

## remeha Gas 3c ECO

## Technical information

Fully condensing  
atmospheric gas boiler

101 - 407 kW



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**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 commissioning 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  $\varnothing$  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 efficiencies 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.

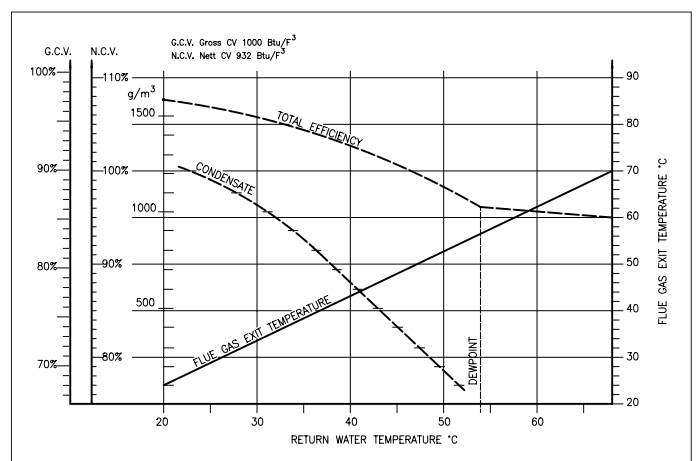


Fig. 01 Relationship between boiler efficiency and return boiler water temperature

