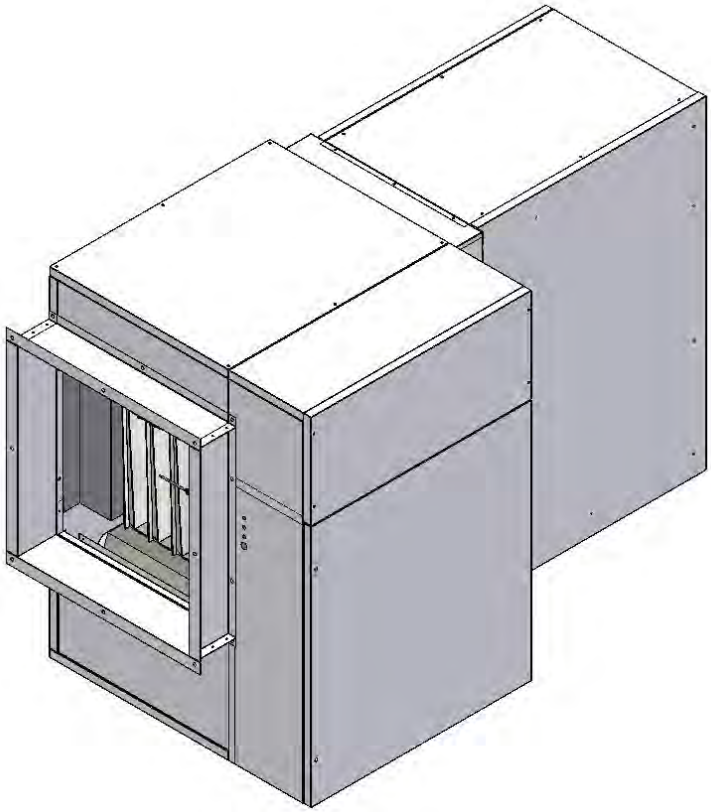
Gas fired room sealed unit heaters

TECHNICAL INFORMATION, ASSEMBLY INSTRUCTIONS, USE AND MAINTENANCE

RS/UHC



CE

BENSON

BENSON HEATING
LUDLOW ROAD
KNIGHTON
POWYS,
LD71LP U.K.

October 2002

Benson Heating is a Division of Benson Climate Systems Ltd

COMPLIANCE NOTICES

The Benson RS/UHC 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 RS/UHC 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 RS/UHC Heater range subject to agreement from The Notified Body.

Contained within the text of the manual, the words '**Caution**' and '**Warning**' are used to highlight certain points.

Caution is used when failure to follow or implement the instruction(s) can lead to premature failure or damage to the heater or its component parts.

Warning is used when failure to heed or implement the instruction(s) can lead to not only component damage, but also to a hazardous situation being created where there is a risk of personal injury.

RANGE

Notified Body PIN Reference is 0694BN3750

Type	*Model*	*Code*
1	**RS/UHC 80**	**3NAGBCR026**
2	**RS/UHC 105**	**3NAGBCR036**
3	**RS/UHC 140**	**3NAGBCR046**
4	**RS/UHC 200**	**3NAGBCR066**
5	**RS/UHC 260**	**3NAGBCR086**
6	**RS/UHC 325**	**3NAGBCR106**

GUARANTEE

The heater is supplied with a 2 year warranty on all parts.
In addition to this there is also a 10 year time related warranty on the combustion chamber.
The warranty commences from the date of dispatch from the manufacturer, and is subject to the terms detailed within the 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 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).

Ensure that the heater is able to operate within the parameters shown on the data plate and the technical data within the manual.
Incorrect gas settings may lead to condensation within the combustion if to low, and overheating if to high both will cause damage to the heat exchanger.

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.

INDEX

DESCRIPTION OF EQUIPMENT

Heat exchanger

- Stainless steel construction easily accessible for inspection and cleaning and maintenance operations.
- Patented exchange elements made in stainless steel modular sections with large surface area, trapezoidal in section with swirl impressions for which give thermal yields of over 90%. The exchange elements have no welded joints or seams near to the burner flame so as to avoid exposure of any weak points.

Flue outlet with integral flue venter to assist dispersal of combustion gasses

External casing

Encloses all controls giving a good aesthetic appearance and streamlined look whilst allowing for easy inspection.
The casing consists of removable panels d also includes:
A burner compartment which is totally sealed off, with an inspection door;
Radiant heat insulation on the surfaces closest to the heat exchanger;
Outlet grille for directing the warm air complete with individually movable horizontal and vertical fins.

Fan assembly

One or two centrifugal fans operated by a single electric motor via pullys and belts the motor pulley is adjustable to give effective cooling of the combustion / heat exchanger .
The position of the fan(s) produce greater effective cooling of the combustion chamber, optimising the heat exchange and avoiding overheating.

Control and protection equipment

This is electronic with ionisation flame detection and ignition controls.
The equipment controls and monitors the operation of the burner in the following sequence.
Checks the differential pressure switch operated by the flue venter is in the closed position and the flue venter is working;
Checks the air temperature of the combustion chamber (below 100ºC)
Opens the gas solenoid valve;
Starts burner ignition;
Detects flame signal from flame probe and allows normal heater operation.
Failure in any of the above sequence will result in the control box shutting the gas valve and stopping the heater.
The Heater will go to lockout and can be only be reset manually by pressing the red light on the front of the equipment.

Gas solenoid valve

The multifunctional gas valve
consists of:

- Safety solenoid valve
- A regulatory solenoid valve
- A pressure regulator
- A gas filter

Atmospheric multigas burner assembly

Consisting of:

- Galvanised steel manifold
- Visual monitoring aperture for the
- electrodes and flame observation
- 3 or 6 stainless steel burner bars
- Ignition and Detection electrodes,

Note: the type 4-5-6 are equipped with two gas manifolds, each manifold has an ignition electrode.

Control and safety thermostat

The heater is controlled by three thermostats pre set to the following:

LM Limit thermostat (100°C)

Capillary type. Manual Reset
Act as a safety device and shuts down the burner if the heater goes to overheat. The yellow light will flash when in overheat. The LIMIT thermostat is reset by the removal of the plastic cap situated on the control panel inside the heater, and manually pressing the reset button, after first ensuring that the fault has been rectified. (calibrated at 100°C). Replaced cap after resetting thermostat.

TR Regulatory thermostat (0 – 90°C)

Capillary type. Automatic reset.
The thermostat monitors the temperature of the airflow and will shut down the burner if the set level is exceeded (calibrated at 70°C). Once the fan has sufficiently cooled the heat exchanger, the burner will automatically relight. The yellow indication light will flash untill the burner relights. If this fault persists the cause should be investigated.

SND Control probe (0 – 40°C)

Connected in series with the thermostat TR. The probe will start the fan when the temperature reaches 30°C (approximately 30 seconds from burner ignition). When the desired room temperature is reached and the burner shuts down, the probe will allow the fan to run for approximately 3-4 minutes untill the heat exchanger has cooled sufficiently.
The probe also monitors the operation of the TR thermostat and if a fault is detected will change the yellow flashing light to a continouson light. In addition to this the SND probe monitors the temperature of the return air and will switch off the fan prior to the 3-4 minute run on time if the heat exchanger has cooled sufficiently (this avoiding cold air flow from the heater).

Differential air pressure switch

This switch will shut the gas valve if the flue venter fails or there is an obstruction in the flue, or in the air inlet preventing the flue venter from operating.

Flue venter

This consists of a centrifugal fan which
Is run by an electric motor with self-cooling rotor the cooling air is supplied through a duct pipe situated in the axial fan air flow

Indication lights

These consist of three different coloured lights on the front of the heater:

- **Green light –** indicates normal working. Illuminates when the gas solenoid valve opens
- **Yellow light –** indicates the operation of the LM, TR and SND thermostat.
- **Red light -** to indicate lockout of the heater by the control circuit failure.

Reset button to reset the lockout

Flue spigot

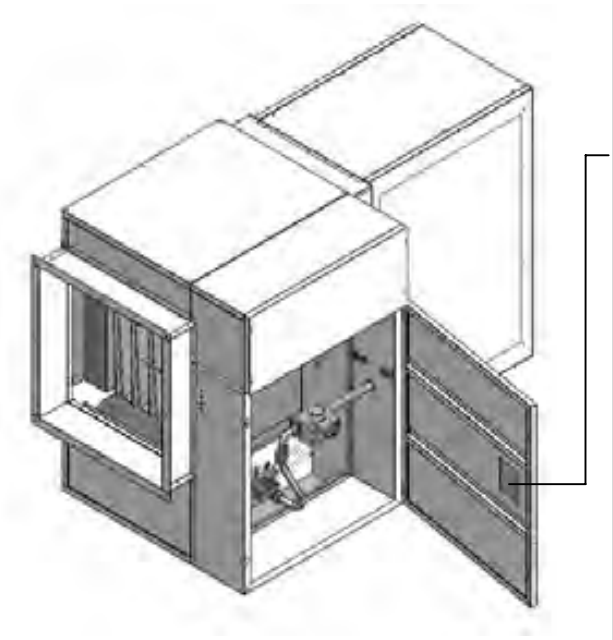
A flue spigot (100mm) is situated at the rear of the heater for connection of flue pipes.

Combustion air spigot

A combustion air spigot (100/150mm) with a safety mesh of less than 16 mm Ø on the rear of the heater allow for connection of combustion air pipes.

IDENTIFICATION

⚠ If the technical data is lost or damaged ask Benson Technical Dept. for a duplicate.



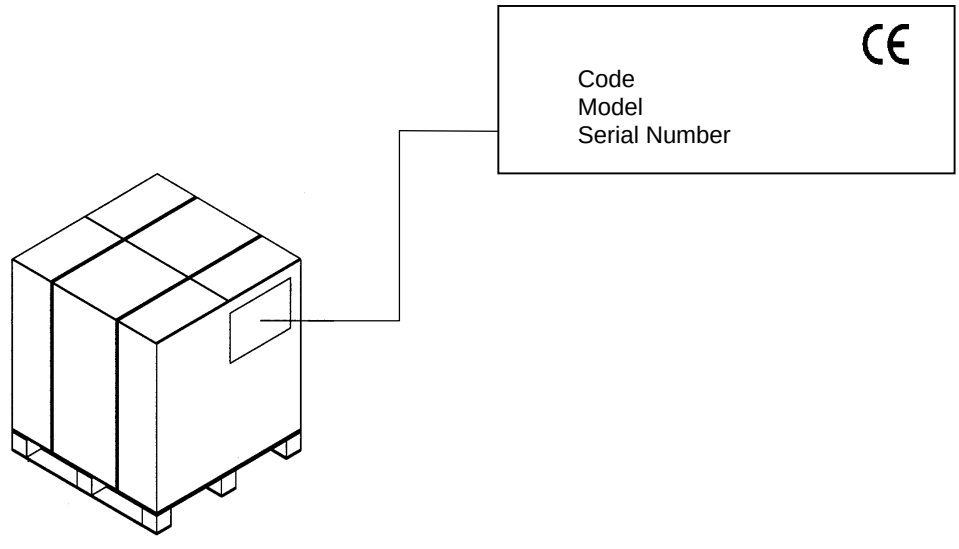
Manufacturer CE

AIR HEATER

Model			
Serial Number			
Country		PIN	
Category		Code	
Type		Year	
Nominal heat INPUT			kW
Nominal heat OUTPUT			kW
Air Flow (+15°C)			m³/h
Electrical Supply			
Electrical power			W
Protection rating			
GAS TYPE			
Supply pressure	mbar		
Nozzle pressure	mbar		
Nozzle diameter	mm		
Gas consumption	m³/h		

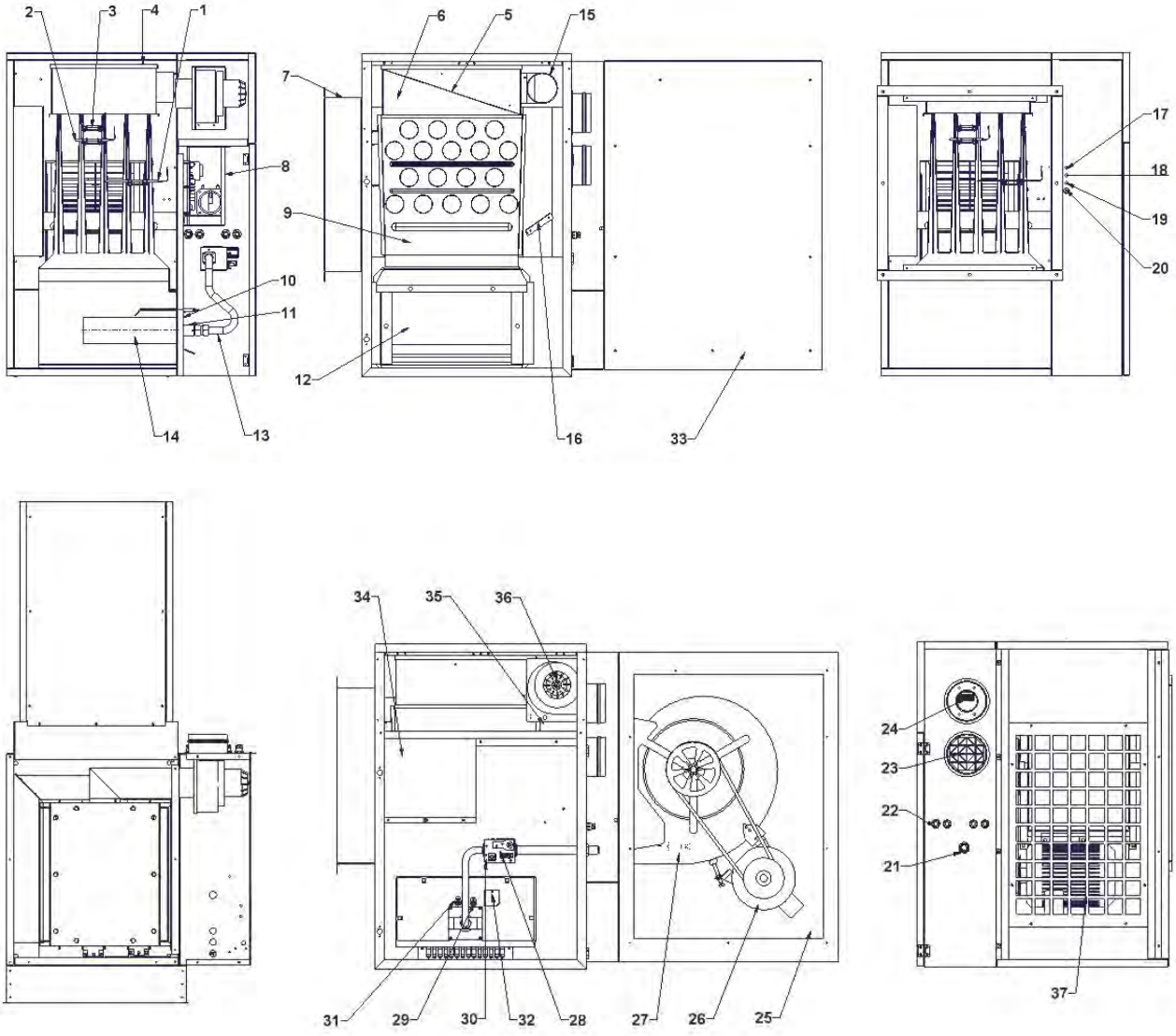
APPLIANCE PRESET FOR G20 NATURALGAS

Packing label position



DESCRIPTION

Type 1÷4

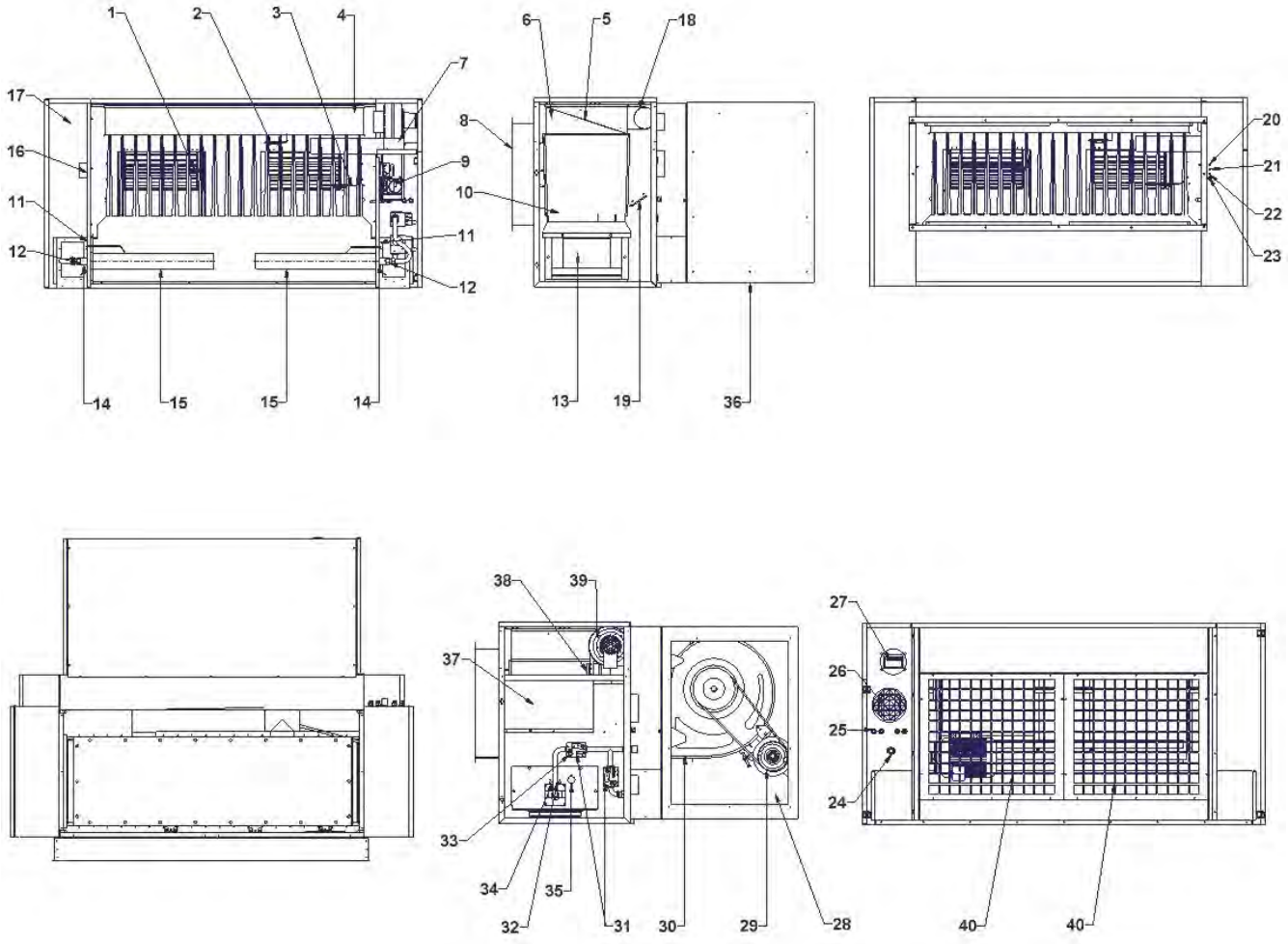


NOTE:

