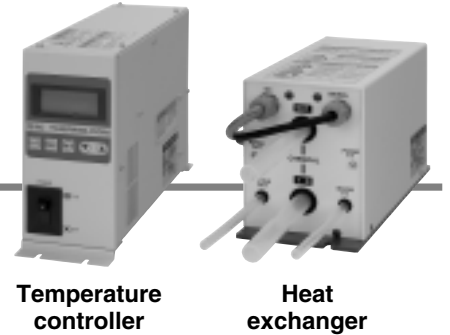


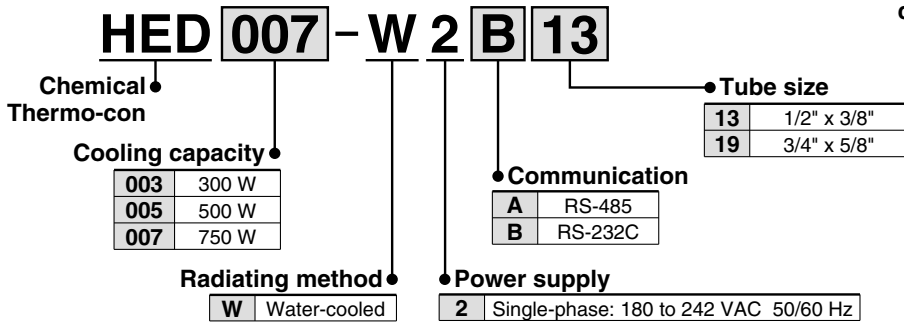
Chemical Thermo-con Series HED



How to Order

Part number of set (Temperature controller + Heat exchanger)

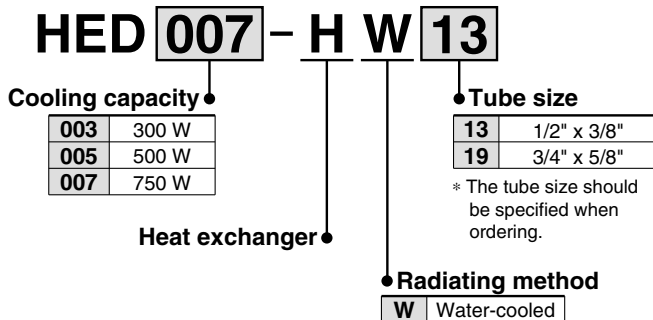
Note) The name plate on the Chemical Thermo-con shows the model numbers of the controller and heat exchanger.



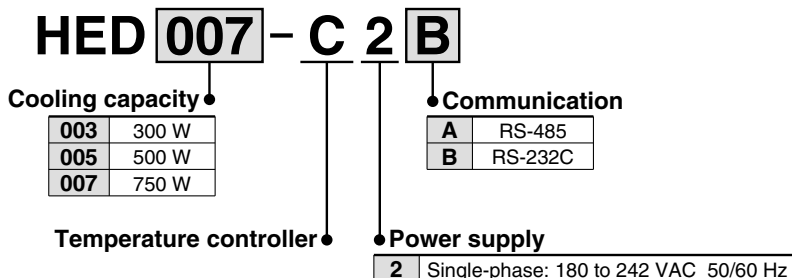
Combination in Set

Part number of set	Heat exchanger model	Temperature controller model
HED003-W2A13	HED003-HW13	HED003-C2A
HED003-W2A19	HED003-HW19	
HED003-W2B13	HED003-HW13	HED003-C2B
HED003-W2B19	HED003-HW19	
HED005-W2A13	HED005-HW13	HED005-C2A
HED005-W2A19	HED005-HW19	
HED005-W2B13	HED005-HW13	HED005-C2B
HED005-W2B19	HED005-HW19	
HED007-W2A13	HED007-HW13	HED007-C2A
HED007-W2A19	HED007-HW19	
HED007-W2B13	HED007-HW13	HED007-C2B
HED007-W2B19	HED007-HW19	

Heat exchanger



Temperature controller



Main Specifications (For details, please consult our "Product Specifications" information.)