\* 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

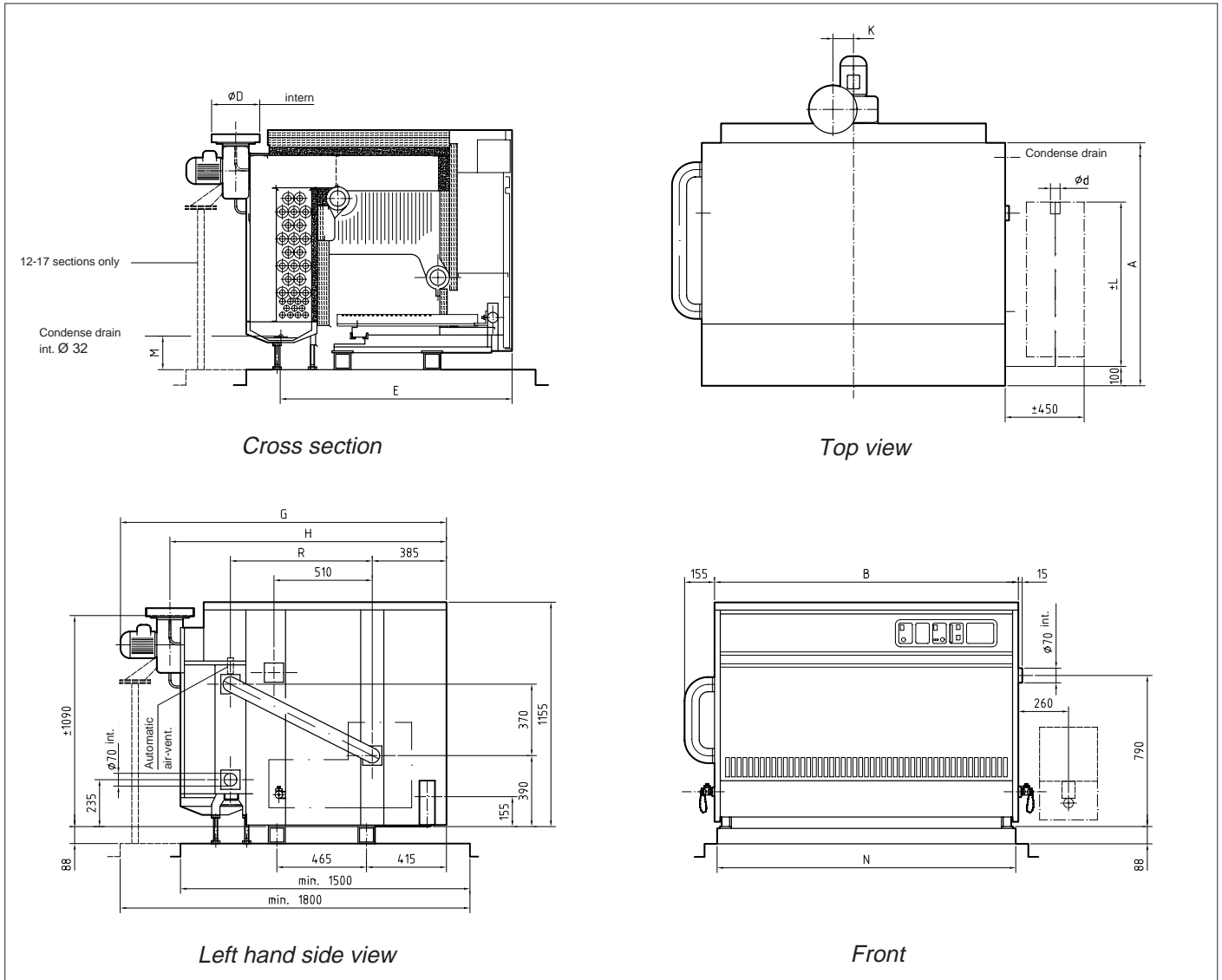


Fig. 02 Dimensions of the remeha Gas 3c ECO

Number of sections	Output kW	Input Hs kW	Dimensions													Water resistance		Water content Litres	Boiler weight kg
			A	B	$\varnothing D$	$\varnothing d$	E	G	H	K	R	N	M	$\pm L$	$\Delta t=10^{\circ}\text{C}$	$\Delta t=20^{\circ}\text{C}$			
			mm	mm	mm	"	mm	mm	mm	mm	mm	mm	mm	mm	mm	mbar	mbar		
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  $\Delta t$  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:

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

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 requirements exists other than for over-temperature protection.

The maximum water flow through the boiler is:

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

#### 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.

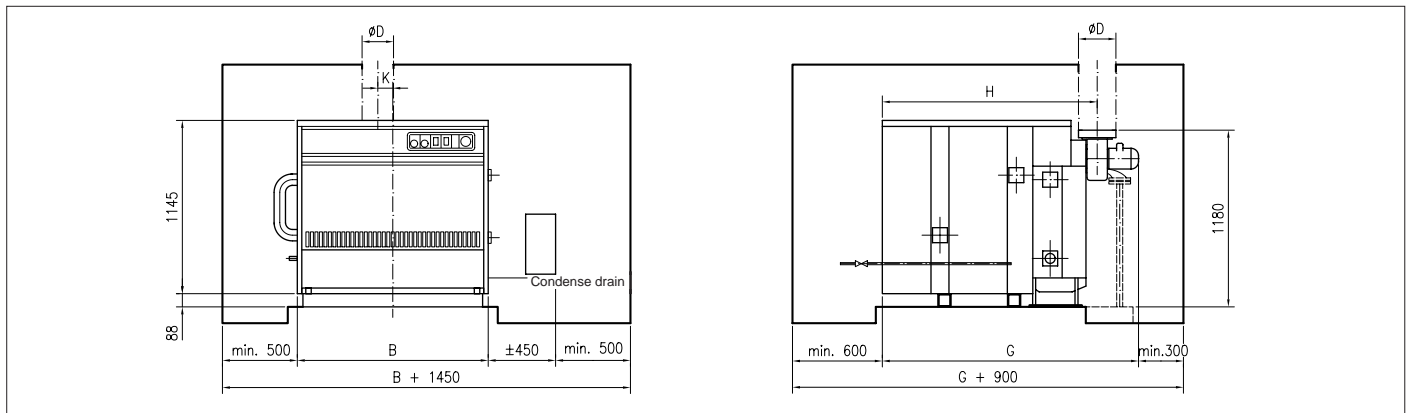
#### 5.3.3 Safety equipment

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

6. TYPICAL BOILER INSTALLATIONS

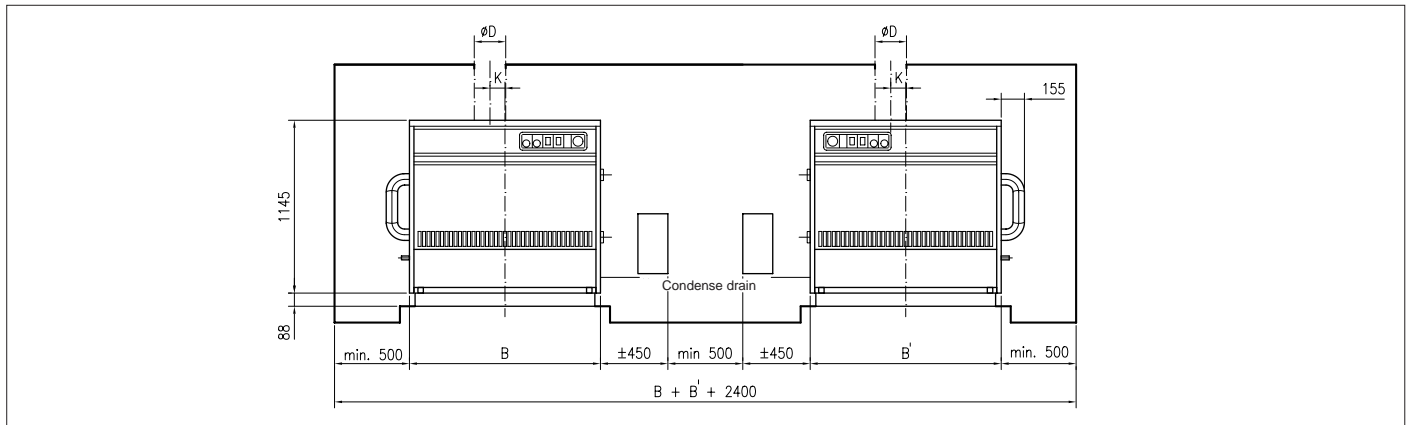
Installation 1

One boiler in boiler room



Installation 2

Two boilers in boiler room



Installation 3

Two boilers in boiler room back to back

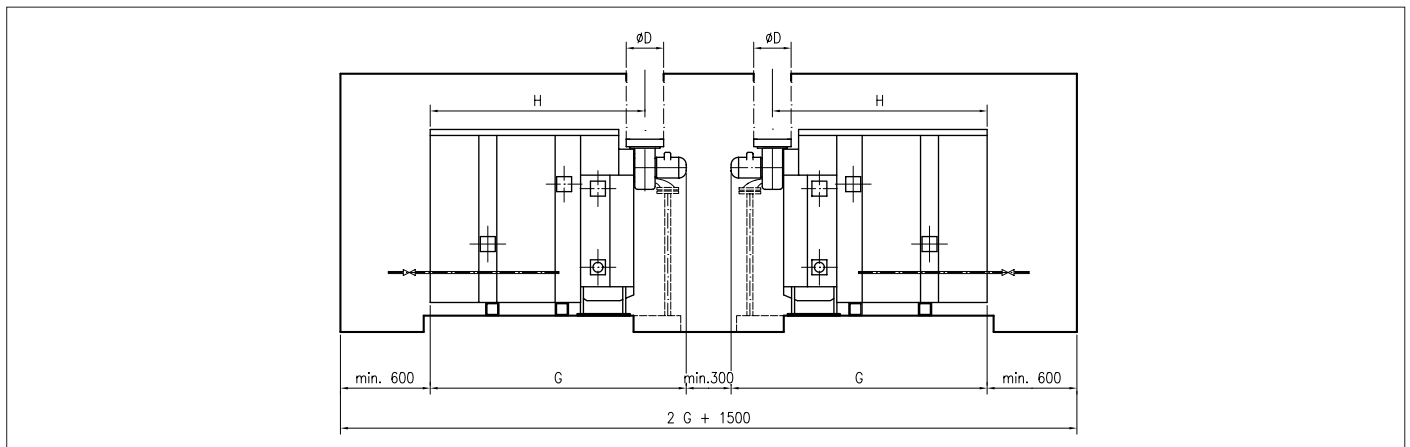


Fig. 03 Boiler installations

		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	1435	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\*\*.

