

BENSON MH150

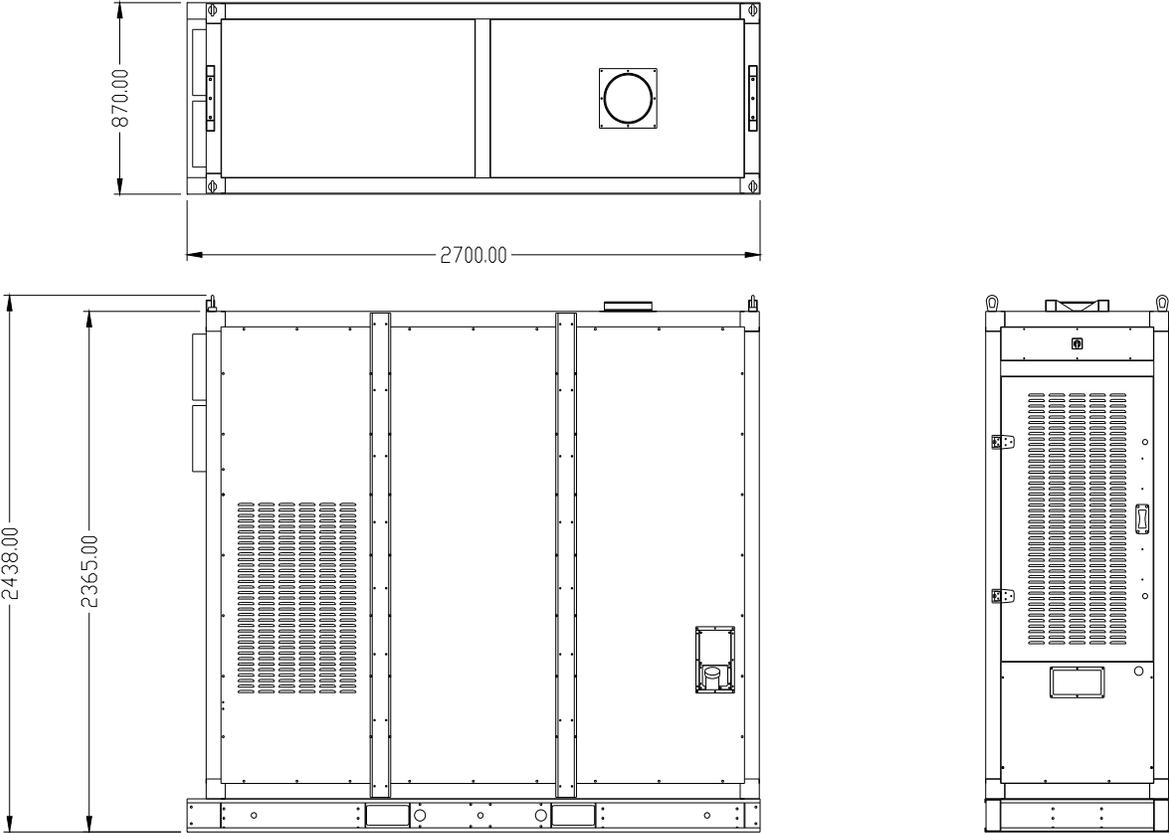
(OIL FIRED MARQUEE HEATER)

**INSTALLATION COMMISSIONING
SERVICING
USER INSTRUCTIONS**



**BENSON
HEATING**

MH150 DIMENSIONS



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1.0 Compliance notices

The Benson MH 150 oil fired Heater detailed herewith is manufactured by Benson Heating within a strictly controlled quality environment within the parameters of ISO 9001.

The Benson MH 150 has been tested and assessed for compliance with the following European Directives.

Machinery Directive (89/392/EEC)
Low Voltage Directive (73/23/EEC & 93/68/EEC)
Electromagnetic Compatibility Directive (89/336/EEC & 91/31/EEC)

Product Liability Directive (65/374/EEC)

The manufacturer has taken reasonable and practical steps to ensure that Benson MH 150 Heaters are safe and without risk when properly used. These heaters should therefore only be used in the manner and purpose for which they were intended, and in accordance with the recommendations detailed herewith. The heaters have been designed, manufactured, assembled, inspected, and tested, with safety and quality in mind, there are certain basic precautions which the installer and user should be aware of, and they are strongly advised to read the appropriate sections of the information pack accompanying the heater, prior to installation or use.

Benson Heating supports all new products being supplied to their customers with a comprehensive information pack; this clearly defines mandatory instructions for the safe installation, use, and maintenance, of the appliance(s).

Where proprietary items are incorporated into Benson Heating products, detailed information and instructions are also provided as part of the information pack.

It is the responsibility of the installer, owner, user, or hirer, of such products supplied by Benson Heating to ensure that they are familiar with the appropriate information/manuals, supplied by the manufacturer, and that they are suitably aware of the purpose of the manuals and the safety instructions. In addition, operators must be suitably trained in the use of the appliance so as to ensure its continued safe and efficient use.

Benson Heating has a commitment to continuous improvement, and therefore reserves the right to amend or change the specification of the MH 150 Heater subject to compliance with the appropriate European, national, and local regulations.

Contained within the text of the manual, the words '**Caution**' and '**Warning**' are used to highlight certain points.

Caution is used when failure to follow or implement the instruction(s) can lead to premature failure or damage to the heater or its component parts.

Warning is used when failure to heed or implement the instruction(s) can lead to not only component damage, but also to a hazardous situation being created where there is a risk of personal injury.

The Benson MH 150 Oil fired heaters conform to the following harmonized standards;

BS EN 292 - Part 1 : 1991
Safety of Machinery - Basic Concepts, General Principles for Design Basic terminology, methodology

BS EN 292 - Part 2 : 1991
Safety of Machinery - Basic Concepts, General Principles for Design Technical Principles and Specifications

BS EN 60204 - Part 1 : 1993
Safety of Machinery - Electrical Equipment for Machines Specification for General Requirements

BS EN 60335 - Part 1 : 1988
Safety of Household and Similar Electrical
Appliances General Requirements

BS EN 55014 - 1993
Limits and methods of measurement of radio
disturbance characteristics of electrical motor-
operated and thermal appliances for
household and similar purposes, electrical
tools and similar electric apparatus

BS EN 50165 - 1997
Electrical Equipment of non-electric heating
appliances for household and similar
purposes, safety requirements

1.1 Certificates of conformity

Certificates are available from the Quality
Control Department at Benson Heating.

1.2 General product information

The Benson MH 150 model has an output
range of 150 kW.

The MH 150 units can suit either ducted
applications, or be used as free blowing units,
but each heater must be connected to its own
individual open flue.

Each heater is fitted with a forced draught
burner which has been test fired and pre-set
prior to dispatch. The safety functions of the
burner are by way of a fully sequential control
box fitted to the burner.

Note

Neither asbestos nor soft soldered joints are
used in the construction or manufacture of the
Benson Heating range of Heaters.
The materials selected for use can withstand
the mechanical, chemical, and thermal
stresses which they will be subject to during
foreseen normal use when installed in
accordance with the manufacturers
recommendations.