Heat Exchanger Specifications

Heat exchanger model		HED003-HW13	HED003-HW19	HED005-HW13	HED005-HW19	HED007-HW13	HED007-HW19
Cooling capacity (Water) ^{Note 1)}		300 W		500 W		750 W	
Heating capacity (Water) ^{Note 1)}		600 W		1000 W		1800 W	
Cooling/Heating method		Peltier element (Thermoelectric device, Thermo-module)					
Radiating method		Water-cooled					
Operating temperature range		10.0 to 60.0°C (depending on the type of circulating fluid)					
Circulating fluid	Applicable fluid ^{Note 2)}	Pure water, Hydrofluoric acid, Ammonia hydrogen peroxide solution, etc.					
	Wetted material	PFA					
	Operating pressure ^{Note 3)}	0 (atmospheric pressure) to 0.35 MPa (0 to 50.75 PSI)					
	Tube size (PFA tube)	1/2" x 3/8"	3/4" x 5/8"	1/2" x 3/8"	3/4" x 5/8"	1/2" x 3/8"	3/4" x 5/8"
Facility water	Temperature	10 to 35°C (no condensation)					
	Wetted material	FEP, Stainless steel 304, Stainless steel 316					
	Max. operating pressure	0.5 MPa (72.5 PSI)					
	Tube size	IN/OUT: FEP tube 3/8" x 1/4"					
	Flow rate	5 to 10 l/min (1.3 to 2.6 g/m)					
Ambient		Temperature: 10 to 35°C, Humidity: 35 to 80%RH (no condensation)					
Dimensions ^{Note 4)}		W130 mm x D263 mm x H170 mm (W5.12" x D10.4" x H6.69")		W150 mm x D294 mm x H222 mm (W5.91" x D11.6" x H8.74")		W150 mm x D294 mm x H222 mm (W5.91" x D11.6" x H8.74")	
Mass		Approx. 8 kg (17.6 lb)		Approx. 14 kg (30.8 lb)		Approx. 15 kg (33 lb)	
Applied temperature controller		HED003-C2A HED003-C2B		HED005-C2A HED005-C2B		HED007-C2A HED007-C2B	

Note 1) The conditions are as follows.

Circulating fluid: Water (Circulating flow rate 15 l/min, Set temperature 25°C), Facility water temperature 25°C, Facility water flow rate 5 l/min, Ambient temperature 25°C

Note 2) For the compatibility between the circulating fluid and materials, refer to "Applicable Fluids" (page 8).

Note that the Chemical Thermo-con is not designed to be explosion proof so it is not suitable for flammable fluids.

Note 3) Install the heat exchanger in the discharge side of a circulating pump. Do not use at location where a negative pressure is applied.

The circulating fluid pump should be prepared by the customer.

Note 4) The outline dimensions do not included protruding parts such as the foot flange and tube.

Temperature Controller Specifications

Temperature controller model		HED003-C2A	HED003-C2B	HED005-C2A	HED005-C2B	HED007-C2A	HED007-C2B
Communication		RS-485	RS-232C	RS-485	RS-232C	RS-485	RS-232C
Control method		Cooling/Heating automatic shift PID control					
Operating temp. range		10.0 to 60.0°C (no condensation)					
Temperature stability ^{Note 1)}		Within ±0.1°C (with stable load)					
Temperature sensor		Resistance thermometer Pt100 Ω, 3-wires, class A, 2 mA (for both internal control sensor and external sensor) The external sensor should be prepared by the customer.					
Main functions		Auto-tuning, Sensor fine adjustment, Offset, Learning control, External sensor control, Set value memory, Upper/lower temperature limit alarm, Output shutdown alarm, Remote ON/OFF, Leakage detection					
Ambient		Temperature: 10 to 35°C, Humidity: 35 to 80%RH (no condensation)					
Power supply spec.	Power supply	Single-phase: 180 to 242 VAC 50/60 Hz					
	Rated current	3A		5A		14A	
Dimensions ^{Note 2)}		W100 mm x D320 mm x H215 mm (W3.94" x D12.6" x H8.46")		W140 mm x D350 mm x H215 mm (W5.51" x D13.8" x H8.46")		W165 mm x D447 mm x H215 mm (W6.50" x D17.6" x H8.46")	
Mass		Approx. 6 kg (13.2 lb)		Approx. 8 kg (17.6 lb)		Approx. 13 kg (28.6 lb)	
Applied heat exchanger ^{Note 3)}		HED003-HW13 HED003-HW19		HED005-HW13 HED005-HW19		HED007-HW13 HED007-HW19	

Note 1) This value is with a stable load with no disturbance and cannot be achieved in some operating conditions.

Note 2) The outline dimensions do not included protruding parts such as the foot flange, screw and connector.

Note 3) The temperature controller should be connected with a specific series of heat exchanger. If connected with a different series of heat exchanger, it may not operate normally. (The HED003 and HED005 series use the same connector, so be careful for incorrect wiring.)

