

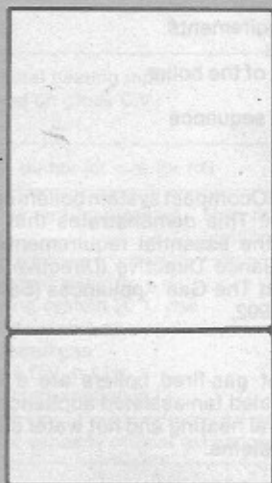
INSTRUCTIONS FOR INSTALLATION AND SERVICING

Wall mounted
THERMOcompact®
system boiler
for central heating

Fan-assisted
Room Sealed

This appliance shall be installed in accordance with the relevant Codes of Practice by British Gas or by an authorized installer (CORGI member).

These instructions should be left with the user when the installation is completed.



VC GB 182 EH
GC-No. 4104404

VC GB 242 EH
GC-No. 4104407

VC GB 282 EH
GC-No. 4104410

VC GB 182 EB
VC GB 242 EB
VC GB 282 EB
For use with L.P.G.

See Para
160108

080224

OPERATOR



Vaillant

HEATING, CONTROLS, HOT WATER.

H 100 53 MSA

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These THERMOcompact system boilers carry the 'CE' Mark. This demonstrates that the boiler fulfils the essential requirements of the Gas Appliance Directive (Directive 90 / 396 / EEC) and The Gas Appliances (Safety) Regulations 1992.

1 Introduction

These Vaillant gas-fired boilers are a wall hung room sealed fan-assisted appliance for use with central heating and hot water storage cylinder systems.

Note to installers

The boiler can be installed on an outside or inside wall inside the building.

The boiler is **not** suitable for external installation. The air/flue duct elbow can be set to allow the air/flue duct to connect to the boiler at any angle in the horizontal plane.

Additional bends and elbows may be installed in the air/flue duct. See separate flue instructions supplement.

Output ratings are shown in "Technical Data". The boiler is designed for use in a sealed water system with pumped circulation.

Contact the manufacturer for information on open vented installations.

Circulation pump, expansion vessel, automatic bypass, terminal box, control and safety devices are provided with the appliance.

This boiler does not have a pilot burner. The main burner is ignited electronically direct via two ignition electrodes and checked by means of a flame sensor.

The sealed system pressure relief valve is also provided.

An automatic system by-pass is included in the boiler.

If desired an inhibitor may be used in the system. Guidance on the use of inhibitors is contained in these instructions.

2 Technical Data

Subject to alteration

We cannot accept responsibility for damage as a result of non-observance of these installation and servicing instructions.

Type	VC GB 182 EH	VC GB 242 EH	VC GB 282 EH	Units	
Nominal heating capacity	18 (61440) (64.8)	24 (81900) (86.4)	28 (95500) (101)	kW (BTU/h) (MJ/h)	
Nominal heating input (based on gross C.V.)	22.2 (75770) (79.9)	29.6 (101030) (106.6)	35 (119500) (126)	kW (BTU/h) (MJ/h)	
Main burner jet size for NG	12 x 7/140	16 x 7/140	16 x 7/140	number x mark.	
Burner setting pressure	4.9 (1.9) 0.6 (0.2)	5.1 (2.05) 1.5 (0.6)	6.8 (2.73) 0.6 (0.2)	mbar (in WG)	
Max. rate Ignition rate					
Minimum water flow for heating system 20°C rise	770 (169)	1030 (227)	1200 (265)	l/h (Imp. Gal./h)	
Delivered gas	G 20	G 20	G 20		
Gross C.V. (s.t.)	37.8 (1014)	37.8 (1014)	37.8 (1014)	MJ/m ³ (BTU/cu. ft)	
Gas consumption (s.t.)	2.11 (1.24)	2.82 (1.66)	3.33 (1.96)	m ³ /h (c.f.m.)	
Water capacity of heat exchanger	0.41 (0.09)	0.57 (0.12)	0.57 (0.12)	l (Imp. Gal.)	
Max. nominal flow temperature	90 (194)	90 (194)	90 (194)	°C (°F)	
Maximum total water capacity of heat- ing system (cold ¹⁾) for sealed system	90 (20)	90 (20)	90 (20)	l (Imp. Gal.)	
Pump pressure available for central heating system	0.25 (8.4)	0.25 (8.4)	0.25 (8.4)	bar (feet)	
Weight	60 (132)	61 (134)	61.5 (136)	kg (pound)	
Electric connection	Voltage Input external Fuse internal Fuses	230-240/50 135 3 0.16/2	230-240/50 135 3 0.16/2	230-240/50 180 3 0.16/2	V~/Hz W Amp Amp (slow)

¹⁾ For systems having a larger water capacity an additional expansion vessel can be installed easily.

3 Construction of appliance

- 1 Air/flue duct*
- 4 Combustion chamber
- 6 Gas control unit with operator
- 7 Pressure differential switch
- 9 Circulating pump
- 11 Pressure gauge
- 12 Flow thermometer
- 17 Terminal box electric system
- 18 Flow temperature selector
- 19 Fuses T 2 A (slow)
- 21 Fault suppression button ignition
- 22 Fault signalling lamp
- 24 Main switch
- 25 Fuse electronic system - 160 mA (slow)

* The connection elbow is supplied together with the accessory No. 9023 (air/flue duct).

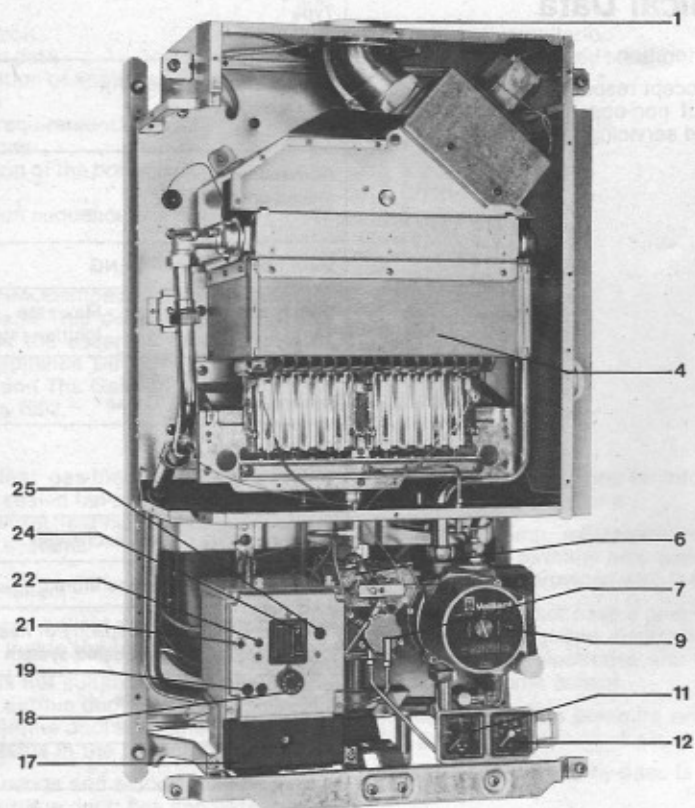


Fig. 1

4 Function

- 1 Flue gas duct
- 2 Air duct
- 3 Main heat exchanger
- 4 Venting point
- 5 Combustion chamber
- 6 Automatic air vent
- 7 Flame sensor electrode
- 8 Burner
- 9 Gas section
- 10 Gas operator
- 11 C.H. expansion vessel pressure test point
- 12 C.H. expansion vessel
- 13 Circulating pump
- 15 C.H. pressure relief valve
- 19 Gas service valve
- 20 C.H. return service valve
- 21 C.H. system
- 22 C.H. flow service valve
- 23 Gas supply
- 25 System bypass
- 28 Electronic control box
- 30 Ignition electrodes
- 32 N.T.C. flow sensor
- 33 Overheat cut off sensor
- 34 Differential valve
- 36 Air pressure switch
- 37 Fan
- 38 C.H. overheat thermostat

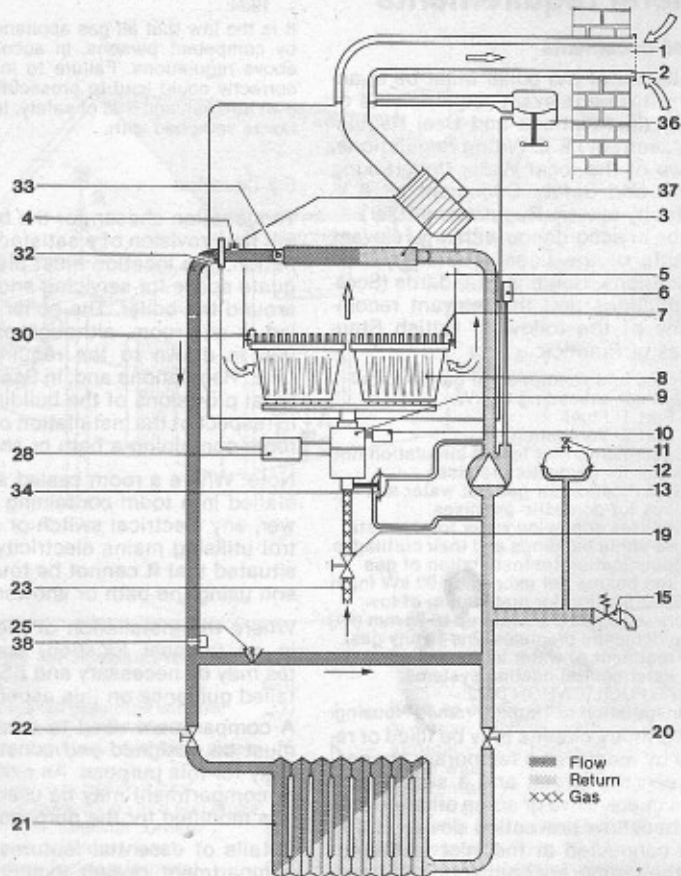


Fig. 2

5 General requirements

5.1 Related documents

The installation of the boiler must be in accordance with the relevant requirements of Gas Safety (Installations and Use) Regulation 1984*, current I.E.E. Wiring Regulations, the by-laws of the local Water-Undertaking and Health and Safety Document N° 6.35 'The Electricity at work Regulations 1989'. It should be in accordance with any relevant requirements of the Local Authority, Building Regulations, Building Standards (Scotland) Regulations and the relevant recommendations of the following British Standard Codes of Practice:

- BS 5440: Flues and ventilation of gas fired boilers not exceeding 60 kW.
 - Part 1: Flues
 - Part 2: Ventilation
- BS 5449 Specification for forced circulation hot water for domestic premises.
- BS 5546: Specification for gas hot water supplies for domestic premises.
- BS 6700: Services supplying water for domestic use within buildings and their curtilages.
- BS 6798: Specification for installation of gas fired boilers not exceeding 60 kW input.
- BS 6891: Specification for installation of low pressure gas pipework up to 28 mm (R1) in domestic premises (2nd family gas).
- BS 7593: Treatment of water in domestic hot water central heating systems.

BRITISH GAS PUBLICATION DM2:

Guide for Installation in Timber Framed Housing. Unvented primary circuits may be filled or replenished by means of a temporary connection between the circuit and a supply pipe provided a check valve or some other no less effective backflow prevention device is permanently connected at the inlet to the circuit and the temporary connection is removed after use.

*) Gas Safety (Installation and use) Regulation, 1984:

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

5.2 Location

The location chosen for the boiler must permit the provision of a satisfactory flue termination. The location must also provide adequate space for servicing and air circulation around the boiler. The boiler may be installed in any room, although particular attention is drawn to the requirements of the I.E.E. Regulations and, in Scotland, the electrical provisions of the building regulations, in respect of the installation of the boiler in a room containing a bath or shower.

Note: Where a room sealed appliance is installed in a room containing a bath or shower, any electrical switch or appliance control utilising mains electricity should be so situated that it cannot be touched by a person using the bath or shower.

Where the installation of the boiler will be in an unusual location, special procedures may be necessary and BS 6798 gives detailed guidance on this aspect.

A compartment used to enclose the boiler must be designed and constructed specifically for this purpose. An existing cupboard or compartment may be used provided that it is modified for the purpose.

Details of essential features of cupboard/compartment design including airing cupboard installations are given in BS 6798.

5.3 Gas supply

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

A gas meter is connected to the service pipe by the local gas supplier or their contractor.

An existing meter should be checked to ensure that it is capable of passing an additional 2.11 m³/h (74.4 CFH) before the VCGB 182EH or 2.82 m³/h (99.6 CFH) before the VCGB 242EH and 3.33 m³/h (117.6 ft³/h) before the VCGB 282EH is installed.

Installation pipes should be fitted in accordance with BS 6891.

Pipework from the meter to the boiler must be of an adequate size. Do not use pipes of a smaller size than the boiler gas connection.

The complete installation must be tested for soundness and purged as described in BS 6891.

5.4 Electrical supply

Wiring external to the boiler must be installed in accordance with the current I.E.E. Regulations and any local regulations which apply.

The boiler is supplied for connection to a 240 V~, 50 Hz. Fuse rating is 3 A.

This appliance must be earthed. The method of connection to the mains electricity supply must provide a means of completely isolating the boiler and its ancillary controls. Isolation is preferably by the use of a fused three-pin plug and unswitched shuttered socket outlet, both complying with the requirements of BS 1363. Alternatively, a 3 Amp. fused doublepole switch with a 3 mm contact separation on both poles may be used.

5.5 Flue system

Detail recommendations for flueing are given in BS 5440:1. The following notes are intended to give general guidance only.

The air/flue duct and terminal assembly can be completely assembled from the inside of the building.

1. The terminal must be positioned such that the combustion products can disperse freely at all times.
2. In certain weather conditions a terminal may steam (high efficiency appliance) and positions where this could cause nuisance should be avoided.
3. If the terminal is fitted within 1000 mm of a plastic or painted gutter or within 500 mm of painted eaves an aluminium shield of at least 1000 mm length should be fitted to the underside of the gutter or painted surface.
4. The air inlet/products outlet duct and the terminal of the boiler must not be closer than 25 mm (1 in.) to combustible material. Detailed recommendations on protection of combustible material are given in BS 5440:1.
5. If the terminal is fitted less than 2 m above a balcony, above ground or above a flat roof to which people have access, then a suitable terminal guard must be provided and fitted.

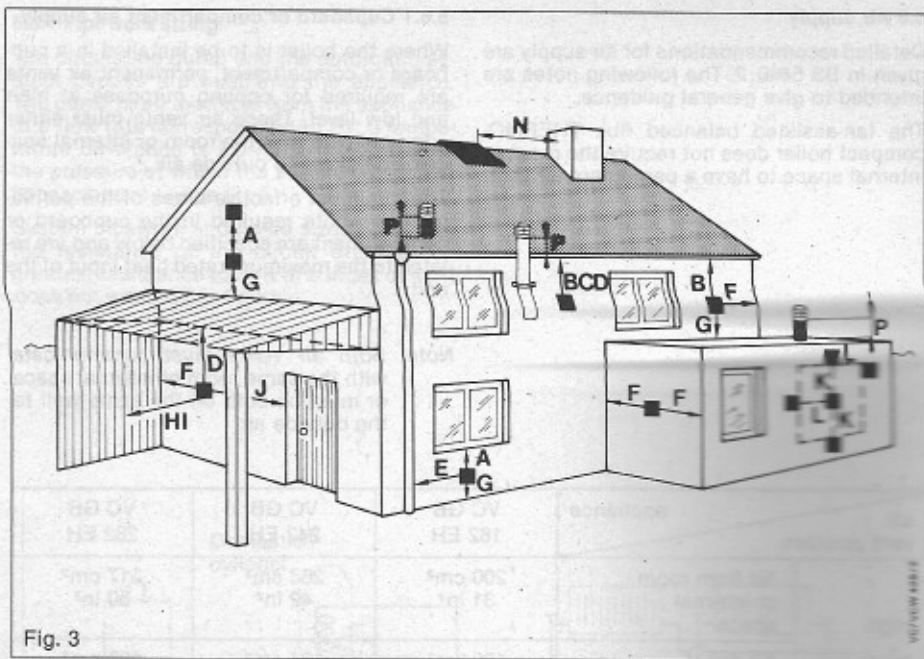


Fig. 3

Terminal position for fan-assisted flue (minimum distance)

	mm		mm
A — Directly below an openable window or other opening (eg air brick)	300	J — From an opening in the car port (e.g. door window) into dwelling	1200
B — Below gutters, soil pipes or drain pipes	75	K — Vertically from a terminal on the same wall	1500
C — Below eaves	200	L — Horizontally from a terminal on the same wall	300
D — Below balconies or car port roof	200	M — From the wall on which the terminal is mounted	N/A
E — From vertical drain pipes and soil pipes	75	N — From a vertical structure on the roof	N/A
F — From internal or external corners	300	P — Above intersection with roof	N/A
G — Above ground or balcony level	300		
H — From a surface facing a terminal	600		
I — From a terminal facing a terminal	1200		

5.6 Air supply

Detailed recommendations for air supply are given in BS 5440:2. The following notes are intended to give general guidance.

The fan-assisted balanced flue THERMO-compact boiler does not require the room or internal space to have a permanent air vent.

5.6.1 Cupboard or compartment air supply

Where the boiler is to be installed in a cupboard or compartment, permanent air vents are required for cooling purposes at high and low level. These air vents must either communicate with the room or internal space or be direct to outside air.

The minimum effective areas of the permanent air vents required in the cupboard or compartment are specified below and are related to the maximum rated heat input of the unit.

Note: Both air vents must communicate with the same room or internal space or must be both on the same wall to the outside air.

air vent position		appliance	VC GB 182 EH	VC GB 242 EH	VC GB 282 EH
High level	Air from room or internal space		200 cm ² 31 in ²	268 cm ² 42 in ²	317 cm ² 50 in ²
	Air direct from outside		100 cm ² 16 in ²	134 cm ² 21 cm ²	159 cm ² 25 in ²
Low level	Air from room or internal space		200 cm ² 31 in ²	268 cm ² 42 in ²	317 cm ² 50 in ²
	Air direct from outside		100 cm ² 16 in ²	134 cm ² 21 cm ²	159 cm ² 25 in ²

5.7 Water circulating system

For general guidance reference should be made to the British Gas publication — BRITISH GAS SPECIFICATIONS FOR DOMESTIC WET CENTRAL HEATING SYSTEMS.

Detailed recommendations for the water circulation system are given in BS 6798 and BS 5449:1 (for smallbore and microbore systems).

Detailed recommendations for the domestic hot water system are given in BS 5546 and BS 6700. The hot water storage cylinder must be of the double feed indirect type. Single feed indirect cylinders must not be used on sealed systems.

It is recommended that copper tubing to BS 2871:1 is used for all water carrying pipework. Any pipework not forming part of the useful heating surface should be insulated to help prevent heat loss and possible freezing, particularly where pipes are run through roof spaces and ventilated under-floor spaces.

Draining taps must be located in accessible positions which permit the flushing and draining of the complete heating and hot water systems. Draining taps should be at least ½" BSP nominal size and be in accordance with BS 2879.

Particularly where a new boiler is to be fitted to an existing system, it is good practice that the system is thoroughly cleansed. This cleansing should take place prior to the fitting of the new boiler and be in accordance with BS 7573.

For advice on the application of system cleansers contact Sentinel, Grace Dearborn Ltd., Widnes, Cheshire WA8 84D, Tel. 0151 495 1861.

5.8 Radiator sizing

Typical sealed central heating and stored hot water installations are shown in figs. 4 and 5.

This Vaillant appliance is designed to operate on a temperature difference around the heating system of 20°C .

The mean radiator temperature for sizing purpose will therefore be the boiler flow temperature minus 10°C .

For example:

Boiler flow temp. = 86°C

(Boiler thermostat knob setting 8—9).

Mean radiator temp. = $86^{\circ}\text{C} - 10^{\circ}\text{C} = 76^{\circ}\text{C}$.

The mean radiator temperature is used in the normal way in conjunction with the designed room temperature and heat loss to determine the size of radiators required. (See radiator manufacturer's literature).

5.8.1 Pipework sizing

The circulating pump and the automatic system bypass are built into the appliance. The pump head available from the appliance at a flow rate corresponding to 20°C temperature difference is 2.5 m (8.4 feet). This is the pressure at which the automatic system bypass opens — see fig. 6.

System pipework should be sized such that the resistance of the circuit offering the greatest resistance to flow (the index circuit) does not exceed this figure.

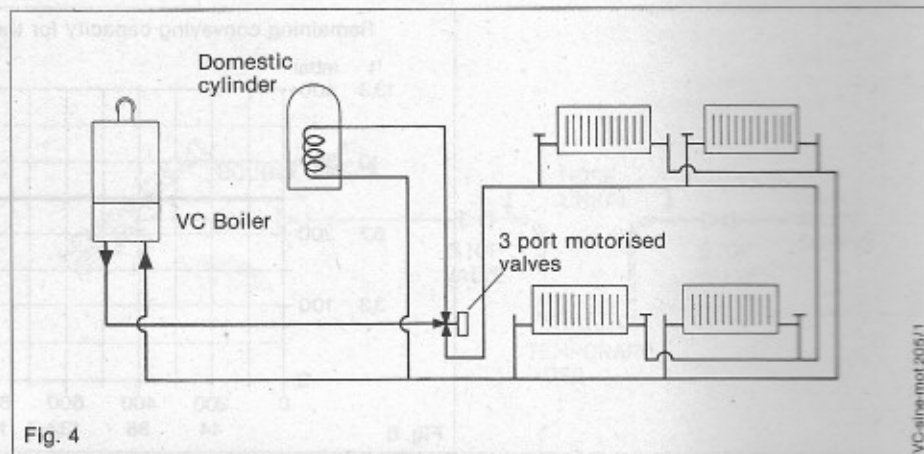


Fig. 4

5.9 System by-pass

A system bypass is included within the boiler. The boiler is suitable for use in systems with thermostatic radiator valves and no additional by-pass is required.

5.10 Open vented system

Refer to manufacturers for further details.

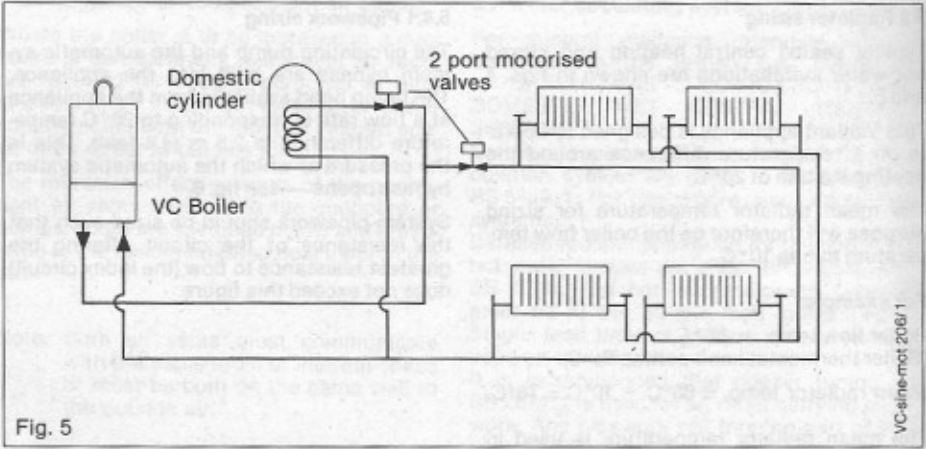


Fig. 5

VC-line-mot 200/1

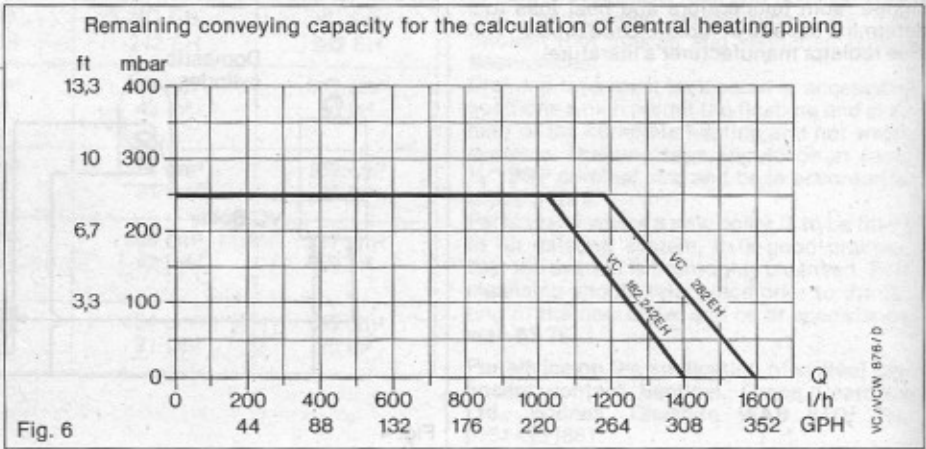


Fig. 6

VC/VCW 876/D

5.11 Sealed systems

Sealed systems do not require feed and expansion cisterns, open vents etc. Only good quality radiator valves and fittings should be used in order to prevent excessive detrimental topping-up.

5.11.1 Pressure relief valve

A pressure relief valve is provided ready-assembled to the return C.H. service valve (4, fig. 15). This safety device is required on all sealed C.H. systems and is pre-set at 3 bar and is provided with 3/4 in. BSP connection for a discharge pipe.

5.11.2 Pressure gauge

This is factory fitted to the boiler and indicates the primary circuit pressure to facilitate filling and testing.

5.11.3 Expansion vessel

An expansion vessel is incorporated into the boiler suitable for a sealed heating system with a maximum water contents of 90 litres (20 imp. galls.).

If the nominal capacity of the built-in expansion vessel is not sufficient for the heating system (for instance in case of modernization of old open systems) an additional expansion vessel can be installed external to the appliance in the return pipe as close as possible to the boiler in accordance with BS 5449: Part 1.

Guidance on the sizing of additional expansion vessel sizing is given in Table A (p. 13).

5.12 Filling and make up (fig. 7)

The system should be filled with water via a separate filling point fitted at a convenient point on the heating circuit. Where local Water Authority Regulation allows, a temporary connection to the mains may be used. The connection must be removed when filling is completed. Where local Water Authority Regulation does not allow temporary connection, a sealed system filler pump with break tank must be used.

In principle, sealed systems do not require water make-up facilities, but experience has shown that some make-up may be necessary.

Methods of filling sealed systems are given in appendix A of BS 6798 and BS 5449: Part 1.

5.13 Parallel installation

If two appliances are installed in parallel for one heating system, it is essential to install one nonreturn valve each in the heating system flow pipe of the appliances.

Refer to manufacturers for further details.

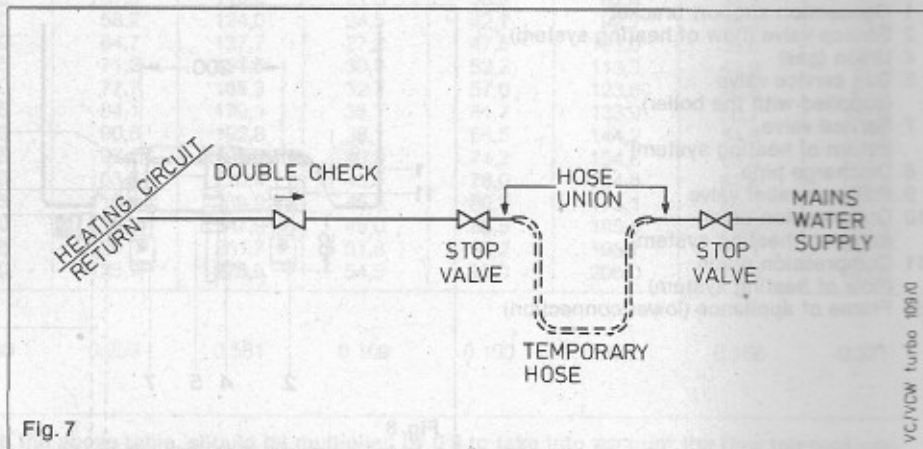


Fig. 7

- 1 Connection support bracket
- 2 Service valve (flow of heating system)
- 4 Union (gas)
- 5 Gas service valve
- 7 Service valve (return of heating system)
- 8 Discharge pipe
- 9 Pressure relief valve
- 10 Compression union (return of heating system)
- 11 Compression union (flow of heating system)
- 23 Frame of appliance (lower connection)

5.14 Gas and water connection

A general view of pipework for gas and water connection is given in Fig. 8.

The wall distance (to the finished wall) of pipework for gas and heating system is 50 mm.

5.15 Venting

The appliance is fitted with an automatic air vent. Additional provision should be made to enable the heating system to be vented during filling and commissioning either by automatic air vents or manually. Hydroscopic types of automatic air vents should not be used on a sealed system as these allow evaporation of small quantities of water.

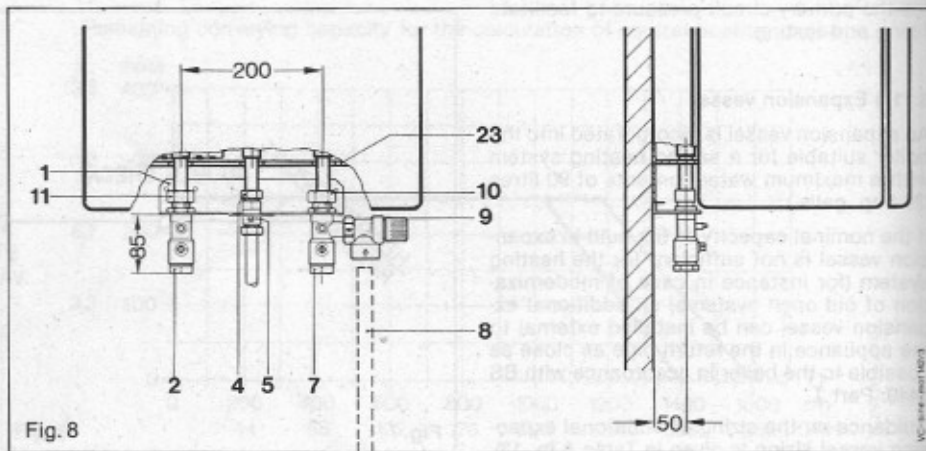


Fig. 8

Table A

Sizing of additional expansion vessels:

Safety valve setting (bar)	3,0									
Vessel charge pressure (bar)	0,5				1,0			1,5		
Initial system pressure (bar)	0,5	1,0	1,5	2,0	1,0	1,5	2,0	1,5	2,0	
Total water content of system	Expansion vessel volume (litres)									
litres										
25	2,1	3,5	6,5	13,7	2,7	4,7	10,3	3,9	6,3	8,3
50	4,2	7,0	12,9	27,5	5,4	9,5	20,6	7,8	11,7	16,5
75	6,3	10,5	19,4	41,3	8,2	14,2	30,9	11,7	17,6	24,8
100	8,3	14,0	25,9	55,1	10,9	19,0	41,2	15,6	23,1	32,1
125	10,4	17,5	32,4	68,9	13,6	23,7	51,5	19,5	29,3	41,3
150	12,5	21,0	38,3	82,6	16,3	28,5	61,8	23,4	35,6	49,6
175	14,6	24,5	45,3	96,4	19,1	33,2	72,1	27,3	41,9	57,9
200	16,7	28,0	51,8	110,2	21,8	38,0	82,4	31,2	47,8	66,2
225	18,7	31,5	58,2	124,0	24,5	42,7	92,7	35,1	53,7	74,5
250	20,8	35,0	64,7	137,7	27,2	47,5	103,0	39,0	59,0	82,7
275	22,9	38,5	71,2	151,5	30,0	52,2	113,3	42,9	65,0	91,0
300	25,0	42,0	77,7	165,3	32,7	57,0	123,6	46,8	70,9	98,3
325	27,0	45,5	84,1	179,1	35,7	61,7	133,9	50,7	76,8	107,6
350	29,1	49,0	90,6	192,8	38,1	66,5	144,2	54,6	82,7	115,9
375	31,2	52,5	97,1	206,6	40,9	71,2	154,5	58,5	88,6	124,1
400	33,3	56,0	103,6	220,4	43,6	76,0	164,8	62,4	94,5	132,4
425	35,4	59,5	110,1	239,2	46,3	80,7	175,1	66,3	101,4	140,7
450	37,5	63,0	116,5	247,9	49,0	85,5	185,4	70,2	108,3	149,0
475	39,6	66,5	123,0	261,7	51,8	90,2	195,7	74,1	115,2	157,2
500	41,6	70,0	129,9	275,5	54,5	95,0	206,0	78,0	122,1	165,5
For system volumes other than those given above, multiply the system volume by the factor across	0,0833	0,140	0,259	0,551	0,109	0,190	0,412	0,156	0,261	0,351

The volume of the expansion vessel found from the above table, should be multiplied by 0,9 to take into account the low temperature.

6 Dimensions

(all dimensions in mm)

- 1a Air/flue duct to the rear
- 1b Air/flue duct to the side
- 2 Appliance bracket
- 3 Heating system return $\frac{3}{4}$ " Rp
($\frac{3}{4}$ " B.S.P.)
- 5 Gas connection (15 mm)
- 7 VCGB 282 EH (22 mm)
- 8 Heating system flow $\frac{3}{4}$ " Rp
($\frac{3}{4}$ " B.S.P.)
- 9 Cable entry to the terminal box
for external connections
- 10 Terminal box — electrical system
- 11 Wall outlet for electrical connections
- 12 N/A
- 13 Pre-assembled connection set with
service valves (flow and return)
and pressure relief valve
- 14 Pressure relief valve $\frac{3}{4}$ " Rp
($\frac{3}{4}$ " B.S.P.)

- 11 Max 995 mm without extension
- Max 1960 mm with one extension
- Max 2920 mm with two extensions.

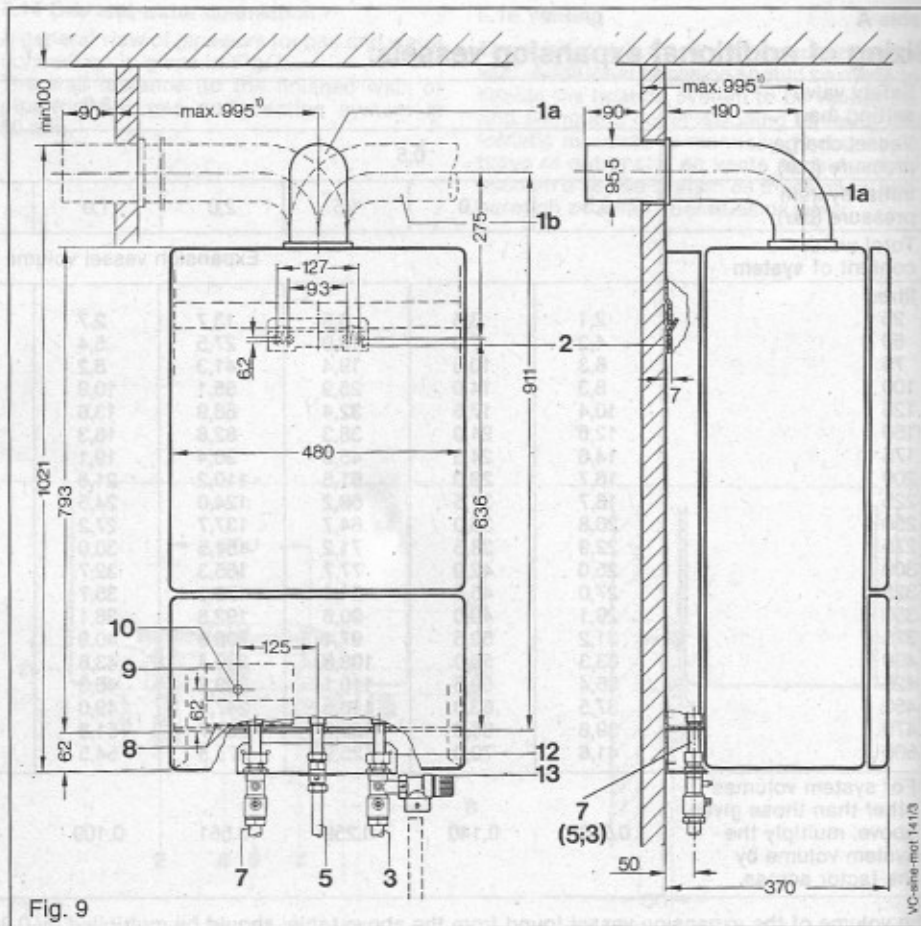


Fig. 9

7 Installation of the boiler

7.1 General

The boiler is to be wall-mounted and a vertical flat area of wall is required which must be of sufficient area for the boiler together with clearances for installation and servicing. The template provided includes these clearances which are:

— 80 mm (3.2 in.) either side of the boiler

Note: A clearance of 25 mm either side of the boiler will allow the safe and correct functioning of the appliance and also allow all servicing and repair operations except for the replacement of the main heat exchanger. The replacement of this component will require a side clearance of 80 mm either side of the boiler which may be catered for by allowing removal of kitchen units etc.

— 150 mm (6 in.) below the boiler

— 265 mm (10.5 in.) on top of the boiler

Additional clearances than those given above may be necessary for installation, as this varies from site to site, it is left to the discretion of the installer.

If the appliance is to be fitted on a wall of combustible material, the wall must be protected by a sheet of fire proof material.

In addition, a minimum clearance of 500 mm (20 in.) must be available at the front of the appliance to enable the boiler to be serviced.

IMPORTANT NOTICE

If the boiler is to be fitted in a timber framed building it should be fitted in accordance with the British Gas publication 'Guide for Gas Installations in Timber Frame Housing'. Reference DM2. If in doubt advice must be sought from the Local Gas Region of British Gas.

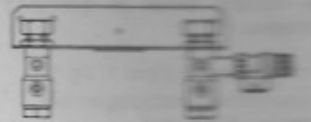
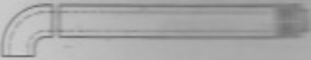





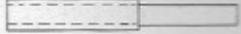
Accessories	Order no.	
1) Pre-assembled connection group incl. isolating valves (flow and return), pressure relief valve	9319	
2) Air/flue duct assembly incl. terminal	300807	
Optional Extras	Order No.	
3) Extension (appr. 1 m) for the standard air/flue duct assembly	300802	
4) Additional 90° elbow	300808	
5) Additional 45° bends (pair)	300809	
6) Additional air/flue duct joint clamps (pair)	300806	
7) Se-duct flue kit	300810	
8) Terminal guard	9308 GB	

Fig. 10

VC-ener med 9319

7.2 Installation accessories

The connection accessories for the connection of the boiler are listed in the fig. 10.

Note:

Should the terminal of the air/flue duct assembly need to be protected by a terminal guard, a suitable guard is available from Vaillant Ltd. (Art. No. 9308 GB).

8 Delivery

The Vaillant boiler is delivered in three packages:

- the cased boiler (item 1, fig 11).
- pre-assembled installation set (order-no.: 9319) and
- the flue duct/terminal assembly (order-no.: 300807)

The foam packing shells (2) contain the following:

- a) Upper front panel (3)
- b) Door panel (4) and screen plate (4a)
- c) Paper template (5)
- d) Installation instructions and user instructions (6)
- e) Gas service valve
- f) Wall bracket with fixing screws, wall plugs and 2 compression olives
- g) The appliance (7)

Note: Lift boiler by the appliance frame not by the airflue duct aperture.

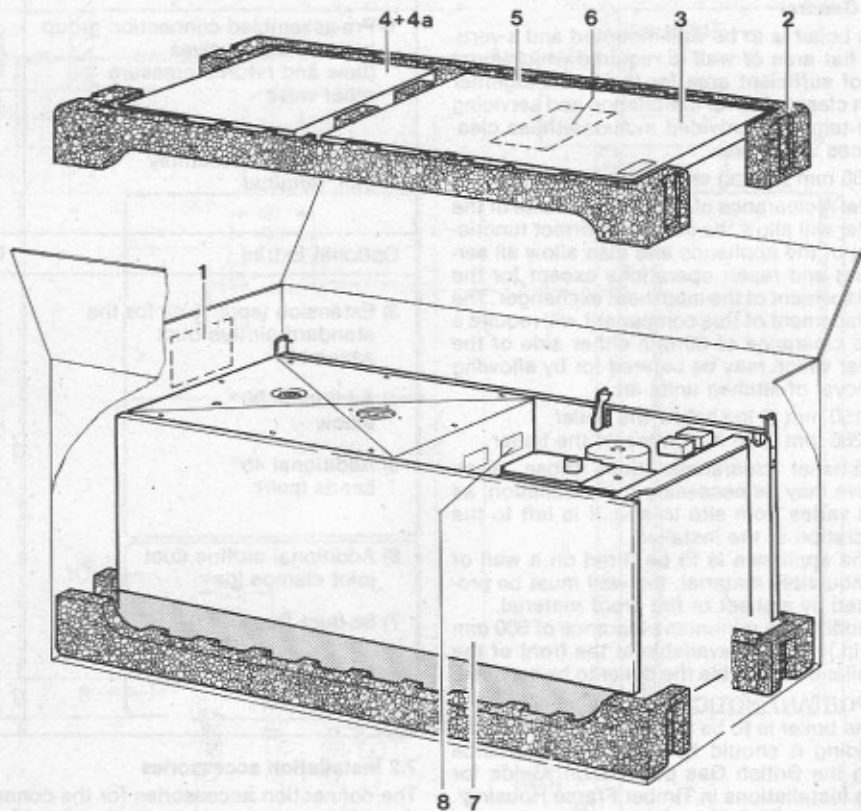


Fig. 11

Check on the data plate (8) the appliance is the correct model for the gas supply.

9 Installation sequence

Using the template (fig. 12)

- Fix the template onto the selected position.

Check with a plumb line that the centre-line (C) of the template used is vertical. The template shows the appliance with necessary clearance around for servicing and air circulation.

Before proceeding check the following:

- a) the necessary air/flue duct length is in accordance with the installation options in section 1 of the instructions packed with the air/flue duct assembly.
 - b) the resulting terminal position is in accordance with section 5.5.
- Mark the position of the centre of flue duct (1) e.g. by drilling through. In the case of an installation with the air/flue duct to the rear of the appliance, mark the circumference of the hole, too.
 - Drill two holes (2) out of four fixing the appliance bracket as marked on the template with 8 mm (5/16 in.) diameter.
 - Drill three holes with 8 mm (5/16 in.) diameter (3) out of seven to fit the connecting group. Use the alternative fixing holes where necessary.

Refer to the air/flue duct installation instructions, Section 2, General, for full details.

Drill the flue duct hole through the wall with a 100 mm core drill.

- Remove the template from the wall and fit the mounting bracket in position (2) and the connecting group in position (3) using the wall plugs and screws provided ensuring both brackets are level and securely fixed to the wall.

If the condition of the wall is poor, additional or alternative screw fixings will be required to ensure adequate support.

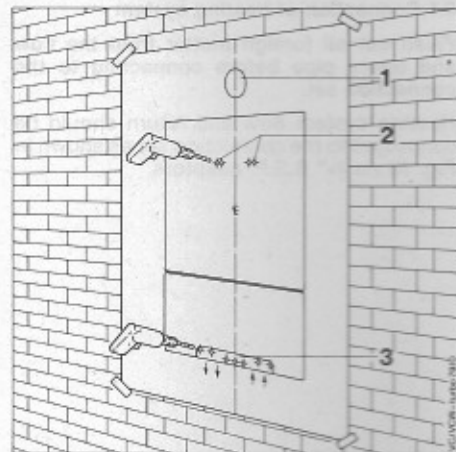
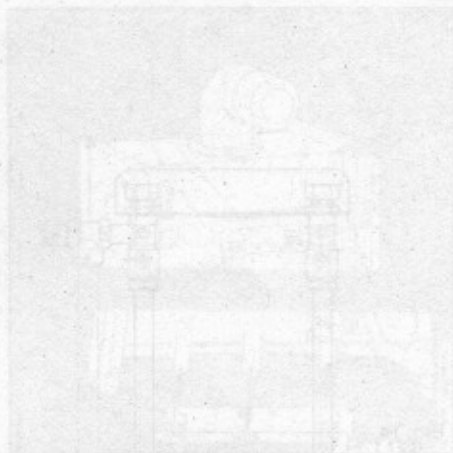


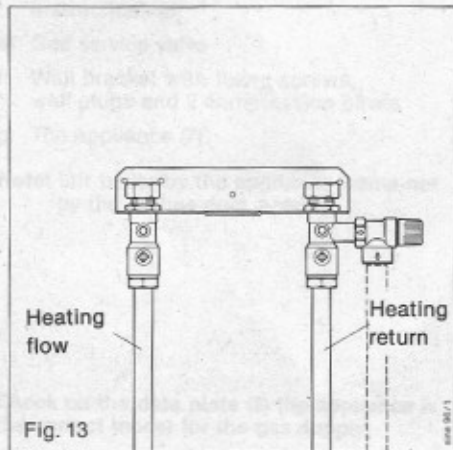
Fig. 12



9.1 Connection of heating system

Flush out all foreign matter from the flow and return pipe before connecting to the connection set.

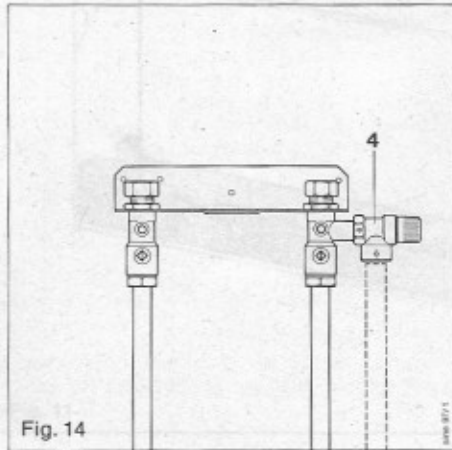
Heating system flow and return should be connected to the connection set as shown in Fig. 13 via $\frac{3}{4}$ " B.S.P. adaptors.



9.2 Pressure relief valve and overflow

The pressure relief valve (4), required for a sealed system, is included in the connection set 9313.

15 or 22 mm pipe should be connected to the pressure relief valve via a $\frac{3}{4}$ " B.S.P. adaptor. This discharge pipework should be as short as possible and installed with a continuous fall away from the boiler. The pipe should terminate in a position which ensures that any discharge of water or steam from the valve cannot create a hazard to persons in or about the Premises, or damage to any electrical components or external wiring, and the point of discharge should be clearly visible. The discharge must not terminate above a window, an entrance or any type of public access. The installer must consider that the pipe could discharge boiling water.



9.3 Air/flue duct

Before proceeding, refer to section 2 of the air/flue duct installation instructions and install the air/flue duct assembly.

9.4 Fitting the appliance

Close service valves (5), unscrew union nuts (6) and take off the olive-shaped plastic plugs.

Unpack boiler from carton and remove side panels (as in fig. 36) and packing aids as well as plastic caps from the connections.

Push union nuts (6) and compression rings (7) onto the C.H. flow and return pipes of the appliance. Temporarily secure nuts and rings well clear of the ends of the pipes with tape. Mount the appliance by inserting the connection tubes into the C.H. service cocks on the connection group and hang the appliance with the crossbar (2) onto the appliance fixing bracket (3).

Remove tape and tighten union nuts (6).

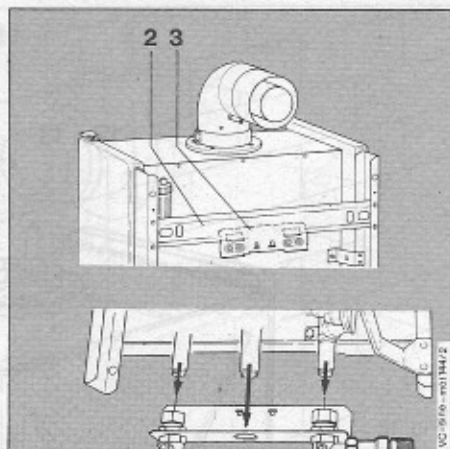
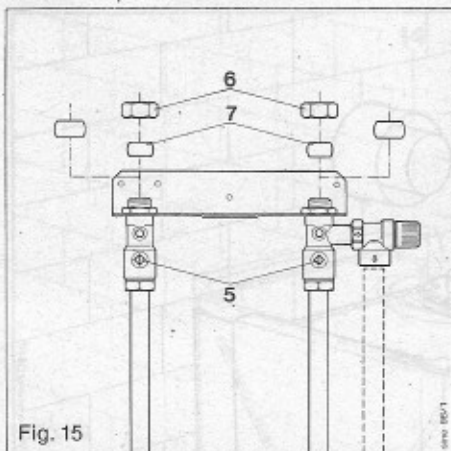


Fig. 16

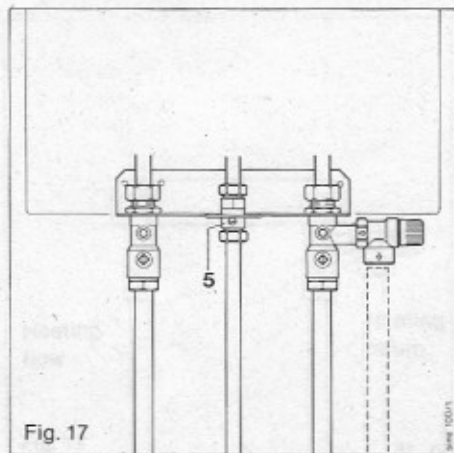
9.5 Gas connection

Fit the gas service valve (5) to the appliance.

Ensure the gas service valve is fully located on the appliance and the ON/OFF control is accessible.

Clean out all foreign matter from the gas supply pipe before connecting to the service valve!

Connect the gas supply pipe to the service valve and tighten.



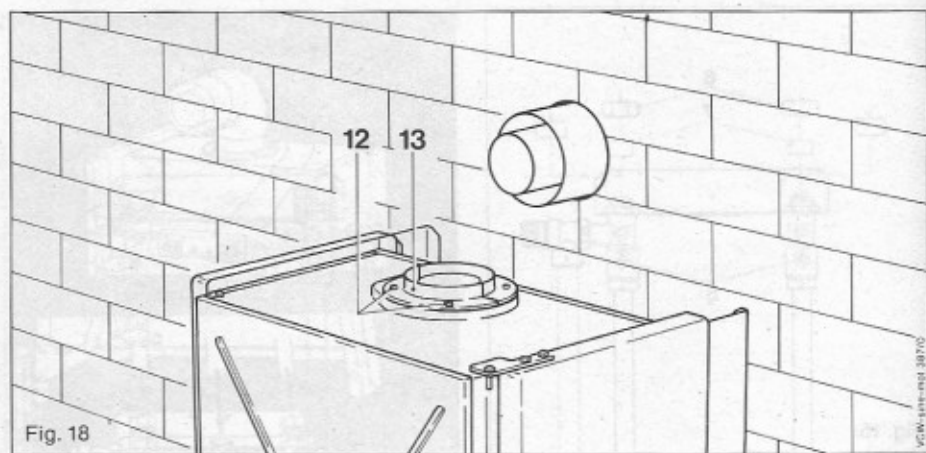
9.6 Connection of the air/flue duct to the appliance

Note:

Refer to the air/flue duct installation instructions for full details of installation of the air/flue duct.

This section is included for further reference only, in case the appliance has to be removed.

- Remove two screws (12, fig. 18) and take off one half-ring (13, fig. 18).



Place the 63 mm diameter x 35 mm wide flue duct clamp (14, fig. 19) loosely over the flue duct (1, fig. 19).

Place a 63 mm diameter x 22 mm wide flue duct clamp (14, fig. 19) over the flue gas connection on the boiler.

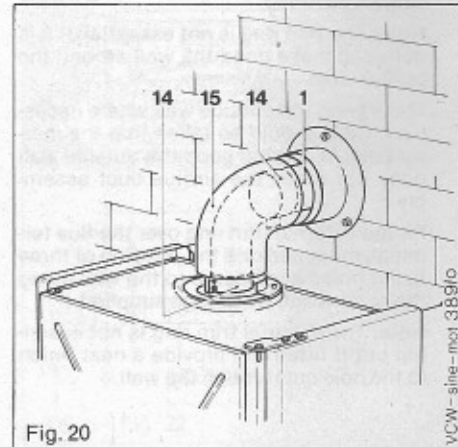
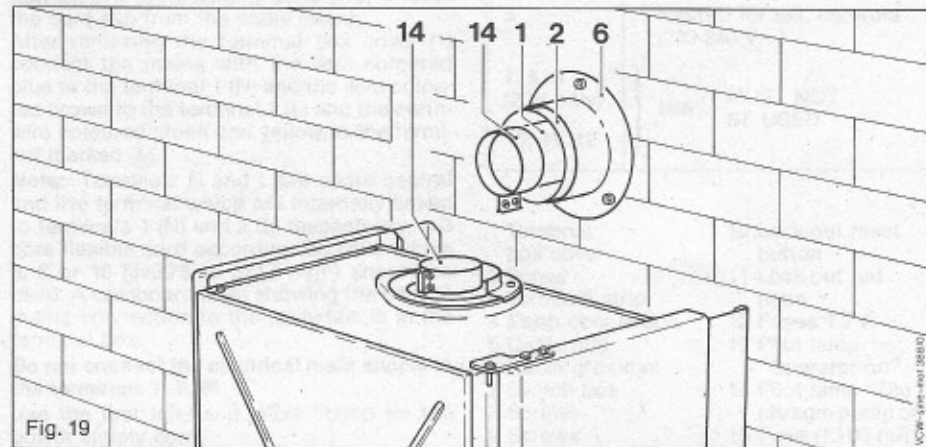
Loosen screws on the 95 mm diameter x 55 mm wide clamp (17, fig. 21) and push over the air duct.

Remove screws and sealing washer on the 95 mm diameter x 25 mm wide clamp (16, fig. 21) and push onto the flue elbow on the side to be connected to the appliance. Ensure the clamp ring is clear of the end of the elbow.

Push the flue elbow into the clamp (24, fig. 20) connected to the appliance flue gas duct and tighten the securing screws lightly.

Ensure that the flue elbow and air/flue duct line up and are closely butted together. Pull the clamp (1, fig. 21) over the joint between the flue gas duct and the flue elbow. Ensure that the air/flue duct and the terminal are correctly positioned. Tighten the securing screws on both flue duct clamps.

Note: Ensure that the air/flue duct and terminal assembly is not displaced through the wall. Check that the terminal assembly still projects 90 mm.



- Refit the half-ring (13, fig. 21), and two screws (12, fig. 21). Pull the 95 mm diameter x 25 mm wide clamp (16, fig. 21) over the joint between the flue elbow and the half rings. Refit the screws and sealing washers and tighten lightly.

- Pull the 95 mm diameter x 55 mm wide clamp ring (17, fig. 21) over the joint between the flue elbow and the air/flue duct.

- Tighten the screws on both air duct clamps.

Drill two holes, 3 mm diameter through both air duct clamps into the air ducts at the most convenient positions (28, fig. 21). Take care not to penetrate the inner flue duct. Screw the clamps to the air ducts using the self tapping screws provided.

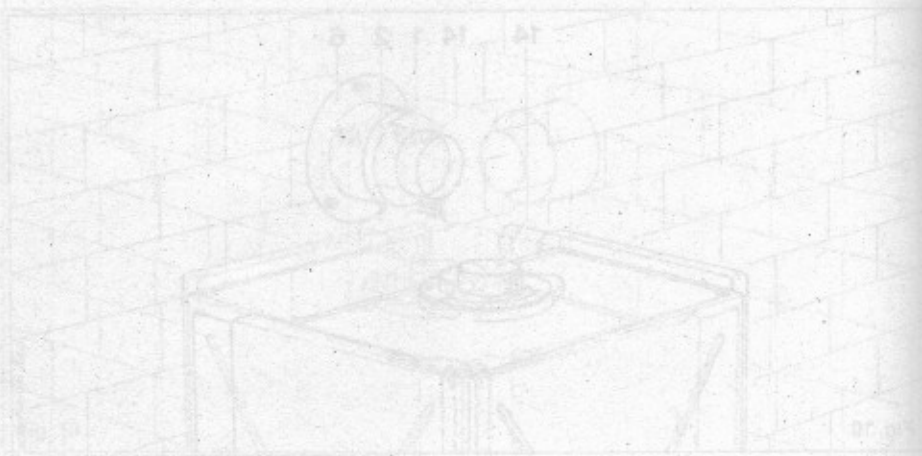
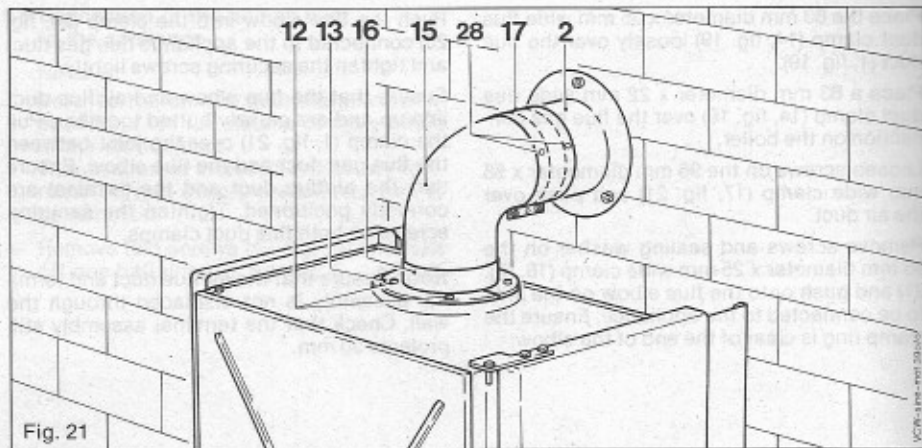
- Secure inner trim ring to wall using three screws provided.

Note: The trim ring is not essential. If it is not used make good the wall around the air/flue duct.

- Make good the outside wall where necessary. Care should be taken that the mortar used in making good the outside wall does not block the air/flue duct assembly.

Fit the external trim ring over the flue terminal, mark and drill the position of three fixing holes and secure to the wall using the screws and wall plugs supplied.

Note: The external trim ring is not essential but if fitted will provide a neat finish to the hole cut through the wall.



10 Electrical installation

Vaillant boilers are completely wired. It is only necessary to connect to the electrical mains and the room thermostat. Connect to a 230-240 V (~), 50 Hz electrical supply fused 3 A.

Warning! This appliance must be earthed.

The method of connection to the electricity supply must facilitate complete isolation and should preferably be via a fused, three-pin plug and unswitched, shuttered socket, both complying with the requirements of BS 1363. Alternatively, connection may be made via a fused, double-pole isolator having a contact separation of at least 3 mm in all poles and supplying the boiler and system controls only.

When connecting the power-supply cord, ensure that the length of the wires is such that the current-carrying conductors become taut before the earthing conductor should the cord slip from the cable clamp.

After removing the terminal box cover (1) connect the mains with the wire coloured blue to the terminal 1 (N) and the wire coloured brown to the terminal 2 (L) and the earth-wire coloured green and yellow to the terminal marked ⊕.

Note: Terminals N and L are spare neutral and live terminal which are internally linked to terminals 1 (N) and 2 (L) respectively. A 3 core flexible cord according BS 6500 tables 6, 8 or 16 (3x0,75 to 3x1,5 mm²) should be used. A cardboard label showing the correct mains connection to the terminals is in the terminal box.

Do not connect the electrical main supply to the terminals 7, 8, 9!

Use the first left-hand cable clamp for the power supply cord.

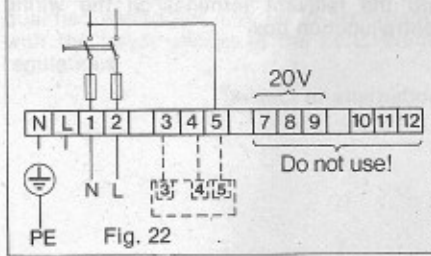
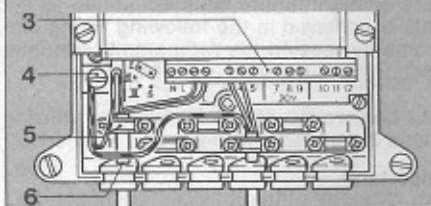
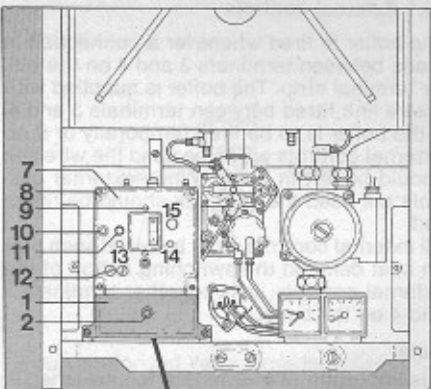
Full wiring diagrams for various control schemes are shown in fig. 23-28. Take care that the cords to the terminal box can not touch the hot water pipework, otherwise cords having a minimum appropriate T-rating of 90 shall be used.

After installation, preliminary system checks i.e. earth continuity, polarity short circuit and resistance to earth shall be carried out using a suitable meter.

List of terminals

Terminals	Connection
1, 2 (N, L)	Mains
3, 4	Room thermostat (230-240 V~)
5	Neutral for ext. controls (230-240 V~)
7, 8, 9 (20V only)	N/A MUST NOT BE USED
10, 11, 12	

- | | |
|----------------------|-----------------------------------|
| 1 Terminal box cover | 10 Lock-out reset button |
| 2 Screw | 11 Lock-out red neon |
| 3 Terminal strip | 12 Fuses T 2 A |
| 4 Earth connection | 13 Pilot lamp "Operator on" |
| 5 Cable grip | 14 Pilot lamp "Diaphragm pump on" |
| 6 Cable grommet | 15 Fuse (T 160 mA) |
| 7 Switch box | |
| 8 Screws | |
| 9 Screws | |



10.1 External controls

The boiler is fired whenever a connection is made between terminals 3 and 4 on the boiler terminal strip. The boiler is supplied with a wire link fitted between terminals 3 and 4. If the boiler is to be fired temporarily or if no external controls are to be used the wire link should be left in place. When external controls are used the wire link should be removed.

All external controls must be wired such that on heat demand the switching action of the external controls links together terminals 3 and 4 on the boiler.

Note:

It is important to ensure that the switched live into terminal 4 is supplied ONLY from terminal 3, via the external controls, and NOT from an external live source!

This is achieved in the following wiring diagrams by feeding the programmer live connection from terminal 3 on the boiler.

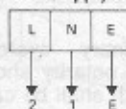
10.2 Connection details for systems utilizing a 3 port motorized valve

Important:

The arrowed numbers indicate connection into the relevant terminal on the wiring centre/junction box.

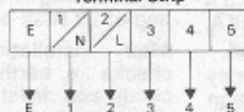
Diagram only applies to the specific controls mentioned.

3amp fused
main supply



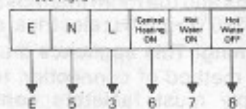
VAILLANT VC/VCW BOILER

Terminal Strip

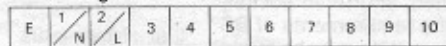


Programmer

For Programmer connections
see Fig. 24

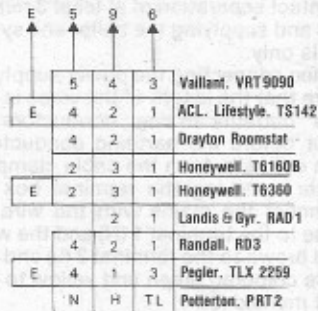
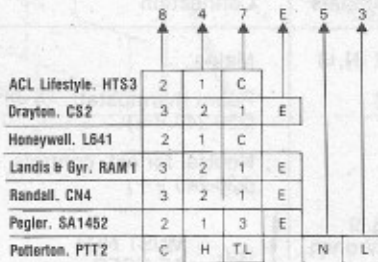


Wiring Centre/Junction Box*

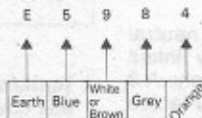


* DO NOT USE PRE-WIRED PRINTED BOARD TYPE.

NOT USED.



Cylinder Thermostat.



Room Thermostat.

3 port mid position motorised valve.

ACL 679H34030L0.
Drayton Flowshare 2.
Grasslin (Tower) MP 322C.
Honeywell V4073A.
Landis & Gyr SK3 (No Earth Required).
Pegler Unishare SDV 1211 (No Earth Required).
Potterton PMV3.

Fig. 23

10.1 External controls

The boiler is fired whenever a connection is made between terminals 3 and 4 on the boiler terminal strip. The boiler is supplied with a wire link fitted between terminals 3 and 4. If the boiler is to be fired temporarily or if no external controls are to be used the wire link should be left in place. When external controls are used the wire link should be removed.

All external controls must be wired such that on heat demand the switching action of the external controls links together terminals 3 and 4 on the boiler.

Note:

It is important to ensure that the switched live into terminal 4 is supplied **ONLY** from terminal 3, via the external controls, and **NOT** from an external live source! This is achieved in the following wiring diagrams by feeding the programmer live connection from terminal 3 on the boiler.

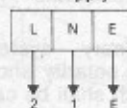
10.2 Connection details for systems utilizing a 3 port motorized valve

Important:

The numbered numbers indicate connection into the relevant terminal on the wiring centre/junction box.

Diagram only applies to the specific controls mentioned.

3amp fused
main supply

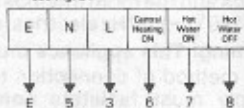


VAILLANT VC/VCW BOILER
Terminal Strip

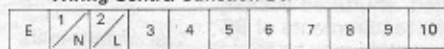


Programmer

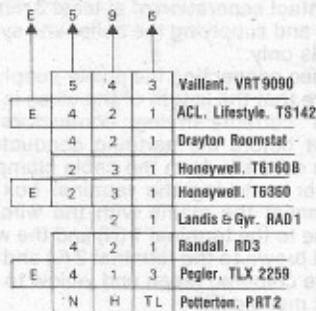
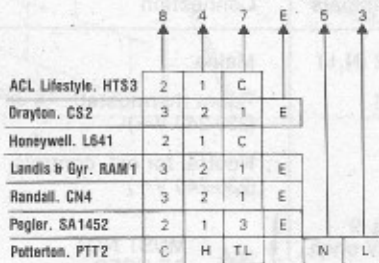
For Programmer connections
see Fig. 24



Wiring Centre/Junction Box*



* DO NOT USE PRE-WIRED PRINTED CIRCUIT BOARD TYPE.



Cylinder Thermostat.



3 port mid position motorised valve.

ACL 679H34030L0.
Drayton Flowshare 2.
Grasslin (Tower) MP 322C.
Honeywell V4073A.
Landis & Gyr SK3 (No Earth Required).
Pegler Unishare SDV 1211 (No Earth Required).
Potterton PMV3.

Room Thermostat.

Fig. 23

Connection details between programmer and wiring centre
(3 port motorized valve systems)

ACL Lifestyle. LS 241, LS 522 & LS 722.

N	L	1	2	3	4
↓	↓	↓	↓	↓	↓
5	3	8	NOT USED	7	6

**Drayton Tempus 3
Tempus 4
Tempus 7**

E	N	L	1	2	3	4
↓	↓	↓	↓	↓	↓	↓
E	5	3	8	NOT USED	7	6

Honeywell ST 7100.

Please Note: Link L-Com 3 & Com 6.

N	L	3	4	5	6	7	8
↓	↓	↓	↓	↓	↓	↓	↓
5	3	NOT USED	6	8	7	8	7

Horstmann 525 & 527.

Please Note: Link L-2 & 2-5.

** Please Note: Earth not required.*

E	N	L	1	2	3	4	5	6
↓	↓	↓	↓	↓	↓	↓	↓	↓
*	5	3	7	8	6	NOT USED		

Landis & Gyr RWB 2, RWB 20* & RWB 40*.

**Please Note: Neutral not required.*

N	L	1	2	3	4
↓	↓	↓	↓	↓	↓
*	3	8	NOT USED	7	6

Potterton EP 2001 + EP 6001.

Please Note: Link L-5.

E	N	L	1	2	3	4	5
↓	↓	↓	↓	↓	↓	↓	↓
E	5	3	8	NOT USED	7	6	

Randall 922 & 972.

Please Note: Link L-2 & 2-5.

**Please Note: Earth not required.*

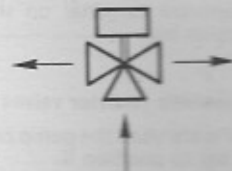
E	N	L	1	2	3	4	5	6
↓	↓	↓	↓	↓	↓	↓	↓	↓
*	5	3	8	7	NOT USED			6

Pegler SP 50 & SP 100.

Please Note: Link L-3.

1	2	L	N	E	S	S	3	4	5
↓	↓	↓	↓	↓			↓	↓	↓
8	7	3	5	E			NOT USED		6

Fig. 24



3 port motorized valve systems
(see Fig. 4)

Fig. 25

Important

1-10 must go to corresponding number in wiring centre.

Do not use pre-wired printed circuit board types.

This drawing is not a wiring diagram. All electrical wiring must be carried out by a qualified electrician and be in accordance with the latest edition of the I.E.E. Wiring regulations.

Subject to alternation.

10.2.1 Connection details for systems utilizing two 2 port motorized valves

Important:

The arrowed numbers indicate connection into the relevant terminal on the wiring centre/junction box.

10.3 Thermostatic radiator valves

where TRV's are used the pump control plug should be set to position II.

Frost protection

If a frost thermostat is fitted then it should be connected in parallel across terminals 3 and 4 on the boiler.

Important

1-10 must go to corresponding number in wiring centre.

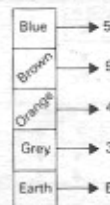
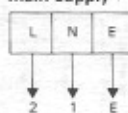
Do not use pre-wired printed circuit board types.

This drawing is not a wiring diagram. All electrical wiring must be carried out by a qualified electrician and be in accordance with the latest edition of the I.E.E. Wiring regulations.

Subject to alternation.

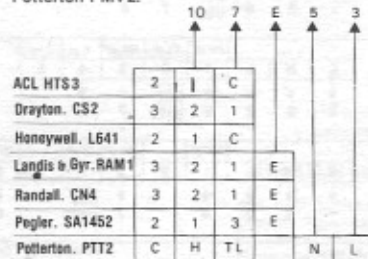
Diagram only applies to the specific controls mentioned.

3amp fused
main supply

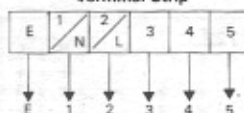


2 Port
Central Heating zone valve

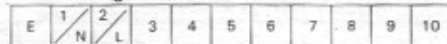
ACL 679H308 30L1.
Drayton ZV 22.
Grasslin (Tower), MU2-3/4.
Honeywell V4043H.
Landis & Gyr SK2 (No Earth Required).
Pegler SZV 1212.
Potterton PMV2.



VAILLANT VC/VCW BOILER
Terminal Strip



Wiring Centre/Junction Box*

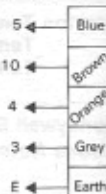
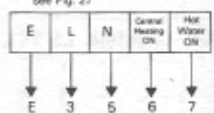


* DO NOT USE PRE-WIRED
PRINTED CIRCUIT
BOARD TYPE.

NOT
USED

Programmer

For programmer connections
see Fig. 27



2 Port
Domestic Hot Water zone valve.

ACL 679H308 30L1.
Drayton ZV 22.
Grasslin (Tower), MU2-3/4.
Honeywell V4043H.
Landis & Gyr SK2 (No Earth Required).
Pegler SZV 1212.
Potterton PMV2.

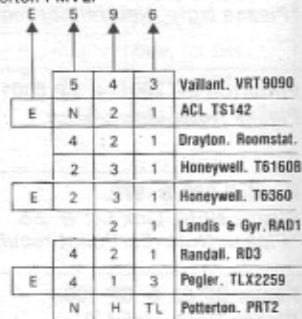
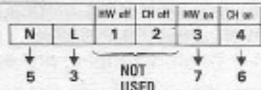


Fig. 26 Cylinder Thermostat.

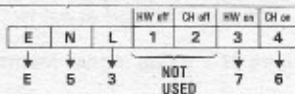
Room Thermostat.

**Connection details between programmer and wiring centre
(2 port motorized valve systems)**

ACL Lifestyle. LS 241, LS 522 & LS 722.

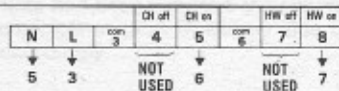


**Drayton Tempus 3
Tempus 4
Tempus 7**



Honeywell ST 7100.

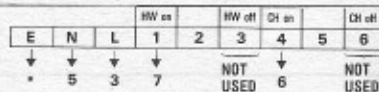
Please Note: Link L-Com 3 & Com 6.



Horstmann 525 & 527.

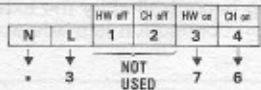
Please Note: Link L-2 & 2-5.

** Please Note: Earth not required.*



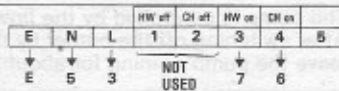
Landis & Gyr RWB 2, RWB 20* & RWB 40*.

** Please Note: Neutral not required.*



Potterton EP 2001 + EP 6001.

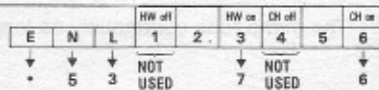
Please Note: Link L-5.



Randall 922 & 972.

Please Note: Link L-2 & 2-5.

** Please Note: Earth not required.*



Pegler SP 50 & SP 100.

Please Note: Link L-3.

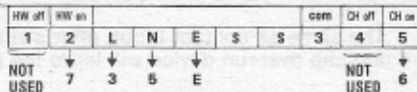
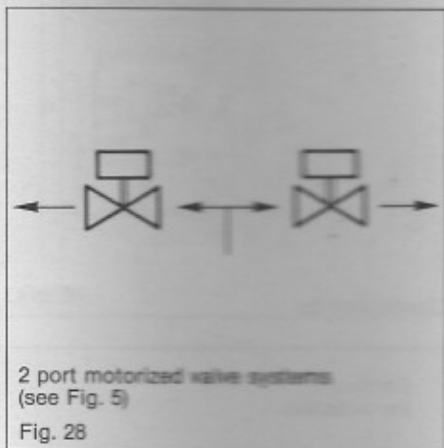


Fig. 27



10.4 Operating modes of the system water circulating pump

In the factory, the heating system pump is set to operating mode (I) (electrical connection to contact I — see fig. 29).

By resetting the plug (1) to contacts I, II, III or S the following operating modes of the circulating pump become possible.

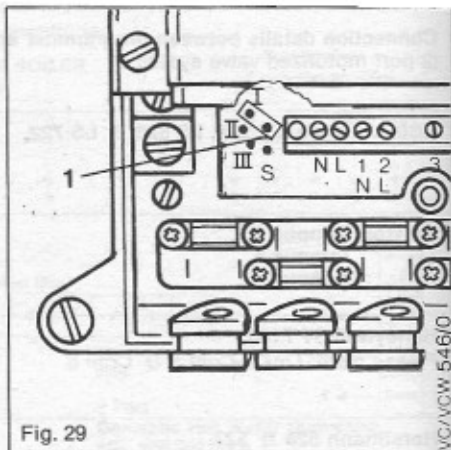


Fig. 29

Connection to:

Contact I: (as supplied)	The pump is controlled by the external controls (only when connection is made across terminals 3 and 4).
Contact II:	The pump is controlled by the flow thermostat (electronic) only. After switching off the burner by the control, a pump over-run device will leave the pump running for about 20 seconds.
Contact III:	The pump runs continuously as long as the heating switch is on.
Contact S: (if fitted. This control is identified by the marking HY on the control box front cover)	The same as contact II but, after switching off the burner by the control, a pump over-run device will leave the pump running for about 5min (factory setting).

10.4.1 Reignition delay for the heating system

The appliance control incorporates a reignition delay to prevent rapid on-off cycling of the burner in the C.H. mode. This delay is factory set to 5 minutes.

On appliances which use a control box marked HY on the front cover, it is possible to change the re-ignition delay if necessary.

Remove the screw (2) to adjust the potentiometer, which is behind the screw.

Adjustment range: about 1-12 minutes.

If the time has been changed the over-run of the pump (connection S) will be also changed accordingly.

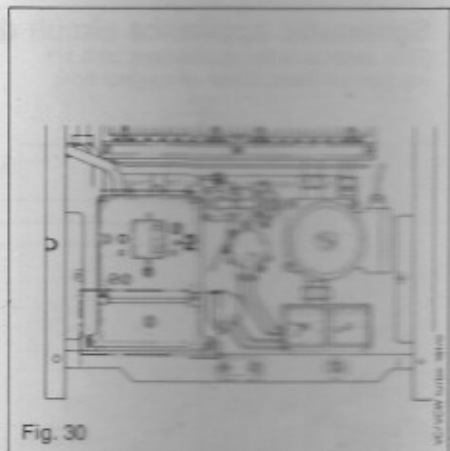


Fig. 30

Schematic appliance circuit diagram

(This version is for appliances with HY marked on front cover of control box)

VC GB 182 EH
 VC GB 242 EH
 VC GB 282 EH
 (with Hybrid)

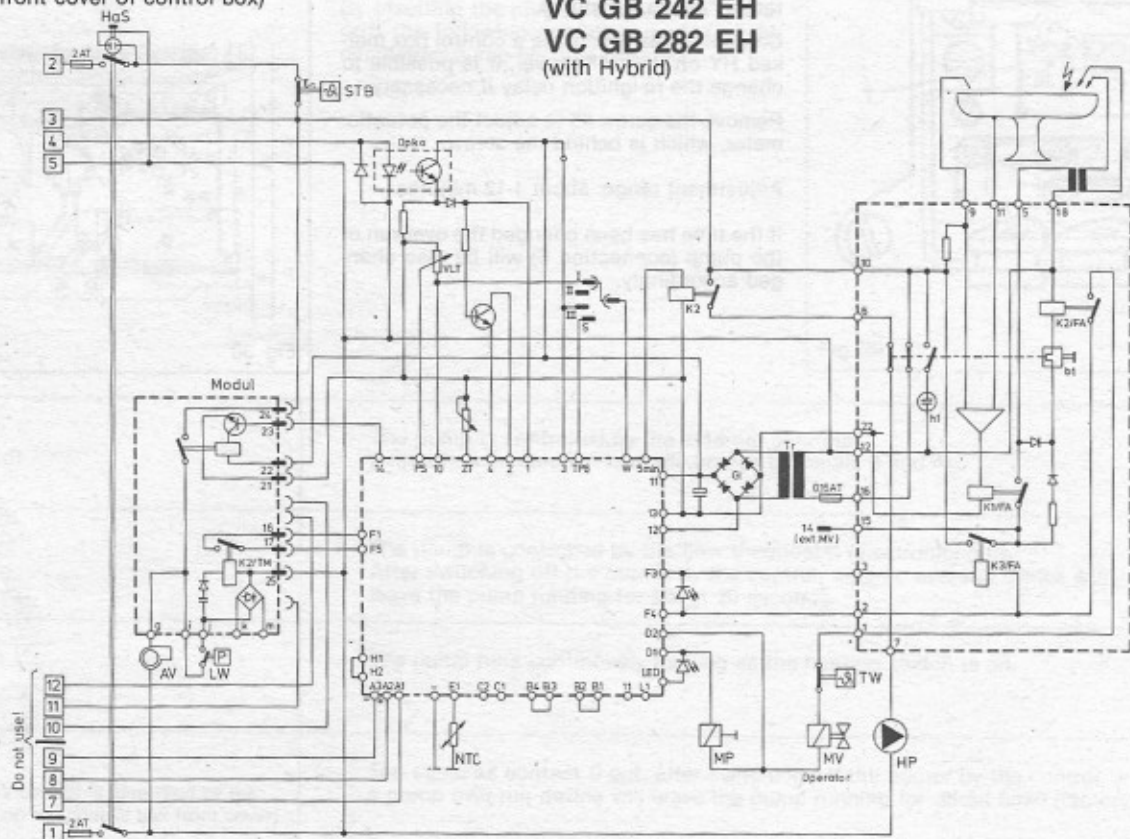


Fig. 31

11 Commissioning and testing

11.1 Electrical installation

Check the electrical installation by carrying out short circuit, earth continuity and resistance to earth tests and check for correct polarity.

11.2 Gas installation

The whole of the gas installation, including the meter, should be inspected and tested for soundness and purged in accordance with the recommendations of BS 6891.

11.3 Central heating system

The whole of the system must be flushed out with both cold and hot water. Ensure all valves at the system and the appliance service valves are open.

Open the stop valve gradually at the filling point connection to the central heating system until water is heard to flow. Do not open fully.

The system should be filled and air locks cleared. Starting with the lowest radiator open each air release valve closing it only, when clear water, free of bubbles, flows out. In the same way release air from any high points in the pipework.

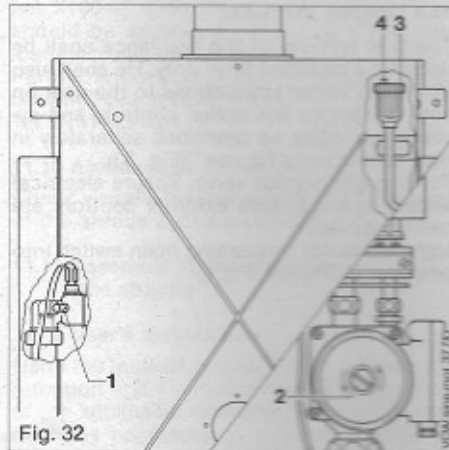
For venting the boiler, back off the screw on the heat exchanger (1, Fig. 32) (see 13.4 to gain access) and the circulating pump (2) by about 1-2 turns.

Fill the sealed system until the pressure gauge registers 1.5 bar (21.5 PSI).

After initial operation, once again drain the complete installation through the lowest point of the system to remove residues from the pipework.

In continuous operation, the appliance is vented automatically through the automatic air vent (3). It is for this reason **essential** that the cap (4) present on the top of the automatic air vent is **unscrewed** by about 1-2 turns and that it **remains** like that.

Check operation of pressure relief valve by lifting the lever or rotating the knob anticlockwise, where applicable. Release water from the system until the initial system pressure of 1.2 bar is attained.



11.4 Lighting the boiler

The first lighting of the appliance shall be done by a qualified fitter only. He shall also give clear verbal instructions to the user on how to operate the boiler, controls and systems generally as described separately in the "Instructions for use" (Fig. 33).

Turn on gas service valve. Ensure electrical supply is on. Ensure external controls are calling for heat.

Light the boiler by pushing main switch into position 1 (ON) (24, Fig.1).

11.5 Gas soundness

In order to test the gas soundness of the burner gas connections it is necessary to temporarily operate the appliance with the inner case front panel removed.

Warning: Do not operate the appliance with the inner case front panel removed for more than a few seconds. Ensure adequate room ventilation. Shut down and refit inner case front panel immediately after completing gas soundness checks. Ensure that the inner case front panel is correctly fitted to obtain a good seal.

Pull the plastic tube off the connection TP (fig. 34). Do not remove any other pipes. Do not touch fan motor assembly or wiring. Turn on main switch and suck using mouth pressure on the plastic tube. This suction will operate the air pressure switch and the

main burner will light. Squeeze tube to maintain suction whilst carrying out gas soundness test on burner and burner test point connections. Shut down appliance and refit tube. Refit inner case front panel (13.4). Check gas soundness of remaining integral gas components and joints with the main burner alight.

11.6 Test of flame supervision device (F.S.D.)

With the appliance running with the main burner alight, turn off the gas supply at the appliance service valve. The burner will extinguish and the ignition system will start sparking. After approximately 10 seconds, the appliance should shut down, the lock out black button on the control box should pop out and the red lock out neon should light. Turn on gas service valve and push black button to reset.

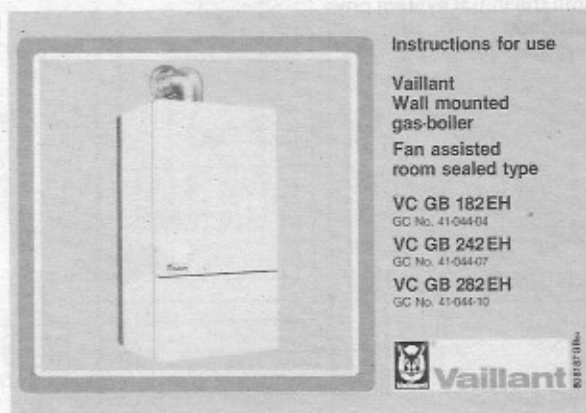


Fig. 33

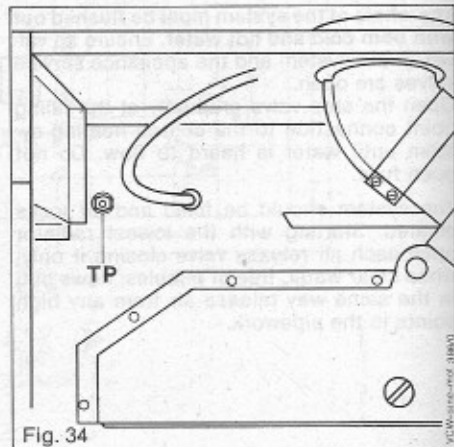


Fig. 34

11.7 Gas pressure

11.7.1 Main burner pressure

The main burner gas pressure is factory set and sealed.

Therefore, it is not necessary to alter the setting during commissioning.

The main burner pressure can be checked by connecting a pressure gauge to the main burner test point (fig. 35).

Disconnect the inline cable connector in the transparent lead from the NTC resistor to the electronic control box (1, fig. 35). Reconnect after completing test. Operate appliance.

This will generate the maximum burner pressure on the modulating burner which is VCGB 182EH 4.9 ± 0.5 mbar, VCGB 242EH 5.1 ± 0.5 mbar and VCGB 282EH 6.8 ± 0.5 mbar.

If the burner pressure is incorrect initially check that a 20 mbar gas inlet pressure is available at the inlet to the appliance with the appliance operating.

If the inlet pressure is less than 20 mbar, remedy external fault or contact Local Gas Supplier. If the inlet pressure is correct at 20 mbar, contact Vaillant Ltd.

Note: The main burner pressure immediately after ignition (ignition rate) will be only VCGB 182EH 0.6 ± 0.5 mbar, VCGB 242EH 1.5 ± 0.5 mbar and VCGB 282EH 0.6 ± 0.5 mbar. After a few seconds of appliance operation, the main burner pressure will automatically increase to the maximum rate.

Important: Ensure N.T.C. is re-connected.

11.8 Flow thermostat

Allow the C.H. System to warm up and adjust the position of the flow thermostat to check that the burner modulates down from high to low and low to off and vice versa (scale range covers about 35 to 90 °C).

Note:

The appliance control incorporates a re-ignition delay to prevent rapid on-off cycling of the burner. This delay can be bypassed by briefly switching the main switch off and on again, so that the appliance-provided heat input is required-starts immediately after the main switch has switched on again.

11.9 Water soundness and final system flush

Allow the water system to reach maximum working temperature and examine for water soundness. The boiler should then be turned off and the C.H. system rapidly drained while still hot. The C.H. system should again be filled and cleared of air locks (see 11.3). Sealed systems should be adjusted to the initial system design pressure of 1.2 bar. The actual reading of the pressure gauge should ideally be 0.5 bar plus an additional pressure corresponding to the head of the highest point of the system above the base of the appliance, (10 m head equals an additional 1 bar reading on the pressure gauge), in any circumstances the minimum gauge reading should not be less than 1.0 bar. Finally set the red hand of the pressure gauge to 0.8 bar. Examine for water soundness.

Note:

If the system is to be treated with an inhibitor it should be applied at this stage. Senti-

nel X100 is suitable for this purpose and should be applied in accordance with the manufactures instructions.

Further informations can be obtained from Sentinel, Grace Dearborn Ltd.
Tel. 0151 495 1861

11.10 Air/flue duct assembly

Check visually the installation and function of the air/flue duct assembly.

11.11 Assemble appliance case (see chapter 12)

11.12 User's instructions

Hand the instructions for use to the user for retention and instruct in the safe operation of the appliance. Advise the user of the precautions necessary to prevent damage to the system and to the building if the system does not remain operative during frost conditions.

Finally, advise the user that for continued efficient and safe operation, this Vaillant appliance should be serviced at least once a year by a qualified servicing company. It is important and strongly recommended that arrangements are made for a MAINTENANCE AGREEMENT with a qualified servicing company to ensure regular servicing.

Please contact

Vaillant Service Department
(FREEHONE 0800 318076)

for further details.

Note:

Leave installation and servicing instructions with the user when the installation is completed.

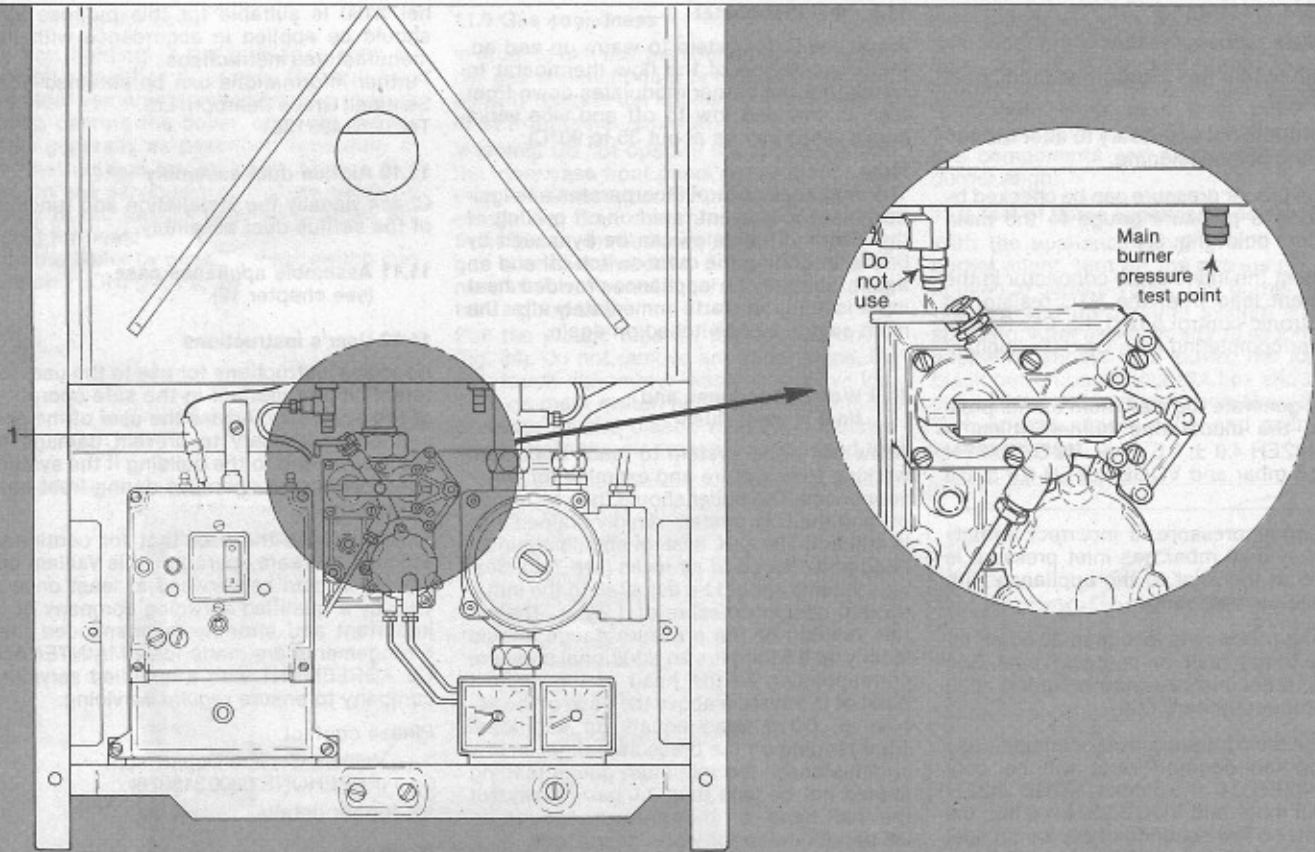


Fig. 35

12 Assembling

12.1 Door hinges

The Vaillant boiler is pre-assembled in the factory for "doors hinged on the right" (see Fig. 37).

If the doors are required to be "hinged on the left", make the following changes (see Fig. 37).

- Unscrew door hinges top (1 a), centre (1 b) and bottom (1 c) from the right-hand side panel (2) and screw them the other way round to the left-hand side panel (3).
- Remove name plate from upper appliance door, rotate it through 180° and refit. Engage upper door in the hinges mounted on the left hand side panel. Secure the door by screwing hinge bolt into appliance door guide (1 a, fig. 37).
- For the installation of the appliance doors see next page. (12.4, 12.5, Fig. 37).

12.2 Side panels (Fig. 36)

Place the two side panels (2, 3) from the front into the upper and the lower pin (6) of the appliance frame and screw tight with the screws (7) at the upper (8a) and the lower support strip (8b).

12.3 Screen plate

Screw on the screen plate (9) with the screws (10). Do not overtighten.

- 2 Side panel (right-hand)
- 3 Side panel (left-hand)
- 6 Pin
- 7 Screw
- 8a Support strip (top)
- 8b Support strip (bottom)
- 9 Screen plate
- 10 Screw
- 11 Flow temperature selector knob.

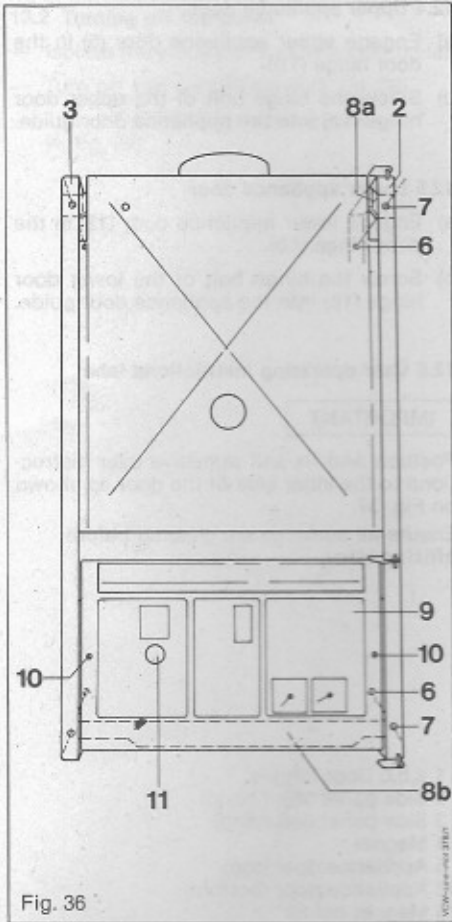


Fig. 36

12.4 Upper appliance door

- Engage upper appliance door (5) in the door hinge (1b).
- Screw the hinge bolt of the upper door hinge (1a) into the appliance door guide.

12.5 Lower appliance door

- Engage lower appliance door (12) in the door hinge (1b).
- Screw the hinge bolt of the lower door hinge (1c) into the appliance door guide.

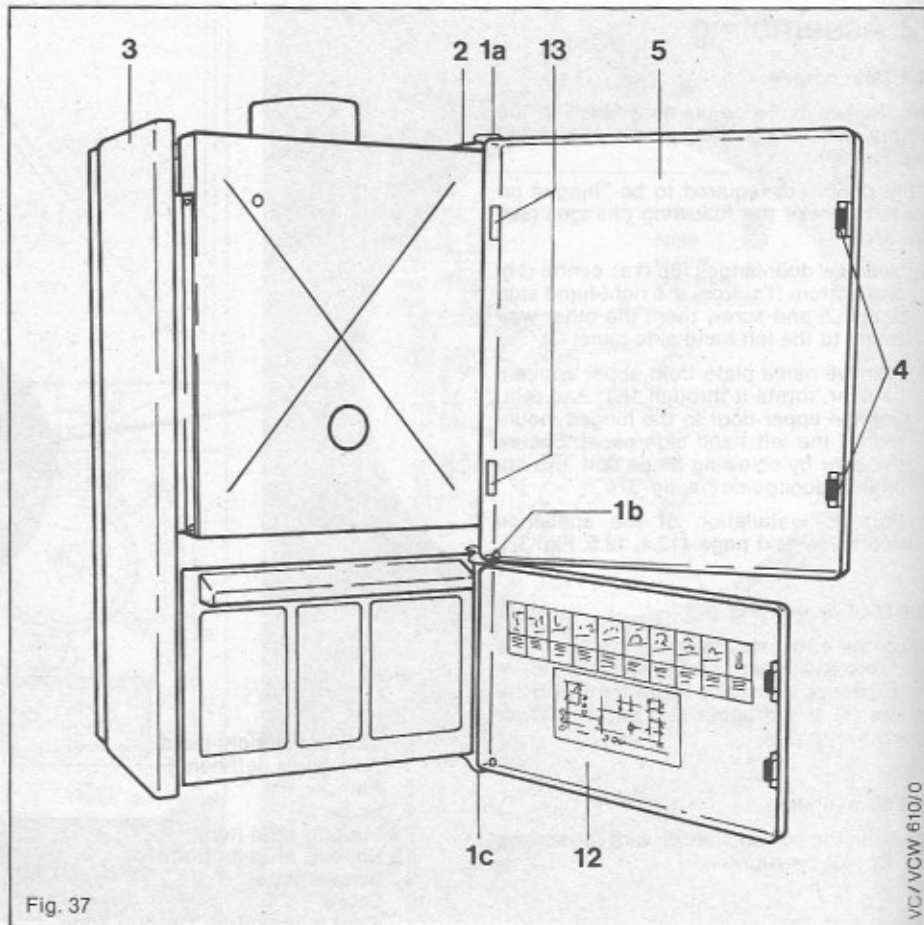
12.6 User operating instructions label

IMPORTANT

Position and fix self adhesive user instructions to the inner side of the door as shown on Fig. 37.

Ensure all surfaces are cleaned before affixing label.

- a,b,c Door hinges
- Side panel (right-hand)
- Side panel (left-hand)
- Magnet
- Appliance door (top)
- Appliance door (bottom)
- Magnet holder



13 Servicing of boiler

To ensure continued efficient operation of the appliance, it is recommended that it is checked and serviced as necessary at regular intervals. The frequency of servicing will depend upon the particular installation conditions and usage but in general once per year should be adequate. It is the law that any service work be carried out by a competent person such as British Gas or other Corgi registered personnel.

IMPORTANT

Warning:

Before starting any maintenance work, switch OFF the mains electricity supply and disconnect the plug at the main isolating switch and socket. (If a switch is used, remove the fuse).

Turn OFF gas supply at the gas service valve fitted to the appliance. Always test for gas soundness after any service work and after exchanging any gas carrying component and always carry out functional checks.

Always after any service work and after exchanging any electrical component.

- Check — earth continuity
— polarity
— resistance to earth
— short circuit

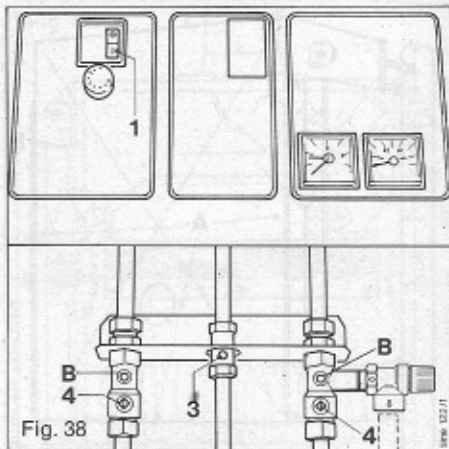
To service the boiler follow the sequence 13.1 to 13.9

13.1 Inspection

13.1.1 Inspect exterior of the boiler, in particular the pipework, electrical connections and flue assembly for indications of damage or deterioration.

13.1.2 Inspect the air supply and ventilation arrangements of the installation ensuring that the requirements of 5.5 and 5.6 are met.

13.1.3 Operate the appliance (as shown in the instruction for use) at a high rate and inspect the burner operation through the viewing window. Check that the flames are of light blue colour and over all burner ports. Inspect for signs of yellowing, excessive lifting or sooting.



13.2 Turning off the boiler

- Isolate the electrical supply to the boiler
- Turn off gas service valve (3, fig. 38)
- Turn off boiler C.H. service valves (4, fig. 38)

13.3 Removing outer case (Fig. 37)

Remove upper door by unscrewing hinge pin (1a) and pulling door out and up. Remove lower door by unscrewing hinge pin (1c) and pulling door out and down.

Remove screen plate by unscrewing the two fixing screws (10, Fig. 36).

Remove side panels by unscrewing top and bottom screws (7, Fig. 36) to clear internal clips and then pulling panels outwards and off.

13.4 Replacing inner case

Remove 3 screws (A, fig. 39)
Lift bottom edge of front panel outwards and unhook from the top of the inner case. Inspect the case seal if damaged, obtain a replacement case panel.

Important:

When replacing the inner case front panel it is essential that the panel is correctly fitted and a good seal is obtained. Check that the top edge of the panel is correctly hooked over the top of the inner case.

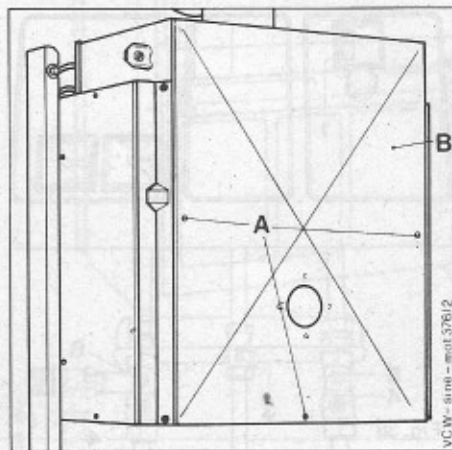


Fig. 39

13.5 Cleaning of burner (Fig. 40)

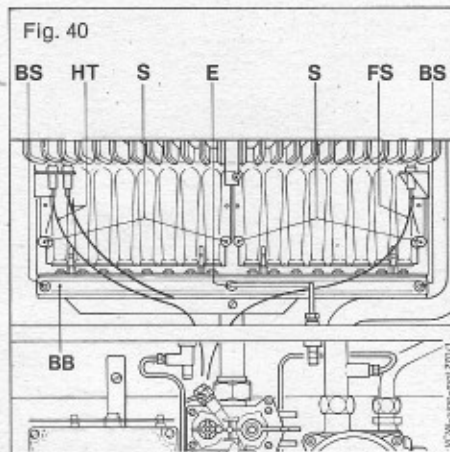
Remove red high tension leads (HT) from spark electrodes and transparent cable (FS) from flame sensing electrode.

Remove the four screws (S) and lift burners up and out.

Disconnect both ends of burner test point extension (E) and remove. Remove burner bar fixing screws (BS).

Remove burner bar by easing forward (BB).

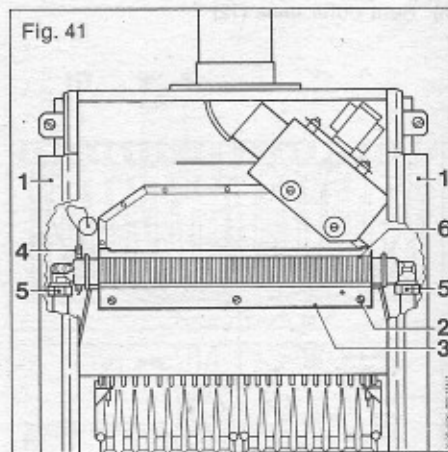
Clean burners and injector nozzles with a light brush or a vacuum cleaner.



13.6 Cleaning of main heat exchanger (Fig. 41)

Place cloth below combustion chamber

- Remove fixing screws (2) and take off cover sheet (3)
- Inspect bottom of heat exchanger through the combustion chamber using a torch and clean if necessary with a stiff long bristle brush.
- Gain access to the top of the heat exchanger by removing the fan (see 14.8) and flue hood (2 screws). Inspect heat exchanger and clean if necessary using a stiff long bristle brush.
- Reassemble in reverse order.



13.7 Check of C.H expansion vessel

Close C.H. service valves (4, fig. 38)

Release pressure from the appliance as under 14.19.

Remove protective cap from valve on bottom of vessel.

Check internal pressure of expansion vessel which should be 0.7 to 0.9 bar. Repressurise the expansion vessel as necessary using an air pump. (fig. 42).

Open C.H. Service valves and repressurise C.H. System if necessary.

(See appropriate paragraphs of 11.9)

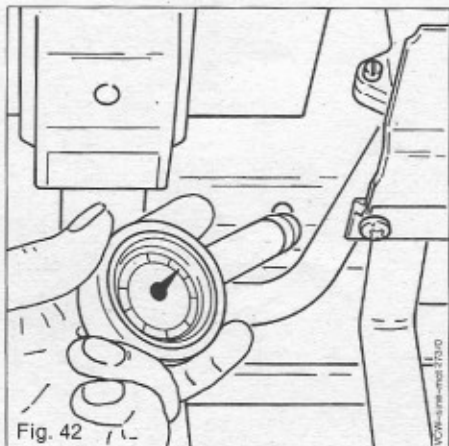


Fig. 42

13.8 Recommissioning the appliance

- a) Refit inner case side panels
- b) Reconnect electrical supply
- c) Turn on gas service valve
- d) Operate burner with inner case front panel removed in order to test gas soundness of burner and burner test point connections (11.5)
- e) Refit inner case front panel (13.4). Ensure the panel is correctly fitted and a good seal is obtained.
- f) Light the boiler (11.4)
- g) Check gas soundness of remaining gas connections (11.5)
- h) Check gas pressure (11.7)
- i) Test flame supervision device (11.6)
- j) Test C.H. flow thermostat (11.8)
- k) Check water soundness (11.9)
- l) Check air/flue duct assembly (11.10)
- m) Carry out electrical test (11.1)
- n) Refit outer case (12)

14 Replacement of parts

General

Before starting any replacement of parts, switch OFF the main electricity supply and disconnect the plug at the main isolating switch and socket. (If a switch is used, remove the fuse).

Turn off gas supply at the gas service valve. Always test for gas soundness after any service work and after exchanging any gas carrying component.

Always carry out functional checks.

After breaking any internal electrical circuit check

- earth continuity
- polarity
- resistance to earth
- short circuit

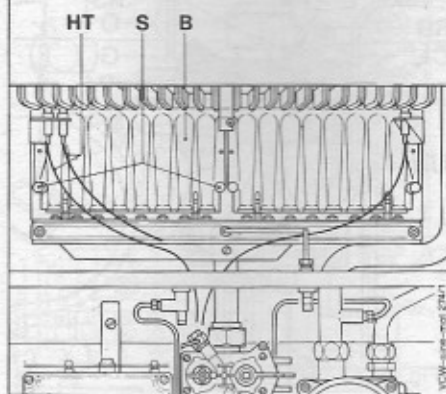
14.1 Change of electrodes (Fig. 43)

Remove outer case and inner case (13.3 and 13.4).

Pull off the two red high tension leads (HT) or the transparent sensor lead as appropriate.

Remove the appropriate burner retaining screws (S) lift and pull out burner (B). Remove fixing screws for the electrode assembly. Replace electrode assembly and reassemble in reverse order.

Fig. 43



14.2 Change of NTC resistor (Fig. 44)

Remove outer and inner case as under 13.3 and 13.4.

Disconnect the push on connector and unscrew the NTC probe.

Reassemble in reverse order.



Fig. 44

14.3 Change of automatic air vent (Fig. 45)

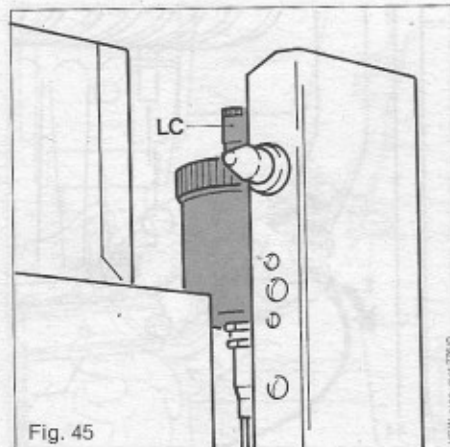
Remove outer case as under 13.3

Release system pressure as under 14.19.

Unscrew the automatic air vent by hand. Reassemble in reverse order, screwing in the automatic air vent by hand only.

Open the locking cap (LC) of the automatic air vent by 1–2 turns.

Reassemble casing in reverse order and repressurise system.



14.4 Gas section

Access to the gas section can be improved by removing the retaining screw (RS, Fig. 51) and pulling the control box forward.

14.4.1 Change of operator (Fig. 46)

Turn off boiler as under 13.2

Remove outer case as under 13.3.

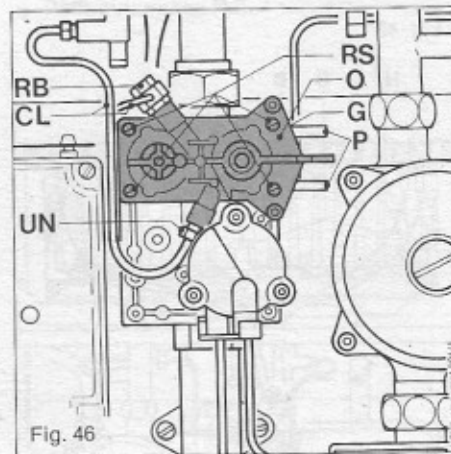
Isolate the appliance from the electrical mains and pull off the cable connectors (P) from the operator (O).

Disconnect the control lines (CL) by unscrewing retaining bolt (RB) and union nut (UN). Unscrew the four retaining screws (RS).

Reassemble in reverse order using new gasket (G).

Check for gas soundness. Carry out electrical checks (11.1).

Check burner pressure (11.7).



14.4.2 Change of gas section (Fig. 47)

Turn off boiler as under 13.2.

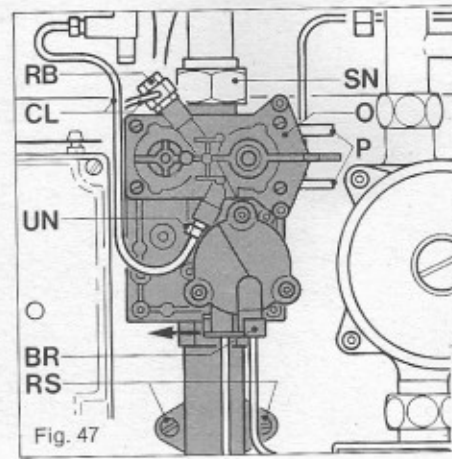
Remove outer case as under 13.3.

Release system pressure in C.H side as under 14.19.

Isolate the appliance from the electrical mains and pull off the connectors (P) from the operator (O).

Disconnect the two control lines (CL) by unscrewing the retaining bolt (RB) and the union nut (UN).

Note the connection of the two control lines to the differential valve. Note the connections of the other ends of these control lines. Remove clamp (BR) by sliding sideways.



The control lines are push fit into the differential valve. (Disconnect connections of the other ends of the control lines to gain movement as necessary. Ensure all connections are noted to assist reassembly).

Remove the two retaining screws (RS) and loosen the sleeve nut (SN).

Reassemble in reverse order using new washers. Repressurise system check connections for gas soundness. Carry out electrical checks (11.1).

Check burner pressure (11.7).

14.4.3 Change of differential valve (Fig. 48)

Turn off boiler as under 13.2.

Remove outer case as under 13.3.

Release system pressure in C.H. side as under 14.19.

Note connections of the two control lines to the differential valve. Note the connections of the other ends of these control lines. Remove clamp (C) by sliding sideways. The control lines are a push fit into the differential valve. (Disconnect connections at the other ends of the control lines to gain movement as necessary. Ensure all connections are noted to assist reassembly). Unscrew the three retaining screws (RS).

Reassemble in reverse order.

Repressurise appliance.

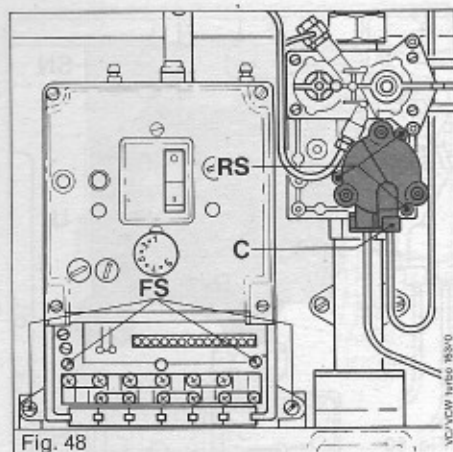


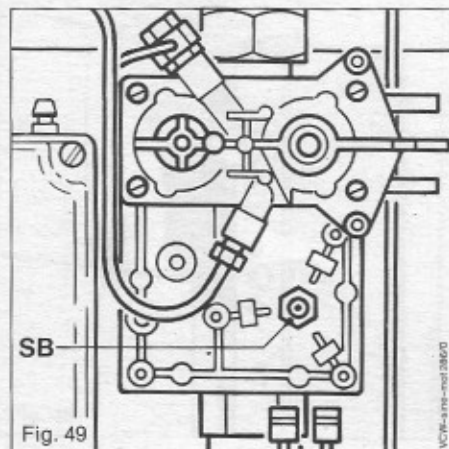
Fig. 48

14.4.4 Change of gas section stuffing box (Fig. 49)

Remove the differential valve as under 14.4.3. Unscrew the stuffing box (SB) taking care not to bend the pin.

Reassemble in reverse order, using new washers.

Check connections for gas soundness.



14.5 Change of pump (Fig. 50)

Turn off the appliance 13.2.

Remove outer case as under 13.3.

Remove inner case as under 13.4.

Drain C.H. side of appliance (14.19 and 14.20).

Open terminal box of the pump.

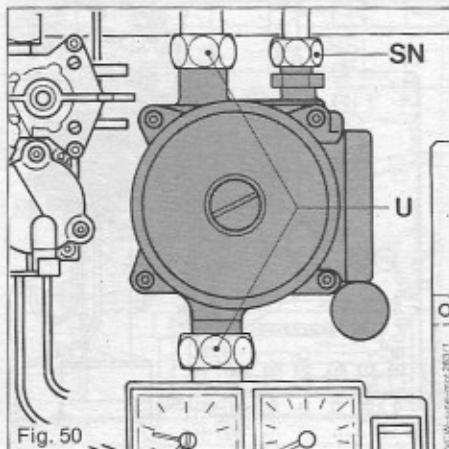
Note the colour code of wiring and disconnect cable.

Unscrew the sleeve nut (SN) of the air vent pipe.

Unscrew the two unions (U) of the pump.

Reassemble in reverse order using new washers and repressurise system.

Carry out electrical checks (11.1).



14.6 Control box

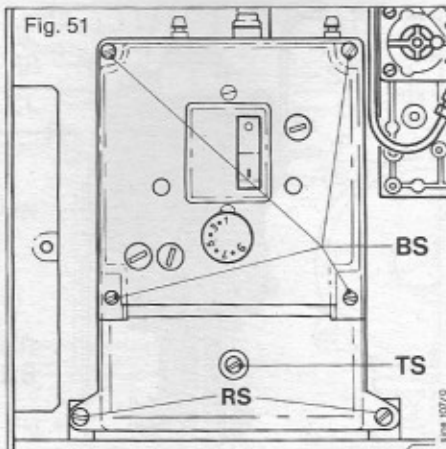
14.6.1 Opening control box (Fig. 51)

Remove outer case as under 13.3.

Isolate the appliance from the electrical mains. Open the terminal box by removing the retaining screw (TS). Mark the wiring and remove it from the terminal block. Remove the four retaining screws (BS). Pull out slowly the control box complete with the switch board and printed circuit boards.

Pull off the multiple plugs from the PC boards. Reassemble the control box in reverse order.

When replacing the screws, position the star washer under the left lower screw.



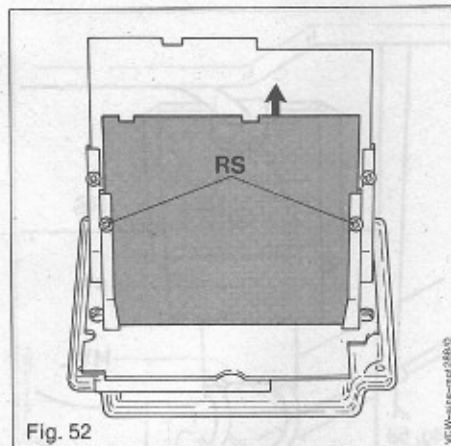
14.6.2 Change of fan control circuit board (F.C.C.B.) (Fig. 52)

Take off control box cover as under 14.6.1.

Unscrew the two retaining screws (RS) or push out the plastic retaining clips (where fitted) and remove FCCB from the main switch circuit board by lifting up.

Reassemble in reverse order.

Carry out electrical checks (11.1).



14.6.3 Change of electronic thermostat circuit board (T.C.B.) (Fig. 53)

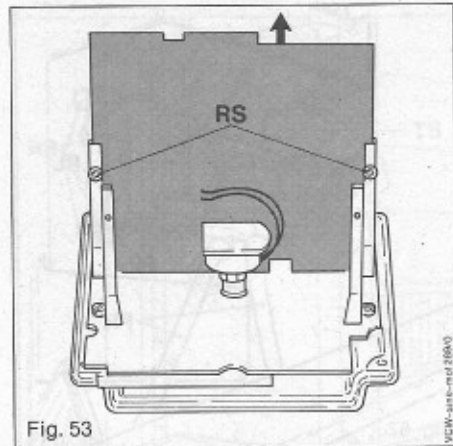
Take off control box cover as under 14.6.1 and F.C.C.B. as under 14.6.2. Pull off temperature selector knob (11, fig. 36).

Unscrew the two retaining screws (RS) or push out the plastic retaining clips (where fitted) and remove T.C.B. from main switch circuit board by lifting up.

Reassemble in reverse order.

Carry out electrical checks (11.1).

Check operation of C.H. flow thermostat (11.9).



14.6.4 Change of flame supervision circuit board (F.S.C.B.) (Fig. 54)

Take off control box cover as under 14.6.1 and remove connections (C) of lock out red neon from F.S.C.B.

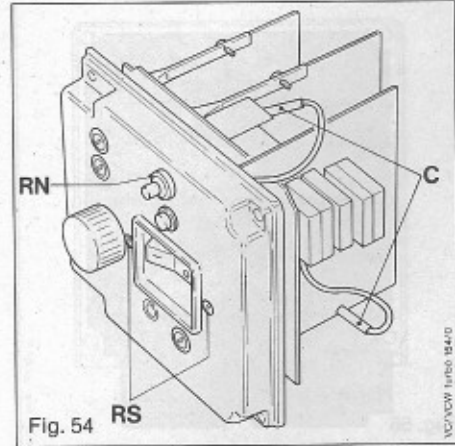
Unscrew retaining nut from lock out reset bottom (RN).

Disengage lock out reset button from control box cover and carefully unhook F.S.C.B.

Reassemble in reverse order.

Carry out electrical checks (11.1).

Check operation of flame supervision device (11.6).



14.6.5 Change of main switch circuit board (M.S.C.B.) (Fig. 56)

Carry out operations 14.6.1, 14.6.2, 14.6.3 and 14.6.4.

Unscrew the two retaining screws (RS) as well as the two retaining screws (RS, fig. 54).

Reassemble in reverse order.

Carry out electrical checks (11.1).

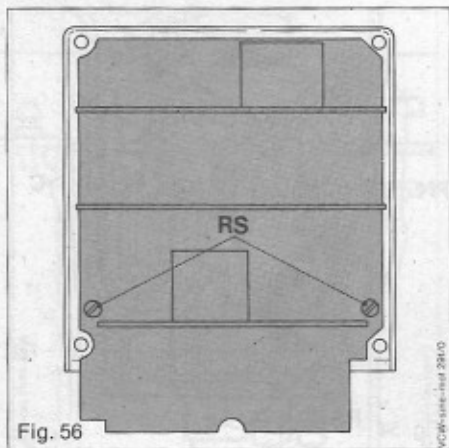


Fig. 56

14.6.6 Change of diaphragm pump (Fig. 57)

Remove outer case as under 13.3.

Isolate the appliance from the electrical mains. Open the main terminal box (screw TS, fig. 51).

Unscrew the four retaining screws (FS, fig. 48). Pull out complete control box to the front.

Mark and disconnect plastic hoses (PH) to operator and push on connectors (AP).

Pull out diaphragm pump with rubber legs (RL) from control box bottom.

If necessary, access to the rubber legs inside the control box can be achieved by sliding out the control box cover completely with printed circuit boards (14.6.1).

Reassemble in reverse order.

Carry out electrical checks (11.1).

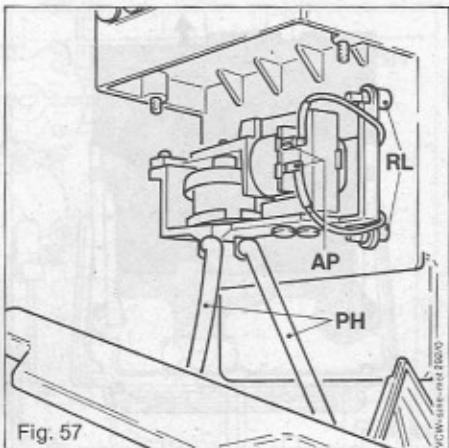


Fig. 57

14.6.7 Change of ignition transformer (Fig. 58)

Isolate the appliance from the electrical mains.

Unscrew two retaining screws (RS, fig. 51), securing the control box to appliance chassis. Pull complete box forward to release clip — the retaining chain will support the box.

Gently rotate box to gain access to the ignition transformer and remove retaining screw (RS, fig. 58).

Note position of the cable connectors. Pull off high voltage leads (HVL), remove cable connectors and remove fixing screws (FS).

Reassemble in reverse order.

Carry out electrical checks (11.1).

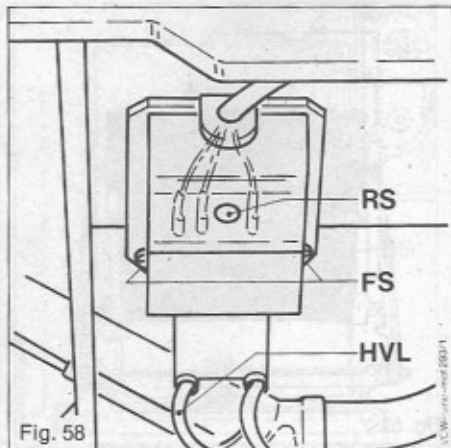


Fig. 58

Note:

Ensure that the earth cable (green/yellow) is connected to the earth terminal on the transformer.

14.7 Change of overheat cut-off device
(Fig. 59)

Isolate the appliance from the electrical mains.

Remove outer and inner case as under 13.3 and 13.4.

Remove left side wall of inner case by unscrewing the six retaining screws (RS).

Remove wire loop retaining the temperature sensor (TS) in the sensor pocket. Slide sensor upwards out of the pocket and draw through the rubber seal (S) in the rear side.

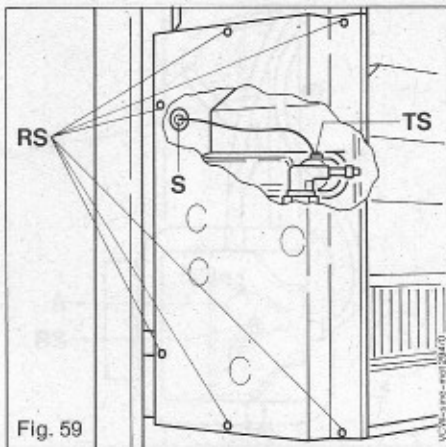


Fig. 59

Note:

Ensure that the earth cable (green/yellow) is connected to the earth terminal on the transformer.

14.7 Change of overheat cut-off device
(Fig. 59)

Isolate the appliance from the electrical mains.

Remove outer and inner case as under 13.3 and 13.4.

Remove left side wall of inner case by unscrewing the six retaining screws (RS).

Remove wire loop retaining the temperature sensor (TS) in the sensor pocket. Slide sensor upwards out of the pocket and draw through the rubber seal (S) in the rear side.

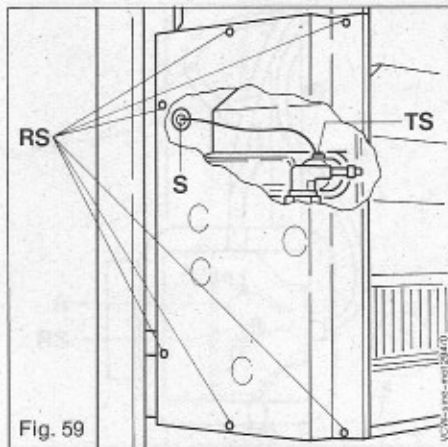


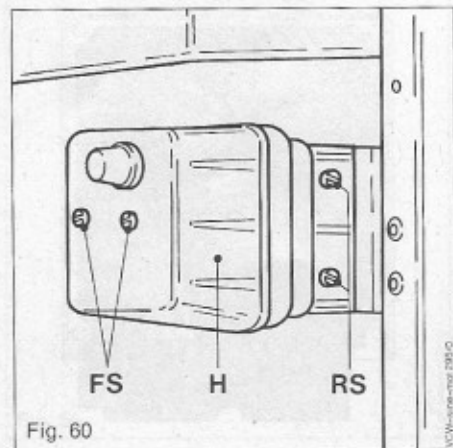
Fig. 59

Remove the two retaining screws (RS, Fig. 60) and open protective housing (H) with screw driver in the slot between the two halves of the protective housing.

Unscrew the two fixing screws (FS). Clear overheat cut-off device from housing. Remove cable connectors.

Reassemble in reverse order.

Check — earth continuity
— polarity
— resistance to earth
— short circuit



14.8 Change of fan (Fig. 61)

Isolate the appliance from the electrical mains.

Remove outer and inner case as under 13.3 and 13.4.

Remove side panel (R.H.S.) of inner case (6 screws).

Loosen 2 fixing screws (FS) as far as possible without removing completely. Gently expand the clamping ring by separating the clamping ring flanges using finger pressure.

Remove the 2 retaining screws (RS) and remove cover plate (C).

Gently lift fan motor vertically upwards a few millimeters to clear the spigot locating the fan onto the flue hood. Slide the fan motor downwards to disengage from the clamping ring.

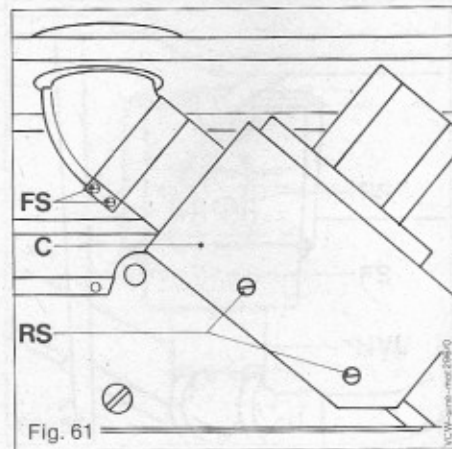
Remove fan motor from the appliance taking care not to damage the small plastic impellor. Note position of cable connectors and remove connectors.

Reassemble in reverse order.

When reassembling, take care to engage fan motor onto the locating spigot on the flue hood, whilst inserting into the clamping ring. Do not overtighten clamping ring fixing screws (FS).

If the retaining screws (RS) for the cover plate (C) do not align, this indicates that the fan motor is not correctly located over the flue hood spigot. Do not overtighten screws RS.

Carry out electrical checks (11.1).



14.9 Change of air pressure switch (Fig. 62)

Isolate the appliance from the electrical mains.

Remove outer and inner case as under 13.3 and 13.4.

Remove the fixing screw (FS) and take out air pressure switch to the left hand side (Fig. 63).

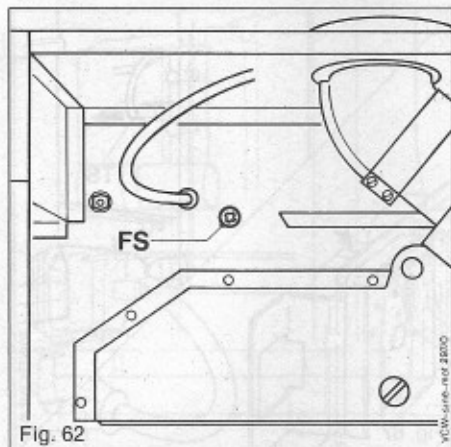
Remove protective cover by unscrewing retaining screw (RS, Fig. 63).

Mark and disconnect plastic hoses (PH).

Remove connectors (A).

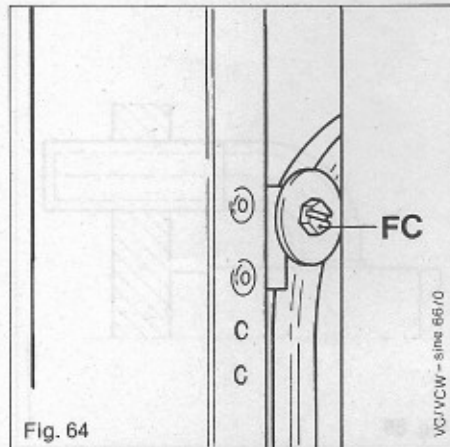
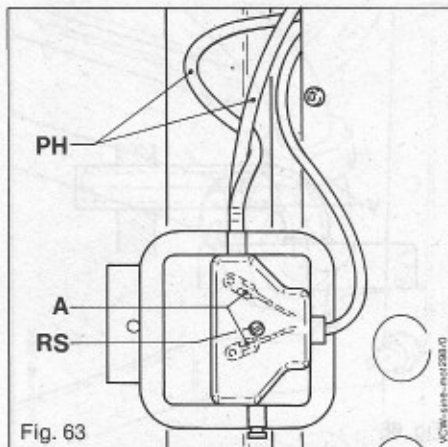
Reassemble in reverse order.

- Check — earth continuity
— polarity
— resistance to earth
— short circuit



14.10 CH expansion vessel

In the unlikely event of a failure of the CH expansion vessel, either procedure 14.11 or 14.11.1 can be followed as appropriate.



14.11 Air/flue duct assembly arranged to the rear and side (Fig. 65 and Fig. 66)

Turn off the boiler (13.2).

Remove outer and inner case as under 13.3 and 13.4.

Release CH system pressure as under 14.19

Isolate the appliance from the electrical mains. Disconnect external wiring as under 14.6.1. Remove air/flue elbow in reverse order to 9.6

Disconnect flow and return connections at compression joints on top of service valves. Disconnect gas connection at compression joint on top of gas valve.

Remove appliance from wall. Remove two fixing clamps (FC, Fig. 64). Lift and take out expansion vessel to the rear. Reassemble in reverse order.

14.11.1 External replacement vessel

Alternatively, a suitable replacement expansion vessel can be fitted external to the boiler as described in 5.11.3

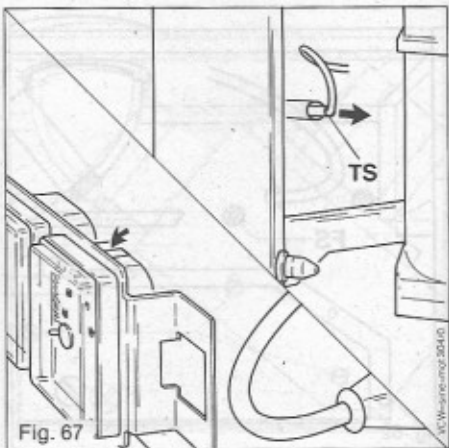
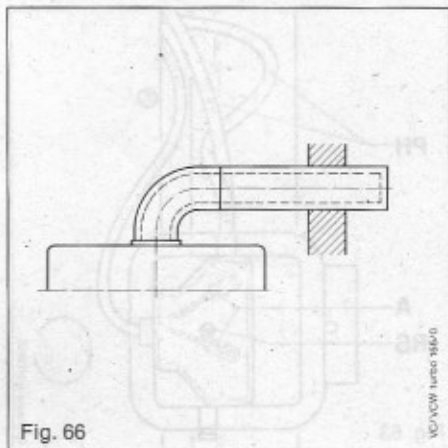
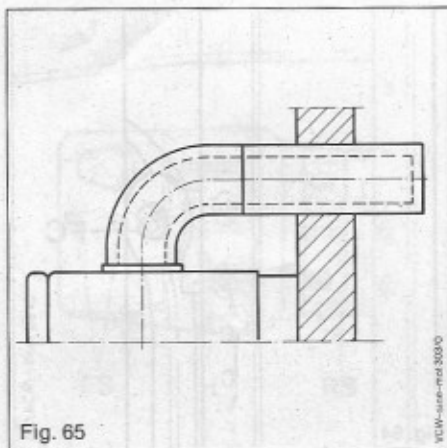
In these circumstances, the replacement expansion vessel must be correctly sized, ignoring the original expansion vessel which can be left in position on the boiler.

14.12 Change of thermometer (Fig. 67)

Remove outer case as under 13.3.

Pull the temperature sensor (TS) out of the sensor tube. Press the two tongues into the thermometer and pull it out to the front side.

Reassemble in reverse order.



14.13 Change of pressure gauge (Fig. 68)

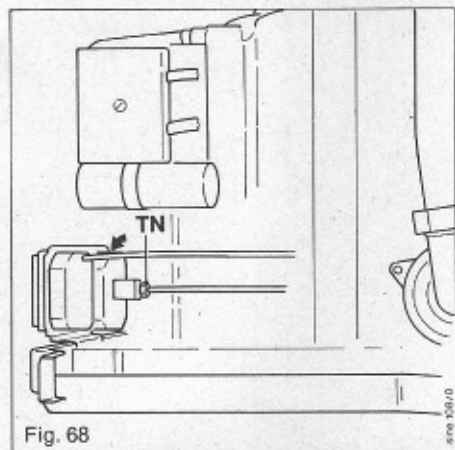
Turn off boiler (13.2).

Remove outer case as under 13.3.

Release CH system pressure as under 14.19

Disconnect the tubing nut (TN) of the control line and press the two tongues on the pressure gauge and pull it out to the front side.

Reassemble in reverse order and repressurise system.



14.14 Change of system bypass (Fig. 69)

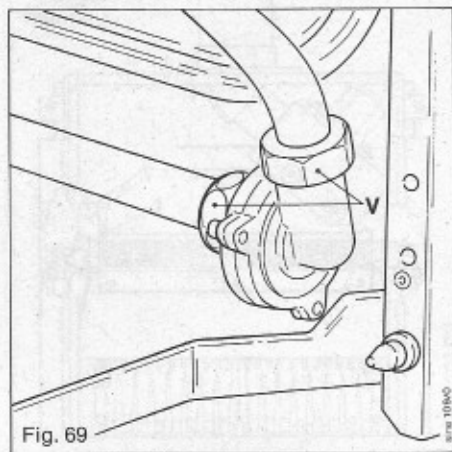
Turn off boiler as under 13.2.

Remove outer and inner case as under 13.3 and 13.4.

Release CH system pressure and drain boiler as under 14.19 and 14.20

Disconnect the two union nuts (V) and remove bypass valve.

Reassemble in reverse order using new washers and repressurise system.



14.15 Change of central heating overheat thermostat

The thermostat is located on the CH flow pipe at the bottom LHS of the boiler.

Remove the cable connectors.

Unscrew the thermostat from the flow pipe.

Do not overtighten the thermostat.

Reassemble in reverse order.

14.16 Change of central heating pressure relief valve

Turn off the boiler as under 13.2.

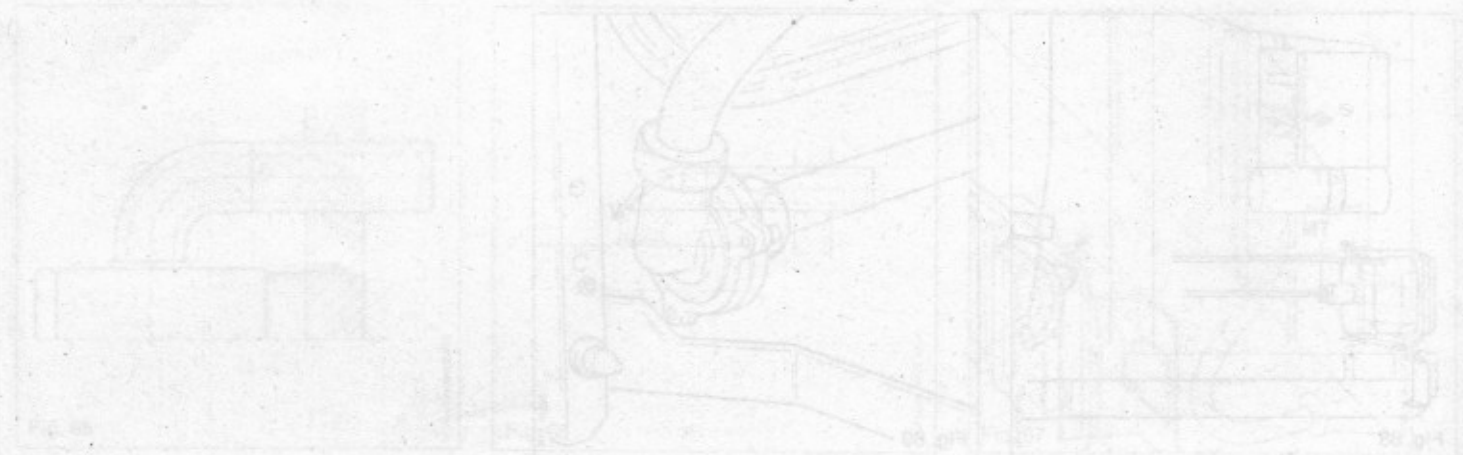
Remove the outer case as under 13.3.

Release CH system pressure as under 14.19

Remove the discharge pipe connection.

Unscrew the pressure relief valve from the return central heating service valve.

Reassemble in reverse order and repressurise system.



14.17 Change of main heat exchanger

- Turn off boiler as under 13.2.
- Remove outer and inner case as under 13.3 and 13.4.
- Remove side panels of inner case (6 screws each side).
- Drain the boiler as under 14.19 and 14.20.
- Remove fixing screws (2) and take off cover sheet (3, Fig. 41).
- Remove securing means and pull out sensing element (4, Fig. 41) of overheat cut-off-device.
- Disconnect union nuts (5, Fig. 41) on main heat exchanger and slide heat exchanger carefully forward and out.
- If necessary, replace heat exchanger.

- Reassemble in reverse order using new washers taking care to correctly locate heat exchanger.

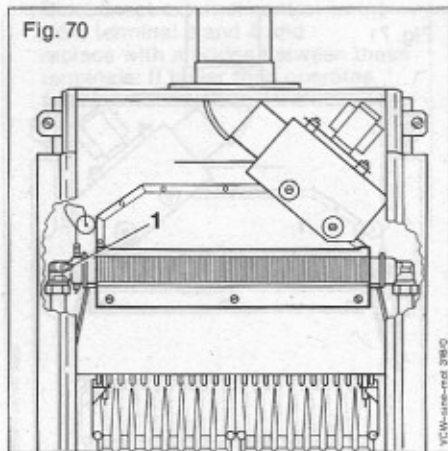
Repressurise system

14.18 Change of combustion chamber duct and insulation.

- Turn off the boiler as under 13.2.
- Remove outer and inner case as under 13.3 and 13.4.
- Remove side panels of inner case (6 screws each side).
- Carry out operation to remove fan and flue hood.
- Carry out operation to remove burner and burner bar.

- Remove burner support bracket (2 screws into back panel of inner case, 2 screws into gas manifold).
- Remove the two guide plates locating the main heat exchanger to the combustion chamber duct (3 screws each side, note plate position to assist reassembly).
- Remove 2 screws securing combustion chamber duct, ease heat exchanger forward and lower duct away to remove.
- Replace combustion chamber duct complete with insulation.
- Reassemble in reserve order ensuring that the combustion chamber duct is positioned centrally under the heat exchanger before refitting the guide plates on each side.

Fig. 70



14.19 Releasing C.H. system pressure

Check C.H. service valves are closed (4, fig. 38).

Release pressure from the appliance by fitting a tube to a drain nipple (B, fig. 38) and unscrewing one turn.

Drain water into a suitable container.

14.20 Draining C.H. system

Release C.H. system pressure (14.19).

Drain the boiler by opening air vent (1, fig. 71) and draining C.H. side of appliance through both drain nipples (B, fig. 38).

Drain water into suitable container.

14.21 Change of safety Isolating transformer

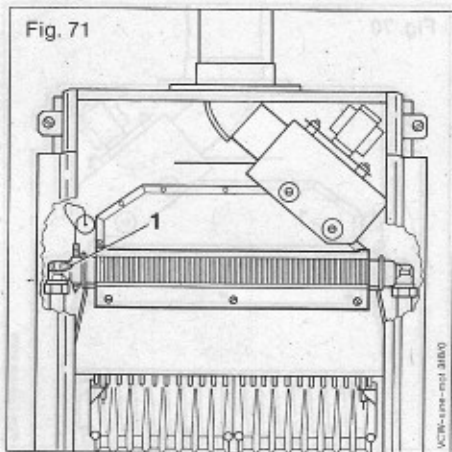
Open the control box as described in 14.6.1 but only remove the multiple plug connecting the transformer to the main switch circuit board. Temporarily replace the control box cover to prevent damage to the circuit boards.

Gain access to the rear of the control box by removing the retaining screws (RS, fig. 51) and pulling control box forward. Remove 4 screws securing the transformer to the rear of the control box.

Reassemble in reverse order taking care to replace the multiple plug onto the main switch circuit board.

Carry out electrical checks (11.1).

Fig. 71



15 Fault Finding

Before proceeding, check the following:

- 1) Carry out preliminary electrical safety checks (see 11.1).
- 2) Turn ON external electrical supply and check external controls are calling for heat.
- 3) Turn ON gas supply and appliance gas service cock.
- 4) Check gas supply pressure at appliance.
- 5) Set boiler main switch to position 1 (ON).
- 6) Check lock out reset button is reset (push in black button on control box).

Always start fault finding procedure with sheet A and follow complete sequence through to sheet F.

Finally complete with electrical safety checks (see 11.1).

Sheet A Check electrical supply

Ensure main switch ON (Position 1)

Does red neon glow in main switch?

Y Go to B

N

Ext. Fault. N Is 230-240 V~ present at input terminals 1 and 2 (N-L)?

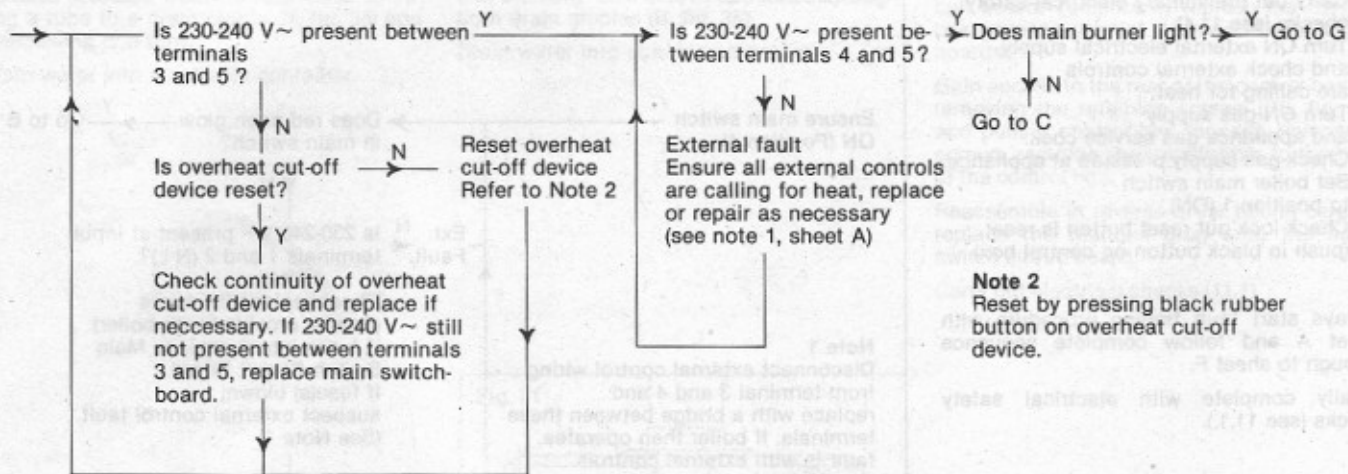
Y

Check/replace 2 A fuses (Spares provided with boiler)
If fuses intact, replace Main Switch Circuit Board.
If fuse(s) blown, suspect external control fault. (See Note 1)

Note 1

Disconnect external control wiring from terminal 3 and 4 and replace with a bridge between these terminals. If boiler then operates, fault is with external controls.

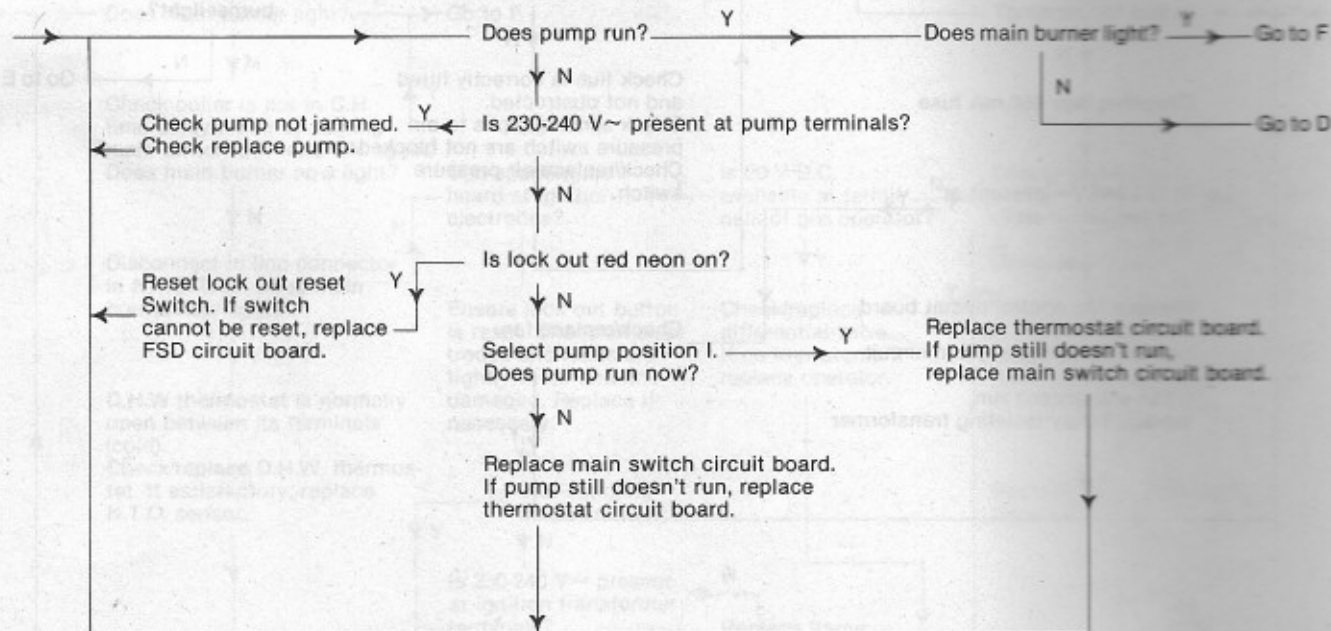
Sheet B Check main switch and overheating cut-off device



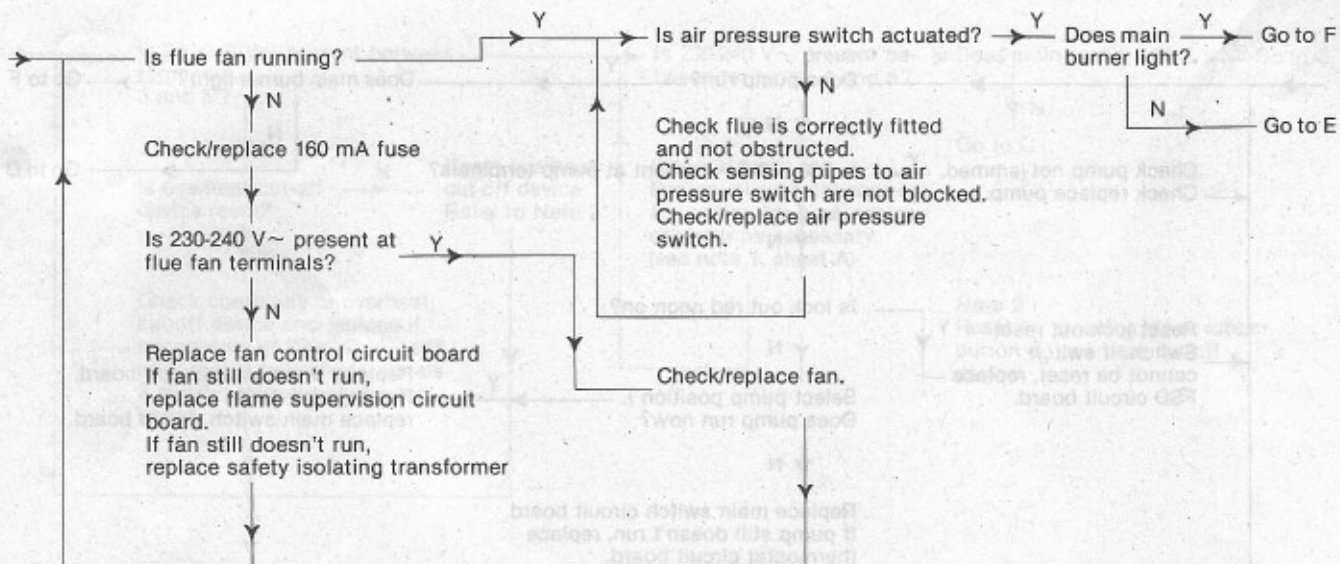
Note 2

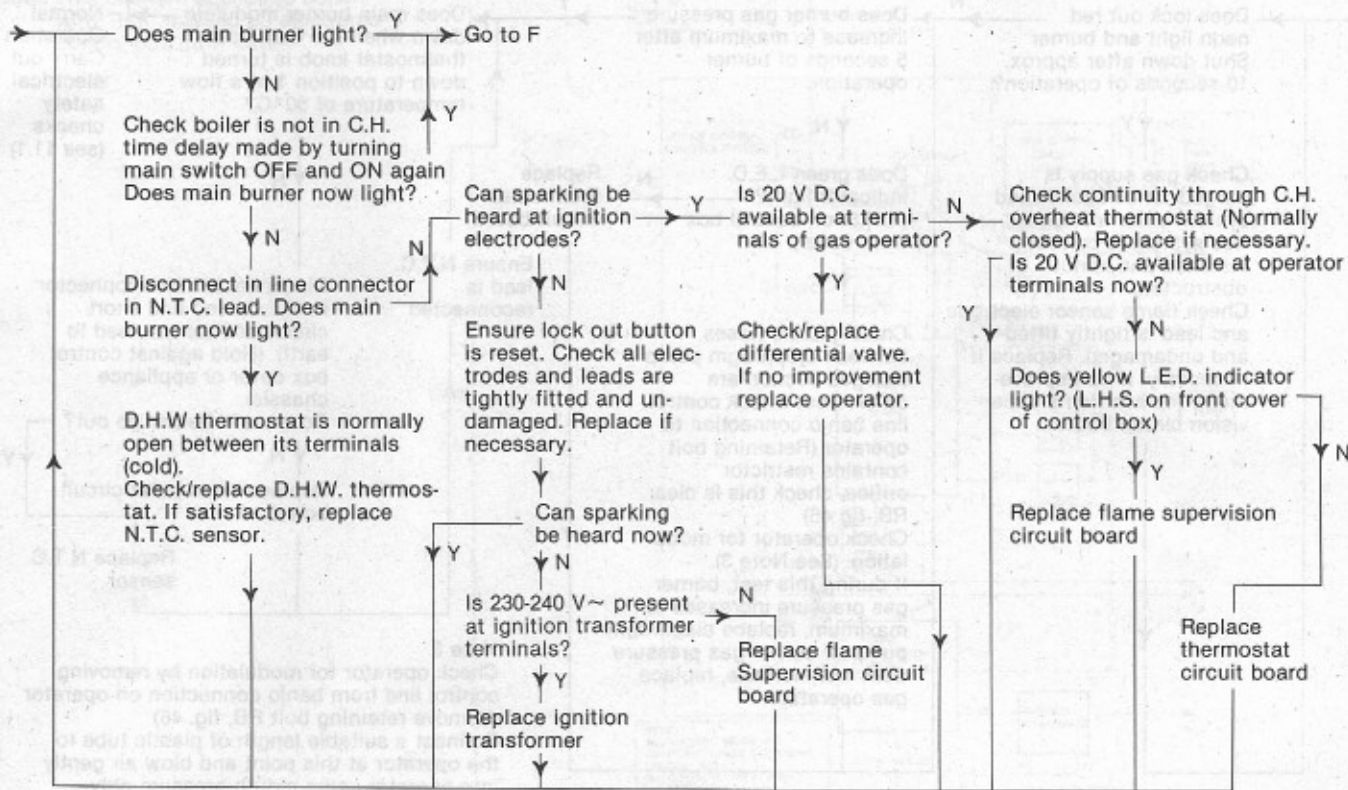
Reset by pressing black rubber button on overheating cut-off device.

Sheet C Check operation of pump

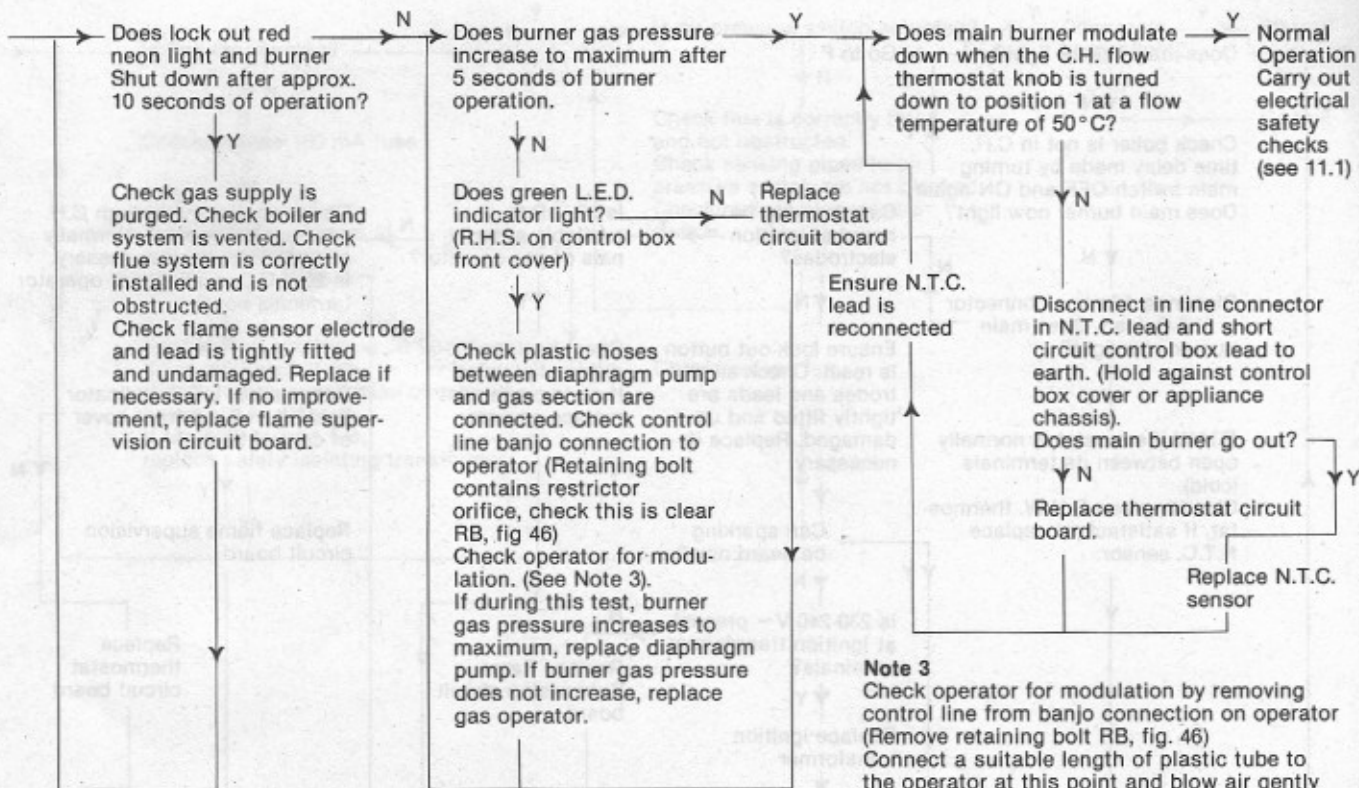


Sheet D Check Flue fan system





Sheet F Check burner modulation



Note 3
 Check operator for modulation by removing control line from banjo connection on operator (Remove retaining bolt RB, fig. 46) Connect a suitable length of plastic tube to the operator at this point and blow air gently into operator using mouth pressure only.

16 Electrical Diagrams

16.1 Functional Flow Diagram

Note: This diagram applies to boilers with "HY" marked on electronic control box front cover.

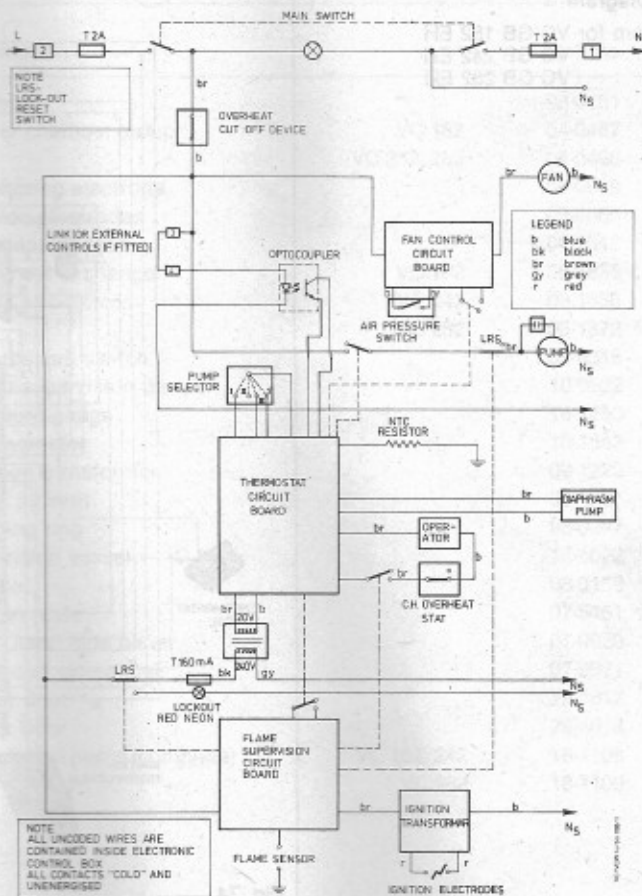


Fig. 72

16.2 Wiring Diagram

Wiring diagram for VC GB 182 EH
 VC GB 242 EH
 VC GB 282 EH

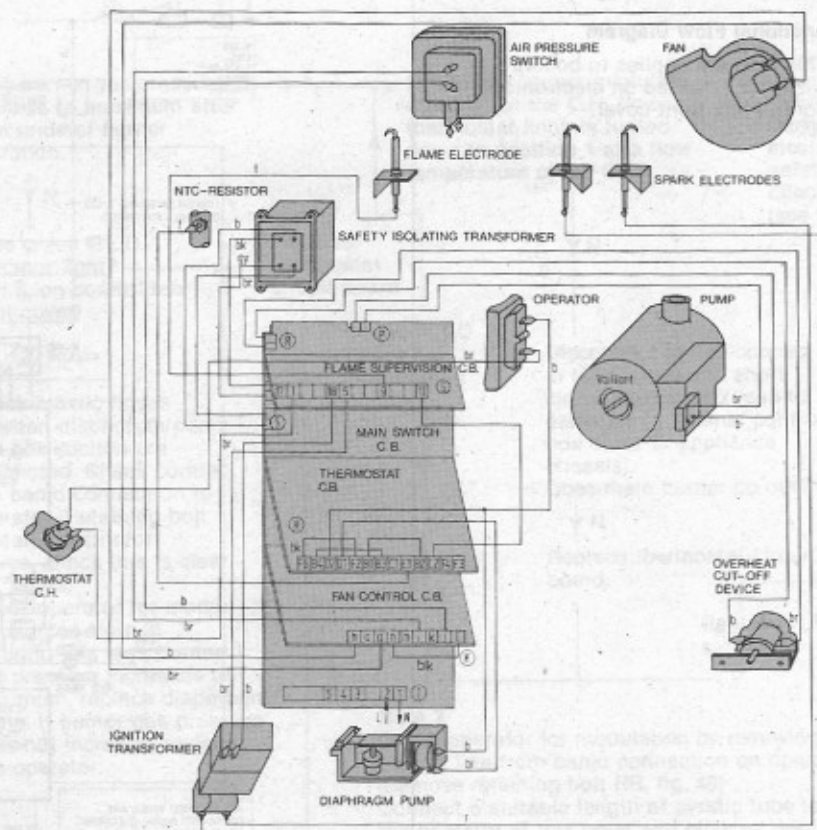


Fig. 74

Legend

- br = brown
- b = blue
- bk = black
- r = red
- t = transparent

17 Short part list



Key No.	Description		Part No.	G.C. No.
2	washer		98-0151	262 335
3	burner chamber group	VC 182	04-0467	255 211
		VC 242, 282	04-0468	255 212
4	monitoring electrode		09-0649	255 213
5	ignition electrodes		09-0665	255 215
6	high tension lead		09-1513	255 222
7	main heat exchanger	VC 182	06-1835	255 234
		VC 242	06-1836	255 235
		VC 282	06-1872	264 123
11	air pressure switch		05-0518	255 273
12	flame supervision device		10-0522	255 335
13	pressure gauge		10-1250	255 328
14	thermometer		10-1542	255 327
16	ignition transformer		09-1222	255 330
17	auto. air vent.		06-1707	263 935
18	packing ring		98-0287	262 316
19	expansion vessel — (C.H.)		18-1022	255 346
20	washer		98-0166	255 296
22	screen plate		07-5461	255 255
23	right hand side panel		07-9920	255 257
24	left hand side panel		07-9921	255 264
25	upper door		29-4012	255 265
26	lower door		29-4013	255 266
27	circulation pump (complete)	VC 182, 242	16-1108	255 300
		VC 282	16-1109	264 148

