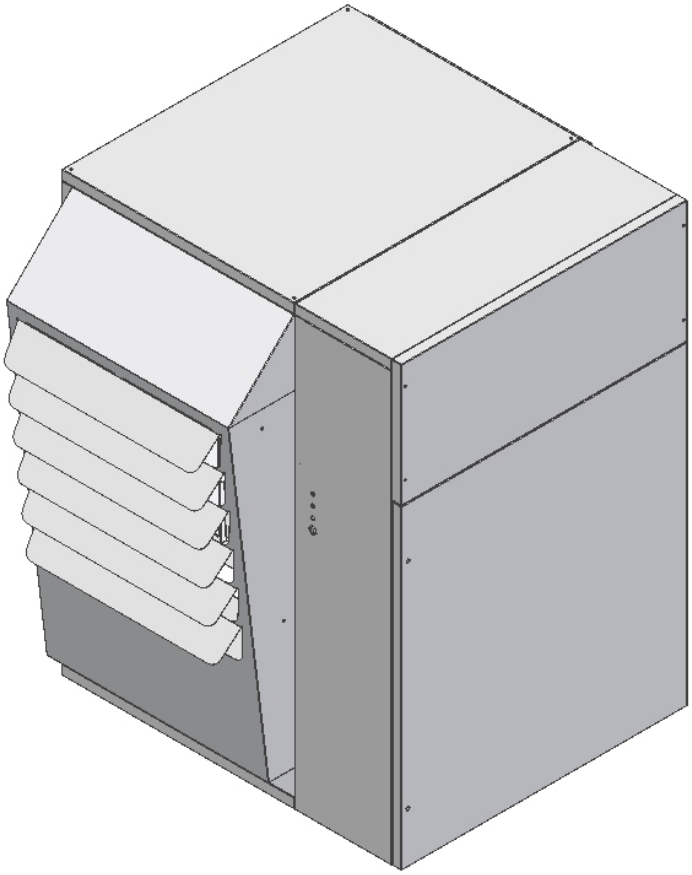
Gas room sealed unit heaters 2 stage

TECHNICAL INFORMATION ASSEMBLY INSTRUCTIONS, USE AND MAINTENANCE

RS/UHA-2



BENSON HEATING
LUDLOW ROAD
KNIGHTON
POWYS
LD7 1LP

MAY 2003

Benson Heating is a divison of
Benson Climate Systems Ltd

COMPLIANCE NOTICES

The Benson RS/UHA2 range of warm air heaters detailed herewith are manufactured for Benson Heating within the parameters of ISO 9002.

The Benson RS/UHA2 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) 91368/EEC 93/44/EEC 93/65/EEC
Low Voltage Directive (73/23/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/UHA2 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/UHA2Heater 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.

