Applications

Semiconductor

p. 14

Etching

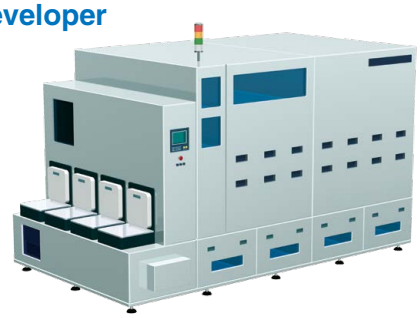
HEC
HECR
HRZ
HRW

CMP

HEC
HECR
HED
HRZ
HRW

Coater/Developer

HEC
HECR
HRZ
HRW



Tester

HRS
HRW
HRSH
HRZ
HRR

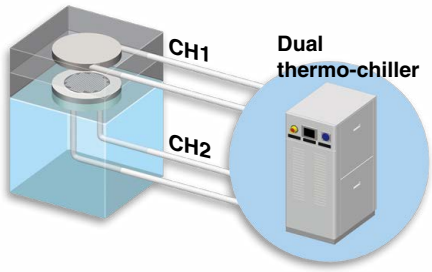
Cleaning machine

Temperature control of cleaning solution

HEC
HECR
HED
HRS
HRSH

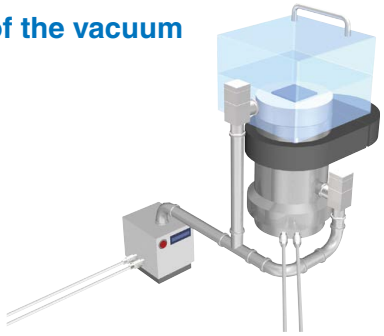
Temperature control of chamber electrode

HRW
HRZ



Cooling of the vacuum pump

HRS
HRSH

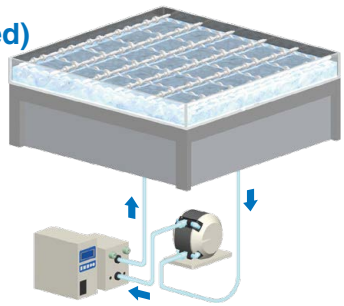


Gas cylinder cabinet

HRS
HRSH

Cleaning machine (hydrocarbon-based)

HED



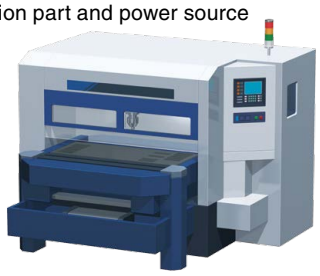
Applications

Laser p. 15

Laser beam machine/Laser welding machine

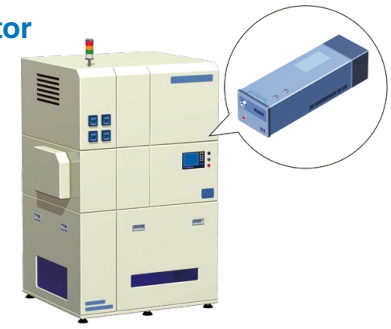
Cooling of the laser oscillation part and power source

