BENSON GAS UNIT HEATERS

Types VRA 065/090/110/140/170/220/285
Types VRC 065/090/110/140/170
Types VRE 090/110//170/220

CE 49/AU/2840
0049

VARIANTE RANGE
INSTALLATION AND SERVICE MANUAL



BENSON HEATING

Issue 2 0ctober 2003

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1-GENERAL RECOMMENDATIONS

The Instructions contained in this manual apply to Variante gas fired models only.
These models are suitable for roof suspension, indoor installation only.
VRA VRC models are suitable for both horizontal and vertical room sealed flue terminals
IMPORTANT :
Variante heaters must be installed in sufficiently ventilated premises
In garage applications the must be mounted at a minimum height of 1.8 meters to the bottom of the heater from floor level
It is a requirement that only suitably qualified and competent personnel may install and commission the heater
The heater should be installed so as to comply with all the relevant standards and guide lines as well as meeting all national and local regulations and insurance criteria
The Benson Variante range of warm air heaters detailed herewith are manufactured for Benson Heating within the parameters of ISO 9002.
The Benson Variante range has been independently tested and assessed, and has been found to meet the Essential Requirement of the following European Directives:

Gas appliance Directive (90/396/EEC)
Machinery Directive (89/392/EEC)
Low Voltage Directive (73/23/EEC and 93/68/EEC)
Electromagnetic Compatibility Directive (98/336/EEC and 91/31/EEC)
Product Liability Directive (65/374/EEC)

The manufacturer has taken reasonable and practical steps to ensure that Benson Variante Range of Heaters are safe and without risk when properly used. These heaters should therefore only be used in the manner and purpose for which they were intended, and in accordance with the recommendations detailed herewith.
The heaters have been designed, manufactured, assembled, inspected, and tested, with safety and quality in mind, there are certain basic precautions which the installer and user should be aware of, and they are strongly advised to read the appropriate sections of the information pack accompanying the heater, prior to installation or use.

Benson Heating supports all new products being supplied to their customers with a comprehensive information pack; this clearly defines mandatory instructions for the safe installation, use, and maintenance, of the appliance (s).

Where proprietary items are incorporated into Benson Heating products, detailed information and instructions are also provided as part of the information pack.

It is the responsibility of the installer, owner, user, or hirer, of such products supplied by Benson Heating, to ensure that they are familiar with the appropriate information/manuals, supplied by the manufacturer, and that they are suitably aware of the purpose of the manuals and the safety instructions. In addition, operators must be suitably trained in the use of the appliance so as to ensure its continued safe and efficient use.

Benson Heating has a commitment to continuous improvement, and therefore reserves the right to amend or change the specification of the Variante Heater range subject to agreement from The Notified Body.

The heater is supplied with a 2 year warranty on all parts.

The warranty commences from the date of dispatch from the manufacturer, and is subject to the terms detailed within the manufacturer 'conditions of business'.

The warranty may be invalidated if :

a) The warranty registration/commissioning card has not been completed and returned to the manufacturer

b) The installation is not in accordance with the general requirements of this manual

c) The flue arrangement and air supply for the heater are not in accordance with the manufacturers recommendations, codes of practice, or similar standards

d) Air flow through the heater is not in accordance with the manufacturers technical specifications

e) Internal wiring on the heater has been tampered with or unauthorised service/repairs undertaken

f) The main electrical supply input to the heater has been interrupted during the heating mode

g) The heater has been subject to and affected by the ingress of water in any form

h) The heater is not operated at the rating(s) laid down in the manufacturers technical specifications

i) The heater has not been operated or used within the normal scope of its intended application

j) The manufacturer's recommended minimum service requirements have not been complied with

All warranty claims must contain the following information to enable processing to take place;

(1) Heater model , (2) Heater serial number (3) Order reference/date of order, together with full installation details (name and address) (4) Details or symptoms of fault (5) Installers name and address.

Faulty parts must be returned to the manufacturer Spares Department, the address of which is provided on the rear cover of this manual. Any such parts will undergo inspection to verify the claim. Replacement parts supplied prior to this may be charged, and a credit supplied upon subsequent validation of the warranty claim. Consumable items are specifically not included within the scope of the warranty.

Notification is required immediately a fault is suspected. The manufacturer will not accept responsibility for any additional damage that has been caused, expense incurred, or consequential loss resulting from any failure of the heater(s).

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. 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.

2–1 TECHNICAL SPECIFICATIONS



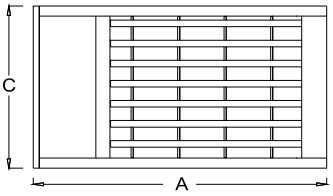
Model VRA

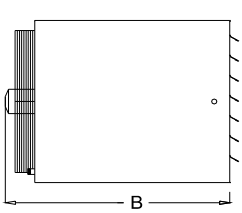
Models VRA are Room Sealed
Axial fan with vertical and horizontal louvres as standard and are unsuitable for ducted systems

Technical Data VRA

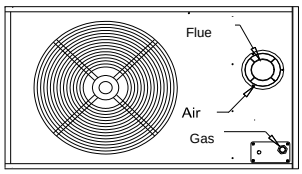
TYPES		VRA065	VRA090	VRA110	VRA140	VRA170	VRA220	VRA285
Heat Input	kW	21	28	35	45	55	71	92
Heat Output	kW	19,5	25,5	31,5	40,5	50	64,4	84
Efficiency	%	92.8	91.1	90.0	90.0	91.0	90.7	91.3
No Fans		1	1	1	1	1	1	2
Fan Speed	Tr/m	900	900	900	900	1400	1400	900
Airflow @ 15 °C Airflow @ 50 °C	m^3/h	1 450 1 625	2 050 2 250	2 900 3 250	4 000 4 400	4 900 5 400	5 800 6 400	8 000 8 800
Delta T	°C	40	36	32	30	30	32	32
Axial fan throw	m	12	16	23	26	28	30	30
Gas rate @ 15°C Natural G20 Propane G31	 20 mbar 37 mbar	 2.22 m^3/ h 1.64 kg/h	 2.96 m^3/ h 2.18 kg/h	 3.70 m^3/ h 2.73 kg/h	 4.76 m^3/ h 3.51 kg/h	 5.82 m^3/ h 4.30 kg/h	 7.40 m^3/ h 5.46 kg/h	 10.0 m^3/ h 7.40 kg/h
Flue diameter	mm	80 /125	80/125	80/125	100	130	130	130
Comb air diameter	mm				100	130	130	130
Electrical Supply	V	230 volts 1ph 50Hz						
Running Current	A	1.3	1.3	1.4	1.5	2.2	2.5	3.2
Weight	kg	82	82	90	105	127	145	185
Sound level @ 5M	dBa	39	40	41	46	51	51	49

Dimensional Data VRA

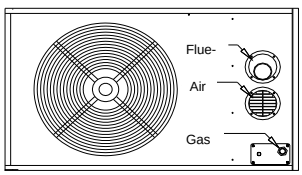




Connections 65/90/110



Connections 140/170/220/285



VRA	A	B	C	Ø Flue	Ø Air	Ø Gas
065	1040	800	460	80 / 125		1/2
090	1040	820	460	80 / 125		1/2
110	1040	820	510	80 / 125		1/2
140	1040	820	570	100	100	1/2
170	1040	840	700	130	130	1/2
220	1120	840	825	130	130	3/4
285	1120	840	1075	130	130	3/4



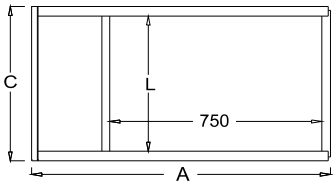
Model VRC

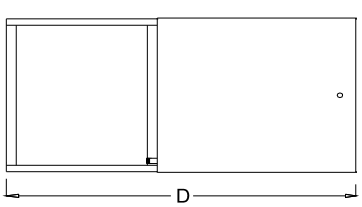
Models in the VRC range are room sealed with Centrifugal Fan suitable for ducted systems (Vertical and Horizontal louvres optional)

