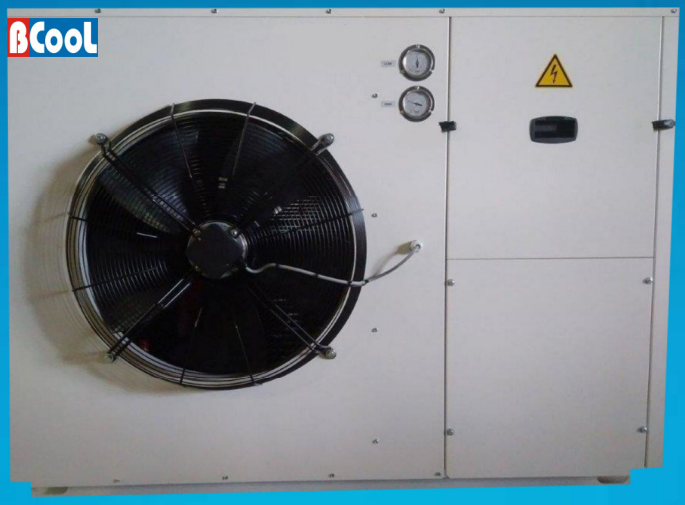
B COOL MANUFACTURERS OF AIR-CONDITIONING EQUIPMENT LTD

BAWHT Series



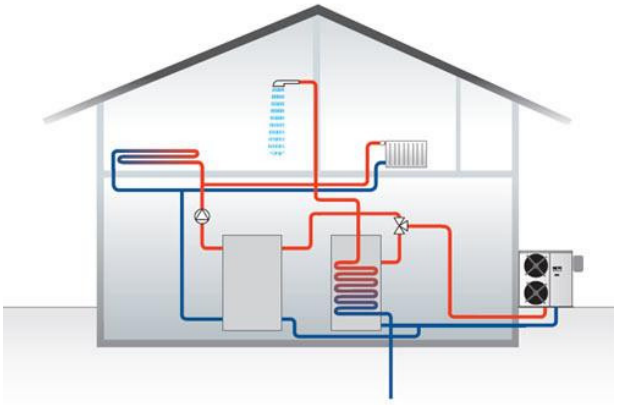
HIGH TEMPERATURE MONOBLOC
AIR TO WATER HEAT PUMPS
HEATING APPLICATIONS / OUTDOOR INSTALLATION

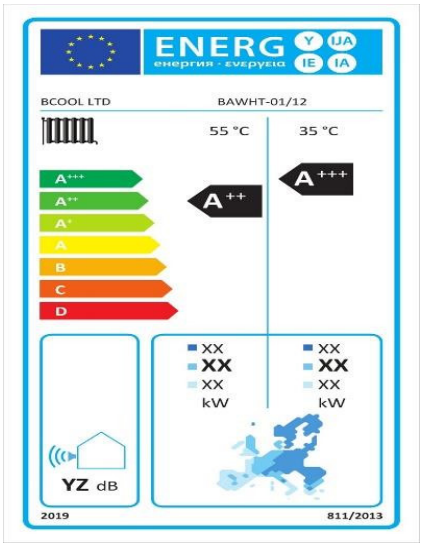
ISO 9001
ISO 14001
BUREAU VERITAS Certification

Ver. 3.02 01_18

HEATING CAPACITY

5,23 kW – 27,40 kW





Engineering Data

The **BCOOL BAWHT series** includes high temperature monobloc air-to-water heat pumps, for heating applications and outdoor installation. They are available in several types and models, with nominal heating capacities ranging from 5,23 to 27,40 kW and A plus energy efficiency classes, in accordance with standard EN14825:2013.

The **BCOOL BAWHT series** is ideal, in combination with water terminal units or underfloor systems, for space heating in residential and commercial applications, as well as for domestic hot water production and for swimming pool heating.

Optimized design for low GWP refrigerants

- Casing: Galvanized Steel plate with polyesteric coating.
- Assembly: Fully bolted/welding free.
- Compressor: Hermetically sealed scroll type.
- Air heat exchanger: Cross finned coil, internally grooved copper tubes and louvered aluminium fins.
- Direct drive propeller fan: Low rpm, quiet operation.
- Water heat exchanger: Brazed, plate type.
- Hydraulic module.