1.3 General requirements

Caution

Ensure that the fuel supply is in accordance
with the manufacturer's recommendations and
is as stated on the appliance data plate.

Installation, commissioning, and servicing must
only be carried out by appropriately qualified
and competent persons.

Warning

Unauthorised modifications to the appliance, or
departure from the manufacturers guidance on
intended use, or, installation contrary to the
manufacturers recommendations may
constitute a hazard.

Note

To ignore the warning and caution notices, and
to ignore the advice from the manufacturer on
installation, commissioning, servicing, or use,
will jeopardise any applicable warranty,
moreover, such a situation could also
compromise the safe and efficient running of
the appliance itself, and thereby constitute a
hazard.

The installation of the appliance must meet all
the relevant European, National, and Local
criteria.

Caution

The heater must not be installed where high
wind velocities may affect burner operation.
Suitable protection should be provided for the
appliance when it is located in a position where
it may be susceptible to external mechanical
damage from; for example, fork lift trucks,

1.4 Delivery and pre-installation checks

The heater is supplied wrapped in heavy duty protective polythene. On receipt of the heater, the following checks

should be carried out;

- a) The model is as per order
- b) That it is undamaged
- c) That it is suitable for the fuel supply
- d) That it is suitable for the electrical supply

If any of these points are not satisfied then contact should be made with the Sales Office at Benson Heating as soon as possible by telephoning 01547 528 534. In the case of claims for damage, this must be reported in writing within 24 hours of delivery, in order to comply with insurance criteria

1.5 Warranty

The heater is supplied with a 2 year warranty made up as follows; first year covering parts and labour, and second year covering parts only. In addition to this there is also a 10 year time related warranty on the combustion chamber/heat exchanger. The warranty commences from the date of dispatch from the manufacturer, and is subject to the terms detailed within the Benson Heating 'conditions of business'.

Note (i)

The warranty may be invalidated if –

- a) The warranty registration/commissioning card has not been completed and returned to Benson Heating
- b) The installation is not in accordance with the general requirements of this manual
- c) The flue arrangement and air supply for the heater are not in accordance with the manufacturers recommendations, codes of practice, or similar standards
- d) Air flow through the heater is not in

accordance with the manufacturers technical specifications

e) Internal wiring on the heater has been tampered with or unauthorised service/repairs undertaken

f) The main electrical supply input to the heater has been interrupted during the heating mode

g) The heater has been subject to and affected by the ingress of water in any form

h) The heater is not operated at the rating(s) laid down in the manufacturers technical specifications

i) The heater has not been operated or used within the normal scope of its intended application

j) The manufacturer's recommended minimum service requirements have not been complied with

Note (ii)

All warranty claims must contain the following information to enable processing to take place;

- (1) Heater model
- (2) Heater serial number
- (3) Order reference/date of order, together with full installation details (name and address)
- (4) Details or symptoms of fault

Faulty parts must be returned to the Spares Department, the address of which is provided on the rear cover of this manual. Any such parts will undergo inspection to verify the claim. Replacement parts supplied prior to this may be charged, and a credit supplied upon subsequent validation of the warranty claim. Consumable items are specifically not included within the scope of the warranty.

Note (iii)

Notification is required immediately a fault is suspected.

The manufacturer will not accept responsibility for any additional damage that has been caused, expense incurred, or consequential loss resulting from any failure of the heater(s).

2.0 Location/positioning

Warning

All of the basic criteria must be satisfied prior to commencing installation and commissioning, additionally, the heater must be positioned and installed so as to comply with all the relevant standards and guide lines (see section 9.0), as well as meeting national and local fire regulations and insurance criteria, especially if it is proposed that the heater is to be installed within a special risk area (e.g. proximity to where petrol engined vehicles are stored or parked, where cellulose spraying takes place, where woodworking machinery is operated, etc.).

Indirect fired heaters must not be located in hazardous areas, however, it is permissible for the heater to supply air to such areas.

The heater must not be installed within an environment where there is a high concentration of chlorides, fluorides, salts, or other aggressive or volatile chemicals/compounds.

The location must also allow for adequate clearance for the air supply, return air circulation, oil supply, electrical supply, whilst also providing good and safe working access.

Any combustible material adjacent to the heater or flue system must be so placed or shielded so that its surface temperature does not exceed 65° C.

TRANSPORTATION and LIFTING

Ensure that Forklift or Mechanical Lifting Devices are suitable for purpose.

The heater should be kept in a **HORIZONTAL** position at all times when being transported by fork lift truck or other mechanical devices .

2.1 Fuel supply - general

The Benson MH 150 of oil fired heater are all manufactured and pre-set for use with 35 second gas oil from the internal tank.

2.2 Fuel

In order to promote trouble free operating it is necessary that the oil within the storage tank and oil line does not fall below the cold filter plugging point (cfpp), in this country and with class D fuel (also referred to as gas oil). The critical temperature is -4oC for this summer grade.

The cfpp critical temperature for the winter grade is -12oC.

If summer grade fuel is stored for winter use in areas prone to severe frosts and low temperatures it will be necessary to insulate or even heat the supply tank and pipe work.

Warning

The pump pressure must not exceed a maximum of 0.4 bar, this is because beyond this point gas is liberated from the oil.

Note

The oil feed to each heater must be fitted with a fire check valve and isolating valve. The fire check valve must be operated by way of a fusible link positioned so that it is above the burner.

Warning

Prolonged exposure and contact with Gas Oil can result in the natural oils being removed from the skin, sensitisation can result in dermatitis.

Always ensure that the appropriate personal protective equipment is used.

2.3 Electrical supply

Wiring external to the cabinet heater must be installed in accordance with any local, national, and European regulations, as well as meeting the appropriate requirements of IEE regulations.

The means of connection to the main electrical supply must allow for complete electrical isolation of the heater, furthermore, in the case of a unit wired for a three phase supply, the supply should only be used to serve the heater itself and no other plant or equipment.

Warning

Ensure that the electric and oil supplies are turned off before any electrical work is carried out on the heater.

Ensure that wiring cannot make contact with any surfaces liable to be subject to high temperatures or where the insulation of the wiring could be impaired as a result of such contact.

All Benson heaters must be earthed.

Caution

The main electrical supply must not be switched off or disconnected as a method for stopping the heater, the exception to this is in an emergency, or during servicing, when the heat exchanger has been allowed to cool sufficiently to prevent any damage from occurring.

Claims for damage will not be considered if they have resulted from incorrect wiring or the incorrect use of the heater.

2.4 Air supply

Provision must be made for the existence of an air supply for both combustion and ventilation.

It is a requirement that the area where the air heater is located must have a permanent air vent of negligible resistance direct to the outside air.

Such air vents must be positioned so as not to become blocked or flooded, nor should they be placed so as to introduce undesirable matter (e.g. flammable, volatile, or aggressive chemicals/compounds or potentially hazardous or harmful substances) either direct from the outside, or through their proximity to an adjacent extraction system.

Caution

Additionally, an automatic control interlocked to the burner must be fitted to ensure burner shutdown in the event of airflow failure or restriction.

2.5 Air distribution system

All materials used within the construction of the delivery and return air ducts must not represent a fire hazard and should be made from thermally inert materials.

