



## Greenstar Heatslave II oil-fired condensing combi boiler range

**Includes  
ErP  
ratings**



# 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.

Worcester is a part of Europe's largest supplier of heating products and with our UK-based resources as well as the Bosch Group's global infrastructure, we can offer you the value-added solutions you deserve. Worcester employs a nationwide network of Service Engineers and technically trained Field Sales Managers, supported by an experienced technical services team which

is able to provide comprehensive support and advice from designing system layouts through to installation.

Worcester is dedicated to providing high performance, energy efficient heating and hot water systems for a wide range of installations. Our oil manufacturing heritage stretches back to the foundation of the company in 1962 and during this period we have built a reputation for manufacturing products which offer the end user the highest levels of quality and reliability.



**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 added value services to ensure you have all you require in order to deliver only the best solutions to your customers’ requirements.”*

Carl Arntzen,  
Managing Director,  
Bosch Thermotechnology Ltd.

## Contents

	<b>Page</b>
The Greenstar condensing combi boiler range	4 - 5
Why choose Worcester?	6
Heatslave II designed with installation and servicing in mind	7
Key features of the range	8 - 9
Optional plug-in controls	10 - 11
ErP easy as ABC	12 - 13
Inside story – Greenstar Heatslave II	14 - 15
Inside story – Greenstar Heatslave II External	16 - 17
Site preparations and guidance	18 - 22
Installation requirements	23 - 27
The Worcester Greenstar System Filter	28 - 29
Condensate pipework	30 - 31
The Worcester CondenseSure auxiliary siphon	32 - 33
Horizontal and vertical flue terminal positioning	34 - 35
Horizontal fluing options (internal models)	36 - 37
Vertical fluing options (internal models)	38 - 39
Horizontal fluing options (external models)	40
Plume management positioning and system options	41 - 43
Conventional flue	44
Oilfit flexible flue liner	45 - 46
Accessories	47 - 49
Worcester training	50 - 52
After-sales	53



# The Greenstar Heatslave II condensing combi boiler range



Worcester has always understood that, as the market leader for heating and hot water, it is our responsibility to pave the way for future standards of quality, reliability and innovation. This common purpose and vision has been held for over 50 years, with Worcester pioneering domestic oil-fired boilers since 1962. The Greenstar oil-fired range has been expertly designed using the latest cutting-edge boiler technology to deliver exceptional performance over a wide range of applications. The appliance is manufactured at Clay Cross in Derbyshire with Bosch production processes and systems.

The launch of the Greenstar Heatslave II ranges marks the latest critical step for our company, with Worcester building upon the valuable feedback that our installers and users have provided to inspire a range of boilers which provide flexibility for the installer and ease of use for the customer.

## On-demand hot water

An instantaneous supply of hot water is available from the plate heat exchanger which rapidly transfers heat from the Heatslave II's thermal store. DHW flow rates of up to 22 l/min can be achieved and the 18/25 and 25/32 models are suitable for properties with more than two bathrooms.

The latest generation Heatronic 4i controls bring advanced and precise control to both the internal and external models, giving the installer and homeowner a vast range of features, allowing the heating system to be as efficient and flexible as possible. They also enable integration with our range of intelligent plug-in controls, enabling further efficiency gains to be made.

Every appliance is operationally tested before it leaves the factory as part of Worcester's rigorous quality control procedure.

## Highly efficient condensing technology


The secondary condensing heat exchanger of the Greenstar range extracts more energy from the oil and, when compared with a non-condensing boiler, can cut heating and hot water bills by over £400 a year\*. All Greenstar condensing boilers are able to deliver this energy-saving performance by extracting additional latent heat from the exhaust gases – a highly efficient use of energy which significantly reduces carbon dioxide emissions into the atmosphere.


\*Source: Energy Saving Trust: Based on replacing a G-rated oil-fired boiler with an A-rated oil-fired condensing boiler and a full set of controls in a typical 3 bedroom semi-detached home with an average oil price of 6.02p/kWh.



Kitchen courtesy of Alno Kitchens.

## The Greenstar Heatslave II combi range at a glance

Heatslave II		12/18	18/25	25/32	
	<b>Part no.</b>	7 731 600 047	7 731 600 048	7 731 600 049	
	<b>ErP Seasonal space heating energy efficiency class</b>	A / 91%	A / 90%	A / 91%	
	<b>ErP Water heating energy efficiency class</b>	B	B	B	
	<b>SEDBUK 2009 efficiency</b>	89.4%	89.2%	89.0%	
	<b>Output kW</b>	<b>Min</b>	12kW	18kW	25kW
		<b>Max</b>	18kW	25kW	32kW
	<b>DHW flow rate</b>	15l/min	18l/min	22l/min	
	<b>Dimensions (h x w x d)</b>	855 x 520 x 600mm	855 x 520 x 600mm	855 x 520 x 600mm	
	<b>Conventional flue</b>	✓	✓	✓	
	<b>Room sealed flue</b>	✓	✓	✓	
<b>Oil burner</b>	Riello RDB	Riello RDB	Riello RDB		

Heatslave II External		12/18	18/25	25/32	
	<b>Part no.</b>	7 731 600 050	7 731 600 051	7 731 600 052	
	<b>ErP Seasonal space heating energy efficiency class</b>	A / 91%	A / 90%	A / 91%	
	<b>ErP Water heating energy efficiency class</b>	B	B	B	
	<b>SEDBUK 2009 efficiency</b>	89.4%	89.2%	89.0%	
	<b>Output kW</b>	<b>Min</b>	12kW	18kW	25kW
		<b>Max</b>	18kW	25kW	32kW
	<b>DHW flow rate</b>	15l/min	18l/min	22l/min	
	<b>Dimensions (h x w x d)</b>	950 x 640 x 770mm	950 x 640 x 770mm	950 x 640 x 770mm	
	<b>Balanced flue</b>	✓	✓	✓	
	<b>Oil burner</b>	Riello RDB	Riello RDB	Riello RDB	



# Why choose Worcester oil?

Given the competitive nature of the heating industry, Worcester know that installers have an important decision to make when it comes to selecting the best product for their customers. Many installers are loyal to the Worcester brand and recognise the importance of the technical support and training Worcester offers.

At Worcester, we pride ourselves on the hard work that goes on behind the scenes to make sure you and your customers benefit from much more than the best in high-efficiency boilers and renewable technologies.

For example, within the product reliability department, every Worcester Greenstar oil boiler is tested. The testing procedure ensures that every boiler has been put through its paces in the most extreme of conditions to ensure they are robust enough to stand up to the highest of demands and toughest of environments.

We collect information on each individual component when we field trial our appliances, whilst also systematically noting any feedback from the service engineer who worked on the boilers. This information, along with responses from installers, is constantly processed to ensure all technical observations can be acted upon as a matter of urgency. It is this commitment that ultimately ensures Worcester products remain the best they can be.



By appointment to  
Her Majesty The Queen  
Boiler Manufacturer  
Worcester, Bosch Group T/A  
Bosch Thermotechnology Ltd.

**“9 out of 10**  
professional installers would choose  
**Worcester**  
for their own home”\*

## Did you know?

- For testing purposes Worcester has its own formula to replicate contaminated heating system water. This mix contains iron dust, quartz sand, hemp fibre and other contaminants which are commonly found in system water samples.
- Test boilers are positioned on a shaker table for 3 hours before being set to vibrate across a range of frequencies to simulate 3,000 miles of worldwide transport.
- Parts in the hydraulic circuit complete 300,000 water pressure cycles to ensure optimum performance is achieved.
- We have received a Royal Warrant in recognition of supplying goods to Her Majesty, the Queen, an honour we have held since 1992.
- With over 100 people in the quality control team on-site, Worcester has more quality control engineers than salesmen.
- As part of the global Bosch Group, Worcester has access to world leading resources, including a corporate research department and access to the very latest manufacturing and product development processes.
- Each new Worcester appliance design is ‘field trialled’ for at least 1 winter period. To benefit from winter conditions all year round, outside of the British winter, products are tested overseas.
- Every boiler receives an end of line full functional test before it leaves the factory.
- One in four oil boilers installed in the UK is a Heatslave.

# Greenstar Heatslave II designed with installation and servicing in mind

In addition to our own extensive testing and research, we also listen and respond to installers as part of our product development programme.

As a result of such feedback, we have brought about the following distinct features that benefit the installer.

## Easy installation

The first thing that you will notice is that the Greenstar Heatslave II models are up to 50kg lighter than the previous Greenstar Heatslave. Look inside and you'll see there is now a cross-firing burner, simplifying oil supply and the expansion vessel is mounted at the front on a hinge, allowing fluing to the left. The hydraulic connections have been positioned on a diagonal plane at the left rear of the boiler enabling quick and easy installation.



Further improvements include an oil line which is run through the cabinet, as well as an oil isolation valve which mounts on an easy-to-access bracket on the right hand side of the primary heat exchanger. There is space on the bracket for the installation of a second oil isolation valve if you are utilising a twin pipe system.

Finally, the Greenstar Heatslave II retains the internal condensate trap from the previous models, which utilises a simple condensate pipe connection. The height of the trap removes the need for a condensate pump in most instances.

## Simple servicing

The Heatslave II range has serviceability at its heart.

Based on installer feedback, the Greenstar Heatslave II has been created to make servicing as simple and quick as possible, with the layout enabling an annual service to take place completely from the front of the boiler.



The expansion vessel moves 90° to allow full unhindered access to the burner, and the primary heat exchanger designed with ErP in mind, contains a one-piece primary baffle which is manufactured in high-temperature-resistant stainless steel, making them easy to clean and quick to service.



The existing, simple-to-remove, mesh baffle design has continued to be utilised in the secondary heat exchanger. The components on the modular hydraulic block will be familiar to those servicing our gas-fired boilers. They offer improved reliability and are easy to replace.

# Key features of the range



## Greenstar Heatslave II boiler range

Greenstar internal models are ideally suited for installation around the home.

The Greenstar Heatslave II internal boilers feature:

- Installer-optimised hydraulic connections
- Cross-firing burner
- Renowned Worcester reliability
- Same class-leading footprint as previous Heatslave models, creating less disturbance in replacement installations
- Front access for routine servicing, including a pivoting expansion vessel for ease of access to the combustion chamber and one-piece baffles
- Pre-wired electrical mains connection
- Easily accessible oil inlet valve
- Reduced boiler weight
- Modern cabinet design
- The option to add a range of digital programmers, including RF options, to give fully automatic control, eliminating the need for external wiring of a programmer
- Weather and load compensation options enabling the boiler flow temperature to be varied in accordance with demand, allowing greater efficiency and comfort
- A pre-heated thermal store which provides the user with instant hot water
- Unique pull-out control panel with LCD display and diagnostic information
- The Heatronic 4i boiler control unit intelligently responds to heating and heat water demands, reducing burner firings and transferring surplus heat from central heating demands to the thermal store
- 10 year guarantee on the plate heat exchanger\*
- 5 year guarantee on Worcester primary heat exchanger\*.

## Greenstar Heatslave II External

Where space in the home is at a premium a Greenstar Heatslave II External boiler is the ideal solution.

Whilst offering many of the operating features of Heatslave II internal models, Heatslave II External boilers also feature:

- A robust, durable external cabinet that blends in with the garden and allows for a long life expectancy
- IP45 Ingress Protection – protecting the boiler from water, dust and external elements
- A pre-wired mains lead with a plug allows easy isolation of the boiler during maintenance
- A built-in frost thermostat which protects the appliance from freezing
- An internal pull-out control panel which contains the boiler heating and hot water temperature controls as well as a lockout indicator, mode indicator and mode switch
- The same performance features as the internal counterparts
- All External combi boilers are now supplied complete with flue.

## Efficiency and environmental features

- Excellent energy performance
- A design which has the ErP Directive in mind
- ErP 'A' rated for heating and ErP 'B' rated for hot water
- The opportunity to improve SAP performance with weather compensation
- 30°C minimum heating return temperature for maximum condensing efficiency
- ECO hot water mode
- Accepts pre-heated hot water from low carbon heating technologies such as solar thermal and biomass.



## Operation

The Greenstar Heatslave II is supplied as standard suitable for sealed primary water systems. The appliance contains an expansion vessel, 3bar pressure relief valve, pressure gauge and an automatic air vent.



Greenstar Heatslave II External model

## Oil

These appliances are for use on 28 sec kerosene fuel only.

### Hot water mode

With the appliance in a standby condition, i.e. the heatbank at a temperature set by the hot water thermostat, when a demand for hot water is required the flow switch will energise the pump and circulate primary hot water around the boiler and the plated water to water heat exchanger. The burner will automatically light to maintain the temperature of the heatbank.

When hot water is no longer required, the appliance will continue to operate until the heatbank has returned to temperature. Priority is always given to the production of domestic hot water.

There are two hot water modes on the appliance. In the standard mode the burner fires soonest to keep the thermal store temperature high, maximising hot water comfort. In ECO mode the thermal store temperature is allowed to fall more before the burner fires, saving fuel.

### Central heating mode

When central heating is required, the diverter valve will open and the pump will energise in order to circulate primary water around the heating system. The burner will automatically light and the radiators will heat up to the temperature set by the heating control thermostat.

## Applications

- The outputs offered by the range ensures installation flexibility, making Greenstar oil-fired boilers ideally suited to many sizes of domestic property
- The Greenstar Heatslave II will accept pre-heated DHW to 60°C from sources such as solar and biomass. They are ideally matched to our range of Greenskies solar thermal panels.



Greenskies Solar-Lux, Solar-Lifestyle and Solar-Lito

## Fluing

The indoor appliance can be used with either a room sealed concentric flue or conventional (open) flue. A flexi-flue liner kit is available to enable the appliance to be flued via a chimney. The room sealed flue ensures quiet operation.



The external appliances utilise a balanced flue system in order to minimise the risk of lockouts caused by heavy winds. A standard flue kit is included with every external boiler.

A plume management kit is available for both internal and external boilers.

### Greenstar Oilfit – the easy-fit fluing solution

- Multiple fluing options with the ability to flue internal floor standing boilers from the top, rear or side and external boilers from the rear and side
- Conventional flue via the adaptor kit or flexi-flue chimney liner kit
- Room sealed flue lengths using 80/125mm dia. flue up to 8m vertically and 6m horizontally. Plume kit lengths to 5m
- Quick-to-install push-fit connections and telescopic options which form a gas-tight seal and in most cases eliminate the need to cut the flue
- Easy-fit installation that requires no special tools when fitting flue extensions, elbows and adaptors.



Installation of a Greenstar Oilfit RS flue system

# Keeping you and your customers in control

The Greenstar Heatslave II features the revolutionary Heatronic 4i control unit which provides accurate and intelligent control of the appliance. The control unit is discretely housed in a drawer with upward-facing controls for ease of adjustment.

The Greenstar Heatslave II pull-out fascia with the intuitive in-built display.



## Easy-to-read and monitor

The clear screen means system parameters, such as hot water flow rate and heating flow temperatures, can be easily monitored by the installer during commissioning.

## Easy reset

Most boiler lockouts can be reset from a single button on the control unit. This is also the reset for burner lockouts, so the end user has no need to access the inside of the boiler.

## Service menu

The simple-to-use engineers' menu can check the operations of various boiler components without the need to remove the boiler front cover. Any problems can be easily identified with diagnostic codes, narrowing the potential causes of the problem.

## ECO hot water mode

The Heatronic 4i has two hot water modes. Standard mode prioritises maintaining the temperature of the slave tank, maximising hot water performance. In ECO mode, to save fuel, the temperature drop of the slave tank is increased, meaning the burner fires less frequently to reheat the tank, thus saving fuel.

## Weather and load compensation

To save energy and improve heating comfort, the Heatslave II will accept compensating room and outdoor temperature controls. For weather compensation, an outdoor sensor can be combined with the Heatronic 4i's in-built weather compensation functionality. Load compensation is provided by wiring the FR10 intelligent room thermostat to the boiler.



As part of the Bosch Group, Worcester is committed to new product development, economical use of heating systems and environmental protection. As part of this commitment, Worcester has a range of heating controls designed to enhance the integral efficiency of our Greenstar Heatslave II range.

## NEW Greenstar Comfort controls

### Greenstar Comfort plug-in twin channel programmer – Part no. 7 733 600 003

- Simple menu navigation
- Heating programme visualisation bar
- 7-day time control for heating and hot water.

### Greenstar Comfort I RF wireless room thermostat and plug-in twin channel programmer – Part no. 7 733 600 001

All the features of Comfort PLUS...

- No wiring required
- Reliable RF signal.

### Greenstar Comfort II RF wireless programmable room thermostat and plug-in RF receiver – Part no. 7 733 600 002

All the features of Comfort & Comfort I PLUS...

- 6 adjustable heating temperatures per day
- Set programme at the room thermostat
- Remote access to boiler diagnostic codes.

### Greenstar Comfort Wall Plate Kit – Part no. 7 733 600 039

- This kit allows a plug-in Comfort programmer or RF receiver to be wall mounted and hard wired to the boiler. This is an ideal solution for external boilers.



## Advanced intelligent controls – load and weather compensation

To maximise savings and heating comfort, the Heatslave II can be paired with a weather sensor or the FR10 intelligent room thermostat.

### FR10 – Intelligent room thermostat – Part no. 7 716 192 065

- Load compensation
- Boiler output automatically adjusted to precisely meet the heat demand of the property at maximum efficiency
- Maximises the condensing boiler's operation
- For use with a 230V programmer. Not compatible with Worcester Comfort controls.



### Outdoor weather sensor – Part no. 7 716 192 764

- Monitors external temperatures to offer weather compensation in combination with the in-built heat curves of the Greenstar Heatslave II
- The appliances inbuilt weather compensation is activated when the sensor is connected. For use with a 230V programmer. Not compatible with Worcester Comfort controls. A 230V room thermostat is required in addition.



## Controls at a glance

Control option

Control option	TYPE		MOUNT		TIME CONTROL				TEMPERATURE CONTROL				CONNECTION TYPE			EFFICIENCY		MODEL			
	Digital	Intelligent	Fascia mounted	Wall mounted	Central heating	Hot water	24 hour	7 day	Auto switch – BST/GMT	Room thermostat	Programmable room thermostat	Optimum start	Boiler flow temp compensation	Weather compensation	Plug-in	Radio frequency	Hard wired	ErP Class	Efficiency benefit	Heatslave II	Heatslave II External
Comfort	✓		✓		✓	✓		✓	✓						✓			N/A	N/A	✓	✓ <sup>1</sup>
Comfort I RF		✓	✓		✓	✓		✓	✓	✓		✓			✓	✓		I	1%	✓	✓ <sup>1</sup>
Comfort II RF		✓		✓	✓	✓		✓		✓		✓			✓	✓		I	1%	✓	✓ <sup>1</sup>
FR10		✓		✓								✓					✓	I	1%	✓ <sup>2</sup>	✓ <sup>2</sup>
Outdoor weather sensor		✓		✓									✓					III	1.5%	✓ <sup>2</sup>	✓ <sup>2</sup>

<sup>1</sup> Should be used with Comfort wall plate kit. <sup>2</sup> Must be used with an external propriety 230V timer.

# ErP easy as ABC

## What is ErP?

The ErP Directive, which is a new regulation set by the European Union, is designed to drive improvements in the efficiency and performance of heating and hot water products. Its purpose is to ensure that end users are aware of the level of energy efficiency inherent within their appliances. As such, the Directive will help improve the overall efficiency of the housing stock, while enabling homeowners to reduce their energy bills. The ErP regulations cover boilers, combination boilers, heat pumps and other heating appliances up to 400kW.



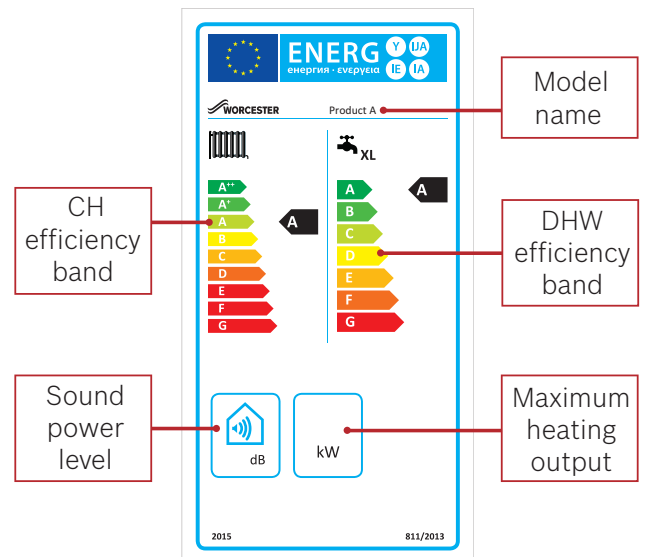
## What is Energy Labelling?

