Technical and Specification Information

Greensource split
air to water heat pump

Greensource
split air to water heat pump series

NEW

WORCESTER
Bosch Group

Worcester and you, making a difference

As part of the Bosch Group, Worcester products are designed and manufactured to provide customers with the highest levels of quality and reliability which are synonymous with the Bosch name throughout the world.

As part of Europe's largest supplier of heating products, Worcester, Bosch Group has the UK-based resources and support capability to offer you the value-added solutions needed to drive your business forward. Worcester employs a nationwide network of Service Engineers and technically trained Field Sales Managers supported by an experienced award winning technical services team which is able to provide comprehensive support and advice from designing system layouts through to installation.

Worcester is dedicated to providing energy efficient gas- and oil-fired condensing boilers, as well as an extensive range of renewable technologies. All of our products have been developed and introduced with the aim of reducing climate change, helping the UK to achieve the Government's efficiency targets.

BOSCH
Invented for life

The reception and main entrance at our Worcester headquarters

"At Worcester we recognise the vital role you play in the specification and installation of energy efficient appliances in homes across the UK. We will continue to invest in our products, people, facilities and support services to ensure you can continue to deliver only the best solutions to your customers' requirements."

Carl Arntzen,
Managing Director,
Bosch Thermotechnology Ltd.

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Greensource split air to water heat pump series

Worcester is proud to offer a highly versatile and efficient series of Greensource split air to water heat pumps, offering low energy heating all year round.

Greensource split air to water heat pumps are not only fuelled by the free and inexhaustible supply of latent energy, but they also offer additional advantages such as a simple and cost-effective installation, the ability to be installed in a wide variety of property types and sizes and, at a time when fuel costs are rising, providing the opportunity for customers to reduce their heating and hot water bills.

Outdoor unit (ODU)

Worcester offers a choice of Greensource split air to water heat pumps in four outputs with heating capacities from 8, 11, 14 and 16kW in single-phase and 14 and 16kW in three-phase.

Indoor units

Worcester split air to water heat pumps are available with two different indoor units, the Hydrolight and Hydrocomfort. The range of the units is designed to offer maximum flexibility for installers and end users, enabling systems to be configured to meet specific requirements.

Hydrolight

The Hydrolight indoor unit is designed to work in conjunction with an existing boiler enabling customers to benefit from heat pump technology. The Hydrolight can be retrofitted to provide energy savings compared to the existing fossil fuel appliance.

In this case, the existing boiler acts as a supplementary heat source to the heat pump. The Hydrolight is configured to start or stop the boiler on demand. The Hydrolight can be used with any boiler with a 230 volt on/off signal and is compatible with any gas, oil or electric boiler up to 25kW.

Hydrocomfort

The Hydrocomfort indoor unit provides a complete stand-alone heating solution (mono-energetic) for use where there is no other heat source. The Hydrocomfort indoor unit incorporates an integral electric heater as a supplementary heat source for the heat pump.

Hydrocomfort indoor units have either a single or three-phase electrical heater of up to 9kW. The heater features step-control modulation, so that its output can be limited to any value, in line with the available circuit protection.

We strongly recommend that you attend our training course to gain knowledge on the best methods for installing Greensource split air to water heat pumps prior to fitting the appliance, it is also required that an installer has the necessary refrigerant qualification.

Greensource split air to water heat pump series at a glance

8kW

11kW,
14kW, 16kW

Heat pump	Part number
Greensource Split HP Hydrolight	
8kW Single-phase (Hydrolight 8, ODU 7.5)	7 716 103 000
11kW Single-phase (Hydrolight 16, ODU 10)	7 716 103 001
14kW Single-phase (Hydrolight 16, ODU 11s)	7 716 103 002
16kW Single-phase (Hydrolight 16, ODU 12s)	7 716 103 003
14kW Three-phase (Hydrolight 16, ODU 11t)	7 716 103 004
16kW Three-phase (Hydrolight 16, ODU 12t)	7 716 103 005

Greensource Split HP Hydrocomfort	
8kW Single-phase (Hydrocomfort 8, ODU 7.5)	7 716 103 006
11kW Single-phase (Hydrocomfort 16, ODU 10)	7 716 103 007
14kW Single-phase (Hydrocomfort 16, ODU 11s)	7 716 103 008
16kW Single-phase (Hydrocomfort 16, ODU 12s)	7 716 103 009
14kW Three-phase (Hydrocomfort 16, ODU 11t)	7 716 103 010
16kW Three-phase (Hydrocomfort 16, ODU 12t)	7 716 103 011

Microgeneration Certification Scheme

The Microgeneration Certification Scheme (MCS) is an internationally recognised quality assurance scheme. It certifies microgeneration technologies used to produce electricity or heat from renewable sources. You must be an MCS certified installer to benefit from this scheme, please see page 25 for more details.

MCS

The Certification Mark for Onsite Sustainable Energy Technologies

Model	Certification no.
Greensource 8kW Hydrolight	*MCS HP0015/12*
Greensource 8kW Hydrocomfort	*MCS HP0015/13*
Greensource 11kW Hydrolight	*MCS HP0015/14*
Greensource 11kW Hydrocomfort	*MCS HP0015/15*
Greensource 14kW Hydrolight Single-phase	*MCS HP0015/16*
Greensource 14kW Hydrocomfort Single-phase	*MCS HP0015/17*
Greensource 14kW Hydrolight Three-phase*	*MCS HP0015/18*
Greensource 14kW Hydrocomfort Three-phase	*MCS HP0015/19*
Greensource 16kW Hydrolight Single-phase	*MCS HP0015/20*
Greensource 16kW Hydrocomfort Single-phase	*MCS HP0015/21*
Greensource 16kW Hydrolight Three-phase*	*MCS HP0015/22*
Greensource 16kW Hydrocomfort Three-phase	*MCS HP0015/23*

**Consists of three-phase outdoor unit (ODU) and the single-phase indoor unit (Hydrolight)*

The features of the Greensource split air to water heat pump

Applications

Greensource split air to water units are a versatile, affordable solution for modernisation, retrofitting and new build properties. Their compact size and ability to be integrated with an existing boiler, solar thermal or underfloor heating system means they are ideally suited to a wide range of applications. These products are sold as a kit and consist of one indoor unit and one outdoor unit.

The three-phase technology available on the 14kW and 16kW units mean that they can also be installed in both large domestic and light commercial properties.

Renewable Heat Incentive (RHI)

Any consumer who is looking to enhance their current heating system with renewable technology, such as a Greensource split air to water unit, or who has installed any such technology since 15th July 2009, will be eligible for the tariffs if installed to MCS standard (see page 25 for further details).

Green Deal

All Worcester Greensource heat pumps are eligible for the Green Deal incentive, providing that the installer is an authorised Green Deal installer. For more information about the scheme you can visit **www.decc.gov.uk/greendeal**

Features and benefits for the installer

- Fast and easy installation – offering a complete system solution with indoor and outdoor unit
- Full MCS Certification – eligible for RHI funding
- Can use with an existing boiler – Hydrolight can be combined with any existing boiler (up to 25kW)
- Ease of siting – no flue system required
- Flexibility – distances up to 50m (8kW) and 70m (11kW-16kW) of refrigerant pipework can be used, outdoor units come pre-charged with up to 30m of pipework as standard
- Compact size – ease of siting
- Compatible with solar thermal and underfloor heating – complete heating and hot water solutions from the UK's leading boiler manufacturer
- Three-phase technology – can also be installed in both large domestic properties and small commercial applications
- No boiler required (with Hydrocomfort)
- Hydrocomfort – pump, expansion vessel and electric heater included as standard
- Hydrolight – pump and mixing valve as standard
- Hydrolight – is only available in single-phase however can be combined with a three-phase outdoor ODU unit.

Ease of installation and maintenance

- Easy access to components
- Compact design
- Diagnostic clearly displayed on LCD screen
- Flexible hinge for ease of servicing (shown below).

Features and benefits for the end user

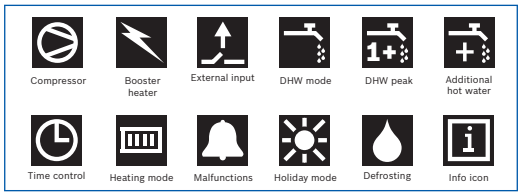
- Flow temperatures up to 55ºC can be achieved without any additional supplementary heat source, however higher temperatures can be achieved
- Energy savings – high seasonal performance due to frequency modulation of the compressor and the minimum use of the additional heat input
- Heat pump with high energy efficiency
- Low noise levels – 48dB at 1m
- Easy to operate – fully integrated, text display menu
- Mixed heating circuits – both underfloor or radiator systems can be combined via an optional accessory
- Solar compatible
- Flow temperature is maintained at 55ºC (until the outside temperature falls below -5°C)
- Hydrolight will automatically control the integration of the supplementary heat source
- Room controller available as accessory
- MCS certified – quality assurance and eligibility for RHI funding
- Products provide hot water and central heating
- Hot gas defrosting helps prevent ice forming in cold temperatures on the outdoor unit
- Weather compensating controls
- Peace of mind – 2 years' parts and labour guarantee*.

Controls – Rego 800

The indoor units are responsible for temperature regulation and feature a Rego 800 menu-driven control. The unit has a simple main menu with advanced features.

Symbol overview

Symbols for different functions and components are displayed in the lower part of the menu window.



Rego 800 control unit symbols

Room controller accessory

- Ability to change room temperature setting
- Shows the room temperature
- Shows the outdoor temperature.

*Subject to terms and conditions

How a Greensource split air to water heat pump works

Operating principle of a refrigeration circuit

The heat pump is an appliance which collects and transfers the available heat from outside to inside the property at a more useful temperature.

In the outdoor unit, the refrigerant meets the outdoor air in the heat exchanger. The air is drawn through the heat exchanger by a fan on the heat pump. The refrigerant, which is in a liquid state, absorbs free energy from the air and evaporates. The refrigerant (now in a gas state) is led into the compressor.

