

C1/sfb

JUNE 1986

**ERECTION INSTALLATION,
COMMISSIONING & SERVICING
INSTRUCTIONS FOR THE**

**CONDENSING
Diplomat**

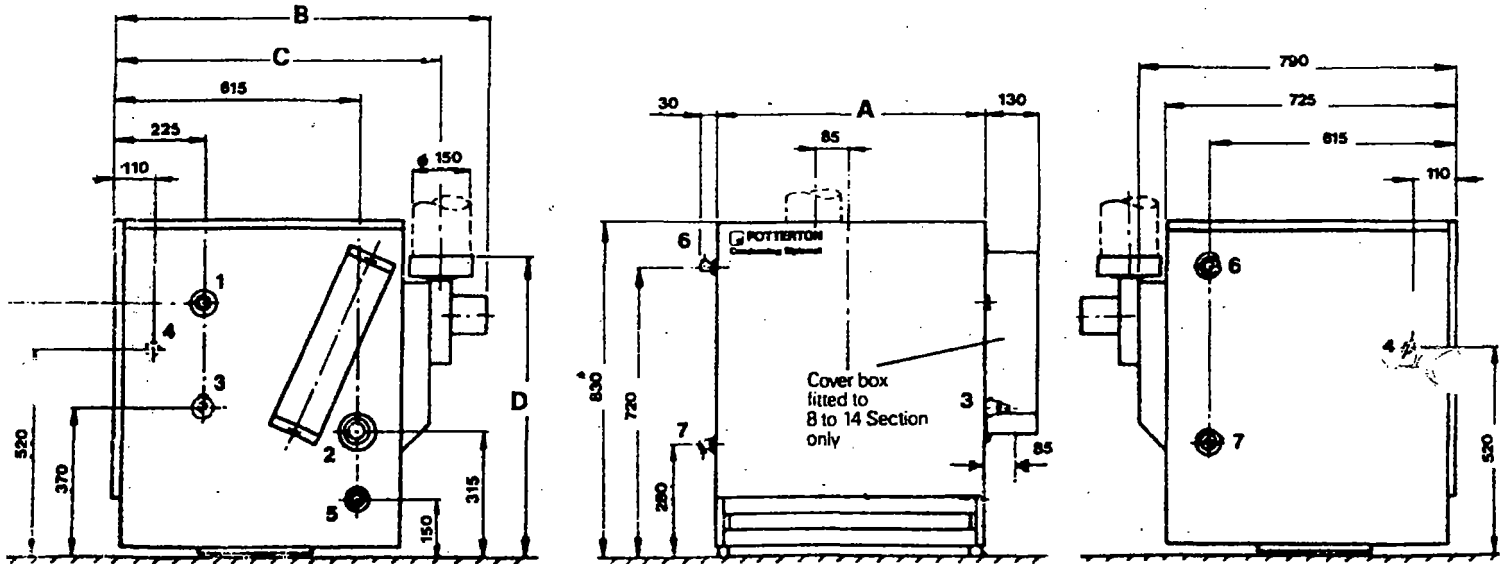
GAS-FIRED BOILER

**THIS BOILER IS FOR USE
WITH NATURAL GAS ONLY.**

PROVISIONAL DRAFT COPY ONLY

Section 1 - The Boiler.

Fig.1 General Dimensions.



Right hand side elevation

Front elevation

Left hand side elevation

Sections	8	10	12	14	16	18	20
Amm	572	696	820	944	1215	1275	1395
Bmm	940	940	945	945	1090	1090	1090
Cmm	818	818	821	821	850	850	850
Dmm	755	755	755	755	790	790	790

- 1. Flow
- 2. Return
- 3. Drain
- 4. Gas
- 5. Condensate drain

- 6. Vent $\frac{1}{2}$ " BSP - 8 to 14 sections as shown.
16 to 20 sections on right hand side.
- 7. Drain 8-14 section boilers only.

Table 1 Performance Details.

No. of Sections		8	10	12	14	16	18	20
Boiler Input	Kw	46.3	59.6	73.3	84.5	96.9	105.6	115.5
	Btu/hr x 1000	159	201	251	289	332	361	395
Boiler Output*	Kw	40	52	63	75	85	96	107
	Btu/hr x 1000	137	178	215	256	291	328	366
Gas Rate	M ³ /hr	4.3	5.6	6.7	8.0	9.1	10.3	11.5
	Ft ³ /hr	152	198	239	284	323	364	406
Flue gas Volume*	M ³ /hr	65	80	98	113	129.6	141.3	154.5
	Ft ³ /hr x 1000	2.3	2.8	3.5	4.0	4.6	5.0	5.5
Main Burner Pressure	Mbar	10.4	11.5	10.8	10.7	9.5	10.3	10.5
	In. w.g.	4.1	4.5	4.3	4.2	3.7	4.1	4.1
Pilot Burner Pressure	Mbar	-	-	-	-	N/A	N/A	N/A
	In. w.g.	-	-	-	-	N/A	N/A	N/A
Main Burner Injector Size	No. Off	5	6	7	9	11	12	14
	Ømm	2.50	2.50	2.60	2.50	2.50	2.50	2.50
Pilot Burner Injector Size	No. of	1	1	1	1	N/A	N/A	N/A
	2 Hole(s) Ømm	0.29	0.29	0.29	0.29	N/A	N/A	N/A
Pilot Input	Kw	0.24	0.24	0.24	0.24	Boiler lights direct on.		
	Btu/hr x 1000	819	819	819	819			

* Boiler outputs are based on a return water temperature of 60°C corresponding to an efficiency of 86.4% gross.

* Flue gas volumes are given at S.T.P. and a typical flue gas temperature at a return water temperature of 60°C is 70°C.

The Technical Department of Potterton Commercial Products Division should be consulted for guidance on the design of flues for Condensing boilers.

Table 2 - General Data.

no. of Sections		8	10	12	14	16	18	20
Flow Tappings	Position	See Figure 1						
	Size In. BSP	1½	1½	1½	1½	1½	1½	1½
Return Tappings	Position	See Figure 1						
	Size In. BSP	1½	1½	1½	1½	1½	1½	1½
Maximum Water Working Head	PSI	56	56	56	56	56	56	56
	Bar	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Gas Inlet Connection	Position	See Figure 1						
	Size In. BSP	½	¾	¾	¾	¾	¾	¾
Minimum Gas Inlet Pressure	mbar	17.5	17.5	17.5	17.5	17.5	17.5	17.5
	In. w.g.	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Electricity Supply		240V single phase AC/DC SA fuse and double pole isolator to be provided by installer						
Power Requirement	Watts	70	70	110	110	225	225	225
Nominal flue Size to BS 835mm		150	150	150	150	200	200	200
Flue Socket internal diameter	mm	190	190	190	190	240	240	240
	in.	7.5	7.5	7.5	7.5	9.5	9.5	9.5
High Level Ventilation	in ²	42	42	44	51	55	58	64
	CM ²	270	270	300	325	353	373	395
Low Level Ventilation	in ²	84	84	88	101	110	116	123
	CM ²	540	540	600	650	706	745	790
Dry Weight	lb.	350	422	500	561	631	702	772
	kg.	159	192	226	255	287	319	351
Water Content	Litre	17	22	27	32	39	44	49
	Gall.	3.8	4.9	6.0	7.1	8.6	9.8	10.9
Water Resistance	t 20°C mbar	74	93	114	140	83	107	133
	t 11°C mbar	244	307	376	462	274	353	439
Water Flow	t 20°C L/sec.	0.48	0.62	0.75	0.89	1.01	1.14	1.27
	t 11°C L/sec.	0.87	1.13	1.36	1.62	1.84	2.08	2.32
Maximum Flow Temperature	°C	90	90	90	90	90	90	90

General

Potterton Condensing Diplomat boilers are available in seven sizes with outputs ranging from 40 Kw (137,000 Btu/hr) to 107 Kw (366,000 Btu/hr). These outputs are based on a return water temperature of 60°C and a gross efficiency of 86.4%. For a return water temperature of 40°C the efficiency rises to 91.0% gross and the output correspondingly.

For ease of installation all boilers are delivered fully assembled with the casing and secondary heat exchanger fitted.

The boilers are delivered on a wooden pallet with a frame work of wood around them and are shrink wrapped over.

For sites with restricted access a fully assembled boiler with the casing and fan removed will pass through a 30" door.

The flow connections are made to the top right hand side of the boiler and the return connections to the bottom left hand side. Drain cocks, air vents and a condensate U trap are provided. The U trap is 32mm (1 1/4") and fits to the right hand side of the boiler.

The boiler sections are cast iron with fins to aid heat transfer and the sections are joined by steel nipples and are hydraulically assembled.

The secondary heat exchanger is manufactured from finned aluminium tube into steel headers. An integral fan is provided to overcome the additional resistance of the secondary heat exchanger and to assist with the evacuation of the flue products through the flue system in the absence of natural buoyancy, caused by low flue gas temperature.

The 8-14 section boilers have a thermoelectric control system based on a 24V multifunctional valve, permanent pilot and flame detection by thermocouple and overheat protection by a thermocouple interrupter.

The 16-20 section boilers have a fully electric control system utilising direct on ignition of main burners without a pilot, flame detection by an ionisation probe under the supervision of a control box.

The sections are insulated by fibre glass insulation and Rockwool and the case is finished in white.

Special Considerations for Condensing Boilers.

