eco hometec

Variable Controlled Output (VCO)
Solar Compatible ★★★★★
Gas Condensing Boilers
EC 16, 23, 31 and 38kW

TECHNICAL MANUAL

eco hometec

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eco hometec is committed to design, develop and produce environmentally friendly appliances for both domestic and commercial applications

Contents

1. Why choose eco hometec?

Benefits at a glance

- Wall mounted ultra high efficiency gas boilers
- Suitable for installation into existing systems, new radiator and/or underfloor installations, can also be used with solar heating systems
- Emissions levels are 90% lower than the “BlueAngel” standards and significantly less than the levels specified in the “Swiss Clean Air Act” and the “Hamburg Development Program" the World’s most stringent regulations. (NOx 20mg\kWh CO 14mg\kWh)
- Long life Austenitic stainless steel heat exchanger
- Energy saving modulating fan
- Energy saving modulating burner
- Energy saving modulating pump
- Energy saving modulating system water temperature
- Plug in components for fast and cost effective servicing
- Corrosion free PPS plastic flue tubes and fittings offering ease of siting Flue lengths of up to 100 metres are possible.
- Data logging via PC for analysing, performance, operating times, temperatures and for fine-tuning
- Built in digital Weather Compensating comfort controller
- Built in digital central heating and hot water time/temperature controller
- HS specification with dual flow temperatures for under floor heating systems
- The most complete energy efficient home heating appliance available
- Guarantee periods Heat Exchanger 5 years other components 2 years
- Free help with technical, design and installation issues

2. Introduction

One of the elements in both Natural Gas and Propane is hydrogen. A gas burning appliance mixes the gas with air and during the combustion process hydrogen and oxygen combine together and produce heat (143,100kJ/kg) and water vapour (H_2O).

For every kg of hydrogen burned 9kg of water vapour is produced. The temperature in the heat exchanger of a boiler can reach 1400^0C. The water vapour produced is so hot it turns into superheated steam.

2.1 The Condensing Process

This superheated steam contains both sensible (available heat) and latent heat (heat locked up in the flue gases). A conventional boiler will recover some of the sensible heat by passing these hot gases over a heat exchanger. The heat exchanger in non condensing boilers is generally made of cast iron and cools the gases to between 250^0C and 350^0C. A conventional boiler does not recover any of the latent heat and this energy is simply lost to the atmosphere through a metal flue. These flue gases are extremely hot and the lost energy wasted can equate to up to half of the annual running costs.

A simple condensing boiler will however extract more of the sensible heat and some of the latent heat by cooling the flue gases down to below 100^0C.

When a condensing boiler is operating in its most efficient manner flue gas temperatures of around 50^0C will be achieved and the boiler will now start to condense the flue gases. The superheated steam is cooled to its dew point, typically around 55^0C, the flue gases give up their latent heat to the boiler and condense out.

The critical factor that ensures maximum efficiency from a condensing boiler is the water return temperature. The water return temperature determines whether the boiler operates in condensing mode, which in turn controls the boilers efficiency.

To sum up, with water return temperature of 55^0C or less, the latent heat is condensed out of the flue gases.

A typical, non-condensing, central heating system is designed with a water flow temperature of 80^0C and a return water differential of 10^0C. This design differential is critical.

System designs had to incorporate high return temperatures (typically 70^0C) to stop any unwanted condensing of the flue gases.

The flue gases leaving a conventional boiler have to be discharged very hot for the following reasons.

To propel the flue gases up a chimney or through a flue they have to be discharged hot to give them buoyancy and enough thermal lift to overcome the flues natural resistance.

If the flue gases are not hot enough the effectiveness of the flue system is reduced and harmful by products of combustion could enter the building via the appliance or its flue.

A conventional boiler has to discharge the flue gases hot to prevent any unwanted condensing.

If the flue gases are not kept hot enough they will condense allowing water to run back down the flue and into the boiler.

Clearly this has to be avoided. Heat exchangers made of cast iron, or boiler designs not equipped to discharge this water would suffer imminent failure.

The flue gas discharge from conventional boilers has to be maintained at high temperatures.

Questions you might be asking yourself now might include:

Question? **Why were such inefficient appliances designed?**

Answer: Fossil fuels were cheap and the environmental consequences of burning and wasting so much fuel were not fully appreciated.

Question? Does an eco hometec boiler need to maintain hot flue gas temperatures?

Answer: No, eco hometec boilers and flue systems are designed and constructed from stainless steel and PPS plastic. The

condensate water from condensing flue gases does not affect these materials.

Question? What are the advantages of such a design?

Answer: Unlike conventional boilers eco hometec appliances do not need to waste gas in maintaining high flue gas temperatures.

Question? What does that mean in real terms?

Answer: By design eco hometec boiler's use less gas. They are a lot more efficient than other boilers and will significantly reduce your annual heating costs.

Question? Why should I choose an eco hometec boiler?

Answer: Heating our homes and water for showers and baths is very costly and bills in the future will only get bigger. By choosing eco hometec for your next boiler you can rest assured you have chosen the most economical and environmentally friendly boiler available.

Question? Finally, what about the environment?

Answer: All eco hometec boilers use less gas and the emissions from the EC range are 90% lower than the "Blue Angel" standards and are also significantly less than the levels specified in the "Swiss Clean Air Act" and the "Hamburg Development Program" the World's most stringent regulations.

(NOx 20mg\kWh CO 14mg\kWh).

As you can now see there really is no reason at all for choosing a boiler constructed to an old and inefficient design that needs to maintain high flue gas temperatures.

3. Not all condensing boilers are the same

When deciding on a condensing boiler, we know that as a result of their superior heat exchanger design, we are getting a more efficient boiler. Typical efficiencies of 86% are achievable when fitted to an existing system with an 80/70^{0}C design.

But, by lowering the water return temperature, condensing boilers are capable of achieving efficiencies up to 98%.

How then can we lower the return water temperature of our heating, increase efficiency and at the same time save gas?

The eco hometec answer

3.1 Variable Controlled output (VCO)

To achieve optimum efficiency from a condensing boiler we need to control the temperature of the water returning to the boiler.

This can best be achieved by adjusting the output of the boiler and/or the pump speed.

The outside air temperature generally determines the load on a heating system. In the U.K we size a boiler to provide enough heat to keep a house or building warm at -1^{0}C.

As the outside air temperature rises then less heat is required to heat the building.

If we were using gas fires to heat our home then as the building warmed up we would turn down the gas fire. This has the desired effect of lowering their output and at the same time reducing gas consumption.

