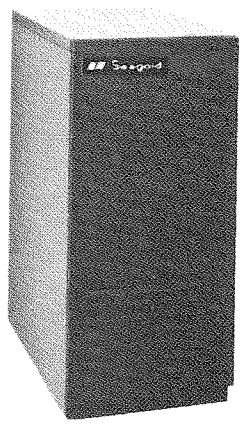

broag - remeha
Advanced boiler technology

Seagold 1A HR FULLY CONDENSING ATMOSPHERIC GAS BOILER

Technical information Gas 1A HR fully condensing boiler

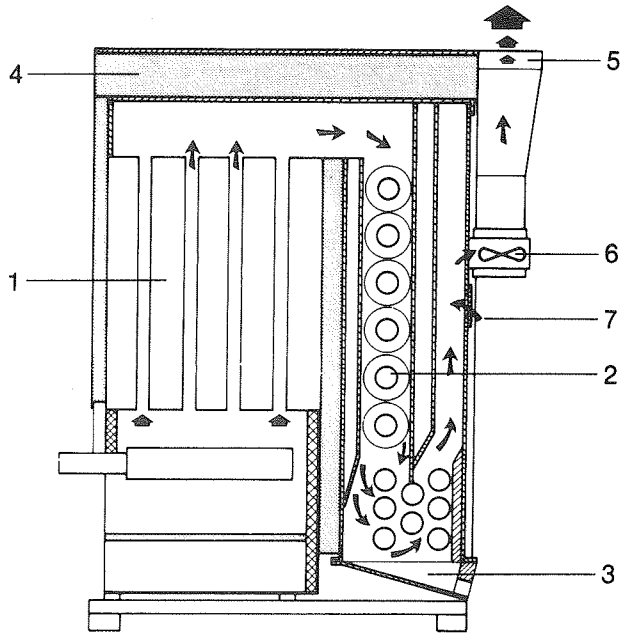


Gas 1A 5HR Section
Output 68,000 Btu/hr
20 kW

Gas 1A 7HR Section
Output 102,000 Btu/hr
30 kW

Technical specification of 1A5 and 1A7

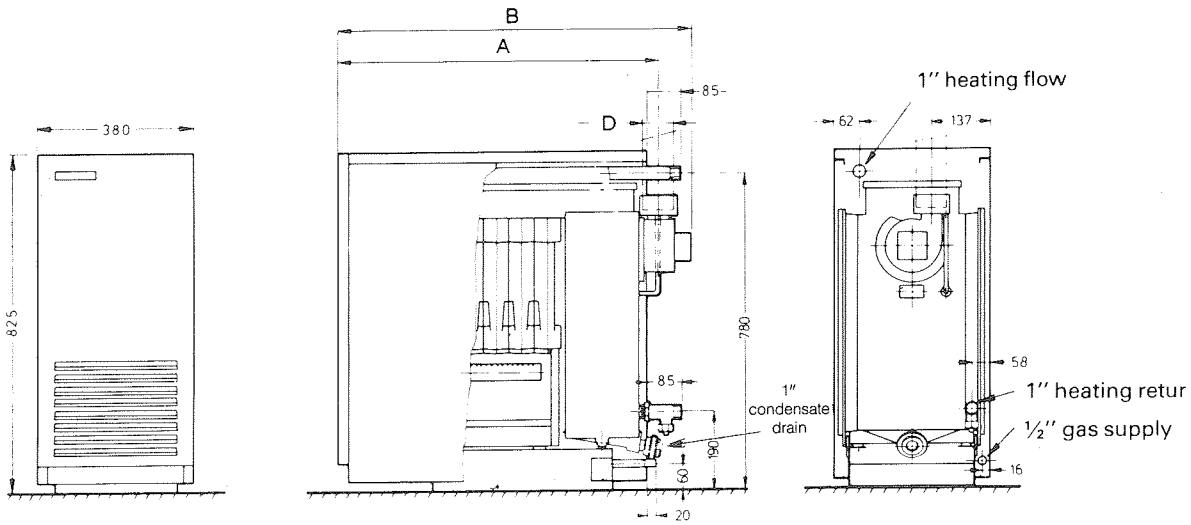
- Nominal capacity 20 kW and 30 kW
- Cast iron primary heat exchanger
- Aluminium secondary heat exchanger with corrosion proof surface treatment
- Air cooled flue gas fan to prevent overheating
- Adjustable delivery head of fan
- Maximum water temperature up to 110°C
- Built in pump circuit
- Built in circulation pump with adjustable delivery head
- Complies with GIVEG-HR mark
- Natural gas burner pressure 6" w/g
- Maximum gas inlet pressure 20" w/g
- Minimum operating overpressure 0.8 bar
- Maximum operating overpressure 4 bar
- Combined temperature and pressure gauge
- Atmospheric burners (aerated bar)
- Adjustable boiler thermostat 25°–95°C
- ½" drain cock
- 24 volt thermo electric control and safety equipment
- 220/240 V-15 VA transformer
- Thermo-electric contact breaker including low water safety cut out
- Grey/Red case with protective film



Operating principles

1-Waterways in cast iron heat exchanger
2-Waterways in aluminium heat exchanger
3-Condensate collection
4-Insulation
5-Flue outlet
6-Flue fan
7-adjustable air inlet for dilution of flue

Broag Ltd. Seagold Boilers, Molly Millars Lane, Wokingham, Berks. Telephone: 0734-783434 Telex: 849137 Fax: (0734) 786977
Midlands Branch: Unit 3, Kestrel Close, Quarry Hill, Ilkeston, Derbyshire DE7 4QQ Telephone: (0602) 440778 Fax: (0602) 440588

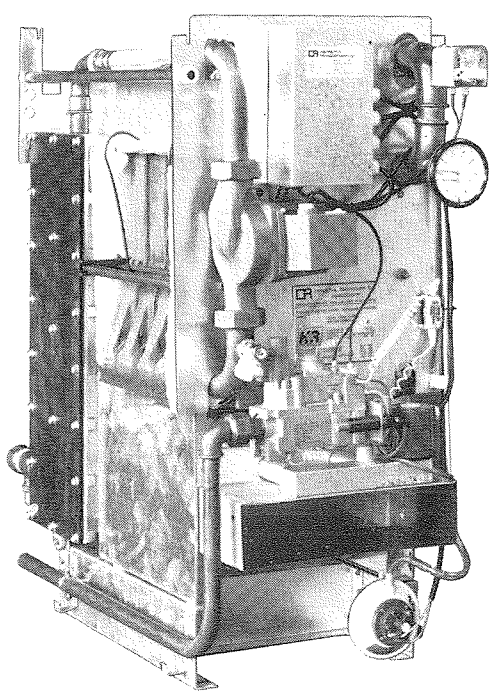


front side back

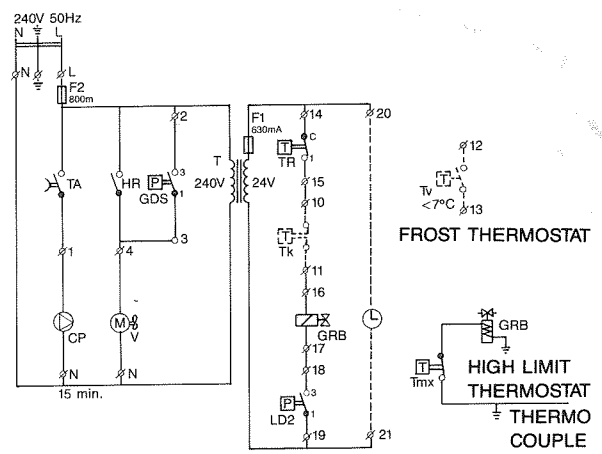
No. of sections	A	B	Ø D
5	743	870	100
7	863	990	100

No of Sections	Boiler output (water temp. 70°C) kW	Btu/hr	Gas input kW	Gas input f^3/hr	Burner pressure ins w/g	mm w/g	Injector Diam. mm	Water Resistance t=20°C m/bars	Water content litres	Weight kg
5	20.2	68,942	23.4	80	4.1	103	2.8	21	11	115
7	30.3	103,413	35.0	120	4.5	113	3.3	48	14	135

Inside the insulated jacket of a 1A HR boiler



1A HR wiring diagram
220/240 volt 5 amp supply



CP	- Circulating Pump	TA	- Relay Contact
F	- Fuse	Tk	- Room Thermostat*
GDS	- Gas Pressure Switch	Tmx	- High Limit Thermostat
GRB	- Gas Valve	TR	- Boiler Thermostat
HR	- Relay	Tv	- Frost Thermostat
LD2	- Air Pressure Switch		- Fan Motor
T	- Transformer	ϕ	- Wiring Terminals

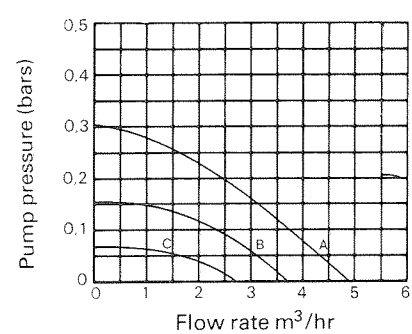
* not supplied or wired

Space Reqd around boiler

FRONT - 700mm
LHS - 150mm
RHS - 700mm
REAR - 330mm

A = Maximum speed maximum flow rate
B = Minimum speed maximum flow rate
C = Minimum speed minimum flow rate

Pump performance graph



GAS APPLIANCE

SEAGOLD GAS 1A HR BOILER

INSTALLATION AND SERVICING INSTRUCTIONS

CONTENTS

GENERAL INSTALLATION REQUIREMENTS

The installation of the boiler must be in accordance with the relevant requirements of the Gas Safety Regulations, Building Regulations, I.E.E. Regulations and the byelaws of the Local Water Undertaking. It should also be in accordance with any relevant requirements of the local Gas Region and Local Authority and the relevant recommendations of the following documents.

BRITISH STANDARD CODES OF PRACTICE

CP 331 Installation of pipes and meters for town gas.
Part 3 - Low pressure installation pipes.

CP 332 Selection and installation of town gas space heating.
Part 3 Boilers of more than 150,000 Btu/h (44 kW) and up to 200,000 Btu/h (586 kW) output.

CP 341 300 - 307 - Central heating by low pressure hot water.

CP 342 Centralised hot water supply.
Part 1 - Individual dwellings.
Part 2 - Buildings other than individual dwellings.
BS 5854 - Flues and flue structures in buildings.

BRITISH GAS PUBLICATION

"Flues for Commercial and Industrial gas fired boilers and air heaters".

GAS SAFETY REGULATIONS 1972

It is the law that all gas appliances are installed by competent persons, e.g. Corgi, in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution. It is in your own interest, and that of safety, to ensure that the law is complied with.

LOCATION

The location chosen for the boiler(s) must permit the provision of a satisfactory flue system(s) and an adequate air supply. The location must also provide adequate space for servicing and air circulation around the boiler.

The boiler must be installed on a level non-combustible surface that is capable of adequately supporting the weight of the boiler(s) when filled with water and any ancillary equipment.

Any combustible material adjacent to the boiler(s) and the flue system(s) must be so placed or shielded as to ensure that it does not exceed a temperature of 65°C (150°F). Further details regarding boiler location are given in CP 332.3.

GAS SUPPLY

Service Pipes

The local Gas Region 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 Region.

Meters

A gas meter is connected to the service pipe by the local Gas Region or a local Gas Region contractor. An existing meter should be checked, preferably by the Gas Region to ensure that the meter is adequate to deal with the rate of gas supply required.

Installation Pipes

Installation pipes should be fitted in accordance with CP 331.3. Pipework from the meter to the boiler(s) must be of adequate size. Do not use pipes of a smaller size than the boiler gas connection. The complete installation must be tested for soundness as described in the above code.

Boosted Supplies

Where it is necessary to employ a gas pressure booster, the controls must include a low pressure cut-off switch at the booster inlet. The local Gas Region must be consulted before a gas pressure booster is fitted.

FLUE SYSTEMS - General Guidance

Detailed recommendations for flueing are given in the British Gas Publication "Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters".

Reference should also be made to CP 332.3 where applicable. The boiler must be flued in an individual flue system. The boiler is supplied with an integral flue fan. Material should be mechanically robust, resistant to internal and external corrosion, non-combustible and durable under the conditions to which they are likely to be subjected.

Formation of condensation within the flue should, wherever possible, be drained back to the boiler. This is an important factor in the design of the flue system.

Where this is not possible provision should be made for condensate to flow freely to a point in which it can be released, preferably into a gully. The condensate pipe from the flue to the disposal point should be of non-corrodable material of not less than 22mm ($\frac{3}{4}$") size.

For individual boiler installations

The basic minimum effective area requirements of the openings are as follows:-

Position of opening(s)	Air direct from outside
High level	4.5 cm^2 per kW (1 in^2 per 5,000 Btu/h)
Low level	9 cm^2 per kW (2 in^2 per 5,000 Btu/h)

Air supply by Mechanical Ventilation

The supply of air to a space housing the boiler(s) by mechanical means should be by mechanical inlet with natural or mechanical extraction. Mechanical extract ventilation with natural inlet must not be used.

Where a mechanical inlet and a mechanical extract system is applied, the design extraction rate should not exceed one third of the design inlet rate.

The requirements for air supply by mechanical ventilation are given in CP 332.3, BS 5720, the British Gas Guidance Notes mentioned above.

Note: For mechanical ventilation systems an automatic control should be provided to cut off the gas supply to the boiler(s) in the event of failure of air flow in either inlet or extract fans.

WATER CIRCULATION SYSTEM

Detailed recommendations for the water circulation system are given in CP 332.3 and CP 341. An integral pump is supplied as standard, the performance chart for which is shown on page 16.

In a combined central heating and hot water system, the hot water storage vessel must be of the indirect cylinder or calorifier type. The hot water storage vessel should be insulated, preferably with not less than 75 mm (3") thick mineral fibre, or its thermal equivalent.

Circulating pipework not forming part of the useful heating surface should be insulated to help prevent heat loss and possible freezing, particularly where pipes are run through roof spaces and ventilated cavities.

Cisterns situated in areas which may be exposed to freezing conditions should also be insulated. Insulation exposed to the weather should be rendered water-proof.

Draining taps must be located in accessible positions which permit the draining of the whole system, including the boiler and hot water storage vessel.

ELECTRICAL SUPPLY

External wiring must be in accordance with the I.E.E. Regulations and any local regulations which apply. Wiring must be completed in heat resistant cable of at least 1.5 mm^2 cross-sectional area, and capable of carrying a minimum electrical load of 5 amps.

Boilers are normally supplied for 230/250 volts, 50 Hz. Fuse rating is 5 amp. The wiring must be clipped away from hot areas. Control box fuse 2 amps. The wires on the incoming mains must be cut so that the earth lead is the longest and will therefore be the last to be disconnected should cable be accidentally pulled from box connection.

The method of connection to the mains electricity supply must facilitate complete electrical isolation of the boiler(s) and the supply should serve only the boiler(s). The method of isolating should be provided adjacent to the boiler(s) in a readily accessible position.

Further details regarding connection to the electricity supply are given in CP 332.3.

INSTALLATION OF SEAGOLD GAS 1A HR BOILERS

GENERAL

Location:

The Seagold Gas 1A HR series boiler is equally suitable for location in basement or rooftop plant rooms and will operate efficiently in either situation. Because of the quiet operation offered by the atmospheric gas burners, the boilerroom can be acceptably sited adjacent to occupied areas.

Adequate access to the boilerroom should be provided to allow for boiler blocks to be offloaded and positioned. Boilers and ancilliary equipment not being installed on delivery should be protected from weather and adverse site conditions.

Builders Work:

A special boiler base is not essential for the Seagold Gas 1A HR series boilers, and they may be mounted directly on a plantroom floor, provided that it is level, of fire-proof construction and suitably stressed to withstand the boiler and ancilliary equipment when charged with water. For weights, etc. see technical data page 16.

Should a base be desired, an indication of the recommended dimensions are given in the diagram shown on page 16.

Access for Servicing:

To facilitate efficient servicing of boilers and component parts, the recommended clearance areas indicated in the diagram shown on page 17 should be observed.

Boiler House Ventilation:

Fresh air essential for combustion and ventilation should be provided through high and low level openings to the atmosphere. These apertures must be of sizes not less than those indicated in the table on page 5.
Dimensions given are for unobstructed openings.
If a grille is to be used, the manufacturers free area allowance should be taken into consideration.

A high level ventilation grille should be installed as close to the ceiling as possible. On exposed boiler rooms, possibly on rooftops, it is advisable to have ventilation grilles on at least two sides to minimise wind pressure conditions. Low level vents should be sited 12" approximately above the finished floow level, in order to avoid blockage and flooding, and as close as is practicable to the boiler front so as to minimise draughts.

For ventilation requirements see Page 5.

Multiple Boiler Installation

The versatile capability of the Seagold Gas 1A HR series boiler renders these units suitable for multiple installations. Multiple installations can be made with boilers side by side and can be adapted to operate on a seasonally varied programme, with individual boilers adjusted accordingly. For example, in a three boiler installation, the No. 1 boiler could be utilised to provide normal summer loading with boilers No. 2 and No. 3 only being introduced for winter duty.

CONNECTION OF BOILER(S) TO FLUE SYSTEM

The flue connection from the boiler to outside air or into a chimney can be provided in aluminium of a diameter not less than the flue connection on the boiler. The boiler will normally operate satisfactorily if a 90° bend is fitted directly on the flue spigot, providing the horizontal run is very short, but suggest you contact our Head Office for technical advice. The total length of flue should not exceed 70 metres.

To minimise condensation and its consequences, insulation is recommended for flues and chimneys wherever possible. Access covers for cleaning should be provided at bends. Refer to British Gas Publication "Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters" (1M/11) and also BS 5854 and CP 332.3 for further information.

The flue fan is an integral part of the boiler and the flue pipe is to be connected to the flue outlet of the boiler. The sealing of the spigot and socket connection should be carried out by using a suitable caulking string and a suitable cold caulking compound.

Condensate Drainage

Should an existing chimney be utilised a survey of the chimney must be made to ensure that there are no restrictions, blockages, or right angle bends. A re-used chimney should be swept clean and lined. Where condensation is likely, depending on the length and exposure of the external chimney, an internal liner must be fitted. Alternatively, provision for draining condensate should be made at the base of the chimney, mindful of its corrosive action.

Gas Connections

Prior to the connection of any gas boiler to existing supplies, the local Gas Authority should be consulted to ensure that an adequate pressure and supply is available at the boiler's maximum output. Further a change of gas tariff may be of benefit to the end user. Under no circumstances should a gas connection be made to a smaller sized gas supply than the connection to the boiler.

A gas service tap and union must be fitted upstream of the gas train to facilitate removal of the gas controls. These are not supplied as standard.

The gas supply piping should be in black, mild steel or galvanised iron and conform to the British Gas Safety Regulations of 1972. All supply lines and control valves must be pressure tested for leaks and BROAG recommend the installation be undertaken by a Company registered with CORGI. Details of CORGI Register of Installers is available at most Gas Showrooms.

Water Connections

Two BSP male 1" threads are provided at the rear of the boiler for flow and return connections. Relief valves etc. must be fitted on the pipework in accordance with B.S.C.P. 332 Part 3.

Condensate Drainage

A condensate discharge pipe complete with a trap fitted close to the boiler must be provided to carry the condensate to the nearest drain. This must be in a material approved by the Gas Council and must comply with two basic requirements, i.e. fire proof and resistant to the corrosive action of the condensate.

The pipe must fall away from the boiler at a rate not less than 50mm per metre run.

Electrical Connections for Gas 1A HR

The Gas 1A HR series boiler is prewired to include for the operation of all controls in the correct ignition and shutdown sequences. These include flame detection,, thermostatic control, safety shut-off, flue fan failure, and pump operation.

The electrical installation must conform to the I.E.E, Regulations for buildings and also to Local Authority requirements. When installation is complete the circuit must be tested for polarity, earthing and continuity. Indicating lamps must be tested for satisfactory operation. The electrical wiring should be connected to the boiler as shown in electrical wiring diagram.

ELECTRICAL WIRING DIAGRAM FOR GAS 1A HR

SEE PAGE 16

WATER CIRCULATION SYSTEM

General

The maximum operating temperature of the Gas 1A HR series boiler is 95°C (203°F) although it is not recommended to to regard this temperature as a design operating temperature. The boiler is supplied with an integral pump. The pump must be in operation at all times when the boiler is in use. The use of horizontal pipe runs should be avoided wherever possible in order to prevent air collecting in the system. If horizontal runs are unavoidable, pipe runs should rise upwards in the direction away from the boiler.

Pressure Relief Valve, Open Vent Pipe, Cold Feed Pipe, Altitude Gauge (Head Gauge) and thermometers should be fitted in accordance with CP 332.3.

COMMISSIONING AND TESTING

Electrical Installation

Checks to ensure electrical safety should be carried out by a competent person.

Gas Installation

The whole of the gas installation, including the meter, should be inspected and tested for soundness and purged in accordance with the recommendations of CP 331.3. A test for soundness must be carried out of the installation pipework with the boiler gas service tap in the open position. This will also test main solenoid valve for complete shut off.

When the boiler is commissioned, the following readings should be taken:

* Gas pressure at burner manifold
* CO reading
* CO_2 reading
* Temperature of flue products
* Amount of gas consumed through meter

From the above the combustion efficiency of the boiler can be calculated, plus boiler input and output.

Water Circulation System

The whole of the system should be thoroughly flushed out with cold water without the pump in position. Ensure that all valves are open. With the pump fitted, the system should be filled and air locks cleared. Vent the radiators and check for water soundness.

Light the boiler as detailed

Lighting the boiler

Before commencing to light the boiler ensure that the water system is fully operational.

Lighting procedure

WARNING: If the pilot light is extinguished either intentionally or unintentionally, no attempt should be made to relight the gas until at least three minutes have elapsed.

1. Open all gas valves to the boiler
2. Ensure that the boiler thermostat is set to the required temperature
3. Switch on circulation pump
4. Remove boiler front panel
5. Ensure that the mains electrical supply is switched off, and that the ON/OFF switch on the boiler is in the OFF position (indicated by 0)
6. Light pilot burner by pushing and holding in the WHITE button on the multifunctional control and applying pressure to the Piezo igniter button. When the pilot is alight keep button pushed fully in for a further 20 seconds. After this period release button and the pilot should remain alight. If the pilot is extinguished push in and release the RED stop button, wait three minutes, then repeat Step 6.

   If the pilot is extinguished again, turn OFF all gas valves and contact your local Seagold Service Engineer whose address is on the label attached to the boiler.

7. Switch ON electrical supply to the boiler, and switch boiler ON/OFF switch to ON position (indicated by 1). The boiler should now light.

   * Ensure circulating pump is working
   * Test for gas soundness around boiler gas components using sense of smell and leak detection fluids
   * Adjust main burner pressure as detailed in gas rate adjustment on page 13.

8. Check appearance of flames in order to establish that there is adequate air for combustion
9. Check operation of flame failure device
10. Check that the boiler thermostat and all automatic controls are operating satisfactorily. Re-adjust controls to appropriate settings. Check for correct operation of air pressure switch, i.e. remove air connection, and burner should be extinguished
11. Allow the water system to reach maximum working temperature and examine for water soundness. Gas, electricity and water should then be turned off and the water system rapidly drained whilst still hot to remove any remaining debris. The system should again be filled, cleared of air locks, and examined for water soundness.

12. If the boiler is put out of service, close the main gas service tap and switch off the switch in the electricity supply line

13. If there is a smell of gas in the boiler room, close the main gas service tap and notify the maintenance department or the licensed specialist company in the meantime

Because of the risk of sparking, do not touch electric switches, equipment etc. Do not use a naked light or smoke

Gas Rate Adjustment

Set the gas rate at each multifunction valve in turn. Fit 'U' tube to pressure nipple on burner manifold. Remove pressure regulator cap screw from the appropriate valve. Switch on burner, allow pressure to settle for 3 minutes then adjust screw by screwing down to increase or up to decrease until the desired pressure is attained.

When complete check the gas rate on the meter.

$$\text{Gas Rate} = \frac{\text{Nominal Heat Input (Gross Btu/h)}}{\text{Calorific value (Btu/ft3)}}$$

Balancing Water Circulation System

The system should be balanced by regulating the flow rate of the pump and the water flow rate through individual radiators of circuits to ensure a satisfactory water temperature at each radiator

User's Instructions

Every boiler must be earthed

On completion of every boiler installed, a set of user's instructions must be handed to the user or the purchaser. To ensure economic and efficient operation of the system, it is important that the installation is inspected and serviced at least once a year by a competent servicing company, i.e. BROAG LIMITED, Local Gas Region, or a Corgi registered company.

Steps must be taken to safeguard the system against frost; this may include the fitting of a frost thermostat set at approximately 4°C.

GENERAL

Maintenance: Once BROAG's own Commissioning Engineers or a reputable service company have commissioned the boiler and its immediate installation, a programme of regular servicing and inspection visits

is essential to ensure that the boiler continues to provide the end user with trouble free continuity of operation, and maintain minimum economic fuel costs.

The installer should leave attached to the boiler(s) on a permanent card(s):-

(a) The date of installation, and

(b) The name and address of the installer

SERVICING:

1. Switch off the gas and electrical supply
2. Remove the front of the boiler casing
3. Remove the top of the boiler casing
4. Slide out complete burner assembly after removing the bolts holding the burner carrier plate, releasing union to gas combination control, unplug the electrical wiring to gas valve
5. Remove top insulation
6. Remove the boiler top cover on the flue hood, brush out the flue ways with brush supplied (short haired nylon brush)
7. Clean (if necessary) the aluminium heat exchanger after removing the guiding plates, by thoroughly flushing with (hot) water. Afterwards brush with long haired nylon brush and flush again.
8. Check the fan blades for dust and if necessary clean.
9. Clean the condensate collector:
   Disconnect the threaded joint and clean the discharge opening. After reconnecting flush the whole secondary heat exchanger.
10. Clean the burners.
11. Brush or vacuum boiler bottom plate.

Reassemble in reverse order and commission.

FAULT FINDING CHART

Pilot Light Extinguishes:-

a. Pilot light is too small -
more gas is needed; use the adjustment screw above the pilot light gas tube.

b. Pilot light is too big -
less gas is needed; use the adjustment screw above the pilot light gas tube.

c. Thermo couple voltage is too small (min 7mV) -
thermo couple is defective.

d. Gas pressure fails -
wait until gas pressure sets right and light the pilot again.

e. The boiler is insufficiently filled up -
check the water pressure and fill up the installation.

f. Pump is defective -
check the pump.

Main Burner Fails to Light

a. The fuse in the transformer 220/240V is not intact -
after disconnecting the electrical supply replace the fuse (100mA slow).

b. Pilot does not light.

c. Electrical supply fails - the boilers will start automatically.

d. The thermostats are not set on the right setting or do not require heat.

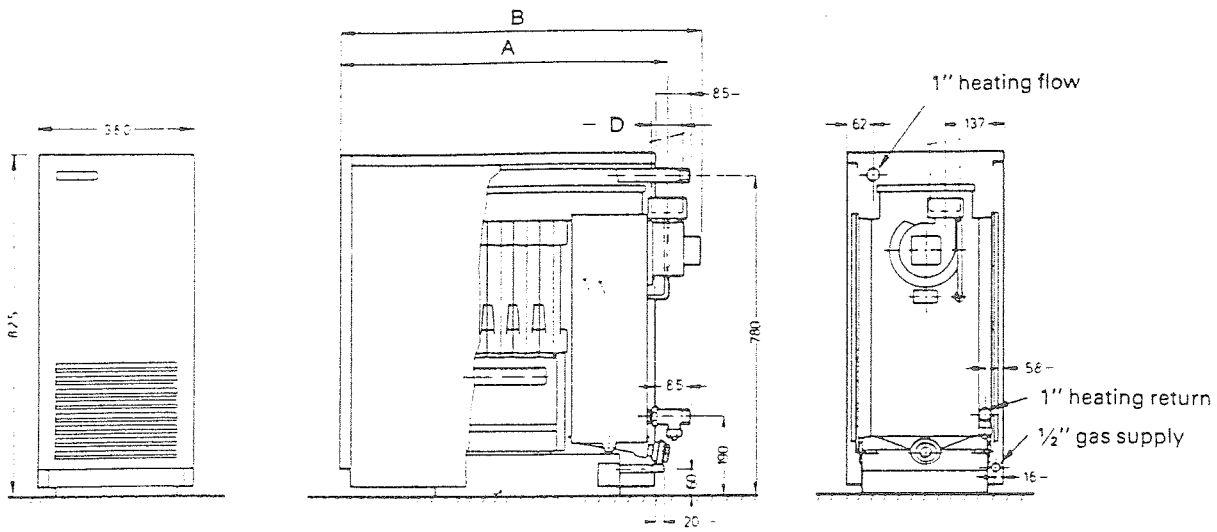
e. Fan does not work - call for BROAG LIMITED.

f. Pressure switch does not work - call for BROAG LIMITED.
Chimney is blocked, minimal under pressure is 0,6 Bar.

Boiler Works but Stops Prematurely

a. Chimney is blocked.

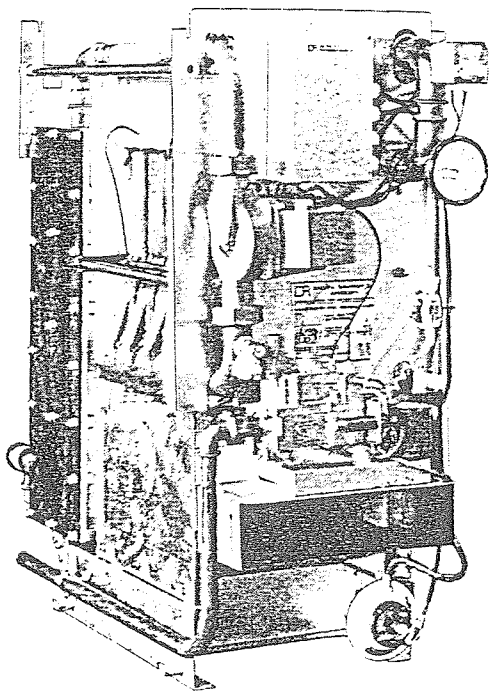
b. Boiler is dirty.



No. of sections	A	B	Ø D
5	743	870	100
7	863	990	100

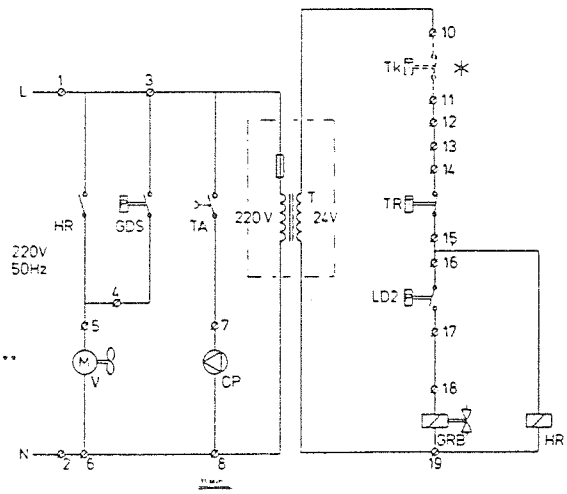
No of Sections	Boiler output (water temp. 70°C) kW	Btu/hr	Gas input kW	Gas input ft³/hr	Burner pressure ins w/g	mm w/g	Injector Diam. mm	Water Resistance t=20°C m/bars	Water content litres	Weight kg
5	20.2	68,942	23.4	80	6	152	2.5	21	11	115
7	30.3	103,413	35.0	120	6	152	3.0	48	14	135

Inside the insulated jacket of a 1A HR boiler



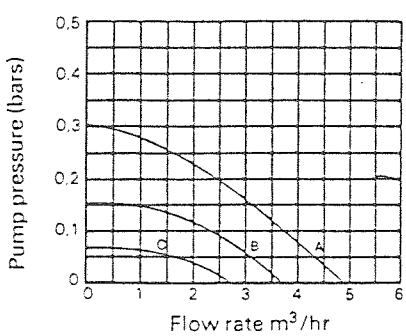
1A HR wiring diagram

220/240 volt 5 amp supply



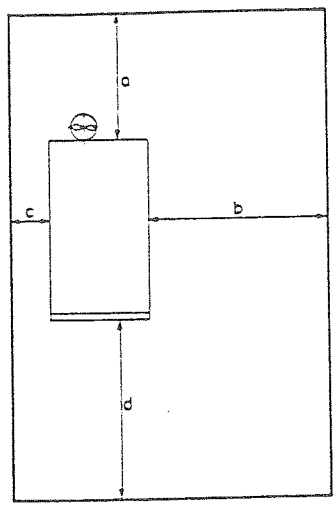
L	- Live input	CP	- Circulating pump
N	- Neutral input	GDS	- Gas pressure switch
T	- Transformer	TA	- Pump relay
TR	- Thermostats (room)	TR	- Boiler thermostat
V	- Flue fan	LD2	- Pressure switch
HR	- Relay	GRB	- Gas control valve

Pump performance graph



A = Maximum speed maximum flow rate
B = Minimum speed maximum flow rate
C = Minimum speed minimum flow rate

MINIMUM FREE AREA REQUIREMENTS AROUND 1A HR BOILERS



a = 500mm

b = 700mm or 150mm dependent upon

c = 150mm or 700mm

d = 700mm

Height required above Boiler = 1,000mm

Minimum water flow rates required through 1A HR boilers:

1A-5	7.6 ft^3/hr	47.5 galls/hr
1A-7	11.5 ft^3/hr	71.9 galls/hr

The Seagold Gas 1A boilers are natural gas fired, with fan assisted flues. They are made in two sizes, 30 kW, 102,000 Btu/h, and 20 kW, 68,000 Btu/h outputs.

The boiler unit comprises a cast iron heat exchanger with a secondary aluminium finned heat exchanger. A fan is supplied as standard to exhaust the products of combustion to atmosphere.

The atmospheric stainless steel burners are designed and manufactured by ourselves and made in our factory.

A pump is supplied as standard and care should be taken that minimum water flow rates are always exceeded. See chart page 17.
The pump is automatically controlled so that the pump runs for 11 minutes after the boiler stops, and if the boiler is not called for within 48 hours the pump will run for 11 minutes every two days.

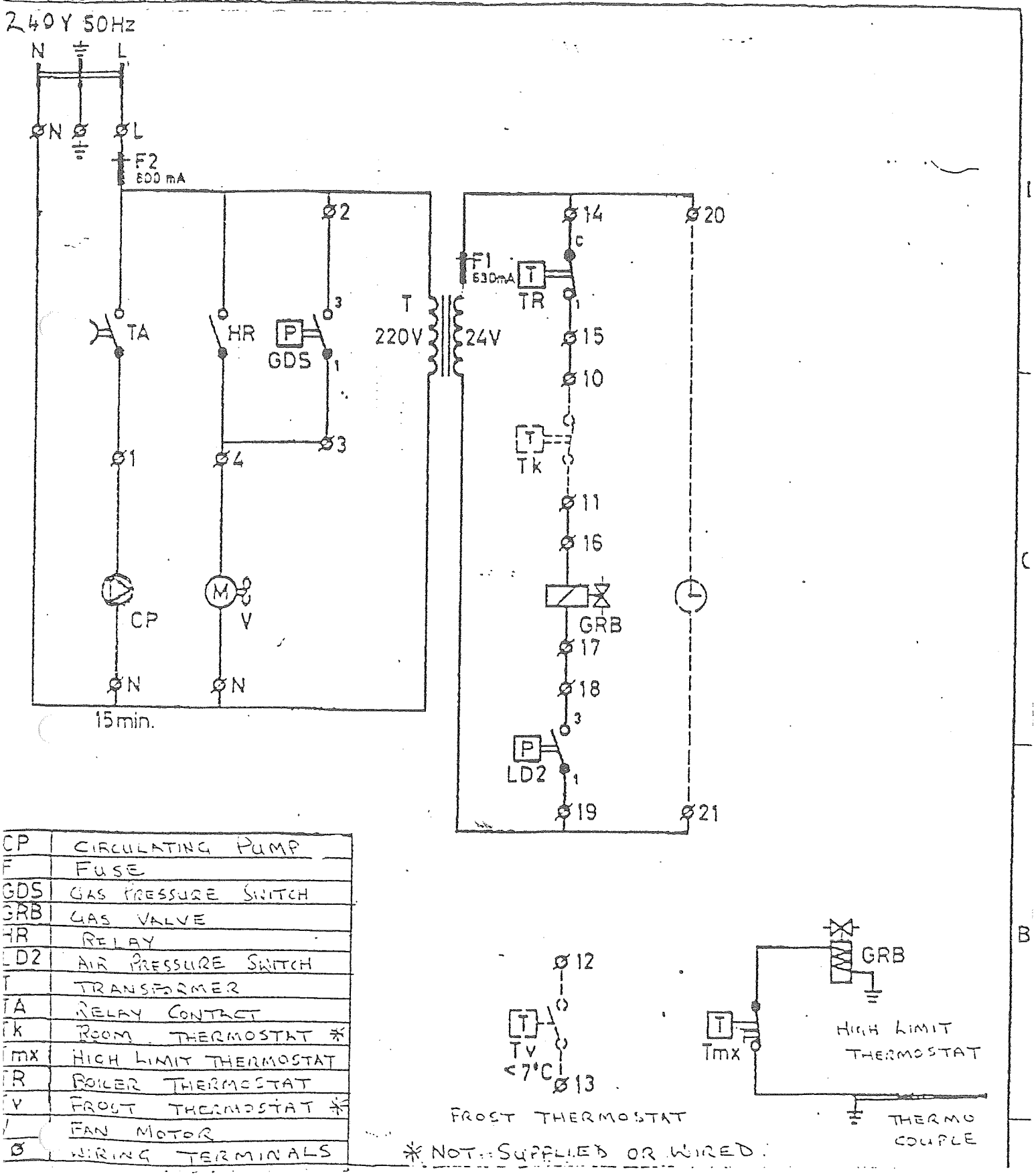
A gas service tap must be fitted to this appliance.

It is imperative that the boilers are commissioned correctly and we strongly recommend that this is carried out by BROAG or the appointed agents.

Wiring Diagram

BROAG LIMITED
SEAGOLD BOILERS

Thyssen House
Molly Millars Lane, Wokingham, Berkshire RG11 2PY.
Tel: (0734) 783434 (10 Lines) Telex: 849137, 847470/7/8/9



CP	CIRCULATING PUMP
F	FUSE
GDS	GAS PRESSURE SWITCH
GRB	GAS VALVE
HR	RELAY
LD2	AIR PRESSURE SWITCH
T	TRANSFORMER
TA	RELAY CONTACT
Tk	ROOM THERMOSTAT *
Tmx	HIGH LIMIT THERMOSTAT
TR	BOILER THERMOSTAT
Tv	FROST THERMOSTAT *
M	FAN MOTOR
Ø	WIRING TERMINALS

* NOT SUPPLIED OR WIRED.

1A 5/7 Eco

remeha

remeha Gas 1000 Gas 1000 Duo

Technical information

for the service engineer
users' manual for maintenance and operation

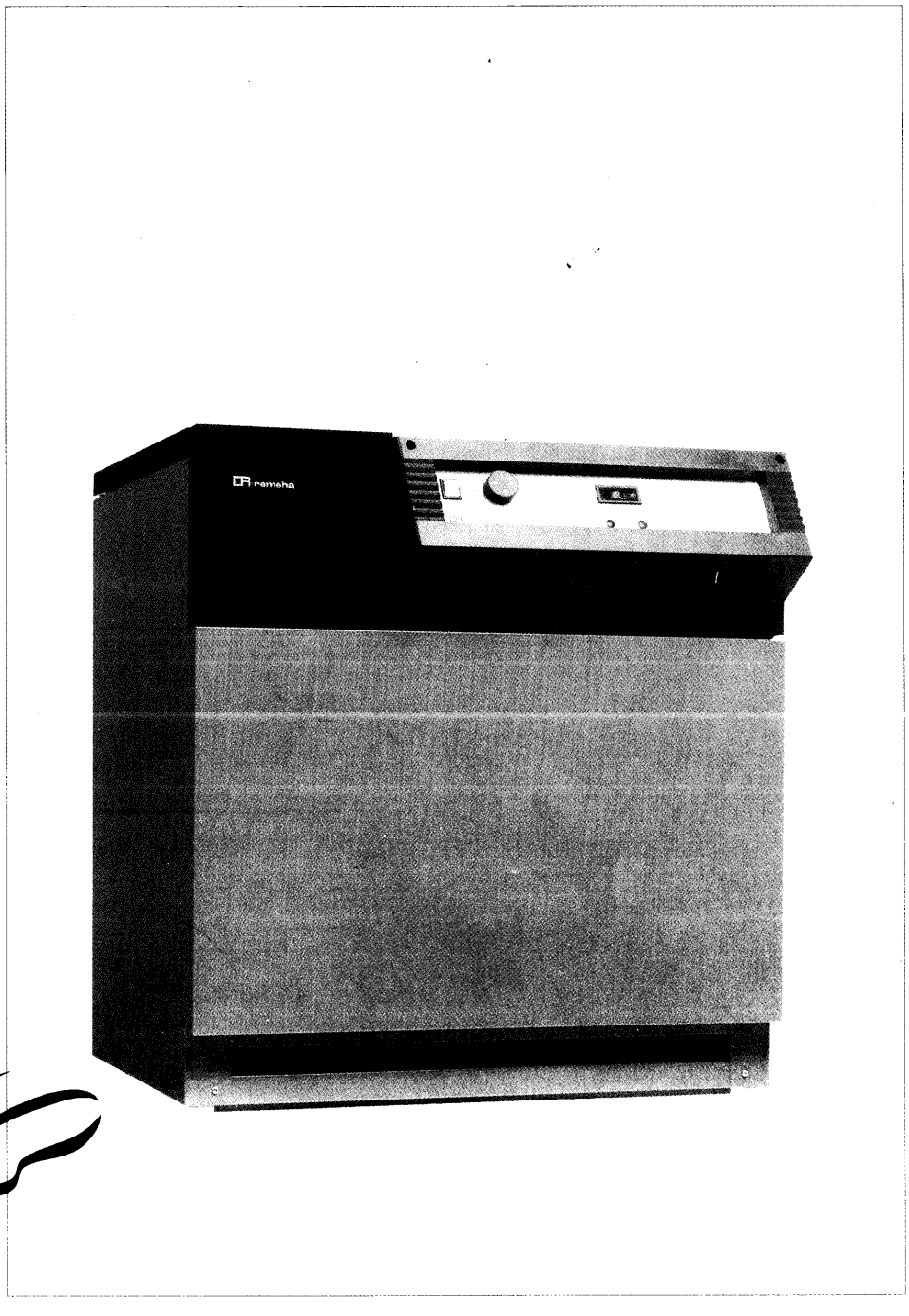
Cast-iron gas-fired central heating boiler, high efficiency

Atmospheric burners

Power output:
remeha Gas 1000
36.2 to 106.0 kW
remeha Gas 1000 Duo
72.4 to 212.0 kW

- Natural gas
- Propane gas, butane

CE



remeha
CLEAN HEAT

TABLE OF CONTENTS

PREFACE

These technical instructions contain useful and important information for the correct operation and maintenance of the remeha central heating boiler, model Gas 1000 and Gas 1000 Duo.
Furthermore, important instructions are given to prevent accidents and serious damage before commissioning and during operation of the boiler, to ensure safe and trouble free boiler operation.
Read these instructions carefully before putting the boiler into operation, familiarize yourself with its operation and control and strictly observe the instructions given.

If you have any questions, or if you need more information about specific subjects relating to this boiler, please do not hesitate to contact us.
The data published in these technical instructions is based on the latest information and is subject to revisions. We reserve the right to modify the design and/or construction of our products at any moment, without being obliged to adjust earlier supplies accordingly.
This document may always be altered or added to. If you require additional information, please contact us.

1. TECHNICAL SPECIFICATIONS

1.1 General

- Fuels:
  Cat. II $_{2H3+}$
  natural gas G20: 20 mbar
  propane gas: P 37 - 37 mbar
  butane gas: B28 - 28 mbar
  other gas: contact our technical service.
- Electrical power supply: single phase 230 V - 50 Hz + earth.
- Maximum operating pressure: 4 bar.
- Minimum operating pressure: 1.0 bar.
- Maximum water temperature: 110°C.
- Minimum return temperature: 20°C.
- Sections in perlitic cast iron ***rem-cast***® with high corrosion resistance.
- Tube burners in stainless steel, with brass injectors.
- Jacket in red and grey enamelled sheet steel, with thermal insulation.
- Fitted with draught diverter.
- Thermo-electrical control and safety equipment, 230 V - 50 Hz.
- Piëzo ignition.
- Control thermostat, 0 - 90°C.
- High limit thermostat 110°C.
- Thermometer.
- Altitude gauge.
- Low water protection.
- Type B11 (B11BS).

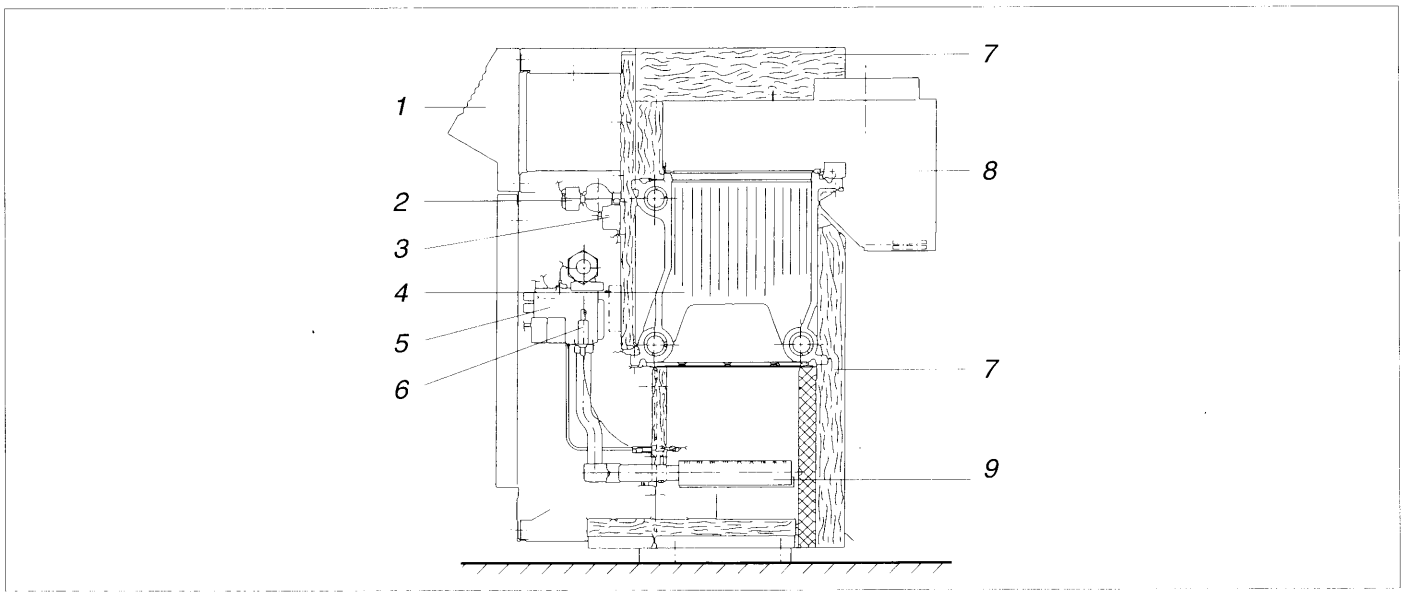


Fig. 01 Cross section remeha Gas 1000

1. *Instrument panel*
2. *Water pressure switch*
3. *High limit thermostat*
4. *Cast iron boiler block*
5. *Gas combi-block*
6. *Piëzo ignition*
7. *Insulation*
8. *Draught diverter*
9. *Burners*

1.2 Dimensions remeha Gas 1000

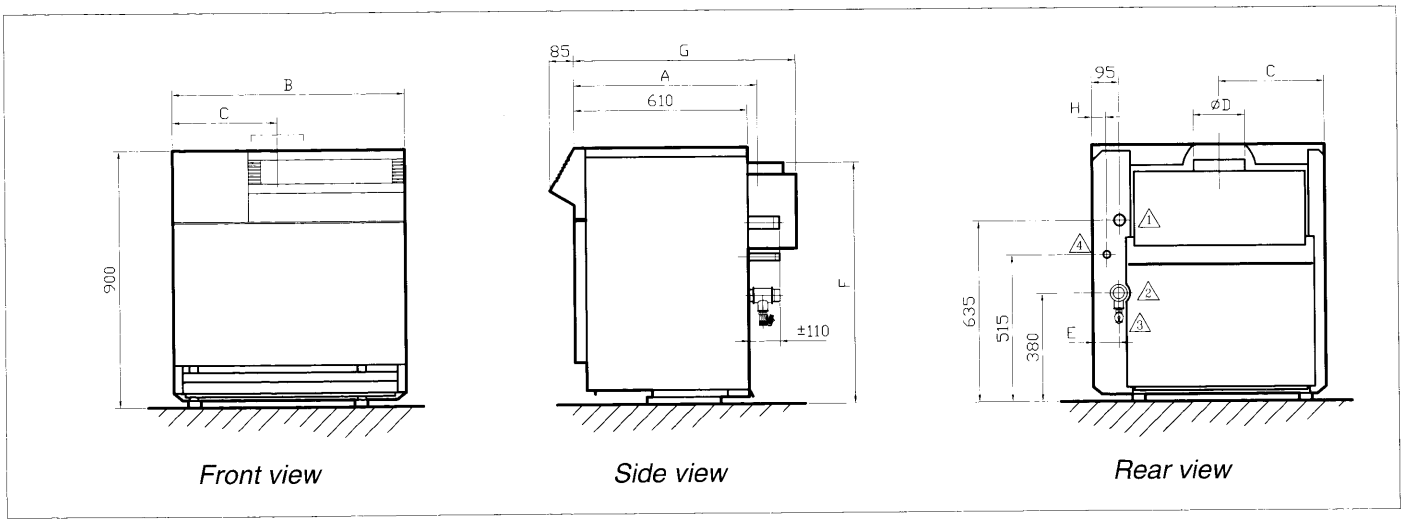


Fig. 02 Dimensions remeha Gas 1000

1 *Flow* — *7 sections R 1"*; *8 - 20 sections R 1 1/4"*

2 *Return* — *7 sections R 1"*; *8 - 20 sections R 1 1/4"*

3 *Drain and filling cock* — *7 - 10 sections R 1/2"*; *12 - 20 sections R 3/4"*

4 *Gas connection* — *7 - 8 sections R 1/2"*; *10 - 20 sections R 3/4"*

Gas- and waterconnections with external thread.

Number of sections	Dimensions (mm)							
	A	B	C	Ø D	E	F	G	H
7	660	693	338	150	90	840	770	± 70
8	660	693	307	150	90	840	810	± 60
10	675	816	369	180	90	845	810	± 60
12	675	939	430	180	90	845	810	± 70
14	685	1062	492	200	90	850	810	± 60
16	660	1187	554	250	60	900	810	± 60
18	660	1310	616	250	60	900	810	± 60
20	660	1433	677	250	60	900	810	± 60

1.3 Technical specifications remeha Gas 1000

Number of sections	Nominal output	Input Hi	Natural gas			Propane/butane					Mass flue rate	Water-resistance Δt = 20°C	Water contents	Assembly weight
			Gas consumption *	Burner pressure	Injector	Gas consumption*		Burner pressure		Injector				
			m³/h	mbar		m³/h		mbar						
	kW	kW	G 20	G 20	Ø mm	P 37	B 28	P 37	B 28	Ø mm	kg/h	mbar	l	kg
7	36.2	40.9	4.3	13.6	2.6	1.67	1.27	35.5	27	1.65	101	28	10.5	116
8	42.4	47.8	5.1	11.6	2.6	1.96	1.48	35.5	27	1.60	118	34	12	134
10	54.6	61.5	6.5	13.4	2.6	2.52	1.90	35.5	27	1.65	152	51	15	162
12	66.8	75.2	8.0	14.6	2.6	3.08	2.33	35.5	27	1.70	186	70	18	190
14	74.5	83.8	8.9	13.8	2.5	3.43	2.60	35.5	27	1.60	207	93	20	218
16	88.7	100	10.6	12.3	2.5	4.10	3.10	35.5	27	1.60	232	44	23	248
18	97.4	110	11.6	12.5	2.5	4.50	3.41	35.5	27	1.60	241	54	26	276
20	106.0	120	12.7	12.8	2.4	4.90	3.70	35.5	27	1.55	248	60	29	306

* *G20 = 34 MJ/m³*
P 37 = 88 MJ/m³
B 28 = 116 MJ/m³

1.4 Dimensions remeha Gas 1000 Duo

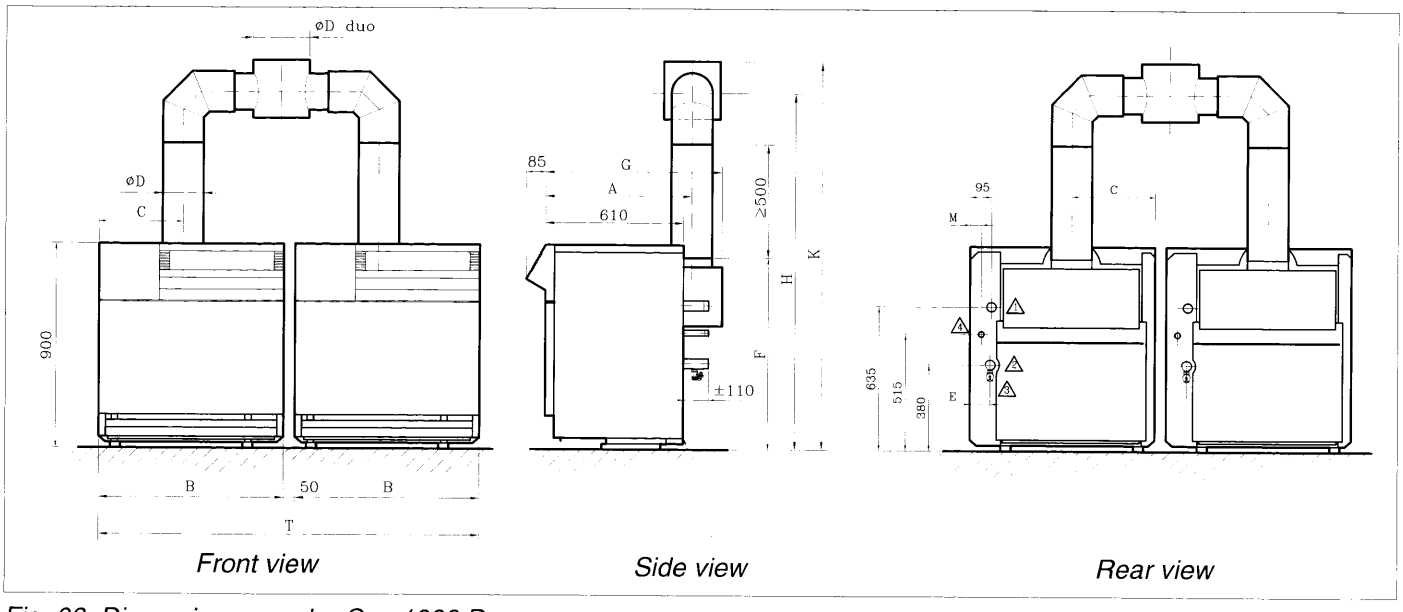


Fig. 03 Dimensions remeha Gas 1000 Duo

1 Flow — 7 sections R 1" / 8 - 20 sections R 1 1/4"

2 Return — 7 sections R 1" / 8 - 20 sections R 1 1/4"

3 Drain and filling cock — 7 - 10 sections R 1/2" / 12 - 20 sections R 3/4"

4 Gas connection — 7 - 8 sections R 1/2" / 10 - 20 sections R 3/4"

Gas- and waterconnections with external thread.

Number of sections	Dimensions (mm)											
	A	B	C	ØD	ØD Duo	E	F	G	H	K	M	T
7	660	693	338	150	200	90	840	770	1550	1690	± 70	1440
8	660	693	307	150	200	90	840	810	1550	1690	± 60	1440
10	675	816	369	180	250	90	845	810	1565	1705	± 60	1685
12	675	939	430	180	250	90	845	810	1565	1705	± 70	1930
14	685	1062	492	200	300	90	850	810	1600	1760	± 60	2175
16	660	1187	554	250	400	60	900	810	1800	2010	± 60	2425
18	660	1310	616	250	400	60	900	810	1800	2010	± 60	2670
20	660	1433	677	250	400	60	900	810	1800	2010	± 60	2920

1.5 Technical specifications remeha Gas 1000 Duo

Number of sections	Nominal output	Input Hi	Natural gas			Propane/butane					Mass flue rate	Water-resistance Δt = 20°C	Water contents per boiler	Assembly weight per boiler
			Gas consumption *	Burner pressure	Injector	Gas consumption*		Burner pressure		Injector				
			m³/h	mbar		m³/h		mbar						
	kW	kW	G 20	G 20	Ø mm	P 37	B 28	P 37	B 28	Ø mm	kg/h	mbar	l	kg
2 x 7	72.4	81.8	8.6	13.6	2.6	3.34	2.54	35.5	27	1.65	202	28	10.5	116
2 x 8	84.8	95.6	10.2	11.6	2.6	3.92	2.96	35.5	27	1.60	236	34	12	134
2 x 10	109.2	123.0	13.0	13.4	2.6	5.04	3.80	35.5	27	1.65	304	51	15	162
2 x 12	133.6	150.4	16.0	14.6	2.6	6.16	4.66	35.5	27	1.70	372	70	18	190
2 x 14	149.0	167.6	17.8	13.8	2.5	6.86	5.20	35.5	27	1.60	414	93	20	218
2 x 16	177.4	200	21.2	12.3	2.5	8.20	6.20	35.5	27	1.60	464	44	23	248
2 x 18	194.8	220	23.2	12.5	2.5	9.00	6.82	35.5	27	1.60	482	54	26	276
2 x 20	212.0	240	25.4	12.8	2.4	9.80	7.40	35.5	27	1.55	496	60	29	306

* *G20 = 34 MJ/m³*
P 37 = 88 MJ/m³
B 28 = 116 MJ/m³

1.6 Output

The **remeha Gas 1000** high efficiency boiler series represents a compromise between a traditional central heating boiler and a condensing boiler. The quality, design, manufacture and insulation guarantee extremely high thermal efficiency.
Example:
- The burner efficiency can exceed 91% Hi.

1.7 Detail drawing

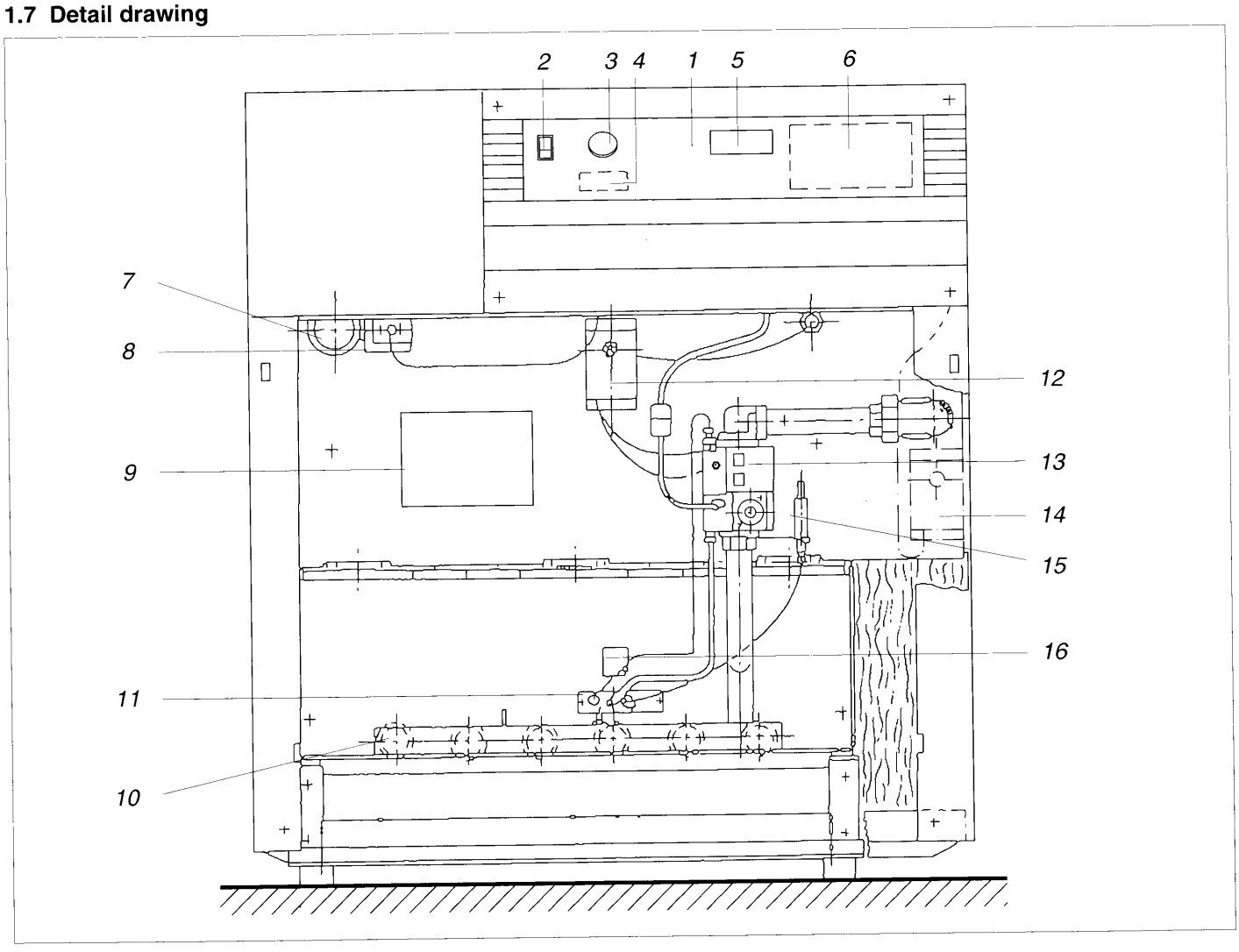


Fig. 04 Detail drawing

1. *Instrument panel*
2. *Main switch*
3. *Control thermostat (0 - 90°C)*
4. *Hour counter (optional)*
5. *Thermometer*
6. *Option for weather compensator (not pre-wired)*
7. *Manometer*
8. *Water pressure switch*
9. *Data badge*
10. *Burners*
11. *Pilot flame*
12. *High limit thermostat 110°C*
13. *Gas combi-block*
14. *Down draft thermostat (optional)*
15. *Piezo ignition*
16. *Inspection cover*

2. INSTALLATION

2.1 Description

The remeha Gas 1000 central heating boiler is approved according to the following European Directives:

- Gas Directive no. 90/396/EEC
- Efficiency Directive no. 92/42/EEC
- E.M.C.Directive no. 89/336/EEC,

and complies with the following Directives:

- Low voltage Directive no. 73/23/EEC
- Machine Directive no. 89/392/EEC.

The EEC approval is registered under the following number: ID remeha Gas 1000: 63AQ6520.

- The central heating boiler is supplied, fully assembled; for boiler installation, the jacket must be removed.
- The water connections are on the right-hand side.

2.2 Installation standards

All gas appliances must, by law, be installed by competent persons (e.g. Corgi). Failure to install appliances correctly could lead to prosecution.
It is in your own interest and that of safety to ensure that the law is complied with.
The following instructions must be adhered to when the remeha Gas 1000 is installed:
Gas Safety (Installation and Use) Regulations 1984 (as amended).
Current IEE Regulations for electrical installations
Local building regulations.
The Building Standards (Scotland) (Consolidation) Regulations, by-laws of the local water undertaking.
Health and Safety Document No 635 'The Electricity at Work Regulations 1989'.

The requirements of Guidance Note PM 5 issued by the Health & Safety Executive 'Automatically controlled steam and hot water boilers'.
Depending on the type and size of installation i.e. large domestic or commercial the requirements of the following publications should be complied with:

Domestic:	BS 5449, BS 5546, BS 6644, BS 6891, CP 3006 and BG DM2.
Commercial:	BS 6644, BS 6700, BS 6880 Pts 1, 2 and 3, CP 342.2 IM2, IM5, IM11, IM16 and IM22.

Manufacturers Instructions must NOT be taken as over-riding statutory obligations.

Important:
The remeha Gas 1000 is a certified appliance and must not be modified or installed in any way contrary to these "Installation and Maintenance Instructions".

2.3 Application

The remeha Gas 1000 central heating boiler can operate directly weather-compensated, i.e. using variable control levels. The permitted minimum return temperature for the boiler block is 20°C.

2.4 Installation

Take account of the applicable regulations. The drawing below indicates the minimum space which must be left free around the boiler.

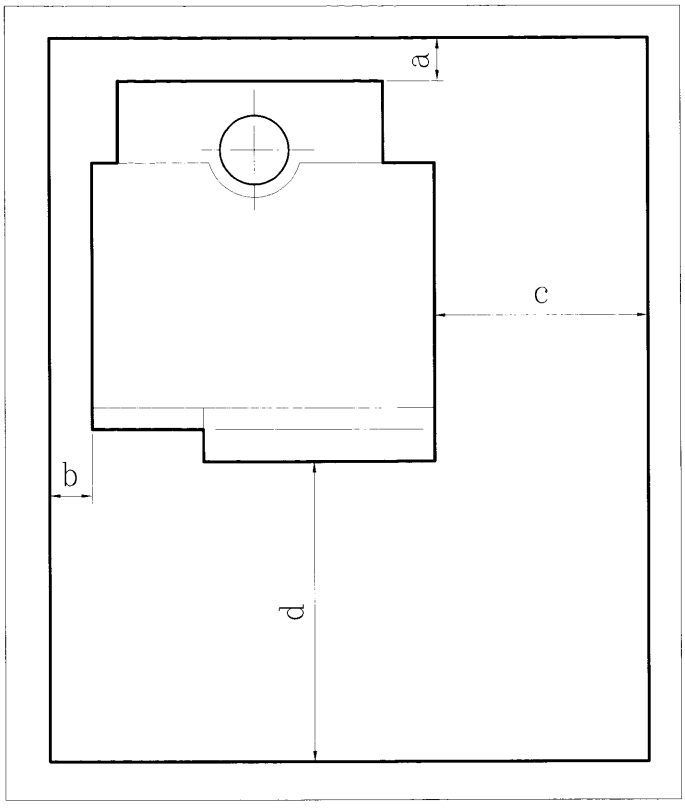


Fig. 05 Installation

a. 100 mm
b. 100 mm
c. 500 mm
d. 700 mm
Minimum headroom above the boiler: 1000 mm.

2.5 Handling

If the boiler is too heavy to be transported as a complete unit to its final place of installation, the jacket may be removed.

2.6 Water connection

- Take account of the applicable standards and regulations.
- Flow and return pipe Ø 1" or $1^1/_4$" at the rear. Both are on the right-hand side.
  The boiler cannot be supplied with left-hand connections.
- A draining and filling cock, with key, is supplied and located on the right-hand side.
- A safety switch for low water pressure has been included (preset on 1.0 bar).
- Minimum return temperature at nominal power: 20°C.

2.7 Gas connection

- Take account of the applicable standards and regulations.
- For the connection diameter, see Fig. 02.
- A gas cock and a filter must be fitted, if not yet present.
- Maximum supply pressure for natural gas between: type G20 17-25 mbar.

Conversion:
From natural gas to propane or butane gas (may only be carried out by a qualified engineer). The remeha Gas 1000 boilers are equipped in the factory for use with natural gas). For the use of propane or butane gas, the following actions must be carried out.

- The injector for the pilot flame, marked "29" (for natural gas) must be replaced by an injector marked "24", "red" (for propane or butane).
- The burner injectors must be replaced by injectors with a diameter marked with the specifications in the diagram in par. 1.3.

2.8 Chimney connection

- Take account of the applicable standards and regulations.
- The central heating boiler is equipped with a built-in draught diverter. See the diagrams on page 4 and 5 for the chimney connection.
- To determine the chimney diameter, please contact us.

2.9 Electrical connection

- Take account of the applicable standards and regulations.
- The electrical wiring is fitted in the factory, complete with a mains cable with a length of 1 metre (see diagram).
- Ensure a fused connection.
- Electrical power supply:
  single phase 230 V - 50 Hz + earth.
  Voltage change tolerance +10%.

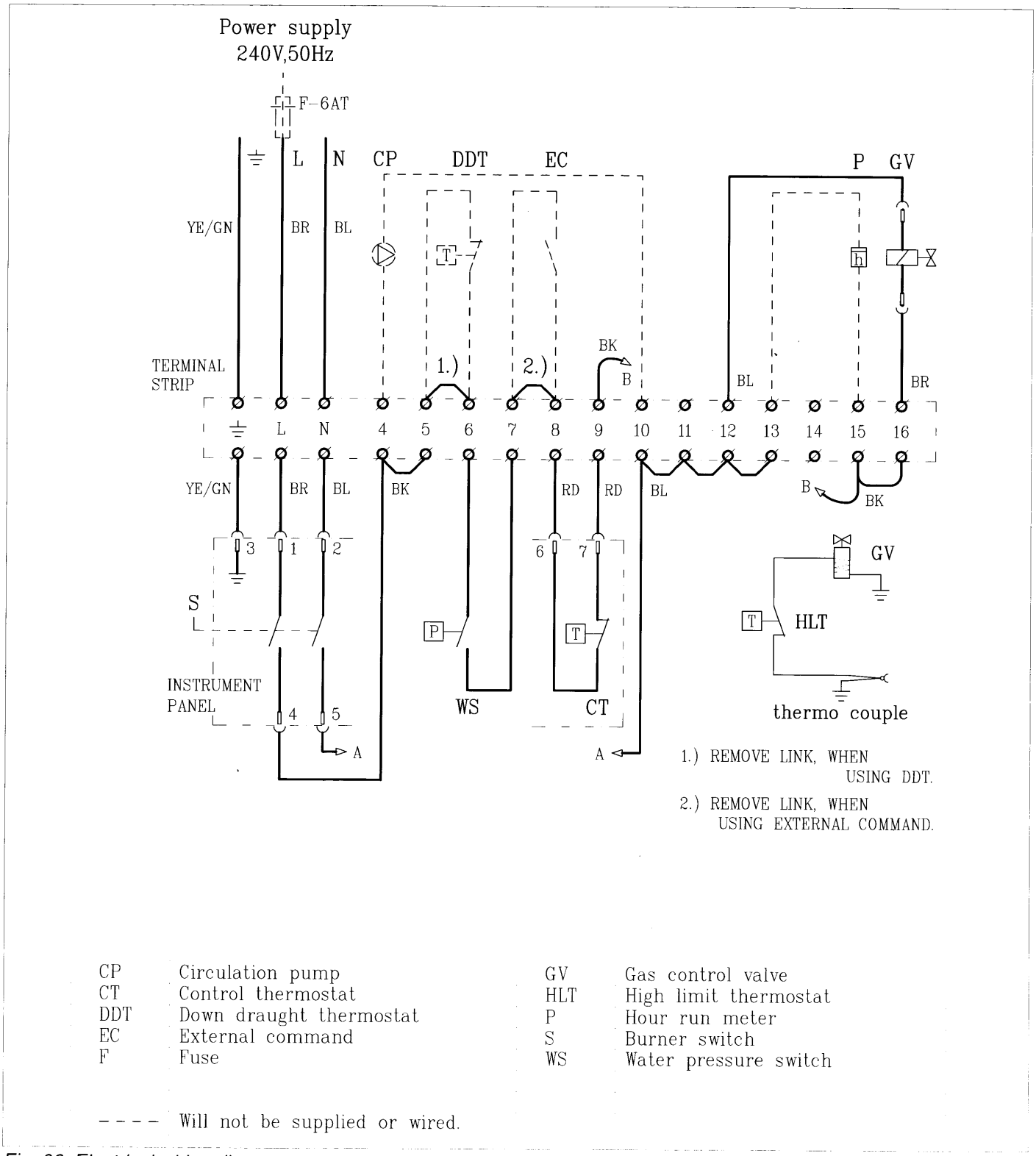
2.10 Regulator connection

To connect a regulator, for example a room thermostat, connection terminals 7 and 8 can be used on the connection block.
Remember the wires and contacts of the thermostat carry a 230 V voltage.
Installation of a room thermostat.

- In a 'control room', where the temperature should be controlled.
- In a draught-free location, without direct heat radiation (e.g. sun, chimney, television appliance, etc.)
- Against an interior wall, at a height of approx. 1.50 metres.

Attention

If no regulator is fitted, connection points 7 and 8 should be wired in parallel *(see wiring diagram, fig. 06).*



CP	Circulation pump	GV	Gas control valve
CT	Control thermostat	HLT	High limit thermostat
DDT	Down draught thermostat	P	Hour run meter
EC	External command	S	Burner switch
F	Fuse	WS	Water pressure switch

---- Will not be supplied or wired.

Fig. 06 Electrical wiring diagram

3. COMMISSIONING

3.1 Commissioning method

1. Check the water pressure of the installation (minimum 1 bar; maximum 4 bar).
2. Check the operation of the circulation pump.
3. Adjust the room thermostat to the highest temperature.
4. Adjust the boiler thermostat to about 85°C.
5. Open the gas cock.
6. Vent the installation carefully.
7. Press the push button on the gas combi-block (the button with the flame, see fig. 07 and 08, a). The gas now released can be ignited using the push button on the piezo ignition.
   The pilot flame will ignite.
   Keep the button on the gas combi-block pushed in for 30 seconds. The thermocouple will now heat up, initiating the electrical protection system. Slowly release the button. If the pilot flame is extinguished, repeat the procedure for igniting the pilot flame.
8. Correctly adjust the pilot flame (see paragraph 4.1).
9. When the electrical power supply is switched on, the main burner will ignite.
10. Adjust the room thermostat or other regulating device to the required level.
11. Set the desired burner pressure by turning screw "e" (fig. 07 and 08).

3.2 Shutting down the boiler

1. Shut off the gas cock.
2. Switch off the electrical power supply.

Note!
Remember the risk of freezing!
If the external temperature is very low, the heating installation must be kept running. Set to a regulation temperature which will avoid the risk of freezing.

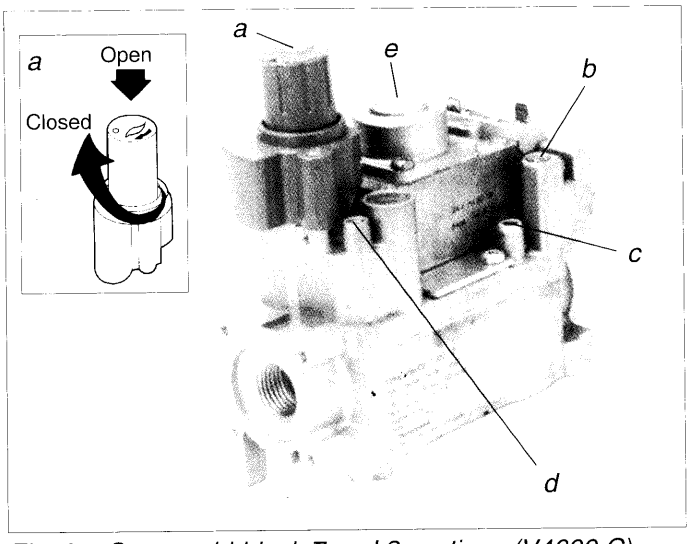


Fig. 07 Gas combi-block 7 and 8 sections (V4600 C)

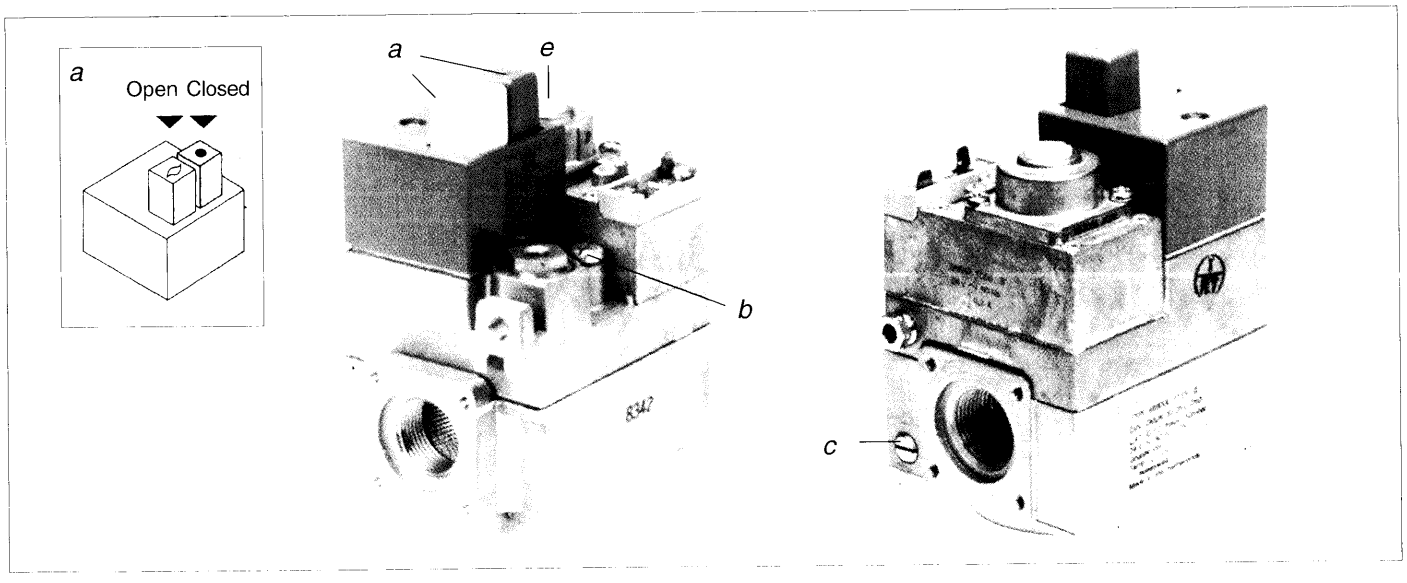


Fig. 08 Gas combi-block 10 - 20 sections (V4400 C)

a Push button
b Pilot flame regulator
c Measuring point for burner pressure
d Measuring point for gas pressure (10-20 section boilers: on gas connection)
e Burner pressure regulator

4. FAULT-FINDING

1. The pilot flame is extinguished.
   Please note: wait for five minutes before reigniting the flame.
   a. The pilot flame is too small: increase the gas flow by adjusting the regulating screw above the gas pipe for the ignition *(see fig. 07 and 08, b)*. Adjust the gas flow to approx. 24 l/h (0.024 m^3/h).
   b. The pilot flame is suffocated by excessive gas flow: reduce the flow *(see point a)*.
   c. The current to the thermocouple is too weak: the thermocouple is faulty (minimum current 7 millivolts, with boiler in operation).
   d. Gas pressure too low: once the gas pressure has returned to the correct value, reignite the pilot flame.
   e. Insufficient water in the boiler. The high limit thermostat will protect the boiler. Check the water pressure and the low water protection. If necessary, depressurise to system pressure.
   f. The circulation pump is faulty; the high limit thermostat will interrupt the circuit to the thermocouple, thus extinguishing the pilot flame.
   Check the operation of the circulation pump.
2. The central heating boiler will not switch on.
   a. The switch fuse is faulty: once you have switched off the electricity, locate the cause of the fault (for example short circuit or a blocked circulation pump) and fit a new fuse.
   b. The pilot flame is not alight (see point 1).
   c. The electrical current has been interrupted, thus closing the gas protection shut-off valve; once the current has returned, the boiler will automatically switch back on.
   d. The thermostats are incorrectly set.
   e. The low water protection is switched on.
   Check the water pressure, and as necessary top up with more water.
   f. If fitted:
   The thermostatic shut-off valve has been switched on. Check the flue gas connection, chimney, and low pressure in the room where the boiler is fitted.

5. MAINTENANCE

5.1 General

Your Remeha heating boiler has been manufactured in such a way so that it will operate satisfactory.
A minimum of maintenance must be carried out, following each heating season, to maintain the maximum thermal efficiency and to ensure safe operation.
This maintenance should be carried out by a specialist.

The maintenance covers the following points:
1. Cleaning the cast iron boiler block.
2. Cleaning the burners.
3. Cleaning the gas filter. .
4. Cleaning the operation and regulating systems.

5.2 Cleaning

Switch off the boiler.
1. Remove the front and top sides of the jacket.
   Remove and clean the burners, before cleaning the boiler block.
2. Cleaning the burners.
   - Disconnect the gas connection in the pipe above the gas combi-block.
   - Remove the electrical connection from the gas combi-block and the protection thermostat.
   - Slacken the screws on the inner casing strip, through several turns. Remove the inner casing strip and retighten the screws.
   - Remove the screws on the front of the combustion chamber.
   - Remove the burner bed, with the air pipe.
   - Clean the burners from inside and outside.
3. Cleaning the boiler block.
   - Remove the top insulation and the cleaning hatch.
   - Remove the retarder, placed on the cast iron element.
   - Then clean the cast iron sections with a metal brush (as supplied).
4. Clean the floor beneath the boiler.
5. Reinstall all the above-mentioned parts. Ensure a good seal around the gas connection.
6. Replace the top insulation and the top of the jacket.
7. When you have completed the maintenance work, switch the central heating boiler back on. Check that the operating and protection equipment works correctly, and that the regulation equipment is correctly set. Also check the installation water pressure (minimum 1.0 bar).

remeha

ISO 9001
since 1988

Broag Ltd.
Head Office
Remeha house,
Molly Millars Lane,
Wokingham,
Berkshire RG 41 2QP.
Tel. 0118 9783434
Fax 0118 9786977
Email address:
boilers@broag.ltd.uk.

Branch Office
Unit 3,Kestrel Close,
Quarry Hill Industrial Estate,
Ilkeston
Derbyshire DE7 4RD
Tel. 0115 9440778
Fax 0115 9440588

Subject to alterations
Art.nr. 51.619/2.500/12.97/Ho.

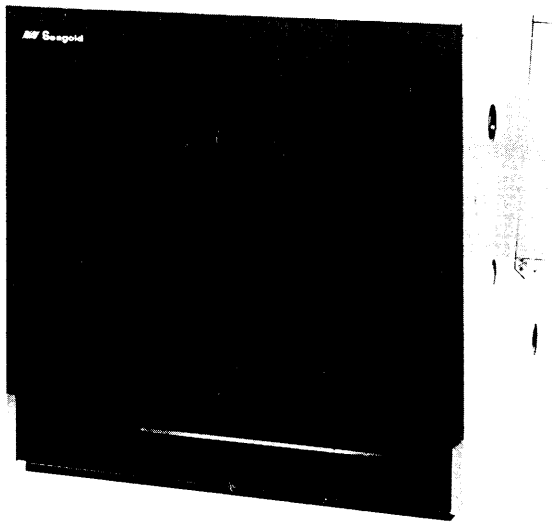
Seagold Gas 2b ECO FULLY CONDENSING ATMOSPHERIC BOILER

Technical Information Gas 2b ECO
39.6 to 110.0 kW
Fully condensing gas boilers

Gas 2b ECO -8 to 14 sections. Thermo-electric control and safety device.

Gas 2b ECO -16 to 20 sections. Electronic control and safety device.

General Description
The Seagold Gas 2b ECO boiler is derived from the standard Gas 2b boiler with economiser fitted.
Designed for low temperature applications.
Suitable for operating temperature of 95°C with maximum setting of high limit thermostat to 110°C.
Maximum pressure 4 bars (58 psi).
All sections tested to 10.0 bars (145 psi).



Construction:
The boiler unit consists of **rem-*CAST*** sections of perlitic cast-iron connected by means of taper nipples. The economiser, composed of finned tubes, is made of aluminium with **rem-*COAT*** treatment to give high corrosion resistance. A flue gas fan included in the boiler ensures that the flue gases are conveyed through the boiler unit, economiser and flue.

Use:
The atmospheric burners and flue gas fan are low-noise. Normal installations present no problems, particularly in view of the chimney design (single-walled aluminium or stainless steel).

Boiler yearly efficiency:
Boiler operating efficiency is measured during testing at an average boiler water temperature of 45°C and a switching cycle of 3 minutes on, 7 minutes off when the boiler is in equilibrium, and must be at least 90% relative to gross calorific value (Hb) of the fuel (or 100% relative to the net calorific value (Ho)).
The measured operating efficiency is 91% relative to gross calorific value.

Boiler efficiency:

a Approx. 88.0% relative to gross calorific value (97.7% relative to net calorific value) at an average water temperature of 70°C. (80/60°C)

b Approx. 92.3% relative to gross calorific value (102.5% relative to net calorific value) at an average water temperature of 45°C. (50/40°C)

Combustion efficiency:

a Approx. 89.6% relative to gross calorific value (99.5% relative to net calorific value) at an average water temperature of 70°C. Excess air n = 1.45 (8.2% CO_2).

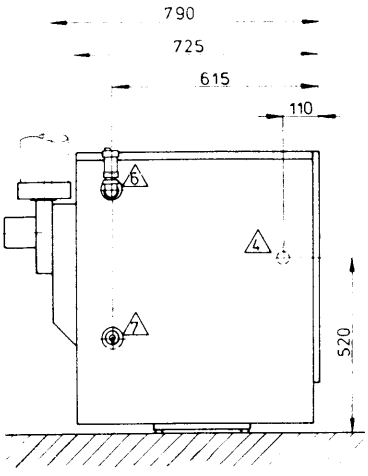
b Approx. 93.8% relative to gross calorific value (104,1% relative to net calorific value) at an average water temperature of 45°C.

BROAG Ltd.
Seagold Boilers
Molly Millars Lane
Wokingham, Berks. RG 11 2PY
Tel. 0734-783434
Telex 849137
Fax 734-786977

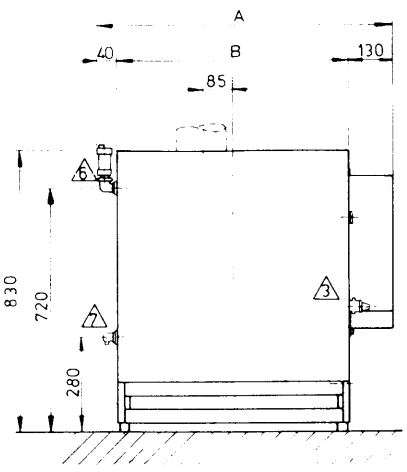
BROAG Ltd.
Branch Office Unit 3
Kestrel Close
Quarry Hill
Industrial Estate
ILKESTON Derbyshire
Tel. (0602) 44 07 78

Seagold

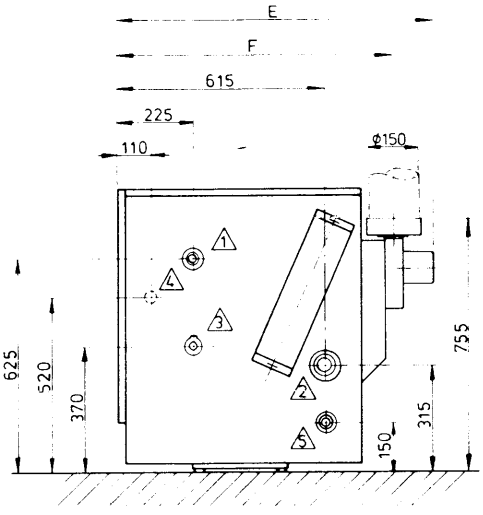
Gas 2b ECO 8 to 14 sections



Left-hand side view

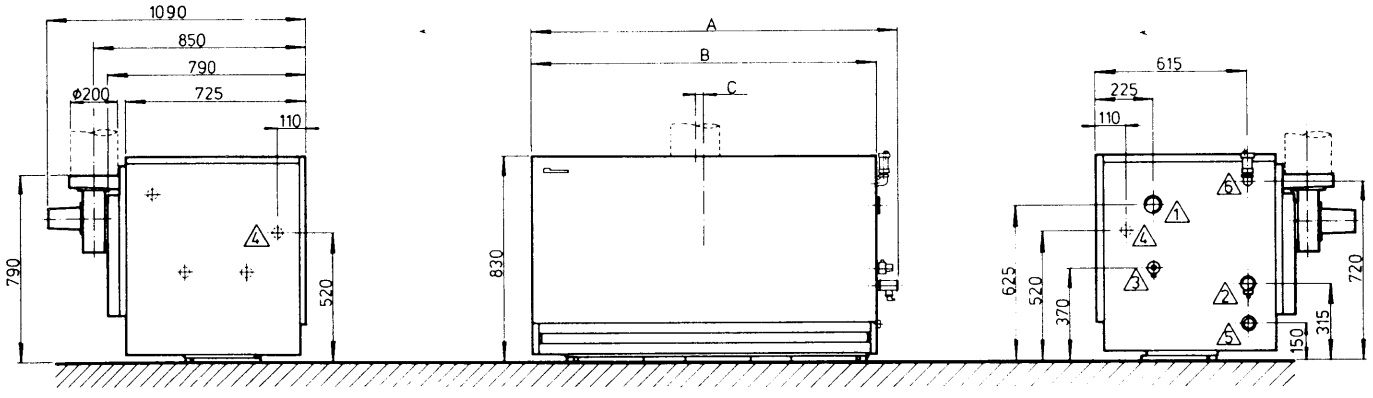


Front view



Right-hand side view

Gas 2b ECO 16 to 20 sections



Left-hand side view

Front view

Right-hand side view

1 Flow connection 1 1/4". BSP (Gas and water connectors female thread)

2 Return connection 1 1/4" / Drain tap 1/2"

3 Filling and drain tap 3/4"

4 Cut out for gas connector 3/4"

5 Condensation drain int. dia. 32 mm.

'ent tap 1/2"

Number of sec-sections	Rated output kW	Rated output BTu/h x 10	Rated input kW	Burner pres- mbar	Injector size mm	Dimensions in mm. A	B	C	F	E	Waterresistance mbar Δt=20°C	Waterresistance mbar Δt=10°C	Mini-mum flow rate m³/hr	Water-capacity ltrs	Weight un-packed kg
8	39,6	135	45,4	12,2	2,4	732	572	85	818	940	74	296	.43	17	159
10	51,6	176	58,4	13,5	2,4	856	696	85	818	940	93	372	.56	22	192
12	63,0	215	71,4	14,9	2,4	980	820	85	821	945	114	456	.68	27	226
14	74,5	254	84,4	12,6	2,4	1104	944	85	821	945	140	560	.80	32	255
16	85,3	291	97,4	11,2	2,4	1285	1215	12	850	1090	83	332	.92	39	287
18	96,1	328	110,4	12,1	2,4	1350	1275	35	850	1090	107	428	1.03	44	319
20	110,0	375	127,3	12,5	2,4	1470	1395	35	850	1090	133	532	1.20	49	351

Seagold

Technical data Gas 2b ECO, 8 to 14 sections

- Natural gas consumption pressure 17 mbar. Maximum supply pressure 50 mbar. Boiler is preset at required burner pressure, but must be checked on commissioning.
- Minimum water pressure during operation 0.8 bar (8 m water head) pressure systems.
- Minimum water pressure open vent systems 0.1 bar (1 m water head).
- Maximum water pressure during operation 4 bar (40 m water head).
- Maximum water temperature 110°C (with pressurized systems).
- Maximum operating temperature 95°C.
- Built-in flue gas fan, motor power: 8 and 10 sections: 55 Watts
  12 and 14 sections: 95 Watts
- Filling and drain tap on boiler (supplied loose) 1/2'' (8 and 10 sections), 3/4'' (12 and 14 sections).
- Drain tap 1/2® ' for economiser (supplied loose).
- Boiler thermostat adjustable from 25° to 95°C.
- High limit thermostat (110°C), resp. water failure safety device (thermo couple interrupter).
- Thermo-electric control and safety equipment, 24V (gas combination valve with re-switch-blocking).
- Transformer 220V/24V - 15 VA.
- Electric power consumption: 90 Watts (8 and 10 sections)
  110 Watts (12 and 14 sections)
- Piezo-Ignition
- Pump Switch (a circulation pump is not supplied)
- Gas pressure switch for closed position control of gas combination valve
- Air pressure differential switch to safeguard flue gas flow.
- Main boiler of perlitic cast iron with high corrosion resistance.
- Economiser of aluminium with durable coating for high corrosion resistance.
- Air intake by flue gas fan to mix air with flue gases. Less condensation in flue.
- Caseing in red and grey with protective foil.
- Syphon trap (supplied loose).

Technical data Gas 2b ECO, 16 to 20 sections.

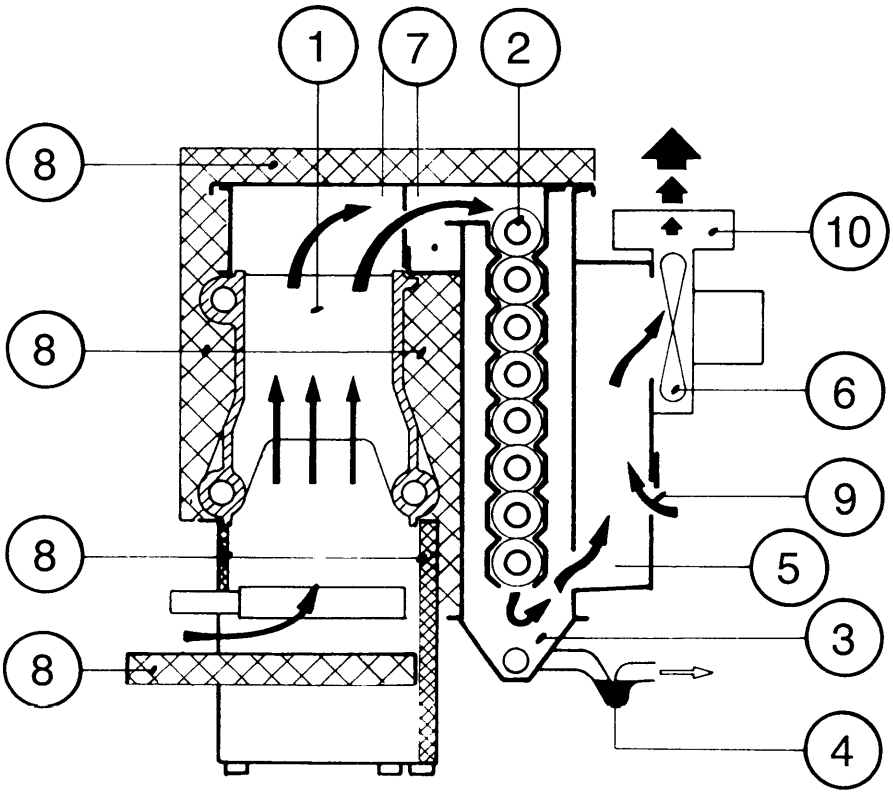
- Natural gas consumption pressure 17 mbar. Maximum supply pressure 100 mbar. Boiler is preset at required burner pressure, but must be checked on commissioning.
- Minimum water pressure during operation 0.8 bar (8 m water head) pressure systems.
- Minimum water pressure open vent systems 0.1 bar (1 m water head).
- Maximum water pressure during operation 4 bar (40 m water head).
- Maximum water temperature 110°C (with pressurized systems).
- Maximum operating temperature 95°C.
- Built-in flue gas fan, motor power: 180 Watts
- Filling and drain tap 3/4'' on boiler (supplied loose).
- T-Piece with drain tap 1/2'' for economiser (supplied loose).
- Boiler thermostat adjustable from 25° to 95°C.
- High limit thermostat (110°C).
- Electronic control and safety with ionisation safety equipment with ionisation safety device.
- Electric power consumption: 225 Watts.
- Minimum water pressure switch (0.8 bar).*
- Air pressure switch to safeguard flue gas flow.
- Main boiler of perlitic cast iron with high corrosion resistance.
- Economiser of aluminium with durable coating for high corrosion resistance.
- Air intake by flue gas fan to mix air with flue gases. Less condensation in flue.
- Panelling in red and grey with protective foil.
- Syphon trap (supplied loose).

* Link out water pressure switch for open vent systems

Operating principle of the Gas 2b ECO - fully condensing

In the first instance the flue gases of this boiler convert a large part of their heat to the first heat exchanger (1) over the burners. The combustion gases then flow along the measuring plate for the air pressure switch into the second heat exchanger (2), where the gas is further cooled. As the gases are relatively low return water is in counter-flow with the flue gases, these gases will ultimately adapt the same temperature as the return water.
With a sufficiently low return water temperature, the temperature of the flue gases in the second heat exchanger first falls to the dew point. At that temperature the water vapour present in the flue gases starts to condense. And are cooled down further with more condensation as a result.
The heat released during this condensation process is transferred to the return water.
The condensate is caught in a collecting vessel (3) and through a syphon (4) to a suitable drain. In a fully condensing boiler the flue gas temperature in the last pass is (5) so low in temperature, that thermal draught has become insufficient to carry off the flue gases naturally. In order to secure the supply of air for combustion and the flue discharge of flue gases, it is necessary to install a fan (6).

The flue gas transport is controlled by means of an air pressure differential switch (7). This switch will also control the so-called "pre-purge" before each start of the boiler.
If there is too little air flow, the boiler will not operate.
By switching off the fan when the boiler switches off, there will be hardly any internal ventilation, so that heat losses during periods of non-operating will be very small indeed.
Insulation material is positioned all around the boiler in order to minimize heat losses (8).
Adjustable air inlet for commissioning (9).
Exhaust of combustion gases to flue (10).

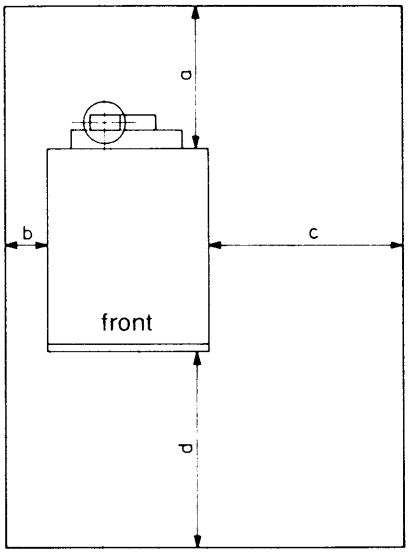


Seagold

INSTALLATION INSTRUCTIONS FOR CENTRAL HEATING SERVICE ENGINEER

General
The Seagold Gas 2b ECO boiler is packed with the casing fitted. Remove the packing material from the boiler.
If the boiler is too heavy to be moved to the desired location, it should be dismantled into two parts that can be easily handled. See the dismantling instructions on page 15 and 16.

Positioning
When positioning the boiler, relevant British Standards and British Gas Regulations must be observed. The minimum space required for the boiler is indicated by the following diagram:

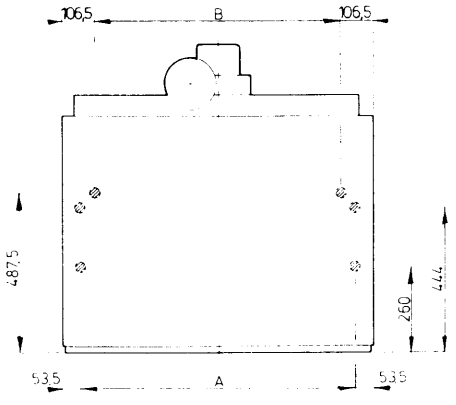


a 500 mm
b 150 mm
c 500 mm
d 500 mm

Height above boiler:
min. 1000 mm.