2-2Technical Data VRC

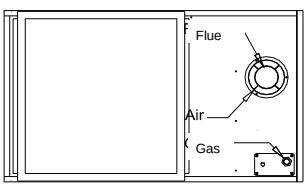
TYPES		VRC065	VRC090	VRC110	VRC140	VRC170
Heat Input	kW	21	28	35	45	55
Heat Output	kW	19,5	25,5	31,5	40,5	50
Efficiency	%	92.8	91.1	90.0	90.0	90.7
Fan speed	Tr/m	1 400	1 400	1 400	1 400	1 400
Airflow @ 15 °C Airflow @ 50 °C	m^3/h	1 450 1 625	2 050 2 250	2 900 3 250	4 000 4 400	4 900 5 400
Delta T	°C	40	36	32	30	30
Available outlet pressure	mm CE	10	10	10	10	10
Gas rate @ 15°C Natural G20 Propane G31	20 mbar 37 mbar	2.22 m^3/ h 1.64 kg/h	2.96 m^3/ h 2.18 kg/h	3.70 m^3/ h 2.73 kg/h	4.76 m^3/ h 3.51 kg/h	5.82 m^3/ h 4.30 kg/h
Flue diameter	mm	80 / 125	80 / 125	80 / 125	100	130
Combustion air diameter	mm				100	130
Electrical supply		230 volts / 1ph / 50Hz				
Running current	A	3.8	4.0	4.0	5.5	6.0
Weight	kg	97	97	105	120	147

Dimensional Data :

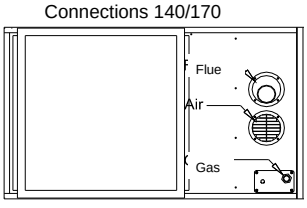




Connections 65/90/110



Connections 140/170



VRC	A	C	D	L	Ø F	Ø Air	Ø Gas
065	1040	460	1160	360	80 / 125		1/2
090	1040	460	1160	360	80 / 125		1/2
110	1040	510	1160	410	80 / 125		1/2
140	1040	570	1260	470	100	100	1/2
170	1040	700	1260	600	130	130	1/2



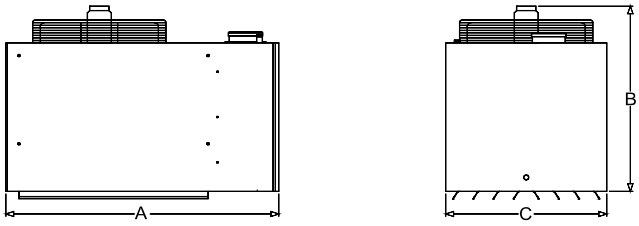
Model VRE

Models in the VRE range are room sealed and have an Axial fan and both horizontal and vertical double deflectors to assist with destratification

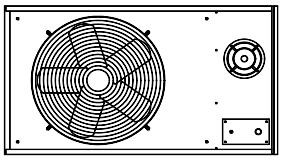
2-3 Technical Data VRE

TYPES		VRE090	VRE110	VRE170	VRE220
Heat Input	kW	28	35	55	71
Heat Output	kW	25,5	31,5	50	64,4
Efficiency	%	91.1	90.0	91.0	90.7
No of fans		1	1	1	1
Motor speed	Tr/m	900	900	1 400	1 400
Gas consumption @ 15 °C Gas consumption @ 50 °C	m^3/h	2 050 2 250	2 900 3 250	4 900 5 400	5 800 6 400
Delta T°	°C	36	32	30	32
Axial fan throw	m	25	30	40	40
Installation height mini/maxi	m	4 / 5	4 / 6	5 / 10	6 / 12
Gas rate @ 15°C Natural G20 Propane G31	20 mbar 37 mbar	2.96 m^3/h 2.18 kg/h	3.70 m^3/h 2.73 kg/h	5.82 m^3/h 4.30 kg/h	7.40 m^3/h 5.46 kg/h
Flue Diameter	mm	80 / 125	80 / 125	130	130
Combustion air diameter	mm			130	130
Electrical supply		230 volts / 1ph / 50Hz			
Running current	A	1.3	1.8	2.6	3.7
Weight	kg	82	90	127	145
Sound level @ 5m	dBa	40	41	51	51

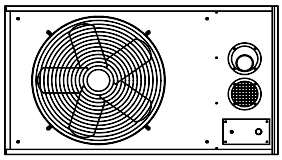
Dimensional Data



Connections 90/110



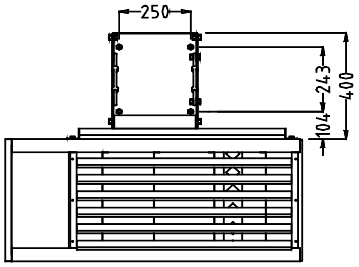
Connections 170/220

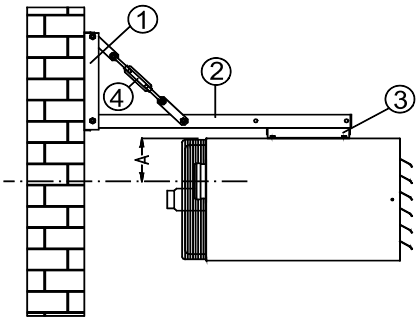


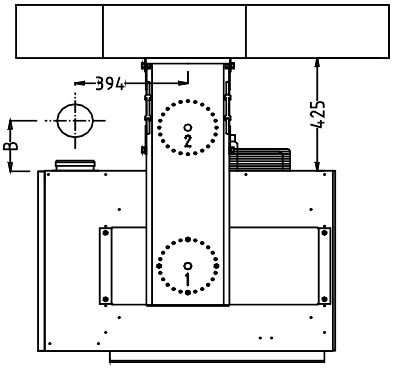
VRE	A	B	C	Ø Flue	Ø Air	Ø Gas
090	1040	820	460	80/125		1/2
110	1040	820	510	80/125		1/2
170	1040	840	700	130	130	1/2
220	1120	840	825	130	130	3/4

3– INSTALLATION OF HEATERS

3-1 Wall mounting installation for VRA 065 to 285 and VRC 065 to 110





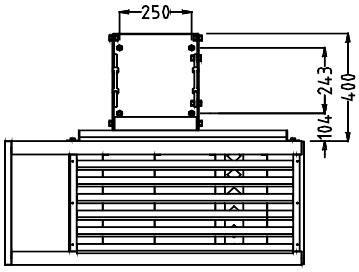


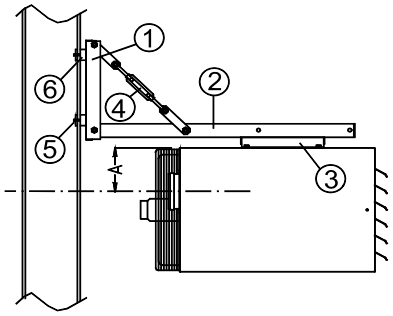
Warning ensure the wall is suitable to support heater weight

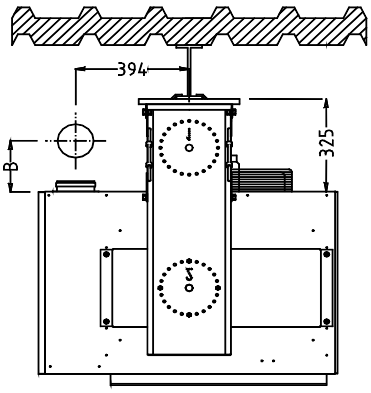
Flue Connection	VRA VRC 065		VRA VRC 090		VRA VRC 110		VRA 140		VRA 170	
Dimensions	B22	C32	B22	C32	B22	C32	B22	C32	B22	C32
A (mm)	160		160		185		200		250	
B (mm)	115	125	115	125	115	125	125	190	135	205

1- Mount plate (1) with suitable masonry bolts to the wall at the required height and level.
2- Fit plate (2) to plate (1) ensuring the plate is the correct way round see drawing below
NOTE there is one fitting for walls and one for girder support .
3- Connect the two turnbuckles (4) to plate (1) and adjust until level.
4- Fit plate (3) to top of heater
5- Lift heater in place and secure plate (3) to plate (2) adjust to required position

3-2 Girder mounting installation for VRA 065 to 285 and VRC 065 to 110





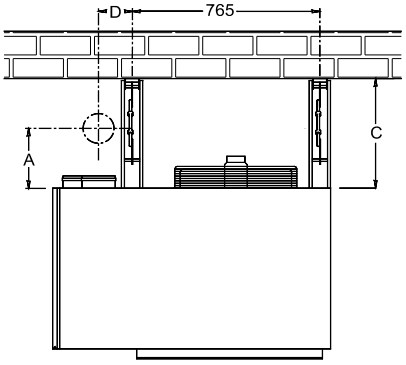


Warning ensure the girder is suitable to support heater weight

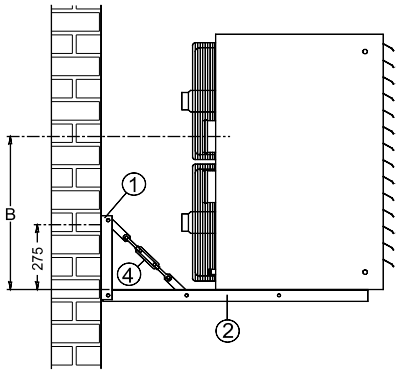
Flue Connection	VRA VRC 065		VRAVRC 090		VRA VRC 110		VRA 140		VRA 170	
Dimensions	B22	C32	B22	C32	B22	C32	B22	C32	B22	C32
A (mm)	160		160		185		200		250	
B (mm)	115	125	115	125	115	125	125	190	135	205

