



Greenstar FS CDi Regular gas-fired condensing regular floor standing boiler series





Worcester and you. Making a difference.

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

As part of Europe's largest supplier of heating products, Worcester, Bosch Group has the UK-based resources and support capability to offer you the value-added solutions 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 energy efficient gas- and oil-fired condensing boilers, as well as an extensive range of renewable technologies. All of our products have been developed and introduced with the aim of helping the UK to achieve the Government's efficiency targets.



BOSCH
Invented for life



The reception and main entrance at our Worcester headquarters

“At Worcester we recognise the vital role you play in the specification and installation of energy efficient appliances in homes across the UK. We will continue to invest in our products, people, facilities and 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.

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The Greenstar FS CDi Regular condensing boiler series



The Greenstar FS CDi Regular series is part of a market leading range of energy-saving condensing floor standing gas-fired boilers.

Higher efficiency therefore highly cost effective

All of the Greenstar FS CDi Regular condensing boilers are SEDBUK A rated. This means they have an average annual efficiency of over 90%, standard efficiently boilers achieve around 78% efficiency. Therefore by upgrading to a Greenstar FS CDi Regular boiler, consumers can reduce their gas bills as well as their carbon footprint.

Greenstar FS CDi Regular condensing boilers deliver this energy-saving performance by recycling exhaust gases to extract the latent heat – a highly efficient use of energy which also significantly reduces carbon dioxide emissions into the atmosphere.

To all these major benefits you can add yet more: renowned Worcester quality and reliability; a range of outputs to satisfy the heating demands of a range of households and truly all-round value for money.

Why choose a regular boiler?

A regular boiler is an ideal replacement for an existing non-condensing regular boiler, delivering over 90% efficiency (SEDBUK 2005 value) with minimal installation requirements.

When combined with Worcester Greenstore unvented hot water cylinders they provide a complete package for properties requiring stored hot water. Using an unvented cylinder, rather than a vented cylinder, results in a fast hot water response time at the taps, more powerful showers and faster-filling baths – all with more economical running costs. They can also be integrated with a Worcester Greenskies solar thermal system to provide a total heating and hot water solution, which will reduce running costs, as well as being more environmentally friendly.



The Greenstar FS CDi Regular series at a glance

| | | FS 30CDi Regular | FS 42CDi Regular |
|-----------------------------------|-----|------------------|------------------|
| Part No. | NG | 7 715 430 442 | 7 715 430 441 |
| | LPG | 7 715 430 450 | 7 715 430 451 |
| Output kW to central heating (CH) | Min | 7.7kW | 9.6kW |
| | Max | 30kW | 40.8kW |
| Primary temperature control | | ✓ | ✓ |
| CH temperature control | | ✓ | ✓ |
| Operational status indicator | | ✓ | ✓ |
| Fault finding diagnostics | | ✓ | ✓ |
| Anti-cycle control | | ✓ | ✓ |
| Built-in frost protection | | ✓ | ✓ |
| Natural gas | | ✓ | ✓ |
| LPG boiler | | ✓ | ✓ |
| Electronic ignition | | ✓ | ✓ |
| 2005 SEDBUK value – natural gas | | 90.5% / A rated | 90.3% / A rated |

Key features of the range

Why choose Worcester Greenstar regular boilers?

Greenstar FS CDi Regular boilers deliver high energy-efficiency and lower running costs for homeowners. They also achieve higher SAP or NHER ratings for new build properties when used in conjunction with a Greenstore unvented cylinder. In well-insulated new homes, where hot water performance is more of a factor than heating, the combination of a Greenstar boiler and Greenstore cylinder may enable a regular boiler with a lower CH output to be used. This lowers energy consumption further, while reducing the need for larger diameter gas pipes for an easier installation.



Applications

- Greenstar FS CDi Regular boilers are suitable for a wide range of heating loads allowing extension to the heating system without upgrading the boiler
- The Greenstar FS CDi Regular is capable of operating on both open vent and sealed primary water systems
- Two or more Greenstar FS CDi Regular boilers can be linked together to cater for small commercial applications
- Using the new flexible flue system the Greenstar FS CDi is an ideal replacement for a floor standing boiler located near a fireplace and using a chimney liner to flue.

Winner of Which? Best Buy awards in 2011, 2012 and 2013

For three consecutive years, in a survey of Which? members, the Worcester Greenstar gas-fired condensing boiler range has been presented with Best Buy awards.* In the latest survey, no other manufacturer scored higher for reliability and customer satisfaction.

Enhanced efficiencies and features

Worcester Greenstar FS CDi Regular boilers feature an advanced heat exchanger design. Primary heat exchangers come with a full 10 year guarantee and all boilers in the range feature anti-cycling and modulation control.

Controls

The Worcester Greenstar FS CDi Regular fascia incorporates a combined temperature control and burner reset button. The fascia panel also displays two operational status neons which indicate mains on/lockout and burner on. The mains on/lockout indicator also operates as fault finding diagnostics, flashing in different sequences in the unlikely event of a boiler fault.



The Building Regulations Section L 2006 require a minimum level of controls to be installed on all heating systems, both on new build and refurbishment.

This requires the fitting of a room thermostat, time and temperature control for the central heating and an automatic by-pass. In addition, TRVs should be fitted to all radiators, or at least those in sleeping areas if not already fitted. TRVs should not be fitted in the room in which the room thermostat is installed.

The complete system solution

Greenstar regular boilers are ideal for use with our comprehensive range of Greenstore single and twin-coil unvented hot water cylinders, providing fast re-heat times with excellent heat retention properties. The combination of a Greenstar regular boiler and a Greenstore cylinder delivers hot water to the taps at mains pressure, filling baths quickly and ensuring that showers are powerful and invigorating. For more information on our Greenstore cylinder range, see pages 10-11.



NEW Worcester Greenstore Single Coil (SC) Cylinder range

*Source: Which? 2013 survey published in Sept 2013.



Solar thermal heating

When used in conjunction with a Greenstore twin-coil cylinder, Greenstar regular boilers can be fully integrated with Greenskies solar water heating systems, which have the potential to provide up to 60%** of annual hot water requirements. So even if solar water heating is not required at the time of installation, installing a twin-coil cylinder will enable the system to be upgraded easily in the future.



Greenskies Solar-Lux, Solar-Lifestyle, Solar-Lito, Solar-Lito Mini and Greenstore TC series

Fluing options

The Greenstar FS CDi Regular series features 2 different sizes of multi-directional RSF flue systems, 100mm or 125mm dia.

The flue can be run horizontally or vertically with additional 90° or 45° in-line bends allowing changes of route or direction, providing an extremely flexible and versatile fluing system enabling the appliance to be sited virtually anywhere.

In addition an 80mm flexible flue system is available which utilises an existing chimney in the building to route the flue terminating on top of the chimney.

More details on our flue and plume management systems are shown on pages 22-32.

Gas and LPG options

Greenstar regular boilers are manufactured in both natural gas and Liquid Petroleum Gas (LPG) variants. This gives a full range of fuel options and eliminates the need for fuel conversion.

Peace of mind



Worchester Greenstar Regular boilers benefit from a 10 year guarantee† on the primary heat exchanger†.

The Greenstar FS CDi Regular range – features and benefits at a glance

Energy-saving & environmental

- SEDBUK A rating of 90.3% and above (2005 value)
- Low electrical consumption in standby mode
- WB5 aluminium-silicon heat exchanger delivers high efficiency and reliability
- Anti-cycle control.

Time- & labour-saving installation

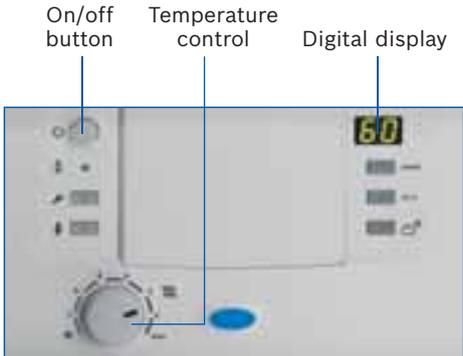
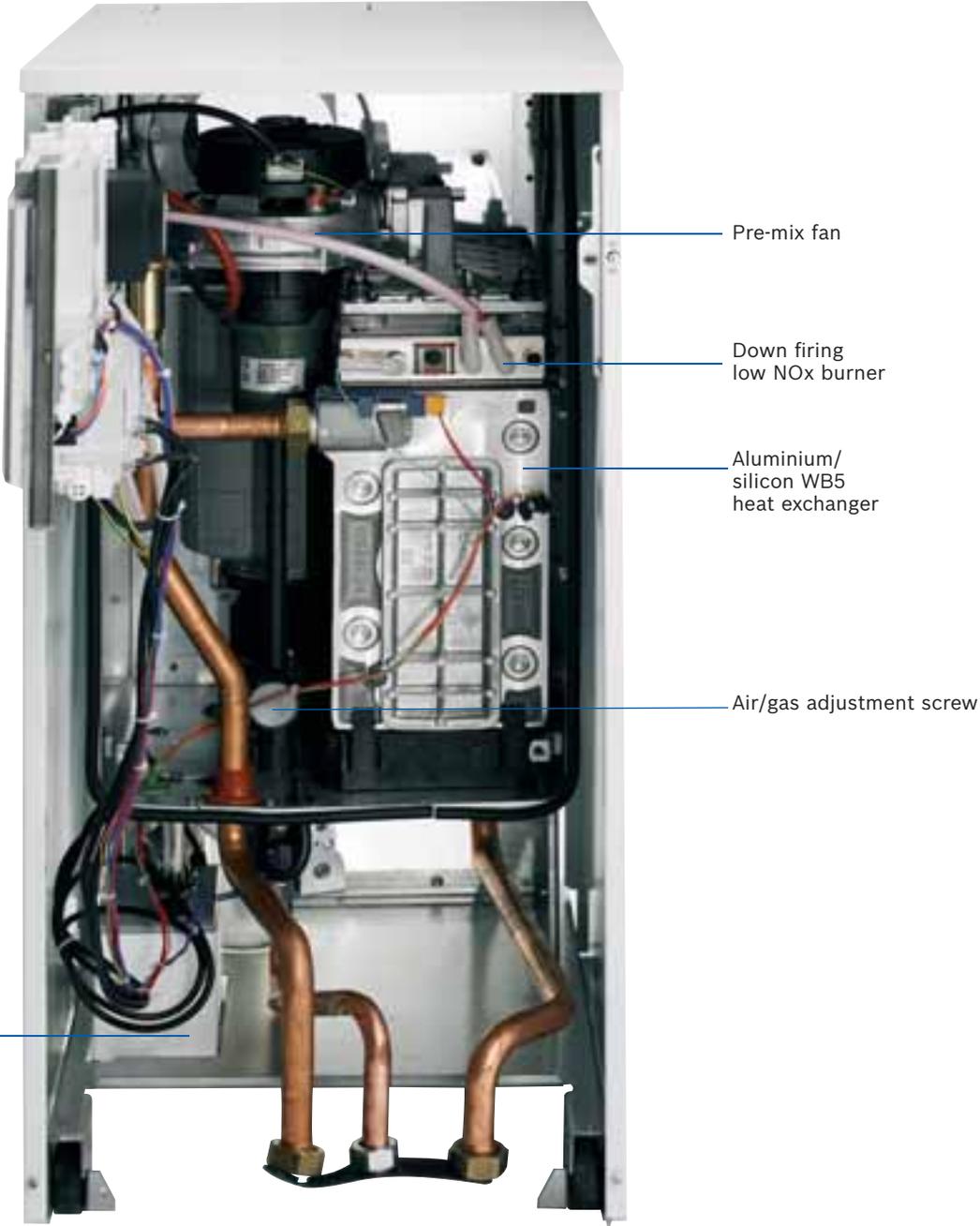
- Pre-fabricated pipe connections supplied
- Roll-in boiler minimises the risk of damaging floors
- Multi-directional Condensit II™ fluing is compatible with plume management
- Fault-finding diagnostics – saves time
- Rigid 22mm gas connection – no pre-forming of gas supply
- Built-in frost protection – money saving, economical protection.

End user comfort and convenience

- 10 year guarantee on Worcester primary heat exchanger†
- Boiler protection plans available for both new and out-of-guarantee Worcester Greenstar boilers
- Bosch renowned quality and reliability
- Built-in boiler frost protection.

*Source: Which? 2013 survey published in Sept 2013. **Source: Energy Saving Trust. †Subject to terms and conditions.

