

UDSA 008 - 100



Gas fired Balanced flue / Fan assisted flue Unit Heater

INSTRUCTION DOCUMENT

APPLIES FOR: Installation/Commissioning/Serviceing



These appliances meet the following EC Directives:

DIR CE 90/396/EEC:GAD

DIR CE 89/336/EEC:EMC

DIR 73/23/EEC:LVD

DIR 89/392/EEC:MD

Please read this document carefully before commencing installation, commissioning and/or servicing.

Leave it with the user or attached to the appliance or gas service meter 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.

INDEX

Warnings	3
1. General	4
2. Installation codes	4
3. Warranty	4
4. Uncrating and preparation	4
5. Dimensions	5
6. Technical data	6
7. Venting requirements	7
8. Clearances	11
9. Unit heater location	11
10. Hanging the heater	12
11. Gas piping and pressures	14
12. Electrical supply and connections	16
13. Fan motors	17
14. Limit controls	17
15. Combustion air pressure switch	17
16. Ignition system	18
17. Gas valve	19
18. Burner	19
19. Check installation and start up	19
20. Maintenance schedule	21
21. Heat exchanger maintenance	22
22. Burner maintenance	22
23. Burner orifice	24
24. Ignition system	24
25. Fan motor, fan blades and guard	25
26. Venter motor and wheel	26
27. Operating gas valve	27
28. Combustion air pressure switch	28
29. Limit controls	28
30. Vent and combustion air system	29
31. Troubleshooting	29
32. Parts list	31

WARNINGS

FOR YOUR SAFETY

What to do 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.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call your fire department.

FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WARNING: 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.

WARNING: Gas-fired appliances are not designed for use in hazardous atmospheres containing flammable vapors or combustible dust, in atmospheres containing chlorinated or halogenated hydrocarbons, or in applications with airborne silicone substances. See Hazard Levels, page 3.

WARNING: 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.

WARNING: 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.

Hazard Levels
of Warnings in
this Manual

HAZARD INTENSITY LEVELS

1. **DANGER: Failure to comply will result in severe personal injury or death and/or property damage.**
2. **WARNING: Failure to comply could result in severe personal injury or death and/or property damage.**
3. **CAUTION: Failure to comply could result in minor personal injury and/or property damage.**

1. General

Models UDSA 008 through 100 are design certified to the CE EN1020 standard for use in industrial and commercial installations only. All models and sizes are available for use with either natural, propane or butane gas. The type of gas, the input rate and the electrical supply requirement is shown on the heater's rating plate. Check the rating plate to determine if the heater is appropriate for the intended installation.

This installation manual is shipped with the heater. Verify that the literature is correct for the heater being installed. If the manual is incorrect for the heater, contact your distributor before beginning installation.

The instructions in this manual apply **only** to the models listed.

Installation should be done by a qualified agency in accordance with these instructions. The qualified service agency installing this heater is responsible for the installation.

2. Installation Codes

These units must be installed in accordance with all local building codes. In the absence of local codes, the unit must be installed in accordance with the appropriate national codes governing the installation of gas-fired heating equipment of this type.

3. Warranty

Warranty is void if ...

- a. Wiring is not in accordance with the diagram furnished with the heater.
 - b. The unit is installed without proper clearance to combustible materials.
 - c. A fan model is connected to a duct system or if the air delivery system is modified.
-

4. Uncrating and Preparation

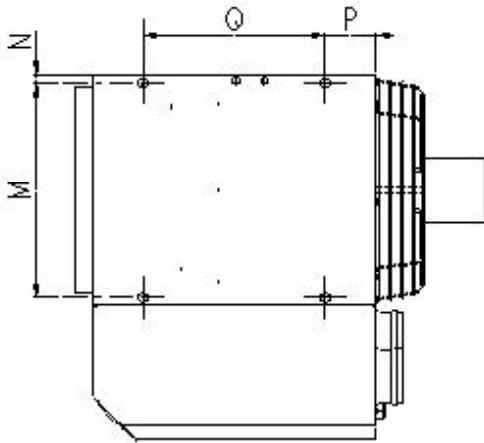
This unit was test operated and inspected at the factory prior to crating and was in proper operating condition. If the heater has incurred damage in shipment, document the damage with the transporting agency and contact an authorized Reznor Distributor. If you are an authorized Distributor, follow the FOB freight policy procedures as published by Thomas & Betts for Reznor products.

Check the rating plate for the gas and electrical specifications of the heater to be sure that they are compatible with the gas and electric supplies at the installation site.

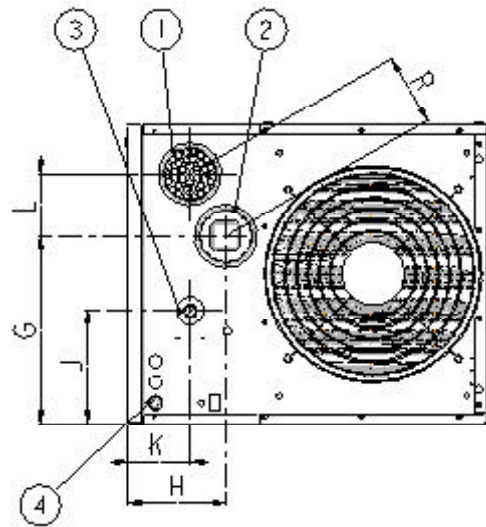
Read this booklet and become familiar with the installation requirements of your heater. If you do not have knowledge of local requirements, check with the local gas company and any other local agencies who might have requirements concerning this installation.

Before beginning, make preparations for necessary supplies, tools, and manpower. If the installation includes optional vertical louvers, downturn nozzle, wall mounting brackets or multiple heater control, install these options before the heater is suspended. Follow the instructions included in the option package. Option packages can be shipped separately.

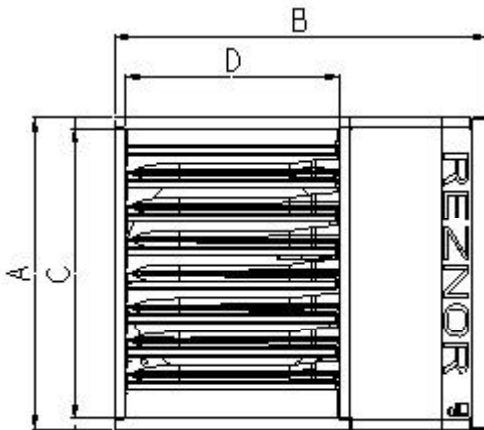
5. Dimensions



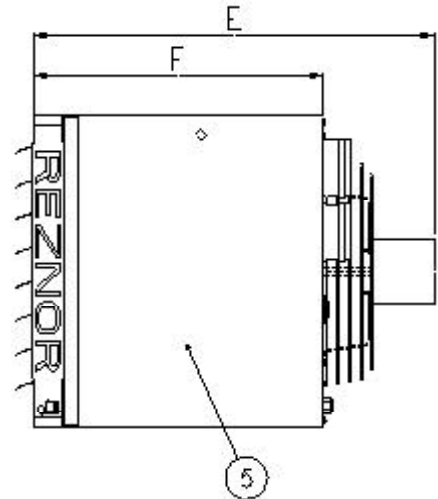
Top view



Rear view



Front view



Side view

- 1. Combustion air inlet**
- 2. Flue connection**
- 3. External gas connection**
- 4. Electric connections**
- 5. Service panel**

MODEL UDSA DIMENSIONS (mm ± 2)

Size	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
008, 011	310	675	255	350	660	550	130	190	130	70	85	415	15	100	350	120
015	385	675	330	350	685	550	200	190	140	120	85	415	15	100	350	120
020	385	675	330	350	700	550	200	190	140	120	85	415	15	100	350	120
025	590	675	535	350	725	550	370	190	220	120	120	415	15	100	350	140
030	590	675	535	350	745	550	370	190	220	120	120	415	15	100	350	140
035, 043, 050	510	970	405	585	1070	900	250	195	125	165	120	625	35	150	600	140
055, 064	665	970	560	585	1140	900	360	210	230	165	205	625	35	150	600	225
073, 085, 100	865	1040	760	585	1150	900	560	210	300	185	205	675	35	150	600	225

6. Technical Data

TECHNICAL DATA

Model		008	011	015	020	025	030
Gas Categories		II _{2H3+} UK					
Comb. Air and Venting; Type-B Installations ¹		B22					
Comb. Air and Venting; Type-C Installations ¹		C12, C32, C42, C52, C62, C82					
Vent & Combustion Air Connection Collars	mm	80	80	80	80	100	100
Heat Input, (Hs)	kW	8,8	13,2	17,6	22,0	30,8	35,2
Heat Input, (Hi)	kW	7,9	11,9	15,9	19,8	27,8	31,7
Heat Output	kW	7,3	11,0	14,6	18,3	25,6	29,2
Thermal Efficiency	%	92	92	92	92	92	92
Gas Consumption Rate							
natural gas G20	m ³ /h	0,84	1,26	1,68	2,10	2,94	3,36
propane gas G31	kg/h	0,62	0,93	1,24	1,55	2,16	2,47
Gas Connection Size (not supply line size)		Rc 1/2					
Temperature Rise	K	32	32	32	32	32	32
Airflow	m ³ /h	680	1020	1360	1700	2385	2725
Motor Speed	rpm	1425	1425	1425	1425	950	950
Recommended Maximum Mounting Height ²	m	2,5		3,0		3,5	
Horizontal Air Throw ³	m	8	10	13	16	20	22
Electrical Service (protection class IP 20)		230/240V 1N ~ 50Hz					
Total Electrical Rating	W	121		126		273	
Weight (net)	kg	30	33	38	40	56	60

Model		035	043	050	055	064	073	085	100
Gas Categories		II _{2H3+} UK							
Comb. Air and Venting; Type-B Installations ¹		B22							
Comb. Air and Venting; Type-C Installations ¹		C12, C32, C42, C52, C62, C82							
Vent & Combustion Air Connection Collars	mm	100	100	100	130	130	130	130	130
Heat Input, (Hs)	kW	42,2	50,8	58,6	66,0	77,7	88,0	102,7	117,3
Heat Input, (Hi)	kW	38,0	45,8	52,8	59,5	70,0	79,3	92,5	105,7
Heat Output	kW	34,9	42,1	48,6	54,7	64,4	73,0	85,1	97,0
Thermal Efficiency	%	92	92	92	92	92	92	92	92
Gas Consumption Rate									
natural gas G20	m ³ /h	4,02	4,85	5,59	6,30	7,41	8,39	9,79	11,18
propane gas G31	kg/h	2,96	3,57	4,12	4,64	5,46	6,18	7,21	8,24
Gas Connection Size (not supply line size)		Rc 3/4							
Temperature Rise	K	31	28	28	28	28	28	28	30
Airflow	m ³ /h	3510	4535	5180	5830	6810	7770	9065	10360
Motor Speed	rpm	950	1425	1425	950	1425	950	950	950
Recommended Maximum Mounting Height ²	m	3,5				4,0			
Horizontal Air Throw ³	m	25	28	30	30	33	35	36	39
Electrical Service (protection class IP 20)		230/240V 1N ~ 50Hz							
Total Electrical Rating	W	345	368	428	490	678	848	848	848
Weight (net)	kg	88	99	99	112	118	143	158	168

1) Gas Appliance Classifications for Approved Venting Methods based on CEN report - CR1749:1995.

2) Height from floor to bottom surface of heater. These are RECOMMENDATIONS ONLY. Positioning of unit heaters for proper performance is application dependent. Operation is affected by other air moving equipment in the space, obstructions to the airflow, drafts and/or close proximity to doors or windows, etc... Care should be taken to **avoid mounting the heaters above these recommendations**, unless downturn nozzle options are used, as significant stratification may occur resulting in poor floor coverage and higher energy losses through the roof structure.

3) Isothermal conditions - 20C ambient air temperature, discharge louvres zero deflection, v=0,5m/s.

7. Venting Requirements

Model UDSA heaters may be installed as Type-B and Type-C installations as shown in the technical data table.