1- Fix the plate (1) to the girder using the adaptors (6) and bolts (5).
2- Fit plate (2) to plate (1) ensuring that it is the correct way round see drawing.
3- Connect the two turnbuckles (4) to plate (1) and (2) and adjust until level.
4- Fit plate (3) to top of heater
5- Lift heater in place and secure plate (3) to plate (2) adjust to required position

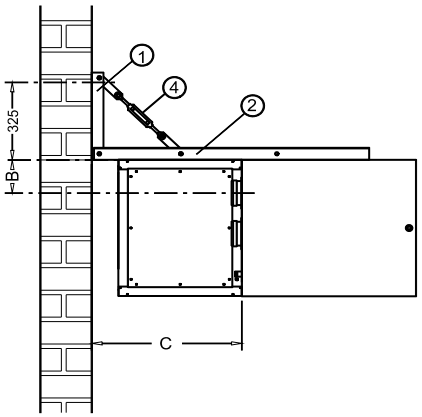
3-3 Installation for VRA 220 / 285 and VRC 140/ 170



4– VRA220/285



5– VRC 140/170



Warning Ensure support is adequate for heater

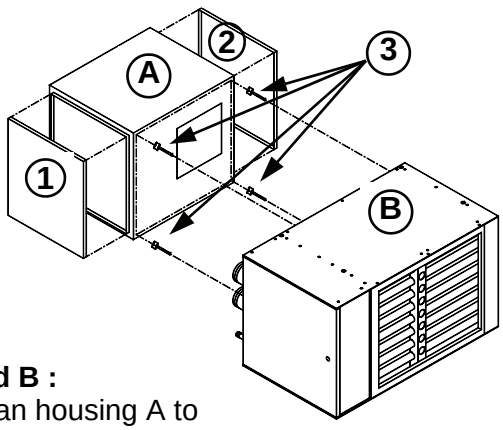
Flue	VRA220		VRA 285	
Connection	B22	C32	B22	C32
A (mm)	135	205	135	205
B (mm)	460		645	
C (mm)	460		460	
D (mm)	120		135	

VRC 065		VRC090		VRC 110		VRC 140		VRC 170	
B22	C32	B22	C32	B22	C32	B22	C32	B22	C32
115	125	115	125	115	125	125	190	135	205
160		160		185		200		250	
585		585		585		585		585	
105		105		105		105		105	

1– Mount plate (1) with suitable masonry bolts to the wall at the required height.
2- Fit plate (2) to plate (1)
3- 3- Connect the two turnbuckles (4) to plate (1) and adjust until level.
4- Fit plate (3) to top of heater
5- Lift heater in place and secure plate (3) to plate (2) adjust to required position.

4– ASSEMBLY OF VRC RANGE FAN HOUSING

A – Fan Housing
B - Heater Case



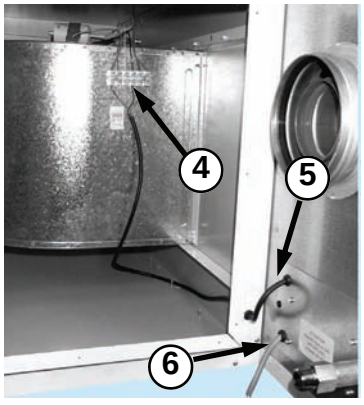
Pre assembly :
- Remove the panels (1 and 2) from the fan housing

Assembly A and B :
- Assemble the fan housing A to heater B, with the 4 screws M8 (3) supplied

Attention fit cable grommet , for the fan cable (5), as per photograph.

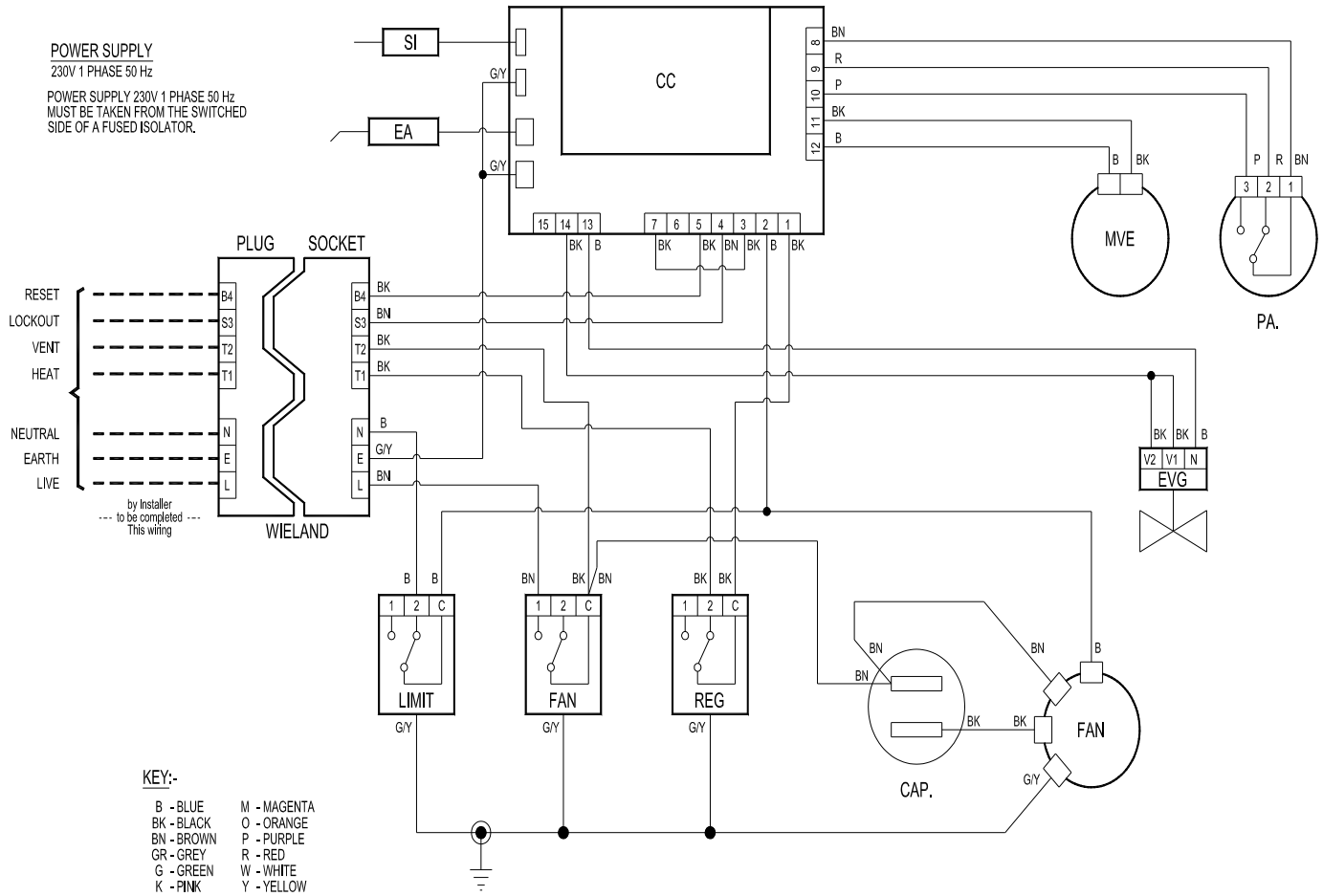
Electrical connection :
Pass the cable 5 through the grommet and wire in to the fan connector strip 4.

Reconnect the side panels (1) and (2) to the heater.