HRS
HRSH
HRR



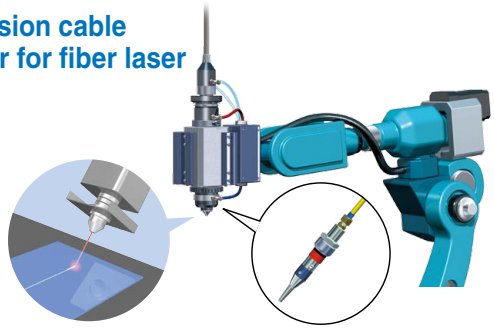
Laser oscillator

HEC
HECR
HRS
HRSH
HRR



Transmission cable connector for fiber laser

HEC
HECR
HRS
HRR



Ultrasonic wave inspection machine

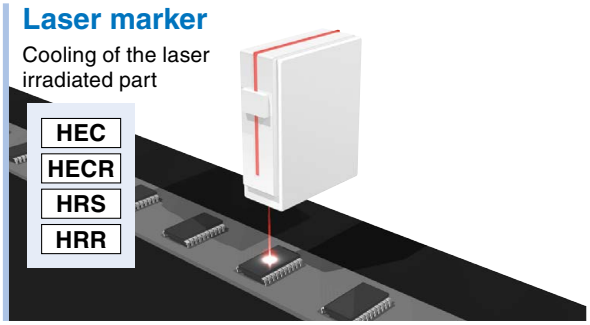
Temperature control of the ultrasonic wave laser part

HEC
HRS
HRR

Laser marker

Cooling of the laser irradiated part

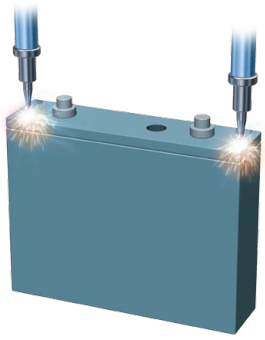
HEC
HECR
HRS
HRR



Secondary battery manufacturing process

Laser welding and cutting

HRS
HRSH
HRR



3D metal printer

HRS
HRSH
HRR

Machine Tools p. 16

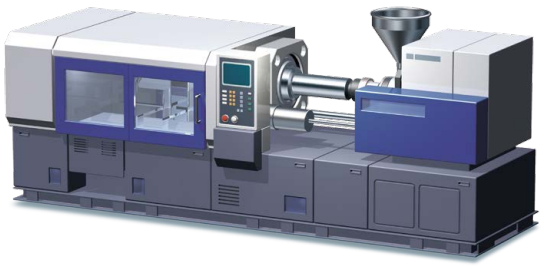
Machining center

Cooling of the spindle

HRS
HRSH

Injection molding

HRS
HRSH



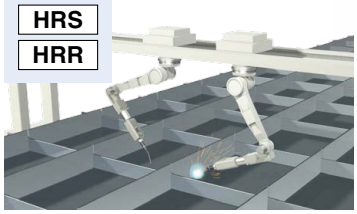
Temperature Control Equipment: Applications According to Industry

Applications

Welding Machines p. 17

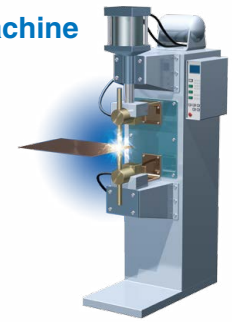
Arc welding machine
Cooling of the torch

HRS
HRR



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

HRS
HRSH
HRR



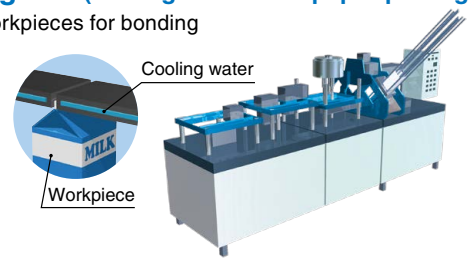
High-frequency induction heating equipment
Cooling of the heating coils, high-frequency power source and around inverters

HRS
HRSH
HRR

Food Products/Packaging Machines p. 18

Packaging line (sealing of film and paper package)
Cooling of workpieces for bonding

HRS
HRSH
HRR



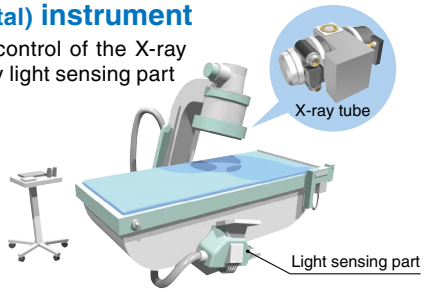
Atomizing device (food and cosmetics)
Temperature control of sample and device

