



High efficiency floor standing fully condensing boiler with ultra low NOx emission

Outputs: Gas 210 ECO PRO

- 3 16 - 87 kW
- 4 22 - 120 kW
- 5 29 - 166 kW
- 6 39 - 200 kW



Gas 210 Eco Pro

Condensing Boiler



Introduction

The Remeha Gas 210 ECO PRO is a compact floor standing condensing boiler. The small footprint and ability to be installed back to back makes it ideally suited for modular configurations.

An optional Optimising Weather Compensating control package is available to ensure maximum efficiency. Now also compatible with Open Therm.



The boilers are suitable for both new and retro-fit applications. With conventional and room sealed capability they can be installed in most situations.



Contents

	page
Introduction	2
Boiler description	2
Boiler construction	3
Efficiency/application information	3
Advantages at a glance	4
Operating principle	4
Dimensions	5
Technical data	6
Typical installation	7-8
Typical flue installation	9
Electrical connections and controls	12-15

Boiler description

The Remeha Gas 210 ECO PRO boiler is a pre-assembled, free standing, gas fired, high efficiency condensing boiler.

The sectional cast aluminium heat exchanger and other major components are contained within a sealed air box. This forms the main boiler casing with a removable front panel section for maintenance purposes. All electrical and electronic controls are contained within the instrument panel mounted on top of the boiler.

The flue gas outlet, combustion air inlet, flow, return and gas connections are located on the top of the boiler with a condensate connection and optional return connection at low level on the right hand side.

The boiler is suitable for room sealed or open flue applications and has been designed for central heating and indirect hot water production at working pressures not exceeding 6 bar. It must be installed on a fully pumped pressurised system (minimum operating pressure 0.8 bar).

The pre-mix, down firing gas burner (NG + Propane only) with its gas/air system ensures clean, trouble free operation with higher than average efficiencies of 109% (NCV) in the condensing mode, combined with ultra low NO_x and minimum CO emissions. The standard control package allows actual and set values to be read and adjusted on the built-in digital display, which also provides normal operating and fault code indication.

An intelligent, advanced boiler control (abc[®]) continuously monitors the boiler conditions, varying the heat output to suit the system load. The control is able to react to external "negative" influences in the rest of the system (flow rates, air/gas supply problems), maintaining boiler output for as long as possible without resorting to a lock out condition. At worst the boiler will reduce its output and/or shut down (shut off mode) awaiting the "negative" conditions to return to normal before re-starting. The 'abc[®]' control cannot override the standard flame safety controls.

Every Remeha Gas 210 ECO PRO is checked, following assembly, by means of a test computer to ensure its proper operation.

The boiler meets the requirements of the EC regulations of the directives:

- 90/396/EEC Gas appliances directive
- 92/42/EEC Efficiency directive
- 89/336/EEC E.M.C. directive

and complies with the following requirements:

- 73/23/EEC Electrical low voltage directive.
- 89/392/EEC Machinery directive.

CE Certification

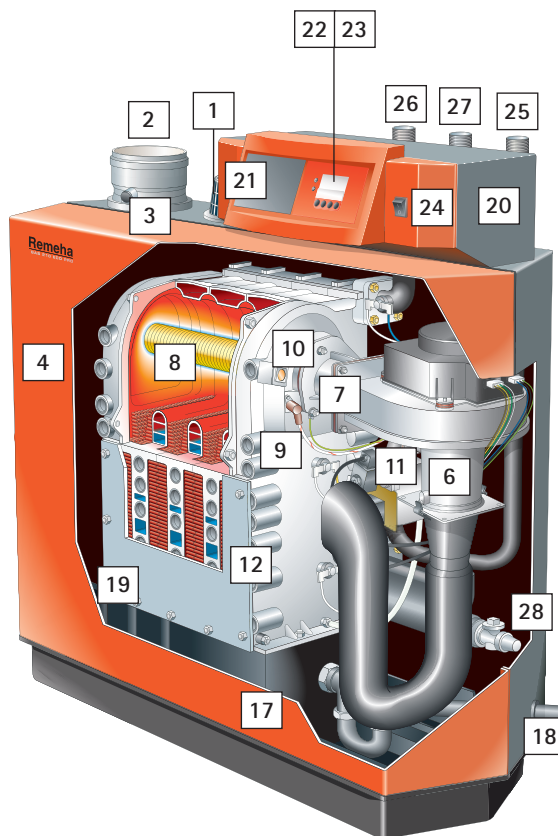
Reference number : 0063 BL 3264.

NO_x-Reference number : NO_x Class 5.

Boiler construction

1. Air supply
2. Flue gas outlet
3. Combustion test point (O₂/CO₂)
4. Sealed air box
5. Differential air pressure switch (LD2) *
6. Venturi
7. Air supply fan
8. Premix, fibre faced burner
9. Combined ignition/ionisation probe
10. Sight glass
11. Gas combi-block
12. Cast aluminium, sectional heat exchanger
13. Temperature sensor - flow *
14. Temperature sensor - return *
15. Temperature sensor - heat exchanger *
16. Temperature sensor - flue gas(option) *
17. Drain pan (condensate)
18. Condensate connection
19. Heat exchanger inspection hatch
20. Instrument panel
21. Facility for incorporating a rematic® weather compensator (optional)
22. Boiler setting keys
23. Read-out display and reset key
24. On/off switch
25. Gas connection
26. Flow connection
27. Return connection
28. Drain cock and optional second return connection or low level return (option)

* Not illustrated



Annual efficiency

Up to 108.6% at Hi (up to 97.8% at Hs) at an average water temperature of 30°C (40/30°C).

Heat to water efficiency

- a. Up to 98.4% at Hi (88.6% at Hs) at an average water temperature of 70°C (80/60°C).
- b. Up to 105.7% at Hi (95% at Hs) at an average water temperature of 35°C (50/30°C).