If we are using a central heating boiler to heat our home then in an ideal installation, as outside air temperature rise, we would turn the boiler down to lower its output at the same time reducing gas consumption.

The only problem was, until now, the output of a gas boiler was determined by the set up of the gas valve and only the service engineer could carry out adjustments.

Until eco hometec developed Variable Controlled Output it was simply not possible to constantly adjust a boilers output and flow temperature to cope with changing weather conditions.

3.2 How does VCO work?

Unlike most boilers with a constant input and output eco hometec boilers incorporate an integral compensating and modulating digital controller that automatically adjusts

the boilers output depending on system load requirements.

This feature, Variable Controlled Output (V.C.O.), is the very latest from eco hometec in condensing technology and ensures the boiler maintains optimum efficiencies even when operating at part load.

A key component of VCO is the ECONOX premixing, radiant, gas burner.

A unique feature of the ECONOX burner is its radiation cylinder that has been specially designed to suit the geometry of the combustion chamber. It is composed of a perforated sheet of stainless steel with a metal fleece on its surface. On the surface of this burner, accurate quantities of premixed gas and air are burnt almost without a visible flame

The eco hometec on-board computerised V.C.O. system with integral fault diagnostic facility, ensures that optimum efficiency is maintained when operating in both heating and domestic hot water modes.

According to the required flow temperature, the premixing radiant burner modulates constantly.

To save electricity, a 24-Volt, high efficiency fan is used with a variable speed and power capacity; if the heat demand decreases, the fan will turn at a lower speed, which results in a lower power consumption.

The air fan is programmed to supply given amounts of air for specific burner outputs.

This air pressure then controls the gas valve, which in turn matches the gas pressure to the required gas to air ratio (1:1).

The combustion gases are then passed through the SPIRANOX stainless steel heat exchanger to the atmosphere.

During their passage these hot gases are used to preheat both the return water to the boiler and the incoming combustion air thus ensuring that all of the available energy is used as efficiently as possible.

3.3 Approvals

The unit has been approved according to the European standards (CE) and the requirements for cleaner combustion (RAL UZ61)

3.4 Modulating pump

A variable speed modulating integral circulating pump is supplied, which operates at different speeds and results in a lower power consumption (between 30 and 119 Watts).

This feature is to help maintain a temperature difference of 20^{O}C between the flow and return temperatures on systems using radiators.

IMPORTANT. Without V.C.O. (Variable Controlled Output) or an alternative control over the temperature of the return water, the performance of a condensing boiler will be impaired and significantly lower.

A modulating pump is essential in all condensing systems if system differentials are to be maintained.

3.5 Frost Protection

If the flow temperature falls below 8^{0}C, in order to provide frost protection, the pump will run even though there may be no demand for heat. If the temperature continues to fall, at 5^{0}C, the burner will also ignite. At 10^{0}C the appliance will return to standby mode.

3.6 Year Long Protection

During summer months, the pump and mixer valve (if fitted) are exercised daily. This prevents seizure of internal components thus reducing maintenance costs.

3.7 P.P.S Plastic Flue System.

Due to the extremely low temperature flue gases, the boiler may be flued using the lightweight and corrosion resistant eco hometec P.P.S. plastic flue system. The boiler can be flued over distances previously impossible (up to 100 metres depending on output and flue design) from conventional boilers.

3.8 Additional Features

A unique SPIRANOX corrosion resistant stainless steel condensate heat exchanger.

Integral sensors (PTC) for monitoring flow and return water temperatures.

3 way switching valve and facilities for connection to an eco hometec DHW storage module or similar.

Computer controlled combustion analysis with built in fault diagnosis facility. These readings can be down loaded onto a PC by using the RS 2323 interface cable and software available from eco hometec.

4. Description of Appliances

4.1 EC 16,23,31 and 38 H

The 'H' model is suitable for a central heating system with hot water output controlled using a 3 way divertor valve (spring return to heating). The appliance produces a low temperature output for under-floor heating or a fixed/variable temperature output for connection to radiators. Flow temperature to hot water cylinder can be set as required (max.80^{O}C)

Hot water cylinders must be double feed indirect and to aid efficiency and fast recovery times (all appliances are hot water priority) should be of the high recovery type. Recommended minimum coil capacity 25kW.

The unit has a variable capacity of 20 to 100%, while the maximum capacity can be set and adapted to the capacity of the CH system.

4.2 EC 16,23,31.

The 'HS' range is a higher specification dual temperature boilers. With its 4 x 22mm connections it offers a low temperature output for under-floor heating or a fixed/variable temperature output for connection to radiators. Alternatively it may be installed with a combination of both.

Hot water cylinders must be double feed indirect and to aid efficiency and fast recovery times (all appliances are hot water priority) should be of the high recovery type. Recommended minimum coil capacity 25kW.

The unit has a variable capacity of 20 to 100%, while the maximum capacity can be set and adapted to the capacity of the CH system.

4.3 EC 16,23,31 and 38 S

This combi unit has a built-in heat primary heat exchanger and Hot water production is continuous.

The unit has a variable capacity of 20 to 100%, while the maximum capacity can be set and adapted to the capacity of the CH system.

4.4 Solar Compatibility

All eco hometec appliances are "solar ready" and can easily be installed as part of a solar heating system.

5. Technical Information.

Table 1 Dimensions & Connections

Product Identification Number	CE ~ 0085AR0057
Appliance Category	2ELL3B/P
Dimensions (H x W x D)	950mm x 458mm x 355mm
Heating Circuit Connections	22mm
Gas Connection	15mm
Condense Drain Connection	¾ BSP
Air Supply/Flue Connections	125/80mm

Table 2 Heating Specifications

Models H, HS and S		EC16	EC23	EC31	EC38
Maximum Rated Input	kW	15	22	28	36
Nominal Output To Heating 80/60^{0}C	kW	14.3	21.4	28.4	35.1
Minimum Output To Heating 80/60^{0}C	kW	2.5	3.1	4.5	6.0
Nominal Output To Heating 50/30^{0}C	kW	15.8	23.1	30.7	38.0
Minimum Output To Heating 50/30^{0}C	kW	3.1	3.6	5.1	6.8
CO2 % content at max/min load	CO2 %	9	9	9	9
Dew Point of Flue Gases	00C	52	52	52	52
Flue Gas Temp @ 80/600C (Amb 20^{0}C)	00C	75	75	75	75
* Maximum Flue Resistance	Pa	100	100	100	100
pH value of condensate water	PH	4-5.5	4-5.5	4-5.5	4-5.5
Pump Pressure @ 30kW and 20K Bar		0.2	0.15	0.1	0.075
Maximum Flow Temperature	00C	85	85	85	85
Min/Max filling pressure	Bar	0.5 - 3.0	0.5 - 3.0	0.5 - 3.0	0.5 –3.0
**Efficiency @ 75/60^{0}C	%	104	104	104	104
**Efficiency @ 40/30^{0}C	%	108.5	108.5	108.5	108.5

* At this resistance, the load will remain within the limits indicated on the data plate.