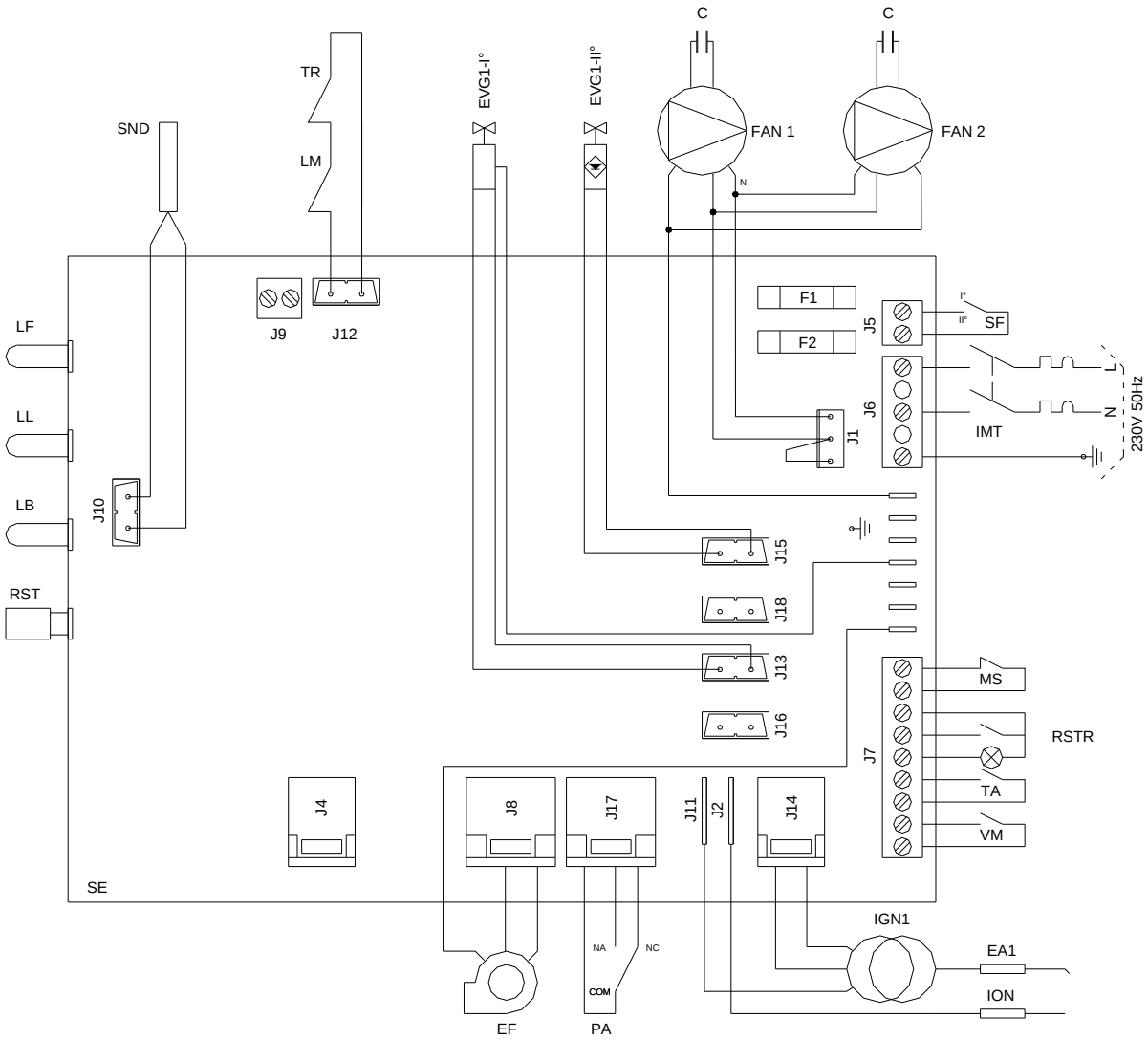
Notified Body PIN Reference is

RANGE

Type	***Model***	***Code***
1	RS/UHA2 50	**3TAIT2C016**
2	RS/UHA2 80	**3TAIT2C026**
3	RS/UHA2 105	**3TAIT2C036**
4	RS/UHA2 140	**3TAIT2C046**
5	RS/UHA2 200	**3TAIT2C066**
6	RS/UHA2 260	**3TAIT2C086**
7	RS/UHA2 325	**3TAIT2C106**

INDEX

Heaters type 1-2-3-4-5

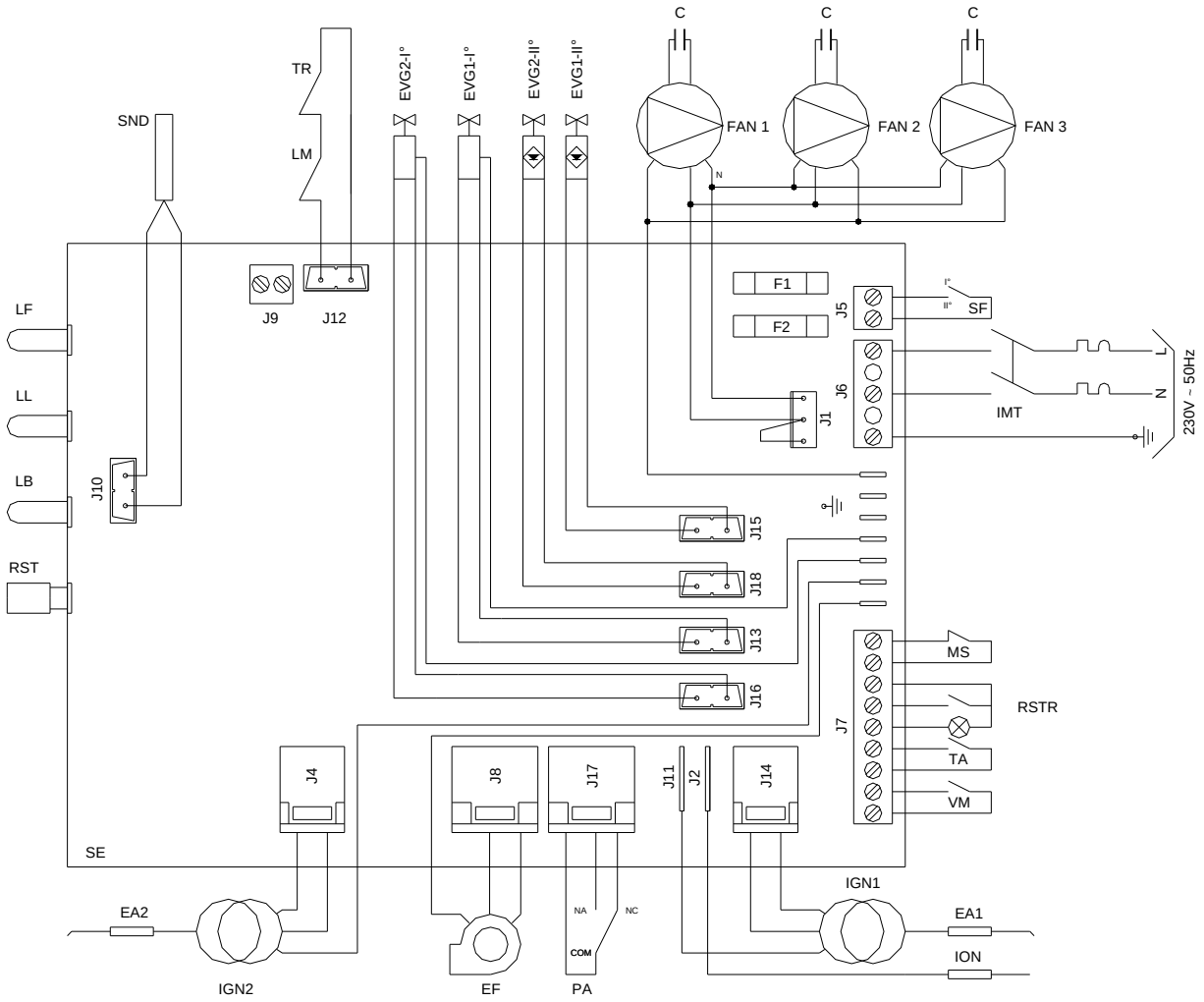


KEY:

SND	Temperature probe
TR	Regulatory control thermostat (auto reset)
LM	LIMIT thermostat (manual reset)
EVG1-I°	Gas solenoid valve1
EVG1-II°	Second stage gas valve 2
C	Fan capacitor
FAN 1	Axial fan 1
FAN 2	Axial fan 2 (type 5)
F1-F2	Line fuse (6,3 A)
LF	Green working light
LL	High temperature indication light
LB	Lockout indication
RST	Lockout reset
EF	Flue venter
PA	Differential pressure switch
IGN1	Ignition transformer
EA1	Spark electrode
ION	Ionisation probe
SE	Electrical control board
IMT (*)	Fused isolator
MS (*)	Fire damper connection (accessory)
RSTR (*)	Remote reset connection
TA (*)	Room thermostat connection
VM (*)	Fan switch connection
SF (*)	Second stage gas valve connection

(*) External to the heater customer supply.