5– WIRING DIAGRAMS

5-1 Electrical Diagram VRA

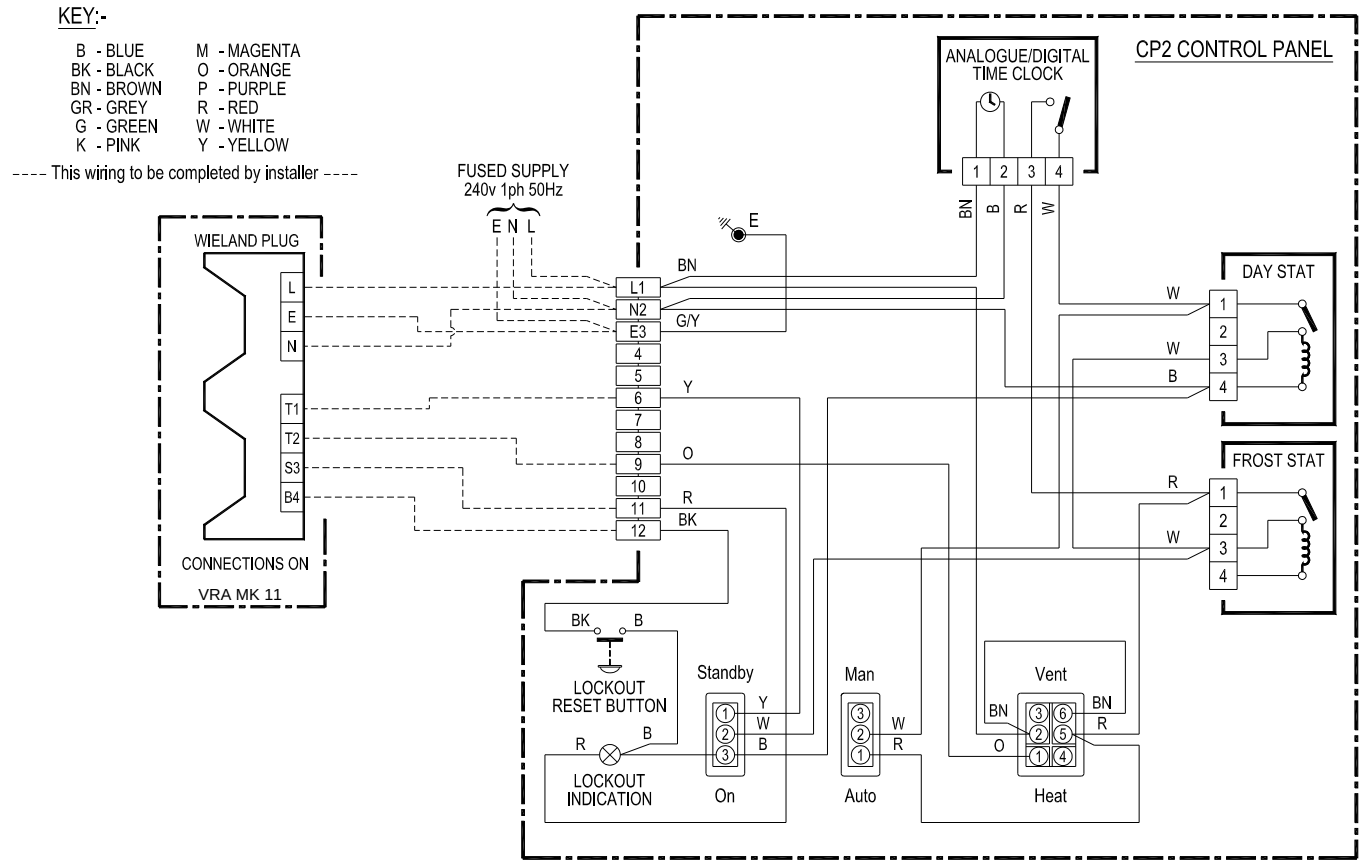


FAN	Fan
RFP	Panel
Limit	Limit stat manual reset
Fan	Fan stat
Reg	Control stat
CC	Control Box

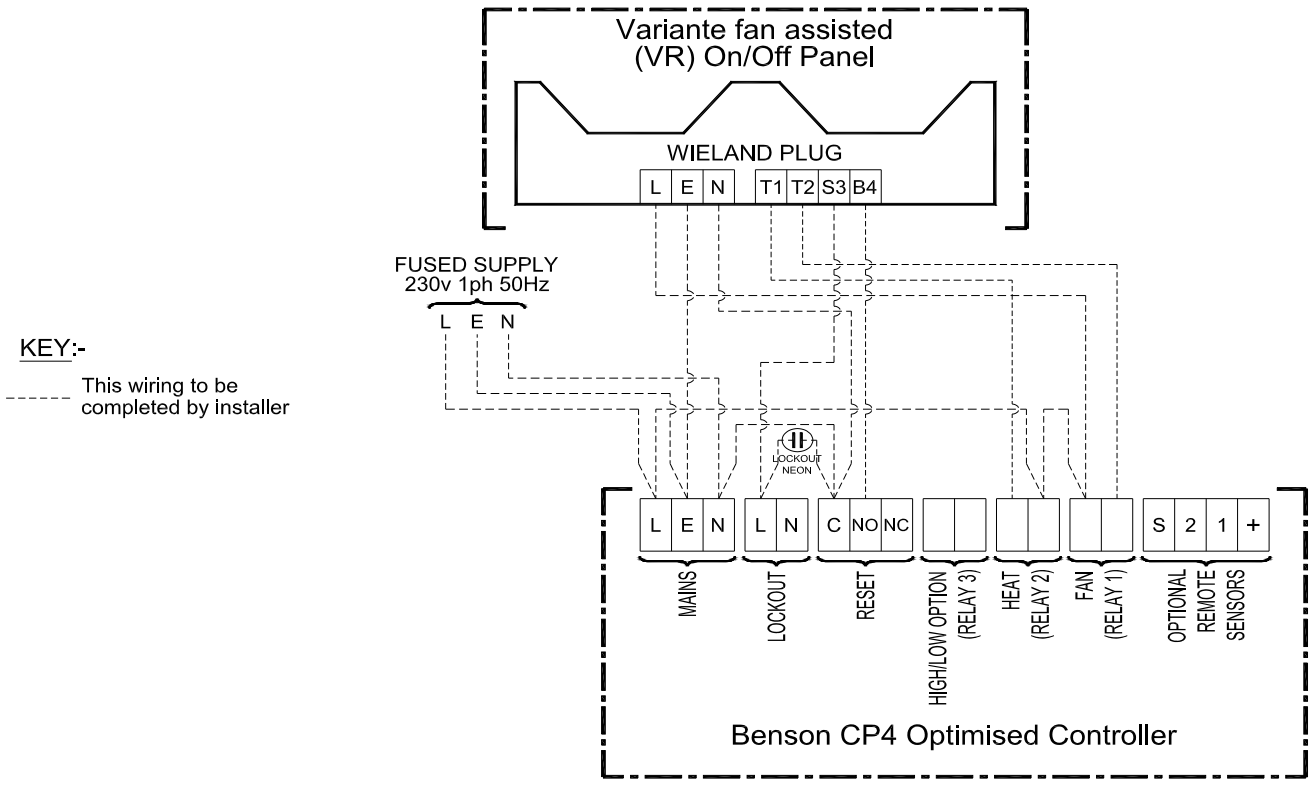
MVE	Flue venter
PA	Air pressure switch
SI	Ionisation probe
EA	Ignition electrode
EVG	Gas valve

WARNING EXTERNAL WIRING TO THE HEATERS MUST BE IN ACCORDANCE WITH ANY LOCAL NATIONAL AND EUROPEAN REGULATIONS AND MEET THE REQUIREMENTS OF .IEE. REGULATIONS

5-2 –Connections CP2— VRA Wiring diagram



VRA Remote connections CP4 (optional remote indication neon)

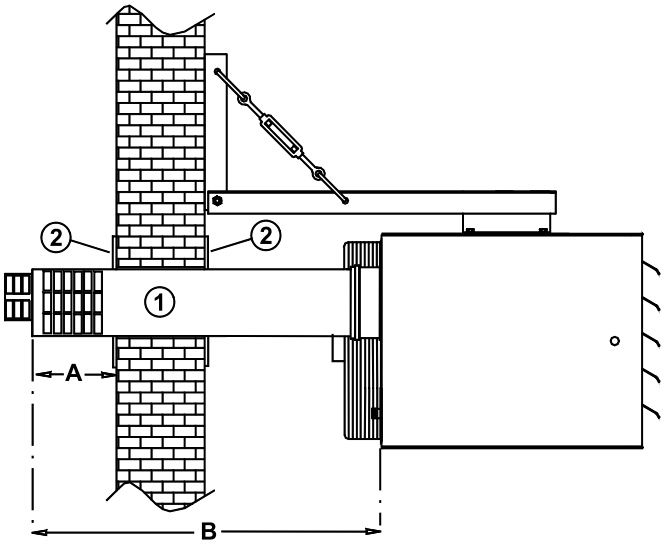


6– FLUE INSTALLATION

6-1 Recommended concentric horizontal flue connections for VRA 065/090/110

Example of a horizontal flue terminal out of the building

The flue is concentric allowing the flue gasses to pass out of the middle 80mm pipe with combustion air drawn along the 125mm outer pipe.
Comprises of a terminal pipe No 1 and 2 wall sleeves No 2. The minimum length the terminal extends through the wall is 200mm to 350mm
Dim A the overall length of the terminal when connected to the heater is 820mm Dim B
The flue can be extended by adding lengths and bends as required see accessories page 15

