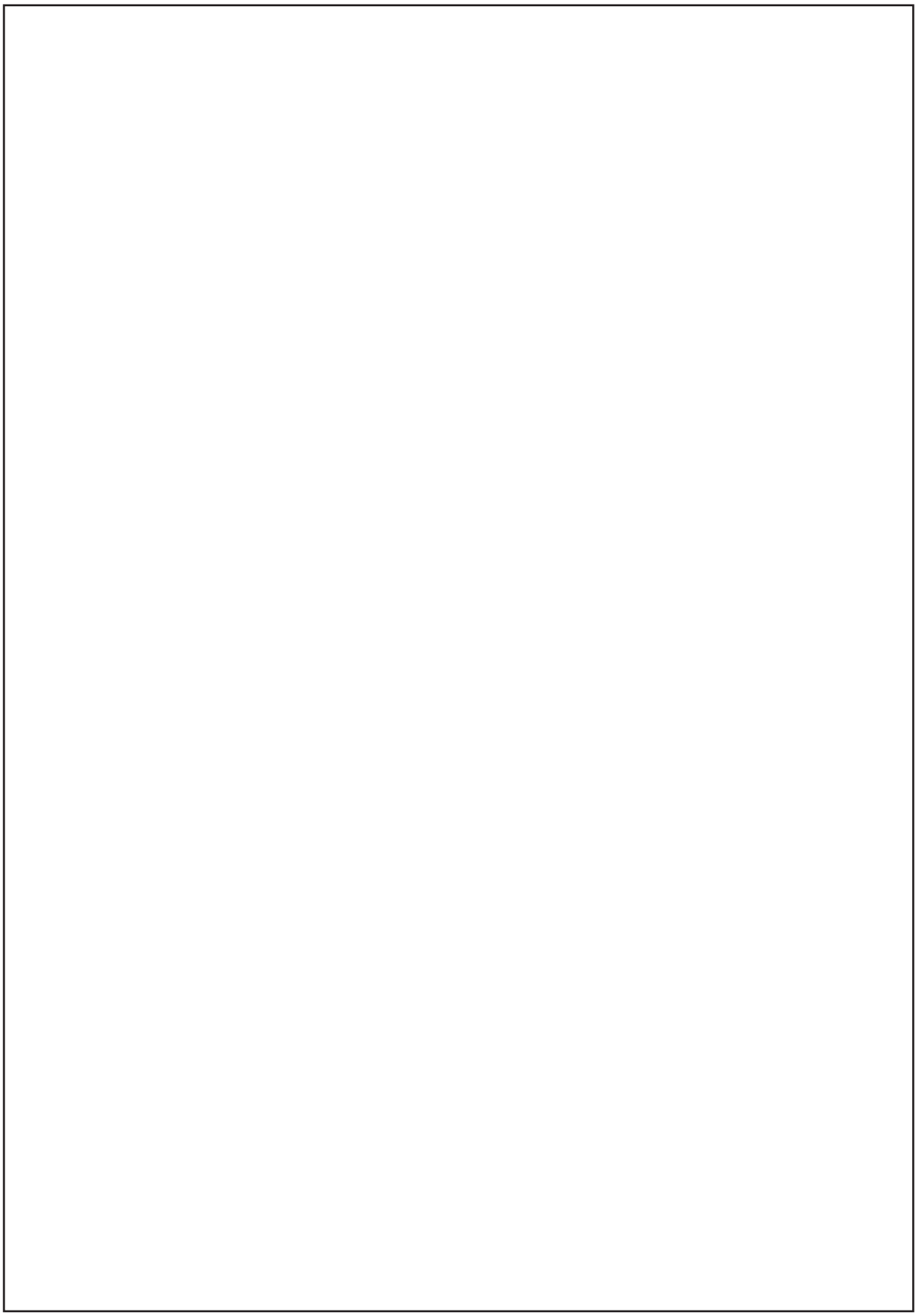
MICROMAT EC

Wall mounted Ultra High Efficiency Gas Boilers

16/22 24/28 31/36 38/45

Instructions for Usage, Installation & Commissioning



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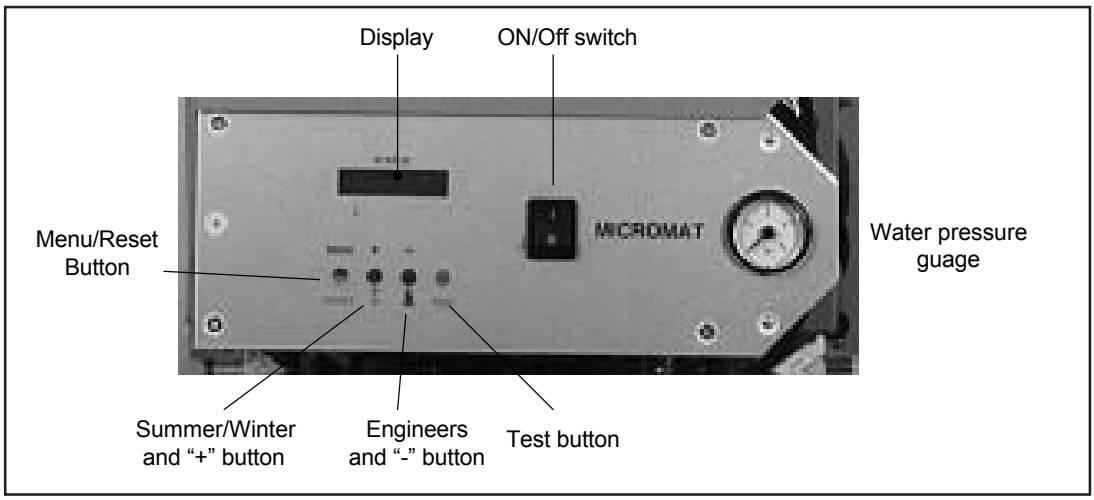
Boiler Switch Panel



Before operating the boiler:

Check that the boiler has been installed in strict accordance with the instructions contained in this manual. Non compliance with the instructions may result in injury and/or damage to property. the warranty on the boiler is void if the boiler is not installed in accordance with these instructions.
Check the following points with the installer:
A suitable corrosion inhibitor has been added to the water in the system. (see page 33)
The water used to fill the system is within the purity limits specified (page 33)
Any soldering fluxes used are compatible with the boiler.
A low pressure cut out switch has been fitted (RVR stock no. SEC569) This must interrupt the power supply to the boiler if the pressure is less than 0.4bar.
The installer should inform the user about the operation and use of the MICROMAT EC 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 MICROMAT EC boiler and any ancillary items.

Important!

The Micromat EC boiler requires an annual service. The boiler display will display [Service] when a service is due although the boiler will continue to operate normally. An RVR approved service technician should carry out the annual service.

Switching ON the MICROMAT EC

1) Ensure the pressure gauge indicates a pressure within the system of not less than 0.5 bar and not more than 3 bar.
2) Ensure the gas supply is turned on.
3) Switch on the on/off switch on the appliance control panel.
After switching on the boiler the MICROMAT EC operates automatically.

Switching OFF the MICROMAT EC

1) Switch off the on/off switch on the appliance control panel.
2) Turn off the gas supply
Turning off the boiler will leave the system at risk of freezing during the winter months and will disable 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.

1.0 user instructions for *the micromat boiler*

Description of Boiler Controls

Menu/Reset Button

This button has three functions

1. Resetting of fault conditions: - When the display text is flashing on and off, a boiler fault is indicated. The type of fault is displayed on the screen. Please refer to the fault finding section on page 56 for a description of these faults. The boiler control is reset by pressing the Menu/Reset button once.

2. Inspection of boiler operating parameters:- When the display is not flashing (ie when the boiler is in normal operation), the Menu/Reset button may be used to inspect the boiler operating parameters.

Press once - Display shows “T1 Sup --°C” - This is the flow water temperature from the boiler.

Press twice - Display shows “T4 Ret --°C “ - This is the return water temperature to the boiler.

Press three times - Display shows “T5 DHW --°C” - This is the domestic hot water storage temperature. A temperature is shown only if the hot water temperature sensor (RVR Stock no: SBA021) is connected to terminals 1 & 2 on the front terminal block of the boiler.

Press four times - Display shows “T6 Out --°C” - This is the outside air temperature. A temperature is shown only if the outside air temperature sensor (RVR Stock no: SPR950) is connected to terminals 3 & 4 on the front terminal block of the boiler.

Press five times - Display shows “T7 Sec --°C” - This is the mixed flow temperature in the secondary heating circuit. This menu item is displayed only if the boiler is configured for a mixing valve circuit and the MR03 regulator is installed.

Press six times - “Revolu -- R/s” - This is the burner blower speed.

Press seven times - Display shows “Pump 1 --%” - This is the speed of the circulation pump as a percentage of its maximum speed.

Press an eighth time and the display returns to normal displaying the supply water temperature and the date & time.

3. Pop-Up menu function - This function is accessed by pressing and holding the button for at least three seconds. The following parameters may now be adjusted.

- Day setpoint temperature
- Timeclock overide function
- Domestic hot water storage temperature
- Current Day and Time
- Timeclock On and Off times for central heating and water heating.
- Setback temperature
- Holiday fuction
- Installation codes

The pop-up menu is navigated using the “+” and/or “-” buttons. The user may move between the menu points as shown in table 1. Menu parameters are adjusted by pressing the menu/reset button when the required menu point is shown on the screen. Values are then adjusted using the “+” and/or “-” buttons. After adjustment the value is saved by pressing the menu/reset button once.

When all adjustments are completed, exit the pop-up menu by moving to [Back] using the “+” and/or “-” buttons and pressing the menu/reset once.

[*1] Day Temperature

This may be used to adjust the boiler output when weather compensation is used. The default value is 20°C and can be adjusted between 5C and 30C. Press the menu/reset once to enter adjustment mode. The “+” and/or “-” buttons may be used to alter the value and cause a parallel displacement in the weather compensation line. The new value is saved by pressing the menu/reset button. Note: This menu point is visible only when weather compensation is enabled.

[*2] Party

The “Party” menu point overides the boiler time programs. It can be set from 0 - 24 hours and returns to 0 once the time has expired. Press the menu/reset button once and then adjust the value using the “+” and/or “-” buttons. Press the menu/reset button once again to save.

[*3] Temp DHW

Press the menu/reset once to enter adjustment mode. The domestic hot water storage temperature is adjusted using the “+” and/or “-” buttons and saved by pressing the menu/reset once. The adjustment range is between 40 and 60°C.

[*4] Day/Time

The current day, hour and minute may be adjusted. Move between the day, hour and minute values using the menu/reset button and change the settings using the “+” and/or “-” buttons as required.

[*5] Set CH Times
The central heating on and off times are adjusted using this menu point. There are three ON times and three OFF times per day.
There are two sub-menus in this menu.
a) Day required
b) On and Off times for central heating
With the menu item [Set CH Times] displayed, press the menu/reset once and [Monday] appears in the display. One can move between the days using the '+' and/or '-' buttons. When the required day is reached, the time program for that day may be entered by pressing the menu/reset button once. [COPY ...>...] now appears on the display. Press the '+' button once to move to the first switching time [SWITCH ON 1]. Press the Menu/Reset button once, the hour value flashes and may be adjusted using the '+' and/or '+' buttons. Press the menu button once more. The minute value now flashes. This may now be adjusted using the '+' and/or '-' buttons. When adjustments have been made, press the menu/reset once again and the new switching time is saved. Use the '+' and/or '-' buttons to move between the switching times for the day which you are adjusting. If no switching times are required then use the value 00:00. When adjustments for the day are completed, repeatedly press the '+' button until [BACK] is displayed and then press menu/reset once. The next day will be displayed. Perform all of the adjustments required for each day and then press the '+' button until [BACK] appears.
Press the Menu/Reset button once to exit CH times. The next menu item [Set HW Times] will now be displayed.
Note: It is also possible to copy a complete switching programme for one day to the next day by using the [Copy] menu item. When [COPY] is displayed press the menu/reset button once. This copies one days programme to the next day. The display will show the next day in sequence once the copy operation is completed.

[*6] Set HW Times
The hot water heating on and off times are adjusted using this menu point. There are three ON times and three OFF times per day. The programming procedure for this is the same as for menu point [*5].

[*7] Set MV Times
When a mixing valve circuit is used for a low temperature circuit (e.g. underfloor heating circuit) , this menu point is available. The mixing valve on and off times are adjusted using this menu point. There are three ON times and three OFF times per day. The programming procedure for this is the same as for menu point [*5].

[*8] Setback
This menu point may be used to set the temperature to be maintained during the off periods. It may be set at any value up to 10°C below the day temperature.

[*9] Holiday
This may be used to overide all of the time programmes for a fixed number of days. The room temperature setpoint will be reduced to the level set using the 'SETBACK' menu point and the domestic water temperature setpoint will be 20°C.

[*10] Install
Configuration of the boiler and the setting of operating parameters is carried out using this menu point. This will generally be done when the boiler is first commissioned. Great care should be taken when altering these parameters as the adjustments can greatly affect the boiler performance.
To access the configuration level in the Pop Up menu, enter the code (21) in menu point [*10]. This is done using the "+" and/or "-" buttons and then pressing the Menu/Reset button. A range of parameter settings then becomes available. These are described in the Commissioning section of this manual.

[*11] Back
Press the Menu/Reset button to exit the Pop-Up menu.

1.0 user instructions for *the micromat boiler*

Engineers Button

The user will not normally need to use this button. It is used by the service technician to enable measurement of flue emissions even without heat requirement being present.
NOTE: This function will not be available if the MICROMAT EC and the heating system have reached their maximum temperatures.
If the Engineers button is pressed once then the MICROMAT EC operates with half power. The display shows [Flue Emissi]. If the Engineers button is not pressed again within 10 minutes the MICROMAT EC will switch back to automatic operation after this period. Pressing the button again when [Flue-Emissi] is displayed brings [10min Low] onto the display. In this condition the power output of the boiler can be adjusted using the '+' and '-' keys
Pressing the '-' key will reduce the power & pressing the '+' key will increase power.
Pressing the Engineers button again while [10 min. low] is shown in the display switches the MICROMAT EC back to automatic operation. After 10 minutes partial output the MICROMAT EC will return to automatic operation

TEST Button

The Test button is used to simulate the operation of the hot water high limit stat.
Whilst theTEST-button is pressed the display shows [Limit F/R W/D]. During this display the function of the MICROMAT EC is blocked. When the button is released the boiler will return to normal operation.
If the button is pressed for more than 3 minutes [STB-Supply] will blink on the display. The function of the MICROMAT EC is then locked.
The MICROMAT EC can also be locked more quickly by simultaneously pressing the TEST and ENGINEERS button.
When the RESET button is pressed again the MICROMAT EC returns to automatic operation.

2.0 general

notes

These instructions are intended to assist the installer, commissioning engineer, maintenance engineer and user with the installation, maintenance and usage of MICROMAT EC 16/22, 24/28, 31/36 & 38/45 models gas fired condensing boilers.

Please read this manual fully before commencing the installation of the appliance. The MICROMAT EC must only be installed by persons deemed to be competent. This manual must be handed to the appliance user following completion of the installation.

3.0 product

description

The MICROMAT EC 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 $\triangle$t of 20°C.

Wall mounted with compact dimensions

At 900H x 458W x 355D the MICROMAT EC 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 domestic hot water temperature, or room temperature, or a combination of the aforementioned.

fully condensing stainless steel heat exchanger

The MICROMAT EC 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 burners. 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 fans have low voltage direct current drive motors with pulse relay counting. This system allows precise control over fan speed/combustion air volumes. Coupled with a gas valve system set to provide a one to one ratio of precisely measured volumes of fuel to air, this allows extremely accurate and instant variable burner output control to be achieved.

3.0 product description

energy saving
In addition to the extremely efficient burner and heat exchanger system employed in the MICROMAT EC each appliance includes a modulating speed boiler primary pump.
This feature allows the boiler to self-maintain a 20°C Δt across the heat exchanger, optimising the heat exchanger efficiency and reducing also the electrical consumption of the pump motors. 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%.

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: -

1. 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.
7. In built 2 stage boiler frost protection program.
8. In built pump exercising program to avoid standstill seizure.
9. Cold start boost facility.
10. 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.
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, plus the ability for the boiler to be controlled by a remote multi function modulating room unit. Multiple boilers may be connected to a modulating Kaskade manager which further enhances the operating efficiency of a larger load modular boiler system.

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 125/70 concentric air duct/flue 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.

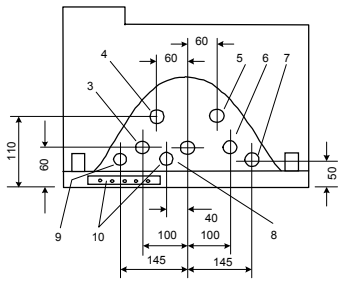
designed for ease of maintenance
Although compact, the MICROMAT EC does not compromise serviceability. The appliance has been engineered to be easy to maintain with even the most major of service operations being able to be completed easily and quickly with the minimum of tools.

guarantee
The heat exchanger carries a five year guarantee against manufacturing or material defect provided that INIBAL corrosion inhibitor is used in the system and a service contract is in place with an RVR approved service agent. Please contact the RVR Customer Care Dept. for details.