- **Heaters type 1, 2, 3 have a single burner manifold.**
- **heaters type 4 have two burner manifolds**

1. Regulation thermostat SND
2. FAN thermostat TR
3. LIMIT thermostat LM
4. Flue venter inspection door
5. Flue pipe
6. Flue manifold
7. Outlet Grille
8. Controls compartment
9. Heat exchanger
10. Burner plate insulation
11. Gas injector
12. Combustion chamber
13. Gas manifold
14. Burner bars
15. Air intake for flue venter cooling
16. Deflector
17. Green power on light
18. Yellow limit indication light
19. Red light/button lockout reset
20. Lockout reset
21. Gas inlet connector
22. Electrical connections
23. Combustion intake air spigot
24. Flue spigot
25. Inlet casing
26. Fan Motor
27. Centrifugal Fan
28. Gas Solenoid valve
29. Ignition electrode
30. Gas pressure manifold test nipple
31. Flame detection electrode
32. Flame check aperture
33. Door
34. 'Limit' thermostat release button
35. Differential pressure switch connection tube
36. Flue venter

Type 5÷6



NOTE:

- **Heaters type 5 are supplied with 2 opposing burner manifolds**
- **heaters type 6 are supplied with 4 opposing burner manifolds**

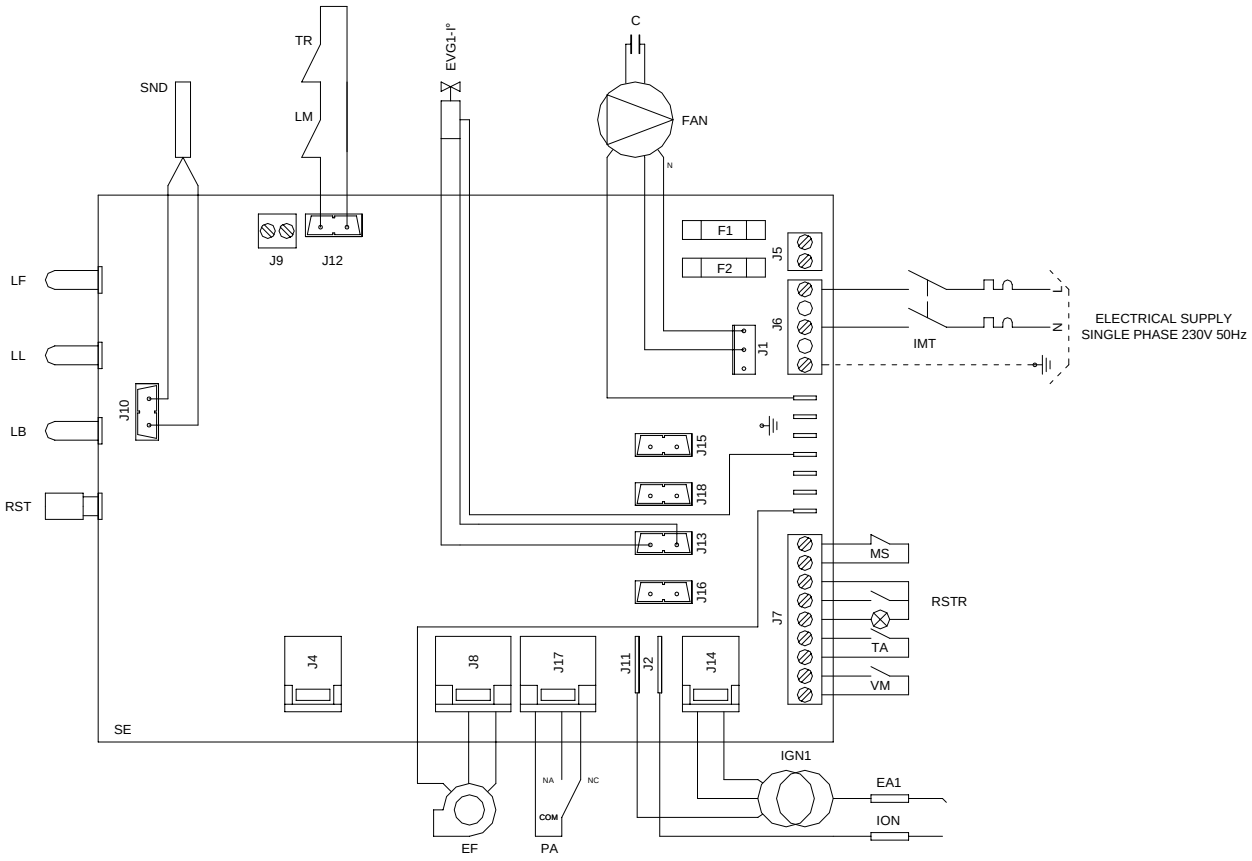
1. Regulation thermostat
2. LIMIT thermostat
3. FAN thermostat
4. Flue venter inspection door
5. Flue pipe
6. Flue manifold
7. Air intake for flue venter cooling
8. Outlet Grille
9. Controls compartment
10. Heat exchanger
11. Burner plate insulation
12. Gas injector
13. Combustion chamber
14. Gas manifold
15. Burner tubes
16. Ignition transformer
17. Left burner casing
18. Flue ducting
19. Deflector
20. Green power light
21. Yellow limit indication light
22. Red light/button lockout reset
23. Inlet grille
24. Gas inlet connector
25. Cable grips
26. Combustion intake air spigot
27. Flue spigot
28. Inlet casing
29. Fan Motor
30. Centrifugal Fan
31. Gas Solenoid valve (2 on 260 – 325)
32. Ignition electrode
33. Gas pressure manifold test nipple
34. Flame detection electrode
35. Flame check aperture
36. Door
37. ‘Limit’ thermostat release button
38. Differential pressure switch connection tube
39. Flue venter

TECHNICAL DATA

Model Type		1	2	3	4	5	6
Heat Output	kW Btu	23.0 78,500	30.5 104,000	41.7 142,000	58.6 200,000	76.6 261,500	95.6 325,000
Heat Input (Nett)	kW Btu	25.4 86,000	33.8 115,000	46.3 158,000	65.0 224,000	85.0 290,000	104.7 357,000
Efficiency	%	90,1	90,2	90,1	90,1	90,1	90,1
Thermostat calibrated							
TR thermostat	°C	70					
LM thermostat	°C	100					
SND control probe	°C	70					
FAN operation							
Fan on	sec	30					
Fan off	min'	3					
Maximum flue resistance	Pa	70	70	70	70	160	115
Centrifugal fan							
Type	Cod.	1800003	1800004	1800008	1800032	1800033	1800031
Number	N°	1	1	1	2	2	2
Category		II $_{2H3P}$					
Inlet Pressure Natural Gas(G20)	m/bar Ins/Wg	20 8	20 8	20 8	20 8	20 8	20 8
Inlet Pressure Propane(G31)	m/bar ins/wg	37 14.8	37 14.8	37 14.8	37 14.8	37 14.8	37 14.8
Burner Pressure (G20)	m/bar	13	13	13	10	13	10.5
Burner Pressure (G31)	m/bar	35.0	35.5	35.5	34.5	35.5	34.5
Consumption (G20)	m^3/hr	2.55	3.39	4.65	6.52	8.53	10.51
Consumption (G31)	Kg/hr	1.97	2.63	3.60	5.05	6.60	8.13
Static Pressure	Pa	200	200	200	200	200	200
∆T	ºC	37	31	30	30	29	32
Air pressure switch	Pa	85	90	85	195	40	70
Air Flow at +15C	m^3/hr	1820	2920	4130	5900	7900	8750
Gas Connection	BSP	1/2	1/2	1/2	3/4	3/4	3/4
Main Injector Nat Gas	mm No	4.10 1	4.80 1	5.55 1	5.00 2	5.40 2	4.50 4
Main Injector Propane	mm No	2.50 1	2.80 1	3.35 1	2.85 2	3.20 2	2.55 4
Flue Diameter	mm	100	100	100	100	100	100
Electricity Supply		230/1/50	230/1/50	230/1/50	230/1/50	415/1/50	415/1/50
Electrical Power	kW	0.367	0.367	0.550	0.750	1.100	1.500
Electrical current	A	3,7	3,7	4,0	4,7	2,8	3,6
Operational limits							
Temperature range		0/+40					
Relative Humidity		60					
Nett Weight	Kg	105	115	135	185	230	270

WIRING DIAGRAM

Type 1-2-3-4

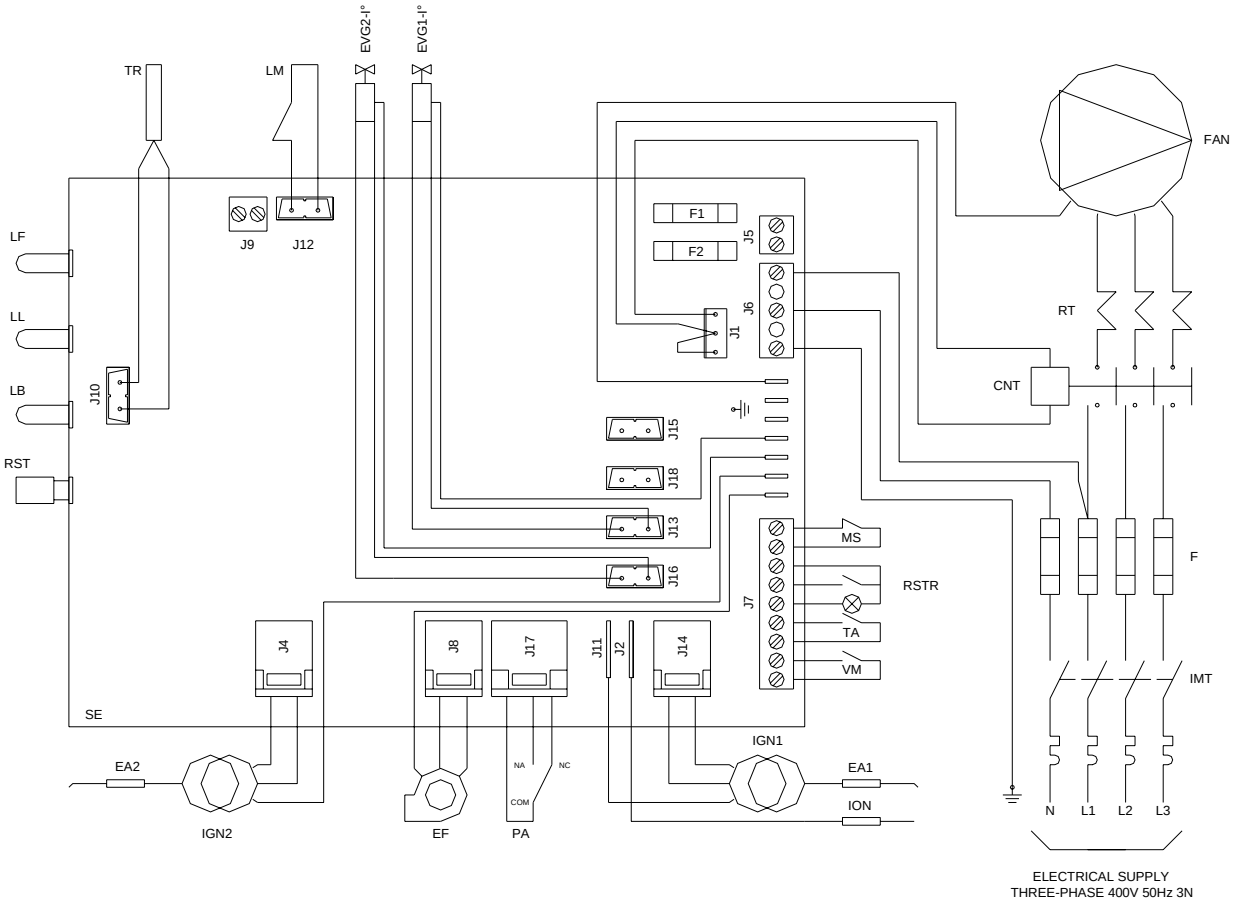


KEY

SND	Temperature control probe
TR	Regulatory control thermostat (auto reset)
LM	LIMIT thermostsat (Manual reset)
EF	Flue Venter
PA	Differential pressure switch
IGN1	Ignition transformer
EA1	Spark electrode
ION	Ionisation probe
SE	Electrical board
IMT (*)	Fused isolator
MS (*)	Fire switch
RSTR (*)	Remote reset
TA (*)	Room thermostat
VM (*)	Fan switch
EVG1-I°	Gas solenoid valve
C	Capicator
FAN	Centrifugal Fan
F1-F2	Line fuse
LF	Green working light
LL	High temperature indication
LB	Lockout indication
RST	Lockout reset button

(*) External to the heater customer installation

Type 5-6



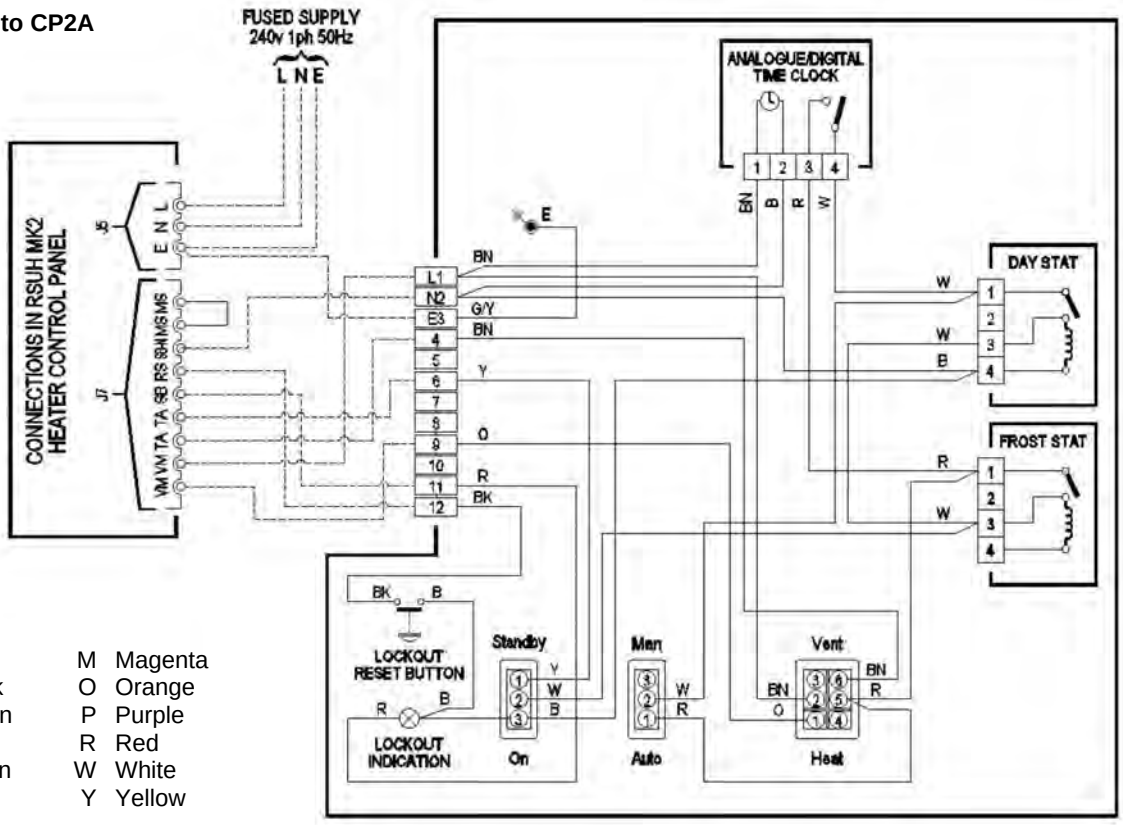
KEY:

SND	Temperature control probe
TR	Regulatory control termostat
LM	LIMIT Termostat (Manaual reset)
EVG1-I°	Gas valve 1
EVG2-I°	Gas valve 2
C	Capacitor
FAN	Centrifigal Fan
F1-F2	Fuses
LF	Green working light
LL	High temperature indication
LB	Lockout indication
RST	Lockout reset button
EF	Flue venter
PA	Differential pressure switch
IGN1	Ignition transformer 1
IGN2	Ignition transformer 2
EA1	Spark electrode 1
EA2	Spark electrode 2
ION	Ionisation probe
SE	Electrical board
IMT (*)	Fused isolator
MS (*)	Fire switch
RSTR (*)	Remote reset
TA (*)	Room Thermostat
VM (*)	Fan switch

(*) External to the heater customer installation.