** European calculation methods are based on efficiency of 100% in units that do not condense the flue gases, and of 110% in condensing units.

Table 3 Capacities & Weights

Model		EC16	EC23	EC31	EC38
Heating Water Capacity	litres	1.5	1.8	2.1	2.4
Heating Water Coil Capacity (S models)	Litres	1	1.3	1.5	10
Weight (empty)	Kg	35	37	39	50

Table 4 Hot Water Specifications

Model		EC16	EC23	EC31	EC38
Maximum Rated Input	kW	22.0	28.0	36.0	46.0
Modulating Output	kW	2.9-22.0	3.4-28	4.8-36.0	6.4-46.0
Hot Water Flow rates at $\Delta\tau$ 30K (S type)	L/min	10.5	13.4	17.2	22
Maximum Tap Water Pressure	bar	10	10	10	10

Table 5 Connection Values

Min/Max Gas Pressure	mbar	15/50	15/50	15/50	15/50
Minimum Input Rate Natural Gas	m/h3	0.31	0.36	0.5	0.68
Maximum Input Rate Natural Gas	m/h3	2.10	2.67	3.44	4.4
Electrical Supply	VAC	230	230	230	230
Power Consumption Average	W	60	60	60	60

6. Accessories.

The following items are available from eco hometec at extra cost.

Colour coded 1/4 Turn Isolating Valves.

Stainless Steel Flexible Pipe Connections.

In line Filter/Strainers.

Condensate sump pump for below ground installations. N.B. LPG installations must not be installed below ground level.

eco hometec servicing software and RS 2323 interface cable for connection to a PC.

eco hometec RE2132 modulating room sensor.

Domestic hot water temperature sensor

eco hometec EC30H Cable for connecting three way diverter valve (external to boiler).

eco hometec cascade manager for controlling multiple boiler installations supplying heat to the same system. A maximum of five boilers can be connected.

eco hometec PRO1 wall mounted pump control box to control one or more pumps in serial with the built in boiler pump.

For more details please contact the

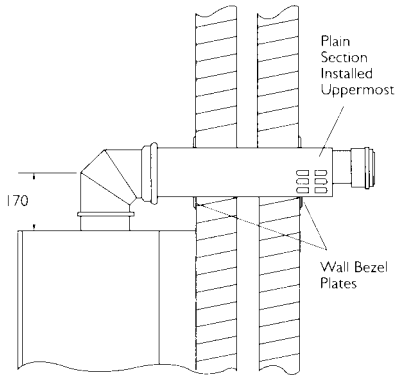
eco hometec technical department.

eco hometec comprehensive range of PPS flue kits, fittings and accessories.

6.1 Flueing Options

The boiler may be installed either as a room sealed, fanned flued appliance using the eco hometec P.P.S plastic 125mm/80mm concentric flue system or alternatively, conventionally flued, using a single skin 80mm P.P.S. plastic pipe.

Figure 1 Wall Terminal

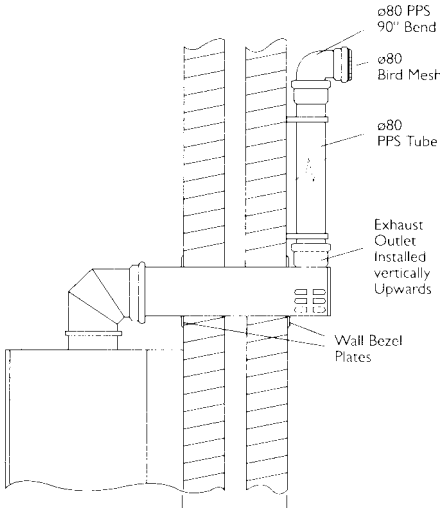


In certain circumstances the location of the boiler may leave the flue outlet in an unsuitable position the eco hometec flue system has been designed to overcome this and the 80mm P.P.S. flue pipe may be simply re-routed to terminate in a more suitable location. To do this simply remove the 80mm stainless steel flue grill and insert either a 90^0 or 45^0 bend

Route the pipe to the desired location and terminate with a suitable bend to direct the flue gases away from the wall or any obstruction. When you are satisfied with the location replace the stainless steel 80mm flue grill..

Alternatively a 90^0 terminal fitting may be purchased from eco hometec and the flue routed vertically.

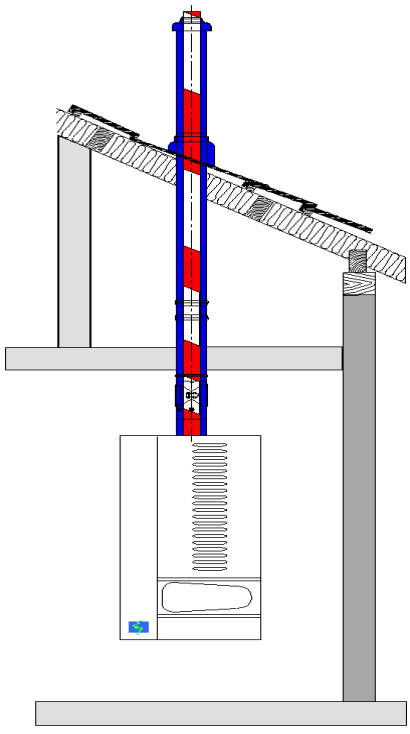
Figure 2 Vertical Wall Terminal



6.2 Vertical flue Installations

For vertical flue applications a range of fittings for both pitched and flat roofs are available. Please contact eco hometec for further advice.

Figure 3 Vertical Flue Application



6.3 Installations Requiring Specialist Flue Design

For multiple boiler (modular) installations eco hometec supply a range of larger diameter flues.

Sizes are available in 150mm, 200mm and 250mm. For assistance in flue design and specification please call the eco hometec technical department.