Safety and functional devices:

- High/low pressure switch.
- Phase sequence-phase failure-reverse phase and voltage monitoring device.
- Electronic microprocessor control with digital display.
- Differential water pressure switch.
- High/low pressure manometers.
- Linear fan speed regulation, according to coil temperature.
- Various optional capabilities.

Generally

The BCOOL BAWHT series, including high temperature monobloc air-to-water heat pumps, consists of 8 basic models, with nominal heating capacities ranging from 5,23 to 27,40 kW and A plus energy efficiency classes, in accordance with standard EN14825 :2013 . It is the end result of a thorough study and accurate design by experienced BCOOL research and development team, to develop a high temperature heat pump series , with compact shape , high performance and reliability of the highest quality standards.
This series meets the highest levels of aesthetic and technical requirements, using the latest technological innovations, including environmentally friendly refrigerants, with low global warming potential value and zero ozone depletion potential. BAWHT units are therefore ideal for installation in residential and commercial applications, due to their robust construction, high efficiency performance, reliability, selected materials and low operating sound levels.

Casing

All units use metal parts that are fabricated from heavy gauge galvanized steel sheets, formed to ensure maximum rigidity that guarantees and preserves the unit's operation during the years. After fabrication these are degreased, phosphatised and electrostatically powder coated with an epoxy-polyester RAL 9002 coating of a thickness of 60-70 μm.
This fully automated process ensures superior corrosion resistance against the most aggressive ambient conditions. This treatment can withstand a salt spray test of 500 hours, according to ASTM B-117.
All components are assembled together using bolts, thus avoiding the need for welding which may harm the galvanization of the steel and ensuring that the whole assembly can fully withstand adverse weather conditions.
The compact footprint of the unit arises from detailed study and design by our engineering team and results in a machine which fits easily in restricted areas, is simple and easy to install and maintain and has been designed with special fittings for easy transportation and lifting.
Removable side panels with special locks are used to permit access only to authorized personnel to internal components of the unit, for inspection and maintenance. Electrical and electronic equipment and components for proper unit's operation are located inside a weatherproof (IP 55) electrical panel, with access via special key.

Compressor

All units use low-noise, maintenance free, hermetic scroll compressors, with low vibration levels, especially optimized for refrigerants with low GWP value, provided from world class suppliers. Compressors are equipped with a crankcase electrical heater for the oil and are internally protected against potential overloading or electrical spikes.
The compressors are mounted on special anti-vibration rubber mounts, to absorb and eliminate any vibrations from the unit's operation. A noise reduction jacket, with excellent sound absorbing properties, is a standard equipment for compressors.

Air heat exchanger

All units' air heat exchangers are manufactured from high quality seamless inner grooved copper tubes according to ASTM B-280, having an outside diameter of 9,52 mm (3/8''). The fins are manufactured from aluminium and form the secondary extended heat transfer surface. The fins are continuous across the heat exchanger and are fabricated in high precision dedicated press lines. The fin surface is waffle formed, so as to increase the fin rigidity and has special louvers that help to increase heat transfer.
The combination of internally grooved copper tubes and louvered fins has resulted in a heat transfer performance 30% superior to that of a conventional coil for this particular application. The assembly of the finned pack is achieved by mechanical expansion of the tubes in such a way, as to form a perfect mechanical bond with the fins. For this purpose, the fin holes have a peripheral extrusion (collar) of adjustable height. This extrusion serves to define the distance between fins (and consequently the total heat transfer surface) and to ensure perfect contact of the fins to the tubes.
Alternative fin materials are available upon request, such as epoxy-coated aluminium or copper for applications in especially aggressive environments.

Water heat exchanger

All units are equipped with a water plate heat exchanger, selected from world class manufacturers. It is made of stainless steel plates (AISI 316/1.4401), especially formed to achieve a large heat transfer surface and assembled by means of an automatic brazing process, under vacuum.
There is an air vent, differential water pressure switch, probes for water temperature sensors and the whole heat exchanger is wrapped in a heavy insulation material.

