

CE

The PGUH Range

Series 3

Installation and Servicing Instructions

WARNING: THIS APPLIANCE MUST BE EARTHED

£2.50 When supplied separately.

PGUH Range Issue 13 October 2002

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1. INTRODUCTION

The Powrmatic PGUH range of gas fired natural draught, open flued, fanned circulation air heaters cover a heat output range of 11.7kW to 150.0kW. They are certified for use on Natural Gas, Group H - G20, Propane - G31 and, with the exception of the PGUH 12, Butane - G30.

Appliance Categories are:-

PGUH 12 - Cat II2H3P

PGUH 15 - 150 - Cat II2H3+.

The heaters are designed to be suspended from suitable roof points or alternatively to be mounted on purpose designed brackets and are intended primarily for heating commercial or industrial premises.

PGUH-F heaters have an axial fan assembly fitted at the rear to circulate the air being heated through the clam-shell heat exchanger. A centrifugal fan variation is presented in the PGUH-C range for use with ducted systems and the PGUH-D range, in having no fan fitted, is for ducted systems where the air moving fan is by others.

Heaters are fitted with atmospheric bar burners, a low energy permanent pilot ignited by a piezo spark generator, a multifunctional control for gas supply control and safety functions, a fan timer and limit thermostat.

Options include automatic ignition by a full sequence control with low level reset, High/Low or modulating burner controls, inlet duct connection/fan silencer, outlet duct connection, 45° head, 90° outlet bend, nozzle outlet and vertical/horizontal outlet louvre assembly.

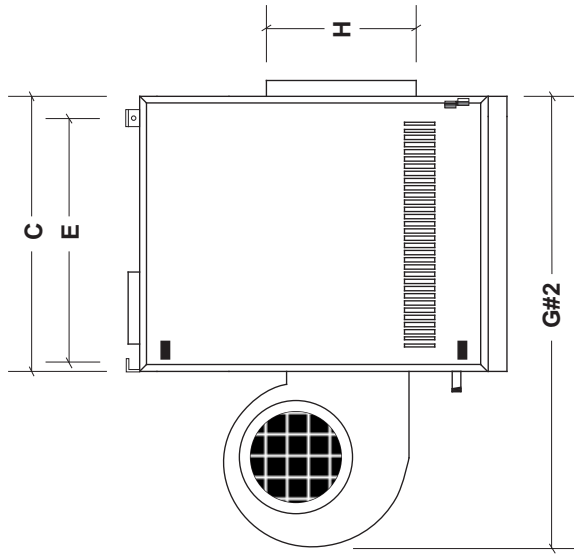
Each air heater must be connected to an individual open flue system only. The draught diverter is integral with the heater.

Gas Safety (Installation & Use) Regulations 1994

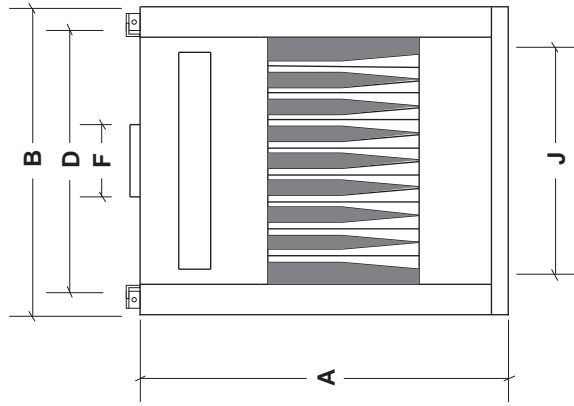
It is law that all gas appliances are installed, adjusted and, if necessary, converted by qualified persons* in accordance with the above regulations. Failure to install appliances correctly can lead to prosecution. It is in your own interests and that of safety to ensure that the law is complied with.

* e.g. Corgi Registered

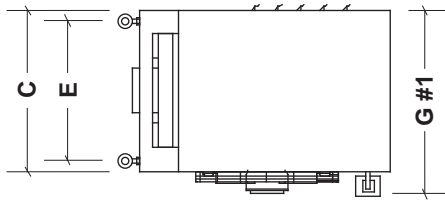
2 Technical Data



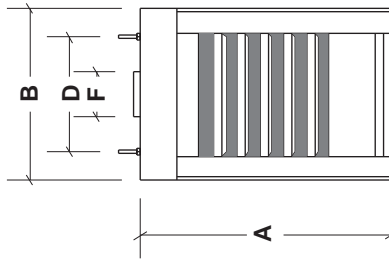
Side View



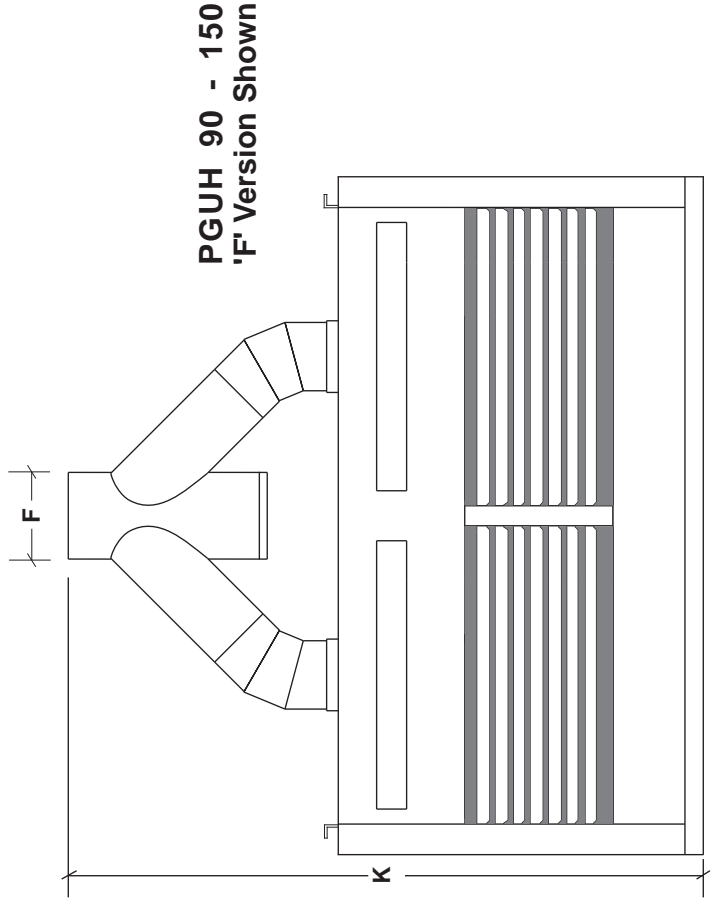
PGUH 45 - 75
'C' Version Shown



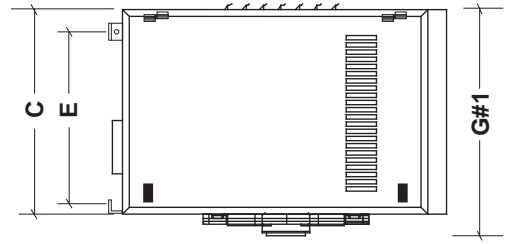
PGUH 12
'F' Version Shown



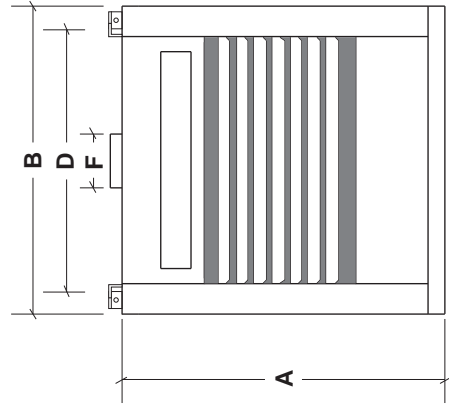
Front View



PGUH 90 - 150
'F' Version Shown



PGUH 15 - 30
'F' Version Shown



Front View

**Table 1
Dimensions**

	A	B	C	D #1	D #2	E	F	G #1	G #2	H	J	K
PGUH 12	700	480	450	320	320	390	125	535	818	360	347	N/A
PGUH 15	960	875	595	737	775	462	150	680	1207	492	720	
PGUH 22								692	1020			
PGUH 30								1207				
PGUH 45	1083	1025	795	887	925	663	200	895	1257	870		
PGUH 52								892				
PGUH 60								935	1295			
PGUH 75								938	1257			
PGUH 90								895				
PGUH 105	892											
PGUH 120	1615	1477	1516	1777	1815	250	935	1295	1460	1598		
PGUH 150							1915	938	1257	1760	1808	