For a condensing boiler to condense, the following should be avoided:-

1. Water calorifiers and other heat exchangers which are likely to have high return water temperature.
2. Oversizing boilers - this will result in boilers cycling rapidly and high return water temperatures.
3. Large numbers of fan convectors - as when they switch off their fans a high return water temperature will result.
4. Undersized systems - which will not be able to transfer the heat to the environment and high return water temperatures may result.

The Applications Department of Potterton Commercial boilers (address given on back page) have written Technical Bulletin No.3 "Systems for Condensing Boilers" and will discuss applications and will be pleased to receive design schemes for consideration.

Installation

The installation should comply with relevant British Standard Specifications, Codes of Practice and current Building Regulations, together with any special regional requirements of the Local Authorities, Gas Region, and Insurance Company. All electrical wiring must comply with I.E.E. Regulations for the electrical equipment of buildings.

The installation of the boiler must be in accordance with the relevant requirements of the Gas Safety (Installation and Use) Regulations: 1984.

I.E.E. Regulations, Model Water Byelaws; Local Water Authority Byelaws. It should also comply with any relevant requirements of the local gas region, local authority and the relevant British Standard Codes of Practice.
CP331:3 Low Pressure Installation Pipes, BS 6644:1986
Installation of Gas Fired Boilers, CP341:300-307 Central Heating by Low Pressure Hot Water.
CP342:2 Centralized Hot Water Supply.
British Gas publications: IM/11 Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters.
Manufacturers notes must not be taken, in any way, as overriding statutory obligations.

Clearances.

minimum clearances required for access, erection and maintenance are:-

- Front - 500mm to withdraw burner bars.
- Top - 600mm to clean flue ways.
- Sides - 130mm.
- Rear - 660mm to commission fan.

Power Requirements.

See Table 2 General Data, Page 4.

Boiler Base.

level floor capable of supporting the weight given in Table 2 must be provided. The boiler base must be of a fireproof material and it is recommended that the boiler be mounted on a plinth 50mm (2") high and 75mm larger than the plan area of the boiler. The base or plinth need not be insulated and the gas train is not supported by the base or plinth.

Electrical Supply

The electrical supply should be 240 Volt 50Hz single phase and must be connected to the boiler through a suitable isolating switch and a 5 Amp fuse. All on site wiring shall conform to I.E.E. regulations and the local authority requirements.

Ventilation

Safe, efficient and trouble-free operation of conventionally fuelled gas boilers is vitally dependent on the provision of an adequate supply of fresh air to the room in which the appliance is installed. Ventilation, by grilles communicating directly with the outside air, is required at both high and low levels.

Minimum free area of the grilles for a single boiler are given in table 2 and are based on:-

- low-level (inlet) 540 cm² plus 4.5 cm² per kilowatt in excess of 60 kW total rated input
- high-level (outlet) 270 cm² plus 2.25 cm² per kilowatt in excess of 60 kW total rated input

Position ventilation grilles to avoid the risk of accidental obstruction by blockage or flooding.

If further guidance on ventilation is required consult BS 6644 and the British Gas Guidance notes.

AIR SUPPLY BY MECHANICAL VENTILATION

The supply of air to a space housing the boiler 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 BS 6644 and the British Gas Guidance notes for Boiler Installation in excess of 2 000 000 Btu/h (586kW) output.

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.

IMPORTANT

The use of an extractor fan in the same room as the boiler (or in an adjacent room in communication) can, in certain conditions, adversely affect the safe operation of the boiler. Where such a fan is already fitted (or if it is intended to fit an extractor fan after installation of the appliance) the advice of the Gas Region should be obtained. Tests for spillage of products from the draught diverter when the extractor fan is running and all doors and windows are shut should be carried out after installation. If spillage be detected, the area of permanent ventilation must be increased.

Water Circulation Systems

The Condensing Dipomat is suitable for INDIRECT fully pumped systems only.

The water circulation system should be installed in accordance with the relevant parts of British Standard Codes of Practice CP 332.2 and CP 342.

Volume flow and pressure drop across the boiler at 11 and 20°C are given in Table 2.

The maximum and minimum working head are 3.5 bar (112 ft. w.g.) and 0.3 bar (9.5 ft. w.g.).

The maximum and minimum temperature differential across the boiler are 35 and 10°C and the minimum return water temperature 35°C.

The boiler flow and return connection sizes are given in Table 2 and the flow connection is made to the front left hand side and the return connection to the bottom right hand side.

It is generally recommended that a minimum flow of 10% of that required for an 11°C temperature differential be maintained through the boiler at all times to keep the thermostats active, remove residual heat and prevent sediment dropping out when the boiler is not firing.

The provision of pump overrun either by a time delay system or a thermostat situated in the flow pipe close to the boiler should be considered.

All systems should be thoroughly flushed before boilers are connected and consideration should be given to the fitting of sludge traps and strainers. Cleaning systems with descaling agents is not generally recommended as, if incorrectly used, the scale and deposits may continue to break up after the system has been flushed and the boiler installed.

There is a basic need to treat the water contained in all heating and indirect water systems, particularly in hard water areas, areas of excessive salinity and open systems generally.

The advice of reputable Water Treatment Specialists should be sought and consideration given to supplying flow meters on water make up systems.

The boiler and the system should be protected by suitable frost thermostats and pressure relief valves.

Unions and isolating valves should be fitted to the flow and return manifolds so that the boiler can be isolated from the system if the need arises.

Pump Overrun

On 8-14 section boilers a pump overrun of 15 minutes is available from the main circuit board see Fig 15 page 23.

The pump contactor should be connected to terminals 1 and neutral (N) where a 240 V single phase 150 mA current is available.

FLUE SYSTEM

Flue gases leaving the boiler will be at a maximum of 10°C above the return water temperature. Flue gas temperatures are therefore unlikely to be greater than 85°C and under most conditions will be saturated with condense droplets. As the boiler is fitted with a fan some overpressure is available to overcome flue resistance.

The flue system should therefore be constructed in corrosion resistant material such as stainless steel or aluminium. Joints should be capable of withstanding slight positive pressure and be water tight. All low points should be fitted with drain points with traps of at least 25mm ID and frost protected where necessary. No part of the flue system should be allowed to collect or trap condensate without being fitted with a suitable drain.

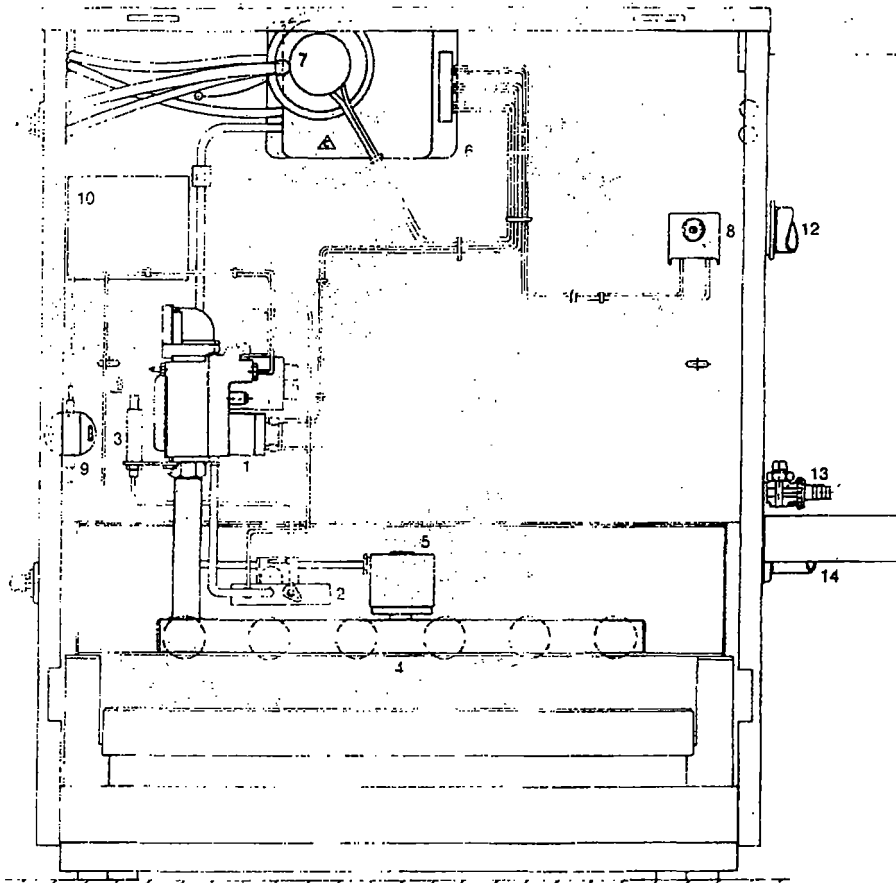
Flue pipe must be installed to a minimum angle of 3° to allow for free drainage.

Table three offers flue sizes, for single systems utilising Six Systems on smooth walled flue materials.

The use of corrugated type flexible liners are not recommended where the flues are to be angled to less than 45° to the horizontal as condensate may be trapped. The flexible liner manufacturer should be consulted as to the suitability for this application. Note also that Table 3 cannot be used for flexible liners.

Where it is proposed to use flue systems which are not covered by Table 3 or where common flue systems are anticipated, advice should be sought from the Applications Department of PIL, address as given at the back page of this manual.

Fig.2 General Arrangement, 8-14 Sections.

