STRATA 38 & 38/46 COMBI







WALL MOUNTED, GAS FIRED, ULTRA HIGH EFFICIENCY CONDENSING BOILERS

INSTRUCTIONS FOR INSTALLATION, SERVICING & OPERATION OF THE MODEL 38 BOILER & THE 38/46 COMBI





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I.O general *notes*

These instructions are intended to assist the installer, commissioning engineer, maintenance engineer and user with the installation, maintenance and usage of the Strata 1-38 gas fired condensing boiler and the Strata 1-38/46 gas fired condensing combination boiler.

Please read this manual fully before commencing the installation of the appliance. The Strata I must only be installed by persons deemed to be competent i.e. Corgi Registered. This manual must be handed to the appliance user following completion of the installation. The appliance must not be left to operate with the outer casing removed.

conformity statement

Strata 1 38 & 38/46 Combi boilers are manufactured to the highest standard of quality, performance and safety, in accordance with EC standards. Strata 1 45, 60 & 75 boilers carry the CE mark

installation requirements

The installation of Strata I boilers must be in accordance with the relevant requirements of Gas Safety (Installation and Use) Regulations 1994, Health & Safety at Work Act, Building Regulations, I.E.E. Regulations, Construction (Design & Management) Regulations 1994, Local Authority Bye-Laws, Local and National Water Bye-Laws, Fire Authority Regulations and Insurance Company requirements.

The following Codes of Practice are also applicable:-

- BS6798: 1987 Specification for installation of gas fired hot water boilers of rated input not exceeding 60kW.
- BS6880 Code of Practice for low temperature, hot water heating systems of output greater than 45kW. Parts I, 2 and 3: 1988.
- CP342 Part 2: 1974 Code of Practice for centralised hot water supply.
- BS6644 1991 Specification for gas fired hot water boilers of rated inputs between 60kW and 2MW.
- IGE/UP/2 Gas installation pipework, boosters and compressors on industrial and commercial premises.
- CIBSE Guide Reference sections B7, B11 and B13.
- BS5440 Installation of flues and ventilation for gas appliances of rated input not exceeding 60kW. Part 1: 1990 Specification for the installation of flues.
- BS5440-2: 2000 Installation and maintenance of flues and ventilation for gas appliances of rated input not exceeding 70kW net (1st, 2nd and 3rd family gases) Part 2: Specification for installation and maintenance of ventilation for gas appliances.
- IGE/UP/10 Installation of gas appliances in industrial and commercial premises. Part 1: Flued appliances.

2.0 product description

The Strata I range of wall mounted gas fired condensing boilers are state of the art appliances which include a comprehensive range of features. The appliance must only be used on sealed and pressurised systems. System design must take into account the boiler operating Δt of 20°C.

wall mounted with compact dimensions

At 900H x 458W x 355D, the Strata I boiler provides maximum heat from minimum dimensions without compromising serviceability.

fully modulating heat output

The output of the boiler is fully variable, sliding between (approx.) 20% to 100%, which automatically and instantly adjusts to match the needs of the system. The percentage of power at any given time can be dictated by either outside air temperature, flow temperature, return temperature, stored or instantaneous domestic hot water temperature, or room temperature, or a combination of the aforementioned.

fully condensing stainless steel heat exchanger

The Strata I boiler is designed with extended heat exchange surface area and is fabricated from corrosion resistant long-life stainless steel. The unique Spiranox heat exchanger will return operating efficiencies from 88% gross (96% nett) at 60°C return temperature, up to 96% gross (104% nett), at 30°C return temperature.

extremely low harmful emissions

The boiler utilises 100% pre-mix gas/air fed at positive pressure to the metal fibre sheathed radiant burner. The combustion system incorporates internal flue gas re-circulation and this combined with the precise nature of pre-mix fuel/air control, gives ultra low emissions to satisfy the most stringent emission regulations in the world currently. That is: < 20mg/kWh NOx (14 ppm DAF) and < 14mg/kWh CO (13 ppm DAF). The fully modulating nature of the appliance also reduces emissions by avoiding repeated start/stops and the associated increase in emissions, which occurs with burner on/off cycling.

accurate variable burner output control

The pre-mix burner fan has a low voltage direct current drive motor with pulse relay counting. This system allows precise control over fan speed/combustion air volumes. Coupled with a gas valve system set to provide proportionately measured volumes of fuel to air, this allows extremely accurate and instant variable burner output control to be achieved.

high domestic hot water flow rate - combi boiler

The combi boiler includes a high performance water to water heat exchanger which coupled with a variable output up to 46kW provides up to 0.21 I/s of hot water raised through 50°C. The water to water heat exchanger contains 10 litres of primary water which is maintained at the required domestic hot water temperature so ensuring prompt delivery of hot water.

energy saving

In addition to the extremely efficient burner and heat exchanger system employed in the Strata I, each appliance includes a modulating speed boiler primary pump.

This feature allows the boiler to self-maintain a $20^{\circ}C \Delta t$ across the heat exchanger, optimising the heat exchanger efficiency and reducing also the electrical consumption of the pump motor. The result is a seasonal increase in boiler efficiency of a further 7-10% and a reduction in pump electricity consumption of up to 70%.



2.0 product description (contd)

natural gas or LPG

Appliances can be supplied for use with natural gas (G20) or LPG (G31).

comprehensive microprocessor control

The boiler control panel includes a user friendly microprocessor control centre which manages the entire function of the appliance and encompasses:-

- I. Management of the essential safety functions of burner ignition and flame monitoring.
- 2. Water high temperature and flue gas high temperature safety cut out.
- 3. Modulation of the boiler output and pump speeds in conjunction with operating temperature control.
- 4. LCD display screen with two lines of text to continuously display operational or fault status.
- 5. In built weather compensator to provide direct-on boiler VT flow temperature (if required).
- 6. Remote stored hot water temperature control and when using optional temperature sensor gives the option of regular anti-legionella programme (not combi).
- 7. In built 2 stage boiler frost protection program.
- 8. In built pump exercising program to avoid standstill seizure.
- 9. Cold start boost facility.
- PC compatibility with data logging which allows communication with the boiler via a lap-top computer to review/modify operational parameters and access operational history as an aid to fault finding and preventative maintenance.
- 11. Range rate adjustment which allows the power to be set to accurately match the maximum needs of the system, with the facility to set a different firing rate for heating. Output to hot water self adjusts to the heat transfer capability of the calorifier or the instantaneous demand (combi boiler).
- 12. Facility to connect optional matched control components which allow the boiler to control a heating circuit pump, *HWS primary pump or *diverter valve and an underfloor circuit mixing valve and pump, (MR03) plus the ability for the boiler to be controlled by a remote multi function modulating room unit. (RE2132) Multiple boilers may be connected to a modulating Kaskade manager (KKM2) or controlled via a 0-3 or 0-10v* signal (*via adaptor) which further enhances the operating efficiency of a larger load modular boiler system. (*Not combi).
- Inbuilt time switch (3 on 3 off/24hr) for heating control and *separate channel for hot water time control. (*Not combi).

room sealed option

If required, the boiler may be installed to be completely room sealed, taking combustion air directly from outside the building, using a 125/80 concentric air duct/flue duct system. Inherent safety is afforded by the negative pressure within the boiler casing, which in the event of incorrect sealing results in safe inward air leakage only.

extended flue lengths

The excess fan pressure from the combustion system is 100 Pa, which allows the appliance to be exhausted using small diameter PPS plastic flue components, over long distances, allowing for complete flexibility in boiler siting.

designed for ease of maintenance

Although compact, the Strata I does not compromise serviceability. The appliance has been engineered to be easy to maintain with even the most major of service operations being able to be completed easily and quickly with the minimum of tools.

guarantee

The heat exchanger carries a five year guarantee against manufacturing or material defect. All other parts carry a one year warranty against manufacturing or material defect.



3.0 technical data & dimensions



underside - model 38



underside - 38/46 combi



Dimensions in millimetres

Model	Strata I	38/46 Combi	38
Input Range Central Heating Net	kW	6.4 - 36.0	6.4 - 36.0
CH Modulating Output 80/60°C	kW	6.2 - 34.6	6.2 - 34.6
CH Modulating Output 50/30°C	kW	7.0 - 37.8	7.0 - 37.8
Min Working Pressure CH	Bar	0.5	0.5
Max Working Pressure CH	Bar	3.0	3.0
Max Flow Temperature CH	°C	85	85
Total Primary Capacity Litre		12.4	2.4
Available CH Pump Pressure at 38kW & 20°C Δt	kPa	23.5	32.5
Input Range Domestic Hot Water Ne	t kW	6.4 - 46.0	6.4 - 46.0
HW Modulating Output	kW	6.4 - 46.0	6.4 - 46.0
Domestic Hot Water Flow at 50° Δt	l/min	13.14	_
Domestic Hot Water Flow at 35° Δt	l/m	18.77	—
Max Working Pressure Domestic HW	Bar	10.0	—
Max Flue Gas Volume (Hot)	m³/h	65.13	65.13
Gas Consumption (Nat Gas G20)	m³/h	0.68 - 4.77	0.68 - 4.77
Min/Max Gas Inlet Pressure	mbar	18/60	18/60
Average Electrical Consumption	Watts	60	60
Power Supply	V	230	230
Weight Empty	kg	50	39

Connection	Strata I	38/46 Combi	38
I. Combustion Air Inlet		DN125	DN125
2. Flue Gas		DN80	DN80
3. Flow		22mm	22mm
4. Hot Water (Out)		22mm	_
5. Cold Water (In)		22mm	_
6. Return		22mm	22mm
7. Condense Waste Outlet		³ / ₄ " BSP-M	³ / ₄ " BSP-M
8. Gas Connection		I5mm	I5mm
9. Condense Syphon Cleaning Point		_	_
10. Glanded Cable Entries			



4.0 delivery consignment /unpacking the boiler

The boiler is delivered as a consignment of a palleted carton containing the boiler and associated fittings, plus any other optional ancillary flue or control components in separate cartons.

The boiler carton contains:-

- Assembled boiler.
- Wall mounting bracket.
- Fittings bag including: condense waste outlet hose union assembly, outside air temperature sensor c/w wall fixings and 1/2" BSP inlet 3/4" BSP outlet safety pressure relief valve set 3 bar.

To unpack the boiler, the palleted carton should be laid on the floor. Carefully cut the nylon bands and lift away fibre board protective panel. Open carton top and lift out wall hanging bracket and fittings bag. Remove packing material and lift away bottomless carton. With 2 men, carefully lift boiler from palette by holding grey rear chassis only.

To remove the casing from the boiler, slacken the screw in the underside of the casing, unlatch left and right hand catches on underside of case, pull casing slightly to the front and lift upwards to disengage casing hooks from rear chassis and then remove casing to the front.