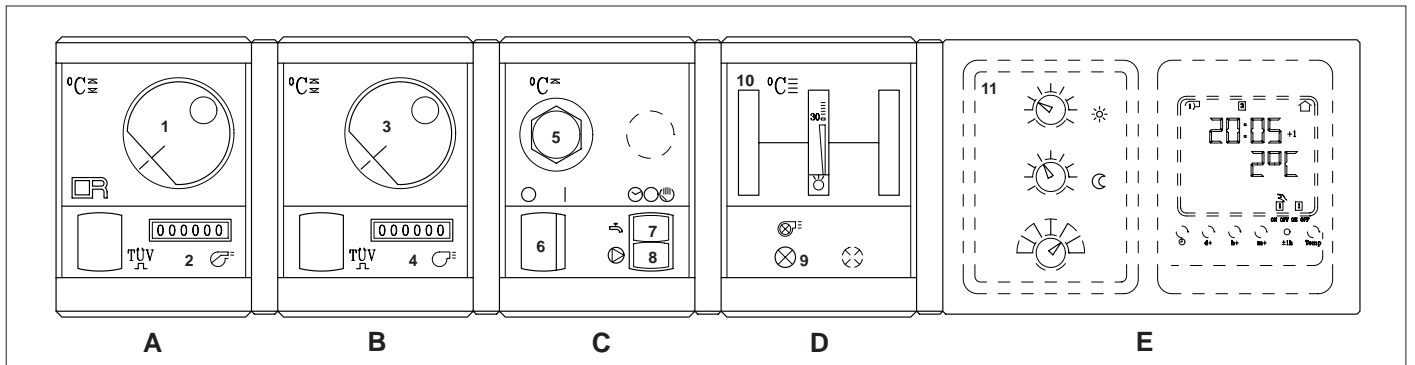


Fig. 04 Instrument panel

#### 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*<sup>®</sup> 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

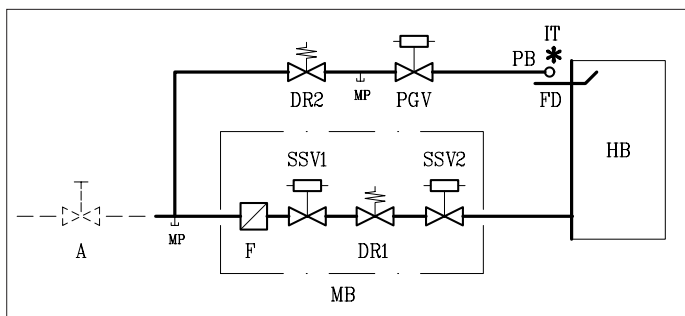


Fig. 05 5-12 sections

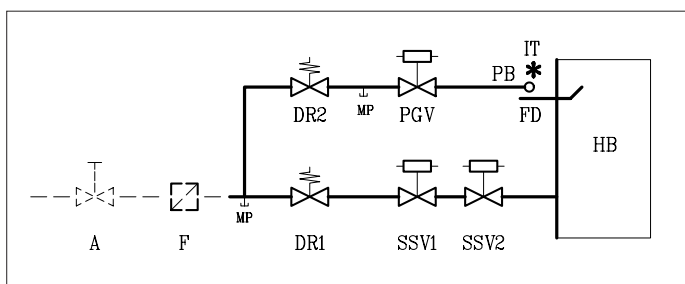


Fig. 06 13-17 sections

#### 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, Brusik
- 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  $\text{Ø} 70 \text{ mm}$  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.

