NEW CONDENS FS 600 SERIES

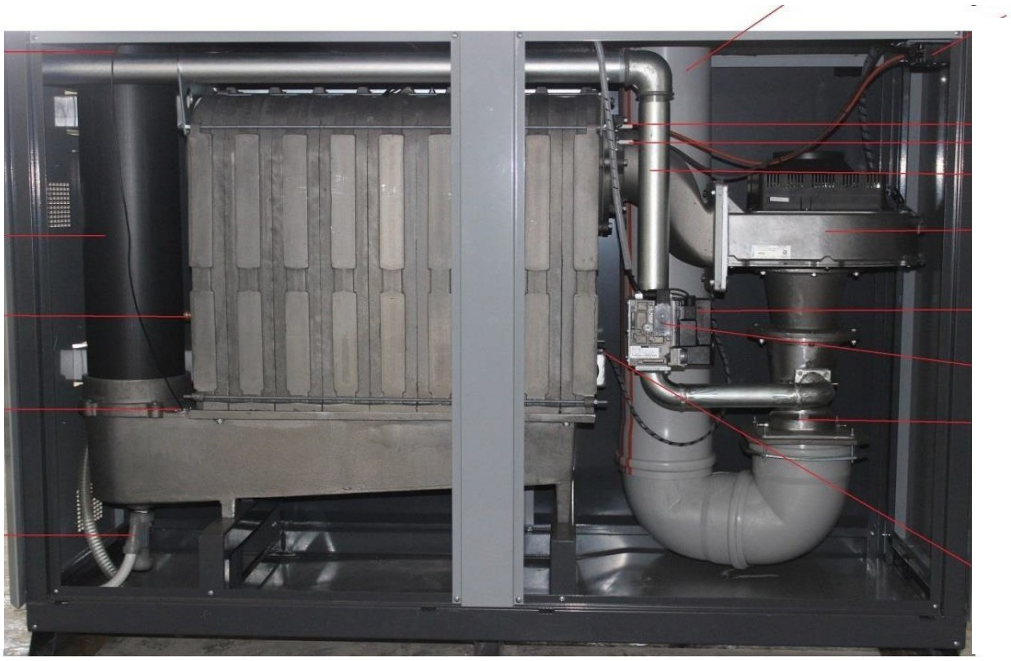
Cast Aluminium Floor Standing Condensing Boilers for Natural Gas

CE

INSTRUCTIONS FOR USE, INSTALLATION AND MAINTENANCE

Rev.00/12-2015-PB/IB600

NEW CONDENS FS 600 SERIES



EN

Declaration of conformity

:

CE
1015

Gas Appliance Directive 2009/142

Efficiency Directive 92/42

Low Voltage Directive 2006/95

Electromagnetic Compatibility Directive 2004/108

President and Legal Representative

NEW CONDENS FS 600 SERIES

Manufacturer's liability

Our products are manufactured in compliance with the requirements of the various directives applicable. They are therefore delivered with the marking and any documents necessary. In the interests of the quality of our products, we strive constantly to improve them. We therefore reserve the right to modify the specifications given in this document.

Our liability as manufacturer may not be invoked in the following cases:

- Failure to abide by the instructions on installing the appliance.
- Failure to abide by the instructions on using the appliance.
- Faulty or insufficient maintenance of the appliance.

Installer's liability

The installer is responsible for the installation and initial commissioning of the appliance. The installer must abide by the following instructions:

- Read and follow the instructions given in the manuals provided with the appliance.
- Install the appliance in compliance with prevailing legislation and standards.
- Carry out initial commissioning and any checks necessary. Explain the installation to the user.
- If maintenance is necessary, warn the user of the obligation to check the appliance and keep it in good working order.
- Give all the instruction manuals to the user.

User's liability

To guarantee optimum running of the installation, you must abide by the following instructions:

- Read and follow the instructions given in the manuals provided with the appliance.
- Call on a qualified professional to carry out installation and initial commissioning.
- Get your installer to explain your installation to you.
- Have the required checks and services done by a qualified professional.
- Keep the instruction manuals in good condition close to the appliance.

1. GENERAL

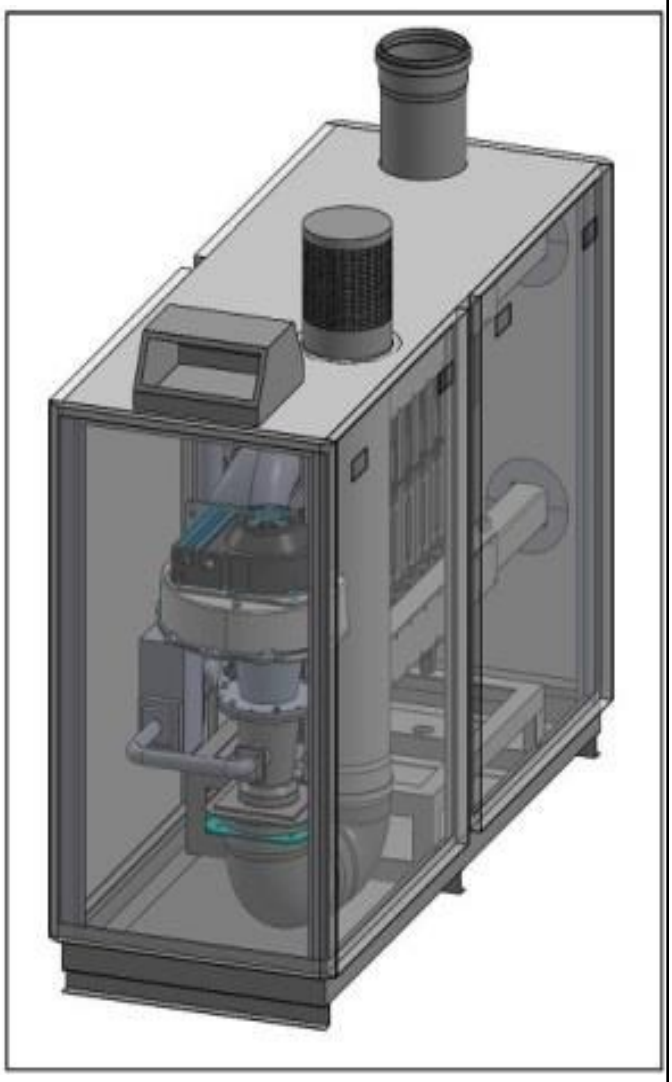
- Carefully read and follow the instructions contained in this instruction booklet.
- After boiler installation, inform the user regarding its operation and give him this manual, which is an integral and essential part of the product and must be kept with care for future reference.
- Installation and maintenance must be carried out by professionally qualified personnel, in compliance with the current regulations and according to the manufacturer's instructions. Do not carry out any operation on the sealed control parts.
- Incorrect installation or inadequate maintenance can result in damage or injury. The manufacturer declines any liability for damage due to errors in installation and use, or failure to follow the instructions.
- Before carrying out any cleaning or maintenance operation, disconnect the unit from the electrical power supply using the switch and/or the special cut-off devices.
- In case of a fault and/or poor operation, deactivate the unit and do not try to repair it or directly intervene. Contact professionally qualified personnel. Any repair/ replacement of the products must only be carried out by qualified personnel using original replacement parts. Failure to comply with the above could affect the safety of the unit.
- This unit must only be used for its intended purpose. Any other use is deemed improper and therefore hazardous.
- The packing materials are potentially hazardous and must not be left within the reach of children.
- The unit must not be used by people (including children) with limited physical, sensory or mental abilities or without experience and knowledge of it, unless instructed or supervised in its use by someone responsible for their safety.
- The unit and its accessories must be appropriately disposed of, in compliance with the current regulations.
- The images given in this manual are a simplified representation of the product. In this representation there may be slight and insignificant differences with respect to the product supplied.

HEALTH & SAFETY

The electricity at work regulations, 1989.

The manufacturer's notes must NOT be taken, in any way, as overriding statutory obligations.