Venting must be in accordance with Local and National Codes. Local requirements may supersede national requirements. These unit heaters are designed to operate safely and efficiently with either a horizontal or vertical vent. Comply with the specific requirements and instructions.

If this heater is replacing an existing heater, be sure that the vent is sized properly for the heater being installed and that the existing vent is in good condition. A properly sized vent system is required for safe operation of the heater. An improperly sized vent system can cause unsafe conditions and/or create condensation.

Installation should be done by a qualified agency in accordance with these instructions. The qualified service agency installing this system is responsible for the installation.

Vent Pipe Diameter and Maximum Vent Length

Vent pipe diameters and maximum vent lengths in TABLE 1 apply to both **Horizontal** and **Vertical** vents. Add **all** straight sections and equivalent lengths for elbows. The total combined length must not exceed the **Maximum Vent Length**.

TABLE 1 - Maximum Vent Pipe Lengths

- Use only one diameter of vent pipe on an installation.
- Minimum vent length is 1m.

Model UDSA		008,011,015,020	025,030,035,043,050	055,064,073,085,100	
Heater socket & pipe dia	mm	Flue pipe	80	100	130
		Inlet pipe	80	100	130
Max. straight length (with wall/roof terminal)	m	Flue pipe	9	9	9
		Inlet pipe	9	9	9
Equivalent length of 45° elbow	m	Flue pipe	0.75	0.75	0.75
		Inlet pipe	0.75	0.75	0.75
Equivalent length of 90° elbow	m	Flue pipe	1.5	1.5	1.5
		Inlet pipe	1.5	1.5	1.5
Concentric vertical/horizontal vent or wall terminal: use any separately approved and marketed system for the supply of combustion air and discharge of the combustion products.					

Venter (Flue) Outlet

Venter Outlet Attachment Requirements:

Depending on the size of vent pipe as determined in TABLE 2, attach either the vent pipe directly to the collar or a taper-type connector.

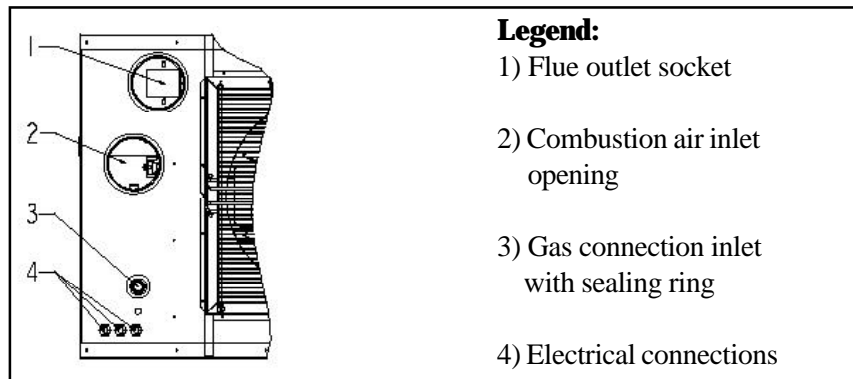
TABLE 2 - Venter Outlet Size

Model Size		008	011	015	020	025	030	035	043	050	055	064	073	085	100
Outlet Diameter	mm	80	80	80	80	100	100	100	100	100	130	130	130	130	130

Combustion air supply and flue system

The air heater may be installed as a balanced flue (Type C) heater requiring both a combustion air inlet duct and a flue pipe or as a power vented (Type B) heater, which requires only a flue pipe exhausting to outdoors. All products of combustion must be flued to outdoor atmosphere.

**FIGURE 1 -
Combustion air and flue
pipe sockets**



Each heater installed as a type B appliance must be fitted with an individual flue pipe and the combustion air inlet opening is provided with a protection grill. Each heater installed as a type C appliance must be fitted with an individual combustion air/flue pipe system. **Type C2 flue and combustion air systems must not be used.**

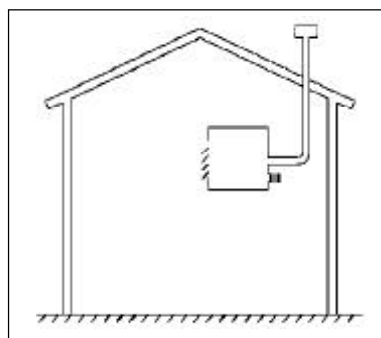
IMPORTANT: The flue must be installed in accordance with national and local regulations. Failure to provide proper fluing could result in death, serious injury and/or property damage. The air heater must be installed with a flue to the outside of the building. Safe operation of any power vented gas apparatus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

If the air heater is to be installed as a type B appliance, 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.

Single wall flue seamless aluminium pipes are required. All joints must be sealed to prevent products of combustion from leaking into the building. 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 a minimum of 25 mm 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 50 mm 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 20 mm diameter. Copper or copper based alloys must not be used for condensation drains.

Approved appliances:



B22 - roof

B22 - wall

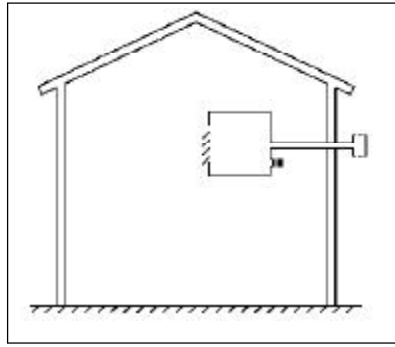
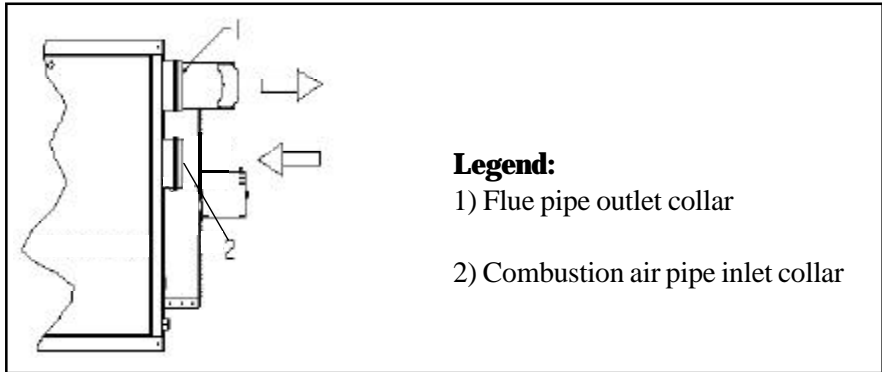


FIGURE 2 - Combustion air and flue pipe sockets Type B



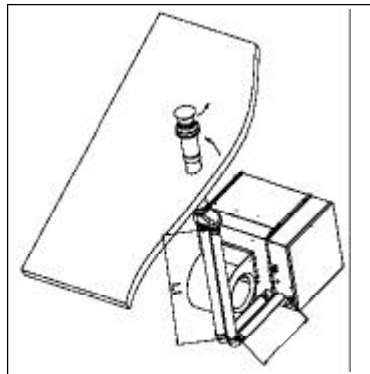
Combustion air inlet pipe & flue pipe for balanced flue installation (Type C appliances)

Balanced flue air heaters are designed to be fitted with a combustion air inlet duct that obtains outdoor air and a flue pipe that exhausts flue products to outdoors. Both the flue and combustion air pipes must be sealed. Use gasket sealed seamless aluminium pipe or equivalent. The flue pipe must include a sealable test port to allow good average sampling of the flue gas mixture for testing.

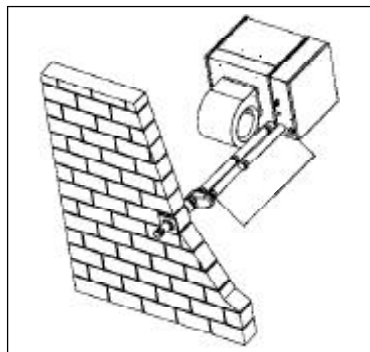
The port must be at least 450 mm away from the air heater flue connection socket. Follow the flue pipe manufacturers installation instructions for making joints, including connections to the air heater, for passing through a building element and for support requirements.

Approved appliances:

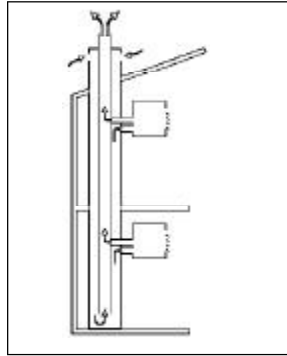
C32 / C62



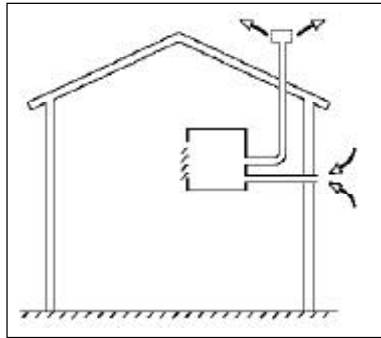
C12 / C62



C42



C52



C82

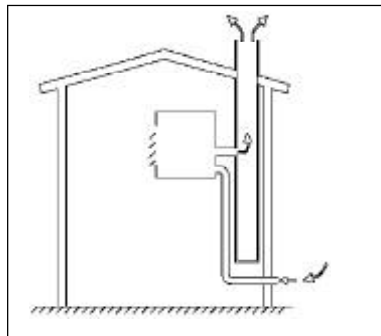
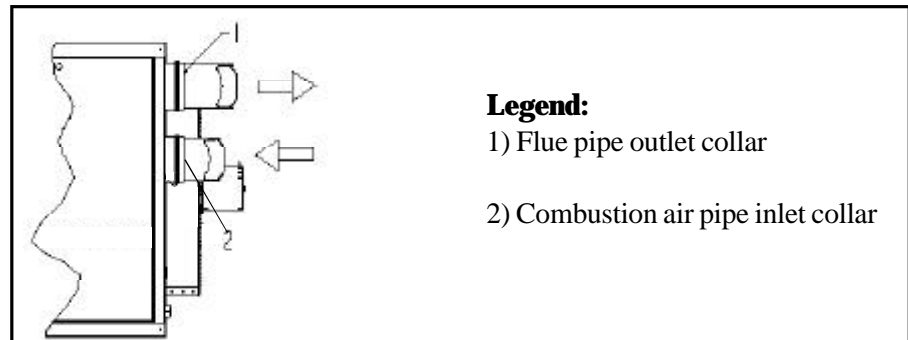


FIGURE 3 - Combustion air and flue pipe sockets Type C



Air supply

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

Proper combustion air supply for a power vented Type B installation requires ventilation of the heated space. Natural infiltration of air may not be adequate. Use of exhaust fans aggravates this situation. It is important to ensure that there is adequate combustion air supply at all times. Reliance on doors and windows is not allowed. Always ensure that adequate combustion air is provided to suit the total installation of all combustion equipment.

WARNING: These air heaters may be installed in type B applications, designed to take air for combustion from the space in which it is installed. Do not restrict the combustion air intake.

8. Clearances

Units must be installed so that the minimum clearances in the following table are provided for combustion air space, inspection and service, and for proper spacing from combustible construction.

Size	Top	Flue Connector	Access Panel	Non-Access Side	Bottom*	Rear
	mm	mm	mm	mm	mm	mm
008 - 030	50	150	850	50	50	450
035 - 100	100	150	850	100	100	450

*Suspend the heater so that the bottom is a minimum of 1.5 meters above the floor.

9. Unit Heater Location

Use the minimum clearances in section 8; the venting tables in section 7 and the throw data in the technical data table of section 6 when determining where to suspend the heater.

Location

Locate the heater so that it is a minimum of 1.5 meters above the floor and in compliance with the clearances in section 8.

WARNING: If touched, the vent pipe and internal heater surfaces that are accessible from outside the heater will cause burns. Suspend the heater such that these components will not be touched.

For best results, the heater should be placed with certain rules in mind. In general, a unit should be located from 2.0 to 3.5 meters above the floor. Locating a unit heater above the maximum recommended height can result in significant air stratification. When possible, heaters should be arranged to blow toward or along exposed wall surfaces.