To insure good operation of this fully condensing boiler we recommend installation in a well-ventilated room with sufficient fresh air supply. (to Britisch Gas regulations)

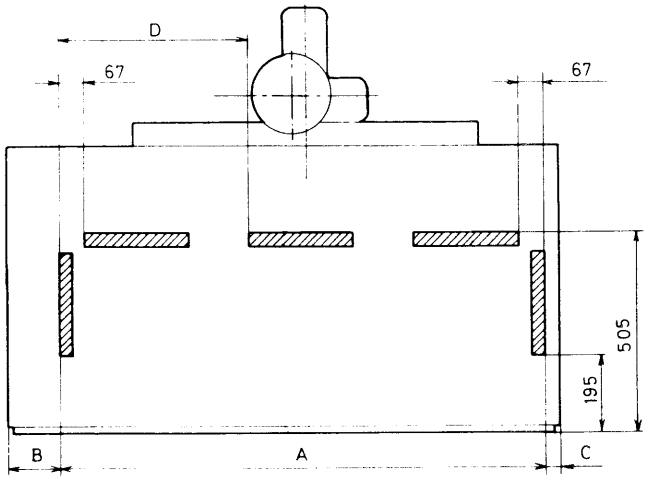
Support surface Gas 2b ECO 8 to 14 sections



Support surfaces: synthetic pieces ∅30 mm (height 15 mm)

Number of sections	A	B
8	465	359
10	589	483
12	713	607
14	837	731

Support surface Gas 2b ECO 16 to 20 sections



Support channel section 265 × 35 mm (height 15 mm)

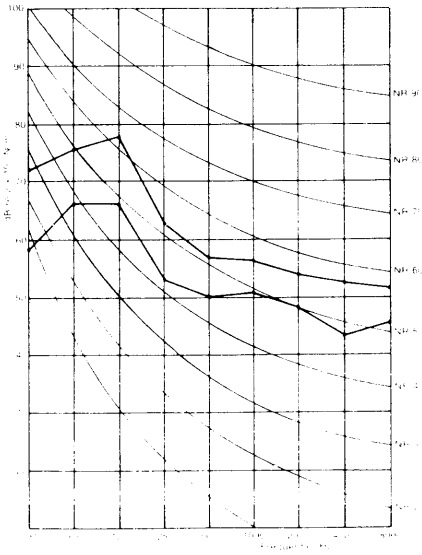
Number of sections	A	B	C	D
16	982	182	51	358
18	1104	135	36	420
20	1224	135	36	480

Flues
The connection to the flue pipe must be made in accordance with the provisional guidelines of British Gas.
The boiler features a built-in flue gas fan to ensure discharge of the flue gases.

Noise production
The noise level measured around the boiler and in the mouth of the fan amounts to about 55 dBA. If this noise causes problems in the immediate vicinity, sound insulating or absorbing measures should be taken. In such cases you can contact Broag for information.

Note
A half-brick enclosed partition wall between boilerhouse and adjacent locality will in itself keep the noise level in that locality below 25 dBA.

Noise production Gas 2b ECO



Draining of condensate
The economiser's condensate collector is fitted with an aluminium socket, internally threaded with 1'' BSP, into which a PVC adapter (1'' ext., 32 mm int.) is fitted. After the boiler has been set in place, the siphon trap (supplied loose) should be glued to the connector socket with normal PVC adhesive.

The syphon trap and condensate discharge line should be connected up by means of a PVC coupling, it may be necessary to remove the side panel.

The condensate must be discharged into a drain. Attention must be paid to the danger of freezing and of chemical attack on the materials used. Plastic is a suitable material.

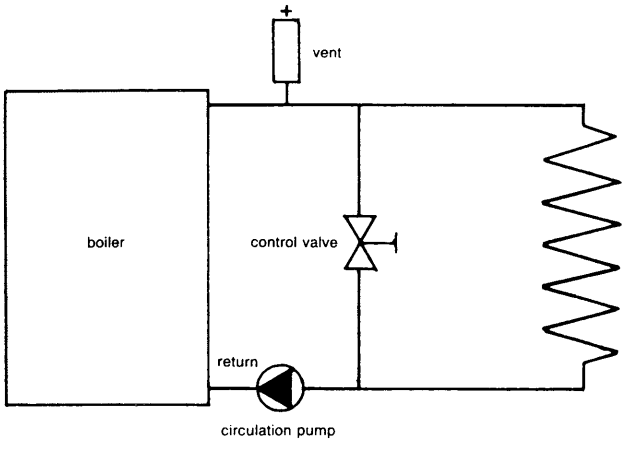
Water connection
The flow and return connections are located on the right-hand side of the boiler. Connection on the left-hand side are not possible.

Safety valve
In accordance with British Standards the system must fitted with a safety valve. Its size must be at least 1/2'' (not supplied by Broag).

Use of thermostatic radiator valves
If thermostatic radiator valves are used, the water flow rate through the boiler will vary constantly.
In such cases, we recommend that a bypass line with control valve should be fitted between flow and return (see diagram).
The control valve should be set once only, with all thermostatic radiator valves closed.

Note:
The flow should have an air venting facility.
If the return cannot be vented via the boiler, it should also have an air venting facility.

Diagram of circuit with thermostatic radiator valve



INSTALLATION INSTRUCTIONS FOR GAS SUPPLY

Gas connection:
The boiler must be connected up to the gas supply line in accordance with the requirements of gas safety regulations. Gas can be connected up on the left or right-hand side by means of a 3/4'' supply pipe.
A gas cock must be incorporated in the supply pipe to the boiler.

Gas pressure:
The unit requires a working pressure of 12 mbar. Maximum gas supply pressure is 50 mbar (Gas 2b ECO, 8 to 14 sections) or 100 mbar (Gas 2B, 16 to 20 sections).

ELECTRICAL INSTALLATION INSTRUCTIONS

General
The Broag Gas 2b ECO boiler, 8 to 14 sections, is fitted with thermo-electric control and safety equipment (gas combination valve with re-switch-on blocking and thermo-couple interrupter).
The boiler is fully wired in accordance with the wiring diagram on page 8.
The connection to the power supply must be made according to the regulations of the I.E.E.

The Broag Gas 2b ECO boiler, 16 to 20 sections, is fitted with electronic control and safety equipment with ionisation safety device.
The boiler is fully wired in accordance with the wiring diagram on page 8.
The connection to the power supply must be made according to the regulations of the I.E.E.

Connection of room thermostat:
The room thermostat is not supplied.
The room thermostat is to be installed:
1.in the room where the temperature is to be controlled;
2.in a draught-free location away from direct heat radiation such as sunlight, open fireplace, TV set, etc.;
3.on an internal wall at a height of about 1 1/2 metres from the floor.

Mains voltage
Gas 2b ECO, 8 to 14 sections:
In the event of mains power failure, the main flame of the boiler cuts out. But the pilot remains alight. The boiler will start automatically when power is restored.

Gas 2b ECO boiler, 16 to 20 sections:
In the event of mains power failure, the boiler cuts out, but automatically restarts when power is restored.

Air pressure switch
The air pressure switch (LD2) is fitted on the mounting panel and serves to monitor the flue gas flow during operation.
If negative pressure is sufficient (approx. 0.6 mbar), the boiler is free to operate.

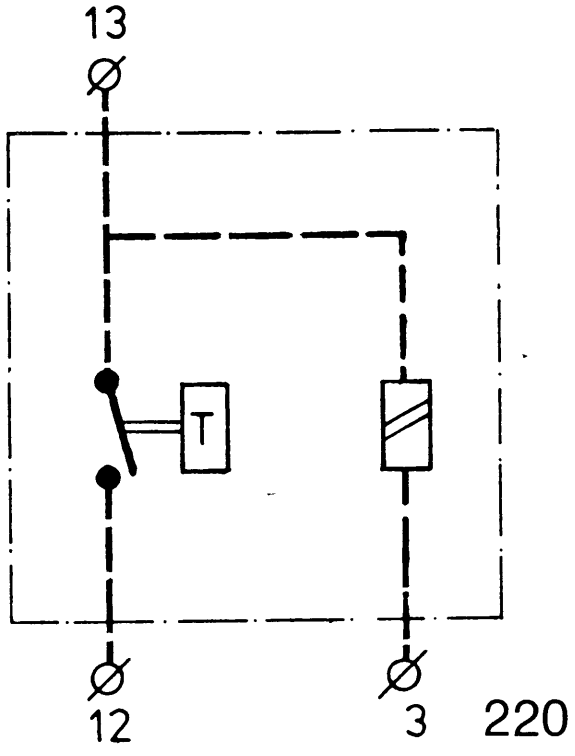
Circulation pump
Gas 2b ECO, 8 to 14 sections:
A circulating pump can be connected to the terminals 7 and 8 in the connecting box. Max. connecting value: 220V-50Hz-150VA.

Gas pressure switch
The gas pressure switch (GDS) serves to control the flue gas transportation, if after the period of heat demand, the gas combination valve or gas safety valve does not shut off entirely (fan keeps rotating).

Pump switch
Gas 2b ECO, 8 to 14 sections
The boiler is provided with a pump switch, which will switch off the circulation pump 15 minutes after the boiler has been switched off (the circulation pump is not included in the accesoires supplied with the boiler).
If there is no heat demand for longer than 48 hours (c.q. in summer) the pump will start operating once every other day. This ensures the correct functioning of the pump after the summer season.
The pump switch is only activated if a circulation pump is connected to the terminals 7 and 8 of the pump switch.
A room thermostat must be connected to the terminals 10 and 11.

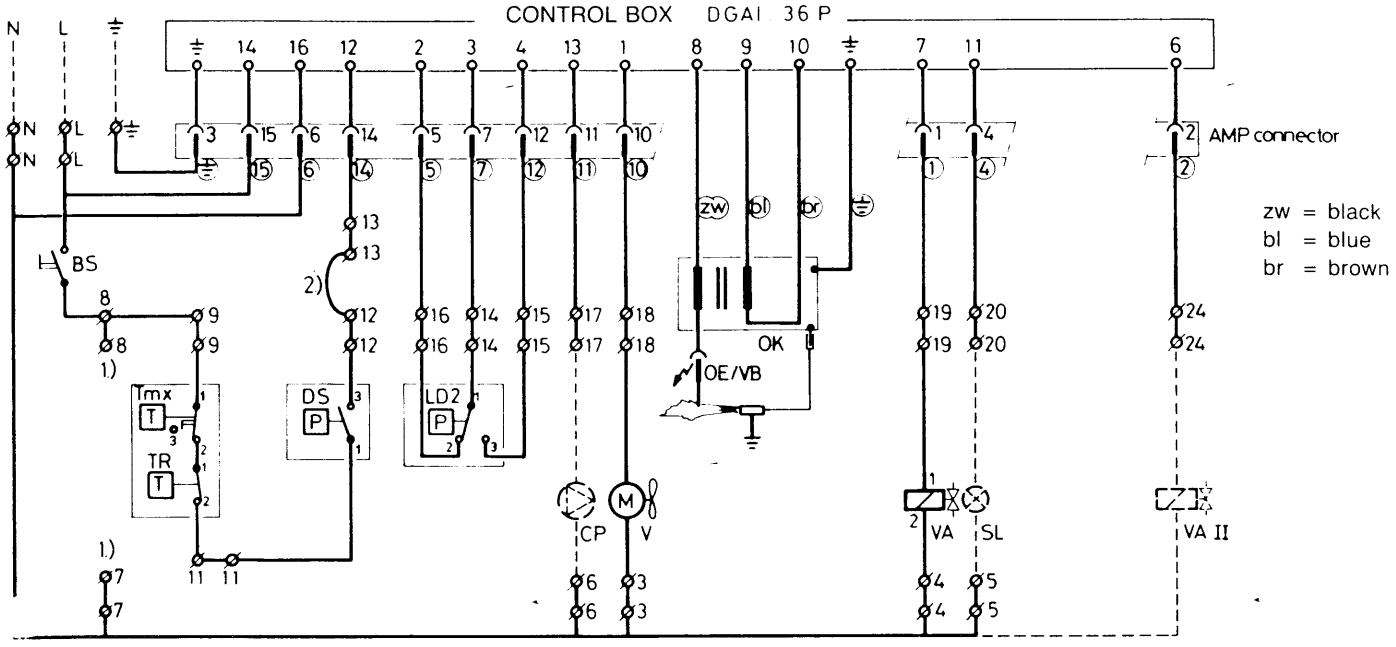
Note:
Pump switch and frost thermostat
Gas 2b ECO, 8 to 14 sections:
When a pump switch is applied it is not impossible that freezing of a very unfavourably positioned radiator (e.g. in a garage) will take place.
In such a case a device must be mounted that bridges that pump switch, e.g. by means of a frost thermostat (not supplied by Broag), which must be installed in the room where there is a possibility of freezing.
The frost thermostat can be connected in accordance with the scheme printed here.

TV = Frost thermostat
Ø = Connecting terminals
[vv] = Terminals (slide)

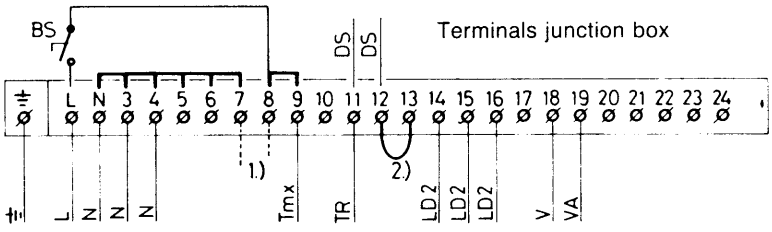


Electric wiring diagram 220/240 volt supply

16/20 sections

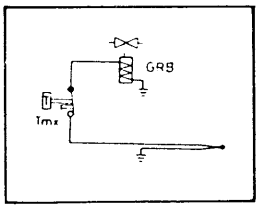


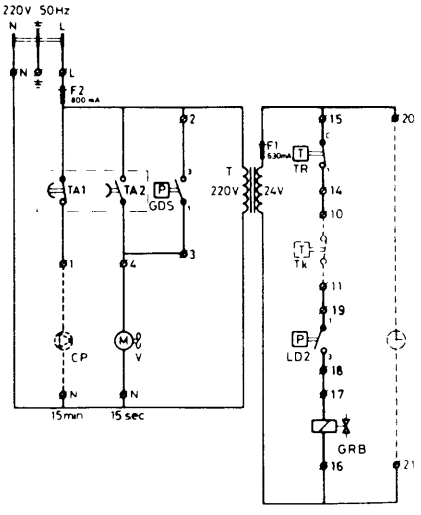
CP	= Circulation pump
DS	= Pressure switch
BS	= Main switch
LD2	= Air pressure switch
OE/VB	= Ignition coil/ignition electrode
SL	= Fault lamp
Tmx	= High limit thermostat
TR	= Control thermostat
VA	= Safety valve
V	= Flue gas fan
Ø	= Junction box terminals
----	= Not supplied or wired
OK	= Ignition coil



1) Terminals for weather compensator 220 V, clips 7 and 8
2) Remove short-cut between clip 12 and 13, when using a weather compensator

8/14 sections





Technical data of automatic safety device

Gas 2b ECO, 16 to 20 sections

Make	: DUNGS.
Type	: DGAI 36 P.
Connection voltage	: 240 V, 50 Hz.
Power input	: 10 VA.
Maximum fuse rating	: 6 A.
Maximum ambient temperature	: 60 °C.
Pre-purging time	: 30 sec.
Start-up safety time	: 5 sec.
Minimum ionisation current	: 6 A.
Reaction time	: 1 sec.

The automatic safety device works on a phase/neutral supply!
Ensure that connections are correct.

Ignition unit

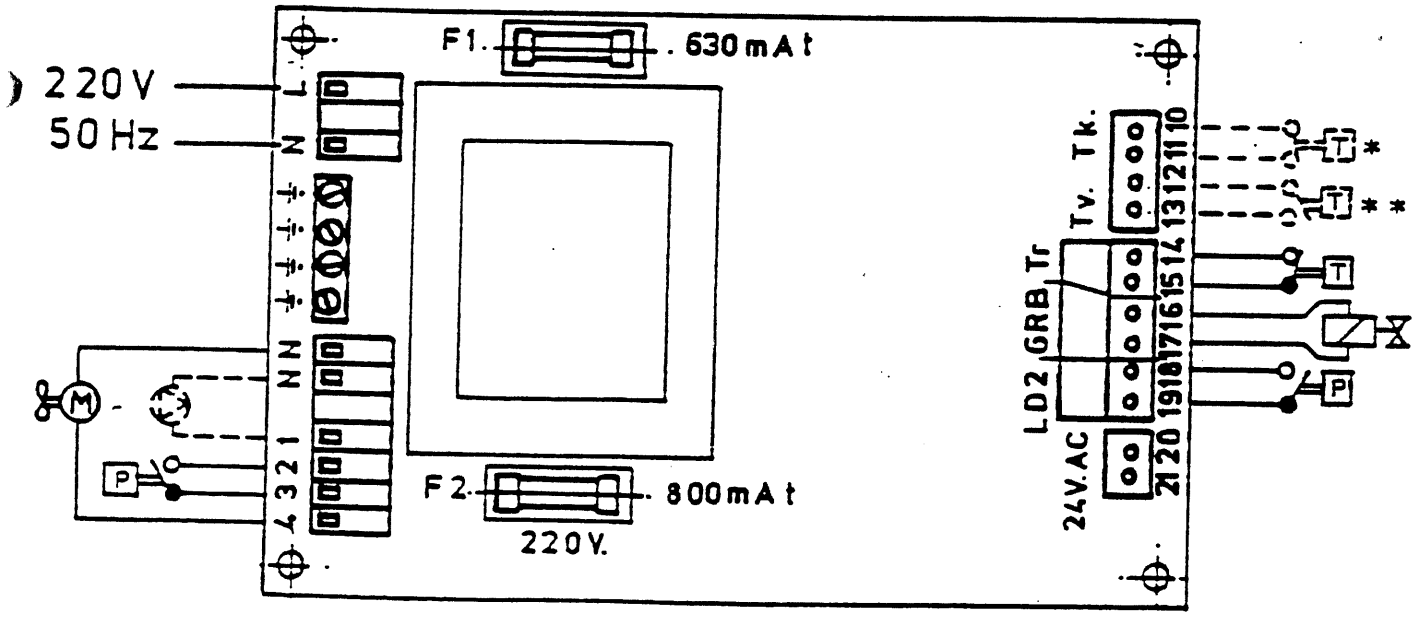
Make	: DUNGS.
Type	: DZÜ 2.
Ignition voltage	: 10 kV.
Electrode gap	: 3 - 4 mm.

Total power input of boiler: 225 VA.

L	– Live input	CP	– Circulating pump
N	– Neutral input	GDS	– Gas pressure switch
T	– Transformer	TA	– Pump relay
Tmx	– Thermostat (High limit)	TR	– Boiler thermostat
V	– Flue fan	LD2	– Pressure switch
HR	– Realy	GRB	– Gas control valve
Tk	– Room thermostat	F	– Fuse

Pompschakeling
De ketel is voorzien van een pompschakeling, overeenkomstig de door het VEG Gasinstituut gestelde eisen. Dit betekent onder andere, dat ± 15 minuten na het uitschakelen van de ketel ook de pomp uitschakelt. Als er langer dan 24 uur geen warmtevraag is (bijv. in de zomer) zal de pomp eenmaal per etmaal 15 minuten gaan draaien. Hierdoor wordt het goed funktioneren van de pomp na een langdurige stilstandsperiode gewaarborgd. De pompschakeling is alleen werkzaam indien een kamerthermostaat op de aansluitklemmen 10 en 11 aangesloten is.
Indien tijdens de zomermaanden de periodieke inschakeling op een bepaald tijdstip moet plaatsvinden, b.v. overdag, dient men op dat tijdstip de kamerthermostaat één keer, gedurende een korte tijd, hoog in te stellen.

Opmerking:
Pompschakeling en vorstthermostaat
Bevriezing van een zeer ongunstig geplaatst toestel, radiator of leiding (b.v. in een garage) is bij toepassing van een pompschakeling niet uitgesloten.
In een dergelijk geval zal een voorziening aangebracht moeten worden, die de pompschakeling overbrugt. Dit kan geschieden middels een vorstthermostaat (wordt niet door Remeha geleverd), die geplaatst moet worden in de ruimte waar bevriezingsgevaar bestaat.
De vorstthermostaat kan aangesloten worden volgens het onderstaande voorbeeldschema.



Seagold

USER INSTRUCTIONS

Gas 2b ECO, 8 to 14 sections
Thermo-electric safety device

Start-up

1. Remove the protective foil from the panelling. After the foil has been removed, stick the lighting instructions supplied on the front panel.

2. The working pressure of the water must be at least
   0.1 bar open vent systems. *
   0.8 bar pressure systems.
   * Bridge out pressure switch.

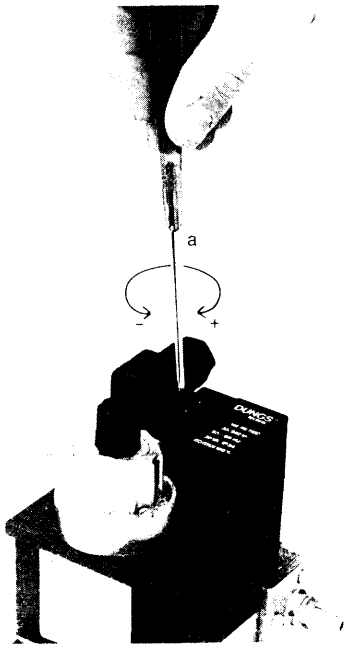
3. Set the boiler thermostat at maximum value.

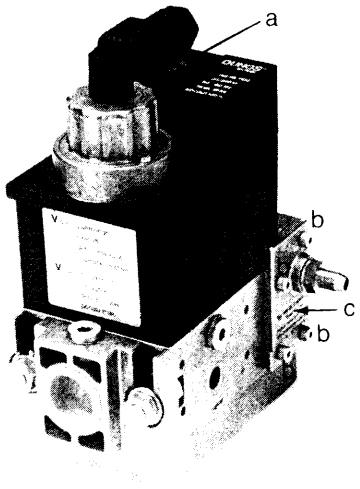
4. Set the room thermostat at maximum value.

5. Switch on the circulation pump and check its installed position and direction of rotation (if the pump is connected to the pump switch, the pump will switch on automatically, see point 7).

6. Open the main gas cock near the boiler.
   Press the button on the gas combination valve, thus releasing pilot flame gas to be ignited by the piëzo ignition. Keep the button pressed for 30 seconds, release it (if the pilot flame extinghuises, see "fault finding instructions").

7. Switch on the electric supply.
   Now the following operations will take place:
   - the circulation pump starts (only if connected to the pump switch).
   - the flue gas fan start. This is monitored during the waiting time (30 sec) by means of the air pressure switch (LD2).
     By way of this switch the boiler will receive a switch-on command, and the gas combination valve will open with some delay.
   - the boiler starts operating.





8. Allow the boiler to burn for a few minutes to get rid of any air in the gas line.

9. Set the desired burner pressure (see rating plate) by turning screw "a" with a screw driver.

10. Set the boiler thermostat at the desired temperature.

11. Set the room thermostat at the desired temperature.

12. Check the pump capacity.

Shut down

1. Switch off electrical supply.

2. Shut down main gas cock.

Venting the boiler

Air should be vented from the boiler by means of the vent tap at the top of the economisers left-hand baffle box. This must be done carefully while the system is being filled. In addition, we recommend that the system be fitted with an automatic vent to prevent the accumulation of air in the boiler during normal operation.

USER INSTRUCTIONS

Gas 2b ECO, 16 to 20 sections
Electronic execution

Start-up

1. Remove the protective foil from the panelling. After the foil has been removed, stick the lighting instructions supplied on the front caseing.
2. Check the gas connections.
3. Check the electrical connection, phase/neutral and supply.
4. The working pressure of the water must be at least
   0.1 bar open vent systems.*
   0.8 bar pressure systems.
   * Bridge out pressure switch.
5. Switch on the circulation pump and check its installed position and direction of rotation.
6. Open the main gas cock near the boiler.
7. Set the thermostats at desired value.
8. Set the sliding air control at the correct setting.
9. Switch on the electric supply.
10. The fan will start to operate. This is monitored during the waiting time of 30 sec., by means of the air pressure switch. The ignition is released, after which the gas safety valve is opened.
    The boiler is now in operation.
11. Allow the boiler to burn for a few minutes to get rid of any air in the gas line.
12. Set the desired burner pressure (see rating plate):
    a. Burner pressure setting
       The correct burner pressure can be set by turning screw "a" with a screwdriver.
    b. Filter
       The filter can be cleaned after allen screws "b" and cover "c" have been removed.
       The other setting points have been sealed by the manufacturer and must not be re-adjusted.
13. Check that the boiler thermostats are operating correctly.
14. Check the operation of the flame safety monitor (remove the cap of the ionisation electrode to do so).
15. Check the operation of the flue gas monitor by detaching the air hose P2 of air pressure switch LD2.

Shut down

1. Switch off electrical supply.
2. Shut down main gas cock.

Venting the boiler

Air should be vented from the boiler by means of the vent tap at the top of the economisers left-hand baffle box. This must be done carefully while the system is being filled. In addition, we recommend that the system be fitted with an automatic vent to prevent the accumulation of air in the boiler during normal operation.

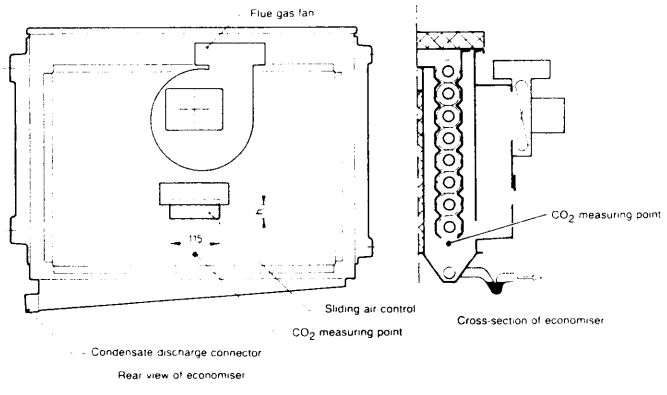
Checking and (if necessary) re-adjusting boiler combustion

Boiler combustion is checked by measuring the CO, percentage at the rear of the economiser. The sliding air control at that point is set by the manufacturer for a CO_2 percentage of 8.2%.

The table for maximum permissible chimney lenghts (see page 12) applies at this setting only.

Measurement and (if necessary) re-adjustmaent may be done as follows:

1. Heat up the boiler to a water temperature of at least 80°C in the flow line.
2. Set the boiler at the correct burner pressure (see rating plate).
3. Check setting 'h' of the sliding air control (see table).
4. Check combustion by measuring the CO_2-percentage at the measuring point indicated in the diagram below.
   The CO_2-percentage can be re-adjusted by means of the sliding air control at the rear of the economiser, in accordance with the chimney diameter/length ratio so that 8.2% CO, is obtained.
   Setting 'h' can be made larger or smaller by means of the sliding air control. For this purpose the securing screw must be removed.
   After the sliding air control has been adjusted to the correct setting, it must be re-secured.



Number of sections	Sliding air control dimension "h" mm
8	21
10	14
12	42
14	33
16	27
18	24
20	20

FAULTS

Gas 2b ECO, 8 to 14 sections

Possible faults:

- Pilot flame extinghuishes:

Warning
After extinguishes of the pilot flame, wait 5 minutes before re-igniting.

a. The pilot flame is too small; increase gas supply by means of the small setting screw above the pilot flame supply pipe.
Set pilot flame consumption at ca. 24 liter/h (0.024 m/h).

b. The pilot flame blows off; decrease gas supply by means of the small setting screw above the pilot flame supply pipe.

c. The thermo-couple voltage is too low; the thermo-couple is faulty: (voltage must be min. 7 mK check when loaded).

d. No supply gas pressure: re-ignite pilot flame after return of gas pressure.

e. The boiler contains insufficient water (maximum thermostat is activated). Check water pressure and top up the installation if necessary).

f. The circulation pump is faulty: the maximum thermostat interrupts the thermo- couple circuit and the pilot flame extinghuishes. Check the circulation pump.

- Boiler does not become operative:

a. The fuse in the control box blown; Switch of electrical supply, and place new fuse (100 mA slow).

b. The pilot flame does not burn; light pilot flame.

c. The current is interrupted, the main flame of the boiler cuts out. But the pilot remains alight. The boiler will start automatically when power is restored.

d. The thermostats are not correctly set or do not require heat supply.

e. The flue gas fan does not function (warn installer).

f. The air pressure switch does not switch to safe position; the transport duct for flue gases is blocked (warn installer). The minimum pressure is 0.6 mbar.

- Boiler starts operation but stops functioning soon after:

a. Chimney duct does not clear flue gases; check for blocking or position of duct mouth.

b. Boiler cannot exhaust the flue gases: check the two heat exchanger for dirt.

Gas 2b ECO, 16 to 20 sections.

General

Check the supply, the closed position of the thermostats, and the water level control (if mounted). Use the electrical wiring diagram and sequence diagram of page 8.

No ignition spark
Check:

1. The ignition coil.
2. The supply to the ignition coil.
3. The electrode gap (must be 3 - 4 mm).

No pilot flame
Check:

1. The supply to the gas safety valve.
2. The gas line to the gas safety valve.
3. The injector for blockage.
4. The gasline for air.

Other faults

1. Gas pressure disappear.
   The boiler cuts out.
2. Current is interrupted: The boiler cuts out and automatically restarts when power is restored.
3. Current fluctuates. Fluctuations of more than + 10 or -15% will cut out the boiler.

Faults flue gas system

1. Flue gas fan does not run during start sequense.
- Check the control circuit.
- Check the correct function of the air pressure switch.

2. Flue gas fan stops while boiler is in function.
- Reset the safety device.
- Check the chimney for dirt.
- Check the boiler block and economiser for dirt.
- Check the correct function of the air pressure switch.

MAINTENANCE AND CLEANING INSTRUCTIONS

Maintenance
The maintenance operations to be performed once a year:

1 - Cleaning the cast-iron main boiler block using the short-haired nylon cleaning brush (short service life).

- Inspecting and, if necessary, cleaning the aluminium economiser with (warm) water and/or the long-haired nylon cleaning brush (long service life).

- Cleaning the burners and combustion area.

- Cleaning the burners.

- Cleaning the gas filter.

2 - Testing and checking that the equipment operates correctly and making any necessary re-adjustments. Recording gas consumption and checking combustion by means of flue gas measurements.

3 - Checking water pressure (sealed systems).

Note:
The nylon cleaning brushes are available from Broag (for an additional price.)

Cleaning
Shut down the boiler (switch off power, close main gas tap) and proceed as follows:

- Lift up the door and remove it.

- Detach the top panel.

- Take the burner bars out of the boiler, after undoing the screws of the burner plate and the connector of the combined gas unit. Undo the electrical connections of the combined gas unit.

  Take off the cleaning cover from the flue gas manifold (after removing the lagging) and clean the combustion channels between the cast-iron sections using the short-haired nylon cleaning brush.

- Then, after removing the vertically fitted flue gas guide plates, clean (only if necessary) the combustion channels in the economiser, by forcefully hosing them with (warm) water. Only use the long-haired nylon cleaning brush if water hosing is not sufficiently effictive.

- Remove the siphon trap's cover and clean the siphon trap.
  If necessary, clean the condensate outlet using the short-haired nylon cleaning brush.
  After this cleaning operation, hose down the economiser from the top.

- Check the blades of the fan for dust deposition and clean them if necessary.

- Clean the burners.

- Clean the baseplate and the floor underneath the boiler.

- Then refit all parts that have been removed in the right places (remember the gasket between the cleaning cover and the flue gas manifold). Refit the lagging at the top of the flue gas manifold.

- Refit the top panel and restart the boiler.

Draining

- Drain the boiler by means of the filling and drain tap on the right-hand side of the boiler.

- Drain the economiser by means of the drain tap fitted in the T-piece in the right-hand baffle box.

DISMANTLING INSTRUCTIONS

If the boiler is too heavy or too large to be moved to the right place in one piece, it can be dismantled into parts that can be easily handled. For this purpose, proceed as follows:

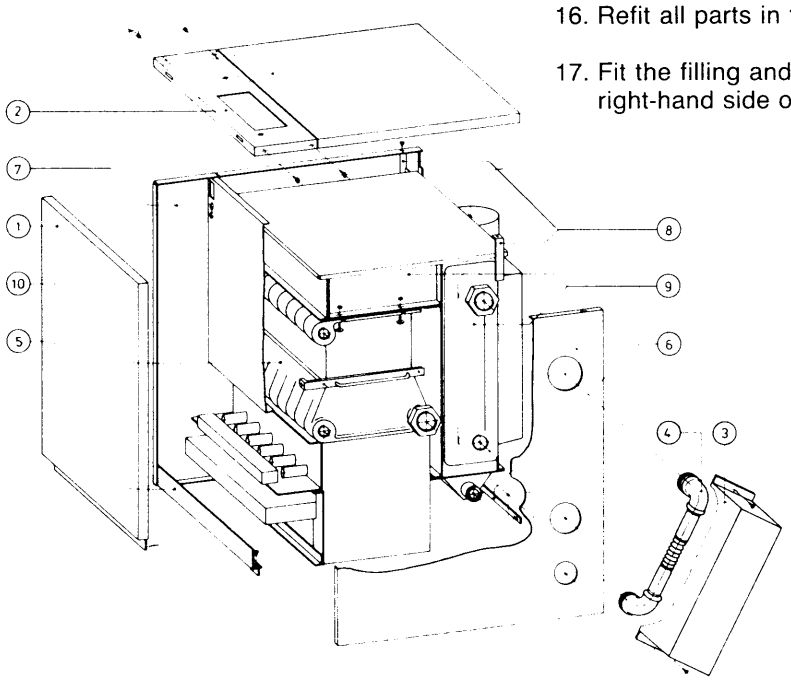
Note:
In most cases, it is advisable to detach the flue gas fan from the economiser. For this purpose, the electrical wiring must be detached from the flue gas fan and the 4 bolts securing the flue gas fan to the economiser must be removed.

Gas 2b ECO, 8 to 14 sections

1. Remove the front panel (1).
2. Remove the top panel (2) and the lagging on the flue gas manifold.
3. Remove the insulation of the flexible connecting hose (3) from the right hand side panel by releasing the two screws.
4. Remove the flexible connecting hose (4) between boiler block and second heat exchanger by releasing the nuts of the knee joints.
5. Remove the Z-section (5) at the front of the boiler by undoing the securing screws at the bottom of the side panels.
6. Remove the connecting strip (6) at the rear of the boiler by undoing the securing screws at the bottom of the side panels.
7. Remove the screws holding the side panels (7) to the mounting plate and to the panel supports (8).
8. Remove the side panels (7).
9. Disconnect the electrical wiring (if still connected up) of the flue gas fan.
10. Remove the panel supports (8) which are mounted to the left and right upper side of the back plate of the second heat exchanger.
11. At the front of the boiler, detach the hose of the air pressure switch.
12. Now remove the economiser, which is connected to the flue gas manifold (9),
    in its entirety from the boiler block by undoing the securing bolts on either side of the boiler block.

Note:
If the fan has not been removed, the economiser must not under any circumstances be lifted by the flue gas fan or chimney connector.

13. Remove the loose lagging at the rear of the boiler block.
14. Position the boiler block (10) at the desired place.
15. Re-mount the economiser, complete with flue gas manifold. Make sure that the turned rim of the condensate pan is relocated between the firebox and the seat of the positioning plate at the rear of the firebox.
16. Refit all parts in the reverse order.
17. Fit the filling and drain tap (supplied loose) in the right-hand side of the boiler block.

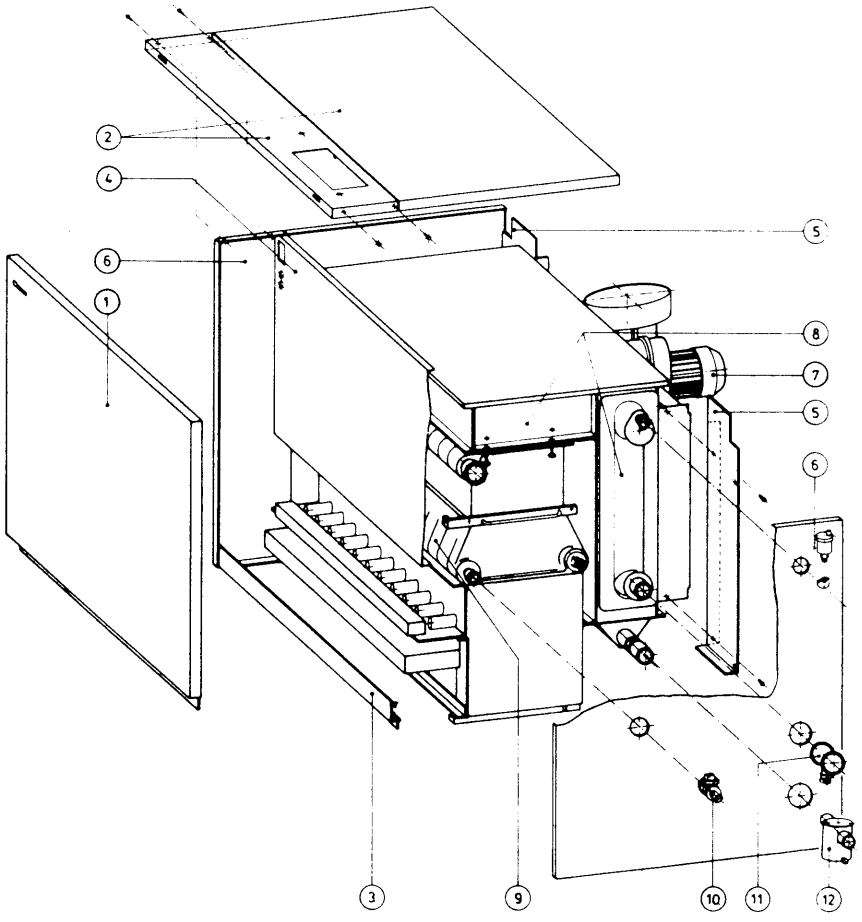


Gas 2b ECO, 16 to 20 sections

1. Remove the front panel (1).
2. Remove the top panel (2) and the lagging on the flue gas manifold.
3. Remove the Z-section (3) at the front of the boiler by undoing the securing screws at the bottom of the side panels.
4. Remove the screws holding the side panels (6) to the mounting plate (4) and to the rear panels (5).
5. Remove the side panels (6) and the loose lagging on the left-hand side of the boiler block.
6. Disconnect the electrical wiring (if still connected up) of the flue gas fan (7).
7. At the front of the boiler, detach the pipe off the differential pressure switch.
8. Detach the rear panels (5) from the economiser (nut/bolt connection) and remove the sockets from the grommets located at the rear of the boiler.
9. Remove the rear panels (5).
10. Now remove the economiser, which is connected to the flue gas manifold (8), in its entirety from the boiler block by undoing the securing bolts on either side of the boiler block.

N.B.:
If the fan has not been removed, the economiser must not under any circumstances be lifted by the flue gas fan or chimney connector.

11. Remove the loose lagging at the rear of the boiler block.
12. Position the boiler block (9) at the desired place.
13. Re-mount the ecomomiser, complete with flue gas manifold. Make sure that the turned rim of the condensate pan is relocated between the firebox and the seat of the positioning plate at the rear of the firebox.
14. Refit all parts in the reverse order.
15. Fit the filling and drain tap (10) (supplied loose) in the right-hand side of the boiler block.
16. Fit the T-piece with the drain tap for the economiser (11) and the siphon trap (12) on the right-hand side of the economiser.

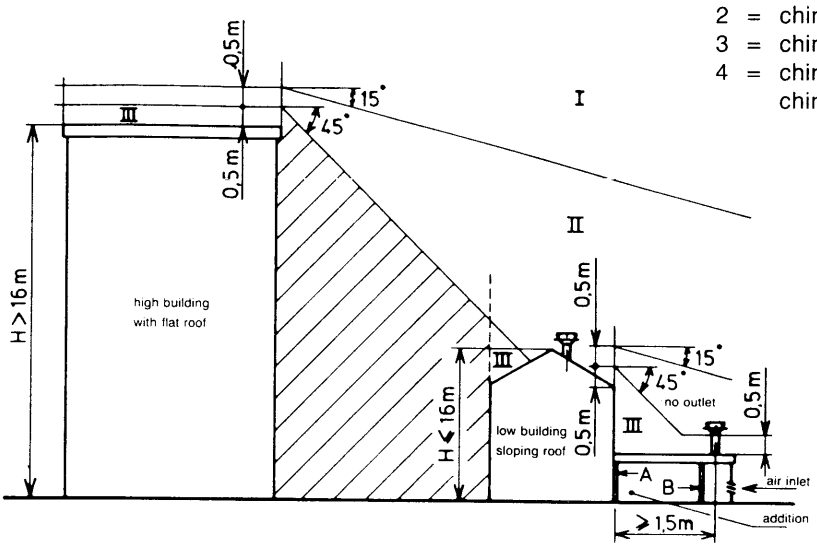


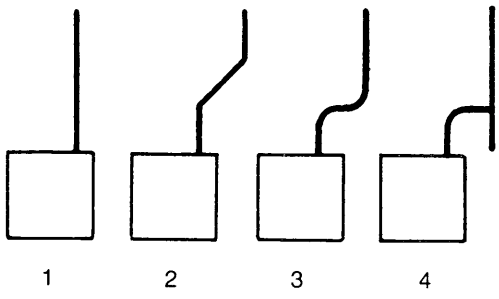
Seagold

Maximum chimney length (in m)

Execution of the chimney*)

1 = chimney without bends
2 = chimney with two bends 45°
3 = chimney with two bends 90°
4 = chimney with a squared inlet and one bend 90° or chimney with two bends 45° and rain cap





Permited outlets 8 – 10 sections: area I and II
12 – 20 sections: area I, II and III

Gas 2b ECO * over 70 m – not applicable		**Free outlet (I)**				**Outlet in II and III (and outlet in I with terminal)**			
D (in MM)		1*)	2*)	3*)	4*)	1*)	2*)	3*)	4*)
8 sections	100	6.2	5.3	4.5	2.8	2.6	1.7	0.8	–
	110	11.3	10.4	9.4	7.6	6.7	5.7	4.8	3.0
	120	18.8	17.7	16.7	14.7	12.9	11.8	10.8	8.8
	130	29.3	28.1	27.0	24.9	21.7	20.5	19.4	17.3
	140	43.6	42.4	41.2	38.9	33.8	32.6	31.4	29.1
	150	62.8	61.5	60.2	57.8	50.2	48.9	47.6	45.1
	160	*	*	*	*	*	*	68.9	66.3
10 sections	100	6.8	5.9	5.0	3.4	2.9	2.1	1.2	–
	110	12.2	11.2	10.3	8.5	7.3	6.3	5.4	3.6
	120	20.1	19.1	18.0	16.1	13.8	12.8	11.7	9.8
	130	31.3	30.1	29.0	26.9	23.1	21.9	20.8	18.7
	140	46.5	45.3	44.1	41.8	35.9	34.6	33.4	31.1
	150	66.9	65.6	64.3	61.8	53.0	51.7	50.4	48.0
	160	*	*	*	*	*	*	*	*
12 sections	100	0.5	–	–	–	–	–	–	–
	110	2.0	1.1	0.1	–	–	–	–	–
	120	4.4	3.4	2.3	0.4	0.6	–	–	–
	130	7.9	6.7	5.6	3.5	3.4	2.2	1.1	–
	140	12.6	11.4	10.2	7.9	7.3	6.1	4.9	2.6
	150	19.1	17.8	16.4	14.0	12.8	11.5	10.1	7.7
	160	27.5	26.1	24.7	22.1	20.0	18.6	17.2	14.6
	170	38.5	37.0	35.5	32.7	29.5	28.0	26.5	23.7
	180	52.3	50.8	49.2	46.3	41.5	39.9	38.4	35.4
	190	69.8	68.1	66.4	63.3	56.7	55.1	53.4	50.3
	200	*	*	*	*	*	*	*	*

Seagold

Gas 2b ECO

* over 70 m
– not applicable

	D (in MM)	Free outlet (I) 1*)	2*)	3*)	4*)	Outlet in II and III (and outlet in I with terminal) 1*)	2*)	3*)	4*)
14 sections	100	1.2	0.4	–	–	–	–	–	–
	110	3.3	2.3	1.4	–	–	–	–	–
	120	6.3	5.3	4.2	2.3	2.3	1.2	0.2	–
	130	10.7	9.6	8.4	6.3	5.9	4.7	3.6	1.5
	140	16.8	15.5	14.3	12.0	11.0	9.7	8.5	6.2
	150	24.9	23.6	22.3	19.8	17.9	16.6	15.2	12.8
	160	35.5	34.1	32.7	30.1	27.0	25.6	24.2	21.6
	170	49.3	47.8	46.3	43.6	39.0	37.5	36.0	33.2
	180	66.8	65.2	63.7	60.7	54.2	52.6	51.0	48.1
	190	*	*	*	*	*	*	*	66.9
	200	*	*	*	*	*	*	*	*
16 sections	100	3.8	2.9	2.0	0.4	–	–	–	–
	110	7.4	6.4	5.5	3.7	3.2	2.2	1.3	–
	120	12.7	11.7	10.6	8.7	7.5	6.4	5.4	3.4
	130	20.2	19.1	17.9	15.8	13.6	12.5	11.3	9.2
	140	30.5	29.3	28.1	25.8	22.1	20.9	19.7	17.4
	150	44.3	43.0	41.7	39.2	33.7	32.4	31.0	28.6
	160	62.4	61.0	59.6	57.0	48.9	47.5	46.1	43.5
	170	*	*	*	*	68.5	67.0	65.5	62.8
	180	*	*	*	*	*	*	*	*
	190	*	*	*	*	*	*	*	*
	200	*	*	*	*	*	*	*	*
18 sections	100	2.4	1.5	0.6	–	–	–	–	–
	110	5.1	4.2	3.2	1.4	1.2	0.3	–	–
	120	9.2	8.1	7.1	5.1	4.4	3.4	2.3	0.4
	130	14.9	13.8	12.7	10.6	9.1	8.0	6.8	4.7
	140	22.9	21.7	20.4	18.2	15.6	14.4	13.2	10.9
	150	33.5	32.2	30.9	28.5	24.4	23.1	21.8	19.4
	160	47.5	46.1	44.7	42.1	36.1	34.7	33.3	30.7
	170	65.5	64.0	62.5	59.7	51.3	49.8	48.3	45.5
	180	*	*	*	*	*	69.0	67.4	64.5
	190	*	*	*	*	*	*	*	*
	200	*	*	*	*	*	*	*	*
20 sections	100	1.4	0.5	–	–	–	–	–	–
	110	3.5	2.6	1.6	–	–	–	–	–
	120	6.7	5.7	4.6	2.7	2.3	1.3	0.2	–
	130	11.3	10.1	9.0	6.9	5.9	4.8	3.7	1.5
	140	17.5	16.3	15.1	12.8	11.0	9.8	8.6	6.3
	150	26.0	24.7	23.3	20.9	18.0	16.7	15.3	12.9
	160	37.1	35.7	34.3	31.7	27.2	25.8	24.4	21.8
	170	51.4	49.9	48.4	45.6	39.2	37.7	36.2	33.4
	180	69.5	68.0	66.4	63.5	54.5	52.9	51.3	48.4
	190	*	*	*	*	*	*	*	67.2
	200	*	*	*	*	*	*	*	*

Broag Ltd.

Head Office, Molly Millars Lane, WOKINGHAM/BERKS. RG11 2PY.
Tel.: (0734) 78 34 34, Telex: 849 137, Fax 734 786 977

Broag Ltd.

Branch Office, Unit 3, Kestrel Close Quarry Hill, Industrial Estate.
ILKESTON Derbyshire, Tel. (0602) 44 07 78

MANUFACTURED BY A

BSI REGISTERED FIRM

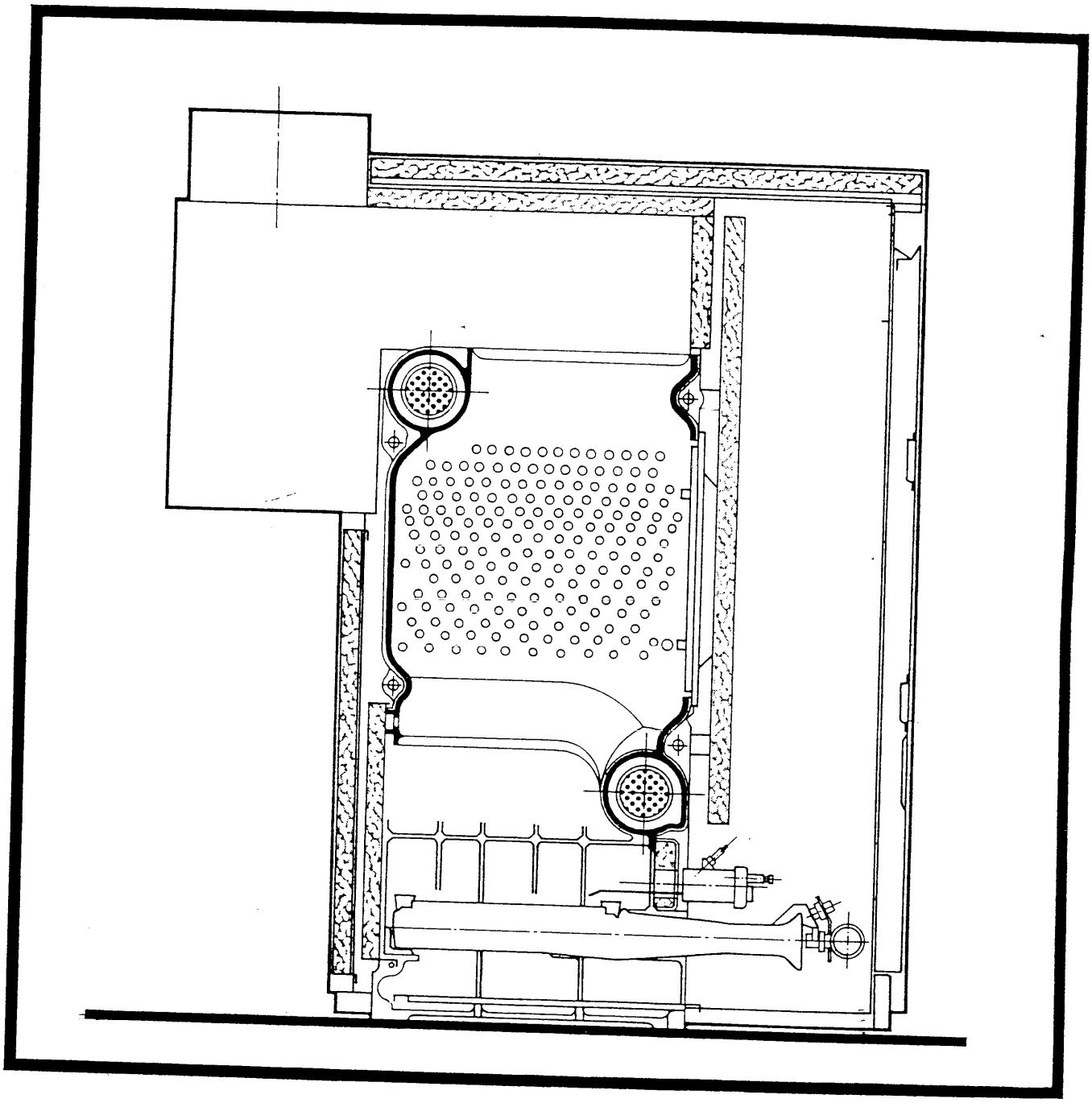
Art.no. 34 193/1000 06/94/I

Seagold

Gas 3 boiler atmospheric technical sales information

CI/SfB reference by RIBA SfB Agency

(5-13) Xh1



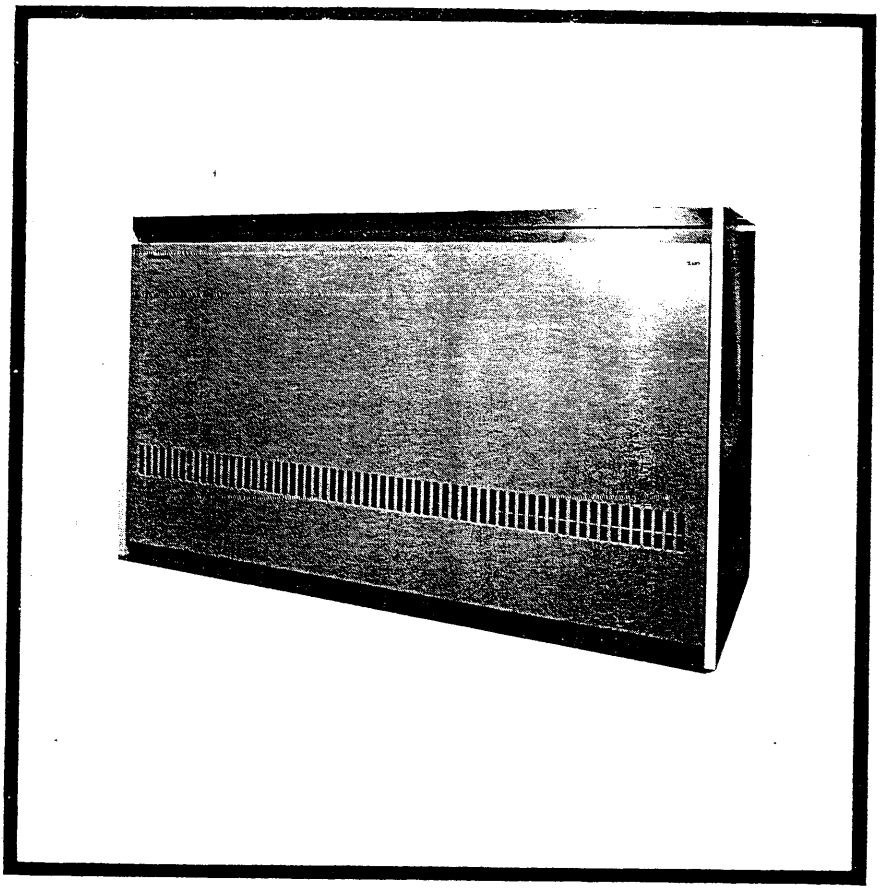
Broag Ltd

Thyccon House
Molly Millars Lane
Wokingham, Berks
Tel. 0734-783434
Telex 849137

SEAGOLD boiler applications include indirect hot water and central heating for schools, hospitals, banks, hotels and high street shops.
Visits to a variety of commercial installations throughout the UK can be arranged on request.

THYSSEN

SEAGOLD Gas 3 series boiler with atmospheric burner



GAS '3'-20

The SEAGOLD Gas '3' series boiler is the first of an extensive range of atmospheric gas fired boilers to complement Seagold's comprehensive range of oil and blown gas fired equipment.

Fourteen different sizes comprise the Gas '3' series: the smallest boiler in the range (Gas 3-7 sections) produces 270,000 Btu/h (79 kW) extending in increments of approximately 44,000 Btu/h (13 kW) to a maximum output of 936,000 Btu/h (275 kW) obtained from the Gas 3-22 section boiler.

Gas '3' boilers were designed for natural gas and are easily convertible to manufactured gas until natural fuel is available.

The quietness of atmospheric gas fired boilers makes them highly advantageous in shops, offices, churches and residential blocks where discernible noise levels (from blown fuel equipment) in public sectors of buildings are unacceptable.

Larger sizes – Seagold's Gas '5A' and Gas '6' series, with outputs from 1 million (293 kW) to over 3.6 million Btu/h (1058 kW) are available.

SEAGOLD Gas '3' Features

- Automatic spark ignition and flame ionisation safety shut-off system provided as standard.
- Burner control system and flow & return designed for left or right hand connections.
- Effects of excessive down-draught minimised by automatic cut-out thermostatic device in flue-way.
- Ignition and safety equipment approved and available in UK.
- Water distribution tube eliminates short-circuiting of return water in boiler.
- British Gas Approved.

SEAGOLD Gas '3' Benefits

- **Reliability**
  High quality castings, sophisticated but well proven control system and constant fuel supply offer users an exceptionally reliable boiler installation.

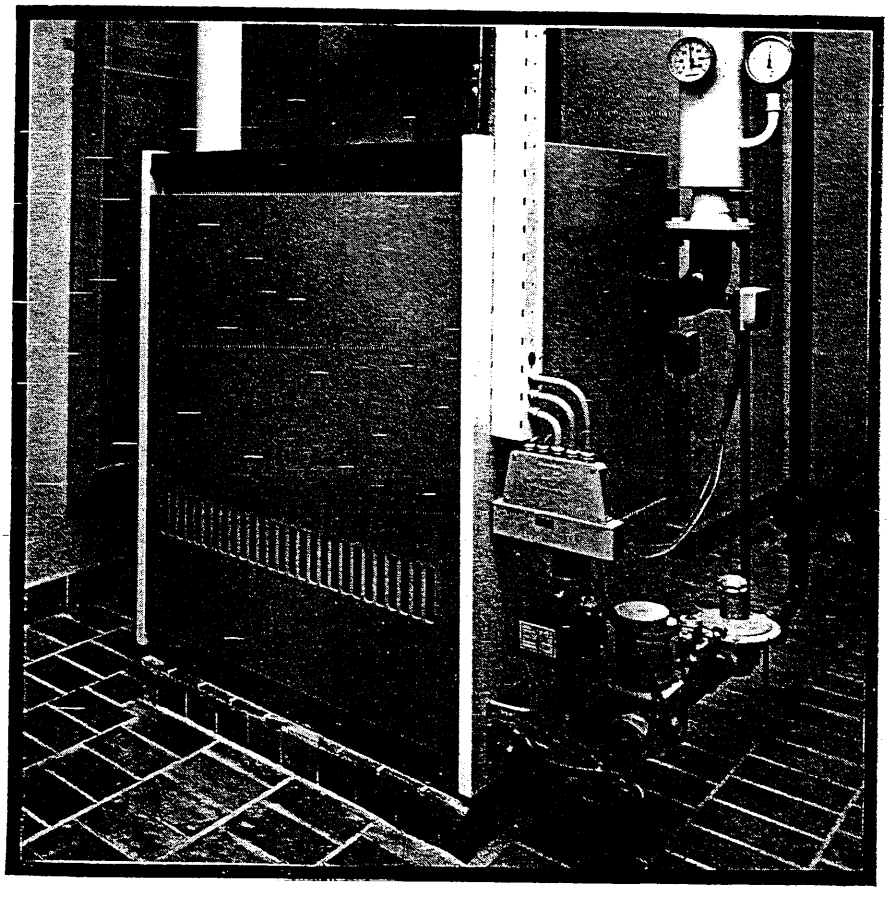
- **Experience**
  Gas '3' series boilers are produced in Holland to British Standards and Codes of Practice from one of Europe's most capable atmospheric gas fired boiler foundries.

- **Labour saving**
  Simple erection and integrally cast feet preclude special boiler base. Clean, natural gas reduces annual maintenance to minimum

- **Versatility**
  Designed for basement or roof-top boiler houses with exceptionally short flue run requirements.

- **Compactness**
  Modest overall dimensions for high output boiler, housed in well insulated robust jacket.

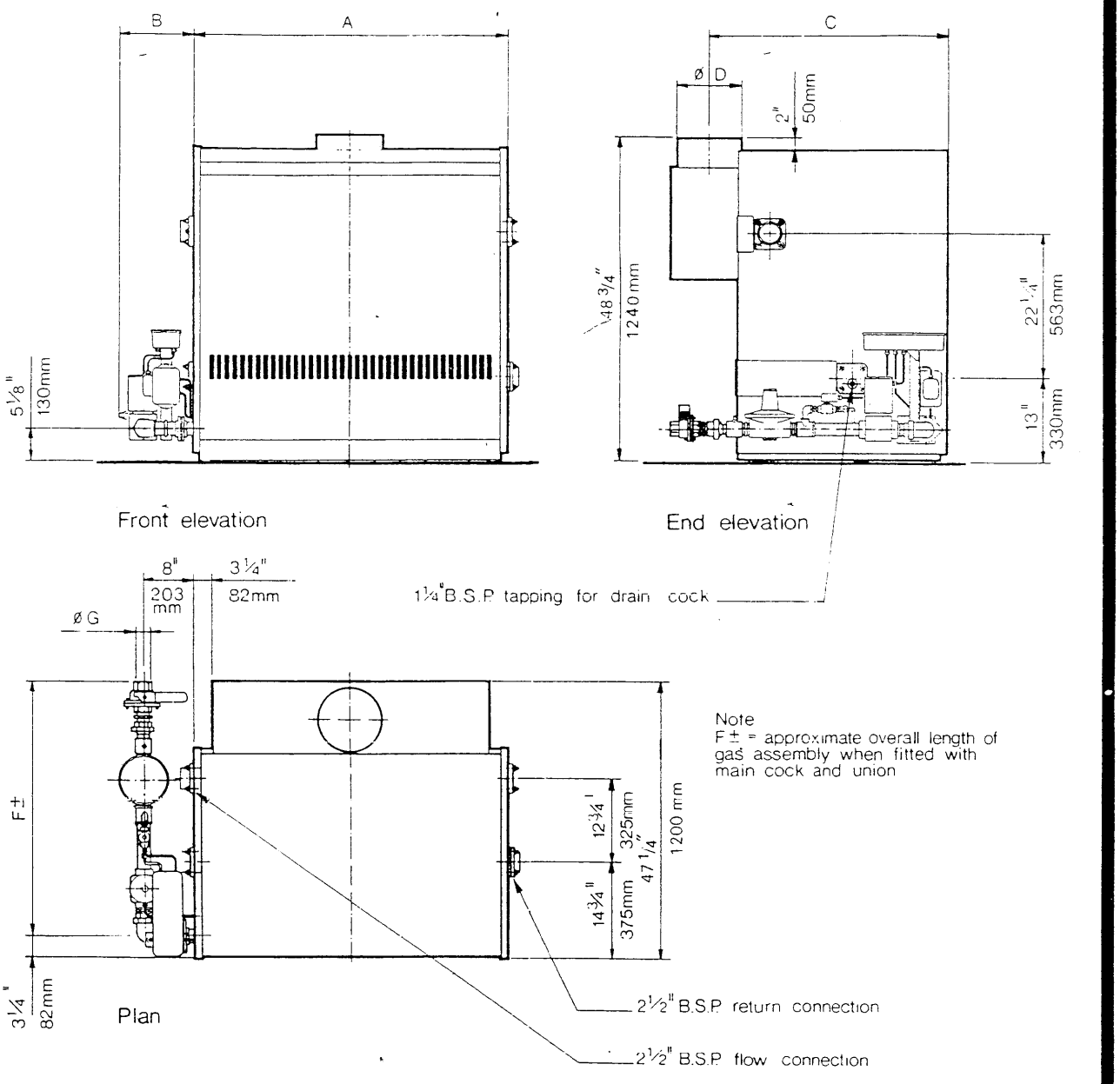
Typical SEAGOLD Gas '3' Installation



SEAGOLD Service

Seagold is an expanding company of experienced 'heating industry' personnel dedicated to provide a special and personal service to their customers. Good stocks of boilers are maintained in the UK but out-of-stock equipment or boilers for a particular specification can be delivered normally within 4 weeks. Seagold Regional Managers are located throughout the UK and at your service for advice and assistance. Seagold's services include commissioning and after-sales servicing under contract at reasonable prices.

Boiler dimensions



Note
F ± = approximate overall length of gas assembly when fitted with main cock and union

To ensure competitive performance, prices and specification Seagold maintains a continuous development programme and reserve rights of modification or alteration without notice

Boiler Model	Output Btu/h x10³	kW	A in	A mm	B in	B mm	C in	C mm	øD in	øD mm	TG.F ± in	TG.F ± mm	øG in	NG.F ± in	NG.F ± mm	øG in
GAS 3-7	270	79	27¾	702	10¾	270	35½	903	8	200	42½	1080	1½	34½	875	1¼
GAS 3-8	314	92	31¼	792	10¾	270	35½	903	8	200	42½	1080	1½	34½	875	1¼
GAS 3-9	358	105	34¾	882	11¾	295	36½	928	10	250	45¼	1150	2	38½	980	1½
GAS 3-10	402	118	38¼	972	11¾	295	36½	928	10	250	45¼	1150	2	38½	980	1½
GAS 3-11	446	131	41¾	1062	11¾	295	36½	928	10	250	45¼	1150	2	38½	980	1½
GAS 3-12	490	144	45¼	1152	11¾	295	36½	928	10	250	45¼	1150	2	38½	980	1½
GAS 3-13	534	157	48¾	1242	11¾	295	36½	928	10	250	45¼	1150	2	38½	980	1½
GAS 3-14	578	170	52½	1332	11¾	295	37½	953	12	300	45¼	1150	2	38½	980	1½
GAS 3-15	622	183	56	1422	11¾	295	37½	953	12	300	45¼	1150	2	38½	980	1½
GAS 3-16	666	196	59½	1512	11¾	295	37½	953	12	300	45¼	1150	2	38½	980	1½
GAS 3-17	710	209	63	1602	12¾	320	38½	978	14	350	47½	1205	2½	42¼	1075	2
GAS 3-18	760	223	66½	1692	12¾	320	38½	978	14	350	47½	1205	2½	42¼	1075	2
GAS 3-20	848	249	73¾	1872	12¾	320	38½	978	14	350	47½	1205	2½	42¼	1075	2
GAS 3-22	936	275	80¾	2052	12¾	320	38½	978	14	350	47½	1205	2½	42¼	1075	2

Gas 3 boiler

technical information

Boiler Specification

Boiler sections are manufactured in pearlitic cast iron providing high corrosion resistance properties. Each section is submitted to a hydraulic pressure test in excess of 6.9 bar (100 lb f/in^2) in accordance with BS 779 : 1961. Gas '3' series boilers are supplied for operating at a working pressure of 3.6 bar (52 lb f/in^2) or 36 m head (120 ft-0 in). Other pressures ranges are available and details may be obtained from SEAGOLD on application.
Waterways are connected with tapered push fit nipples and sections secured by full length external tie rods. Sealing is accomplished by sealant compound (supplied with the boiler) compressed between the machined section faces. The side surfaces of each section have integrally cast studs to encourage heat transfer : when the boiler is assembled, these surfaces form the flueways. The flueways are accessible for cleaning through bolt-on cover plates sealed with asbestos gaskets, at the boiler front.
The multiple atmospheric burner bed is comparatively silent in operation on manufactured or natural gas and arranged horizontally at low level. The gas manifold serving the burner bed may be mounted on either the left or right hand side of the boiler.
Flue gases are exhausted up between the sections, into the draught diverter ; passing through the central, vertical flue connection at the back of the boiler. Protection against down draughts in the flue is provided for by a cut-out thermostat pre-set to 70°C (158°F) mounted in the draught diverter.
SEAGOLD'S Gas '3' series boiler is enclosed within an easily removable, insulated, stove enamelled, mild steel jacket.

Water Connections

One – 3 in table D flange flow elbow and one 2½ in return welding socket are provided at each side of the boiler to enable the pipework connection to be made either diagonally opposite or from one side.
A water distribution pipe is provided for insertion into the boiler return flow casting to prevent short circuiting when flow and return pipework is connected on the same side.
The unused blanked off flow connection may be drilled and tapped to accept a relief valve in accordance with CP332 : Pt 3 up to a maximum size of 1 in, alternatively, the relief valve should be mounted in the flow pipework adjacent to the boiler. A ½ in BSP x 4 in long pocket will be required in the flow pipework as close to the boiler as is practical to accommodate the thermostat supplied with Gas '3' boilers. The thermostat should be secured by a grub screw or split pin to prevent easy removal.
If an altitude gauge or thermometer is required, these should also be mounted on the flow pipework.
The blanked off return connection is provided with a plugged socket to accept a 1¼ in drain off cock.

Flue Connection

Gas '3' series boiler flues may be provided in single or double walled galvanised steel or aluminium flue pipework or heavy duty asbestos or cast iron, of a diameter not less than the boiler outlet.
Where the flue is to be connected to a chimney, it is advisable to situate the boiler as close to the chimney as is practical, avoiding offsets, bends and horizontal runs wherever possible.
The angle at which the flue enters the chimney should be a minimum of 135° and must not protrude beyond the inner face of the chimney. Although it is desirable for each boiler to have an individual flue, it is permissible for boilers in the *SAME* boiler room to be connected to a common flue. The main flue size should be adjusted as each boiler is connected in, to give a cross sectional area equivalent to the sum total area of entering flues. See Gas Council publication "Technical Notes on the Design of Flues for Larger Gas Boilers" – Dec 1971 and also CP 337 : 1963.
To prevent condensation and its resultant consequences, it is important to avoid exposed flue runs and attention should be paid to the proper insulation of flue pipework.
Removable access covers for inspection and cleaning purposes should be fitted on bends and wherever considered necessary.
Maximum draught required for SEAGOLD Gas '3' series boilers = 0.1 mbar (0.0394 in wg).

Chimneys

Vertical flues and chimneys should be designed to provide adequate draught for combustion and heat transfer whilst protecting the combustion process from down draughts and other atmospheric effects.
If an existing chimney is to be re-used, a survey should be made to ensure there are no internal obstructions, abrupt changes of section or restricted right angle bends. Existing dampers should be removed or locked open. Chimneys previously used should be swept clean, or where condensation is likely to occur an internal liner is recommended.
Provision for draining condensation should be made in the base of the chimney, below the flue inlet.
Flue gas exit temperature on SEAGOLD Gas '3' series boilers is approximately 145°C (293°F) at the draught diverter. For efficient operation, the minimum temperature allowable at the chimney terminal is 65°C (149°F).
For information on chimney sizing it is recommended that the Gas Council publication : "Technical Notes on the Design of Flues for Larger Gas Boilers" – Dec 1971, is referred to.

Gas Supply Pipework

Before commencing installation work, the local gas authority should be consulted to determine the gas pressure and supply available at the boiler. The service supply must be of adequate size to meet the gas demand of the boiler at its maximum output. For service pipe installation recommendations see CP331 Pt 1 : 1973.

Existing gas installations should not be used without prior consultation with the local gas authority, particularly where the existing pipe is of a smaller internal diameter than the boiler gas connection.

The local gas authority will also be required to install an adequate meter or check that an existing meter is suitable for the supply of gas required and that a suitable tariff has been decided. Installation pipework should terminate with a main gas cock and union for connection to the boiler gas manifold.

To minimise sediment or foreign particles being deposited in the gas regulation and safety equipment, an approved filter may be attached to the pipework immediately preceding the main gas cock.

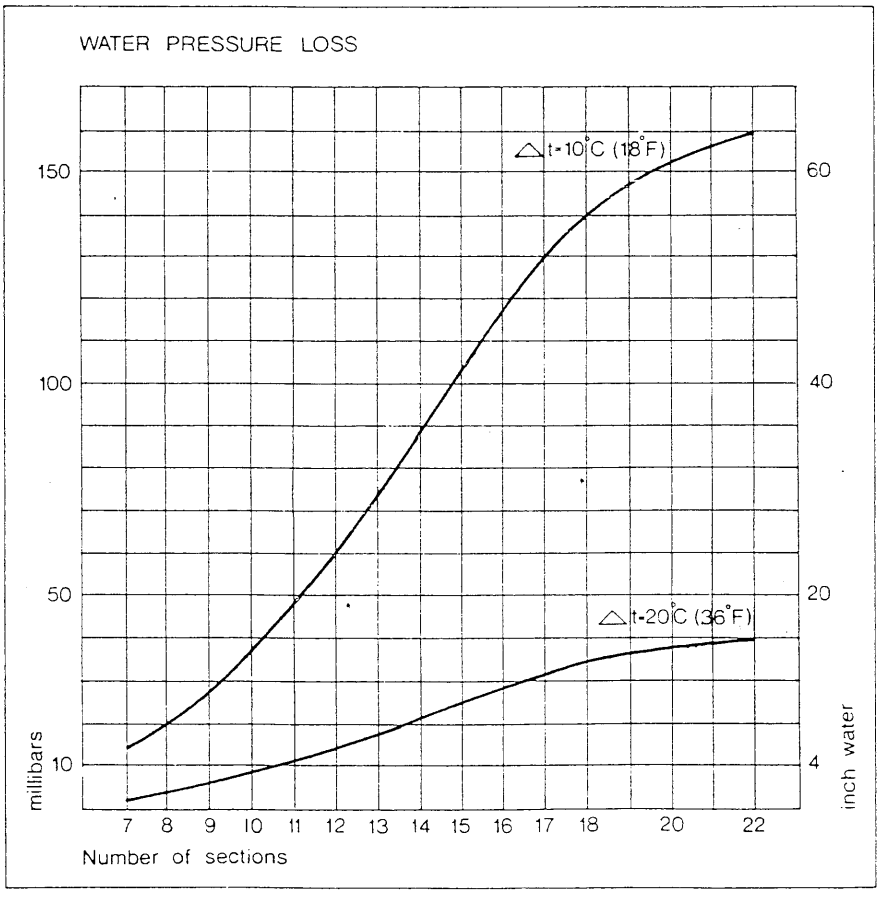
Gas supply lines should be laid in black mild steel pipe, pressure tested for leaks and should comply with CP331 : Pt 3 1965 and the Gas Safety Regulations 1972. To ensure sound gas fitting, SEAGOLD recommend that installation of gas equipment is undertaken by companies registered with CORGI. Details of CORGI's Register of Installers is available at any gas showroom.

Water Resistance and Temperatures

The graph below indicates resistance to water flow through Gas '3' series boilers at the temperature differentials of 10°C (18°F) and 20°C (36°F). To minimise the possibility of condensation occurring and also attain the required water flow velocity through the boiler sections, it is recommended that systems are designed within this range, i.e. 10°C minimum to 20°C maximum (18-36°F) temperature difference.

Maximum operating temperature for SEAGOLD Gas '3' boilers is 100°C (212°F).

In order to prevent the overheating of water remaining in the boiler on shutdown, it is advisable to wire the circulating pump to run on for approx. 15 minutes after the burner has shut off.



Site requirements

Location

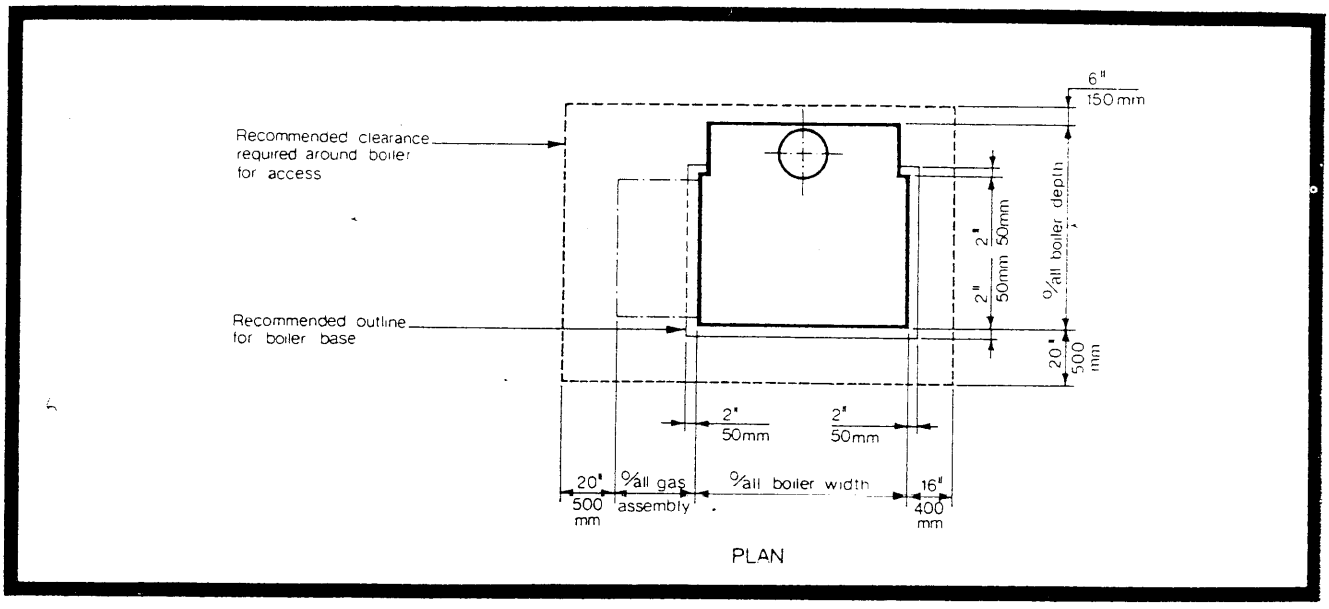
SEAGOLD'S Gas '3' series boiler is equally suited for location in a basement or rooftop plant room and will operate efficiently in either situation.
Because of the quiet operation afforded by atmospheric gas burners, it is acceptable to situate the boiler room adjacent to occupied areas.
Adequate access to the boiler room should be provided to allow boiler sections to be offloaded and positioned.
Boilers and ancillary equipment not being installed on delivery should be protected from weather conditions and damage likely to occur on site.

Builders Work

A special boiler base is not necessary and SEAGOLD Gas '3' series boilers may be mounted directly on a plant room floor, provided that it is level, of fireproof construction and suitably stressed to carry the boiler and ancillary equipment when charged with water.
If a base should be required, a recommended outline is indicated in the sketch below.

Access for Servicing

To enable servicing of boilers and component parts to be executed with maximum efficiency the recommended clearances indicated in the sketch below should be employed.



Approximate Weights

Boiler Model		3-7	3-8	3-9	3-10	3-11	3-12	3-13	3-14	3-15	3-16	3-17	3-18	3-20	3-22
Boiler weight dry	lb	1007	1133	1259	1385	1511	1637	1763	1889	2015	2141	2267	2393	2645	289
	kg	457	514	571	628	685	742	799	856	913	970	1027	1074	1188	130
Water content	UK/gal	17	19	21	24	26	28	30	32	35	37	39	41	46	50
	litres	78	88	98	108	118	128	138	148	158	168	178	188	208	228
Total weight	lb	1177	1323	1469	1625	1771	1917	2063	2209	2365	2511	2657	2803	3105	339
	kg	534	602	667	739	804	872	940	1004	1078	1140	1207	1275	1412	154

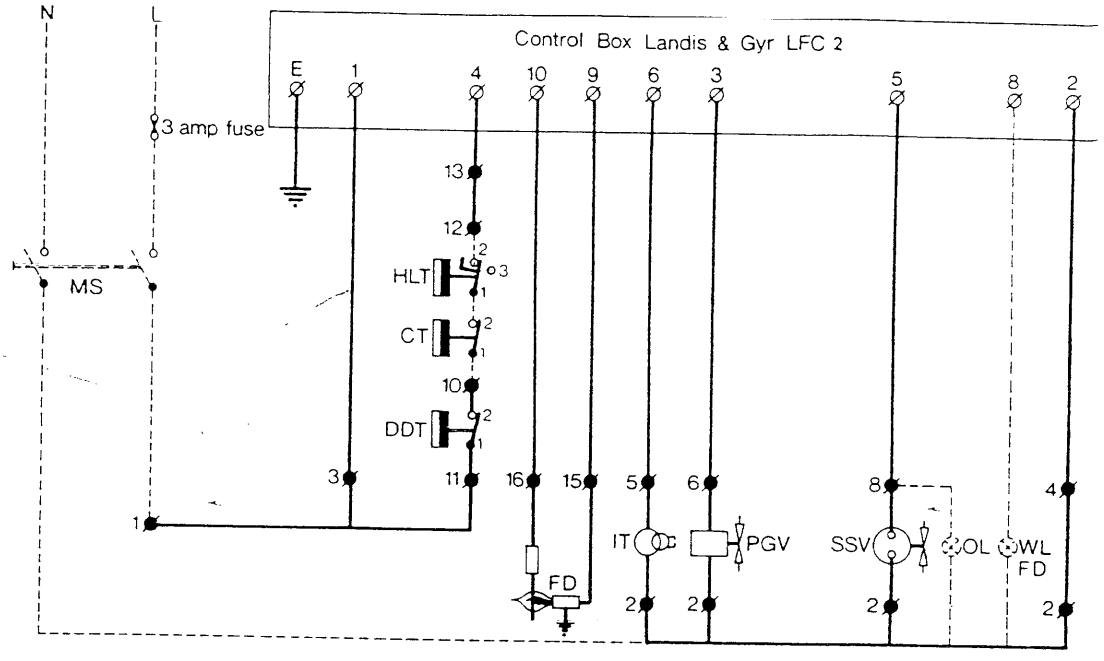
Boiler House Ventilation

Fresh air necessary for combustion and ventilation should be provided through high and low level openings to atmosphere, of a size not less than that indicated in the chart below.
Dimensions shown are for unobstructed openings ; if a grille is to be used, the manufacturers free area allowance should be taken into consideration.
Low level apertures should be positioned approximately 12 in up from finished floor level to avoid blockage and flooding and as close as is practical to the boiler front to minimise draughts. Where this does not connect to outside air, it will be necessary to run a duct from high level.
Openings for ventilation at high level should be as close as possible to the ceiling.
On exposed boiler rooms, it is desirable to have ventilation openings on all four sides to minimise wind pressure conditions. Should this prove impractical, they must be provided on at least two sides.

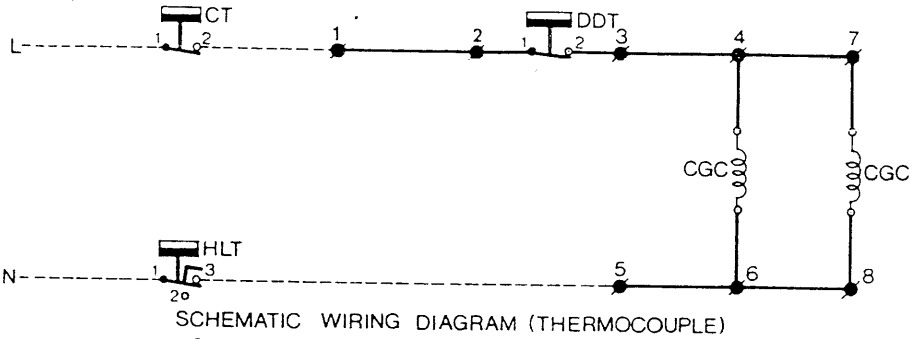
Ventilation Requirements

Boiler Model		3-7	3-8	3-9	3-10	3-11	3-12	3-13	3-14	3-15	3-16	3-17	3-18	3-20	3-22
Minimum air required	ft³/min	204	236	268	301	334	368	400	434	466	500	533	570	636	702
	m³/s	0·10	0·11	0·12	0·14	0·15	0·17	0·18	0·20	0·22	0·23	0·25	0·27	0·30	0·33
Low level opening free area	in²	135	157	179	201	223	245	267	289	311	333	355	380	424	468
	cm²	869	1012	1155	1298	1441	1584	1727	1870	2013	2156	2299	2453	2739	302
High level opening free area	in²	68	79	90	101	112	123	134	145	156	167	178	190	212	234
	cm²	436	506	578	649	722	792	864	935	1007	1078	1150	1226	1370	151

Electrical wiring diagram



SCHEMATIC WIRING DIAGRAM (IONISATION)
all Gas 3 models standard equipment



SCHEMATIC WIRING DIAGRAM (THERMOCOUPLE)
Gas 3-7 to 11 section, natural gas, optional equipment

LEGEND

Ø	Connection screws (control box)	FD	Flame Detector
●	Connection screws (terminal strip)	IT	Ignition Transformer
----	Not supplied or wired	PGV	Pilot Gas Valve
MS	Main Switch	SSV	Safety Shut-off Valve
HLT	High Limit Thermostat	OL	Operation Light
CT	Control Thermostat	WL	Warning Light
DDT	Down Draught Thermostat	CGC	Combination Gas Control

Electrical Supply

Gas '3' series boilers are supplied with the gas controls and down draught ther
pre-wired into the control box.
The heating engineer is required to wire in the dual boiler control and high limi
if not supplied pre-wired and connect the boiler to a single phase 220/240V /
supply via a 3 amp fuse.
All electrical connections must be carried out in accordance with I.E.E. regulat
into consideration any local power supply requirements.

Regulation & safety equipment

Control Specification

Gas '3' *standard equipment* (ionisation) all sizes, for manufactured and natural gas.

Boiler Model	3-7	3-8	3-9	3-10	3-11	3-12	3-13	3-14	3-15	3-16	3-17	3-18	3-20	3-22
Natural Gas Low Pressure Governor	Jeavons J48-1"		Jeavons J48-1½"								Jeavons J48-2"			
Natural Gas Safety Shut Off Valve	Dungs MVL-210-1"		Dungs MVL-215-1½"								Dungs MVL-220-2"			
Town Gas Low Pressure Governor	Jeavons J48-1½"		Maxitrol MV91M-2"								Maxitrol RV91-2½"			
Town Gas Safety Shut of valve	Dungs MVL-215-1½"		ITT General Controls UHOV-1A-268L-2"								ITT General Controls UHOV-1A-273L-2½"			

Thermostat :	Landis & Gyr RAZ 14/1915. Combined boiler control and high limit thermostat, requires manual reset when high limit temperature is exceeded. Control range 40 to 100C (104-212°F).
Down Draught Thermostat :	Sauter TSC 17 Anr. 106 set to 70°C (158°F).
Pilot burner :	Dungs E71 injector size 1.2 mm NG. 2.1 mm TG
Ionisation electrode :	Sapco, Material – Inconel
Sparking plug :	Beru ZK 14-8-45
Ignition transformer :	Belpa H15F
Pilot solenoid valve :	Lucifer LU-V2-121-G01-05
Control box :	Landis & Gyr LFC2
Pilot burner : (2)	Bray type 861. injector 12½
Thermocouple : (2)	Robertshaw T45 lg 60cm
Piezo ignition : (2)	Junkers 1311192
Combination gas control : (2)	Robertshaw 7000 BER 57 – C/AL – ¾ in.

Burner Specification

Burner pressure : natural gas : 11·8 millibar (4·75 inches water).
Burner pressure : manufactured gas group 4 : 4·2 millibar (1·85 inches water).
Burner pressure : manufactured gas group 5 : 5·0 millibar (2·0 inches water).
Injector diameter : natural gas : 3·3 mm (0·13 inches).
Injector diameter : manufactured gas groups 4 & 5 : 5·9 mm (0·232 inches).
Minimum gas pressure required to operate burner controls: natural gas—13·6 millibar (5·45 inches water). Manufactured gas group 4—6·8 millibar (2·72 inches water).

Operation sequence

On/off operation of the burners is controlled by the main safety shut off valve which operates in response to the sequence determined by the boiler controls. In the event of electrical failure, the safety valve cuts off the gas supply within one second, automatically relighting when power is restored. A reduction in gas pressure also causes the safety valve to close but, in this instance, will require the boiler to be manually reset.
See lighting instructions inside boiler casing.

Boiler performance

Boiler Model	Nominal Heat Input Btu/h x 10^3	kW	Nominal Heat Output Btu/h x 10^3	kW	Natural Gas Gasrate ft^3/h	m^3/h	Towns Gas Gasrate Group 4 ft^3/h	m^3/h	Group 5 ft^3/h	m^3/h
GAS 3-7	350	102	270	79	329	9·3	657	18·6	727	20·6
GAS 3-8	408	119	314	92	381	10·8	763	21·6	847	24·0
GAS 3-9	466	136	358	105	437	12·4	875	24·8	967	27·4
GAS 3-10	524	153	402	118	491	13·9	982	27·8	1088	30·8
GAS 3-11	582	170	446	131	547	15·5	1094	31·0	1210	34·3
GAS 3-12	640	187	490	144	604	17·1	1208	34·2	1335	37·8
GAS 3-13	698	204	534	157	657	18·6	1312	37·2	1455	41·2
GAS 3-14	756	221	578	170	714	20·2	1424	40·4	1575	44·6
GAS 3-15	814	238	622	183	767	21·7	1532	43·4	1695	48·0
GAS 3-16	872	255	666	196	823	23·3	1645	46·6	1815	51·4
GAS 3-17	930	272	710	209	872	24·7	1742	49·4	1935	54·8
GAS 3-18	988	290	760	223	930	26·3	1860	52·6	2055	58·2
GAS 3-20	1104	324	848	249	1039	29·4	2040	58·8	2300	65·2
GAS 3-22	1220	358	936	275	1150	32·6	2300	65·2	2455	72·0

Calorific Values

The gas rates shown in the above chart are for gases of the following calorific values.
Manufactured gas, Group 4 — 500 Btu/ft^3 ; Group 5, — 450 Btu/ft^3 .
Natural gas 1000 Btu/ft^3 .

Assembly

Information relating to the assembly of SEAGOLD Gas '3' series boilers is found in the separate building instruction brochure.

Commissioning

To ensure that new installations operate at maximum efficiency from initial light up onwards ; it is essential that they be commissioned correctly.
SEAGOLD Service engineers have a vast experience of our range of boilers and are on call to commission all types of installations promptly and accurately, at the same time producing an independent report on the boiler to both the heating engineer and client.

Maintenance

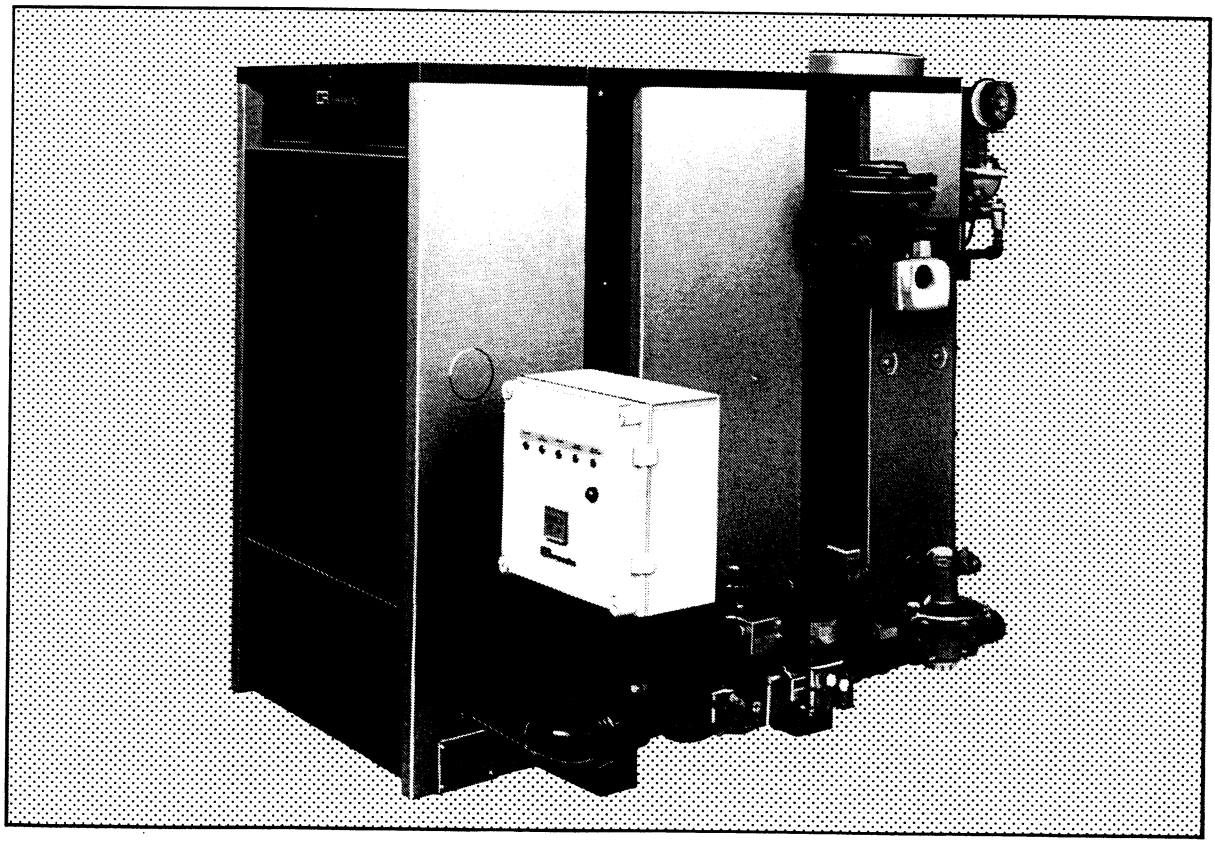
For a boiler to continue achieving its design output, regular service and inspection are essential and it is recommended that only qualified service engineers be employed to carry out these tasks.
To meet such requirements, SEAGOLD offer a Service Plan operated by skilled engineers, who will carry out commissioning, annual inspection and service of installations anywhere in the British Isles.

Broag Ltd

Thyssen House
Molly Millars Lane
Wokingham, Berks
Tel. 0734-783434
Telex 849137

Products marketed by SEAGOLD include a comprehensive range of gas and oil fired boilers suitable for a wide variety of applications from domestic to industrial. Information and catalogues on these may be obtained by contacting the Rheinstahl Office or our Regional Managers throughout the UK.

Seagold Gas 3a eco



Operating & Maintenance Instructions

Seagold Gas 3a eco. fully condensing gas boiler

LIGHTING INSTRUCTIONS - GAS 3A ECO

Before commencing to light the boiler ensure that the water system is fully operational, for example any water circulation valves are open. Also ensure that the condense pipe and the drain into which it discharges are not blocked or obstructed.

TO LIGHT THE BOILER

1. Open the main boiler gas valve.

2. Ensure that the boiler thermostat is set to the required temperature.

3. Switch on the water circulation pump.

4. Switch on electrical supply to the boiler - 'Power On' and 'Flame Fail' lamps will light.

5. Press 'Reset' button - 'Flame Fail' lamp will go out. After a short delay the flue fan will start. This can be heard and the 'Fan' lamp will light. After approximately half a minute, sparking at the pilot ignition electrode can be heard followed by the main burners lighting - 'Burner On' lamp will light.

6. If the boiler fails to light, the flue fan will stop and the 'Fan' lamp go out leaving the 'Power On' and 'Flame Fail' lamps alight.

7. Wait one minute then press the 'Reset' button when the cycle will proceed as from 5.

8. If the boiler again fails to light, turn off the main gas valve, switch off the electrical supply to the boiler and contact your local Seagold Service Engineer whose address is on the label attached to the boiler.

TO SHUT DOWN THE BOILER

To shut down the boiler for short or long periods, turn off the main gas valve, and switch off the electrical supply to the boiler and the water circulation pump.

NOTE: If you have any problems with your Seagold boiler, contact your local Seagold Service Engineer whose address is on the label attached to the boiler, or contact:

SEAGOLD BOILERS
Broag Limited
Molly Millars Lane
Wokingham
Berkshire (0734) 783434)

USERS INSTRUCTIONS

WARNING: This appliance must be earthed.

GENERAL

Before operating the boiler always ensure that the water system is fully operational and that there is adequate water circulation through the boiler. Also ensure that the condensate can run away freely, i.e. the condensate pipe and drain are clear and unobstructed.

TO LIGHT THE BOILER

1. Open main boiler gas valve A, and check that the pilot and burner gas valves B and C are in the open position. See Fig. 3.

2. Ensure that the boiler thermostat is set to the required temperature, see Table 1.

3. Switch on the water circulation pump.

4. Switch on electrical supply to the boiler. The 'Power On' and 'Flame Fail' lamps will light on the Control Box. See Fig. 2

5. Press the 'Reset' button (see Fig. 2) - the 'Flame Fail' lamp will go out. After a short delay the flue fan will start - the 'Fan' lamp will light and the fan can be heard. After a further half minute (approx), sparking at the pilot electrode will be heard followed soon after by the main burners crosslighting from the pilot. The 'Burner On' lamp will light.

6. If the boiler fails to light, the flue fan will stop and the 'Fan' lamp go out, leaving the 'Power On' and 'Flame Fail lamps alight.

7. Wait one minute then press the 'RESET' button - the lighting cycle will recommence from 5.

8. If the boiler goes again to 'Flame Fail' turn off the main gas valve, switch off the electrical supply to the boiler and contact your local Seagold Service Engineer whose address is on the label attached to the boiler.

TO SHUT DOWN THE BOILER

To shut down the boiler for short or long periods, turn off the main gas valve and switch off the electrical supply to the boiler and the water circulation pump.

NOTE: If you have any problems with your Seagold boiler, contact your local Seagold Service Engineer whose address is on the label attached to the boiler, or contact:

Carefully examine fins of the Eco tubes, if they are relatively free from deposits, clean by flushing with water. If the fins are very dirty then they should be brushed as follows:

Remove plastic tubing (Item No. 9), remove cover plates 10 and 11, brush fins horizontally with special brush provided.

Check and clean condensate collector (Item 12) as necessary also clean and check the trap.

Remove dirt and dust from fan motor (Item 13) and rotor blades by removing from boiler and brushing with a soft brush.

Refit motor and rotor blades, cover plates 11 and 10 replacing any suspect seals in the process, refit plastic tubing (Item 9)

9. Clean the burners by carefully brushing or vacuuming the tubes.

10. Vacuum or sweep the floor protection plates.

11. Replace burners through front of boiler pushing them far enough in so as not to obstruct the fitting of the gas manifold.

12. Refit gas manifold, tighten union and nuts holding manifold to brackets.

13. Slide burners back into their injectors ensuring a rigid fix.

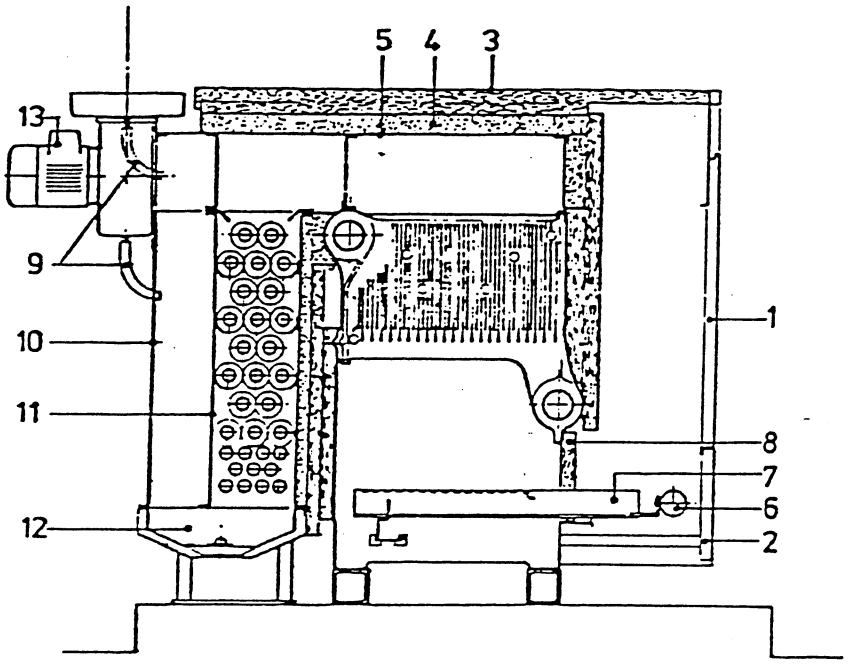
14. Refit pilot burner, reconnecting gas and electrics to same.