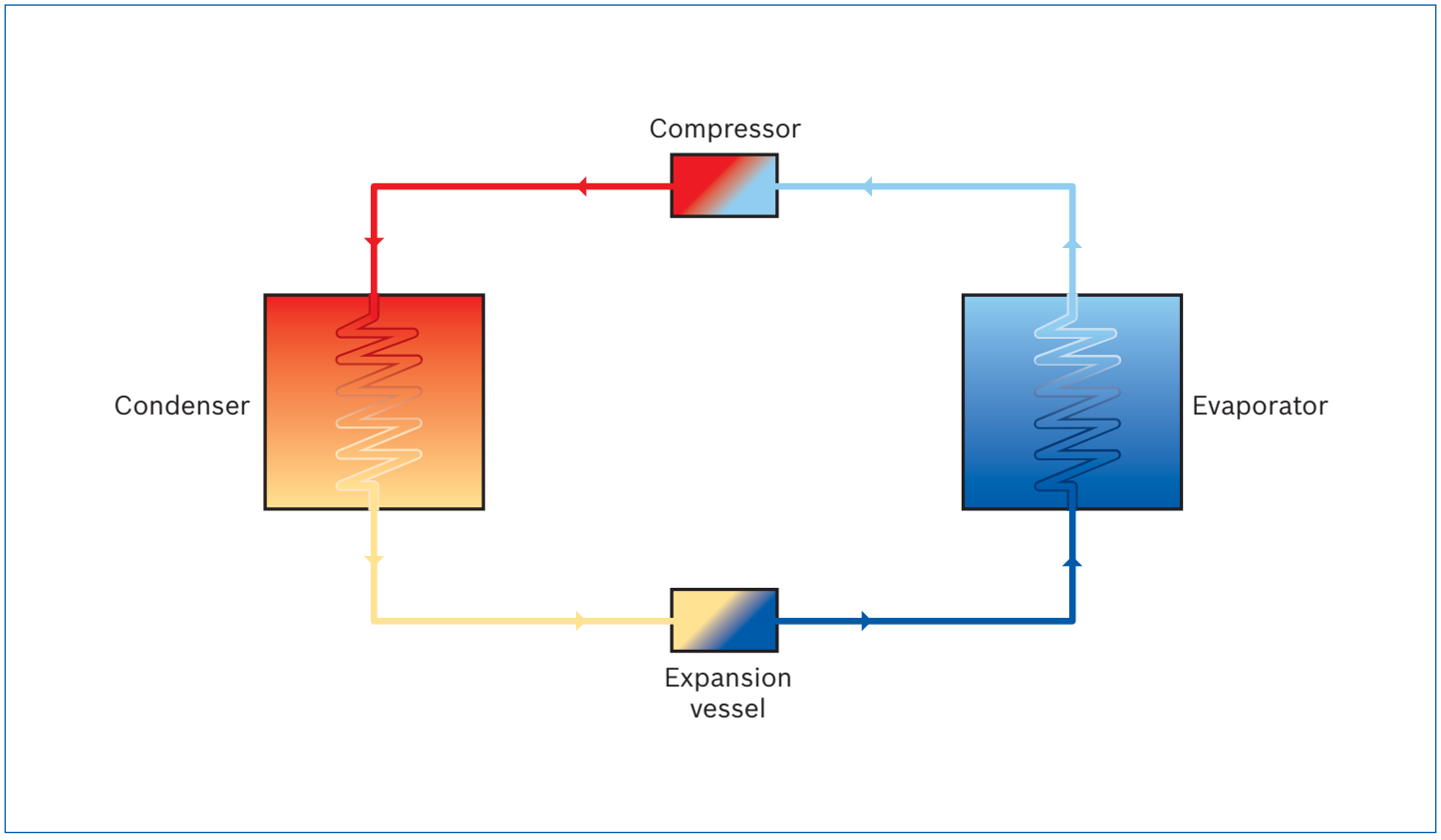
The inverter-driven compressor adapts the capacity of the heat pump to match the needs of the system. It increases the pressure of the refrigerant, allowing the temperature of the vapour to reach approximately 100°C. The warm gas is then led into the condenser.

The condenser is the heat pump's second heat exchanger which allows heat transfer from the refrigerant circuit to the primary heating circuit. When the warm gas is cooled by the primary heating circuit, it condenses into a liquid state. Energy is then discharged into either the heating system or the hot water supply. After the condenser, the refrigerant, which is now in liquid form, continues through a drying filter.

The drying filter is used to collect any moisture in the system.

Hot gas defrost allows a reverse in the operational flow of refrigerant to defrost ice forming in cold temperatures on the outdoor unit (see page 15 for more details).

Refrigeration flow diagram



System layouts – Hydrolight

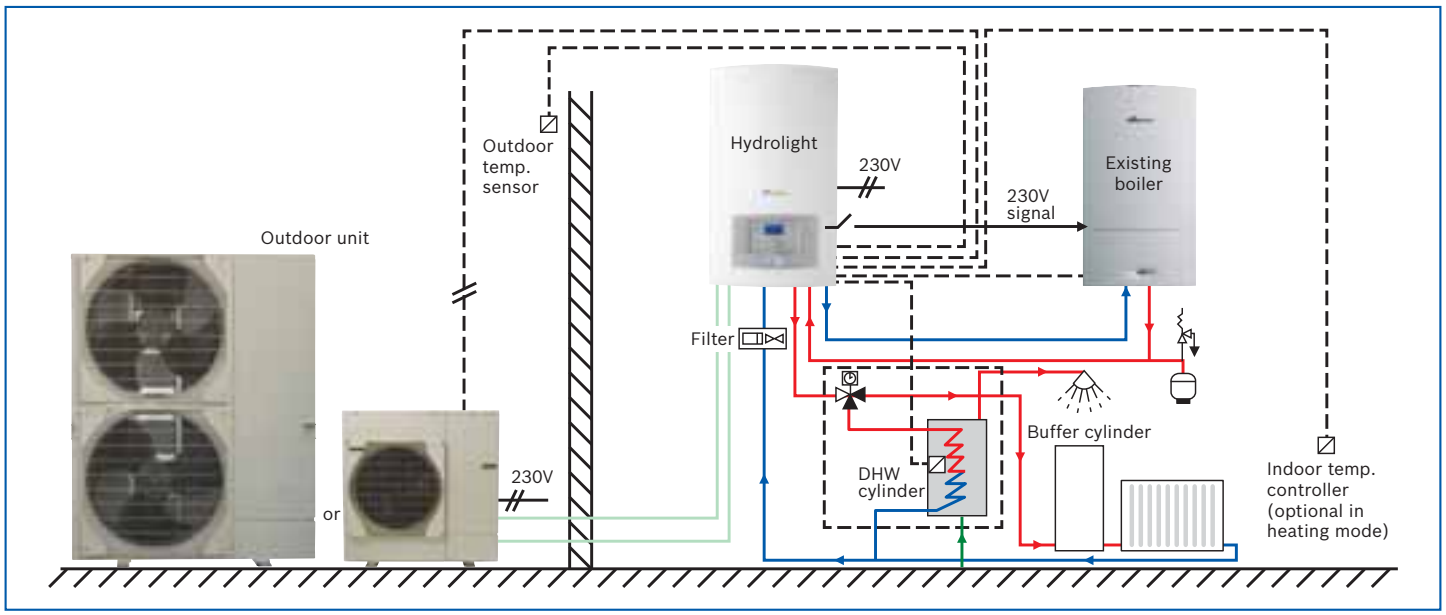
Greensource split air to water heat pumps have the versatility to be used in a variety of different system designs. The system layouts below are examples only, please refer to the installation manual for more details.

Control with Hydrolight

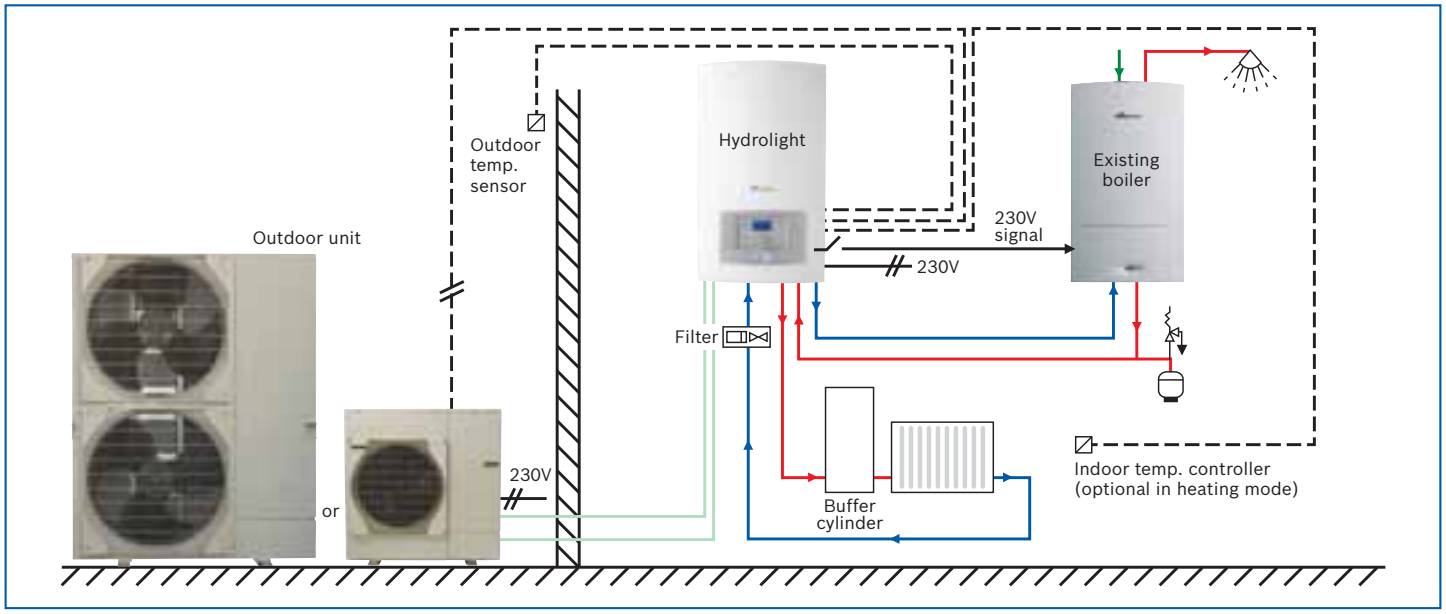
When the Hydrolight detects that the heat pump is unable to meet heating demands, it will initiate the boiler to provide additional heat. The heat pump and boiler will then operate at the same time. The Hydrolight unit will mix hot water from both sources to achieve the required flow temperature. This strategy minimises the use of the boiler to maximise energy savings.

If the outdoor temperature falls below -15°C, the heat pump will stop automatically and the boiler will be used for 100% of the heating.

Hydrolight with system boiler and DHW cylinder



Hydrolight with combi boiler only



NOTE: There is no expansion vessel in the Hydrolight unit so it will be necessary to size an expansion vessel against the existing heating system. Installation of a buffer tank between the Hydrolight and the boiler is recommended to minimise on/off cycling and improve system efficiency.