The Energy Labelling involves a label which we are familiar with today on washing machines and televisions at the point of sale. The Energy Labelling regulations introduce Europe-wide energy labelling requirements for boilers, combination boilers, water heaters and other heating products up to 70kW and hot water cylinders under 500 litres.

## How will the labelling scheme work?

The new Energy Labelling Directive will introduce new efficiency classes from A++ to G alongside the existing SEDBUK rating for boilers in the domestic and light commercial sectors.

Most condensing boilers will fall within the A band, which requires them to achieve more than 90% seasonal efficiency, while renewable technologies such as heat pumps will likely be in the A+ or A++ bands (depending on flow temperature).



### What about systems that contain different products?

In these circumstances, there is a responsibility to provide a package label when combining a heating appliance with a temperature control and/or solar device, cylinder or a supplementary heating appliance (for example, a two-boiler cascade with a combined total output of under 70kW).

The person who puts that package together will need to produce a package document known as a fiche (data table) and label that provides the combined energy efficiency rating rather than ratings of each individual component.

For example, this could be the merchant's responsibility if they supply a complete package under one part number or the installer if the items are bought individually under separate part numbers.

In either circumstance, Worcester will provide an online tool that makes calculating the overall package efficiency of a Worcester system effortless.

### What about controls?

The ErP Directive covers all products that consume energy, such as boilers, heat pumps, solar thermal etc. It also includes controls, which are defined using 'classes'. These run from Class I (a simple on/off room stat) through to Class VIII (multi-sensor room control for use with modulating heating appliances).

Each control class equates to a certain percentage uplift in system efficiency e.g. a class III weather sensor and room thermostat will add 1.5% efficiency to the heating system. Details of the controls class for each Worcester control can be found on page 11.



## ErP easy as ABC with Worcester

The Energy Labelling obligation under the Energy Related Products (ErP) Directive comes into force on the 26th September 2015. Worcester will have a number of measures in place to support you including:

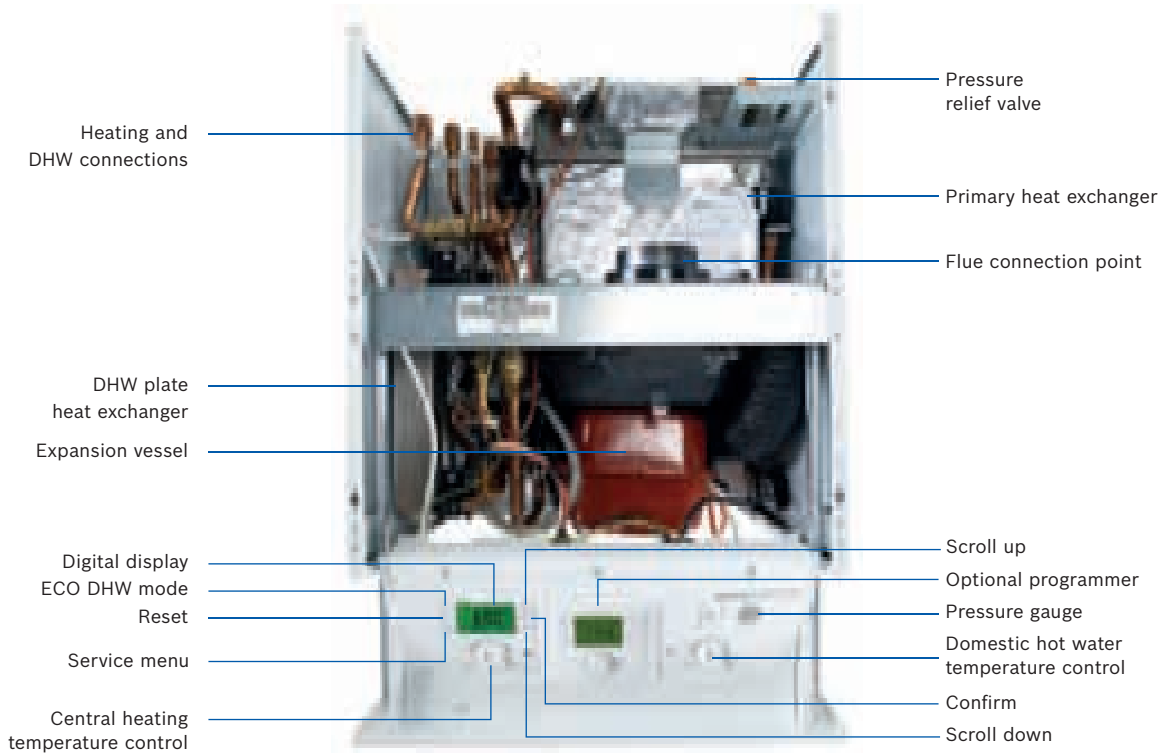
- ✔ An **online tool** which creates product and heating system labels
- ✔ ErP will be covered in all **Worcester training courses**
- ✔ **ErP experts** – our technical and customer support teams can answer all your questions.

ErP Technical Support: **0330 123 3641**  
Email: **ErP-advice@uk.bosch.com**

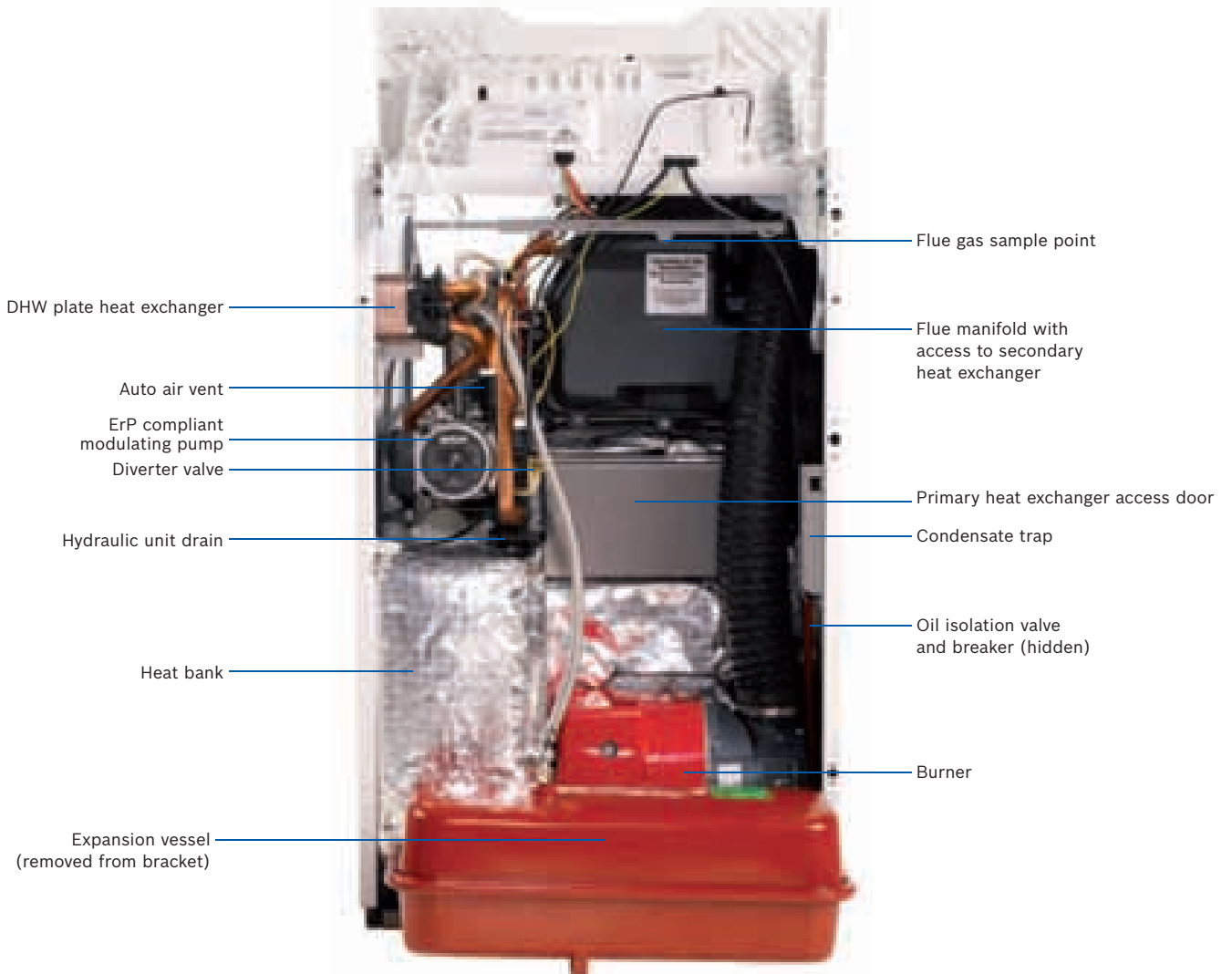




# Inside story – Greenstar Heatslave II internal condensing combi boiler series



Greenstar Heatslave II fascia with optional Greenstar Comfort plug-in twin channel programmer fitted

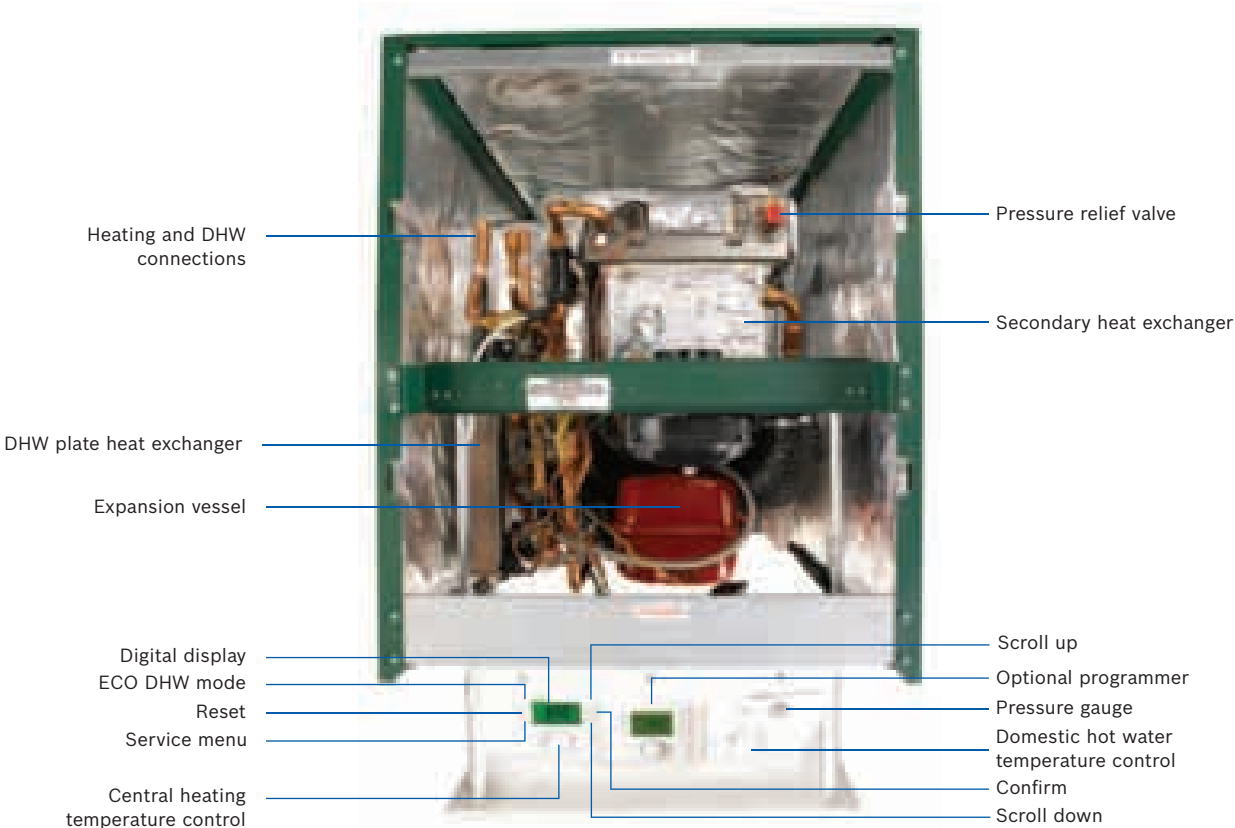


## Technical data

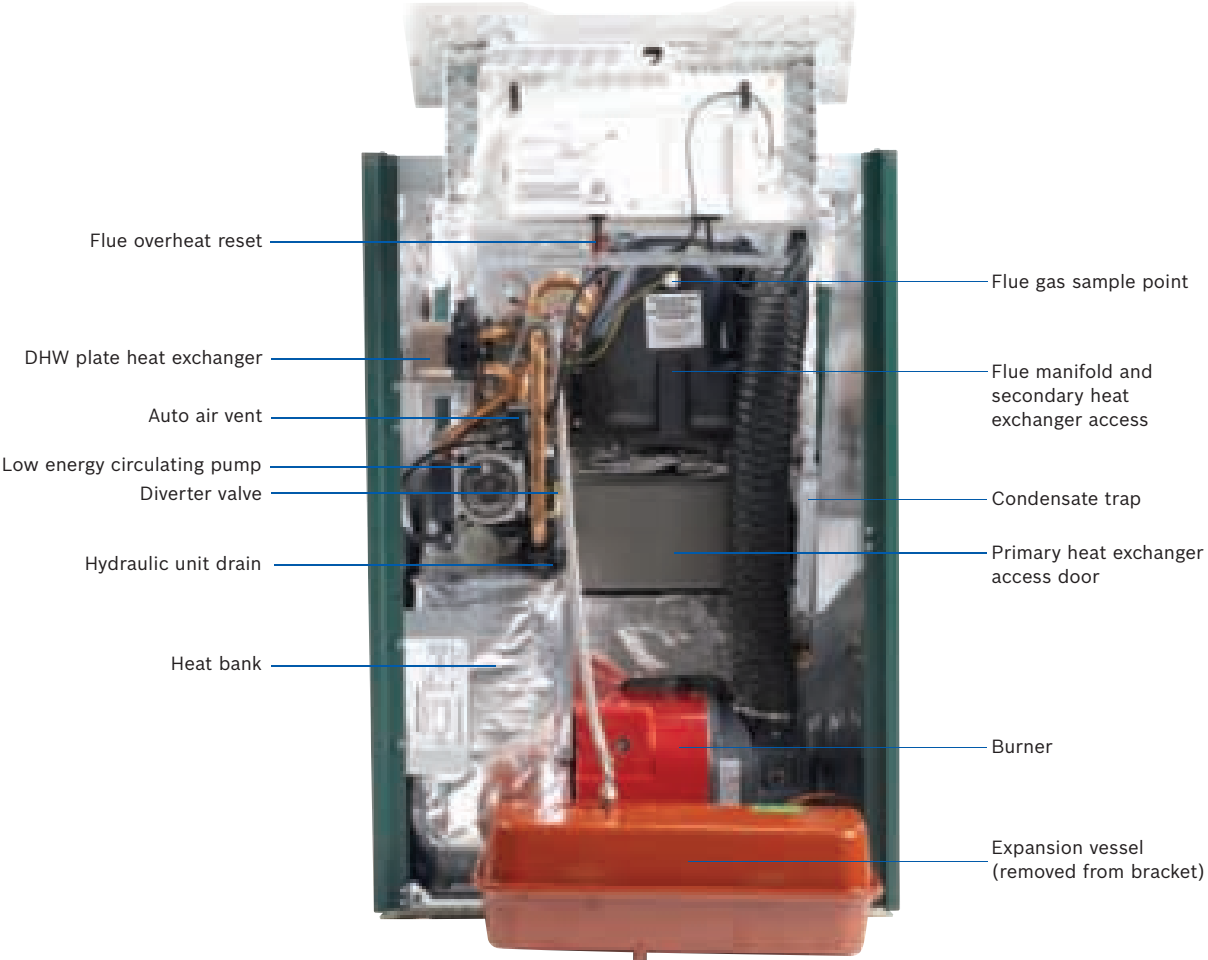
Boiler	Greenstar Heatslave II 12/18	Greenstar Heatslave II 18/25	Greenstar Heatslave II 25/32
Height	855mm	855mm	855mm
Width	520mm	520mm	520mm
Depth	600mm	600mm	600mm
Weight - lift	124kg	126kg	128kg
ErP Seasonal space heating energy efficiency class	A / 91%	A / 90%	A / 91%
ErP Water heating energy efficiency class	B	B	B
ErP Water heating efficiency - declared load profile	XL	XL	XL
2009 SEDBUK efficiency	89.4%	89.2%	89.0%
Primary water capacity (total)	62 litres	63 litres	64 litres
Available pump head (20°C difference) at maximum output	4.7m	4.0m	4.2m
Maximum permissible sealed system operating pressure in accordance with WRAS guidelines	2.5bar	2.5bar	2.5bar
Maximum flow rate for a 40°C ΔT over a 90 litres draw off	15 ltr/min*	18 ltr/min*	22 ltr/min*
Minimum inlet pressure (dynamic) for maximum flow rate	1.5bar	1.2bar	1.6bar
Exit flue gas mass flow	29kg/hr	40kg/hr	51kg/hr
Fuel line (compression)	10mm	10mm	10mm
CH flow	22mm	22mm	28mm
CH return	22mm	22mm	28mm
Water main inlet	15mm	15mm	15mm
DHW outlet	22mm	22mm	22mm
Condensate connection	21.5mm polypropylene	21.5mm polypropylene	21.5mm polypropylene
Electrical power supply voltage	230V AC	230V AC	230V AC
Frequency	50Hz	50Hz	50Hz
Maximum power consumption	184W	209W	233W
Part load power consumption†	44W	47W	48W
CH control range	50/82°C	50/82°C	50/82°C
Heat store control range	55/84°C	55/86°C	55/88°C
Boiler manual reset overheat set point	105°C	105°C	105°C
Flue reset overheat thermostat set point	110°C	110°C	110°C
Tank manual reset overheat thermostat set point	95°C	95°C	95°C
Maximum hearth temperature	<100°C	<100°C	<100°C
Output to central heating	12 - 18kW	18 - 25kW	25 - 32kW
Oil burner	Riello RDB2.2**	Riello RDB2.2**	Riello RDB2.2**
Plug-in timer	✓ (optional)	✓ (optional)	✓ (optional)
Weather/load compensation	✓ (optional)	✓ (optional)	✓ (optional)
Maximum vertical room sealed balanced flue (125mm dia.) inc. terminal	8,000mm	8,000mm	8,000mm
Maximum horizontal room sealed balanced flue (125mm dia.)	6,000mm	6,000mm	6,000mm
Plume management maximum length	5,000mm	5,000mm	4,000mm
CF Flexiflue (100mm dia.)	12,000mm	12,000mm	12,000mm
Appliance protection rating	IP 20	IP 20	IP 20
Noise output level	55dB(A)	56dB(A)	54dB(A)

\*Restricted DHW flow rate. \*\*Suitable for kerosene (28 sec oil) only. †Power consumption excluding pump.

# Inside story – Greenstar Heatslave II External condensing combi boiler series



Greenstar Heatslave II External fascia with optional Greenstar Comfort plug-in twin channel programmer fitted



## Technical data

Boiler	Greenstar Heatslave II External 12/18	Greenstar Heatslave II External 18/25	Greenstar Heatslave II External 25/32
Height	950mm	950mm	950mm
Width	640mm	640mm	640mm
Depth	770mm	770mm	770mm
Weight – lift	151kg	154kg	158kg
ErP Seasonal space heating energy efficiency class	A / 91%	A / 90%	A / 91%
ErP Water heating energy efficiency class	B	B	B
ErP Water heating efficiency – declared load profile	XL	XL	XL
2009 SEDBUK efficiency	89.4%	89.2%	89.0%
Primary water capacity (total)	62 litres	63 litres	64 litres
Available pump head (20°C difference) at maximum output	4.7m	4.0m	4.2m
Maximum permissible sealed system operating pressure in accordance with WRAS guidelines	2.5bar	2.5bar	2.5bar
Maximum flow rate for a 40°C ΔT over a 90 litres draw off	15 ltr/min*	18 ltr/min*	22 ltr/min*
Minimum inlet pressure (dynamic) for optimum flow rate	1.5bar	1.2bar	1.6bar
Exit flue gas mass flow	29kg/hr	40kg/hr	51kg/hr
Fuel line (compression)	10mm	10mm	10mm
CH flow	22mm	22mm	28mm
CH return	22mm	22mm	28mm
Water main inlet	15mm	15mm	15mm
DHW outlet	22mm	22mm	22mm
Condensate connection	21.5mm polypropylene	21.5mm polypropylene	21.5mm polypropylene
Electrical power supply voltage	230V AC	230V AC	230V AC
Frequency	50Hz	50Hz	50Hz
Maximum power consumption	184W	209W	233W
Part load power consumption†	44W	47W	48W
CH control range	50/82°C	50/82°C	50/82°C
Heat store control range	55/84°C	55/86°C	55/88°C
Boiler manual reset overheat thermostat set point	105°C	105°C	105°C
Flue reset overheat thermostat set point	110°C	110°C	110°C
Tank manual overheat reset thermostat set point	95°C	95°C	95°C
Maximum hearth temperature	<100°C	<100°C	<100°C
Output to central heating	12 - 18kW	18 - 25kW	25 - 32kW
Oil burner	Riello RDB2.2**	Riello RDB2.2**	Riello RDB2.2**
Plug-in timer	✓ (optional)	✓ (optional)	✓ (optional)
Weather load/compensation	✓	✓	✓
Plume management maximum length	5,000mm	5,000mm	4,000mm
Appliance protection rating	IP 45	IP 45	IP 45
Noise output level	N/A	N/A	N/A

\*Restricted DHW flow rate. \*\*Suitable for kerosene (28 sec oil) only. †Power consumption excluding pump.