Standing losses

On average, 0.21% at Hi (0.23% at Hs) at an average water temperature of 45°C.

Note: NCV = Hi, GCV = Hs.

Application information

The Gas 210 ECO PRO can be used on all new and refurbishment projects in both single and cascade configurations. Conventional and room sealed flue system capability means that the boiler can be sited almost anywhere within a building.

The Remeha range of weather compensators (option) are able to communicate directly with the boiler controls to make full use of its fully modulating feature, ensuring that the boiler closely matches the system demand at all times. Our range of external control systems can be interfaced with the boiler to provide on/off - high/low or modulating (0-10V) control options. For cascade flue arrangements a motorised flue/gas damper is available as an accessory.

Advantages at a glance

- Compact lightweight construction
- High efficiency - 110% NCV at 40/30°C (99% GCV)
- Boiler controls - On/Off High/Low or Fully modulating over 18-100%
- Premix burner for optimum combustion
- Low NO_x <39 expected seasonal
- Ultra quiet < 59 dBA
- Digital diagnostic display
- Remote signalling options
- Cast - sectional aluminium heat exchanger
- Easy maintenance
- Options for direct weather compensation
- Compatible with Open Therm 
- Advanced intelligent (abc[®]) control system
- Diagnostic PC connection
- Conventional or "room sealed" capability
- Supplied fully assembled for ease of installation
- Optional low level return kit

Operating principle

Combustion air is drawn into the closed air box through the air inlet from the plant room (open flued) or from outside via the eccentric flue system (room sealed) by a variable speed fan.

The inlet side of the fan is fitted with a venturi, where air and gas are mixed according to a fixed ratio. This ensures precise combustion.

This mixture is initially ignited by the combined ignition/ionisation probe which monitors the state of the flame. Should the flame be unstable or not ignite within the pre-set safety time cycle, the controls will (after 5 attempts) shut the boiler down, necessitating manual intervention to reset the boiler. The digital display will indicate a flashing fault code confirming the reason for the failure.

The products of combustion in the form of hot flue gases are forced through the heat exchanger transferring their heat to the system water (the flue gas temperature is reduced to approximately 5°C above the temperature of the system return water), then discharged via the condensate collector, vertically through the 150mm connection to atmosphere.

Because of the low flue gas exit temperature there will be a vapour cloud formed at the flue gas terminal - this is not smoke, simply water vapour formed during the combustion process.

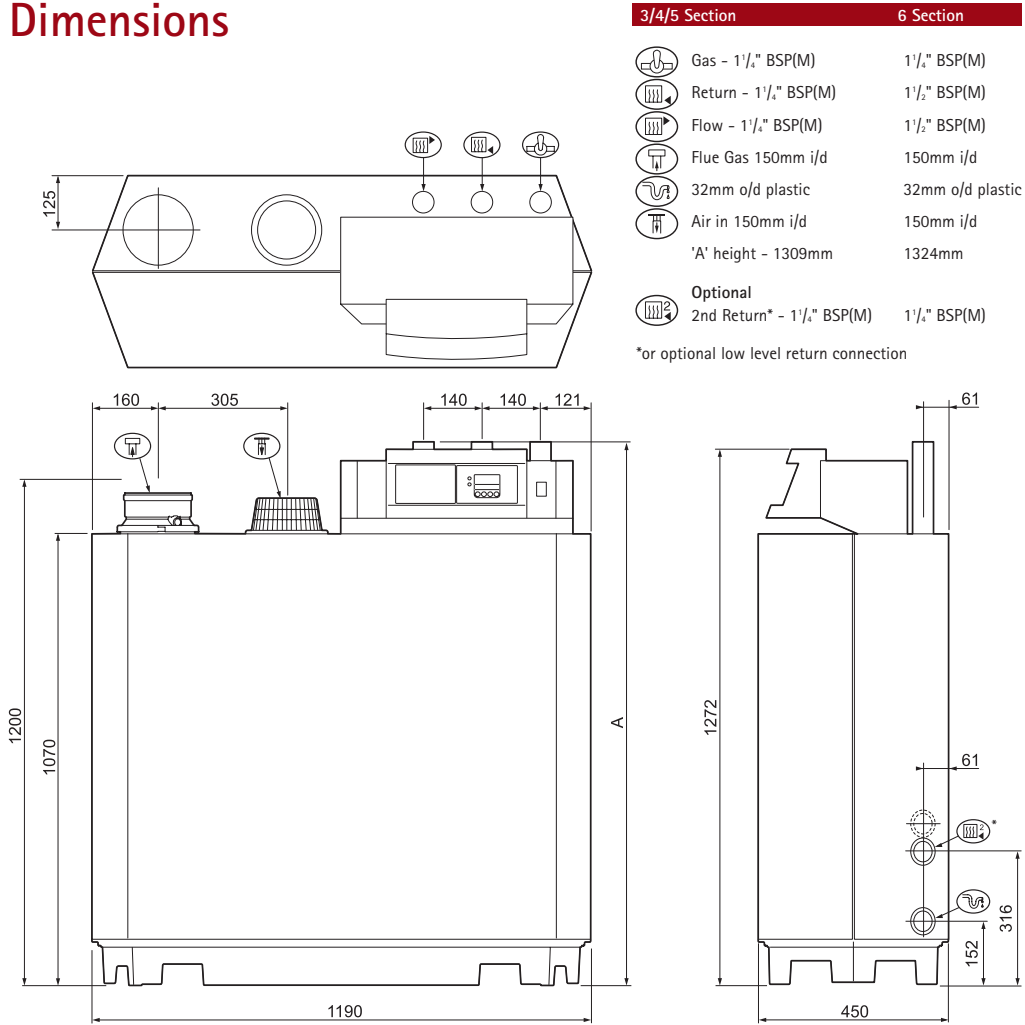
If the controls allow the flow and therefore return temperature to fall below dew point (55°C), this water vapour will begin to condense out in the boiler, transferring its latent heat into the system water, increasing the output of the boiler without increasing the gas consumption.