HEC
HECR
HRS
HRSH
HRR

Medical

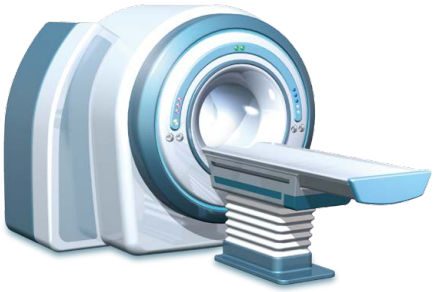
X-ray (digital) instrument
Temperature control of the X-ray tube and X-ray light sensing part

HEC
HECR
HRS
HRR



MRI

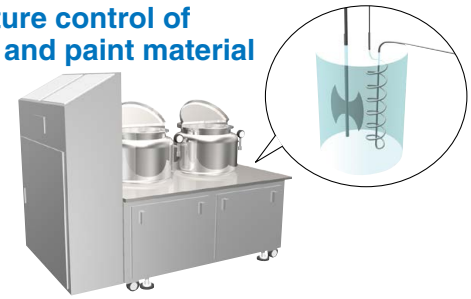
HRS
HRR



Physical and Chemical

Temperature control of adhesive and paint material

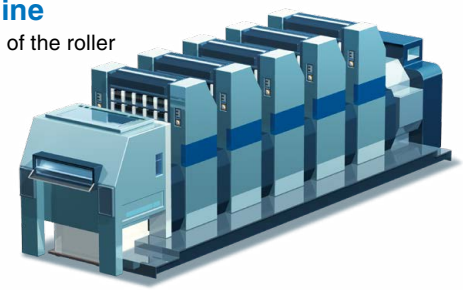
HEC
HECR
HEBC
HRS
HRSH
HRR



Printing

Printing machine
Temperature control of the roller

HRS
HRSH
HRR



Semiconductor

Semiconductor Thermo-chiller Variations

Series	Number of channels	Cooling capacity*1	Set temperature	Pump capacity*1	Temperature accuracy	Circulating fluid	Safety standards	Actual equipment
HRZD 	**2**	9.5 kW	−30 to 90°C (−30, 0, 100)	40 L/min	±0.1°C	Fluorinated fluid Ethylene glycol aqueous solution (60%)	CE, UL, SEMI	•Etching
HRZ 	**1**	10 kW	−20 to 90°C (−20, 0, 100)	40 L/min	±0.1°C	Fluorinated fluid Tap water Deionized water Ethylene glycol aqueous solution (60%)	CE, UL, SEMI	•Etching •CMP •CVD (MO) •PVD
HRS 	**1**	5.9 kW	5 to 40°C (−20, 0, 100)	42 L/min	±0.1°C	Tap water Deionized water Ethylene glycol aqueous solution (15%)	CE, MET (Only 60 Hz)	•Dicer •Implant
HEC 	**1**	0.6 kW (Air-cooled) 1.2 kW (Water-cooled)	10 to 60°C (−20, 0, 100)	10 L/min (Air-cooled) 23 L/min (Water-cooled)	±0.01°C	Tap water Ethylene glycol aqueous solution (20%) Fluorinated fluid	CE, MET, ETL (Only air-cooled type)	•Coater/ Developer •CMP •Dicer •Cleaning •Exposure
HED 	**1**	0.75 kW	10 to 60°C (−20, 0, 100)	–	±0.1°C	Deionized water Chemical liquid	CE, SEMI	•CMP •Cleaning
HRW 	**1**	30 kW	20 to 90°C (−20, 0, 100)	40 L/min	±0.3°C	Fluorinated fluid Tap water Deionized water Ethylene glycol aqueous solution (60%)	CE, UL, SEMI	•Etching •CVD •PVD

*1 The maximum capacity is displayed.