15. Refit top of flue hood and casing parts.

16. Recommission boilers.

17. Refit boiler doors.

SERVICING OF 3A-ECO BOILER



1. Isolate the boiler by turning OFF the main gas service tap and isolate electricity supply.

2. Remove the boiler front door, bottom front casing door, top casing cover and the upper front panel.

3. Remove the top section of the flue hood. (Item No. 5)

4. Disconnect and remove the pilot supply pipe. Unplug the rectification lead and the spark ignition lead from the probes by pulling off the plug caps from the relevant probes. Remove the earth wire. Remove pilot burner complete by undoing the brass nuts, clean and adjust as necessary.

5. Release the burners from their push on fit on the injectors.

6. Remove gas manifold (Item 6) by undoing union at the end of the gas train and removing 2 nuts that hold the manifold to its brackets. Ensure that the gas train is adequately supported before commencing this operation.

7. Slide out the burners from the front of the boiler.

8. The vertical boiler flue ways can now be swept from the top of the boiler with the appropriate brush.

SEAGOLD BOILERS
Broag Limited
Molly Millars Lane
Wokingham
Berks Tel (0734) 783434

FROST

If the boiler is shut down for long periods during the winter it is recommended that the whole system, including the boiler and condensate trap, should be drained to avoid the risk of freezing. Alternatively, a frost thermostat can be fitted and set to approximately 4°C.

MAINTENANCE

To ensure safe and efficient operation at all times it is strongly recommended that the boiler be cleaned and serviced once a year by your local Gas Region or approved engineer.

ADDITIONAL SAFETY ADVICE

1. Do not block or obstruct any ventilation grilles or ducts to the boiler room and always ensure there is a clear passage for ventilation and combustion air to the boiler.

2. If at any time a gas leak is suspected, turn OFF the gas supply to the boiler and contact your Gas Region immediately.

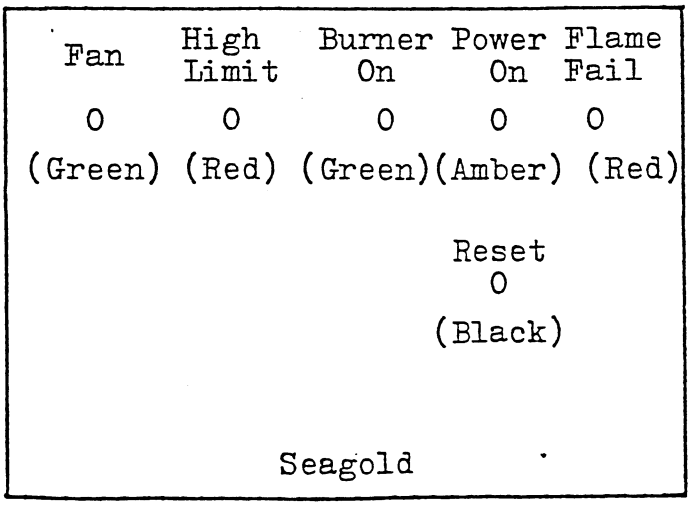
   DO NOT USE A NAKED LIGHT TO DETECT GAS LEAKS

3. If you consider the boiler is malfunctioning, turn off the boiler and contact your local Seagold Service Engineer.

Table 1

Boiler Thermostat °C	°F
50	122
55	131
60	140
65	149
70	158
75	167
80	176

Fig. 2 - Control Box



FAULT FINDING CHART

Operating Faults

1. The boiler fails to restart after a normal shut down.

1.1 Ensure that both gas and electricity supplies are available at the boiler.

1.2 The automatic control box has gone to lockout because of a fault, press the black re-set button on the automatic control box.

If normal start up does not occur, check whether -

1.2 The appliance service tap is fully open.

1.3 The boiler control thermostat is set at the correct value.

After waiting for two minutes, press the reset button again, if the boiler does not restart normally, notify the Service Engineer.

2. Ignition does not take place

2.1 Electricity supply isolated.

2.2 Thermostat adjusted too low a temperature.

2.3 Check whether the limit thermostat was activated by excess temperature, re-set to remove fault.

2.4 Check correct operation of flue fan and air switch.

2.5 Check voltage (220/240V) at transformer terminals.
If no voltage is registered, the automatic control box is faulty and should be replaced. If there is voltage check the electrode spacing of the ignition plugs, setting as per enclosed diagram, in case they have been moved by accident.

If ignition does not occur, the ignition transormer is faulty and should be replaced.

2.6 No ignition gas at pilot burner, ignition gas valve fails to open.

Check voltage (220/240V) at the terminals on the gas valves. If there is no voltage the automatic control box is faulty, and should be replaced.

If there is voltage, replace the ignition gas valve.

2.7 No pilot flame, pilot burner nozzle blocked - clean.

3. Pilot Burner ignites but becomes faulty immediately

3.1 Check the position of the flame detector probe in relation to the pilot burner.

3.2 Pilot flame too small, incorrect pilot burner nozzle 1 x 0.8mm Ø for natural gas.

3.3 Check current in the flame detector probe, removing cable from terminal and connect a D.C. micro ammeter (range 0-50 μA) in series. Check the current reading with boiler operating. If reading is zero check Satronic control box. If reading is below 2.4 uA or showing wide variations, check stability of gas flame and state of ionisation probes.

3.4 If the boiler cannot be brought into service after point 3.3, replace the automatic control box.

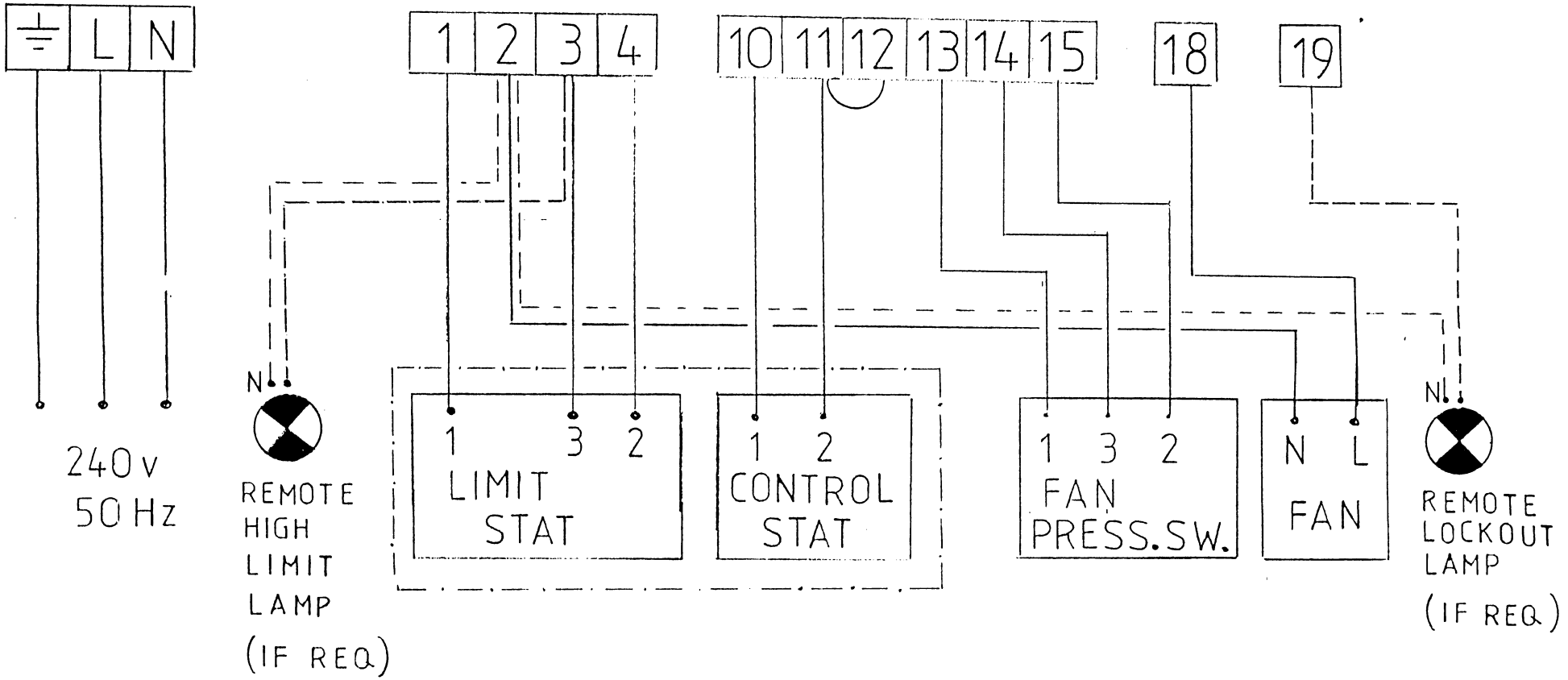
4. Pilot flame burns but no mains gas released

4.1 Check voltage (220/240V) at the terminals of the main gas valves. If there is voltage, the coil of the main gas valve is faulty and should be replaced.

SHORT LIST OF SPARES FOR GAS 3A ECO

Pilot burner	-	Dungs AZ 5
Ignition & Ionisation Electrodes	-	Dungs (material Kanthal)
Ignition Transformer	-	Dungs Z-AB-5000/18-20
Pilot Solenoid Valve	-	Dungs MV 202
Control Box	-	Satronic 740/2 Model 4554
Main Gas Valve 5 - 13 sect	-	Dungs MVDLE 215/5
Main Gas Valve 14-17 sect	-	Dungs MVDLE 220/5
Safety Shut Off Valve 5 - 13 sect	-	ITT SA403 KV5 401
Safety Shut Off Valve 14 - 17 sect	-	Dungs MVD 220/5
Combined Control/High Limit Thermostat	-	GYR RAZ 14 2583
Flue Fan	-	Electror E05 (5 to 8 section)
		" E06 (9 to 14 ")
		" E064 (15 - 17 ")
Air Pressure Switch	-	Huba 600 9929
Gas Governor	-	Jeavons J48 1½" (5 - 13 section)
	-	Jeavons J48 2" (14 - 17 section)

BOILER PANEL TERMINALS

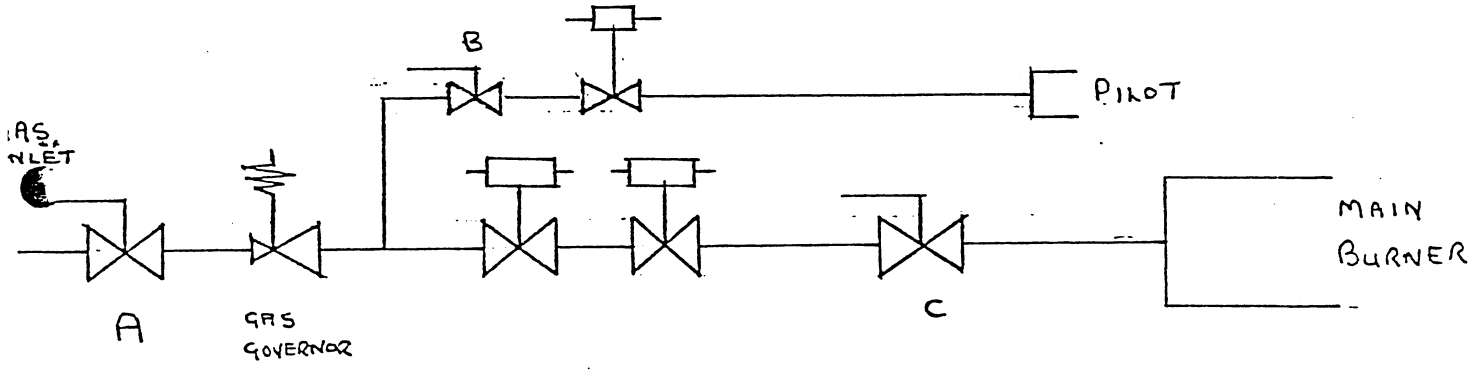


Broag Ltd Seagold Boilers Molly Millars Lane, Wokingham, Berks. RG11 2PY Tel: (0734) 783434 Telex: 849137 Fax: (0734) 786977	Title INTERCONNECTING WIRING		
	Project GAS 3A-ECO		
	Dg.No. IW – 14	Date 16/10/90	Revision / Date Drawn: TGH Scale: NTS

Fig. 3 - Gas Controls

A - Main boiler gas valve.

B and C are subsidiary gas valves each must have its handle in line with its body for the open position. To move to the closed position, turn the handle clockwise to the stop.



satronic

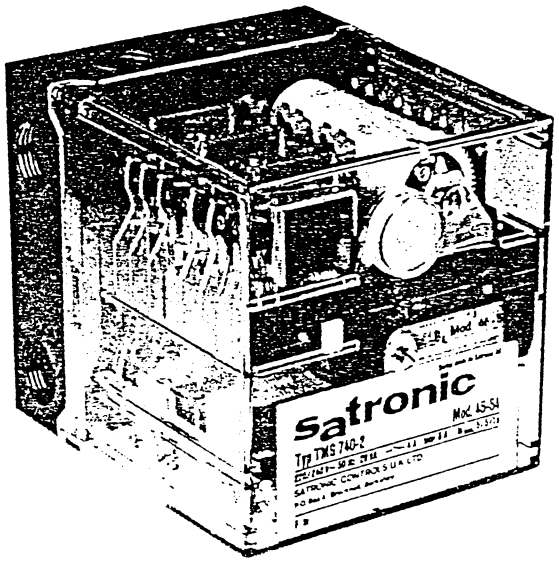
GAS BURNER SAFETY CONTROL

TMG 740-2

Introduction

The TMG 740-2 gas burner safety control is suitable for most types of fully automatic forced and induced draught gas burners. It caters for burners with intermittent (expanding flame) or interrupted gas pilot systems.
It provides a safe light-up and shut-down sequence for the burner and incorporates pre-purge, ignition and ignition safety time intervals, start gas flame or pilot gas flame, main flame and modulation stages.
In addition, the control monitors and supervises the correct positioning of the air damper system, if fitted, throughout the burner operation.
The TMG 740-2 control is suitable for use on UV (ultra-violet) with the UVZ 780 detector, or flame ionisation principles of flame detection, and is fully interchangeable with the earlier series TMG 740-1.
It is certificated by the British Gas Corporation, and a number of other models are available which have approval for use in other Countries.

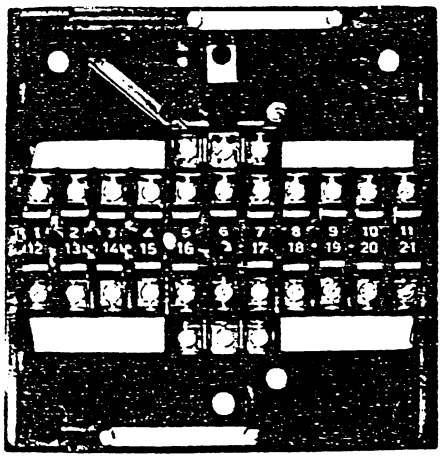
Control Box and Base



Features

1. The control box and UVZ 780 detector have a working ambient temperature of up to 60°C.
2. The timing sequence is accurately controlled by a synchronous motor driving a cam switch assembly. This produces a consistent performance despite variations in the supply voltage.
3. UV or flame ionisation principles of flame detection can be used, without alteration to the control box.
4. Interlock with the burner air damper system is provided by the control if required.
5. The control automatically checks the burner air pressure proving switch on both its normally open and closed contacts.
6. The option is provided for use with start gas or pilot gas flame systems.
7. A coloured programme indicator is incorporated to show the position reached by the control at any stage in the sequence.
8. A remote reset from lockout facility is provided in addition to the reset button supplied on the control box. Similarly, provision is made for a remote lockout warning signal.
9. The main relay and flame relay operate on d.c. to give better noiseless operation with voltage variations, and the electronic and electrical components are incorporated onto two plug-in printed circuit boards.
10. A keying arrangement between the control chassis and wiring base prevents incorrect connection between the two parts.
11. Extra terminals for neutral and earth wiring connections are provided in the base, 4 for neutral, 3 for earth.
12. The UVZ 780 is suitable for side-on and end-on viewing.

Wiring Base



CONSTRUCTION

The control box comprises a control chassis which plugs into its wiring base. The chassis is encased in a tough clear plastic cover, so that the working parts and coloured programme indicator are easily seen.

A synchronous motor driving a cam switch assembly controls the timing sequence and 3 relays complete the switching circuits.

An electronic amplifier and supply transformer for the flame detection circuit are also incorporated onto a plug-in printed circuit board.

Manual reset from the lockout position is provided by a push button switch on top of the control and a lockout signal lamp is incorporated behind this button.

The chassis and wiring base plug-in arrangement is keyed to prevent incorrect connection between the two parts. A single screw through the chassis locks it onto the base.

The wiring base is a robust bakelite moulding allowing adequate room when connecting up to the external wiring terminals supplied.

A variety of cable entry points to the base is provided in the form of 4 easy knock-out holes at the base ends, suitable for screwed electrical fittings. Provision is also allowed for cable entry through the underside of the base. In addition, 2 detachable cable entry plates are supplied, each providing further screwed knockout holes or simpler entries for p.v.c. type wiring if required.

UVZ DETECTOR

For ultra-violet flame sensing, a UVZ 780 detector should be used.

The detector consists of a UV sensing tube, 4 pin socket, capacitor and resistor mounted inside a tubular metal casing, ensuring good earth contact through the burner.

The casing has 2 apertures which allow the UV tube to 'see' the flame, in either an end-on or side-on attitude.

Over the outer casing, an adjustable metallic ring is supplied. This enables the positioning of the entire assembly on the burner to be altered to give an optimum flame viewing position for the UV tube.

At the base of the UVZ detector, wiring terminals and a cable clamp are provided behind a small removable cover plate.

A mounting flange is supplied for the UVZ detector and this is keyed to locate with the adjustment ring.

FLAME IONISATION PROBE

This is not supplied as part of the control system. A flame electrode with good heat resisting properties and well insulated should be used for this. The flame electrode should therefore be similar to a good ignition electrode.

OPERATION

Normal Start-up

With the electric supply switched on, the synchronous timer in the control runs to the "start" position and stops. When the controlling thermostat calls for heat, an automatic check takes place between the control box and air proving switch. Providing this switch is made to its normally closed contact, (i.e. no air position) start-up is allowed to take place.

The main relay inside the control pulls in, and the burner motor and air damper motor circuits are switched on.

When the damper has moved to the "high" air position, the auxiliary swtich indicating this position will be made, and the synchronous timer starts to run to begin the pre-purge period.

With an air supply now established the air proving switch breaks from its normally closed contact. The control allows a period of approximately 8 seconds for this to occur.

After 40 seconds, the timer motor stops and the damper is de-energised. When the damper has returned to the "low" air position, the auxiliary switch for this position will be made. The timer then restarts to continue the light-up sequence.

Terminal 3 is then energised which supplies the ignition transformer circuit.

The remainder of the sequence will depend upon whether a pilot gas flame or start gas flame system is used.

a) For burners with interrupted gas pilot systems the following sequence now applies, see Figs. 1 and 2 on leaflet G.19.

   Terminal 2 is energised and the pilot gas valve opens.

   When a flame is established and sensed by either the UV detector or flame ionisation probe, the flame relay inside the control pulls in.

   The timer runs on switching off the ignition circuit. Terminal 6 is energised after 11 seconds. This supplies the main flame gas valve.

   Terminal 2 is de-energised shortly after this and the pilot gas valve closes.

   Terminal 21 energises approximately 5 seconds later. This supplies the modulation or high flame circuit and the damper is energised to open again. The auxiliary switch for this will eventually be made and the circuit to V_2 the modulation or high flame gas valve will be completed.

   The timer stops shortly after this and the control is then in the "run" position.

b) For burners with intermittent (expanding flame) pilot systems. See Figs. 4 and 6 on leaflet G.19.

   Terminal 5 is energised and the start gas valve opens.

   When flame is sensed, the flame relay pulls in, the timer motor runs on and ignition is switched off.

   Terminal 6 is energised after 11 seconds and the main flame gas valve opens.

   Terminal 21 energises approximately 10 seconds later to supply the modulation or high flame circuit as described above under a).

Failure to establish a flame

If a flame is not established or sensed correctly by the flame detection system, the control goes to lockout, shutting down the burner within 5 seconds from the initial release of fuel from either the pilot or start gas valves.

The lockout signal lamp behind the reset button is energised and the burner cannot be restarted until the reset button is pressed.

Reset can be effected immediately following a lockout, and upon resetting, the timer runs to the "start" position, and a full light-up sequence begins as previously described under "normal start-up".

Running flame failure

If, during a run, the gas flame is extinguished the flame detection system reacts instantly to the loss of flame.

The gas valve circuits will be de-energised within 1 second, and the control goes to lockout shutting down the burner completely.

KEY TO FIGS. 1, 2, 4, 6 & 7

HS — Main isolator switch.
GW — Gas Pressure proving switch (if fitted).
ST — Limit thermostat (normally hand-reset)
RT — Control thermostat.
LW — Air pressure proving switch, (see figs. 11 & 12)
SA — External lockout signal lamp.
LK — Air damper motor or actuator.
M_1 — Burner Motor.
Z — Ignition transformer.
R — Remote reset switch (if required)
GL — High flame or modulation stage thermostat.
PV — Pilot flame gas valve.
SV — Start flame gas valve.
V_1 — Main flame gas valve.
V_2 — High flame or modulation stage gas valve.
U — UVZ detector.
IS — Flame ionisation probe.
M_2 — Burner motor for post-purge.

Underside Wire Links I & II.
On the underside of the chassis, two wire links, I and II, are incorporated. Link I is used in conjunction with spark detection, and for applications in the United Kingdom, this link should be left intact. Link II should only be broken when additional interlocks are required with proof of a combustion air supply. See notes on wiring to air pressure switch.

FIG. 1 External wiring diagram for burner with interrupted pilot gas flame system, flame ionisation detection

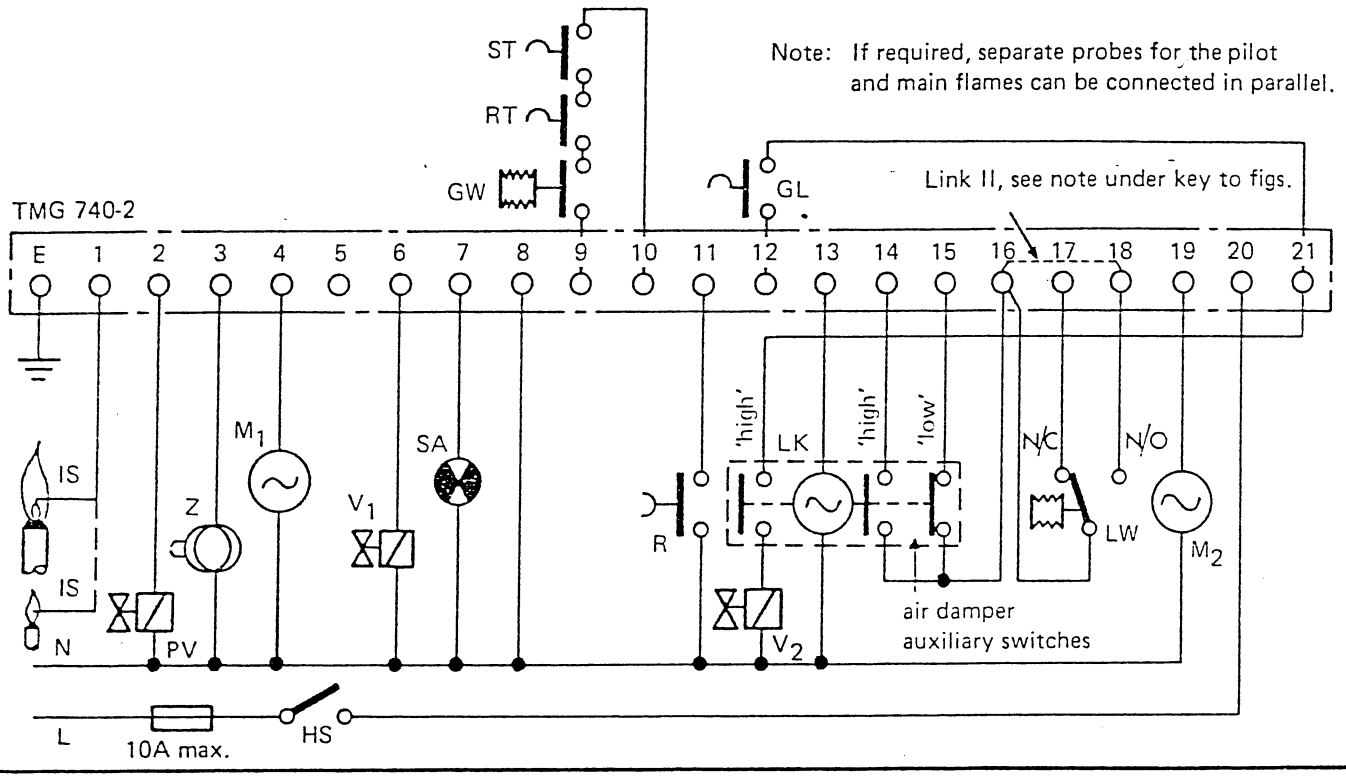
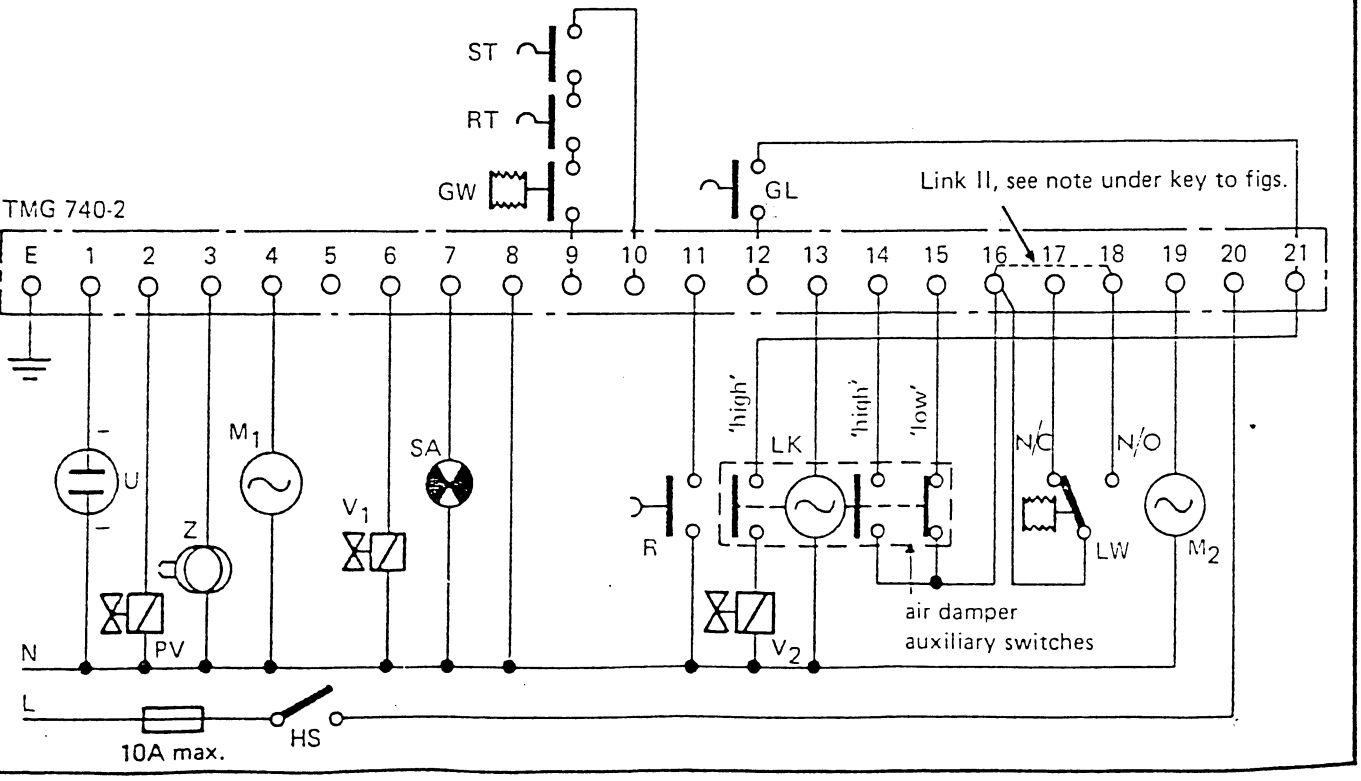


FIG. 2 External wiring diagram for burner with interrupted pilot gas flame system, UV flame detection



INSTALLATION INSTRUCTIONS

Control Box

1. The control can be mounted on the burner or the wall. Three fixing holes are provided in the wiring base for this purpose.

   The control is suitable for mounting in any attitude.

2. Ensure that the control box is correctly wired up in accordance with the appropriate diagram. A general diagram is provided on the underside of the control chassis, but it is also advisable to refer to the burner manufacturer's scheme drawing where available.

   Faulty or incorrect wiring could cause damage to the control box or installation.

3. Ensure the control box is mounted in a position where the ambient temperature does not exceed 60°C.

4. To assist trouble free operation, choose a position for the control box where, if possible, it is not subjected to harsh vibration.

5. TMG 740-2 is fully interchangeable with earlier series TMG 740-1.

UVZ Detector

1. Observe correct wiring polarity to the UVZ detectors, + connection to terminal 1 on control box – connection to 8 or neutral on control box.

   Incorrect wiring will cause damage to the UVZ detector.

2. For best results, keep the length of wiring run between control box and UVZ detector as short as possible. Max. permissible length 20 metres.

3. The UVZ mounting flange should be in positive contact with the metallic parts of the burner to ensure good earthing and screening effects.

4. The ambient temperature at the UVZ detector should not exceed 60°C.

   It should be positioned such that it has a direct sight of the gas flame. It should not be subjected to other external sources of UV radiation, otherwise trouble-free operation will be prevented.

5. By use of the adjustable ring over the outer casing of the UVZ detector, the positioning can be altered slightly to obtain an optimum flame sighting position.

Flame Ionisation Probe

1. For best results, the length of wiring run between flame probe and control box, should be kept as short as possible. Max. permissible length 20 metres.

2. The flame probe should be well positioned in the flame, but as remote as practical from the HT ignition electrodes.

   The HT ignition electrodes should not be in contact with the flame as this may upset the flame signal current.

3. Ensure that the burner, boiler are effectively bonded to the incoming earth from the mains supply, otherwise little or no flame signal can occur.

NOTES FOR WIRING DIAGRAMS, FIGS. 1, 2, 4, 6 & 7

1. Observe correct wiring polarity of Live and Neutral supply to control box. Live supply direct onto terminal 20, neutral onto terminal 8.

   Under no circumstances, should the supply to terminal 20 be broken, other than by the mains isolator switch.

2. Where a timeswitch is used, it must have independent motor connections, e.g. 4 pin type.

   The switch contacts should be connected in series with the thermostat etc.

3. For burners where air damper control is not required, link together terminals 14, 15 and 16.

   Also the wiring from terminal 12 can be omitted altogether.

   Fig. 7 shows a typical wiring arrangement for simple on/off burner operation.

4. For burners where a short post-purge period on normal shut-down is required, the burner fan motor circuit can be wired off terminal 19.

   This will reduce the pre-purge period by approximately 2 seconds as terminal 19 is not energised until 2 seconds after the commencement of the cycle.

5. Where the burner motor loading exceeds the control box current output rating of 4A, a contactor or starter must be used to switch the motor load.

COMMISSIONING & ROUTINE CHECKS

Generally, the control box should not require any maintenance and no attempt should be made to take off the cover or break the seals.

The UVZ detector should be periodically checked for dirt, dust etc., and wiped with a soft clean cloth.

For safety reasons, it is recommended that the UV tube is replaced after 10,000 hours of operation.

On commissioning the installation and after each routine service visit it is advisable to carry out the following checks.

1. Close the main gas cock, link out the gas pressure switch contacts (if fitted) and start the burner.

   The control should go to lockout after the expiry of the ignition safety time.

2. Open the main gas cock, but with the gas pressure switch contacts linked out, allow the burner to start.

   When the burner is in the "run" position close the main gas cock.

   When the flame goes out, the control should go to lockout almost immediately.

   Remove link, and open gas cock.

3. Allow the burner to re-start, and towards the end of the pre-purge period, simulate a failure in the combustion air supply.

   The control should go to lockout immediately.

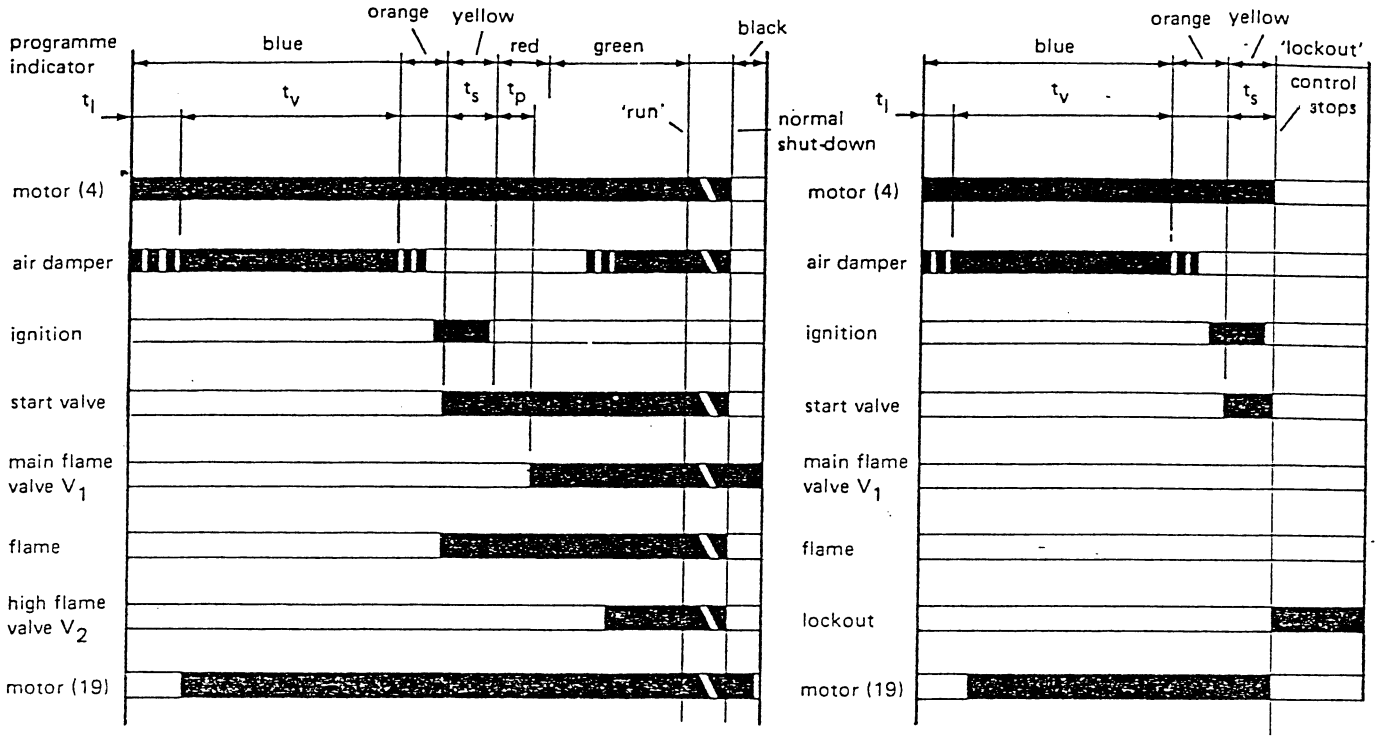
4. Re-start the burner, and during the pre-purge period, simulate a false flame signal.

   The control should shut-down the burner and go to lockout after 5 seconds.

FIG. 5 Burner with intermittent start gas flame system. Typical programme sequence (see figs. 4 & 6)

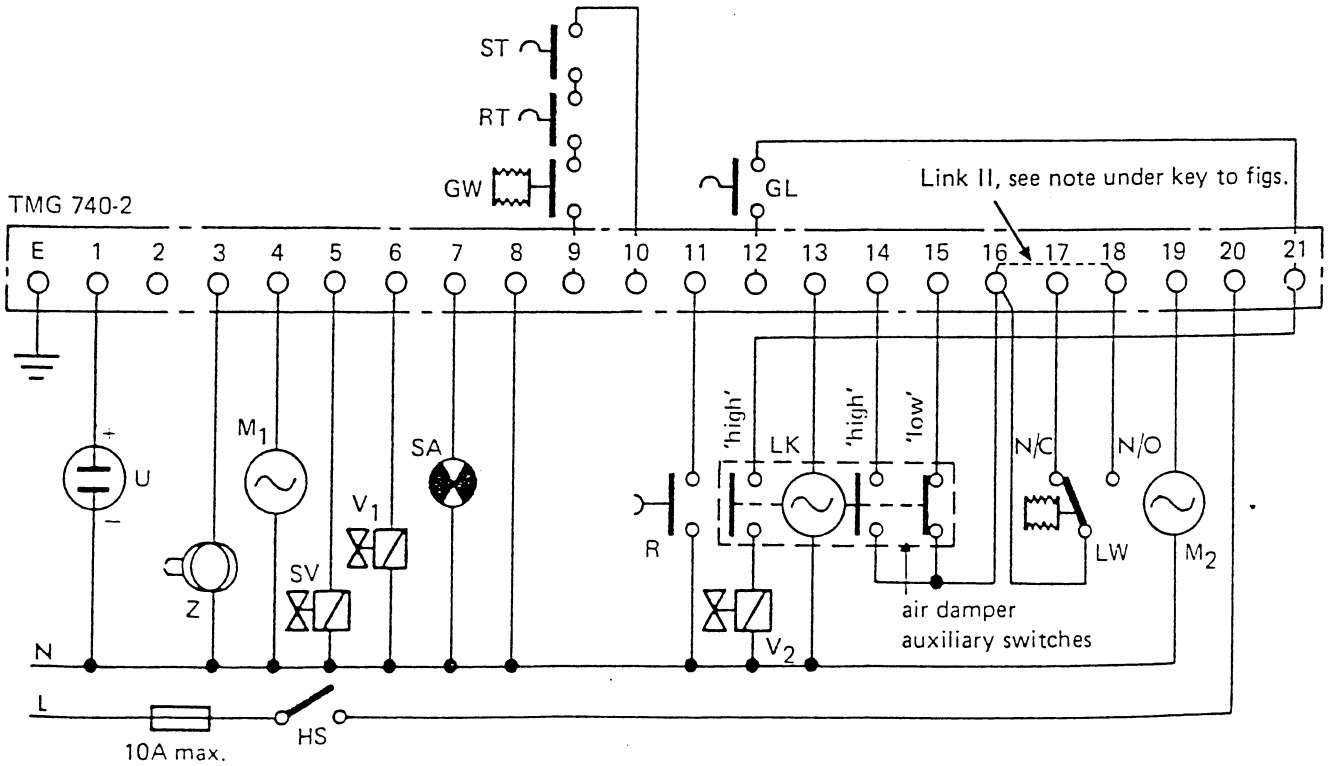
a) Start-up, flame established.

b) Start-up, flame not established



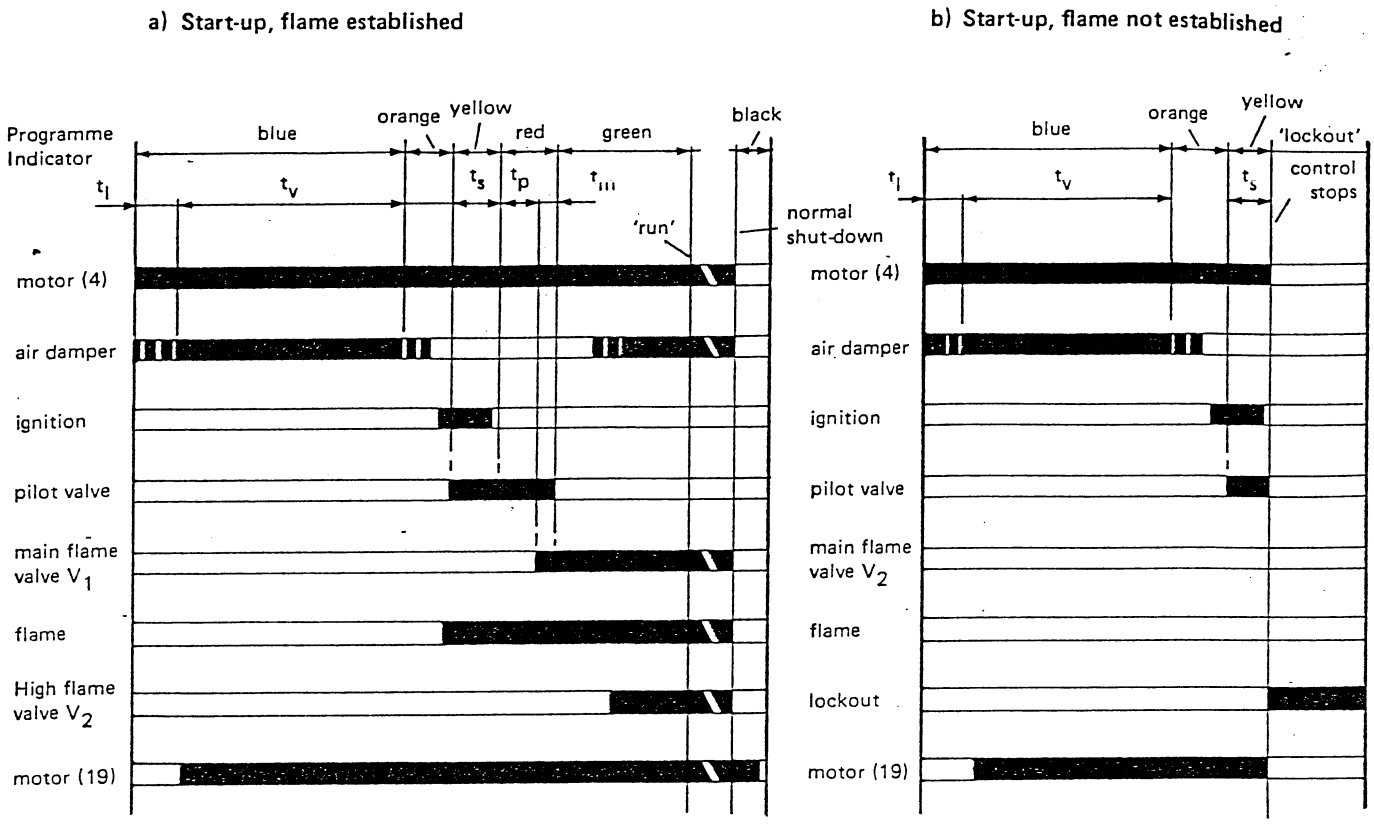
t_l = Air damper running time
t_v = Pre-purge time, damper open to high position
t_s = Ignition safety time
t_p = Start flame proving period

FIG. 6 External wiring diagram for burner with intermittent start gas flame system, UV flame detection



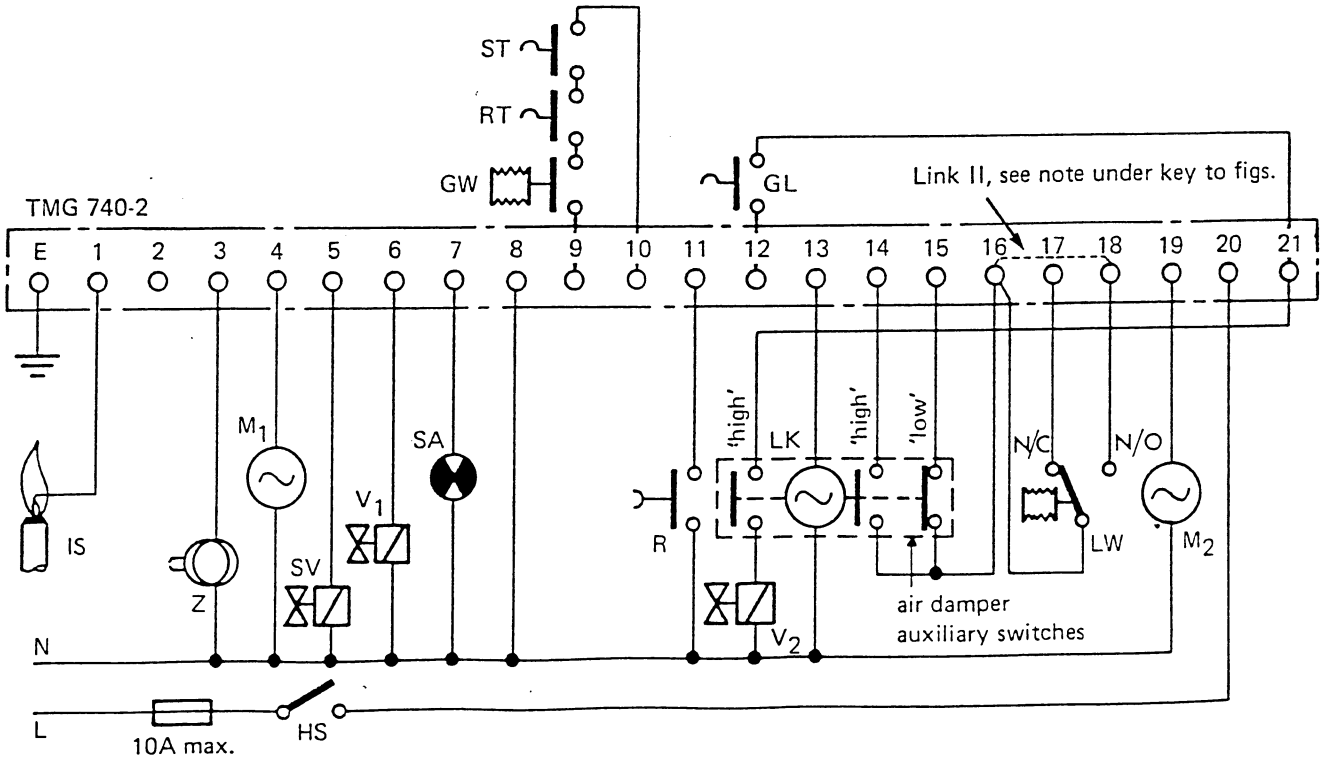
Note: Main flame is not separately supervised.

FIG. 3 Burner with interrupted pilot flame system. Typical programme sequence (see figs. 1 & 2)



t_l = air damper running time
t_v = pre-purge time, air damper open to 'high' position
t_s = ignition safety time
t_p = pilot proving period
t_m = main flame proving period

FIG. 4 External wiring diagram for burner with intermittent start gas flame system, flame ionisation detection



Note: Main flame is not separately supervised.

FAULT FINDING (see Figs. 3 and 5)

1. Burner will not start.
   Programme indicator remains at the end of the BLACK section.
   a) Check wiring.
   b) Check for live supply onto terminal 20.
   c) Check that control circuit is complete, across terminals 9 & 10.
   d) Check that air proving switch is made to its normally closed contact i.e. no air position.
2. Burner starts and gives continuous pre-purge. Programme indicator remains at the end of BLACK section, start of BLUE section.
   a) Check that air damper system is open, and auxiliary switch for this position is made.
   b) If air damper system is not used, check that terminals 14, 15 and 16 are linked together in the wiring base.
3. Burner starts and goes to lockout without firing. Programme indicator at a position inside BLUE section.
   a) Check that air proving switch contacts can change-over on establishing an air supply.
   b) Check for false flame signals or stray light onto UVZ detector.
   c) Check for loss of air supply.
4. Burner starts and gives continuous pre-purge. Programme indicator at the end of the BLUE section.
   a) Check that air damper system has returned to the low air position, and that the auxiliary switch for this has made.
5. Burner starts, no flame established, control goes to lock-out. Programme indicator at the end of the YELLOW section.
   a) Check ignition is present and is in the correct position.
   b) Check main gas supply is turned on.
   c) Check pilot valve or start gas valves are opening correctly.

FLAME IONISATION ON SUPPLY SYSTEMS WITH POORLY EARTHED OR UNEARTHED NEUTRAL WIRE

In cases where the supply system has a poorly earthed or non-earthed neutral wire an isolating transformer is required, to enable the flame ionisation detector system to work correctly.
Such supply systems can give rise to a neutral potential of 25V or greater.
Fig. 14 below shows the arrangement using an isolating transformer to overcome this problem.
The VA output rating of the transformer should be sufficiently high enough to handle the total VA rating of all the burner components e.g. Motor, ignition transformer, gas safety shut-off valves etc.

6. Burner starts, flame established, control goes to lockout Programme indicator at the end of the YELLOW section.
   a) Check that UVZ detector is properly sighted to view the flame. or
   b) Check that flame probe is correctly positioned in the flame.
   c) If necessary change UVZ detector or control box.
7. Burner starts, flame established, control goes to lock-out. Programme indicator at the end of the RED section.
   a) For burners with interrupted pilot systems, a lock-out in this position, indicates that the main flame (V_1), is not being detected.
8. Burner shut-down, control box at lockout. Programme indicator at the end of the GREEN section.
   a) A lockout with the programme indicator at this position indicates that of loss of flame or air supply failure has occurred during a run.

For the details of the colour code and various positions of the programme indicator see Figs. 3 and 5.

SPECIAL NOTE

If the control box goes to lockout, it is generally performing the function it is designed for. Causes of lockout can be.

1. No ignition.
2. Ignition not in the correct position, check electrodes, settings and ceramic insulators for cracks or damage.
3. No gas supply.
4. Gas valves not opening.
5. Failure of combustion air supply.
6. UVZ detector or flame probe poorly positioned.
7. UVZ detector subject to stray UV radiation.
8. Faulty control box.
9. Faulty flame detector.

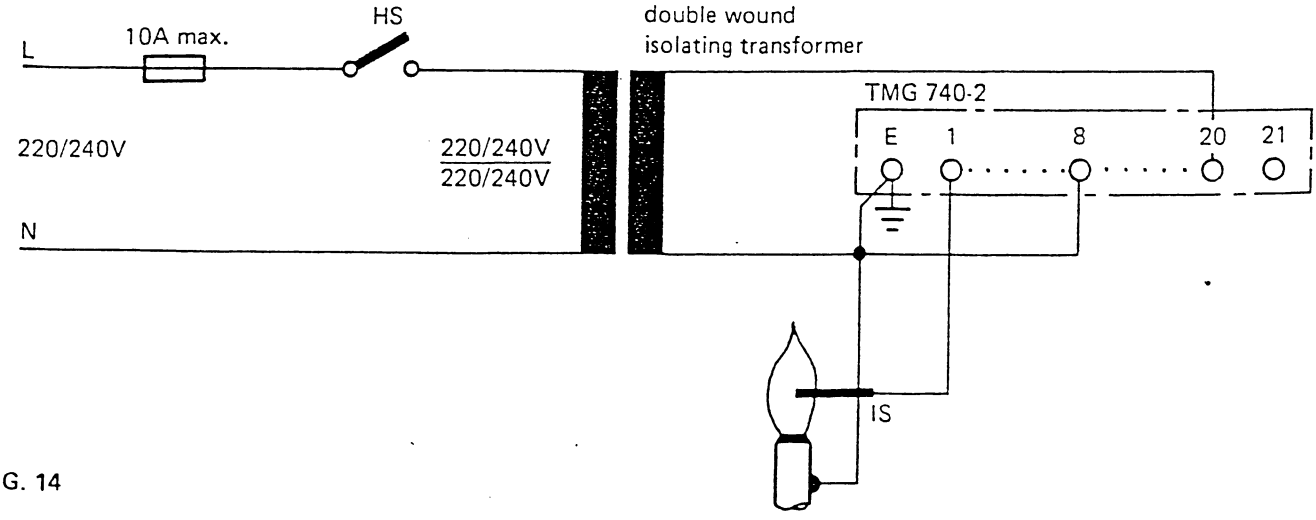


FIG. 14

MEASUREMENT OF FLAME SIGNAL CURRENT

To ensure good sighting of the flame by the UVZ detector, or good positioning of the flame probe, a simple current measurement can be taken.

Figs. 9 and 10 below show the method, using a d.c. micro-ammeter with ranges 0–10μA and 0–100μA.

FIG. 9 Ionisation signal current

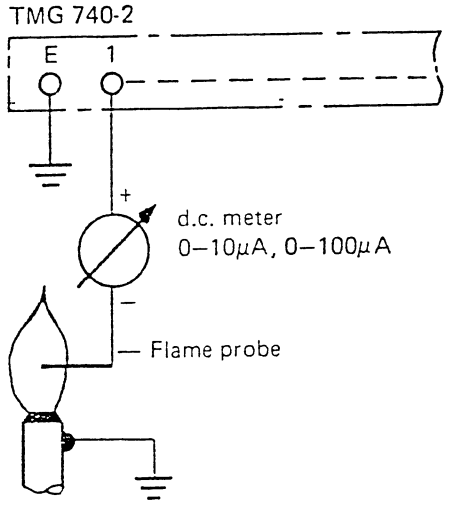
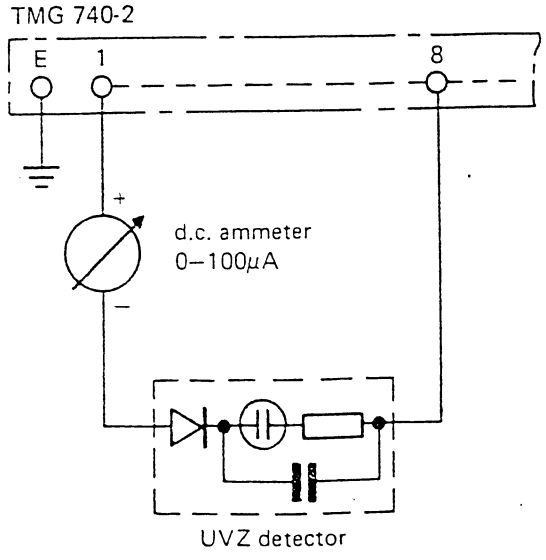


FIG. 10 UV signal current



NOTES ON FLAME DETECTION PRINCIPLES

Flame Ionisation

A flame ionisation is simply a metal electrode which is positioned in the flame. When an a.c. voltage is applied between the burner and the probe, a d.c. current flows through the probe via the flame to the burner (earth).

The flame therefore acts as a rectifier. The resulting d.c. current is amplified such that it is sufficient to operate the flame relay within the burner control.

If the insulation between the flame probe and earth is insufficient, leakage currents will occur and these will be a.c.

A filter connected between the amplifier and flame probe will separate leakage currents from the ionisation current.

In cases of short circuit between the probe and burner, the rectifying action will not take place and the burner control reacts as if a "loss of flame" occurs.

UV

An ultra-violet detector comprises a discharge tube enclosed within a bulb which will allow the passage of UV radiation.

Without the presence of UV radiation, the applied voltage is well below the ignition or discharge voltage of the tube. On receiving a UV source, the ignition voltage value is lowered and the tube discharges.

A current flows through the tube, over a rectifier at the base of the detector and after amplification the flame relay inside the control operates.

It is usual to apply a higher than normal voltage (test voltage) to the tube during each cycle to detect a potentially faulty tube before danger to the safe working of the system can arise. The rectifier at the base of the detector prevents danger from leakage and short circuit currents.

The filter and amplifier react only to d.c. or uni-directional currents, and not to a.c. currents which leakage effects and short-circuits will produce.

WIRING TO AIR PRESSURE SWITCH

Earlier series of TMG 740-1 always required 3 wire control from the air pressure switch, see fig. 11 below.

TMG 740-2 incorporates a wire link II on the underside of the control box chassis which is effectively across terminals 16 and 18. Although 3 wire control is not necessary on this series, it is recommended, to ensure complete interchange-ability between earlier and later series, see fig. 12 below.

FIG. 11

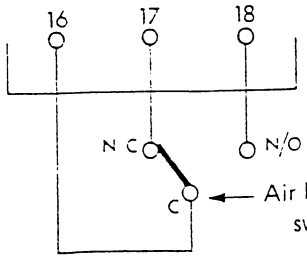
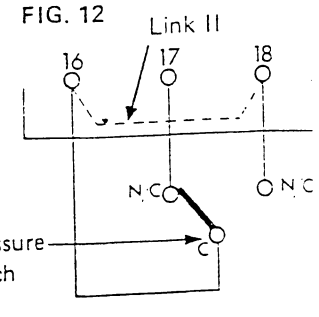


FIG. 12



In cases where an additional interlock is required with proof on air supply, break link II on the chassis underside and wire the required interlock in series with terminal 18.

SAFEGUARD AGAINST FLAME DETECTOR FAULTS OR FALSE FLAME SIGNALS

The flame detection circuit is active continuously throughout operation and the control box provides a safeguard against these conditions.

During the burner 'off' and pre-purge periods a higher than normal working voltage is applied to the UV detector and flame detection circuit. This enables a potentially faulty UV tube to be detected before a hazardous condition can arise.

If flame simulation occurs during the 'off' periods the control box will go to lockout after a delay of approximately 30 seconds. In this way nuisance lockouts occurring after a normal shut-down due to 'after burning' are avoided.

When flame simulation occurs at the "start" position, the control box goes to lockout within 30 seconds.

If flame simulation occurs during the pre-purge the burner shuts down immediately, and if the flame simulation is longer than 5 seconds, the control box goes to lockout.

Immediately following the ignition safety interval, the sensitivity of the flame detection circuit automatically reverts to normal. This effectively checks that the test voltage has been applied, since the flame relay can only be energised initially via the test voltage circuit. In the event of the test voltage circuit becoming inoperative, the control box will go to lockout during the light-up sequence.

It is not possible to reset the control from lockout, whilst a false flame condition exists.

SUMMARY OF SAFETY FEATURES

1. Flame failure during a run, results in burner shut-down within 1 second and lockout.
2. Failure to establish flame during the light-up sequence, results in burner shut-down and lockout within 5 seconds from initial release of fuel.
3. Air supply failure at any time, results in burner shut-down and immediate lockout.
4. Air proving switch is automatically checked on both its normally open and normally closed contacts. A period of 8 seconds only from initial burner start-up is allowed for the pressure switch to detect a combustion air supply.
5. Where interlocked with the burner air damper system, failure to open the air damper prevents burner operation. Failure to close the damper to 'low air' for pilot or start gas valve stages also prevents further operation.
6. Initial release of fuel is dependent upon the synchronous timer being operational and progressing towards the lockout position if required.
7. Restoration of the electric supply after power failure results in a full light-up sequence to safely restart the burner.

   Power failure after a lockout, will not interfere with this condition when the supply has been restored.
8. False flame signals result in burner shut-down followed by lockout.
9. The sensitivity of the flame detection circuit is raised during the periods where false flame signals can occur.
10. The control automatically checks that the test voltage has been applied.

SPECIFICATION

1. Electrical

Supply	:	220/240V (+10% −15%) 50 Hz (40–60 Hz) Model for 110V 40–60 Hz supply is also available, see under note 4 below.
Frequency variations	:	Timings will vary in proportion to supply frequency.
Max. Fuse Rating	:	10A (Rapid fusing type)
Power Consumption	:	15VA approx.
Max. current rating per output terminal	:	4A
Total output current	:	6A
Air pressure proving switch contacts	:	S.P. Changeover, 5A rating at 240V.
Flame detection system	:	Ionisation or UV.
Min. flame signal current	:	2μA on Ion; 5μA on UV.
Typical current – UV	:	30μA or better.
Typical current – Ionisation	:	20μA or better.

2. Timings

Model No.	32–32	63–55	45–54
Pre-purge time, air damper open to high position:	30 secs.	60 secs.	40 secs.
Pre-ignition time:	3 secs.	3 secs.	3 secs.
Ignition safety time (pilot valve PV):	3 secs.	5 secs.	5 secs.
Total pilot valve 'on' time:	11 secs.	14.5 secs.	15 secs.
Ignition safety time (start valve SV):	2 secs.	3 secs.	5 secs.
Pilot or start gas flame proving periods:	6 secs.	5 secs.	6 secs.
Main flame establishment period (V1):	2 secs.	5 secs.	4 secs.
Delay to modulation on high flame stage V2 (from start of main flame):	6 secs.	10 secs.	10 secs.
Post-purge time, burner motor connected onto terminal 19:	4 secs.	4 secs.	10 secs.

Reaction to loss of flame: less than 1.0 sec. all models.

Reset time from lockout: None, all models.

3. General

Ambient temperature rating, for control box and UVZ detector	:	−20°C to +60°C.
Flame sensing probe for ionisation	:	Heat resisting metal, well insulated. (Material and insulation as for an ignition electrode).
UV detector	:	UVZ 780, see note 5 below.
UV tube type	:	Sylvania P607
Insulation resistance for ionisation and UV systems	:	Not less than 50MΩ.
Max. wiring cable length (Both systems)	:	20 metres.
Weight	:	Approx. 0.76 Kg with wiring base and UVZ detector.
Mounting attitude	:	Any.
Insulation standard	:	P 31.

4. Model Nos.

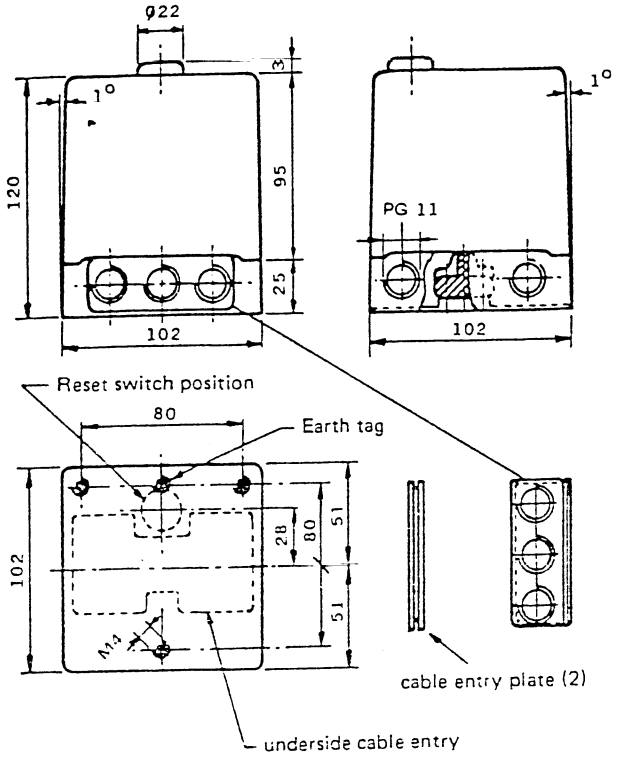
The various model numbers apply to the appropriate Standards in the following Countries.

TMG 740-2 45–54 : United Kingdom
TMG 740-2 32–32 : West Germany, France & Italy.
TMG 740-2 63–55 : Holland.
TMG 740-2 (110V) 45–54 : United Kingdom see leaflet G23.

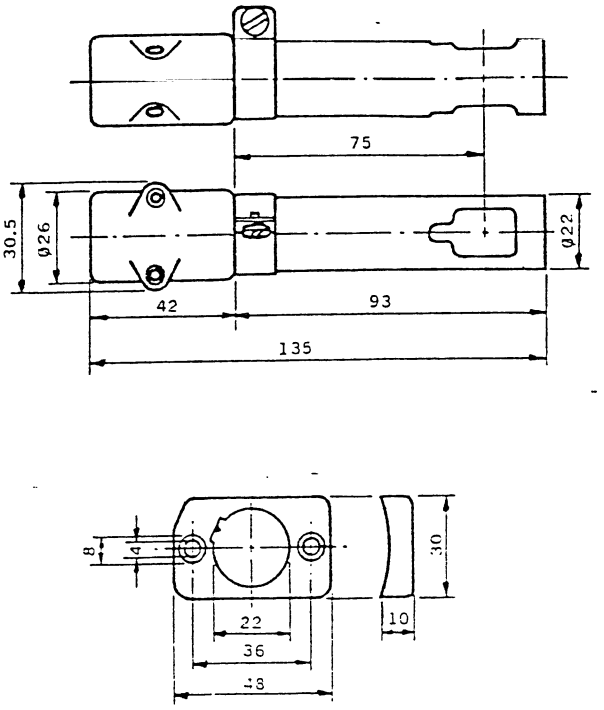
5. UVZ Detectors

UVZ 780 (Blue) : Normal sensitivity
UVZ 780 (Red) : Higher sensitivity

TMG 740-2 Control Box with Wiring Base



UVZ Detector with Mounting Flange



broag

remeha Gas 3c Technical information

Atmospheric gas boiler

92 - 372 kW

CE

remeha
CLEAN HEAT

CONTENTS

PREFACE

These technical instructions contain useful and important information for the proper operation and maintenance of the remeha Gas 3c central heating boiler.
Furthermore, important instructions are given to prevent accidents and serious damage before commissioning and during operation of the boiler, to ensure safe and trouble free boiler operation. Read these instructions carefully before putting the boiler into operation, familiarize yourself with its operation and control and strictly observe the instructions given.

If you have any questions, or if you need more information about specific subjects relating to this boiler, please do not hesitate to contact us.
The data published in these technical instructions is based on the latest information and is subject to revisions. We reserve the right to modify the construction and/or design of our products at any moment, without being obliged to adjust earlier supplies accordingly.

1. BOILER DESCRIPTION

The remeha Gas 3c boiler is a cast iron sectional boiler with atmospheric burners.
Suitable for all qualities of natural gas, cat. I 2 H (20 mbar).
The boiler meets the requirements of the CE regulations at the following directives:

- Gas appliance directive	no. 90/396/EEC
- Efficiency directive	no. 90/42/EEC
- Electrical low voltage directive	no. 73/23/EEC
- Machinery directive	no. 89/392/EEC
- E.M.C. directive	no. 89/336/EEC.

Classification type for evacuation of the combustion products: B11 BS.
For further advice or information contact Broag Ltd.

The remeha Gas 3c is supplied with electronic ignition and insulated casings.
Water connections Ø 70 mm int.

2. CONSTRUCTION

2.1 General

- Boiler block of cast iron sections are joined together with conical nipples.
- Gas train and water connections can be fitted on either side of the boiler.
  The gas train should as standard always be fitted on the same side as the instrumental panel, thermostat pocket and the flow*.
- Instrument panel is fitted in the front casing.
- Cleaning of the cast iron block from top of the boiler.

2.2 Burners

The burners are stainless steel, atmospheric burners. They guarantee a low noise level.

2.3 Boiler floor

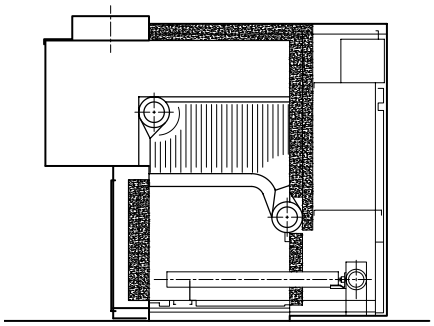
The remeha Gas 3c boiler is supplied as standard with reflecting floor plates with ventilation underneath.

2.4 Assembling

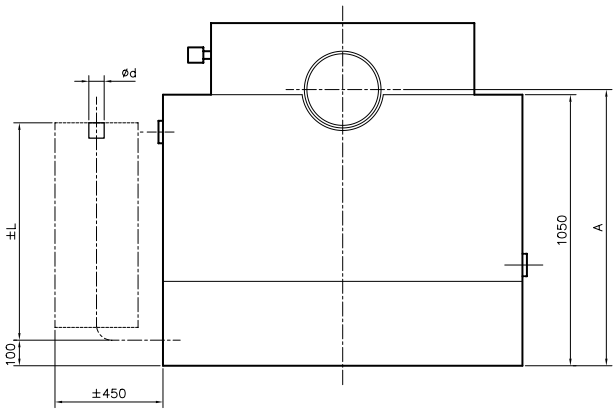
The boiler must be assembled on site.

** On request extension cables can be delivered, so that the gas train can be fitted on the opposite side to the instrument panel, thermostat pocket and the flow.*

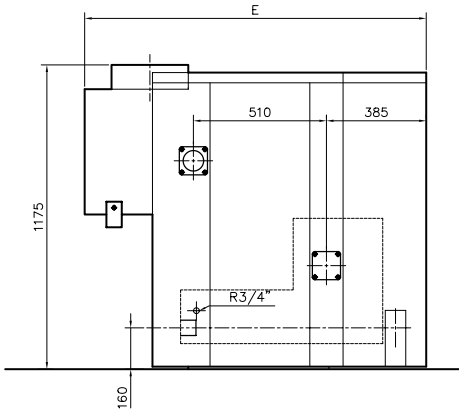
3. TECHNICAL INFORMATION AND DIMENSIONS



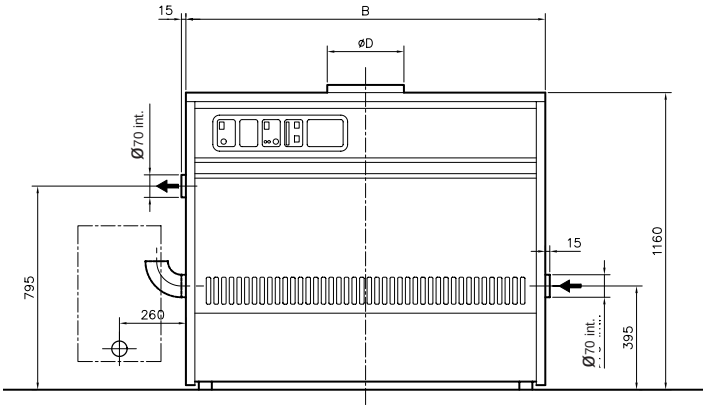
Cross section



Top view



Left hand side view



Front view

Fig. 01 View figures

Number of sections	Output	Input Hs	Dimensions						Water resistance		Water contents	Boiler weight
			A	B	Ø D	Ø d	E	±L	Δt = 10°C	Δt = 20°C		
	kW	kW	mm	mm	mm	"	mm	mm	mbar	mbar	l	kg
5	92	114	1015	675	200	1"	1220	670	16	4	51	385
6	115	142	1015	775	200	1"	1220	670	24	6	58	440
7	138	170	1040	875	200	1"	1220	670	36	9	65	495
8	162	200	1040	975	250	1"	1220	670	48	12	71	550
9	186	228	1040	1075	250	$1^1/_4$"	1220	700	60	15	78	605
10	210	258	1040	1175	250	$1^1/_4$"	1220	700	76	19	85	665
11	234	286	1065	1275	300	$1^1/_4$"	1320	700	96	24	91	720
12	256	315	1065	1375	300	$1^1/_4$"	1320	700	116	29	98	775
13	280	343	1065	1475	300	2"	1320	960	136	34	105	830
14	301	369	1065	1575	300	2"	1320	960	160	40	111	890
15	325	399	1090	1675	350	2"	1320	960	186	46	118	945
16	348	426	1090	1775	350	2"	1320	960	208	52	125	1000
17	372	454	1090	1875	350	2"	1320	960	236	59	131	1055

4. APPLICATION

4.1 L.P.H.W. system

4.1.1 Water temperature
Maximum water temperature is 110°C (high limit thermostat).
Highest boiler water temperature is 95°C (control thermostat).
Minimum return water temperature is 20°C at a flow rate related at a Δt of 20°C (flow/return temperature).

4.1.2 Water pressure
Boiler sections pressure test at 12 bar.
Maximum pressure test for the boiler block is 6 bar.
Minimum working pressure boiler is 0.8 bar.
Maximum working pressure is 6 bar.

4.1.3 Water flow
The minimum water flow through the boiler is:

$$\frac{\text{Output boiler in kW}}{93} = \ldots \text{ m}^3/\text{h}$$

This minimum flow must be maintained for 5 minutes after the burner stops firing to avoid high temperature shutdown due to residuel heat gain.
Due to the design and manufacture of the boiler no specific minimum water flow requirement exists other than for high-temperature protection.

4.1.4 Water treatment
Water treatment under normal circumstances is not necessary (see our water quality recommendations).

4.1.5 Noise level
The noise level measured around the boiler depending on boiler room construction is about 50-55 dBA.
(Noise level taken at 1 meter from the boiler)

4.2 Chimneys
The average flue gas temperature is so low that the chimney must be in accordance with the guidelines of British Gas and BS 6644.

4.3 Installation standards
The following instructions must be adhered to when the remeha Gas 3c is installed:
Gas safety (installation and use) Regulations 1984 (as amended).
All gas appliances must, by law, be installed by competent persons (e.g. Corgi) in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution.
It is in your own interest and that of safety to ensure that the law is complied with.
In addition to the above regulations, this appliance must be installed in compliance with the current I.E.E. Regulations for electrical installation, local building regulations, the Building Standards (Scotland), Consolidation Regulations and bye laws of the local water undertaking and Health and Safety Document No. 635 'The Electricity at Work Regulations 1989'. It should also be in accordance with the relevant recommendations in the current editions of the following British Standards and Codes of Practice, viz.
BS 5540 Pt 1 and 2, BS 5449, BS 5546, BS 6798, BS 6891 and BG.DM2.

Important:
The remeha Gas 3c is certified appliance and must not be modified or installed in any way contrary to these 'Installation and Servicing Instructions'.
Manufacturers instructions must NOT be taken in any way as overriding statutory obligations.

5. TYPICAL BOILER INSTALLATIONS

One boiler in boiler room

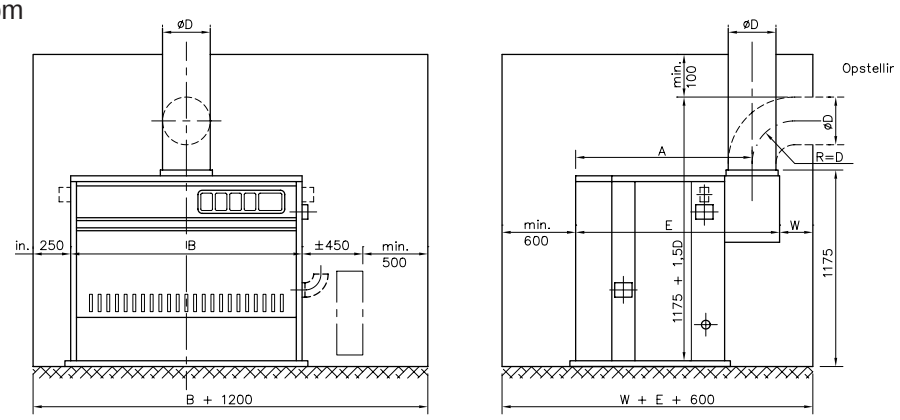


Fig. 02 Installation 1

Two boilers in boiler room

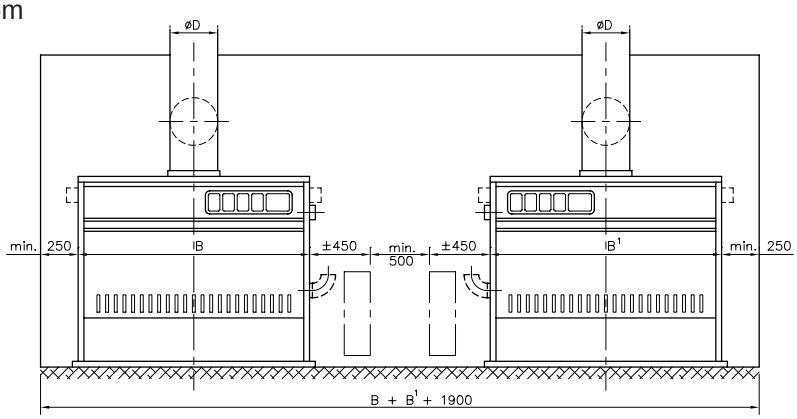


Fig. 03 Installation 2

Two boilers in boiler room
back to back

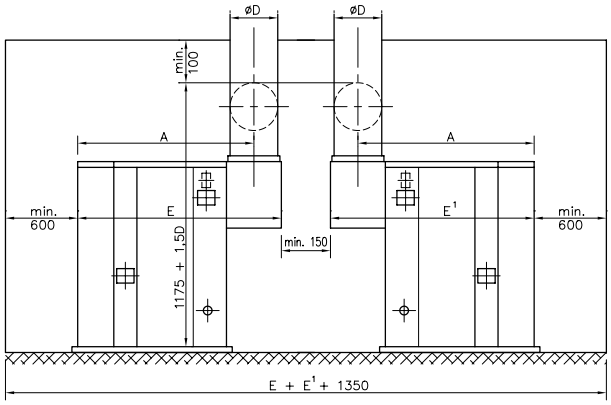


Fig. 04 Installation 3

		Number of sections												
		5	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
Dimensions (mm)	**A**	1015	1015	1040	1040	1040	1040	1065	1065	1065	1065	1090	1090	1090
	B	675	775	875	975	1075	1175	1275	1375	1475	1575	1675	1775	1875
	Ø D	200	200	200	250	250	250	300	300	300	300	350	350	350
	E	1220	1220	1220	1220	1220	1220	1320	1320	1320	1320	1320	1320	1320

6. REGULATION AND SAFETY EQUIPMENT

6.1 General

The remeha Gas 3c is supplied with electronic control and safety equipment with flame detection.

6.2 Instrument panel

The remeha Gas 3c is supplied with an instrument panel that is fitted in the front of the boiler, either left or right. The instrument panel can be delivered in three models:

- simple instrument panel On/Off;
- simple instrument panel High/Low;
- complete instrument panel High/Low.

All connections are pre-wired and fitted with plugs. The capillaries from the control panel should be fitted in the pocket of the boiler, wich is fitted in the top front of the end section.

The instrument panel, pocket and the flow should always be fitted at one side of the boiler either left or right and standard on the same side as the gas train.***

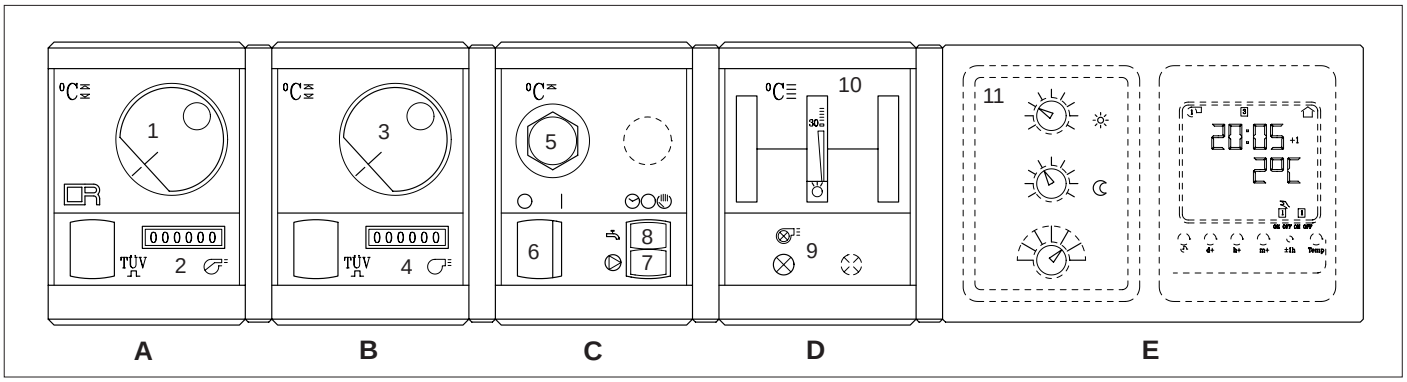


Fig. 05 Layout of the complete instrument panel

The modules contain:

Module A

1. Control thermostat
   Setting between 35°-95°C
2. Hour run meter total running hours*

Module B

3. High-Low thermostat
   Setting between 35°-95°C**
4. Hour run meter full load*

Module C

5. High-limit thermostat 110°C (locking)
6. Operating switch (On/Off with optical display)*
7. Switch for circulating pump*
   Manual/Off/Automatic
8. Switch for domestic hot water storage pump*
   Manual/Off/Automatic

Module D

9. Warning light*
10. Analogue thermometer water temperature

Module E

11. Option for ***rematic***® weather compensating boiler control*

* *Absent in simple instrument panels*
** *Absent in simple instrument panel On/Off*
*** *On request extension cables can be delivered, so that the gas train can be fitted on the opposite side to the instrument panel, thermostat pocket and the flow.*

6.3 Standard electronic gas train On/Off or High/Low

6.3.1 Schematic construction

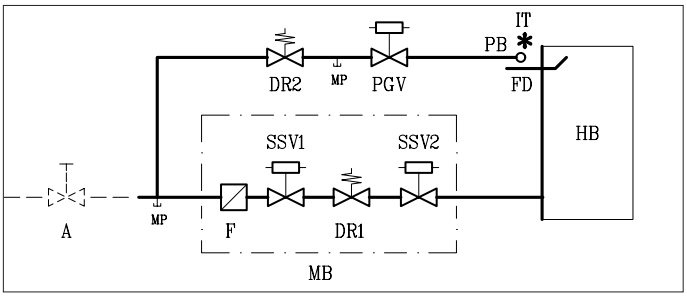


Fig. 06 5-12 sections

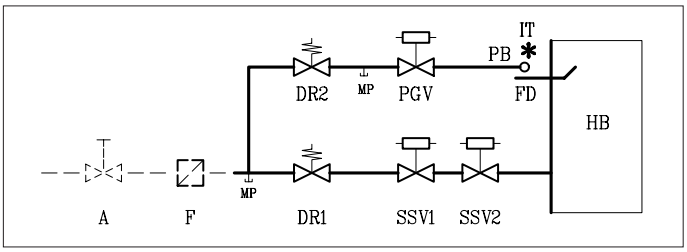


Fig. 07 13-17 sections

Legend

A	*Gas cock*
PB	*Pilot burner*
DR	*Gas governor*
F	*Gas filter*
HB	*Main gas burners*
MB	*Gas multibloc*
IT	*Ignition transformer*
PGV	*Pilot gas valve*
MP	*Measuring point*
SSV	*Safety shut-off valve*
FD	*Flame detector*
- - - -	*Not supplied*

6.3.2 Specification

1 Gas multibloc (5-12 sections)
2 Safety shut-off valves (13-17 sections)
1 Gas governor (13-17 sections)
1 Pilot gas valve
1 Pilot gas governor
1 Ignition transformer 5 kV
1 Pilot burner with flame detector
1 Down draught thermostat set at 70˚C

6.3.3 Control panel on gas train

1 Main switch
1 Control box Satronic
1 Fuse, brusk
1 Signal lamp

6.4 Functions

6.4.1 Flame protection

Flame protection by means of ionisation flame detection.

6.4.2 Down draught thermostat

The boiler is fitted with a down draught thermostat Honeywell (typ L6068A).
If there is down draught the thermostat will switch off the boiler. Fixed setpoint is 70°C.

6.4.3 Thermostats

Control thermostat On/Off Landis & Gyr 35°-95°C.
Control thermostat High/Low Landis & Gyr 35°-95°C (High/Low version only).
High-limit thermostat locks out at 110°C.

7. ASSEMBLY AND INSTALLATION GUIDELINES

7.1 General

The boiler is suitable for operating at a maximum working pressure of 6 bar and a minimum pressure of 0.8 bar. Boiler can be installated in open or closed systems.

7.2 Boiler assembly

Broag provides special tools on loan, for the boiler assembly with detailed building instructions. However, building supervision and/or actual boiler erection services can be provided by Broag or an approved boiler erection engineer.

7.3 Water connections

The boiler water connections can be fitted on either side of the boiler.
The water connection is flanged on the boiler with a pipe connection for welding Ø 70 mm to the installation.
The top blind-flange has an integral cast 1" tapping to accept a safety valve. The end sections have a $^{3}/_{4}$" tapping to accept drain/off cocks (Tapping BSP).

7.4 Pocket for instrument panel

The pocket should be fitted in the top front end section of the boiler and at that side of the boiler where the gas train is fitted. Other end section tapping 1" should be sealed.

7.5 Water pressure

Each section is hydraulically tested to at least 12 bar.
Maximum test pressure for the assembled boiler block is 6 bar.
Operating pressure between 0.8 bar and 6 bar.

8. GAS SUPPLY

8.1 General
The gas train can be fitted on the left or right hand side of the boiler but as standard is always fitted on the same side of the boiler instrument panel (fitted in the front casing).*
The local Gas authority should be consulted to ensure that an adequate pressure and supply is available at the boilers maximum output. To minimise risk of sediment or foreign particles entering the control valves, an approved filter may be fitted into the pipe work downstream.
The gas supply should be conform to the British Gas safety regulations.

8.2 Gas pressure
Maximum gas pressure at inlet 100 mbar.
Burner pressure:
- full load : 11.8 mbar (100%)
- part load (High/Low version only): 4.2 mbar (60%)
- injector size: 4.4 mm Ø.

9. ELECTRICAL SUPPLY

9.1 General
The electrical installation must conform to the IEE regulations and also to local authority requirements.

9.2 Control panel
A control panel is fitted on the gas train.

9.3 Electrical connections
The boiler is pre-wired. Only the main supply should be wired to this control panel.

9.4 Electrical data
Main supply: 240V - 50Hz (L/N).
Running current: 120 W.
Installed fuse: 6 Amp.

9.5 Wiring diagram for the instrument panel

9.5.1 Simple instrument panel

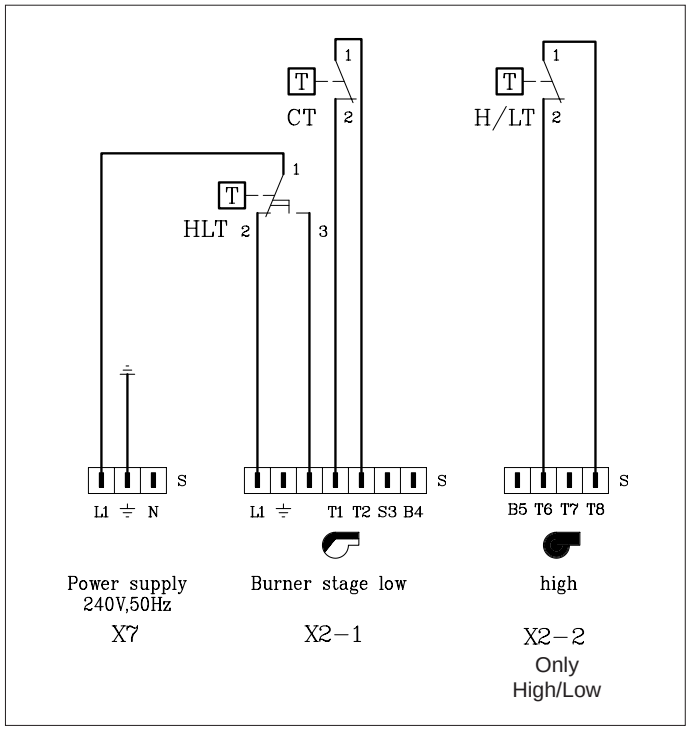
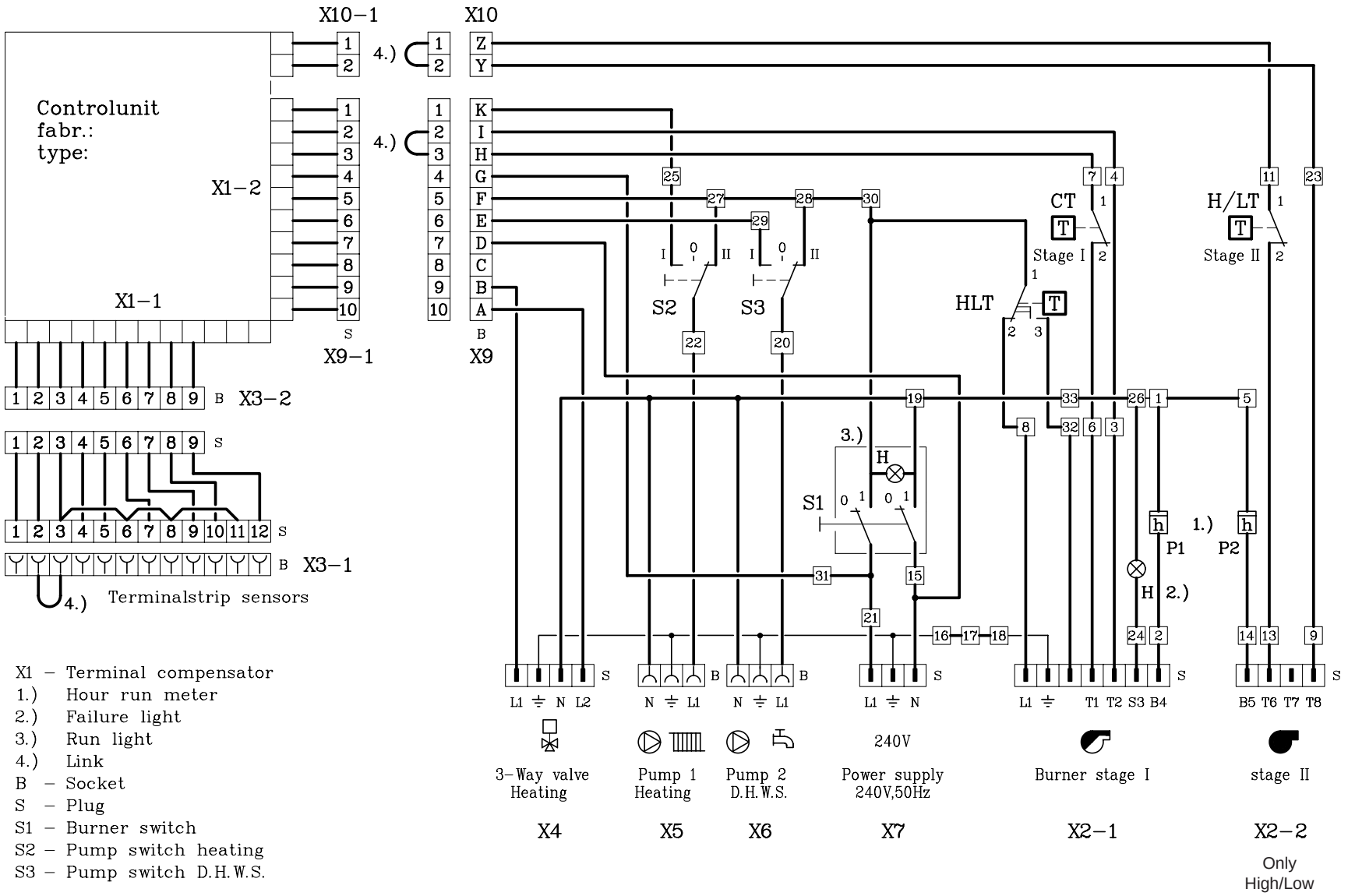


Fig. 08 Wiring diagram for the simple instrument panel

Legend
CT Control thermostat
HLT High limit thermostat
H/LT High/Low thermostat
S Plug
Connector

* *On request extension cables can be delivered, so that the gas train can be fitted on the opposite side to the instrument panel, thermostat pocket and the flow.*



X1 – Terminal compensator
1.) Hour run meter
2.) Failure light
3.) Run light
4.) Link
B – Socket
S – Plug
S1 – Burner switch
S2 – Pump switch heating
S3 – Pump switch D.H.W.S.

Fig. 09 Wiring diagram for the complete instrument panel

9.6 Wiring diagram boiler

9.6.1 Complete wiring diagram for On/Off boiler with simple instrument panel

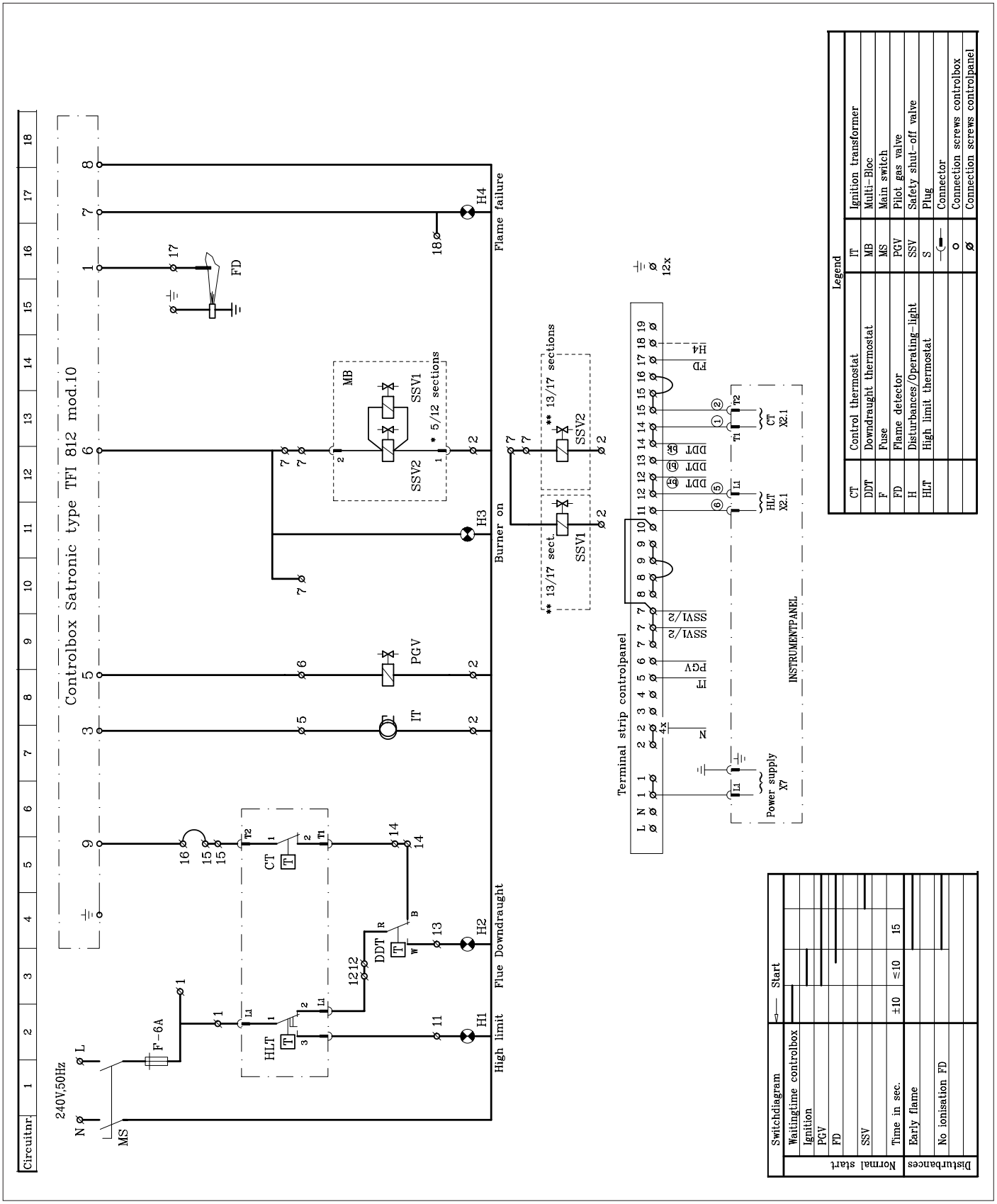


Fig. 10 Wiring diagram for the boiler with simple instrument panel

9.6.2 Complete wiring diagram for On/Off boiler with complete instrument panel (High/Low thermostat will not be used)

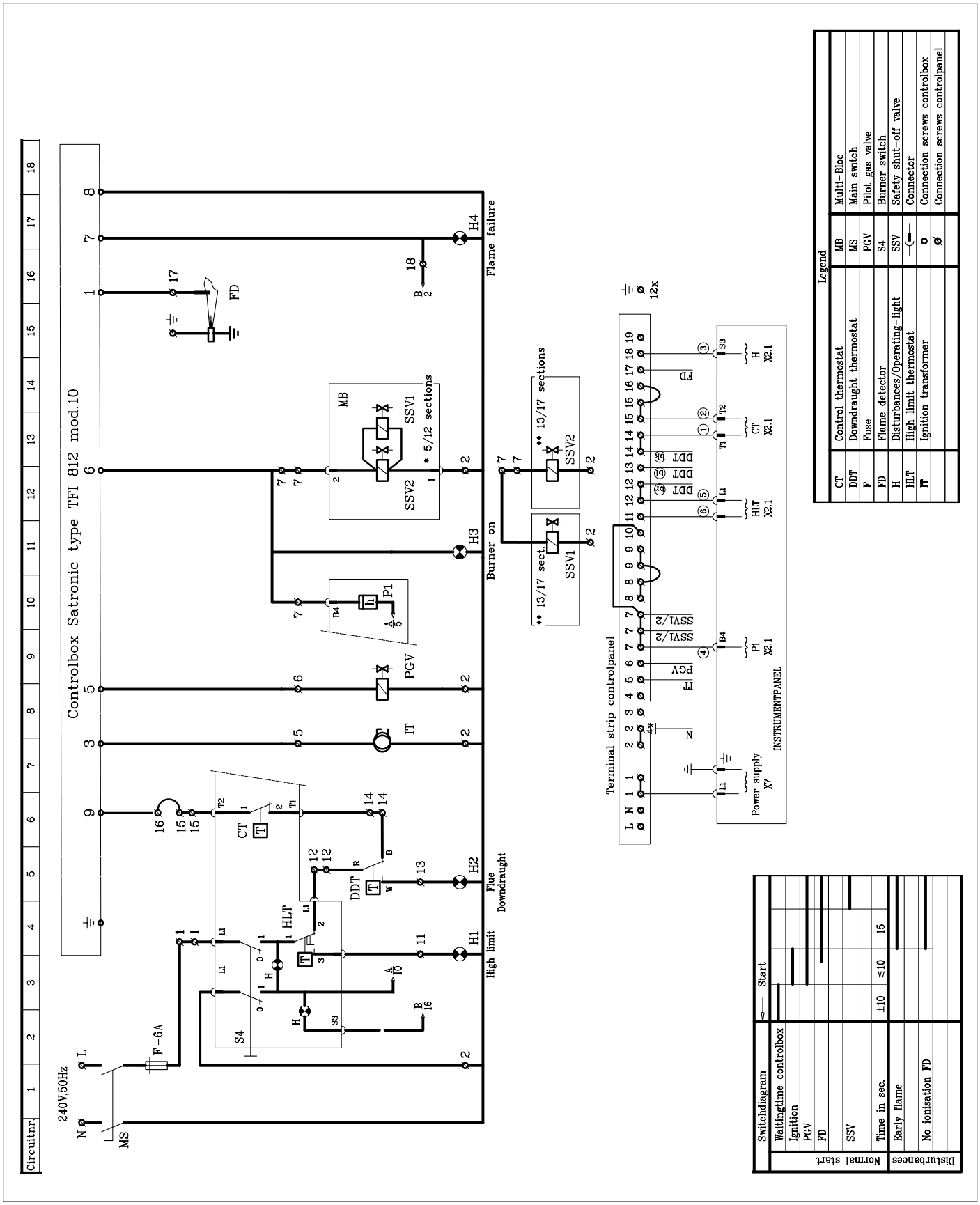


Fig. 11 Wiring diagram for the boiler with complete instrument panel

9.6.3 Complete wiring diagram for High/Low boiler with simple instrument panel

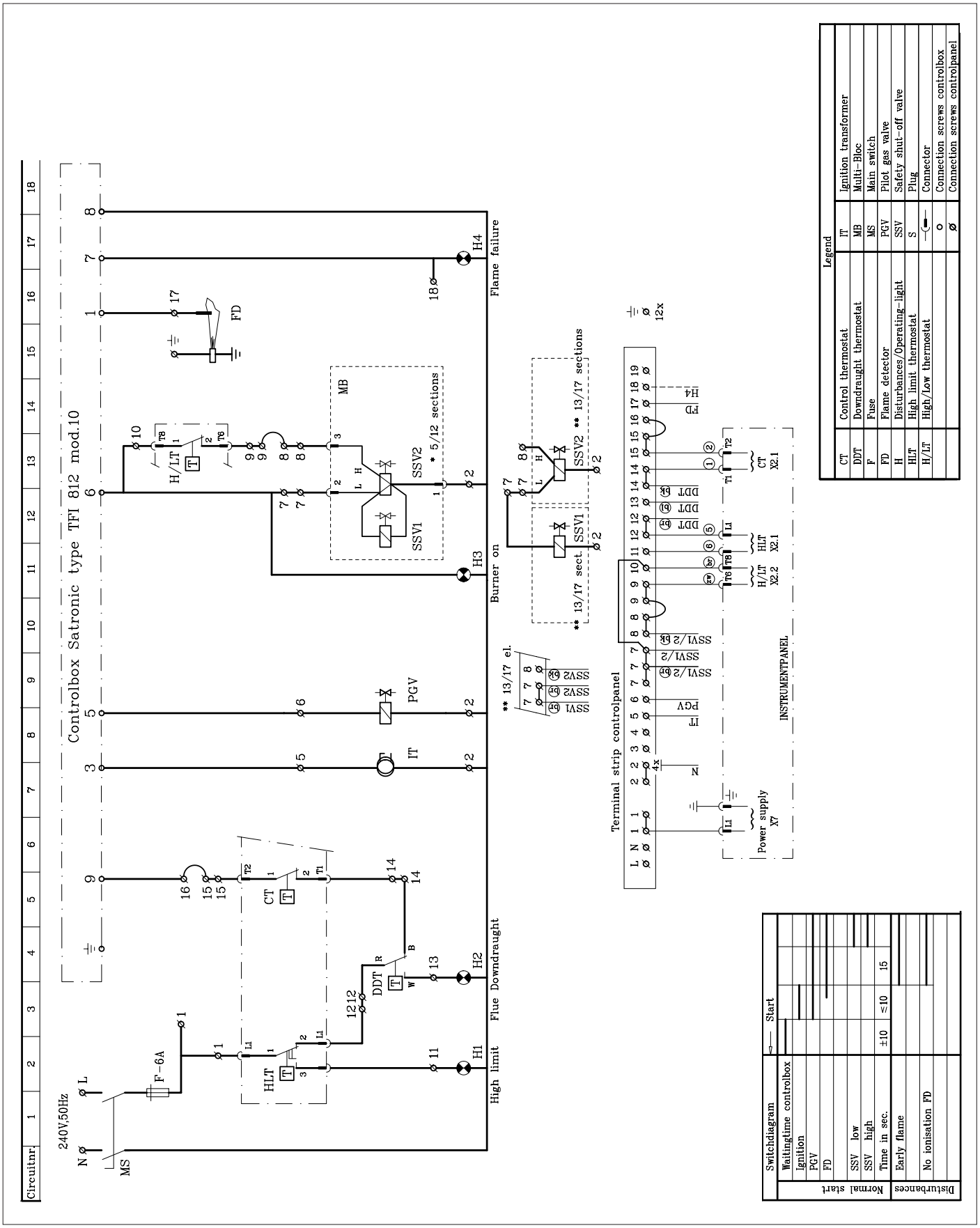


Fig. 10 Wiring diagram for the boiler with simple instrument panel

9.6.4 Complete wiring diagram for High/Low boiler with complete instrument panel

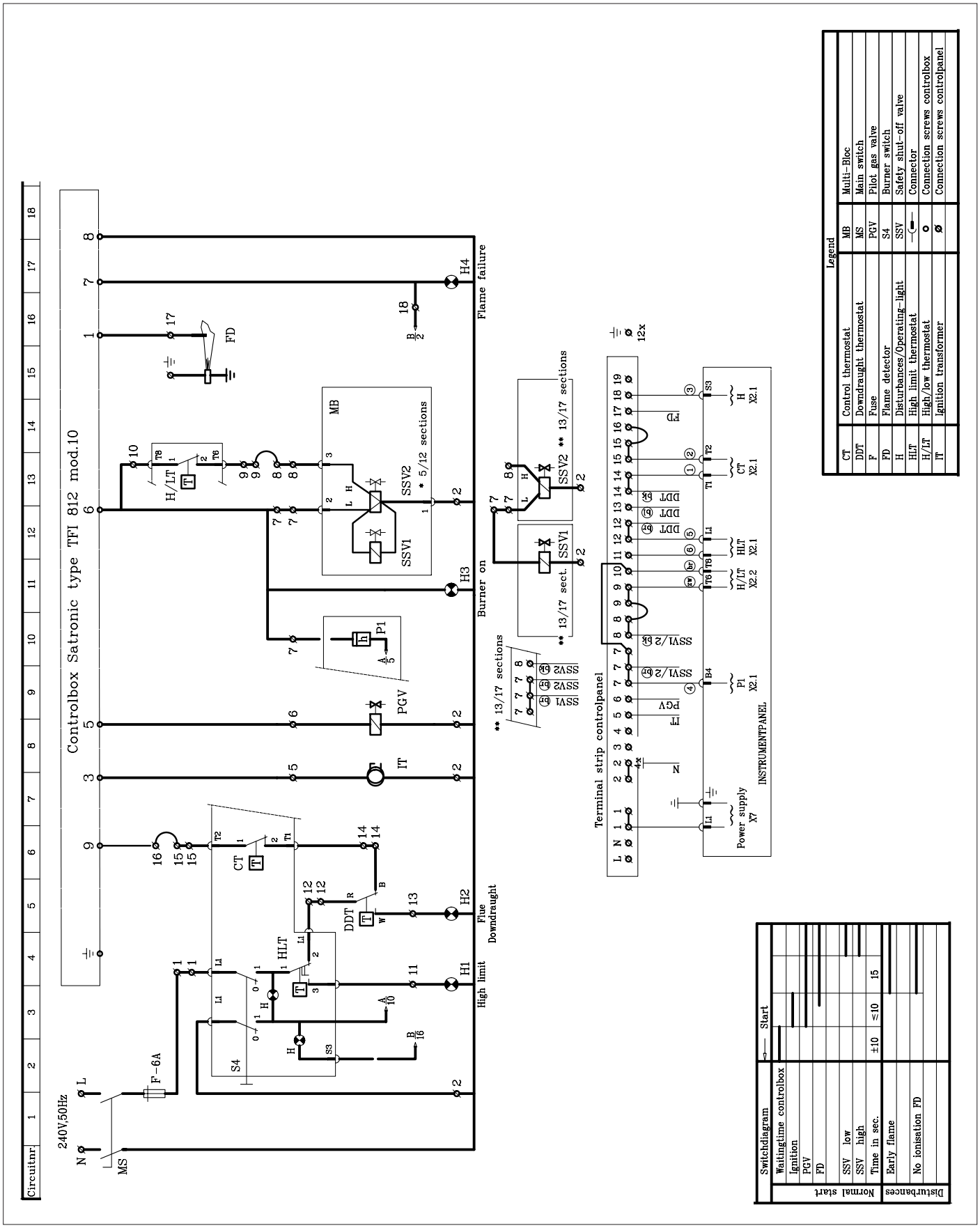


Fig. 11 Wiring diagram for the boiler with complete instrument panel

10. COMMISSIONING

10.1 Technical information

Control box: Satronic TFI 812 B mod. 10.
Main supply: 240V - 50 Hz.
Minimum ionisation current: 5 μA.
Reaction time flame protection: 1 sec.
Safety time: < 10 sec.
Maximum ambient temperature: 60°C.
Injector size pilot burner: Ø 0.8 mm.
Injector size main burner: Ø 4.4 mm.
Burner pressure full load: 11.8 mbar (100%).
Burner pressure part load: (High/Low version only): 4.2 mbar (60%).