REMOTE CONTROL CONNECTIONS

Connection to CP2A

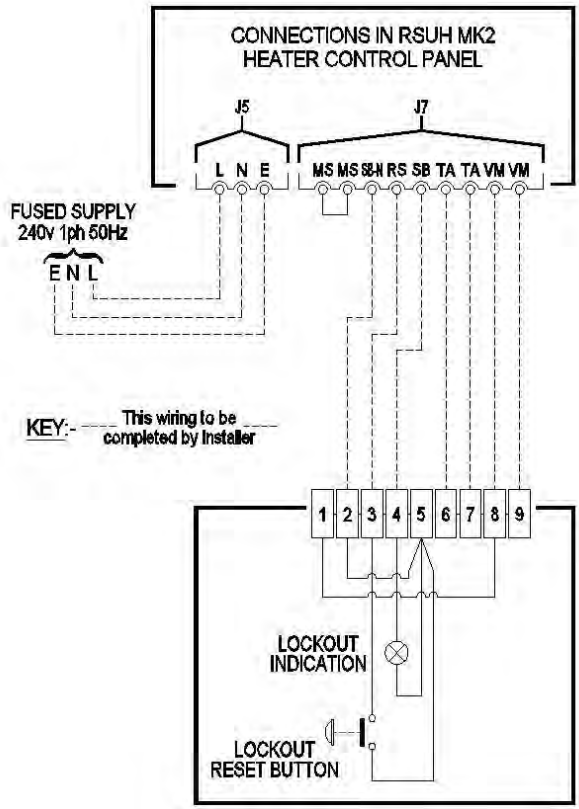


Key:

B	Blue	M	Magenta
BK	Black	O	Orange
BN	Brown	P	Purple
GR	Grey	R	Red
G	Green	W	White
K	Pink	Y	Yellow

This wiring to be completed by the installer

Connection to CP4A



⚠ **READ THE INSTRUCTION MANUAL BEFORE PROCEEDING WITH THE INSTALLATION**

⚠ **THIS HEATER IS NEUTRALLY SWITCHED ENSURE THE WIRING IS CORRECT TO THE DIAGRAMS PROVIDED**

⚠ **INCORRECT WIRING WILL DAMAGE THE ELECTRICAL CONTROL PANEL**

SETTING UP

To switch ON the heater

- Switch the fused isolator switch ON (supply customer)
- Switch the heater ON/OFF selector to “ON”
- Turn the thermostat to the desired temperature
- The heater will start automatically

To switch OFF the heater

- Turn the thermostat to its lowest temperature setting or alternativly switch the heater ON/OFF selector switch to OFF
- The burner will switch off but the fan will continue to operate for 3 to 4 minutes to cool the combustion chamber before stopping
- Finally switch the fused isolator to OFF

To switch ON fan only

- Switch the fused isolator to ON
- Set ON/STANDBY switch to ON
- Set VENT/HEAT switch to VENT position
- The fan only will run

To switch OFF fan

- Set ON/STANDBY switch to STANDBY

Stop

- Turn the selector switch to STOP

IF HEATER IS TO BE SWITCHED OFF FOR A LONG PERIOD

- Set ON/STANDBY switch to STANDBY
- Isolate at mains electrical supply
- Isolate the gas supply

⚠

WARNING! UNLESS IN AN EMERGENCY

Never stop the heater by switching off at the mains isolator. The residual heat accumulated in the heat exchanger may trigger the LIMIT safety device resulting in the need to reset manually.

If this is repeated it will damage the heat exchanger and will invalidate the warranty on the heater

SERVICING

⚠ **WARNING !**

It is a requirement that only qualified personnel are allowed to carry out installation commissioning or servicing. In addition only spare parts recommended by the manufacturer may be fitted, and the installer should provide a list of recommended spare parts that are available through the manufacturer or his agent

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

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

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

A safe working platform giving good access to the heater is required,

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

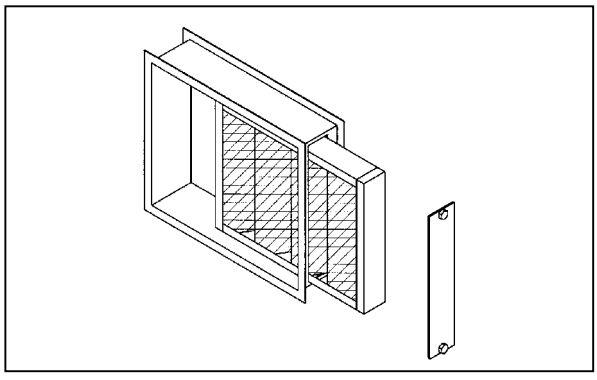
Visually check all electrical wiring for signs of damage, possibly through contact with hot surfaces, check conduit for signs of chaffing and for security . Check all terminals are secure and free from escaped / stray conductor strands

CLEAN EXTERNAL PANELS

This cleaning should only be carried out with damp cloths with soap and water. In If there are stubborn stains dampen The cloth with a 50% mixture of water and white spirit

After cleaning dry the surfaces carefully.

Filters should be cleaned regularly as required.



HEATER INDICATOR LIGHTS

If a fault should occur with the heater the lights situated at the right hand side of the heater will be illuminated indicating the fault

- **Red Lockout indication (1)**.

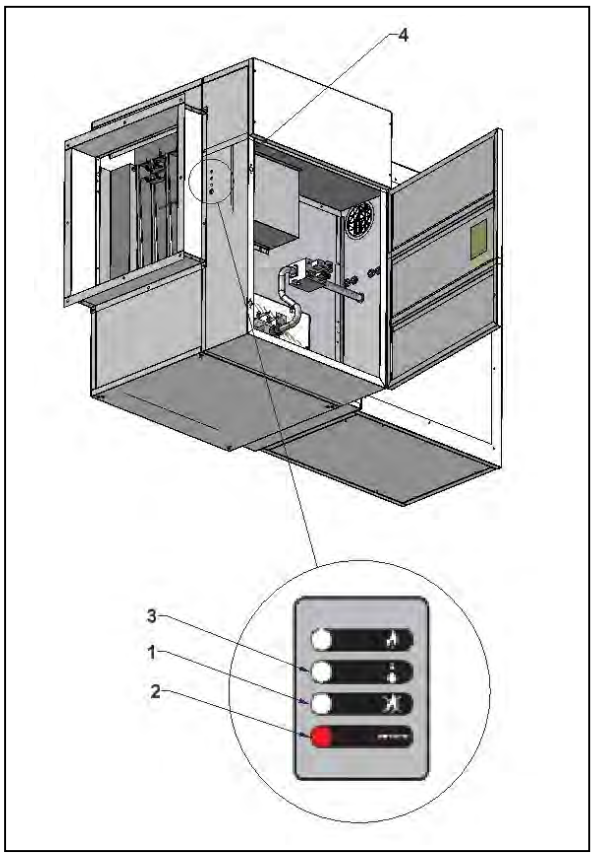
This will be illuminated if the heater has gone to lockout due to the loss of flame sensing by the flame probe situated in the burner assembly in order to reset the heater the RESET Button **(2)** should be pressed (if fitted with remote controls the remote reset button will reset this switch).

- **Yellow overheat indication (3)**.

This will be illuminated if the heater has exceeded the temperature set on the thermostat. The thermostat will shut down the burner until the fan(s) have cooled the chamber sufficiently and the burner will re light.

If the yellow light is flashing this means that the heater has gone to overheat and the LIMIT thermostat has operated and shut down the burner The heater will not re light until the LIMIT **(4)** has been reset this can be done by removing the plastic cap covering the reset button and pushing the reset replace cap

The cause of the overheat should be investigated



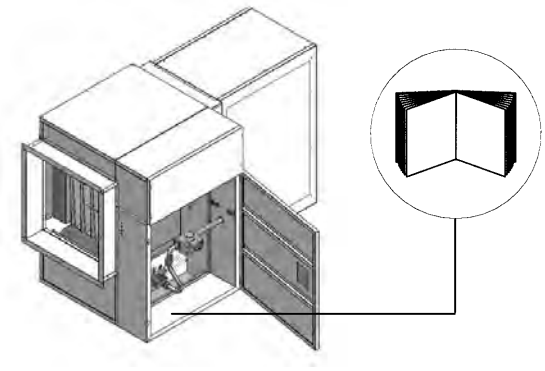
RECEIPT OF PRODUCT AND TRANSPORT

Delivery & pre installation checks

The heater is supplied wrapped in heavy duty protective polythene, mounted on a pallet. On receipt of the heater, the following checks should be carried out:

a) The model is as per order
b) That it is undamaged
c) That it is suitable for the gas supply and pressure
d) That it is suitable for the electrical supply

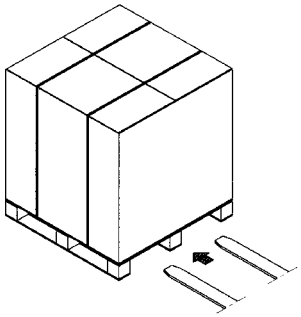
If any of these points are not satisfied then contact should be made with the Sales Office at Benson Heating In the case of claims for damage this must be reported in writing within 24Hrs of delivery, in order to comply with insurance criteria



WARNING

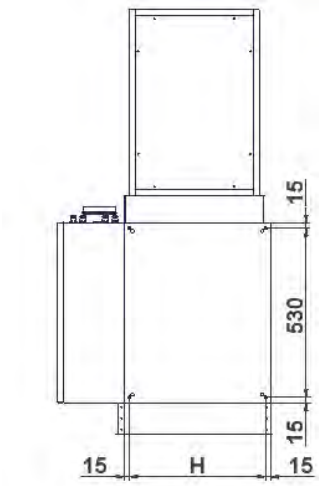
The instruction manual is an integral part of the equipment and so, after the packaging has been removed, make sure that it has been collected and stored safety.

When moving the heater ensure that the equipment used is capable of lifting and supporting the weight of the heater
When lifting by fork truck ensure that the forks support the weight



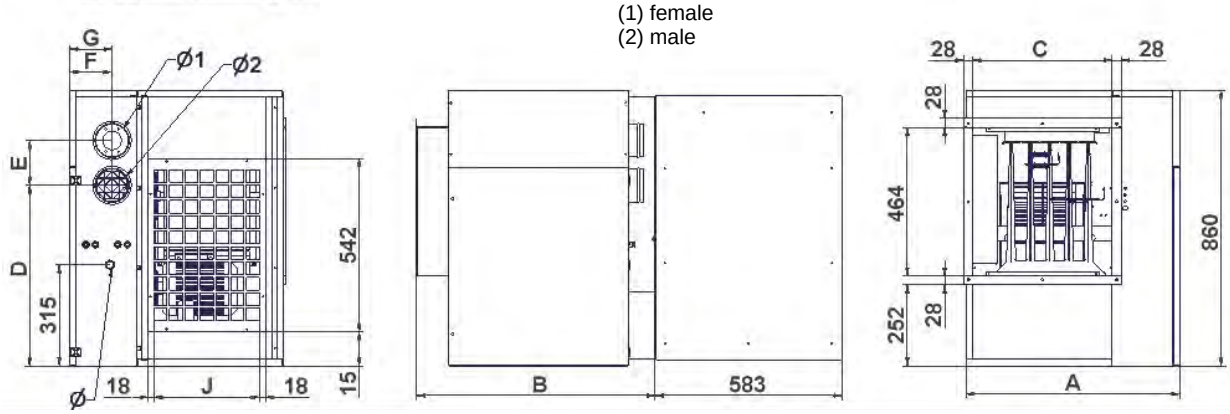
DIMENSION AND WEIGHT

Type 1 – 2 – 3 – 4



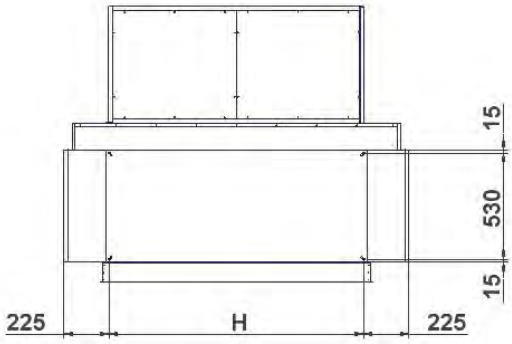
Type	1	2	3	4
A [mm]	665	745	925	1170
B [mm]	1327	1327	1327	1377
C [mm]	435	515	695	940
D [mm]	563	563	555	510
E [mm]	140	140	140	185
F [mm]	132	132	132	115
G [mm]	132	132	132	132
H [mm]	425	505	625	930
J [mm]	367	447	627	872
Ø1 [mm]	100 (1)	100 (1)	100 (1)	100 (2)
Ø2 [mm]	100 (1)	100 (1)	100 (1)	150 (2)
Ø [bsp]	½	½	½	¾
nett weight [kg]	105	115	135	185

(1) female
(2) male

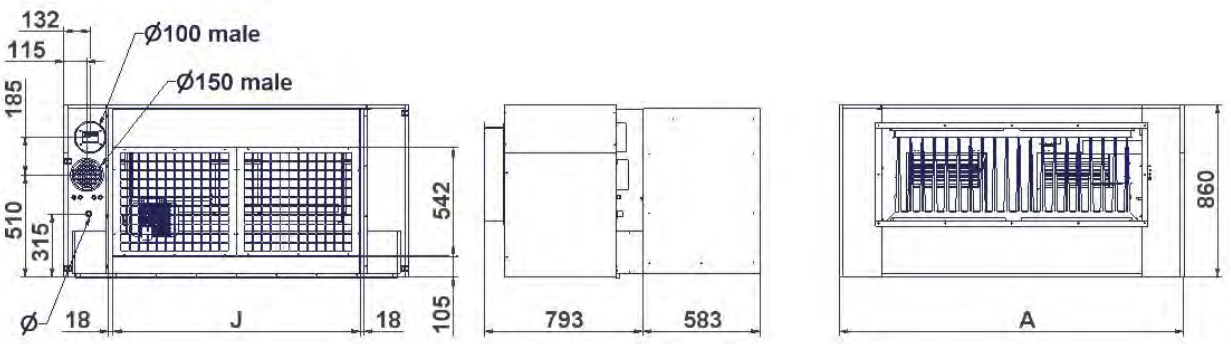


NOTE: heater type 4 has two fans

Type - 5 – 6



Type	5	6
A [mm]	1720	1960
H [mm]	1270	1510
J [mm]	1232	1472
Ø [bsp]	¾	¾
nett weight [kg]	230	270



INSTALLATION

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

WARNING

All of the basic criteria must be satisfied prior to commencing installation and commissioning, additionally, the Unit Heater must be positioned and installed so as to comply with all the relevant standards and guide lines as well as meeting national and local fire regulations and insurance criteria, especially if it is proposed that the heater is to be installed within a special risk area (e.g. proximity to where petrol engined vehicles are stored or parked, where cellulose spraying takes place, where woodworking machinery is operated, etc,).

Indirect fired heaters **must not** be located in hazardous areas. However, it is permissible for the heater to supply air to such areas. The heater **must not** be installed within an environment where there is a high concentration of chlorides, fluorides, salts, or other aggressive or volatile chemicals/compounds.
Nor should the heater be positioned where the burner could be adversely affected by high winds or draughts.

The heater must be installed so that it is level. Supports for the heater must be sufficiently robust to withstand the weight of the heater and any ancillary equipment. Any combustible material adjacent to the heater or flue system must be so placed or shielded so that its surface temperature does not exceed 65ºC

The location chosen for the heater must allow for the fitting of an effective flue system.

The heater must be installed so that it is level, supports for the heater must be sufficiently robust to withstand the weight of the heater and any ancillary equipment
Any combustible material adjacent to the heater or flue system must be so placed or shielded so that its surface temperature does not exceed 65^{o}C. Generally a free blowing heater should be located at a height (measured from floor level to the base of unit)

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

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

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

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

CAUTION

Ensure that the gas service to the appliance carries the correct gas type and that the supply pressure is in accordance with the supply type and pressure stated on the appliance data plate.

Installation, commissioning, and servicing must only be carried out by appropriately qualified and competent persons.

WARNING

Unauthorised modifications to the appliance, or departure from the manufacturers guidance on intended use, or, installation contrary to the manufacturers recommendations may constitute a hazard.

NOTE

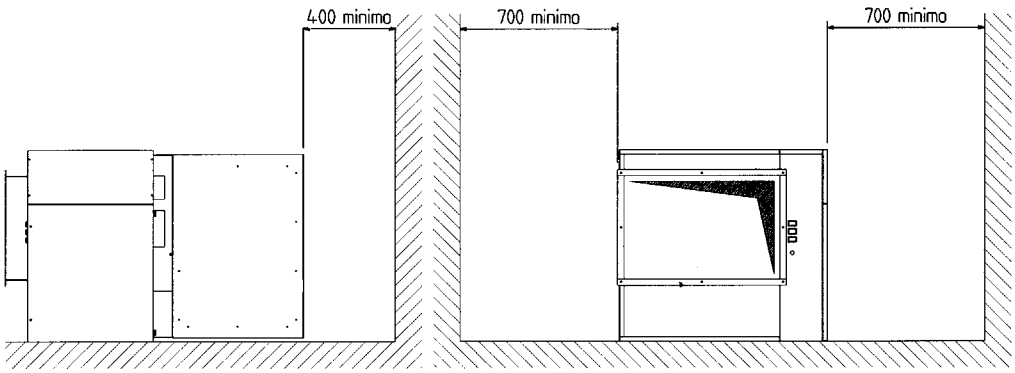
To ignore the **warning** and **caution** notices, and to ignore the advice from the manufacturer on installation, commissioning, servicing, or use, will jeopardise any applicable warranty, moreover, such a situation could also compromise the safe and efficient running of the appliance itself, and thereby constitute a hazard.
The installation of the appliance must meet all the relevant European, National, and local criteria. Prior to installation the following points should be considered:

a) The position of the heater for the optimum efficient distribution and circulation of warm air
b) The position of the heater relative to the route of the flue
c) The position of the heater relative to the supply of gas
d) The position of the heater relative to the electrical services, wiring routes, and if appropriate, any additional controls.
e) The position of the heater relative to the supply of fresh air
f) The position of the heater relative to potential stratification / circulation problems, which generally occur at higher levels and which may be overcome through the provision of a suitable de-stratification unit.
g) The position of the heater relative to service and maintenance requirements

CAUTION

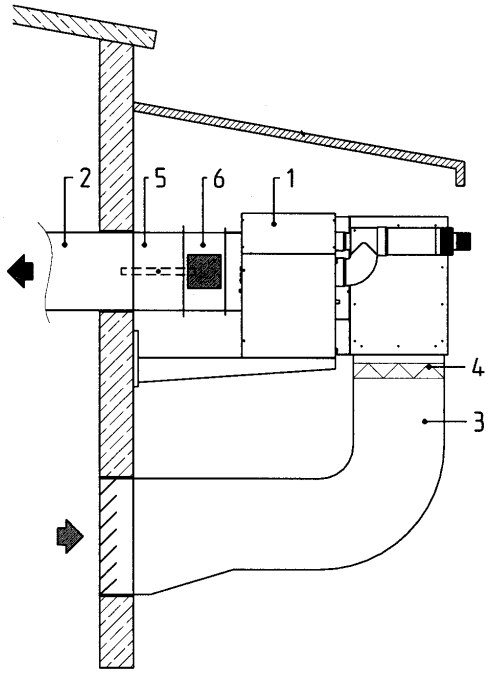
The heater **must not** be installed within an area where the conditions are unsuitable, e.g. where the atmosphere is highly corrosive, has a high degree of salinity, or where high wind velocities may affect burner operation. Suitable protection should be provided for the appliance when it is located in a position where it may be susceptible to external mechanical damage from; for example, fork lift trucks, overhead cranes etc

Minimum area around appliance

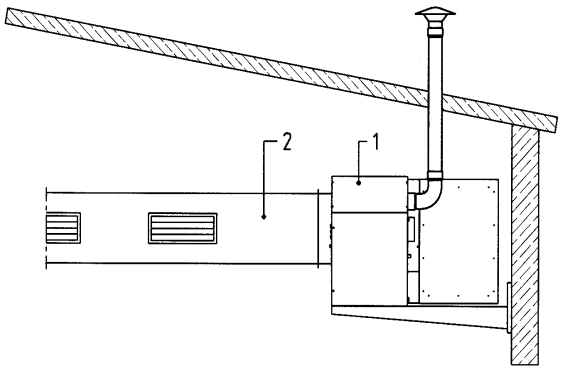


SOME EXAMPLES FOR INSTALLATION

Installation outside the room to be heated (but in any event protected from atmospheric agents) with warm air intake duct and air recycling.