5.0 boiler *location*

The Strata I Boiler is not suitable for installation external to a building. The position chosen for the boiler must be a structurally sound wall capable of supporting the weight of the boiler and any ancillaries. The position should allow for access to a condense waste drain nearby or an alternative is to install a condense sump receptacle and condense disposal pump which should remove the condense waste water to a remote drain. The wall mounting position of the boiler must allow the boiler to be true plumb vertical to ensure correct operation of the internal gravity flow condense system. The position for the boiler must satisfy the requirements of BS6798:1987 or BS6644:1991 as appropriate.

6.0 installation *clearances*

For ease of installation, commissioning and maintenance the following minimum clearances should be observed:-

-
m
m
m
r r

7.0 wall *mounting*

The Strata I boiler mounts to the wall via a wall mounting bracket which interlocks to a rail mounted upon the rear of the boiler. The wall mounting bracket should be firmly fixed to the wall using suitable fixings. The wall mounting bracket positioning detail is shown in fig I. The boiler must be carefully offered up to the wall so that the rail on the rear of the boiler is just above the wall mounting bracket and then the boiler should be lowered to engage the bracket and rail. Lifting is advised with 2 persons. Do <u>NOT</u> lift the boiler by the internal parts of the appliance.

Important Note

When viewed from the side, the north/south axis of the boiler must be vertical. The appliance must not be inclined out from the top, if necessary adjust the positioning of the boiler using the adjustable wall bearing assemblies located at the bottom rear left and right hand of the appliance back panel.



8.0 gas connection

The gas connection is located at the base of the appliance rear centre, see fig 2.

The pipe size used to supply the appliance must not be smaller than the gas connection size on the appliance.

The connection to the appliance must include a suitable method of disconnection and a gas control cock must be installed adjacent to the appliance for isolation purposes.

The gas pipe used to supply the appliance must not allow a pressure drop of greater than Imbar from the meter to the appliance.

The nominal inlet working gas pressure measured at the appliance should be 20.0 mbar for Nat Gas (G20) or 37 mbar for LPG (G31). The installer should install a pressure test point adjacent to the gas inlet connection.



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9.0 water *connections*

Note the Strata I boiler must only be installed on sealed and pressurised systems. The maximum working pressure of the boiler = 3 bar. A safety valve set 3.0 bar is supplied with the boiler and must be installed onto the flow pipe adjacent to the boiler. It is recommended that the final working pressure (hot) of the system does not exceed 2.3 bar. Note – the appliance does NOT include an expansion vessel. A suitable vessel must be connected to the system.

The central heating flow and return connections are 22mm OD, located at the base of the appliance (see fig 3) and should be connected to the system pipework using compression type fittings. DO NOT make soldered connections onto the appliance.

The COMBI BOILER includes domestic hot and cold water connections located at the base of the appliance see fig 4. These connections are 22mm and should be connected using compression type fittings. DO NOT make soldered connections onto the appliance.

The flow, return and domestic cold supply pipework should include isolation valves and all pipes should include means of disconnection.



IO.O condense waste connection

The condense waste connection is located at the underside rear of the appliance see fig 5.

The condense syphon cleaning point is factory fitted with a heavy grade black plastic cap which MUST NOT BE REMOVED (see fig 5) apart from routine maintenance cleaning operations and must be in place whenever the appliance is in operation. WARNING operating the appliance with the cap removed from the syphon cleaning point will cause products of combustion to be discharged from the cleaning point.

The condense waste connection is a ³/₄" BSP Male threaded stub fabricated from plastic. The installer must connect to this stub, a condense waste pipe fabricated from plastic tube and fittings (³/₄", 22mm, overflow pipe is considered suitable). Copper Tube is not acceptable. The condense waste pipe must fall continuously from the appliance to suitable nearby drain.

If any part of the condense waste pipe is to be run external to the building or is at risk of freezing, then the pipe must be suitably insulated to protect from freezing.

If a suitable drain for accepting the condense waste is not available nearby to, and below the boiler, (e.g. boiler installed in a basement below ground level location), then a suitable condense sump receptacle with a discharge pump should be installed below the boiler to remove the condense to a remote drain.



10.0 condense waste connection (contd)

When making the condense waste pipe connection to the boiler, do not use adhesives, it is recommended to lightly apply a suitable jointing tape (PTFE or similar) and use only light pressure to connect fittings to the appliance to avoid damage to the condense waste outlet assembly.

It is recommended that the condense waste pipework should include a method of disconnection and cleaning points.



II.0 flue/combustion air connection - general

The flue connection and combustion air inlet to the appliance are located on the top of the appliance see fig 6. These connections are arranged concentrically with the 80mm flue gas connection centrally within the I25mm air inlet connection.

There are two options for flueing the Strata I boiler:

i) Conventionally, using flue gas tube only and air for combustion from the room or compartment in which the appliance is installed. If using a conventional flue arrangement then the room or

compartment must be ventilated in accordance with the requirements of BS5440. For guidance on ventilation see section 16.

 ii) Room sealed using concentric 80/125 components or two seperate tubes, where air for combustion is taken from outside of the building. When using a room sealed flue, where air for combustion is provided from outside of the building directly to the appliance, ventilation to a compartment may still be required - See section 16 for general space cooling.



Multiple Boilers

For detail and advice on common flues serving multiple boilers, contact MHS Boilers Ltd.

Important Note

Where the Strata I is to be installed in an application where the combustion air is likely to be contaminated with oxidising agents, such as swimming pool areas, special industrial processes etc, then the appliance must be room sealed.



12.0 conventional *flue installation*

The Strata I boiler has an excess pressure combustion system, which coupled with the very low flue gas temperatures produced allows the appliance to exhausted over considerable distances using 80mm Polypropylene PPS flue pipe and fittings. Suitable flue pipe and fittings are available from MHS Boilers Ltd and are listed below.

The flue should be installed to have at least a 3° fall to the boiler to allow any condense formed in the flue to run back to the boiler.

The flue system used must be gas and water tight and must be adequately supported over it's entire length. Support at I metre intervals. It is not necessary to install a terminal to the flue system, however, a mesh guard should be included to prevent blockage or entry of foreign material. Straight lengths may be cut to size with any surplus cut from the plain end. Tube ends should be cut square and de-burred.

Care should be taken when selecting a position for a low level discharge or discharge adjacent to windows etc as the flue terminal will plume heavily and the white water vapour discharge may cause a visual nuisance.

Flue components available from MHS Boilers Ltd

80 mm PPS Flue Tube x 1000 mm long (effective length 945 mm)
80 mm PPS Flue Bend x 93°
80 mm PPS Flue Bend x 45°
80 mm Wall Fixing Bracket - Aluminium
80 mm Bird Mesh Cap - Plated Steel

The above flue components are light grey self coloured Polypropylene moulded components with push together spigot and socket joints with integral seal ring located in the socket.

If fire stop seals are required to be installed where PPS plastic flue components pass through walls, floors or ceilings then suitable fire stop seals are available from:-

Nullifire Ltd Torrington Avenue Coventry CV4 9TJ

Tel 02476 855000 Fax 02476 469547

Dufaylite Developments Ltd Cromwell Road, St Neots Huntingdon PE19 1QW

Tel 01480 215000 Fax 01480 405526

Quelfire PO Box 35, Altrincham Cheshire WA14 5QA Tel 0161 928 7308 100 mm PPS Flue Tube x 1000 Long (Effective Length 945 mm)
100 mm PPS Flue Bend x 93°
100 mm PPS Flue Bend x 45°
100 mm Wall Fixing Bracket
100 mm Bird Mesh Cap - Plated Steel
80 x 100 mm Increaser



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13.0 room sealed *flue installations*

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The Strata I boiler has an excess pressure combustion system, which coupled with the very low flue gas temperatures produced allows the appliance to be exhausted and supplied with room sealed combustion air using a concentric flue arrangement of 80 mm PPS polypropylene flue pipe within a 125 mm outer painted metal air tube over considerable distances. A range of concentric flue components are available from MHS Boilers Ltd and are listed below. Alternatively, two seperate tubes, one carrying combustion air and one carrying flue gas may be used in conjunction with the appropriate adaptor.

The concentric flue system should be installed to have at least a 3° fall to the boiler to allow any condense formed in the flue to run back to the boiler.

The flue system must be gas and water tight and must be adequately supported over it's entire length. Support at 1.5m intervals. Horizontal Discharge and Vertical Discharge Terminal Sets are available.

Care should be taken when selecting a position for a low level discharge or discharge adjacent to windows etc as the flue terminal will plume heavily and the white water vapour discharge may cause a visual nuisance.

Concentric flue components have push together spigot and socket joints. Both the inner PPs flue gas tube and the outer air tube have soft seal rings located in the socket components.

To aid assembly and assurance that the joints have been fully pushed home, the seal rings and make ends of tubes/fittings should be lightly lubricated with silicone grease.

list of concentric flue components

- 80/125 concentric wall terminal set:- comprises 845 mm straight length with made on terminal, 90° concentric bend and wall bezel plates.
- 80/125 concentric roof terminal set:- comprises 1000 mm straight length with made on terminal and INr 125 wall bracket.
- I25 pitched roof tile flashing for use with concentric roof terminal set, adjustable between 25° to 50°.
- 125 flat roof flashing for use with concentric roof terminal set.
- 80/125 concentric flue tube set x 1000 mm.
- 80/125 concentric flue tube set x 500 mm.
- 80/125 concentric 93° bend.
- 80/125 concentric 45° bend.
- I 25 Wall bracket assembly.
- 80/125 concentric vertically extendible discharge room sealed wall terminal assembly (610 mm long (*850) - For use where a standard wall terminal may cause visual flue gas pluming nuisance. Includes 90° Concentric bend, wall bezel plates and silicone mastic. Used in conjunction with additional 80 mm pps flue gas tube and fittings listed on page 10.
- 80/125 concentric to 2 x 80 mm separate tubes adaptor.
- 80/125 to 100/150 concentric increaser (not shown).
- 100/150 concentric wall terminal (not shown).
- 100/150 concentric roof terminal (not shown).
- 100/150 concentric flue tube set x 1000 mm (not shown).
- 100/150 concentric flue tube set x 500 mm (not shown).
- 100/150 concentric 93°C bend (not shown).
- I00/I50 concentric 45°C bend (not shown).









installation of standard wall terminal

In order to determine the length of concentric tube required to correctly terminate a side outlet arrangement, the following procedure should be followed:

- 1. Measure wall thickness W in mm see fig 7.
- 2. Measure distance between side of appliance and inside face of wall L1 in mm see fig 7.
- Mark off and cut flue tubes following guidance shown in fig 8 below. Flue tubes should be cut to length TL in mm. Both inner and outer tubes should be cut flush with each other, square and any burrs removed.

Where TL required, is greater than 845 mm, then additional lengths (as appropriate) of 80/125 concentric tube will be required to extend the standard wall terminal. A fall of 3° is required along the length of the flue towards the appliance.





installation of standard wall terminal

In order to determine the length of concentric tube required to correctly terminate a rear outlet arrangement, the following procedure should be followed.

- 1. Measure wall thickness W in mm see fig 10.
- 2. Mark off and cut flue tubes following guidance shown in fig 11 below.