Warning:
Control box operates on a neutral/phase supply.

10.2 Commissioning the boiler

1. Check gas connections.
2. Check electrical supply (L/N and earth).
3. Check water connections and if the installation is filled.
4. Switch on circulation pump and check rotation direction.
5. Open main gas cock (release air in gas pipe work).
6. Switch on electrical supply.
7. Set the control thermostats at about 85°C.
8. After a waiting time of about 12 seconds you will get ignition. At a minimum ionisation current of 5 μAmp the ignition stops. 15 sec. later the safety gas valve will open, the boiler is on.
9. Leave the boiler on for a couple of minutes to get rid of air in the gas pipe.
10. Set the correct burner pressure.
11. Check the thermostats for correct operation.
12. Check the flame protection, start the boiler with disconnected ionisation probe.

10.3 Switching off the boiler

1. Switch off the electrical supply.
2. Turn off the gas cock.

11. MAINTENANCE

11.1 General

It is essential for a good combustion, to clean the boiler, the gas train and boiler room once a year.

11.2 Maintening the boiler

1. Clean the internal flue ways of the boiler with a steel cleaning brush (available from Broag).
   Remove top casing and top of the flue hood.
2. Clean the burners internally and externally.
3. Clean boiler room and the floor underneath the boiler.
4. Clean the boiler casings.
5. Clean the gas train, ignition, pilot burner, thermostats and wiring.
6. Check start program, ignition time and safety times.
7. Check flame protection, and thermostats.
8. Check the boiler input at 100% and 60% load (High/Low version only).
9. Make a combustion efficiency calculation.
10. Check the boiler and installation for water leakage.
11. Check gas train and gas pipe for gas leakage.

broag

ISO 9001
since 1988

Broag Ltd.
Head office
Remeha house,
Molly Millars Lane,
Wokingham,
Berkshire RG41 2QP.
Tel. 0118 9783434
Fax 0118 9786977

Branch office
Unit 3, Kestrel Close,
Quarry Hill Ind. Estate,
Ilkeston
Derbyshire DE7 4RD
Tel. 0115 9440778
Fax 0115 9440588

Subject to alterations
Art.nr. 50.696/1500/10.96/Bo.

broag

remeha Gas 3c ECO

Technical information

Fully condensing atmospheric gas boiler

101 - 407 kW

CE

CONTENTS

PREFACE

These technical instructions contain useful and important information for the correct operation and maintenance of the remeha Gas 3c ECO gas boiler.
Furthermore, important instructions are given to prevent accidents and serious damage before commissiong and during operation of the boiler, to ensure safe and trouble-free operation. Read these instructions carefully before putting the boiler into operation, familiarize yourself with its operation and controls and strictly observe the instructions given.

If you have any questions, or if you need more information about specific subjects relating to this boiler, please do not hesitate to contact us.
The data published in these technical instructions is based on the latest information and is given subject to later revisions.
We reserve the right to modify the design and/or configuration of our products at any moment, without being obliged to adjust earlier supplies accordingly.

1. BOILER DESCRIPTION

The remeha Gas 3c ECO boiler is a fully condensing atmospheric gas boiler, with stainless-steel atmospheric burners.
The boiler meets the requirements of the CE regulations at the following directives:

- Gas appliance directive no. 90/396/EEC
- Efficiency directive no. 92/42/EEC
- Electrical low voltage directive no. 73/23/EEC
- Machinery directive no. 89/392/EEC
- E.M.C. directive no. 89/336/EEC.

Suitable for all qualities of natural gas and propane.
Cat. II 2H3p

Classification type for evacuation of the combustion products: B23
For further advice or information contact Broag Ltd.

The remeha Gas 3c ECO boiler is fitted with electronic ignition and is supplied complete with an insulated casing. Water connections Ø 70 mm.

2. CONSTRUCTIONS

2.1 General

- Boiler block (primary heat exchanger) of cast iron sections connected with conical nipples.
- Economiser (secondary heat exchanger) of anodised aluminium.
- Gas train can be fitted on the left or right hand side of the boiler.
- Water connections can be fitted on the left or right hand side of the boiler. The return is fitted as standard on the left hand side of the economiser.
  The gas train should always be fitted on the same side as the instrument panel and the flow connection*.
- Instrument panel is fitted in the front casing.
- The boiler block (primary heat exchanger) is cleaned from the top.
  The economiser (secondary heat exchanger) is cleaned from the top rear side.

2.2 The burners

The burners are stainless steel, atmospheric burners. They guarantee a low noise level.

2.3 Boiler floor

The remeha Gas 3c ECO boiler is supplied as standard with reflecting floor plates which allows for ventilation underneath.

2.4 Assembly

The boiler is delivered in sections for assembly on site.

3. BOILER EFFICIENCY

3.1 General

The remeha Gas 3c ECO can operate with exceptionally low return water temperatures (down to 20°C) and in doing so extracts the maximum efficiency by creating condensation within the economiser so releasing the latent heat from the flue gases. By raising the return water temperature via the economiser the boiler block is protected at all times, and heat to water efficiences of 86% (G.C.V.) are can be attained.

3.2 Condensation

Condensation will take place within the economiser when return temperature drops below 55°C. Above this temperature no condensing takes place and the latent heat is not released. Even so, efficiencies well in excess of 95% are still achieved.

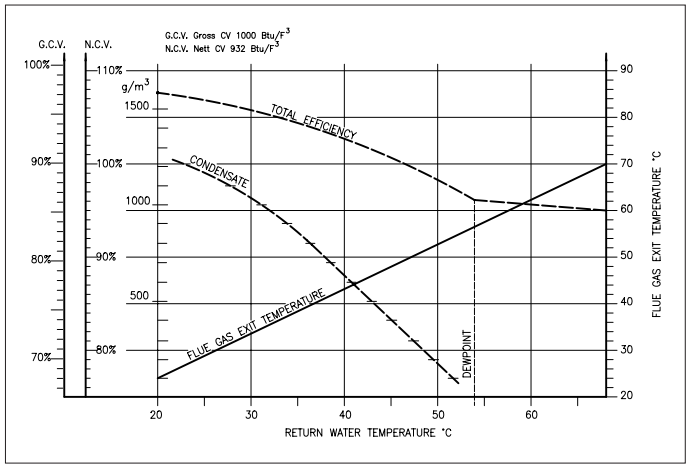


Fig. 01 Relationship between boiler efficiency and return boiler water temperature

** On request extension cables can be delivered, so that the gas train can be fitted on the opposite side to the instrument panel, thermostat pocket and the flow.*

4. TECHNICAL DATA AND DIMENSIONS

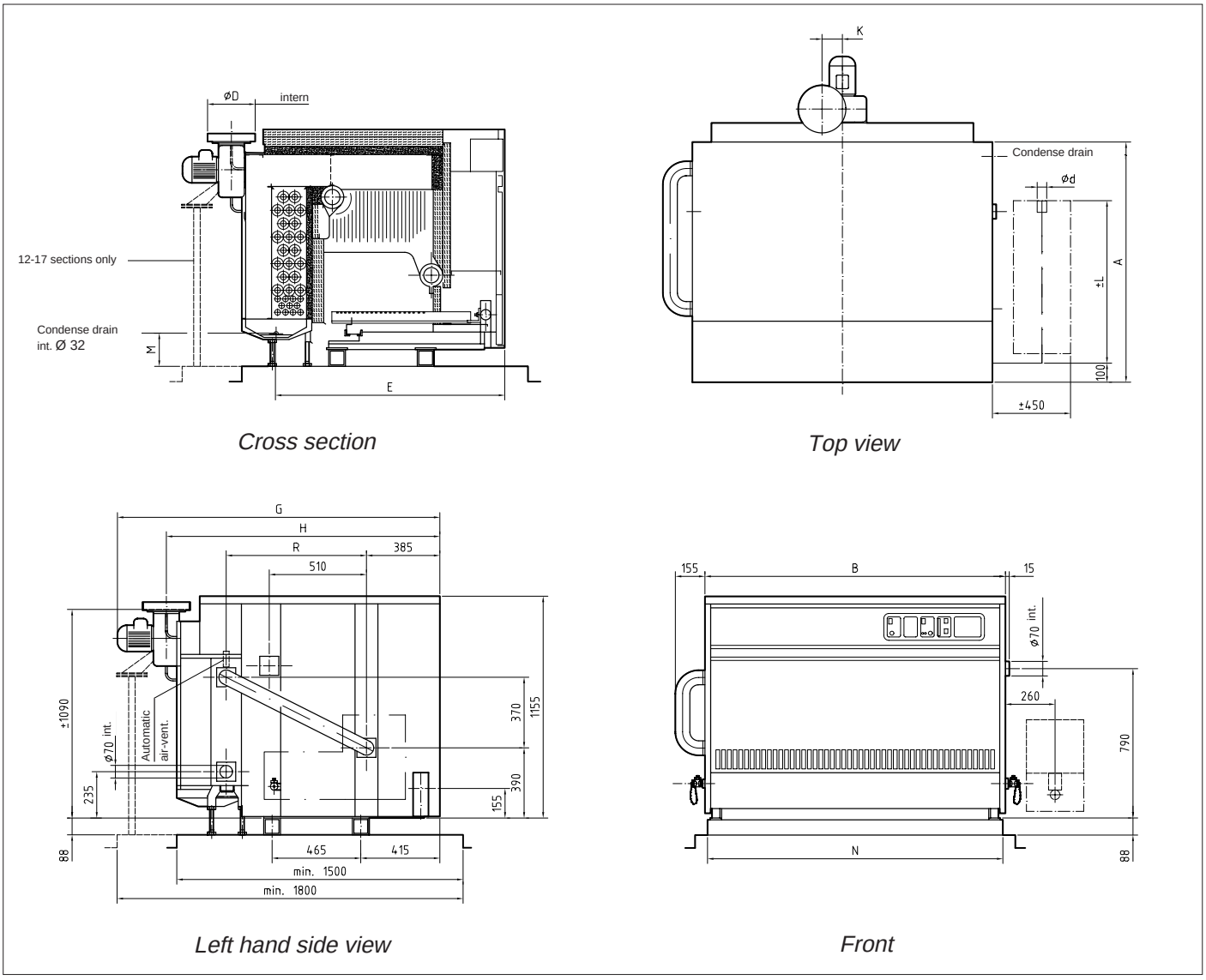


Fig. 02 Dimensions of the remeha Gas 3c ECO

Number of sections	Output	Input	Dimensions												Water resistance		Water content	Boiler weight
		Hs	A	B	Ø D	Ø d	E	G	H	K	R	N	M	±L	Δt=10°C	Δt=20°C		
	kW	kW	mm	mm	mm	"	mm	mm	mm	mm	mm	mm	mm	mm	mbar	mbar	Litres	kg
5	101	119	1260	675	200	1	1195	1610	1425	85	736	600	143	670	44	11	71	445
6	127	149	1260	775	200	1	1195	1610	1425	85	736	600	143	670	60	15	78	500
7	153	178	1260	875	200	1	1195	1610	1425	85	736	800	139	670	92	23	90	565
8	179	208	1260	975	200	1	1195	1610	1425	85	736	800	139	670	116	29	96	620
9	203	236	1260	1075	200/250*	$1^1/_4$	1195	1710	1435	107	736	1000	134	700	160	40	108	690
10	228	265	1260	1175	200/250*	$1^1/_4$	1195	1710	1435	107	736	1000	134	700	188	47	115	750
11	254	295	1260	1275	200/250*	$1^1/_4$	1195	1710	1435	107	736	1200	134	700	220	55	121	805
12	281	324	1260	1375	300	$1^1/_4$	1195	1740	1435	131	736	1200	123	700	264	66	134	875
13	307	354	1260	1475	300	2	1195	1740	1435	131	736	1400	123	960	312	78	141	930
14	330	381	1260	1575	300	2	1195	1740	1435	131	736	1400	123	960	360	90	147	990
15	356	411	1310	1675	350	2	1225	1800	1500	131	769	1600	116	960	312	78	158	1050
16	381	440	1310	1775	350	2	1225	1800	1500	131	769	1600	116	960	352	88	165	1105
17	407	470	1310	1875	350	2	1225	1800	1500	131	769	1800	116	960	400	100	171	1160

** Specified when the boiler is ordered*

5. APPLICATION

5.1 L.P.H.W. system

5.1.1 Water temperature

Maximum water temperature is 110°C (high limit thermostat).
Highest operating flow temperature is 95°C (control thermostat).
Minimum return water temperature is 20°C at a flow rate related to a Δt of 20°C (flow/return temperature).

5.1.2 Water pressure

Boiler sections pressure tested to 12 bar.
Maximum test pressure for the boiler block is 6 bar.
Minimum working pressure boiler is 0.8 bar at a maximum water temperature of 110°C or 0.3 bar at a maximum water temperature of 95°C.
Maximum working pressure boiler is 6 bar.

5.1.3 Water flow

The minimum water flow through the boiler is:

$$\frac{\text{Output boiler in kW}}{81} = \ldots \text{ m}^3/\text{h}$$

This minimum flow must be maintained for 5 minutes after the burner stops firing to avoid high temperature shut-down due to residuel heat gain. Due to the design and manufacture of the boiler no specific minimum water flow requirements exists other than for over-temperature protection.
The maximum water flow through the boiler is:

$$\frac{\text{Output in kW}}{9.3} = \ldots \text{ m}^3/\text{h}$$

5.1.4 Water treatment

Water treatment of all systems, but in particular open vented systems used with the remeha Gas 3c ECO, is considered necessary good practice in order to:

- avoid metallic corrosion within the system
- avoid sludge and scale information
- reduce to a minimum the risk of microbiological contamination of the system
- minimise chemical action and changes which take place over a period of time when system water is untreated.

The boiler contains an aluminium heat exchanger and the system will also contain a variety of metals. Ferrous metals - cast iron and steel, and non-ferrous metals - copper, brass and gunmetal, may be present, so it is essential that treatment is suitable for all of them.
Suitable chemicals and the extent of treatment should be discussed with specialist manufacturers prior to any work commencing. The specification of new systems must be carefully considered. The removal of debris, flux residue, grease, metal, swarf etc. from new systems, and any black magnetic iron oxide sludge and other corrosive residue from old systems is essential.

For information on water treatment we advise direct contact with either:

Fernox Manufacturing Company Ltd.
Britannia Works
Clavering
Essex, CB1L 4QZ
Tel No: 0179 9550811

or: Sentinal
Grace Dearborne Ltd
Foundry Lane
Widnes
Cheshire WA8 8UD
Tel No: 0151 4951861

5.2 Noise level

The noise level taken at a distance of 3 m around the boiler depending on boiler room construction is about 64 dBA.

5.3 Chimney/Flues

5.3.1 General

Consideration of flues for condensing appliances can conveniently be split between a flue dilution system and other types of flue.
Please contact our technical department for advice.

5.3.2 Fan

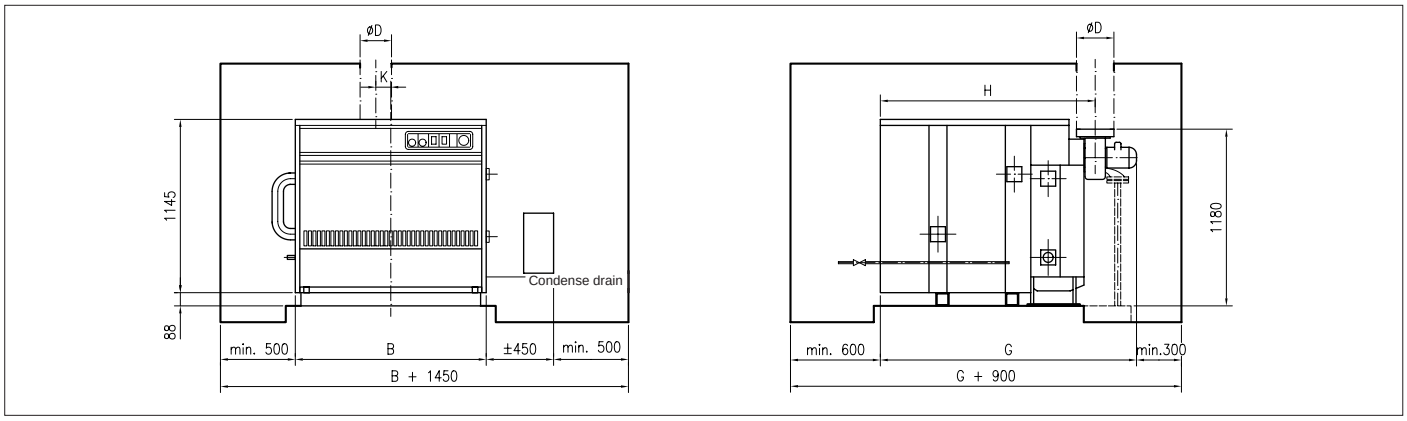
At I.D. Fan is supplied with each boiler, this has been designed to overcome the added resistance through the heat exchanger and exhaust the combustion gasses through the relatively cold flues.

5.3.3 Safety equipment

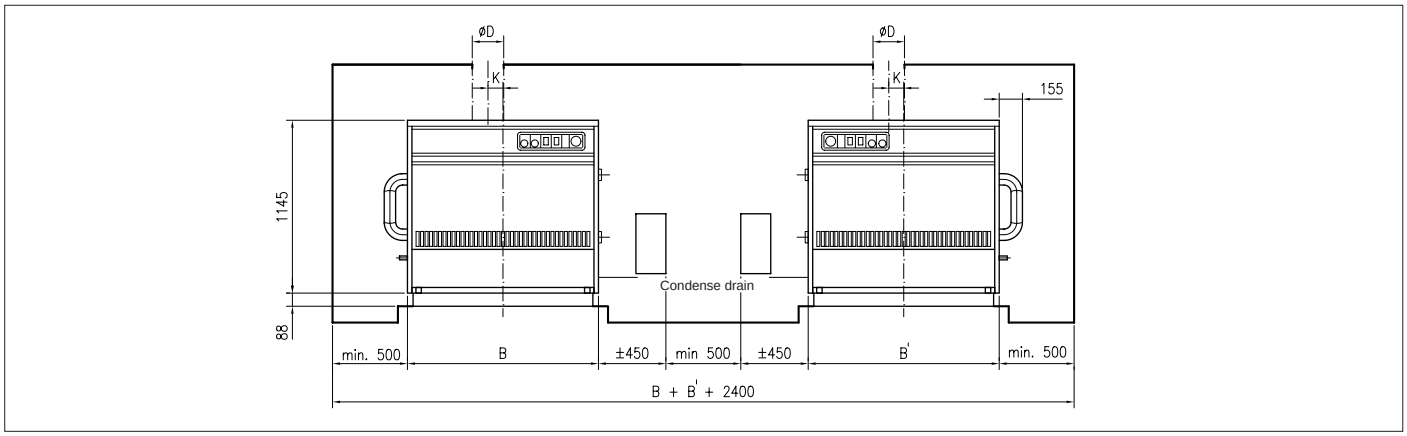
An air pressure switch checks the correct functioning of the flue fan.

6. TYPICAL BOILER INSTALLATIONS

Installation 1
One boiler in boiler room



Installation 2
Two boilers in boiler room



Installation 3
Two boilers in boiler room back to back

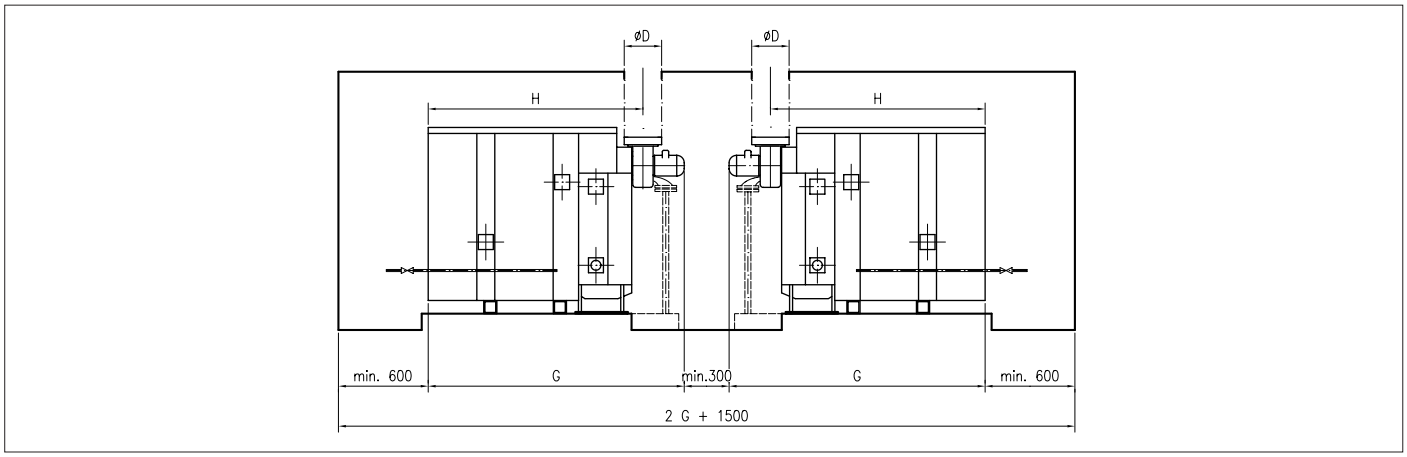


Fig. 03 Boiler installations

		Number of sections												
		5	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
Dimensions (mm)	**B**	675	775	875	975	1075	1175	1275	1375	1475	1575	1675	1775	1875
	Ø D	200/250*	200/250*	200/250*	200/250*	200/250	200/250	200/250	300	300	300	350	350	350
	G	1710*	1710*	1710*	1710*	1710	1710	1710	1737	1737	1737	1800	1800	1800
	H	1435*	1435*	1435*	1435*	1435	1435	1435	1435	1435	1435	1498	1498	1498
	K	107*	107*	107*	107*	107	107	107	131	131	131	131	131	131

** Specified when the boiler is ordered*

7. CONTROL AND SAFETY EQUIPMENT

7.1 General

The remeha Gas 3c ECO is supplied with electronic control and safety equipment, with ionisation flame detection.

7.2 Instrument panel

The remeha Gas 3c ECO is supplied with an instrument panel and it is fitted in the front of the boiler, either left or right. The panel can be delivered in a simple and a complete version. The instrument panel consists of modules. The modules contain all the necessary control and measuring instruments required to control the boiler.
All connections are pre-wired and have male connectors. The capillary from the control panel should be fitted in the pocket of the boiler, which is located in the top front of the sections. The instrument panel, pocket and the flow should be always fitted to the same side of the boiler either left or right and standard on the same side as the gas train**.

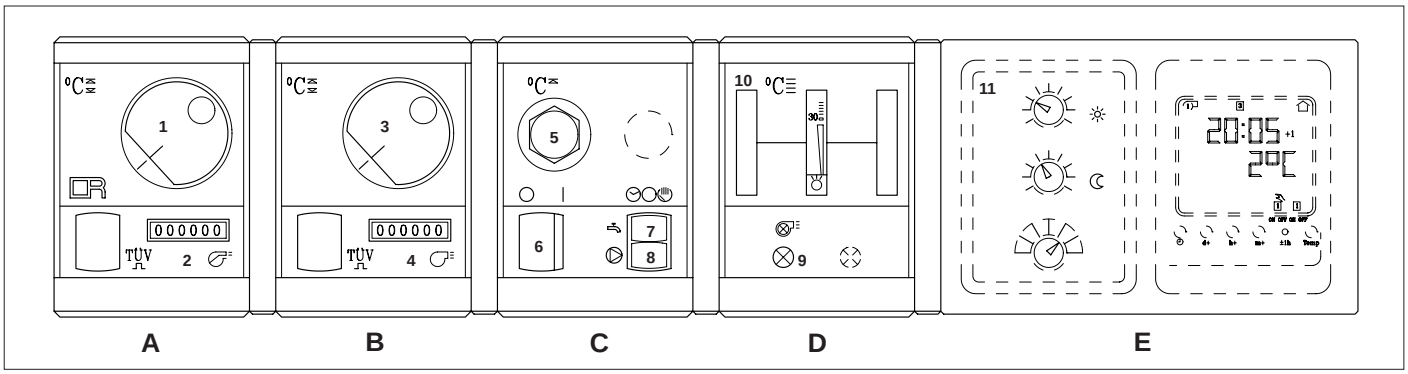


Fig. 04 Instrument panel

The modules contain:

Module A

1. Control thermostat
   Setting between 35°C-95°C
2. Hour run meter total running hours*

Module B

3. High-Low thermostat (not connected)*
   Setting between 35°C-95°C
4. Hours run meter counter full load hours*

Module C

5. High-limit thermostat 110°C
6. Operating switch (On/Off) with optical display*
7. Switch for circulating pump*
   Manual/Off/Automatic
8. Switch for domestic hot water storage pump*
   Manual/Off/Automatic

Module D

9. Analogue thermometer (water temperature)
10. Central warning light*

Module E

11. Facility for incorporating ***rematic***® weather compensator*

** Absent in the simple instrument panel.*

*** On request extension cables can be delivered, so that the gas train can be fitted on the opposite side to the instrument panel, thermostat pocket and the flow.*

7.3 Standard electronic gas train

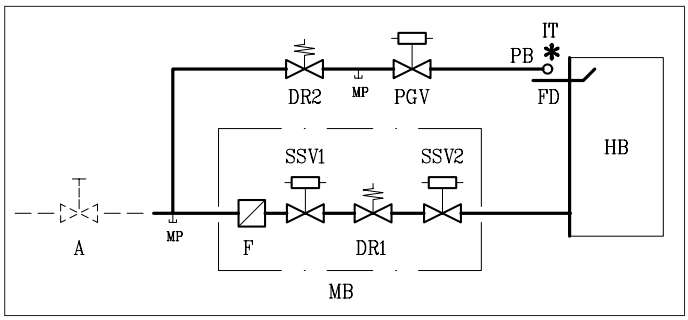


Fig. 05 5-12 sections

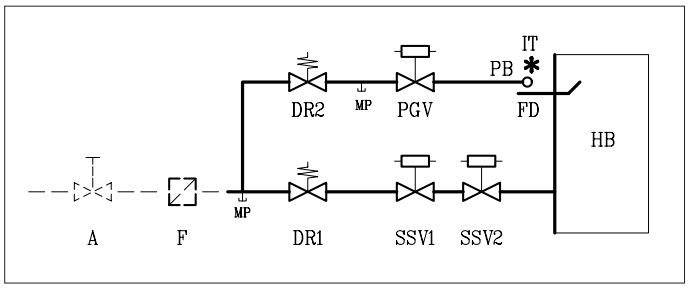


Fig. 06 13-17 sections

Legend

A	*Gas cock*
PB	*Pilot burner*
DR	*Gas governor*
F	*Gas filter*
HB	*Main gas burner*
PGV	*Pilot gas valve*
MP	*Measuring point*
SSV	*Safety valve*
IT	*Ignition electrode*
FD	*Ionisation probe*
MB	*Multibloc*
- - - -	*Not supplied*

7.3.1 Specification

1 Gas multibloc (5-12 sections)
2 Safety gas valves (13-17 sections)
1 Gas governor (13-17 sections)
1 Pilot gas valve
1 Pilot gas governor
1 Ignition transformer 5 kV
1 Pilot burner with ionisation probe

7.3.2 Control panel on gas train

1 Main switch
1 Control box Satronic
1 Fuse, Brusk
5 Signal lamps

7.4 Functions

7.4.1 Flame protection (lock out)

Moniterers by ionisation flame detection

7.4.2 Thermostats

Control thermostat On/Off, T&G 35-95°C.
High Limit lock out at 110°C.

7.4.3 Air-pressure switch (lock out)

An air pressure switch checks the function of the flue fan. If a failure is detected the boiler is shut down.

8. ASSEMBLY AND INSTALLATION GUIDELINES

8.1 General
Boiler can be installed in open or closed systems.

8.2 Boiler assembly
Broag provides special tools, on loan, for the boiler assembly with detailed building instructions. However, building supervision and/or actual boiler erection services can be provided by Broag or an approved boiler erection engineer.

8.3 Water connections
The boiler water connections can be fitted on one side of the boiler either left or right hand side. The return is fitted as standard on the left-hand side of the boiler (view from the front). The return can be fitted on the right; this must be clearly specified when the boiler is ordered.
The water connection is flanged on the boiler with a pipe connection for welding Ø 70 mm to the installation.
The top blind-flange has an integral cast 1" tapping to accept a safety valve. The end sections have a 3/4" tapping to accept a drain off cock (Tapping BSP). The economiser has at the bottom a 1/2" tapping for a drain off cock.

8.4 Pocket for instrument panel
The pocket should be fitted in the top front end section of the boiler and at that side of the boiler where the gas train is fitted. Other end section tapping 1" should be plugged.

8.5 Water pressure
Each section is hydraulically tested to at least 12 bar.
Maximum test pressure for the assembled boiler block is 6 bar.
Maximum working pressure is 6 bar.
Minimum working pressure is 0.8 bar at a maximum working temperature of 110°C or 0.3 bar at a maximum working temperature of 95°C.

8.6 Condensate drain
A drain pipe with ext. dia. 32 mm can be secured with adhesive to the siphon trap.
The liquid condensate produced by condensing boilers must be led away via a pipe to a drain for disposal. This pipe may be separate from the flue system and incorporate a water- sealed trap allowing condensate to pass but preventing the escape of flue gases.

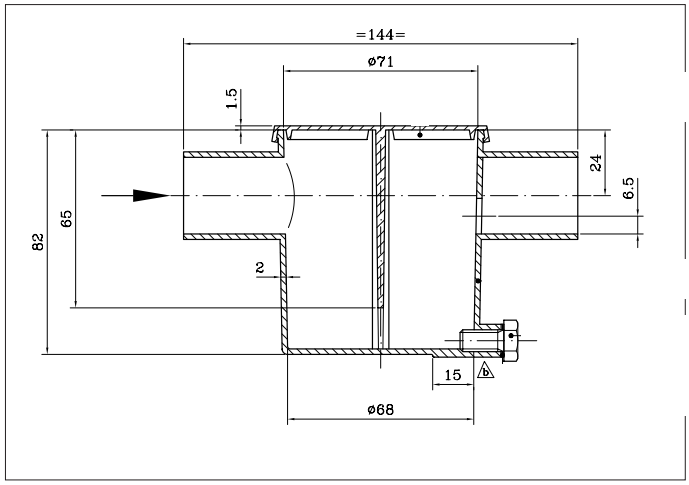


Fig. 07 Siphon trap dimensions

9. GAS SUPPLY

9.1 General
The gas train can be fitted on the left or right hand side of the boiler but is normally positioned on the same side as the instrument panel is fitted*.
The local Gas authority should be consulted to ensure that an adequate pressure and supply is available, at the boilers maximum output. To minimise risk of sediment or foreign particles entering the control valves, an approved filter may be fitted into the pipework downstream. The gas supply should be conform to the British Gas safety regulations.

9.2 Gas pressure
Maximum gas pressure at inlet 100 mbar.
(Minimum 20 mbar).
Burner pressure: 12.3 mbar.

* *On request extension cables can be delivered, so that the gas train can be fitted on the opposite side to the instrument panel, thermostat pocket and the flow.*

10. ELECTRIC SUPPLY

10.1 General
The electrical installation must conform to the IEE Regulations and also to Local Authority Requirements.

10.2 Control panel
A control panel is fitted on the gas train.

10.3 Electric connections
The boiler is pre-wired. Only the mains supply should be connected to the control panel.

10.4 Electric data
Main supply: 240 V-50 Hz (L/N)
Installed fuse: 6 Amp.
Running current:

Number of sections	W
5	500
6	500
7	500
8	500
9	600
10	600
11	600
12	800
13	800
14	800
15	800
16	800
17	800

10.5 Wiring diagram for the instrument panel

10.5.1 Simple instrument panel

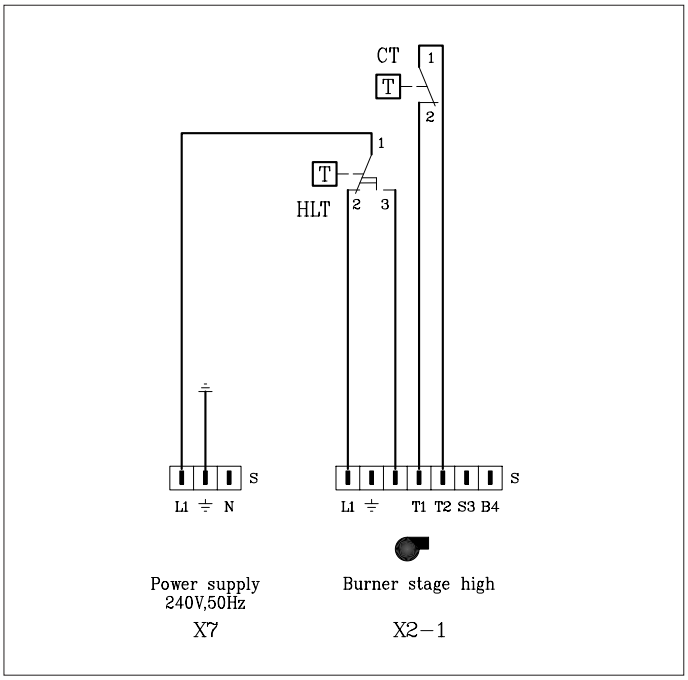
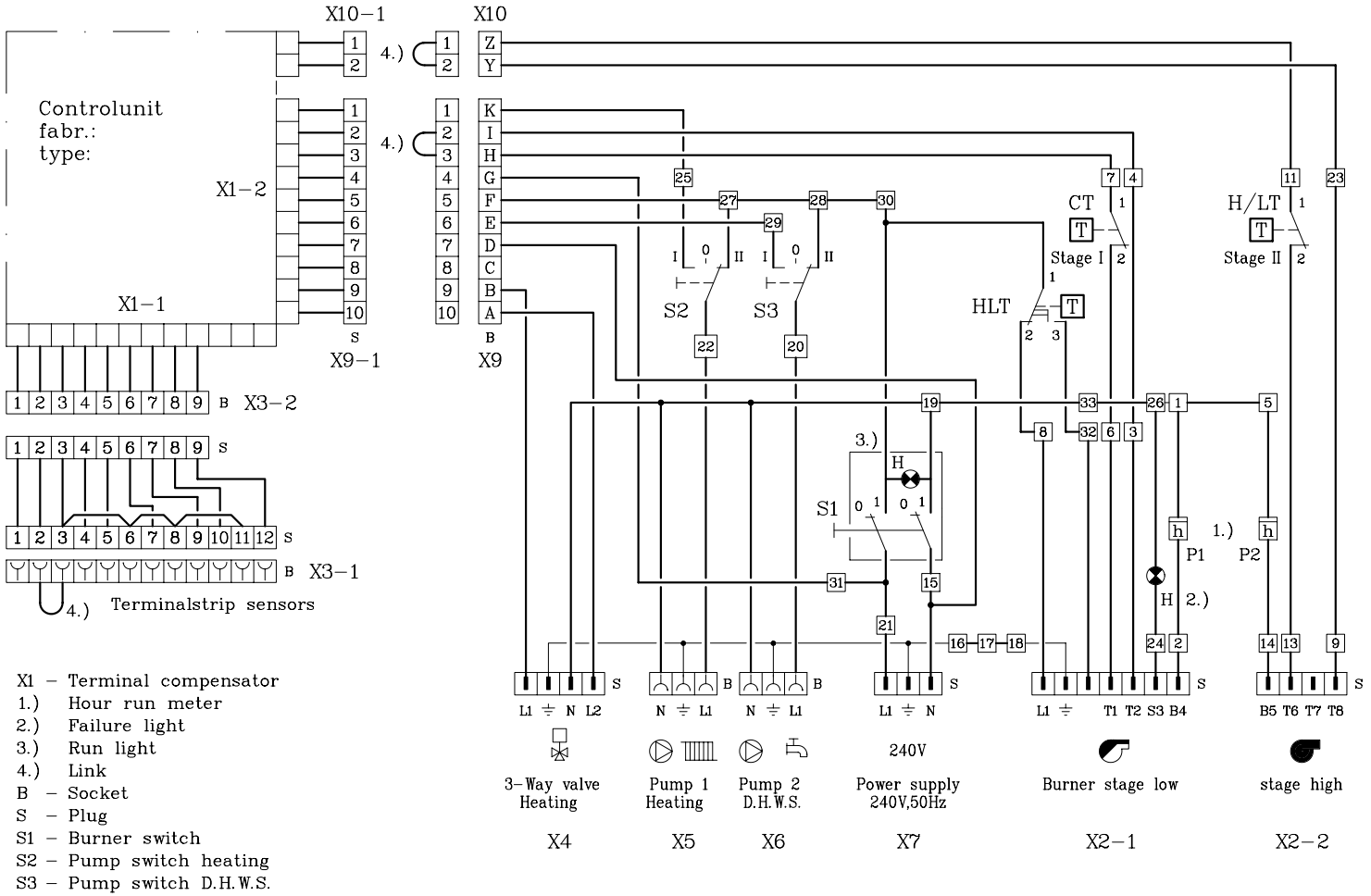


Fig. 08 Simple instrument panel

Legend
CT Control thermostat
HLT High limit thermostat
S Plug
Connector



X1 – Terminal compensator
1.) Hour run meter
2.) Failure light
3.) Run light
4.) Link
B – Socket
S – Plug
S1 – Burner switch
S2 – Pump switch heating
S3 – Pump switch D.H.W.S.

Fig. 09 Complete instrument panel

Legend			
CT	Control thermostat	LD2	Air-pressure switch
DK	Reset button	MB	Multi bloc
F	Fuse	MS	Main switch
FD	Flame detector	PGV	Pilot gas valve
FF	Flue fan	SSV	Safety shut-off valve
H	Lock out/Operating-light	S1	Boiler switch
HLT	High limit thermostat	—(—	Connector
IT	Ignition transformator	O	Connection screws control box
		Ø	Connection screws control panel

10.6 Wiring diagram for the boiler

10.6.1 Complete wiring diagram for the boiler with simple instrument panel

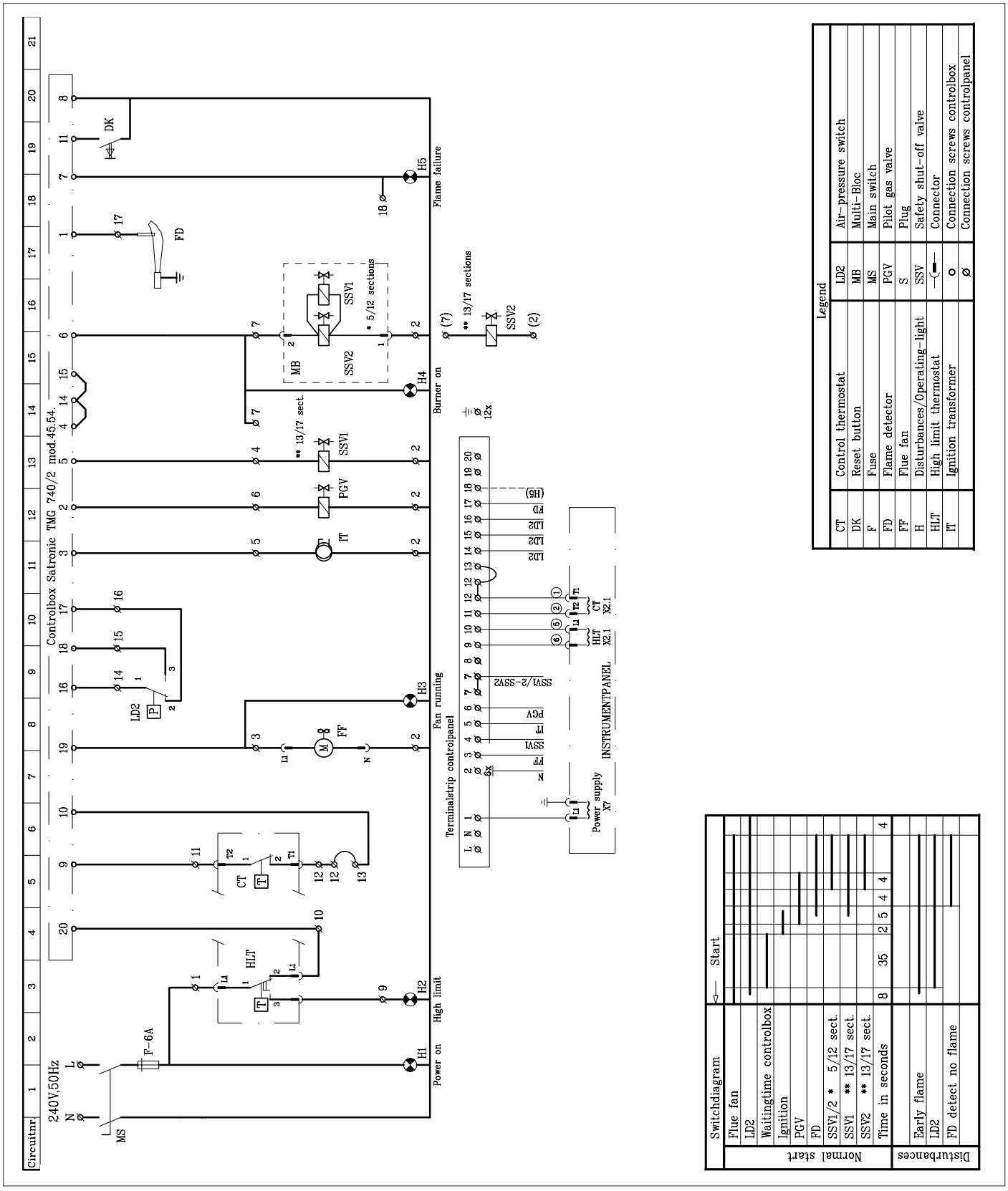


Fig. 10 Complete wiring diagram for the boiler with simple instrument panel

10.6.2 Complete wiring diagram for the boiler with complete instrument panel

(High/Low thermostat will not be used)

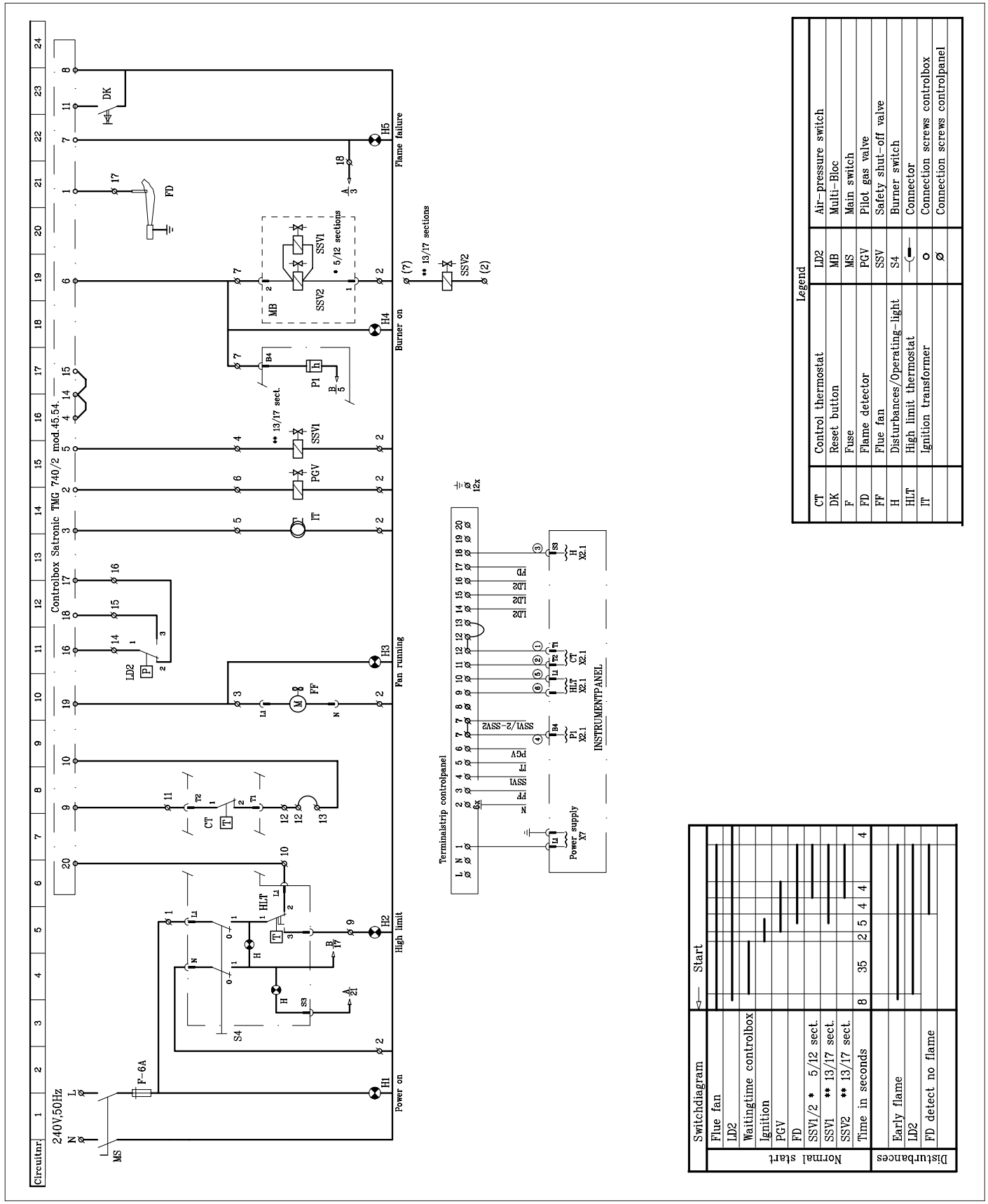


Fig. 11 Complete wiring diagram for the boiler with complete instrument panel

11. COMMISIONING

11.1 Technical information

Control box	: Satronic TMG 740/2 mod. 45.54.
Main supply	: 240 V-50 Hz.
Minimum ionisation current	: 7 µA.
Reaction time flame protection	: 1 sec.
Safety time	: 5 sec.
Maximum ambient temperature	: 60°C.
Injector size pilot burner	: Ø 0.8 mm.
Injector size main burner	: Ø 4.4 mm.
Burner pressure full load	: 12.3 mbar.
Pilot burner pressure	: 13 mbar

11.2 Commissioning

1. Check gas connections.
2. Check electrical supply (L/N and earth).
   The control box operates on a neutral/phase supply.
3. Check water connections and release the air out of the ECO and boiler. Fill the syphon with water.
4. Switch on circulation pump and check rotation direction.
5. Open main gas cock (release air in gas pipe work).
6. Switch on electrical supply.
7. Check rotation direction of the flue fan.
8. Set the control thermostat at about 85°C.
9. Adjust the sliding air inlet (see table).
10. After a waiting time of about 43 seconds you will get ignition. At a minimum ionisation current of 7 µA the safety gas valve will open and the pilot gas valve will close after about 15 seconds. The boiler is on.
11. Let the boiler run for a couple of minutes to get rid of air in the gas pipe.
12. Set the correct burner pressure.
13. Optimal combustion efficiency can be obtained by adjusting the plate on the rear of the economiser so that a CO_2 of 7-8% is obtained at a minimum return water temperature of 60°C.
14. Check that the thermostats are locked in position.
15. Check for flame protection by starting the boiler with ionisation probe disconnected.
16. Check the operation of the air-pressure switch.

11.3 Switch off the boiler

1. Switch off the electric supply.
2. Turn off the gas cock.

Number of sections	Setting 'h' in mm	Flue Fan	Fan power in kW
5	34	E 05-S972- 4mF	0.13
6	24	E 05-S972- 4mF	0.13
7	21	E 05-S976- 3mF	0.24
8	27	E 05-S976- 3mF	0.24
9	68	E 06-S972- 6mF	0.30
10	63	E 06-S972- 6mF	0.30
11	43	E 06-S972- 6mF	0.30
12	103	E 064-S972- 10mF	0.63
13	90	E 064-S972- 10mF	0.63
14	86	E 064-S972- 10mF	0.63
15	60	E 064-S972- 10mF	0.63
16	62	E 064-S972- 10mF	0.63
17	65	E 064-S972- 10mF	0.63

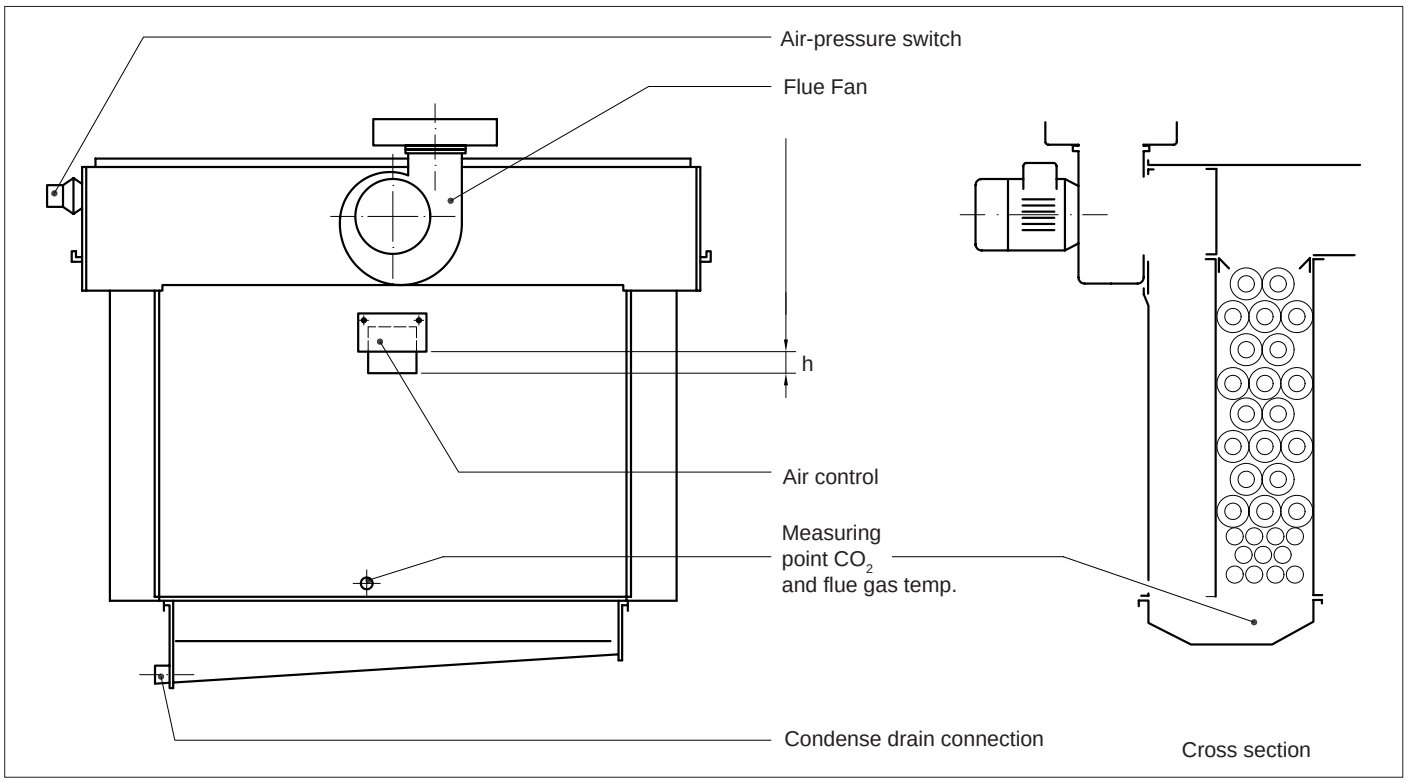


Fig. 12 Rear view of 'ECO'

12. MAINTENANCE

12.1 General

It is essential for a good combustion, to clean the boiler, the gas train and boiler room once a year.

12.2 Maintenance instructions

1. Clean the internal flue ways of the boiler (cast iron sections) with a steel cleaning brush (available from Broag). Remove top casing and the top of the flue hood.
2. Clean (if necessary) the aluminium economiser. If it is not too dirty (normal deposition of dust) it is best be cleaned with water, which can be hosed into the top of the economiser. This water can be drained down through the condensate drain. If it is badly fouled, it should be cleaned by using the nylon cleaning brush. In that case, remove the rear panel and then the intermediate panel. Clean the aluminium pipes using the special **nylon** cleaning brush (available from Broag). Clean the condensate collector. **Never use the nylon brush for the cast iron sections and the economiser.**
3. Remove the lit of the siphon trap and clean it.
4. Clean the burners internally and externally.
5. Clean the floor underneath the boiler and boiler room.
6. Clean boiler casings.
7. Clean the gas train, ignition, pilot burner, thermostats and wiring.
8. Check start program, ignition time and safety times.
9. Check flame protection and thermostats.
10. Check boiler input.
11. Check the combustion efficiency.
12. Check the boiler and installation for water leakage (seals).
13. Check gas train and gas pipe for gas leakage.

broag

ISO 9001
since 1988

Broag Ltd.
Head office
Remeha House,
Molly Millars Lane,
Wokingham,
Berkshire RG 41 2QP
Tel. 0118 9783434
Fax 0118 9786977

Branch office
Unit 3, Kestrel Close,
Quarry Hill Ind. Estate
Ilkeston,
Derbyshire DE7 4RD
Tel. 0115 9440778
Fax 0115 9440588

Subject to alterations
Art.nr. 50.455/1000/06.96/Bo.

broag

remeha Gas 3d Technical information

Atmospheric gas boiler with *reminox*® Low NOx burners

90 - 360 kW

CE

remeha
CLEAN HEAT

CONTENTS

PREFACE

These technical instructions contain useful and important information for the proper operation and maintenance of the remeha model Gas 3d central heating boiler.
Furthermore, important instructions are given to prevent accidents and serious damage before commissioning and during operation of the boiler, to ensure safe and trouble free boiler operation. Read these instructions carefully before putting the boiler into operation, familiarize yourself with its operation and control and strictly observe the instructions given.

If you have any questions, or if you need more information about specific subjects relating to this boiler, please do not hesitate to contact us.
The data published in these technical instructions is based on the latest information and is subject to revisions. We reserve the right to modify the construction and/or design of our products at any moment, without being obliged to adjust earlier supplies accordingly.

1. BOILER DESCRIPTION

The remeha Gas 3d boiler is a cast iron sectional boiler with atmospheric burners.
Suitable for all qualities of natural gas, cat. I 2 H (20 mbar).
The boiler meets the requirements of the CE regulations at the following directives:
- Gas appliance directive no. 90/396/EEC
- Efficiency directive no. 90/42/EEC
- Electrical low voltage directive no. 73/23/EEC
- Machinery directive no. 89/392/EEC
- E.M.C. directive no. 89/336/EEC.

Classification type for evacuation of the combustion products: B11 BS.
For further advice or information contact Broag Ltd.

The remeha Gas 3d is supplied with electronic ignition and insulated casings.
Water connections: Ø 70 mm int.

2. CONSTRUCTION

2.1 General
- Boiler block of cast iron sections are joined together with conical nipples.
- Gas train and water connections can be fitted on either side of the boiler.
  The gas train should as standard always be fitted on the same side as the instrumental panel, thermostat pocket and the flow*.
- Instrument panel is fitted in the front casing.
- Cleaning of the cast iron block from top of the boiler.

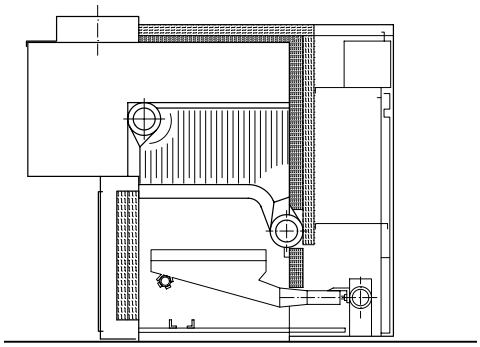
2.2 Burners
The burners are cast iron, atmospheric ***reminox***®-burners. They guarantee a low noise level and a low NOx-emission.

2.3 Boiler base
The Broag remeha Gas 3d boiler is supplied as standard with reflecting floor plates with ventilation underneath.

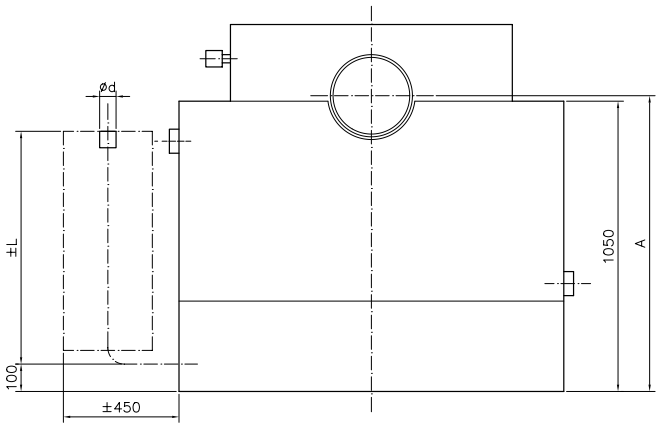
2.4 Assembly
The boiler must be assembled on site.

** On request extension cables can be delivered, so that the gas train can be fitted on the opposite side to the instrument panel, thermostat pocket and the flow.*

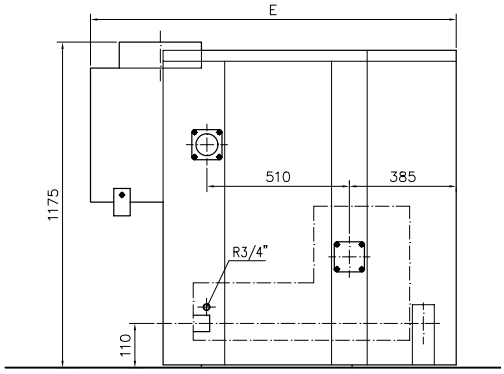
3. TECHNICAL INFORMATION AND DIMENSIONS



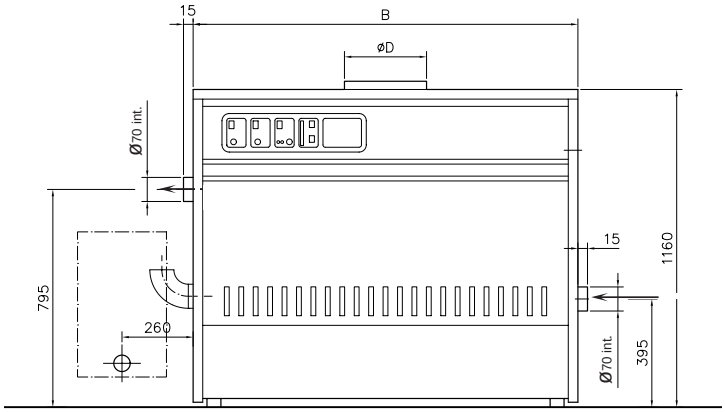
Cross section



Top view



Left hand side view



Front view

Fig. 01 View figures

Number of sections	Output	Input GCV	Dimensions						Water resistance		Water contents	Boiler weight dry	Mass flue rate
			A	B	Ø D	Ø d	E	±L	Δt = 10°C	Δt = 20°C			
	kW	kW	mm	mm	mm	"	mm	mm	mbar	mbar	l	kg	kg/h
5	90	111	1015	675	200	1"	1220	670	16	4	51	425	211
6	113	139	1015	775	200	1"	1220	670	24	6	58	490	264
7	135	167	1040	875	200	1"	1220	670	32	8	65	555	316
8	158	194	1040	975	250	1"	1220	670	40	10	71	620	369
9	180	222	1040	1075	250	1 1/4"	1220	700	52	13	78	685	422
10	203	250	1040	1175	250	1 1/4"	1220	700	64	16	85	755	475
11	225	279	1065	1275	300	1 1/4"	1320	700	80	20	91	820	527
12	248	306	1065	1375	300	1 1/4"	1320	700	100	25	98	885	580
13	270	333	1065	1475	300	1 1/2"	1320	1030	120	30	105	950	633
14	293	361	1065	1575	300	1 1/2"	1320	1030	140	35	111	1020	685
15	315	389	1090	1675	350	1 1/2"	1320	1030	160	40	118	1085	738
16	338	417	1090	1775	350	1 1/2"	1320	1030	184	46	125	1150	791
17	360		1090	1875	350	1 1/2"	1320	1030	208	52	131	1215	844

4. APPLICATION

4.1 L.P.H.W. system

4.1.1 Water temperature
Maximum water temperature is 110°C (high limit thermostat).
Highest boiler water temperature is 95°C (control thermostat).
Minimum return water temperature is 20°C at a flow rate related at a Δt of 20°C (flow/return temperature).

4.1.2 Water pressure
Boiler sections pressure test at 12 bar.
Maximum pressure test for the boiler block is 6 bar.
Minimum working pressure boiler is 0.8 bar.
Maximum working pressure is 6 bar.

4.1.3 Water flow
The minimum water flow through the boiler is:

$$\frac{\text{Output boiler in kW}}{93} = \ldots \text{ m}^3/\text{h}$$

This minimum flow must be maintained for 5 minutes after the burner stops firing to avoid high temperature shutdown due to residuel heat gain.
Due to the design and manufacture of the boiler no specific minimum water flow requirement exists other than for high-temperature protection.

4.1.4 Water treatment
Water treatment under normal circumstances is not necessary (see our water quality recommendations).

4.1.5 Noise level
The noise level measured around the boiler depending on boiler room construction is about 50 dBA.
(Noise level taken at 1 meter from the boiler)

4.2 Chimneys
The average flue gas temperature is so low that the chimney must be in accordance with the guidelines of British Gas and BS 6644.

4.3 Installation standards
The following instructions must be adhered to when the remeha Gas 3d is installed:
Gas safety (installation and use) Regulations 1984 (as amended).
All gas appliances must, by law, be installed by competent persons (e.g. Corgi) in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution.
It is in your own interest and that of safety to ensure that the law is complied with.
In addition to the above regulations, this appliance must be installed in compliance with the current I.E.E. Regulations for electrical installation, local building regulations, the Building Standards (Scotland), Consolidation Regulations and bye laws of the local water undertaking and Health and Safety Document No. 635 'The Electricity at Work Regulations 1989'. It should also be in accordance with the relevant recommendations in the current editions of the following British Standards and Codes of Practice, viz.
BS 5540 Pt 1 and 2, BS 5449, BS 5546, BS 6798, BS 6891 and BG.DM2.

Important:
The remeha Gas 3d is a certified appliance and must not be modified or installed in any way contrary to these 'Installation and Servicing Instructions'.
Manufacturers instructions must NOT be taken in any way as overriding statutory obligations.

5. TYPICAL BOILER INSTALLATIONS

One boiler in boiler room

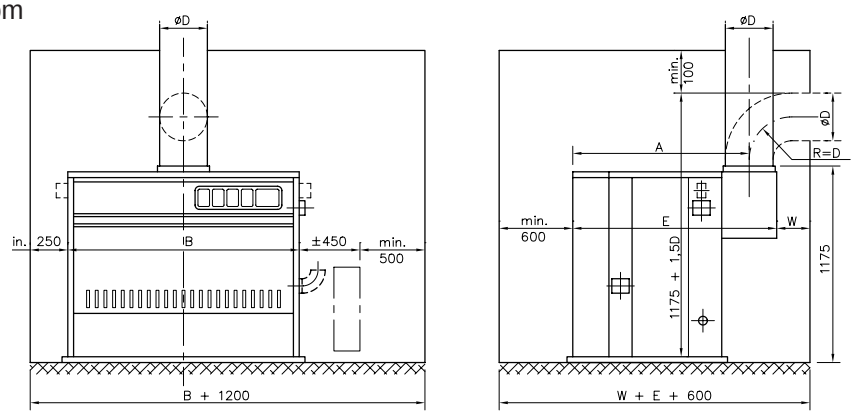


Fig. 02 Installation 1

Two boilers in boiler room

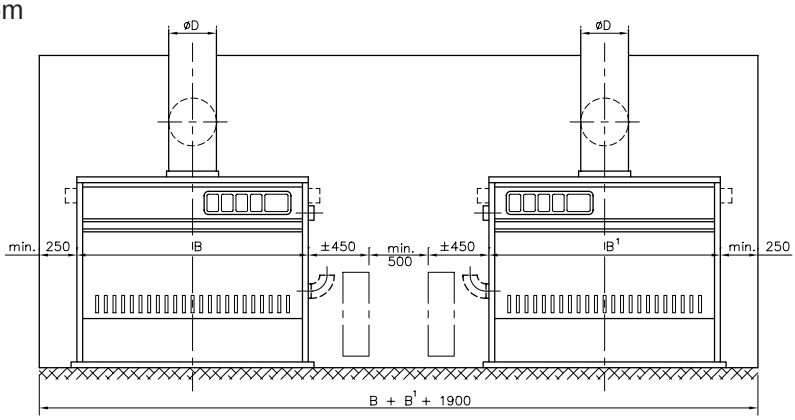


Fig. 03 Installation 2

Two boilers in boiler room
back to back

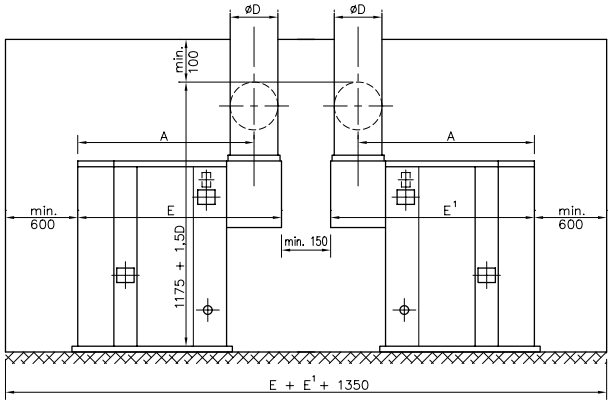


Fig. 04 Installation 3

		Number of sections												
		5	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
Dimensions (mm)	**A**	1015	1015	1040	1040	1040	1040	1065	1065	1065	1065	1090	1090	1090
	B	675	775	875	975	1075	1175	1275	1375	1475	1575	1675	1775	1875
	Ø D	200	200	200	250	250	250	300	300	300	300	350	350	350
	E	1220	1220	1220	1220	1220	1220	1320	1320	1320	1320	1320	1320	1320

6. REGULATION AND SAFETY EQUIPMENT

6.1 General

The remeha Gas 3d is supplied with electronic control and safety equipment with UV flame detection.

6.2 Instrument panel

The remeha Gas 3d is supplied with an instrument panel that is fitted in the front of the boiler, either left or right. The instrument panel can be delivered in two models:

- simple instrument panel High/Low;
- complete instrument panel High/Low.

All connections are pre-wired and fitted with plugs. The capillaries from the control panel should be fitted in the pocket of the boiler, wich is fitted in the top front of the end section.

The instument panel, pocket and the flow should always be fitted at one side of the boiler either left or right and standard on the same side as the gas train.**

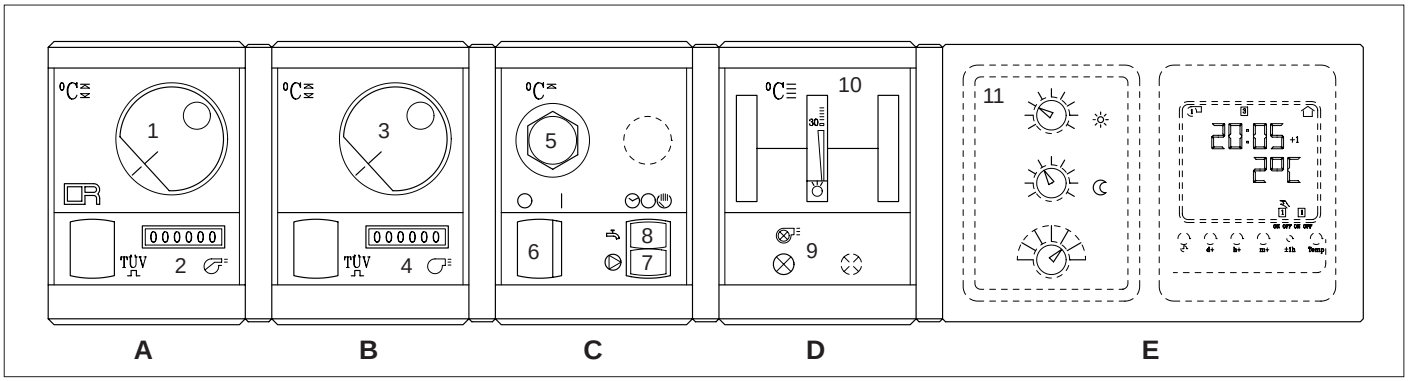


Fig. 05 Layout of the complete instrument panel

The modules contain:

Module A

1. Control thermostat
   Setting between 35°-95°C
2. Hour run meter total running hours*

Module B

3. High-Low thermostat
   Setting between 35°-95°C
4. Hour run meter full load*

Module C

5. High-limit thermostat 110°C (locking)
6. Operating switch (On/Off with optical display)*
7. Switch for circulating pump*
   Manual/Off/Automatic
8. Switch for domestic hot water storage pump*
   Manual/Off/Automatic

Module D

9. Warning light*
10. Analogue thermometer water temperature

Module E

11. Option for ***rematic***® weather compensating boiler control*

* *Absent in simple instrument panel High/Low*

** *On request extension cables can be delivered, so that the gas train can be fitted on the opposite side to the instrument panel, thermostat pocket and the flow.*

6.3 Standard electronic gas train High/Low

6.3.1 Schematic

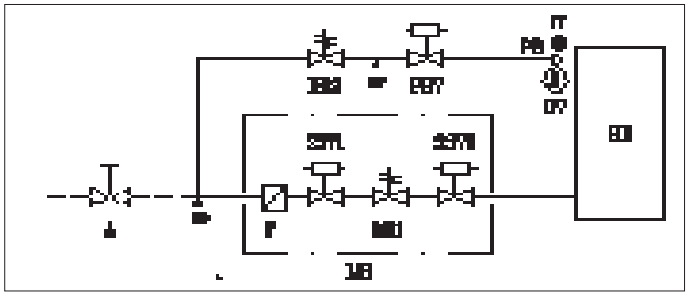


Fig. 06 5-12 sections

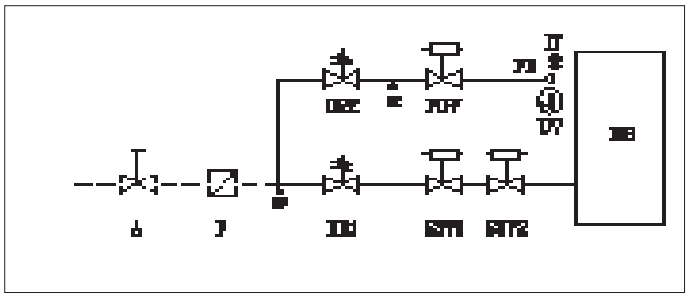


Fig. 07 13-17 sections

Legend

A Gas cock
PB Pilot burner
DR Gas governor
F Gas filter
HB Main gas burners
MB Gas multibloc
IT Ignition transformer
PGV Pilot gas valve
MP Measuring point
SSV Safety shut-off valve
UV UV diode
- - - - Not supplied

6.3.2 Specification

1 Gas multiloc (5-12 sections)
2 Safety shut off valves
1 Gas governor
1 Gas filter
2 Safety shut off valves (13-17 sections)
1 Gas governor
1 Pilot gas valve
1 Ignition transformer 5 kV
1 Pilot burner with UV protection

6.3.3 Control panel on gas train

1 Main switch
1 Control box Landis & Gyr
1 Fuse, brusk
1 Signal lamp

6.4 Functions

6.4.1 Flame protection

Flame protection by means of UV flame detection.

6.4.2 Down draught thermostat

The boiler is fitted with a down draught thermostat.
If there is down draught the thermostat will switch off the boiler. Fixed setpoint is 70°C.

6.4.3 Thermostats

Control thermostat On/Off 35°-95°C.
Control thermostat High/Low 35°-95°C.
High-limit thermostat locks out at 110°C.

7. ASSEMBLY AND INSTALLATION GUIDELINES

7.1 General
The boiler is suitable for operating at a maximum working pressure of 6 bar and a minimum pressure of 0.8 bar. Boiler can be installed in open or closed systems.

7.2 Boiler assembly
Broag provides special tools on loan, for the boiler assembly with detailed building instructions. However, building supervision and/or actual boiler erection services can be provided by Broag or an approved boiler erection engineer.

7.3 Water connections
The boiler water connections can be fitted on either side of the boiler.
The water connection is flanged on the boiler with a pipe connection for welding Ø 70 mm to the installation.
The top blind-flange has an integral cast 1" tapping to accept a safety valve. The end sections have a $^{3}/_{4}$" tapping to accept drain/off cocks (Tapping BSP).

7.4 Pocket for instrument panel
The pocket should be fitted in the top front end section of the boiler and at that side of the boiler where the gas train is fitted. Other end section tapping 1" should be sealed.

7.5 Water pressure
Each section is hydraulically tested to at least 12 bar.
Maximum test pressure for the assembled boiler block is 6 bar.
Operating pressure between 0.8 bar and 6 bar.

8. GAS SUPPLY

8.1 General
The gas train can be fitted on either side of the boiler but as standard is always fitted on the same side of the boiler instrument panel (fitted in the front casing).*
The local Gas authority should be consulted to ensure that an adequate pressure and supply is available at the boilers maximum output. To minimise risk of sediment or foreign particles entering the control valves, an approved filter may be fitted into the pipe work downstream.
The gas supply should be conform to the British Gas safety regulations.

8.2 Gas pressure
Maximum gas pressure at inlet 100 mbar.
Burner pressure:
- full load : 13.0 mbar (100%)
- part load : 4.7 mbar (60%)
- injector size : 2.9 mm Ø

* *On request extension cables can be delivered, so that the gas train can be fitted on the opposite side to the instrument panel, thermostat pocket and the flow.*

9. ELECTRICAL SUPPLY

9.1 General
The electrical installation must conform the IEE regulations and also to local authority requirements.

9.2 Control panel
A control panel is fitted on the gas train.

9.3 Electrical connections
The boiler is pre-wired. Only the main supply should be wired to this control panel.

9.4 Electrical data
Main supply: 240 V-50Hz (L/N).
Running current: 120 W.
Installed fuse: 6 Amp.

9.5 Wiring diagram for the instrument panel

9.5.1 Simple instrument panel

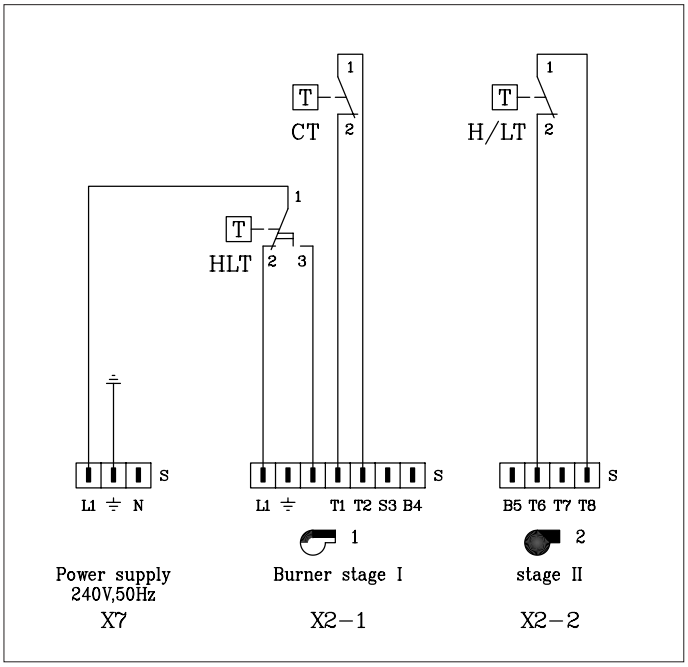


Fig. 08 Wiring diagram for the simple instrument panel

Legend

CT Control thermostat
HLT High limit thermostat
H/LT High/Low thermostat
S Plug
Connector

9.5.2 Complete instrument panel

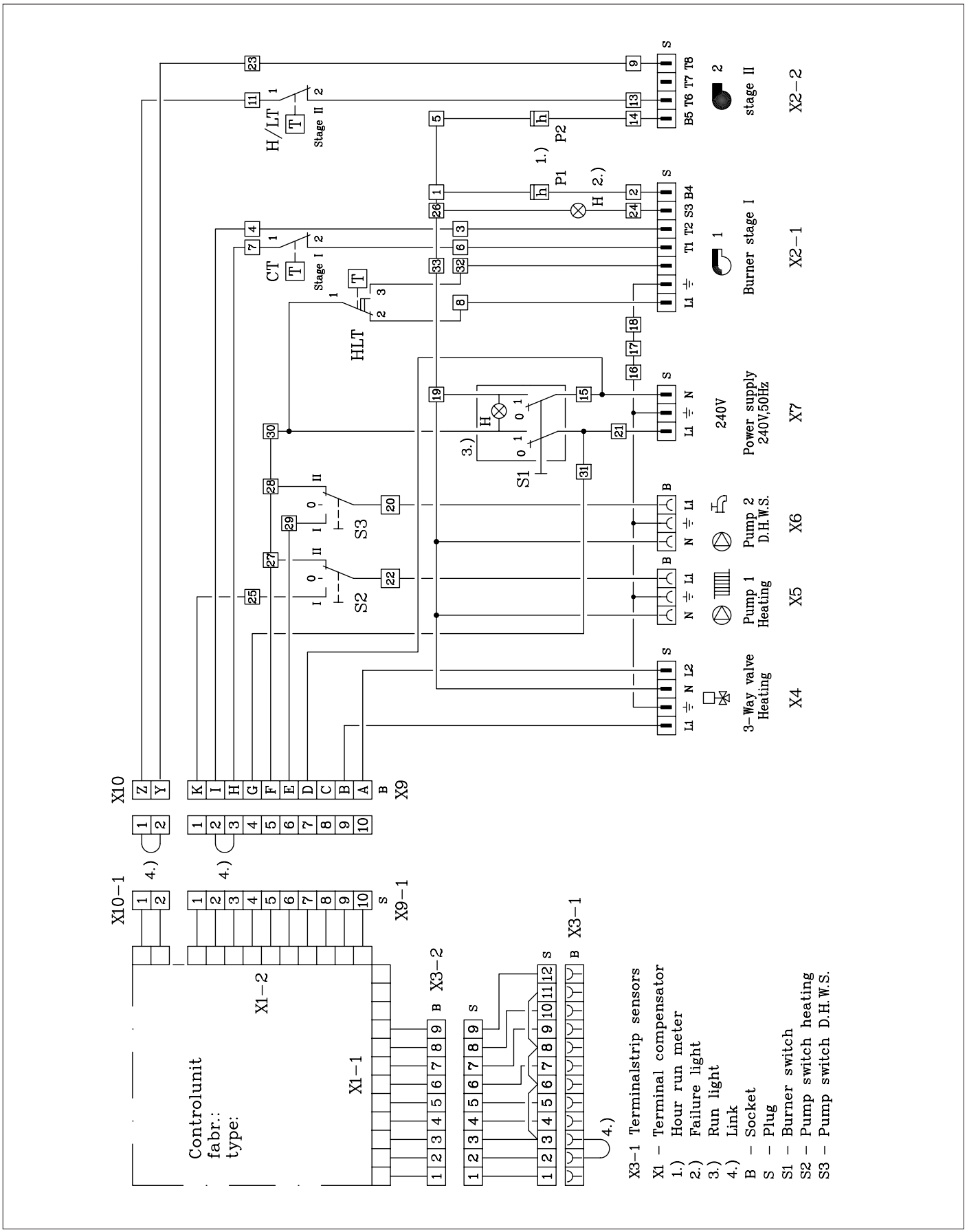


Fig. 09 Wiring diagram for the complete instrument panel

9.6 Wiring diagram boiler

9.6.1 Complete wiring diagram for the boiler with simple instrument panel

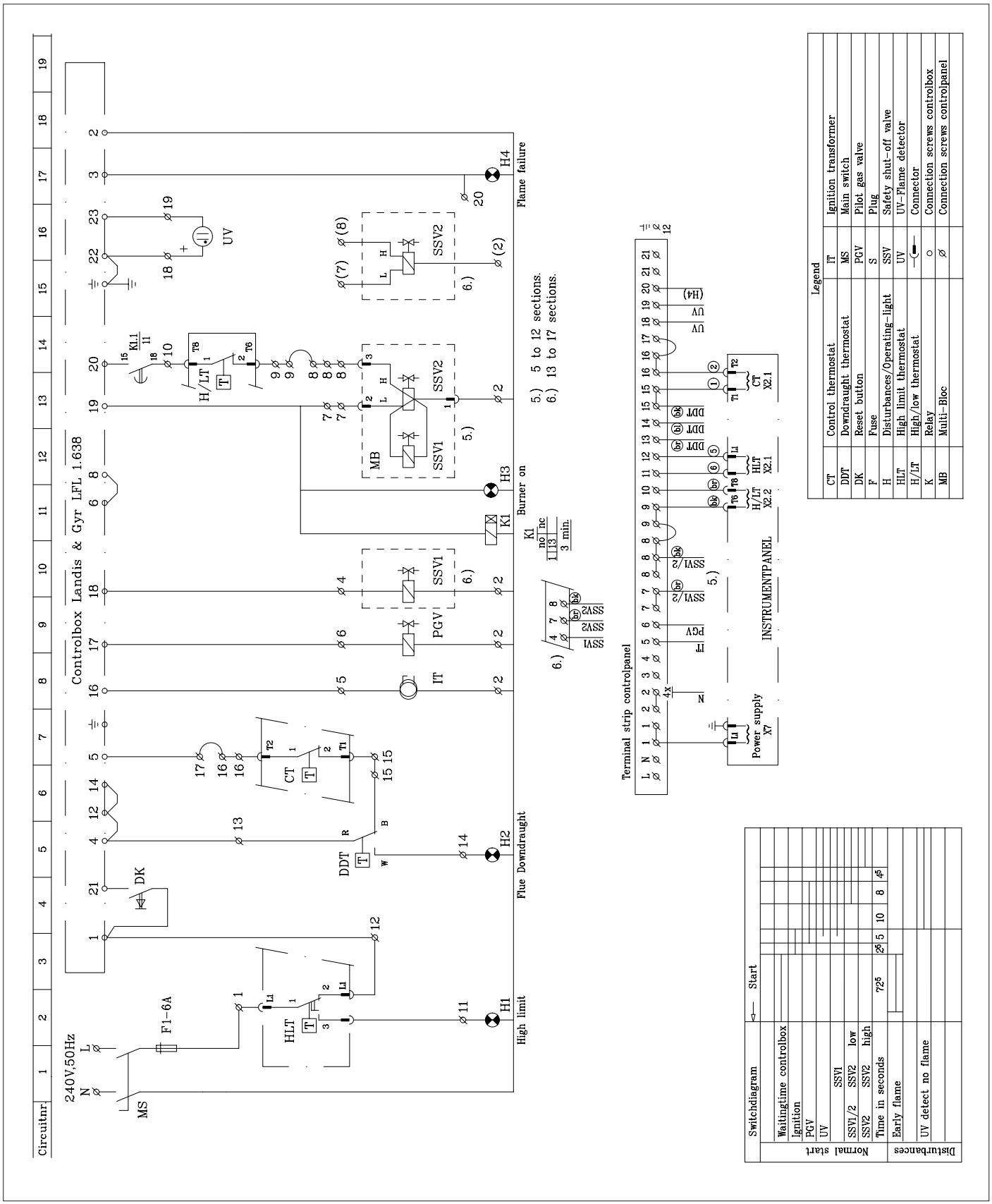
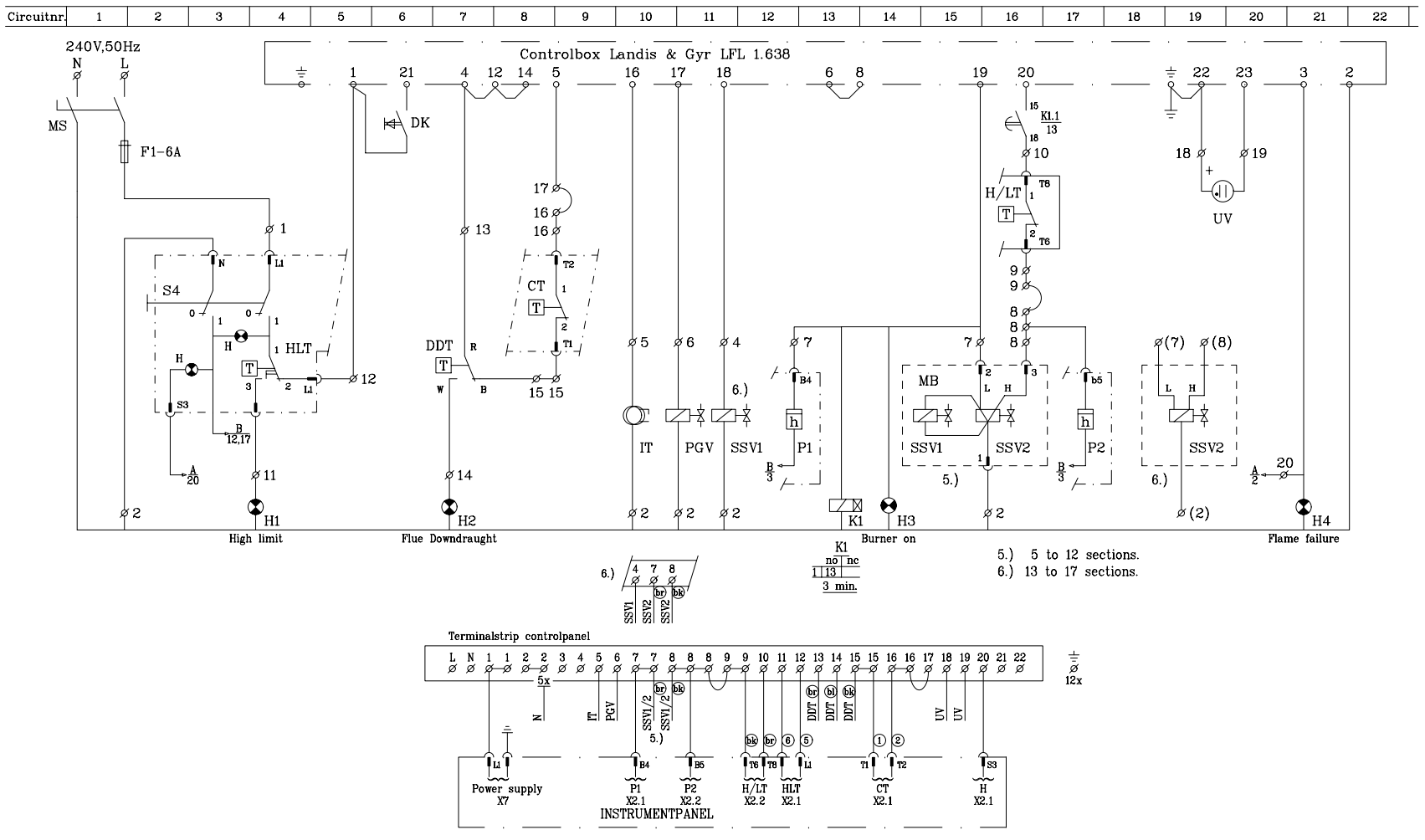


Fig. 10 Wiring diagram for the boiler with simple instrument panel



	Switchdiagram	Start						
Normal start	Waitingtime controlbox							
	Ignition							
	PGV							
	UV							
	SSV1							
	SSV1/2 SSV2 low							
	SSV2 SSV2 high							
	Time in seconds	72^5	2^5	5	10	8	4^5	
Disturbances	Early flame							
	UV detect no flame							

Legend			
CT	Control thermostat	MS	Main switch
DDT	Downdraught thermostat	P	Hour run meter
DK	Reset button	PGV	Pilot gas valve
F	Fuse	S4	Burner switch
H	Disturbances/Operating-light	SSV	Safety shut-off valve
HLT	High limit thermostat	UV	UV-Flame detector
H/LT	High/low thermostat	—⊂—	Connector
K	Relay	○	Connection screws controlbox
IT	Ignition transformer	⌀	Connection screws controlpanel
MB	Multi-Bloc		

Fig. 11 Wiring diagram for the boiler with complete instrument panel

10. COMMISSIONING

10.1 Technical information

Control box: Landis & Gyr typ LFL 1.638.
Main supply: 240 V-50 Hz.
Minimum UV current: 100 μA.
Reaction time flame protection: 1 sec.
Safety time: 5 sec.
Maximum ambient temperature: 60°C.
Injector size pilot burner: Ø 0.8 mm.
Injector size main burner: Ø 2.9 mm.
Burner pressure full load: 13.0 mbar (100%).
Burner pressure part load: 4.7 mbar (60%).
Burner pressure pilot burner = 16 mbar.

Warning:
Control box operates on a neutral/phase supply.

10.2 Commissioning the boiler

1. Check gas connections.
2. Check electrical supply (L/N and earth).
3. Check water connections and if the installation is filled.
4. Switch on circulation pump and check rotation direction.
5. Open main gas cock (release air in gas pipe work).
6. Switch on electrical supply.
7. Set the control thermostats at about 85°C.
8. After a waiting time of about 72 seconds you will get ignition. At a minimum UV current of 100 μAmp the safety gas valve will open and the pilot gas valve will close after 15 seconds. The boiler is on.
9. Leave the boiler on for a couple of minutes to get rid of air in the gas pipe.
10. Set the correct burner pressure.
11. Check the thermostats for correct operation.
12. Check the flame protection, start the boiler with the UV-blindfolded.

10.3 Switching off the boiler

1. Switch off the electrical supply.
2. Turn off the gas cock.

11. MAINTENANCE

11.1 General

It is essential for a good combustion, to clean the boiler, the gas train and boiler room once a year.

11.2 Maintening the boiler

1. Clean the internal flue ways of the boiler with a steel cleaning brush (available from Broag).
   Remove top casing and top of the flue hood.
2. Clean the burners internally and externally.
3. Clean boiler room and the floor underneath the boiler.
4. Clean the boiler casings.
5. Clean the gas train, ignition, pilot burner, UV, thermostats and wiring.
6. Check start program, ignition time and safety times.
7. Check flame protection, and thermostats.
8. Check the boiler input at 100% and 60% load.
9. Make a combustion efficiency calculation.
10. Check the boiler and installation for water leakage.
11. Check gas train and gas pipe for gas leakage.

broag

ISO 9001
since 1988

Broag Ltd.
Head office
Remeha house,
Molly Millars Lane,
Wokingham,
Berkshire RG41 2QP.
Tel. 0118 9783434
Fax 0118 9786977

Branch office
Unit 3, Kestrel Close,
Quarry Hill Ind. Estate,
Ilkeston
Derbyshire DE7 4RD
Tel. 0115 9440778
Fax 0115 9440588

Subject to alterations
Art.nr. 50.695/1000/09.96/Bo.

Technical information

Remeha Gas 350

Remeha Gas 350

- Atmospheric gas boiler
- 64 - 174 kW

broag

TABLE OF CONTENT

PREFACE

These technical instructions contain useful and important information for the correct operation and maintenance of the Remeha boiler, model Gas 350.
Read these instructions carefully before putting the boiler into operation, familiarise yourself with its control functions and operation, strictly observing the instructions given. Failure to do so may invalidate warranty or prevent the boiler from operating.
A competent Engineer, with the relevant certification (i.e. CORGI, ACOPS, IEE regs. etc.) must carry out the installation and commissioning of the boiler.
On completion a copy of the boiler log / commissioning sheet should be returned to Broag Ltd for record purposes.

If you have any questions, or if you need more information about specific subjects relating to this boiler, or it's installation please do not hesitate to contact us.
The data published in these technical instructions is based on the latest information (at date of publication) and may be subject to revisions.
We reserve the right to continuous development in both design and manufacture, therefore any changes to the technology employed may not be retrospective nor may we be obliged to adjust earlier supplies accordingly.

1 BOILER DESCRIPTION

The Remeha Gas 350 boiler is a cast iron sectional floor standing gas fired boiler with Class II reduced NO_X burners. Supplied c/w control high/low and high limit thermostats, automatic ignition and flame failure safety controls. Suitable for all qualities of natural gas and propane, cat. $II_{2H3B/P}$. The Remeha Gas 350 central heating boiler is approved according to the following European directives:

- Gas appliance directive no. 90/396/EEC,
- Efficiency directive no. 92/42/EEC,
- E.M.C. directive no. 89/336/EEC,
- Low voltage directive no. 73/23/EEC.