Heater type 6-7



KEY:

SND	Temperature probe
TR	Regulatory control thermostat (auto reset)
LM	LIMIT thermostat (manual reset)
EVG1-I°	Gas solenoid valve 1
EVG2-I°	Gas solenoid valve 2
EVG1-II°	Second stage gas valve 1
EVG2-II°	Second stage gas valve 2
C	Fan capacitor
FAN 1	Axial fan 1
FAN 2	Axial fan 2
FAN 3	Axial fan 3(Type 7)
F1-F2	Line fuse
LF	Green working light
LL	High temperature indication light
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 control board
IMT (*)	Fused isolator
MS (*)	Fire damper connection (accessory)
RSTR (*)	Remote reset connection
TA (*)	Room thermostat connections
VM (*)	Fan switch connections
SF (*)	Second stage gas valve connection

(*) External to the heater customer supply.

GAS CONVERSION

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

Natural Gas (G20)

TYPE	1	2	3	4	5	6	7	
Number of injectors	1	1	1	1	2	2	4	N°
Diameter of injectors	3,10	410	480	555	500	540	450	mm/100
Gas supply pressure	20							mBar
Head pressure high fire	11,0	13,0	13,0	13,0	10,0	13,0	10,5	mBar
Head pressure low fire	6,0	7,0	6,5	6,5	7,0	6,5	5,0	mBar

BEFORE CHANGING INJECTORS ENSURE GAS SUPPLY IS ISOLATED

INSTRUCTIONS FOR CONVERSION TO PROPANE GAS G(31)

1. Change the injectors
2. Adjust the gas inlet pressure
3. Adjust the head pressure
4. Fit primary air diaphragm (if required)
5. Fit adhesive label supplied with kit indicating gas type
6. Ensure settings are correct as per the manual and data plate

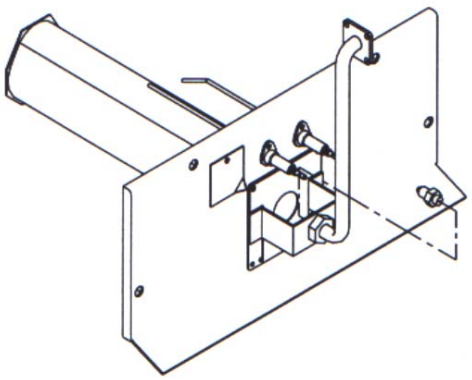
CHANGE INJECTORS:

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

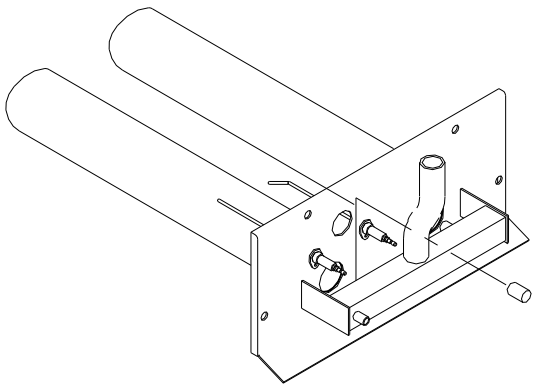
Propane gas (G31)

TYPE	1	2	3	4	5	6	7	
Number of injectors	1	1	1	1	2	2	4	N°
Diameter of injectors	190	250	280	335	285	320	255	mm/100

Replacing injectors single manifold **(type 1-2-3-4-6)**



Replacing injectors 2 per manifold **(type 5-7)**



⚠ Check the size stamped on the side of the injector is correct to the data in the manual.

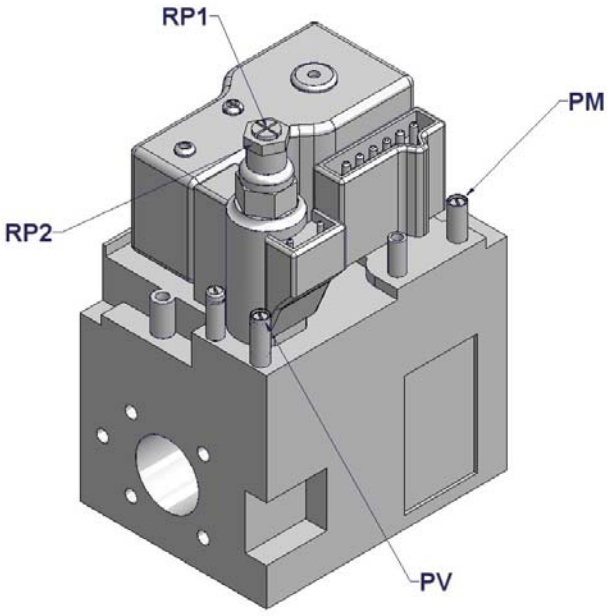
⚠ Ensure that the new injectors are correctly fitted in the manifold and are gas tight, When the conversion is complete fix the transfer supplied with the kit showing the correct gas pressure on to the manifold
Test for gas soundness on completion
Ensure that the aluminium washers supplied for (types 5–7) are fitted when changing the injectors.

