Installation and Operating Manual for the ProCon MC 115 Wall Mounted Condensing Boilers

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk
010315 Draft

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk
010315 Draft

Appliance Type

There is currently only a single boiler in the ProCon MC range. Additional boilers are being designed and will be available shortly.

ProCon MC 115

The ProCon MC 115 is designed to be applied to systems requiring direct on boiler weather compensated heating and priority hot water production via a separate high recovery calorifier/cylinder.

The ProCon MC 115 can be applied to a cascade of up to seven boilers using a MHG Theta cascade manager, however, the current range of mounting frames only accommodate a maximum of four boilers with matched hydraulic and flue sets.

Dedicated cascade controllers, communication adapters, mounting frames, hydraulic kits and flue kits are available if required.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Installation Regulations and Requirements

The installation of ProCon MC boilers must be in accordance with the relevant requirements of Gas Safety (Installation & Use) Regulations 1994, Health & Safety at Work Act, Building Regulations, IEE Regulations, Construction (Design & Management) Regulations 1994, Local Authority Bye-Laws, National, Fire Regulations and Insurance Company requirements.
The following Codes of Practice are also applicable:-
BS 5440-1: 2008 Installation of flues and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases).
Part 1: Specification for the installation of flues.

BS 5440-2: 2009 Installation of flues and ventilation for gas appliances of rated input not exceeding 70 kW net (1st, 2nd and 3rd family gases).
Part 2: Specification for installation and maintenance of ventilation for gas appliances.

BS 5449: 1990 Specification for forced circulation hot water central heating systems for domestic premises.
BS 6644: 2011 Specification for gas fired hot water boilers of rated inputs between 70kW (net) and 1.8MW(net) (2nd and 3rd family gases).
BS 6798: 1987 Specification for installation of gas fired hot water boilers of rated input not exceeding 60 kW.
BS 6880: 1988 Code of Practice for low temperature hot water heating systems of output greater than 45kW. Parts 1, 2 & 3.
BS 6891: 1988 Specification for installation of low pressure gas pipework of up to 28mm (R1) in domestic premises (2nd family gases)
BS 7593: 1992 Code of Practice for treatment of water in domestic hot water central heating systems.
BS 7671: 1992 Requirements for electrical installations. IEE Wiring Regulations. Sixteenth edition.
CISBE Guide reference sections B7, B11 and B13.
CP342 Part 2: 1974 Code of Practice for centralized hot water supply.
GE/UP/2 Gas installation pipework, boosters and compressors on industrial and commercial premises.
IGE/UP/4 Commissioning of gas fired plant on industrial and commercial premises
IGE/UP/10 Installation of gas appliances in industrial and commercial premises. Part 1: Flued appliances. And any addition prevailing regulation and or code of practice not detailed above.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Appliance Warranties

All MHG appliances enjoy a full 24 month warranty as detailed in our terms and conditions.
The guarantee period shall begin on the day of commissioning, or within 3 months after delivery has been made.

The customer shall only be able to claim against MHG under guarantee if the commissioning of the object of delivery has been carried out by MHG staff or the authorized supplier. Only if the customer has followed MHG's instructions relating to the treatment and maintenance of the object of delivery, and if no replacement parts of outside origin have been fitted.

Parts subject to wear such as ignition electrodes, seals etc. are strictly excluded from the guarantee. In addition to the above warranties, the Primary Heat Exchangers carry a 60 month guarantee against manufacturing or material defect.

Supplied Components

All ProCon 115s are supplied with the following components:

Pressure relief valve outlet extension, seal and Tundish.

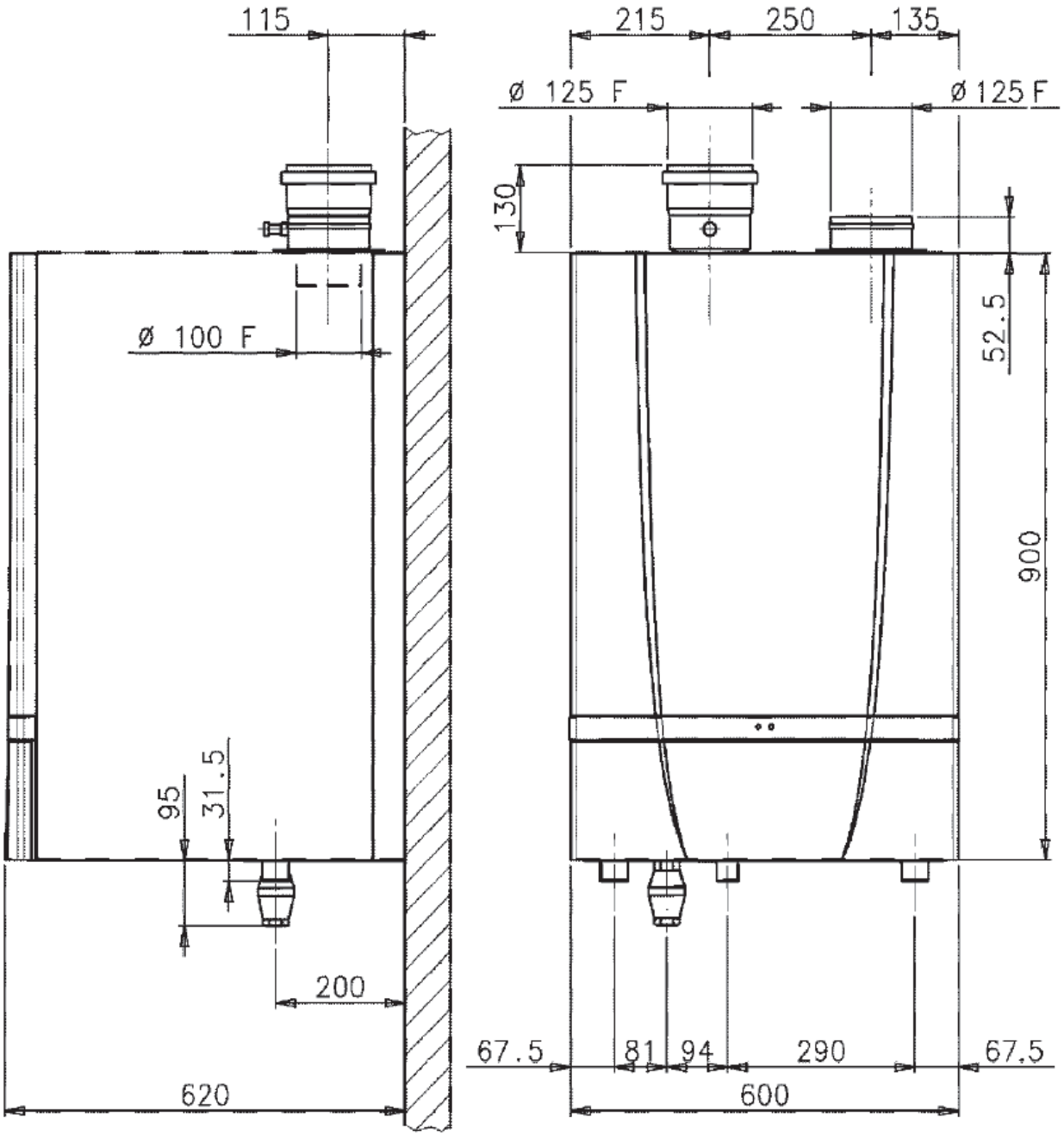
A DN100-125 flue adapter to provide a flue gas analysis sampling point and a combustion air inlet adapter and seal. (The adapter may be omitted depending upon the proposed flue route.)


Six screws for securing the rear panel to the boiler prior to fixing the boiler to the wall or frame.

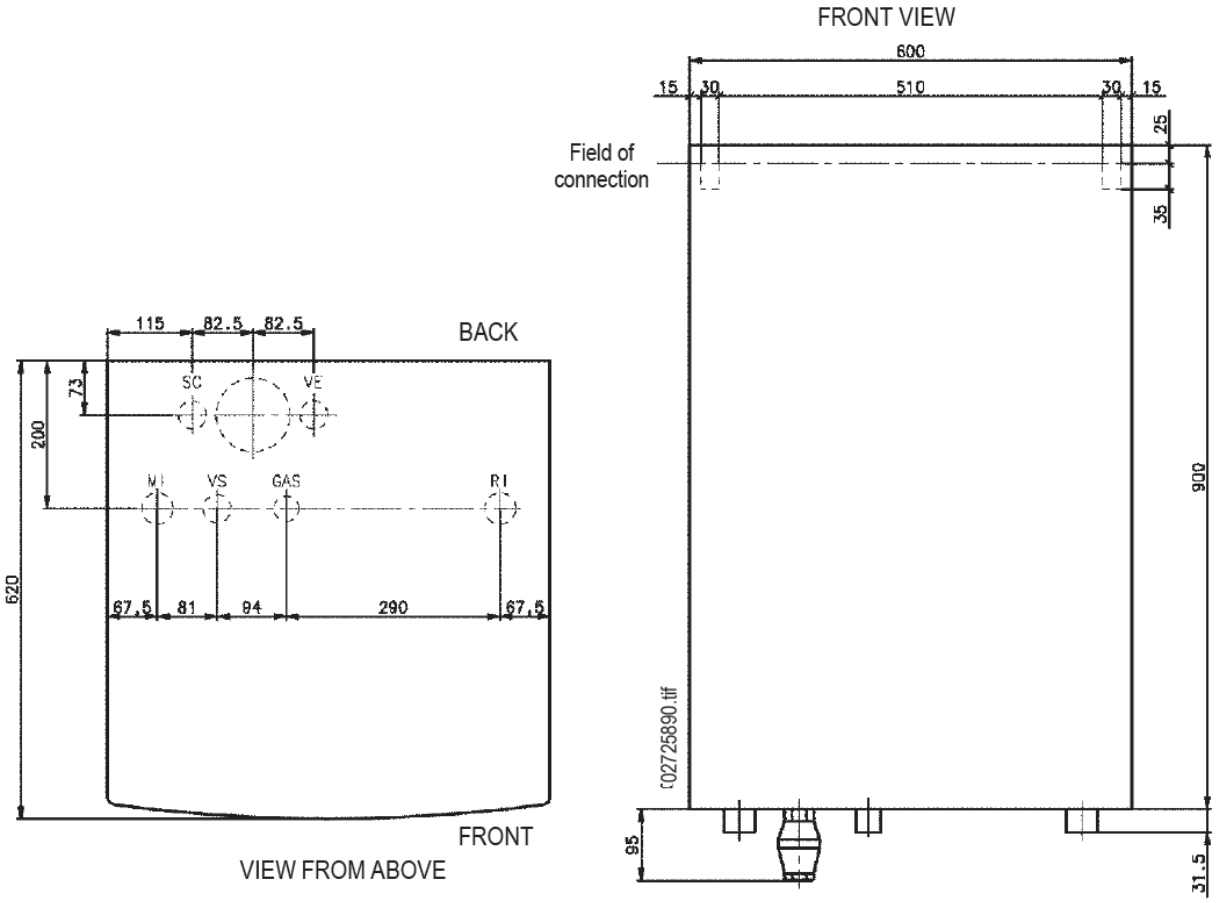
Two Case Entry Sealing Grommets.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Dimensions



MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk
010315 Draft

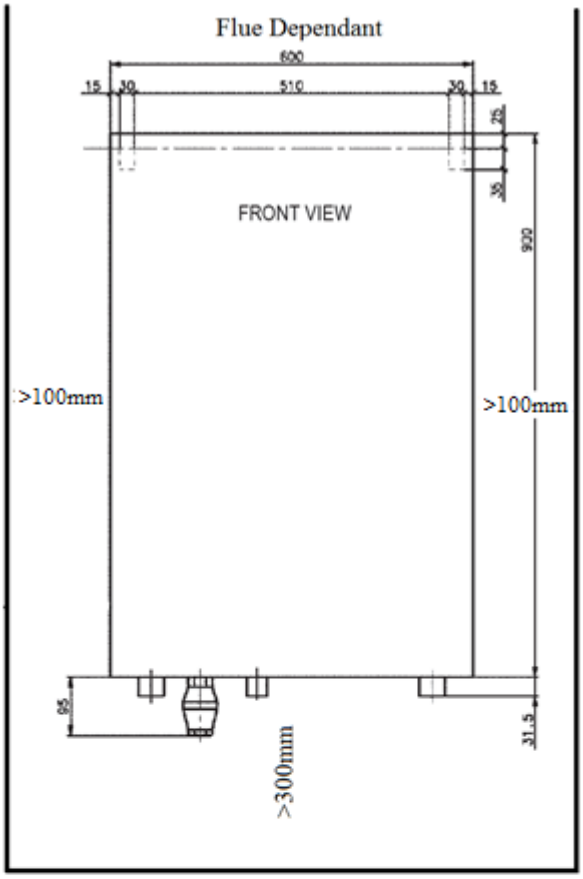


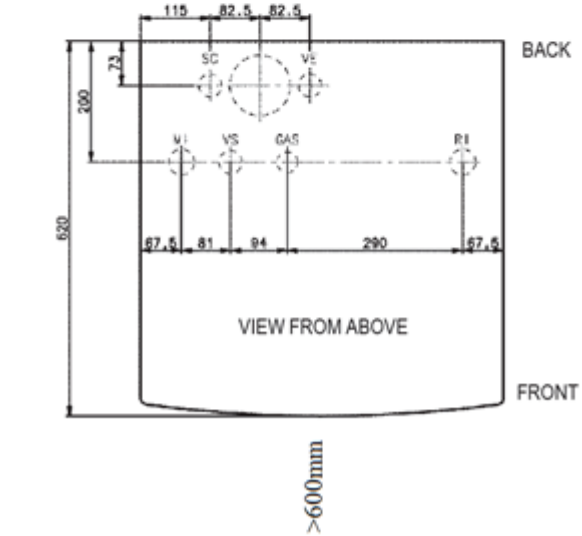
Legend

MI	System Flow 1.25” BSP M
VS	Pressure Relief Valve Discharge 0.75” BSP F
GAS	Gas Inlet 0.75” BSP M
RI	System Return 1.25” BSP M
SC	Condensate Drain 25mm
VE	Pressure Vessel Connection

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Installation and Service Clearances





MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Delivery and Mobility

All ProCon MCs are supplied fully tested and therefore may contain residual test water.
The test water utilised contains additives that will help prevent the pump from sticking and other metals from oxidising.

To maintain the structural integrity of the appliance the internal components should not be used during the lifting and positioning of the unit onto the customer supplied wall fixings.

All packaging materials should be disposed of in an environmentally way.

Case Removal

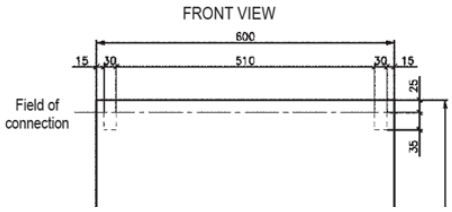
The lower case covering the display can be hinged down to gain access to the control panel facia.

The facia can also be hinged down following the disengaging of the retaining screws by turning through 90 degrees.

The upper front case panel can be removed by firstly removing the two top panel securing screws then slide the panel up and pull forward.

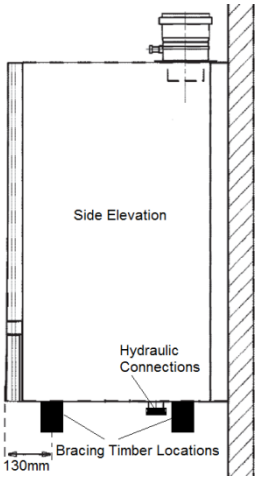
Hanging the Boiler.

Due to the varied nature of the wall mounting locations/conditions that can be encountered a wall mounting bracket is not supplied with the ProCon MC115. Mounting frames for use with one to four boilers are available. Free standing or supported versions are available.



Mounting holes are located at the top rear of the boiler. It is advisable to use raised shoulder/head fixings or adequately secured studding in combination with square washer and securing nuts to aid location and mounting.

If the boiler is to be raised in to position on a mechanical lifting device, it is essential that the base of the unit and the components immediate inside are protected from damage by using bracing timbers located as shown in the image to the right.



MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Technical Data

General Boiler Data		115 kW	
Type of fume discharge			
Category		II2H3+	
Fuel type		Natural gas /PLG	
		Min	Max
Nominal heating capacity	kW	27.0	108.0
Reduced-nominal thermal power (50/30°C)	kW	29.7	115.0
Reduced-nominal thermal power (80/60°C)	kW	25.9	105.0
Energy output (Dir. 92/42/EEC-Law 10/91-LD 192)			
Usable thermal output at nominal power (80/60°C)	%	97.5	
Usable thermal output at 30% nominal power (50/30°C)	%	108.3	
Usable thermal output at nominal power (50/30°C)	%	106.7	
Energy output (Dir. 92/42/EEC)	%	****	
Loss to shell (Dt=50°C) Pd	%	0.2	
Loss to fumes with burner on Pf	%	2.3	
Loss to fumes with burner off Pfbs	%	0.1 0.8	

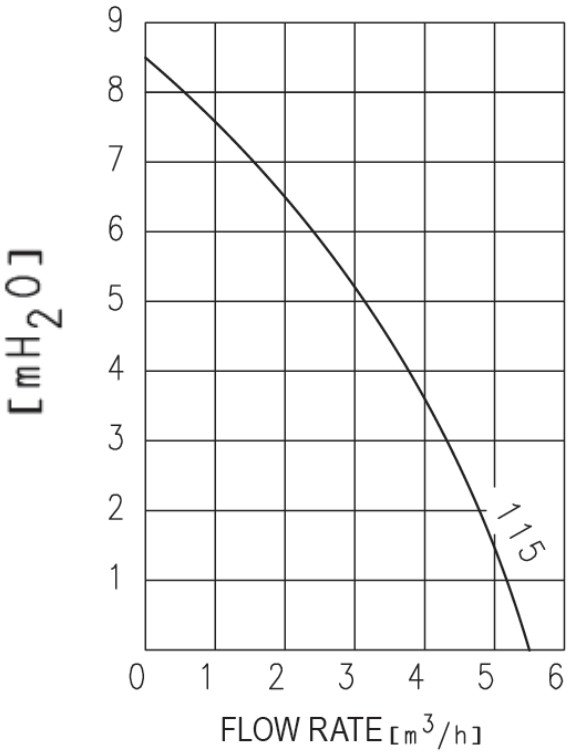
Chimney size			
Fume temperature (80/60°C)	°C	53	72
Fume temperature (50/30°C)	°C	31	52
CO_2 value	%	8.9	9.1
Residual channel head from smoke (without clapet valve)	Pa	20	90
Maximum gas capacity at min/max nominal power	kW	45.8	179.3
Diam. Of fume discharge	mm	100	
Diam. Of discharge stub with smoke exhaust	mm	125	
Combustion/gas data			
Gas capacity at nominal power [1])G20	m^3/h	2.86	11.43
Gas capacity at nominal power [1])G30	kg/h	2.13	8.52
Gas capacity at nominal power [1])G31	kg/h	2.18	8.39
NOx Class (according to EN 483 - EN 656)		5	
Dynamic gas pressure on inlet - Natural Gas G20	mbar	20	
Dynamic gas pressure on inlet - Natural Gas G30/31	mbar	28-29/37	
Gas connector	inches	G 1 M	

(Screened cable must be used for all low voltage and sensor wiring)

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Hydraulic data		
Water content of individual heating element	L	10.60
Heating circuit water content	L	11.20
Maximum working pressure	bar	4.0
Diam. of return system	inches	G 1 ¼
Diam. of fume discharge coupling	mm	25.0
Load loss on water input side (Dt=20°C)	mbar	See curve
Maximum quantity of condensation (50/30°C) (CH4)	l/h	17.0
Dimensional data		
Overall dimension (HxLxD)	mm	900x600x620
Weight	kg	90
Electrical data		
Power supply	VAC/Hz	230/50
Total absorbed power	W	469
Maximum power on standby	W	50

Load Loss on Water Input Side Curve (DT=20C)



Designed flow rate at max output 4.95 m³/h

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Pressure (Safety) Relief Valve

In accordance with the prevailing British Standard 5440/6644, the installer shall install as suitably sized Pressure (Safety) Relief Valve.

The location of this valve is important with respect to the applied pressure of the boiler circulation pump, it is therefore recommended to locate the Pressure (Safety) Relief Valve on the flow pipe immediately adjacent to the boiler; furthermore, there must not be any means of isolation between the boiler and the Pressure (Safety) Relief Valve.

A pressure Relief Valve has been supplied within the unit.

Standard setting: 3.4bar

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Electrical Connections

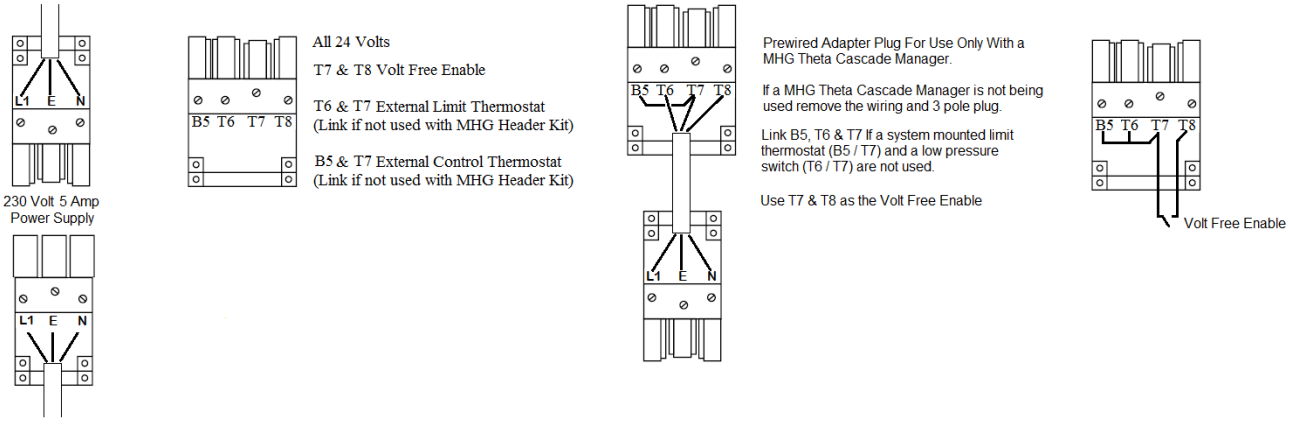
Basic electrical connection for the ProCon MC

Legend

230 Volts			
1	Power Supply Plug	230 Volts. 5 Amp. Live, Neutral, Earth.	X20
24 Volts			
2	Cascade Adapter Plug	Interfacing Plug for use with a Dedicated Theta Cascade Controller	X22
3	Enabling/Safety Plug	Volt Free Enable T7 & T8 Safety Interlocks (For use with installation kit) T7, T6 & B5	X21
4	Outside Air Sensor Plug	Outside air sensor if Direct On Boiler Weather Compensation is required.	SE
5	Hot Water Sensor Plug	Sensor or Volt Free Enable Plug.	T3

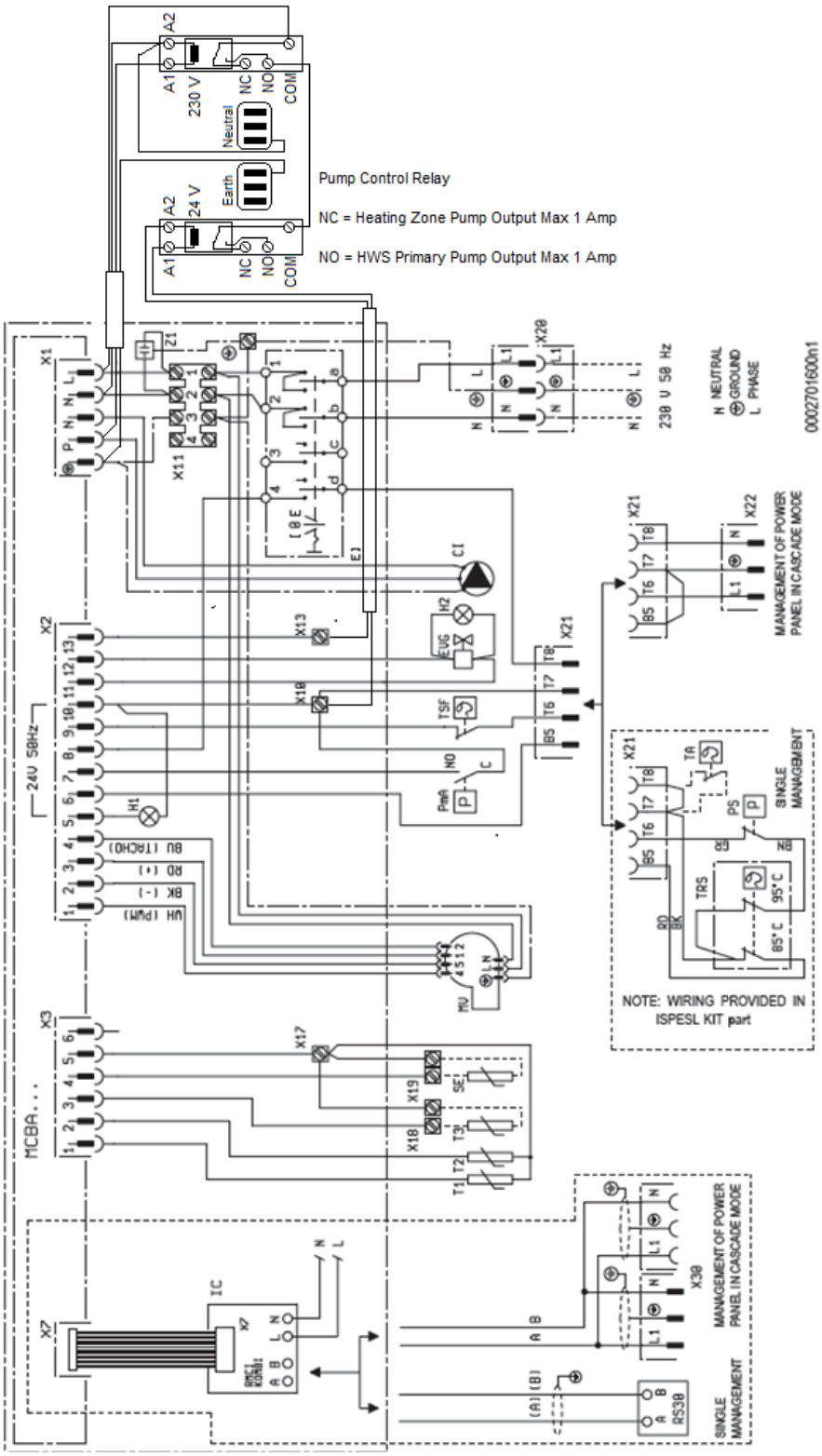
(Screened cable must be used for all low voltage and sensor wiring)

