

# **BENSON GUHA/GUHC RANGE**

**(NATURAL GAS FIRED UNIT HEATER)**

**INSTALLATION COMMISSIONING**

**SERVICING**

**USER INSTRUCTIONS**

GUH RANGE GAS FIRED UNIT HEATERS  
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### 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**

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 GUH range of warm air heaters detailed herewith are manufactured by Benson Heating within a strictly controlled environment within the parameters of ISO9001

The Benson GUH Range has been independently tested and assessed, and has been found to meet the Essential Requirements of 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 (98 / 336 / EEC & 91 / 31 / EEC)  
 Product Liability Directive 65 / 374 / EEC)

The manufacturer has taken reasonable and practical steps to ensure that Benson GUH Range of 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 GUH Heater range subject to agreement from The Notified Body.

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 GUH range of heaters conform to the following European Harmonised Standards.

BS EN 621 1998 Requirements for non domestic gas fired forced convection air heaters for space heating without a fan to assist 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

Declarations and Certificates are available upon request from the Quality Control Department at Benson Heating .

**Notified Body PIN Reference is 63AQ0533**

## 1.2 General product information

The Benson GUH Range have an output rated at between 15.2kW to 140.7kW, and are available with either axial or centrifugal fans

<b>MODEL NO</b>	<b>50</b>	<b>75</b>	<b>100</b>	<b>125</b>	<b>165</b>	
<b>OUTPUT Kw</b>	<b>15.2</b>	<b>22.0</b>	<b>29.3</b>	<b>37.0</b>	<b>48.4</b>	
<b>MODEL NO</b>	<b>205</b>	<b>250</b>	<b>285</b>	<b>325</b>	<b>400</b>	<b>480</b>
<b>OUTPUT kW</b>	<b>61.6</b>	<b>73.3</b>	<b>85.0</b>	<b>95.3</b>	<b>117.3</b>	<b>140.7</b>

Each heater must be connected to its own individual open flue in accordance with the manufactures recommendations.

### Cabinet

Manufactured from zintec coated steel, finished in a durable stove enameled polyester powder paint.

### Heat Exchanger

Manufactured from aluzinc coated steel, and formed from pressed and welded sections into a multiple clam assembly.

### Flue Outlet

Fabricated from aluzinc coated steel . The part is designed to terminate with a spigot . the assembly incorporates the down draught diverter.

### Burner

The atmospheric gas burner is manufactured from aluzinc coated steel and is located beneath the clam. The complete burner rack is easily withdrawn through the front of the heater. Standard heaters are supplied suitable for Natural Gas.

## Burner Control

Models 50 - 480 heaters are fitted with a manually operated piezo spark igniter and low consumption pilot, linked via an integral thermocouple to the main multifunctional valve.

An automatic facility is also available for all models within the range.

## Fan

Models GUH (A) are supplied with an Axial fan for free blowing applications .

Models GUH (C) are supplied with Centrifugal fans suitable for ducted applications

## Note

Neither asbestos nor soft soldered joints are used in the construction or manufacture of the Benson range of GUH 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 pressure is in accordance with the supply type and pressure 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.

(See sections 2 and 8).

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, wiring routes, and if appropriate, any additional controls.
- e) The position of the heater relative to the supply of fresh air
- f) The position of the heater relative to potential stratification / circulation problems, which generally occur at higher levels and which may be overcome through the provision of a suitable de-stratification unit.
- 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.

## 1.4 Delivery and pre-installation checks

The heater is supplied wrapped in heavy duty protective polythene, mounted on a pallet.

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 and pressure

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- 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 1 year warranty on all parts except the thermocouple.

In addition to this there is also a 5 year time related warranty on the combustion chamber.

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 Benson Heating 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 Installation

**Note**

It is a requirement that only qualified and competent personnel may undertake installation commissioning and servicing of GUH Range Heaters.

**Warning**

All of the basic criteria must be satisfied prior to commencing installation and commissioning, additionally, the Unit Heater must be positioned and installed so as to comply with all the relevant standards and guide lines (**see section 8.0**), 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

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**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 heater must be installed so that it is level. Supports for the heater must be 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 65C

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, oil supply, electrical supply, whilst also providing good and safe working access.

The heater must be installed so that it is level, supports for the heater must be 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 65oC. Generally a free blowing heater should be located at a height (measured from floor level to the base of unit) as detailed within section 2.1

The location chosen for the air heater must allow for the fitting of an effective flue system. It must also allow adequate clearance for the air supply, return air circulation, gas supply, electrical supply and also provide good service access.

Suspended free blowing Unit Heaters are at their most effective when located as close to the working area as possible. However care should be exercised to avoid directing the discharged air directly onto the occupants of the area to be heated.

Where the passage of cold air causes problems (eg by entrances, loading bays etc) it is considered favourable if the heater is positioned so as the discharge towards or across the cold air source from a distance from 1.5m - 6m dependent upon the size of the entrance and the air throw characteristics of the heater. On exposed walls heaters should be positioned so as to discharge towards, or along the length of the exposed wall.

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. Air pressure within the area heated and the outside air pressure must remain the same, factors influencing this would be the presence of extraction systems, ventilation systems, and various types of process plant.

GUH (A) Heaters are only suitable for free blowing applications or where the duct length does not exceed 2 metres.

In which case the cross-section of the duct must be at least the same as that of the heater discharge grille

Where the heater is positioned to discharge through a wall opening a clearance of 2 metres in front of the unit is required to allow for the correct operation of the down draught diverter and access for servicing. In such applications a stub duct should be fitted and sealed at the interface between the discharge grille on the heater and the opening in the wall.

## 2.1 Installation Clearances and Mounting Heights

The Heater must be installed so as to provide the following clearances

FRONT	REAR	TOP	LEFT	RIGHT	BASE
2000mm	500mm	200mm	500mm	500mm	250mm

The recommended maximum and minimum mounting heights in metres are as follows:

MODEL	50	75	100	125	165
Max	2.73	2.73	3.03	3.33	3.64
Min	1.82	1.82	2.12	2.42	2.73

MODEL	205	250	285	325	400	480
Max	3.94	3.94	4.24	4.24	4.24	4.24
Min	2.73	2.73	2.73	2.73	2.73	2.73

Any combustible material adjacent to the air heater and / or flue system must be so placed or shielded so as to ensure that its temperature does not exceed 65Deg C

## 2.2 Heater Mounting

The heater and flue must be adequately supported by one of the following methods ;

### GUH RANGE GAS FIRED UNIT HEATERS

a) Suspension by steel drop rods or straps from the M12 fixing points located on top of the heater

These must be of sufficient strength to safely carry the weight of the unit and ancillary equipment. The straps may only drop vertically to eyebolts, if used; I.E. They must not be joined to the eyebolt at an angle to the vertical, and eyebolts if used should be of an approved type.

b) On specifically designed cantilever brackets mounted from a non-combustible wall.

c) On a level non-combustible surface capable of adequately supporting the weight of the unit and ancillary equipment . Under these circumstances approved mounting feet must be fitted.

### Note

GUH (C) Models cannot be supported on cantilever brackets.

## 2.3 Warm Air Circulation

The air heater should be positioned to enable maximum circulation of discharged warm air within the area to be heated, whilst taking account of personnel within the area, sources of cold air ingress , and obstructions.

The air temperature rise on passing the heat exchanger is typically around 34Deg C

A full and unobstructed return air path to the air heater must be provided (see 2.4 Air Supply).

Where the heater is positioned to deliver blown air through an opening in a wall, return air intakes should be located so that they cannot become blocked. Similarly these intakes must be positioned so as not to draw in odours, fumes, hazardous vapours or particles.

Barrier rails should be provided to eliminate the risk of combustible materials being placed within 1M of the warm air outlet.

## 2.4 Air Supply

Provision must be made for the existence of an air supply in order to satisfy both combustion and ventilation criteria.

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



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It is strongly recommended that BS 6230 : 1991 is referred to for further information concerning ventilation requirements.

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**

<b>INLET</b> Low level (<60kW) Low level (>60kW)	9.0cm <sup>2</sup> per kW 540cm <sup>2</sup> + 4,5cm <sup>2</sup> per kW of rated input per heater
<b>OUTLET</b> High level (<60kW) High level (>60kW)	4.5cm <sup>2</sup> per kW 270cm <sup>2</sup> + 2,25cm <sup>2</sup> 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 7.2 of this manual.

The natural extraction air vents must have a minimum area as per the above table, 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.

When the area to be heated already has an extraction system, the size of the air vent must be sized to account for this and to maintain the required number of air changes

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, further consideration should be made for free air for recirculation to avoid the possibility of negative pressure in the plant room (see guidance notes below)

Additionally the maximum temperature within the plant room should not exceed 32DegC

**Note**



## 2.5 Flue Installation.

An integral flue spigot is fitted to all GUH Air 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.

Further more all of the flue section joints must face upwards and the seal between the sections achieved through the use of approved caulking string and / or grout.

### 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 7.2 within this manual.

The flue assembly must comply with all the relevant regulations regarding height and materials, and must terminate with an approved flue terminal.

All GUH Air Heaters are equipped with a built in down draught diverter which prevents the recirculation of combustion products, consequently an external draught diverter, barometric damper, or anti spillage system must not be installed. Such devices are unnecessary on the GUH range of heaters.

Alterations to the built in down draught diverter must not be carried out, and it is necessary to provide a minimum unobstructed clearance in front of the heater of 2M to ensure that the down draught diverter will function correctly and also provide access for servicing.

In order to provide adequate natural draught, the minimum vertical length of flue must not be less than 2M.

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

The temperature of the combustion products can be as high as 260Deg C and therefore tend to rise naturally within the flue. Unnecessary bends and restrictions should therefore be avoided.

Provision for the disconnection of the flue for servicing and inspection purposes must also be made, and where appropriate bends should be fitted with access covers, again to allow for cleaning and inspection.

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 free escape of flue

gases without risk of their re-entering the building through windows, ventilation ports etc. The following illustrations of different flue configurations are included for guidance purposes (see figures 2-12 )

If the flue does not have access to an existing chimney then it should be extended through the roof or wall to a height of at least 1M above that of any object within 3.5M of the terminal.

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 650C.

### 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.

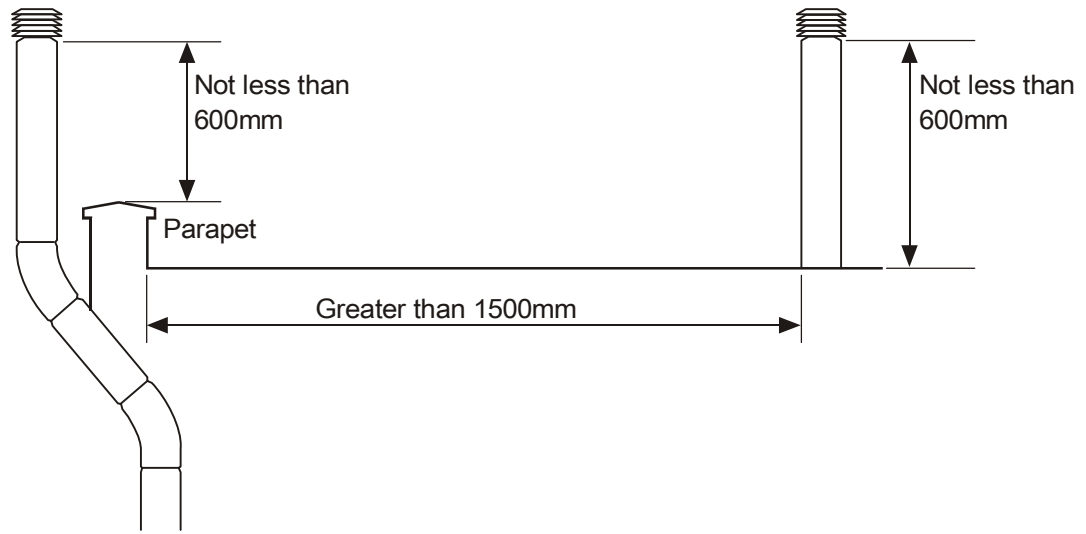
The flue outlet on all GUH heaters can be in either vertical or horizontal (top or rear) configuration.