Condensation formed within the boiler and flue system is discharged from the boiler to an external drain via the drain pan/siphon supplied.

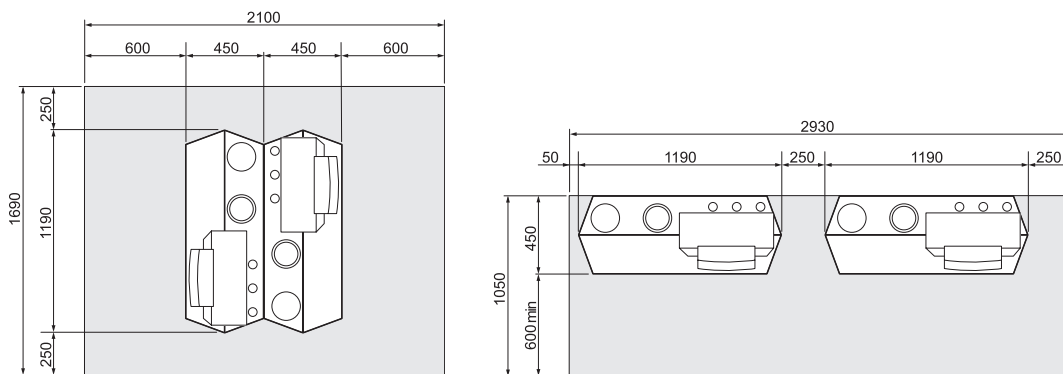
The boiler can be supplied, as an option, with a second (fixed temperature) return connection. This additional connection enables the boiler to make full use of its condensing ability whilst accepting both fixed and variable temperature returns from the same system.



Dimensions



Maintenance area for two boilers side to side



Note: For other configurations, please consult technical manual

Technical data

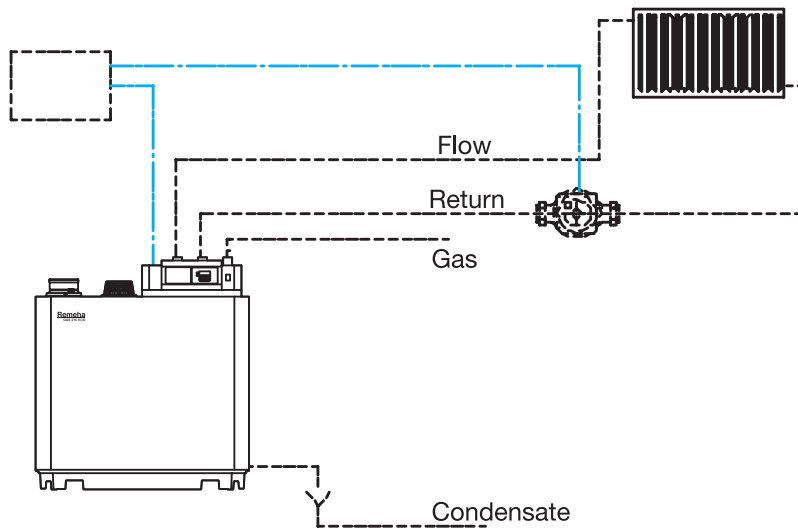
Boiler type		Remeha Gas 210 PRO 80	Remeha Gas 210 PRO 120	Remeha Gas 210 PRO 160	Remeha Gas 210 PRO 200
General					
Number of sections	qty	3	4	5	6
Input control		Modulating, 0-10 V or on/off			
Nominal output (80/60°C) Pn	min. kW	16	22	29	39
	max. kW	87	120	166	200
Nominal output (50/30°C) Pn	min. kW	18	24	33	44
	max. kW	93	129	179	217
Nominal input gross calorific value (GCV/Hs) Qn	min. kW	19	26	34	46
	max. kW	99	137	189	228
Nominal input net calorific value (NCV/Hi) Qn	min. kW	17	23	31	41
	max. kW	89	123	170	205
Gas and flue gas side					
Category		II _{2H3P}			
Inlet gas pressure natural gas	mbar	17/30			
Gas consumption natural gas	min. m ³ /h	1.8	2.4	3.3	4.3
Gas consumption natural gas	max. m ³ /h	9.4	13	18	21.7
NO _x emission (expected seasonal)	mg/kWh	<39			
Residual fan pressure	Pa	130	130	130	130
Flue gas quantity	min. kg/h	27.2	36.7	49.5	65.5
Flue gas quantity	max. kg/h	149.7	206.9	286	344.9
Type classification with respect to flue gas discharge		B23, B23p, C13, C33, C43, C53, C63, C83			
Central heating side					
High limit temperature	°C	110			
Operating temperature range	°C	20 - 90			
Minimum water working pressure	bar	0.8			
Maximum water working pressure PMS	bar	6			
Water content	litres	12	16	20	24
Hydraulic resistance at ΔT = 20°C	mbar (kPa)	165 (16.5)	135 (13.5)	170 (17)	180 (18)
Hydraulic resistance at ΔT = 11°C	mbar (kPa)	545 (54.5)	446 (44.6)	562 (56.2)	595 (59.5)
Electrical					
Main voltage	V/Hz	230/50			
Input power (without pump)	min. Watt	4	4	4	4
	max. Watt	125	193	206	317
Insulation class	IP	20			
Other					
Weight excluding water	kg	115	135	165	188
Noise level at a distance of 1M from boiler (enclosed version)	dB(A)	≤59			
Environment temperature	°C	0 - 40			
Colour of casing	RAL	2002(red) / 7037(grey)			