If the gas line has not been correctly purged ignition may not take place at the first attempt resulting in the heater going to lockout
Reset the lockout before re starting ignition sequence

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

- Connect the manometer on to the pressure test point PM and check inlet gas pressure if correct connect manometer to test point PV and start heater with heater running ensure the gas pressure corresponds to that shown on the data plate adjust by altering the screws RP1 and RP2 on the gas valve
- Check that 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 gas supply
- Remove manometer ensure the screw at the test point is tightened test for gas leaks
- Open the gas isolating cock switch on the electrical supply set the room thermostat to the desired temperature.
- The heater is now ready for operation

GAS VALVE
Model SIT 843 (two stage)



PM Inlet pressure test point.
PV Head pressure test point
RP1 Cross cut screw low fire adjuster
RP2 Hexagonal screw high fire adjuster

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

STOPPING

To stop the heater use only the room thermostat Set it to the minimum temperature The fan will stop after 3 minutes or when the heat exchanger is sufficiently cool If required switch off the electricity supply at the isolator

⚠ **!**

The main electrical supply must not be switched off or used as a method of stopping the heater except in an emergency until the heater has cooled down sufficiently preventing damage to the heat exchanger
Interruption of electrical supply whilst heater is in operation will cause it to go to overheat and may damage the heat exchanger the LIMIT thermostat will operate and this will have to be manually re set.

Assembly of primary air diaphragm:

Diagram showing the fitting of a primary air diaphragm to single burner manifold (1-2-3-4-6)

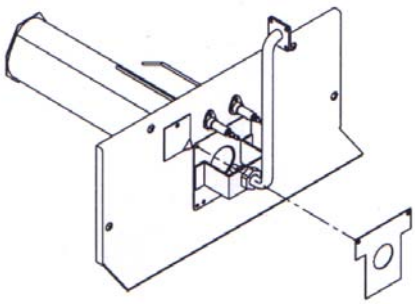
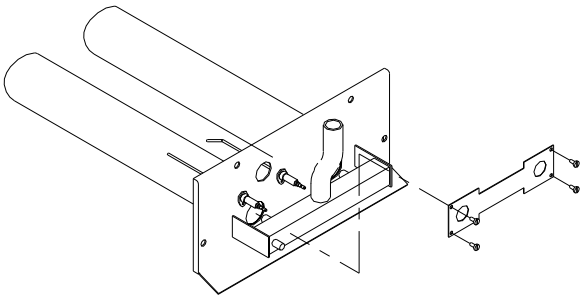


Diagram showing the fitting of a primary air diaphragm for a two burner manifold type (7)



⚠ **Warning the diaphragm plates should only be used when using propane gas G31.**

Gas conversion adhesive label:
Once the heater has been converted to propane ensure that the correct label is fitted to the burner overtop of the factory fitted one covering it completely. It is recommended that the diameter of the nozzles be checked also that the pressure corresponds to that shown 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 etc
Ensure that the pressure regulators are sealed after carrying out the conversion.

GAS PRESSURE REGULATION

To regulate the gas inlet pressure :

- Connect a manometer onto the gas valve test point (**PM**)
- Adjust the inlet gas supply regulator (customer installation) to pressure indicated on data plate:

To regulate the gas head pressure to the burner:

- Connect a manometer onto the gas valve test point (**PV**)
- Adjust the pressure regulating adjusters RP1/ RP2 as detailed on next page to obtain correct pressures indicated in table below:

Propane gas (G31)

TYPE	**1**	**2**	**3**	**4**	**5**	**6**	**7**	
Gas supply pressure	37							mBar
Head pressure max	35,5	35,0	35,5	35,5	34,5	35,5	34,5	mBar
Head pressure min	20,0	18,0	18,5	18,0	18,0	18,0	18,5	mBar

⚠ **Gas inlet pressure must not exceed 60 mbar at the gas valve inlet.**

Gas valve head pressure setting high fire Propane G31:

When setting the gas pressure for propane high fire (second stage) contact SF should be closed the high fire pressure adjusting screw on the gas valve must be excluded.
Connect a manometer on test point PV

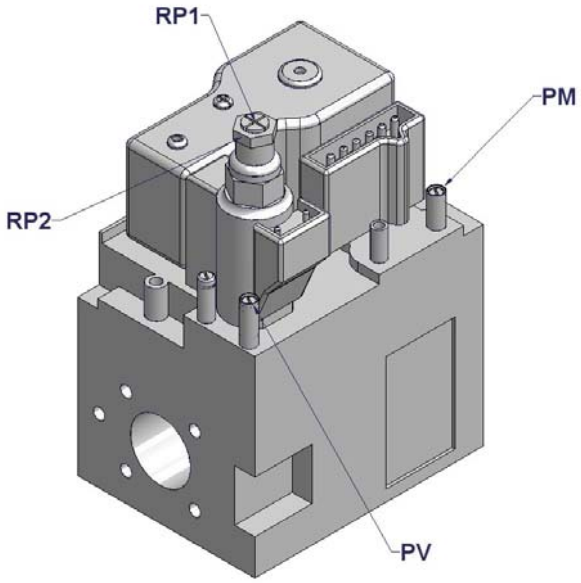
Remove the plastic cover from the adjuster **RP1 RP2**
With a screw driver hold the adjuster RP1 stationary and using a spanner, screw adjuster RP2 clockwise to the bottom of the thread until the correct pressure according to the data plate is achieved .

