

CO₂ (R744) HEAT PUMP

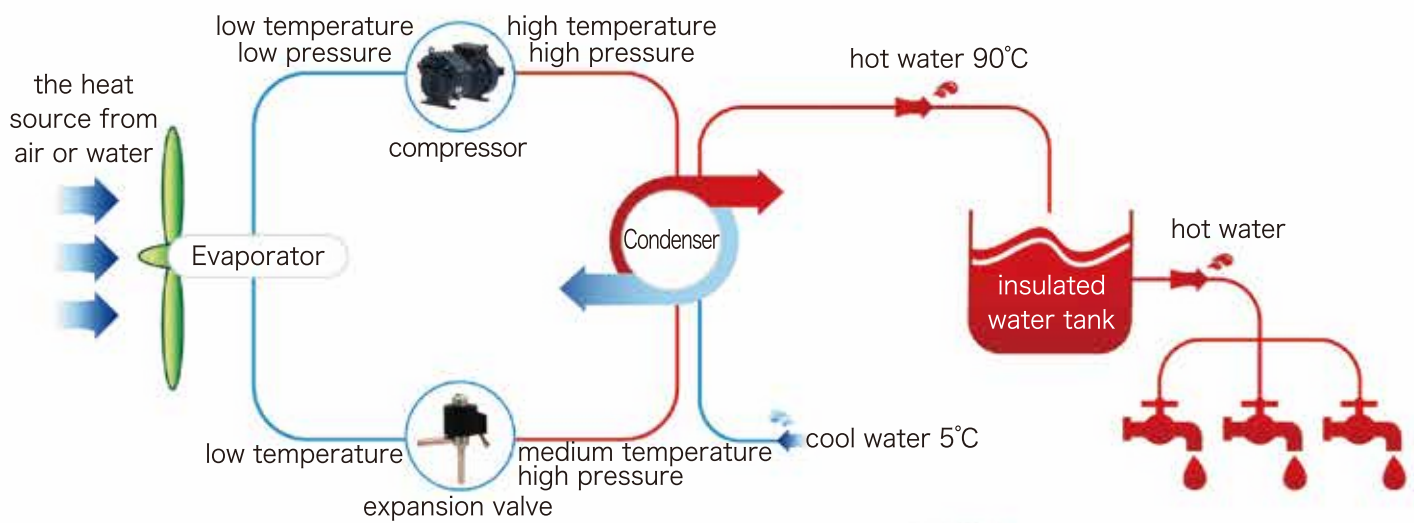
High-Temperature | Energy-Saving | Environment Friendly



Principles and Applications of Heat Pumps

The Principle of CO₂ heat pump

CO₂ Heat pump water heater utilizes the heat energy from air or water. It undergoes heat exchange with the refrigerant through an external heat exchanger, then the heat energy is further compressed into high temperature and high pressure by the compressor. Subsequently, it heats the terminal water source through an internal heat exchanger. Due to the characteristics of CO₂ (R744) refrigerant, it can heat water up to 98 degrees Celsius and operate in extremely low temperature environments.