Remeha Gas 350 PIN: 0063AS3842
Classification type for evacuation of the combustion products: B_{11BS}, B_{11}.
For further advice or information contact Broag Ltd.
The Remeha Gas 350 is supplied with electronic junction with insulated casings.

2 CONSTRUCTION DETAILS

2.1 General

The Remeha Gas 350 is a floor standing boiler complete with temperature and safety controls. The cast iron sectional heat exchanger is assembled using conical nipples and jointing compounds and ceramic rope. The finished unit is cased in an insulated enamel coated steel enclosure. The boiler has a built in draught diverter. It has water and gas connections within the casings at the rear right hand side (when viewed from the front). The boiler is supplied prewired requiring only permanent mains supply and external control connections.

2.2 Burners

The burners are stainless steel, atmospheric type with cooling rods to reduce the flame temperature. They guarantee a low noise level and a reduced NO_X-emission. Front and top access is required for service work to be carried out.

2.3 Boiler Floor

The Remeha Gas 350 boiler is supplied as standard with reflecting floor plates with ventilation underneath.

2.4 Delivery

The boilers are supplied in sections for on site assembly. The gas train, control panel, burners and casings supplied loose for fitting one site by others. The 4 - 6 units can also be delivered pre-assembled with the main block pressure tested.

3 DIMENSIONS AND TECHNICAL DATA

3.1 Dimensions Remeha Gas 350

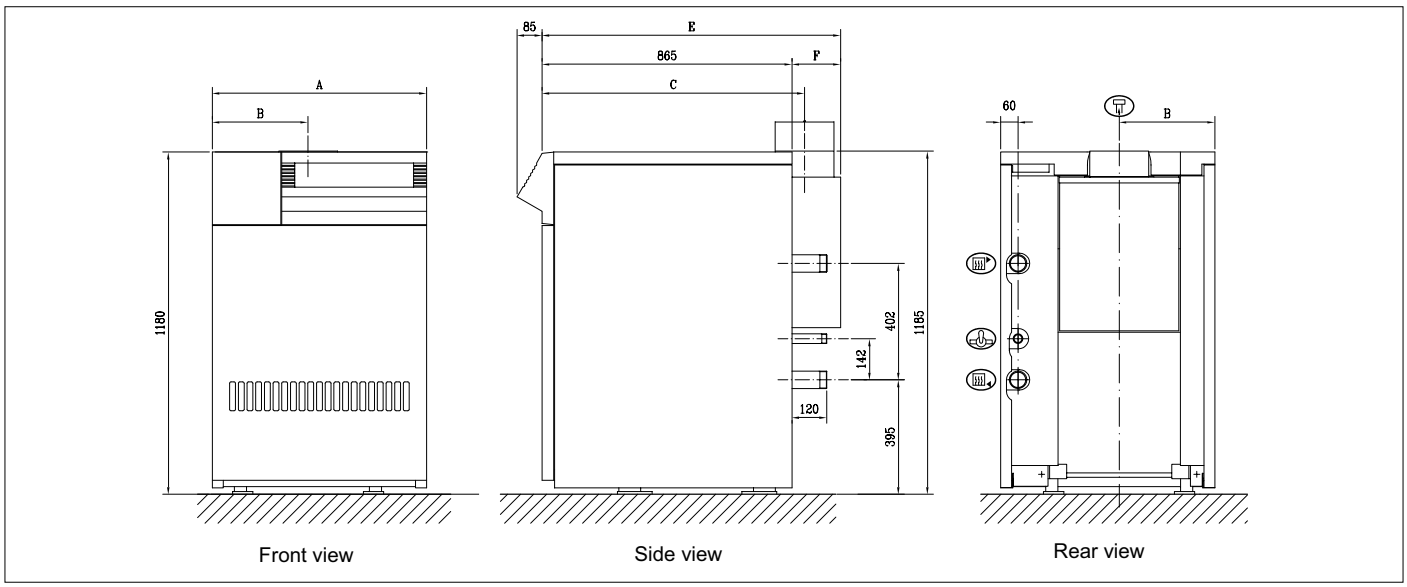


fig. 01 Dimensions Remeha Gas 350

Flow R2" (BSP M)
Return R2"
Gas connection 4 - 6 sections R1"
7 - 9 sections R1¼"
Flue gas Ø D

Number of sections		4	5	6	7	8	9
A	mm	640	740	840	940	1040	1140
B	mm	280	330	380	430	480	530
C	mm	905	905	905	930	930	930
Ø D	mm	200	200	200	200	250	250
E	mm	1030	1030	1030	1080	1080	1080
F	mm	165	165	165	215	215	215

table 01 Dimensions

3.2 Technical data

Number of sections			4	5	6	7	8	9
Nominal heat output		kW	64	87	109	130	152	174
Nominal heat input	Hi / NCV	kW	72	97	121	145	169	193
	Hs / GCV	kW	80	108	134	161	188	214
Gas consumption		m^3/h	7.6	10.3	12.8	15.3	17.9	20.4
Flue temperature		°C	154	152	146	138	138	142
Water resistance	Δt = 10°C	mbar	5	13	21	30	41	52
	Δt = 20°C	mbar	2	3	5	8	10	13
Water contents		litre	45	51	58	65	71	78
Boiler weight (dry)		kg	335	390	445	500	555	610
Flue gas flow rate		kg/h	219	239	255	271	398	407

table 02 Technical data Remeha Gas 350

3.3 Quotation specifications

General specifications:

- Heat exchanger manufactured from corrosion resistant “pearlite” cast iron
- Maximum operating pressure of 6 bar
- Maximum operating temperature of 95°C
- Electronic ignition as standard
- High/low operation as standard
- Reduced NO_X burners (CE class 2)
- Built in draft diverter
- Supplied in broken down form, the models 4-6 sections can also be delivered pre-assembled
- Powder coated enamel steel casing
- 80 mm thick glass wool insulation
- Suitable for use with a Natural gas (propane available as an option)
- Minimum return water temperature 20°C
- Supplied as standard with on/off switch, temperature indication, control and high limit thermostats
- Efficiency 81.5% (GVC)
- Manufactured to ISO 9001
- CE approved

Optional:

- Hours run meters
- BMS contacts for remote indication
- Water pressure switch
- Down draught thermostat
- ***rematic***® control.

4 APPLICATION INFORMATION

4.1 L.P.H.W. system

4.1.1 Water temperature

Maximum water temperature is 110°C (high limit thermostat).
Highest operating boiler water temperature is 95°C (control thermostat).
Minimum return water temperature is 20°C at a flow rate related to a Δt of 20°C (flow/return temp).

4.1.2 Water pressure

Boiler sections are factory pressure tested to 10 bar.
Maximum pressure test boiler block is 8 bar.
Maximum working pressure is 6 bar.
Minimum working pressure is 0.8 (sealed system) or 0.3 (open vented).

4.1.3 Water flow

The minimum water flow through the boiler on shut down is:

$$\frac{\text{Output boiler in kW}}{93} = \text{m}^3/\text{h}$$

This minimum flow must be maintained for approximately 5 minutes after the burner stops firing to avoid high temperature shut down due to residual heat gain. Due to the design and manufacture of the boiler no specific minimum water flow requirements exist other then for overheating protection.

4.1.4 Water treatment

The system should be filled with mains cold water (for the UK this will usually have a pH of between 7 and 8). Pressurised installations with a boiler/system content ratio of 1:10 or less should not require water treatment, provided that the following conditions apply:

1. The system is flushed thoroughly to remove all fluxes and debris and then filled completely once.
2. Make up water is limited to 5 % per annum.
3. The hardness of the water does not exceed 360 ppm (20°D).

All scale deposits will reduce the efficiency of the boiler and should be prevented. However provided the above is complied with any scale produced will not be too detrimental to the boiler efficiency and will not reduce the anticipated life expectancy of the boiler.

NOTE: Scale deposits in excess of 3 to 5 mm will reduce boiler efficiency and greatly increase the risk of premature casting failure.

As most systems contain a variety of metals which can react with each other to cause corrosion. It is considered good practice to provide some form of water treatment (especially in open vented systems) in order to prevent or reduce the following:

- Metallic corrosion;
- Formation of scale and sludge;
- Microbiological contamination;
- Chemical changes in the untreated system water.

Suitable chemicals and their use should be discussed with a specialist water treatment company prior to carrying out any work. The specification of the system and manufacturers recommendations must be taken into account, along with the age and condition of the system. New systems should be flushed thoroughly to remove all traces of flux, debris, grease and metal swarf generated during installation. Care to be taken with old systems to ensure any black metallic iron oxide sludge and other corrosive residues are removed, again by thoroughly flushing, ensuring that the system is drained completely from all low points.

NOTE: Please ensure that the new boiler plant is not in circuit when the flushing takes place, especially if cleansing chemicals are used to assist the process.

Under no circumstances is the boiler to be operated with cleaning chemicals in the system.

To Summarise:
- Minimise water loss;
- Prevent pumping over in open vented systems;
- Provide adequate air venting at all high points;
- Keep pH level between 7 - 9 when using additives;
- Maximum chlorine content of 200 mg/l;

Take advice on the suitability of inhibitors.

4.1.5 Noise level
The noise level measured around the boiler depending on boiler room construction is about 50 dBA. Noise levels taken at 1 meter from the boiler.

4.2 Chimneys
The average flue gas temperature is so low (108-173°C) that the chimney must be made in accordance with the guidelines of British Gas, BS 6644 and IG 10.

4.3 Installation standards
The following instructions must be adhered to when the Remeha Gas 350 is installed:
Gas Safety (installation and use) Regulations 1984 (as amended).
In addition to the above regulations, this boiler must be installed in compliance with:
- Current I.E.E. Regulations for electrical installations;
- Local building regulations;
- The Building Standards (Scotland);
- (Consolidation) Regulations;
- By-laws of the local water undertaking;
- Health and Safety Document No 635 'The Electricity at Work Regulations 1989'.

It should also be in accordance with the relevant recommendations in the current editions of the following British Standards and Codes of Practice, viz. BS 5440 Pt 1 and 2, BS 5449, BS 5546,
BS 6798, BS 6891 and BG.DM2.

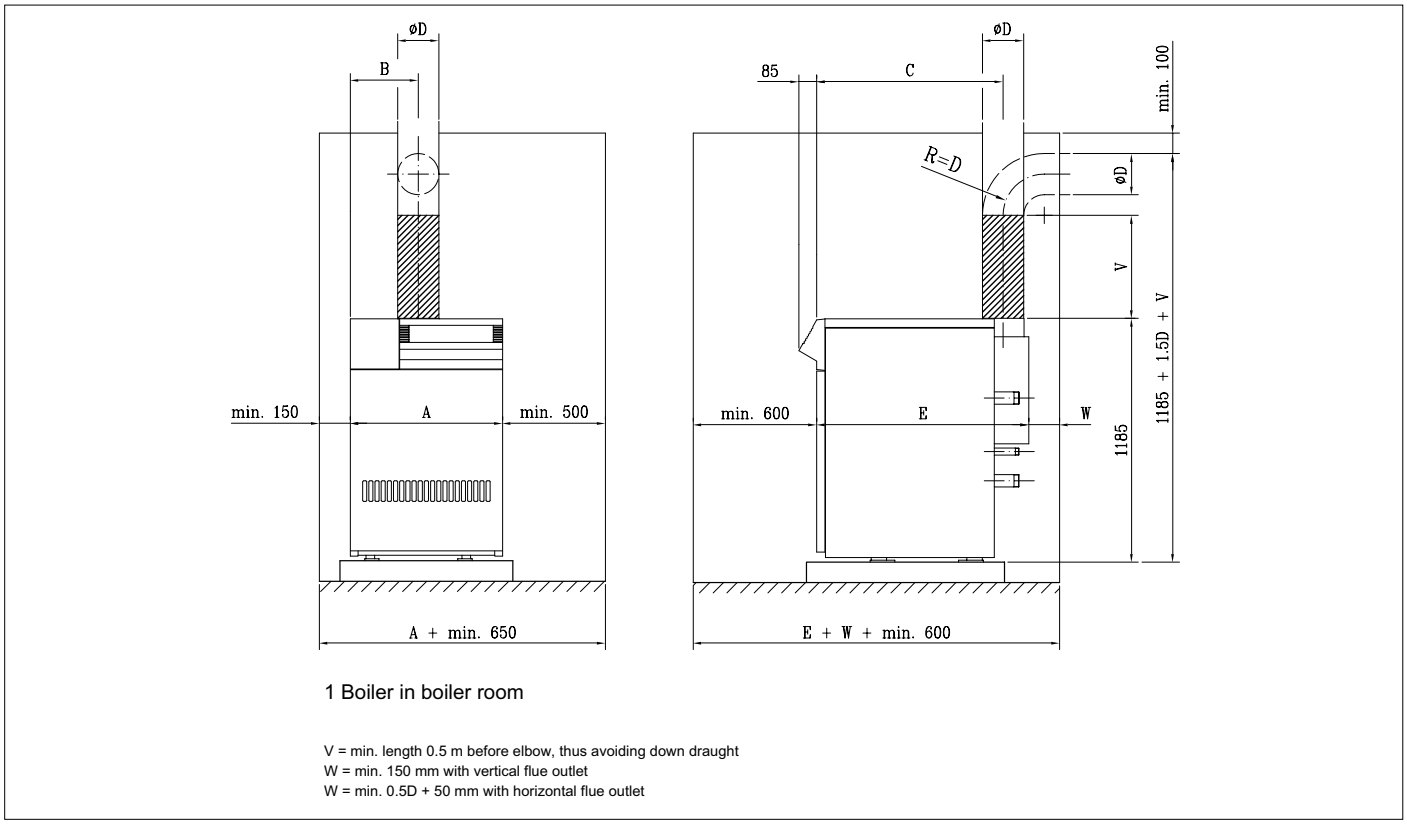
Lawfully all gas appliances must be installed by competent persons (e.g. Corgi, ACOPS).
Failure to install appliances correctly could lead to prosecution.
It is in your own interest and that of safety to ensure that the law is complied with.

Important:
The Remeha Gas 350 is a certified appliance and must not be modified or installed in any way contrary to these 'Installation and Servicing Instructions'. Manufacturer instructions must NOT be taken in any way as when overriding statutory obligations.

5 TYPICAL BOILER INSTALLATIONS

5.1 Installation 1

Recommended layout for one boiler installation, measurements in mm.



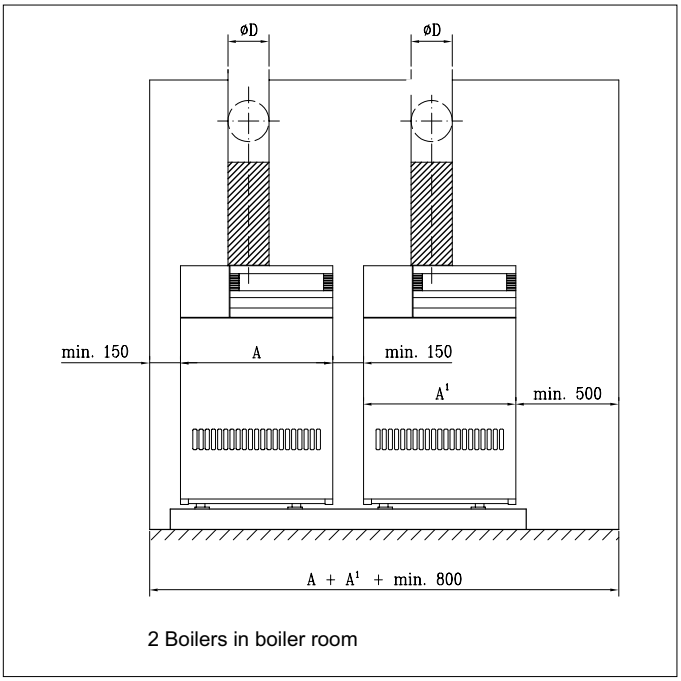
1 Boiler in boiler room

V = min. length 0.5 m before elbow, thus avoiding down draught
W = min. 150 mm with vertical flue outlet
W = min. 0.5D + 50 mm with horizontal flue outlet

fig. 02 One boiler

5.2 Installation 2

Recommended layout for two-boiler installation, measurements in mm.



2 Boilers in boiler room

fig. 03 Two boilers

number of sections	Dimensions				
	A	B	C	Ø D	E
4	640	280	905	200	1030
5	740	330	905	200	1030
6	840	380	905	200	1030
7	940	430	930	200	1080
8	1040	480	930	250	1080
9	1140	530	930	250	1080

6 CONTROL AND SAFETY EQUIPMENT

6.1 General

The Remeha Gas 350 is supplied with electronic control and safety equipment with ionisation flame detection.

6.2 Instrument panel

The Remeha Gas 350 is supplied with an instrument panel that is fitted in the front of the boiler. The standard instrument panel can be extended with the fitting of the following options: hour run meters, water pressure switch, down draught thermostat, simple or complex volt free modules and/or ***rematic***® control. All connections are pre-wired and fitted with plugs. The capillaries from the control panel should be fitted in the pocket of the boiler, which is fitted in the flow connection of the boiler.

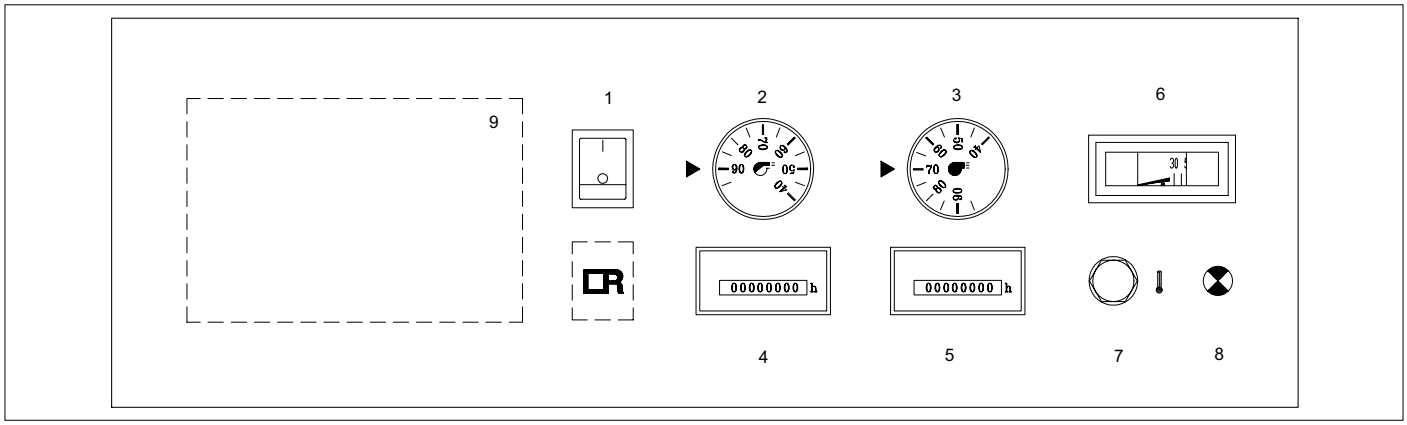


fig. 04 Instrument panel

The instrument panel contains:
1. Operating switch (On/Off);
2. Control thermostat On/Off, range 35°C-95°C;
3. Control thermostat High/Low, range 35°C-95°C;
4. Hour run meter total running hours (option);
5. Hour run meter full load hours (option);
6. Analogue thermometer for flow temperature;
7. High – limit thermostat pre set to 110°C;
8. Lock out warning lamp;
9. Option for ***rematic***® weather compensator.

6.3 Standard electronic gas train High/Low

6.3.1 Schematic

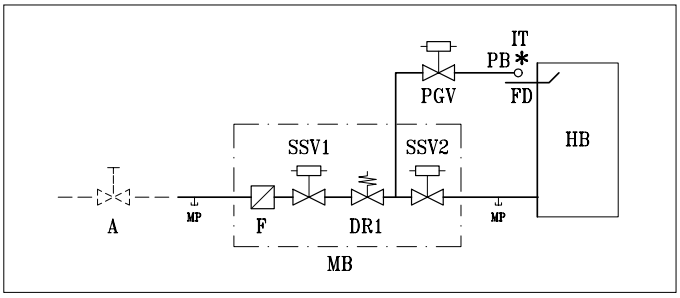


fig. 05 Schematic layout gas train

Legend

A	Gas cock
PB	Pilot burner
DR	Gas pressure governor
F	Gas filter
HB	Main burners
PGV	Pilot gas valve
MP	Measuring point
SSV	Safety shut off valve
FD	Ionisation probe
MB	Gas multiblock
IT	Ignition transformer
- - -	Not supplied as standard

6.4 Specification control box

Control box	: Satronic DKG 972-27
Mains supply	: 230 V – 50 Hz
Minimum ionisation current	: min 3 µA (DC)
Reaction time flame protection	: 1 sec.
Safety time	: ≤ 10 sec.
Maximum ambient temperature	: 60 °C
Injector size pilot burner	: Ø 0.5 mm
Injector size main burner	: Ø 4.0 mm
Burner pressure full load (high calorific gas)	: 14.0 mbar (100%)
Burner pressure part load (high calorific gas)	: 5.0 mbar (60%)
Start repetitions	: 5x

Warning: control box is phase / neutral sensitive.

6.4.1 Specification Ignition transformer

Ignition transformer:	Satronic ZT. 870
Ignition voltage:	16 kV
Distance electrodes:	3,5 ± 1 mm.

6.5 Functions

6.5.1 General

The following functions (standard and optional) will, when activated, either lock out or shut down the boiler. For all options full fitting instructions are included in the option pack.

6.5.2 Flame control (lock out)

The flame is monitored using ionisation flame detection. In the event of a flame failure the boiler will lock out. Manual intervention is required to reset the boiler (on the control box) once the cause of the problem has been rectified.

6.5.3 Thermostats (shutdown / lock out)

- Control thermostat On/Off: shutdown (35°C-95°C); The boiler will automatically resume operation when the flow temperature falls below the set point.
- Control thermostat High/Low: shutdown (35°C-95°C); The boiler will automatically resume operation when the flow temperature falls below the set point.
- High Limit thermostat: lock out at 110°C; The boiler will lock out. Manual intervention is required to reset the boiler (on the instrument panel) once the cause of the problem has been rectified.

6.5.4 Water pressure switch - optional (shut down)

The boiler can be fitted with an optional water pressure switch. If the water pressure drops below the set value (0.8 bar), the boiler will shut down. When the water pressure returns to 1 bar, the boiler will resume operation again.
Type: SIT 340

6.5.5 Gas pressure switch LD - optional (shut down)

The boiler can be fitted with an optional gas pressure switch LD. If the supply gas pressure drops below the set value (12 mbar; for natural gas only), the boiler will shut down. When the supply gas pressure returns above this set value the boiler will resume operation again.
Type: Dungs GW50 A5.

6.5.6 Down draught thermostat - optional (shut down)

The boiler can be fitted with an optional down draught thermostat. When the temperature in the draught diverter rises above the down draught thermostat set point, the boiler will shut down. It automatically resets after 3 minutes, provided that the temperature also falls.
Type: Honeywell L6068A; fixed set point is 70°C.

7 ASSEMBLY AND INSTALLATION GUIDELINES

7.1 General

The boiler is suitable for operating at a maximum working pressure of 6 bar. It can be installed in open vented system with a minimum pressure of 0.3 bar or in sealed system with a minimum pressure of 0.8 bar.

7.2 Boiler assembly

The boiler is supplied with full assembly instructions. On request special assembly tools can be hired from Broag on a daily basis. However, Broag (or a Broag approved boiler erection engineer) can provide boiler assembly services and / or building supervision.

7.3 Water connections

The boiler water connections (2" male thread) are fitted at the rear of the boiler (right hand connections only). The two sections have a ¾" BSP tapping, the right hand end section to accept a drain/off cock and the left hand end section to accept a plug.

7.4 Pocket the thermostat capillaries

The multi pocket for the thermostat capillaries is fitted in the flow connection of the boiler.

7.5 Water pressure

Each section is hydraulically tested at 10 bar. Operating pressure between 0.3 and 6 bar. The boiler can be fitted with an optional water pressure switch, set at 0.8 bar.

8 GAS SUPPLY

8.1 General
The gas train is fitted behind the front casing.
The local Gas authority should be consulted to ensure that an adequate pressure and supply is available. To minimise risk of sediment or foreign particles entering the control valves, an approved filter can be fitted into the pipe system downstream. The gas supply should be conforming to the British Gas safety regulations.

8.2 Gas pressure
Natural gas, cat. $I_{2H\ 3B/P}$ (20 mbar).
Maximum gas pressure at inlet 100 mbar. Recommended min gas pressure required at the boiler is 17 mbar with it operating at high fire.
Main burner pressure settings:

full load:	14.0 mbar
part load:	5.0 mbar
Pilot burner pressure settings:	13 mbar
Gas inlet pressure:	17 - 100 mbar

8.3 Injectors
Injector size main burner: 4.0 mm
Injector size ignition burner: 0.5 mm

8.4 Operation on propane
The boiler is supplied, as standard set for natural gas, therefore the boiler must be converted to propane **BEFORE** the boiler is fired and commissioned for the first time on propane.
Important: The boiler can only operate **ON/OFF** once converted to propane!

For operation on propane the main burner injectors and pilot burner injector (Ø 0.25 mm) must be replaced. Also the burner pressure must be adjusted. **It is important to remove the cooling rods from the burners, including their supports.**
Use our conversion kit for propane and follow the fitting and commissioning instructions.
Technical data for operation on propane are shown in table 03

Note: Place the sticker from the conversion kit to indicate that the boiler has been changed for propane firing.

Number of sections	Heat output	Heat input Hi	Burner pressure[1)]	Gas consumption[2)]		Injector size main burner	Injector size pilot burner
	kW	kW	mbar	m^3/h	kg/h	Ø mm	Ø mm
4	64	72	28	2.9	5.6	2.5	0.25
5	87	97	28	4.0	7.5	2.5	0.25
6	109	121	28	4.9	9.4	2.5	0.25
7	130	145	28	5.9	11.2	2.5	0.25
8	152	169	28	6.9	13.1	2.5	0.25
9	174	193	28	7.9	15.0	2.5	0.25

table 03 Technical data propane
[1)] The burner pressure may never vary more than 20% of the inlet pressure
[2)] Caloric value propane = 24.44 kWh/m^3 = 12.9 kWh/kg

9 ELECTRICAL SUPPLY

9.1 General
The electrical installation must conform to the IEE regulations and also to local authority requirements.

9.2 Control box
The Satronic control box is fitted behind the front casing.

9.3 Electrical connections
The boiler is pre-wired requiring only a mains supply and external controls connected to the control panel.
The boiler can be fitted as an option, with a basic or an extended signalling print.

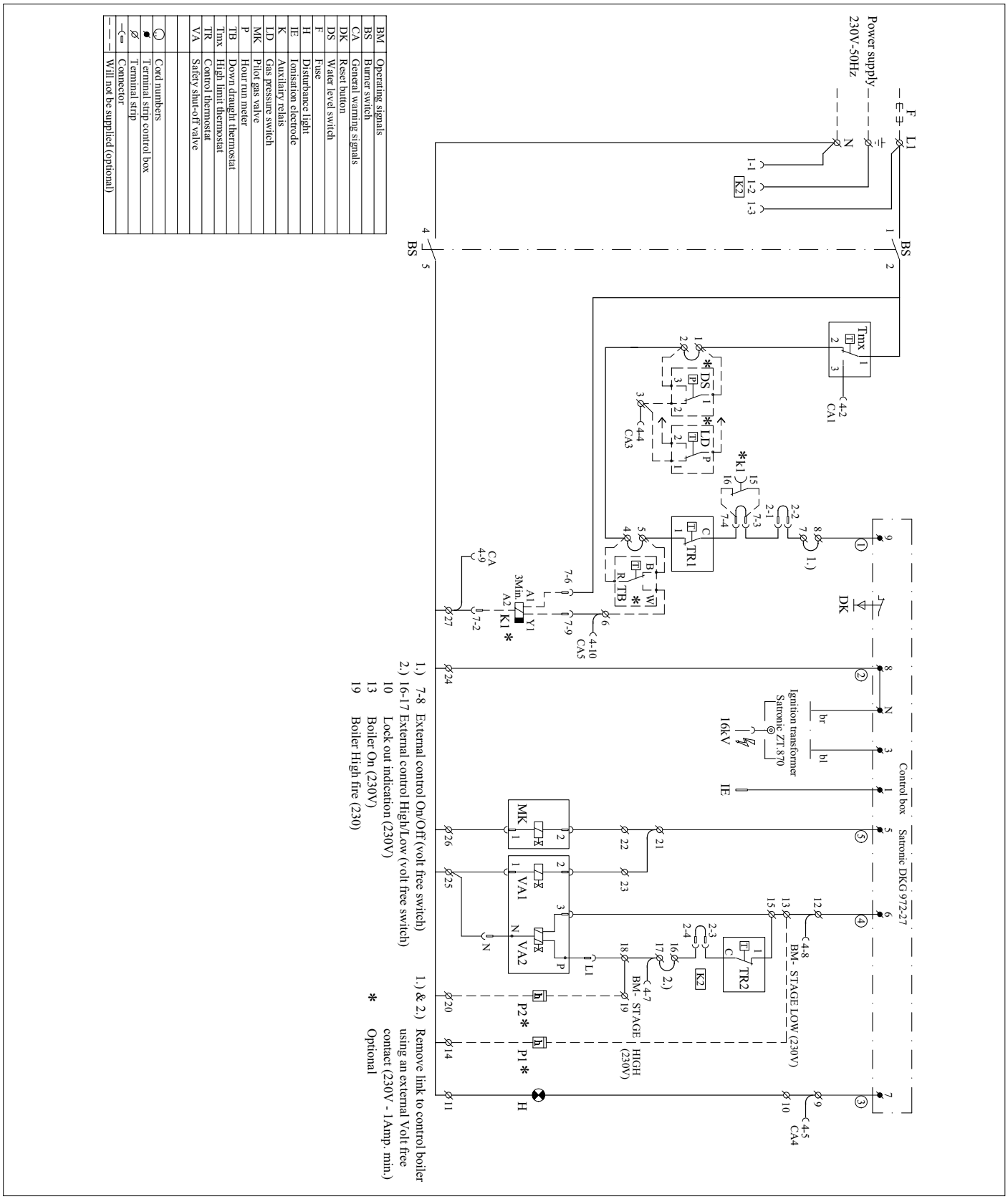
Functions of the basic signalling print:
- general alarm
- operating signals stage 1 and stage 2

Functions of the extended signalling print:
- general alarm
- operating signals stage 1 and stage 2
- no power supply
- valve leakage failure
- burner failure
- low water level
- down draught thermostat
- water level control
- high limit thermostat.

9.4 Electrical information

Main supply: 230 V-50 Hz (L/N)
Power consumption running: 110 W
Maximum fuse: 6.3 A (slow blow)

9.5 Wiring diagrams



BM	Operating signals
BS	Burner switch
CA	General warning signals
DK	Reset button
DS	Water level switch
F	Fuse
H	Disturbance light
IE	Ionisation electrode
K	Auxiliary relais
LD	Gas pressure switch
MK	Pilot gas valve
P	Hour run meter
TB	Down draught thermostat
Tmx	High limit thermostat
TR	Control thermostat
VA	Safety shut-off valve
	Cord numbers
	Terminal strip control box
	Terminal strip
	Connector
	Will not be supplied (optional)

fig. 06 Electrical principle diagram

04.03F.SC.00004

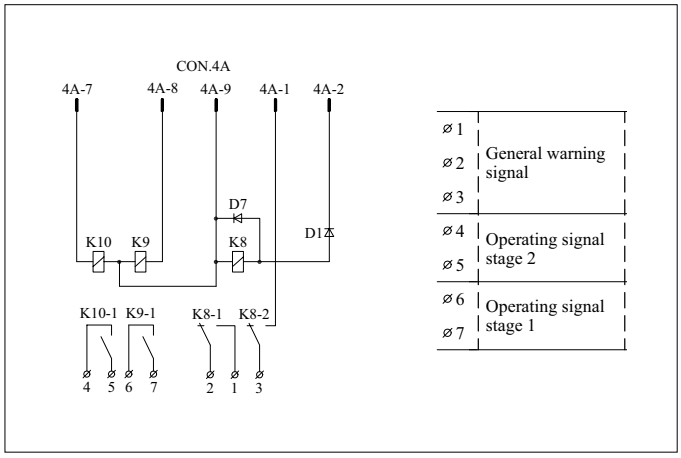


fig. 07 Optional basic signalling print

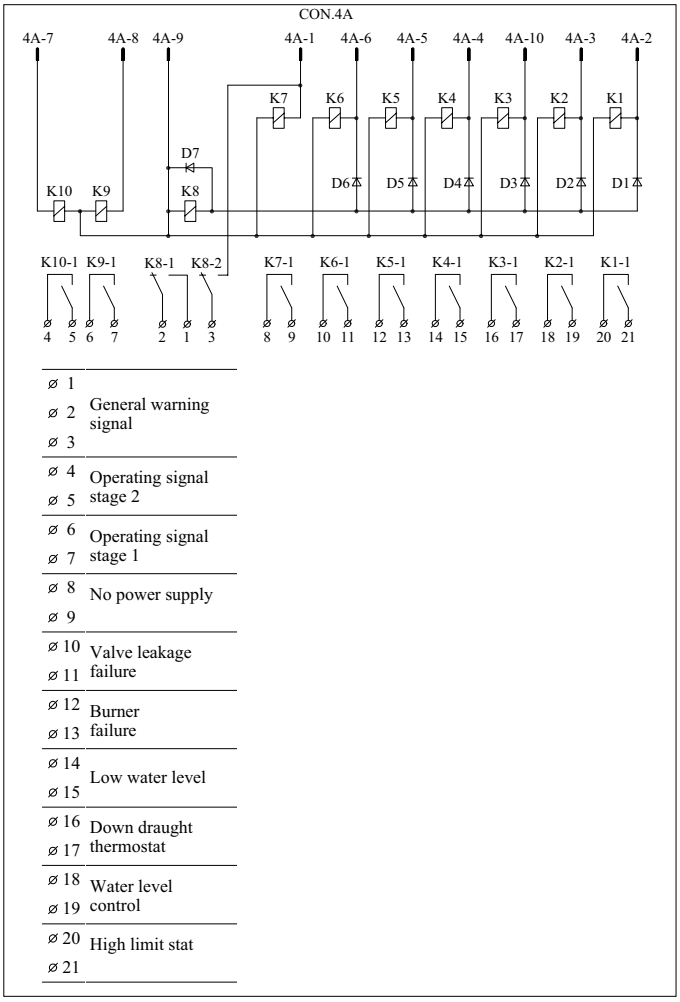


fig. 08 Optional complex signalling print

10 COMMISSIONING

NOTE: Commissioning must only be carried out by a qualified engineer with the relevant training and certification i.e. Acops - Corgi and a commissioning data sheet / log book completed and left on site for issue to the owner.

Important: commissioning for propane, first see par. 8.4

10.1 Commissioning the boiler

1. Check the gas connections.
2. Check the electrical supply (L/N and earth).

Warning: control box is phase / neutral sensitive.

3. Check the water connections and whether the installation is full and under system pressure.
4. Switch on the circulation pump and check the rotation direction.
5. Open the main gas cock (purge gas pipeline).
6. Switch on the electrical supply.
7. Set both the thermostats to about 85°C.
8. If a control system is built in: put the selector switch on manual operation.
9. Switch on the boiler.
10. After a waiting time of about 3 seconds the ignition starts. The magnetic valve MK opens and ignition burner lights. At a minimum ionisation current of 3 µA the safety gas valve will open. The boiler runs.
11. Let the boiler run for a couple of minutes on high fire to clear any air still in the gas pipe.
12. Set the correct **full load burner pressure** by means of the pressure regulator on the gas multiblock gas valve (*see fig. 09, pos. a*).
    Warning: When the required burner pressure can not be reached because of low inlet pressure, ensure that the pressure regulator remains within it's operating range.
    Now do the following:
    - Set the burner pressure to the highest possible value (but not over the required full load burner pressure).
    - Turn the pressure regulator anticlockwise until the burner pressure is affected.
    - The burner pressure is now limited, this will prevent the boiler from being over gassed should the inlet gas pressure increase.

13. Set the correct **part load burner pressure**:
    - Turn the High/Low thermostat to its minimum setting (35°C). When the flow temperature is over 35°C, the boiler will burn at part load.
    - Set the part load burner pressure by turning the adjustment ring (*fig. 09, pos. b*).
    - To check the high fire setting: Turn the High/Low thermostat to 85°C and check the full load burner pressure (if necessary re-adjust).

    The speed of opening of the main gas valve can also be adjusted to ensure a smooth light up. Setting the hydraulic brake on the main gas valve as follows:
    - Remove the setting cap (*fig. 09, pos. c*) and turn it upside down on the hydraulic brake.
    - Turn it clockwise to slow down, anticlockwise to speed up.
    - Check both burner pressures again and if necessary re-adjust.
14. Check the **thermostats** for the correct operation setting.
15. Check the **flame control on the control box**
    - Start the boiler with disconnected ionisation probe, after the ignition phase the pilot gas valve must close. The boiler will lock out.
    - Reset by pressing the reset button on the control box.
    - Then disconnect the ionisation probe during operation, the pilot gas valve must close immediately. The boiler will lock out.
    - Reset by pressing the reset button on the control box.
16. **Water level control**:
    - Check the water level.
    - Check the operation of the water level control by disconnecting the electrode. The boiler should go to lock out
    - Create a shortcut between the electrode and earth. The boiler should go to lock out
    - Reset by pressing the reset button on the instrument panel. The boiler will resume operation
17. Check the **down draught thermostat** by pressing the bimetallic strip on the thermostat. The boiler will shut down for 3 minutes. After that the boiler will resume operation.
18. Send the initial commissioning report CE to Broag.

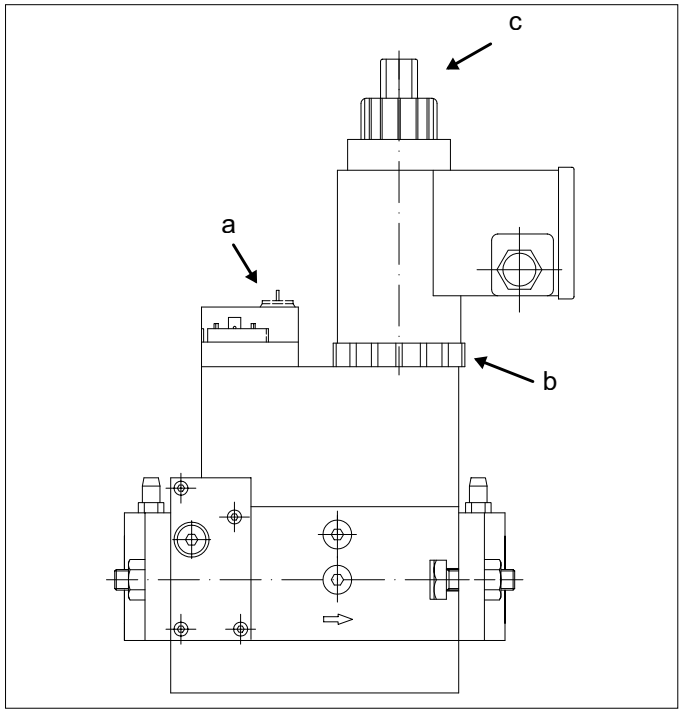


fig. 09 Dungs MB-ZRDLE 410/412 B01 S52

a. Pressure regulator
b. Part load adjustment ring
c. Hydraulic brake (setting cap)

10.2 Switching off the boiler

1. Set boiler controls to OFF
2. Allow system to cool
3. Switch off the electric supply
4. Turn off the gas cock.

Warning: The boiler can be damaged, when the temperature falls below freezing point and it is switched off and full of water.

Note:
Commissioning must only be carried out by a qualified engineer with the relevant product training and certification i.e. Acops - Corgi. A commissioning data sheet / logbook must be completed on site for issue to owner.

11 MAINTENANCE

To maintain maximum efficiency it is essential to service the boiler, check safety parameters and re-set combustion once a year.

Normal Service Maintenance

- Isolate power, controls and gas supply.
- Remove front and top casings and flue hood covers.
- Remove gas manifold.
- Remove the burners and floor plates.
- Clean the internal flue ways of the boiler.
- Clean the floor underneath the boiler and boiler room.
- Clean the burners internally and externally using a soft brush.
- Clean the plates under the burners as well - they must be fitted and in the correct place for the combustion to be correct
- Clean the gas train, ignition, pilot burner, thermostats and wiring.
- Check and reset/replace ignition electrode and ionisation probe as found necessary.
- Re-assemble boiler.
- Check ignition and ionisation cables for connections and continuity.
- Restore power, controls and gas supply.
- Check start program, ignition time and safety times.
- Check flame protection and thermostats.
- Check boiler input at 100% (full load) and 60% (part load) load.
- Carryout combustion efficiency test.
- Check the boiler and immediate installation connections for water leaks (seals).
- Check gas train and gas pipe for gas leaks.
- Check flue connections.
- Clean boiler casings.
- Complete a commissioning report and fill in the boiler logbook if available.

12 TROUBLE SHOOTING

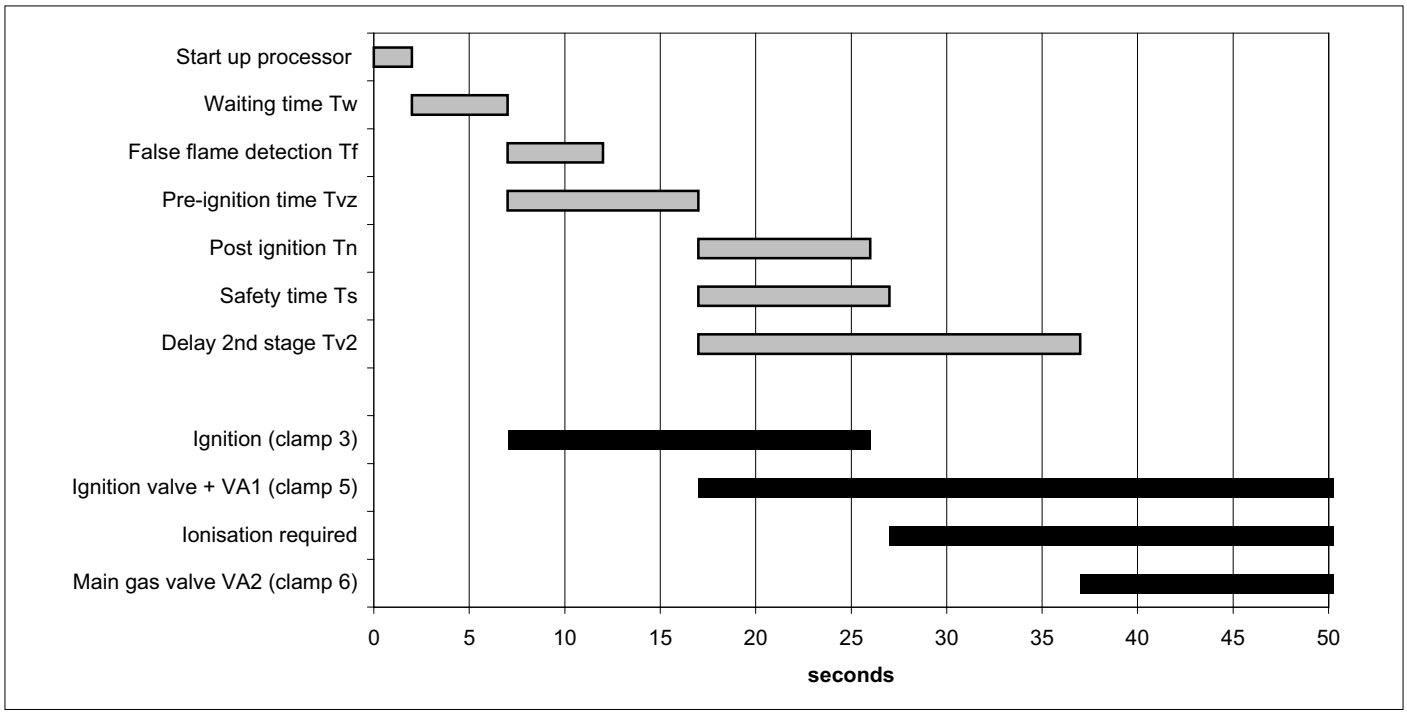


fig. 10 Switch diagram

12.1 Communication

The control box communicates by using a flash code. An LED inside the reset button of the control box displays this flash code.

flash code	meaning of codes
	waiting time Tw
	pre-ignition (Tvz)
	safety time (Ts) and post ignition time (Tn)
	delay time to valve V2 (Tv2)
	running

table 04 Program phases

flash code	meaning	cause
	low mains voltage (shut down)	
	Internal fuse defect	control box defect
	lock out	no flame detection within safety time Ts
	early flame	Ionisation probe may be faulty
	manual lock out	

table 05 Error messages

▌ = long pulse
| = short pulse
. = short pause

12.2 Fault causes

In case of a failure the LED is permanently illuminated. Every 10 seconds the illumination is interrupted by a flash code.
In case of all failures the gas supply is interrupted.

Fault	Possible cause:
Burner not working => shut down	- no heat demand - no mains supply - voltage < 187 V - continuously tension on terminal A
2-3 seconds after applying mains => lock out	- control box not reset
Burner starts, no flame => lock out	- false flame detected - no ignition - no gas supply
Burner starts, flame established => lock out after safety time (Ts)	- ionisation current < 1,5 µA - phase and neutral reversed - ionisation probe damaged or dirty

table 06 Trouble shooting

Remeha Gas 350

Broag Ltd.

Remeha House

Molly Millars Lane

RG41 2QP WOKINGHAM, Berks.

United Kingdom

Tel: 0118 9783434

Fax: 0118 9786977

uk.remeha.com

boilers@broag-remeha.com

Midlands Branch Office

Unit 3 Kestrel Close

Quarry Hill Industrial Estate

Ilkeston

Derbyshire DE7 4RD

Tel: 0115 944 0778

Fax: 0115 944 0588

Subject to alterations

ISO 9001 since 1988 | ISO 14001 Registered by GASTEC 2000 | CE | 51247-0303

broag

Technical information

Remeha Gas 450

Remeha Gas 450

- Atmospheric gas boiler with reduced NOx emission
- 217 - 344 kW

remeha
Clean Heat

CONTENTS

PREFACE

These technical instructions contain useful and important information for the proper operation and maintenance of the Remeha central heating boiler, model Gas 450. Further it contains important directions to prevent accidents and serious damage before putting it into service and during operation of the boiler, to allow as far as possible a safe and trouble free operation. Read these instructions carefully before putting the boiler into operation, familiarize yourself with its operation and control and strictly observe the directions given.

If you have any questions, or if you want more information about specific items relating to this boiler, please do not hesitate to contact us.
The data published in these technical instructions is based on the most recent information and is given subject to later revisions.
We reserve the right to modify the construction and/or design of our products at any moment, without obligation to update earlier supplies accordingly.

1. BOILER DESCRIPTION

The Remeha Gas 450 boiler is a cast iron sectional boiler with atmospheric burners.
Suitable for all qualities of natural gas and LPG, cat. II 2H3P (LPG version on request)
The Remeha Gas 450 central heating boiler is approved according to the following European directives:

- Gas appliance directive no. 90/396/EEC
- Efficiency directive no. 92/42/EEC
- E.M.C. directive no. 89/336/EEC

and complies with the following directives:

- Low voltage directive no. 73/23/EEC
- Machine directive no. 89/392/EEC.

Classification type for evacuation of the combustion products: B11 BS.
For further advice or information contact Broag Ltd.

The Remeha Gas 450 is supplied with electronic junction with insulated casings.
Water connections $2^1/_2$" BSP.

2. CONSTRUCTIONS

2.1 General

- Boiler block of cast iron sections nippled together with conical nipples.
- Gas and water connections are at the rear of the boiler.
- Instrument panel is fitted in the front casing and must be assembled on the same side as the gas and water connections.
  Instrument panel must be assambled on the same side of gas and water connections.
- Cleaning of the cast iron block from top of the boiler.
- The control and safety equipment is fitted behind the front casings.
- The boiler is entirely prewired.
- Gas and water connections can be assembled both left and right.

2.2 Burners

The burners are stainless steel, atmospheric burners with cooling rods to reduce the flame temperature. They guarantee a low noise level and a reduced NOx-emission.

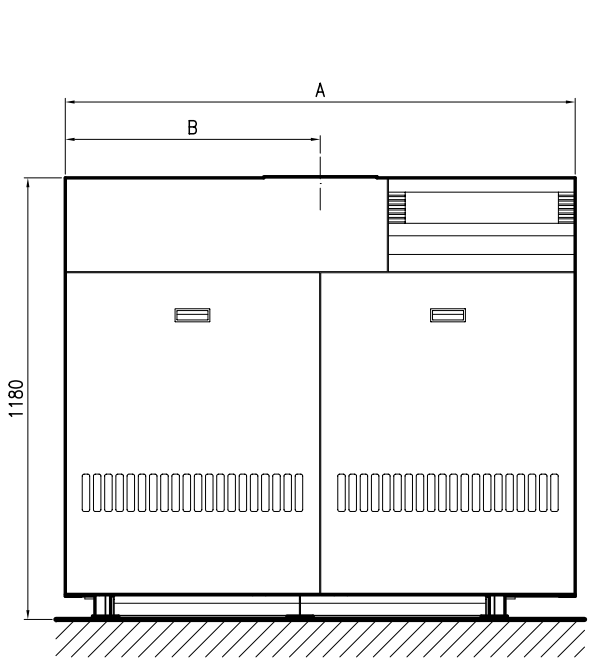
2.3 Boiler floor

The Remeha Gas 450 boiler is supplied as standard with reflecting floor plates with ventilation underneath.

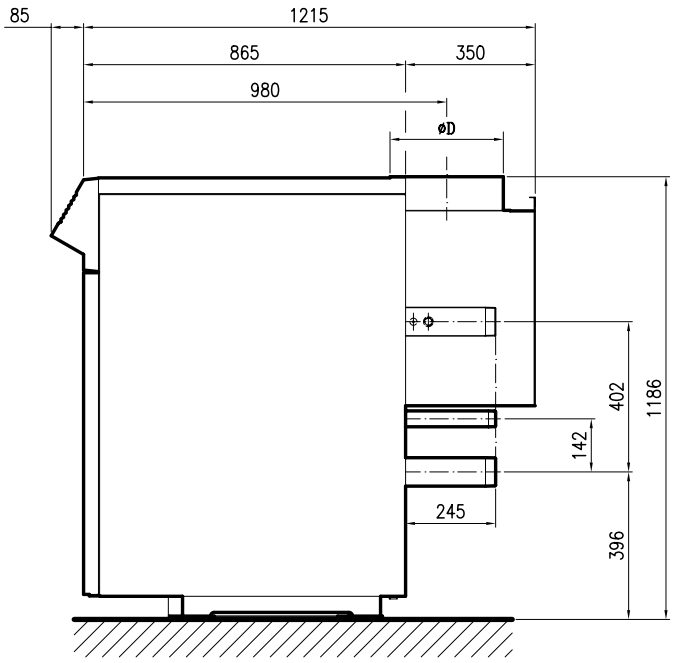
2.4 Delivery

The total range is supplied in parts for site assembly.

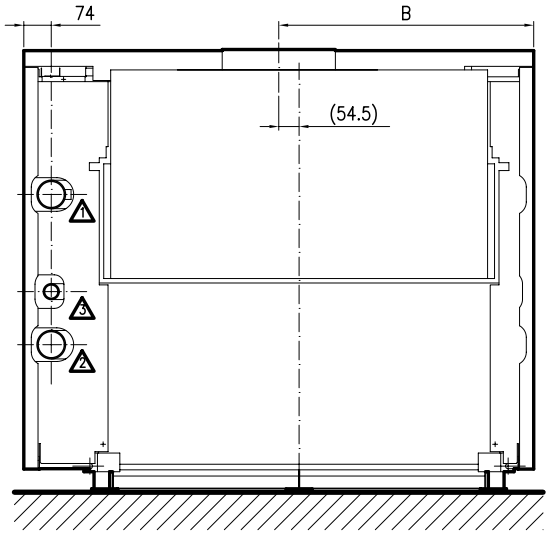
3. TECHNICAL INFORMATION AND DIMENSIONS



Front view



Side view



Rear view

1 *Flow R 2½"*
2 *Return R 2½"*
3 *Gas connection: R 1¼"*

Note:
Right hand execution is shown: instrument panel, gas and water connections on the right hand side; left hand execution is mirror image

Fig. 01 Dimensions

Number of sections	Heat output	Heat input		Gasrate	Dimensions			Water resistance		Water content	Boiler weight	Mass flue rate
		Hs	Hi		A	B	Ø D	³t = 10°C	³t = 20°C			
	kW	kW	kW	m³/h	mm	mm	mm	mbar	mbar	l	kg	kg/h
11	217	268	241	25.0	1365	682.5	300	84	21	91	725	544
13	262	322	290	30.1	1565	782.5	300	120	30	105	835	654
15	307	376	338	35.1	1763	881.5	350	164	41	118	950	752
17	344	420	378	39.2	1963	981.5	350	208	52	131	1060	831

** Connections can also be assembled on the other side*

4. APPLICATION

4.1 L.P.H.W. system

4.1.1 Water temperature
Maximum water temperature is 110°C (high limit thermostat).
Highest boiler operation water temperature is 95°C (control thermostat).
Minimum return water temperature is 20°C at a flowrate related to a ³t of 20°C (flow/return temperature).

4.1.2 Water pressure
Boiler sections pressure test at 10 bar.
Maximum pressure test boiler block is 8 bar.
Maximum working pressure is 6 bar.
Minimum working pressure boiler is 0.8 bar.
Optional a water pressure switch set at 0.8 bar can be supplied with the boiler.

4.1.3 Water flow
The minimum water flow through the boiler is:

$$\frac{\text{Output boiler in kW}}{93} = \ldots \text{ m}^3/\text{h}$$

This minimum flow must be maintained for 5 minutes after the burner stops firing to avoid high temperature shut-down due to residuel heat gain.
Due to the design and manufacture of the boiler no specific minimum water flow requirement exists other than high-temperature protection.

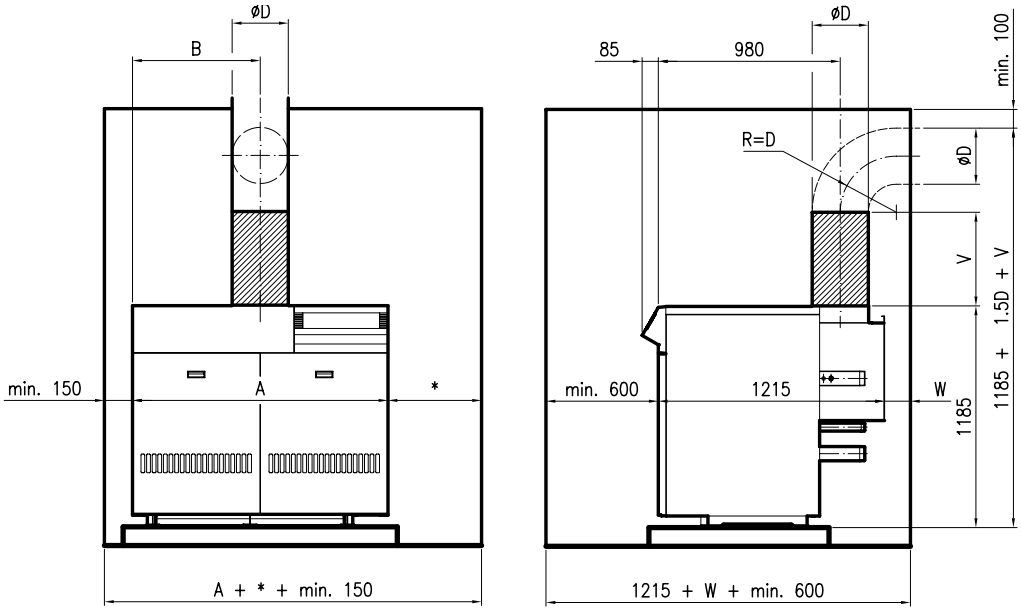
4.1.4 Water treatment
Water treatment under normal circumstances is not necessary (see our water quality recommendations).

4.1.5 Noise level
The noise level measured around the boiler depending on boiler room construction is about 50 dBA.
(Noise level taken at 1 meter from the boiler).

4.2 Chimneys
The average flue gas temperature is so low that the chimney must be in accordance with the guidelines of British Gas and BS 6644.

5. TYPICAL BOILER INSTALLATIONS

1 boiler in boiler room

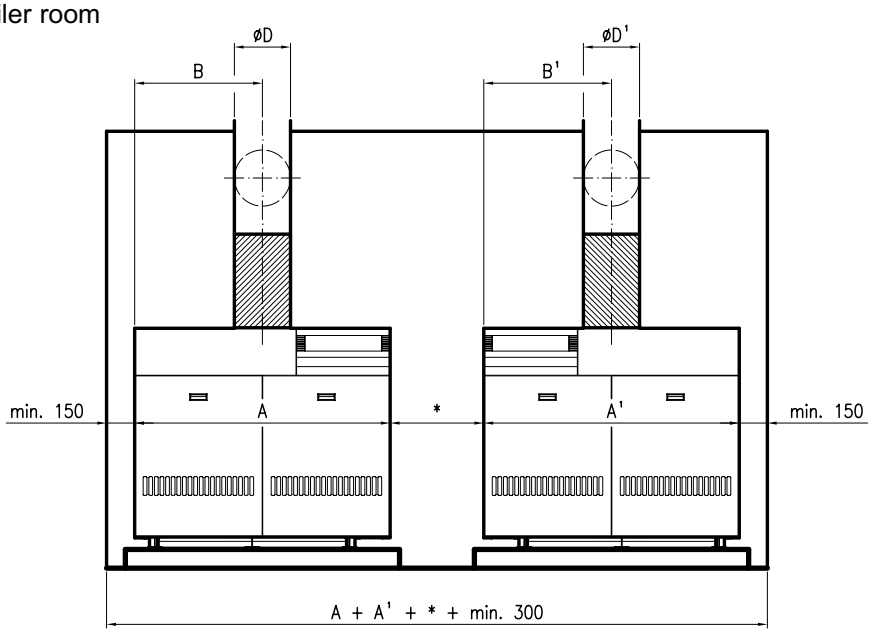


V = min. length 0.5 m before elbow, thus avoiding down-draught
W = min. 150 mm with vertical flue outlet
W = min. 0.5D + 50 mm with horizontal flue outlet

** = free access to rear of boiler*
Note:
Right hand execution is shown: instrument panel, gas and water connections on the right hand side; left hand execution is mirror image

Fig. 02 Installation 1

2 boilers in boiler room



** = free access to rear of boiler*

Note:
Both right and left hand execution are shown:
- *left boiler: instrument panel, gas and water connections on the right hand side;*
- *right boiler: instrument panel, gas and water connections on the left hand side.*

Fig. 03 Installation 2

		Dimensions (mm)		
		A	**B**	**Ø D**
Number of sections	**11**	1365	682.5	300
	13	1565	782.5	300
	15	1763	881.5	350
	17	1963	981.5	350

6. REGULATION AND SAFETY EQUIPEMENT

6.1 General
The Remeha Gas 450 is supplied with electronic control and safety equipment with ionisation flame detection.

6.2 Instrument panel
The Remeha Gas 450 is supplied with an instrument panel that is fitted in the front of the boiler. The standard instrument panel can be extended with the fitting of the following options: hour run meters, water pressure switch, down draught thermostat, no volt contacts and/or ***rematic***® control.

All connections are pre-wired and fitted with plugs. The capillaries from the control panel should be fitted in the pocket of the boiler, which is fitted in the flow connection of the boiler.

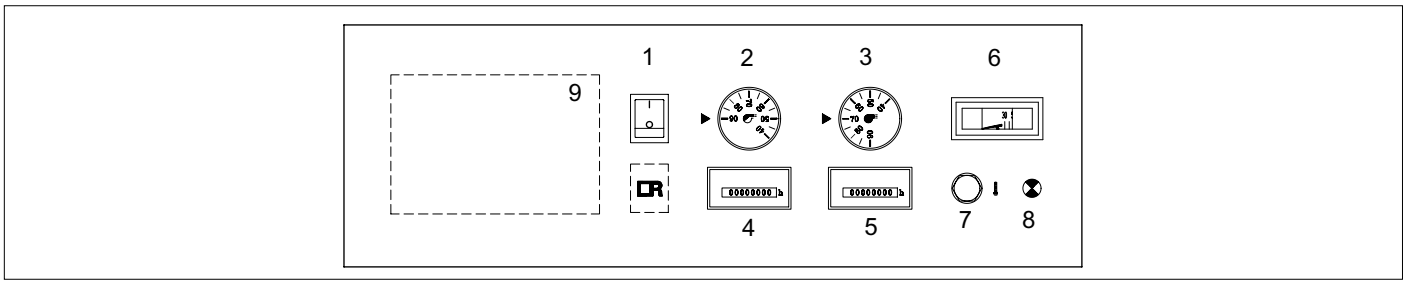


Fig. 04 Layout of the instrument panel, extended with hour counters

1. Operating switch (On/Off)
2. Control thermostat On/Off. Setting between 35 - 95°C
3. Control thermostat high/low. Setting between 35 - 95°C
4. Hour run meter total running hours (not standard)
5. Hour run meter full load hours (not standard)
6. Analogue thermometer for water temperature
7. High - Limit thermostat 110°C (pre set)
8. Warning light (lock out)
*9. Option for **rematic**® weather compensator*

6.3 Standard electronic gas train High/Low

6.3.1 Schematic

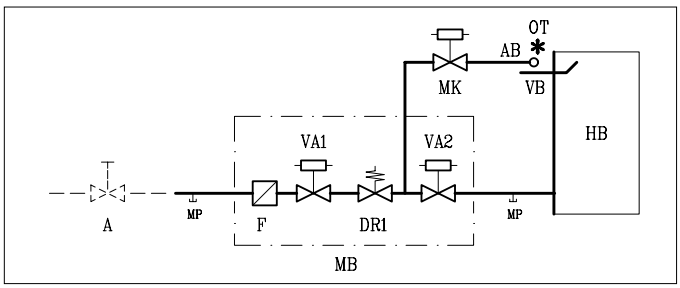


Fig. 05 Gastrain

Legend
A Gas cock
AB Pilot burner
DR Gas governor
F Gas filter
HB Main gas burners
MB Gas multibloc
OT Ignition transformer
MK Pilot gas valve
MP Measuring point
VA Safety shut off valve
VB Ionisation probe
- - - - Not supplied.

6.3.2 Specification
1 Gas Multi-Bloc contains:
  2 Safety shut off valves
  1 Gas governor
  1 Gas filter
1 Pilot gas valve
1 Pilot burner with ionisation probe and ignition probe

6.3.3 Control panel behind front panel
1 Control box Satronic
1 Ignition transformer 16 kV

6.4 Functions

6.4.1 Flame protection
Flame protection by means of ionisation flame detection.

6.4.2 Down draught thermostat
Optional the boiler can be fitted with a down draught thermostat. When there is down draught of the flue gases this thermostat will switch off the boiler.
Fixed setpoint is 70°C.

6.4.3 Thermostats
Control thermostat On/Off 35°-95°C.
Control thermostat High/Low 35°-95°C.
High-Limit thermostat locks out at 110°C.

7. ASSEMBLING AND INSTALLATION GUIDELINES

7.1 General
The boiler is suitable for operating at a maximum working pressure of 6 bar and a minimum pressure of 0.8 bar. Boiler can be installed in open or closed systems.

7.2 Boiler assembly
Broag can provide special tools on loan for the boiler assembly with detailed building instructions. However, building supervision and/or actual boiler erection services can be provided by Broag or an approved boiler erection engineer.

7.3 Water connections
The boiler water connections ($2^1/_2$" BSP) are fitted at the rear of the boiler (can be assembled either left or right). The two end sections have a $^3/_4$" BSP tapping with plug, one end section to accept a drain/off cock (to be assembled on the same side as the gas/water connections) and other end section to accept a plug.

7.4 Pocket for instrument panel
The thermostat pocket is fitted in the flow connection of the boiler.

7.5 Water pressure
Each section is hydraulically tested to at least 10 bar. Maximum test pressure for the assembled boiler block is 8 bar. Operating pressure between 0.8 bar and 6 bar. Optional the boiler can be fitted with a water pressure switch, set at 0.8 bar.

8. GAS SUPPLY

8.1 General
The gas train is fitted behind the front casing.
The local Gas authority should be consulted to ensure that an adequate pressure and supply is available at the boilers maximum output. To minimise risk of sediment or foreign particles entering the control valves, an approved filter may be fitted into the pipe work downstream.
The gas supply should be conform to the British Gas safety regulations.

8.2 Gas pressure
Cat. I_2H
Maximum gas pressure at inlet 100 mbar.
Burner pressure:
- full load : 14.0 mbar (100%)
- part load : 5.0 mbar (60%)
- injector size: 3.85 mm Ø

Note: LPG version on request.

9. ELECTRICAL SUPPLY

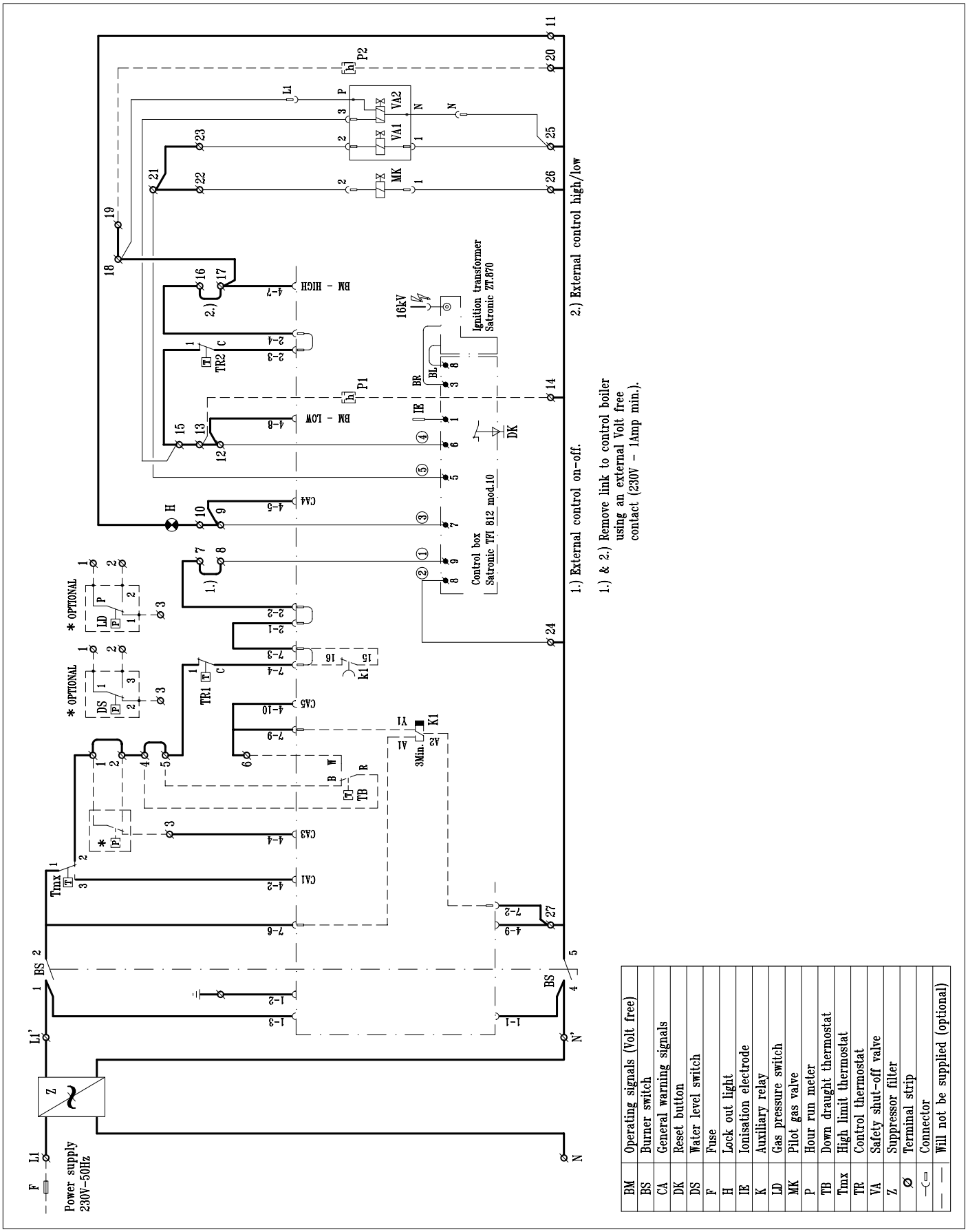
9.1 General
The electrical installation must conform to the IEE regulations and also to local authority requirements.

9.2 Control panel
A control panel is fitted behind the front casing on the same side as the water and gas connections.

9.3 Electrical connections
The boiler is pre-wired. Only the main supply should be wired to the control panel.

9.4 Electrical data
Main supply : 230 V-50Hz (L/N).
Running current: 155 VA.
Installed fuse : 6 Amp.

9.5 Wiring diagram boiler



BM	Operating signals (Volt free)
BS	Burner switch
CA	General warning signals
DK	Reset button
DS	Water level switch
F	Fuse
H	Lock out light
IE	Ionisation electrode
K	Auxiliary relay
LD	Gas pressure switch
MK	Pilot gas valve
P	Hour run meter
TB	Down draught thermostat
Tmx	High limit thermostat
TR	Control thermostat
VA	Safety shut-off valve
Z	Suppressor filter
Ø	Terminal strip
—⊂⊃	Connector
— —	Will not be supplied (optional)

Fig. 06 Wiring diagram

10. COMMISSIONING

Note:
Commissioning to only be carried out by a qualified engineer with the relevant training and certification i.e. Acops - Corgi and a commissioning data sheet completed on site for issue to owner.

10.1 Technical information

Control box: Satronic TFI 812-2 mod. 10.
Main supply: 230 V-50 Hz.
Minimum ionisation current: 3 µA.
Reaction time flame protection: 1 sec.
Safety time: < 10 sec.
Maximum ambient temperature: 60°C.
Injector size pilot burner: Ø 0.5 mm.
Injector size main burner: Ø 3.85 mm.
Burner pressure full load: 14.0 mbar (100%).
Burner pressure part load: 5.0 mbar (60%).

Warning:
Control box is neutral/phase sensitive: if incorrectly connected the boiler will not start.

10.2 Commissioning the boiler

1. Check gas connections.
2. Check electrical supply (L/N and earth).
3. Check water connections and if installation is filled.
4. Switch on circulation pump and check rotation direction.
5. Open main gas cock (release air in gas pipe work).
6. Switch on electrical supply.
7. Set the control thermostats at about 85°C.
8. After a waiting time of about 3 seconds you will get ignition. At a minimum ionisation current of 3 µAmp the safety gas valve will open. The boiler is on.
9. Let the boiler run for a couple of minutes to get rid of air in the gas pipe.
10. Set the correct burner pressure.
11. Check the thermostats for correct operation.
12. Check the flame protection, by starting with the ionisation probe disconnected.
13. Send the commissioning reports to Broag.

10.3 Switching off the boiler

1. Set boiler controls to off.
2. Allow system to cool.
3. Switch off the electrical supply.
4. Turn off the gas cock.

11. MAINTENANCE

11.1 General

It is essential for efficient operation, to service the boiler, the gas train and clean the boiler room once a year.

11.2 Maintaining the boiler

1. Remove the front casing of the boiler.
2. Remove the top casing and the top of the flue hood.
3. Clean the internal flue ways of the boiler with a steel cleaning brush (available from Broag).
4. Clean the boiler room and the floor underneath the boiler.
5. Clean the burners internally and externally and check the kanthal bars.
6. Clean the boiler casings.
7. Clean the gas train, ignition, pilotburner, thermostats and wiring.
8. Check the gas train and pipe for gas leakage.
9. Check the start program, ignition time and safety times.
10. Check flame protection and thermostats.
11. Check the boiler input at 100% (full load) and 60% (part load).
12. Make a combustion efficiency calculation.
13. Check the boiler and installation for water leakage.

Remeha Gas 450

Broag Ltd.

Head office

Remeha house

Molly Millars Lane

Wokingham,

Berkshire RG41 2QP

Tel.: 0118 978 3434

Fax: 0118 978 6977

E-mail address:

boilers@broag-remeha.com

Branch office

Unit 3, Kestrel Close,

Quarry Hill ind. Estate,

Ilkeston

Derbyshire DE7 4RD

Tel.: 0115 944 0778

Fax: 0115 944 0588

ISO 9001 since 1988

CE

Subject to alterations
53899/1.500/0401/Ho.

remeha

Clean Heat

Technical information

Remeha Gas 550/550 Duo

Remeha Gas 550/550 Duo

- Atmospheric gas boiler
- 278 - 1058 kW

remeha
Clean Heat

TABLE OF CONTENT

PREFACE

These technical instructions contain useful and important information for the correct operation and maintenance of the Remeha boiler, model Gas 550 and Gas 550 Duo.

Read these instructions carefully before putting the boiler into operation, familiarise yourself with it's control functions and operation, strictly observing the instructions given. Failure to do so may invalidate warranty or prevent the boiler from operating.

The installation and commissioning of the boiler must be carried out by a competent Engineer, with the relevant certification i.e.: CORGI, ACOPS, IEE regs. etc.
On completion a copy of the boiler log / commissioning sheet should be returned to Broag Ltd for record purposes.

If you have any questions, or if you need more information about specific subjects relating to this boiler, or it's installation please do not hesitate to contact us.
The data published in these technical instructions is based on the latest information (at date of publication) and may be subject to revisions.
We reserve the right to continuous development in both design and manufacture, therefore any changes to the technology employed may not be retrospective nor may we be obliged to adjust earlier supplies accordingly.

1 BOILER DESCRIPTION

The Remeha Gas 550 series boiler is a cast iron sectional boiler, with a powder coated enamel steel casing compleet with glass fibre insulation.It has high / low atmospheric gas burners, suitable for natural gas, cat. I_{2H} - 20 mbar.
It is supplied in sections for delivery and on site assembly.

The boiler meets the requirements of the CE regulations at the following directives:
- Gas appliance directive no. 90/396/EEC;
- Efficiency directive no. 92/42/EEC;
- E.M.C. directive no. 89/336/EEC.

And is correspondent with:
- Electrical low voltage directive no. 73/23/EEC.

Remeha Gas 550 (Duo)-reference number: 0063AP6520

Classification type for evacuation of the combustion products, according: EN-656: B11, B11BS.

For further advice or information contact Broag Ltd.

2 CONSTRUCTION DETAILS

2.1 General
The Remeha Gas 550 / 550 Duo is a floor standing boiler complete with temperature and safety controls. The cast iron sectional heat exchanger is assembled using conical nipples and jointing compound.The boiler has a built in draft diverter. It has water connections at the side within the casing dimensions and a gas train to one side.

Note: Both water and gas connections can be handed on site during assembly. But the instrument panel, mounted in the front casing should always be fitted on the same side as the flow connection.
The casings can be fitted after the flue and pipework to the boiler have been installed and connected.

2.2 Burners
The burners are stainless steel, atmospheric type with a heat reflecting floor plate providing the correct ventilation distribution. Front and top access is required for service work to be carried out.

Note: The Gas 550 Duo has two complete boiler units within one casing using a common flue connection.

2.3 Assembly
The boiler cannot be supplied pre-assembled and must be assembled on site.

3 DIMENSIONS AND TECHNICAL DATA

3.1 Dimensions Remeha Gas 550

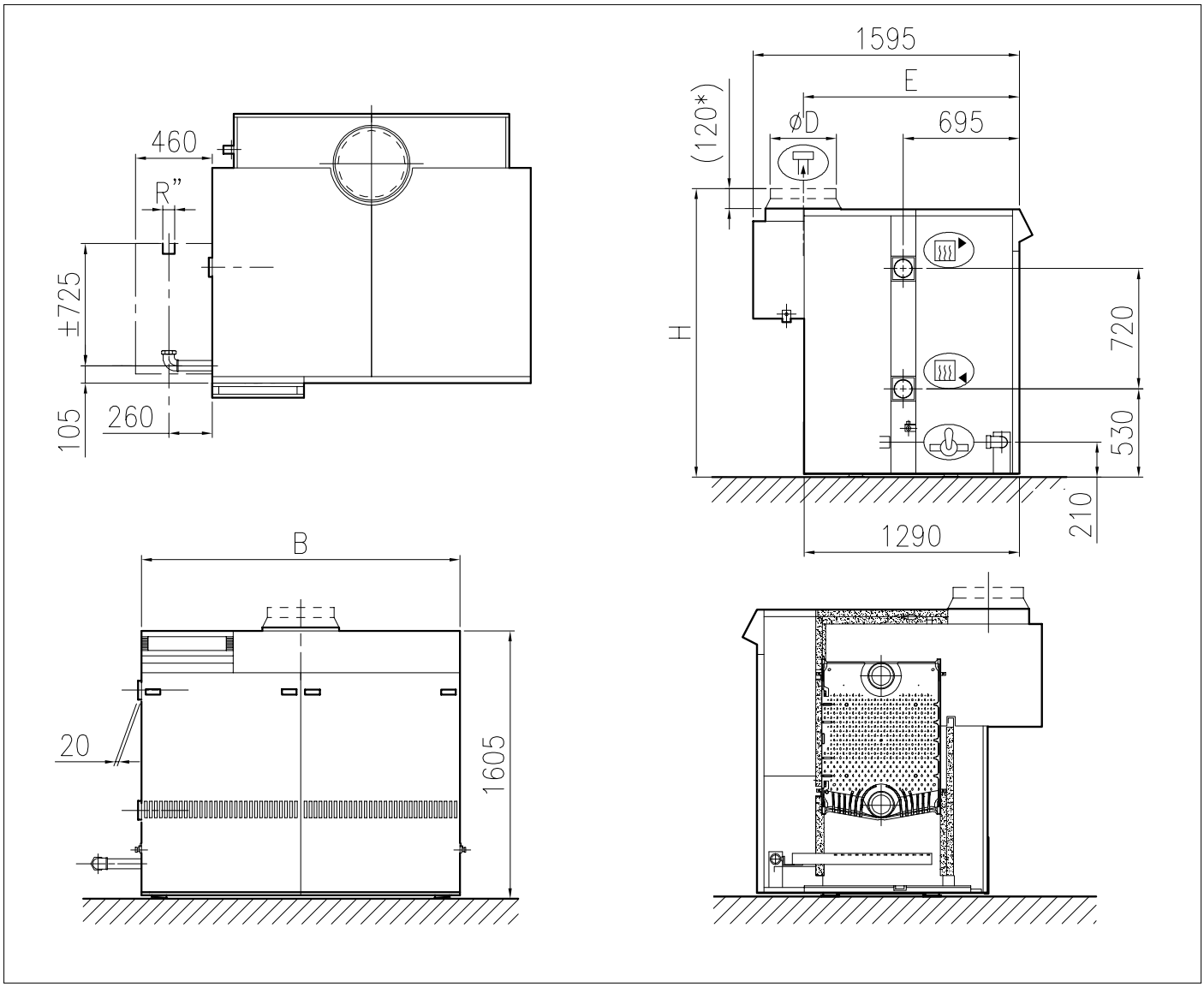


Fig. 01 Dimensions Remeha Gas 550

00.05F.79.00002

Flow Ø107 int.

Return Ø107 int.

Gas 2"

Flue gas Ø

Number of sections			10	12	14	16	18	20	22
Nominal heat output		kW	139-278	170-340	202-403	233-466	265-529	296-592	328-656
Nominal heat input	Hi / NCV	kW	160-309	195-378	232-448	266-518	301-588	337-657	372-728
	Hs / GCV	kW	177-343	217-420	256-498	296-576	335-653	374-730	414-809
Gas consumption		m^3/h	33	40	47	55	62	70	77
Dimensions	B	mm	1240	1460	1680	1900	2120	2340	2560
	Ø D	mm	300*	350*	400*	450	450*	500	500*
	E	mm	1295	1295	1295	1295	1295	1295	1245
	H	mm	1730	1730	1730	1610	1730	1610	1730
Flue temperature		°C	154	152	146	138	138	142	142
Water resistance	Δt = 10°C	mbar	64	72	80	128	160	180	196
	Δt = 20°C	mbar	16	18	20	32	40	45	49
Water contents		litre	291	349	407	465	523	581	639
Boiler weight (dry)		kg	1450	1695	1940	2185	2430	2675	2920
Flue gas flow rate		kg/h	692	847	1033	1239	1376	1560	1678

Table 01 Technical data Remeha Gas 550
** Supplied with a flue gas pipe adapter*

3.2 Dimensions Remeha Gas 550 Duo

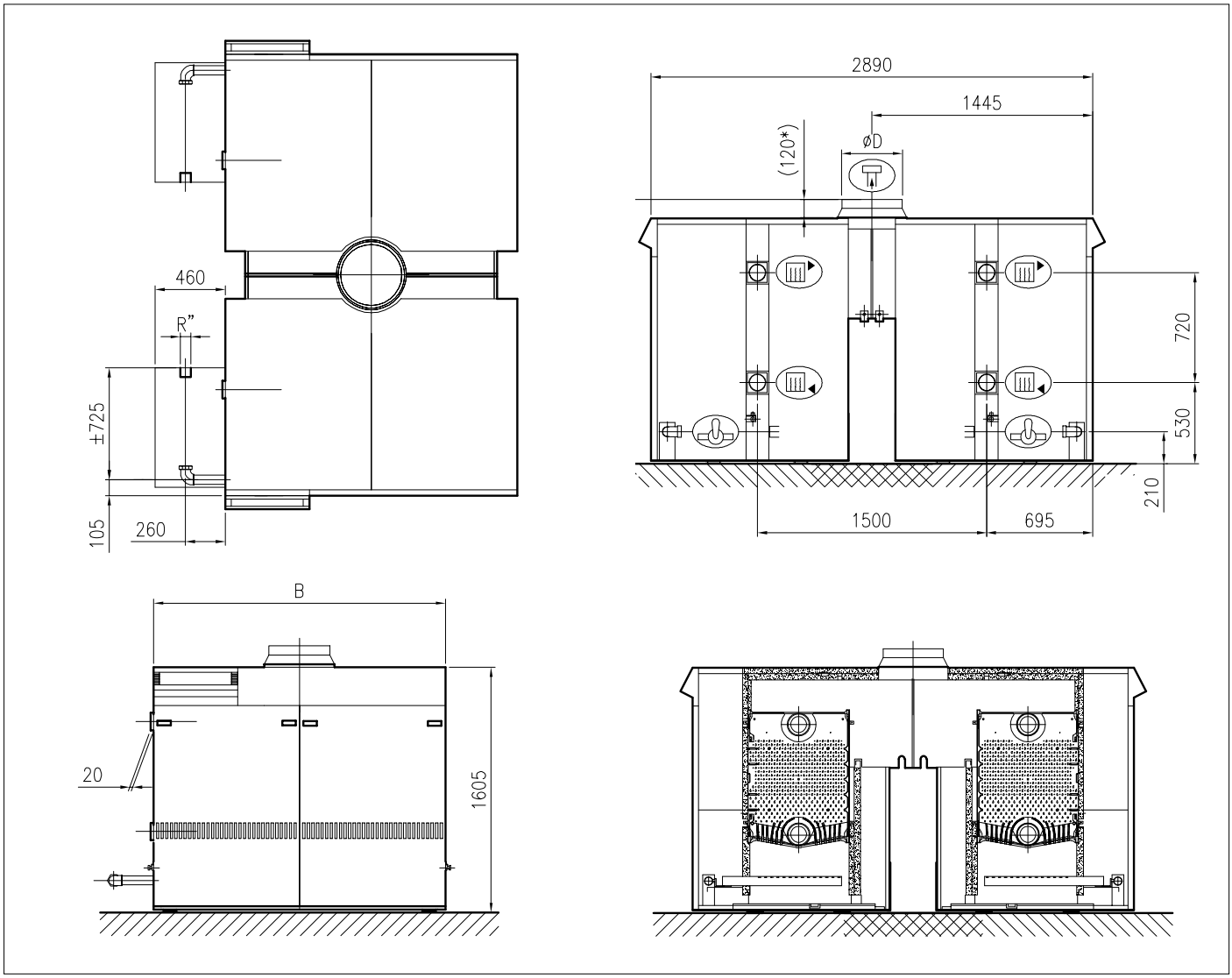


Fig. 02 Dimensions Remeha Gas 550 Duo
00.05F.79.00003

Flow Ø107 int.

Return Ø107 int.

Gas 2"

Flue gas Ø

Number of sections			2 x 10	2 x 12	2 x 14	2 x 16	2 x 18
Nominal heat output		kW	139-556	170-680	202-806	233-932	265-1058
Nominal heat input	Hi / NCV	kW	160-618	195-756	232-896	266-1036	301-1176
	Hs / GCV	kW	177-686	217-840	256-996	296-1152	335-1306
Gas consumption		m^3/h	66	80	94	110	124
Dimensions	B	mm	1240	1460	1680	1900	2120
	Ø D	mm	450*	500*	600*	650	650*
Water contents		litre	582	698	814	930	1046
Boiler weight (dry)		kg	2900	3390	3880	4370	4620
Flue gas flow rate		kg/h	1385	1694	2066	2478	2752

Table 02 Technical data Remeha Gas 550 Duo
** Supplied with a flue gas pipe adapter*

4 APPLICATION INFORMATION

4.1 L.P.H.W. system

4.1.1 Water temperature

Maximum water temperature is 110°C (high limit thermostat).
Highest boiler water temperature is 95°C (control thermostat).
Minimum return water temperature is 20°C at a flow rate related to a Δt of 20°C (flow/return temp).

4.1.2 Water pressure

Boiler sections are factory pressure tested at 10 bar.
Maximum pressure test boiler block is 7,8 bar.
Maximum working pressure is 6 bar
Minimum working pressure is 0,8 bar at a maximum working temperature of 110°C or 0,3 bar at a maximum working temperature of 95°C.

4.1.3 Water flow

The minimum water flow through the boiler on shut down is:

$$\frac{\text{Output boiler in kW}}{93} = m^3/h$$

This minimum flow must be maintained for approximately 5 minutes after the burner stops firing to avoid high temperature shut down due to residual heat gain.
Due to the design and manufacture of the boiler no specific minimum water flow requirements exist other then for overheating protection.

4.1.4 Water treatment

The system should be filled with mains cold water (for the UK this will usually have a pH of between 7 and 8).
Pressurised installations with a boiler/system content ratio of 1:10 or less should not require water treatment, provided that the following conditions apply:

1. The system is flushed thoroughly to remove all fluxes and debris and then filled completely once.
2. Make up water is limited to 5 % per annum.
3. The hardness of the water does not exceed 360 ppm (20°D).

All scale deposits will reduce the efficiency of the boiler and should be prevented. However provided the above is complied with any scale produced will not be too detrimental to the boiler efficiency and will not reduce the anticipated life expectancy of the boiler.

Note: Scale deposits in excess of 3 to 5 mm will reduce boiler efficiency and greatly increase the risk of premature casting failure.

As most systems contain a variety of metals which can react with each other to cause corrosion. It is considered good practice to provide some form of water treatment (especially in open vented systems) in order to prevent or reduce the following:
- Metallic corrosion;
- Formation of scale and sludge;
- Microbiological contamination;
- Chemical changes in the untreated system water.

Suitable chemicals and their use should be discussed with a specialist water treatment company prior to carrying out any work. The specification of the system and manufacturers recommendations must be taken into account, along with the age and condition of the system. New systems should be flushed thoroughly to remove all traces of flux, debris, grease and metal swarf generated during installation. Care to be taken with old systems to ensure any black metallic iron oxide sludge and other corrosive residues are removed, again by thoroughly flushing, ensuring that the system is drained completely from all low points.

Note: Please ensure that the new boiler plant is not in circuit when the flushing takes place, especially if cleansing chemicals are used to assist the process.

Under no circumstances is the boiler to be operated with cleaning chemicals in the system.

To Summarise:
- Minimise water loss;
- Prevent pumping over in open vented systems;
- Provide adequate air venting at all high points;
- Keep pH level between 7 - 9 when using additives;
- Maximum chlorine content of 200 mg/l;

Take advice on the suitability of inhibitors.

4.1.5 Noise level
The noise level measured around the boiler depending on boiler room construction is about 50-55 dBA. Noise levels taken at 1 meter from the boiler.

4.2 Chimneys
The average flue gas temperature is so low that the chimney must be made in accordance with the guidelines of British Gas (BS 6644).

4.3 Installation standards
The following instructions must be adhered to when the Remeha Gas 550/550 Duo is installed:
Gas Safety (installation and use) Regulations 1984 (as amended).
In addition to the above regulations, this boiler must be installed in compliance with:
- Current I.E.E. Regulations for electrical installations
- Local building regulations
- The Building Standards (Scotland)
- (Consolidation) Regulations
- By-laws of the local water undertaking
- Health and Safety Document No 635 ‘The Electricity at Work Regulations 1989’.

It should also be in accordance with the relevant recommendations in the current editions of the following British Standards and Codes of Practice, viz. BS 5440 Pt 1 and 2, BS 5449, BS 5546,
BS 6798, BS 6891 and BG.DM2.

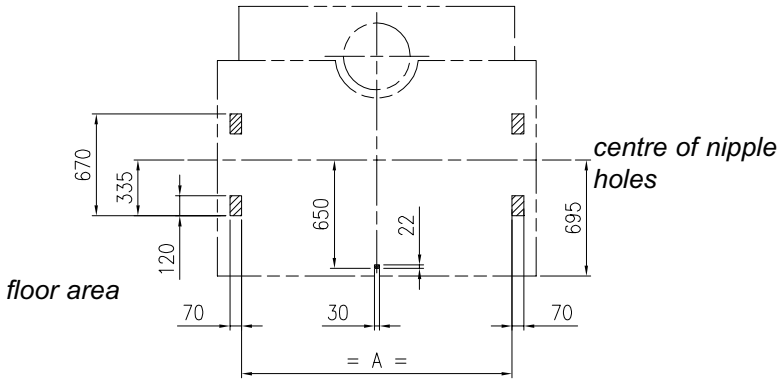
Lawfully all gas appliances must be installed by competent persons (e.g. Corgi, ACOPS).
Failure to install appliances correctly could lead to prosecution.
It is in your own interest and that of safety to ensure that the law is complied with.

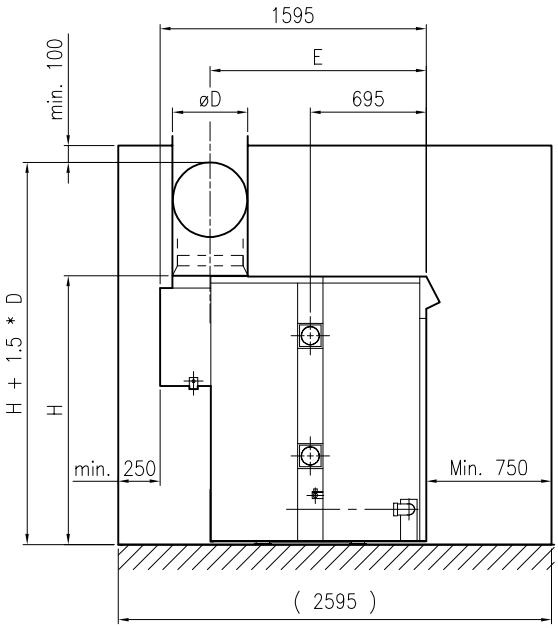
Important:
The Remeha Gas 550/550 Duo is a certified appliance and must not be modified or installed in any way contrary to these ‘Installation and Servicing Instructions’.
Manufacturer instructions must NOT be taken in any way as when overriding statutory obligations.

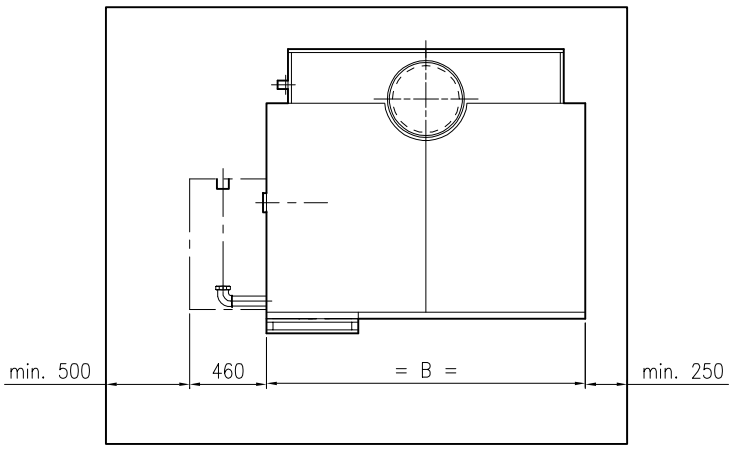
5 TYPICAL BOILER INSTALLATIONS

5.1 Installation 1

Recommended layout for boiler installation, measurements in mm.







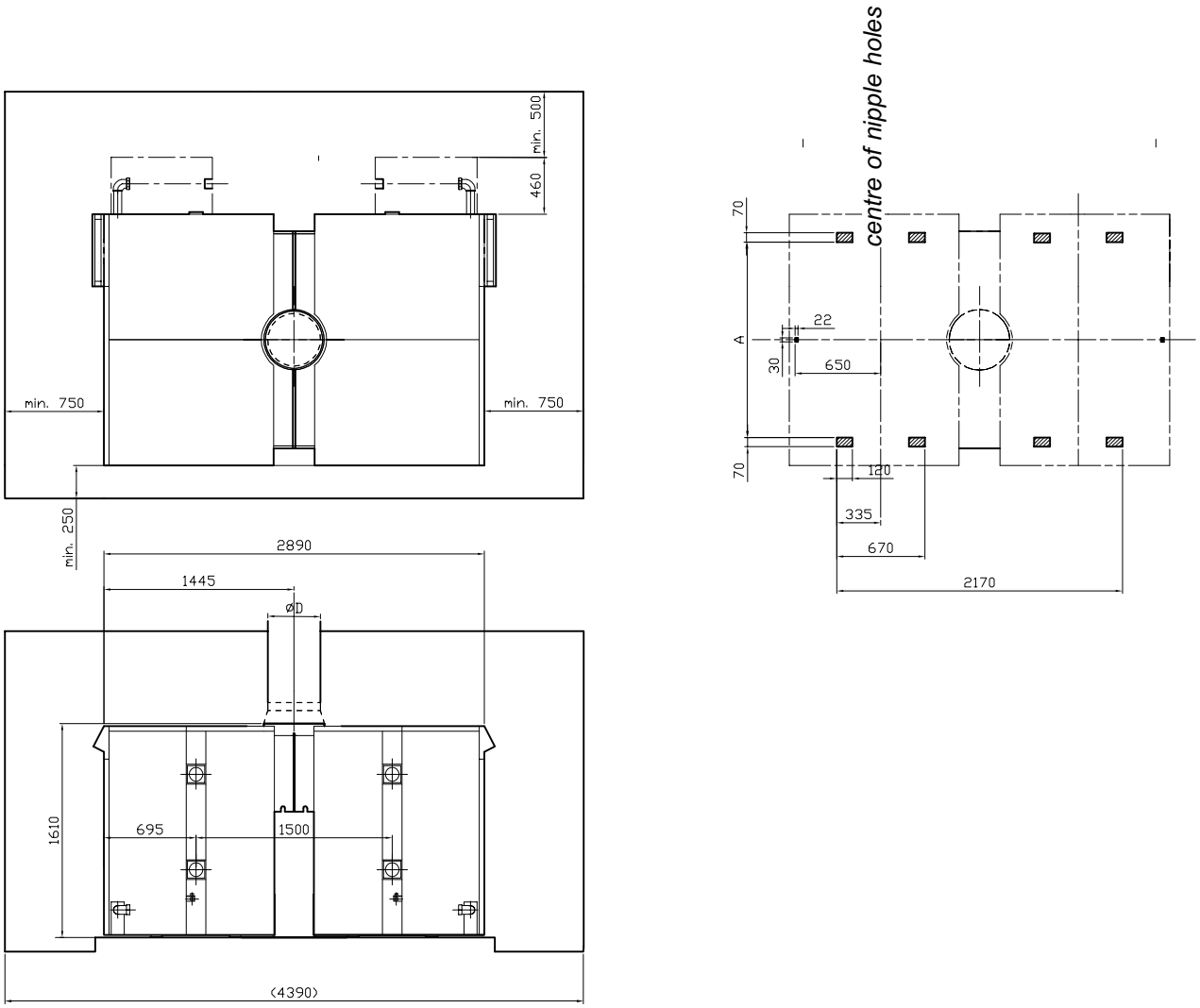
number of sections	10	12	14	16	18	20	22
Size A	965	1185	1405	1625	1845	2065	2285
Size Ø D	300	350	400	450	450	500	500
Size B	1240	1460	1680	1900	2120	2340	2560
Size E	1295	1295	1295	1295	1295	1295	1245
Size H	1730	1730	1730	1610	1730	1610	1730

Fig. 03 Remeha Gas 550

00.05F.79.00004

5.2 Installation 2

Recommended layout for boiler installation, measurements in mm.



number of sections	10	12	14	16	18
Size A	965	1185	1405	1625	1845
Size Ø D	450	500	600	650	650

Fig. 04 Remeha Gas 550 Duo

00.05F.79.00005

6 CONTROL AND SAFETY EQUIPMENT

6.1 General
The Remeha Gas 550 is supplied with electronic control and safety equipment with ionisation flame detection.

6.2 Instrument panel
The Remeha Gas 550 is supplied with an instrument panel mounted in the front of the boiler, either left or right. All connections are pre-wired and fitted with plugs. The capillaries from the instrument panel should be fitted in the thermostat pocket of the boiler flow connection, which is fitted in the top front of the end section.

The instrument panel and the flow connection with thermostat pocket should always be fitted on the same side of the boiler, either left or right.

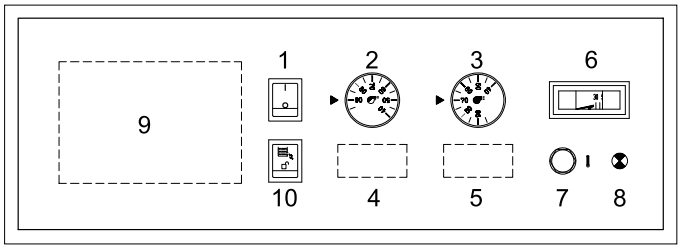


Fig. 05 Instrument panel
04.05F.79.00001

The instrument panel contains:
1. Operating switch (On/Off);
2. Control thermostat On/Off, range 35°C-95°C;
3. Control thermostat High-Low, range 35°C-95°C;
4. Hour run meter total running hours (option);
5. Hour run meter full load hours (option);
6. Analogue thermometer for flow temperature;
7. High – limit thermostat preset to 110°C;
8. Lock out warning lamp;
9. Option for ***rematic***® weather compensator;
10. Reset for water level control.

The Instrument panel mounted in the front casing also contains circuit boards for:
- Water level control (see §9.6);
- Common alarm and operating signal.