Air heat exchanger fans

All units' fans are of the axial type, single phase, 6-pole, internally protected against potential overheating, silent and suitable for outdoor installation. Due to the sophisticated aerodynamic design of the blades and inlet cones, as well as the perfect static and dynamic balancing, their operation is completely vibration free. The fan-motor assembly has a protective grid against accidental contact with moving parts, which is designed according to ISO regulations. Fan motors are of the external rotor type, aerodynamically shaped so as not to interfere with the airflow and have permanently lubricated bearings that to do not require service. Continuous linear fan speed regulation control is achieved according to coil temperature, resulting in fan silent mode operation. This standard feature for BCOOL BAWHT units saves energy and reduces sound levels dramatically, optimizing capacity.

Microprocessor controller

All units are equipped with a sophisticated controller that combines intelligence with operating simplicity. The controller constantly monitors all unit's parameters and precisely manages among others:

- Automatic compressor control function, through return water temperature.
- Continuous fan speed control, based on coil heat exchanger temperature.
- Defrost control.
- Hydraulic circuit pump control.
- Compressor start-up time delay function.
- Compressor running time records.
- Over 150 programmable parameters.
- Fan motor overload protection.
- Auto diagnostic stop function, due to low water circulation and high/low operating pressure.
- Auto diagnostic stop function and digital display of approximately 30 possible error codes, including sensor faults.
- Digital display of inlet/outlet water and coil temperatures.
- Remote on/off switch.

Optional accessories:

- Remote keyboard.
- Dynamic set point program.
- BMS module interface kit for Modbus connection.
- Parallel unit operation with optional controller.
- Microprocessor parameter reprogramming card.

Phase sequence - phase failure - reverse phase and voltage monitoring device is located inside the electrical panel.

Refrigerant circuit

All units have one refrigerant circuit. The refrigerant circuit has restrictors/thermal or electronic expansion valve.

Other components fitted are: suction accumulator, 4-way reversing valve, check valve, filter dryer and high/low pressure manometers.

Unit protection is provided by a high/low pressure switch with auto reset.

Other unit accessories/options

- AC inverter scroll compressor availability, upon request.
- R134a or other eco-friendly refrigerants, with low GWP value.
- Air heat exchanger's fins made of epoxy-coated aluminium or copper for anti-corrosion protection.
- Pressure relief valve on compressor discharge.
- A-meter, V-meter.
- Water heat exchanger's anti-freeze electrical heater.
- Hydraulic module without buffer tank (PK series).
- Hydronic module with buffer tank (HD series).
- Two pumps (one stand-by).
- Axial fans with EC motors, for energy saving.
- Soft starter, for reducing starting current.

