



These instructions are to be left with the User or adjacent to the Gas Meter

# HI-SPEC J25SC SERIES WARM AIR HEATERS

## SYSTEM E-T and BASIC Control

### INSTALLATION, COMMISSIONING & SERVICING INSTRUCTIONS

G.C. No 42 417 96

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This appliance has been tested and certified by B G Technology for use with natural gas G20.

Note: If a water heater is fitted, these instructions must be read in conjunction with the Installation, Commissioning and Servicing Instructions for that appliance.

#### 1. BRIEF DESCRIPTION

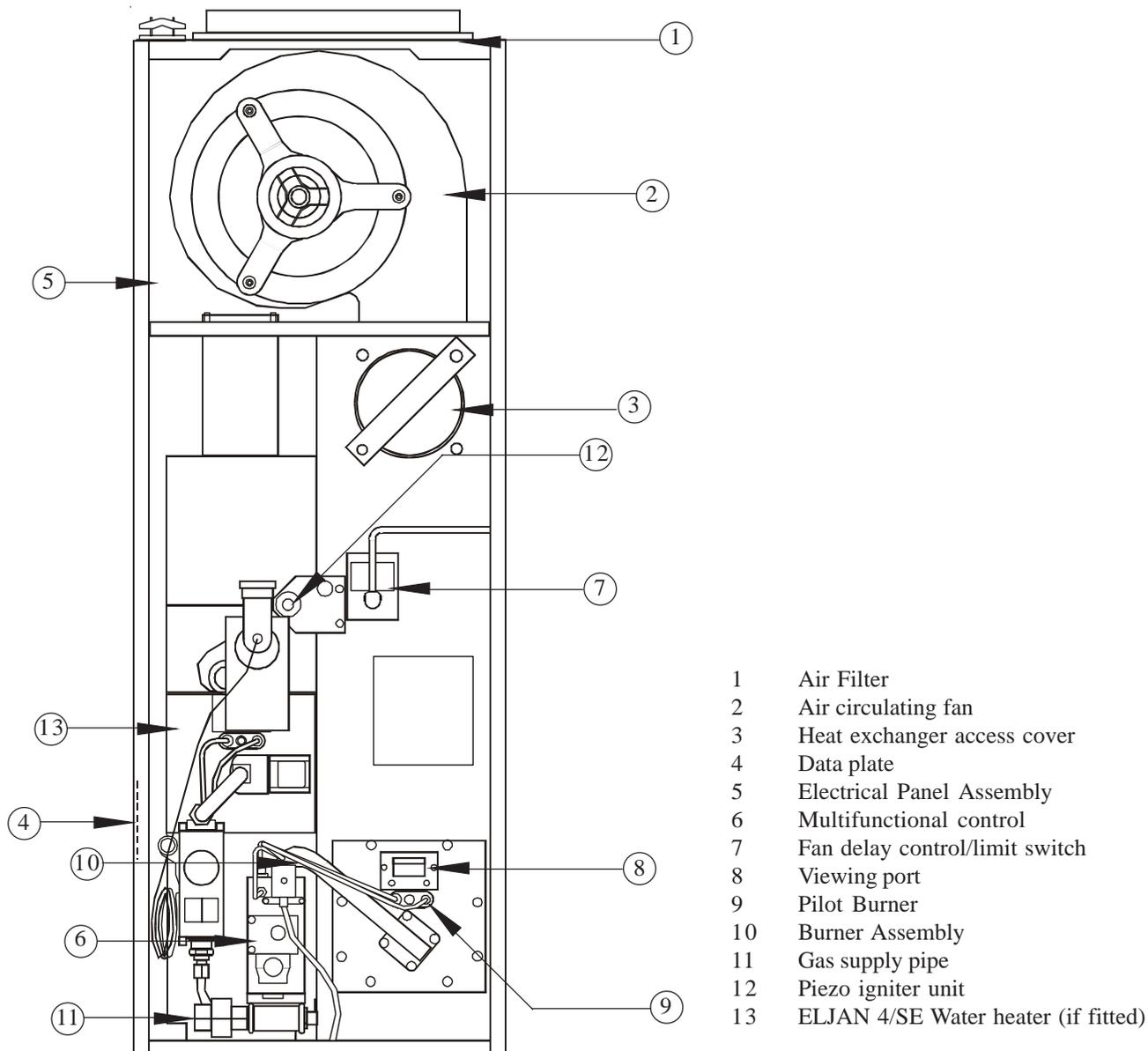


Fig. 1

- 1.1 HI-SPEC J25SC is a fanned-circulation, downflow, ducted warm air heater for SE-duct applications, which may be supplied with SYSTEM E-T or Basic control, and in combination with an ELJAN 4/SE (electrically switched) water heater.
- 1.2 The Air heater output can be adjusted between 6.44kW (23.2MJ/h, 22,000 Btu/h) and 7.3kW (26.4MJ/h, 25,000Btu/h). "Summer air circulation" of unheated air is available by manual selection (see User's Instructions). ELJAN 4/SE output is 3.32kW (12.0MJ/h, 11,340Btu/h).

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)
- BS7671 Institute of Electrical Engineers (I.E.E.) Wiring Regulations
- BS6891 Installation of Low Pressure Gas Pipework of up to 28mm (R1) in domestic premises (2nd family gases).
- BS5440 Pt.1 (Flues for Gas Appliances)
- BS5440 Pt.2 (Air Supply for Gas Appliances)
- BS5864 Installation of Gas Fired Ducted Air Heaters
- 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 BS5864)**

- 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 right hand corner of the heater is aligned with the rear right hand corner of the base duct, so that any overhang or blanking off will be at the front and/or left 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 side walls of 20mm (0.75 in) and 25mm (1.0 in) from the 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 600mm (24 ins) 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 must be not less than 75mm (3 in). However, if 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 sections 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 (0.5 in).
- 2.5 The base duct on which the air heater stands must be only placed on a non-combustible floor.
- 2.6 **IMPORTANT: The red ‘SAFETY’ label supplied with the heater, MUST BE AFFIXED in a prominent position on the inside of the compartment door.**

**3. VENTILATION AND COMBUSTION AIR**

- 3.1 An SE-duct appliance does not require a combustion air vent in the room or internal space in which it is installed. If the appliance is installed in a compartment, the minimum total free area of the high and low level ventilation air vents must be as specified in Table 1 (as per BS5440 Pt. 2 Table 1).

**Note:** These free areas allow for the operation of the appliance in combination with an ELJAN 4/SE water heater.

VENTILATED FROM INSIDE BUILDING	Low level grille	127 cm <sup>2</sup> (19.7in <sup>2</sup> )
	High level grille	127cm <sup>2</sup> (19.7in <sup>2</sup> )
VENTILATED FROM OUTSIDE BUILDING	Low level grille	63cm <sup>2</sup> (9.8in <sup>2</sup> )
	High level grille	63cm <sup>2</sup> (9.8in <sup>2</sup> )

**Table 1: Minimum Effective Areas**

- 3.2 Both vents must communicate with the same room or internal space, or must both be on the same wall to outside air. The vertical distance between the vents shall be as large as is practicable. The compartment containing the room sealed appliance MUST be labelled to warn against blockage of vents - referring to BS 5440 Part 2, clause 4.2.4.

## 4.

### DUCT SYSTEM

All ductwork **MUST** be mechanically secured and sealed with good quality ducting tape.

#### 4.1 RETURN AIR

- 4.1.1 Room-sealed appliances may be installed without return air ducting provided that the path between the return air grille and the appliance return air inlet is protected in such a manner that the required airflow will be maintained at all times. The return air grille should have a free area of not less than 0.06m<sup>2</sup> (93 in<sup>2</sup>).
- 4.1.2 An adequate and unobstructed return air path is essential from areas 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 0.0088m<sup>2</sup>/kW (1 in<sup>2</sup>/250Btu/h) of heat supplied to the room. The only exceptions are kitchens, bathrooms and w.c's.

#### 4.2 WARM DELIVERED AIR

- 4.2.1 All ductwork, including riser ducts, should be fully insulated with 50m (2 in.) of 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 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 the resistance to air flow.
- 4.2.3 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

#### 5.1 SIDE RETURN AIR

If return air is to be introduced via the side of the appliance, it will be necessary to prepare it prior to installation. Return air ducting may be connected to either side of the heater as follows:

- 5.1.1 Remove the air filter, front cover and the air circulation fan.
- 5.1.2 Cut a hole in the chosen side of the fan compartment. The knock outs will determine the size and position.
- 5.1.3 Remove and the filter frame retaining screws and remove the filter frame.
- 5.1.4 Position the filter frame centrally over the prepared hole so that the front of the frame is flush with the front of the heater.
- 5.1.5 Using the frame as a template, mark and drill the 6 x 3.2mm dia. frame fixing holes.
- 5.1.6 Secure the filter frame to the side of the heater using the screws previously removed.
- 5.1.7 Refit the air circulation fan, front cover and air filter.
- 5.1.8 Using suitable material, manufacture a plate to cover the original return air opening in the top of the air heater, and secure with self tapping screws (not provided).