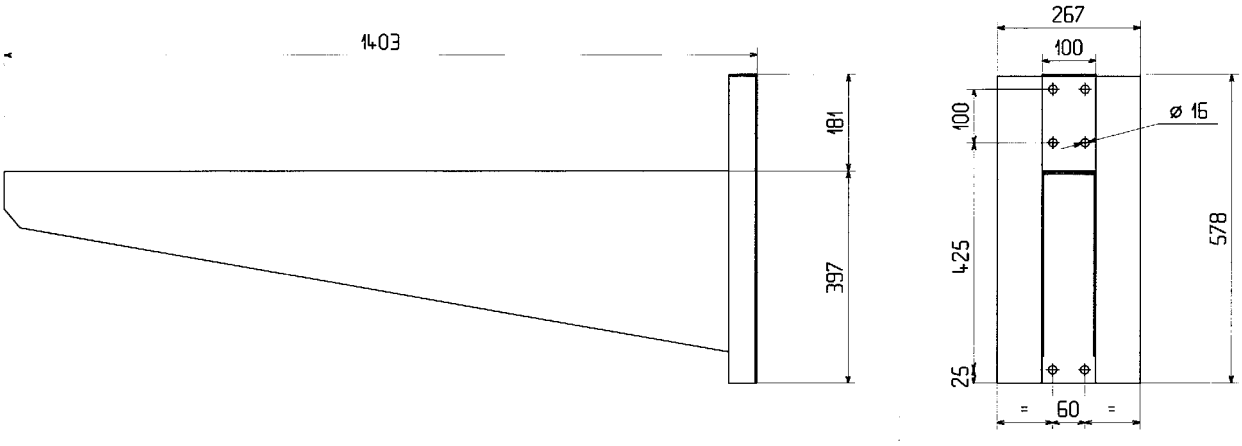
Installation inside the room to be heated with duct for warm air intake.



Key:

1. Heater
2. Warm air delivery duct
3. Recycled air duct
4. Filter casing (accessory to be requested separately)
5. Fire stop barrier (accessory to be requested separately)
6. Exhaust vent (accessory to be requested separately)

WALL BRACKET DIMENSIONS



WARNING

The support brackets are designed to support ONE HEATER ONLY.
It is the responsibility of the installer to ensure that all fixing brackets are properly secure

GAS CONNECTION

Connection of the heater to the gas supply, whether Natural gas LPG, must be carried in compliance with the installation laws and by qualified personnel. The warm air heater is set to work with (G20) Natural Gas.
A (G31) propane conversion kit is also available.

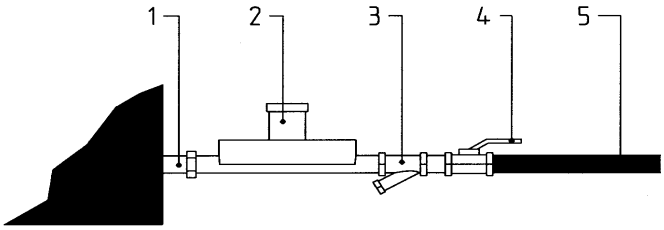
Before connecting up it is necessary to make sure that:

- The correct type of gas is that for which the equipment has been set up is available.
- The gas pipes are clean and free of debris.
- The gas supply and meter are capable of delivering the required volume of gas to ensure the correct burner pressure can be achieved. See TECHNICAL DATA.
- The diameter of the pipework from the isolating cock to the burner must not be less than the diameter of the connection into the multiblock.

⚠ **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**

1. **Threaded Gas pipe connector** Male1/2" bsp thread on the type 1 ÷ 4 heaters and 3/4" BSP on the type 5 ÷ 7 heater
2. **Pressure stabiliser*** (required to ensure the correct pressure of combustible gas).
3. **Filter*** (required to provent impurites which may be present in the gas line from entering the equipment and also to permit simple inspection and maintenance).
4. **Isolating Cock*** 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.
5. **Gas Pipe**

(*) **Customer supply**



⚠ **WARNING!**

When a LPG supply is used it is advisable to install a first pressure reducer close to the liquid gas tank to reduce the pressure to 1.5 bars and a second pressure reducer near to the heater installation to bring the pressure down from 1.5 bars to 40 mbar.
A third reducer (see position 2) mounted in proximity to the equipment ensures the correct pressure is provided.

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

To prevent any problems which could arise due to a loss of pressure it is advisable to install a minimum pressure switch to shut down the heater in the event of gas pressure failure

FLUE AND COMBUSTION OPTIONS

Room sealed unit heaters are suitable for installation with the following flue configurations : **B_{22} - C_{12} - C_{32} .**

Option B_{22}

In this configuration the heater is connected to a single flue pipe to discharge the products of combustion outside the building either through the roof or through a wall
The combustion air is taken from inside the room

- The flue pipe should be metal smooth bored pipe with a diameter of not less than the flue spigot connection on the heater
- All joints should be sealed
- It must be properly secured so as to remain stable at all times
- It must have a wind shielded and rain proof terminal
- The flue should not exceed the length limits indicated in the following pages
- There must be adequate ventilation in the room as per current leglisation.

Option C_{12}

In this configuration the heater is connected by two pipes, One discharging the products of combustion and the other bringing the combustion air from outside the building in which the heater is located

The outlet must be through the wall and may be made with two seperate pipes or with concentric pipes

- The flue pipe and combustion air inlet should be metal smooth bored pipe with a diameter of not less that both the flue and combustion spigot connections on the heater
- All joints should be sealed
- It must be properly secured so as to remain stable at all times
- It must have a wind shielded and rain proof terminal
- The flue should not exceed the length limits indicated in the following pages
- There must be adequate ventilation in the room as per current leglisation

Option C_{32}

In this configuration the heater is connected by two pipes, One discharging the products of combustion and the other bringing the combustion air from outside the building in which the heater is located

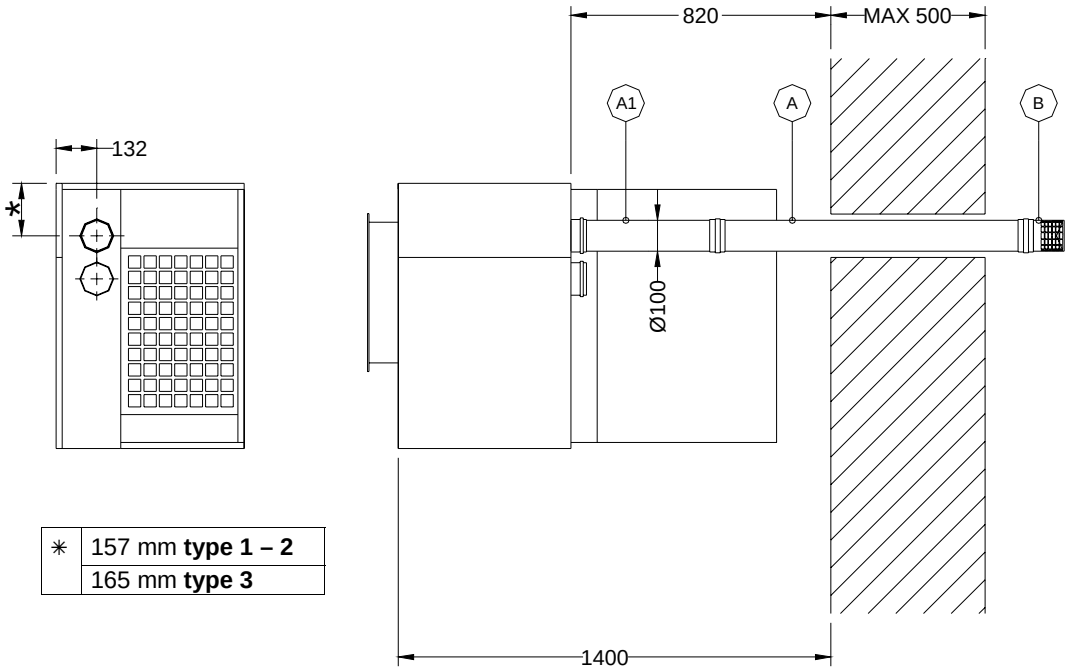
The outlet must be through the roof and must be made with concentric pipes

- The flue pipe and combustion air inlet should be metal smooth bored pipe with a diameter of not less that both the flue and combustion spigot connections on the heater
- All joints should be sealed
- It must be properly secured so as to remain stable at all times
- It must have a wind shielded and rain proof terminal
- The flue should not exceed the length limits indicated in the following pages

The following pages show installation diagrams of the above configurations.

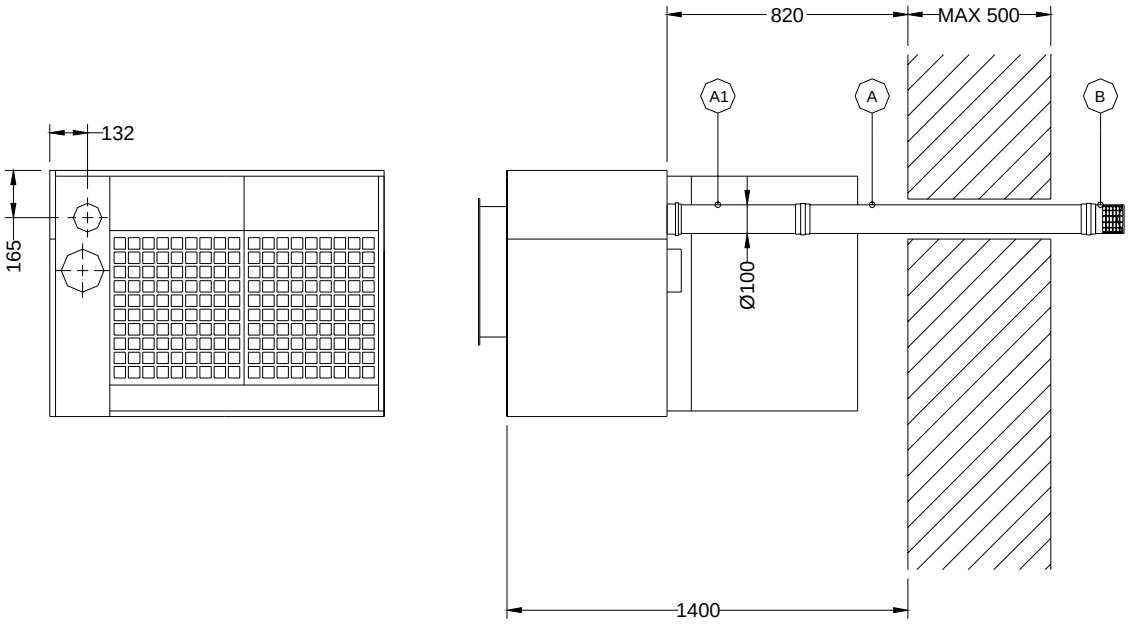
B_{22}: Flue pipe to outside wall combustion air from inside building

Type 1 – 2 – 3



✳	157 mm **type 1 – 2**
	165 mm **type 3**

Type 4 – 5 – 6



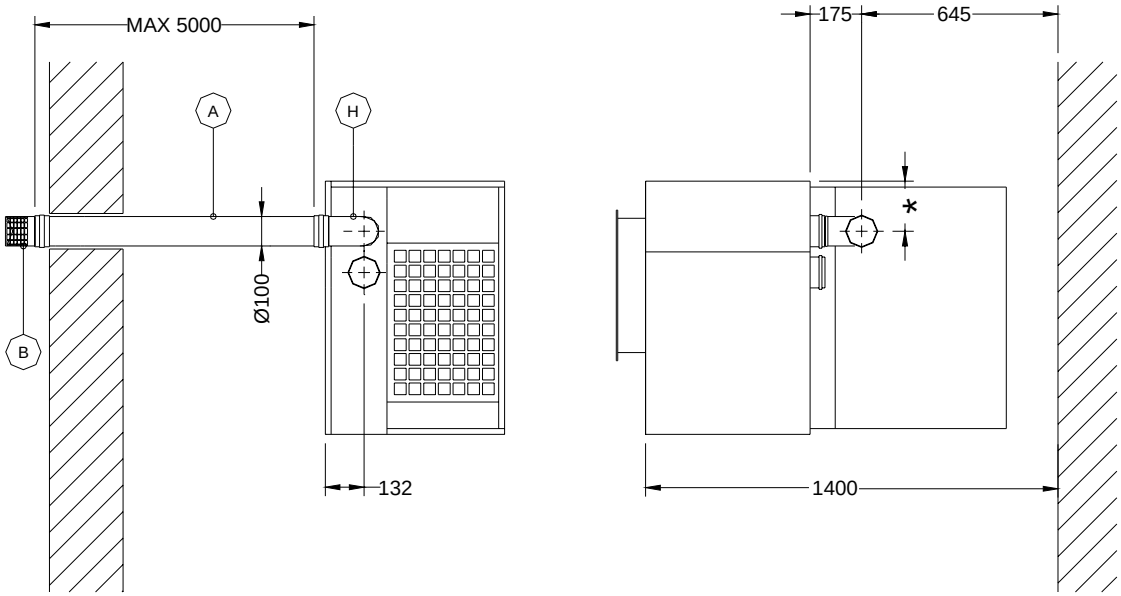
ITEM	DESCRIPTION
A	Flue pipe M/F ∅100 L=1000 with seal
A1	Flue pipe M/F ∅100 L=500 with seal
B	Terminal with guard ∅100

IMPORTANT:

MODEL	1-2-3	4-5-6
∅ FLUE SPIGOT SIZE	∅100 female	∅100 male
∅ COMBUSTION AIR SPIGOT	∅100 female	∅150 male
INSTALLATION	Flue should be adequately supported Each bend corresponds to about 0.8-1meter of straight pipework	

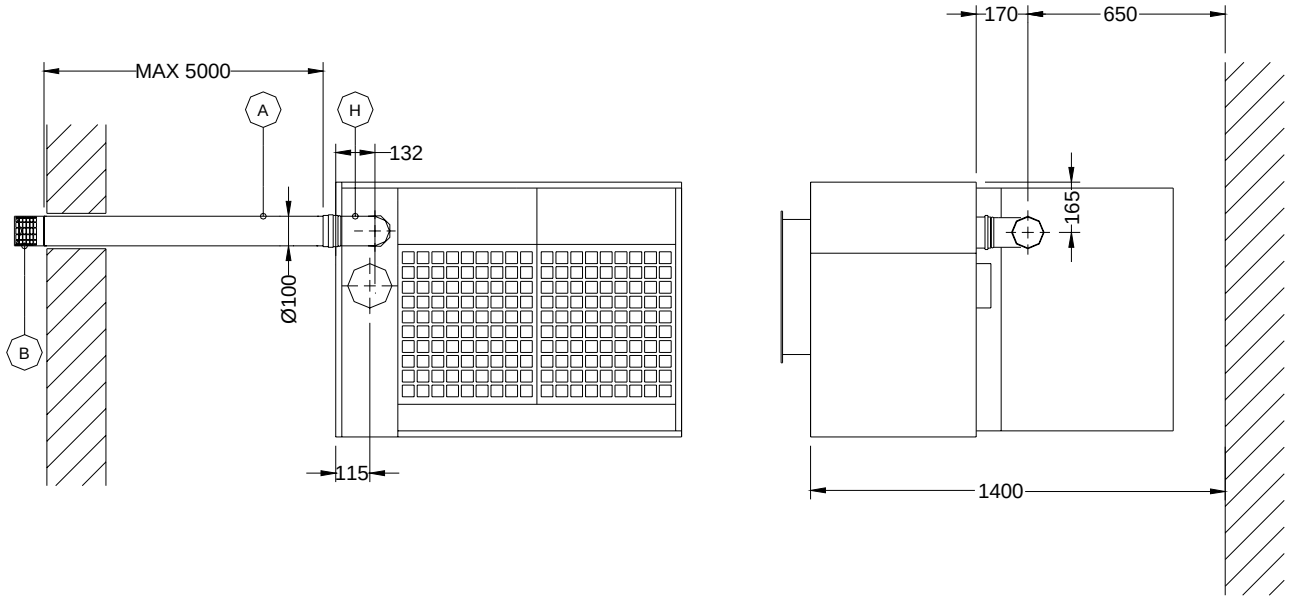
B_{22}: Flue pipe to outside wall maximum distance, combustion air from inside building