D #1 - Front, D #2 - Back

Table 2 - Specifications

MODEL	HIGH FIRE		LOW FIRE		AIR VOLUME		MAXIMUM DUCT RESISTANCE		FAN MOTOR		WEIGHT kg	
	INPUT (Nett)	OUTPUT	INPUT (Nett)	OUTPUT	Standard	High	Standard	High	Standard	High		
	kw		kw		m³/s		pa		kw			
PGUH 12	F	13.20	12.0	7.90	7.03	0.2486	0.3375	N/A	N/A	0.030	0.08	50
	C							100	125	0.335	0.55	56
PGUH 15	F	17.05	15.0	8.52	7.5	0.4219	0.5370	N/A	N/A	0.040	0.10	98
	C							194	170	0.355	0.55	110
PGUH 22	F	25.57	22.5	12.78	11.25	0.6327	0.8060	N/A	N/A	0.100	0.18	98
	C							260	245	0.550	0.75	110
PGUH 30	F	34.09	30.0	17.05	15.0	0.8438	1.0740	N/A	N/A	0.100	0.25	98
	C							232	245	0.550	1.10	110
PGUH 45	F	51.14	45.0	25.57	22.5	0.8705	1.1813	N/A	N/A	0.100	0.37	134
	C							212	155	0.560	1.10	155
PGUH 52	F	59.66	52.5	29.83	26.25	1.0569	1.4347	N/A	N/A	0.120	0.41	134
	C							145	165	0.560	1.50	155
PGUH 60	F	68.18	60.0	34.09	30.0	1.2436	1.6877	N/A	N/A	0.370	0.50	134
	C							74	200	0.990	1.50	155
PGUH 75	F	85.23	75.0	42.61	37.5	1.4925	2.0255	N/A	N/A	0.370	0.50	153
	C							120	40	0.750	1.50	185
PGUH 90	F	102.27	90.0	51.14	45.0	1.741	2.3626	N/A	N/A	2 x 0.100	2 x 0.37	268
	C							212	155	2 x 0.560	2 x 1.10	310
PGUH 105	F	119.32	105.0	59.66	52.5	2.1138	2.8694	N/A	N/A	2 x 0.120	2 x 0.41	268
	C							145	165	2 x 0.990	2 x 1.50	310
PGUH 120	F	136.36	120.0	68.18	60.0	2.4872	3.3754	N/A	N/A	2 x 0.370	2 x 0.50	268
	C							74	200	2 x 0.990	2 x 1.50	310
PGUH 150	F	170.45	150.0	85.23	75.0	2.985	4.0510	N/A	N/A	2 x 0.370	2 x 0.50	310
	C							120	40	2 x 0.750	2 x 1.50	374

Table 3.1
Injector Sizes & Burner Pressures Natural Gas - Group H - G20 Net CV (Hi) = 34.02MJ/m³
Inlet pressure 20mbar

Inlet Pressure 20mb	INJECTORS			High Fire		Low Fire	
				Burner Pressure	Gas Rate	Burner Pressure	Gas Rate
MODEL	No.	Size mm	Marked	mbar	m ³ /h	mbar	m ³ /h
PGUH 12	4	1.59	159	13.7	1.40	4.9	0.84
PGUH 15	5	1.51	151	18.2	1.8	4.5	0.90
PGUH 22	6	1.7	170	15.5	2.7	4.5	1.35
PGUH 30	8	1.7	170	15.5	3.6	4.5	1.80
PGUH 45	6	2.46	246	15.5	5.41	4.5	2.71
PGUH 52	7	2.46	246	15.5	6.31	4.5	3.12
PGUH 60	8	2.46	246	15.5	7.21	4.5	3.61
PGUH 75	10	2.46	246	15.5	9.01	4.5	4.51
PGUH 90	12	2.46	246	15.5	10.81	4.5	5.41
PGUH 105	14	2.46	246	15.5	12.63	4.5	6.31
PGUH 120	16	2.46	246	15.5	14.43	4.5	7.21
PGUH 150	20	2.46	246	15.5	18.02	4.5	9.01

Pilot Injector
 Front Orifice dia
 0.38 mm
 Rear Orifice dia
 0.355 mm
 Pilot Rate 0.1 kW

Table 3.2
Injector Sizes & Burner Pressures - Propane G31 - Net CV (Hi) = 116.09MJ/m³
Inlet Pressure 37mbar

Inlet Pressure 20mb	INJECTORS			High Fire		Low Fire	
				Burner Pressure	Gas Rate	Burner Pressure	Gas Rate
MODEL	No.	Size mm	Marked	mbar	m ³ /h	mbar	m ³ /h
PGUH 12	4	1.14	114	22.0	0.54	6.8	0.32
PGUH 15	5	0.93	120	N/A	0.70	N/A	N/A
PGUH 22	6	1.04	150	N/A	1.05	N/A	N/A
PGUH 30	8	1.04	150	N/A	1.39	N/A	N/A
PGUH 45	6	1.45	280	N/A	2.09	N/A	N/A
PGUH 52	7	1.45	280	N/A	2.44	N/A	N/A
PGUH 60	8	1.45	280	N/A	2.79	N/A	N/A
PGUH 75	10	1.51	300	N/A	3.48	N/A	N/A
PGUH 90	12	1.45	280	N/A	4.19	N/A	N/A
PGUH 105	14	1.45	280	N/A	4.88	N/A	N/A
PGUH 120	16	1.45	280	N/A	5.58	N/A	N/A
PGUH 150	20	1.51	300	N/A	6.97	N/A	N/A

Pilot Injector
 Front Orifice dia
 0.20 mm
 Rear Orifice dia
 0.23 mm
 Pilot Rate 0.1 kW

Table 3.3
Injector Sizes & Burner Pressures Butane G30 Net CV (Hi) = 88.00MJ/m³
Inlet pressure 29mbar

Inlet Pressure 20mb	INJECTORS			High Fire	
				Burner Pressure	Gas Rate
MODEL	No.	Size mm	Marked	mbar	m ³ /h
PGUH 12	N/A	N/A	N/A	N/A	N/A
PGUH 15	5	0.93	120	N/A	0.53
PGUH 22	6	1.04	150	N/A	0.79
PGUH 30	8	1.04	150	N/A	1.06
PGUH 45	6	1.45	280	N/A	1.58
PGUH 52	7	1.45	280	N/A	1.85
PGUH 60	8	1.45	280	N/A	2.11
PGUH 75	10	1.51	300	N/A	2.64
PGUH 90	12	1.45	280	N/A	3.17
PGUH 105	14	1.45	280	N/A	3.70
PGUH 120	16	1.45	280	N/A	4.23
PGUH 150	20	1.51	300	N/A	5.28

Pilot Injector
 Front Orifice dia
 0.20 mm
 Rear Orifice dia
 0.23 mm
 Pilot Rate 0.1 kW

Table 4 - Electrical Loadings 1ph

Note: 3ph Data is supplied separately with units ordered to this specification.

MODEL	Standard Airflow					High AirFlow					
	MOTOR R.P.M.	PLATE AMPS (A)	START AMPS (A)	RUN AMPS (A)	FUSE RATING (A)	MOTOR R.P.M.	PLATE AMPS (A)	START AMPS (A)	RUN AMPS (A)	FUSE RATING (A)	
PGUH 12F	900	0.35	0.46	0.28	1	1500	1.37	1.6	1.33	2	
PGUH 15F		0.91	1.5	0.78	2	1500	1.60	3.5	1.70		
PGUH 22F			1.8	0.94			1.61	5.4	1.75		
PGUH 30F			1.6	1.23			2.60	5.3	2.56		3
PGUH 45F		0.87	1.60	1.10		1000	3.00	4.7	2.20		3
PGUH 52F	1500	1.00	1.80	1.33		1500	2.57	8.9	2.70		
PGUH 60F	3.00	6.10	1.95	3	4.00		5.2	3.87	5		
PGUH 75F		5.50	2.50				8.5	3.90			
PGUH 90F	2 x 1000	2 x 0.87	3.20		2.20	2 x 1000	2 x 3.00	9.4	4.40	10	
PGUH 105F		2 x 1.00	3.60		2.70	2 x 1500	2 x 2.57	17.8	5.40		7
PGUH 120F		2 x 3.00	12.20		3.90		5	2 x 4.00	10.4		7.74
PGUH 150F			11.00	5.00	7	17.0	7.80				
PGUH 12C	1000	2.60	2.80	1.80	3		2.60	5.40	3.60	5	
PGUH 15C	900	5.80	9.0	5.40	7	5.4	32.0	4.70	6.00		
PGUH 22C			9.0	5.50				4.80			
PGUH 30C			9.0	5.50				7			
PGUH 45C	1000	4.10	9.80	3.20		5	7.40	32.0	6.40		7
PGUH 52C			11.0	3.80					8.60		
PGUH 60C		7.40	13.0	5.50	1500		9.50	36.0	7.50	10	
PGUH 75C			37.0	6.60				7	36.0		9.20
PGUH 90C	2 x 1000	2 x 4.10	20.0	6.50		10	7.40	64.0	12.80	13	
PGUH 105C			22.0	7.00				10	9.50		64.0
PGUH 120C		2 x 7.40	26.0	11.0			13	9.50		72.0	15.00
PGUH 150C			74.0	13.0	15		72.0		18.40		

Table 5 - Damper Settings PGUH 'C' Units Standard Airflow

MODEL	DESIGN AIRFLOW	Distance of Damper Plate from Fan Casing (mm)								DUCT RESISTANCE
		20	30	40	50	60	70	80		
PGUH 12C	0.2486 m³/s	80	98	115	120	135	150		Pa	
PGUH 15C	0.6327 m³/s	192	210	240	245	250	255	260	Pa	
PGUH 22C	0.7172 m³/s	90	180	230	235	240	245	250	Pa	
PGUH 30C	0.8438 m³/s	110	160	196	210	228	230	232	Pa	
PGUH 45C	0.8705 m³/s	136	158	176	194	202	212		Pa	
PGUH 52C	1.0569 m³/s	40	84	108	122	140	145		Pa	
PGUH 60C	1.2436 m³/s			22	44	61	74	78	Pa	
PGUH 75C	1.4925 m³/s								Pa	
PGUH 90C	1.741 m³/s	2 x 136	2 x 158	2 x 176	2 x 194	2 x 202	2 x 212		Pa	
PGUH 105C	2.1138 m³/s	2 x 40	2 x 84	2 x 108	2 x 122	2 x 140	2 x 145		Pa	
PGUH 120C	2.4872 m³/s			2 x 22	2 x 44	2 x 61	2 x 74	2 x 78	Pa	
PGUH 150C	2.985 m³/s								Pa	

3. General Requirements

3.1 Related Documents

The installation of the air heater(s) must be in accordance with the rules in force and the relevant requirements of the Gas Safety Regulations, Building Regulations and the I.E.E. Regulations for Electrical Installations.

