

GAS-FIRED POWER VENTED UNIT HEATER

RHC DJL 4000



INSTALLATION/ COMMISSIONING/SERVICING



EU)2016/426(GAR),2009/125/EC(ErP), 2014/35/EU(LVD),and2014/30/EU(EMC) Regulations and Directives.

The following harmonised standards have been applied:

EN 1020, EN 60335-1, EN 60335-2-102, EN 55014-1, and EN 55014-2

Please read this document carefully before commencing installation, commissioning and/or servicing.
Leave it with the end user/site agent to be placed in their premises technical file after installation.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death.
All work must be carried out by appropriately qualified persons.

The manufacturer does not take any responsibility in the event of non-observance of the regulations concerning the connection of the apparatus causing a dangerous operation possibly resulting in damage to the apparatus and/or environment in which the unit is installed.

EC Declaration of Incorporation

(Directive 2006/42/EC (annex II, Sub B))

PROHIBITION TO PUT INTO SERVICE

Nortek Global HVAC (UK) Ltd.,
Fens Pool Avenue,
Brierley Hill,
West Midlands,
DY5 1QA,
United Kingdom

Herewith declares that:

Power-vented gas-fired air heaters, type:

- RHC 4000 DJL series

Are destined to be incorporated in other machines (air-handlers) or to be combined with other machines (air-handling systems), and are for this reason not entirely in compliance with the machinery directive 2006/42/EC. Proper integration into the air-handling systems is required to comply with the prescribed machinery directive.

Is in conformity with the provisions of the (EU) 2016/426 (GAR), 2009/125/EC (ErP), 2014/35/EU (LVD), and 2014/30/EU (EMC) Regulations and Directives

The following harmonised standards have been applied:

EN 1020, EN 60335-1, EN 60335-2-102, EN 55014-1, and EN 55014-2

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.

Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury, or death. Read the installation, operation, and

maintenance instructions thoroughly before installing or servicing this equipment.

Do not use this appliance if any part has been immersed in water. Immediately call a qualified service technician to inspect the appliance and replace any gas control that has been immersed in water.

Gas-fired appliances are not designed for use in hazardous atmospheres containing flammable vapours or combustible dust, in atmospheres containing chlorinated or halogenated hydrocarbons or in applications with airborne silicone substances.

Should overheating occur, or the gas supply fail to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.

This appliance is not intended for use by persons (including children) with

reduced sensory or mental capabilities or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance. 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.

The manufacturer 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.



CAUTION



WARNING

Failure to comply with the information given with these symbols will result in severe personal injury or death and/or property damage.

Note: Warning: For your safety, if you smell gas:

- Do not try to light any appliance
- Do not touch any electrical switch, do not use any phone in your building
- Evacuate all personnel & contact your gas supplier immediately
- Do not store or use petrol or other flammable vapours and liquids in the vicinity of the appliance.
- Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death.
- Read the installation, operation and maintenance instructions thoroughly before installing or servicing this equipment.
- In case of persisting problems, contact your distributor
- The electrical isolator should only be used in an emergency and should not be used for closing down the main burner, as it switches off the fan prematurely and may damage the heat exchanger, invalidating the warranty.
- The temperature in the control section of the unit may never be less than -10°C otherwise damage could occur to the sealing elements of the gas valve and to the electronic components.

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.

1. Introduction

Isolate any electrical supply to the heater and controller before proceeding.

1.1 Basic Information

The instructions in this manual apply to the RHC 4000(M) DJL gas-fired/ fan-assisted warm air heaters, installed at an operational ambient temperature between -15°C and +45°C.

The appliances must be installed in accordance with the rules in force. Before installation, check that the local distribution conditions, nature of gas and pressure and adjustment of the appliance are compatible.

A permanent electricity supply of 230 volts, 50 Hz, single phase is required.

- **Gas categories** I2H, I2E, I2E(S)B, I2E(R)B, I2Esi and I2EK.
- **RHC 4000(M) DJL** model suitable for indoor air handlers only (when installed where the height above floor level is greater than 1,8 meters measured to the underside of the appliance they may be used as a garage air heater).
Model RHC 4000(M) DJL heaters are approved for:
Type B22 / B52 – vertical vent (through the roof) or horizontal vent (through the wall)

All models & sizes are available for use with natural gas with operating temperatures between -15°C and 40°C.

These instructions are only valid for appliances designed to operate in Europe. If the country code and gas category on the appliance data label does not match the country of installation or the country codes and gas category's as shown in this instruction manual, it will be necessary to contact the distributor or manufacturer to provide the necessary information for the modification of the appliance to the conditions of use for the country of installation.

Check that the local distribution conditions of electricity supply, type of gas and pressure of the appliance are compatible.

The total installation should be installed in accordance with the rules in force, relevant National Standards, local regulations, and Codes of Practice.

When the external control calls for heat, an electronic control begins the ignition sequence to provide for a safe start.

Under normal conditions the fan motor runs constantly and after a call for heat it switches the heater on through a room or duct stat. However, in some applications, about 30 seconds after the call for heat, the fan control relay will activate the fan motor of the air handler.

The electronic control will supervise the flame during the entire heating cycle to ensure safe operation. When the required room temperature is reached, the main burner will shut down leaving the fan running to cool down the heat exchanger. After approximately 45 seconds, the fan delay relay will turn off the fan (if wired).

All models may only be used when installed within a closed compartment, e.g. an air handler.

Dimensions: we refer to the figures 1 through 9.

All dimensions are in mm (25.4mm= 1 inch)

1.2 Warranty

Warranty is void if:

- a. Model RHC 4000(M) DJL heaters are installed in atmospheres containing flammable vapors or atmospheres containing chlorinated or halogenated hydrocarbons or atmospheres containing any silicone, aluminum oxide, etc., that adheres to spark ignition flame sensing probes.
- b. The installation is not in accordance with these instructions.
- c. The maximum air flow through the heat exchanger tubes is not respected (see section 3.4).
- d. The required minimum air delivery is not respected (see table 1).
- e. The duct dimensions do not comply with the prescribed dimensions (see table 5)
- f. The inlet temperature (measured at the heat exchanger inlet) is lower than the value stated on the chart (see table 8: dew point occurrence chart).

2. Technical Data

2.1 Specifications

Models		4024-05	4030-06	4036-08	4050 06	4060-07	4075-09	4100-12	4125M15	4150M18	
Heat input Gross	G20	kW High	29.3	36.6	44.0	62.0	74.6	91.5	120.0	153.5	182.9
		kW Low	14.7	18.3	22.0	31.0	37.3	45.8	60.0	76.8	91.5
	G25 / G25.3	kW High	29.3	36.6	44.0	62.0	74.6	91.5	116.0	153.5	182.9
		kW Low	14.7	18.3	22.0	31.0	37.3	45.8	60.0	76.8	91.5
Heat Output (1)	G20	High Fire	24.0	29.8	36.0	50.8	61.2	75.0	100.0	126.3	151.3
		Low Fire	12.0	14.9	17.9	24.0	28.6	36.0	47.0	51.0	75.8
	G25 / G25.3	High Fire	24.0	29.8	36.0	50.8	61.2	75.0	93.2	126.3	151.3
		Low Fire	12.0	14.9	17.9	24.0	28.6	36.0	47.0	51.0	75.8
Gas Rate High Fire	G20	m ³ /h	2.8	3.5	4.2	5.9	7.1	8.7	11.5	14.6	17.5
	G25 / G25.3	m ³ /h	3.3	4.1	4.9	6.9	8.3	10.2	12.9	17.1	20.3
Power Consumption		kW	0.153	0.153	0.153	0.153	0.153	0.153	0.153	0.282	0.282
Injector Details	G20 / G25 / G25.3	mm	2.20	2.20	2.20	3.00	3.00	3.00	3.00	3.00	3.00
		Marking	220	220	220	300	300	300	300	300	300
	Quantity		5	6	8	6	7	9	12	15	18
Burner Pressure (2)	G20	20 mbar	9.7/2.5	9.2/2.4	7.9/2.1	7.0/1.9	7.5 / 1.9	7.5/2.1	8.3 / 2.4	7.4/2.2	7.5/2.2
	G25	25 mbar	13.5/3.7	13.2/3.4	11.1/3.0	10.0/2.7	11.3 / 3.0	10.2/3.2	11.8 / 3.3	10.2/3.2	10.4/3.2
	G25.3	25 mbar	13.5/3.7	13.2/3.4	11.1/3.0	10.0/2.7	11.1 / 3.0	10.2/3.2	11.7 / 3.3	10.2/3.2	10.4/3.2
Minimum Air Volume with Heat Output H1 (3)	V1 (4)	m ³ /h	N/A	N/A	N/A	3900	4700	5700	7500	N/A	N/A
		m ³ /s	N/A	N/A	N/A	1.08	1.31	1.58	2.08	N/A	N/A
		kW	N/A	N/A	N/A	50.0	60.0	73.8	97.0	N/A	N/A
Minimum Air Volume with Heat Output H2 (5)	V2 (6)	m ³ /h	2880	3290	5281	5950	7150	8800	11700	9600	12300
		m ³ /s	N/A	N/A	N/A	1.65	1.99	2.44	3.25	4.30	3.40
		kW	24.0	29.8	35.8	50.8	61.2	75.0	100.0	126.3	151.3

1. Heat output depends on airflow - heat output H2 only for airflows above V2
2. With open Service door
3. H1 = heat output at airflow V1
4. V1 = minimum airflow required through enclosure
5. H2 = heat output at airflow V2
6. V2 = minimum airflow for high heat output H2

Table 1 – Technical data

Country Code	Approved Gas Category
AT, BG, CH, CY, CZ, DK, EE, ES, FI, GB, GR, HR, IE, IT, IS, LT, LV, NO, PT, RO, SE, SI, SK, TR	I2H
DE, LU, PL, RO	I2E
FR	I2Esi
BE	I2E(S)B / I2E(R)B
NL	I2EK

Table 2.1 – Technical Data

Gas Category	Gas Type	Nominal Supply Pressure (mbar)	Max Supply (mbar)	Minimum Supply (mbar)
I2H / I2E	Nat Gas (G20)	20	25	17.5
I2E (S) B / I2E(R)B / I2Esi	Nat Gas (G20 / G25)	20 / 25	25 / 30	17.5 / 18
I2EK	Nat Gas (G20 / G25.3)	20 / 25	25 / 30	17.5 / 20

Table 2.2 – Gas Supply Pressures

2.2 Definitions

Jacket-less:

A gas-fired air heater supplied as a skeleton appliance e.g. without case or cover.

Module:

The jacket-less gas fired air heater.

Constructor

The undertaking, which builds a module into another casing. e.g. an air handler.

Appliance

An appliance where the air for combustion is taken from within the area where the gas burner is operated.

Compartment

The section of an appliance into which the module is installed.

B22 / B52 Appliance

An appliance where the air for combustion is taken from within the area where the gas burner is operated.

Dew point

The condition, when the temperature is such that the water vapour in the combustion products condenses out.