Flue tubes should be cut to length TL in mm. Both inner and outer tubes should be cut flush with each other, square and any burrs removed.

Where TL required, is greater than 845 mm, then additional lengths (as appropriate) of 80/125 concentric tube will be required to extend the standard wall terminal. A fall of 3° is required along the length of the flue towards the appliance.



method of assembly of horizontal concentric flue system using standard wall terminal

- Lubricate male ends of concentric bend with silicone grease and locate bend into flue and air tube connection sockets on the top of the boiler and gently push fully home.
- 2. Slip flue tube and terminal assembly through prepared hole in the outside wall.
- 3. Locate wall bezel plate loosely onto air tube.
- 4. Lubricate male ends of concentric flue tube and female sockets of flue bend lightly with silicone grease. Insert concentric tubes into bend and gently push fully home. Ensure plain section of external part of air inlet tube is located uppermost.
- Make good internally and externally gap between air tube and prepared hole through wall.

- 6. Slip on external wall bezel plate.
- 7. Fix internal and external wall bezel plates with fixings provided.

Where a flue terminal discharges through a wall within 2m of ground level or balcony etc then the terminal should be fitted with an appropriate sized terminal guard to prevent that the terminal may be touched.

extending the flue gas discharge vertically away from a room sealed wall terminal

The Strata I boiler is a fully condensing appliance with very low flue gas temperatures. Consequently, the flue gas discharge is commonly seen as a white vapour plume, Whereas this is not harmful when properly discharged into the atmosphere outside of a building from a correctly operating appliance, the white vapour plume may cause, in certain applications a visual nuisance.

It must also be considered that a flue termination will drip condense water and may cause an ice hazard below the terminal position

If it is considered that pluming or dripping from the end of a standard wall terminal may create a nuisance, then as an alternative, the vertically extendible discharge wall terminal is available see figs 14 and 16. This creates a local room sealed intake for combustion air but allows the installer to extend the 80 mm PPS flue gas tube to a point where pluming or dripping discharge will not cause a visual nuisance or hazard.

installation of vertical discharge wall terminal

In order to determine the length of concentric tube required to correctly terminate a side outlet extended vertical discharge arrangement, the following procedure should be followed.

- 1. Measure wall thickness W in mm see fig 14 overleaf.
- 2. Measure distance between side of appliance and inside face of wall L1 in mm see fig 14 overleaf.
- Mark off and cut flue tubes following guidance shown in fig 15 overleaf. Flue tubes should be cut to length TL in mm. Both inner and outer tubes should be cut flush with each other, square and any burrs removed.

Where TL required, is greater than 610 mm, (*850mm) then additional lengths (as appropriate) of 80/125 concentric tube will be required to extend the vertical discharge wall terminal. A fall of 3° is required along the length of the flue towards the appliance.

installation of vertical discharge wall terminal with side outlet

installation of vertical discharge wall terminal with rear outlet

In order to determine the length of concentric tube required to correctly terminate a rear outlet extended vertical discharge arrangement, the following procedure should be followed.

- 1. Measure wall thickness W in mm see fig 16.
- 2. Mark off and cut flue tubes following guidance shown in fig 17 below.

Flue tubes should be cut to length TL in mm. Both inner and outer tubes should be cut flush with each other, square and any burrs removed.

Where TL required is greater than 610 mm, (*850) then additional lengths (as appropriate) of 80/125Concentric tube will be required to extend the vertical discharge wall terminal. A fall of 3° is required along the length of the flue towards the appliance.

method of assembly of extendible vertical discharge wall terminal assembly

See fig 18.

- 1. Lubricate male ends of concentric bend with silicone grease and locate bend into flue and air tube connection sockets on the top of the boiler and gently push fully home.
- 2. Slip flue tube and terminal assembly through prepared hole in the outside wall.
- 3. Locate internal wall bezel plate loosely onto air tube.
- 4. Lubricate male ends of concentric flue tubes and female sockets of flue bend lightly with silicone grease. Insert concentric tubes into bend and gently push fully home. Ensure flue gas discharge is positioned vertically upwards.
- 5. Made good internally and externally gap between air tube and prepared hole through wall.
- 6. Fit external 2 piece wall bezel and secure both internal and external wall bezels using fixings provided.
- 7. Seal air tube to exhaust discharge with a bead of silicone rubber mastic (mastic supplied) to create weather seal to avoid entry of rain water into air tube.
- 8. Extend flue gas discharge to chosen position using 80 mm PPS flue tube fittings. Flue gas discharge must discharge on same face of building as air inlet to avoid wind caused imbalance in flue system.

14.0 examples of calculating flue pressure loss

example l

A Strata 1-38/46 combination boiler is proposed to be installed with a room sealed concentric flue taking an all horizontal route to a wall terminal that has the flue gas duct extended to a more acceptable termination position to avoid a potential visual nuisance problem with flue gas pluming.

Flue system comprises: 3 x 90° concentric bends 8 metres concentric flue tube 3 x 80mm 90° flue gas elbows 3 metres 80mm flue gas tube Concentric wall terminal

Resistance =

I x 80/125 concentric wall terminal @ 5.0 Pa = 5.0 3 x 80/125 90° concentric bends @ 4.0 Pa = 12.0 8 x Im lengths 80/125 concentric tube @ 4.0 Pa = 32.0 3 x 90° DN80 bends @ 2.5 Pa = 7.5 3 x Im lengths DN80 PPS tube @ 2.5 Pa = 7.5

I x DN80 open termination with mesh @ 2.5 Pa = 2.5

Total Resistance = 66.5 Pa

conclusion: Total resistance is less than 100 Pa therefore there will be no effect on boiler output. System may be installed as proposed.

example 2

A Strata 1-38/46 combination boiler is proposed to be installed with a room sealed concentric flue taking a part horizontal (6m) and part vertical (10m) route to a vertical concentric roof terminal set. The flue system includes 3 Nr 90° concentric bends and is installed to run within the building.

Resistance =

 $\begin{array}{l} 3 \times 80/125 \; 90^\circ \; \text{concentric bends} \; @ \; 4.0 \; Pa = 12.0 \\ 16 \times 1m \; \text{lengths} \; 80/125 \; \text{concentric tube} \; @ \; 4.0 \; Pa = 64.0 \\ 1 \times 80/125 \; \text{concentric roof terminal with cap} \\ @ \; 7.5 \; Pa = \; \; 7.5 \end{array}$

Total Resistance = 83.5 Pa

There is 10 m of vertical flue which will create an updraught of 33 Pa.

Therefore final operating resistance = 83.5 - 33 = 50.5 Pa.

conclusion: Total resistance is less than 100 Pa therefore there will be no effect on boiler output. System may be installed as proposed.

14.1 calculating *flue resistance*

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The excess pressure available for overcoming the frictional resistance of a flue system is 100 Pa.

The adjacent table of flue component resistances will assist the designer in calculating total flue system frictional loss.

If the total installed flue system resistance exceeds 100 Pa, then the result will be a reduction in boiler output. Reference to the "Effect of Flue System Resistance On Boiler Output", graphs will assist. If the resistance of a proposed flue system has an unacceptable effect on boiler output, then a larger diameter flue tube should be selected.

Thermal up-draught is generated in a vertical flue system, reducing the resistance of the system. Reference to the "Thermal Updraught Graph" will provide a figure in Pa, which may be deducted from the total calculated flue system resistance.

NOTE: Does not apply to horizontal sections of a flue system.

Component.	Resistance Pa Strata 38 38/46
80/125 Concentric Wall Terminal	7.5
80/125 Concentric Roof Terminal Without Rain Cap	7.5
80/125 Concentric Roof Terminal With Rain Cap	11.25
Im Length 80/125 Concentric Tube	5.5
93° 80/125 Concentric Bend	5.5
45° 80/125 Concentric Bend	2.75
Im Length DN 80 PPS Flue Tube (Flue	egas) 5.0
93° DN 80 PPS Flue Bend (Fluegas)	5.0
45° DN 80 PPS Flue Bend (Fluegas)	2.5
Room Sealed Chimney Cap	7.0
Im Length DN 100 PPS Flue Tube	2.0
93° DN 100 PPS Flue Bend (Fluegas)	2.0
45° DN 100 PPS Flue Bend (Fluegas)	1.0
DN 80 Open Termination with Mesh	4.0
DN 100 Open Termination with Mesh	2.0
80/125 Concentric to 2 x 80 Tubes A	daptor 3.5
Im length DN80 PPS Tube (Air)	4.0
93° DN 80 PPS Bend (Air)	4.0
45° DN 80 PPS Bend (Air)	2.0

15.0 flue terminal positions

The flue terminal of a Strata I boiler will plume heavily and care must be taken when selecting a terminal position to ensure that a "nuisance situation" is not created.

If a flue terminal is positioned within 2 m above ground level or any upper part of a building where people have general access (e.g. balcony etc) then the terminal should be fitted with an appropriate guard.

I 5.0 flue terminal positions (contd)

minimum dimensions of flue terminal positions See fig 19.

Dimension	Terminal	Balanced flue	Non room
	position	room sealed	sealed
A	Directly below an opening, air brick, windows etc. Not recommended.	300mm but installation not recommended.	300mm but installation not recommended.
В	Below gutters, soil pipes or drain pipes.	75mm	75mm
С	Below eaves.	200mm	200mm
D	Below balconies or car port roof. Not recommended.	200mm but installation not recommended.	200mm but installation not recommended.
E	From a vertical drain pipe or soil pipe.	150mm	I 50mm
F	From an internal or external corner.	300mm	200mm
G	Above ground, intersecting roof or balcony level.	300mm	300mm
Н	From a surface facing the terminal.	2000mm	2000mm
I	From a terminal facing the terminal.	2000mm	2000mm
J	From an opening in the car port (e.g. door, window) into dwelling.	1200mm but installation not recommended.	I 200mm but installation not recommended.
К	Vertically from a terminal on the same wall.	1500mm	1500mm
L	Horizontally from a terminal on the same wall.	300mm	300mm
Μ	From a vertical structure on the roof.	500mm	N/A
Ν	Above intersection with roof.	500mm	I 50mm
Р	Directly above an opening, air brick, window etc.	300mm	300mm
Q	Horizontally to an opening, air brick, window etc.	500mm	500mm

I 6.0 ventilation requirements single appliances

The room or space in which the Strata 1 boiler is installed may require to be ventilated in accordance with BS5440: Part 2: 2000, or BS6644:1991 as a appropriate.

The following tables must be read to ascertain the amount of ventilation required for the installation of a single appliance and has been calculated from BS 5440: Part 2: 2000.