The selection of materials must take account of the environment into which the heater and its air delivery system is expected to work, it must also take account of the stresses and loadings placed upon it during its normal working life.

Where interjoist spaces are used to route ducting these must be lined with fire resistant insulation material.

In installations where forced recirculation is a feature, a full and unobstructed return air path to the heater(s) must be provided, with return air grilles connected by ducting directly to the return air inlet on the heater.

The limit for recirculation should not be greater than 85% re-circulated air to 15% fresh air.

If the inlet air is ducted to the outside, then the lowest edge of the inlet air duct must be at least 500mm above the outside floor or ground level, it must also be fitted with an access point (s) to allow for cleaning and servicing to occur. The openings in the structure through which the ductwork passes must be of fire resistant material and constructed to prevent the likelihood of any fire from spreading.

In ducted applications the ductwork must be designed so as to give a static pressure within the limits stated in section 8 of this manual.

It should be noted that if the static pressure is too high, nuisance shut-down will occur when the heater goes out on the overheat limit thermostat, if the static pressure is too low, then damage can be caused to the fan motor.

Warm air outlets on ducted applications must be such that they cannot be closed or become blocked, which again would lead to an

increase in static pressure and nuisance shut-down.

The outlets must not be sited so that warm air can be discharged onto combustible materials, if necessary, guard rails should be used to ensure that effected areas are kept clear.

Return air intakes must not be located so that potentially harmful or hazardous contaminated air can be drawn into the system.

2.6 Flue system

Warning

Each heater must have its own separate flue, with a flue diameter of not less than is detailed in section 8 within this manual.

The minimum vertical length of flue must not be less than 1m.

The maximum vertical length of flue must not be more than 20 m.

The flue should rise vertically, and the number of bends should be kept to a minimum.

It is strongly advised that BS 5854; 1980, and BS 5440; parts 1 and 2, are used as consultative documents when considering flue requirements.

Care should be taken to ensure that the flue terminal is not situated in a high-pressure area, the proximity of buildings and other obstacles which will influence this must be taken into account.

Provision must be made for the disconnection of the flue for inspection and service requirements, and it is strongly advised that where bends are fitted inspection covers are included.

The materials from which the flue is constructed must be non-combustible, resistant to internal and external corrosion, and be capable of withstanding the stresses and loadings associated with normal use.

When designing the flue system the prevention of the formation and entrapment of condensation must be a key consideration. Twin wall or insulated systems are

recommended, as they tend to inhibit the formation of condensates.

Where condensation is unavoidable traps should be included to encourage the condensates to flow freely to a point from which they may be released, preferably into a gully.

The condensate pipe from the flue to the disposal point must be made from corrosion resistant pipe of not less than 25mm internal diameter.

If the flue passes through a wall, ceiling, or roof made from combustible material then it has to be sleeved so as to provide a minimum of a 25mm void between the exterior of the flue and the internal wall of the sleeve.

The maximum permitted temperature of any adjacent combustible material is 65°C.

The position of the flue and its terminal should be such that it does not impair the combustion process.

It should terminate in an exposed position so as to allow the escape and dissipation of flue gases without risk of their re-entering the property through windows, ventilation ports, etc.

The flue should extend to at least 1m above the height of any object within 3,5m of the terminal.

Flue terminals should be fitted on all flues with a diameter of 200mm or less.

The terminal must be of the approved type, and have outlet grilles on all sides giving a total free area of at least double that of the flue.

Note

It should be noted that claims made under warranty and attributed to the ingress of water may not be considered especially if an approved method of sealing has not been used, or if the design of the flue has not made provision for possible condensation problems.

3.0 Installation

3.1 Flue Installation

An integral flue spigot is fitted to all Cabinet Heaters thereby allowing the flue to connect directly to the heater.

The design of the flue must ensure that it can be disconnected to allow for cleaning and servicing, furthermore, all of the flue section joint sockets must face upwards, and the seal between the sections achieved through mechanical joints or through the use of approved caulking string and grout. It is strongly advised that BS 5854 and BS 5440 parts 1 and 2 are referred to.

Warning

Always ensure that the appropriate personal protective equipment is used.

3.2 Heater Siting

The heater must be installed on a level surface capable of supporting the weight of the heater and any ancillary equipment.

3.3 Electrical Installation/connection

Benson MH 150 heaters are
415V 50 Hz 3PH NEUTRAL & EARTH

It is recommended that reference is made to the wiring diagrams contained within section 7 of this manual prior to installation or connection to the supply.

The electrical supply must be as specified and suitable for the heater, and must be run within conduit to a point adjacent to the heater, and be terminated to provide an isolation point that will prevent remote or inadvertent activation. Cables, conduit, and fittings that are used to make the connection between the isolator and the heater must conform to the appropriate IEE regulations. All heaters are supplied fused and pre-wired, all must be earthed.

Final connections for any additional external controls must be completed on site, and must be carried out according to IEE regulations.

Separate user information is provided for the time control unit and the burner, and forms part of the product information pack which accompanies every heater when dispatched.

Warning

Always isolate from mains electrical supply before commencing work on the heater.

Always ensure that the appropriate personal protective equipment is used.

3.4 Air Distribution Installation

The materials selected must be of low heat capacity, and it is preferable that all warm air ductwork is thermally insulated.

Where ducting may be subject to deterioration from exposure to moisture or high humidity material selection and insulation are prime considerations.

Joints and seams must be airtight and fastened securely and designed to remain so, even when operating at high temperatures.

Adequate support must be designed into the layout of the ductwork to ensure that the integrity of the seams and joints is maintained.

The support must be independent and separate from the heater and the ducting, to allow for free movement during expansion and contraction.

Where ducting passes through walls or partitions sufficient clearance must be left, irrespective of any fire stop requirement, to allow for expansion and contraction.

Failure to adhere to these latter two points can result in the generation and transmission of excess noise.

Where ducting is installed in concrete flooring a permanent membrane must be used to isolate the ducting from the corrosive effect of the alkaline salts within the concrete.

Care should be taken to ensure that soft insulation material does not become compressed and thereby lose its effectiveness.

3.5 Heater Control Installation

Warning

Isolate heater from mains before undertaking any electrical work.

- (a) On/off switch
- (b) Ventilation/heat switch (summer/winter switch)
- (c) Manual/automatic switch
- (d) Thermostat
- (e) Phase change over switch

4.0 Commissioning

Note

It is a requirement that only suitably qualified and competent personnel are allowed to undertake the commissioning of the heater.

It is also strongly recommended that prior to commissioning the engineer familiarises himself with; the information contained within the information pack that accompanies the heater, the heater itself, and with the specific requirements of the installation/application. The following checks should be carried out after the familiarisation process.

Warning

All Heaters undergo a rigorous test programme prior to being dispatched, whilst such a programme does involve pre-commissioning and setting up the heater to operate efficiently and well within its designed operational limits, this does not mean that on site commissioning is less important than might otherwise be the case. The idiosyncrasies of each installation can only ever be allowed for, through the use of thorough on site commissioning carried out by trained and experienced personnel equipped with the correct tools and apparatus.