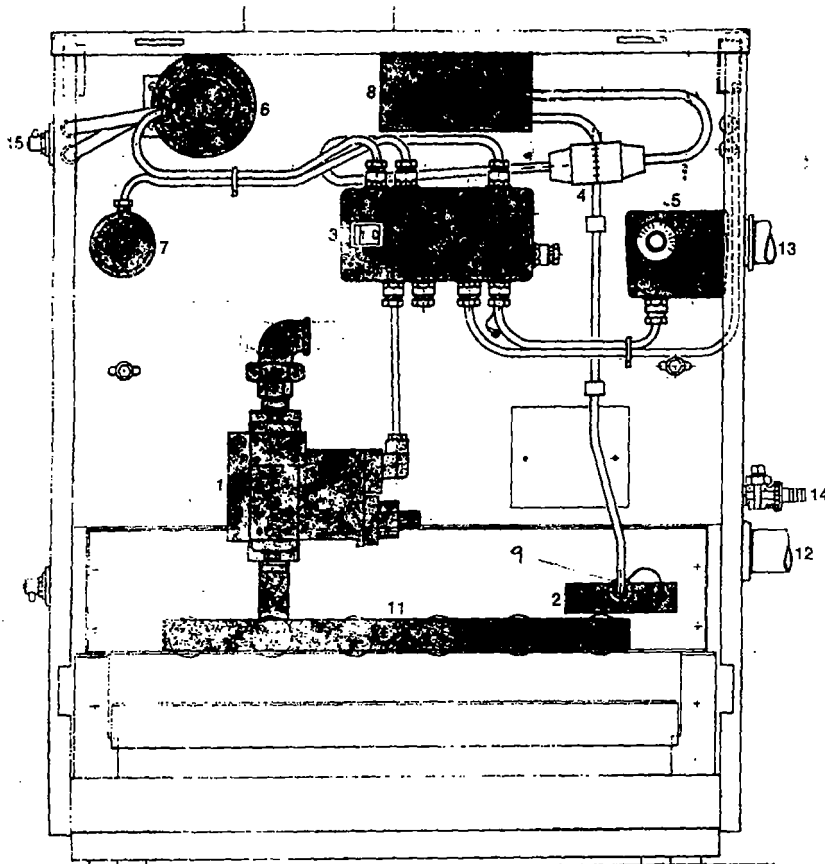


Parts List

PTL Part No.

1. Honeywell multifunctional control valve 1/2 8 sections 24V.	358215
1. Honeywell multifunctional control valve 3/4" 10-14 sections 24V	-
2. Polydoro type 511 pilot burner	358216
3. Piezo ignitor Honeywell Q365.	-
4. Burner assembly	358204
5. Huba gas pressure switch type 620.9100	358024
6. Junction box	-
7. Huba fan air differential pressure switch type 602.99042	358206
8. Boiler thermostat Honeywell Aquastat 30-90°C L4188A/10041	-
9. Overheat cut off device Honeywell LS8097A	357382
10. Data plate	358020
11. Air vent	-
12. Flow connection	358021
13. Drain cock 1/2" BSP 8-10 sections	-
14. Drain cock 1/4" BSP 12-20 sections	358143
15. Transformer 240-220V AC	-
16. Honeywell Q309 thermocouple (8. section 450mm)	358234
17. Honeywell Q309 thermocouple (10-14 section 600mm)	358028
18. Ignition electrode	358220
19. Pilot injector 2 holes Ø 0.29mm	358026
20. Overheat cut off device connection wires	358027
21. Main burner injector Ø 2.50mm	358031
22. Main burner injector Ø 2.60mm	358029
23. Ignition electrode lead	358217
24. Fuse 220V 800 mA	358046
25. Fuse 24V 630 mA	358218
26. Transformer 220V-24V	358219
27. Fan motor 8-10 sections 220V ITT RL 133/0027 AI - EMK 41 22/2	358235
29. Fan motor 12-14 sections 220V ITT RL133/0034 AI - EMK 4320/2	358221

Fig.3 General Arrangement 16-20 sections.



Parts List

PIL Part No.

1. Dungs MBDLE 405 B03 220V gas valve	358223
2. Ignition/ionisation assembly	358224
3. On/off switch Acro electric	358023
4. Amphenol connector	358225
5. Landis and Gyr combined thermostat ic box RAZ 14/2583	358226
6. Huba 602.99042 fan air differential pressure switch	357382
7. Water level sensor, Huba 625.95.42	358227
8. Dungs DGAI.36P 220V control box	358228
9. Spark generator/ionisation device Dungs DZUZ	358229
10. Transformer 240 - 220 V AC	358220
11. Burner assembly	-
12. Return connection 1 $\frac{1}{4}$ " BSP	-
13. Flow connection 1 $\frac{1}{4}$ " BSP	-
14. Drain cock $\frac{3}{4}$ " BSP	358028
15. Air vent	358143
16. Ignition/ionisation electrode	358230
17. Control thermostat 35-95 $^{\circ}$ C RA2 14/2583.A	358231
18. High limit thermostat 95-110 (-6) RAZ 14/2583.8	358232
19. Main burner injector \varnothing 2.50mm (16-20 sections)	358029
20. Fan motor Elektor E05/5986 220V	358233

Fig. 4 Condensing Diplomat Feet 8-14 Sections.

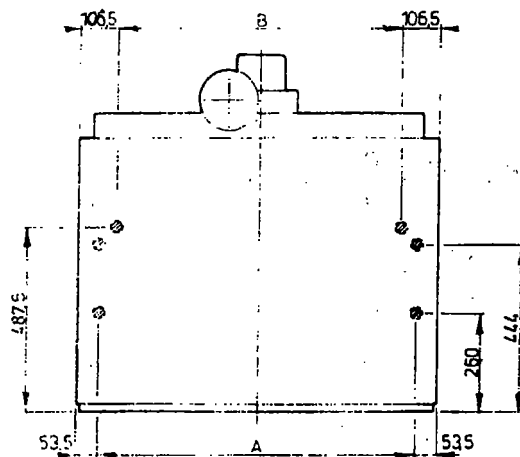
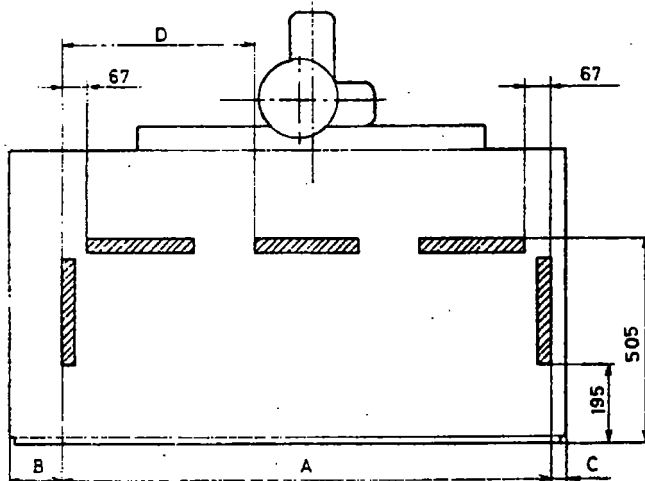
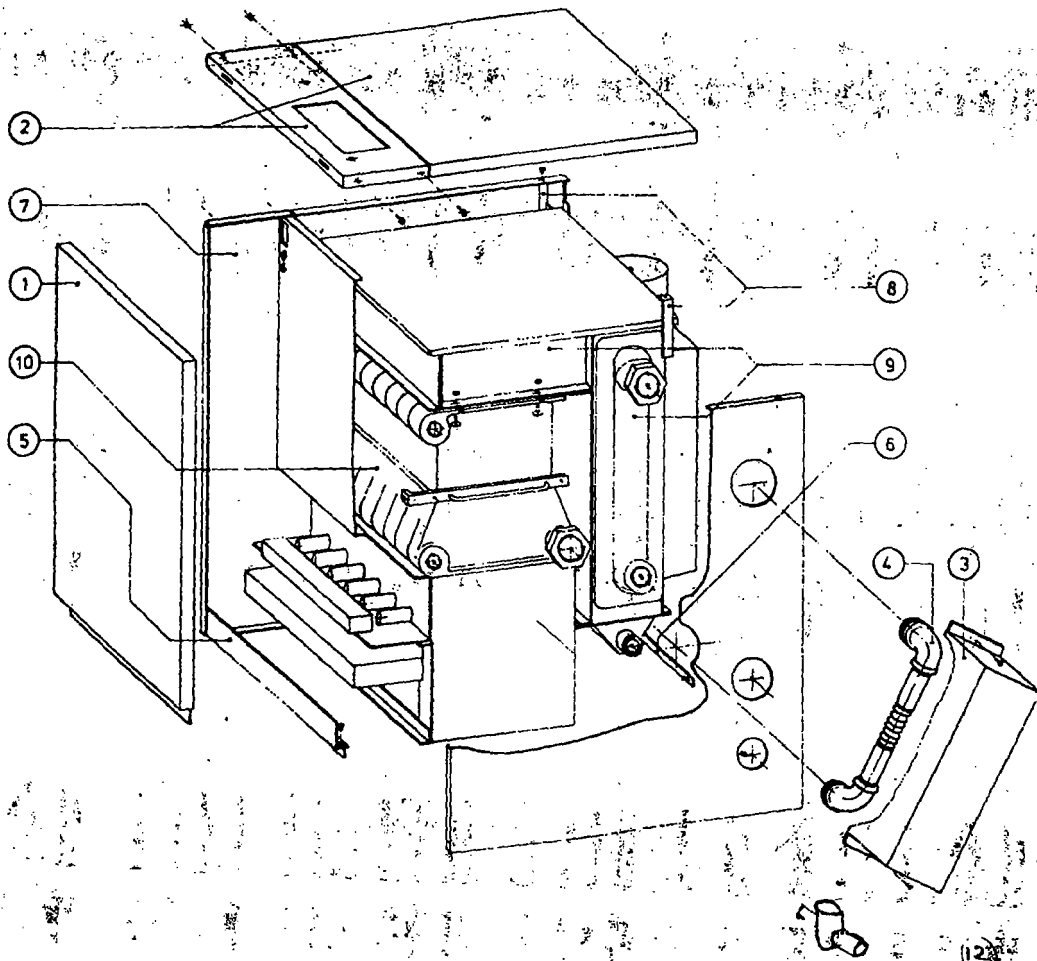


Fig. 5 Condensing Diplomat Feet 16-20 Sections.