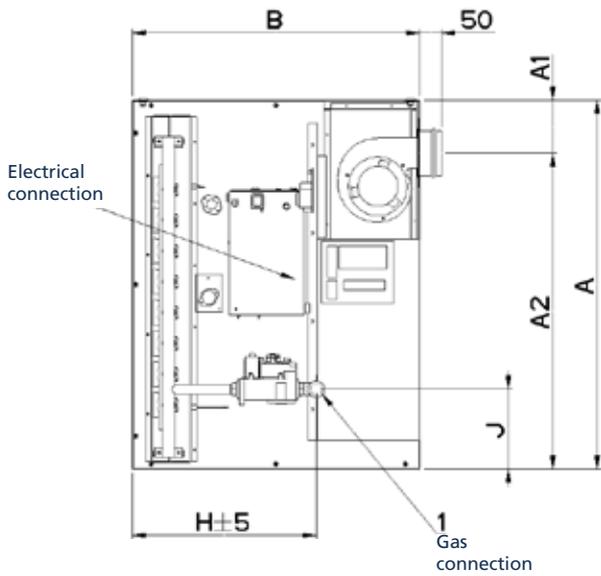


Figure 1. 4024-4036 side view (mm)

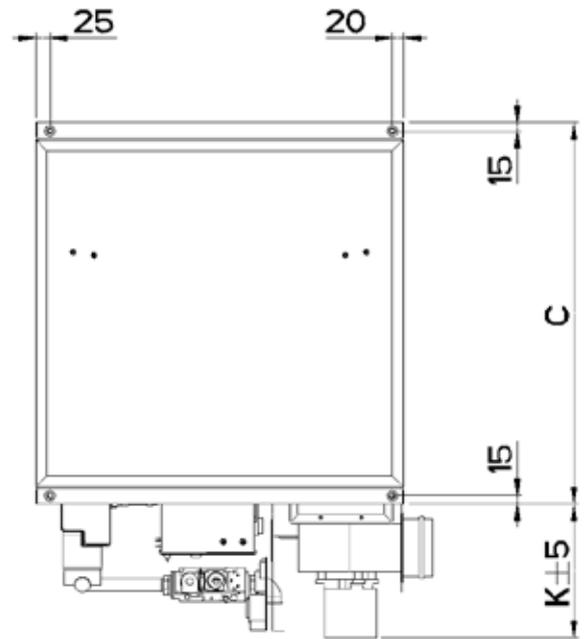


Figure 3. 4024-4036 top view (mm)

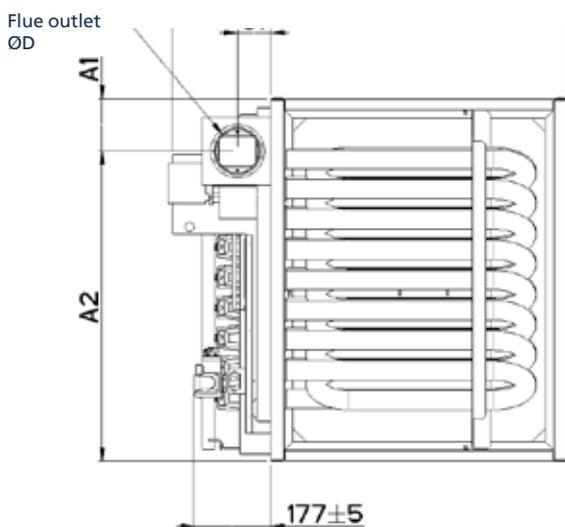


Figure 2. 4024-4036 back view (mm)

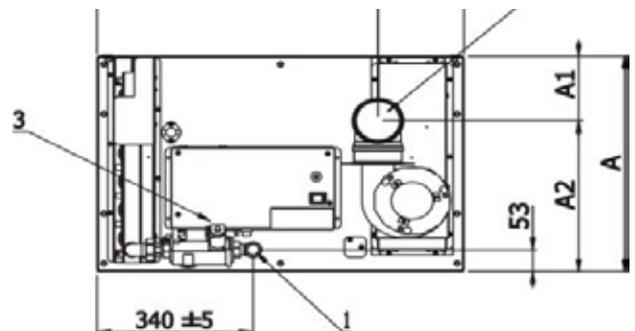


Figure 4. 4050-4100 side view

RHC models	A	A1	A2	B	B1	B2	C	C1	E	H	J	K
4024-05	559	121	438	648	N/A	N/A	677	65	N/A	425	112	225
4030-06	559	121	438	648	N/A	N/A	677	65	N/A	425	112	225
4036-08	837	121	716	648	N/A	N/A	677	80	N/A	425	181	230
4050-06	531	85	466	800	613	187	224	268	118	N/A	N/A	N/A
4060-07	601	160	441	800	613	187	224	268	118	N/A	N/A	N/A
4075-09	741	160	581	800	613	187	224	268	118	N/A	N/A	N/A
4100-12	950	160	790	800	613	187	224	268	118	N/A	N/A	N/A
4125M15	1272	190	1082	930	778	152	361	348	118	N/A	N/A	N/A
4150M18	1481	190	1291	930	778	152	361	348	118	N/A	N/A	N/A

RHC models	Unit	Packaging	Total
4024-05	31	18	49
4030-06	33	18	51
4036-08	52	23	75
4050-06	90	29	119
4060-07	100	29	129
4075-09	120	29	149
4100-12	149	29	178
4125M15	220	58	278
4150M18	250	58	308

Table 2.2. - Mounting flange & dimensions

Table 3 - Weights (Kg)

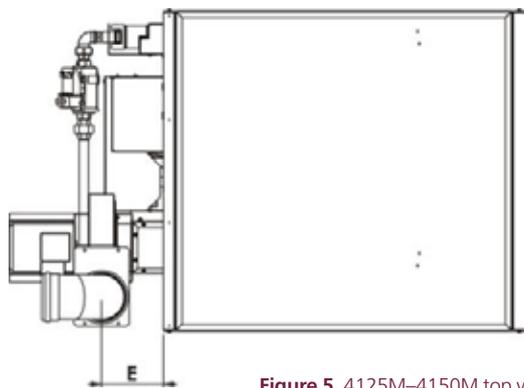


Figure 5. 4125M-4150M top view

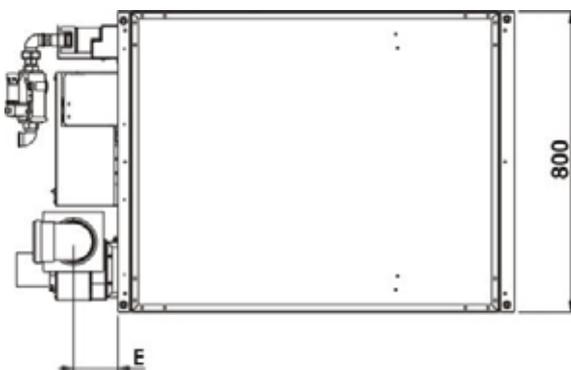


Figure 6. 4050-4100 top view

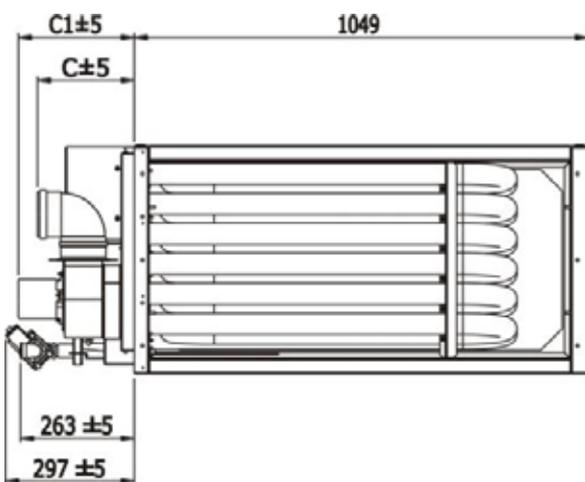


Figure 7. 4050-4100 front view

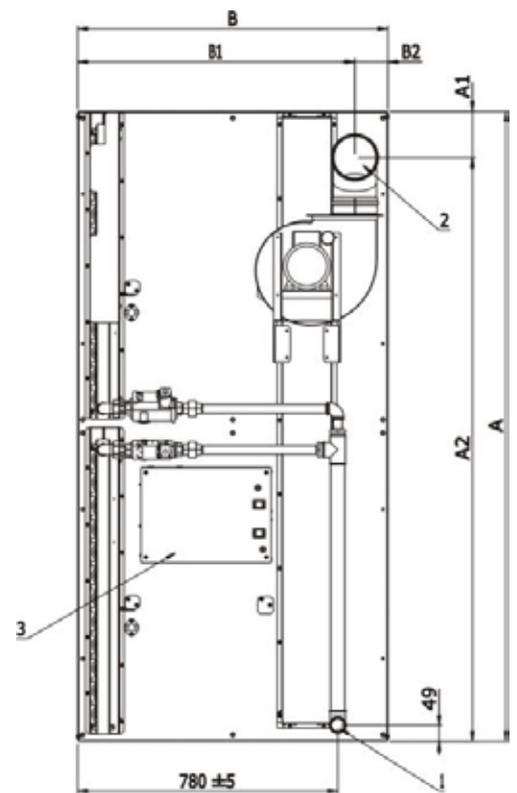


Figure 8. 4125M-4150M side view

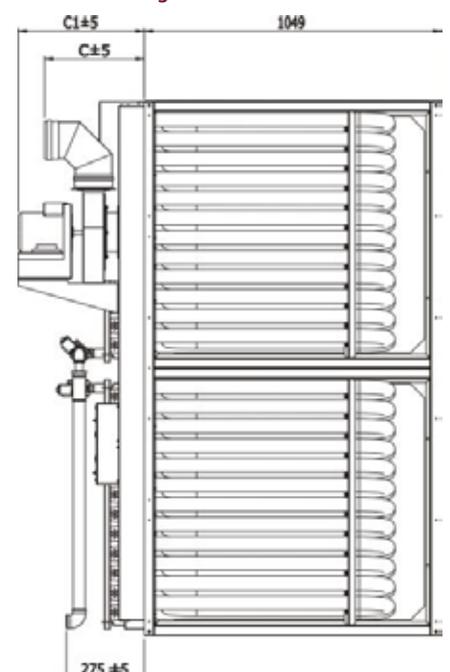


Figure 9. 4125M-4150M front view

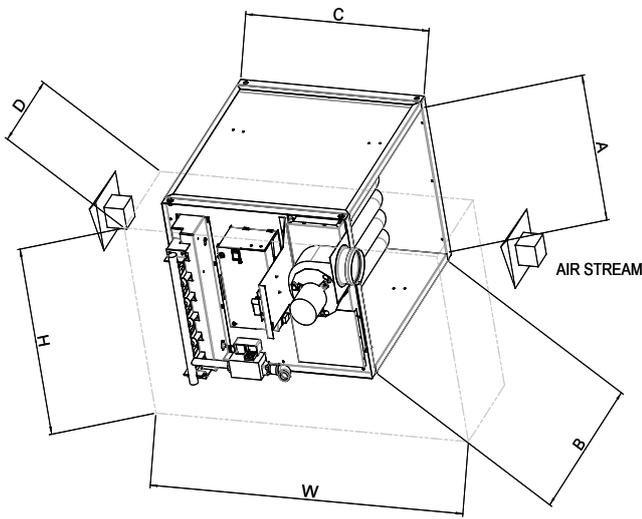


Figure 10. Compartment dimensions 4024–4036

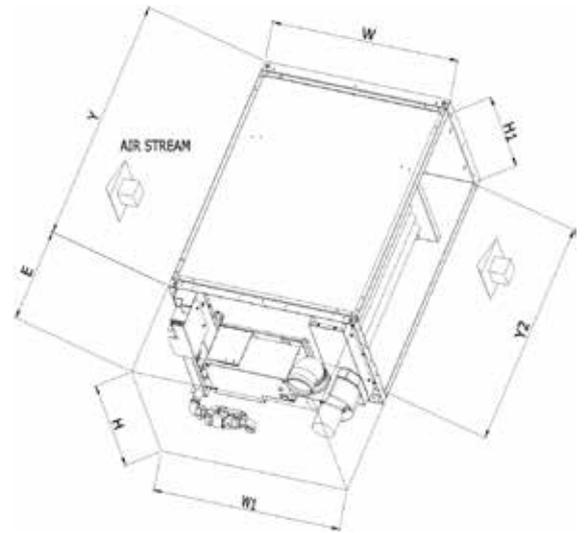


Figure 11. Compartment dimensions 4050–4150

Models	A	B	C	D minimum	D maximum	E	H	H1	W	W1	Y	Y2
4024-05	509	617	648	315	393	N/A	650	N/A	1100	N/A	N/A	N/A
4030-06	509	617	648	315	393	N/A	650	N/A	1100	N/A	N/A	N/A
4036-08	787	617	648	330	408	N/A	1000	N/A	1100	N/A	N/A	N/A
4050-06	N/A	N/A	N/A	N/A	N/A	400	531	461	800	800	1049	975
4060-07	N/A	N/A	N/A	N/A	N/A	400	601	531	800	800	1049	975
4075-09	N/A	N/A	N/A	N/A	N/A	400	741	671	800	800	1049	975
4100-12	N/A	N/A	N/A	N/A	N/A	400	950	880	800	800	1049	975
4125M15	N/A	N/A	N/A	N/A	N/A	420	1272	1202	930	930	1049	975
4150M18	N/A	N/A	N/A	N/A	N/A	420	1481	1411	930	930	1049	975

Table 4 – Compartment dimensions (mm)

3. General Requirements

3.1 General

It is important that all gas appliances are installed in accordance with the rules in force and by appropriately qualified persons. Failure to install appliances correctly could lead to prosecution. It is in your own interest and that of safety to ensure compliance with the law.

