

Modular Wall Mounted Ultra-High Efficiency Gas Condensing

Boilers for Low Cost Commercial and Industrial Heating

KESTON

CONDENSING BOILERS



- Small diameter plastic flue systems can be extended up to 39 metres vertically or horizontally
- Low cost plastic flue material saving thousands of pounds on installation costs
- Boilers from 38 kW to 100 kW output
- Modular systems available to match any heating output
- Compact size and preassembled design reduces space requirements and installation time.

Keston BOILERS

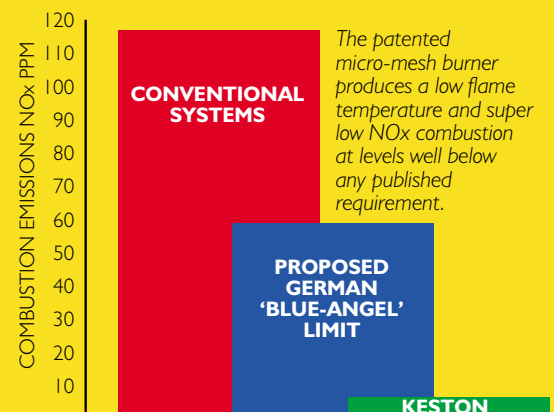
The commercial range of Keston wall mounted gas condensing boilers covers outputs from 38 kW (Keston 130) to 100 kW (Keston 340) with single boiler units. As with all Keston Boilers each has an extremely high efficiency performance of 98% (GCV).

Despite their powerful outputs each unit is designed for wall mounting though floor standing installations can be accommodated for the Keston 260 and Keston 340 using an optional floor standing frame.

Keston Boilers offer complete and cost effective solutions to commercial and industrial heating and in all installations can offer the highest quality systems. These are very often at much lower costs than a single commercial boiler of equivalent output.

Power POINTS

- Practically any heating output possible with modular system
- Wall mounted with optional floor standing frame
- Compact size from 889H x 500W x 327D
- Up to 99.1% efficient – can save 30% or more on fuel bills
- with virtually no NOx emissions (Class 5 rated)
- Flue system is small diameter plastic pipe with lengths up to 39m (Keston 260 and 340) - vertical or horizontal - can save thousands of pounds in installation costs
- Purpose designed boiler plant rigs available for easy installation and drastically reduced site time.
- Simple and quick to install and maintain - all access from front and top.
- Completely room sealed, can site practically anywhere, no need for expensive dedicated boiler room with combustion air ventilation.
- Integral shunt pumps on Keston 260 and 340 models
- Perfect match for Keston Spa hot water storage system - high efficiency commercial models up to 450 litre storage.
- No complicated PCB's
- Exceptionally high quality stainless steel single pass heat exchanger
- LPG options available for Keston 130 and Keston 170
- CE Marked, British Gas Approved and manufactured to ISO 9001



Keston Commercial - Higher Output Keston 260 and Keston 340

Following the immediate success of the Keston 130 (38 kW) and the Keston 170 (50 kW) light commercial models Keston Boilers launched two additional commercial condensing gas boilers to further extend its range of ultra high efficiency boilers

The Keston 260 (76 kW output) and Keston 340 (100 kW output) are unique in concept and design and each have an exceptionally high efficiency at 98% (GCV).

Despite their powerful output the boilers are designed to be wall mounted, though floor standing installations can be accommodated using the optional floor standing frame.

The compact size means these boilers can be sited practically anywhere without the need for a dedicated boiler room.

Each model comprises two boiler modules with individual gas valve, fans, burners and heat exchanger assemblies. Each module operates completely independently and is automatically sequenced to offer maximum load matching.

Firing sequence is regularly rotated automatically to even usage levels.



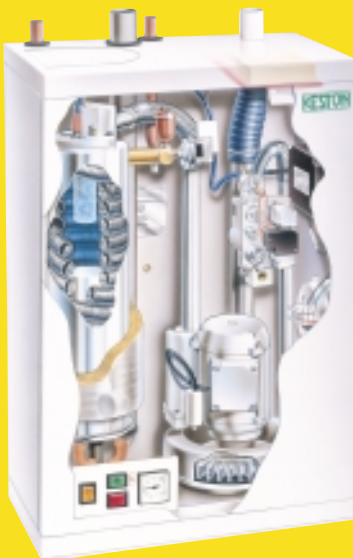
**Sheltered Housing Project:
3 Keston 170's**

Unique **FLUE SYSTEM**

All Keston boilers have the advantage of a small diameter plastic flue system and the commercial range is no exception.

