

BENSON VNAG VDAG

A. G. CABINET HEATER

(NATURAL GAS FIRED)

**INSTALLATION COMMISSIONING
SERVICING
USER INSTRUCTIONS**

WARNING

IMPORTANT NOTICE TO INSTALLERS

Installers should satisfy themselves that the gas pipework installation is carried out in accordance with all current legislation, Codes of Practice and recommendations .

Additionally it may be necessary to protect the gas valves which form part of the heater or burner assembly from potential pipe contamination particularly, but not exclusively , where copper gas pipework is used.

In instances where copper pipework is to be used for all or part of a gas pipework installation, including short length final connections then we advise that installers consult with gas supplier or provider and satisfy themselves what additional precautions may be necessary

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Any reference made to Laws, Standards, Directives , Codes of Practice or other recommendations governing the application and installation of heating appliances and which may be referred to in Brochures, Specifications, Quotations, and Installation, Operation and Maintenance manuals is done so for information and guidance purposes only and should only be considered valid at the time of the publication. Benson Heating cannot be held responsible from any matters arising from the revision to or introduction of new Laws, Standards, Directives, Codes of Practice or other recommendations.

1.0 Compliance notices

The Benson AG range of ATMOSPHERIC GAS fired Cabinet Heaters detailed herewith are manufactured by Benson Heating within a strictly controlled quality environment within the parameters of ISO 9001.

The Benson AG range has been tested and assessed for compliance with the following European Directives.

Gas Appliance Directive (90/396/ EEC)
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 AG Cabinet 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 AG Cabinet Heater range subject to agreement with the notified body in 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.

NOTE

THE WARRANTY REGISTRATION CARD SUPPLIED WITH THE HEATER MUST BE COMPLETED AND RETURNED IN THE PRE-PAID ENVELOPE TO BENSON HEATING ON COMPLETION OF COMMISSIONING

Warranty claims made without this condition being fulfilled will not be processed

The Benson AG range of gas fired cabinet heaters conform to the following harmonised standards;

PrEN – 621

Requirements for non domestic gas fired forced convection air heaters for space heating without a fan to assist the transportation of combustion air and or combustion products.

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 - 1995

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.

Notified body Pin reference is 63AQ0533.

1.2 General product information

The Benson AG range of indirect gas fired forced convection heaters have an output range from 29.3kW to 102.6 kW, and are available in a configuration that will allow for floor mounting, only.

The AG Heaters 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 an atmospheric burner which has been test fired and pre-set prior to dispatch. The safety functions of the burner are by way of the Honeywell gas control valve.

Note

Neither asbestos nor soft soldered joints are used in the construction or manufacture of the Benson range of Cabinet 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 gas service to the appliance carries the correct gas type and that the supply pressures in accordance with the supply type and pressure stated on the 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.

(See sections 3 and 9).

Prior to installation the following points should be considered;

- a) The position of the heater for the optimum efficient distribution and circulation of warm air
- b) The position of the heater relative to the route of the flue
- c) The position of the heater relative to the supply of gas
- d) The position of the heater relative to the electrical services, and if appropriate, any additional controls.
- e) The position of the heater relative to the supply of fresh air
- f) The height if applicable at which the heater is to be mounted and potential stratification / circulation problems.
- g) The position of the heater relative to service and maintenance requirements

Caution

The heater **must not** be installed within an area where the conditions are unsuitable, e.g. where the atmosphere is highly corrosive, has a high degree of salinity, or 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, overhead cranes etc.

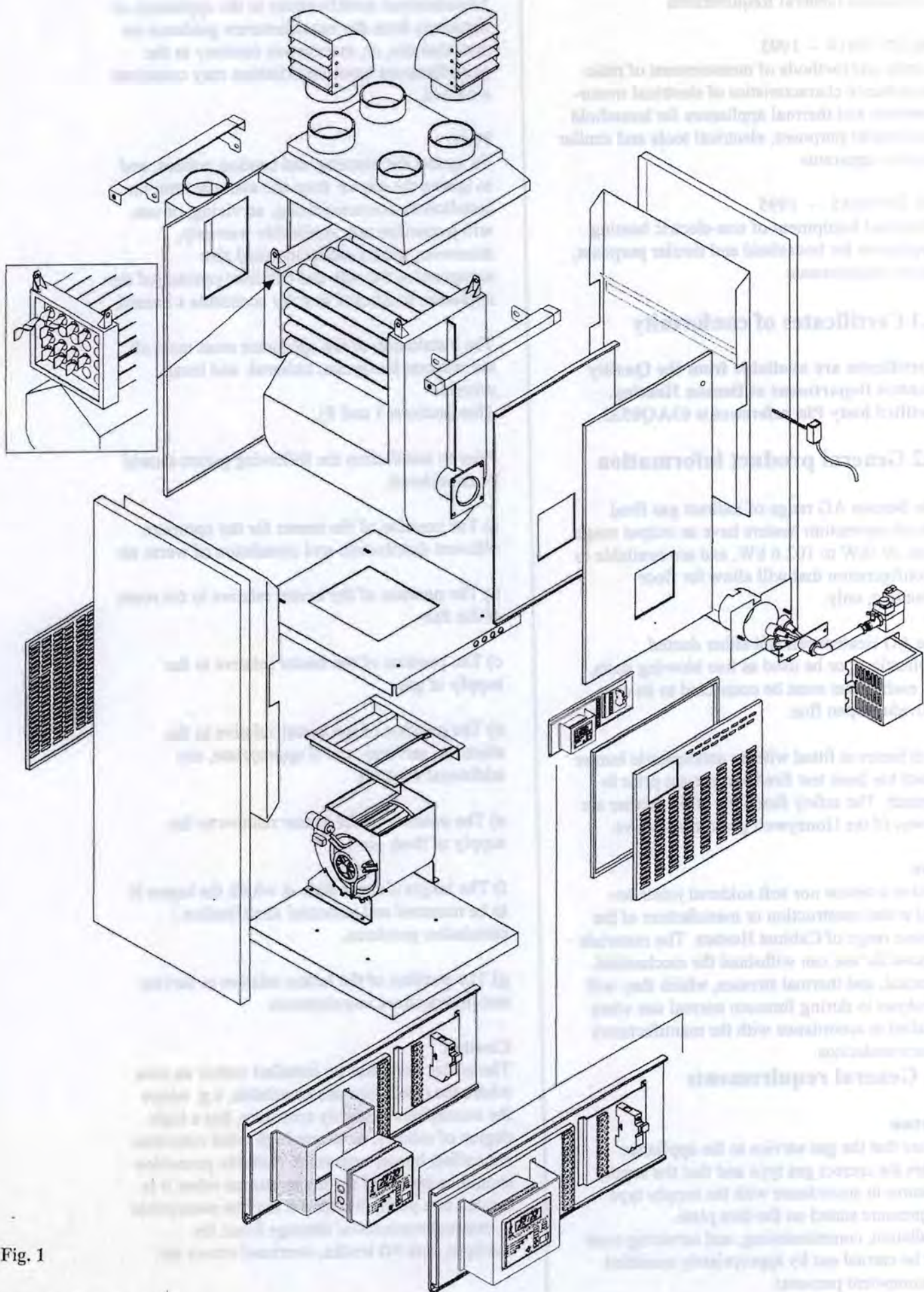


Fig. 1

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 gas 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 01547-528534. 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
- (5) Installers name and address.

Faulty parts must be returned to the Knighton Spares Department, the address of which is provided on the 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 Cabinet 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. Nor should the heater be positioned where the burner could be adversely affected by high winds or draughts. The location chosen for the heater must allow for the fitting of an effective flue system. The location must also allow for adequate clearance for the air supply, return air circulation, gas supply, electrical supply, whilst also providing good and safe working access.

The heater must be installed on a flat and level surface made from non-combustible material, which is sufficiently robust to withstand the weight of the heater and any ancillary equipment. 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. In areas where it is proposed that more than one heater is to be installed, a general scheme of circulation should be drawn up and maintained, thereby offering the best heat distribution.

2.1 Gas supply - general

The Benson AG range of gas fired cabinet heaters are all manufactured and pre-set for use with natural gas classified under the following categories, based upon the destination of the heater I_{2H}

The heater must be compatible with the gas supply, and each heater must be installed with a separate approved isolating gas cock positioned adjacent to and upstream of the union between the service pipe and the heater. The gas supplier should have been contacted to confirm that the supply feed (pipe work and metering) is capable of delivering the required dynamic volume of gas, thereby ensuring that the minimum burner pressure can be achieved. Consideration should have also been given to the pressure drop on single and multiple heater installations, and the affect that such installations will have upon other plant sharing the gas supply. If it is necessary to fit a gas booster, the controls must include a low pressure cut-off switch which must be fitted on the supply side of the booster. It is also a requirement that the gas supplier is contacted prior to the fitting of the unit

Reference to the Institute of Gas Engineers publication UP-1 and UP-2 together with BS6891 is strongly advised.

Service and Installation pipe work must be of a diameter equal to or greater than the inlet connection on the heater, all joints must be sealed using an approved sealing compound, and the system purged and tested for soundness.

2.2 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.

The position of the isolation switch must be such that it is adjacent to the heater and easily accessible at all times. In addition, the isolator itself must have a contact separation of not less than 3mm as per BS5991 clause 20.2.

The Control Fuse ratings are detailed on the appliance data plate.

Warning

Ensure that electrical and gas 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 cabinet 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

2.3 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.

The criteria necessary for establishing the minimum size of natural vents is detailed as follows;

Position of vent Area of vent direct to Outside

INLET	
Low level (<60kW)	9.0cm ² per kW
Low level (>60kW)	540cm ² + 4.5cm ² per kW of rated input per heater
OUTLET	
High level (<60kW)	4.5cm ² per kW
High level(>60kW)	270cm ² + 2.25cm ² per kW of rated input per heater

Where mechanical ventilation is used it is a requirement that the inlet is of the mechanical type, and the outlet is either mechanical or natural.

Caution

Systems of ventilation that employ mechanical extraction and natural inlet must not be used. Furthermore, where the air supply is by way of a mechanical means the inlet must be positioned at low level and be capable of providing a minimum throughput as detailed in section 8 of this manual.

The natural extraction air vents must have a minimum area as per above, and it is strongly recommended that natural extraction vents are situated at high level. Additionally, an automatic control interlocked to the burner must be fitted to ensure burner shutdown in the event of airflow failure or restriction.

If the heater is to be installed within its own separate building or plant room, the above details do still apply as does the requirement for minimum space.

2.4 Minimum space requirements

The minimum space requirements for single and multiple heater applications are detailed in section 3.3 later within this manual

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.

Where the heater is installed within a compartment or plant room the return air and discharge air arrangement must be such that the air circulation fan does not interfere with the operation of the flue.