Table I	Room installation - non room sealed flue. Natural ventilation direct to outside air.
	Ventilation openings free area cm ²
	220
Table 2	Room Installation - Non Room Sealed Flue Natural ventilation from adjacent room which is directly ventilated to outside air.
	Ventilation openings free area cm ²
	220
	With adjacent room similarly ventilated direct to outside air
Table 3	Room Installation - Room Sealed Flue There are no specific requirements for a room to be ventilated where the appliance is room sealed. However, consideration should be given to providing ventilation for general cooling,
Table 4	Compartment Installation - Non room sealed flue Natural Ventilation Direct to outside air
	Ventilation openings free area cm ²
	High Level Low Level 230 460
Table 5	Compartment Installation - Non room sealed flue Natural Ventilation from Adjacent room
	Ventilation openings free area cm ²
	High Level Low Level 460 920

With adjacent room having a ventilation opening of not less than 220cm² direct to outside air.

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16.0 ventilation requirements (contd)

 Table 6
 Compartment Installation - Room sealed flue

 Natural Ventilation direct to outside air

Ventilation openings free area \mbox{cm}^2

High Level Low Level 230 230

 Table 7
 Compartment Installation - Room Sealed Flue

 Natural Ventilation from Adjacent Room

Ventilation openings free area \mbox{cm}^2

High Level Low Level 460 460

Multiple Appliances Installed in the Same Room or Space

Where multiple Strata 1 boilers are installed in the same room or space then the aggregate of the appliance inputs must be taken to determine (from the following data) the amount of ventilation required.

Appliance Gross Heat Inputs Should be taken as:-

51.1kW

Table 8Non Room Sealed Flue InstallationsNatural Ventilation Direct to Outside Air.

Low Level (Inlet): 540cm2 plus 4.5cm² per kW in excess of 60kW total rated input.

High Level (Outlet): 270cm2 plus 2.25cm² per kW in excess of 60kW total rated input.

 Table 9
 Room Sealed Flue Installations

 Natural Ventilation Direct to Outside Air
 (Ventilation recommended for cooling purposes)

Low Level (Inlet): $4.5cm^2$ per kW of total rated input. High Level (Outlet): $4.5cm^2$ per kW of total rated input.

17.0 hydraulic system design

- The Strata I boiler can be operated to serve a heating load in a number of ways:
 - 1. Constant flow temperature, with the option to set either high temperature (85°C), medium temperature (70°C) or low temperature (55°C).
 - 2. Direct-on-boiler weather compensated flow temperatures, with adjustable maximum flow temperature.
 - 3. Underfloor heating coils via a VT mixing valve with a maximum flow temperature of 55°C plus a second circuit (eg. radiators) operating with direct-on-boiler weather compensated temperatures.
- Flow to return drop (Δ t). The microprocessor controls monitor return temperature and the facility to operate at a set Δ t (by pump speed modulation) is a standard and most important feature and will, where possible, maintain the Δ t across the boiler at 20°C, as the lower the return temperature, the higher the operating efficiency. HT and MT systems should be designed for Δ t 20°C and LT (underfloor coils via a mixing valve) systems Δ t 10°C. Designing for a Δ t 20°C gives the added cost saving advantage of smaller pipe sizes and pumps.
- The Strata I includes an 'in built' primary pump with a residual head pressure as listed below.
- Appliances may be installed as single units or in multiples.
- Single units may or may not require additional system pumps which will be dictated by the system configuration and by the index resistance.
- Multiple units (and single units which require additional pumps), must always be installed with a low loss mixing header or similar arrangement. see table below.
- The Strata 1/38 boiler has in built domestic hot water (remote stored) temperature control ability, and if required, the in built pumps may be used to provide the primary flow to a nearby indirect cylinder or calorifier with the boiler controlling a diverter valve in the main flow or return pipework.
- Provision within the system design must allow for: Low water pressure cut off device and water pressure gauge.

low velocity mixing header diameter sizing guide

Boiler Power kW	Design ∆t 20°C
Up to 38	40mm
76	50mm
114	65mm
152	65mm

Tube diameters refer to steel pipe and calculated using data from CIBSE Guide C4

in-built boiler pumps approx residual head pressure at max speed

Boiler Model	Pressure Metres wc
Strata 1/38	3.3
Strata 1/38-46 Combi	2.4

in-built boiler pumps approx residual head pressure at min speed

Boiler Model	Pressure Metres wc
Strata 1/38	1.0
Strata 1/38-46 Combi	1.0

The following system schematics show a number of typical installation types to which the Strata 1 boiler may be connected.

The Strata I is not limited to just the systems shown, and may be used in conjunction with many commercially available control items.

For further advice or guidance on schematic designs or control options contact MHS Boilers Ltd.

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17.0 hydraulic system design (contd)

system type l

Typical single Strata 1 boiler installation serving heating only where the boiler's own inbuilt circulating pump is used to circulate the water around the system (used only where system index resistance < pump residual head - see page 24). Flow temperature may be fixed/constant or weather variable.

- C = Room Controls, either RE2132 modulating room unit from MHS Boilers or a room thermostat.
- PS = Low water pressure cut off switch.

17.0 hydraulic system design (contd)

system type 2

Typical single Strata I boiler installation serving domestic hot water (not Combi) and heating where hot water has priority via a divertor valve. The in-built circulating pump within the boiler is used to circulate the system (used only where system index resistance < pump residual head - see page 24). Flow temperature to hot water is constant and flow temperature to heating may be constant or weather variable.

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17.0 hydraulic system design (contd)

system type 3

Typical Single Strata I boiler installation serving heating only and using a low velocity mixing header where system index resistance exceeds in-built boiler pump residual head - see page 24. Flow temperature may be fixed/constant or weather variable.

17.0 hydraulic system design (contd)

system type 4

Typical Single Strata I boiler installation serving heating & domestic hot water (not Combi). Hot water is priority and is served via a divertor valve and the boiler's in built circulating pump where index loss through HWS primaries is less than boiler pump residual head*. Heating circuit index loss exceeds boiler pump residual head* and is served via a low velocity mixing header and a separate pump. Heating flow temperature may be fixed/constant or weather variable.

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17.0 hydraulic system design (contd)

system type 5

Typical Single Strata I boiler installation serving heating & domestic hot water (not Combi) with hot water priority. Hot water & heating circuits both have index resistance exceeding boiler pump residual head* & are served by independent pumps from a low velocity mixing header. Heating flow temperature may be fixed/constant or weather variable.

* See page 24

17.0 hydraulic system design (contd)

system type 6

Typical Single Strata I boiler installation serving domestic hotwater (not Combi) and radiator heating zone and an underfloor coil zone all via a low velocity mixing header. The HWS will always have priority. The 2Nr heating zones may operate independently via 2 Nr separate room units. The 2 Nr heating zones will always be weather compensated but may have differing compensation slopes.

OS = Outside air temperature sensor. Provides outside air temperature reference for both heating zones.

MRO3 = Pumps and mixer regulation control box from MHS Boilers provides pump control for both heating zones i.e. auto operation, frost protection and summer stand still protection running. Provides drive for underfloor coil zone VT mixing valve with max flow temperature limitation set at 55°C. Includes controls for compensation of under floor coils. Max pump motor loads 2A.

RC1 = RE2132 modulating room unit from MHS Boilers provides Time & Temperature control for radiator heating zone.

- RC2 = As RC1 but for underfloor coil zone. Only to be used when RCI is used.
- VS = Underfloor zone VT flow sensor (supplied with MR03).
- S/T = Hot water temperature controls, either "S", an HWS temperature sensor from MHS Boilers or "T", a cylinder thermostat.
- PS = Low water pressure cut off switch.

* Not applicable to Strata 1 - 38/46 Combi

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17.0 hydraulic system design (contd)

system type 7

Typical Multiple Strata 1 installation. Boilers controlled by modulating Kaskade manager which also has the facility to control heating & domestic hot water production. Heating flow temperature may be fixed/constant or weather variable. Hot water has priority.

17.0 hydraulic system design (contd)

system type 8

17.1 filling the system

The initial filling of a sealed heating system, and subsequent refilling, must be by a method that has been approved by the Water Regulation Advisory Scheme (WRAS) for that type of heating system. ie. Domestic (In-house) Fluid Category 3 (C-3). Non Domestic (Other than In-House) Fluid Category 4 (C-4).

For Category 3 systems, the approved method of filling must comprise of the following components in the arrangement shown;

- Control Valve incorporating a Double Check Valve on the mains cold water pipework.
- Temporary Connecting hose, which must be disconnected after use.
- Control Valve, on the heating system.

For Category 4 systems, the approved method of filling must comprise of the following components in the arrangement shown;

- Control Valve
- Strainer
- Verifiable Backflow Device with Reduced Pressure Zone (RPZ Valve). Incorporating a 'Type BA' air gap.
- Tundish
- Control Valve

Further more, in accordance with BS6644, for boiler/s with an input greater than 60kW, an automatic pressurisation unit must be installed to automatically replenish any lost or evpourated water.

- The pressurisation unit must comprise of the following components;
- A Cistern fitted with a Float Operated Valve incorporating either a 'Type AG' (C-3), or 'Type AF' (C-4) air gap.
- A Presssure Booster Pump fitted with a Single Check Valve
- A Pressure Reducing Valve
- A Pressure Switch

For information on a comprehensive range of pressurisation units please contact MHS Sales.

17.2 water treatment system cleaning

The entire primary system must be thoroughly cleansed and flushed to remove debris, flux residues etc before opening the boiler isolation valves & flooding the boiler. Particular care must be taken where the Strata boiler is being retro-fitted into an old/existing system, as system silt or magenite can be very damaging to the new boiler.

Following cleansing and flushing the system must be dosed with a good quality water treatment to prevent corrosion and the formation of scale. Failure to observe these requirements will render the guarantee on the product void. Cleansing, flushing and water treatment must be carried out in accordance with the requirements of BS 7593:1992 prior to commissioning the unit.

Repeated draining and refilling of the system must be avoided as this is very damaging to the boiler. The boiler must not be operated without the system water being correctly and adequately dosed with an appropriate corrosion inhibitor.

For specific guidance on water treatment, direct contact is advisable with:-

Betz Dearborn Limited Widnes Cheshire WA8 8UD Telephone: 0151 495 1861 Fernox Tandem House Marlowe Way, Croydon Surrey CR0 4XS Telephone: 0208 665 6666

17.3 care with the use of soldering flux

The Strata I boiler has a primary heat exchanger fabricated from 316L stainless steel. It is most important that the compatibility of any flux is checked with the flux supplier before use, and that any flux manufacturers recommendations are strictly followed with regards to use in conjunction with stainless steel.

17.4 hydraulic system design domestic hot water - Combi

17.5 Combi boiler - prevention of scale *in water to water heat exchanger*

In hard water supply areas, it is highly recommended to install a suitable proprietary in-line scale reducing device into the cold supply pipe serving the Strata 1/38-46 combi boiler. The scale reducing device should be installed in accordance with the instructions supplied with the device.