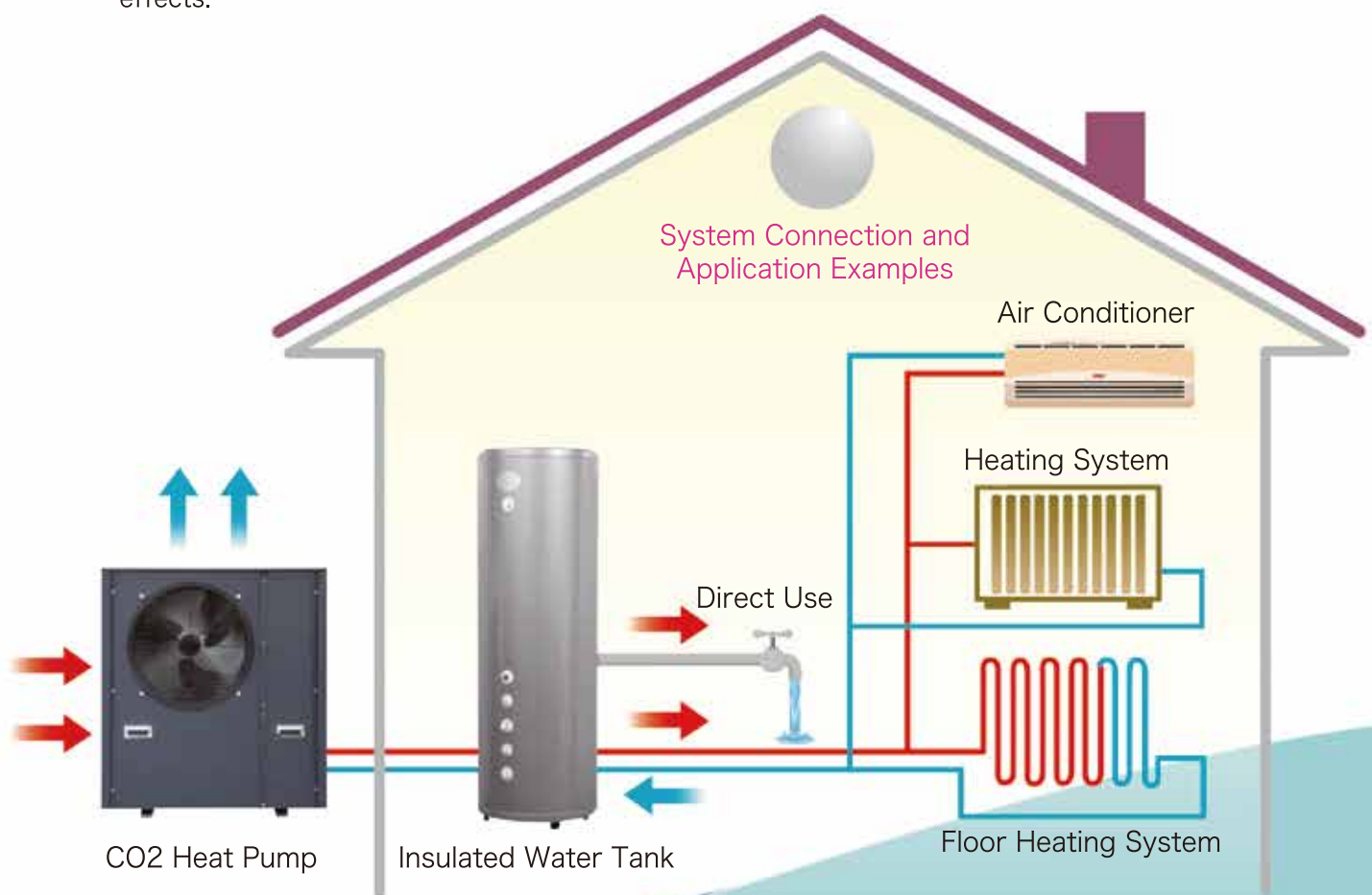


Operating temperature: -43°C ~ 43°C
Outlet water temperature: 35°C ~ 98°C
Suitable for various environments:
factories, hospitals, hotels, and households.



Features of CO2 Heat Pumps

- A. Using direct heating design, the temperature of output water matches the set temperature, capable of heating up to 98° C, suitable for a wide range of applications.
- B. Adaptable to low-temperature environments, maintaining high-efficiency heating even during cold snaps.
- C. COP can reach 5 or above, and with the addition of cooling applications, COP can be higher than 7.
- D. For saving energy, variable frequency control adjusts automatically according to operating conditions.
- E. With modular design device units can be parallel connected easily.
- F. 6 layers of safety pressure protection ensure the equipment operates safely in all aspects.
- G. Intelligent variable frequency defrosting system maintains high efficiency and energy savings during defrosting.
- H. Built-in RS485/Modbus control compatible with central control system, and can be equipped with remote control systems.
- I. Equipped with graphical touchscreen, providing clear visibility of the unit's status.
- J. Can be simultaneously designed for heating and hot water to achieve multi-purpose and energy-saving effects.