## 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.

### 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.

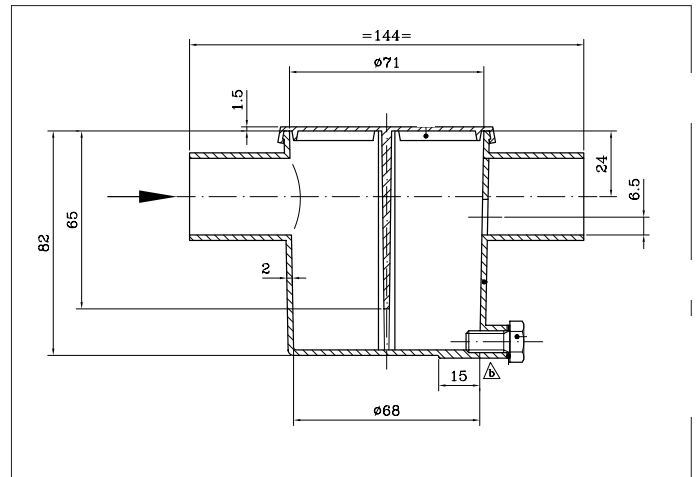


Fig. 07 Siphon trap dimensions

### 9.2 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**

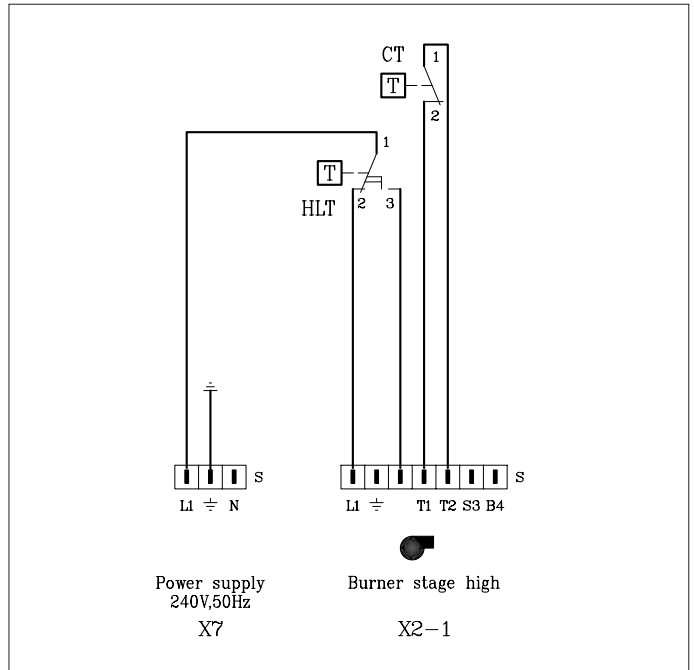


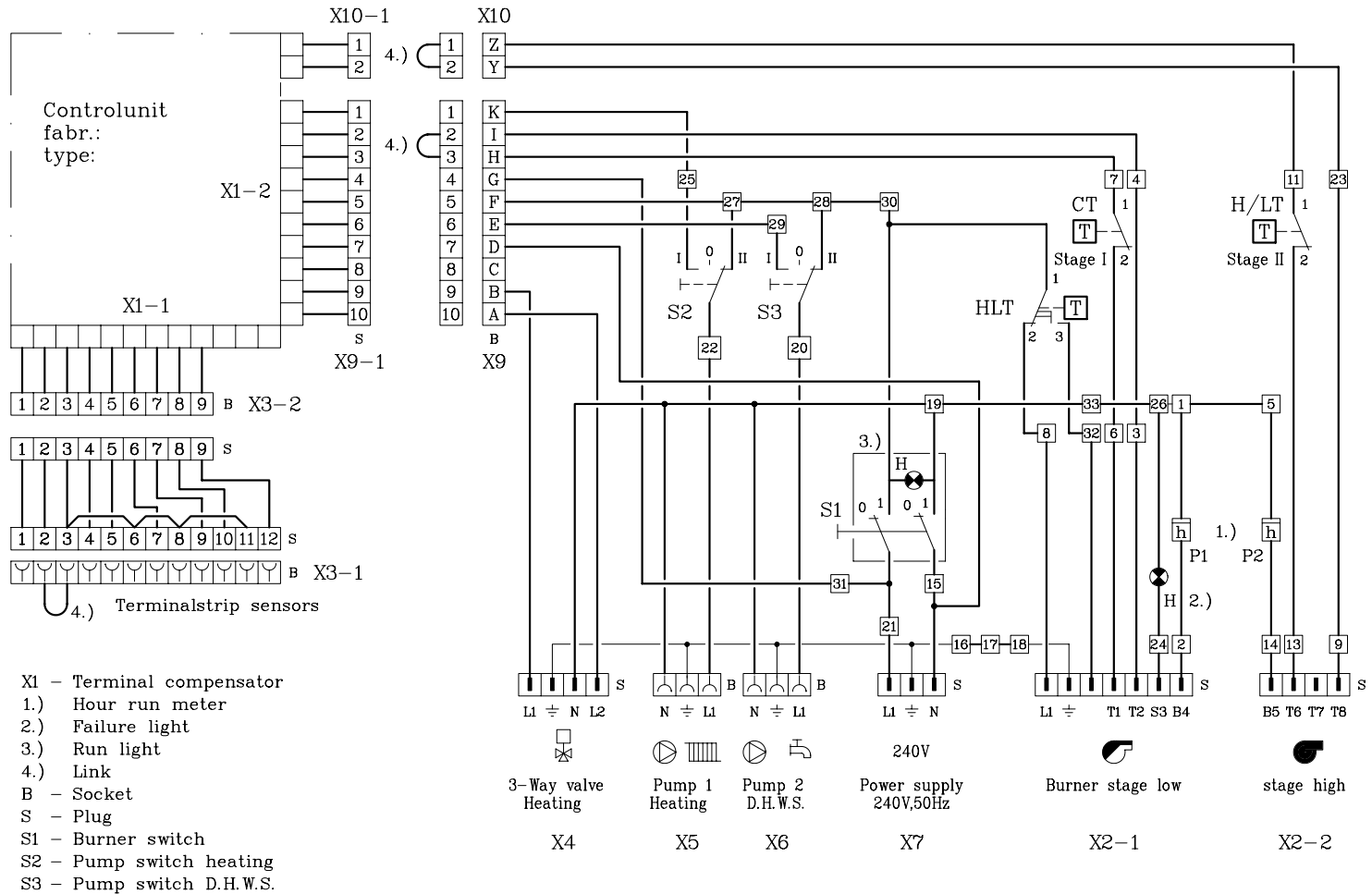
Fig. 08 Simple instrument panel

**Legend**

- CT Control thermostat
- HLT High limit thermostat
- S Plug
- Connector

**10.5.2 Complete instrument panel**  
 (High/Low thermostat will not be used)

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 transformer	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