It should be in accordance also with any relevant requirements of the local gas region, local authority and fire authority and the relevant recommendations of the following documents.

British Gas Plc Publications

IM/11 : 1989 Flues for Commercial and Industrial Gas Fired Boilers and Air Heaters

IM/16 : 1988 Guidance notes for the installation of gas pipework, boosters and compressors in Customer's premises (excluding domestic installation of 25mm and below).

British Standards Code of Practice

BS 5588 -11 : 1997 Fire precautions in the design, construction and use of buildings. Code of practice for shops, offices, industrial, storage and other similar buildings

BS 6230:1991 Installation of Gas Fired Forced Convection Air Heaters for Commercial and Industrial Space Heating.

Those appliances having an input rating not exceeding 60kW viz. PGUH 12 to PGUH 52 inclusive must be installed in accordance with the relevant recommendations of the following documents.

BS 5440 Flues and Air Supply for gas appliances of rated input not exceeding 60kW (1st and 2nd family gases). Part 1 - Flues, Part 2 - Air Supply

3.2 Location

The location chosen for the air heater must permit the provision of a satisfactory flue system and an adequate air supply. The location must also provide adequate space for servicing and air circulation around the air heater.

The heater(s) must not be installed in conditions for which it is not specifically designed e.g. where the atmosphere is corrosive or salty and where high wind speeds may affect burner operation, and they are not suitable for outdoor use.

Where the location of the air heater is such that it might suffer external mechanical damage e.g. from overhead cranes, fork lift trucks, it must be suitably protected.

PGUH units are designed to operate in a maximum ambient temperature of 25 °C.

3.3 Gas Supply

3.3.1 Service Pipes

The local gas undertaking should be consulted at the installation planning stage in order to establish the availability of an adequate supply of gas. An existing service pipe must not be used without prior consultation with the local gas undertaking.

3.3.2 Meters

A gas meter is connected to the service pipe by the local gas undertaking or a local gas undertaking contractor. An existing meter should be checked, preferably by the gas undertaking, to ensure that the meter is adequate to deal with the total rate of gas supply required.

3.3.3. Installation Pipes

Installation pipes should be fitted in accordance with IM/16:1988. Pipework from the meter to the air heater must be of adequate size. Do not use pipes of a smaller size than the inlet gas

connection of the heater. The complete installation must be tested for soundness as described in the above Code. The complete installation must be tested for soundness as described in BS 6230.

3.3.4. Boosted Supplies

Where it is necessary to employ a gas pressure booster the controls must include a low pressure cut off switch at the booster inlet. The local gas undertaking must be consulted before a gas pressure booster is fitted. The maximum inlet pressure is 60mb.

3.4 Flue System

Detailed recommendations for fluing are given in BS 5440, Part 1 (Flues) and IM/11.

The air heater is fitted with an integral draught diverter and must be connected to an individual flue system having a cross sectional area not less than the area of the flue outlet from the air heater.

Materials used for the flue system should be mechanically robust, resistant to internal and external corrosion, noncombustible and durable under the conditions to which they are likely to be subjected.

Prevention of condensation within the flue should be an important factor in the design of the flue system and the use of an approved double walled flue pipe with an air gap or insulation is recommended.

Where condensation in the flue is unavoidable provision should be made for condensation to flow freely to a point at which it can be released, preferably into a gully. The condensation pipe from the flue to the disposal point should be of non-corrodible material of not less than 22mm (1/2") size.

It must be possible to disconnect the flue pipe(s) from the air heater(s) for inspection and servicing purposes. The flue should terminate in a freely exposed position and must be so situated as to prevent the products of combustion entering any opening in a building in such concentration as to be prejudicial to health or a nuisance.

It is recommended that consideration be given to the fitting of a terminal at the flue outlet, however, where the heater flue is less than 200mm (8") in diameter an approved terminal must be fitted.

3.5 Air Supply

Where PGUH units are to be installed in heated spaces having a design air change rate of less than 0.5 /h and a volume less than 4.7 m³ /kW of total rated heat input grilles shall be provided at low level as follows:-

- (1) for heaters of heat input less than 60 kW, the total minimum free area shall not be less than 4.5² cm per kilowatt of rated heat input.
- (2) for heaters of heat input 60 kW or more, the total minimum free area shall not be less than 270cm² plus 2.25 cm² per kilowatt in excess of 60 kW rated heat input.

Where the air heater(s) will be installed in a plant room the latter must have permanent air vents at high level and low level communicating directly with the outside air. Where communication with the outside air is possible only by means of high level air vents, ducting down to floor level for the lower vents should be used.

The basic minimum effective area requirements of the air vents are as follows:

- (a) Low Level (inlet)
 - (1) for heaters of total rated heat input less than 60 kW: 9cm² per kilowatt of rated heat input
 - (2) for heaters of total rated heat input 60kW or more: 540 cm² plus 4.5 cm² per kilowatt in excess of

60 kW total rated input.

- (b) High Level (outlet)
 - (1) for heaters of total rated heat input less than 60 kW: 4.5 cm² per kilowatt of rated heat input;
 - (2) for heaters of total rated heat input 60kW or more: 270 cm² plus 2.25 cm² per kilowatt in excess of 60kW total rated input.

All air vents should have negligible resistance and must not be sited in any position where they are likely to be easily blocked or flooded or in any position adjacent to an extraction system which is carrying flammable vapour. Air vents should be so designed that high velocity air streams do not occur within the plant room.

3.6 Air Distribution System

The following notes are of particular importance. For free-blowing units it must be taken into account that the buoyancy of the heated air leaving the heater and air patterns within the space being heated will modify the air throw pattern achieved. In buildings having a low heat loss where single units are required to cover a large floor area and in buildings with high roof or ceiling heights Calecon thermal economiser units should be fitted to ensure even heat distribution and minimise stratification respectively. Care should be taken to avoid impeding the air throw with racking, partitions, plant or machinery etc. Various outlet configurations are available as optional extras to modify the air throw pattern to suit particular site conditions.

For ducted units all delivery and return air ducts, including air filters, jointing and any insulation or lining must be constructed entirely of materials which will not contribute to a fire, are of adequate strength and dimensionally stable for the maximum internal and external temperatures to which they are to be exposed during commissioning and normal operation. In the selection of materials account must be taken of the working environment and the air temperatures which will result when the overheat limit thermostat is being commissioned. Where inter-joint spaces are used as duct routes they should be suitably lined with a fire-resisting material.

A full and unobstructed return air path to the air heater(s) must be provided.

If the air heater(s) is installed in a plant room the return air intake(s) and the warm air outlet(s) from the heater(s) must be fully ducted, in to and out of the plant room to avoid interference with the operation of the flue by the air circulation fan. The openings in the structure of the plant room through which the ducting passes must be fire stopped.

Care must be taken to ensure that return-air intakes are kept clear of sources of smells and fumes, and in special circumstances where there is any possibility of pollution of the air by dust, shavings etc., precautions must be taken by carefully positioning return air intakes and by the provision of screens to prevent contamination.

In addition, where there is a risk of combustible material being placed close to the warm air outlets, suitable barrier rails should be provided to prevent any combustible material being within 900mm (3ft) of the outlets.

3.7 Electrical Supply

Wiring external to the air heater must be installed in accordance with the I.E.E. Regulations for Electrical Installations and any local regulations which apply. Wiring should be completed in flexible conduit.

All standard heaters are supplied by 230V - 1ph, 50Hz. The method of connection to the main electricity supply must facilitate the complete electrical isolation of the air heater(s) and the supply should serve only the air heater(s).

It must have a contact separation of at least 3mm in all poles. The method of connection should be provided adjacent to the air heater(s) in a readily accessible position.

See the accompanying wiring diagram for the heater electrical connections

PGUH units can also be supplied for 400V 3N, 50Hz

4. Installation of Air Heater(s)

4.1 General

Before installation, check that the local distribution conditions, nature of gas and pressure, and adjustment of the appliance are compatible.

The air heater must be installed in accordance with the rules in force and the relevant requirements of any fire regulations or insurance company's requirements appertaining to the area in which the heater is located, particularly where special risks are involved such as areas where petrol vehicles are housed, where cellulose spraying is carried out, in wood working departments etc.

Whichever method of mounting the air heater is used the following minimum clearances for installation and servicing must be observed.

Side of heater having controls and burner removal - width of heater plus 0.5m, otherwise 0.25m

Top of the heater to ceiling 0.6m

Rear of heater to nearest wall 0.6m

For multi air heater installations the following minimum distances between units must be observed.

Between units, side to side 3.0m

Between units, back to back 3.0m

Mounting heights

Floor to underside of heater

Model	Recommended	Minimum
12F	2.0m - 2.5m	1.8m
15F - 60F	2.5m - 3.0m	2.5m
75F - 150F	3.0m - 5.0m	2.5m

'C' & 'D' Not applicable As above

All models

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

IMPORTANT:

No air heater shall be installed where there is a foreseeable risk of flammable particles, gases and vapours or corrosion inducing gases or vapours being drawn into either the heated air stream or the air for combustion. In such cases installation may only proceed if the air to be heated and the air for combustion are ducted to the heater from an uncontaminated source preferably outside the building. In certain situations where only airborne particles are present it may suffice to fit filters on the air inlet ducts of the heater. Advice in these instances may be obtained from Powmatic Ltd.