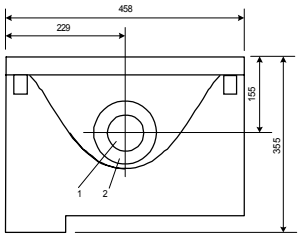
4.0 technical data

& dimensions

underside - models EC16/22, EC24/ 28, EC31/36 & EC38/45H

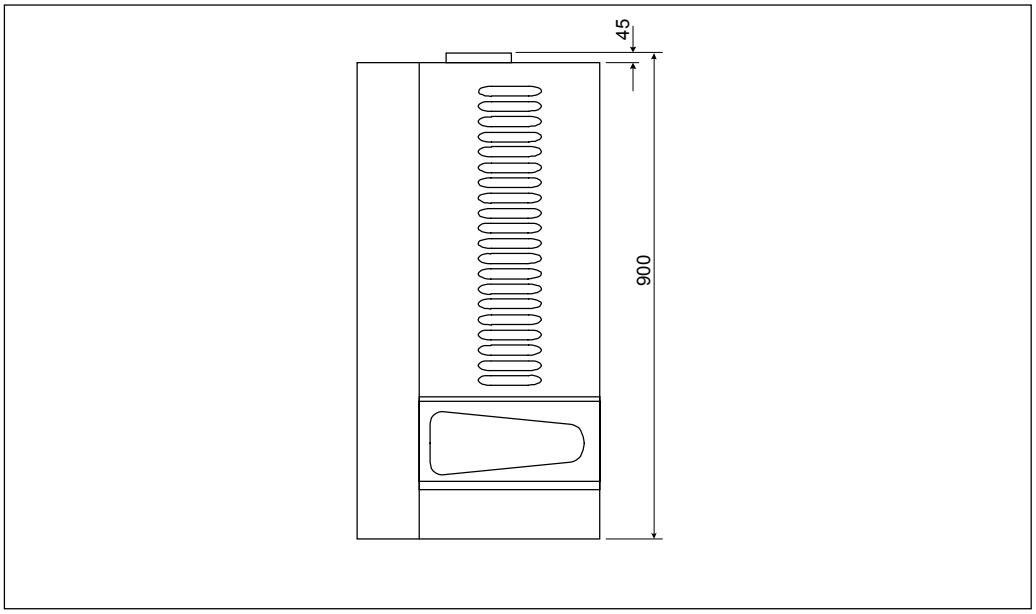


plan - models EC16/22, EC24/28, EC31/36 & EC38/45H



Model	MICROMAT EC	16/22	24/28	31/36	38/45
Nominal Heat Input Nett (max)	kW	2.9-15.0	3.4-22.0	4.8-29.0	6.4-36.0
Nominal Heat Output 80/60°C	kW	2.5-14.3	3.1-21.4	4.5-28.4	6.0-35.1
Nominal Heat Output 50/30°C	kW	3.1-15.8	3.6-23.1	5.1-30.7	6.8-38.0
Input Rate Nat Gas (max)	m3/h	1.6	2.3	3.1	3.3
Input Rate LPG (max)	m3/h	0.6	0.89	1.14	1.2
Minimum/Maximum Gas Pressure	mbar	15/60	15/60	15/60	15/60
Flue Gas Volume (hot)	m3/h				
Pressure at Flue Outlet	pa	100	100	100	100
Maximum Working Pressure	bar	3.0	3.0	3.0	3.0
Minimum Working Pressure	bar	0.5	0.5	0.5	0.5
Maximum Flow Temperature	°C	85	85	85	85
Power Supply	Volts	230	230	230	230
Fuse rating	Amps	3.0	3.0	3.0	3.0
Average Power Consumption	Watts	60	60	60	70
Water Content	litres	1.5	1.8	2.1	2.5
Weight (Dry)	kg	34	36	39	45
Design Dt	°C	20	20	20	20

1. Air Duct (OD)	125mm	125mm	125mm	125mm
2. Flue Gas (OD)	70mm	70mm	70mm	70mm
3. Flow	22mm	22mm	22mm	22mm
4. Flow DHW (EC...HS & S)	22mm	22mm	22mm	22mm
5. Return DHW (EC...HS & S)	22mm	22mm	22mm	22mm
6. Return	22,mm	22,mm	22,mm	22,mm
7. Condense Waste	20mm	20mm	20mm	20mm
8. Gas	15mm	15mm	15mm	15mm
9. Condense Siphon Cleaning Point (capped)	3/4" BSP	3/4" BSP	3/4" BSP	3/4" BSP
10. Cable Entries	Multiple	Grommets		



5.0 delivery consignment

unpacking the boiler

The boiler is delivered as a consignment of a 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 attached to corner bracket of packaging containing outside air temperature sensor, vent key and hose connection.

To unpack the boiler, the carton should be laid on the floor with the top carton seam uppermost. Carefully remove tape from seam and open carton flaps, remove packing material, wall mounting bracket and fittings carton. For ease of boiler handling from the carton it is suggested that the carton be slit down each corner and the carton sides laid out flat. The boiler should only be lifted by contact with the rear (grey) chassis assembly.

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.

6.0 boiler

location

The MICROMAT EC 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 condensate drain nearby or an alternative is to install a condensate sump receptacle and condensate disposal pump which should remove the condensate 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.

7.0 installation

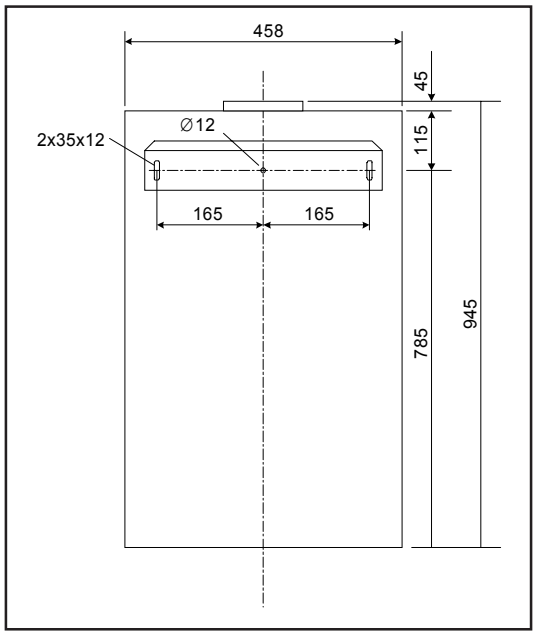
clearances

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

Sides	50mm
Above	250mm
Below	150mm
Front	450mm

8.0 wall *mounting*

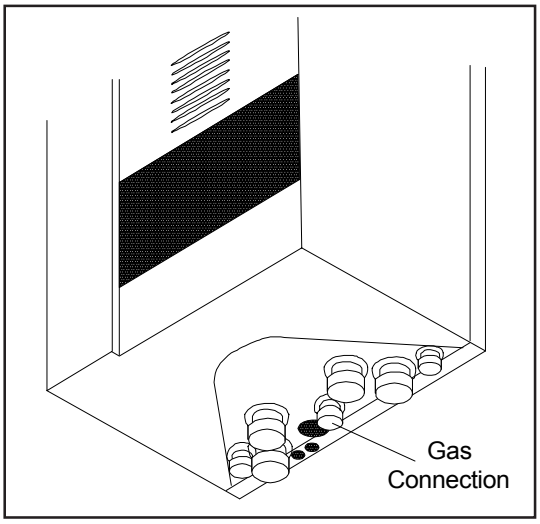
The MICROMAT EC boiler mounts to the wall via a wall mounting bracket which interlocks to a rail mounted on the rear of the boiler. The wall mounting bracket should be firmly fixed to the wall using suitable fixings with a countersunk head. The wall mounting bracket positioning detail is shown in fig 1. 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 NOT lift the boiler by the internal parts of the appliance.



important
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 block or shim behind the bottom rear of the boiler to achieve a vertical installation.

9.0 gas *connection*

The gas connection is located at the base of the appliance rear r/h side, 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 1mbar 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).



9.1 gas conversion

The MICROMAT EC is factory fitted for Natural Gas (G20). However the unit can easily be converted to LPG (G31) by using the kit supplied (part no. 251588) and following the instructions below.

- •Remove cover from boiler
- •Open the outlet flange joints at the gas combi valve.
- •On the outlet side of the gas combi valve add the Ø 5.7mm LPG jets from the conversion kit.
- •Re-tighten the flange joint. Do not forget the O-ring.
- •Check for Leakage.
- •Plug all the air holes (front and back) on the gas/air mixing chamber using the blind grommets supplied.

Enter the gas type to which the MICROMAT EC is converted on the label next to the type label

10.0 system flow *& return connections*

NOTE: The MICROMAT EC boiler must only be installed on sealed and pressurised systems. The maximum working pressure of the boiler = 3 bar. It is recommended that the final working pressure (hot) of the system does not exceed 2.3 bar.

The boiler is equipped with a 22mm flow connection on the left (when looking head on at the boiler) and one return on the right (22mm).

fig 3

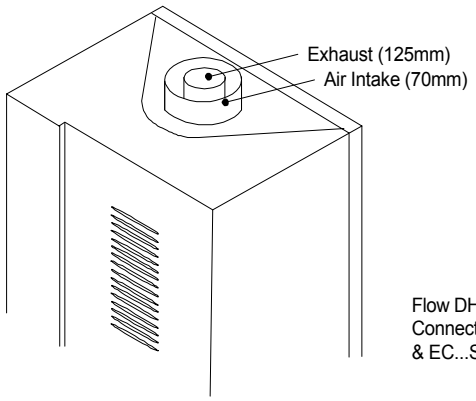
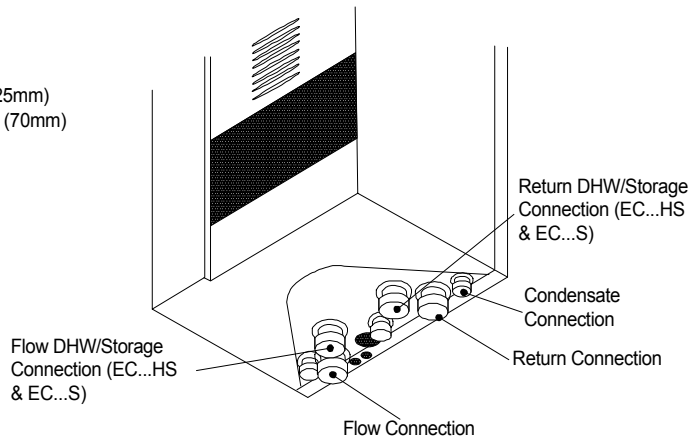


fig 4



11.0 condensate *connection*

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

The condensate 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 condensate connection is a ¾" BSP Male threaded stub fabricated from plastic.
The installer must connect to this stub, a ccondensate pipe fabricated from plastic tube and fittings (¾", 22mm, overflow pipe is considered suitable). **Copper Tube is not acceptable.** The condensate pipe must fall continuously from the appliance to suitable nearby drain.

11.0 condensate

connection (contd.)

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

When making the condensate 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 condensate outlet assembly.

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

12.0 flue/combustion

air connection

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 70mm flue gas connection centrally within the 125mm air inlet connection.

There are two options for flueing the MICROMAT EC 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 BS 6644 or BS5440 as appropriate. For guidance on ventilation see section 15.
ii) Room sealed using concentric 70/125 components 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 15 for general space cooling.

Multiple Boilers

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

Important Note

Where the MICROMAT EC 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.

Fig 5

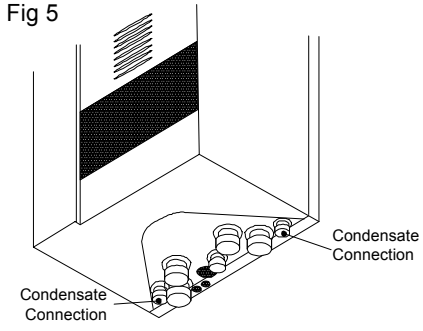
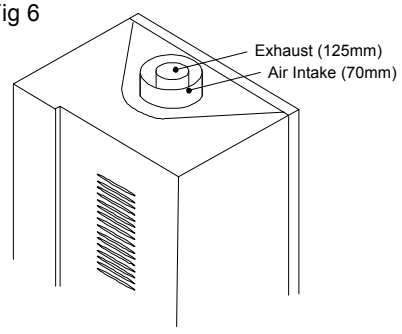


Fig 6

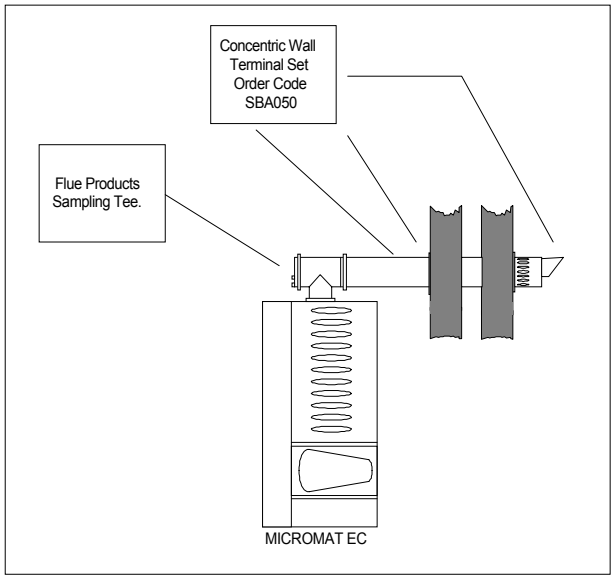


13.0 flue systems

The MICROMAT EC has an excess pressure combustion system that allows the appliance to be exhausted over extended distances using small OD flue components.

The flue gas temperature is extremely low (typically the same as the flow water temperature), which allows the use of easy to install PPS (polypropylene) flue pipe and fittings.

The appliance can take combustion air from the room in which it is installed (conventional application) or can be room sealed (fanned balanced flue) using a concentric flue arrangement of a 70mm PPS flue duct within a 125mm galvanised metal air duct, finished in off-white RAL 7035. A full range of flue pipe and air duct components including roof and wall terminals is available from RVR Limited.



Horizontal Balanced Flue with side exit.

Flue System Option No. 1

Horizontal Balanced Flue System

Using this sytem the air for combustion and the flue products are piped to/from outside the space.

The balanced flue may pass through the wall directly behind, or, on either side of the MICROMAT EC.

The following components and options are available from RVR Limited:--

•70/125 concentric wall terminal set complete with flue products sampling tee, 500mm straight concentric flue, wall sealing plates and outside terminal. These are finished in RAL 7035 (the 125mm galvanised pipe) and light grey (natural coulour of 70mm PPS pipe). RVR Order Code - SBA050

The system may be extended using the following accessories:

•125mm Ø Extension pipe RAL7035, 250mm long. RVR Order Code - SBA053

•125mm Ø Extension pipe RAL7035, 500mm long. RVR Order Code - SBA054

•125mm Ø Extension pipe RAL7035, 1000mm long. RVR Order Code - SBA055

•125mm Ø 90° bend RAL7035. RVR Order Code - SBA056

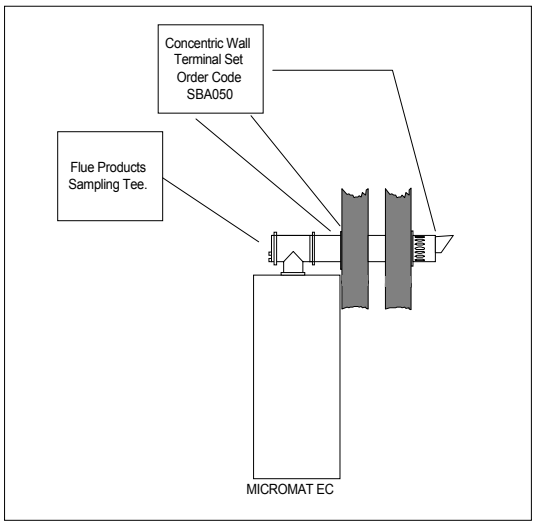
•70mm Ø Extension Pipe PPS, 250 mm long. RVR Order Code - SBA057

•70mm Ø Extension Pipe PPS, 500mm long. RVR Order Code - SBA058

•70mm Ø Extension Pipe PPS, 1000mm long. RVR Order Code - SBA059

•70mm Ø 90° bend PPS. . RVR Order Code - SBA060

•Birdscreen for 70mm Pipe. RVR Order Code - ACB002



Horizontal Balanced Flue with rear exit.

13.0 flue *systems*

Flue System Option No. 2
Vertical Balanced Flue System

Using this system the air for combustion and the flue products are piped vertically to/from outside the space. The balanced flue may exit through both flat and pitched roofs. Suitable flashings are available for either case. This following components and options are available from RVR Limited:

•70/125 concentric roof terminal set, complete with concentric pipes and terminal. The air pipe is finished in black PPS and the flue pipe in grey PPS. The length is 1150mm. RVR Order Code - SBA051

•70/125 concentric roof terminal set, complete with concentric pipes and terminal. The air pipe is finished in black PPS and the flue pipe in grey PPS. The length is 2000mm. RVR Order Code - SBA061

•Flue Products Sampling Tee (RAL 7035). RVR Order Code - SBA052 (Note: This item must be used with either of the above kits)

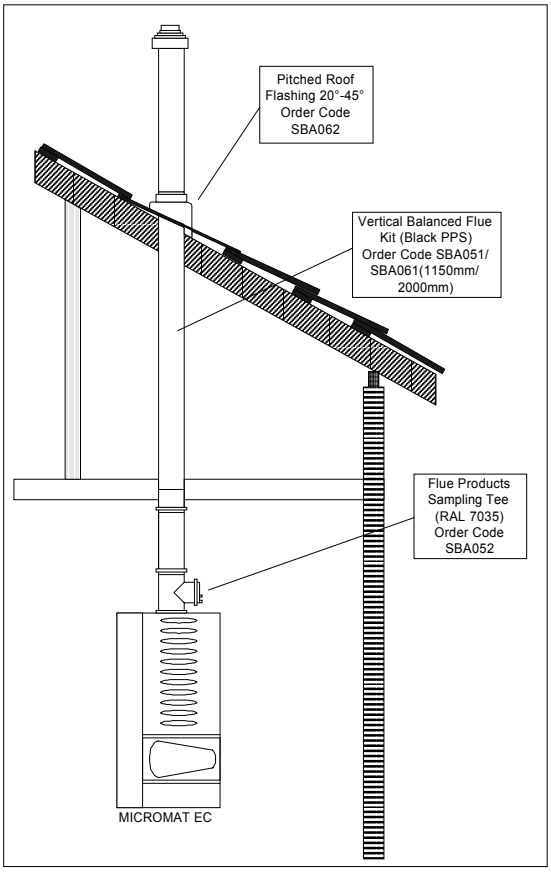
•Pitched Roof Flashing (20° - 45°). RVR Order Code - SBA062

or

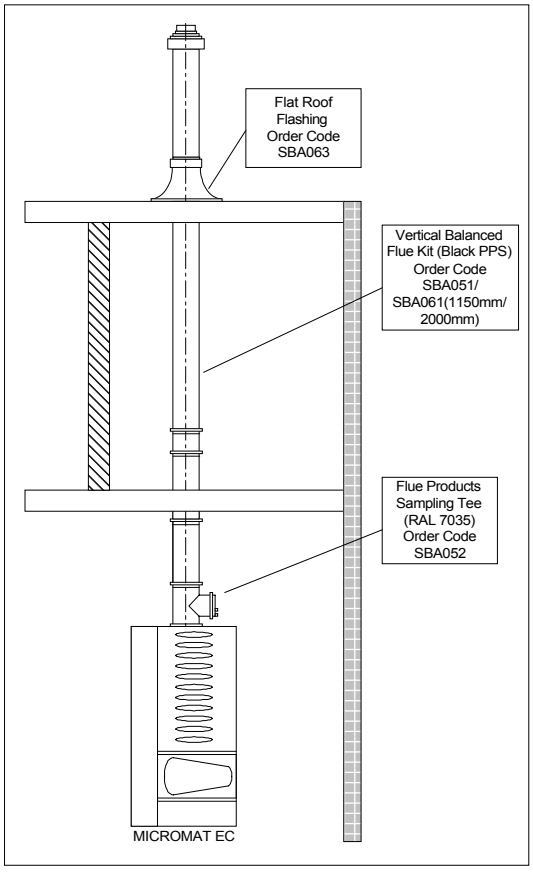
• Flat Roof Flashing. RVR Order Code - SBA063

The system may be extended using the following accessories:

•125mm Ø Extension Pipe, Black PPS, 1020mm long. RVR Order Code - SBA064
•125mm Ø Extension Pipe, Black PPS, 2000mm long. RVR Order Code - SBA065
•70mm Ø Extension Pipe, Grey PPS, 1000mm long. RVR Order Code - SBA059
•70mm Ø Extension Pipe, Grey PPS, 2000mm long. RVR Order Code - SBA066
•45° Bend Black PPS, Male and Female Connections. RVR Order Code - SBA067
•45° Bend Black PPS, two Female Connections. RVR Order Code - SBA068
•70mm Ø 90° bend PPS. RVR Order Code - SBA060

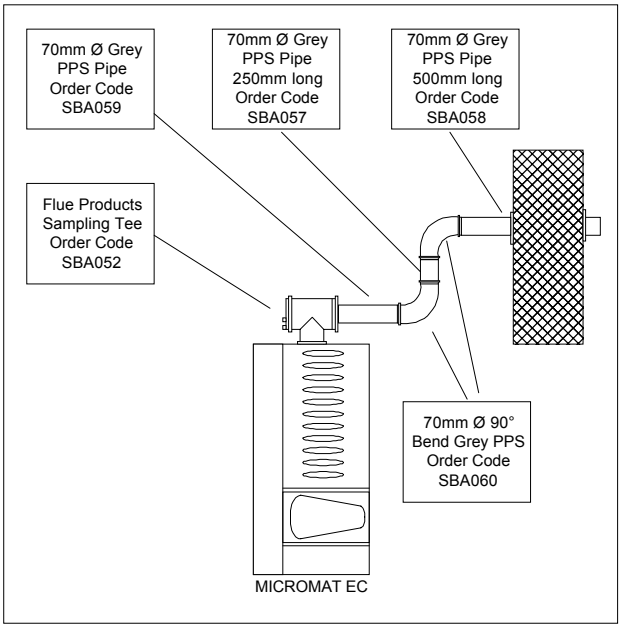


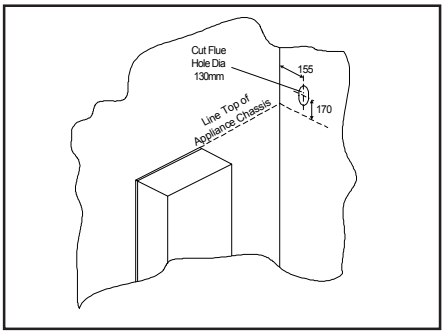
Vertical Concentric System (Pitched Roof)

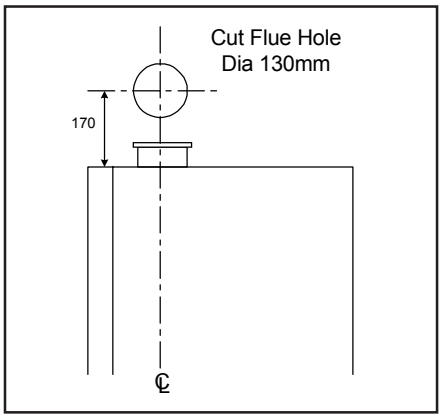


Vertical Concentric System (Flat Roof)

13.0 flue *systems*







Flue System Option No. 3

Horizontal Discharge with air for Combustion taken from Room.