# Site preparations and guidance (internal models)

## Siting of appliance

Greenstar Heatslave II oil-fired appliances are not suitable for external installation unless a suitable enclosure is provided. The floor must be firm and level. The floor on which the boiler is to be mounted should be capable of supporting an overall weight of approximately 140kg.

All models have a hearth temperature of below 100°C, removing the need for a constructional hearth. The appliances should be positioned on a non-combustible solid base as near to the flue location point as possible. Care should be taken to ensure that the appliance is level.

## Flue system

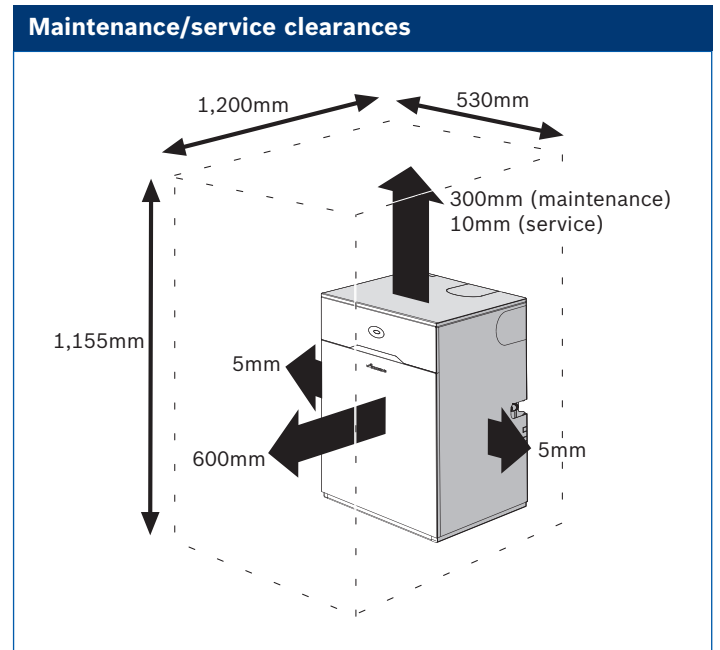
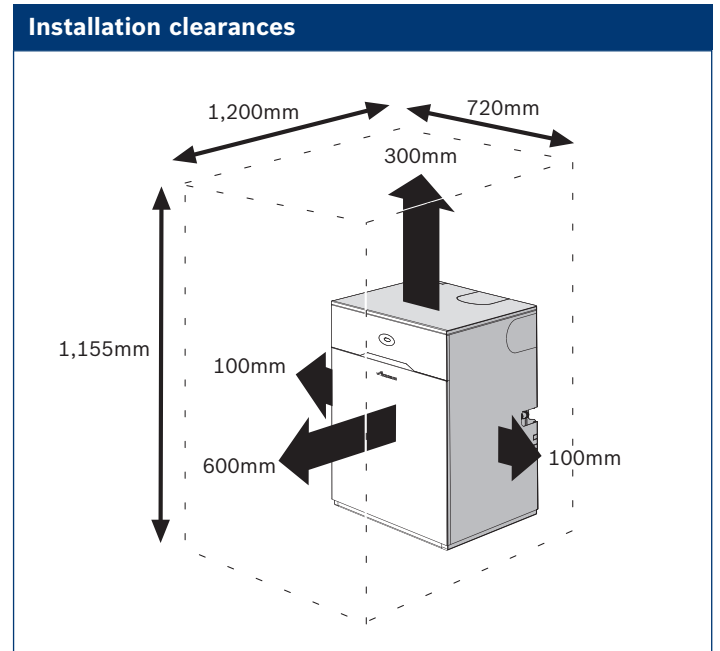
Greenstar Heatslave II appliances can be connected to either a conventional flue system or a multi-directional, room-sealed balanced flue. In either case, the conventional flue adaptor or the appropriate RS flue kit needs to be specified.



Installation of a Greenstar Oilfit RS flue system

## Installation and service clearances

The minimum clearances shown below should be allowed for installation and servicing.



A removal work surface may be installed over the boiler



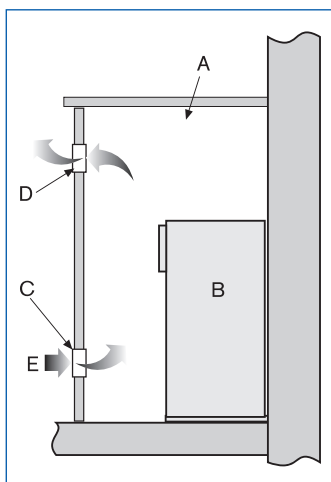
# Compartment installation

Follow the requirements of BS 5410 and note:

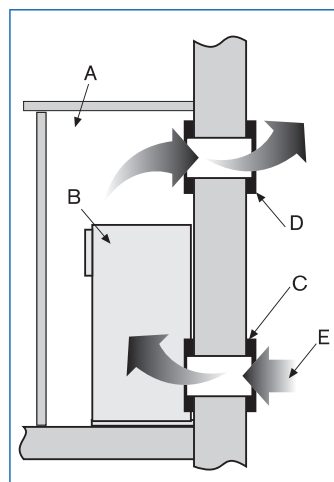
- Minimum clearances must be maintained
- An access door is required to install, service and maintain the boiler as well as any ancillary equipment, i.e. condensate trap
- If fitting the boiler into an airing cupboard use a non-combustible material to separate the boiler from the airing space. If the material is perforated, the holes must not exceed 13mm.

## Compartment ventilation

- Ventilation must be provided for boilers fitted into compartments as described in BS 5410
- A minimum of 2 air vents must be fitted, one at low level (C) and another at high level (D) onto the same wall using the same air (E) for circulation
- Free air must not be taken from a room or internal space containing a bath or shower and must not communicate with a protected area such as a hall, stairway, landing, corridor, lobby, shaft, etc.
- Air vents must allow access for clean, free air and must be sited to comply with the flue terminal position requirements
- Air ducting runs must not exceed 3 metres.
- Low level air vents must be within 450mm from the floor
- A warning label must be added to the vents with a statement to the effect: "Do not block this vent. Do not use for storage".



Internal ventilation



External ventilation

Compartment ventilation	
A	Compartment
B	Boiler
C	Low level vent
D	High level vent
E	Air supply

Conventional flue* – minimum air vent area (cm <sup>2</sup> ) for appliances installed in a compartment				
kW	Internal ventilation*		External ventilation**	
	High level (D)	Low Level (C)	High level (D)	Low Level (C)
12/18	198	279	99	198
18/25	275	413	138	275
25/32	352	528	176	352

Room-sealed flue* – minimum air vent area (cm <sup>2</sup> ) for appliances installed in a compartment				
kW	Internal ventilation*		External ventilation**	
	High level (D)	Low Level (C)	High level (D)	Low Level (C)
12/18	198	198	99	99
18/25	275	275	138	138
25/32	352	352	176	176

\*Internal air to and from a space/room inside the building.

\*\*External air to and from directly outside the building.

\*Due to changes to BS 5410 and modern building design, these figures no longer incorporate the adventitious ventilation allowance.

## Air supply

### CF (conventional flue)

An adequate supply of free air must be delivered to the boiler for combustion purposes through a permanent inlet, such as an air brick, into the area where the boiler is situated.

**Combustion air must not be taken from bathroom or bedroom areas.**

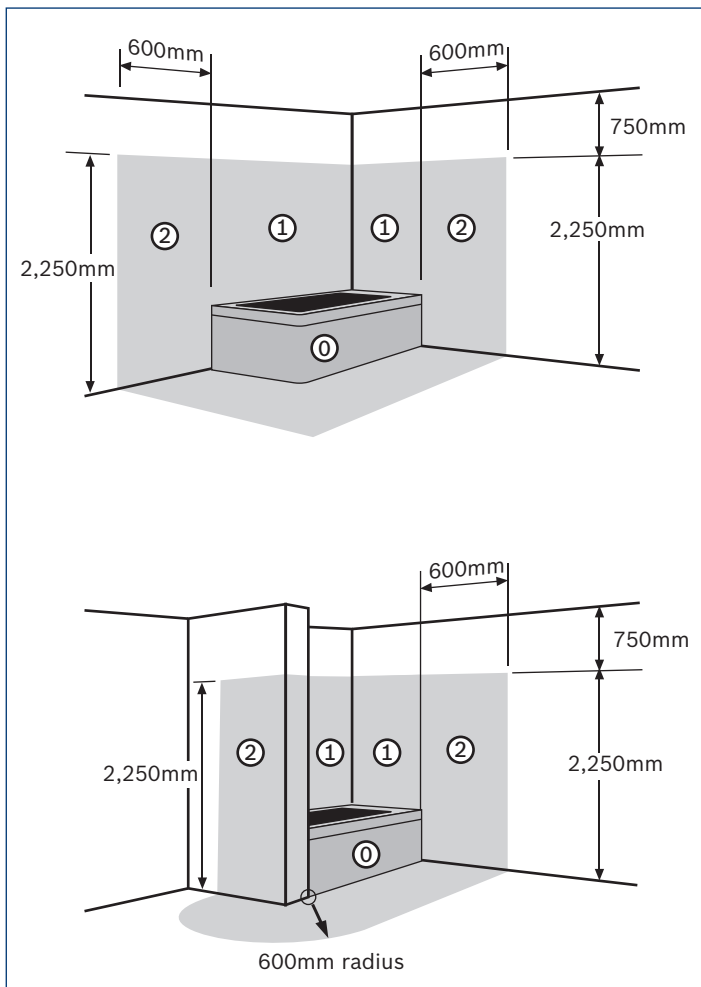
Minimum area of air inlet for combustion*	
kW	Area
12/18	99cm <sup>2</sup>
18/25	138cm <sup>2</sup>
25/32	176cm <sup>2</sup>

\*Due to changes to BS 5410 and modern building design, these figures no longer incorporate the adventitious ventilation allowance.

**Important: bathroom locations and clearances**

- The boiler must not be installed in zones 0, 1 or 2
- Any switch or appliance control using mains electricity must not be within reach of a person using the bath or shower
- Electrical switches, fused spurs and socket outlets must not be situated in the bathroom.

Refer to the latest IEE wiring regulations.



**Conventional flued boilers must not be fitted in a bathroom.**

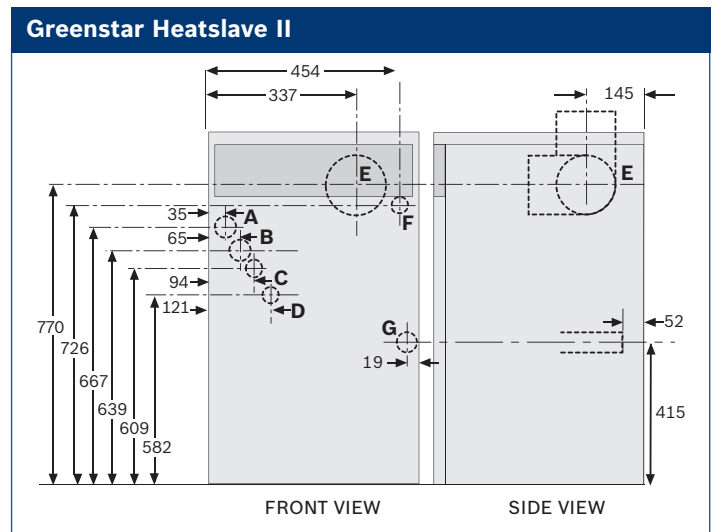
**Casing dimensions**



**Pipework connections**

A to G (below) show the flue and pipe outlets (mm):

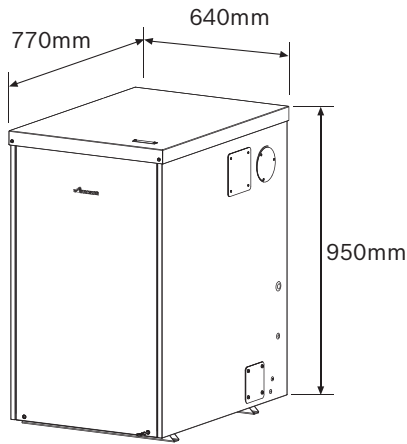
Note: For servicing purposes, keep the condensate and pressure relief discharge pipes away from components and pipework connections.



Flue and pipe connections			
Key	Description	Heatslave II 12/18 & 18/25	Heatslave II 25/32
A	CH flow	22mm dia. plain ended copper	28mm dia. plain ended copper
B	DHW flow	22mm dia. plain ended copper	
C	DCW mains water inlet	15mm dia.	
D	CH return	22mm dia. plain ended copper	28mm dia. plain ended copper
E	Flue outlet	Flue outlet	
F	Pressure relief pipe	15mm dia. plain ended copper	
G	Condensate outlet	21.5mm dia. polypropylene	
	Oil	15mm copper compression	

# Site preparations and guidance (External models)

## Casing dimensions



## Installation and service clearances

The minimum clearances shown below should be allowed for installation and servicing. **It is strongly recommended that the flue terminal faces away from walls to reduce the possibility of “wetting” occurring.** Care should be taken to ensure that pipework leaving the appliance and entering the building should not be exposed. The appliance should be sited as close to the dwelling as possible.

## Siting of appliance

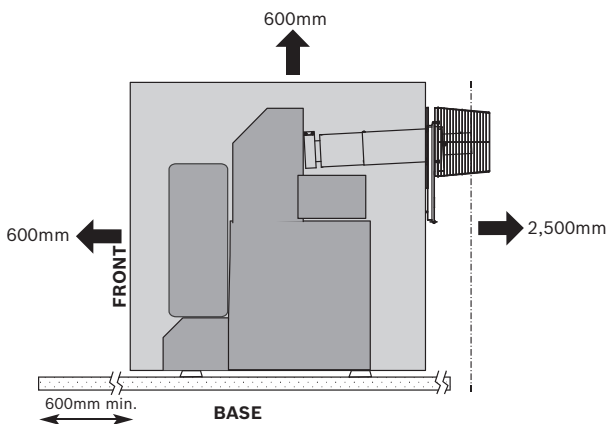
Greenstar Heatslave II External appliances are suitable for external installation only. Appliances should be installed at a suitable location onto a fixed, permanent and rigid surface. There must be sufficient hard-standing around the appliance to allow for servicing. Appliances must be installed on a flat, level surface to ensure that condensation does not enter the primary heat exchanger. Appliances should not be installed where there is a potential for excessive ground water coverage. Tarmac and wood hard-standings are not recommended.

## Flue system

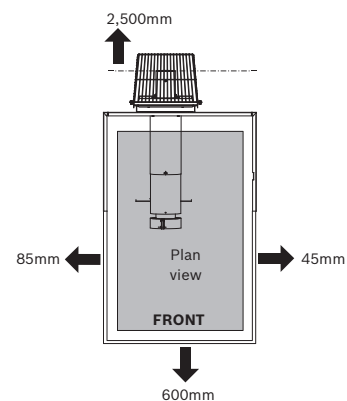
For all external boilers, consideration should be given to the location of the appliance and its flue outlet in relation to windows, doors and air vents. Greenstar Heatslave II appliances can be connected to the Greenstar Oilfit plume management system.



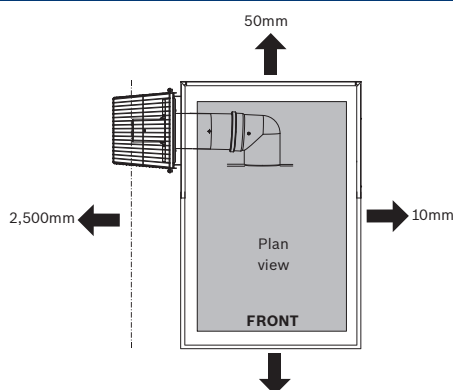
## Side view, rear flue



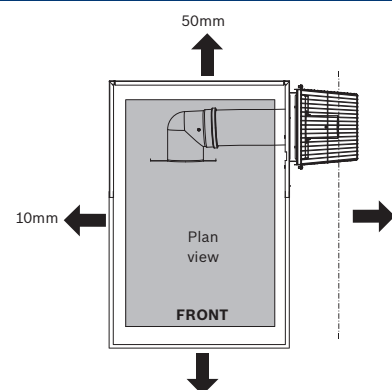
## Top view, rear flue



## Top view, left flue



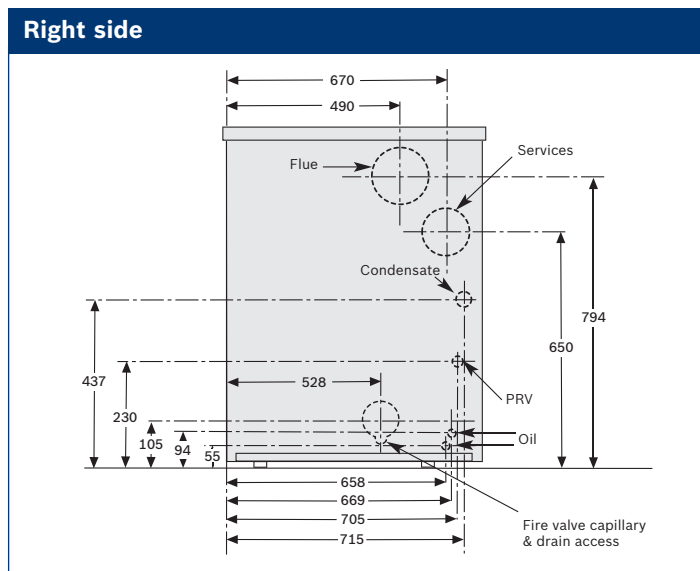
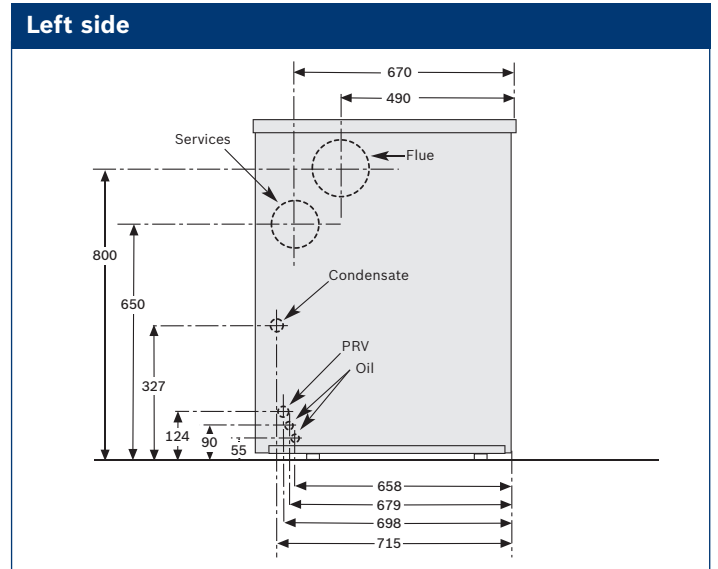
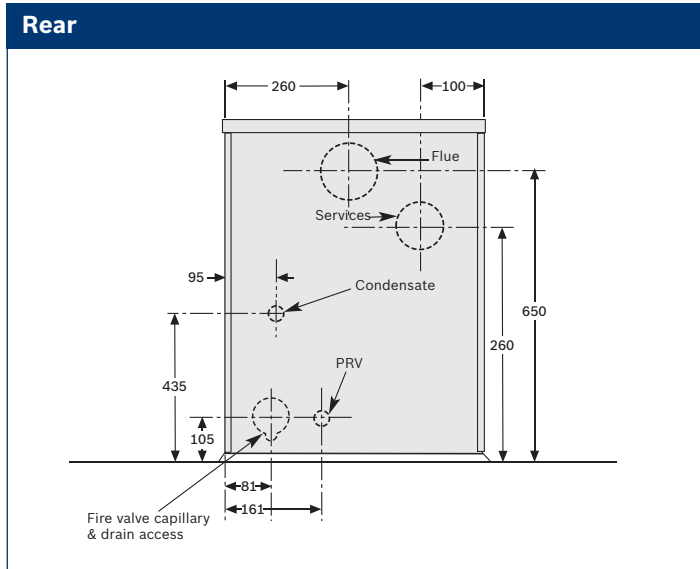
## Top view, right flue



## Pipework connections

Flue and pipe outlets (mm):

Note: For servicing purposes, keep the condensate and pressure relief discharge pipes away from components and pipework connections.