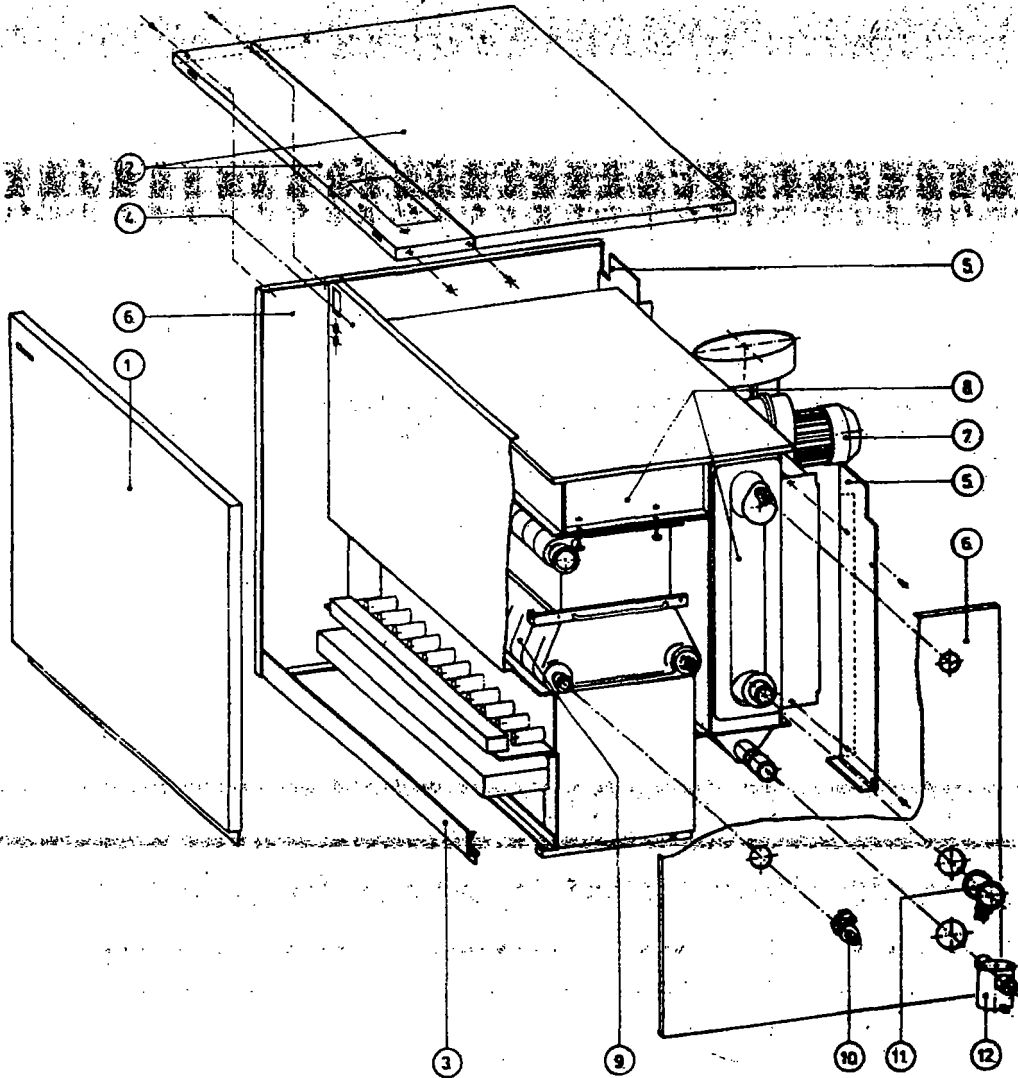
Sections	A	B	C	D
8	465	359	-	-
10	589	483	-	-
12	713	607	-	-
14	837	731	-	-
16	982	182	51	358
18	1104	135	36	420
20	1224	135	36	480

Fig.6 General arrangement of casing 8-14 sections.



1. Front door panel.
2. Top panel (two piece).
3. Cover for waterway interconnection.
4. Waterway interconnection pipe.
5. Front door mounting strip.
6. Rear tie strip.
7. Left hand side panel.
8. Side panel fixing brackets.
9. Secondary heat exchanger and flue hood.
10. Primary cast iron heat exchanger.
11. Inner front panel.
12. Condensate U trap.

Fig. 7 General arrangement of casing 16-20 sections.



1. Front door panel.
2. Top panel (two piece).
3. Front door mounting strip.
4. Inner front panel.
5. Side panel fixing brackets.
6. Right hand side panel.
7. Fan motor.
8. Secondary heat exchanger and flue hood.
9. Primary cast iron heat exchanger.
10. Drain cock.
11. Air vent.
12. Condensate U trap.

Fig. 8 CO₂ measuring point and fan commissioning flap.

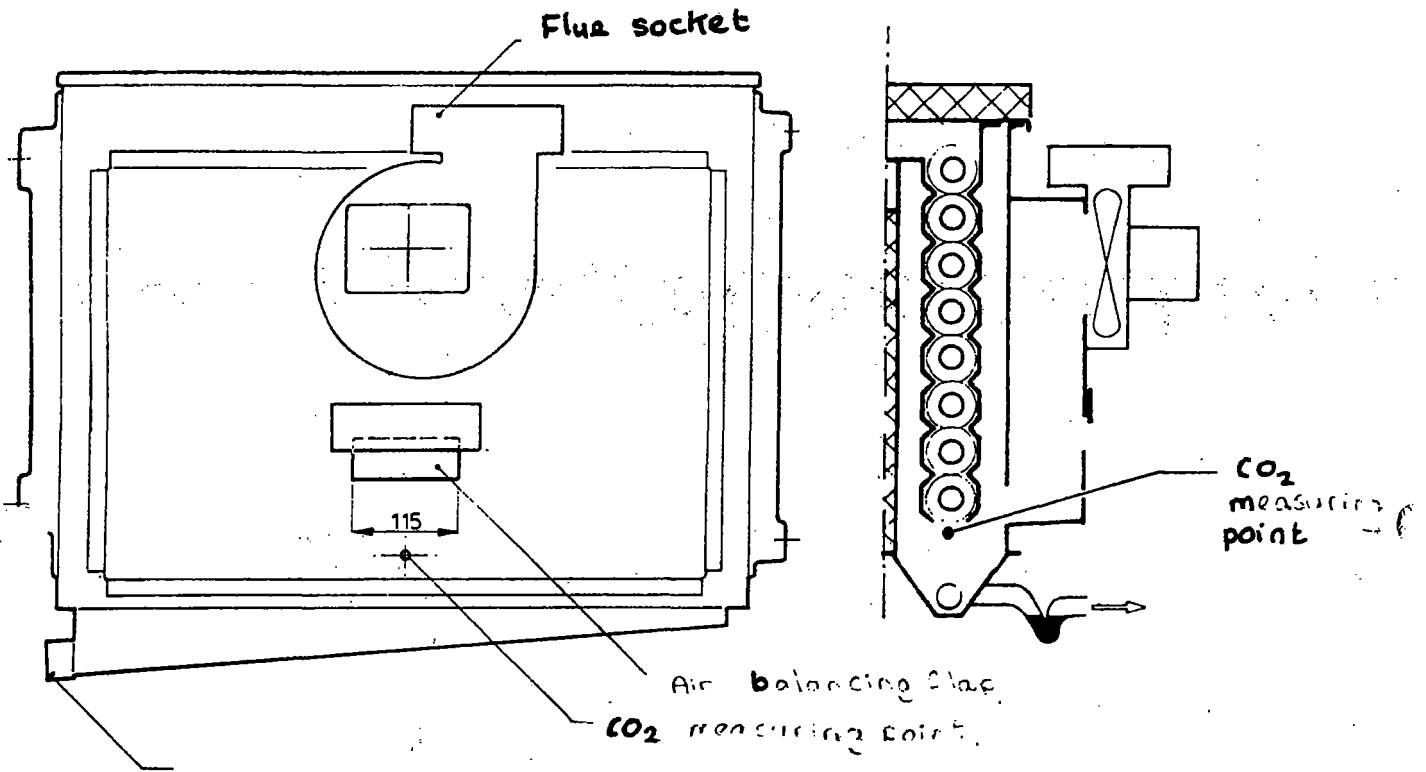


Fig. 9 Multifunctional control valve 8 section boiler.