Suspended heaters are most effective when located as close to the working zone as possible, but care should be exercised to avoid directing the discharged air directly on to room occupants.

NOTE: Venting requirements may affect location. Consult the Venting Section for this heater before making a final determination.

Partitions, columns, counters, or other obstructions should be taken into consideration when locating the unit heater so that a minimum quantity of airflow will be deflected by such obstacles.

When units are located in the center of the space to be heated, the air should be discharged toward the exposed walls. In large areas, units should be located to discharge air along exposed walls with extra units provided to discharge air in toward the center of the area.

At those points where infiltration of cold air is excessive, such as at entrance doors and shipping doors, it is desirable to locate the unit so that it will discharge directly toward the source of cold air, typically from a distance of 4.5 to 6.0 meters.

CAUTION: Do not locate the heater where it may be exposed to water.

Hazards of Chlorine - apply to the location of the combustion air inlet

The presence of chlorine vapors in the combustion air of gas-fired heating equipment presents a potential corrosion hazard. Chlorine, found usually in the form of freon or degreaser vapors, when exposed to a flame will precipitate from the compound, and go into solution with any condensation that is present in the heat exchanger or associated parts. The result is hydrochloric acid which readily attacks all metals including 300 grade stainless steel. Care should be taken to separate these vapors from the combustion process. This may be done by wise location of the unit vent and combustion air terminals with regard to exhausters or prevailing wind directions. Chlorine is heavier than air. Keep this fact in mind when determining installation location of the heater in relation to building exhaust systems.

10. Hanging the Heater

Before suspending the heater, check the supporting structure to verify that it has sufficient load-carrying capacity to support the weight of the unit.

Model UDSA

Size	008	011	015	020	025	030	035	043	050	055	064	073	085	100
kg	30	33	38	40	56	60	88	99	99	112	118	143	158	168

WARNINGS:

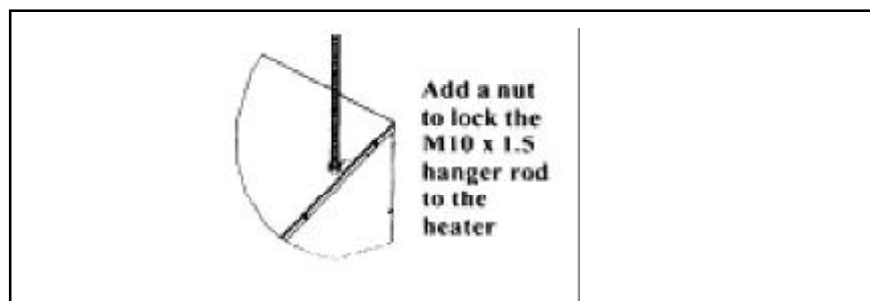
Check the supporting structure to verify that it has sufficient load-carrying capacity to support the unit weight. Suspend the heater only from the threaded nut retainers or with a manufacturer provided kit. Do NOT suspend from the heater cabinet panels.

WARNING: Do not place or add additional weight to the suspended heater. Hazard Levels, page 3.

When the heater is lifted for suspension, support the bottom of the heater with plywood or other appropriately placed material. If the bottom is not supported, damage may occur.

The heater is supplied with four point suspension. All points must be used. Two threaded nut retainers are provided on each side of the top of the heater. See figure 4 for hanger rod size.

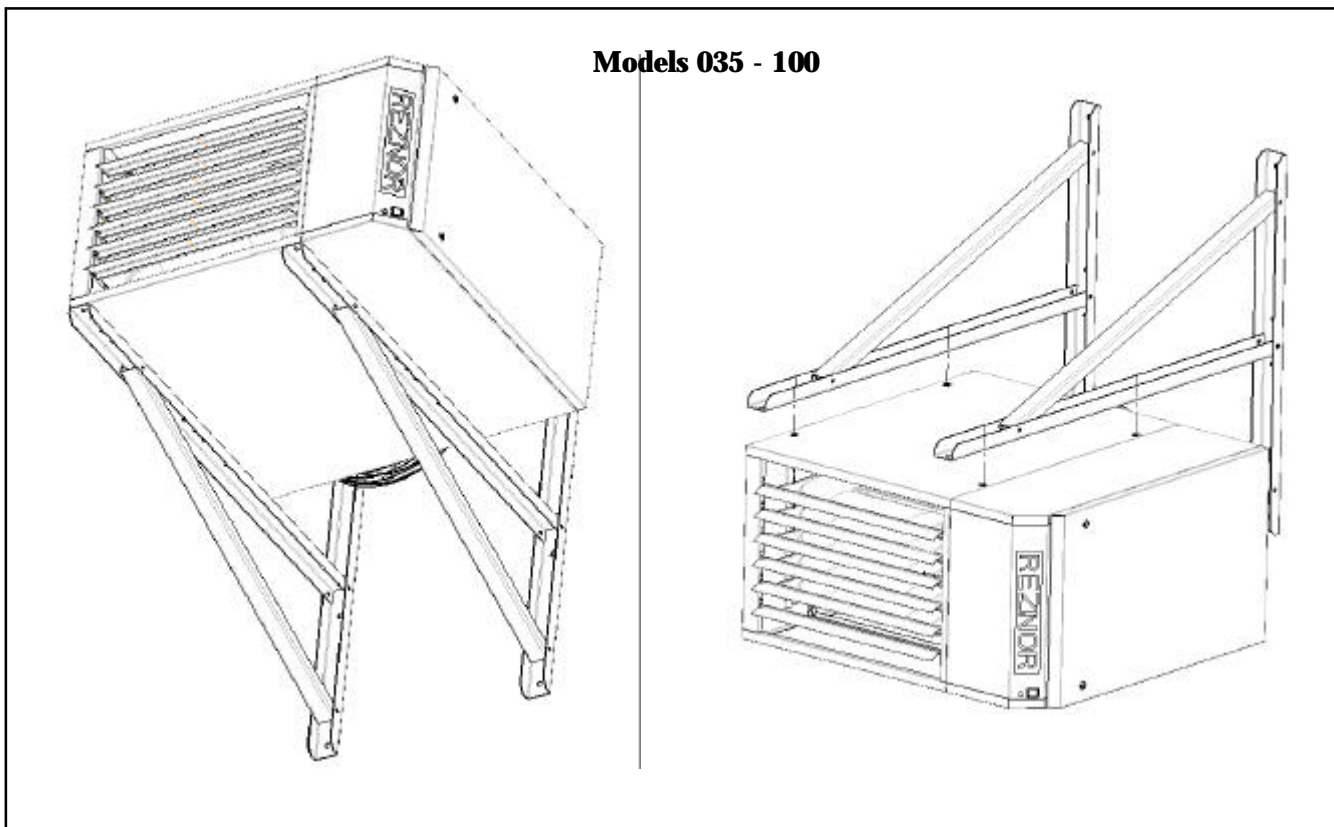
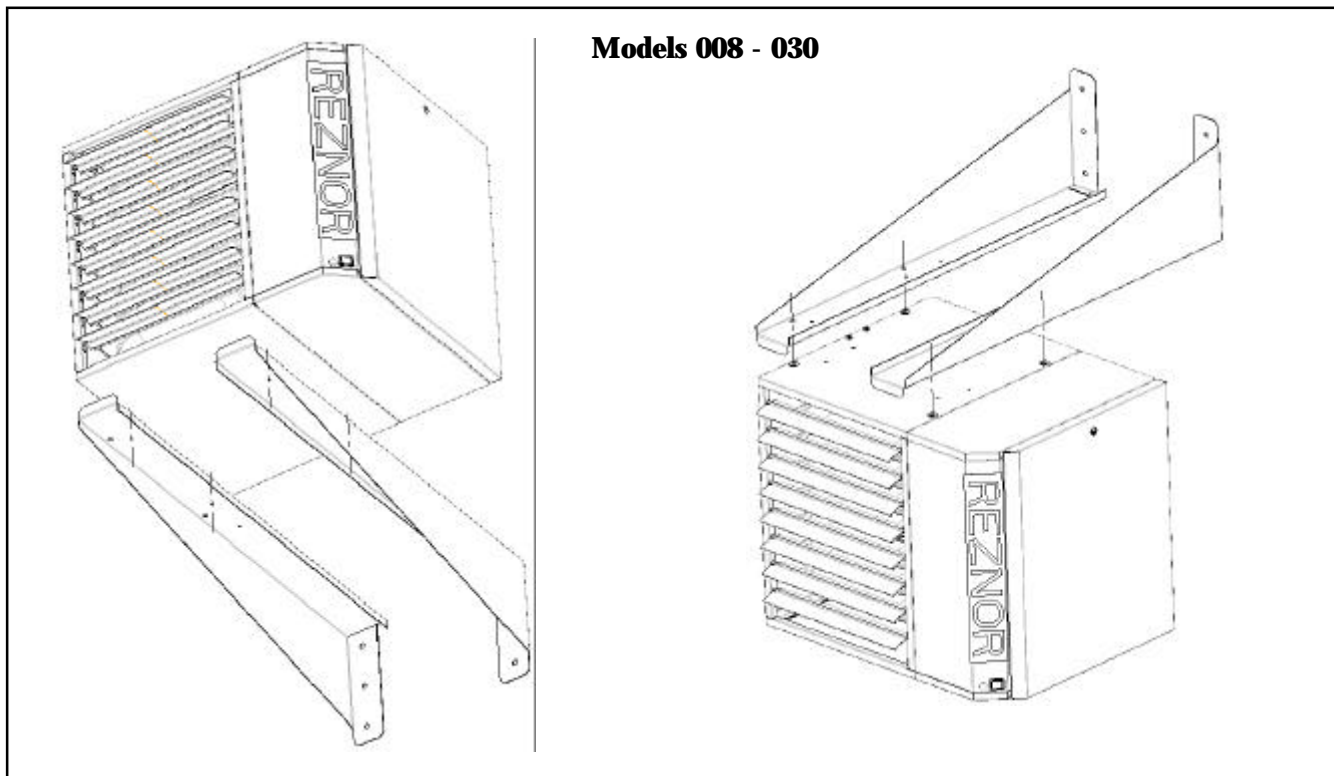
FIGURE 4 - Suspending the Heater with Rods from the Threaded Nut Retainers



Be sure that the threaded hanger rods are locked to the heater as illustrated. Recommended maximum hanger rod length is 1.8m.

FIGURE 5 - Suspending the Heater using optional wall bracket kits

When desired the heaters may be supported by wall brackets. Supporting in this manner allows the heaters to be placed in close proximity to the ceiling or mounted directly to the vertical supporting structures of the building. There are 2 different wall bracket designs for UDSA models as shown in the illustrations below. Mounting instructions are detailed in the literature supplied with these optional kits.



11. Gas Piping and Pressures

WARNING: This appliance is equipped for a maximum gas supply pressure of 60 mbar (class 3).

WARNING: PRESSURE TESTING SUPPLY PIPING
Test Pressures Above 60 mbar (class 3) : Disconnect the heater and manual valve from the gas supply line which is to be tested. Cap or plug the supply line.
Test Pressures Below 60 mbar (class 3) : Before testing, close the manual valve on the heater.

WARNING: All components of a gas supply system must be leak tested prior to placing equipment in service. NEVER TEST FOR LEAKS WITH AN OPEN FLAME. Failure to comply could result in personal injury, property damage or death.

All piping must be in accordance with requirements outlined in the National Gas Codes (different for each country). Gas supply piping installation should conform with good practice and with local codes. Support gas piping with pipe hangers, metal strapping, or other suitable material. **Do not rely on the heater to support the gas pipe.**

Pipe joint compounds (pipe dope) shall be resistant to the action of liquefied petroleum gas or any other chemical constituents of the gas being supplied.

Install a ground joint union and manual shutoff the gas cock upstream of the unit control system.