6.3 Standard electronic gas train High/Low
6.3.1 Schematic

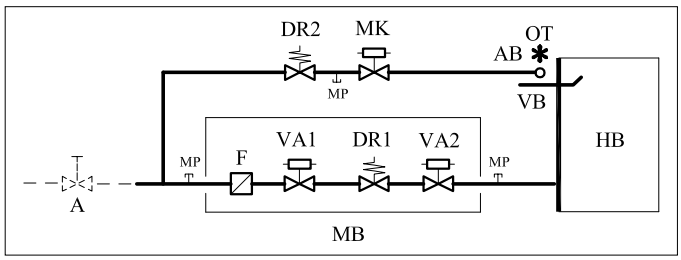


Fig. 06 Schematic layout gas train
04.05F.AP.00001

Legend

A	Gas cock
AB	Pilot burner
DR	Gas pressure regulator
F	Gas filter
HB	Burners
MK	Pilot gas valve
MP	Measuring point
VA	Safety shut off valve
OT	Ignition transformer
VB	Ionisation probe
MB	Gas multibloc valve
- - -	Not supplied as standard

6.3.2 Control panel on gas train
The instrument panel is linked to the control panel on gas train by means of a cable and connector. If required the control panel (and gas train) can be fitted on the opposite side of the boiler by using extension cables (option).

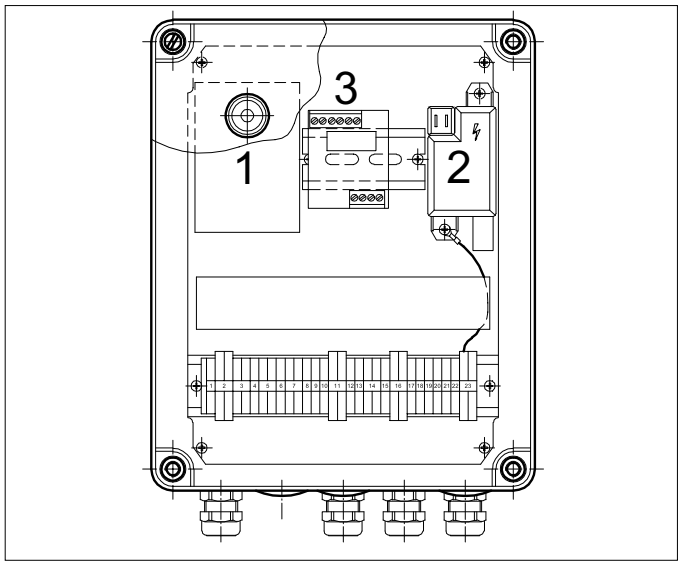


Fig. 07 Front of Control panel
04.05F.79.00002

1. Control box Satronic MMI 816;
2. Ignition transformer Satronic ZT 870;
3. Operation report circuit board.

6.3.3 Specification control box

Control box	: Satronic MMI 816
Main supply	: 230 V – 50 Hz
Minimum ionisation current	: min 3 µA (DC)
Reaction time flame protection	: 1 sec.
Safety time	: ≤ 10 sec.
Maximum ambient temperature	: 60 °C
Injector size pilot burner	: Ø 1.0 mm
Injector size main burner	: Ø 5.4 mm
Burner pressure full load (high calorific gas)	: 8.4 mbar (100%)
Burner pressure part load (high calorific gas)	: 2.2 mbar (50%)
Burner pressure pilot burner (high calorific gas)	: 13 mbar

Warning: control box is phase neutral sensitive.

6.3.4 Specification Ignition transformer

Ignition transformer	: Satronic ZT 870
Ignition voltage	: 16 kV
Distance electrodes	: 3,5 ± 1 mm.

6.4 Functions

General

The following functions (standard and optional) will, when activated, either lock out or shut down the boiler. For all options full fitting instructions are included in the option pack.

6.4.1 Flame control (lock out)

The flame is monitored using ionisation flame detection. In the event of a flame failure the boiler will lock out. Manual intervention is required to reset the boiler (on the control panel) once the cause of the problem has been rectified.

Note: The Gas 550 Duo has two sets.

6.4.2 Thermostats (shutdown / lock out)

- **Control thermostat On/Off:** shutdown (35°C-95°C); The boiler will automatically resume operation when the flow temperature falls below the set point.
- **Control thermostat High/Low:** shutdown (35°C-95°C); The boiler will automatically resume operation when the flow temperature falls below the set point.
- **High Limit thermostat:** lock out at 110°C. The boiler will lock out. Manual intervention is required to reset the boiler (on the instrument panel) once the cause of the problem has been rectified.

Note: The Gas 550 Duo has two sets.

6.4.3 Water level control (lock out)

The boiler is equipped with a water level sensor to prevent boiler from operating without water. The boiler will lock out. Manual intervention is required to reset the boiler (on the instrument panel) once the cause of the problem has been rectified.

Note: The Gas 550 Duo has two sets.

6.4.4 Valve leakage control - optional (lock out)

The gas train can be combined with a valve leakage control, which checks for gas leakage between the valves at every start. The boiler will lock out. Manual intervention is required to reset the boiler (on the valve leakage control) once the cause of the problem has been rectified.
Type: Dungs VPS 504.

Note: The Gas 550 Duo requires two sets.

6.4.5 Gas pressure switch LD - optional (shut down)

If the supply gas pressure drops below the set value (12mbar; for natural gas, cat. I_{2H} only), the boiler will shut down. When the supply gas pressure returns above this set value the boiler will resume operation again.
Type: Dungs GW50 A5.

Note: The Gas 550 Duo requires two.

6.4.6 Gas pressure switch HD - optional (lock out)

If the gas arrival pressure rises above the set value (10mbar; for natural gas, cat. I_{2H} only), the boiler will lock out. Manual intervention is required to reset the boiler (on the gas pressure switch) once the cause of the problem has been rectified.
Type: Dungs UB 50 A2.

Note: The Gas 550 Duo requires two.

6.4.7 Down draught thermostat; (optional, shut down)

If the themperature in the draft diverter rises above the down **draught** thermostat set point, the boiler will shut down. It automatically resets after 3 minutes, provided that the temperature also falls.
Type: Honeywell L6068A; fixed setpoint is 70°C.

Note: The Gas 550 Duo requires two.

7 ASSEMBLY AND INSTALLATION GUIDELINES

7.1 General
The boiler is suitable for operating at a maximum working pressure of 6 bar. It can be installed in open vented or sealed systems with a minimum pressure of 0.8 bar sealed and 0.3 bar open vented.

7.2 Boiler assembly
The boiler is supplied with full assembly instructions. On request special assembly tools can be hired from Broag on a daily basis.
However, Broag (or a Broag approved boiler erection engineer) can provide boiler assembly services and / or building supervision.

7.3 Water connections
The boiler flow and return connections can be fitted on either side of the boiler (left or right hand side) dependant on design or site conditions.
The boiler comes with four flanges, 2 x blank and 2 x Ø 107 mm (int.) weld neck.
The end sections have a 3/4 " BSP tapping to accept the supplied drain cock.

Note: The Gas 550 Duo has two sets.

7.4 Pocket for the thermostat capillaries
The multi pocket for the thermostat capillaries should be fitted in the top front-end section of the boiler and on the same side of the boiler as the instrument panel. The water level control electrode should be fitted in the 1" tapping of the other end section.

Note: The Gas 550 Duo has two sets.

7.5 Water pressure
Each section is hydraulically tested at 10 bar. Maximum test pressure for the assembled boiler block is 7.8 bar. Minimum working pressure is 0.8 bar at a maximum working temperature of 110°C or 0.3 bar at a maximum working temperature of 95°C. Maximum working pressure is 6 bar.

8 GAS SUPPLY

8.1 General
The instrument panel (mounted in the front casing) must be mounted on the same side of the boiler as the flow connection, either left or right (choice on assembly). As standard the gas train must also be on the same side as the flow connection. However an extension cable can be supplied (option) to allow the gas train to be mounted on the opposite side to the instrument panel.

The local Gas authority should be consulted to ensure that an adequate pressure and supply is available at the boilers maximum output. To minimise risk of sediment or foreign particles entering the control valves, an approved filter can be fitted into the pipe system downstream.
The gas supply should be conforming to the British Gas safety regulations.

Note: The Gas 550 Duo requires two gas supplies.

8.2 Gas pressure
Natural gas, cat. I_{2H} (20mbar)
Maximum gas pressure at inlet 100 mbar.
Main burner pressure settings :

- full load	:	8.4 mbar
- part load	:	2.2 mbar
Pilot burner pressure settings	:	13 mbar
Gas inlet pressure	:	17 - 25 mbar

8.3 Injectors

Injector size main burner	:	5.4 mm
Injector size ignition burner	:	1.0 mm

Note: The Gas 550 Duo has two sets.

9 ELECTRICAL SUPPLY

9.1 General
The electrical installation must conform to the IEE regulations and also to local authority requirements.

9.2 Instrument panel
The Gas 550 is supplied with an instrument panel that is fitted in the front of the boiler, either left or right (dependant on flow and gas connection).

Note: The Gas 550 Duo has two instrument panels and requires two sets of power supplies.

9.3 Control panel
A control panel is fitted on the gas train.

Note: The Gas 550 Duo has two control panels and requires two sets of operating controls and has two sets of function indication.

9.4 Electrical connections
The boiler is pre-wired. Only the main supply should be wired to the instrument panel.

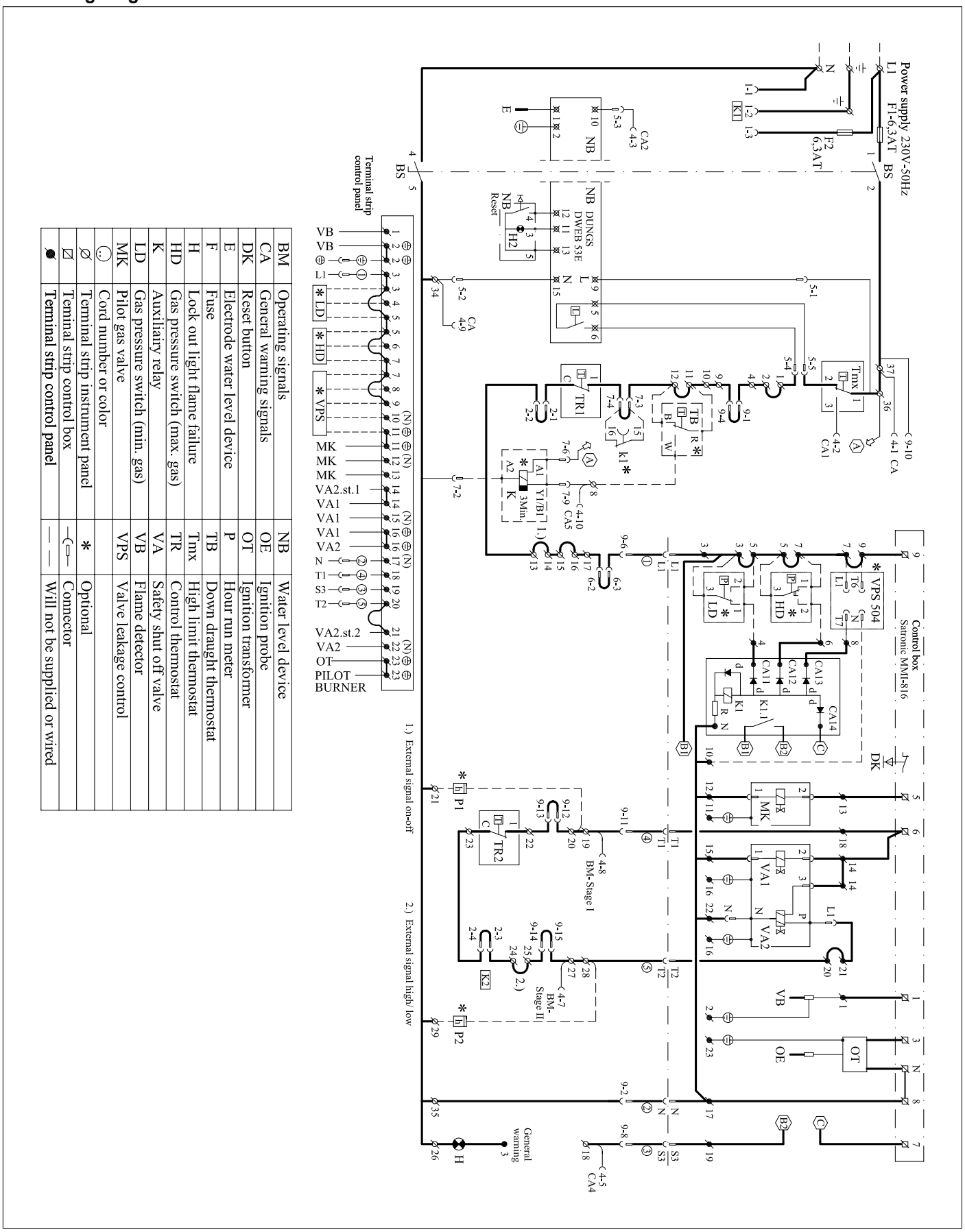
9.5 Electrical information
Main supply : 230 V-50 Hz (L/N)
Running current : 150 VA
Maximum fuse : 6 A (slow acting)

Note: The Gas 550 Duo requires two sets of power supplies.

9.6 Water level control
Water level control : Dungs DWEB 53E
Main supply : 230 V – 50 Hz
Running current : 5 W
Electrode voltage : 42 V (AC)
Working area : 100 – 10.000 mA (AC)
Electrode resistance : max. 20 kOhm; min. 1 kOhm
Electrode : Dungs FLE ½”
Must be fitted in one of the end sections (see 7.4).

Note: The Gas 550 Duo has two sets.

9.7 Wiring diagrams



BM	Operating signals	NB	Water level device
CA	General warning signals	OE	Ignition probe
DK	Reset button	OT	Ignition transformer
E	Electrode water level device	P	Hour run meter
F	Fuse	TB	Down draught thermostat
H	Lock out light flame failure	Tmx	High limit thermostat
HD	Gas pressure switch (max. gas)	TR	Control thermostat
K	Auxiliairy relay	VA	Safety shut off valve
LD	Gas pressure switch (min. gas)	VB	Flame detector
MK	Pilot gas valve	VPS	Valve leakage control
	Cord number or color		
	Terminal strip instrument panel	*	Optional
	Teminal strip control box		Connector
	Terminal strip control panel		Will not be supplied or wired

Fig. 08 Electrical principle diagram

04.05F.SC.00001

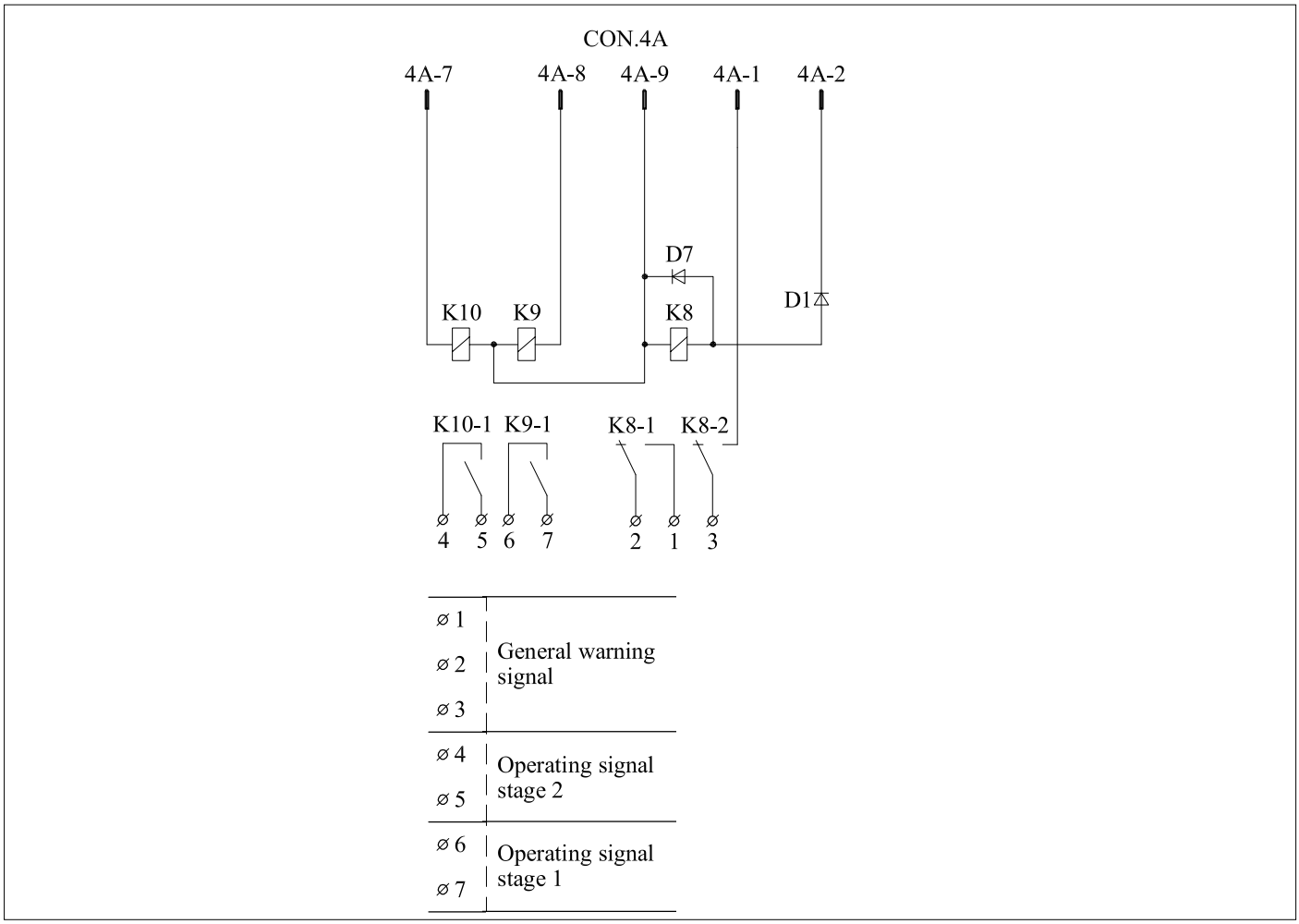


Fig. 09 Electric connection central alarm

00.03F.60.00042

10 COMMISSIONING

Note: Commissioning must only be carried out by a qualified engineer with the relevant training and certification i.e. Acops - Corgi. A commissioning data sheet / boiler logbook must be completed on site for issue to owner.

1. Check the gas connections.
2. Check the electrical supply (L/N and earth).
3. Check the water connections and whether the installation is full and under system pressure.
4. Switch on the circulation pump and check the rotation direction.
5. Open the main gas cock (purge gas pipeline).
6. Switch on the electrical supply.
7. Set both the thermostats to about 85°C.
8. If a control system is built in, put the selector switch-on manual operation.
9. Switch on the boiler.
   - If a **valve leakage control** is installed the following will take place:
     A membrane pump will create overpressure between safety valves VA1 & VA2, which are inside the multibloc gas valve. When, within 27 sec, an overpressure of 30 mbar (compared to the inlet pressure) is reached, the electric supply is released to the control box.
10. After a waiting time of about 13 seconds the ignition starts. The magnetic valve MK opens and ignition burner lights. At a minimum ionisation current of 3 µA the ignition stops. After 5 seconds the main gas valves VA1 en VA2 will open. The boiler runs.
11. Let the boiler run for a couple of minutes on high fire to clear any air still in the gas pipe.

12. Set the correct **full load burner pressure** by means of the pressure regulator on the gas multibloc gas valve(see Fig. 10, pos. 1).
    Warning: When the required burner pressure can not be reached because of low inlet pressure, ensure that the pressure regulator remains within it's operating range.

Now do the following:

- Set the burner pressure to the highest possible value (but not over the required full load burner pressure).
- Turn the pressure regulator anticlockwise until the burner pressure is affected.
- The burner pressure is now limited, this will prevent the boiler from being over gassed should the inlet gas pressure increase.

13. Set the correct **part load burner pressure:**

- Turn the high/low thermostat to it's minimum setting (35°C). When the flow temperature is over 35°C, the boiler will burn at part load.
- Set the part load burner pressure by turning the adjustment ring (Fig. 10, pos. 2).
- To check the the high fire setting: Turn the high/low thermostat to 85°C and check the full load burner pressure (if necessary re-adjust). The speed of opening of the main gas valve can also be adjusted to ensure a smooth light up. Setting the hydraulic brake on the main gas valve as follows:
- Remove the setting cap (Fig. 10, pos.3) and turn it upside down on the hydraulic brake.
- Turn it clockwise to slow down, anticlockwise to speed up.
- Check both burner pressures again and if necessary re-adjust.

14. Adjustment of the **gas pressure switch** LD (optional):
    - Switch the boiler to full load.
    - Connect a pressure gauge to measuring point LD.
    - Turn the adjustment disc of the pressure switch to it's minimum setting.
    - Now close the main gas cock slowly until the inlet pressure drops to the value detailed in the documentation supplied with the gas pressure switch.
    - Slowly turn the adjustment disc of the pressure switch until the pressure control operates.
    - The control box shuts down the gas supply and will restart.
15. Adjustment of the **gas pressure switch HD** (optional):
    - Switch the boiler to full load.
    - Connect a pressure gauge to manifold.
    - Set the pressure switch to the value detailed in the documentation supplied with the gas pressure switch.
    - Check whether the gas pressure switch HD comes to action at the set value by increasing (Fig. 10, pos.1) the full load burner pressure to that value. The boiler will lock out.
    - Reset by pressing the reset button on the gas pressure switch HD. The boiler will resume operation.
    - Set the correct full load burner pressure again according §10.2.12.
16. **Valve leakage control** (optional)
    - Remove plug Pa during boiler start up (see §10.2. 9).The plug Pa is located opposite the valve leakage control on the multibloc.The boiler will lock out.
    - Reset by pressing the reset button on the valve leakage control.The boiler will resume normal operation.
17. Check the **thermostats** for the correct operation setting.
18. Check the **flame control on the control box**
    - Start the boiler with disconnected ionisation probe, after the ignition phase the pilot gas valve must close. The boiler will lock out.
    - Reset by pressing the reset button on the control box.
    - Then disconnect the ionisation probe during operation, the pilot gas valve must close immediately. The boiler will lock out.
    - Reset by pressing the reset button on the control box.
19. **Water level control**:
    - Check the water level.
    - Check the operation of the water level control by disconnecting the electrode. The boiler should go to lock out
    - Create a shortcut between the electrode and earth. The boiler should go to lock out
    - Reset by pressing the reset button on the instrument panel. The boiler will resume operation
20. Check the **down draft thermostat** by pressing the bimetallic strip on the thermostat. The boiler will shut down for 3 minutes. After that the boiler will resume operation.
21. Send the initial commissioning report CE to Broag.

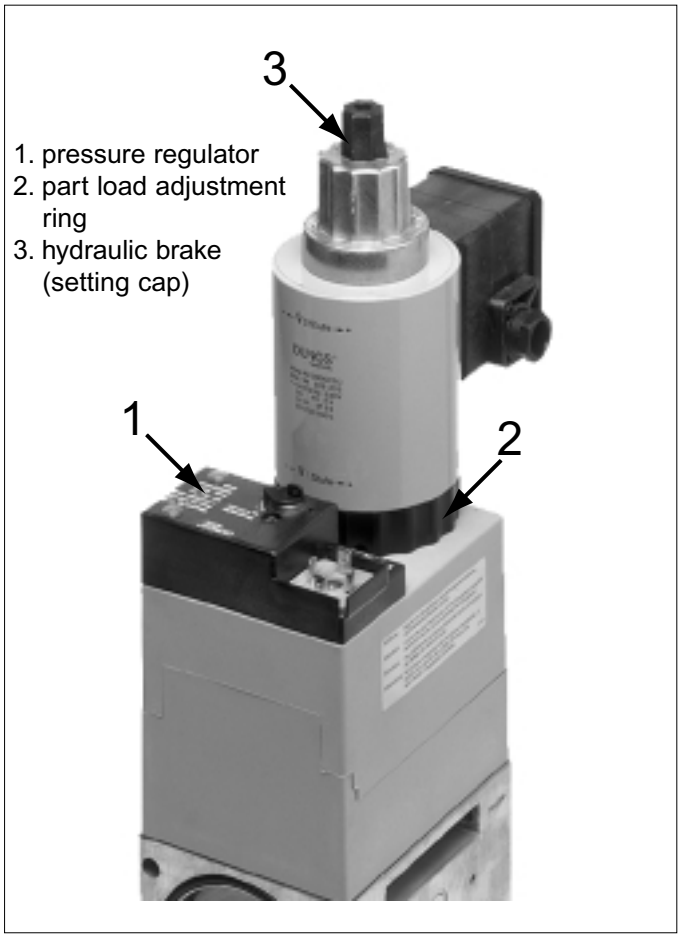


Fig. 10 Dungs MB-ZRDLE 415 / 420 S22.

10.1 Switching off the boiler

1. Switch off the electric supply.
2. Shut off the gas cock.

Warning: When switched off and full of water the boiler could be damaged if the temperature falls below freezing point.

Note: Commissioning must only be carried out by a qualified engineer with the relevant product training and certification i.e. Acops - Corgi. A commissioning data sheet / logbook must be completed on site for issue to owner.

11 MAINTENANCE

To maintain maximum efficiency it is essential to service the boiler, check safety parameters and re-set combustion once a year.

Normal Service Maintenance

- Isolate power , controls and gas supply.
- Remove front, top casings and flue hood covers.
- Remove gas manifold.
- Remove the burners and floor plates.
- Clean the internal flue ways of the boiler.
- Clean the floor underneath the boiler and boiler room.
- Clean the burners internally and externally using a soft brush.
- Clean the gas train, ignition, pilot burner, thermostats and wiring.
- Check and re-set/re-place ignition electrode and ionisation probe as found necessary.
- Re-assemble boiler.
- Check ignition and ionisation cables for connections and continuity.
- Restore power, controls and gas supply.
- Check start program, ignition time and safety times.
- Check flame protection and thermostats.
- Check boiler input at 100% (full load) and 50% (part load) load.
- Carryout a combustion efficiency test.
- Check the boiler and immediate installation connections for water leaks (seals).
- Check gas train and gas pipe for gas leaks.
- Check flue connections.
- Clean boiler casings.
- Complete a commissioning report.

12 TROUBLE SHOOTING

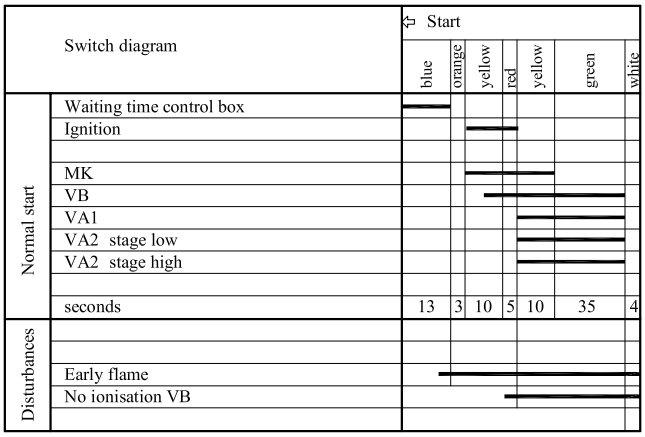


Fig. 11 Switch diagram

04.05F.SC.00001

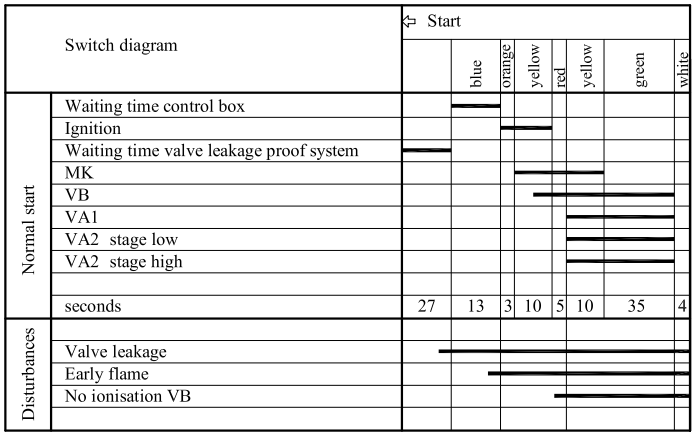


Fig. 12 Switch diagram with valve leakage control (optional)

04.05F.SC.00001

12.1 Fault causes

In case of all disturbances the gas supply is interrupted and the color disc stops rotating.
Check the position of the color disc for a indication of the cause. The color disc is situated at the side of the control box.

Indication mark at:	**Possible cause:**
end of green zone; (no rotation of color disc)	- no tension - no heat demand
end of yellow zone; begin of red zone	- no flame (signal) of pilot burner - no spark
red zone	failing or unstable flame of pilot burner
end of yellow zone; begin of green zone	no flame (signal) of main burner
Green zone; end of green zone	failing or unstable flame of main burner

Table 03 Trouble shooting

Remeha Gas 550/550 Duo

Broag Ltd

Head Office

Remeha House,

Molly Millars Lane,

Wokingham,

Berkshire RG41 2QP.

Tel.: 0118 9783434

Fax: 0118 9786977

Email: boilers@broag-remeha.com

Internet: www.broag-remeha.com

Branch Office

Unit 3, Kestrel Close,

Quarry Hill Ind. Estate,

Ilkeston,

Derbyshire DE7 4RD

Tel. 0115 9440778

Fax 0115 9440588

ISO 9001 since 1988

ISO 14001 Registered by GASTEC 2000

Subject to alterations
56267/1500/0601/Ho.

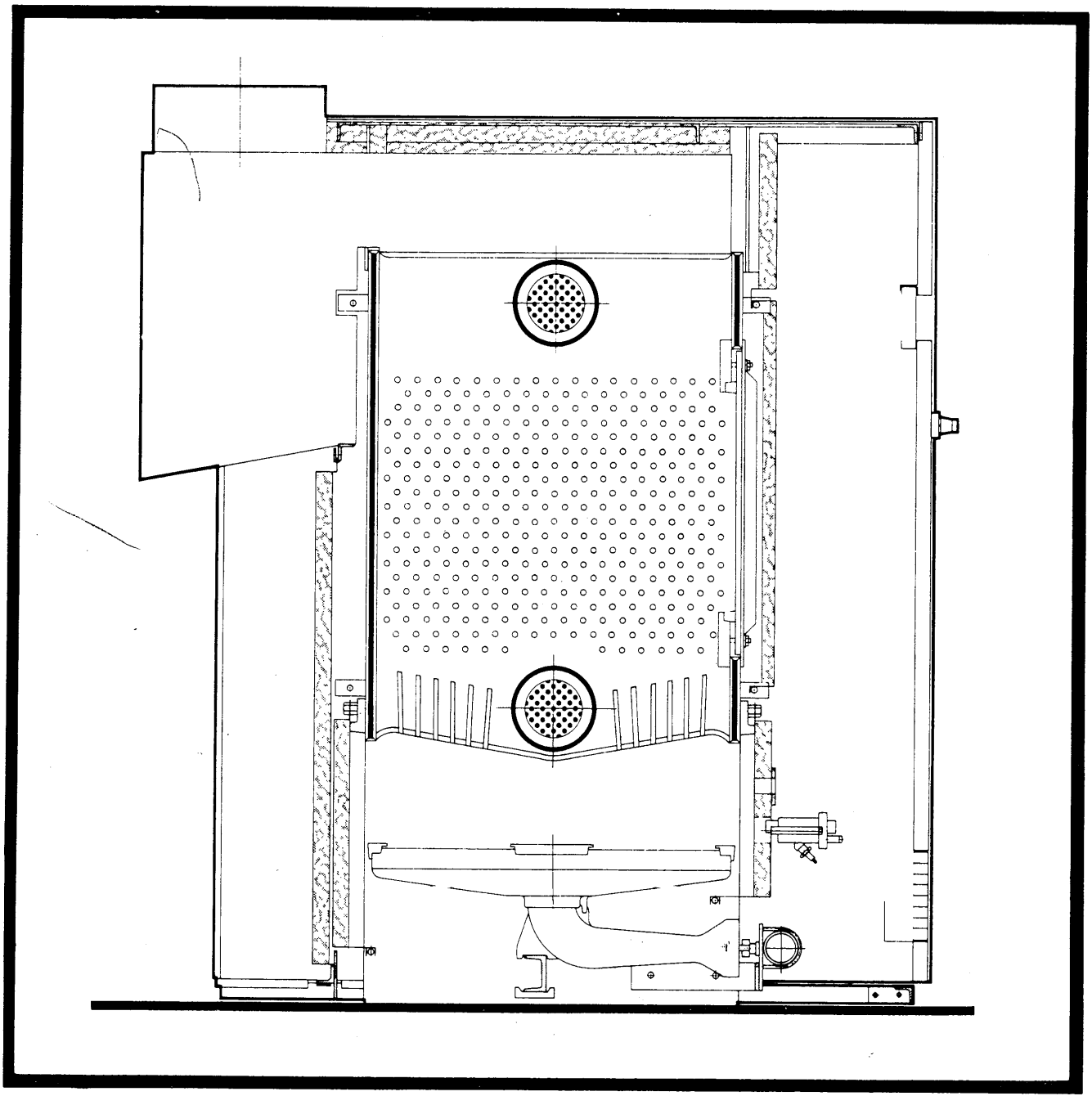
remeha

Clean Heat

Seagold

Gas 5 boiler atmospheric

technical information



BROAG BURNERS LTD.
TRT House
Molly Millars Lane
Wokingham, Berkshire
Telephone: Wokingham (0734) 783434
Telex: 849137

SEAGOLD Gas 5 Advantages

- **Versatility**
  The component size of the boiler makes it ideally suitable for installation in relatively small plantrooms. Simplicity of erection and minimal flue height permit convenient installation on rooftops or in basements.

- **Quietness**
  Exceptionally low noise levels on ignition and during operation make Gas 5 boilers suitable for installation adjacent to domestic or public accommodation.

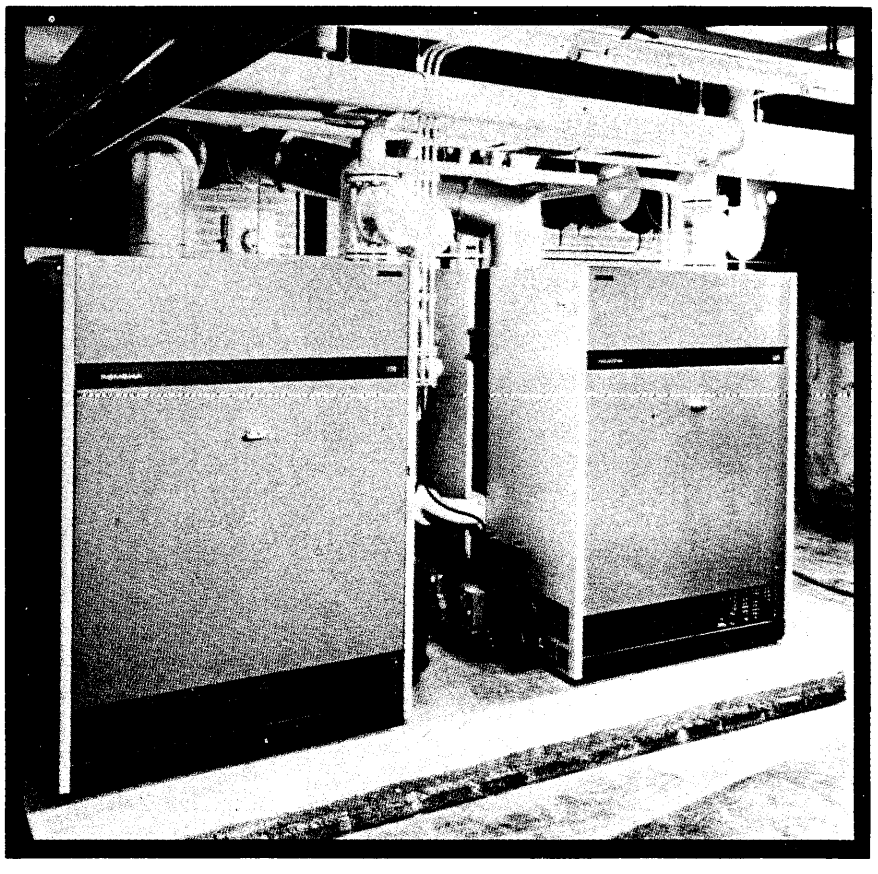
- **Reliability**
  High quality, cast iron sections and a reliable fuel supply make this boiler series one of the most reliable available.

- **Experience**
  The SEAGOLD Gas 5 boiler series is manufactured to the highest standards by one of Europe's most established foundries.

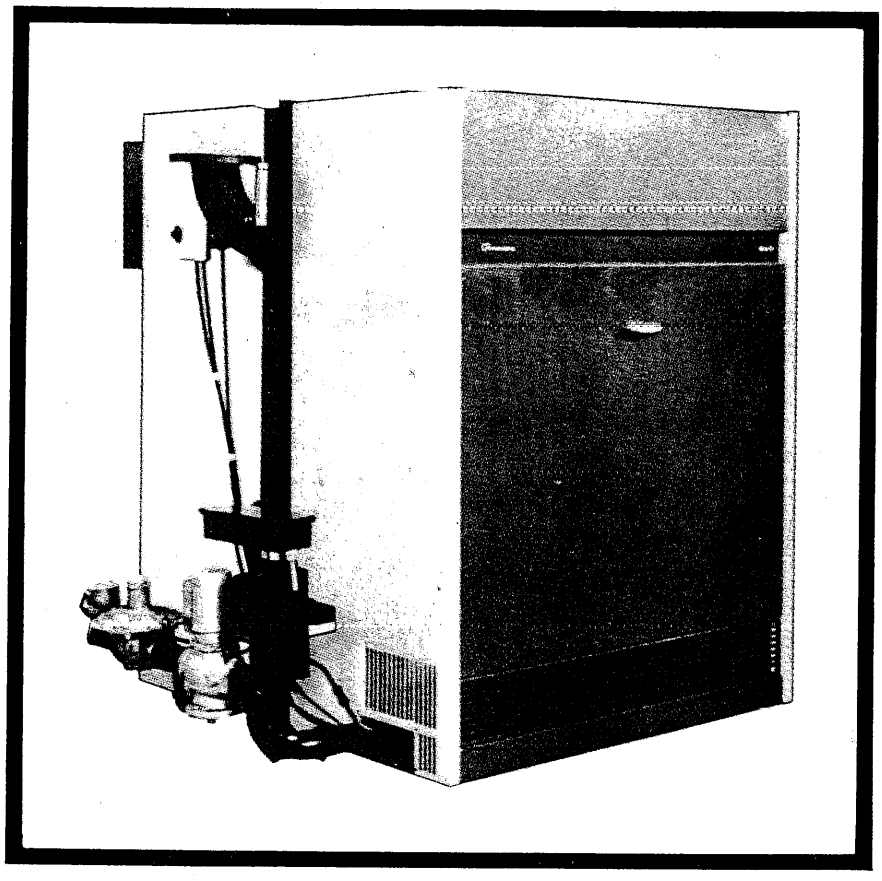
SEAGOLD Service

SEAGOLD is the registered trade name for Rheinstahl's extensive range of boilers available in the U.K. to British Standards. Stocks of boilers are maintained in a conveniently located warehouse in the United Kingdom and out of stock equipment or boilers, for a particular specification, can normally be delivered within four weeks. Rheinstahl's Regional Managers (Heating) are located in many areas throughout the United Kingdom and are available to provide advice and assistance. The services provided by Rheinstahl include, commissioning and after-sales servicing under contract, all at reasonable prices.

Typical Gas 5 installation



G .s 5 series boiler with atmospheric burner



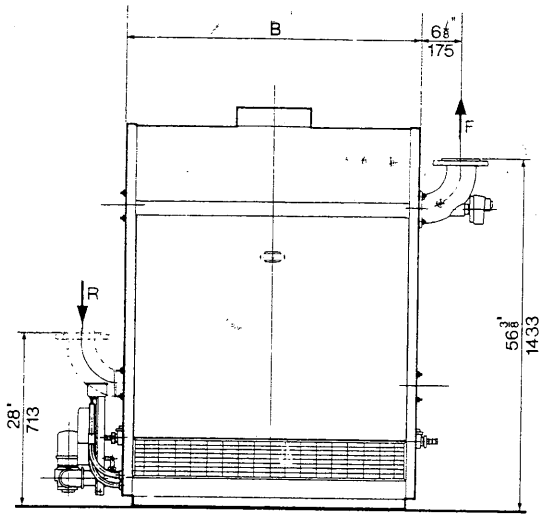
Gas 5-10 section

SEAGOLD Gas 5 is the second series of atmospheric gas-fired boilers to become available in the United Kingdom, following the successful introduction of the smaller Gas 3 boiler series in 1974. Gas 5 units lend themselves ideally to multiple installations providing extreme plant flexibility and standby facilities.
Boilers in the Gas 5 series are available for natural or manufactured gas supplies.
Twelve different sizes of the Gas 5 series are available, with outputs ranging from the smallest in the range—the 689,000 Btu/h (202 kW.) Gas 5-9 boiler, to the largest—1,638,000 Btu/h (480 kW.) Gas 5-20 boiler.
In addition to the Gas 5 boiler series, Rheinstahl produce the larger SEAGOLD Gas 6 range. These units can be supplied to provide outputs of up to 4,000,000 Btu/h (1,172 kW.) and complete technical information will be available early in 1975.

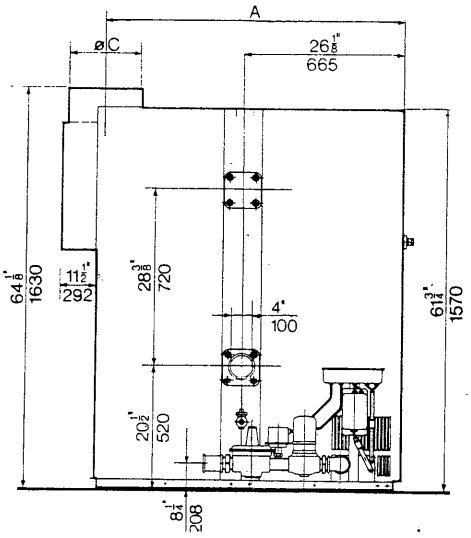
Gas 5 Features

- Burner controls assembly designed to be suitable for either right or left hand installation.
- Boiler and controls designed and manufactured to British Gas specifications.
- An automatic, pre-set, down draught cut-out thermostat provided on all models.
- Ionisation flame failure safety equipment and automatic spark ignition are supplied as standard.

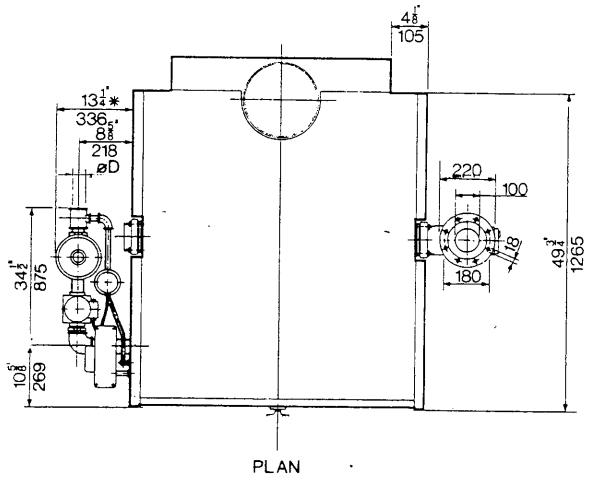
B ler dimensions



FRONT ELEVATION



END ELEVATION



PLAN

Note!
Dimensions shown for gas controls apply to natural gas. For manufactured gas allow 24" 600mm overall width of controls *

To ensure competitive performance, prices and specification Seagold maintains a continuous development programme and reserve rights of modification or alteration without notice

Boiler Model	Output Natural gas Btu/h×10³	kW	A in	A mm	B in	B mm	ØC in	ØC mm	ØD NG in	ØD MG in
GAS 5-9	689	202	48⅜	1230	42⅝	1083	12	300	2	2½
GAS 5-10	778	228	48⅜	1230	47	1193	12	300	2	2½
GAS 5-11	863	253	49⅜	1255	51¼	1303	14	350	2	2½
GAS 5-12	949	278	49⅜	1255	55⅝	1413	14	350	2	2½
GAS 5-13	1037	304	50⅜	1280	60	1523	16	400	2	2½
GAS 5-14	1123	329	50⅜	1280	64¼	1633	16	400	2	3
GAS 5-15	1208	354	50⅜	1280	68⅝	1743	16	400	2	3
GAS 5-16	1293	379	50⅜	1280	73	1853	16	400	2	3
GAS 5	1378	404	51	1295	77¼	1963	18	450	2	3
GAS 5-[illegible]	1467	430	51	1295	81⅝	2073	18	450	2	3
GAS 5-19	1552	455	51	1295	86	2183	18	450	2	3
GAS 5-20	1638	480	51	1295	90¼	2293	18	450	2	3

Gas 5 boiler technical information

Boiler specification

Sections are produced in pearlitic cast iron for exceptional high corrosion resistance. All Gas 5 series boilers are supplied for operating at a working pressure of 3·6 bar (52 lbf/in²) or 36 m. head (120 ft.) and each section is hydraulically tested to at least 6·9 bar (100 lbf/in²) in accordance with British Standard 772:1961. Higher operational pressures are permissible on specially prepared boilers and details can be obtained from Rheinstahl's Sales Office.
Sections are machined-faced to ensure gas tight joints when assembled with push-fit tapered nipples between sections. A special sealant compound, together with asbestos rope, is supplied for sealing the sections when pulled up with the tools provided. The side faces of each section, when assembled together, form the internal flueways of the boiler. Each face has integrally cast studs to encourage heat transfer. The flueways are easily accessible from vertical bolt-on cover plates bolted to the front of the boiler sections.
The atmospheric burners, suitable for manufactured or natural gas, are arranged horizontally beneath each flueway and coupled with the main gas burner manifold. The gas burner controls assembly and supply connection can be installed on either side of the burner.
Flue gases, passing between the flueways (sections) are exhausted via the flue collection hood into the central and vertical flue connection at the rear of the boiler. A pre-set down-draught thermostat is located in the collection hood. Should continuous down draught create a temperature in excess of a pre-set 70°C (158°F), the cut-out switch automatically shuts down the main burner supply.

Water connections

Two (2) flanged cast iron bends are provided for connection to the flow and return tappings on one side of the boiler or diagonally opposite. The cast iron flanged bends to British Standard 4504 are provided for 4 in. pipe connections.
To ensure that water flow within the boiler cannot be short-circuited, a water distribution pipe is supplied for insertion through the return hole tappings and nipples when the flow and return connections are made on one side of the boiler.
The unused flow connection plate may be drilled and tapped to accept a relief valve to British Standard CP332 Part 3, up to 2 in. Alternatively, a relief valve can be mounted on the flow pipework adjacent to the boiler. The flow bend has an integral cast $\frac{1}{2}$ in. BSP tapping to accept a dual high/low boiler thermostat connection. Should an altitude gauge and/or thermometer be required, provision should be made on the flow pipework close to the boiler or connected to the drilled boss in the side of the cast iron flow bend.
A 2 in. drain cock connection is drilled and plugged in the blanked off return plate.

Flue connection

The flue connection from the boiler to outside air or into a chimney can be provided in heavy duty asbestos, cast iron, single or double-walled galvanised steel or aluminium of a diameter not less than the flue connection on the boiler.
A minimum of 1 m. (3 ft.) of vertical flue pipe should preferably be connected directly to the boiler flue connection before a bend or terminal (i.e. on rooftop boiler houses). However, the boiler will normally operate satisfactorily if a 90° bend is fitted directly on the flue spigot, providing the horizontal run is very short.
The Gas 5 series boiler requires a minimum draught of (only) 0·1 millibar (0·0394 in. wg.). Where an existing chimney is utilized the flue connection between boiler and chimney should be as short as possible. The angle of the flue at chimney entry point should be in excess of 135° and the flue pipe should not protrude beyond the inner face of the chimney. Right angle bends and long flue runs should not, or rarely, be used.
To minimise condensation and its consequences, insulation is recommended for flues and chimneys wherever possible. Access covers for cleaning should be provided at bends.
More than one boiler may be connected to a common chimney, provided the gross sectional area of the main flue to the chimney is equivalent to the total area of the entering flues. (Refer to Gas Corporation publication entitled "Technical Notes on the Design of Flues for Larger Gas Boilers", dated December 1971 and also British Standards Code of Practice 337:1963.)

Operation sequence

Burner ON/OFF operation is effected by means of the main safety shut-off valve which responds to the sequence determined by the boiler controls. Should electrical failure occur, the gas supply is cut off within one second by the safety valve. Re-lighting is implemented automatically upon the restoration of power. A reduction in gas pressure will also cause the safety valve to close and, in that instance, the boiler will require to be reset manually. In this event, reference should be made to the lighting instructions inside the boiler casing.

Boiler performance

Boiler Model	Nominal Heat Input Btu/h×10^3	kW	Nominal Heat Output Btu/h×10^3	kW	Natural Gas Gas rate ft^3/h	m^3/h
GAS 5-9	894	262	689	202	894	25·3
GAS 5-10	1007	295	778	228	1007	28·5
GAS 5-11	1119	328	863	253	1119	31·6
GAS 5-12	1228	360	949	278	1228	34·8
GAS 5-13	1344	394	1037	304	1344	38·0
GAS 5-14	1454	426	1123	329	1454	41·1
GAS 5-15	1566	459	1208	354	1566	44·3
GAS 5-16	1675	491	1293	379	1675	47·4
GAS 5-17	1784	523	1378	404	1784	50·5
GAS 5-18	1900	557	1467	430	1900	53·7
GAS 5-19	2010	589	1552	455	2010	56·9
GAS 5-20	2122	622	1638	480	2122	60·0

The gas rate in the above table is for natural gas with a calorific value of 1000 Btu/ft^3.

Burner specification

Burner pressure:	natural gas: 13·0 millibar. (5·2 in. wg) high capacity
Burner pressure:	natural gas: 5·0 millibar. (2·0 in. wg) low capacity
Burner pressure:	manufactured gas group 4: 4·7 millibar. (1·88 in. wg)
Burner pressure:	manufactured gas group 5: 5·6 millibar. (2·24 in. wg)
Injector diameter:	natural gas: 4·5 mm. (0·177 in.)
Injector diameter:	manufactured gas groups 4 & 5: 7·8 mm. (0·307 in.)
Auxiliary injector diameter:	natural gas: 3·8 mm. (0·149 in.)
Auxiliary injector diameter:	manufactured gas: 5·7 mm. (0·224 in.)

Approximate weights

Boiler Model		5-9	5-10	5-11	5-12	5-13	5-14	5-15	5-16	5-17	5-18	5-19	5-20
Boiler weight dry	lb	3197	3527	3858	4078	4409	4740	5071	5291	5622	5952	6283	6614
	kg	1450	1600	1750	1850	2000	2150	2300	2400	2550	2700	2850	3000
Water content	UK/gal	58	64	70	77	83	90	96	102	109	115	121	128
	litres	262	291	320	349	378	407	436	465	494	523	552	581
Total weight	lb	3773	4167	4562	4846	5241	5636	6030	6314	6709	7120	7497	7892
	kg	1711	1890	2069	2198	2377	2556	2735	2864	3043	3230	3400	3579

Assembly

Rheinstahl provide special tools, on loan, for the boiler assembly with detailed building instructions. However, building supervision and/or actual boiler erection services can be provided by Rheinstahl or an approved boiler erecting engineer.

Commissioning

It is essential that new installations are commissioned correctly, if trouble-free service and maximum efficiency are to be attained.
It is strongly recommended that Rheinstahl's service engineers inspect and commission all types of installation and, at the same time, provide an independent report to both the heating engineer and client.

Maintenance

Once Rheinstahl's own commissioning engineers or a reputable service company have commissioned the boiler and its immediate installation, a programme of regular servicing and inspection visits is essential to ensure the boiler continues to provide the end user with trouble free continuity of operation, maintained at minimum economic fuel costs.

Ch eys

The average flue gas temperature at the draft diverter of a Gas 5 series boiler is approximately 145°C (293°F) and the minimum temperature at the point of termination must not fall below 65°C (149°F)—a temperature drop of 80°C (144°F) for efficient, continuous operation. Should an existing chimney be utilized a survey of the chimney must be made to ensure there are no restrictions, blockages or right angle bends. A re-used chimney should be swept clean and existing dampers removed or locked open. Where condensation is likely, depending on the length and exposure of the external chimney, an internal liner should be fitted. Alternatively, provision for draining condensate should be made at the base of the chimney, mindful of its corrosive action.

For detailed information on chimneys and sizes, see the Gas Corporation publication entitled "Technical Notes on the Design of Flues for Larger Gas Boilers", dated December 1971.

Gas supply pipework

Prior to the connection of any gas boiler to existing supplies, the local Gas authority should be consulted to ensure that an adequate pressure and supply is available, at the boilers maximum output. Further, a change of gas tariff may be of benefit to the end user. Under no circumstances should a gas connection be made to a smaller sized gas supply than the connection to the boiler.

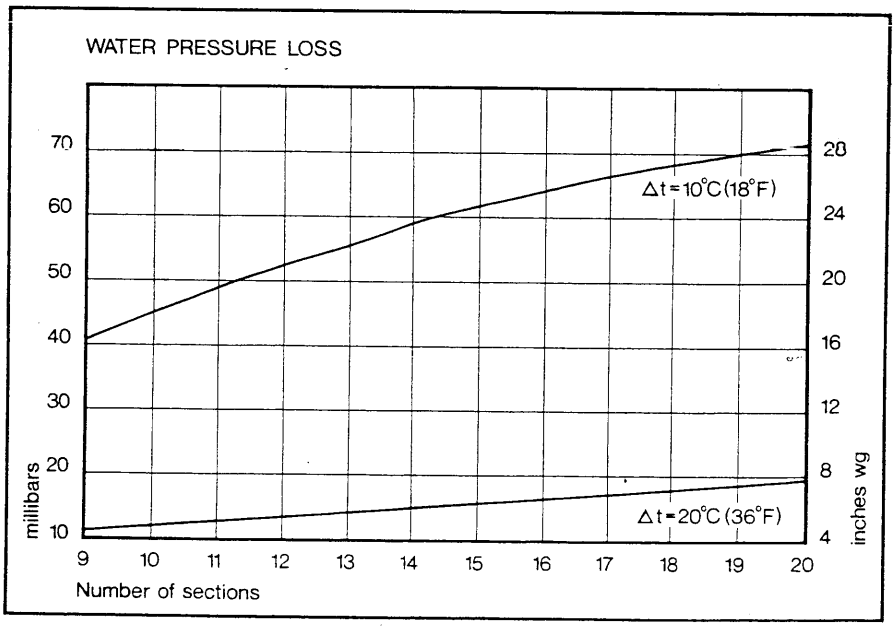
To minimise risk of sediment or foreign particles entering the control valves, an approved filter may be fitted into the pipework downstream of the main cock or valve.

The gas supply piping should be in black, mild steel or galvanised iron and conform to the British Gas safety regulations of 1972. All supply lines and control valves must be pressure tested for possible leaks and Rheinstahl recommend the installation be undertaken by a company registered with C.O.R.G.I. Details of C.O.R.G.I.'s Register of Installers is available at most gas showrooms.

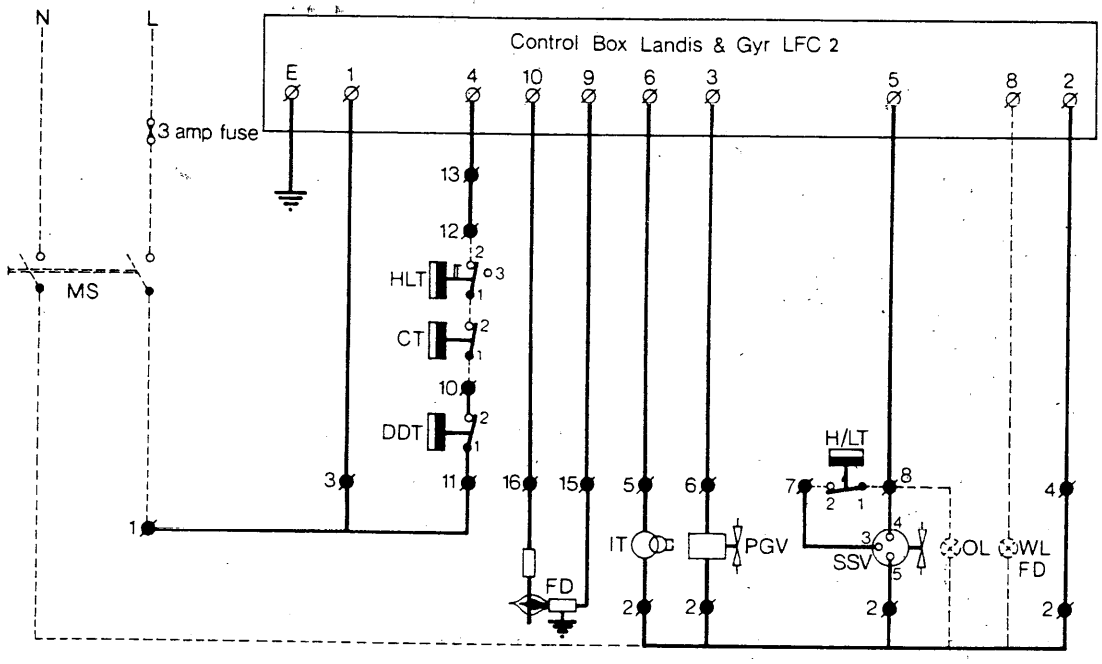
Water resistance and temperatures

To minimise the risk of boiler condensation, the temperature differentials indicated on the temp/resistance chart below should be observed. The temperatures, with gradients between 10°C (18°F) and 20°C (36°F) will also ensure an adequate water flow through the boiler and systems should be designed within these recommended curves. The flow and return temperatures for the figures shown on the graph are 90°C–80°C (194°F–176°F) and 90°C–70°C (194°F–158°F). The maximum operating temperature of the Gas 5 series boiler is 100°C (212°F), although it is not recommended to regard this temperature as a design operating temperature.

To prevent overheating of water remaining in the boiler after shutdown, the circulating pump should be arranged to run on for 15 minutes after the boiler has shut down.



Electrical wiring diagram



LEGEND

⌀	Connection screws (control box)	FD	Flame Detector
●	Connection screws (terminal strip)	IT	Ignition Transformer
----	Not supplied or wired	PGV	Pilot Gas Valve
MS	Main Switch	SSV	Safety Shut-off Valve
HLT	High Limit Thermostat	OL	Operation Light
CT	Control Thermostat	WL	Warning Light
DDT	Down Draught Thermostat	H/LT	High-Low Thermostat

Electrical supply

The Landis & Gyr control box for the Gas 5 series boiler is pre-wired to include for the operation of all controls in the correct ignition and shutdown sequences. These include high limit protection, flame detection, thermostatic control, safety shut-off and down draught cut-out. Provision for manual reset is made in the event of high limit. An indicating lamp, within the control box, is wired to illuminate in the event of a control malfunction.

Mains supply to the boiler should be single-phase, 220/240 volt A.C., 50 Hz via 3/5 amp fuse and main switch.

The electrical installation must conform to the I.E.E. regulations for buildings and also to local authority requirements.

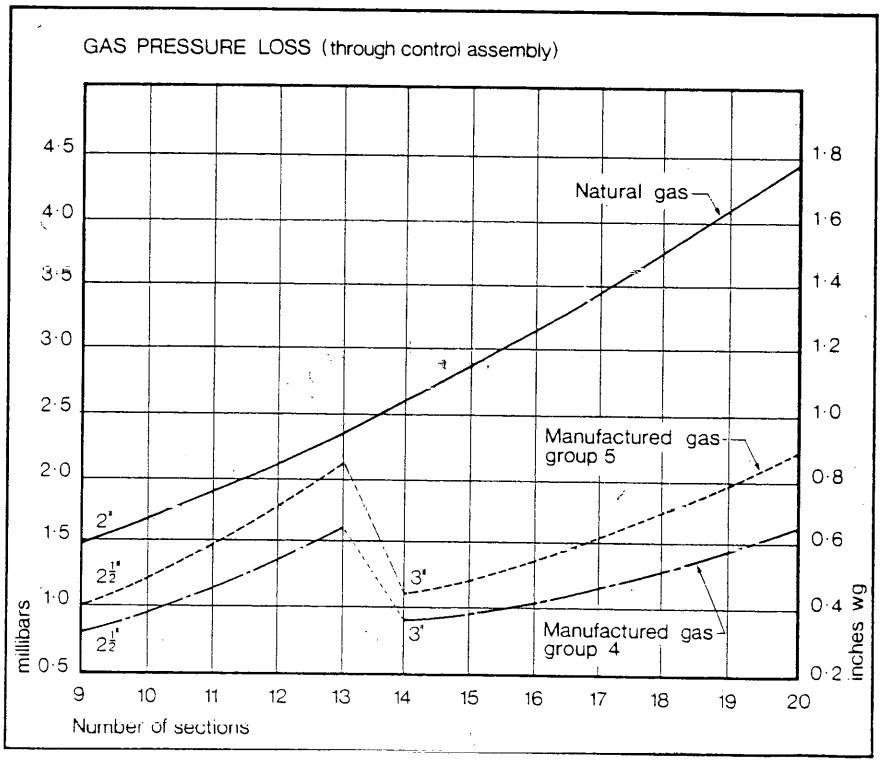
When installation is complete the circuit must be tested for polarity, earthing and continuity. Indicating lamps must be tested for satisfactory operation.

Regulation & safety equipment

Control specification

Boiler Model	5-9	5-10	5-11	5-12	5-13	5-14	5-15	5-16	5-17	5-18	5-19	5-20
Natural Gas Low Pressure Governor	Jeavons J48–2 in.											
Natural Gas Safety Shut Off Valve	ITT SH 230 NVS 50L (high-low-off)—2 in.											
Manufactured Gas Low Pressure Governor	Maxitrol RV 91-2½ in.					Maxitrol RV 110-3 in.						
Manufactured Gas Safety Shut Off Valve	ITT SH 230 VS (high-low-off)—2½ in.					ITT SH 230 VS (high-low-off)—3 in.						

Dual thermostat:	Landis & Gyr RAZ 14/1915. Combined boiler control and high limit thermostat, requires manual reset when high limit temperature is exceeded. Control range 40 to 100°C (104–212°F).
High/low thermostat:	Landis & Gyr 120090
Down draught thermostat:	Honeywell L6068A set to 70°C (158°F)
Pilot burner:	Dungs E71 injector size 1·2 mm N.G. 2·1 mm M.G.
Ionisation electrode:	Material—Inconel
Sparking plug:	Beru ZK 14–8–15
Ignition transformer:	Belpa H15F
Pilot governor:	Maxitrol RV43 (½ in.)
Pilot solenoid valve:	Dungs MV 205
Control box:	Landis & Gyr LFC2



Site requirements

Location

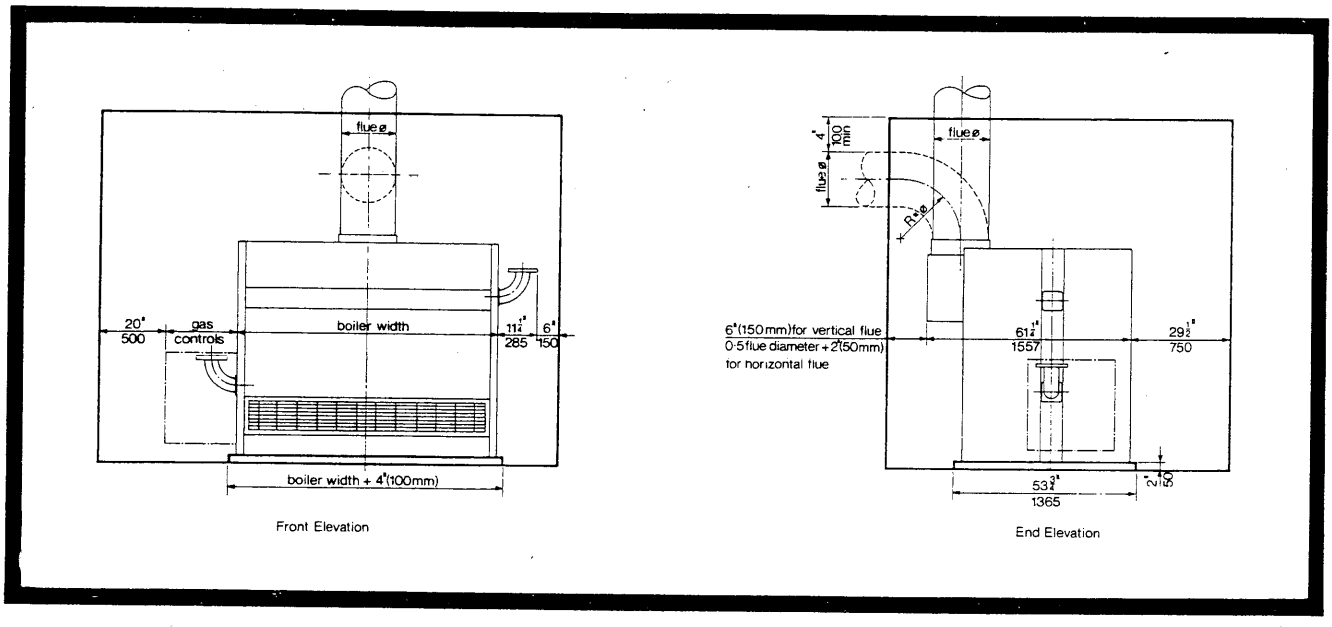
The SEAGOLD Gas 5 series boiler is equally suitable for location in basement or rooftop plantrooms and will operate efficiently in either situation. Because of the quiet operation afforded by the atmospheric gas burners, the boiler room can be acceptably sited adjacent to occupied areas.
Adequate access to the boiler room should be provided to allow for boiler sections to be offloaded and positioned.
Boilers and ancillary equipment not being installed on delivery should be protected from weather and adverse site conditions.

Builders Work

A special boiler base is not essential for the SEAGOLD Gas 5 series boilers and they may be mounted directly on a plantroom floor, provided that it is level, of fireproof construction and suitably stressed to withstand the boiler and ancillary equipment when charged with water. Should a base be desired, an indication of the recommended dimensions is given in the diagram below.

Access for servicing

To facilitate efficient servicing of boilers and component parts, the recommended clearance areas indicated in the diagram below should be observed.



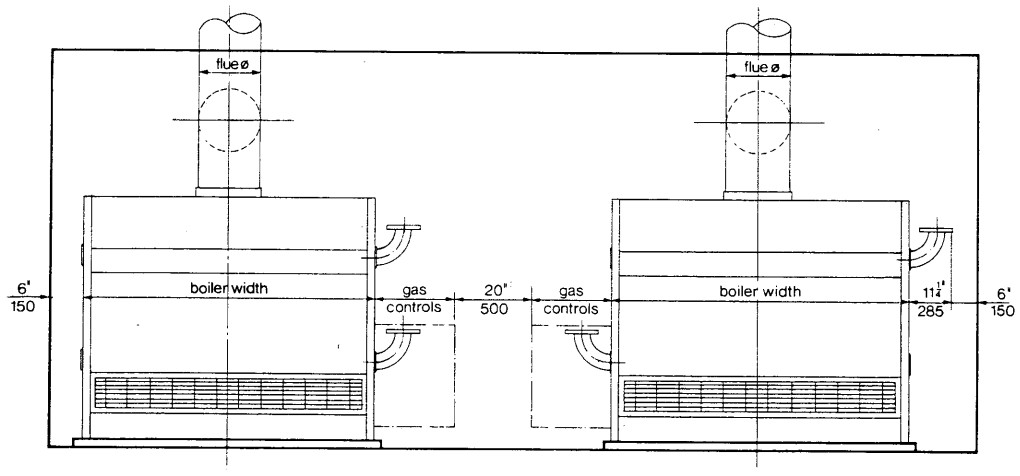
Boiler House ventilation

Fresh air essential for combustion and ventilation should be provided through high and low level openings to atmosphere. These apertures must be of sizes not less than those indicated in the following table. Dimensions given are for unobstructed openings; if a grille is to be used, the manufacturers' free area allowance should be taken into consideration.
A high level ventilation grille should be installed as close to the ceiling as possible. On exposed boiler rooms—possibly on rooftops—it is advisable to have ventilation grilles on at least two sides to minimise wind pressure conditions. Low level should be sited 12 in. approximately above the finished floor level, in order to avoid blockage and flooding, and as close as is practicable to the boiler front so as to minimise draughts.

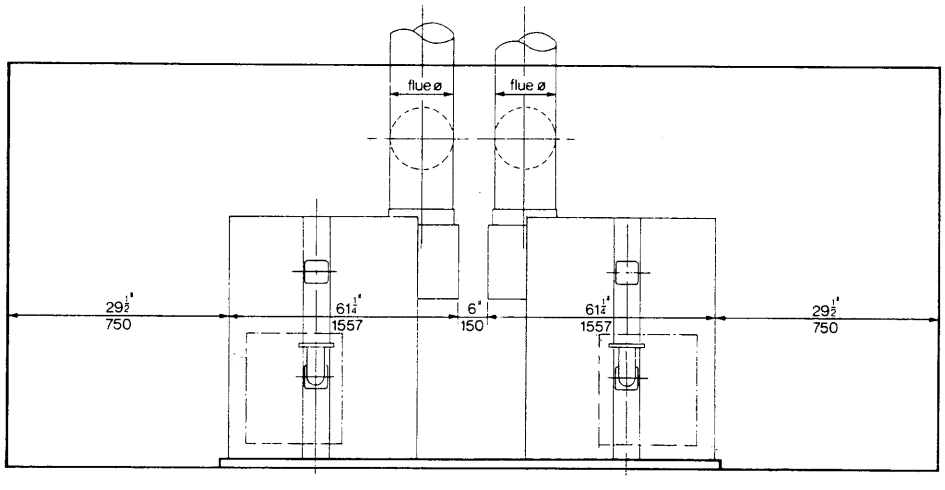
Ventilation requirements

Boiler Model		5-9	5-10	5-11	5-12	5-13	5-14	5-15	5-16	5-17	5-18	5-19	5-20
Minimum air required	ft³/min	517	583	647	712	778	842	906	970	1033	1100	1164	1228
	m³/s	0·24	0·28	0·31	0·34	0·37	0·40	0·43	0·46	0·49	0·52	0·55	0·58
Low level opening free area	in²	345	389	432	475	519	562	604	647	689	734	776	819
	cm²	2226	2510	2787	3065	3348	3626	3897	4174	4445	4736	5007	5284
High level opening free area	in²	173	195	216	238	260	281	302	324	345	367	388	470
	cm²	1116	1258	1394	1535	1677	1813	1948	2090	2226	2368	2503	2645

Multiple boiler installation



Side by side installation

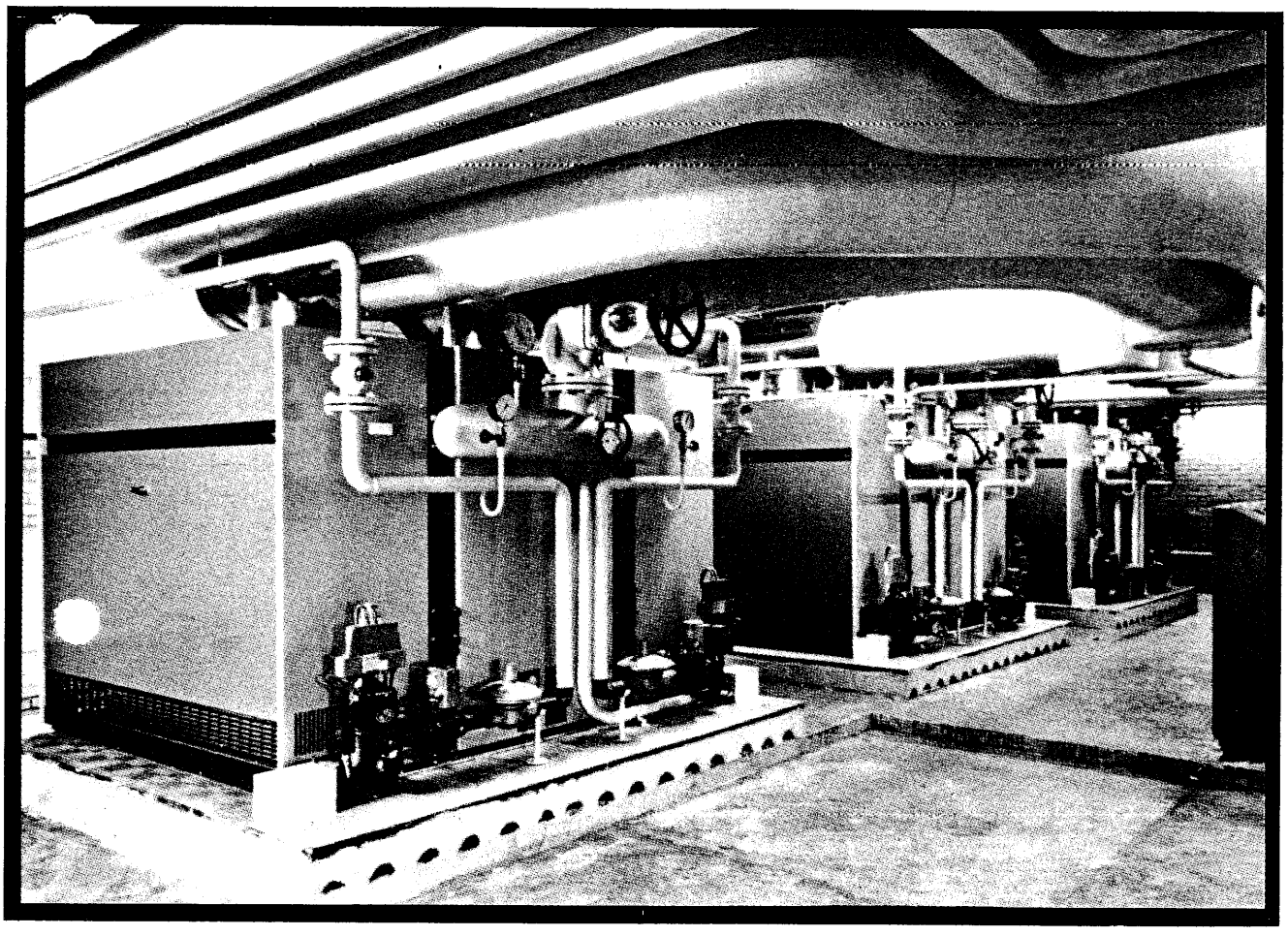


Back to back installation

Multiple boiler installation

The versatile capability of the SEAGOLD Gas 5 series boiler renders these units suitable for multiple installations. Multiple installations can be made with boilers back to back or side by side (as shown in drawing above) and can be adapted to operate on a seasonally varied programme, with individual boilers adjusted accordingly. For example in a three boiler installation, the No. 1 boiler could be utilized to provide normal summer loading with boilers No. 2 and No. 3 only being introduced for winter duty.

For larger output situations, a parallel type installation is suggested, as this will share the load equally between each unit, provided that the water resistance is uniform. Only the physical dimensions of the plantroom and/or the capacity of the associated equipment need limit the number of units installed in multiple installations.



Multiple installation utilizing six SEAGOLD Gas 5 boilers

Other ducts

In addition to the Gas series of atmospheric gas fired boilers, Rheinstahl provide an extensive range of oil and gas boilers up to 10 million Btu/h (2,930 kW.) output. These boilers are designed for firing with blown gas or oil burners and are matched with the majority of reputable burner manufacturers' products including BROAG—Rheinstahl's own U.K. burner company.
BROAG's range of oil and gas fired burners currently extends from 60,000 Btu/h (17.5 kW.) to over 3 million Btu/h (879 kW.).

Local Distributor/Regional Manager:

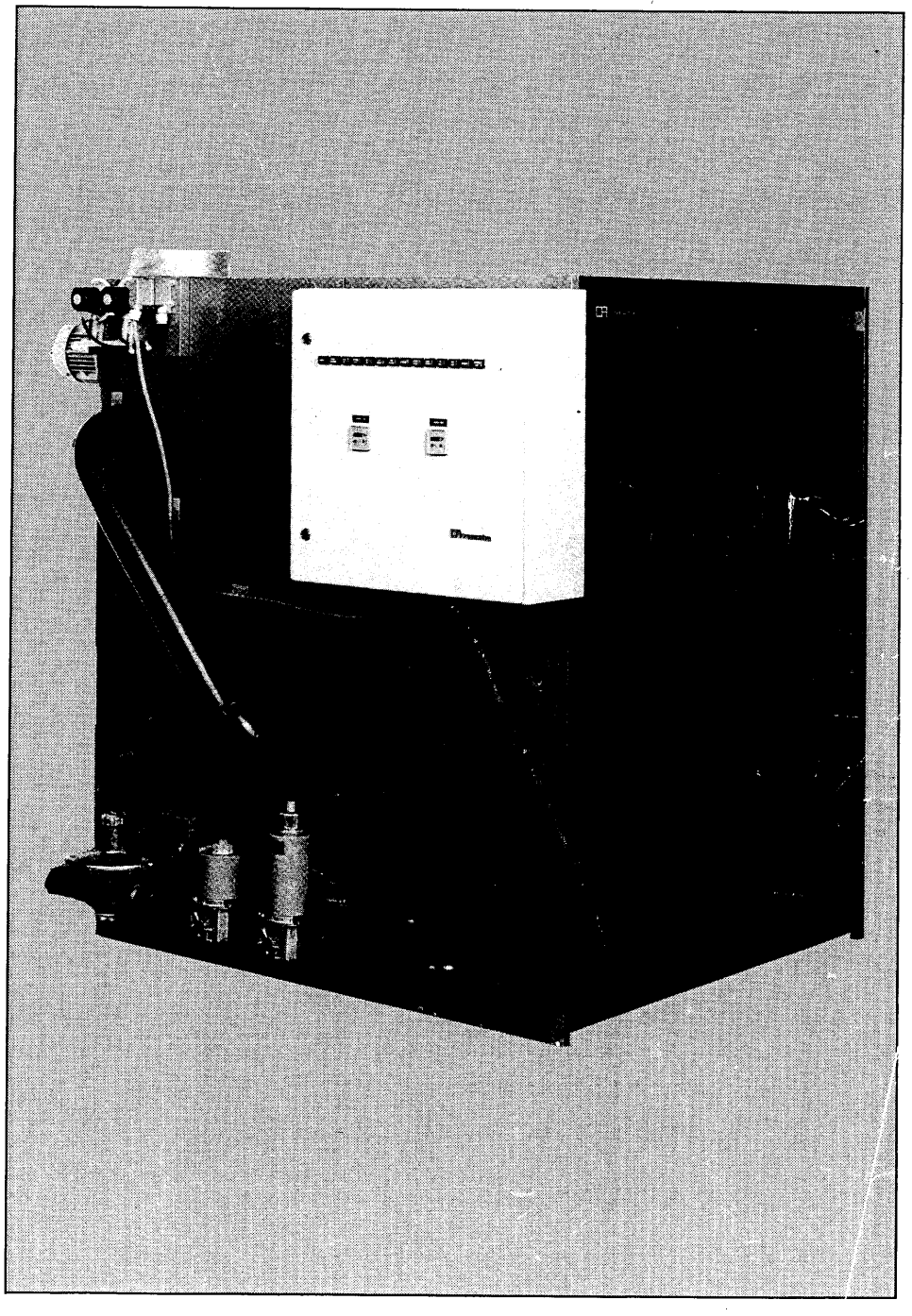
broag seagold

Gas 5a ECO

Technical information

Fully condensing atmospheric gas boiler

292-819 kW



CONTENTS

1. BOILER DESCRIPTION

1.1 General
The Gas 5a ECO fully condensing boiler has been designed around and incorporates the well known basic design features of the standard series 5a, which has been fully tested and tried in the UK and has full Watson House approval.
The basic of the new design utilises an integral corrosion proof heat exchanger positioned in the exhaust gas stream, to extract maximum heat from the flue gas and pre-heats the return water from the heating system before entry to the boiler block.
This new system allows the boiler to operate with exceptionally low return water temperatures (down to 25°C) and in doing so extracts the maximum efficiency by creating condensation within the heat exchanger so releasing the latent heat from the condenser. By raising the return water temperature via the heat exchanger the boiler block is protected at all times, and gross efficiencies up to 97% can be achieved.

1.2 Condensation
Condensation will take place within the heat exchanger when return temperatures drop below 55°C; above this temperature no condensing takes place and the latent heat is not released even so, efficiencies well in excess of 85% are still achieved.

1.3 Heat exchanger
The heat exchanger, flue hood, condensate collector and heat exchanger casing are constructed from cast and sheet aluminium which has been treated by anodising to combat corrosion and have a life expectancy equal to that of a standard boiler.
An adjustable air intake is provided into the flue gas stream to partially dry products of combustion by dilution, control through-put of gasses via the integral ID fan and adjust conditions to suit different chimney characteristics, it is also used to control and ensure acceptable figures for combustion test purposes.

1.4 Fan
ID Fan is supplied with each boiler, this has been designed to overcome the added pressure drop through the heat exchanger and exhaust the combustion gasses through the relatively cold chimneys.
As the exhaust gasses are on average 5°C higher than the return water temperature, there will be little or no pull from the chimney as such. It is therefore advisable in each instance to advise Broag Limited of the chimney dimensions and boiler room details when installing in existing sites in conjunction with existing boilers, or installing as a straight forward replacement, so that we may check and advise accordingly.

1.5 Installation
Where multiple boilers are to be used, one should consider using a mixture of fully condensing and standard boilers to achieve maximum efficiency. For example where systems have been designed to operate to the normal 82°C/71°C flow and return temperatures, condensing boilers should be sized to satisfy up to 50% of the heating load, and should be made to operate as the lead boiler with normal boilers to provide additional output during peak conditions.

2. CONSTRUCTIONS

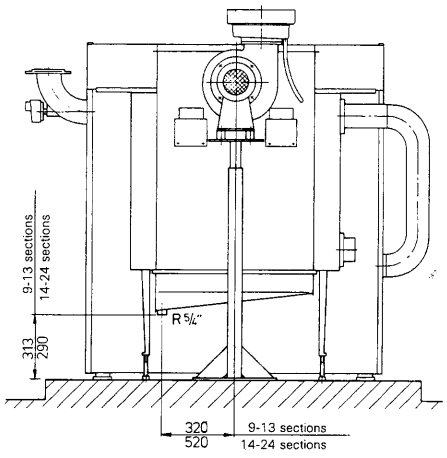
2.1 General
The fully condensing boiler (up to 959 kW) has full Watson House approval. The boiler is supplied as standard with fully wired control and safety equipment for high/low operation with control panel.
The boiler is provided with lagged sheet-steel panelling. Water connections are via a flow elbow with flange to DIN 2633,two return line flanges with 100 mm dia. pipe ends and an interconnecting pipe between the boiler and aluminium economiser. Aluminium flue gas manifold. Two-speed flue gas fan rated in accordance with boiler output and provided with support structure.
The boiler is supplied as loose parts. Dimensions are such that all parts can be brought into the boilerhouse through a normal size door.
The panelling and equipment parts are supplied in packaged units. The aluminium flue gas manifold is supplied fully assembled.

2.2 Burners
The burners are stainless steel, atmospheric burners.

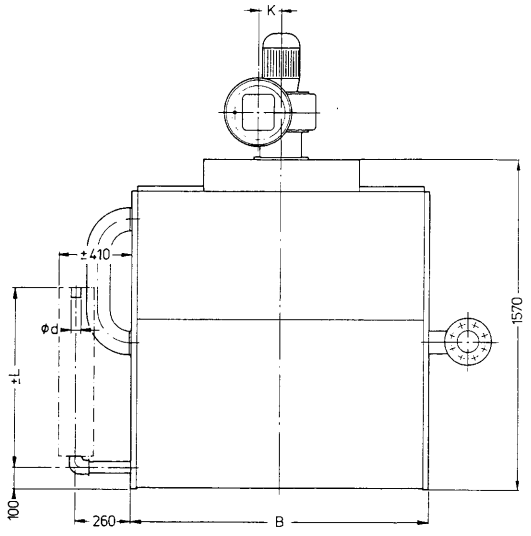
2.3 Assembly
Assembly of the boiler should be done by the Broag Service Engineers Department.

3. TECHNICAL INFORMATION AND DIMENSIONS

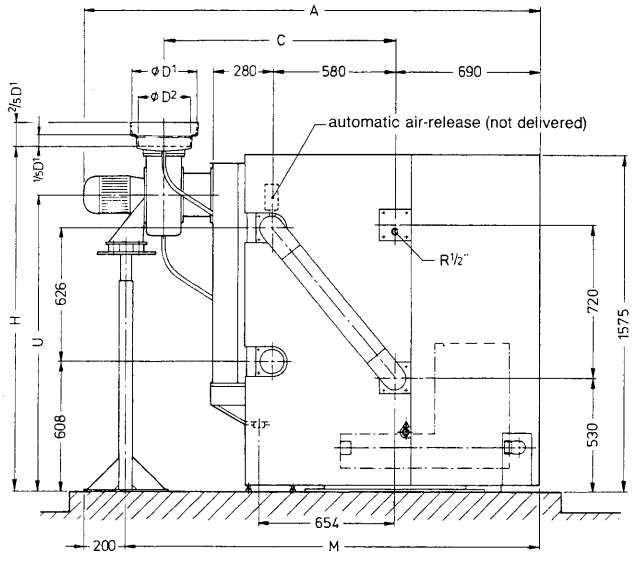
3.1 Flue-fan behind boiler



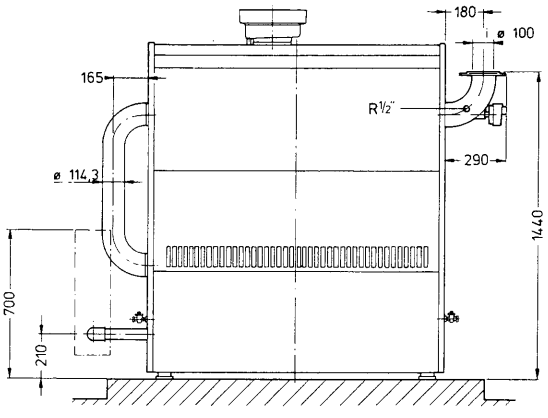
Rear view



Top view



Left-side view



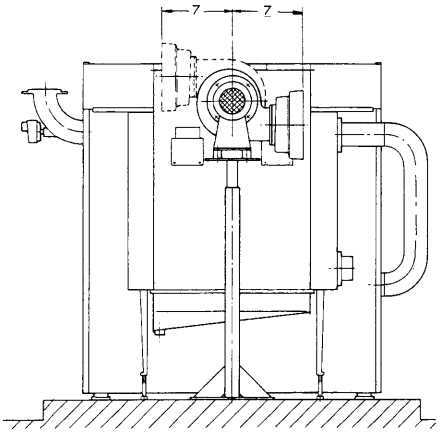
Front view

Number of sections	Input	Output	Natural Gasrate	Dimensions											Water resistance		Water content	Dry weight
				Ød	A	B	C	K	L	ØD¹	ØD²	H	M	U	Δt = 20°C	Δt = 10°C		
	kW	kW	m³/h	mm											mbar	mbar	Litres	kg
9	341	292	32	2"	2165	1070	1090	115	1040	300	250	1617	1955	1395	41	162	310	1470
10	383	329	36	2"	2165	1180	1090	115	1040	300	250	1617	1955	1395	49	197	339	1590
11	426	366	41	2"	2165	1290	1090	115	1040	300	250	1617	1955	1395	57	229	368	1715
12	469	415	46	2"	2165	1400	1090	115	1040	300	250	1617	1955	1395	67	270	397	1835
13	512	441	49	2"	2165	1510	1090	115	1040	300	250	1617	1955	1395	78	311	426	1960
14	554	473	53	2"	2210	1620	1100	165	1040	400	300/350*	1600	1995	1410	38	150	463	2125
15	597	512	57	2"	2210	1730	1100	165	1040	400	300/350*	1600	1995	1410	42	168	492	2250
16	626	539	60	2"	2210	1840	1100	165	1040	400	300/350*	1600	1995	1410	46	182	521	2370
17	682	583	65	2"	2210	1950	1100	165	1040	400	300/350*	1600	1995	1410	50	202	550	2495
18	725	619	69	2"	2210	2060	1100	165	1040	400	300/350*	1600	1995	1410	55	221	579	2615
20	810	693	78	2"	2305	2280	1120	180	1040	400	350	1635	2095	1395	66	263	637	2860
22	896	764	85	2"	2305	2500	1120	180	1040	400	350	1635	2095	1395	80	308	695	3095
24	959	819	91	2"	2305	2720	1120	180	1040	400	350	1635	2095	1395	96	364	753	3330

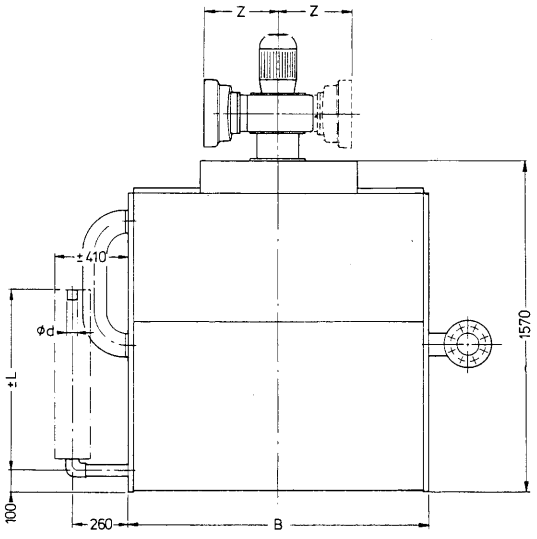
* Specified when the boiler is ordered.

Boiler performance at boiler-water return of 70°C

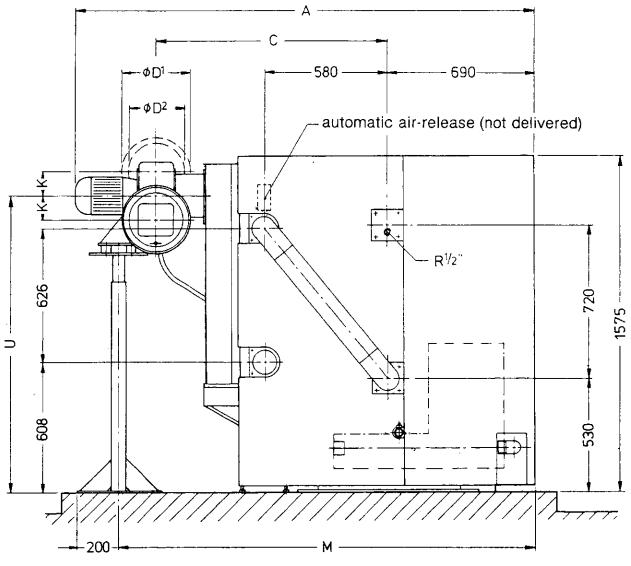
3.2 Flue-fan behind boiler with horizontal connection



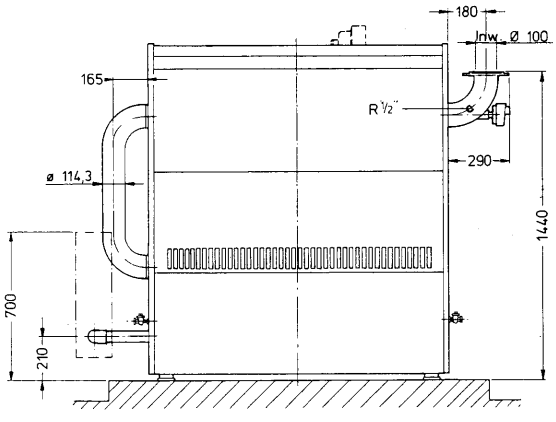
Rear view



Top view



Left-side view



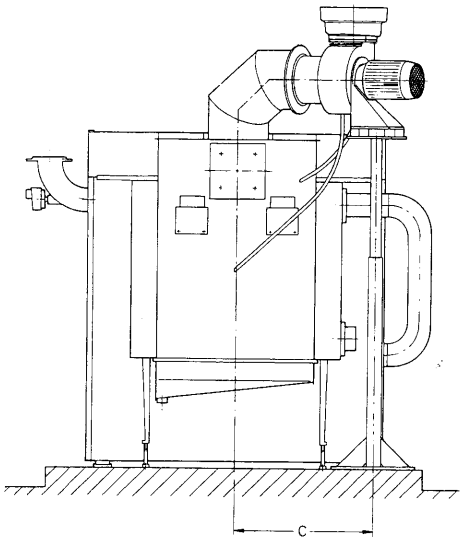
Front view

Number of sections	Input	Output	Natural Gasrate	Dimensions											Water resistance		Water content	Dry weight
				Ød	A	B	C	K	L	ØD¹	ØD²	M	U	Z	Δt = 20°C	Δt = 10°C		
	kW	kW	m³/h	mm											mbar	mbar	Litres	kg
9	341	292	32	2"	2165	1070	1090	115	1040	300	250	1955	1395	342	41	162	310	1470
10	383	329	36	2"	2165	1180	1090	115	1040	300	250	1955	1395	342	49	197	339	1590
11	426	366	41	2"	2165	1290	1090	115	1040	300	250	1955	1395	342	57	229	368	1715
12	469	415	46	2"	2165	1400	1090	115	1040	300	250	1955	1395	342	67	270	397	1835
13	512	441	49	2"	2165	1510	1090	115	1040	300	250	1955	1395	342	78	311	426	1960
14	554	473	53	2"	2210	1620	1100	165	1040	400	300/350*	1995	1410	350	38	150	463	2125
15	597	512	57	2"	2210	1730	1100	165	1040	400	300/350*	1995	1410	350	42	168	492	2250
16	626	539	60	2"	2210	1840	1100	165	1040	400	300/350*	1995	1410	350	46	182	521	2370
17	682	583	65	2"	2210	1950	1100	165	1040	400	300/350*	1995	1410	350	50	202	550	2495
18	725	619	69	2"	2210	2060	1100	165	1040	400	300/350*	1995	1410	350	55	221	579	2615
20	810	693	78	2"	2305	2280	1120	180	1040	400	350	2095	1395	400	66	263	637	2860
22	896	764	85	2"	2305	2500	1120	180	1040	400	350	2095	1395	400	80	308	695	3095
24	959	819	91	2"	2305	2720	1120	180	1040	400	350	2095	1395	400	96	364	753	3330

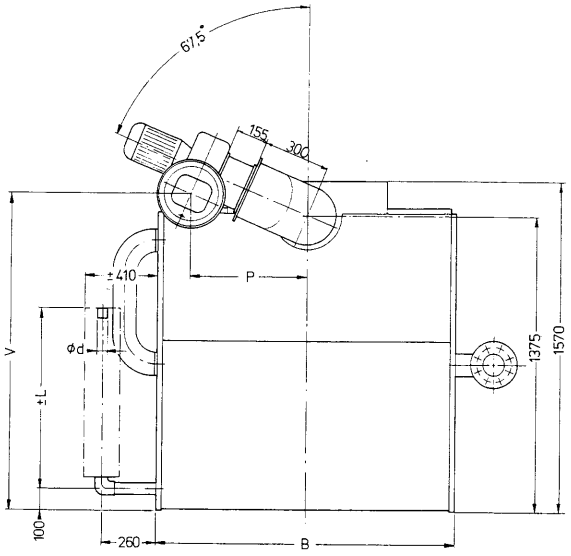
* Specified when the boiler is ordered.

Boiler performance at boiler-water return of 70°C

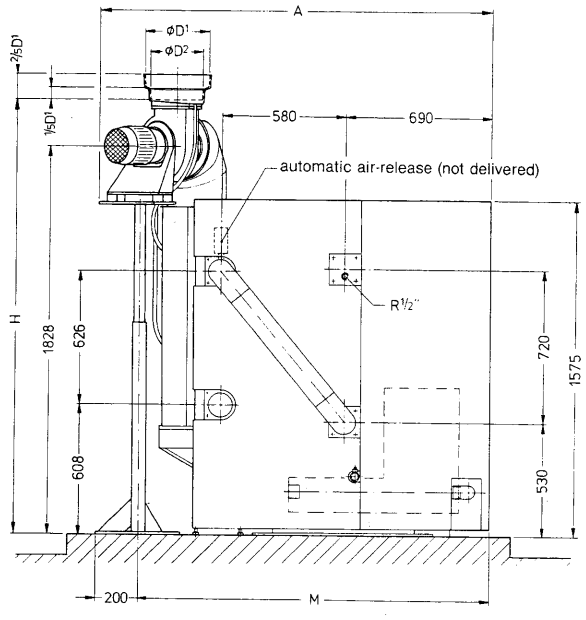
3.3 Flue-fan above boiler



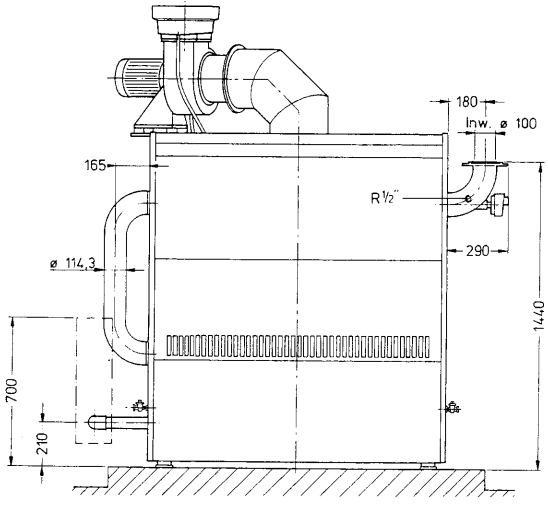
Rear view



Top view



Left-side view



Front view

Number of sections	Input	Output	Natural Gasrate	Dimensions											Water resistance		Water content	Dry weight
				Ød	A	B	C	L	ØD¹	ØD²	H	M	P	V	Δt = 20°C	Δt = 10°C		
	kW	kW	m³/h	mm											mbar	mbar	Litres	kg
9	341	292	32	2"	1830	1070	660	1040	300	250	2052	1645	540	1475	41	162	310	1470
10	383	329	36	2"	1830	1180	660	1040	300	250	2052	1645	540	1475	49	197	339	1590
11	426	366	41	2"	1830	1290	660	1040	300	250	2052	1645	540	1475	57	229	368	1715
12	469	403	46	2"	1830	1400	660	1040	300	250	2052	1645	540	1475	67	270	397	1835
13	512	441	49	2"	1830	1510	660	1040	300	250	2052	1645	540	1475	78	311	426	1960
14	554	473	53	2"	1845	1620	700	1040	400	300/350*	2020	1665	570	1430	38	150	463	2125
15	597	512	57	2"	1845	1730	700	1040	400	300/350*	2020	1665	570	1430	42	168	492	2250
16	625	539	60	2"	1845	1840	700	1040	400	300/350*	2020	1665	570	1430	46	182	521	2370
17	682	583	65	2"	1845	1950	700	1040	400	300/350*	2020	1665	570	1430	50	202	550	2495
18	725	619	69	2"	1845	2060	700	1040	400	300/350*	2020	1665	570	1430	55	221	579	2615
20	810	693	78	2"	1910	2280	850	1040	400	350	2070	1725	590	1425	66	263	637	2860
22	896	764	85	2"	1910	2500	850	1040	400	350	2070	1725	590	1425	80	308	695	3095
24	959	819	91	2"	1910	2720	850	1040	400	350	2070	1725	590	1425	96	364	753	3330

* Specified when the boiler is ordered.