Using this sytem the air for combustion is taken in from the room at the sampling Tee and the flue products are exhausted horizontally through a wall.
This sytem comprises :
•Flue Products Sampling Tee (RAL 7035). RVR Order Code - SBA052 (This must always be used)
•70mm Ø Extension Pipe, Grey PPS, 1000mm long. RVR Order Code - SBA059

The system may be extended using the following accessories:

•70mm Ø Extension Pipe PPS, 250 mm long. RVR Order Code - SBA057
•70mm Ø Extension Pipe PPS, 500mm long. RVR Order Code - SBA058
•70mm Ø Extension Pipe PPS, 2000mm long. RVR Order Code - SBA066
•70mm Ø 90° bend PPS. RVR Order Code - SBA060.
•Birdscreen for 70mm Pipe. RVR Order Code - ACB002.

14.0 calculating *flue resistance*

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

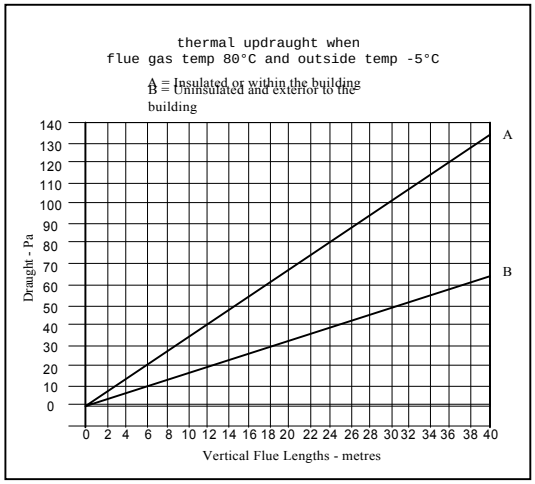
Thermal up-draught is generated in a vertical flue system, reducing the resistance of the system. Reference to the 'Thermal Up-draught Graph' will provide a figure in Pa., which may be deducted from the total calculated flue system resistance.

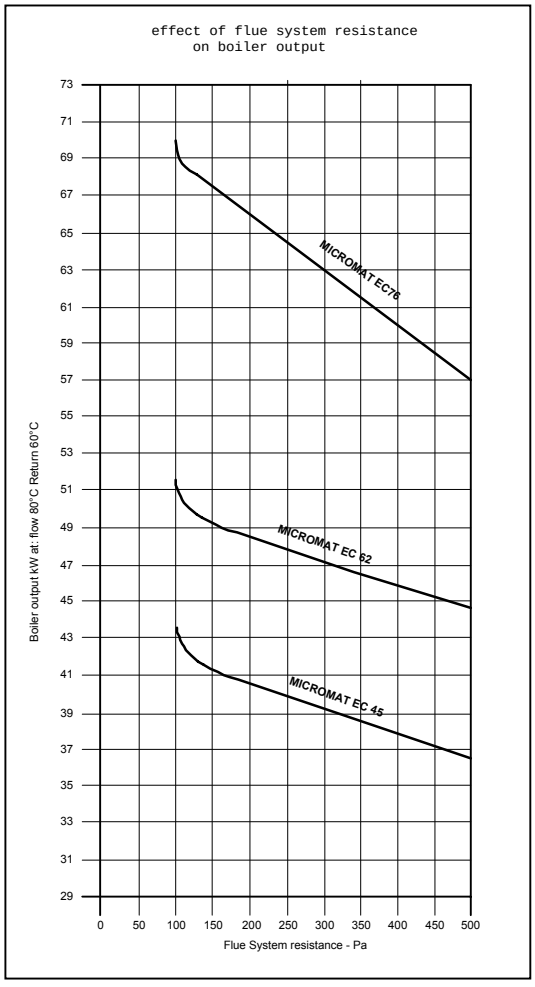
NB. Thermal up-draught does not apply to horizontal sections of a flue system.

Component Resistance (Pa).	Boiler Model			
	16/22	24/28	31/36	38/45
70/125 Concentric Wall Terminal	6	8.5	10.6	12.7
70/125 Concentric Roof Terminal Without Rain Cap	6	8.5	10.6	12.7
70/ 125 Concentric Roof Terminal With Rain Cap	8.9	12.7	15.8	19
I m length 70/l25 Concentric Tube	4.5	6.4	7.9	9.5
93°C 70/l25 Concentric Bend	4.5	6.4	7.9	9.5
45°C 70/l25 Concentric Bend	2.4	3.4	4.2	5
lm length DN 70 PPS Tube Carrying Fluegas	4	5.7	7.1	8.5
lm length DN 70 PPS Tube Carrying Combustion Air	2.4	3.4	4.2	5
90° DN 70 PPS Bend Carrying Fluegas	4	5.7	7.1	8.5
90° DN 70 PPS Bend Carrying Combustion Air	2.4	3.4	4.2	5
45° DN 70 PPS Bend Carrying Fluegas	2	2.8	3.4	4
45° DN 70 PPS Bend Carrying Combustion Air	1	1.4	1.7	2
Room Sealed Chimney Cap DN 70	5.6	8	10	12
DN 70 x 100 PPS Increaser Piece-Fluegas or Air	0.8	1.1	1.3	1.5
90° DN 100 PPS Bend Carrying Fluegas	1.7	2.4	3	3.5
90° DN 100 PPS Bend Carrying Combustion Air	1.2	1.7	2.1	2.5
45° DN 100 PPS Bend Carrying Fluegas	0.8	1.1	1.3	1.5
45° DN 100 PPS Bend Carrying Combustion Air	0.8	1.1	1.3	1.5
lm length DN 100 PPS Tube Carrying Fluegas	0.8	1.1	1.3	1.5
lm length DN 100 PPS Tube Carrying Combustion Air	0.8	1.1	1.3	1.5
DN 70 Open Termination With Mesh	3.4	4.8	5.9	7
DN 100 Open Termination with Mesh	0.8	1.1	1.3	1.5
70/125 To 100/150 Concentric Increaser	1.4	2	2.5	3
90° DN 100 PPS Bend Carrying Fluegas	0.6	0.8	0.9	1.0
90° DN 100 PPS Bend Carrying Combustion Air	0.6	0.8	0.9	1.0
45° DN 100 PPS Bend Carrying Fluegas	0.6	0.8	0.9	1.0
45° DN 100 PPS Bend Carrying Combustion Air	0.3	0.4	0.5	0.5
lm length DN 100 PPS Tube Carrying Fluegas	0.8	1.1	1.3	1.5

14.0 calculating flue resistance-
flue pressure loss

example I
A MICROMAT EC 62 boiler is installed with a concentric flue system which takes an all horizontal route to a wall terminal. Length of flue **=** 3m including one 90° bend.
Resistance =
3 x 1m length 70/125 concentric tube @ 16.6 Pa **=** 49.8
1 x 90° 70/125 concentric bend @ 16.6 Pa **=**16.6
I x 70/125 concentric wall terminal @ 21.4 Pa **=** 21.4
Total Resistance = 87.6Pa
conclusion: Total resistance is less than 100 Pa. therefore, no alternative design required and no effect on boiler output, or positioning required
example 2
A MICROMAT EC 45 boiler is installed with a concentric flue system which takes a part horizontal, part vertical route to a roof terminal with rain cap.
Length of horizontal section **=** 1m, vertical section = 6m, system includes 1 x 90° bend.
Resistance =
7 x 1m lengths 70/125 concentric tube @ 10.7 Pa = 74.9
1 x 90° 70/125 concentric bend @ 10.7 Pa= 10.7
1 x 70/125 roof terminal @ 21.9 Pa = 21.9
Total Resistance = 107.5 Pa
Take into account that 6m of vertical (assume uninsulated, as air for combustion direct from outside air surrounds the flue gas tube) flue creates 10 Pa of up-draught,
then final resistance = 107.5 - 10 = 97.5 Pa.
conclusion: Final operating resistance is less than 100 Pa, therefore, no alternative design required and no effect on boiler output.
example 3
A MICROMAT 1-75 boiler is installed (non room sealed) with a proposed flue using DN 70 PPS single skin flue components which takes a part horizontal, part vertical route to a vertical open termination with bird mesh.
Length of horizontal section = 4m, length of vertical (uninsulated) section = 11m with 4 x 90° bends,
and 2 x 45° bends.
Resistance =
15 x 1m lengths DN 70 PPS tube @ 21.4 Pa = 321
4 x 90° DN 70 PPS bends @ 21.4 Pa = 85.6
2 x 45° DN 70 bends @ 10.7 Pa = 21.4
1 x DN 80 open termination @ 15.6 Pa = 15.6
Total Resistance: 443.6 Pa
Take into account that 11m of vertical uninsulated flue creates 18 Pa of up-draught, then final resistance would be 443.6-18 = 425.6 Pa.
Reference to the graph of resistance effect on boiler output shows the output would be reduced to approximately 59kW. If this is unacceptable, then the flue resistance must be re-calculated using a larger size flue tube as shown below or consideration given to moving the boiler position.
Re-calculating proposed flue installation using DN 100.
15 x 1m lengths DN 100 PPS tube @ 3.0 Pa = 45
4 x 90° DN 100 bends @ 3.0 Pa = 12
2 x 45° DN 100 bends @ 1.5 Pa = 3.0
1 x DN 100 open termination @ 4.0 Pa = 4.0
Total Resistance: 64 Pa
Take into account thermal up-draught created (as before) 18 Pa. Therefore operating resistance = 64 – 18 = 46 Pa, with no effect on boiler output.





14.0 calculating flue resistance-
flue pressure loss

Minimum dimensions of flue terminal positions see fig. 7 below

Dimension	Terminal Position	Balanced Flue Room Sealed	Non Room Sealed
A	Directly below an opening, air brick, windows etc. Not Recommended	300mm	300mm
B	Below gutters, soil pipes or drain pipes	75mm	75mm
C	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 vertical drain pipe or soil pipe	75mm	75mm
F	From an internal or external corner	300mm	300mm
G	Above ground, intersecting roof or balcony level	300mm	300mm
H	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	1200mm But installation not recommended
K	Vertically from a terminal on the same wall	1500mm	1500mm
L	Horizontally from a terminal on the same wall	300mm	300mm
M	From the wall on which the terminal is mounted	n/a	50mm
N	From a vertical structure on the roof	500mm	500mm
P	Above intersection with roof	500mm	500mm

flue terminal positions

The flue terminal of a MICROMAT EC 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.

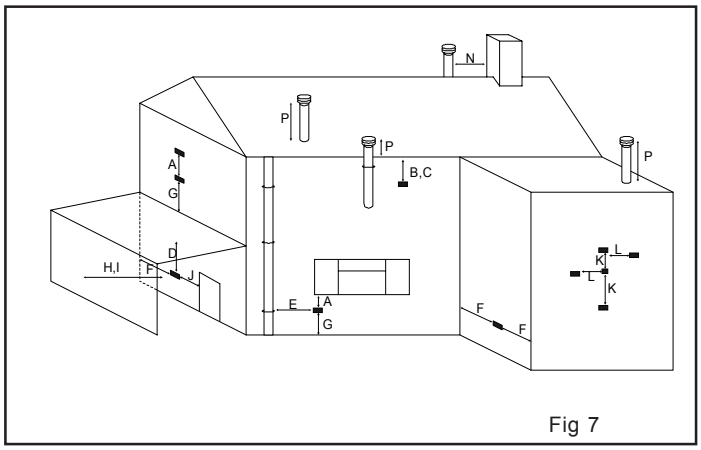


Fig 7

15.0 ventilation requirements
single appliances

The room or space in which the Micromat EC boiler is installed is required to be ventilated in accordance with BS 5440: Part 2:2000.

The following tables must be read to ascertain the amount of ventilation required.

Table 1 Room Intallation - Non Room Sealed Flue.
Natural Ventilation Direct to Outside Air

Boiler Model	Ventilation openings Free Area cm^2	
	High Level	Low Level
Micromat EC 16/22	75	---
Micromat EC 24/28	105	---
Micromat EC 31/36	145	---
Micromat EC 38/45	190	---

Tabel 2 Room Installation - Non Room Sealed Flue.
Natural Ventilation from Adjacent Room

Boiler Model	Ventilation openings Free Area
Micromat EC 16/22	75 with adjacent room similarly ventilated to outside air
Micromat EC 24/28	105 with adjacent room similarly ventilated to outside air
Micromat EC 31/36	145 with adjacent room similarly ventilated to outside air
Micromat EC 38/45	190 with adjacent room similarly ventilated 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, (BS 6644 specifies room temperature limits) and the following free ventilation areas are recommended to be installed.

Boiler Model	Recommended Natural Ventilation free Area cm^2
Micromat EC 16/22	75 with adjacent room similarly ventilated to outside air
Micromat EC 24/28	105 with adjacent room similarly ventilated to outside air
Micromat EC 31/36	145 with adjacent room similarly ventilated to outside air
Micromat EC 38/45	190 with adjacent room similarly ventilated to outside air

Table 4 Compartment Installation - Non room sealed flue
Natural Ventilation Direct to Outside Air

Boiler Model	Ventilation Openings free Area cm^2	
	High Level	Low Level
Micromat EC 16/22	110	220
Micromat EC 24/28	140	280
Micromat EC 31/36	180	360
Micromat EC 38/45	225	450

Table 5 Compartmetn Installation - Non Room Sealed Flue
Natural Ventilation from Adjacent Room

Boiler Model	Ventilation Openings free Area cm^2	
	High Level	Low Level
Micromat EC 16/22	220	440
Micromat EC 24/28	280	560
Micromat EC 31/36	360	720
Micromat EC 38/45	450	900

15.0 ventilation requirements

single appliances

Table 6 Compartment Installation - Room Sealed Flue
Natural Ventilation Direct to Outside Air

Boiler Model	Ventilation openings Free Area cm^2	
	High Level	Low Level
Micromat EC 16/22	110	110
Micromat EC 24/28	140	140
Micromat EC 31/36	180	180
Micromat EC 38/45	225	225

Table 7 Compartment Installation - Room Sealed Flue
Natural Ventilation from Adjacent room

Boiler Model	Ventilation Openings Free Area cm^2	
	High Level	Low Level
Micromat EC 16/22	220	220
Micromat EC 24/28	280	280
Micromat EC 31/36	360	360
Micromat EC 38/45	450	450

16.0 hydraulic system

design

• The MICROMAT EC 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 (75°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 (Δt). The microprocessor controls monitor return temperature and the facility to dictate a set Δt (by pump speed modulation) is a standard and most important feature and will maintain the Δt 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 Δt 20°C and LT (underfloor coils via a mixing valve) systems Δt 10°C. Designing for a Δt 20°C gives the added cost saving advantage of smaller pipe sizes and pumps.

• The MICROMAT EC includes 'in built' primary pumps 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), should always be installed with a low loss mixing header or similar arrangement – see table below.

• The MICROMAT EC 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.

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

The MICROMAT EC 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 RVR Ltd.

low velocity mixing header diameter sizing guide

Boiler Power kW	Design Δt 20°C
Up to 45	40mm
75	50mm
100	65mm
120	65mm
150	80mm
200	80mm
250	100mm
270	100mm
300	100mm
340	100mm

Tube Diameters refer to steel pipe and calculated from CIBSE Guide C4

Inbuilt boiler pumps approx residual head pressure at Δt 20°C

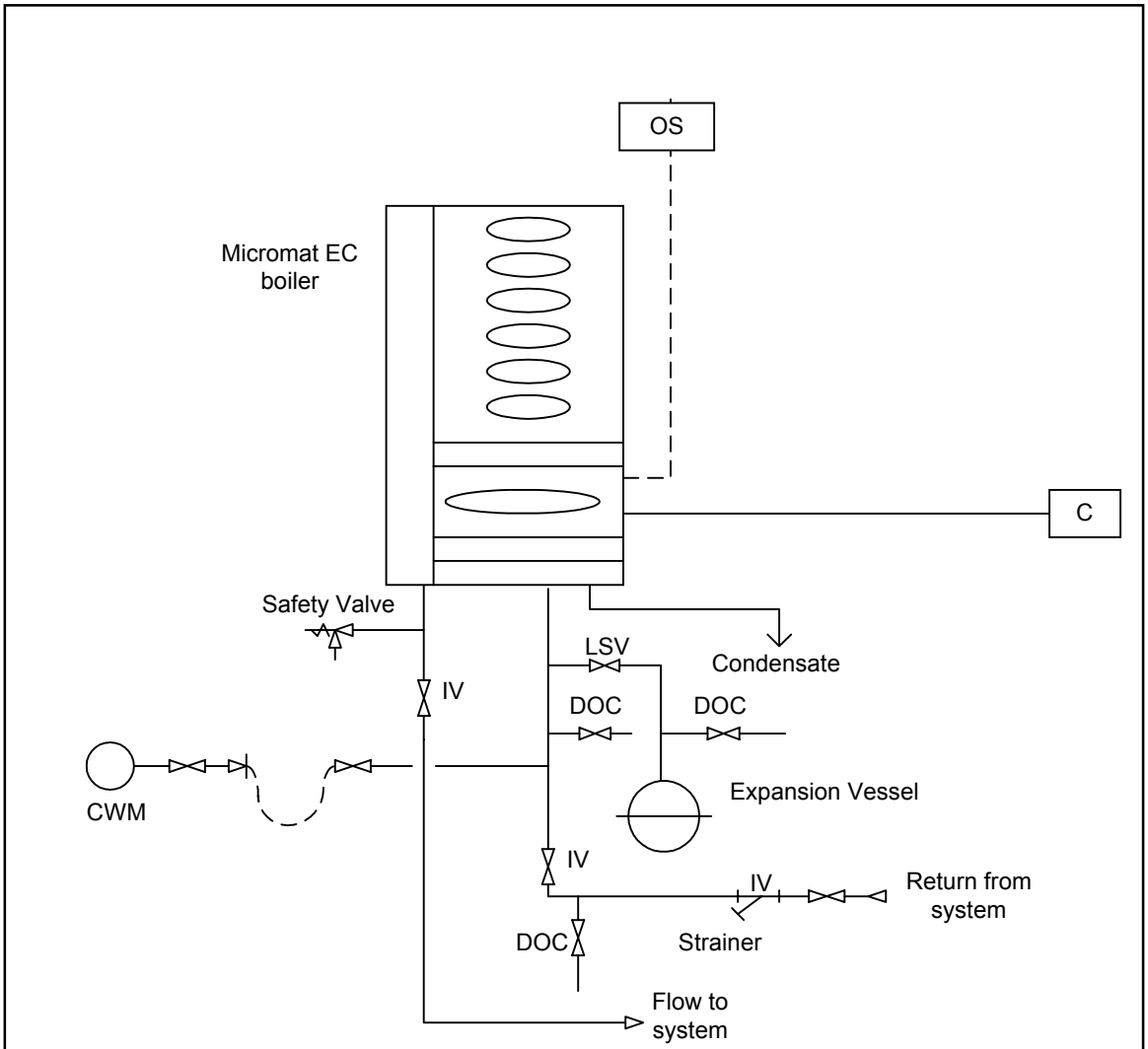
Boiler Model	Pressure Metres wc
16/22	1
24/28	1
31/36	1
38/45	1

16.0 hydraulic system

design

System type 1

Typical Typical Single MICROMAT EC boiler installation serving heating only where the boiler's own in-built circulating pump is used to circulate the water around the system (used only where system index resistance <1 metre). Flow temperature may be fixed/constant or weather variable.