The unit is equipped with a nipple that extends outside the cabinet. The gas connection is 13 mm (1/2") or 29 mm (3/4"). (see table below)

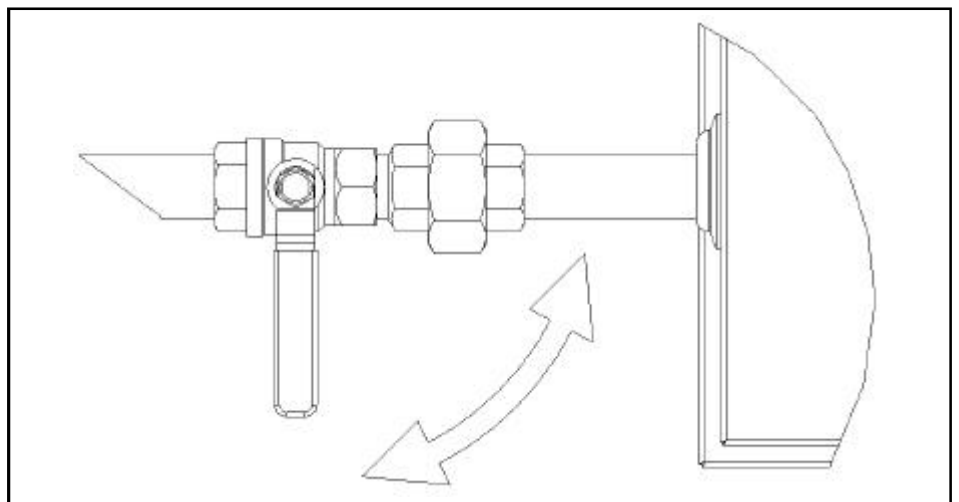
Leak test all connections by brushing on a leak detecting solution.

Gas connection size

Gas Connection inches

Models	008	011	015	020	025	030	035	043	050	055	064	073	085	100
Natural gas G20, G25 / Butane gas G30 / Propane gas G31	1/2	1/2	1/2	1/2	1/2	1/2	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4

FIGURE 6 - Gas connection is at the pipe nipple that extends outside the cabinet



Burner gas pressure adjustment

The gas pressure is set for the required heat input before the appliance leaves the factory. Provided that 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 use the following procedure:

- * Ascertain from the heater's data plate the correct operating gas pressure;
- * Turn the room thermostat control to its lowest setting;
- * Remove the screw from the burner pressure test point of the multi-functional control valve. Connect a manometer to the test point(see figure 7a & 7b);
- * Adjust the room thermostat to call for heat i.e. above room ambient temperature;
- * Observe the burner gas pressure on the manometer and compare to the required pressure on the data plate;
- * If necessary, for G20 or G25 applications adjust the burner gas pressure (except in Belgium). Remove the cover screw (models 035 - 100) or cover cap (models 008 - 030). Turn the regulator screw anti-clockwise to decrease pressure or clockwise to increase pressure (see figure 7a & 7b);
- * Set room thermostat to lowest setting to turn OFF the burners. Replace the test point screw/cap and with the main burner OFF, test for gas soundness using a soap solution.

Reset temperature control/room thermostat to comfort operating level.

FIGURE 7a : SIT gas valve

Legend:

- 1) Shut-off solenoid valve EV1
- 2) Pressure regulator setting device, or, alternatively, outlet flow setting screw
- 3) Pilot gas flow restrictor
- 4) Step ignition flow adjustment screw
- 5) Inlet pressure test point
- 6) Outlet pressure test point
- 7) Shut-off solenoid valve EV2
- 8) Pilot outlet
- 9) Main gas outlet
- 10) Holes (M5) for fixing flanges
- 11) Connection for pressure regulator/combustion chamber compensation

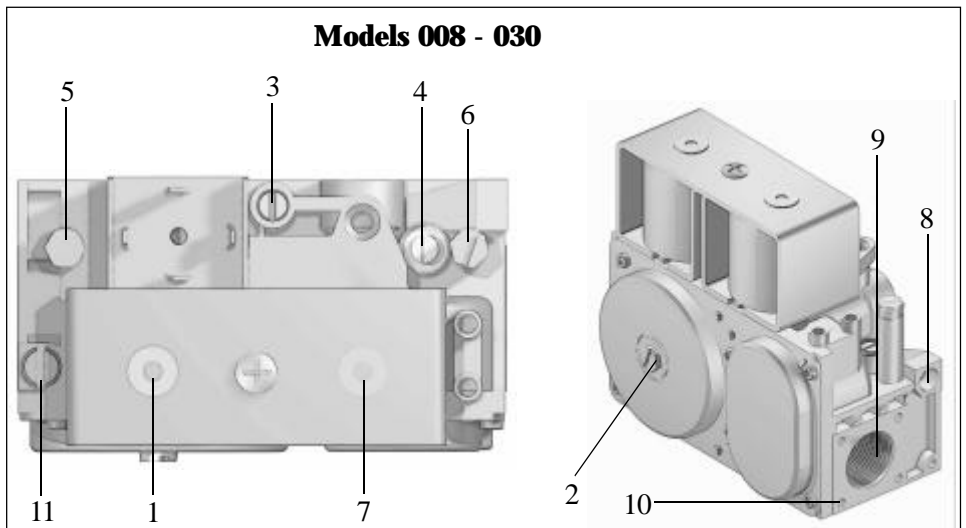
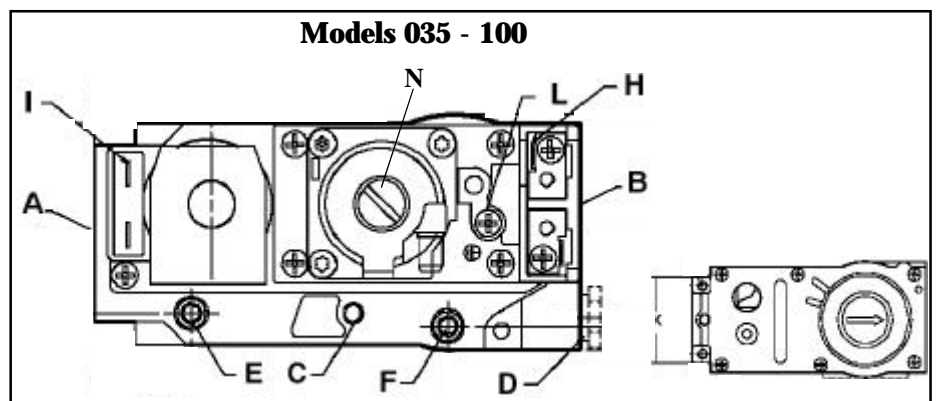


FIGURE 7b : HONEYWELL gas valve

Legend:

- A) Inlet
- B) End outlet
- C) M5 connection for switchable outlet (where applicable)
- E) Inlet pressure tap
- F) Outlet pressure tap
- H) 6.3 mm AMP terminals and screws for wiring
- D) 6.3. mm AMP terminals
- K) Surface to be clamped
- L) Earth terminal/screw (line voltage models only)
- N) Pressure regulator adjustment screw



Burner jets and pressures																
Size		008	011	015	020	025	030	035	043	050	055	064	073	085	100	
Burner jet G20	∅	2.60	3.30	3.70	4.20	4.80	5.30	5.90	6.50	6.80	7.10	8.00	8.50	8.90	10.00	
Burner pressure G20	mB.	8.10	7.00	7.70	7.20	8.30	7.50	7.50	7.20	7.80	7.80	7.80	7.20	8.00	7.10	inlet pressure 17,5/20 mB.
Burner jet G31	∅	1.35	1.70	1.95	2.20	2.60	2.80	3.10	3.35	3.65	3.90	4.15	4.50	4.90	5.20	
Burner pressure G31	mB.	36.90	36.90	36.90	36.70	36.70	36.50	35.50	35.30	35.20	35.20	35.40	35.00	34.80	34.34	inlet pressure 37 mB.

12. Electrical Supply and Connections

The electrical installation may only be carried out by appropriately qualified persons observing the rules in force. The supply line to the heater should include a main switch. The minimum **creapance** distance between the contacts must be more than 3 mm.

All electrical connections should be made in the heater control compartment (refer to figure 9). Screw type terminals are provided. Connections should be in accordance with the terminal markings and the wiring diagram affixed to the air heater.

DANGER: THIS APPLIANCE MUST BE EARTHED

The minimum external control required for the air heater is a room thermostat. **It is essential that the main input line and neutral to terminals L and N remain live at all times even when the heater is switched off to ensure correct operation of the unit.**

A green indicator light and polarisation switch is fitted inside the heater to check if Line, Neutral and Earth are connected correctly. If this is the case, the green light will glow when pushing on the switch. If the light does not glow, check earth, line and neutral connections.

A burner reset switch with red indicator light is fitted on the heater. To add a remote reset button, make connections to the terminals in the electric box as indicated on the wiring diagram.

IMPORTANT: If the reset button requires activating for any reason, the cause must be determined. After determining and correcting the problem, restart the heater and monitor long enough to ensure proper operation (app.5 minutes).

An orange indicator light is fitted on the heater to signify when the burner is on.

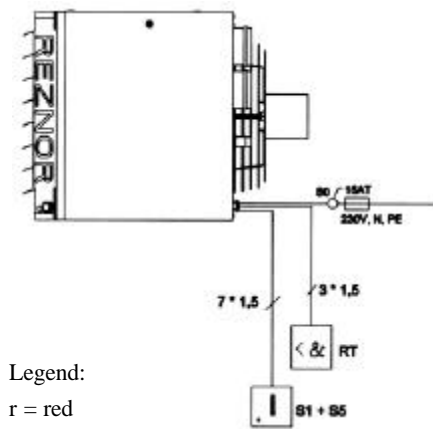
Do not attempt to control more than 1 air heater from a single thermostat or control panel unless a properly wired relay is fitted. Follow the instructions supplied with such panels.

The location of the room thermostat is important. It should not be positioned 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 should be mounted on a vibration free surface and mounted about 1,5 metres above floor level. Follow the thermostat manufacturers instructions. The thermostat must be suitable for potential free contacts.

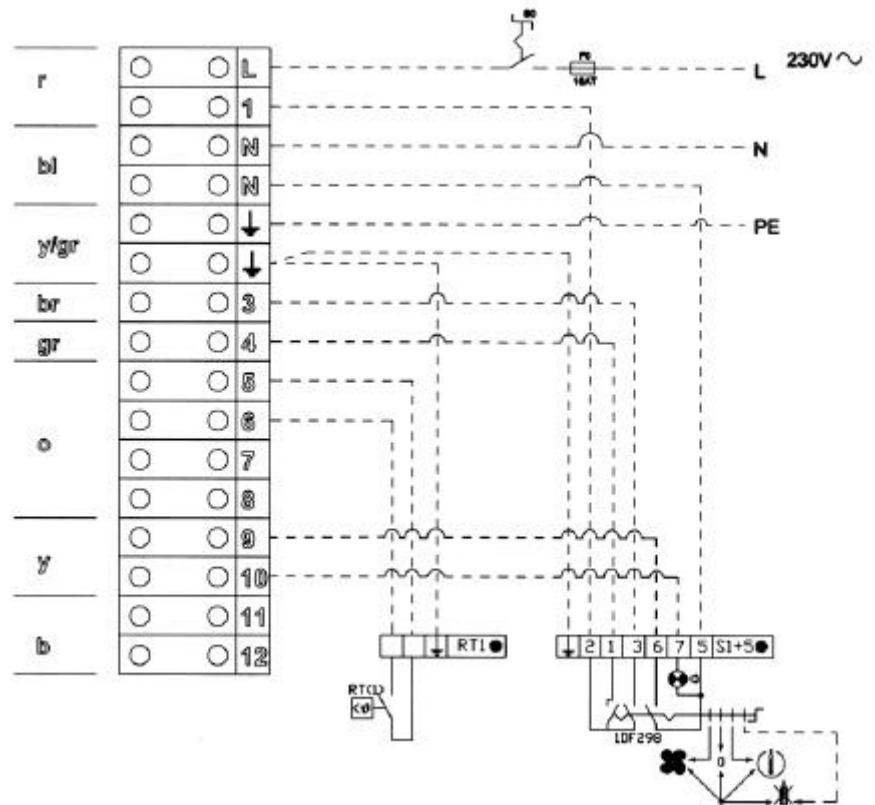
Do not use bimetal thermostats. The anticipation resistor cannot be connected to the neutral.