The 50 mm diameter plastic flue used on the Keston 130 and Keston 170 can be extended up to 29 metres away from the unit. The 100 mm diameter plastic flue on the Keston 260 and Keston 340 can be extended up to 39 metres. All boilers can accommodate vertical or horizontal flue routes. The usage of low cost plastic pipe for the flue can save thousands of pounds on installation costs when compared to a conventional flue. In refurbishment projects there is no need for expensive relining of the flue. This system is also ideal for buildings with difficult flue options and particularly listed buildings with various restrictions.

Added benefits of the flue flexibility is that the boiler can be sited practically anywhere in the most convenient position and the flue can be terminated in a location where the "plume" generated with a condensing boiler does not cause a visual nuisance.



How It Works

The Keston modules use a high powered combustion blower to deliver a premix of gas and air to a downward firing burner in a high efficiency single pass heat exchanger. The heat exchanger is made from highly corrosion resistant stainless steel formed into a tightly wound coil. Hot combustion gases pass through the coil providing heat to the water system.

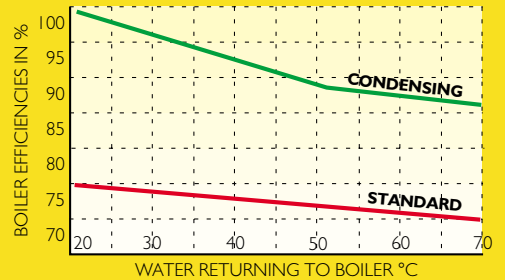
Shunt pumps, integral to the appliance on the Keston 260 and Keston 340, will ensure each module receives the correct water flow when firing.

The Keston boilers are of low mass and low water content giving a rapid response when there is a call for heat.

The design of Keston boilers, with its single pass heat exchanger, avoids the complications associated with other condensing boilers and as a result does not require complicated printed circuit boards. The unit is totally room sealed and requires no ventilation for combustion air to the room or compartment in which it is installed.

The Keston commercial boilers are exceptionally easy to install and maintain and pipework header assemblies are available as an option to assist speedy installation. They are completely environmentally sound with negligible NO_x emissions (Class 5 rated) and can save 30% on the heating bill.

Full Load Efficiency vs. Return Water Temperature



High efficiency condensing boilers produce more heat, using the same amount of gas, than any other type of gas boiler.

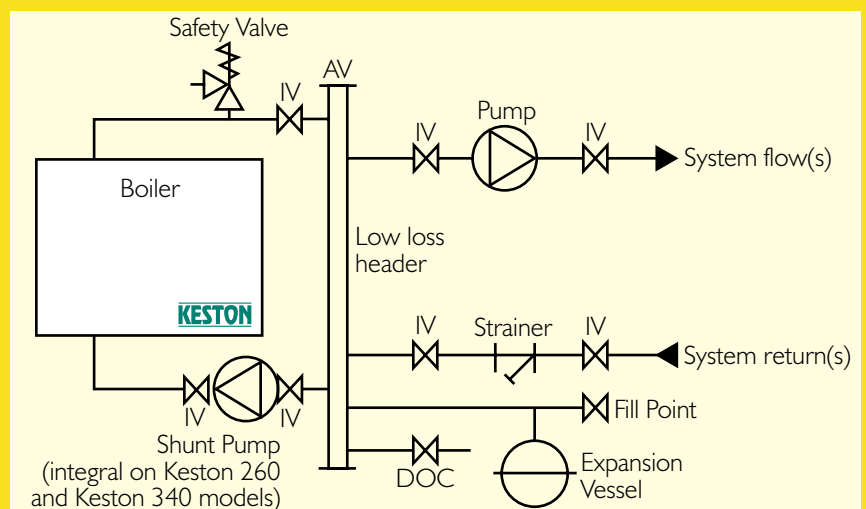
Practically **ANY HEATING OUTPUT**

Because of its modular design the Keston lends itself to almost any required heating output by way of multiple unit installations for larger commercial or industrial applications and the benefits over a single commercial boiler are immense. The Keston modular system is perfect for decentralisation programmes now happening in many commercial installations such as hospitals and universities where one large commercial boiler is being replaced. From initial purchase through to installation, running and maintenance, the Keston saves money, time, valuable space and aggravation.

In many commercial applications the Keston modular system has proved to be far less expensive to buy or install than the equivalent output single commercial boiler.