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17.6 Combi boiler hot water system pipework pressure drop

17.7 Combi boiler - domestic hot water system design considerations

- Ensure adequate working water pressure and flow rate availability.
- Consider that not only is water volume required for instantaneous production of hot water, but cold water most likely will be required simultaneously ie: shower blending, hot and cold taps running together, toilet flushing etc.
- Consider that as an absolute minimum the cold water main must be capable of supplying 18 litres/minute into the property. The required working water pressure will be dependent on the length of run to the draw off, the pipe size and any resistance at the drawoff (resistance of mixer taps, blenders etc). Reference to the flow rate/pressure drop charts will give guidance with regards to the hot water installation pipework (the resistance of the boiler's water to water heat exchanger is included in the pressure drops indicated). The additional working water pressure required for simultaneous cold water flow can be calculated by reference to CIBSE Guide C4.

17.7 system design considerations (contd)

- Be generous with pipe sizing to keep pressure loss to a minimum.
- Consider that water will always take the least line of resistance and will take preference to an opened drawoff closest to the boiler whilst perhaps ignoring/starving a simultaneous draw off further away from the appliance.
- Consider installing flow restrictors into both hot and cold water draw off points to ensure reasonable distribution of water around the building at times of multipoint draw off.

I 8.0 electrical connections

The electrical connections to the Strata I boiler are made via a plug/socket arrangement (mains) and labelled terminal rails which are located within the boiler case and to the left of the gas valve assembly. Connections must only be made using appropriate diameter multi strand flex cables and cable entry must only be via the rubber glanded cable entry points located at the bottom rear I/h side of the appliance. If the boiler is to be room sealed flued then care must be taken to ensure the cable entries are reasonably air tight. For electrical connection rail detail see fig 20.

The low voltage rail is mounted in front of the mains voltage rail. To access the mains voltage rail, pull the quick release pins located diagonally either side of the low voltage rail.

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domestic hot water temperature sensor

If a hot water temperature sensor (from MHS Boilers) is used to sense the temperature of stored hot water, then this should be inserted into a pocket or surface mounted to measure the water temperature at approximately 1/3 of the height of the hot water vessel up from the base of the vessel.

Cable Detail		
Length m	Cable Diameter mm ²	
Up to 35	0.25	
35 to 70	0.5	
70 to 140	1.0	

remote fault indication

The Strata I boiler includes a built in fault alarm relay with volt free contacts for interface with, if required a remote alarm indicator. The volt free contacts within the boiler control panel will close in the event that the boiler goes to a fault resulting in boiler lockout. The volt free contacts indicate "common alarm" upon closing. The actual fault description will be displayed upon the LCD screen of the boiler. Connection to the volt free contacts is made via an alarm plug and lead assembly available from MHS Boilers Ltd. The alarm plug and lead connects to socket x9 located behind the cover plate on the top front of the control panel. To release cover plate, pull quick release pins located at either side.

outside air temperature sensor

If weather compensated flow temperature (recommended for best seasonal efficiency and comfort) is required, then the supplied air sensor must be installed and electrically connected to the boiler. The outside air sensor should be installed on the exterior face of a north facing wall, away from any artificial influences such as ventilation discharge grilles or in direct sunlight. Ø 5mm wall fixings and screws are provided.

Cable Detail		
Length m	Cable Diameter mm ²	
Up to 35	0.25	
35 to 70	0.5	
70 to 140	1.0	

optional matched controls

In addition to the ability of the boiler to be connected to traditional industry standard control systems, MHS Boilers can supply a range of dedicated matched controls which not only simplify the selection of controls but in addition enhance the efficiency of the boiler and comfort conditions within the building.

combination pump and underfloor system mixing valve control

MRO3 module: For single boiler applications. A small and neat wall mounted control box which allows the boiler to control two different heating circuits.

- **Circuit I** A variable temperature circuit with pump and mixing valve (240v) for use with underfloor coils where the maximum flow temperature = 55°C.
- Circuit 2 A pumped heating circuit (eg radiators) where the flow temperature is direct-on-boiler weather compensated variable. The MRO3 has the facility to connect an RE2132 modulating room unit to provide modulating room temperature and time control over the underfloor circuit. A second RE2132 unit may be connected directly to the boiler to control Circuit No.2.

modulating room temperature control

RE2132 room unit: A compact digital room temperature control that will modulate boiler power according to room temperature requirements.

key features

- In-built optimising time control and temperature sensor.
- Three temperature levels including frost protection.
- Holiday programmable.
- Can be used as a remote control for parallel shift of compensation slope.
- Self learning.
- Can be connected to an individual boiler, on MR03 (underfloor) control or a KKM2 sequence controller.
- QAW44 an additional tamper proof sensor can be wired to the RE2132 to allow sensing of remote areas away from RE2132.

optional matched controls (contd)

multiple boiler Kaskade manager

KKM2 modulating sequence controller:

A comprehensive compact wall mounted microprocessor control panel which allows the control of up to five Strata I boilers. The KKM2 provides fully modulating control over the connected boilers ensuring precise output control and maximum efficiency.

In addition to boiler control, the KKM2 can provide the drive signal for a heating circuit pump and can provide control for stored domestic hot water (with priority over heating). Domestic hot water may be charged using either a diverter valve or primary pump, either of which are driven from the sequencer.

External control input is via either a volt free contact (eg time switch), 0-3v or 10v input, or an RE2132 modulating room unit plus necessary temperature sensors. Heating flow temperatures may be either constant temperature or direct-on-boiler weather compensated variable (by means of the in-built compensator). If more than five boilers are required to be controlled, then additional KKM2's may be slaved to the first control with slave capacity of four boilers per each additional sequencer. Standard features include pump overrun, boiler load rotation, frost protection and pump exercise program.

0-3/0-10 volt control

The Strata I can be operated via 0-3 volt or 0-10 volt control. The connection details are shown in fig 22. For further details on 0-3 or 0-10 volt control please contact the Technical Department.

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19.0 commissioning the Strata 1 boiler

The Strata I boiler should be expertly commissioned by a competent engineer who will need, in addition to standard hand tools, a U tube manometer and a combustion analyser.

Before attempting to set the Strata 1 38 or 38/46 combi boiler to work, the following check list must be worked through. See 19.1.

19.1 Pre-commissioning *checks*

- a) Ensure system has been thoroughly cleansed and flushed, any strainers have been cleaned and that the appropriate water treatment has been added to the system to prevent corrosion, scale formation etc. Failure to comply with this will void all warrantee applied to the boiler.
- b) Ensure the system and boiler has been properly fully flooded and vented of air and the cold fill pressure at the boiler is at a minimum 0.5 bar. Air vent for primary heat exchanger is located to the right hand side of the top of the boiler chassis.
- c) Check that the pump within the boiler is free to rotate by removing the vent screw in the end of pump motor and checking that the impeller shaft rotates freely when turned with an appropriate sized screwdriver. Replace vent screw.
- d) Ensure the appliance has been converted to burn the type of gas available on site.
- e) Ensure Gas supply has been purged and there is the availability of working inlet pressure of nominal 20mbar (Nat gas) or 37 mbar (LPG), and that the appliance supplied is suitable for the gas type being used. If the boiler is required to be converted to an alternative you must contact MHS Boilers for assistance.
- f) Check that the flue installation has been properly made.
- g) Check that a condense waste pipe (in plastic copper tube is not acceptable) has been connected to the boiler and that the syphon cleaning point cap is in place.
- h) Where the appliance is taking air for combustion from the room in which it is installed ensure an adequate provision for ventilation has been made.
- i) Ensure that there is an adequate heat load available.
- j) Ensure that the electrical connections have been made correctly.
- k) Combi boiler ensure domestic hot water pipework is flushed and fully flooded.
- Combi boiler ensure primary side of water to water heat exchanger is fully vented by releasing air from vent located on the top right hand side of the insulated heat exchanger. It is recommended to vent heat exchanger several times during initial commissioning.
- m) Set the low pressure switch to operate at 0.5 bar.

19.2 LPG Conversion *Procedure*

The Strata I 38 and 38/46 combination boilers can be converted to operate on LPG. (G31). Only the parts supplied in conversion kit# 250158 must be used. The 3.5mm injector must be installed into the inlet of the gas valve and the 5.7mm injector in to the outlet of the gas valve. Using the plastic plugs supplied the aeration holes in the white premix air box mounted on the inlet of the combustion fans must be plugged according to the table below.

Boiler Type	White Premix Air Box Hole	White Premix Air Box Hole
Strata I 38 Boiler	Plug with 15mm Plugs	Leave Open
Strata 38/46 Combination Boiler	Plug with 15mm Plugs	Plug with 13mm Plug

The data badge of the appliance must be marked to indicate the conversion has been undertaken. Refer to the commissioning section for guidance on Combustion Adjustment.

19.3 control panel

The user interfaces on the boiler control panel include a double pole on/off switch, 4Nr membrane button switches with click response, an LCD display screen with backlight and a mechanical dial type pressure gauge to indicate heating system water pressure.

The membrane button switches (with the exception of the test button) are multi-function and have varying operation depending upon the operational mode of the boiler.

When requiring to use the membrane button switches, light but firm finger pressure must be exerted on the appropriate circular marking until a click response is felt/heard.

display

The back lit LCD display screen has two lines. The normal text displayed is:-

- a) Upper Line Indicates current status of boiler, e.g. "HW DEMAND", and either "S" (summer) or "W" (winter) / "D" (day) or "N" (night).
- b) Lower Line Indicates current flow temperature of boiler and real time.

menu/reset button

- Gives access to the various menus
- Scrolls through the current operational status messages.
- Confirms an entry during controls programming.
- Resets the boiler following a "lockout".

"+"/米**恭 button**

- Advances (Scrolls forward) through menu.
- Increases a value to be edited.
- Sets controls to either summer (heating off) or winter (heating on) operation.

"-"/ 🛔 button

- Reverses (scrolls backward) through menu.
- Reduces a value to be edited
- Sets appliance (for 10 minutes) into Engineers mode for commissioning or checking purposes.

test button

- Checks overheat safety circuit (during a burner on mode; will cause burner to be shut down and then re-ignited).
- Checks boiler pump operation (during a burner off mode; will cause pump to be operated at 100% speed for approx 2 seconds.