Caution : Air heaters should not be installed in corrosive atmospheres, i.e. near plating spray or de-greasing plants or in areas where there is a fire risk.

Care should be exercised when designing ducting systems especially with regard to the application of restriction and direction turning fittings, i.e. elbows directly on to the air heater, doing so can cause an uneven and turbulent air flow across the heat exchanger resulting in heat exchanger spots and nuisance shut down of the gas burner due to localized overheating, thus activating thermal over-heat controls.

The location must also provide sufficient space to allow the heater to be serviced.

3.2 Specific Heater Locations

DJL installation :

Do not locate the air heater where it may be exposed to water spray, rain, etc.

The location chosen for the air heater must permit the provision of a satisfactory flue system venting to outdoor atmosphere and adequately ventilated to provide for combustion air. Installation clearances (mm) (towards combustible materials)

Top	150
Flue Connector	150
Access Panel	600
Non-Access Side	150
Bottom	50

Table 5 – Installation clearances (mm)

3.3 Minimum Airflow Requirement

The minimum airflow duty through the heating section enclosure (see figures 10 and 11) must be observed as indicated in table 1.

3.4 Maximum airflow condition

Special attention must be given to ensure that the temperature rise of the air, passing through the enclosure (duct channel) around the heat exchanger tubes, is high enough to avoid condensation forming within the tubes. This condensation forming could occur by super cooling of the products of combustion. Such condensation can be the source of severe corrosion and damage to tubes or part of the tubes.

The chart below indicates the probability of condensation forming within the tubes reference :

- The temperature rise of the air through the enclosure (around the tubes).
- The inlet air temperature passing over the heat exchanger
- In function of the expected minimum inlet air temperature, the minimum required temperature rise (to avoid condensation) must be derived from the chart shown below.

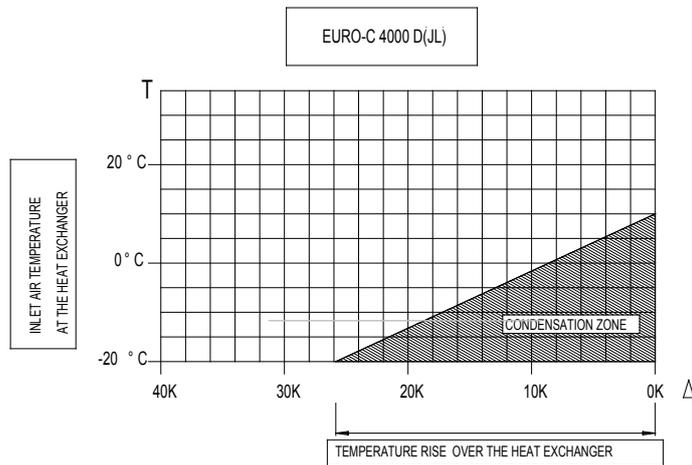


Table 6 – Dew point occurrence chart (condensation zone)

Example

- Expected minimum inlet temperature = -5°C
- Minimum required temperature rise shown on the chart = +13°K

Table 1 on page 6 indicates the heat output (kW) of the different models.

The maximum allowable airflow [through the enclosure (duct channel) around the tubes] can be calculated as follows :

$$V_{max} (m^3/h) = \frac{\text{heat output (kW)} \times 1000}{\Delta T_{\text{minimum}} \times 0.3423}$$

For air heaters with modulating gas valve, attention must be given to determine the maximum allowable airflow in function of the appropriate heat input.

Example

$$\Delta T_{\text{minimum}} = \frac{13K \text{ (with minimum inlet temperature = -5°C)}}{\text{inlet temperature = -5°C}}$$

Model 4075 09 at 50% modulation (see table 1 'output') : 36W

results into:

$$V_{max} (m^3/h) - 36 \text{ kW} \times 1000 - 8090m^3/h$$

3.5 Combustion air supply & flue system

All products of combustion must be flued to outdoor atmosphere.

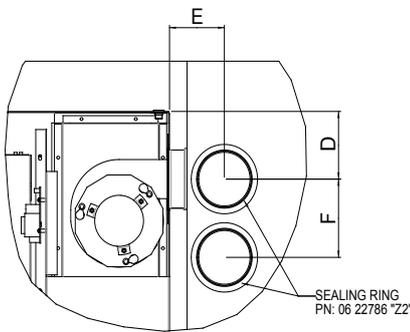


Figure 12. Combustion air and flue pipe sockets

The air heater must be installed as a power vented (Type B) heater, which requires only a flue pipe exhausting to outdoors and takes combustion air directly from the space to be heated. For models fitted with the optional vestibule, an air inlet terminal must be fitted into the air inlet socket (see figure 14).

The center distance between the combustion air inlet socket and the flue outlet socket is 225mm for all 4050-4150M models.

Each appliance requires it's own individual flue system. When several appliances are installed, one common flue and combustion air system, thus combining several heaters, is not allowed

Note: The flue must be installed in accordance with national and local regulations. Failure to provide proper fluing could result in death, serious injury and/or property damage. The air heater must be installed with a flue to the outside of the building. Safe operation of any power vented gas apparatus requires a properly operating flue system, correct provision for combustion air, and regular maintenance and inspection.

Use of flue restriction rings (Only for 4000M units !!)

To ensure the efficiency of the units, eventually a flue restriction ring needs to be fitted in the outlet collar of the venter housing. The diameter of the restriction ring will be determined by the flue pipe length.

Models	D	E	F
4024	121	105	140
4030	121	105	140
4036	121	178	225

Table 7.1 – Combustion air & flue pipe sockets

Combustion out and inlet application	4125M.15	4150M.18
1 x 1M pipe length till 1 x 3M pipe length	86mm	90mm
B Appliance 1 x 4M pipe length till 1 x 6M pipe length	90mm	93mm
1 x 7M pipe length till 1 x 9M pipe length	93mm	95mm

Table 7.2 – Diameter flue restrictors for DJL

3.5.1 Flues for power vented installations

(Type B appliances)

Air for combustion will be taken from within the space where the heater is installed. Ensure that an adequate air supply for combustion and ventilation is provided within the building in accordance with the regulations & rules in force. Table 8 shows flue pipe sizes and maximum vent lengths. The minimum flue length is 0.5 meters.

The combustion air inlet socket at the appliance must be foreseen with an inlet grill of class IP20 (for indoor applications, or an approved vertical flue terminal for outdoor terminations).

Indoor air inlet socket = PN 60-50712-300 (100mm), PN 60-50712-130282 (130mm)

Outdoor air inlet cap = PN 33-54-107 (100mm), PN 33-54-207 (130mm)

Outdoor air inlet 250mm extension pipe = PN 33-54-103 (100mm), PN 33-54-203 (130mm)

Note: extension pipe must be used with the outdoor inlet cap.

Models	4024-4030	4036	4050-4150
Heater socket & pipe dia	100	130	130
Centre distance	165	225	225
Maximum straight length	7.5	7.5	9
Equivalent length of 45° elbow	0.75	0.75	0.75
Equivalent length of 90° elbow	1.5	1.5	1.5

Table 8 – Combustion air inlet & flue pipe requirements

To avoid leakage use single wall flue pipes of seamless aluminium or stainless steel. All joints must be sealed to prevent products of combustion from leaking into the building. An approved flue terminal is required.

If the flue passes through a combustible element of the building it must be enclosed by a sleeve of non-combustible material and separated from the sleeve by at least a 25mm air break.

The temperature of any combustible material near to the flue must not exceed 65°C when the heater is in operation.



The flue must be at least 50mm away from any combustible material.

Single wall flue pipe exposed to cold air or run through unheated areas must be insulated. Where condensation is unavoidable, provision must be made for the condensation to flow freely to a point to which it can be released, i.e. a drain or gully.

The condensation drain from the flue must be constructed from non-corrodible material not less than 20mm diameter. Copper or copper-based alloys must not be used for condensation drains.

3.6 Air supply



This model air heater is installed as a type B application and is designed to take air for combustion from the space in which it is installed. Do not restrict the combustion air intake.

It is important to ensure that there is an adequate air supply at all times for both combustion and heating requirements. Modern constructions involve the greater use of insulation, improved vapor barriers, and weather-proofing. This practice means that buildings are sealed much tighter than in the past.

The combustion air supply for a power vented gas fired air heater (Type B installation) can be affected by lack of air supply. Natural infiltration may not be adequate.

Use of extract fans aggravates this situation. It is important to ensure that there is an adequate air supply at all times. Reliance on doors and windows is not allowed. Always ensure that an adequate inlet for fresh air for combustion is provided sized to suit the total installation of any combustion apparatus.

Fit an access guard (IP20) to the combustion air inlet and take appropriate action to ensure that it remains unblocked. See national installation requirements for aeration and ventilation of buildings..

3.7 Electrical supply

Wiring external to the air heater must be carried out in accordance with the rules in force and by appropriately qualified persons.

Check the electrical specification is in accordance with the specification on the appliance data plate. A unique appliance wiring diagram is supplied as a separate document attached to this one plus an additional copy attached to the air heater.

A constant 230 volt 50 Hertz single phase with neutral link fused electricity supply is required. All heaters and controls must be earthed. A lockable isolator with

contact separation of at least 3.0mm on all poles should be installed adjacent to the appliance and within reach of any person working on the heater.

When a number of heaters are to be connected as part of a single installation each heater must be provided with a separate isolator.

Ensure that electrical supply cables do not touch the very hot combustion collector box. The cables must be fitted on the gas pipe inside the service compartment. The final connection must be made in the terminals provided in the control compartment. Follow the wiring diagram provided with the air heater and air handler.

Electrical supply cable conductor size should be 1.5mm. Fit the cord grip supplied with the heater. The length of conductors between the cord grip and the terminals must be such that, in the event that the cable becomes taut the line conductors do so before the earth conductor.

3.8 Gas supply

(gas service connection Rc ¾)

RHC 4000 DJL heaters are designed to operate on natural gas (G20 / G25 / G25.3). Refer to the specifications in section 2 of this document and to the data plate for details of supply pressures.

The gas meter and gas service must be checked by the supply undertaking to ensure that they are adequate to deal with the total load of all gas fired apparatus installed.

Connection to a gas network may only be carried out by appropriately qualified persons. The gas installation must comply with the rules in force using materials appropriate for gas installation.

To facilitate servicing, the air heater must be fitted with an approved gas service tap and union fitting or union tap adjacent to the appliance.

The inlet gas supply line must be installed so as to permit the access door to be opened and to allow removal of slide out burner assembly.

An adequate gas supply sized to provide the dynamic pressure for the volume required for the air heater(s) is essential to maintain the nominal heat input. Account of other gas fired plant using the same gas service must also be taken into account.

A 90° action, positive stopped gas service tap must be fitted adjacent to the appliance, fitted in a manner to facilitate appliance burner removal for service purposes, see Figure 13.

Ensure that the gas service includes a filter and has been tested and purged in accordance with prescribed practice prior to commissioning and taking the appliance into service.

As a rule, gas service pipes should not be routed through air ducts. Should it be necessary to do so then pipe work joints must not be made within the air duct.

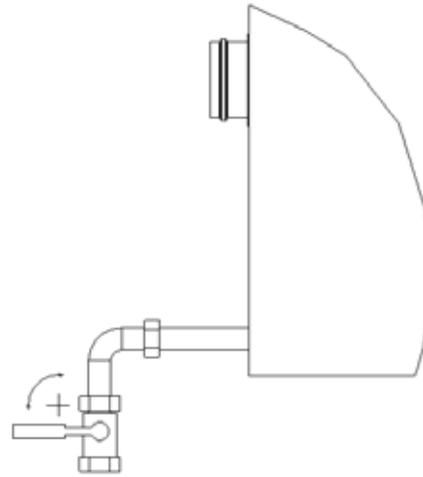


Figure 13. Gas connection detail ¾

4. Installation

4.1 Unpacking and preparation

Prior to dispatch, the air heater was operated and tested at the factory.