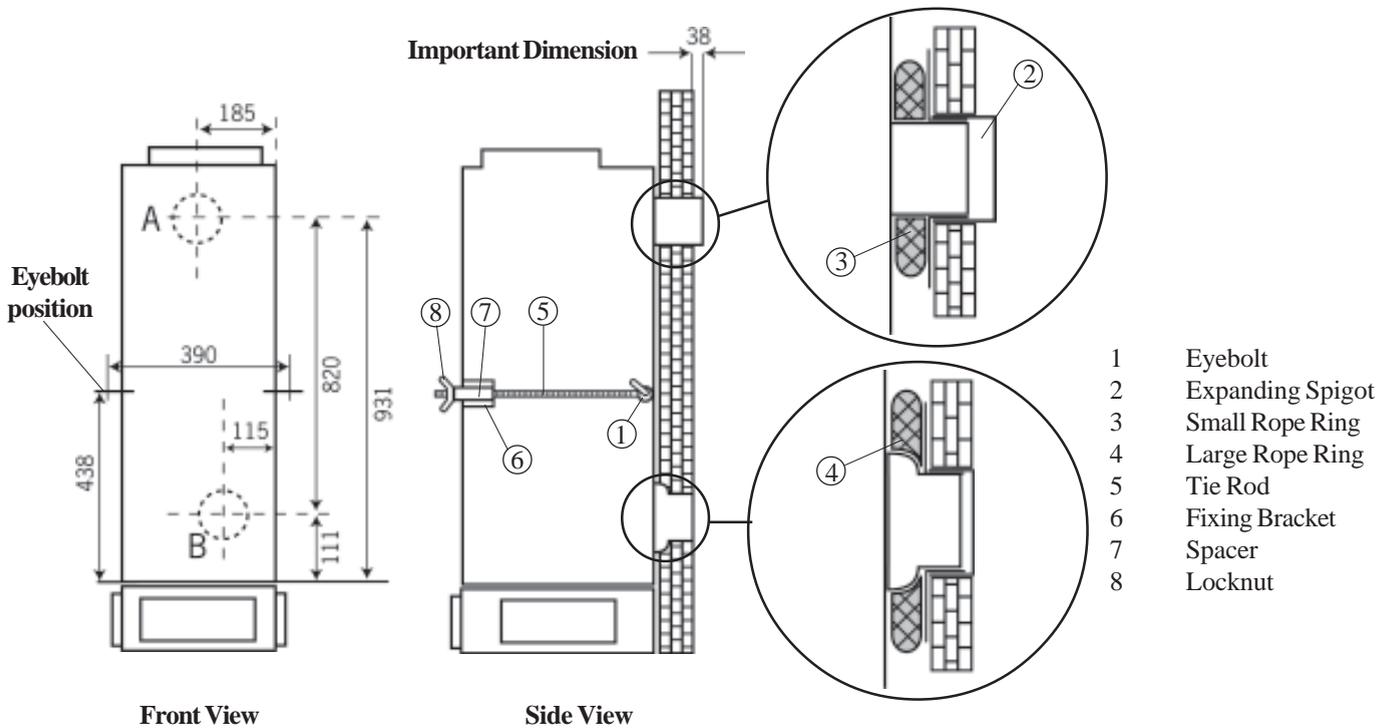
#### 5.2 SE-DUCT PREPARATION

- 5.2.1 Ensure that the existing air heater has first been removed.

**IMPORTANT: Many SE-ducts are constructed from asbestos-based materials, and due to dimensional variations between Johnson & Starley and other manufacturers appliances, a certain amount of rework will be required on the SE-duct by REGISTERED CONTRACTORS.**

- 5.2.2 In some circumstances, the SE-duct may be completely exposed and special components needed to complete the installation. Consult Johnson & Starley Service Department if this situation is encountered.
- 5.2.3 **Referring to Fig. 2, NOTE THE DATUM POINTS INDICATED before proceeding.** A Sealing Template Kit (ST25) is available for cutting the holes in the SE-duct.
- 5.2.4 Thoroughly clean and replace the sealing material from the top of the existing base duct.
- 5.2.5 The holes in the SE-duct **MUST** correspond with the positions 'A' and 'B' as shown in Fig. 2, 138mm (5.5 in.) minimum diameter, 152mm (6.0in.) maximum diameter, and clear the duct of all resulting debris. Should the original heater be a SUGG Type 22/WH 'Halcyon', the existing bottom hole is suitable for use.
- 5.2.6 Seal the redundant hole/s in the SE-duct using a suitable cement or blanking material, to ensure a good flat surface on both the inner and outer faces of the duct wall.

**IMPORTANT: Any debris which falls into the SE-duct MUST BE REMOVED.**



**Fig. 2**  
**HI-SPEC J25RS fitted to SE-Duct - fitting dimensions**

5.2.7 Referring to Fig. 2, drill 2 x 9mm diameter holes and fix the eye-bolts using the masonry plugs provided in the installation kit.

#### 5.4 METHOD OF FIXING

- 5.4.1 Due to base plan variations between the replacement and the original heaters, at some stage it may be necessary to blank off part or parts of the base duct aperture. This can be done at the discretion of the installer, but it is important that a suitable non-combustible material is used and that the perimeter of the remaining aperture is bounded by suitable sealing tape to ensure a good seal between the heater and the base duct. Blanking plates **MUST** be mechanically secure to the base duct, and the use of TAPE ALONE IS NOT ACCEPTABLE.
- 5.4.2 Measure the thickness of the SE-duct wall and, using one of the expanding spigots as the flue spigot, adjust it such that it projects 38mm (1.5 in), and secure the spigot to length using 2 x self tapping screws provided.  
**Note: This dimension is critical.**
- 5.4.3 Adjust the other spigot to a length equal to the thickness of the SE-duct wall and secure to length as above.  
**Note: If the SE-duct wall is 125mm or less, the inner tube of the expanding spigot should be discarded, and the outer tube cut to length as necessary.**
- 5.4.4 Apply a suitable mastic (not provided) to the spigot flanges and insert them into their respective apertures, and seal them to the face of the SE-duct wall.
- 5.4.5 Position the larger rope ring seal over the raised flange on the heater inlet spigot, and secure with three equally spaced beads of a suitable mastic (not provided).
- 5.4.6 Place the smaller rope ring (denoted by blue ident) onto the air heater flue spigot, and place the air heater onto the base plenum to engage the spigots with the SE-duct apertures.

**NB ensure that the rope ring is fitted such that it is pushed OVER the bulge the protrudes from the heater. See fig 2.**

- 5.4.7 Hook the tie rods to the eye-bolt wall fixings, and secure using the brackets provided, hooked into the slots in the front edge of the side of the air heater.
- 5.4.8 Fit the nuts and washers provided, then carefully tighten the tie rods so that the air heater is effectively sealed against the SE-duct.  
**Note: If the air heater is installed in a compartment, the warning label must be applied in a prominent position.**
- 5.4.9 The air heater must be mechanically secured to the base plenum on at least 2 sides.

## 5.5 ELECTRICAL

### 5.5.1 Mains.

- a. The heater is supplied with mains cable (PVC sheathed, heat resisting to 85°C), 3-core Brown-Blue-Green/Yellow, 6A, 0.75mm<sup>2</sup>), connected to a terminal block and exiting through the heater at the top left hand 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 BS1362. Connections shall be in accordance with the current edition of I.E.E Regulations BS 7671.
- b. **SYSTEM E-T MODELS:** An electronic controller (Thermista-stat) is supplied which acts as a room thermostat.
- c. **BASIC CONTROL MODELS:** A 24V room thermostat (not supplied), that complies with BS800, BS3955 and BS4201 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 0.3.
- d. To gain access to the control panel to make the Thermista-stat/Room Thermostat connections, remove the air filter and the front cover from the air heater, release the 2 x securing screws and hinge down the electrical panel.

### 5.5.2 Thermista-stat/Room Thermostat and its location.

- a. The Thermista-stat/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 Thermista-stat/Room thermostat wires to control panel terminals '7' and '8' (see Fig. 6a/b or 7a/b).

## 5.3 GAS (See BS5864 and BS6891)

- 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 1.0 mbar (0.4in wg) pressure drop (See table of discharge in BS6891).
- 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 where 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).

## 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 SETTING OF FAN SPEED:

#### 6.2.1 Remove air filter and air heater front door.

**SYSTEM E-T MODELS:** On the electronic control module, set:

#### 6.2.2 Rate Switch to 'MAX',

#### 6.2.3 Cleanflow switch to '0'. (If not fitted)

### 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 Thermista-stat/room thermostat to lowest or **OFF** setting.
- 6.3.2 On the Multifunctional control, remove the Outlet Pressure test point cover, and fit a pressure test gauge (refer Fig. 4).
- 6.3.3 Turn the heater Gas supply **ON**, test for gas soundness and purge the whole gas pipe as described in BS6891.
- 6.3.4 Referring to Fig. 4, partially depress the OPERATING CONTROL and set the control  $\frac{1}{4}$  turn anti-clockwise to the 'SPARK' symbol. 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 '。' position and ensure that the OPERATING CONTROL is fully reset. Wait three minutes and repeat steps 6.3.4 and 6.3.5, holding the OPERATING CONTROL depressed for a longer period, until the Pilot burner remains alight.
- 6.3.6 Ensure that the pilot flame envelops thermocouple tip, if not, check that the pilot orifices is free from obstruction. The pilot is factory set and is non-adjustable.
- 6.3.7 With the Pilot burner lit, depress the OPERATING CONTROL and turn it to the position indicated by the flame symbol.
- 6.3.8 Set the air heater Electricity supply **ON**.
- 6.3.9 Set the Time control to required Heating On periods.
- 6.3.9 Set the Selector switch to 'TIMED'.
- 6.3.10 Set the Thermista-stat or 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, Pilot and Main burners using proprietary detection fluid and 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:

**NOTE: AIR HEATER BURNERS ARE FACTORY SET TO PROVIDE A NOMINAL HIGH PRESSURE OUTPUT AS DETAILED IN SUB PARA 1.2**

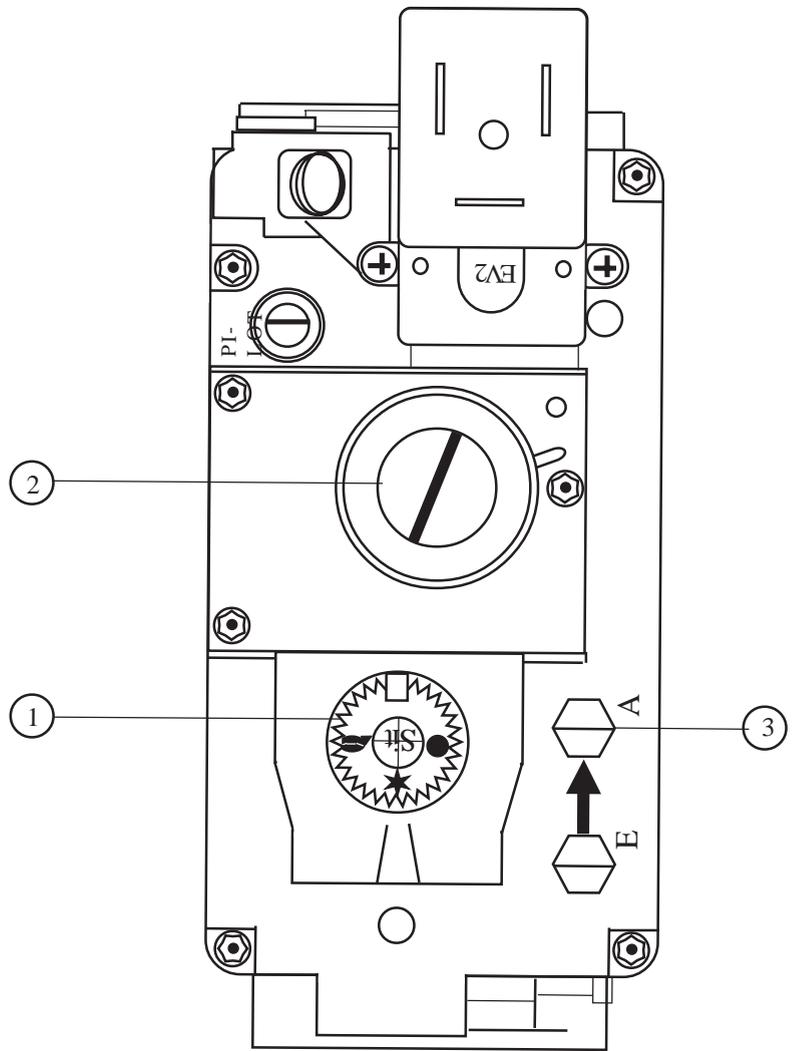
- 6.4.1 Referring to Table 2 and Fig. 4 below, ensure that the pressure test gauge indicates the correct burner pressure, resetting if required as follows:
  - a. At the Multifunctional control:
    - i. Remove the Burner Pressure Adjuster cover.
    - ii. Set the Burner Pressure Adjuster to provide a pressure test gauge indication for the correct burner pressure as detailed in Table 2.
    - iii. Refit the Burner Pressure Adjuster cover.
- 6.4.2 Apply the pressure set arrow to indicate the appropriate burner pressure on the data badge.

### 6.5 EXTINGUISHING OF PILOT AND MAIN BURNERS:

- 6.5.1 On the Multifunctional control, rotate the OPERATING CONTROL clockwise to the '。' position and ensure that the OPERATING CONTROL fully resets, and both the 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.

### 6.6 TEMPERATURE RISE CHECKS:

- 6.6.1 Ignite the Pilot and Main burners and allow 15 minutes for stability before continuing.
- 6.6.2 Check that the temperature rise across the heater is between 45°C - 55°C, setting the fan speed as follows:
  - i. SYSTEM E-T heaters: System E-T provides a fan speed corresponding to the above temperature rise, if the appliance is to be set to operate at the minimum rate and the ducting has been sized accordingly, set the 'RATE SWITCH' to 'MIN', thus reducing the fan speed.
  - ii. BASIC Control heaters, the fan speed is adjusted by selecting the fan speed at control panel (decrease voltage selection to decrease fan speed).



- 1 Operating control
- 2 Burner Pressure Adjuster
- 3 Outlet Pressure test point

**Fig. 4**  
**Multifunctional Control**

#### 6.7 AUTOMATIC CONTROLS CHECK

- 6.7.1 Ignite the Pilot and Main burners and allow to operate for 15 minutes to ensure stability.
- 6.7.2 Set the TIME CONTROL (if fitted) to 'ON'.
- 6.7.3 Turn the Thermista-stat or room thermostat slowly clockwise until the Main burner ignites.
- 6.7.4 Ensure that the fan starts to operate after a short period (approx. 1-2 minutes).

##### **SYSTEME-T models:**

- 6.7.5 Ensure that the fan speed increases to full speed.
- 6.7.6 When the temperature reaches the control setting, check that the main burner cycles ON and OFF, at approximately 75 to 120 seconds.

##### **BASIC CONTROL models:**

- 6.7.7 When the temperature reaches the control setting, ensure that the Main burner extinguishes followed by the fan switching off after a short period.
- 6.7.8 When the temperature falls below the control setting, ensure that the Main Burner re-ignites followed by fan operation.

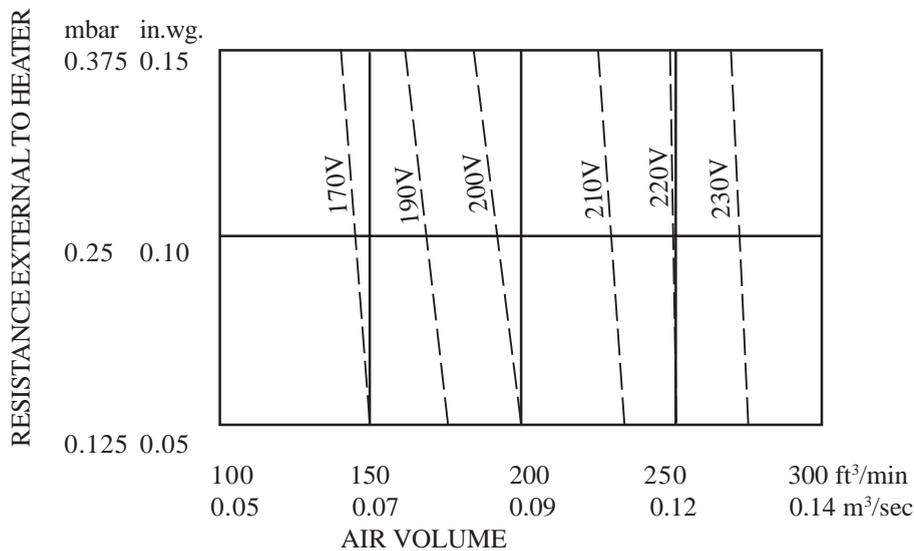
#### 6.8 SAFETY CHECKS:

- 6.8.1 On the Multifunctional control, rotate OPERATING CONTROL clockwise to the '0' position and ensure that the OPERATING CONTROL fully resets, and both Pilot and Main Burners are extinguished.
- 6.8.2 Switch OFF the electrical supply to the air heater.
- 6.8.3 Release the securing screw and hinge down the fan chamber door.
- 6.8.4 Disconnect the air circulation fan as follows:
  - a. **System E-T models:** disconnect the 2 x red conductors at the terminal block terminals '30' and '31'
  - b. **Basic control models:** disconnect the 2 x black conductors at the terminal block terminals '16' and '18'
- 6.8.5 Switch ON the electrical supply to the air heater.

- 6.8.6 Ignite the pilot and main burners, and check that the Limit switch operates between 120 and 180 seconds (indicated by the main burner extinguishing).
- 6.8.7 Switch OFF the electrical supply to the air heater.
- 6.8.8 Reconnect the air circulation fan at the terminal block.
- 6.8.9 Hinge up the fan chamber door, taking care to avoid causing damage to wiring, and secure using the 3 x screws previously removed.
- 6.8.10 Switch ON the electrical supply to the air heater.
- 6.8.11 Ensure that the Limit switch resets, indicated by the main burner igniting, within approximately 60 seconds.
- 6.8.12 Check for gas soundness within the appliance.
- 6.8.13 Turn OFF the gas supply at the service cock and ensure that the Multifunctional control fail-safe operates within 60 seconds (indicated by loud click from Multifunctional control).
- 6.8.14 Turn the gas supply ON at the service cock.

	LOW RATE			HIGH RATE		
	kW	MJ/h	Btu/h	kW	MJ/h	Btu/h
<b>INPUT</b>	8.59	30.9	29,350	9.69	34.9	33,100
<b>OUTPUT</b>	6.44	23.21	22,000	7.32	26.4	25,000
Gas rate cv 1037Btu/ft <sup>3</sup>	0.80m <sup>3</sup> /h (28.3ft <sup>3</sup> /h)			0.90m <sup>3</sup> /h (31.9ft <sup>3</sup> /h)		
Burner setting pressure (hot)	12.0mbar (4.8 in wg)			16.0mbar (6.4 in wg)		
Main Injector	AMAL187/001/800					

**Table 2**  
**Main Burner Pressure Settings**



**Table 3**  
**Fan Performance Curve**

**6.9 SYSTEM WARM AIR BALANCING:**

- 6.9.1 Set the 'SUMMER AIRFLOW' switch to 'I'.
- 6.9.2 Balance the system to provide required volume proportions at 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.

- 6.9.3 Set the 'SUMMER AIRFLOW' switch to 'O'.
- 6.9.4 Ignite the Pilot and Main burners as detailed in sub-paras 6.3.4 to 6.3.7.
- 6.9.5 Set the appliance to operate in accordance with the User's requirements.

## INSTRUCTIONS FOR USERS

- 7.
- 7.1 If the building is unoccupied, ensure that the Instructions for User are left taped to the air heater for the User, and Installation 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 the User understands:
- 7.2.1 How to ignite the pilot and burner.
  - 7.2.2 How to operate the Thermosta-stat/room thermostat, time and 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 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 for new houses, weekly).
  - 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.

## 8. MAINTENANCE

**IMPORTANT: Ensure 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 Commissioning Instructions at Sect 6.1 to 6.8 inclusive. Replace any sealing gasket or insulation that is damaged before re-commissioning, taking care to not disperse fibrous materials.**

### 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 para 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, as shown in para 8.10.
- 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.
- 8.1.13 If no defects are found, fully commission the air heater in accordance with the Installation, Commissioning and Maintenance instructions applicable to the appliance.