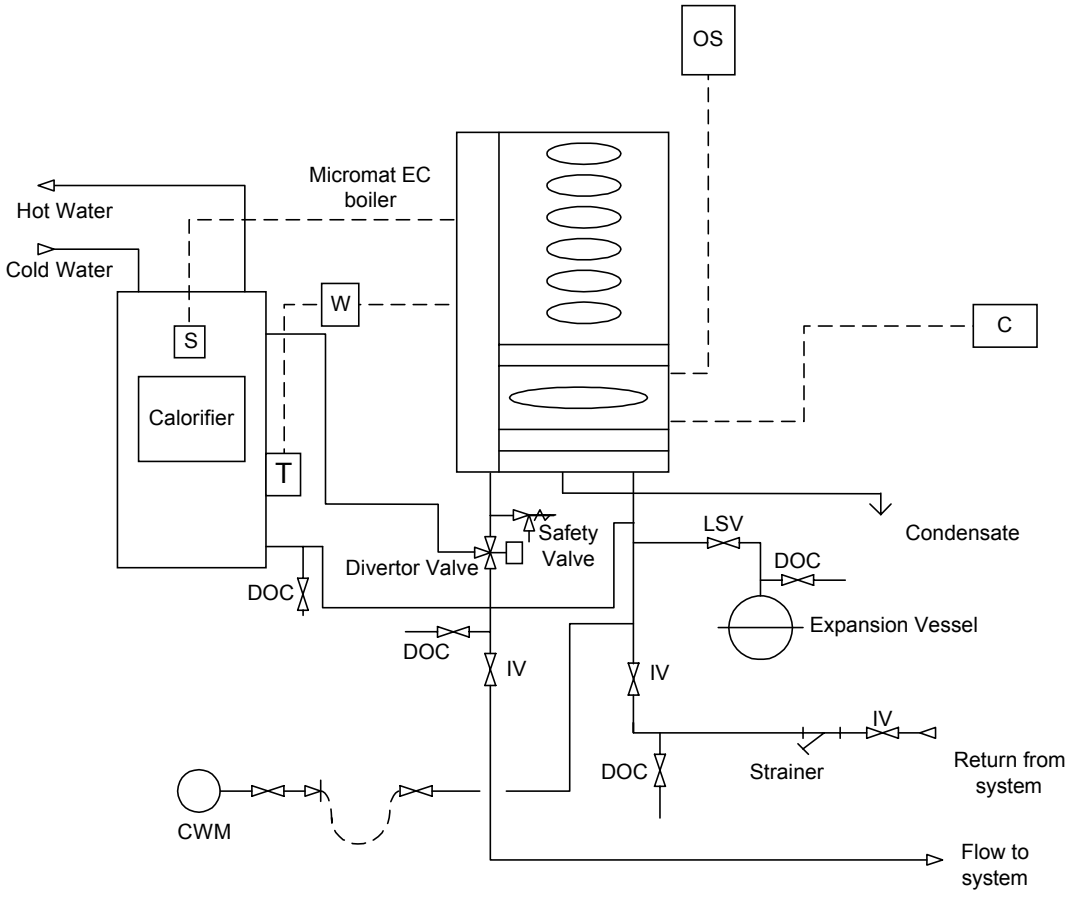
OS = Outside air temperature sensor, used where direct-on-boiler weather compensated flow temperatures are required.
C = Room temperature controls e.g. RE2132 modulating room unit from RVR Ltd., or, separate time clock & room thermostat.

16.0 hydraulic system

design

System type 2

Typical Single MICROMAT EC boiler installation serving domestic hot water and heating where hot water has priority via a divertor valve. The in-built circulating pump in the boiler is used to circulate the system (used only where system index resistance <1 metre). Flow temperature to hot water is constant and flow temperature to heating may be constant or weather variable.



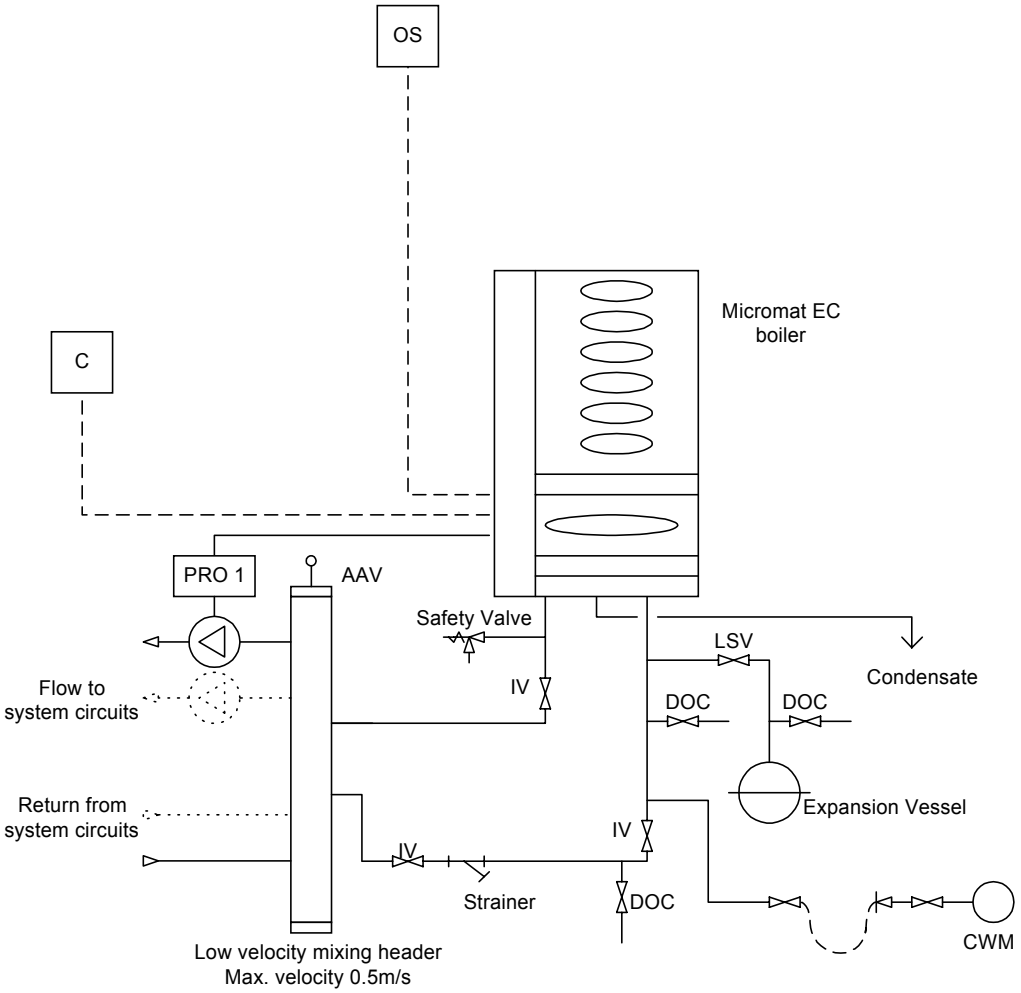
OS = Outside air temperature sensor, used where direct-on-boiler weather compensated flow temperatures are required.
C = Room temperature controls e.g. RE2132 modulating room unit from RVR Ltd., or, separated time clock & room thermostat.
S = HWS sensor from RVR Ltd. Gives 24hr HWS operation.
W/T = Alternative to “S” where “W” is a time switch in series with a cylinder thermostat “T”. Allows for timed HWS.
Divertor valve will require SPDT relay if not spring return.
Divertor valve must be so installed as to spring return to heating.

16.0 hydraulic system

design

System type 3

Typical Single MICROMAT EC boiler installation serving heating only and using a low velocity mixing header where system index resistance exceeds 1 metre. Flow temperature may be fixed/constant or weather variable.



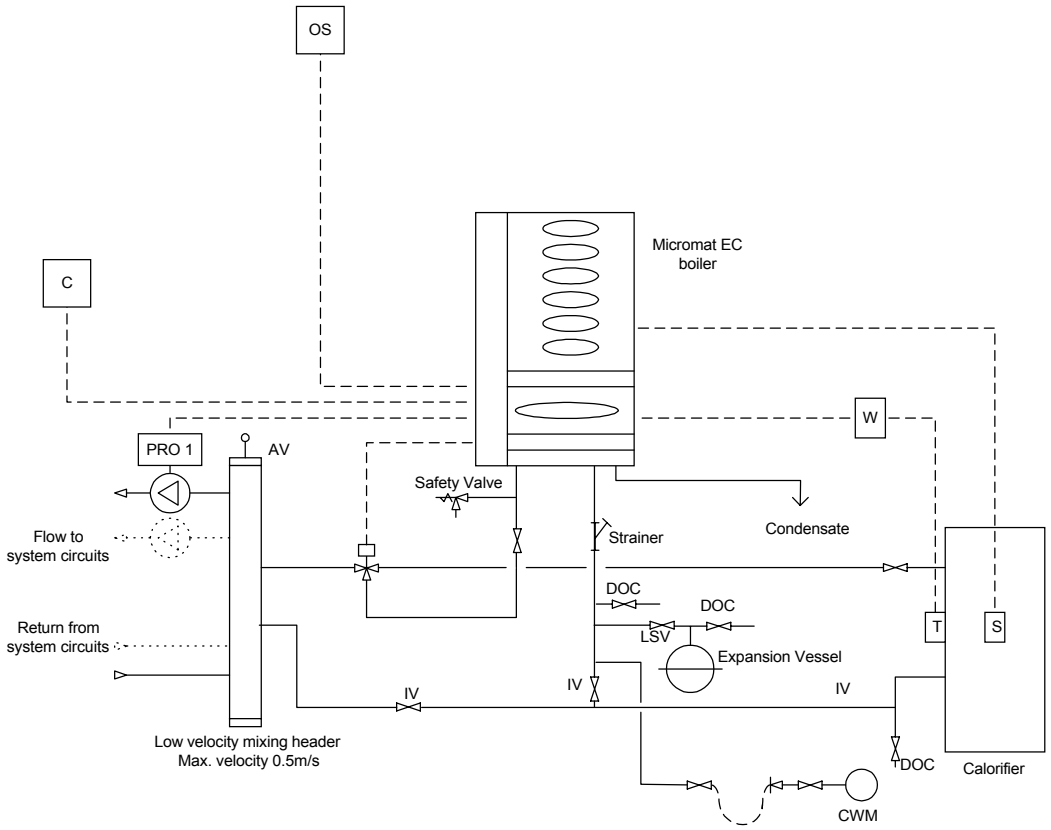
OS = Outside air temperature sensor, used where direct-on-boiler weather compensated flow temperatures are required.
C = Room temperature controls e.g. RE2132 modulating room unit from RVR Ltd., or, separated time clock & room thermostat.
PR01 = Pump regulation module from RVR Ltd. Allows heating pump to be driven from boiler, providing for auto operation, frost protector running & summer standstill exercising.
Must be used where RE2132 modulating room unit is installed. Max pump motor load 2A.

16.0 hydraulic system

design

System type 4

Typical Single MICROMAT EC boiler installation serving heating & domestic hot water. 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 1 metre. Heating circuit index loss exceeds 1 metre and is served via a low velocity mixing header and a separate pump. Heating flow temperature may be fixed/constant or weather variable.



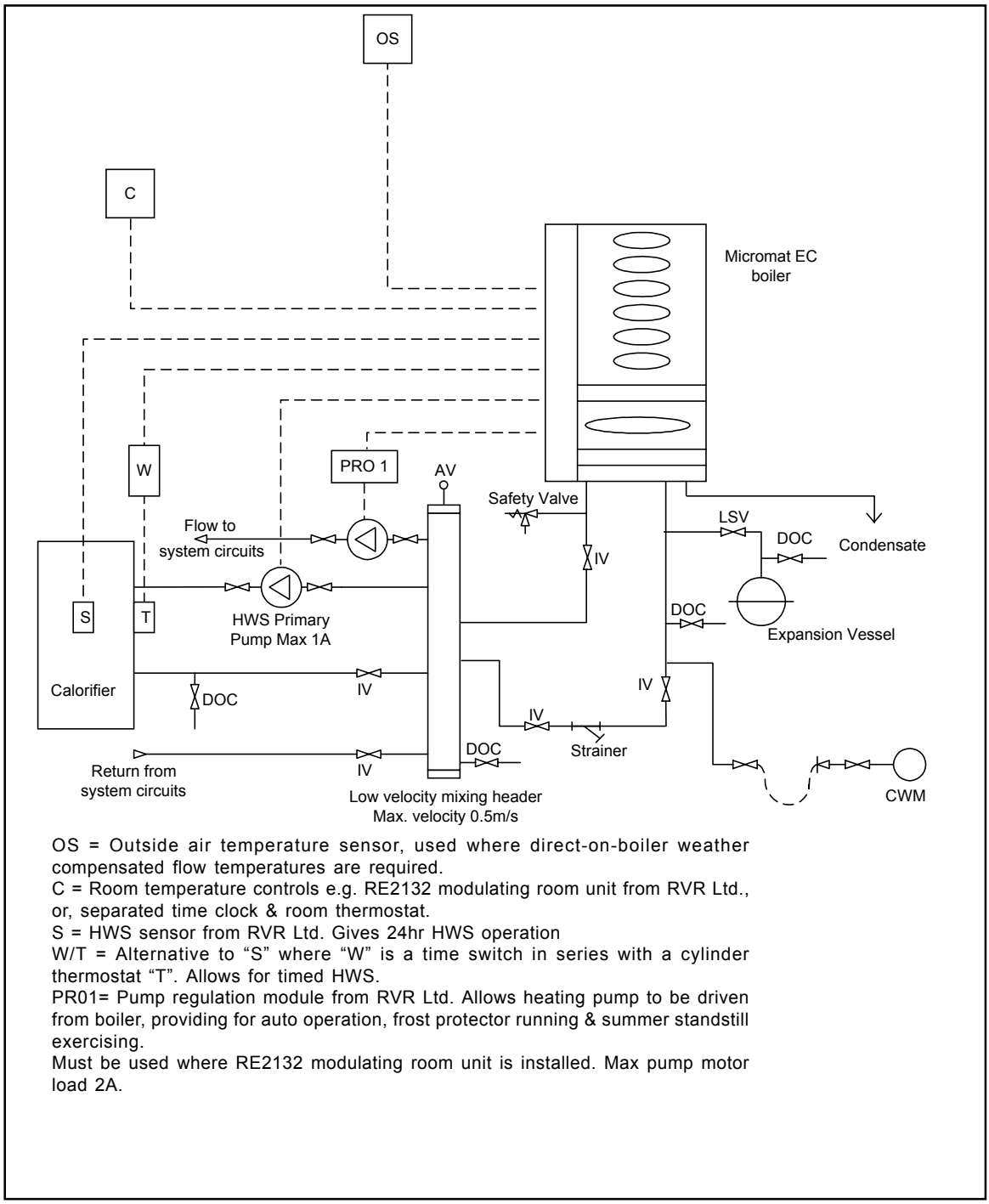
OS = Outside air temperature sensor, used where direct-on-boiler weather compensated flow temperatures are required.
C = Room temperature controls e.g. RE2132 modulating room unit from RVR Ltd., or, separated time clock & room thermostat.
S = HWS sensor from RVR Ltd. Gives 24hr HWS operation.
W/T = Alternative to "S" where "W" is a time switch in series with a cylinder thermostat "T". Allows for timed HWS.
PR01=Pump regulation module from RVR Ltd. Allows heating pump to be driven from boiler, providing for auto operation, frost protector running & summer standstill exercising.
Must be used where RE2132 modulating room unit is installed. Max pump motor load 2A.
Divertor valve will require SPDT relay if not spring return.
Divertor valve must be so installed as to spring return to heating.

16.0 hydraulic system

design

System type 5

Typical Single MICROMAT EC boiler installation serving heating & domestic hot water with hot water priority. Hot water & heating circuits both have index resistance exceeding 1 metre & are served by independent pumps from a low velocity mixing header. Heating flow temperature may be fixed/constant or weather variable.