Check the shipping label and data plate to ensure the specification of gas and electrical supplies are compatible. Read this document and become familiar with the installation requirements and the appliance before commencing installation.

4.2 Fitting the combustion air inlet/flue system

Flue pipe runs may be horizontal or vertical and terminate either through the wall or roof. See Table 8 on page 11 for maximum vent length for an appliance installed as type B.

4.2.1 Fitting the flue pipe

Models	4024 - 4030	4036-4150
Flue Pipe socket size (Ømm)	100	130

Flue pipes must be sealed. Use seamless, aluminium or stainless steel pipe. Follow pipe manufacturer's instructions.

Table 9 – Flue pipe socket size (Ømm)

4.2.2 Guard installation on combustion air inlet pipe

(Type B installations) for power vent

When installed as a type B appliance, protect the inlet by fitting an access guard on the socket. Do not block this socket as it supplies combustion air for the burner. The inlet must be provided with a protection grill IP20 (see Figure 14).

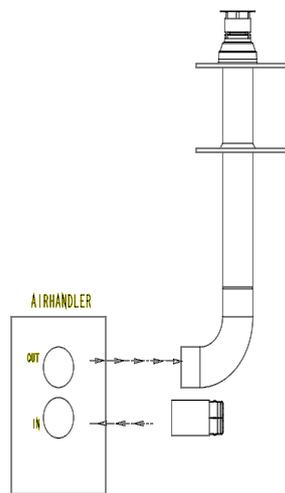


Figure 14.

Indoor air inlet socket = PN 60-50712-300 (100mm), PN 60-50712-130282 (130mm)
 Outdoor air inlet cap = PN 33-54-107 (100mm), PN 33-54-207 (130mm)
 Outdoor air inlet 250mm extension pipe = PN 33-54-103 (100mm), PN 33-54-203 (130mm)

Note: extension pipe must be used with the outdoor inlet cap.

4.3 Electrical connections

The electrical installation may only be carried out by appropriately qualified persons observing the rules in force. All electrical connections should be made in the heater control compartment. Screw type terminals are provided. Connections should be in accordance with the terminal markings and the wiring diagram affixed to the air heater or included with this document.



WARNING

This appliance must be earthed.

The minimum external controls required for the air heater are a room thermostat. It is essential the main input line and neutral to terminals L and N remains live at all times even when the appliance is switch off this is to ensure correct operation of the unit. An indicator light and burner-reset button are fitted inside the appliance. To add a remote reset button, make connections to the terminals in the electric box as indicated on the wiring diagram.

Note: If the reset button requires activating for any reason the cause should be identified before resetting. After resetting stay with the appliance for long enough to ensure that lockout does not reoccur (suggest 5 minutes).

4.3.1 Room thermostat siting

The siting of the room thermostat is important. It should not be fitted on an outside wall. Avoid location in draughty areas or where it may be influenced by heat sources e.g. The sun, process plant, etc. The thermostat or temperature sensor should be mounted on a vibration free surface and mounted about 1,5 meters above floor level. Follow the thermostat manufacturers fitting instructions. The thermostat must be suitable for switching 230 volts.



WARNING

Do not attempt to control more than 1 air heater from a room thermostat or control panel unless a properly wired relay is fitted. Follow instructions supplied with such panels.

5. Commissioning & Testing

Appropriately qualified persons may only carry out the commissioning and testing. This section should be read and fully understood before commencing commissioning and testing.

5.1 Electrical check

After completion of the installation and before switching on the electrical supply to the appliance, a qualified electrician must carry out a preliminary check. The following must be checked:

- Check that electrical cables/wiring do not touch the 'hot' combustion collector box and fix them all on the gas pipe.
- Check that all wiring is connected in accordance with the appliance circuit diagram.
- Ascertain that the correct fuse value and cable size has been provided.
- Check to ensure that the appliance is earthen by conducting an earth continuity test. Connect a test meter, one lead to the appliance earth terminal and the other to the mains incoming earth point at the electrical isolator. A resistance reading of 1.0 ohm or less must be indicated. If a higher reading is obtained, check all cable connections to ensure adequate security and cleanliness. If problem still exists it may be necessary to consult the electricity supply undertaking.
- Carry out a polarity test. Connect one lead of a suitable AC voltmeter to earth and connect the other lead to the live supply terminal (L) at the air heater. Switch ON the power to the air heater and check for correct voltage. The same result should be obtained by connecting the test leads between live and neutral.
- Connect the voltmeter test leads to N and E.
- A reading of $\pm 0V$ should be obtained. If these tests do not conform to the above, there is a fault, which must be rectified before proceeding further with the commissioning.
- Check that a suitable thermostat or control panel has been fitted.
- Ensure that an electrical isolator with two-pole separation with a minimum air break between poles of 3mm has been fitted adjacent to the air heater.

5.2 Gas connection

Only persons formally qualified to work on gas-fired apparatus may carry out commissioning and testing. The whole of the gas service installation including the meter must be inspected, tested for soundness and purged in accordance with appropriate requirements by a qualified person.

 Never use a flame for checking gas soundness.

5.3 Lighting the air heater

RHC 4000 DJL air heaters are all fitted with automatic spark ignition systems. When adequate airflow for combustion is proven by an air proving control and a pre-purge period has elapsed, the integral igniter and multi-functional gas control operate.

The ignition spark ignites the gas creating the burner flame, which is detected by a flame rod sensor. If a burner flame is not detected, the ignition controller proceeds to lockout and requires manually resetting. Lockout is indicated by the red warning light on the wiring panel inside the heater.

Note: If the first reset is not successful, wait 15 seconds before attempting reset.

5.3.1 To turn the air heater "ON"

The following checks should be carried out before attempting to light the air heater.

- Ensure all burner tubes contain a x-baffle and are fully inserted into the tubes. There is a tab at one end to prevent over insertion.
- Ensure that the gas supply to the air heater is turned ON;
- Ensure that the electrical supply to the air heater is switched ON;
- If fitted ensure that a time switch is set to an ON period;
- Set room thermostat to call for heat. e.g. above room ambient temperature (see air handling system instructions;)
- **Ensure the NOx reducing x-baffle is fitted flush into each burner tube.**
- Adjust the room thermostat to the required operating comfort temperature. The air heater will now start automatically when the room thermostat calls for heat,

Note: If the air heater will not start on initial start-up, the ignition controller may be in lockout position and require resetting. This may occur especially if the appliance has been on stand-by for a prolonged period.

5.3.2 To turn the air heater "OFF" for short periods

Adjust the room thermostat to its lowest setting or 'OFF'. The fan will continue to run to cool the heater and then switch OFF automatically (or follow the instructions of the air handler).

5.3.3 To turn the air heater "OFF" for long periods

Adjust the room thermostat to OFF or its lowest setting. When the fan has stopped, turn OFF the gas supply and then switch OFF the electricity supply to the air heater (or follow the instructions of the air handler).

Air heater gas pipework

The soundness of the air heater pipe work has been checked prior to leaving the factory. However during

installation, connections may have been loosened. Check the soundness of the appliance pipe work using a soapy solution. If any leaks are found they must be rectified immediately.

 Never use a flame for testing for gas soundness

5.4 Adjustments

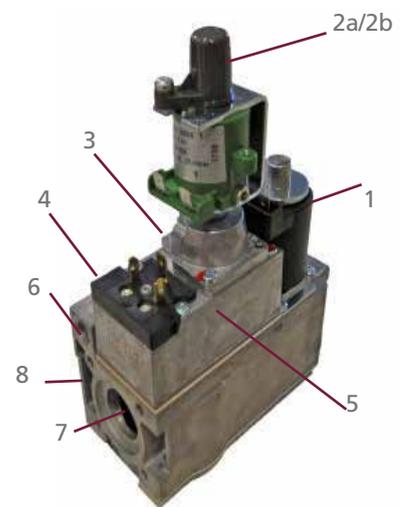


Figure 15. Honeywell gas valve

Legend

1. Shut-off solenoid valve EV1
2.
 - 2a. Adjustment low fire
 - 2b. Adjustment high fire
3. Inlet pressure test point (not visible on figure 15)
4. Outlet pressure test point (not visible on figure 15)
5. Shut-off solenoid valve EV2
6. Pilot outlet
7. Main gas outlet
8. Holes (M5) for fixing flange

Burner gas pressure

The gas pressure is set for the required heat input before the appliance leaves the factory, normally provided the gas supply to the air heater is in accordance with the supply pressure described on the appliance data plate the operating pressure will not require adjustment. To check the pressure, the following procedure should be carried out:

- Ascertain from section 2 and the appliance data plate the correct operating gas pressure for the air heater;
- Turn the room thermostat control to its lowest setting (see instructions of the air handler);
- Remove screw from the outlet pressure test point of the multi-functional control valve. Connect a manometer to the test point;
- Adjust the room thermostat to call for heat e.g. above room ambient temperature;
- Observe the burner gas pressure on the manometer and compare to the required pressure (table 10);
- If necessary, adjust the burner gas pressure. Refer to following section for procedure;
- Set room thermostat to lowest setting to turn OFF the burners. Replace the test point screw (if removed) and with the main burner alight, test for gas soundness using a soapy solution.
- Reset temperature control/room thermostat to comfort operating level.

RHC 4000			4024 05	4030 06	4036 08	4050 06	4060 07	4075 09	4100 12	4125M 15	4150M 18	
Burner Pressure	Pressure at 100%	G20	mbar	9.7	9.2	7.9	7.0	7.5	7.5	8.3	7.4	7.5
		G25	mbar	13.5	13.2	11.1	10.0	11.3	10.2	11.8	10.2	10.4
		G25.3	mbar	13.5	13.2	11.1	10.0	11.1	10.2	11.7	10.2	10.4
	Pressure at 50%	G20	mbar	2.5	2.4	2.1	1.9	1.9	2.1	2.4	2.2	2.2
		G25	mbar	3.7	3.4	3.0	2.7	3.0	3.2	3.3	3.2	3.2
		G25.3	mbar	3.7	3.4	3.0	2.7	3.0	3.2	3.3	3.2	3.2
Gas Consumption at 50%	G20	m³/h	1.4	1.7	2.1	3.0	3.6	4.4	5.7	7.3	8.7	
	G25/ G25.3	m³/h	1.6	2.0	2.4	3.4	4.1	5.1	6.7	8.5	10.2	

Table 10 – gas pressures and low rate consumption values

5.5.1 Modureg V7335A 2000 series modulation system

The Modureg V7335A 2000 Series Modulating gas pressure regulators are fitted as standard and used on "Honeywell" Multifunctional gas controls for modulating the burner gas pressure for firing over the range 50% to 100% of the nominal high fire burner rate.



Heaters must be controlled so that burner start-up takes place in the high fire (100%) mode.

Modureg gas pressure regulators require to be powered by a maximum 24V DC voltage over the range 15–65 mA maximum. Maximum outlet pressure occurs at the high set point value (high fire). Minimum outlet pressure occurs at low set point value (low fire).

The power signal may be obtained from a system amplifier, which may be an integral control within the appliance, or, from a remote control system designed to provide the required controlling voltages. Adjusting the V7335A Regulator, refer to Figure 1716.

To check the minimum or low fire and maximum or high fire pressures for limits of modulation use the following procedures. Fit a manometer to appliance burner pressure test point.

Allow time for gas pressure to stabilise before making adjustments.

To set minimum (low fire) 50% rate (see table 10)

1. Remove regulator cover cap;
2. Disconnect electrical connection to the regulator coil;
3. Energise operator, set control in operation and wait until outlet pressure is recorded on manometer;
4. Use a 9mm wrench to turn the minimum rate adjustment screw clockwise to increase or counter-clockwise to decrease the minimum pressure setting

The minimum pressure setting must be adjusted first, because any adjustment of the minimum pressure setting influences the maximum pressure setting.