4.2 Fitting the Air Heater

The air heater may be installed either:

- a) suspended by suitable drop rods, chains or straps.
- b) on specifically designed cantilever brackets from a noncombustible wall.
- c) on a level noncombustible surface providing the surface does not extend past the front edge of the heater. Whatever method of installation is used it must be capable of adequately supporting the weight of the unit (See Table 2, Page 3) and allowance must be made for any ancillary equipment.

Before installing the heater any existing trusses, walls, brackets etc., must be inspected to ensure they are suitable. All supports should be protected against the effects of corrosion. If noise levels are of particular importance the heater should be insulated from the structure of the building by installing it on suitable anti-vibration mountings. In all such cases and, in addition, when the heater is suspended all gas, duct, electrical and flue connections to the heater must be made with flexible connections. In the case of the flue connection single wall stainless steel flue is deemed to flex sufficiently to meet the requirements.

4.3 Connection of Air Heater(s) to Flue System

All models are fitted with an integral down draught diverter. For models PGUH 12 - 75 the flue system connects directly into the flue socket on the top of the unit. Models PGUH 90 - 150 are supplied with a flue 'Y' piece to common together the individual flue outlets and this must be fitted, the flue system connecting directly on to it. (See Table 1 Page 4 for flue sizes). All units must be fitted with a flue having a minimum height of 2m from the heater or flue 'Y' piece socket to the flue terminal. 90o bends and horizontal runs of flue are not permitted. If necessary offsets, using two 45° bends, can be included to avoid obstructions with the minimum height being increased by 1m per offset.

4.4 Condensate Drainage

The design of the flue system should minimise the formation of condensation, however when this is envisaged to be a problem provision should be made for condensation to flow to a joint where it can be drained, preferably into a gully.

4.5 Gas Connection

A servicing valve and downstream union must be fitted at the gas inlet to the air heater. The gas supply to the air heater must be completed in solid pipework and be adequately supported. Heaters suspended by drop rods or chains must have a flexible connection as the final link between the gas supply pipework and the heater. Sufficient slack must be left in the connection to take account of normal movement of the heater. On models PGUH 90 - 150 two connections to the unit are required and a union connection must be provided at the gas inlet to each gas control assembly.

WARNING:

When completing the final gas connection to the heater do not place undue strain on the gas pipework of the heater.

4.6 Electrical Connections

Units only require final connections for the incoming mains supply and completion of the control circuit (230V) via a room thermostat, time clock etc. The electrical supply must be run to a point adjacent to the heater and be suitably terminated to provide an isolation point that will prevent remote activation of the unit during servicing. Cables of adequate cross-sectional area to safely carry that load must be used for the electrical installation. (See Table 4 (Page 5) for the electrical loading of the air heater(s)) The length of the conductors between the cord anchorage and the terminals must be such that the current carrying conductors become taut before the earth conductor if the cable or cord slips out of the cord anchorage. All external controls must be of an approved type. See the wiring diagram accompanying these instructions.

When installing PGUH 'D' models they must be electrically interlocked to the air movement system so that this is started in the same manner as the air heater fan would be.

A connection from heater terminal No 5 must be made to one side of the fan motor contactor coil, the other side of the coil

being connected to Neutral. Under no circumstances must the fan motor electrical supply be taken direct from the internal wiring of the PGUH.

5. Air Distribution System

5.1 General

PGUH 'C' and 'D' models are for use with duct work to more precisely define the point of air delivery, and /or provide ducted return air or ducted fresh air inlet. If inlet ductwork is used heaters must be ordered with fan inlet sections in order to maintain service access to the centrifugal fan(s). All ducting must be independently supported of the air heater. Joints and seams of supply ducts and fittings must be securely fastened and made airtight.

5.2 Noise Reduction

It is recommended that ducting should be connected to the heater spigots via an airtight flexible coupling of noncombustible material. Before fitting coupling it must be ensured that a maximum clearance of 13mm (1/2") will be maintained between the ends of the ducting and the heater spigots.

If required sound attenuators may be fitted in inlet and outlet ducts to reduce airborne fan noise. Materials used in outlet sound attenuators must be capable of withstanding 100 °C air temperature without any deterioration.

5.3 Room Thermostat Siting

The room thermostat should be fitted at a point which will be generally representative of the heated area as far as temperature is concerned. Draughty areas, areas subjected to direct heat e.g. from the sun, and areas where the air movement is relatively stagnant e.g. in recesses, are all positions to be avoided for siting the thermostat. The thermostat should be mounted about 1.5m (5ft) from the floor.

Any room thermostat, frost thermostat, time clock etc. must be suitable for switching 230V, 0.02A (Standard Units) or 230V, 5A (/AI Units) and must be of the 'snap action' type to minimise contact bounce.

For electrical connections of external controls see the accompanying wiring diagram.

6. Commissioning & Testing

6.1 Electrical Installation

Checks to ensure electrical safety must be carried out by a qualified person.

6.2 Gas Installation

The whole of the gas installation, including the meter, should be inspected and tested for soundness and purged.

6.3 Air Distribution System

The system should be checked to ensure that the installation work has been carried out in accordance with the design requirements.

Particular attention should be given to the correct arrangement of delivery ducts and registers, return air ducts and grills and general adequacy of return air paths.

For PGUH 'C' standard airflow units the fan damper must be set to match the resistance of the ductwork (See Table 5 (Page 5)). PGUH 'C' high airflow units are matched to the published duct resistance and the ductwork must be balanced accordingly (See Table 2 (Page 3)).

6.4 Checks before lighting the Air Heater

The following preliminary checks should be made before lighting the heater(s)

- Ensure that the **ELECTRICAL** supply to the heater is switched **OFF**.
- Check that all warm air delivery outlets are open.
- Check that the thermostat is set at **MAX**.
- Check that the clock control is set to an **ON** period.
- Check that any other controls are calling for heat.
- Check that the overheat reset button has not operated.

6.5 Lighting the Air Heater

WARNING: The multifunctional gas control(s) is operated by 230 volts.

IMPORTANT:

The internal pipework of the appliance has been tested for soundness before leaving the factory. After establishing the pilot(s) and with the main burners alight test round the gas inlet

connection using a leak detection fluid.

NOTES:

- When attempting to light the pilots at any time ensure that the mains electricity supply is switched off.
- On initial lighting of the heater(s), it may take some time to purge the internal pipework of air.

6.5.1 Standard Models

6.5.1.1 Models PGUH 12 - 75. (SIT 820 NOVA MFC)


- For models PGUH 15 - 75 open the access door.
- Press the knob of the multifunctional control (Fig.3a - 1) and rotate to Pilot. 
- Light the pilot flame by pressing the piezo unit button (Fig

Fig. 1a Controls Location PGUH 12

Viewed from rear of unit

Pilot tube and thermocouple not shown for clarity

- SIT 820 Nova M.F.C.
- Gas connection (Rp^{1/2}).
- Piezo spark generator.
- Viewing port.
- Cable entry points.
- Summer / Winter switch.
- Limit Thermostat reset button.
- Side panel (For access to electical section).

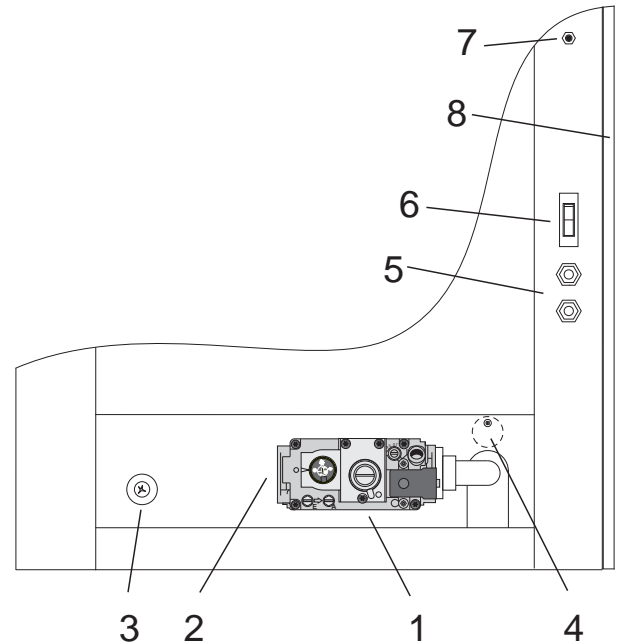


Fig. 1b Controls Location PGUH 15 - 150

Pilot tube and thermocouple not shown for clarity

- SIT 820 Nova M.F.C.
- Gas connection (Rp^{3/4}).
- Piezo spark generator.
- Viewing port.
- Limit Thermostat reset button
- Fan Timer