The return air intake and warm air outlet should therefore be fully ducted to and from the heater, respectively, within the compartment or plant room.

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 of the plant room, through which the ductwork passes must be of fire resistant material and constructed to prevent the likelihood of any fire from spreading.

On 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.

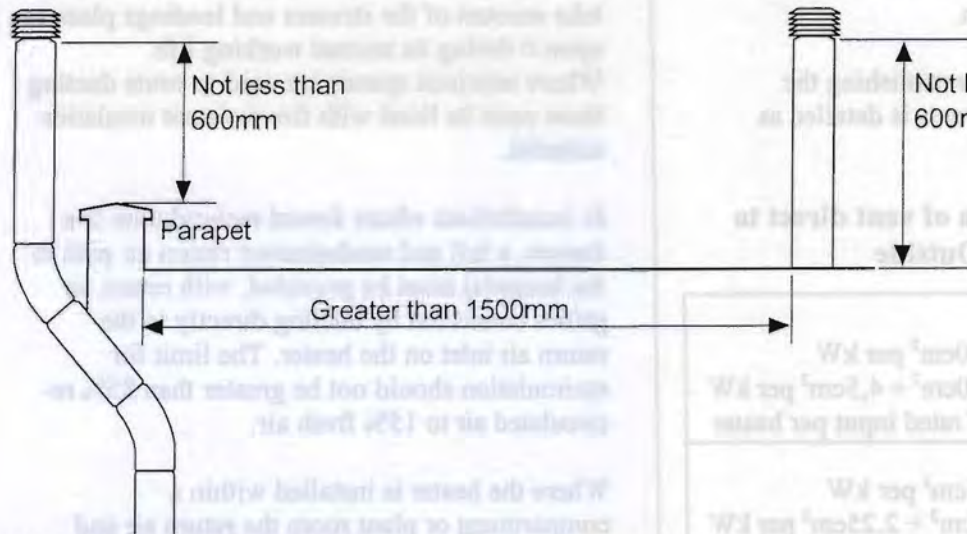


Fig. 2 Flat roof, with parapet

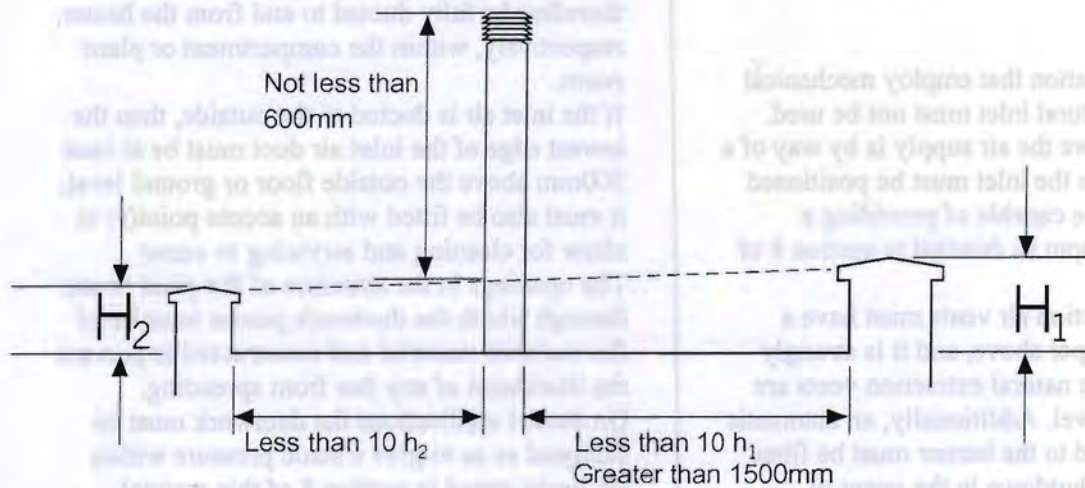


Fig. 3 Flat roof, envelope method

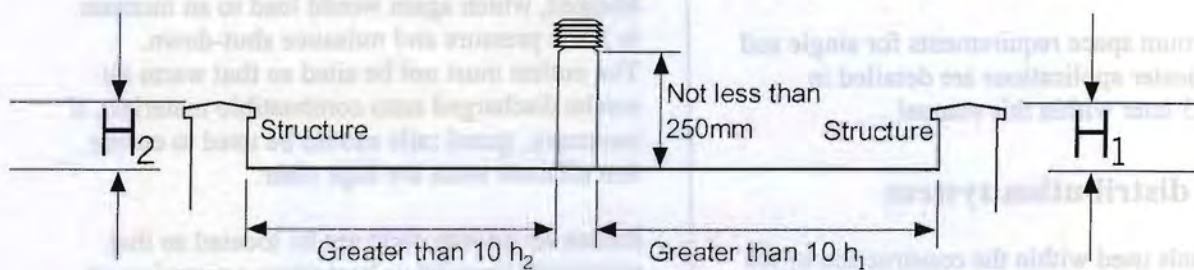


Fig 4 Flat roof where the flue height is more than 10 Heights (H) away from all structures

OUTLET	INLET
Low level (<40kW)	High level (>40kW)
240cm ² = 4.2cm ² per kW	370cm ² = 2.25cm ² per kW
9.0cm ² per kW	4.5cm ² per kW

When mechanical ventilation is used it is a requirement that the inlet is of the mechanical type and the outlet is either mechanical or natural.

Systems of ventilation that employ mechanical exhaust and natural inlet must not be used. Furthermore, where the air supply is by way of a mechanical means the inlet must be positioned at low level and be capable of providing a minimum throughput of 10 litres per second. The natural exhaust system must have a minimum area at high level of 10 litres per second. It is recommended that natural extraction vents are situated at high level. Additionally, all central installed in the heater must be closed to prevent shut-down in the event of a failure of the heater.

If the heater is to be installed within its own separate building or plant room, the above details still apply as does the requirement for minimum space requirements.

2.4 Minimum space requirements

The minimum space requirements for single and multiple heater applications are detailed in section 2.5.

2.5 Air distribution

All materials used within the room must not impede delivery and return air ducts must not impede a free flow of air.