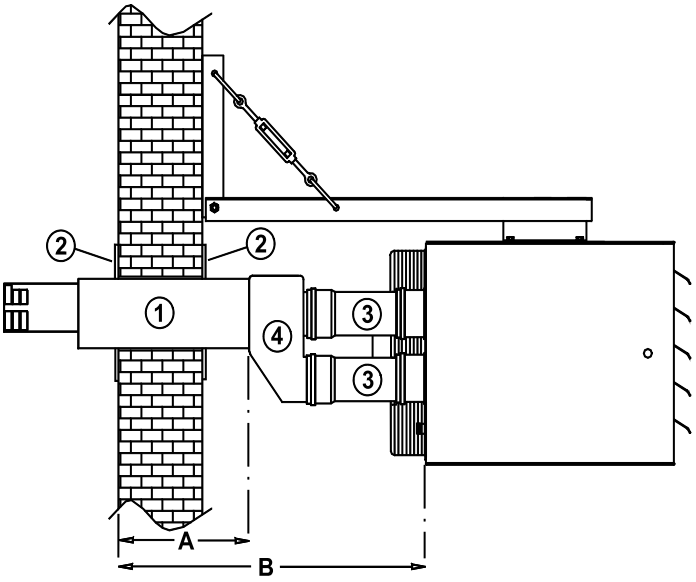


WARNING
The flue pipe must be properly supported and all joints sealed and made air tight, the maximum length for a horizontal flue must not exceed 6 meters overall length a 45 or 90 deg bend is equivalent to 1 meter of flue within the 6 meters

6-2 Recommended horizontal flue connections C12 –for VRA140/170/220/285

Example of a horizontal flue terminal out of the building

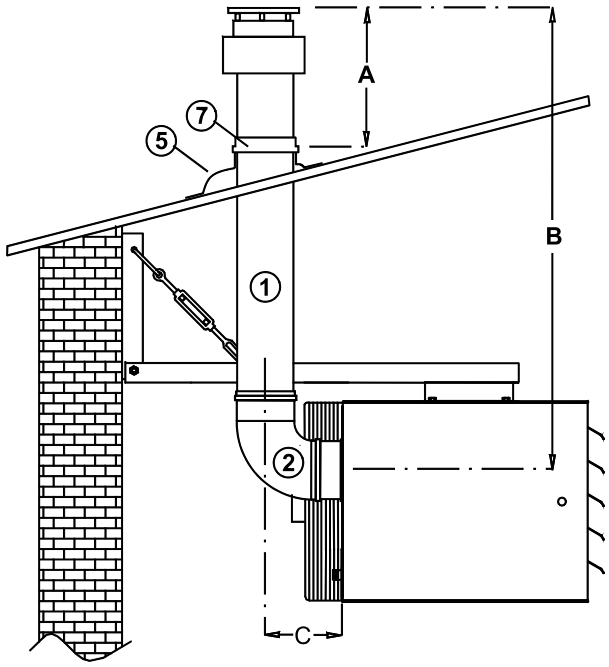
Flue(ø 100/100) for VRA140 and (ø130/130) for VRA170/220/285 Comprises of terminal (1) complete with concentric adaptor (4) and two wall plates (2).Extra lengths (3) 250/500/1000mm are available if required The diameter of the combustion pipes is 100/100 for the model VRA140 and 130/130 for the models VRA170/220/285.
The standard kits are for a maximum wall thickness of (A) 270 mm, and the length of the terminal connected to the heater is (B) 550 mm.
It is possible to shorten or lengthen the flue terminal with the range of accessories shown on page 15



WARNING
The flue pipe must be properly supported and all joints sealed and made air tight, the maximum length for a horizontal flue must not exceed 6 meters overall length a 45 or 90 deg bend is equivalent to 1 meter of flue within the 6 meters

6-3 Recommended vertical flue connections C32 - for VRA065/090/110

Example of a vertical concentric flue kit through the roof .
Flue **(ø 80/125)** comprises of a terminal pipe (1) and a 90° concentric elbow (2).
The roof seal (5) and a roof cravat (7) which slides over the seal The minimum length the terminal should extend through the roof is 250mm (A). The length of the terminal connected to the heater is 1195mm (B) the center line for the flue the rear of the heater (C) is 125 mm.
It is possible to shorten or lengthen the flue terminal with the range of accessories shown on page 15



WARNING
The flue pipe must be properly supported and all joints sealed and made air tight, the maximum length for a horizontal flue must not exceed 8 meters overall length a 45 or 90 deg bend is equivalent to 1 meter of flue within the 8 meters

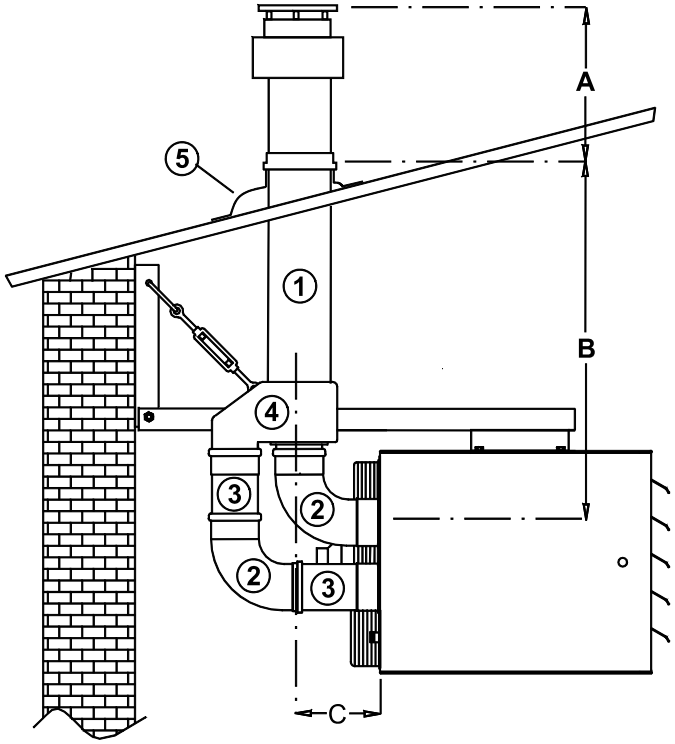
6-4 Recommended vertical flue connections C32 for VRA 140/170/220/285

Example of a vertical concentric flue kit through the roof .

Flue(ø 100/100) for VRA140
-1 Concentric terminal (1)
-3 Bend 90° 100 mm diameter (2)
-1 Pipe 250 mm x 100 mm diameter (3)

Kit ø 130/130) for VRA170/220/285
-1 Concentric terminal (1)
-2 Bend 90° 130 mm diameter (2)
-1 Bend 45° 130 mm diameter (not shown)
-1 pipe 250 mm x 130 mm diameter (3)
-1 concentric adaptor piece (4)

When longer flues are required a range of accessories are available see page 15.



WARNING
The flue pipe must be properly supported and all joints sealed and made air tight, the maximum length for a horizontal flue must not exceed 8 meters overall length a 45 or 90 deg bend is equivalent to 1 meter of flue within the 8 meters

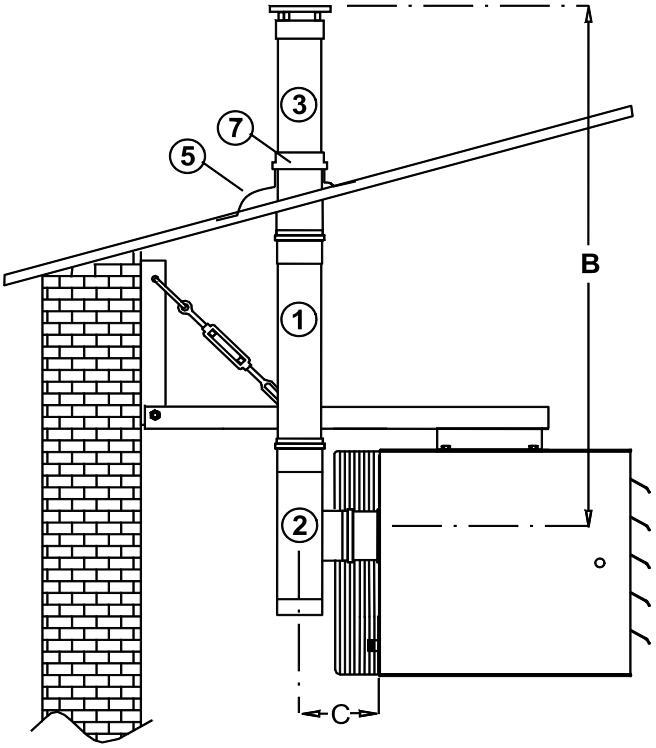
Dim A	545 mm	955 mm
Dim B	930 mm	1060 mm
Dim C	190 mm	205 mm

6-5 Recommended Vertical flue assembly - B22 - for -VRA065/090/110

Air for combustion is taken from within the room and products of combustion are discharged via a roof terminal
Comprises of 1 one roof terminal 1 X 90° bend (2)
Ensure that the terminal is a minimum of 600mm above the apex of the roof
Dimension (B) will be 2150 mm, dimension (C) 125 mm.

