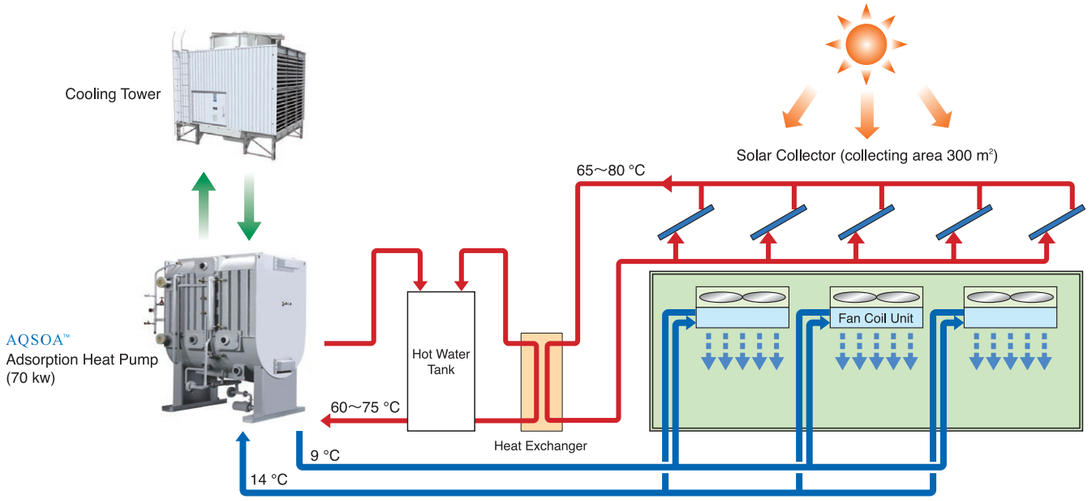
Actual installation example

Example of solar heat utilization



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AQSOA Project

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Manufactured at MAYEKAWA MFG. CO., LTD

AQSOA™ Adsorption Heat Pump was a product developed by both MITSUBISHI PLASTICS, INC. and MAYEKAWA MFG. CO., LTD, and is sold by both companies.
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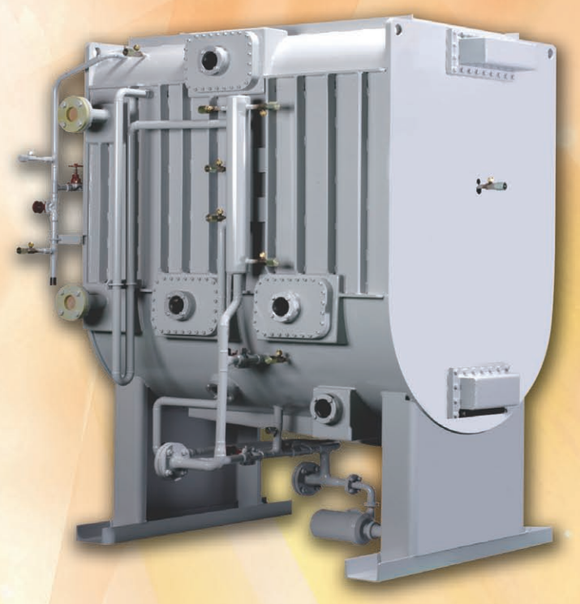
MITSUBISHI PLASTICS

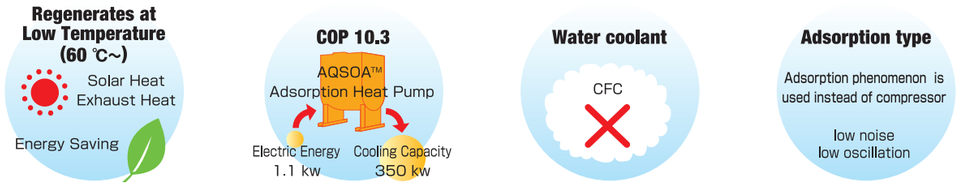
Zeolitic Water Vapor Adsorbent

AQSOA™

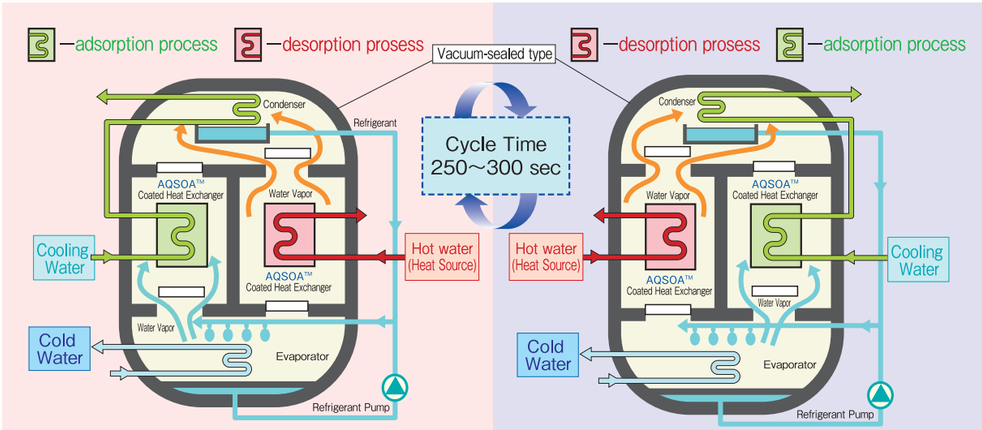
AQSOA™ Adsorption Heat Pump



Main features of AQSOA™ Adsorption Heat Pump



Operating Principle



Water (refrigerant) evaporates in the evaporator. Cold water is generated by the evaporative latent heat.
The vapor is adsorbed by the adsorption heat exchanger. Adsorption heat is generated by the adsorption heat exchange and removed by cooling water to improve adsorption process.
The adsorbed vapor is removed from the other adsorption heat exchanger by hot water.