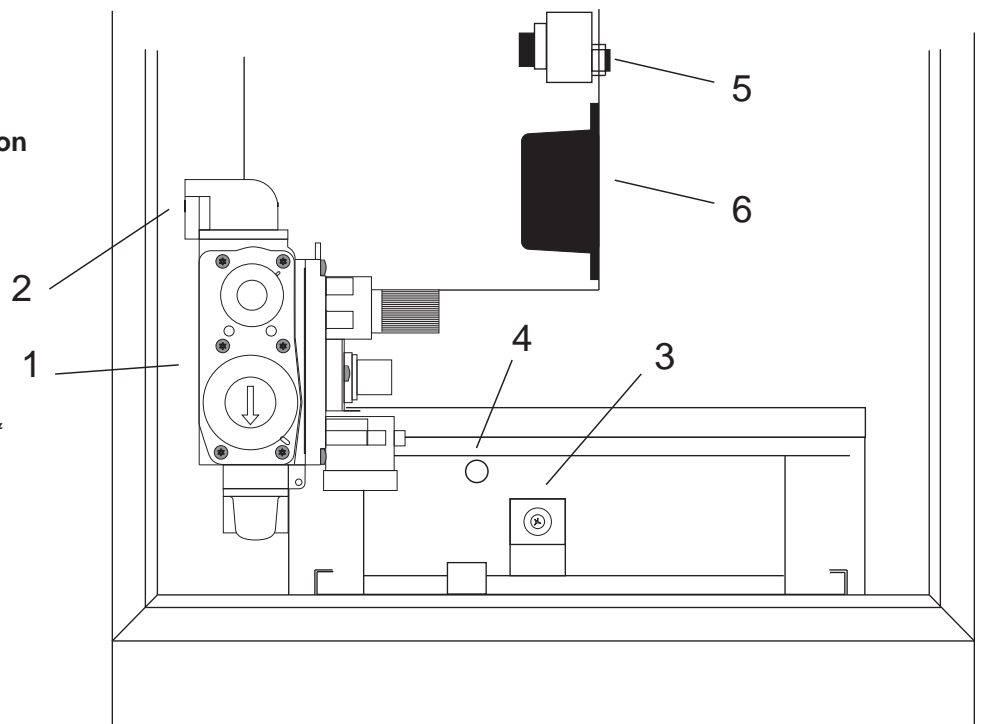


Fig.2 Pilot Flame Adjustment

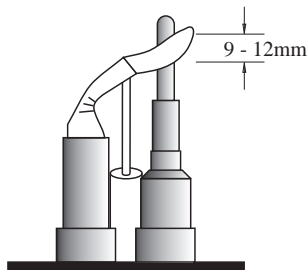


Fig. 3a - SIT 820 Nova

1. Control Knob.
2. Pressure Regulator cap screw.
3. Pilot gas rate adjuster.
4. Thermocouple connection.
5. Pilot connection.
6. Inlet pressure test point.
7. Burner pressure test point.
8. Electrical connections for main valve operator.

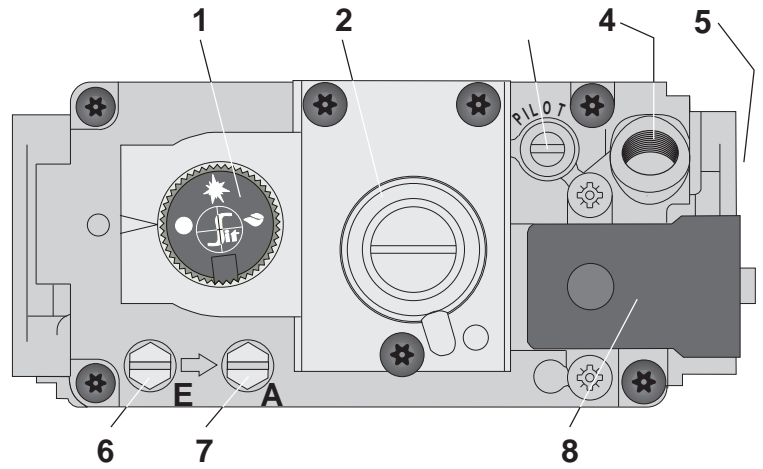
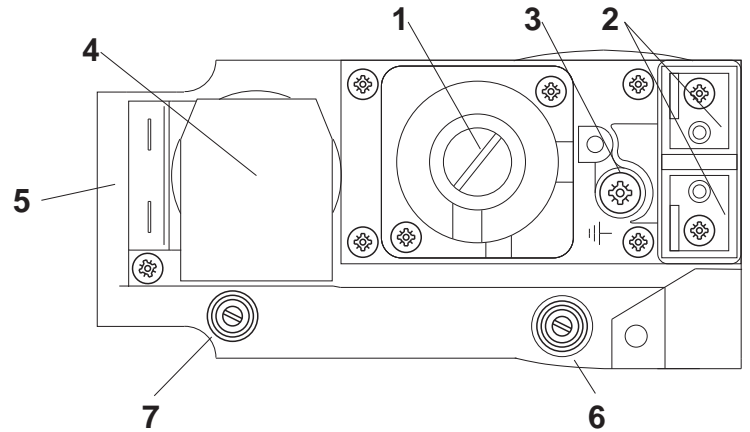


Fig. 3b - Honeywell V4605C

1. Governor adjustment cover screw.
2. Electrical connections for main valve operator.
3. Earth connection.
4. Safety shut off valve.
5. Safety shut off valve electrical connections.
6. Inlet pressure test point.
7. Inlet pressure test point.



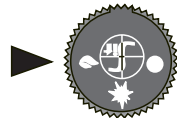
1a ,1b - 3) several times keeping the multifunctional control knob depressed. The pilot flame may be viewed through the viewing port in the side of the burner tray. (Figs. 1a & 1b - 4)

4. Ensure that the pilot flame fully envelopes 9-12mm of the thermocouple tip (See Fig. 2) and, if necessary adjust the pilot regulating screw (Fig.3a - 3) .

5. Once the pilot has been established continue pressing the control knob for approximately 30 seconds and then slowly release. The pilot should remain alight.

WARNING: Should the pilot be extinguished at any time, either intentionally or unintentionally, slightly depress the control knob and rotate clockwise to OFF. Wait 3 minutes before attempting to relight the gas, then repeat steps 3-5 above.

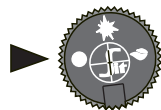
6. Slightly depress the control knob and turn to On.



7. Switch on the electricity supply at the isolator, and the main burners will light.

8. SHUT OFF

To interrupt all gas flow through the multifunctional control slightly depress the control knob and rotate clockwise to OFF.



CAUTION

The restart interlock device prevents the heater from re-igniting because the flame supervision device has interrupted the gas flow. After waiting 3 minutes the heater may be relit by following the previous instructions from 6.5.

6.5.1.2 Models PGUH 90 - 150. (SIT 820 NOVA MFC)

1. Follow steps 6.5.1.1.1 to 6.5.1.1.6 and establish the left hand pilot.
2. Follow steps 6.5.1.1.1 to 6.5.1.1.6 and establish the right hand pilot.

3. Switch on the electricity supply at the isolator and the main burners will light.

4. SHUT OFF

To interrupt all gas flow through the multifunctional controls slightly depress the control knobs and rotate clockwise to OFF.

CAUTION

The restart interlock device prevents the heater from re-igniting because the flame supervision device has interrupted the gas flow. After waiting 3 minutes the heater may be relit by following the previous instructions from 6.5.

6.5.2. Auto Ignition Units

6.5.2.1 All Models

1. Switch on the electrical supply at the isolator and the ignition sequence will commence. After a delay of approximately 30 seconds the ignition spark will be generated and the main gas valves energized. The burners will then light.

Note: On PGUH 90 - 150 units the left hand (viewed from the front) burner set will light first. Only when this burner set is lit will the right hand burner set begin its ignition sequence.

2. If the burners fail to light the control box will go to lockout and the lockout light on the low level remote reset will be illuminated. To restart the ignition sequence depress the reset button on the low level reset.

3. SHUT OFF

Set the clock control to OFF or set the room thermostat to MIN.

6.6 Adjustments

6.6.1 Burner Gas Pressure

This is set for the required heat input before despatch. In the case of Hi/Lo and Modulating units both high and low pressures are set. Pressures should be checked in the following manner. For models PGUH 90-150 inclusive follow the instructions below for both sets of burners whilst both sets are alight.

6.6.1.1 Standard & Auto Ignition Units

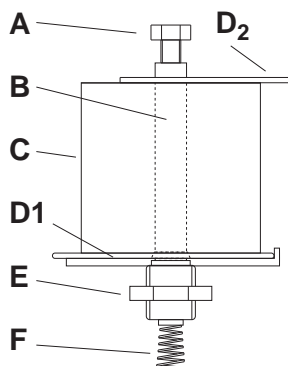
1. Set external controls to ensure that the main burner is off. Open the access door on PGUH 15 - 150. Connect a pressure gauge to the burner pressure testpoint on the multifunctional control.
2. Set external controls so as to turn on the main burner. Compare the measured burner gas pressure to that stated in Section 2.
3. If necessary adjust the burner gas pressure by removing the cover screw (Fig 3a -2, Fig 3b - 1) and turning the regulator screw anticlockwise to decrease the pressure, or clockwise to increase the burner pressure.
4. In addition it is advisable to check the gas rate using the gas meter dial pointer. Ensure that no other appliances supplied through the meter are in operation.
5. Turn off the main burner as in 6.6.1.1.1 disconnect the pressure gauge and retighten the sealing screw. Turn on the main burner as in 6.6.1.1.2. and test for gas soundness around pressure test joint using a leak detection fluid. Close access door on PGUH 15-150.