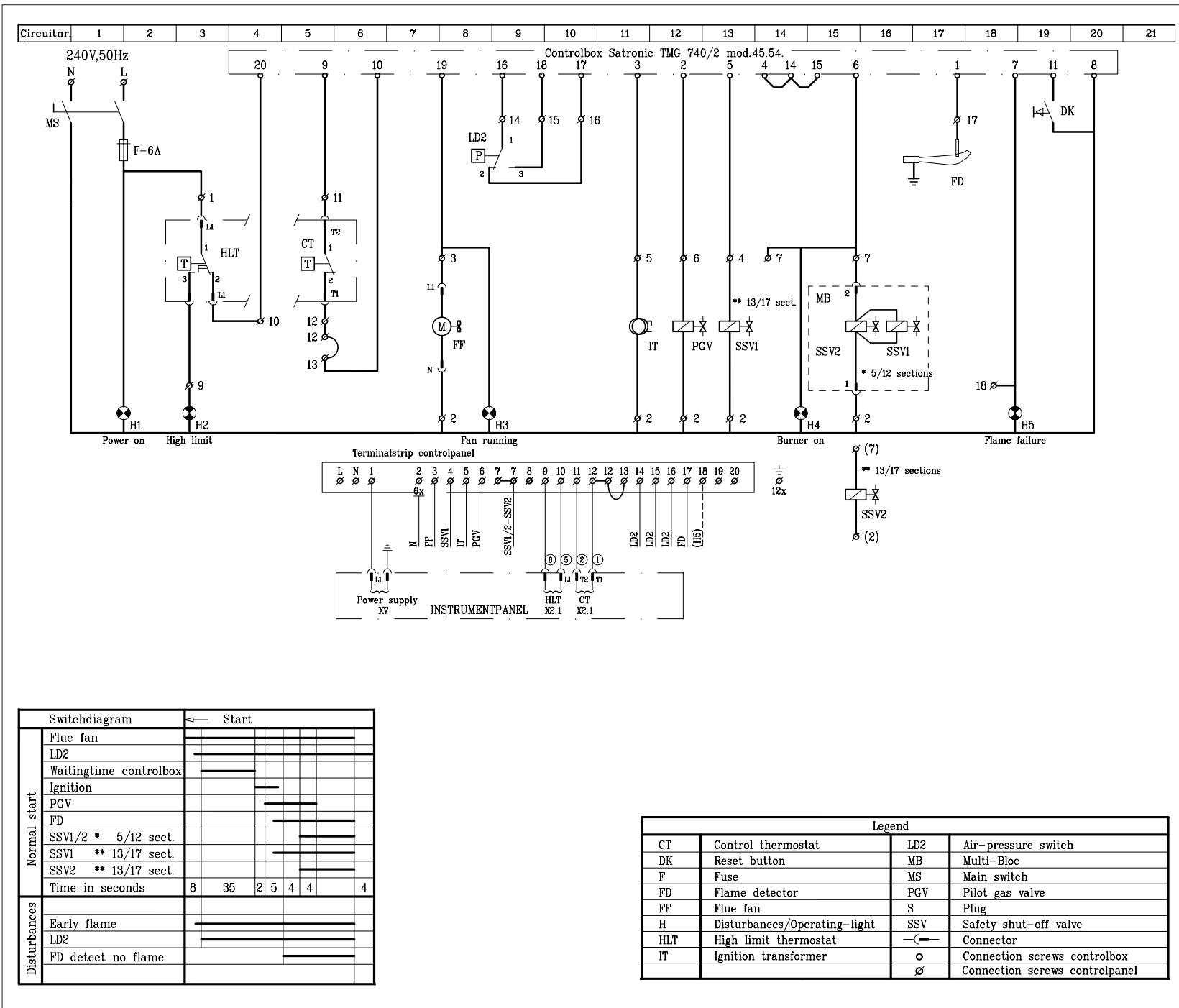