Type 1 – 2 – 3



✳	157 mm **type 1 – 2**
	165 mm **type 3**

Type 4 – 5 – 6



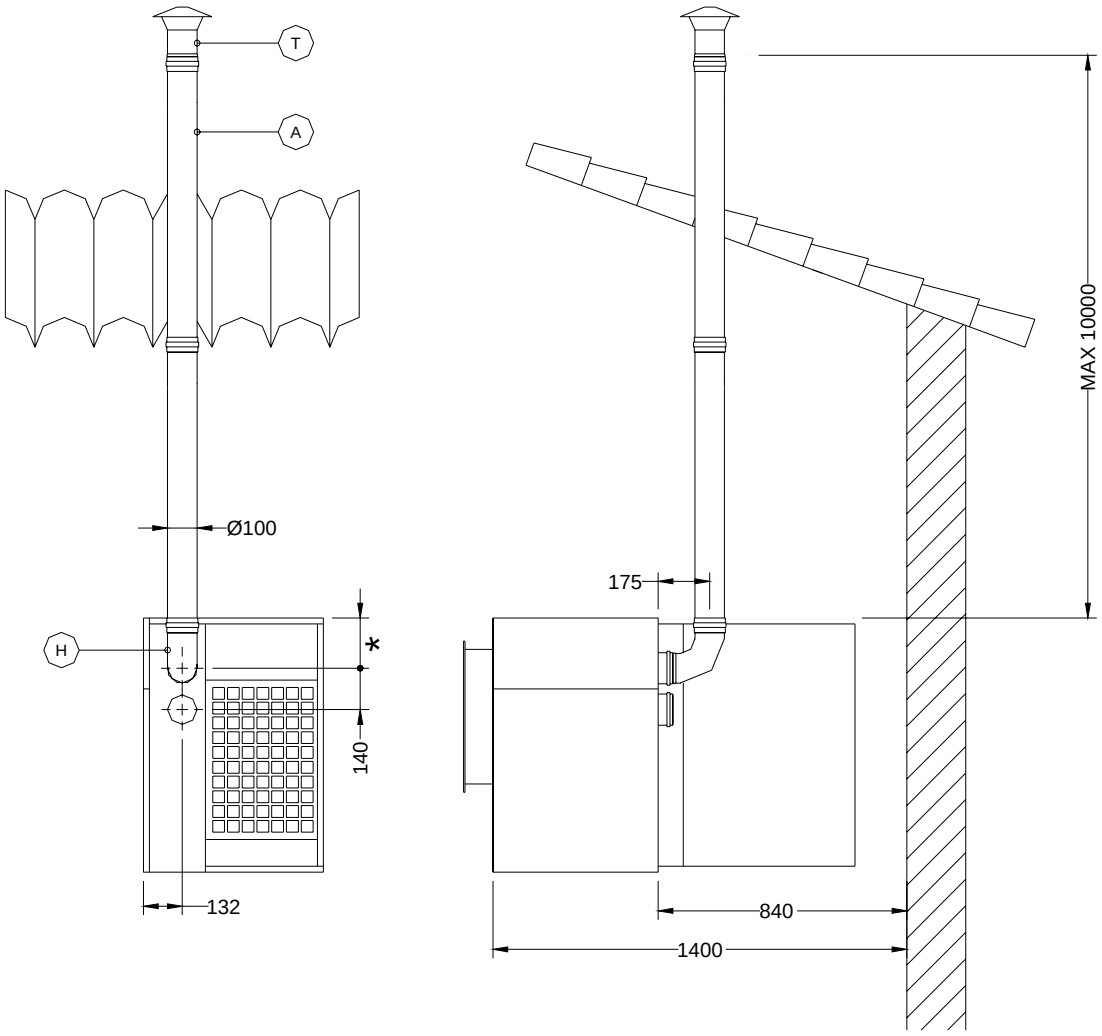
ITEM	DESCRIPTION
A	Flue pipe M/F ∅100 L=1000 with seal
B	Terminal with guard ∅100
H	Bend 90° M/F ∅100 with seal

IMPORTANT:

MODEL	1-2-3	4-5-6
∅ FLUE SPIGOT SIZE	∅100 female	∅100 male
∅ COMBUSTION AIR SPIGOT	∅100 female	∅150 male
INSTALLATION	Flue should be adequately supported Each bend corresponds to about 0,8-1 meter of horizontal pipe work	

B_{22}: Single flue option with roof terminal combustion airfrom inside building

Type 1 – 2 – 3



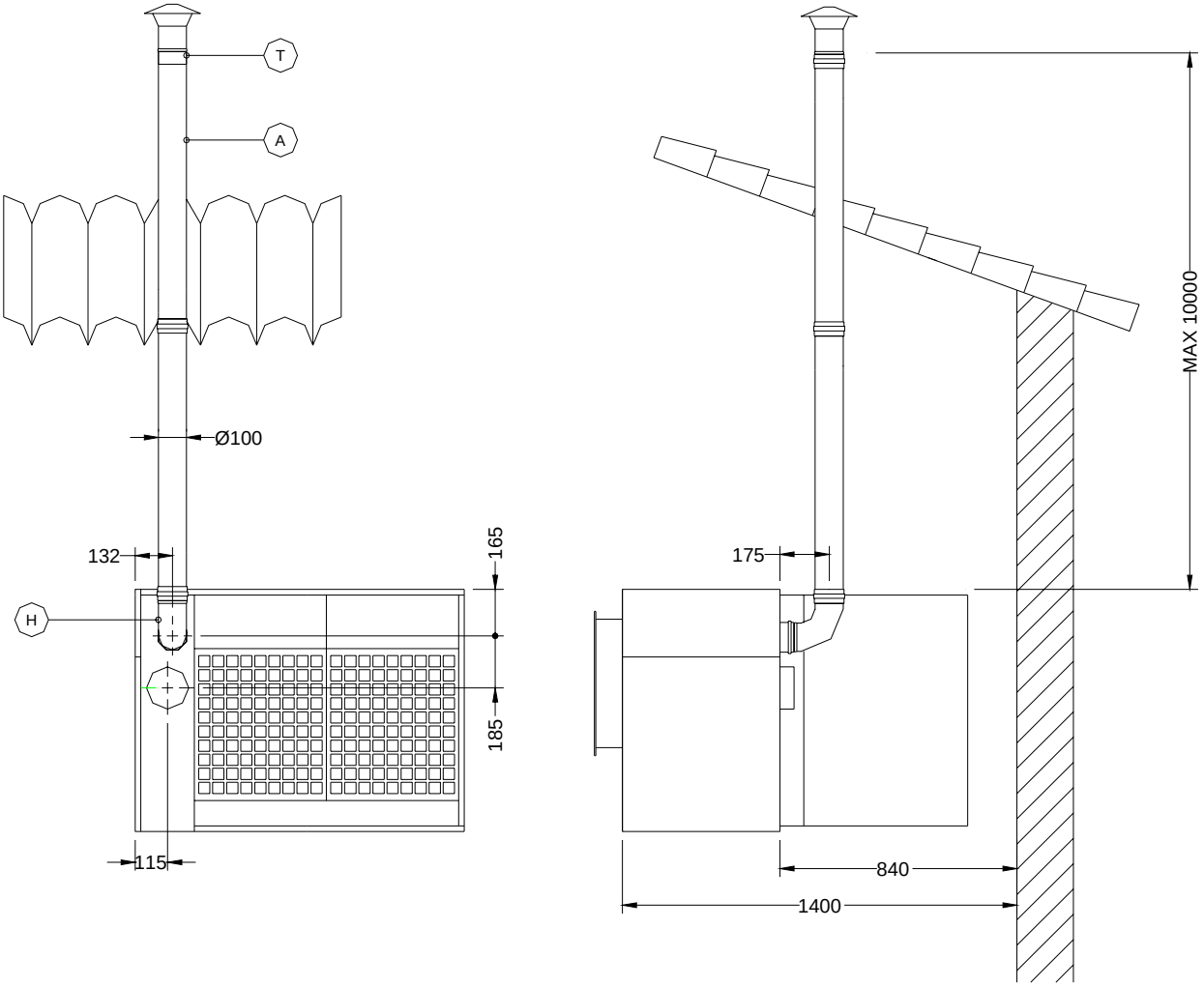
✳	157 mm **type 1 – 2**
	165 mm **type 3**

ITEM	DESCRIPTION
A	Flue pipe M/F ∅100 L=1000 with seal
H	Bend 90° M/F ∅100 with seal
T	Terminal with guard ∅ 100

IMPORTANT:

MODEL	1-2-3
∅ FLUE SPIGOT SIZE	∅100 female
∅ COMBUSTION AIR SPIGOT	∅100 female
INSTALLATION	Flue should be adequately supported Each bend corresponds to about 0,8-1 meter of horizontal pipe work

Type 4 – 5 – 6



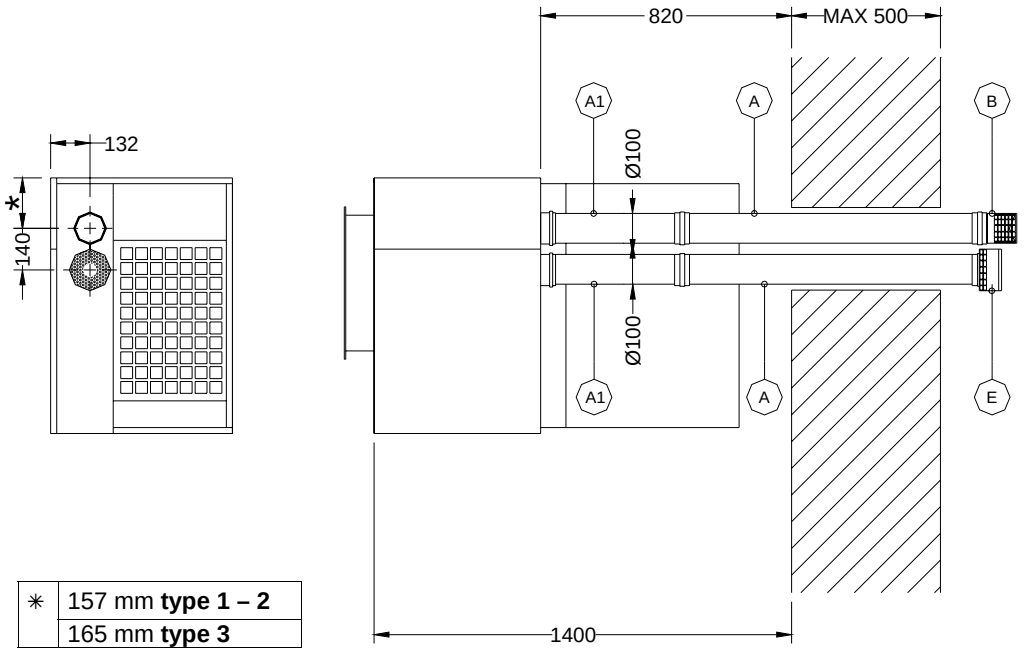
ITEM	DESCRIPTION
A	Flue pipe M/F ∅100 L=1000 with seal
H	Bend 90° M/F ∅100 with seal
T	Terminal ∅100

IMPORTANT:

MODEL	4-5-6
∅ FLUE SPIGOT SIZE	∅100 male
∅ COMBUSTION AIR SPIGOT	∅150 male
INSTALLATION	Flue should be adequately supported Each bend corresponds to about 0,8-1 meter of horizontal pipe work

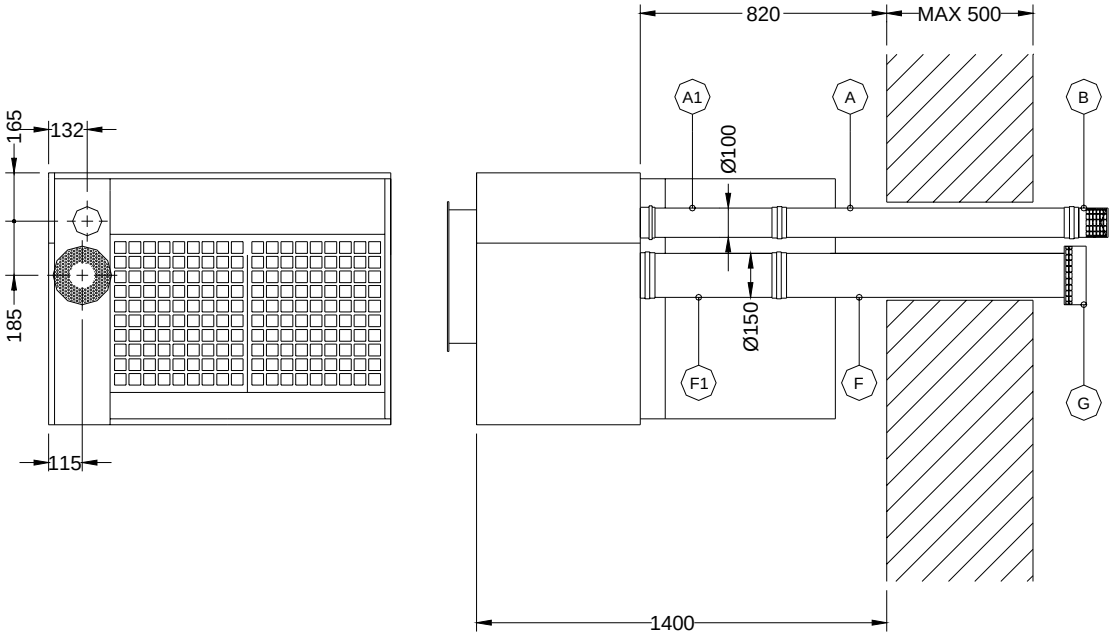
C_{12}: Flue discharge and combustion air inlet through wall two independant pipe kit.

Type 1 – 2 – 3



✳	157 mm **type 1 – 2**
	165 mm **type 3**

Type 4 – 5 – 6



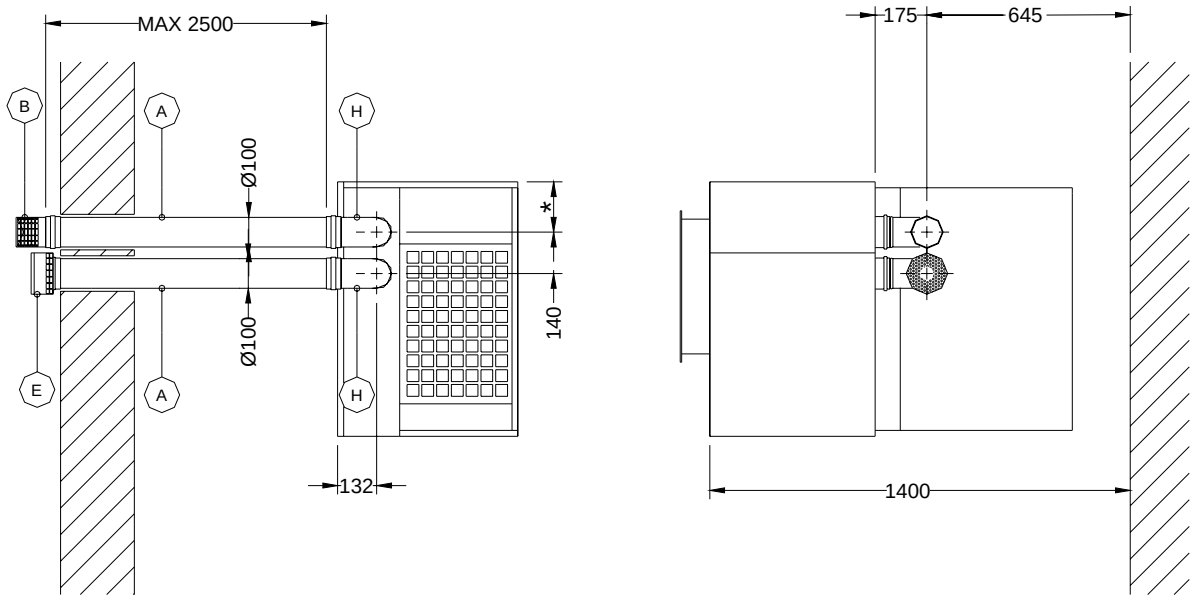
ITEM	DESCRIPTION
A	Flue pipe M/F ∅100 L=1000 with seal
A1	Flue pipe M/F ∅100 L=500 with seal
B	Flue terninal with guard ∅100
E	Combustion air terminal with guard ∅100
F	Combustion pipe M/F ∅150 L=1000 with seal
F1	Combustion pipe M/F ∅150 L=500 with seal
G	Combustion air terminal with guard ∅150

IMPORTANT:

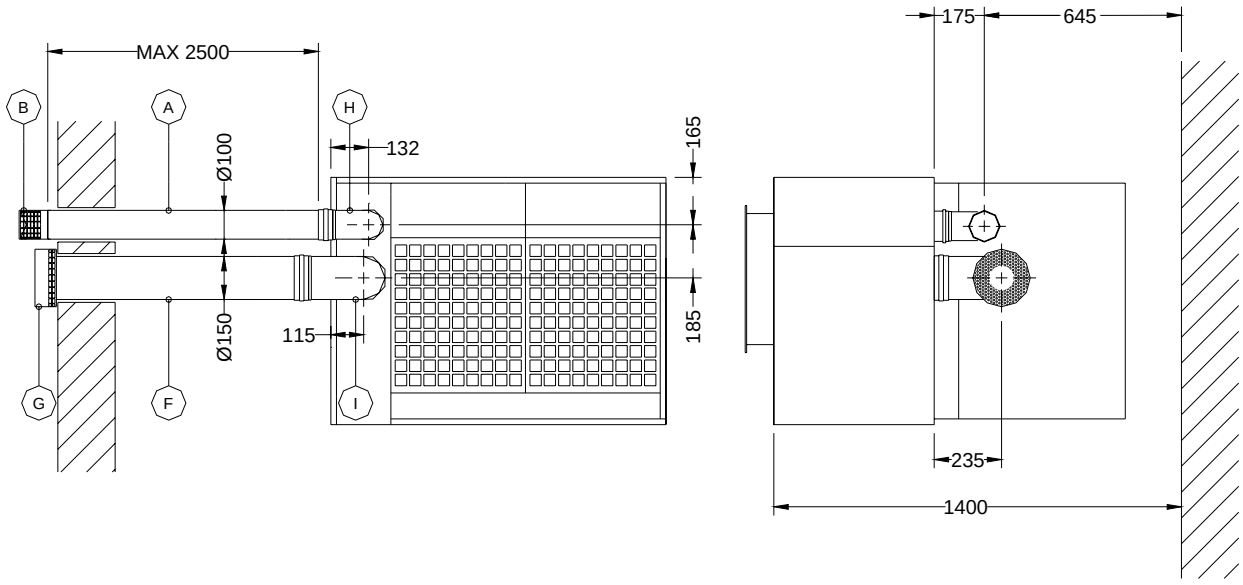
MODEL	1-2-3	4-5-6
∅ FLUE SPIGOT SIZE	∅100 female	∅100 male
∅ COMBUSTION AIR SPIGOT	∅100 female	∅150 male
INSTALLATION	Flue and combustion pipes should be adequately supported	

C_{12}: Flue discharge and combustion inlet two independant pipe kit maximum distance.