Comparison of cooling system (Mitsubishi Plastics data)

A highly effective cooling is achieved by effective use of exhaust heat. (COP10.3)

The electric energy is only 1.1 kw.

Cooling capacity : 350 kW, Cold water : 7~9 ℃, 50 Hz Area

	AQSOA™ Adsorption Heat Pump	Turbo refrigerator	Air cooling chiller	Steam absorption chiller
Driving force source	Exhaust Heat (Hot Water)	Electric heater	Electric heater	Steam
Refrigerant	Water (H_2O)	HFC (R134a)	HFC (R407c)	Lithium bromide
Cooling Capacity	350 kW (at 9 ℃)	387 kW (at 7 ℃)	355 kW (at 9 ℃)	352 kW (at 7 ℃)
Device rating power Auxiliary driving power included	34.1 kW Main machine (1.1 kW)	92.4 kW Main machine (85 kW)	81.2 kW Main machine (74 kW)	16.2 kW Main machine (5.2 kW)
Steam	–	–	–	390 kg/h
Amount of CO_2 emissions (t/year)	113.6	307.7	270.4	467.6
COP※2 (Cooling capacity÷Device rating power)※3	10.3	4.2	4.4	1.1

CO_2 emission coefficient Electric Energy 0.555 kg-CO_2/kWh A fuel oil 2.71 kg-CO_2/L Operating time 6,000 h/year

※1 ●AQSOA™ Adsorption Heat Pump
: Circulating cooling water pump, Cooling tower fan, Hot water pump
●Turbo refrigerator
: Circulating cooling water pump, Cooling tower fan
●Air cooling chiller
: Air cooling fan
●Steam absorption chiller
: Circulating cooling water pump, Cooling tower fan
※2 Coefficient of Performance
※3 Adsorption Heat Pump (Generation calorie÷Input calorie)

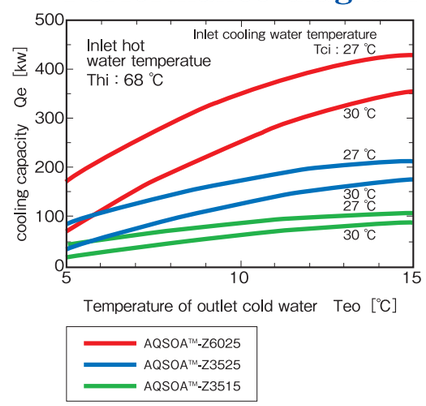
Improvements over conventional type

	Conventional type		New type
Adsorbent	Silica gel (Filling type)	Performance improvement and cost reduction	AQSOA™ (Coating type)
Structure	Separate type (The main composition equipment is connected by piping.)	Size and weight reduction	Monocock
Switch at cycle	Steam valve activated by separately generated pressurized air	Size and cost reduction	Self-driving type switch valve activaled by vapor (pressure difference)

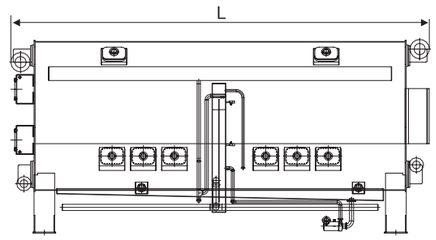
Standard Unit Specifications

Term		Model	AQSOA™-Z3515	AQSOA™-Z3525	AQSOA™-Z6025
Cooling Capacity		kw	88	175	350
Heat source condition	Inlet temperature	℃	68	68	68
	Flow rate	m³/h	21.3	42.5	85.0
	Pressure loss	MPa	0.030	0.030	0.030
Cooling water condition	Inlet temperature	℃	30	30	30
	Flow rate	m³/h	50.0	99.0	198.0
	Pressure loss	MPa	0.098	0.098	0.098
Cold water condition	Outlet temperature	℃	15	15	15
	Flow rate	m³/h	12.1	24.3	48.7
	Pressure loss	MPa	0.078	0.078	0.078
Refrigerant Pump	Power	kw	0.55	0.55	1.1
Vacuum pump	Power	kw	0.4	0.4	0.75
Externals size	Length	mm	3,700	3,700	6,100
	Width	mm	1,500	2,450	2,450
	Height	mm	2,800	2,800	2,800
Unit empty weight		kg	6,600	10,000	15,000

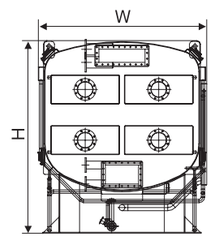
Performance diagram



〈standard design conditions〉
・Temperature of inlet hot water : 60~80 ℃・Temperature of outlet cold water : 5~25 ℃・Temperature of inlet cooling water : Under 32 ℃
※Please consult about conditions other than the above.
※The specification and/or external appearance might change without previous notice along with improvements to the product.
※The control board is attached to the main body.



<Side view>



<Frontal view>

HISHI COOLING TOWER™ cooling tower is recommended as cooling water source.

Term		Model	AQSOA™-Z3515	AQSOA™-Z3525	AQSOA™-Z6025
Open type	Low noise type		HT-100ME-Ri	HT-200ME-Ri	HT-400ME-Ri
	Ultra-low noise type		HT-100MQ-Ri	HT-200MQ-Ri	HT-400MQ-Ri
Closed type	Low noise type		HT-100PE-Ri	HT-200PE-Ri	HT-400PE-Ri
	Ultra-low noise type		HT-100PQ-Ri	HT-200PQ-Ri	HT-400PQ-Ri

※Conditions : Outside air wet bulb temperature of 27 ℃, Inlet air temperature of 35 ℃.
※Please contact us for detailed information.