Figure 4 Modular Installation

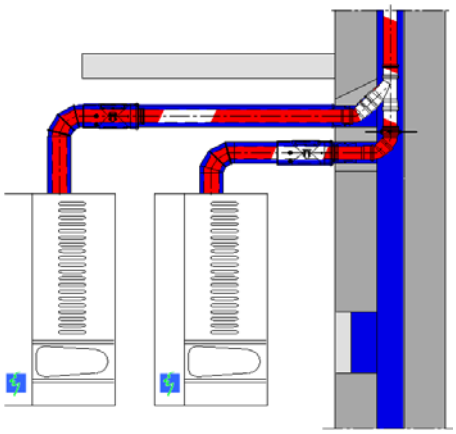
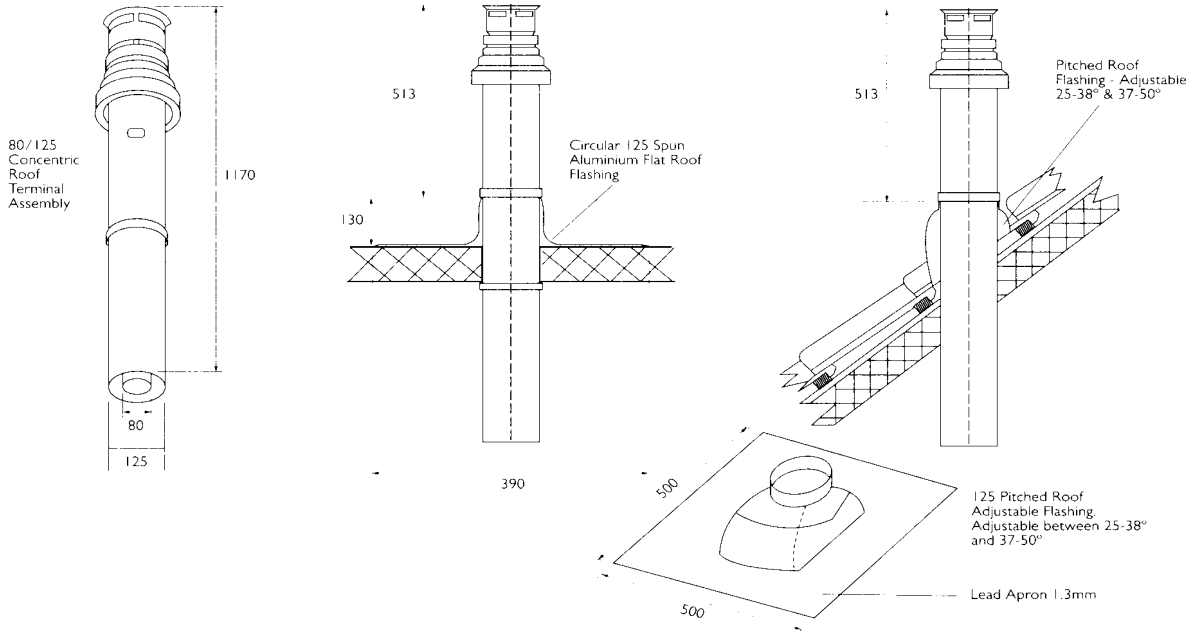


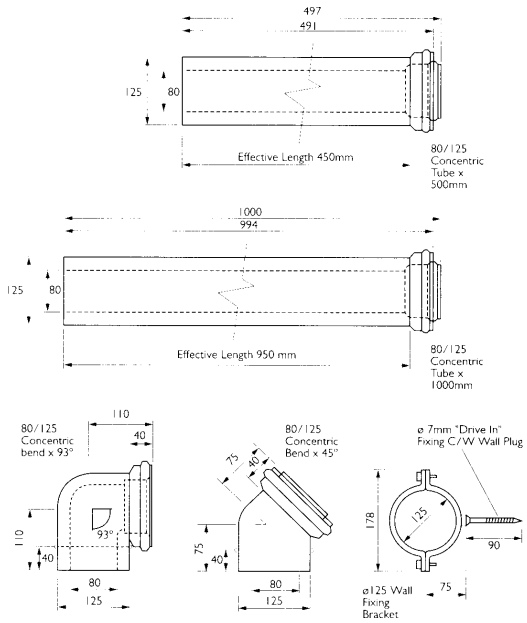
Figure 5 Vertical Roof Terminals



The above 80/125mm concentric vertical flue fittings are available from eco hometec. Concentric flue components have push together spigot and socket joints. The inner PPS flue gas tube has silicone seal rings located in the socket component. The outer air tube has EPDM rubber seal rings located in the socket component. To aid assembly and assurance that the joints have been fully pushed home, the seal rings and make ends of tubes and fittings should be lightly lubricated with silicone grease.

Additional 80/125mm concentric flues tubes and fittings are available from eco hometec.

Figure 6 Concentric flue fittings



80/125 1000mm length PPS/White Galvanised Concentric Flue

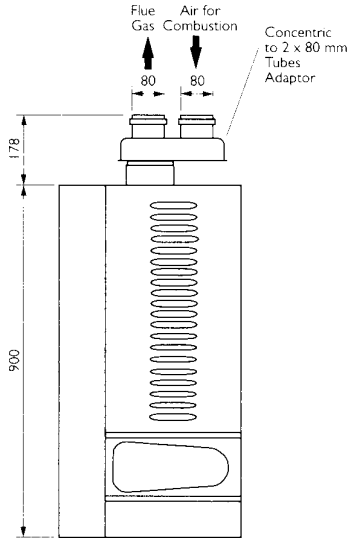
80/125 500mm length PPS/White Galvanised Concentric Flue

80/125 PPS/White Galvanised 90 degree elbow

80/125 PPS/White Galvanised 45 degree elbow

125mm Wall Fixing Clamp

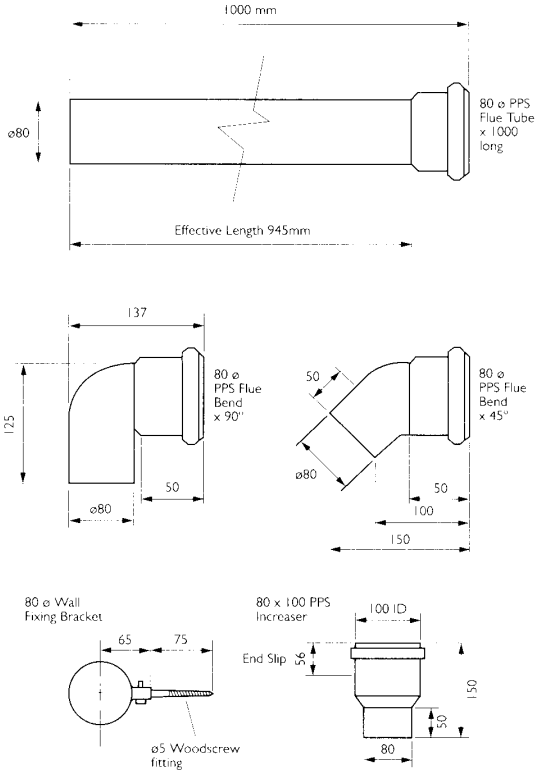
Figure 7 Concentric 80mm adaptor



The concentric 80mm double adaptor is used to separate the air flue gas tubes. Both air and flue gas may be piped separately and if required in different directions.