Type 1 – 2 – 3



Type 4 – 5 – 6



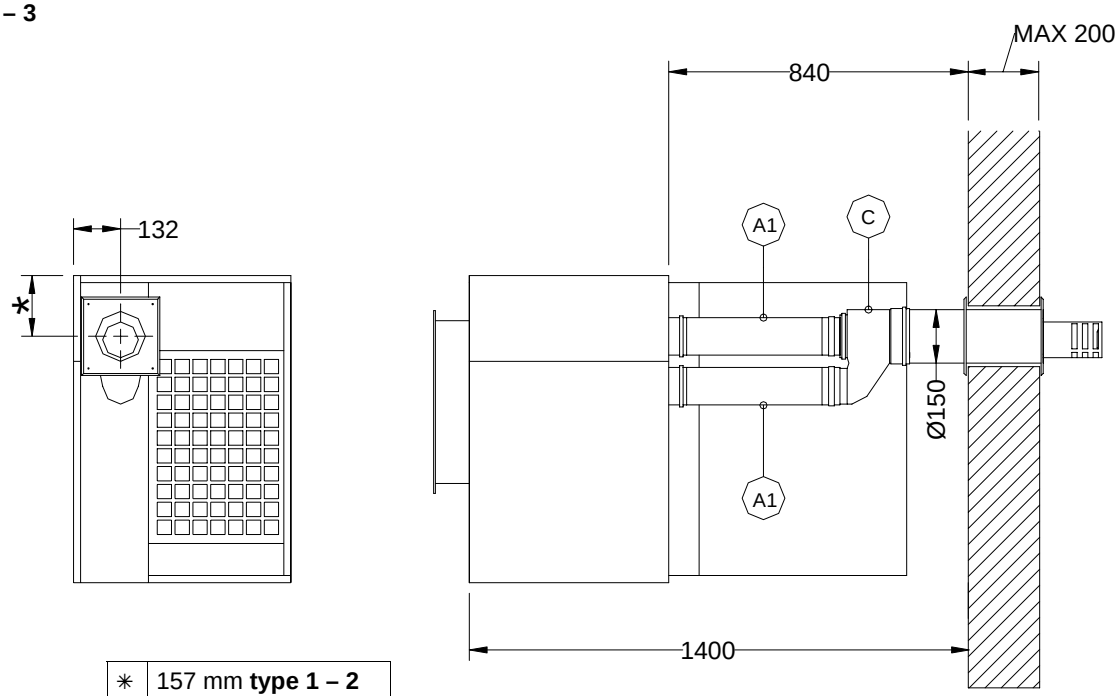
ITEM	DESCRIPTION
A	Flue pipe ∅100 L=1000 with seal
B	Flue terminal with guard ∅100
E	Combustion air terminal with guard ∅100
F	Combustion air pipe M/F ∅150 L=1000 with seal
G	Combustion air terminal with guard ∅150
H	Bend 90° M/F ∅100 with seal
I	Bend 90° M/F ∅150 with seal

IMPORTANT

MODEL	1-2-3	4-5-6
∅ FLUE SPIGOT SIZE	∅100 female	∅100 male
∅ COMBUSTION AIR SPIGOT	∅100 female	∅150 male
INSTALLATION	Flue should be adequately supported Each bend corresponds to about 0,8-1 meter of horizontal pipe work	

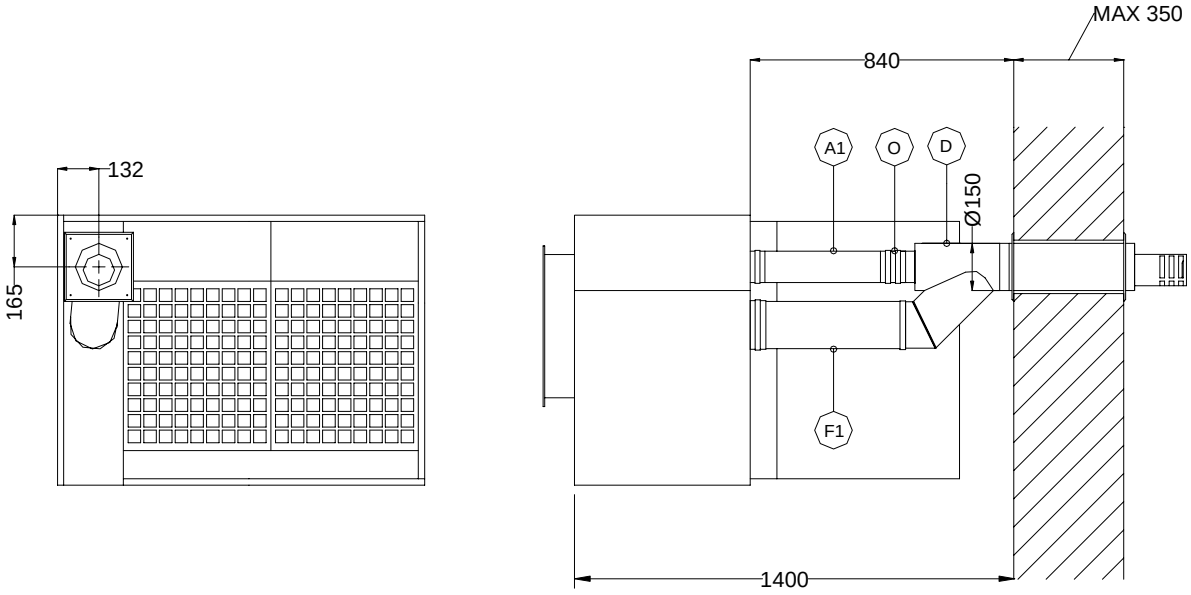
C_{12}: Horizontal co axial wall kit

Type 1 – 2 – 3



✳	157 mm **type 1 – 2**
	165 mm **type 3**

Type 4 – 5 – 6



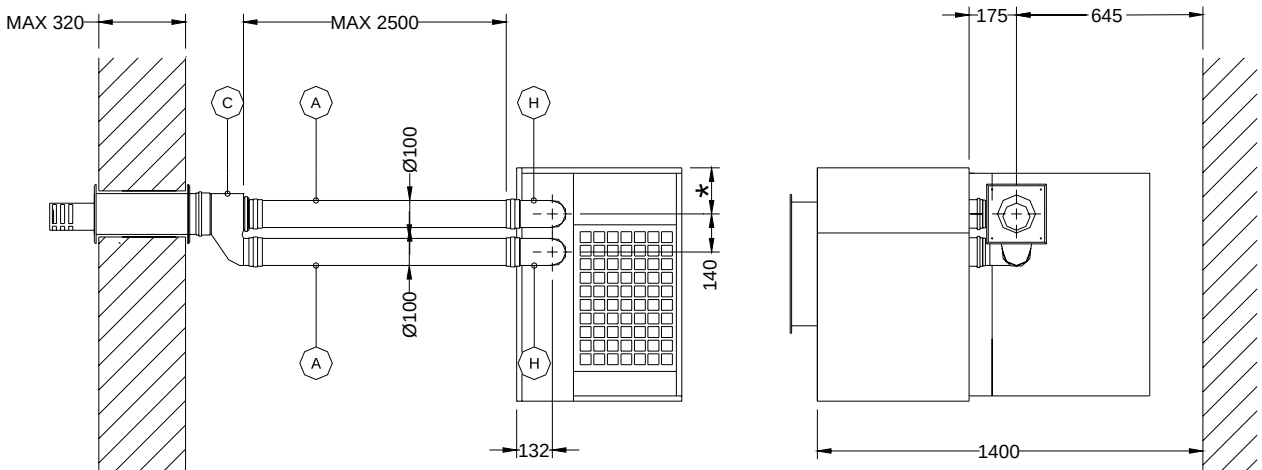
ITEM	DESCRIPTION
A1	Flue pipe M/F ∅100 L=500 with seal
C	Horizontal wall kit ∅100-100
D	Horizontal wall kit ∅100-150
F1	Combustion Air pipe M/F ∅150 L=500 with seal
O	Adaptor F/F ∅100 L=80 with seal

IMPORTANT:

MODEL	1-2-3	4-5-6
∅ FLUE SPIGOT SIZE	∅100 female	∅100 male
∅ COMBUSTION AIR SPIGOT	∅100 female	∅150 male
INSTALLATION	Flue and combustion pipes should be adequately supported	

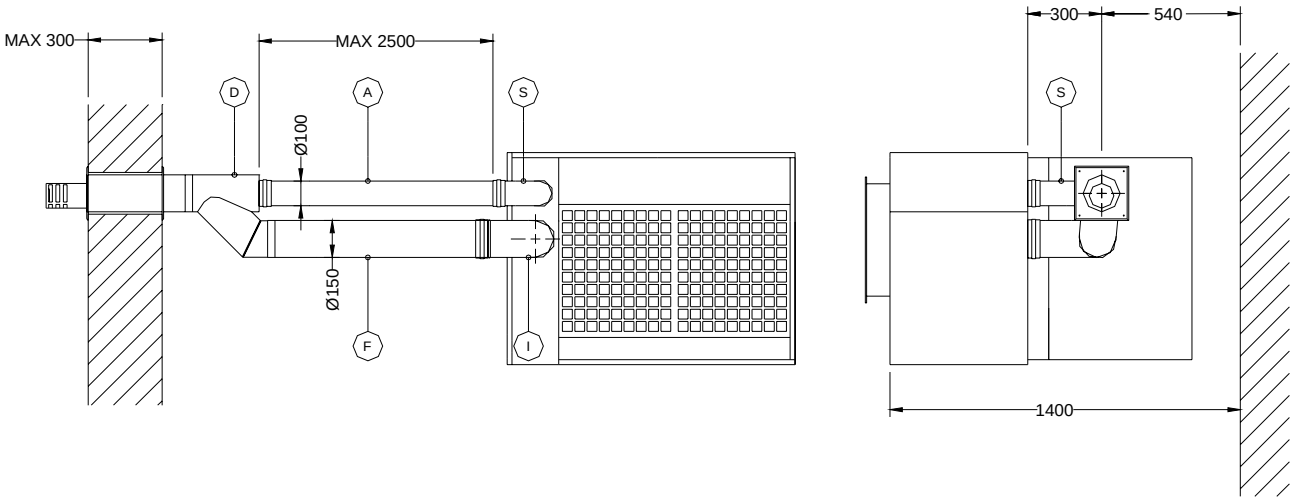
C_{12}: Co axial wall kit maximum installation distance

Type 1 – 2 – 3



✳	157 mm **type 1 – 2**
	165 mm **type 3**

Type 4 – 5 – 6



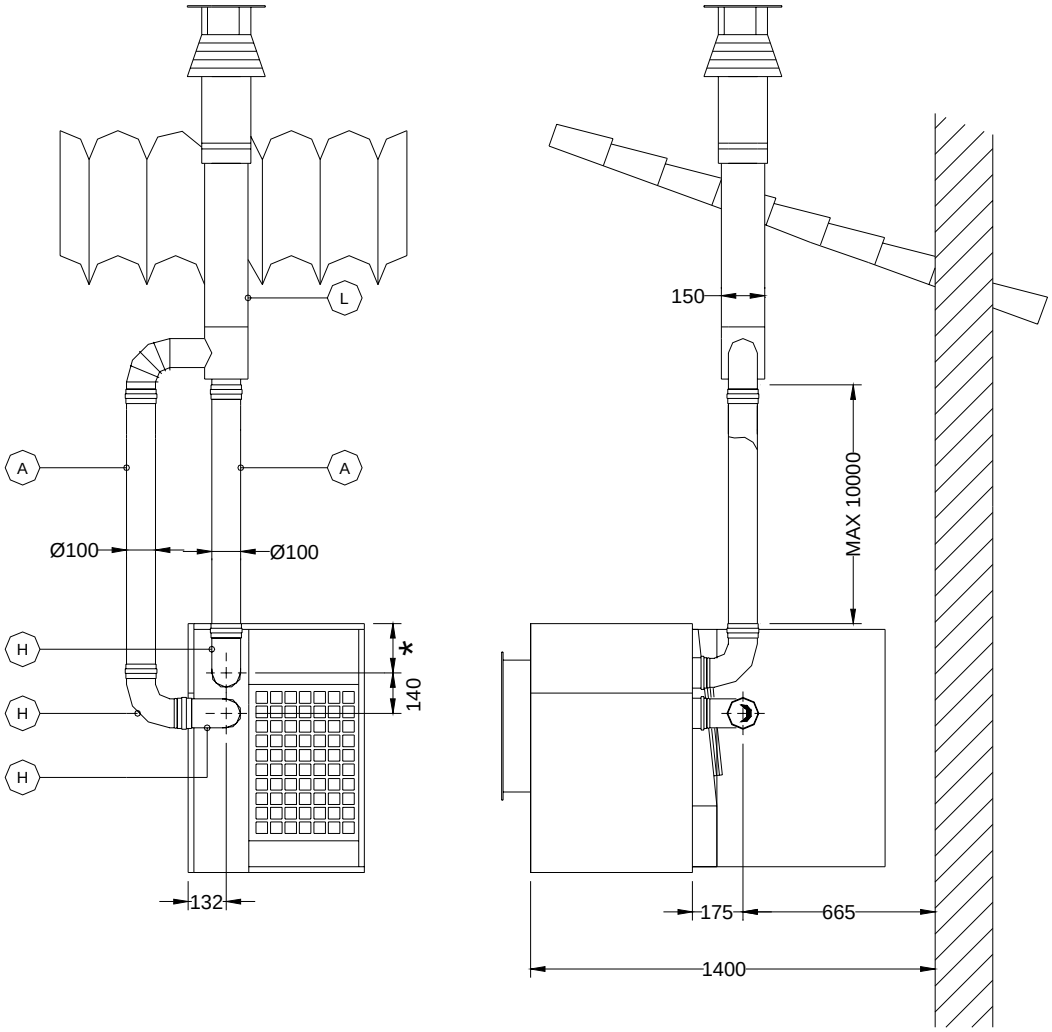
ITEM	DESCRIPTION
A	Flue pipe M/F ∅100 L=1000 with seal
C	Horizontal wall kit ∅100-100
D	Horizontal wall kit ∅100-150
F	Combustion air pipe M/F ∅150 L=1000 with seal
H	Bend 90° M/F ∅100 with seal
I	Bend 90° M/F ∅150 with seal
S	Bend 90° F/F ∅100 with seal

IMPORTANT:

MODEL	1-2-3	4-5-6
∅ FLUE SPIGOT SIZE	∅100 female	∅100 male
∅ COMBUSTION AIR SPIGOT	∅100 female	∅150 male
INSTALLATION	Flue should be adequately supported Each bend corresponds to about 0,8-1 meter of horizontal pipe work	

C_{32} Vertical coaxial flue kit

Type 1 – 2 – 3



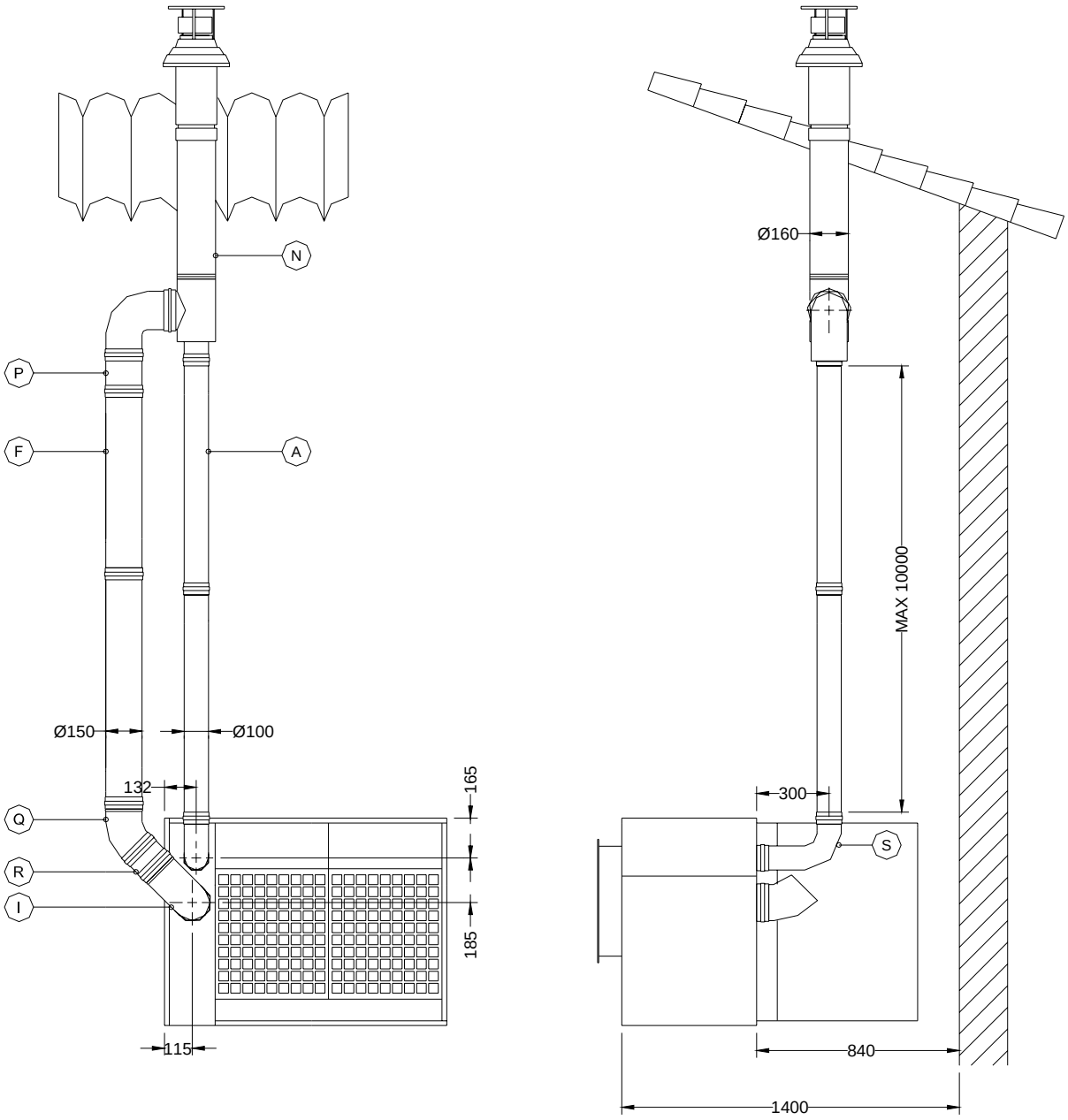
✳	157 mm **type 1 – 2**
	165 mm **type 3**