Hydraulic **SYSTEM DESIGN**

- The Keston commercial boilers suitable for use on open, vented water systems with combined feed and vent. It is preferable for use on sealed water systems, provided the appropriate components required are included in the system.
- The Keston commercial boilers do not incorporate a system safety valve or system expansion vessel. Correctly sized and rated safety valve(s) and expansion vessel(s) must be provided by the installer.
- The hot water storage vessel, if applicable, must be of the indirect type, direct cylinders must not be used. The Keston Spa unvented calorifier range is ideally suited to the Keston commercial boiler.
- Multiple Keston commercial boilers can be installed to meet any required heating output. The implementation of a balance header is recommended to ensure adequate water circulation is maintained through the boiler by the boiler shunt pumps (integral on Keston 260 and Keston 340), irrespective of system conditions. Suitable balance header assemblies are available from Keston Boilers as an optional extra.
- The Keston 260 and Keston 340 boilers are supplied complete with integral boiler shunt pumps. However, these pumps are sized purely to provide adequate flow rate through the boiler at the pressure drop caused by the boiler itself. No allowance has been provided in the shunt pump size for system resistance. A system pump(s) should therefore be selected sized to provide the required system flow rate at the pressure drop created by the system index circuit.



Electrical CONNECTION

Electrical supply and control of the Keston condensing boiler is dependent on model as follows:

- Keston 130 and 170 10A permanent live, 2A switched live on/off control. Shunt pump overrun control.
- Keston 260 and 340 13A permanent live, volt free link on/off control.



**School Project:
3 Keston 170's on a rig**

Gas SUPPLY

The Keston Condensing Boiler uses premix combustion technology which requires adequate gas supply pressure and flow at all times during operation. Care should therefore be taken to ensure that the supply, meter and distribution pipework is correctly sized for the gas flows required. Details of gas consumption are provided on the back page of this brochure.

Flue SYSTEM DESIGN

The Keston commercial condensing boiler range use high powered combustion blowers that enable flueing over exceptional distances using small diameter plastic flue pipe and fittings.

The exceptionally high efficiency of the units ensure very low flue temperatures which permits the use of such low cost plastic pipe for the flue duct. A second plastic pipe carries combustion air from outside the building enabling the boiler to be installed in a room without ventilation for combustion air purposes. Boiler room combustion air ventilation is therefore not required for a Keston commercial installation.

Design

For combustion air supply and flue exhaust individual air supply and flue outlet pipes are used. The material used for flue outlet &/or air inlet must be 50mm muPVC (BS5255) waste pipe for the Keston 130 and Keston 170. Keston Composite pipe of an internal diameter not less than 100mm is required for the Keston 260 and Keston 340 models. Suitable pipe and fittings can be obtained via Keston Boilers Ltd appointed distributors.

Both flue outlet terminal and air inlet terminal are supplied with each boiler.

Minimum & Maximum Lengths

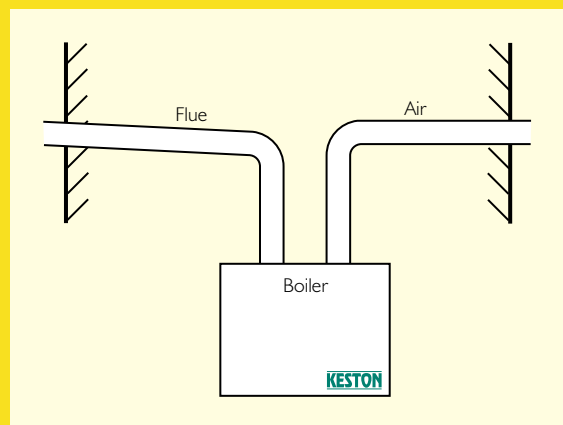
The flue outlet and air inlet pipes must have lengths of at least 1m each.

The maximum lengths of both air inlet pipe and flue outlet pipe, when no bends are used, are as detailed.

| | Keston 130 & 170 | Keston 260 & 340 |
|---|------------------|------------------|
| Maximum Air Inlet Length | 15.0m | 20.0m |
| Maximum Flue Outlet Length | 29.0m | 39.0m |
| Maximum Combined Air Inlet and Flue Outlet Length | 30.0m | 40.0m |

However, each bend used has an equivalent length that must be deducted from the maximum straight length stated above. Knuckle bends must not be used.

A 92.5° sweep elbow is equivalent to 1.0m straight length.