6.6.1.2 High/Lo and Modulating Units

1. Set external controls to ensure that the main burner is off. Open the access door and connect a pressure gauge to the outlet pressure testpoint on the multifunctional control.
2. Set external controls so as to turn on the main burner and maintain high fire. Compare the measured burner gas pressure to that stated in Section 2. In addition it is advisable to check the gas rate using the gas meter dial pointer. Ensure that no other appliances supplied through the meter are in operation.
3. Repeat 2 above with external controls set to maintain low fire.
4. If it is necessary to adjust the high pressure setting then proceed from step i). If it is only necessary to adjust the low fire pressure setting proceed from step vii). Refer to Fig.4 i) Set external controls to turn main burner OFF. ii) Pull back the clip retaining the actuator coil to its mounting stem and remove the coil. iii) Set external controls to turn main burner ON. iv) Screw adjustment screw A fully clockwise. v) Release the M13 locknut E that secures the actuator stem into the mfc governor and turn the actuator stem to set the HIGH FIRE pressure (clockwise to increase pressure). vi) Tighten the locknut without further turning the actuator stem. vii) Unscrew adjustment screw A to set the LOW FIRE pressure (anti clockwise to decrease pressure). viii) Set external controls to turn burner OFF and replace valve body C onto the valve stem ensuring that it clips into position and then re check the pressures.
5. Turn off the main burner as in 6.6.1.1. disconnect the pressure gauge and retighten the sealing screw. Turn on the main burner as in 6.6.1.2. above and test for gas soundness around pressure test joint using a leak detection fluid e.g. soap solution. Close access door.

Fig. 4 High/Lo and Modulating Heads

- A Low pressure setting screw
- B Valve stem
- C Valve body
- D₁ Locking spring (Modulating Head)
- D₂ Locking spring (Hi/Low Head)
- E Locknut
- F Spring



6.6.2 Down Draught Diverter

1. Check that there is no spillage of products of combustion from the air heater down draught diverter by carrying out a spillage test by testing for CO (A smoke test may give misleading results due to general air movement at the draught diverter).

6.6.3 Air Heater Controls

6.6.3.1 Standard Units

1. Check that the flame failure device will shut off the gas to the main burner within 60 seconds by turning off the gas supply at the gas service valve. A distinct click will be heard when the thermocouple current is no longer sufficient to hold in the magnetic unit.
2. Check that the room thermostat and all automatic controls are operating satisfactorily.

6.6.4 Fan Timer

Fan operation is controlled by an electronic timer. The timer is set prior to despatch so that the air fan starts approximately 15 seconds after the burners light. This delay may be increased to 30 seconds by turning clockwise the adjustment on the front of the timer with a small screwdriver, or decreased down to zero by adjusting anticlockwise. The timer provides a non adjustable fan off time of 150 seconds after the controls turn off the burners.

6.7 Handing over the Air Heater

Hand the Users Instructions to the user or purchaser for retention and instruct in the efficient and safe operation of the air heater and associated controls.

Adjust the automatic controls as required by the User. Finally, advise the user or purchaser that, for continued efficient and safe operation of the air heater, it is important that servicing is carried out annually.

In the event that the premises are not yet occupied turn off the gas and electricity supplies and leave instructional literature adjacent to gas meter.

7. Servicing

WARNING: Always switch off and disconnect electricity supply and close the gas service valve(s) before carrying out any servicing work or replacement of failed components.

NOTE:

1. The following instructions refer specifically to Models PGUH 12-75. For Models 90-150 inc repeat the instructions so that both sets of components are fully serviced.
2. If a suspended air heater is to be serviced do not lean ladders against the heater. Ensure that an access tower or equivalent is used.

7.1 General

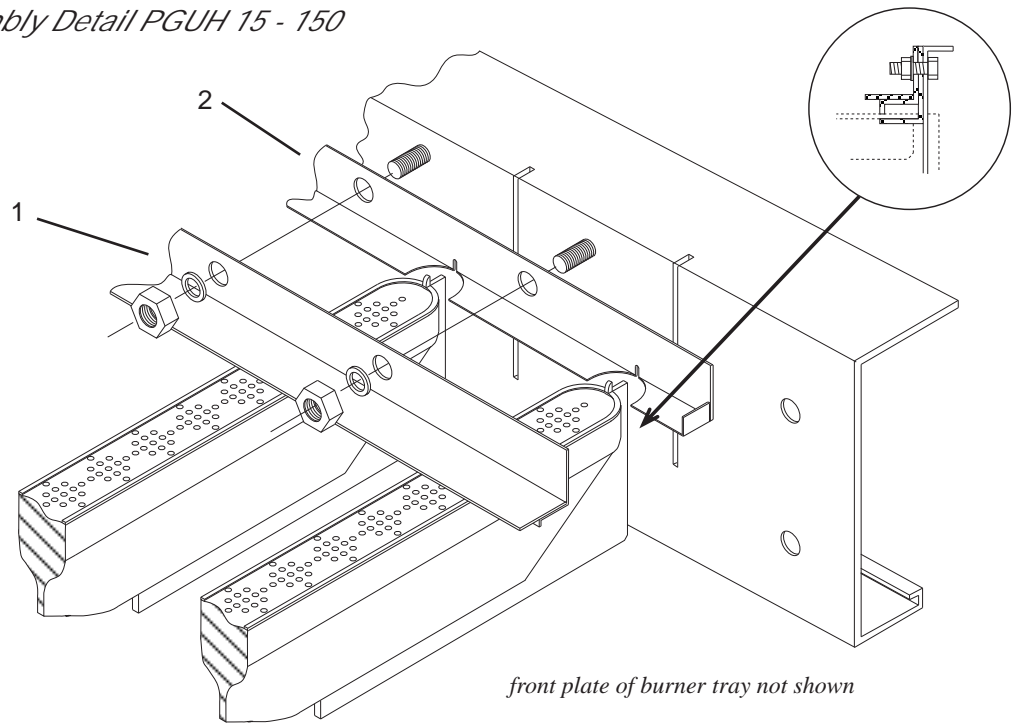
Full maintenance should be undertaken not less than once per year by a qualified person. After any servicing work has been completed or any component replaced the air heater(s) must be fully commissioned and tested for soundness as described in Section 6.

7.2 Main Burner Assembly Removal

7.2.1 PGUH 12

1. Ensure that the gas service valve is turned OFF and then unscrew the union nut situated immediately down stream of it.
2. Remove the plug (Fig 3a - 8), or push on connections (Fig 3b - 2 & 5), from the multifunctional valve.
3. Remove the right and left outer panels.
4. Remove the two M5 screws that secure the burner tray in position .
5. Remove the lower front panel and lower rear panels by releasing the two securing screws on each side of each panel. On standard units remove the piezo igniter lead from the piezo

Fig 5 Cross Lighting Assembly Detail PGUH 15 - 150



igniter in the rear lower panel.

6. Remove the burner tray complete, from the front of the air heater, by pulling forwards. For suspended air heaters it is recommended that the burner assembly is taken down to floor level before proceeding.

7. Release the screws securing the cross lighting strip assembly and remove the assembly.

8. Remove the anti flame roll strip at the injector end of the burner tray.

9. Remove each burner from its injector and using a stiff brush (not wire), brush the flame strips to dislodge accumulated deposits. Inspect the burners both internally and externally to ensure that they are clean. Examine the injectors and if damaged or deteriorated, replace with new ones of the correct size and marking (see Section 2 - Tables 3.1, 3.2 or 3.2). If deemed necessary, clean the injectors. Do not broach out with wire. NOTE: If a full service is being undertaken then complete sections 7.3 and 7.4 before continuing.

10. Reassemble the injectors, burners anti flame roll strip and cross lighting assembly etc in reverse order to that above.

7.2.2 PGUH 15 - 75

1. Ensure that the gas service valve is turned OFF.

2. Open the access door.

3. Remove the plug(s) (Fig 3a - 8, 3b2&5) from the multifunctional valve.

4. Remove the inner burner securing plate by removing the securing screws.

5. Pull the burner tray out. For suspended air heaters it is recommended that the burner assembly is taken down to floor level before proceeding.

6. Release the nuts securing the cross lighting strip assembly and remove the two strips (see Fig 5, - 1 & 2 Page 12)

7. Remove each burner by lifting up at the cross lighting strip end and then disengaging from its injector. Using a stiff brush (not wire), brush the flame strips to dislodge accumulated deposits. Inspect the burners both internally and externally to ensure that they are clean. Examine the injectors and if damaged or deteriorated, replace with new ones of the correct size and marking (see Section 2 - Tables 3.1, 3.2 and 3.3). If deemed necessary, clean the injectors. Do not broach out with

wire. NOTE: If a full service is being undertaken then complete sections 7.3 and 7.4 before continuing.

8. Reassemble the injectors, burners and cross lighting assembly in reverse order to that above.

CAUTION: Ensure that the cross lighting strip is assembled as shown in Fig 5 - Item 2 locates under the rolled edge around the burner flame strip and Item 1 abuts onto the top of the burner.

7.3 Pilot Burner Assembly Removal

1. To remove the pilot assembly, release thermocouple and pilot gas tube at the multifunctional control and remove the two M5 tapite screws securing the pilot assembly to its mounting bracket.

2. Inspect pilot burner, thermocouples and electrode, making sure that they are in a sound and clean condition. In particular check that the ignition electrode is clean, undamaged and straight. Check that the spark gap is 2.5-3.5mm. Clean the pilot injector, do not broach out with wire.

3. Reassemble the pilot and refit to the burner assembly. Note that the pilot assembly is mounted on top of the manifold bracket. Tighten thermocouple nut by hand, then tighten by spanner a further 1/6th of a turn.