Additional 80 PPS flues tubes and fittings are available from eco hometec details below:

Figure 8 80mm Flue tubes



80mm 1000mm PPS flue pipe

80mm PPS 45 degree PPS Elbow

80mm PPS 45 degree connector

80mm Wall Fixing Clamp

80mm – 100mm increaser

Also a range of flexible liners and fittings

80mm PPS flexible flue liner

80mm PPS flexible flue liner 360-degree spacers

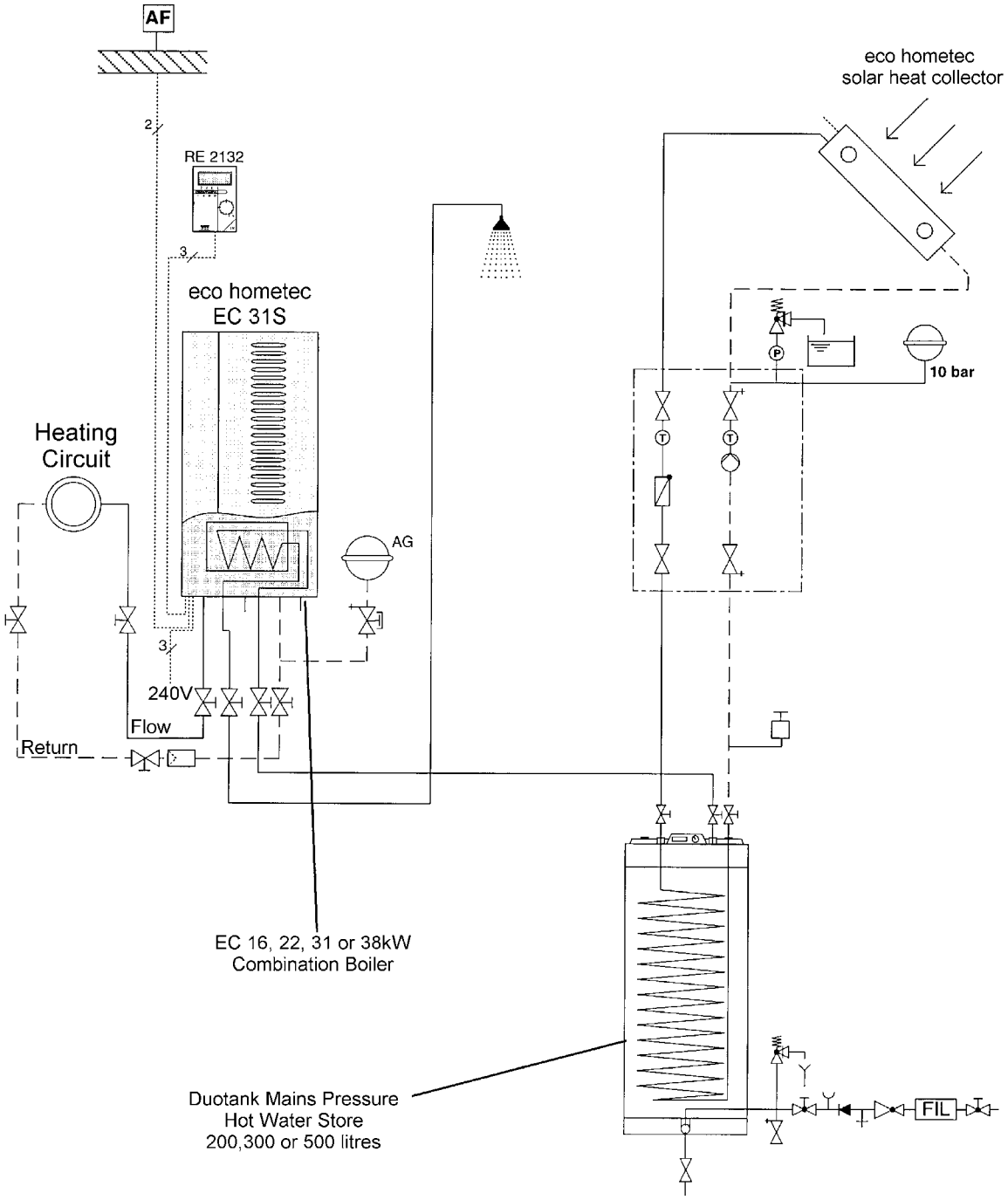
80mm PPS flexible flue liner chimney terminal

80mm PPS flexible flue liner chimney terminal clamp

80mm PPS flexible flue liner boiler flue connector

Figure 9 Solar Installation

S Type Combi Hydraulic system design when installed with Solar heating.



Please call the eco hometec technical department for more advice on Solar heating installations.

Figure 10 H Type Hydraulic system design

Typical EC H installation serving domestic hot water and heating using integral expansion vessel and modulating circulating pump. Hot water production has priority controlled by spring return to heating divertor valve wired to boiler. Flow temperature to hot water is constant temperature to heating may be fixed or variable (weather compensated).