Air to Water Heat Pump Systems

《SPECIFICATION》

Parameters \ Model		PD-7TW (250L)	PD-8TW	PD-14TW(-M)	PD-40TW	PD-75TW	PD-120TW	PD-160TW
Standard temperature condition	Heating capacity(kW)	7.8	8.3	13.6	40	75.5	125.4	163
	Hot water capacity(L/H)	149	158	259.8	764	1442	2396	3114
	Heating power input(kW)	1.7	1.8	3	9	16.7	26.6	36.1
	COP(W/W)	4.58	4.6	4.6	4.4	4.5	4.7	4.51
Low temperature condition	Heating capacity(kW)	7	7.5	12.1	35	64	95	147
	Hot water capacity(L/H)	118	126.4	203.9	590	1079	1602	2478
	Heating power input(kW)	1.7	1.78	3	9.4	16.8	24.6	33.2
	COP(W/W)	4.1	4.2	4.1	3.7	3.8	3.9	4.4
Ultra-Low temperature condition	Heating capacity(kW)	6.5	6.8	11.2	28	49.1	78	104
	Hot water capacity(L/H)	109	114.6	188.8	472	826	1315	1753
	Heating power input(kW)	1.71	1.74	2.9	10.1	16.8	26	33.6
	COP(W/W)	3.8	3.9	3.9	2.8	2.9	3	3.1
Power supply		1Φ3W 220 ~ 240V/50 ~ 60HZ			3Φ4W380 ~ 440V/50 ~ 60HZ			
Heating type		Instant						
Rated output water temperature		45℃						
Maximum output water temperature		95℃						
Work ambient temperature		-25℃ ~ 43℃						
Compressor	Type	Panasonic			Dorin			Bitzer
Circulation	Brand	Nidec (DC)			Wilo(Inverter AC)			
water pump	Power (kW)	0.05	0.05	0.08	0.37	0.55	1.1	1.85
Defrosting type		Bypass						
Water connection pipe size		DN15	DN20			DN25	DN32	DN40
Water side heat exchanger		Tube-Tube type						
Air side heat exchanger		High efficiency copper tube(Interior Screw) nested in aluminium fin						
Refrigerant		R744(CO2)						
Controller		CAREL(Italy)						
Dimensions	Length (mm)	850	910	1060(700)	1803	2046	2468	3855
	Width (mm)	680	488	488(850)	830	1106	1368	1123
	Height (mm)	2060	1000	1380(1088)	2100	2300	2413	2108
Unit noise level dB(A)		45	46	48	57	60	65	70
Net weight (kg)		132	130	200	680	980	1350	2200
Inverter		DC Inverter			AC Inverter			
Note: 1. Standard temperature condition: Ambient temperature 20℃ ,Water temperature: inlet 15℃ ,outlet 60℃ 2. Low temperature condition: Ambient temperature 7℃ ,Water temperature: inlet 9℃ ,outlet 60℃ 3. Ultra-Low temperature condition: Ambient temperature -7℃ ,Water temperature: inlet 9℃ ,outlet 60℃								