Weiland Plugs

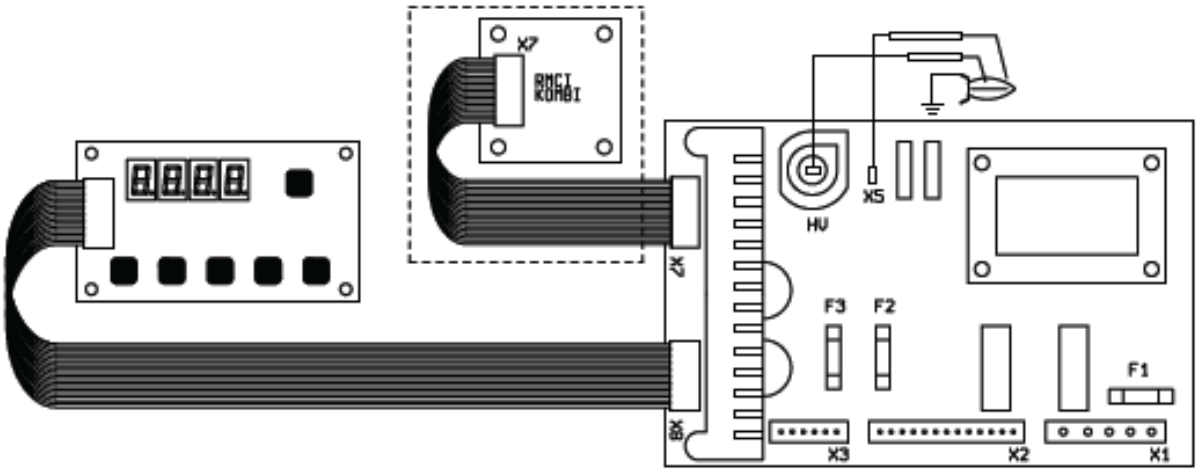


MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk
010315 Draft

Internal Wiring Diagram



MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk



Key

CI -System circulating pump (230V AC)
EI -Summer / off / Winter switch
EVG -Gas solenoid Valve (24V AC)
F1 -F 2A / 250V fuse (230V supply)
F2 -F 2A / 250V fuse (24V circuit)
F3 -T 3A / 250V fuse (24V electric fan)
H1 -Powered boiler warning light (24V AC)
H2 -Flame lit warning light (24V AC)
HV -Ignition electrode
IC -Communication interface (optional)
MV -Fan motor (24V DC and 230V AC)
PDA -Differential water pressure switch
PmA -Min. water pressure switch
PS -Safety pressure switch
SE -External probe (optional)
T1 -Boiler delivery temperature probe
T2 -Boiler return temperature probe
T3 -Boiler temperature probe (optional)
TA -Room thermostat (optional)
TRS -Safety and adjustment thermostat
TSF -Fume safety thermostat / thermofuse
VD -Bypass valve actuator (24V AC)
(Optional depending on the version)
X1 -Board-circulating pump thermal board
X2 -Thermostat valve fan connector
X3 -Probe connector
X5 -Detection Electrode
X7 -Service connector (optional)
X8 -Control board connector
X10 -Thermostat pressure switch common terminal
X11 -Auxiliary terminal board
X13 -Bypass valve terminal
X14 -Bypass valve microswitch terminal
X17 -Common probe terminal
X18 -Boiler temperature probe terminal
X19 -External probe terminal
X20 -Supply connector
X21 -ISPESL safety connector
X22 -Heating unit management connector
X30 -BUS connector (optional)
Z1 -Anti interference filter

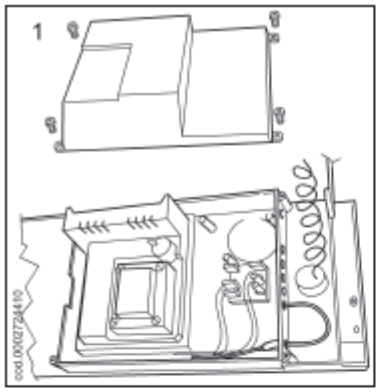
BK-Black/RD-Red/WH-White/BU-Blue/BN-Brown

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

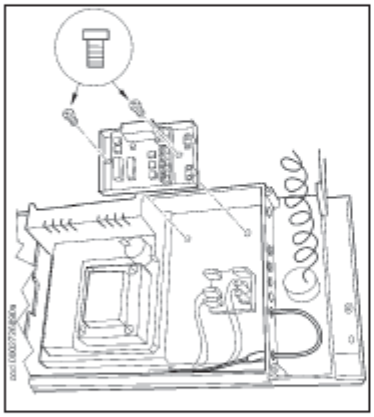
Installing a MCBMSADAPT (AM3) BMS Adapter (Volt Free Fault and Run indication)

This must be used if:

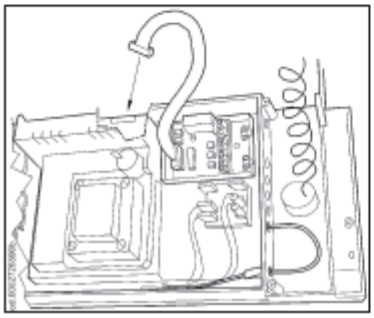
A Run or Fault output is required from the ProCon MC boiler



-Remove the cover from the dashboard



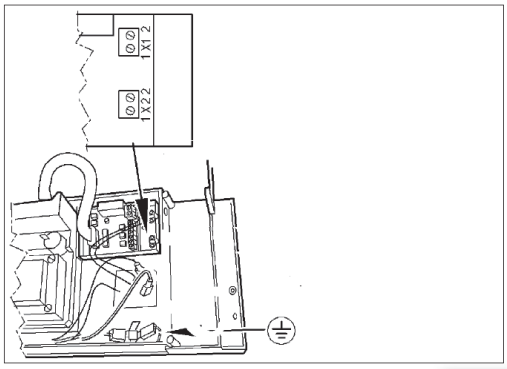
-Fasten the interface with the screws supplied



-Connect the interface board to the boiler control board (MCBA)

Using the flat wire provided.

-Position the flat wire so that it is not compressed when the closing cover is placed on the dashboard



-X1 1&2 Fault indication relay. Normally open, closes on fault

-X2 1&2 Run indication relay. Normally open, closes on run

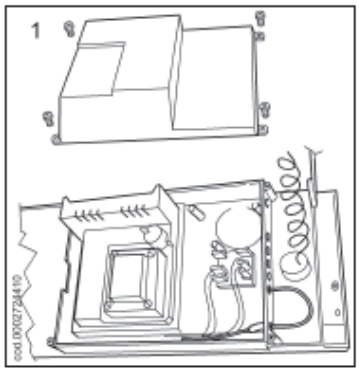
(Screened cable must be used for all low voltage and sensor wiring)

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk
010315 Draft

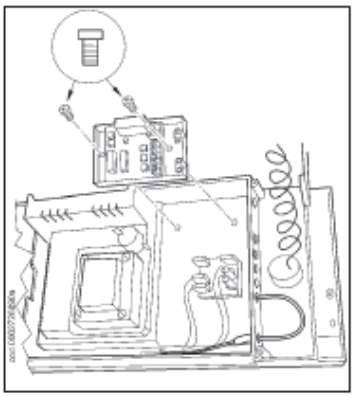
Installing a MC0-10ADAPT (AM4 0-10V) Adapter

This must be used if:

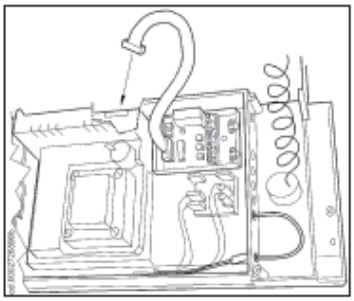
0-10 Volt control of the boiler from building management system is required



-Remove the cover from the dashboard

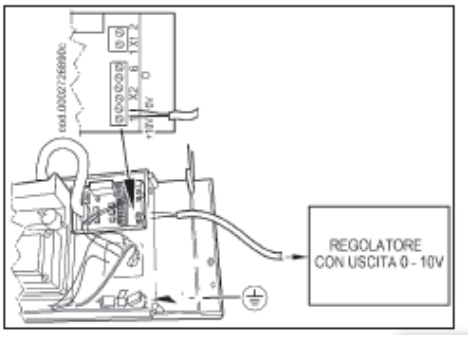


-Fasten the interface with the screws supplied



-Connect the interface board to the boiler control board (MCBA) Using the flat wire provided.

-Position the flat wire so that it is not compressed when the closing cover is placed on the dashboard



-Connect the 0-10V signal wire on connector X2, taking care to respect the polarity: terminal X2-1 signal +10V; terminal X2-2 signal 0V.

X1 -Alarm relay. This contact is closed as soon as there is a boiler block.

X2 1-2 -Analogue input 0-10V (X2-1=Input+, X2-2=0V). The voltage is directly proportional to the fans rotation speed or the delivery temperature (type of function settable via parameter 45)

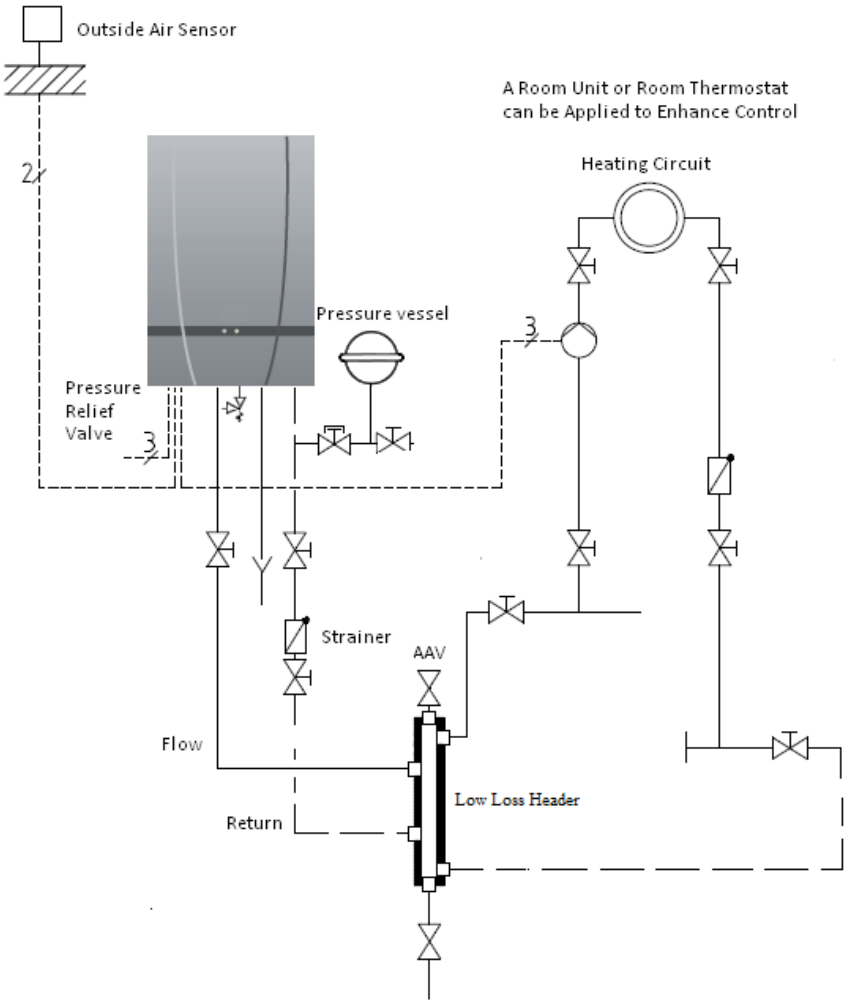
X2 3-4 -Do not use

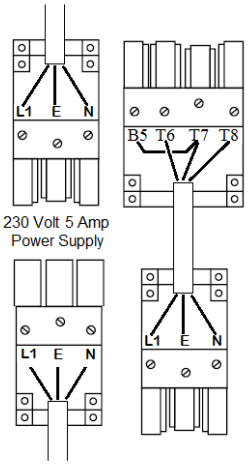
X2 5-6 -Do not use

(Screened cable must be used for all low voltage and sensor wiring)

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Hydraulic Design Single Unit (Option 1)



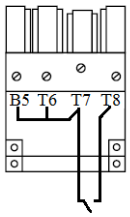


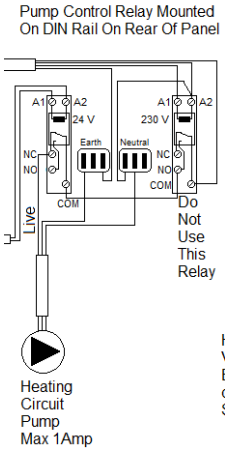
Prewired Adapter Plug For Use Only With a MHG Theta Cascade Manager.

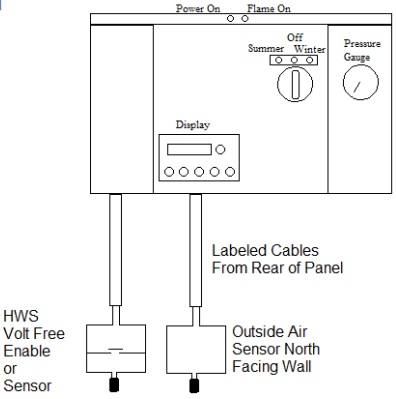
If a MHG Theta Cascade Manager is not being used remove the wiring and 3 pole plug.

Link B5, T6 & T7 If a system mounted limit thermostat (B5 / T7) and a low pressure switch (T6 / T7) are not used.

Use T7 & T8 as the Volt Free Enable





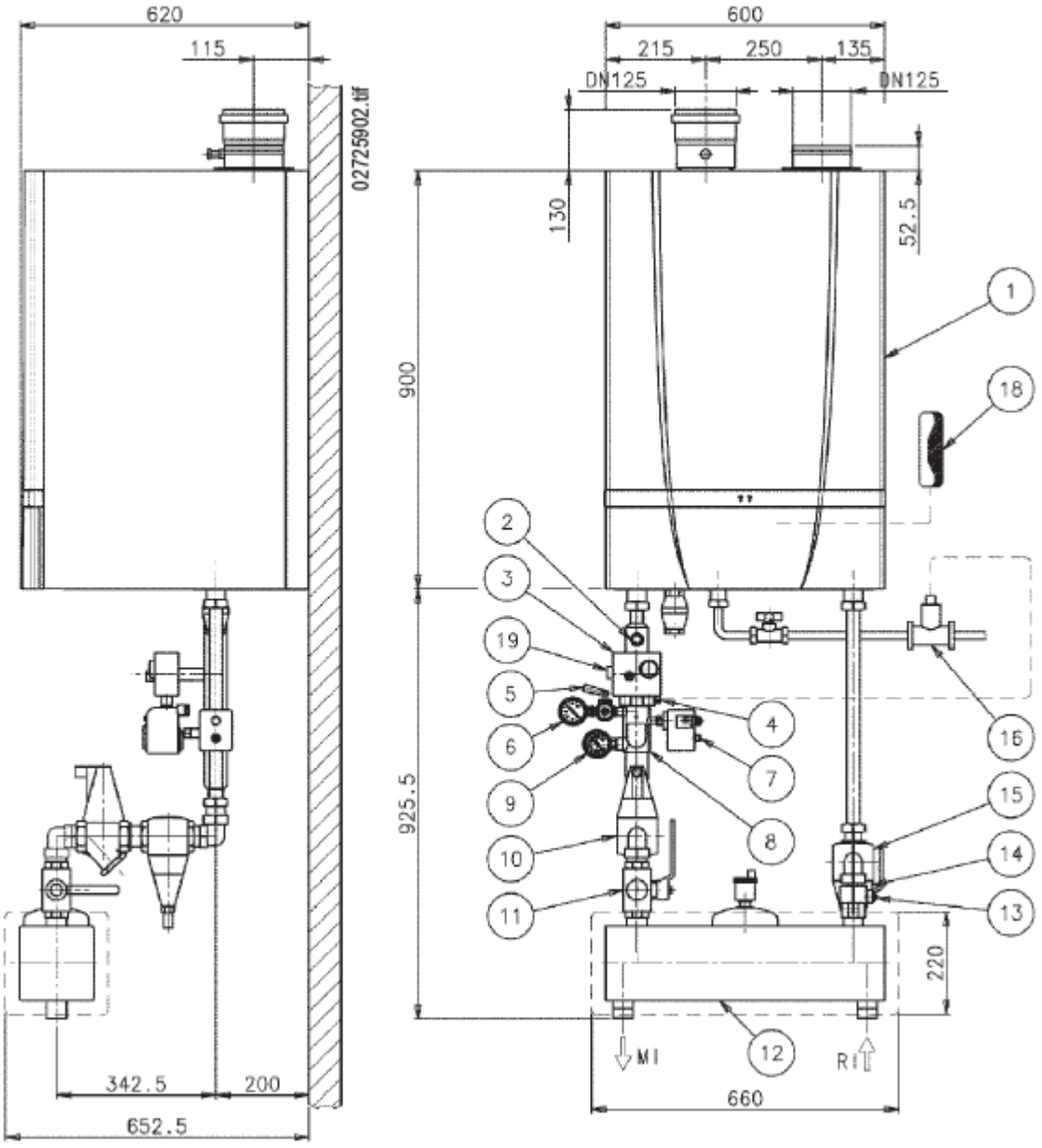


If a HWS Volt Free Enable is used in place of a sensor Parameter 46 will require updating from 22 to 21

(Screened cable must be used for all low voltage and sensor wiring)

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Single Boiler Hydraulic kits are also available

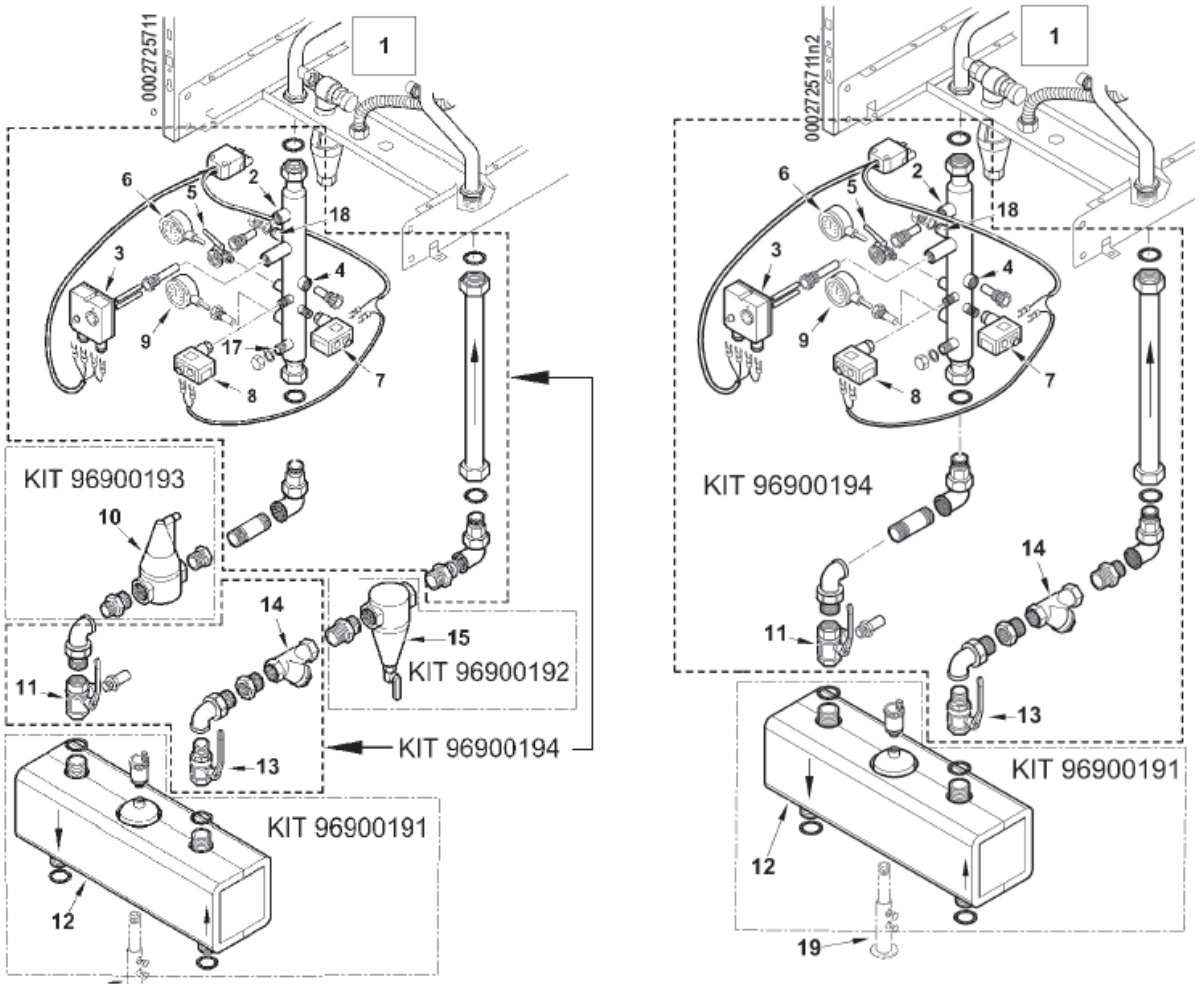


Legend

1	ProCon MC115	10	Air Separator
2	Test Thermostat Pocket	11	3 Way Vent Valve
3	Limit Thermostat	12	Low Loos Header With AAV
4	SSOV Pocket	13	Return Service Valve
5	Pressure Testing 3 Way Valve	14	Strainer Y
6	Pressure Gauge	15	Filter
7	Maximum Pressure Switch	16	SSOV Actuator
8	Minimum Pressure Switch	18	Pressure Vessel
9	Thermometer		All parts are available in kit form

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk
010315 Draft

Kit Formation

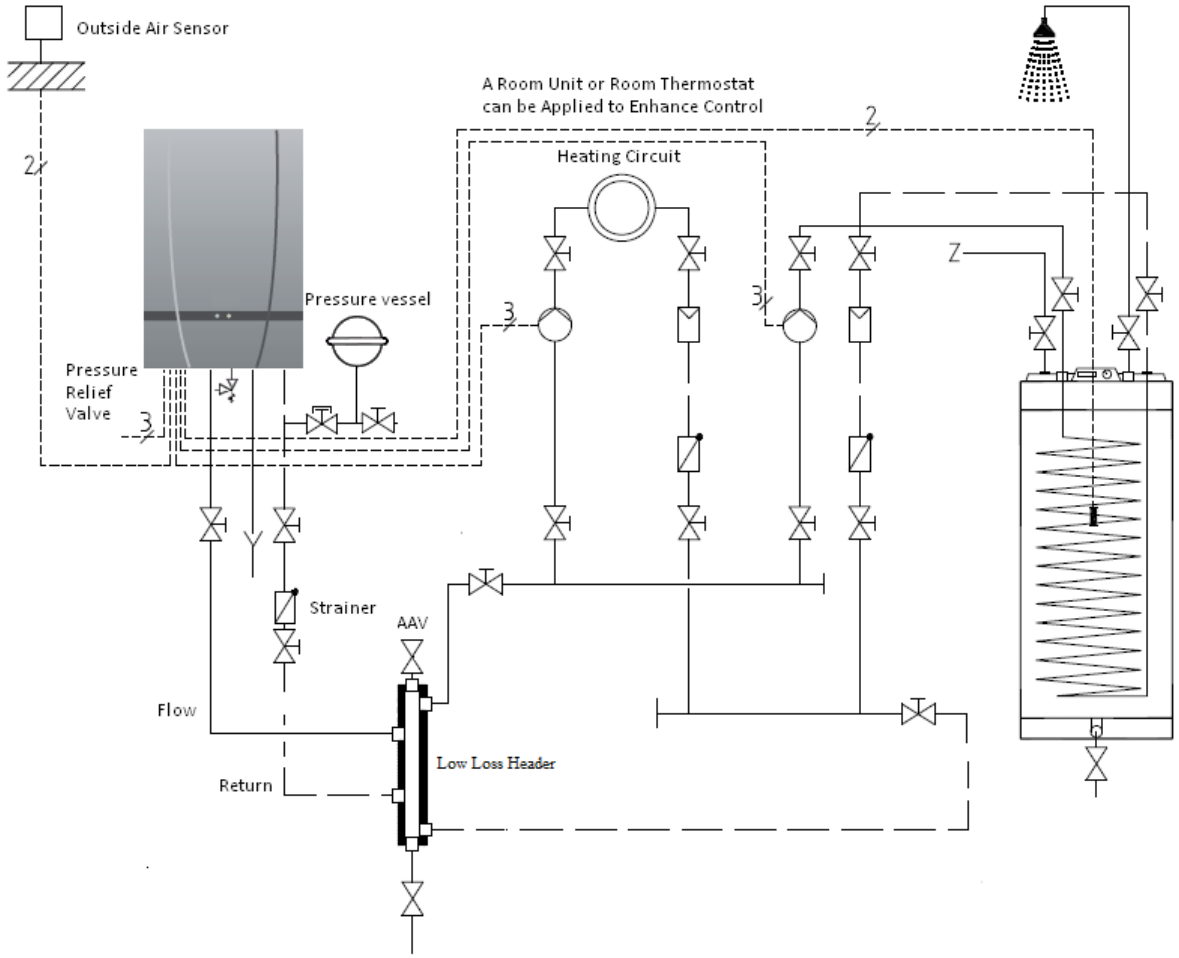


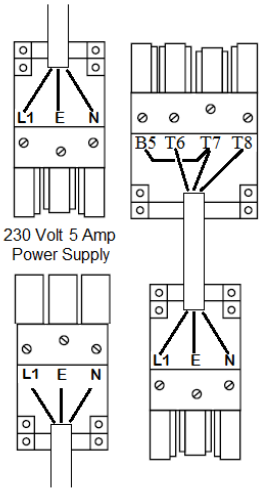
Legend

1	ProCon MC115	10	Air Separator
2	Test Thermostat Pocket	11	3 Way Vent Valve
3	Limit Thermostat	12	Low Loos Header With AAV
4	SSOV Pocket	13	Return Service Valve
5	Pressure Testing 3 Way Valve	14	Strainer Y
6	Pressure Gauge	15	Filter
7	Maximum Pressure Switch	16	SSOV Actuator
8	Minimum Pressure Switch	18	Pressure Vessel
9	Thermometer		All parts are available in kit form

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Hydraulic Design Single Unit (Option 2)



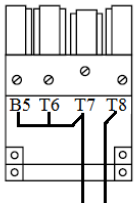


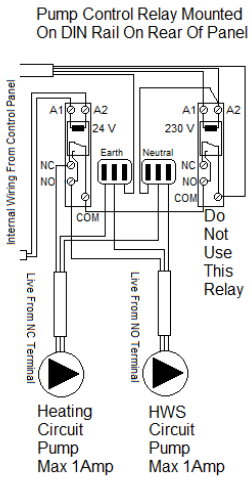
Prewired Adapter Plug For Use Only With a MHG Theta Cascade Manager.

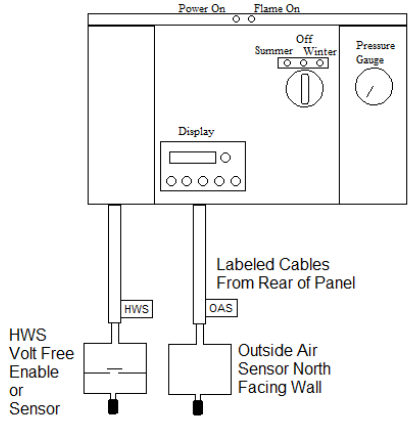
If a MHG Theta Cascade Manager is not being used remove the wiring and 3 pole plug.

Link B5, T6 & T7 If a system mounted limit thermostat (B5 / T7) and a low pressure switch (T6 / T7) are not used.