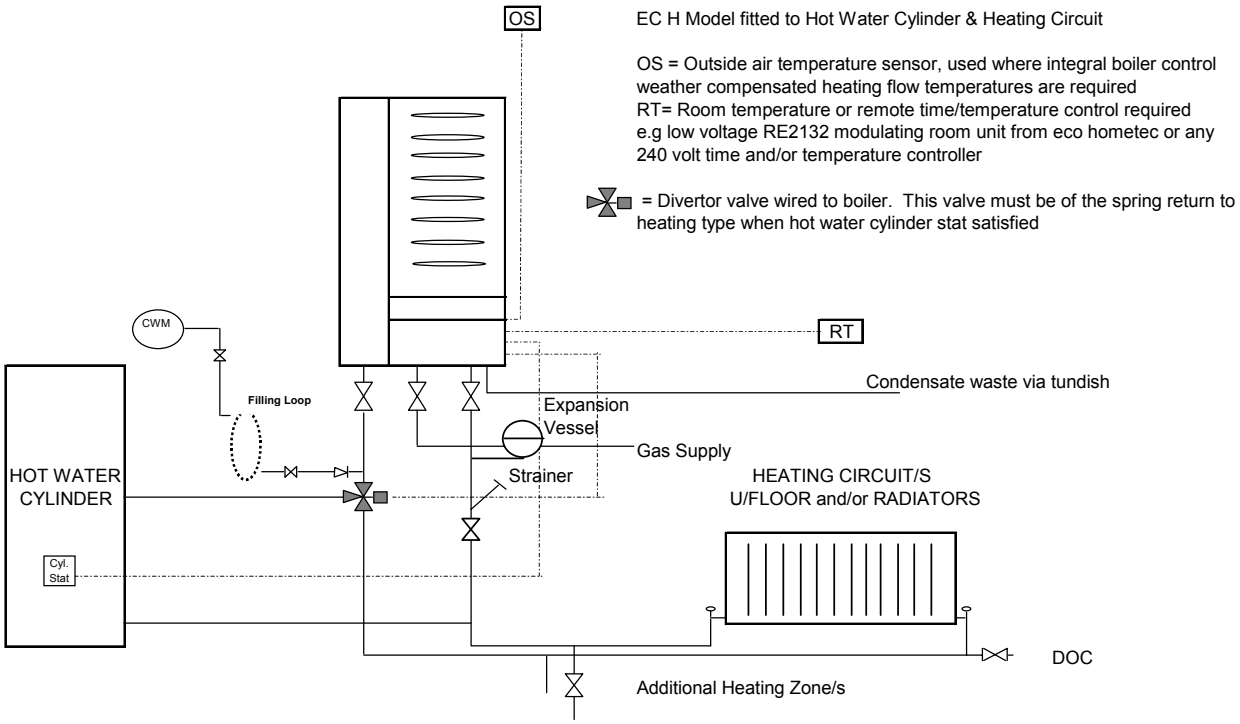


Figure 11 HS Type Hydraulic system design

Typical EC HS installation serving domestic hot water and heating using integral expansion vessel and modulating circulating pump. Hot water production has priority controlled by on boiler spring return divertor valve and cylinder thermostat wired to boiler. Flow temperature to hot water is constant; temperature to heating may be fixed or variable (weather compensated).

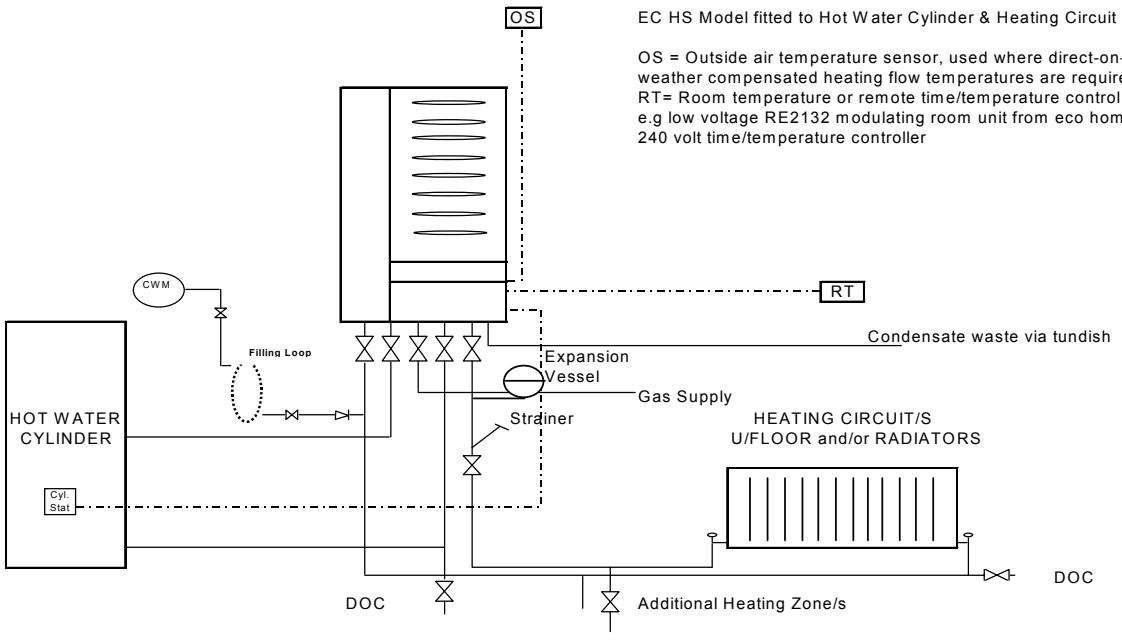


Figure 12 S Type Combi Hydraulic system design

(IMPORTANT SEE NOTE REF: 38/46kW model) Typical EC S (Combi) installation serving domestic hot water and heating using integral expansion vessel and modulating circulating pump. How water production has priority. Maximum flow temperature of hot water is constant temperature to heating may be fixed or variable (weather compensated).