Boiler performance at boiler-water return of 70°C

4. BOILER EFFICIENCY

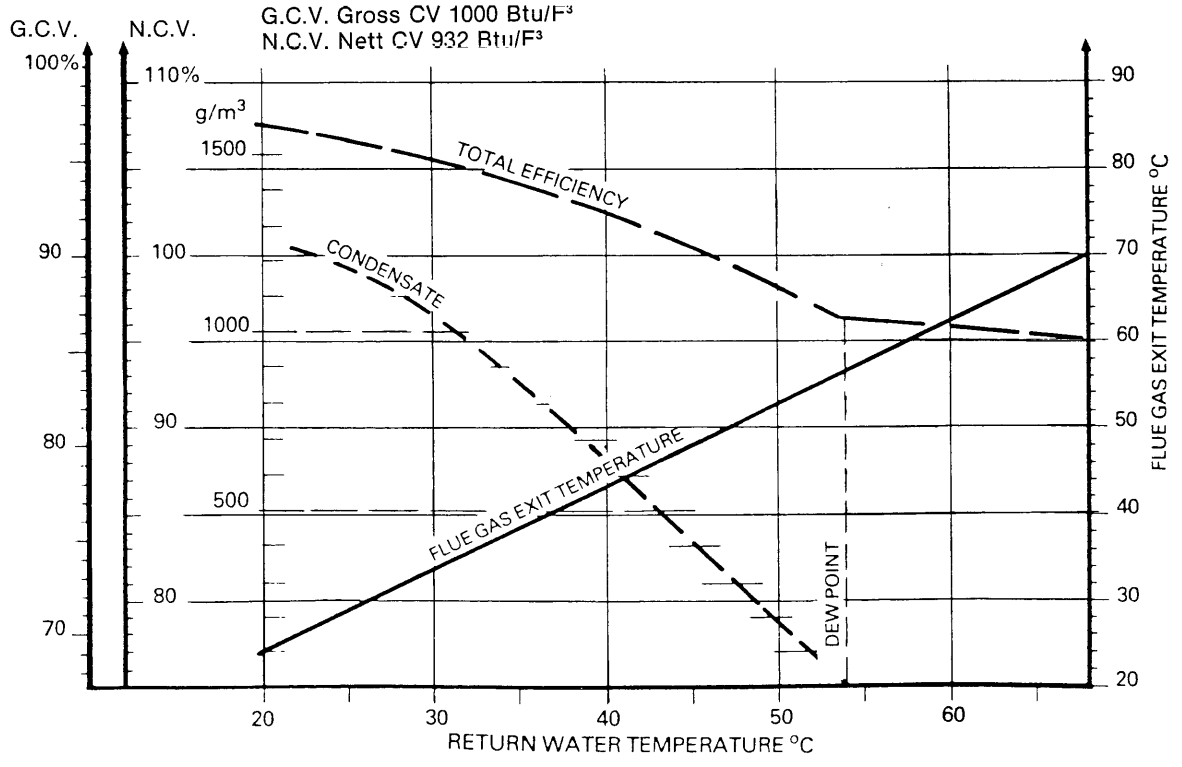


Fig. 1. Relationship between boiler efficiency and return boiler water temperature

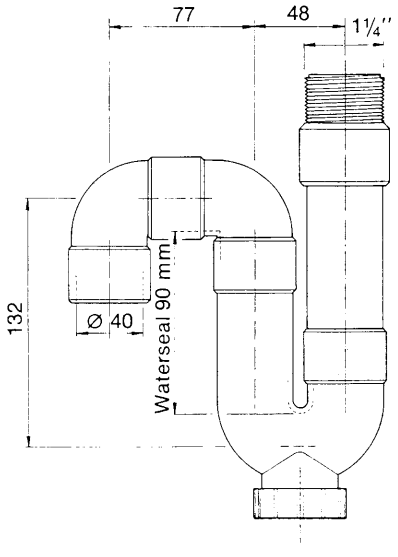
5. APPLICATIONS

5.1 Water connections

The boiler flow can be connected up on the left or right as desired.
The return is fitted as standard on the left-hand side of the economiser. This is because the economiser is supplied as standard with the return on the left-hand side of the boiler (viewed from the front). The return can be fitted on the right; this must be clearly specified when the boiler is ordered.
The flow elbow is supplied with flange to DIN 2633. It is provided with 3 x ½" threaded holes for fitting the dual thermostat, high/low thermostat and optional thermometer (not supplied by Broag).
A straight flange is supplied for the return connection on the economiser.
The top blind flange of the boiler block is provided with a ½" threaded hole. The end sections of the boiler each have a ¾" threaded hole at the bottom, in which a filling and drain tap is fitted. The economiser is fitted at the bottom with a ½" threaded hole for the fitting of a filling and drain tap. At the top there is a ½" threaded hole in which a tap vent can be fitted.

5.2 Drain

A drain pipe with ext. dia. 40 mm can be secured by adhesive to the siphon trap (siphon trap dimensions see picture below).
The liquid condensate produced by condensing boilers must be led away via a pipe to a drain for disposal. This pipe may be separate from the flue system and incorporate a water-sealed trap allowing condensate to pass but preventing the escape of flue gases.



Dimensions siphon trap

5.3 The fan
Condensing boilers will be fitted with a fan to assist flueing. The fan is located at the flue outlet (inducod draught fan.)
There are 3 possibilities of fluefan connections.
a. standard with fan at the rear side eco.
b. additional with fan at the rear side eco with horizontal flue connection.
c. additional with fan at the top eco, this must be clearly specified when the boiler is ordered.

5.4 Flues
Consideration of flues for condensing appliances can conveniently be split between a flue dilution system and other types of flue.
It is advisable in each instance to advise Broag limited of the chimney dimensions and possibilities.
For a single flue system see section 13.

5.5 Noise production

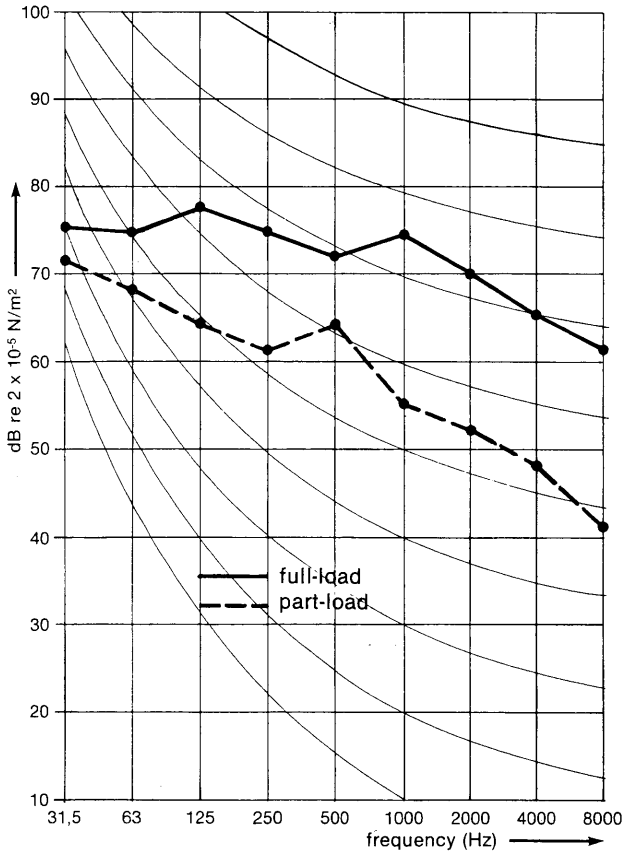


Fig. 2. Noise production

Average value. Measuring point at 3 m distance away from boiler.
The boiler house noise level around the boiler amounts to 78 dBA in full-load and 58 dBA in part-load.
These values should be taken as guidelines only. Other values may arise, depending on boiler house construction.

5.6 Safety equipment fluegas transport
By means of two pressure switches the fluegas transport is checked through the boiler and economiser.
Measuring points are located in the fluehood.
If insufficient fluegas transport is being conveyed, the boiler is shut down.

5.7 Operating pressure
The boiler sections are subjected to a testpressure of 12 bar.
The maximum testpressure of an installed boiler plus economiser is 6 bar.
Maximum operating pressure is 3.6 bar.
Maximum water temperature is 100°C (lock out).
In open installations the maximum water temperature is 95°C. The highlimit thermostat supplied must be set at 95°C.

5.8 Water treatment
Under normal conditions, water treatment is not necessary. The installation should be filled with normalised mains water. The **pH** of the system water should lie between **7 and 11.**
In installations with a content-ratio boiler installation of 1 : 10 or less, no water treatment will be necessary in case the following requirements are complied with:
- the installation is only once completely filled with suitable water
- the feed is **not** more than 5% per year.
- the hardness of the feed water does not exceed 358 ppm (20°D).

The scale in the boiler in this case will not influence the boiler operation and will not reduce the boiler life-time.
In case the installation content is extremely large compared to the boiler content, or in case the feed exceed 5%, dependent on the hardness of the feed, water treatment will be required.
Following can be done to avoid corrosion:
1. To add oxygenbinders. We advise against compounds like nitrates, nitrites, sulphates and hydrazine, because of environmental reasons and several materials in the installation e.g. rubber and plastics, can be corroded.
2. To install an automatic air relase valve in the flow at the highest temperature point in the installation.

Notes:
- pH value between 7 and 11
- max. content of chlorine is 200 mg/l.
- max. content of copper is 1 mg/l.
- The correct choice of inhibitors for the acid is vital. Note must be taken of the recommended methods for adding the inhibitor, and special precautions are necessary

It is advisable in each instance to advise Broag Limited of water treatment.

5.9 Circulation
To prevent cavitation-corrosion the water-velocity should be less than 2.5 m/sec.
This means that $\triangle t$ between flow and return should be more than 8°C.
The minimum flowrate is given by the equation:

$$\frac{\text{output boiler in kW}}{93} = \ldots. \text{ m}^3/\text{h}.$$

With this circulation rate, the control thermostat's highest cut-out point is 95°C.

6. OPERATING PRINCIPLE OF THE ECO BOILER

In this boiler, the combustion gases transmit a great deal of their heat to the first heat exchanger (1) located above the burners.
The direction of flow of the combustion gases is then reversed and they pass via the orifice plate (2) into the second heat exchanger (economiser) (3) where they are further cooled down. As the relatively cold return water flows counter to the combustion gases, those gases will ultimately acquire practically the same temperature as the return water.
If the temperature of the return water is sufficiently low, the temperature of the combustion gases in the economiser will fall to dew-point. This is the temperature at which the water vapour present in the combustion gases start to condense.
If then the combustion gases are cooled down further, condensation occurs. The heat liberated by this condensation process is transferred to the central heating water. The condensate is collected in a collector (4) and discharged to the drain via a siphon trap (5) (supplied by Broag Ltd). The entire boiler is fully insulated (6) to minimise heat losses to the environment.
With a fully condensing boiler, the temperature of the combustion gases in the vicinity of the discharge point (7) falls to such an extent that the thermal draught is insufficient to exhaust the gases naturally through the chimney. In order to ensure that combustion air removed, a fan (8) is supplied and must be used.
The flow of combustion gases is monitored by air pressure switches. These air pressure switches will also monitor the 'pre-purging' that precedes each boiler start-up. If the flue gas flow is insufficient the boiler will be shut down.

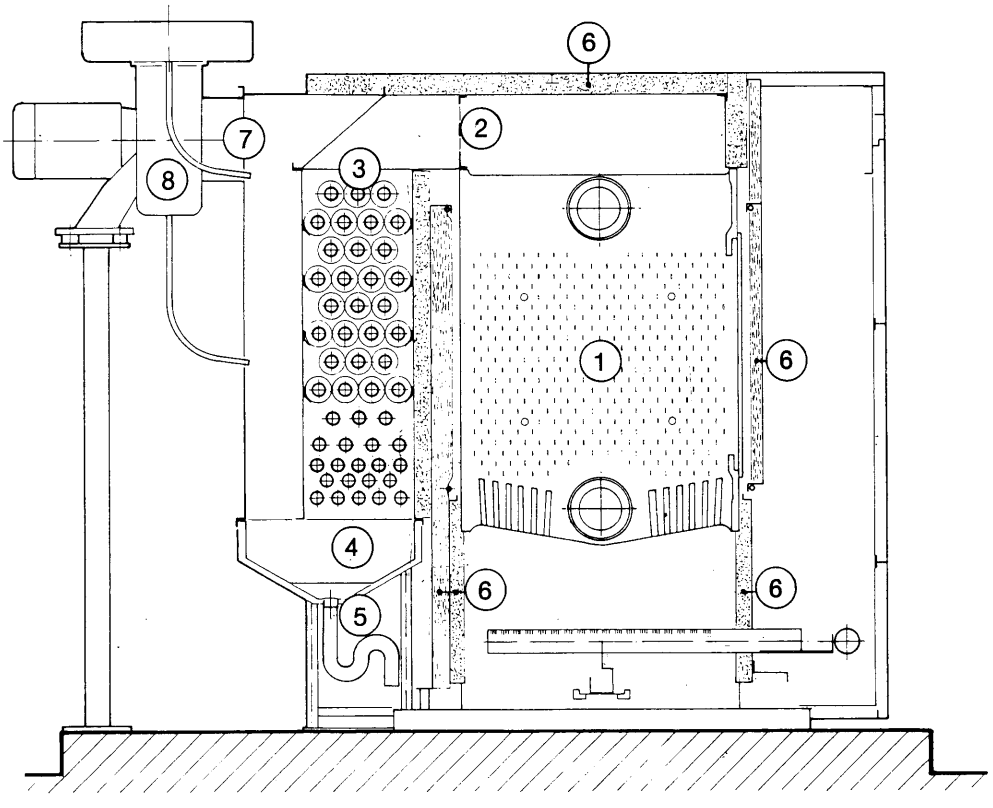


Fig. 3. Cross-section

7. GAS-INSTALLATION INSTRUCTIONS

7.1 General
The gas-connections should be in accordance with British Gas requirements.
Gas connection can be done on the left or right-hand side.

7.2 Gas pressures
Min. gaspressure is 20 mbar.
Max. gaspressure is 100 mbar.
Burnerpressure (Except the 16 and 24 sections) 11.4 mbar at full-load and 2.8 mbar at 50% load.
Only for 16 and 24 sections:
Burnerpressure 10.9 mbar at full-load and 2.8 mbar at 50% load.
Injector-size ∅ 5.40 mm.

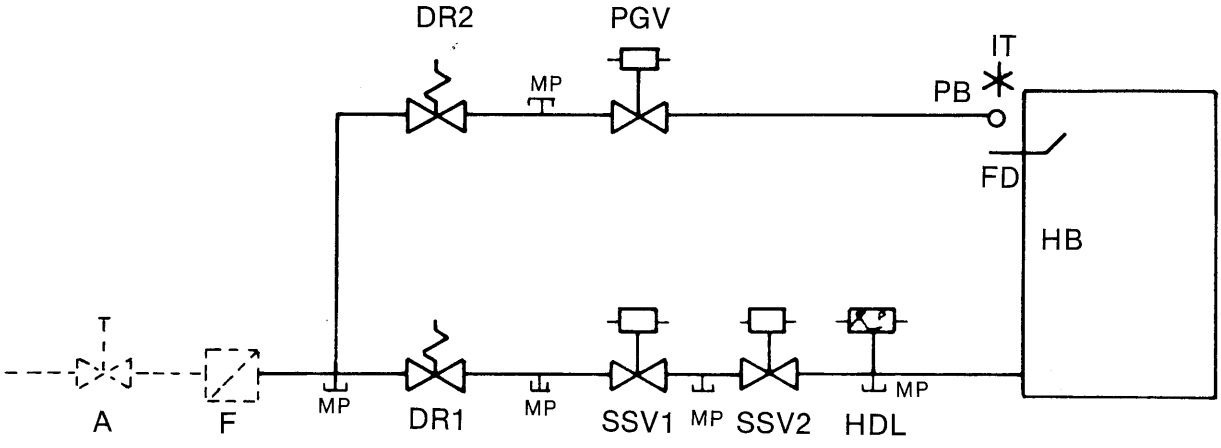


Fig. 4. Standard according Watson House

PGV Pilot gas valve
MP Measuring point
SSV Safety shut off valve
IT Ignition transformator
FD Ionisation probe
- - - - Not supplied as standard

A Shut-off valve
PB Pilot burner
DR Gas governor
F Gas filter
HB Burners
HDL Gas pressure switch

8. INSTALLATION INSTRUCTIONS ELECTRICIAN

8.1 General

The electrical connections and facilities must be provided in accordance with I.E.E. regulations.

The gas control and safety equipment is pre-wired as far as the boiler's terminal box. The control panel is supplied separately.
The following electrical connections are to be provided by the electrician.

1. Power supply.
2. Wiring between thermostats and control panel.
3. Wiring between air pressure switches and control panel.
4. Wiring between flue gas fan and control panel.

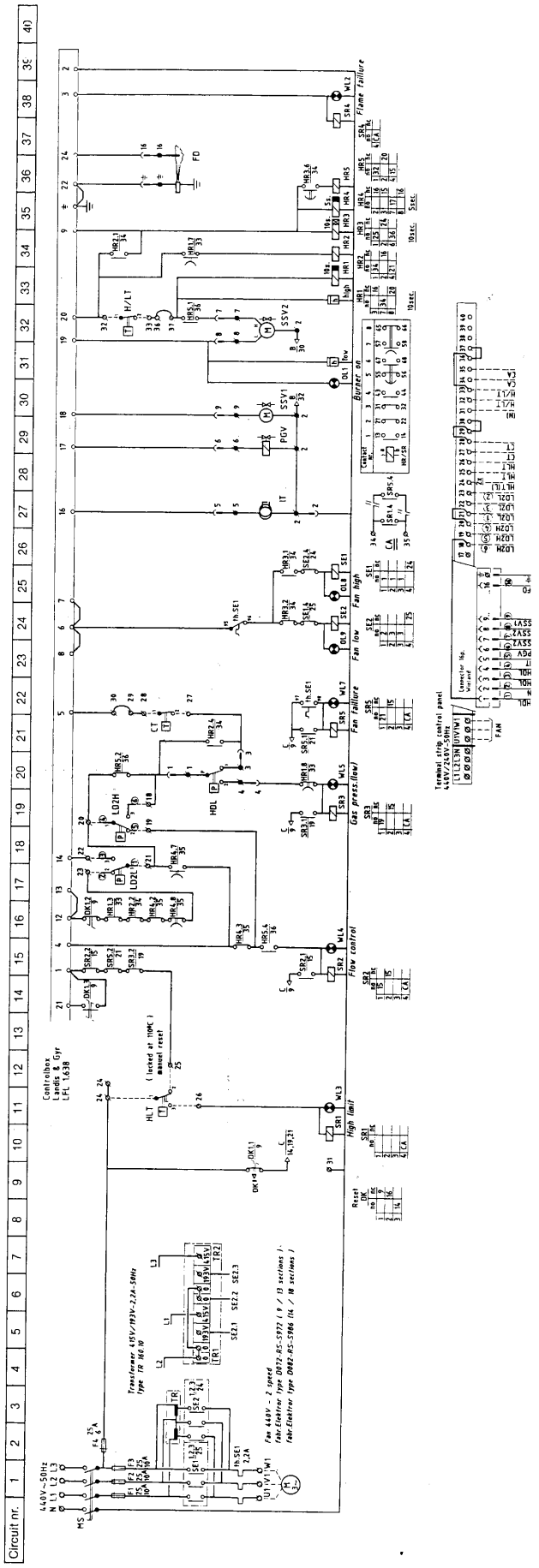
Electrical connections must be made in accordance with the electrical wiring diagrams supplied (See § 8.3 and 8.4).
The boiler is earthed in vicinity of the pilot burner.

8.2 Electrical data

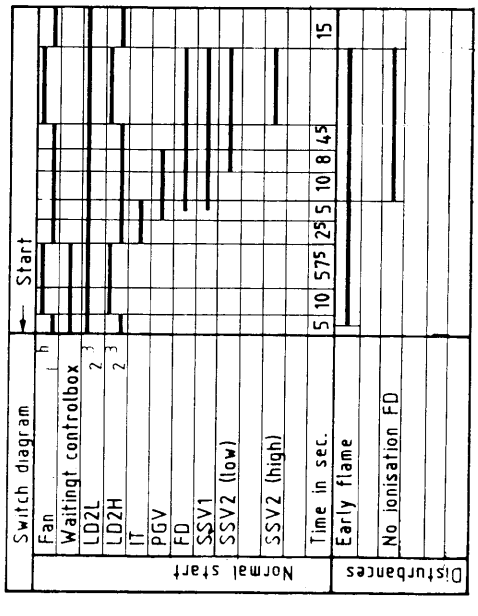
Power supply 415 V-50 Hz.
Controlling current 240 V-50 Hz.
Max. fuse: 10 A.

Control box (Landis & Gyr) operates on a neutral/phase supply.

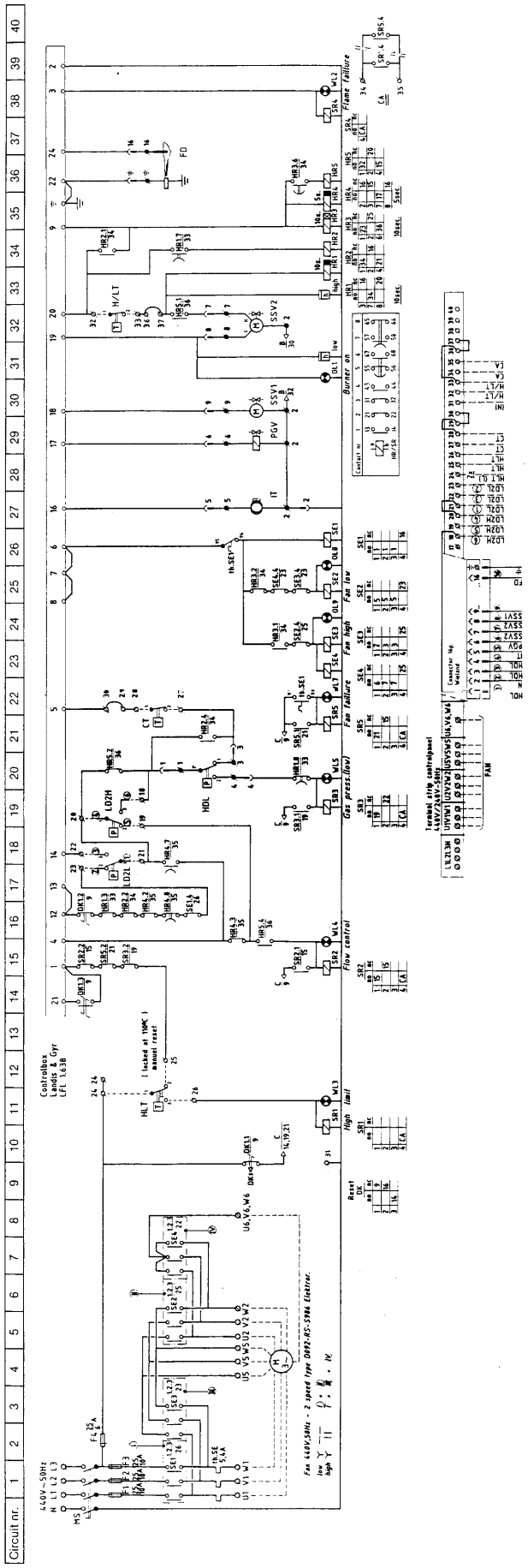
8.3 Electrical wiring diagram 9 till 18 sections



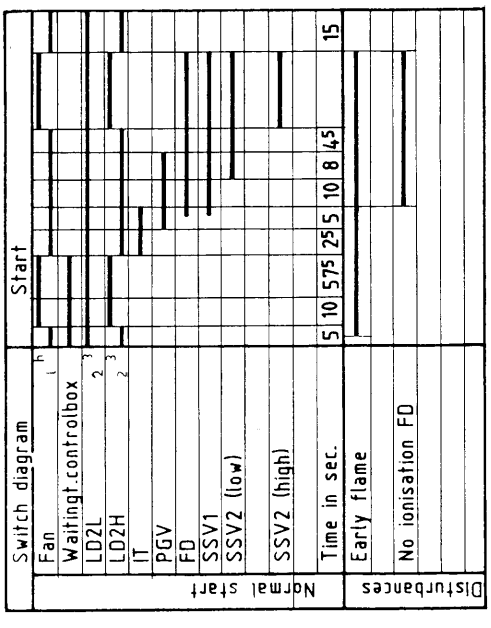
Legend				
CA	General warning signal	OL	Operating light	th.SE	Pilot relay with thermal unit
CT	Control thermostat	PGV	Pilot gas valve		
DK	Release button	SE	Pilot relay	HR	Auxiliary relay
F	Fuse	SR	Shutdown relay		
FD	Flame detector	SSV	Safety shut-off valve		
HDL	Gas pressure switch	WL	Warning light (disturbances)		
HLT	High limit thermostat				
H/LT	High/low thermostat	○	Wire number		
h	Hour counter	●	Connection screws wiringbox		
IT	Ignition transformer	—⊂—	Connector		
LD2L	Flow control low	○	Connection screws controlbox		
LD2H	Flow control high	⌀	Connection screws terminal strip control panel		
MS	Main switch	- - - -	Will not be supplied or wired		



8.4 Electrical wiring diagram 20 till 24 sections



Legend					
CA	General warning signal	MS	Main switch	th.SE	Pilot relay with thermal unit
CT	Control thermostat	OL	Operating light		
DK	Release button	PGV	Pilot gas valve		
F	Fuse	SE	Pilot relay		
FD	Flame detector	SR	Shut down relay		
HDL	Gas pressure switch	SSV	Safety shut-off valve		
HLT	High limit thermostat	WL	Warning light		
H/LT	High/low thermostat		(disturbances)		
HR	Auxiliary relay	◯	Wire number		
h	Hour counter	-◯-	Connector		
IT	Ignition transformer	●	Connection screws wiringbox		
LD2H	Flow control high	○	Connection screws controlbox		
LD2L	Flow control low	⌀	Connection screws terminal strip controlpanel		
		----	Will not be supplied or wired.		



9. CONTROL AND SAFETY EQUIPMENT

9.1 General
Electronic control and safety equipment with high/low control in accordance with British Gas requirements for 9 to 24 sections boilers.

9.2 Flame detection
The fully condensing boiler is supplied with electronic control and safety equipment with ionisation flame detection, featuring one ionisation electrode for the pilot burner and main burners.

9.3 Gaspressure control
The boiler is safequarded on 'low flame' by means of a maximum gas pressure switch (HDL).

9.4 Flue gas fan
The boiler is provided with a two-speed flue gas fan for high/low control.

9.5 Air pressure control
The throughflow of flue gases is monitored by two differential air pressure switches (LD2L and LD2H) mounted on the rear-side casing of the economiser.

9.6 Main voltage (415-50 Hz)
In the event of mains power failure, the boiler cuts out and automatically restarts when power is restored.

9.7 The safety and control equipment
1 Control panel (supplied loose) dimensions (height x width x depth) 600 x 600 x 210 mm.
featuring:
- 1 Landis & Gyr control box LFL 1.638
- 1 main switch
- 1 central warning signal connection and reset button
- 2 hours counters (one for low and one for high + low hours)
- 1 fuse for burner control
- 3 fuses for flue fan
- 5 warning lights
  - high/limit
  - flow control fan
  - gas pressure low
  - fan failure
  - flame failure
- 3 operating lights
  - fan low
  - fan high
  - burner on
- 1 motor safety cut-out
- 2 safety shut-off valves
- 1 pilot gas valve
- 1 ignition transformer 5 kV
- 1 high/low thermostat
- 1 dual thermostat consisting of: 1 high/limit, mechanically locked at 110°C (setting at 95°C is possible) 1 control thermostat (35°C till 95°C) (Dual thermostat is supplied loose and must be fitted in the flow elbow)
- 1 pilot burner with ignition electrode
- 2 differential air pressure switches
- 1 two-speed flue fan
  - 9 to 13 sections typ D 072-RS-S 972
  - 14 to 18 sections typ D 082-RS-S 986
  - 20-22-24 sections typ D 092-RS-S 986
- 1 gaspressure switch for low flame
- 1 control transformer unit for fan-motor, consisting of two transformers 193 V, 2.2 A, 50 Hz.

10. LIGHTING INSTRUCTION

10.1 Technical data

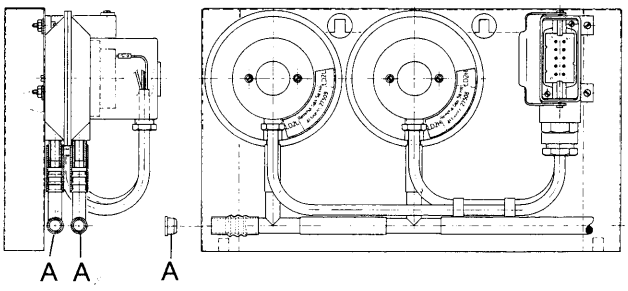
Power supply: 415 V-50 Hz.
Controlling current: 240 V-50 Hz.
Power input:

sections	Power input (W)
9	600
10	600
11	700
12	700
13	700
14	800
15	800
16	900
17	900
18	1000
20	1700
22	1700
24	1700

Control box: Landis & Gyr LFL 1.638.
Minimum ionisation current: 7 micro Amp.
Reaction time of flame detection: 1 sec.
Limiting time: 5 sec.
Maximum ambient temperature: 50°C.

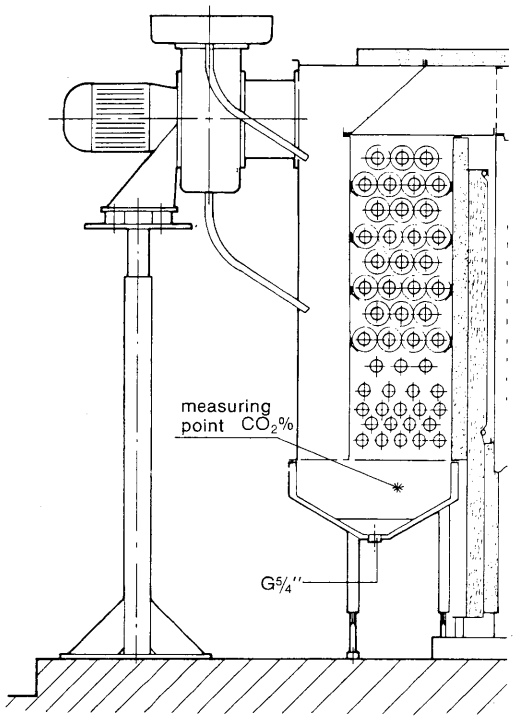
10.2 Instructions

1. Check gas connections.
2. Check electrical supply phase/neutral and earth.
3. Check water level.
4. Check waterflow, pumps.
5. Open main gascock.
6. Set thermostats on required temperatures.
7. Adjust the sliding air inlets.
8. Adjust the timer relais. (See electric wiring diagram in section 8.3 or 8.4.)
9. Switch on electrical supply.
10. Check direction of rotation fluefan in high speed and low speed.
11. The following will now take place.
    Safety valve SSV 1 opens and the fan is switched on at the high speed.
    The boiler and economiser are ventilated for 67.5 sec. which is monitored by the differential air pressure switch LD2H.
    The flue gas fan is then switched back to low speed, which is monitored by airpressure switch LD2L.
    Ignition and the pilot gas is then enabled. The pilot flame is monitored by ionisation probe FD. Sparking stops and safety valve SSV 2 opens to low level. The pilot flame is turned off and burner control is enabled.
    When the high/low thermostat calls for heat, first the fan is switched to high speed.
    This is monitored by air pressure switch LD2H. Then safety valve SSV 2 opens to high level.
12. Once the boiler is operational, allows it to burn for a few minutes to get rid of the air still present in the gas supply.
13. Set the burner pressure at 11.4 mbar (16 and 24 sections: 10.9 mbar) by means of the gas governor.
14. After the required full-load burner pressure has been set, the combustion efficiency must be optimised. The CO_2 percentage by the indicated location must be subsequently adjusted by means of the sliding air controls at the rear of the economiser (see § 10.3) depending on the chimney's diameter/length ratio, so that 8% CO_2 is obtained at min. returnwater temp. of 60°C. Also check whether carbon monoxide is being formed.
    After this adjustment, the sliding controls must be locked in position.
15. Set the boiler to low flame by means of the high/low thermostat and set the low-level burner pressure to 2.8 mbar by adjusting safety valve SSV 2.
    Check the CO_2% (approx. 8%) and check whether carbon monoxide is being formed.
16. Adjustment of max. pressure switch HDL (low flame gas pressure too high). This switch is operational while safety valve SSV 2 is on the low level. Set the switch at 3.4 mbar. Starting the boiler on full load instead on half load causes the high-pressure switch to trip, the burner to cut out and the system be switched off. The warning light 'Gas press Low'. lights up. Reset the system. The correct cut-out point can be checked by connecting a U-tube pressure gauge to the switch's sensor.
17. Check that the thermostats are operating correctly and set the correct values. The high/limit thermostat has a lock out action.
18. Check the operation of the flame failure by disconnecting the ionisation probe (FD) during the start-up.
19. Check the operation of the differential air pressure switches LD2L and LD2H by detaching the sealing caps of the hoses during start-up and normal operation. See A.

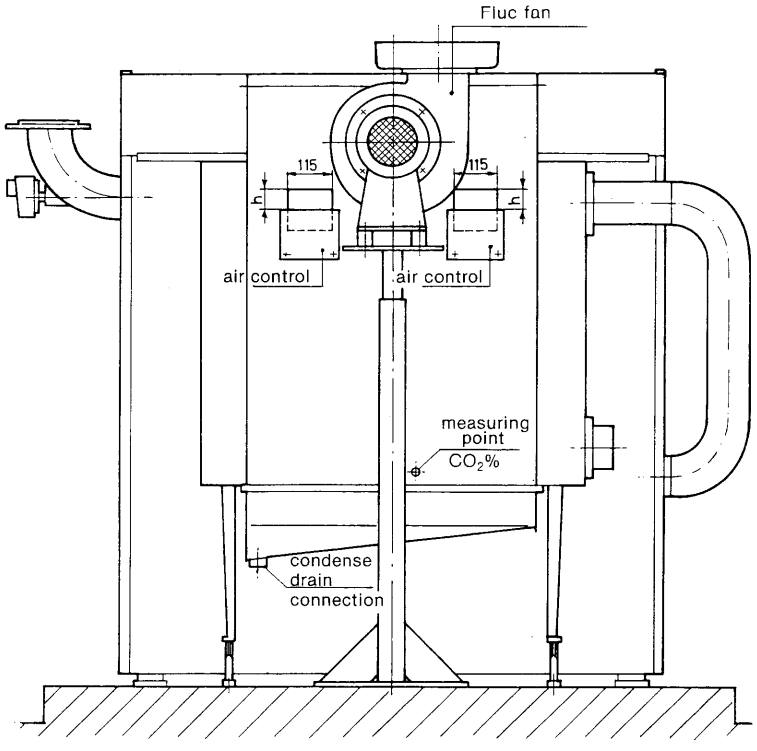


Side Front

10.3 Guidelines for adjustment of sliding air controls



cross-section Eco



Rear view of Eco

Nummer of sections	Setting 'h' in mm.	Flue Fan	Fan Power in kW
9	37	D 072	0,41
10	34	D 072	0,41
11	30	D 072	0,41
12	26	D 072	0,41
13	17	D 072	0,41
14	57	D 082	0,60
15	51	D 082	0,60
16	45	D 082	0,60
17	39	D 082	0,60
18	33	D 082	0,60
20	85	D 092	1,20
22	75	D 092	1,20
24	65	D 092	1,20

11. GUIDELINES FOR FAILURES

11.1 General
Follow electric wiring diagram and switch diagram (see section 11.8).

Action
Check the main voltage and ensure that the thermostats and the limit contacts of the butterfly valves are in a closed position.

11.2 No ignition spark
Check.
1. The ignition transformer.
2. The ignition electrode gap. This must be 2 mm.

11.3 No pilot flame (but ignition spark present)
Check.
1. Voltage to the pilot gas valve.
2. Gas supply to the pilot gas valve.
3. Whether injector is clogged.
4. Whether air is present in gas line.

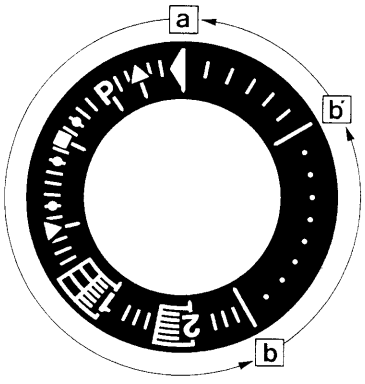
11.4 No main flame
Check.
1. Voltage to the safety valves.
2. Ionisation current (min. 7 uA).
3. Setting of ionisation probe FD (see maintenance instructions).
4. Wiring of ionisation probe.

11.5 External faults
1. Loss of gas pressure.
   Control box switches to fault position.
   Warning light 'flame failure'.
2. Loss of mains power. Boiler outs out. Afer mains power has been restored, the boiler will automatically restart.
3. Mains power fluctuates of more than + 10 or − 15% will cause the safety equipment to switch to fault position.

11.6 Flue gas discharge faults
1. Flue fan is not operating during start-up.
   Warning light 'Flame failure' or 'Fan failure'
   - Check direction of rotation of fan (see arrow on motor). If motor rotates in wrong direction, check wiring.
   - Check control circuit and reset fault status.
   - Check correct operation of differential air pressure switches.

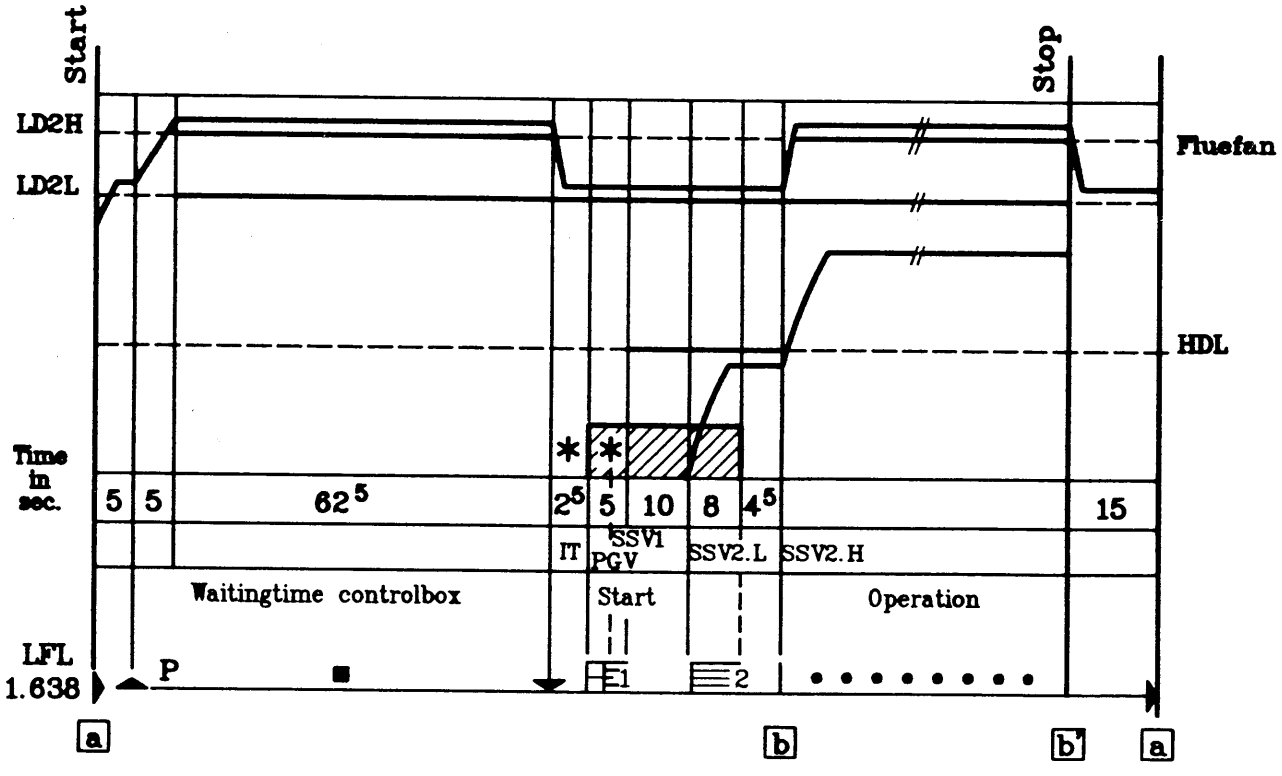
11.7 Fan stops during operation
1. Warning light 'Flame Failure'.
   - Check flue for obstructions.
   - Check boiler and eco for fouling.
   - Check correct operation of differential air pressure switch LD2H (min. negative pressure 4.2 mbar.).
   - Reset control box.
2. Warning light 'Flow control'.
   - Reset failure: push reset button. Check correct operation differential air pressure switch LD2L (min. negative pressure 1.2 mbar).
3. Warning Light 'Fan Failure'.
   - Reset thermal safety device.

11.8 Control program under fault conditions and lockout indication



a-b:
start-up
sequence

◀ **No start.** The controlling circuit is not closed.
▲ **Start.** Fluefan (High/Low).
P **Lockout.** Differential air pressure switch LD2H is not made.
■ **Lockout.** Due to a fault in the flame supervision circuit.
▼ **Interruption of the start sequence.** Differential air pressure switch LD2L is not made.
1 **Lockout.** Flame failure of the first safety time.
2 **Lockout.** Flame failure of the second safety time.
| **Lockout.** Flame failure during burner operation, differential air pressure switch LD2L is not made.



* * Ignition

PGV excited

When lockout occurs, the control can be reset immediately and runs to its start position.

12. MAINTENANCE INSTRUCTIONS

12.1 General

To keep the combustion at an optimum, it is essential to clean the boiler, equipment components and boiler house at least once a year.
This prevents dust from being drawn in and fouling the burners and boiler during operating. This would ultimately lead to poor combustion and possibly the formation of soot.

12.2 Maintening the boiler

1. Cleaning the cast-iron block. Remove the frontpanels and the inner frontpanel of the boiler. Then remove the boiler block's cleaning covers. Disassemble the burner manifold and burners. Clean the combustion ducts between the sections of the boiler block using a **steel** cleaning brush (available from Broag).
2. Inspecting and, if necessary, cleaning the aluminium economiser.
   If it is not too dirty (normal deposition of dust) it can best be cleaned with water, which can be hosed onto the top of the economiser. The hosed-in water can be drained down trough the condensate drain.
   If it is heavily fouled, it should be cleaned using the **nylon** cleaning brush. In that case, remove the rear panel and then the intermediate panel. Clean the aluminium pipes using the special **nylon** cleaning brush (available from Broag).

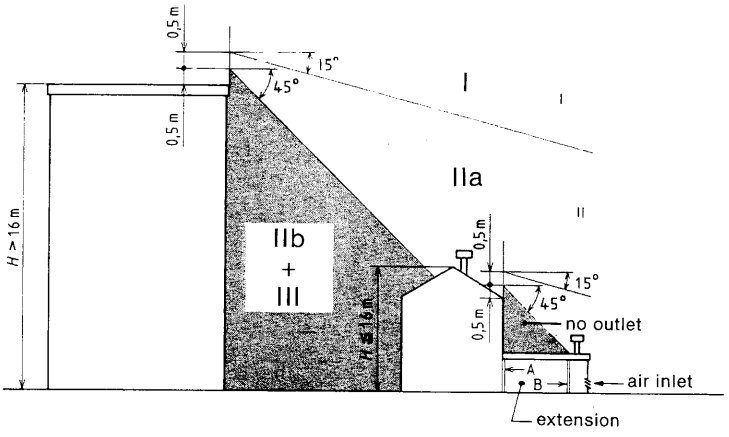
   Do not use a steel cleaning brush. If the nylon brush is being used for the cast-iron block, don't use it anymore for the aluminium economiser.

   Check the condensate collector for fouling and remove any dirt present.
   Remove the screw cap of the siphon trap and clean it.
3. Inspecting and, if necessary, cleaning the flue gas fan.
   Remove the flexible connector between eco and fan.
   Check the fan rotor and clean it if necessary.
4. Cleaning the burners, internally and externally. Clean the burners by blowing air through them from the top. Clean the floor underneath the boiler and the boiler house area in the immediate vicinity of the boiler.
5. Cleaning the ignition electrode.
   Remove the pilot burner. Clean the ignition electrode and check the electrode gap (2 mm). After refitting the pilot burner, tighten up all joints.
   Then adjust the ionisation probe correctly: the probe must stick through the flame and be positioned approx. 40 mm. above the burner surface.
6. Cleaning the equipment components.
   Remove any dirt or dust from the gas equipment components, thermostats and cabling. Special attention must be paid to the air inlet and outlet holes of the governors.
7. External cleaning of the boiler panel.
   Re-assemble all components that have been disassembled and then clean the casings. Ensure that the disassembled components are relagged.
   (Lagging material available from Broag).

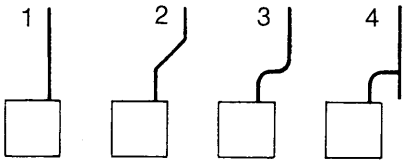
After the boiler and equipment have been cleaned and all detached components have been reassembled, attention must be paid to the following points:

a. Check that the gas equipment components operate properly.
b. Check the main gas trap. If necessary, lubricate with valve grease.
c. Check the start-up cycle, ignition time, safety times.
d. Check the gas pressure switches and differential air-pressure switches.
e. Check that the flue gas fan operate properly.
f. Check the overall efficiency.
g. Check the joints, flanges of the system on leakage.

13. MAXIMUM LENGTHS CHIMNEY



*)
1 = Chimney without bends
2 = Chimney with 2 bends of 45°
3 = Chimney with 2 bends of 90°
4 = Chimney with 1 bend of 90° and T junction or
Chimney with 2 bends of 45° and a raincap



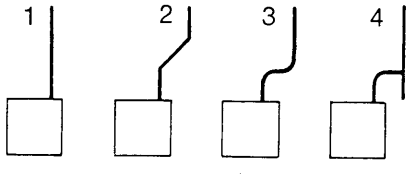
Outlet in region III not possible or in some circumstances.
It is advisable to advice Broag Ltd.

+ Chimney length more than 70 m. - Cannot be used		**Outlet in region (I)** free outlet				**Outlet in region II and III** with raincap			
D (in mm)		1*)	2*)	3*)	4*)	1*)	2*)	3*)	4*)
9 Sections	200	7.6	5.8	4.1	0.8	-	-	-	-
	225	17.1	15.1	13.2	9.5	4.0	2.0	-	-
	250	32.3	30.1	27.9	23.8	15.0	12.8	10.6	6.5
	275	55.2	52.8	50.4	45.9	32.1	29.7	27.3	22.8
	300	+	+	+	+	57.4	54.8	52.2	47.3
	325	+	+	+	+	+	+	+	+
	350	+	+	+	+	+	+	+	+
	375	+	+	+	+	+	+	+	+
	400	+	+	+	+	+	+	+	+
10 Sections	200	8.5	6.7	5.0	1.7	-	-	-	-
	225	18.7	16.7	14.8	11.1	5.2	3.3	1.3	-
	250	35.0	32.8	30.6	26.5	17.1	14.9	12.7	8.7
	275	59.5	57.1	54.7	50.3	35.5	33.1	30.7	26.3
	300	+	+	+	+	62.7	60.1	57.5	52.6
	325	+	+	+	+	+	+	+	+
	350	+	+	+	+	+	+	+	+
	375	+	+	+	+	+	+	+	+
	400	+	+	+	+	+	+	+	+
11 Sections	200	9.3	7.5	5.8	2.5	-	-	-	-
	225	20.2	18.2	16.2	12.6	6.4	4.4	2.5	-
	250	37.4	35.2	33.1	29.0	19.1	16.9	14.7	10.6
	275	63.5	61.1	58.7	54.2	38.7	36.3	33.9	29.4
	300	+	+	+	+	67.6	65.0	62.4	57.5
	325	+	+	+	+	+	+	+	+
	350	+	+	+	+	+	+	+	+
	375	+	+	+	+	+	+	+	+
	400	+	+	+	+	+	+	+	+

+ Chimney length more than 70 m. - Cannot be used		Outlet in region (I) free outlet				Outlet in region II and III with raincap			
D (in mm)		1*)	2*)	3*)	4*)	1*)	2*)	3*)	4*)
12 Sections	200	9.9	8.1	6.4	3.1	–	–	–	–
	225	21.2	19.3	17.3	13.6	7.2	5.3	3.3	–
	250	39.2	37.1	34.9	30.8	20.5	18.3	16.1	12.1
	275	66.4	64.0	61.6	57.1	41.0	38.6	36.2	31.7
	300	+	+	+	+	+	68.6	65.9	61.1
	325	+	+	+	+	+	+	+	+
	350	+	+	+	+	+	+	+	+
	375	+	+	+	+	+	+	+	+
	400	+	+	+	+	+	+	+	+
13 Sections	200	7.4	5.6	3.9	0.6	–	–	–	–
	225	16.7	14.8	12.8	9.1	3.7	1.7	–	–
	250	31.6	29.4	27.3	23.2	14.4	12.3	10.1	6.0
	275	54.2	51.8	49.4	44.9	31.3	28.9	26.5	22.0
	300	+	+	+	+	56.2	53.5	50.9	46.0
	325	+	+	+	+	+	+	+	+
	350	+	+	+	+	+	+	+	+
	375	+	+	+	+	+	+	+	+
	400	+	+	+	+	+	+	+	+
14 Sections	250	10.9	8.7	6.5	2.4	–	–	–	–
	275	20.7	18.3	15.9	11.5	4.7	2.3	–	–
	300	35.2	32.6	26.9	25.1	15.1	12.5	9.9	5.0
	325	55.6	52.8	49.9	44.6	30.3	27.4	24.6	19.3
	350	+	+	+	+	51.4	48.4	45.3	39.6
	375	+	+	+	+	+	+	+	+
	400	+	+	+	+	+	+	+	+
	425	+	+	+	+	+	+	+	+
	450	+	+	+	+	+	+	+	+
15 Sections	250	11.7	9.6	7.4	3.3	–	–	–	–
	275	22.1	19.7	17.3	12.9	5.8	3.4	1.0	–
	300	37.4	34.7	32.1	27.2	16.9	14.2	11.6	6.7
	325	58.8	56.0	53.1	47.9	32.9	30.0	27.2	21.9
	350	+	+	+	+	55.2	52.1	49.0	43.3
	375	+	+	+	+	+	+	+	+
	400	+	+	+	+	+	+	+	+
	425	+	+	+	+	+	+	+	+
	450	+	+	+	+	+	+	+	+
16 Sections	250	12.4	10.3	8.1	4.0	–	–	–	–
	275	23.3	20.9	18.5	14.0	6.7	4.3	1.9	–
	300	39.1	36.5	33.9	29.0	18.2	15.6	13.0	8.1
	325	61.4	58.6	55.8	50.5	34.9	32.1	29.2	24.0
	350	+	+	+	+	58.2	55.1	52.0	46.3
	375	+	+	+	+	+	+	+	+
	400	+	+	+	+	+	+	+	+
	425	+	+	+	+	+	+	+	+
	450	+	+	+	+	+	+	+	+

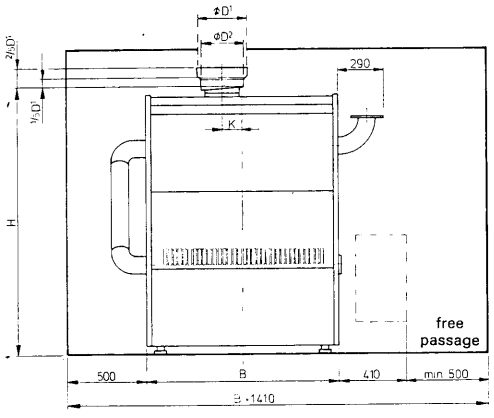
+ Chimney length more than 70 m. - Cannot be used		Outlet in region (I) free outlet				Outlet in region II and III with raincap			
D (in mm)		1*)	2*)	3*)	4*)	1*)	2*)	3*)	4*)
17 Sections	250	13.1	10.9	8.7	4.6	-	-	-	-
	275	24.3	21.9	19.5	15.0	7.6	5.1	2.7	-
	300	40.7	38.1	35.4	30.6	19.5	16.9	14.3	9.4
	325	63.8	61.0	58.1	52.8	36.8	33.9	31.1	25.8
	350	+	+	+	+	60.9	57.8	54.7	49.1
	375	+	+	+	+	+	+	+	+
	400	+	+	+	+	+	+	+	+
	425	+	+	+	+	+	+	+	+
	450	+	+	+	+	+	+	+	+
18 Sections	250	12.9	10.7	8.5	4.5	-	-	-	-
	275	24.0	21.6	19.2	14.7	7.3	4.9	2.5	-
	300	40.2	37.6	35.0	30.1	19.1	16.5	13.9	9.0
	325	63.1	60.3	57.4	52.1	36.2	33.4	30.6	25.3
	350	+	+	+	+	60.1	57.0	53.9	48.3
	375	+	+	+	+	+	+	+	+
	400	+	+	+	+	+	+	+	+
	425	+	+	+	+	+	+	+	+
	450	+	+	+	+	+	+	+	+
20 Sections	250	3.4	1.2	-	-	-	-	-	-
	275	8.7	6.3	3.9	-	-	-	-	-
	300	16.6	14.0	11.3	6.5	0.4	-	-	-
	325	27.8	25.0	22.2	16.9	8.2	5.4	2.6	-
	350	43.4	40.3	37.3	31.6	19.5	16.4	13.4	7.7
	375	64.2	61.0	57.7	51.6	35.0	31.7	28.7	22.4
	400	+	+	+	+	55.7	52.2	48.7	42.2
	425	+	+	+	+	+	+	+	+
	450	+	+	+	+	+	+	+	+
22 Sections	250	2.8	0.6	-	-	-	-	-	-
	275	7.7	5.3	2.9	-	-	-	-	-
	300	15.0	12.4	9.8	4.9	-	-	-	-
	325	25.5	22.7	19.8	14.6	6.4	3.6	-	-
	350	40.0	37.0	33.9	28.2	16.8	13.8	10.7	5.0
	375	59.5	56.2	52.9	46.8	31.2	28.0	24.7	18.6
	400	+	+	+	+	50.5	47.0	43.5	37.0
	425	+	+	+	+	+	+	+	+
	450	+	+	+	+	+	+	+	+
24 Sections	250	2.6	0.4	-	-	-	-	-	-
	275	7.4	5.0	2.6	-	-	-	-	-
	300	14.6	11.9	9.3	4.4	-	-	-	-
	325	24.8	22.0	19.1	13.9	5.9	3.0	-	-
	350	39.0	36.0	32.9	27.2	16.0	13.0	9.9	4.2
	375	58.1	54.8	51.5	45.4	30.1	26.8	23.6	17.5
	400	+	+	+	69.7	49.0	45.5	42.0	35.5
	425	+	+	+	+	+	69.9	66.2	59.3
	450	+	+	+	+	+	+	+	+

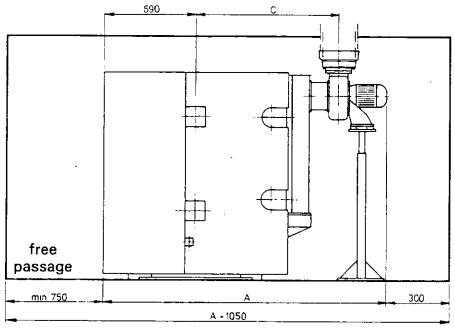
*) 1 = Chimney without bends
2 = Chimney with 2 bends of 45°
3 = Chimney with 2 bends of 90°
4 = Chimney with 1 bend of 90° and T junction or Chimney with 2 bends of 45° and a raincap



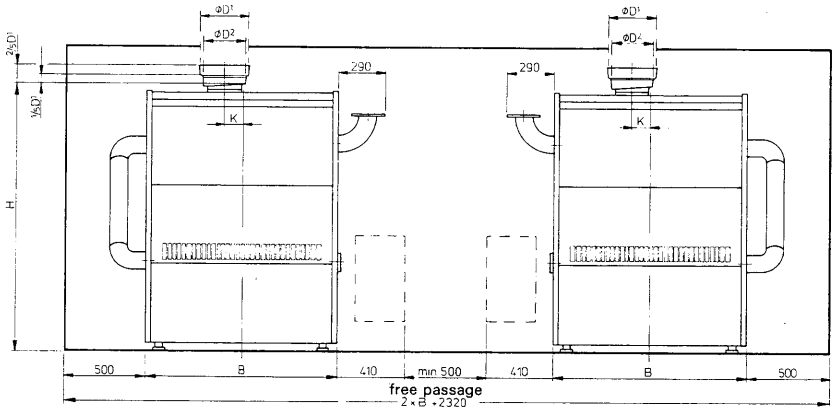
14.1 Boilerroom lay-out with fan behind boiler

14.1 Boilerroom lay-out with fan behind boiler

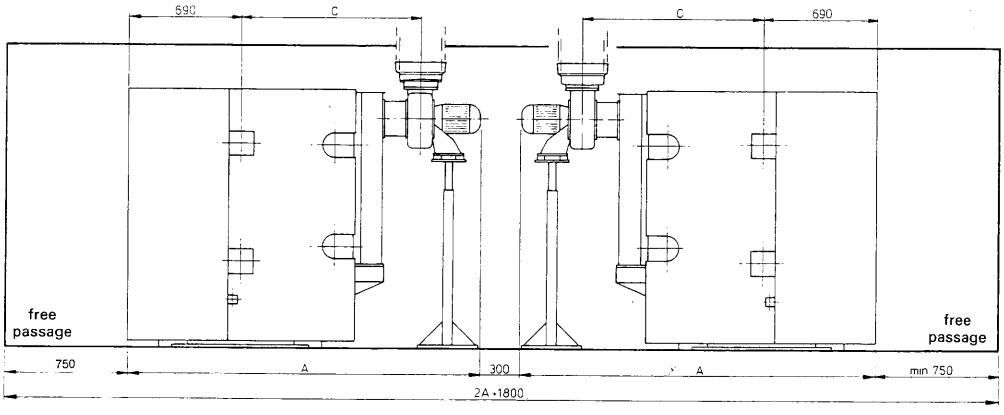




lay-out 1



lay-out 2



lay-out 3

Number of Sections	output (kW)	Dimensions						
		A	B	C	∅D1	∅D2	H	K
9	292	2165	1070	1090	300	250	1617	115
10	329	2165	1180	1090	300	250	1617	115
11	366	2165	1290	1090	300	250	1617	115
12	403	2165	1400	1090	300	250	1617	115
13	441	2165	1510	1090	300	250	1617	115
14	473	2210	1620	1100	400	300/350*)	1600	165
15	512	2210	1730	1100	400	300/350*)	1600	165
16	539	2210	1840	1100	400	330/350*)	1600	165
17	583	2210	1950	1100	400	300/350*)	1600	165
18	619	2210	2060	1100	400	300/350*)	1600	165
20	693	2305	2280	1120	400	350	1635	180
22	764	2305	2500	1120	400	350	1635	180
24	819	2305	2720	1120	400	350	1635	180

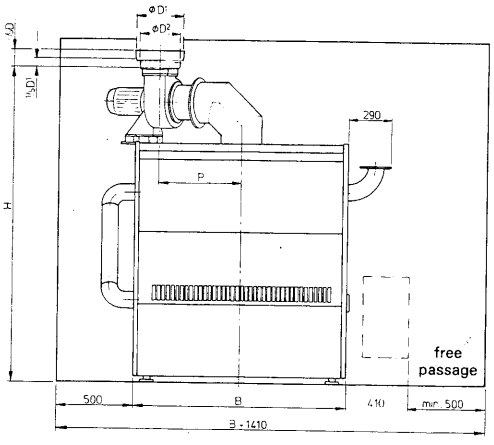
*) Specified when the boiler is ordered.

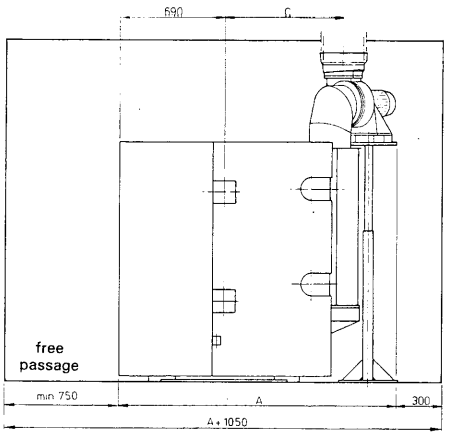
Lay-out 1
1 boiler in boiler-room.

Lay-out 2
2 boilers in boiler-room installed side by side.

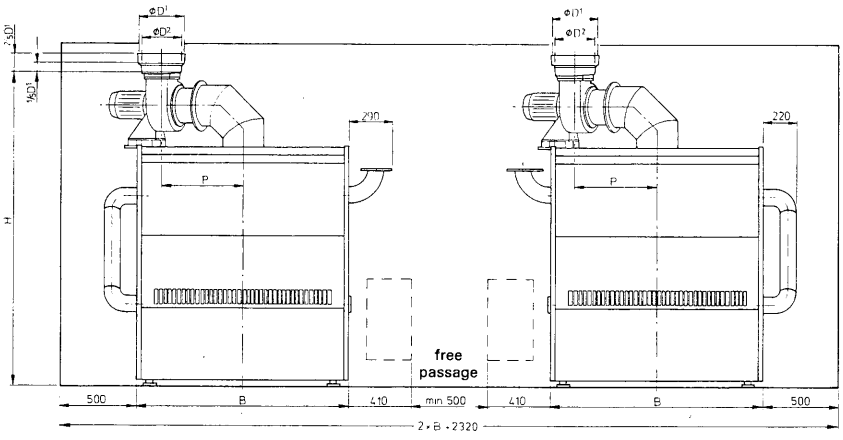
Lay-out 3
2 boilers in boiler-room installed back to back.

14.2 Boilerroom lay-out with fan above boiler

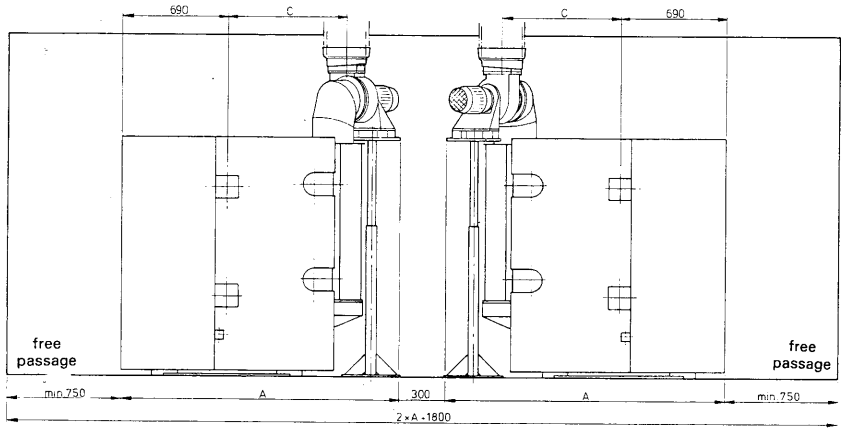




lay-out 1



lay-out 2



lay-out 3

Number of Sections	output (kW)	Dimensions						
		A	B	C	ØD1	ØD2	H	P
9	292	1830	1070	785	300	250	2052	540
10	329	1830	1180	785	300	250	2052	540
11	366	1830	1290	785	300	250	2052	540
12	403	1830	1400	785	300	250	2052	540
13	441	1830	1510	785	300	250	2052	540
14	473	1845	1620	740	300	300/350*)	2020	570
15	512	1845	1730	740	400	300/350*)	2020	570
16	539	1845	1840	740	400	330/350*)	2020	570
17	583	1845	1950	740	400	300/350*)	2020	570
18	619	1845	2060	740	400	300/350*)	2020	570
20	693	1910	2280	735	400	400	2070	590
22	764	1910	2500	735	400	400	2070	590
24	819	1910	2720	735	400	400	2070	590

*) Specified when the boiler is ordered.

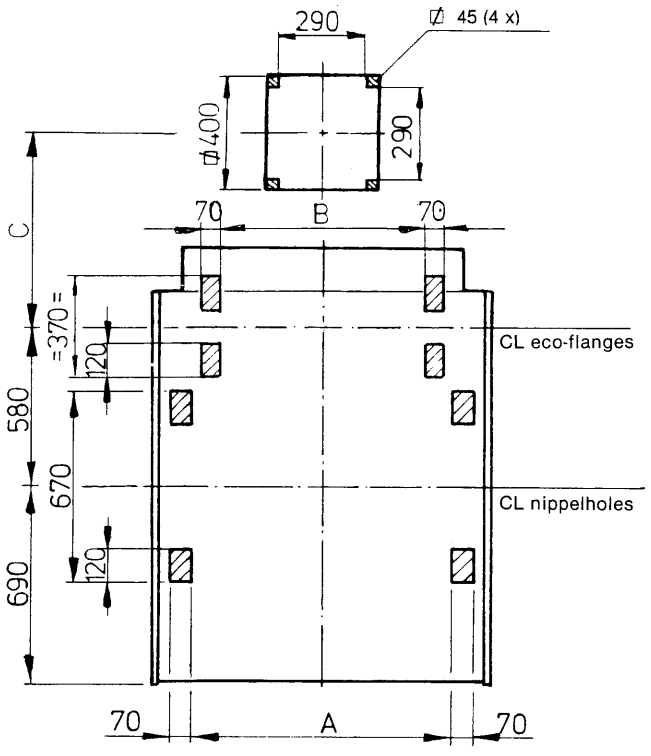
Lay-out 1
1 boiler in boiler-room.

Lay-out 2
2 boilers in boiler-room installed side by side.

Lay-out 3
2 boilers in boiler-room installed back to back.

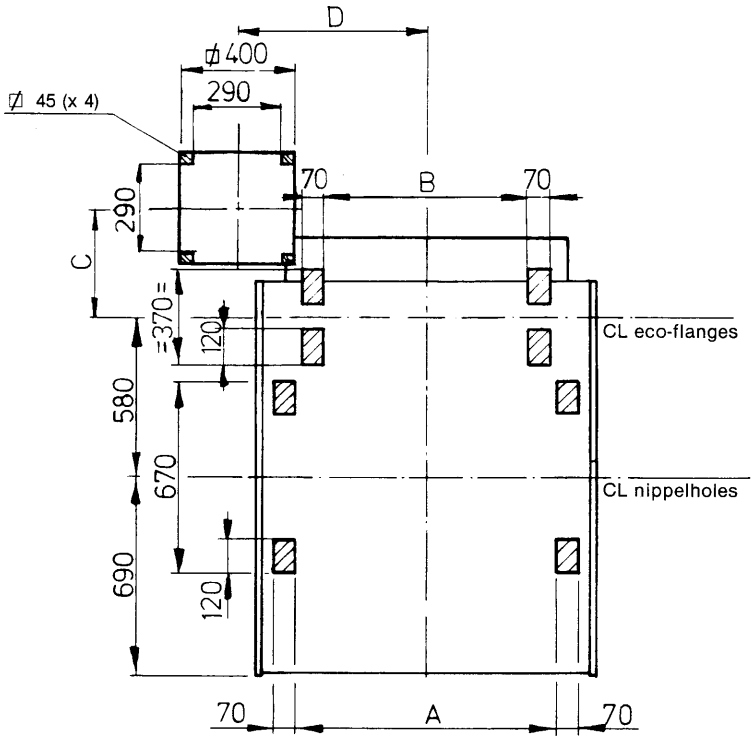
15. SUPPORT SURFACE ON FLOOR

15.1 Fan behind boiler



Number of Sections	Dimensions A	B	C
9	855	810	682
10	965	810	682
11	1075	810	682
12	1185	810	682
13	1295	810	682
14	1405	1210	725
15	1515	1210	725
16	1625	1210	725
17	1735	1210	725
18	1845	1210	725
20	2065	1210	823
22	2285	1210	823
24	2505	1210	823

15.2 Fan above boiler



Number of Sections	Dimensions A	B	C	D
9	855	810	375	660
10	965	810	375	660
11	1075	810	375	660
12	1185	810	375	660
13	1295	810	375	660
14	1405	1210	395	700
15	1515	1210	395	700
16	1625	1210	395	700
17	1735	1210	395	700
18	1845	1210	395	700
20	2065	1210	455	850
22	2285	1210	455	850
24	2505	1210	455	850

broag seagold

Broag Ltd

Head Office
Molly Millars Lane,
Wokingham, Berks.
RG11 2PY.
Tel. 0734-783434
Telex 849137
Fax 0734-786977

Branch Office
Unit 3
Kestrel Close Quarry Hill
Industrial Estate
ILKESTON Derbyshire
Tel. (0602) 44 07 78

ISO 9001
since 1988

Ours is a policy of continuous development. We reserve the right to alter specifications without prior notification.

Art. nr. 40.396/1000/02/94/Ho.

broag

remeha
Gas 5a/5a Duo

Technical information

Atmospheric gasboiler

276 - 1044 kW

CONTENTS

PREFACE

These technical instructions contain useful and important information for the correct operation and maintenance of the Broag remeha Gas 5a/5a Duo gas boiler. Futhermore, important instructions are given to prevent accidents and serious damage before commisioning and during operation of the boiler, to ensure safe and trouble free operation. Read these instructions carefully before putting the boiler into operation, familiarize yourself with its operation and controls and strictly observe the instructions given.

If you have any questions, or if you need more information about specific subjects relating to this boiler, please do not hesitate to contact us.
The data published in these technical instructions is based on the latest information and is given subject to later revisions.
We reserve the right to modify the design and/or configuration of our products at any moment, without being obliged to adjust earlier supplies accordingly.

1. BOILER DESCRIPTION

The Broag remeha Gas 5a boiler is a cast iron sectional boiler with atmospheric burners.
Suitable for all qualities of natural gas.
The Broag remeha Gas 5a boiler is fitted with electric ignition and is supplied with an insulated casing.

Water connecties Ø 100 mm.
Output: Gas 5a - 10 to 22 sections : 276 to 644 kW.
Gas 5a Duo - 2 x 10 sections to 2 x 18 sections : 552 to 1044 kW.

2. CONSTRUCTION

2.1 General

- Boiler block consists of cast iron sections nippled together with conical nipples.
- Gas train can be fitted on the left or right hand side of the boiler.
- Fitting of the casings is possible after the boiler is installed.
- The boiler is cleaned from the front.
- Water connections can be fitted on the left or right hand side of the boiler.

2.2 Burners

The burners are stainless steel, atmospheric burners. They guarantee a low noise level.

2.3 Boiler base

The Broag remeha Gas 5a boiler is supplied as standard with reflecting floor plates wich allows for ventilation beneath the boiler.

2.4 Assembling

The boiler is assembled on site.

2.5 Boiler dimensions and technical data

2.5.1 Broag remeha Gas 5a

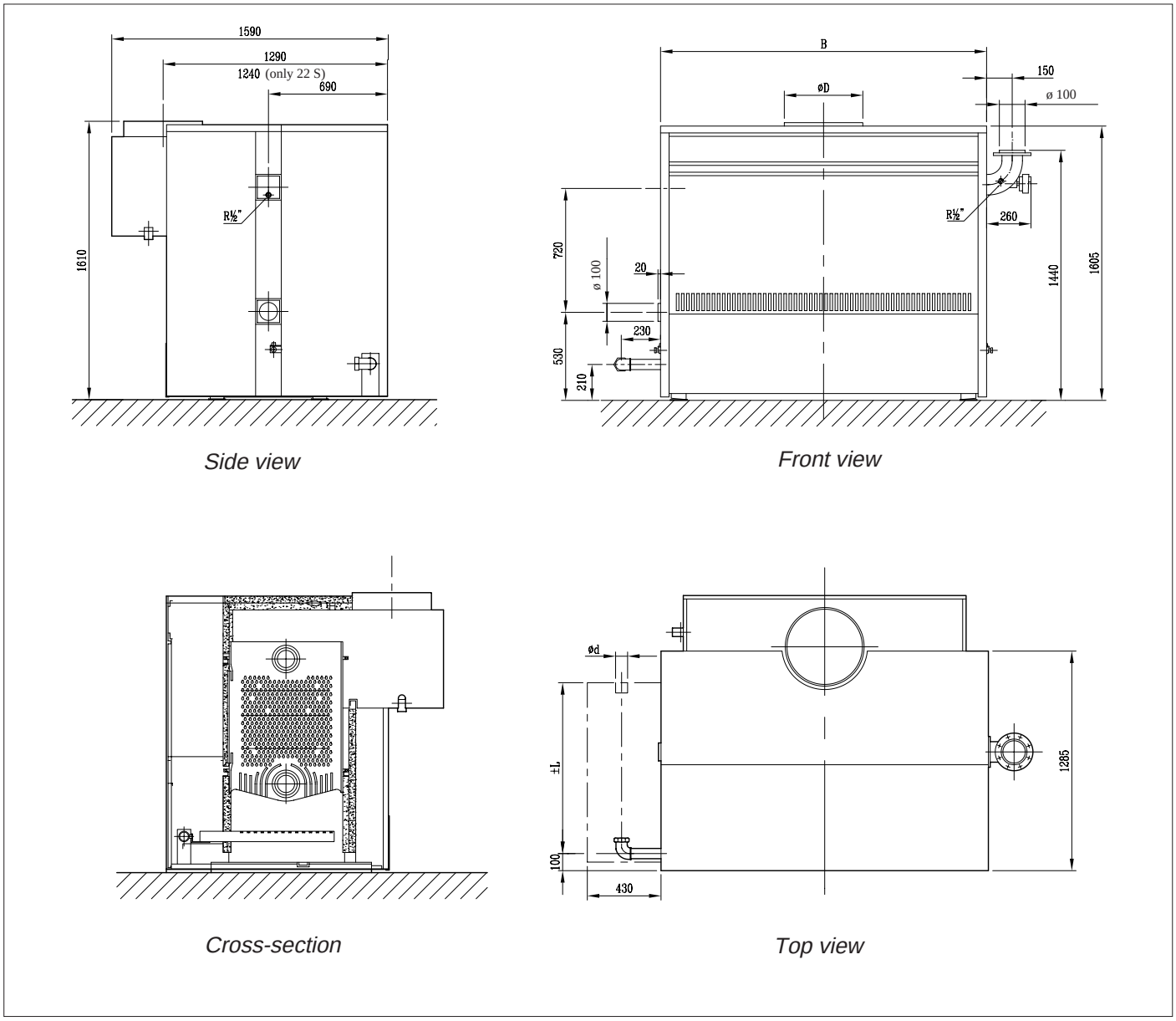
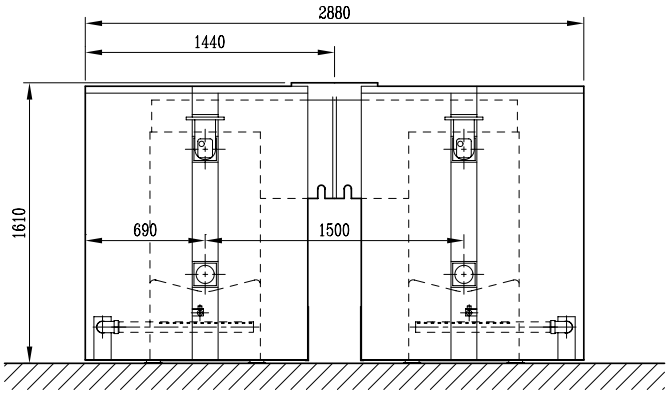


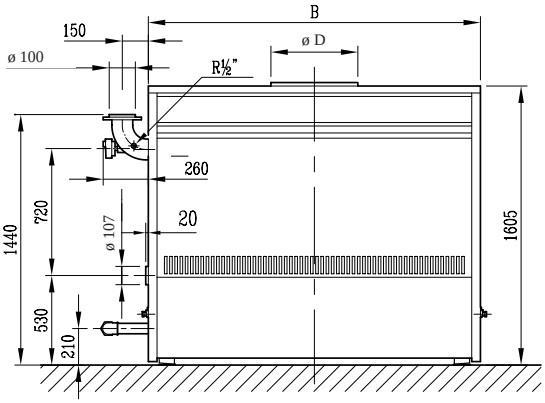
Fig. 01 Dimensions of the Broag remeha Gas 5a

Model	Nominal output	Input G.C.V.	Dimensions				Resistance		Water content	Weight dry
			B	±L	Ø D	Ø d	Δt = 20°C	Δt = 10°C		
	kW	kW	mm	mm	mm	"	mbar	mbar	l	kg
Broag remeha Gas 5a-10	276	345	1240	940	350	2"	15	59	291	1450
Broag remeha Gas 5a-11	306	383	1350	940	400	2"	16	63	320	1575
Broag remeha Gas 5a-12	338	422	1460	940	400	2"	17	67	349	1695
Broag remeha Gas 5a-13	368	460	1570	940	400	2"	18	71	378	1820
Broag remeha Gas 5a-14	398	498	1680	940	450	2"	19	75	407	1940
Broag remeha Gas 5a-15	430	537	1790	940	450	2"	20	78	436	2065
Broag remeha Gas 5a-16	460	575	1900	940	450	2"	35	137	465	2185
Broag remeha Gas 5a-18	522	652	2120	940	500	2"	44	172	523	2430
Broag remeha Gas 5a-20	582	728	2340	940	500	2"	50	195	581	2675
Broag remeha Gas 5a-22	644	805	2560	940	600	2"	54	211	639	2920

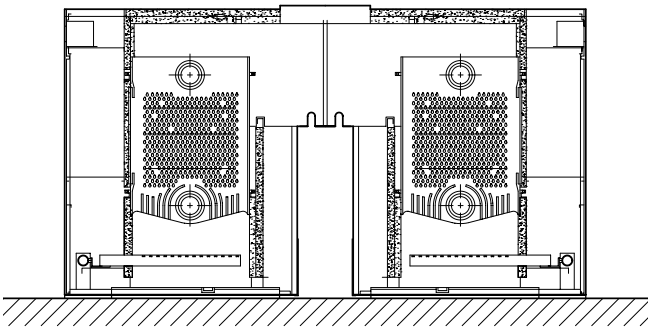
2.5.2 Broag remeha Gas 5a Duo



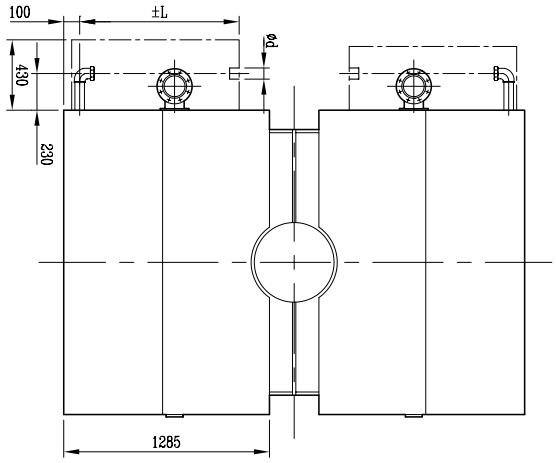
Side view



Front view



Cross-section



Top view

Fig. 02 Dimensions of the Broag remeha Gas 5a Duo

Model	Nominal output	Input G.C.V.	Dimensions				Water content	Weight dry
			B	±L	Ø D	Ø d		
	kW	kW	mm	mm	mm	"	l	kg
Broag remeha Gas 5a Duo-10	552	690	1240	940	500	2"	582	2900
Broag remeha Gas 5a Duo-11	612	766	1350	940	600	2"	640	3150
Broag remeha Gas 5a Duo-12	676	844	1460	940	600	2"	698	3390
Broag remeha Gas 5a Duo-13	736	920	1570	940	600	2"	756	3640
Broag remeha Gas 5a Duo-14	796	996	1680	940	650	2"	814	3880
Broag remeha Gas 5a Duo-15	860	1074	1790	940	650	2"	872	4130
Broag remeha Gas 5a Duo-16	920	1150	1900	940	650	2"	920	4270
Broag remeha Gas 5a Duo-18	1044	1304	2120	940	700	2"	1046	4860

3. APPLICATION

3.1 L.P.H.W. system

3.1.1 Water temperature
Maximum water temperature is 110°C (high limit thermostat).
Highest operating flow temperature is 95°C (control thermostat).
Minimum return water temperature is 20°C at a flowrate related to a Δt of 20°C (flow/return temperature).

3.1.2 Water pressure
Boiler sections pressure test at 12 bar.
Maximum pressure test boiler block is 6 bar.
Minimum working pressure boiler is 0.8 bar at a maximum water temperature of 110°C or 0.3 bar at a maximum water temperature of 95°C.
Maximum working pressure boiler is 6 bar.

3.1.3 Water flow
The minimum water flow through the boiler is:

$$\frac{\text{Output boiler in kW}}{93} = \ldots \text{ m}^3/\text{h}$$

This minimum flow must be maintained for 5 minutes after the burner stops firing to avoid high temperature shut-down due to residual heat gain. Due to the design and manufacture of the boiler no specific minimum water flow requirement exists other than for over-temperature protection.

3.1.4 Water treatment
Water treatment of all systems, but in particular open vented systems used with the Broag remeha Gas 5a, is considered necessary good practice in order to:
- avoid metallic corrosion within the system
- avoid sludge and scale information
- reduce to a minimum the risk of microbiological contamination of the system
- minimise chemical action and changes which take place over a period of time when system water is untreated.

The system will contain a variety of metals. Ferrous metals - cast iron and steel, and non-ferrous metals - copper, brass and gunmetal, may be present, so it is essential that treatment is suitable for all of them. Suitable chamicals and the extent of treatment should be discussed with specialist manufactures prior to any work commencing. The specification of new systems and general condition of older existing systems must be carefully considered. The removal of debris, flux residue, grease, metal, swarf etc. from new systems, and any black magnetic iron exide sludge and other corrosive residue from old systems is essential.

For information on water treatment we advise direct contact with either:

Fernox Manufacturing Company Ltd.
Britannia Works
Clavering
Essex, CB1L 4QZ
Tel No: 0799 550811

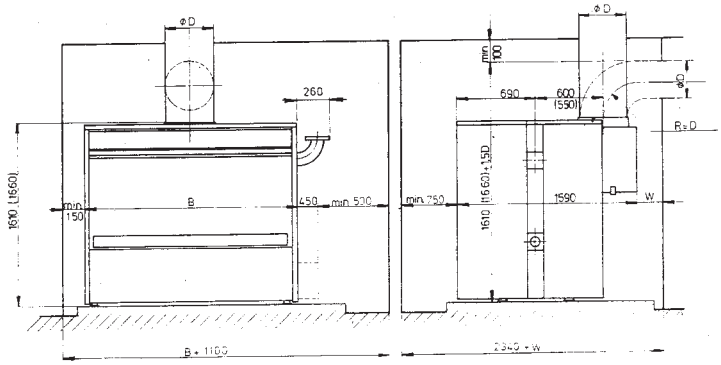
or: Sentinal
Grace Dearborn Ltd
Widnes
Cheshire WA8 8UD
Tel No: 051 495 1861

3.1.5 Noise level
The noise level measured around the boiler depending on boiler room construction is about 50-55 dBA.
Noise levels taken at 1 meter from the boiler.

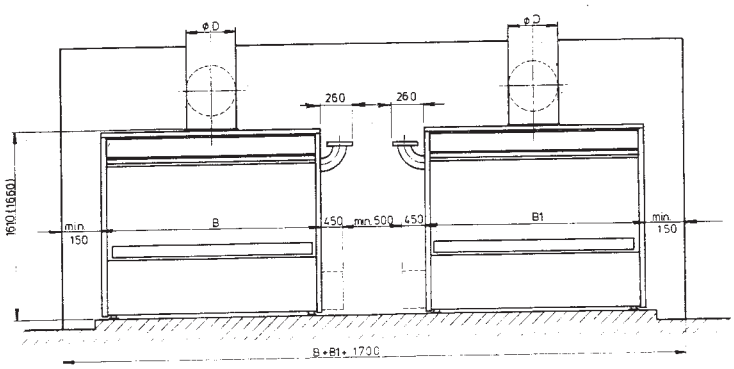
3.2 Chimneys
The average flue gas temperature is so low that the chimney must be made in accordance with the guidelines of British Gas.

4. TYPICAL BOILER INSTALLATION

Installation 1
1 boiler in boiler room



Installation 2
2 boilers in boiler room



Installation 3
Duo arrangement

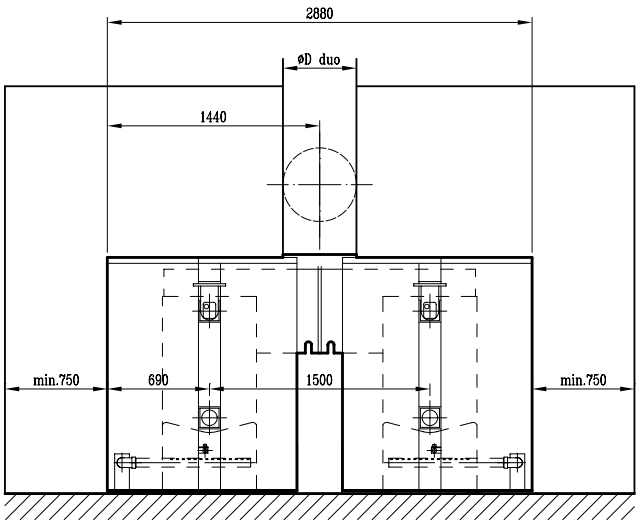


Fig. 03 Boiler installations

Dimensions	Number of sections									
mm	10	11	12	13	14	15	16	18	20	22
B	1240	1350	1460	1570	1680	1790	1900	2120	2340	2560
Ø D	350	400	400	400	450	450	450	500	500	600
Ø D duo	500	600	600	600	600	600	650	700	700	800

5. REGULATION AND SAFETY EQUIPMENT

5.1 General
The Broag remeha Gas 5a is supplied with electronic control and safety equipment with ionisation flame detection.

5.2 Standard electronic gastrain High/Low

5.2.1 Schematic lay out

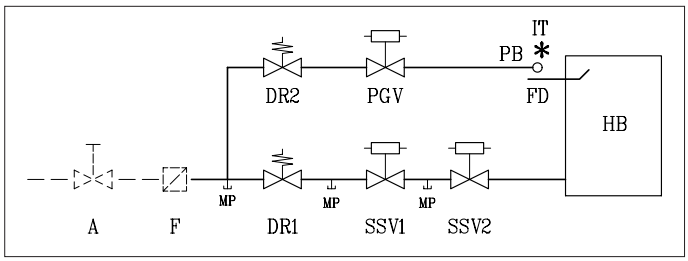


Fig. 04 Schematic layout

Legend
A Gas cock (not supplied)
PB Pilot burner
DR Gas governor
F Gas filter (not supplied)
HB Main gas burners
IT Ignition transformer
PGV Pilot gas valve
MP Measuring point
SSV Safety shut off valve
FD Ionisation probe
- - - - Not supplied

5.2.2 Specification
2 Safety gas valves
1 Gas governor
1 Pilot gas valve
1 Pilot gas governor
1 Ignition transformer 5 kV
1 Pilot burner with ionisation probe
1 Down draught thermostat set at 70°C

5.3 Functions

5.3.1 Flame protection

5.3.2 Down draught thermostat
The boiler is fitted with a thermo-down draught thermostat.
If there is a down draught in the chimney the thermostat will switch off the boiler. Fixed setpoint is 70°C.

5.3.3 Thermostats
Control thermostat On/Off 35-95°C.
Control thermostat High/Low 35-95°C.
High Limit thermostat locks out at 110°C.

6. ASSEMBLY AND INSTALLATION GUIDELINES

6.1 General
Boiler can be installed in open or closed systems.

6.2 Boiler assembly
Broag provides special tools on loan, for the boiler assembly with detailed building instructions. However, building supervision and/or actual boiler erection services can be provided by Broag.

6.3 Water connections
The boiler water connections can be fitted on one side of the boiler either left or right hand side.
The return water connection is flanged on the boiler with a pipe connection for welding Ø 107/114 mm.
The flow water connection is a cast iron bend flanged on the boiler and comes complete with a welding neck flange Ø 107/114 mm according BS10 table D. The flow bend has 1/2" tappings to accept a dual control/limit boiler thermostat and the high/low thermostat. The end sections have a 3/4" tapping to accept drain/off cocks. (BSP Tapping).

6.4 Water pressure
Each section is hydraulically tested to at least 12 bar.
Maximum test pressure for the assembled boiler block is 6 bar.
Maximum working pressure is 6 bar.
Minimum working pressure is 0.8 bar at a maximum working temperature of 110°C or 0.3 bar at a maximum working temperature of 95°C.

7. GAS SUPPLY

7.1 General

The gas train can be fitted on the left or right hand side of the boiler.
The local Gas authority should be consulted to ensure that an adequate pressure and supply is available at the boilers maximum output. To minimise risk of sediment or foreign particles entering the control valves, an approved filter may be fitted into the pipework downstream. The gas supply should be conform to the British Gas safety regulations.

7.2 Gas pressure

Maximum gas pressure at inlet 100 mbar.
Burner pressure:
- full load : 8.7 mbar (100%)
- part load : 3.5 mbar (60%)

8. ELECTRIC SUPPLY

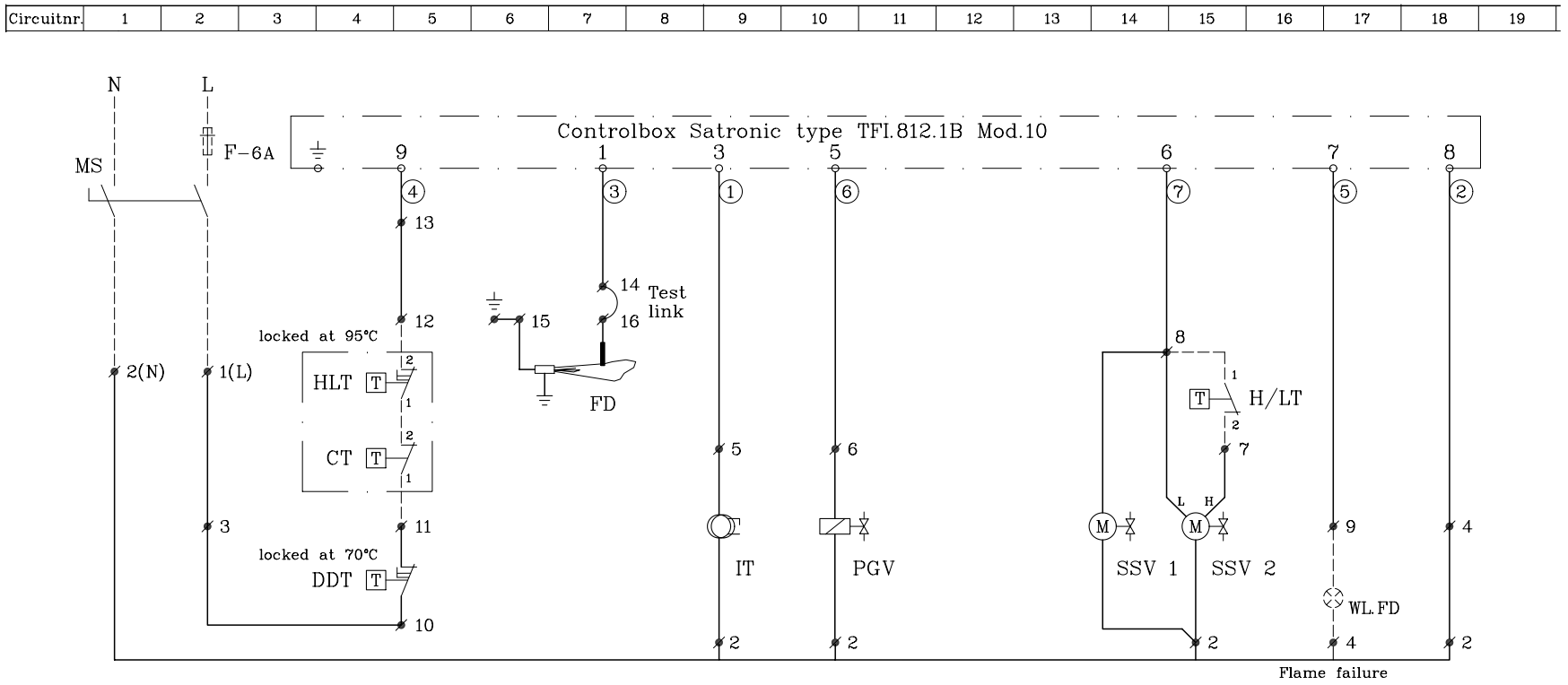
8.1 General
The electrical installation must conform to the IEE Regulations for Electrical Installations and also to Local Authority requirements.

8.2 Electric connections
The Satronic control box for the Broag remeha Gas 5a series boilers is prewired for the operation of all controls in the correct ignition and shut-down sequences. These include high limit protection, flame detection, thermostatic control and safety shut-off. Provision for manual reset is made in the event of high limit shut-down and flame failure. An indication lamp within the control box illuminates in the event of control malfunction. A 240 volts ~ 50 Hz single phase supply should be connected to the live and neutral terminals in the junction box.

The control box operates on a neutral/phase supply. The earth conductor should be connected to the earth bar using the screw provided with an anti-spread washer. These conductors should be entered via one of the cable entry glands. A wiring diagram is fixed inside the lid of the junction box and is also included in this manual (see section 8.4). Time controls and remote thermostats can be connected across terminals 12 and 13 after removal of the link. These controls should be BEAB or BSI approved.

8.3 Electric data
Main supply: 240 V-50 Hz (L/N).
Running current: 120 W.
Maximum fuse: 6Amp.

Fig. 05 Wiring diagram



Switch diagram		Start				
Normal start	Waitingtime controlbox					
	Ignition					
	PGV					
	SSV 1					
	SSV 2					
	Time in seconds	±10	⩽10	15		
Failure						
	No ignition					
	No start flame					

Legend			
CT	Control thermostat	IT	Ignition transformer
DDT	Downdraught thermostat	MS	Main switch
F	Fuse	PGV	Pilot gas valve
FD	Flame detector	SSV	Safety shut off valve
HLT	High limit thermostat	WL.FD	Warning light flame failure
H/LT	High/Low thermostat	①	Cord number
		⌀	Connection wiringbox
		- - - -	Will not be supplied or wired.

9. COMMISSIONING

It is important that the protective plastic coating is removed from the casing prior to commissioning by a competent person.

9.1 Technical information

Control box: Satronic TFI 812.1B Mod 10.
Main supply: 240 V-50 Hz.

Minimum Ionisation I.O. current	: 5 m Amp.
Reaction time	: 5 sec.
Maximum ambient temperature	: 60°C.
Injector size pilot burner	: Ø 0.8 mm.
Injector size main burners	: Ø 5.4 mm.
Burner pressure full load	: 8.7 mbar (100%).
Burner pressure part load	: 3.5 mbar (60%).
Pilot burner pressure	: 13 mbar.

9.2 Commissioning the boiler

1. Check gas connections.
2. Check electrical supply (L/N and earth).
3. Check water connections and if installation is filled.
4. Switch on circulation pump and check rotation direction.
5. Open main gas cock (bleed the air in gas pipe work).
6. Switch on electrical supply.
7. Set the control thermostats to about 85°C.
8. After a waiting time of about 10 seconds you will get ignition and the Pilot Gas valve opens. At a minimum ionisation current of 5 m Amp the safety shut off valves will open after a waiting time of 15 seconds. The boiler is on.
9. Let the boiler on for a couple of minutes to get rid of air in the gas pipe.
10. Set the correct burner pressure.
    High flame adustment by means of the gas governor.
    Low flame adjustment by means of the safety shut-off valve.
    Details of safety shut-off valves:
    9-16 sections (Fig. 06):
    - Low flame adjustment can be made by loosening screw 2 and turning knob 1. Turning clockwise decreases gasflow. Do not touch sealed screw 3 unless solenoid or hydraulic unit (knob 1) is to be replaced.
    - After adjustments screw 2 must be retightened.

    17-22 sections (Fig. 07):
    Gas rate adjustment can be made by turning the screw in the junction box on the valve actuator.
    - Turn screw V1 to adjust low flame.
    - Turn clockwise to increase gas rate.

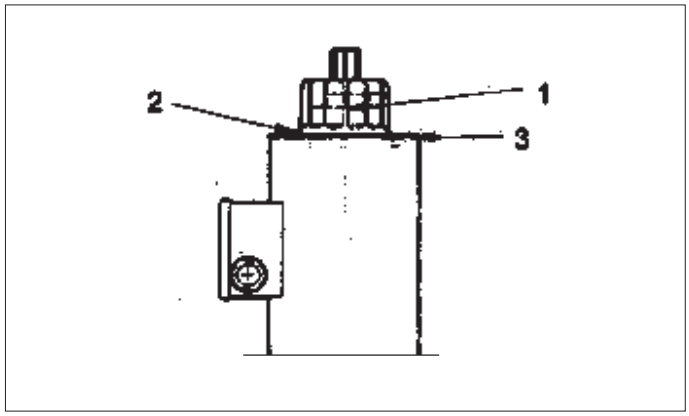


Fig. 06 9-16 sections

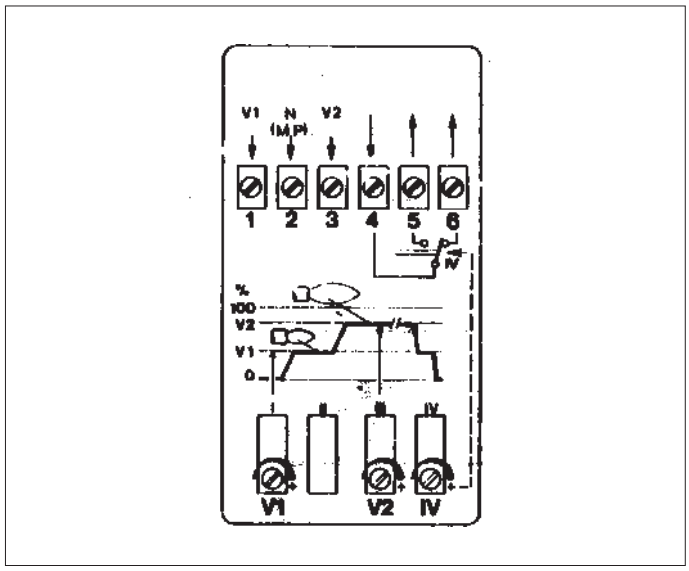


Fig. 07 17-22 sections

11. Check the thermostats are operating correctly.
12. Check the flame protection, start the boiler with the ionisation probe disconnected.

To turn off the boiler:
1. Switch off the electric supply.
2. Shut off the gas cock.

10. MAINTENANCE

10.1 General

It is essential for a good combustion, to clean the boiler the gas train and boiler room once a year.

10.2 Maintenance instructions

1. Clean the internal flue ways of the boiler with a steel cleaning brush (available from Broag).
   Remove top casing and top of the flue hood.
2. Clean the burners internally and externally.
3. Clean the floor underneath the boiler and boiler room.
4. Clean boiler casings
5. Clean the gas train, ignition, pilot burner, thermostats and wiring.
6. Check start program, ignition time and safety times.
7. Check flame protection, and thermostats.
8. Check boiler input at 100% and 60% load.
9. Check the combustion efficiency.
10. Check the boiler and installation for water leaks.
11. Check gas train and gas pipework for leaks.