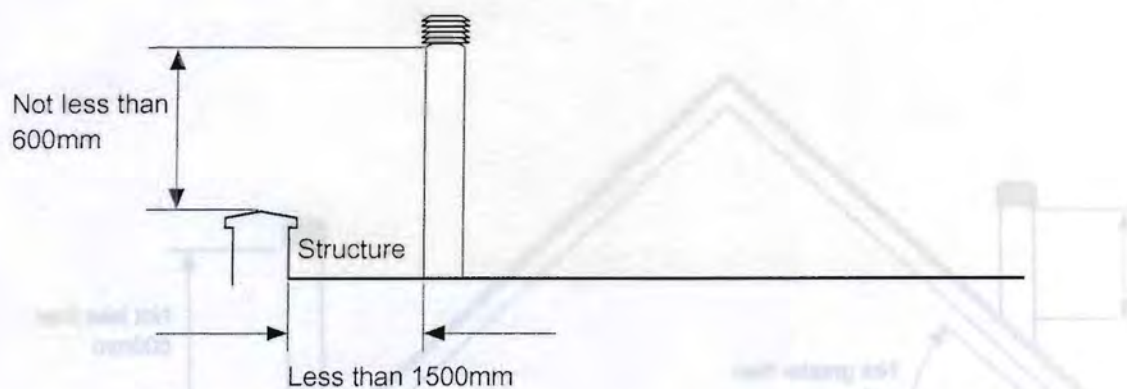


Fig 5 Flat roof with flue close to parapet

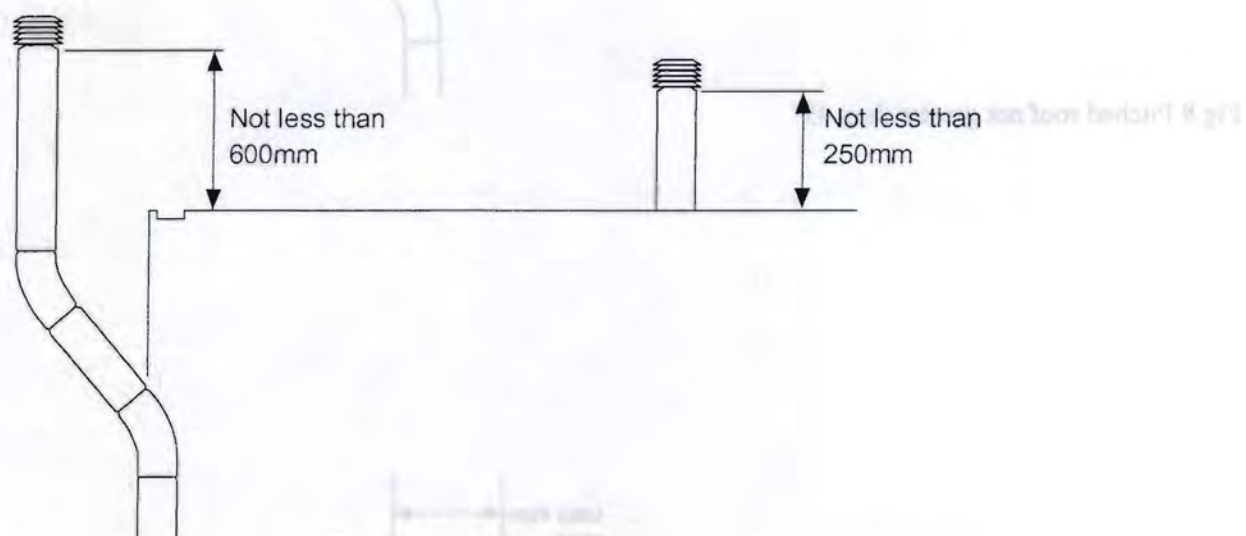


Fig 6 Flat roof with no parapet

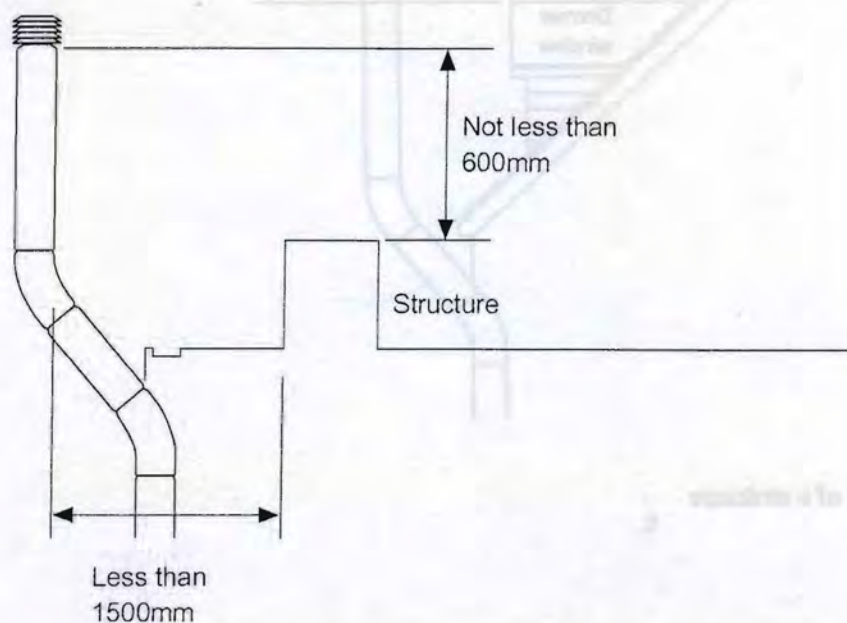


Fig 7 Flat roof with structure close to flue outlet

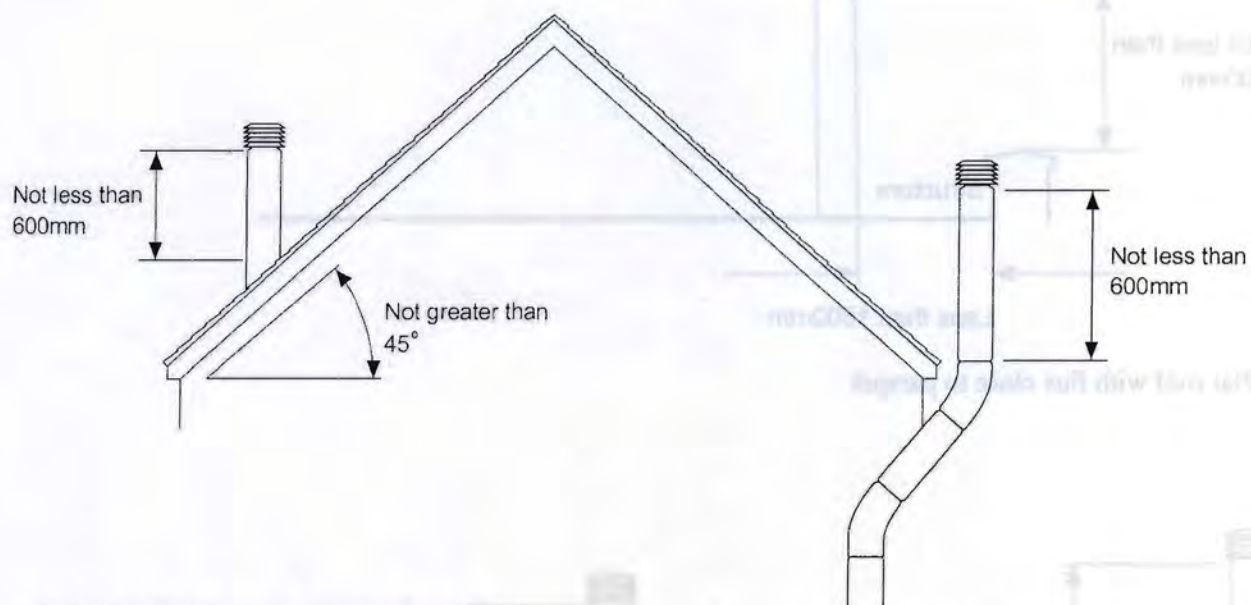


Fig 8 Pitched roof not greater than 45°

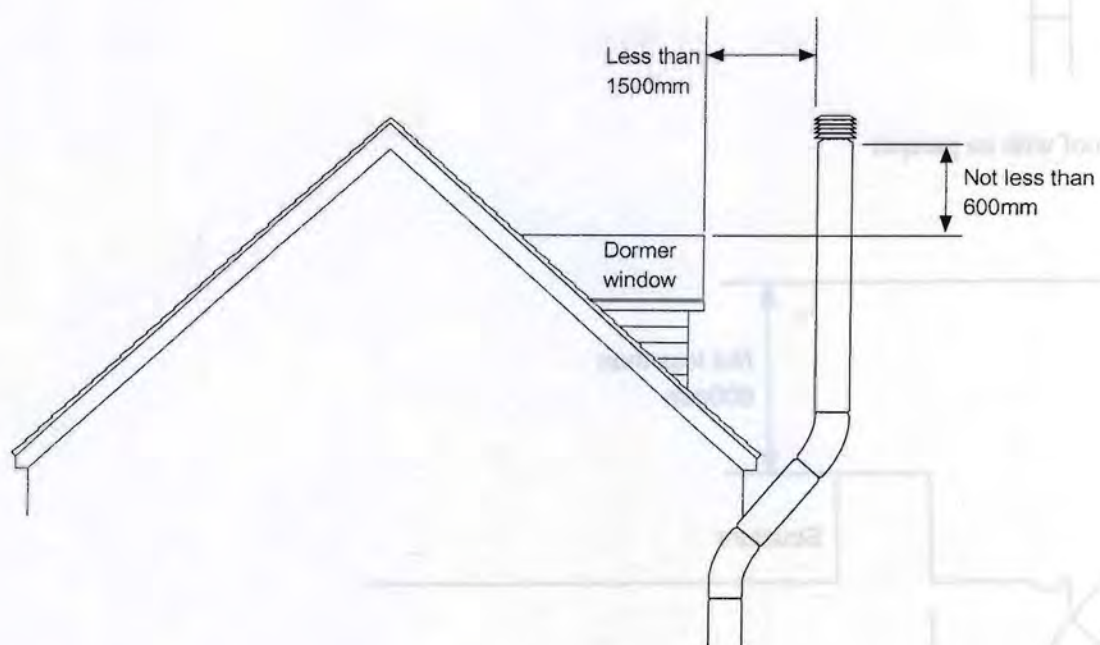


Fig 9 Pitched roof within 1.5m of a structure

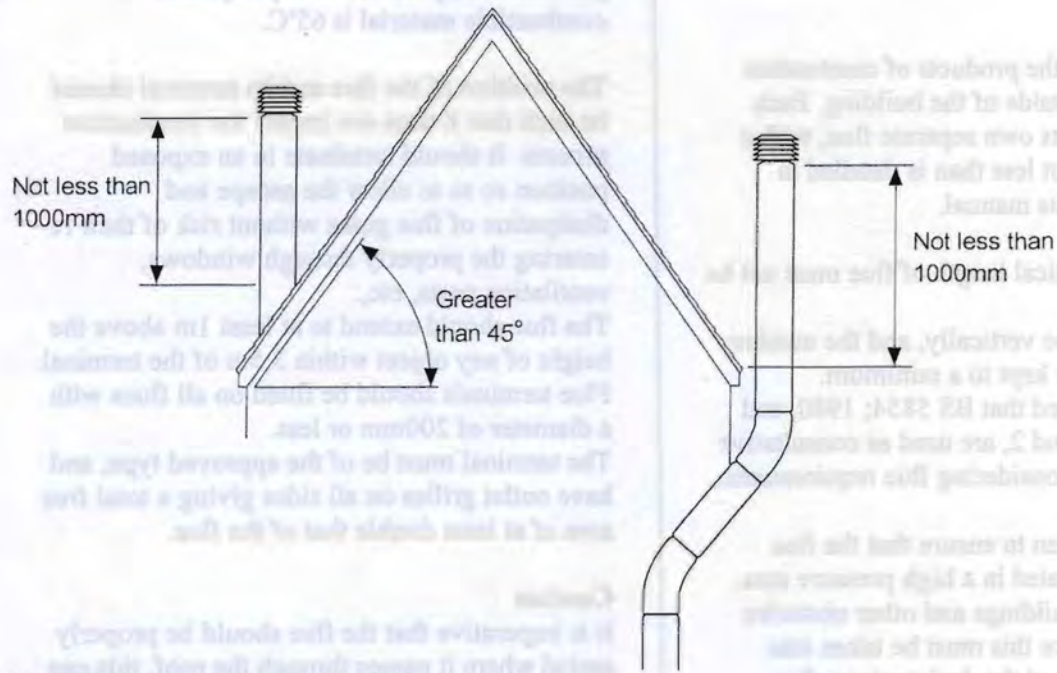


Fig 10 Pitched roof exceeding 45°

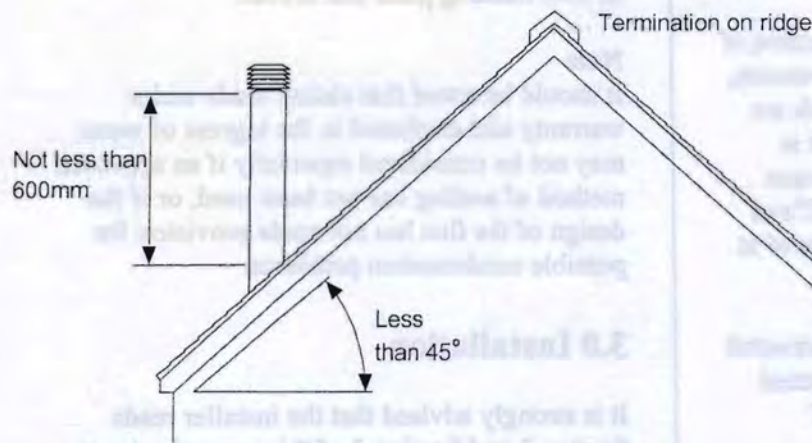


Fig 11 Pitched roof internal route not exceeding 45° and ridge terminal

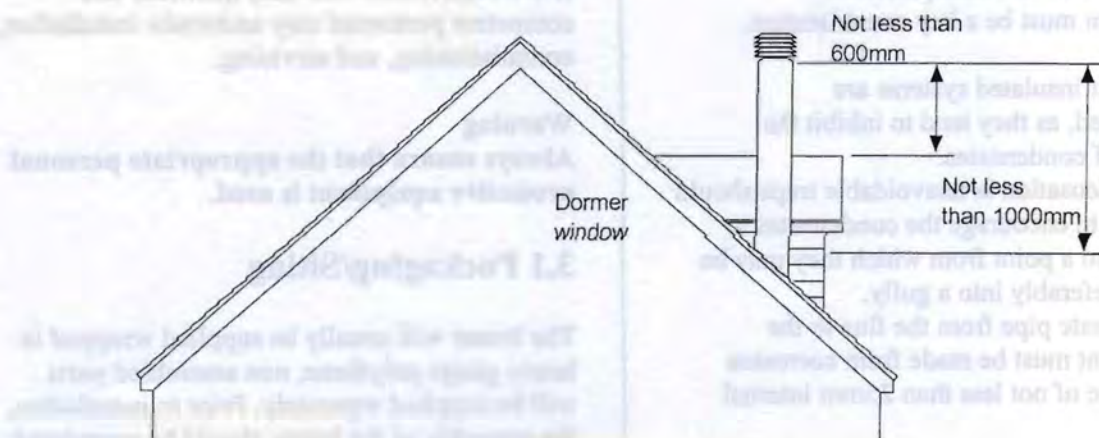


Fig 12 Pitched roof chimney within 1.5m from Dormer window

2.6 Flue system

Warning

It is essential that the products of combustion are flued to the outside of the building. 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 3m.