Note: For Firing on LPG, please contact Broag sales department

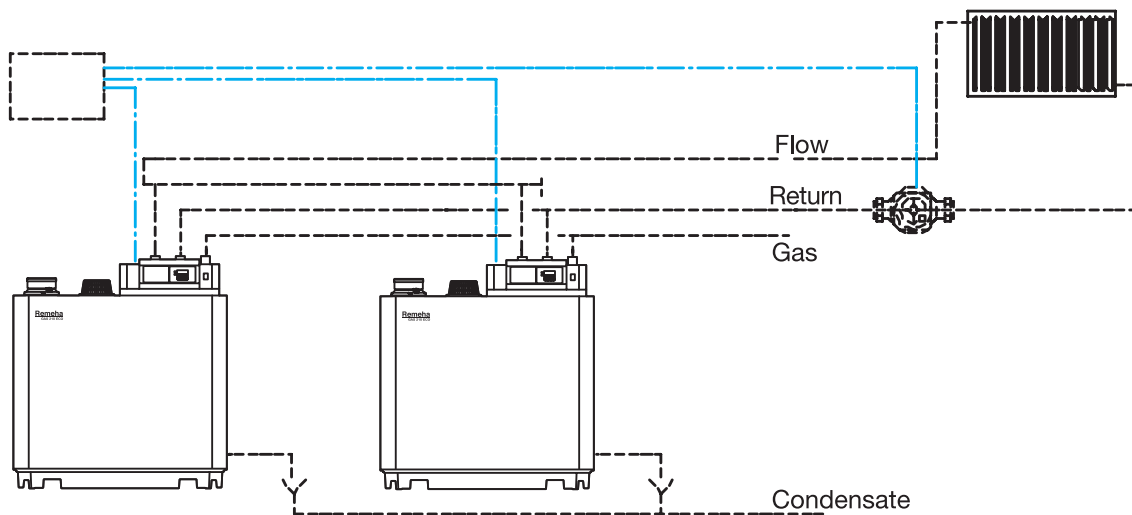
Typical installations

Please Note: These layouts do not constitute a design. Calculations must be carried out to ensure pipework and pumps are sized to match boiler nominal flows against system design flow requirements.

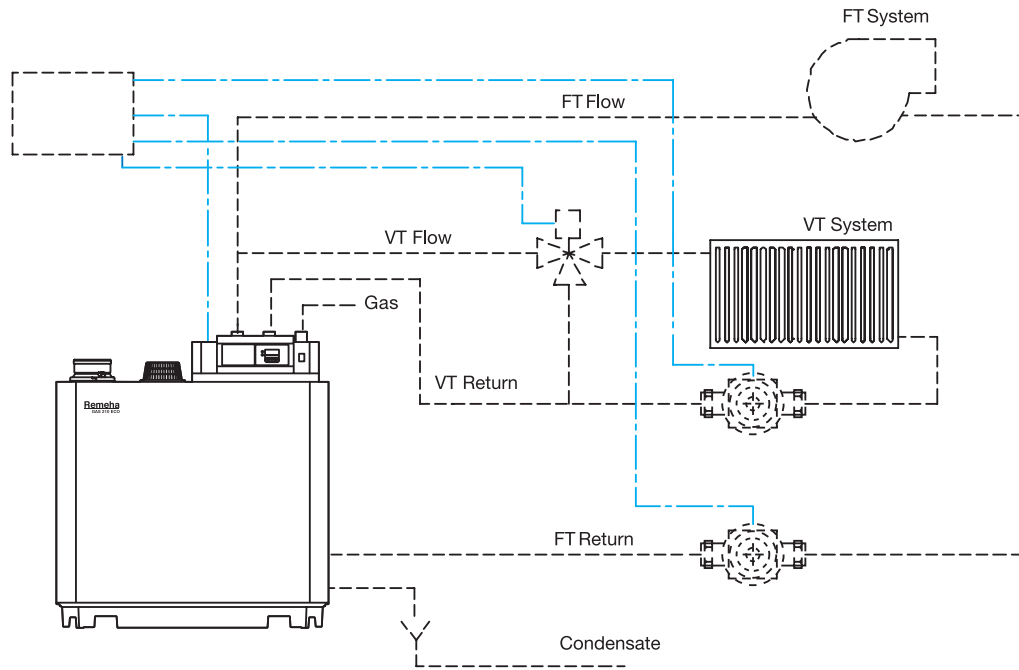
Single boiler



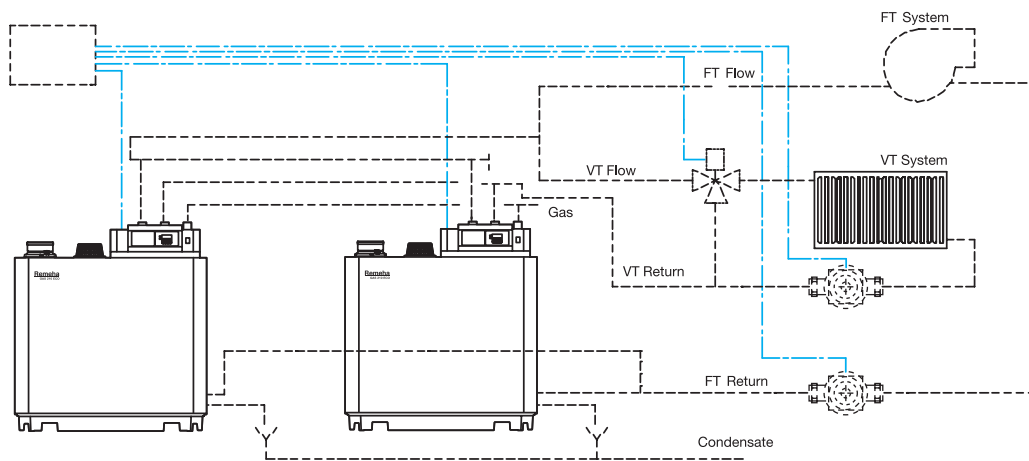
Multiple boiler



Single boiler using the optional 2nd return connection (FT)