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19.4 first *firing*

- Attach a "U" tube manometer to a gas pressure test point on the supply pipe (by installer) adjacent to the gas inlet connection on the appliance.
- b) Turn on (purged) gas and electricity supplies.
- c) Switch on boiler at on/off switch (see fig 21). Screen display will show "Deaeration" and boiler pump will pulse on and off for approx 60 seconds. Following which, the boiler will revert to either standby or DHW demand (combi).
- d) Press menu/reset button repeatedly until screen display shows "Revolu.....R/S (see fig 21).
- e) Press minus/engineers button twice. Screen display will show "10 min test". (see fig 21). Burner should ignite. (If after four attempts the burner fails to ignite, then the appliance will lockout and show "ignit fault". Press menu/reset button. Boiler will activate "Deaeration" programme following which:remove cover screw from gas valve adjustment (2) Q min and turn adjustment screw half turn clockwise see fig 22. Now repeat operations d and e until burner ignites.
- f) Check working inlet gas pressure should be nominal 20mbar for NG or 37mbar for LPG.
- g) Using the "+" and "-" buttons adjust burner fan speed to approx 1200 Revolutions. (see fig 21).
- h) Observe the colour of the burner, correct colour should be dull red. Using adjustment (2) Q min (see fig 22), set burner at correct colour. Turning screw clockwise increases brightness; anti clockwise reduces brightness of burner. Turn the screw very slowly and just a few degrees at a time the adjustment is very sensitive. Following this procedure will avoid poisoning your combustion analyser.
- Remove flue gas analysis test point cap (top-front-right of combustion chamber shell) and insert probe of combustion analyser. Adjust as necessary (2) Q min to obtain required CO₂% value – see Table 10. Make adjustments slowly and wait at least 2 minutes for analyser reading to stabilise before re-adjusting. Turning (2) Q min clockwise increases CO₂%. Turning (2) Q min anti-clockwise decreases CO₂%.
- j) Using the "+" and "-" buttons (see fig 21) increase burner fan speed to approx 6000 revolutions.
- k) Check working inlet gas pressure again see f above.
- Check CO₂% value in accordance with values shown in table 10. If adjustment is required, then turn screw (3) Q max (see fig 22). Turning (3) Q max clockwise decreases CO₂%. Turning (3) Q max anti-clockwise increases CO₂%.

NOTE: Adjustment of either (2) Q min or (3) Q max will affect the other adjustment to a lesser or greater extent. Following the adjustment of either Q min or Q max, check the CO_2 % value at the other setting and correct as necessary.

Table 10

Flue gas CO₂% settings

Nat Gas G20	LPG G31
9.5	11.5
9.0	11.0
	Nat Gas G20 9.5 9.0

19.4 first firing (contd)

- m) Repeat operations g, l, j and l and check/adjust settings as necessary.
- n) Press "Test" button (see fig 21) to stop the burner.
- o) Repeat operations d, e, g, i, j, and I and check/adjust settings as necessary. Refit (2) Q min cover screw.
- p) Press "Test button (see fig 21) to stop the burner.
- Remove analyser test probe and re-fit test point cap hand tight. Ensure rubber seal disc is in place inside cap.
- r) Turn off gas supply and remove U tube manometer from inlet pressure test point and re-fit test point screw and tighten. Turn on gas supply and check test point for gas soundness using leak detection fluid.

NOTE: Test period expires after 10 minutes. If this period expires before or whilst adjustments are being made/completed, then return to required adjustment position by repeating d, e, etc.

s) Check operation of flame failure system by turning off gas supply and then attempt to ignite burner. After 4 unsuccessful ignition attempts, the boiler should lockout and display "ignit fault". Restore gas supply and press reset button.

19.5 setting the control panel

The control panel has a number of parameters that need to be set to the requirements of the attached system and the needs of the user. The control parameters are accessed via a scrolling menu.

- MENU/RESET Button press and hold for approximately 3 seconds (see fig 20).
- The screen will briefly display "-MENU-" and will then display a menu option.
- To scroll through the menu options, use the "+" or "-" buttons, simply stop at the required option and follow specific instructions to programme as appropriate.

menu options

I. party

This is a user function and allows the user to extend normal heating operation (on an as and when required basis) beyond the normal heating period.

To access the "Party" option press the "Menu" button once. "——— hours" will flash on the screen, press "+" or "-" to enter a value and then press "Menu" to confirm the entry. Range 0 to 24 hours. Default 0 hours.

2. temp DHW

This is a user function and allows the user to programme the required stored hot water temperature where the boiler is serving a hot water cylinder (not combi boiler) and where the temperature control is via a sensor. If temperature control is via a cylinder thermostat then this function is not operative.

To access the "TEMP DHW" option press the "Menu" button once. "———°C" will flash on the screen, press "+" or "-" to raise or lower the value and then press "Menu" to confirm the entry. Range 40-60°C. Default 60°C.

19.5 setting the control panel (contd)

3. day temperat (day temperature)

This option is only displayed when the outside air temperature sensor (supplied with the boiler) is installed and operation with direct-on-boiler weather compensated flow temperatures is required.

This is a user function and allows the user to raise or lower the room temperature for adjustment of the comfort level.

Raising or lowering the set value will cause parallel displacement of the heating slope line which will result in raising or lowering of the heat emitter temperatures.

The default value for this setting = 20° C.

4. day/time

This is a user function and at this option the real day of the week and time should be set.

To set clock:-

- a) Press "Menu" button
- b) Use "+" or "-" to set day
- c) Press "Menu" button
- d) Use "+" or "-" to set hour (24 hour clock)
- e) Press "Menu" button
- f) Use "+" or "-" to set minutes
- g) Press "menu" button to effect settings.

5. set CH timer

This is a user function and at this option the on/off times for normal heating may be set. 3 ON and 3 OFF Periods may be set each day.

IMPORTANT: If the heating circuit is being controlled by a remote timeswitch or BMS system then the 1st on time must be set to 0000 and the 1st off time must be set to 2400 for each day.

To set operational times:-

- a) Press "Menu" "Monday >" is displayed on screen.
- b) Press "Menu" "Copy SU>MO" is displayed on screen, (ignore this)
- c) Press "+", "Switch on I" is displayed on screen
- d) Press "Menu" (hours will flash) use "+" or "-" to set required hour
- e) Press "Menu" (minutes will flash) use "+" or "-" to set required minute
- f) Press "Menu" to confirm settings
- g) Press "+", "switch off I" is displayed on screen
- h) Repeat d to f input 1st switch off time.
- At this point, press either "+" to programme 2nd heating period, in which case, repeat d to h for 2nd period, and then if 3rd heating period is required, repeat c to h for 3rd period or press "+" until "
back" is displayed, then press "Menu" to advance to next day.
- j) At this point, press either "Menu" to copy programme to next day or press "+" to allow individual day programming. If individual day programming is required then repeat d to j as appropriate.
- k) Continue programming/copying each day until each day has been programmed ending with Sunday and screen display "<Back".
- Press "Menu" to return to main menu. Default setting – on 0.600 – off 23.00

6. set HW timer

This is a user function, and at this option the on/off times for hot water production may be set.

NOTE: This function is not appropriate to the Combi boiler and may be ignored. Hot water production with the combi boiler is instantaneous and is available at all times.

Hot water production always takes priority over heating and the heating function will be temporarily suspended whilst hot water is being generated. This applies to both the Strata I-38 boiler and Strata I-38/46 Combi.

To set operational times for hot water charging follow the procedure as described in 19.4.5 a to l. Default – on 0.600 - off 23.00.

19.5 setting the control panel (contd)

7. set MV timer

This is a user function and at this option, the on/off times for an under floor coil circuit (that is controlled by an MR03 mixing valve regulation control box from MHS Boilers) may be set.

To set operational times for under floor circuit operation, follow the procedure as described in 19.4.5 a to I. Default on 0.600 – off 23.00.

8. setback

This is a user function and sets the reduction in room temperature for overnight operation. This is a reduction in temperature from that which is set in 19.4.3 - Day temperature. Default value 5°C.

To programme set back temperature:-

- a) With "SETBACK" displayed on the screen press "Menu".
- b) "___°C" will flash on the screen, press "+" or "-" to raise or lower the value to the required setting and then press "Menu" to confirm the entry.

9. holiday

This is a user function and allows up to 255 days of holiday period to be programmed.

During this period the heating will operate (if in winter mode) at "setback" temperature see 19.4.8 and the domestic hot water will be maintained at a minimum of 20°C.

After the number of "holiday" days has expired, the unit will revert back to the normal operation.

NOTE: If the heating circuit is being controlled by an RE2132 modulating room unit, then this piece of control equipment should also be "holiday" programmed. See instructions supplied with the RE2132 unit. Default setting 0 days.

To programme a holiday period:-

- a) With "holiday" displayed on the screen press "Menu".
- b) "___days" will flash on the screen press "+" or "-" to input the required number of days in the holiday period and then press "Menu" to confirm the entry.

The holiday period should be programmed on the day that the holiday begins.

10. installer

This function should not be accessed by the user and is code protected. For Installer programming instructions see 19.6.

II. back

This is the end of the menu. Press "Menu" to exit.

19.6 installer programming of control panel

A number of operational options are available to the installer. These can only be accessed by means of a pass code. If the correct code is entered at 19.4.10 then the following parameters may be set, see 19.5.2. (For installer code no see bottom right hand corner of page).

I. to enter installer programming menu:-

- a) With "INSTALLER>" displayed on the screen press "Menu".
- b) Code: 0 will flash on the screen press "+" or "-" to input the installer code and then press "Menu" to confirm the entry and access the installer menu.

2. installer programme menu

Scroll through menu using "+" or "-" buttons. The current setting for any parameter will be displayed under the particular parameter title.

Installer Code = 21

a) CURV 20°C CH (Default setting = 0°C)

This option is only displayed when the outside air sensor is installed for direct on boiler weather compensation.

Shift adjustment of the weather compensated flow temperature (if active – see 19.5.2l) at $+20^{\circ}$ C outside air temperature.

At this setting, the installer may add or subtract up to 20° C to or from the factory set 20° C flow temperature. In other words, the flow temperature at outside air temperature 20° C may set between 0° C and 40° C. See figs 22-25.

To make an adjustment:-

Press "Menu" button once, the current setting will flash on the screen, press "+" or "-" to input a new value between -20° C and $+20^{\circ}$ C and then press "Menu" button to confirm the entry.

NOTE: Settings a and b are only relevant if the supplied outside air temperature sensor has been installed and "outside air control" selected in 19.5.2l.

b) CURV – **I** °**C CH** (Default setting = 0°C)

This option is only displayed when the outside air sensor is installed for direct on boiler weather compensation.

Shift adjustment of the weather compensated flow temperature (if active – see 19.5.2l) at -1 °C outside air temperature.

At this setting, the installer may add or subtract up to 20°C to or from the set maximum central heating flow temperature. (the base setting for the maximum central heating flow temperature is made in 19.5.2l)

NOTE: The maximum flow temperature is 85°C. If a shift adjustment is made that asks for 85°C to be exceeded, the curve will flatten at flow temperature 85°C but the result will be, that the maximum flow temperature of 85°C will be achieved at a higher outside air temperature. See figs 22-25.

To make an adjustment:-

Press "Menu" button once, the current setting will flash on the screen, press "+" or "-" to input a new value between -20° C and $+20^{\circ}$ C and then press "Menu" button to confirm the entry.

c) PUMP MIN (Default setting = 35%)

Setting for the lowest (minimum) speed that the inbuilt modulating speed pump can operate at. Recommended setting 35%.

To make an adjustment:-

Press "Menu" button once, the current setting will flash on the screen, press "+" or "-" to input a new value between 35% and "PUMP MAX" and then press "Menu" to confirm the entry.

d) PUMP MAX (Default setting = 100%)

Setting for the highest (maximum) speed that the inbuilt modulating speed pump can operate at. Recommended setting 100%.