⚠ Caution

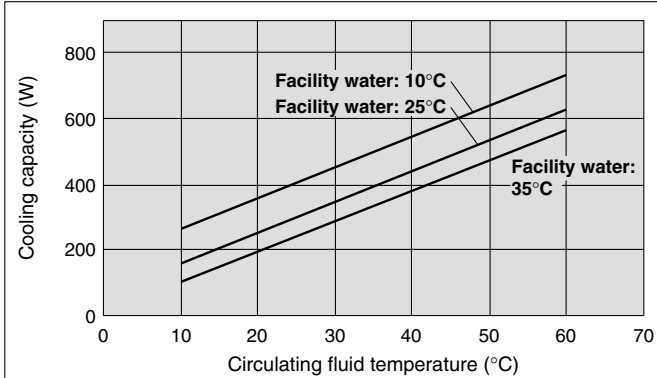
• For the combination of the heat exchanger and temperature controller, refer to "Combination in Set".

Series HED

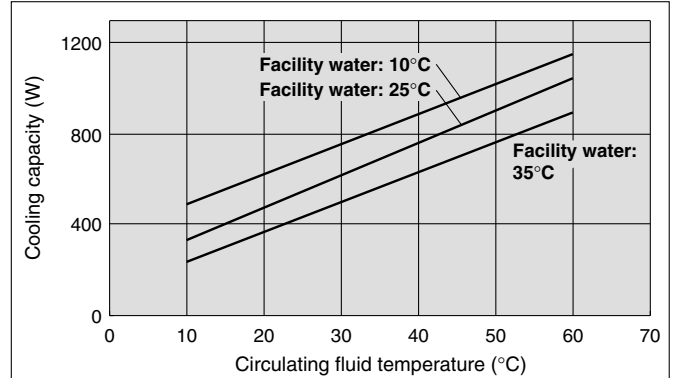
The values shown on the performance chart are representative and not guaranteed. Allow a margin for safety to device when choosing the product.

Cooling Capacity <Conditions> Circulating fluid: Water, Circulating fluid flow rate: 15 l/min, Facility water flow rate: 5 l/min

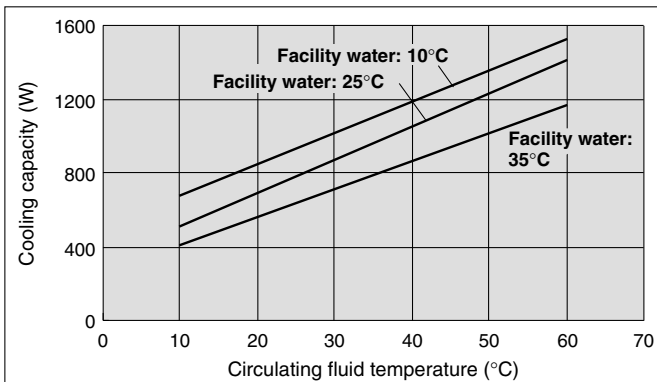
HED003



HED005

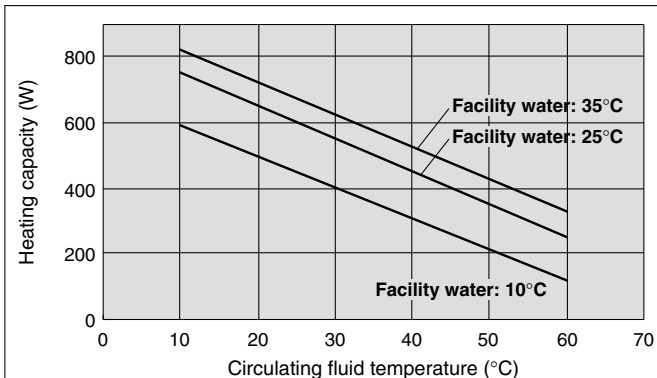


HED007

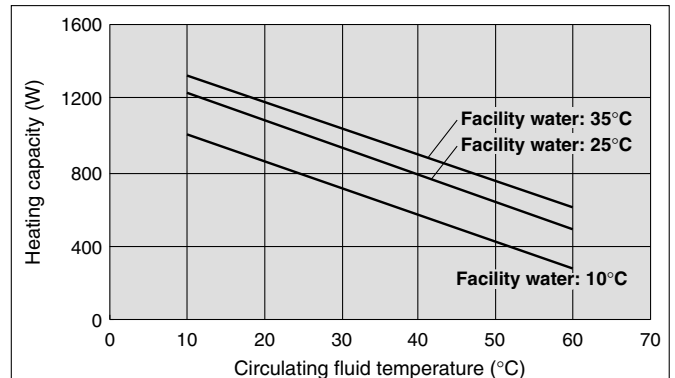


Heating Capacity <Conditions> Circulating fluid: Water, Circulating fluid flow rate: 15 l/min, Facility water flow rate: 5 l/min