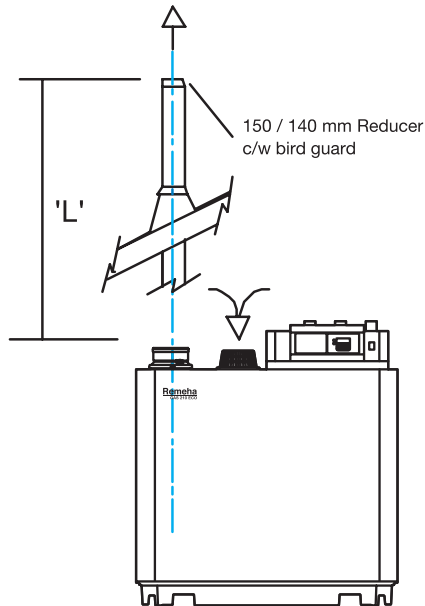


Multiple boiler using the optional 2nd return connection (FT)



Note: 2nd return for fixed temperature or low level return in place of high level return

Typical flue installation (Conventional)

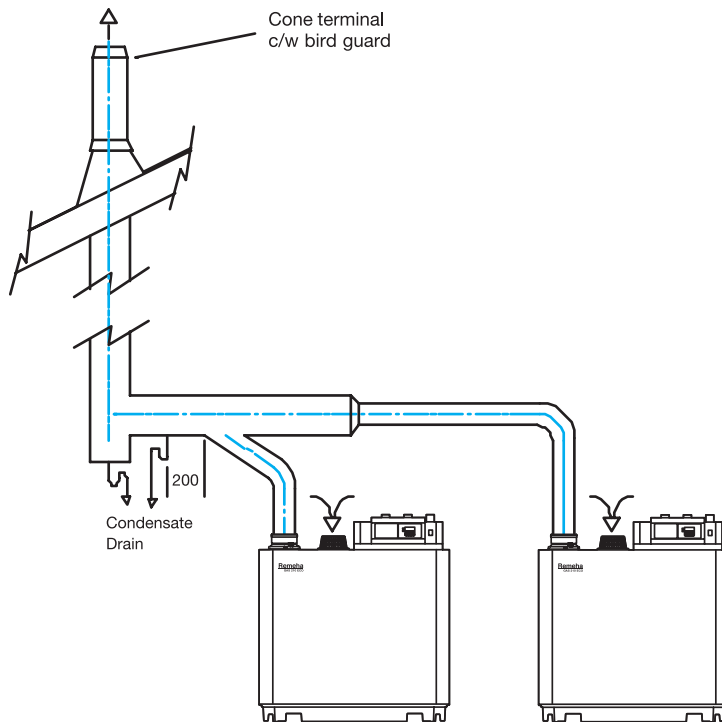


Boiler Model	3	4	5	6
Maximum length 'L'	50M	50M	45M	31M
(Using 150mm diameter*)				

45 bend = an equivalent length of 1.2M
 90 bend = an equivalent length of 2.1M

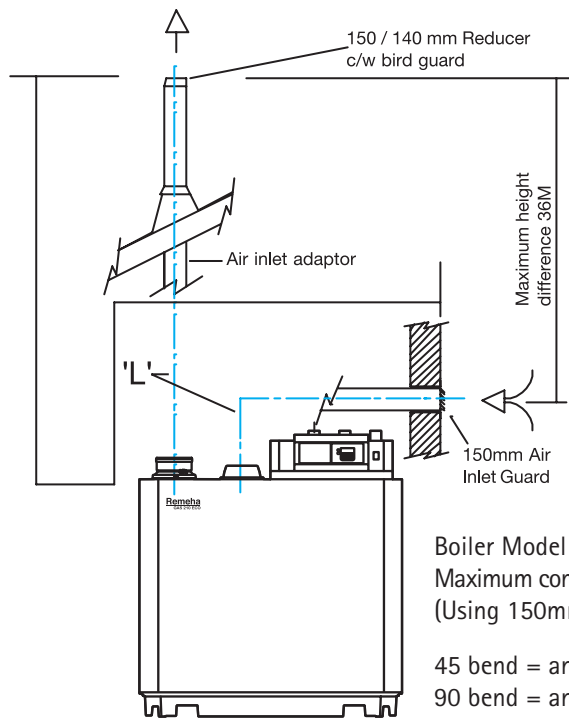
Note: For alternative flue diameters and greater overall fluing distances please consult the technical manual.

Conventional flue with two boilers using a common header arrangement

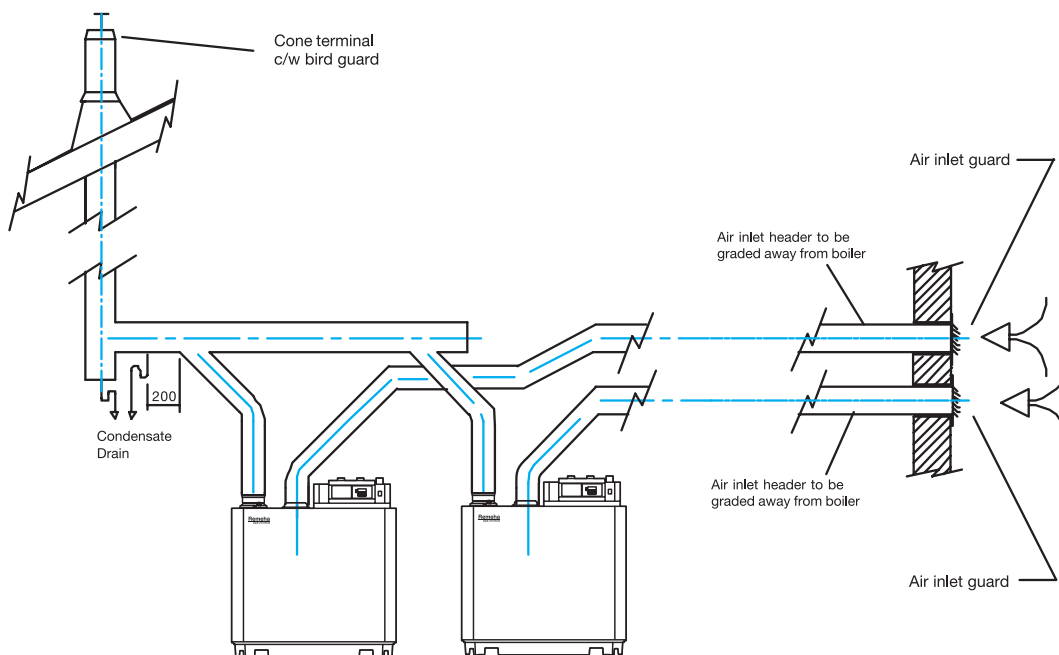


Note: Flue calculation must be carried out to confirm header sizes. Please consult with Broag.