IMPORTANT. These appliances are CE certified for safety and performance. It is, therefore, important that no external control devices, e.g. flue dampers, economisers etc., are directly connected to these appliances unless covered by these Installation and servicing Instructions or as otherwise recommended by **Ferroli Ltd** in writing. If in doubt please enquire. Any direct connection of a control device not approved by **Ferroli Ltd could invalidate the certification and the normal appliance warranty. It could also infringe the Gas Safety Regulations and the above regulations.**



Introduction

Dear Customer,

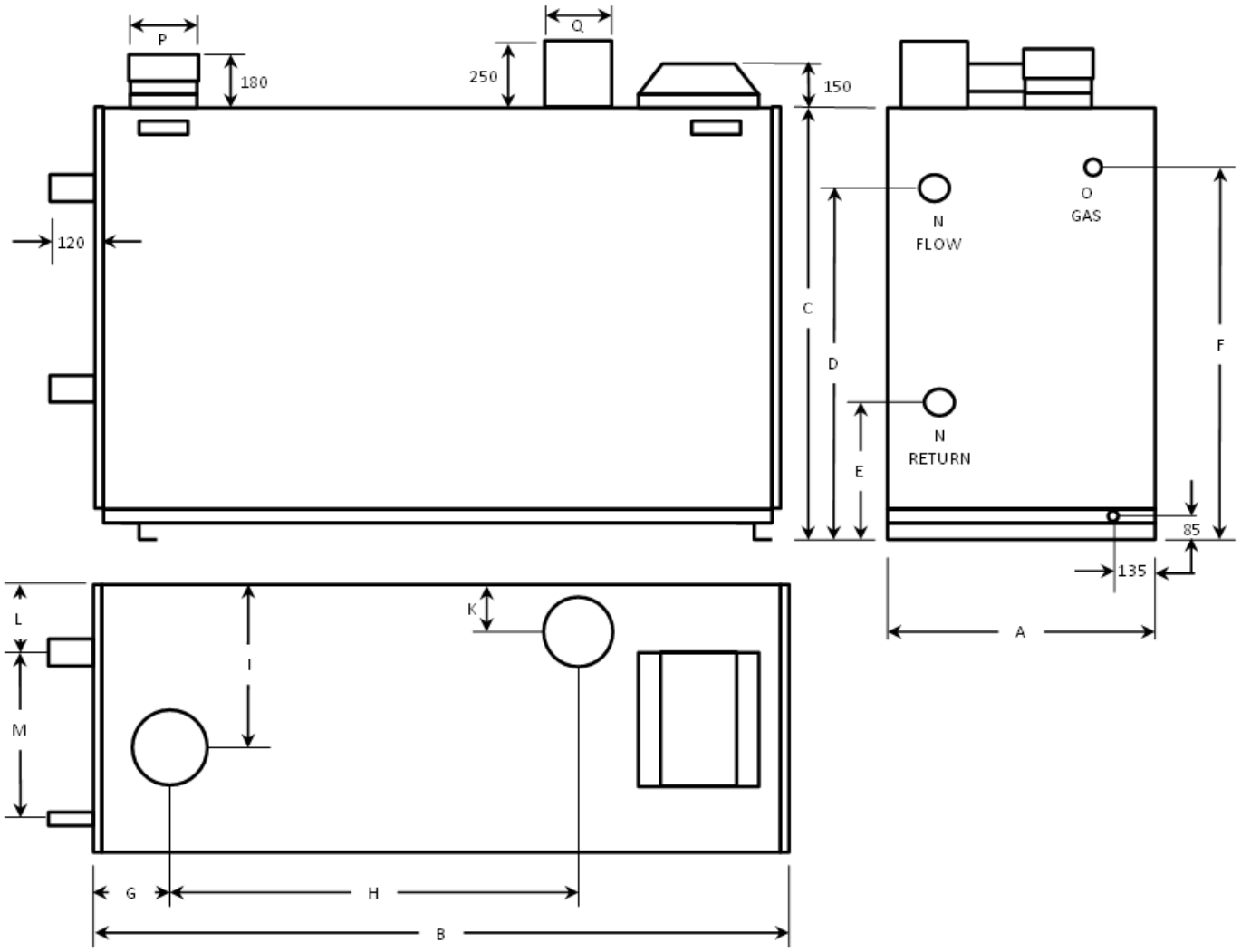
Thank you for choosing the **New Condens FS Series**, a floor-standing boiler featuring advanced design, cutting-edge technology, high reliability and quality construction. Please read this manual carefully since it provides important information on safe installation, use and maintenance. **New Condens FS Series** is a high efficiency, low emissions **premix condensing** heat generator for heating, running on natural gas and equipped with a microprocessor control system.

The **boiler body** consists of a sectional cast Al-Si-Mg alloy heat exchanger and a **woven mesh premix burner** in stainless steel, equipped with electronic ignition with ionisation flame control, modulating speed fan and modulating gas valve. **New Condens FS Series** is a heat generator arranged to operate alone or in cascade.

Technical Data Table

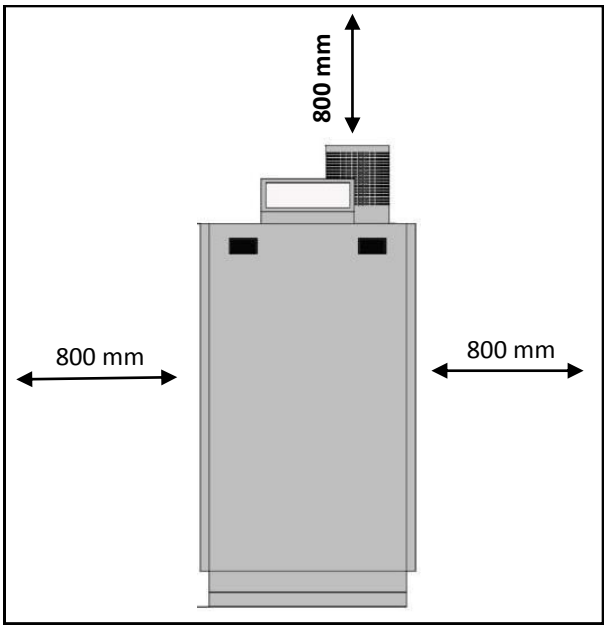
FERROLI NEW CONDENS 600 SERIES		604	605	606	607	608	609
EFFİCİENCY AND PERFORMANCE							
Max. heat input in CH mode	kW	198	266	331	407	475	542
Min. heat input in CH mode	kW	30	37	45	55	63	74
Max. heat output in CH mode (80/60°C)	kW	184	258	321	390	456	522
Min. heat output in CH mode (80/60°C)	kW	28	36	44	53	60	72
Max. heat output in CH mode (50/30°C)	kW	200	269	339	408	477	542
Min. heat output in CH mode (50/30°C)	kW	32	40	49	58	68	79
Efficiency at Pmax (80/60°C)	%	95.2	96.9	96.9	95.8	96.0	96.4
Efficiency at Pmin (80/60°C)	%	95.0	97.2	97.7	96.3	95.2	96.8
Efficiency at Pmax (50/30°C)	%	100.3	101.1	102.4	100.2	100.4	100.4
Efficiency at Pmin (50/30°C)	%	105.5	108.1	108.9	105.4	107.9	106.8
Efficiency at 30% (30°C)	%	105.7	107.6	103.3	105.3	107.1	106.7
NOx class		5					
Max. central heating temperature	°C	80					
Max. domestic hot water temperature	°C	65					
Max. heat exchanger ΔT	°C	26					
Max. stack pressure at Pmax	Pa	190	200	230	180	220	250
Operating pressure (min – max)	bar	0.8 - 6					
Water resistance at ΔT°C 11	mbar	210	200	210	230	220	250
Water resistance at ΔT°C 20	mbar	80	90	91	100	93	110
STRUCTURAL CHARACTERİSTİCS							
Water Contents	l	18.6	22.9	26.4	32.6	36.9	41.0
Empty weight	kg	195	237	305	358	380	423
Width	mm	600	600	660	710	710	710
Height	mm	1500	1500	1500	1500	1500	1500
Depth	mm	1320	1400	1590	1800	1900	1990
ELECTRİCAL SPECİFİCATİONS							
Power supply voltage	V/Hz	230 / 50					
Protection level	IP	20					
Power consumption	W	320	390	460	550	700	850
WATER AND GAS FİTTİNGS							
Central heating flow outlet		2”		DN 65			
Central heating return inlet		2”		DN 65			
Gas inlet		1 ¼”	1 ½”	1 ½”	2”	2”	2”
Flue gas outlet (Ø)	mm	160		200			
COMBUSTİON							
Type of appliance		B23, C63					
Combustion efficiency at Pmax	%	98.2	98.2	98.3	98.2	98.1	98.2
Combustion efficiency at Pmin	%	98.4	98.4	98.5	98.4	98.4	98.4
Flue gas temperature at Pmax (80/60°C)	°C	80.2	80.5	79.6	80.5	79.3	80.2
Flue gas temperature at Pmin (80/60°C)	°C	66.7	63.8	63.1	65.2	64.7	63.5
Flue gas temperature at Pmax (50/30°C)	°C	55.5	56.8	54.7	54.6	55.7	56.8
Flue gas temperature at Pmin (50/30°C)	°C	33.9	34.5	33.8	35.6	34.6	34.5
Flue gas flow-rate at Pmax	g/s	92	118	145	171	198	224
Flue gas flow-rate at Pmin	g/s	34	42	52	60	68	73
CO_2 at Pmax	%	9.0	9.1	9.1	9.3	9.2	9.3
CO_2 at Pmin	%	8.3	8.1	8.2	8.3	8.2	8.5
CO O_2=0% weighted	ppm	44	51	45	55	53	52
NOx O_2=0% weighted	mg/ kWh	31	30	28	29	31	30