Use T7 & T8 as the Volt Free Enable





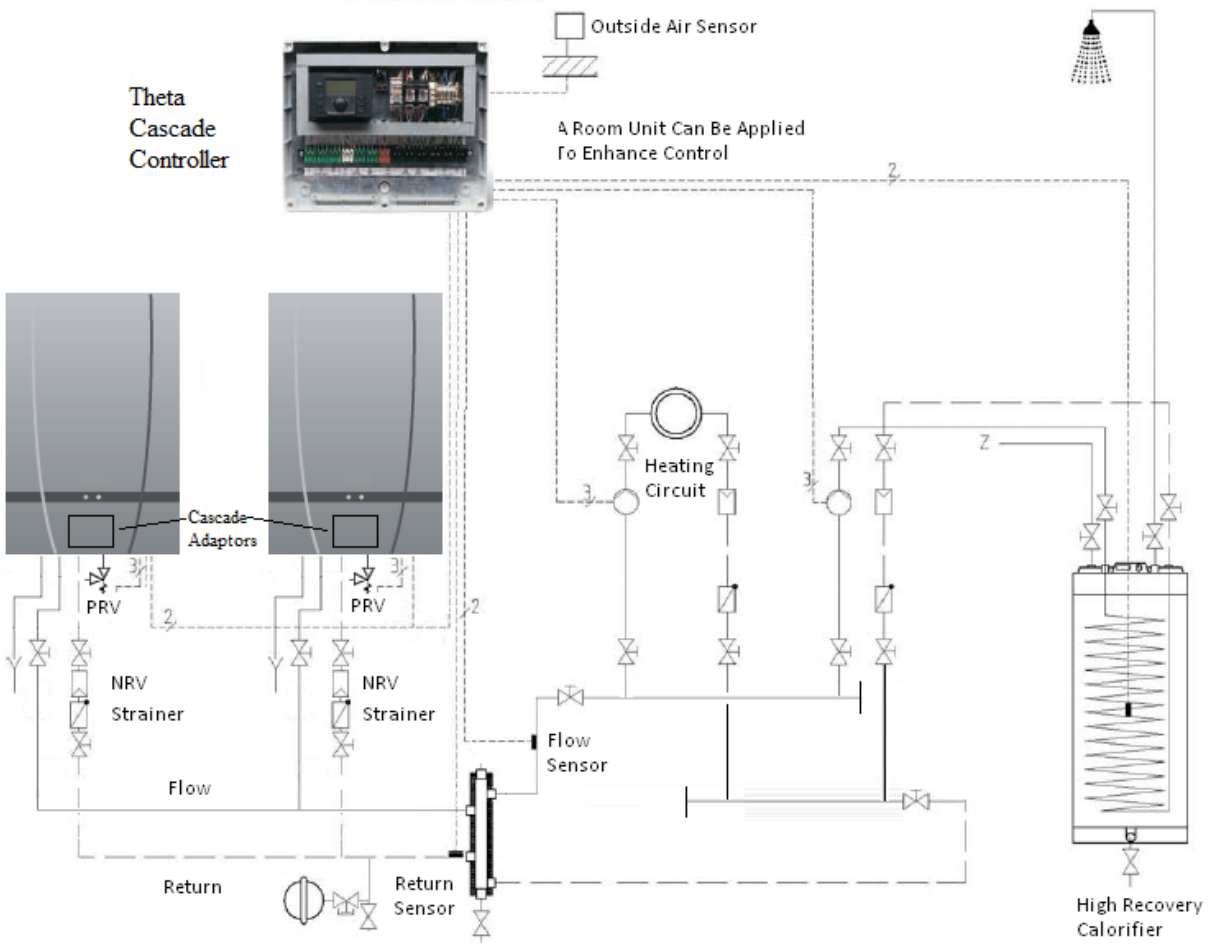


If a HWS Volt Free Enable is used in place of a sensor Parameter 46 will require updating from 22 to 21

(Screened cable must be used for all low voltage and sensor wiring)

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk
010315 Draft

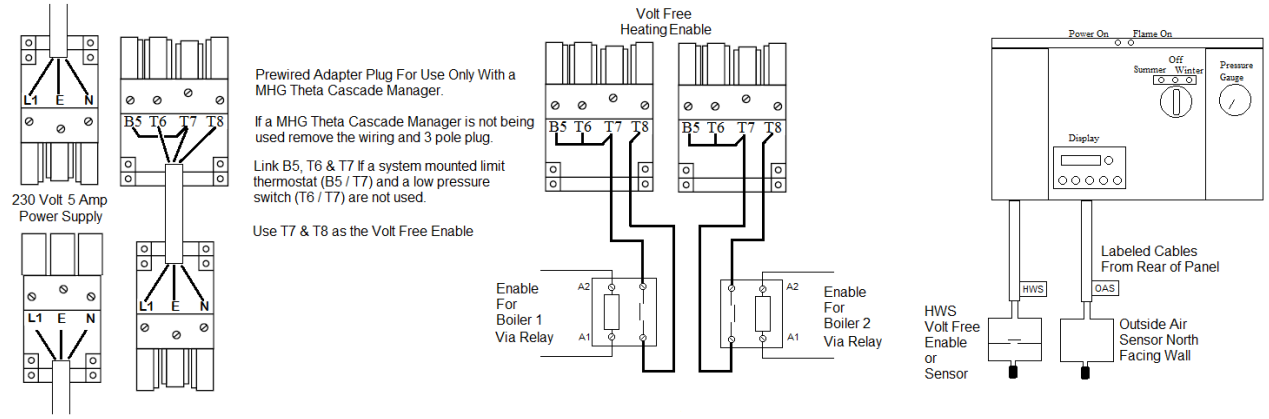
Hydraulic Design Twin Boiler (Option 3)(With Optional Theta Cascade Controller)



Please refer to the Theta Cascade Manager section later in this manual for wiring guidance.

If a Theta control is to be used the boilers require cascade clips. White wire/plugs will be present within the boilers case.

Independent Volt Free Enables must be provided if the boilers are not being controlled by a Theta Cascade Manager.



If a HWS Volt Free Enable is used in place of a sensor Parameter 46 will require updating from 22 to 21

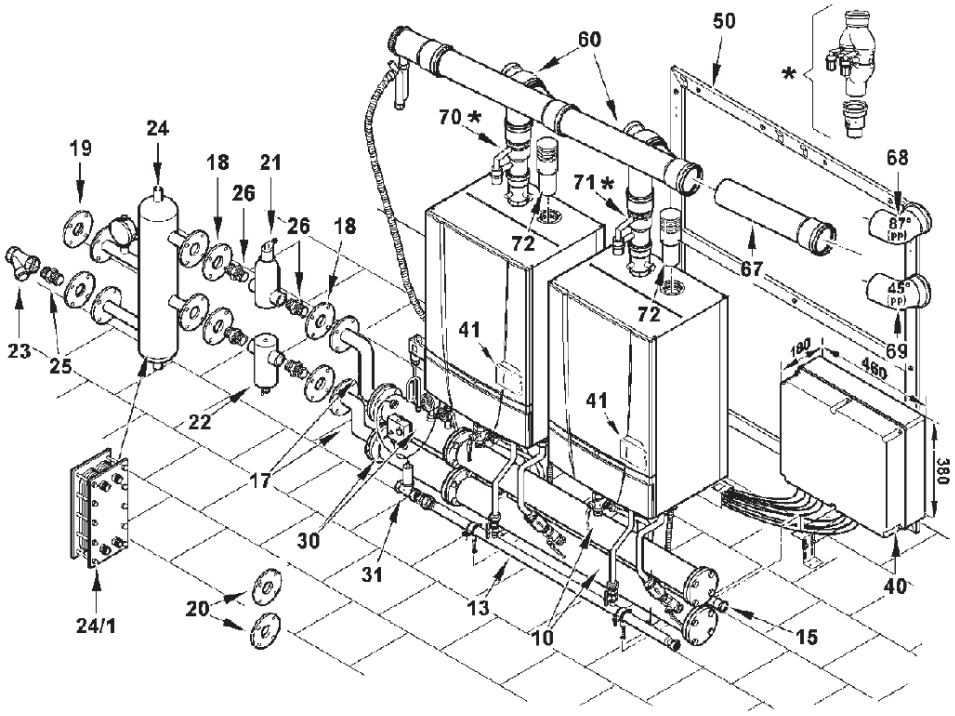
(Screened cable must be used for all low voltage and sensor wiring)

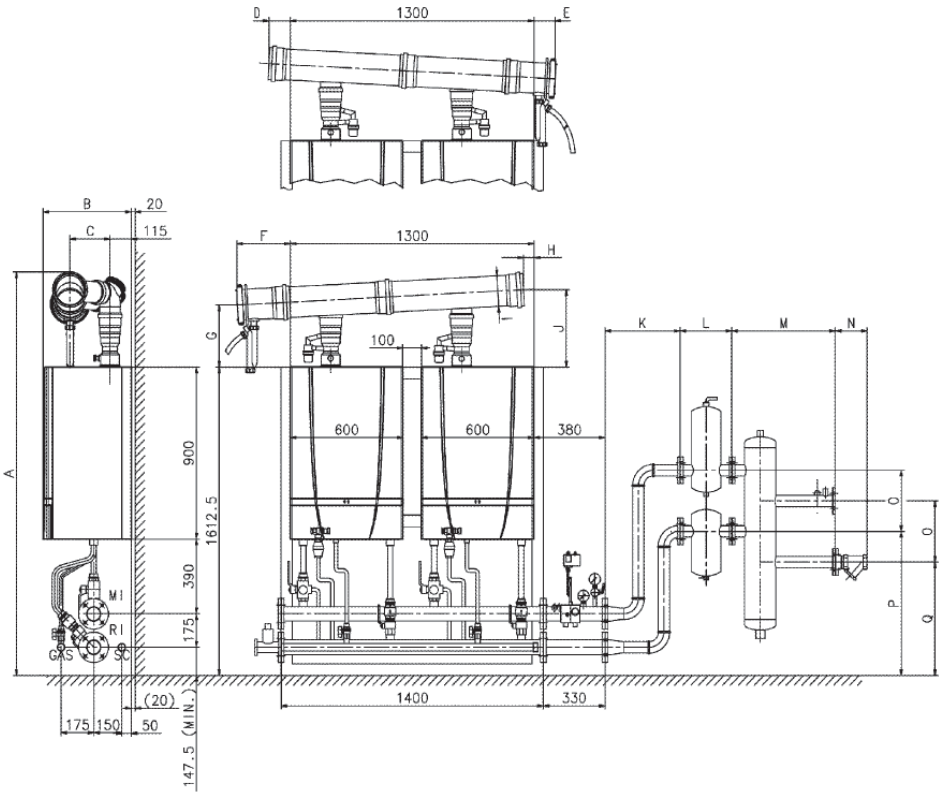
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Cascade Options

Prefabricated cascade kits are available if required. (PN6 Flanges)

Two Boiler Cascade: Option 1 (Requiring a wall or suitable structure for support)

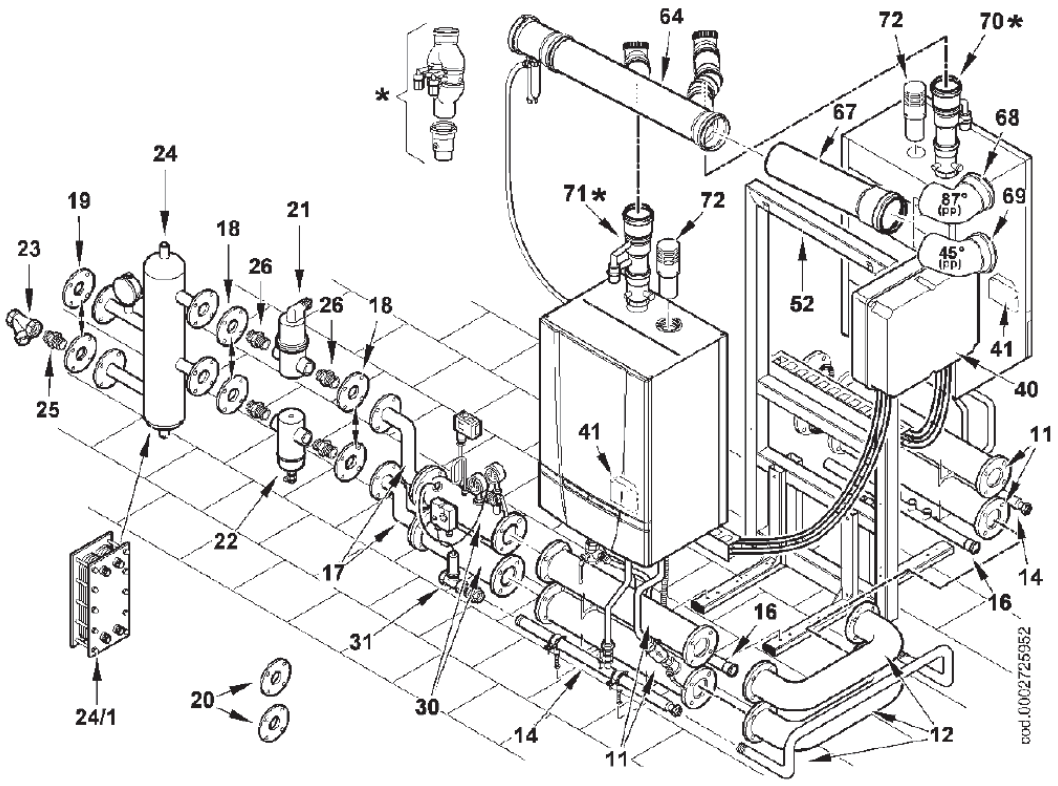


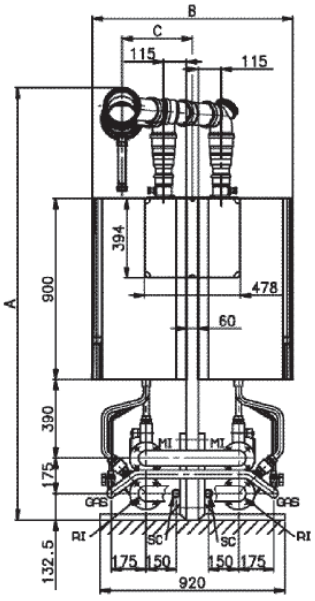


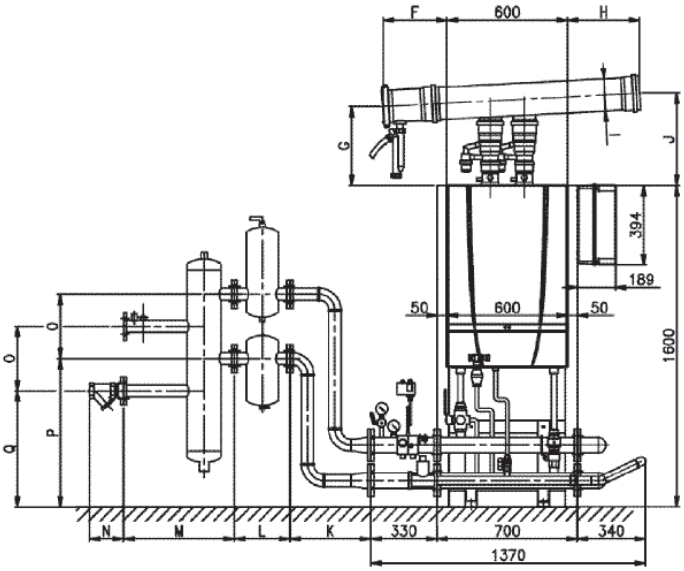
115+115	
A	2335
B	620
C	214
D	115
E	115
F	285
G	550
H	55
I	DN160
J	625
K	352
L	276
M	677
N	280*
O	420
P	902.5
Q	692.5

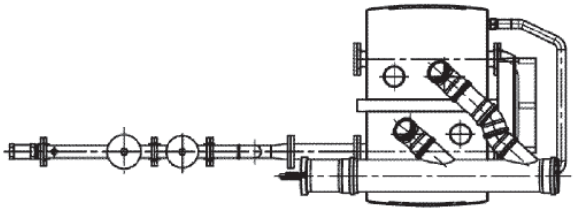
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Two Boiler: Option 2 (Not requiring a wall or suitable structure for support)





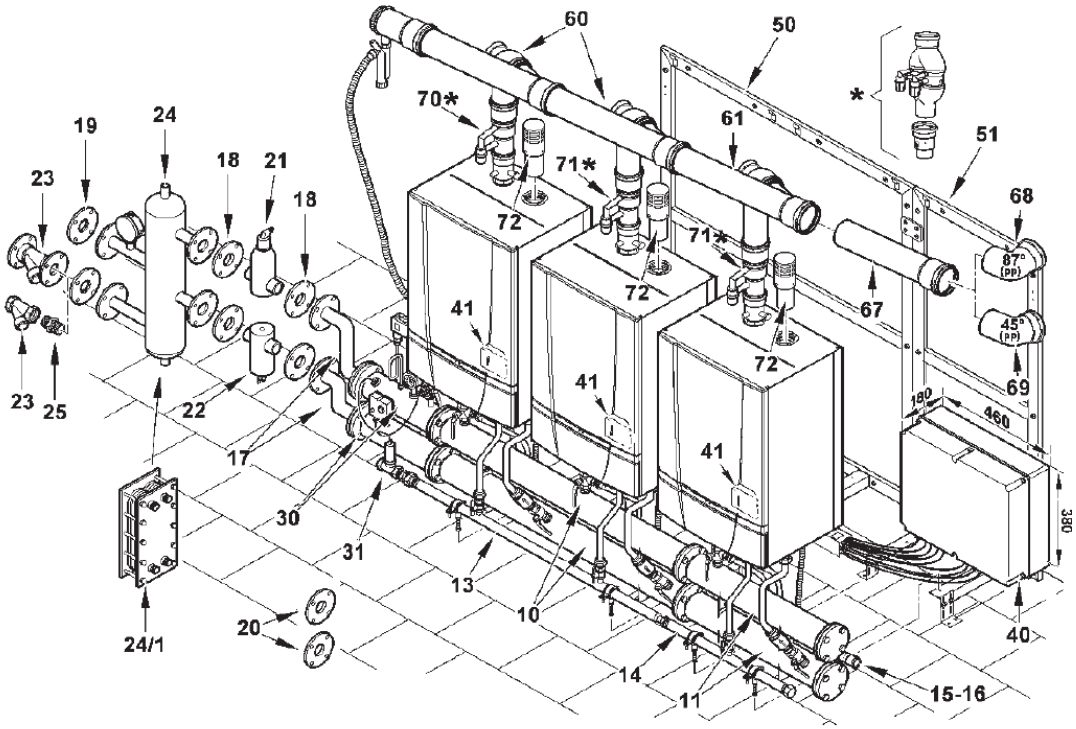


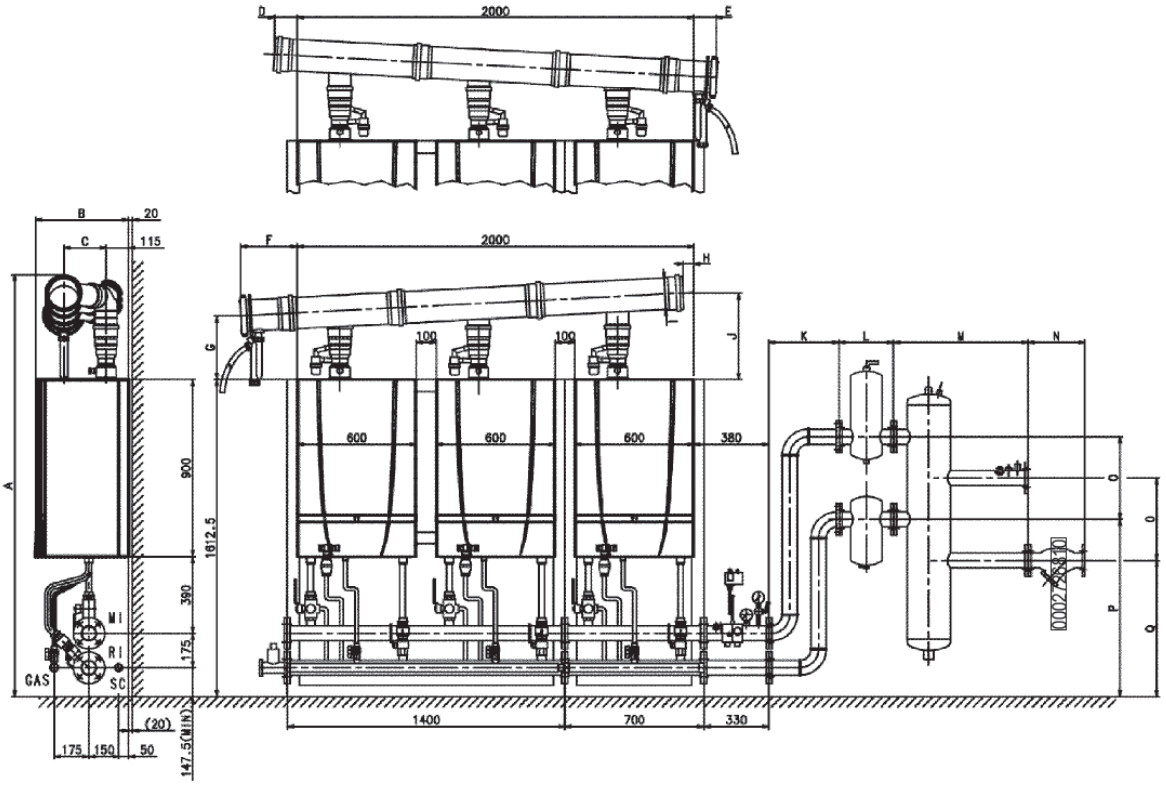


115+115	
A	2150
B	1300
C	350
F	320
G	615
H	360
I	DN160
J	685
K	352
L	276
M	677
N	280*
O	420
P	885
Q	675

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Three Boiler Cascade: Option 1 (Requiring a wall or suitable structure for support)

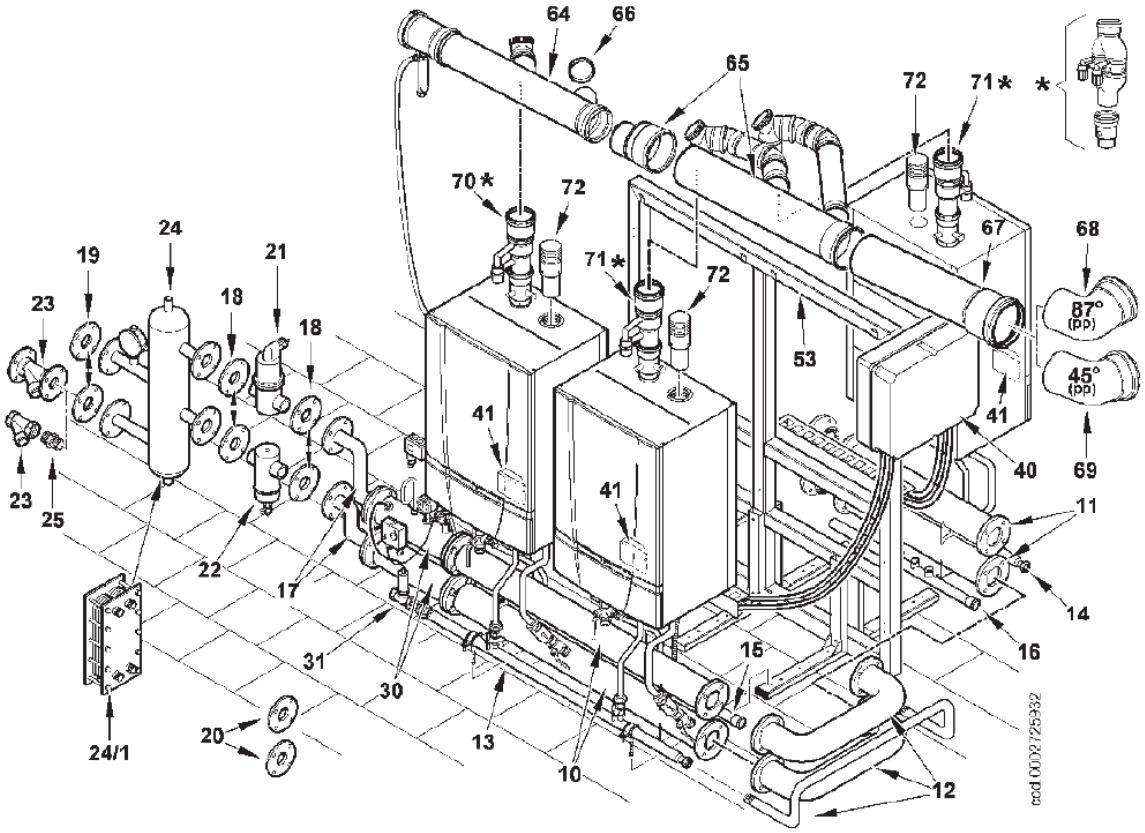


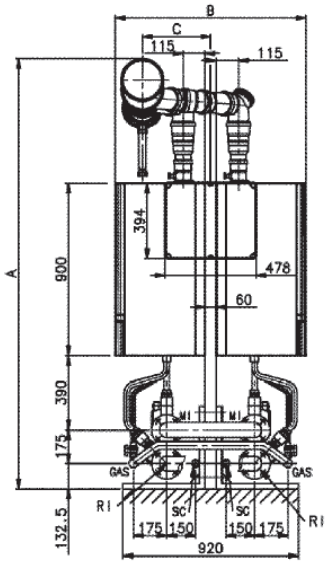


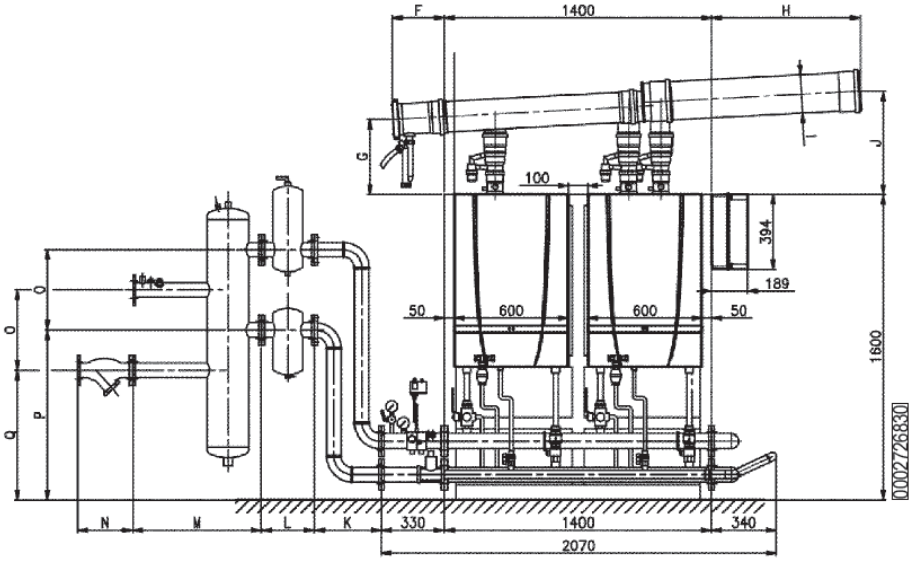
115+115+115	
A	2375
B	620
C	214
D	155
E	155
F	285
G	550
H	55
I	DN200
J	705
K	352
L	276
M	677
N	280*
O	420
P	902.5
Q	692.5

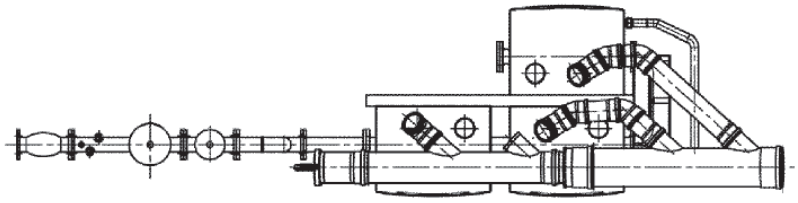
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Three Boiler Cascade: Option 2 (Not requiring a wall or suitable structure for support)