Inside story – the Greenstar FS CDi Regular condensing boiler



Technical data

| Boiler | FS 30CDi Regular | FS 42CDi Regular |
|---|-------------------|-------------------|
| Height | 850mm | 850mm |
| Width | 400mm | 400mm |
| Depth | 600mm | 600mm |
| Weight - dry | 55.1kg | 55.1kg |
| 2005 SEDBUK value - natural gas | 90.5% / A rated | 90.3% / A rated |
| 2005 SEDBUK value - LPG | 91.9% / A rated | 91.1% / A rated |
| 2009 SEDBUK value - natural gas | 88.9% | 88.8% |
| 2009 SEDBUK value - LPG | 89.9% | 89.8% |
| Heating flow / return connections | 28mm compression | 28mm compression |
| Condensate connection | 22mm plastic pipe | 22mm plastic pipe |
| Gas connection | 22mm compression | 22mm compression |
| Maximum flow temperature | 88°C | 88°C |
| Output to central heating (natural gas) | 7.7 - 30kW | 9.6 - 40.8kW |
| Fault diagnostic display | ✓ | ✓ |
| Flow and return pipes supplied to allow pipes behind installation | ✓ | ✓ |
| Maximum vertical flue (100mm dia.) inc. terminal | 6,400mm | 6,400mm |
| Maximum vertical flue (125mm dia.) inc. terminal | 15,000mm | 15,000mm |
| Maximum horizontal flue (100mm dia.) | 4,000mm | 4,000mm |
| Maximum horizontal flue (125mm dia.) | 13,000mm | 13,000mm |
| NOx classification - natural gas | 33.3mg/kWh | 32.2mg/kWh |
| NOx class | 5 | 5 |
| Noise output level | 37dB(A) | 37dB(A) |
| Ingress protection (IP) | X4D | X4D |

The Greenstore cylinder series

Efficient hot water storage solutions

Worcester offers a range of Greenstore high-efficiency cylinders which provide excellent hot water comfort for properties with a stored DHW supply. They are available in both a Single Coil (SC) and Twin Coil (TC) option. The Greenstore SC is available in seven different models ranging from the Greenstore SC-90 to the SC-300. The Greenstore TC solar-compatible cylinders are available in five options ranging from the TC-150 to the TC-300.

The Worcester Greenstore cylinder series is fully compatible with a wide range of non-Worcester boilers and solar panels, although to achieve the optimum system solution, it is recommended that a Greenstore cylinder is coupled with either a Greenstar high-efficiency boiler or Greenskies solar panel installation.

The Greenstore SC single coil series

The Greenstore single coil cylinder benefits consumers who do not require solar compatibility, but are looking for a cylinder which offers high levels of insulation, excellent flow rate and outstanding re-heat performance. The Greenstore SC range is also ideal for consumers who require a smaller capacity of hot water storage, with the SC series being available in SC-90 and SC-120 variants.

The Greenstore TC twin coil series

All of the models in the TC cylinder series feature high levels of insulation and dedicated solar volumes in compliance with current Building Regulations, SAP 2012 and the Microgeneration Certification Scheme (MCS). Worcester's Greenstore TC stainless steel hot water storage cylinders have been specifically designed for use with solar heating installations, combined with boiler back-up. As such, they offer outstanding efficiency, ease of installation and full compliance with current legislation.



Features and benefits of the Greenstar cylinder series

High levels of heat retention

The Greenstore SC and TC cylinders feature extremely high heat retention, which is made possible by the factory-fitted 65mm of EPS (Expanded Polystyrene) insulation between the inner shell and outer casing.

The high energy efficiency of the Greenstore cylinder directly increases the overall energy rating of the hot water system, something that is particularly important when assessing a new build system's compliance in SAP.

Outstanding re-heat performance

A cylinder re-heat time will directly affect the levels of continuous hot water supply, the levels of comfort and the length of time the boiler is firing. The superb re-heat times for the Greenstore range are achieved due to the high-efficiency heat exchange coil(s) which maximise heat transfer to the water within the cylinder.

There are two different coil output sizes within the Greenstore SC and TC cylinders. Within the 90-180 models, a 32kW rated coil is utilised, whilst the 210-300 models have a class-leading 39kW rated output coil.

Cost-effective hot water solution

Everything you need as a part of a single package, ordered via a single part number.

With the Greenstore SC and TC models, you will receive a full G3 accessory kit, including:

- Tundish (15/22mm)
- Inlet control group
- 2-port motorised valve
- Expansion vessel
- Dual thermostat
- Connection set
- Solar high limit thermostat (TC series only).

Greenstore cylinder series at a glance

| Single coil | Greenstore SC-90 Cylinder | Greenstore SC-120 Cylinder | Greenstore SC-150 Cylinder | Greenstore SC-180 Cylinder | Greenstore SC-210 Cylinder | Greenstore SC-250 Cylinder | Greenstore SC-300 Cylinder |
|---------------------------|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Part no. | 7 716 842 027 | 7 716 842 028 | 7 716 842 029 | 7 716 842 030 | 7 716 842 031 | 7 716 842 032 | 7 716 842 033 |
| Height | 835mm | 1,035mm | 1,285mm | 1,490mm | 1,665mm | 1,860mm | 2,155mm |
| Diameter | 570mm | 570mm | 570mm | 570mm | 570mm | 570mm | 570mm |
| Weight – dry | 26kg | 31kg | 36kg | 40kg | 44kg | 48kg | 54kg |
| Volume domestic hot water | 93 litres | 123 litres | 161 litres | 191 litres | 216 litres | 246 litres | 292 litres |
| Standing heat loss – 24hr | 0.72kWh/24hrs | 1.06kWh/24hrs | 1.35kWh/24hrs | 1.54kWh/24hrs | 1.67kWh/24hrs | 1.93kWh/24hrs | 2.17kWh/24hrs |

| Twin coil | Greenstore TC-150 Cylinder | Greenstore TC-180 Cylinder | Greenstore TC-210 Cylinder | Greenstore TC-250 Cylinder | Greenstore TC-300 Cylinder |
|---------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|
| Part no. | 7 716 800 542 | 7 716 800 543 | 7 716 800 544 | 7 716 842 043 | 7 716 842 044 |
| Height | 1,285mm | 1,490mm | 1,665mm | 1,860mm | 2,155mm |
| Diameter | 570mm | 570mm | 570mm | 570mm | 570mm |
| Weight – dry | 35.6kg | 38.1kg | 44.6kg | 48.9kg | 53.0kg |
| Volume domestic hot water | 158 litres | 187 litres | 211 litres | 241 litres | 287 litres |
| Standing heat loss – 24hr | 1.27kWh/24hrs | 1.31kWh/24hrs | 1.42kWh/24hrs | 1.52kWh/24hrs | 1.93kWh/24hrs |
| Dedicated solar volume | 65 litres | 65 litres | 105 litres | 115 litres | 115 litres |

Site preparations and guidance

Greenstar FS CDi Regular boilers are designed for connection to a traditional heating and hot water system. The major benefits of the Greenstar FS CDi Regular boiler are:

- The boiler is compatible with S and Y plan systems
- The boiler comes with a roll-in boiler tray and pre-plumbing jig.

Greenstar FS CDi Regular boilers are exceptional for their number of additional time-saving installation features:

- Built-in frost sensor for boiler protection
- Built-in fault finding diagnostics
- Automatic gas pressure adjustment
- Highly versatile multi-directional fluing system
- Combined ignition and control board means fewer connections
- A rigid 22mm compression gas connection eliminating the need for pre-fabricating the gas pipe onto the isolating valve
- The large output range capability of the appliances.

Siting of appliance

General

The appliance is not suitable for external installation.

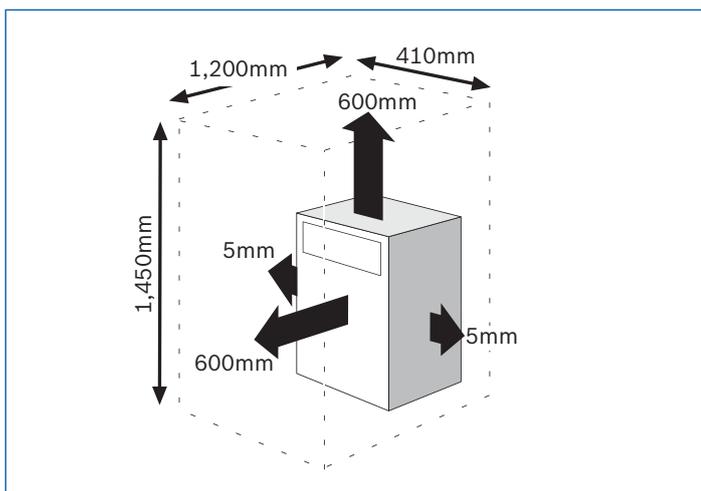
The appliance may be installed in an airing cupboard if required. See section “Compartment Installation” on page 13.

Clearances

The following clearances should be allowed for installation and servicing.

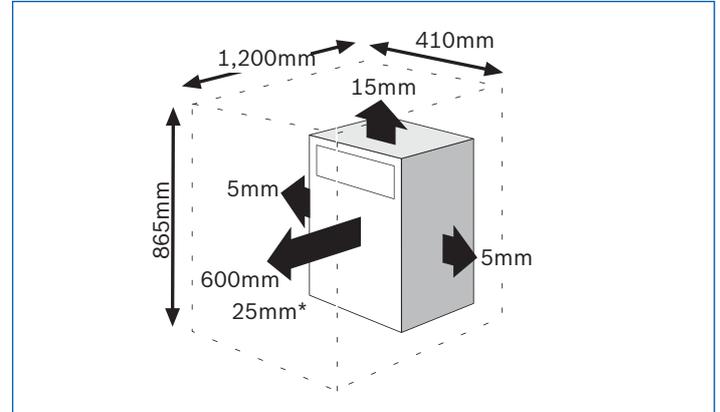
Installation clearances

The minimum space required to install the boiler only.



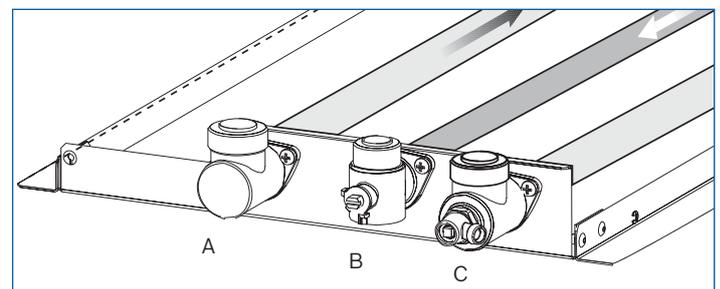
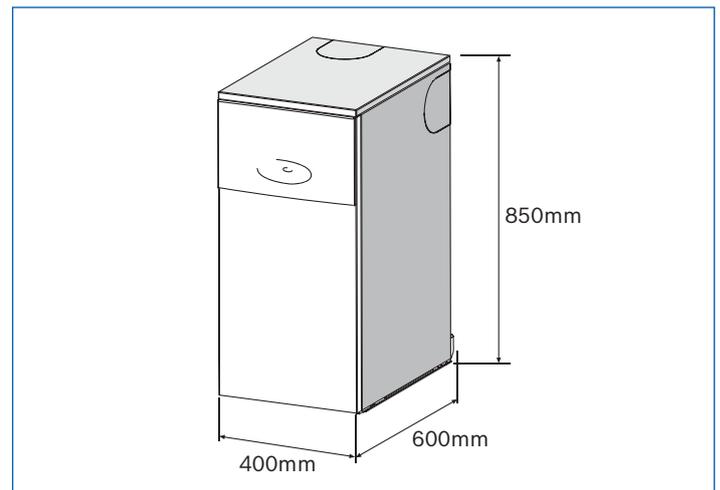
Service clearances

The minimum space required to service the boiler only.



*25mm to a removable door

Pipework connections and casing dimensions



| Pipework connections | | |
|----------------------|------------------------|------|
| A | Central heating flow | 22mm |
| B | Gas inlet | 22mm |
| C | Central heating return | 22mm |

Compartment installation

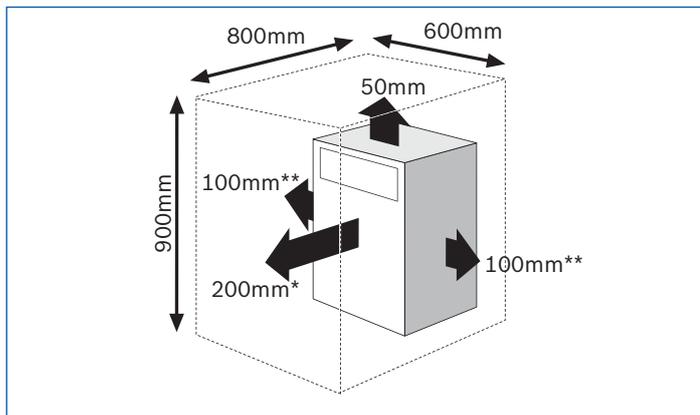
The appliance may be installed in any room, although particular attention is drawn to the requirements of the IEE regulations applicable and in Scotland the electrical provisions with respect to installation in a room containing a bath or shower.

Air supply

1. The room in which the appliance is installed does not require a dedicated air vent.
2. If the appliance is installed in a cupboard or compartment with dimensions that allow the following minimum clearances, then no ventilation is required:

| Compartment installation | |
|--------------------------|---|
| Position of appliance | Min. unventilated clearance (to removable door) |
| In front | 200mm |
| Right side | 100mm* |
| Left side | 100mm* |
| Above | 50mm |

*This space can be reduced to 50mm for one side only as long as both the side clearances add up to the total of both of the side measurements shown or more.



*Space required for unvented areas with a removable door or panel.

**This space can be reduced to 50mm for one side only as long as both the side clearances add up to the total of both the side measurements shown or more.

Boiler location & clearances

Bathrooms

IMPORTANT:

Any switch or appliance control using mains electricity must not be within reach of a person using the bath or shower.