Pipework connections		
Description	Heatslave II External 12/18 & 18/25	Heatslave II External 25/32
CH flow/heating vent	22mm dia. plain ended copper	28mm dia. plain ended copper
DHW flow	22mm dia. plain ended copper	22mm dia. plain ended copper
Mains water inlet	15mm dia. plain ended copper	15mm dia. plain ended copper
CH return	22mm dia. plain ended copper	28mm dia. plain ended copper
Condensate outlet	21mm polypropylene	
Pressure relief pipe	15mm dia. plain ended copper	15mm dia. plain ended copper
Oil connections	10mm dia. copper compression	

## Installation regulations

The appliance should be installed by a competent person who is aware of the Health and Safety at Work Act. They should take appropriate action to ensure that the regulations are adhered to. In order to give optimum efficiency and trouble-free operation, the appliance must be commissioned by a qualified OFTEC engineer.

In particular, the installation of this appliance must be in accordance with the relevant requirements of the following British Standards and regulations in respect of the safe installation of equipment:

The compliance with a British Standard does not, of itself, confer immunity from legal obligations.

BS 5410: part 1 & 2: Code of Practice for Oil Fired Boilers.

BS 799: part 5: Specification for Oil Storage Tanks.

BS 7593: Code of Practice for treatment of water in domestic hot water central heating systems.

BS 5449: part 1: Specification for forced circulation hot water central heating for domestic premises.

BS 5955: part 8: Specification for the installation of thermoplastic pipes and associated fittings for use in domestic hot and cold water services and heating systems.

BS 7291: Thermoplastic pipes and associated fittings for hot and cold water for domestic purposes and heating installations in buildings.

BS 7074: part 1: Application, selection and installation of expansion vessels and ancillary equipment for sealed water systems.

BS 7671: IEE Wiring Regulations, current edition.

**Full British Standards requirements can be found on the British Standards website.**

The Building Regulations England, Wales, Scotland and Northern Ireland.

Local water company bye-laws.

The Control of Pollution (Oil) Regulations.

OFTEC Standards.

## Sealed system installation

The Greenstar Heatslave II oil-fired appliances are designed for sealed systems, incorporating a pre-plumbed expansion vessel, pressure relief valve set to 3bar, automatic air vent and pressure gauge. The charge pressure of the built-in 12 litre expansion vessel is 0.5bar as dispatched, which is equivalent to a static head of five metres. At 1bar pressure the vessel will provide 107 litres expansion capacity, and as the boiler has a primary water capacity of between 62 and 64 litres, therefore additional system expansion capacity may be required. The system should be filled to between 1 and 2bar through a WRAS approved temporary hose connection to the mains water supply.

## Underfloor heating

- Plastic pipework used for underfloor heating must be correctly controlled with a thermostatic blending valve, limiting the temperature of the circuits to approximately 50°C. A 20°C temperature differential must also be maintained at the appliance.

## Primary system/connections/valves

- **Do not use galvanised pipes or radiators**
- Any plastic pipework used for the CH system must have a polymeric barrier, complying with BS 7921 and installed to BS 5955 with 1,000mm (minimum) length of copper or steel pipe connected to the boiler
- All system connections must be capable of sustaining a pressure up to 3bar
- Radiator valves should conform to BS 2767:10
- All other valves should conform to BS 1010
- An automatic bypass valve must be connected between the heating flow and return where TRVs are used on all radiators. It should be fitted to give at least a 3 metre circuit when activated
- Drain cocks are required at all of the lowest points on the system
- Air vents are required at all of the high points on the system.



## Water supply

The following are general requirements and if necessary the advice of the local water company should be sought before fitting the appliance.

- The appliance cold water supply should be the first connection off the water main where possible.

## Water mains pressure

Minimum dynamic mains water pressure for maximum performance.

Mains water pressure		
12/18	18/25	25/32
1.5bar	1.2bar	1.6bar

Maximum mains fed water pressure 10bar. If necessary, fit a pressure reducing valve.

The appliance will accept pre-heated hot water to a temperature of 60°C

Non-return, back flow prevention devices (including those associated with water meters) fitted to the mains water supply can cause a pressure build up which could damage the boiler and other household appliances. Where the water main supply has a non-return, back flow prevention valve fitted, a mini expansion vessel (part no. 7 716 192 105) must be connected to the mains water inlet pipe between the non-return valve and the boiler.

## Use in hard water areas

Normally there is no need for water treatment to prevent scale formation as the maximum temperature of the heat exchanger is limited by the electronic control circuit. In areas where the temporary water hardness exceeds 200ppm, consideration may need to be given to the fitting of a scale prevention device. In such circumstances, the advice of the local water authority should be sought.

## Hot water systems

Taps and mixing valves must be capable of sustaining a pressure up to 10bar in accordance with the Water Regulations as they will be operating at mains water pressure.

- Hot water temperature and flow rate are affected by the size and insulation of pipework making up the distribution system and are controlled by the hot water tap and the water main inlet pressure. A mixing valve can be fitted if a more permanent setting is required.
- If using more than one outlet at once causes water flow starvation, fit flow balancing valves or Ball-O-Fix valves to the appropriate outlets.
- Only thermostatically controlled showers are suitable for use with this appliance.

## Plastic pipework

Any plastic pipework used for the DHW system must have a polymeric barrier, complying with BS 7921 and installed to BS 5955 with 1,000mm (minimum) length of copper or stainless steel pipe connected to the boiler.

- Before installing plastic pipework, the pipe manufacturer's literature should be consulted.
- To prevent the temperature and pressure exceeding the limits advised by the pipe manufacturer, a pressure reducing valve must be used to prevent the incoming water pressure exceeding 3bar (maximum). Also, a mini expansion vessel must be fitted to absorb the expanding water and a blending valve set to 60°C must be fitted before the DHW plastic pipework.
- When selecting plastic pipework for use with domestic water supply, it should be ensured that it is compliant with all current local and national legislation and regulations, including building regulations part G, BS 7291 - 1, 2 & 3: 2006, BS 8000 - 15-15: 1990 and information.

## Guarantee

Worcester oil-fired appliances are offered with a 2 year\* guarantee on parts and labour from the date of installation, providing the appliance is commissioned upon installation and the regular service requirements are met. The primary heat exchanger comes with a 5 year\* guarantee and the secondary heat exchanger is guaranteed for 10 years\*.



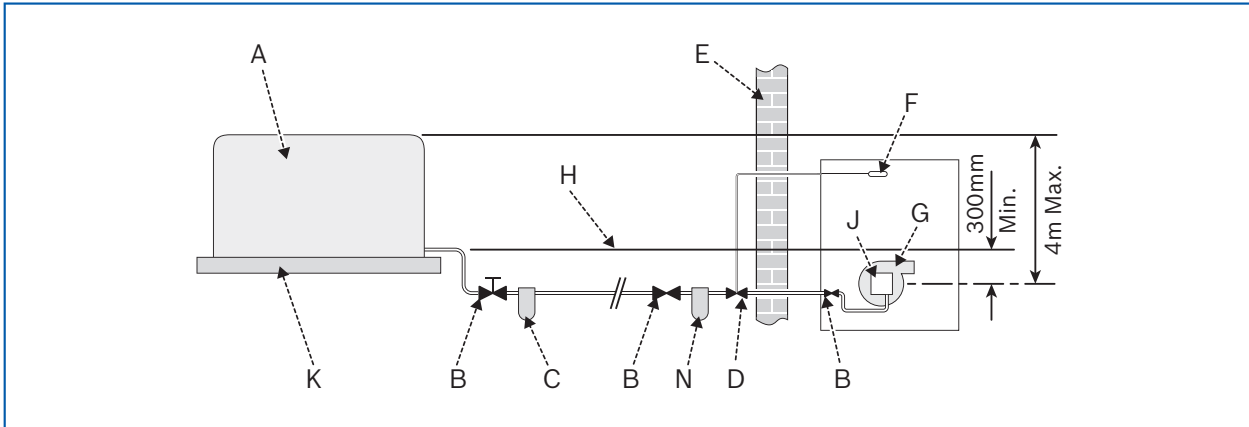


Fig. 10 Single pipe system – Heatslave II

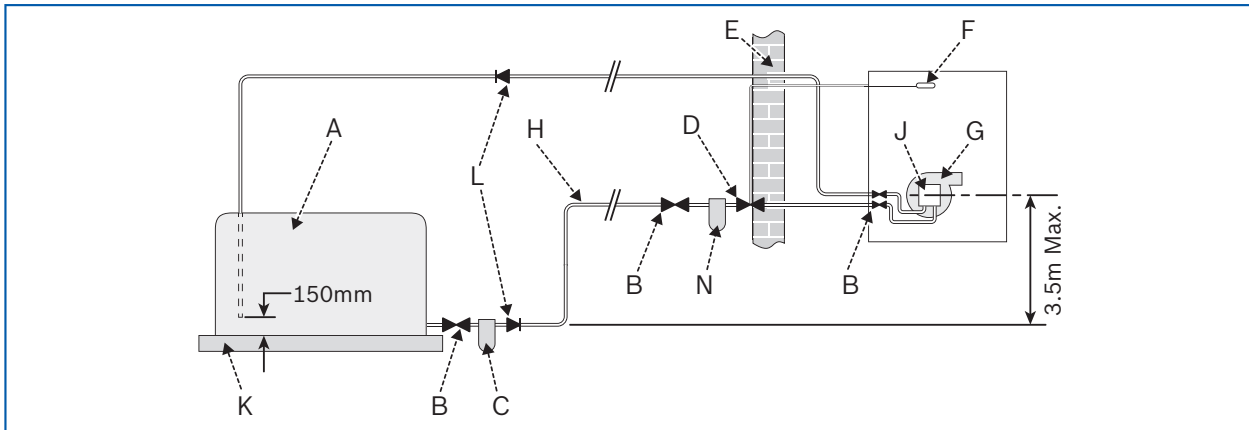


Fig. 11 Two pipe system – Heatslave II

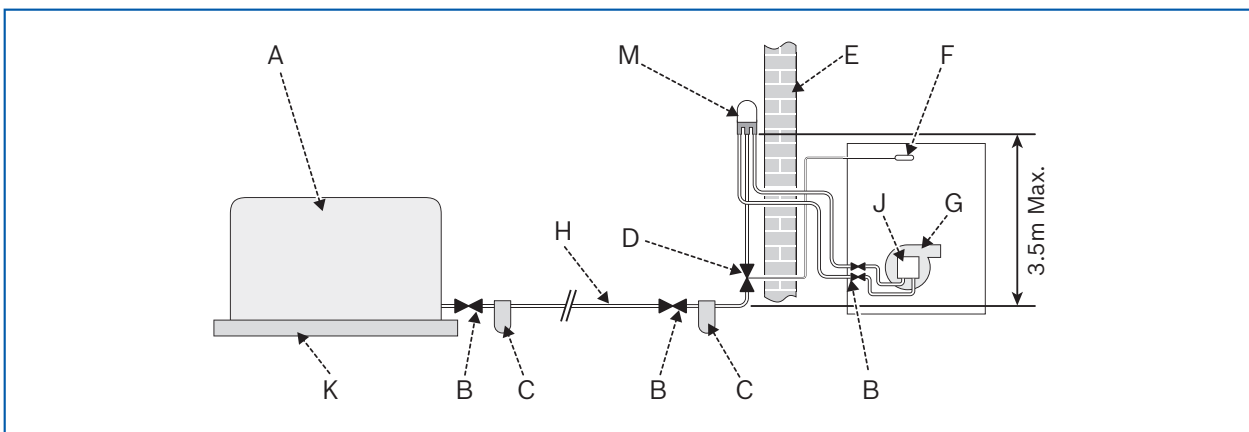


Fig. 12 Single pipe lift system with de-aerator – Heatslave II

### Key

- |   |                                  |   |  |
|---|----------------------------------|---|--|
| A | Oil storage tank                 | H | Oil supply pipe                        |
| B | Isolating valve                  | J | Oil pump                               |
| C | Oil strainer and water separator | K | Full base (plastic tanks)              |
| D | Fire valve to BS 5410            | L | Non-return valve                       |
| E | External wall                    | M | De-aerator                             |
| F | Fire valve sensor                | N | Oil filter (70µm max. filtration size) |
| G | Oil burner                       |   |  |

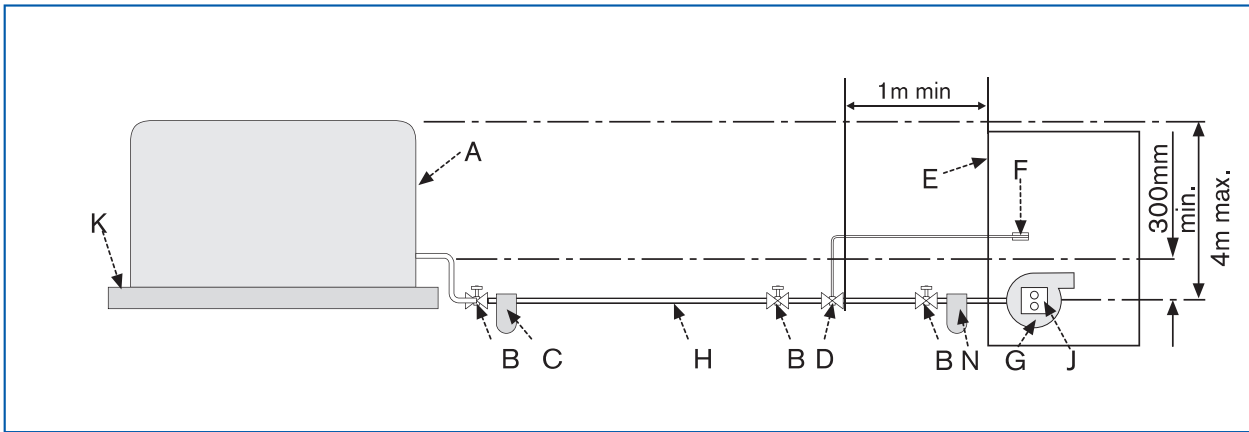


Fig. 10 Single pipe system – Heatslave II External

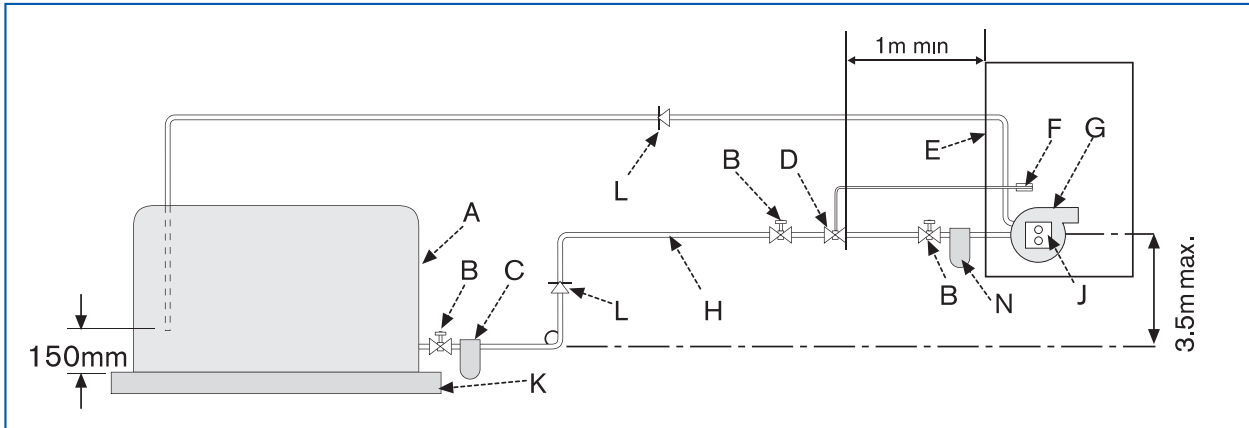


Fig. 11 Two pipe system – Heatslave II External

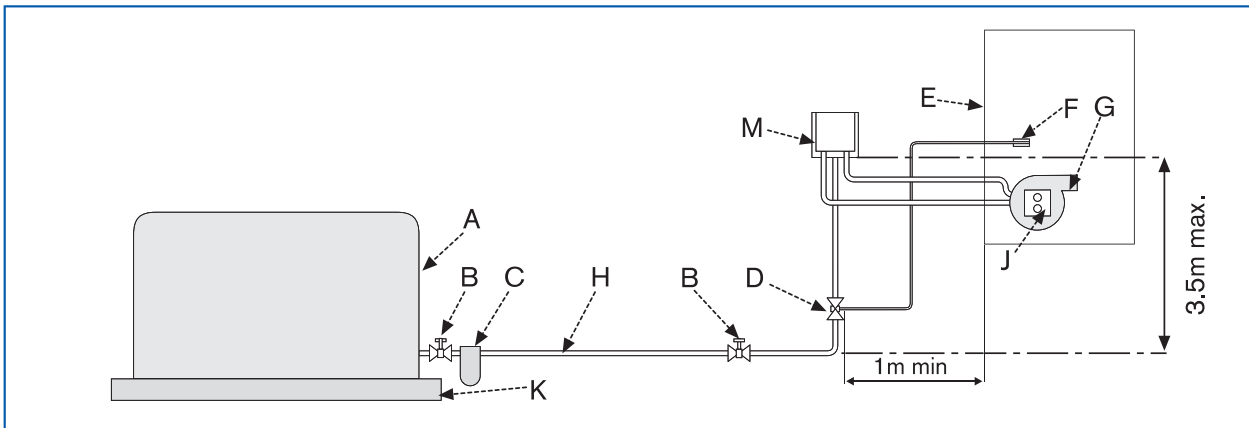


Fig. 12 Single pipe lift system with de-aerator – Heatslave II External

- Key**
- |                                    |                             |  |
|------------------------------------|-----------------------------|--|
| A Oil storage tank                 | G Oil burner                | N Oil filter (70µm max. filtration size) |
| B Isolating valve                  | H Oil supply pipe           |  |
| C Oil strainer and water separator | J Oil pump                  |  |
| D Fire valve to BS 5410            | K Full base (plastic tanks) |  |
| E External wall                    | L Non-return valve          |  |
| F Fire valve sensor                | M De-aerator                |  |

The oil burner on the Greenstar oil-fired appliances is supplied with a single flexible fuel line from the oil pump which is connected to the main oil supply line (via the oil isolation valve) within the appliance. This enables the burner to be removed without the need for disconnection of the fuel line.

The maximum permissible head is 4 metres. If the head is greater, then a head breaking device must be incorporated into the oil supply line.

All oil pumps on Worcester appliances can easily be converted to work on a two pipe system or a single pipe suction lift system with de-aerator. The maximum suction height is 3.5m (details are within the Installation and Servicing instructions which come with the appliance).

More advice on fuel lines can be sought from OFTEC Book Three as well as Technical sheet TI/134.

### Supply pipe

The oil supply pipe itself would normally be annealed copper tube with a protective plastic coating which is easily manipulated around bends and usually enables the fuel line to be run in a continuous length without joints. If joints must be used, they must be accessible, even if underground (via an access duct) and should be of the manipulative type. Plastic pipe specifically for oil lines does exist and is acceptable but must only be used underground.

**Galvanised pipe, fittings and soldered joints must not be used in oil lines.** More advice on fuel lines can be sought from OFTEC Book Three as well as Technical sheet TI/134.

### Supply pipe sizing

The diameter of the oil supply pipe itself is determined by the distance from the oil tank to the appliance and the head of oil whether it be positive or negative.

Tables 1 and 2 give the required diameter of supply pipe when cross referenced with the head. Table 3 gives the diameter of the supply pipe when the use of a de-aeration device is made.