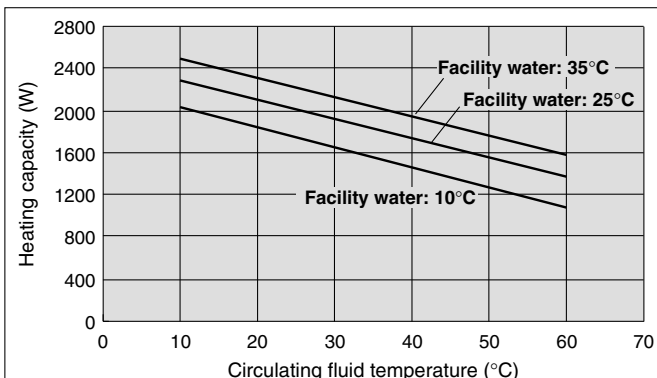
HED003



HED005

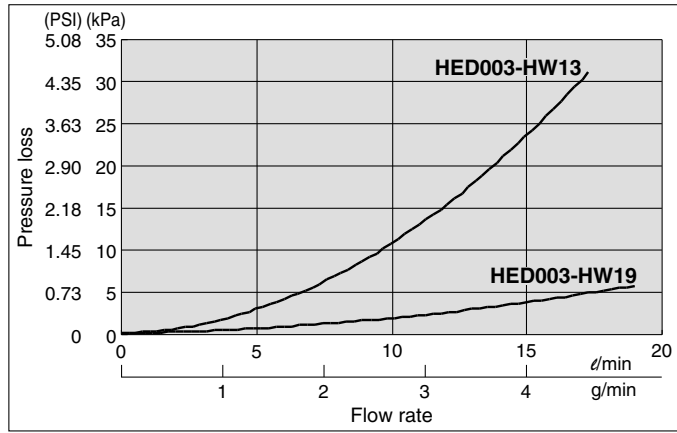


HED007

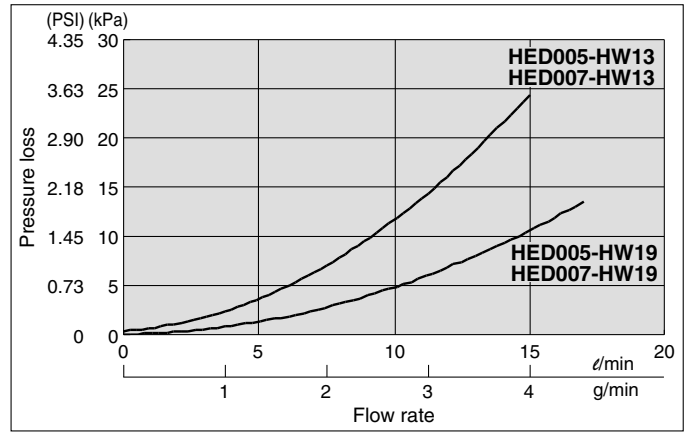


Pressure Loss in Circulating Fluid Circuit <Condition> Water

HED003

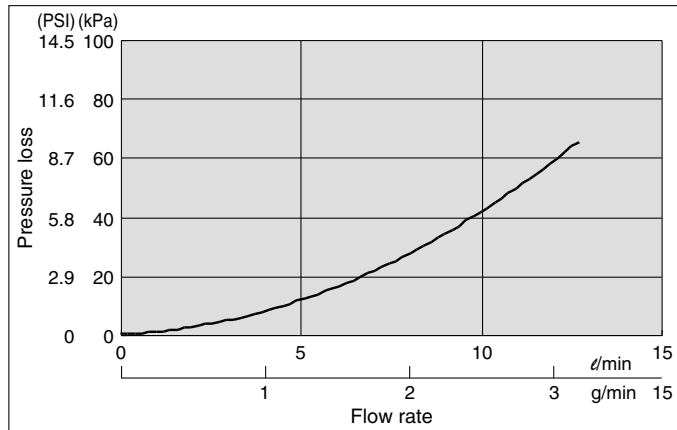


**HED005
HED007**

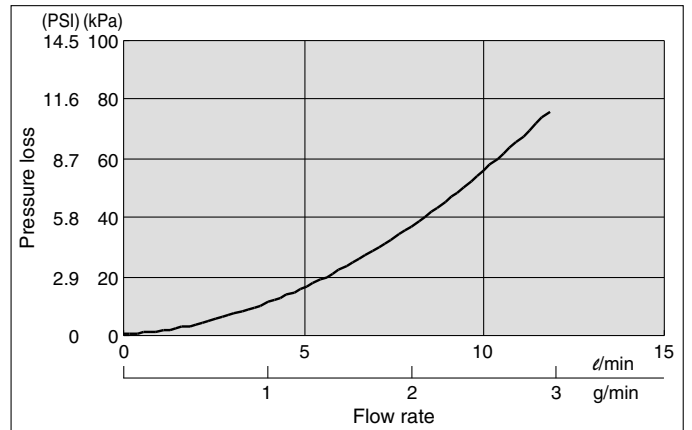