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, preferably at the design stage. See figures 2-12.

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. If it is unavoidable to use a horizontal run this must rise away from the appliance by at least 2° and be followed immediately by a vertical rise of at least twice that of the horizontal run.

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.

Caution

It is imperative that the flue should be properly sealed where it passes through the roof, this can best be achieved by using the approved method of roof flashing plate and cravat.

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

It is strongly advised that the installer reads Section 2 and Section 3 of this manual prior to starting any installation work.

It is a requirement that only qualified and competent personnel may undertake installation, commissioning, and servicing.

Warning

Always ensure that the appropriate personal protective equipment is used.

3.1 Packaging/Siting

The heater will usually be supplied wrapped in heavy gauge polythene, non assembled parts will be supplied separately. Prior to installation, the assembly of the heater should be completed, it is advisable that this is undertaken in the area where the heater is scheduled to be sited.

Caution

It is strongly advised that when positioning the heater the lifting eyes are used, thereby reducing the risk of inadvertent damage being occasioned to the heater.

3.2 Flooring

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

3.3 Minimum clearances

The following minimum clearances (in millimeters) must be observed when installing the heater.

Model	Front	Rear	Lhs	Rhs
100 150	600	800	150	150
200 250	700	1,000	150	150
300 350	700	1,100	150	150

3.4 Assembly

The following sub-assembly parts should be assembled to allow installation to continue.

Place Nozzle Base plate onto the top of the heater, align holes, and secure.

Fit the nozzles to the spigots, turning the nozzles to give the required approximate direction for air flow.

Adjust louvres to give the desired angle of warm air down flow

Secure nozzles to spigots, when correctly positioned, by means of drilling and inserting self tapping screws.

3.5 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, see also figs 2-12.

Where condensation is likely to be a problem provision should be made preferably at the design stage (see section 2.5).

3.6 Gas Installation/connection

Service pipe work must terminate at an approved gas cock, and be adjacent to the position of the heater.

The connection to the heater can be made by way of either an approved flexible coupling, or rigid connection. Threaded connections must comply with ISO288/1 of ISO 7/1, further information concerning the accepted practice in European countries is detailed in the June 1995 version of prEN 1020 annex A7 The diameter of the pipe work from the cock to the burner connection must not be less than the diameter of the burner connection inlet. (see section 8) The installation must be purged and tested for soundness prior to commissioning.

3.7 Electrical Installation/connection

Benson AG cabinet heaters are available either for 415V 50Hz 3PH or 230V 50Hz 1PH supplies depending upon the model specified. 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.

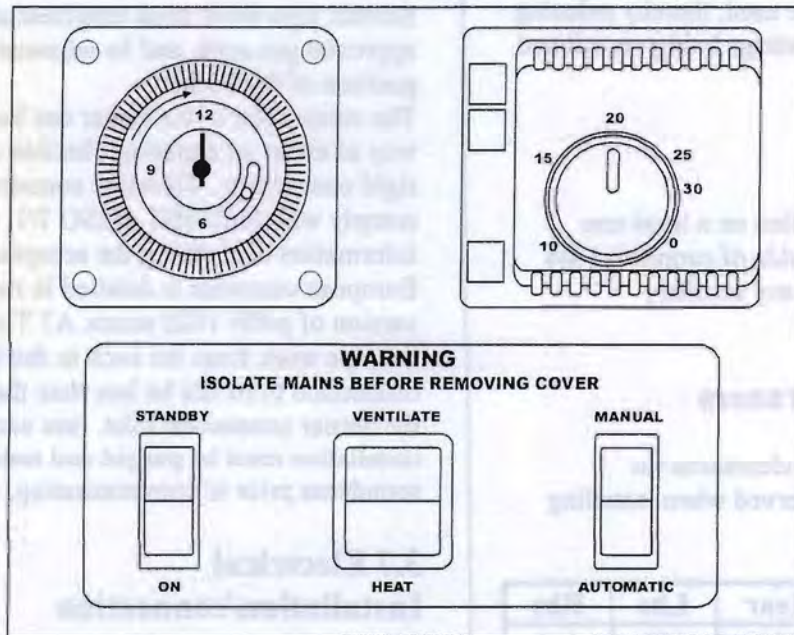


Fig 13 Control Panel

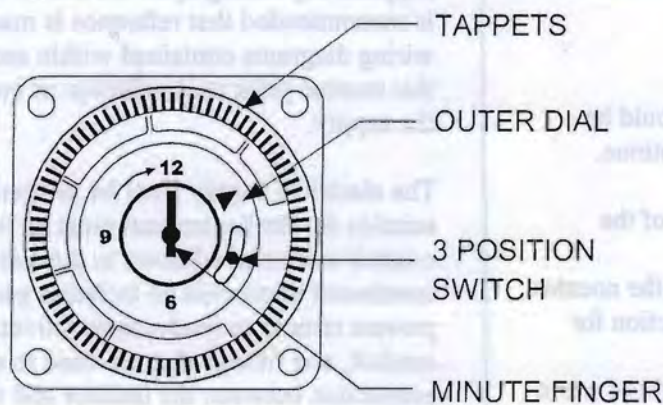


Fig 14 Time Clock

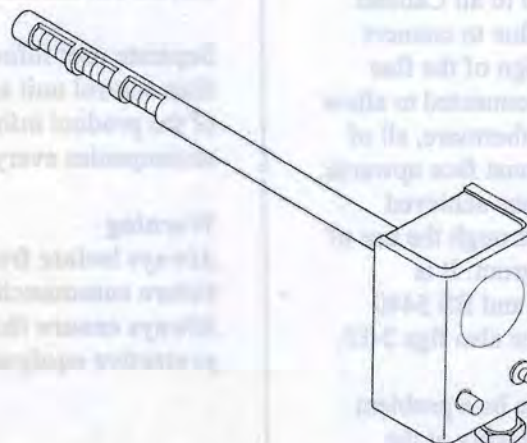


Fig 15 Fan and Limit Stat

3.8 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.

3.9 Warm Air Registers

In order that vertical temperature gradients are minimal thereby providing a more even heat distribution, it is preferable to install warm air registers at low wall levels or at floor level, with the size, number, and position commensurate with the requirement of the application.

To minimise noise levels the registers should be set away from corners, additionally, a good seal between the register frame and the wall is important, particularly on high level positions, if unsightly staining through warm air/particulate deposition is to be avoided.

3.10 Heater Control Installation

Warning

Isolate heater from mains before undertaking any electrical work.

All AG Cabinet Heaters are manufactured with the following controls pre-wired and installed. See figures 13 and 14.

- (a) On/Standby switch
- (b) Ventilation/heat switch (summer/winter switch)
- (c) Manual/automatic switch
- (d) Thermostat
- (e) Time clock
- (f) Frost stat

All of the above controls are located on a removable panel which when separated from the heater can be re-positioned so as to offer a remote facility. However, to facilitate this, it is necessary to order and fit an electrical panel cover and front panel blanking plate to the heater in place of the control unit.

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.

Warning

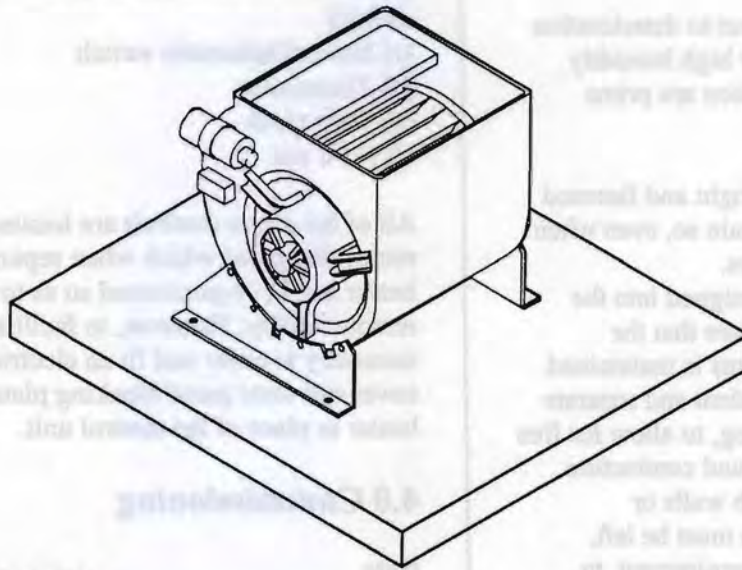
All Cabinet Heaters undergo a rigorous test programme prior to being dispatched, whilst such a programme does involve pre-commissioning and setting up the heater to operate efficiently and well within its designed operational limits, this does not mean that on site commissioning is less important than 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 $\pm 0.1\%$ and maintained so that it is regularly calibrated.

Fig 16 Fan and Motor Assembly



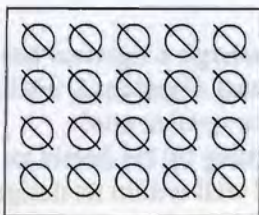
AG 100 / 150 28-09-001

AG 200 / 250 28-09-002

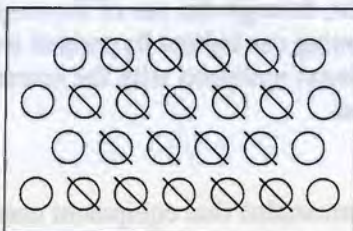
AG 300 / 350 28-09-050

Fig 18 Spiral positions for Atmospheric range

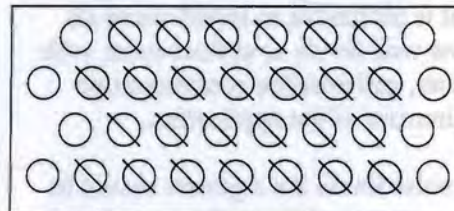
AG100/150



AG200/250



AG300/350



4.1 Commissioning - Pretest

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

- (a) Ensure that the electrical supply is turned off.
- (b) Ensure that the gas 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.
- (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	- 60oC
Overheat limit	- 100oC
Fan off	- 30oC

Also check that the white button (**automatic**) is pulled outward and that the red button (**reset**) is pushed inwards to the reset position. See fig 15.

(l) Remove lower panel and check motor and fan drive system for integrity of joints, check pulley alignment, fan rotation, and belt tension (see section 5.2 and figs 16).

(m) Ensure that the burner is securely attached to the heater.

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

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

On/Standby	- 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.

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

(q) Set room thermostat and time clock to 'demand' positions.