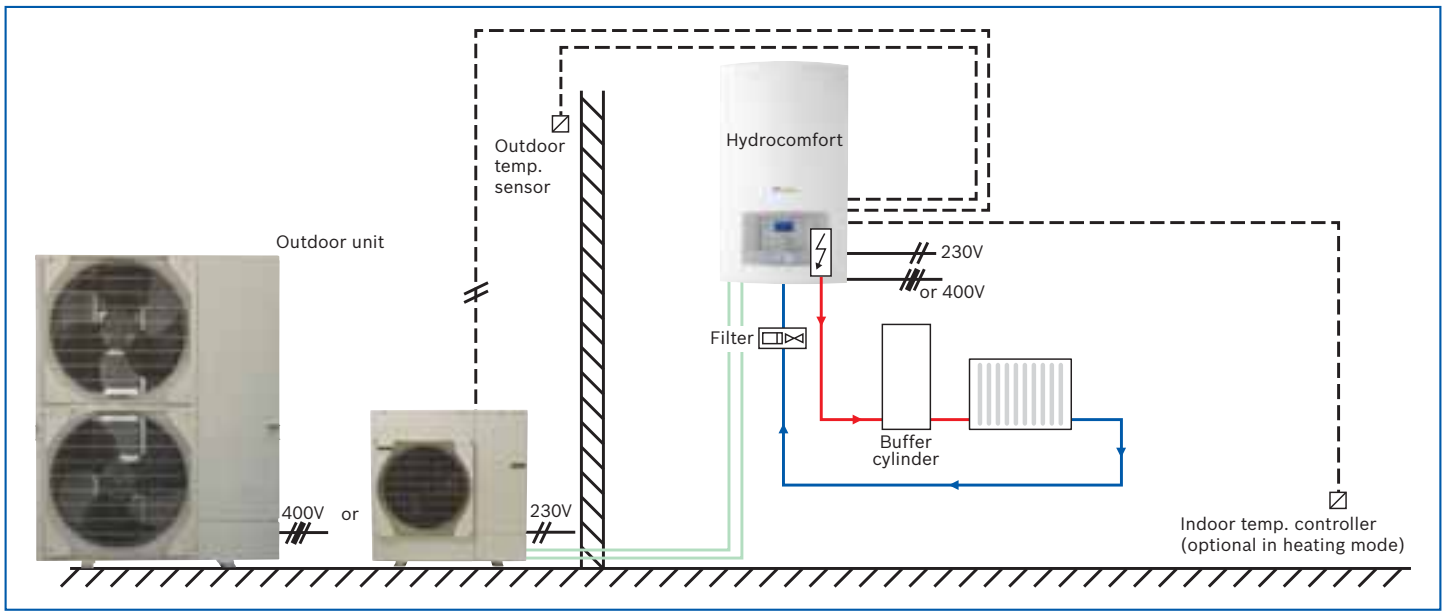
System layouts – Hydrocomfort

Control with Hydrocomfort

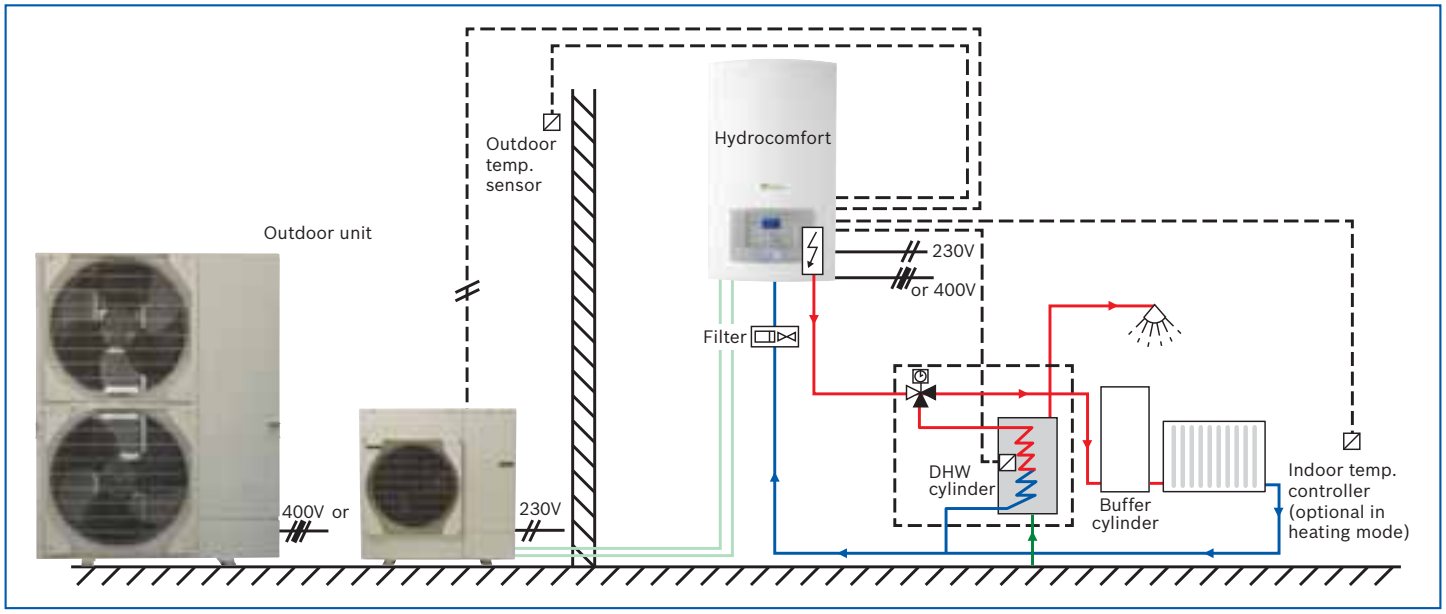
The control strategy for Hydrocomfort is the same as with the Hydrolight, except that the supplementary heat source is a 0-9kW electric heater. The electric heater is modulated in steps to ensure optimal performance from the heat pump.

As with the Hydrolight, if the outdoor temperature falls below -15°C the heat pump will stop automatically and the supplementary heater will be used for 100% of the heating.

Hydrocomfort



Hydrocomfort with DHW



NOTE: There is no expansion vessel in the Hydrocomfort unit so it will be necessary to size an expansion vessel against the existing heating system. Installation of a buffer tank between the Hydrocomfort and the boiler is recommended to minimise on/off cycling and improve system efficiency.

Outdoor unit (ODU)

Outdoor unit (11kW, 14kW, 16kW)

Outdoor unit (8kW)

Technical data

	ODU 7.5 Single-phase	ODU 10 Single-phase	ODU 11 Single-phase	ODU 12 Single-phase	ODU 11 Three-phase	ODU 12 Three-phase
Output	8kW	11kW	14kW	16kW	14kW	16kW
Height	943mm	1,338mm	1,338mm	1,338mm	1,338mm	1,338mm
Width	950mm	1,050mm	1,050mm	1,050mm	1,050mm	1,050mm
Depth	360mm	360mm	360mm	360mm	360mm	360mm
Weight – lift	67kg	116kg	116kg	119kg	126kg	132kg
Maximum heating capacity at A-7/W35	6.0kW	8.3kW	10.5kW	11.2kW	11.5kW	11.2kW
Input power	2.4kW	3.5kW	4.5kW	4.5kW	5.1kW	4.5kW
Mains power supply	230V, 1N AC 50Hz	230V, 1N AC 50Hz	230V, 1N AC 50Hz	230V, 1N AC 50Hz	400V, 3N AC 50Hz	400V, 3N AC 50Hz
Recommended automatic circuit breaker[2)]	25A	32A	32A	32A	10A	16A
Maximum current[3)]	19A	26.5A	26.5A	28A	9.5A	13A
Refrigerant connection type	Flare connection 3/8" and 5/8"	Flare connection 3/8" and 5/8"	Flare connection 3/8" and 5/8"	Flare connection 3/8" and 5/8"	Flare connection 3/8" and 5/8"	Flare connection 3/8" and 5/8"
Refrigerant type[4)]	R410A	R410A	R410A	R410A	R410A	R410A
Refrigerant mass	3.5kg	5.0kg	5.0kg	5.0kg	5.0kg	5.0kg
Nominal flow rate	1.008m³/h	1.404m³/h	1.764m³/h	2.016m³/h	1.764m³/h	2.016m³/h
Pressure difference, water side	58 ΔP(kPa)	50 ΔP(kPa)	17 ΔP(kPa)	14 ΔP(kPa)	17 ΔP(kPa)	14 ΔP(kPa)
Fan motor (DC inverter)	86W	60W + 60W (two fans)	60W + 60W (two fans)	60W + 60W (two fans)	60W + 60W (two fans)	60W + 60W (two fans)
Nominal air flow rate	3,300m³/h	6,600m³/h	7,200m³/h	7,200m³/h	7,200m³/h	7,200m³/h
Sound pressure level at a distance of 1m	48 dB(A)	51dB(A)	52dB(A)	52dB(A)	52dB(A)	52dB(A)
Sound power level[5)]	66dB(A)	68dB(A)	68dB(A)	68dB(A)	68dB(A)	68dB(A)
Compressor oil	FV 50S	FV 50S	FV 50S	FV 50S	FV 50S	FV 50S
Maximum heating water flow temperature, outdoor unit only	55ºC	55ºC	55ºC	55ºC	55ºC	55ºC
Maximum heating water flow temperature, supplementary heating only	80ºC	80ºC	80ºC	80ºC	80ºC	80ºC
IP rating	IP24	IP24	IP24	IP24	IP24	IP24

1) Rating according to EN 14511
2) Fuse type MCB type C
3) Starting current; depending on the type, a starting peak will not occur
4) GWP_{100} = 1980
5) Sound power level in accordance with EN 9614-2

Inside story – Hydrolight indoor unit

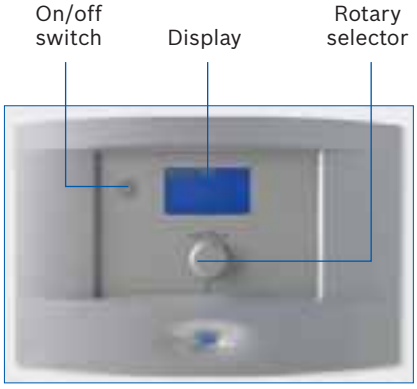
Rego 800 control unit

Technical data

Hydrolight unit with supplementary heat appliance

	Hydrolight 8 Single-phase	Hydrolight 16 Single-phase
Height	850mm	850mm
Width	500mm	500mm
Depth	420mm	420mm
Weight – lift	49kg	52kg
Recommended automatic circuit breaker	10A	10A
Mains power supply	230V, 1N AC 50Hz	230V, 1N AC 50Hz
Maximum power consumption	6A	6A
Maximum heating output, 2nd heat appliance	25kW	25kW
Connection type (central heating and booster heater flow/return)	1" male thread	1" male thread
Maximum operating pressure	3bar	3bar
Expansion vessel	N/A	N/A
Internal pressure drop	8kPa	17kPa
Available external pressure	38kPa	48kPa
Circulation pump type	Wilo-Star RS 25/6	Wilo-Star Top-S 25/7
Refrigerant pipe connection type	Flare connection 5/8" - 3/8"	Flare connection 5/8" - 3/8"

Inside story – Hydrocomfort indoor unit



Rego 800 control unit

Technical data

Hydrocomfort unit with electric supplementary heater

	Hydrocomfort 8 Single-phase	Hydrocomfort 8 Three-phase	Hydrocomfort 16 Single-phase	Hydrocomfort 16 Three-phase
Height	850mm	850mm	850mm	850mm
Width	500mm	500mm	500mm	500mm
Depth	420mm	420mm	420mm	420mm
Weight – lift	51kg	51kg	54kg	54kg
Mains power supply	230V 1N AC 50Hz	400V 3N AC 50Hz	230V 1N AC 50Hz	400V 3N AC 50Hz
Recommended automatic circuit breaker	45A	16A	45A	16A
Maximum power consumption	45A	16A	45A	16A
Electric supplementary heater	9kW	9kW	9kW	9kW
Connection type (central heating and electric heater flow/return)	1" male thread	1" male thread	1" male thread	1" male thread
Maximum operating pressure	3bar	3bar	3bar	3bar
Expansion vessel	6 litres	6 litres	6 litres	6 litres
Internal pressure drop	8kPa	8kPa	17kPa	17kPa
Available external pressure	38kPa	38kPa	49kPa	49kPa
Circulation pump type	Wilo-Star RS 25/6	Wilo-Star RS 25/6	Wilo-Star Top-S 25/7	Wilo-Star Top-S 25/7
Refrigerant pipe connection type	Flare connection $^5/_8$" - $^3/_8$"	Flare connection $^5/_8$" - $^3/_8$"	Flare connection $^5/_8$" - $^3/_8$"	Flare connection $^5/_8$" - $^3/_8$"

Hydrocomfort is electrically wired as three-phase as standard and supplied with electrical jumpers to convert to single-phase.

