

THE 310 AIR

INTERNAL ASHP FROM
THE LITTLE HEAT PUMP COMPANY



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Our Story

The engineers at the Little Heat Pump Company have been installing ground source and air source heat pumps for over 12 years all over the UK.

From the wealth of experience gained working at the forefront of the industry, it became increasingly clear that as build quality and insulation levels of homes increases, the average heat load required for space heating was decreasing, especially in apartments and small new-build homes, which are now being built with peak heat loads of less than 2kw at the coldest time of the year.

Having seen the pitfalls of other options and technologies for space heating and hot water in residential apartment buildings, our engineers in collaboration with Ochsner heat pumps from Austria, over a 6-year period, developed the a design for a compact, internal ASHP, providing both space heating and hot water using the external air as its heat source via insulated ducting, without the need for an external fan unit.

Ochsner bring 50 years of knowledge and experience, focussing solely on building some of the highest quality heat pumps in the world. Ochsner are highly regarded in the heat pump industry for their high levels of efficiency, longevity and low noise levels.

The 310 Air

There has been a seismic shift in the last couple of years that has seen the need for the 310 Air emerge as a solution to some of the biggest challenges moving forward in the residential homebuilding sector. Some of the factors in this shift are :

- Changes in building regulations – no longer allow the installation of gas boilers in new build homes from 2025 – most developers have already shifted away from gas for all new projects. On 15th June 2023, the grace period for compliance with the updated Part L Building Regulations ended.
- Direct electric solutions cannot get SAP compliance without costly investment in other renewable energy sources such as solar power
- With the increasing cost of electricity, direct electric options leave the homeowner or tenant with extremely high energy bills
- Large centralised systems in residential buildings for heating and hot water are costly to design, have high infrastructure costs and ongoing service charges are required. If there's a system failure or major maintenance required, everyone is without heating and hot water
- Standard air source heat pumps require an outdoor evaporator/fan unit – residential apartment buildings and many small homes, are not able to install these due to lack of amenity space, noise levels and other design restrictions
- Exhaust air heat pumps are limited in the amount of air they have available as a heat source, often requiring the use of direct electric immersion heaters to provide enough energy to supply space heating and hot water during the winter months
- Climate change is fuelling our desire to reduce our carbon emissions in all sectors, the residential housing sector is a major contributor to the levels of carbon in our atmosphere and Ground Sun are proud to be a part of the solution

How it works

The 310 Air has a heat pump positioned on top of the hot water cylinder to minimise its footprint. Exterior air is used as the heat source, supplied via 2 x 160mm insulated ducts. (No exterior fan unit).

The 330-litre stainless steel, hygienically safe hot water cylinder is a stratified thermal store which acts as a water storage battery. This is an unvented cylinder.

The tank is filled with treated water which is heated up to 60°C via the heat pump. Mains cold water enters the tank and passes through a coil from the bottom of the tank to the top. This water is heated by the surrounding treated water as it passes through the coil and then hot water is drawn out of the tank for use in the bathroom and kitchen.

The treated water is drawn off lower down the tank at a lower temperature to supply the underfloor heating circuit for space heating.

There are two back up immersion e-rods, one higher up the tank to provide back up for the hot water and one lower down for the heating. These immersions are situated in treated water which minimises maintenance, and failures due to limescale building up whilst maintaining efficiency.

As there are only 15 litres of potable water in the coil at any one time, this unit doesn't qualify as a hot water storage cylinder and therefore doesn't require the annual G3 water storage check, further reducing running costs.

Summary of Benefits

- No exterior fan unit - requires only two small vents
- For both heating and hot water
- Quiet, efficient and small footprint (0.7m diameter)
- 330-litre thermal store hot water cylinder
- Each apartment becomes completely autonomous
- Reduced infrastructure costs – no plant room, no gas connection
- No need to pipe hot water or refrigerant throughout the building
- No occupier standing charges, metering or need to manage service charges
- Highest quality Ochsner heat pump with 50 year history
- Pre-gassed & Pre-plumbed connections - quick and easy to install
- Zero local carbon emissions - surpasses all sustainability requirements
- Modular design - cost-effective maintenance and low lifecycle embodied carbon.

Suitability

The 310 Air was designed primarily for apartments and small new build homes with a peak heat load of 2kw and an annual energy consumption of about 4000kwh for hot water and space heating combined.

Ideally the 310 Air should be installed in conjunction with underfloor heating systems due to the lower flow temperatures and longer running hours required (please refer to later slide '310 Air & Underfloor Heating')

It's essential that you have a qualified energy assessor work out the room-by-room heat loss calculations to confirm the energy requirements of your apartment, home or development to confirm suitability of the 310 Air.