### Note

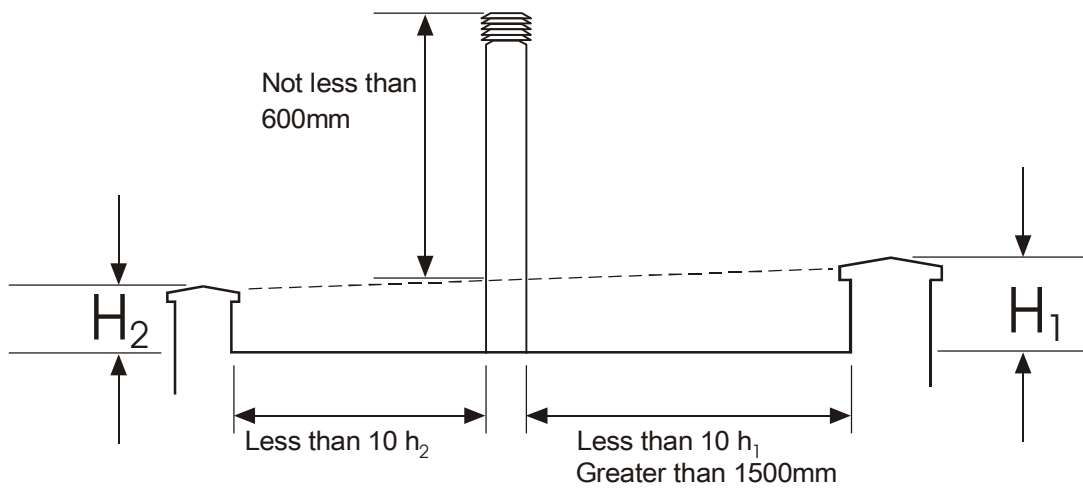
It should be noted that claims made under warranty and attributed to the ingress of water may not be considered especially if an approved method of sealing has not been used, or if the design of the flue has not made provision for possible condensation problems.

Where a horizontal outlet is used, the manufacturer strongly recommends that a flue venter of an approved type is fitted to aid the evacuation of the combustion products.

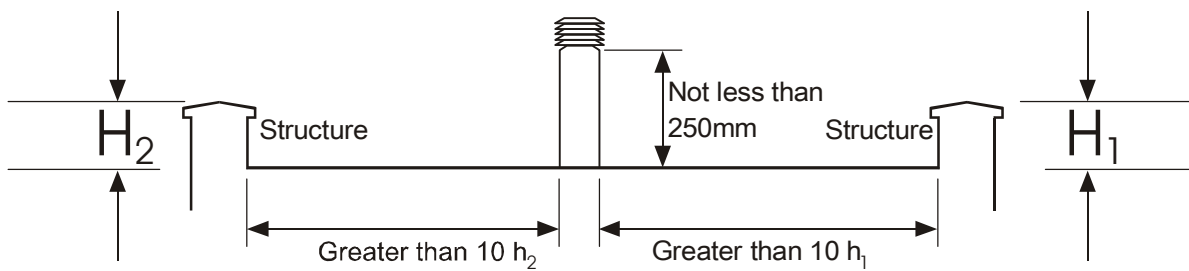
It is also recommended that BS5854: 1980 and BS5440: parts 1 and 2 are used as a consultative document when considering flue requirements.



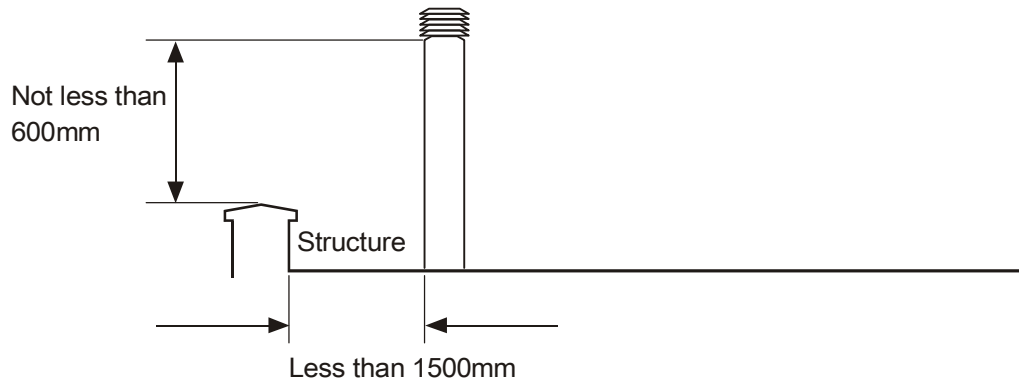
**Fig 2** flat roof with parapet



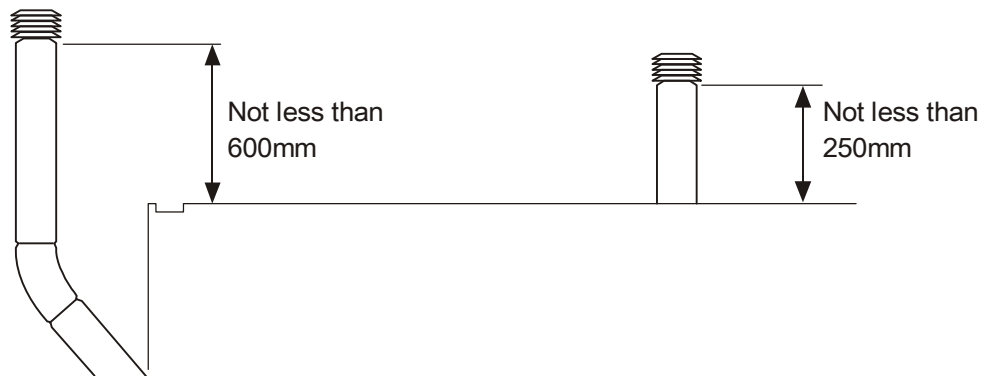
**Fig 3** Flat roof envelope method



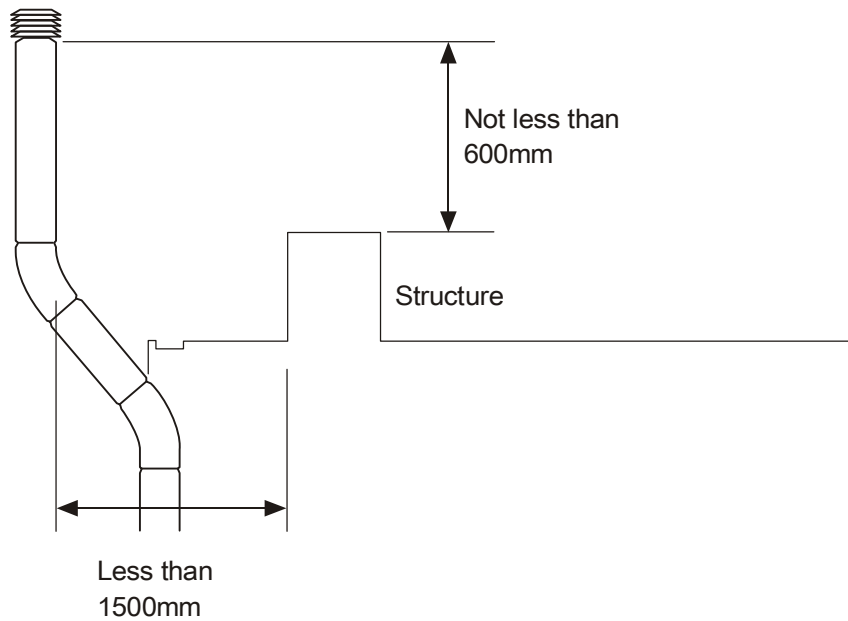
**Fig 4** Flat roof where the flue height is more than 10 Heights ( $H$ ) away from all structures



**Fig 5** Flat roof with flue close to parapet

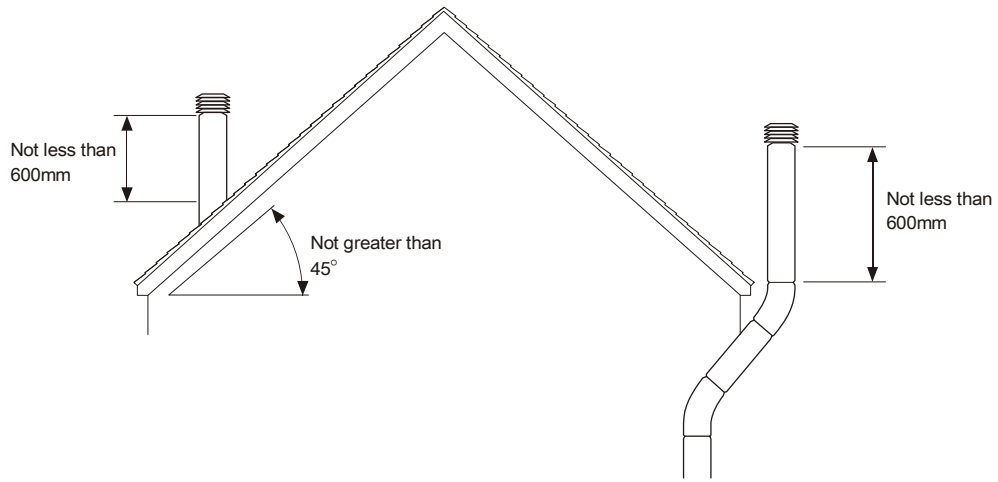


**Fig 6** Flat roof with no parapet

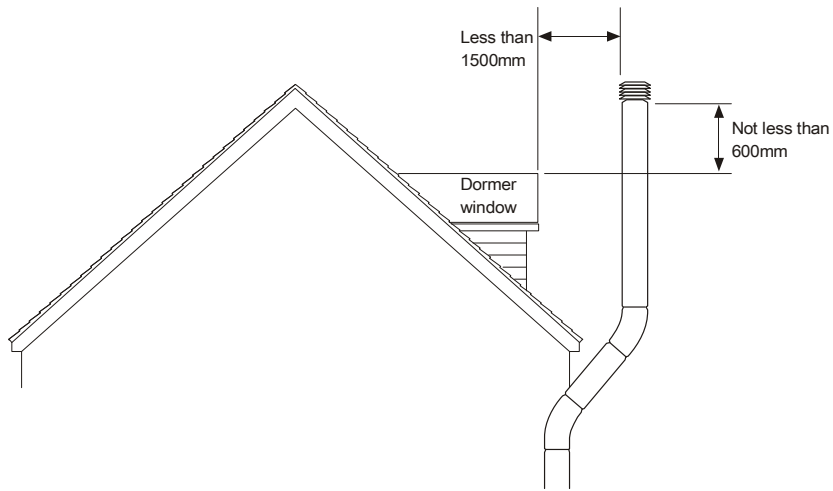


**Fig 7** Flat roof with structure close to flue outlet

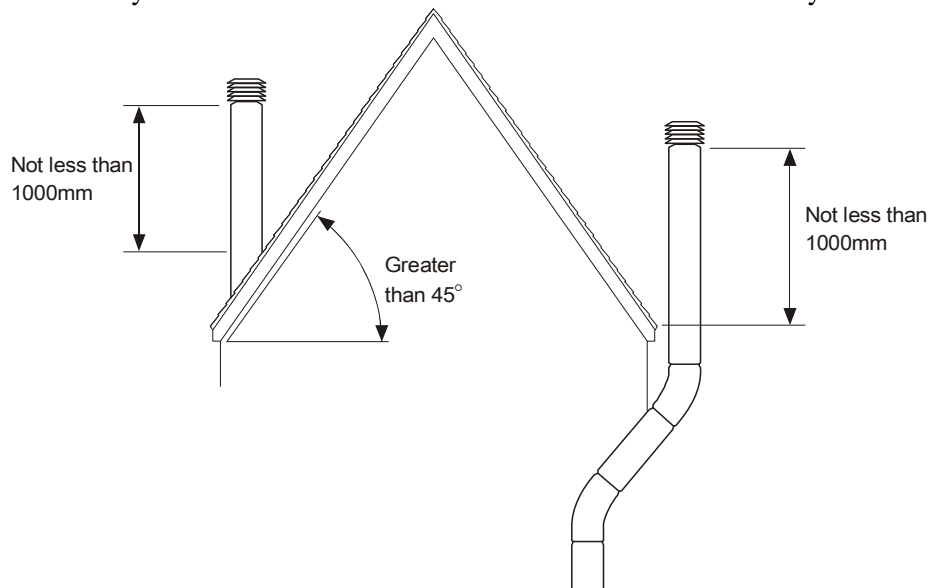
# GUH RANGE GAS FIRED UNIT HEATERS



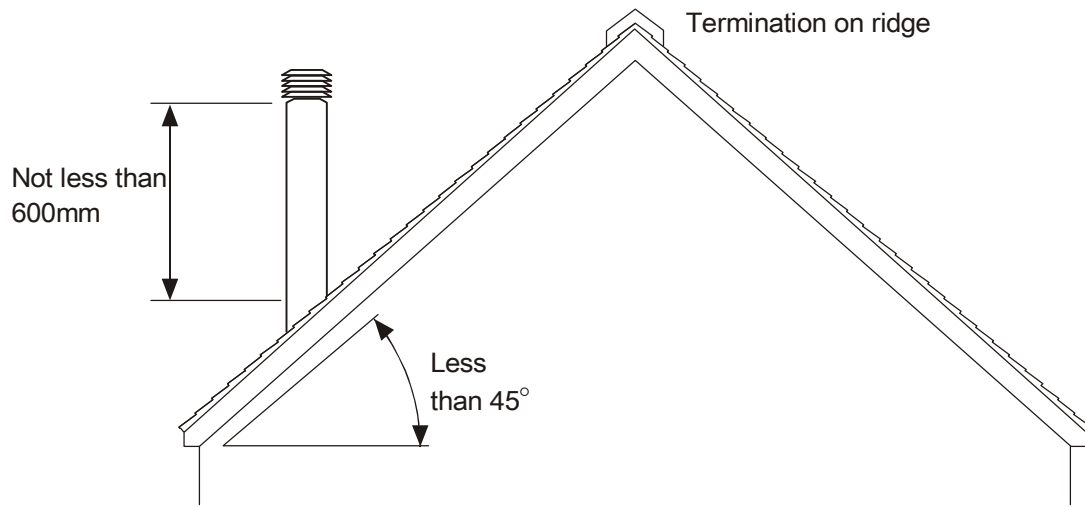
**Fig 8** Pitched roof not greater than 45°