Pressure Loss in Facility Water Circuit <Condition> Water

HED003



**HED005
HED007**

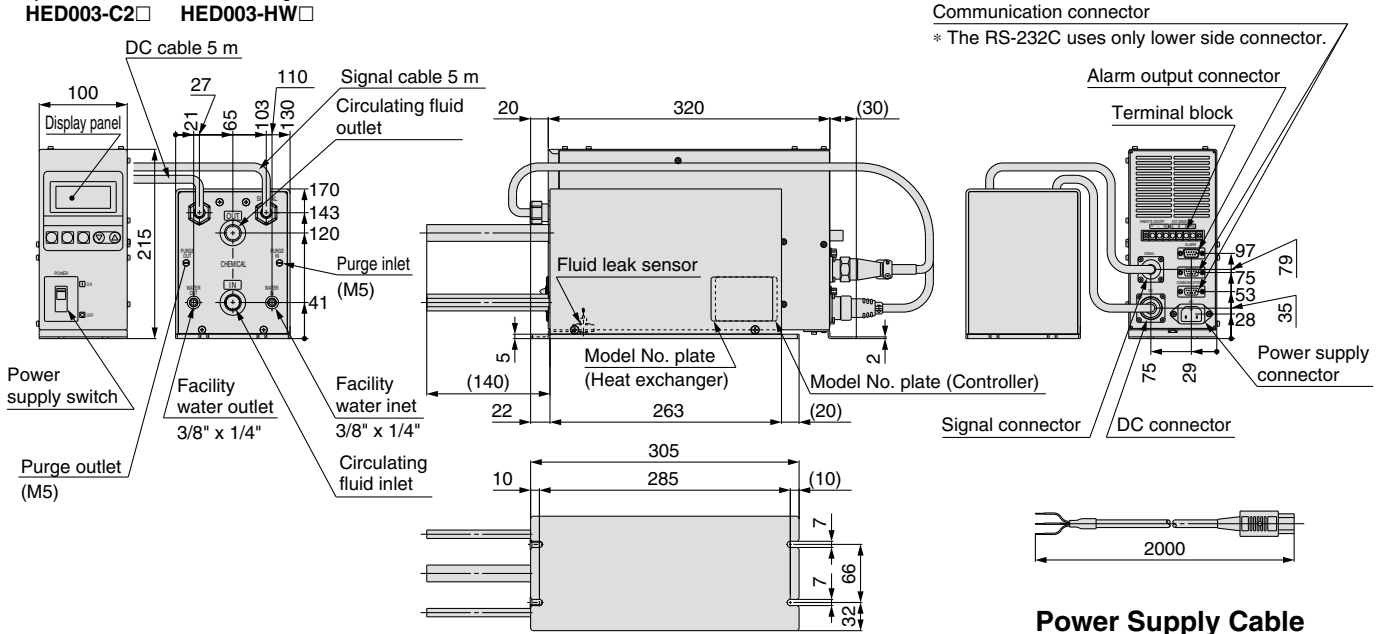


Series HED

Dimensions

HED003-W2□□

Temperature controller Heat exchanger
HED003-C2□ HED003-HW□



Circulating Fluid Tube Size

Heat exchanger model	Circulating fluid tube size
HED003-HW13	1/2" x 3/8"
HED003-HW19	3/4" x 5/8"