- 8.2 **BURNER AND CONTROL ASSEMBLY REMOVAL:**
- 8.2.1 Ensure that the Gas and Electrical supplies are switched OFF
  - 8.2.2 Remove air filter and the appliance door.
  - 8.2.3 Disconnect igniter at the piezo unit.
  - 8.2.4 Disconnect Multifunctional control electrical connections.
  - 8.2.5 Disconnect the gas supply by breaking the union at the input of the Multifunctional control.
  - 8.2.6 Remove the 8 Burner assembly securing screws and withdraw the Burner and Control Assembly.
  - 8.2.7 Refitment or replacement is in reverse order.
- 8.3 **MAIN BURNER REMOVAL:**
- 8.3.1 Remove the Burner and Controls assembly as detailed in 8.2.
  - 8.3.2 Release the 4 x securing screws and withdraw the Main Burner.
  - 8.3.3 Refitment or replacement is in reverse order.
- 8.4 **MAIN INJECTOR REMOVAL:**
- 8.4.1 Remove the Main Burner as detailed in 8.3.
  - 8.4.2 Unscrew the main injector from its holder.
  - 8.4.3 Refitment or replacement is in reverse order.
- 8.5 **PILOT BURNER ASSEMBLY DISMANTLING AND REMOVAL:**
- 8.5.1 Remove Burner and Controls assembly as detailed in 8.2.
  - 8.5.2 Release the Thermocouple lock nut from the Pilot Burner Assembly and Multifunctional Control, and withdraw the Thermocouple, taking care to avoid damage to the capillary.
  - 8.5.3 Release the Igniter electrode lock nut from the Pilot Assembly and withdraw the electrode.
  - 8.5.4 Disconnect the pilot gas feed pipe from the Multifunctional control and Pilot Assembly.
  - 8.5.5 Withdraw the Pilot injector from the Pilot Assembly.
  - 8.5.6 Release the 2 x screws, nuts and lock washers securing the Pilot Assembly to the Burner and Controls assembly, and withdraw the Pilot Assembly.
  - 8.5.7 Refitting or replacement is in reverse order, ensuring that the Pilot Assembly gaskets are not damaged and that the Pilot Assembly firmly seals with the Burner and Controls assembly. **DO NOT** over tighten the thermocouple connection at the Multifunctional control, (finger tight plus 1 flat).
- 8.6 **MULTIFUNCTIONAL CONTROL REMOVAL:**
- 8.6.1 Remove the Burner and Controls Assembly as detailed in 8.2
  - 8.6.2 Disconnect the Thermocouple at the Multifunctional control, avoiding damage to the capillary.
  - 8.6.3 Disconnect the Pilot gas 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.
- NOTE:** When refitting or replacing the Multifunctional control, the 'O' ring seals are to be replaced.
- 8.7 **PIEZO UNIT REMOVAL:**
- 8.7.1 Disconnect the 2 conductors from Piezo unit.
  - 8.7.2 Release the retaining nut and remove the Piezo 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 front door, release the 2 x securing screws and hinge down the electrical panel.
  - 8.8.3 Disconnect the fan flying lead socket.
  - 8.8.4 Withdraw the fan flying lead from the cable clamp on fan chamber floor.
  - 8.8.5 Release the 2 x Fan Assembly securing screws and withdraw the Fan Assembly from the Heater cabinet, avoiding damage to the fan blades.
  - 8.8.6 Remove all dust from both the impeller and motor, taking care to not disturb the balance of the fan.
  - 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 front door, release the 2 x securing screws and hinge down the electrical panel.

### SYSTEME-T models:

8.9.3 Disconnect the following

- a. Air circulation fan flying leads from the capacitor and withdraw from the cable clamp,
- b. 230V mains 'L', 'N' and 'E' from connection block terminals '1' and '2', and **Earth stud** respectively,
- c. Thermosta-stat connections from connection block terminals '7' and '8',
- d. Limit switch from connection block terminals '13' and '14',
- e. Fan Delay Control from connection block terminals '18' and '17',
- f. Multifunctional Control from connection block terminals '16 (N) and '15' (L), and **Earth stud**.
- g. Water heater from connection block terminals '10' (L) and '9' (N),
- h. Water Pump from connection block terminals '12' (L) and '11' (N),
- i. Cleanflow from connection block terminals '19' (24V) and '20' (0V),
- j. Earth lead from the fan chamber floor,

### CONVENTIONAL Control models:

8.9.4 Disconnect the following:

- a. Air circulation fan flying lead from the flying lead socket and withdraw from the cable clamp,
- b. 230V mains 'L', 'N' and 'E' from connection block terminals '1' and '2', and **Earth stud** respectively,
- c. Room thermostat connections from connection block terminals '7' and '8',
- d. Limit switch from connection block terminals '13' and '14',
- e. Fan Delay Control from connection block terminals '18' and '17',
- f. Multifunctional Control from connection block terminals '16 (N) , '15' (L) and **Earth stud**.
- g. Water heater from connection block terminals '10' (L) and '9' (N),
- h. Water Pump from connection block terminals '12' (L) and '11' (N),
- i. Cleanflow from connection block terminals '19' (24V) and '20' (0V),
- j. Earth lead from the fan chamber floor,

### Both model types:

8.9.5 Release the hinge pins and withdraw the Electrical assembly, releasing wiring from cable clamps and grommets as required.

8.9.6 Refitting or replacement is in reverse order.

## 8.10 ELECTRONIC MODULE REMOVAL (SYSTEM E-T models only)

8.10.1 Ensure that the electrical is isolated.

8.10.2 Remove the appliance front door, release the 2 x securing screws and hinge down the electrical panel.

8.10.3 Disconnect terminals '21' to '33' from the Electronic module.

8.10.4 Release the 2 x screws and nuts securing Electronic module to Electrical assembly and remove module.

8.10.5 Refitting or replacement is in reverse order.

## 8.11 TRANSFORMER REMOVAL (BASIC Control models only):

8.11.1 Ensure that the electrical is isolated.

8.11.2 Remove the appliance front door, release the 2 x securing screws and hinge down the electrical panel.

8.11.3 Disconnect the Transformer as follows:

- a. **RED** Fan Speed voltage selector from the transformer terminal block,
- b. **BROWN** conductor from electrical panel connection block terminal '1',
- c. **BLUE** conductor from electrical panel connection block terminal '2',
- d. **PURPLE** conductor from relay panel terminal marked '0V',
- e. **YELLOW** conductor from relay panel terminal marked '24V',

8.11.4 Release 2 x screws, nuts and star washers securing Transformer to the Electrical assembly, and remove the Transformer.

8.11.5 Refitting or replacement is in reverse order.

- 8.12.1 Ensure that the electrical is isolated.
- 8.12.2 Remove the appliance front door, release the 2 x securing screws and hinge down the fan chamber door.

**Time Control removal:**

- 8.12.3 Disconnect conductors 'C1', 'C2', 'C3' and 'C5' from the Time control.
- 8.12.4 Release the 3 x fixing nuts, and withdraw the Time control.
- 8.12.5 Refitting or replacement is in reverse order.
- 8.12.6 Set Time Control to required ON and OFF times.
- 8.12.7 Set Time Control to correct time.

**Switch removal:**

- 8.12.8 Disconnect the conductors from the switch terminals.
- 8.12.9 Depress the retaining clips and press the switch out of the fascia panel.
- 8.12.10 Refitting or replacement is in reverse order.

**WARNING: The fascia panel is held in place by push fit retainers which must be removed with caution to avoid causing damage to the support pins. Removal of the fascia is not advised unless it is intended to be replaced.**

## 8.13 FAN DELAY CONTROL/LIMIT SWITCH REMOVAL:

- 8.13.1 Ensure that the electrical supply is isolated.
- 8.13.2 Remove appliance front door, release the 2 x securing screws and hinge down the fan chamber door.
- 8.13.3 Release the 2 screws securing the Limit Switch cover plate and withdraw the control from the appliance by drawing the conductors through the grommet in the fan chamber floor.
- 8.13.4 Disconnect the required control/switch, noting the position of wiring for subsequent reconnection.
- 8.13.5 Release the 2 x securing screws, and withdraw the required control/switch
- 8.13.5 Refitting or replacement is in reverse order, ensuring that the Igniter earth lead (if fitted) is grounded by the Limit Switch cover plate securing screw.

## 8.14 HEAT EXCHANGER ACCESS:

- 8.14.1 Ensure that the electrical supply is isolated.
- 8.14.2 Remove the appliance front door.
- 8.13.3 Release the 2 screws securing the heat exchanger access cover plate, and withdraw the cover plate and gasket.
- 8.13.4 Withdraw the 'U' baffle from the heat exchanger.
- 8.13.5 Reassembly is in reverse order.

**NOTE: When reassembling, ensure that the 'U' baffle correctly locates within the heat exchanger, gaskets are soundly sealed, and the heater is fully re-commissioned.**

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.
- 9.2.2 **SYSTEM E-T models:**
  - a. When carrying out any electrical testing, a test meter **MUST** be used, since low resistance test devices can cause damage to the Electronics module.
  - b. Before commencing defect diagnosis, ensure that the Thermista-stat is set to maximum, the mains supply is 'ON' and the time control (if fitted) is at an 'ON' position.
  - c. Care is to be taken during the replacement and handling of electronic assemblies (i.e. electronic panel, airflow sensor or Thermista-stat), it is not practical to rectify defects on these assemblies, except at the manufacturer, and any attempt to do so may render the guarantee or factory replacement arrangement invalid.

