Heat Pump Data
HEAT PUMP ASSOCIATION DATA SHEET
HPA
Helping you save energy
to create a better environment
www.heatpumps.org.uk
Data Sheet No. 1

AIR TO WATER HEAT PUMPS — DOMESTIC

What is an air to water heat pump?

A device which extracts energy from the air and uses it to heat water.

How does it work?

An air to water heat pump absorbs low temperature energy from the air (usually outside air) raises it to a higher, more useful temperature using a refrigerant cycle and uses water to deliver the heat. A heat exchanger transfers the energy from the air to a refrigerant with a low boiling point which evaporates and circulates in a closed system. The pressure of the refrigerant gas is raised by a compressor, which also raises the temperature to a useable level. The refrigerant then condenses in a second heat exchanger and releases heat to a water delivery system. The pressure of the refrigerant is then reduced by an expansion valve, its temperature falls, and it is ready to start the cycle again and absorb energy from the air.

Types of air to water heat pump

Air to water heat pumps can be:

- Single packaged for outdoor installation (fully weatherproofed with insulated water distribution pipes to and from the building).
- Single packaged for indoor installation (requires air intake and outlet, one or both of which will be ducted unless the heat pump is installed in a corner).
- Split (a matched pair of units with the heat pump evaporator mounted outside and the condenser mounted indoors — the two units are linked with pipework containing refrigerant).

Exhaust air may also be used as the source in which case the heat pump is usually a single packaged unit mounted in the loft.

See overleaf diagrams of basic heat pump system configurations.

What you need to know to select a product

- The building heat loss — it is important to size the heat pump accurately. Heat pumps can be sized to meet all or part of the heating load.
- Heat pump dimensions and location requirements — the physical size will vary depending on the output and type but will be larger than a gas boiler of the same capacity. Typically a 12 kW (heating) single package unit will be about 1500 × 1200 × 750 mm.
- Heat pump efficiency — usually given as the Coefficient of Performance (CoP)* at a specific operating condition (the Standard rating condition is A7W35, i.e. input air at 7°C, output water at 35°C).
- The operating range of the heat pump — usually the minimum air temperature is –15°C (or –20°C if it is fitted with a supplementary direct electric heater which boosts the output at low air temperatures). The maximum water temperature is typically 55°C but can be up to 65°C.
- The type of heating distribution system, including buffer/storage tank arrangement.

Applications

Space heating

This is the main application. The lower the distribution temperature in the heating system the higher the efficiency of the heat pump will be. Heat pumps are therefore best suited for use with low temperature heating systems such as:

- Underfloor heating (delivery temperature 30-45ºC).
- Fan coils (delivery temperature 35-55ºC).
- Low temperature radiators (delivery temperature 45-55ºC).

Domestic hot water

Heat pumps able to provide supply water in the range 60-65ºC can provide full water heating.

Where the output temperature is lower than this the heat pump can provide the majority of the water heating but supplementary heating will be needed.

Space cooling

Reversible heat pumps can be used with fan coils to provide cooling in summer. With underfloor heating partial cooling can be provided (the minimum water temperature is limited to about 18ºC to limit the risk of condensation).

Air to water heat pumps are suitable for both new build and retrofit

The ideal site:

- Is new build (easy to use low temperature heating system).
- Has no access to gas (relatively high fuel prices).

Advantages

- Relatively low capital cost (higher than gas condensing boiler, lower than ground source heat pump).
- Low running costs.
- Easy to install.
- High efficiency.
- Low energy consumption.
- Low carbon emissions (lower than gas condensing boiler).

Aspects to consider

- Possible disturbance from noise especially from the outdoor fan at night.
- Possible fouling of the air intake.
- At low air temperatures water from the air can condense to form ice on the outdoor heat exchanger which will need to be defrosted. This is usually done automatically by reversing the refrigerant flow. During this short process heat output from the heat pump can be interrupted.
- With a single phase electricity supply the maximum output is about 12 kW (heating), i.e. sufficient to heat a well insulated property of over 200 m^2. Larger capacity products will require a 3 phase electricity supply.
- When supplementary heating is in use the system efficiency will be significantly decreased so its use needs to be carefully controlled. Ensure that the heat pump is sized to achieve the majority of the required duty.

Financial incentives

VAT on heat pumps is charged at 5%.

Possible grants are available for domestic installations (Low Carbon Building Programme, or from Electricity suppliers).

MCS — See Microgeneration Certification Scheme product and installer criteria.

* The Coefficient of Performance is measured as the heating output (kW) divided by the total power consumed by the system including fans, pumps and controls (kW). The European Standard for testing and rating heat pump performance is EN 14511.

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(Repeated from front of leaflet)

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Diagrams and notes

The diagrams are for illustrative purposes only. Refer to supplier for comprehensive installation details.