CLV system (two zone)

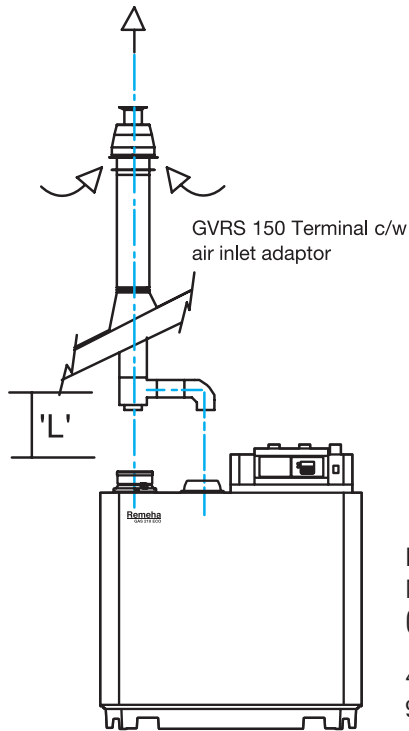


CLV flue system with two boilers using a common flue and air inlet header arrangement



Note: Flue calculation must be carried out to confirm header size. Please consult with Broag.

Room sealed GVRS terminal

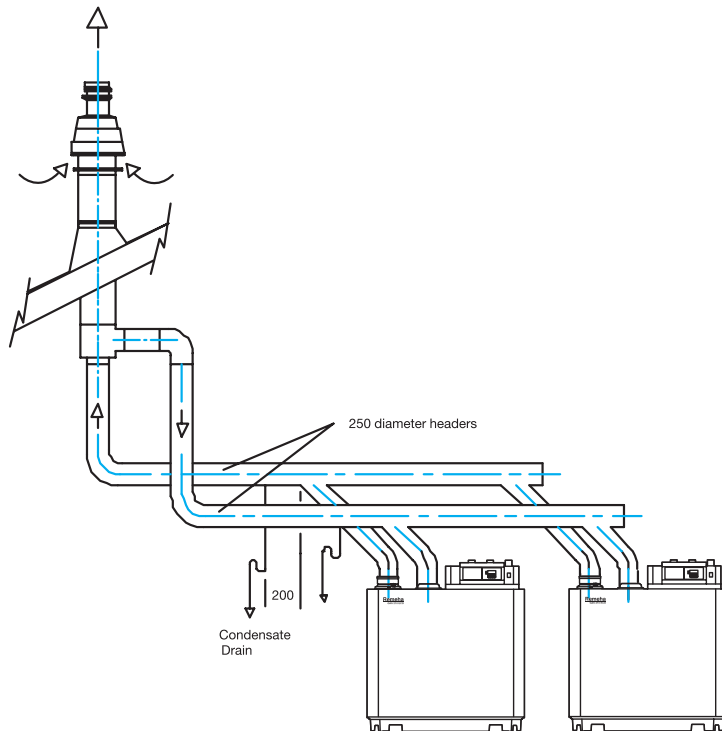


Boiler Model	3	4	5	6
Maximum combined length 'L'	30M	30M	22M	13M

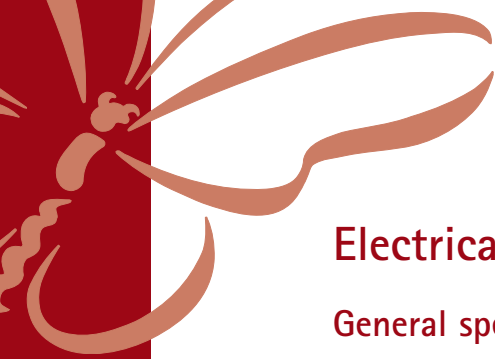
(Using 150mm diameter*)

45 bend = an equivalent length of 1.2M
 90 bend = an equivalent length of 2.1M

Room sealed eccentric system for two boilers using the GVRS 250 terminal



Note: Flue calculation must be carried out to confirm max lengths. Please consult with Broag.



Electrical connections and controls

General specifications

The Remeha Gas 210 ECO PRO is supplied as standard with electronic control and flame ionisation safety controls, with a specially designed microprocessor at the heart of the control system.

Power supply

The appliance is suitable for a supply of 230V-1-50Hz 6amp with phase/neutral/earth.

Note: the controls are phase/neutral sensitive.

Automatic controls

SIT

Type: PCU-01

Electrical supply: 230V -1-50 Hz

Power consumption at standby/part load/full load:

- 3 sections: 4 / 36 / 125 W
- 4 sections: 4 / 37 / 193 W
- 5 sections: 4 / 53 / 206 W
- 6 sections: 4 / 54 / 317 W

Maximum power output to pump: 300 VA.

Fuse specification

The boiler is protected by fuses:

- Fuse F on the 230v terminal strip 6.3AT

On the control box:

- F1 rated at 1.6 amps (fast acting)- control circuit 230V

Boiler temperature control

The Remeha Gas 210 ECO PRO has electronic temperature control with flow, return, heat exchanger temperature sensors. An optional flue gas safety switch can be supplied as an optional extra.