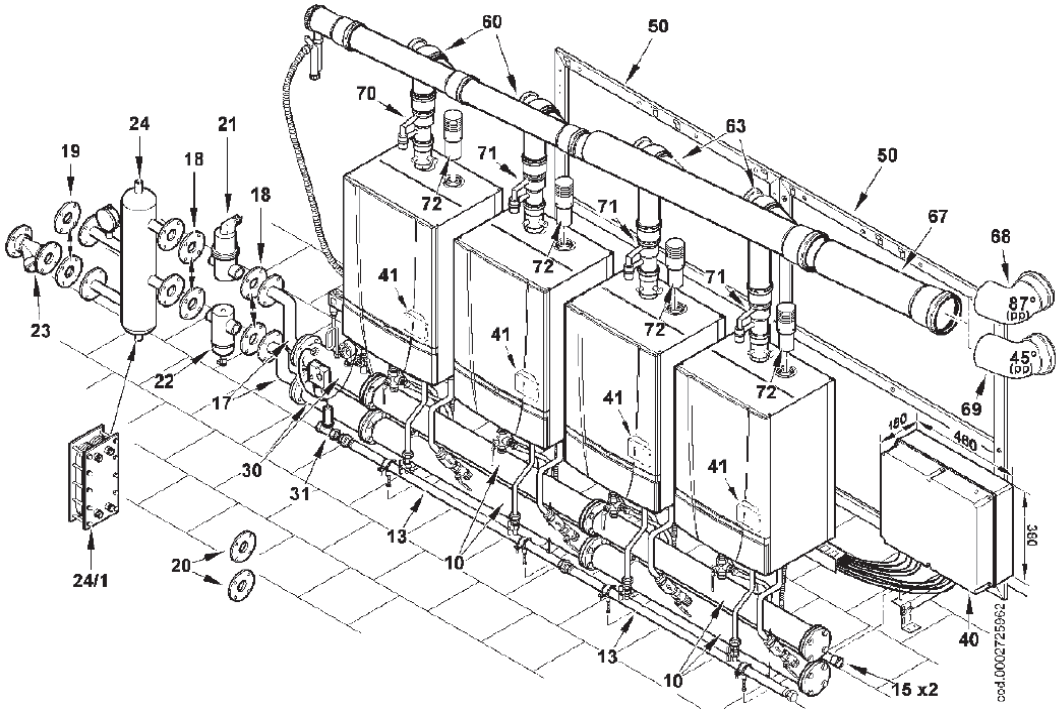


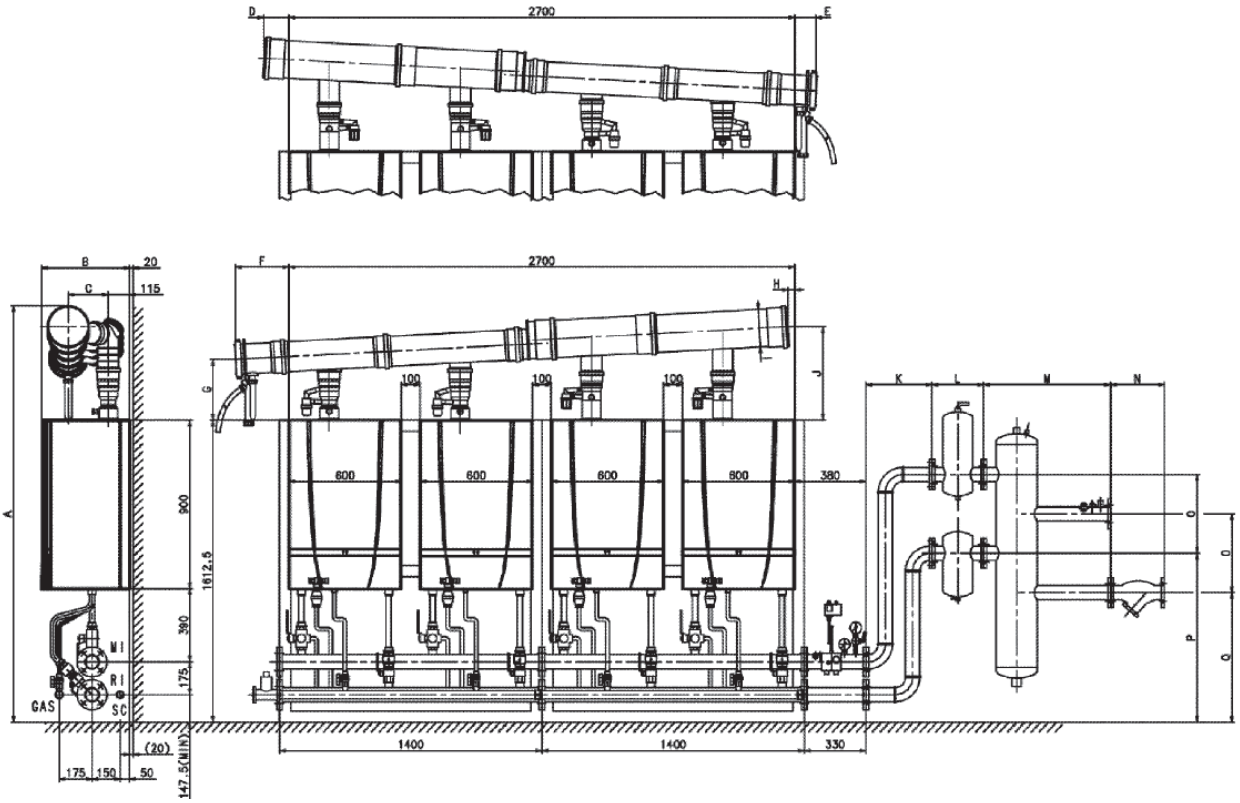


115+115+115	
A	2425
B	1300
C	350
F	320
G	615
H	780
I	DB200
J	765
K	352
L	276
M	677
N	280*
O	420
P	685
Q	675

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Four Boiler Cascade: Option 1 (Requiring a wall or suitable structure for support)

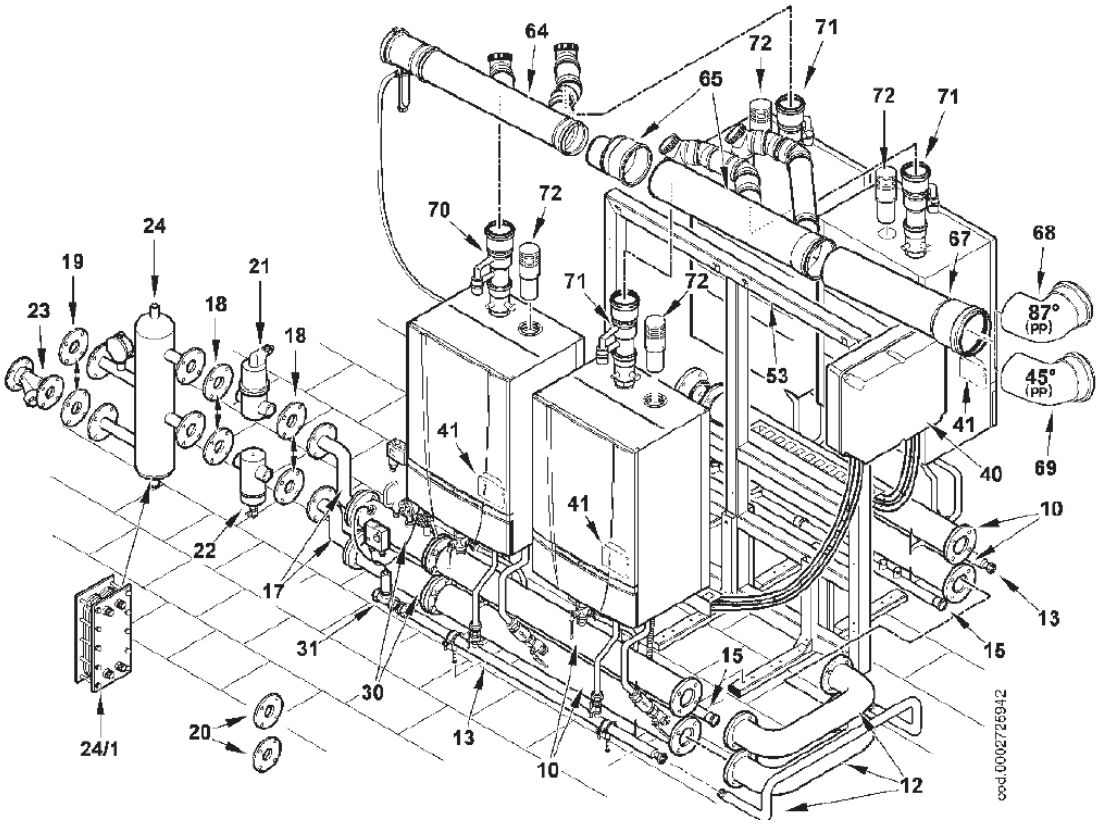


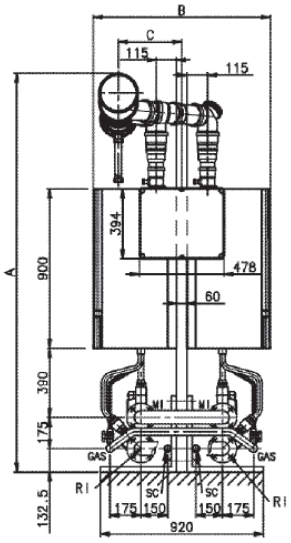


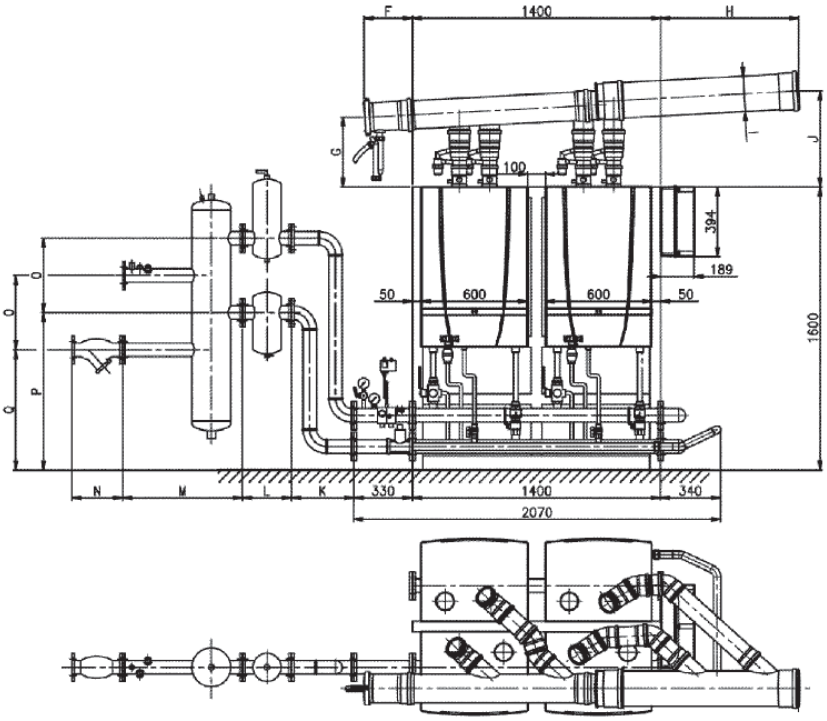
115+115+115+115	
A	2450
B	620
C	214
D	115
E	115
F	285
G	550
H	35
I	DN200
J	725
K	352
L	276
M	677
N	280*
O	420
P	902.5
Q	692.5

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Four Boiler Cascade: Option 2 (Not requiring a wall or suitable structure for support)



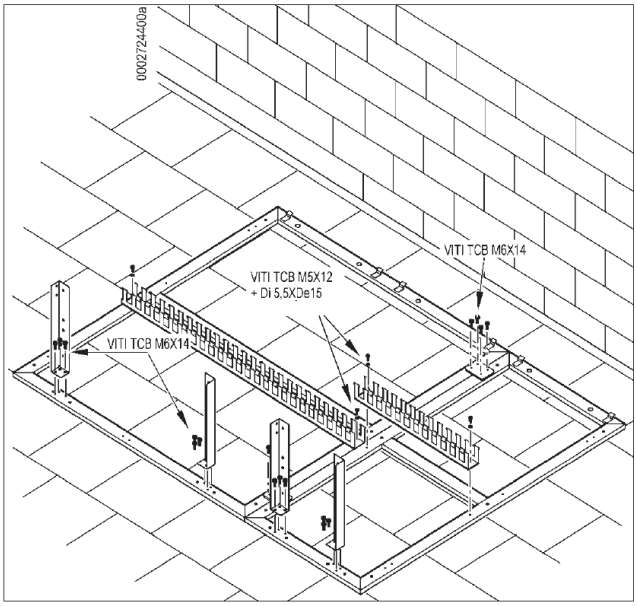


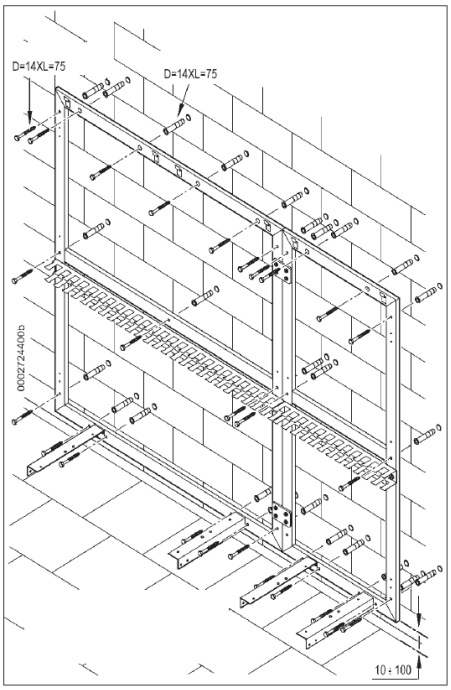


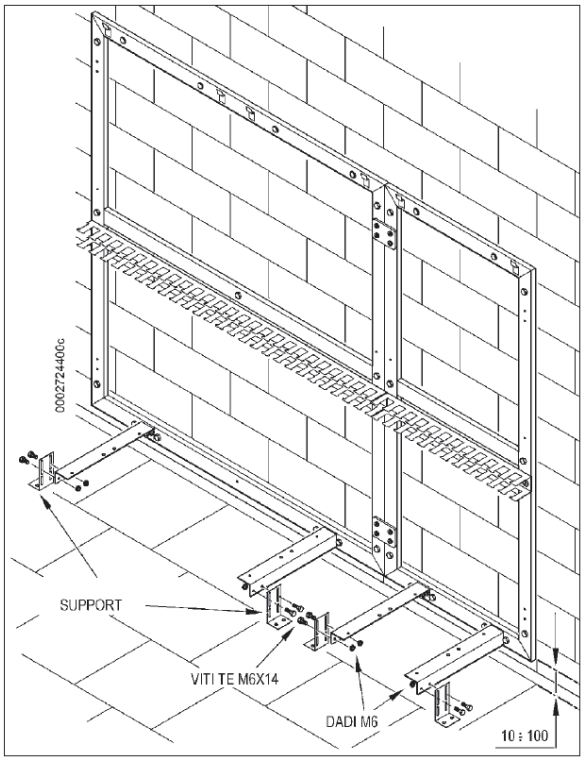
115+115+115+115	
A	2475
B	1300
C	350
F	320
G	615
H	780
I	DB200
J	765
K	352
L	276
M	677
N	280*
O	420
P	685
Q	675

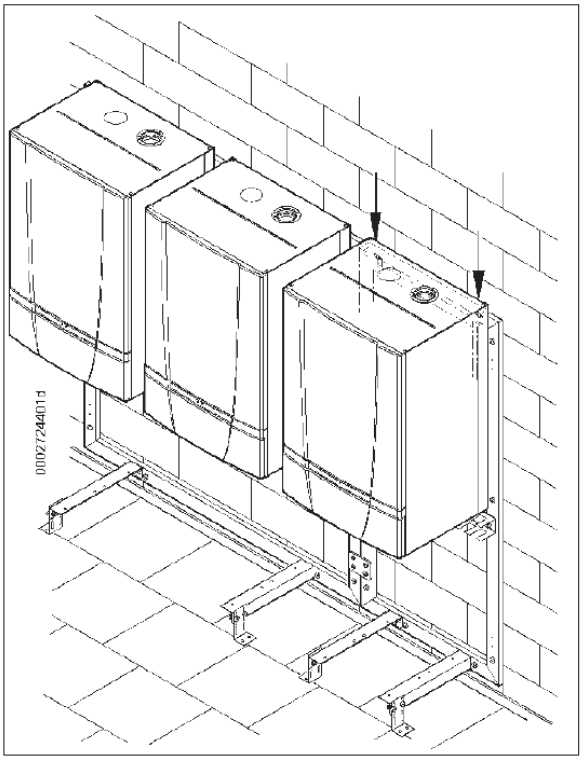
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Erection Procedure of a Boiler Cascade Frame: Option 1 (Requiring a wall or suitable structure for support)



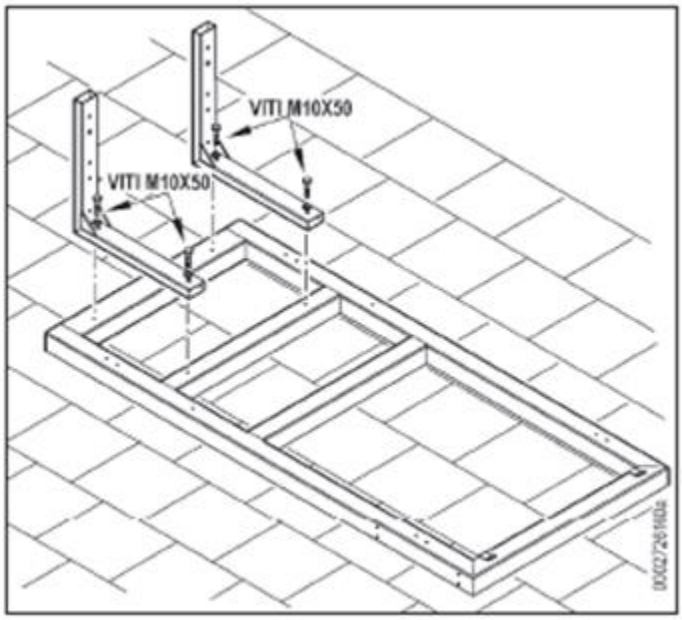


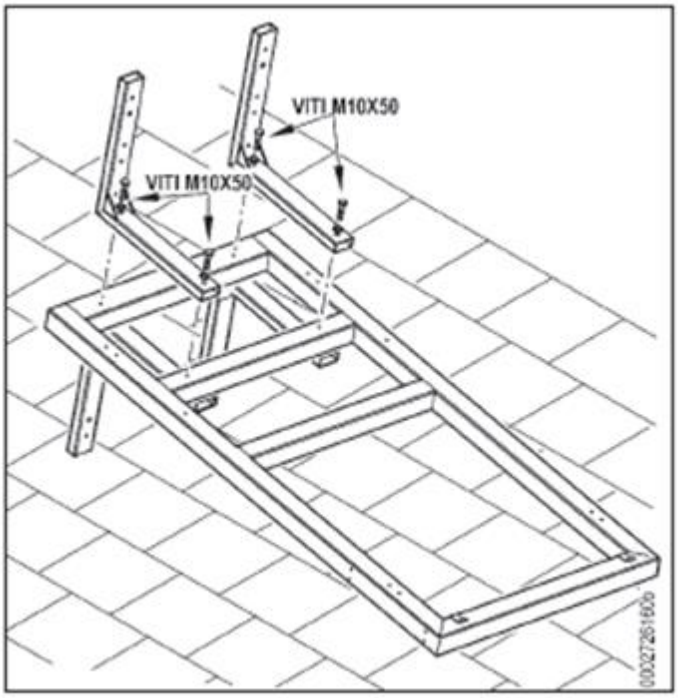


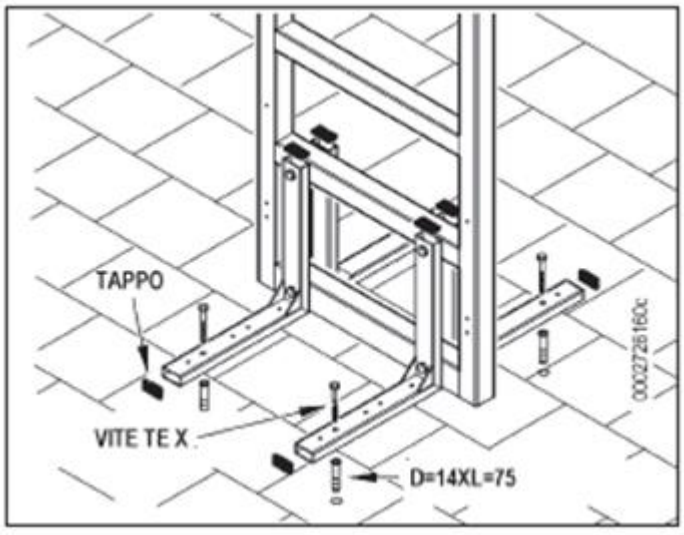


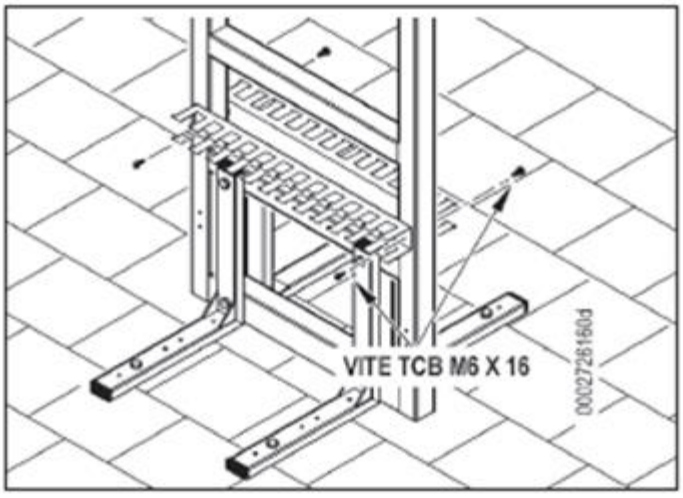
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Erection Procedure of a Boiler Cascade Frame: Option 2 (Not requiring a wall or suitable structure for support)

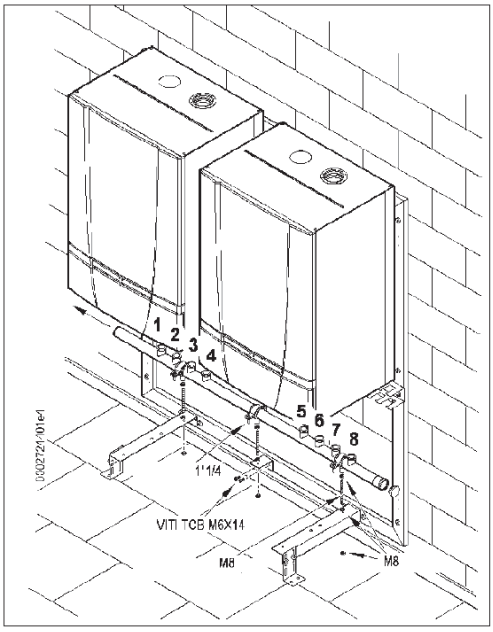




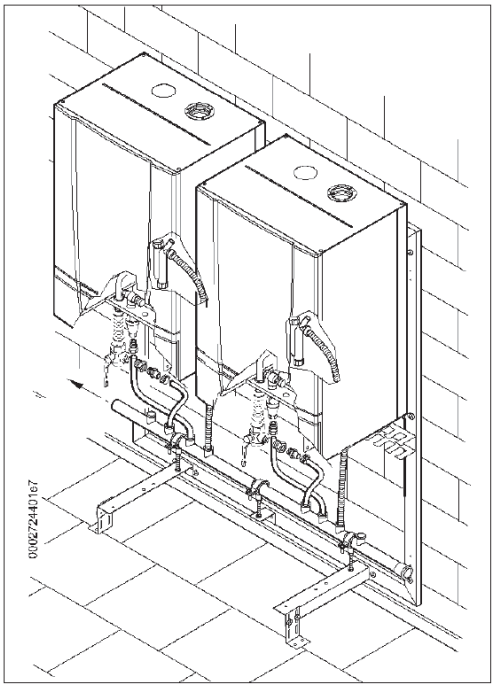




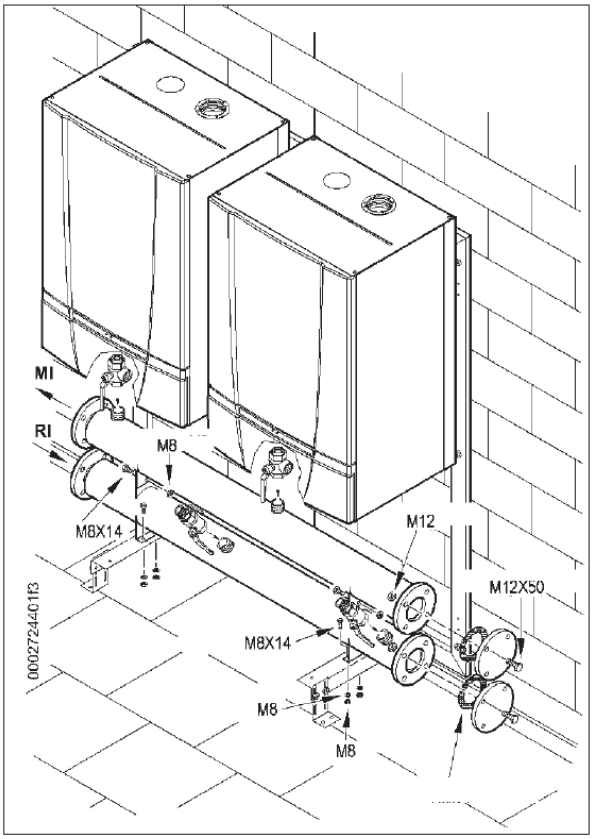
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

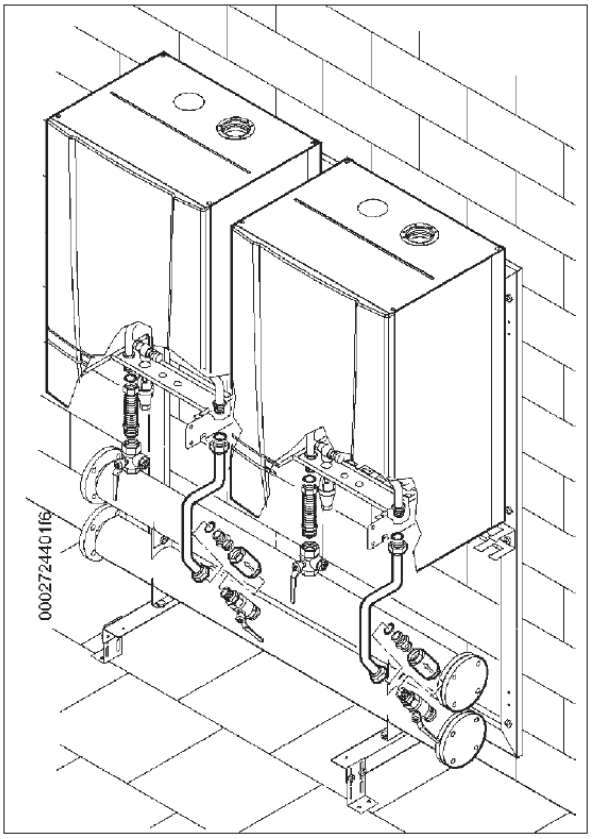


1. Flue System Condensate Connection
2. Boiler 3 Way Vent Valve Connection
3. Boiler Pressure Relief Connection
4. Boiler Condensate Drain Connection
5. Boiler 3 Way Vent Valve Connection
6. Boiler Pressure Relief Connection
7. Boiler Condensate Drain Connection
8. Flue System Condensate Drain



(PN6 Flanges)





MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

The 3 way vent valves will need to be configured to ensure correct operation.