Example

Air inlet uses one 92.5 sweep elbow. Hence, for a Keston 130 or 170 maximum length permissible = 15.0m - 1.0m = 14.0m.

For a Keston 260 or 340 maximum length permissible = 20.0m - 1.0m = 19.0m.

Flue outlet uses one 92.5 sweep elbow. Hence, for a Keston 130 or 170 maximum length permissible = 30.0m - 1.0m - total air inlet length = 29.0m - total air inlet length.

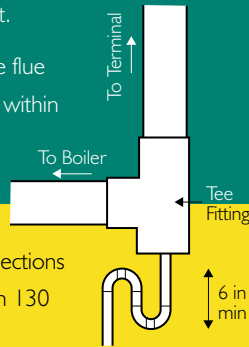
For a Keston 260 or 340 maximum length permissible = 40.0m - 1.0m - total air inlet length = 39.0m - total air inlet length.

Slope

'Horizontal' flue outlet pipework MUST slope at least 2.5 degrees (45 mm per metre run) downwards towards the boiler. Pipework can be vertical. Only swept elbows can be used. For installations requiring reduced slope contact Keston Boilers Technical Support.

Air inlet pipework can be truly horizontal or vertical, or sloping in a downward direction towards the boiler but in this case rain, etc, must be prevented from entering the pipe. There must be no troughs in any of the pipework, whether it be air inlet or flue outlet.

Due to the low temperature of the flue gases further condensate will form within the flue system. Drain points, with suitable traps, must therefore be incorporated within the flue system at the base of vertical flue sections in excess of 4m (2m for the Keston 130 and Keston 170). These additional condensate drains must be run to discharge as detailed in section "Condensate Drainage". Such drain points can be formed using standard Keston Composite flue fittings.



Terminations

Air inlet terminals must be positioned to ensure only fresh air is drawn into the boiler. The air terminal must be located outside of the building.

Drawing of combustion air directly from a ventilated boiler room will invalidate the heat exchanger warranty.

The flue outlet terminal is designed to face outwards but can, if desired, be adapted to face in any direction BUT must not be directed in the region of the air inlet. Where the air and flue terminals are located in close proximity the flue terminal should be located above the level of the air inlet terminal.

| Minimum Flue Terminations and Air Inlet Dimensions (mm) | Flue Terminal | Air Inlet |
|---|---------------|-----------|
| A Below or beside openable window, air brick etc. | 500 | 50 |
| B Below gutters, soil pipes, drain pipes | 75 | 75 |
| C Below eaves | 300 | 50 |
| D Below balconies or car port roof | 200 | 50 |
| E From vertical drain or soil pipes | 75 | 50 |
| F From internal or external corner | 600 | 50 |
| G Above ground or balcony or roof | 300 | 100 |
| H From surface facing a terminal | 600 | 100 |
| I From terminal facing a terminal | 1200 | 1200 |
| J From opening in a car port | 1200 | 100 |
| K Vertically from terminal on same wall | 1500 | 1500 |
| L Horizontally from terminal on same wall | 300 | 300 |

The two terminals are subject to the requirements of BS 5440 Pt 1 for clearances from features of the building although some can be decreased to the values indicated.

If either the air inlet or the flue outlet terminate at a height of less than 2m (6ft) above ground level the termination must be protected by a suitable guard. Suitable terminal guards can be obtained from Tower Flue Components Ltd or its distributors.

The Keston Condensing Boiler, as with any condensing boiler, will generate a condensate "plume" from the flue terminal in all weather conditions. Consideration must therefore be given to the effect of this "plume" when selecting a location for the flue terminal.

It is advisable for horizontal flue terminals to place a 45° elbow at the end of the flue to direct the condensate plume up and away from the property.

Flue outlet and air inlet terminations must be at least 60 mm and 95 mm respectively from the wall face.

There is no maximum distance between flue terminal and air inlet terminal - the terminations can be on opposite sides of the dwelling if desired.

A minimum clearance of at least 500 mm must be left between the terminations.

Compartment Installation

The casing temperatures of the Keston commercial boilers are very low. Due to this fact, no compartment ventilation is required for cooling purposes.

Condensate Drainage

Being a condensing boiler, the Keston is fitted with a condensate trap at the base of the heat exchanger and flue assembly, with facility to connect to a drain point underneath the appliance.

Use only plastic piping and do not reduce below 22mm internal diameter within the dwelling. Condensate should preferably be drained into the sanitary waste system or, alternatively, the rainwater system of the property.