The 310 Air is not suitable for larger homes and apartments that have a high occupancy rate and thus excessive hot water consumption and higher peak heat loads for space heating

If your development requires an additional boost for space heating, the 310 Air plus comes with a larger 2.5kw immersion.

For Passive House standard homes and apartments with higher levels of air tightness and potential for solar gain, please consider the weather compensated controller option. This will adjust the UFH flow temperature according to the internal and external air temperatures to mitigate issues with overheating

For retrofit projects please refer to the later slide 'Retrofit'

Product Range



Model	Specification	
310 Air	Hot water immersion	- 1kw
	Heating immersion	- 1.5kw
310 Air plus	Hot water immersion	- 1kw
	Heating immersion	- 2.5kw
Optional	Weather compensated controller (for Passive House standard builds)	

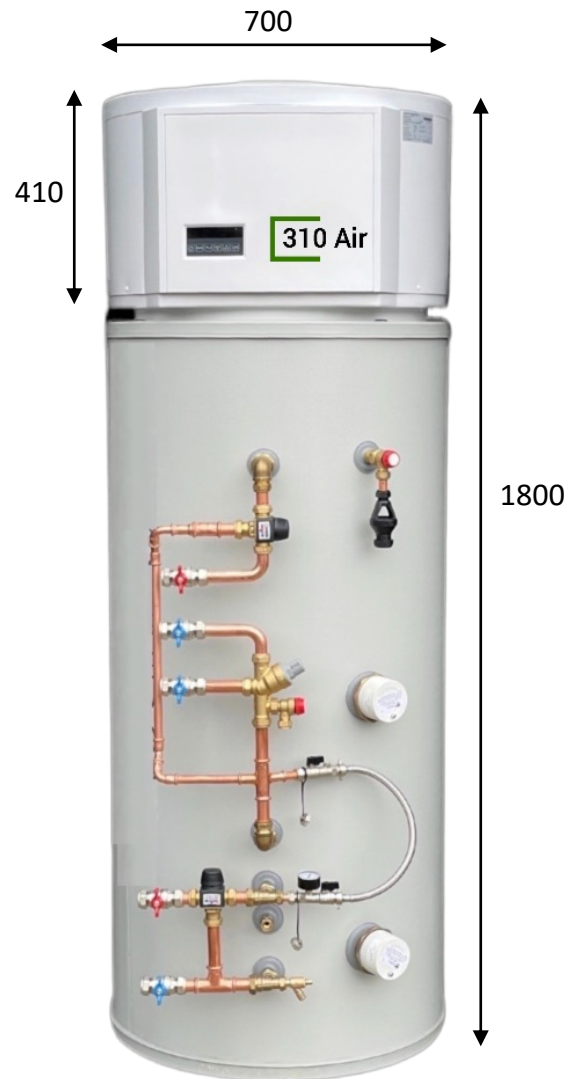
Dimensions

Height 1800mm x Diameter 700mm

Utility Cupboard Size

To allow space for the plumbing, installation and maintenance, a minimum utility cupboard space of 850mm wide and 950mm deep is required with a 2200mm ceiling height.

Additional space to be considered for the expansion vessel and UFH manifold (not supplied). Ensure there is sufficient space above the 310 Air for removal of cover for maintenance and servicing. (400mm)



⚠ We do not recommend installing the 310 Air in the loft due to the weight of the unit once filled with water as well as difficulty during installation and servicing.

Delivered weight 45kg + 32kg

Ducting

The 310 Air is a true ASHP and its heat source is the exterior air, requiring 2 x 160mm insulated ducts to the exterior for air intake and extract

Ducting design – minimize the number of bends and the distance from the exterior wall where possible. Maximum allowable duct pressure drop 80 Pa

Ducting and wall vents to be designed for unrestricted airflow of 360–510 m³/h

Air inlet and outlet should be at least 1.2 - 1.5m apart when exiting the exterior wall