Low water protection (flow and content)

Provided by monitoring the temperature sensors in the boiler.

The Remeha Gas 210 ECO PRO is supplied with low water protection on the basis of temperature measurement. By modulating back at the moment that the water flow threatens to fall too low, the boiler is kept operating for as long as possible. In the event of low flow (F/R ($\Delta t = 45^{\circ}\text{C}$), the boiler will shut off and not lockout.

Note: If the boiler is fired dry, it will go to high temperature lock out, flashing failure code 14.

High limit temperature protection

The high limit temperature protection device switches off and locks out the boiler when the flow temperature exceeds the high limit set point. When the fault is corrected the boiler can be re-started by using the reset key on the boiler control panel.


Flue gas differential switch further protects the boiler against internal flue gas blockages, an E12 fault code will appear to indicate a blockage.

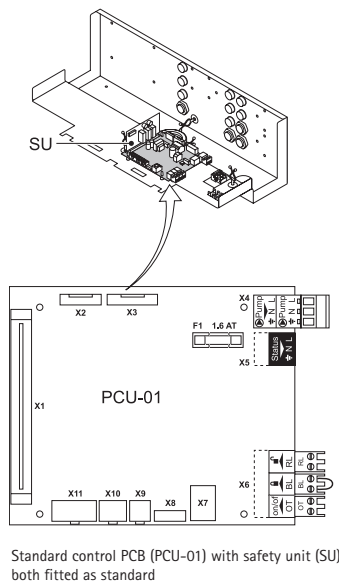
External connections

These are accessed by removing the plastic cover from the instrument panel, exposing the terminal strip and electronic components which make up the boiler controls. All external connections (power and control) are made on these terminal strips, as detailed in the following section.

The boiler is supplied with the following standard control:


Standard (PCU-01)

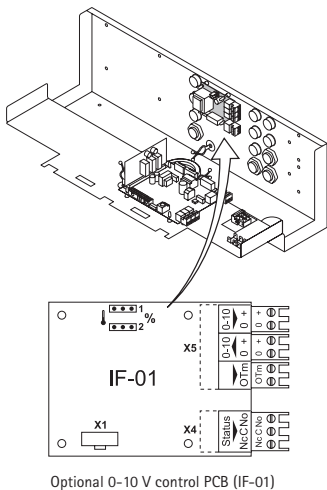
- On/off control (OT)
- Modulation (OT)
- Open Therm 
- External interlock (BL)
- Input release (RL)
- Pump (Pump)



The following options must be specified at time of order:

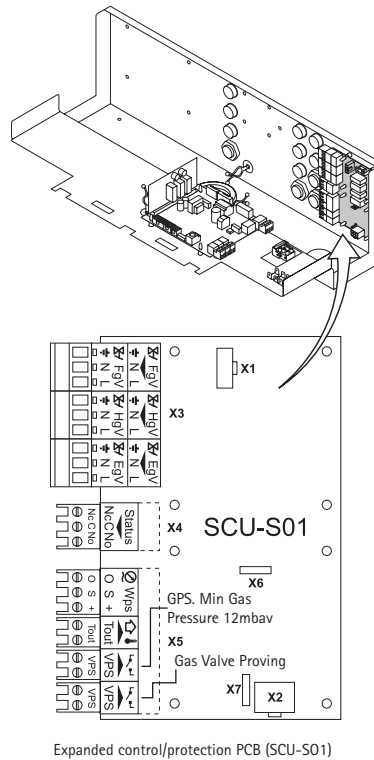
Additional option 1 (IF-01)

- 0-10v control operation (Temperature or output)
- Connection status (lockout) (NC)
- Open Therm 



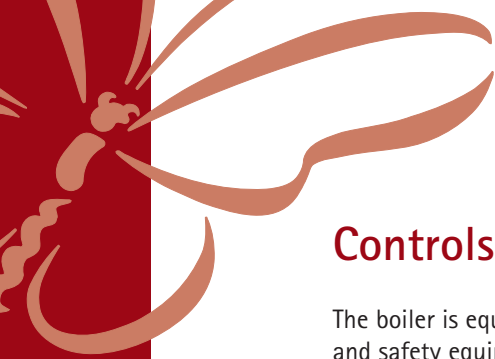
Additional option 2 (SCU-S01)

- Expanded control/protection PCB
- Gas valve proving
- Low gas pressure
- Flue gas damper
- Hydraulic valve control
- External gas valve control
- Water pressure sensor
- Facility to fit outside sensor
- Operation/failure signal (NC/NO)



Note 1: When connecting the interlocks or communication wires of more than one boiler in parallel observe and match the connection polarity.

Note 2: Unless otherwise stated at the time of ordering, the boiler will be delivered with the standard control fitted. Additional options will be supplied for on-site fitting by others.



Controls

The boiler is equipped with electronic control and safety equipment with ionisation flame protection. The advanced boiler control (abc), is a microprocessor that protects and controls the boiler. Connect the boiler to the mains supply in accordance with the local electricity supplier's instructions and IEE regulations.

Boiler control

The heat output of the Remeha Gas 210 ECO PRO can be controlled as follows:

- Modulating, where the output modulates between the minimum and maximum values on the basis of the flow temperature defined by the modulating controller.
- On/off control, where the heat output modulates between the minimum and maximum values on the basis of the flow temperature set in the unit. This can be combined with an outside sensor so that the internal heating curve is used.
- Analogue control (0-10 V), where the heat output or temperature is controlled by a 0-10 V signal, Only possible with optional 0-10 V control PCB (IF-01).

Modulating controls general

The modulating nature of the boiler is used to maximum effect with a modulating controller based on room and /or outside temperatures. If the controller demands heat, the boiler supplies the heat output (providing the flow conditions have been met). If the controller supplies a calculated set point flow temperature, the boiler modulates to this calculated value (providing the flow conditions have been met.) This increases the number of operating hours and drastically reduces the number of starts. Combined with the fixed gas/air mixture, this results in greater efficiency.