Coefficient of Performance of a split air to water heat pump

The performance and efficiency of an air source heat pump system is commonly measured by the Coefficient of Performance (CoP). The CoP is a simple calculation which works out how much energy the heat pump is able to extract from the energy source, compared to the amount of electrical energy used by the heat pump.

$$\text{CoP} = \frac{\text{Heat output of system (useful heat)}}{\text{Electrical input from compressor and circulating pumps}}$$

$$\text{e.g.} \quad \frac{\text{9kW heat pump}}{\text{2.7kW of electrical input}} = \text{CoP of 3.3}$$

The CoP depends on the temperature that can be extracted from the outdoor unit and the temperature required by the heating system of the house. The best combination for a high CoP would be a higher source temperature (e.g. 10ºC) and a lower flow temperature for the heating (e.g. 35ºC). The return on the energy employed in this case is higher since the heat pump has to increase the temperature by only 25ºC. If the energy from the source is lower in temperature and the required flow temperature is higher the CoP will be reduced.

The equation shows the CoP for 2.7kW of heat provided by the pump (which is provided by electrical consumption) and 6.3kW of energy extracted from the outside air.

Model and efficiency	ODU 7.5 Single-phase	ODU 10 Single-phase	ODU 11 Single-phase	ODU 12 Single-phase	ODU 11 Three-phase	ODU 12 Three-phase
kW output	**8kW**	**11kW**	**14kW**	**16kW**	**14kW**	**16kW**
Nominal heating capacity A7/W35 (kW)	8.68	11.85	14.00	14.00	16.00	16.00
Max. heating capacity A2/W35 (kW)	7.5	10.5	11.5	11.5	11.8	11.8
Max. heating capacity A-2/W35 (kW)	6.2	9.0	11.0	11.0	11.5	11.5
Max. heating capacity A-7/W35 (kW)	6.0	8.3	10.5	10.5	11.2	11.2
Nominal heating capacity A7/W45 (kW)	8.0	11.2	14.0	16.0	14.0	16.0
Max. heating capacity A2/W45 (kW)	6.7	10.0	12.5	12.5	13.7	13.7
Max. heating capacity A-2/W45 (kW)	6.1	8.1	11.0	11.0	11.6	11.6
Max. heating capacity A-7/W45 (kW)	5.5	7.5	9.7	9.7	10.2	10.2
Max. heating capacity A7/W55 (kW)	8.0	11.2	14.0	16.0	14.0	16.0
CoP A7/W35 (at nominal speed)	4.34	4.39	4.24	4.24	4.10	4.10
CoP A2/W35 (at max. speed)	2.9	2.9	2.7	2.7	2.8	2.8
CoP A-7/W35 (at max. speed)	2.5	2.4	2.3	2.3	2.5	2.5
CoP A7/W45 (at nominal speed)	3.2	3.2	3.1	3.1	3.1	3.1
CoP A-7/W45 (at max. speed)	2.0	1.8	1.7	1.7	1.9	1.9
CoP A7/W55 (at max. speed)	2.3	2.4	2.3	2.3	2.4	2.4

Rating according to EN 141511

Performance

The Greensource split air to water heat pump is optimised for UK heating market requirements and has a Coefficient of Performance (CoP) from 4.1 to 4.39 at A7/W35 (air at 7°C, water flow temperature at 35°C).

The maximum flow temperature in heating mode is 55°C from the heat pump.

Greensource split air to water heat pumps will deliver a higher CoP when used with a low temperature system, such as underfloor heating or appropriately sized radiator systems that are designed for low flow temperatures and have a larger heat exchanger area.

To achieve maximum energy savings in high temperature systems, it is desirable to maximise the use of the heat pump and minimise the use of the secondary heat source (back up boiler, electric heater). This can be achieved by optimising the heating distribution system for lower flow temperatures, for example fitting more radiators or sizing radiators to the flow temperature that can be achieved.

Power modulation and seasonal efficiency

The heating needs of a building clearly vary considerably during the course of the year. With conventional heat pumps this results in considerable on/off cycling, which wastes energy.

Greensource split air to water heat pumps use the inverter control of the compressor to modulate the speed of the compressor in response to variation in heating or hot water demands. This reduces the number of on/off cycles. However, a buffer may still be required for optimal performance, dependent upon the heating system volume. The heating system to which the heat pump is connected must have a volume of at least 25L always available, otherwise a buffer tank (primary water storage) must be installed.

Operation with a DHW tank

If required, the Greensource split air to water heat pump can be connected to a domestic hot water tank. A set of 3-way valves allows switching from heating mode to DHW mode although priority is always given to DHW mode.

The desired hot water temperature is set by the installer in the control unit. The heat pump raises the temperature of the DHW as much as possible and if a higher temperature is required the secondary heat source will supplement the heat pump.

It is very important that only DHW storage cylinders specifically designed for use with heat pumps are used. Cylinders of this type have a large heat exchange area, typically at least $3m^2$, and pre-defined positions for the temperature sensors.

Using a heat pump DHW cylinder with the surface areas of heat exchange being less than $3m^2$, or wrong positioning of sensors, could result in a drop in DHW comfort and heat pump efficiency. From test work undertaken, the Kingspan Albion Aerocyl series are particularly compatible with the Greensource split heat pump range.

Defrosting the heat pump

The principle of defrosting the heat pump is known as hot gas defrosting. During defrosting, the flow in the refrigerant circuit is reversed by means of an electrically controlled 4-way valve.

The compressed gas from the compressor is fed into the top of the evaporator, causing the ice on the outside to melt. During this process, the heating water is cooled slightly. Hot gas is sprayed into the evaporator and a sensor ensures that the process functions correctly.

The time required for defrosting depends on the amount of ice and the outdoor temperature.

Is a heat pump suitable for the property?

It is essential that heat pump systems are designed to operate efficiently in order to meet the heating needs of the building, and the expectations of the customer. In order to achieve this, the following design activities must be completed prior to the installation:–

- ***Pre-design assessment***
  Determine the suitability of a heat pump system for the building based on the customer's requirements, expectations and building type.
- ***Detailed design***
  Complete building heat loss calculations and domestic hot water usage assessment.
- ***Specification***
  Select a suitable heat pump and system components based on the detailed design. Calculate and communicate the predicted energy use and running costs of the system to the customer.

Heat loss

The total heat loss of the property (or building) is calculated from the addition of fabric and ventilation heat losses. Fabric heat loss is the transmission of heat by conduction through the building structure, i.e. windows, walls, roof and floor. Ventilation heat loss is heated air escaping from the house and being replaced by cold air from the outside.

Calculating the heat loss of the property

It is essential to accurately calculate the heat loss of the property to ensure correct sizing of the heat pump system. The heat loss is dependent on the construction of the building, room sizes, external and internal design temperatures and air change rates. The heat loss calculations should satisfy the requirements of BS EN 12831.

Estimating heat loss

Estimating the heat loss of the building is useful in determining the suitability of a heat pump system. However, assumptions based on floor area (e.g. 50 W/m^2 for new build etc.) and SAP (the Government's Standard Assessment Procedure) should not be used for the detailed design and specification stage. It should be noted that the heat loss for non-standard houses i.e. houses with large areas of glazing, high ceilings, log burners etc. or houses in exposed locations may deviate significantly from any rules of thumb.

In existing properties, boilers are often oversized and should therefore not be used to determine the actual heat requirements of the house.

However, estimates may be made on the basis of the existing energy consumption of the space to be heated.

This brochure does not cover all the necessary details to calculate the heat loss. The information given here is provided to remind the heating system designer and installer of the process and considerations.

Worcester design service

Worcester's design team offers design support across all of the Worcester, Bosch Group product range. The design team produces technical drawings and provides specification advice for a range of customers; all of our team are authorised SAP assessors and hold an IDHEE Domestic Heating Certificate. Worcester provides a range of indemnified design solutions in support of our core range of Greenstar gas- and oil-fired boilers, Greenfloor heating and a growing portfolio of renewable technologies – including Greenskies solar thermal panels as well as Greenstore ground source and Greensource air source heat pumps.

The design service for Worcester Greensource split air to water heat pumps includes calculations for:

- Heat pump sizing
- Estimated annual running costs
- Fact sheets.

For more information on the suitability of heat pumps for your home visit **www.worcester-bosch.co.uk**
For information and guidance on planning permission for split air to water heat pumps visit **www.energysavingtrust.org.uk**

Installing a Greensource split air to water heat pump

Heat pump installations should be made in accordance to the current MIS3005 micro generation installation standards, including MCS020 planning standards.

Siting of the outdoor unit

The outdoor unit requires a flat, solid base (e.g. concrete plinth or slabs) and should be positioned at least 300mm from the building into which it connects. A minimum of 100mm installation height above the ground is recommended to compensate for possible ice formation. Care should be taken to ensure that the ventilation hole on the side of the unit is not obstructed.

The heat pump will produce between 15-25 litres of condense water per day, depending on external temperatures, and this should be diverted to a mains drain or a soakaway.

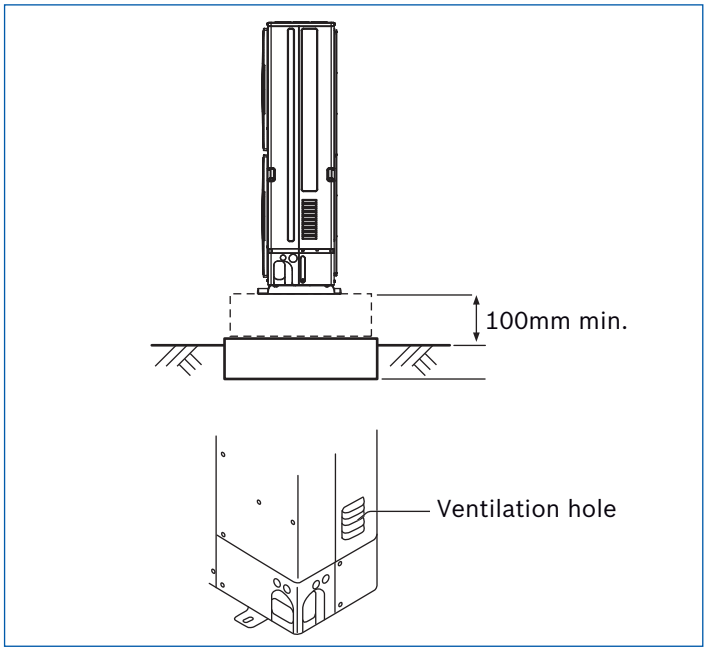
The outdoor heat pump can be sited up to 70m from the indoor unit, taking care that the correct insulation is used for refrigeration pipework.