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 gas supply is turned off.
- (c) Select the following switch settings on the heater

On/Standby	- Standby
Heat/Ventilation	- Heat
Manual/Automatic	- Automatic

(d) Connect manometers to the test points on the gas control valve.

(e) Set the room thermostat to its highest setting the time clock to ON and ensure that heat is being demanded.

(f) Open Main Gas valve

(g) Depress the Pilot valve button, whilst pushing the piezo igniter to light the pilot.

(h) Continue to hold in the pilot valve until flame detection via the thermocouple is established

Warning

If pilot fails to become established after 1 Minute wait at least 3 Minutes before attempting to re light the pilot ignition When flame detection is established continue as follows.

(i) Turn on main electrical supply.

(j) Set heater control ON / STANDBY switch to ON,

(k) The main gas valve will open allowing burner ignition to occur.

l) Check the fan start is within two minutes of burner ignition.

Caution

If the fan fails to operate within two minutes of burner ignition and the heater goes to overheat the main gas valve will be automatically shut down. The reason for the overheat situation must be ascertained and remedial action taken before manually resetting the lockout on the fan and limit stat in readiness for an attempted re-ignition.

(m) When the heater has fired for at least ten minutes check that the thermostat is operating correctly by reducing its setting to the lowest value, and then ensuring that the burner shuts down when the demand for heat is no longer present.

(n) Reset the thermostat to the required setting ensuring that the burner re-fires when heat is demanded..

(o) Reset the time clock to a minimum off period, checking that the burner shuts down, and then re-lights once the minimum off period has elapsed. (Separate time clock information is contained within the information package supplied with the heater.

(p) 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, i.e., fan on 60oC, fan off 30oC, limit 100oC.

(ii) Check that the position of the unit is correct, i.e., 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

(q) Check manometer gas pressure readings adjust as required, referring to the additional supplier information within section B .

(r) After any adjustment check the adjustment screw for soundness.

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

Record mains gas, and burner head pressure, ambient temperature, barometric pressure, and complete percentage efficiency calculation using the formula detailed in section 8.

Caution

All Cabinet 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.

(t) Check flame failure circuit by loosening the connection between the thermocouple and the overheat limit control to the main gas valve. The burner should be extinguished, always re-tighten after checking.

(u) 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 Benson Heating Service Department immediately after the satisfactory completion of commissioning, failure to do so can invalidate any subsequent warranty claim.

(v) 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 labeling.
- (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.

(d) Section C 'User Instructions' should be left with the customer upon satisfactory completion of the commissioning and hand-over.

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 gas and electric supplies to it turned off at the gas cock 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: room thermostat, time clock, frost thermostat, sequential controller, and 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 gas control valve 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 programme is adopted by the user.

Quarterly Inspection

- (a) Visual inspection of the burner
- (b) Clean and check thermocouple
- (c) Check overheat safety is operational

Bi-Annual Inspection

- (a) As per quarterly inspection, plus...
- (b) Combustion check
- (c) Gas control valve

Annual Inspection

- (a) As per half year inspection, plus...
- (b) Heat exchanger and cleaning
- (c) Electrical connections
- (d) Main fan motor
- (e) Main fan assembly
- (f) Pulleys
- (g) Fan belts
- (h) Gas supply
- (i) Air delivery system
- (j) Flue
- (k) 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 are used to facilitate this.

Access to the heat exchanger is gained through the removal of the rear upper 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 the spirals and 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.

Gas Supply

The gas supply pipe work and fittings should be inspected to ensure they are free from corrosion and that where brackets have been fitted these remain secure and offer adequate support. The system should be soundness tested in accordance with Institute of Gas Engineers recommendations detailed in Utilization Procedures IGE/ UP-1 and 2

Note

It is most important that the burner is serviced regularly and in accordance with the manufacturers instructions.

Air Delivery System

A visual inspection should be undertaken to ensure that the air delivery system is in good order, that it remains adequately supported and that the various joints are effectively sealed.

Report

A full and detailed service report should be prepared, it is advised that the report is not completed until the heater has been re-commissioned, where upon the completed report can then be run through with the user.

5.3 Service Re-commissioning

The heater should be re-commissioned as follows, as per section 4.1 through to section 4.4 inclusive.

This must be regarded as a necessary part of the heater service by the servicing engineer.