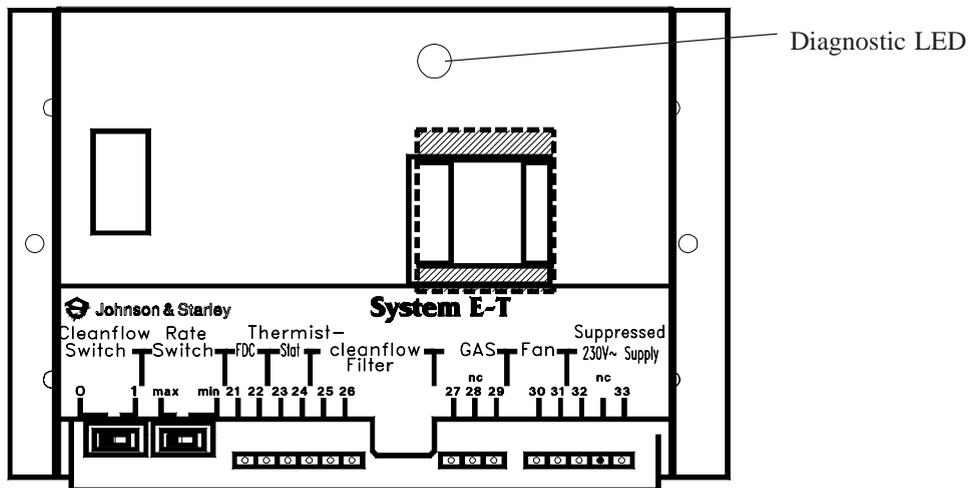
SYMPTOM	POSSIBLE CAUSE	REMEDY
a. Pilot will not light.	i. No gas supply to heater. ii. Gas supply pipe not purged. iii. Pilot orifice restricted. iv. Piezo system faulty. v. Excessive gas supply pressure.	Check for gas at inlet pressure test point on multifunctional control. Purge gas supply pipe in accordance with BS 6891. Clear pilot orifice or replace pilot injector. Check igniter, lead, and electrode. Check that mains gas pressure is 20mbar, 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. ii. Faulty Multifunctional control. iii. Faulty thermocouple. iv. Pilot orifice restricted. v. Air inlet/flue outlet fitted incorrectly.	Check connection is secure. Replace Multifunctional control. Replace pilot assembly. Clear pilot orifice or replace pilot injector. Check that inlet/outlet arrangements conform to Fig. 3, and that seals are air tight.
c. Main burner lights but fan fails to run after approximately 3 mins.	i. Loose electrical connection on Fan Delay Control. ii. Faulty Fan Assembly. iii. Faulty Fan Delay Control. iv. Burner pressure setting incorrect.	Check connections. Replace, taking care to not damage impeller. Replace. Adjust.
d. Main burner operating intermittently with fan running.	i. Gas rate or burner pressure setting high. ii. Temperature rise excessive. iii. Air filter or return air path restricted. iv. Excessive number of outlets closed.	Check gas rate and burner pressure setting. Adjust fan speed or gas rate accordingly. Check filter is clean and air path is clear. Open additional outlets.
e. Main burner operating with intermittent fan operation.	i. Gas rate or burner pressure setting too low. ii. Fan delay control faulty	Check gas rate and burner pressure setting. Replace.
f. Fan runs for excessive period or operates intermittently after main burner shuts down.	i. Fan delay control faulty.	Replace.
g. Noisy operation.	i. Gas pressure too high. ii. Noisy fan motor. iii. Fan speed setting too high.	Check burner pressure setting. Replace fan assembly. Adjust fan speed.
<b>SYSTEME-T models:</b>		
h. Incorrect operation of fan or main burner.	Fault related to SYSTEME-T Control system (refer to pages 14 -18)	Consult diagnostic chart and follow recommended procedure.

**Basic control models:**

- |   |   |   |
|---|---|---|
| j. Pilot alight but main burner not igniting. | i. Mains electrical supply not connected to heater.   | Check mains supply.   |
|   | ii. Controls not demanding heat room thermostat are operating correctly.  | Check that time control (if fitted) and room thermostat are operating correctly.                                  |
|   | iii. T3.15A 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, relay module or 24V transformer. | Check connections.  |
|   | v. 230V/24V transformer failure.  | Check 24V side with test meter, if voltage missing, replace transformer.  |
|   | vi. Faulty relay module   | Check 230V at white wire from switch S5   |
|   | vii. Multifunctional control faulty.  | Replace Multifunctional control.  |
|   | viii. Limit control faulty.   | Short circuit control 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. |

9.3 The SYSTEM E-T module is fitted with a diagnostic light emitting diode (LED) which is visible through a hole in the module cover, as shown in Fig. 5 below. If the LED is flashing, this means that :

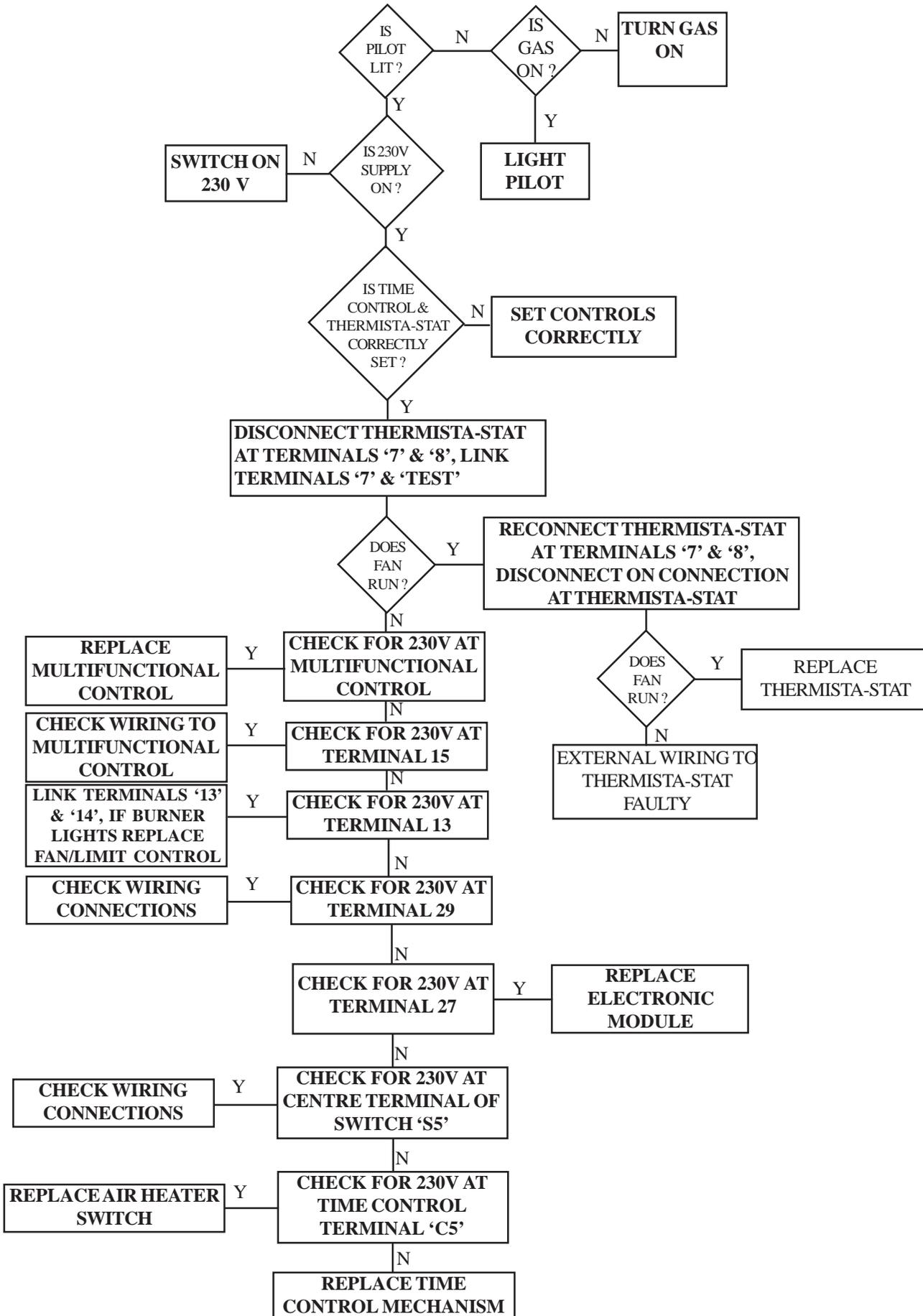
- 9.3.1 The fan is not connected, or
- 9.3.2 The capacitor is not connected, or
- 9.3.3 There is a short circuit in the fan supply.



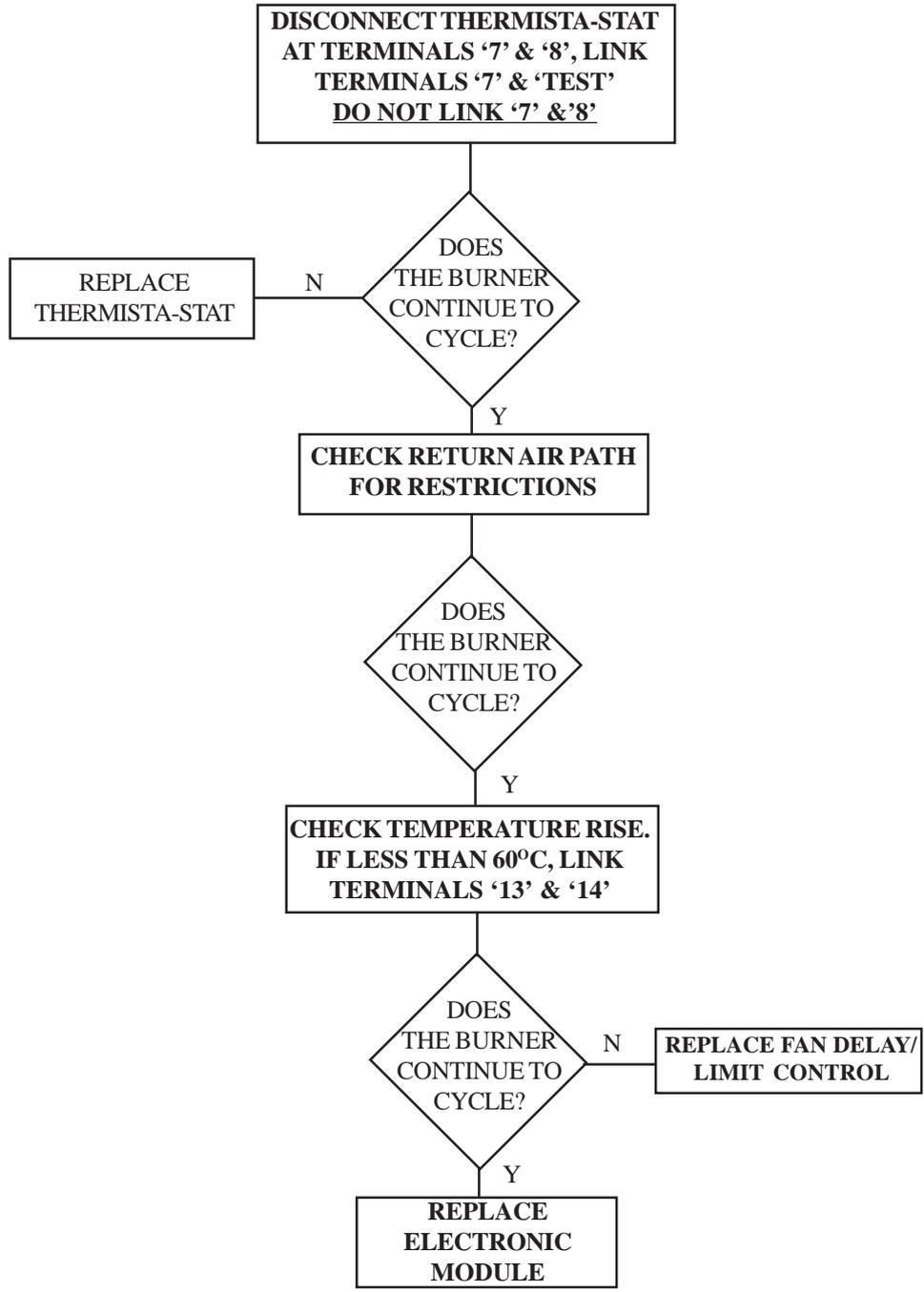
**Fig. 5**  
**SYSTEME-T Electronic module**