To set maximum (high fire) 100% rate

1. Follow point 1 above. Connect electrical connection to the regulator coil and ask for maximum heat;
2. Using a 7mm wrench to turn the maximum adjustment screw clockwise to increase or counter-clockwise to decrease the maximum pressure setting to the value stated on the appliance data plate;
3. Replace cover cap, re-wire coil in circuit;
4. Operate burner several times in high, intermediate and low-pressure modes and check performance on the manometer 16.

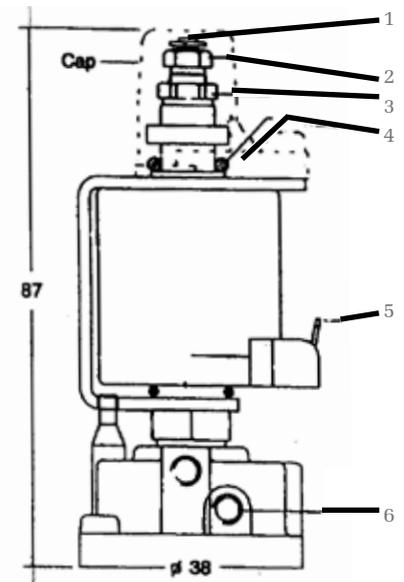


Figure 16. Modureg V7335A

Legend

1. Shaft
2. Adjustment screw (7mm) for maximum pressure setting
3. Adjustment screw (9mm) for minimum pressure setting
4. "O" ring
5. 6.3mm AMP terminals
6. M5 pressure feedback connection

**Fault finding “MODUREG”
operation setting procedure:**

1. Minimum or Low Fire unobtainable :
 - Ambient temperature too high in location of regulator max 70°C;
 - Check input voltage to coil,
 - Zero volt is low fire mode, shaft out;
2. Cannot obtain Maximum or high fire
 - Open circuit to regulator coil;
 - Measure coil resistance = 127Ω;
 - Short circuit between coil and casing;
 - Check resistance between one terminal and casing, reading indicates short circuit;
 - Low voltage to regulator;
 - Check for correct voltage range, should be: 0–24 V DC;
 - Low gas supply pressure;
 - Check natural gas supply pressure - table 2.2. Push down plunger, burner pressure should rise to high-fire rate;
3. Erratic operation:
 - Fluctuating or pulsating DC voltage ;
 - Check using meter, if pulsating suspect input signal, transients, etc.
4. Minimum rate lower than setting required or below 1.5mbar:
 - Minimum pressure set too low; re-adjust;
 - Line supply gas inlet control regulator faulty or requires adjustment;
 - Appliance gas tap not fully open

6. Servicing Instructions



Only appropriately qualified persons may carry out servicing and fault finding on this gas fired equipment. Before commencing service ensure that both the gas and the electricity are turned and switched “OFF” and that the air heater has cooled down. Inadvertent substitution or replacement of components similar to those specified or replacement in a manner contrary to the method herein described could constitute a hazard and lead to prosecution.

RHC 4000(M) DJL air heaters will operate with a minimum of maintenance. To ensure long life and satisfactory and safe performance, an air heater that is operated under normal conditions should be inspected and cleaned at the start of each heating season. If the air heater is operated in an area where unusual amounts of dust, etc are present in the air, more frequent servicing is recommended.

5.6 Air heater controls and operation

Check air heater operation after all adjustments have been carried out. Set the temperature control above ambient temperature.

RHC 4000 air heaters are fitted with a pressure sensitive, combustion air safety control that monitors pressure differential in the combustion airflow. The control operates with the settings given in table 11 (settings are for sea level installations).

When the combustion air safety control closes verifying airflow, the gas control valve will open and the burner will light. If the burner does not light, the ignition controller will lockout and must be manually reset. The air heater is fitted with a signal lamp and manual reset button that indicates lockout.

Note: If the first reset is not successful wait 15 seconds before resetting the igniter.

Wait approximately 30 seconds after the burner has lit, the time delay relay will activate the thermal fan control and will also activate the fan if wired (most air handlers are equipped with constant running fans). Continue to operate the air heater for several minutes to ensure correct operation.

Turn room thermostat to its lowest setting. The main burners should extinguish while the fan continues to run to cool the air heater. The fan delay relay will normally be de-energized and stop the fan motor in approximately 45 seconds (if wired).

When any service is completed, be sure that components are reassembled correctly to ensure that no unsafe condition exists.

Upon completion of the service carry out the commissioning instructions outlined in section 5 of this document.



Excessive dirt buildup on the inside of the burner ports could cause unburned gas to spill out of the back of the burner tube causing a fire or explosion. To prevent this occurring, clean all of the burner ports at least annually.



When cleaning air heaters, wearing of eye protection and a dust face mask is recommended

Model	Normal Equilibrium warm (Pascal) DJL	Set point 'off' (Pascal) DJL
4024 05	155	120
4030 06	155	120
4036 08	130	88
4050 06	210	165
4060 07	195	146
4075 09	175	155
4100 12	135	115
4125M. 15	105	82
4150M. 18	105	82

Table 11 – Combustion air pressure control setting

5.7 Handing over

Upon satisfactory completion of commissioning and testing, hand the instructions to the user or their representative. Advise the appropriate person how to safely use and operate the air heater and describe the use of appropriate external controls. Ensure that the person understands how to start the heater and how to turn it OFF.

Suggest that the **instructions are placed** close to the air heater for future reference. In the absence of an appropriate location fix them to the gas service meter. **Ensure they are not placed where they may restrict the airflow from the heater or where they may catch fire from a hot surface.**



Do not fix them in the control section.

Advise the person who is assuming responsibility that for continued safe operation the air heater should be serviced at least once a year.

6.1 Service procedure

The following procedures should be carried out at least annually:

1. Remove the burner assembly as in section 7.1. Clean thoroughly, (cleaning the burners requires an emery cloth, wire brush and a cleaning cloth-stubborn deposits on burners are best cleaned using “acetone” as a solvent). Vacuum cleaner or compressed air may assist in this cleaning operation of the burner head.
 - Check the condition of the igniter and clean to remove all deposits. Check the spark gap (3.0mm).
 - Check the sensor - clean as necessary

- Remove any soot deposits from the burner with a wire brush. Clean the ports with a degreaser or acetone. A vacuum cleaner or compressed air may assist in this cleaning operation. Wipe the inside of the burner tube clean (cleaning thoroughly with a degreaser as recommended will retard future build-up of dirt). Inspect the burner for any damage or deterioration. If the burner is damaged or corroded, replace it.



Caution : The inshot burner is precision machined to fine tolerances, do not clean with hard sharp or abrasive instruments.

- Remove each x-baffle and check for signs of damage, warping or bending. Replace if necessary. Ensure x-baffles are fully inserted into each burner tube. There is a tab at one end to prevent over insertion.



The appliance must not be operated with some or all of the x-baffles removed.

- The heat exchanger should remain clean unless a problem has developed due to poor combustion. Examine the heat exchanger tubes internally and externally for any sign of deterioration. The outside of the tubular heat exchanger can be cleaned from the front of the heater with an air jet and/or a flexible brush. Remove any dust and grease deposits. an air jet and/or a flexible brush. Remove any dust and grease deposits.

The inner surfaces of the heat exchanger can be reached for cleaning with the burner and combustion air fan (venter) assemblies removed, (see figures 17 through 23 and section 7). Clean with a flue brush or a heavy wire to which wire wool has been attached. Brush inside each heat exchanger tube until all foreign material has been removed. The use of a flashlight is necessary to carry out this operation

- Remove any dirt and/or grease that may have accumulated on the venter fan motor and its housing.

Note: Venter fan motors are lubricated for life and do not require greasing.

- The gas multi-functional control valve requires no field maintenance except cleaning of it's exterior and checking the condition of the wire connections. Instructions for testing pressure are given in section 5.5.
- Check the flue/combustion air system for soundness. Reseal/replace any parts that are not sound.
- Check all wiring connections. Check wiring for any signs of damage. Replace any suspect wiring with an equivalent specification.
- Check operation of thermal fan control and control relay.
- When service is complete carry out full commissioning procedure as per section 5 of this document.

7. Removal & Replacement Of Parts



RHC 4000 air heaters must only be fitted with authorized replacement parts. These heaters must use certificated spare parts to comply with legislation.

7.1 Main burner removal

7.1.1 Instructions for burner removal (see Figure 17):

- Turn off the gas supply to the air heater.
- Switch off the electricity supply to the air heater.
- Open the access door.
- Disconnect the union in the gas supply outside of the appliance.
- Remove gas supply pipe from the multifunctional gas control valve - remove flame sensor wire from flame sensor & high tension ignition wire from burner relay.

- The burner rack assembly is now visible
 - Models 4024 - 4036 : At the bottom of the burner rack assembly, remove the nut that secures the burner box bottom. At the top of the burner rack assembly, remove the bolt that attaches the burner rack assembly to the bracket. Lift the burner rack/manifold assembly upward (to clear the locating weld pins) and pull the assembly out of the air heater.

- Models 4050 - 4150M At the bottom & top of the burner rack assembly, remove the 2 bolts that secures the burner rack to the burner box bottom & top.

At the top of the burner rack assembly, remove the 2 bolts that attaches the burner rack assembly to the bracket. Lift the burner rack / manifold assembly upward (to clear the locating weld pins) and pull the assembly out of the air heater.

For clarity, the heater cabinet & other parts are not illustrated; do not remove the burner box assembly from the heater.

7.1.2 Instructions for re-assembly:

- Reverse the procedure for removal making sure that all parts are installed correctly.
- Check that all components are secure.
- When lighting, always follow the lighting instructions on the air heater.

Note: After any service work has been carried out, the air heater must be fully commissioned. See section 5 of this document.

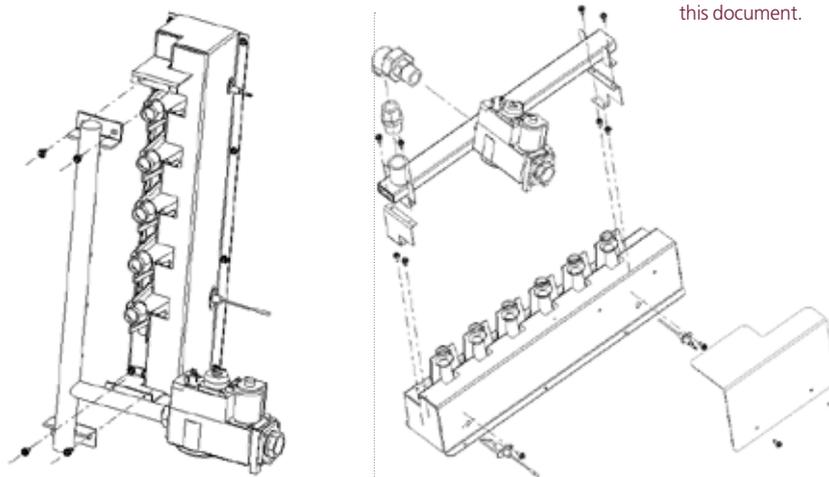
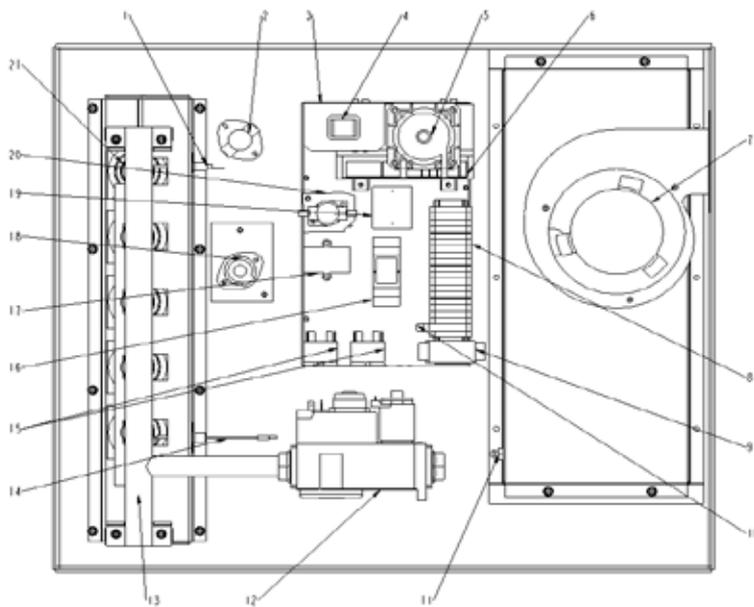