Water to Water Heat Pump Systems

《SPECIFICATION》

Model		PDS-8TW	PDS-14TW	PDS-40TW	PDS-75TW	PDS-120TW	PDS-160TW	PDS-250TW
Parameters								
Hot Water Side inlet 15°C, outlet 55°C	Heating capacity(kW)	8.00	14.00	39.3	76.3	118	156	250
	Hot water capacity(L/H)	172	301	750	1450	2256	2980	4350
	Heating power input(kW)	1.56	2.85	8.1	16.5	25	37.1	62
	COP	5.1	4.9	4.8	4.6	4.7	4.2	4.03
Cool Water Side inlet 12°C, outlet 7°C	Cooling capacity(kW)	6.44	11.15	31	59.8	86.2	118.9	185
	Cool water capacity(L/H)	1107	1917	6000	10000	14500	20400	33870
	COP(W/W)	4.12	3.91	3.82	3.63	3.45	3.2	2.98
Power supply	Ph/V/Hz	1Φ3W/208 ~ 240V/50-60Hz		3Φ4W/380 ~440V/50-60Hz				
Heating type		Direct						
Output water temperature(°C)		45~90						
Input water temperature(°C)		5~50						
Water source temperature(°C)		5~30						
Compressor	Type	Panasonic		Dorin(Italy)			Bitzer(Germany)	Dorin(Italy)
Circulation water pump	Brand	Nidec		Wilo				
	Power(kW)	0.05		0.37	0.55	1.1	1.5	2
Hot water connection size(mm)		DN15		DN20	DN25	DN32	DN40	DN60
Cool water connection size(mm)		DN15		DN32	DN40	DN50	DN80	DN100
water heat exchanger	Type	Tube Type/PHE						
Refrigerant	Type	R744/CO2						
Controller	Brand	CAREL						
Dimensions	Length (mm)	700		1500/800	1742/800	900	900	1750
	Width(mm)	700		900	996/900	900	900	900
	Height(mm)	1088		1285/1906	1540/1906	1910	1910	1625
Unit noise level	dB(A)	44	48	49	50	54	65	75
Net weight	kg	120	160	450	790	850	900	2800
Inverter (VFD)		DC		AC				

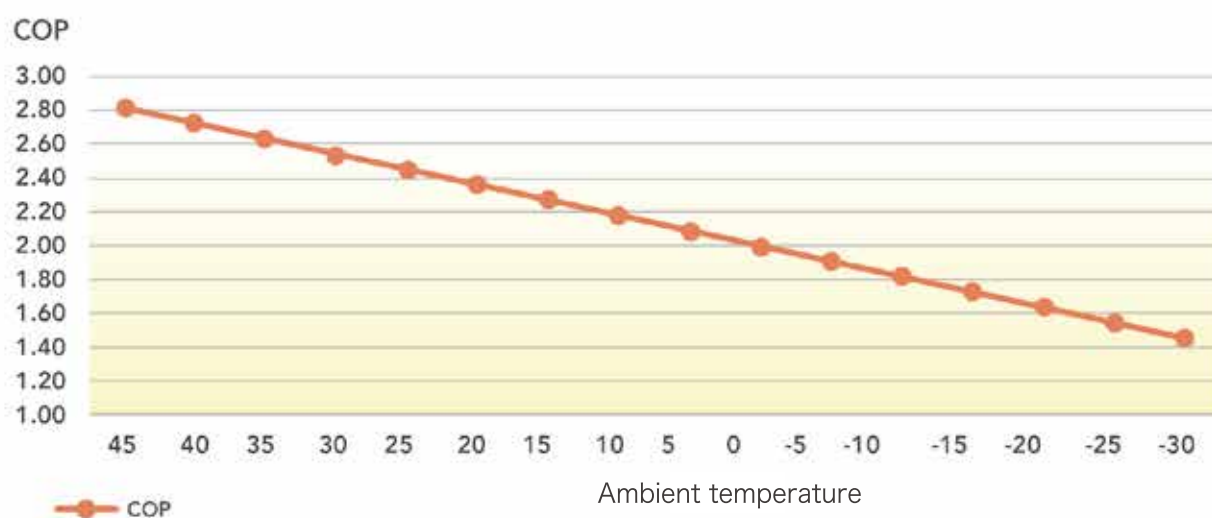
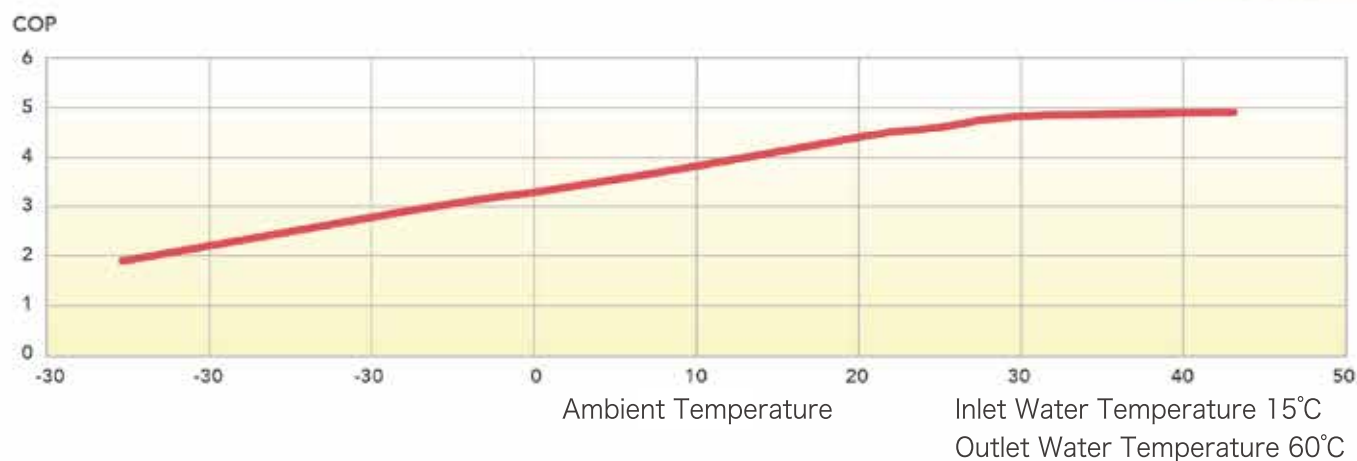
Air to Air Heat Pump Systems