# SYSTEM E-T DEFECT DIAGNOSIS FLOW CHART

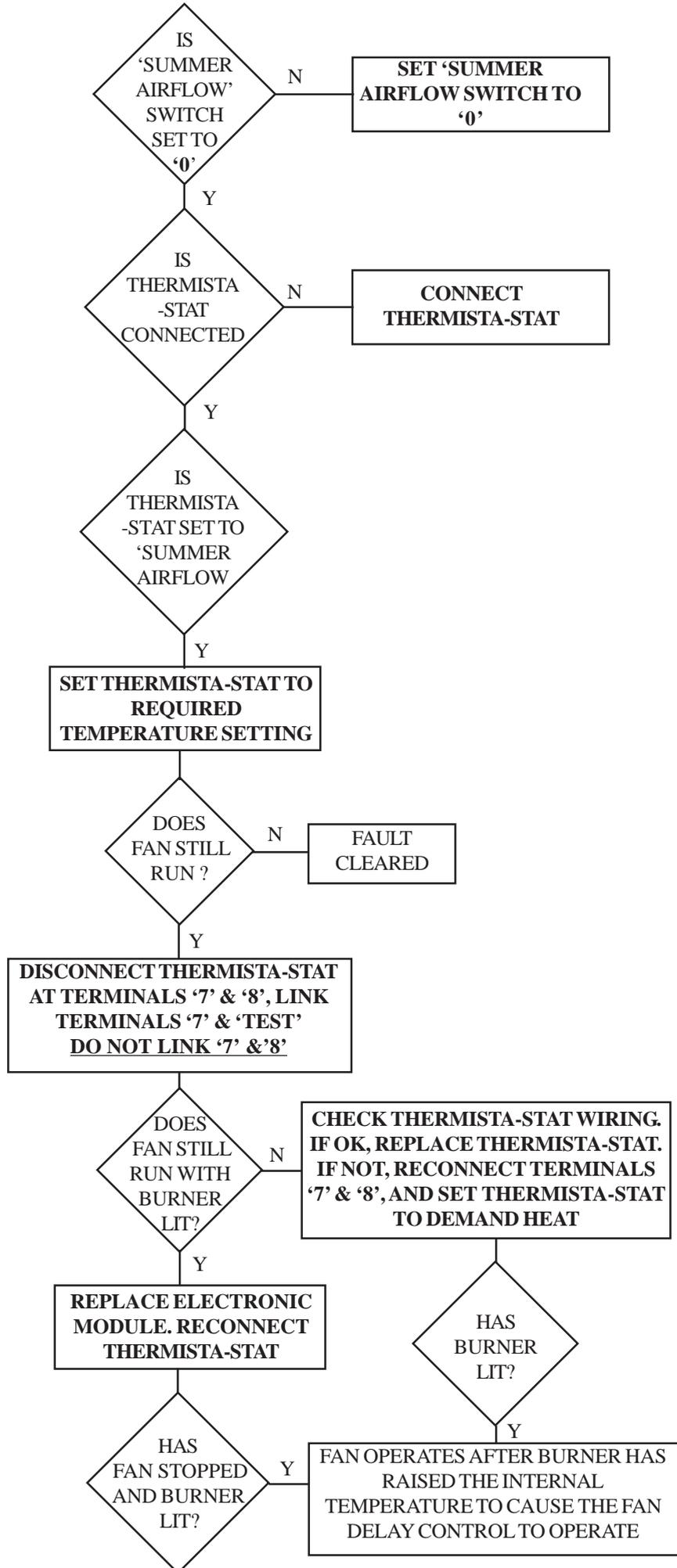
## MAIN BURNER NOT OPERATING



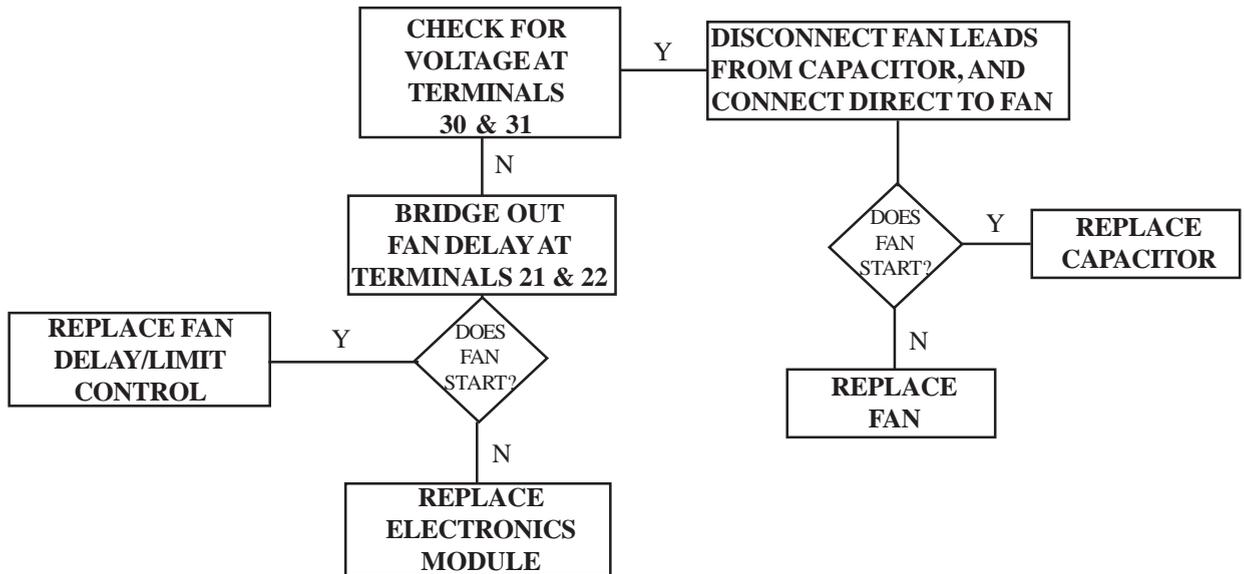
**FAN OPERATES, BUT BURNER CYCLES BEFORE REQUIRED TEMPERATURE IS REACHED**



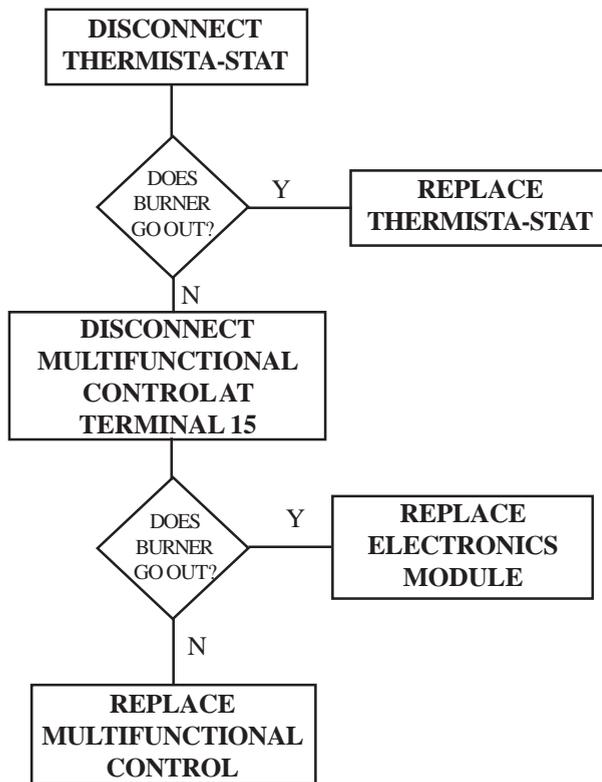
## FAN RUNS BUT MAIN BURNER NOT OPERATING