Note

It is strongly recommended that equipment used for the sampling and analysis of flue gases is accurate to within +/- 0.1% and maintained so that it is regularly calibrated.

4.1 Commissioning - Pretest

Check to ensure electrical safety, and inspect and check the oil system, testing for leaks.

- (a) Ensure that the electrical supply is turned off.
 - (b) Ensure that the oil supply is turned off.
 - (c) Check that all panels and fasteners are secure and in place.
 - (d) Check that the heater is installed so that it is square and that the support is adequate.
 - (e) Ensure that warm air delivery outlets are open and that ducting is adequately supported.
 - (f) Ensure that if filter assemblies are fitted that they are secure and correctly located.
 - (g) Check that air inlets are clear and that return air paths are adequate.
 - (h) Ensure that the flue is secure, adequately supported, and that the various joints are properly sealed.
 - (i) Check that condensate trap and drain facilities are adequate (if fitted).
 - (j) Check that there is provision for flue gas sampling and that this sample point can be plugged and sealed after commissioning.
 - (k) Check that fan and limit stat settings have not been disturbed and are as follows
 - Fan on - 40°C
 - Overheat limit - 100°C
 - Fan off - 30°C
- Also check that the white button (automatic) is pulled outward and that the red button (reset) is pushed inwards to the reset position.
- (l) Ensure that the burner is securely attached to the heater.

(m) Test for electrical earth continuity between the heater, oil pipe work, and mains supply.

(n) Turn on main electrical supply, select the following switch settings

- On/Off - On
- Heat/Ventilation - Ventilation
- Manual/Automatic - Manual

The fan will start enabling fan direction etc to be verified. Reset on/off switch to off position.

(o) Turn mains electrical supply to off, replace and secure lower louvred panel covering fan and motor assembly.

(p) Set thermostat to 'demand' position.

4.2 Commissioning - Ignition

Warning

Do not proceed with commissioning unless all the criteria detailed within sections 4.0 and 4.1 have been satisfied.

(a) Ensure that the electrical supply is turned off.

(b) Ensure that the oil supply is turned off.

(c) Select the following switch settings on the heater

- On/Off - off
- Heat/Ventilation - heat
- Manual/Automatic - automatic

(d) Turn on main electrical supply.

(e) Select 'on' position for heater on/off switch.

(f) Check for the following burner sequence

Interval	Operand
1 <5s	Combustion air damper actuated, burner fan motor initiates purge cycle...
2 <15s	Solenoid valve opens ignition transformer provides spark for burner ignition...

----- E I T H E R -----

3 >15s Ignition failure caused by oil starvation resulting in burner lock-out/shut-down...

(g) Set heater on/off switch to off position

(h) Attach oil manifold (bleed screw and pressure gauge)

(i) Open oil supply valves and bleed air from pipe work and adjust burner oil pressure as per detailed in burner manual

(j) Repeat steps 4.1 q, and 4.2 c,e,f.
----- O R -----

4 >15s Burner ignition.flame detection...

5 <20s Burner ignition cycle complete

Note

It is strongly recommended that the separate manual concerning the operational details of the burner supplied with the heater as part of the information package is studied prior to commissioning.

Time intervals within the ignition sequence will vary slightly from one model to another.

Warning

If burner ignition is not satisfactorily accomplished, commissioning must not proceed until the reason or fault has been identified and rectified, if necessary by reference to the separate burner information or to section 6 of this manual.

(k) Repeat steps 4.2 c,a,

(l) Repeat steps 4.2 d,e,f, allowing the heater to reach thermal equilibrium.

(m) Adjust thermostat to its highest setting, and allow the heater to continue to fire.

(n) Gradually reduce the temperature setting on the thermostat until the burner shuts down, (@ < ambient and then gradually increase the temperature setting on the thermostat until heat is called for, (@ > ambient) and the burner automatically re-fires.

(o) Check fan and limit stat by depressing and holding in the fan motor overload re-set button, located on the heater electrical panel. The time between the fan stopping and burner shut down should be noted, once the burner has shut down the overload on the motor should be released.

If the time interval between fan stop and burner shut down is greater than 90 seconds further checks should be made.

These are as follows

(i) Check settings on fan and limit stat are correct, ie, fan on 40°C, fan off 30°C, limit 100°C.

(ii) Check that the position of the unit is correct, ie, equi-distant between heat exchanger body and heat shield panel.

(iii) Check integrity of unit, ensuring that neither the bi-metallic strip nor its casing is damaged.

(p) Undertake flue gas analysis using approved and calibrated analysing equipment recording data on the commissioning card, ie, CO, CO², net and gross flue temperatures.

Record burner oil pump pressure, ambient temperature, barometric pressure, and smoke reading (0 - 1 Baccarach scale).

Note (i)

The burner air and oil pressure settings should be only very finely adjusted to achieve a CO² reading of 12.5% (+/- 0.5%).

Note (ii)

The gross efficiency must be approximately 80%.

Note (iii)

All Heaters are test fired and pre-commissioned as part of the manufacturing process, if however, during on site commissioning the data are found to be not in accordance with the manufacturers data, then

the following action is recommended.

- * Re-check all readings and calculations.

- * Adjust burner as per manufacturers instructions.

- * Consult Benson Heating Technical Department.

(q) Complete commissioning card and provide operating instructions for the user, high-light the fact that the manufacturer recommends that in the interests of safety and efficiency the heater is serviced on a regular basis only by qualified and competent persons.

The completed commissioning card must be returned to the Service Department immediately after the satisfactory completion of commissioning, failure to do so can invalidate any subsequent warranty claim.

(s) Set all controls to the requirements of the user.

4.3 Commissioning - air delivery system

Caution

On ducted applications it is necessary that the system is balanced in order to optimise the efficiency of the heater and the air distribution and delivery system

Failure to balance the system can result in fan motor overloading and premature component failure, it can also result in an inefficient heating/ventilation system.

(a) Check that the amount of fan produced air volume is in accordance with the heater specification, if the volume is too great the fan can be overloaded.

Ensure that the running current is as per that stated on the heater data plate.

Alternatively, the static pressure should be measured at the start of the ductwork to confirm that it is within the permissible tolerance.

(b) If the current drawn is greater than the stated running current, in most probability this will be caused by insufficient static pressure

within the ductwork, in which case system resistance should be increased through the introduction of a damper placed as close to the start of the ductwork as possible, thereby resulting in a reduction in drawn current. The damper should be adjusted until the current is in accordance with that stated on the data plate.

(c) If the current drawn is too low the duct outlet grilles will require opening to reduce static pressure and increase air volume, if this is not the case overheat cut outs can be caused.

4.4 Commissioning - hand over

(a) Upon full and satisfactory completion of commissioning, a record of commissioning information (contact, date, etc) should be left with the heater, a copy of which must also be forwarded to Benson Heating Service Department.

(b) The commissioning engineer must ensure that the user is familiar with the safe and efficient use of the heater, detailing the function of all controls, and main components.

(c) The user should be made aware of the following in particular

(i) Lighting, shutdown, and operational information.

(ii) Safety features, data plate, and labelling.

