



HEATING PRODUCTS

**INSTALLATION & SERVICING
MANUAL FOR**

**WARMFLOW
OIL FIRED
WARM AIR HEATERS**

MODELS

WAH 100/150

WAH 200/300

WAH 500/600

LEAVE THESE INSTRUCTIONS WITH THE END USER





ENGINEERING CO. LTD.

COMMISSIONING

****THIS APPLIANCE MUST
BE COMMISSIONED***

Refer to the commissioning details at rear of this handbook.

SERVICING

To ensure continued reliable operation and fuel economy it is recommended that the heater is serviced annually.

Warmflow Engineering Service division provides an excellent back-up service, operating a team of Oftec trained engineers who can meet all the servicing, commissioning and breakdown requirements for your appliance.

Simply telephone

TEL: (028) 92620852

FAX: (028) 92620869

E-MAIL: service@warmflow.co.uk

****Failure to commission the heater may invalidate warranty***

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1.0 Introduction

All Warmflow oil fired warm air heaters are suitable for space heating of industrial and commercial premises. The heaters are automatic in operation and are designed for free-standing operation, supplied as standard for free blowing via the air discharge hoods or for connection to a ductwork distribution system. (Contact Warmflow for details).

The heaters are indirect fired with the products of combustion being carried via the flue to atmosphere.

Warmflow warm air heaters are designed to burn 28 second redwood No1 (Kerosene class C2) fuel or with some adjustment 35 second redwood No1 (gas oil class D).

On the 500/600 WAH only gas oil may be used.

The construction of the heaters provides a framework of exceptional strength and pleasing design, while the integral base pallet guarantees safe stable handling.

All the external panels are of a double skin construction, which insures low surface temperatures. The panels are all easily removable for complete access to any part of the heater while the front panel has been split to allow for easy access to the combustion chamber door.

As standard the burner, heater and controls are covered by the manufacturers parts and labour warranty valid for 12 months (from the heater date stamp). However this warranty will be invalidated if the heater is improperly installed or commissioned.

1.1 General Requirements

The installation of the air heater must be in accordance with the following regulations:

BS 5410: Parts 1 & 2: 1977: Code of practice for oil firing.

Current fire regulations.

Current building regulations.

Current IEE wiring regulations.

1.2 Installation

The heaters must be placed on a level non-porous, non-combustible surface which is capable of supporting the weight of the heater. The heaters must be stable or rigidly fixed in order to prevent vibration in the appliance, which can lead to the premature failure of the heater components.

2.0 User Instructions

2.1 Controls

The main user controls are the 2 rocker switches on the left hand side of the control panel.

The three position rocker switch at the top is marked '**Fan Only**', '**Off**' and '**Heating On**'.

At the '**Fan Only**' position the heater provides summer time ventilation by delivering air at the ambient temperature with the burner switched off.

At the '**Off**' position the heater will not operate.

When the switch is positioned at '**Heating On**' the heater will fire and deliver warm air automatically controlled by the fan stat and the room thermostat.

The sequence of firing will be as follows. The burner will go through its ignition cycle and fire. When the combustion chamber has been sufficiently heated the fan stat will automatically start the main air fan and discharge warm air through the swivel hoods or ducting.

When the heater is shutdown either via the room stat or any other controls the burner will stop firing although the main air fan will continue to operate until the combustion chamber has been properly cooled down. At which point the fan stat will shut the main air fan down.

Because of residual heat within the combustion chamber the fan stat may re-start the main air fan until sufficient cooling of the combustion chamber has taken place.

When the burner is firing the indicator lamp on the panel will be illuminated.

The 2 position rocker switch is marked '**Automatic**' and '**Manual**'.

At the '**Automatic**', position the heater will be operated automatically via the time clock.

When positioned at '**Manual**' the end user controls the time of operation.

NOTE: WHEN FIRING OR WHEN HOT, THE HEATER MUST NEVER BE SWITCHED OFF AT THE MAINS SUPPLY.

This is to allow proper cooling of the combustion chamber thus preventing tripping out on the high limit stat and heat damage to the combustion chamber.

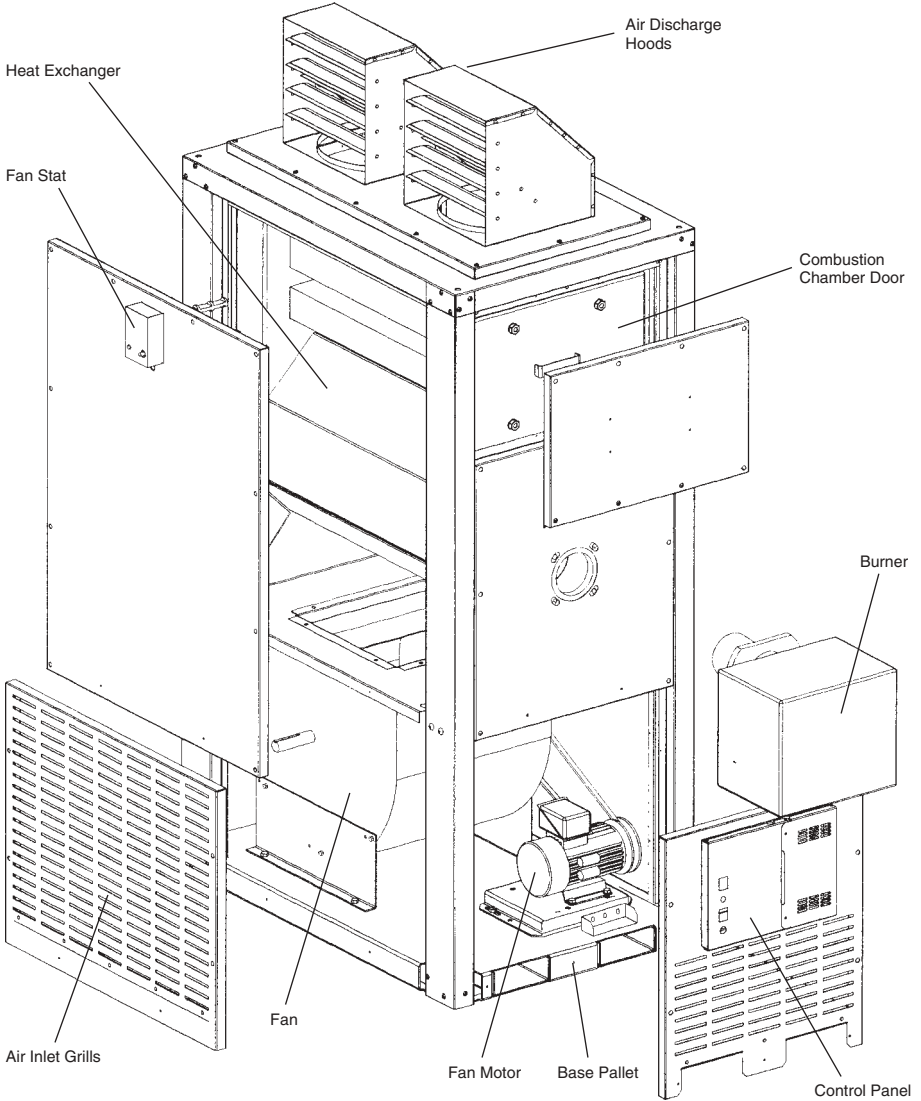
If the high limit fan stat should trip out wait until the combustion chamber has cooled sufficiently before pressing the red reset button on the fan stat. If the high limit continues to trip, switch the heater to 'off' and contact the Warmflow Service Department.

If the fan motor draws more current than the set limit the overload relay can be reset by pressing the red button in the control panel.

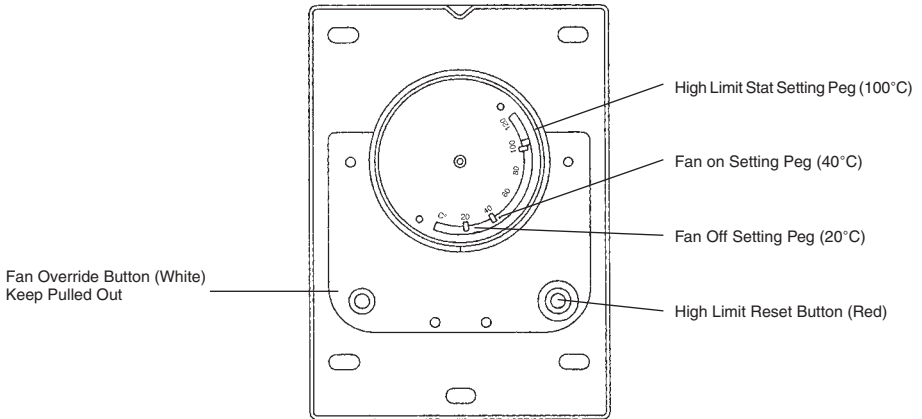
If the relay continues to trip contact the Warmflow Service Department.