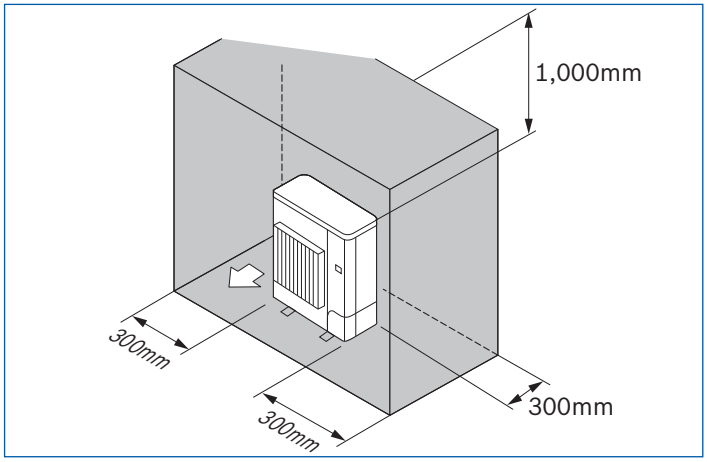
A heating cable is available as an accessory to reduce freezing of the condensate discharge.

Hydraulic units

The outdoor heat pump cannot be used on its own. It must be combined with one of the Hydrocomfort or Hydrolight indoor hydraulic units, and is sold as a complete kit.

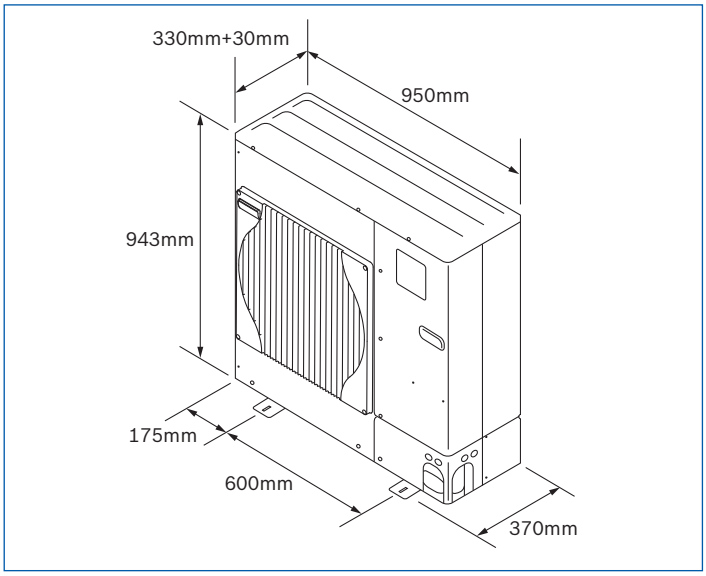
Installation clearances for the outdoor unit



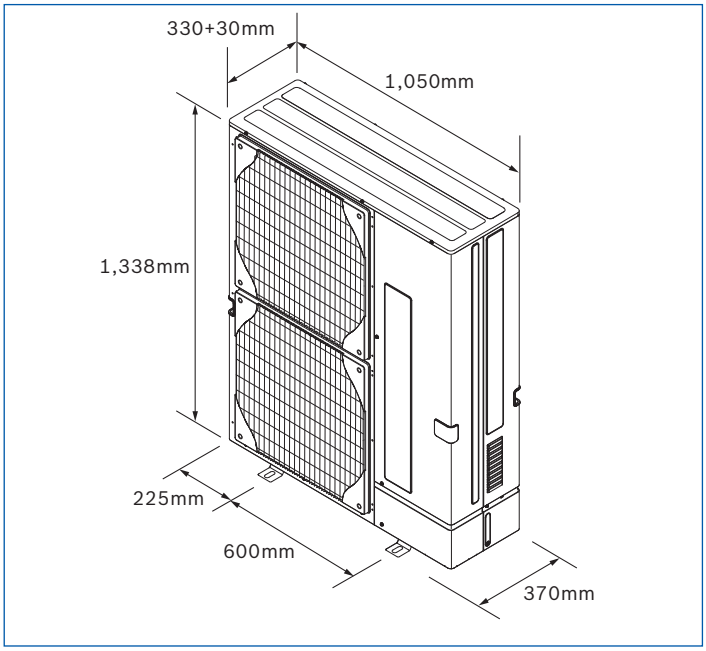


Outdoor unit casing dimensions and pipework connections

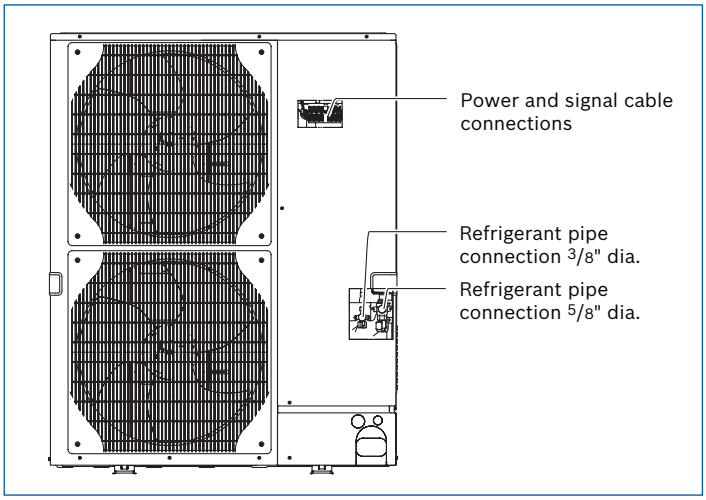
ODU 7.5 unit dimensions



ODU 10, 11 and 12 unit dimensions



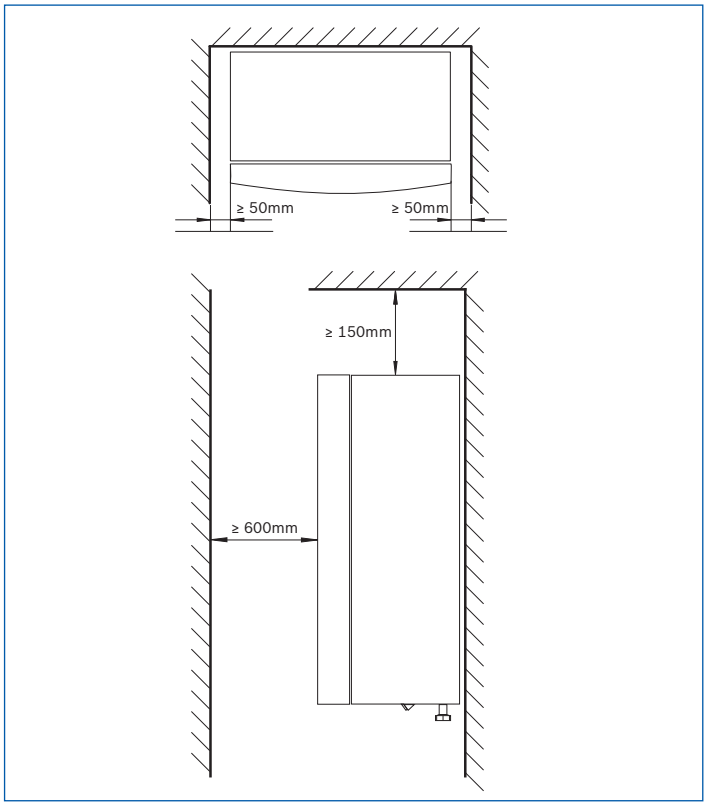
Outdoor unit pipework connections



Siting of the indoor unit

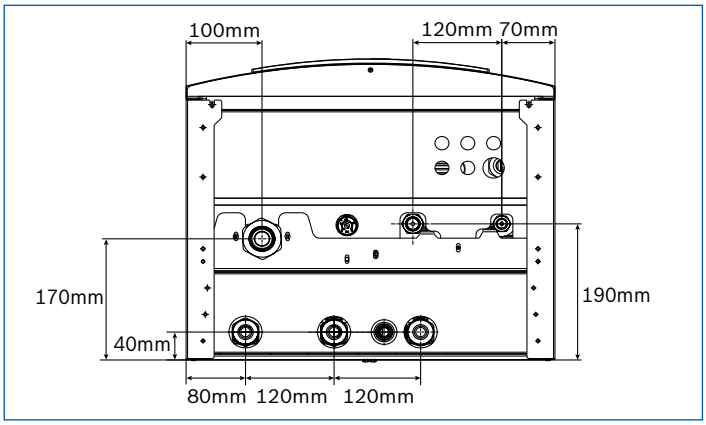
An installation clearance of at least 50mm is required between the Hydrolight/Hydrocomfort unit and the walls. An installation clearance of at least 600mm is required in front of the Hydrolight/Hydrocomfort unit with at least 150mm above the unit.