6.0 Fault Diagnosis

Fig 18

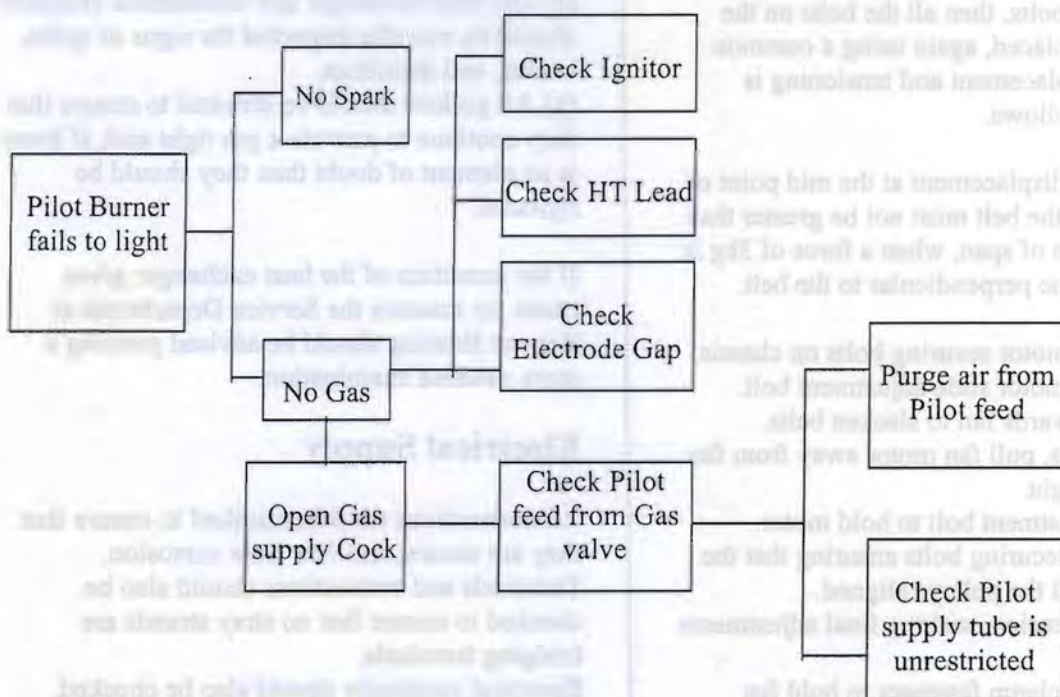


Fig 19

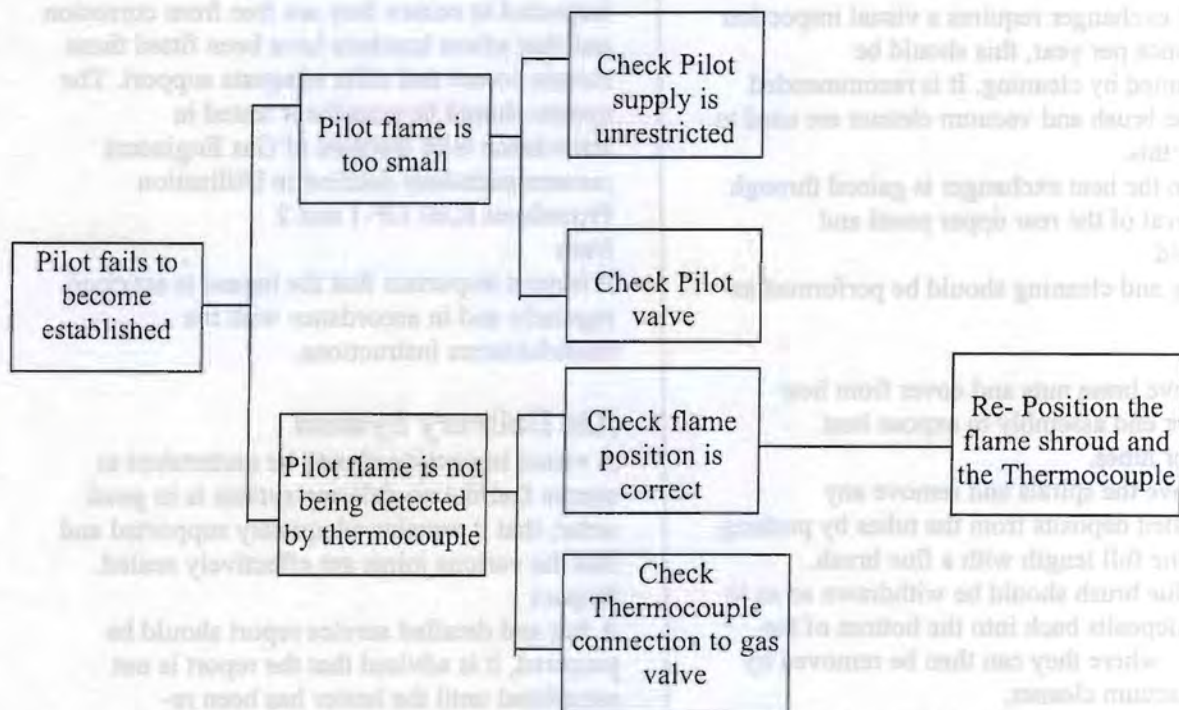


Fig 20

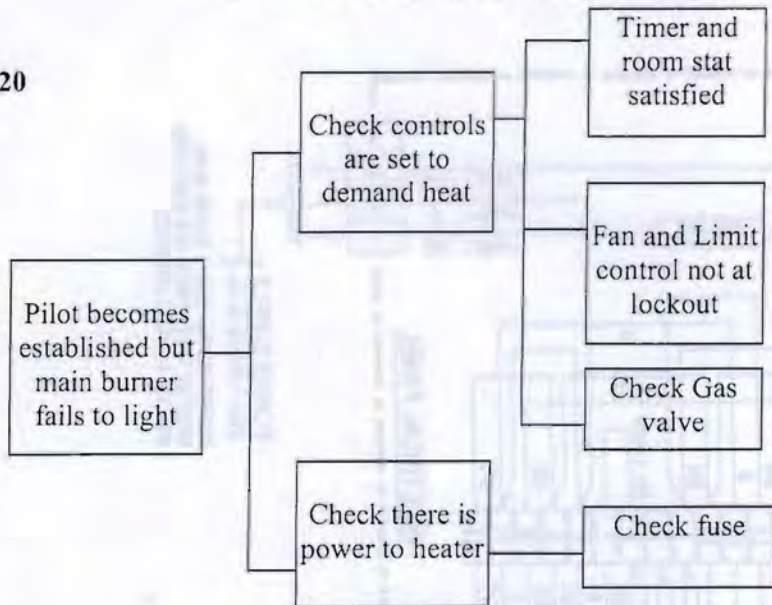
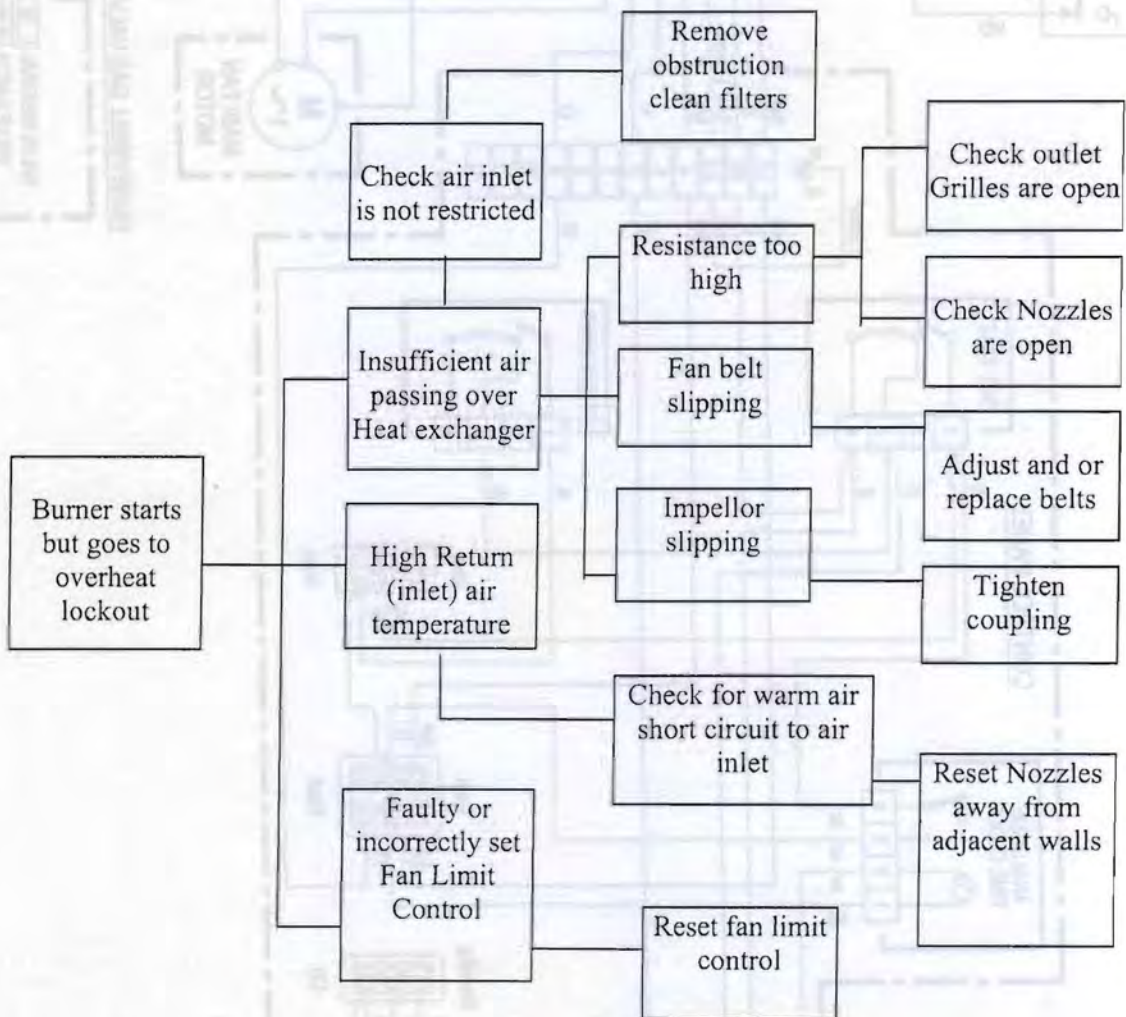


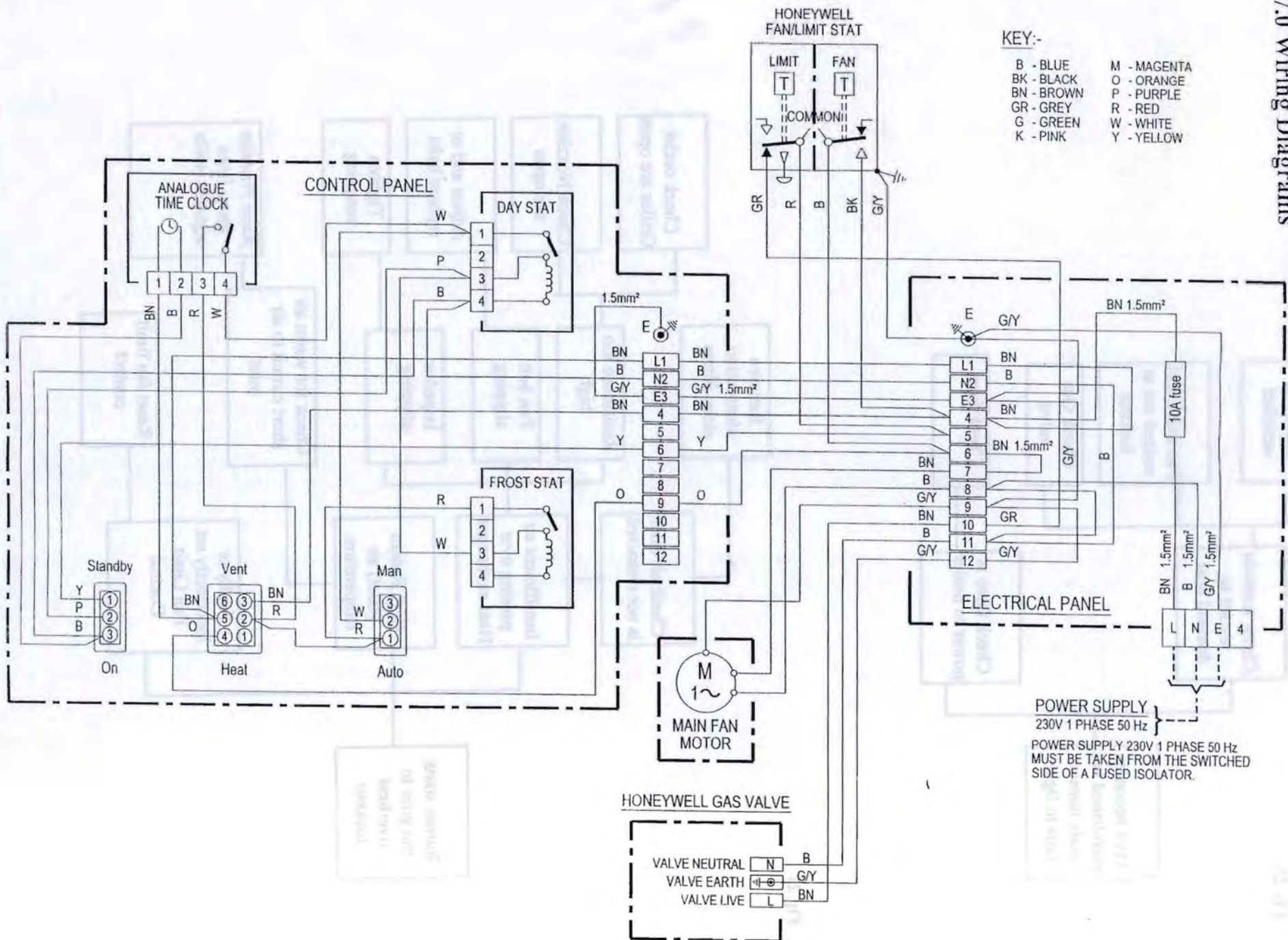
Fig 21



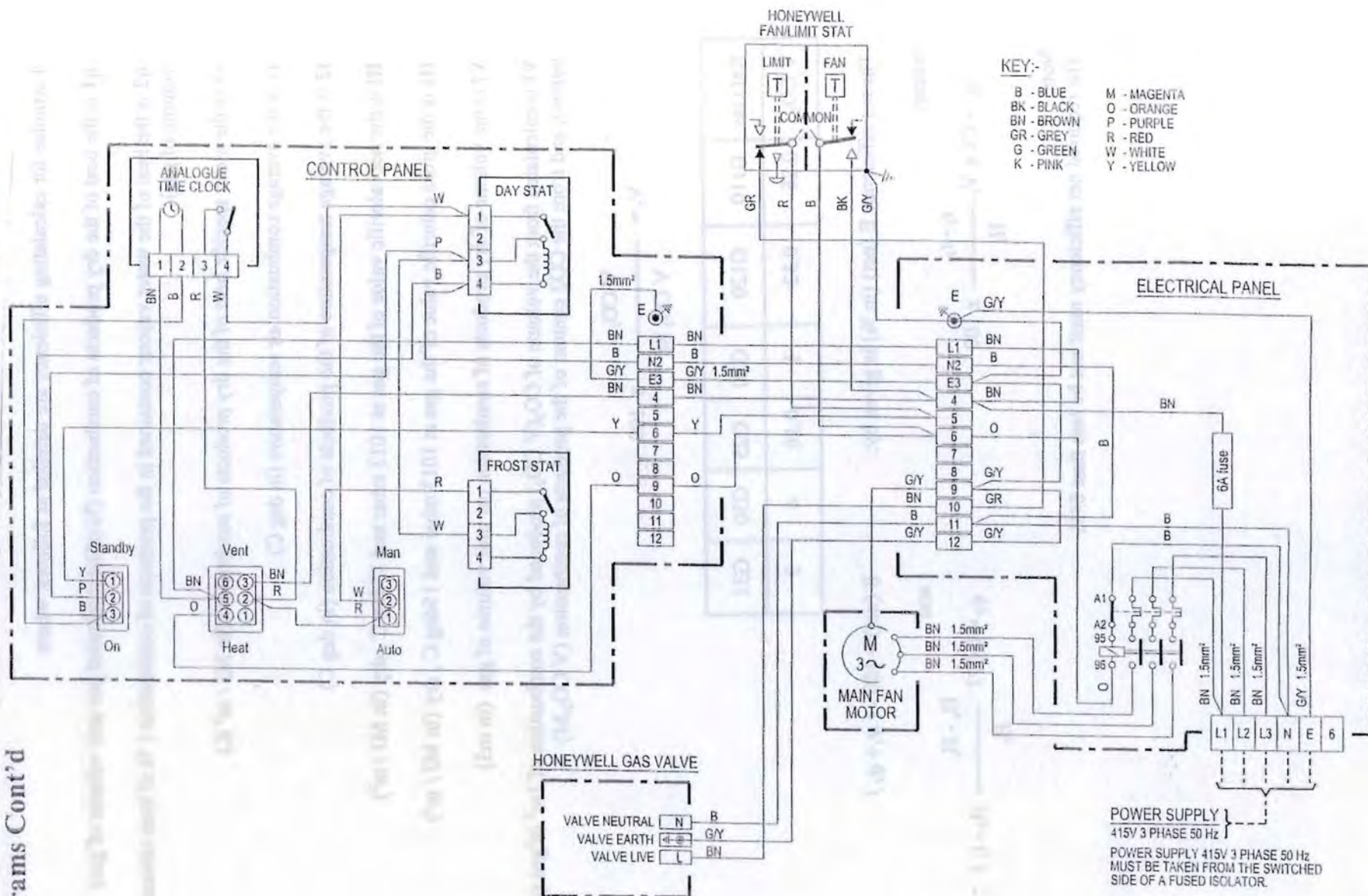
7.0 Wiring Diagrams

KEY:-

B - BLUE	M - MAGENTA
BK - BLACK	O - ORANGE
BN - BROWN	P - PURPLE
GR - GREY	R - RED
G - GREEN	W - WHITE
K - PINK	Y - YELLOW