Maximum allowable pipe run		
Head	8mm inside dia. pipe (10mm OD copper)	10mm inside dia. pipe (12mm OD copper)
0.5m	12m	30m
1.0m	25m	69m
1.5m	37m	91m
2.0m	49m	100m
2.5m	62m	100m
3.0m	74m	100m
3.4m	87m	100m
4.0m	99m	100m

Table 1: Single pipe gravity feed system

Maximum allowable pipe run		
Head	8mm inside dia. pipe (10mm OD copper)	10mm inside dia. pipe (12mm OD copper)
0m	50m	100m
-0.5m	44m	100m
-1.0m	38m	95m
-1.5m	32m	80m
-2.0m	26m	66m
-2.5m	20m	50m
-3.0m	14m	37m
-3.5m	8m	22m

Table 2: Double pipe sub-gravity feed system

Maximum allowable run from tank to de-aerator				
Fuel flow rate	2.5 (kg/h)	5 (kg/h)	10 (kg/h)	10 (kg/h)
Head	8mm dia.	8mm dia.	8mm dia.	10mm dia.
0m	100m	55m	26m	100m
0.5m	95m	45m	23m	100m
1.0m	80m	40m	20m	90m
1.5m	70m	35m	17m	75m
2.0m	60m	30m	14m	65m
2.5m	45m	25m	11m	50m
3.0m	35m	15m	8m	35m
3.5m	25m	10m	5m	20m

Table 3: Single pipe suction lift with de-aerator

### Oil tanks

For further information on oil tank location, please consult the tank supplier.

### Oil filters

Oil filters must always be incorporated in the oil supply line. One should be fitted on the outlet from the oil tank to filter deposits from within the tank or fuel, and one should be fitted near the appliance to filter deposits from within the fuel line itself. They are supplied and fitted by the installing engineer and are not part of the boiler's components. It should be possible to service them without the need for draining down the fuel supply line. There must be sufficient clearance below the filter to enable servicing operations to be carried out easily. Filters must comply to OFTEC standard OFS E104.

### Fire valves

A fire valve is an essential part of the oil supply system. It must be supplied and fitted by the installing engineer and is not part of the boiler's components. Its purpose is to cut off the flow of oil outside the building in the event of fire within the boiler area. The valve should be located on the fuel line at the point of entry into the building. It must be activated by a remote sensor located over the burner. A clip is provided within the appliance for the sensor. Fire valves must comply with OFTEC standard OFS E101 and be rated at 85°C or above to avoid nuisance tripping.

# The Worcester Greenstar System Filter

Modern condensing boilers are precision engineered and designed to run with a clean water heating system. Over time, dirty system water will damage a boiler and its components, causing failures as well as potentially shortening the life of the overall system.

## Damaged boiler and system components

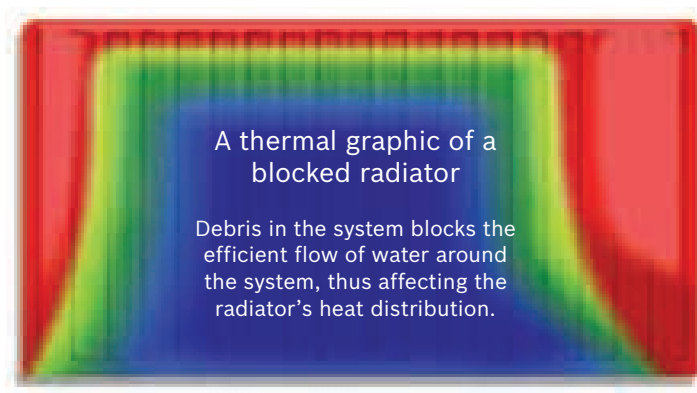
- Blockages in primary heat exchanger
- Increased wear on pumps
- Blocked valves.



A circulating pump damaged by system debris and pollutants

## Reduced efficiency

- Energy efficiency loss equivalent to a boiler being reduced from A rated efficiency to D rated, resulting in fuel wastage\*
- Blocked radiators can reduce efficiency and heating comfort.



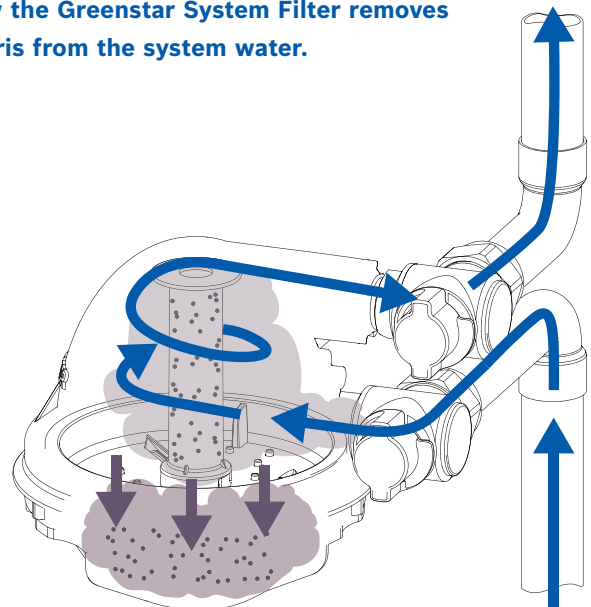
## A highly effective solution from the brand you can trust

The Worcester Greenstar System Filter has been specifically designed to combat the damaging effects of system debris and pollutants, allowing homeowners to protect their boiler or heat pump for a fraction of its cost. The filter is suitable for any 22mm piped heating systems.

At the centre of this innovative design is a highly powerful magnet that removes the magnetic debris (magnetite) that is present in the heating system water. The central location of the magnet ensures that magnetite is collected quickly and retained, maximising the overall protection, a proven technology that offers a capacity to collect up to 200g of magnetite a year. Any non-magnetic debris is caught by the twin-action cyclonic trap.

**The Greenstar System Filter has been extensively tested in simulated systems, proving its effectiveness in removing iron oxide, magnetite, limescale particles, casting sand, welding debris, non-magnetic metal flakes, paint particles and other system pollutants.**

## How the Greenstar System Filter removes debris from the system water.



## Installation

The filter can be installed almost anywhere in a heating system. However, to maximise the effectiveness, it should be placed before the boiler and after the last radiator.



Features	Benefits
Highly effective filter	Safeguards the boiler against damage and protects the efficiency of the system. Saves up to 6% a year on energy bills*
Prevent blockages in radiators	A warmer home and quieter system
High powered internal magnet	Proven technology that can capture up to 200g of magnetite
Cylindrical design	Increased performance – better installation options
Twin-action – magnetic and non-magnetic filtration	Instantly effective against a wide range of system debris
No power consumption or moving parts	No electrical wiring connection or supply needed. Zero running costs and no failure of components
Can be installed under the boiler or away from the appliance	Flexibility
One-way valve for adding system chemicals	Removes the need to isolate a section of the system when carrying out servicing and maintenance
Worcester, Bosch Group specification and design	Reliability of components and filter

*\*Independent research carried out by GASTEC at CRE*

### Product info

Part number	7 716 192 609
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# Condensate pipework

Important points to consider when siting a condensate drainage pipe:

- **Where a new or replacement boiler is being installed, access to an internal “gravity discharge” point should be one of the factors considered in determining boiler location**
- **The condensate pipe must be a minimum of 22mm dia. plastic pipe**
- **The condensate pipework must fall at least 52mm per metre towards the outlet and should take the shortest practicable route**
- **Ensure there are no blockages in the pipe run.**

## Internal connections

In order to minimise risk of freezing during prolonged cold spells, the following methods of installing a condensate drainage pipe should be adopted, **in order of priority**.

Wherever possible, the condensate drainage pipe should be routed and terminated so that the condensate drains away from the boiler under gravity to a suitable internal foul water discharge point such as an internal soil and vent stack. A suitable permanent connection to the foul waste pipe should be used. (see fig. 1)

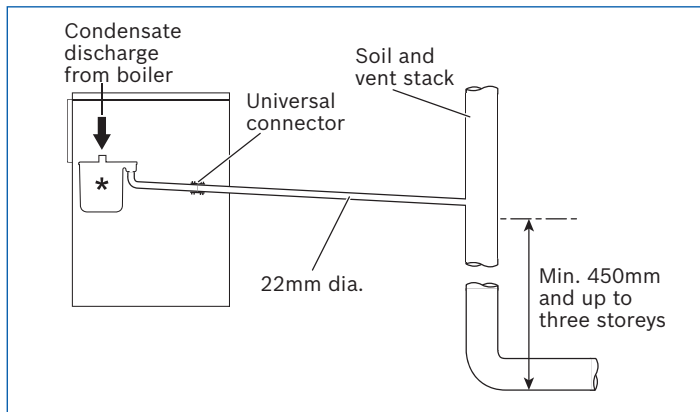


Fig. 1 Disposal to soil vent stack (internal and external models). **For external models increase pipe size and insulate pipework.**

Alternatively if the first option is not possible, an internal kitchen or bathroom waste pipe, washing machine waste pipe, etc. can be used. (see fig. 2)

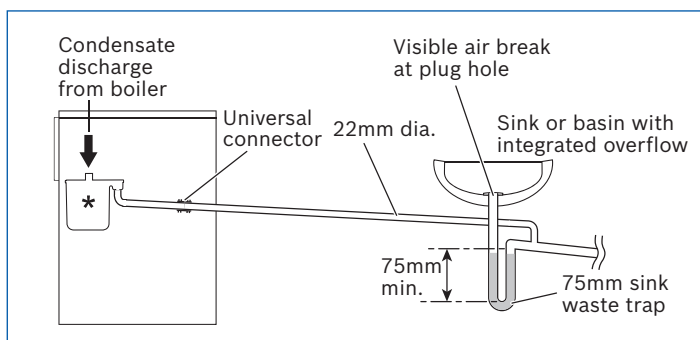


Fig. 2 Disposal to a waste pipe (internal models)

## Condensate pump

Where “gravity discharge” to an internal termination is not physically possible, or where very long internal runs would be required to reach a suitable discharge point, condensate should be removed using a proprietary condensate pump, of a specification recommended by the boiler or condensate pump manufacturer.

The pump outlet pipe should discharge to a suitable internal foul water discharge point such as an internal soil and vent stack, internal kitchen or bathroom waste pipe, washing machine waste pipe, etc. A suitable permanent connection to the foul waste pipe should be used. (see fig. 3 and 4)

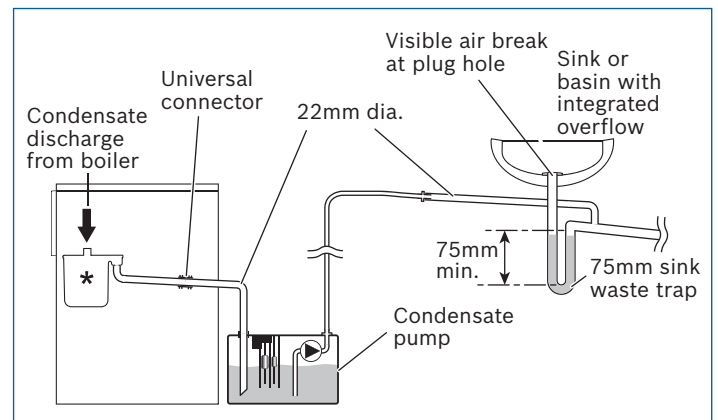


Fig. 3 Condensate pump disposal (internal models)

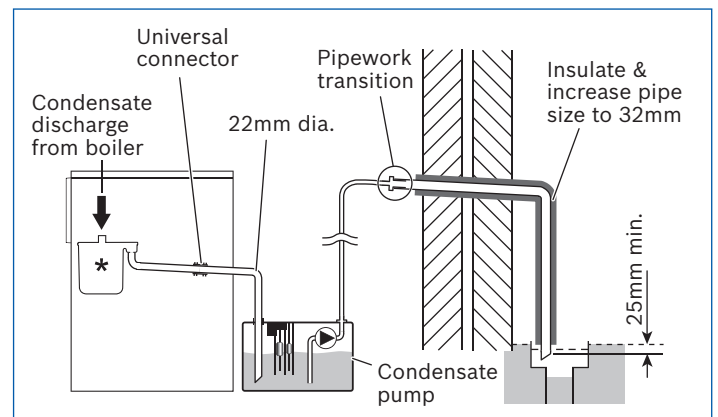


Fig. 4 Condensate pump to external disposal (internal models)

**For full technical information on pipe size, insulation and different condensate pipework methods, please see Installation, Commissioning and Servicing Instruction Manual.**

## External connections

### Freezing conditions

- Pipework length should be kept to a minimum and the route should be as vertical as possible
- A CondenseSure auxiliary siphon may be used to reduce the risk of freezing
- Where pipework is subjected to extreme cold or wind chill, a form of weather-proof insulation should be used.

### Condensate waste

- Care should be taken when siting a soak away to avoid obstructing existing services.

If no other discharge method is possible, then the use of an externally-run condensate drainage pipe terminating at a suitable foul water discharge point, or purpose-designed soak away, may be considered (see fig. 5).

If this method is chosen, then the following measures should be adopted:

- The external run should be kept as short as possible and not exceed 3m
- A CondenseSure auxiliary siphon may be used to reduce the risk of freezing
- The pipe should be run internally as far as possible before going externally and the pipe diameter should be increased to 32mm before it passes through the wall to the exterior. The pipe should be insulated using suitable waterproof and weather resistant insulation
- The external pipe should take the shortest and least exposed route to the discharge point, and should “fall” as steeply as possible away from the boiler, without horizontal runs in which condensate might stand
- The use of fittings, elbows, etc., should be kept to a minimum and any internal “burrs” on cut pipework should be removed so that the internal pipe section is as smooth as possible.

### Fitting an external air break

- Refer to Fig 6. When a rainwater down pipe (which goes directly into a sewer that carries both rain water and foul water) is used to dispose of condensate, an air break must be installed. It should be fitted on the 43mm pipework, between the boiler condensate outlet and the drainpipe. The installation should take place outside the property to avoid flooding during adverse weather conditions.

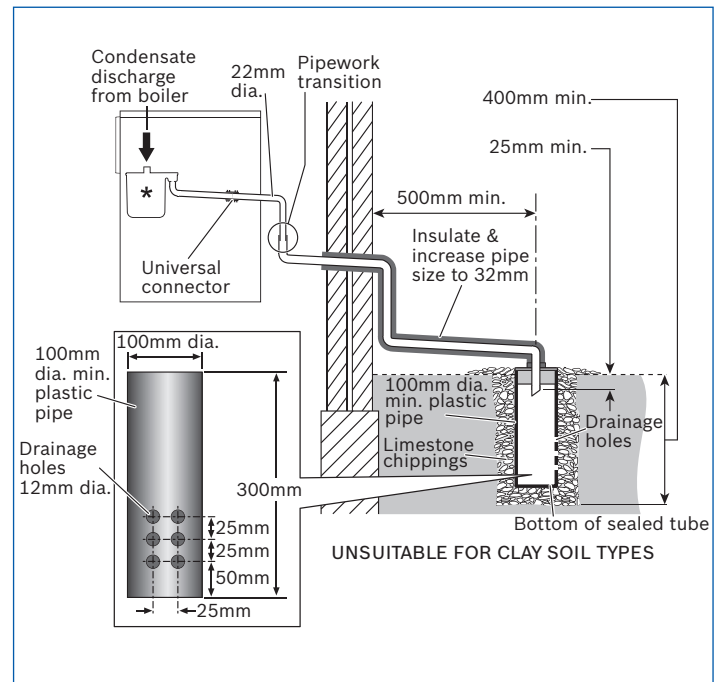


Fig. 5 Soak away (internal and external models).

**For external models increase pipe size and insulate pipework.**

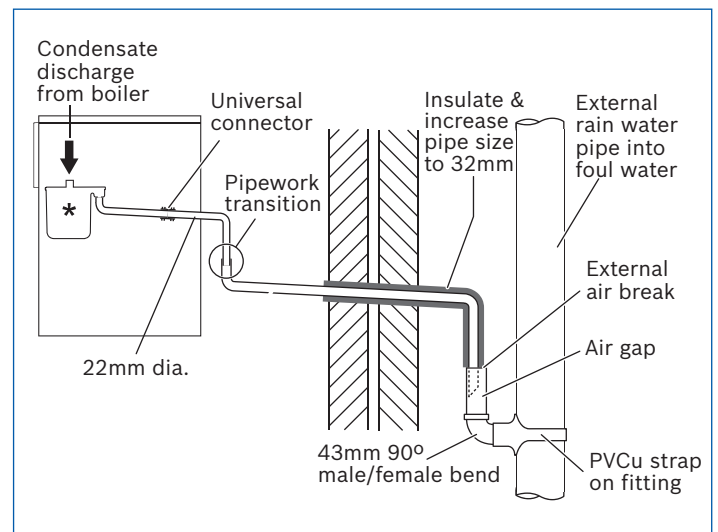


Fig. 6 Disposal into a rainwater down pipe (internal and external models).

**For external models increase pipe size and insulate pipework.**

In addition to the condensate discharge options illustrated on these pages and in the Installation, Commissioning and Servicing Instruction Manual, the Worcester CondenseSure auxiliary siphon provides an innovative alternative for the prevention of freezing for externally run discharge condensate (see pages 32-33 for details).

# The Worcester CondenseSure

With climate change and extreme weather variations becoming increasingly common, and with very cold winters with temperatures as low as -20°C being experienced, practices such as externally run condensate discharge pipework are now being questioned.

In these conditions the condensate pipe on a condensing oil-fired boiler can freeze. This can lead to a blocked condensate pipe, which will cause condensate to drain back into the boiler leading to corrosion of mild steel components and leakage of condensate. This can result in premature component failure, damage to property and burner failure.

The CondenseSure auxiliary siphon has been designed to allow a more flexible approach to boiler siting.

## Tested to extreme temperatures

The CondenseSure auxiliary siphon has been extensively tested under simulated extreme weather conditions, proving its effectiveness in preventing frozen condensate at -15°C for a sustained period of 48 hours.

## CondenseSure principle of operation

Most oil-fired condensing boilers have a trap which releases condensate as it is formed. A typical A-rated condensing boiler will generate up to 2 litres of condensate an hour (dependent on output and temperature) which is discharged as a continuous trickle. With this frequency of discharge, the condensate pipework is never empty of condensate, consequently increasing the potential for freezing of the pipework in prolonged sub-zero temperatures.

The CondenseSure siphon connects to the boiler condensate discharge outlet and collects the condensate into a larger volume before releasing it into the discharge pipe.

With this expanded siphonic operation, the discharge from the CondenseSure increases to every 15 to 20 minutes, resulting in:

- Increased velocity and flow rate
- Only 3 to 4 siphonic actions per hour, meaning the condensate pipework is empty for longer
- Significantly decreased or even eliminated freezing potential.



The CondenseSure insulating jacket helps to retain the temperature of the condensate.

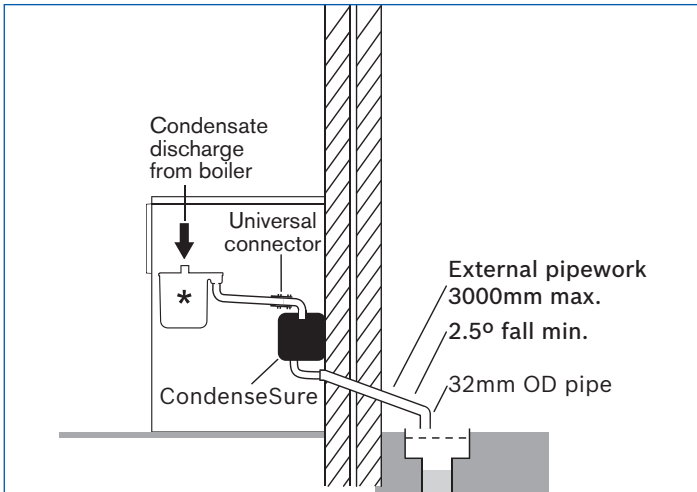
## A universal fitting for new and existing installations

Although developed specifically for Worcester Greenstar gas- and oil-fired boilers, the Worcester CondenseSure can also be fitted to any make of condensing boiler for both new and retrofit installations. The CondenseSure can provide a simple solution which eliminates the need for re-siting both the new boiler and the system pipework when replacing an existing non-condensing appliance. CondenseSure can easily be fitted to an existing condensing boiler to provide peace of mind in extreme weather conditions.

Features	Benefits
No power consumption	No electrical wiring connection or supply needed, meaning zero running costs
No moving parts	No failure of components
Can be installed on new or existing installations	Suitable for any gas- or oil-fired condensing boilers
Can be attached to 22mm heating flow pipework (gas-fired boiler)	Uses 'free' energy from the pipe to heat the condensate
Under boiler or remote installation	Flexibility
No electrical connections	No electrician needed
No pipe insulation needed	Cost saving and aesthetically pleasing

### Ease of installation

The CondenseSure has been designed for ease of installation and is suitable for most boiler applications. Although it can be clipped to a flow pipe under a wall hung boiler, on floor standing boilers the CondenseSure can be wall-mounted away from the boiler, whilst still being connected to the condensate discharge pipe.