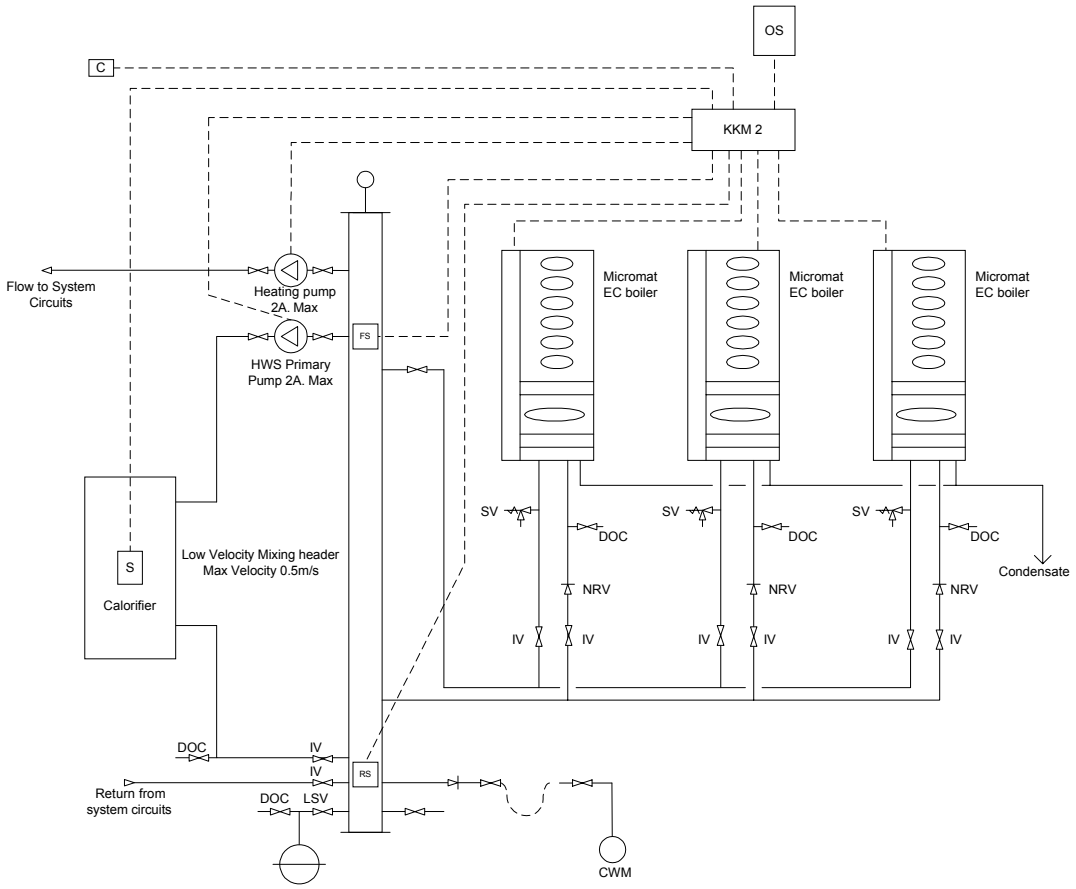
OS = Outside air temperature sensor, used where direct-on-boiler weather compensated flow temperatures are required.
C = Room temperature controls e.g. RE2132 modulating room unit from RVR Ltd., or, separated time clock & room thermostat.
S = HWS sensor from RVR Ltd. Gives 24hr HWS operation
W/T = Alternative to “S” where “W” is a time switch in series with a cylinder thermostat “T”. Allows for timed HWS.
PR01= Pump regulation module from RVR Ltd. Allows heating pump to be driven from boiler, providing for auto operation, frost protector running & summer standstill exercising.
Must be used where RE2132 modulating room unit is installed. Max pump motor load 2A.

16.0 hydraulic system

design

System type 6

Typical Multiple MICROMAT EC 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.



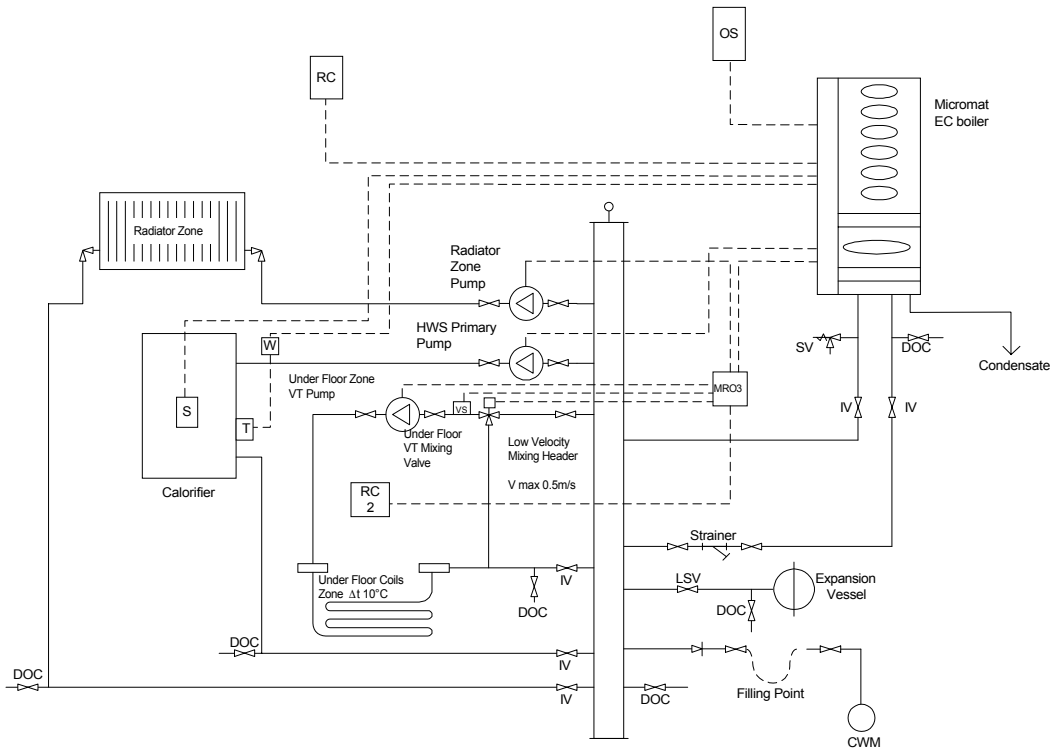
OS = Outside air temperature sensor, used where direct-on-boiler weather compensated flow temperatures are required.
C = Room temperature controls e.g. RE2132 modulating room unit from RVR Ltd., or, separated time clock & room thermostat.
FS = Flow temperature sensor
RS = Return temperature sensor
S = Hot water temperature sensor or thermostat.
KKM2 = Modulating Kaskade Manager. Up to 9Nr boilers may be controlled using 2Nr linked KKm2's.

16.0 hydraulic system

design

System type 7

Typical Single MICROMAT EC boiler installation serving domestic hot water 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 references for both heating zones

MR03 = Pumps and mixer regulation control box from RVR Ltd. 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 ratio setter for compensation of under floor coils. Max pump motor loads 2A.

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

RC2 = As RC1 but for underfloor coil zone.

VS = Underfloor zone VT flow sensor (supplied with MR03)

S = HWS sensor from RVR Ltd. Gives 24hr operation.

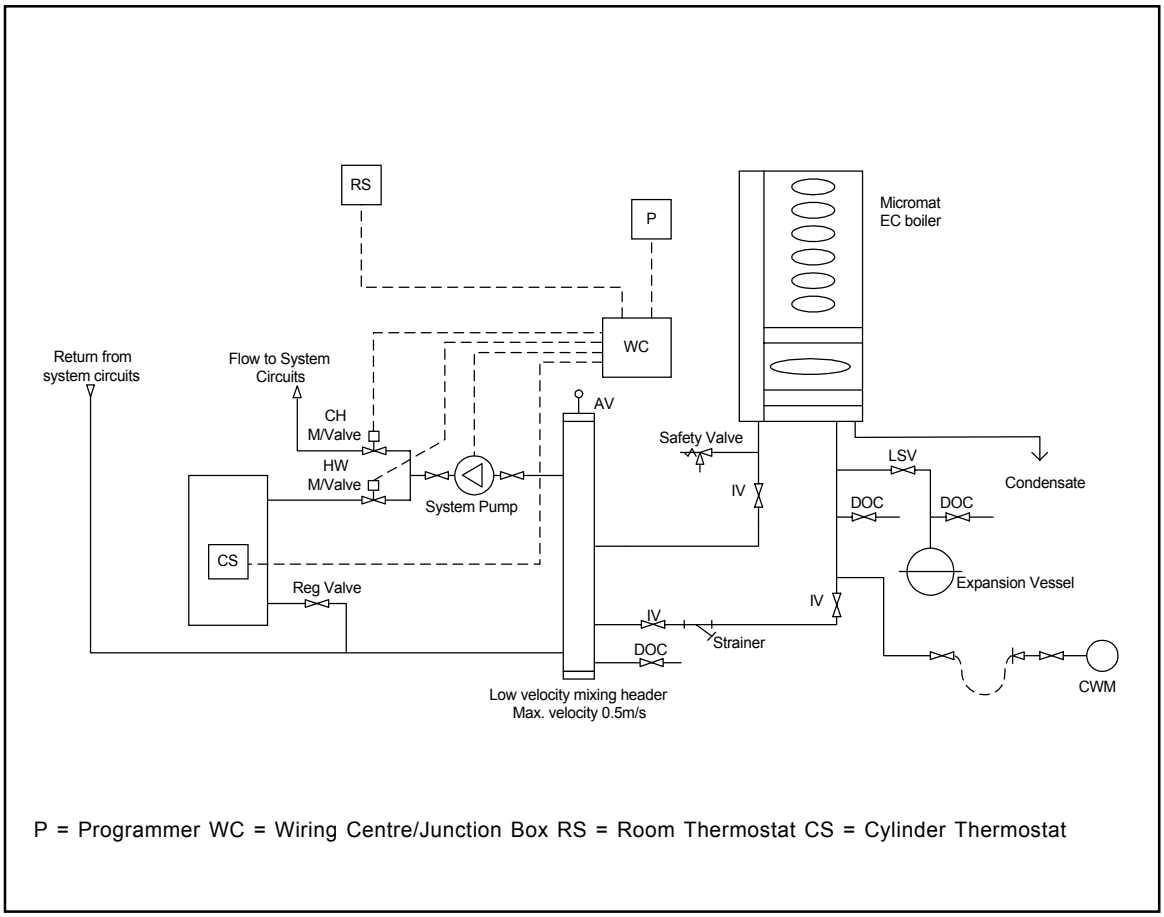
W/T = Alternative to “S” where “W” is a time switch in series with a cylinder thermostat “T”. Allows for timed HWS.

16.0 hydraulic system

design

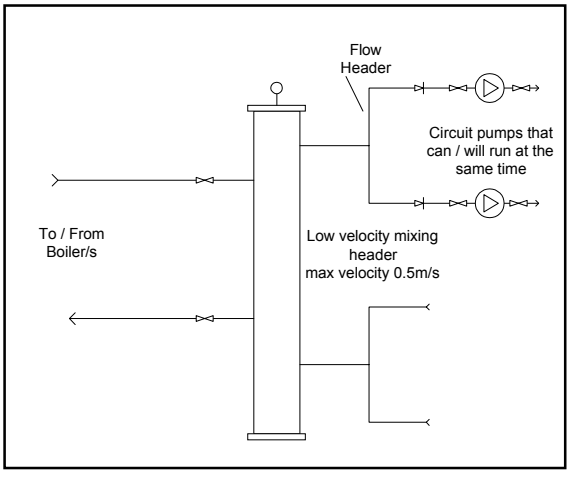
System type 8

Typical Single MICROMAT EC boiler installation serving heating and domestic hotwater via a system pump and 2Nr 2Port motorised valves with conventional controls i.e. programmer, room stat & cylinder stat.
NOTE: system temperature will be fixed constant and direct-on-boiler weather compensation is not possible.



P = Programmer WC = Wiring Centre/Junction Box RS = Room Thermostat CS = Cylinder Thermostat

Typical schematic arrangement where system has multiple pumps that will operate at the same time.



16.1 water treatment

system cleaning

The entire 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 MICROMAT EC boiler is being retro-fitted into an old/existing system, as system silt or magenite can be very damaging to the new boiler.

The system must be filled with clean chemically neutral water. Water hardness must not exceed 3.6 mol/m^3 (=20°dH). Chloride Concentrations must not exceed 150mg/l.

Following cleansing and flushing, the system must be dosed with a good quality water treatment to prevent corrosion and the formation of scale. A suitable corrosion inhibitor 'INIBAL' is available from RVR Limited and should be used in all systems. The required concentration is 1-2% of system capacity.

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.

16.2 care with the use of

soldering flux

The MICROMAT EC boiler has heat exchangers 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.

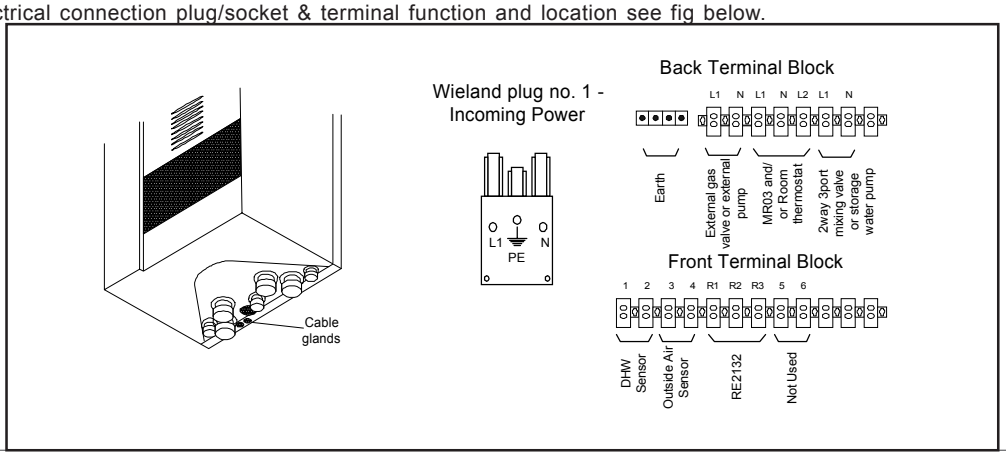
17.0 electrical

connection

The electrical connections to the MICROMAT EC boiler are made via a Weiland Plug and socket (incoming live, neutral and earth) and two terminal blocks which are located within the boiler case and below the control panel. The lower terminal block is 24V d.c. and the upper terminal block is 220V a.c.

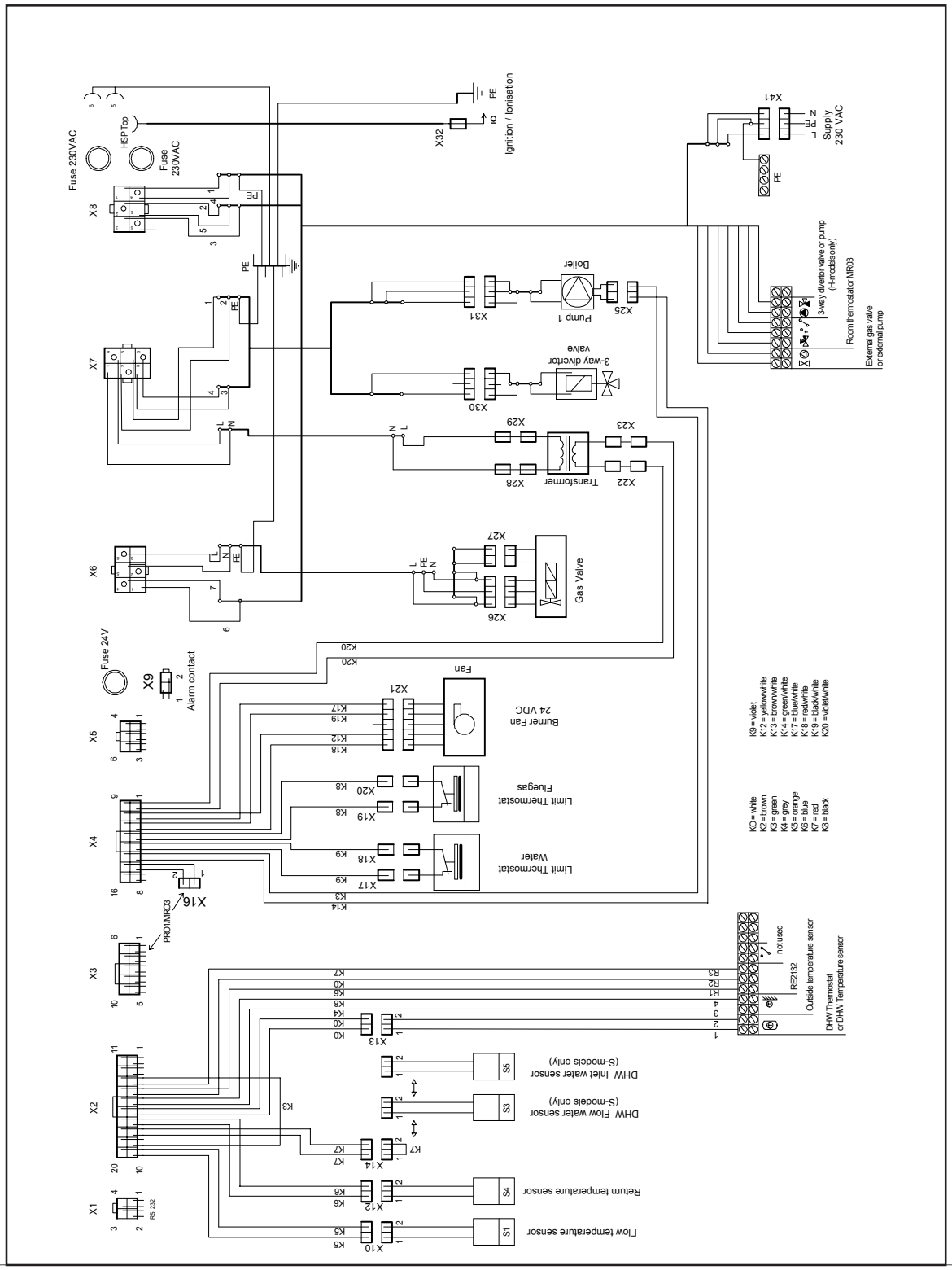
Connections must only be made using appropriate diameter multi strand flex cables and cable entry must only be via the rubber glanded cable entry points located at the bottom rear r/h side of the appliance. If the boiler is to be room sealed flued then care must be taken to ensure the cable entries are reasonably air tight.

For electrical connection plug/socket & terminal function and location see fig below.