7.4 Flueways

Whilst the main burner assembly is removed from the appliance the flueways should be cleaned by brushing upwards from the burner tray compartment. For suspended units the heater base may be hinged down after removing the screws at the bottom of the lower front panel. If it is necessary to gain access to the top of the heat exchanger then for PGUH 15-150

1. Disconnect first length of flue fitted to the flue outlet (for PGUH 90 - 150 also remove the Y branch)

2. Remove the screws, accessed through the side panels, securing the top/upperfront panel in place and remove panel.

3. Remove the draught diverter and then the inner baffle plate.

4. Renew the sealing gaskets and reassemble in the reverse order to that above.

5. Re-commission the appliance as described in Section 6.

7.5 Fan Assembly

7.5.1 PGUH 'F' Models

1. Inspect the fan blades to see that they are not damaged and that there is no excessive build up of deposits that could give rise to an imbalance. Should it be necessary to remove the assembly for cleaning proceed as follows.
2. Slacken the cable gland nut on the heater casing through which the fan electrical cable passes. (Fig 1a or 1b - 5).
3. Remove the right hand side panel (PGUH 12 Fig 1a - 8) or open the access door (PGUH 15-150 Fig 1b - 9) and disconnect the fan leads from the electrical terminals and withdraw cable.
4. Remove the fan and motor assembly complete by removing the four hexagon headed bolts that secure the fan to the rear panel.
5. Reassemble in reverse order.

7.5.2 PGUH 'C' Models

1. Inspect the fan blades to see that they are not damaged and that there is no build up of excessive deposits that could give rise to an imbalance. Should it be necessary to remove the assembly for cleaning proceed as follows.
2. Slacken the cable gland nut on the heater casing through which the fan electrical cable passes (Fig 1a or 1b - 5).
3. Remove the right hand side panel (PGUH 12 Fig.1a - 8) or open the access door (PGUH 15-150 Fig 1b - 9) and disconnect the fan leads from the electrical terminals and withdraw cable.
4. Where fan capacitor is mounted on rear of appliance remove the two screws that secure the cover box.
5. Remove the complete fan assembly by removing the nuts securing the fan to the rear panel.

7.6 Replacement of Faulty Components

7.6.1 Multifunctional Control

1. On standard units release the pilot tube and thermocouple (Fig 3a - 5&4) and remove electrical connections.
2. Release the flanged elbows at the inlet and outlet of the multifunctional control by removing the M5 screws and remove the multifunctional control.
3. Renew the sealing gaskets and fit the new valve, in the reverse order to that above, ensuring that the valve is correctly orientated.
4. Re-commission the appliance as described in Section 6.

7.6.2 Burner Bars

1. Remove the burner assembly and dismantle it as previously described in Section 7.2.
- NOTE: It is not necessary to disturb the pilot assembly.
2. Exchange those burner bars as required and reassemble components in reverse order.
 3. Re-commission the appliance as described in Section 6.

7.6.3 Pilot Assembly

1. Remove the burner assembly as previously described in Section 7.2 and remove the pilot assembly as described in Section 7.3.
2. Fit the new pilot assembly and reassemble in reverse order.
3. Re-commission the appliance as described in Section 6.

7.6.4 Piezo Unit

1. Remove the right and left hand panels (PGUH 12) or open the access door (PGUH 50 - 150).
2. On the PGUH 12 remove the lower rear panel after having released the burner assembly See 7.2.1..
3. Disconnect the spark ignition lead from the rear of the piezo unit.
4. Unscrew the backnut of the piezo unit and withdraw the unit.
5. Fit the new unit, reconnect the spark ignition lead and reassemble in reverse order.

7.6.5 Limit Thermostat

1. Remove the right hand panel (PGUH 12) or open the access

door (PGUH 15 - 150).

2. Remove the two screws securing the phial bracket and withdraw bracket.
3. Unclip the thermostat phial.
4. Disconnect the electrical leads from the thermostat by pulling off the connectors.
5. Release the thermostat from the electrical panel.
6. Fit the new thermostat in reverse to the above steps. NB. Ensure that the thermostats are set correctly before fitment - see following table.

LIMIT THERMOSTAT SET POINT

PGUH 60, 120 - 80°C

PGUH 12, 45, 52, 75, 90, 105, 150 - 90°C

PGUH 15 - 100°C

PGUH 30 - 110°C

7.6.6 Fan Timer

1. Release the four timer leads from the terminal block and remove the two screws securing the timer.
2. Fit the new timer and reassemble in reverse order.

7.6.7 Fan and Motor Assembly

Note: On 3ph heaters ensure that the fan direction of rotation corresponds with the direction of rotation arrow on the fan guard or case. If necessary reverse the direction of rotation by interchanging any two of the motor live leads at the terminal strip in the electrical panel.

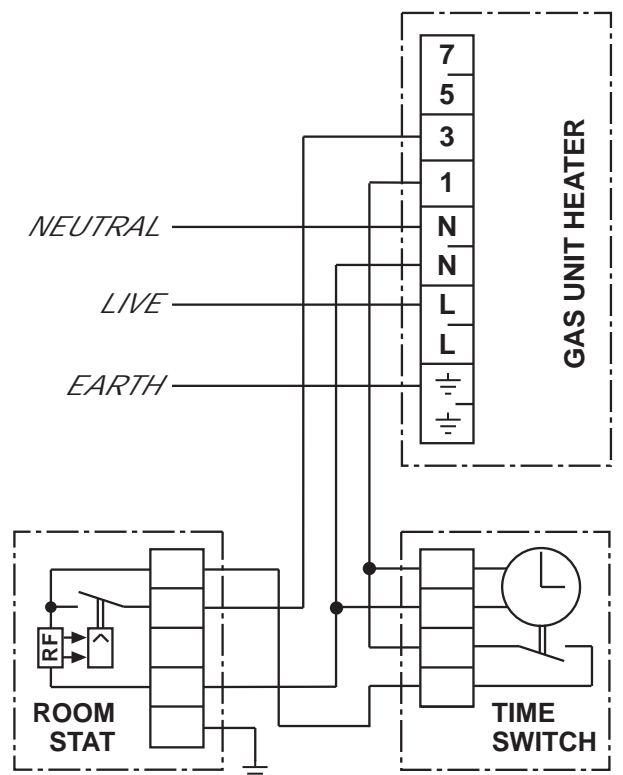
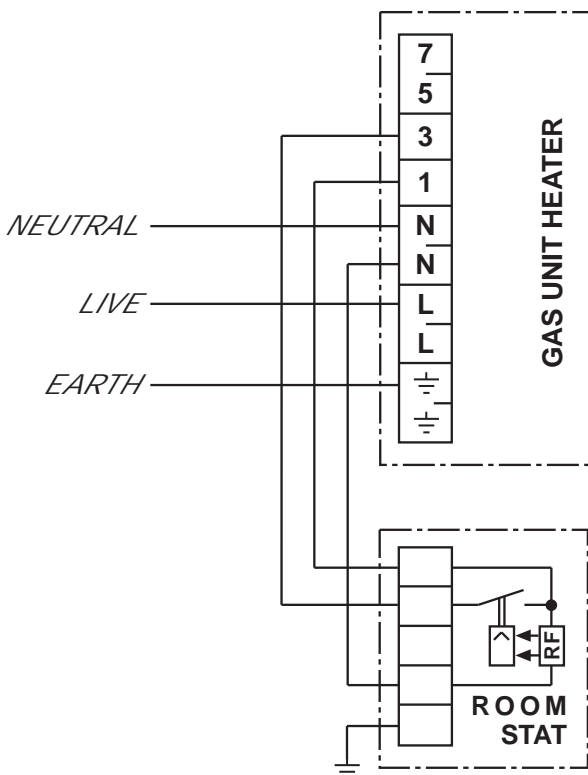
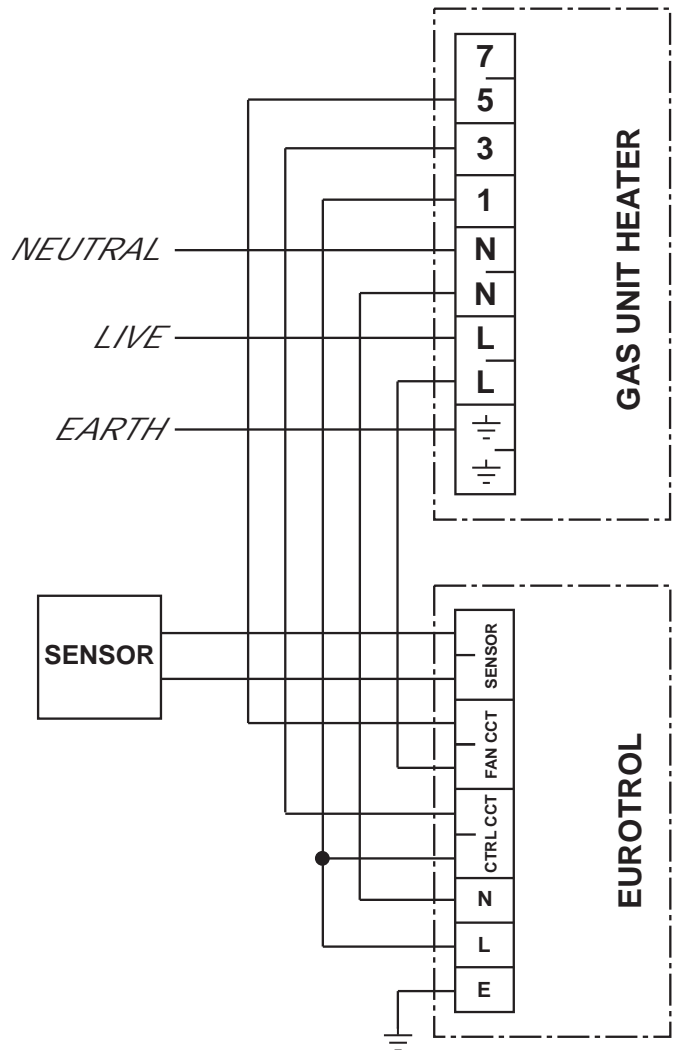
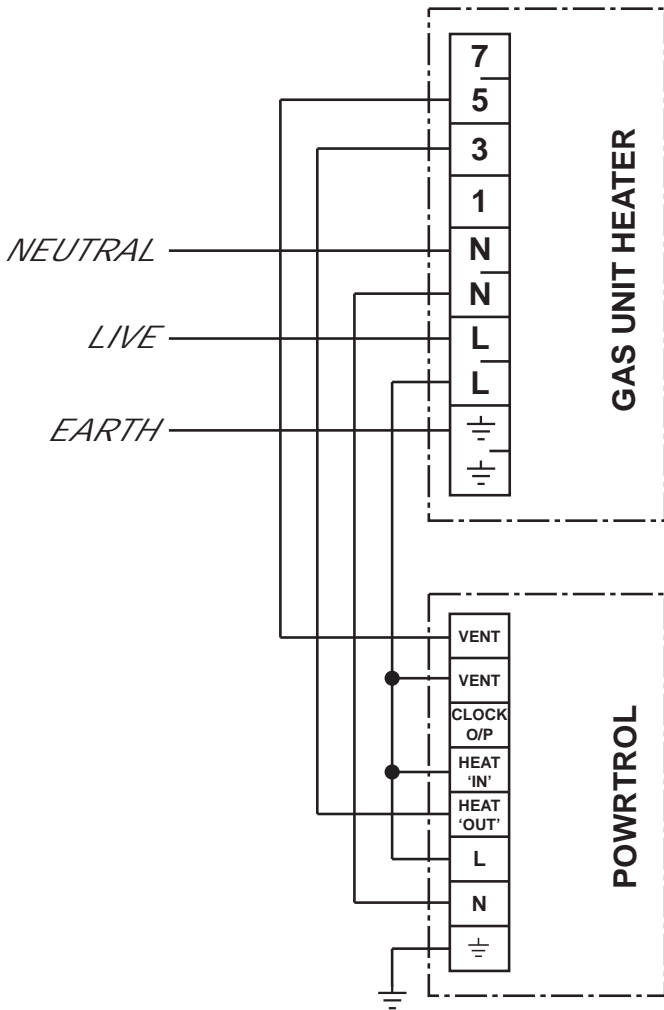
7.6.7.1 PGUH 'F' Models