7.0 Wiring diagrams Cont'd



MODELS AG200 / 350 Atmospheric Gas ON / OFF 415V 3ph 50Hz

8.0 Technical Data

Formulae for calculating efficiency are detailed as follows: where

q₁ is the heat of the dry products of combustion (% of heat released per unit volume of gas)

q₂ is the heat of the water vapour contained in the products of combustion (% of heat released per unit volume of gas)

c₁ is the mean specific heat of the dry products of combustion (in MJ / m³ K)

t₁ is the average combustion air temperature (in deg C)

t₂ is the average temperature of the products of combustion (in deg C)

H_i is the net calorific value of the gas at 1013 mbar and 15deg C , dry (in MJ / m³)

H_s is the gross calorific value of the gas at 1013 mbar and 15deg C , dry (in MJ / m³)

V_f is the volume of dry products of combustion per unit volume of gas (in m³)

V_f is calculated from the volume of CO₂(V CO₂) produced by the combustion of 1m³ of gas (see table below), and from the CO₂ content of the products of combustion (V CO₂,M)

$$V_f = \frac{V_{CO_2}}{V_{CO_2} M} \times 100$$

Ref Gas	G110	G120	G20	G25	G30	G31
V CO ₂	0.26	0.32	1	0.86	4	3

The net efficiency E (net) (in %) is given by:

$$E(\text{net}) = 100 - (q_1 + q_2)$$

where

$$q_1 = C_1 \times V_f \times \frac{t_2 - t_1}{H_i} \times 100$$

and

$$q_2 = 0.077 \times \frac{H_s - H_i}{H_i} (t_2 - t_1)$$

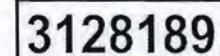
Note

The required net efficiency must not be less than 84%

8.1 Atmospheric Gas Heater Technical Data

MODEL		100	150	200	250	300	350
HEAT OUTPUT	Kw	29.3	43.0	60.5	72.0	88.0	102.6
	Btu/hr	100,000	146,700	206,000	245,700	300,000	350,000
HEAT INPUT (GROSS)	Kw	37.2	55.5	77.3	92.9	111.4	130.7
	Btu/hr	126,900	189,300	263,750	317,000	380,000	445,860
BURNER PRESSURE	Mbar	15.1	12.0	13.3	13.0	15.0	14.6
	Ins WG	6.04	4.8	5.3	5.2	6	5.8
MINIMUM GAS INLET PRESSURE	Mbar	17.5	17.5	17.5	17.5	17.5	17.5
	Ins WG	7	7	7	7	7	7
CONSUMPTION NATURAL GAS	Ft ³ /hr	122	184	255	312	369	428
	M ³ /hr	3.5	5.2	7.2	8.8	10.4	12.1
TEMPERATURE RISE	Deg C	39	49.2	47.8	42.1	36.3	42.3
	Deg F	102	120	118	107	97	108
AIR DELIVERY	M ³ /sec	0.61	0.71	1.03	1.39	1.97	1.97
	Ft ³ /min	1300	1500	2180	2950	4170	4170
AIR THROW	Ft	45	45	55	55	55	55
	Mtrs	14	14	17.1	17.1	17.1	17.1
AVAILABLE OUTLET PRESS	Pa	63	63	75	100	125	125
	Ins WG	0.25	0.25	0.3	0.4	0.5	0.5
NOZZLE DISCHARGE VELOCITY	M/sec	5.73	4.53	6.57	5.91	5.19	5.19
	Ft/min	1124	888	1288	1159	1018	1018
SOUND LEVEL	DbA	64	66	72	72	78	78
GAS CONNECTION		RC3/4	RC3/4	RC3/4	RC3/4	RC3/4	RC3/4
MAIN INJECTOR SIZE AMOUNT	Mm	3.5	3.5	3.5	3.5	3.5	3.5
	No Off	2	3	4	5	6	7
FLUE DIAMETER	Mm	150	150	200	200	250	250
ELECTRICITY SUPPLY	Standard	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
RATED INPUT	Kw	0.335	0.335	0.99	0.99	1.5	1.5
FUSED ISOLATOR SIZE	Amps	16	16	20	20	25	25
RUNNING CURRENT	Amps	3.2	5.1	7.2	7.2	9.0	9.0
MIN FREE VENTILATION AREA FOR COMBUSTION	cm ²	968	1080	1194	1339	1484	1730
	m ²	150	168	185	208	230	268
WEIGHT	Kg	194	194	380	380	445	458
AIR NOZZLE SIZE	Ins	9.4	9.4	9.4	9.4	11	11
	mm	240	240	240	240	280	280
NOZZLE AMOUNT		2	2	2	3	3	4
FLUE RESISTANCE	Max mbar	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2
	Min mbar	0.4	0.4	0.4	0.4	0.4	0.4
FLUE TEMPERATURE (GROSS)	@ 20°C Ambient	220	240	190	210	180	210

B - BLUE
BK - BLACK
BN - BROWN
GR - GREY
G - GREEN
K - PINK
M - MAGENTA
O - ORANGE
P - PURPLE
R - RED
W - WHITE
Y - YELLOW



ON/OFF
GAS FIRED

SINGLE PHASE
230V 1PH 50Hz
BURNER SUPPLY

HONEYWELL GAS VALVE MANUAL IGNITION

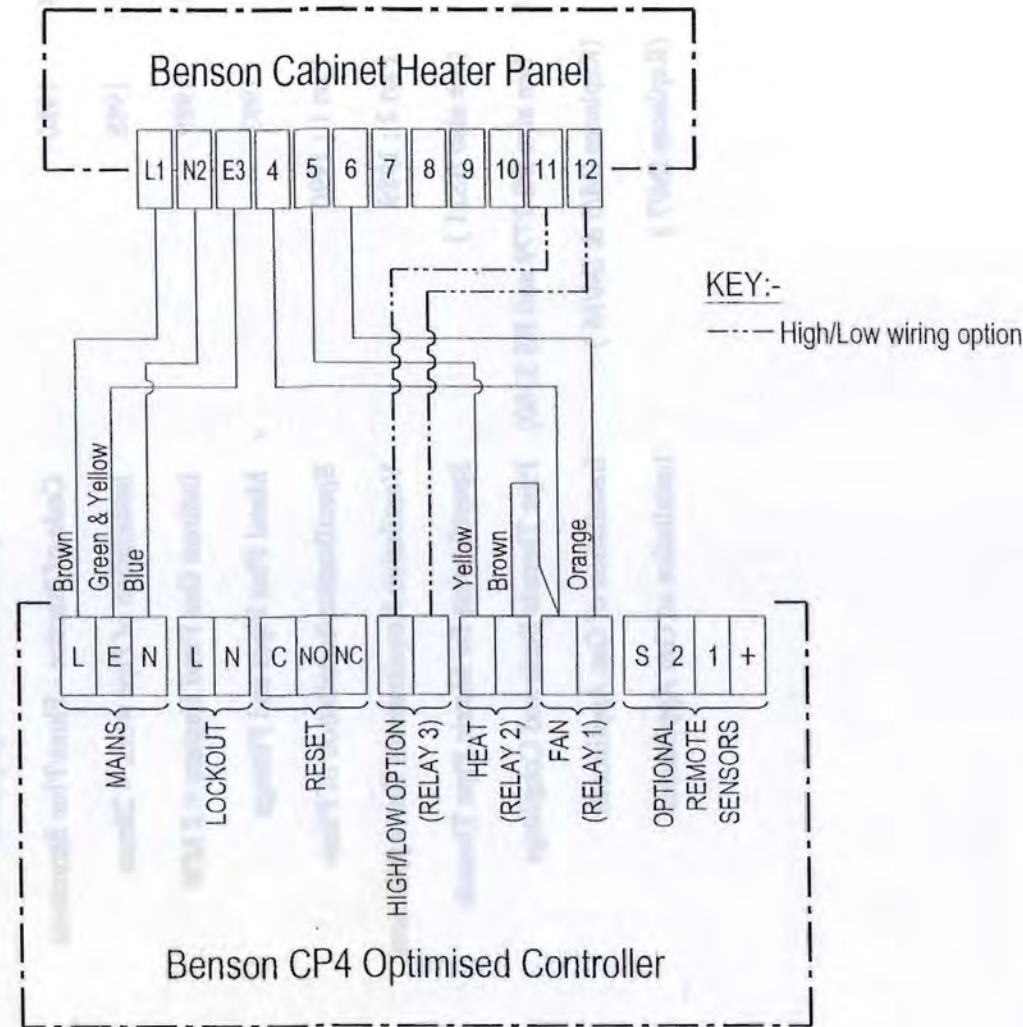
HONEYWELL MANUAL
RESET FAN / LIMIT STAT

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9.0 Reference Information

Doc/Ref	Title/Subject
prEN 621	Non Domestic Gas Fired Forced Convection Air Heaters For Space Heating
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 1995	Safety of Electrical Equipment
BS 5854 1980	Code of Practice - Flues/Flue Structures
BS 6891 1988	Installation of Pipe work < 28mm
BS 5991 1989	Indirect Gas Fired Heaters < 2 MW
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
ISO 7/1 (see also BS21)	Specification for Metric Pipe Threads
ISO 228/1 See also BS 2779 and BS 5380)	Pipe Threads Seals and Couplings
UP/1 (Replaces IM/5 & IM/16)	Installation of Gas Appliances
UP/2 (Replaces IM/7)	Installation of Gas Appliances



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GEOMETRIC TOLERANCE SYMBOLS	
CHARACTERISTIC	SYM
Straightness	—
Flatness	—
Roundness	—
Cylindricity	—
Profile of a line	—
Profile of a surface	—
Parallelism	—