The flue can be extended by adding lengths and bends as required see accessories page 15

Warning ensure that adequate provision has been made for combustion air when using this type of installation .minimum combustion air requirement is 100m^3/ h per heater



WARNING
The flue should always be vertical where possible and when bends are required a maximum angle of 45 deg elbows only should be used
If the installation requires more than 2 meters of the flue pipe outside then insulated flue should be used

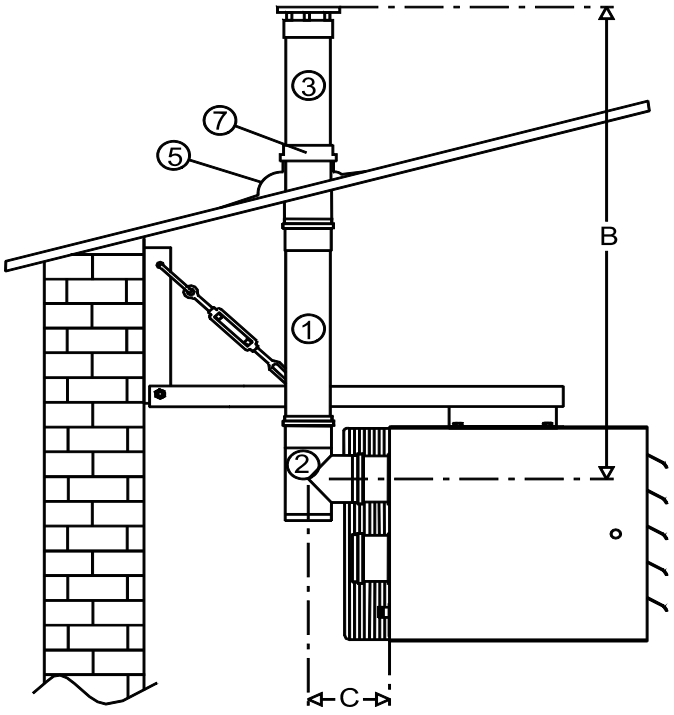
6-6 Recommended Vertical flue assembly - B22 - for VRA140/170/220/285

Air for combustion is taken from within the room and products of combustion are discharged via a roof terminal. Ensure that the terminal is a minimum of 600mm above the apex of the roof
Flue **(ø100) and (ø130)**) One roof terminal (3) x 90° bend (2)

For VRA 140 dimension (B) 2150 mm, dimension (C) 125 mm.
For VRA 170/220/285 dimension (B) 2150 mm, dimension (C) 135 mm.

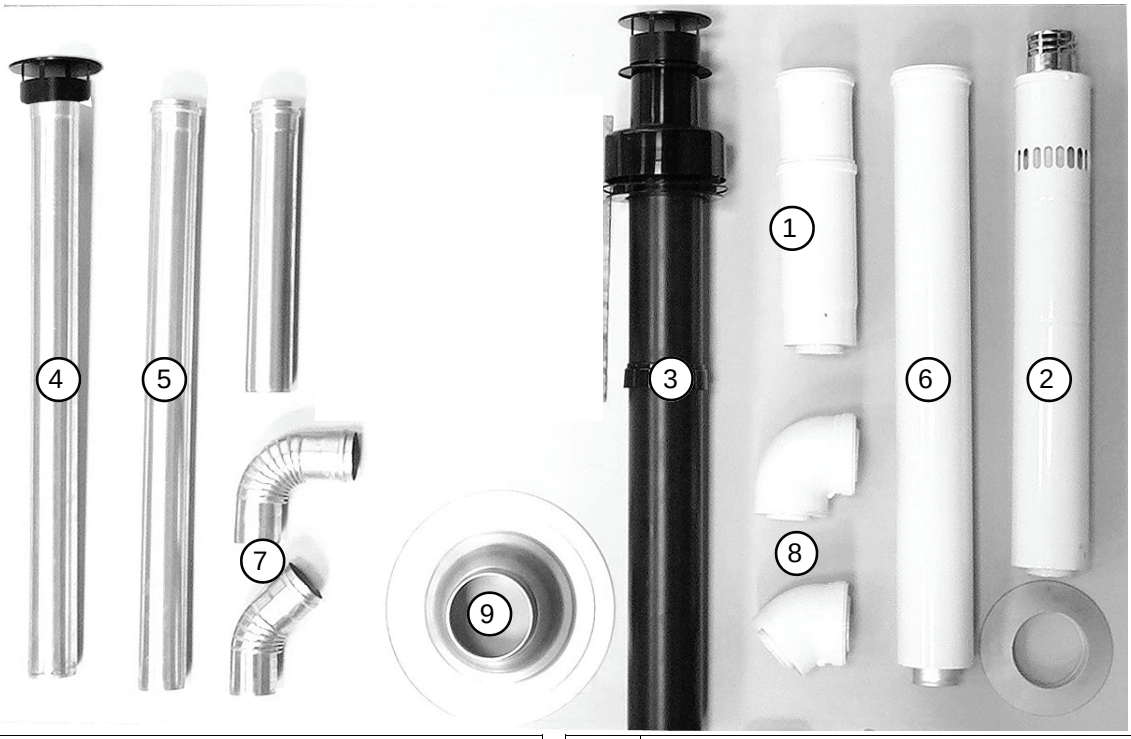
The flue can be extended by adding lengths and bends as required see accessories page 15

Warning ensure that adequate provision has been made for combustion air when using this type of installation. minimum combustion air requirement is 100m^3/ h per heater



WARNING
The flue should always be vertical where possible and when bends are required a maximum angle of 45 deg elbows only should be used
If the installation requires more than 2 meters of the flue pipe outside then insulated flue should be used

6-7 Flue accessories for VRA 065/090/110



1	Telescopic concentric pipe
2	Horizontal terminal
3	Vertical terminal
4	Single skin terminal
5	Single skin pipes 250 / 500 / 1000 mm

6	Concentric pipes 500 / 1000 mm
7	Single skin bends 45° and 90°
8	Concentric bends 45° and 90°
9	Roof flashing

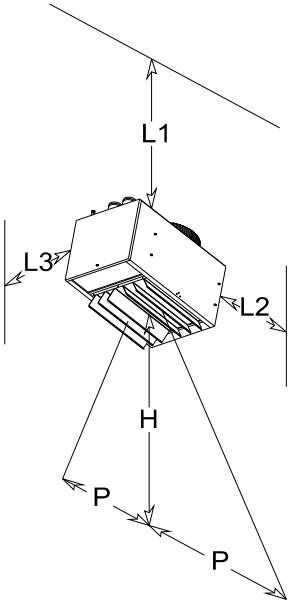
6-8 Flue accessories for VRA 140/170/220/285



2	Horizontal terminal
3	Vertical terminal
4	Single skin terminal
5	Single skin pipes 250 / 500 / 1000 mm

6	Concentric pipes 500 / 1000 mm
7	Single skin bends 45° and 90°
8	Concentric bends 45° and 90°
9	Roof flashing

7– VRE RANGE DATA



7-1 Fixing height dimensions for VRE Range

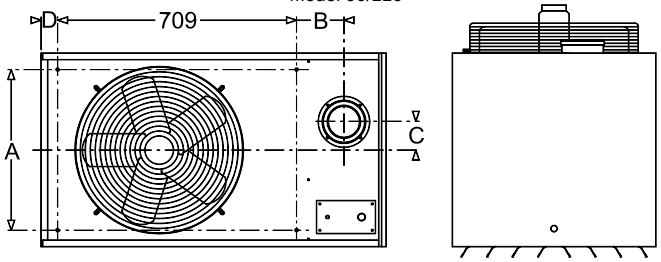
The VRE Models are suspended using 8mm drop rods from suitable girders or pearlings

The heaters should be installed as per the dimensions recommended below

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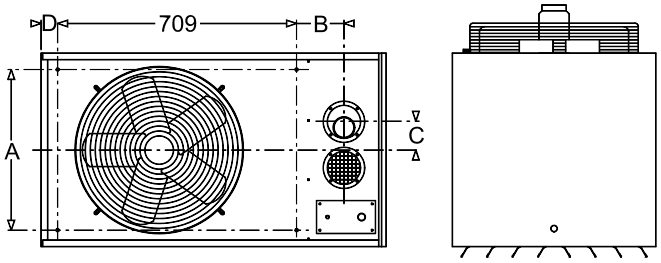
Types VRE		090	110	170	220
L1	m	0,45	0,45	0,45	0,50
L2	m	1	1	1	1
L3	m	1	1	1	1
Heater (mini / maxi)	m	4 / 5	4 / 6	5 / 10	6 / 12
P Throw (at H mini)	m	10 + 10	14 + 14	17 + 17	19 + 19