Termination of the pipe must be either at a branch or stack internal to the building, or externally at an open gully. Alternatively, discharge into a purpose made condensate soakaway can be considered. Existing or purpose built drains must use suitable corrosion resistant material as condensate is mildly acidic.

A minimum slope downwards towards the drain of 1 in 20 is essential. Freezing of the termination and pipework must be prevented. Any drainage pipes outside the property must be at least 32 mm inside diameter.

Multiple BOILER INSTALLATIONS

The modular design of the Keston Commercial range lends itself ideally to multiple boiler installations. As a result almost any heating output requirement can be accommodated using multiple Keston units.

Using this multiple boiler approach the system can be controlled to ensure optimum matching of boiler output to load at any given time. In addition, individual units can be taken off-line for servicing with minimal impact on system performance.

Common Balance Headers

Boiler water flows are critical to the operation of the boilers. If flow cannot be maintained through the system pipework to meet the minimums required by the boiler the boiler will "kettle" or even produce steam. The implementation of a balance header, as shown in the schematics, is recommended to ensure adequate water circulation is maintained through the boiler by the boiler shunt pumps, irrespective of system conditions.

The size of the balance header is dependant on the number of boilers serving the header
A guide to sizing is given here:

| Total Boiler Output | Header Diameter |
|---------------------|-----------------|
| up to 100kW | 3" |
| up to 200kW | 4" |
| up to 300kW | 4.5" |
| up to 400kW | 5" |

When assembling a balance header the following design considerations must be observed:

- Each boiler must have its own flow and return connection to the balance header pipe. Common flow and return connections with other boilers can cause reverse circulation effects to occur.
- The minimum distance between the system flow and return connections is 600mm
- A drain off point should be fitted to the base of the header, along with cleaning access, for sludge removal.

The top of the header should be vented.

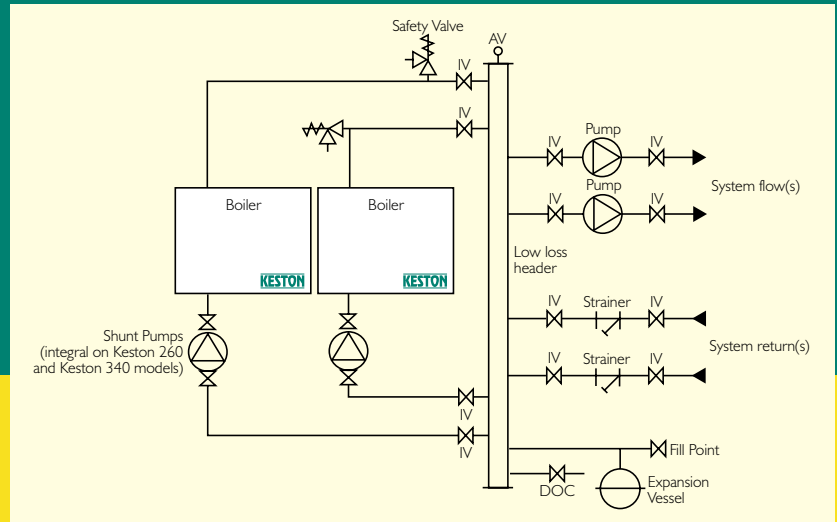
CLEARANCES

The boilers are designed for ease of servicing and installation. On the Keston 260 and Keston 340 all servicing is carried out through the front of the unit. On the Keston 130 and Keston 170 additional access is required to the top of the cabinet for removal of the burner.

Details of installation clearances are provided in the table on the back page of this brochure.



**Hospital Project:
6 Keston 170's**



OPTIONS

Preassembled Boiler Plant Rigs

In circumstances where site time and/or space may be at a premium Keston Boilers can provide a pre-assembled solution to any plant room needs.

The Keston Rigs are delivered to site pre-assembled and incorporate up to three units within a floor standing frame. The units are pre-piped to a single balance header.

- The Keston Rigs include :
- Up to three Keston commercial units as specified by the customer
 - Individual shunt pumps for each unit
 - Safety Valves
 - Isolating Valves
 - Test Points
 - Drain Points
 - Single Balance Header sized according to output

The incorporated equipment is pre-piped and pre-wired ready for immediate connection within the plant room.

The balance header includes tappings for air vent, fill point/expansion vessel, drain off and system flow and return. The number and size of system tappings is as per the customers own specification.