This is achieved by realigning the handle and the valve insert. As detailed below.

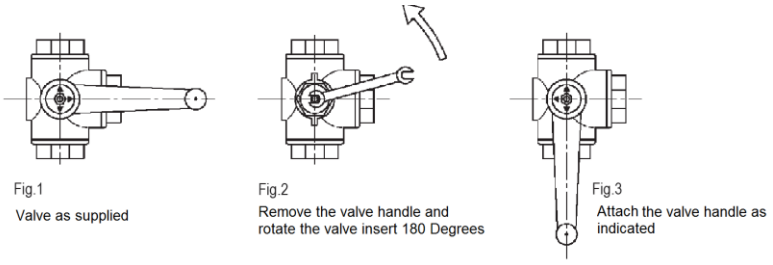
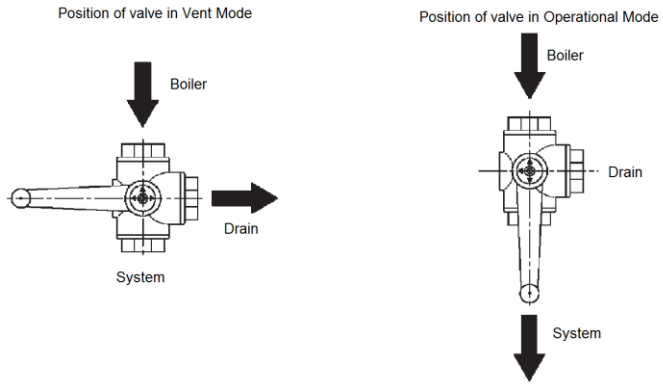


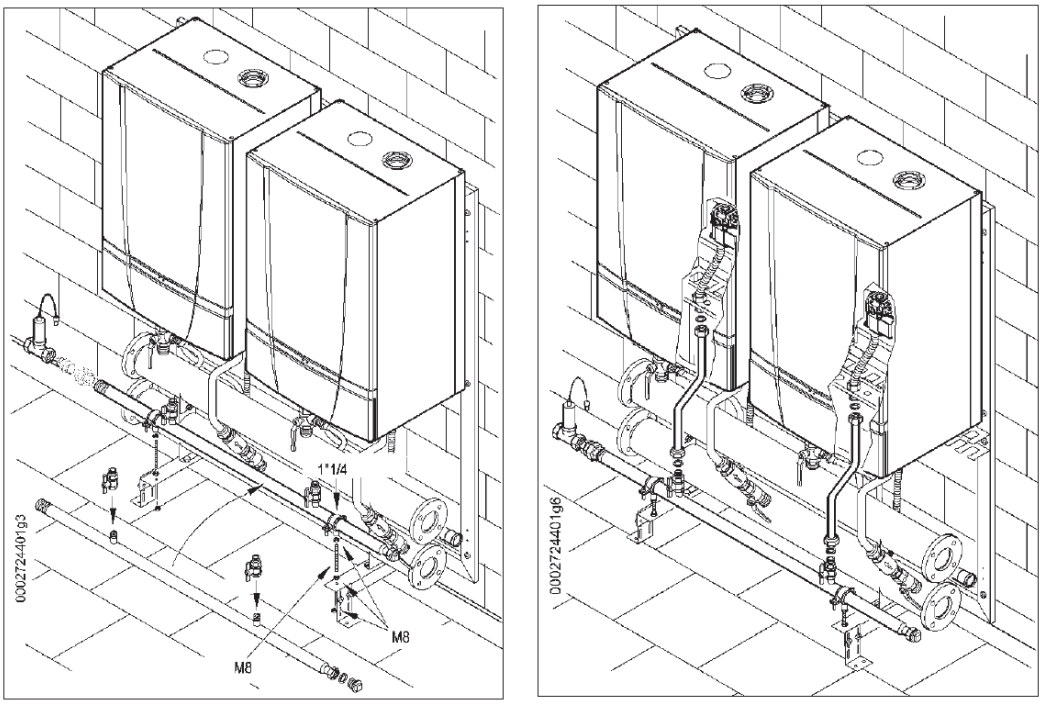
Fig.1
Valve as supplied

Fig.2
Remove the valve handle and rotate the valve insert 180 Degrees

Fig.3
Attach the valve handle as indicated



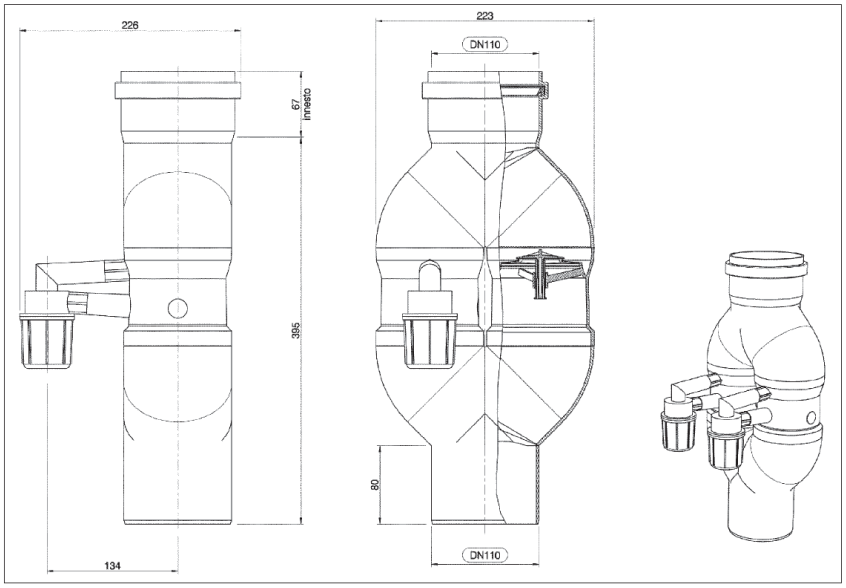
Please ensure that the 3 way vent valve are mounted with the handle pointing forward and the vent outlet pointing to the right. This will ensure that the supplied drain hoses fit!



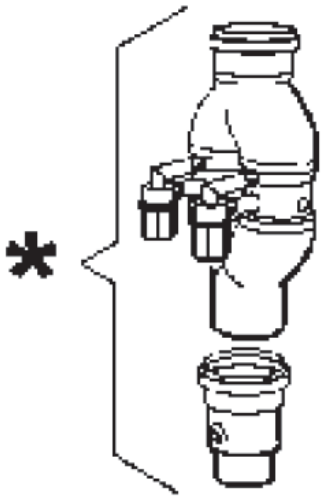
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Cascaded Appliance Fluing Installation Open Flued

A full range of cascade flue items can be supplied by MHG.
If alternative suppliers are used it is essential that an approved non return valve is used to prevent recirculation of products of combustion through non firing boilers.
Non Return Assembly.



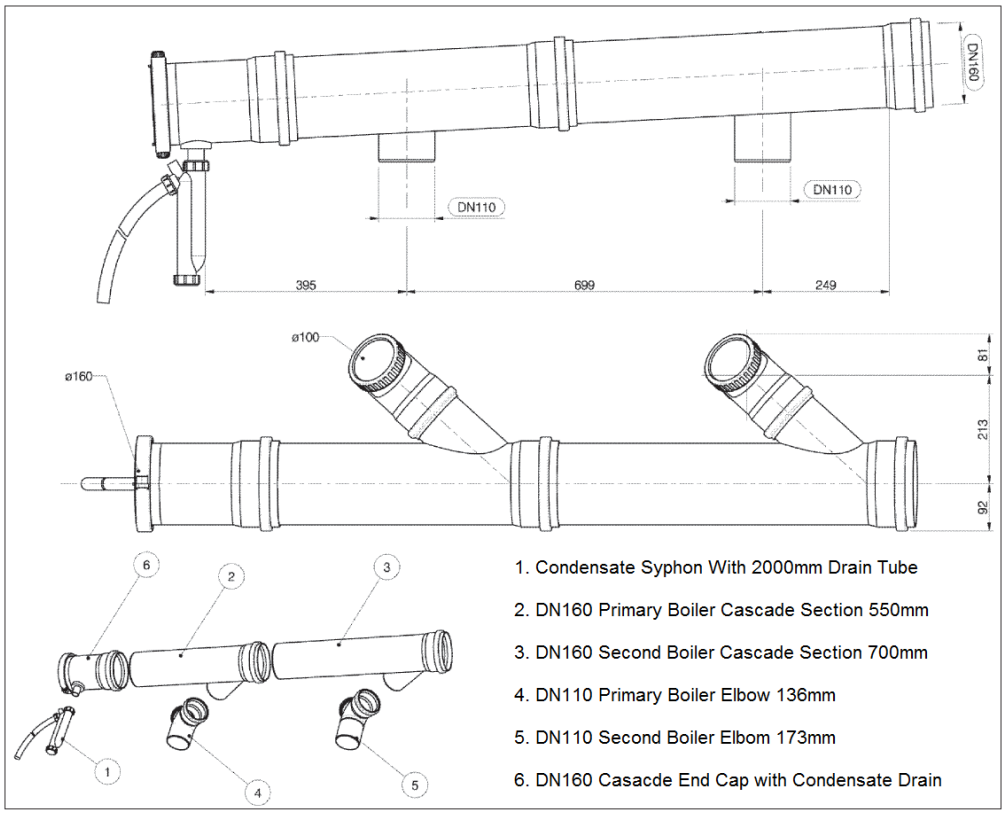
A flue spigot adapter is also required.



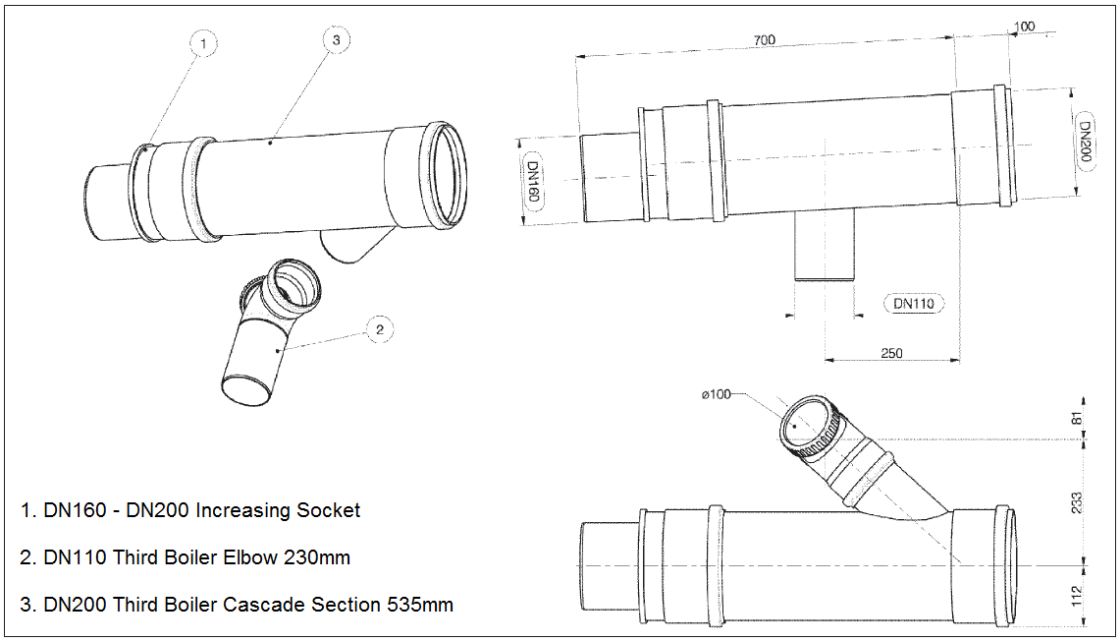
Please refer to the cascade options detailed earlier in the manual.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Cascaded Open Flue Options 1 & 2

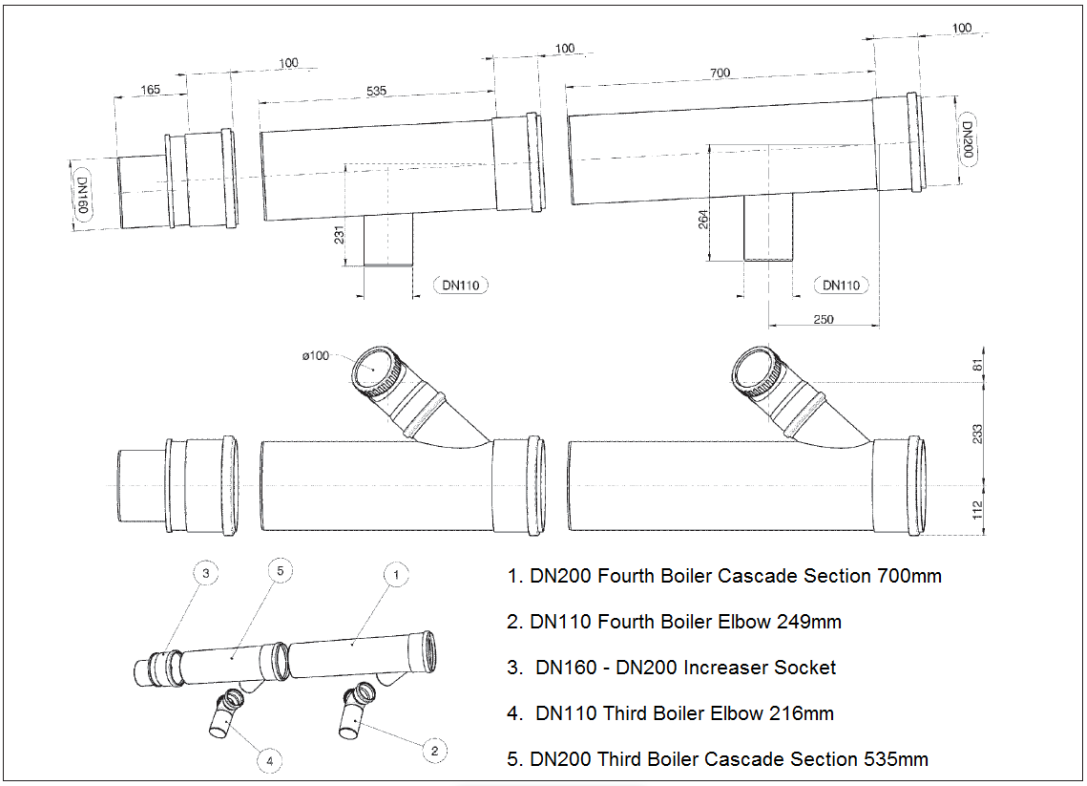


1. Condensate Syphon With 2000mm Drain Tube
2. DN160 Primary Boiler Cascade Section 550mm
3. DN160 Second Boiler Cascade Section 700mm
4. DN110 Primary Boiler Elbow 136mm
5. DN110 Second Boiler Elbom 173mm
6. DN160 Casacde End Cap with Condensate Drain



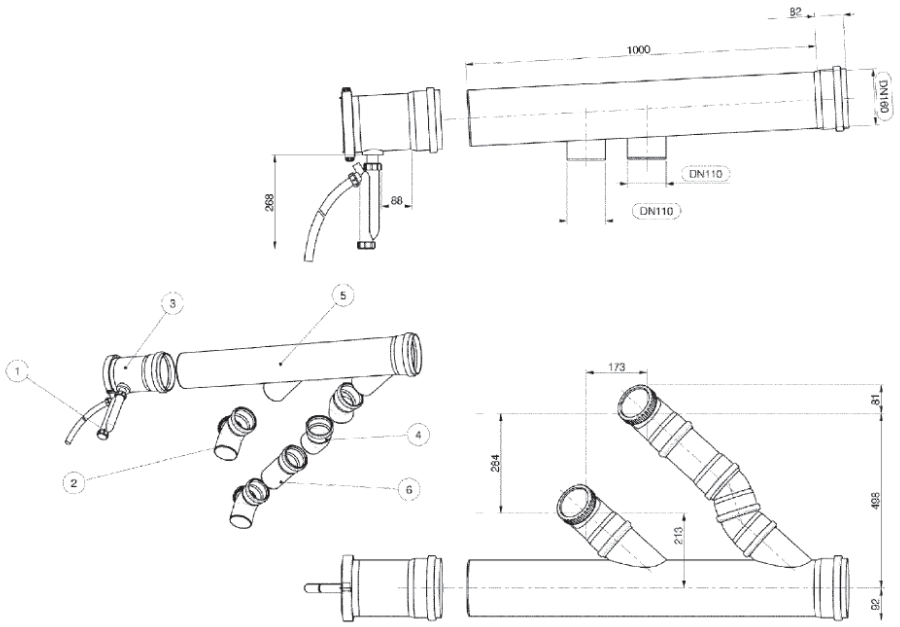
1. DN160 - DN200 Increasing Socket
2. DN110 Third Boiler Elbow 230mm
3. DN200 Third Boiler Cascade Section 535mm

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

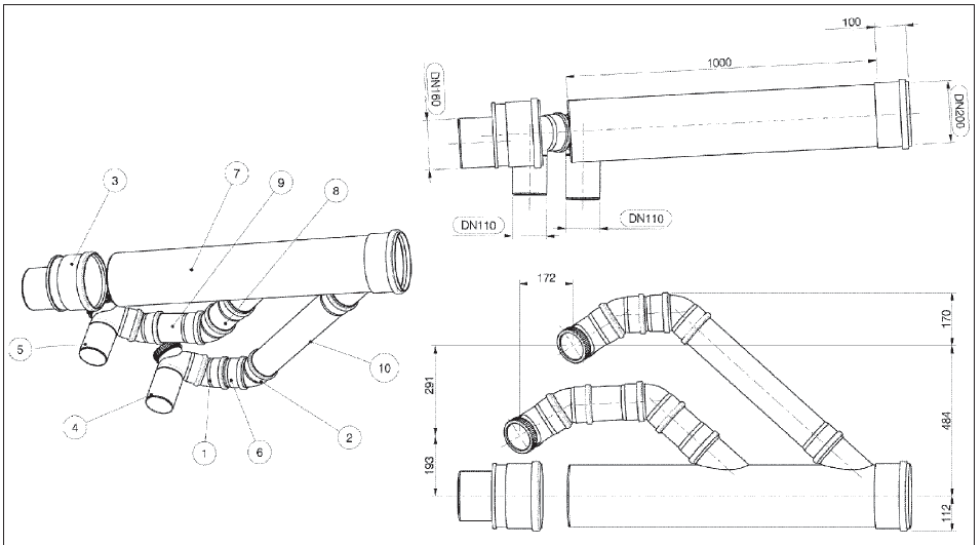


1. DN200 Fourth Boiler Cascade Section 700mm
2. DN110 Fourth Boiler Elbow 249mm
3. DN160 - DN200 Increaser Socket
4. DN110 Third Boiler Elbow 216mm
5. DN200 Third Boiler Cascade Section 535mm

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk



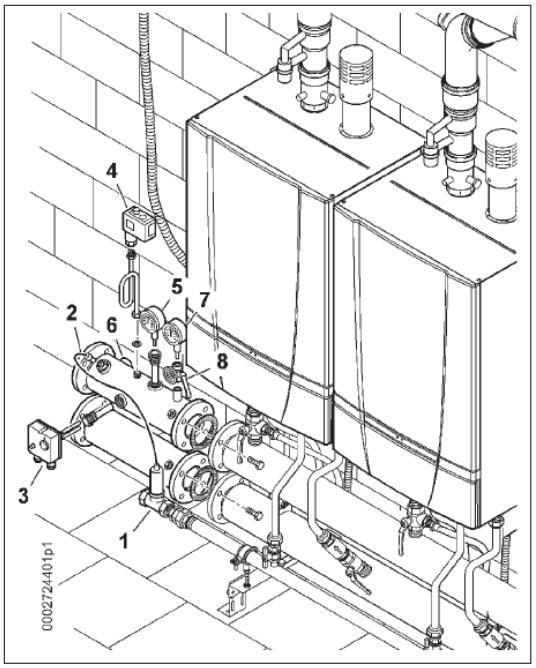
1. Condensate Syphon With 2000mm Drain Hose
2. DN110 Boiler Elbows 136mm
3. DN160 Cascade End Cap With Condensate Drain
4. DN110 30 Degree Elbows
5. DN160 Cascade Section 1000mm
6. DN110 Boiler Extension 175mm



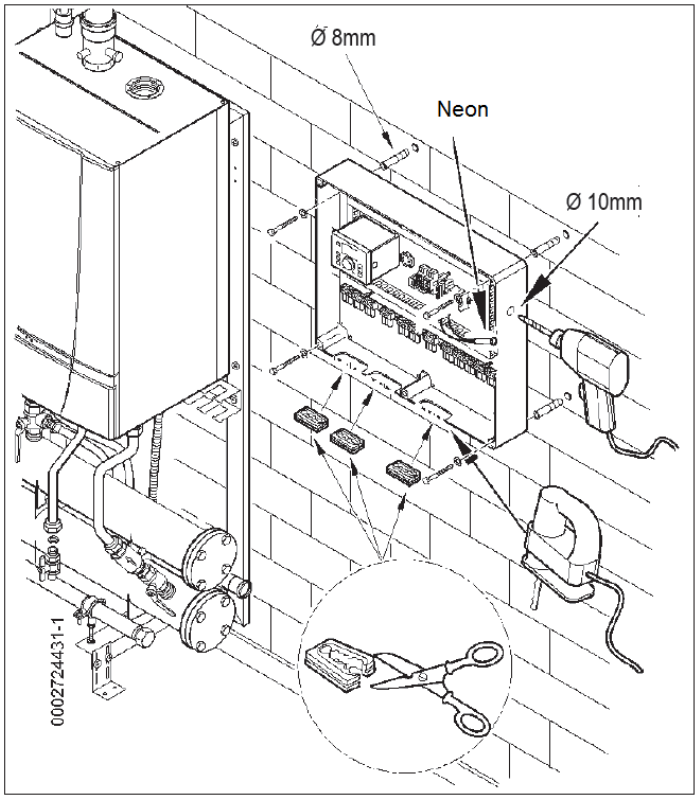
1. DN110 30 Degree Elbow
2. DN110 45 Degree Elbow
3. DN160 - DN200 Increaser Socket
4. DN110 Boiler Elbow 216mm
5. DN110 Boiler Elbow 200mm
6. DN110 Short Extension 78mm
7. DN200 Cascade Section 1000mm
8. DN110 Short Extension 140mm
9. DN110 Short Extension 163mm
10. DN110 Short Extension 568mm

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Optional Hydraulic Cascade Transition / Safety Section (Temperature and Pressure Monitoring)



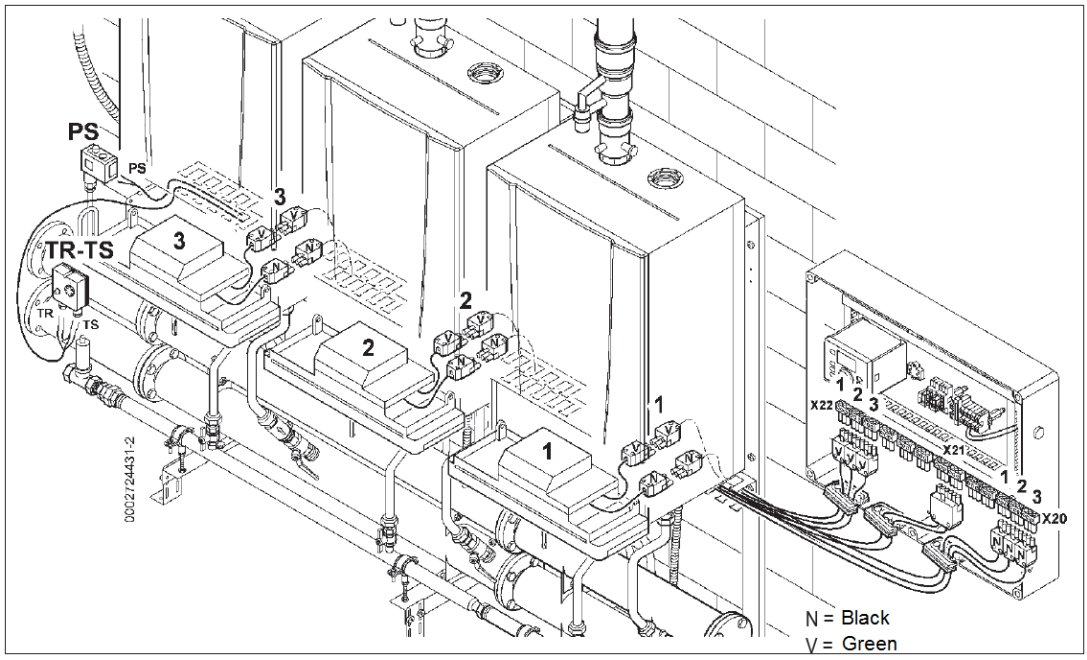
1. Gas Shut Off Valve Activatrion Tempertaure 98 Degree C
2. Gas Shut Off Sensing Probe
3. System Control Thermostat and Limit Thermostat (Manual Reset)
4. System High Pressure Switch. (Manual Reset)
5. Thermometer 0-120C
6. Connection Tapping for Additional Thermostat.
7. Pressure Gauge 0-4 bar
8. Pressure Gauge Calibration Flange



MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Theta Wiring Data

Prefabricated Cascade Wiring (Black & Green Plugs / System Safety Interlocks)



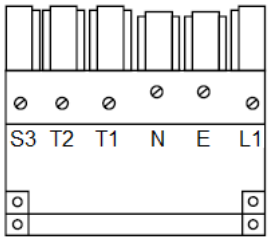
X 20 Black Plugs & X 22 Green Plugs

Ensure that the boilers are connected to the correct plug output. The closest boiler to the cascade controller being #1

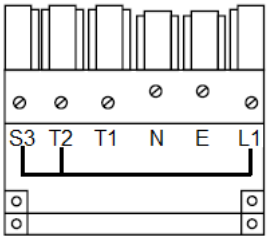
X 21 can be wired to the hydraulic kit system safety devices if applied.

(See above: Hydraulic Cascade Transition / Safety Section. (Temperature and Pressure Monitoring.))

Alternatively they can be connected to a MHG System Pressure Managers high and low pressure switches or simply linked out if no external pressure or temperature monitoring is required.