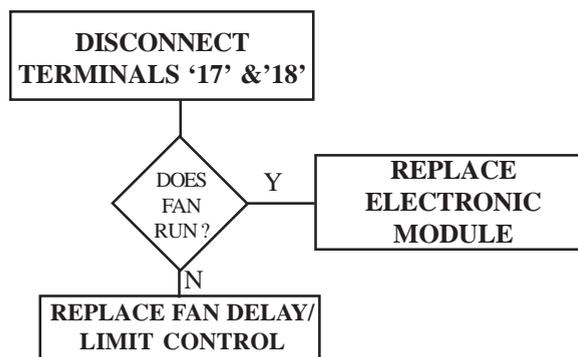
### MAIN BURNER ON, BUT FAN NOT RUNNING



### MAIN BURNER NOT CYCLING (ROOM TEMPERATURE TOO HIGH)



### FAN CONTINUES TO RUN, OR CYCLES AFTER HEATING IS TURNED OFF



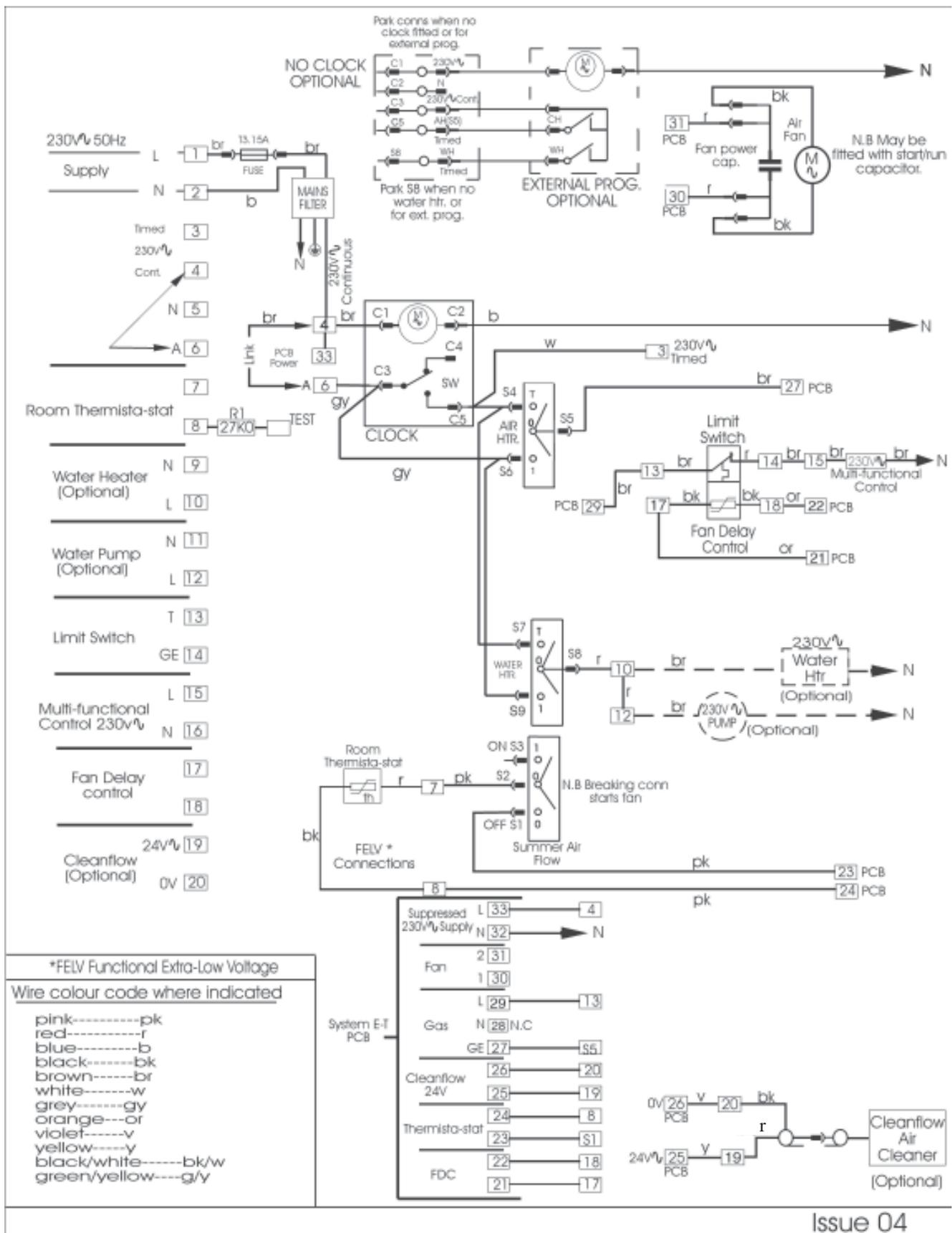
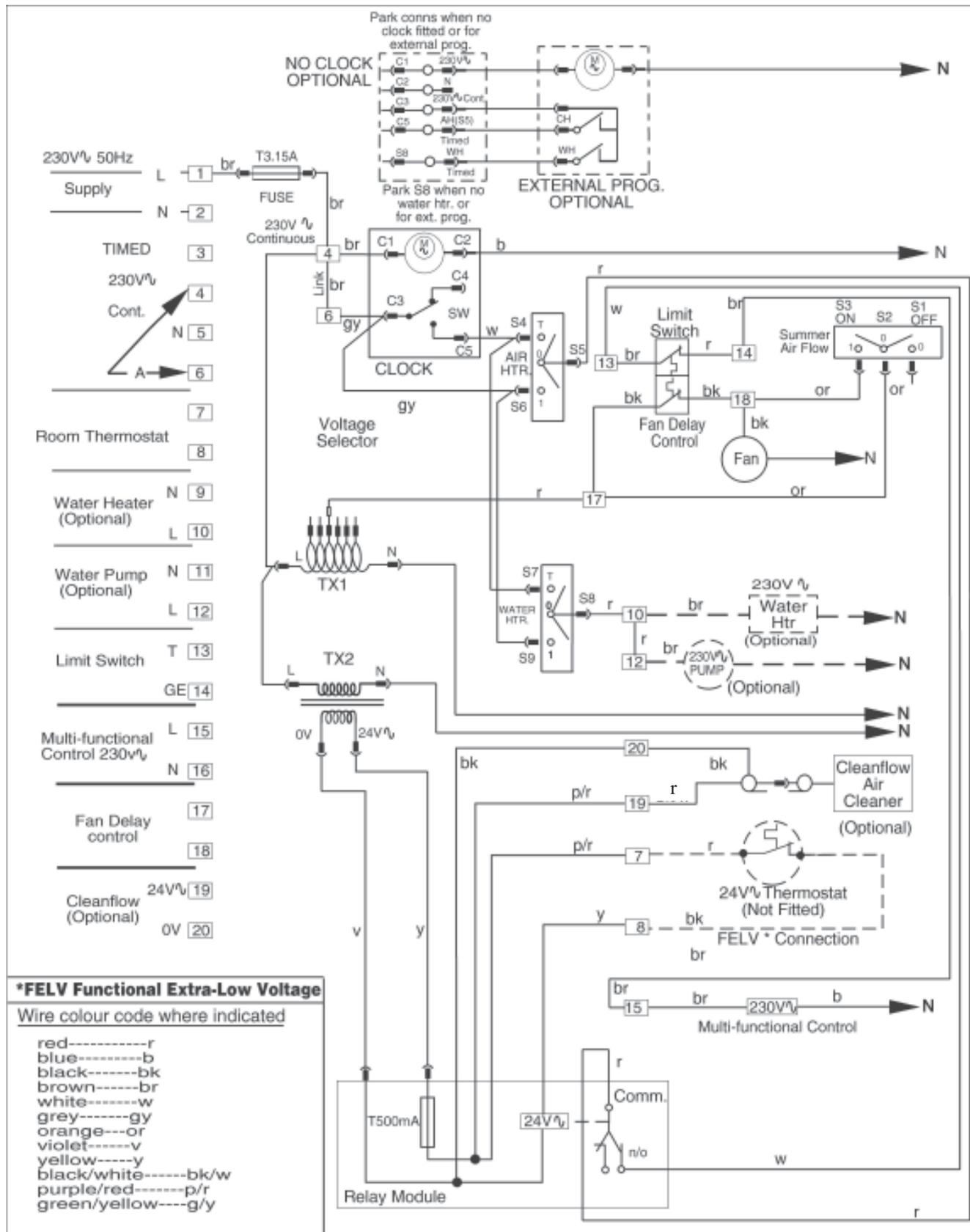


Fig.6a, SYSTEME-T FUNCTIONAL DIAGRAM



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Fig.6b, BASIC CONTROL FUNCTIONAL DIAGRAM