LINEAR TOLERANCES EXCEPT WHERE OTHERWISE STATED	
RANGE	TOLERANCE
Over 0	± 0.25
Over 50	± 0.5
Over 150	± 0.5
Over 300	± 0.75
Over 600	± 0.75
Over 1200	± 1.0
On ANGLES	± 0.5°

SURFACE TEXTURE VALUES MACHINE WHERE MARKED	
FINISH	SYMBOL
ROUGH	—
MEDIUM	—
FINE	—
GRIND	—

FINISH	
DRAWING PRACTICE TO BS308 ALL WELDS TO BS5135 ALL DIMENSIONS IN MILLIMETRES (mm) Ø DENOTES CRITICAL DIMENSION REMOVE SHARP EDGES & BURRS	

1	ITEM	DESCRIPTION	MATERIAL	OFF
TITLE				
W.D - CP4 to BENSON CABINETS				
USED ON		BENSON CABINET HEATER RANGE		
SCALE	DRAWN	DATE	APPROV	DRG No
1:1	RG	08/03		2045292

9.1 Parts Listing

PART DESCRIPTION	AG100	AG150	AG200
Heat Exchanger Assembly	31-28-099	31-28-099	31-24-065
Heat Exchanger Baffle	20-45-087 (19)	20-45-087 (19)	20-45-085 (18)
Cabinet Bonnet Assembly	31-20-113	31-20-113	31-24-064
Flue box Assembly	31-28-098	31-28-098	31-24-082
Flue box guard	31-28-096	31-28-096	31-24-083
Flue box gasket	31-28-094	31-28-094	31-24-079
Front top panel	31-28-101	31-28-101	34-20-044
Back top panel	31-28-103	31-28-103	34-20-046
Heat shield front panel	31-28-102	31-28-102	34-20-045
Heat shield back panel	31-28-104	31-28-104	34-20-047
Front bottom panel	31-28-075	31-28-075	31-24-057
Rear air inlet bottom panel	31-20-107	31-20-107	31-20-012
Fan/limit Thermostat	28-60-021	28-60-021	Common
Fan/limit Thermostat gasket	20-33-549	20-33-549	Common
Motorised Fan	28-09-001	28-09-001	28-09-002
Fan restrictor	31-30-017	N/A	31-30-016
Analogue Time Clock	28-15-008	28-15-008	Common
Room Thermostat	28-16-031	28-16-031	Common
Frost Thermostat	28-16-044	28-16-044	28-16-044
Rocker Switch Red Neon	28-40-105	28-40-105	Common
Rocker Switch Dual	28-40-106	28-40-106	Common
Rocker Switch	28-40-104	28-40-104	Common
Fuse Holder	28-07-050	28-07-050	Common
Fuse	28-07-049	28-07-049	Common
Overload	n/a	n/a	28-11-053
Nozzle Outlet Assembly	31-28-085(2)	31-30-167(2)	31-30-167 (2)
Thermocouple/Pilot Assembly	31-28-087	31-28-087	31-30-085
Burner Nozzle Weld Assembly	34-20-471	New	34-30-052
Gas Train Assembly	34-30-353	34-30-353	34-30-366
Burner cover Assembly	34-30-340	New	34-20-051
Blast Tube Assembly	34-30-342	New	34-30-044
Burner Jet	31-24-063 (2)	31-24-063 (3)	31-24-063 (4)
Shroud Tube	34-30-146 (2)	34-30-146 (3)	34-30-146 (4)
Pilot Injector	28-90-153	28-90-153	Common
Electrode	28-90-156	28-90-156	Common
Thermocouple	28-90-150	28-90-150	Common
Gas Valve	28-30-103	28-30-103	Common
Spark Ignitor	33-50-007	33-50-007	Common

Parts Listing Contd

PART DESCRIPTION	AG250	AG300	AG350
Heat Exchanger Assembly	31-24-065	31-27-188	31-27-188
Heat Exchanger Baffle	20-45-085 (18)	31-27-189 (26)	31-27-189 (26)
Cabinet Bonnet Assembly	31-24-064	31-27-187	31-27-187
Flue box Assembly	31-24-082	31-27-171	31-27-171
Flue box guard	31-24-083	31-27-175	31-27-175
Flue box gasket	31-24-079	New	New
Front top panel	34-20-044	31-27-153	31-27-153
Back top panel	34-20-046	31-27-155	31-27-155
Heat shield front panel	34-20-045	31-27-154	31-27-154
Heat shield back panel	34-20-047	31-27-156	31-27-156
Front bottom panel	31-24-057	31-27-110	31-27-110
Rear air inlet bottom panel	31-20-012	31-10-106	31-10-106
Fan/limit Thermostat	28-60-021	28-60-023	28-60-023
Fan/limit Thermostat gasket	20-33-549	28-33-549	28-33-549
Motorised Fan	28-09-002	28-09-050	28-09-050
Analogue Time Clock	28-15-008	Common	Common
Room Thermostat	28-16-031	Common	Common
Frost Thermostat	28-16-044	28-16-044	28-16-044
Rocker Switch Red Neon	28-40-105	Common	Common
Rocker Switch Dual	28-40-106	Common	Common
Rocker Switch	28-40-104	Common	Common
Fuse Holder	28-07-050	Common	Common
Fuse	28-07-049	28-07-048	28-07-048
Overload	28-11-053	28-11-056	28-11-056
Nozzle Outlet Assembly	31-30-167 (3)	31-30-159 (3)	31-30-159 (4)
Thermocouple/Pilot Assembly	31-24-085	34-20-129	34-20-129
Burner Nozzle Weld Assembly	New	31-27-180	New
Gas Train Assembly	34-30-366	31-27-181	31-27-181
Burner cover Assembly	New	31-27-182	New
Blast Tube Assembly	New	31-27-183	New
Burner Jet	31-24-063 (5)	31-24-063 (6)	31-24-063 (7)
Shroud Tube	34-30-146 (5)	34-30-146 (6)	34-30-146 (7)
Pilot Injector	28-90-153	Common	Common
Electrode	28-90-156	Common	Common
Thermocouple	28-90-150	Common	Common
Gas Valve	28-30-103	Common	Common
Spark Ignitor	33-50-007	Common	Common

SECTION B

WARRANTY REGISTRATION INFORMATION

Warranty terms and Conditions

1. In the first instance any warranty claim or query concerning warranty, must be communicated to the Service Department at Benson Heating
2. Any part manufactured by Benson Heating which fails due to defective materials or poor workmanship within twelve months from the despatch date of the heater, will be repaired or replaced free of charge, inclusive of parts and labour.
3. Any part manufactured by Benson Heating which fails due to defective materials or poor workmanship within two years from the despatch date of the heater will be replaced free of charge on a parts only basis.
4. In addition to 2 and 3 above, the heat exchanger and combustion chamber carries a ten year time related warranty based upon a sliding scale.
5. Bought in parts and consumables are specifically not included under the terms of the warranty
6. The WARRANTY REGISTRATION card must be completed in full and returned within 30 Days from the date of despatch of the heater in order for the warranty to be established.
Any warranty claims made without this condition being fulfilled will not be processed.
7. The heater must be used in accordance with the guidelines contained within the "Installation Operation and Service Manual" supplied with the heater.
Failure to comply with this requirement will invalidate the warranty.

8. This warranty is additional to the terms and conditions detailed within Benson Heating 'Conditions of Business' and does not affect the statutory rights of the customer.

Note

Prior to completing the warranty registration card the commissioning Engineer must be satisfied that the installation and commissioning are in accordance with the manufactures recommendations as detailed in the relevant sections of the manual supplied with the heater.

Completion of the warranty registration card is considered to be a necessary part of the commissioning procedure

SECTION C

BASIC USER INSTRUCTIONS

10.0 Introduction

The following information is relevant to the Gas fired AG Cabinet Heater range manufactured by Benson Heating. These heaters are manufactured within a strictly controlled quality system to ISO 9001.

All Benson Heating Gas Fired Cabinet Heaters are CE marked, having been found to satisfy the essential requirements of 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)

Benson Heating support all new products being supplied to their customers with a comprehensive information pack, and it is the responsibility of the owner, user, or hirer, of such products supplied by Benson Heating to ensure that operators are provided with the operator manual, and that they are suitably instructed regarding the purpose of the manual and safety instructions. In addition to this, operators must also be suitably and adequately trained in the use of the product.

Contained within the text of this 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 a premature failure or damage being occasioned to the heater or its component parts.

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

10.1 Commissioning and hand over

Warning

As part of the commissioning programme, the commissioning engineer must go through the following with the operator.

- (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 engineers.

Caution

After approximately 100 hours of running, the tension on the fan belts must be checked to ensure that it is correct, and that the belts have not stretched. It is strongly advised that this is undertaken by the commissioning engineer, and not the operator.

10.2 Servicing

Warning

Servicing must be carried out on a regular basis, the maximum interval between services being one year.

It is a requirement that only suitably qualified and competent persons are allowed to undertake the servicing.

Benson Heating advise that the planned service schedule as detailed in section 5.1 of the Installation, Commissioning and Servicing Manual is adopted by the user.

Further details are available from either Benson Heating or from the commissioning engineer.

10.3 Start up procedure

- (a) Ensure that the gas supply cock is open, and that the mains electrical supply is turned on
- (b) Ensure that the controller has been correctly programmed
- (c) Ensure programme is set for on setting
- (d) Ensure heat/ventilation switch to 'heat'
- (e) Check for the following burner sequence

(f) Depress pilot valve button whilst pushing piezo igniter to light pilot

(g) Continue to hold pilot valve until pilot is established.

(h) The main gas valve will open allowing burner ignition to occur

(j) Check that fan starts within two minutes of ignition.

10.4 Stop procedure

(a) Set programmer to off.

(b) The fan motor will continue to run until heat dissipation allows the fan and limit stat to shut down the fan.

Caution

Do not use the main electrical isolator to turn off the heater, to do so can cause damage to the heat exchanger and combustion chamber, and thereby invalidate the warranty.

10.5 Shut down procedure

- (a) Follow steps 10.4 (a) and (b), when fan stops turn main electrical isolator off, and shut gas isolating cock

10.6 Ventilation only

(a) Set heat/ventilate switch to 'ventilate'.

10.7 Lockout situations

If the fan and limit stat goes to lockout, the lockout must be cleared manually before the ignition sequence can be re-initiated.

Caution

Repeated or frequent lockouts must be investigated and their cause determined by a qualified and competent engineer.

10.8 Contact information

Further information is available from :-

Benson Heating
Ludlow Road
Knighton
Powys
LD7 1LP

Telephone 01547 528534

Facsimile 01547 520399

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Climate Systems Ltd**