(iii) The requirement for regular inspection - especially if the heater is within a more demanding environment - and the need for regular servicing carried out by competent and qualified persons.

(Caution)

After approximately 100 hours of running, the tension of the fan belts must be checked to ensure that they are correct and that they have not stretched. See section 5.2 for further instructions.

5.0 Servicing

Warning

Servicing must be carried out on a regular basis, the maximum interval between services being 1 year. It is a requirement that only suitably qualified and competent persons are allowed to undertake servicing.

Before any maintenance or servicing work is carried out the heater must be shut down and allowed to cool, and have the oil and electric supplies to it turned off at the supply valve and isolator respectively.

Caution

Certain component parts are factory sealed and are designed so as to be tamper proof. Usually such items do not require servicing, and therefore should not be tampered with.

Failure to comply with this can invalidate any warranty, and can also lead to premature failure.

The following parts fall within this category: thermostat, fan and motor.

Additionally, the fan and limit stat has been factory set, and must not be re-set without formal consent from the manufacturer.

Reference should be made to the separate information covering the operational details of the burner and timer.

Only approved spare / replacement parts can be fitted, failure to comply with this can compromise the safe and efficient running of the heater, and can also invalidate any warranty claim

5.1 Planned Servicing

In order to maintain the efficient operation of the heater it is recommended that the following planned servicing and preventative maintenance program is adopted by the user.

Quarterly Inspection

- (a) Visual inspection of the burner
- (b) Clean and check spark

- electrode
- (c) Clean and check photocell
- (d) Check overheat safety is operational

Bi-Annual Inspection

- plus...
- (a) As per quarterly inspection,
 - (b) Combustion check
 - (c) Smoke test

Annual Inspection

- plus...
- (a) As per half year inspection,
 - (b) Heat exchanger and cleaning
 - (c) Electrical connections
 - (d) Main fan motor
 - (e) Main fan assembly
 - (f) Pulleys
 - (g) Fan belts
 - (h) Oil supply including filter
 - (i) Burner
 - (j) Air delivery system
 - (k) Flue
 - (l) Report

5.2 Servicing Procedure - Major Component Parts

Flue

A visual inspection should be carried out to ensure that the flue remains adequately supported, both internally as well as externally, and that the various joints are effectively sealed.

Inspection covers, where fitted, should be removed and the flue checked to see whether cleaning is required

If inspection covers are not fitted the flue gas exit duct and flue spigot will provide not only an indication of the cleanliness of the flue, but will also enable access for cleaning.

The presence of the flue terminal should be checked.

If a condensate trap and drain facility is fitted this should be checked to ensure that it continues to function correctly, and the drainage of condensates is not impaired.

Main Fan Motor

Remove access panel. Dust and other foreign matter should be cleaned by blowing over with

compressed air and through the use of a soft bristle brush and cloth.

Solvent wipes may be used to remove heavy soiling from the motor casing.

Traces of surplus lubricants spreading from the bearings should also be cleaned away.

Where motors are fitted with grease nipples bearings should be lubricated with the correct grade of lubricant. Motors which do not have grease nipples feature sealed bearings which are lubricated during manufacture for their life.

The electrical connections should be checked as follows.

The cover to the terminal box should be removed by undoing the screws which secure it.

Check connections for signs of corrosion, tightness, and ensure that there are no stray strands which could form a short circuit.

Clean, tighten, and replace as necessary.

Replace cover and secure.

Main Fan

Remove dust and other foreign matter by blowing off with compressed air or through the use of a soft bristle brush.

Check that the bearings do not show signs of excessive wear.

It should be noted that these bearings do not require lubricating.

If the bearings require replacing the following procedure should be followed.

- (a) Remove belt(s).
- (b) Loosen set screw on eccentric collar and tap collar in the opposite direction to fan rotation.
- (c) Remove collar and bearing.
- (d) Check shaft for alignment and straightness.
- (e) Locate the bearing in its seat and place on the shaft with the cam facing outwards.
- (f) Fit the eccentric collar and engage the cams.
- (g) Tighten initially by rotating, and then by tapping in the direction of the fan rotation.
- (h) Replace fasteners and secure.
- (i) Turn by hand to ensure free fan rotation.

Pulleys

Check pulleys for alignment using a straight edge, if necessary reposition either or both of the pulleys and the fan motor.

Check for excessive wear within the root and sides of the grooves, and check for any other signs of wear or damage, if necessary replace the pulley as follows.

- (a) Release tension on belts and remove.
- (b) Release the taper locks by slackening the securing screws by several complete turns.
- (c) Fully remove one screw from the taper lock, and having oiled it, insert into the threaded jacking point.
- (d) Tighten screw until the taperlock is free.
- (e) Remove taperlock and pulley.
- (f) Fit taperlock in new pulley, and provisionally position on the shaft.
- (g) Remove the screw from the jacking point, and tighten both screws in their clamping points until the pulley can just be moved on the shaft by hand.
- (h) Align pulleys using a straight edge, and by gradual alternate tightening of the screws clamp in position.
- (i) Refit belts and check for the correct amount of tension.

Fan Belts

Check belts for signs of wear.

Frayed or split belts must be replaced using belts with a common batch code.

Belt tension must be checked, and if on multi-belt units it is found that one belt contains more slack than its accompanying belts, then all the belts on the unit must be replaced, again using a common batch code. Replacement and tensioning is carried out as follows.

Note

The maximum displacement at the mid point of the top edge of the belt must not be greater than 16mm per metre of span, when a force of 3kg is applied in a plane perpendicular to the belt.

- (a) Loosen fan motor securing bolts on chassis.
- (b) Loosen fan motor slide adjustment bolt.
- (c) Slide fan towards fan to slacken belts.
- (d) Replace belts, pull fan motor away from fan until belts are tight.

- (e) Tighten adjustment bolt to hold motor.
- (f) Tighten fan securing bolts ensuring that the fan is square and the pulleys aligned.
- (g) Check belt tension, making final adjustments as necessary.
- (h) Tighten and clamp fasteners to hold fan motor in position.

Heat Exchanger

The heat exchanger requires a visual inspection at least once per year, this should be accompanied by cleaning. It is recommended that a flue brush and vacuum cleaner be used to facilitate this.

Access to the heat exchanger is gained through the removal of the front panel and heat shield.

Servicing and cleaning should be performed as follows.

- (a) Remove brass nuts and cover from heat exchanger end assembly to expose heat exchanger tubes.
- (b) Remove any accumulated deposits from the tubes by pushing through the full length with a flue brush.
- (c) The flue brush should be withdrawn so as to pull any deposits back into the bottom of the flue box where they can then be removed by using a vacuum cleaner.
- (d) Particular attention should be paid to the upper internal surfaces of the tubes, where through convection heavier deposition is likely to occur.
- (e) Any deposits which may have accumulated within the combustion chamber can be removed with a vacuum cleaner once the burner is removed.

Note

It is most important that a build up of deposits is not allowed to occur as this can have an adverse effect upon the efficiency of the heater and reduce the life of the heat exchanger.

- (f) The heat exchanger and combustion

chamber should be visually inspected for signs of splits, cracks, and distortion.

