

Submittal Data GAHP Line AR Series

Reversible Gas Fired Absorption Heat Pump

Heating and Cooling

GAHP is the acronym for Gas Absorption Heat Pump. The GAHP-AR is a High Efficiency Reversible Air-Water Heat Pump, utilizing a water-ammonia absorption cycle that is designed for outdoor use. The GAHP-AR is capable of chilling water down to a temperature of 37.4 °F, or heating water up to 140 °F in the heat pump mode with a nominal efficiency of 126% in nominal conditions (external ambient temperature 44.6 °F, inlet water temperature 122 °F). Obtaining efficiencies up to 141% are possible depending on operating conditions. The cycle of the GAHP-AR is driven by thermal energy provided by a gas burner. Therefore, the required electric energy is limited to driving the fan, pump motors and low voltage components. The GAHP-AR is fed by natural gas or LPG, and supplied with 208-230 V -60 Hz SINGLE PHASE electrical power.



Operating mode

- Cooling mode (summer). The appliance operates as an absorption chiller, and the heat, taken away from the cooled environment via the hydronic circuit, is dissipated to the outside via the air-cooled finned coil.
- Heating mode (winter). The appliance uses the absorption cooling cycle to recover heat from the outside environment via the finned coil, which, when combined with the heat produced by the combustion of natural/LPG gas, is transferred into the exchanger and then into the environment to be heated, ensuring efficiency of 126 %

(under nominal conditions). The GAHP-AR is equipped with the following devices:

- steel sealed circuit, externally coated with epoxy paint;
- premixed multigas burner with ignition and flame sensing device managed by an electronic control box;
- steel tube air exchanger with single-row coil and aluminum fins;
- titanium stainless steel tube bundle water heat exchanger, with external insulation:
- reversing valve on the refrigerant circuit; which switches the unit between heating and chilling mode;
- two-way automatic defrosting valve, controlled

by the microprocessor, allows for fin coil defrosting;

 variable speed condenser fan, controlled by the microprocessor.

Control and safety devices

The GAHP-AR is controlled and monitored by the S60 control board through the peripheral AR10 card. These cards and other components compose the control and safeties of the GAHP-AR, listed below:

 S60 Electronic Control Board with integrated microprocessor, LCD display and encoder located inside the electric box; it is programmable and it controls and monitors the

- operation of the heat pump;
 water flow switch; located on the return chilled water line; monitors the water flow and helps prevent the freezing of the evaporator (cooling mode) or overheating of the condenser-absorber (heating mode);
- sealed circuit high temperature limit; located on the external wall of the generator; helps prevent overheating of the generator;
- hot water high temperature limit switch; located on the outlet water line; prevents water circuit from overheating;
- differential air pressure switch; located inside the

electric box; it helps manage the combustion system by monitoring the air flowing into the air-gas mixing chamber and stopping the burner if the air flow is too low;

 flue gas temperature limit switch; located inside the rear portion of the combustion chamber; helps prevent overheating of the generator;

- sealed circuit safety relief valve;
- safety by-pass valve; located inside the sealed system; prevents over pressurizing of the sealed system;
- antifreeze function for
- hydronic system; together

with the flow switch, this electronic function programmed into the microprocessor, helps prevent the freezing of water in the heat exchanger; • ignition control box; located inside the electric box; it manages the combustion system controlling the

burner ignition, the gas

valve, the air pressure switch, the air blower and the flame sensor;

- dual gas valve;
- temperature probes; located both on the sealed system and on the water lines; they monitor functional parameters of the unit.