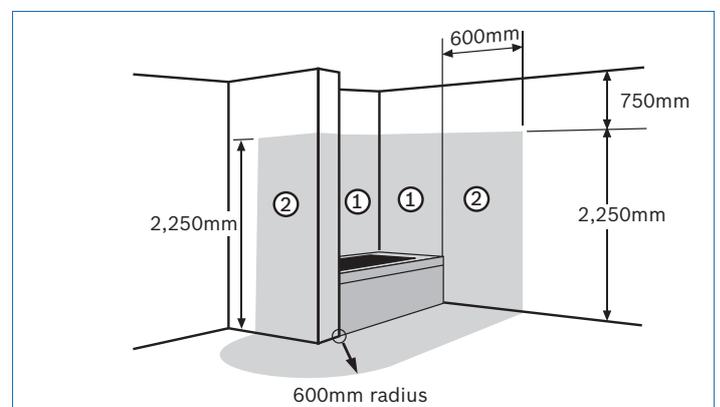
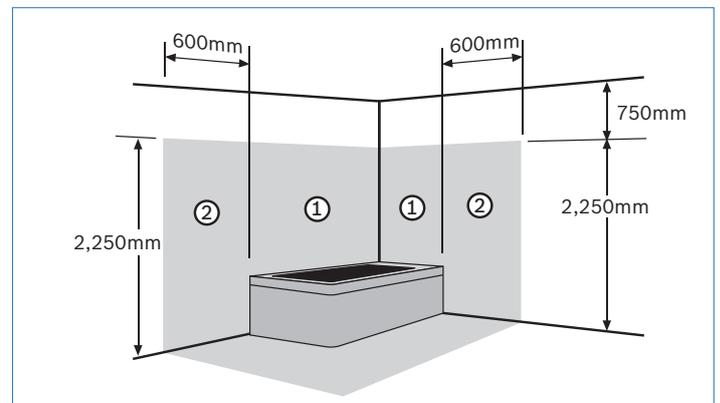
Electrical switches, fused spurs and socket outlets must not be situated in the bathroom.

A boiler fitted with a non-mechanical timer or with no timer can be installed in zone 2 or outside the shaded area.

A boiler with a mechanical timer or RF mechanical timer with a room thermostat must only be installed outside the shaded area.

Additional Residual Current Device (RCD) protection may be required.

Refer to the latest IEE wiring regulations.



Installation requirements

Installation of the Greenstar FS CDi Regular Series must be in accordance with the relevant requirements of the Gas Safety (Installation Use) Regulations at the time of installation, current IEE Wiring Regulations, local Building Regulations, Building Standards (Scotland) regulations and bylaws of the local Water company and Health and Safety Document No. 635 (Electricity at Work Regulations 1989). It should be in accordance with the relevant recommendations of the following British Standards:

BS 6798; BS 5449; BS 5546:1; BS 5440:1; BS 5440:2; BS 6891.

Gas Safety (Installation and Use) Regulations. All gas appliances must be installed by a Gas Safe registered person in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution.

The manufacturer's notes must not be taken in any way as overriding statutory regulations.

Sealed primary systems

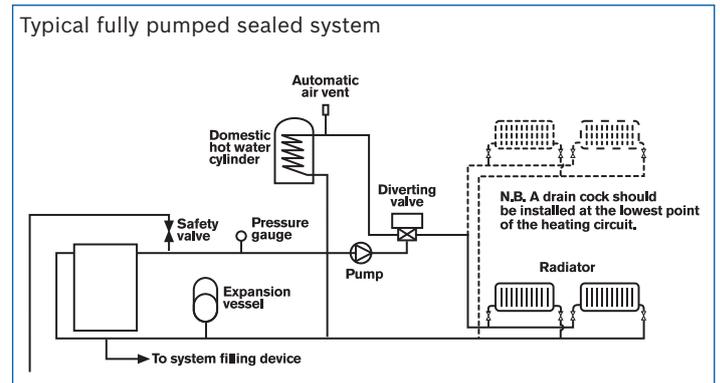
The appliance is fitted with a manual reset high limit thermostat and is suitable for use with a sealed primary system.

The system should be installed in compliance with the requirements of BS 5449: Part 1. The boiler must be fitted with a spring loaded safety valve set to operate at 3bar (45 psi) and the pipe connections made through the system must be capable of sustaining a pressure of up to 3bar.

Manual air vents should be fitted at any high points in the system.

The following is a list of major items which must be fitted to the system:

1. Safety valve – 3bar
2. Pressure gauge – 0 - 4bar
3. Expansion vessel
4. Automatic air vent



The use of plastic pipework is acceptable. However, some plastics are permeable to oxygen and must be avoided. Only pipework with a polymeric barrier should be used. Please note that the first 600mm of pipework connected to the boiler must be of copper.

Open vented primary systems

Greenstar FS CDi Regular boilers are designed for connection to an open vented fully pumped heating and hot water system.

The following points are for guidance only. The system installation should be carried out in accordance with BS 5449:Part 1.

The feed and expansion pipes must rise continuously from the appliance and must be of the minimum diameter shown below.

The cistern must be arranged to provide a minimum static head of 0.25 metres above the top of the highest point in the heating circuit.

Air in the appliance is expelled through the vent pipe or dissipated into the system. Manual air vents should be fitted at any high points in the system.

Air supply

The Worcester Greenstar FS CDi Regular is a room sealed appliance; the room in which it is installed does not therefore require a purpose provided combustion air vent.

Natural gas supply

The appliances when on full output demand will require up to 3.27m³/h (FS 30CDi) or 4.4m³/h (FS 42CDi) of gas. The gas meter and supply pipes must be capable of supplying this quantity of gas in addition to the demand from any other appliance being served. Under no circumstances should the size of the gas supply pipe be less than that of the appliance inlet connection (22mm diameter). The meter outlet governor should be capable of ensuring a dynamic nominal pressure of 20mbar (8in wg) at the appliance. Particular consideration should be given to the resistance to gas flow created by elbows, bends etc. Pipework should be sized to overcome this resistance, and details of this are given in the following table.

| | Total length of gas supply pipe (m) | | | Pipe diameter (mm) |
|---|-------------------------------------|------|-----|--------------------|
| | 3 | 6 | 9 | – |
| Gas discharge rate m³/h | 2.9 | – | – | 15 |
| | 8.7 | 5.8 | 4.6 | 22 |
| | 18.0 | 12.0 | 9.4 | 28 |

Approximate additional length to be allowed (natural gas)

| Elbows or tees | | 90° bends | |
|----------------|------|-----------|------|
| Metres | Feet | Metres | Feet |
| 0.5 | 2 | 0.3 | 1 |

Liquid Petroleum Gas (LPG) supply

The Greenstar FS CDi Regular appliance is available in an LPG version. The appliance, when on demand at full output will require 2.3kg/h for the FS 30CDi Regular and 3.3kg/h for the FS 42CDi Regular.

The gas tank or bottles must be capable of supplying this quantity of gas at a nominal pressure of 37mbar (14.8in wg) at the appliance. The table below shows the LPG discharge through varying lengths of pipe and the resistance to flow created by elbows, bends etc. Pipework should be sized to overcome this resistance.

| | Total length of gas supply pipe (m) | | | Pipe diameter (mm) |
|---|-------------------------------------|------|-----|--------------------|
| | 3 | 6 | 9 | – |
| Gas discharge rate m³/h | 1.5 | 1.01 | – | 15 |
| | 8.0 | 5.2 | 4.2 | 22 |
| | 15.9 | 8.9 | 8.3 | 28 |

Approximate additional length to be allowed (LPG)

| Elbows or tees | | 90° bends | |
|----------------|------|-----------|------|
| Metres | Feet | Metres | Feet |
| 0.6 | 2 | 0.3 | 1 |

Electricity supply

A 3 amp fused three pin plug and unswitched shuttered socket outlet (both complying with BS 1363) or preferably a double pole isolator with a contact separation of 3mm in all poles supplying the appliance should be used.

The appliance electrical circuits are also protected by an internal 2.5 amp fuse. The appliance must be earthed.

Guarantee

Worcester Greenstar FS CDi Regular appliances are offered with a full 2 year guarantee* on parts and labour, a 10 year guarantee* on the primary heat exchanger and a 5 year guarantee* on the plate heat exchanger. Ongoing service and maintenance contracts can be arranged through the Worcester Customer Service Department.

Please contact our guarantee registration advisors on 0330 123 2552 or visit www.worcester-bosch.co.uk/guarantee

*Subject to conditions.

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 and shortening the life of the overall system.

Damaged boiler and system components

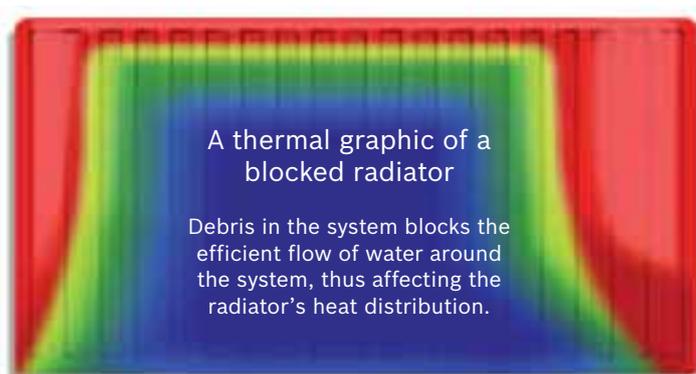
- Blockages in primary heat exchanger
- Increased wear on pumps
- Blocked valves.



Heat exchanger 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.



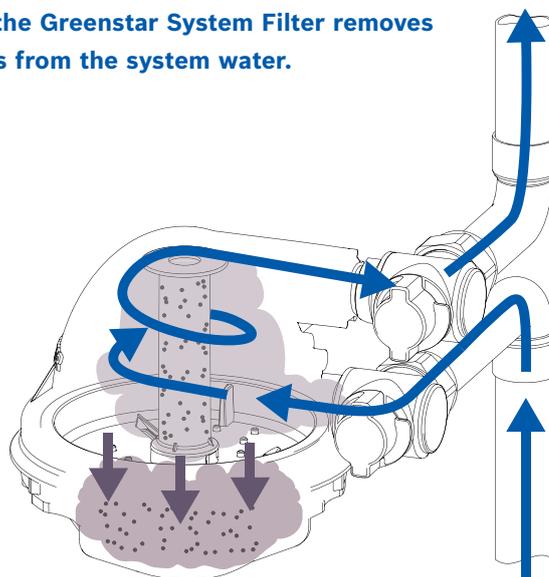
A highly effective solution from the brand you can trust

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 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. Any non-magnetic debris is caught by the twin-action cyclonic trap, a proven technology that offers a capacity to collect up to 200g of magnetite a year.

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 on the return pipework.



| 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 |

Condensate pipework

All condensing boilers generate condensate discharge which needs to be piped away from the appliance using a plastic pipe.

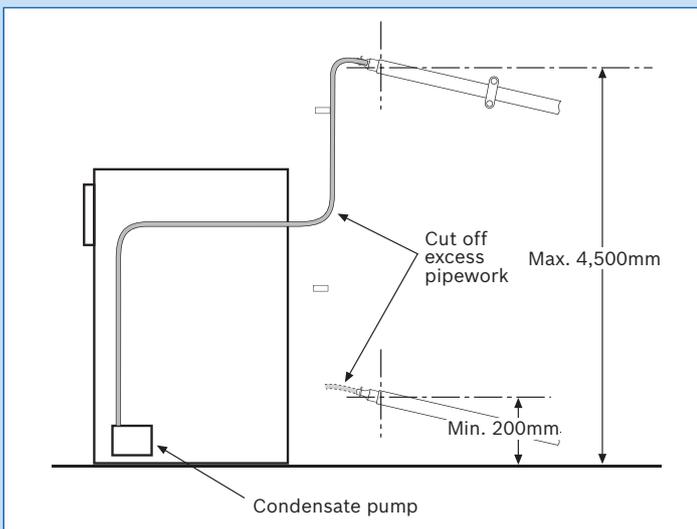
The amount of condensate generated depends on the efficiency and operating status of the appliance. Depending on operating temperatures, the appliance will condense in both heating and hot water modes and may generate up to 2.7 litres of condensate per hour for the FS 30CDi Regular and 3.7 litres per hour for the FS 42CDi Regular.

Condensate termination and route

Greenstar FS CDi Regular boilers incorporate a condensate pump which allows condensate to be plumbed above the boiler, allowing more flexible siting possibilities.

Condensate connection

The condensate pump fills up and periodically discharges through the flexible condensate pipe between 200mm and 4,500mm from floor level. After this point the condensate continues down the 22mm rigid pipework to the outlet using gravity.



- The flexible plastic pipe can be reduced in length to suit the installation circumstances. The pipework must follow one of the options shown opposite.

Never terminate or discharge into any open source, including: sink, bath, shower, bidet, toilet etc.

Note: any external condensate pipework should be protected with weather resistant insulation to help prevent freezing.

The condensate connection on Worcester appliances is in 22mm polypropylene. The pipe should be extended and run away from the appliance with a constant fall of 3° or at least 50mm in every metre away from the boiler.

The condensate pipe can terminate into any one of four areas.

Whilst all of the methods are acceptable it is best practise to terminate the condensate pipe via an internal waste system. This will eliminate the need for any external condensate pipe runs which can be susceptible to freezing in extreme weather. Best practise is not to run external condensate pipe any further than 3m. If it is necessary to run more than 3m externally increase pipe size to 32mm.