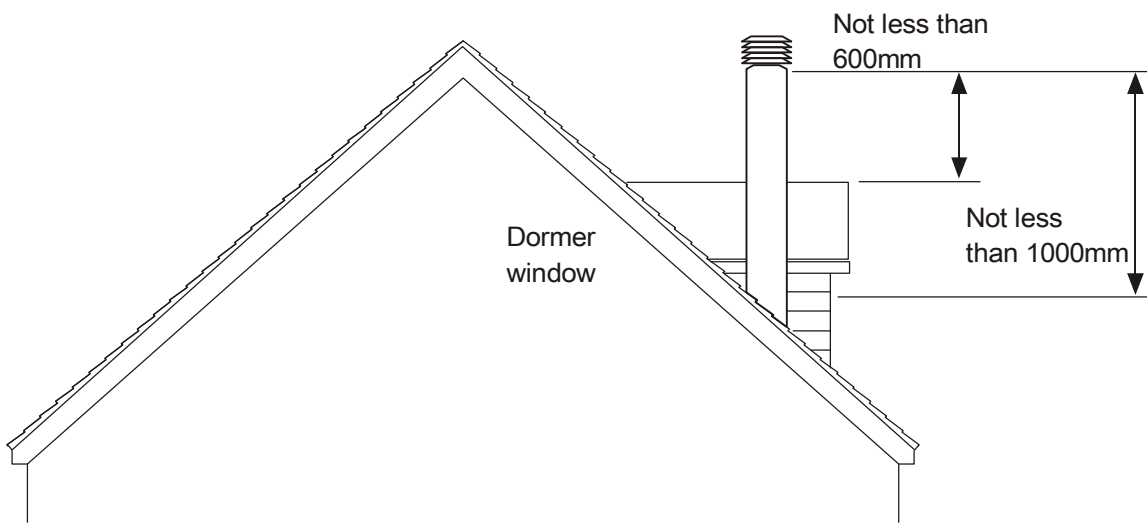
**Fig 9** Pitched roof chimney within 1.5m from dormer window measured horizontally



**Fig 10** Pitched roof exceeding 45°



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



**Fig 12** Pitched roof chimney within 1.5m from dormer window measured horizontally

## 2.6 Electrical Installation

All electrical wiring and connections must be in accordance with the relevant European, National, and Local regulations as well as to IEE Standards.

### Warning

Ensure that the Electric and gas supplies are turned off before any electrical work is carried out on the heater. Also ensure that wiring cannot make contact with any metal surfaces liable to be subject to high temperatures, and where insulation of the wiring could be impaired as a result of such contact.

All GUH models 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 the event of an emergency, or when the heater has been allowed to cool sufficiently to prevent any damage from being sustained to the heater or its controls (ie: during servicing).

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

Each heater requires a permanent 230V 50Hz 1ph electrical supply, which must be wired through a fused isolator fitted with a fuse of the correct rating (see section 7.1). The correct supply connection points for the live, neutral, and earth are clearly indicated on the wiring diagram mounted inside the wiring box cover. Wiring diagrams are also detailed within this manual, (section 6.0 )

The electrical supply isolator should be mounted adjacent to the air heater in an easily accessible position to allow for servicing isolation, or emergency shut off.

## 2.7 Electrical panel

### Warning

Ensure that the mains isolator is turned OFF before undertaking any electrical on the heater. Access to the electrical panel is gained by removing the right hand heater side panel, (Lift the panel clear of the lower lip, pull panel outwards and let it slide until it is retained by the two lugs and the lower lip.

The panel can be fully removed by tilting one of the top corners towards the heater thereby disengaging the lugs).

The cover to the electrical panel can be removed by undoing the two screws which secure it to the panel. A copy of the wiring diagram is affixed to the inside of the cover .

### Warning

Ensure that all connections are secure and that there are no loose strands which could bridge across the terminals.

A minimum conductor size of 1.0mm (diameter) is required.

### Caution

One electrical panel per heater is required, unless heaters are specified for multiple heater control applications. On no account should more than one heater be connected to a single time switch or thermostat. The only exception to this is when a control panel suitable for multiple heater applications is supplied by the manufacturer, in which case the wiring diagram supplied with the control panel should be read in conjunction with the existing wiring diagram.

Any ancillary electrical items e.g. room thermostats , time switches, remote panels etc, must be wired into the heater electrical circuit in accordance with the diagrams provided

**Note** When external controls operate to switch the heater OFF, power to the heater should remain to allow the fan to continue to operate to sufficiently cool the heater thereby preventing damage to the heat exchanger.

## 2.8 Time switch

### Caution

Time switches may only be fitted if they are of an approved type, and must have separate motor connections, the motor must be connected to a suitable live and neutral supplies, and with the switching contacts then wired in series from the neutral side of the room thermostat to terminal 7 Reference should be made to the wiring diagrams contained with the time switch, and within section 6.0 of this manual

## 2.9 Room thermostat

Any external room thermostat should be fitted with the common terminal (if fitted with changeover contacts) to terminal 5.

If the thermostat is fitted with a heat anticipator this should be fitted to terminal 2.

The thermostat should be mounted at a height of approximately 1.5mm from the floor in an area where the ambient temperature is representative of the area to be heated. The siting of the room thermostat should be in a draught free area. or in an area where temperatures are free from the influences of direct sunlight or heated discharged air.

## 2.10 Fan limit control

( Situated inside the right hand side panel)

### Fan control (white button)

The fan control switch features normally open 230V contacts, and is wired to control the live



supply to the fan motor . When the circuit is made, the fan will switch on when the heat anticipator has closed the fan switch contacts. When the thermostat or time switch shuts down the burner, the fan will continue to run until the thermal switch has cooled sufficiently to prevent the residual heat from damaging the heater or its controls.

On startup the fan delay prevents air being circulated until the desired temperature is achieved

#### **Limit control** (red button)

An adjustable high temperature manual reset limit control. If this control needs resetting the cause should be determined and rectified immediately.

On models with two fans a second limit control is situated inside the left side panel and is wired in series. Operation of either switch will shut down the heater

On the GUH 400 / 480 where four fans are fitted there are separate sensors again, however as these units are modular they will react much the same as a twin fan unit as there are two sensors per module linked to the relevant control.

#### **Caution**

The power supply to the fan must not be interrupted, the only time when power supply can be disconnected or interrupted is during servicing or in emergencies.

If there is a requirement for the heater to be switched off over night then the gas valve circuit should be opened via a time switch, etc, as per the wiring instructions and diagrams supplied within section 6.0 of this manual.

## **2.11 Summer switch**

A heat / ventilation switch may be fitted remotely and connected between terminals 9. and 4.

This switch will allow the fan motor to run continuously. Where the remote control box is used, the burner is automatically inhibited during the summer / ventilation setting.

## **2.12 Gas installation**

**Warning** As there have been recorded instances of the deposition of copper sulphide dust within the valves and orifices of gas appliances as a direct result of a reaction between the hydrogen sulphide contained in some natural gasses and copper pipe we recommend that the heater(s) should not be connected to any natural gas pipe distribution system which utilizes copper pipework, including final connections. Instead steel pipework should be used throughout.

## **GUH RANGE GAS FIRED UNIT HEATERS**

In the event that it is impractical to use steel pipework or where installers are obliged or insist on using elements of copper pipework within the installation then we strongly recommend that the gas supplier be consulted as specific conditions and requirements may be necessary.

#### **Please read notice inside front cover of manual**

Only qualified and competent personnel are allowed to undertake the installation, commissioning, and servicing of Unit Heaters

The GUH range of heaters are all manufactured and pre set for use with Natural Gas, and all feature 3/4" BSP connection points. Prior to installation the supply characteristics (gas type and pressure) must be checked to ensure that they are in accordance with the data plate on the heater.

The gas supplier should check that the meter and service connection to the heater are capable of delivering the required volume of gas, thereby ensuring that the minimum burner pressure can be achieved. Consideration should be given to the pressure drop on single and multi heater installations and the effect they may have on other plant sharing the supply.

If it is necessary to fit a gas pressure booster, the controls must include a low pressure cutoff switch which must be fitted on the supply / inlet side of the booster. It is also a requirement that the gas supplier is advised prior to the installation or fitting of the booster.

Each heater supply must be fitted with a separate isolating cock positioned adjacent to and upstream of the union which must be sited outside the heater the isolating cock should be of the 90° turn type and should be clearly marked OPEN / CLOSED

it should also be installed so as to fall to the closed position

An approved gas jointing compound must be used on all joints and unions and the system purged and tested for soundness prior to final connection

The connection to the heater can be made by way of either an approved flexible coupling or rigid connection . Threaded connections must comply to ISO 288/1 or ISO 7/1 further information concerning accepted European practice is detailed in June 1995 version of prEN1020 Annex 7.

The diameter of the pipework from the isolating cock to the burner must not be less than the diameter of the connection into the multiblock.

**Note** Reference to The Institute of Gas Engineers publications Utilisation Procedures IGE/UP1 and IGE/UP2 together with reference to BS6891 is strongly advised.





### 3.0 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 engineers familiarise themselves with the heater. the specific requirements of the installation /application, and the information contained within the manual.

#### Warning

All heaters are subject to a rigorous test programme prior to despatch, whilst such a programme does involve pre-commissioning and the setting of the heater to operate efficiently and within its designed operational limits this does not mean that the function of thorough on site commissioning is less important

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

The following pre-commissioning checks should be undertaken, having first ensured that the gas and electrical supplies are turned off.

- (a) Check that all panels and fasteners are secure and in place.
- (b) Check that the heater is mounted safely.
- (c) Check that the flue is sealed, secured, and adequately supported.
- (d) Check that the fan is free to rotate, that the fan is secured to its shaft, and that the guards and fan assembly are all in place and properly secured.
- (e) Check that the heater is installed so that it is not tilted and remains square.
- (f) Check that the outlet louvres are set to offer minimum resistance to air flow.

### 3.1 Electrical pre-tests

The electrical safety checks must include the following

- a) Test for earth continuity
- b) Test for resistance to earth

c) Check live and neutral connections are correct.

d) Check to ensure that when the external controls operate to switch the heater off, power remains to the fan

### 3.2 Gas supply pre-test

Ensure that the service pipework has been installed purged and tested in accordance with the relevant regulations, and that the installation is served by an adjacent isolating cock.

Connection from the supply to the heater must also comply with the relevant regulations (see section 8.0) and must have been purged and soundness tested by an authorised engineer.