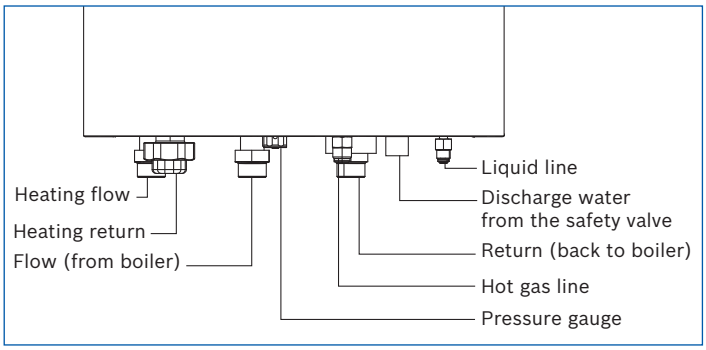
Hydrolight/Hydrocomfort unit clearances

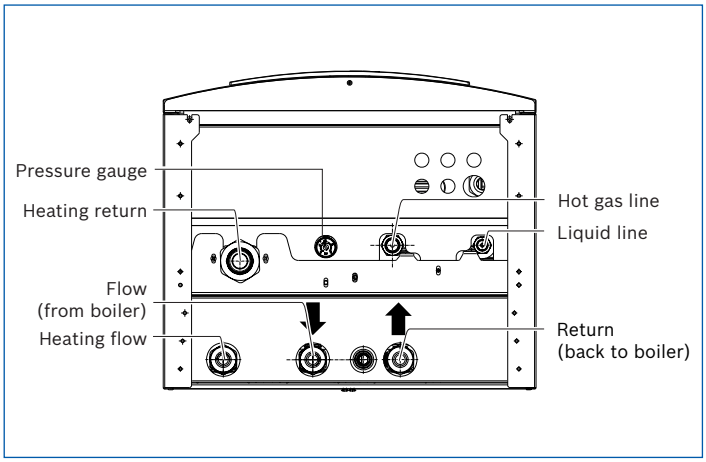


Indoor unit pipe connections – Hydrolight

Pipe connections of Hydrolight unit, with mixer

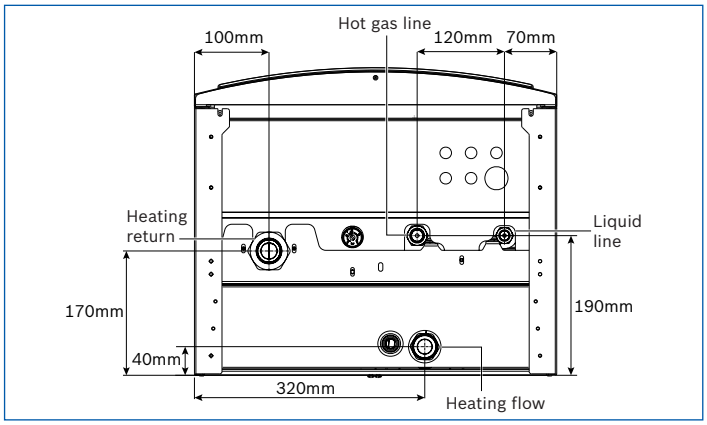


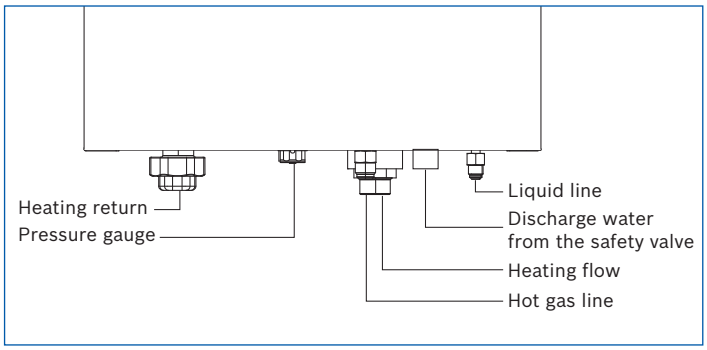


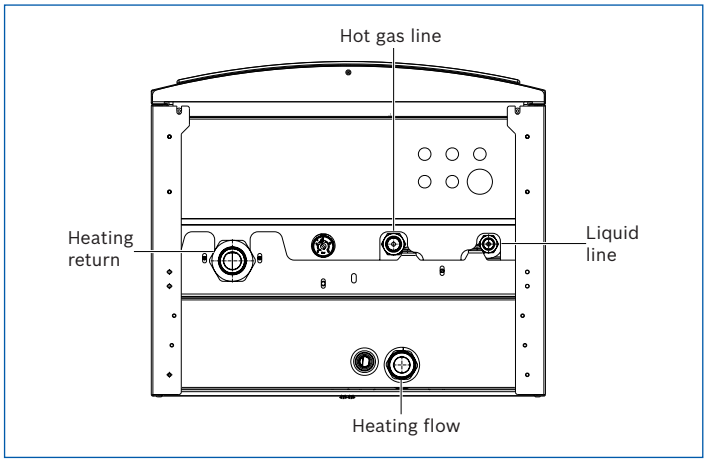


Indoor unit pipe connections – Hydrocomfort

Pipe connections for Hydrocomfort unit with electric supplementary heater







Pipe dimensions	
Flow/return, heating system and additional heat	R25, 1" (26x34)
Refrigerant pipe gas/liquid, to outdoor unit	5/8" and 3/8"

Installation requirements

It is very important that only DHW storage cylinders specifically designed for use with heat pumps are used. Specifically, cylinders of this type have a large heat exchange area, typically at least 3.0m^2, and pre-defined positions for the temperature sensors.

Using a heat pump DHW cylinder with a surface area of heat exchange less than 3m^2, or wrong positioning of sensors, could result in a drop in DHW comfort and heat pump efficiency. In test work undertaken by Worcester the Kingspan Albion Aerocyl series was found to be particularly compatible with the Greensource split heat pump range.

Pipe connections

The following connections must be made in the Hydrolight/Hydrocomfort unit:
Route the discharge water hose downwards from the safety valve to a frost-free drain.

The installation must only be carried out by a certified refrigeration engineer (F Gas). The installer must comply with the applicable rules, regulations and specifications of the installation and operating instructions.

Heat pump sizing

Although the sizing of the heat pump can only be accurately carried out by taking all factors into consideration, this section offers some explanation of the principles behind the sizing of a heat pump according to the energy requirement of the property.

The benefit of sizing the heat pump below the peak load requirement is that the pump, for the majority of the year, is able to remain on and deliver a 'trickle charge' of heat to the property, rather than being oversized and constantly cycling in and out of operation. This helps the heat pump to operate more efficiently.

In order to obtain RHI funding, an air to water heat pump must be sized in accordance with the current MIS 3005.

The Worcester, Bosch Group design team offers a heat pump sizing service which is MCS compliant. To request this service, download and submit the form using the guidance notes from our website:
www.worcester-bosch.co.uk/hp

There are significant climatic differences across the UK and this should be taken into consideration when sizing the heat pump. The Worcester design team is able to provide information on an individual basis. For more information on the suitability of heat pumps for your home visit **www.worcester-bosch.co.uk**

Building Regulations and standards

This appliance must be installed and serviced only by a competent person in accordance with the current IEE Regulations, Building Regulations, Building Standards (Scotland) (Consolidation), Building Regulations (Northern Ireland), local water byelaws, Health & Safety Document 63S (The Electricity at Work Regulations 1989), IS 813 (Eire) and other local requirements.

The relevant Standards should be followed, including:
BS7074:1: Code of practice for domestic and hot water supply

EN:12828: Central heating for domestic premises

BS7593: Treatment of water in domestic hot water central heating systems

BS EN 14511: Requirements for heat pumps for space heating

BS EN 378: Safety and environmental requirements for heat pumps

The Health and Safety at Work Act 1974

The Management of Health and Safety at Work Regulations 1999

The Construction (Health, Safety and Welfare) Regulations 1996

The Construction (Design and Management) Regulations 1994

The Lifting Operations and Lifting Equipment Regulations 1998

Where no specific instruction is given, reference should be made to the relevant codes of practice.

Potable water: all seals, joints, compounds (including flux and solder) and components used as part of the secondary domestic water system must be approved for use with potable water supplies.

This is to certify that the above ranges of products manufactured by Bosch Thermotechnology Ltd. have been tested and found to comply with:

- the requirements of the (Water Fittings) Regulations 1999 for England and Wales, the Water Byelaws 2000, Scotland and the Water Regulations Northern Ireland.

- the requirements of the UK Building Regulations:
  The Building Regulations 1991 (England & Wales) Requirements G3, L1 and Regulation 7.
  The Building Standards (Scotland) Regulations 1990. Regulation 10 (B2), 22 (J3.3a and J3.4), 27 and 28 (P2.6 and P3).
  The Building Regulations (Northern Ireland) 2000.

In accordance with current EU legislation (the F-gas regulation, EC Regulation No 842/2006 which came into effect on 4 July 2006), a heat pump that contains more than 3kg of refrigerant R410A must be checked regularly by a refrigerant engineer. It is therefore a requirement that the owner of a Worcester ODU model has the refrigerant circuit checked by a refrigerant engineer. Leak tests must be performed at installation and then repeated every 12 months.

Heat emitters

Worcester, Bosch Group heat pumps are fitted with weather compensation controls as standard. However, for a heat pump to perform to its highest energy efficiency, the central heating emitter circuit should be designed so that the flow temperature is as low as possible.

As a guide, the system should be designed using the following maximum flow temperatures;
- Underfloor heating: 35-40ºC
- Radiators: 45-50ºC.

If underfloor heating has been installed, it is important to remember that the underfloor system designer should have been informed that the heat source will be from an air source heat pump. It is also important to remember that radiators should have been correctly sized to work effectively with lower flow temperatures.

A tool to aid installers and end users to understand the relevance of building heat loss and heat emitter selection on heat pump performance, has been created by the joint trade associations. The 'Heat Emitter Guide' can be downloaded from the following website:
www.microgenerationcertification.org

System design requirements

The heating system should be designed to maintain 70% of the nominal flow of the system across the heat pump at all times. Underfloor heating systems should have at least half of the underfloor coils fully open at all times.

The heating system to which the heat pump is connected must always have an uncontrolled volume of at least 25l, otherwise a buffer tank (primary water storage) must be installed.

System flushing and care

Flushing the system in line with BS 7593

- Fill the system with cold water and check for leaks
- Open all drain cocks and drain the system
- Close drain cocks and add a suitable flushing agent compatible with aluminium at the correct strength for the system conditions and in accordance with the manufacturer's instructions
- Circulate the flushing agent before the heat pump is connected
- Run the system at normal operating temperature as directed by the manufacturer of the flushing agent
- Drain and thoroughly flush the system to remove the flushing agent and debris
- It may be necessary to use a power flushing machine to aid the cleansing procedure in some circumstances
- Close the drain cocks and refill with fresh water and a suitable inhibitor
- Vent any air from the boiler and system
- Clean the particle filter.

The heating system must not contain more than 200ppm chlorine.

Filling the heating system

First flush the heating system. If the water heater is connected to the system, it must be filled with clean water. The heating system is then filled.

Filling the heating system with clean water

Worcester recommends the fitting of an in-line system filter to help ensure that the heating system can perform at its optimum level.

- Set the pre-pressure for the expansion vessel in the premises according to the heating unit's static height
- Open the heating system's valves
- Top up the heating water in the system and fill system to appropriate operating pressure
- Vent the heating system by opening the shut off valve. This may have to be repeated a couple of times and is very important to ensure the correct operation of the heat pump
- Also bleed via the heating system's other bleed valves (e.g. radiators)
- Refill to the correct pressure. Normal pressure is 1.0-2.5bar, but depends on the expansion vessel's pre-pressure and the height of the building
- Shut the heating water filling valve when the correct pressure is reached.

Inhibitor

If the system is exposed to freezing conditions, add a suitable inhibitor or combined inhibitor/anti-freeze in accordance with the DWTA code of practice and manufacturer's guidelines.

The Worcester Greenstar System Filter

Modern heat pumps are precision engineered and designed to run with a clean water-heating system. Over time, dirty system water will develop, damaging a heat pump and its components, causing failures, shortening the life of the overall system and dramatically reducing the efficiency of the heat pump.

A highly effective solution

The Worcester Greenstar System Filter has been specifically designed to combat the damaging effects of system debris and pollutants, protecting the heat pump and heating system for a fraction of its cost.

At the centre of its innovative design is a powerful magnet that removes the magnetic debris that is present in the heating system water. The central location of the magnet ensures that the debris is collected quickly and retained. Any non-magnetic debris is caught by the twin-action cyclonic trap, maximising overall protection.

Greenstar System Filter features and benefits:

- Highly effective – safeguards the boiler against damage and can save up to 6% a year on energy bills*
- Prevents blockages in radiators – a warmer home and quieter system
- Twin action – effective against magnetic and non-magnetic system debris.

The filter can be fitted under or away from the heat pump.

Product info	
Part number	7 716 192 609

*Independent research.

Communication cable

The printed circuit boards in the Hydrolight/Hydrocomfort unit, and accessories board if applicable, are connected via the CANbus communication line. The CAN (Controller Area Network) is a system that facilitates communication between microprocessor-based units/printed circuit boards.

A room controller is available as an accessory and must be connected by a CANbus cable – also available as an accessory.