Thermostat location

FIGURE 8 - Supply Wiring Connections are on the Terminal Board



Legend:
 r = red
 bl = blue
 y = yellow
 gr = green
 br = brown
 o = orange
 b = black



13. Fan Motors

The fan motor is equipped with thermal overload protection of the automatic reset type. Should the motor refuse to run, it may be because of improper voltage characteristics. Make certain that the correct voltage is available at the motor.

14. Limit Controls

All units are equipped with temperature activated limit controls. The controls are factory set and non-adjustable. If either setpoint is reached, the corresponding limit control will interrupt the electric power to the gas valve. These safety devices provide protection in the case of motor failure or lack of airflow due to restrictions. (For locations, see FIGURE 9, page 21.)

WARNING: Never bypass the limit controls; hazardous conditions could result. See Hazard Intensity Levels, page 3.

15. Combustion Air Pressure Switch

The combustion air pressure switch ensures that proper combustion airflow is available. The switch senses the differential pressure between the negative pressure in the venter housing and the pressure in the cabinet. (For switch location, see FIGURE 9, page 21.)

On startup when the heater is cold, the sensing pressure is at the most negative level, and as the heater and flue system warm up, the sensing pressure becomes less negative.

If a restriction or excessive pipe length causes the sensing pressure to be below the allowable level, the pressure switch will shut off the main burner.

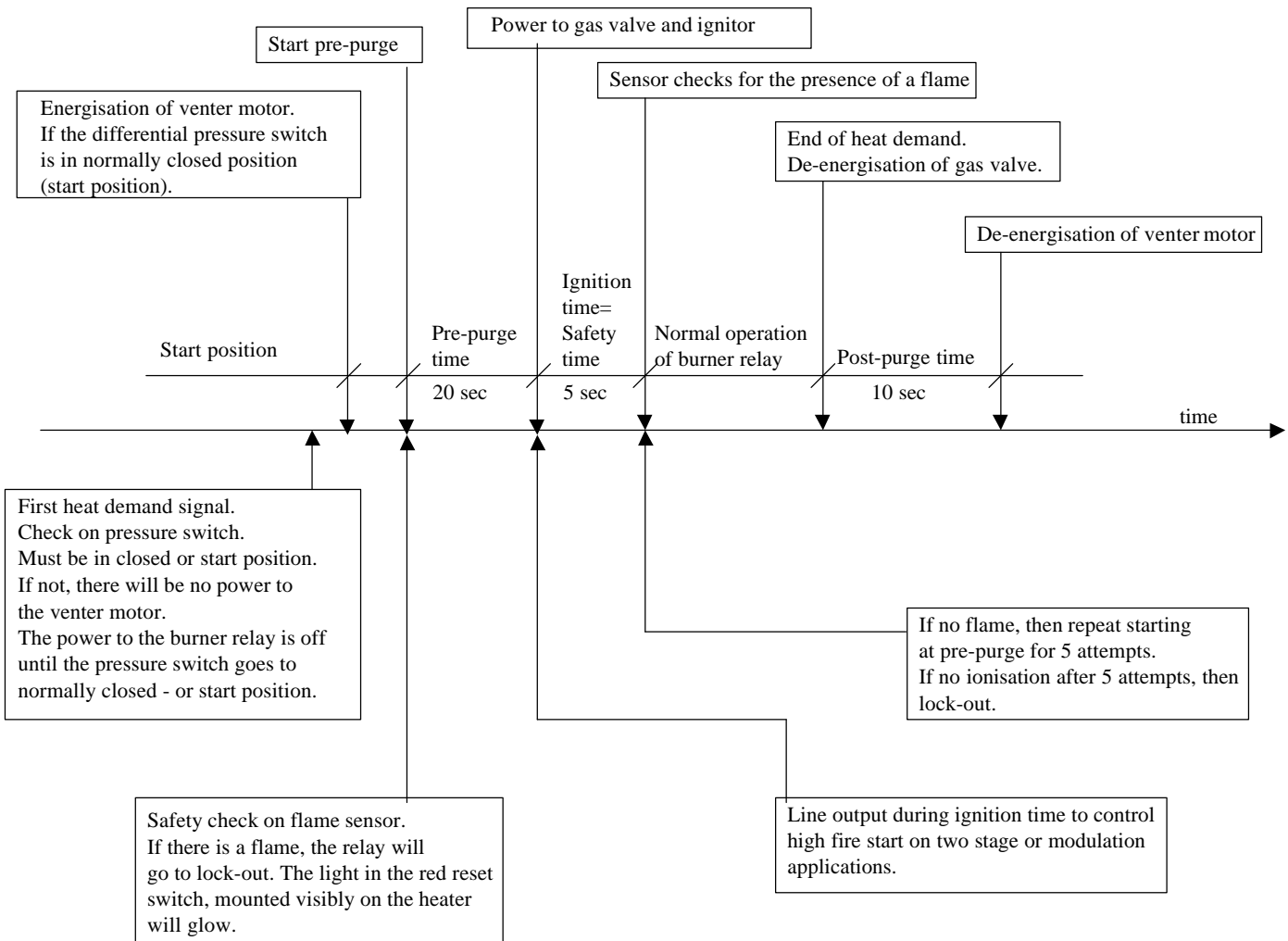
DANGER: Safe operation of this unit requires proper venting flow. NEVER bypass the combustion air pressure switch or attempt to operate the unit without the venter operating. Hazardous conditions could result. See Hazard Levels, page 3.

16. Ignition System

Normal Heat Cycle Operating Sequence

This heater is equipped with a direct spark integrated control relay. The control relay monitors the safety devices and controls the operation of the venter motor and the gas valve between heat cycles.

The time line below illustrates a normal heat cycle.



Definitions

Start position: The system is not in lock-out position and can proceed with the start-up sequence upon a demand for heat.

Pre-purge time: This is a period of 20" during which the combustion fan (venter) operates prior to activation of the ignition device.

Safety time: The safety time is the delay between the gas valve being energised and the flame sensor checking for the presence of a flame. This is a period of 5".

Note: If no flame is sensed, the burner relay will **attempt ignition 5 times before going into lock-out mode.**

Post-purge time: This is the time of 10" between burner shut-down and the moment the combustion fan (venter) is de-energized.

17. Gas Valve

The main operating quick opening gas valve is powered through the thermostat and safety controls. The main control valve is of the diaphragm type providing regulated gas flow and is preset at the factory. (For location, see FIGURE 9, page 21.)

WARNING: The operating valve is the prime safety shutoff. All gas supply lines must be free of dirt or scale before connecting the unit to ensure positive closure. See Hazard Levels, page 3.

18. Burner

This heater has a unique one-piece T-CORE²® burner assembly (patent pending) designed to provide controlled flame stability without lifting or flashback.

The burner can be removed as a unit for inspection or service; see Maintenance Section for removal instructions.

19. Check Installation and Startup

Check the installation prior to startup:

- Check suspension. Unit must be secure.
- Check clearances from combustibles. Requirements are in section 8.
- Check vent system to be sure that it is installed according to the instructions in section 7, venting requirements.
- Check piping for leaks and proper gas line pressure. Bleed gas lines of trapped air. See section 11.
- Check electrical wiring. Be sure all wire sizes meet requirements.
- Check polarity. Verify that line voltage exists between the black “L1” and earth ground. (Use the green switch provided on the controls mounting bracket)

Heater Startup:

WARNINGS: For your safety, read before operating. If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury, or loss of life.

- **This heater does not have a pilot flame. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.**
- **Before operating, smell all around the heater area for gas. Be sure to smell next to the floor because propane and butane gases are heavier than air and will settle near the floor.**

WHAT TO DO IF YOU SMELL GAS

- **Do not try to light any appliance.**
- **Do not touch any electrical switch or use any phone in the building.**
- **Evaluate all personnel from the building.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the local fire department.**

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

Operating Instructions and Operating Sequence

1. Set thermostat to the lowest setting.
2. Turn off all electric power to the heater.
3. This heater is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
4. Shut the gas cock at the inlet of the unit.
5. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. **If you smell gas, STOP!** and follow the steps in the **WARNINGS** printed above or on the Operating Label of the heater. If you do not smell gas, proceed to the next step.
6. Open the gas cock at the inlet of the unit.
7. Close the access door.
8. Turn on the electric power to the heater.
9. Set the thermostat to the desired setting. (must be above current room temperature.)

NOTE: If the appliance does not operate, follow the instructions "To Turn Off Gas to Appliance" printed below (and on the Operating Label on the heater) and call your service technician.

10. Thermostat calls for heat, energizing the venter motor.
11. Venter pressure switch closes, firing the unit.
12. Burner flame is sensed and when the heat exchanger is warmed up (+/- 30 seconds) and the gas valve is energized, the fan motor is energized.
13. If the flame is extinguished during the main burner operation, the integrated control system closes the main valve and attempts to relight the burner. The unit will attempt 5 ignitions before entering a "lock out" mode. To end this mode push on the reset switch.

TO TURN OFF GAS TO THE APPLIANCE

- 1) Set thermostat to the lowest possible setting.
- 2) Turn off electric power to the appliance.
- 3) Shut off the gas tap.

Check installation after startup:

- Turn the unit off and on, pausing two minutes between each cycle. Observe for smooth ignition.
- Place this booklet and any control or optional information in an accessible location near the heater or give this information to the end user or installer.

MAINTENANCE AND SERVICE

WARNING: If you turn off the power supply, always turn off the gas. See Hazard Levels, page 3.

The material contained in the MAINTENANCE AND SERVICE Section of this manual is designed to aid a qualified service technician in maintaining and servicing this equipment. This heater will operate with a minimum of maintenance. To ensure long life and satisfactory performance, a heater that is operated under normal conditions should be inspected and cleaned at the start of each heating season. If the heater is operating in an area where an unusual amount of dust, soot, or other impurities are present in the air, more frequent maintenance is recommended. When any service is completed, be careful to reassemble correctly to ensure that no unsafe conditions are created. When starting the heater, always follow the lighting instructions on the heater.

20. Maintenance Schedule

NOTE: If replacement parts are required, use only factory-authorized parts.

Maintenance Schedule - The following procedures should be carried out at least once each year (See FIGURE 9 and sections 21-29.):

- Clean all dirt, lint, and grease from the fan blade, fan guard, and motor.
- Check the heat exchanger both internally and externally for evidence of physical damage.
- Check the burner for scale, dust, or lint accumulation. Clean if required.
- Check the vent or vent/combustion air system for soundness. Replace any parts that do not appear sound.
- Check the wiring for any damage. Replace damaged wiring.