S3 = System Temperature Control (Input) (Supply to Relay K11)
T2 = Common Control Voltage (Output 230V)
T1 = Linking Terminal From Limit Thermostat to Pressure Switches
N = Linking Terminal From High Pressure Switch to Low Pressure Switch
E = Common Earth
L1 = System Limit Control (Input) (Supply to Relay K3)

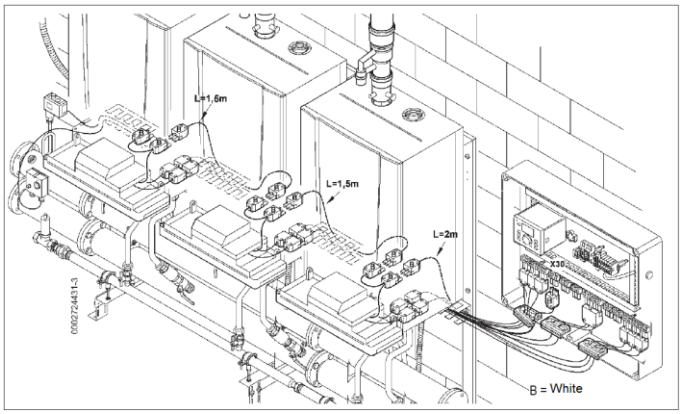


If no external temperature or pressure control is required please insert links between S3 - T2 - L1 as shown above

(Screened cable must be used for all low voltage and sensor wiring)

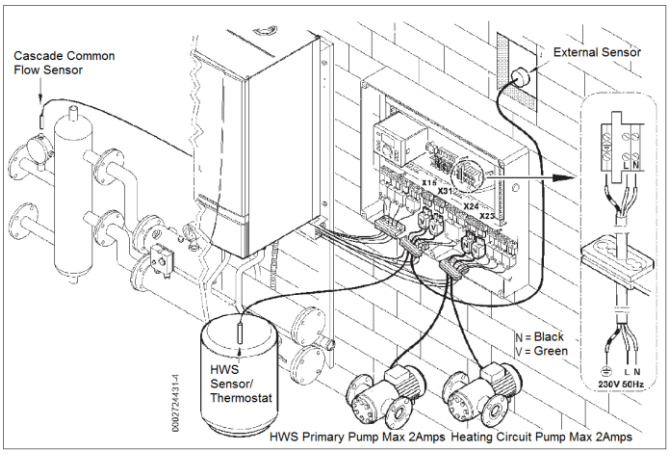
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Prefabricated Cascade Wiring (White Plugs)



X30 White Plugs

Ensure that the boilers are connected in series to the preformed white cascade cables.



Sensor and System Component Wiring

To ensure the correct operation of the Theta controller a common flow sensor must be connected.

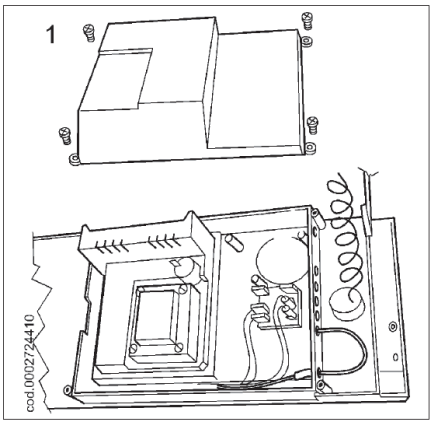
Plug #	Terminals	Function	Voltage	Max Amps
Sensors				
X15.1	L1 – E	Common Flow Senor	<24V	NA
X15.1	L1 – N	HWS Sensor or Volt Free Enable	<24V	NA
X15.2	L1 – N	Mixed Heating Zone 1 Flow Sensor	<24V	NA
X15.2	L1 – E	Mixed Heating Zone 2 Flow Sensor	<24V	NA
X31	L1 – E	Outside Air Sensor	<24V	NA
Pump and Valve Outputs				
X23	L1 – N – E	Main Heating Circuit Pump	230V	2 Amp
X23.1	L1 – N – E	Mixed Heating Zone 1 Pump	230V	2 Amp
X23.2	L1 – N – E	Mixed Heating Zone 2 Pump	230V	2 Amp
X24	L1 – N – E	HWS Charging Pump	230V	2 Amp
X26.1	L1 – E – N	Mixed Heating Zone 1 Valve (L1 = Open E = Close)	230V	1 Amp
X26.2	L1 – E – N	Mixed Heating Zone 2 Valve (L1 = Open E = Close)	230V	1 Amp

(Screened cable must be used for all low voltage and sensor wiring)

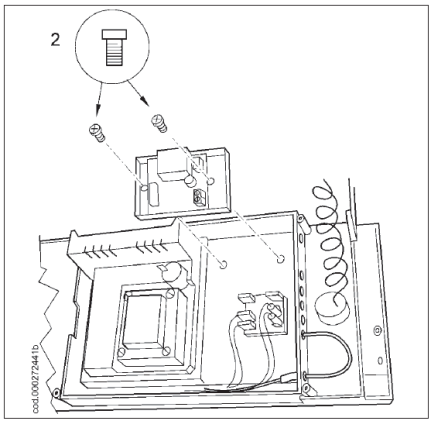
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Installation of the cascade Communication Clips RMCI 1400 EBV3 SU

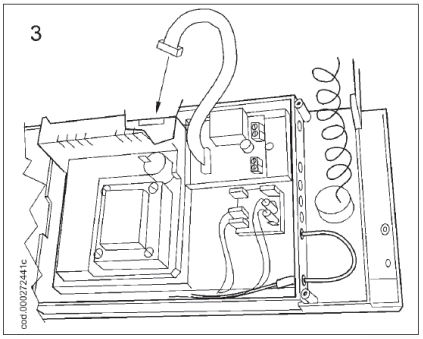
Remove Control panel rear cover



Install Clip In location as Indicated

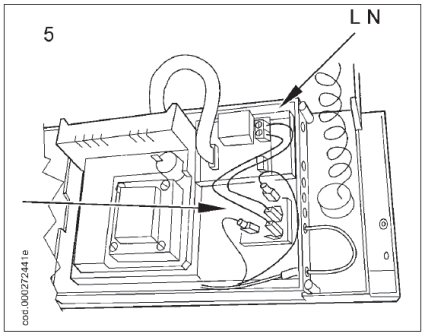


Install Ribbon Cable to X7



Install the piggy back equipped wires

as shown to the L & N Terminal

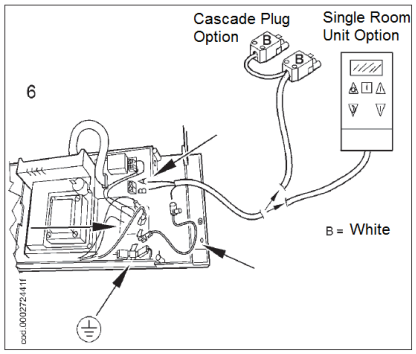


MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk
010315 Draft

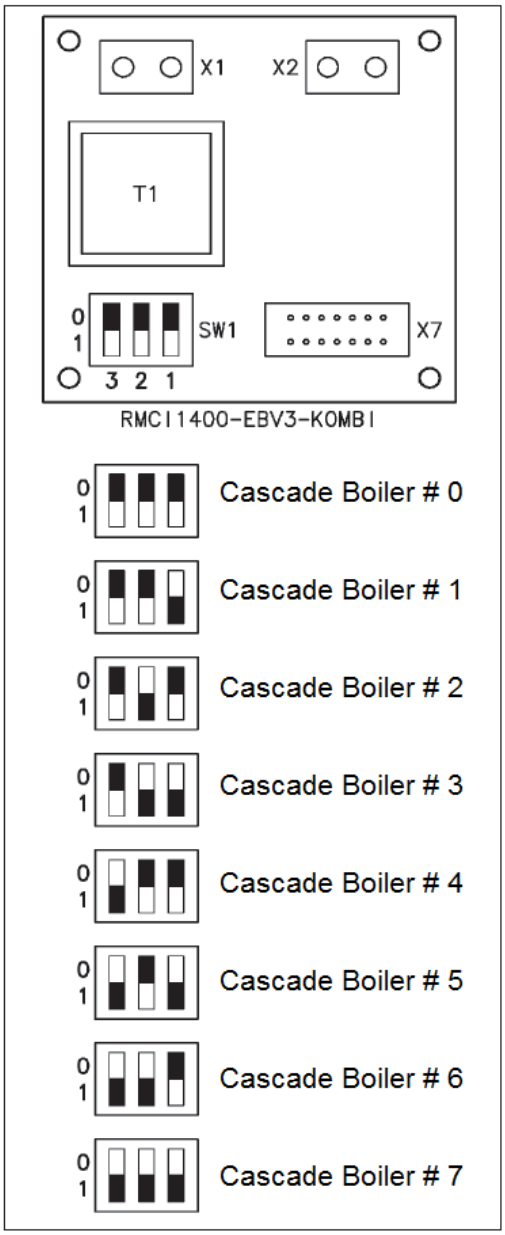
Install the White plug Connection Cables to

Terminals Brown Wire A & White Wire B and the appliances Earth.

Leave the white plugs within the appliances case ready for connection to the Theta controller cascade wiring.



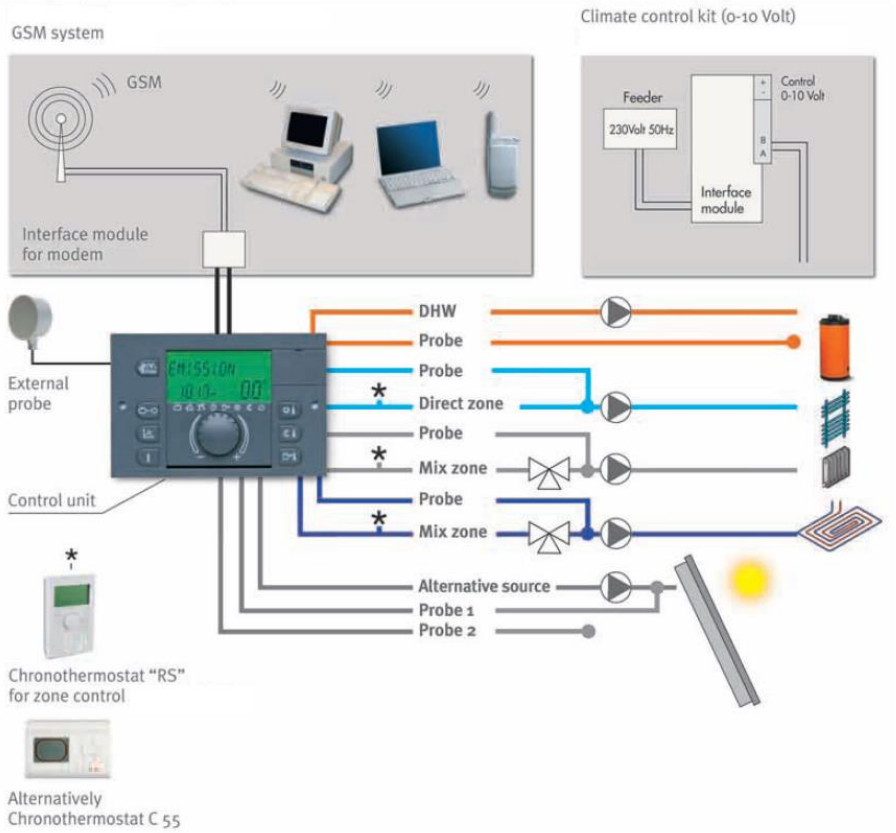
Cascade Clip Configuration



MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Theta Cascade Manager

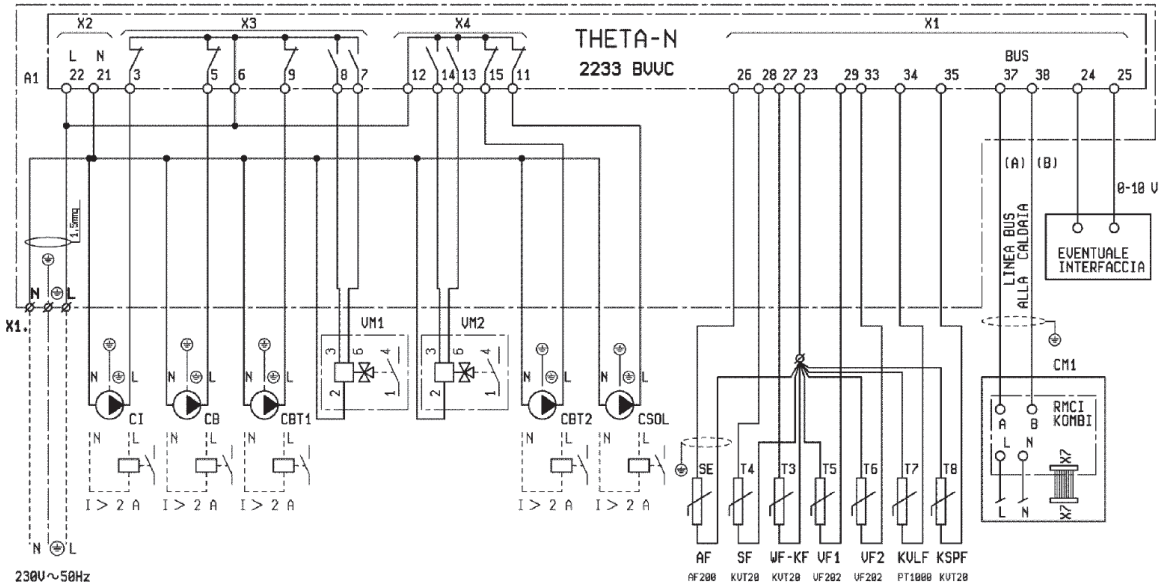
The Theta Cascade Manager can be used to control up to Eight ProCon MC 115s.
The unit is supplied in a dedicated housing and associated sensors.
Each ProCon will require a Cascade Communication Clip.
The Theta Cascade Controller can proved direct control of:
Up to Eight ProCon MC 115.
One Direct Heating Zone. (With Optional Room Unit. With or Without Direct on Boiler Compensation.)
Two Variable Temperate (3 Way Mixing Valve) Zones. (With Optional Room Unit. With or Without Compensation.)
Direct Hot Water Generation.
Thermal Solar Input to Domestic Hot Water Generation.
0-10 Volt Drive response.
Remote monitoring and adjustmet via The Internet (LAN) or Mobile Network (GSM)



Please refer to the separate Theta Controller manual for guidance on parameter settings.
A copy is supplied with the unit, it is availible from the website or from MHG's Technical Department.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Theta Electrical Connections



Legend

#	Terminals	Plug	Description
A1	~		Theta Controller
CB	5 / N	X 24	HWS Primary Pump
CBT1 / CBT2	9 / 15	X 23.1.2	Mixing Zone Pumps
CI	3 / N	X 23	System Heating Pump
CMI	37 / 38 / N		ProCon MC115 Cascade Interface Clip
CSOL	11 / N		Solar Pump
SE	26 / 23	X 31	Outside Air Sensor
T3	27 / 23	X 15.1	Common Flow Sensor
T4	28 / 23	X 15.1	HWS Sensor / Volt Free Enable
T5	29 / 23	X 15.2	Mixing Circuit 1 Sensor
T6	33 / 23	X 15.2	Mixing Circuit 2 Sensor
T7	34 / 23		Solar Collector Sensor
T8	35 / 23		Solar Buffer Sensor
VM1 / VM2	7 / 8 / 13/ 14 / N	X 26.1.2	Mixing Circuit Mixing Valves
X1	~		Low Voltage Connections
X2	21 / 22		230 Volt Input Connections
X3	~		230 Volt Output Connections
X4	~		230 Volt Output Connections
1-10 V	24 / 25		0 – 10 Volt Interface Module

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Fluing Options

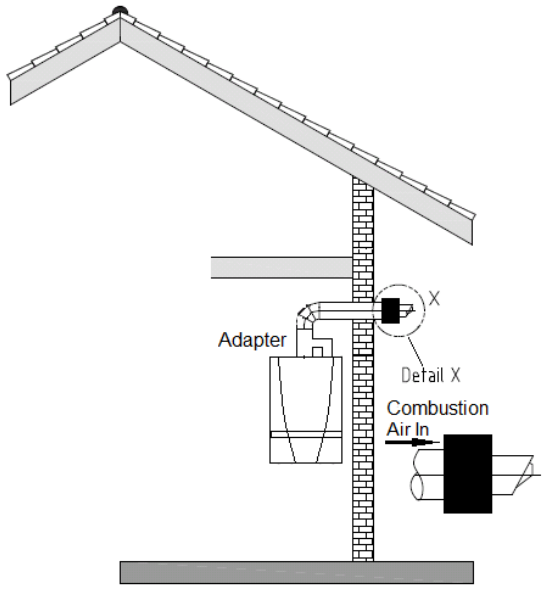
Please note that excessive resistance within the flue and combustion air supply systems will lead to a reduction in the output of the appliance and induce operational faults.

DN110/160 Concentric Flue Components (Pa Resistances)	
Concentric Adapter	TBC
Wall Terminal	TBC
Vertical Terminal	TBC
955mm Flue Extension	TBC
500mm Flue Extension	TBC
255mm Flue Extension	TBC
87° Bend	TBC
45° Bend	TBC
30° Bend	TBC
DN125 PPS Flue Components (Pa Resistances)	
Exhaust Pipe Terminal	TBC
Air Pipe Terminal	TBC
955mm Flue Extension	TBC
500mm Flue Extension	TBC
255mm Flue Extension	TBC
87° Bend	TBC
45° Bend	TBC
30° Bend	TBC

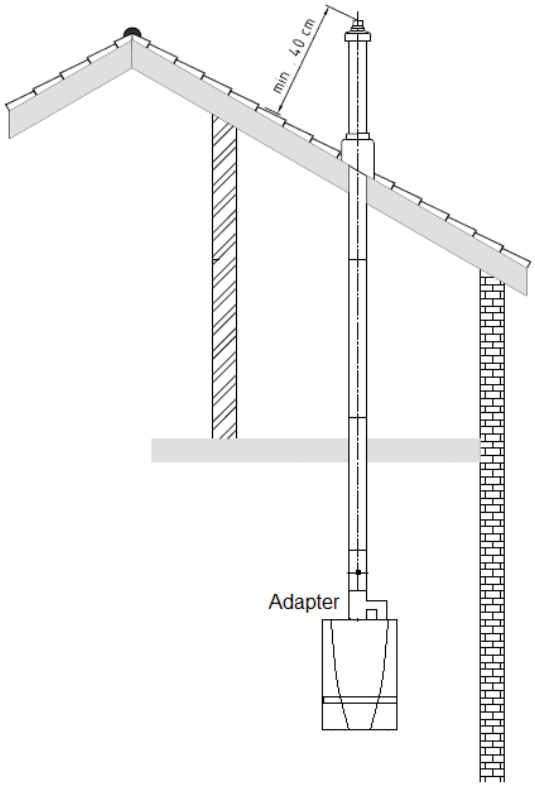
When flues are installed with horizontal sections/portions a 3^0 fall back to the boiler must be maintained. This will not only ensure condensate removal preventing premature seal failure, but also prevent nuisance condensate dripping from the wall terminal.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Single ProCon Balanced Flued Through The Wall Termination (DN 110/160)



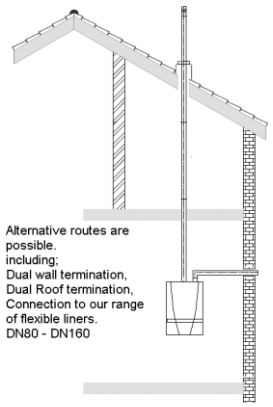
Single ProCon Balanced Flued Vertical Termination (DN110/160)



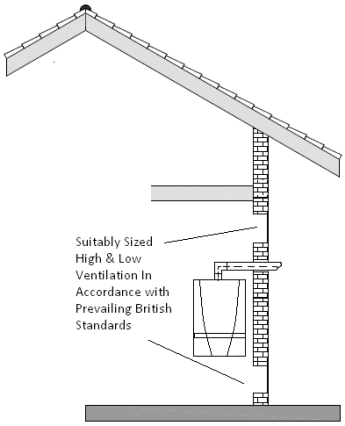
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Single ProCon Individually Routed Combustion air and Products of Combustion

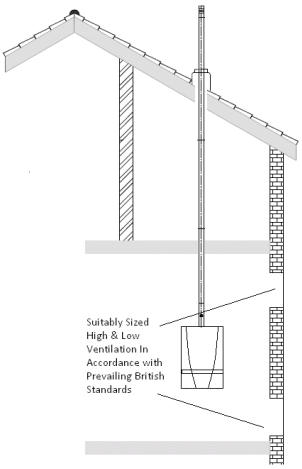
Individual DN125 solid or flexible flues can be utilized with the ProCon range



Single ProCon Open Flued Through The Wall Termination (DN 125)



Single ProCon Open Flued. Vertical Termination. (DN125)

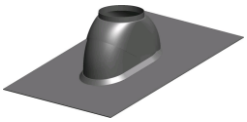


MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Dimensions of Available Concentric Flue Components

Description	Image
Concentric Adapter DN110/160	
Concentric 87° Elbow DN110/160 with Control Opening	
Concentric Straight DN110/160 with Control Opening	
Concentric 30° Elbow DN110/160	
Concentric 45° Elbow DN110/160	
Concentric 87° Elbow DN110/160	
Concentric 225mm Straight DN110/160	
Concentric 500mm Straight DN110/160	
Concentric 955mm Straight DN110/160	
Concentric 225mm Straight with Condensate Syphon DN110/160	

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Concentric Wall Terminal 1000mm DN110/160	
Concentric 1450mm Roof Terminal DN110/160	
Flat Roof Flashing	
Pitched Roof Flashing	

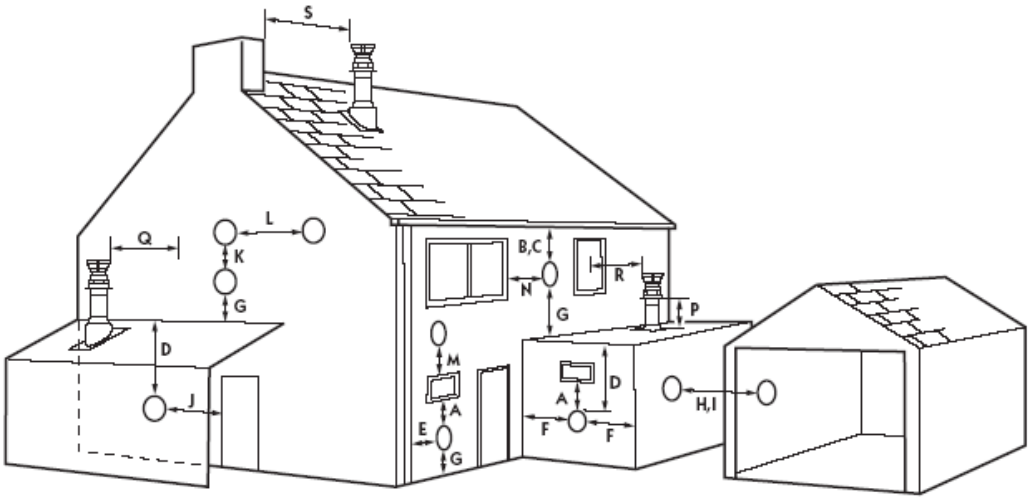
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Balanced Flue Terminal Positions For Boilers Below and Above 70kW Net Input

(All measurements are in mm and are minimum clearances)

Terminal Location		Boilers with a rated Input < 70kW Net	Boilers with a rated Input > 70kW Net
A	*Below and opening window etc.	300	600
B	Below gutter soil pipes etc.	75	700
C	Below Eaves.	200	200
D	*Below balconies or car port roof.	200	N/A
E	From vertical drain or soil pipe etc.	150	150
F	From internal or external corners.	300	300
G	Above ground or balcony level.	300	300 (2000 where people have general access)
H	From a surface facing the terminal.	2000	2000
I	From a terminal facing the terminal.	2000	2000
J	*From opening in a carport into a dwelling.	1200	N/A
K	Vertically from a terminal on the same wall.	1500	1500
L	Horizontally from a terminal on the same wall.	300	600
M	Above an opening, window etc.	500	600
N	*Horizontally to an opening, window etc.	300	600
P	Above a level roof (base of terminal.)	500	500
Q	From an adjacent wall (edge of terminal.)	500	500
R	From adjacent opening, window etc.	1000	1000
S	From any other flue terminal.	600	600

* Positions not recommended



Groups of appliances of 150kW gross input (136kW net input) and above must comply with the Clean Air Act with respect to the chimney discharge height.

The terminal/s shall be guarded if it is less than 2000mm above the ground or in any position where it may cause injury to persons resulting from touching a hot surface. Absolute guidance must be sought from the respective regulation.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

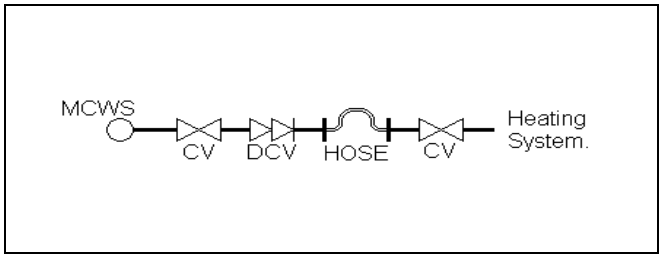
Filling The System

The Initial filling of a sealed heating system, and subsequent refilling, must be by a method that has been approved by the Water Regulation Advisory Scheme (WRAS) for that type of heating system.

i.e.	Domestic (*In-House*)	Fluid Category 3 (*C-3*)
	Non Domestic (Other than *In-House*)	Fluid Category 4 (*C-4*)

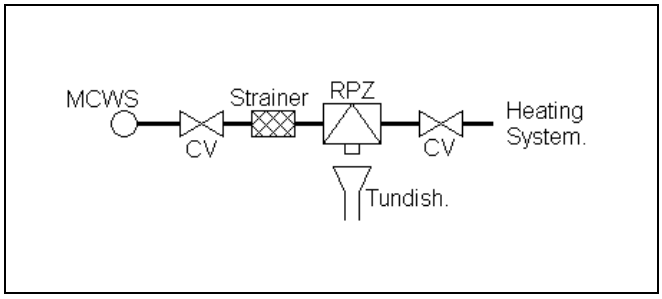
For Category 3 systems, the approved method of filling must comprise of the following components in the arrangement shown;

- Control Valve incorporating a Double Check Valve on the Mains Cold Water pipework.
- Temporary Connecting Hose, which must be disconnected after use.
- Control Valve, on the heating system.



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

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



Furthermore, in accordance with BS 6644: 2011 system with an input greater than 70kW (nett), an automatic water replenishment unit shall be installed to automatically replenish any lost or evaporated water.

Please refer to BS 6644: 2011 for allowable water replenishment methods for use with sealed/pressurized heating systems.

For information on a comprehensive range of pressurization units that comply with current British Standards and WRAS Regulations, please contact MHG Heating Ltd Sales.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Expansion Vessel

In accordance with BS 6644: 2011, WRAS Regulations, and Local Authority Water Regulations, as applicable, the installer shall install a suitably sized, and approved, Expansion Vessel to ensure that the water capacity of the system has ample expansion capacity. In complete compliance with BS6644:2011 a tapping is provided at the base of the boiler for the connection if a dedicated expansion vessel.

The location of the expansion vessel shall only be isolatable from the system via a Lockable Type Service Valve, which shall be locked in the *OPEN* position, to prevent accidental isolation.
Furthermore, a drain facility should be provided adjacent to the expansion vessel to aid the routine maintenance, overhaul, of the vessels Air Pressure setting.