To make an adjustment:-

Press "Menu" button once, the current setting will flash on the screen, press "+" or "-" to input a new value between "PUMP MIN" and 100% and then press "Menu" to confirm the entry.

e) SERVICE IN

The control panel includes a countdown service timer and at this setting will initially show the number of days left until the boiler should be serviced and at which time the screen display will show exclusively "Service". The boiler will continue to function but the user should arrange for a service visit.

To reset the service counter to the default value of 365 days press "Menu" button twice. If another value between "off" (service counter inactive) and 1500 days (Recommended setting not greater than 365 days) is required, then press "Menu" button once, input a new value using either the "+" or "-" buttons and then press "Menu" to confirm the entry.

f) PUMP CONTINUE (Default setting = off)

At this setting, the inbuilt pump and any connected external pump may be operated continuously during winter mode. Recommended setting = off.

To alter the setting:-

Press "Menu" button once, press either "+" or "-" to alter the setting to "on or off" and then press "Menu" to confirm the entry.

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g) ECO + (Default setting = on)

The inbuilt modulating speed pump will automatically modulate in order to maintain the design 20°C Δt across the boiler flow and return temperatures.

If "ECO+" is set to "off", the pump speed is free to modulate at any return water temperature with the exception of the first start-up in the morning.

To alter the setting:-

Press "Menu" button once, press "+" or "-" to input the required setting and then press "Menu to confirm the entry.

h) POSTRUN HW (Default setting I min)

At this setting the post running time (overrun) of the inbuilt boiler pump and any connected HW primary charging pump may be set. The pump/s will overrun for the set time at the end of a HW demand period.

This setting is only applicable for Combi boilers, and standard boilers serving a domestic hot water cylinder or calorifier. Recommended settings:

Combi boiler = 1 minute

Model 38 boiler = Not less than I minute

To alter the setting:-

Press "Menu" button once, the current setting will flash on the screen, press "+" or "-" to input a new value between I and 5 minutes and then press "Menu" to confirm the entry.

i) POSTRUN CH (Default setting 3 min)

At this setting the post running time (overrun) of the inbuilt boiler pump and any connected CH circulation pump may be set. The pump/s will overrun for the set time at the end of a CH demand period. Recommended setting = not less than 3 minutes.

To alter the setting:-

To aller the setting.

Press "Menu" button once, the current setting will flash on the screen, press "+" or "-" to input a new value between 3 to 20 minutes and then press "Menu" to confirm the entry.

j) MIN POWER (Default setting 17%)

This is the minimum power for both central heating and hot water demands that the burner may modulate down to.

Recommended setting = not less than 17%.

To alter the boiler minimum power:-

Press "Menu" button once, the current setting will flash on the screen, press "+" or "-" to input a new value between 17 to 100% and then press "Menu" to confirm the entry.

k) MAX POWER CH (Default setting 100%)

At this setting, the maximum output of the boiler for a central heating demand may be set. This adjustment is only relevant to those market places where national or local regulations demand that a boiler must be accurately set to meet design load.

The Strata I-38 and 38 combi boilers are fully modulating appliances and automatically adjust to suit load conditions and for the UK market it is recommended to leave the setting at 100%.

To alter the boiler maximum CH power, press "menu" button once, the current setting will flash on the screen, press "+" or "-" to input a new value between "Min Power" and 100% and then press "Menu" to confirm the entry.

I) FUNCTION NR (Default setting = 9)

At this setting the boiler is programmed to suit the needs of the attached system.

Select the appropriate "Function No" from the following tables and then enter the required number. To input "Function No":-

Press "menu" button once, the current setting will flash on the screen, press "+" or "-" to input the appropriate number and then press "menu" to confirm the entry.

NOTE: Take care to enter the correct function number as relevant to the system configuration. Entry of an incorrect function number may result in an error (fault) message being displayed on the control panel screen and or incorrect or unwanted operation of the boiler and system.

m) <BACK

To exit the installer menu, press "menu" button twice when screen display shows "
back".

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19.6 installer programming (contd)

Table I I

Valid for Combi boilers and standard boilers where primary hot water control is via a 3 way divertor valve.

System Type	Room Controls Type	CH Flow Temperature	Function Number
Outside air temperature controlled,	With RE2132 modulating room unit	Max 55°C	I
without a secondary underfloor		Max 70°C	2
mixing circuit		Max 85°C	3
	With room thermostat/volt free switch	Max 55°C	4
		Max 70°C	5
		Max 85°C	6
	Without room controls	Max 55°C	7
		Max 70°C	8
		Max 85°C	9
Outside air temperature controlled,	With 2Nr RE2132 room units	Primary 70°C	10
with a secondary underfloor		Primary 85°C	11
mixing circuit and MR03 controller	With INr RE2132 modulating room unit	Primary 70°C	12
		Primary 85°C	13
	With room thermostat/volt free switch	Primary 70°C	14
		Primary 85°C	15
	Without room controls	Primary 70°C	16
		Primary 85°C	17
No outside air temperature control,	With RE2132 modulating room unit	Max 55°C	18
and without secondary underfloor		Max 70°C	19
mixing circuit		Max 85°C	20
	With room thermostat/volt free switch	Max 55°C	21
		Max 70°C	22
		Max 85°C	23
No outside air temperature control,	With 2Nr RE2132 modulating room units	Primary 70°C	24
and with secondary Underfloor		Primary 85°C	25
mixing circuit and MR03 controller	With 1Nr RE2132 modulating room unit	Primary 70°C	26
		Primary 85°C	27
	With room thermostat/volt free switch	Primary 70°C	28
		Primary 85°C	29
Fixed constant flow temperature with no ou	tside air temperature control and without room	controls.	
Without secondary underfloor mixing circuit		Max 55°C	30
	-	Max 70°C	31
		Max 85°C	32
With secondary underfloor mixing circuit		Primary 70°C	33
and MR03 controller		Primary 85°C	34

Table 12

Valid for combi and standard Strata 1-38 boilers. Multiple boiler installation with boilers controlled by a cascade manager.

System Type	Function Number
KKM2 Modulating Kaskade Manager	35
Analog cascade manager with signal 0-3v or 0-10v*	36

* Boilers must be fitted with optional extra 0-10v interface

Table 13

Valid for standard Strata 1-38 boilers only (NOT COMBI) where the domestic hot water cylinder (if fitted) is charged via an additional hot water primary pump and the pump is electrically connected to the boiler.

System Type	Room Controls Type	CH Flow Temperature	Function Number
Outside air temperature controlled, without a secondary underfloor	With RE2132 modulating room unit	Max 55°C Max 70°C	37 38
mixing circuit		Max 85°C	39
	With room thermostat/volt free switch	Max 55°C	40
		Max 85°C	41
	Without room controls	Max 55°C	43
		Max 70°C	44
		Max 85°C	45
Outside air temperature controlled	With 2Nr RE2132 modulating room units	Primary 70°C	46
with a secondary underfloor		Primary 85°C	47
mixing circuit and MR03 controller	With INr RE2132 modulating room unit	Primary 70°C	48
		Primary 85°C	49
	With room thermostat/volt free switch	Primary 70°C	50
	Without room controls	Primary 05 C	57
		Primary 85°C	52
No outside air temperature controls	With RE2132 modulating room unit	Max 55°C	54
and without secondary underfloor		Max 70°C	55
mixing circuit		Max 85°C	56
	With room thermostat/volt free switch	Max 55°C	57
		Max 70°C	58
		Max 85°C	59
No outside air temperature controls	With 2Nr RE2132 modulating room units	Primary 70°C	60
and with a secondary underfloor	With INF PEOLO2 modulating room unit	Primary 85°C	61
mixing circuit and r mos controller	With the NE2132 modulating room unit	Primary 85°C	63
	With room thermostat/volt free switch	Primary 70°C	64
		Primary 85°C	65
Fixed constant flow temperature with no o	outside air temperature control and without room	controls.	
		May EE°C	
www.unout.secondary undernoor mixing circ	uit	Max 70°C	60 67
		Max 85°C	68
With secondary underfloor mixing circuit		Primary 70°C	69
and MR03 controller		Primary 85°C	70

glossary of terms

Outside Air Temperature Controlled	The (supplied) outside air temperature sensor has been installed and direct-on-boiler weather compensated flow temperature is required.
Max	Maximum flow temperature either fixed or weather variable.
Primary	Maximum flow temperature either fixed or weather variable with reference to the boiler supply side of an under floor coil mixing valve and any primary radiator zone.
RE2132 Modulating Room Unit	Intelligent (time and temperature) room controller from MHS Boilers. For specific details see either Technical Sales Literature or specific installation/user guide.
MR03 Controller	Interface control box giving the ability for the boiler to control the space temperature and coil temperature of an under floor heating coil zone.

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19.7 output for charging hot water

There is no adjustment necessary or possible, as the boiler controls are self learning and will self adapt the optimum output to hot water according to the heat transfer capabilities of the connected hot water calorifier or cylinder, or the rate of hot water usage (combi boiler).

20.0 setting the boiler to work

WARNING: This appliance must not be left to operate with the outer casing removed.

- 1. To fit casing to boiler ensure hooks on top rear edge of boiler case engage properly into rear chassis assembly. Latch bottom case fixings and tighten central locking screw.
- 2. Turn ON on/off switch and set any external controls to auto operation.
- 3. With boiler operating (burner on) press "Test" button on boiler control panel to test overheat controls in the boiler. The boiler must shut-down and then re-ignite.
- 4. Before handing over the appliance to the user, check again and clean strainers/filters.

21.0 servicing *instruction*

general

In general, maintenance/inspections should take place:

- a) When the display on the unit indicates that inspection is required (status shows "SERVICE") normally after 365 days.
- or b) At least every 12 months.

21.1 inspection

Before carrying out any maintenance the unit must be inspected.

- a) Ask the user about any problems with the boiler unit or any other comments.
- b) Check the water pressure of the installation.
- c) Remove the casing of the unit and inspect all pipes and connections for water leaks.
- Inspect the top of the casing and/or the top of the heat exchanger for water leaks or signs of water from the flue air supply tube.
- e) If you have a notebook computer, connect it and check the service page for any errors, messages, starts and successful restarts. (Special communication lead and service software required)
- f) Run the unit at maximum capacity and measure the input and the CO₂%.
- g) Run the unit at minimum capacity and measure the input and the CO₂%.
- h) Listen to the sound of the in built pump.

21.1 inspection (contd)

- i) Turn off the boiler and disassemble the burner by removing the six M6 nuts around the burner door, removing the ignition cable and pulling the burner forwards. When the burner has been pulled forwards to halfway across the burner area, the plug on the fan cable must be removed from the fan motor. Check the interior of the heat exchanger.
- j) Open the syphon cleaning rinsing point at the base of the unit with suitable receptacle below to collect syphon contents. Refit rinse point cap after flushing.
- k) Disassemble the plastic box at the suction side of the fan, inspect the fan blades.
- I) Check the distance between the electrode and the burner earthing rod; this should be 4 to 5 mm.
- m) Check water treatment dosage level.