2.2 Components

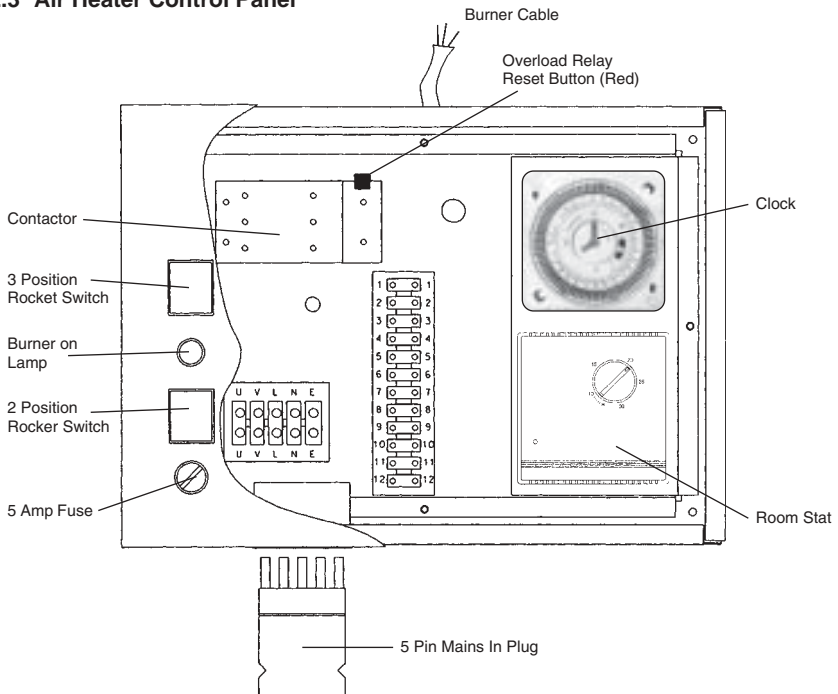
2.2.1 Heater



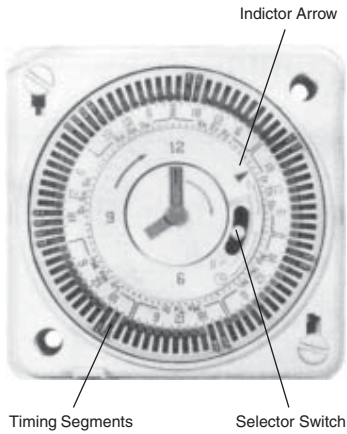
2.2.2 Fan Stat (Cover Removed)



2.2.3 Air Heater Control Panel



2.2.4 Time Clock



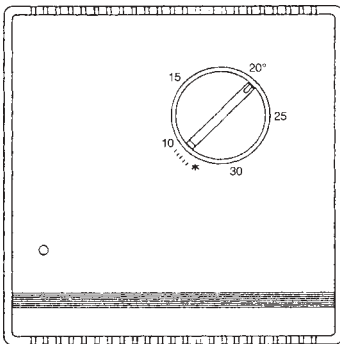
Each heater is supplied as standard with a 7-day analogue clock.

To set the day of the week and the time turn the minute hand in a clockwise direction until the correct day and time is opposite the indicator arrow.

The required on/off switching time is set by pushing the timing segments to the outer rim of the clock. The minimum time period for each segment is 2 hours.

Before operating the heater ensure that the selector switch is in its mid position.

2.2.5 Room Stat



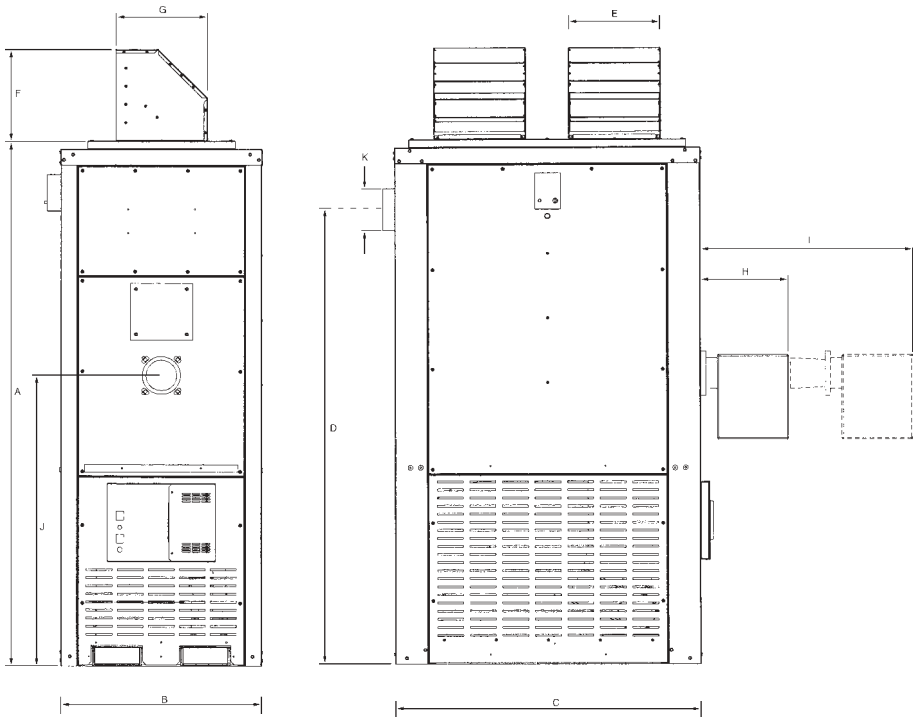
A room thermostat is mounted on the main control panel and controls the operation of the burner. If the heater is not installed in the area being heated or it has been fitted with a separate fresh air intake then an additional remote room thermostat must be fitted.

3.0 General Data

3.1 Technical Data

WAH MODEL		100/150	200/300	500/600
Output Range	kW	29.3-44.0	58.6-88.0	146.5-175.8
Nominal Heat	kW	52.4	102.3	206.9
Input (max)	Btu	178,800	349,000	705,900
Nominal Heat	kW	44.0	88.0	175.8
Output (max)	Btu	150,000	300,000	600,000
Nominal combustion efficiency	gross %	84	86	85
Burner Riello		RDB 2	G10	G20s
Head		LD3 A	G10	G20s
Flue Dia	mm	127	152	203
Flue Dia	in	5	6	8
Exit Flue Gas Mass Flow	Kg/h			
Co2	%	11.0	11.0	11.0
Smoke Bacarach	0-1	0-1	0-1	0-1
NFGT	°C	225	185	195
Nozzle (Kerosine)		Danfoss or Delevan		
		1.25 x 60°S	2.5 x 60°S	—
Pump	Bar	10	9	—
Pressure	psi	145	130	—
Nozzle (Gas Oil)		Danfoss or Delevan		
		1.0 x 60°S	2.0 x 60°S	4.0 x 60°S
Pump	Bar	13	12.5	13.0
Pressure	psi	190	180	190
Approx Fuel	L/h	5.2	10.1	20.4
Flow Rate	Gal/h	1.14	2.22	4.49
Fan Motor	kW	0.37	1.1	2.2
Motor Speed	rpm	1,440	1,440	1,440
Running Current	Amps	1.8	4.8	5.6
Electrical Supply at 50hz	Volts	230 ± 6% 1PH	230 ± 6% 1PH	400 ± 6% 1PH
Fuse Rating (per phase)	Amps	5	8	16
Temp Rise	°C	40	42	40
Inlet Air Flow @ 15 C	CFM	1,590	2,755	7,355
	M³/h	2,700	4,680	12,500
No of Discharge Hoods		2	2	4
Fan Speed (Nominal)	rpm	650	900	925
Weight (including burner)	Kg	195	360	680

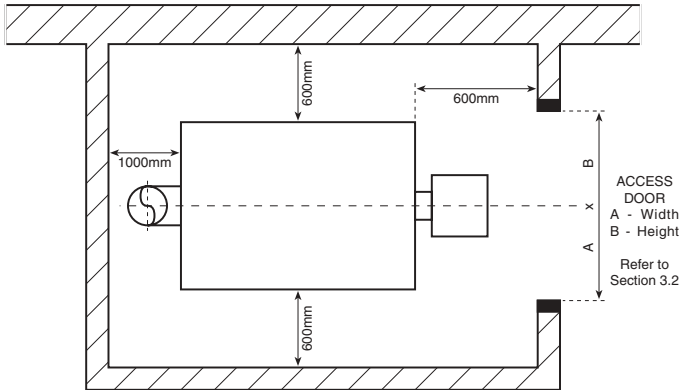
3.2 Dimensions



MODEL	100/150	200/300	500/600
A	1625	1860	2145
B	615	790	1020
C	950	1090	1445
D	1410	1640	1895
E	285	375	375
F	285	380	380
G	280	380	380
H	202	260	290
I	342	400	430
J	900	1095	1190
K	127	152	203

3.3 Installation Clearances

The space in which the heater is to be fitted must have the following minimum dimensions:



Note: Any combustible material adjacent to the air heater and the flue system must be so placed or shielded as to ensure that its temperature does not exceed 65°C (150°F).

In addition to the dimensions mentioned above the following minimum clearances must be available at the front of the heater to enable it to be serviced.

Heater Model	Clearance
100 & 150	760mm
200 & 300	1000mm
500 & 600	1000mm

Note: To give additional access to the fan stat when installed in a confined space the left and right side panels are interchangeable.

3.4 Air Supply

In all cases there must be provision for an adequate supply of air for both combustion and general ventilation.