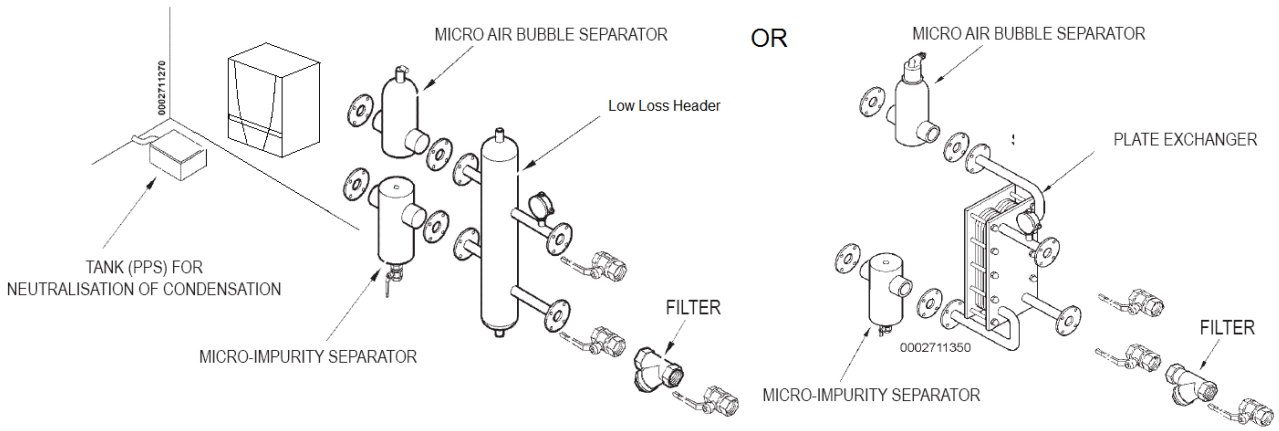
For information on a comprehensive range of expansion vessels that comply with current British Standards and WRAS Regulations, please contact MHG Heating Ltd Sales.

System Water Quality

Cleaning, flushing and water treatment must be carried out in accordance with the requirements of prevailing Building Regulations, British Standards, CIBSE Guides and related documents.

The entire system/s MUST be thoroughly cleaned and flushed to remove debris, flux residues, etc. before opening the boiler isolation valves & flooding the boiler.

Particular care must be taken where the ProCon boiler is being retro-fitted into an old/existing system, as system silt or magnetite can be very damaging to the new boiler. Consideration must be given to the installation of a MHG matched plate heat exchanger. Failing this a suitable straining/filtering device must be utilized to remove water borne debris.



MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Following the cleansing and flushing the system MUST be dosed with a good quality water treatment to prevent corrosion and the formation of scale. FAILURE TO OBSERVE THESE REQUIREMENTS WILL RENDER THE WARRANTEE ON THE APPLIANCE VOID.

Repeated draining planned or via leaks and refilling of the system, without replenishment of water treatment, must be avoided, as this is very damaging to the boiler and system components.

Before activating the boiler following the initial installation or hydraulic remedial work on the system, allow the system to circulate for at least 2 hours with the boiler off. This will allow the system installed devices to capture/remove any water borne debris. (Micro Air Bubble & Impurity separators). These devices must then be cleaned prior to commissioning the boiler. Additional device cleaning may be required during the first heating cycles.

The system water must have the following characteristics to ensure the long term operation security of all boiler and system components.

pH: ..... from 9.6 to 10.5
$Ca^{++} + Mg^{++}$: ..... below 0.5° f
$OH^- + 1/2\ CO_3^{--}$: ... from 5 to 15° f
P_2O_5: ..... from 10 to 30 mg/l
Na_2SO_3: ..... from 20 to 50 mg/l

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

Betz Dearborn Limited
(Sentiel)
Foundry Lane
Widnes
Cheshire
WA8 8UD
Tel: 0151 424 5351

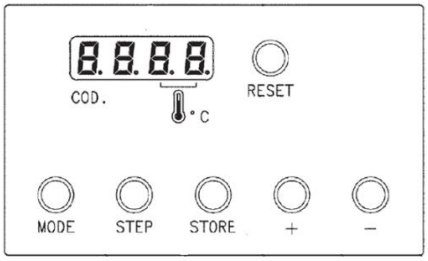
Alpha-Fry Technologies (Fernox)
Cookson Electronics
Forsyth Road
Woking
Surrey
GU21 5RZ
Tel: 0208 665 6666

Care With The Use of Solder Flux

The ProCon MC range has heat exchangers fabricated from 304L Stainless Steel. It is most important that the compatibility of any flux is checked with the supplier before use, and that any flux manufactures recommendations are strictly followed with regards to use in conjunction with Stainless Steel.
If you are applying any of the ProCon Range to a system where the water quality cannot be cleansed or treated please consider installing a system separation plate heat exchanger to ensure absolute separation of the system water and the boiler water.
Please refer to our website for further details on our matched brazed and gasketed plate heat exchanger range.

Appliance Controls

All appliance operational mode adjustments and settings are undertaken via the unit control fascia.



Button	Function
COD	LED Display. Operating Temperature, Modes and Fault Codes
RESET	Resetting of an Operation Fault
MODE	Selections of an Operating Mode to Inspect or Amend
STEP	Scrolling of the Parameter List
STORE	Saving any Parameter Alterations
+	Positive Adjustment
–	Negative Adjustment

The controller can provide the following levels of information and adjustment.

System Configuration
Control Configuration
Weather Compensation Configuration
Temperature Configuration
Speed Configuration
Pump Configuration
Historical Error Code Recovery

To prevent functional parameters from being altered in error they are located behind a code.

C O D E

To access this level the following procedure must be followed:

Press the MODE and STEP buttons simultaneously until the display indicates	CODE
Press the STEP button once. The display indicates	C. ??
Press the + or – buttons to change the third and fourth digit to 54	C. 54
Press the STORE button and the display will blink for a few seconds to indicate that the code has been accepted.	C. 54
Press the MODE button until the desired menu is displayed a DOT will be seen in the bottom right of the first digit box.	Standby, Para, Info, ect.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Display	Description of parameters	Factory setting	Suggested Changes
1	Hot Water set point. T3	50	60
2	Setting DHW on or off; 00 = off 02 = off + pump on continuous 01 = on 03 = on + pump on continuous	00	
3	Setting CH on or off; 00 = off 02 = off + pump on continuous 01 = on 03 = on + pump on continuous	01	
4	Maximum set point in Heating mode. (at minimum outside temp)	60	80
P.10	Minimum set point in Hating mode. (at maximum outside temperature)	20	
P.11	Minimum outside temperature of Heating curve.	-20	-1
P.12	Maximum outside temperature of Heating curve.	25	
P.13	Frost protection start temperature	-10	0
P.14	Correction of outside temperature	00	
P.15	Maximum set point for 2nd Heating circuit	20	
P.16	Minimum set point for 2nd Heating circuit	10	
P.17	T6<T6set-T6hysteresis generates heat request when 2nd circuit is selected as master. T6set is determined by T4	10	
P.18	Summer Winter flow temperature cut off (Tblocking) If T1set < Tblocking then the CH request is ended T1set is determined by OTC and or RMCI	00	Set between 1°C and 60°C
P.19	The Booster function serves to bring the system to fully operational conditions more rapidly. Every N minutes in heating mode the temperature is increased by 10°C.(to the max temp set in para 4)	00	
P.20	Night set back flow temperature. (reduction from calculated day temp)	00	
P.21	Delivery temperature increase for production of Hot Water	30	20
P.22	Maximum fan speed in Heating mode. (rpm/minute x 1000)	63	
P.23	Maximum fan speed in Heating mode. (used in connection with P22 to provide fan speed, e.g 6300)	00	
P.24	Maximum fan speed in Hot Water production.(rpm/min x 100)	63	
P.25	Maximum fan speed in Hot Water Production. (used in connection with P22 to provide fan speed, e.g 6300)	00	
P.26	Fan minimum speed in Heating mode. (rpm/minute x 100)	17	

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

P.27	Fan minimum speed in Heating mode. (used in connection with P22 to provide fan speed, e.g 1700)	00	
P.28	Fan speed during ignition. (rpm/minute x 100)	30	
P.29	Fan speed during forced low and slow start	17	
P.30	Not Used	00	
P.31	Not Used	00	
P.32	Pump overrun time after Heating mode	01	
P.33	Pump overrun time after Hot Water mode.	06	
P.34	Hysteresis for activation of burner in heating mode.	00	03
P.35	Hysteresis for deactivation of burner in Heating mode	04	
P.36	Hysteresis for activation of burner in Hot Water mode	00	
P.37	Hysteresis for deactivation of burner in Hot Water mode	04	
P.38	Hysteresis for activation of burner in Hot Water mode with NTC probe	00	
P.39	Hysteresis for deactivation of burner in Hot Water mode with NTC probe	02	
P.40	Heating mode Anti-Cycling time	00	3
P.41	Hot Water mode Anti-Cycling time	00	
P.42	Burner blocking time. When set to 00 the burner stays on when switching from DHW to CH mode. (to have full boiler shut down set to 30) Units=x 10.2 seconds.	00	
P.43	Hot Water mode time-out.	00	
P.44	"BUS" address	08	
P.45	Heating Mode type; 00=Room thermostat 01=outside temperature (night set back) 02 and 03 not used 04=0-10v AM4 capacity 05=0-10v AM4 temperature 06 and 07 Not Used 08=0-10V on AM4 + RT capacity 09=0-10V on AM4 + RT thermal	00	
P.46	Hot Water mode type; x0=Instant water heater with NTC3 x1=Instant water heater without NTC3 x2=Storage tank with NTC3 x3=Storage tank without NTC3 x4-x9=Not used 0x=3-way valve normally open 1x=DHW pump present and 3way valve normally open 2x=3-way valve normally closed	22	23 (for Volt free enable) (Screened cable must be used when volt free enable required)
P.47	Manual fan speed.(-01=automatic)	-01	

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Operating Modes

The boiler display will provide operational data in all modes. Including a no demand state.
The display is divided in four segments.
The operational data will always be displayed in the first segment with a numerical code.

Status	Boiler operation
0	Standby; no heating or hot water required
1	Pre-ventilation / post-ventilation
2	Ignition
3	Burner operating in heating mode
4	Burner operating in hot water mode
5	Awaiting air pressure switch or rpm to start
6	Burner off as set point reached. Heating still required
7	Pump post-circulation after heating mode
8	Pump post-circulation after hot water mode
9	Burner blocked
A	Auto adjusting
H	Boiler in test mode, high fire
L	Boiler in test mode, low fire

Temperature Display

Whilst in the CODE level the controller can display temperatures of the attached sensors.

Display	Description or parameter
PARA	Press STEP until the desired information is displayed
INFO	The dot next to the final digit will blink to indicate that the boiler is in INFO mode
1	Delivery temperature T1 in °C
2	Return temperature T2 in °C
3	DHW temperature T3
4	Outside temperature T4
5	Not Used
6	Target Calculated Delivery Temperature
7-D	Not Used
E	Ionisation current
F-N	Not Used

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Fan Speed Display

Whilst in the CODE level the controller can display the actual fan speed.

Display	Description or parameter
FAN	Fan speed
----	The fan sped in real time is displayed

Last Error Code Display

Whilst in the CODE level the controller can display the last Error Code Information.

(The first digit will flash)

Display	Description or parameter
1. ??	Last error
2. ??	Boiler status at time of error
3. ??	Delivery temperature T1 at time of error
4. ??	Delivery temperature T2 at time of error
5. ??	Hot water temperature T3 at time of error
6. ??	External temperature T4 at time or error

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Appliance Fault Codes

Codes	Error Description	Error Resolution
E.00	Abnormal reading of flame ON signal	-Check wiring (short circuit in 24 Volt Wiring) -Check electrode -Replace the MCBA unit (damage caused by water)
E.02	No flame after five ignition attempts	-Check the ignition wire -Check the electrode and its position -Check for gas near burner
E.03	Error of gas valve or gas connector	-Replace rectification cable or gas valve
E.04	Persistent block	-Press the "RESET" button
E.05 - E.07	Internal error	-If the problem persists after two attempts to "RESET", replace the MCBA unit
E.11	EPROM error	-If the problem persists after two attempts to "RESET", replace the MCBA unit
E.12	Thermostat input maximum open or 24 volt fuse damage	-Check the wiring -Check the 24 Volt fuse of the MCBA -Fume safety thermostat / thermofuse activated -I.S.P.E.S.L. safety devices activated
E.13 - E.17	Internal error	-If the problem persists after two attempts to "RESET", replace the MCBA unit
E.18	T1>110°C	-Check the NTC wire and replace if necessary -If the NTC1 probe is OK, make sure water is circulating.
E.19	T2>110°C	-Check the NTC wire, replace if necessary
E.24	NTC probe error	Inversion of NTC1 and NTC2
E.25	Delivery temperature T1 rising to quickly	-Check the pump operation -If the pump is ok, purge the system
E.28	No signal from tachometer	-Check the PWM connection -Check the fan wiring -If the problem persists after two attempts to "RESET", replace the MCBA unit
E.29	The tachometer signal of the fan does not return to "0"	-Check extraction of the flue -If extraction is correct replace the fan
E.30	NTC probe safety	-Exceeded the max ΔT
E.31	NTC short circuit	-Check the NTC1 probe connector -Check the NTC1 probe wiring -If the problem persists replace the NTC1 probe
E.32	NTC2 short circuit	-Check the NTC2 probe connector -Check the NTC2 probe wiring -If the problem persists replace the NTC2 probe

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Codes	Error Description	Error Resolution
E.33	NTC3 short circuit	-Check the NTC3 probe connector -Check the NTC3 probe wiring -If the problem persists replace the NTC3 probe
E.36	NTC1 connection open	-Check the NTC1 probe connector -Check the NTC1 probe wiring -If the problem persists replace the NTC1 probe
E.37	NTC2 connection open	-Check the NTC2 probe connector -Check the NTC2 probe wiring -If the problem persists replace the NTC2 probe
E.38	NTC3 connection open	-Check the NTC3 probe connector -Check the NTC3 probe wiring -If the problem persists replace the NTC3 probe
E.44	Internal error	-If the problem persists after two attempts to "RESET", replace the MCBA unit
E.60	Error during reading	-Perform a RESET -If the error persists, replace the MCBA unit
E.65	Fan power supply problems	-Check the power supply voltage of the MCBA -If no problem is found, replace the fan

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Cut-Out Codes

If the boiler has malfunctioned an error/cut-out code will be displayed in the first, third and fourth segments.

Status	Boiler Operation
b.08	Air pressure switch
b.18	Delivery temperature T1>95°C
b.19	Return temperature T2>95°C
b.24	T2-T1 > 10°C after 90 seconds
b.25	dT1 / dt > maximum gradient T1
b.26	Gas pressure switch or absence of water not closed / Thermostat for regulation I.S.P.E.S.L.
b.28	No signal from tachometer
b.29	Signal from tachometer not correct
b.30	T1-T2>ΔT max
b.33	NTC3 short circuit
b.38	NTC3 interrupted
b.65	Awaiting fan start

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Weather Compensation Curve

An outside air sensor is required to activate the direct on boiler weather compensation function.

The curve can be adjusted from its defaults to provide the comfort level the installation requires.

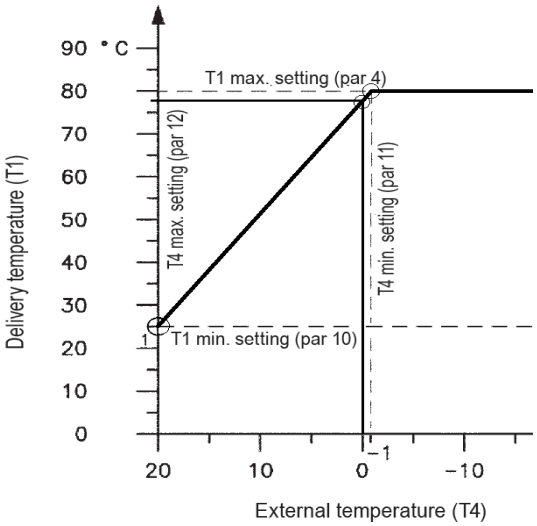
The curve defaults are:

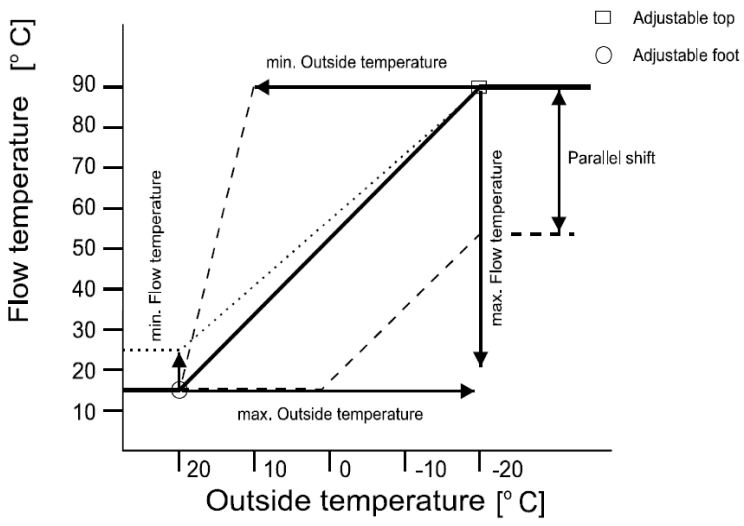
Para	Default Setting	Description
P4	60	Maximum Flow Temperature Achieved at Minimum Outside Air Temperature (P11)
P10	20	Minimum Flow Temperature Achieved at Maximum Outside Air Temperature (P12)
P11	-20	Minimum Outside Air Temperature To Provide Maximum Boiler Flow Temperature (P4)
P12	25	Maximum Outside Air Temperature To Provide Minimum Boiler Flow Temperature (P10)

Worked Example:

Para	Suggested Changes	Description
P4	80	Maximum Flow Temperature Achieved at Minimum Outside Air Temperature (P11)
P10	25	Minimum Flow Temperature Achieved at Maximum Outside Air Temperature (P12)
P11	-1	Minimum Outside Air Temperature To Provide Maximum Boiler Flow Temperature (P4)
P12	20	Maximum Outside Air Temperature To Provide Minimum Boiler Flow Temperature (P10)

The calculated flow temperature at an outside temperature of 0°C will be 77°C





MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk
010315 Draft

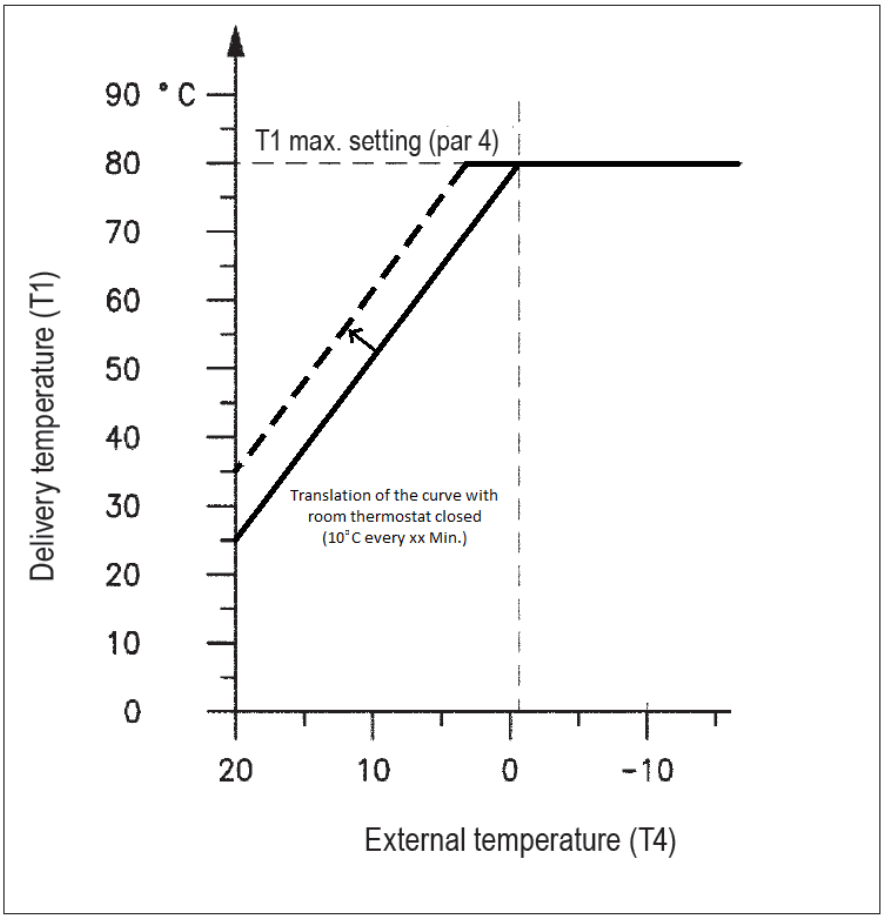
Boost Function

(Only Functioning when Weather Compensation is Active)

The Boost Function is designed to bring the system to its maximum comfort level as quickly as possible.

The calculated flow temperature is increased by 10°C for every time period set in Parameter P19 that the enable signal is applied. The calculation is reset if the enable signal is removed or the boiler reaches the maximum flow temperature as detailed in parameter P4.

The default setting for P19 is 00



MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

0-10 Volt Control Adjustment

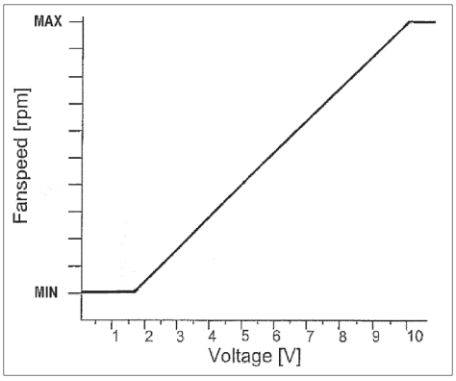
If the boiler is to be controlled via a 0-10Volt signal an AM04 0-10 Volt adapter is required. The installation of the adapter is detailed earlier in the manual.

Via Parameters 45 the 0-10Volt drive signal can be used to adjust the following:

Setting	Function
04	Boiler Output via Fan Speed Adjustment
05	Boiler Flow Temperature

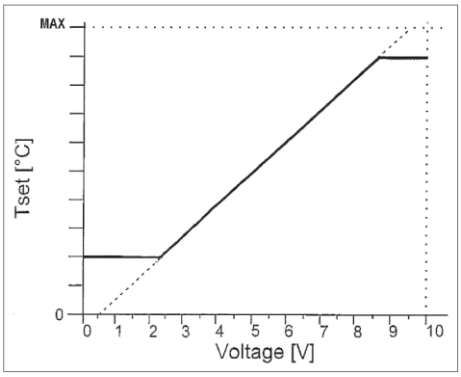
Boiler Output via Fan Speed Control

On/Off Hysteresis:	Field Of Operation
Input Signal <0.5 volt = Boiler Off	Input Signal 1 to 1.8 volt = Boiler on at Minimum Operating Setting
Input Signal >1.0 volt = Boiler On	Input Signal 10 volt = Boiler on at Maximum Operating Setting (P22)



Boiler Output via Flow Temperature Control

On/Off Hysteresis:	Field Of Operation
Input Signal <0.5 volt = Boiler Off	Input Signal 0.5 volt = Boiler on at Minimum Operating Setting
Input Signal >1.0 volt = Boiler On	Input Signal 9.5 volt = Boiler on at Maximum Operating Setting (P4)



MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Converting The Appliance To Burn LPG (G31)

Unless specified at the time of ordering the appliance/s will be supplied ready to operate on a Natural Gas (G20) fuel supply.
The appliances data badge will indicate the type of fuel gas the modules have been set to operate with.
If the unit is required to operate on LPG the following conversion procedure must be undertaken.

Isolate the appliance from the gas and electrical supplies.

Discount the gas valve (VR8615) from the inlet gas supply being careful to retain the sealing washer.

Remove the four bolts attaching the gas valve (VR8615) to the fan inlet manifold being careful to retain the sealing washer.

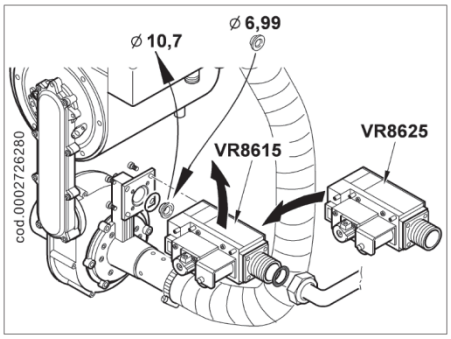
Remove the Natural Gas 10.7mm Restrictor.

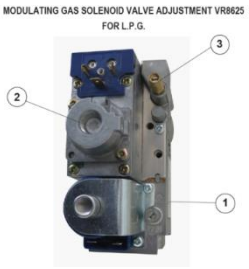
Install the LPG 6.99mm Restrictor.

Install the LPG gas valve (VR8625) in reverse order ensuring the correct location of the inlet and outlet sealing washers.

Test for gas tightness.

The appliance will now require commissioning.





Gas Type	ProCon MC 115
Natural Gas (G20)	10.7mm
LPG (G31)	6.99mm

Gas Type	High Fire $C0_2/O_2$	High Fire Fan Speed RPM	Low Fire $C0_2/O_2$	Low Fire Fan Speed RPM
Natural Gas (G20)	9.15 / 4.7	6300	8.90 / 5.2	1700
LPG Propane (G31)	10.30 / 5.2	5500*	10.10 / 5.5	1400*
LPG Butane (G30)	10.30 / 5.2	6300	10.10 / 5.5	1700

*The fan speed for Propane requires updating from the Natural Gas default

Parameter	Original Setting (NG G20)	Required Setting (LPG G31)
P22	63	55
P26	17	14

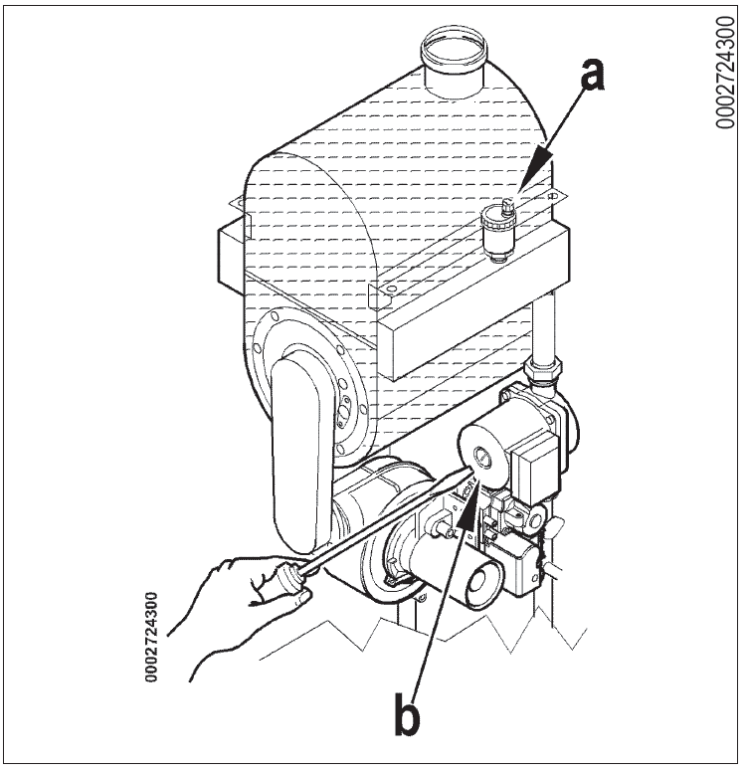
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Commissioning The Appliance

Pre-Commissioning Checks

Prior to undertaking the commissioning of the unit please ensure that the system water has been cleansed and treated with a suitable inhibitor as detailed in Filling the System and System Water Quality.

Prior to applying power to the appliance its circulation pump (b) should be bled and checked to ensure free rotation of the armature and the automatic air vent (a) should be opened and allowed to vent the heat exchanger and associated pipework. Better access to the pump can be achieved by removing the air duct from the fan inlet Venturi.
Also ensure that the ignition electrodes spark gap is set to 4mm.