《SPECIFICATION》

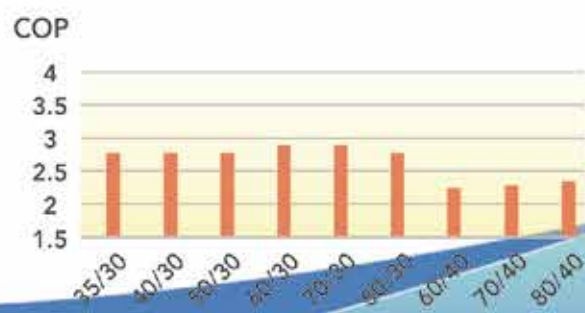
	Model	40TW			75TW			120TW		
Ambient(℃)	In/Out Air(℃)	Heating Capacity(kW)	Power Input (kW)	COP W/W	Heating Capacity(kW)	Power Input (kW)	COP W/W	Heating Capacity(kW)	Power Input (kW)	COP W/W
6 ~ 7℃	20->45	36	7.7	4.67	57	12.1	4.74	114	23.25	4.9
	20->60	34.3	7.7	4.44	55.5	12.5	4.44	110.5	25.1	4.4
	20->85	33.1	10.1	3.27	56.1	16.5	3.4	108.1	33.5	3.22
-15℃	20->45	19.6	7.12	2.75	32.1	11.5	2.79	64.2	23.1	2.77
	20->60	19	7.4	2.56	31.2	12.1	2.57	62.5	24.2	2.58
	20->85	18.1	8.2	2.2	30.2	14.2	2.16	61.2	28.2	2.17
-25℃	20->45	14.3	6.8	2.1	23.4	10.4	2.25	47.2	20.8	2.26
	20->60	13.8	6.8	2.02	22.8	10.5	2.17	45.2	21.1	2.14
	20->85	10.5	6.8	1.54	17.4	10.8	1.61	34.5	21.5	1.
Horizon AHU	Size(mm)	1480*1330*720			1750*1330*720			2400*1330*820		
	Air Volume(m3/h)	5000			9000			12000		
	Air Pressure(Pa)	250			230			300		
	Fan Motor Power(kW)	1.5			1.5			3		
	Weight(Kg)	338			500			535		
	Noise(dB)	50			55			60		
Vertical AHU	Size(mm)	1170*600*2130			1800*630*2130			1800*630*2130		
	Air Volume(m3/h)	5000			6000			12000		
	Air Pressure(Pa)	90			230			210		
	Fan Motor Power(kW)	0.8			1.65			1.8		
	Weight(Kg)	254			294			480		
	Noise(dB)	55			60			65		
Outdoor Unit	Heating Type	Direct								
	Compressor	13*1			20*1			35*1		
	Power Supply	380V ~ 440V/50 ~ 60HZ/3PH								
	Max Current	28A			38A			75A		
	Max Power Input	18kW			25kW			50kW		
	Weight (Outdoor)	480			850			1200		
	Size(mm)	1803*830*2100			2045*1108*2300			2470*1370*2415		
	Max Pressure(Mpa)	12								
	Refrigerant	R744/CO2								
	Evaporator	Fin Copper Tube Evaporator								
	Defrosting Type	Bypass								
	Connection Size	Φ9.52-φ15.88			Φ12.7-φ22			Φ15.88-φ22		
	Working Ambient (℃)	-30℃ ~ 43℃								
	Noise(Outdoor)	55			65			75		