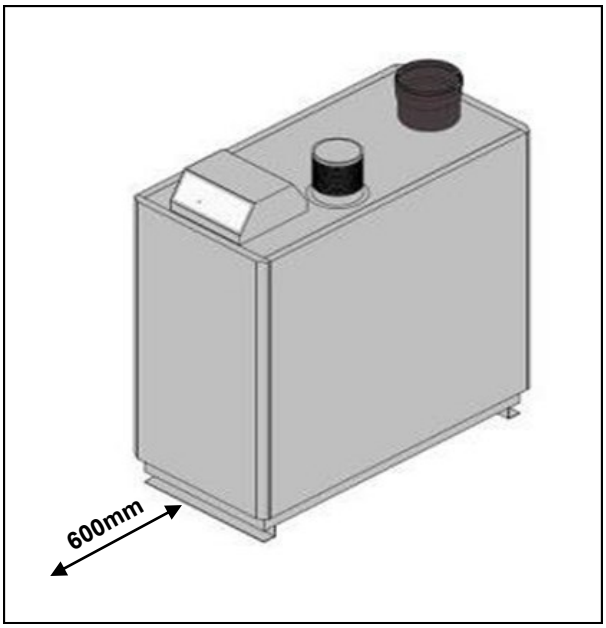
Boiler Dimensions

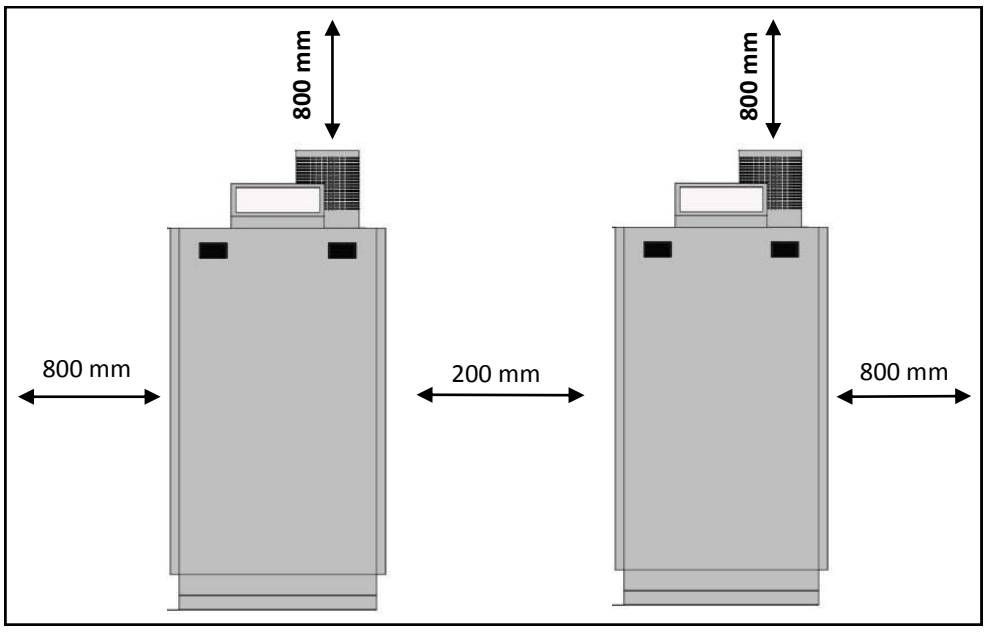


MODEL	A	B	C	D	E	F	G	H	I	K	L	M	N	O	P	Q
604	604	1200	1270	1046	450	1040	178	591	294	110	127	305	R 2”	R 1 ¼”	160	100
605	604	1285	1270	1058	475	1056	178	675	299	110	127	305	R 2”	R 1 ½”	160	100
606	660	1470	1270	1078	505	1090	169	793	338	120	150	305	DN65	R 1 ½”	160	120
607	714	1681	1270	1078	505	1150	195	904	415	192	225	225	DN65	R 2”	200	180
608	714	1776	1270	1078	505	1150	195	999	415	192	225	225	DN65	R 2”	200	180
609	714	1871	1270	1078	505	1150	178	1089	415	192	225	225	DN65	R 2”	200	180

Recommended Minimum Distances







BOILER CLEARANCES

The minimum dimensions as indicated must be respected to ensure good access around the boiler.

Recommended minimum clearances are as follows.

Front: 600mm; except, access doors may be closer, but not less than 200mm and 600mm must still be available for service across the width of the boiler.

Rear: 1000mm or adequate space from the rear of the jacket to make the flue connections and access to the flue sample point, drain connection, flue and any safety or control devices.

Top: **800mm**.

Left side: **800mm**

Right side: **800mm**

Between boilers: **200mm**

Detailed recommendations are contained in the following Standards and Codes of Practice:

BS EN 1212:2005	Chemicals used for treatment of water intended for human consumption. Sodium polyphosphate
BS EN 13076:2003	Devices to prevent pollution by backflow of potable water. Unrestricted air gap. Family A. Type A
BS EN 13077:2008	Devices to prevent pollution by backflow of potable water. Air gap with non-circular overflow (unrestricted). Family A. Type B
BS EN 13959:2004	Anti-pollution check valves. DN 6 to DN 250 inclusive Family E, type A, B, C, and D
BS EN 1567:1999	Building valves. Water pressure reducing valves and combination water reducing valves. Requirements and tests.
BS 6880-2:1988	Code of practice for low temperature hot water heating systems of output greater than 45 kW. Selection of equipment
BS 6644:2011	Specification for the installation and maintenance of gas-fired hot water boilers of rated inputs between 70 kW (net) and 1.8 MW (net) (2nd and 3rd family gases)
BS 5854:1980	Code of practice for flues and flue structures in buildings
BS 6880-1:1988	Code of practice for low temperature hot water heating systems of output greater than 45 kW. Fundamental and design considerations
BS 6880-2:1988	Selection of equipment
BS 6880-3:1988	Installation, commissioning and maintenance
BS EN 13384-1:2015	Chimneys. Thermal and fluid dynamic calculation methods. Chimneys serving one heating appliance
BS EN 13384-2:2015	Chimneys. Thermal and fluid dynamic calculation methods. Chimneys serving more than one heating appliance
PD CEN/TR 1749:2014	European scheme for the classification of gas appliances according to the method of evacuation of the combustion products (types)
BS 2879:1980	Specification for draining taps (screw-down pattern)
BS 7671:2008+A3:2015	Requirements for Electrical Installations. IET Wiring Regulations
IGE/UP/1	Soundness testing and purging of industrial and commercial gas installations
IGE/UP/2	Gas installation pipework, boosters and compressors on industrial and commercial premises
IGE/UP/10	Installation of gas appliances in industrial and commercial premises

INTRODUCTION

The New Condens FS Series boilers are fully automatically controlled, floor standing, fanned, super efficient condensing appliances.
The Siemens LMS14 Boiler Management Unit (BMU) built into the appliance is a comprehensive boiler control unit which provides all supervisory and control functions required for burner operation, space heating and DHW heating. It also offers modular system extensions in the form of integrated communication interfaces.
Through a sophisticated control system combined with premix burner technology and an aluminium heat exchanger, the boilers are capable of high operating efficiencies of 98.1% (gross) and low emissions.
The boilers can draw their combustion air from the room or via ducting from outside.
These boilers are certified to meet the requirements of the EC
Gas Appliance Directive, Boiler Efficiency Directive, EMC, Low Voltage Directive and 2009/125/EC Ecodesign Directive.

SAFETY

Current Gas Safety (Installation and Use) Regulations or rules in force

The appliance is suitable only for installation in GB and IE and should be installed in accordance with the rules in force.