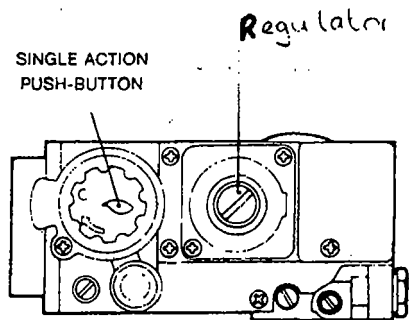


Fig. 10 Multifunctional Control Valve 10-14 Sections

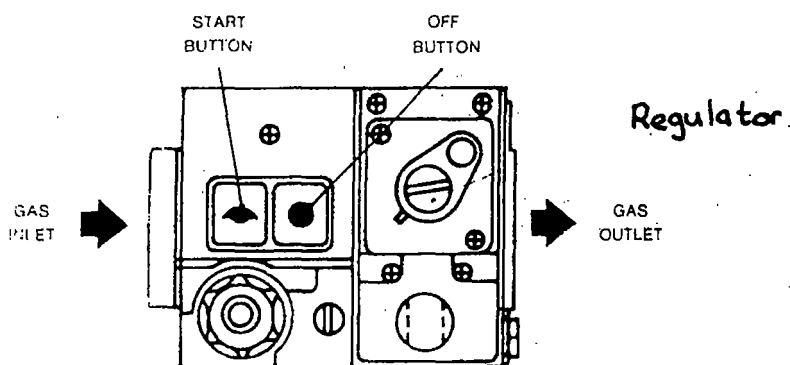


Fig. 11 Multiblock valve 16-20 Sections

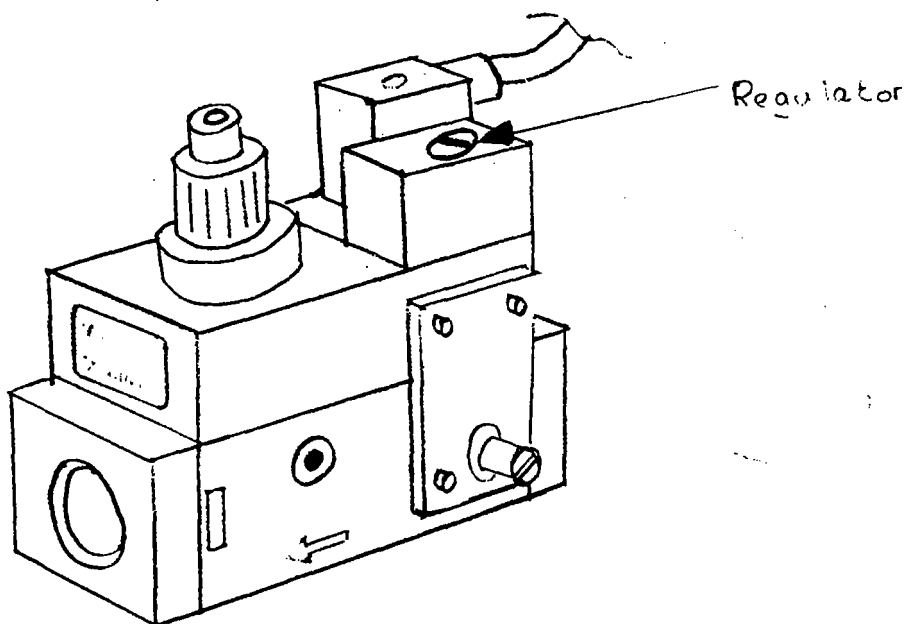


Fig. 12 Sparge Pipe 8-14 Sections

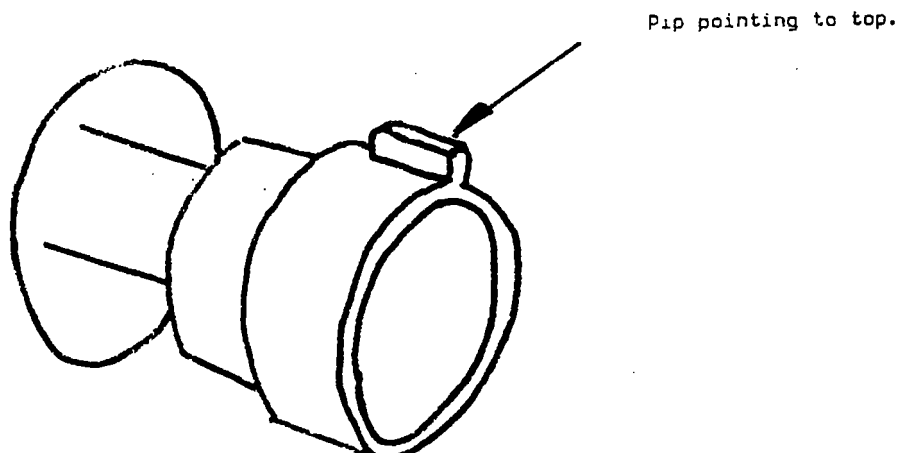


Fig. 13 Pilot assembly 8-14 sections.

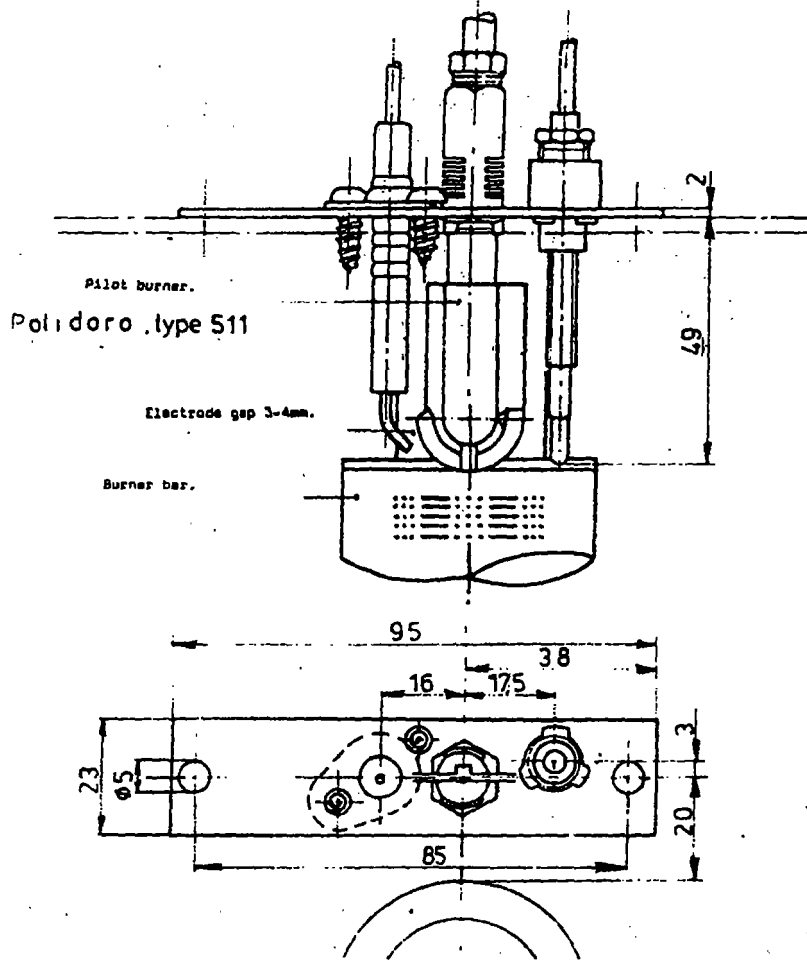
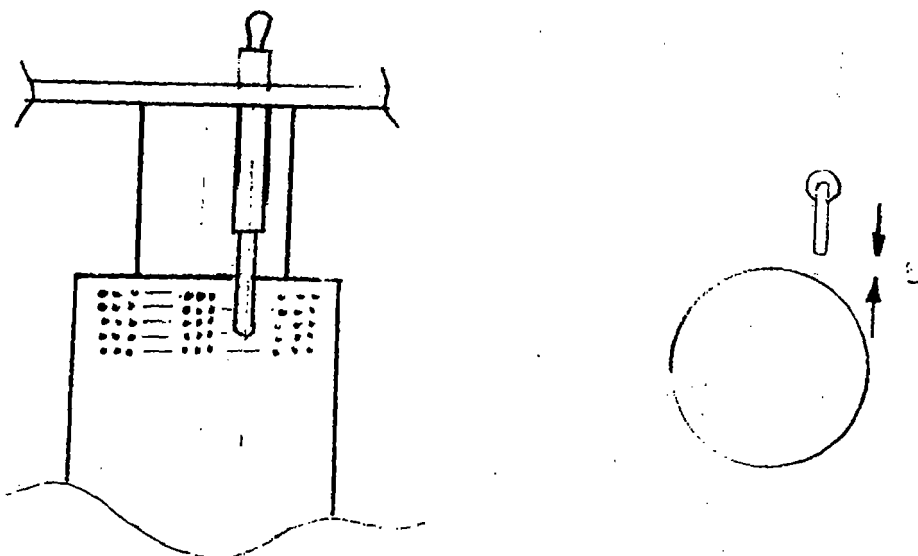


Fig. 14 Ignition Ionisation Electrode Assembly 16-20 sections.



INSTALLATION INSTRUCTIONS

General

Please check the Installation and Clearances requirements given on Page 5 to 6.

The boiler is delivered fully assembled with casing fitted. To remove the boiler from its wooden pallet remove the casing as illustrated in Fig. 6 for 9-14 section boilers and Fig. 7 for 16-20 section boilers, then remove the 4 screws securing the boiler to the wooden pallet.

The boiler may be lifted by the carrying handles on the cast iron sections to its position.

The boiler is supported on its wooden pallet by 6 plastic feet for the 9-14 section and 5 plastic strips for the 16-20 section model.

Their feet should be positioned as shown in Fig. 4 for the 9-14 section boilers and Fig. 5 for 16-20 section boilers on the boiler base and the boiler positioned on them.

Replace the casing. The casing is protected by shrink wrap plastic and this should be peeled off before the installation is handed over.