11. FAULT FINDING CHART

11.1 The boiler fails to restart after a normal shut-down

- Ensure that both gas and electricity supplies are available at the boiler.
- The automatic control box has gone to lockout because of a fault. Press reset button on control box.
  If normal start up does not occur, check whether:
  - The appliance manual gas valves are fully open.
  - The boiler control thermostat is set at the correct value. After waiting for two minutes, press the reset button again, if the boiler does not restart normally, check as follows.

The ignition cycle should be as follows: After 10 seconds (approx.) sparking at the pilot electrode will be heard followed by the main burners crosslighting from the pilot.

11.2 No ignition

If there is no ignition sequence, check:

- Electricity supply isolated.
- Thermostat adjusted to a low temperature.
- Check whether the limit thermostat was activated by excess temperature. Reset to remove fault.
  (If fault persists this should be rectified.)
- Check whether the draught diverter thermostat was activated by down draught. Reset to remove fault.
  (If fault persists this should be rectified.)
- Check voltage (240 V ~) at ignition transformer terminals. If no voltage is registered, the automatic control box is faulty and should be replaced. If there is voltage, check the position of the ignition electrode and flame electrode setting. If spark does not occur, the ignition transformer is faulty and should be replaced. If electrode setting is incorrect, replace complete assembly.
- No ignition gas at pilot burner, pilot safety shut-off valve fails to open. Check voltage (240 V ~) at the terminals on the pilot safety shut-off valve. If there is no voltage the automatic control box is faulty and should be replaced. If there is voltage, replace the valve.
- No pilot flame, pilot burner injector/nozzle blocked - clean.

11.3 Pilot burner ignites but fails immediately

- Check the position of the flame detector probe in relation to the pilot burner. if electrode setting is incorrect, replace complete assembly.
- Pilot flame too small - incorrect pilot burner nozzle 1 x 0.8 mm for natural gas. Or pilot burner injector/nozzle blocked.
- Check current in the flame detector probe, removing shunt between terminals 14 and 16 and connect a D.C. Micro Ammeter (range 0-50 μA) in series. Check the current reading with boiler operating. If reading is zero, check Satronic Control Box. If reading is below 5 μA or showing wide variations, check stability of gas flame and state of ionisation probe.
- If the boiler does not fire, replace the automatic Control Box.

11.4 Pilot burner ignites but gas does not reach main burners

- Check voltage (240 V ~) at the terminals of the main burners safety shut-off valves. If there is voltage, the coil of one of the main gas valves is faulty and should be replaced.

broag

ISO 9001
since 1988

Broag Ltd.
Head office
Molly Millars Lane,
Wokingham, Berks.
RG11 2PY
Tel. 01734-783434
Telex 849 137
Fax 01734-786977

Branch office
Unit 3
Kestrel Close, Quarry Hill
Industrial Estate
Ilkeston, Derbyshire
DE7 4QQ
Tel. (01159) 440778
Fax (01159) 440588

Subject to alterations
Art.nr. 46.836/2000/01.95/Ho.

Technical information

Remeha Gas 5c / 5c Duo

Remeha Gas 5c/5c Duo

- Atmospheric gas boiler
- 278 - 1058 kW

remeha
Clean Heat

CONTENTS

PREFACE

These technical instructions contain useful and important information for the correct operation and maintenance of the Remeha central heating boiler, model Gas 5c/5c Duo. Furthermore, important instructions are given to prevent accidents and serious damage before commissioning and during operation of the boiler, to ensure safe and trouble free boiler operation.
Read these instructions carefully before putting the boiler into operation, familiarize yourself with its operation and control and strictly observe the instructions given.

If you have any questions, or if you need more information about specific subjects relating to this boiler, please do not hesitate to contact us.
The data published in these technical instructions is based on the latest information and is subject to revisions.
We reserve the right to modify the design and/or configuration of our products at any moment without being obliged to adjust earlier supplies accordingly.

1. BOILER DESCRIPTION

The Remeha Gas 5c boiler is a cast iron sectional boiler with atmospheric burners.
Suitable for all qualities of natural gas, cat. I 2 H (20 mbar).
The boiler meets the requirements of the CE regulations at the following directives:
- Gas appliance directive no. 90/396/EEC
- Electrical low voltage directive no. 73/23/EEC
- Machinery directive no. 89/392/EEC
- E.M.C. directive no. 89/336/EEC
- Efficiency directive no. 92/42/EEC.

Classification type for evacuation of the combustion products: B11 BS.
For further advice or information contact Broag Ltd.

The Remeha Gas 5c is supplied with electronic junction with insulated casings.
Water connections Ø 107 mm int.

2. CONSTRUCTION DETAILS

2.1 General
- Boiler block of cast iron sections joined together with conical nipples.
- Gas train can be fitted on the left hand or right hand side of the boiler.
- Water connections can be fitted on the left hand side or right hand side of the boiler. The gas train should if possible always be fitted on the same side as the flow connection. If required it can be fitted opposite (extension cables can be provided on request).
- The casings can be fitted after the boilers have been installed.
- Control panel is fitted in the front casing.
- Cleaning of the cast iron block from top of the boiler.

2.2 Burners
The burners are stainless steel, atmospheric type. They guarantee a low noise level.

2.3 Boiler floor
The Remeha Gas 5c boiler is supplied with a reflecting floor plate with ventilation underneath.

2.4 Assembly
The boiler will be assembled on site.

3. TECHNICAL DATA AND DIMENSIONS

3.1 Dimensions Remeha Gas 5c

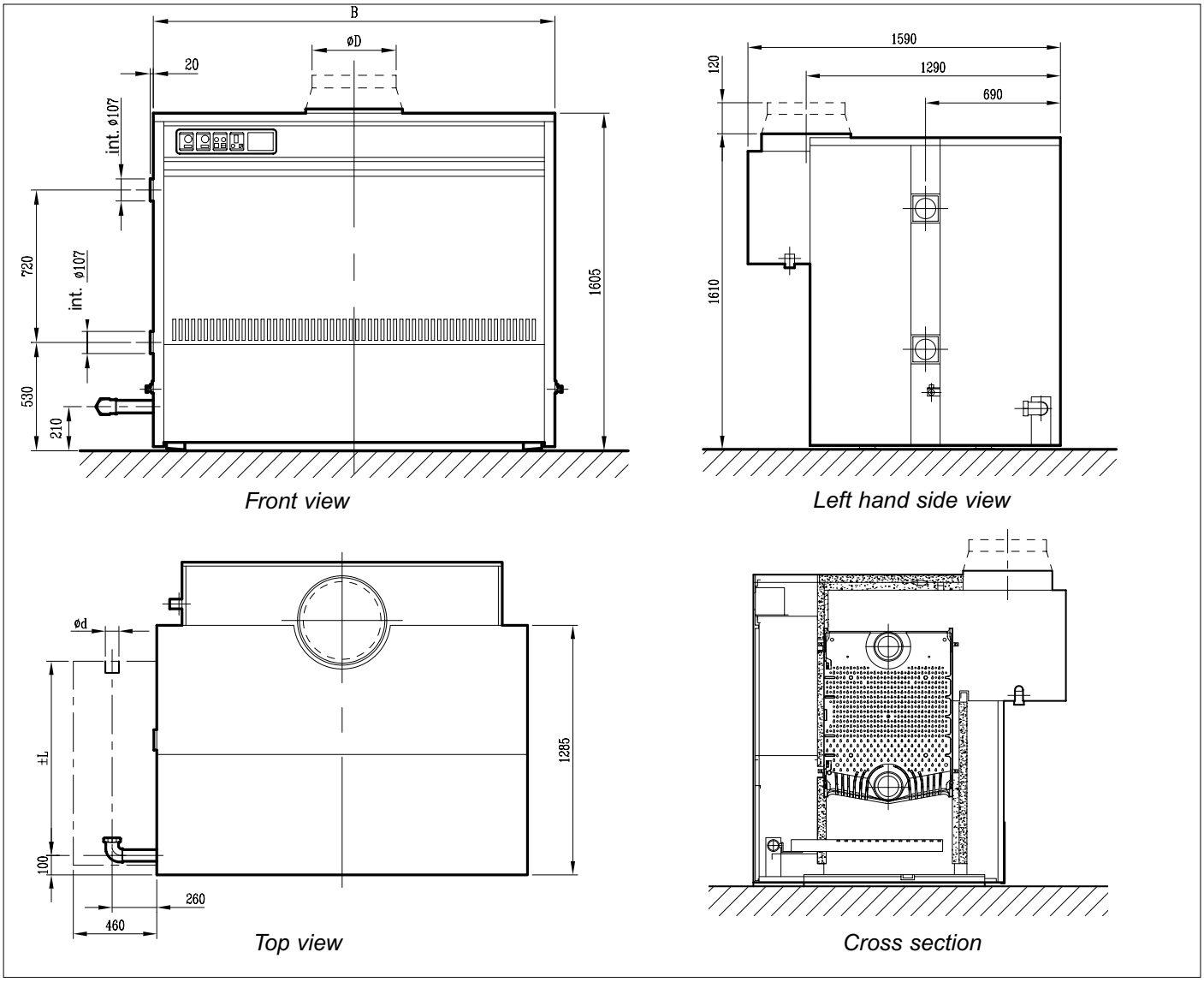
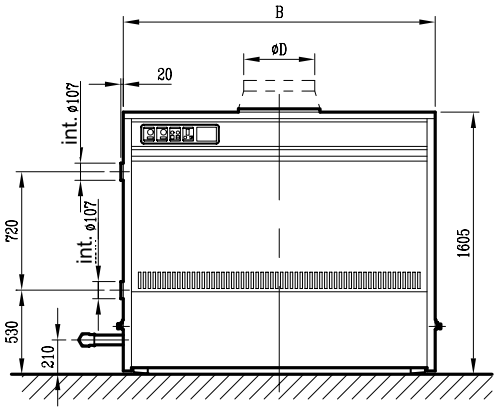


Fig. 01 Dimensions Remeha Gas 5c

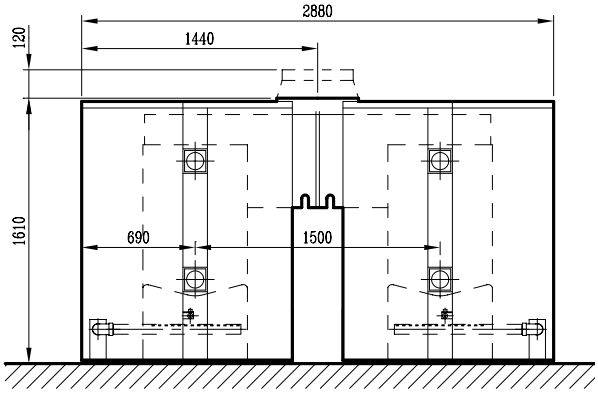
Number of sections	Nom. heat output	Nom. heat input		Gas consumption	Dimensions				Flue temp.	Water resistence		Water contents	Boiler weight	Flue gas flow rate
					B	Ø D	± L	Ø d		t= 10°C	t= 20°C			
	kW	kW-NCV	kW-GCV	m³/h	mm	mm	mm	"	°C	mbar	mbar	litre	kg	kg/h
10	139 - 278	155 - 309	172 - 343	33	1240	300 *	850	2	154	64	16	291	1450	692
11	155 - 310	173 - 345	192 - 383	37	1350	350 *	850	2	152	68	17	320	1575	795
12	170 - 340	189 - 378	210 - 420	40	1460	350 *	850	2	150	72	18	349	1695	847
13	186 - 372	207 - 414	230 - 460	44	1570	400	850	2	148	76	19	378	1820	983
14	202 - 403	224 - 448	249 - 498	47	1680	400 *	850	2	146	80	20	407	1940	1033
15	217 - 434	241 - 482	268 - 535	51	1790	400 *	850	2	142	84	21	436	2065	1080
16	233 - 466	259 - 518	288 - 576	55	1900	450	850	2	138	128	32	465	2185	1239
18	265 - 529	294 - 588	327 - 653	62	2120	450 *	985	2	138	160	40	523	2430	1376
20	296 - 592	329 - 657	365 - 730	70	2340	500	985	2	142	180	45	581	2675	1560
22	328 - 656	364 - 728	404 - 809	77	2560	500 *	1170	2 1/2	142	196	49	639	2920	1678
24	360 - 720	400 - 799	444 - 888	85	2780	500 *	1170	2 1/2	142	208	52	697	3165	1842

Table 1 Technical data Remeha Gas 5c ** Supplied with a flue gas pipe adaptor*

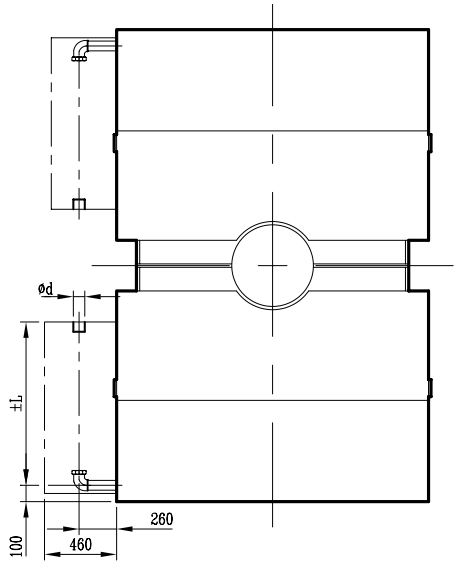
3.2 Dimensions Remeha Gas 5c Duo



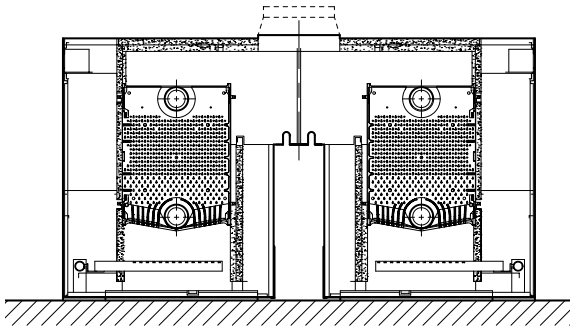
Front view



Left hand side view



Top view



Cross section

Fig. 02 Dimensions Remeha Gas 5c Duo

Number of sections	Nom. heat output	Nom. heat input		Gas consumption	Dimensions				Water contents	Boiler weight	Flue gas flow rate
					B	ØD	Ød	± L			
	kW	kW-NCV	kW-GCV	m^3/h	mm	mm	"	mm	litre	kg	kg/h
2 x 10	139 - 556	155 - 618	172 - 686	66	1240	450 *	2	850	582	2900	1385
2 x 11	155 - 620	173 - 690	192 - 766	74	1350	500 *	2	850	640	3150	1590
2 x 12	170 - 680	189 - 756	210 - 840	80	1460	500 *	2	850	698	3390	1694
2 x 13	186 - 744	207 - 828	230 - 920	88	1570	600	2	850	756	3640	1966
2 x 14	202 - 806	224 - 896	249 - 996	94	1680	600 *	2	850	814	3880	2066
2 x 15	217 - 868	241 - 964	268 - 1070	102	1790	600 *	2	850	872	4130	2160
2 x 16	233 - 932	259 - 1036	288 - 1152	110	1900	650	2	850	930	4370	2478
2 x 18	265 - 1058	294 - 1176	327 - 1306	124	2120	650 *	2	985	1046	4620	2752

Table 2 Technical data Remeha Gas 5c Duo ** Supplied with a flue gas pipe adaptor*

4. APPLICATION INFORMATION

4.1 L.P.H.W. system

4.1.1 Water temperature
Maximum water temperature is 110°C (high limit thermostat). Highest boiler water temperature is 95°C (control thermostat). Minimum return water temperature is 20°C at a flowrate related to a t of 20°C (flow/return temp).

4.1.2 Water pressure
Boiler sections pressure tested at 10 bar.
Maximum pressure test boiler block is 7,8 bar.
Minimum working pressure boiler is 0,8 bar.
Maximum working pressure bar is 6 bar.

4.1.3 Water flow
The minimum water flow through the boiler is:

$$\frac{\text{Output boiler in kW}}{93} = \text{m}^3/\text{h}$$

This minimum flow must be maintained for approx. 5 minutes after the burner stops firing to avoid high temperature shut down due to residual heat gain.
Due to the design and manufacture of the boiler no specific minimum water flow requirements exist other then for overtemperature propection.

4.1.4 Water treatment
Water treatment is under normal circumstances not necessary (see our water quality recommendations)

4.1.5 Noise level
The noise level measured around the boiler depending on boiler room construction is about 50-55 dBA. Noise levels taken at 1 meter from the boiler.

4.2 Chimneys
The average flue gas temperature is so low that the chimney must be made in accordance with the guidelines of British Gas (BS 6644).

4.3 Installation standards
The following instructions must be adhered to when the Remeha Gas 5c / 5c Duo is installed:
Gas Safety (installation and use) Regulations 1984 (as amended).
All gas appliances must, by law, be installed by competent persons (e.g. Corgi) in accordance with the above regulations. Failure to install appliances correctly could lead to prosecution.
It is in your own interest and that of safety to ensure that the law is complied with.
In addition to the above regulations, this appliance must be installed in compliance with the current I.E.E. Regulations for electrical installation, local building regulations, the Building Standards (Scotland), (Consolidation) Regulations and by laws of the local water undertaking and Health and Safety Document No 635 'The Electricity at Work Regulations 1989'. It should also be in accordance with the relevant recommendations in the current editions of the following British Standards and Codes of Practice, viz.
BS 5440 Pt 1 and 2, BS 5449, BS 5546, BS 6798, BS 6891 and BG.DM2.

Important:
The Remeha Gas 5c / 5c Duo is a certified appliance and must not be modified or installed in any way contrary to these 'Installation and Servicing Instructions'. Manufacturers instructions must NOT be taken in any way as overriding statutory obligations.

5. TYPICAL BOILER INSTALLATIONS

Recommended layout for boiler installation, measurements in mm.

Installation 1
Remeha Gas 5c

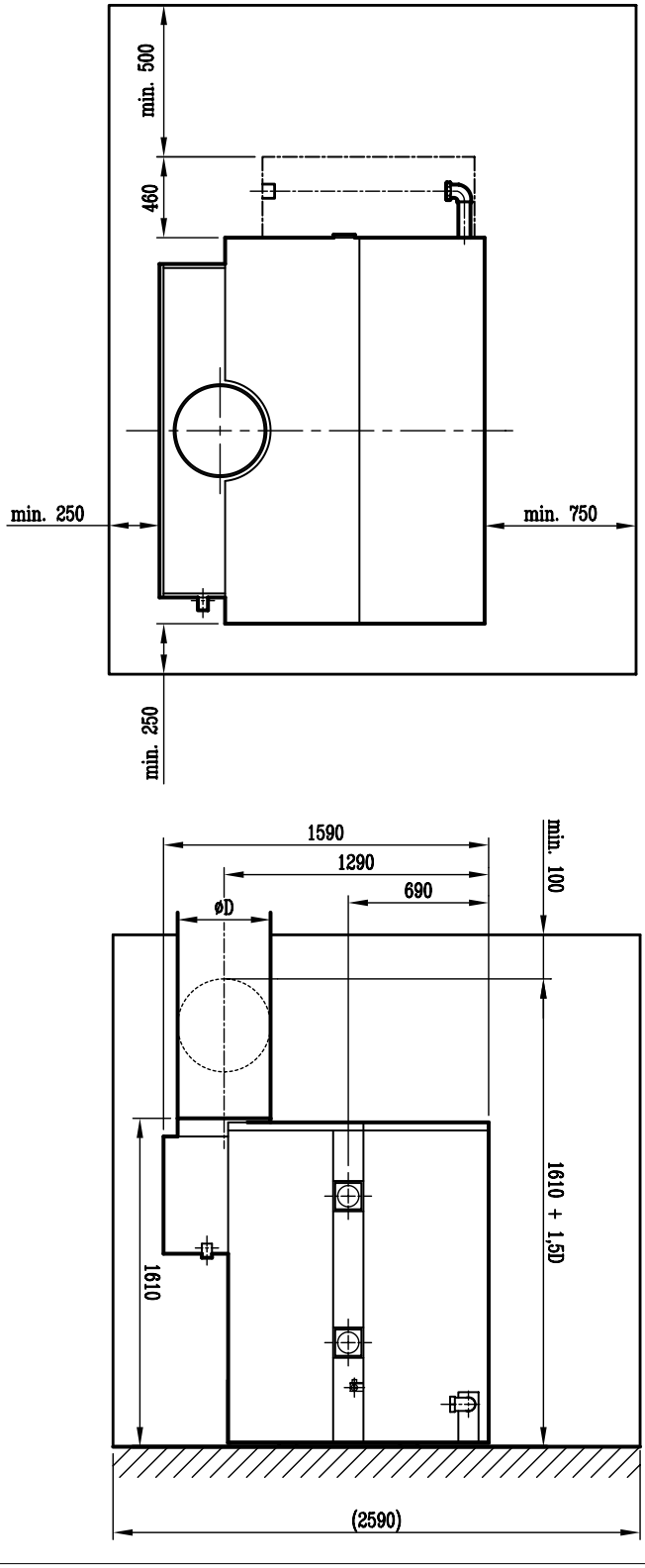


Fig. 03 Boiler installation Remeha Gas 5c

Recommended layout for boiler installation, measurements in mm.

Installation 2
Remeha Gas 5c Duo

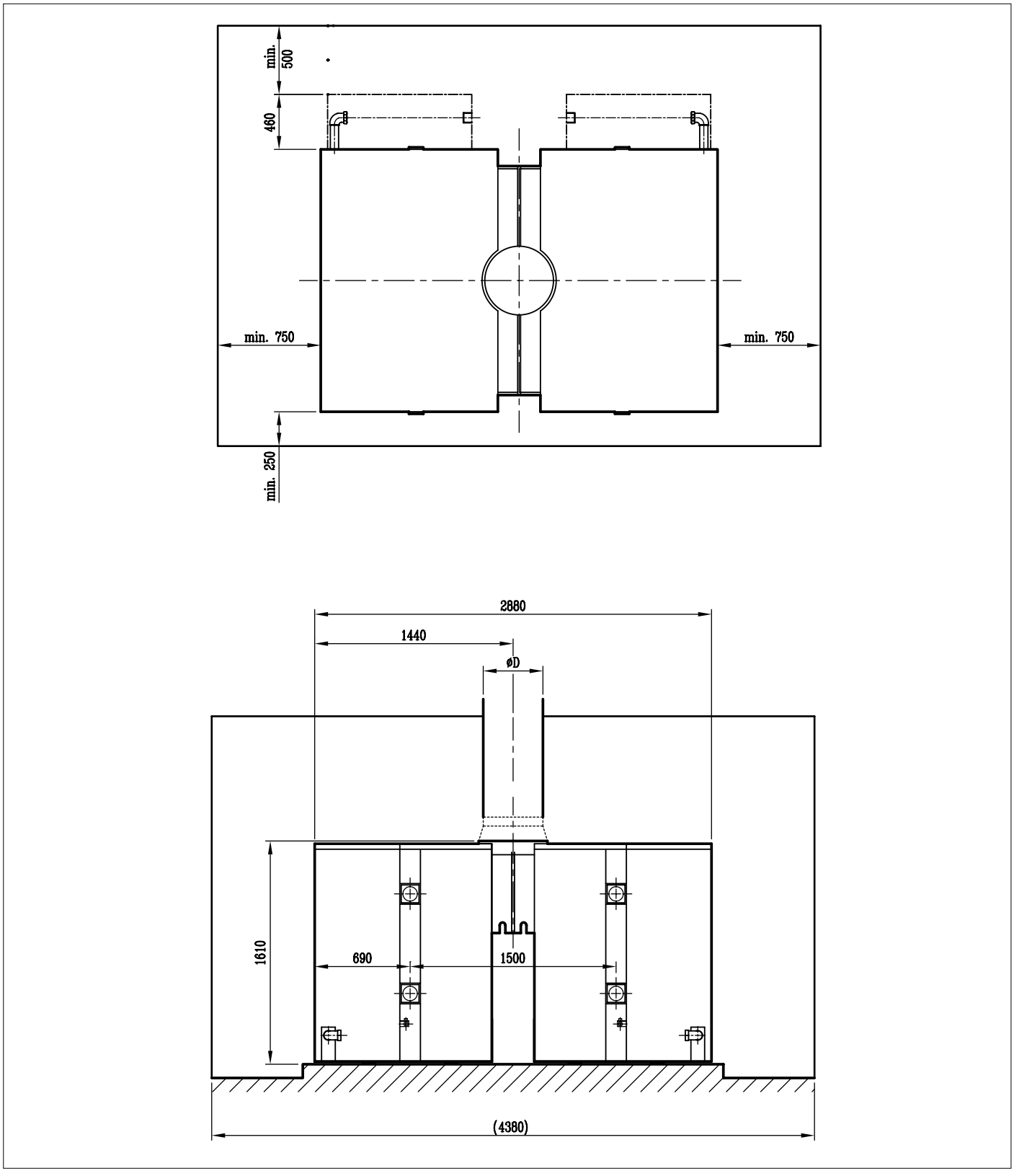


Fig. 04 Boiler installation Remeha Gas 5c Duo

6. CONTROL AND SAFETY EQUIPMENT

6.1 General

The Remeha Gas 5c is supplied with electronic control and safety equipment with ionisation flame detection.

6.2 Instrument panel

The Remeha Gas 5c is supplied with an instrument panel that is fitted in the front of the boiler, either left or right. The instrument panel can be delivered in two models:
- simple instrument panel High /Low;
- complete instrument panel High /Low.

The boiler is supplied as standard with the simple instrument panel. All connections are pre-wired and fitted with plugs. The capillaries from the control panel should be fitted in the pocket of the boiler, which is fitted in the top front of the end section.

The instrument panel, pocket and flow connection should always be fitted on the same side of the boi-ler either left or right. If this is not possible extension cables are available on request.

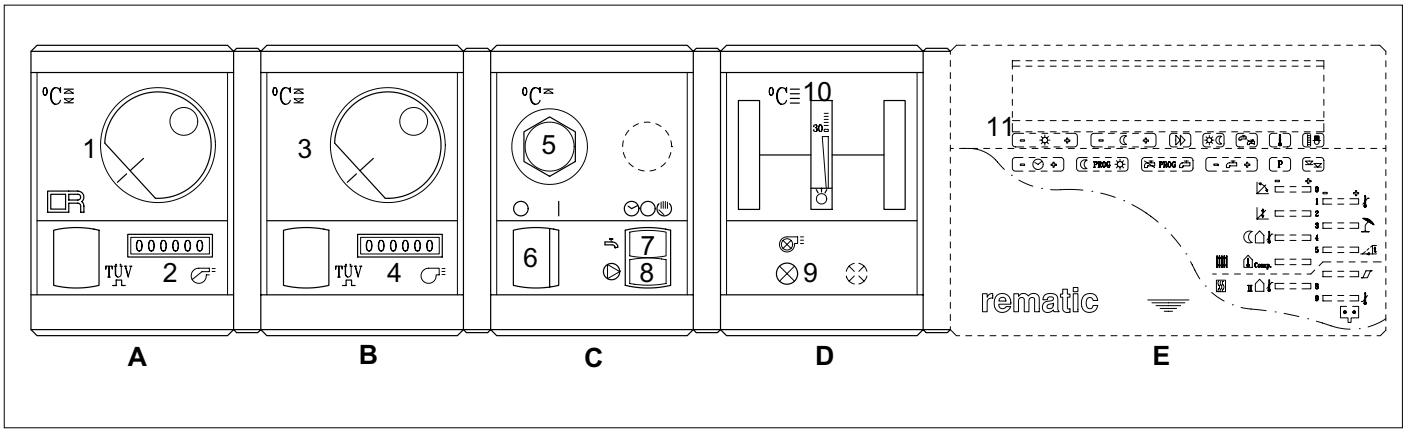


Fig. 5 Complete instrument panel

The modules contain:

Module A
1. Control thermostat, setting between 35°C-95°C.
2. Hour run meter *.

Module B
3. High-Low thermostat, setting between 35°C-95°C.
4. Hour run meter *.

Module C
5. High-limit thermostat 110°C (lock out).
6. Operating switch (On/Off with optical display) *.
7. Switch for domestic hot water storage pump * Manual/Off/Automatic.
8. Switch for circulating pump * Manual/Off/Automatic.

Module D
9. Warning light *.
10. Analog thermometer water temperature.

Module E
11. Option for ***rematic*** weather compensated boiler. control *.

** Absent in simple instrument panel.*

6.3 Standard electronic gas train High/Low

6.3.1 Schematic

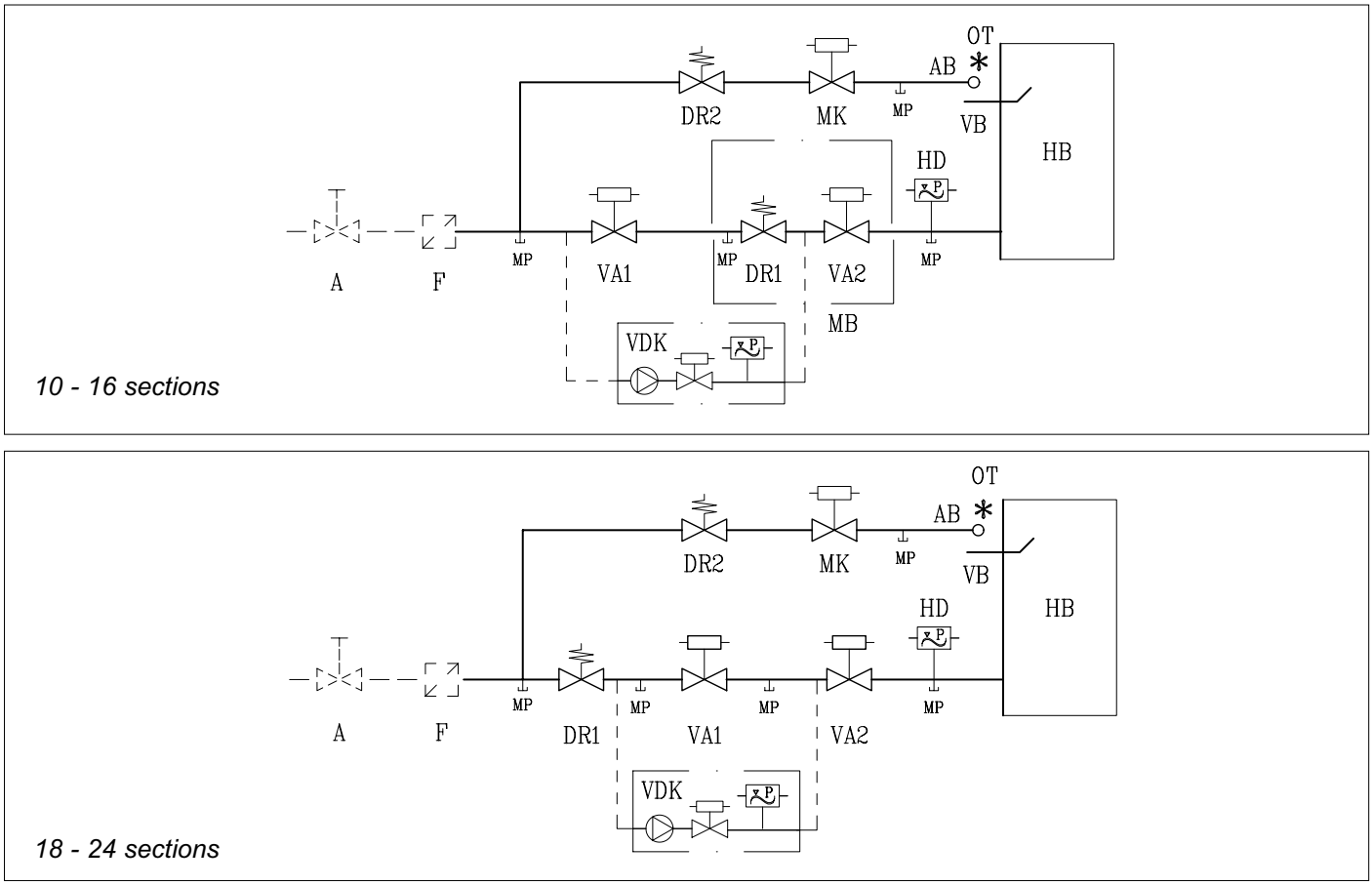


Fig. 06 Schematic construction gas train

Legend

A	*Gas cock*
AB	*Pilot burner*
DR	*Gas governor*
F	*Gas filter*
HB	*Burners*
HD	*Gas pressure switch*
MK	*Pilot gas valve*
MP	*Measuring point*
VA	*Safety shut off valve*
OT	*Ignition transformer*
VB	*Ionisation probe*
MB	*Gas multibloc*
VDK	*Valve leakage control box (option)*
- - -	*Not supplied as standard*

6.3.2 Specification

2 Safety gas valves
1 Gas governor
1 Pilot gas valve
1 Pilot gas governor
1 Ignition transformer 5 kV
1 Pilot burner with ionisation probe
1 Down draught thermostat set at 70°C

6.3.3 Control panel on gas train

1 Main switch
1 Control box Satronic
1 Fuse (Brusk)
Signal lamps
1 Water level control

6.4 Functions

6.4.1 Flame protection

Flame protection by means of ionisation flame detection.

6.4.2 Down draught thermostat

Type B11 Bs.
The boiler is fitted with a thermo-down draught thermostat. When there is down draught of the flue gases this thermostat will switch off the boiler. Fixed set point is 70°C (automatic reset).

6.4.3 Thermostats

Control thermostat On/Off 35°C-95°C.
Control thermostat High/Low 35°C-95°C.
High Limit thermostat lock out at 110°C.

7. ASSEMBLY AND INSTALLATION GUIDELINES

7.1 General
The boiler is suitable for operating at a maximum working pressure of 6 bar and a minimum pressure of 0.8 bar. Boiler can be installated in open or closed systems.

7.2 Boiler assembly
Broag provides special tools on loan, for the boiler assembly with detailed building instructions. However, building supervision and/or actual boiler erection services can be provided by Broag or an approved boiler erection engineer.

7.3 Water connections
The boiler water connections can be fitted on one side of the boiler either left or right hand side. The water connection is flanged on the boiler with a pipe connection for welding Ø 107 mm (int.) to the installation.
The top blind-flange has an integral cast 1" tapping to accept a safety valve. The end sections have a 3/4 " tapping to accept a drain/off cock (tapping BSP).

7.4 Pocket for the instrument panel
The pocket should be fitted in the top front end section of the boiler and at that side of the boiler where the gastrain is fitted. In the other end section tapping 1" the water level control electrode should be fitted.

7.5 Water pressure
Each section is hydraulically tested to at least 10 bar. Maximum test pressure for the assembled boiler block is 7,8 bar. Operating pressure between 0.8 bar and 6 bar.

8. GAS SUPPLY

8.1 General
The gas train can be fitted on the left or right hand side of the boiler and on the same side of the boiler instrument panel (fitted in the front casing).
The local Gas authority should be consulted to ensure that an adequate pressure and supply is available at the boilers maximum output. To minimise risk of sediment or foreign particles entering the control valves, an approved filter may be fitted into the pipework downstream. The gas supply should be conform to the British Gas safety regulations.

8.2 Gas pressure
Cat. I 2 H.
Maximum gas pressure at inlet 100 mbar.
Burner pressure :
- full load : 8.4 mbar (100%)
- part load : 2.2 mbar (50%).

Min. gas inlet pressure 20 mbar.

9. ELECTRICAL SUPPLY

9.1 General
The electrical installation must conform to the IEE regulations and also to local authority requirements.

9.2 Control panel
A control panel is fitted on the gas train.

9.3 Electrical connections
The boiler is pre-wired. Only the main supply should be wired to this control panel.

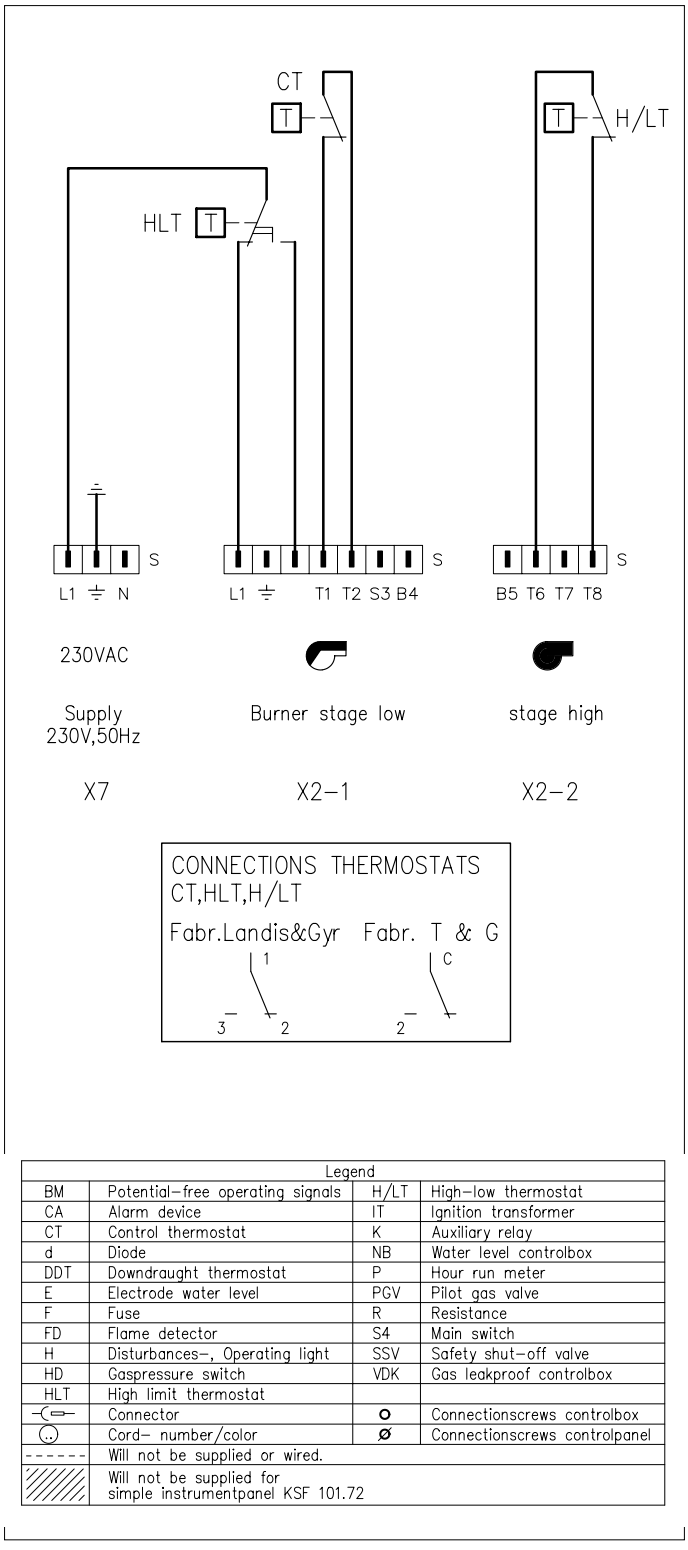
9.4 Electrical information
Main supply	:	230 V-50 Hz (L/N)
Running current	:	120 W
Maximum fuse	:	6 Amp.

9.5 Water level control (lock out)
a. Water level control	:	Dungs DWEB 34/2
Main supply	:	230V-50 Hz
Running current	:	5 W
Electrode current	:	42 V (AC)
Working area	:	0.5 to 15 mA (AC)
Electrode resistance	:	max. 20 kOhm
min. 1 kOhm.		
b. Electrode	:	Dungs FLE 1/2"

To be fitted in one of the end sections *(see par. 7.4)*.

9.6 Wiring diagram for the instrument panel

9.6.1 Simple instrument panel



Legend			
BM	Potential-free operating signals	H/LT	High-low thermostat
CA	Alarm device	IT	Ignition transformer
CT	Control thermostat	K	Auxiliary relay
d	Diode	NB	Water level controlbox
DDT	Downdraught thermostat	P	Hour run meter
E	Electrode water level	PGV	Pilot gas valve
F	Fuse	R	Resistance
FD	Flame detector	S4	Main switch
H	Disturbances-, Operating light	SSV	Safety shut-off valve
HD	Gaspressure switch	VDK	Gas leakproof controlbox
HLT	High limit thermostat		
-C-	Connector	O	Connectionscrews controlbox
(..)	Cord- number/color	Ø	Connectionscrews controlpanel
------	Will not be supplied or wired.		
	Will not be supplied for simple instrumentpanel KSF 101.72		

Fig. 07 Scheme simple instrument panel

9.6.2 Complete instrument panel

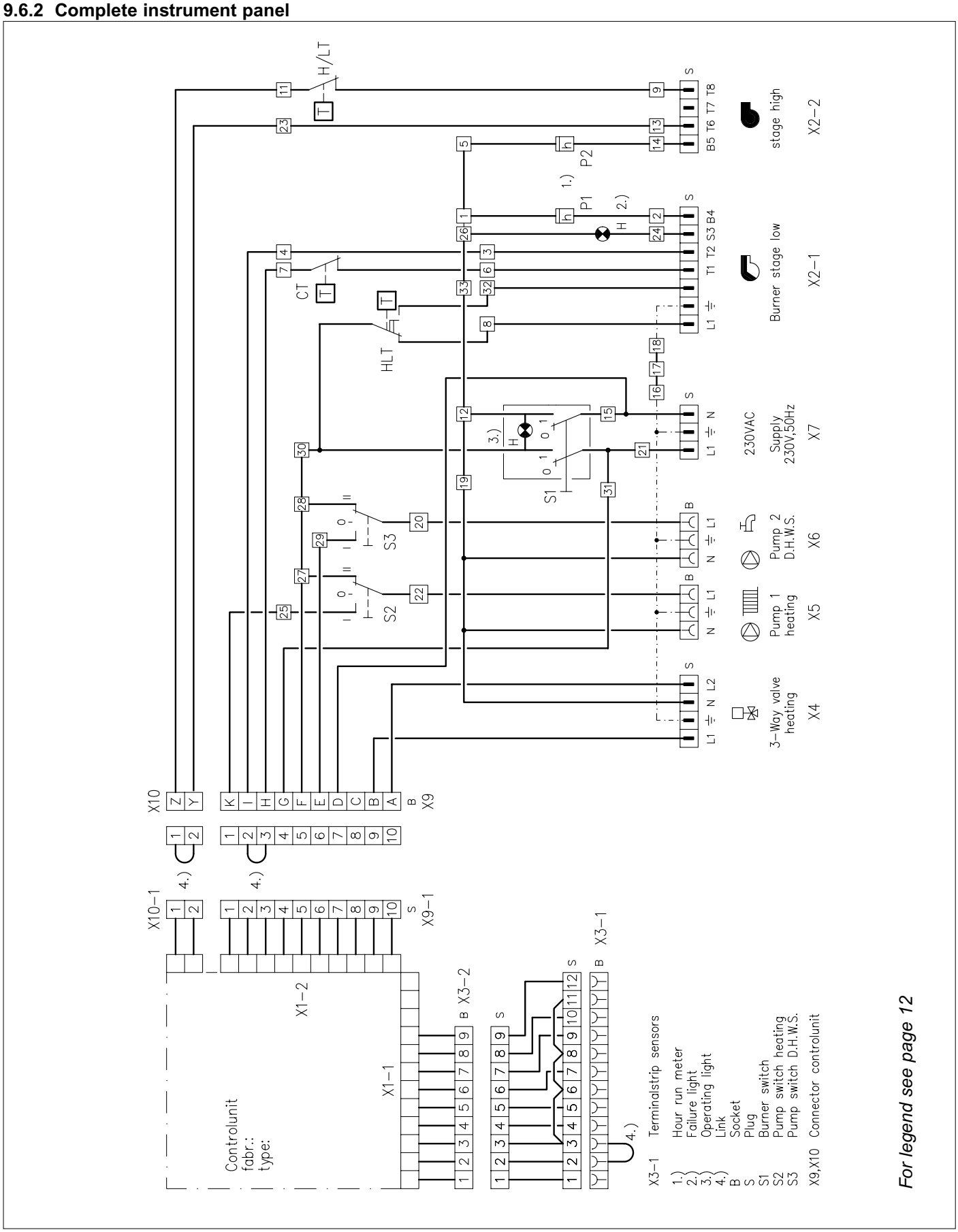


Fig. 08 Scheme complete instrument panel

9.7 Wiring diagram boiler

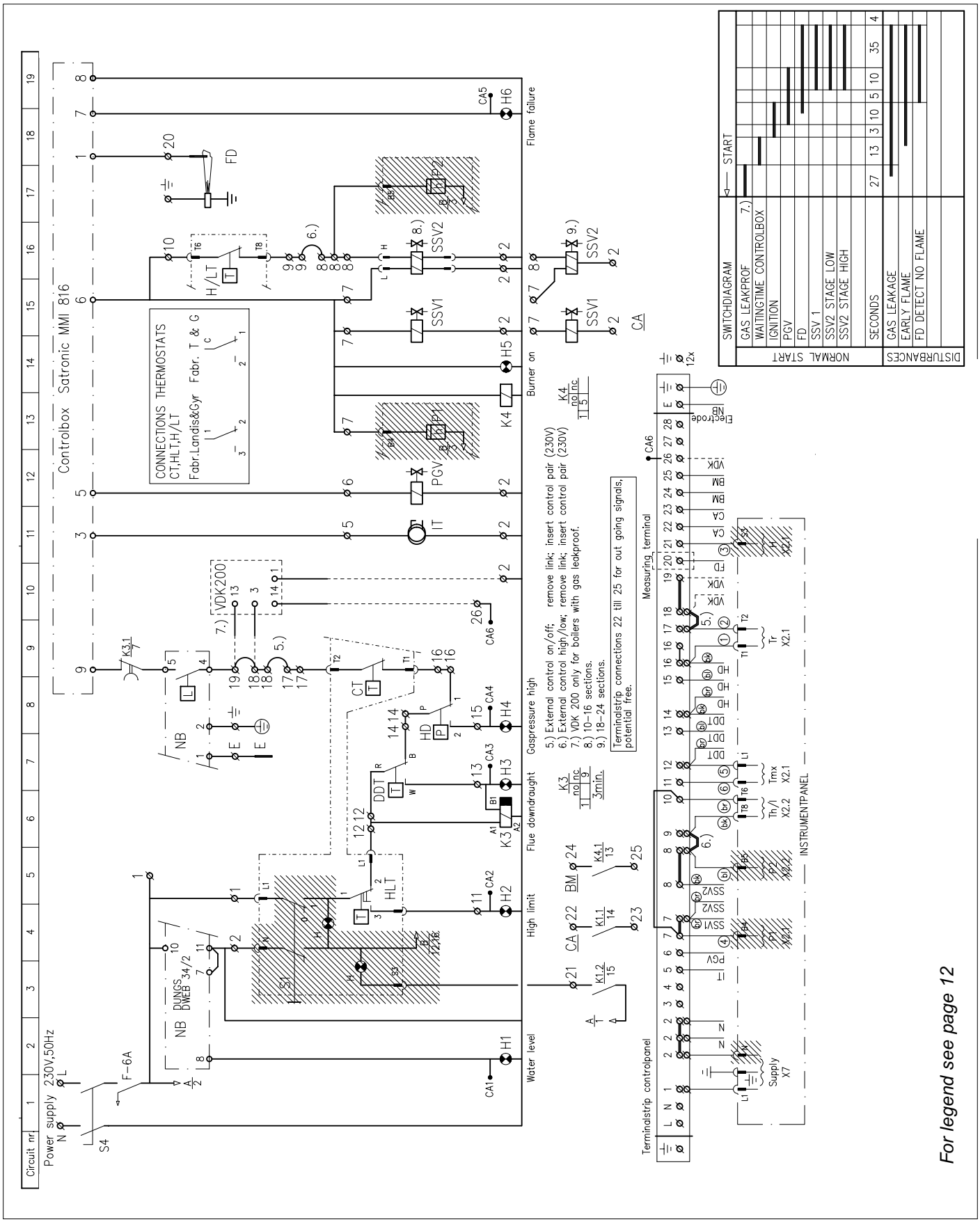


Fig. 09 Wiring diagram boiler

10. COMMISSIONING

10.1 Technical information

Control box:	Satronic MMI 816
Main supply:	230 V - 50 Hz
Minimum ionisation current:	min 3 µA (DC).
Reaction time flame protection:	1 sec.
Safety time:	10 sec.
Maximum ambient temperature:	60°C
Injector size pilot burner:	Ø 0.8 mm
Injector size main burner:	Ø 5.4 mm
Burner pressure full load:	8.4 mbar (100%)
Burner pressure part load:	2.2 mbar (50%)
Burner pressure pilot burner:	13 mbar

Warning
Control box operates on a neutral/phase supply.

10.2 Commissioning

1. Check gas connections.
2. Check electrical supply (L/N and earth).
3. Check water connections and if installation is filled.
4. Switch on circulation pump and check rotation direction.
5. Open main gas cock (release air in gas pipe work).
6. Switch on electrical supply.
7. Set thermostats at about 85°C.

The following will happen:

8. After a waiting time of about 13 seconds you will get ignition. At a minimum ionisation current of 7 µA the ignition stops. The main gas valve will open. The boiler runs.
9. Let the boiler run for a couple of minutes to get rid of air in the gas pipe.
10. Set the correct burner pressure.
11. Check the thermostats for the correct setting.
12. Check the flame protection, start the boiler with the ionisation probe disconnected.
13. Check the water level control.

10.3 Switching off the boiler

1. Switch off the electric supply.
2. Shut off the gas cock.

Be aware of the possibility of the danger of frost.

Note:
Commissioning to only be carried out by a qualified engineer with the relevant training and certification i.e. Acops - Corgi and a commissioning data sheet completed on site for issue to owner

11. MAINTENANCE

11.1 General

It is essential for a good combustion, to clean the boiler, the gas train and boiler room once a year. This prevents dust from being aspired and fouling the burners and boiler during operation, thereby avoiding poor combustion and possibly build-up of soot deposits.

11.2 Maintenance

1. Clean the internal flue ways of the boiler. Remove front casing and cleaning hatches, and remove the burners.
2. Clean the burners internally and externally.
3. Clean the floor underneath the boiler and boiler room.
4. Clean boiler casings.
5. Clean the gas train, ignition, pilot burner, ther mostats and wiring.
6. Check start program, ignition time and safety times.
7. Check flame protection, and thermostats.
8. Check boiler input at 100% and 50% load.
9. Make a combustion efficiency calculation.
10. Check the boiler and installation for water leakage (seals).
11. Check gas train and gas pipe for gas leaks.

Remeha Gas 5c/5c Duo

Broag Ltd.

Head office

Remeha house,

Molly Millars Lane,

Wokingham,

Berkshire RG41 2QP.

Tel. 0118 9783434

Fax 0118 9786977

Email: boilers@broag-remeha.com

Branch office

Unit 3, Kestrel Close,

Quarry Hill Ind. Estate,

Ilkeston

Derbyshire DE7 4RD

Tel. 0115 9440778

Fax 0115 9440588

ISO 9001 since 1986

CE

Subject to alterations
44430/1.000/11,00/Bo.

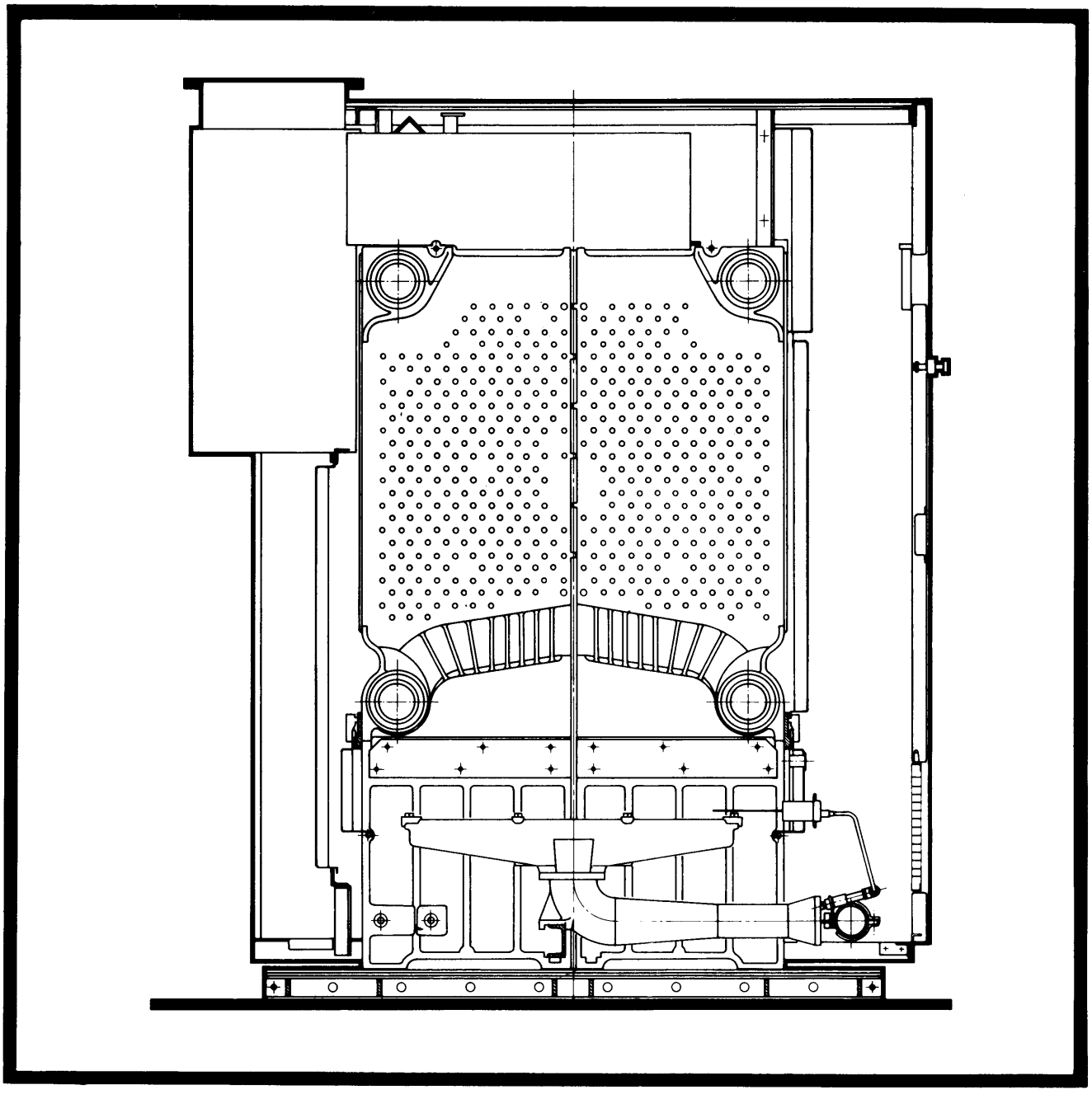
remeha

Clean Heat

Seagold

Gas 6 boiler atmospheric

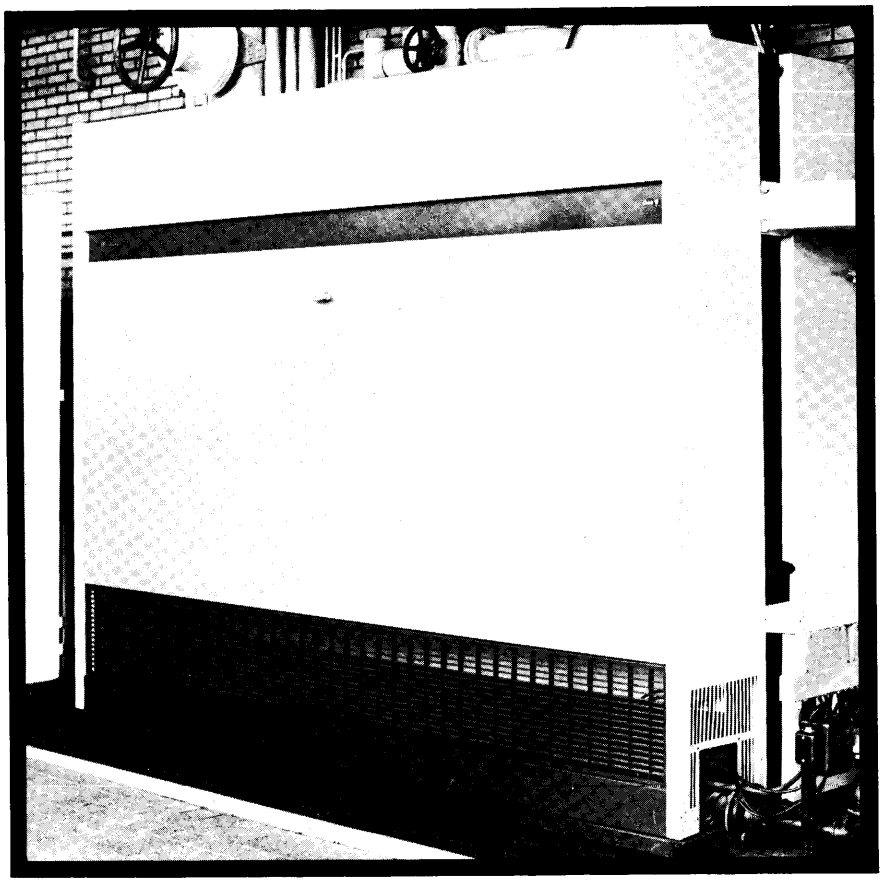
technical information



Broag Ltd

Seagold Boilers
Molly Millars Lane,
Wokingham, Berks.
Tel. 0734-783434
Telex 849137

Gas 6 series boiler with atmospheric burner



Gas 6-12 Section.

The SEAGOLD Gas 6 is the latest series and an addition to the extensive range of atmospheric gas-fired boilers manufactured by Rheinstahl for the United Kingdom market.
Gas 6 series boilers provide the same high-performance and reliability as other SEAGOLD series boilers, and extend the range into the largest available capacity of atmospheric gas boilers available in the United Kingdom.
From a minimum output of 1,705,000 Btu/h (500 kW), Gas 6 boilers can be provided to operate at a maximum of 3,611,000 Btu/h (1058 kW) with 11 different sizes in the series.
Boilers in the Gas 6 series are designed for (maximum efficiency) natural gas operation (only) and are particularly suitable for large multiple installations on special tariffs.
Within the SEAGOLD "Gas" series are the Gas 3 and Gas 5 ranges of boilers, both offering lower outputs to cater for smaller heating requirements, between 270,000 Btu/h (79 kW) and 1,638,000 Btu/h (480 kW).

Gas 6 Benefits

Silence in Operation
Relative silence on ignition and in operation render the SEAGOLD Gas 6 suitable for location adjacent to occupied areas.

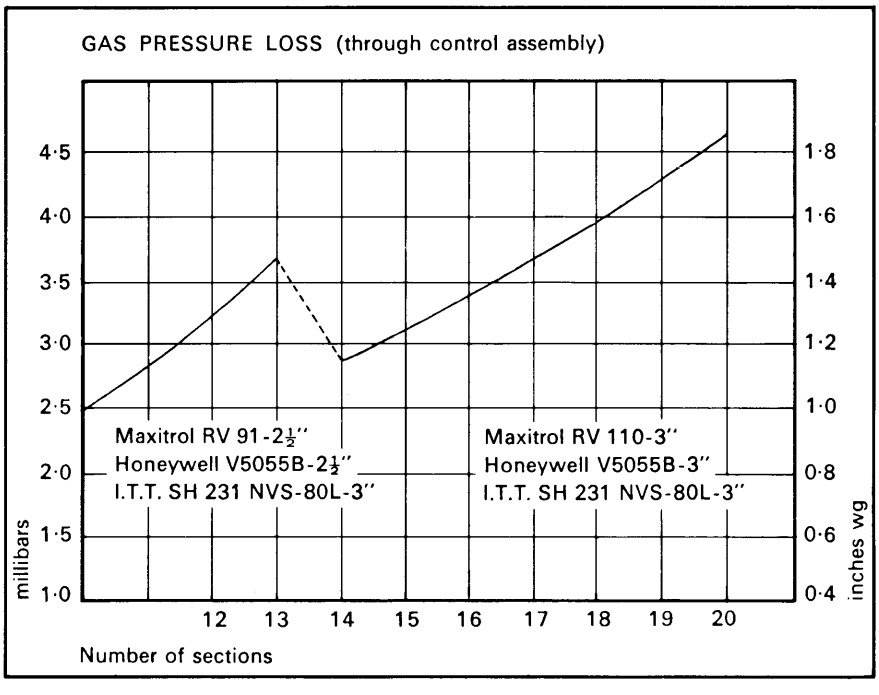
Durability
High resistance to corrosion and sturdy construction ensure a long, trouble-free operational life.

Regulation & safety equipment

Control Specification

Boiler Model	6-12	6-13	6-14	6-15	6-16	6-17	6-18	6-19	6-20
Low Pressure Governor	Maxitrol RV 91-2½ in.		Maxitrol RV 110-3 in.						
Safety Shut Off Valve (on-off)	Honeywell V5055B-2½ in.		Honeywell V5055B-3 in.						
Safety Shut Off Valve (high-low-off)	ITT-General Controls. SH 230 - NVS-80L-3 in.								

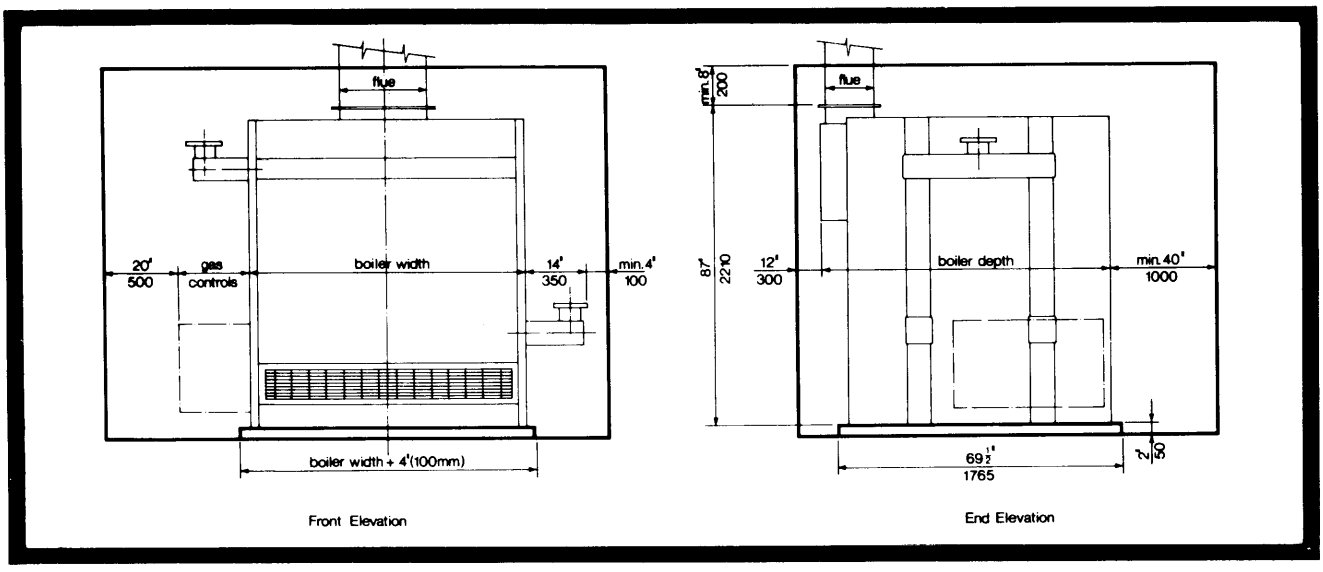
Dual thermostat:	Landis & Gyr RAZ 14/2583. Combined boiler control and high limit thermostat, requires manual reset when high limit temperature is exceeded. Control range 40 to 100°C (104-212°F).
High/low thermostat:	Landis & Gyr RAK 12.00.20. Control range 35 to 95°C (104-212°F).
Down draught thermostat:	Honeywell L6068A set to 70°C (158°F)
Pilot burner:	Dungs E71. Injector size 1.2mm
Ionisation probes:	Material - Inconel
Sparking plug:	Beru ZK 14-8-15
Ignition transformer:	Belpa H15F
Pilot governor:	Maxitrol R500S (¾ in.)
Pilot solenoid valves (2):	Dungs MVD 207/5
Control box:	Landis & Gyr 1.638



Site requirements

Builders Work

SEAGOLD Gas 6 series boilers do not require a specially provided base and may be mounted directly on any suitable plantroom floor. However, the plantroom floor must be level, of fireproof construction and suitably stressed to withstand the boiler and ancilliary equipment when charged with water
Should it be necessary to construct a base for the boiler unit, the sketch provided indicates the outline recommended by SEAGOLD



Access for Servicing

To facilitate boiler and component servicing with the maximum efficiency, it is recommended that the above diagram be consulted, particularly when positioning the boiler and associated controls equipment.

Boiler House Ventilation

Fresh air essential for combustion and ventilation should be provided through high and low level openings to atmosphere, of a size not less than that indicated in the following table. Dimensions shown are for unobstructed openings; if a grille is to be used, the manufacturers free area allowance should be considered.
Low level apertures should be positioned approximately one foot above the finished floor level. This should avoid blockage or flooding. The apertures should also be as close as is practical to the front of the boiler, so as to minimise draughts. Where these apertures do not connect to atmosphere it will be necessary to run a duct from high level.
Openings for ventilation at high level should be as close as possible to the ceiling. Ideally, exposed boiler rooms should have ventilation apertures in all four walls, but should this prove impractical, they must be provided on at least two sides to minimise risk of down-draught. For further information on boiler house ventilation refer to British Gas publication: Combustion and ventilation air. Guidance notes for boiler installations in excess of 2,000,000 Btu/h (586 kW) output. (DCM/2/73)

Ventilation Requirements

Boiler Model		**6-12 to 6-19**	**6-20**
Low level opening	**ft^2**	7.0	7.2
free area	**m^2**	0.65	0.67
High level opening	**ft^2**	3.5	3.6
free area	**m^2**	0.325	0.335

Location

SEAGOLD Gas 6 series boilers are equally suitable for location in basement or at rooftop level, and will function efficiently in either position.
By virtue of the quiet operation of the atmospheric burners, the Gas 6 can satisfactorily be sited adjacent to occupied areas.
Access to the boiler house should be sufficient to allow for the erection of the boiler sections, controls and implementation of servicing.

Gas 6 boiler technical information

Boiler Specification

Each boiler section is tested in accordance with British Standard 722.1961 to 6·9 bar (100 lbf/in²). Normally Gas 6 series boilers are supplied for operating at a working pressure of 3·6bar (52 lbf/in²) or 36 m.(120 ft) head. However, boilers for higher operational pressures can be provided by SEAGOLD upon application.
High resistance to corrosion is assured, every boiler section being manufactured in pearlite cast-iron.

Sections are assembled with tapered push-fit nipples to align the waterways and full length external tie rods. A sealant compound is used for compression between the machined faces, to seal the sections, when tightend. Side surfaces of each section have integrally cast studs to facilitate a high heat transfer when the boiler is assembled and these surfaces form the internal flueways of the boiler. Access for cleaning the flueways is provided by bolt on cover plates at the front of the boiler.
A multiple atmospheric burner bed - natural gas operation only - is horizontally located between the end sections at low level. The gas manifold and controls system package serving the burners is provided for installation on either side of the boiler.
Flue gases are exhausted up between the flueways (sections), pass into the draught diverter and exit through the central, vertical flue connection at the rear of the boiler.
In the event of down draught creating a temperature in excess of 70°C (158 F), a thermostatically-operated cut-out shuts down the burners for automatic re-ignition once the temperature has decreased.

Water Connections

Two 6 in. internal diameter flow and return connections are provided diagonally opposite on either side of the boiler.
A relief valve can be fitted to the blanked-off flow connection, provided that the connection is suitably drilled and tapped. Alternatively, a valve could be mounted on the flow pipework adjacent to the boiler. Only relief valves complying with Code of Practice C.P.332 Part 3, up to a size of 2 ins. should be used.

The dual high/low thermostat must be sited in the purpose-provided ½ in. BSP socket connection located on the flow connection.

Flue Connection

Flues for the Gas 6 series boiler may be provided in heavy duty asbestos; single or double walled galvanised steel or aluminium; or cast iron. The diameter of the flue pipework must not be less than the boiler flue connection and a minimum length of 1 metre (3 feet) vertical flue pipe should be connected directly to the boiler draught diverter.
Should the boiler flue be connected to a chimney, the boiler should be sited as close as is practicable to the chimney base. Offsets, bends and horizontal flue runs should be avoided. It is advisable to angle flue entry into the chimney at a minimum of 135° and the flue pipe must not protrude beyond the inner face of the chimney.
Although it is possible to connect all boilers sharing the same boiler house to a common flue, it is desirable to have boilers connected to individual flues. However, should a common facility be required, this may be undertaken by increasing the main flue dimensions as each boiler is added. Before carrying out this type of installation it is recommended that the publications 'Technical Notes on the Design of Flues for Larger Gas Boilers' (dated 1971) and Code of Practice 337:1963, be consulted.
Exposed flues should be avoided wherever possible and adequate flue insulation should be provided if condensation and its attendant consequences are to be averted. Access covers, to facilitate cleaning, should be provided in all flue pipework, ideally at bends.
The maximum draught requirement of the SEAGOLD Gas 6 series boilers is 0·1 millibar (0·0394 in. wg.).

Chimneys

Vertical flues and chimneys should be so arranged that adequate draught to effect combustion is provided; whilst ensuring that provision for the protection of combustion from down draughts and other atmospheric effects is designed into the installation.
For information on chimney sizing and orientation, it is advisable to refer to the Gas Council publication: Technical Notes on the Design of Flues for Larger Gas Boilers (dated December 1971).

Chimneys contd.

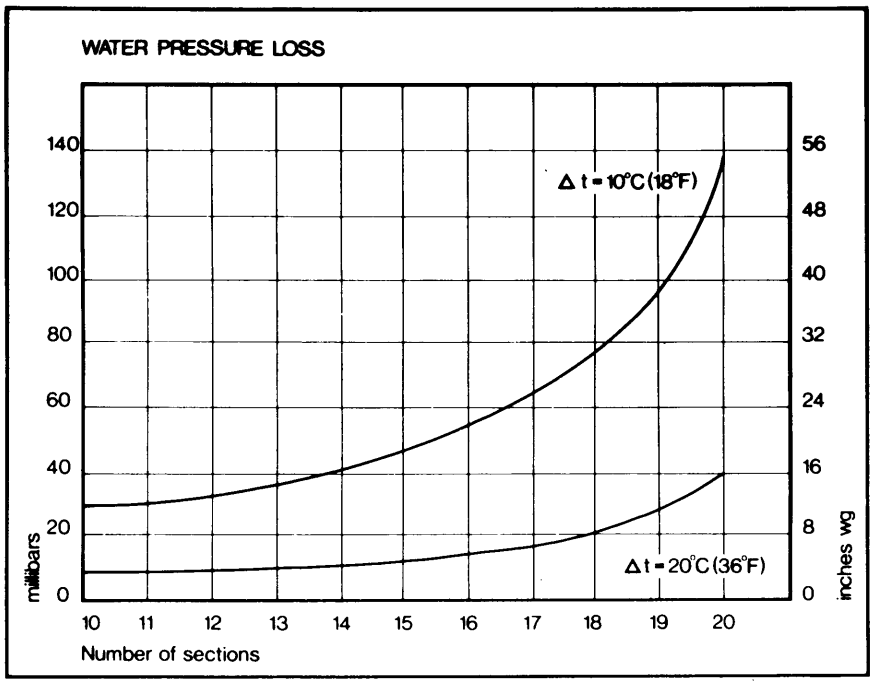
If an existing chimney is to be utilized, it must be free from internal obstructions; abrupt changes of section and restricted right angle bends. Chimneys previously used for oil-fired installations should be brushed clean, or where there is a possibility of condensation, an internal liner may be used. Provision of drainage in likelihood of residual condensation should be made at the base of the chimney, below the flue inlet. Existing dampers should be removed. If this is not possible, they must be 'locked' open.
SEAGOLD Gas 6 series boilers normally operate with a flue gas temperature of approximately 145°C (293°F) measured at the draught diverter. For efficient operation, the minimum permissible chimney temperature at the terminal is 65°C (149°F)

Gas Supply Pipework

Before commencing installation it is recommended that the local Gas Authority be consulted to determine that adequate gas pressure and supply are available at the boiler. The service supply must be of adequate size to meet the gas demand of the boiler at its maximum output.
Existing gas installations must not be used without prior consultation with the local Gas Authority, where the existing pipe is of a smaller internal diameter than the boiler gas connection. They will also need to install a suitable meter (or check that an existing meter is suitable) for the required supply of gas and that an appropriate tariff is arranged.
To minimise the risk of sediment or foreign particles being deposited in the gas regulation and safety equipment, a filter should be inserted into the pipework immediately preceding the main gas cock and can be supplied by Rheinstahl as an optional extra.
Gas supply lines should be laid in black mild steel pipe, pressure tested for leaks, and comply with the Gas Corporation Safety Regulations 1972. To ensure a sound gas installation, SEAGOLD recommend that installation of gas equipment is undertaken by companies registered with CORGI (the Confederation of Registered Gas Installers).

Water Resistance and Temperatures

The graph below indicates resistance to water flow through Gas 6 series boilers at temperature differentials of 10°C (18°F) and 20°C (36°F). Reference to this will indicate whether boiler performance is within the prescribed parameters.
The maximum operating temperature of the Gas 6 series boilers is 100°C (212°F), however, it is not recommended to consider this as a designed operating temperature.
To prevent residual hot water from overheating the boiler following shutdown, the circulating pump should be programmed to run-on for a period of 15 minutes after the burner has been shut-off, to dissipate latent heat.



Operation Sequence

Burner HIGH/LOW/OFF operation is achieved by virtue of the main safety shut-off valve. This valve responds to the operating sequence determined by the boiler controls. The safety valve terminates gas supply within one second should electrical failure occur. Relighting is automatic when power is restored.
Inadequate gas pressure will also cause the safety valve to close; however, in this event, the boiler will have to be reset manually.

Boiler Performance

Boiler Model	Nominal Heat Input		Nominal Heat Output		Gas rate	
	Btu/h x 10^3	kW	Btu/h x 10^3	kW	ft^3/h	m^3/h
GAS 6-12	2706	793	2088	613	2706	76.5
GAS 6-13	2948	864	2280	668	2948	83.4
GAS 6-14	3197	937	2471	724	3197	90.4
GAS 6-15	3443	1009	2662	780	3443	97.4
GAS 6-16	3685	1080	2845	835	3685	104.3
GAS 6-17	3934	1153	3036	891	3934	111.3
GAS 6-18	4176	1224	3228	946	4176	118.2
GAS 6-19	4422	1296	3419	1002	4422	125.2
GAS 6-20	4671	1369	3611	1058	4671	132.8

The gas rate in the above table is for natural gas, calorific value 1000 Btu/ft^3.

Burner Specification

Burner pressure:	14.9 millibar (6.0 in.wg) high capacity
Burner pressure:	5.0 millibar (2.0 in.wg) low capacity
Injector diameter:	6.6 mm (0.26in.)
Auxiliary injector diameter:	7.2 mm (0.28in)

Approximate Weights

Boiler Model		6-12	6-13	6-14	6-15	6-16	6-17	6-18	6-19	6-20
Boiler	lb	8818	9480	10141	10802	11464	12125	12786	13448	14109
weight dry	kg	4000	4300	4600	4900	5200	5500	5800	6100	6400
Water	UK/gal	171	185	199	213	227	240	254	268	282
content	litres	778	841	904	967	1030	1093	1156	1219	1282
Total	lb	10528	11330	12131	12932	13734	14525	15326	16128	16929
weight	kg	4775	5139	5502	5866	6229	6588	6952	7315	7679

Assembly

All relevant information pertaining to the assembly of SEAGOLD Gas 6 series boilers is provided in the separate Building and Installation recommendation brochure. Copies of this publication can be obtained upon application to SEAGOLD.

Commissioning

Correct commissioning is essential for efficient and reliable boiler operation. Whether a new installation; a modified or an overhauled unit being restored to operation, commissioning should only be entrusted to specialized boiler engineers. SEAGOLD recommend that their appointed service engineers be employed to commission SEAGOLD boiler equipment. SEAGOLD engineers will ensure a prompt and efficient service on all types of installation and, in addition, produce an objective report submitting copies to both the heating engineer and the client.

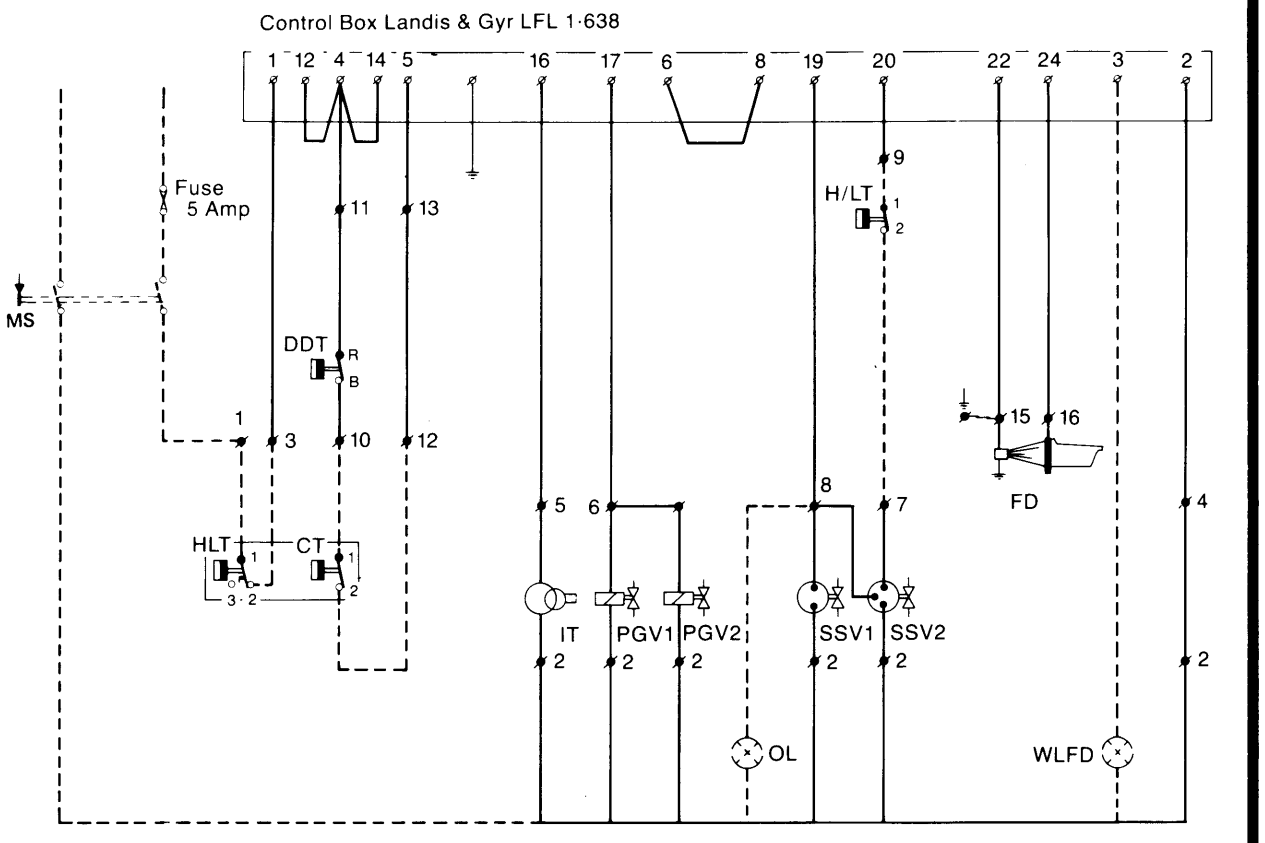
Maintenance

In order to ensure boiler performance of operation, consistant to its design output, it is vital that regular inspection and maintenance be carried out, and SEAGOLD recommend that only qualified service engineers be employed upon these tasks. To satisfy this requirement, SEAGOLD have a Service Plan to commission, annually-inspect and service installations throughout the United Kingdom. SEAGOLD will provide additional information on these services, upon application.

Other Products

Additional products marketed by Rheinstahl for plantrooms include blown gas and oil-fired boilers and a comprehensive range of burners and pumps suitable for a variety of applications. Information and catalogues on these products may be obtained by contacting SEAGOLD's headquarters in Wokingham.

Electrical wiring diagram



LEGEND

⌀	Connection screws (control box)	FD	Flame Detector
●	Connection screws (terminal strip)	IT	Ignition Transformer
---	Not supplied or wired	PGV	Pilot Gas Valve
MS	Main Switch	SSV1	Safety Shut-off Valve
HLT	High Limit Thermostat	OL	Operation Light
CT	Control Thermostat	WL	Warning Light
DDT'	Down Draught Thermostat	H/LT	High-Low Thermostat
		SSV2	Safety Shut-off Valve High Low

Electrical Supply

Gas 6 series boilers are supplied complete with ignition and shutdown sequence control package, in addition to down-draught protection equipment. All the appropriate controls are situated in the Landis & Gyr control box.

The electrical supply required for connection to the boiler circuitry must be single-phase 220/240 Volt, 50 Hz, AC type supplied through a 5 amp fuse and isolating switch. In addition, a separate wiring feed has to be taken to the 'dual' and the high/low thermostat.

Boiler controls include a dual thermostat for boiler control; high-limit temperature protection, high-low thermostatic control; flame detection, safety shut-off and down-draught cut-out systems.

The electrical installation must conform to I.E.E. regulations for buildings and also to local authority requirements.

Upon installation, all circuits should be tested for polarity, earthing and continuity. Indicating lamps should also be tested to ensure satisfactory operation.

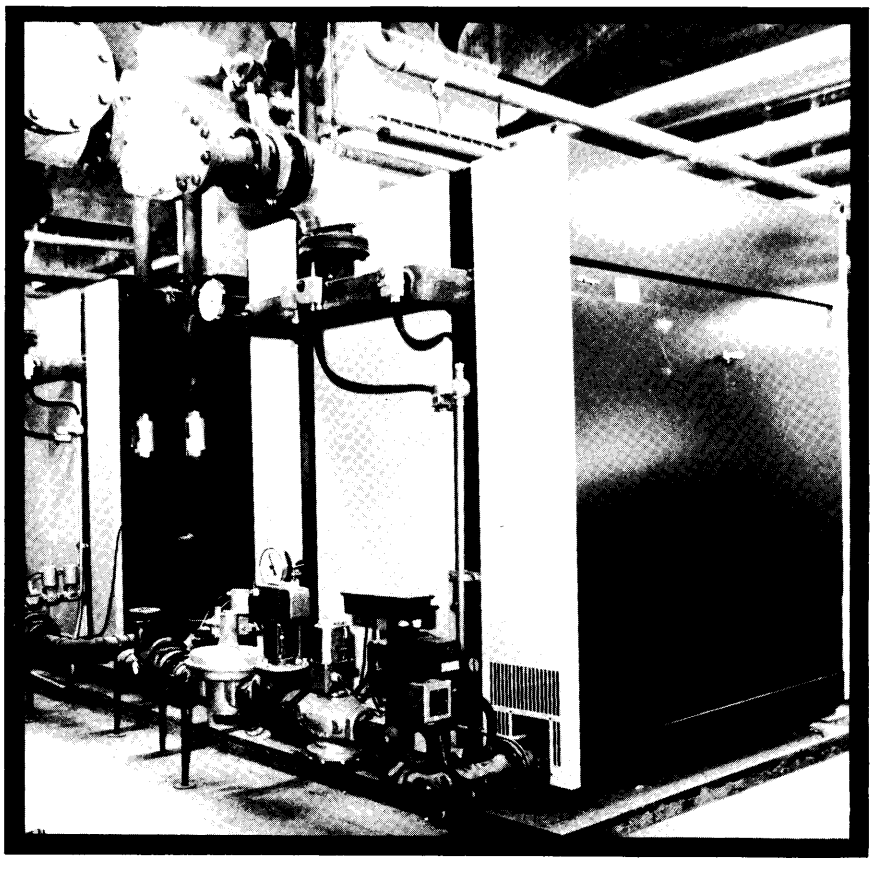
- **Reliability**
  A comprehensive range of protection and functional controls are provided to guarantee safe and reliable operation.

- **Plant room Efficiency**
  A minimum floor area requirement in relation to high Btu/h output is afforded by superior design and production techniques.

- **Ease of Access**
  The Gas 6 has been constructed to facilitate inspection and maintenance with the minimum difficulty.

- **Experience**
  One of Europe's most reputable manufacturers produce the Gas 6 boilers to scrupulously high production standards and advanced design principles.

Typical Gas 6 installation



Gas 6 - Features

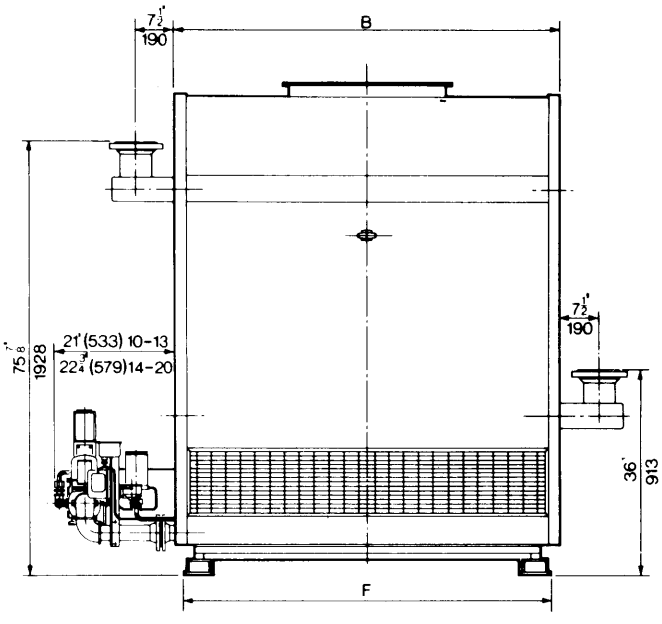
- Sophisticated manufacturing techniques make site construction of the Gas 6 a simple, straight-forward exercise.

- Down-draught protection provided by a thermostatically controlled burner cut-out system.

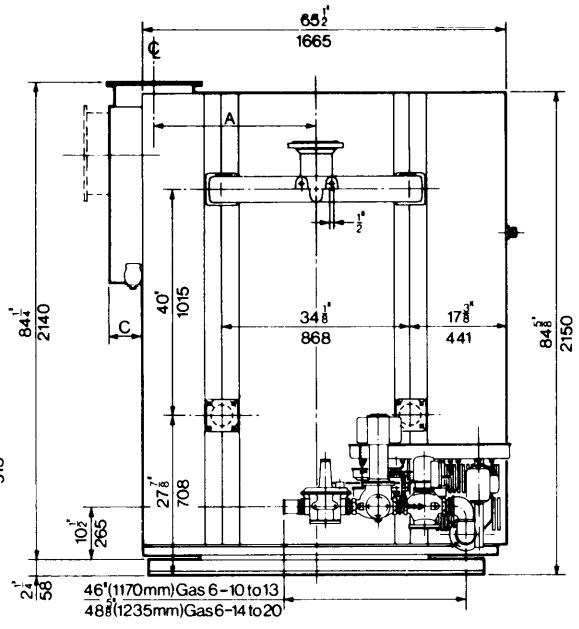
- Dual control system

- All boiler equipment designed, manufactured and tested to British Gas Specifications.

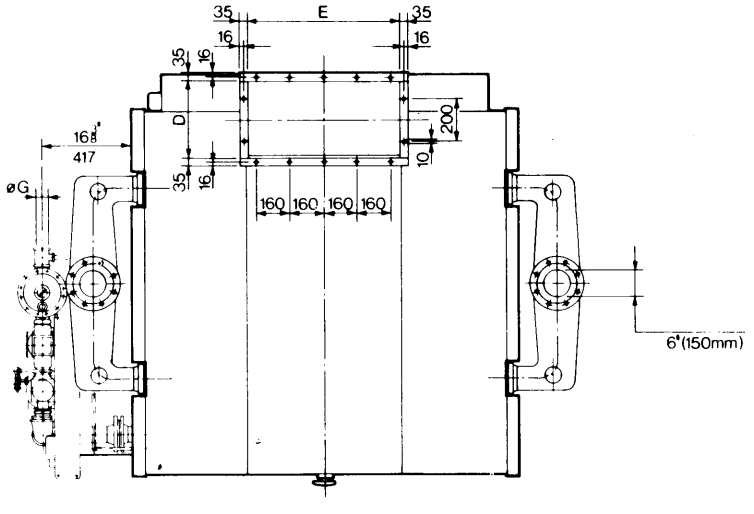
Boiler dimensions



FRONT ELEVATION



END ELEVATION

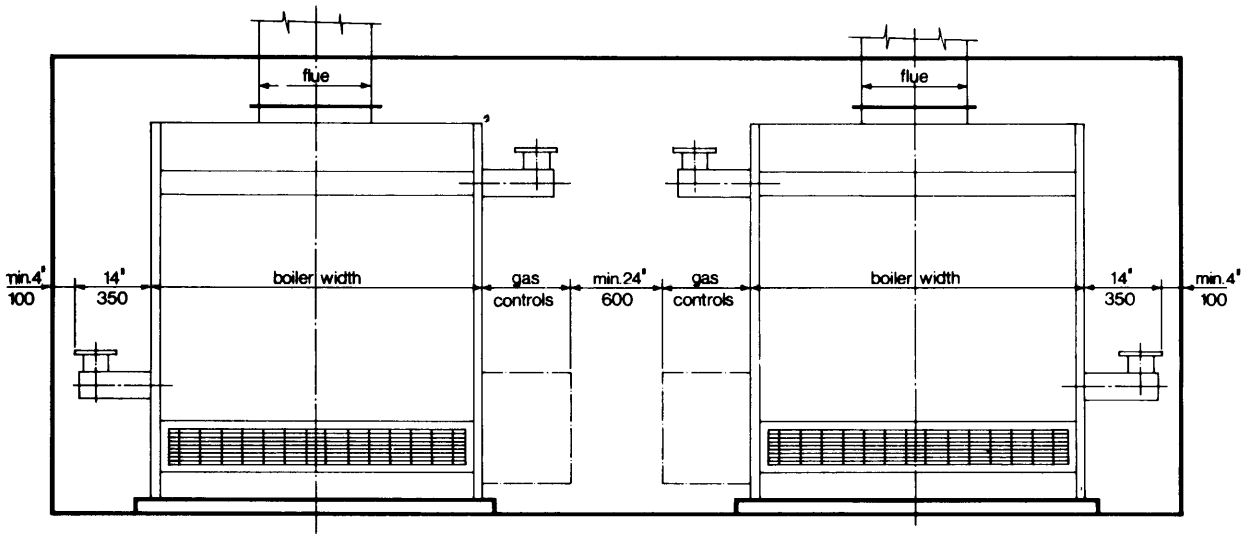


PLAN

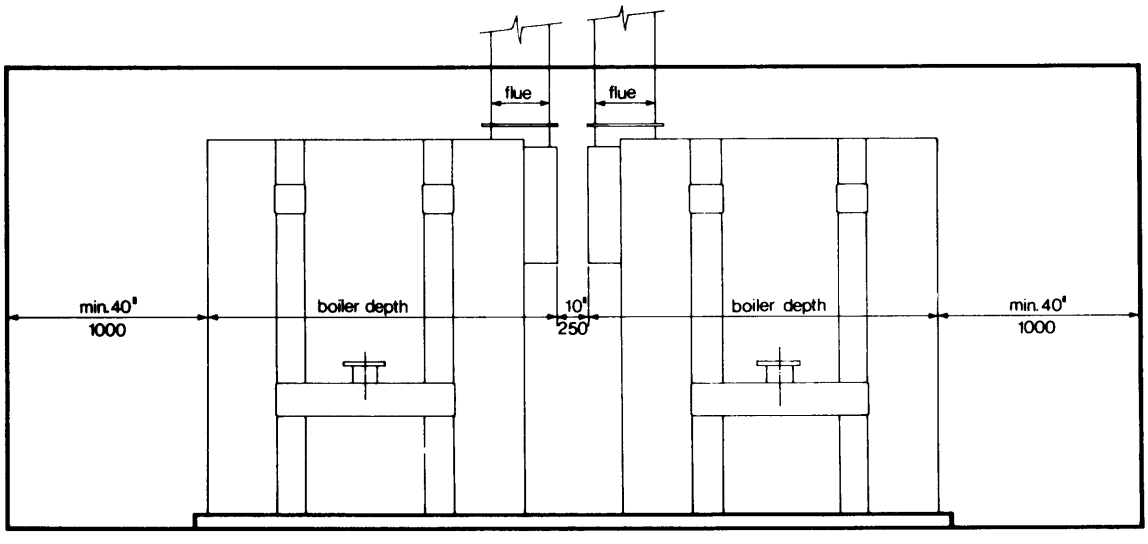
To ensure competitive performance, prices and specification Seagold maintains a continuous development programme and reserve rights of modification or alteration without notice

Boiler Model	Output Btu/h x 10^3	kW	A in	mm	B in	mm	C in	mm	D in	mm	E in	mm	F in	mm	ØG in
GAS 6-12	2088	613	29½	748	63¾	1618	6¼	159	13¾	350	27½	700	59⅞	1520	2½
GAS 6-13	2280	668	29½	748	68⅝	1743	6¼	159	13¾	350	27½	700	65⅛	1655	2½
GAS 6-14	2471	724	30⅛	765	73½	1868	7⅝	194	15⅛	385	30¼	770	70⅛	1780	3
GAS 6-15	2662	780	30⅛	765	78½	1993	7⅝	194	15⅛	385	30¼	770	75	1905	3
GAS 6-16	2845	835	30⅞	783	83⅜	2118	9	230	16⅝	421	33⅛	842	79⅞	2030	3
GAS 6-17	3036	891	30⅞	783	88⅜	2243	9	230	16⅝	421	33⅛	842	84⅞	2155	3
GAS 6-18	3228	946	30⅞	783	93¼	2368	9	230	16⅝	421	33⅛	842	89¾	2280	3
GAS 6-19	3419	1002	30⅞	783	98⅛	2493	9	230	16⅝	421	33⅛	842	95⅛	2415	3
GAS 6-20	3611	1058	30⅞	783	103	2618	9	230	16⅝	421	33⅛	842	100	2540	3

Multiple boiler installation



Side by side installation



Back to back installation

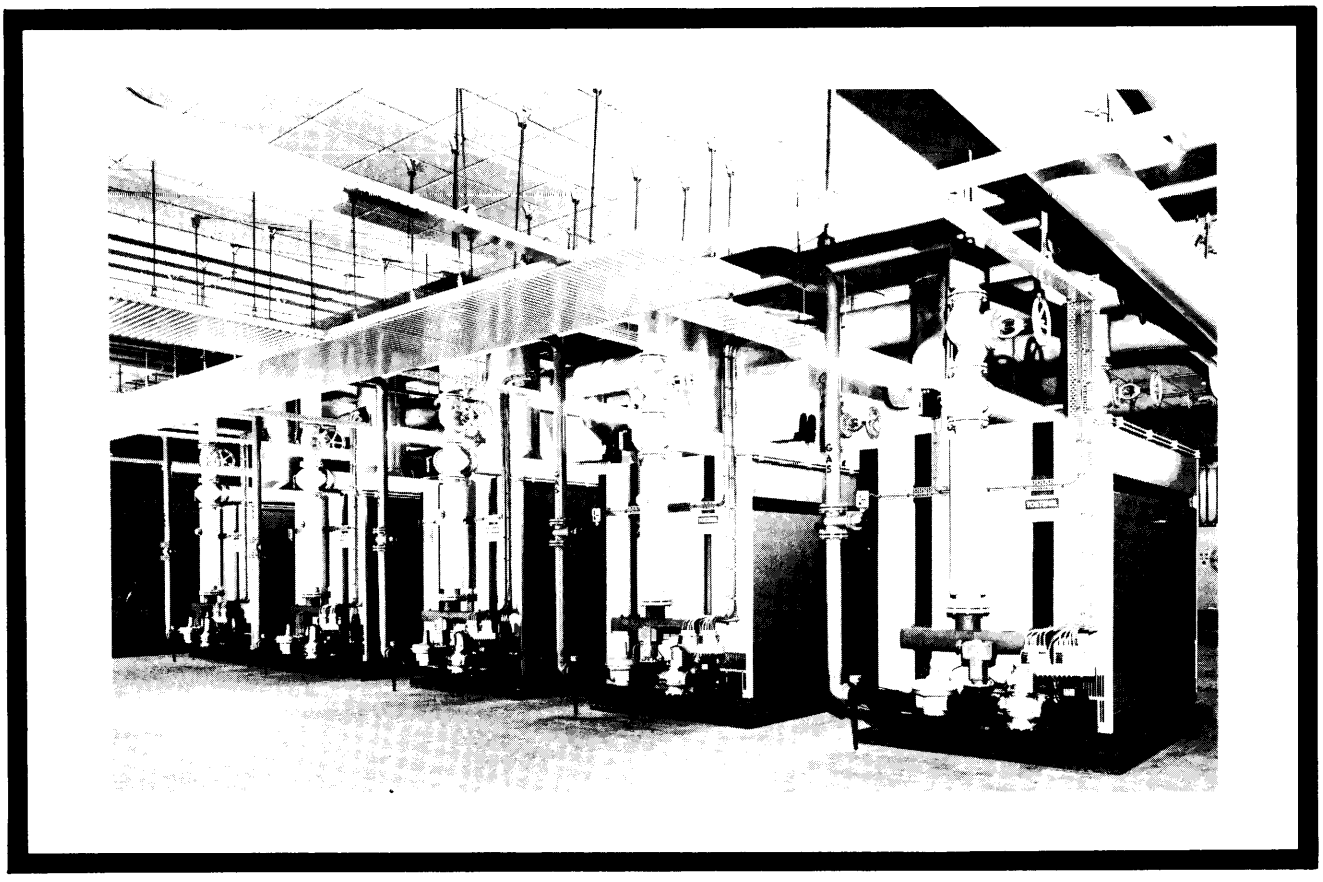
Multiple Boiler Installation

The Gas 6 series, similar to the Gas 5 range of boilers, is ideal for installation in multiple installations. Only the size of the boiler house and/or the capacity of the related plant need necessarily limit the number of units used in a multiple arrangement.

The diagrams above provide an indication of the manner in which Gas 6 boilers can be arranged in a multiple installation plantroom.

Multiple installations can be arranged to provide either seasonally varied programmes or large scale mass-output situations.

SEAGOLD will gladly provide their expertise to assist in the selection of units for multiple installation purposes.



Multiple boiler installation utilising five SEAGOLD Gas 6 boilers

Service

SEAGOLD is the registered trade name for SEAGOLD's extensive range of gas and oil-fired boilers produced for British markets. SEAGOLD's Regional Managers are specially selected for their experience in the boiler industry and are located in various parts of the United Kingdom and available to assist customers, consultants and contractors.

Substantial stocks of all boilers are retained in SEAGOLD's Wokingham warehouse and can be provided at relatively short notice. Requests for out-of-stock equipment, or boilers provided to suit individual specifications, can usually be accommodated within four weeks.

SEAGOLD offer a range of 'back-up' services, including commissioning and after-sales servicing under contract. All services are obtainable at competitive prices.

Regional Manager: