

HI-SPEC J50P WARM AIR HEATERS

INSTALLATION, COMMISSIONING & SERVICING INSTRUCTIONS

G.C. No 42 416 12

This appliance is for use with PROPANE gas G31 only

1. BRIEF DESCRIPTION

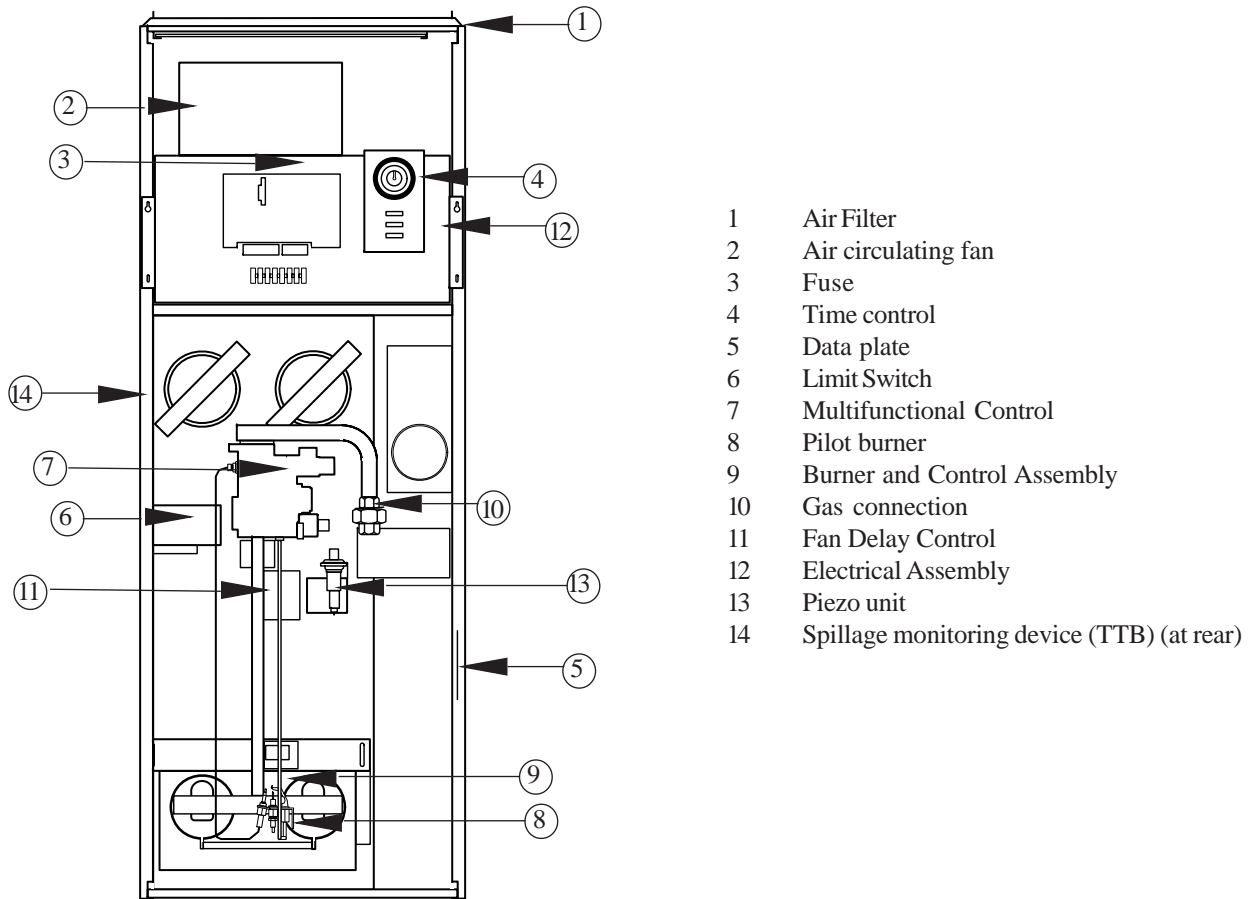


Fig. 1

- 1.1 HI-SPEC J50P is an open-flued, fan assisted downflow, ducted warm air heater. A Spillage Monitoring Device (TTB) is fitted which senses the temperature in the draught diverter, and shuts down the appliance when this temperature rises due to the presence of flue gases.
- 1.2 The air heater output is 14.65kW (57.75MJ/h, 50,000Btu/h). “Summer air circulation” of unheated air is available by manual selection (see User’s Instructions).

THIS APPLIANCE CONFORMS TO BS EN 55014

Installation shall be in accordance with the current editions of:-
 Building Standards (Scotland) (Consolidation) Regulations
 Building Regulations
 Gas Safety (Installation and Use) Regulations (as amended)
 BS 7671 Institute of Electrical Engineers (I.E.E) Wiring Regulations
 BS 5482 Pt. 1 Domestic Butane- and Propane-gas-burning installations.
 BS 5440 Pt. 1 (Flues for Gas Appliances)
 BS 5440 Pt. 2 (Air Supply for Gas Appliances)
 BS 5864 Installation of Gas Fired Ducted Air Heaters
 British System Design Manual “Gas Fired Warm Air Heating”
 Model and Local Authority Bye-laws

IMPORTANT: STATUTE LAW DEFINES THAT ALL GAS APPLIANCES MUST BE INSTALLED BY COMPETENT PERSONS, (i.e. CORGI REGISTERED INSTALLERS) IN ACCORDANCE WITH THE GAS SAFETY (INSTALLATION AND USE) REGULATIONS (CURRENT EDITION). FAILURE TO COMPLY WITH THESE REGULATIONS MAY LEAD TO PROSECUTION.

2. HEATER COMPARTMENT AND CLEARANCES (SEE BS 5864)

- 2.1 **IMPORTANT:** If the heater is to be fitted to an existing base duct (warm air plenum), always ensure that installation is carried out such that the rear left hand corner of the heater is aligned with the rear left hand corner of the base duct, so that any overhang or blanking off will be at the front and/or right hand side. In any event, blanking plates must be mechanically secured and all joints sealed.
- 2.2 When the heater is fitted into a compartment, a minimum clearance from the compartment walls of 25mm (1in) at the sides, rear and front must be left. Consideration should also be given to the space required for the removal and replacement of the filter tray and the entry of the gas and electrical supplies.
- 2.3 For service access, a minimum of 450mm (18ins) is required at the front of the heater. Space must also be allowed, in a compartment installation, to permit the removal of the heater. The clearance between the appliance and the compartment should not be less than 75mm (3in). However, where clearances are less than 75mm, the internal surface of the compartment must be lined with non-combustible material. The compartment must be of a fixed rigid structure.
- 2.4 In airing cupboard installations, the part used as the air heater compartment must comply with the relevant section of BS 5864 and must be completely separated by either a non-combustible partition or a perforated metal partition with the perforations not exceeding 13mm ($\frac{1}{2}$ in). The secondary flue must be a tight fit where it passes through the partition and must be suitably protected (see BS 5440: Part 1).
- 2.5 In under-stairs installations, the compartment must comply with the relevant section of BS 5864, provided that in addition, all internal surfaces, including the base, are non-combustible or lined with non-combustible material. This requirement is applicable only to dwellings of more than two storeys.
- 2.6 In slot fit installations (see instructions packed with Slotfit Kit TS50), the slot fit compartment must comply with the relevant section of BS 5864. Side and rear clearances should be not less than 25mm (1in).

Important: Ensure that the rear of the heater is at no time subjected to air pressure subject to leaks from underfloor, joists or roof spaces.

- 2.7 In freestanding installations (see instructions packed with Top Closure Kit TCS50), only one or two walls will be in close proximity to the air heater; these must be non-combustible in compliance with the relevant section of BS 5864.
- 2.8 If the appliance is to be installed onto a combustible surface, a suitable base tray (BT50) is required. However, when a base duct is used, this provides sufficient protection for combustible material and no further insulation is needed.
- 2.9 For Slot Fix applications (see instructions packed with the Slot Fix Kit), it is important to ensure that the draught diverter relief is maintained on both sides of the application.

3. VENTILATION AND COMBUSTION AIR

- 3.1 The room or internal space in which the heater is installed requires a permanent air vent of minimum effective area 81cm² (12in²). The air vent should be either direct to outside air or to an adjacent room or internal space (other than a toilet or bathroom) that itself has an equivalent air vent direct to outside.
- 3.2 Combustion air may be introduced, via a 120mm (5in) nominal bore pipe, connected to a return air duct or plenum from a ventilated area and fitted with a lockable damper. The damper should be adjusted to control combustion airflow to 0.0137m³/s (29cfm), (i.e. 1.11m/s [220ft/min] velocity in a 120mm [5in] bore pipe). If this arrangement is used, a non-closeable warm air register **MUST** be provided in the same area as the front of the air heater or heater compartment if a return air grille is not located in that area.
- 3.3 When installed in a compartment, two permanent ventilation openings into the compartment are required, one at high level and one at low level, both communicating either directly with outside air or with a ventilated room or space. The minimum effective areas specified in Table 1 are related to the rated heat input of the Air Heater.
- 3.4 If any room or area from which air is drawn for ventilation or combustion contains an extract fan, the permanent vents must be sized to ensure that the operation of the appliance(s) at full rate is/are not adversely affected. A spillage test as specified in sub-para 6.8 (Safety Checks) is carried out and any remedial work undertaken.

Ventilated from inside building.	Low level grille	337cm ² (52.3in ²)
	High level grille	169cm ² (26.2in ²)
Ventilated from outside building.	Low level grille	169cm ² (26.2in ²)
	High level grille	85cm ² (13.1in ²)

Table 1
Minimum Effective Areas

4. DUCT SYSTEM

(See British Design Manual - Gas fired Warm Air Heating)

4.1 RETURN AIR

- 4.1.1 All return air shall be POSITIVELY ducted from outside the compartment to the top of the unit via a return air duct or, if appropriate, using a Side Return Air Kit SR50, and mechanically secured. It is recommended that the return air duct be not routed directly from the main living area, but from a convenient central area serving the remainder of the dwelling.
- 4.1.2 The return air system should be constructed of fire-resistant material. The flue shall not be run through an area serving as a return air path. It is extremely important that the correct size of return air grilles and ducting is used. For heaters on maximum output the return air duct size should not be less than the equivalent of 300mm x 250mm (12" x 10"). If flexible duct is used the duct diameter should not be less than 350mm (14") dia. The return air grille should have a free area of not less than 1266cm² (196in²).
- 4.1.3 An adequate and unobstructed return air path is essential from areas not served by a directly ducted return and to which warm air is delivered. All such rooms should be fitted with relief grilles which have a free area of 0.0088m²/kW (1in²/250Btu/h) of heat supplied to the room. The only exceptions are kitchens, bathrooms and WC.'s.
- 4.1.4 The return air duct should allow for ease of removal for access to the flue.
- 4.1.5 All duct work in the room or internal space in which the heater is installed shall be mechanically secured, and sealed with ducting tape.

4.2 WARM DELIVERED AIR

- 4.2.1 All duct work, including riser ducts, should be fully insulated with 50mm (2in) fibreglass or similar. If short extended duct runs are taken below floor level these should be similarly insulated, and in addition wrapped with a sound vapour proof barrier, and protected from crushing.
- 4.2.2 The duct system should be carefully designed (as given in the guidelines in the British System Design Manual) to suit the needs of its specific heating requirements and building layout. The type of duct system, (i.e. radial/extended plenum/stepped) should be installed using the least number of fittings to minimise airflow resistance. The base duct, which equalises the air pressure to supply ducts, shall be constructed to support the weight of the heater, which shall be secured to the plenum with screws on at least two sides, and sealed using self-adhesive foam strip, ducting tape or sealing compound. All ducting and blanking plates shall be mechanically secured and sealed.

5. INSTALLATION REQUIREMENTS

5.1 FLUES (see British Standards BS 5440 Pt. 1 Flues)

- 5.1.1 All joints shall be soundly sealed.
- 5.1.2 The flue should be kept as short and warm as possible.
- 5.1.3 Sufficient support brackets shall be installed to bear the weight of the total flue system.
- 5.1.4 The spigot connection of the heater draught diverter will accept internally the spigot end of a non-asbestos flue to BS 567 or twin wall metal flue to BS 715 of nominal 100mm (4in) diameter.
- 5.1.5 A split collar should be fitted to provide for flue maintenance or inspection.
- 5.1.6 The flue shall be in accordance with the Building Regulations and British Gas Materials and Installations specification (3rd edition) with regard to clearance and shielding from combustible materials.
- 5.1.7 All materials shall be in accordance with Building Regulations requirements.
- 5.1.8 The flue should run as vertically as possible. Horizontal runs should be avoided if at all possible and any directional

change should be as gentle as possible. If there is any doubt about the flue configuration, the equivalent flue height should be determined (see 5.1.10).

- 5.1.9 If the appliance to be fitted is a replacement, the old appliance should be checked for signs of spillage prior to commencement of the installation and appropriate action taken, (i.e. check flue system and renew as necessary).
- 5.1.10 It is recommended that at least 600mm of vertical flue should be provided from the top of the draught diverter (for new installations this shall be incorporated into the flue design). However, when carrying out replacement installations, an existing flue system may be encountered, where the vertical flue above the appliance to the first bend is less than 600mm. In the first instance, the installer must judge whether this distance can be achieved practicably by some means. Where this is not practicable, the existing flue system may be used, providing there is no evidence of spillage from the old appliance (see 5.1.9 above). Every effort must be made, however, to ensure that the existing flue complies in every other way to BS 5440 Part 1, including the visual inspection, flue flow and spillage test described in 4.3.2 of the above standard. Flue configurations may be assessed in terms of equivalent vertical height - details are given in 5.1.11. For air heaters, the minimum equivalent vertical height is 1 metre. The installer must make a judgement based on his knowledge and experience and the examination and testing described above as to whether an existing flue system can be used.

Note: Ventilation of the compartment, room or internal space in which the appliance is to be installed must be checked for compliance with the requirements of BS 5440 Part 2 (Ref. Section 3 of these instructions) and upgraded as necessary.

Component	Internal Size (mm)	Resistance	Components	Internal Size (mm)	Resistance
Flue Blocks	197 x 67	0.85 per metre	45° bend	100mm pipe	0.61 per fitting
	231 x 65	0.65 run		125mm pipe	0.25 per fitting
	317 x 63	0.35		150mm pipe	0.12 per fitting
	140 x 102	0.60		197 x 67	0.30 per fitting
	200 x 75	0.60		231 x 65	0.22 per fitting
	183 x 90	0.45		317 x 63	0.13 per fitting
Pipe	100	0.78	Raking Block	Any	0.30 per block
	125	0.25			
	150	0.12	Adaptor Block	Any	0.50 per block
Chimney	213 x 213	0.02	Terminal	100mm ridge	2.5
				125mm ridge	1.0
90° Bend	100mm pipe	1.22 per fitting		150mm ridge	0.48
	125mm pipe	0.50 per fitting		100mm GCI	0.6
	150mm pipe	0.24 per fitting		125mm GCI	0.25
				150mm GCI	0.12

Table 2
Resistance factors for use in calculating equivalent heights

Appliance	Inlet Resistance (K_i)	Flue	Outlet resistance (K_o)
100mm Dia Spigot	2.5	100mm	2.5
125mm Dia Spigot	1.0	125mm	1.0
150mm Dia Spigot	0.48	150mm	0.48

Table 3
Inlet and outlet resistances

5.1.11 Calculation method for flue sizing: (from BS 5440: Part 1, Appendix A)

- This appendix provides a procedure for estimating whether a given flue design is likely to ensure full clearance of combustion products.
- The procedure is based on calculating the 'equivalent height' of the flue under consideration, (i.e. that height of the straight vertical circular flue pipe of specific size which will produce the same flow rate as the flue under consideration). The equivalent height is calculated from the formula:

$$H_e = H_a \times \frac{(K_i + K_o)_e}{(K_i + K_o)_a - K_e H_a + \text{Sum K}}$$

where:

H_e is the height of the equivalent flue;

H_a is the vertical height of the actual or proposed flue;

K_i is the inlet resistance of the flue;

K_o is the outlet resistance from the flue;

subscript e refers to the equivalent flue diameter;

subscript a refers to the actual or proposed flue diameter;

K_e is the resistance per unit length of the equivalent flue;

Sum K is the resistance (other than the inlet and outlet resistance) of the actual or proposed flue.

Note: K and Sum K are obtained from Table 2. K_o and K_i are obtained from Table 3.

- Table 2 gives resistance factors for common flue components for use in the formula. Table 3 contains the appropriate inlet and outlet flue resistances, (**the flue is likely to be satisfactory if its equivalent height exceeds 1m**).

d. **Worked Calculation Example:**

A warm air unit with a 100 mm diameter flue spigot, fitted with a pre-fabricated flue system leading to a ridge tile in the loft (refer Fig. 2):

From table 3:

K_{ia}	Inlet resistance of actual flue	= 2.5
K_{oa}	Outlet resistance of actual flue	= 2.5
K_{ie}	Inlet resistance of equivalent flue	= 2.5
K_{oe}	Outlet resistance of the actual flue	= 2.5

From table 2:

Other resistances of actual flue:

Terminal	= 2.5
Pipe bend (2 x 0.61)	= 1.22
Pipe (4 x 1m @ 0.78)	= 3.12
(5 x 0.3m @ 0.78)	= 1.17

Sum K = 8.01

Equivalent height :

From the formula

$$H_e = 6.2 \times \frac{(2.5 + 2.5)}{(2.5 + 2.5) - (0.78 \times 6.2) + 8.01}$$

$H_e = 3.793$ This flue exceeds 1.0m equivalent height and is therefore satisfactory.

5.1.12 Where flue blocks are used, builders should ensure that no obstruction is created during erection. The installer should ensure that the connection flue does not project beyond the internal wall of the flue blocks and that there is provision for examination and servicing.

5.1.13 **Important:** Before installing the appliance, carry out a visual check of the flue system as directed in the relevant section of BS 5440 Pt. 1, then check the flue performance as follows:-

- Close all doors and windows in the room in which the appliance is to be installed.
- Introduce some heat into the flue, using a blow torch or other means.

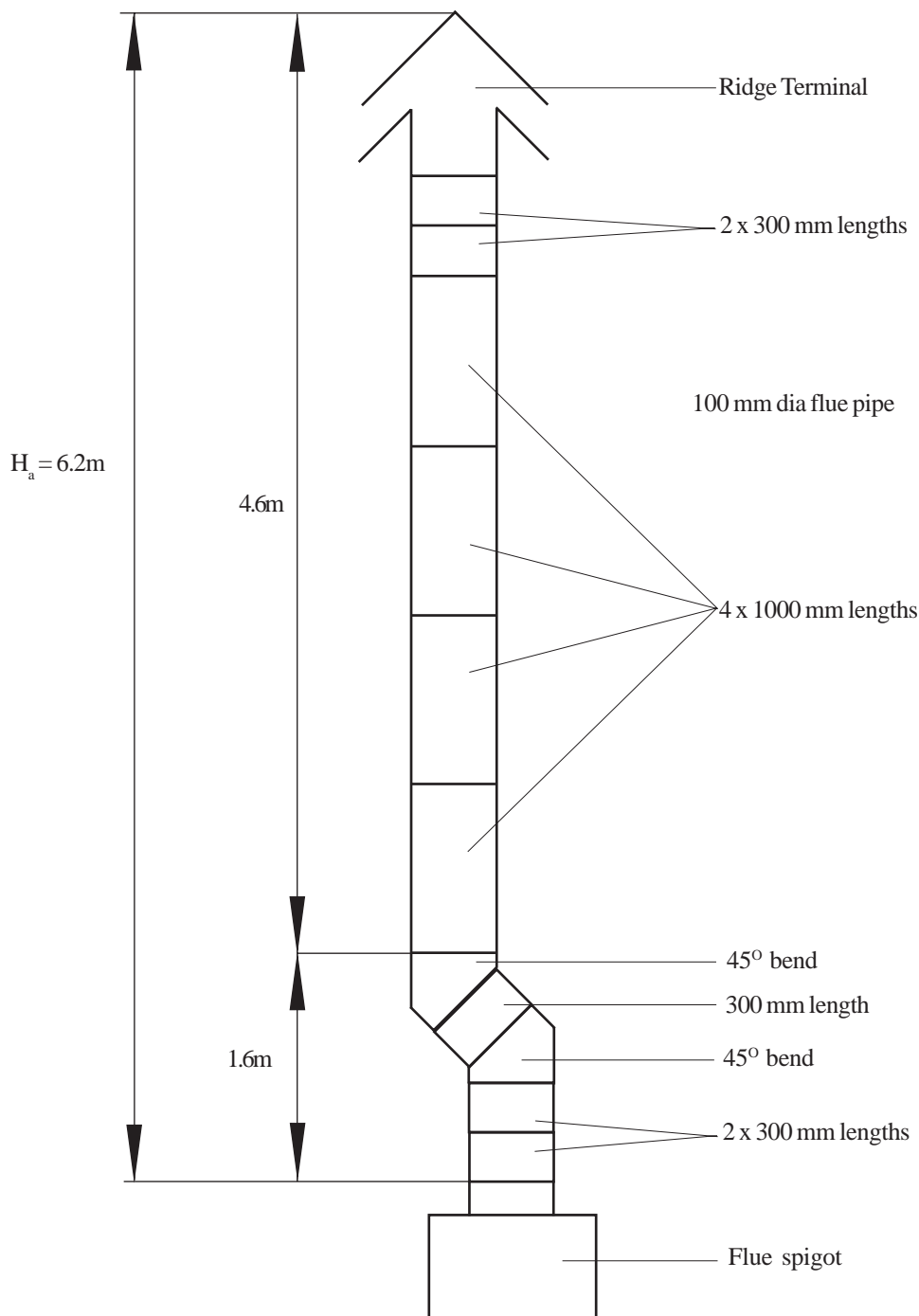


Fig. 2
Worked example of equivalent flue height

- c. Carry out a flow visualisation check with a smoke pellet at the intended position for the appliance. Ensure that there is discharge of smoke from the correct terminal only, and no spillage into the room. Smoke coming out of other than the correct terminal only, or a down draught or 'no flow' condition, indicates that the flue has failed the test, and the appliance shall not be connected until the defect has been found and rectified, and the test satisfactorily completed.

5.2 ELECTRICAL

5.2.1 Mains.

- a. The heater is supplied with mains cable (PVC sheathed, heat resisting to 85°C), 3-core Brown-Blue-Green/Yellow, 6A, 0.75mm², connected to a terminal block and exiting through the heater at the right hand top front. The cable is suitable for a 230V 50Hz supply and shall be connected to the fixed wiring using a double pole switched, fused spur, incorporating a protective earth link. The fuse fitted shall be rated 5A to BS 1362. Connections shall be in accordance with the current edition of I.E.E Regulations BS 7671.
- b. A 24V room thermostat (not supplied), that complies with BS 800, BS 3955 and BS 4201 is essential to ensure close control of comfort conditions. An anticipator is located within the thermostat and is graded in amps. The anticipator should be checked and adjusted to 0.2A.

5.2.2 Room Thermostat and its location.

- a. The Room Thermostat should be located where there is free air circulation approx. 1.5m (5ft) from the floor.
- b. Avoid the following locations:
 - i) In a room where temperature is greatly affected by the sun or any other heat source, e.g. radiant fire, wall light fittings or TV set.
 - ii) Near an outside door or windows, or on an outside wall.
 - iii) Where affected by warm air ducts, diffusers, waste pipes or the heater itself.
 - iv) Where subject to vibration.
- c. Connect room thermostat wires control panel terminals '16' and '17'

5.3 GAS (SEE BS 5864 AND BS 5482)

- 5.3.1 An independent gas supply pipe from the meter is to be preferred wherever possible. When this is not possible, the pipe must be capable of taking the complete input of the heater and all other gas appliances being served by this same pipe. This supply should be suitably sized to conform to British Standards requirements of no more than 2.5 mbar (1.0 in wg) pressure drop (BS 5482 Pt. 1).
- 5.3.2 The 1/2in union gas cock (supplied) must be fitted to the gas inlet of the heater for easy isolation during servicing. The gas pipe should be so fitted and installed as to be durable, substantial and gas tight. To assist in determining whether a gas connection may not be tight, a leak detection fluid should be applied around the connection. Under no circumstances should a flame be used to locate a gas leak. Gas entry to the air heater is through either side to a Rc1/2 (1/2in BSP. external [taper] thread).

5.4 DRAUGHT DIVERTER & DEFLECTOR PLATE:

- 5.4.1 The HI-SPEC J50P heater is supplied with a draught diverter which houses the TTB, and which requires fitting to the rear of the heater prior to installation, using 6 x 4mm screws and lock washers (provided). Connect the TTB to the terminal block situated on the rear upper left hand corner of the appliance.
- 5.4.2 The deflector plate prevents spillage from the draught diverter in the event of a leak between the air heater and the base plenum and MUST be fitted as shown in fig 3 using the screws provided.

5.5 DEFLECTOR PLATE SAFETY CHECK:

In order to ensure that the deflector plate is preventing warm air from entering the draught diverter and therefore causing spillage, the following test MUST be carried out BEFORE commissioning:

- 5.5.1 Turn on the power supply to the heater.
- 5.5.2 Set the summer airflow switch to "on".
- 5.5.3 Using a smoke match, introduce smoke into the heat exchanger at the burner opening.
- 5.5.4 Ensure that the smoke is drawn into the heat exchanger and not blown back from the burner opening.
- 5.5.5 If smoke is blown back from the burner opening, check for air leaks between the heater and the base plenum, paying particular attention to the rear of the heater directly beneath the draught diverter.

6.

COMMISSIONING

6.1 PREPARATION:

- 6.1.1 Ensure that:
 - a. Gas and Electrical supplies are **OFF**.
 - b. Filter, fan and fan compartments are free from obstructions.
 - c. All registers or grilles are open and conform to design specifications.
 - d. Return, relief and ventilation air installations are adequate.

6.2 SYSTEM BALANCING:

- 6.2.1 Set the heater electrical supply ON.
- 6.2.2 Set the SUMMER AIR CIRCULATION switch to 'ON'.
- 6.2.3 Balance the system to provide the required volume proportions at the warm air outlets.

NOTE: If the system includes ceiling diffusers, air velocities through these should be NOT LESS THAN 1.5m/s (300ft/min), except for very small rooms, (i.e. bathrooms etc.). Outlet faces may require partial blanking in order to achieve this.

- 6.2.4 Set the SUMMER AIR CIRCULATION switch to 'OFF'.

6.3 IGNITION OF PILOT AND MAIN BURNERS:

WARNING: If the Pilot Burner is extinguished either intentionally or unintentionally, no attempt should be made to relight the gas for a minimum of 3 minutes. Ensure that the Electrical supply, time control and Selector switches are set to 'OFF'.

- 6.3.1 Set the room thermostat to its lowest or **OFF** setting.
- 6.3.2 On the Multifunctional Control, remove the Outlet Pressure test point cover, and a fit pressure test gauge (refer Fig. 5)..
- 6.3.3 Turn the heater Gas supply **ON**, test for gas soundness and purge the whole gas pipe as described in BS 6891.
- 6.3.4 Referring to Fig .5, press and hold the OPERATING CONTROL, and whilst observing the Pilot Burner, repeatedly press the Piezo igniter button until the Pilot Burner ignites.
- 6.3.5 After 20 seconds release the OPERATING CONTROL and let it spring out; ensure that the Pilot Burner remains alight. If the Pilot Burner extinguishes, rotate the OPERATING CONTROL clockwise to the '1' position and ensure that the OPERATING CONTROL is fully reset. Wait three minutes and repeat steps 6.3.4 and 6.3.5 until the Pilot Burner remains alight.
- 6.3.6 Ensure that the pilot flame envelops the thermocouple tip, adjusting the Pilot Adjuster as required (Refer Figs. 4 and 5).
- 6.3.7 Set the Heater Electricity supply ON.
- 6.3.8 Set the Time Control to the required Heating On periods.
- 6.3.9 Set the Selector switch to 'TIMED'.
- 6.3.10 Set the room thermostat to MAXIMUM.
- 6.3.11 Ensure that the Main Burner has now ignited.
- 6.3.12 Test for gas leakage at the supply, Multifunctional Control, and Pilot and Main Burners using a proprietary detection fluid, sealing any leaks found.
- 6.3.13 Allow the heater to operate for a minimum of 15 minutes to ensure stability.

6.4 MAIN BURNER PRESSURE TEST:

IMPORTANT: AIR HEATER BURNERS ARE FACTORY SET TO PROVIDE A NOMINAL RATE OUTPUT AS DETAILED IN SUB PARA 1.2

- 6.4.1 Referring to Table 4 and Fig. 4 below, ensure that the pressure test gauge indicates the correct burner pressure.

6.5 EXTINGUISHING OF PILOT AND MAIN BURNERS:

- 6.5.1 On the Multifunctional Control, rotate the OPERATING CONTROL clockwise to the '1' position and ensure that the OPERATING CONTROL fully resets, and both Pilot and Main Burners are extinguished.
- 6.5.2 On the Multifunctional Control, remove the pressure test gauge and refit the Outlet Pressure test point cover, and test for gas soundness.

6.6 TEMPERATURE RISE CHECK:

- 6.6.1 Ignite the Pilot and Main Burners and allow to operate for 15 minutes to ensure stability.
- 6.6.2 With the Main Burner operating continually, check that the temperature rise across the heater is between 45°C -55°C, setting the fan speed accordingly, (decrease the fan speed to increase the temperature rise). The fan speed is adjusted by selecting the fan speed at the electrical control panel (decrease voltage selection to decrease fan speed).

Note: TAPPING 1 = 150V, TAPPING 2 = 170V, TAPPING 3 = 190V, TAPPING 4 = 210V, TAPPING 5 = 230V.

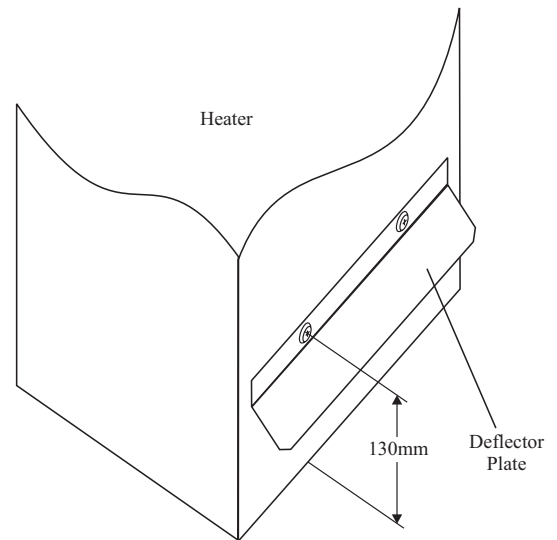


Fig. 3
Deflector Plate

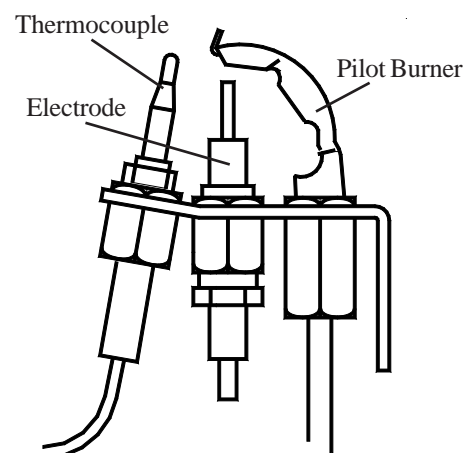


Fig. 4
Pilot Burner Assembly

6.7 AUTOMATIC CONTROLS CHECK

- 6.7.1 Set the TIME CONTROL to 'ON'.
- 6.7.2 Turn the room thermostat slowly clockwise until the Main Burner ignites.
- 6.7.3 Ensure that the fan starts to operate after a short period (approx. 1-2 minutes).
- 6.7.4 When the temperature reaches the control setting, ensure that the Main Burner extinguishes followed by the fan switching off after a short period.
- 6.7.5 When the temperature falls below the control setting, ensure that the Main Burner re-ignites followed by fan operation.

6.8 SAFETY CHECKS:

- 6.8.1 Check for gas soundness within the appliance.
- 6.8.2 **Spillage test:** Carry out a full spillage test as follows, and ensure that the flue operates effectively with all doors closed and any extractor fans in operation.

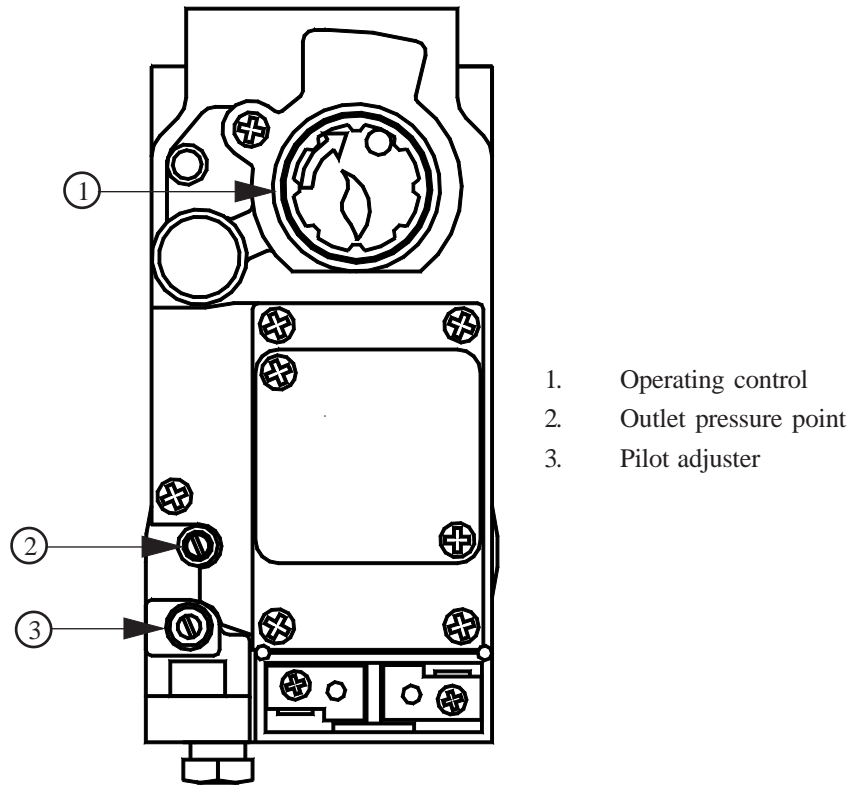


Fig. 5
Multifunctional Control

NOTE: If an extractor fan is situated in an adjoining or adjacent room, carry out the spillage test with the interconnecting doors open.

If the draught diverter is accessible:

- a. Introduce smoke into the draught diverter adjacent to an exit from the heat exchanger, by means a smoke match or puffer.
- b. Ensure that there is no spillage present (indicated by displacement of smoke downwards and out of the draught diverter).

If the Draught Diverter is not accessible:

- a. Introduce smoke, by means of **part** of a smoke pellet on a non-combustible support, into the heat exchanger.
- b. Extinguish the Main and Pilot Burners.
- c. Ensure that there is no spillage evident by visually observing the draught diverter location on the air heater.
- d. If spillage is evident, further investigation and rectification is required before re-testing the appliance.

WARNING: The appliance shall not be left connected to the gas supply unless it has successfully passed the above spillage test.

- 6.8.3 Turn OFF the gas supply at the service cock and ensure that the Multifunctional Control fail-safe operates within 60 secs (indicated by loud click from Multifunctional Control).
- 6.8.4 Turn the gas supply ON at the service cock.
- 6.8.5 Switch the electrical supply **OFF**.
- 6.8.6 Disconnect the fan at the electrical control panel.
- 6.8.7 Switch the electrical supply **ON**.
- 6.8.8 Ignite the Main and Pilot Burners as detailed in sub para 6.3.1 to 6.3.5
- 6.8.9 Ensure that the Limit Switch operates, indicated by the Main Burner extinguishing, (approximately 2 to 3 minutes).
- 6.8.10 Switch the electrical supply **OFF**.
- 6.8.11 Reconnect the Air Heater Fan.
- 6.8.12 Switch the electrical supply **ON**.
- 6.8.13 Ensure that the Main Burner re-ignites when the appliance temperature reduces, (note: with the fan disconnected, there may be some delay before the Main Burner re-ignites).

	kW	MJ/h	Btu/h
Input	18.72	67.4	63,900
Output	14.65	52.75	50,000
Gas Rate	1.81m ³ /h (64.1ft ³ /h)		
Burner Setting Pressure	35.8mbar (14.3 in wg)		
Main Injector	AMAL 187/001/290		

Table 4
Main Burner Pressure Settings

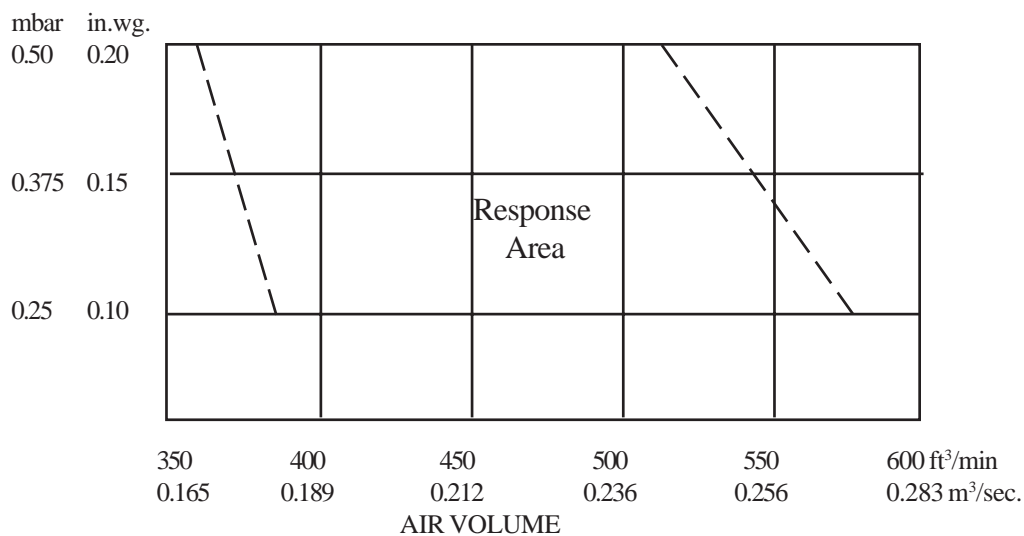


Table 5
Fan Performance Curve

7. INSTRUCTIONS FOR USERS

- 7.1 If the building is unoccupied, ensure that the Instructions for the User are left taped to the air heater, and that the Installation, Commissioning and Maintenance Instructions are left at or near the air heater for use on future service calls.
- 7.2 If the building is occupied, hand the User Instructions over and ensure that the User understands:
 - 7.2.1 How to ignite the Pilot and Main Burners.
 - 7.2.2 How to operate the Thermosta-stat/room thermostat, Time Control, heater ON/OFF switch and summer air circulation switch, and that the Time Control must be reset following a power failure.
 - 7.2.3 How to extinguish the Pilot and Main Burner at the Multifunctional Control, and switch off the electrical supply to the heater.
 - 7.2.4 How to remove, clean and refit the air filter and at what intervals (i.e. fortnightly, or weekly for new houses.)
 - 7.2.5 How to control the heating system by opening and closing warm air outlets.
 - 7.2.6 How to obtain summer air circulation.
 - 7.2.7 That the air grilles on the heater or heater compartment; grilles and ventilators in the walls, windows or doors of the building must not be obstructed.
 - 7.2.8 That the heater must be serviced at least once a year by a competent person to ensure efficient and safe operation.
 - 7.2.9 That the red instructions for safe use have been pointed out and understood.
 - 7.2.10 That expert help must be obtained if persistent failure of the pilot burner occurs.

IMPORTANT: Ensure that the gas and electricity supplies are isolated before commencing any maintenance or replacement of components. After completion of any maintenance, always test for gas soundness and carry out a complete functional test of the appliance in accordance with the Commissioning Instructions at Sect 6.1 to 6.8 inclusive.

8.1 ROUTINE MAINTENANCE:

- 8.1.1 Operate the appliance and check for the correct function of the burner and controls.
- 8.1.2 Turn OFF the gas and electrical supplies to the appliance.
- 8.1.3 Remove the air heater front panel.
- 8.1.4 Remove and check the return air filter/cleaner for cleanliness, remove and clean the Air Circulation fan as detailed in s. 8.8.
- 8.1.5 Remove the Burner and Controls Assembly as detailed in para 8.2. Inspect and clean the Main Burner and injector as necessary. Examine the Main Burner for cracks, including hairline cracks, exchanging the burner as necessary.
- 8.1.6 Inspect and clear the pilot burner orifice.
- 8.1.7 Clean the heat exchanger flueways by thoroughly brushing from above and below.
- 8.1.8 By viewing through the Fan Aperture, and using a torch or similar, examine the heat exchanger externally for signs of cracks or holes, particularly around welded joints.
- 8.1.9 Using a torch or similar, introduce a light source into the heat exchanger burner aperture and upper access port, and again examine the heat exchanger for signs of cracks or holes, particularly around welded joints, whilst again viewing through the Fan Aperture.
- 8.1.10 Refit the Air Circulation fan, Burner and Controls Assembly, and air filter/air cleaner.
- 8.1.11 Light the appliance and note the main burner flame profile. If the flame profile is affected when the Air Circulation fan switches on, check for any air leaks between the air heater and the base plenum, paying particular attention to heaters with rear draught diverters. Rectify any air leaks before continuing with this procedure.
- 8.1.12 Allow the air heater to operate for approximately 15 minutes to ensure stability, and with the main burner lit, ensure that the operation of Air Circulation fan does not affect the main burner flame profile.

8.2 BURNER AND CONTROL ASSEMBLY REMOVAL:

- 8.2.1 Ensure that the Gas and Electrical supplies are switched OFF
- 8.2.2 Remove the appliance lower front door.
- 8.2.3 Disconnect the igniter at the Piezo unit.
- 8.2.4 Disconnect the Multifunctional Control electrical connection.
- 8.2.5 Disconnect the water heater (if necessary).
- 8.2.6 Disconnect the gas supply by breaking the union at the input side of the Multifunctional Control.
- 8.2.7 Remove 6 x Burner Assembly fixing screws and withdraw the Burner Assembly.
- 8.2.8 Refit the Burner and Control Assembly in reverse order, ensuring that the spillage baffle above the Burner Assembly contacts the top of each burner arm.

8.3 MAIN BURNER ASSEMBLY CLEANING:

- 8.3.1 Remove the Burner and Control Assembly as detailed in 8.2.
- 8.3.2 Clean the burner thoroughly both inside and out with a soft brush. **DO NOT ENLARGE, DISTORT OR DAMAGE BURNER HOLES.**
- 8.3.3 Reassemble in reverse order.

8.4 MAIN INJECTORS REMOVAL, CLEANING AND REPLACEMENT:

- 8.4.1 Remove the Burner and Control Assembly as details in 8.2
- 8.4.2 Remove 2 x screws securing the Pilot Burner assembly to the Burner and Control Assembly and withdraw the Pilot Burner assembly, taking care to avoid damage to the Thermocouple Capillary.
- 8.4.3 Remove 2 x screws securing the Burner Arm to the Burner and Controls assembly, and withdraw the Burner Arm.
- 8.4.4 Unscrew 2 x main injectors, and 1 x cross lighter injector from their housings.
- 8.4.5 Clean as necessary. **DO NOT ENLARGE, DISTORT OR DAMAGE MAIN INJECTOR HOLES.**
- 8.4.6 If the injectors are to be replaced, ensure that they are correctly marked, referring to the Data Badge for details.
- 8.4.7 Refit or replace the injectors in reverse order.

8.5 PILOT BURNER, THERMOCOUPLE AND ELECTRODE, REMOVAL AND REPLACEMENT:

- 8.5.1 Remove the Burner and Control Assembly as detailed in 8.2
- 8.5.2 Disconnect the Igniter lead from the Piezo unit.
- 8.5.3 Disconnect the Thermocouple from the Thermocouple adapter on the Multifunctional Control, taking care to avoid damage to the Thermocouple Capillary.
- 8.5.4 Release the Pilot Feed Pipe from the Multifunctional Control.
- 8.5.5 Remove 2 x 4mm screws securing the Pilot Burner Assembly to the Burner and Control Assembly, and withdraw the Pilot Burner Assembly.
- 8.5.6 Release the Thermocouple securing nut from the Pilot Burner assembly and withdraw the Thermocouple, taking care to avoid damaging the Thermocouple Capillary.
- 8.5.7 Release the Electrode securing nut from the Pilot Burner Assembly and withdraw the Electrode.
- 8.5.8 Release the Pilot Feed Pipe securing nut from the Pilot Burner Assembly and withdraw the Pilot Feed Pipe and Pilot Injector from the Pilot Burner Assembly, and disconnect the Pilot Injector from the Pilot Feed Pipe hook.
- 8.5.9 Refitting or replacement is in reverse order.

NOTE: When refitting or replacing the Thermocouple, tighten only to FINGER TIGHT + 1 FLAT.

8.6 MULTIFUNCTIONAL CONTROL REMOVAL:

- 8.6.1 Remove the Burner and Control Assembly as detailed in 8.2
- 8.6.2 Disconnect the Thermocouple at the Multifunctional Control (including the adapter), avoiding damage to the capillary.
- 8.6.3 Disconnect the Pilot Feed Pipe from the Multifunctional Control.
- 8.6.4 Disconnect the Multifunctional Control input and output supply feeds.
- 8.6.5 Refitting or replacement is in reverse order.

8.7 PIEZO UNIT REMOVAL:

- 8.7.1 Disconnect 2 x conductors from Piezo unit.
- 8.7.2 Unscrew the Piezo retaining nut and remove the unit from its mounting bracket.
- 8.7.3 Refitting or replacement is in reverse order.

8.8 AIR CIRCULATING FAN, REMOVAL AND CLEANING:

- 8.8.1 Ensure that the electrical supply is isolated.
- 8.8.2 Remove the appliance lower and upper doors.
- 8.8.3 Disconnect the 230V connections (L/N/E) from the Fan Assembly.
- 8.8.4 Release 4 x screws securing the control panel, and withdraw the panel, avoiding damage to wiring.
- 8.8.5 Release 2 x Fan Assembly securing screws and withdraw the Fan Assembly from the Heater cabinet, avoiding damage to fan blades.
- 8.8.6 Remove all dust from the impeller and motor, avoiding damage to the fan blades.
- 8.8.7 Refitting or replacement is in reverse order.

8.9 ELECTRICAL ASSEMBLY REMOVAL:

- 8.9.1 Ensure that the electrical supply is isolated.
- 8.9.2 Remove the appliance lower and upper doors.
- 8.9.3 Release 2 x 4mm screws securing the Limit Switch cover and the withdraw cover.
- 8.9.4 Release the Electrical Assembly cable clamp,
- 8.9.5 Disconnect the following:
 - a. Disconnect 230V connections (L/N/E) from Fan Assembly,
 - b. 230V mains 'L', 'N' and 'E' from connection block terminals '1' and '3', and earth stud respectively,
 - c. Room thermostat from connection block terminals '5' and '6',
 - d. Limit Switch 'LOAD' and 'COMMON' connections,
 - e. Fan Control 'LOAD', 'COMMON' and 'EARTH' connections,

- 8.9.6 Disconnect 2 x TTB connections.
- 8.9.7 Disconnect the Multifunctional Control connections.
- 8.9.8 Release 4 x 4mm screws securing the Electrical Assembly to the heater cabinet and remove the Electrical Assembly, releasing wiring from cable clamps and grommets as required..
- 8.9.9 Refitting or replacement is in reverse order.

8.10 TIME CONTROL REMOVAL:

- 8.10.1 Ensure that the electrical supply is isolated.
- 8.10.2 Release the securing screw situated on the lower face of the Time Control and remove it by partially withdrawing bottom of the Time Control and then lifting upwards.
- 8.10.3 Disconnect the Time Control electrical connections from its integral terminal strip.
- 8.10.4 Refitting or replacement is in reverse order.
- 8.10.5 Set the Time Control to the required ON and OFF times.
- 8.10.6 Set the Time Control to the correct time.

8.11 FAN DELAY CONTROL AND LIMIT SWITCH REMOVAL:

- 8.11.1 Ensure that the electrical supply is isolated.
- 8.11.2 Remove the appliance lower and upper doors.
- 8.11.3 Release 2 x 4mm screws securing the Limit Switch cover and withdraw the cover.
- 8.11.4 Disconnect the required control/switch.
- 8.11.5 Release 2 x securing screws and remove the required control/switch.
- 8.11.6 Refitting or replacement is in reverse order.

8.12 SPILLAGE MONITOR DEVICE (TTB) REMOVAL:

- 8.12.1 Ensure that the electrical supply is isolated.
- 8.12.2 Remove the appliance lower and upper doors.
- 8.12.3 Remove the Air Circulation fan as detailed in para 8.8.
- 8.12.4 Cover the aperture to the heat exchanger in the top shelf to prevent objects falling into the heat exchanger.
- 8.12.5 Release and remove 6 x screws securing the fan compartment rear access panel, and withdraw the panel.
- 8.12.6 Disconnect the TTB terminal block plug from the terminal block socket, situated on the compartment rear bulkhead, remove the grommet rearwards and pass the terminal block through the aperture in the rear bulkhead.
- 8.12.7 Release and remove the 5mm nut and lock washer securing the TTB Assembly to the Draught Diverter, and withdraw the TTB Assembly.
- 8.12.8 Refitting or replacement is in reverse order.

8.13 HEAT EXCHANGER ACCESS:

- 8.13.1 Release 2 x securing screws and remove heat exchanger access caps and gaskets.
- 8.13.2 Remove the heat exchanger baffles.
- 8.13.3 Reassembly is in reverse order.

NOTE: When reassembling, ensure that the baffles are pushed fully home and that the access caps are fully sealed. In the event of heat exchanger replacement being necessary, contact Johnson and Starley Service Department.

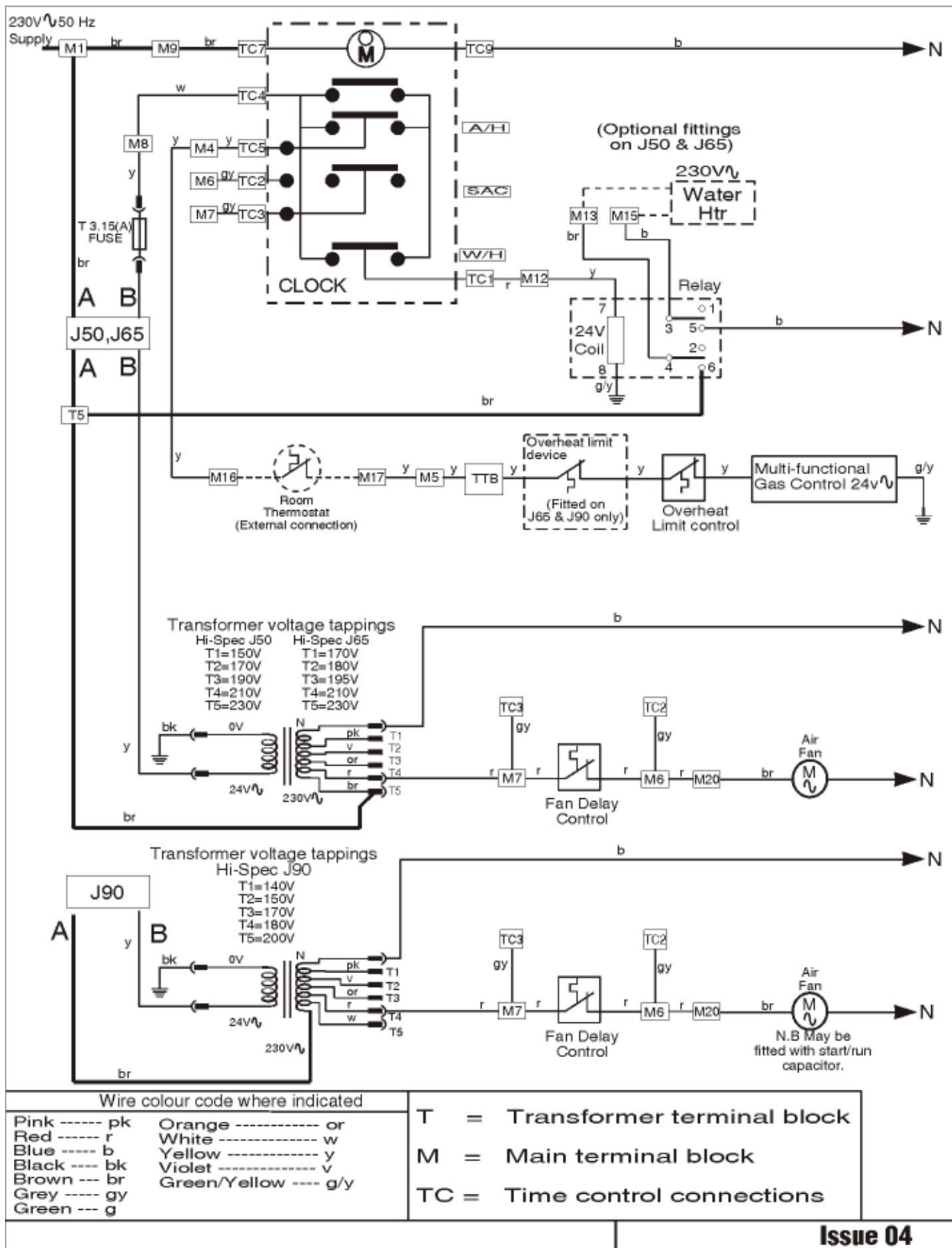
9. DEFECT DIAGNOSIS

9.1 IMPORTANT: If an electrical defect occurs after installation of the appliance; preliminary earth continuity, polarity, and resistance to earth checks should be carried out with a multimeter. On completion of any maintenance/fault-finding task that has required the breaking and remaking of electrical connections, then checks of continuity, polarity, and resistance to earth must be repeated.

9.2 WARNINGS:

- 9.2.1 When purging or checking gas supplies, ensure that the ventilation to the room or cupboard is adequate, and that all naked lights are extinguished.

SYMPTOM	POSSIBLE CAUSE	REMEDY
a. Pilot will not light.	i. No gas supply to heater.	Check for gas at inlet pressure test point on Multifunctional Control.
	ii. Gas supply pipe not purged.	Purge gas supply pipe in accordance with BS 6891.
	iii. Pilot orifice restricted.	Clear pilot orifice or replace pilot injector.
	iv. Piezo system faulty.	Check igniter, lead, and electrode.
	v. Excessive gas supply pressure.	Check that mains gas pressure is 37mbar, and reduce if necessary.
b. Pilot lights but goes out on releasing START button during initial light-up, or after normal operation.	i. Connection between thermocouple and Multifunctional Control not secure.	Check connection is secure.
	ii. Faulty power unit on Multifunctional Control.	Replace Multifunctional Control.
	iii. Faulty thermocouple.	Replace Thermocouple.
c. Main burner lights but fan fails to run after approx. 3 min.	i. No voltage to fan.	Check connections from electrical panel to fan.
	ii. Loose electrical connection Fan Delay Control.	Check connections.
	iii. Fan Delay Control set incorrectly.	Check for correct settings.
	iv. Faulty fan assembly.	Replace, taking care not to damage impeller.
	v. Faulty Fan Delay Control.	Replace.
d. Main burner operating intermittently with fan running.	i. Gas rate or burner pressure setting high.	Check gas rate and burner pressure setting.
	ii. Temperature rise excessive.	Adjust fan speed or gas rate accordingly.
	iii. Air filter or return air path restricted.	Check filter is clean and air path is clear.
	iv. Excessive number of outlets closed.	Open additional outlets.
	v. Spillage of flue gases.	Carry out spillage test and rectify.
	vi. Spillage monitor device (TTB) faulty.	Replace Spillage device (TTB)
e. Main burner operating with intermittent fan operation.	i. Gas rate or burner pressure setting too low.	Check gas rate and burner pressure setting.
	ii. Fan Delay Control set incorrectly.	Check for correct settings.
f. Fan runs for excessive period or operates intermittently after main burner shuts down.	i. Fan Delay Control set incorrectly.	Check for correct settings.
g. Noisy operation.	i. Gas pressure too high.	Check burner pressure setting.
	ii. Noisy fan motor.	Replace fan assembly.
	iii. Fan speed setting too high.	Adjust fan speed.
h. Pilot alight but main burner not igniting.	i. Mains electrical supply not connected to heater.	Check mains supply.
	ii. Controls not demanding heat	Check that time control and room thermostat are operating correctly.
	iii. 3A fuse failed.	Replace. If failure occurs again, check wiring for short circuits.
	iv. Loose connection to room thermostat, Limit Switch, Multifunctional Control lead, Time Control, or transformer.	Check connections.
	v. Transformer open circuit.	Check with test meter and replace electrical assembly.
	vi. Multifunctional Control faulty.	Replace Multifunctional Control.
	vii. Limit Switch faulty.	Short circuit switch, and replace if necessary.
	ix. Room Thermostat or external wiring faulty.	Fit temporary loop in heater Thermostat socket. If heater ignites, external circuit
	or room thermostat is faulty.	



Issue 04

Fig. 7
Functional Diagram

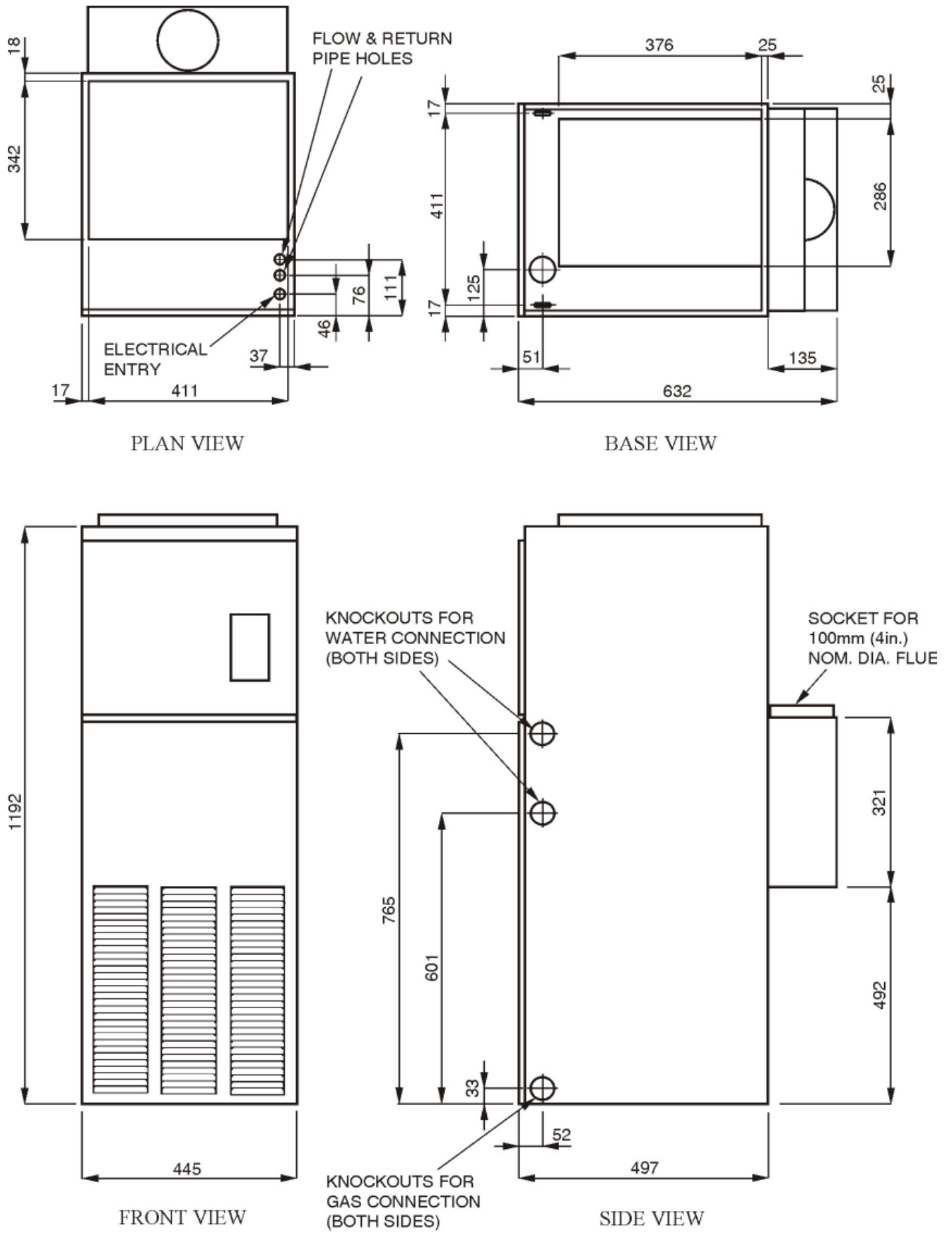


Fig. 8
Principal Dimensions (mm)

BENCHMARK Number

--	--	--	--	--	--	--	--



WARM AIR HEATER AND CIRCULATOR COMMISSIONING CHECKLIST

WARM AIR UNIT

APPLIANCE SERIAL NUMBER: NOTIFICATION No:

HOT WATER GENERATOR

APPLIANCE SERIAL NUMBER: NOTIFICATION No:

CONTROLS to comply with the Building Regulations, each section must have a tick on one or other of the boxes

REQUIREMENT	MEASURES PROVIDED		
1. Time & temp control to heating	Room stat & integral timer	<input type="checkbox"/>	
2. Time & temp control to hot water	Cylinder stat & Integral timer	<input type="checkbox"/>	
3. Heating zone valves	Fitted	<input type="checkbox"/>	Not Required <input type="checkbox"/>
4. Thermostatic Radiator Valves	Fitted	<input type="checkbox"/>	Not Required <input type="checkbox"/>
5. Boiler interlock	Provided	<input type="checkbox"/>	Not Required <input type="checkbox"/>

FOR WARM AIR HEATERS ONLY

Has the system been balanced in accordance with the heater manufacturer's instructions? YES NO

Was an anemometer used? YES NO

Have balancing dampers been fitted? YES NO

FOR WARM AIR HEATING: MEASURE AND RECORD

Burner operating pressure Mbar

Heat input KW

Temperature differential between return air inlet and nearest outlet °C

FOR HOT WATER GENERATORS: MEASURE AND RECORD

Burner operating pressure Mbar

Heat input KW

Water flow temperature °C

FOR ALL PRODUCTS

Does the heating & hot water system comply with the appropriate building regulations? YES NO

Has the appliance and associated controls been installed & commissioned in accordance with manufacturer's instructions? YES NO

Have you demonstrated the operation of the appliance & system controls to the customer? YES NO

Have you left all the manufacturer's literature with the customer YES NO

Competent person's signature Customer's Signature
(To confirm demonstration of equipment & receipt of appliance instructions)

COMMISSIONING ENGINEER'S DETAILS

Name Commissioning Date

Address

Tel No

CORGI REGISTRATION No CORGI ID SERIAL No

SERVICE INTERVAL RECORD

It is recommended that your heating system is serviced regularly and that your service engineer completes the appropriate service interval record below.

SERVICE PROVIDER

Before completing the appropriate service interval record below, please ensure that you have carried out the service as described in the heater manufacturer's instructions and in compliance with the Gas Safety Regulations

SERVICE 1 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 6 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 2 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 7 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 3 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 8 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 4 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 9 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 5 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

SERVICE 10 Date

Engineer's Name

Company Name

Tel No

CORGI ID Serial No

Comments

Signature

When all of the above services have been completed, please contact your service engineer for an additional service record sheet.

10.

SHORT LIST OF SPARES

ITEM No	GC. No	MAKER'S No	DESCRIPTION	QTY
1	382 758	1000-0500725	Fan assembly	1
2	E20-417	B502-0182000	Filter tray assembly	1
3	244 985	CL30-0500000	Time control CL3	1
4	244 986	1000-0000040	Time control cover	1
5	384 739	BOS00105	Overheat (limit Control) Honeywell L4069C	1
6	393 412	BOS02237	Multifunctional control Honeywell V8600D	1
7	232 903	BOS02061	Sealing ring (for item 6)	2
8		BOS02397/2	Pilot assembly	1
9	E01-088	1000-0701440	Pilot Injector	1
10	E02-418	1000-0705260	Pilot Feed Pipe	1
11	386-820	1000-0703870	Thermocouple	1
12	386 775	BOS01970	Electrode	1
13	397 819	BOS02394	Electrode lead	1
14	244 898	BOS02406	Electrode Nut	1
15	E02-419	B502-0502000	Spillage Monitoring Device (TTB)	1
16		B502-0800000	Burner and Controls Assembly	1
17		1000-0708110	Burner and Cross Lighter Assembly	1
18		1000-0703600	Main Injector AMAL 187/001/290	2
19		1000-0705330	Cross Lighting Injector AMAL 187/001/35	1
20	E02-424	B502-0300005	Heat Exchanger exchange kit	1
21	395 945	1000-0700570	Piezo Unit	1
22	244 971	B300-0706000	Igniter Bracket	1
23	244 957	1000-2500010	Rope Ring Seal (for heat exchanger cap)	1
24	245 067	B500-0380005	Draught Diverter Assembly	1
25	E02-425	B502-0161000	Lower Compartment Door	1
26	E02-427	B502-0157000	Fan Compartment Door	1
27	245 040	B500-0500730	Control Panel	1
28	245 045	1000-0500870	Wiring Harness	1
29	385 159	BOS00104	Fan Control Honeywell L4068C	1
30	245-509	1000-0514230	Fuse 3.15A, (T)	1

Johnson and Starley prides itself on its ability to supply spare parts quickly and efficiently. If you have a problem in obtaining a spare part, please contact Johnson and Starley Spares Department at the address below.

Telephone: (01604) 762881

Fax: (01604) 767408

JOHNSON & STARLEY LTD.
Rhosili Road,
Brackmills,
Northampton NN4 7LZ