Flue

The flue adaptor socket on top of the integral fan is non load bearing and the flue system should be supported independently.

The flue system should be fitted into the adaptor socket provided and the joints made good against the slight over pressure of the flue system and against the condensate.

Electrical Connections

All electrical wiring must be installed in accordance with I.E.E. Regulations. Care must be taken that all wiring is kept clear of sharp edges and hot surfaces.

An isolator and 5A fuse should be installed close to the boiler.

The incoming electrical connections should be made through the conduit provided on the left or right hand side of the boiler running from front to back.

The 240V AC single phase supply should be made into the diecast junction box containing the 240V to 220V transformer via the cable grommet.

Access to the junction box is made by removing the screws holding the lid in position.

A wiring diagram is fixed to the back of the front door and is also included in this manual.

Gas Connection

A gas cock should be provided by the installer and installed close to the boiler in an easily accessible position. It is recommended that a union be provided between the gas cock and boiler so that the boiler may be disconnected from the gas supply if ever needed.

A union should be fitted at the connection to the main gas valve.

Water Connections

The flow and return connections are made on the right hand side of the boiler.

On the 8 to 14 and 16 to 20 section boilers the return connection is made to a 1½" BSP male connection.

The 8 to 14 section boilers contain one sparge pipe in the primary heat exchanger and the 16-20 section contains two. Care should be taken regarding the correct positioning of these if sections are ever replaced. See Page Section Replacement.

Unions and isolating valves should be provided by the installer to isolate the boiler from the system if ever required.



The drain cock and air vents provided should be fitted as shown in Fig. 6 and 7.

Condensate Drain.

The U trap provided must be fitted to the connection shown in Fig. 6 and 7 and connected to a permanent drain in a frost free position.

The fitting of a Tundish between the U trap and the drain is recommended and the U trap should be filled with water at the commissioning stage.

Commissioning.

- 1.0 To light boiler, 8-14 sections.
 - 1.1 After having removed the front casing panel check that the electricity supply to the boiler is off, the on/off switch is off and that the boiler thermostat is at its lowest setting.
 - 1.2 Check that ancillary controls such as time clocks and external thermostats are off or at their lowest settings.
 - 1.3 Ensure that the gas supply to the boiler is on.
 - 1.4 On 9 section model press in the round button marked , press the Piezo igniter two or three times to light the pilot. Hold the button fully pushed in for 20 seconds after the pilot has lit, then release the button and check that the pilot remains alight.
 - 1.5 For 10 to 20 section models, press in the square button marked  and press the Piezo igniter two or three times to light the pilot. Hold the button in for 20 seconds after the pilot has lit, then release the button and check that the pilot remains alight.
 - 1.6 When the pilot is alight turn on the electricity supply, on/off switch, time clock, external thermostats and turn the boiler thermostat to its required setting. The boiler will now light.
 - 1.7 Refit the boiler front casing.
- WARNING** - If the pilot light is extinguished either intentionally or unintentionally, no attempt should be made to relight the gas until at least 3 minutes have elapsed.
- 1.8 To light boiler, 16-20 sections.
 - 1.9 After having removed the front casing panel check that the on/off switch is off.
 - 1.10 Check that the gas supply is turned on at the gas cock.
 - 1.11 Check that the electricity supply is turned on and that all external controls, e.g. time clocks etc., are turned on.
 - 1.12 Turn ON the on/off switch and the boiler will now light. Check that the control thermostat is at the required setting.
 - 1.13 Replace the front casing panel.

1.14 Boiler Fails To Light.


- 1.15 If the boiler fails to light and the red lock out light is lit on the control box reset by pressing it.

- 1.16 If the control box again locks out switch off as for "Long Periods" and seek qualified help.

2.0 To shut down Boiler, 8-14 Section Boilers.

- 2.1 Temporarily - turn the electricity supply off at the isolator fitted near to the boiler by the installer. To bring the boiler back on again turn on the electricity supply at the isolator.

- 2.2 Long periods - turn off the electricity supply at the isolator provided by the installer and turn off the time clock and any external controls.

On 8 section model turn the round button marked  on the gas valve anti clockwise and the pilot will go out. Turn off the gas supply at the gas cock.

On 10-14 section models push the square off button marked 'O' on the gas valve and the pilot will go out. Turn off the gas supply at the gas cock.

3.0 To shut down boiler, 16-20 Sections.

- 3.1 Temporarily - Turn the on/off switch off and the electrical supply at the isolator provided by the installer.

- 3.2 Long periods - as for temporary shut down but in addition turn off the gas supply at the gas cock.

Final Adjustment

Main Burner

Fit a pressure test gauge to the outlet pressure test nipple on the valve as shown in Figs. 9, 10 and 11.

Check that the main burner pressure is as given in table 1 and if necessary adjust the pressure regulator, the position of the adjustor is shown in Figs. 9, 10 and 11.

Pilot Burner, 8-14 Sections.

Ignition Device, 16-20 Sections.

The 16-20 section boilers do not have a separate pilot burner and ignition is direct on.

The combined ignition/ionisation electrode should be as illustrated in Fig. 14.

Thermostats.

Boiler Thermostat, 8-14 Sections.

This is a Honeywell Aquastat range 30-90°C.

The thermostat has been calibrated by the manufacturers and no attempt should be made to recalibrate it on site.

When the boiler reaches a suitable temperature turn it to a lower setting to check that the main burner shuts down.

Overheat Cut Off Device, 8-14 Sections.

This is a Honeywell LS 9087A which acts as a thermocouple interrupter.

It has been set to 98°C and when this temperature is reached it shuts down the pilot and the boiler will not operate until the pilot has been relit.

Before relighting the pilot investigate the cause of the overheat cut-off device tripping and rectify any fault.

Combined Thermostat, 16-20 Sections.

This is a combined control and high limit thermostat with a range of 30-95°C. This thermostat has been calibrated by the manufacturers and no attempt should be made to recalibrate it on site.

Commissioning Combustion.

To obtain the most efficient use of the boiler the fan must be commissioned to match the flue system.

Check that the condensate drain is full and not allowing air to pass into the secondary heat exchanger.

Switch the boiler on and allow to warm up for 30 minutes or come to the designed operating conditions. Check the burner pressure and gas rate as described under "Final Adjustment of Main Burner".

Measure the CO₂ at the measuring point as shown in Fig. 8. The CO₂ should be 8.0%.

To increase the CO₂ open the balancing flap and to decrease the CO₂ close the flap.

Commissioning the Fan Differential/Air Pressure Switch.

With the boiler switched off remove the two plastic pipes to the pressure switch and check that the boiler will close down when air pressure is not detected during light up.

Replace the plastic pipes as taken off and light the boiler normally. Remove both plastic pipes from the air pressure switch and check that the boiler closes down. Replace the two plastic pipes as taken off.

Commissioning the Gas Pressure Switch 8-14 Sections Only.

The gas pressure switch is a safety feature to ensure that the fan runs at all times when there is gas pressure in the burner manifold.

With the boiler switched off at the isolator remove the two screws securing the pressure switch terminal cover.

Using a multimeter measure the voltage between terminal 2 and a suitable neutral. Switch the boiler on and terminal 2 should change from 240V AC to 0 V AC as the gas pressure detected in the manifold changes the contacts over.

Replace the gas pressure switch terminal cover.

WARNING

Always isolate the electrical supply and the gas supply to the boiler before commencing maintenance.

Always replace the electrical junction box cover after maintenance.

Check the gas assembly for leaks with a soap solution after installation and every service visit.

Maintenance

To Clean the Cast Iron Heat Exchanger and Burners - All Sizes.

Remove the front casing cover, the bottom strip secured by two screws and the top casing panel.

Remove the plastic terminal cover on the main gas valve secured by screws and disconnect the electrical supply made by push on connections. Disconnect the overheat cut-off device by removing the two push on connections from it.

Release the gas line union connected to the main gas valve.

Remove the Tap Tite screws securing the burner assembly and withdraw it.

Remove the Rockwool covering the flue hood clean out cover and unscrew the screws, securing it and remove the cover without damaging the seal.

Clean the flueways from the top and bottom with a brush and sweep away the debris from the bottom of the combustion chamber.

Replace the flue hood cover taking care to position it on the seal and secure it adequately. Replace the Rockwool insulation cover.

While the burner assembly is removed from the boiler check the condition of the burner front plate insulation and replace if necessary.

Check the condition of the Vermiculite blocks lining the combustion chamber and replace if necessary.

Lightly brush the burners and remove any fluff which may have accumulated.

Inspect thermocouple, ignition electrode and pilot burner head. See Fig. for correct position of thermocouple and ignition electrode.

Replace burner assembly taking care not to damage Vermiculite lining and refit Tap Tite screws.

Reconnect gas line, thermocouple interrupter and electrical connection to valve.

Check for gas soundness and operation of thermostats as described earlier.

Refit the casing.

To Clean the Secondary Heat Exchanger.

Remove the flue hood clean out cover as above.

Check that the condensate U trap is operational and not blocked.

Remove the baffle from the secondary heat exchanger and hose down the secondary heat exchanger with water.

Flue brushes and cleaning chemicals should not be used.

Replace the flue baffle, refit the flue hood clean out cover and the casing panels.

Overheat Cut-off Device Replacement
8-14 SECTIONS ONLY

Remove the front casing panel, front bottom strip secured by two screws, top panel and left hand side panel.

Remove the thermostat phial from its pocket and disconnect the two wires which are connected to "cut-off" device by push on connections.

Remove the screw securing the cut-off device and replace it. Position the new phial on the thermostat pocket taking care to secure it with the retaining clip. Reconnect the two wires to the "cut-off" device.