(a) Where heater is sited within area to be heated

So far as any ventilation requirements are concerned, the installer should take note of any mandatory requirements for the provision of permanent air vents direct to outside. Any such air vents should have negligible resistance and must not be sited in any position where it is likely to become easily blocked or flooded nor in a position where it is possible for the ingress of toxic or flammable vapour. However, if the heater is sited within a building with an air infiltration rate of less than 0.5 per hour or where the

building volume is less than 2.2m³ per kW of heater input, then ventilation should be provided in accordance with our table of recommended minimum sizes.

(b) Where heater is supplied within a plant room or confined area

Where the heater is sited within a plant room or other confined area, then provision must be made for the positive connection of either return air with high/low level ventilation in accordance with BS 6230 or if return air is through a louver arrangement then the return air louver must be of adequate size so as not to starve the main air distribution fan of air. Under no circumstances must the burner be left to operate within an area of negative pressure without a combustion air duct.

It is recommended that for applications such as these that you contact our Technical Department.

(c) The heater should not be operated within a toxic, corrosive or flammable atmosphere

The basic minimum effective area requirement of the air (not return air louvres) including air for combustion is as follows.

Heater Model	Min air vent area per heater (free area)
100/150	2300 CM ²
200/300	3000 CM ²
500/600	6500 CM ²

3.5 Ductwork

All heaters are supplied for free standing and free blowing operation and are not suitable for connection to a ducted system unless the necessary drive modifications have been made. Warmflow can make the necessary drive modifications in the factory to suit a range of ductwork resistances (i.e. 0.5", 1.0", 1.5" and 2.0" wg).

Warmflow cannot guarantee the correct fan/drive configuration unless we have either designed the ductwork system or were supplied with a set of as installed drawings for the existing ductwork. Prior to installation all existing ductwork and distribution grilles must be thoroughly cleaned to ensure there is no additional resistance within the system.

As an additional safeguard against overheating Warmflow would recommend the installation of a thermostat within the ductwork to control the operation of the burner. The thermostat should be installed as close to the heater as possible. (Consult our technical department for details).

3.6 Filters

Before fitting any inlet or outlet filters, insure that the resistances are maintained or the correct modifications to belts, pulleys and motor have been made. (Contact Warmflow for details and advice).

3.7 Electrical Supply

Wiring external to the air heater must be installed in accordance with IEE Wiring Regulations and any local regulations which apply.

Models 100 to 300 are supplied for 240 volts, 50Hz, single phase, neutral and earth.

Models 500 to 600 are supplied for 400 volts, 50Hz, 3 phase, neutral and earth.

The method of connection to the mains electricity supply must facilitate complete electrical isolation of the air heater by an isolator having a contact separation of at least 3mm in all poles and the supply should serve only the air heater. The method of connection should be provided adjacent to the air heater in a readily accessible position.

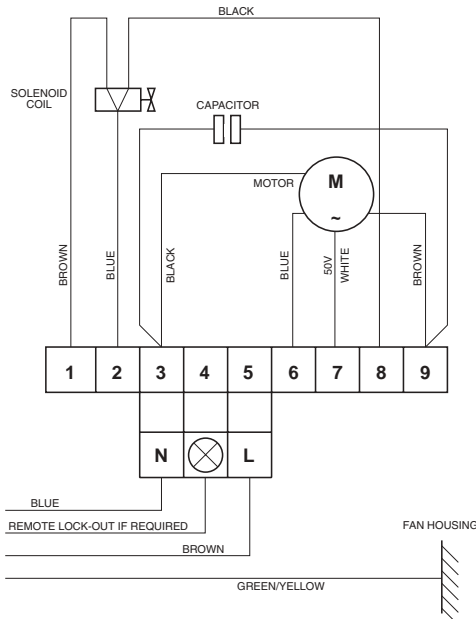
The minimum recommended cable size for the mains supply is 2.5mm².

All external wiring must be enclosed within approved conduit. Conduit from isolator switch must run so as not to interfere with the removal of the service panels of the air heater.

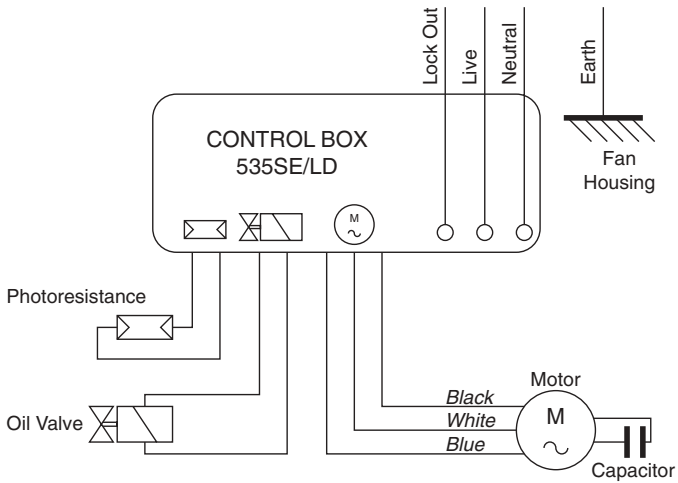
Whether a single heater or a number of heaters are to be wired as part of a single installation an isolator must be provided to each heater so that each heater can be separately disconnected. The isolator switch should be located in a readily accessible position. Each heater should be independently fused.

The interwiring of controls from one heater to another heater is not permitted.

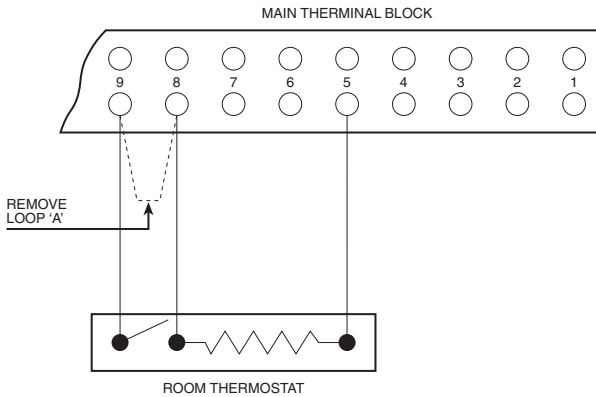
3.7.1 R40 Burner Control Box G10 & G20S



3.7.2 RDB Burner Control Box



3.7.3 Fitting External Room Thermostat

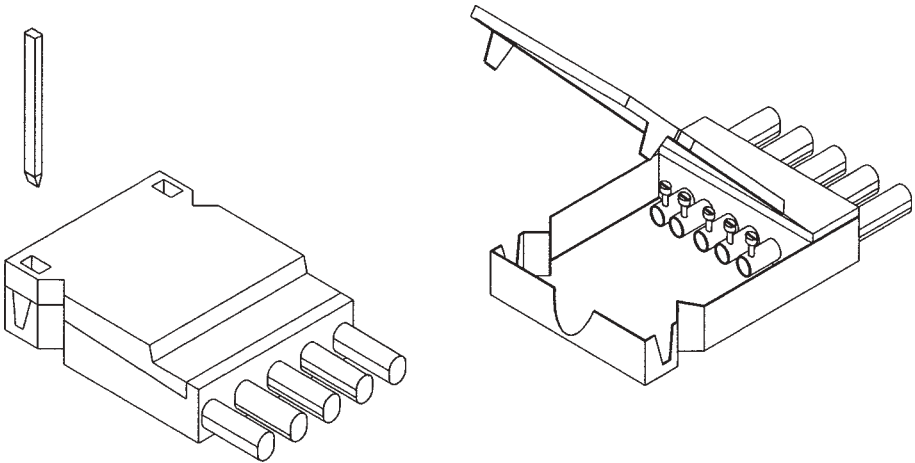


3.7.4 Fitting a Frost Thermostat

The frost thermostat must be located in the coldest part of the building but where it can respond to a rise in temperature as a result of switching on the heater. A frost thermostat should not be fitted on an outside wall.

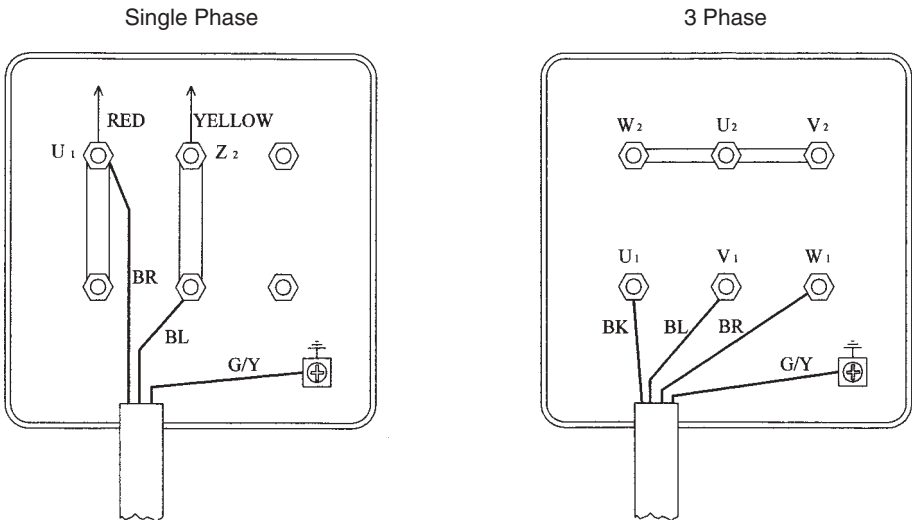
The frost thermostat can be connected as per the room thermostat.

3.7.5 Mains Plug

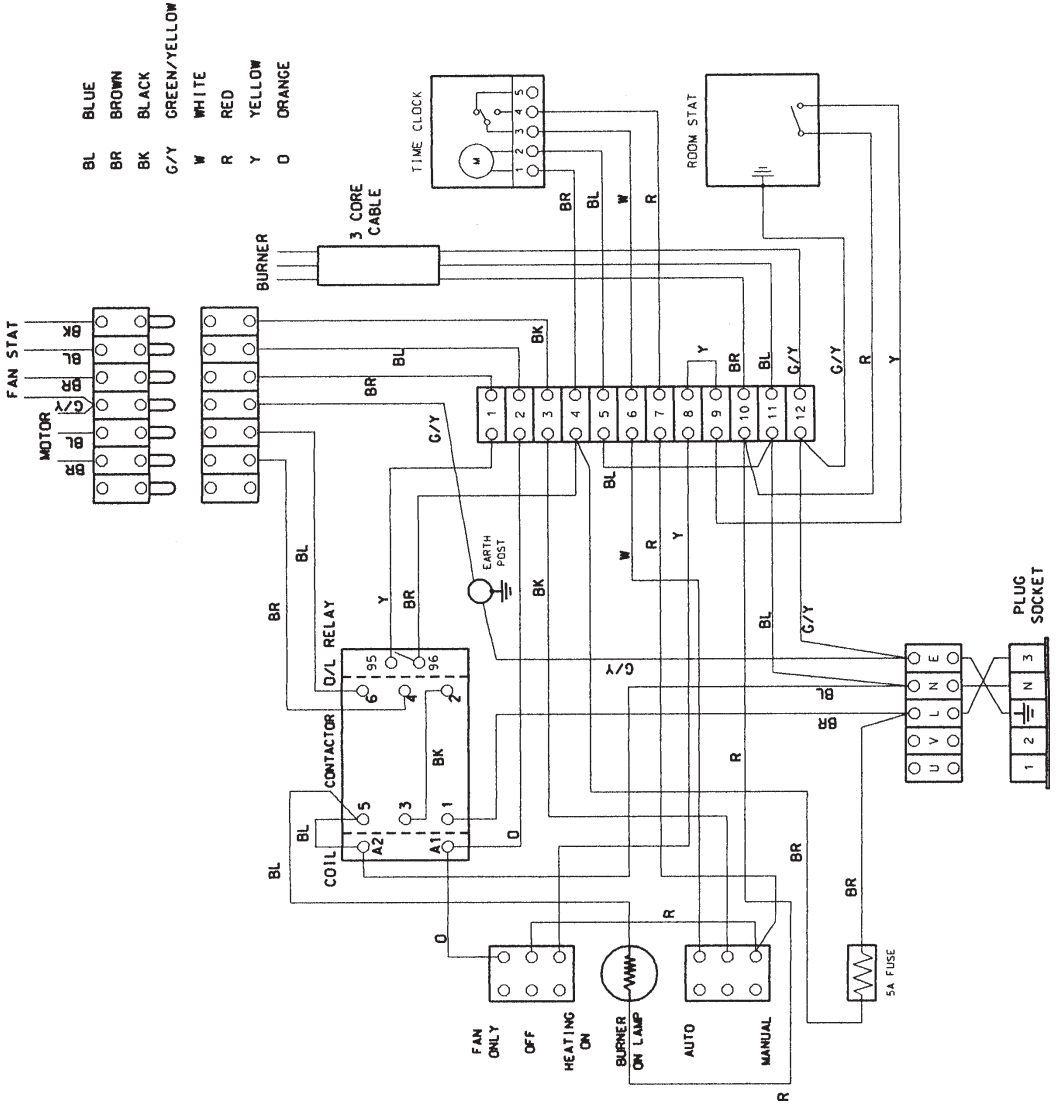


By inserting a small screwdriver into the slots as shown, the retaining clips can be prised open so allowing the cover to be hinged up revealing the wiring connections. Before closing, ensure the cable clamp has properly been fitted.

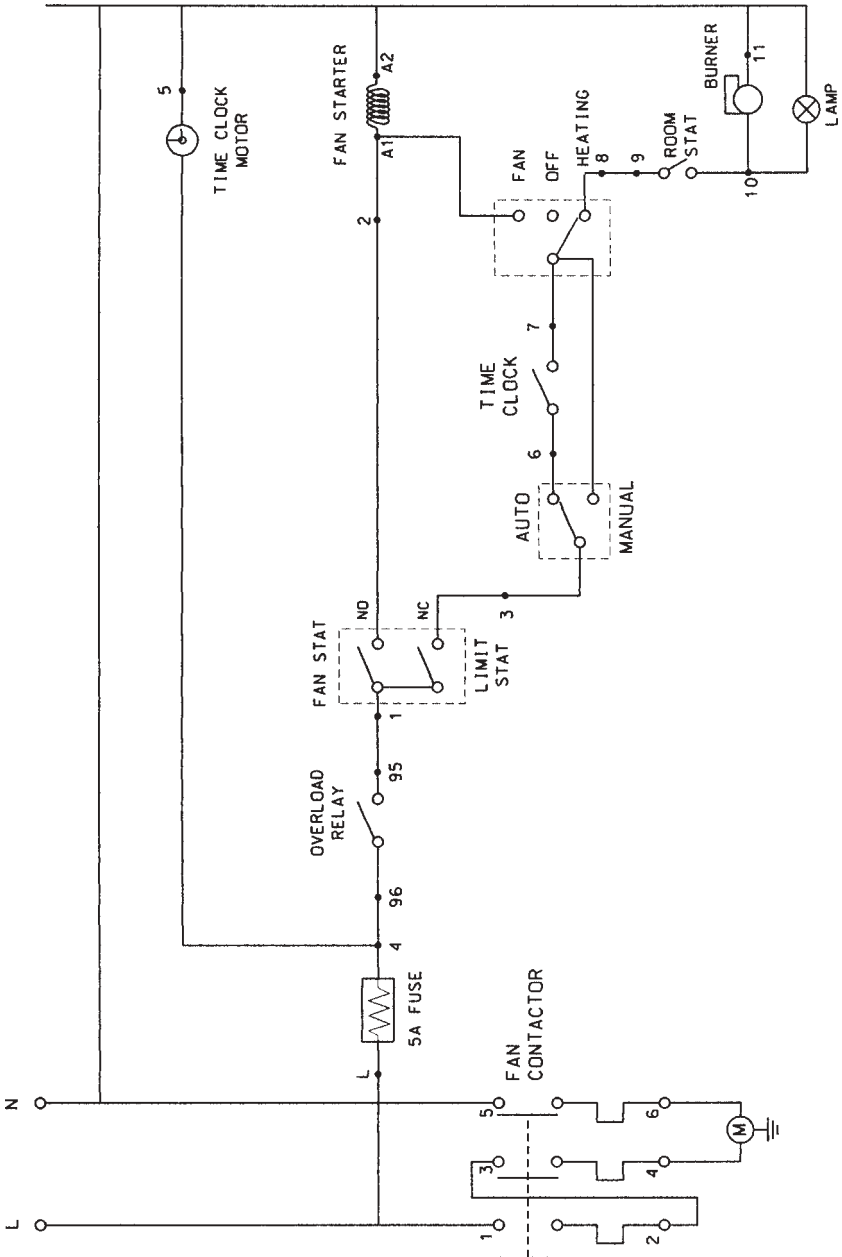
3.7.6 Motor Wiring



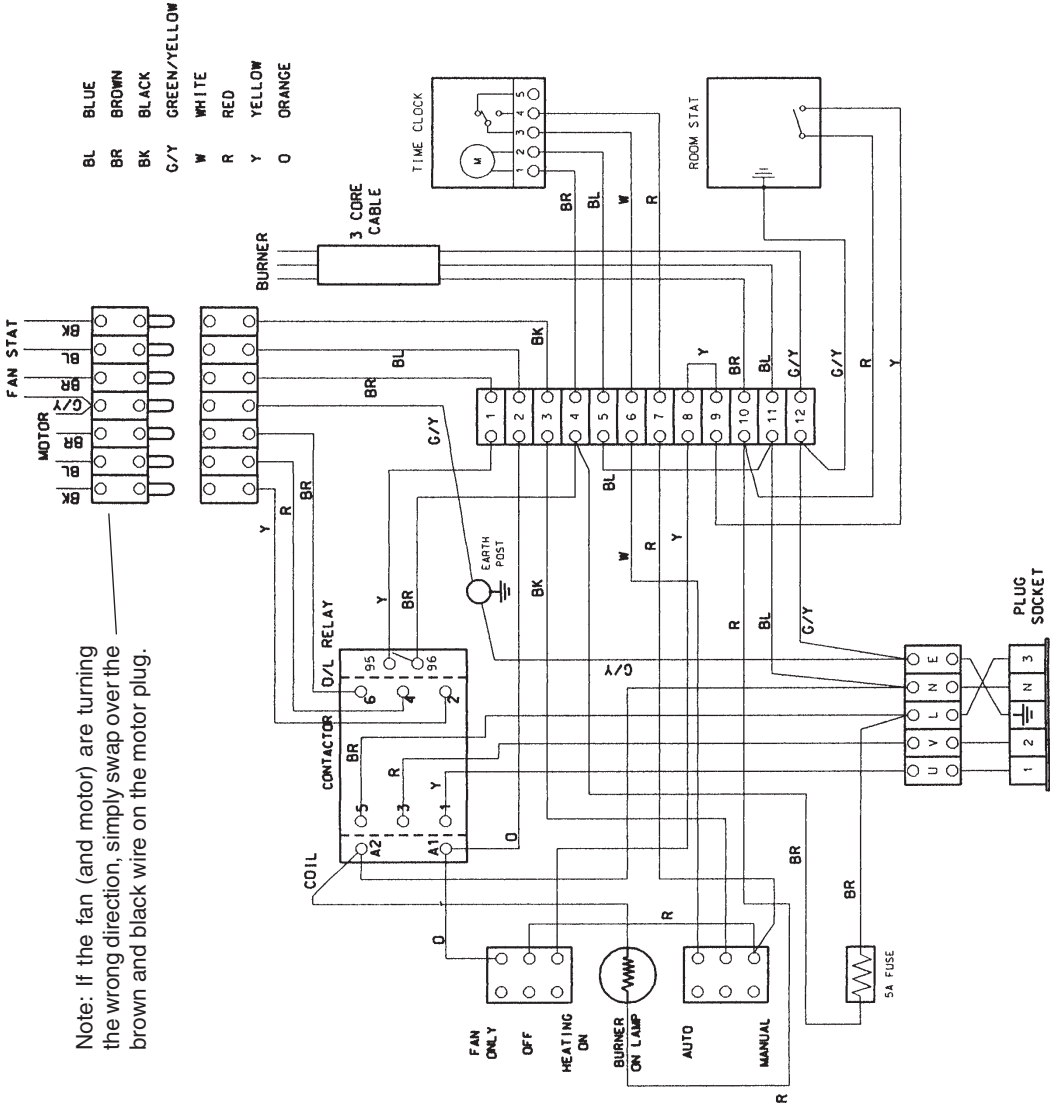
3.7.7 Wiring Diagram for Single Phase Control Panel



3.7.8 Wiring Schematic for Single Phase Control Panel

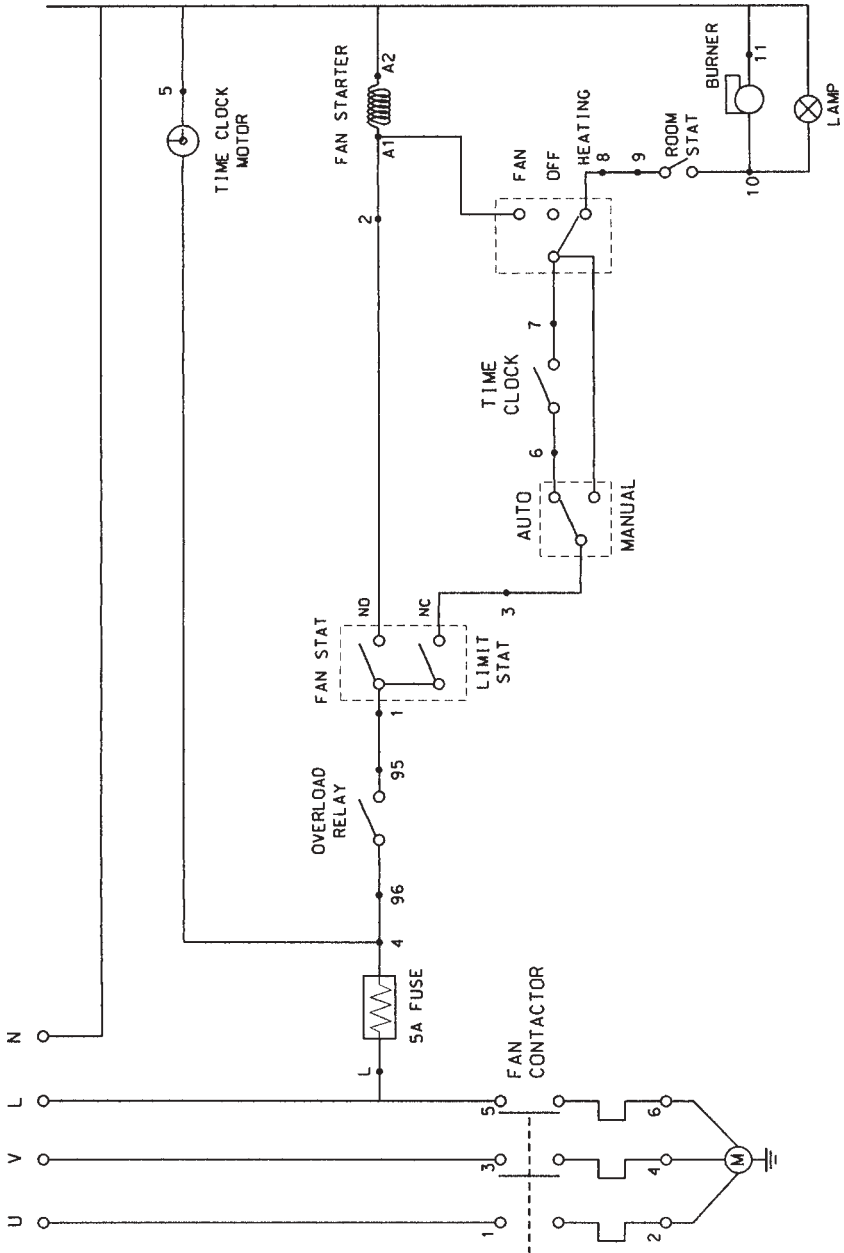


3.7.9 Wiring Diagram for Three Phase Control Panel



Note: If the fan (and motor) are turning the wrong direction, simply swap over the brown and black wire on the motor plug.

3.7.10 Wiring Schematic for Three Phase Control Panel



4.0 Oil Supply

1. Oil Tank

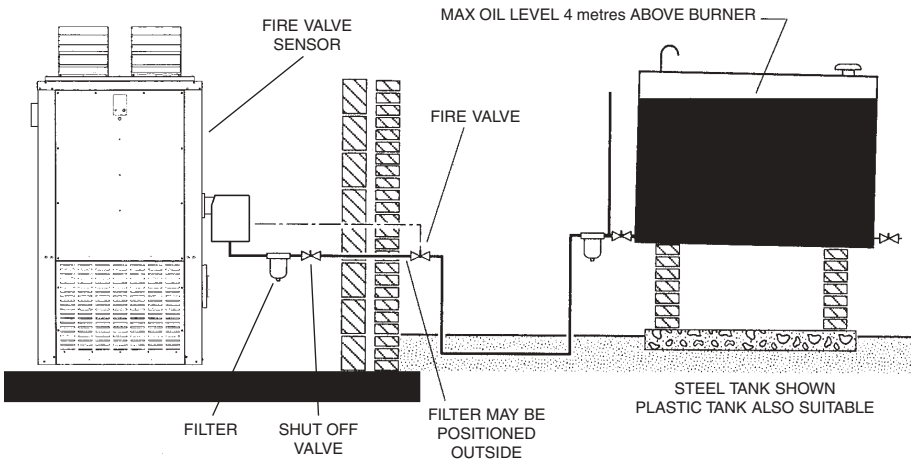
Steel tanks constructed to BS 799 Part 5 1987 should be painted on the outside only and mounted on piers to prevent corrosion. Plastic oil tanks are also available and can be suitable for installation at ground level. However, oil should never be stored in translucent plastic containers.

- The pipe from the oil tank to the burner should be run in copper, steel or aluminium pipework. Galvanised pipe and fittings should not be used. The pipework should terminate close to the boiler and be fitted with an isolating valve and filter. It is also recommended that a remote sensing fire valve should be fitted to the oil line preferably before the oil line enters the building. (I.E. BS 5410)

The fire valve sensor can be connected to heater casing above the burner by attaching a retaining clip.

Depending on the position of the tank a two pipe system may be required. One and two pipe oil systems are shown below. As an alternative to a two pipe system a Tigerloop or other approved de-aerator may be used.

4.1 One Pipe System

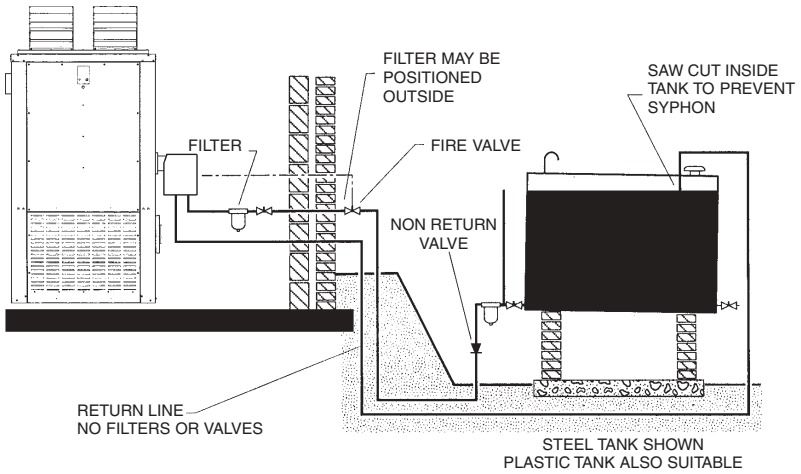


Total Maximum Pipe Length (m)

Head H _(m)	0.5	1	1.5	2
I.D. 8 mm	10	20	40	60
I.D. 10 mm	20	40	80	100

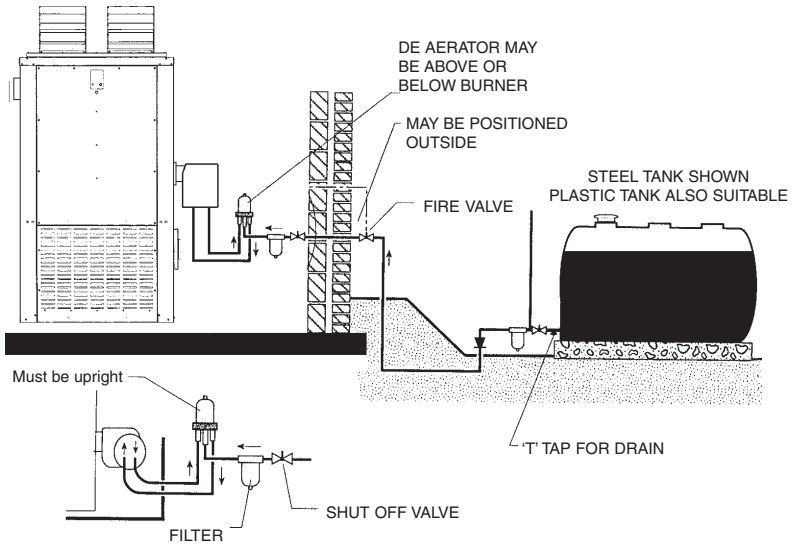
Note: The 'head' of oil refers to the distance the outlet from the oil tank is above the oil pump.

4.2 Two Pipe Systems



Total Maximum Pipe Length (m)

Lift H _(m)	0.5	0.5	1	1.5	2	3	3.5
I.D. 8 mm	35	30	25	20	15	8	6
I.D. 10 mm	100	100	100	90	70	30	20



For maximum pipe length and lift contact de-aerator manufacturer.

5.0 Flues

The flue should be designed in accordance with the local bye-laws and the Clean Air Act. Draught stabilisers are not recommended. Sharp bends or horizontal runs should be avoided and the flue should terminate 2 feet (600 mm) above the ridge of the dwelling. Terminals which restrict the discharge or allow ingress of water should be avoided.

It is recommended that when connecting to an existing masonry chimney a flexible stainless steel liner of the correct diameter should be used. The annular space must be sealed top and bottom and filled with insulation.

Materials used for the flue system should be mechanically robust, resistant in internal and external corrosion, non-combustible and durable under the conditions to which they are likely to be subjected.

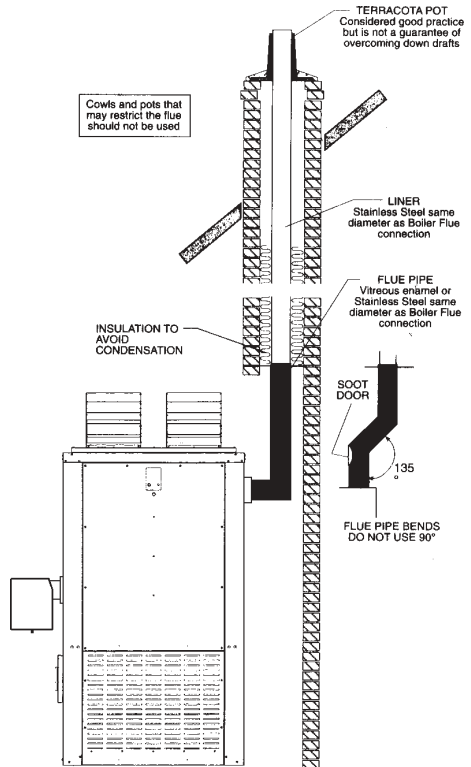
Prevention of condensation within the flue should be an important factor in the design of the flue system. In order to minimise condensation the use of double walled flue pipe or insulation is recommended.

Where condensation in the flue is unavoidable, provision should be made for condensate to flow freely to a point at which it can be released, preferably into a gully. The condensate pipe from the flue to the disposal point should be of non-corrodible material of not less than 22mm (in) size.

Facilities should be made for disconnecting the flue pipe from the air heater for inspection and servicing purposes. Bends with removeable covers should be fitted for inspection and cleaning purposes where considered appropriate.

The flue system should ensure safe and efficient operation of the air heater to which it is attached, protect the combustion process from wind effects and disperse the products of combustion to the external air.

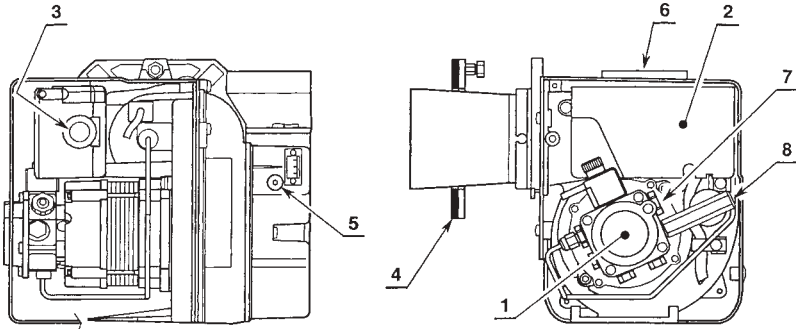
The flue should terminate in a freely exposed position and must be so situated as to prevent the products of combustion entering any opening in a building in such concentration as to be prejudicial to health or a nuisance.



6.0 Burners

6.1.1 RDB Burner

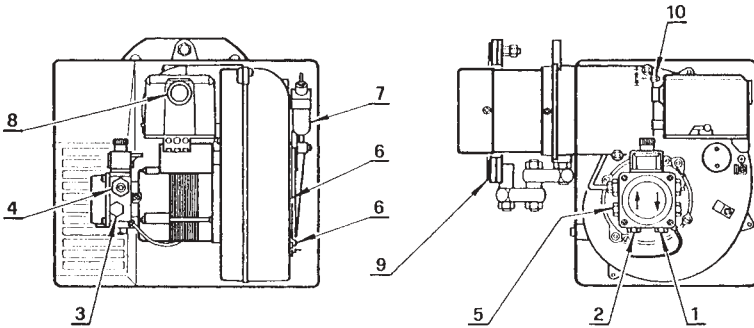
The burner is fitted with the correct nozzle and the pressure set. All that is further required before commissioning, is to connect the oil and electricity supply.



1. Pump
2. Control box
3. Reset button with lock-out lamp
4. Flange with insulating gasket

5. Air damper adjustment screw
6. Air tube connection (B/F)
7. Pump pressure adjustment screw
8. Pressure gauge port

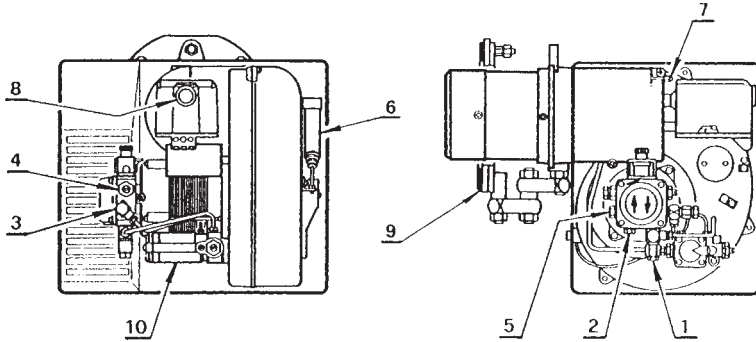
6.1.2 G10 Burners



1. Return line
2. Suction line
3. Gauge connection
4. Pump pressure regulator
5. Vacuum gauge connection

6. Screw fixing air-damper
7. Hydraulic jack with air-damper
8. Lock-out lamp and reset button
9. Flange with insulating shield
10. Combustion head adjustment screw

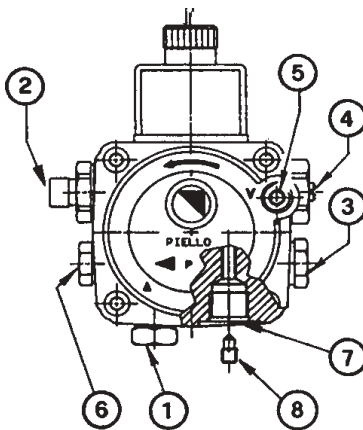
6.1.3 G20S Burner



- | | |
|-----------------------------|-------------------------------------|
| 1. Return line | 6. Hydraulic jack with air-damper |
| 2. Suction line | 7. Combustion head adjustment screw |
| 3. Gauge connection | 8. Lock-out lamp and reset button |
| 4. Pump pressure regulator | 9. Flange with insulating shield |
| 5. Suction gauge connection | 10. Start delaying device |

6.2 Oil Supply

The burner is supplied for use with a one pipe system. For use on a two pipe system, it is necessary to remove the return port plug and fit a small by-pass plug as shown.



- | |
|----------------------------------|
| 1. Suction port |
| 2. To nozzle |
| 3. Pressure gauge port/air bleed |
| 4. Pump pressure adjustment |
| 5. Vacuum port |
| 6. To hydraulic ram |
| 7. Return port |
| 8. By-pass plug |

6.3 Air Damper Adjustment

The setting is purely indicative.

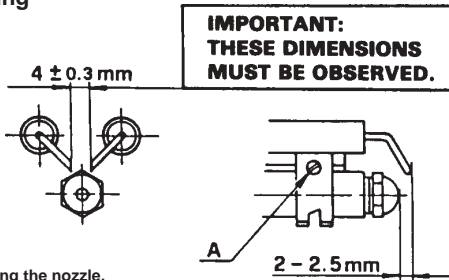
Each installation however, has its own unpredictable working conditions: actual nozzle output; positive or negative pressure in the combustion chamber, the need of excess air, etc.

All these conditions may require a different air-damper setting, which should be checked and set during commissioning.

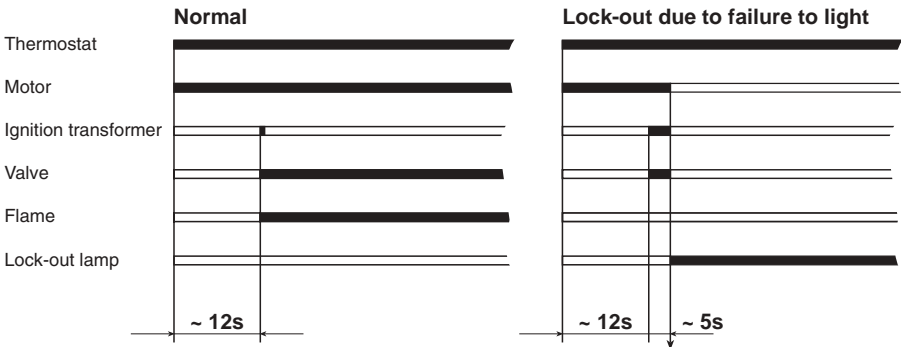
6.4 Electrode Setting

Attention
Before working at the electrodes ensure that the power supply is switched off.

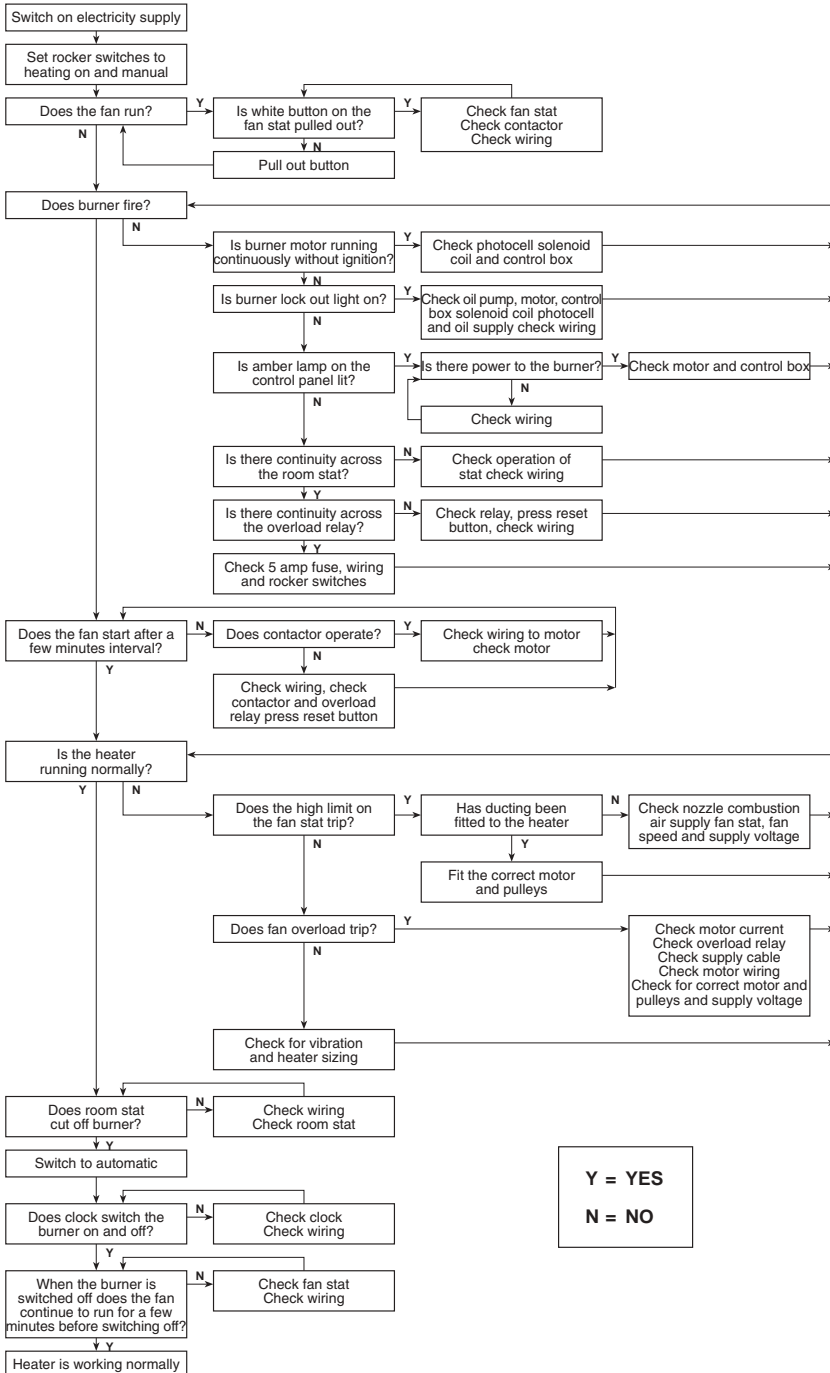
Before assembling or removing the nozzle, loosen the screw (A) and move the electrodes away from the nozzle.



6.5 Burner Start-up Cycle



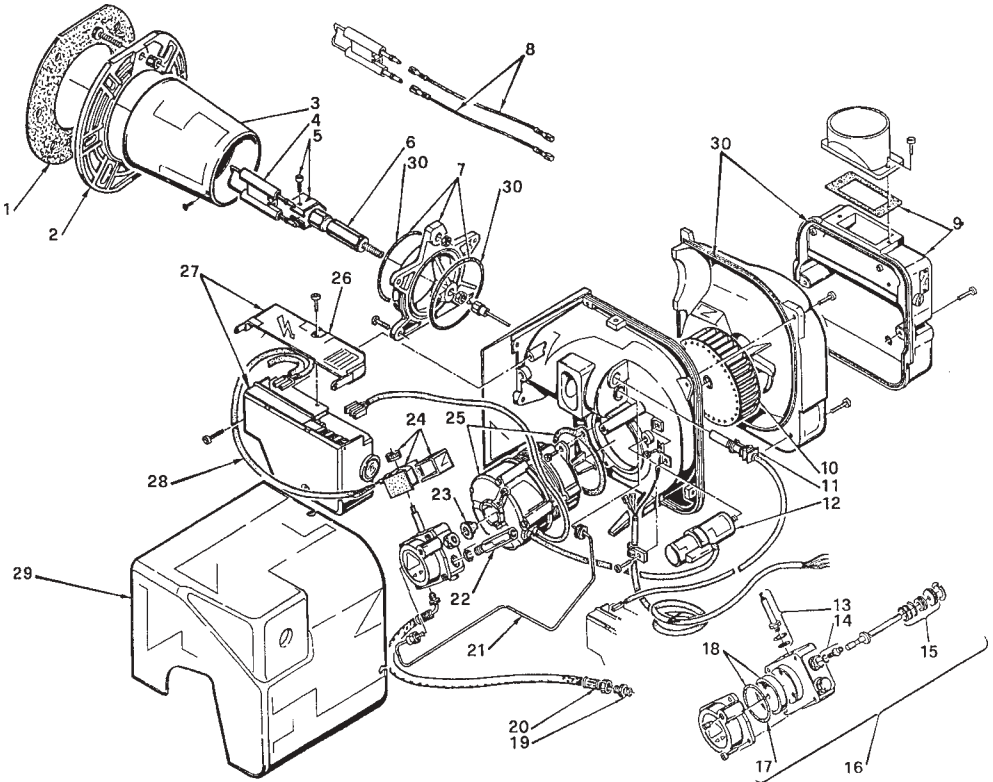
7.0 Fault Finding



Y = YES
N = NO

8.0 Burner Spares

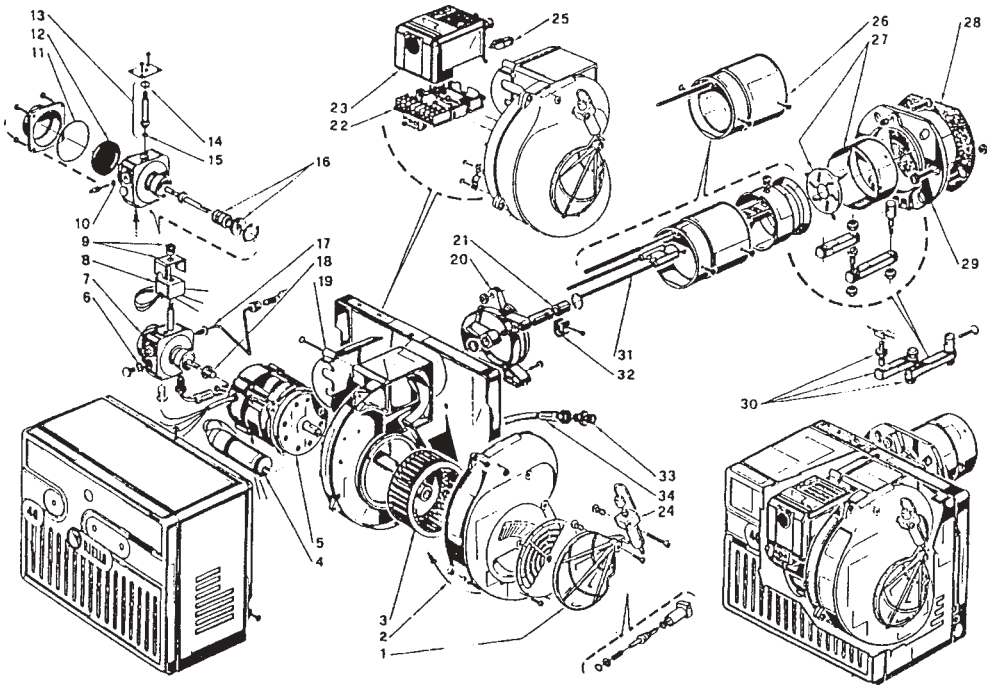
Riello RDB Burner



NO	CODE	3748757	DESCRIPTION
1	3005787	•	Gasket
2	3006384	•	Flange
3	3008769	•	Cup-shaped Head
4	3007513	•	Electrode Assembly
5	3006552	•	Electrode Bracket
6	3008642	•	Nozzle Holder
7	3008643	•	Collar
8	3008794	•	High Voltage Lead
9	3008647	•	Air Damper Assembly
10	3008645	•	Fan
11	3008646	•	PE Cell
12	3007479	•	Capacitor 4µF
13	3007582	•	Needle Valve
14	3008651	•	Regulator
15	3000439	•	Pump Seal

NO	CODE	3748757	DESCRIPTION
16	3008654	•	Pump
17	3007162	•	'O' Ring
18	3008653	•	Filter 'O' Ring
19	3003602	•	Connector
20	3005720	•	Flexible
21	3008644	•	Tube
22	3008876	•	Pressure Gauge
23	3000443	•	Joint
24	3008648	•	Coil
25	3008650	•	Motor
26	3008649	•	Protection
27	3008652	•	Control Box 535 RSE/LD
28	3008877	•	Lead Coil
29	3008879	•	Cover
30	3008878	•	Kit Seal

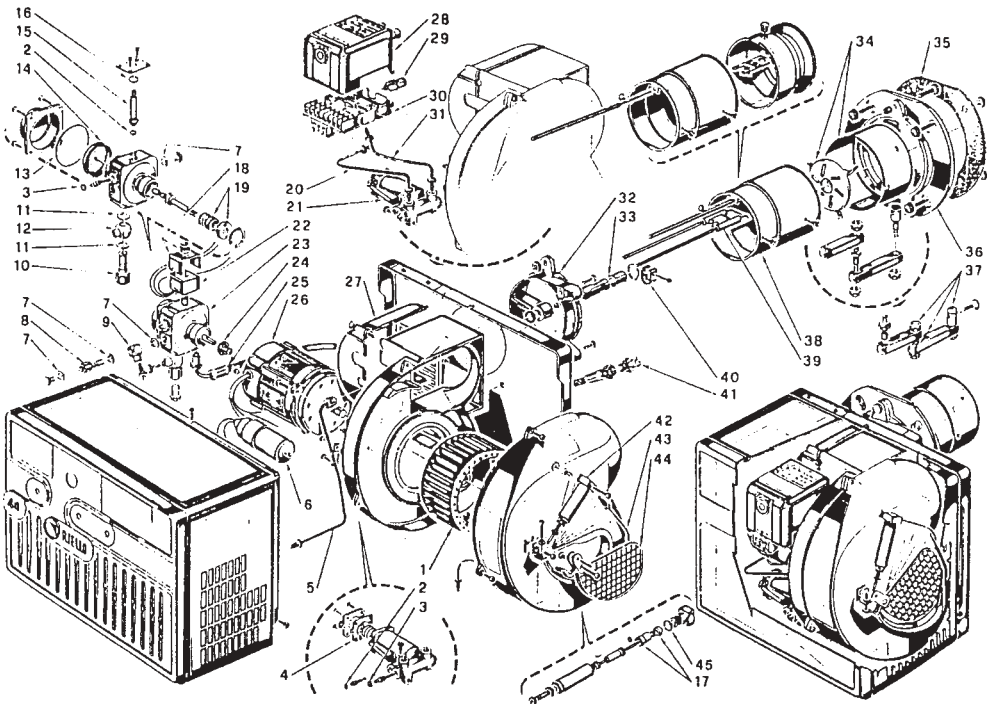
Riello 40 – G10



NO	CODE	DESCRIPTION
1	3000879	Air Shutter Assembly
2	3006913	Tube
3	3005788	Fan
4	3005798	Condenser
5	3007355	Motor
6	3007077	Washer
7	3007450	Pump
8	3002279	Coil
9	3006553	Cover
10	3007028	'O' Ring
11	3007162	'O' Ring
12	3005719	Filter
13	3006925	Valve Stem
14	3007029	'O' Ring
15	3007156	'O' Ring
16	3000439	Pump Seal
17	3005789	Tube
18	3000443	Joint

NO	CODE	DESCRIPTION
19	3006557	Access Plate
20	3005791	Collar
21	3005764	Nozzle Holder
22	3002278	Control Box Base
23	3001156	Control Box
24	3002297	Igniter
25	3002280	Photocell
26	3005792	Head
27	3006392	Disc with Ring Pressed
28	3005795	Flange Gasket
29	3005796	Flange
30	3000640	Hinge
31	3005790	Electrode
32	3006552	Electrode Clamp
33	3009068	Connector
34	3005720	Flexible Pipe
35	3006911	Hydraulic Ram

Riello 40 – G20S



NO	CODE	DESCRIPTION
1	3005799	Fan
2	3007156	'O' Ring
3	3007028	'O' Ring
4	3005801	Washer
5	3005800	Tube
6	3005802	Condenser
7	3007077	Washer
8	3005771	Pivot
9	3005803	Washer
10	3005804	Pivot
11	3007079	Washer
12	3005805	Connector
13	3007162	'O' Ring
14	3005719	Filter
15	3006925	Valve
16	3007029	'O' Ring
17	3002297	Igniter
18	3006553	Cover
19	3000439	Pump Seal
20	3005808	Tube
21	3006500	Retarder
22	3002279	Coil
23	3006924	Pump

NO	CODE	DESCRIPTION
24	3000443	Joint
25	3005720	Flexible Pipe
26	3005820	Motor
27	3006558	Access Plate
28	3001156	Control Box
29	3002280	Photocell
30	3002278	Control Box Base
31	3005809	Tube
32	3005810	Collar
33	3005764	Nozzle Holder
34	3006264	Ring
35	3005813	Flange Gasket
36	3005814	Flange
37	3000640	Hinge Assembly
38	3006265	Head
39	3005816	Electrodes
40	3006552	Clamp
41	3009068	Connector
42	3006499	Hydraulic
43	3006501	Tube
44	3006501	Air Shutter
45	3007161	'O' Ring
46	3007165	Valve Piston 'O'

Notes

COMMISSIONING DETAILS

To ensure the reliable and efficient operation of your heater it is necessary to have this appliance properly commissioned by a suitably qualified commissioning engineer. The page below is to be completed by the commissioning engineer and the manual retained by the end user.

Users Name:

Address of Installation:

.....

..... Postcode:

Tel No (Home): (Daytime):

Heater Date Code:

Installation Date:

Heater Serial No:

Commissioned by:

OFTEC No:

Address:

..... Postcode:

Pump Pressure:

Co2 %:

FGT°C: Smoke No:

Motor Current: Cold: Amps Hot: Amps

Date Commissioned:

It is the responsibility of the installer to ensure that the heater is properly commissioned (Ref BS 5410 Parts 1 & 2)

Failure to have this appliance commissioned may invalidate the warranty.



HEATING PRODUCTS

Lisburn

Lissue Industrial Estate, Moira Road,
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E-mail: sales@warmflow.co.uk

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Fax: (0161) 205 4818

Dublin

Balbriggan Industrial Estate,
Dublin
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Fax: (01) 841 6614

FOR PARTS, SERVICE & WARRANTY CONTACT

TEL: (028) 92621515

FAX: (01846) 621199

E-MAIL: service@warmflow.co.uk

N IRELAND

TEL: (DUBLIN) 8416158

FAX: (DUBLIN) 8416614

REP OF IRELAND

TEL: (0161) 205 4202

FAX: (0161) 205 4818

**ENGLAND,
SCOTLAND & WALES**

FOR TECHNICAL ASSISTANCE CONTACT WARMFLOW ON

TEL: (028) 92621515

E-MAIL: technical@warmflow.co.uk

This manual is accurate at the date of printing but will be superseded and should be disregarded if specifications and/or appearances are changed in the interests of continued product improvement.