### 3.3 Ignition sequence manual versions

#### Warning

If during the following sequence of operations the heater fails to operate correctly the fault should be traced and rectified before proceeding, if necessary referring to section 5.0 fault diagnosis. If for any reason the pilot light is extinguished **no attempt should be made to re light it within three minutes**

- a) Switch off the main electrical supply to the heater
- b) Turn off gas supply to the heater
- c) Remove side panel, and connect manometers to the gas supply test point and to the main burner test point
- d) Ensure outlet louver's are correctly set
- e) Ensure fan rotation is not impaired or obstructed
- f) Set room thermostat to its lowest setting
- g) If a time switch is fitted ensure it is set to an on period
- h) Switch on electrical supply
- i) Turn on gas supply, and open burner viewing port
- j) Depress and hold in control start button and test for soundness

k) Continue to depress start button whilst operating igniter until pilot light is present

l) Hold in start button for at least one minute to establish pilot - carefully release button confirming presence of pilot

**Warning**

If the pilot fails to become established **do not** attempt to re light for at least three minutes , if the pilot is established continue as follows.

m) Close burner viewing port

n) Turn thermostat to the highest setting, and the main burner will light then re-open the viewing port and check that the main burner is providing a good flame i.e. even, stable, and conical.

o) Check pressure readings on the manometers, and continue to let the heater fire for ten minutes

p) When the fan starts ensure that the direction of rotation is correct , and that the fan start is within two minutes of burner ignition

**Caution**

If the fan fails to operate within approximately two minutes and the heater goes to overheat it will shut down through breaking the circuit to the gas valve, the cause must be ascertained and rectified before re-ignition.

Once the limit thermostat has tripped out it must be manually reset to allow re-ignition to take place.

q) After ten minutes check burner head pressure is as specification - adjust as necessary by removal of the gas pressure adjustment cover, and using a screwdriver turn the adjustment screw on the governor as follows: Anti clockwise to reduce. Clockwise to increase.

r) Check that the gas pressure remains satisfactory for all appliances on the same circuit

s) Undertake combustion tests checking CO CO<sup>2</sup> and efficiency (see section 7.0) check for spillage using a dry, water cooled ,rhodium or chromium plate.

t) Check that the burners are extinguished when the thermostat is set to its lowest setting, and then remove the manometers.

u) Turn the thermostat to its highest setting to re light the burner and replace the adjustment screw cover

v) Check flame failure circuit by loosening the connection between the thermocouple and the overheat limit control on the main gas valve, the ignition and main burners should go out, retighten after testing

w) Turn the thermostat to its lowest setting and shut off the gas supply at the gas control valve, allow the fan to continue to run until the heater is cooled sufficiently for the fan to shut down

x) Turn off the electrical supply

y) Set thermostat to desired room temperature and replace the side cover panel

z) Ensure that the user is familiar with the heater and its controls and that the user is satisfied with the commissioning and testing, and that he is aware of the instructions within the manual It is strongly advised that the commissioning engineer runs through the lighting, shutdown, and general safe and efficient running of the heater before hand over.

**3.4 Ignition sequence automatic versions**

Automatic control is by way of a Satronic controller (with automatic gas valve replacing the manual standing pilot valve) used in conjunction with a Satronic spark generator (which replaces the piezo igniter as fitted to manual units) , giving a maximum pilot sequence of 15 seconds.

Flame supervision is via a flame sensor rod. instead of the thermocouple as fitted to the manual units.

The sequence is as follows: as per 3.3 a-i The start signal will ignite the pilot, once the flame proving has taken place the main gas valve will supply the burner and burner ignition will occur.

Continue as per 3.3 m-y

**3.5 Hand over**

Upon satisfactory completion of commissioning and testing, the customer should receive the completed guarantee and commissioning card (section B) from the commissioning engineer together with the user instructions (section C). At the same time the user should be made aware of the most efficient and economical methods of operation.

The user must be familiar and satisfied with the safety, ignition, shutdown, and general operational procedures.

## 4.0 Servicing

### Warning

It is a requirement that only qualified personnel are allowed to carry out installation commissioning or servicing.

In addition only spare parts recommended by the manufacturer may be fitted, and the installer should provide a list of recommended spare parts that are available through the manufacturer or his agent (see section 9)

Before commencing any maintenance or servicing work the heater must be shut down and allowed to cool, and have the gas and electric supplies to it turned off at the supply cock and isolator respectively.

### **Always test for gas soundness after completing any service work particularly if this has necessitated the removal and / or replacement of gas carrying components**

It is advisable that routine inspections are carried out on a frequent basis, servicing must also be carried out regularly, and in accordance with the manufacturers recommendations i.e. at a maximum interval of one year. In certain applications the frequency of servicing will have to be increased, this to a large extent is governed by the working environment, and both the manufacturer and the installer will be able to offer further advice.

A safe working platform giving good access to the heater is required, It should be noted that on suspended units the lower front panel is removable so as to provide access to the burner tray, injectors, and manifold, all of which should be serviced in the normal way as detailed.

Clean all accessible surfaces including the outside of the heat exchanger by removal of the fan assembly and the louvres. Check for panel damage and that all fasteners are present and secure.

Visually check all electrical wiring for signs of damage, possibly through contact with hot surfaces, check conduit for signs of chaffing and for security . Check all terminals are secure and free from escaped / stray conductor strands.

## 4.1 Servicing procedure - major component parts

### Heat exchanger

### GUH RANGE GAS FIRED UNIT HEATERS

Remove louvres and fan assembly and carry out visual inspection of the heat exchanger using an inspection lamp and mirror. Check seams and joints for perforations. Check for severe corrosion and splits in the body of the heat exchanger.

Check that there are no blockages and that there is not an excessive build up of soot within the heat exchanger.

If required remove the down draught diverter and burner tray allowing access for cleaning, with a flexible flue brush and vacuum cleaner.

**Warning** If the heat exchanger is found to be perforated the heater must not be fired until a replacement heat exchanger has been fitted

### Burner Pilot

Remove the right hand side panel. Disconnect the pilot gas feed at both the gas valve and pilot bracket.

Disconnect the piezo HT lead from the terminal. Unscrew the thermocouple retaining nut from the pilot bracket and withdraw the thermocouple. Remove the two retaining screws and withdraw the pilot bracket assembly.

Clean the thermocouple, pilot bracket and pilot burner ports with a fine wire brush and / or lint free cloth if necessary using acetone

### Caution

Where pilot gas lines are copper, aluminium, or Bundy tube, feed pipes should be undone at both ends to prevent undue stressing and the risk of premature failure.

### Burner Tray

#### Caution

Burner tray cannot be removed with the pilot assembly in place

Remove the two screws from the hinged front panel and open the panel fully. Remove the two burner tray fixing screws located on the right hand side inner panel. Pull tray forward and if required clear of the heater. Clean the burner ports with a vacuum cleaner, fine wire brush, and / or lint free cloth and acetone. Visually inspect the burner ports ensure that they are all clean and unrestricted , if necessary using compressed air to carefully dislodge and remove any foreign matter.

### Injectors and Manifold

With the pilot bracket assembly removed and the burner tray either fully withdrawn or pulled forward by at least 100mm the manifold and injectors can be removed by using the following

procedure. Release the union between the gas valve and the flange, remove the four flange fixing screws. Rotate the manifold so that the injectors are aligned with the keyhole and carefully withdraw the manifold complete with the injectors through the right hand side panel. Check that the manifold is straight, the injectors are correctly aligned, and that they are clean, and that there are no contaminants restricting the orifices, if necessary clean carefully with compressed air and lint free cloth and acetone.

### Caution

The injector orifice is precision machined to fine tolerances, do not clean with hard sharp or abrasive instruments. If the injectors have been removed from the manifold, when they are replaced, the copper washers must be refitted, and care should be taken not to overtighten.

**Ensure all joints are gas tight.**

### Fan and Motor

Check that the fan is secure and rotates freely without excessive play in the shaft. The fan blades and motor should be cleaned using a soft brush. The fan and motor assembly can be removed from the heater by first disconnecting the leads from the terminal block and by removing the strain relief bush. The four screws securing the fan and motor assembly to the rear of the plenum can be removed, and the assembly complete with guard can then be removed from the heater.

### Fan and Limit Thermostats

Lower the right hand panel, on twin fan units the left hand side panel will also have to be lowered, so as to gain access. Remove securing screw from cover, remove cover plate and disconnect the cables. Remove the screws which secure the unit to the side of the heater and withdraw the thermostat complete from the heater. Check that the bi metal coil and its housing are secure clean as necessary with a soft brush.

### Flue System

Check that the flue is in good condition, that it is adequately supported, that there are no blockages or restrictions, and that there is a positive draw. Check that any joints are properly sealed preventing an escape of products of combustion. Check condensate drain if fitted. Check for signs of water ingress and any resultant damage.

### Test

Test and re-commission as per sections 3.0 to 3.4 inclusive.

### Automatic Controls

Automatic control is by way of a Satronic controller (with automatic gas valve replacing the manual standing pilot valve) used in conjunction with a Satronic spark generator (which replaces the piezo igniter as fitted to manual units), giving a maximum pilot sequence of 10 seconds.

Flame supervision is via a flame sensor rod instead of the thermocouple as fitted to the manual units.

Check the flame sensor rod for signs of pitting or corrosion, ensure that the ceramic insulation material is not damaged or cracked. Check connections are secure.

### Multibloc Valves

#### a) Main Governor

To adjust the main governor, slide the cover off to reveal the adjustment screw, and turn as follows: Clockwise to increase pressure. Anticlockwise to decrease pressure.

#### b) Solenoid

The solenoid valve is positioned down stream of the main governor on the multibloc assembly and can be adjusted for fast initial lift and throughput. To alter the amount of fast initial lift, remove the cover which when inverted doubles as an adjustment key, clockwise movement will reduce and anticlockwise will increase the fast initial lift.

The maximum adjustment possible will give 40% of the valve throughput, after this initial lift the hydraulic brake takes over and the remaining valve movement takes 20 seconds to complete. Throughput can be adjusted by slackening off the cheese head screw to allow the hand adjuster to be turned clockwise to reduce, or anticlockwise to increase. After any such adjustment the cheese head screw must be retightened to clamp the adjustment ring in its correct position. It should be noted that full clockwise adjustment will result in the valve being closed permanently.

#### c) Pilot

For valves fitted with an integral pilot valve, adjustment can be made, having removed the black plastic cover on the side of the valve and then by turning the pilot rate adjustment screw clockwise to reduce, and anticlockwise to



increase The maximum pilot rate is restricted to being 25% of the maximum valve throughput.

**d) Wiring the 4 pin Hirshman Plug**

	<b>Colour</b>	<b>Function</b>
1	Blue	Neutral
2	Brown	First valve pilot gas for units with internal pilot / main gas for units with external pilot
3	Black	Second valve main gas for units with internal pilot / high fire gas hi-lo burners
4	Yel/Grn	Earth

**Note**

On high fire / low fire units the second solenoid affects only the high fire output. The low fire output can be adjusted by slackening off the cheese head screw and turning the knurled ring at the base of the solenoid, after any such adjustment the screw must be tightened to re-clamp the ring in the correct position.