Condensate termination and route

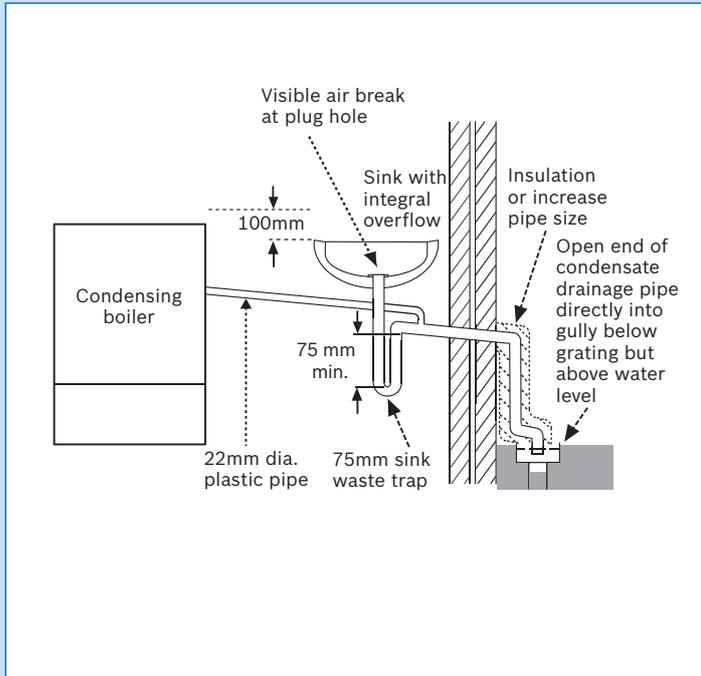
External condensate pipework

The Worcester Greenstar FS CDi Regular appliances have a condensate pump rather than a siphonic condensate trap. Rather than the condensate constantly dripping into the discharge pipe, the condensate is collected in the pump which releases it in 100ml quantities. This will help prevent freezing occurring.

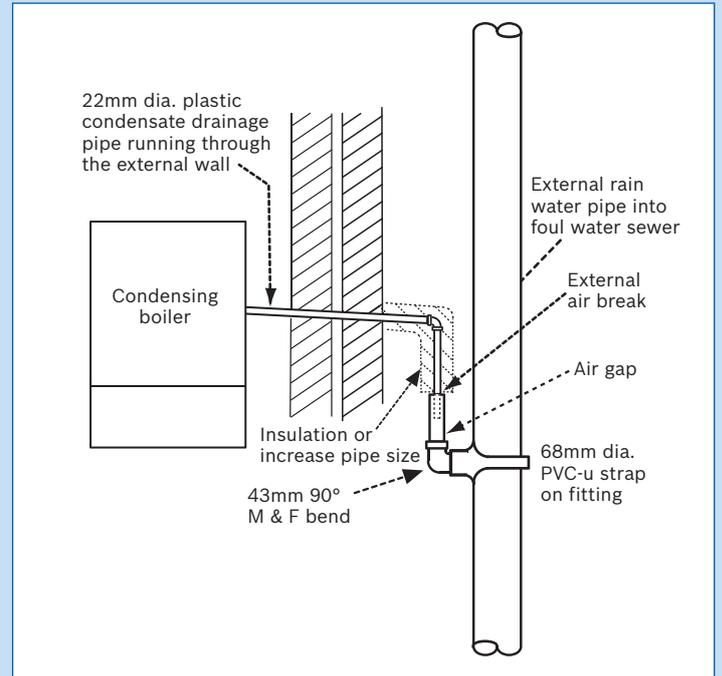
Wherever possible the condensate discharge pipework should be routed and terminated internally. Should this not be possible, and the only available route is external, the following conditions should be observed:

- The pipework length should be kept to a minimum and the route as vertical as possible
- Where pipework could be subjected to extreme cold or wind chill, a weather proof insulation should be used. **Alternatively, the condensate pipework could be increased to a minimum 32mm.**

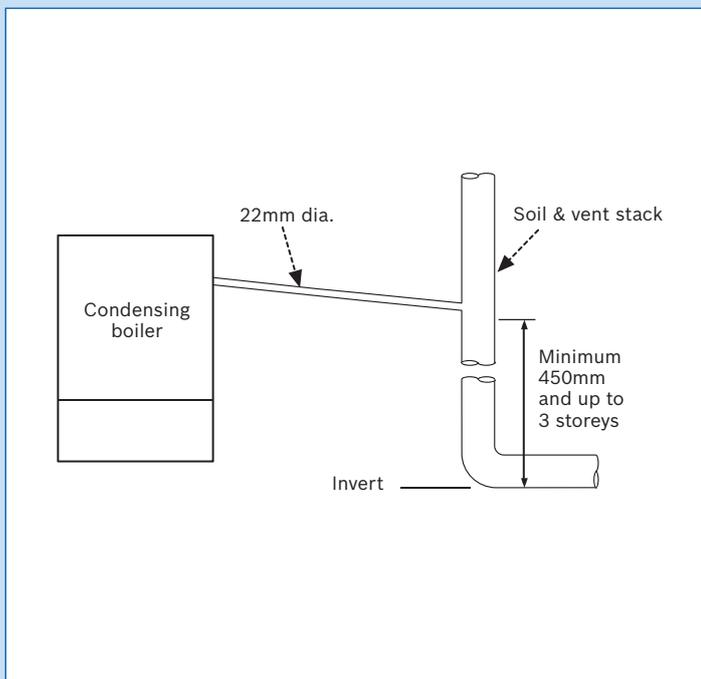
For full technical information on pipe size, insulation and different condensate pipework methods, please see Installation, Commissioning and Servicing Instruction Manual.



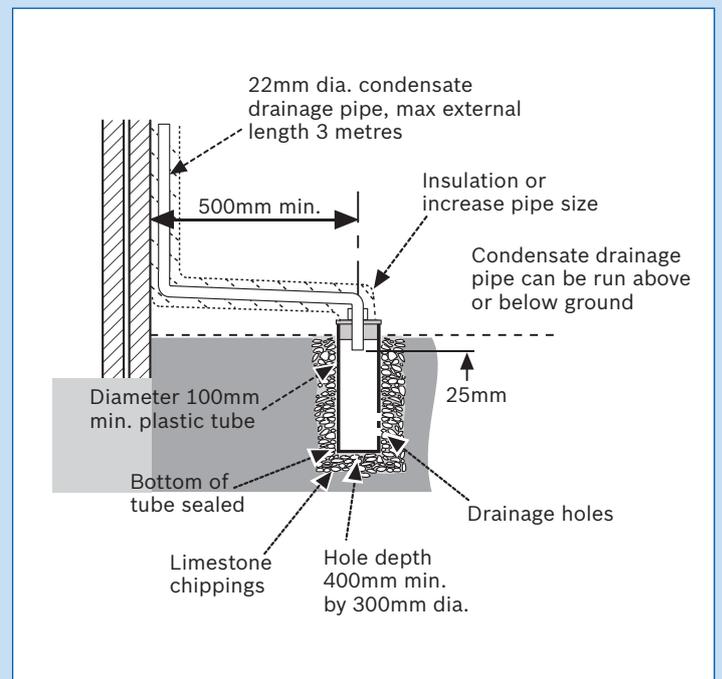
Internal sink/washing machine drain



External air break when using a foul water down pipe



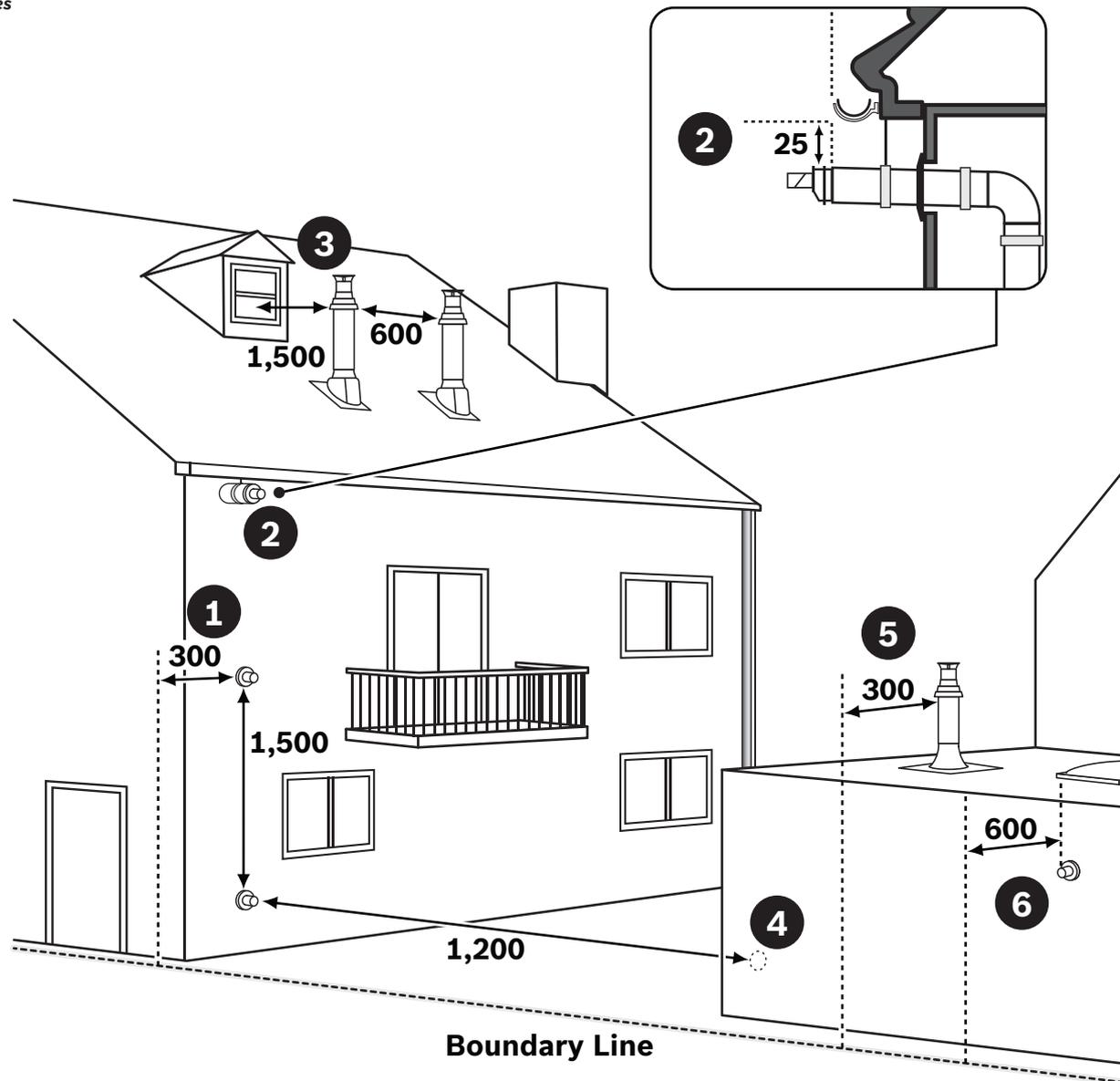
Soil and vent stack



External condensate absorption point (unsuitable for clay soil types)

Horizontal and vertical flue terminal positioning

All measurements in millimetres



Note

- All measurements are the minimum clearances required
- Terminals must be positioned so 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.

Flue bracket part numbers:

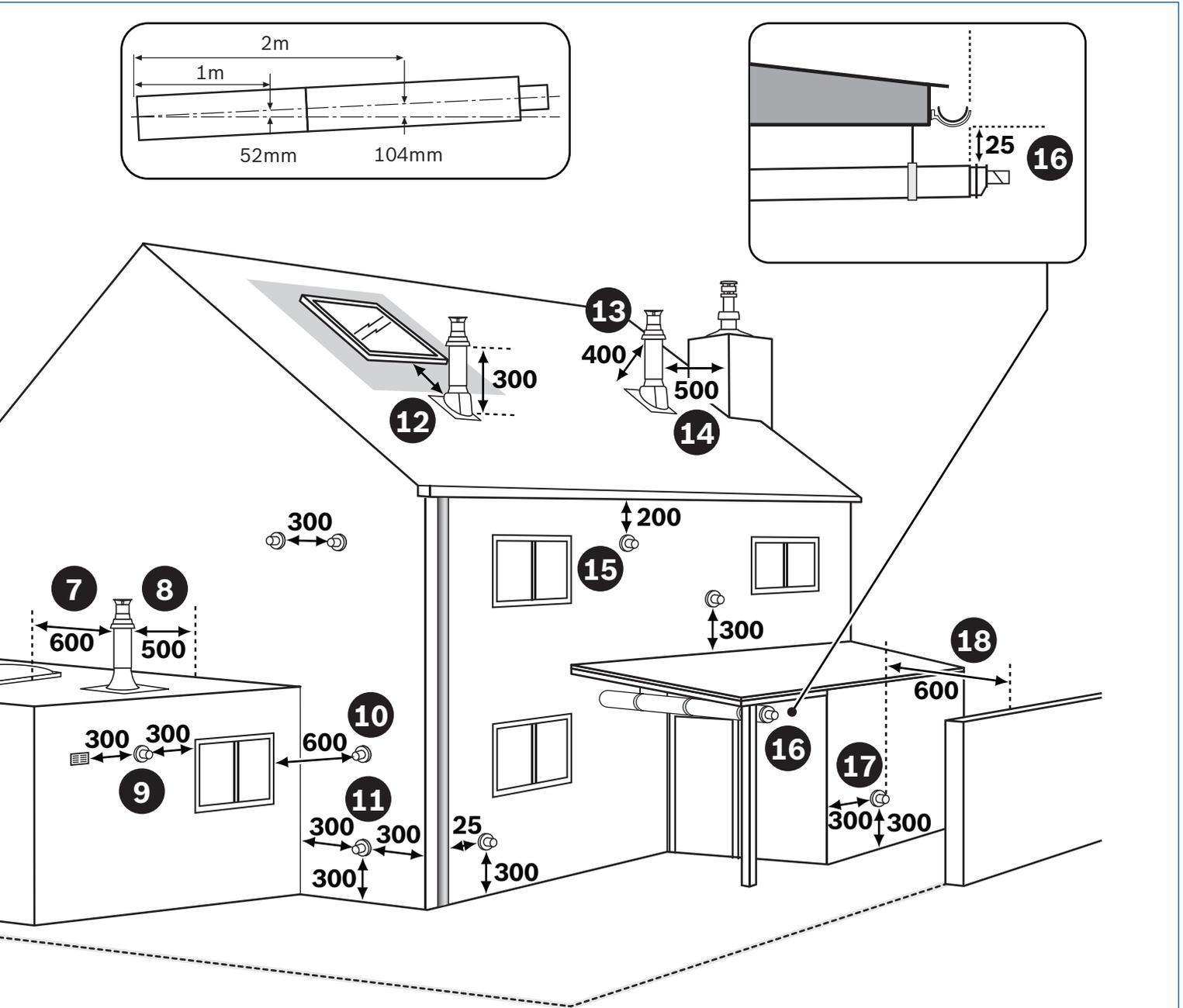
7 716 191 092 (100mm dia.)