FIGURE 9 - Location of Controls

Legend:

- 1) Burner assembly
- 2) LC3 Limit control (not shown)
- 3) Burner operating light (H6)
- 4) Reset switch (S3)
- 5) Spark ignitor (ER)
- 6) Control panel assy located on a removable bracket (see figure 9a)
- 7) Gas valve (V1)
- 8) Fan motor (M1)
- 9) Venter motor (model 008-020) illustrated. Venter motor is in the same location for all models, but appearance may differ. (M3)
- 10) Fan control (FC)
- 11) LC1 Limit control
- 12) Flame sensor (IS)
- 13) Reset LC3 (limit control)
- 14) Fuse (F3.1)

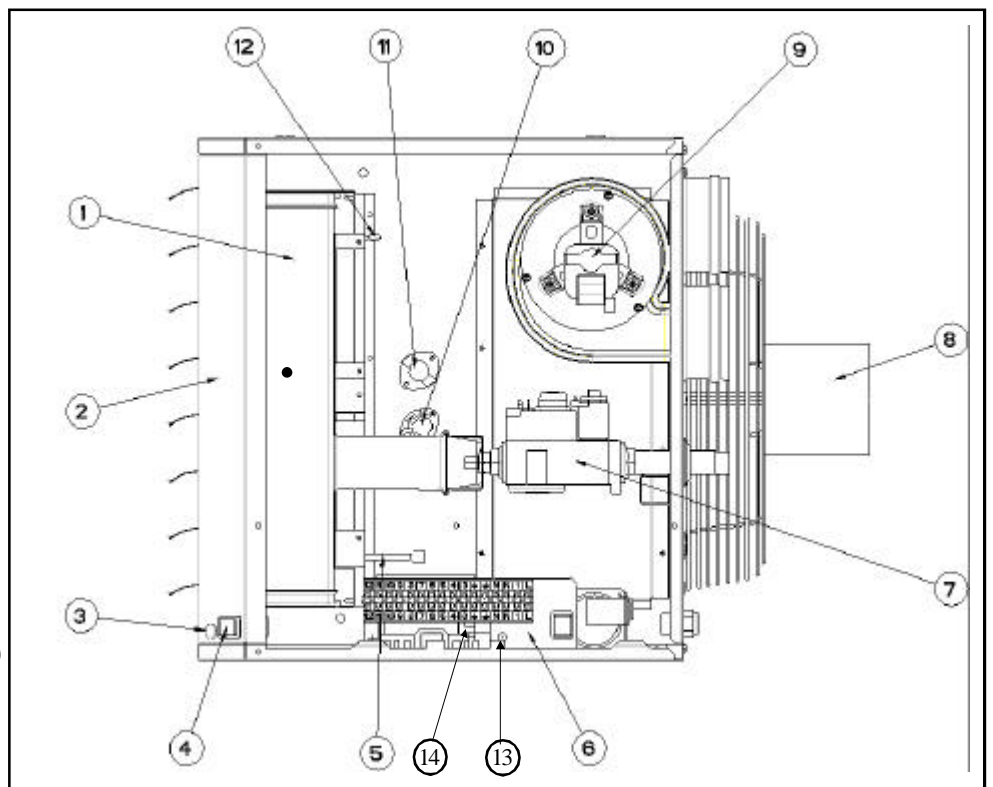
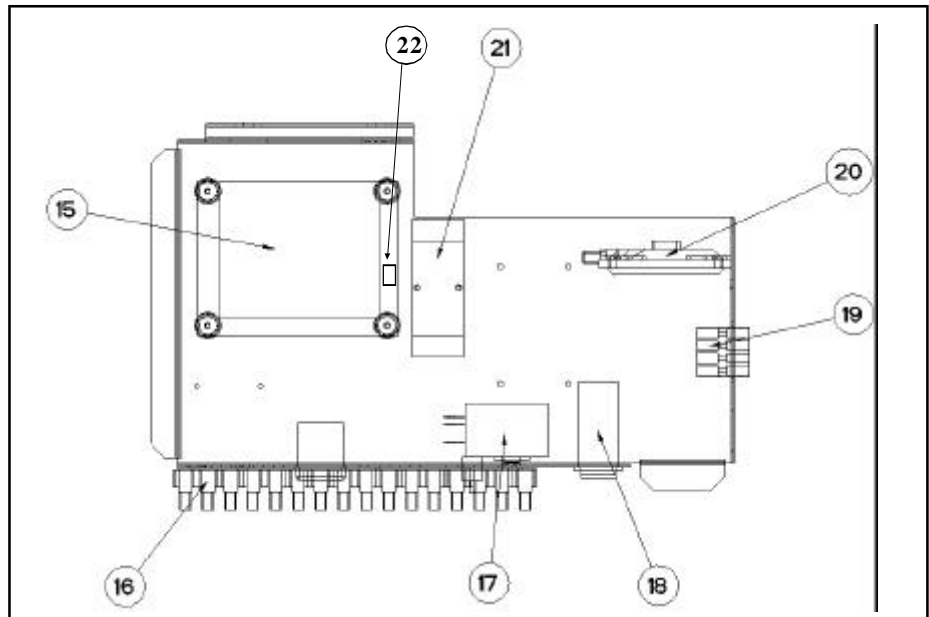


FIGURE 9a - Control panel assy located on a removable bracket

Legend:

- 15) Control relay (ER)
- 16) Terminal blocks
- 17) LC3 Limit control
- 18) Polarity check (S14)
- 19) Connector
- 20) Pressure switch (S3)
- 21) Relay only for two stage burner control (option) (K1..)
- 22) Electronic burner relay fuse (3.15F)



21. Heat Exchanger Maintenance

This heater is equipped with a T-CORE²® heat exchanger (patent pending).

Remove any external dirt or dust accumulation. Visually check the heat exchanger for cracks and holes. If a crack or hole is observed, replace the heat exchanger.

22. Burner Maintenance

This heater is equipped with a T-CORE²® burner (patent pending).

Inspect the burner/control compartment annually to determine if cleaning is necessary. If there is an accumulation of dirt, dust, and/or lint, clean the compartment and follow the instructions below to remove and clean the burner.

CAUTION: Use of eye protection is recommended.

Burner Removal

Instructions for Burner Removal (Refer to FIGURE 10)

1. Outside the cabinet, shut the gas supply off at the manual valve ahead of the union.
2. Turn off the electric supply.
3. Disconnect the gas supply at the union outside of the cabinet.
4. Open the access door.
5. **Disconnect the Manifold and Move it Out of the Way** - At the gas valve, mark and disconnect the connector. Carefully remove the burner orifice and orifice adapter locking nut. Slide the orifice adapter out through the bracket on the burner pushing the manifold in the direction of the gas line. This will move the manifold out of the way. Refer to figure 10 for component definitions.

PICTURE 1



6. Remove Burner Assembly

- a) Locate the burner body front support. Remove the screws that attach it to the secondary air shield. Refer to figure 10 for component definitions.



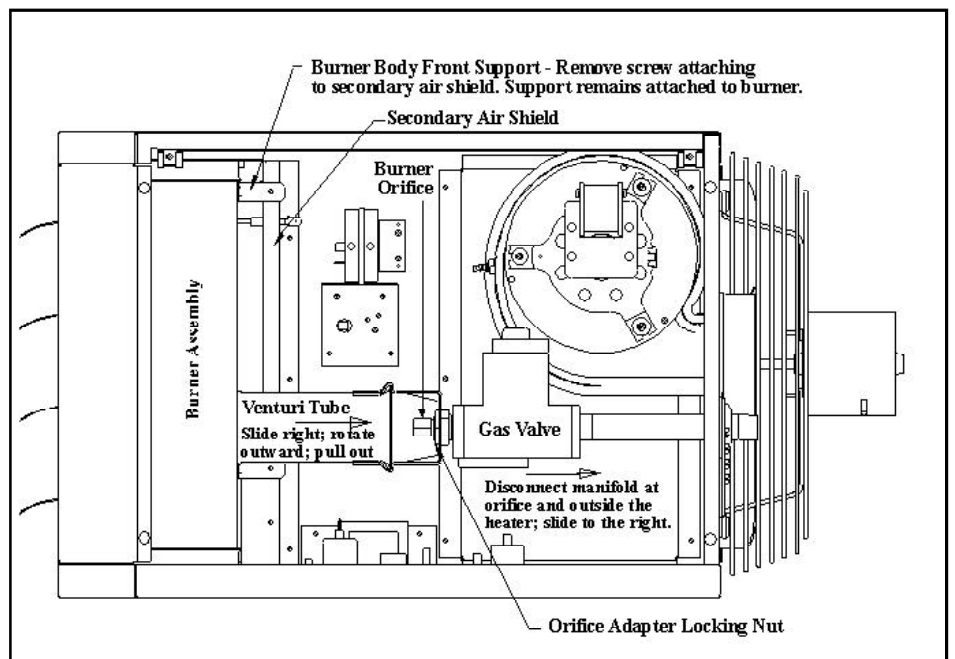
PICTURE 2

- b) Holding the venturi tube, slide the entire burner assembly slightly to the right to disengage the burner from the supports on the left. Then rotate the open end of the venturi tube outward away from the heater. Carefully pull the burner assembly out of the cabinet.



PICTURE 3

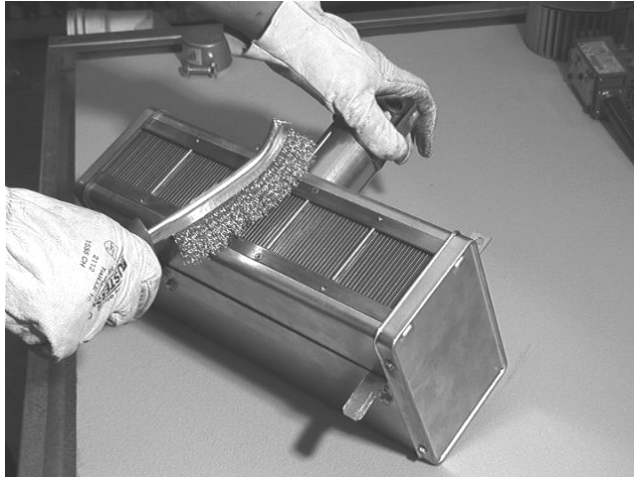
FIGURE 10 - Burner Removal Steps



Inspect and Clean the Burner

With the burner assembly removed, shine a flashlight on the burner ribbons. Look for carbon buildup, scale, dust, lint, and/or anything that might restrict flow through the spaces between the burner ribbons. Holding the burner assembly so that any foreign material will fall away from the burner, use a stiff bristle brush to loosen

PICTURE 4



and remove any foreign material(s). If the burner is excessively dirty, remove one of the burner end caps. Remove the four screws that hold the end cap to the burner housing. Lightly tap the end cap to remove it.

Clean all foreign material from the burner and venturi. After the burner is thoroughly clean, replace the end cap making certain that it is tight against the burner housing. NOTE: If any of the burner components are damaged or deteriorated, replace the burner assembly.

Inspect the Internal Portion of the Heat Exchanger (with burner assembly removed)

At the burner flame entrance of each tube, shine a bright light into each heat exchanger section. With the light shining into the heat exchanger, observe the outside surface of the tube where discoloration is evident. Repeat this procedure with each heat exchanger tube. If any light is observed in these high temperature regions, replace the heat exchanger.

Reinstall the Burner

Repeat "Burner Removal" steps above in the opposite order.

23. Burner Orifice

The burner orifice normally needs to be replaced only when a change in gas is made. When ordering a replacement orifice, provide (MJ/m³) heating value and specific gravity of gas, as well as the model and serial number of the unit. When removing or replacing the burner orifice be careful not to damage the venturi tube and/or the bracket.

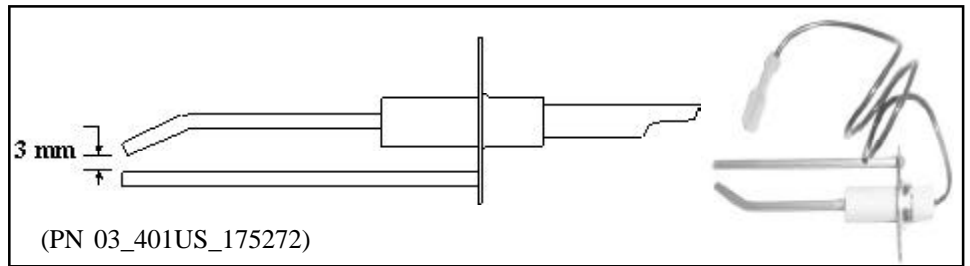
24. Ignition System

Ignitor - Refer to FIGURE 9 and locate the ignitor. Disconnect the wire; remove the screw and the ignitor. Clean the ignitor assembly with an emery cloth.

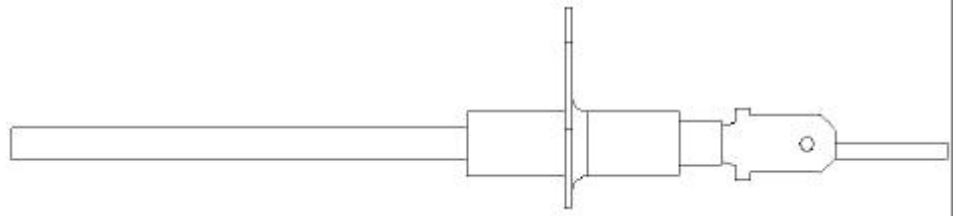
Spark gap must be maintained to 3 mm. See FIGURE 11.

