rise of circulating fluid temperature	AL30	Digital Input 1	Contact input 1 signal detection
AL10	CH1 High Temp.	CH1 circulating fluid temperature rise	AL31	Digital Input 2	Contact input 2 signal detection
AL11	CH1 Low Temp.	CH1 circulating fluid temperature drop	AL34	Communication	Communication error
AL12	CH1 TEMP READY Alarm	CH1 TEMP READY alarm	AL35	Ambient Temp.	Outside of the ambient temperature range
AL13	CH2 High Temp. FLT	CH2 abnormal rise in circulating fluid temperature	AL36	Maintenance	Maintenance alarm
AL14	CH2 High Temp.	CH2 circulating fluid temperature rise	AL37	Refrigeration Circuit	Compressor circuit failure
AL15	CH2 Low Temp.	CH2 circulating fluid temperature drop	AL38	Sensor	Sensor failure
AL16	CH2 TEMP READY Alarm	CH2 TEMP READY alarm	AL39	Controller	Controller failure
AL17	CH1 HX In High Temp. FLT	CH1 abnormal rise in heat exchanger inlet temperature	AL40	Compressor Inverter	Compressor inverter error
AL18	CH1 Press. Sensor	CH1 failure of circulating fluid discharge pressure sensor	AL41	Compressor Inverter Comm.	Compressor inverter communication error
AL19	CH1 High Press.	CH1 circulating fluid discharge pressure rise	AL42	CH1 Pump Inverter	CH1 pump inverter error
AL20	CH1 Low Press.	CH1 circulating fluid discharge pressure drop	AL43	CH1 Pump Inverter Comm.	CH1 pump inverter communication error
AL21	CH2 Press. Sensor	CH2 failure of circulating fluid discharge pressure sensor	AL44	CH2 Pump Inverter	CH2 pump inverter error
AL22	CH2 High Press. Error	CH2 abnormal rise in circulating fluid discharge pressure	AL45	CH2 Pump Inverter Comm.	CH2 pump inverter communication error
AL23	CH2 High Press.	CH2 circulating fluid discharge pressure rise			