17.0 electrical *connections*

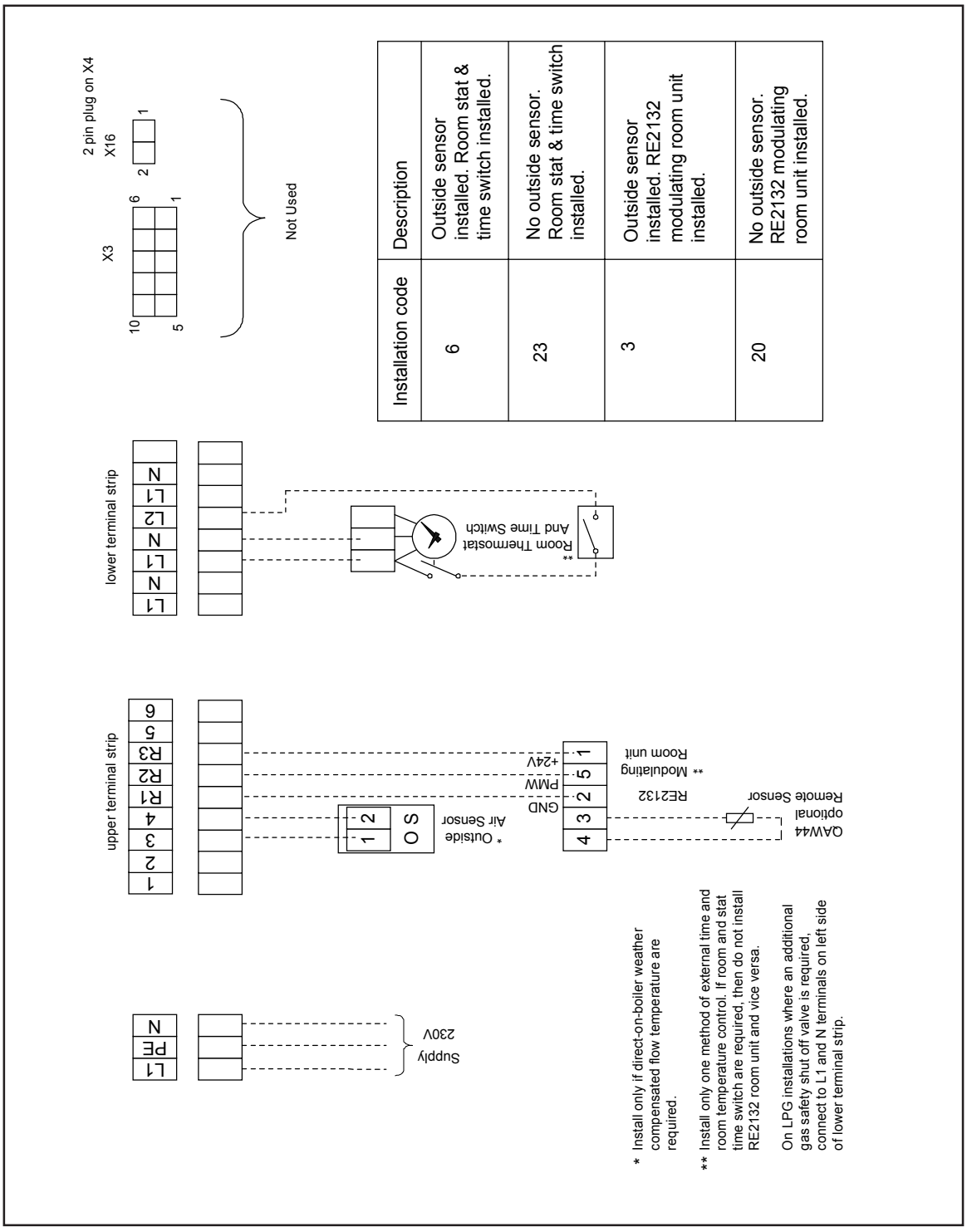
Plan of internal electrical connections



17.0 electrical

connections

Typical electrical connection schematic to suit system type 1



Installation code	Description
6	Outside sensor installed. Room stat & time switch installed.
23	No outside sensor. Room stat & time switch installed.
3	Outside sensor installed. RE2132 modulating room unit installed.
20	No outside sensor. RE2132 modulating room unit installed.

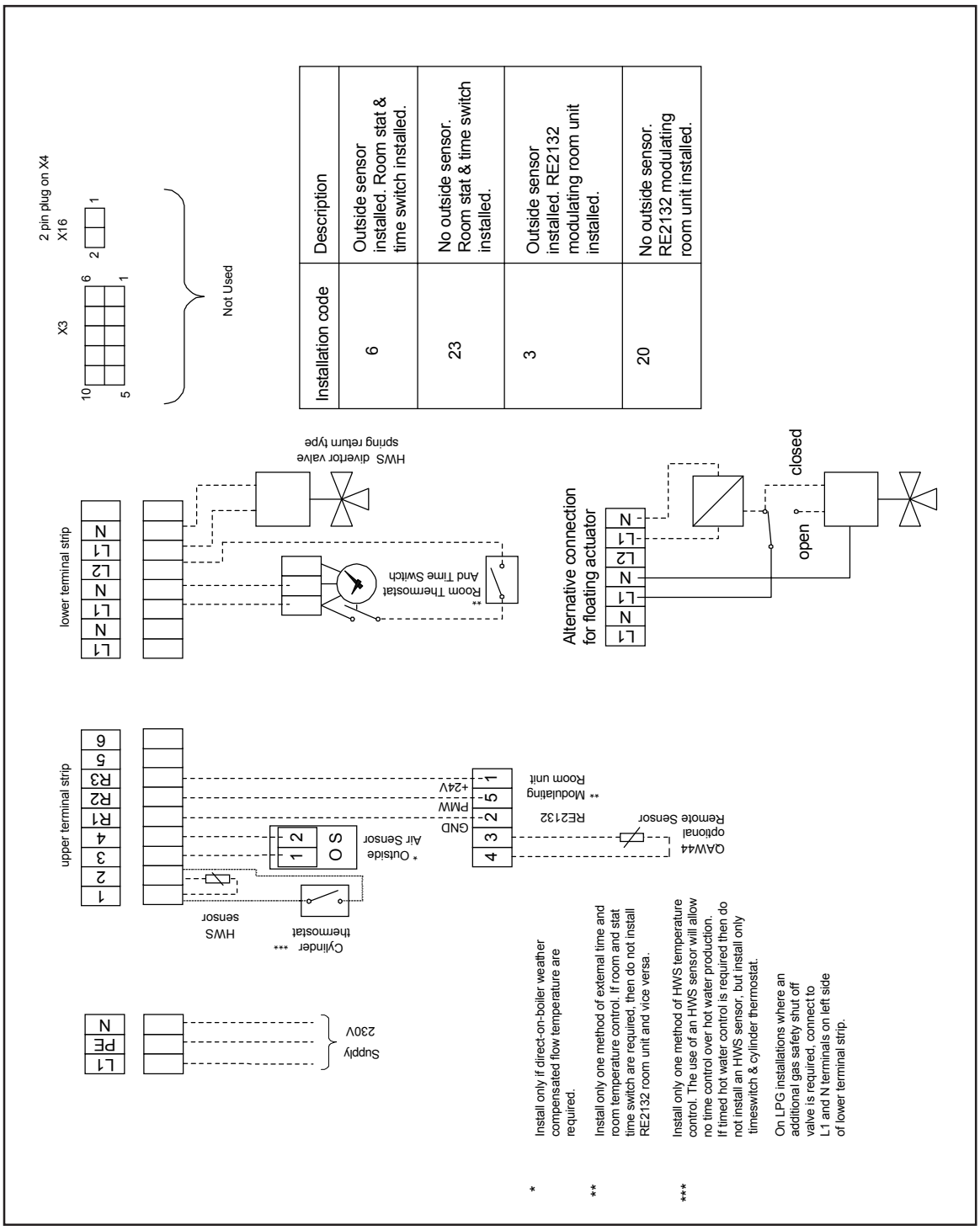
* Install only if direct-on-boiler weather compensated flow temperature are required.

** Install only one method of external time and room temperature control. If room and stat time switch are required, then do not install RE2132 room unit and vice versa.

On LPG installations where an additional gas safety shut off valve is required, connect to L1 and N terminals on left side of lower terminal strip.

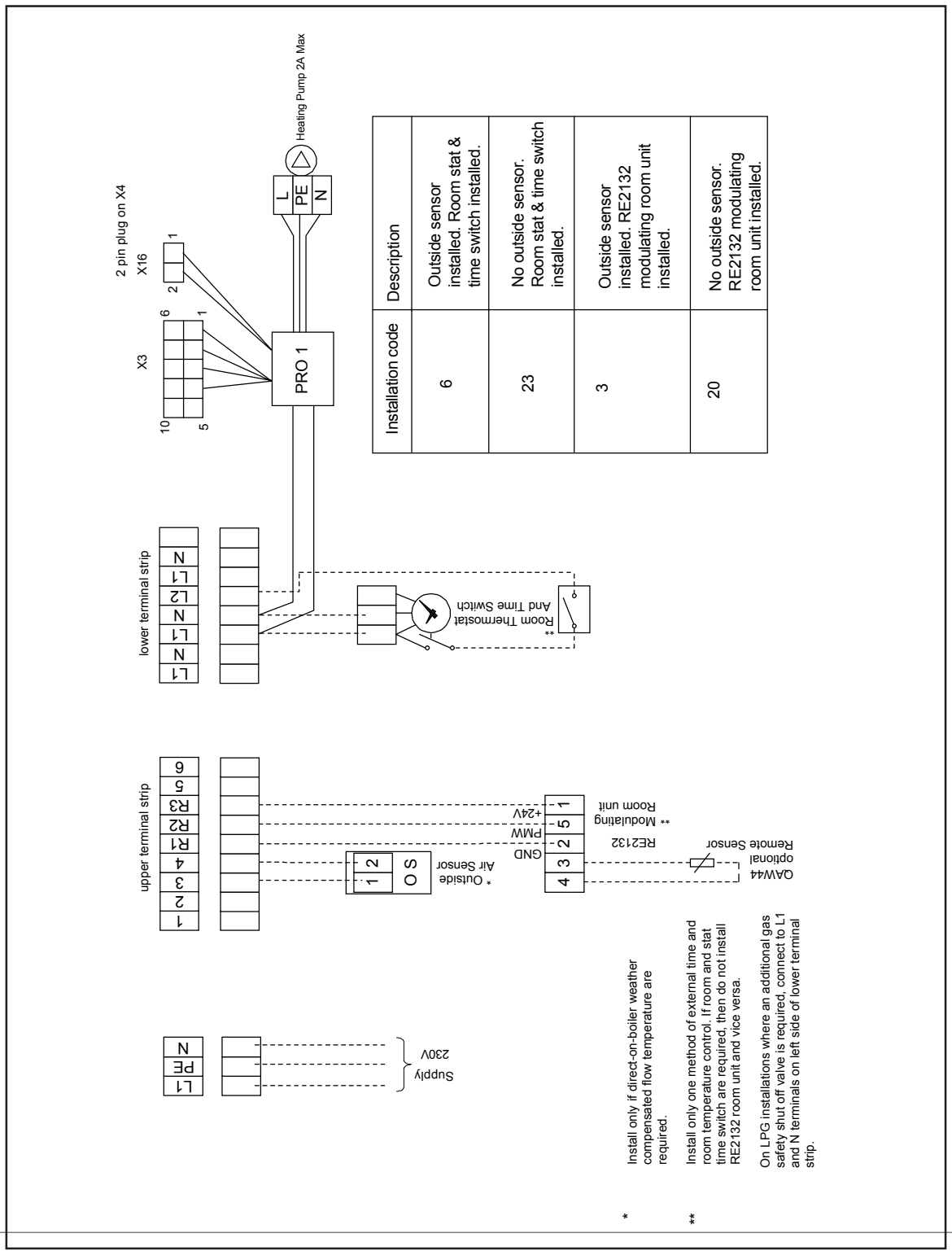
17.0 electrical *connections*

Typical electrical connection schematic to suit system type 2



17.0 electrical connections

Typical electrical connection schematic to suit system type 3

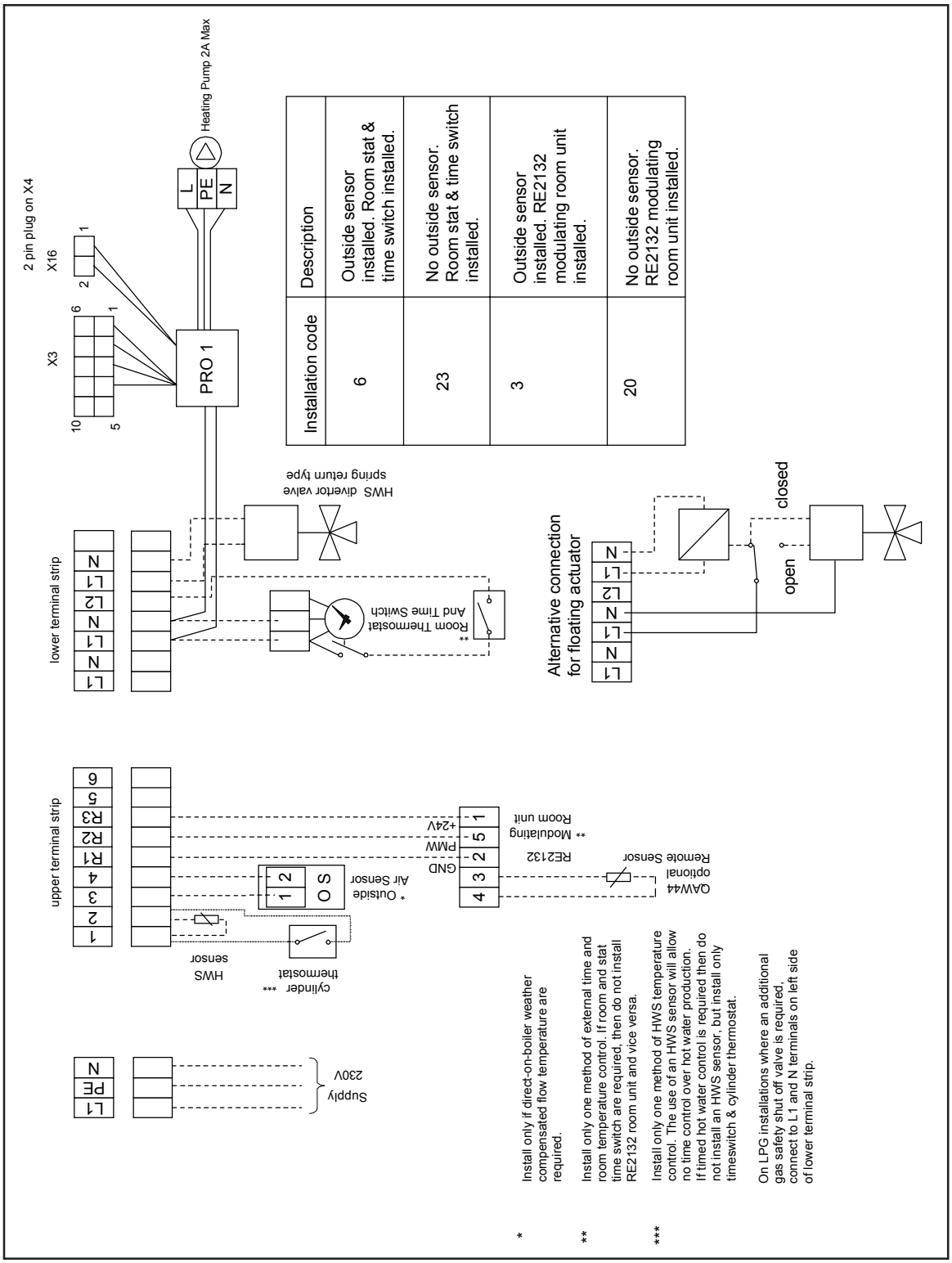


Installation code	Description
6	Outside sensor installed. Room stat & time switch installed.
23	No outside sensor. Room stat & time switch installed.
3	Outside sensor installed. RE2132 modulating room unit installed.
20	No outside sensor. RE2132 modulating room unit installed.

17.0 electrical

connections

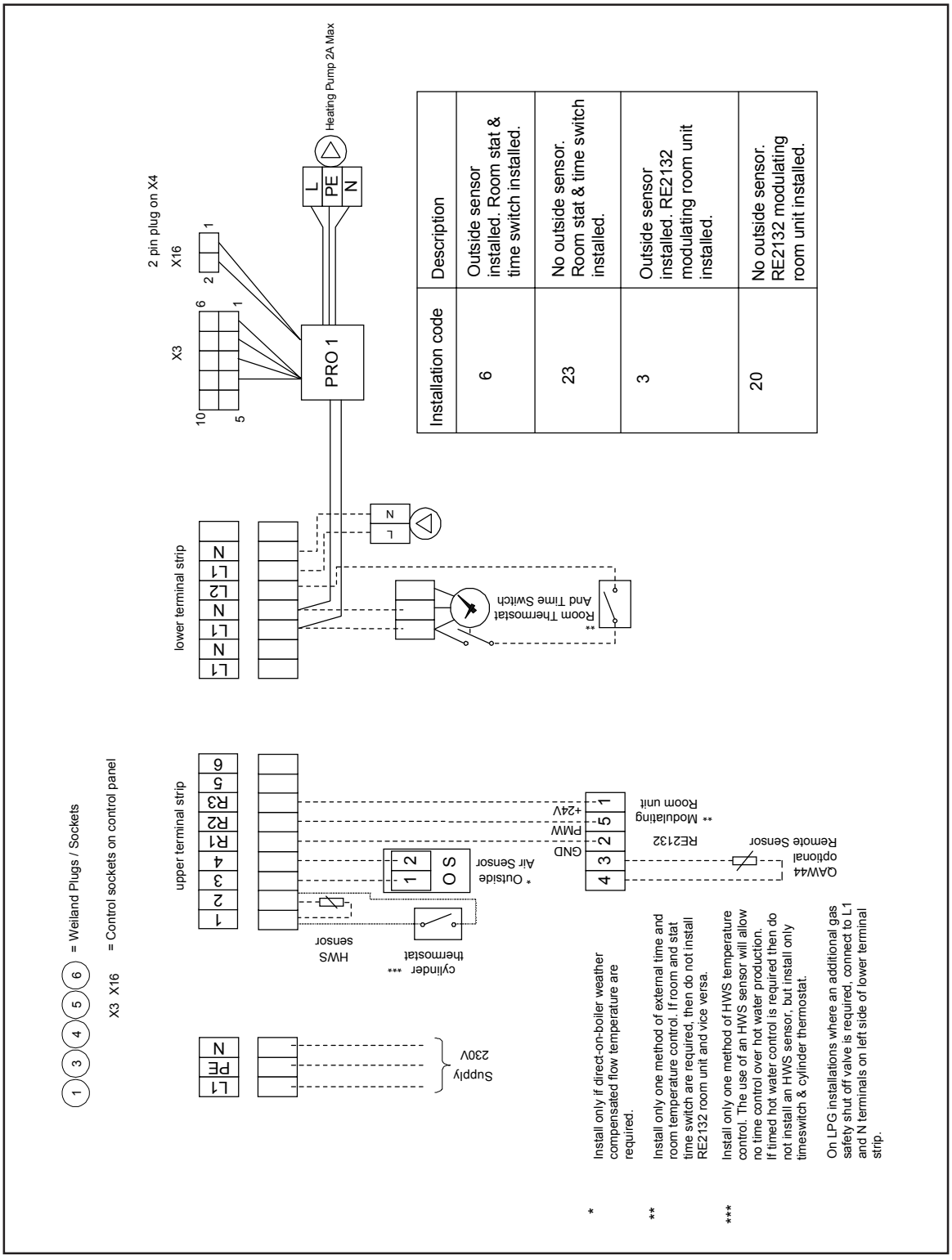
Typical electrical connection schematic to suit system type 4



17.0 electrical

connections

Typical electrical connection schematic to suit system type 5



Installation code	Description
6	Outside sensor installed. Room stat & time switch installed.
23	No outside sensor. Room stat & time switch installed.
3	Outside sensor installed. RE2132 modulating room unit installed.
20	No outside sensor. RE2132 modulating room unit installed.

* Install only if direct-on-boiler weather compensated flow temperature are required.

** Install only one method of external time and room temperature control. If room and stat time switch are required, then do not install RE2132 room unit and vice versa.