Model 90/110



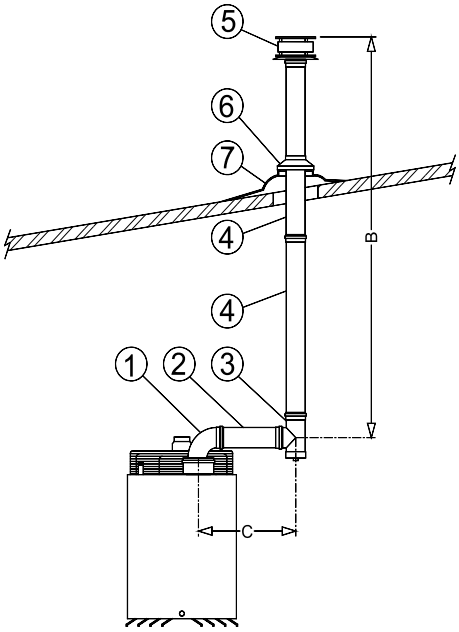
VRE	090	110	170	220
A	380	430	620	740
B	110	110	110	120
C	70	70	100	50
D	65	65	65	65

Model 170/220



7-2 Recommended vertical flue connection - B22 - for VRE Range

Air for combustion is taken from within the room and products of combustion are discharged via a roof terminal
Ensure that the terminal is a minimum of 600mm above the apex of the roof
Flue (ø 80) and **(ø 130)** The comprise of one sealed elbow 90° (1), one sealed pipe 0,5 m (2), one sealed tee piece (3), two x one meter pipes (4) rain cap (5).
The minimum height from the heater to the terminal dimension (B) is 2150 mm, dimension (C) 630 mm for VRE 090/110 and dimension (C) 750 mm for VRE 170/220
The flue can be extended by adding lengths and bends as required see accessories page 15
Warning ensure that adequate provision has been made for combustion air when using this type of installation. minimum combustion air requirement is 100m^3/ h per heater



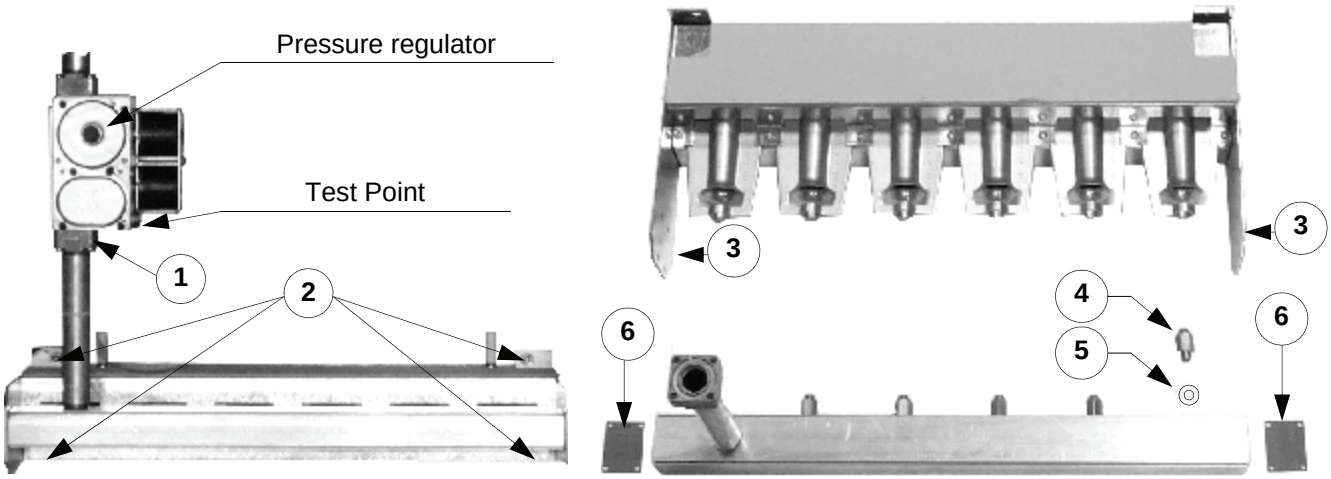
WARNING
The flue should always be vertical where possible and when bends are required a maximum angle of 45 deg elbows only should be used
If the installation requires more than 2 meters of the flue pipe outside then insulated flue should be used

8– GAS

8-1 Gas conversion

The Benson Variante Range are equipped with an atmospheric multi injector type burner for natural or propane gas.
It is a requirement that only qualified and competent personnel may undertake installation,
To convert burner for operation on either Natural or Propane Gas
1– Isolate the Electrical and Gas supplies
2– Open the door and disconnect the gas pipe from the regulator (Fig1) and undo the screws (Fig.2) that secure the burner bar assembly into the heater and remove.
3 - Undo the screws (Fig 3) and remove burner bar from the assembly.
4 - Select the correct nozzles for either Natural or Propane gas (see table below).
5 - Replace the injectors (Fig 4) ensuring that the seals (Fig 5) are also replaced .
6- Reassemble the burner bar onto the burner assembly using new gaskets (Fig 6)
7 –Refit the burner assembly to the heater and reconnect the gas valve ensuring a good seal on all joints.

Types	Settings for Natural Gas G20						Settings for Propane G31		
	Pressure Regulator	No Nozzles and Size	Air Disc size				Pressure Regulator	No Nozzles and Size	Air Disc size
065	9 mbar	5 x AL 1.90	40				25 mbar	5 x AL 1.10	40
090	9 mbar	5 x AL 2.20	27				25 mbar	5 x AL 1.30	27
110	9 mbar	6 x AL 2.20	30				25 mbar	6 x AL 1.30	30
140	9 mbar	8 x AL 2.20	No Disc				25 mbar	8 x AL 1.30	No Disc
170	9 mbar	10 x AL 2.20	No Disc				25 mbar	10 x AL 1.30	No Disc
220	9 mbar	12 x AL 2.20	No Disc				25 mbar	12 x AL 1.30	No Disc
285	9 mbar	16 x AL 2.20	27				25 mbar	16 x AL 1.30	30



WARNING : Disconnect Electric and Gas supply before carrying out the above procedure

8-2 Gas supply

WARNING 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 pipe 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 .
Consideration should be given to the pressure drop on single and multi heater installations and the effect they may have on other plant sharing the supply.
As there have been recorded instances of the deposition of copper sulphide dust within the valves and orifices of gas appliances as a direct result of a reaction between the hydrogen sulphide contained in some natural gasses and copper pipe we recommend that the heater(s) should not be connected to any natural gas pipe distribution system which utilizes copper pipework, including final connections. Instead steel pipework should be used throughout.
In the event that it is impractical to use steel pipework or where installers are obliged or insist on using elements of copper pipework within the installation then we strongly recommend that the gas supplier be consulted as specific conditions and requirements may be necessary.
Only qualified and competent personnel are allowed to undertake the installation, commissioning, and servicing of Gas Heaters
Prior to installation the supply characteristics (gas type and pressure) must be checked to ensure that they are in accordance with the data plate on the heater. The gas supplier should check that the meter and service connection to the heater are capable of delivering the required volume of gas, thereby ensuring that the minimum burner pressure can be achieved. If it is necessary to fit a gas pressure booster, the controls must include a low pressure cutoff switch which must be fitted on the supply / inlet side of the booster. It is also a requirement that the gas supplier is advised prior to the installation or fitting of the booster.
Each heater supply must be fitted with a separate isolating cock positioned adjacent to and upstream of the union which must be sited outside the heater.
The isolating cock should be of the 90^0 turn type and should be clearly marked OPEN / CLOSED
it should also be installed so as to fall to the closed position
An approved gas jointing compound must be used on all joints and unions and the system purged and tested for soundness prior to final connection
The connection to the heater can be made by way of either an approved flexible coupling or rigid connection . Threaded connections must comply to ISO 288/1 or ISO 7/1 further information concerning accepted European practice is detailed in BS EN1020 1998.