Gas valve head pressure setting low fire Propane G31 :

When setting the gas pressure for propane low fire (first stage) contact SF should be open. The low fire pressure should be adjusted to the settings shown on the data plate and the data in the manual provided by adjusting screw RP1
Clockwise increases the pressure

Anti clockwise to decrease the pressure
On completion replace the plastic cover and seal with paint
Remove manometer ensuring that the test point screw is gas tight

Gas valve gas SIT 843



⚠ **On heaters with 2 gas valves the pressure regulation must be carried out on both gas valves**

FAULT FINDING

If the heater is not working firstly check the following :

- Check electrical supply
- Check voltage is as stated +15%, -15%
- Check gas supply is on
- Check that the pressure is as stated in the 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 pipe to switch is connected and not damaged Check electrical connections Check that pipes are condensate free .
	Faulty flue venter	Replace flue venter
	Faulty control panel	Replace control panel
	Faulty ignition electrode	Check ignition probe is not cracked or damaged Replace the ignition probe
No ignition *Flue venter working* *No indication lights on*	Room thermostat open	Check room thermostat.
	Faulty flue venter	Replace flue venter
	Faulty control panel	Replace control panel

Burner lights but locks out after 5 seconds	Live and neutral inverted Poor earth	Check electrical connections
	Faulty ionisation probe	Check electrical connection on probe. Check probe for cracks or damage. Replace ionisation probe .
	Faulty ignition	Check the gas type is suitable for the heater. Check the inlet gas pressure. Check the head pressure. Check the gas supply pipes have been properly purged of air .
Explosive start up.	Faulty ignition electrode	Replace ignition electrode
	Incorrect electrode position	Reposition electrode correctly over the burner bar.
	Faulty burner tube	Replace the burner tube
	Faulty ignition transformer	Replace ignition transformer
	Faulty ignition	Check the gas type is suitable for the heater. Check the inlet gas pressure. Check the head pressure. Check the gas supply pipes have been properly purged of air .
	heat exchanger dirty	Check / clean heat exchanger
Burner shuts down then re lights automatically . *No indication lights on*.	Pressure differential switch not operating correctly	Check that air pipe to switch not damaged or blocked. Check that the flue and combustion air pipes are clear. Check that the thermal overload on the flue venter has not operated
	Faulty pressure differential switch	Replace differential switch
	Room thermostat in warm air flow	Check position of thermostat

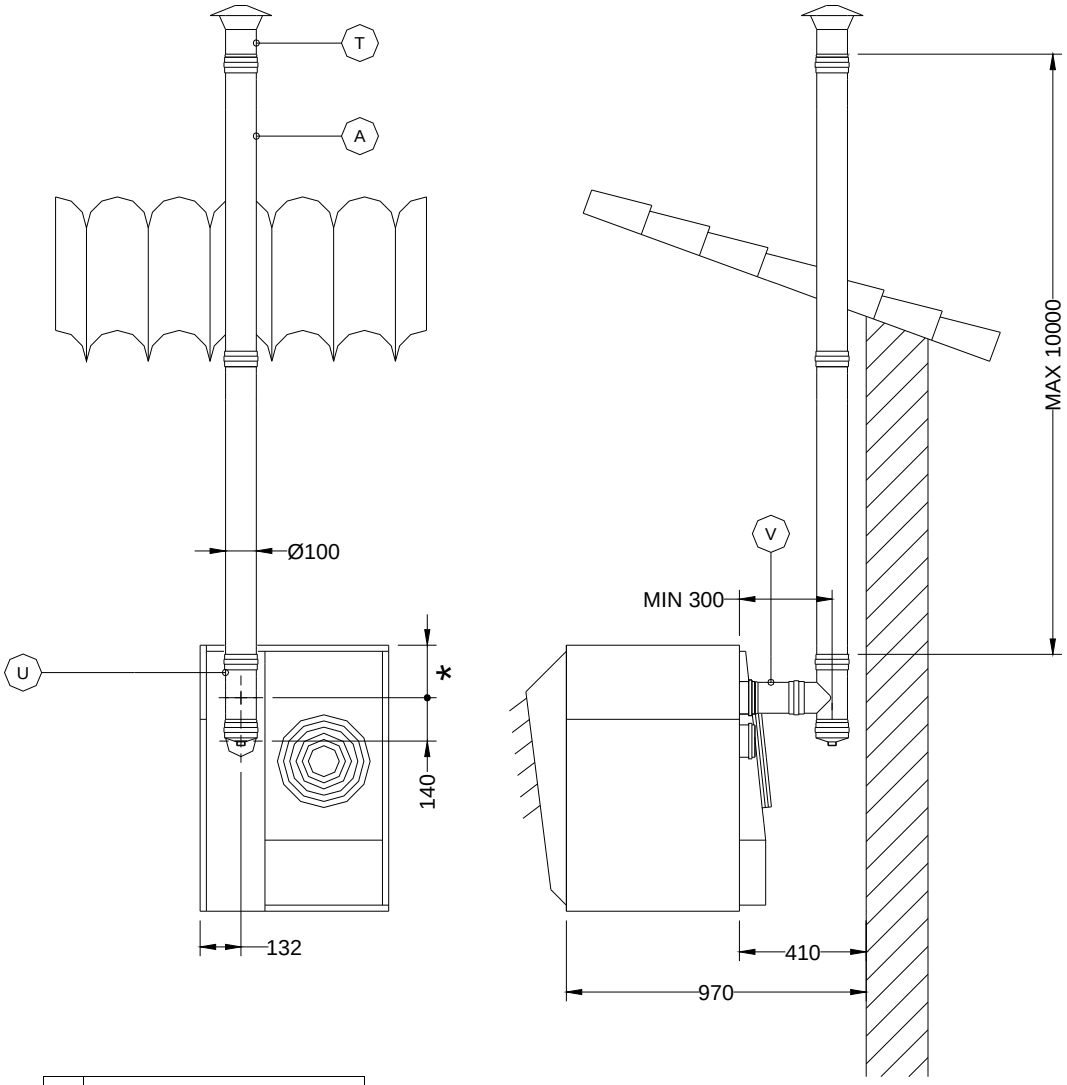
Burner goes out due to the intervention of the SND thermostat and is restarted automatically when the heater has cooled down . *Yellow indication light on.*	Excessive heat exchanger temperature	Check inlet gas pressure Check burner head pressure Check that gas type is suitable for heater Check injector size is correct for the heater.
	Excessive air temperature due to insufficient air flow over heat exchanger.	Check the fan blades are clean Check that the horizontal and (vertical if fitted) louvers are sufficiently open. (see in installation section of manual) Check that the fan speed is correct and the air flow over the chamber is sufficient.
	Faulty SND thermostat or control panel	Replace SND thermostat or control panel
Burner goes out due to the intervention of the TR thermostat and is restarted automatically when the heater has cooled down . *Yellow indication light on.*	Excessive heat exchanger temperature	Check inlet gas pressure Check burner head pressure Check that gas type is suitable for heater Check injector size is correct for the heater.
	Excessive air temperature due to poor air flow	Check the fan blades are clean Check that the horizontal and (vertical if fitted) louvers are sufficiently open. (see in installation section of manual) Check that the fan speed is correct and the air flow over the chamber is sufficient.
	Faulty thermostat	Replace thermostat