In GB, the installation must be carried out by a Gas Safe Registered Engineer or in IE by a competent person. It must be carried out in accordance with the relevant requirements of the:

Gas Safety (Installation and Use) Regulations

The appropriate Building Regulations either The Building Regulations, The Building Regulations (Scotland), Building Regulations (Northern Ireland).

The Water Fittings Regulations or Water byelaws in Scotland.

The Current I.E.E. Wiring Regulations.

Where no specific instructions are given, reference should be made to the relevant British Standard Code of Practice.

In IE, the installation must be carried out by a Competent Person and installed in accordance with the current Building Regulations and reference should be made to the current ETCI rules for electrical installation.

The boilers have been tested and conform to EN 15502-1 for use with Natural Gas

SAFE HANDLING OF SUBSTANCES

No asbestos, mercury or CFCs are included in any part of the boiler or its manufacture.

FOUNDATION / LOCATION OF BOILER

The boiler must stand on a floor which must be flat, level and of a suitable load bearing capacity to support the weight of the boiler (when filled with water) and any ancillary equipment.

Ideally the boiler should be placed on a plinth exceeding the plan area of the boiler by 75mm on each side and at least 100mm high.

The boiler must not be fitted outside.

GAS SUPPLY

The local gas supplier should be consulted, at the installation planning stage, in order to establish the availability of an adequate supply of gas. An existing service pipe must NOT be used without prior consultation with the local gas supplier.

A gas meter can only be connected by the local gas supplier or by a Gas Safe Registered Engineer or in IE by a competent person.

An existing meter should be checked, preferably by the gas supplier, to ensure that the meter is adequate to deal with the rate of gas supply required. A minimum working gas pressure of 20mbar MUST be available at the boiler Inlet for Natural gas.

Do not use pipes of smaller size than the boiler inlet gas connection.

The complete installation MUST be tested for gas soundness and purged in accordance with the appropriate standards.

Gas Boosters

A gas booster is required if the gas pressure available at the boiler is lower than that required by the boiler manufacturer to attain the flow rate for maximum burner input rating.

Location of the booster requires careful consideration but should preferably be closer to the burner rather than the gas meter. Ventilation should also be considered to ensure ambient temperature do not exceed designed recommendations.

Further guidance is provided in IGE/UP/2.

FROST PROTECTION

The boiler has built into its control system the facility to protect the boiler only against freezing.

The set point for the boilers frost protection can be set via the Siemens LMS Controller

Frost protection is ensured, independent of heat requests or connected plant components. Therefore, boiler control checks frost protection autonomously and causes the burner to be started, if necessary.

Frost protection for the boiler is activated whenever the boiler temperature drops below the frost protection set point.

FLUE INSTALLATION

IMPORTANT. It is the responsibility of the installer to ensure, in practice, that products of combustion discharging from the terminal cannot re-enter the building or any other adjacent building through ventilators, windows, doors, other sources of natural air infiltration, or forced ventilation / air conditioning.

If this should occur the appliance MUST be isolated from the gas supply and labelled as 'unsafe' until corrective action can be taken.

Terminal Position

Due to the high efficiency of the boilers pluming will occur.

Particular care should be taken in the case of large output boiler installations in complying with the requirements of the Clean Air Act.

The flue must be installed in accordance with the appropriate Building Regulations and standards listed on page 8 and in compliance with BS6644. In IE refer to I.S.820:2000.

Boiler Type (PD CEN/TR 1749:2014)

C63 = A room sealed appliance intended to be connected to a separately approved and marketed system for the supply of combustion air and discharge of combustion products. The fan is up stream of the combustion chamber.

B23 = An appliance intended to be connected to a flue which evacuates the products of combustion to the outside of the room containing the boiler. The combustion air is drawn directly from the room. The fan is up stream of the combustion chamber.

IMPORTANT NOTE.

If combustion air is drawn from within the boiler room, ensure no dust or airborne debris can be ingested into the appliance. Dusty concrete flooring should be sealed to reduce the presence of dust. Ideally where possible duct the air supply into the boiler room from a clean source outside the boiler room / building.

Where it is not possible to duct air from outside the boiler, the air inlet guard MUST be used,

FLUE SYSTEM DESIGN

Due to the high efficiency of these boilers, the flue gas temperatures are low and the buoyancy in the stack will be relatively small. The boiler is supplied with an integral fan which is fully matched to the boiler in each case to provide correct combustion air flow and overcome the flue resistance.

The power of this fan is such that there is a large reserve of pressure available to overcome a significant length of flue without affecting the combustion performance of the boiler. The maximum pressure available at the base of the flue to overcome flue resistance is shown in the table below. Calculations should include the resistance of any air ducts used to connect the air inlet direct to outside air. Care should be taken with tall flue systems to ensure excess buoyancy is not created. A negative pressure must not be created at the boiler flue outlet. All horizontal flue lengths must have a fall back to the boiler of 3°

See table below for approximate maximum straight flue length.

The addition of elbows and their positions in the flue will have a significant effect on the maximum allowable flue and air duct lengths. Consult with your flue supplier for detailed design work

Material

With no requirement for buoyancy to discharge flue products and with low flue gas temperatures, single wall flues are suitable for most installations. Care should still be taken to maintain compliance with building regulations and relevant standards.

The flue used should be a suitably approved flue for use on a pressurised condensing flue system. Materials choice includes plastic, aluminium and 316 grade stainless steel. **Unless the flue is manufactured from aluminium, the condensate from the flue must be collected and drained before entering the sump of the boiler** (when employing the vertical combined (cascade) flue outlet header, a flue condensate drain is provided for this purpose).
Advice regarding the availability of proprietary types of flue system can be obtained by contacting Ferroli Ltd. All joints or connections in the flue system must be Impervious to condensate leakage.
Low points in the flue system should be drained using pipe of material resistant to condensate corrosion. All drains in the flue should incorporate a water trap.

Care should also be taken in the selection of flue terminals as these tend to accentuate the formation of a plume and could freeze in cold weather conditions.

Care should be taken to ensure the specification of the chimney is suitable for the application by reference to the manufacturers literature.

MODELS 600	604	605	606	607	608	609
FLUE OUTLET DIAMETER (mm)	160	160	160	200	200	200
STACK PRESSURE (at max. power)	190	200	230	180	220	250
MAX. EQUIV. FLUE LENGTH (m)	35	38	43	47	53	58

WATER CIRCULATION SYSTEM

A circulation pump MUST be connected to the boiler, see below.

The boiler must NOT be used for direct hot water supply. The hot water storage cylinder MUST be of the indirect type.

Single feed, indirect cylinders are not recommended and MUST NOT be used on sealed systems.

The appliances are NOT suitable for gravity central heating nor are they suitable for the provision of gravity domestic hot water.

The hot water cylinder and ancillary pipework, not forming part of the useful heating surface, should be lagged to prevent heat loss and any possible freezing - particularly where pipes run through roof spaces and ventilated underfloor spaces.

The boiler must be vented. There must be no low points between the boiler flow connection and a system vent point, which should be positioned as close as practically possible to the boiler flow connection.

Draining taps MUST be located in accessible positions, which permit the draining of the whole system - including the boiler and hot water storage vessel. They should be at least 1/2" BSP nominal size and be in accordance with BS. 2879. Do not use the boiler drain tap to drain the system as this can induce sludge into the heat exchanger.

The central heating system should be in accordance with the relevant standards listed on page 8.

Due to the compact nature of the boiler the heat stored within the castings at the point of shutdown of the burner must be dissipated into the water circuit in order to avoid overheating. In order to allow pump operation after burner shutdown the boiler control incorporates a pump overrun facility. In order to make use of this, a pump must be supplied from the terminals inside the boiler. **Note**: for pumps requiring greater than 1.0 amp current, they must be connected via a relay.

When sizing pumps, reference should be made to the Hydraulic Resistance Table on page 12 which show the boiler resistance against flow rates, to achieve the required temperature differential.

Flow rates for common systems using either 11°C or 20°C temperature differentials are given in the table below.

Note.

With the boiler firing at maximum rate, the temperature differential should not be less than 10°C. Higher flow rates required for lower temperature differentials could lead to erosion of the heat exchanger water ways.

With the boiler firing at minimum rate, the temperature differential should not be greater than 26°C. Lower flow rates generating higher temperature differentials will lead to lock out of the boiler.

The lower the return temperature to the boiler, the higher the efficiency. At return temperatures of 55°C and below, the difference becomes marked because the water in the flue gases starts to condense, releasing its latent heat.