BAWHT Series - MODEL		50 Hz	BAWHT 001	BAWHT 002	BAWHT 003	BAWHT 004	BAWHT 005	BAWHT 007	BAWHT 010	BAWHT 012
SCOP	**LWT 35ºC**	**kW / kW**	**4,24**	**4,33**	**4,43**	**3,67**	**4,13**	**4,04**	**4,13**	**4,02**
Energy Efficiency Class	**Average Climate**	**Label**	**A++**	**A++**	**A+++**	**A+**	**A++**	**A++**	**A++**	**A++**
SCOP	**LWT 55ºC**	**kW / kW**	**2,80**	**2,88**	**2,96**	**2,66**	**2,63**	**2,75**	**2,84**	**2,81**
Energy Efficiency Class	**Average Climate**	**Label**	**A+**	**A+**	**A+**	**A+**	**A+**	**A+**	**A+**	**A+**
SCOP	**LWT 35ºC**	**kW / kW**	**5,02**	**5,04**	**5,17**	**4,29**	**4,81**	**4,70**	**4,79**	**4,65**
Energy Efficiency Class	**Warmer Climate**	**Label**	**A+++**	**A+++**	**A+++**	**A++**	**A+++**	**A+++**	**A+++**	**A+++**
SCOP	**LWT 55ºC**	**kW / kW**	**3,20**	**3,25**	**3,34**	**3,01**	**3,04**	**3,08**	**3,16**	**3,13**
Energy Efficiency Class	**Warmer Climate**	**Label**	**A++**	**A++**	**A++**	**A+**	**A+**	**A+**	**A++**	**A++**
Nominal Heating Capacity	**LWT 35ºC at OAT 7ºC**	**kW**	**5,59**	**8,17**	**12,05**	**14,55**	**17,35**	**19,80**	**26,10**	**30,70**
Nominal Heating Capacity Standard Unit (1)	**LWT 55ºC at OAT 7ºC**	**kW**	**5,23**	**7,68**	**11,30**	**14,00**	**16,10**	**18,05**	**22,80**	**27,40**
Construction		Material / Color	Galvanized steel / Light grey-beige (RAL-9002)							
Compressor		Type	Hermetic Scroll, 1 item, 1 capacity stage							
Nominal Absorbed Power (1)		kW	1,73	2,49	3,57	4,83	5,72	6,25	7,75	9,30
COP (1)		kW / kW	3,02	3,08	3,17	2,90	2,81	2,89	2,94	2,95
Nominal Operating Current (1)		A	3,12	5,03	7,17	11,41	11,67	12,96	14,51	18,31
Maximum Operating Current (1)		A	5,20	8,23	11,80	17,00	17,70	21,00	25,00	32,00
Air Heat Exchanger		Type	High capacity coil, with internally grooved copper tubes & louvered aluminium fins							
Water Heat Exchanger		Type	Brazed, Plate type							
Nominal Water Flow (1)		Lit / h	901	1.323	1.947	2.412	2.773	3.109	3.928	4.720
Water Pressure Drop (1)		kPa	29,8	33,9	38,9	43,0	40,9	37,7	49,4	52,6
Connections		Inch	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4	1-1/4
Maximum Operating Pressure	Water side	Bar	30							
	Refrigerant side	Bar	30							
Minimum Content of Water System		Lit.	38	55	81	101	116	130	164	197
Air Heat Exchanger Fan		Type	Axial, 6-pole, with fan speed regulation control (230 V / 1 Ph)							
Quantity			1	2	2	2	2	2	2	2
Maximium Rotation Speed		RPM	900							
Total Air Flow		m³ / h	4.500	5.000	7.200	10.000	10.000	10.000	18.000	18.000
Nominal Absorbed Power		kW	0,22	0,37	0,39	0,44	0,44	0,44	1,20	1,20
Nominal Operating Current		A	0,97	1,68	1,76	1,94	1,94	1,94	5,24	5,24
Water Pump (for PK Series with Hydraulic Module)		Type	Centrifugal / In-line / Variable Speed							
Nominal Absorbed Power		kW	0,30		0,31				0,40	
Nominal Operating Current		A	1,09		1,11				1,33	
Available External Static Pressure		kPa	150 stardard (or upon request)							
Maximum Operating Pressure of Water System		Bar	3,0							
Electrical Characteristics	Power Supply	V / Ph / Hz	400 / 3 / 50 or 230 / 1 / 50			400 / 3 / 50				
Total Absorbed Power (1)		kW	1,95	2,86	3,96	5,27	6,16	6,69	8,95	10,50
Total Operating Current (1)		A	4,09	6,71	8,93	13,35	13,61	14,90	19,75	23,55
Voltage Operating Limits		V	360 - 440 or 205 - 240			360 - 440				
Starting Current (1)		A	32	64	74	99	111	127	167	198
Starting Current with Soft Starter (1)		A	11	21	25	33	37	42	56	66
Refrigerant Circuit			1							
Expansion Device		Type	Restrictors / Thermal or Electronic Expansion Valve							
Refrigerant	Type	GWP	R134a / 1430 (optional R513a / 631)							
	Charge R134a	Kg	1,4	1,6	1,8	2,2	2,3	2,4	3,2	3,3
		TCO2eq	2,0	2,3	2,6	3,1	3,3	3,4	4,6	4,7
Sound Power Level (2)		db(A)	63	67	68	69	69	70	72	72
Sound Pressure Level at 10 m distance (3)		db(A)	32	36	37	38	38	39	41	41
Dimensions	Width	mm	503	503	503	503	503	503	810	810
	Length	mm	1.149	1.249	1.449	1.449	1.449	1.449	2.056	2.056
	Height	mm	1.043	1.243	1.243	1.243	1.243	1.243	1.235	1.235
Shipping Weight	without Hydraulic Module	Kg	150	166	185	195	210	220	310	330
	with Hydraulic Module	Kg	160	176	195	207	222	232	325	345

