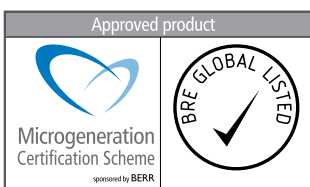


Air Source Heat Pumps Frequently Asked Questions



Heat King

Heating that doesn't cost the earth

What are the benefits of Air Source Heat Pumps over Ground Source Heat Pumps?

There are a number of benefits when using an Air Source Heat Pump (ASHP). Capital cost is lower as ASHP's are self-contained units without additional heat transfer requirements such as ground pipe work. This also means that installation costs are lower as the ASHP simply needs siting in an appropriate position and connecting to the mains supply electricity and building wet system; whereas a GSHP will require significant ground works, either bore holes or deep furrows and this type of work is not always possible on existing buildings due to limited access and is always costly. New technology has enabled ASHP's to achieve similar seasonal efficiencies to those traditionally associated with Ground Source Heat Pumps.



What issues are associated with installing ASHP's in existing properties?

If heat pumps are fitted as part of a completely new wet system there are no problems as everything will be designed to suit the heat pump.

If it is replacing another heat source on an existing wet system then there may be issues that need attention.

Radiator systems

Existing radiator sizes should be checked to ensure that they are suitable to work with a supply temperature of 50°C or 60°C. The system should be a pressurised sealed system with an appropriately sized expansion vessel. The old system should be thoroughly flushed and cleaned prior to connecting the heat pump and a cleanable filter should be added to the return pipe of the heat pump.

Heat pumps should not be connected to an old micro-bore system as there may be flow restrictions due to high water side pressure drops. A suitable inhibitor and anti-freeze should be added to protect the system down to the lowest expected outdoor temperature.

Check that the pipe insulation meets the current requirements of the Building Regulations.

Underfloor systems

These do not pose the same problems, as they will already be sized to work with a lower water temperature. The building itself should be assessed for suitability, as heat pumps will not work efficiently with all types of buildings. Heat losses should be kept to a minimum with building insulation and draught proofing better than current regulations if possible.

How many Air Source Heat Pump units can be fitted in parallel?

There is no absolute answer as it depends upon the size and type of system being installed. When connecting multiple units to a system it is advisable to connect them to a buffer tank or to use them in different zones.

The Heating Master/Slave control system will allow up to four units to be connected together and operated as a Master/Slave system with Auto Change-over, Lead/Lag and Run/Standby. It will also allow the water temperature to switch between 35°C and 50°C (60°C for BWarm i units) depending upon demand for DHW.

How often does the heat pump go into de-frost and what is the effect?

Heat pumps de-frost on demand and the frequency is relative to the operating conditions. It is reasonable to expect a heat pump to defrost once an hour when outdoor temperatures are low, but will not require it to de-frost once the temperature rises above 5°C.

Can units be hidden behind fences, bushes etc...?

Units may be installed behind barriers or even inside enclosures. The important consideration is ensuring that adequate airflow is available and that the discharge air cannot be re-circulated back onto the inlet as this will result in a continual lowering of the air temperature reducing the efficiency of the unit.

How does the heat pump noise level compare with other heating appliances?

Sound levels inside the house are generally lower than those that would be expected from a gas or oil boiler with a fan assisted flue and will not cause a nuisance provided the installation guidelines have been followed correctly. Noise levels outside may be 2-3 dB higher than those expected from a condensing boiler flue and this should be considered when selecting the position of the heat pump.

Low noise options are available.

Can the heat pump cool as well as heat?

Heatking BWarm and BWarm i heat pumps are supplied for heating only. However if cooling is required the BCool2 range of units is available to provide both heating and cooling. Cooling may be used with underfloor heating or with fan coil units but it is not recommended with radiators as even though the minimum water temperature can be controlled, on certain days, depending upon conditions, the radiators could sweat and cause water damage to carpets or flooring.

No, this has to be done by simply pressing a button on the controller to prevent cycling between the two demands. Controllers can be purchased to perform this operation automatically.

What is the minimum water content in the system?

See table below for recommended water volume for all units. Water quantities lower than these given are achievable with the addition of a boost heater to aid defrost. The lower the water volume the more the unit will cycle on and off.

Unit Size	Water Volume
6000 (6kW)	45 litre
8000 (8kW)	60 litre
9000i (9kW)	60 litre
12000 (12kW)	90 litre
13000i (13kW)	90 litre



What size should the radiators be?

Radiators should be sized to operate with a supply water temperature of 55°C (65°C for BWarm i units) and a return temperature of 45°C (55°C for BWarm i units) using the radiator manufacturers data to select appropriately sized radiators for the application.