21.2 maintenance

Depending on the results of the inspection, carry out any maintenance and if necessary any preventive maintenance. Possible actions following inspection (21.1) include:

- at a) The remarks and comments of the client must be taken seriously and the cause(s) of any faults or problems must be found.
- at b) The pressure of the installation must be between I and 2 bar when hot (not less than 0.5 bar cold): any possible leaks in the system must be identified; if necessary, have a pipework engineer solve the problem.
- at c) Possible leaks or weeping must be resolved immediately.
- at d) In case of water leakage or ingress from the air supply pipe, the cause must be found and rectified.
- at e) Draw your conclusions from the service screen of the service software program (available from MHS Boilers spares department) and attend to those parts that have caused any faults.
- at f) and at g)

If necessary, adjust the gas setting on the gas valves.

at h) If the in built pump makes an un-natural noise, and in particular if the pump is more than 5 years old, it is recommended that the pumps should be replaced by way of preventive action.

NOTE: The pump is modulating and does have characteristic "yet yet" noise which is normal at low speeds.

at i) NEVER CLEAN THE BURNER ITSELF.

If the interior of the heat exchanger is contaminated and/or there is a deposit on the surfaces of the coiled stainless steel pipes, the latter must be removed with a natural bristle brush. Strata heat exchanger cleaning granuals can be obtained from MHS Boilers spares department. (DO NOT USE A STEEL BRUSH !) Then remove any dirt with a vacuum cleaner.

- at j) The syphon must be rinsed. With the burners removed, use a filling hose to insert water into the heat exchanger, which will automatically reach the siphon. Allow the water to run clear prior to refitting the rinse point cap.
- at k) If dirt has deposited on the fan blades, each blade must be carefully cleaned, until the blade material is visible again. If this is not done evenly the fan will not rotate properly and be out of balance.
- at I) Carefully bend the electrode without touching the burner, until the correct distance has been reached. Adjust only the angle of the bend nearest the ceramic insulator. Do not use tools. Firm finger pressure is all that is required.

21.2 maintenance (contd)

at m) check and top up as necessary water treatment to required %.

Important Note

IF ANY WATER CARRYING JOINT WITHIN THE BOILER IS DISASSEMBLED THEN THE "O" RING SEAL MUST ALWAYS BE REPLACED, LIKEWISE IF ANY OTHER SEAL IS NOTED TO BE DEFORMED THEN THEY SHOULD ALSO BE REPLACED. WATER SEALING "O" RINGS ARE A ONE TIME USE ONLY AND SHOULD NOT BE RE-USED.

cancelling the "service" message

Following the maintenance operations, the service message (when displayed) must be cancelled See 19.6).

22.0 screen display/ diagnosis of faults

The control panel of the Strata I boiler has an LCD screen, displaying two lines of data. This screen provides information about the operation of the appliance; it shows operation messages (non flashing) and fault messages (flashing display). The first line contains text information about the status of the unit.

It shows:

status messages (non flashing) for normal operation

No Demand	No heat demand (boiler not required to be on).
Pre-purge	Combustion chamber is being pre-ventilated with air from the burner fan.
Ignition	The ignition sequence of the burner is initiated.
CH Demand	The boiler is operating in central heating mode.
HW Demand	The boiler is operating to produce domestic hot water.
Chimney	The boiler is operating in test mode at mid output to enable flue gas emissions to be checked (auto expires after 10 min).
10 min Test	The boiler is operating in engineers test mode for adjustment purposes (auto expires after 10 min).
Post-Purge	Combustion chamber is being post-ventilated with air following boiler operation.
Limit F/R	The flow and/or return temperature is too high (currently).
Fan High	The burner fan is running too fast (currently).
Fan Low	The burner fan is running too slow (currently)
Fault R/U	There is a fault with the modulating unit (RE2132) or kascade manager (KKM2) or a fault in the wiring to these controls (in the case of the RE2132 the boiler runs continuously in heating mode to protect the building).
OTS Fault	There is a fault in the outside air sensor or in the wiring to the sensor or the function Nr is incorrectly set to ask the boiler to look for an outside sensor when there is none installed.
Service	The service interval time has expired and the boiler should now be maintained.
Deaeration	The in built pumps are operating to remove any possible collection of air from the heat exchanger. (Occurs when power turned off/on and after reset of fault).

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22.0 screen display/diagnosis of faults (contd)

The second line of text displays values such as temperature, percentages etc and the reset button may be used to scroll through (for information) the values of the various sensors that are/may be connected in the boiler plus fan speed and pump speed etc.

status messages (flashing display) indicating a fault

A flashing display indicates a fault and that the boiler has shutdown (lockout). The boiler will not attempt to operate until the "red" reset button is pressed.

Any repetitive flashing fault message should be investigated, the cause found and corrective action taken. For each flashing display message there is a possible cause, see list of cause numbers following the "flashing status" list.

Display Message Flashing	Meaning	Cause Number/s
STB-Supply	Heat exch high limit stat has tripped.	5, 6, 7, 8, 21, 24, 25, 26, 31, 36
STB-Flue Gas	Flue limit stat has tripped.	2, 5, 6, 7, 21, 24, 25, 31, 36
Fan Spd high	Burner fan speed is too high.	9, 11, 29, 31, 33
Fan Spd Iow	Burner fan speed during pre-purge is too low.	9, 10, 11, 14, 18, 29, 31, 33
Fan Spd oper	Burner fan is detected as operating when should be idle.	4, 11, 29, 31
lgnit Fault	lgnition to burner has not been successful after 4 attempts.	11, 12, 13, 15, 16, 17, 19, 22, 23, 27, 29, 30, 31, 35, 37, 38
No Flame	Flame at burner has been lost on 4 consecutive occasions during operation.	13, 15, 16, 17, 20, 22, 23
False Flame	Flame is detected at the burner when there should be no flame.	17, 19, 30
SI Disconnect	Heat exch flow temperature sensor interrupted.	3, 5, 33
S3 Disconnect	Combi boiler - hot water flow temperature sensor interrupted.	3, 5, 33
S4 Disconnect	Return temperature sensor interrupted.	3, 5, 33
S7 interrupt	Mixed flow temperature sensor interrupted. Only when MR03 unit installed.	1, 3, 5, 33
Program end	Follows reprogramming of control panel with laptop PC, not a fault - just press reset button.	
Gas valve	High resistance in the electrical circuit to and including the gas valve is detected.	26, 28, 29, 31, 33, 37
Soft W Fault	Error in software in the control.	29
Display Message Flashing	Meaning	Cause Number/s

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22.0 screen display/diagnosis of faults (contd)

Reset Key	There is a fault with the reset button.	29, 31, 34
Eeprom	There is a fault in the EEPROM in the control.	29
Intern Fault	There is an internal fault in the control panel.	
Test Fault	There is a fault with the test button.	29, 31

22.I (possible) causes of fault & corrective action

Cause No.	Reason/Action
Ι.	Operational function No. not set correctly / Check and correct settings. See tables 11, 12, 13.
2.	Unsound electrical connections to flue limit stat / Check and correct.
3.	Sensor not correctly connected or sensor defective/Check connections and or replace sensor.
4.	Short circuit in wiring / Check and rectify.
5.	Short circuit in wiring to sensor / Check and rectify.
6.	Boiler pump not rotating (seized or defective)/Free seized shaft or if defective replace pump.
7.	System lacks water / Investigate, refill and vent.
8.	Connections to heat exchanger limit stat unsound /check & rectify.
9.	Unsound electrical connection to fan / Check integrity of fan connection plug.
10.	Fan blades heavily contaminated / Clean fan.
П.	Fan is defective / Replace fan.
12.	There is no gas supply available / Investigate, restore gas supply.
13.	Low gas pressure / Investigate and rectify.
14.	Fuse defective / Check fuses and replace as necessary.
15.	Gas valve min output setting is incorrect / Check and adjust min output CO2%.
16.	Oxidation on burner mounting screws / Loosen and retighten screws.
17.	Poor ignition lead connection to electrode or damp connection or lead damaged and shorting to earth / Check and rectify.

22.1 (possible) causes of fault (contd)

Cause No.	Reason/Action
18.	Transformer defective / Replace transformer / loose connection.
19.	Condense siphon is blocked or condense waste blocked or frozen / Clear siphon or waste pipe.
20.	Flue gas leakage from connection at rear of heat exchanger / Check, reposition or replace seal.
21.	System strainer blocked ?, isolation valve closed ? Or some other interruption to water flow / Check and rectify.
22.	Unacceptably high resistance in flue or air supply tubes or flue blocked / Check flue for suitability or clear obstruction.
23.	Leakage of flue gas from flue gas tube into air tube vitiating the combustion air / Strip out flue system and remake joints.
24.	Zone pumps not running / Check and rectify.
25.	Heat exchangers fouled internally with silt or scale / Clean, descale heat exchangers and system and re-dose system with water treatment.
26.	Heat exchanger high limit stat defective / Replace limit stat.
27.	Boiler set for wrong gas type / Convert boiler to burn the gas being supplied.
28.	Flue gas limit stat defective / Replace limit stat.
29.	Boiler control panel defective / Replace control panel.
30.	Incorrect position of ignition electrode / Reset gap 4-5mm.
31.	moisture in-on electrical connections or components / Dry carefully using warm air from a hair dryer.
32.	Incorrect electrical connection / Check and rectify.
33.	Wiring interrupted (broken wire) / Check and rectify.
34.	reset button stuck / Press button in attempt to free sticking contacts. If no success then replace control panel.
35.	Ignition electrode damaged or broken / Replace electrode.
36.	Unsound electrical connections to pump / Check and rectify.
37.	Gas valve defective / Replace gas valve.
37.	Gas valve defective / Replace gas valve.
38.	Reversed polarity on incoming power supply.

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23.0 instructing the user

The installer should inform the user about the operation and use of the Strata 1 boiler and in particular point out:-

- Any safety provisions.
- The need to carry out regular maintenance when the screen display shows a "SERVICE" message.

The installer must provide the user with all documentation relating to the Strata I boiler and any ancillary items.

23.1 to turn on *the appliance*

- I. Ensure the manometer indicates a pressure within the system of not less than 0.5bar.
- 2. Ensure the gas supply is turned on.
- 3. Switch on the on/off switch on the appliance control panel.
- 4. If all controls connected to the appliance are calling for heat the screen with display DHW demand or CH demand.
- 5. If all controls are in the off position the screen will display standby.
- 6. Allway check the setting of the summer/winter switch marked with "+"/ \pm

23.2 to turn off *the appliance*

- 1. Switch off the on/off switch on the appliance control panel.
- 2. Turn off the gas supply.

NOTE: Turning off the appliance will leave the system at risk of freezing during winter months and will put out of action the automatic pump exercising routine. If the only reason for shutdown is that normal heating is not required, then it is recommended to leave the boiler on and turn off or turn down any external controls.

24.0 parts list

24.0 parts list (contd)

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24.0 parts list (contd)

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