ITEM	DESCRIPTION
A	Flue pipe M/F ∅100 L=1000 with seal
H	Bend 90° M/F ∅100 with seal
L	Vertical coaxial roof kit ∅100-100

IMPORTANT:

MODEL	1-2-3
∅ FLUE SPIGOT SIZE	∅100 female
∅ COMBUSTION AIR SPIGOT	∅100 female
INSTALLATION	Flue should be adequately supported Each bend corresponds to about 0,8-1 meter of horizontal pipe work

Type 5 – 6 – 7

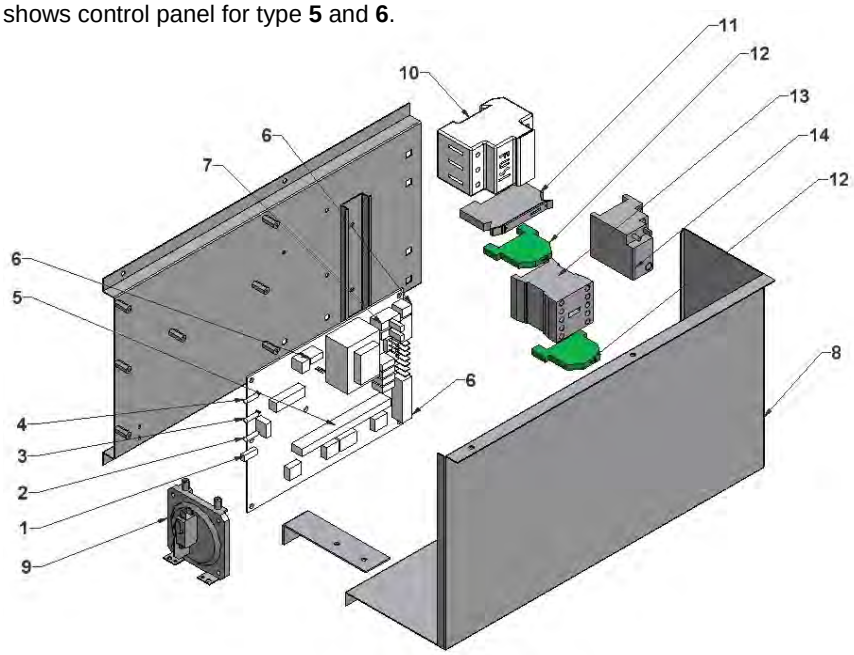


ITEM	DESCRIPTION
A	Flue pipe M/F ∅100 L=1000 with seal
F	Combustion air pipe M/F ∅150 L=1000 with seal
I	Bend 90° M/F ∅150 with seal
N	Vertical co axial roof terminal ∅100-150
P	Adaptor F/F ∅150 L=200 with seal
Q	Bend 45° M/F ∅150 with seal
R	Combustion M/F ∅150 L=140 with seal
S	Bend 90° F/F ∅100 with seal

MODEL	4-5-6
∅ FLUE SPIGOT SIZE	∅100 male
∅ COMBUSTION AIR SPIGOT	∅150 male
INSTALLATION	Flue should be adequately supported Each bend corresponds to about 0,8-1 meter of horizontal pipe work

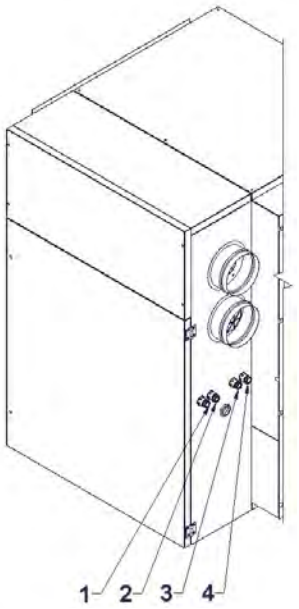
ELECTRICAL PANEL

The exploded view shows control panel for type **5** and **6**.



1. Lockout reset
2. Lockout indication Red
3. Over temperature indication Yellow
4. Operating light green
5. Flame control circuit
6. Terminal block
7. Line fuse
8. Control box cover
9. Differential pressure switch
10. Fuse holder (type **5** and **6**) only
11. Neutral connection with fuse (type **5** and **6**) only
12. Hearth connection (type **5** and **6**) only
13. Fused isolator (type **5** and **6**) only
14. Termal overload (type **5** and **6**) only.

1. Mains connection socket
2. Remote thermostat socket
3. Remote controls socket
4. Fire damper connection socket (customer supply)



ELECTRICAL CONNECTIONS

The heaters are supplied with the electric panel fitted and pre wired Connection is required to

- The mains electrical supply
- A room thermostat
- Or accessories such as a remote control panel.

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

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

⚠ The main electrical supply must not be switched off or disconnected as a method for stopping the heater, the exception to this is in the event of an emergency, or when the heater has been allowed to cool sufficiently to prevent any damage from being sustained to the heater or its controls (ie: during servicing).

Claims for damage will not be considered if they have resulted from incorrect wiring or the incorrect use of the heater.
Each heater requires a permanent 230V 50Hz 1ph (415/3/50Hz, Types 5 6) electrical supply, which must be wired through a Fused Isolator fitted with a fuse of the correct rating.
The correct supply connection points for the live, neutral, and earth are clearly indicated on the wiring diagram mounted inside the wiring box cover.
Wiring diagrams are also detailed within this manual.
The electrical supply isolator should be mounted adjacent to the air heater in an easily accessible position to allow for servicing isolation, or emergency shut off.

⚠ **Ensure that the mains isolator is turned OFF before undertaking any electrical on the heater. Access to the electrical panel is gained by opening the right hand heater side panel.**

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

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

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

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

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

WARNING

THESE HEATERS ARE NEUTRALLY SWITCHED

ELECTRICAL TABLE

Type	Electrical supply (V-50Hz)	Electrical power (kW)	Maximum current (A)	Line fuse (1) (A)	Live conductor (2) (mm^2)	Earth conductor (2) (mm^2)
1	230V 50Hz~ 1PH	0,450	4,08	6,3	1,5	1,5
2	230V 50Hz~ 1PH	0,450	4,08	6,3	1,5	1,5
3	230V 50Hz~ 1PH	0,640	4,59	6,3	1,5	1,5
4	230V 50Hz~ 1PH	0,850	6,73	10	1,5	1,5
5	415V 50Hz~ 3PH	1,210	3,27	6,3	1,5	1,5
6	415V 50Hz~ 3PH	1,610	4,35	6,3	1,5	1,5

(1) Included with the heater
(2) The supply cables size should ensure afall in voltage of not less than 5% over a length of 30 meters

DUCT CONNECTIONS

- **Air intake**

Connect any air intake ducts to the special opening in the intake plenum, interposing an anti-vibration joint to avoid transmission of vibration in the ducts. The appliance is set up for connection both to the rear and the bottom. To adapt the intake side it is sufficient to invert the assembly direction of the side closing panel with the intake grid.

- **Air delivery**

Connect the warm air distribution ducts to the front delivery flange of the appliance, interposing an anti-vibration joint to avoid transmission of vibration in the ducts.

⚠ **The appliance should always be attached to a duct as the gear ratio does not allow open head operation. The duct sizing must always be carried out by qualified personnel.**

PROTECTION

To avoid personal injury ensure all :

- Grills are in place and secure
- Panels and doors are shut

PRE COMMISSIONING CHECKS

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

- Check that all panels and fasteners are secure and in place.
- Check that the heater is mounted safely.
- Check that the flue is sealed, secured, and adequately supported.
- Check that the fan is free to rotate, that the fan motor is secure and that the guards and fan assembly are all in place and properly secured
- Check that the heater is installed so that it is not tilted and remains square.
- Check that the outlet duct resistance is compatible to the data plate .

Once the equipment has been installed, and before it is started up, check the following:

- All the safety conditions have been observed
- The equipment has been suitably positioned
- That the free area around the machine has been respected
- The gas connections have been properly carried out
- The exhaust and intake pipes have been correctly installed
- All the taps for the various circuits are open
- All the electrical connections have been properly carried out

⚠ **The may be fumes and odours the first time the equipment is started up, caused by the evaporation of liquid protecting the heat exchanger in storage; this is normal and will disappear after a short time of working. It is advisable to properly ventilate the room.**

INITIAL START UP

VENTILATION

- Switch on mains supply to the equipment
- Set On/ Standby switch to ON

Set the remote control panel switch to VENT check that fans rotation is correct

HEAT

- Set the remote control panel to HEAT
- Set the room thermostat to the desired temperature
- The flue venter will start, activating the differential pressure switch

After a short period ignition takes place After one minute the air flow fan will start

When desired room temperature is reached the burner will stop the fan will overrun for approximately 3-4 minutes .

IGNITION

- Connect the manometer on the pressure test point on the gas manifold
- Set mains isolator to On
- Open gas isolator cock
- Set the on/standby switch to ‘On’
- Set heat/vent switch to Heat
- Set the room thermostat to the desired temperature
- Reset any lockout in the system as indicated by the red or yellow lights

The flue venter will start up activating the differential pressure switch.

The heater will pre purge the combustion chamber the electronic control box will supply the ignition electrode and the gas valve simultaneously.

If the gas line has not been correctly purged ignition may not take place at the first attempt resulting in lockout of the burner. Reset button and repeat.

⚠ **Before each attempt at ignition it is necessary to wait at least 10 seconds**

When the burner has ignited check the manometer and, adjust gas pressure setting to pressure indicated on data plate, adjust by turning the solenoid valve screw on gas valve.

- Check the gas consumption reading corresponds with that indicated in the TECHNICAL DATA section.
- Set on/standby switch to 'standby'. When heater is sufficiently cool Isolate electrical supply Isolate gas supply. Remove the manometer and ensure the screw at the test point is tightened to avoid any gas leaks
- Open the gas isolating cock Switch on electrical supply. Set the room thermostat to the desire temperature. The heater is now ready for operation.

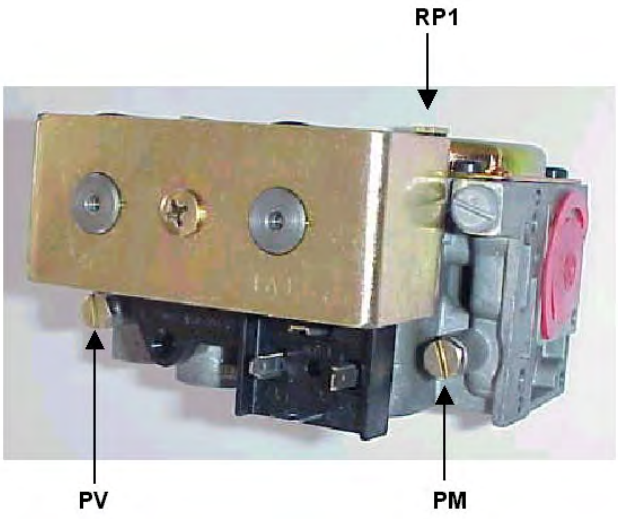
⚠ WARNING!
The heater must only be operated with the burner compartment door(s) closed

STOPPING
To stop the heater using only the room thermostat Set it to the minimum temperature. Fan will stop after about 3-4 minutes. If required, switch off the mains current at the isolator.

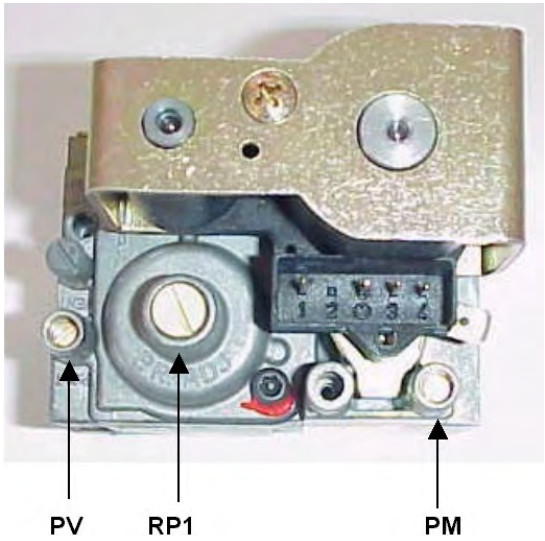
⚠ WARNING
If Heater is to be switched Off for a Long Period set ON/STANDBY switch to STANDBY.
Isolate at mains electrical supply
Isolate the gas supply

GAS SOLENOID VALVES

Model SIT 830(single stage)
(type 1 – 2)



Model SIT 840 (single stage)
(type 3 – 4 – 5 – 6)



PM Main inlet pressure test point
PV Head pressure test point
RP1 Pressure adjusting screws

GAS CONVERSION

The heaters are supplied ready for use with (G20) Natural Gas set as per the table below
Conversion kits are available from the manufacturer
Natural Gas H (G20)

TYPE	**1**	**2**	**3**	**4**	**5**	**6**	
Number of injectors	1	1	1	2	2	4	N°
Diameter of injector	410	480	555	500	540	450	mm/100
Gas supply pressure	20						mBar
Head pressure	13,0	13,0	13,0	10,0	13,0	10.5	mBar

To convert to Propane G31

1. Change injectors
2. Adjust the inlet gas pressure
3. Adjust the head pressure gas
4. Fit primary air diaphram (if required)
5. Fit adhesive label indicating gas type
6. Ensure settingsare correct as per manual.

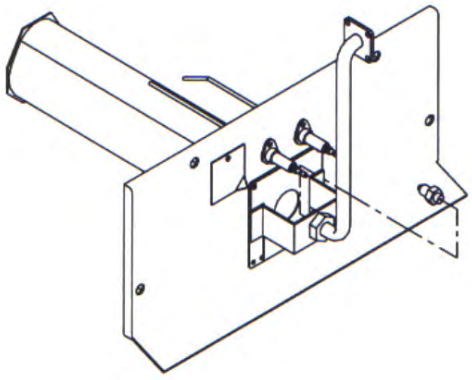
CHANGE INJECTORS:

To change injectors
Unscrew the natural gas injectors and replace with the correct size injectors for propane as shown in the table below :

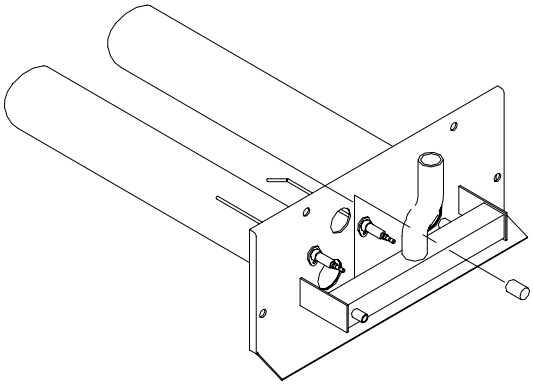
Propane Gas (G31)

TYPE	**1**	**2**	**3**	**4**	**5**	**6**	
Number of injectors	1	1	1	2	2	4	N°
Diameter of injectors	250	280	335	285	320	255	mm/100

Replacing injector in the manifold heater (type 1, 2, 3, 5)



Replacing injectors 2per manifold for heater (type 4, 6)



⚠ Check that the size of the injector corresponds to that on the data plate.

⚠ Check the size of the nozzles and the pressure correspond to that shown on the data plate.
When the conversion is complete place the transfer with the correct gas pressure on to the manifold as supplied in the conversion kit.
Test for gas soundness on completion. Ensure new aluminium washers are fitted **(type 4-6)**.