Can radiator and underfloor systems be combined?



Yes, but if used in this way the heat pump return water temperature should be set to suit the radiator system and a mixing valve used to reduce the underfloor supply to the design temperature. A 2nd set point kit is available for use with this type of system.

What is the Design Outdoor Temperature (DOT)?

This is the lowest normally expected temperature in the area where the heat pump is to be installed. The DOT will vary from region to region, being lower in the North of Scotland and gradually increasing moving south. Local information on weather patterns should be used to determine the correct DOT to use. The building heat load and the capacity of the heat pump should be calculated using this temperature.

How often should the water temperature be boosted to raise its operating temperature?

In most conditions the heat pump will start and raise the water temperature as expected. In periods of very cold weather, when the external ambient temperature drops below the external design temperature, a boost heater is available to top up the heating duty available. This can be programmed to switch on automatically with the addition of a digital stat kit. The boost heater will increase the flow to the radiators and will also aid the heat pump at start up.

Can the heat pump raise the water temperature to 65°C?

This would depend on the system chosen. The standard heat pump will raise the supply water temperature to 55°C as set by the controller. If applying the BWarm (or BCool2) 9000i or 13000i heat pumps, water temperatures of up to 65°C will be possible but the higher the water temperature the lower the overall unit efficiency.

How should Domestic Hot Water be heated?

The heat pump should be used to pre-heat the water before additional heating is added to raise the water to the desired temperature. If connected in parallel with a Solar Heating System the heat pump should be set to operate if the Solar cannot provide adequate heating. DHW systems should be designed to comply with current regulations. BWarm i models are able to supply domestic hot water at 65°C.

What refrigerant is used with HeatKing Heat Pump units?

Heatking use R407C in all of its products. This is an approved refrigerant with zero Ozone Depleting Potential and a low Global Warming Potential.

What is the best type of wet system to connect a heat pump to?

For optimum efficiency an underfloor system provides the best results, as it requires a lower flow temperature and the heat pump can be programmed to provide the water at the required temperature with no need for a mixing valve. Any system will benefit from using a thermal store rather than a direct feed which will allow the heat pump to raise the water to the correct operating temperature more quickly as there is no direct heat loss from the thermal store during the start up period.



What is the lower limit operating temperature?

-20°C is defined as the lower operating limit but the heat pump will not switch off at this temperature. At -20°C the maximum supply water temperature will be 45°C (55°C for the 13000i unit).

What controls will the heat pump work with?



The heat pump is fitted with a controller that is pre-programmed with all of the operating set points and alarms and simply requires an input from an external time clock/thermostat. Any standard type of central heating controller will work with the heat pump but the best solution is to use a controller with a number of on/off options for each day to take advantage of any special off peak tariffs available.

What are the maintenance requirements?

The heat pump should be serviced once a year by a qualified technician and the following items checked;

The unit structure for signs of corrosion or damage.

Panels are securely fastened and vibration free.

All electrical connections are secure and that there is no damage to any of the wiring.

All water connections are tight and the system water pressure is correct.

Pipe insulation has not deteriorated or come loose.

The air path to and from the unit is clear.

Condensate drain pan and pipe are clear and clean. (if fitted)

Switch on the unit and check;

The controls are working correctly.

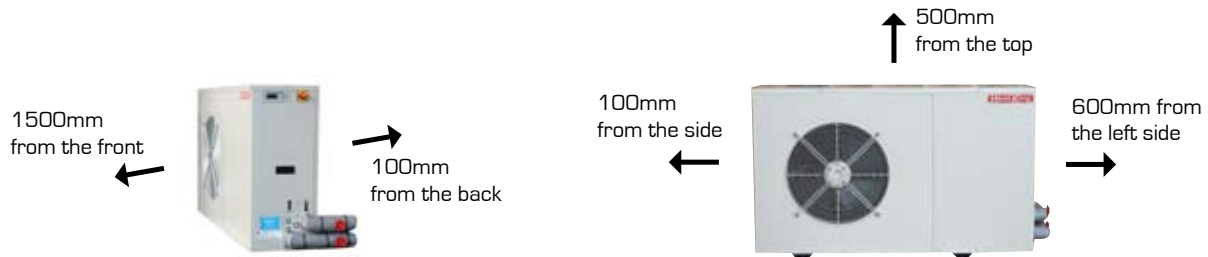
The water pump is free and operating correctly.

The unit fan is operating.

The unit raises the water to the correct operating temperature.