Burner goes out due to the intervention of the LIMIT thermostat (LM). *Yellow light flashing*	Excessive heat exchanger temperature.	Check inlet gas pressure Check burner head pressure Check that gas type is suitable for heater Check injector size is correct for the heater.
	Excessive air temperature due to poor air flow over heat exchanger	Check the fan blades are clean Check that the horizontal and (vertical if fitted) louvers are sufficiently open. (see in installation section of manual) Check that the fan speed is correct and the air flow over the chamber is sufficient..
	Faulty thermostat	Replace thermostat
	Faulty fan	Check fan capacitor Check fan motor.
	Intervention of thermal overload on fan	Check electrical absorption Replace fan motor
	Faulty fan operation	Change fan control or SND thermostat
Heater at lockout *Red lamp illuminated*	Faulty ignition	Check inlet gas pressure Check burner head pressure Check that gas type is suitable for heater Check that gas line has been purged correctly.
	Faulty ionisation probe	Check electrical connection to the probe. Check probe is not cracked or damaged Change probe or probe lead
	Faulty ignition electrode	Replace ignition electrode.
	Faulty solenoid	Replace solenoid
	Dirty gas filter	Clean filter

The control panel will not reset . *Red light on*	Faulty flame control module	Replace the flame control module after first checking the electrical connections
Fan works intermittently	Defective fan control	Change fan control or SND thermostat
	Insufficient gas pressure	Check that the gas type is suitable for the heater . Check the gas pressure Check burner head pressure.
The fan does not work.	Defective fan control	Change fan control or SND thermostat
	Faulty fan	Check fan capacitor. Check the fan motor .
The heater works continuously with out reaching the required temperature	Heater to small for application Insufficient gas pressure	Re check heat output required for the application Check that the gas type is suitable for the heater . Check gas pressure. Check burner head pressure.
	Dirty heat exchanger	Clean heat exchanger

B_{22}: Single flue option with condensate tee and roof terminal combustion air from inside the room

Type 1 – 2 – 3 – 4



✳	**157 mm** type 1 – 2 – 3
	165 mm type 4

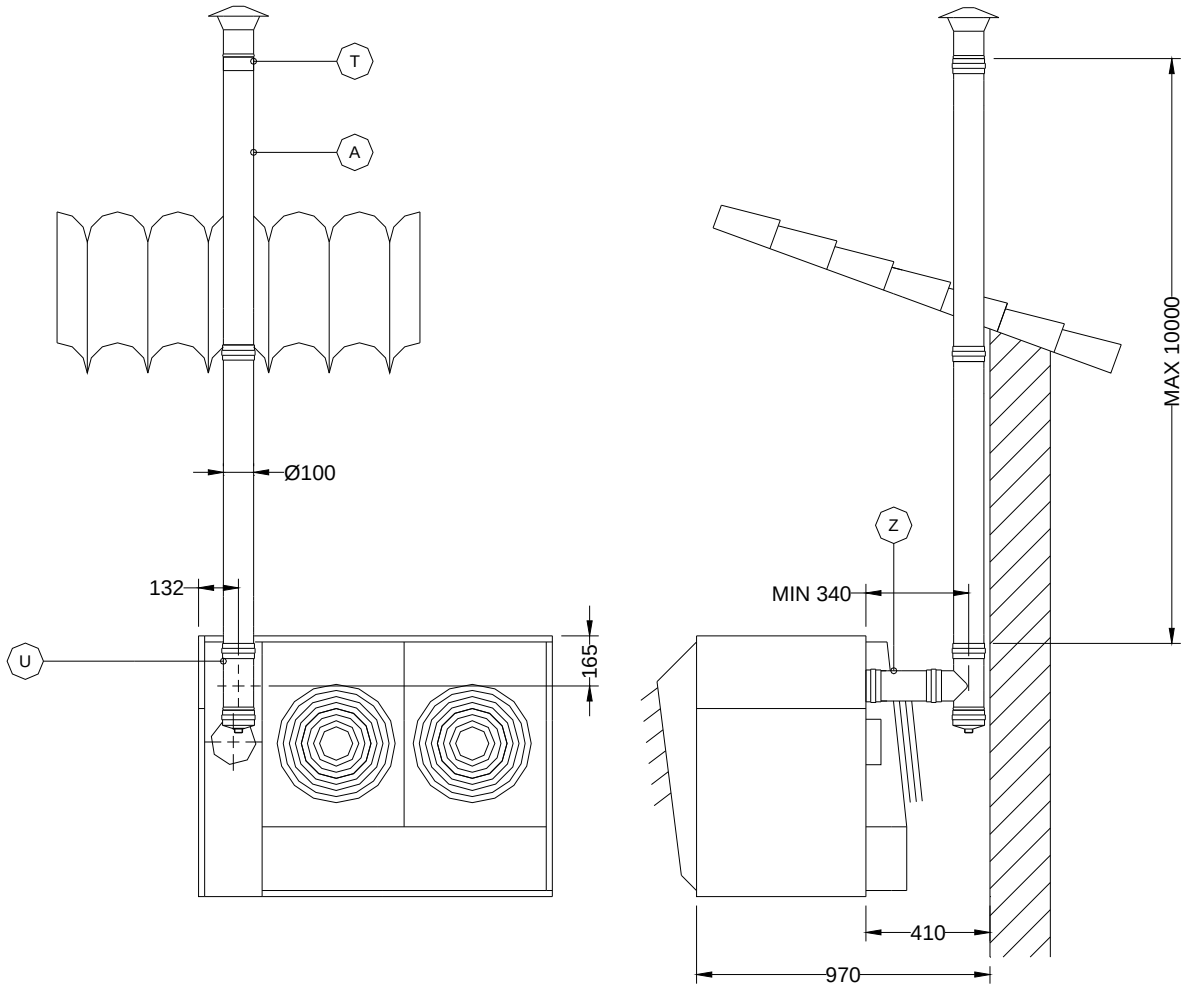
ITEM	DESCRIPTION
A	Pipe M/F ∅100 L=1000 with seal
T	Terminal with guard ∅100
U	Condensate Tee with drain point
V	Pipe M/M ∅100 L=200 without seal