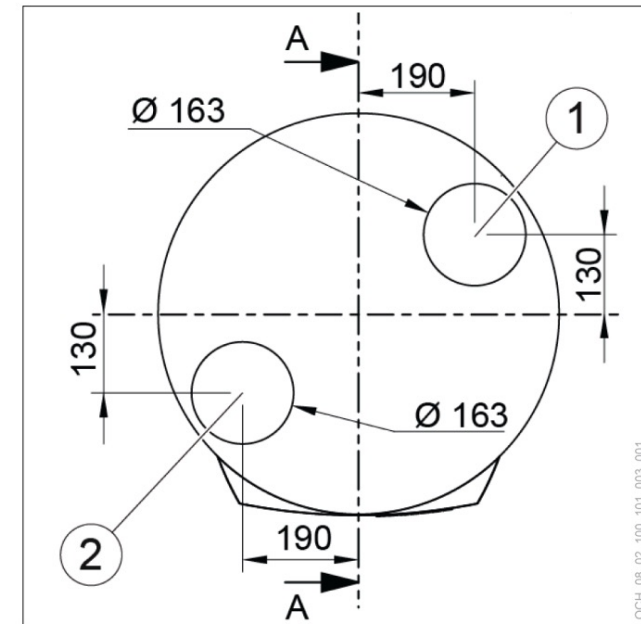
Ensure outside terminals have grill & rain cover

Ducting should be insulated up to the building fabric insulation

Ensure air-tight connection to the 310 Air with ducting installed vertically out of the inlet & outlet. If required, use a male coupler with rubber seals (not supplied)

⚠ Do not use flexible ducting

⚠ Not suitable to connect the inlet duct to MVHR extract air



- 1 Air inlet
- 2 Air outlet (expelled air)

For more information please refer to the installation manual

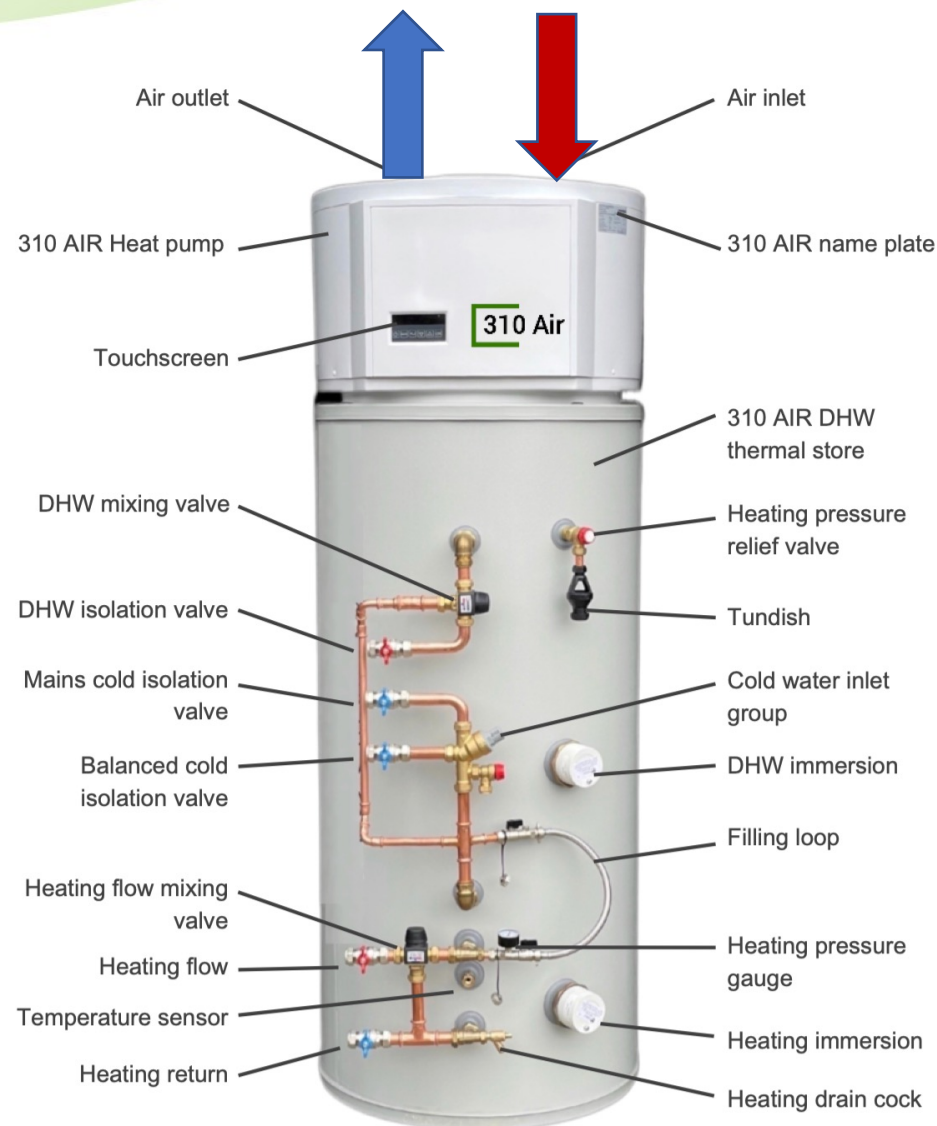
Plumbing

Plumbing connections are standard 22mm

Please observe G3 water regulations for mains cold water requirements prior to connecting to the 310 Air