Laser

Cooling location Oscillator

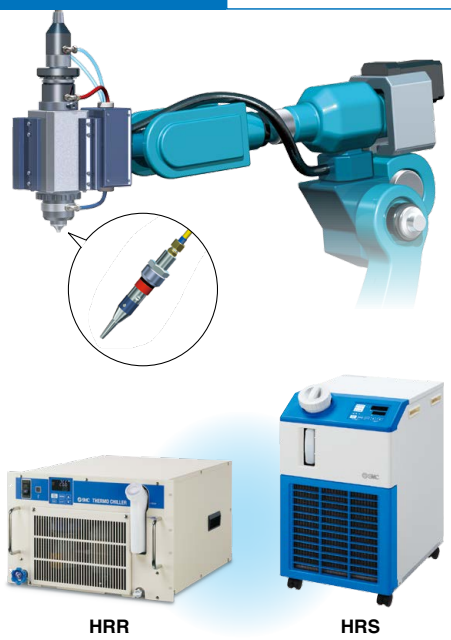
Industrial High-power Laser

Laser			Chiller	
Laser output [kW]	Energy conversion efficiency [%]	Required cooling capacity [W]*1	Chiller cooling capacity [W]	SMC chiller model
1	30	2,880	3,500	**HRS050**
	40	1,800	3,500	**HRS050**
2	30	5,640	6,000	**HRS090**
	40	3,600	6,000	**HRS090**
3	30	8,400	11,000	**HRSH100**
	40	5,400	6,000	**HRSH090**
4	30	11,400	18,000	**HRSH250**
	40	7,200	11,000	**HRS150**
5	30	14,400	15,000	**HRSH200**
	40	9,000	11,000	**HRS150**
6	30	16,800	18,000	**HRSH250**
	40	10,800	11,000	**HRS150**
7	30	19,800	24,000	**HRSH300**
	40	12,600	24,000	**HRSH300**
8	30	22,800	24,000	**HRSH300**
	40	14,400	15,000	**HRSH200**
9	40	16,200	18,000	**HRSH250**
10	40	18,000	18,000	**HRSH250**

Conditions: Circulating fluid temperature 20°C, Ambient temperature 40°C

*1 Required cooling capacity = Laser output/Energy conversion efficiency – Laser output x 1.2

Cooling location Fiber connector

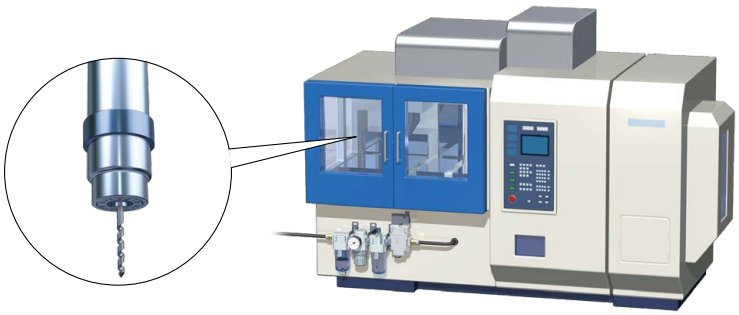


Industrial High-power Laser

Laser	Chiller	
Laser output [kW]	Chiller cooling capacity [W]	SMC chiller model
1	Up to 1,200	**HRS012(-MT)** **HRR012(-MT)**
2		
3		
4		
5		
6		
7		
8		
9		
10		

Machine Tools

Cooling location Main shaft



HRS

Machine tools main shaft			Chiller	
Main shaft output [W]	Motor efficiency [%]	Required cooling capacity [W]*1	Chiller cooling capacity [W]	SMC chiller model
22,500	85	4,764	4,800	HRS050
20,000		3,529	4,300	
15,000		3,176	3,200	
10,000		2,118	2,200	
7,000		1,482	1,500	
5,000		1,059	1,100	HRS030-T

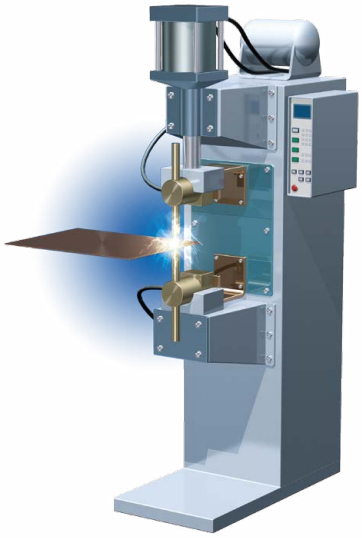
Conditions: Circulating fluid temperature 20°C, Ambient temperature 25°C