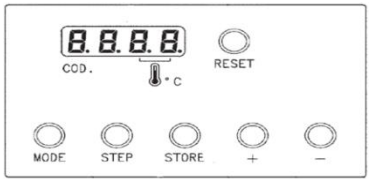


MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Combustion System Commissioning

To ensure correct operation of the combustion system the gas valve must be set at Maximum and Minimum outputs.

The commissioning mode can be activated regardless of the operating status of the heating and how water control system. If zone or mixing valves are installed within the system ensure that these are open to allow for complete circulation of the generated heat.



The High Fire commissioning mode is activated by pressing the MODE & + buttons simultaneously.

The Low Fire commissioning mode is activated by pressing the MODE & - buttons simultaneously.

To leave the commissioning mode press the RESET button or the + & - Button simultaneously.

It is advisable to check the combustion figures on High and Low Fire prior to carrying out any adjustments.

Adjusting the High Fire has a marked effect on the Low Fire figures. Where as adjusting the Low Fire has little effect on the High Fire figures.

The High fire adjustment is carried out via red sheathed screw (4) (Make small adjustments 1/12 turn only.)

The High Fire adjustment is a Gate type restrictor.

Therefore turning the screw clockwise will close the Gate and thus restrict the quantity of gas passing through to the burner.

The Low fire adjustment is carried out via the 4mm TORX head (2) (Under dust cap)

The Low Fire adjustment is a diaphragm governor.

Therefore turning the screw clockwise will increase the pressure on the diaphragm and thus increase the quantity of gas passing through to the burner.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Legend	
1.	Gas inlet pressure
2.	Low fire adjuster(Governor type) Under dust cap*
3.	Valve outlet gas pressure
4.	High fir adjuster (gate type)*

*(Make small adjustments only)

A flue gas analyser must be used to ensure that the correct combustion setting are achieved.

This is undertaken by inserting the analyser's probe in to plugged hole within the flue collector of the appliance or in the tapping in the flue immediately above the appliance if present.

The combustion setting required for all ProCon appliances are as detailed in the following table.

Gas Type	High Fire $C0_2/O_2$	High Fire Fan Speed RPM	Low Fire $C0_2/O_2$	Low Fire Fan Speed RPM
Natural Gas (G20)	9.15 / 4.7	6300	8.90 / 5.2	1700
LPG Propane (G31)	10.30 / 5.2	5500*	10.10 / 5.5	1400*
LPG Butane (G30)	10.30 / 5.2	6300	10.10 / 5.5	1700

*The fan speed for Propane requires updating from the Natural Gas default

Parameter	Original Setting (NG G20)	Required Setting (LPG G31)
P22	63	55
P26	17	14

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Routine Inspection and Servicing

As with all Gas Appliances, we would highly recommended that a competent heating engineer services the ProCon MC, at least every 12 months. This is assuming a normal daily usage of 8 – 10 hours.
If however the boiler is to be operated 24 hours a day, 7 days a week, we would recommend services every 6 months.

If the Installer/Commissioning Engineer is unable to undertake the Routine Service Inspection, as detailed in Section 18.1, please contact the MHG Technical Department, who will be able to arrange the Routine Service Inspection to be undertaken.

Routine Service Inspection

Before commencing any service/maintenance work, the following tasks must be undertaken.

a) Ask the end user about any problems with the operation of the boiler unit and note their comments.
b) Check the water pressure of the installation.
c) Remove the boiler casing and visually inspect all pipe and water joints for signs of leakage.
d) Inspect the top of the casing and the top of the heat exchangers for signs of water leakage or ingress.
e) Run the unit in Commissioning Mode HIGH FIRE; with the use of a flue gas analyzer record the CO_2 level.
f) Run the unit in Commissioning Mode LOW FIRE; with the use of a flue gas analyzer record the CO_2 level.
g) Listen to the sound of the combustion fan. Utilizing the appliances fascia review the units Operating Error Codes, and note the recorded codes onto the Service Report.
h) Undertake a System Water Analysis to check the concentration level of the Water Treatment, and note the level onto the Service Report.
i) Check the flue route including the terminal position for conformity with prevailing regulations, and trim back any foliage that may be around the terminal.
j) Check the plant room/compartment ventilation system for conformity with prevailing regulations.
k) Check the Pressure (Safety) Relief Valve size, rating and orientation, for conformity with prevailing regulations.

The results of the Inspections undertaken above must be acted upon, and all discrepancies should be recorded on the Service Report and brought to the Client / End User's attention.
Undertake any maintenance, and if necessary any preventative maintenance, that's required.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Routine Cleaning & Maintenance

As part of the Routine Service Inspection, certain areas of the boiler need to the checked and cleaned as necessary.

a) Turn the boiler OFF at the ON/OFF switch and electrically isolate the boiler by removing the plug or fuse from the boiler supply.

b) Turn off the gas at the boiler isolation tap, fitted by the installer, adjacent to the appliance.

c) Remove the electrical connections, Gas valve balancing pipe and air inlet duct from the units fan assemble.

d) Disconnect the earth lead, HT cap and Lead from the ignition electrodes.

e) Loosen and disconnect the inlet gas supply form the gas valve. (Inspect and clean the inlet filter of the gas valve).

f) Disassemble the burner by removing the six M6 nuts around the burner door, using a 10mm Spanner. Pull the burner forward and remove from the heat exchanger. Gently put to one side.

g) Once access has been gained to the combustion chamber and lower heat exchanger, visually inspect the heat exchanger coils.

It is usually only necessary to clean the lower section of the heat exchanger. If server deposits are found, the upper section of the heat exchanger should also be checked and cleaned, which may necessitate the removal of the heat exchanger from the boiler.

If any coils appear to be significantly dis-coloured, then a blockage of either, scale, magnetite, or general system debris has occurred which will have allowed excessive overheating to have occurred within the coil. If dis-colouration has occurred, then specialist de-scaling of the heat exchanger will be required, however, stress cracking may have occurred, and the heat exchanger may become porous following the de-scale works.

h) If the heat exchanger has not suffered from dis-colouration, as 'Item g' above, then a Standard Service can be undertaken. Using a natural bristled brush ONLY, remove the worst of the mineral/debris build up. With the use of the dissolved *ProCon Combustion Chamber Cleaning Granules*, spray the solution onto the heat exchanger surface and leave for approximately 5 minutes. This will help to remove any stubborn mineral deposits and clear the condensate drain connections. Finally brush the heat exchanger whilst rinsing thoroughly with copious amounts of fresh water. *ProCon Combustion Chamber Cleaning Granules* are available from MHG Heating Ltd Spares Department.

A STEEL OR PVC BRUSH MUST NOT BE USED TO CLEAN THE HEAT EXCHANGER.

i) Following the cleaning of the Heat Exchangers, the condensate syphon must be flushed to ensure that all mineral deposits/debris that has been washed from the heat exchanger surface is correctly removed. Open the syphon cleaning point cap at the base of the boiler, with a suitable receptacle directly below to collect the syphon contents. Safely dispose of the contents of the syphon. Replace the receptacle below the cleaning point and poor 2 litres of clean tap water into the heat exchanger, which will drain through the cleaning point. Refit the cleaning point cap and poor one litre of clean tap water into the heat exchanger to ensure the syphon is re-flooded. Check the cleaning point cap for leaks.

j) Visually check the burner surface for signs of damage and debris build-up. Remove any debris build up with compressed air. If excessive debris build-up is identified, the burner lance should be removed and the inner metal surface should be washed and cleaned.

A BRUSH, OF ANY KIND, MUST NOT BE USED TO CLEAN THE BURNER SURFACE.

If damage has occurred to the burner surface, the burner MUST be replaced.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

k) To ensure that the rectification circuit operates correctly the resistance between the burner and burner door must be check with a multi-meter to ensure that it is less than 1 Ohm (<1 Ohm.)

l) Clean with abrasive material and inspect the ignition electrode. Replace if necessary. Adjust the spark gap to 4mm.

m) Check the combustion fan blades for debris build-up. Remove any debris with a soft bristle brush or preferably compressed air.

DO NOT TOUCH OR SPIN THE FAN BLADES WITH YOUR FINGERS AS THIS COULD AFFECT THE BALANCING OF THE FAN BLADES.

n) Re-fit the Burners, in the reverse order of dismantling, ensure that all electrical connections are correctly and securely connected.

o) Inspect all water joints. Any joints found to be leaking MUST be replaced. It is also advisable when replacing water joints to also change any adjacent joints at the same time.

p) Inspect all gas joints with a suitable leak detection method. Any joints found to be leaking MUST be replaced. It is also advisable when replacing gas joints to also change any adjacent joints at the same time.

q) Via the tappings on the boiler connector adapter, elbow or straight a flue gas recirculation check must be undertaken when the boiler is operating on high and low fire modes.

r) Drain and clean the condensate syphon assembly.

s) If fitted inspect and clean the condensate neutralising tank, replenishing the neutralising granules as required. Granules available from MHG Heating Ltd Spares Department.

t) With the use of a suitable Flue Gas Analyser, check and adjust the combustion settings, as detailed in the previous commissioning section.

u) Inspect the general condition of the flue system, including the termination, repair as necessary or advise on any remedial action as required.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

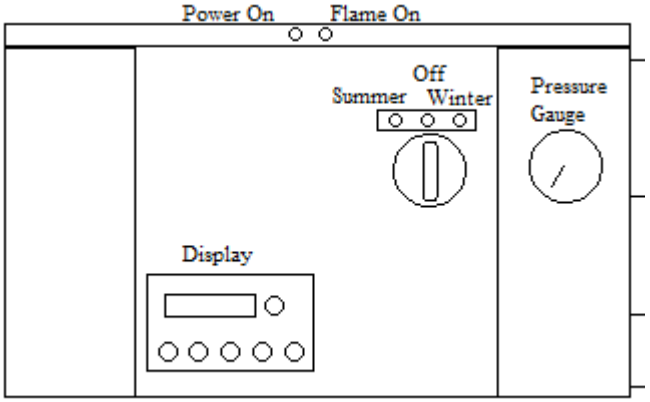
User Information

The ProCon's display panel provides operational information and a means of adjusting the unit to provide the required level of heating and hot water generation.

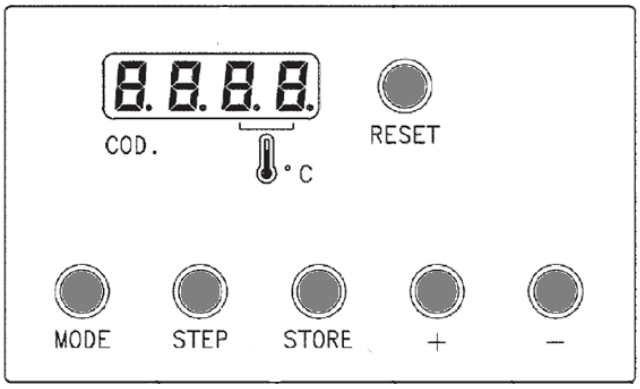
Off = **Frost Protection and anti-seize programs disabled**

Summer Mode = Hot Water Generation Only

Winter Mode = Heating and Hot Water Generation



Legend



Button	Function
COD	LED Display. Operating Temperature, Modes and Fault Codes
RESET	Resetting of an Operation Fault
MODE	Selections of an Operating Mode to Inspect or Amend
STEP	Scrolling of the Parameter List
STORE	Saving any Parameter Alterations
+	Positive Adjustment
-	Negative Adjustment

Following the powering up of the appliance a series of internal checks are undertaken.

This can take a number of minutes.

During this process the appliance will not respond to any requests for heat.

"A" followed by a number will be displayed on the boilers LED display card.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Operating Modes

The boiler display will provide operational data in all modes. Including a no demand state.

The display is divided in four segments.

The operational data will always be displayed in the first segment with a numerical code.

Status	Boiler operation
0	Standby; no heating or hot water required
1	Pre-ventilation / post-ventilation
2	Ignition
3	Burner operating in heating mode
4	Burner operating in hot water mode
5	Awaiting air pressure switch or rpm to start
6	Burner off as set point reached. Heating still required
7	Pump post-circulation after heating mode
8	Pump post-circulation after hot water mode
9	Burner blocked
A	Auto adjusting
H	Boiler in test mode, high fire
L	Boiler in test mode, low fire

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Cut-Out Codes

If the boiler has malfunctioned an error/cut-out code will be displayed in the first, third and fourth segments.

Status	Boiler Operation
b.08	Air pressure switch
b.18	Delivery temperature T1>95°C
b.19	Return temperature T2>95°C
b.24	T2-T1 > 10°C after 90 seconds
b.25	dT1 / dt > maximum gradient T1
b.26	Gas pressure switch or absence of water not closed / Thermostat for regulation I.S.P.E.S.L.
b.28	No signal from tachometer
b.29	Signal from tachometer not correct
b.30	T1-T2>ΔT max
b.33	NTC3 short circuit
b.38	NTC3 interrupted
b.65	Awaiting fan start

NTC3 = HWS Sensor

If the unit fails to operate and displays an error code please make a note of the code prior pressing the RESET button.
If site support is required the noting of the error code will assist with the fault diagnosis and the provision of suitable replacement components if required.
If the cause of the operational error has not been rectified the boiler will display a further error code following a period of up to 5 minutes during which time the unit is undergoing an internal diagnosis process.

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Setting the Operating Temperatures

The operation and temperature settings for both heating and hot water can be set via the control panel. (All alterations must be made from a Standby Menu / Default Display)

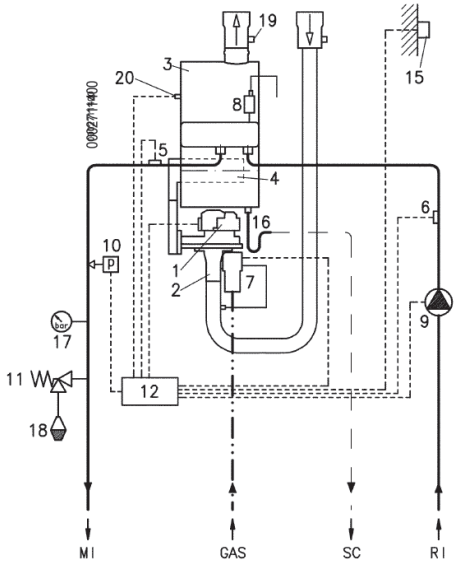
Number that appears in the first field of the display	Description of parameter		Field of adjustment allowed	Value set in factory
1.	Hot water temperature setting		From 20°C to 65°C	50°C
2.	Hot water	00 = Off (disabled) 01 = On (enabled) 02 = Off + pump always on 03 = On + pump always on	/	00
3.	Heating	00 = Off (disabled) 01 = On (enabled) 02 = Off + pump always on 03 = On + pump always on	/	01
4.	Setting the heating water temperature		From 20°C to 85°C	60°C

The settings are made in the PARA menu.

Press the MODE button once.	PARA
To adjust the HWS set temperature Press the STEP button until 1 appears in the display. Use the + or – buttons to alter the display to the required setting. (20c-65C) Press the STORE button to save the changes. Press the Mode Button once to return to the selection menu. Press the STEP button once to access the next parameter. Alternatively. Press the MODE button twice to return to the Standby Menu.	1. 50
To adjust the HWS operating mode Press the STEP button until 2 appears in the display. Use the + or – buttons to alter the display to the required setting. See table above for setting options. Press the STORE button to save the changes. Press the Mode Button once to return to the selection menu. Press the STEP button once to access the next parameter. Alternatively. Press the MODE button twice to return to the Standby Menu.	2. 00
To adjust the Heating operating mode Press the STEP button until 3 appears in the display. Use the + or – buttons to alter the display to the required setting. See table above for setting options. Press the STORE button to save the changes. Press the Mode Button once to return to the selection menu. Press the STEP button once to access the next parameter. Alternatively. Press the MODE button twice to return to the Standby Menu.	3. 01
To adjust the Heating set temperature Press the STEP button until 4 appears in the display. Use the + or – buttons to alter the display to the required setting. (20C-85C) Press the STORE button to save the changes. Press the Mode Button once to return to the selection menu. Press the STEP button once to access the next parameter. Alternatively. Press the MODE button twice to return to the Standby Menu.	4. 60

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Operational Diagram



Legend

Item	Description
MI	Boiler Flow
GAS	Gas Inlet
SC	Condensate Outlet
RI	System Return
1	Combustion Fan
2	Air Gas Mixing Venturi
3	Heat Exchanger
4	Premix Burner
5	Flow Sensor NTC 1
6	Return Sensor NTC 2
7	Gas Valve
8	Automatic Air Vent
9	Boiler Pump
10	Minimum System water Pressure Switch
11	Pressure Relief Valve
12	Control Panel
15	Outside Air Sensor
16	Condensate Trap
17	Pressure Gauge
18	Tundish
19	Flue Gas Analyser Test Point
20	Flue Gas Thermostat

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

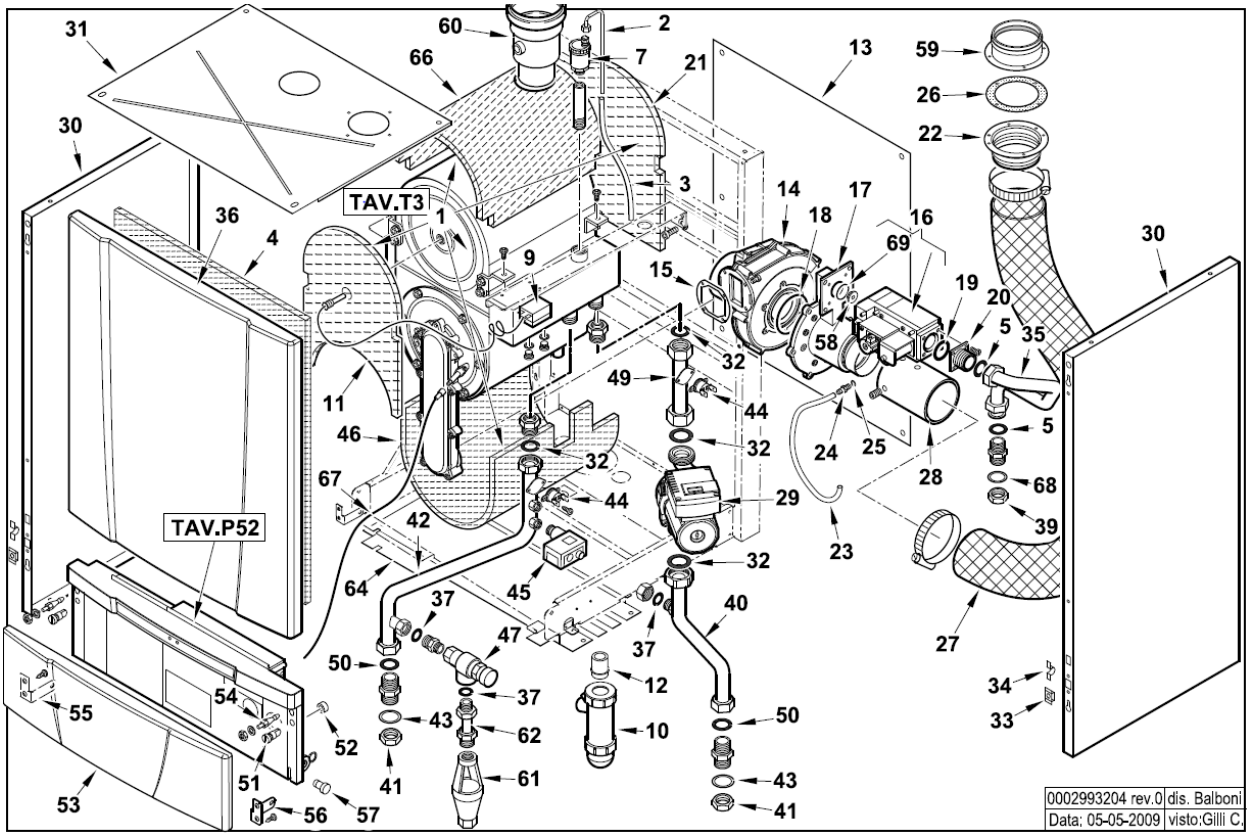
Sensor Resistance Table

T(°C)	R(kΩ)
-15	76.02
-10	58.88
-5	45.95
0	36.13
5	26.60
10	22.80
15	18.30
20	14.77
25	12.00
30	9.804
35	8.054
40	6.652

T(°C)	R(kΩ)
45	5.522
50	4.607
55	3.862
60	3.252
65	2.751
70	2.337
75	1.993
80	1.707
85	1.467
90	1.266
95	1.096
100	0.9524

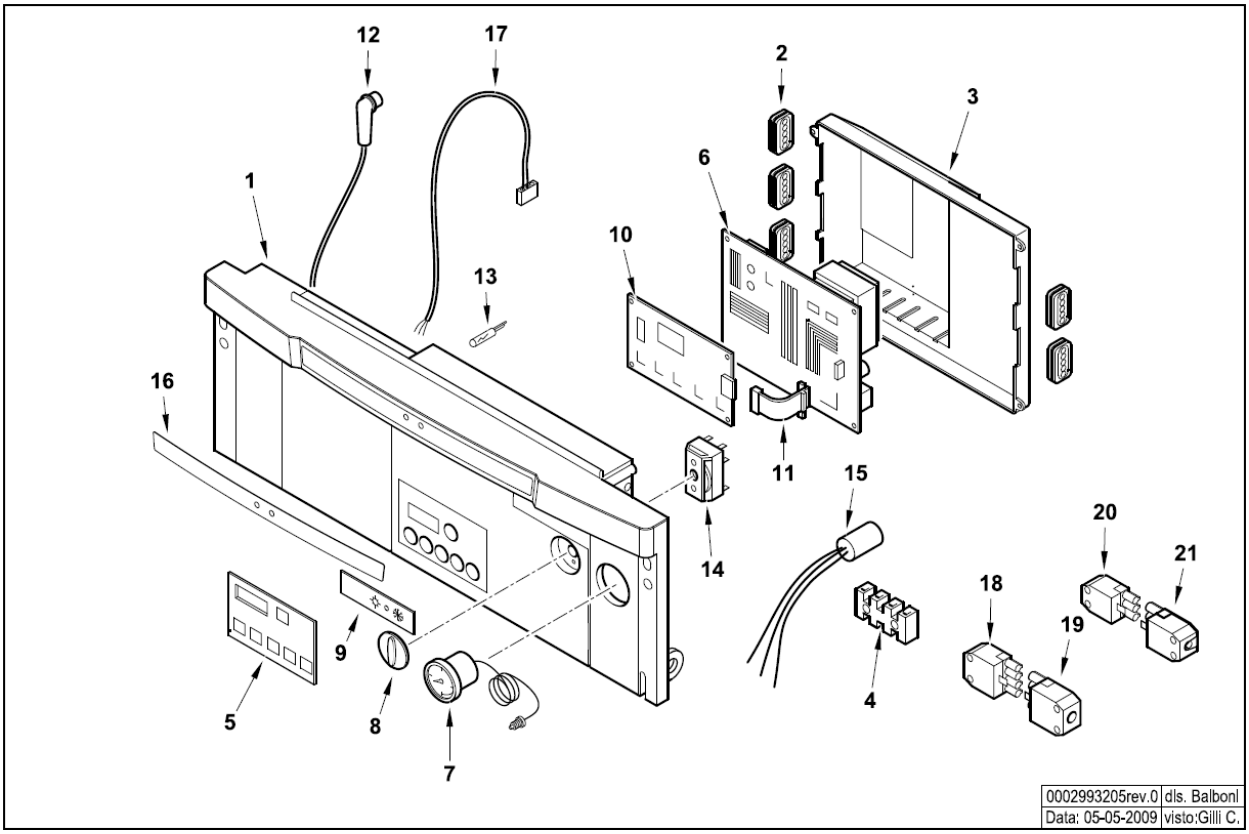
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Exploded Spares Diagram



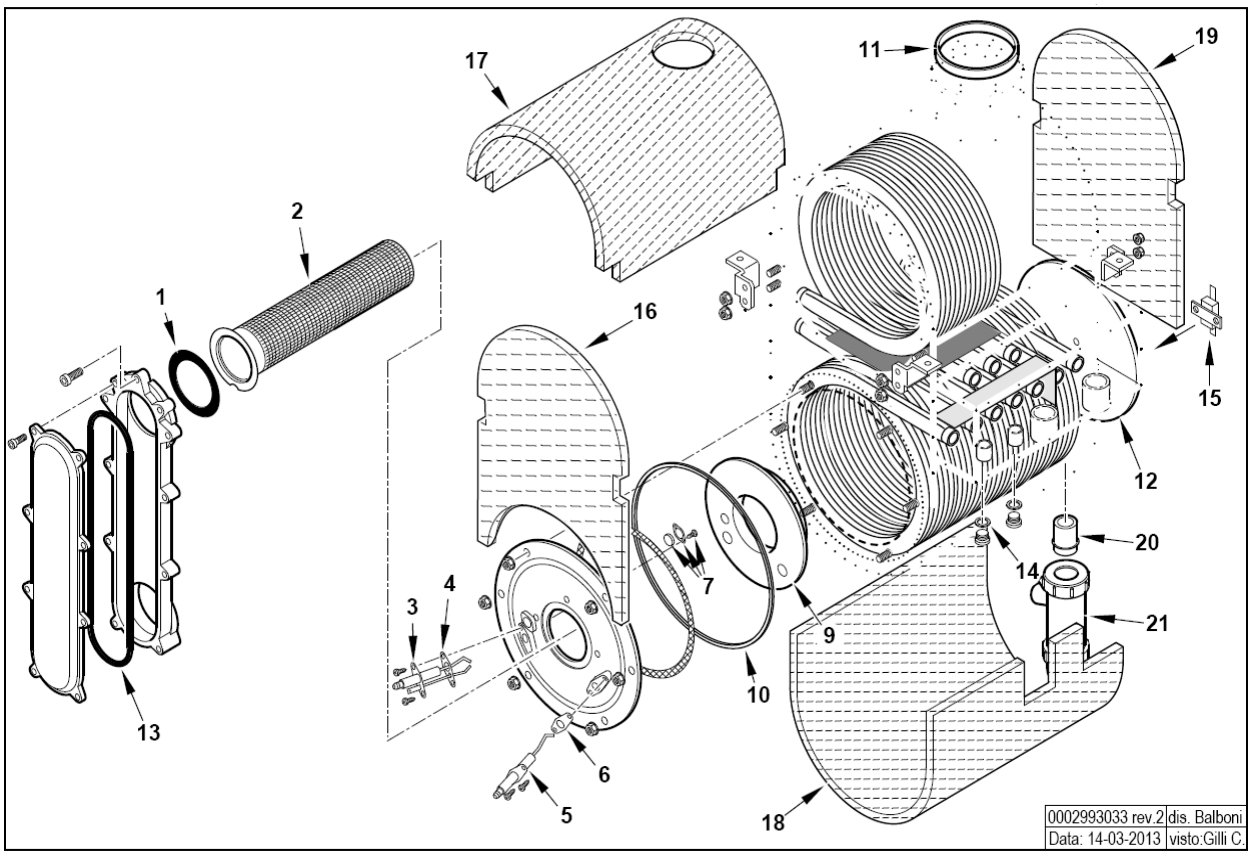
MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Exploded Spares Diagram



MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Exploded Spares Diagram



MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk

Notes

MHG Heating Ltd Unit 4 Epsom Downs Metro Centre, Waterfield, Tadworth, Surrey KT20 5LR
Telephone 08456 448802 Fax 08456 448803 Email info@mhgheating.co.uk Web www.mhgheating.co.uk