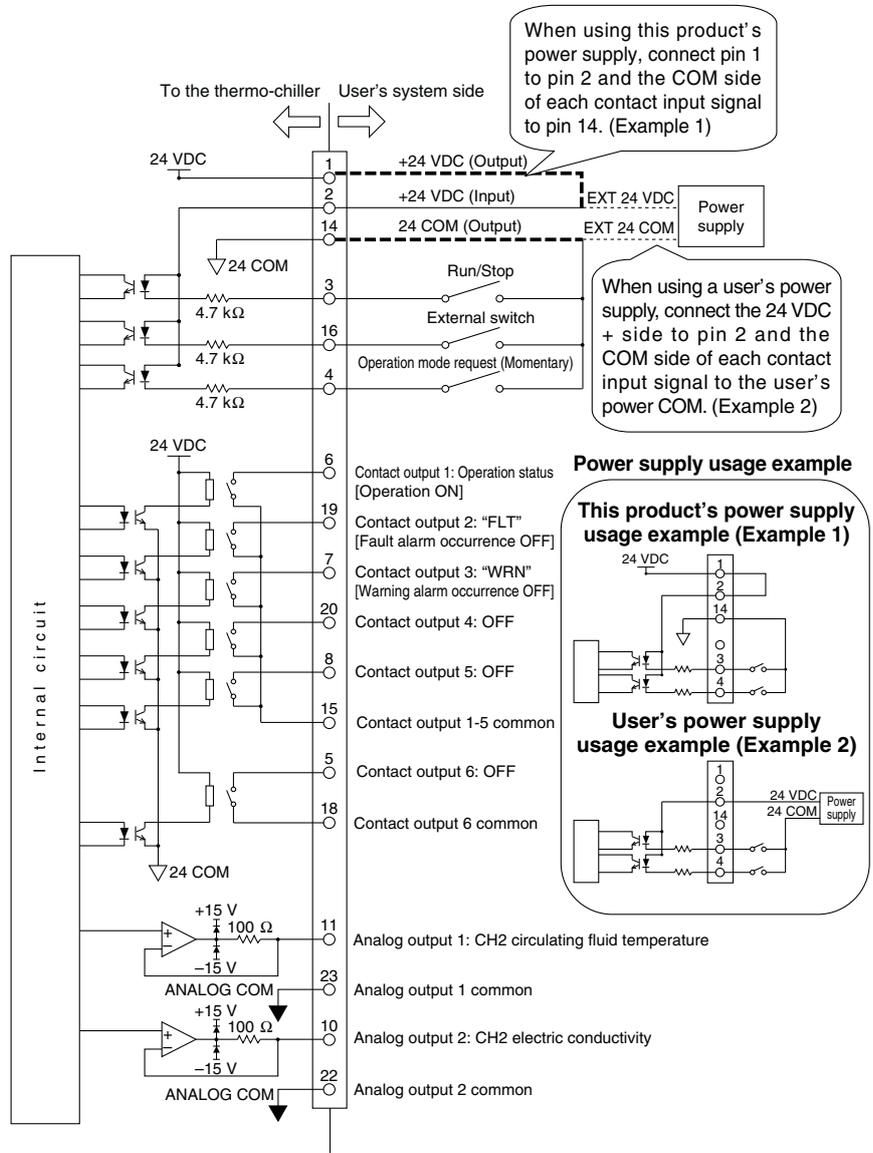
Communication Functions

Contact Input/Output

Contact Input/Output, Analog Output Communication Specifications

Item		Specifications	
Contact input signal 1, 2, 3	Insulation method	Photocoupler	
	Rated input voltage	24 VDC	
	Operating voltage range	21.6 to 26.4 VDC	
	Rated input current	5 mA TYP	
	Input impedance	4.7 kΩ	
Contact output signal 1, 2, 3, 4, 5, 6	Rated load voltage	48 VAC or less/30 VDC or less	
	Maximum load current	800 mA AC/DC or less*1	
	Minimum load current	5 VDC 10 mA	
Analog output signal 1, 2	Output voltage range	0 to +10 V	
	Maximum output current	10 mA	
	Output accuracy	±0.4% F.S. or less	
Output voltage		24 VDC ±10% 200 mA MAX*1 (No inductive load)	

Circuit diagram



*1 Make sure that the total load current is 800 mA or less. When using the power supply of this product, make sure that the total load current is 200 mA or less.

Communication Functions

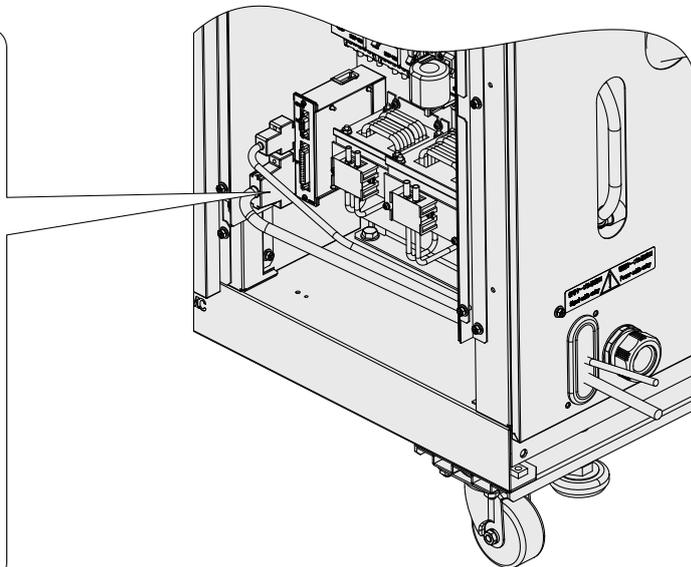
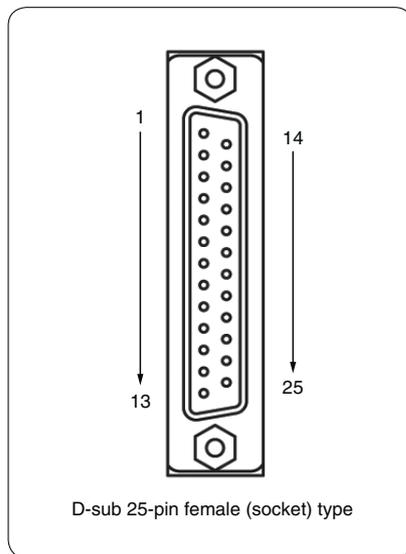
Contact Input/Output, Analog Output Pin Nos.