NOTE IMPORTANT:

MODEL	1-2-3-4
Ø FLUE SPIGOT	∅100 female
Ø COMBUSTION AIR SPIGOT	∅100 female
INSTALLATION	Flue should be adequately supported each bend corresponds to approx 0,8-1 meter of horizontal pipe work

B_{22}: Single flue option with condensate tee and roof terminal combustion air from inside the room

Type 5 – 6 – 7



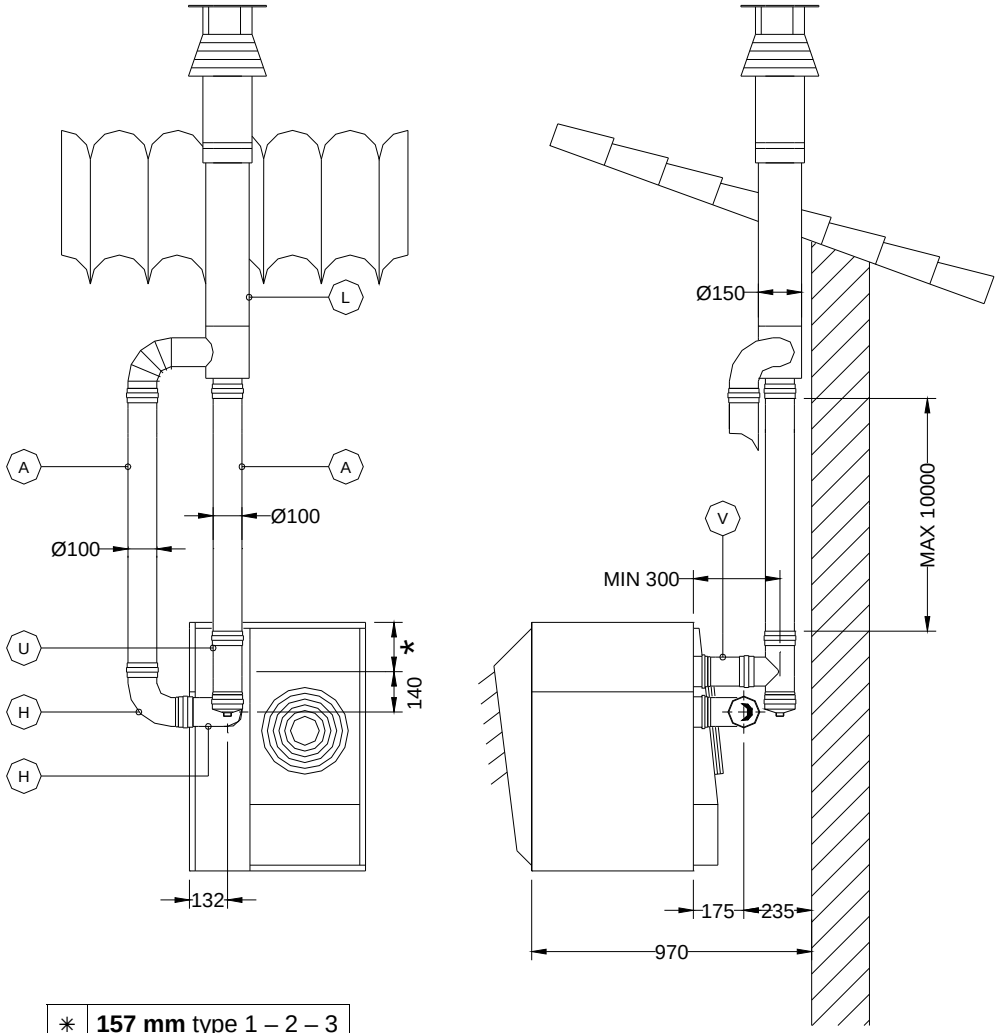
ITEM	DESCRIPTION
A	Pipe M/F ∅100 L=1000 with seal
T	Terminal with guard ∅100
U	Condensate tee with drain point
Z	Pipe M/F ∅100 L=250 with seal