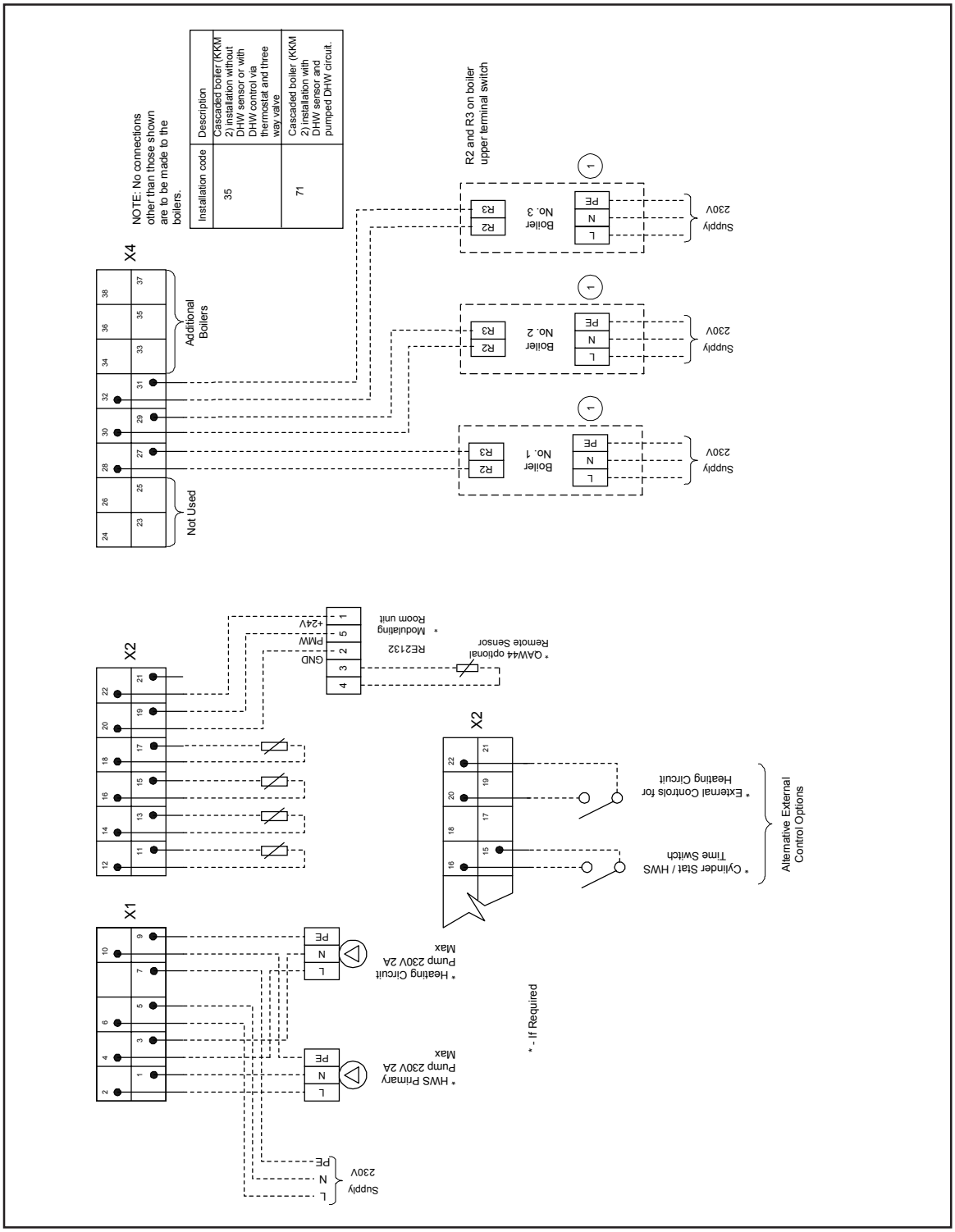
*** Install only one method of HWS temperature control. The use of an HWS sensor will allow no time control over hot water production. If timed hot water control is required then do not install an HWS sensor, but install only timeswitch & cylinder thermostat.

On LPG installations where an additional gas safety shut off valve is required, connect to L1 and N terminals on left side of lower terminal strip.

17.0 electrical

connections

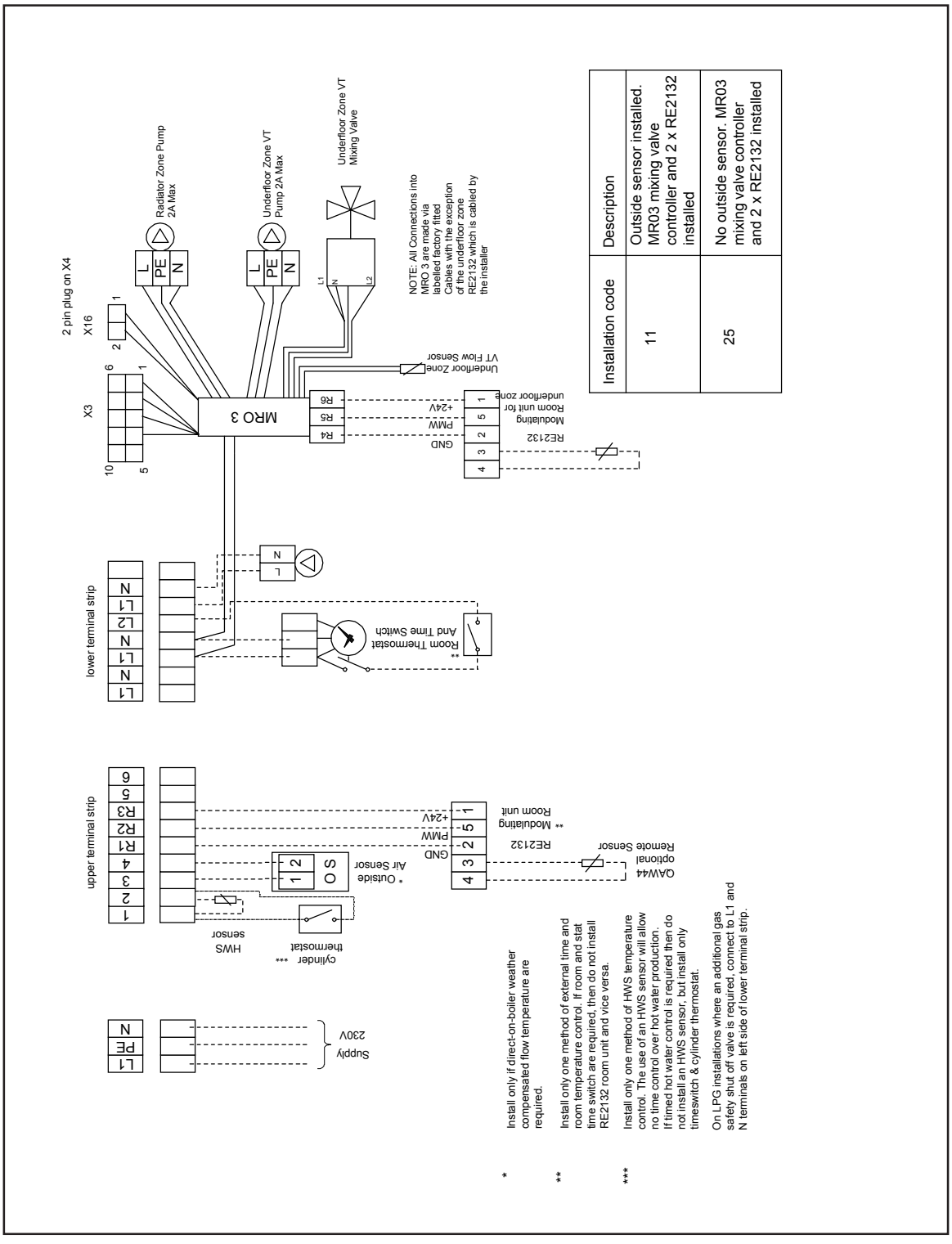
Typical electrical connection schematic to suit system type 6



17.0 electrical

connections

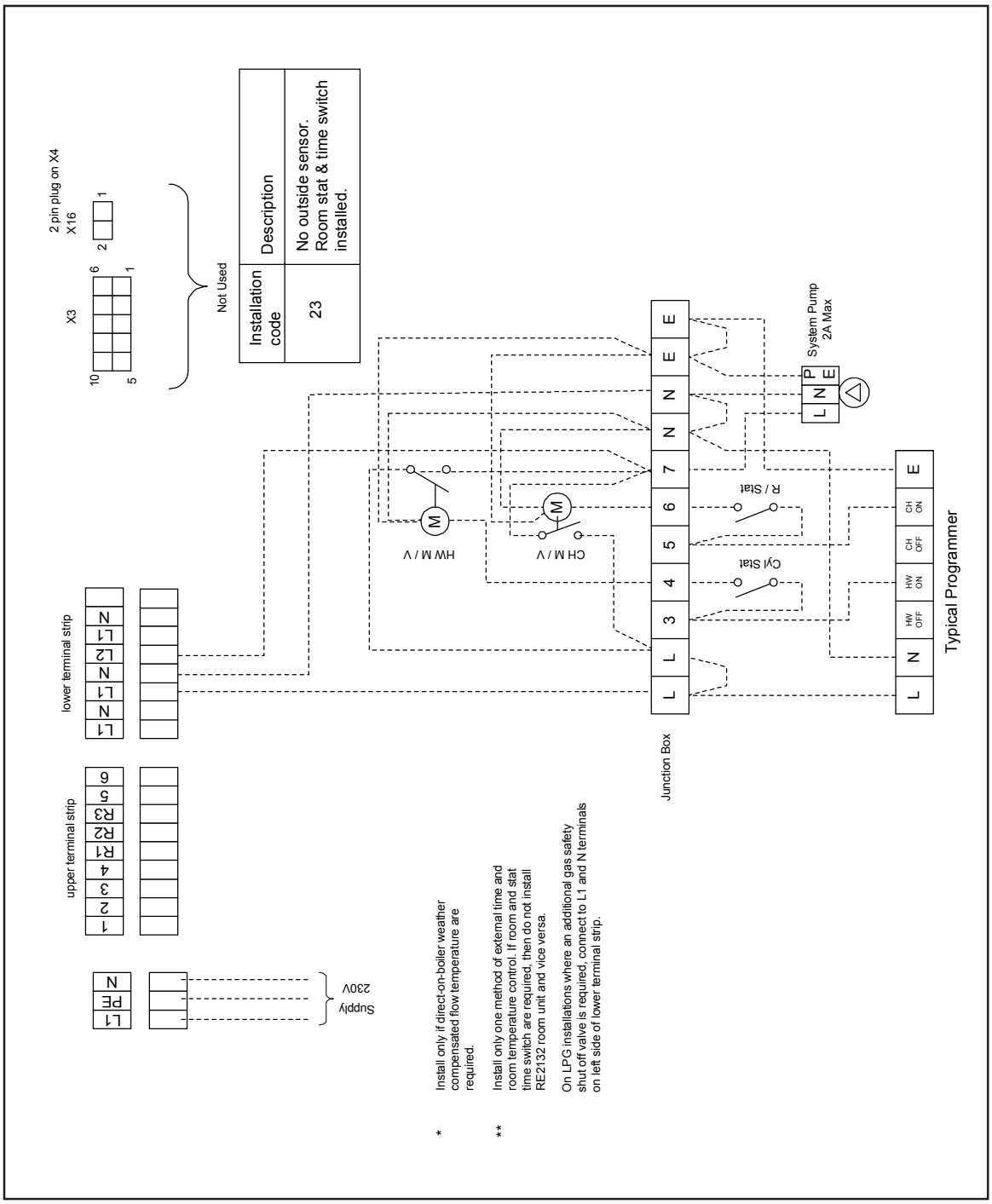
Typical electrical connection schematic to suit system type 7



Installation code	Description
11	Outside sensor installed. MR03 mixing valve controller and 2 x RE2132 installed
25	No outside sensor. MR03 mixing valve controller and 2 x RE2132 installed

17.0 electrical connections

Typical electrical connection schematic to suit system type 8



17.0 electrical *connections*

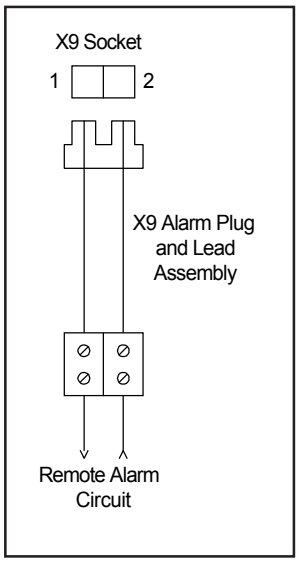
Remote Fault Indication

The MICROMAT EC 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 RVR Ltd.

The alarm plug and lead connects to socket x9 located in the lower area of the boiler control panel.



18.0 commissioning *the micromat EC boiler*

The MICROMAT EC 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 MICROMAT EC boiler to work, the following check list must be worked through. See 18.1.

18.1 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.

b) Ensure the system and boiler has been properly and fully flooded and vented of air and the cold fill pressure at the boiler is at a minimum 0.5 Bar

c) Check that the pumps within the boiler are free to rotate by removing the vent screw in the end of both pump motors and checking that the impeller shafts rotate freely when turned with an appropriate sized screwdriver. Replace vent screws.

d) Ensure Gas supply has been purged and them is the availability of working inlet pressure of nominal 20 mbar (Nat gas) or 37 mbar (LPG).

e) Check that the flue installation has been properly made.

f) Check that a condensate pipe (in plastic - copper tube is not acceptable) has been connected to the boiler and that the syphon cleaning point cap is in place.

g) 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.

h) Ensure that there is an adequate heat load available.

i) Ensure that the electrical connections have been made correctly.

j) Ensure that the appliance has been correctly configured with the appropriate installation code for the system, See tables page 45 onwards.

18.2 installation

codes

Weather compensated control without DHW sensor or with DHW control via thermostat and three way valve.

			Function Number
Weather Compensation without mixing circuit. (Direct Heating Only)	with RE2132 Room Unit	Low Temperature heating	1
		Medium Temperature heating	2
		High Temperature heating	3
	with Room Thermostat	Low Temperature heating	4
		Medium Temperature heating	5
		High Temperature heating	6
	without room unit or thermostat or with RE2 room regulator	Low Temperature heating	7
		Medium Temperature heating	8
		High Temperature heating	9
Weather Compensated Direct Heating and mixing circuit with MR03(the mixing circuit is always low temperatue heating)	with two RE2132 Room Units	Medium Temperature Direct heating	10
		High Temperature Direct heating	11
	with one RE2132 Room Unit	Medium Temperature Direct heating	12
		High Temperature Direct heating	13
	with Room Thermostat	Medium Temperature Direct heating	14
		High Temperature Direct heating	15
	without room unit or thermostat or with RE2 room regulator	Medium Temperature Direct heating	16
		High Temperature Direct heating	17

Room temperature controlled (without weather compensation) without DHW sensor or with DHW control via thermostat and three way valve

Room Temperature control without mixing circuit. (Direct Heating Only)	with RE2132 Room Unit	Low Temperature heating	18
		Medium Temperature heating	19
		High Temperature heating	20
	with Room Thermostat	Low Temperature heating	21
		Medium Temperature heating	22
		High Temperature heating	23
Room temperature controlled Direct Heating and mixing circuit with MR03 (the mixing circuit is always low temperatue heating)	with two RE2132 Room Units	Medium Temperature Direct heating	24
		High Temperature Direct heating	25
	with one RE2132 Room Unit	Medium Temperature Direct heating	26
		High Temperature Direct heating	27
	with Room Thermostat	Medium Temperature Direct heating	28
		High Temperature Direct heating	29

18.2 installation *codes*

Flow temperature control(without room controller and without weather compensation) without DHW sensor or with DHW control via thermostat and three way valve

without mixing circuit (Direct heating only)	Without outside temperature sensor, room unit, room thermostat (Fixed point control)	Low Temperature heating	30
		Medium Temperature heating	31
		High Temperature heating	32
Direct Heating and mixing circuit with MR03 (the mixing circuit is always low temperatue heating)	Without outside temperature sensor, room unit, room thermostat (Fixed point control)	Medium Temperature heating	33
		High Temperature heating	34

Cascaded boiler installation without DHW sensor or with DHW control via thermostat and three way valve

MAN Kaskade manager(KKM) with PWM signal. (Connected to R2 and R3)	Max heating temperature is set in the KKM	35
Other cascade controller with 0 - 3V output signal (connection to …)	Max heating temperature is set in the cascade controller	36

Weather compensated control with DHW sensor and pumped DHW circuit.

Weather Compensated Direct Heating without mixing circuit (direct heating only)	with RE2132 Room Unit	Low Temperature heating	37
		Medium Temperature heating	38
		High Temperature heating	39
	with Room Thermostat	Low Temperature heating	40
		Medium Temperature heating	41
		High Temperature heating	42
	without room unit or thermostat or with RE2 room regulator	Low Temperature heating	43
		Medium Temperature heating	44
		High Temperature heating	45
Weather Compensated Direct Heating and mixing circuit (the mixing circuit is always low temperatue heating)	with two RE2132 Room Units	Medium Temperature Direct heating	46
		High Temperature Direct heating	47
	with one RE2132 Room Unit	Medium Temperature Direct heating	48
		High Temperature Direct heating	49
	with Room Thermostat	Medium Temperature Direct heating	50
		High Temperature Direct heating	51
	without room unit or thermostat or with RE2 room regulator	Medium Temperature Direct heating	52
		High Temperature Direct heating	53

18.2 installation codes

Room temperature controlled (without weather compensation) with DHW sensor and pumped DHW circuit.

			Function Number
Room Temperature control without mixing circuit. (Direct Heating Only)	with RE2132 Room Unit	Low Temperature heating	54
		Medium Temperature heating	55
		High Temperature heating	56
	with Room Thermostat	Low Temperature heating	57
		Medium Temperature heating	58
		High Temperature heating	59
Room temperature controlled Direct Heating and mixing circuit (the mixing circuit is always low temperatue heating)	with two RE2132 Room Units	Medium Temperature Direct heating	60
		High Temperature Direct heating	61
	with one RE2132 Room Unit	Medium Temperature Direct heating	62
		High Temperature Direct heating	63
	with Room Thermostat	Medium Temperature Direct heating	64
		High Temperature Direct heating	65

Flow temperature controlled (without room controller & without weather compensation) with DHW sensor and pumped DHW circuit.

			Function Number
Without mixing circuit (Direct heating only)	outside temperature sensor, room unit, room thermostat (Fixed point	Low Temperature heating	66
		Medium Temperature heating	67
		High Temperature heating	68
Direct Heating and mixing circuit (the mixing circuit is always low temperatue heating)	Without outside temperature sensor, room unit, room thermostat (Fixed point control)	Medium Temperature heating	69
		High Temperature heating	70

Cascaded boiler installation with DHW sensor and pumped DHW circuit.

		Function Number
MAN Kaskade manager(KKM) with PWM signal. (Connected to R2 and R3)	Max heating temperature is set in the KKM	71
Other cascade controller with 0 - 3V output signal (connection to ...)	Max heating temperature is set in the cascade controller	72

18.3 first *firing*

Notes
The MICROMAT EC boiler has a single heat exchange and burner assembly. There is one gas valve serving the assembly.
a) Ensure gas & electricity supplies are turned on to the appliance.

b) Switch on the boiler at the on/off switch. (See figure to the right) The appliance will purge the combustion chamber with air from the burner fan and then will pulse the pumps on/off (deaerating).

c) Attach U tube manometer to inlet pressure test point on gas valve (See figure 8). The nominal pressure should be 20mb for NG or 37mb for LPG.

d) Press the Engineers test button twice - the screen should/must display [10 min Low]. To reduce the burner to its lowest firing rate press the '-' key until the fan speed reduces to its minimum revs (see section 18.5). In the event that ignition of the burner does not occur after 4 attempts the appliance will go to ignition failure lockout. Remove the cover cap screws from Qmin adjustment on gas valve (See figure 8(3)) turn adjustment screw half turn clockwise.