In installations where all radiators have been provided with thermostatic radiator valves, it is essential that water circulation through the boiler is guaranteed. A mixing header will perform this task. Alternatively this can be best achieved by means of a differential pressure valve, which is installed in a bypass between the flow and return pipes. The bypass should be fitted at least 6m from the boiler, and should be capable of allowing a minimum flow rate to achieve a temperature differential of no greater than 26°C at minimum rate.

Boiler	Water flow rate temp. difference 11°C		Water flow rate temp. difference 20°C	
	l/s	m3/h	l/s	m3/h
604	4.0	14.3	2.3	8.6
605	5.3	19.2	3.2	11.5
606	6.7	24.2	4.0	14.5
607	8.1	29.2	4.9	17.5
608	9.5	34.1	5.7	20.5
609	10.8	38.8	6.5	23.3

Water hardness

With reference to the specific system volume (e.g. when using heating water buffer storage tanks), determine which requirements apply regarding total hardness of the fill and top-up water to VDI directive 2035 and the following table.

If partial softening to 6°dH is insufficient according to the project specific water hardness diagram, use either an additive or use only fully desalinated water (with pH stabiliser).
If a boiler is replaced in an existing system, we recommend installing a dirt trap or filter in the system return, upstream of the boiler. Flush the system thoroughly.

Depending on the materials used, determine whether the addition of inhibitors, partial softening or full desalination is the best method.

Record the filling process (If an additive is used, note this on the boiler). To prevent gas pockets and bubbles, it is essential to fully vent the system at maximum operating temperature.

After 8 to 12 weeks, check and record the pH value. Offer and conclude a maintenance contract.
Once a year, check the system is operating correctly with regard to pressure maintenance, pH value and the volume of top-up water used.

HYDRAULIC RESISTANCE

Boiler	Pressure Drop (mbar)@ Δt 20°C	Pressure Drop (mbar)@ Δt 11°C
604	80	210
605	90	200
606	90	210
607	100	230
608	90	220
609	110	250

WATER TREATMENT

These boilers incorporate Al-Si-Mg alloy heat exchangers. IMPORTANT. The application of any other treatment to this product may render the guarantee of Ferroli Ltd INVALID.

Ferroli Ltd recommend Water Treatment in accordance with Guidance Notes on Water Treatment in Central Heating Systems.

Ferroli Ltd recommend the use of Fernox or Sentinel inhibitors and associated water treatment products, which must be used in accordance with the manufacturers' instructions.
For further information contact:

Fernox Manufacturing Co. Ltd.
Cookson Electronics,
Forsyth Road,
Sheerwater, Woking,
Surrey,
GU21 5RZ
Tel: 0870 8700362 or

Sentinel Performance Solutions.
The Heath Business & Technical Park,
Runcorn,
Cheshire,
WA7 4QX
Tel: 0151 424 5351

It is most important that the correct concentration of the water treatment products is maintained in accordance with the manufacturers' instructions.

If the boiler is installed in an existing system any unsuitable additives MUST be removed by thorough cleansing.

In hard water areas, treatment to prevent lime scale may be necessary - In this instance the use of artificially softened water may be required.

Under no circumstances should the boiler be fired before the system has been thoroughly flushed.

Total Heating Capacity (kW)	Hardness (°F)
≤ 50	None
50 - 200	≤ 20
200 - 600	≤ 15
> 600	< 0,2

VENTILATION

The ventilation requirements of these boilers are dependent on the type of flue system used, and their heat input. All vents must be permanent with no means of closing, and positioned to avoid accidental obstructions by blocking or flooding.

Detail reference should be made to BS. 6644 for inputs between 70kW and 1.8MW (net). In IE refer to the current edition of I.S.820.
The following notes are for general guidance only:

Dust contamination in the combustion air may cause blockage of the burner slots. It is recommended direct connection of the air intake via ducting to clean outside air be used. However, if combustion air is to be drawn directly from the boiler room, the air inlet guard MUST be used.

IMPORTANT NOTE.

If combustion air is drawn from within the boiler room, ensure no dust or airborne debris can be ingested into the appliance. Dusty concrete flooring should be sealed to reduce the presence of dust.

The temperature within a boiler room shall not exceed 25oC within 100 mm of the floor, 32oC at mid height and 40oC within 100 mm of the ceiling.

OPEN VENTED SYSTEM REQUIREMENTS

Detail reference should be made to the appropriate standards listed on page 8.

The information and guidance given below is not intended to override any requirements of the above publications or the requirements of the local authority, gas or water undertakings. The vertical distance between the pump and feed/expansion cistern MUST comply with the pump manufacturer's minimum requirements, to avoid cavitation. Should these conditions not apply either lower the pump position or raise the cistern above the minimum requirement specified by Ferroli Ltd
The isolation valves should be fitted as close to the pump as possible.

The information provided is based on the following assumptions:

An independent open vent/safety pipe connection is made immediately after the system flow pipe connection.
An independent cold feed/expansion pipe connection is made immediately after the open vent/safety pipe connection.
The maximum flow rate through the boiler is based on a temperature difference of 11°C at full boiler output.

The boiler is at the highest point of circulation in the system. Systems designed to rise above the boiler flow tappings will automatically require a minimum static head higher than that shown.

The position of the open vent/safety pipe above the expansion cistern water level is given as a guide only. The final position will depend upon the particular characteristics of the system. Pumping over of water into the expansion cistern must be avoided.

Both open vent/safety pipe and cold feed/expansion pipes must be of adequate diameter to suit the output of the boiler. Refer to Tables below and BS 6644:2005.

Open Flued Installations

If ventilation is to be provided by means of permanent high and low vents communicating direct with outside air, then reference can be made to the sizes below. For other ventilation options refer to BS. 6644. In IE refer to the current edition of I.S.820.

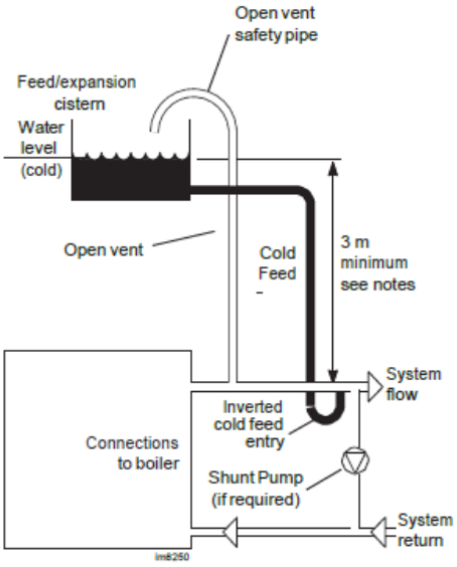
Required area (cm2) per kW of total rated input (net)

	Boiler Room	Enclosure
Low level (inlet)	4	10
High level (outlet)	2	5

Note: Where a boiler installation is to operate in summer months (e.g. DHW) additional ventilation requirements are stated, if operating for more than 50% of time (refer to BS6644).

Room Sealed Installations

A minimum of 2cm2 free area per kW of net heat input at both high and low level is required for boiler rooms. For enclosures refer to BS6644.



With a cold feed head of <8m, the pump must be fitted on the return to the boiler.

This diagram does not show safety valves, water flow switches, etc. necessary for the safe operation of the system.

Open Vent Pipe Sizes

Rated output kW	Minimum bore mm	Nominal Size (DN) in
301 to 600	50	2
Steel pipe sizes complying with medium or heavy quality or BS 1387.		

Cold Feed Pipe Sizes

Rated output kW	Minimum bore mm	Nominal Size (DN) in
301 to 600	38	1 1/2
Steel pipe sizes complying with medium or heavy quality or BS 1387.		

SEALED SYSTEM REQUIREMENTS

Working pressure 6 bar maximum.

Particular reference should be made to BS. 6644 and Guidance note BG01 "Automatically controlled steam and hot water boilers" published by the Health and Safety Executive.

The information and guidance given below is not intended to override any requirements of either of the above publications or the requirements of the local authority, gas or water undertakings.

In general commercial closed pressurised systems are provided with either manual or automatic water make up.

In both instances it will be necessary to fit automatic controls intended to protect the boiler, circulating system and ancillary equipment by shutting down the boiler plant if a potentially hazardous situation should arise.

Examples of such situations are low water level and operating pressure or excessive pressure within the system. Depending on circumstances, controls will need to be either manual or automatic reset. In the event of a shutdown both visual and audible alarms may be necessary.

Expansion vessels used must comply with BS. 4814 and must

be sized on the basis of the total system volume and initial charge pressure.