5.0 Fault Diagnosis

Fig 19

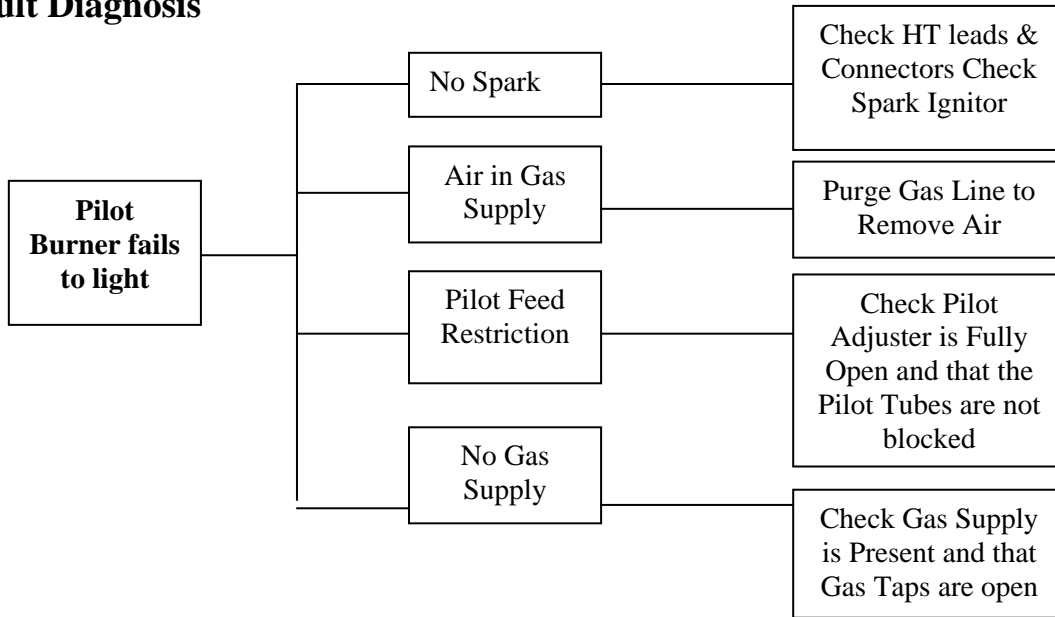


Fig 20

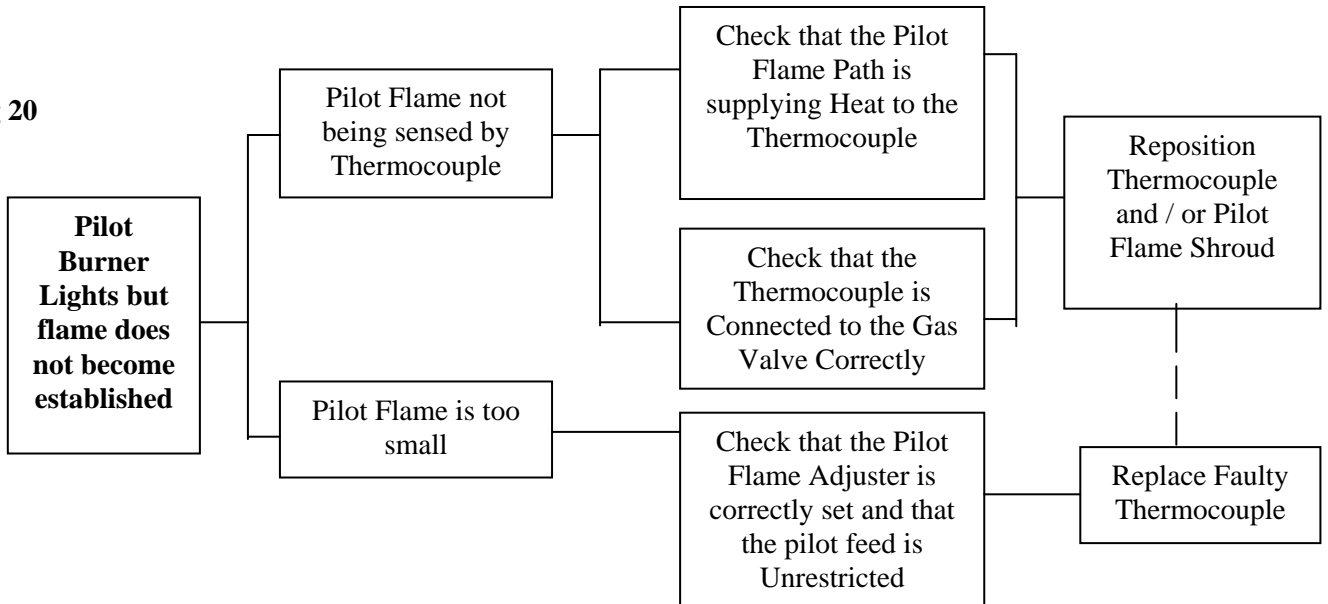


Fig 21

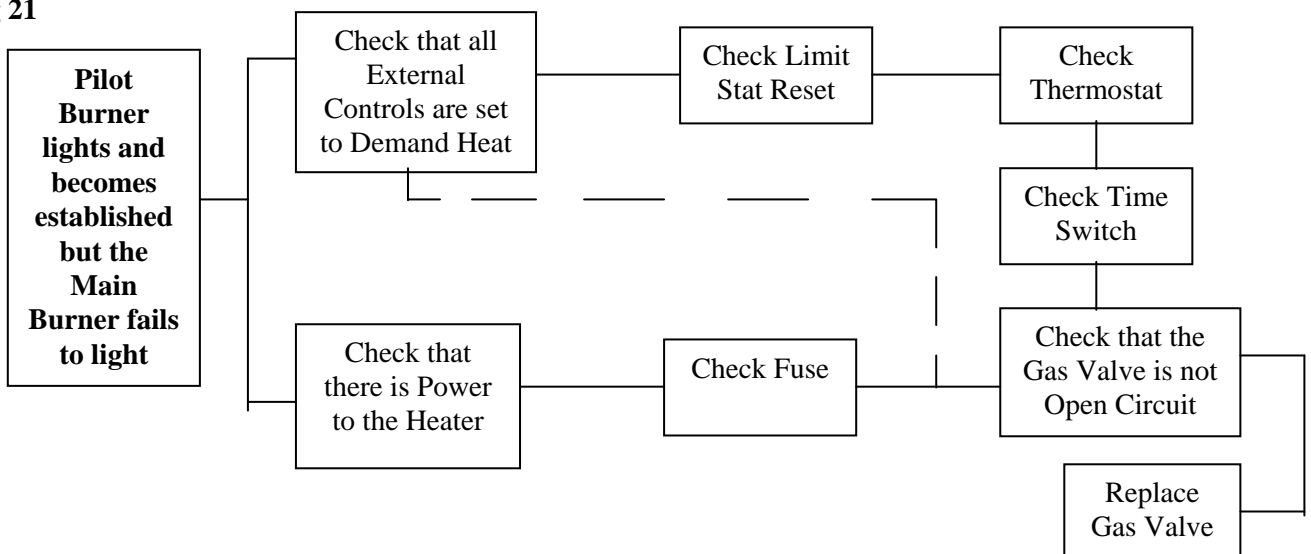


Fig 22

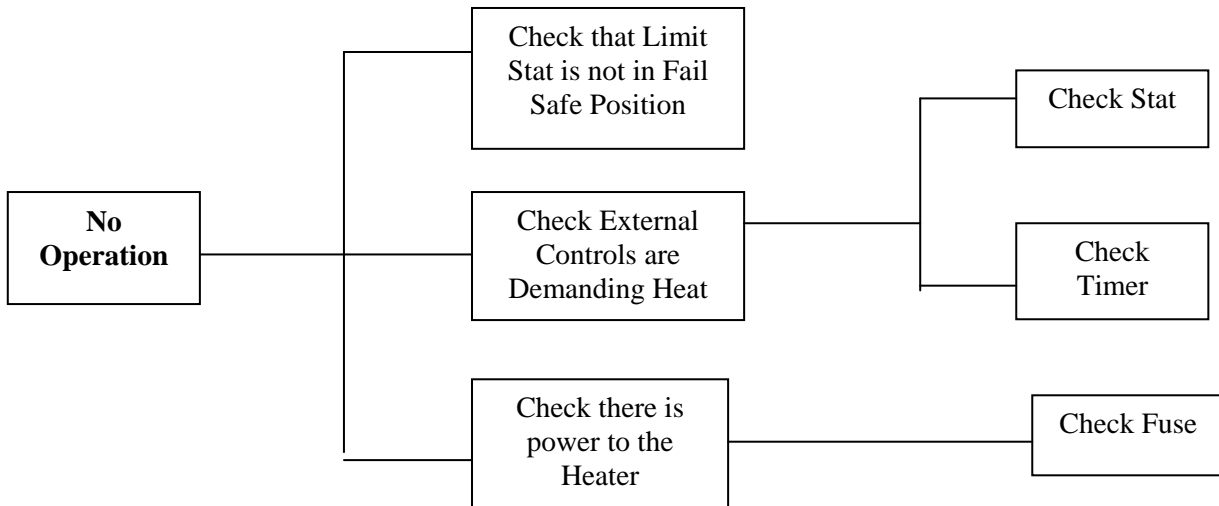


Fig 23

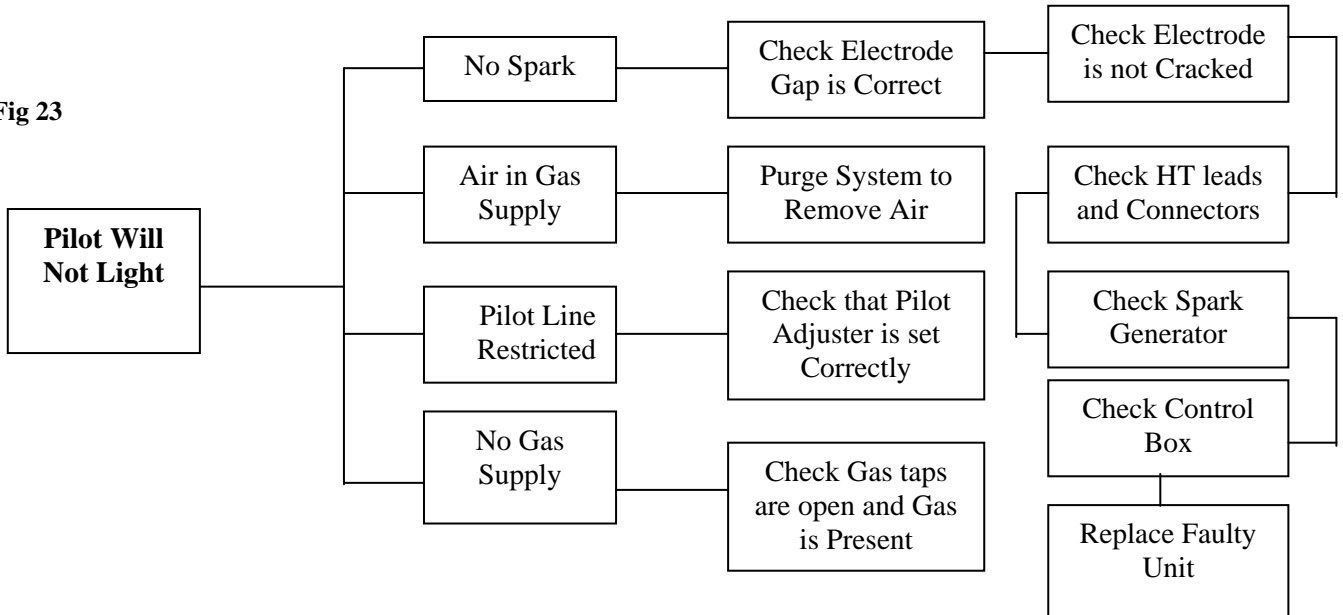


Fig 24

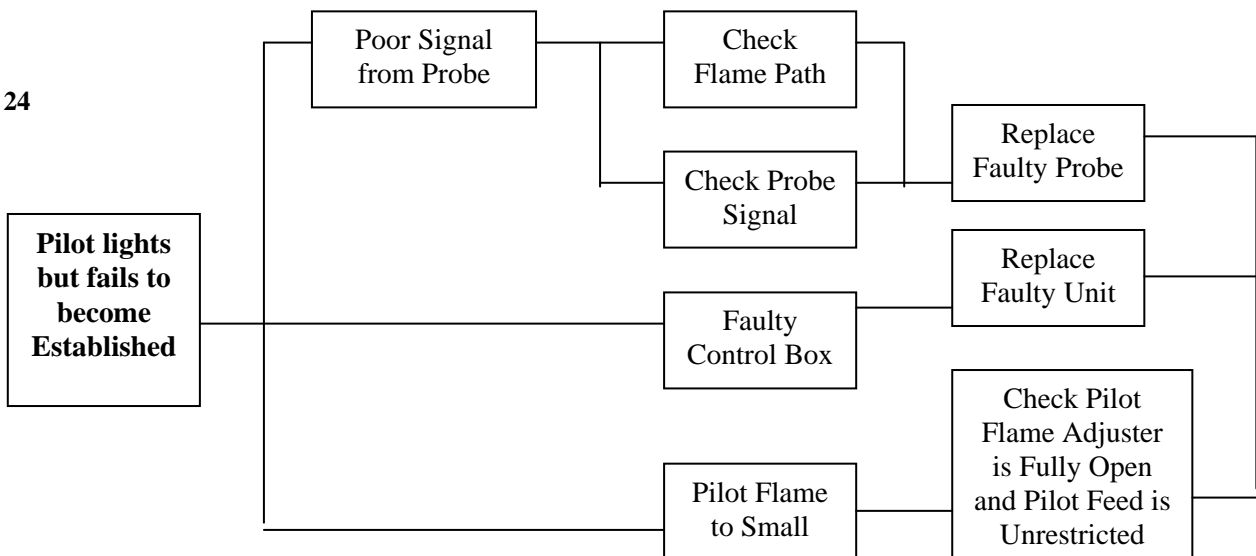
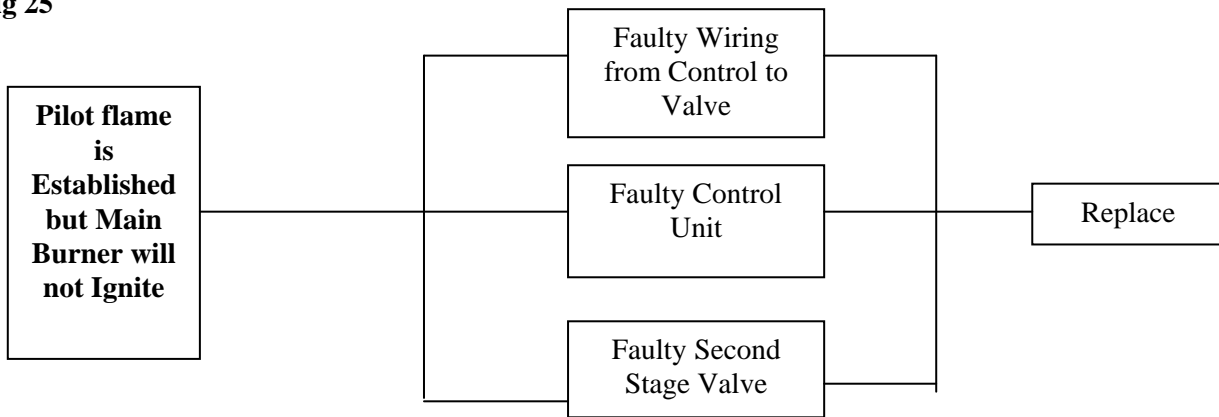