(g) All gaskets should be checked to ensure that they continue to provide a gas tight seal, if there is an element of doubt then they should be replaced.

If the condition of the heat exchanger gives cause for concern the Service Department at Benson Heating should be advised pending a more detailed examination.

Electrical Supply

All connections must be checked to ensure that they are secure, and free from corrosion. Terminals and connections should also be checked to ensure that no stray strands are bridging terminals. Electrical continuity should also be checked.

Oil Supply

The oil supply pipe work, tank, and fittings should all be inspected to ensure that they are free from corrosion, and to ensure that where brackets have been fitted these remain secure and offer adequate support.

The oil filter should be replaced with a new one, and the system should be checked for leaks.

If the oil level is such to allow removal of any sludge or other contaminants from the tank this too should be undertaken, particularly if there have been problems of poor firing associated with contaminants reaching the burner.

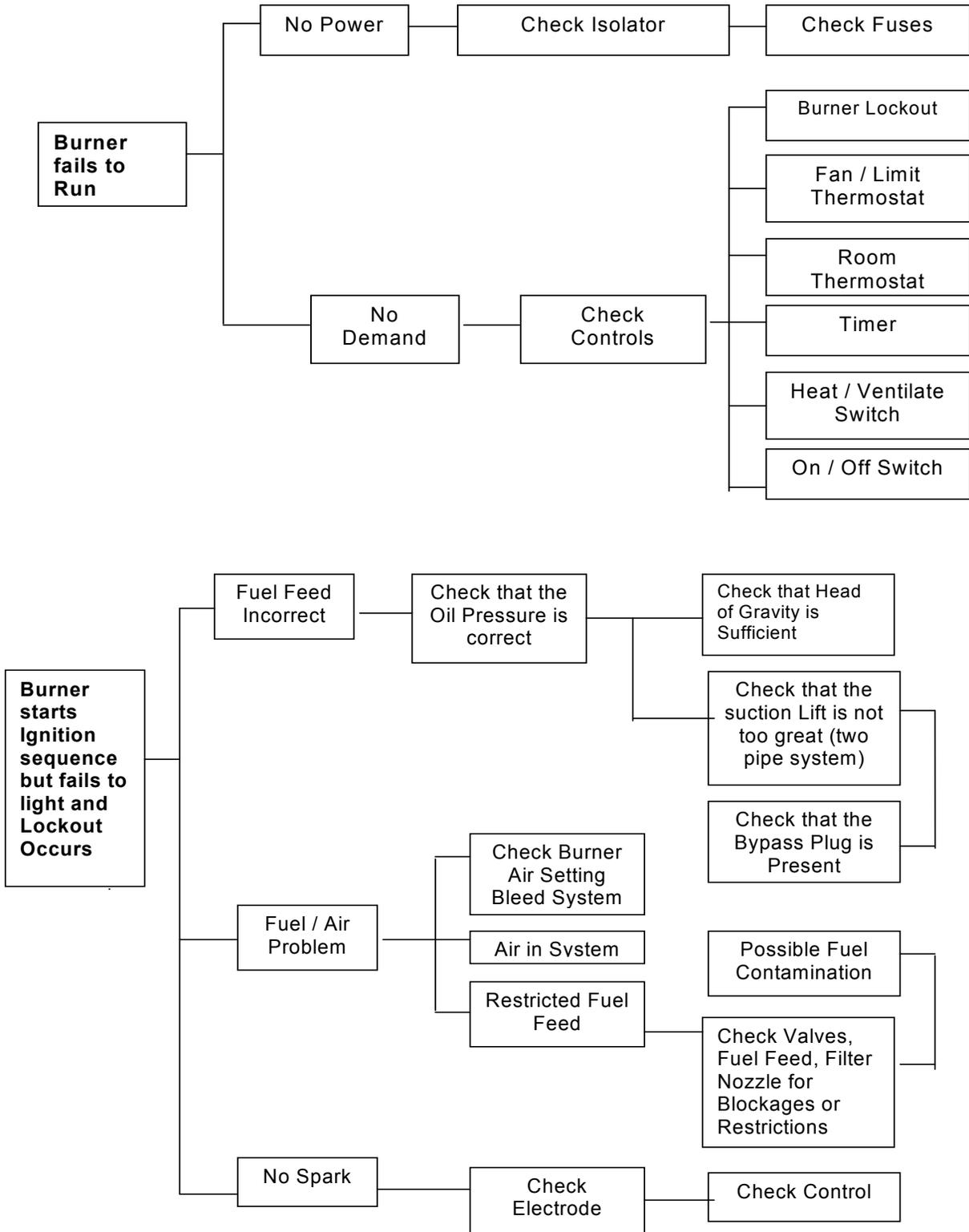
Note

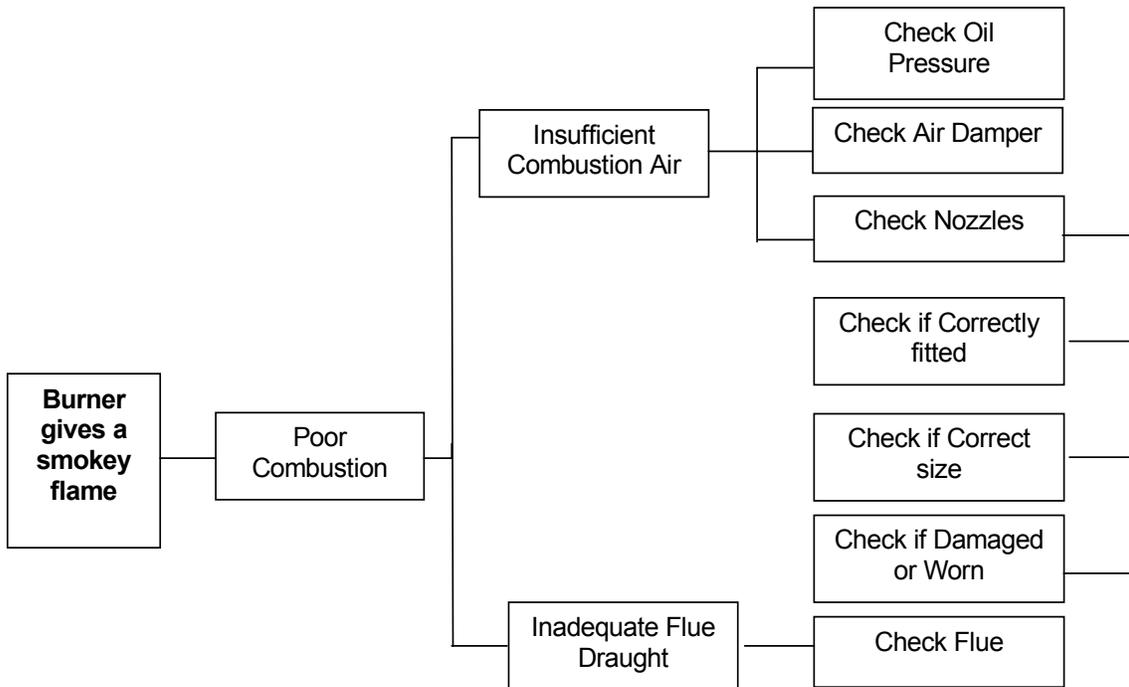
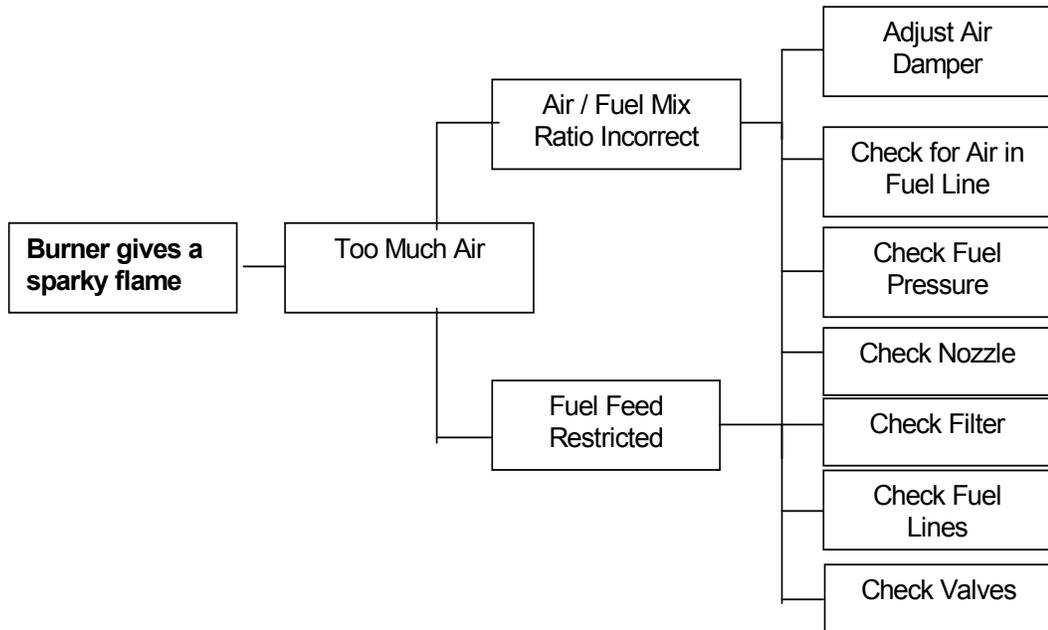
Any waste oil or sludge must be disposed of correctly. Never dispose of it by dumping or tipping it down drains or into water courses where ground water can become polluted and environmental damage caused.

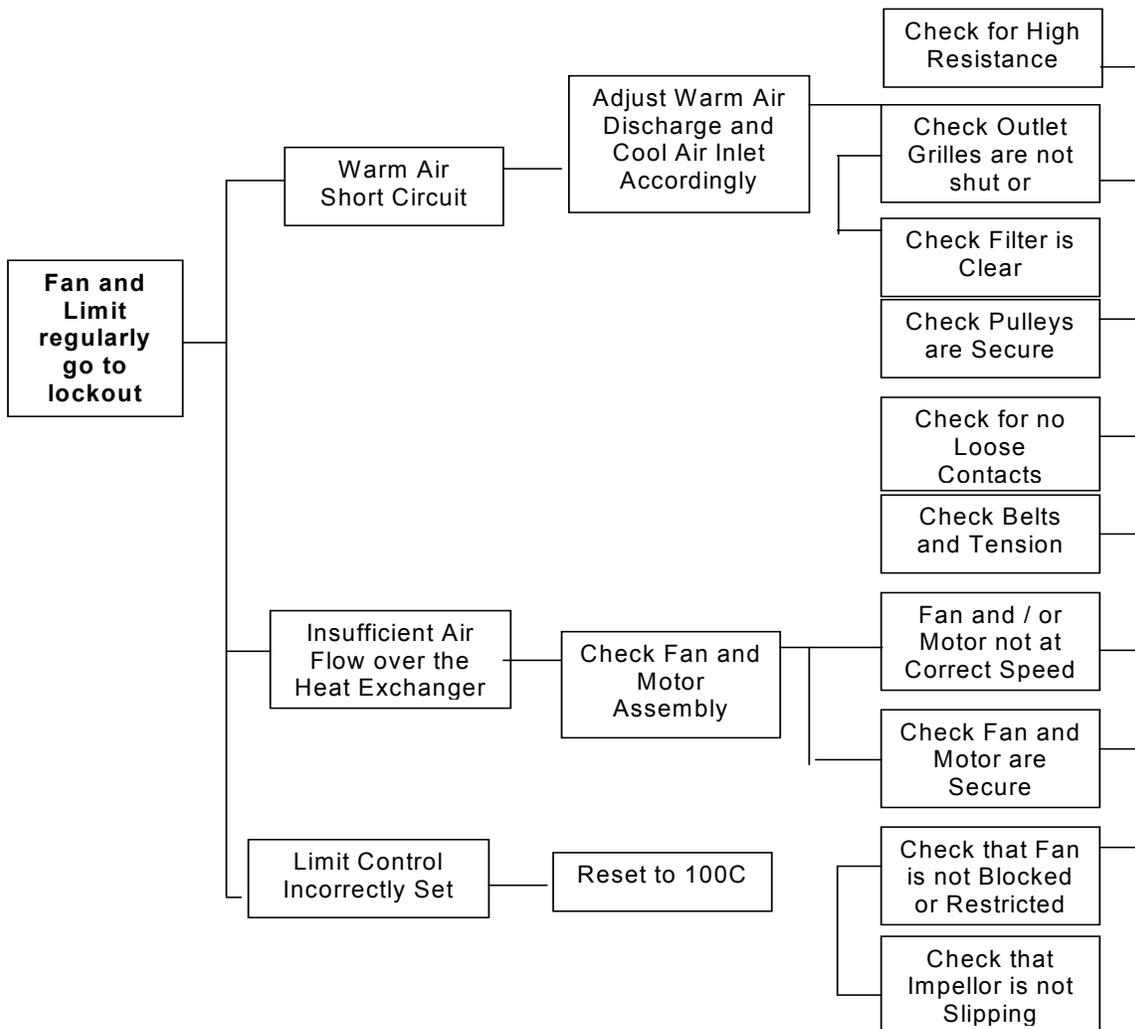
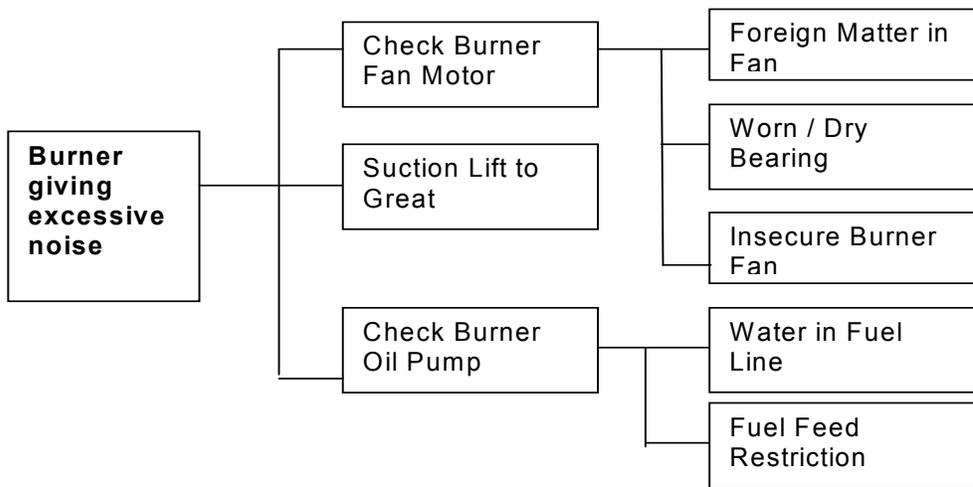
Burner

Service requirements for the burner fitted to the heater are covered in the separate manual prepared by the burner manual.