Initial minimum charge pressure should not be less than 0.5 bar (7.2psi) and must take account of the static head and specification of the pressurising equipment. The maximum water temperatures permissible at the point of minimum pressure in the system are specified in Guidance Note PM5.

When make up water is not provided automatically it will be necessary to fit controls which shut down the plant in the event of the maximum system pressure approaching to within 0.35bar (5psi) of the safety valve setting.

Other British Standards applicable to commercial sealed systems can be found on page 8.

CONDENSATE DRAIN

Condensate drains are provided on the boiler. These drains must be connected to a drainage point on site. All pipework and fittings in the condensate drainage system MUST be made of plastic solvent weld type - no other materials may be used.

IMPORTANT. Any external runs must be insulated to avoid freezing in cold weather causing a blockage.

The routing of the drain must be made to allow a minimum fall of 2.5° away from the boiler, throughout its length.

If the vertical flue header is specified the flue manifold condensate drain connection must also be connected in the same manner.

BOILER WATER CONNECTIONS

The boiler flow and return pipes are terminated with 2 x R2" BSP male connections at the rear of the appliance for the 604 and 605 models and DN65 for the others. Water returning from the system should be connected to the lower header pipe, with the flow water connection coming from a top header pipe.

All flow and return pipework must be independently supported.

Plastic plugs fitted on the open ends of the flow and return pipes must be removed before connecting the system pipework.

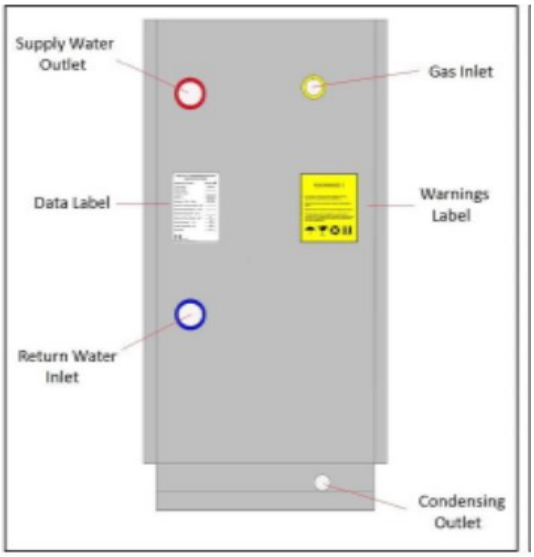
An air vent must be provided immediately after the flow connection.

If installing the boiler onto an existing system it is strongly recommended that the system be thoroughly flushed before connecting the boiler. When connecting to a new system it is still important to flush the whole system in accordance with the relevant standards.

Note.

Connection to the boilers using manifolds must use a reverse return principle to ensure equal flow distribution through both of the modules.

Connection of opposing flow and return points can be made either on the LH side or RH side, dependent upon the particular needs of the boiler installation.



ELECTRICAL CONNECTIONS

Warning: This appliance MUST be earthed.

A PERMANENT mains supply of 230V 50Hz is required. External controls should NOT be wired in series with these mains inputs. Controlling the boiler in this way will prevent the pump over-run sequence and may cause damage to the boiler. The supply wiring MUST be suitable for mains voltage. Wiring should be 3 core PVC insulated cable NOT LESS than 0.75mm2 (24 x 0.2 mm) and to BS. 6500. The fuse rating should be 7A.

Wiring external to the boiler MUST be in accordance with the current I.E.E. (BS7671) wiring Regulations and any local regulations. For Ireland reference should be made to the current ETCI rules for electrical installations

Connection should be made in a way that allows complete isolation of the electrical supply - such as a double pole switch, having a 3mm (1/8") contact separation in both poles, or a plug and unswitched socket serving only the boiler and system controls. The means of isolation must be accessible to the user after installation.

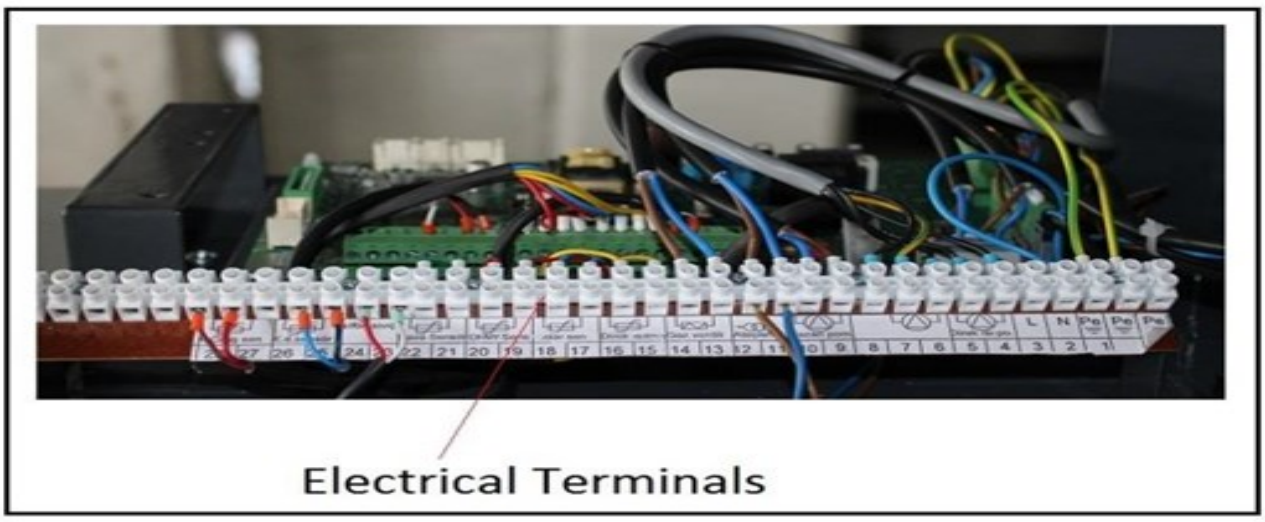
When making mains electrical connections to the boiler it is important that the wires are prepared in such a way that the earth conductor is longer than the current carrying conductors.

WARNING. Sensor cables must be separated from cables in the 230V circuit.