Fig 25



**Manual and Automatic Operation**

Fig 26

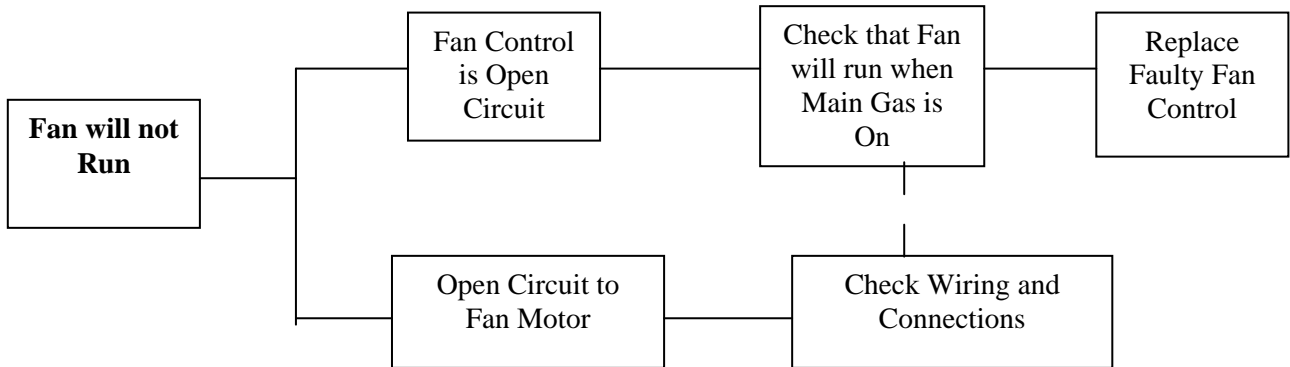
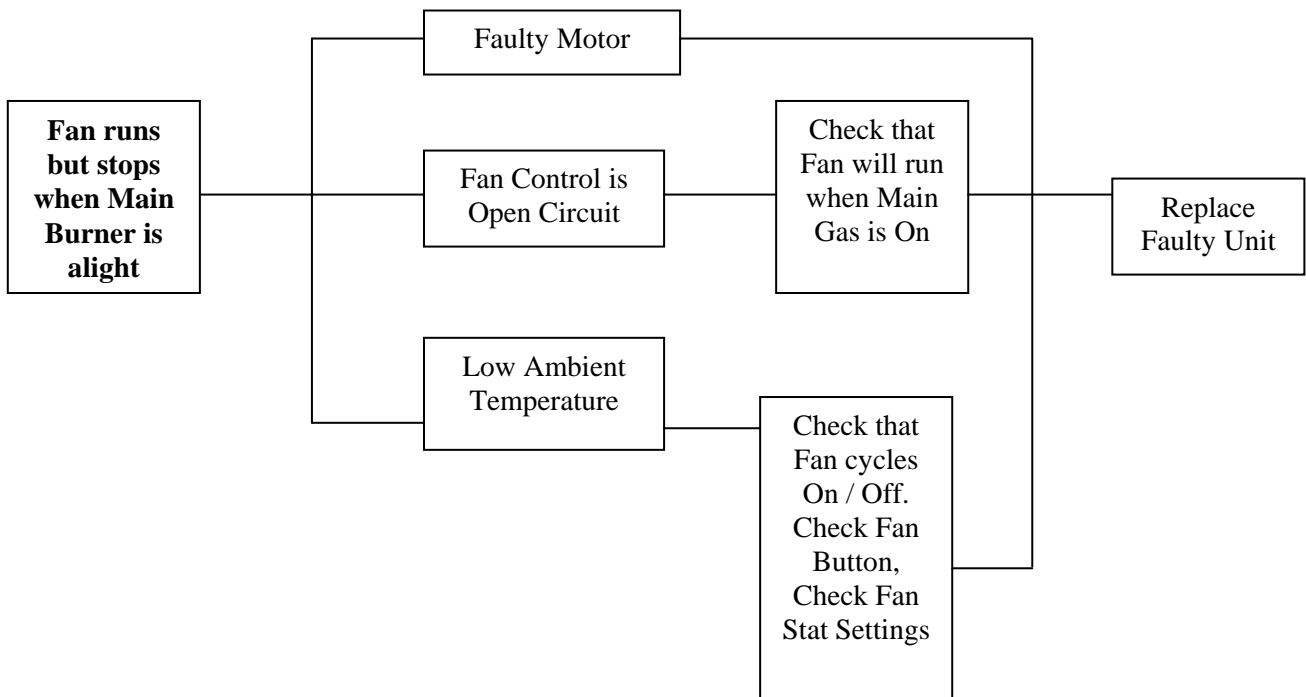
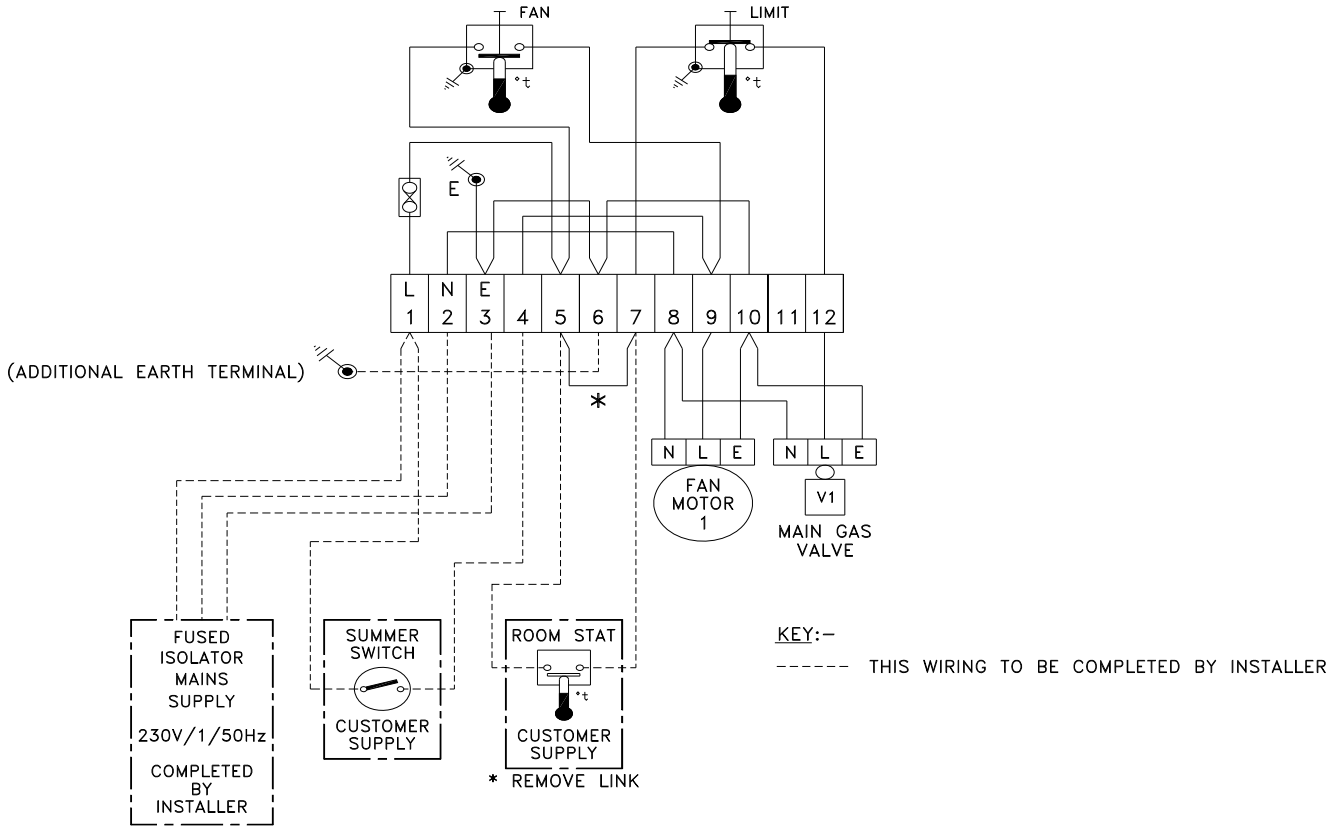