GAS PRESSURE SETTINGS

To regulate the gas inlet pressure :

- Connect a manometer to the main inlet pressure test point (**PM**)
- Ensure that the gas supply pressure is correct as per the table provided:

To regulate the head pressure:

- Connect the manometer to the head pressure test point (**PV**)
- Ensure the head pressure is correct to the tables provided

Gas propane (G31)

TYPE	1	2	3	4	5	6	
Head pressure	35,5	35,5	34,5	35,5	34,5	35,5	mBar
Inlet gas pressure	37						mBar

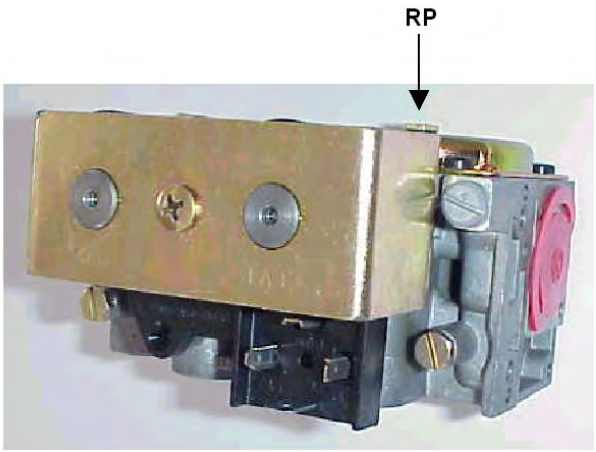
⚠ **WARNING Inlet gas pressure must not exceed 60mbar at the gas valve inlet**

Gas valve settings Propane G31

For operation on propane it will be necessary to exclude the pressure regulation of the gas valves by the method shown

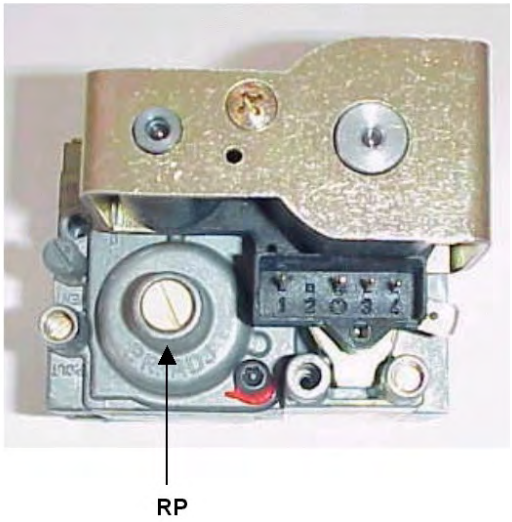
Screw adjuster **RP** to the bottom:

Elettrovalve gas SIT 830 (type1-2)



- Remove plastic cap
- Turn screw clockwise **RP**
- Replace the cap and seal with paint

Elettrovalve gas SIT 840 (type 3-4-5-6)



- Remove plastic cap
- Turn screw clockwise **RP**
- Replace the cap and seal with paint

⚠ **On heaters with 2 gas valves the above must be carried out on both valves.**

Diaphram assembly:

Diagram showing the fitting of a diaphram plate for the primary air single burner manifold
Heater types 1-2-3-5

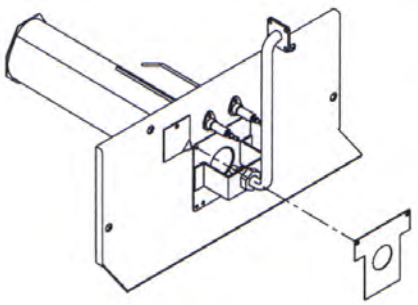
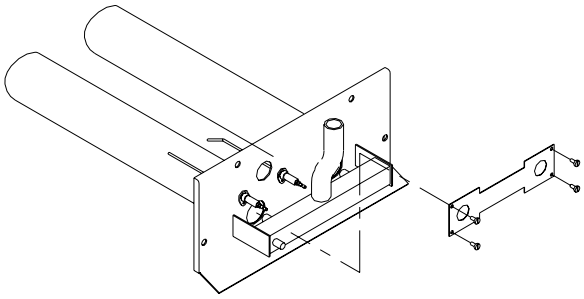


Diagram showing the fitting of a diaphram plate for the primary air for two burner manifolds
Heater types 4-6



⚠ **WARNING the diaphram plates should only be used when using propane gas G31.**

Gas conversion label:
Once a heater has been converted to Propane ensure that the correct label is fitted to the burner over top of the one fitted in the factory covering it completly.

⚠ **ATTENTION!**
It is recommended that the diameter of the nozzles be checked and that the pressure corresponds to that on the data plate provided.

Ensure that all of the additional gas components are Correct for the installation (Including storage tank pipes and pressure valves ect).
Ensure that the pressure regulators are re sealed after carring out the conversion.

THERMOSTAT

The heater is supplied with thermostats to control the FAN operation and LIMIT functions .

- **FAN OPERATION (SND)**

When the air near the sensor SND reaches the set temperature (30°C) which is approximately 30 seconds after ignition the electrical contact closes and starts the fan.
When the air temperature close to the sensor drops below the set temperature (30°C) and about 3-4 minutes after the burner switches off the fan will stop. This prevents cold air flows when the burner starts and stops.

Fan control SND TR function is connected in parallel through the control box to the fan operation SND

- **FAN CONTROL THERMOSTAT (SND - TR)**

If the air reaches the set temperature due to a fault in the air circulation (SND – TR) thermostat (70°C), will shut down the burner and the yellow light on the front of the heater will illuminate. Once the heater has sufficiently cooled down the thermostat will reset and the light will go out
Continual operation should be investigated.

- **LIMIT THERMOSTAT (LM)**

When due to a fault the air temperature near the sensor reaches exceeds the set value and reaches (100°C), the yellow indicator light will flash and the burner will shut down The overheat limit switch will have to be manuallyreset

FAN

The driven viariable pitch pulley drive and fixed fan pulley are factory pre set and are suitable for most applications.
For short duct lenghts and free blowing applications the motor pulley may be changed to a large size to further reduce the fan speed.

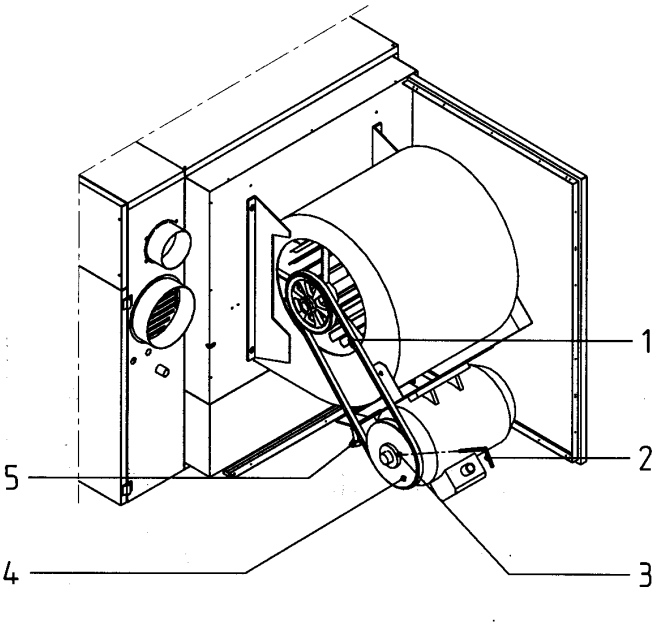
If will be necessary to check that the temperature rise across the heater is within the tolerance shown in the tecnical data
On type 5-6 Three Phase heaters, fan rotation should be checked prior to first ignition of the unit.

If may be necessary to adjust the motor pulley to achieve correct motor running current as motor plate.

To check electrical absorption of the motor proceed as follows:

- Insert the ammeter on a phase of the general supply line
- Set the appliance to summer ventilation, so as to exclude all other equipment (burner and auxiliary parts)
- Read the absorption figure on the ammeter and compare it with the plate data for the motor shown in the TECHNICAL DATA chapter.

Regulation of the variable pulley on motor



1. Slacken the belt tension by unscrewing screw (5)
2. Remove the belt (1)
3. Loosen grub screw (3) of the mobile part of pulley with a hexagonal spanner (2)
4. Rotate the mobile part of the pulley so as to obtain the pitch line diameter required
5. Lock the grub screw (3) tightly at the hub hollow
6. Mount and tighten the belt (1)

CONTROLS

To ensure that the heater is working correctly certain criteria need to be checked . Start up heater and check the following

- Check that the fan starts approximately 30 seconds after ignition of the burner.

When the heater is at its full efficiency after about 20 minutes the following checks should be made

Check that the horizontal fins are correctly set so as to give the optimum heating performance and the air flow is sufficient to cool the heat exchanger. ensure where vertical fins are installed they are also open and not resrtricting the air flow .

- Check that there are no gas leaks
- Check that the gas rate is correct using a meter.
- Check injector pressure is correct.
- Check temperature rise is correct to data plate.
- Check the operation of the control and limit thermostats TR, SND, LM.
- Check that the room thermostat operates the burner not the fan.
- Check that the motor absorbtion is not more than stated on data plate.
- Check that the flue venter and axial fan are working correctly.
- Check that the fan runs on 3–4 minutes ofter the burner has shut down.
- Check output corresponds to that on the data plate.
- Check that there is no condensate in the flue gasses.

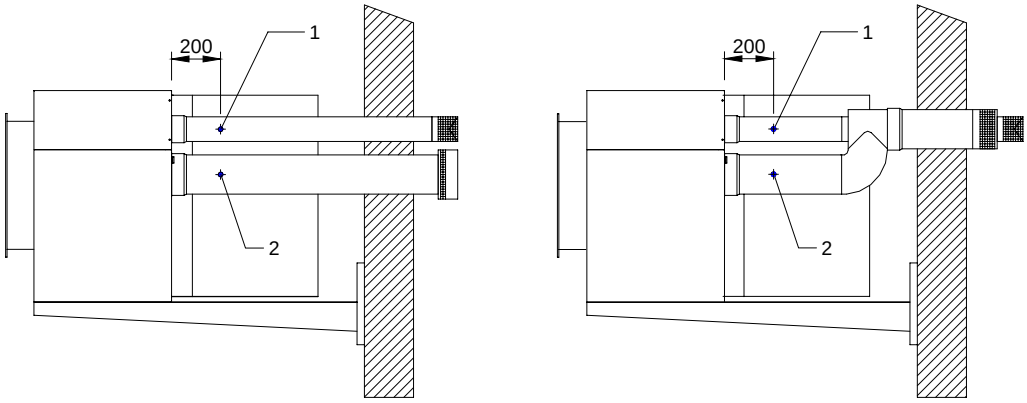
MAINTENANCE

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 at the supply cock and isolator respectively..

COMBUSTION PRODUCTS SAMPLING

In order to carry out analyses of the Flue gasses sample points must be made at the following dimensions See Diagram



1. Combustion by-product sampling point
2. Combustion air sampling point

- **CLEANING OF EXHAUST AND INTAKE DUCTS**

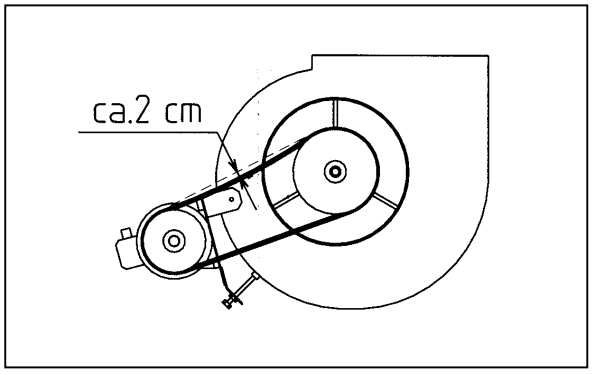
The cleaning of the exhaust and combustion air intake ducts consists of the mechanical removal of dust and any foreign substances which may have been deposited internally.

- **CENTRIFUGAL FAN MAINTENANCE**

Cleaning of the fan consists of the mechanical removal of dust and any foreign substances which may have been deposited on the fan wheel, motor and intake grate. Periodically, check the transmission belt tension and the alignment between motor pulley and the fan pulley.

The belts must not be tighter than is necessary in order to prevent sliding; on pressing the two sides of the belt with hands, the belt must give at least 2-3 cm.

To regulate the transmission use the special belttightening system.



- **CLEANING OF EXHAUST EXTRACTOR**

Cleaning of the exhaust extractor consists of the mechanical removal of dust and any foreign substances which may have been deposited on the fan.

- **LIMIT THERMOSTAT**

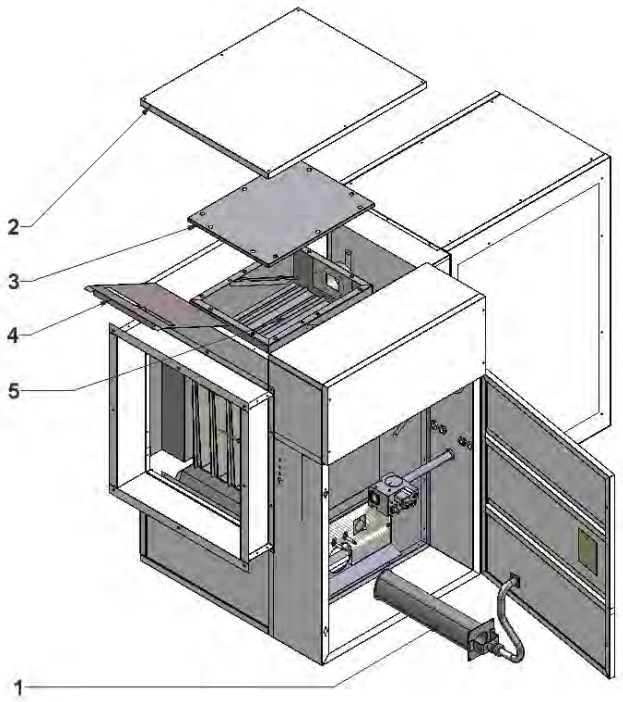
Annually, check the LIMIT thermostat is functioning properly, disconnecting the special bridge marked TEST and checking that the burner stops.

- **CLEANING OF BURNER**

Cleaning of the burner takes place by removing it from its housing and removing any scale which may have been deposited on the tubing, using exclusively compressor air or brass brush. Any broken tubes or packing must be replaced.

- **CLEANING OF HEAT EXCHANGER**

Cleaning of the heat exchanger must be carried out by authorized personnel and is governed by specific regulations. As a guideline cleaning should take place at least once a year, at the beginning of the winter. For this operation proceed as follows:



- Remove burner **(1)** from its housing after having disconnected the gas solenoid valve unit;
- Remove upper panel **(2)**;
- Remove inspection door **(3)**;
- Remove conveyor **(4)**;
- Brush the exchange elements **(5)**;
- Remove any soot which may have fallen from the exchange elements into the combustion chamber **(5)**;
- Clean all the external surfaces of the heat exchanger
- Reassemble everything, paying particular attention to tightness and substituting packing if necessary

FAULT FINDING

If heater is not working firstly check the following:

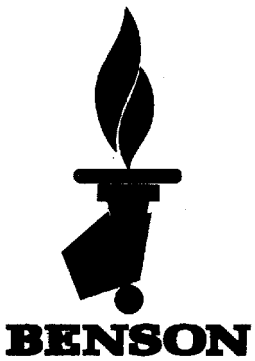
- Check electrical supply
- Check gas pressure
- Check gas pressure is a stated in Technical Data

FAULT	CAUSE	SOLUTION
No operation	No electrical supply	Check main isolator. Check supply cables. Check line fuses. Check electrical connections
No spark ignition. *Flue venter working* *No indication lights on*	Differential pressure switch not working	Check flue pipe and combustion air pipe are clear
	Faulty differential pressure switch	Replace differential pressure switch
	Poor connection at pressure switch	Check air pipes Check electrical connection Check that the air pipes are condensate free
	Faulty flue venter	Change flue venter
	Faulty control box	Change control box
	Faulty ionization electrode	Check the electrode is not cracked or damaged Check the probe
No ignition *Flue venter not working* *No indication lights on*	Room thermostat open	Check room thermostat
	Faulty flue venter	Change flue venter
	Faulty control box	Change control box

Burner lights but cuts out after 5 seconds	Phase and Neutral inverted	Check polarity of electrical supply
	Faulty ionization probe	Check electrical connection to the probe. Check probe Change ionization probe.
	Faulty ignition	Check that the gas type is suitable for heater Check gas pressure Check head pressure. Check gas supply pipes have been purged of air.
Explosive start up	Faulty ignition electrode	Change ignition electrode
	Incorrect electrode position	Reposition electrode correctly over the burner bar
	Faulty burner tube	Change burner tube
	Faulty ignition transformer	Change transformer
	Faulty ignition	Check that the gas type is suitable for heater Check gas pressure Check head pressure. Check gas supply pipes have been purged of air.
	Heat exchanger dirty	Check heat exchanger
Burner shuts down *No indication lights on*	Pressure differential switch not operating	Check air intake pipes are not blocked . Check flue pipes are not blocked check operation of flue venter
	Faulty differential pressure switch	Replace differential pressure switch
	Room thermostat in hot air flow	Check position of thermostat

The burner goes out due to the intervention of the thermostat SND; and is restarted automatically when heater has cooled down *Yellow light on.*	Excessive heat exchanger temperature	Check that the gas type is suitable for heater Check gas pressure Check head pressure. Check injector size is correct for the heater
	Excessive air temperature due to poor air flow.	Check that the fan blades are clean. Check that the horizontal and (vertical if fitted) louvres are sufficiently open (see installation). Check fan is operating correctly with sufficient air flow.
	Faulty SND thermostat or faulty fan control l	Change SND thermostat or fan control l
The burner goes out due to the intervention of the thermostat TR. and is restarted automatically when heater has cooled down *Yellow light on.*	Excessive heat exchanger temperature	Check that the gas type is suitable for heater Check gas pressure Check head pressure. Check injector size is correct for the heater
	Excessive air temperature due to poor air flow.	Check that the fan blades are clean. Check that the horizontal and (vertical if fitted) louvres are sufficiently open (see installation). Check fan is operating correctly with sufficient air flow
	Faulty thermostat	Change thermostat

Control box will not reset. *Red light illuminated*	Faulty flame control module	Change control module check electrical connections
Fan works intermittently	Faulty FAN operation	Change fan control or SND thermostat
	Insufficient gas pressure	Check that the gas type is suitable for heater Check gas pressure Check head pressure. Check injector size is correct for the heater
The fan does not work	Faulty FAN operation	Change fan control or SND thermostat
	Faulty fan	Check fan operation Check fan motor.
Heater works continuously without reaching the required temperature	Heater to small for application Insufficient gas pressure	Re check heat output required for application Check that the gas type is suitable for heater Check gas pressure Check head pressure. Check injector size is correct for the heater
	Dirty heat exchanger	Clean heat exchanger



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