-T: High-pressure pump mounted

*1 Required cooling capacity = Main shaft output/Motor efficiency x 1.2

Welding Machines

Cooling location Transformer/Electrode



HRSH HRS

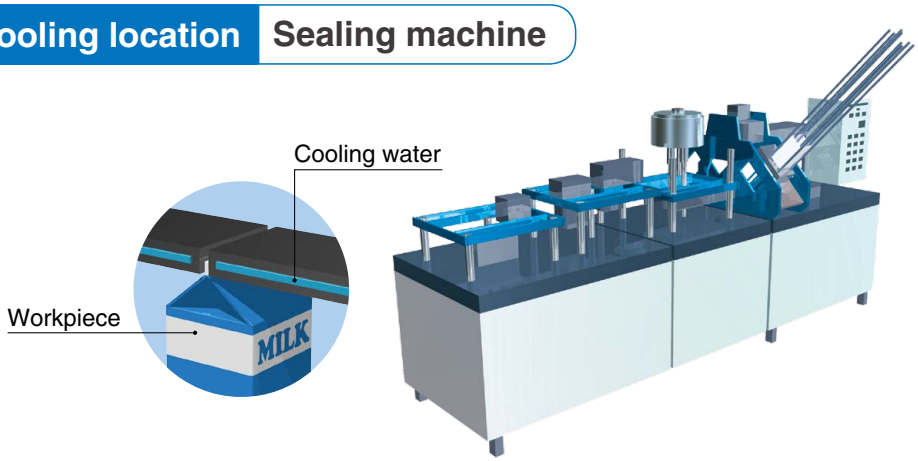
Resistance welding machine (Spot welding)			Chiller	
Max. welding current value [A]	Allowable utilization rate [%]	Required cooling capacity [W]*1	Chiller cooling capacity [W]	SMC chiller model
6,000	3	1,500	3,500	**HRS050**
	5	1,944	3,500	**HRS050**
	7	2,292	3,500	**HRS050**
	10	2,736	3,500	**HRS050**
9,000	3	2,256	3,500	**HRS050**
	5	2,904	3,500	**HRS050**
	7	3,432	3,500	**HRS050**
	10	4,104	5,200	**HRS090**
12,000	3	3,000	3,500	**HRS050**
	5	3,864	5,200	**HRS090**
	7	4,572	5,200	**HRS090**
	10	5,472	6,000	**HRSH090**
16,000	3	3,996	5,200	**HRS090**
	5	5,160	5,200	**HRS090**
	7	6,096	7,000	**HRSH100**
	10	7,296	11,000	**HRS150**
18,000	3	4,500	5,200	**HRS090**
	5	5,796	6,000	**HRSH090**
	7	6,864	7,000	**HRSH100**
	10	8,208	11,000	**HRS150**
20,000	3	4,992	5,200	**HRS090**
	5	6,444	7,000	**HRSH100**
	7	7,620	11,000	**HRS150**
	10	9,108	11,000	**HRS150**

Conditions: Circulating fluid temperature 25°C, Ambient temperature 40°C

*1 Required cooling capacity = Max. welding current value x $\sqrt{\text{Utilization rate}}$ x 1.2

Food Products/Packaging Machines

Cooling location Sealing machine



HRS

Package sealing machine			Chiller	
Maximum current [A]	Power supply voltage [V]	Required cooling capacity [W]*1	Chiller cooling capacity [W]	SMC chiller model
3	200	720	1,500	**HRS030-T**
5		1,200	1,500	**HRS030-T**
7		1,680	3,500	**HRS050**
10		2,400	3,500	**HRS050**
14		3,360	3,500	**HRS050**
25		6,000	6,000	**HRSH090**

Conditions: Circulating fluid temperature 20°C, Ambient temperature 40°C

-T: High-pressure pump mounted

*1 Required cooling capacity = Maximum current x Power supply voltage