PERFORMANCE RATINGS - HEATIN			GAHP-AR
Heating capacity (2)		BTU/h	120,400
Gas input		BTU/h	95,500
Ambient operating temperature	maximum	۴	95
Ambient operating temperature	minimum	۴	-20
Hot water temperature	maximum outlet (to hydronic system)	۴	140
	maximum inlet (to unit)	۴	122
Hot water flow	nominal	GPM	13.4
Internal pressure drop		Feet of Head	9.8
at nominal hot water flow		psi _g	4.2

PERFORMANCE RATINGS - COOLING (1)

Cooling capacity (3)		BTU/h	57,700
Gas input		BTU/h	95,500
Ambient operating temperature	maximum	۴	120
	minimum	°F	32
Chilled water temperature	minimum outlet (to hydronic system)	°F	37.4
	maximum inlet (to unit)	°F	113
Chilled water flow	nominal	GPM	12.8
Internal pressure drop		Feet of Head	10.5
at nominal chilled water flow		psi _g	4.5

ELECTRICAL RATINGS

Required voltage, 60 Hz, single phase (4)		V	208 - 230
Operating consumption (5)	heating mode	kW	0.9
	cooling mode	kW	0.75
MCA (Minimum Circuit Ampacity)		Α	8.0
MOP (Maximum Overcurrent Protection)		A	10.9

PHYSICAL DATA

Operating weight		pounds	838
	width	inches	33 1/2
Dimensions	length	inches	48 1/2
	height	inches	50 3/4

⁽¹⁾ All illustrations and specifications contained herein are based on the latest information available at the time of publication. $^{\scriptscriptstyle (4)}$ Units are factory-wired for 208-230 volts operation.

 $^{\scriptscriptstyle (B)}$ May vary by \pm 10% as function of both power supply and electrical motor input tolerance.

 $^{\tiny (2)}$ Heating capacity at standard conditions of 44.6 °F ambient temperature. Hot water outlet temperature 122 °F, hot water inlet temperature 104 °F.

 $^{\scriptscriptstyle (3)}$ Cooling capacity at standard conditions of 95 °F ambient temperature. Chilled water outlet temperature 44.6 °F, chilled water inlet temperature 53.6 °F.

Due to continuous product innovation and development, Robur reserves the right to change product specifications without prior notice.

HEATING MODE CAPACITY (BTU/h)

External ambient operating	Outlet (to plant) hot water temperature			
temperature (dry bulb)	86 °F	113 °F	122 °F	140 °F
		Ø~T=18 °F		Ø [~] T = 27 °F
-20.0 °F	91,100	82,900	82,900	80,900
-13.0 °F	92,100	83,900	83,900	81,900
-4.0 °F	93,200	85,000	85,000	82,900
5.0 °F	97,200	89,400	88,000	85,600
14.0 °F	105,400	94,500	92,100	90,100
19.4 °F	111,900	100,300	96,900	95,500
35.6 °F	123,900	118,700	109,900	102,400
44.6 °F	129,300	128,000	120,400	112,600
50.0 °F	131,700	131,000	124,200	117,700
59.0 °F	134,100	133,400	128,300	122,200
68.0 °F	134,800	134,400	129,300	123,900
77.0 °F	134,800	134,400	129,700	126,200

Nominal value in bold type.

~ T is the difference between outlet and inlet temperature.

COOLING MODE CAPACITY (BTU/h)

External ambient operating	Outlet (to plant) chilled water temperature				
temperature (dry bulb)	37.4 °F	44.6 °F	50.0 °F		
	Ø~T=9°F				
59.0 °F	64,800	63,800	64,800		
68.0 °F	63,500	63,500	64,100		
77.0 °F	60,100	62,400	63,300		
86.0 °F	54,300	60,700	61,800		
95.0 °F	44,000	57,700	59,400		
104.0 °F		51,200	54,600		
113.0 °F			46,100		

Nominal value in bold type.

~ T is the difference between outlet and inlet temperature.