Suitable cable for external laying is cable type LIYCY (TP) 2 x 2 x 0.5.

The cable must be twisted pair and screened. The screen must only be earthed at one end and to the chassis.

Maximum cable length is 30m between the internal room controller and the internal Hydro unit.

The CANbus cable must not be routed together with the mains cable that carry 230V or 400V. The minimum clearance is 100mm. Routing of these cables together with the sensor cables is not permitted.

The connection between the circuit boards is by four wires, because the 12V supply between the circuit boards must also be connected. The circuit boards have markings for both the 12V and CANbus connections.

Refrigerants

The air to water heat pump is filled with R410A refrigerant. It is therefore a requirement that the owner of a Worcester Greensource Split Heat Pump has the refrigerant circuit checked by a refrigerant engineer. Leak tests must be performed at installation and then repeated every 12 months.

Maintenance of the outdoor heat pump

The outdoor heat pump unit should be checked regularly for leaves and debris, especially on the evaporation fins and water tray. To prevent damage these must only be cleaned using a watering can with a rose attachment and a soft cloth.

Maintenance on the indoor unit

This should be serviced annually. If a cylinder is fitted this would have to be serviced annually in accordance with G3 Building Regulations.

Spare parts

Only genuine Worcester, Bosch Group spare parts can be used with these products.
Visit your nearest Profile stockist or visit **www.worcester-bosch.co.uk/spares**

Frequently asked questions

What benefits do split air to water heat pumps offer over ground source heat pumps?
There are significant benefits, such as lower installation costs and no need to dig trenches or boreholes. They also take up much less space as you don't need a large area for the collector trenches which are required for ground source heat pumps.

What refrigerant is used in Greensource split air to water heat pumps?
Greensource split air to water heat pumps use R410A. It is an approved refrigerant featuring zero ozone depleting potential. It also has a low global warming potential which is more environmentally friendly.

What is the lower limit operating temperature?
The lower limit operating temperature of Greensource split air to water heat pumps is -20°C though the standard configuration will turn the heat pump off if the outdoor temperature falls to -15°C. This can be overridden by the Rego controller.

What are the key maintenance requirements for Greensource split air to water heat pumps?
It will need servicing once a year by a qualified refrigerant engineer. The technician will need to check a number of things during the service, including:

- A temperature pressure relief valve is fitted – in line with G3 requirements for unvented cylinders
- Check the unit for signs of damage or corrosion
- All water connections must be checked for tightness or signs of leakage and the system water pressure must be checked
- The air path to and from the unit must be checked to ensure it is clear
- The heat pump water drain tray and the pipe to it must be checked to ensure it is clear and clean.

The technician should then turn the unit on and check that:

- the controls are operating properly
- the water pump is free and operating properly
- the unit's fan is operating
- that the unit is increasing the water to the correct operating temperature.

How should the unit be sited to ensure the airflow and access it needs?
It is important to ensure there is sufficient space for airflow into the unit and enough clearance at the front of the heat pump to stop cold air re-circulation. You'll also need to ensure that there is adequate space for access for service and maintenance. Also, you should try to ensure that the unit is sheltered from high winds as this will improve the unit's efficiency level by lowering the fan power requirement. Siting should be made in accordance with MIS 3005 (MCS 020 planning standards). The minimum clearances required are shown on pages 17 and 18.

What should I consider when connecting the split air to water heat pump to the mains electricity supply?
Consideration should be given to the size of the unit, the length the cable needs to run, and the voltage passing through it. Installation work of this type should only be carried out by a qualified electrician who would be able to calculate all of the above points and install the correct sized cable for each installation.

What is the most efficient flow water temperature setting?
The lower the flow water temperature, the less the heat pump has to work, and the more efficient it will be. It depends on the type of heating system the heat pump is working alongside, we recommend that the operating temperature for an underfloor heating system is 35°C and for a typical radiator system is 50°C.

What size of radiators should be used on installations linked to split air to water heat pumps?
We recommend that radiators are appropriately sized based on the heat loss of the home. Most radiator manufacturers will supply selection tables and offer advice on this.

Can you combine radiators and underfloor heating when using a split air to water heat pump?
Yes you can. However, the heat pump return water temperature should be set for a radiator system at the higher return temperature and a mixing valve should be fitted to reduce the water temperature for the underfloor heating part of the system.

A multi-modular accessory is available to support this system.

Can the external split air to water heat pump unit be hidden behind bushes, trees and fences?
Yes, but you have to be aware that wherever you position the unit it has to have adequate airflow available to it and that the discharge air can't be re-circulated back to the inlet. If you don't take enough care in this respect, it will result in lowering the air temperature and can significantly reduce the efficiency of the unit. Our recommended clearances are noted on page 18.

What guarantee is available?
Greensource split air to water heat pumps come with a 2 year manufacturer's guarantee provided that the guarantee is registered within 30 days of installation. For more information please call 0844 892 3000.

Is there a training course available?
Yes, Worcester offers a range of training courses including a 1 day Greensource Split Air to Water training course. Please call 01905 752526 for more information.

Renewable Heat Incentive (RHI)

Is there any Government funding to help with the cost of installing an air to water heat pump?
The UK Government's Renewable Heat Incentive scheme is designed to encourage people to install renewable technologies.

A new scheme for owner occupiers and private landlords is planned to be introduced in summer 2013 for a period of 7 years. Under the scheme, a tariff will be paid per kW of heat generated by an air to water heat pump to the householder.

Installations since July 15th 2009 will also qualify for the payments. The tariffs take into account the installation cost of the system.

Who can apply for the Renewable Heat Incentive?
If the homeowner lives in England, Scotland or Wales, they are eligible to apply for Renewable Heat Incentive payments.

All homeowners qualify for tariff payments, irrespective of the type of fuel currently used for their heating and hot water system.

Are tariff payments available for commercial properties?
Air to water heat pumps do not qualify at present, although there is a current Government consultation process in progress.

To find out more visit the Department of Energy and Climate Change website at: **www.decc.gov.uk**

Greensource split air to water heat pump

8kW

11kW, 14kW, 16kW

Heat pump	Part number
Greensource Split HP Hydrolight	
8kW Single-phase (Hydrolight 8, ODU 7.5)	7 716 103 000
11kW Single-phase (Hydrolight 16, ODU 10)	7 716 103 001
14kW Single-phase (Hydrolight 16, ODU 11s)	7 716 103 002
16kW Single-phase (Hydrolight 16, ODU 12s)	7 716 103 003
14kW Three-phase (Hydrolight 16, ODU 11t)	7 716 103 004
16kW Three-phase (Hydrolight 16, ODU 12t)	7 716 103 005

Greensource Split HP Hydrocomfort	
8kW Single-phase (Hydrocomfort 8, ODU 7.5)	7 716 103 006
11kW Single-phase (Hydrocomfort 16, ODU 10)	7 716 103 007
14kW Single-phase (Hydrocomfort 16, ODU 11s)	7 716 103 008
16kW Single-phase (Hydrocomfort 16, ODU 12s)	7 716 103 009
14kW Three-phase (Hydrocomfort 16, ODU 11t)	7 716 103 010
16kW Three-phase (Hydrocomfort 16, ODU 12t)	7 716 103 011

Greensource split air to water heat pump accessories

Accessory	Part number
50 litre buffer storage tank	7 716 161 063
120 litre buffer storage tank	8 718 544 081
Room controller	8 718 581 097
Heating cable kit 5m	7 748 000 318
15m CANbus cable	7 748 000 040
8kW wall mounting brackets with 700mm arm	7 716 192 354
Anti-vibration feet – one size fits all ODU models	7 716 192 355
DHW 3-way valve and sensor	7 738 600 251
Diagnostic tool for outdoor heat pump	7 716 161 051
Condensate tray – 1,100mm wide	7 716 161 066
IOB multi-module control box	8 738 204 509

A Greensource split air to water heat pump with Greenfloor heating – a great combination

Whether you are upgrading an existing system or installing a new system, Worcester Greenfloor heating can provide an ideal alternative to traditional radiators. Worcester's Greenfloor heating system uses a water-filled pipe system that turns the floor into a large surface area radiator. The pipe system gently warms the space above it through a combination of radiant energy and heat conduction.

In a modern, well-insulated space where heat loss factors have been taken into consideration, underfloor heating can act as the primary heating source and, in most cases, no other space heating methods will be required.

Underfloor heating operates with lower water temperatures than traditional radiator systems. This makes it suitable for use with Greensource split air to water heat pumps, ensuring they remain at their optimum efficiency, with significant energy savings.

As there are no radiators to take up space, Worcester Greenfloor systems also provide maximum flexibility within the property. They can also be used with a wide range of floor coverings, including parquet, carpeting, marble or tiles.

Underfloor heating is a system where every component is important to the overall performance. Worcester Greenfloor systems provide a comprehensive selection of high quality system components, while offering considerable flexibility to meet all project needs.

System components

Greenfloor heating systems comprise a number of elements:

- PE-Xc system pipe
- Stainless steel manifolds
- Manifold cabinets
- Pump and mixing stations
- Pipe fixing methods
- Controls.

Features	Benefits
PE-Xc Pipe, protected against thermal ageing and stress fracture	Flexible and durable
Pre-insulated pipe positioning panels	Quick and easy installation
Stainless steel manifolds	Robust and durable
Full suite of wireless and wired control systems	Suits any type of installation
Uses radiant heat	Less circulation of dust than with radiators, cleaner air for home
Requires lower working temperatures	Maximises the efficiency of condensing boilers and heat pumps
Eliminates the need for radiators	Creates space on walls and allows unrestricted layout within a room
Complements Worcester gas- and oil-fired boilers, ground source and air to water heat pumps	Complete heating and hot water solutions from one source

All Greenfloor systems are supplied complete with all components and connections. Any specialist tools that are necessary are also available from Worcester.

Greenfloor PE-Xc system pipe

System pipe is available in coils, with a reel available to ease unwinding, reduce waste and avoid the need for couplings.

Pipe and pipe fixing method compatibility		
Pipe positioning panel	14 x 2mm	16 x 2mm
Stapler panel systems	14 x 2mm	16 x 2mm
Dry construction system	14 x 2mm	–
Timber suspended floor	14 x 2mm	16 x 2mm

Pipe	14 x 2mm	16 x 2mm
PE-Xc	Yes	Yes
Coil length (standard)	200m	200m
Coil length (long)	750m	650m
Maximum operating pressure	6bar	6bar
Maximum operating temperature	90ºC	90ºC
Minimum bend radius	70mm	80mm

Worcester Greenskies solar thermal panels

Worcester is proud to offer the Greenskies range of solar thermal panels which use a sustainable energy source to provide efficient heating comfort.

How do solar water heating systems work?

Solar water heating systems use solar panels (called collectors) to collect the heat from the sun which is then used to heat up the water stored in a hot water cylinder. A boiler is then used, when required, to further heat the water to the desired temperature.

The panels are mounted on a surface which is selected for its exposure to sunlight. These are usually connected, via pipe work, to the lower coil of a twin-coil solar cylinder.

Worcester Greenskies solar panels form part of a system which remains separate from the boiler or split air to water heating system.