A typical installation using CondenseSure

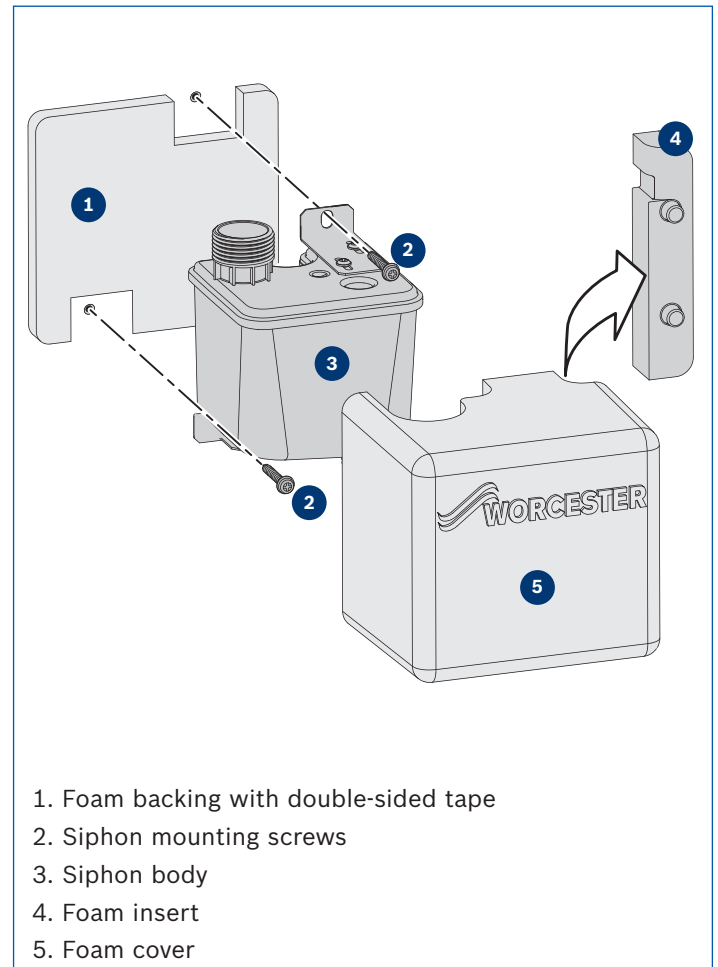
### CondenseSure installation parameters

The CondenseSure will protect an externally run condensate discharge pipe from freezing for 48 hours at -15°C providing the following installation parameters are met:

- The externally run pipe length does not exceed 3 metres
- There is a fall on the discharge pipe of at least 2.5 degrees
- The discharge pipe diameter is not less than 32mm in diameter.

Whilst it is not necessary to insulate the pipework, it may be a consideration if longer lengths or lower external temperatures are expected.

### Fitting



1. Foam backing with double-sided tape
2. Siphon mounting screws
3. Siphon body
4. Foam insert
5. Foam cover

Additional installation considerations include:

- Keeping any external pipework as short as possible
- Minimising the number of bends and connections
- Removal of burrs after cutting any pipe
- Removal of surplus solvent from the interior of the pipe.

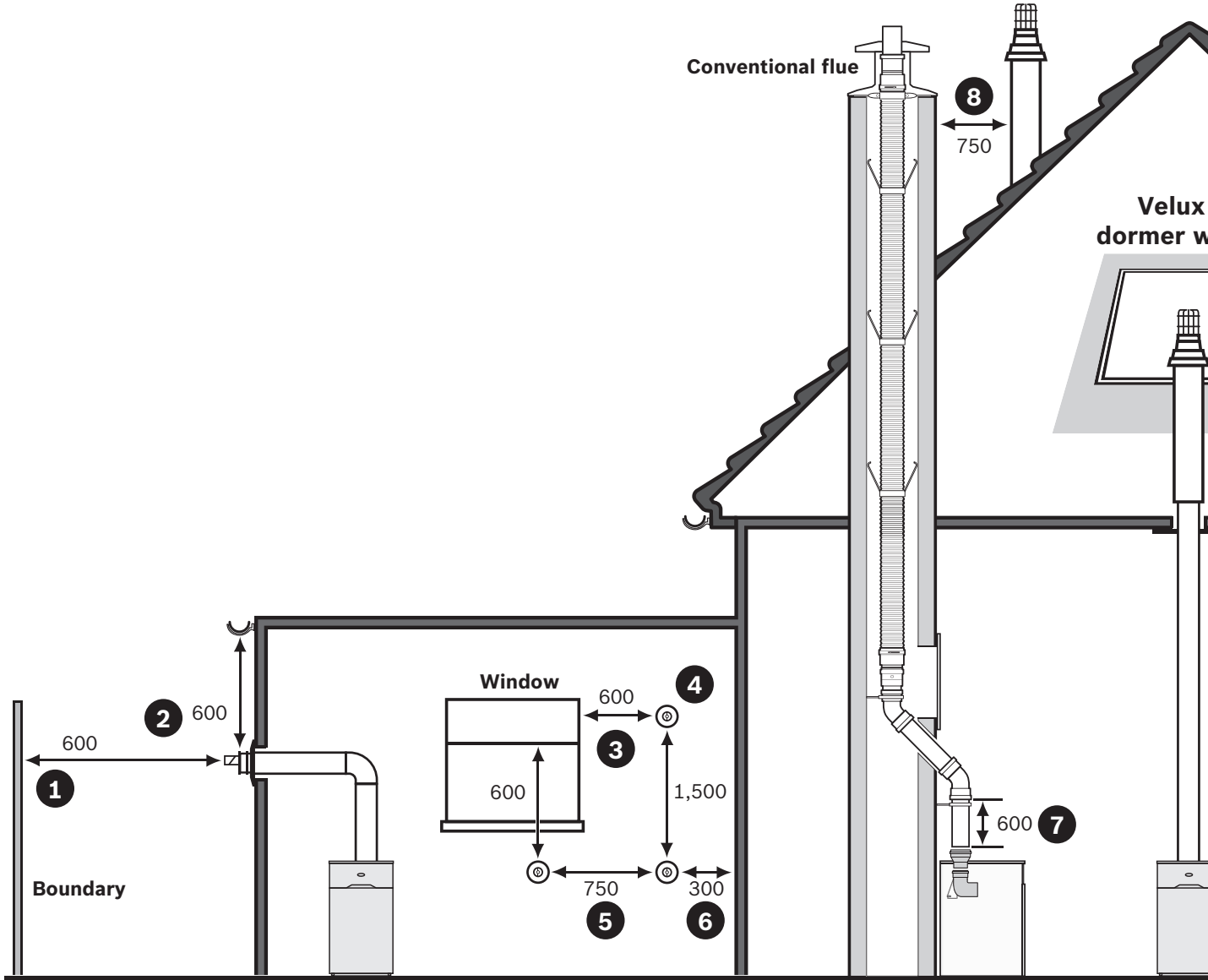
There is no Part P requirement as the CondenseSure has no working parts to break down, does not use any energy and has no electrical connections.

### Product info

Part number	7 716 192 746
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# Horizontal and vertical flue terminal positioning

All measurements in millimetres

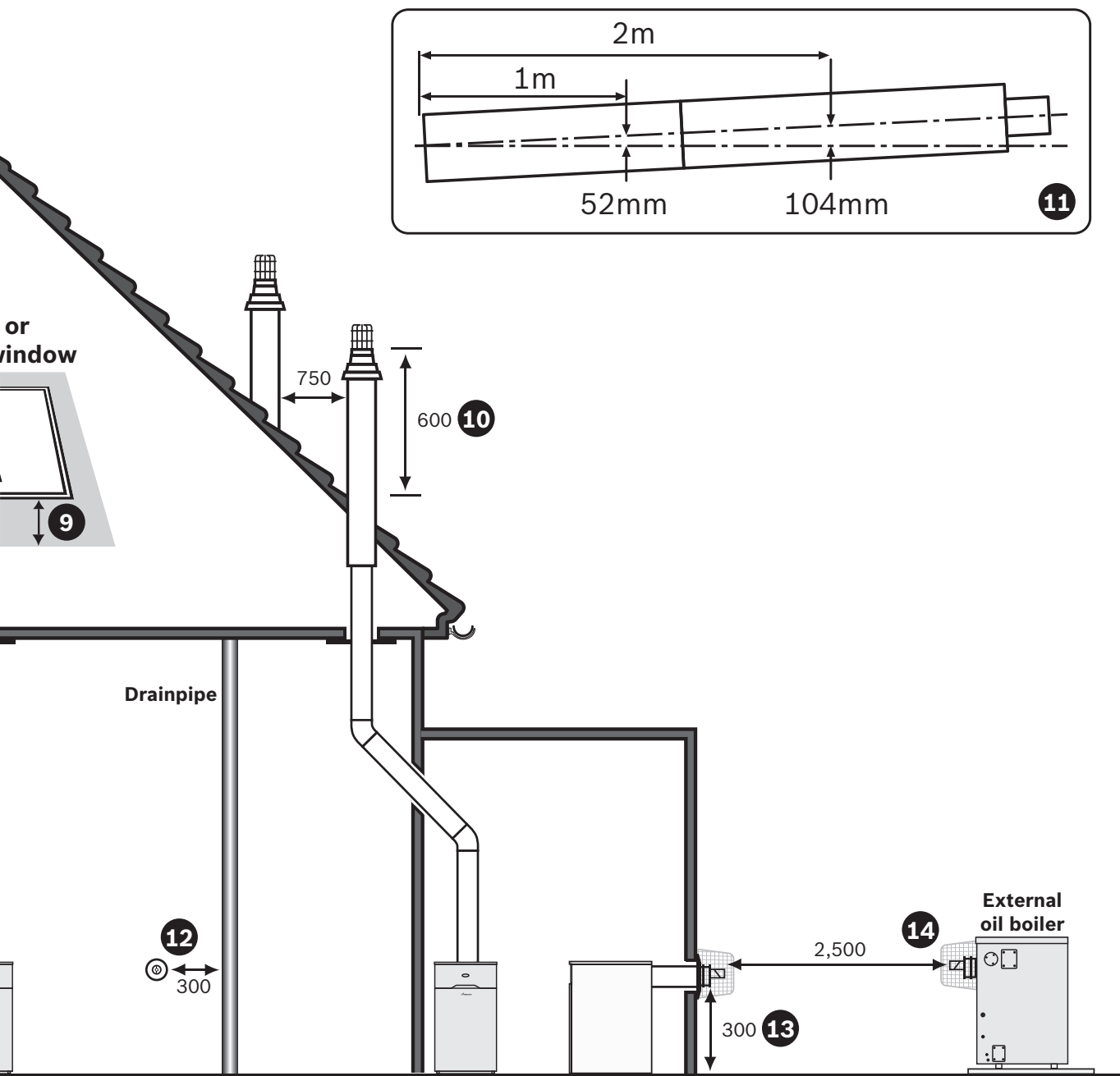


## Note

- All measurements are the minimum clearances required.
- Use suitable brackets and fittings to support the flue at approximately one metre intervals and at a change of direction.
- Terminals must be positioned so as to avoid combustion products entering the building.
- In spite of the dimensions given here, the terminal must not be closer than 300mm to combustible material, in the case of a thatched roof, double this dimension.
- Terminals must be positioned so as to avoid products of combustion accumulating in stagnant pockets around or entering the building.
- Terminals must be at least 1.8m from an oil storage tank unless a wall with of at least 30 minutes fire resistance which extends 300mm wider and higher than the tank is present between the tank and the terminal.

## Key to illustration

1. 600mm distance to a boundary, unless it will cause a nuisance. BS 5410: Part 1 recommends that care is taken when siting terminals in relation to boundaries.
2. 600mm below eaves and balconies, this can be reduced to 75mm, as long as the flue terminal is extended to clear any overhang.
3. 600mm horizontally or vertically to an opening, air brick or opening window.
4. 1,500mm vertically from a terminal on the same wall.
5. 750mm horizontally from a flue on the same wall.
6. 300mm to an internal or external corner.



7. Minimum 600mm straight flue before any bend on a conventional flue.
8. 750mm between a vertical structure and a flue terminal.
9. 1,000mm below a Velux or dormer window, 300mm above or to either side of the Velux or dormer window or any opening on a sloping roof.
10. 600mm above the highest point of an intersection with a roof.
11. Any flue must fall back towards the boiler by 3° or 52mm for every metre of flue so that the condensate drains back to the boiler for disposal.
12. 300mm to any vertical sanitary pipework or drain pipe.
13. Flue clearance must be at least 300mm above ground or balcony level. Terminal guards must be fitted if the flue is less than 2 metres from the ground or if a person could come into contact with the flue terminal.
14. 2,500mm between terminals facing each other.



# Greenstar Heatslave II combi boiler range horizontal fluing options (internal models)

The Greenstar Heatslave II combi boiler range has a 125mm diameter telescopic horizontal room sealed flue system including a plume management kit.

## Horizontal room sealed flue – rear exit flue lengths



Flue diameter	125mm	
Greenstar Heatslave II series		
Minimum flue length	160mm	
Maximum flue length	Rear exit	6,000mm
	Side exit	5,000mm*
	High level	5,000mm**

\*Length includes 90° bend inside cabinet.

\*\*Length includes 2x90° bends, one within the cabinet and one before the telescopic flue kit.

**Note: The maximum flue length must be reduced by the following amounts for each additional bend used.**

	45° bend	90° bend
80/125mm flues	500mm	1,000mm

## Greenstar Heatslave II components

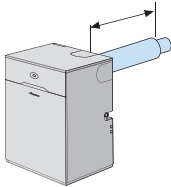



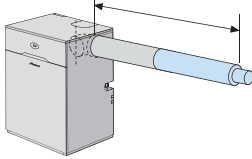



	Part No.	Description
125mm diameter		
	7 716 190 064	Standard telescopic flue kit (460 - 670mm)
	7 716 190 062	Short telescopic flue kit (350 - 460mm)
	7 716 190 033	1,000mm flue extension
	7 716 190 097	600mm short flue extension
	7 716 190 034	90° bend
	7 716 190 035	45° bends (pair)
	7 716 190 101	Flue damper
	7 716 190 050	Flue terminal guard
	7 716 190 105	Infill plate kit for high level horizontal flues

The following criteria should be noted when planning the installation:

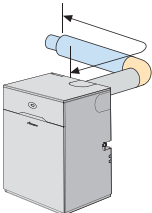



- The concentric flue system must be inclined at 3° (52mm per metre) from the appliance, to allow condensate to drain back into the boiler
- A white plume of condensation will be emitted from the terminal because the appliance operates at high efficiency. Care must be taken when selecting the flue terminal position
- To achieve a maximum flue length, one of the extension flue kits will need to be cut so that the permitted maximum flue length is not exceeded
- **Note:** The short flue extension (600mm) may be used as an alternative to the standard 1,000mm extension on 80/125mm flue installations as required up to the maximum flue lengths stated (Part No. 7 716 190 097).

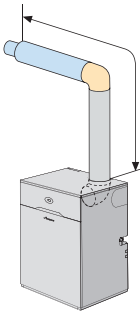
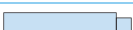


Horizontal flue options 1-5 illustrate common flue installations. Other configurations of the flue system are possible up to, and not exceeding, the stated maximum flue lengths.

Option 1: Standard rear flue assembly				
				
Components				
Part No. 125mm	7 716 190 064			
Minimum length (mm) & no. of components required				
Greenstar Heatslave II series				
125mm	460	1		

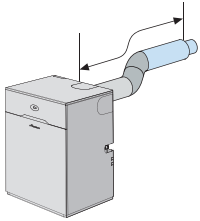
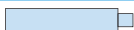


Option 4: Side flue extension				
				
Components		  		
Part No. 125mm	7 716 190 064	7 716 190 033	7 716 190 034	
Maximum lengths (mm) & no. of components required				
Greenstar Heatslave II series				
125mm	5,000	1	up to 5	1

Maximum flue length includes 90° bend inside cabinet.

Option 2: Extended rear flue assembly using a 90° bend				
				
Components		  		
Part No. 125mm	7 716 190 064	7 716 190 033	7 716 190 034	
Maximum lengths (mm) & no. of components required				
Greenstar Heatslave II series				
125mm	5,000	1	up to 5	1

Option 5: High level horizontal discharge				
				
Components		  		
Part No. 125mm	7 716 190 064	7 716 190 033	7 716 190 034	
Maximum lengths (mm) & no. of components required				
Greenstar Heatslave II series				
125mm	5,000	1	up to 5	2

Maximum flue length includes 2x90° bends, one within the cabinet and one before the telescopic flue kit.

Option 3: Extended rear flue assembly using two 45° bends				
				
Components		  		
Part No. 125mm	7 716 190 064	7 716 190 033	7 716 190 035	
Maximum lengths (mm) & no. of components required				
Greenstar Heatslave II series				
125mm	5,000	1	up to 5	1

**Note:** The maximum flue length must be reduced by the following amounts for each additional bend used.

	45° bend	90° bend
80/125mm flues	500mm	1,000mm

# Greenstar Heatslave II combi boiler range vertical fluing options (internal models)

The Greenstar Heatslave II combi boiler range has a 125mm diameter vertical room sealed flue system.

## Vertical room sealed flue



Flue diameter	125mm
Greenstar Heatslave II series	
Minimum flue length	1,080mm
Maximum flue length	8,000mm

**Note: The maximum flue length must be reduced by the following amounts for each additional bend used. A flue damper is required for effective flue lengths greater than 6m.**

	45° bend	90° bend
80/125mm flues	500mm	1,000mm

## Greenstar Heatslave II components



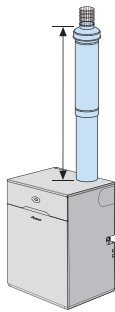
	Part No.	Description
125mm diameter		
	7 716 190 103	Vertical flue kit
	7 716 190 033	1,000mm flue extension (960mm)
	7 716 190 097	600mm short flue extension
	7 716 190 034	90° bend
	7 716 190 035	45° bends (pair)
	7 716 190 101	Flue damper
	7 716 191 090	Flashing – flat roof
	7 716 191 091	Flashing – pitched roof


The following criteria should be noted when planning the installation:

- To achieve a maximum flue length, one of the extension flue kits will need to be cut so that the permitted maximum flue length is not exceeded
- The concentric flue system must be inclined at 3° (52mm per metre) from the appliance, to allow condensate to drain back into the boiler
- Because the appliance operates at high efficiency, a white plume of condensation will be emitted from the terminal. Care must be taken when selecting the flue terminal position
- **Note:** The short flue extension (600mm) may be used as an alternative to the standard 1,000mm extension on 80/125mm flue installations as required up to the maximum flue lengths stated (Part No. 7 716 190 097).

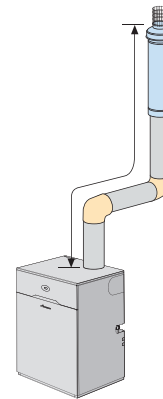
Vertical flue options 1-4 illustrate common flue installations. Other configurations of the flue system are possible up to, and not exceeding, the stated maximum flue lengths.



Option 1: Vertical balanced flue system minimum height



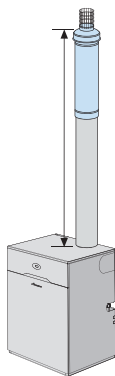
Components		
Part No. 125mm		7 716 190 103
Minimum lengths (mm) & no. of components required		
Greenstar Heatslave II series		
125mm	1,080	1



Option 3: Vertical balanced flue system with two 90° bends



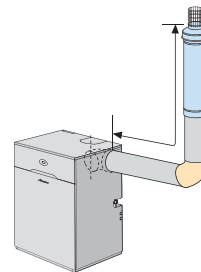
Components			
Part No. 125mm		7 716 190 103	7 716 190 033
			7 716 190 034
Maximum lengths (mm) & no. of components required			
Greenstar Heatslave II series			
125mm	6,000	1	up to 5
			2



Option 2: Vertical balanced flue system maximum height



Components			
Part No. 125mm		7 716 190 103	7 716 190 033
Maximum lengths (mm) & no. of components required			
Greenstar Heatslave II series			
125mm	8,000	1	up to 7

Option 4: Vertical balanced flue system side discharge



Components			
Part No. 125mm		7 716 190 103	7 716 190 033
			7 716 190 034
Maximum lengths (mm) & no. of components required			
Greenstar Heatslave II series			
125mm	6,000	1	up to 5
			2

**Note:** The maximum flue length must be reduced by the following amounts for each additional bend used. A flue damper is required for effective flue lengths greater than 6m.