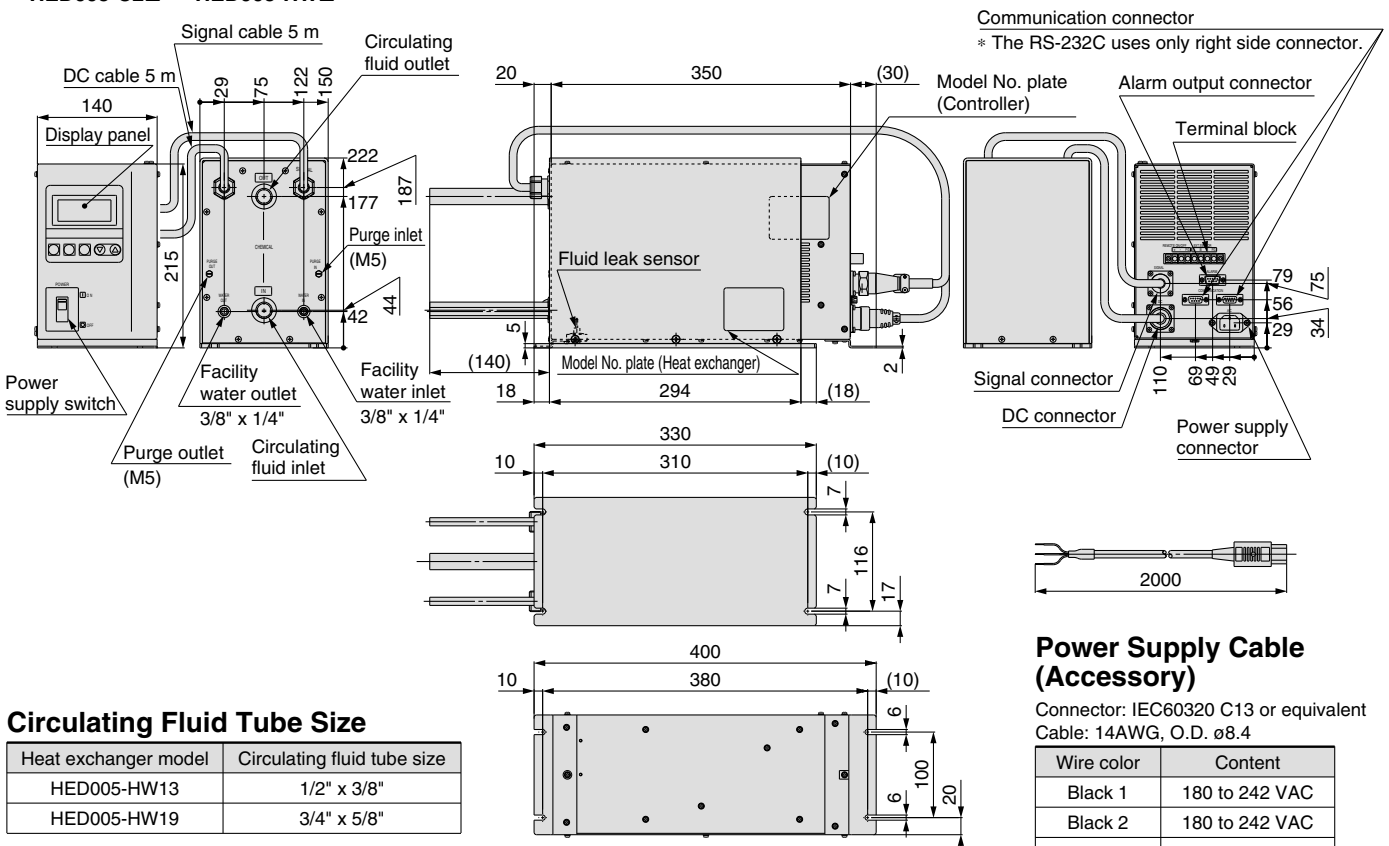
Power Supply Cable (Accessory)

Connector: IEC60320 C13 or equivalent
Cable: 14AWG, O.D. ø8.4

Wire color	Content
Black 1	180 to 242 VAC
Black 2	180 to 242 VAC
Green/Yellow	PE

HED005-W2□□

Temperature controller Heat exchanger
HED005-C2□ HED005-HW□



Circulating Fluid Tube Size

Heat exchanger model	Circulating fluid tube size
HED005-HW13	1/2" x 3/8"
HED005-HW19	3/4" x 5/8"