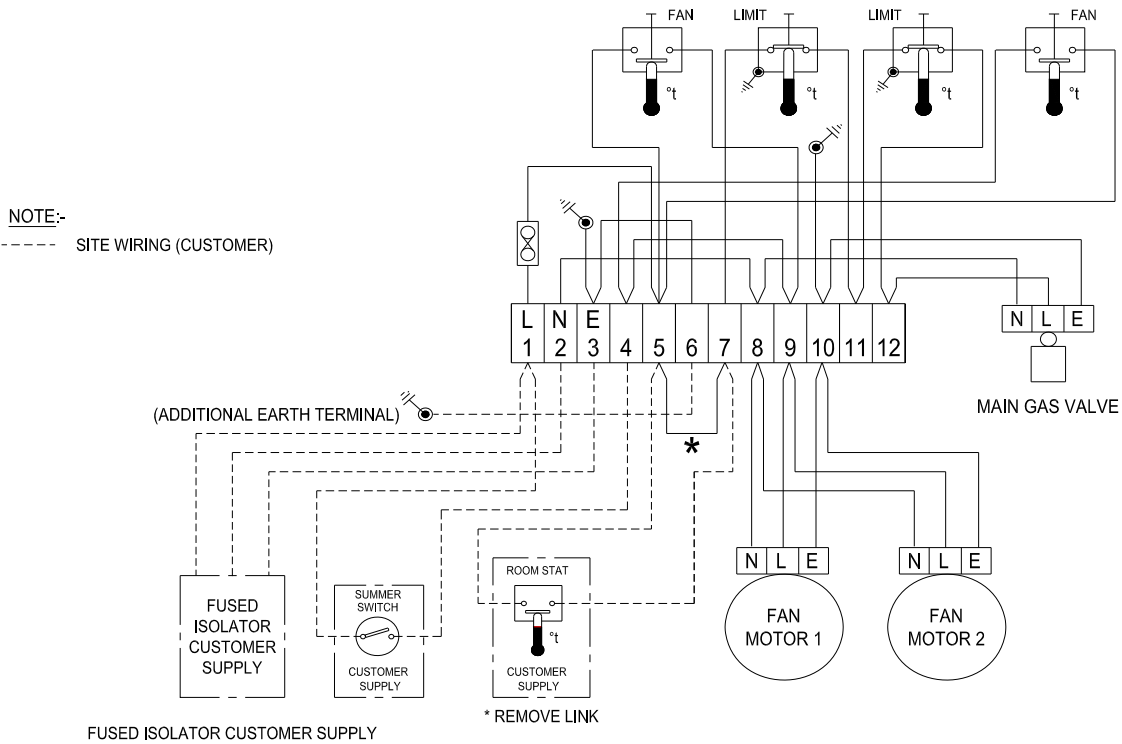
Fig 27



6.0 Wiring Diagrams



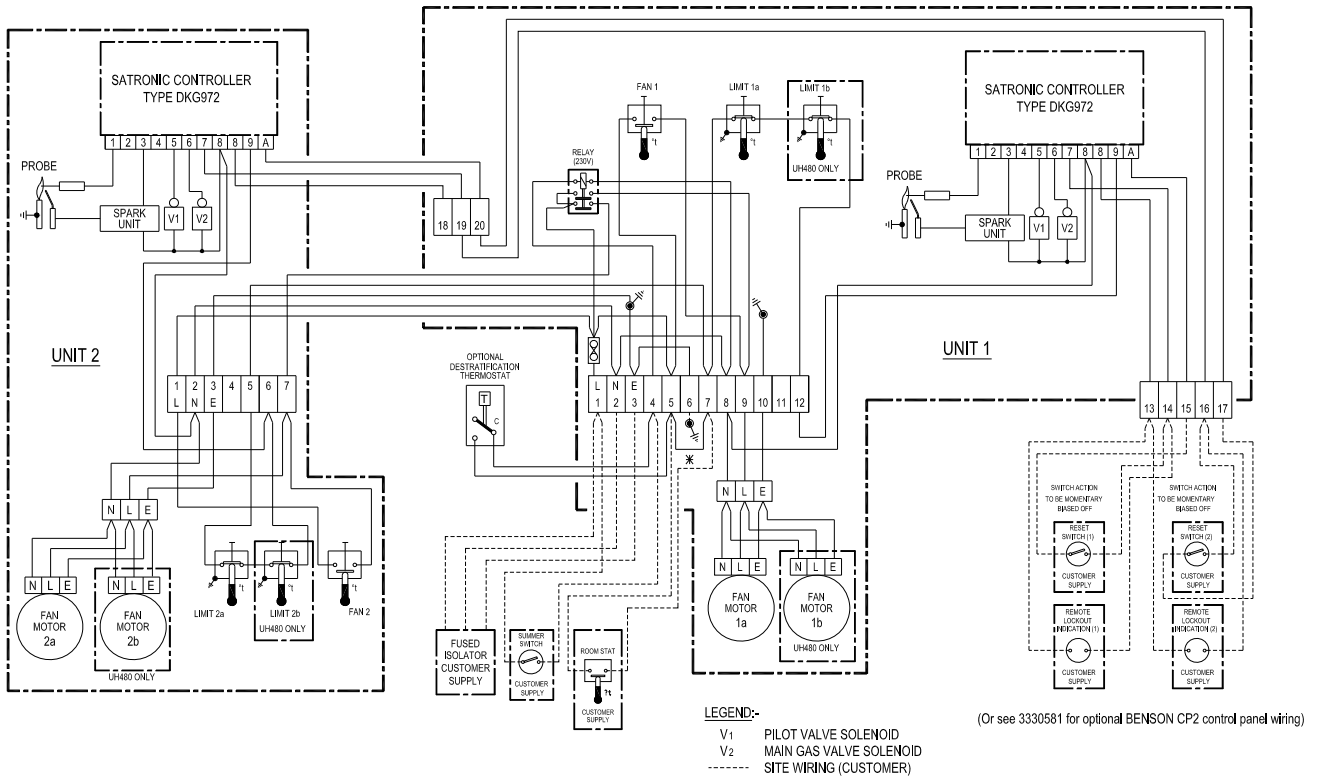
GUH 50 – 165 Piezo Ignition





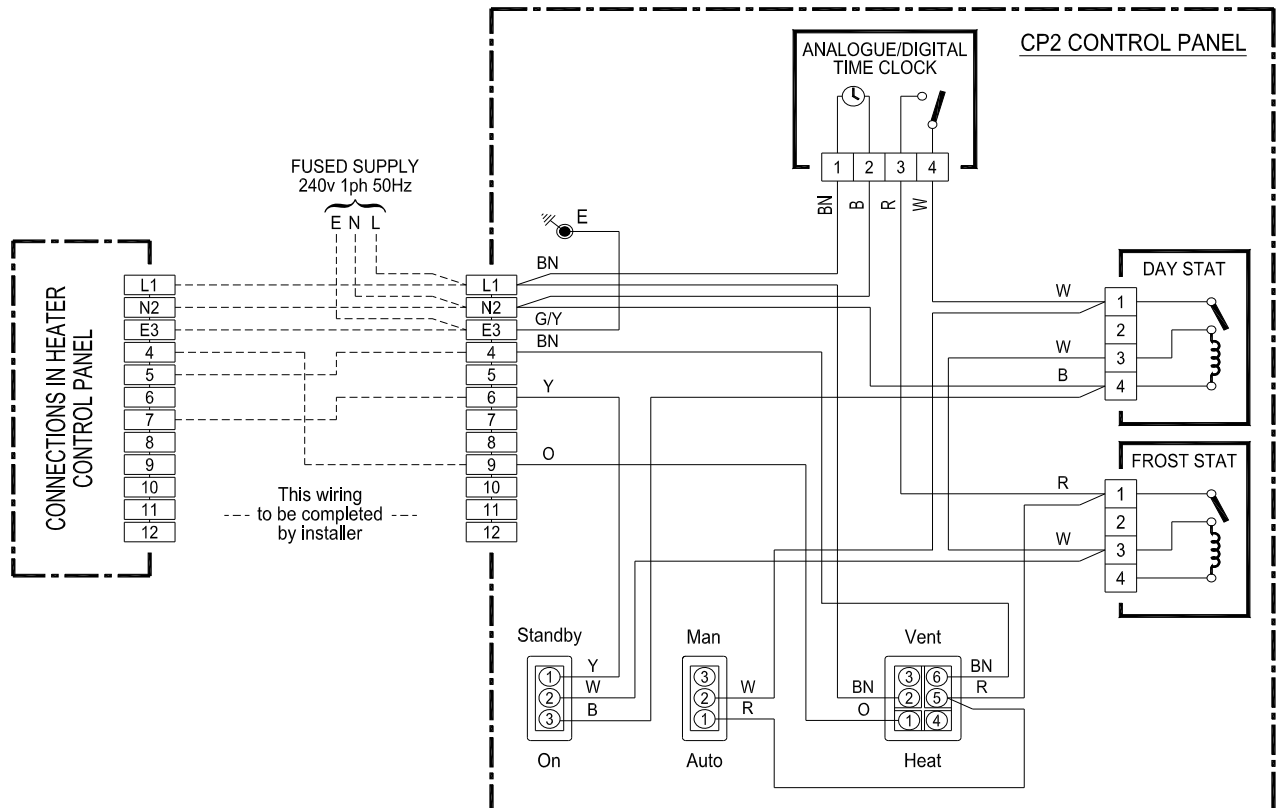
# GUH RANGE GAS FIRED UNIT HEATERS

## GUH 400-408 Piezo Ignition



## GUH 400 – 480 Automatic Ignition

# GUH RANGE GAS FIRED UNIT HEATERS



## CP2 Controller Piezo Ignition











## 7.0 Technical Data

Formulae for calculating efficiency are detailed as follows

$q1$  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 / (m<sup>3</sup>K) )

$t1$  is the average combustion air temperature (in °C)

$t2$  is the average temperature of the products (in °C)

$H_i$  is the net calorific value of the gas at 1013 mbar and 15°C, dry (in MJ / m<sup>3</sup>)

$H_s$  is the gross calorific value of the gas at 1013 mbar and 15°C, dry (in MJ / m<sup>3</sup>)

$V_f$  is the volume of dry products of combustion per unit volume of gas (in m<sup>3</sup>)

$V_f$  is calculated from the volume of CO<sub>2</sub> (  $V_{CO_2}$  ) produced by the combustion of 1m<sup>3</sup> of gas (see table below), and from the CO content of the products of combustion (  $V_{CO_2M}$  )

$$V_f = \frac{V_{CO_2}}{V_{CO_2M}} \times 100$$

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

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

$$E (net) = 100 + (q1 - q2)$$

Where

$$q1 = C1 \times V_f \frac{t_2 - t_1}{H_i} \times 100$$

$$q2 = 0.077 \frac{H_s - H_i}{H_i} (t_2 - t_1)$$

## 7.1 Technical Data Common Information

Gas supply Types	I <sub>2E+</sub> I <sub>2E(R)B</sub> I <sub>2H</sub> I <sub>2R</sub>
Destinations	BE FR GB IE NL
Appliance Type	B <sub>11</sub>
PIN / report no	63AQ0533 / 160009
Electrical Supply	230V 50Hz 1ph
Fuse Rating	6 / 10 AMP
IP Rating	IP44
Fan Limit Settings	Fan On 60°C Fan Off 30°C Limit 100°C

**7.2 Unit Heater Models Technical Data**

MODEL NATURAL GAS		GUH50	GUH75	GUH100	GUH125	GUH165	GUH205
<b>HEAT OUTPUT</b>	kW	15.2	22	29.3	37.0	48.4	61.6
	Btu	51,900	75,000	100,000	126,250	165,140	210,180
<b>HEAT INPUT (Gross)</b>	kW	20.1	28.2	37.5	47.6	62.3	79.2
	Btu	68,600	96,200	128,000	162,500	212,600	270,300
<b>MIMIMUM INLET PRESSURE</b>	mbar	17.5	17.5	17.5	17.5	17.5	17.5
	Ins WG	7	7	7	7	7	7
<b>BURNER PRESSURE</b>	mbar	13.2	13.0	6.5	7.1	7.4	7.4
	Ins WG	5.3	5.2	2.6	2.8	3.0	3.0
<b>NAT GAS CONSUMPTION</b>	ft <sup>3</sup> /hr	66.6	93.4	124.3	157.8	206.3	262.5
	m <sup>3</sup> /hr	1.9	2.65	3.5	4.5	5.85	7.45
<b>TEMPERATURE RISE</b>	°C	28	34	33	32.6	32.5	33
	°F	82	93	91	90	90	91
<b>AIR FLOW</b>	ft <sup>3</sup> /min	934	1114	1528	1860	2485	3060
	m <sup>3</sup> /sec	0.441	0.526	0.721	0.878	1.173	1.444
<b>AXIAL FAN THROW</b>	ft	35	40	50	55	65	65
	mtrs	10.9	12.4	15.5	17.1	20.2	20.2
<b>CENTRIFUGAL FAN STATIC PRESSURE</b>	Pa	75	100	100	125	163	125
	Ins WG	0.3	0.4	0.4	0.5	0.65	0.5
<b>SOUND LEVEL</b>	DbA	57	63	63	69	72	72
<b>GAS CONNECTION</b>	BSP	3/4	3/4	3/4	3/4	3/4	3/4
<b>MAIN INJECTOR NATURAL GAS</b>	mm	1.8	1.8	2.6	2.6	2.6	2.6
	No Off	4	6	5	6	8	10
<b>FLUE DIAMETER</b>	mm	125	125	150	175	200	200
<b>ELECTRICITY SUPPLY</b>		230/1/50	230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
<b>ELECTRICAL POWER (AMPERES)</b>	Axial	0.4	0.8	0.8	1.5	1.7	2.0
	Cent						
<b>FUSE RATING Axial</b>	Amps	6	6	6	6	6	6
<b>POWER ABSORPTION Kw</b>	Axial	0.1	0.15	0.15	0.36	0.36	0.3
	Cent	0.4	0.63	0.63	0.85	1.05	1.26
<b>AIR OUTLET VENTILATION AREA</b>	cm <sup>2</sup>	90	127	169	215	275	313
	in <sup>2</sup>	14	20	26	34	43	49
<b>MOUNTING HEIGHT (MTRS)</b>	Min	1.82	1.82	2.12	2.42	2.73	2.73
	Max	2.73	2.73	3.03	3.33	3.94	3.94
<b>GROSS FLUE TEMP</b>	°C	170	180	170	180	170	180
<b>WEIGHT Kgs</b>	Axial	70	88	107	123	155	188
	Cent	81	101	120	136	175	216