Ambient Temperature-COP

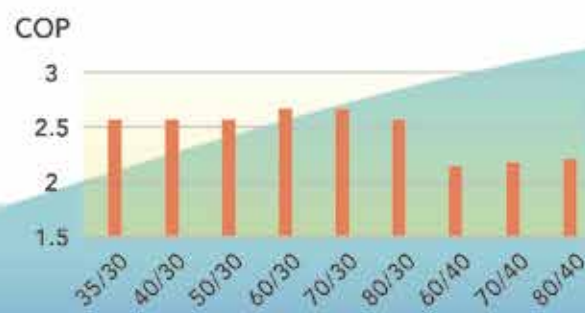
《SPECIFICATION》



Test conditions: Inlet Water Temperature 15°C
Outlet Water Temperature 98°C



5°C Ambient



-5°C Ambient

High Temperature Heat Pump

one step steam system

《SPECIFICATION》

	Spec \ Model	GS-75TW-Z	GS-150TW-Z	GS-200TW-Z	GS-260TW-Z	GS-400TW-T
60°C Hot Water or 120°C Steam	Heating Capacity(kW)	70	140	210	280	421
	Air / Water Volume(m ³ /h)	0.096/12	0.192/24	0.288*36	0.384/48	0.58/72.3
	Input Power(kW)	25	50	75	100	188.5
	COP(W/W)	2.8	2.8	2.8	2.8	2.23
	Power Supply	380~415V / 50-60Hz 3Φ4W				
	Heat Source Water Volume(m ³ /H)	8	16	24	32	40
	Output Water / Steam Temperature(°C)	95 ~ 125				
	Heat Source Temperature(°C)	30 ~ 90				45 ~ 90
	Connection Source / Sink	DN32/DN40	DN50/DN65	DN65/DN80	DN80/DN100	DN100/DN125
Size	Length (mm)	1750	1750	2600	2600	2600
	Width (mm)	900	900	1500	1500	1500
	Height (mm)	1622	1622	1900	1900	1900
	Noise dB(A)	65	68	70	72	75
	Weight (kg)	500	1000	1500	2000	2800

- High-Temperature/ Steam Heat Pump (HTHP)
- 130kW heating capacity, 380V ~ 440V power supply
- 0.25 tons/ hour steam output
- Dry heat/ space heating/ industrial heat recovery
- Capable of heating up to 130° C
- Heats low-grade water or recovers waste heat into high-temperature steam for industrial use.
- A sustainable and energy-saving solution