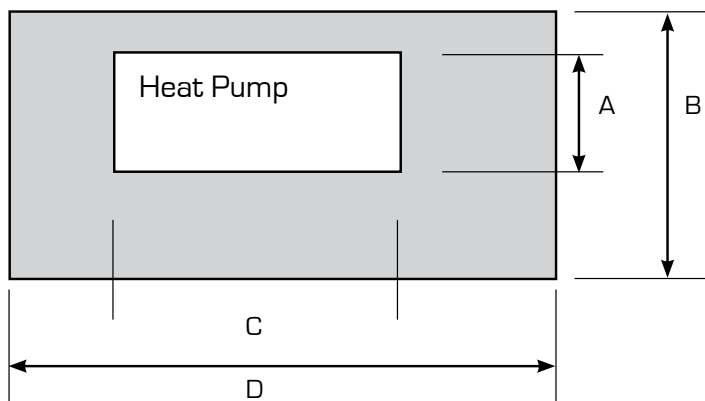
How should the unit be sited to ensure adequate air flow and access?

Sufficient space is required for airflow into the machine and adequate clearance is needed at the front of the heat pump to prevent cold air re-circulation. Access is also needed for service and maintenance. If possible the unit should be sheltered from high winds to improve efficiency by reducing the fan power requirement. Units are best placed in a south facing aspect to gain maximum benefit from solar gains. Shown below are the minimum clearances (in mm) required for a Heating Air Source Heat Pump.



What is the required footprint for each unit?

The overall footprint will be the size of the unit plus the free area around the unit for airflow and access.



Unit	6000	8000	9000i	12000	13000i
A (mm)	300	340	340	375	375
B (mm)	1900	1940	1940	1975	1975
C (mm)	1000	1280	1280	1400	1400
D (mm)	1700	1980	1980	2100	2100
Height (mm)	700	780	780	780	780
Weight (kg)	87	110	110	145	145

What is the electric current rating for the units?

Each unit has a different mains power requirement as the compressor size differs from unit to unit and it is the compressor that draws most of the power. To minimise the peak starting current a soft start device is fitted to all single phase units. This device reduces the starting peak to a level acceptable to the electricity suppliers and also prevents possible interference with other electrical equipment. The table below gives the nominal running current for each unit.

Unit	Nominal Running Current 1Ph [amps]	Nominal Running Current 3 Ph [amps]
6000	10.7 A/Ph	3.4 A/Ph
8000	13.5 A/Ph	4.3 A/Ph
9000i	13.5 A/Ph	4.3 A/Ph
12000	19 A/Ph	6.5 A/Ph
13000i	19 A/Ph	6.5 A/Ph

What size of MCB should be fitted?

The 6000, 8000 & 9000i units require a 32A 'D' Type motor rated MCB.
The 12000 & 13000i units require a 40A 'D' Type motor rated MCB.

What size of cable should be used to connect the unit to the mains supply?

This will need to be calculated to suit an individual installation, as a number of variables need to be considered. The size of unit, the length of the cable run and the type of cable being used are all factors in determining cable size. Electrical installation work must be carried out by suitably qualified personnel, who should be able to provide the cable sizing once the position of the unit has been determined.



Is single phase or three phase best?

As the majority of dwellings in the UK are connected to a single phase supply, this is the only option for most domestic applications. If three phase is available either in domestic or commercial applications then it is better when considering the load on the mains supply as it spreads the starting and running load evenly. The capacity and efficiency of 1 Phase and 3 Phase units is almost identical.

What is the most efficient water temperature setting?

As with any form of heating the efficiency of a heat pump is directly related to the amount of work it has to do. Heat pumps are used with various heating systems and can operate over a range of return water temperatures of 30 to 55°C. The lower the return water temperature the less work the heat pump has to do and therefore the more efficient it will be. This has to be balanced out against the type of heating system the heat pump is attached to and the length of time the unit has to run to satisfy demand.

How long does it take for the radiators to get up to temperature?

This will depend upon a number of factors. A HeatKing heat pump will raise the water passing through it by between 5 or 6°C depending upon the water flow rate. As a rule of thumb the heat pump will raise the water temperature at a rate of 1°C per minute therefore the time taken to achieve the maximum operating temperature will be the difference between the standing temperature and the required operating temperature in minutes.

Example: Required operating temperature 50 °C; Standing temperature 10°C
 $50 - 10 = 40$ minutes

What is the maximum number of radiators per heat pump system?

The number of radiators is less significant than the total capacity of all of the radiators added together. This should not exceed the expected heat pump output at the design condition; i.e. if the heat pump output is 6kW at the design outdoor condition then the radiator capacity should be 6kW based upon the water supply temperature of 50°C.

Want additional information?

If you want to find out more about any of the topics in this booklet or your question has not been answered then please contact us at TEV Limited by;

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