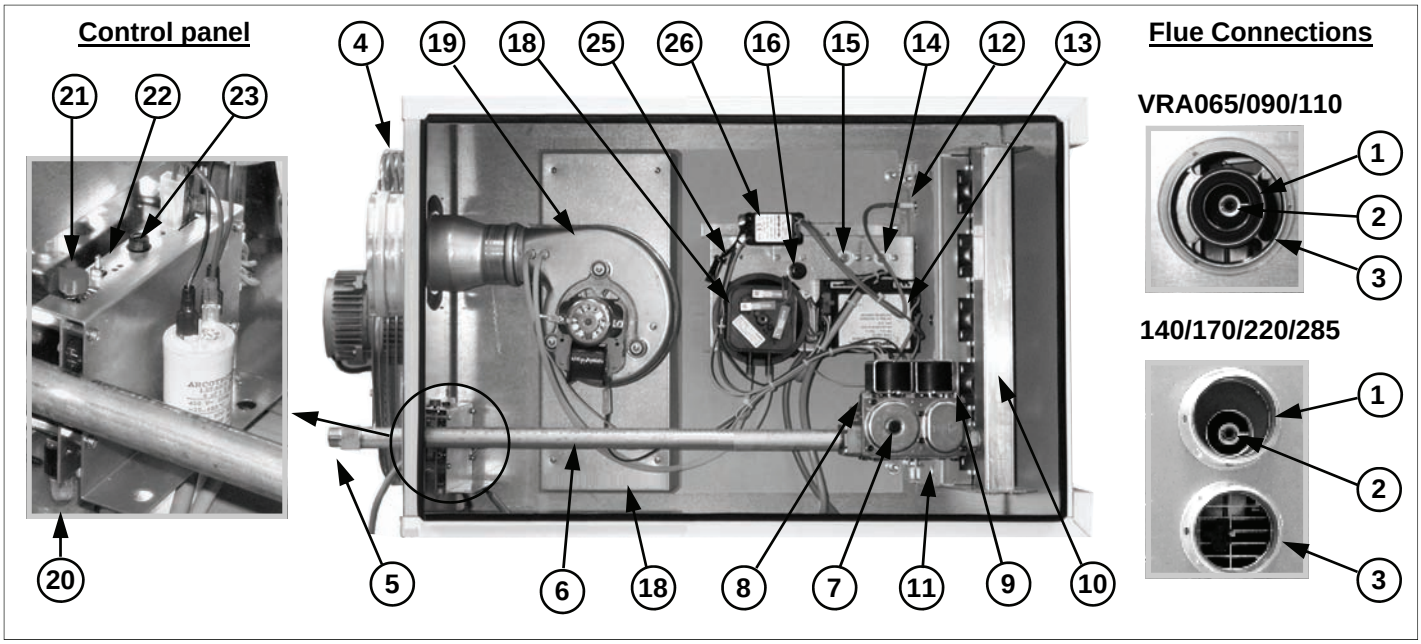
The diameter of the pipework from the isolating cock to the burner must not be less than the diameter of the connection into the heater

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

9- SERVICE

Warning It is a requirement that only qualified and competent personnel may undertake servicing and commissioning
On completion of service details should be entered in the heater log book

9-2 Heater Controls



Nº	Description	Parts List						
		VRA065	VRA090	VRA110	VRA140	VRA170	VRA220	VRA285
1	Flue spigot	ATE132	ATE132	ATE132	ATE004	PF328	PF328	PF328
2	Air disc plate	ATE167	ATE168	ATE169	———	———	———	———
3	Combustion spigot	———	———	———	ATE004	PF328	PF328	PF328
4	Axial fan VRA VRE	ATE121	ATE123	ATE192	ATE119	ATE117	ATE108	2xATE119
4	Centrifugal fan VRC	ATE065	STE061	ATE061	ATE062	ATE063	———	———
5	Gas supply size 1/2	PBMW59	PBMW59	PBMW59	PBMW59	PBMW59	FAB0100	FAB0100
6	Gas pipe	GAZ0101	GAZ0101	GAZ0101	GAZ0101	GAZ0101	GAZ0101	GAZ0101
7	EV Gas regulation valve	PB507	PB507	PB507	PB507	PB507	GAZ0008	9EL0070
8	Inlet pressure test point	———	———	———	———	———	———	———
9	Head pressure test point	———	———	———	———	———	———	———
10	Gas manifold	SE0410	SE0419	SE0401	SE0429	SE0438	SE0447	
11	Electrode	ATE021 + ATE024						
12	Ionisation probe	ATE022 + ATE024				ATE022 + ATE025		
13	Burner safety relay	ATE018	ATE018	ATE018	ATE018	ATE018	ATE018	ATE018
14	Regulating thermostat (65°C)	ATE146	ATE146	ATE146	ATE146	ATE146	ATE146	ATE146
15	Fan thermostat (30 or 35°C)	ATE146	ATE146	ATE146	ATE146	ATE146	ATE146	ATE146
16	Limit (100°C)	ATE147	ATE147	ATE147	ATE147	ATE147	ATE147	ATE147
17	Air pressure switch	ATE149	ATE149	ATE149	ATE149	ATE149	ATE149	ATE149
18	Exhaust manifold	SE0411	SE0420	SE0403	SE0430	SE0439	SE0448	
19	Flue venter	ATE002	ATE002	ATE013	ATE013	ATE013	ATE112	ATE113
20	Control unit (fault finding)	See page 20						
21	Burner reset	———	———	———	———	———	———	———
22	Manual Auto Switch	———	———	———	———	———	———	———
23	Fuse 5 A	———	———	———	———	———	———	———
24	Wire pilot receiver	ATE148	ATE148	ATE148	ATE148	ATE148	ATE148	ATE148
25	Fan thermostat High / Low (40 to 45°C)	ATE146	ATE146	ATE146	ATE146	ATE146	ATE146	ATE146
26	Transformer							

10-MAINTENANCE

Warning It is a requirement that only qualified personnel are allowed to carry out installation commissioning or servicing. Before commencing any maintenance or servicing work the heater must be shut down and allowed to cool, and have the gas and electric supplies to it turned off.

Description	**Maintenance operation**
Heater	Ensure all switches and controls are functioning correctly.
Heat exchanger and Flue Venter	Remove burner assembly flue venter and heat exchanger manifold plate. Clean with compressed air re assemble and test all joints for soundness use an approved leak detection spray on all gas lines
Main Fan	Clean with compressed air
Flue pipes	Inspect and clean if required
Heater casing and grilles	Inspect and clean with damp cloth
Nozzle manifold	Remove burner assembly inspect and clean
Injectors	Inspect injectors clean or replace as required
Ionisation probe and electrodes	Inspect and clean replace as required
Gas filter	Remove and clean with compressed air replace as required .

11- RECOMMENDATIONS END USER

Precautions

- Ensure flue pipes are free from obstruction.
- Unauthorised modifications to the appliance, or departure from the manufacturers guidance on intended use, or, installation contrary to the manufacturers recommendations may constitute a hazard.
- Changing the gas type on the heater will require a nozzle change and the burner re tested by a suitably qualified engineer

Fault Diagnosis

FAULT	**SOLUTION**
Smell of gas	***VENTILATE AREA isolate gas supply Do not operate electrical devices until area has been properly ventilated***
Burner at lockout *(warning light on)*	***Investigate the cause, Low gas pressure, Faulty ignition Faulty probe Faulty solenoid*** ***Reset the switch***

12– FAULT FINDING

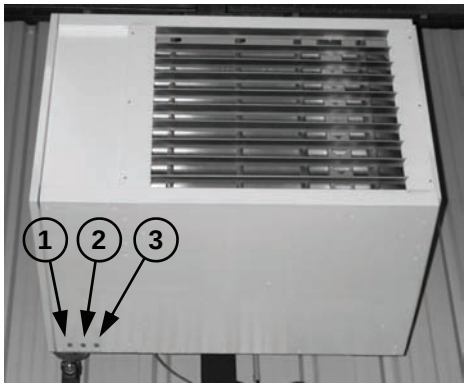
Fault	Cause	Solution
Heater will not run	- No power - No Demand	-Check power supply / Isolator / On off Switch -Check thermostat setting
Limit stat trips	-Main fan motor faulty -Fan obstructed/dirty Discharge blocked Excessive gas pressure -Thermostat failure.	-Replace fan motor -Clean fan -Clear blockage -Check gas pressure -Replace stat
Ignition takes place the heater lights The control box locks out (Lockout lamp illuminated)	-Incorrect electrical connection -Faulty gas valve -Faulty control box -Ionisation probe failure -Air in gas pipework -No gas	- Rewire correctly - Replace - Replace -Check connections / replace probe -Purge Gas line -Check gas pressure
Heater locks out during operation (Lockout lamp illuminated)	-Gas pressure failure -Probe failure -Power loss	-Check pressure -Reset the control box -Check electrical connection
Main fan runs before the unit is at temperature	-Fan Thermostat	-Incorrect fan thermostat setting Ensure stat is set to 35 degrees
Insufficient heat output	-Bad thermostat position -Incorrect thermostat setting -Insufficient gas pressure -Incorrect or faulty injectors	-Move thermostat -Reset thermostat settings -Check heater head pressure is sufficient -Check injectors replace if faulty.

External indication lights

1 - Fault indication

2 - Power indication

3 - Lockout indication





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Benson Heating is a Division
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