7 716 191 173 (100mm dia. x 6)

7 716 191 174 (125mm dia.)

Key to illustration

1. 300mm adjacent to a boundary line.
2. The dimension below eaves, balconies and car ports can be reduced to 25mm, as long as the flue terminal is extended to clear any overhang. External flue joints must be sealed with suitable silicon sealant.
3. 1,500mm between a vertical flue terminal and a window or dormer window.
4. 1,200mm between terminals facing each other.
5. Vertical flue clearance, 300mm adjacent to a boundary line.
6. 600mm distance to a boundary line, unless it will cause a nuisance. BS 5440:Part 1 recommends that care is taken when siting terminal in relation to boundary lines.
7. 600mm minimum clearance from a skylight to a vertical flue.
8. Vertical flue clearance, 500mm to non-combustible building material, and 1,500mm clearance to combustible building material.



9. 300mm above, below and either side of an opening door, air vent or opening window.
 10. 600mm diagonally to an opening door, air vent or opening window.
 11. 300mm to an internal or external corner.
 12. 2,000mm below a Velux window, 600mm above or to either side of the Velux window.
 13. 400mm from a pitched roof or 500mm in regions with heavy snowfall.
 14. 500mm clearance to any vertical structure on a roof, 600mm to room sealed flue or 1,500 to an open flue.
 15. 200mm below eaves and 75mm below gutters, pipe and drains.
 16. The dimension below eaves, balconies and car ports can be reduced to 25mm, as long as the flue terminal is extended to clear any overhang. External flue joints must be sealed with suitable silicon sealant.
 17. Flue clearance must be at least 300mm from the ground. 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.
 18. 600mm distance to a surface facing a terminal, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminals in relation to surfaces facing a terminal.
- **Installations in car ports are not recommended**
 - **The flue cannot be lower than 1,000mm from the top of a light well due to the build up of combustion products**
 - **Dimensions from a flue terminal to a fanned air inlet to be determined by the ventilation equipment manufacturer.**

Greenstar FS CDi Regular boiler horizontal fluing options

Greenstar FS CDi Regular boilers offer a choice of 2 different sized horizontal RSF flue systems, 100mm diameter and 125mm diameter. The systems have different maximum lengths. Options 1 to 8 detail the permissible lengths.

Horizontal RSF flue



| Flue diameter | 100mm | 125mm |
|---------------------------------|---------|----------|
| Greenstar FS CDi Regular series | | |
| Minimum flue length | 130mm | 350mm |
| Maximum flue length | 4,000mm | 13,000mm |

100mm dia. telescopic flue kit

- 1 x internal flue connector bend
- 1 x flue adaptor
- 1 x flue connector
- 2 x wall cover plates
- 530mm (100mm dia.) of flue duct including terminal

Part No. 7 716 191 155

125mm dia. standard flue kit

- 1 x internal flue connector bend
- 1 x flue adaptor
- 1 x flue connector
- 2 x wall cover plates
- 965mm (125mm dia.) of flue duct including terminal

Part No. 7 716 191 157

Accessories



| Components | Part No. | Description |
|----------------|---------------|--|
| 100mm diameter | | |
| | 7 716 191 155 | Standard telescopic flue kit (310 - 530mm) |
| | 7 716 191 083 | Extension flue kit (960mm*) |
| | 7 716 191 172 | 2m flue extension |
| | 7 716 191 133 | Short flue extension (220mm*) |
| | 7 716 191 084 | 90° bend |
| | 7 716 191 085 | 45° bend |
| | 7 716 191 164 | Vertical flue adaptor |
| | 7 716 191 092 | Support bracket kit |
| | 7 716 191 173 | Support bracket kit (6 pack) |

| 125mm diameter | | |
|----------------|---------------|-----------------------------|
| | 7 716 191 157 | Horizontal flue kit (965mm) |
| | 7 719 003 666 | Extension flue kit (960mm*) |
| | 7 719 003 664 | 90° bend |
| | 7 719 003 665 | 45° bend |
| | 7 716 191 165 | Vertical flue adaptor |
| | 7 716 191 174 | Support bracket kit |

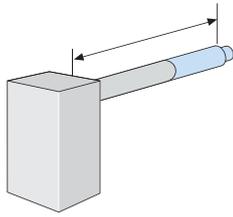
*Dimensions when fitted

**The 100mm flue system inclines 2° within the 100mm terminal.

The following criteria should be noted when planning the installation:

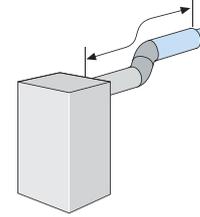
- The concentric flue system must be inclined at 3° (52mm per metre) from the appliance, to allow condensate to drain back into the boiler
- A white plume of condensation will be emitted from the terminal because the appliance operates at high efficiency. Care must be taken when selecting the flue terminal 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
- Horizontal flue options 1-8 illustrate common flue installations. Other configurations of the flue system are possible up to, and not exceeding, the stated maximum flue lengths.

Option 1: Extension rear flue horizontal flue assembly



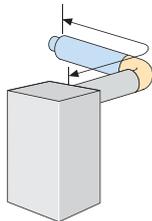
| Components | |  |  |
|---|--------|---|---|
| Part No. 100mm | | 7 716 191 155 | 7 716 191 083 |
| Part No. 125mm | | 7 716 191 157 | 7 719 003 666 |
| Maximum lengths (mm) & no. of components required | | | |
| Greenstar FS CDi Regular series | | | |
| 100mm | 4,000 | 1 | up to 4 |
| 125mm | 13,000 | 1 | up to 12 |

Option 3: Extension rear flue horizontal using 45° bends



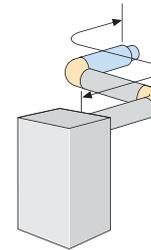
| Components | |  |  |  |
|---|--------|---|---|---|
| Part No. 100mm | | 7 716 191 155 | 7 716 191 083 | 7 716 191 085 |
| Part No. 125mm | | 7 716 191 157 | 7 719 003 666 | 7 719 003 665 |
| Maximum lengths (mm) & no. of components required | | | | |
| Greenstar FS CDi Regular series | | | | |
| 100mm | 2,500 | 1 | up to 2 | 2 |
| 125mm | 11,000 | 1 | up to 10 | 2 |

Option 2: Extension rear flue horizontal using a 90° bend



| Components | |  |  |  |
|---|--------|---|---|---|
| Part No. 100mm | | 7 716 191 155 | 7 716 191 083 | 7 716 191 084 |
| Part No. 125mm | | 7 716 191 157 | 7 719 003 666 | 7 719 003 664 |
| Maximum lengths (mm) & no. of components required | | | | |
| Greenstar FS CDi Regular series | | | | |
| 100mm | 2,500 | 1 | up to 2 | 1 |
| 125mm | 11,000 | 1 | up to 10 | 1 |

Option 4: Extension rear flue horizontal using a second 90° bend



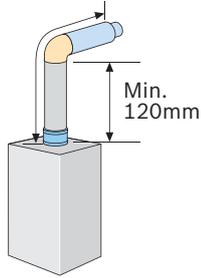
| Components | |  |  |  |
|---|-------|---|---|---|
| Part No. 100mm | | 7 716 191 155 | 7 716 191 083 | 7 716 191 084 |
| Part No. 125mm | | 7 716 191 157 | 7 719 003 666 | 7 719 003 664 |
| Maximum lengths (mm) & no. of components required | | | | |
| Greenstar FS CDi Regular series | | | | |
| 100mm | 1,000 | 1 | up to 2 | 2 |
| 125mm | 9,000 | 1 | up to 8 | 2 |

Note: The short flue extension (100mm dia.) may be used as an alternative to the standard extension as required up to the maximum flue lengths stated (Part No. 7 716 191 133).

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

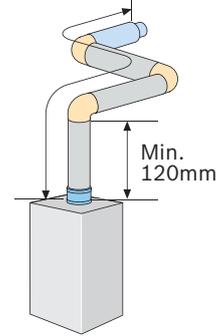
| | 45° bend | 90° bend |
|---|----------|----------|
| Greenstar FS CDi Regular 60/100mm flues | 750mm | 1,500mm |
| Greenstar FS CDi Regular 80/125mm flues | 750mm | 1,500mm |

Option 5: Extension flue upwards and horizontal



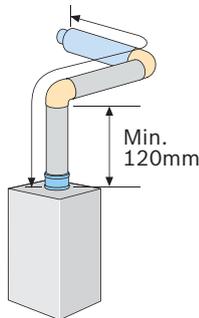
| Components | | | | | |
|---|---------------|---------------|---------------|---------------|---|
| | | | | | |
| Part No. 100mm | 7 716 191 155 | 7 716 191 083 | 7 716 191 084 | 7 716 191 164 | |
| Part No. 125mm | 7 716 191 157 | 7 719 003 666 | 7 719 003 664 | 7 716 191 165 | |
| Maximum lengths (mm) & no. of components required | | | | | |
| Greenstar FS CDi Regular series | | | | | |
| 100mm | 2,500 | 1 | up to 2 | 1 | 1 |
| 125mm | 11,000 | 1 | up to 10 | 1 | 1 |

Option 7: Extension flue upwards and horizontal using a third 90° bend



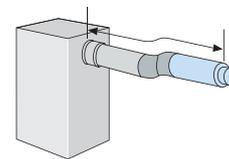
| Components | | | | | |
|---|---------------|---------------|---------------|---------------|-----|
| | | | | | |
| Part No. 100mm | 7 716 191 155 | 7 716 191 083 | 7 716 191 084 | 7 716 191 164 | |
| Part No. 125mm | 7 716 191 157 | 7 719 003 666 | 7 719 003 664 | 7 716 191 165 | |
| Maximum lengths (mm) & no. of components required | | | | | |
| Greenstar FS CDi Regular series | | | | | |
| 100mm | N/A | N/A | N/A | N/A | N/A |
| 125mm | 7,000 | 1 | up to 6 | 3 | 1 |

Option 6: Extension flue upwards and horizontal using a second 90° bend



| Components | | | | | |
|---|---------------|---------------|---------------|---------------|---|
| | | | | | |
| Part No. 100mm | 7 716 191 155 | 7 716 191 083 | 7 716 191 084 | 7 716 191 164 | |
| Part No. 125mm | 7 716 191 157 | 7 719 003 666 | 7 719 003 664 | 7 716 191 165 | |
| Maximum lengths (mm) & no. of components required | | | | | |
| Greenstar FS CDi Regular series | | | | | |
| 100mm | 1,000 | 1 | up to 2 | 2 | 1 |
| 125mm | 9,000 | 1 | up to 8 | 2 | 1 |

Option 8: Side flue extension using two 45° bends



| Components | | | | |
|---|---------------|---------------|---------------|---------------|
| | | | | |
| Part No. 100mm | 7 716 191 155 | 7 716 191 083 | 7 716 191 085 | 7 716 191 164 |
| Part No. 125mm | 7 716 191 157 | 7 719 003 666 | 7 719 003 665 | 7 716 191 165 |
| Maximum lengths (mm) & no. of components required | | | | |
| Greenstar FS CDi Regular series | | | | |
| 100mm | 2,500 | 1 | up to 2 | 2 |
| 125mm | 11,000 | 1 | up to 10 | 2 |

Note: The short flue extension (100mm dia.) may be used as an alternative to the standard extension as required up to the maximum flue lengths stated (Part No. 7 716 191 133).