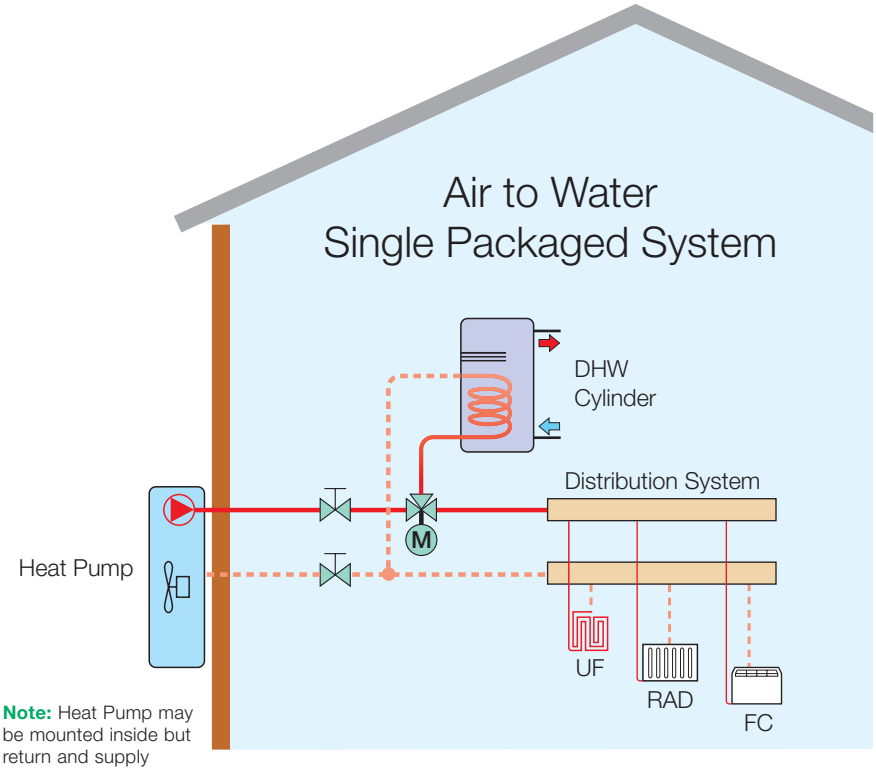
The Heat Pumps shown represent equipment that supplies warm water for space heating or DHW on a priority basis.

Heat Pumps that can supply warm water for space heating and DHW simultaneously will have two separate heat pump circuits.

Domestic hot water must be regularly heated to at least 60ºC to eliminate any risk of legionella. This may be achieved by the heat pump itself or by auxiliary (electric) heating as dictated by the individual machine specification.

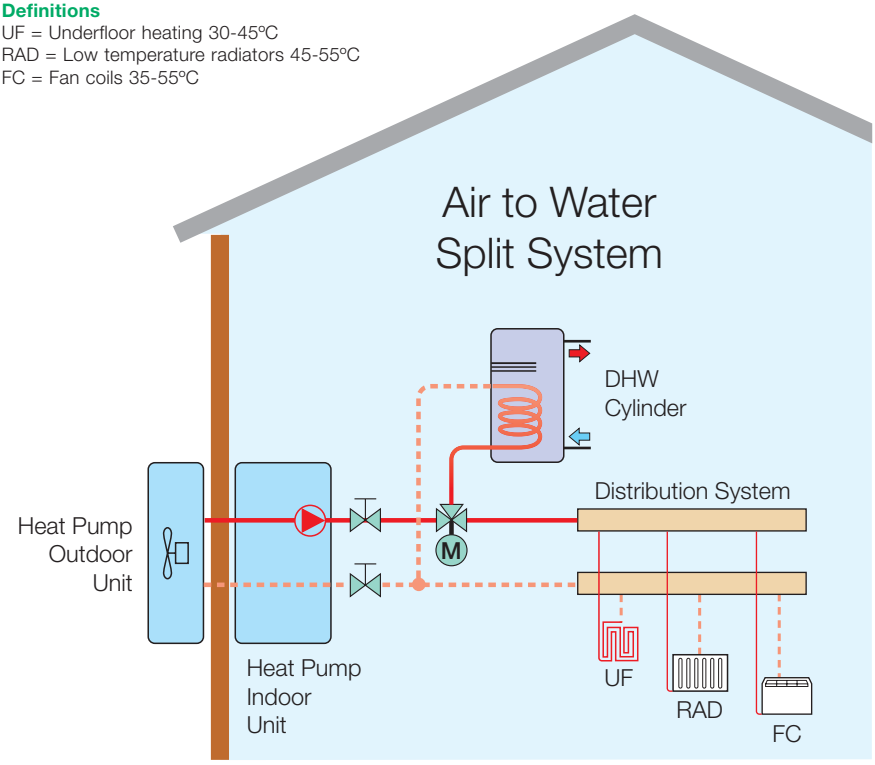
HPA members list and products

For information on heat pump products available, please go to our website where there is an up-to-date list of members contact details.



Note: Heat Pump may be mounted inside but return and supply airflows will need to be ducted to the outside.

Definitions
UF = Underfloor heating 30-45ºC
RAD = Low temperature radiators 45-55ºC
FC = Fan coils 35-55ºC



New HPA Website
www.heatpumps.org.uk

a FETA Association

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