NOTE IMPORTANT:

MODEL	5-6-7
∅ FLUE SPIGOT SIZE	∅100 male
∅ COMBUSTION AIR SPIGOT SIZE	∅150 male
INSTALLATION	Flue should be adequately supported Each bend corresponds to approx 0,8-1 meters of horizontal pipe work

C_{32} Installation showing Vertical co axial flue terminal with condensate drain

Type 1 – 2 – 3 – 4



✳	**157 mm** type 1 – 2 – 3
	165 mm type 4

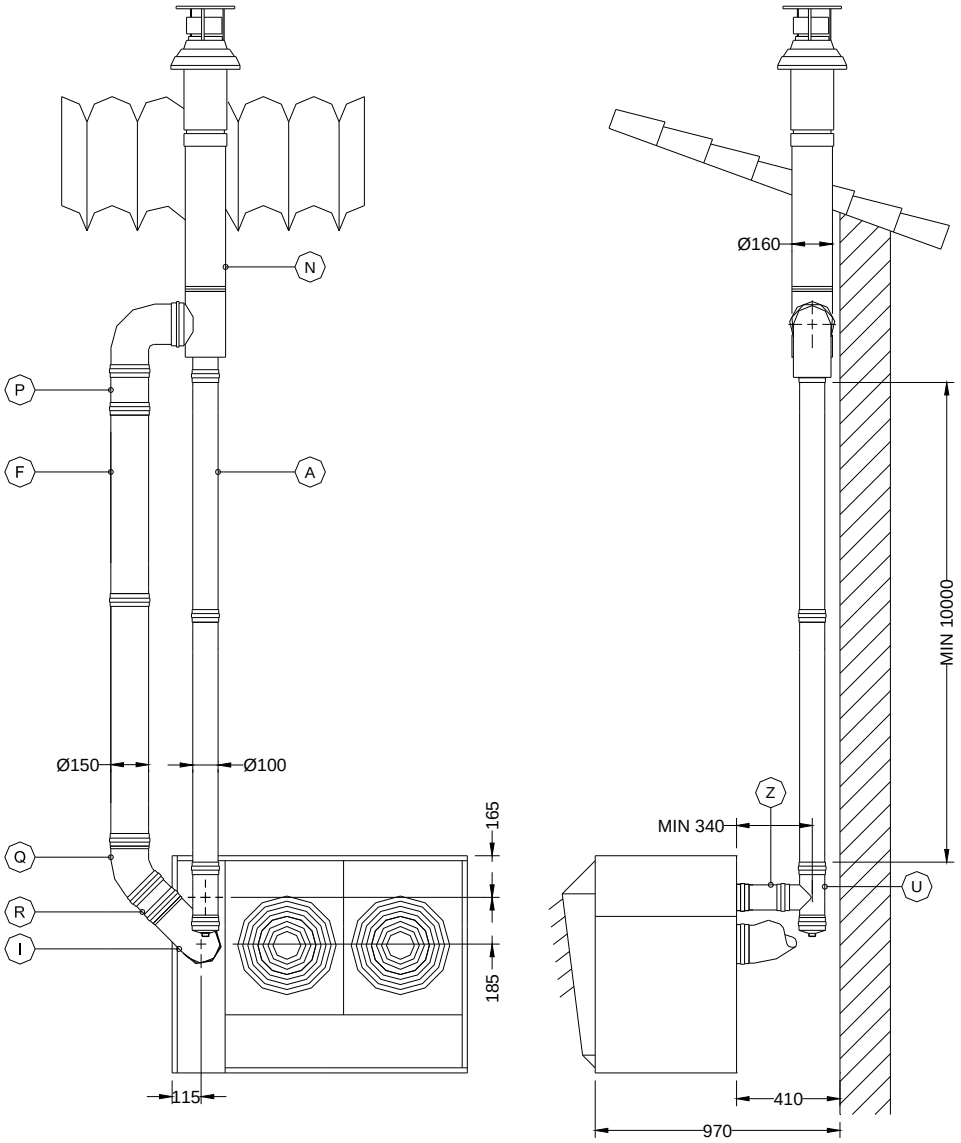
ITEM	DESCRIPTION
A	Flue pipe M/F ∅100 L=1000 with seal
H	Bend 90° M/F ∅100 with seal
L	Vertical co axial roof terminal kit ∅100-100
U	Condensate tee with drain point
V	pipe M/M ∅100 L=200 without seal

NOTE IMPORTANT:

MODEL	1-2-3-4
∅ FLUE SPIGOT SIZE	∅100 female
∅ COMBUSTION AIR SPIGOT SIZE	∅100 female
INSTALLATION	Flue should be adequately supported each bend corresponds to about 0,8-1 meters of horizontal pipework

C_{32} Installation showing Vertical co axial roof terminal with condensate drain

Type 5 – 6 – 7



ITEM	DESCRIPTION
A	Pipe M/F ∅100 L=1000 with seal
F	Pipe M/F ∅150 L=1000 with seal
I	Bend 90° M/F ∅150 with seal
N	Vertical co axial roof terminal kit ∅100-150
P	Adaptor F/F ∅150 L=200 with seal
Q	Bend 45° M/F ∅150 with seal
R	Pipe M/F ∅150 L=140 with seal
S	Bend 90° F/F ∅100 with seal
U	Condensate tee with drain point
Z	Pipe M/F ∅100 L=250 with seal

NOTE IMPORTANT:

MODEL	5-6-7
∅ FLUE SPIGOT SIZE	∅100 male
∅ COMBUSTION AIR SPIGOT SIZE	∅150 male
INSTALLATION	Flue should be adequately supported each bend corresponds to about 0,8-1 meters of horizontal pipework