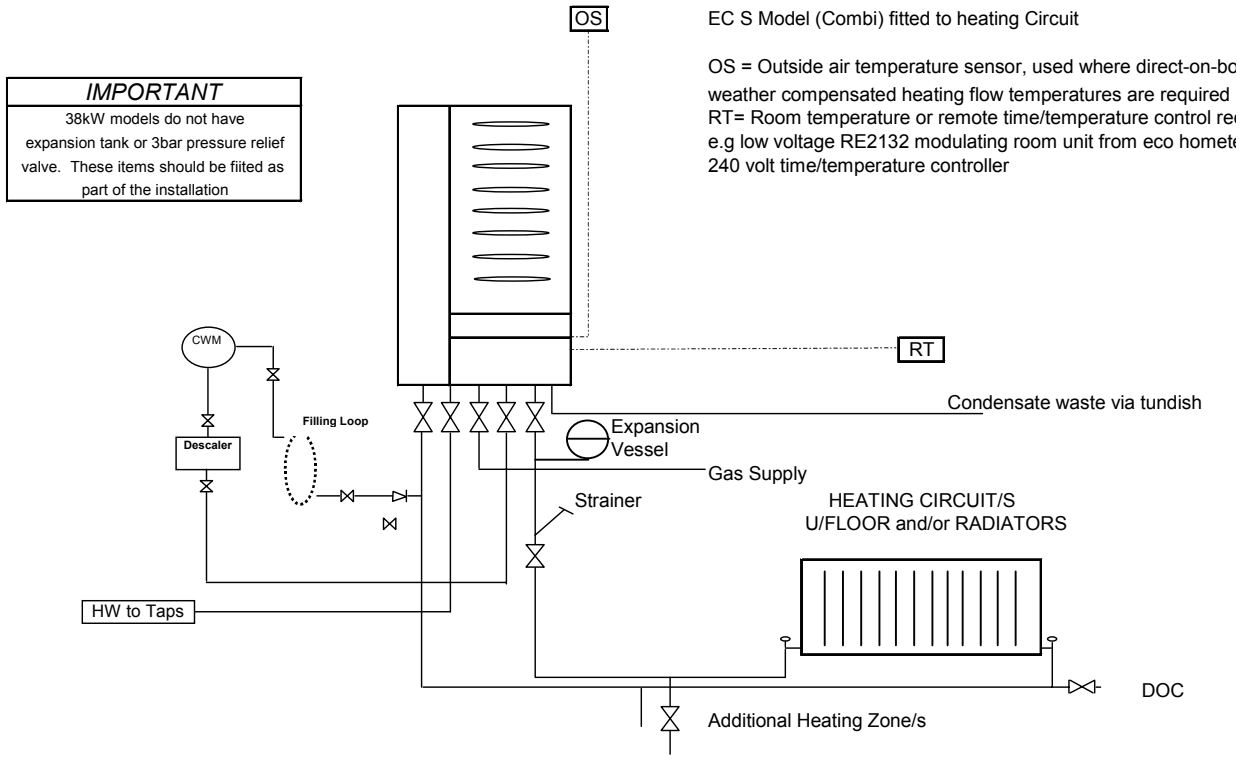
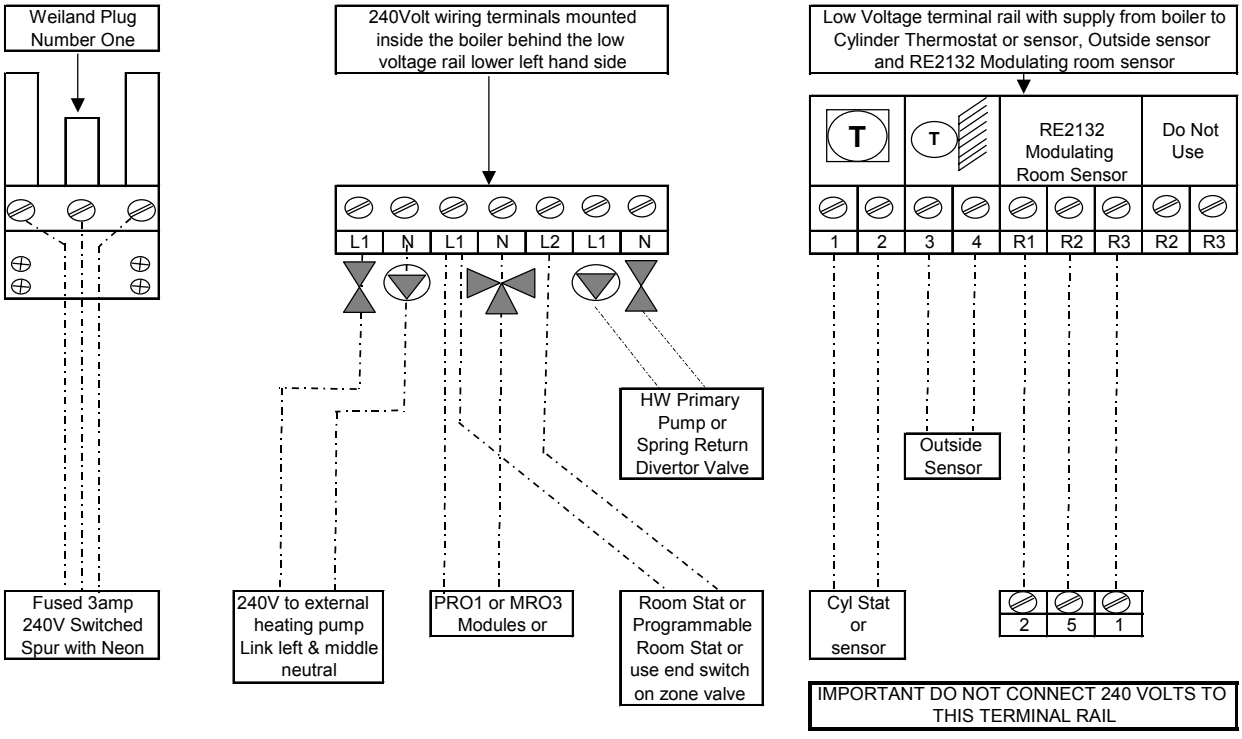


Figure 13 Electrical Connections



THE IMPLICATIONS OF eco hometec V.C.O. CONDENSING BOILERS and

THE DESIGN OF OLD AND NEW CENTRAL HEATING AND HOT WATER SYSTEMS

7. Condensing Boiler System Design

eco hometec V.C.O. condensing boilers are, without doubt more efficient (up to 98% efficient) than conventional balanced or natural draught boilers and condensing boilers without output control.

The principal design criterion for a condensing boiler installation is controlling the return water temperature. If the return water temperature is allowed to rise in excess of 55^{O}C the potential for optimum efficiencies will be lost.

This simple fact has design implications that must not be ignored if we are to achieve the maximum fuel savings and efficiencies from a condensing boiler installation.

In order to achieve condensing mode the design of old and new systems needs to be considered carefully:

7.1 Design Considerations.

Under-floor Heating System Design.

Radiator sizing and their output.

Pipe sizing - the flow of water.

Controls - Thermostatic Radiator Valves.

Hot water and its control.

The following system temperatures are generally the norm for the following.

7.2 Traditional

Flow temperature 80^{O}C

Return temperature 70^{O}C

System drop 10^{O}C

7.3 Condensing

Flow temperature 70^{O}C

Return temperature 50^{O}C

System drop 20^{O}C

7.4 Under-floor

Flow temperature 50^{O}C

Return temperature 40^{O}C

System drop 10^{O}C

7.5 Under-floor Heating

Under-floor heating systems generally offer the lowest return water temperatures and will ensure the condensing boiler will operate more efficiently.

The EC may be safely fitted to systems using a high temperature thermal store however we bring to your attention that any heating system using constant high temperature circuits (80^{O}C) will inevitable lead to a reduction in the potential efficiency of a true low temperature design optimised for a condensing boiler.