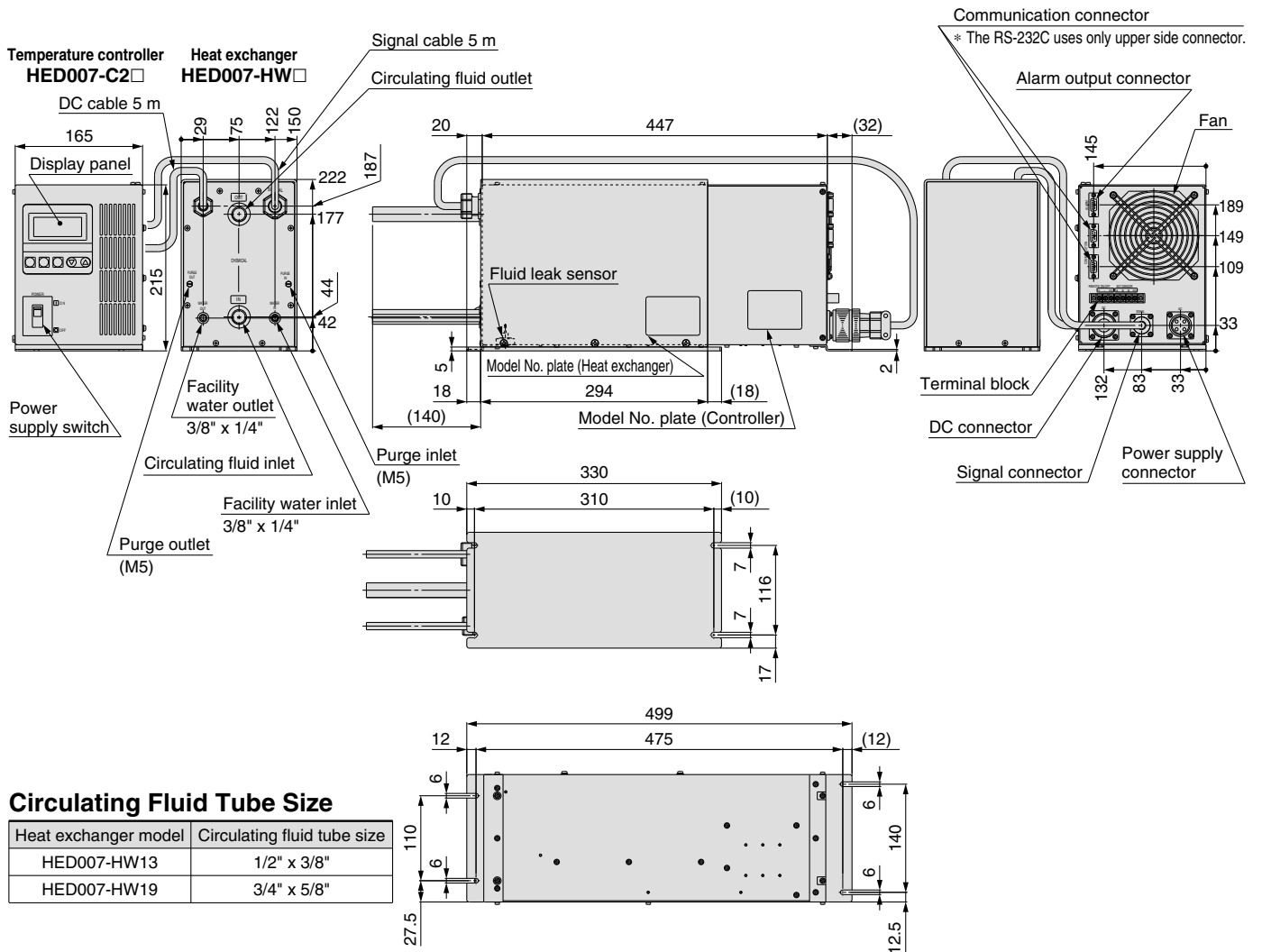
Power Supply Cable (Accessory)

Connector: IEC60320 C13 or equivalent
Cable: 14AWG, O.D. ø8.4

Wire color	Content
Black 1	180 to 242 VAC
Black 2	180 to 242 VAC
Green/Yellow	PE

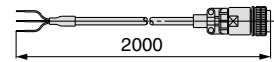
Dimensions

HED007-W2□□



Circulating Fluid Tube Size

Heat exchanger model	Circulating fluid tube size
HED007-HW13	1/2" x 3/8"
HED007-HW19	3/4" x 5/8"



Power Supply Cable (Accessory)

Connector: DDK CE05-6A18-10SD-D-BSS
Cable: 12AWG, O.D. ϕ 11.8

Wire color	Content
Black 1	180 to 242 VAC
Black 2	180 to 242 VAC
Green/Yellow	PE

Alarm

The Chemical Thermo-con has failure diagnosis function. When an failure happens, its failure mode is displayed in the LCD display on the controller and it can be read out through the serial communication. And the Chemical Thermo-con has relay outputs for upper/lower temperature limit alarm and shutdown alarm.