Figure 17. Removing the burner rack/manifold assembly
4024 - 4036
4050 - 4150M



1. Flame sensor
2. LC1 limit control (without reset)
3. Electrical wiring panel
4. Reset lockout signal lamp
5. Differential pressure switch
6. Burner control relay or ignition controller
7. Flue gas extractor for combustion products
8. Electrical connectors
9. Time delay relay
10. Fuseholder with fuse
11. Differential pressure point
12. Combination gas valve with pressure regulation
13. Manifold & injectors
14. Ignition electrode
15. Relay K1.1 (not for UK/IE)
16. Relay K1.2 (not applicable on RHC 4000 DJL/RJL)
17. RHC 4000 DJL/RJL
18. Relay main ventilator (not applied on RHC 4000 DJL/RJL)
19. Electronic net filter
20. LC3 max limit controller with manual reset
21. 3VA separation transformer (not for UK/IE)
22. Fan control relay
23. Tube burner

Figure 18. Removing the burner rack/manifold assembly

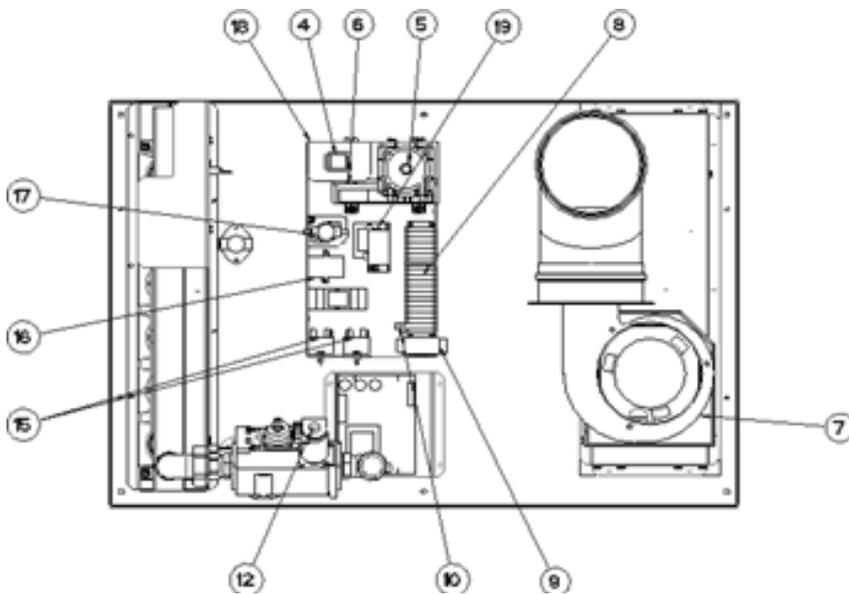
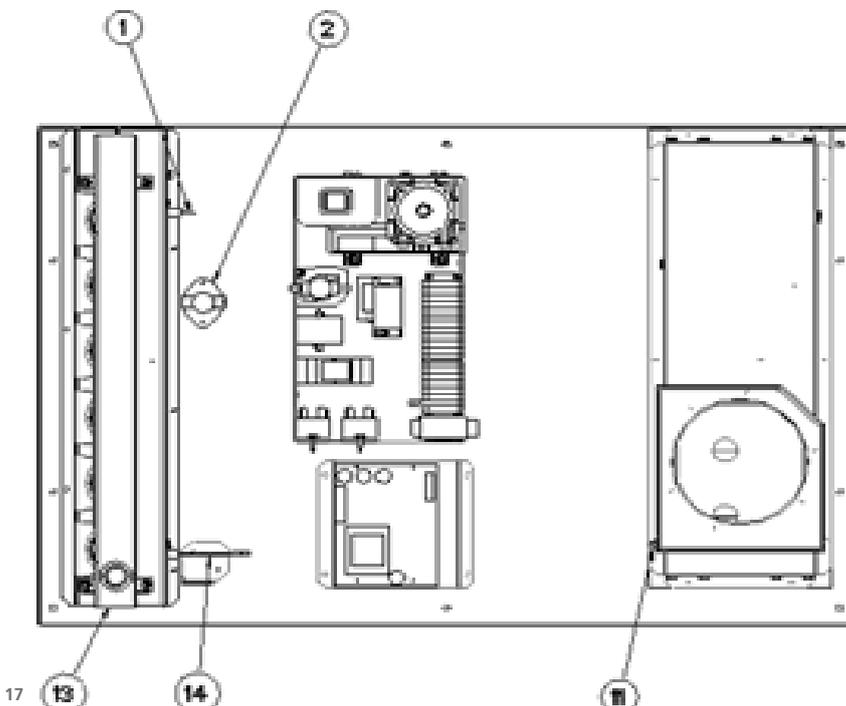


Figure 19. View of the control compartment (4050 - 4100)



1. Flame sensor
2. LC1 limit control (without reset)
3. Electrical wiring panel
4. Reset lockout signal lamp
5. Differential pressure switch
6. Burner control relay or ignition controller
7. Flue gas extractor for combustion products
8. Electrical connectors
9. Time delay relay
10. Fuseholder with fuse
11. Differential pressure point
12. Combination gas valve with pressure regulation
13. Manifold & injectors
14. Ignition electrode
15. Relay K1.1 (not for UK/IE)
Relay K1.2 (not applied in case of modulation)
16. Electronic net filter
17. Fan control relay
18. LC3 max limit controller with manual reset
19. 3VA separation transformer (not for UK/IE)

Figure 20. View of the control compartment (4050 - 4100)

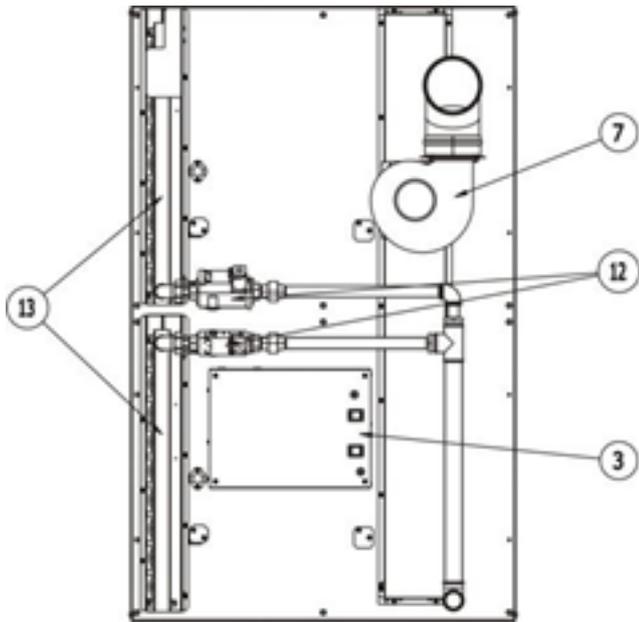


Figure 21. View of the control compartment RHC 4000(M) DJL

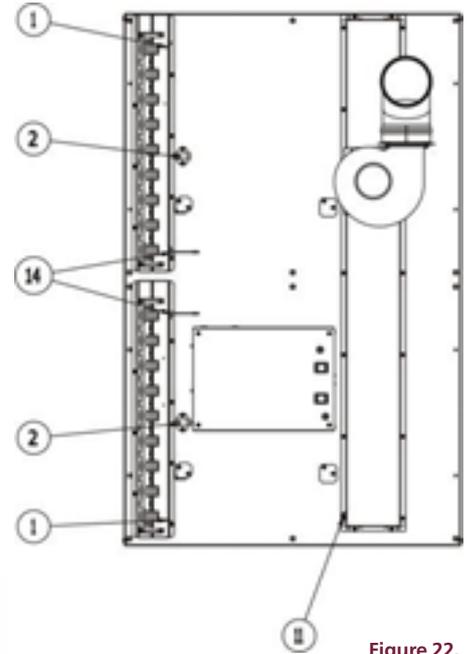


Figure 22.

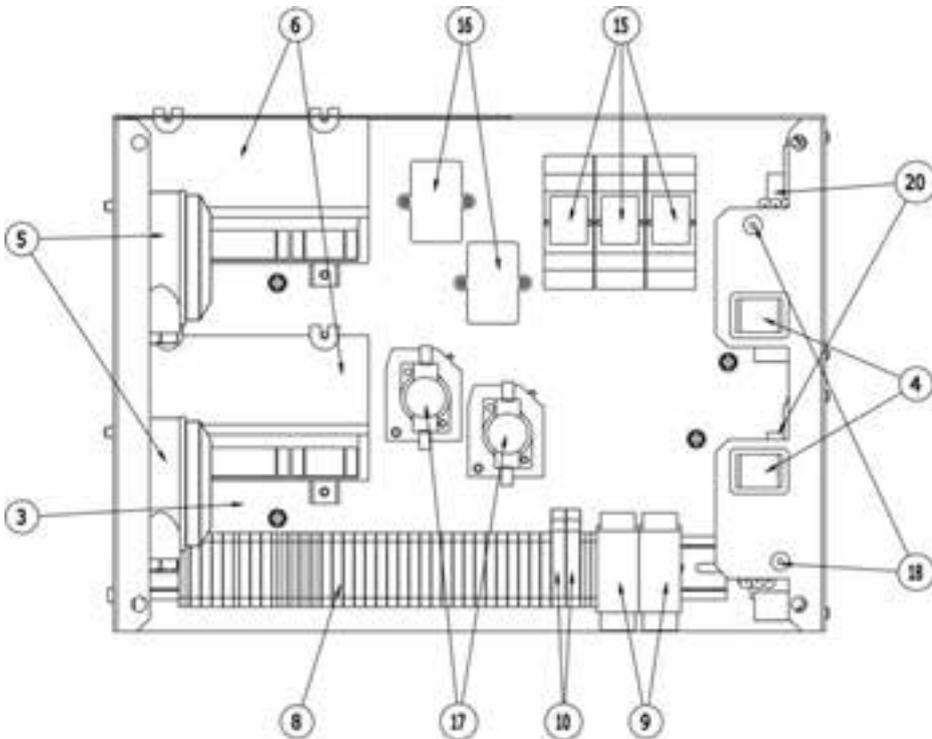


Figure 23.

1. Flame sensor
2. LC1 limit control (without reset)
3. Electrical wiring panel
4. Reset lockout signal lamp
5. Differential pressure switch
6. Burner control relay or ignition controller
7. Flue gas extractor for combustion products
8. Electrical connectors
9. Time delay relay
10. Fuseholder with fuse
11. Differential pressure point
12. Combination gas valve with pressure regulation
13. Manifold & injectors
14. Ignition electrode
15. Relay K1.1 (not for UK/IE)
Relay K1.2 (not applied in case of modulation)
16. Electronic net filter
17. Fan control relay
18. LC3 max limit controller with manual reset
19. GM 44

7.2 Burner injectors

1. Carry out steps described in section 7.1.
2. Unscrew the main burner injectors.
3. Re-fit new injectors.
4. Re-assemble in reverse order.

7.3 Ignition system

To access the ignition system, follow steps 1 to 3 in section 7.1.

Igniter

Refer to Figure 1818, 20, or 22 and locate the igniter (on the side of the burner rack). Disconnect the wire, remove the screw and the igniter. Clean with an emery cloth.

Note: Spark gap must be maintained to 3.0mm See Figure 24 on page 19. When re-assembling the earth wire must remain attached to the igniter. We refer to Figure 255 for installing the igniter.



Due to high voltage on the spark wire and electrode, do not touch when energized. See hazard levels.

Flame sensor

Refer to Figure 15, 18, 20, or 22 and locate the flame sensor. Disconnect the wire, remove the screw and the flame sensor. Clean with an emery cloth.