NOTES

- LWT: Leaving Water Temperature, OAT: Outdoor Air Temperature. Detailed Heating Capacities for Water DT = 5ºC, are depicted on Table 2.2.
- SCOP and Energy Labels, in accordance with Standard EN14825:2013 for average and warmer climate zones, are valid for Water DT = 5ºC.
- (1) Nominal Heating Capacities (Standard Unit) are valid for operational conditions: Entering / Leaving Water Temperature: 50 / 55ºC, Outdoor Air Temperature 7ºC DB / 6ºC WB.
- (2) In dB ref 10^{-12} W, A-Weighting.
- (3) In dB ref 20 μPa, A-Weighting, calculated from Sound Power Level L_{WA}. These values depend on ambient conditions and are therefore higher in actual operation.
- Electrical installation specifications are purely indicative and non-binding.
- All connections to the system and the electrical installation must be in full accordance with the applicable national and local codes.

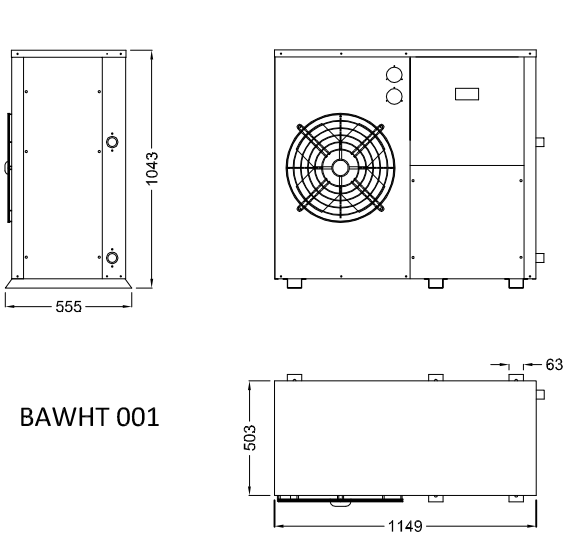
2.2 Heating Capacity Tables
BAWHT Series

Leaving Water Temperature 35ºC								
Outdoor Air Temperature	2ºC		7ºC		12ºC		20ºC	
MODEL	Heating Capacity kW	Absorbed Power kW	Heating Capacity kW	Absorbed Power kW	Heating Capacity kW	Absorbed Power kW	Heating Capacity kW	Absorbed Power kW
BAWHT 001	4,70	1,15	5,59	1,20	6,85	1,26	7,98	1,36
BAWHT 002	6,93	1,65	8,17	1,74	9,93	1,83	11,50	1,99
BAWHT 003	10,20	2,38	12,05	2,50	14,65	2,63	17,00	2,86
BAWHT 004	12,20	3,45	14,55	3,64	17,90	3,87	20,80	4,21
BAWHT 005	14,80	3,71	17,35	3,89	20,40	3,91	24,50	4,18
BAWHT 007	16,75	4,30	19,80	4,51	24,20	4,79	28,00	5,20
BAWHT 010	22,00	5,50	26,10	5,83	31,90	6,22	37,00	6,78
BAWHT 012	25,80	6,66	30,70	7,07	37,70	7,55	43,80	8,23