High Temperature Heat Pump

one step steam system

《Performance Parameters》

Performance			Water Source Temperature °C							
Output Temperature (°C)	Condensation Temperature (°C)		27	30	35	40	45	50	55	60
130	135	Heating Capacity(kW)	Heat Source Temperature Too Low	Heat Source Temperature Too Low	Heat Source Temperature Too Low	Heat Source Temperature Too Low	50.93	55.97	61.39	67.9
		Power input(kW)					27.68	28.08	28.27	28.39
		COP					1.8	2	2.2	2.4
125	130	Heating Capacity(kW)	29.85	33.39	39.36	45.59	51.02	56.35	62.3	69.55
		Power input(kW)	21.96	22.27	22.31	23.49	24.21	24.62	24.85	25.05
		COP	1.4	1.5	1.8	1.9	2.1	2.3	2.5	2.8
115	120	Heating Capacity(kW)	27.63	31.61	39.08	45.11	50.81	56.87	64	72.9
		Power input(kW)	18.02	18.32	18.46	19.47	20.1	20.48	20.77	21.1
		COP	1.5	1.7	2.11	2.3	2.5	2.8	3.1	3.5
105	110	Heating Capacity(kW)	25.07	29.58	38.69	44.68	50.79	57.73	66.2	76.91
		Power input(kW)	15.81	16.07	16.28	17.09	17.59	17.92	18.22	18.64
		COP	1.6	1.8	2.4	2.6	2.9	3.2	3.6	4.1
95	100	Heating Capacity(kW)	22.77	27.89	38.8	44.89	51.57	59.54	69.5	82.15
		Power input(kW)	14.12	14.33	14.57	15.15	15.48	15.72	16.01	16.49
		COP	1.6	1.9	2.7	3	3.3	3.8	4.3	5

High Temperature Heat Pump

cascaded steam systems

《Performance Parameters》

Water Temperature	Spec \ Model	GS-75TW	GS-150TW	GS-200TW	GS-260TW
30°C	Heating Capacity(kW)	57.6	115.2	172.8	230.4
	Air / Water Volume(m ³ /h)	0.079/10	0.158/20	0.237/30	0.317/40
	Power input(kW)	28.8	57.6	86.4	115.2
	COP(W/W)	2	2	2	2
20°C	Heating Capacity(kW)	56.4	112.8	169.2	225.6
	Air / Water Volume(m ³ /h)	0.077/10	0.154/20	0.231/30	0.31/40
	Power input(kW)	29.5	59	88.5	118
	COP(W/W)	1.91	1.91	1.91	1.91
10°C	Heating Capacity(kW)	57.6	115.2	172.8	230.4
	Air / Water Volume(m ³ /h)	0.079/10	0.158/20	0.237/30	0.317/40
	Power input(kW)	36.1	72.2	108.3	144.4
	COP(W/W)	1.6	1.6	1.6	1.6
Power Supply		380V~415V / 50~60Hz 3Φ4W			