Ignition controller

The enclosed integrated circuit monitors the operation of the burner including ignition. Do not attempt to dismantle the ignition controller. Each heating season lead wires should be checked for insulation deterioration and good connections. Proper operation of the direct spark ignition system requires a minimum flame current of 1.0 μ A when measured with a micro ammeter.

For further information and checkout procedure of the direct spark ignition system, refer to the manufacturers control operating instructions a copy of which is supplied with the air heater.

7.4 Multi-functional gas control valve

1. Ensure gas supply to the air heater is turned OFF.
2. After the air circulation fan has stopped, switch OFF the electricity supply to the air heater.
3. Mark for future identification and disconnect the wires connected to the valve.
4. Disconnect the gas service union between the control valve and the gas service tap. Remove the gas control valve.
5. Re-fit a replacement valve making all of the required connections.
6. Carry out complete commissioning procedure prior to placing the appliance back into service as outlined in section 5.0.



The gas control operating valve is the prime safety shut-off. All gas supply lines must be free of dirt, scale, etc. before connecting to the air heater thus ensuring positive closure of the control valve.

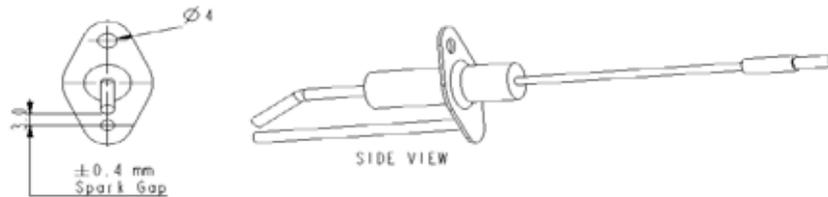


Figure 24. Igniter assembly

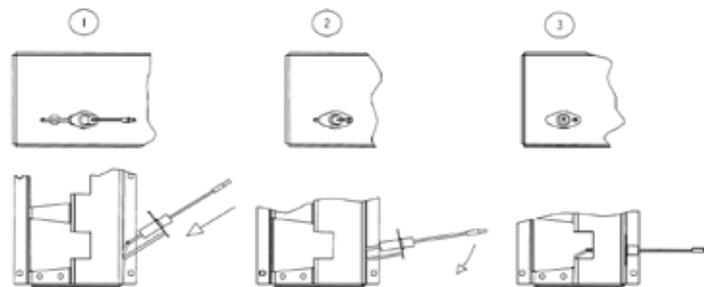


Figure 25. Installing the igniter

7.5 Thermal overload (limit) controls

If it is determined that the thermal overload control needs replacing, use only Reznor authorized replacements that are designed for this appliance.

To gain access to the control, open the hinged controls compartment access door. Refer to Figures 18 through 23 for control locations. The control near the top of the air heater is a disc type control.

The lower one is a capillary type one with a capillary tube that extends into the heat exchanger area. To remove the controls, disconnect the wires leading to them, remove the fixing screws and lift clear of the inner-casing panel.

Note: The capillary control is fitted to a bracket. With the bracket removed from the air heater, remove the control from the bracket.

When replacing the capillary control be careful not to damage the capillary tube by kinking. Make bends with a generous radius (\pm 25mm). When replacing the disc type control never manually attempt to operate the disc by pushing on the disc. Doing so will alter the calibration and could be hazardous.

7.6 Combustion air control pressure switch

If it is determined that the air differential pressure switch needs replacing, use only authorized replacements that are designed for the air heater being serviced. These switches are calibrated to operate at the designed combustion airflow duty for each appliance size in the product range

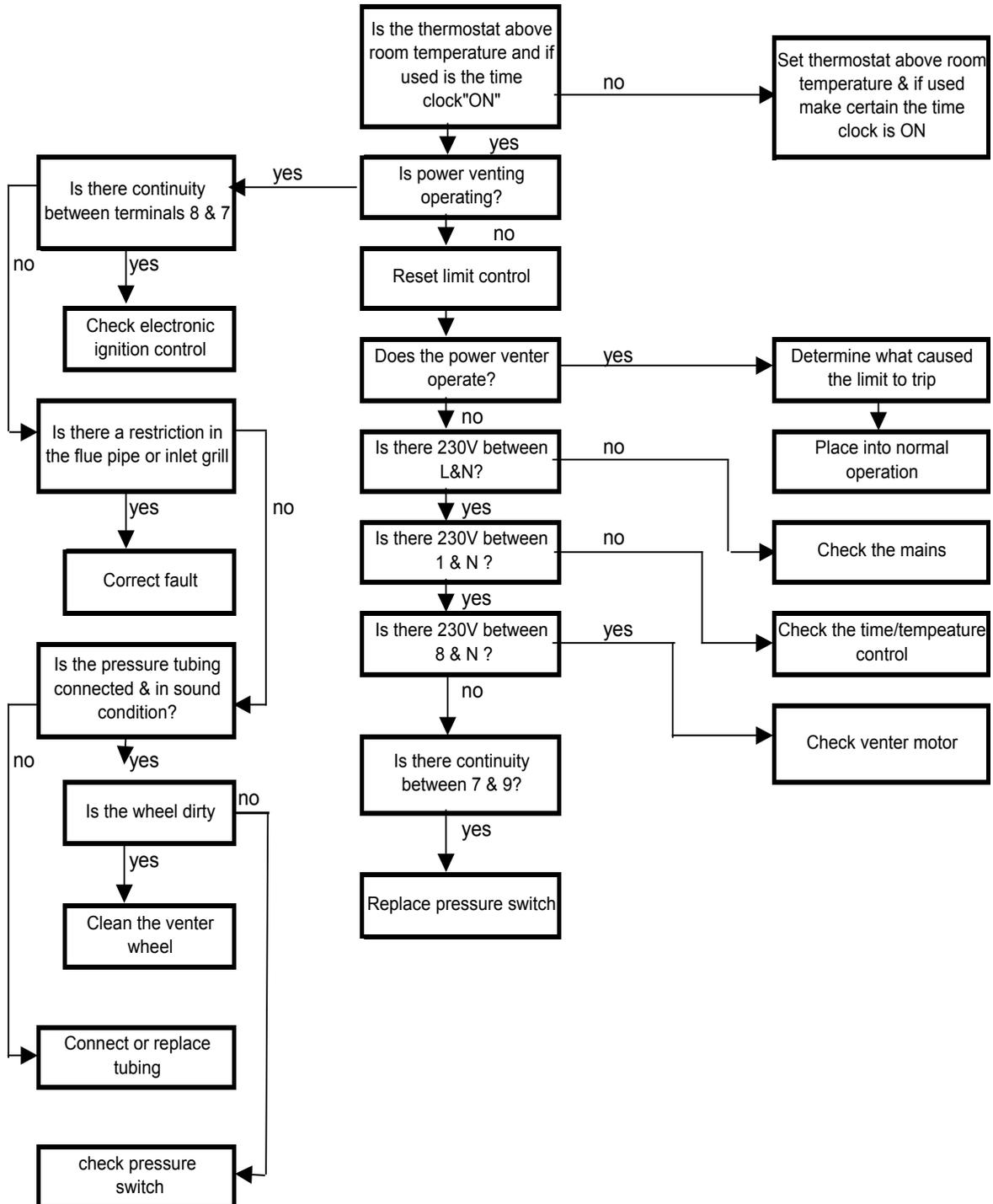
7.7 Combustion air fan (venter)

1. Ensure gas supply to the air heater is turned OFF
2. After the air circulation fan has stopped, switch OFF the electricity supply to the air heater.
3. To gain access to the fan open the controls compartment access door - refer to figures 18, 19, or 21 for location. Mark for future identification and disconnect the wires connecting the fan motor at the terminals on the main wiring junction.
4. Remove combustion air fan and clean as necessary using a wire brush and solvent to remove sticky residues.
5. Re-assemble and check for free rotation before proceeding to test the appliance.

8. Fault Finding

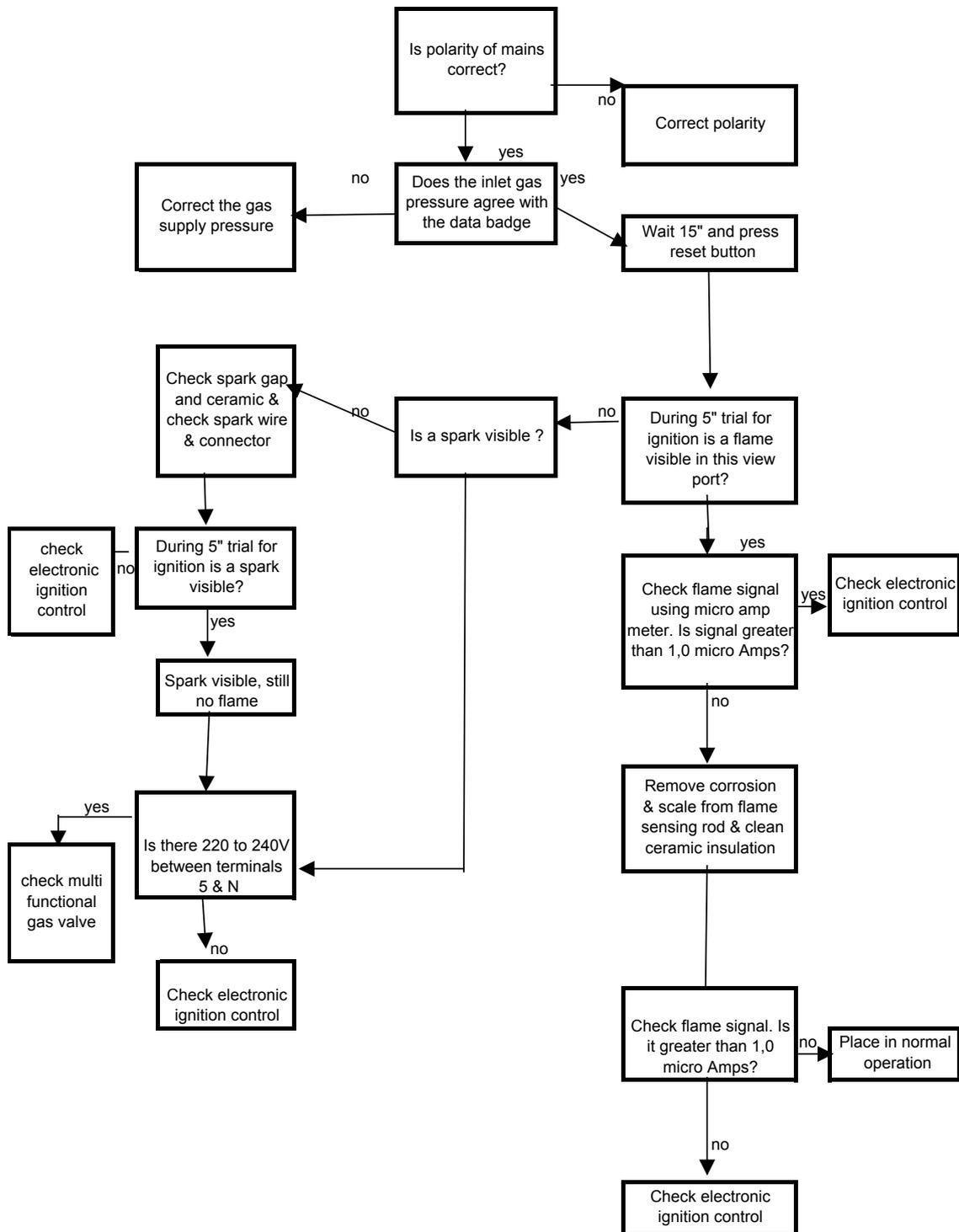
8.1 Main Fault Finding Chart - Lockout Indicator Light Is "Off", But Air Heater Will Not Operate