List water flow	Outlet water temperature				
Hot water flow	122.0 °F	104.0 °F	86.0 °F		
GPM	Ø~ P (Feet of Head)				
6.60	3.05	3.08	3.15		
7.04	3.30	3.32	3.35		
7.48	3.58	3.62	3.65		
7.93	3.89	3.98	4.05		
8.37	4.25	4.35	4.42		
8.81	4.64	4.76	4.86		
9.25	5.05	5.19	5.28		
9.69	5.50	5.66	5.77		
10.13	5.96	6.18	6.29		
10.57	6.45	6.66	6.83		
11.01	6.95	7.16	7.39		
11.45	7.47	7.68	7.97		
11.89	7.99	8.21	8.57		
12.33	8.52	8.76	9.18		
12.77	9.06	9.32	9.80		
13.21	9.59	9.90	10.43		
13.65	10.12	10.50	11.07		
14.09	10.64	11.11	11.72		
14.53	11.36	11.81	12.60		
14.97	11.98	12.48	13.35		
15.41	12.63	13.17	14.12		
15.85	13.29	13.87	14.91		
16.29	13.97	14.60	15.72		
16.73	14.67	15.35	16.55		
17.17	15.39	16.11	17.40		
17.61	16.13	16.90	18.27		
18.05	16.88	17.70	19.16		
18.49	17.65	18.53	20.07		
18.93	18.44	19.37	21.00		
19.37	19.25	20.23	21.94		
19.81	20.08	21.11	22.91		
20.25	20.92	22.01	23.90		
20.69	21.78	22.93	24.90		
21.13	22.66	23.87	25.93		
21.57	23.56	24.82	26.97		
22.01	24.48	25.80	28.03		

PRESSURE DROP - Heating mode (ØP condenser / absorber)

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Chilled water flow		Outlet water temperature				
	37.4 °F	44.6 °F	50.0 °F			
GPM		Ø~P (Feet of Head)				
11.01	8.55	8.11	7.84			
11.45	9.15	8.67	8.39			
11.89	9.77	9.25	8.96			
12.33	10.40	9.85	9.54			
12.77	11.05	10.46	10.15			
13.21	11.71	11.08	10.76			
13.65	12.38	11.72	11.40			
14.09	13.07	12.38	12.04			

PRESSURE DROP - Cooling mode (*Ø*P evaporator)









PRESSURE DROP – HEATING MODE

APPROXIMATE WATER FREEZING POINT TEMPERATURE

Percentage of monoethylene glycol	10	15	20	25	30	35	40
Water freezing point temperature (°F)	26.6	23.0	17.6	10.4	5.0	-4.0	-13.0
Percentage of increase in pressure drop		6	8	10	12	14	16
Loss of efficiency of unit		0.5	1	2	2.5	3	4

The numbers provided in this table are approximate and you must refer to the glycol manufacturer's instructions for additional instructions and amount of glycol required based on expected ambient conditions.

GAHP-AR DIMENSIONS





Side View

Front View



GAHP-AR SERVICE PLATE DIMENSIONS



GAHP-AR HYDRONIC SYSTEM: Typical Installation Arrangement (External Components not included with Robur Unit)

2 Pressure gauge 3 Flow regulating valve 4 Water filter 5 Shut-off valve

7 Expansion tank 8 Safety valve 9 DDC (optional from Robur) 10 Can Bus cable (optional from Robur)

Clearances

Position the appliance so that minimum clearances from combustible surfaces and constructions (walls and other equipment) are maintained, as shown in the figure below. The appliance may be installed directly on wood flooring. Minimum clearances are necessary for operating performance, and in order to be able to carry out maintenance operations and to ensure the correct airflow required for proper heat exchange with the finned coil.

There must not be any obstructions or structural overhangs (roof edges, balconies) over the top of the unit. The re-circulation of the air discharged from the condenser results in poor unit performance.

When the unit is installed in close proximity to buildings, keep the unit away from the roof edge drip line. In no case should the unit be placed within 6 feet of any external air intakes of the

building. For installations on

balconies or roofs, the unit must not be located within 8 feet from chimney flues, outlets and other such vents. It is important that the unit is located so that hot or contaminated air is not drawn into the air intakes of the unit.

Observe all local and State codes.



Single unit

Multiple units