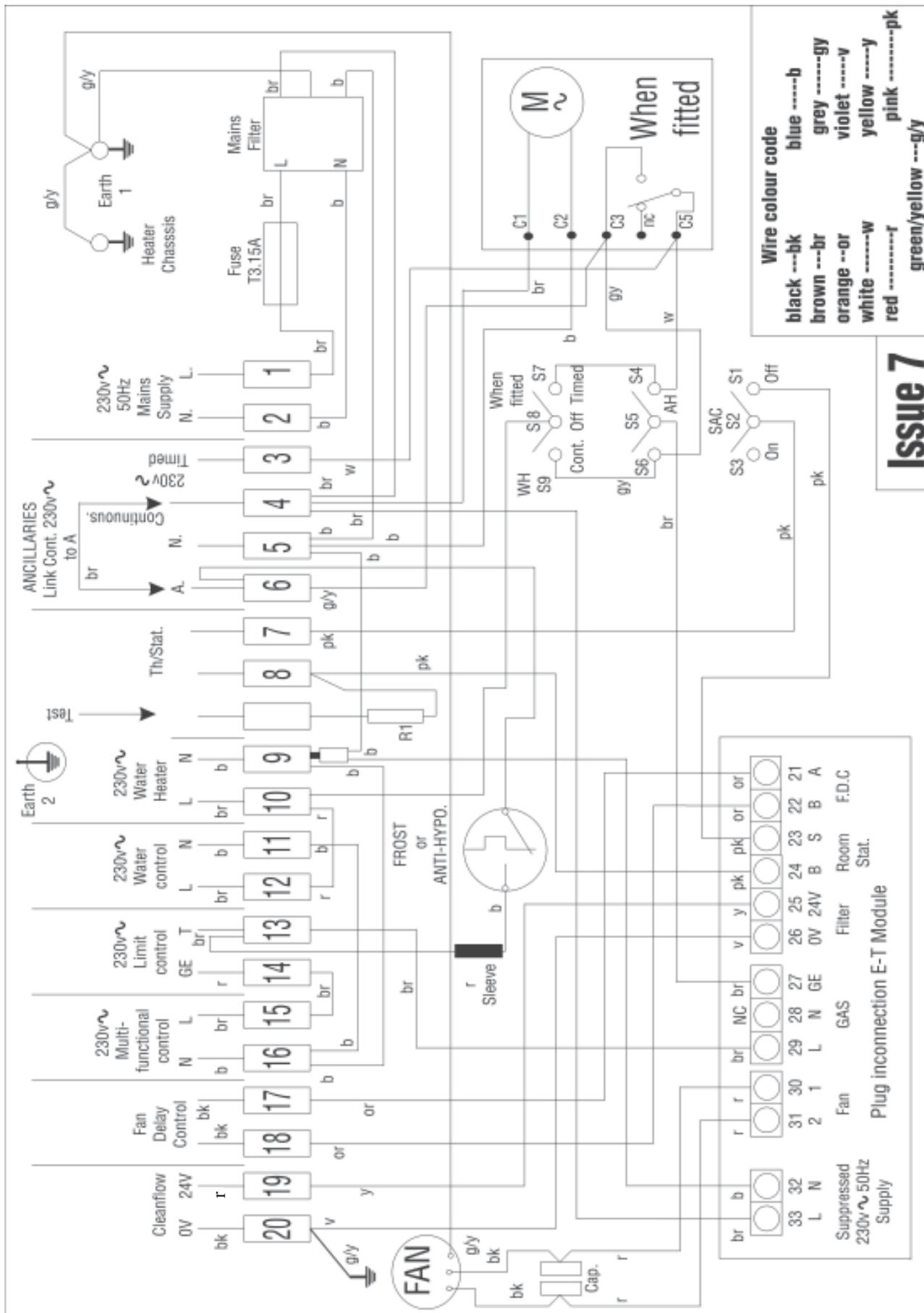


Fig. 7a. SYSTEM E-T CIRCUIT DIAGRAM

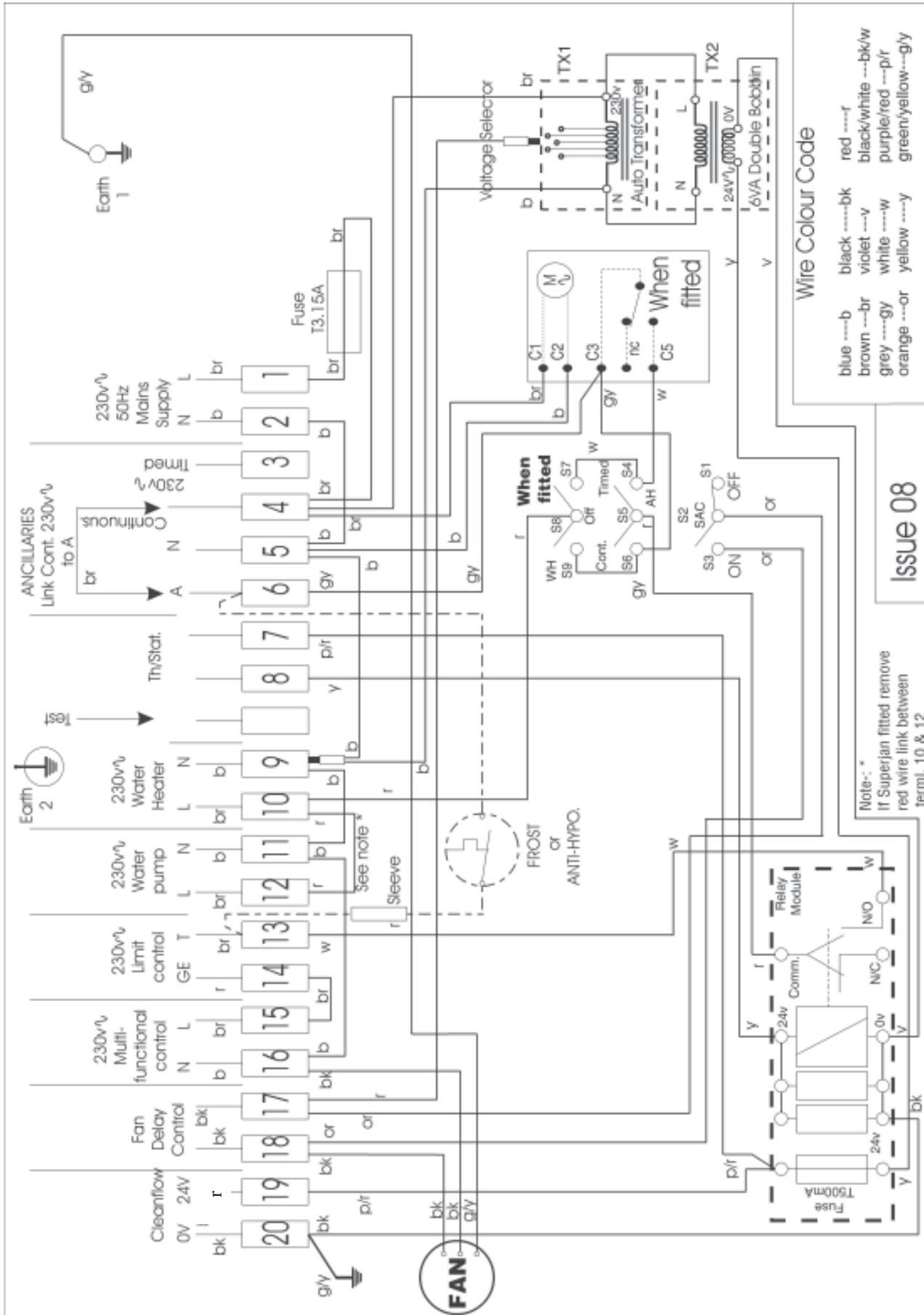
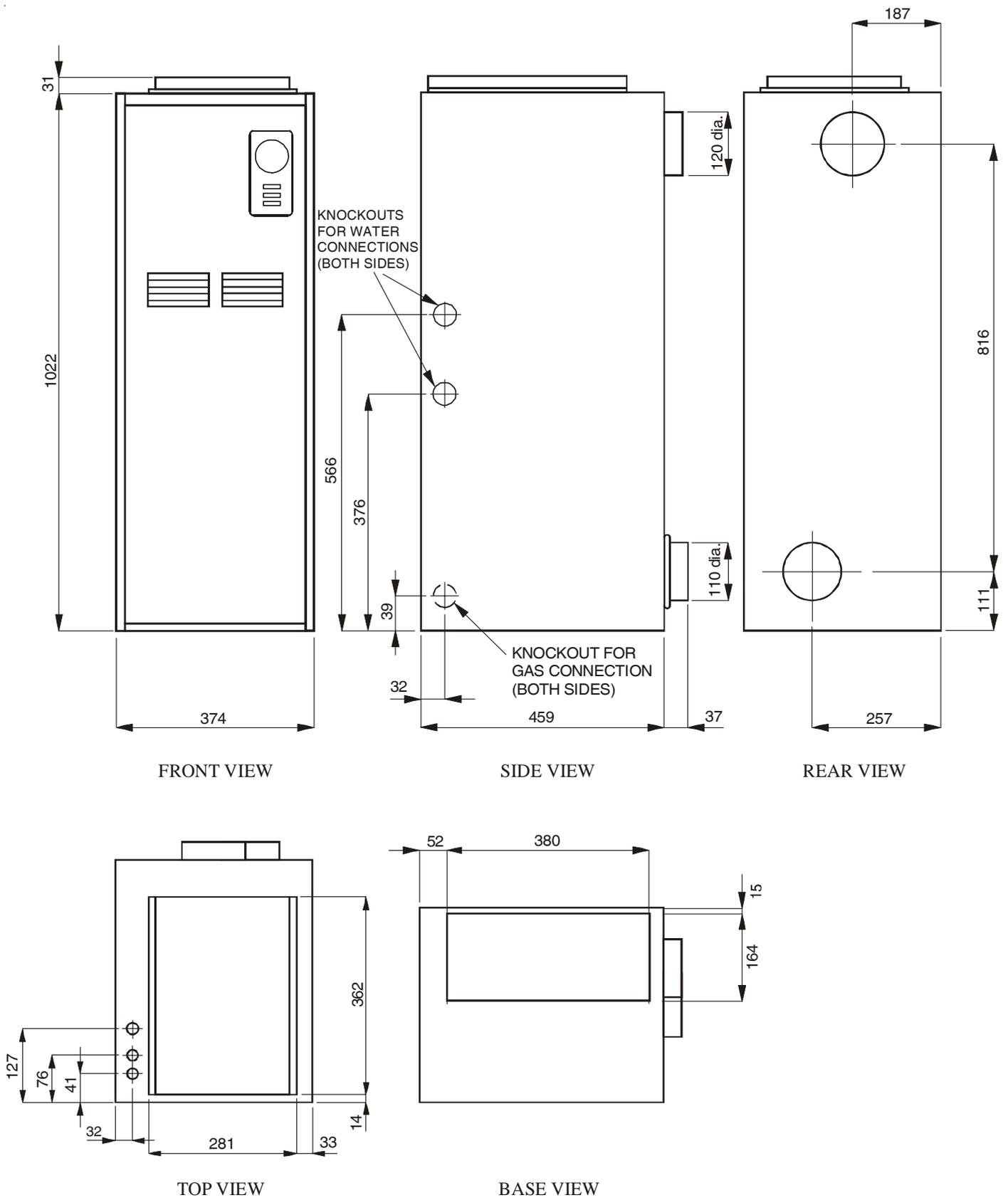


Fig. 7b, BASIC CONTROL CIRCUIT DIAGRAM



**Fig. 8, PRINCIPAL DIMENSIONS (mm)**

**SHORT LIST OF SPARES****HI-SPEC.J25SC**

<b>KEY</b>	<b>G.CNo</b>	<b>MFR'S No</b>	<b>DESCRIPTION</b>	<b>QTY</b>
1		BOS02064SP	Fan Assembly	1
2		T193-0145000	Filter Assembly	1
3	378 466	BOS 02031	Time Control	1
4	381 627	1000-0701140	Multifunctional Control	1
5	232 948	BOS 02061	'O' Ring Seal	2
6	245 482	S 00556	Pilot Burner Assembly (including gaskets)	1
		S01494	Pilot Feed Pipe Kit	1
7		1000-2500580	Pilot Gasket	1
8	381 713	1000-0702030	Thermocouple	1
9	245 509	1000-0513820	Fuse T3.15A anti-surge	1
10		S252-0700000	Burner and Controls Assembly	1
11	245 480	S250-0709000	Main Burner Assembly	1
12	397 484	1000-0703450	Main Injector	1
13	392 935	1000-0701260	Pilot injector (S.I.T. No. 27)	1
14	395 945	1000-0700570	Piezo Unit	1
15	386 775	BOS 01970	Igniter Electrode	1
16	397 819	BOS 02394	Electrode lead	1

**System E-T Models Only**

17	245 539	ET005	Electronic Panel Assembly and Daughter board	1
18		S252-0500000	Electrical Panel Assembly	1
19	245 514	1000-0515620	Thermista-stat	1
20	245 516	1000-0516375	Fan Delay Control/Limit Switch	1
21	245 542	1000-0515970	Capacitor 15µf	1

**Basic Models only**

22	245 544	S252-0501000	Electrical Panel	1
23	245 521	1000-0516365	Fan Delay Control/Limit Switch	1
24	245 522	1000-0515200	Fan Speed Transformer	1
25	245 525	1000-0515730	Transformer 24V	1
26	245 413	1000-0511760	Relay Module	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.

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