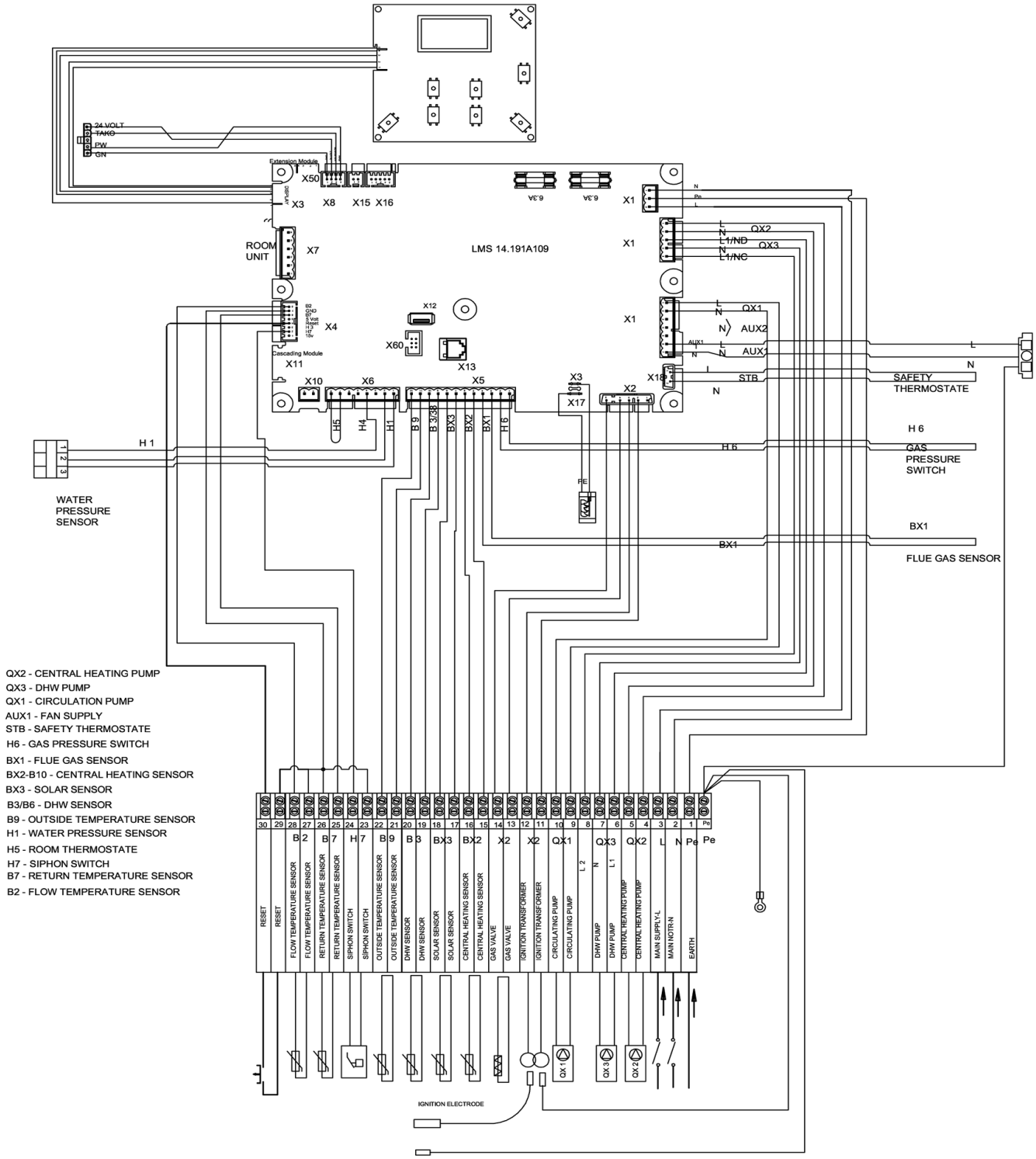
INSTALLING THE MAINS AND CONTROL WIRING

To access the electrical connections remove four screws and lift off the control panel cover.

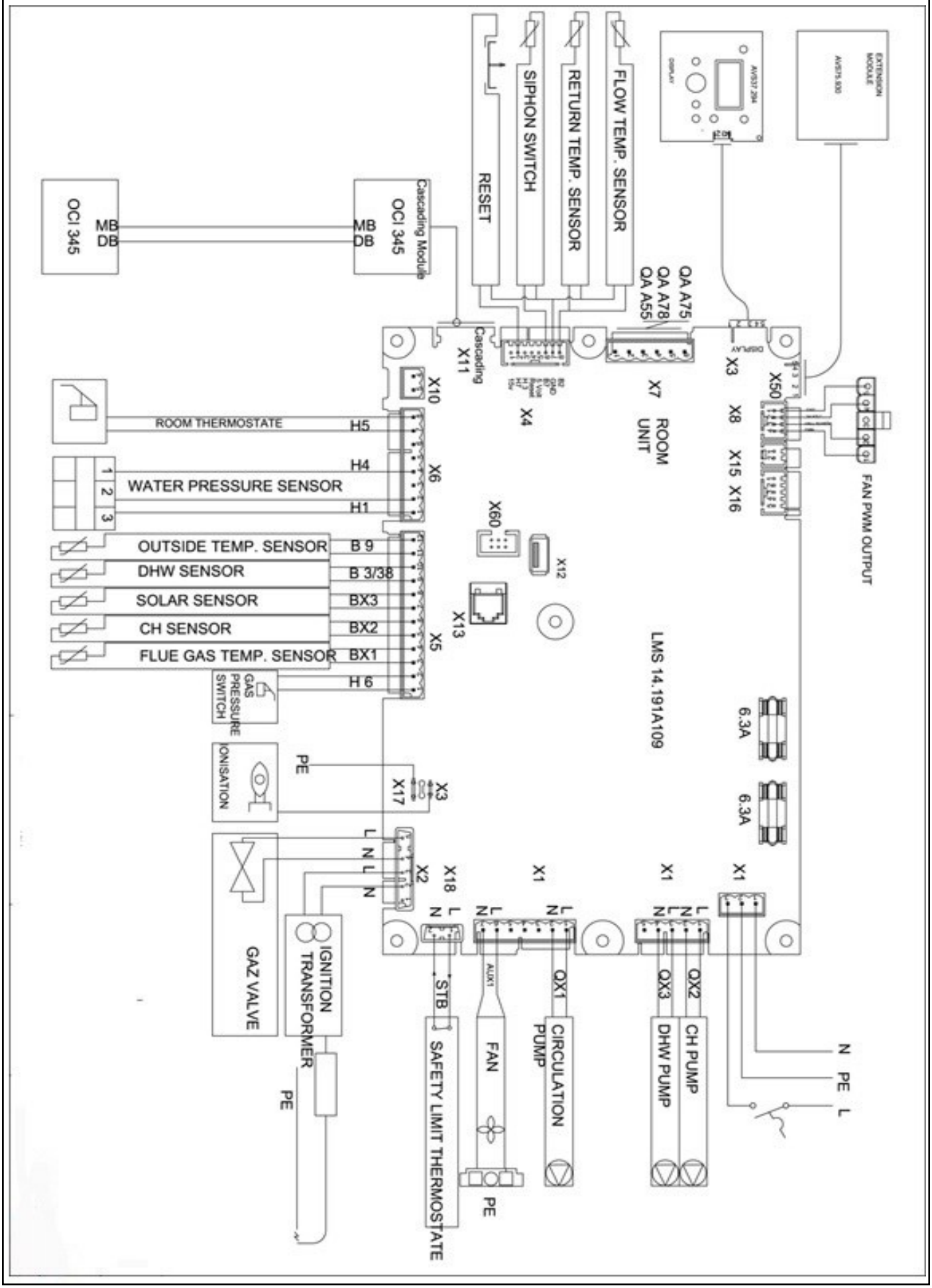
1. Route all 230V circuits in at the rear of the control panel
2. Route all low voltage remote sensor/control cables through a separate grommet.
3. Secure the cables with the cable clamps provided on the main controls panel



Wiring diagram



Sensor locations



COMMISSIONING INSTRUCTIONS

Checks to be made at first lighting and after all maintenance operations that involved disconnection from the systems or an operation on safety devices or parts of the boiler:

Before lighting the boiler

- Open any valves between the boiler and the system.
- Check the tightness of the gas system, proceeding with caution and using an approved leak detection fluid or portable gas detector to detect any leaks.
- Check correct prefilling charge of the expansion vessel. (0.2bar below cold fill pressure)
- Fill the water system and make sure all air contained in the boiler and the system has been vented, by opening the air vent valve on the boiler and any vent valves on the system.
- Fill the condensate trap and check correct connection of the condensate system.
- Make sure there are no water leaks on the system, DHW circuits, connections or the boiler.
- Check correct connection of the electrical system and efficiency of the earth connection.
- Make sure the gas pressure value for heating is that required.
- Make sure there are no flammable liquids or materials in the immediate vicinity of the boiler

Checks during operation

- Switch on the unit.
- Make sure the fuel circuit and water systems are tight with no leaks.
- Check the integrity of the flue and air ducts while the boiler is working. Record the flue pressure @ standby, max and min outputs.
- Check the correct tightness and functionality of the condensate drain system and trap.
- Ensure the water is circulating correctly between the boiler and the system.
- Ensure the gas valve modulates correctly in heating and domestic hot water modes.
- Put the boiler through several ignition sequences to ensure correct firing operation.
- Using a combustion analyser connected to the boiler flue outlet, check that the CO_2 content in the fumes, with the boiler operating at max. and min. output, corresponds to that given in the technical data table for the corresponding type of gas. (See section on gas valve adjustment)
- Make sure the fuel consumption indicated on the meter matches that given in the technical data table on page 5.
- Check the correct programming of the parameters and carry out any necessary customization (compensation curve, power, temperatures, etc.).