	45° bend	90° bend
80/125mm flues	500mm	1,000mm

# Greenstar Heatslave II External combi boiler range fluing options

Greenstar Heatslave II External boilers include a low level balanced flue kit.

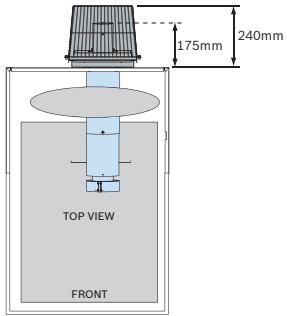
## Greenstar Heatslave II External components





Components	Part No.	Description
<b>125mm diameter</b>		
	7 716 190 034	90° bend (internal) required for fluing to left or right
	7 716 190 050	Flue terminal guard

Low-level rear

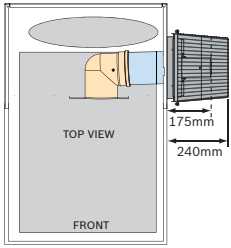
**Top view**






Components		
Part No. 125mm	-	7 716 190 050
<b>Maximum lengths (mm) &amp; no. of components required</b>		
<b>Greenstar Heatslave II External series</b>		
125mm	-	Included
		1

Low-level right

**Top view**

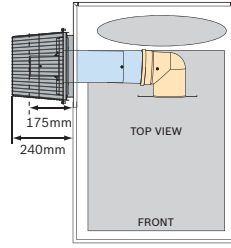





Components			
Part No. 125mm	-	7 716 190 034	7 716 190 050
<b>Maximum lengths (mm) &amp; no. of components required</b>			
<b>Greenstar Heatslave II External series</b>			
125mm	-	Included	1
			1

N.B. For left and right hand flue termination, a 90° bend is required.

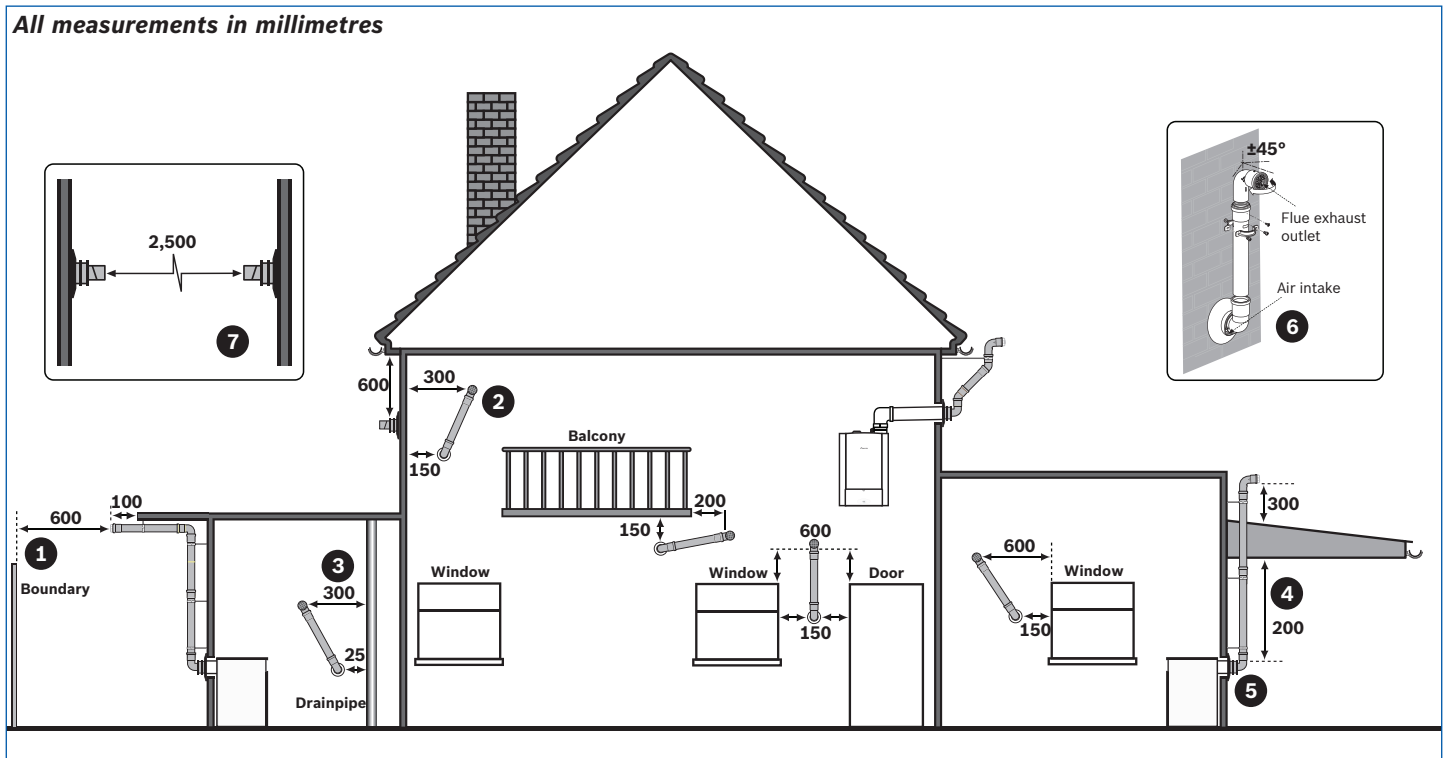
Low-level left

**Top view**



Components			
Part No. 125mm	-	7 716 190 034	7 716 190 050
<b>Maximum lengths (mm) &amp; no. of components required</b>			
<b>Greenstar Heatslave II External series</b>			
125mm	-	Included	1
			1

N.B. For left and right hand flue termination, a 90° bend is required.



## Note

- All measurements are the minimum clearances required
- Terminals must be positioned so as to avoid combustion products entering the building
- Support the flue at approximately one metre intervals and at a change of direction. Use suitable brackets and fittings.

## Key to illustration

1. 600 mm distance to a boundary, unless it will cause a nuisance. BS 5410: Part 1 recommends that care is taken when siting terminals in relation to boundaries.
2. Internal/external corners the air intake can be reduced to 150mm providing the flue exhaust outlet has a 300mm clearance.
3. Vertical sanitary pipe: 25mm to the flue air intake and 300mm to the flue exhaust outlet.
4. Clearance no less than 200mm from the lowest point of the balcony or overhang, installations in car ports are not recommended.
5. 1,200mm from an opening in a car port on the same wall i.e. door or window leading into dwelling. 600mm to a surface facing a terminal.
6. Using a plume management kit, the air intake measurement can be reduced to 150mm providing the flue exhaust outlet has a 600mm clearance. Plume kits running horizontally must have a 10° fall back to the boiler for proper disposal of condensate. For details on specific lengths see relevant boiler Technical & Specification manual.
7. 2,500mm between air intake and facing terminal.



# Plume management system options

## Greenstar Heatslave II (internal) series

### Condensfit II™ plume management system components

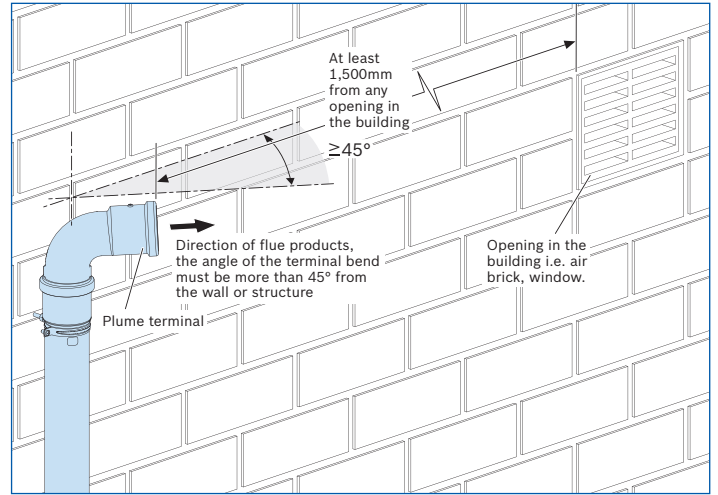
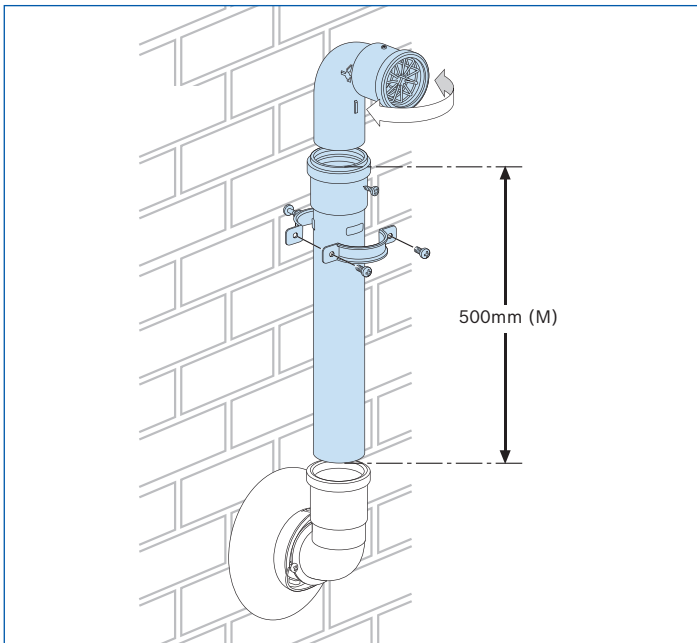


	Part No.	Description
<b>80mm diameter</b>		
	7 716 190 092	Plume management kit
	7 716 190 093	1,000mm extension
	7 716 190 095	90° bend
	7 716 190 094	45° bend (pair)

### Standard plume management system

The flue terminal outlet has built-in stops to limit rotation for horizontal fluing to allow condensate to run back into the boiler for safe disposal. Do not attempt to force beyond the limit stops.

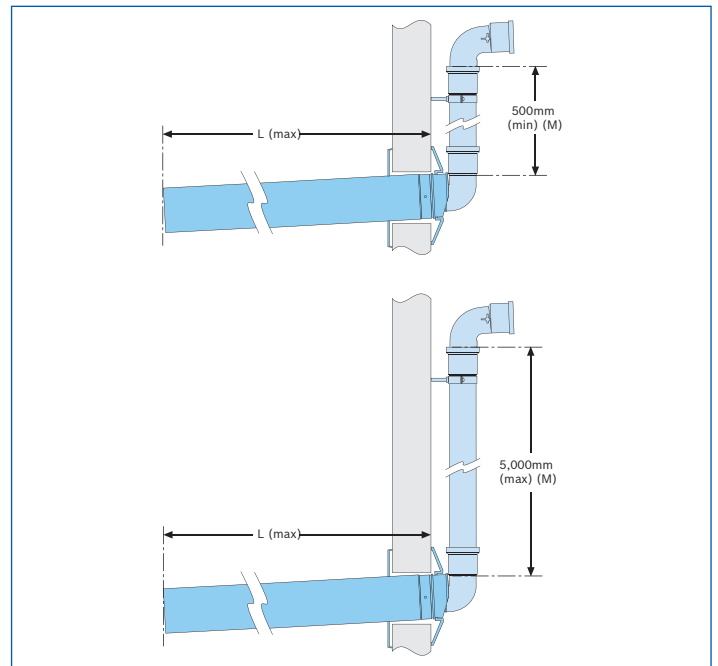
The first section of plume management flue up to the first elbow must rise by at least 173mm per metre (10°) from the terminal; subsequent sections must rise by 52mm per metre (3°).



Re-directing flue discharge from an 80mm dia. plume management outlet

### Plume management system measuring

**Note:** All boilers have a maximum permissible plume management length – see table below.



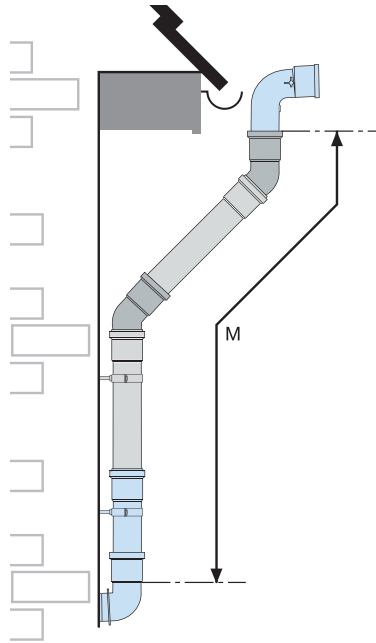
Flue length (L)	Max. number of bends	Plume length (M)	Max. number of bends
<b>Greenstar Heatslave II 12/18 &amp; 18/25</b>			
160 - 2,000mm	2	500 - 5,000mm	2
<b>Greenstar Heatslave II 25/32</b>			
160 - 2,000mm	2	500 - 4,000mm	2

### Additional bends

Adding bends to the plume management system reduces the actual plume management length. Each bend has an equivalent straight length and must be factored into the overall effective length.

- 90° bend is equivalent to 1,000mm
- 45° bend is equivalent to 500mm.

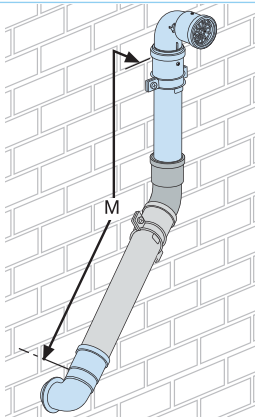
Plume management system with extensions and two 45° bends



Components			
Part No. 80mm	7 716 190 092	7 716 190 093	7 716 190 094*
Maximum lengths (mm) & no. of components required			
Greenstar Heatslave II 12/18 & 18/25			
80mm	5,000	1	5
Greenstar Heatslave II 25/32			
80mm	4,000	1	4

\*Pack contains a pair of 45° bends

Plume management system with extensions and 45° bend



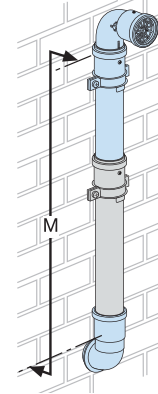
Components			
Part No. 80mm	7 716 190 092	7 716 190 093	7 716 190 094*
Maximum lengths (mm) & no. of components required			
Greenstar Heatslave II 12/18 & 18/25			
80mm	4,500	1	4
Greenstar Heatslave II 25/32			
80mm	3,500	1	3

\*Pack contains a pair of 45° bends

**Note: The plume management length must be reduced by the following amounts for each additional bend.**

	45° bend	90° bend
<b>Greenstar Heatslave II &amp; Heatslave II External series</b>	500mm	1,000mm

Plume management system with extensions



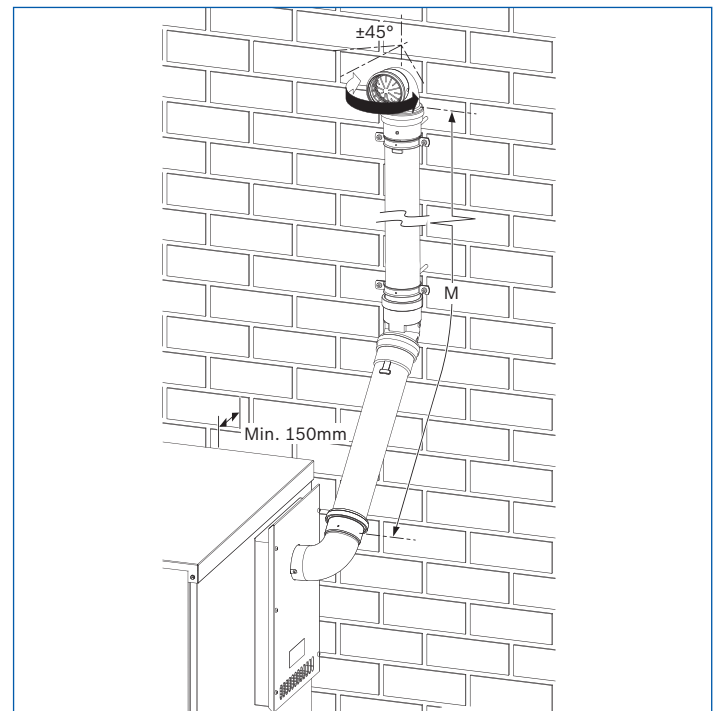
Components		
Part No. 80mm	7 716 190 092	7 716 190 093
Maximum lengths (mm) & no. of components required		
Greenstar Heatslave II 12/18 & 18/25		
80mm	5,000	1
Greenstar Heatslave II 25/32		
80mm	4,000	1

## Greenstar Heatslave II External series

### Plume management on

#### Greenstar Heatslave II External boilers

The plume management kit can be used on the Greenstar Heatslave II External models in conjunction with the external low level horizontal flue kit.



Plume length (M)	Maximum number of bends
Greenstar Heatslave II External 12/18 & 18/25	
500 - 5,000mm	2
Greenstar Heatslave II External 25/32	
500 - 4,000mm	2

# Conventional flue

**Open (conventional) flued appliances must not be installed in a bedroom, bathroom or bedsitting room.**



- The flue system must be in accordance with BS 5410 and the current Building Regulations.
- The flue must be constructed of materials suitable for use with condensing combustion products.
- External flue systems must be of the insulated type.
- Brick and masonry chimneys must be lined with a suitable non-combustible material and properly jointed to withstand the effects of the working temperature (minimum rating of material 120°C) of the appliance and any condensate which may form.
- All flue joints must be sealed to prevent the leakage of condensate and combustion products.
- Ensure that joints are made so that the condensate runs away and is not collected within the joint.

**NOTE: The flue can be increased in size from the boiler take off point providing the joint is correctly sealed. Never reduce the flue diameter from the boiler take-off point.**

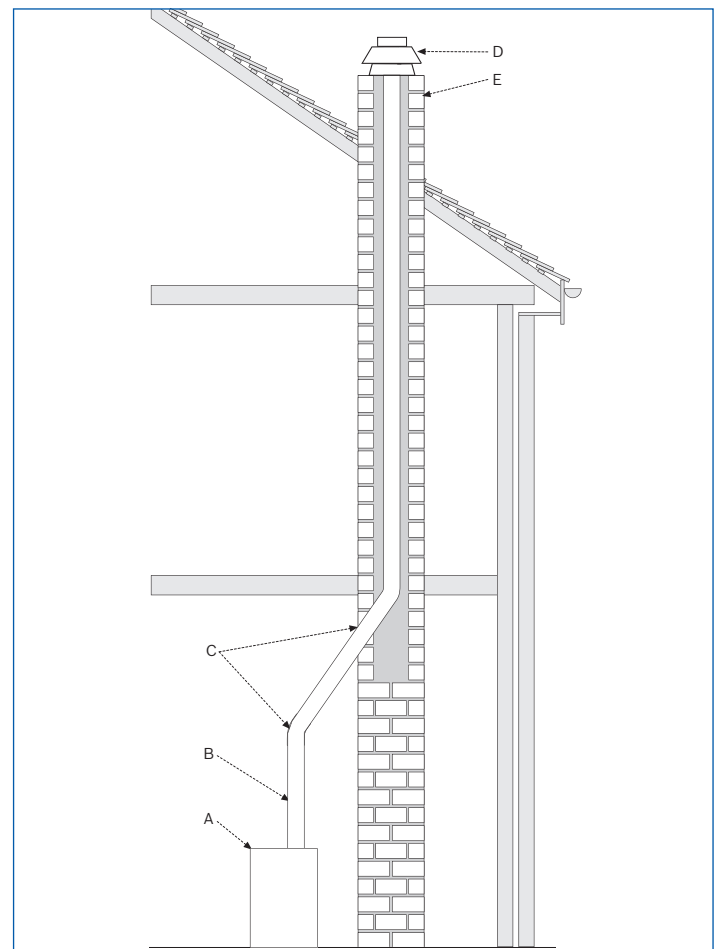
Conventional flue sizing		
Output	Flexi-flue diameter	3rd party flue diameter
12/18	100/103mm	100/103mm
18/25	100/103mm	100/103mm
25/32	100/103mm	130mm

- Because the flue operates at a lower temperature on a condensing boiler compared to that of a conventional appliance, the flue draught will be lower. Typically the draught will be between 0.5mmwg and 4.4mmwg, measured with the flue warm but the burner not firing. The actual figure will vary depending on weather conditions, flue height and position.
- The flue should be vertical and contain as few bends as possible. A maximum of two 135° bends should be used.
- The flue outlet must be extended beyond the eaves of the building and, where possible, above the apex.
- Fit a suitable anti down-draught terminal where down draughts are experienced.

To convert the appliance to a conventional flue system the vertical flue adaptor needs to be specified:

	Part No.	Description
	7 716 190 104	Conventional flue 80/100mm and 100/103mm adaptor kit
	7 716 190 065	130mm adaptor

The flue must be constructed of materials suitable for the use of condensing combustion products.