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

| | 45° bend | 90° bend |
|---|----------|----------|
| Greenstar FS CDi Regular 60/100mm flues | 750mm | 1,500mm |
| Greenstar FS CDi Regular 80/125mm flues | 750mm | 1,500mm |

Greenstar FS CDi Regular boiler vertical fluing options

Greenstar FS CDi Regular boilers offer a choice of 2 different sized vertical RSF systems, 100mm diameter and 125mm diameter. Both systems have different maximum lengths. Options 1 to 3 detail the permissible lengths.

Vertical RSF flue



| Flue diameter | 100mm | 125mm |
|-------------------------------------|---------|----------|
| Greenstar FS CDi Regular series | | |
| Flue terminal assembly diameter | 120mm | 135mm |
| Maximum flue length (inc. terminal) | 6,400mm | 15,000mm |
| Flue terminal assembly length | 1,140mm | 1,365mm |

Vertical balanced flue kit

- 1 x flue terminal assembly
- 1 x weather sealing collar
- 1 x fire stop spacer
- 1 x vertical flue adaptor
- 1 x wall bracket
- 1 x flue adaptor

Part No. 7 716 191 156 (100mm dia.)

Part No. 7 716 191 158 (125mm dia.)

Accessories



| Components | Part No. | Description |
|----------------|---------------|-------------------------------|
| 100mm diameter | | |
| | 7 716 191 156 | Vertical 1,140mm kit |
| | 7 716 191 083 | Extension flue kit (960mm*) |
| | 7 716 191 172 | 2m flue extension |
| | 7 716 191 133 | Short flue extension (220mm*) |
| | 7 716 191 084 | 90° bend |
| | 7 716 191 085 | 45° bend |
| | 7 716 191 090 | Flashing – flat roof |
| | 7 716 191 091 | Flashing – pitched roof |

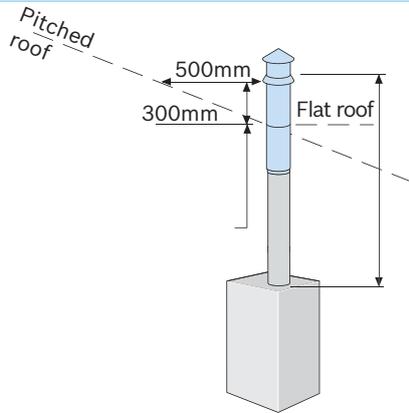
| 125mm diameter | | |
|----------------|---------------|-----------------------------|
| | 7 716 191 158 | Vertical 1,365mm kit |
| | 7 719 003 666 | Extension flue kit (960mm*) |
| | 7 719 003 664 | 90° bend |
| | 7 719 003 665 | 45° bend |
| | 7 716 191 090 | Flashing – flat roof |
| | 7 716 191 091 | Flashing – pitched roof |

*Dimensions when fitted

The following criteria should be noted when planning the installation:

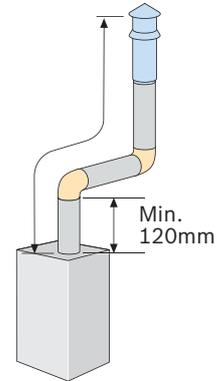
- Because the appliance operates at high efficiency, a white plume of condensation will be emitted from the terminal. Care must be taken when selecting the flue terminal position
- To achieve a maximum flue length, one of the extension flue kits will need to be cut so that the permitted maximum flue length is not exceeded
- Vertical flue options 1-3 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 assembly



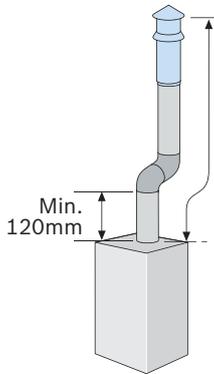
| Components | |  |  |
|---|--------|---|---|
| Part No. 100mm | | 7 716 191 156 | 7 716 191 083 |
| Part No. 125mm | | 7 716 191 158 | 7 719 003 666 |
| Maximum lengths (mm) & no. of components required | | | |
| Greenstar FS CDi Regular series | | | |
| 100mm | 6,400 | 1 | up to 6 |
| 125mm | 15,000 | 1 | up to 14 |

Option 3: Vertical balanced flue using two 90° bends



| Components | |  |  |  |
|---|--------|---|---|---|
| Part No. 100mm | | 7 716 191 156 | 7 716 191 083 | 7 716 191 084 |
| Part No. 125mm | | 7 716 191 158 | 7 719 003 666 | 7 719 003 664 |
| Maximum lengths (mm) & no. of components required | | | | |
| Greenstar FS CDi Regular series | | | | |
| 100mm | 3,400 | 1 | up to 3 | 2 |
| 125mm | 11,000 | 1 | up to 10 | 2 |

Option 2: Vertical balanced flue using two 45° bends



| Components | |  |  |  |
|---|--------|---|---|---|
| Part No. 100mm | | 7 716 191 156 | 7 716 191 083 | 7 716 191 085 |
| Part No. 125mm | | 7 716 191 158 | 7 719 003 666 | 7 719 003 665 |
| Maximum lengths (mm) & no. of components required | | | | |
| Greenstar FS CDi Regular series | | | | |
| 100mm | 4,900 | 1 | up to 5 | 2 |
| 125mm | 13,000 | 1 | up to 12 | 2 |

Note: The short flue extension (100mm dia.) may be used as an alternative to the standard extension as required up to the maximum flue lengths stated (Part No. 7 716 191 133).

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

| | 45° bend | 90° bend |
|---|----------|----------|
| Greenstar FS CDi Regular 60/100mm flues | 750mm | 1,500mm |
| Greenstar FS CDi Regular 80/125mm flues | 750mm | 1,500mm |

Greenstar FS CDi Regular series flexible flue system for chimney installations

Greenstar FS CDi Regular boilers can be used with a flexible flue system which utilises an existing chimney in the building to route the flue terminating on top of the chimney. It is available in one size – 80mm diameter and 12m length. The flexible liner can be cut down from the 12m length to suit.

80mm flexible flue system

Comprises:

- 1 x flue terminal (A)
- 1 x chimney cowl (B)
- 1 x self-adhesive weather seal (C)
- 1 x terminal adaptor (D)
- 1 x support bracket assembly (E)
- 2 x liner (F)
- 2 x seal (G)
- 1 x flexible liner (H)
- 4 x centralising spacers (I)
- 1 x support bend adaptor (J)
- 1 x support bend (K)
- 1 x bend support (L)
- 2 x flue inspection plates (M)
- 1 x seal for flue inspection plates (N)
- 1 x 125mm flue extension (O)
- 1 x tee piece (P)
- 1 x 125mm flue connector (Q)
- 1 x 80/80mm flue adaptor (R)

Part No. 7 716 191 159

Flexible flue terminal clearances

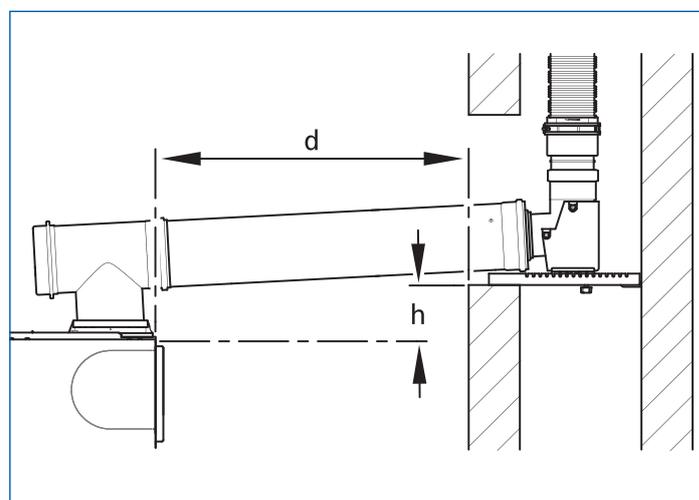
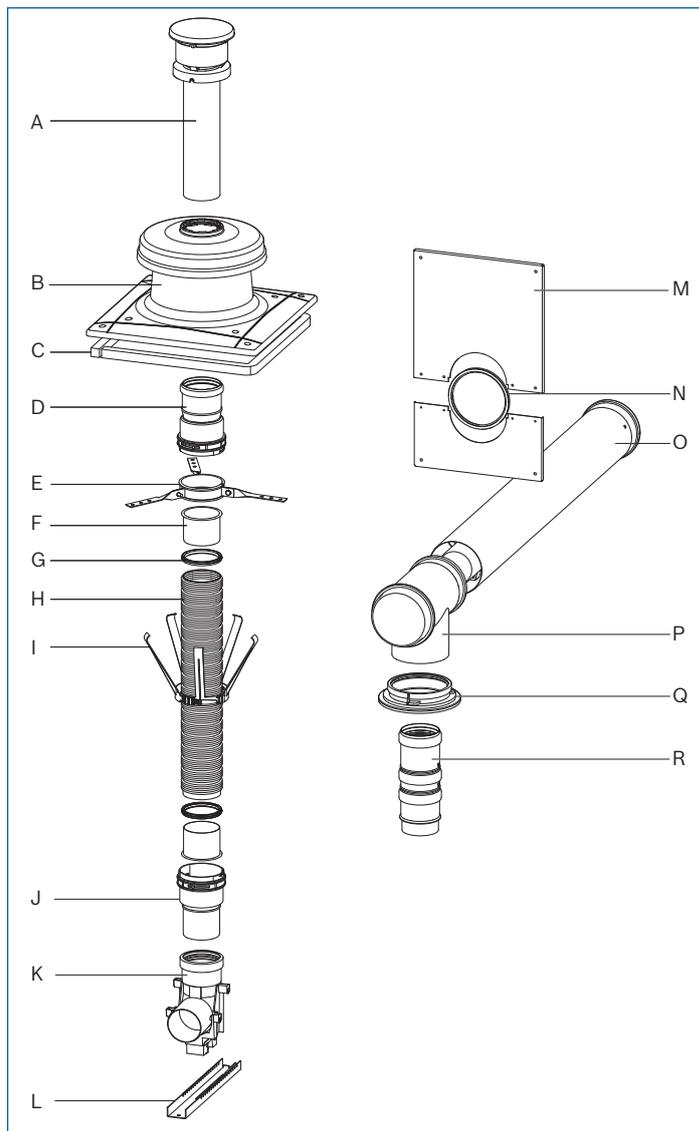
The same clearances apply as for the vertical flue as shown in the flue terminal positioning diagram on pages 20 and 21.

Requirements for the chimney

The flexible flue system is designed to be installed through a hole in the side of the chimney as shown in the diagram opposite.

This will necessitate cutting a hole 150mm min./260mm max. width and 360mm min./390mm max height into the chimney.

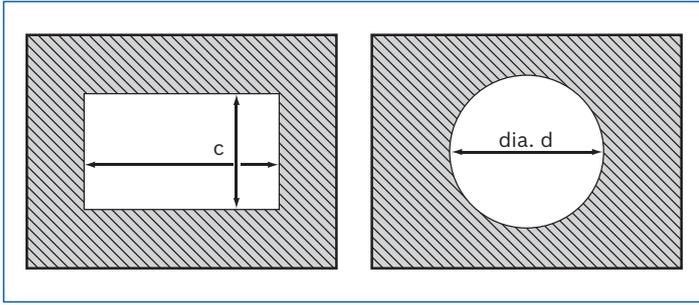
To avoid debris falling into the air inlet duct, do not install the duct with the open end facing up the chimney.