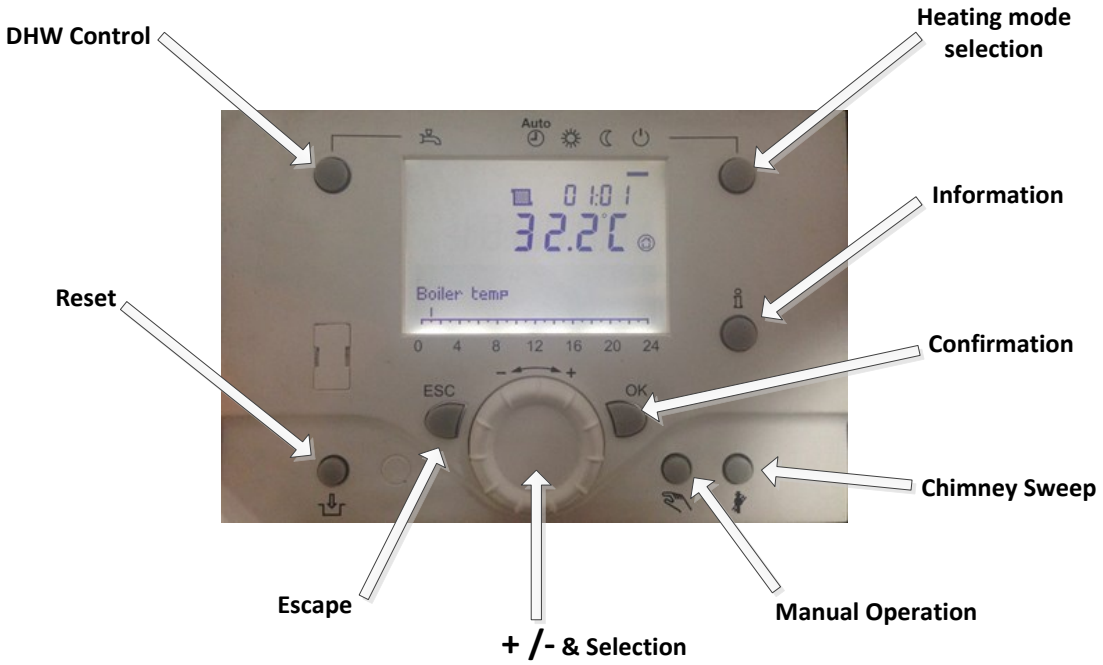
Periodical inspection

To ensure correct operation of the unit, it is necessary to have an annual inspection carried out by qualified personnel.

- Check and clean heat exchanger with suitable products if dirty or clogged
- Check and clean burner (do not use chemical products or wire brushes)
- Check and clean electrodes, which must be free of deposits and correctly positioned
- Check seals and gaskets (burner, sealed chamber, etc.)
- Check and clean sludge filters and system filters
- Check, clean and fill condensate drain traps
- Check wiring, contacts, electrical actuators
- Check and clean generator air inlets and boiler room air intakes
- Check and clean fume evacuation duct-manifold-flue system.
- Check expansion tank and prefilling pressure
- Check for correct and stable system water pressure, ensuring conformity with the required working pressure.

SIEMENS

Boiler Management Unit LMS 14



Commissioning

Burner set up and flue gas analysis

Flue gas analysis should be carried out at maximum and minimum rate. To put the boiler in test mode:-

- Press and hold the Heating mode selection button for five seconds. This will fire the boiler and access '304:controller stop' function. (Fig.1)
- Press the information button once. (If any fault codes remain within the units' memory the information button will need to be pressed again until a percentage figure is shown on the screen). (Fig.2)
- The display now shows the boilers' power output as a percentage.
- Press the confirmation button once. The figure will now flash intermittently.
- Rotate the '+/- selection' dial until the figure reads 100%. (Fig.3)
- Press the confirmation button once more to save this value.
- To reduce the boiler output to minimum press the 'confirmation' button once. The display will flash.
- Rotate the '+/- selection' dial until the display reads 0%.
- Press the confirmation button to save this value. (Fig.4)
- To exit from test mode press 'Escape' then press and hold the 'Heating mode selection' key for five seconds.

Fig.1

Fig.2

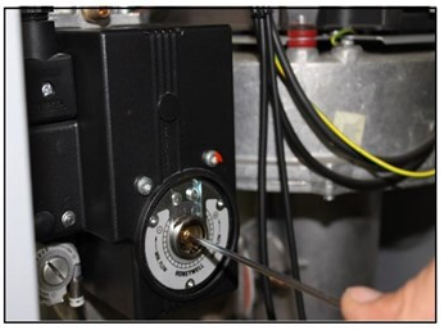
Fig.3

Fig.4

GAS VALVE ADJUSTMENT

Maximum rate adjustment

- Switch the boiler on and operate for 10 minutes.
- To ensure the boiler operates at maximum rate without modulating follow the instruction on page 19.
- Insert the Flue Gas Analyser (FGA) probe into the test point.



- Remove the plastic cover from the gas valve to gain access to the adjustment screw.
- Using a 4mm Allen key adjust as necessary to achieve the correct CO_2 reading shown in the table below. (Clockwise to decrease, anti-clockwise to increase)

Minimum rate adjustment.

- Adjust the modulation rate to minimum (0%) as described on page 19.
- Allow combustion and flame to stabilise then compare CO_2 reading to that given in the table below.

- To adjust, remove adjustment cover with a flat blade screwdriver.
- Using a 40Torx driver adjust CO_2 (Clockwise to increase, anti-clockwise to decrease) to that given in the table below.
- Replace covers.

Emissions Values				
	CO_2	**NO_x**	**CO**	**CO/CO_2**
Minimum	9%	< 39 ppm	<100 ppm	<0.004
Maximum	9.50%	< 39 ppm	<100 ppm	<0.004

SAFETY

The law requires that any service work must be carried out by a Gassafe Registered Engineer. In IE service work must be carried out by a competent person.

WARNING.

Always turn off the gas supply at the gas service cock. Switch off and disconnect the electricity supply to the appliance and any external controls before servicing or replacing components.

IMPORTANT

After completing the servicing or replacement of components always:

Test for gas tightness

Test the burner manifold flanges for soundness.

This can be done with leak detection spray whilst operating the boiler. The gas valve and controls must be shielded from the spray.

Check the water system is correctly filled and free of air. Air in the boiler could cause damage to the heat exchanger. For this reason if an automatic air vent is fitted it must never be shut off.

Check the inner front and outer jacket panels are correctly fitted.

With the system hot examine all water connections for soundness.

Check the gas rate and measure the combustion CO/CO2 content. Refer to page 19 for reference on how to force the burner to maximum and minimum gas rates.

The CO/CO2 ratio of the flue gas on each module should not be greater than 0.004 ratio. The CO2 values should be correct to the figures on page 20.

Carry out functional checks as appropriate.

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HANDING OVER

ROUTINE OPERATION

Full instructions covering routine lighting and operation of the boiler are given on the Lighting and Operation Instruction section of this manual.

Draw the attention of the boiler owner or his representative to the Lighting and Operating Instructions. Give a practical demonstration of the lighting and shutting down of the boiler.

Describe the function of the boiler and system controls and show how they are adjusted and used.

Hand these Installation and Servicing Instructions/User's Instructions and Log book to the customer and request him to keep them in a safe place for ready reference. For IE, it is

necessary to complete a "Declaration of Conformity" to indicate compliance to the appropriate standard.

IMPORTANT

Point out to the owner that the boiler must have regular maintenance and cleaning, at least annually, in order to ensure reliable and efficient operation. Regular attention will also prolong the life of the boiler and should preferably be performed at the end of the heating season.

After servicing, complete the service section of the log book and return to the owner or their representative.

Recommend that a contract for this work should be made with the regional gas authority or a Gas Safe Registered Engineer. In IE servicing work must be carried out by a competent person.

SERVICING INSTRUCTIONS

To ensure the continued safe and efficient operation of the appliance it is recommended that it is checked at regular intervals and serviced as necessary. The frequency of servicing will depend upon the installation condition and usage but should be carried out at least annually.

Ferroli Ltd does not accept any liability resulting from the use of unauthorised parts or the repair and servicing of appliances not carried out in accordance with the Company's recommendations and specifications.

Note.

Some aluminium oxide build-up within the heat exchanger assembly is quite usual with this type of condensing boiler. Though removal and cleaning is recommended annually, the heat exchanger, sump and condensate trap must be inspected and cleaned after a maximum of 2 years operation.

Light the boiler and carry out function checks, noting any operational faults.

Run the boiler for 10 minutes and then check the gas consumption rate. Refer to Technical Data Table. To force the burner to maximum and minimum rates refer to page 19.

For correct boiler operation the CO/CO ratio of the flue gas should not be greater than 0.004 ratio and the CO2 values should be correct to the figures given on page 20 of this manual. If this is the case and the gas input is at least 90% of the nominal, then no further action need be taken. If not proceed to page19 for guidance.

Remove and inspect the fan/venturi assembly.

Remove the burner manifold and inspect the electrodes and sight glass.

Remove and clean the burner.

Inspect the heat exchanger through the burner opening. Optionally remove the inspection covers on the side of the heat exchanger. If there are signs of aluminium oxide build up, spray water down the flue ways taking care not to get water on the gas valve and controls.

Clean the condensate trap.

Check that the flue terminal and air inlet are unobstructed and that the flueing and ducting are correctly sealed.

Put the boiler back into normal operation.

Notes

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