The 310 Air is delivered pre-plumbed and pre-gassed for an easy installation

Ensure building regulation flow rate taps and shower heads are installed to avoid excessive consumption of hot water supply



An expansion vessel is required (not supplied), sized according to the heating circuit

Ensure that installed location of the expansion vessel doesn't obstruct the removal of the heat pump cover and is easily accessible for installation and maintenance as per manufacturers' instructions

Electrical

The 310 Air heat pump system is to be fed from a dedicated 20A C type breaker via a 2 pole 20A switched spur 16amp fuse protection.

Larger Immersion coils

The 310 Air plus has a larger 2.5kw immersion for the heating circuit with an external contactor. This means 2x 16A supplies are required.



The immersions are connected from the hot water cylinder to the heat pump via the two 3 pin plugs (supplied)



We recommend connecting to the mains power supply via its own RCD. The heat pump is equipped as standard with a 2m mains power cable for 220-240 VAC 50 Hz

Large Residential Installations

When operating without the boost, the 310 Air compressor draws just 500 Watts of power, just 1/5 of an electric kettle

In boost mode this can increase up to 3,000 Watts, a little more than a regular kettle

Compared to standard ASHP units this low energy consumption is particularly important when considering infrastructure costs connecting to the grid based on size of electrical loading

The 310 AIR & Underfloor Heating

There are numerous benefits of utilizing underfloor heating (UFH) in a home or apartment regardless of what heating source you're using –

- Aesthetics – no radiators cluttering the walls, especially important in small apartments
- Healthy home – radiators collect and agitate airborne dust particles. UFH is based on radiant heat rather than convection, therefore atmospheric agitation of dust particles is reduced, improving air quality

UFH & Heat Pumps are a perfect combination

- Heat pumps are more efficient at the lower flow temperatures required by UFH systems
- The thermal mass of the UFH screed needs to be maintained and is thus more suitable to the longer running hours of heat pumps topping up the temperature over long periods. The on/off timers used by gas boilers is a very inefficient way to utilize UFH and should be avoided

Underfloor Heating Schematic

The diagram illustrates the plumbing connections for an underfloor heating system. Key components and their connections include:

- Manifold (L):** A multi-port distribution unit with two rows of outlets. It is connected to the pump (M) and the boiler (Y).
- Pump (M):** A circulator pump that moves water through the system. It is connected to the manifold (L) and the boiler (Y).
- Boiler (Y):** A large vertical unit with various controls and connections. It includes a pressure gauge (P) and a temperature control knob (310 Air). The boiler is connected to the manifold (L) and the pump (M).
- Underfloor Heating Pipes (K):** A horizontal pipe section with a valve (T) and a pressure gauge (P). It is connected to the manifold (L) and the boiler (Y).
- Fixtures:** A shower (R) and a sink (Q) are connected to the manifold (L) via blue lines. The shower (R) is connected to the manifold (L) via a red line. The sink (Q) is connected to the manifold (L) via a blue line.
- Other Components:** The diagram includes various valves (A, B, C, D, E, F, G, H, J), a pressure gauge (P), a temperature control knob (310 Air), and a pressure relief valve (U).

- A - HOT WATER OUTLET (22mm)
- B - MAINS COLD WATER INLET (22mm)
- C - BALANCED COLD WATER OUTLET (22mm)
- D - PRESSURE TEMPERATURE RELIEF VALVE
- E - DHW MANUAL BLENDING VALVE
- F - COLD WATER INLET GROUP (22mm)
- G - FILLING LOOP WITH PRESSURE GAUGE
- H - HEATING MANUAL BLENDING VALVE
- J - HEATING DRAIN COCK
- K - HEATING EXPANSION VESSEL
- L - UFH HEATING MANIFOLD
- M - UFH HEATING CIRCULATION PUMP
- N - HEATING INLINE MAGNETIC FILTER
- O - HEATING BACKUP/BOOST IMMERSION
- P - UFH HEATING CONTROLLER
- Q - BALANCED COLD CIRCUIT
- R - DHW CIRCUIT
- S - CONDENSATE DRAIN & U BEND
- T - MAINS COLD WATER ISOLATION VALVE
- U - TUNDISH
- V - DHW BACKUP/BOOST IMMERSION

Retrofit

Despite being designed for new builds, the 310 Air has been installed in retrofit situations. However, there's a number of things to consider with regards to the installation and potential running costs.