Floor Standing Boiler Frame

Where plant room wall space is at a premium a floor standing frame is available for the Keston 260 and Keston 340.

Balance Headers

A range of standard headers is available from Keston Boilers Ltd for single and multiple installations. In addition bespoke headers can be produced in order to meet customers specific requirements.

Performance Data

| | | Keston 130 | Keston 170 | Keston 260 | Keston 340 |
|--|-----------------------------|---------------------------------------|---------------------------------------|----------------------------|-------------------|
| Max Input (GCV) | kW/(Btu/h) | 42.3/(144,330) | 55.0/(187,660) | 84.6/(288,650) | 110.0/(375,300) |
| Max Output to water (80/60 Flow/Return) | kW(Btu/h) | 38.1/(130,000) | 49.8/(170,000) | 76.1/(259,650) | 99.0/(337,800) |
| Max Output to water (60/40 Flow/Return) | kW(Btu/h) | 40.0/(136,500) | 52.4/(178,800) | 79.5/(271,250) | 104.0/(354,800) |
| Max Output to water (50/30 Flow/Return) | kW/(Btu/h) | 41.4/(141,500) | 54.5/(186,000) | 82.9/(282,850) | 107.8/(367,800) |
| Burner Setting Pressure - Hot (factory preset) | mbar/(in wg) | 7.5/(3) | 10.0/(4) | 9.8/(3.9) | 13.0/(5.2) |
| Gas Consumption after 10 mins | l/s / (ft ³ /hr) | 1.09/(139) | 1.42/(181) | 2.19/(278) | 2.84/(362) |
| Required Inlet Gas Pressure (Dynamic) | mbar/(in wg) | 20.0/(8.0) | 20.0/(8.0) | 20.0/(8.0) | 20.0/(8.0) |
| Recommended Temperature Differential | °C | 10 to 15 | 10 to 15 | 10 to 15 | 10 to 15 |
| Required Water Flow Rate | l/s | 0.83 | 1.00 | 1.60 | 2.00 |
| Integral Shunt Pumps | | No | No | Yes | Yes |
| Max Operating Flow Temperature | °C | 80.0 | 80.0 | 80.0 | 80.0 |
| Max Head (Open Systems) | m | 30.5 | 30.5 | 30.5 | 30.5 |
| Max Press. (Sealed Systems) | Bar | 2.70 | 2.70 | 2.70 | 2.70 |
| Min Head (Open Systems) | m | 3.0 | 3.0 | 3.0 | 3.0 |
| Electrical Supply | | 230V 50Hz | 230V 50Hz | 230V 50Hz | 230V 50Hz |
| Power Consumption (Max) | W | 600 | 600 | 1200 | 1200 |
| Cabinet Height | mm | 890 | 890 | 1260 | 1260 |
| Cabinet Width | mm | 500 | 500 | 1080 | 1080 |
| Cabinet Depth (Max) | mm | 327 | 327 | 350 | 350 |
| Top Clearance | mm | 254 | 254 | 127 | 127 |
| Side Clearance | mm | 1 | 1 | 1 | 1 |
| Base Clearance | mm | 127 | 127 | 127 | 127 |
| Front Clearance | mm | 305 | 305 | 305 | 305 |
| Weight – Full | kg/(lbs) | 68/(150) | 68/(150) | 165/(363) | 165/(363) |
| Weight – Empty | kg/(lbs) | 61/(134) | 61/(134) | 150/(330) | 150/(330) |
| Flow and Return Connections | | 35mm copper | 35mm copper | Rp 2" F | Rp 2" F |
| Gas Connection | | ³ / ₄ BSPT Male | ³ / ₄ BSPT Male | Rp 1.25" F | Rp 1.25" F |
| Flue Pipe Size (Nominal Bore) | mm/(in) | 50/(2) | 50/(2) | 100/(4) | 100/(4) |
| Air Intake Pipe Size (Nominal Bore) | mm/(in) | 50/(2) | 50/(2) | 100/(4) | 100/(4) |
| Max Air Intake Length | m | 15 | 15 | 20 | 20 |
| Max Combined Flue & Air Intake Length | m | 30 | 30 | 40 | 40 |
| Flue and Air Intake Material | | muPVC BS5255 Pipe Only | | Keston Composite Pipe Only | |
| LPG Option available | | Yes | Yes | No | No |
| Optimum Flue Gas CO ₂ Level (G20) | % | 8.4 | 8.4 | 8.4 | 8.4 |

KESTON Boilers



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