Clearly, for the purposes of condensing boiler efficiency, these types of systems should be considered carefully, ask your heating engineer or call the eco hometec technical department for further advice.

8. Low temperature under-floor heating

The EC HS (higher specification) condensing boiler has two built in circuits.

The HS range provides 4 No. 22mm connections offering a low temperature circuit for under-floor heating and a high temperature circuit for domestic hot water.

This low temperature heating circuit (50^{O}C) can be dedicated to an under-floor heating system.

Boilers not configured for under-floor designs will overcome the problem by mixing their high temperature flow output with the return heating water via a mixing valve to achieve the required 50^{O}C design temperature.

Controlling the water temperature to 50^{O}C by modulating the burner uses less gas and is obviously more efficient than lowering, with mixing valves, the temperature from a fixed 80^{O}C start point.

The eco hometec range of V.C.O. boilers has been specifically designed to work with low temperature under-floor heating.

8.1 Systems using radiators

Assuming the objective is to maximise the condensing feature of the boiler, when designing a system using radiators, the ECHS and S Combi model offers the designer two options.

Option 1. Design the system using a variable flow temperature decided by outside air temperature. Maximum flow temperature 85^{O}C system differential 2O^{O}C.

Maximum flow temperature would only be required when the outside air temperature is -1^{O}C. For this period (typically no more than 3-4 weeks per year) the return water temperature would be too high to maximise condensing mode. However for the remainder of the year the boiler would adjust the flow temperature (typically 7O^{O}C/5O^{O}C) providing the correct temperature for condensing.

Option 2. Controlling the maximum heating flow temperature to 7O^{O}C with system differential of 2O^{O}C.

8.2 Sizing Radiators and Output

The heat loss for the room should be calculated accurately. Then, the radiators mean water temperature should be used.

$$\frac{70 + 50}{2} = 60^{O}C$$

or

$$\frac{85 + 65}{2} = 75^{O}C$$

8.3 Pipe Sizing and Flow Rates

It can be calculated, that a 15mm pipe with an adequate flow rate is able to carry 8kw of sensible heat a 22mm pipe 16kW.

Due to the higher flow and return temperature differentials in a system designed for condensing boilers (approximately twice that of traditional systems) an equivalent size pipe would carry the same amount of heat.

Therefore it can be calculated that a 15mm pipe is able to carry 16kW, a 22mm pipe 32kW.

When designing installations using

eco hometec V.C.O. condensing boiler with radiators sized for a flow temperature of 7O^{O}C with a return differential of 2O^{O}C you may permit the use of smaller pipe diameters for the heating circuits.

This will result in lower heat losses, due to smaller diameter pipework, and should result in installation savings with reduced costs for pipe, fittings, pipe insulation and installation costs.

8.4 Controls

Pump Sizing or Output and Commissioning.

Over recent years the use of higher 'head' pumps has become usual to overcome bad design, layout, the use of elbows, high resistance valves, and boilers.

This has given us pumped flows and water velocities in excess of the recommendations of BS4449 especially as many installers simply set the speed of the pump to maximum.

If you are about to convert an existing installation into a high efficiency condensing installation then you need to consider how you will control system water velocity, pump speeds, flow and return temperatures. Without considering these points the conversion of an existing system is not really beneficial unless you install an eco hometec V.C.O. condensing boiler.

To emphasise this point an analogy can be drawn by bringing attention to some of the facts regarding sensible heat and heat carried. If a red hot steel bar is plunged into a bucket of water for one second and withdrawn, the bar will still be red hot while the water remains relatively cool, not all its sensible heat being transferred to the water.

If water passes through a radiator at too high a speed because of inadequate or inaccurate balancing, all the available or calculated sensible heat will not be used, resulting in higher return water temperature and reduced radiator outputs.

It is important on conventional systems that the flow rate matches the circuit loads

On Condensing Boilers it is essential if we are to achieve and maintain maximum efficiency.

The pump setting and boiler output therefore must be as near the system demand as possible. The current balancing of radiator systems is a fallacy. The discipline has to be reinstated to its former position with the accurate measurements of flow and return temperatures being carried out using a differential electronic thermometer if total efficiency is to be achieved.

The eco hometec range of V.C.O. boilers have been specifically designed to overcome the system design requirements in order to maintain condensing mode.

To achieve optimum efficiency from a condensing boiler then clearly we need to control the temperature of the water returning to the boiler.

This can best be achieved by adjusting the output of the boiler and/or the pump speed.

Unlike most boilers with a constant input and output the EC incorporates an integral compensating and modulating digital controller that automatically adjusts the boilers output, while simultaneously adjusting the integral pump speed to maintain condensing mode.

This feature, Variable Controlled Output, (V.C.O.) is the very latest from eco hometec in condensing technology and ensures the EC maintains optimum efficiencies even when operating at part load.

8.5 Temperature Control of Circuits

The relevant new Building Regulation relating to the control of heat input to rooms and houses requires something other than a single room thermostat, Thermostatic Radiator Valves (TRV's) should be used on all new installations.

TRV's on condensing systems offer the ideal solution as they will match exactly the flow of water through the radiator to give the current required heat output taking into account any heat gains from secondary sources such as cooking or solar gain.

This further enhances the need for pump control or modulation since these automatic reductions in demand will reduce the required flow from the boiler, putting additional strains on a non-modulating pump unless it is dissipated somehow.

We are all aware that TRV's on every radiator were not a good idea because of the above problem and it was usual to leave one radiator without or to install a system by-pass to maintain a flow across the boiler.

If this practice were to be continued then the return temperature would rise as room temperatures were achieved.

This rise in return water temperatures is counter productive to the condensing mode of the boiler.

The VCO feature from eco hometec recognises the increase in return water temperature and will instantly start to modulate the pump and burner lowering outputs.

VCO's rapid response to system temperature changes remove the need for a system by-pass and allows the installer to fit TRV's on all radiators.

The eco hometec super condensing VCO boilers take boiler design and efficiencies to new levels.

If you have any queries or points you would like to see discussed and/or included in this guide then please write or e.mail them – address is on the back outside cover.

Finally something, for **YOU,** to consider. Have you ever bought a gas cooker or a gas fire that you couldn't turn up or down? The answer is of course no! No one would consider, for even a minute, buying a fire or cooker that could not be turned up or down!

Yet every day hundreds of people buy boilers without automatic output and system water temperature control.

As heating our homes accounts for 70% of our annual fuel bills.

WHY?

Save gas

Save money

Only boilers from

eco hometec are fitted with

Variable Controlled Output

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