Alarm no.	Alarm description	Operation condition	Main reason
WRN	Upper/lower temp. limit alarm	Continue	The temperature has exceeded the upper or lower limit of the set temperature.
WRN	Remote OFF alarm	Stop	The remote ON/OFF contact is set to be off. (This alarm is not generated by the relay output.)
ERR00	CPU hung-up	Stop	The CPU has crashed due to noise, etc.
ERR01	CPU check failure	Stop	The contents of the CPU cannot be read out correctly when the power supply is turned on.
ERR03	Back-up data error	Stop	The contents of the back-up data cannot be read out correctly when the power supply is turned on.
ERR04	EEPROM writing error	Stop	The data cannot be written to EEPROM.
ERR05	EEPROM input over time error	Stop	The number of times of writing to EEPROM has exceeded the maximum value.
ERR11	DC power voltage failure	Stop	Momentary loss of AC power supply, DC power supply has excessive temperature, or the thermo-module has been short-circuited.
ERR12	Internal sensor value is high.	Stop	The internal temperature sensor has exceeded the upper limit where the Chemical Thermo-con is set to stop.
ERR13	Internal sensor value is low.	Stop	The internal temperature sensor has exceeded the lower limit where the Chemical Thermo-con is set to stop.
ERR14	Thermostat alarm	Stop	The thermostat has been activated due to insufficient flow rate of the circulating fluid or facility water or high temperature.
ERR15	Output failure alarm	Continue	The temperature cannot be changed even at 100% output, due to overload or disconnection of the thermo-module.
ERR17	Cutoff/short of internal sensor	Stop	The internal temperature sensor has been disconnected or short-circuited.
ERR18	Cutoff/short of external sensor	Continued by normal control	The external temperature sensor has been disconnected or short-circuited. (Only detected when in learning control, auto-tuning operation 2, or external sensor control)
ERR19	Auto-tuning failure	Stop	Auto-tuning has not been completed within 60 minutes.
ERR21	Fan alarm	Stop	The air-cooled fan alarm of the power supply has been activated.
ERR22	Leak alarm	Stop	The fluid leak sensor has detected leakage of fluid.

Maintenance

Please prepare back-up equipment as necessary to minimize the downtime.

1) Heat exchanger

The heat exchanger will not be repaired in principle.

Only the return to SMC for an investigation within warranty will be accepted. The return unit has to be completely decontaminated with appropriate method such as use of neutralizing agent before return to SMC.

2) Temperature controller

Maintenance of the temperature controller will be performed only at SMC. SMC will not support on-site maintenance. The following parts have published life time. To make a maintenance return schedule is recommended based on the following parts life expectation.

Parts Life Expectation

Description	Expected life	Possible failure
Fan	5 to 10 years	Lack of fan cooling because of the life time of the bearing. It will activate the overheat protection of DC power supply and generate alarm.
DC power supply	5 to 10 years	End life of electrolytic condenser. It will generate DC power supply alarm.
Display panel	50,000 hours (approx. 5 years)	End life of backlight of LCD display.



Applicable Fluids

Chemical Compatibility Table against the Wetted Material in Chemical Thermo-con

Chemical	Operating temperature range	Compatibility
Hydrofluoric acid	10 to 40°C	○ Note 2)
Buffered hydrogen fluoride	10 to 40°C	○ Note 2)
Hydrofluoric acid and Nitric acid mixture		△
Nitric acid (except fuming nitric acid)		△
Hydrochloric acid		△
Copper sulfate solution	10 to 50°C Note) HED007 10 to 30°C	○ Note 2)
Sulfuric acid (except fuming sulfuric acid)	10 to 50°C Note) HED007 10 to 30°C	○ Note 2)
Ozone	10 to 60°C	◎
Ammonium hydroxide	10 to 60°C	○ Note 2)
Ammonia hydrogen peroxide solution	10 to 60°C	○ Note 1) 2)
Sodium hydroxide	10 to 60°C	○ Note 2)
Pure water	10 to 60°C	○ Note 1)
Ultra pure water	10 to 60°C	○ Note 1)

◎ : Excellent No effect
○ : Good Minor effect/Conditional service
△ : Fair Moderate effect—Consult SMC.



The table is to be used as a general guide only. SMC is not responsible for the accuracy of this data and assumes no obligation of liability in connection with its use. Therefore, SMC insists that all customers test and evaluate the suitability for use of the Chemical Thermo-con in its particular application before using the unit.

Note 1) Static electricity may be generated by dynamic friction with the fluid. It may make a malfunction of electric components. Any countermeasures have to be taken. An example is use of conductive PFA tube or use of metal piping with ground wire.

Note 2) Permeation of the chemical may be possible. The permeated chemical may have a moderate corrosion to inside components and it may effect their life time. In case the fluid has a possibility to generate corrosive gas, SMC recommends a nitrogen purge of the enclosure. N2 purge ports are located at the piping connection side of the heat exchanger.