

2 Semiconductor Manufacturing Process

CHEMICAL CIRCULATOR

Direct circulation type chemical isothermal device indispensable for wet process by contamination free in-line type cooling/heating unit.

Chemical Circulator performs precision temperature control of chemicals used for RCA cleaning and wet etching. This is widely employed as an element indispensable for the wet process of semiconductor manufacturing. This Chemical Circulator is newly introduced to meet the needs for an increase in cleanliness along with recent diversification of chemicals and higher megabits.

(Note) For use with high-temperature chemicals, the CS-Heater is recommended.

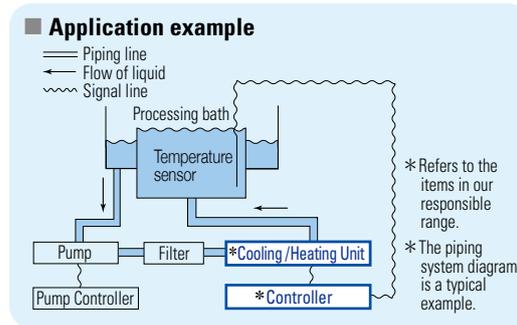
Features

1. The wet material for heat transfer in contact with the liquid in the cooling/heating unit is made from high-purity glassy carbon and is free from contamination with dissolved metallic ions. No surface protection film is necessary. Performance deterioration due to peeling of the film is therefore eliminated.
2. The seal is constructed to prevent direct contact of the rubber O ring with the liquid. Accordingly, it is not necessary to select the seal material as using each of the acid or alkaline chemicals.
3. Thermoelectric heating/cooling is appropriate for temperature control to around room temperature with high accuracy.
4. This equipment conforms with the International Protection (IP) code 31.
5. A leak sensor for chemical liquid and overheat/overcool temperature sensors, each for chemical liquid and cooling water, give safety for operation.

Applications

1. Chemicals temperature control for the wet process of semiconductor manufacturing
 - RCA cleaning liquid
 - Etching liquid
 - Development liquid of the lithography process
2. Chemicals temperature control in other fields
 - Plating liquid, various surface treatment liquids

(Note) This heater cannot be used for chemicals containing ozone.



Specifications

Model	Cooling/heating unit	NES-333-7	NES-363-7	NES-3123-7	EX-410-R
	Controller	GRT-63-R-UL	GRT-66-R-UL	GRT-612-R-UL	RX-610-R
Cooling and heating method	Water-cooled thermoelectric cooling/heating Direct circulation system with the processing bath through in-line piping				
Temperature setting range	15°C to 50°C for typical chemicals used in application 1 (Varies with the kind of chemicals, total heat capacity of the circulation system, and heat balance)				
Temperature control accuracy	±0.1°C (Varise with the conditions)				
Cooling capacity ※1		Approx. 230W (200kcal/h)	Approx. 450W (390kcal/h)	Approx. 810W (700kcal/h)	Approx. 870W (750kcal/h)
Heating capacity ※1		Approx. 580W (500kcal/h)	Approx. 1160W (1000kcal/h)	Approx. 1980W (1700kcal/h)	Approx. 2500W (2150kcal/h)
Temperature control method	Digital PID control with auto tuning function				
Temperature sensor	Platinum resistor (Pt 100Ω) built-in				Platinum resistor (Pt 100Ω) (Platinum resistor is not included in this product)
Temperature setting method	Setting by UP/DOWN key				
Temperature indicator	Four-digit digital display in 0.1°C increments				
Wetted Material in circulation	Fluorocarbon polymer, Vitrified carbon (Amorphous carbon) on the heat transfer wetted surface				
Circulation system pressure loss (at 20 ℓ/min.)		0.01MPa (0.1kgf/cm ²) or less	0.01MPa (0.1kgf/cm ²) or less	0.02MPa (0.2kgf/cm ²) or less	0.003MPa (0.03kgf/cm ²) or less
Maximum allowable liquid pressure of circulation system	0.25MPa				0.3MPa
Flow rate range of circulation liquid ※2	15 (ℓ/min) or more (Range with the upper limit not exceeding the allowable liquid pressure of circulation line)				25 (ℓ/min) or more (Range with the upper limit not exceeding the allowable liquid pressure of circulation line)
Maximum allowable water pressure of cooling system	0.5Mpa				
Temperature range of cooling water	10 to 30°C				
Flow rate range of cooling water		3 to 5 ℓ/min	4 to 6 ℓ/min	5 to 6 ℓ/min	5 to 6 ℓ/min
Safety functions	Self-diagnosis function: Power off, alarm, error indication or signal output in case of error detection				
Other functions	External communication function (RS-232C), remote ON/OFF functions, cascade control possible by adding an external sensor (PV2)				External communication function (RS-232C), remote ON/OFF functions
Overall dimension (mm) ※3	Cooling/heating unit	W136×D300×H226 Approx. 10.5kg	W156×D300×H226 Approx. 12.5kg	W280×D300×H226 Approx. 21kg	W180×D475×H230 Approx. 28kg
Weight	Controller	W150×D400×H180 Approx. 7kg	W185×D420×H267 Approx. 12kg	W220×D405×H250 Approx. 18kg	W160×D445×H290 Approx. 15kg
Pipe diameter of circulation system	PFA tube (OD 3/4"×ID 5/8")				PFA tube (OD 25mm×ID 22mm)
Power requirement (50/60Hz)	AC200/240V 8A		AC200/240V 8.5A	AC200/240V 17A	

※1 NES/GRT series (CONDITIONS) : Set temp 25°C, Ambient temp 25°C, Cooling water temp 25°C, Cooling water flow rate 5 ℓ/min, Circulation liquid flow rate 15 ℓ/min. Not including load of heat generation caused by pump circulation.
 EX/RX series (CONDITIONS) : Set temp 25°C, Ambient temp 25°C, Cooling water temp 25°C, Cooling water flow rate 5 ℓ/min, Circulation liquid flow rate 25 ℓ/min. Not including load of heat generation caused by pump circulation.
 ※2 Circulation flow should be stipulated flow rate or more. ※3 Not including the dimensions of any projections.