IMPORTANT: When reassembling, the wire must remain attached to the ignitor.

FIGURE 11 - Ignitor showing required Spark Gap measurement



Flame Sensor



CAUTION: Due to high voltage on the spark wire and electrode, do not touch when energized. See Hazard Levels, page 3.

Flame Sensor - Refer to FIGURE 9 and locate the flame sensor. Disconnect the wire; remove the screw and the flame sensor. Clean with an emery cloth.

Control Relay - See FIGURE 12. The electronic burner relay monitors the operation of the heater including ignition.

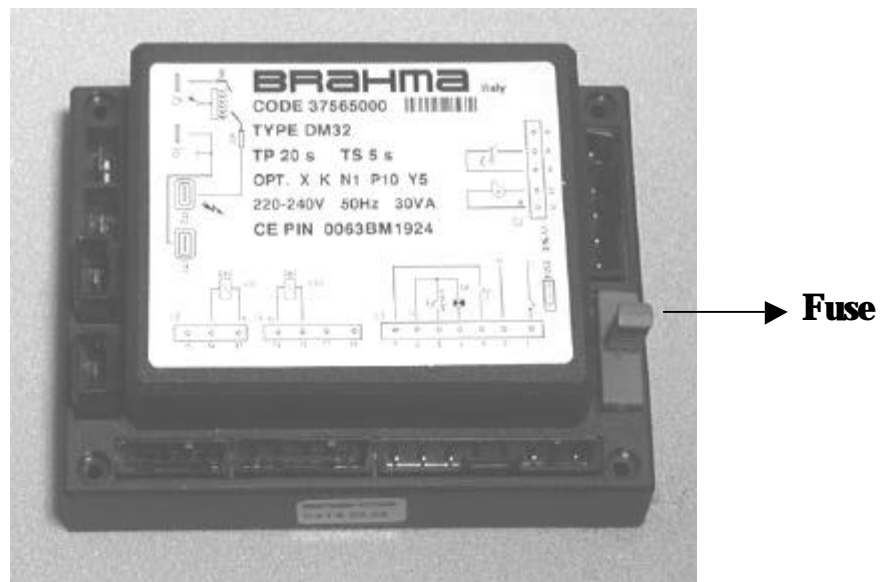
Do not open the control relay. Each heating season check the lead wires for insulation deterioration and good connections.

Proper operation of the direct spark ignition system requires a minimum flame signal of 1.0 microamps (DC) as measured by a microammeter.

For further information and check out procedure on the direct spark ignition system, refer to section 16 and the Troubleshooting Flow Chart in section 31.

FIGURE 12 - Control Relay

(PN 03_25322)



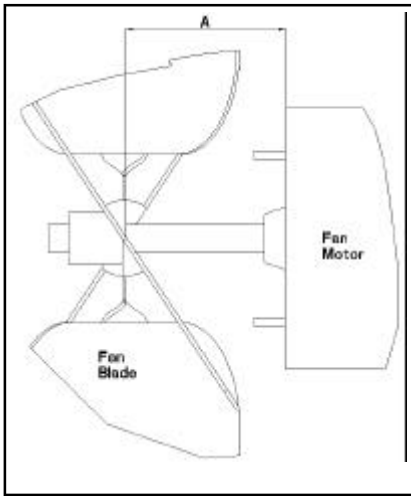
25. Fan Motor, Fan Blades, and Guard

Remove dirt and grease from the motor, the fan guard, and blades. Use care when cleaning the fan blades to prevent causing misalignment or imbalance. Check that the hub of the fan blades is secure to the shaft.

Follow these instructions for replacement of the fan guard, fan motor and/or fan blades.

1. If the heater is installed, turn off the gas and disconnect the electric power.
2. Open the access door and disconnect the fan motor wires.

FIGURE 13- Fan Blade Position on the Motor Shaft



3. Remove the fan assembly (fan guard, motor and fan blade).
4. Disassemble and replace parts as needed, then reassemble.
Be sure the fan blade is in the proper position on the shaft; refer to the illustration and table in FIGURE 13.

Dimension A

Size	008	011	015	020	025	030	035	043	050	055	064	073	085	100
mm	48	42	68	68	93	90	95	98	94	90	95	88	85	88

Position the assembly on the heater and attach the fan guard.

Rotate the fan blade by hand to check for adequate clearance. If adjustment is required, loosen the mounting screws, reposition the fan guard, and tighten the screws. Rotate the fan blade and recheck for adequate clearance. Repeat this procedure until the assembly is positioned properly.

5. Reconnect the fan motor wires according to the wiring diagram and close the access door.
6. Restore power to the heater and turn on the gas. Light, following the instructions on the lighting instruction plate. Check for proper operation.

26. Venter Motor and Wheel

Remove dirt and grease from the motor casing, the venter housing, and the venter wheel. Venter motor bearings are permanently lubricated.

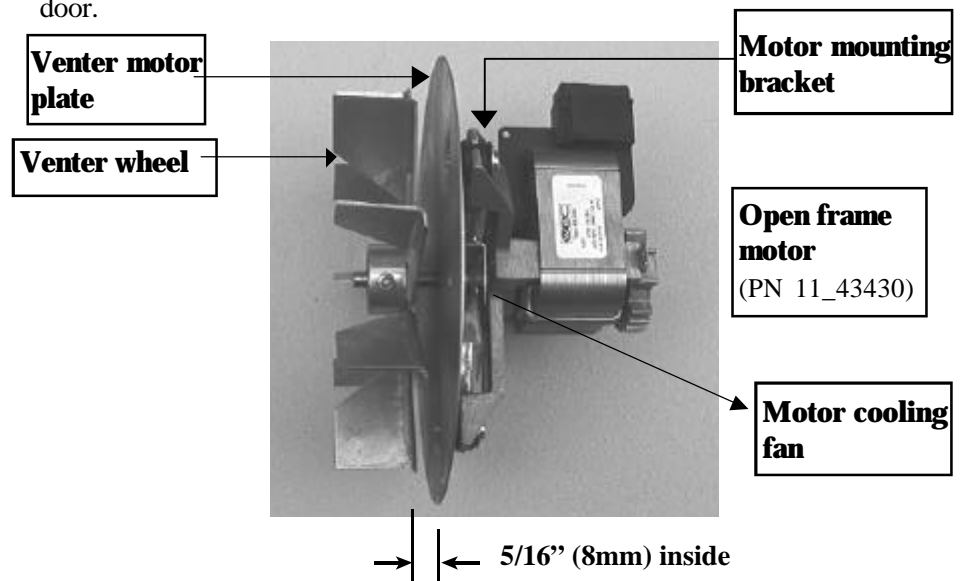
Follow these instructions for replacement of the venter motor and wheel assembly. Keep all hardware removed to be used in reassembling and installing the replacement parts.

1. Turn off the gas and disconnect the electric power.
2. Open the control compartment access door.
3. Disconnect the three venter motor wires at the control relay and ground screw (located on the control panel).
4. Holding the motor, remove the screws that attach the motor plate to the venter housing. Remove the motor and wheel assembly from the heater.
5. Reassemble with the replacement venter motor and wheel assembly.
6. Follow the wiring diagram to properly connect the wires.
7. Restore power to the heater and turn on the gas. Light, following the instructions on the lighting instruction plate. Check for proper operation. Replace the access door.

PICTURE 5 - Venter Wheel Position on Shaft

UDSA models 008 - 020

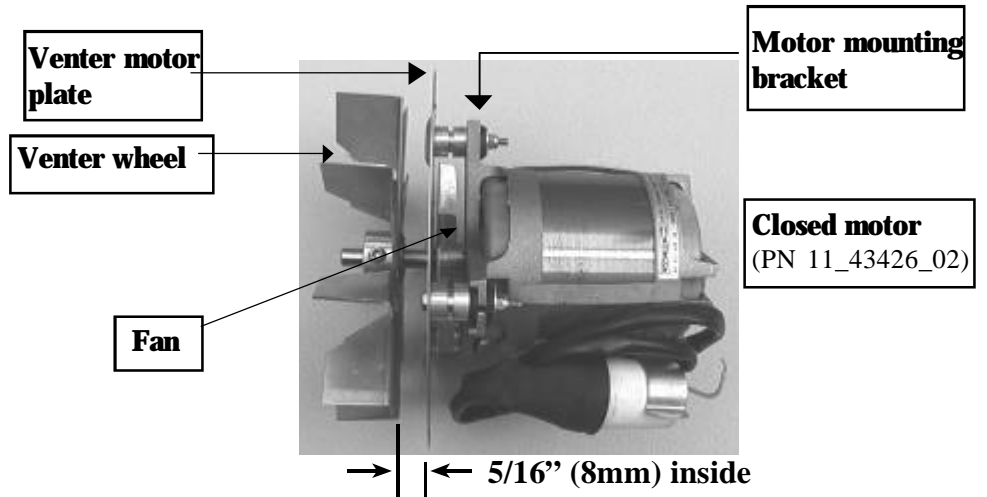
(Rotation clockwise from motor shaft end)



PICTURE 6

UDSA models 025 - 030

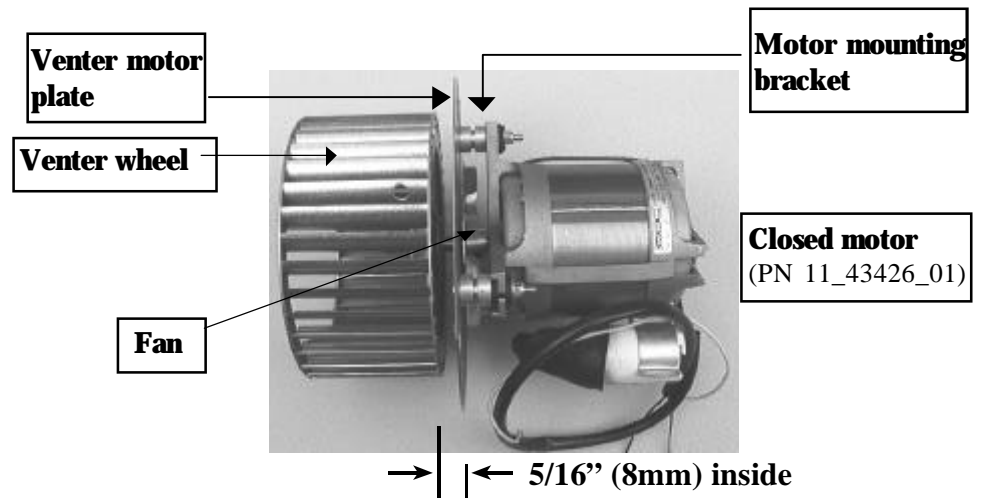
(Rotation clockwise from motor shaft end)



PICTURE 7

UDSA models 035 - 100

(Rotation counter clockwise from motor shaft end)



27. Operating Gas Valve

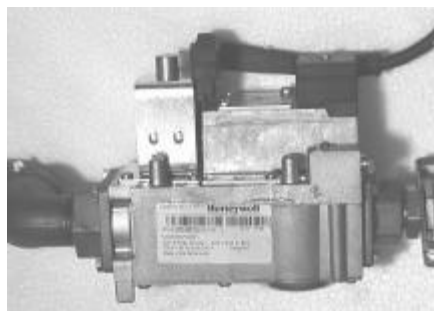
The gas valve requires no field maintenance except careful removal of external dirt accumulation and checking of wiring connections. Instructions for testing pressure settings are in section 12.

WARNING: The operating valve is the prime safety shutoff. All gas supply lines must be free of dirt or scale before connecting to the unit to ensure positive closure. See Hazard Levels, page 3.



PICTURE 8
Gas Valve
(UDSA models 008 - 030)

(PN 03_25250)



PICTURE 9
Gas Valve
(UDSA models 035 - 100)

(PN 03_25136)

28. Combustion Air Pressure Switch

(PN 30_60607_120)

PICTURE 10



See FIGURE 9, page 21, for location. If it is determined that the pressure switch needs replacing, use only the factory-authorized replacement part that is designed for the model and size of heater being serviced.