Pin no.	Application	Division	Default setting
1	24 VDC output	Output	—
2	24 VDC input	Input	—
3	Contact input signal 1	Input	Run/Stop*1
4	Contact input signal 3	Input	Operation mode request signal (fix)*2
5	Contact output signal 6	Output	OFF*1
6	Contact output signal 1	Output	Run status signal [N.O. type] (fix)*2
7	Contact output signal 3	Output	Operation continuation "WRN" alarm signal [N.C. type] (fix)*2
8	Contact output signal 5	Output	OFF*1
9	None	—	Cannot be connected*3
10	Analog output signal 2	Output	CH2 electric conductivity*1
11	Analog output signal 1	Output	CH2 circulating fluid temperature*1
12	None	—	Cannot be connected*3
13	None	—	Cannot be connected*3
14	24 COM output (Common of contact input signal)	Output	—
15	Common of contact output signal 1, 2, 3, 4, 5	Output	—
16	Contact input signal 2	Input	External switch signal*1
17	None	—	Cannot be connected*3
18	Common of contact output signal 6	Output	—
19	Contact output signal 2	Output	Operation stop "FLT" alarm signal [N.C. type] (fix)*2
20	Contact output signal 4	Output	OFF*1
21	None	—	Cannot be connected*3
22	Common of analog output signal 2	Output	—
23	Common of analog output signal 1	Output	—
24	None	—	Cannot be connected*3
25	None	—	Cannot be connected*3

*1 It is possible to change the setting.

*2 It is not possible to change the setting. ("N.O. type/N.C. type" can be changed.)

*3 Do not connect wiring.



Communication Functions

Serial Communication

The following operations can be performed by the serial communication RS-232C/RS-485.

Writing

To run/stop the product
To change the set value of circulating fluid temperature

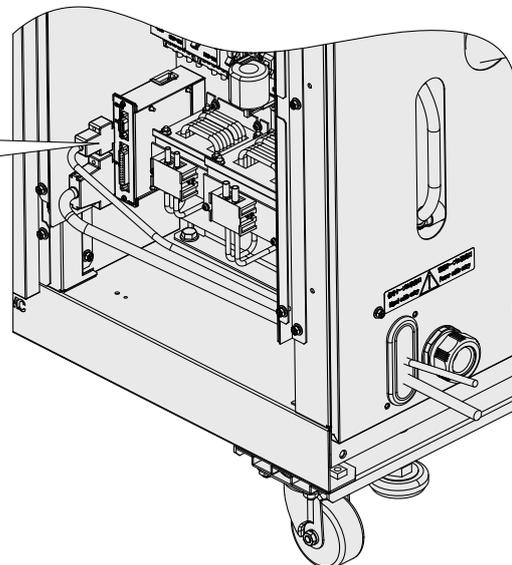
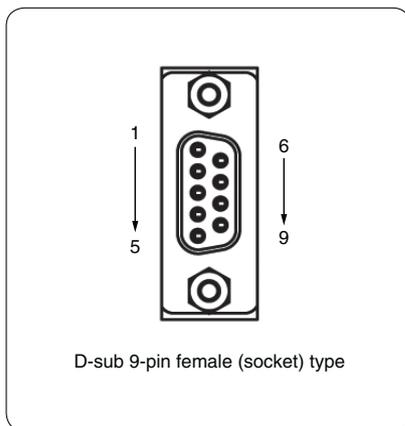
Readout

To readout the circulating fluid temperature, pressure, flow rate and electrical conductivity (CH1*1)
To readout the circulating fluid temperature, pressure, flow rate and electrical conductivity (CH2)
To readout the status of respective parts of the product (e.g., operation status and content of alarm)

*1 For Option D1 (CH1 With electric conductivity control)

Wiring of Interface Cable for Serial Communication

Item	Specifications
Connector type	D-sub 9-pin female (socket) type
Configuration of connection	RS-485
Circuit diagram	<p>One thermo-chiller for one host computer, or multiple thermo-chillers for one host computer. (31 thermo-chillers can be connected at maximum.)</p> <p style="text-align: center;">* Do not connect with other pins.</p>
Standards	RS-232C
Circuit diagram	<p>One thermo-chiller for one master</p> <p style="text-align: center;">* Do not connect with other pins.</p>



Optional Accessories

Consumables List

Part no.	Description	Qty.	Note
HRS-S0213	Dustproof filter (Lower)	1	For HRL200-A: 2 pcs. are used per unit.
HRS-S0214	Dustproof filter (Upper)	1	For HRL100/200-A: 2 pcs. are used per unit.
HRS-S0185	Dustproof filter	1	For HRL300-A: 4 pcs. are used per unit.
HRS-PF006	Particle filter element	1	Common to each model: For CH1
EJ202S-005X11	Particle filter element	1	Common to each model: For CH2
HRR-DF001	DI filter replacement cartridge	1	Common to each model: For CH2
HRR-DF002	DI filter replacement cartridge	1	Common to each model: For CH1 Option D1 only

 **Safety Instructions** Be sure to read the "Handling Precautions for SMC Products" (M-E03-3) and "Operation Manual" before use.