Requirements for the chimney

Chimney size

Ensure the cross section of the chimney complies with the diagram and table below.



| Chimney size (mm) | | | |
|-------------------|---------|--------------|--------------|
| 'c' min | 'c' max | 'dia. d' min | 'dia. d' max |
| 130 | 300 | 146 | 300 |

Fire resistance

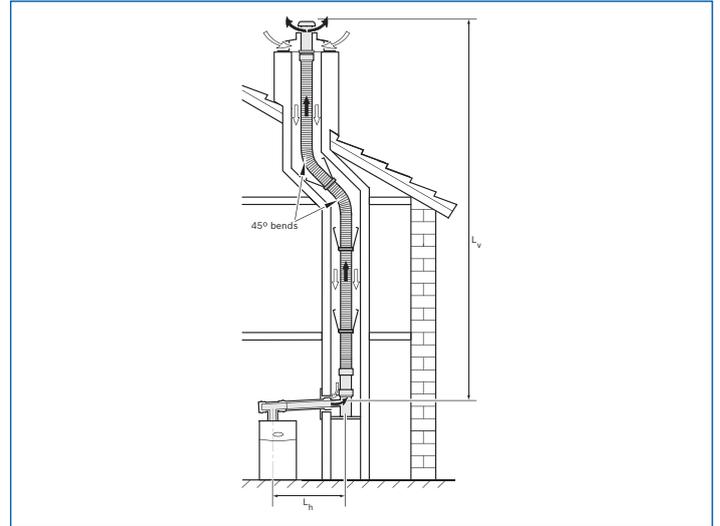
The materials used for the construction of the chimney must be fire resistant in compliance with the figures stated below.

| Type of building | Fire resistance |
|------------------|-----------------|
| Single storey | 30 minutes |
| Multi-storey | 90 minutes |

Preparing the chimney

- The chimney must be swept if it has been previously used for an appliance burning a fuel other than gas
- It is recommended that the chimney be swept before installation of the flexible flue
- Any damper or restrictor plate in the chimney must be removed. If it is not possible to remove the sliding damper it must be fixed permanently in the open position
- Any holes in the chimney must be sealed
- The existing chimney pot and flaunching must be removed
- The catchment space (void below the point of flue connection) must be checked to ensure it complies with the flue to be installed
- All debris must be cleared from the catchment space

Calculating the effective flue length



Calculating the effective flue length

| Appliance | Max. flue length vertical (L_v max) | Max. flue length horizontal (L_h max) |
|-----------|--|--|
| FS 30CDi | 12m | 3m |
| FS 42CDi | 12m | 3m |

To calculate the effective flue length:

- Check the flue path and consider the following:
 - number of 90° and 45° bends required outside the chimney
 - number of bends in the flexible liner
- Deduct the effective length of each bend from the maximum horizontal flue length of 3m

| 80/125mm bend | Effective length (m) |
|---------------|----------------------|
| 90° | 2 |
| 45° | 1 |

- Deduct the effective lengths of each bend from the maximum vertical flue length (L_v max) of 12m.

| Bend in 80mm flexible liner | Effective length (m) |
|-----------------------------|----------------------|
| 45° | 1.5 |

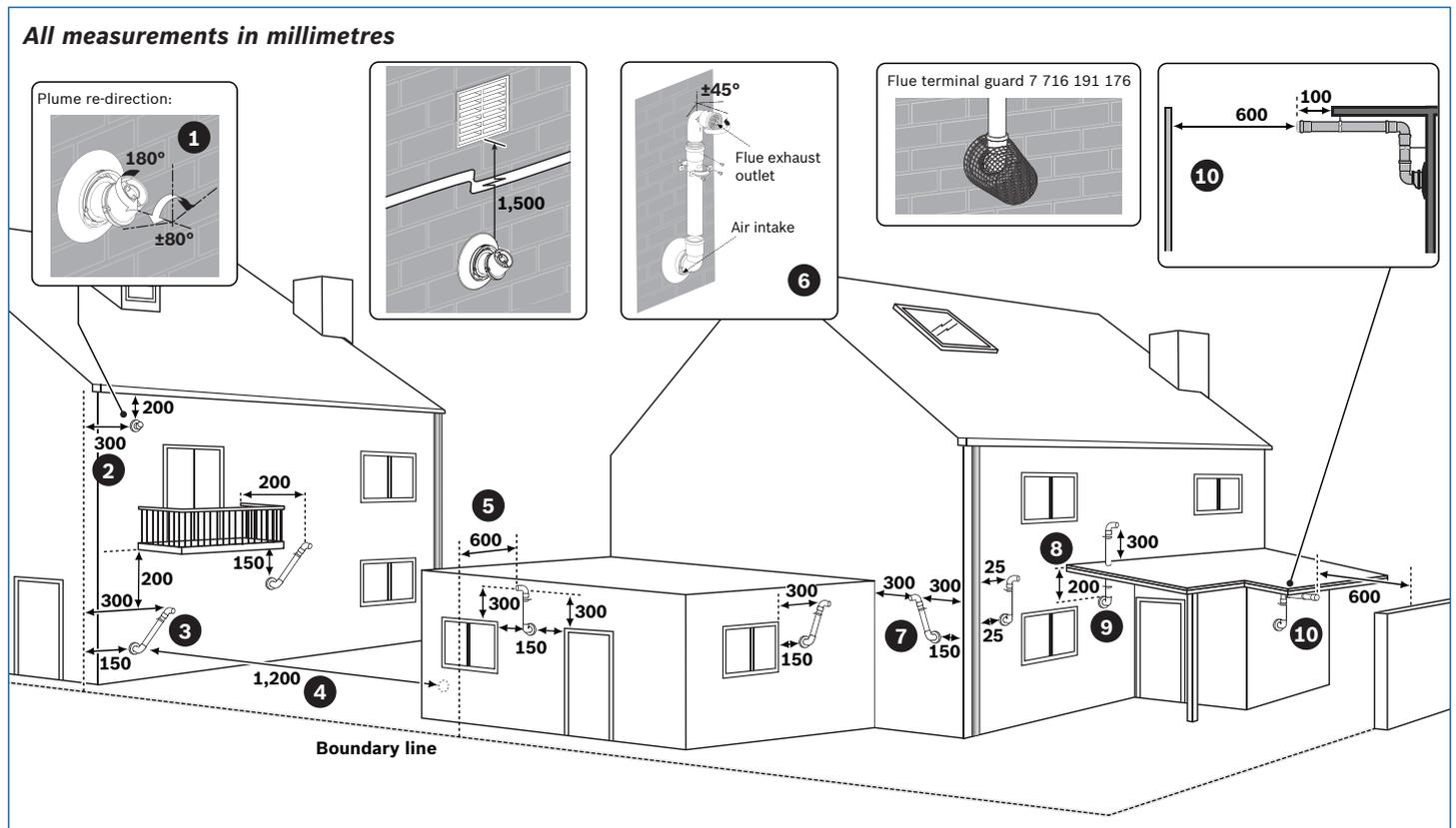
Example of effective flue length calculation

This example shows the use of the flexible flue kit without additional extensions or bends.

| Horizontal effective flue length (no extensions or bends) | | $L_h \leq L_h$ max ? |
|---|----------------|----------------------|
| $L_h = 1m$ | L_h max = 3m | Yes |

| Vertical effective flue length (with 2 x 45° bends) | L_v |
|---|-------|
| L_v max = 12m - 2 x 45° bends = 3m = (12 - 3) | 9m |

Plume management terminal positioning



Note

- All measurements are the minimum clearances required
- Refer to pages 20-21 for all concentric flue terminal positions unless the flue position is specified on the figure above “Plume terminal positions”
- 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. This feature allows some basic plume re-direction options on a standard telescopic horizontal flue terminal. 300mm minimum clearances to an opening, e.g. window. However the minimum clearances to an opening in the direction that the plume management is facing, must be increased to 1,500mm. Where the flue is less than 150mm to a drainpipe, and plume re-direction is used, the deflector should not be directed towards the drainpipe.
2. 300mm adjacent to a boundary line.
3. Plume Management Kit air intake can be reduced to 150mm providing the flue exhaust outlet is no less than 300mm adjacent to a boundary line.
4. 1,200mm between terminals facing each other.
5. 600mm distance to a boundary line, unless it will cause a nuisance. BS 5440:Part 1 recommends that care is taken when siting terminal in relation to boundary lines.

6. Using a Plume Management Kit, the air intake measurement can be reduced to 150mm providing the flue exhaust outlet has a 300mm 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 information.
7. Internal/external corners. The air intake clearance can be reduced to 150mm providing the flue exhaust outlet has a 300mm clearance.
8. Clearances no less than 200mm from the lowest point of the balcony or overhang.
9. 1,200mm from an opening in a car port on the same wall e.g. door or window leading into the dwelling.
10. 600mm distance to a surface facing a terminal, unless it will cause a nuisance. BS 5440: Part 1 recommends that care is taken when siting terminals in relation to surfaces facing a terminal.

- Installations in car ports are not recommended
- The flue cannot be lower than 1,000mm from the top of a light well due to the build up of combustion products
- Dimensions from a flue terminal to a fanned air inlet to be determined.

Plume management system options

Plume management system

60mm dia. plume management kit

- 1 x terminal bend
- 1 x extension 500mm
- 1 x outlet assembly
- 1 x clamp pack

Part No. 7 716 191 086

Accessories

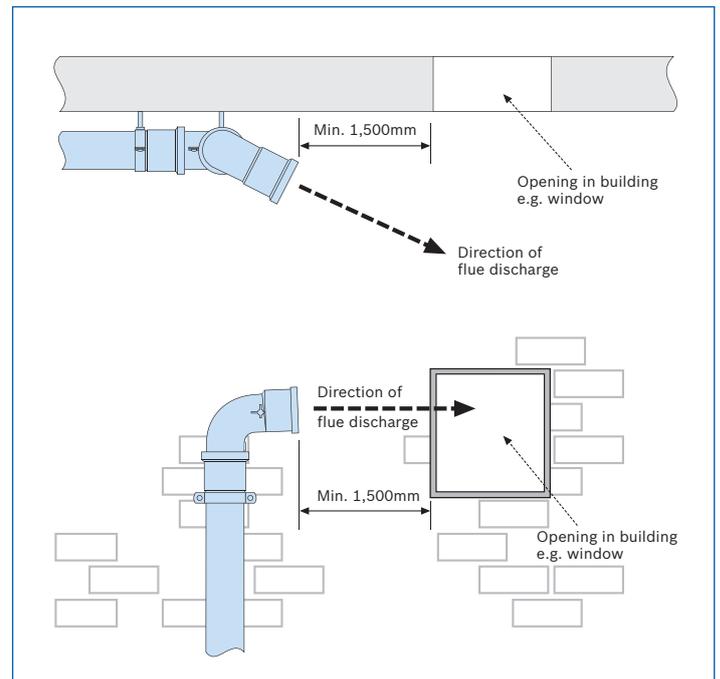
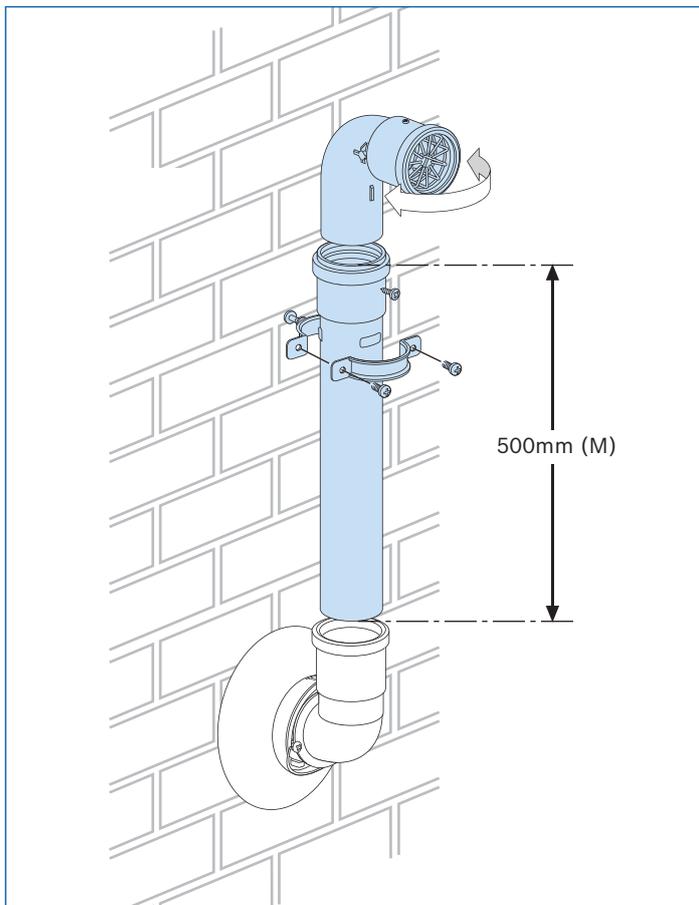


| Components | Part No. | Description |
|----------------------|---------------|---------------------------------------|
| 60mm diameter | | |
| | 7 716 191 086 | Plume management kit |
| | 7 716 191 087 | Extension (1,000mm) |
| | 7 716 191 088 | 90° bend |
| | 7 716 191 089 | 45° bend (pair) |
| | 7 716 191 176 | Plume management terminal guard round |

Standard plume management system

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

All plume management sections must rise by at least 173mm per metre (10°) from the terminal to ensure that condensate flows back into the boiler.



Re-directing flue discharge from a 60mm dia. plume management outlet

The maximum effective flue lengths (L) are stated opposite for the relevant appliance together with the minimum and maximum lengths (M) of the plume management system connected, these lengths must not be exceeded.

External plume management bends still need to be allowed for. See below.

60mm dia. plume management system

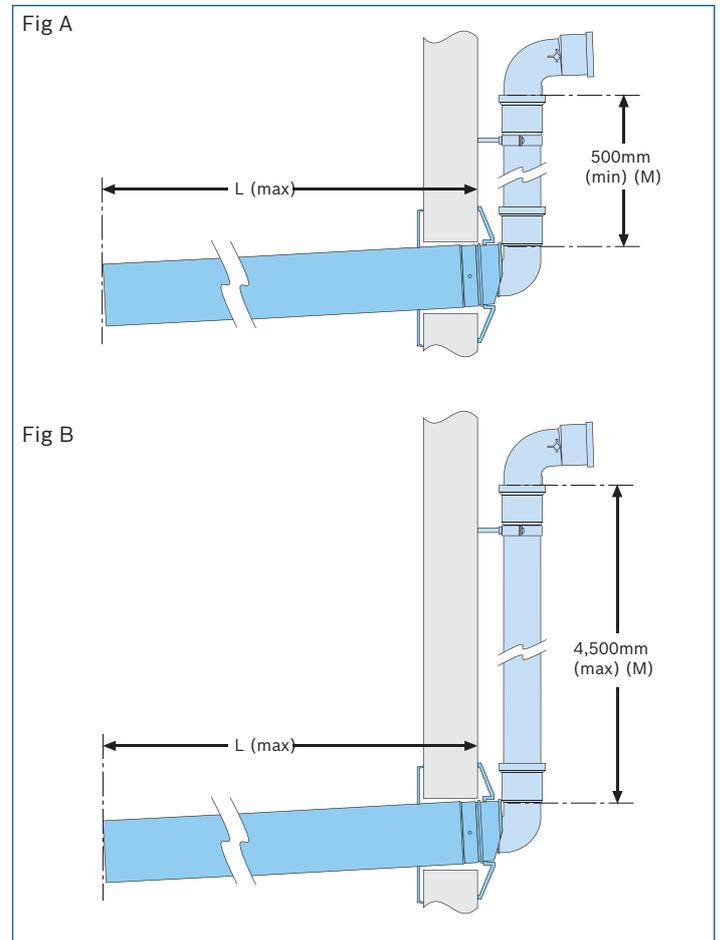
To ensure that the maximum total straight flue length along the plume management route is not exceeded, the following should be added to dimension (M):

- 1,500mm for each extra 90° bend
- 750mm for each extra 45° bend

For plume management options with 60mm dia. extensions, refer to page 32.