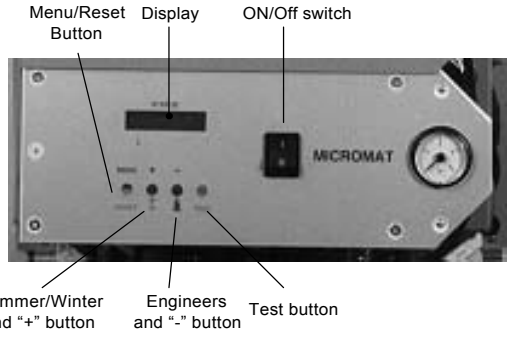
Press reset button, appliance will post purge and vent again.
Press Engineers test button twice to reset appliance to "I0 min Low" and ignition sequence will start again. If ignition fails again after 4 attempts, then further increase Qmin on gas valve by half turn until burner ignites.

e) Observe the colour of burner flame - correct colour should be dull red. Adjust colour of burner flame using Qmin until flame colour is correct. Following this procedure will avoid poisoning your combustion analyser.

f)Remove flue gas analysis test point cap or plug (from top right of combustion chamber) of the heat exchanger and insert probe of combustion analyser Adjust as necessary Qmin of valve to obtain required C02% value. (See table 2) Make adjustments slowly and wait at least 2 minutes for reading to stabilise before re-adjusting. Remove analyser and refit cap/plug to test point.

NOTE: Test period expires after 10 minutes - if this expires whilst commissioning is still in progress, press Engineers button twice to reset and carry on with necessary checks and adjustments. To exit "10 min Low' test period - press Engineers button once, this will set controls to auto.

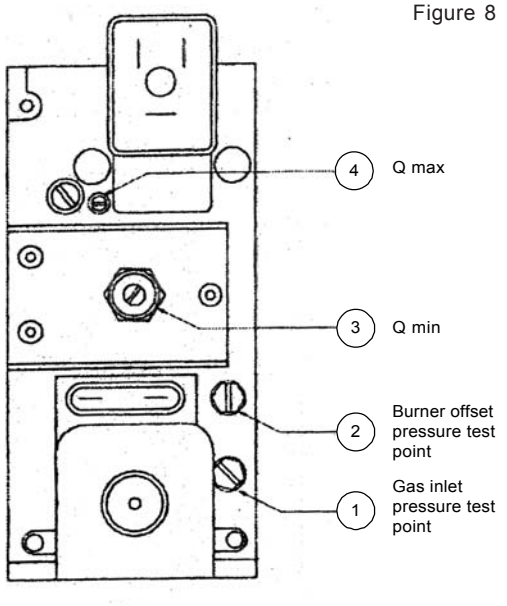
g)Press the '+' button until the fan is at its maximum rate (see section 18.5) This will set the burner to maximum output.



Flue Gas CO_2% Settings

Gas type	Nat Gas G20	LPG G31
CO2 % at Min Output	9-9.5	11-12
CO2 % at Max Output	8.7-9.2	10-11

Figure 8



Adjustments
Turning 3 clockwise increases min output & CO2%
Turning 4 clockwise increase max output & CO2%

18.3 first *firing*

h)Check CO2% of heat exchanger and adjust as necessary screw (4) Q max of right hand valve, to obtain required value. (See table I)

NOTE: Adjustment of either (3) Q min or (4) Q max will affect the other adjustment to a lesser or greater extent. Following either adjustment of (3) or (4) check the effect on the setting of the other adjustment and correct as necessary.

i)Remove analyser from upper heat exchanger and refit cap/plug to test point.

j)Press Engineer ‘s test button once to exit 10 minute test mode.

k)Turn off electricity and gas supplies and remove manometer from inlet pressure test point and refit test point screw.

l)Turn on gas and electricity supplies.

18.4 commissioning -pop-up menu
& weather compensation

Explanation of the [install] pop up menu

Menu Point	Parameter	Minimum	Maximum	Default value	Adjustment	Unit
[1]	Curv 20C CH	-20	20	0	1	^{0}C
[2]	Curv -1C CH	-20	20	0	1	^{0}C
[3]	Pump min	35	Pump max	35	1	%
[4]	Pump max	Pump min.	100	100	1	%
[5]	Curv 20C MV	-20	20	0	1	^{0}C
[6]	Service in	1	1500	365	1	Day
[7]	Pump Continue	Off	On	Off		
[8]	ECO+	Off	On	On		
[9]	Postrun HW	0	5	1	1	Minute
[10]	Postrun CH	0	20	3	1	Minute
[11]	Min Power	Min speed	Max ??	Min speed	1	%
[12]	Max Power	Min speed	100	100	1	%
[13]	Function Nr	1	72	9		
[14]	Back					

[1] fixed point of of the direct heating circuit.
Using menu point [1] the flow temperature at an outside air temperature of 20°C may be adjusted between -20°C and +20°C.

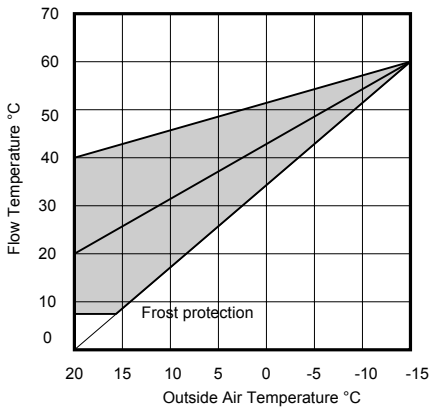
[2] Design point of the direct heating circuit.
Using menu point [2] the design point of the direct heating circuit may be set at an external temperature of -15°C.

High Temperature Heating
The adjustable range is 60°C - 100°C

Medium temperature Heating
The adjustable range is 50°C - 90°C

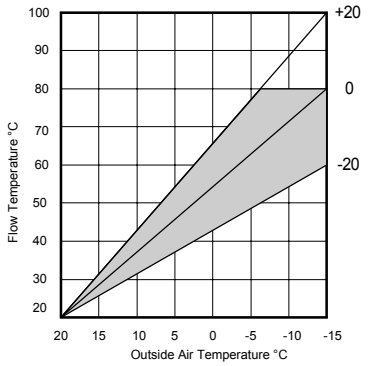
Low temperature heating
The adjustable range is 35°C-75°C

Notes:
Do not set underfloor heating to a temperature greater than 45°C. Comfort will be optimised by low floor heating temperatures.

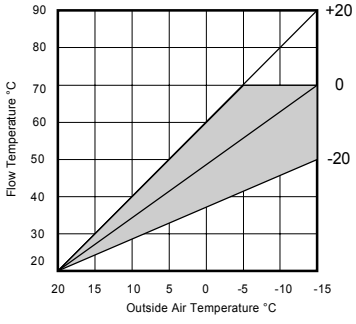


Fixed Point Adjustment Range

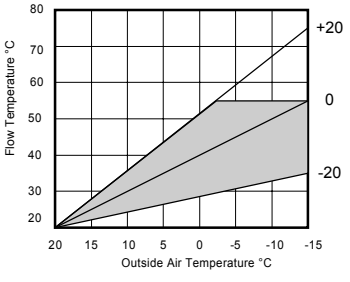
If menu point [13] [function no.] is set to 'no external sensor' then the weather compensation settings will not work. The Micromat EC will then heat according with the max. temperature set in [function no.]. The flow temperature control will then be taken over by a modulating room controller or a cascade controller.
The adjustable range for the design point temperature depends on which heating system has been entered in [function no.]. This function also determines the control function (High temp : 80°C, Medium Temp : 70°C, Low Temp : 55°C)
This setting does not replace the safety thermostat for underfloor heating!



High Temperature heating



Medium Temperature Heating



Low Temperature Heating

18.4 commissioning -pop-up menu *& weather compensation*

[3] The minimum pump revolution setting [pump min]
To set the minimum pump revolutions select menu item [3] and press the ‘reset’ key to confirm. The value may then be changed by using the ‘+’ and ‘-’ keys. Confirm the selection by pressing the ‘menu’ key.

[4] The maximum pump revolutions setting [pump max]
To set the maximum pump revolutions select menu item [4] and press the ‘reset’ key to confirm. The value may then be changed by using the ‘+’ and ‘-’ keys. Confirm the selection by pressing the ‘menu’ key.

[5] Setting the fixed point of a mixed flow circuit.
If the mxing valve controller MR03 is connected to the Micromat EC then menu item [5] may be used to set the fixed point for the mixed circuit weather compensation curve. The fiexed point may be adjusted from -20°C up to 20°C at an outside temperature of 20°C.

[6] Service [Service In]
To reset the sevice interval back to 365 days select menu item [6] and press the ‘menu’ key twice‘. this will remove the service request from the display.
If a servicing is carried out before the service interval has expired, and if no service request appears on the display then menu item [6] must still be reset to 365days by pressing the ‘menu’ key twice. If no service request is required to appear on the display then set the number of days in menu item [6] to OFF (<1)

[7] Pump Continue [Pump ____]
If a pump run-on time is required, then set this parameter to [ON]. The default value for this parameter is [OFF]

[8] ECO and ECO PLUS Operation [ECO+]
Use this parameter to set ECo or ECO+ operation.
In ECO PLUS operation the Micromat EC pump regulates a temperature differential of 20K (10K for underfloor heating) as long as this is possible. This gives the best fuel consumption figures.
In ECO operation the temperature differential is regulated only if the return temperature rises to over 50°C. For lower temperatures the pump works at full capacity. This mode of operation will also give very good fuel consumption.
ECO operation is recommended if individual rooms do not get warm enough and hydraulic balancing is not possible.

[9] Domestic hot water pump run on time. [Postrun HW]
The run on time of the DHW charging pump is set in parameter [9]. THis must be set to 0 if the DHW is controlled using a 2 way 3 port diverting valve. The adjustment range of this parameter is 0 up to 5 minutes wth adjustment steps of 1 minute.

[10] Heating circulating pump run on time. [Postrun CH]
The run on time for the circulating pumps are set in parameter [10]. The adjustment range is 0 up to 20 minutes with adjustment steps of 1 minute.

[11] Minimum load [Min Power]
The minimum boiler load is set in parameter [11] . The adjustment range is min boiler output up to max CH.

[12] Maximum load for heating operations [Max Power]
The maximum boiler load is set in parameter [12]. the adjustment range is min. boiler output up to 100%.

[13] Function no. [Function no.]
In this parameter the installation codes may be entered (see last column of the tables on pages _____) These codes are used to set up the boiler controls and the type of heating required.

[14] Back [Back]
When this parameter is on the display pressing the ‘menu’ key will exit the installation pop up menu.

18.5 commissioning -
the status indicator

Overview of fan revolutions per minute

Boiler type	Boiler Absolute		Start Revs	Max HK??		Min. Boiler standard		Min. Boiler absolute	
	Min. rev/min	Max. Rev/min	Rev/min	Rev/min	[%]	Rev/min	[%] of max. HC	Rev/min	[%] of max. HC
EC 11/22	900	6000	2200	3000	100	1380	46	900	30
EC 15/22	900	6000	2200	4080	100	1380	33	900	22
EC 23/28	900	6000	2200	4680	100	1380	29	900	19
EC 31/36	900	6000	2200	4860	100	1380	28	900	18
EC 40 H	1260	6300	2200	6300	100	1380	22	1260	19

in case of a boiler controlpanel exchange (EC 11/22 - EC 40) the Revs per min. should correspond to the back-up panel instructions.

Status Indicator
The status indicator gives information in clear text on the operating condition of the boiler. Status reports appear as non flashing messages and fault reports appear as flashing text.

Status report (non flashing)
The following status reports are given during normal operation of the micromat EC
1. [No Demand] The burner is switched off and the circulating pump is operating in accordance with heat requirements.
2. [Pre-Purge] The fan is purging the burner.
3. [Ignition] The gas/air mix is being fired.
4. [Heating] burner and circulating pumps are heating the system
5. [Storage] burner and/or circulating pumps are heating strorage water.
6. [Post-Purge] the fan is purging the burner.
7. [Legionella] tha anti-Legionella program is active.
8. [S/D] The boiler is in Summer mode / day mode (heating up stage)
9. [S/N] The boiler is in Summer mode / night mode.
10. [W/D] The boiler is in Winter mode / day mode (heating up stage)
11 [W/N] The boiler is in Winter mode / Night mode (cooling down stage)

The following status reports are exceptions to these:
1. [Service] A yearly maintenance must be carried out on the Micromat EC. The boiler will continue to work as normal when this display is showing.
2. [Fault M. Ru]???? The connection to the room unit is broken. The Micromat EC will heat to the recommended room temperature of 20°C.
3. [Fault M. ET]???? The connection to the external temperature sensor is broken. In this instance the Micromat EC will heat as for a 0°C external temperature.
4. [Fan High] The boiler fan revolutions per minute are too high
5. [Fan Low] The boiler fan revolutions per minute are too low.
6. [Deaeration]???? The boiler is undergoing a short ventilation program.
7. [Limit F/R]???? The boiler is experiencing a high flow / return temperature momentarily.

Fault Report (flashing indicator)
A table of fault reports and possible sources of the faults can be found in the section entitles ‘Screen display / Diagnosis of faults’ on pages _____
When the source of the error has been found and corrected the report must be deleted by using the ‘reset’ key. If the fault occurs again,please contact the RVR Customer Care Department.
The boiler is locked when the status display shows a flashing indicator (fault report).

18.6 setting domestic *hot water temperature*

A) With HWS sensor in/on calorifier

Press and hold the menu/reset button on the boiler conbtrol panel for over 3 seconds. Next press the '+' key until [temp DHW] appears on the display. Press the menu/reset button to enter adjustment mode. Press the '+' or '-' key to adjust the setpoint. The maximum temperature temperature setting is 60°C.

B) With cylinder thermostat in/on DHW calorifier

Set desired stored hot water temperature by the adjustment of the cylinder thermostat. With this arrangment time control of hot water charging is possible by installing a time switch in series with the cylinder thermostat, but hot water charging always takes priority over the heating demand.

18.7 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.

19.0 setting the boiler *to work*

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. Set ECO/ECO plus option to ECO position for systems without additional heating circuit pump OR Set ECO/ECO plus switch to ECO plus position for systems with a local low velocity header and additional heating circuit pump.

4. With boiler operating (burners on) press "Test" button on boiler control panel to test overheat controls in the boiler. The boiler must shut-down and then re-ignite.

20.0 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]).

b) At least every 18 months, before carrying out any maintenance the unit must be inspected.

20.1 inspection

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.

d) Inspect the top of the casing and/or the top of the upper heat exchanger for water leaks or signs of water from the flue air supply tube.

e) Open the siphon cleaning rinsing point at the base of the unit.

f) 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)

g) Run the unit at maximum capacity and measure the input and the CO2%.

h) Run the unit at minimum capacity and measure the input and the CO2%.

i) Listen to the sound of the in built pumps.

j) Disassemble each 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.

k) Disassemble the plastic box at the suction side of the fan, inspect the fan blades.

l) Check the distance between the electrode and the burner; this should be 4 to 5 mm.

20.2 maintenance

Depending on the results of the inspection carry out any maintenance and if necessary any preventive maintenance.

Possible actions 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 1 and 2 bar: 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.

at e) If the condensation in the siphon is highly contaminated, the siphon must be rinsed. With the burners removed, use a filling hose to insert water into the heat exchanger, which will automatically reach the siphon.

at f) Draw your conclusions from the service screen and attend to those parts that have caused any faults.

at g) and at h) If necessary, adjust the gas setting on the gas valves.

at i) If the in built pumps make an un-natural noise, and in particular if the pumps are more than 5 years old, it is recommended that the pumps should be replaced by way of preventive action.
Note the pumps are fully modulating and do have characteristic a “yet yet” noise which is normal at low speeds.

at j) 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 hard brush or citric acid. (DO NOT USE A STEEL BRUSH!) Then remove any dirt with a vacuum cleaner

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 l) Carefully bend the electrode without touching the burner, until the correct distance has been reached

IMPORTANT NOTE

IF ANY WATER CARRYING JOINT WITHIN THE BOILER IS DISASSEMBLED THEN THE “0” RING SEAL MUST ALWAYS BE REPLACED, LIKEWISE IF ANY OTHER SEAL IS NOTED TO BE DEFORMED THEN THEY SHOULD ALSO BE REPLACED.

WATER SEALING “0” 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. This is done by pressing and holding in the service button for at least 10 seconds.

21.0 screen display
diagnosis of faults

2.1 Screen display

The control panel of the MICROMAT EC 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

Standby	No heat demand (boiler not required to be on)
Pre-purge	Combustion chambers are being pre-ventilated with air from the burner fans
Ignition	The ignition sequence of the burners is initiated
CH Demand	The boiler is operating in central heating mode
DHW Demand	The boiler is operating to produce domestic hot water
Flue-emission	The boiler is operating in test mode at mid output to enable flue gas emissions to be checked (auto expires after 10 mm)
10min Low	The boiler is operating in engineers test mode for adjustment purposes (auto expires
Post-purge	Combustion chambers are being post-ventilated with air following boiler operation
Limit F/R	The flow and/or return temperature is too high (currently)
Fan high	The lower burner fan is running too fast (currently)
Fan low	The lower burner fan is running too slow (currently)
Fault room u	There is a fault with the modulating unit (RE 132) or Cascade manager (KKM2) or a fault in the wiring to these controls (in these circumstances the boiler runs continuously in heating mode to protect the building)
Fault outside	There is a fault in the outside air sensor or in the wiring to the sensor or the dip switches are incorrectly set to ask the boiler to look for an outside sensor when there is none installed
Deaerating	The in built pumps are operating to remove any possible collection of air from the heat exchangers. (Occurs when power turned off/on and after reset of fault)

The second line of text displays values such as temperature, percentages etc and the red 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 speeds and pump speed etc.

21.1 screen display

diagnosis of faults

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
Wat 1 Lockout	high limit stat has tripped.	5,6,7,8,21,24,25,26,31
Wat 2/Flue Lo	ht/exch high limit or flue limit stat has tripped	2,5,6,7,8,21,24,25,26,31
Fan High	burner fan speed is too high	9,11,29,31,33
Fan Low	burner fan speed during pre-purge is too low	9,10,11,14,18,29,31,33
Fan oper	Lower burner fan is detected as operating when should be idle	3,4,11,29,31
Ignit fault	Ignition to burner has not been successful after 4 attempts	12,13,15,16,17,19,22, 23,27,29,30,31,35
Flame 1 out	Flame at burner has been lost on 4 consecutive occasions during operation	13,15,17,19,20,23
Flame 1 on w/	Flame is detected at the lower burner when there should be no flame	17,19,30
S3	ht/exch flow temperature sensor interrupted	3,5,33
S4	Return temperature sensor Interrupted	3,5,33
S7	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	

21.1 Screen display/ *Diagnosis of faults (contd)*

Gas valve	Connection to gas valve interrupted	16,26,28,29,31,33
Soft fault	Error in software in the control	29
Reset button	There is a fault with the reset button	29,31,34
Eeprom	There is a fault in the EEPROM in the control	29

21.2 (possible) causes of fault *& corrective action*

CAUSE No. REASON/ACTION

1 - Dip switches not set correctly / Check and correct settings

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 pumps 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

11 - 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 mm output setting is incorrect / Check and adjust mm output C02%

17 - Poor ignition lead connection to electrode or damp connection or lead damaged and shorting to earth / Check and rectify

18 - Transformer defective / Replace transformer

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

21.2 (possible) causes of fault *& corrective action*

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

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