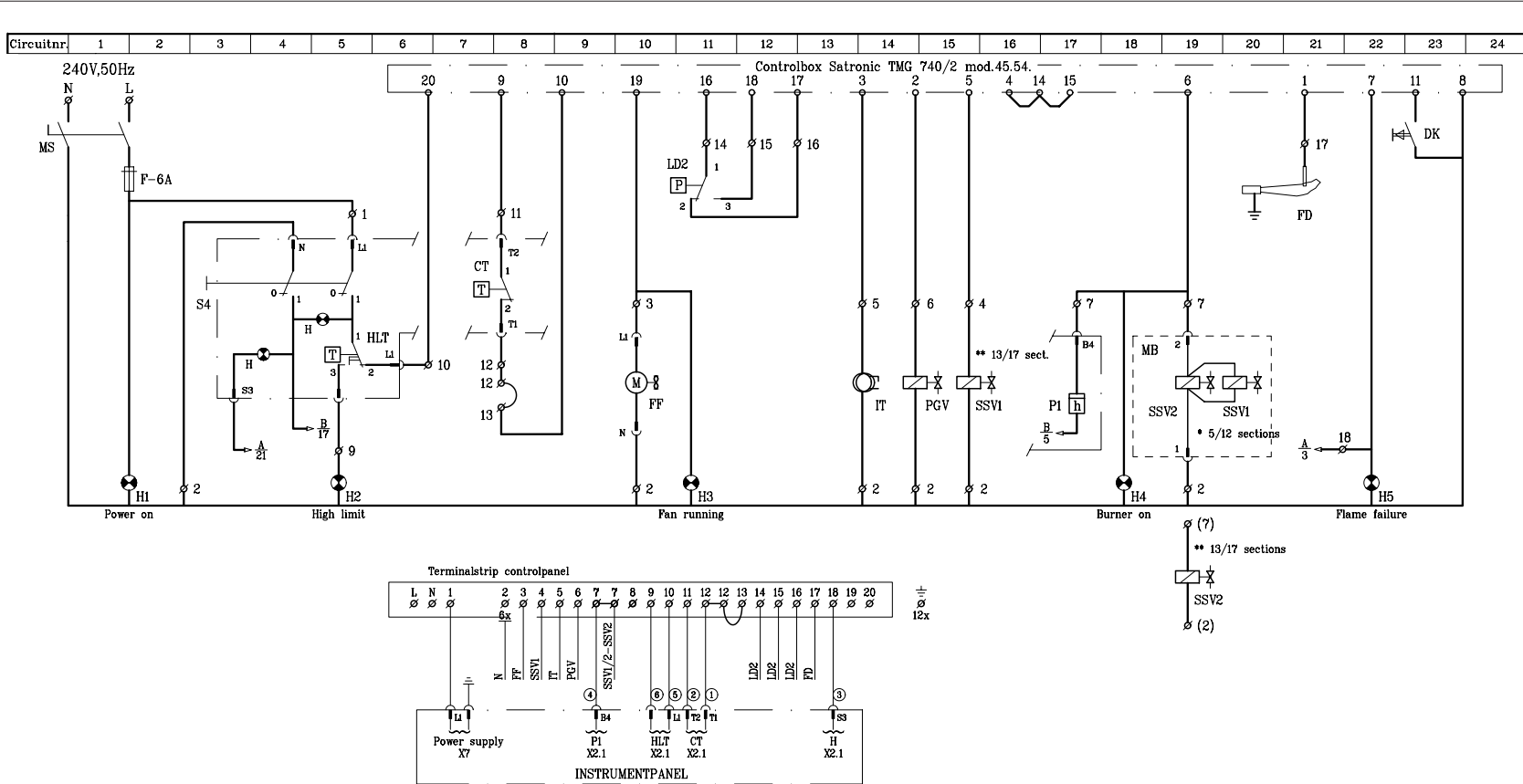