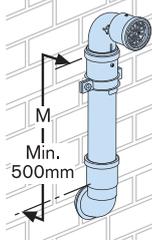
The effective flue length can be determined by adding together all the straight flue lengths and the effective lengths of the bends used, 2,000mm for each 90° bend and 1,000mm for each 45° bend.

Condensfit II™ telescopic flue and plume management system measuring



| Effective straight flue lengths for telescopic flue with plume management | | |
|---|---|---|
| Boiler | Fig. A Maximum straight flue length (L) with minimum plume management length 500mm (M) | Fig. B Maximum straight flue length (L) with maximum plume management length 4,500mm (M) |
| FS CDi Regular series | 4,000mm | 1,200mm |

Plume management system



Components



Part No. 60mm

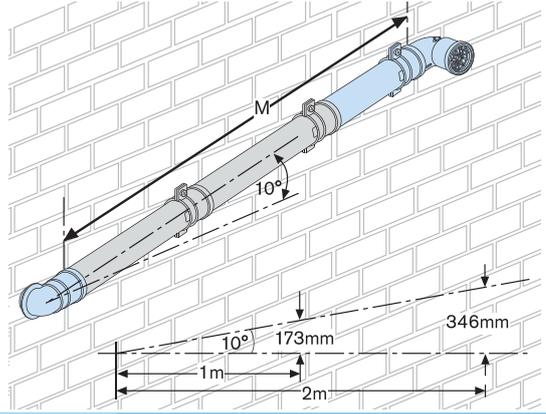
7 716 191 086

Maximum lengths (mm) & no. of components required

Greenstar FS CDi Regular series*

| | | |
|------|-----|---|
| 60mm | 500 | 1 |
|------|-----|---|

Plume management system with angled termination



Components



Part No. 60mm

7 716 191 086

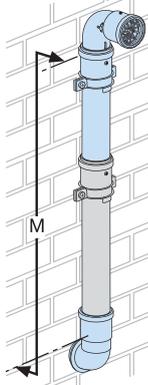
7 716 191 087

Maximum lengths (mm) & no. of components required

Greenstar FS CDi Regular series*

| | | | |
|------|-------|---|---------|
| 60mm | 4,500 | 1 | up to 4 |
|------|-------|---|---------|

Plume management system with extensions



Components



Part No. 60mm

7 716 191 086

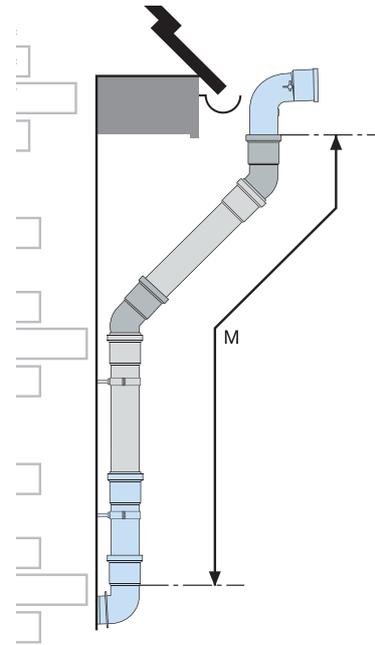
7 716 191 087

Maximum lengths (mm) & no. of components required

Greenstar FS CDi Regular series*

| | | | |
|------|-------|---|---------|
| 60mm | 4,500 | 1 | up to 4 |
|------|-------|---|---------|

Plume management system with extensions and 45° bends



Components



Part No. 60mm

7 716 191 086

7 716 191 087

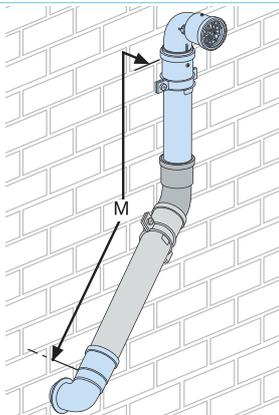
7 716 191 089

Maximum lengths (mm) & no. of components required

Greenstar FS CDi Regular series*

| | | | | |
|------|-------|---|---------|---|
| 60mm | 3,000 | 1 | up to 3 | 2 |
|------|-------|---|---------|---|

Plume management system with extensions and 45° bend



Components



Part No. 60mm

7 716 191 086

7 716 191 087

7 716 191 089

Maximum lengths (mm) & no. of components required

Greenstar FS CDi Regular series*

| | | | | |
|------|-------|---|---------|---|
| 60mm | 3,750 | 1 | up to 4 | 1 |
|------|-------|---|---------|---|

***NOTE:** You must refer to the table on page 31 to calculate your horizontal flue lengths and plume management lengths.

Greenstar FS CDi Regular series accessories

| | | | |
|--|--|---|---|
| <p>Standard telescopic flue kit (100mm dia.)</p>  <p>Worcester Part No. 7 716 191 155</p> | <p>Horizontal flue kit (125mm dia.)</p>  <p>Worcester Part No. 7 716 191 157</p> | <p>Vertical BF kit (100mm dia.)</p>  <p>Worcester Part No. 7 716 191 156</p> | <p>Vertical BF kit (125mm dia.)</p>  <p>Worcester Part No. 7 716 191 158</p> |
| <p>Vertical flue adaptor (60/100mm)</p>  <p>Worcester Part No. 7 716 191 164</p> | <p>Vertical flue adaptor (80/125mm)</p>  <p>Worcester Part No. 7 716 191 165</p> | <p>1,000mm extension kit (100mm dia.)</p>  <p>Worcester Part No. 7 716 191 083</p> | <p>2m flue extension (100mm dia.)</p>  <p>Worcester Part No. 7 716 191 172</p> |
| <p>Short flue extension 220mm (100mm dia.)</p>  <p>Worcester Part No. 7 716 191 133</p> | <p>1,000mm extension (125mm dia.)</p>  <p>Worcester Part No. 7 719 003 666</p> | <p>45° bend (100mm dia.)</p>  <p>Worcester Part No. 7 716 191 085</p> | <p>45° bend (125mm dia.)</p>  <p>Worcester Part No. 7 719 003 665</p> |
| <p>90° bend (100mm dia.)</p>  <p>Worcester Part No. 7 716 191 084</p> | <p>90° bend (125mm dia.)</p>  <p>Worcester Part No. 7 719 003 664</p> | <p>Support bracket kit (100mm dia.)</p>  <p>Worcester Part No. 7 716 191 092</p> | <p>Support bracket kit (125mm dia.)</p>  <p>Worcester Part No. 7 716 191 174</p> |

Note: For information on the Condensfit II™ Telescopic Flue System and Plume Management Kit, please see dedicated flue Technical and Specification leaflet 8 716 112 174.

Greenstar FS CDi Regular series accessories

**Support bracket kit
6 pack (100mm dia.)**



**Worcester Part No.
7 716 191 173**

**80mm flexible
flue system**



**Worcester Part No.
7 716 191 159**

**Plume management kit
(60mm dia.)**



**Worcester Part No.
7 716 191 086**

**Extension
(60mm dia., 1,000mm)**



**Worcester Part No.
7 716 191 087**

**90° bend
(60mm dia.)**



**Worcester Part No.
7 716 191 088**

**45° bend
(60mm dia.)**



**Worcester Part No.
7 716 191 089**

Greenstar System Filter



**Worcester Part No.
7 716 192 609**

**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**

The total **training** experience

Worcester expertise that will build your skills

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

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

Courses available

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

Training centres throughout the UK

To enable us to meet the growing demand for training we have invested in additional facilities at the award-winning training academy at our Worcester headquarters. In addition to the original academy there is now a new 400m² unit, 25% of which is devoted to an open-plan domestic training area with life-size single-storey brick buildings. These feature working Greenskies solar thermal systems which enable installers to get up onto the roof of the building to get more realistic training. There are bays full of all Greenstar gas-fired appliances, so installers can really get to grips with the importance of system design. The additional space also contains dedicated training areas for our renewable and future products. The training centre also runs certified domestic and commercial ACS training and assessment.

Further academies are located at West Thurrock in Essex, Wakefield and Clay Cross in Derbyshire, all offering our full suite of courses. Please phone 0330 123 0166 for more information about a course near you. Each course is run by specialist trainers and is superbly equipped to deliver a combination of classroom theory and practical hands-on experience that's second to none.

College-linked Learning

As well as offering training at our own centres, Worcester has established close partnerships with many colleges around the UK, equipping them with our latest products. Call us on 0330 123 0166 to find out when we will be running the course of your choice at a college in your area.

Mobile training

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

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

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

Distance learning/web based learning

Worcester has produced a selection of Distance Learning CD ROMs/DVDs which are packed with information. Call 0330 123 9119 for your copies, or visit www.worcester-bosch.co.uk for information on Web Based Learning.

Get on course for a more profitable future now.



Call now for more information 0330 123 0166

Gas-fired product courses

As a market leader in gas-fired condensing boilers, we aim to ensure the highest levels of competence and expertise in the installation of all Worcester gas-fired products. We run intensive training courses for installers, commissioning engineers and operatives involved with servicing and fault finding.

Our comprehensive gas-fired condensing boiler training courses include product overview, inspection and cleaning of components, CO and CO₂ analysis of flue gas, removal of compact hydraulics, service mode functions and fault finding on 'live and demo' appliances.

Gas-fired condensing boiler courses

Greenstar CDi Classic gas-fired condensing combi boilers.

Greenstar CDi Compact and NEW Greenstar Si Compact gas-fired condensing combi boilers.

Greenstar i Junior gas-fired condensing combi boilers.

Greenstar system & regular gas-fired condensing boilers

(covers NEW Greenstar 27Ri & 30Ri, Greenstar 12Ri-24Ri, Greenstar CDi Classic Regular, Greenstar FS CDi Regular, Greenstar 30CDi Classic System, NEW Greenstar 27i & 30i System and Greenstar 12i-24i System boilers).

Greenstar Highflow CDi & FS CDi Regular floor standing gas-fired condensing combi and regular boilers.

Greenstar FX Controls (covers MT10, MT10RF, DT20RF, DT20, DT10RF, TD200, RT10, FR10, FR110, FW100 and ISM1).

| | CDi Classic | CDi Compact & Si Compact | i Junior | System & Regular | Highflow CDi & FS CDi Regular | FX Controls |
|-------------------------------|-------------|--------------------------|----------|------------------|-------------------------------|---|
| Duration | 1 Day | 1 Day | 1 Day | 1 Day | 1 Day | 1 Day |
| Cost | Free* | Free* | Free* | Free* | Free* | Free* |
| Training course covers | | | | | | |
| Specification | ✓ | ✓ | ✓ | ✓ | ✓ | Guide to the varied range of control options that are available |
| Installation | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Commissioning | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Servicing | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Maintenance | ✓ | ✓ | ✓ | ✓ | ✓ | |
| Course locations | | | | | | |
| 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.

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.**



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.

Oil-fired product courses

Greenstar oil-fired products.

Oil advanced fault finding.

OFTEC 50.

OFTEC 101 & 105e.

OFTEC 600a.

OFTEC 101/105e/600a.

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.

Greensource air to water heat pumps.

Greensource split air to water heat pumps.

Greenstar Plus hybrid heat pumps.

Accessories training courses

Worcester controls.

We are here to provide you with training and assistance for all areas of your business, not just product training. 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**

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.

MCS Made Easy.

Green Deal.



A complete after-sales service

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

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

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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



All the technical advice you need

Spares

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

Customer Technical Support

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

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

Technical

Tel: 0330 123 3366

Fax: 01905 752 741

Email: technical.enquiries@uk.bosch.com

Opening times

Monday – Friday: 7.00am – 8.00pm

Saturday: 8.30am – 4.00pm

Bank Holidays: 8.00am – 4.30pm



Useful numbers

Sales

Tel: 0330 123 9669

Fax: 01905 456445

sales.mailbox@uk.bosch.com

Spare Parts

Tel: 0330 123 9779

Fax: 01905 754620

spares.mailbox@uk.bosch.com

Technical Helpline (Pre & Post Sales)

Tel: 0330 123 3366

Fax: 01905 752741

technical.enquiries@uk.bosch.com

Renewables Technical Helpline

Email: renewable.energy@uk.bosch.com

or telephone 0330 123 9229

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Fax: 01905 752535

training@uk.bosch.com

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or download instantly from our website

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or telephone 0330 123 9339

Enquiries

Email: service.mailbox@uk.bosch.com

or telephone 0330 123 9559

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or telephone 0330 123 2552

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