WARNING Fault finding may only be carried out by appropriately qualified persons



8.2 Ignition Controller Lockout Indicator Light Repeatedly Comes "On"

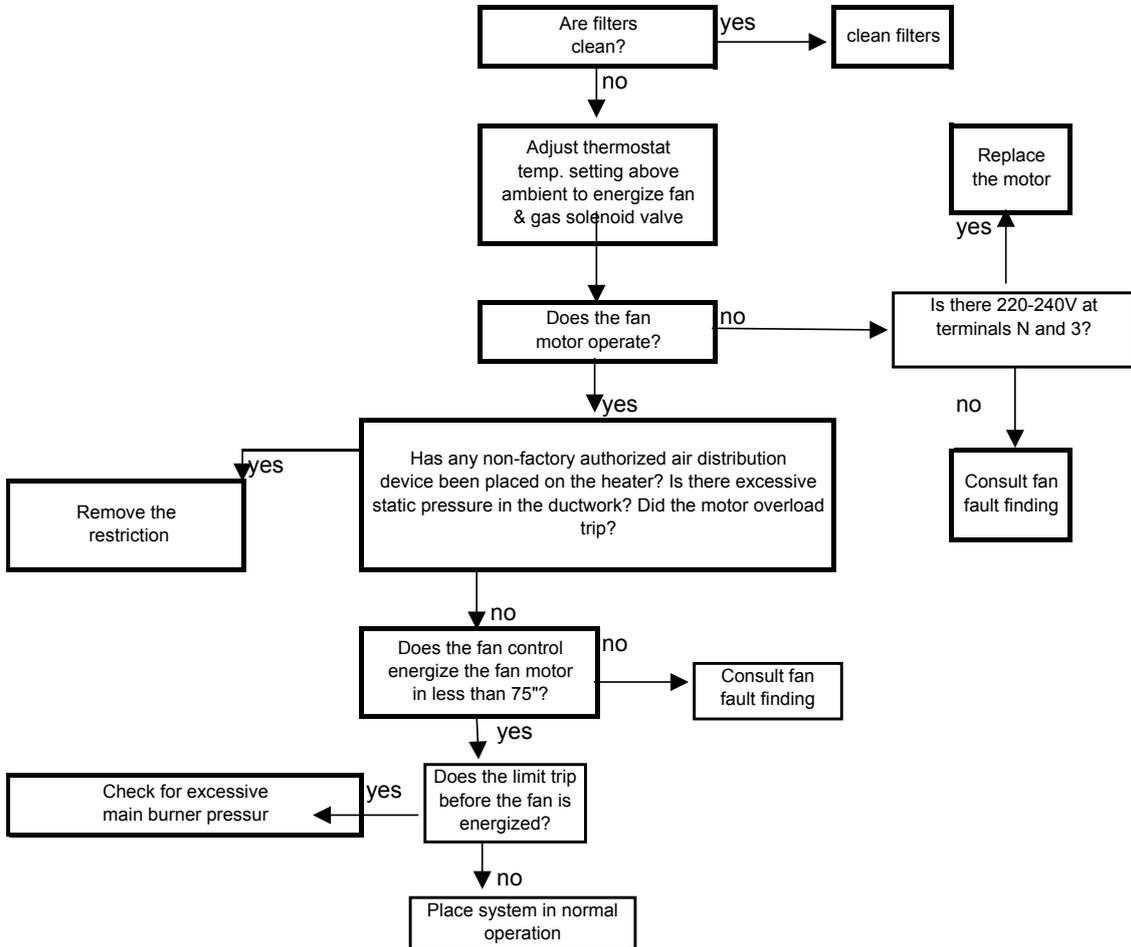
WARNING: Fault finding may only be carried out by appropriately qualified persons



8.3 Limit Control Fault Finding Chart (Limit Control Trips)

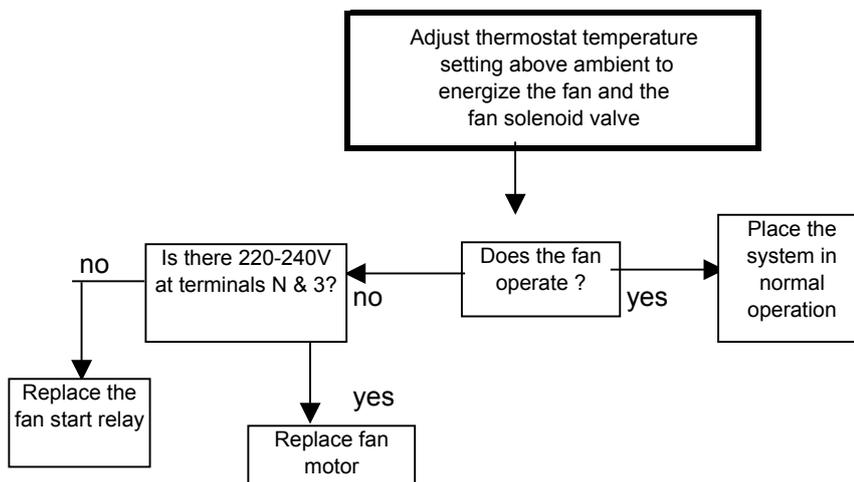
WARNING: Fault finding may only be carried out by appropriately qualified persons

Note: RHC 4000(M) DJL air heaters are equipped with 2 limits (a recycling limit and a manual reset limit). During normal operation, neither limit should trip even if the main electric supply is interrupted during operation. In the event of motor failure, the recycling limit will trip opening the gas valve.



8.4 Fan Fault Finding Chart

WARNING: Fault finding may only be carried out by appropriately qualified persons



9. Parts List

Description	Type	Part number	Application	Settings
Differential pressure switch S3		30-60617-120	4024 05	120 Pa off
		30-60617-120	4030 06	120 Pa off
		30-60617-88	4036 08	88 Pa off
		30-60617-165	4050 06	165 Pa off
		30-60617-146	4060-07	146Pa off
		30-60617-155	4075 09	155 Pa off
		30-60617-115	4100-12	115Pa off
		30-60617-82	4125M 15	82 Pa off
		30-60617-82	4150M 18	82 Pa off
Thermal overheat control (limit) LC1	T.O.D 60T 11 201614	03-400US-01	All	170F out 130F in
Thermal overheat control (limit) LC3	T.O.D 10H14 212557 IMIT LS1	03-400US-03 03-24959	4024-4036 4050-4150M	240F out 96°C - 6 Reset Reset
Relay K1.1	Thermodisc 12 S 20	03-25167	4024-4036	20-60 seconds 60-120 seconds
Relay K1.2	Potter & Brumfield T92 S11 A22	30-61742-240V	4024-4036	
Combustion fan	AACO motor + wheel + case EBM G2E160 fan assembly	36-79094 20-25745	4024-4100 4125M-4150M	
Modulating gas valve	Honeywell VK4105A with Modureg Honeywell VR46 with Modureg	03-25141-M 03-35145	4024-4030 4036-4150M	
Fan delay control (K1.1) FCR	TOD 12S 20 LX-2578A	03-25167		
Modulating controller	GM44	30-61511-330-01	All	
X-baffle	40mm	1022961	4024-4036	
	45mm	1001978	4050-4150M	
Burner	Inshot	1002831	All	
Ignition controller	Brahma	03-25322	All	
Ignition electrode ER	Channel products	03-400US-42	All	
Flame sensor electrode IS	Channel products	SCS43	All	
Filter	2.0A	30-61747	All	

Table 12 – Parts list

10. User Operating Instructions

How the air heater works:

Gas is burned by an atmospheric burner that fires into a heat exchanger. The gas burner is controlled by a double gas valve via an electronic burner control, which is actuated automatically via external controls i.e. a room thermostat and/or a time switch. The burner is ignited by a spark igniter. When the burner fires and warms the heat exchanger, the heat is sensed by a thermally actuated fan control which switches on the fan (in case there is no constant running fan) when the air temperature has reached its preset operating level.

At the end of a heating cycle the burner is switched off, the air circulation fan will continue to run until the air heater has cooled to a safe condition. Thereafter the fan will remain off until the next cycle is initiated.

Safety:

1. Flame failure is detected by the ionization probe which is the sensor and will immediately result in gas valve shut down.
2. Safety against overheating is assured by two overheat controls. The first is an automatic recycle control which protects against low air flow i.e. clogged air ways, fan failure etc. The second, which is set to a higher level than the first one, is a control which locks out and switches off the burner in the event of gross overheating for any reason. Manual intervention is necessary to reset this control device. Resetting of the automatic burner control may also be required.

To light the heater:

1. Turn on the gas supply to the air heater.
2. Switch on the electricity supply to the air heater.
3. Ensure time switch (if fitted) is set to a 'ON' cycle.
4. Adjust control/room thermostat to desired temperature.
5. Air heater will light automatically when the room thermostat calls for heat after +/- 30 seconds.
6. If the appliance does not light:
 - 6a. Check that the burner control does not require resetting. An indicator light glows at the back panel of the appliance and on a remote control if fitted. Reset by pushing reset/button on appliance or the remote control.
 - 6b. Check if thermal overheat control requires resetting
7. If the thermal overheat control requires resetting and doing so restarts the air heater, wait until the appliance warms to thermal equilibrium, to ensure the overheat control does not lock out again. If it does and the return air temperature near the heater is less than 30°C, then switch off the appliance and call for service. If the return air temperature is over 30°C, take appropriate action to reduce the ambient temperature near the air heater.

Air circulation:

The space heating process is for air to be circulated through the appliance whereby it gains heat from a heat exchanger. The air is directly discharged into the space to be heated. The air is eventually recirculated. Therefore it is very important that an unobstructed path for the circulation of the air will be maintained.

Maintenance:

1. Maintenance and service must only be carried out by appropriately qualified persons
2. It is in your interest to ensure proper service and maintenance is carried out at a regular basis. Periods between service are dependent upon the local environment where the heater is installed. All gas appliances should be serviced at least once a year.
3. In case of any damage to the appliance, it must be shut down completely and checked by an appropriately qualified person.
4. In the event of difficulties in resolving any of these matters, please do not hesitate to contact the official distributor.



Never switch off electricity supply to the air heater without first closing the gas tap.

11. Health & Safety Statement

11.1 General

The manufacturer hereby provides the following information on substances hazardous to health.

Product range reference RHC 4000(M) Series air heaters.

11.2 Cautionary note

During first firing some smoking may occur, this is due to the burning off of protective/lubricating oils used during appliance production. Most of this will have been removed during the production testing process. It is a wise precaution to ensure that adequate ventilation is provided during the initial firing and throughout the commissioning period, this is particularly important if the discharge air is to blow into a confined space. This smoking does not constitute a poison hazard.

11.3 Declaration

RHC products contain no asbestos; copper is not employed in gas carrying components; solder which has a melting point below 450°C is not used; paints for corrosion protection and decoration are heat cured and contain no lead. The above appliances meet the Electrical Safety requirements of EN 60335-1.

11.4 Miscellaneous

Small quantities of adhesives and sealants used in the product are dried and cured and present no known hazard.

11.5 Insulation and Seals

Material: Alumino - silicon fibre - crane glass
Description: Tapes

Known hazards: Some people can suffer reddening and itching of the skin. Fibre entry into the eyes will cause foreign body irritation. Inhalation will cause irritation to the respiratory tract.

Precautions: Wear protective gloves when handling. People with a history of skin complaints may be susceptible to irritation.

Dust levels are only likely when the material is abraded.

11.6 Thermostat. (Thermal overheat (limit) control LC3) Material: Illuminating Kerosene.

Description: Sealed phial contains a small quantity in liquid form.

Recognition: Colourless liquid, paraffin oil/petroleum hydrocarbon odour.

Characteristics: Non-corrosive, flammable with no poisonous reference-CH poison
Class 3 Precautions: Avoid handling. This product can irritate and defat the skin. Prolonged contact may cause dermatitis. Avoid breathing vapour.

Avoid eye contact. Do not ingest.

First Aid: Skin. Wash thoroughly with soap and water. Eyes. Rinse immediately with copious amounts of clean water.

Ingestion: Seek medical advice.

Note: If skin irritation persists seek medical advice.

11.7 Electrolytic Capacitor

Two types are used by random selection:

Recognition: 1. Plastic enclosure
2. Aluminium enclosure

Material: Contained liquid electrolyte
Known hazards: Electric shock possible if charged.

Precautions: Discharge to ground/earth. Do not incinerate.

First Aid: Treat for electric shock if affected.



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