Various types of modulating controls can be connected, including the following:

- Modulating room control,
- Modulating weather-compensated,
- Modulating cascade control.

a) Modulating room control

The boiler is set up for communication via the OpenTherm protocol. Modulating controllers can be connected according to the

OpenTherm protocol, e.g. the Remeha Celcia 20. The controller is mounted in a reference area. Connection is made with a two-core cable to the On/off - OT terminal strip X6 (not polarity sensitive).

b) Modulating weather-compensated control rematic

The following optional controller can be supplied. The optional controller is supplied with a connection adapter and interface that can be built into the boiler. The connections for this feature are fully pre-wired.

rematic 2945 3C K

In addition to the weather-compensated boiler pre-control, this controller provides optimum start, single zone weather compensation and priority DHW (if required). Fit the controller in the boiler. Connection takes place using the supplied rematic adapter plate and the supplied interface that can be integrated in the control panel. Refer to the relevant controller documentation for detailed information.

c) Modulating cascade controller rematic MC4

The rematic MC4 cascade controller is suitable for the modulated control of 2 to 4 Remeha Gas 210 ECO PRO units in cascade. This controller is wall-mounted and communicates according to the OpenTherm protocol. Several rematic MC controllers can be combined to control more than 4 boilers. Refer to the relevant controller documentation for detailed information.

Electrical connection options

The boiler has several control, protection and regulation connection options. The standard control PCB (PCU-01) can for example be expanded with:

- an optional 0-10 V control PCB (available as an accessory IF-01);
- and/or the optional expanded control/protection PCB (available as an accessory SCU-S01).

To install or access these PCBs, the plastic cover must be removed from the control panel. The required external connections are made on these (optional) PCBs. Refer to the relevant fitting instructions.

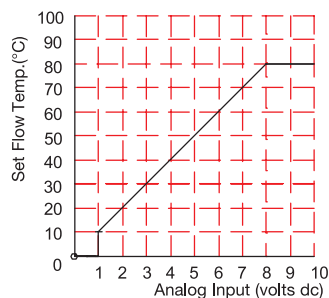
Analogue control (0–10v)

Two formats available :

1. Temperature based (10 to 90°C)

Set the minimum and maximum temperatures required on the basis of the voltage supplied by an external analog signal (0–10V DC).

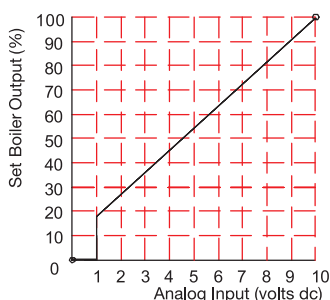
- 0 volt = boiler off
- 0.5 volt = boiler on
- 1 volt = boiler 10°C
- 5 volts = 50°C etc.



2. Output based (18–100%)

Set the minimum and maximum outputs required on the basis of the voltage supplied by an external analog signal (0–10V DC).

- 0 volt = boiler off
- 0.5 volt = boiler on 10%
- 1–10 volt = boiler modulates between 10 and 100% on demand.



3. On/Off control (1 x volt free switched pair)

The heat output modulates between the minimum and the maximum value based on the set flow temperature. Terminals OT on PCU 01 (X6).

4. Frost protection

Install the boiler in a frost-free room. The built-in frost protection system is activated as follows :

Below 7°C the system pump will be switched on if it is connected to the boiler. Pump terminals on PCU -01 (X4).

Below 3°C the boiler will be switched on, but is limited to a flow temperature of 10°C, when both will switch off.

Note: This control function is designed to protect the boiler only, for full frost protection of the system and building, a frost thermostat or weather compensator should be used.

5. Boiler with frost protection, out of operation for a long time

Set the controller low, for example to 10°C; The Gas 210 ECO PRO will now only come into operation to protect itself against freezing.

To prevent radiators and the system from freezing in the rooms where there is a risk from frost (e.g. garage or storage room), a frost thermostat can be connected to the boiler. The boiler will then keep the radiators in that room warm.

Safety interlocks

As standard the boiler is supplied with two interlocks, BL and RL on PCU - 01(x6). BL can be used for a:

1. Normal shut down
2. A shut down without frost protection
3. A lock out (wire bridge must be removed to use this option).

RL can be used to shut down the boiler (wire bridge must be removed to use this option).

Optional controls

- Operation and failure remote signal
- Boiler gas valve proving system (only models 5 and 6)
- System water pressure sensor
- Outside temperature
- External gas valve control
- Minimum gas pressure switch
- Flue gas damper control
- Hydraulic valve control

System pump

A system pump can be connected to the boiler (230–1–50 supply max. current rating of 1 amp). If the system pump requires more than 1 amp the terminals can only be used to provide a switch signal to a pump relay.

System water quality

Before operation the system should be thoroughly flushed and re-filled with mains cold water. As the heat exchanger is aluminium, if water treatment is considered, a minimum pH level of 7 and a maximum pH level of 9 MUST NOT BE EXCEEDED.

Broag's recommended treatments are :

- Fernox "Copal"
- Sentinel "X-100"



TreadLightly

ON THE PLANET

**GAS 210 ECO PRO
CONDENSING**



Broag Ltd. Head Office

Remeha House
Molly Millars Lane
Wokingham
Berkshire RG41 2QP
T: 0118 978 3434
F: 0118 978 6977
E: boilers@broag-remeha.com

www.uk.remeha.com

The data published in this technical sales leaflet is based on the latest information (at date of publication) and may be subject to revisions. It should be read in conjunction with our full technical brochure (available on request). We reserve the right to continuous development in both design and manufacture, therefore any changes to the technology employed may not be retrospective, nor may we be obliged to adjust earlier supplies accordingly.

Issue 4 date: 01/02/08



Broag UK is committed to carbon offsetting