Replace the casing panels.

Boiler Thermostat Replacement
8-14 SECTIONS ONLY

Remove the front casing panel and unscrew the plastic cover plate on the front of the thermostat body and disconnect the electrical connections. Remove the electrical wire through the cable entry gland.

Remove the top casing panel and release the screw securing the thermostat body to the head of the thermostat pocket.

Refit a new thermostat, secure to the thermostat pocket, remake the electrical connection, tighten up the cable entry gland and refit the plastic cover over the connections.

Check the operation of the thermostat as described under Commissioning and refit the casing panels.

Combined Thermostat Replacement,
15-20 Sections.

To replace a single thermostat release the front cover by removing the two screws to reveal the two thermostat bodies.

Disconnect the electrical connections from the appropriate thermostat.

Remove the top casing panel and release the screw securing the thermostat body the head of the thermostat pocket.

Remove the combined thermostat phials, release the two screws securing the thermostat body to the thermostat housing and replace the thermostat and refit as the reverse of the above.

Check the operation of the thermostat as described under Commissioning and refit the casing.

On/Off Switch Replacement

Remove the front casing panel and the front of the junction box which is secured by screws. Disconnect the push on connectors to the switch. Push the body of the switch through the junction box lid and replace with a new one and reconnect the push on connectors.

Relight the boiler and check that the switch closes down the main burner and that down is the 'ON' position.

Pilot Assembly, Thermocouple/Ignition Electrode Replacement, 8-14 Sections.

Remove the burner assembly as detailed under "Cleaning" and disconnect the pilot line from the pilot burner taking care not to lose the injector.

Remove the two screws securing the pilot burner to the burner assembly and replace with a new pilot assembly if necessary.

To remove the thermocouple above unscrew the thermocouple head from the pilot burner and the thermocouple connection from the main gas valve and replace.

To remove the ignition electrode unscrew the two screws securing the electrode and replace if necessary.

Replace the pilot assembly and secure with the two screws.

Reconnect the pilot line taking care to make sure the pilot injector is included.

Check the position of the pilot burner, thermocouple and electrode as given in Fig. 13.

Replace burner assembly, check for gas soundness and adjust the pilot rate as described under "Commissioning".

Main Gas Valve Replacement, 8-14 Sections.

Remove the burner assembly as described under "Cleaning".

Release pilot line, the thermocouple and the two thermocouple interrupter wires from the valve.

Release the eight screws securing the valve to its flanges and replace with a new valve using new O seals.

Reassemble the thermocouple, the pilot line and the thermocouple interrupter wires.

Replace the burner assembly, relight the burner, check for gas soundness and recommission the main burner and pilot as described under Commissioning.

Main Gas Valve Replacement,
6-20 Sections.

The multiblock gas valve is fitted with quick release flanges which seal with "O" rings.

Remove the electrical connection to the valve by removing the screw through the electrical connection cap.

Remove the valve by releasing the four nuts holding the quick release flanges and replace the valve using new "O" rings.

Replace the electrical connection cap and test for gas soundness.

Secondary Heat Exchanger Replacement.

Remove the casing and the flue hood clean out cover and release the fan pressure sensing pipes by undoing the back nuts.

Remove the insulation and interconnecting flexible pipes between the secondary heat exchanger and cast iron sections.

Disconnect the electrical supply to the fan and the condensate drain.

The flue hood and secondary heat exchanger are fastened to the cast iron sections by four bolts and these should be released.

The secondary heat exchanger is supported by a bracket at the rear and the heat exchanger and flue hood can be lifted away.

Reassembly as the reverse of the above procedure, refit the casing and insulation and recommission the boiler.

Section Replacement.

Remove the casing and the secondary heat exchanger as described previously.

Each section is joined together on the waterside by steel push nipples and strips of Tapperril sealing mastic between the sections to form a gas tight seal. Tapperril is also used to seal the flue hood to the top of the heat exchanger and fire cement is used to seal the sections to the combustion chamber.

The sections are held to the combustion chamber by four Taprite screws passing through lugs at the base of the section into fixing brackets on the combustion chamber.

The flue hood and draught diverter are fixed to the cast iron sections by bolts and washers securing the flue hood to lugs on the top of the sections.

If a section leaks, the boiler must be drained down and the heat exchanger containing the leaking section removed.

To do this the casing must be stripped away, the insulation and the flue hood.

When the heat exchanger is removed check the burners and combustion chamber Vermiculite lining for damage and replace as necessary.

Once the heat exchanger is removed, remove the sparge pipe on the 9 section model and the two sparge pipes on the 10-20 section models. Remove all plugs and the thermostat pocket.

Remove the two tie rods holding the sections together. The sections can be split by inserting a sharp chisel between the sections and carefully easing apart.

When reassembling use new nipples, clean the nipple ports with wire wool and use a proprietary jointing compound. Fit new strips of Tapperril jointing mastic along the edges of the section.

Fit the sections together and pass three tie through the sections. Use the tie rods to pull up the sections evenly, refit the two tie rods. At this stage the block of sections should be pressure tested to $1\frac{1}{2}$ times the operating pressure.

Refit the thermostat pocket, plugs and sparge pipes using a proprietary jointing compound.

On the 9-14 sections the pip on the $1\frac{1}{2}$ " BSP female socket should point upwards.

On the 16-20 section models the holes in the sparge pipes should be positioned so as to direct the water flow up into the legs of the section. Mark the sparge pipes so that it is possible to ensure that they are fitted with the holes in the correct position.

Refit the heat exchanger to the combustion chamber using new fire cement. Refit the flue hood to the heat exchanger using new strips of Tapperril jointing mastic.

Refit the insulation and the casing panels and recommission the boiler.

To Replace Fan Motor and Impellor

- Remove the motor terminal block cover and disconnect the electrical connections.
1. Remove the four taptite screws securing the motor mounting flange. The motor and impellor are balanced and they must be replaced together with the mounting flange.
 2. Refit a new fan/motor assembly as the reverse of the above and remake the electrical connections and refit the terminal block cover.
 3. The combustion performance of the boiler must be recommissioned and the fan pressure switch reset.

Fan Pressure Switch Replacement

1. Remove the terminal cover from the pressure switch, disconnect the push on female connectors and remove the connection wire through the cable gland.
2. Remove the two plastic pipes from the pressure switch.
3. Remove the two screws securing the pressure switch mounting bracket to the front inner panel.
4. Release the pressure switch from the mounting bracket.
5. Refit a new pressure switch as the reverse of the above and set the new switch.

To set a new Fan Pressure Switch.

1. Remove the terminal cover from the pressure switch.
2. Light the boiler from cold.
3. Turn the adjustor screw marked and in the plus direction until the boiler loses down.
4. Turn the adjustor back $\frac{1}{8}$ of a turn or until the boiler will light and run satisfactorily.
5. Replace the terminal cover.

FIG. 15 CONDENSING DIPLOMAT WIRING DIAGRAM, 8-14 SECTIONS.