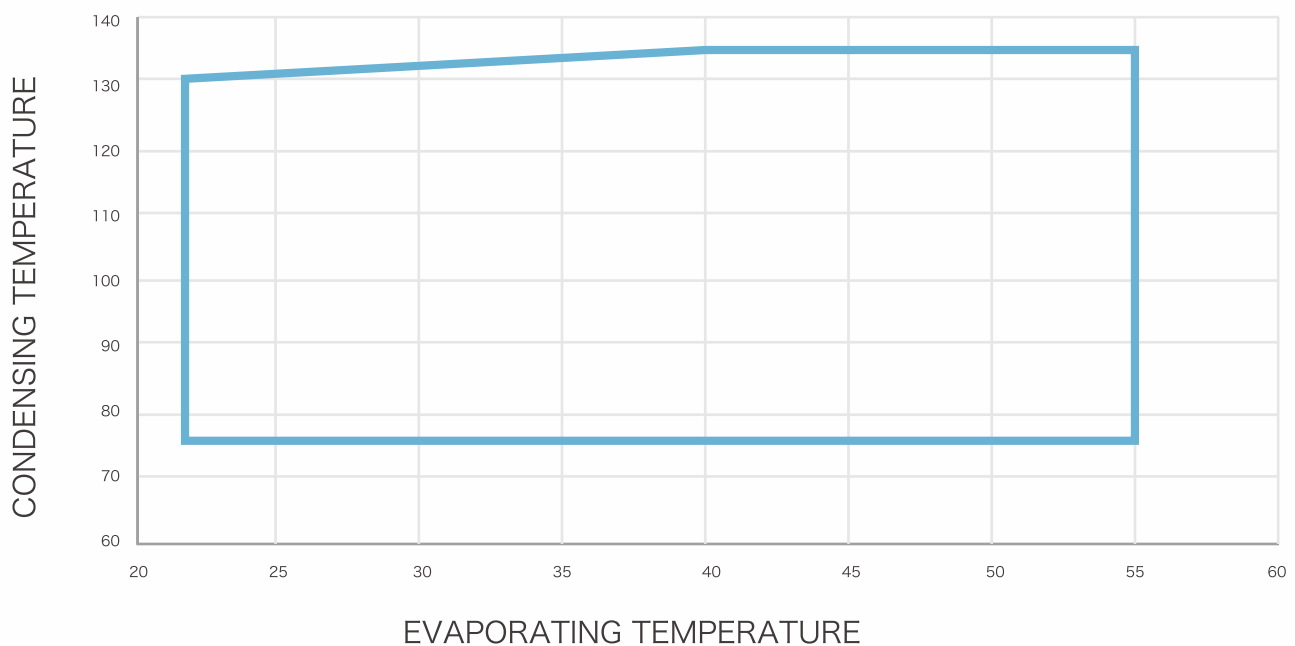
1. High efficiency in generating hot water/steam up to 130°C.
2. High-temperature heat pump technology.
3. Easy operation with a touch interface. Integrated Modbus, compatible with wireless central control.
4. Suitable for industrial waste heat recovery, reducing daily costs.
5. Uses low ODP and GWP HFO refrigerants.
6. COP up to 5, meaning 70% energy savings in steam production.
7. Reduces fossil fuel usage, promoting energy savings and emissions reduction.
8. Modular design: single system heating capacity of 65kW (can be combined up to 260kW), or up to 400kW per unit without a modular solution.
9. Applicable conditions: dual-stage cascade system with water source temperatures of 10°C to 30°C, heating side water output temperatures of 90°C to 125°C, heating COP = 1.5 to 5.0, overall COP = 2.0 to 6.
10. Single-stage system with water source temperatures of 30°C to 90°C, heating side water output temperatures of 90°C to 125°C, heating COP = 1.4 to 5.0.
11. Environmentally friendly: uses eco-friendly refrigerants R245FA/R1233zd(E).
12. Dual function: using cascade variable frequency technology to produce chilled water as low as 7°C while simultaneously generating 125°C hot water or steam.
13. Safe and reliable: when using independent modular systems (4 systems), a failure in one system does not affect normal heating supply.
14. Low initial investment cost: stable heating supply can be achieved without standby units.
15. Low maintenance costs: no need to replace refrigeration oil, and the replacement cost of damaged components is very low.

Energy Data Analysis

The Total Amount of Heat Required to Heat One Metric Ton of Water from 15°C to 60°C is $(60-15) \times 1,000 = 45,000$ Kcal

	CO2 Heat Pump	Traditional Heat Pump	Electric Water Heater	Oil-Fired Boiler	Gas-Fired Boiler	Vacuum Hot Water Boiler	Solar Energy
Type of Energy	Electric Energy	Electric Energy	Electric Energy	Diesel Fuel	Natural Gas	Natural Gas	Electric Energy
COP	4.50	2.50	0.90	0.85	0.85	0.92	0.85
Calorific Value (Kcal)	860	860	860	10200	8600	8600	860
Heat Exchange Efficiency	1	1	1	0.7	0.7	1	1
Actual Calorific Value per Unit	3870	2150	774	6069	5117	7912	731
Actual Consumption Units of Energy	11.63	20.93	58.14	7.41	8.79	5.69	20.50

Operation Envelope





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