Introduction to the Greenskies solar thermal family

Greenskies Solar-Lux

The Solar-Lux evacuated tube collector series is Worcester's premium collector option, offering homeowners unparalleled hot water luxury. Designed to complement the Worcester Greenskies solar flat collector range, the Solar-Lux 6 and 12 tube collectors, represent an optimum investment in hot water comfort per square metre of collector.

Worcester Greenskies Solar-Lux collectors take full advantage of 360º absorption due to their Compound Parabolic Concentrator (CPC) mirror technology. This, combined with the Solar-Lux double glass vacuum tubes, means that the collectors not only provide a high output, but also high efficiency, even when conditions are not optimal.

Best applications:

Cold weather climate, solar central heating contribution*

Greenskies Solar-Lifestyle

The name, as it suggests, stands for a product which fits in with all of the lifestyle requirements of the homeowner. The Solar-Lifestyle collector boasts a modern, visually stunning one-piece collector design.

This collector is highly versatile as it can be installed in-roof, on-roof, and as a flat-roof or façade. It is also available in a portrait and landscape format. It provides a high level of efficiency and is the optimum choice for most installations.

The Greenskies Solar-Lifestyle collectors feature a whole range of Installer's Choice Design (ICD) accessories which make installation easier.

Best applications:

High performance all-rounder, visually pleasing with in-roof capabilities

Greenskies Solar-Lito

The Lito range of collectors offers the homeowner affordable solar hot water comfort, whilst also allowing flexible solutions for the installer. Both 1 sq.m. (Solar-Lito Mini) and 2 sq.m. options can be combined to combat awkward roof spaces and shapes. They also have the added benefit of being more accurately sized to 150 litre and 250 litre cylinders.

Like the Lifestyle, the Greenskies Solar-Lito collectors also feature an attractive aluminium one-piece construction. This makes the collector lightweight, with the 2m² Lito panel weighing in at a class-leading 30kg. The Lito-Mini meanwhile represents a one person lift at only 18kg.

Best applications:

Affordable on-roof hot water solutions, space critical installation – awkward roof spaces

**Additional system design required.*

The very best training programmes from Worcester

Worcester has always placed great emphasis on technical support and training for installers and service engineers. Advances in heating technology, including the increasing use of renewables, make the need for training greater than ever.

To ensure the highest levels of competence and expertise in the installation of all Worcester products, we run intensive training courses for installers, commissioning engineers and operatives involved with servicing and fault finding.

Courses available

Our training facilities offer a number of courses suitable for the installer and commissioning engineers, and more in-depth courses for the servicing and fault finding engineers.

Training centres throughout the UK

To enable us to meet the growing demand for training we have invested in additional facilities at the award-winning training academy at our Worcester headquarters. In addition to the original academy there is now a new 400m^2 unit, 25% of which is devoted to an open-plan domestic training area with life-size single-storey brick buildings. These feature working Greenskies solar thermal systems which enable installers to get up onto the roof of the building to get more realistic training. There are bays full of all Greenstar gas-fired appliances, so installers can really get to grips with the importance of system design. The additional space also contains dedicated training areas for our renewable and future products. The training centre also runs certified domestic and commercial ACS training and assessment.

Further academies are located at West Thurrock in Essex, Wakefield and Clay Cross in Derbyshire, all offering our full suite of courses. Please phone 01905 752526 for more information about a course near you. Each course is run by specialist trainers and is superbly equipped to deliver a combination of classroom theory and practical hands-on experience that's second to none.

College-linked Learning

As well as offering training at our own centres, Worcester has established close partnerships with many colleges around the UK, equipping them with our latest products. Call us on 01905 752526 to find out when we will be running the course of your choice at a college in your area.

Mobile training

To complement our training venues across the country, we can also bring training to you.

We have mobile vehicles fully equipped with operational Greenstar gas-fired boilers, dry strip-down models and even a Greensource air to air heat pump, ensuring that quality training in a comfortable environment can be achieved on your doorstep!

If it's oil training you require, our 7.5 tonne mobile oil vehicle is available throughout the country for hands-on product training and OFTEC assessments.

Distance learning/web based learning

Worcester has produced a selection of Distance Learning CD ROMs/DVDs which are packed with information. Call 0844 892 9800 for your copies, or visit **www.worcester-bosch.co.uk** for information on Web Based Learning.

Get on course for a more profitable future now.

Call now for more information 01905 752526

Heat pump product courses

All academies allow customers to gain hands-on experience with our entire range of renewable products and inform installers about the true benefits of installing heat pumps and underfloor heating. The introduction to heat pumps course is designed for installers and heating engineers who have no experience in installing heat pumps. The various one day heat pump courses are designed for those with more practical experience in heat pump technology.

Renewable courses

- **Introduction to heat pumps.**
- **Greenstore LECP ground source heat pumps.**
- **Greensource split air to water heat pumps.**
- **Greensource air to water heat pumps.**
- **Greensource air to air heat pumps.**
- **Greenstar Plus Hybrid heat pumps.**
- **Renewable range overview.**

	Intro to heat pumps	GSHP	Split AW	AWHP	AAHP	Hybrid	Renewable Overview
Duration	1 Day	1 Day	1 Day	1 Day	1 Day	1 Day	1 Day
Cost	£65	£65	£65	£65	£65	£65	£65
Training course covers							
Specification	✔	✔	✔	✔	✔	✔	✔
Installation	✔	✔	✔	✔	✔	✔	–
Commissioning	✔	✔	✔	✔	✔	✔	–
Servicing	✔	✔	✔	✔	✔	✔	–
Maintenance	✔	✔	✔	✔	✔	✔	–
Product overview	✔	✔	✔	✔	✔	✔	✔
System design	✔	✔	✔	✔	✔	✔	–
Course locations							
Worcester	✔	✔	✔	✔	✔	✔	✔
Clay Cross	✔	✔	✔	✔	✔	✔	✔
Wakefield	✔	✔	✔	✔	✔	✔	✔
West Thurrock	✔	✔	✔	✔	✔	✔	✔
College Links*	✔	✔	✔	✔	✔	✔	✔
Mobile*	–	–	–	–	✔	–	–

*Please contact Worcester Training for specific colleges and mobile dates

To complement the above courses, Worcester also runs a **Hot Water Systems and Safety course** and **IDHEE domestic heating design course.** For more information turn to page 31.

Please note: it is recommended that unless you have experience installing/commissioning/servicing heat pumps or have worked previously with heat pump technology, that the one day introduction to heat pumps course be attended before commencing with any specific heat pump product courses.

Additional product and industry training courses

The diversity of products in today's heating industry gives you the opportunity to expand your expertise, whilst offering more choice to your customers. Worcester provides comprehensive training from all its academies on its entire range of technologies.

We are here to provide you with training and assistance for all areas of your business, not just product training. Call us on **01905 752526** to order a full course training brochure or to book yourself onto a training course, alternatively, you can visit **www.worcester-bosch.co.uk/training**

Gas-fired condensing boiler courses

- **Greenstar CDi Classic gas-fired condensing combi boilers.**
- **Greenstar CDi Compact gas-fired condensing combi boilers.**
- **Greenstar Si & i Junior gas-fired condensing combi boilers.**
- **Greenstar system & regular gas-fired condensing boilers** (covers Greenstar Ri, Greenstar CDi Classic Regular, Greenstar FS CDi Regular, Greenstar 30CDi Classic System and Greenstar i System boilers).
- **Greenstar Highflow CDi & FS CDi regular floor standing gas-fired condensing combi and regular boilers.**

Oil-fired product courses

- **Greenstar oil-fired products.**
- **Oil advanced fault finding.**
- **OFTEC 101, 105e and 600a.**

Accessories training courses

- **Greenfloor heating.**
- **Worcester controls.**

Commercial product courses

- **Greenspring CWi47 water heater.**
- **GB162 overview.**
- **GB162 domestic.**
- **GB162 commercial.**
- **Commercial ACS training and assessment – CODNCO1.**

Industry focused courses

- **BPEC underfloor heating installation.**
- **Hot water systems & safety.**
- **Chemical water treatment.**
- **Construction skills F-Gas training/ assessment certification.**
- **IDHEE domestic heating design.**
- **Domestic ACS training and assessment – reassessment. CCN1 + 3 appliances.**
- **MCS Made Easy.**

A complete after-sales service

As part of the worldwide Bosch Group, Worcester strives to maintain the highest possible standards of after-sales care.

In addition to the no-nonsense parts and labour guarantee applicable to all Worcester products, you and your customers have the assurance that every Worcester product is manufactured to both the appropriate British and European standards.

Worcester Contact Centre

Should you require support, our award winning Contact Centre team, based at our head office in Worcester, are ready to take your calls. Whatever your query our contact centre operators along with our nationwide team of engineers are ready to help you.

Tel: 0844 892 9900

Opening times

Monday – Friday: 7.00am – 8.00pm
Saturday: 8.00am – 5.00pm
Sunday: 9.00am – 12 noon
Bank Holidays: 8.00am – 4.30pm

TOP 50 CALL CENTRES FOR CUSTOMER SERVICE 2011

OFTEC AWARDS FOR EXCELLENCE 2012

All the technical advice you need

Spares

Genuine replacement parts for all supported Worcester products are readily available from stock, or on a next day delivery basis. Visit our website at www.worcester-bosch.co.uk/**spares** to find your local stockist.

Customer Technical Support

The Worcester Technical Helpline is a dedicated phone line – committed to providing a comprehensive service to complement the brand name and quality of our products. Our experienced team of technical experts provides answers to queries of a technical nature across the entire Worcester range.

Worcester also has a pre-sales department, which provides assistance in selecting a heating system to suit a particular application, along with full guidance on installation. For more information please contact the Technical Helpline or alternatively visit our website where literature can be downloaded at **www.worcester-bosch.co.uk**

Technical

Tel: 0844 892 3366
Fax: 01905 752 741
technical.enquiries@uk.bosch.com

Opening times

Monday – Friday: 7.00am – 8.00pm
Saturday: 8.30am – 4.00pm
Bank Holidays: 8.00am – 4.30pm

Notes

Notes

Notes

Useful numbers

Sales
Tel: 01905 752640
Fax: 01905 456445

Spare Parts
Tel: 01905 752576
Fax: 01905 754620

Technical Helpline (Pre & Post Sales)
Tel: 0844 892 3366
Fax: 01905 752741
technical.enquiries@uk.bosch.com

Renewables Technical Helpline
Email: renewable.energy@uk.bosch.com
or telephone 0844 892 4010

Training
Tel: 01905 752526
Fax: 01905 752535

Literature
Email: literature@uk.bosch.com
or download instantly from our website
or telephone 0844 892 9800

Customer Service

Engineer Appointments
Email: appointment.worcester@uk.bosch.com
or telephone 0844 892 3000

Enquiries
Email: service.mailbox@uk.bosch.com
or telephone 0844 892 3000

Guarantee Registration
To register your Worcester guarantee,
please visit our website or
telephone 0844 892 2552

Calls to the listed 0844 numbers are charged at up to 3 pence per minute from BT land lines.
Calls from mobiles and some other networks may vary. Calls to and from Bosch Thermotechnology Ltd
may be recorded for training and quality assurance purposes.

www.worcester-bosch.co.uk

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