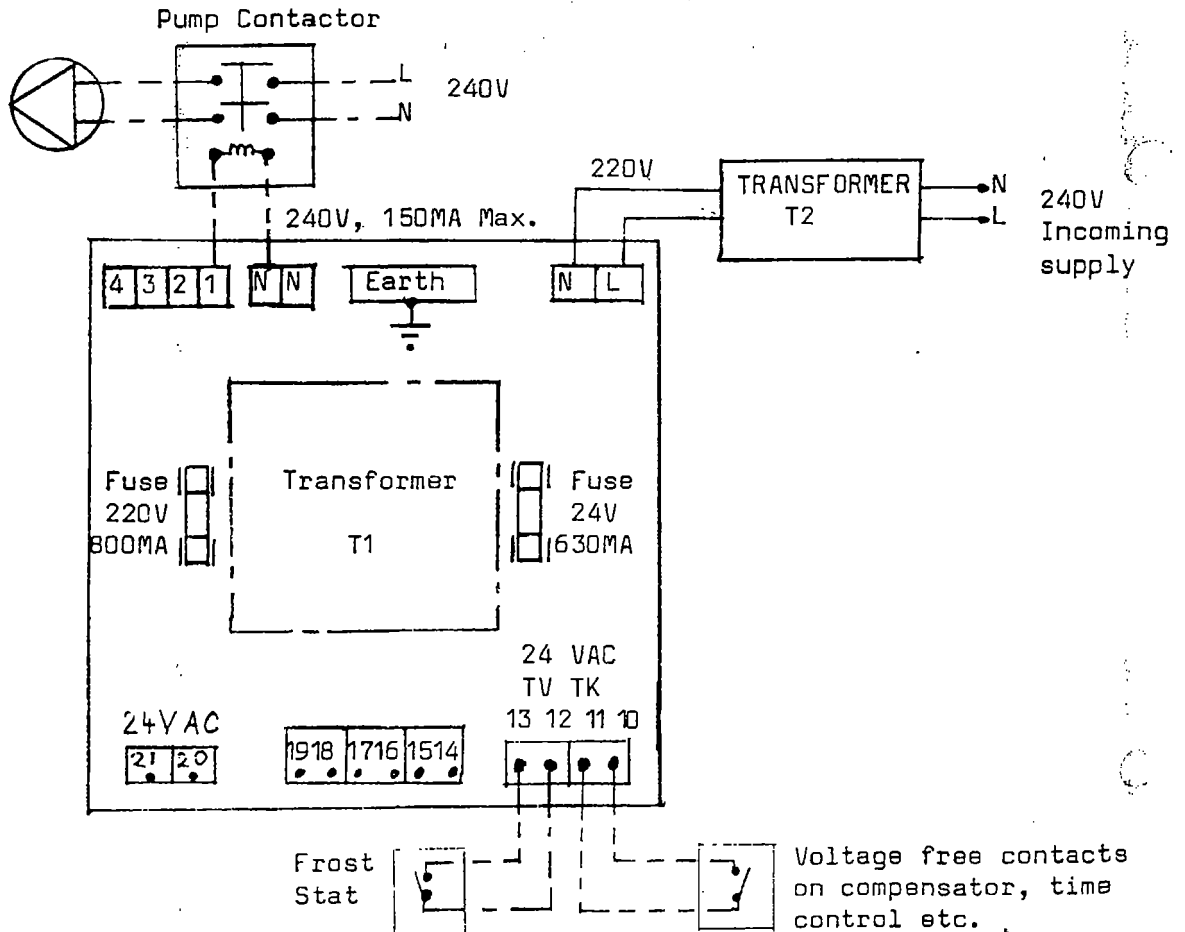
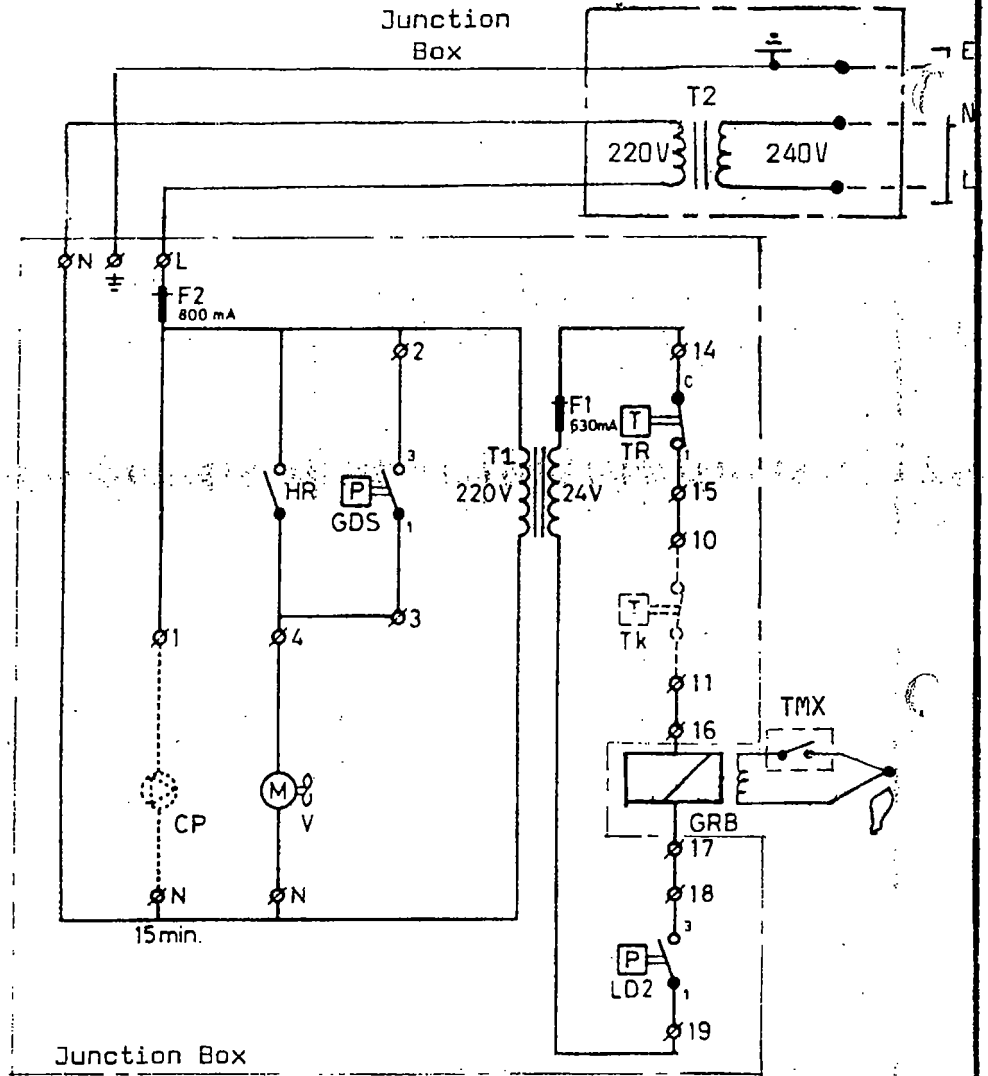
SCHEMATIC

- GDS Gas pressure switch
- V Flue fan
- CP Circulating pump
- T1 220-24V transformer
- T2 240-220V transformer
- Tk External control
- Tr Boiler thermostat
- LD2 Air pressure switch
- GRB Gas valve
- HR Relay
- Tmx Overheat cut off device.
- F1 630 MA Fuse
- F2 800 MA Fuse

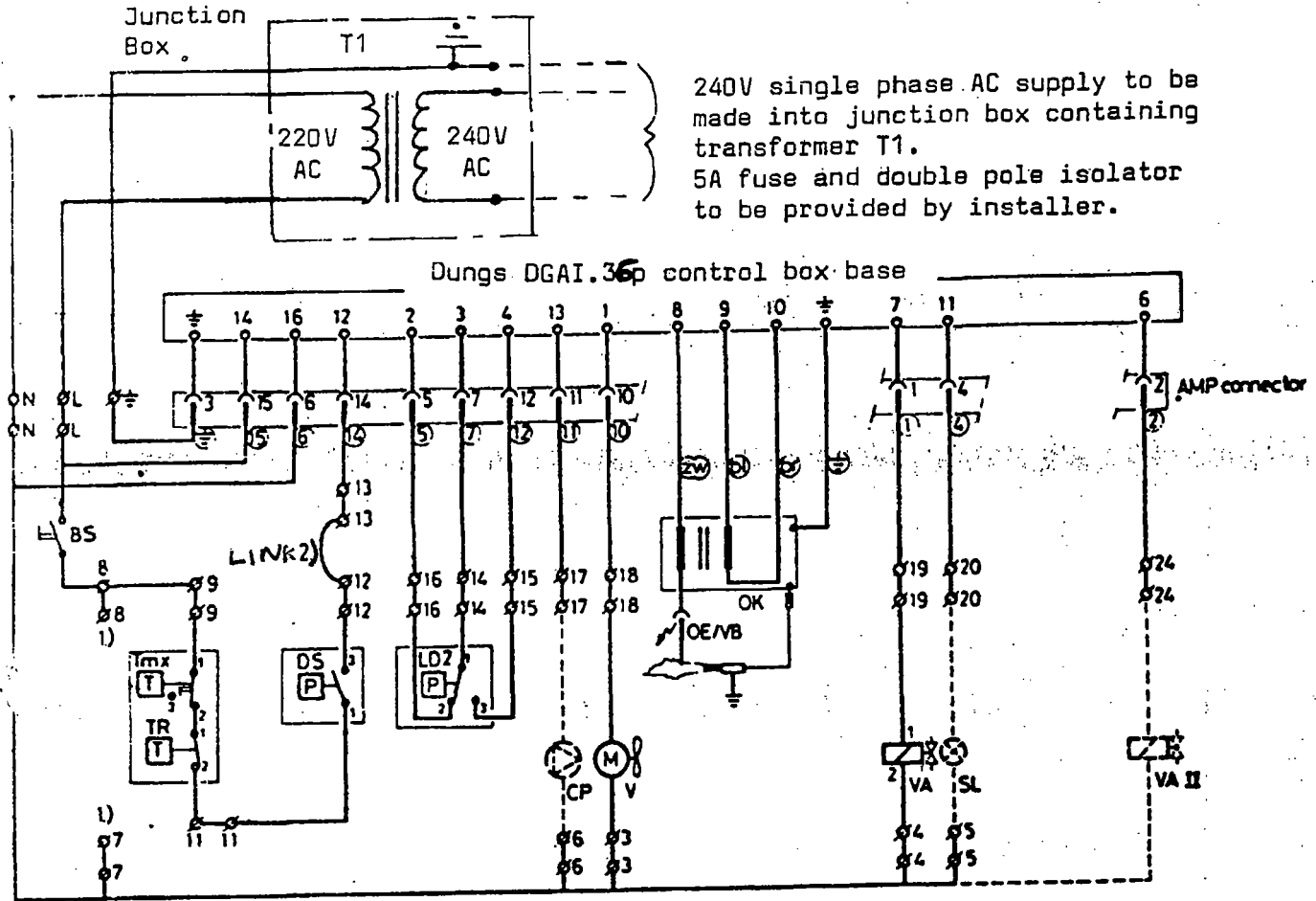
Incoming Mains Supply

240 V single phase AC
50 HZ supply to be made into junction box containing transformer T2.

5A fuse and double pole isolator to be provided by installer.



CONDENSING DIPLOMAT WIRING DIAGRAM 16-20 SECTIONS



SCHEMATIC

- On/off switch
- High limit thermostat
- Control thermostat
- Water level switch
- Air pressure switch
- Circulating pump/contactor
- Fan motor
- 1) Combined ignition electrode
- 2) ionisation probe and spark generator.

- VA Main gas valve
- VA II Main gas valve
- SL Lockout alarm
- AMP Amphenol connector
- Link 2 Voltage free contacts of time clock, compensator etc.
- T1 Transformer 240V AC to 220 VAC

Junction Box Terminal Block