29. Limit Controls

If a limit control needs replacing, use only the factory-authorized replacement part for the size of heater.

For approximate limit locations, see FIGURE 9, page 21.

PICTURE 11

LC1

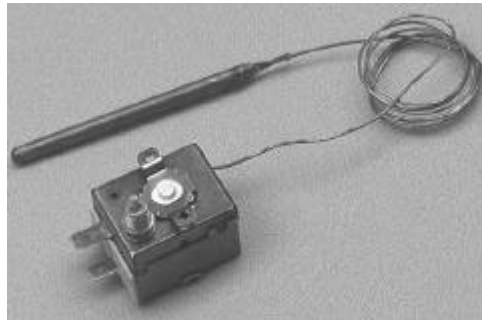
(PN 03_24969_01)



PICTURE 12

LC3

(PN 03_24959)



FCR

PICTURE 13

Fan control (FC)

(PN 03_25168)



30. Vent and Combustion Air Piping

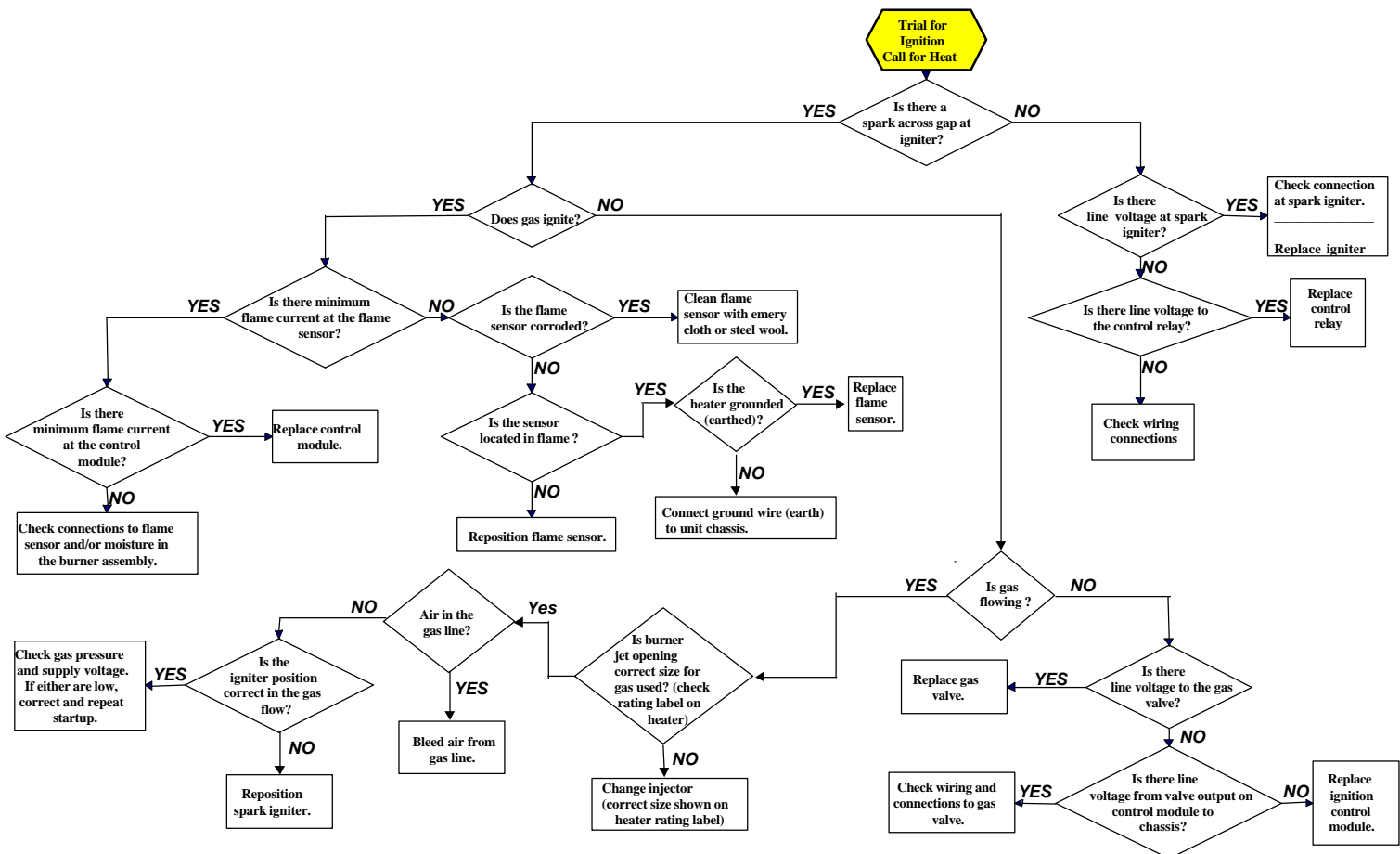
Check the complete system at least once a year. Inspection should include all joints, seams, concentric adapters and the vent terminal cap. Replace any defective or heavily corroded parts.

31. Troubleshooting

The integrated control relay monitors the operation of the heater. If the heater fails to operate properly, review the flow chart below and see the operating sequence in section 16.

The general troubleshooting charts on the following pages will also help you to determine the problem.

Control Relay Trial Troubleshooting Flowchart



General Troubleshooting

PROBLEM	PROBABLE CAUSE	REMEDY
Venter motor will not start	<ol style="list-style-type: none"> 1. No power to unit. 2. No power to venter motor. 3. Integrated burner relay defective. 4. Defective venter motor. 5. Fluse blown (F3.1). 6. Fuse burner relay blown. 7. LC1 open. 8. LC3 open. 9. Unit in lock-out. 10. Room thermostat open. 	<ol style="list-style-type: none"> 1. Turn on power, check supply fuses or circuit breaker. 2. Check connections at burner relay and/or venter motor terminals. 3. Replace burner relay. 4. Replace venter motor. See Section 26. 5. Replace fuse. 6. Replace fuse. 7. a) Set heater on ventilation until LC1 closes. b) Replace LC1. c) Check if there is obstruction at the fan side. 8. a) Reset LC3. b) Replace LC3. 9. Push on reset button. 10. Set thermostat above room temperature.
Burner will not light	<ol style="list-style-type: none"> 1. Main valve not operating. 2. Air in the gas line. 3. Gas pressure too high or too low. 4. No Spark: <ol style="list-style-type: none"> a) Loose wire connections. b) Incorrect spark gap. c) Spark cable has a short circuit to ground. d) Spark electrode has a short circuit to ground. e) Burner relay not grounded. f) Unit not properly grounded. g) Faulty burner relay. 5. Combustion air pressure switch not closing upon power to venter. 	<ol style="list-style-type: none"> 1. a) Check voltage on valve during ignition period. b) Check connector on main gas valve. c) Check connector on burner relay. d) Replace valve. 2. Purge gas line. 3. a) Supply pressure should be 15 mbar for natural gas (UK only) or 37 mbar for propane gas (UK only). b) Obstruction in the gas line. c) Gas line connection diameter too small. 4. Check the following : <ol style="list-style-type: none"> a) Be certain all wire connections are solid. b) Maintain spark gap at 3 mm. c) Replace worn or grounded spark cable. d) Replace if ceramic spark electrode is cracked or grounded. e) Check burner relay ground wire. f) Make certain unit is properly field grounded (earthed) and properly phased (L1 to hot lead L2 to neutral). g) If voltage is available to the burner relay and all other causes have been eliminated, replace burner relay. 5. First check the following : <ol style="list-style-type: none"> a) Make sure unit is properly vented. b) Remove obstructions from vent. c) Replace faulty tubing to pressure switch. d) Replace faulty pressure switch.
Burner cycle on and off	<ol style="list-style-type: none"> 1. Gas pressure too high or too low. 2. Burner relay not grounded. 3. Faulty burner relay. 4. Flame sensor grounded. 5. Cracked ceramic at sensor. 6. Incorrect polarity. 	<ol style="list-style-type: none"> 1. Supply pressure should be 15 mbar for natural gas (UK only) or 37 mbar for propane gas (UK only). 2. Check burner relay ground wire connection. 3. If (220/240) volts is available to the burner relay and all other causes have been eliminated, replace burner relay. 4. Be certain flame sensor lead is not grounded or insulation or ceramic is not cracked. Replace as required. 5. Replace sensor. 6. Check polarity switch and if necessary reverse line voltage wires to terminal block connections.
Fan motor will not run	<ol style="list-style-type: none"> 1. Circuit open. 2. Defective fan control (FC). 3. Defective motor. 	<ol style="list-style-type: none"> 1. Check wiring and connections. 2. a) Replace fan control. b) Check voltage on anticipation resistor when gas valve is open. 3. Replace motor or starter.
Fan or venter motor turns on and off while burner is operating	<ol style="list-style-type: none"> 1. Motor internal thermal protection device cycling on and off. 	<ol style="list-style-type: none"> 1. Check motor load against motor rating plate. Replace motor if needed.

32. Parts list

Description	Application	Partnumber (PN)
Control relay	UDSA008 ... 100	03 25322
Spark ignitor	UDSA008 ... 100	03 401US 175272
Flame sensor	UDSA008 ... 100	03 401US 195292
Limit control LC3	UDSA008 ... 100	03 24959
Limit control LC1	UDSA008 ... 100	03 24969 01
Fan control FC	UDSA008 ... 100	03 25168
Fuse wiring panel 2A	UDSA008 ... 100	06 00157 2A
Fuse control relay	UDSA008 ... 100	06 00161
Pressure switch	UDSA008 ... 100	30 60607 120
Polarity switch	UDSA008 ... 100	60 61989
Burner-on indication lamp	UDSA008 ... 100	60 61996
Reset switch	UDSA008 ... 100	60 61988
Gas valve nat. gas 1st	UDSA035 ... 100	03 25136
Gas valve nat. gas 1st	UDSA008 ... 030	03 25250
Gas valve nat. gas 2st	UDSA008 ... 100	03 25136 02
Gas valve prop./but. 1st	UDSA008 ... 030	03 25250
Gas valve prop./but. 1st	UDSA035 ... 100	03 25136 B
Gas valve prop./but. 2st	UDSA008 ... 100	03 35136 P437
Gas valve plug + wire	UDSA035 ... 100	03 25136 V1
Gas valve plug + wire	UDSA008 ... 030	03 25250 V1
Venter motor	UDSA008 ... 020	11 43430
Venter motor	UDSA025 ... 030	11 43426 02
Venter motor	UDSA035 ... 100	11 43426 01
Venter wheel assy	UDSA008 ... 020	90 82242
Venter wheel assy	UDSA020 ... 030	90 82244
Venter wheel	UDSA035 ... 100	02 25728
Fan motor	UDSA008 - 011	01 25630
Fan motor	UDSA015 - 020	01 25631
Fan motor	UDSA025 - 030	01 25632
Fan motor	UDSA035	01 25633
Fan motor	UDSA043	01 25634
Fan motor	UDSA050	01 25635
Fan motor	UDSA055	01 25636
Fan motor	UDSA064	01 25637
Fan motor	UDSA073 ... 100	01 25638
Axial fan	UDSA008	02 25701
Axial fan	UDSA011	02 25701 01
Axial fan	UDSA015	02 25702
Axial fan	UDSA020	02 25702 01
Axial fan	UDSA025	02 25705
Axial fan	UDSA030	02 25705 01
Axial fan	UDSA035	02 25703
Axial fan	UDSA043	02 25706
Axial fan	UDSA050	02 25707
Axial fan	UDSA055	02 25731
Axial fan	UDSA064	02 25708
Axial fan	UDSA073	02 25716
Axial fan	UDSA085	02 25717
Axial fan	UDSA100	02 25719
Main wiring assy 1st	UDSA008 ... 100	21 41640 01
Main wiring assy 2st	UDSA008 ... 100	21 41640 02
Venter wiring assy	UDSA008 ... 020	06 41640
Relay 2st	UDSA008 ... 100	30 61736

0210UDSAGBEN
Subject to modifications

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0210UDSAGBEN, Page 31