1. Remove the complete axial fan assembly as described in Section 7.5.1.
2. Refit axial fan assembly to the heater in reverse order. On 3ph units the direction of fan rotation must be checked. If it is incorrect reverse any two of the live wires to the fan motor.

7.6.7.2 PGUH 'C' Models

1. Remove the complete centrifugal fan assembly as described in Section 7.5.2.
2. Fit the new centrifugal assembly in reverse order. On 3ph units the direction of fan rotation must be checked. If it is incorrect reverse any two of the live wires to the fan motor.

8. Connections to External Controls

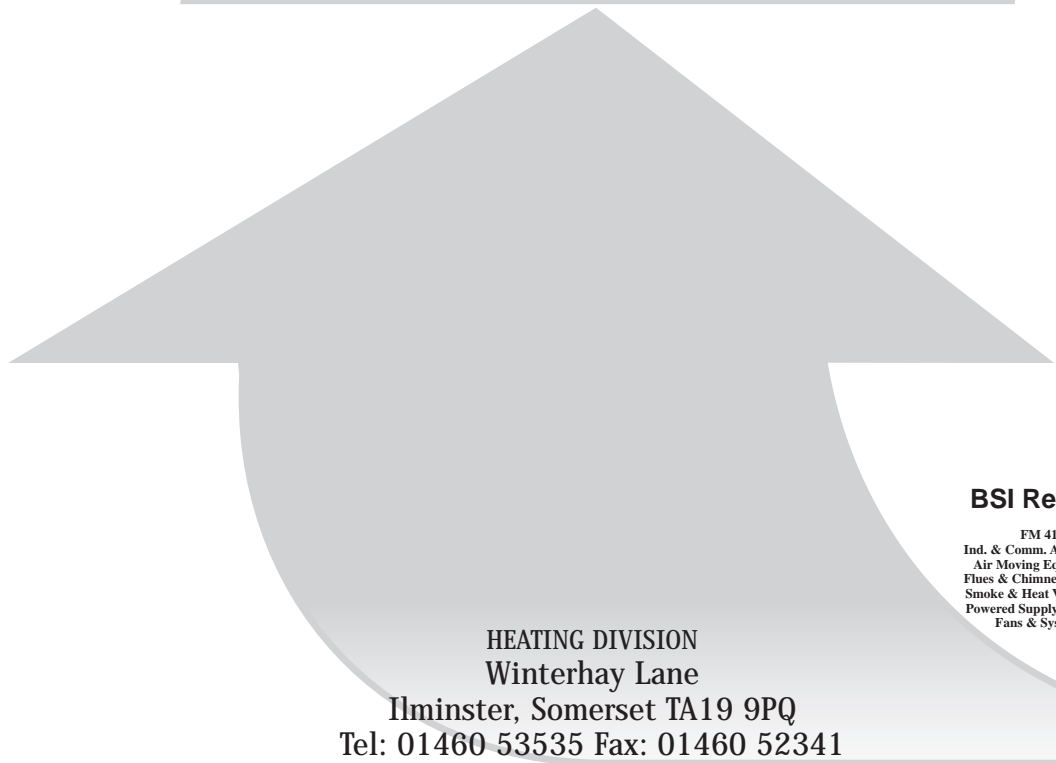


9. Fault Finding

Fault	Cause	Action
Pilot will not light.	Electrical	<ol style="list-style-type: none"> No spark <ul style="list-style-type: none"> - check ignition lead connections - check spark electrode gap - <i>See Section 7.3.</i> - faulty piezo igniter - change - faulty control box - change (auto ignition units).
	Gas	<ol style="list-style-type: none"> Check gas supply to pilot assembly. No pilot flame - <i>See Section 6.</i> Start button on multifunctional control not depressed for long enough.
Pilot lights but goes out when start button released.	Electrical	<ol style="list-style-type: none"> Faulty thermocouple - check connections- change High limit thermostat tripped out - check for reason, rectify and reset. Faulty multifunctional control - change
	Gas	<ol style="list-style-type: none"> Pilot flame too small - check - <i>See Section 6.</i>
Main burner will not light	Electrical	<ol style="list-style-type: none"> Check electrical supply is ON. Check controls are ON or calling for heat. Faulty multifunctional - change. No ignition spark or rectification signal (auto ignition units) Control box at lockout - reset, or faulty - change (auto ignition units)
Main burner lights, but goes out before main fan comes on.		<ol style="list-style-type: none"> Unit goes out on high limit - <ol style="list-style-type: none"> Check Fan command module (timer) operation. Check limit thermostat setting - <i>See Section 7.6.5.</i> Relight pilot as in Section 6 Faulty limit thermostat - change. Relight pilot as in Section 6. Faulty fan assembly - change. (Ducted Units Only) -fan motor out on thermal overload. - Allow motor to cool then check running amps <i>See table 4.</i> - check duct resistance <i>See Table 5.</i>
Main fan runs continuously	Electrical	<ol style="list-style-type: none"> Summer/Winter switch and/or external controls set to Summer. Fan command module (timer) faulty - change.
Main fan fails to run	Electrical	<ol style="list-style-type: none"> Fan motor or capacitor failed - replace. Fan command module (timer) faulty - change. Fan contactor failed - replace (3ph units)

10. Short List of Parts

ITEM	APPLICATION	PART NUMBER
MFC - SIT Nova 820 0.820.063	ALL - Std	142400439
MFC - Honeywell V4605C 1029B	ALL - /AI	142400431
Pilot Assembly - Honeywell Q359A1058	ALL - Std	142403002
Pilot Injector - Honeywell 45004108-001B (0.38mm / 0.355mm)	ALL - Std - NG	1424402801
Pilot Injector - Honeywell 45004114-005 (0.20mm / 0.23mm)	ALL - Std - Propane	142402823
Pilot Compression Fitting - Honeywell 4500062-002	ALL - Std	142400404
Ignition Electrode - Morgan & Matroc 61028	ALL - Std	142423121
Ignition / Rectification Electrodes - Johnson 27B2P6T0000CIW	ALL - /AI	142400625
Thermocouple - Johnson 2800B0 (600mm)	ALL - Std	142403832
Thermocouple - Orkli T50 (900mm)	150	142403833
Piezo Unit - Morgan & Matroc 66156	ALL - Std	142436021
Burner Bar - Bray AB 17510	45 - 150	142400212
Burner Bar - Bray AB 17509	12 - 30	142400234
Thermostat - Limit - IMIT LS/1 L2	ALL	142403609
Fan Command Module (timer)	ALL	142403605
Contactors - Danfoss CI4-5+1 037H311433	ALL - /C, /3	143016131
Full sequence control - Pactrol P16HI/VB4(CE)	ALL - /AI	142400421/H
Hi/Lo Governor Head - Anglo Nordic MD20003	ALL - /HL	142466410
Modulating Governor Head - Anglo Nordic MD1003/MD	ALL - /MOD	142466421
Amplifier board - Johnsons PIB-24	ALL - /MOD	142400304



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