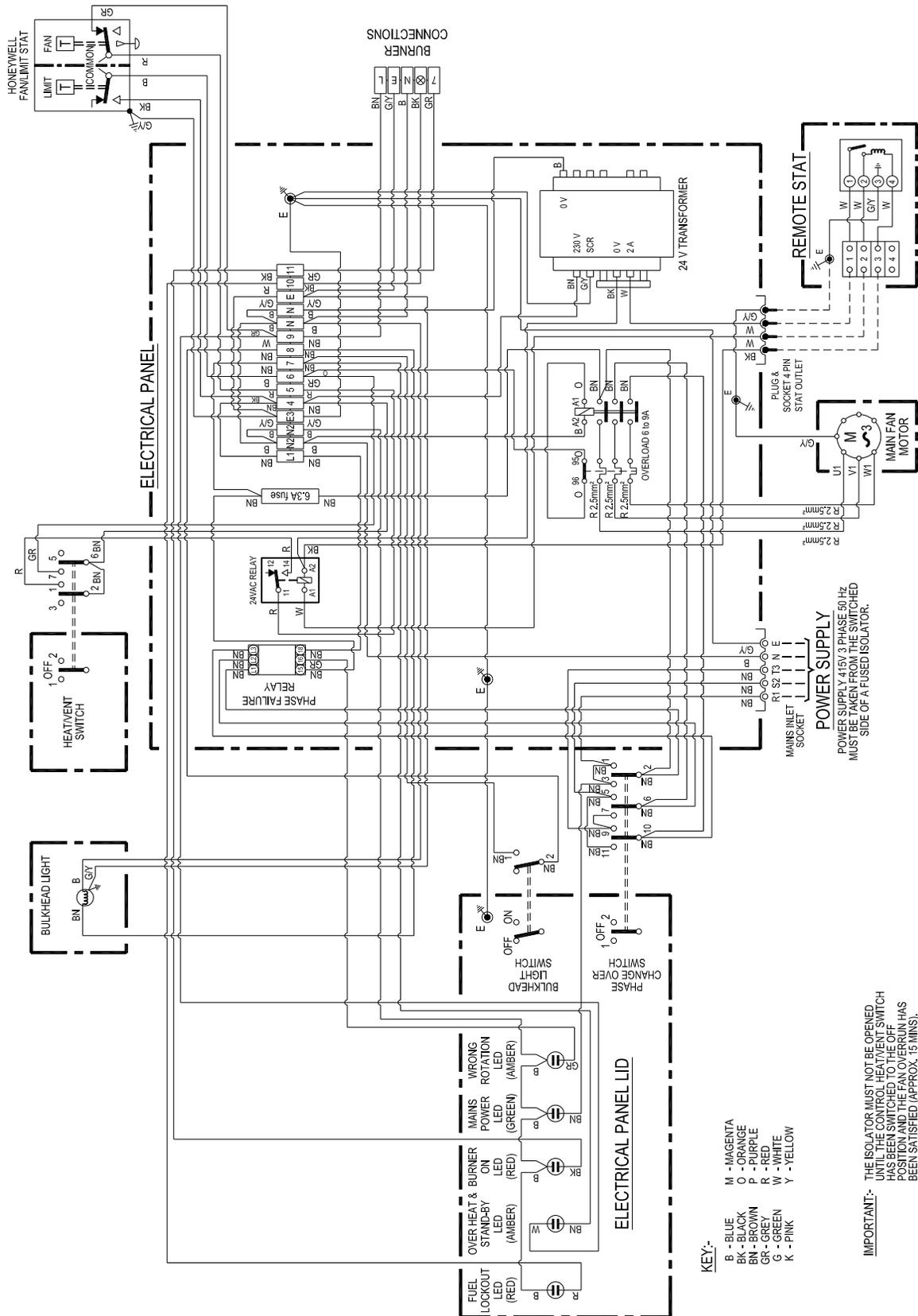
6.0 Fault Finding







7.0 Wiring Diagram 20-48-286RS



8.0 MH 150 TECHNICAL DATA

Heat Input (Nett)	kW	170.9
Heat output	kW	149.4
Nett efficiency	%	87.4
Fuel consumption	L/hr	17.2
Oil pressure	Psi	170
Burner type / control	Riello	R40 G20S On/Off
Nozzle specification	Danfoss	3.5 x 60 s
Fuel specification		35 Sec Gas oil
Fuel Capacity	Litres	520
Burner Air Setting	No	5
Burner Head Setting	No	3
CO	ppm	0
CO ²	%	12.5
O ²	%	4.5
Duct diameter	mm	4 X 300
Maximum duct length	m	50
Electrical supply	V/Hz/Ph	415/50/3
Running Current	Amps / ph	7.6
Start Current	Amps / ph	22
Power Consumption	W	3300
Max Running Hours	Hrs	30
IP Rating	IP	44
Air volume	M ³ /s	3.0
Static pressure	pa	450
Discharge velocity	M/s	11.5
Temperature rise	°C	40.6
Overheat thermostat setting	°C	100
Fan Overrun setting	°C	30
Noise level	DbA @ 3 m	76
Flue diameter	mm	200
Flue temp	°C	280
Weight	kg	1086
Height	mm	2438
Width	mm	870
Length	mm	2700
Heated Area	M ³	3700

9.0 Reference Information

Doc/Ref	Title/Subject
BS 5410 Part 1 ; 1977 and Part 2 ; 1978	Code of Practice for oil firing
BS EN 292 Parts 1 and 2; 1992	Safety of Machinery
BS EN 60204 Part 1; 1993	Safety of Machinery - Electrical
BS EN 60335 Part 1; 1988	Safety of Electrical Appliances
BS EN 55014 1993	Electromagnetic Compatibility
BS EN 50165 1997	Safety of Electrical Equipment
BS 5854 1980	Code of Practice - Flues/Flue Structures
BS 799 Part 5 ; 1987	Oil Burning Equipment - oil tanks
BS 715 1993	Metal Flue Pipes and Fittings
BS 5440 Part 1 ; 1990	Specification/Installation of Flues
BS 5440 Part 2 ; 1989	Ventilation Requirements Gas Appliances
BS 779 Part 2 ; 1991	Oil burning equipment - burners
ISO 228/1 See also BS 2779 and BS 5380)	Pipe Threads Seals and Couplings



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