Leaving Water Temperature 55ºC								
Outdoor Air Temperature	2ºC		7ºC		12ºC		20ºC	
MODEL	Heating Capacity kW	Absorbed Power kW	Heating Capacity kW	Absorbed Power kW	Heating Capacity kW	Absorbed Power kW	Heating Capacity kW	Absorbed Power kW
BAWHT 001	4,49	1,64	5,23	1,73	6,19	1,82	7,60	1,96
BAWHT 002	6,64	2,35	7,68	2,49	9,02	2,63	11,00	2,87
BAWHT 003	9,75	3,37	11,30	3,57	13,25	3,78	16,20	4,11
BAWHT 004	11,60	4,49	14,00	4,83	16,00	5,09	19,70	5,62
BAWHT 005	13,40	5,51	16,10	5,72	19,40	5,89	23,40	6,16
BAWHT 007	16,10	5,93	18,05	6,25	21,90	6,65	26,70	7,20
BAWHT 010	20,90	7,39	22,80	7,75	28,60	8,44	35,20	9,27
BAWHT 012	24,30	8,75	27,40	9,30	33,60	10,10	41,60	11,20

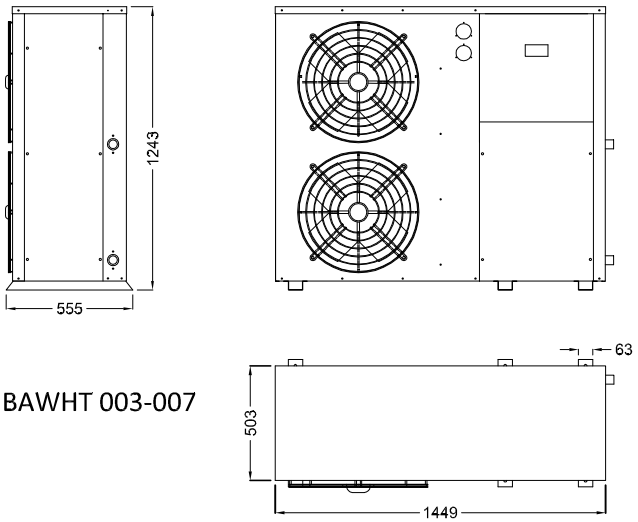
NOTES

- Heating Capacities are valid for Water DT = 5ºC.
- Absorbed Power (kW) refers to the Compressor.

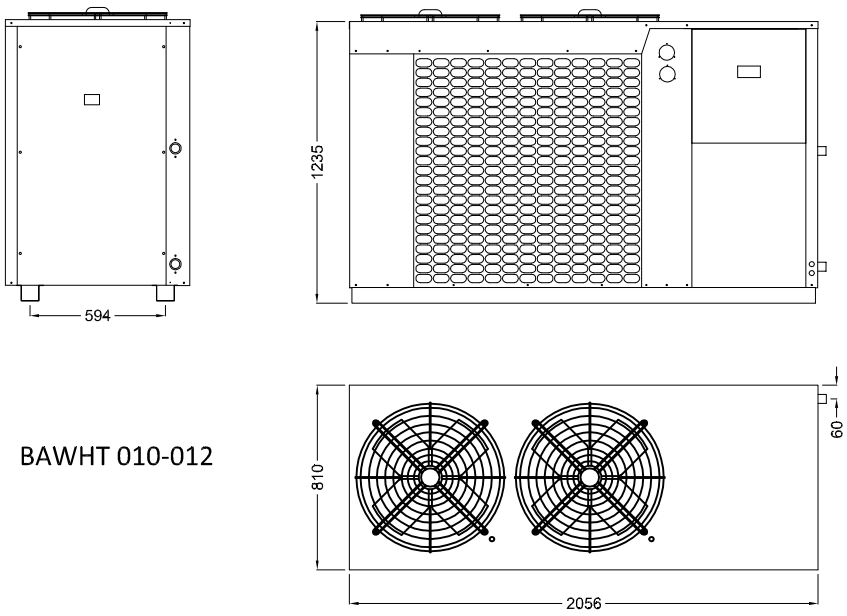


BAWHT 001

BAWHT 002



BAWHT 003-007



BAWHT 010-012

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"BCOOL reserves the right to change specifications without prior notice"