Fig. 10 Complete wiring diagram for the boiler with simple instrument panel

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



Switchdiagram		← Start						
Normal start	Flue fan							
	LD2							
	Waitingtime controlbox							
	Ignition							
	PGV							
	FD							
Disturbances	SSV1/2 * 5/12 sect.							
	SSV1 ** 13/17 sect.							
	SSV2 ** 13/17 sect.							
	Time in seconds	8	35	2	5	4	4	4
Early flame								
LD2								
FD detect no flame								

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	Disturbances/Operating-light	S4	Burner switch
HLT	High limit thermostat	—○—	Connector
IT	Ignition transformer	○	Connection screws controlbox
		∅	Connection screws controlpanel

10.6.2 Complete wiring diagram for the boiler with complete instrument panel (High/Low thermostat will not be used)

## 11. COMMISSIONING

### 11.1 Technical information

Control box	: Satronic TMG 740/2 mod. 45.54.
Main supply	: 240 V-50 Hz.
Minimum ionisation current	: 7 $\mu$ A.
Reaction time flame protection	: 1 sec.
Safety time	: 5 sec.
Maximum ambient temperature	: 60°C.
Injector size pilot burner	: $\varnothing$ 0.8 mm.
Injector size main burner	: $\varnothing$ 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  $\mu$ A 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<sub>2</sub> 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

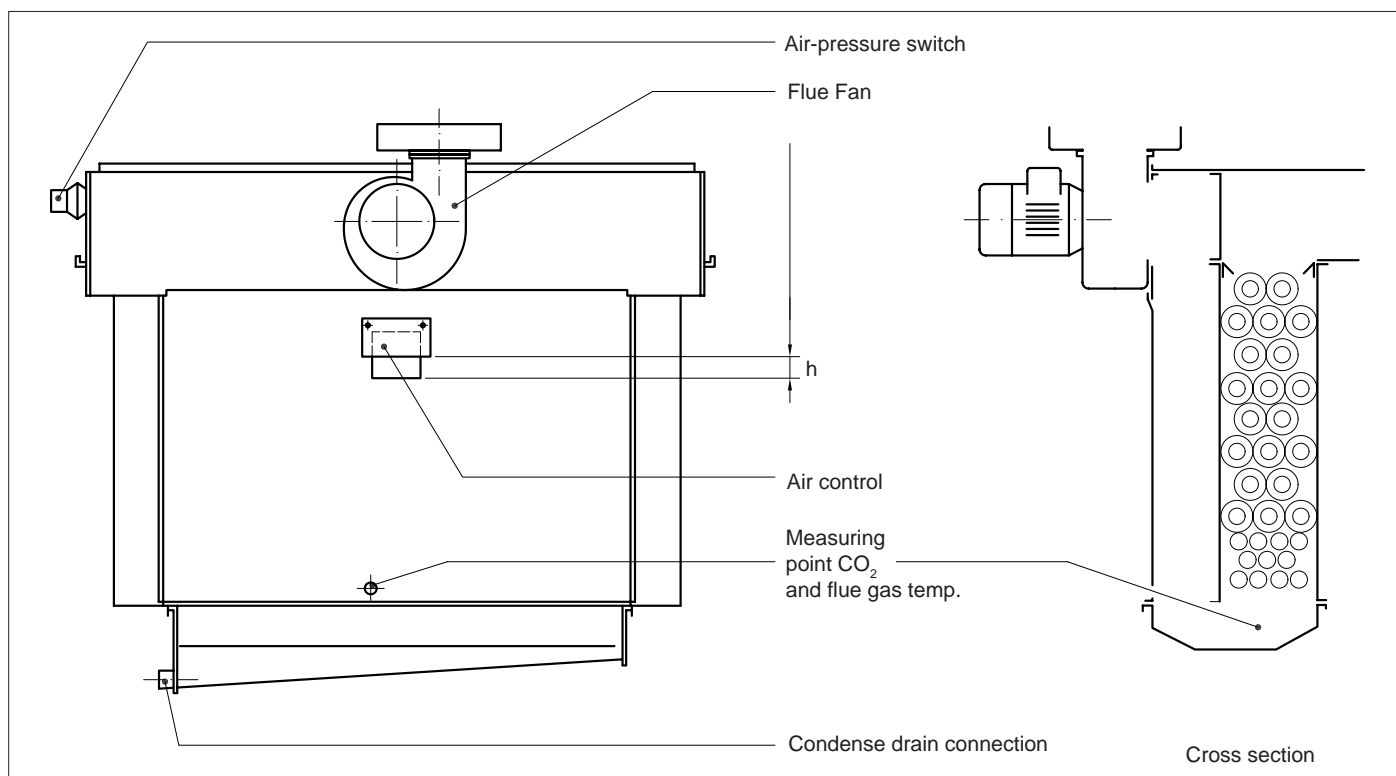


Fig. 12 Rear view of 'ECO'

## 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 lid 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.



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