- 2 x 160mm insulated ducts need to be installed, ceiling void space needs to be considered if not close to exterior wall
- If replacing an exhaust air heat pump - existing ducts need to be replaced and both directed to the exterior wall
- Consider improving levels of insulation in walls, ceilings, windows and doors to minimize peak heat load
- Get room by room heat loss calculations (British standard) to ascertain required heat and suitability of the 310 Air
- Replace taps and shower head to ensure building reg flow rates & consider flow restrictors to reduce hot water demand
- Ensure you have the required space to install the 310 Air as close to the exterior as possible to minimize duct lengths

Due to the potentially higher peak heat loads at the colder temperatures, the 310 Air plus will be more suitable in most retrofit installations. These will potentially incur higher running costs in these lower temperatures due to the use of direct electric immersions.

310 AIR Thermal Store Tank

310 AIR Thermal Store Tank Specifications	
Capacity	330L
Internal tank material	Stainless steel
Coil material	Stainless steel
Volume of coil	15L
Weight empty / full (+ASHP)	32/362kg (+45kg)
Max operating temperature	90°C
Immersion elements DHW / Heating	1kw / 1.5kw (2.5kw Air plus)
Standing heat loss	1.8kwh/day
Energy efficiency class	A+

Technical Information

For manuals, data sheet and brochure please visit our website at
www.littleheatpump.co.uk

If you require any additional information please contact us at :

Email - info@littleheatpump.co.uk

Phone – 0203 576 4407

Frequently Asked Questions

- Noise Levels

Does the Heat pump make any noise? Do I need to sound insulate the cupboard?

Yes, the 310 Air will have a quiet hum and therefore wherever the unit is located we recommend that the cupboard space have sufficient sound insulation.

Exterior vent noise? The 310 Air has two vents on the exterior walls for the air intake and air extract. These are very quiet, especially when compared to an exterior fan unit usually connected to an ASHP. Please schedule a visit to an existing installation if you would like to hear first-hand just how quiet this unit is.

- Can the 310 Air be installed outside?

The 310 Air can be mounted outside the home on the exterior wall. This space would need to be a minimum of 1m² and have a minimum of 50mm insulation with a well fitted, insulated door. The unit is 1.8m tall and will require additional headroom for the ducting, totalling a minimum of 2.2m height.

- Does the 310 Air have a defrost cycle?

Yes, it does, but unlike the larger heat pumps with the external fan unit that needs to work in reverse for the defrost cycle, (and can draw a significant amount of power for this). The 310 Air is designed in such a way that when the defrost cycle is required, all it needs to do is switch off the compressor for about 5 mins, the ambient temperature inside the insulated heat pump unit combined with the continual air flow through the unit is enough to complete the defrost.

FAQ's continued

- Is there a Legionella cycle?

No legionella cycle is required as fresh cold water comes in at the bottom of the tank and goes around the coil in the centre. There's no sitting water going stale where you'd require to heat it up to prevent legionella from forming. Storing less than 15 litres of water falls under the G3 regulations even though there is circa 300 litres of available hot water.

- Will the Immersion coils fur up from hard water?

The hot water tank contains two immersion coils. The hot water tank has been designed in such a way that the immersion coils don't come into contact with any hard water. They only interact with treated water that is used for the heating circuit. This significantly reduces one of the most common maintenance issues with hot water cylinders.

- What are the hot water replenish rates?

For a 250L volume of water this depends on the degree of temperature increase. For example, a 40-degree increase = 3 hours and a 35-degree increase = 2.5 hours. Bear in mind this is for the whole tank. With normal use, after the demand for hot water in the morning for showers, there is very little demand throughout the day until the evening, giving the heat pump plenty of time to replenish the heat in the thermal store cylinder.

- Does the 310 Air come with a warranty?

The 310 Air comes with an industry standard 2-year warranty for parts only. Extended warranties are available subject to conditions. All warranties require an annual maintenance check.

FAQ's continued

- What servicing and maintenance is required?

The Little heat Pump Company Ltd has a dedicated servicing team that will provide you with support for your 310 Air heat pump. Annual service checks are recommended and to be carried out by qualified service engineers or engineers verified by The Little heat Pump Company Ltd. Servicing contracts are available for larger residential installations (please contact The Little heat Pump Company for further details).