A Boiler	D Anti down-draught terminal
B Flue	E Chimney
C Maximum 2 bends at 135°	

## Oilfit flexible flue liner

The Oilfit flexible flue liner allows installation into a position where a standard efficiency appliance had previously been installed. It achieves this by enabling a Greenstar condensing boiler to be open-flued up a chimney. The continuous flexible flue is installed from the roof, providing a condensate-proof lining for the chimney.

A roof terminal, extension pieces and a flue adaptor are all included within the kit.

### Conventional flexible flue liner kit

#### 100mm dia. Oilfit flexible flue liner kit










- 1 x chimney cowl
- 1 x terminal
- 1 x support collar
- 1 x support bracket assembly
- 1 x centralising spacer
- 1 x flexible to rigid adaptor kit (includes liner & seal)
- 1 x flexible liner
- 1 x rigid to flexible adaptor kit (includes liner & seal)

**Part No. 7 716 190 076** (8m)

**Part No. 7 716 190 077** (12m)

### Greenstar Heatslave II flexible flue liner components



	Part No.	Description
<b>100mm diameter</b>		
	7 716 190 076	Oilfit flexible flue liner kit (8m)
	7 716 190 077	Oilfit flexible flue liner kit (12m)
	7 716 190 078	Oilfit flexible flue liner kit (15m)
	7 716 190 066	1,000mm extension kit*
	7 716 190 067	500mm extension kit*
	7 716 190 068	Telescopic extension*
	7 716 190 069	45° bend*
	7 716 190 104	Conventional flue 80/100mm and 100/103mm adaptor kit
	7 716 190 074	Wall cover plate kit

Model	Flue diameter	Maximum flue length
<b>Greenstar Heatslave II series</b>		
12/18	100mm	12,000mm
18/25	100mm	12,000mm
25/32	100mm	12,000mm

**Typical installations**

**Open (conventional) flued appliances must not be installed in a bedroom, bathroom or bed-sitting room.**

Before installation commences it must be checked that:

- The chimney is structurally sound and free of obstructions
- The chimney has been thoroughly swept to remove deposits since it was last used.

The flexible flue pipe is only suitable for lining chimneys that conform to the Building Regulations and it should not be used as a chimney on its own or outside a masonry or flueblock chimney.

All the flexible liner and adaptors must be within the chimney with rigid stainless steel flue pipe connecting to the boiler.

**The first 600mm of the stainless steel flue pipe off the boiler must be vertical with no bends or restrictions.**

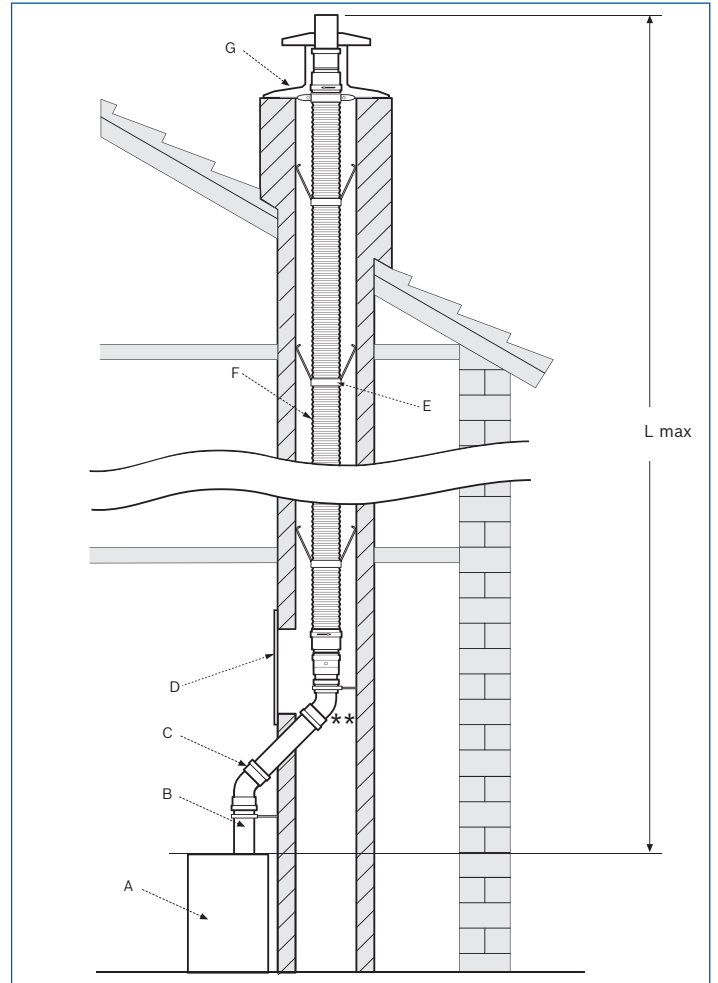
There must be at least a 25mm clearance between the stainless steel flue pipe and any combustible material.

The data label must be secured onto the chimney or chimney hearth using the plate provided.

If it is not possible to attach the plate to the chimney, the plate can be attached, in a visible position, next to the electricity consumer unit.

Do not attach the data plate or label to the flue system.

The terminal should not be modified and an extra cowl or cover must not be fitted. The boiler is designed so that any rain that enters the flue will be directed down to the condensate drain.



A Boiler	D Fire stop plate/inspection plate
B Stainless steel vertical section (min. 600mm)	E Centralising spacer
C Maximum 2 bends at 45°	F Flexible liner
	G Chimney cowl

**Calculating the length:**

L maximum = boiler maximum minus 1m\*.  
(Each 45° bend has a 0.5m equivalent flue length)

\*If the chimney has an additional offset, then L will be reduced by an extra metre.  
\*\*The top 45° bend may not be required if there is sufficient room in the chimney to turn the flexible liner through 45° within the chimney. The stainless steel section must be adequately supported.

# Greenstar Heatslave II accessories

<p><b>Comfort plug-in twin channel programmer</b></p>  <p><b>Worcester Part No. 7 733 600 003</b></p>	<p><b>Comfort I RF wireless room thermostat and plug-in twin channel programmer</b></p>  <p><b>Worcester Part No. 7 733 600 001</b></p>	<p><b>Comfort II RF wireless programmable room thermostat and plug-in RF receiver</b></p>  <p><b>Worcester Part No. 7 733 600 002</b></p>	<p><b>FR10 intelligent room thermostat*</b></p>  <p><b>Worcester Part No. 7 716 192 065</b></p>
<p><b>Outdoor weather sensor</b></p>  <p><b>Worcester Part No. 7 716 192 764</b></p>	<p><b>Comfort wall mounting plate</b></p>  <p><b>Worcester Part No. 7 733 600 039</b></p>	<p><b>CondenseSure auxiliary siphon</b></p>  <p><b>Worcester Part No. 7 716 192 746</b></p>	<p><b>Greenstar System Filter</b></p>  <p><b>Worcester Part No. 7 716 192 609</b></p>

# Greenstar Oilfit internal flue system



## Greenstar Heatslave II Internal series

<p><b>Standard telescopic flue kit (125mm dia.)</b></p>  <p><b>Worcester Part No. 7 716 190 064</b></p>	<p><b>Short telescopic flue kit (125mm dia.)</b></p>  <p><b>Worcester Part No. 7 716 190 062</b></p>	<p><b>Vertical flue kit (125mm dia.)</b></p>  <p><b>Worcester Part No. 7 716 190 103</b></p>	<p><b>1,000mm flue extension (125mm dia.)</b></p>  <p><b>Worcester Part No. 7 716 190 033</b></p>
<p><b>600mm flue extension (125mm dia.)</b></p>  <p><b>Worcester Part No. 7 716 190 097</b></p>	<p><b>45° bend (pair) (125mm dia.)</b></p>  <p><b>Worcester Part No. 7 716 190 035</b></p>	<p><b>90° bend (125mm dia.)</b></p>  <p><b>Worcester Part No. 7 716 190 034</b></p>	<p><b>Conventional flue 80/100mm &amp; 100/103mm adaptor kit</b></p>  <p><b>Worcester Part No. 7 716 190 104</b></p>



# Greenstar Oilfit internal flue system – continued

Greenstar Heatslave II Internal series



**Infill plate kit for high level horizontal flues**



**Worcester Part No.**  
7 716 190 105

**Flat roof flashing kit (100mm & 125mm dia.)**



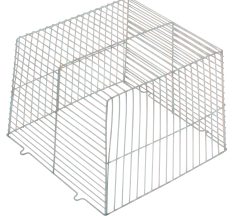
**Worcester Part No.**  
7 716 191 090

**Pitched roof flashing kit (100mm & 125mm dia.)**



**Worcester Part No.**  
7 716 191 091

**Stainless steel flue terminal guard**



**Worcester Part No.**  
7 716 190 050

**Conventional flue 130mm adaptor**



**Worcester Part No.**  
7 716 190 065

# Greenstar Oilfit flexible flue kit accessories

Greenstar Heatslave II Internal series



**Oilfit flexible flue kit (100mm dia.)**



**Worcester Part No.**  
7 716 190 076 (8m)  
7 716 190 077 (12m)

**Stainless steel 1,000mm extension kit (100mm dia.)**



**Worcester Part No.**  
7 716 190 066

**Stainless steel 500mm extension kit (100mm dia.)**



**Worcester Part No.**  
7 716 190 067

**Stainless steel telescopic extension (100mm dia.)**



**Worcester Part No.**  
7 716 190 068

**Stainless steel 45° bend (100mm dia.)**



**Worcester Part No.**  
7 716 190 069

**Wall cover plate kit (100mm dia.)**



**Worcester Part No.**  
7 716 190 074

# Greenstar Oilfit low level external flue system



Greenstar Heatslave II External series

**Low level horizontal flue kit (125mm dia.)**



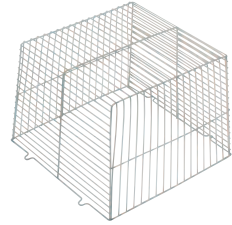
Included in boiler

**90° bend\* (125mm dia.)**



Worcester Part No.  
7 716 190 034

**Stainless steel flue terminal guard**




Worcester Part No.  
7 716 190 050

## Plume management accessories

Greenstar Heatslave II Internal & Heatslave II External series

**Plume management kit (80mm dia.)**



Worcester Part No.  
7 716 190 092

**1,000mm extension (80mm dia.)**



Worcester Part No.  
7 716 190 093

**45° bend (80mm dia.)**



Worcester Part No.  
7 716 190 094

**90° bend (80mm dia.)**



Worcester Part No.  
7 716 190 095

\*Used inside boiler when fluing to the side

# Total training experience from Land's End to John O'Groats

Worcester has always been committed to setting the industry standard for expert professional training and this is reflected in the scope and content of the courses, venues and options available.

We offer training on our entire range of domestic and commercial heating technologies as well as industry-led courses. All tuition is handled by expert heating specialists, combining classroom theory with, practical hands-on experience. Keep up-to-date with legislation and experience hands-on-training with our new technologies.

To increase your skills, expertise and value in the market place, trust Worcester's unique and proven total training concept.

## Training centres throughout the UK

### **Worcester**

Worcester's award-winning, state-of-the-art Training Academy is an innovative and spacious high tech training arena at our headquarters in Worcester. Facilities include open-plan domestic training areas with life-size single-storey brick buildings. Here installers can get to grips with Greenskies solar thermal systems working with Greenstar gas appliances, clearly demonstrating the importance of system design and operation.

### **Wakefield**

Opened in Summer 2013, the Wakefield Training and Assessment Academy boasts a large gas laboratory which features our entire range of Greenstar gas-fired appliances, a flushing area, wet and dry boilers and a light commercial area with a cascade of Worcester GB162 boilers. There is a solar room with fully working components from our entire Greenskies solar range and a pitched roof for practical training, as well as a large commercial training room.

### **West Thurrock and Clay Cross**

Further academies are located at West Thurrock in Essex and Clay Cross in Derbyshire, both of which offer a comprehensive choice of courses.

## 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.

Worcester has worked closely with leading colleges and independent training centres for more than 20 years – a successful enterprise which in 2007 was enhanced further with the launch of the College Links Learning Scheme.

## Mobile training

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. Our 7.5 tonne mobile oil vehicle is also available for hands-on oil product training and OFTEC assessments.

**Call now for more information 0330 123 0166.**



# Oil-fired product courses

Worcester's oil manufacturing heritage stretches back to the foundation of the company in 1962. Since then, we have built a strong reputation for not only manufacturing products at the highest levels of quality and reliability, but also for training installers, commissioning engineers and operatives.

Our oil-fired boiler training courses are extensive, covering areas such as dismantling a jet burner, setting oil pump pressures, maintaining a condensate trap, the relationship between air and oil supplies, as well as the detection of intermittent faults. Our oil advanced fault-finding course, running exclusively at Claycross, has been designed for installers and heating engineers who are already knowledgeable on our range of oil-fired products. Our expert trainers will further increase your experience, whilst also providing a strong understanding of fault-finding techniques.

OFTEC establishes the standards for competence within the domestic oil heating. OFTEC registered installers are able to self-certify their work under the building regulations. Worcester offer OFTEC training with a variety of courses to choose from.

## Oil-fired condensing boiler course

**Greenstar Danesmoor & Heatslave II high efficiency condensing oil-fired boilers.**

**Oil advanced fault finding.**

## OFTEC training and assessment courses

**OFTEC 50.**

**OFTEC 101/105e, OFTEC 600a and OFTEC 101/105e/600a.**



	Oil-fired Course	Oil Advanced Fault Finding	OFTEC 50	OFTEC 101/105e	OFTEC 600a	OFTEC 101/105e/600a
Duration	1 Day	1 Day	5 Days	4 Days	1 Day	4 Days
Cost	Free*	Free*	£200	£350	£175	£500
<b>Training course covers</b>						
Specification	✓	✗	A preparatory course for OFTEC assessment courses. (Price of course includes all necessary OFTEC text books).	Domestic/light commercial pressure jet commissioning, servicing and boiler installation	Oil tank installation and associated controls	Combined OFTEC 101, 105e and 600a courses
Installation	✓	✗				
Commissioning	✓	✓				
Servicing	✓	✓				
Maintenance	✓	✓				
<b>Course locations</b>						
Worcester	✓	✗	✓	✓	✓	✓
Clay Cross	✓	✓	✓	✓	✓	✓
Wakefield	✓	✗	✓	✓	✓	✓
West Thurrock	✓	✗	✓	✓	✓	✓
College Links*	✓	✗	✓	✓	✓	✓
Mobile*	✓	✗	✓	✓	✓	✓

\*A holding fee of £65 applies to free courses and is refunded on attendance of the course. If a booking is cancelled more than 10 working days before the course date, the fee will be fully refunded. The fee is non-refundable if a cancellation is made less than 10 working days before the course date.

\*Please contact Worcester Training for specific colleges and mobile dates.

Any customers who book onto an OFTEC 50 course with Worcester are entitled to a £150 discount on their subsequent OFTEC 101/105e or 101/105e/600a course.

To complement the above courses, Worcester also runs **unvented, water treatment, Domestic ACS training and assessment, IDHEE domestic heating design, MCS Made Easy and Green Deal courses.**

**Please note:** to attend OFTEC courses you must have a minimum of 12 months' experience installing/servicing oil boilers or have attended an OFTEC 50 course. For candidates with limited oil experience, our Greenstar one day oil-fired course offers pre-OFTEC training. Consult with the trainer at the end of the session to see if you are ready to undertake OFTEC assessment. For experienced oil technicians, training is not a pre-requisite for OFTEC assessment.

# 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. Call us on **0330 123 0166** 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](http://www.worcester-bosch.co.uk/training)

## Gas-fired condensing boiler courses

- Greenstar CDi Classic gas-fired condensing combi boilers.
- Greenstar CDi Compact and Greenstar Si Compact gas-fired condensing combi boilers.
- Greenstar i gas-fired condensing combi boilers.
- Greenstar system & regular gas-fired condensing boilers.
- Greenstar Highflow CDi & FS CDi Regular floor standing gas-fired condensing combi and regular boilers.
- Greenstar Controls (covers MT10, MT10RF, NEW Greenstar Comfort range, NEW Wave internet connected room thermostat, FR10, FR110, FW100, and solar controls).

## Renewable product courses

- Renewables overview.
- Greenskies solar.
- Greenskies advanced solar.
- Introduction to heat pumps.
- Greenstore LECP ground source heat pumps.
- Greensource air to air heat pumps.

## Worcester commercial product courses

- Greenspring CWi47 water heater.
- GB162 overview.
- GB162 domestic.
- GB162 commercial.
- Greenstar Heat Distribution Unit.
- Commercial ACS training and assessment – CODNCO1.

## Bosch commercial product courses

- GB312 & GB402 overview.
- Solar thermal product overview.
- GWPL Gas Absorption Heat Pumps overview.
- CHP overview.
- Commercial controls overview.

## Industry focused courses

- 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.
- QCF Level 3 Award
  - Air source and ground source heat pumps.
  - Air to water and split air to water heat pumps.
  - Solar thermal.
- MCS Made Easy.
- Green Deal.
- LPG Changeover.
- WRAS Water Regulations.



# A complete after-sales service

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

## 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: 0330 123 9559**

## Opening times

Monday – Friday: 7.00am – 8.00pm

Saturday: 8.00am – 5.00pm

Sunday: 9.00am – 12 noon

Bank Holidays: 8.00am – 4.30pm



## Spares

Genuine replacement parts for all supported Worcester products are readily available from stock, or on a next day delivery basis. Visit [www.worcester-bosch.co.uk/spares](http://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.

## Technical Support

**Tel: 0330 123 3366**

**Fax: 01905 752 741**

**Email: [technical-advice@uk.bosch.com](mailto:technical-advice@uk.bosch.com)**

## Opening times

Monday – Friday: 7.00am – 8.00pm

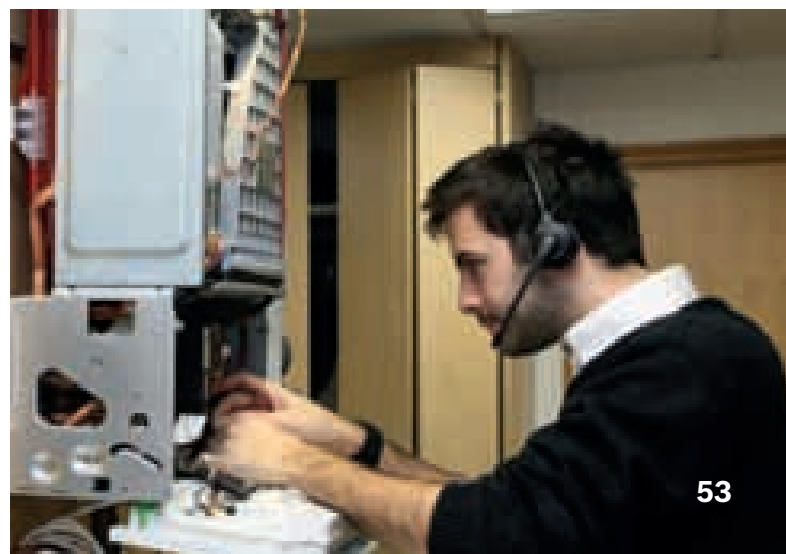
Saturday: 8.30am – 4.00pm

Bank Holidays: 8.00am – 4.30pm

## ErP Technical Helpline

**Tel: 0330 123 3641**

**Email: [ErP-advice@uk.bosch.com](mailto:ErP-advice@uk.bosch.com)**



## Notes





# Useful numbers

## Sales

Tel: 0330 123 9669  
sales.mailbox@uk.bosch.com

## Spare Parts

Tel: 0330 123 9779  
spares.mailbox@uk.bosch.com

## Technical Helpline (Pre & Post Sales)

Tel: 0330 123 3366  
technical-advice@uk.bosch.com

## Renewables Technical Helpline

Email: renewable-advice@uk.bosch.com  
or telephone 0330 123 9229

## ErP Technical Helpline

Tel: 0330 123 3641  
ErP-advice@uk.bosch.com

## Training

Tel: 0330 123 0166  
training@uk.bosch.com

## Literature

Email: brochure-request@uk.bosch.com  
or download instantly from our website  
or telephone 0330 123 9119

# Customer Service

## Engineer Appointments

Email: service-appointment@uk.bosch.com  
or telephone 0330 123 9339

## Service Enquiries

Email: service-enquiries@uk.bosch.com  
or telephone 0330 123 9559

## Guarantee Registration

To register your Worcester guarantee, please visit our website  
[www.worcester-bosch.co.uk/registration](http://www.worcester-bosch.co.uk/registration),  
download our guarantee registration app or  
telephone 0330 123 2552



Guarantee app

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