**7.2 Unit heater Technical Data Contd**

MODEL NATURAL GAS		GUH250	GUH285	GUH325	GUH400	GUH480
<b>HEAT OUTPUT</b>	kW	73.3	85.0	95.3	117.3	140.7
	Btu	250,000	290,000	325,000	400,000	480,000
<b>HEAT INPUT (Gross)</b>	kW	93.5	110.7	124.1	151.0	182.7
	Btu	319,000	377,700	423,400	515,000	623,500
<b>MIMIMUM INLET PRESSURE</b>	mbar	17.5	17.5	17.5	17.5	17.5
	Ins WG	7	7	7	7	7
<b>BURNER PRESSURE</b>	mbar	7.1	8.1	8.3	6.7	7.0
	WG	2.8	3.2	3.3	2.7	2.8
<b>NAT GAS CONSUMPTION</b>	ft <sup>3</sup> /hr	300	341	396	494	600
	m <sup>3</sup> /hr	8.5	9.65	11.2	14	17
<b>TEMPERATURE RISE</b>	°C	34.3	33	33	33	34.3
	°F	94	91	91	91	94
<b>AIR FLOW</b>	ft <sup>3</sup> /min	3530	4284	4899	6120	7060
	m <sup>3</sup> /sec	1.666	2.022	2.312	2.888	3.332
<b>AXIAL FAN THROW</b>	ft	70	80	90	65	70
	mtrs	21.7	24.8	28	20.2	21.7
<b>CENTRIFUGAL FAN STATIC PRESSURE</b>	Pa	125	163	163	150	163
	ins WG	0.5	0.65	0.65	0.6	0.65
<b>SOUND LEVEL</b>	Db	72	70	70	72	73
<b>GAS CONNECTION</b>	BSP	3/4	3/4	3/4	2 x 3/4	2 x 3/4
<b>MAIN INJECTOR NATURAL GAS</b>	mm	2.6	2.6	2.6	2.6	2.6
	No Off	12	14	16	20	24
<b>FLUE DIAMETER</b>	mm	250	250	300	300	300
<b>ELECTRICITY SUPPLY</b>		230/1/50	230/1/50	230/1/50	230/1/50	230/1/50
<b>ELECTRICAL POWER (AMPERES)</b>	Axial	1.9	3.1	3.3	4.0	3.9
	Cent	8.4	8.4	9.6	9.6	8.4
<b>FUSE RATING Axial</b>	Amps	6	6	6	10	10
<b>POWER ABSORPTION Kw</b>	Axial	0.3	0.72	0.72	1.1	0.6
	Cent	1.26	1.26	2.1	2.1	2.5
<b>AIR OUTLET VENTILATION AREA</b>	cm <sup>2</sup>	346	384	414	475	546
	in <sup>2</sup>	54	60	64	72	85
<b>MOUNTING HEIGHT (MTRS)</b>	Min	2.73	2.73	2.73	2.73	2.73
	Max	3.94	4.24	4.24	4.24	3.95
<b>GROSS FLUE TEMP</b>	°C	170	170	170	140	150
<b>WEIGHT Kgs</b>	Axial	218	266	303	386	436
	Cent	246	313	351	442	492





**8.0 Reference Information**

<b>Doc/Ref</b>	<b>Title/Subject</b>
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 pipework < 28mm
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 228/1	See also BS 2779 and BS 5380) Pipe Threads Seals and Couplings
UP / 1	Replaces IM / 5 and IM / 16 Installation of Gas Appliances
UP / 2	Replaces IM / 7 Installation of Gas Appliances

**9.0 Parts list**

<b>Part Description</b>	<b>GUH 50</b>	<b>GUH 75</b>	<b>GUH 100</b>	<b>GUH 125</b>	<b>GUH 165</b>	<b>GUH 205</b>
Heat Exchanger Assy	33-10-598	33-10-599	33-10-600	33-10-601	33-10-602	33-10-603
Draught Diverter Assy	33-20-598	33-20-592	33-20-559	33-20-606	33-20-607	33-20-611
Gas Train Assembly	33-20-261	33-20-264	33-20-263	33-20-264	33-20-265	33-20-266
Pilot Installation Rhs	33-30-330	common	common	common	common	common
Control Box Assembly	33-20-326	common	common	common	common	common
Flue Kit Assembly	N/A	N/A	N/A	N/A	N/A	N/A
Control Box Lid	33-20-865	common	common	common	common	common
F & L Stat L4064 8"	28-60-023	common	common	common	common	common
Limit Thermostat (IMIT)	N/A	N/A	N/A	N/A	N/A	28-40-059
Choke Plate Weld Assy	33-30-540	common	33-30-240	common	common	common
Manifold Assy Rhs	33-10-150	33-10-152	33-10-151	33-10-152	33-10-153	33-10-154
Copper Washer	91-00-052	common	common	common	common	common
Injector Nat Gas	33-30-538	common	33-30-302	common	common	common
Gasket	33-30-295	common	common	common	common	common
Gas Valve(Honeywell)	28-30-114	common	common	common	common	common
Pilot Burner c/w shear olive	28-90-148	common	common	common	common	common
Pilot Injector	28-90-153	common	common	common	common	common
Thermocouple	33-50-004	common	common	common	common	common
Ignition Electrode	28-90-156	common	common	common	common	common
Ignition Lead	28-02-172	common	common	common	common	common
Burner	33-00-123	common	33-00-124	common	common	common
Fuse Holder	28-07-050	common	common	common	common	common
Fuse 10 x 38 Axial	28-07-048	common	common	common	common	28-07-048
Fuse 10 x 38 Centrifugal	28-07-048	common	common	common	common	28-07-048
Fan/Motor Guard Assy Axial	28-09-041	28-09-039	28-09-039	28-09-040	28-09-036	28-09-042
Fan/Motor Guard Assy Cent	28-09-025	28-09-001	28-09-001	28-09-001	28-09-002	28-09-001
Fan Plenum Axial	33-10-626	33-10-634	33-10-540	33-10-554	33-10-528	33-10-567
Fan Plenum Cent	33-00-169	33-00-168	33-00-167	33-00-166	33-00-165	33-00-161
*Down Flow head 30 Deg	33-20-476	33-20-477	33-10-427	33-10-428	33-10-429	33-10-430
*Down Flow Head 90 Deg	33-20-502	33-20-503	33-20-504	33-20-505	33-20-506	33-20-507
*Vertical Louvre	33-20-943	common	33-20-873	common	common	common
*CP2 Control Panel	33-10-424	common	common	common	common	common
*Flue Ventor Assy	33-20-751	common	33-20-752	33-20-753	33-20-754	common

\* Items marked are available as Optional Extras

**Parts list Contd**

<b>Part Description</b>	<b>GUH 250</b>	<b>GUH 285</b>	<b>GUH 325</b>	<b>GUH 400</b>	<b>GUH 480</b>
Heat Exchanger Assy	33-10-664	33-10-604	33-10-605	33-10-603	33-10-664
Draught Diverter Assy	33-20-665	33-10-615	33-10-609	33-20-611	33-20-665
Gas Train Assembly Rhs	33-10-683	33-20-554	33-20-554	30-20-266	30-10-683
Gas Train Assembly Lhs	N/A	N/A	N/A	33-10-712	33-10-717
Pilot Installation	33-30-330	33-30-553	33-30-553	33-30-330	33-30-330
Pilot Installation Lhs	N/A	N/A	N/A	33-10-713	33-10-713
Control Box Assembly	33-20-326	33-20-326	33-20-326	33-10-716	33-10-715
Flue Kit Assembly	N/A	N/A	N/A	33-21-155	33-21-155
Control Box Lid	33-20-865	common	common	33-20-865	common
F & L Stat L4064 8"	28-60-023	common	common	28-60-023	common
Limit Thermostat (IMIT)	28-40-059	common	common	common	common
Choke Plate Weld Assy	33-30-240	common	common	33-30-240	common
Manifold Assy Rhs	33-10-682	33-10-155	33-10-156	33-10-154	33-10-682
Manifold Assy Lhs	N/A	N/A	N/A	33-10-715	33-10-718
Copper Washer	91-00-052	91-00-052	91-00-052	91-00-052	91-00-052
Injector Nat Gas	33-30-302	common	33-30-302	common	33-30-302
Gasket	33-30-295	common	33-30-295	common	33-30-295
Gas Valve(Honeywell)	28-30-114	28-30-103	28-30-103	28-30-114	28-30-114
Pilot Burner c/w shear olive	28-90-148	common	28-90-148	common	28-90-148
Pilot Injector	28-90-153	28-90-153	common	28-90-153	common
Thermocouple	33-50-004	35-50-004	35-50-004	35-50-004	35-50-004
Ignition Electrode	28-90-156	common	28-90-156	common	28-90-156
Ignition Lead	28-02-172	28-02-172	28-02-172	28-02-172	28-02-172
Burner	33-00-124	common	33-00-124	common	33-00-124
Fuse Holder	28-07-050	28-07-050	28-07-050	28-07-050	28-07-050
Fuse 10 x 38 Axial	28-07-048	28-07-048	28-07-048	28-07-049	28-07-049
Fuse 10 x 38 Centrifugal	28-07-048	common	28-07-051	28-07-051	28-07-051
Fan/Motor Guard Assy Axial	28-09-042	28-09-040	28-09-036	28-09-042	28-09-042
Fan/Motor Guard Assy Cent	28-09-001	28-09-001	28-09-002	28-09-002	28-09-001
Fan Plenum Axial	33-10-670	33-10-578	33-10-592	33-21-154	33-10-670
Fan Plenum Cent	33-10-672	33-00-164	33-00-163	33-10-706	33-10-672
*Down Flow head 30 Deg	33-10-678	33-10-431	33-10-432	33-10-430	33-10-678
*Down Flow Head 90 Deg	33-10-675	33-20-508	33-20-509	33-20-507	33-10-675
*Vertical Louvre	33-20-873	common	33-20-873	common	33-20-873
*CP2 Control Panel	33-10-424	common	33-10-424	common	33-10-424
*Flue Ventor Assy	33-20-754	33-20-755	TBA	TBA	TBA

\* Items marked are available as Optional Extras

## 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 GUH Cabinet Heater range manufactured by Benson Heating. These heaters are manufactured within a strictly controlled quality system to ISO 9001.

All Benson Heating 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 4.1 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

#### Warning

If during the following sequence of operations the heater fails to operate correctly the fault should be traced and rectified before proceeding, if necessary referring to section 5.0 fault diagnosis. If for any reason the pilot light is extinguished **no attempt should be made to re light it within three minutes**

- a) Switch on electrical supply
- b) Turn on gas supply, and open burner viewing port

c) Depress and hold in control start button whilst operating igniter until pilot light is present

d) Hold in start button for at least one minute to establish pilot - carefully release button confirming presence of pilot

**Warning**

If the pilot fails to become established **do not** attempt to re light for at least three minutes , if the pilot is established continue as follows.

e) Close burner viewing port

f) Set the thermostat to the highest setting, and the main burner will light then re-open the viewing port and check that the main burner is providing a good flame i.e. even, stable, and conical.

**Caution**

If the fan fails to operate within approximately two minutes and the heater goes to overheat it will shut down through breaking the circuit to the gas valve, the cause must be ascertained and rectified before re-ignition.

Once the limit thermostat has tripped out it must be manually reset to allow re-ignition to take place.

g) Set controls as required

**10.4 Ignition sequence automatic versions**

Automatic control is by way of a Satronic controller (with automatic gas valve replacing the manual standing pilot valve) used in conjunction with a Satronic spark generator (which replaces the piezo igniter as fitted to manual units) , giving a maximum pilot sequence of 15 seconds.

Flame supervision is via a flame sensor rod. instead of the thermocouple as fitted to the manual units.

The sequence is as follows: as per 10.3 a-i  
The start signal will ignite the pilot, once the flame proving has taken place the main gas valve will supply the burner and burner ignition will occur.

**10.5 Stop procedure**

(a) Set controller to off position.

(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.

**10.6 Shut down procedure**

(a) Follow steps 10.5 (a) and (b), when fan stops turn main electrical isolator off, and shut gas supply cock

**10.7 Ventilation only**

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

**10.8 Lockout situations**

If either the burner or the fan and limit stat go 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.

**10.9 Contact information**

Further information is available from :-

Benson Heating  
Ludlow Road  
Knighton  
Powys  
LD7 1LP

Telephone 01547 528534

Facsimile 01547 520399

**Benson Heating is a Division of Benson Climate Systems Ltd**