
# RHF561FT3 Energysaver Space Heater

Service manual

Rinnai

# Important

This information is being made available to qualified tradespeople such as licensed gasfitters and plumbers. It is not intended for use by non-qualified people or members of the public.

Gas appliances MUST BE serviced by an authorised person, being in New Zealand a licensed gasfitter, in accordance with the manufacturer's service instructions and all applicable local rules and regulations.

Installation, servicing and repair shall be carried out only by authorised personnel.

**Warning**
Improper installation, adjustment, alteration, service and maintenance can cause property damage, personal injury or loss of life.

For more information about buying, using, and servicing of Rinnai appliances call: 0800 RINNAI (0800 746 624).

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# Contents



**Parts lists**

The exploded diagrams and parts lists have not been published in this manual due to the frequency in which they change. Please refer to the Rinnai website (rinnai.co.nz) for the latest spares PDF's.

# Specification


## Description

Designed and made in Japan, Rinnai Energysavers are externally flued gas appliances designed to be installed against a wall. They are intended for installation in living spaces and open plan areas.

Colour - white with grey louvres.

## Scope of use

Ideal for living rooms, bedrooms, and open plan areas as space heaters. Versatile power flue system makes for easy installation in almost any living space.

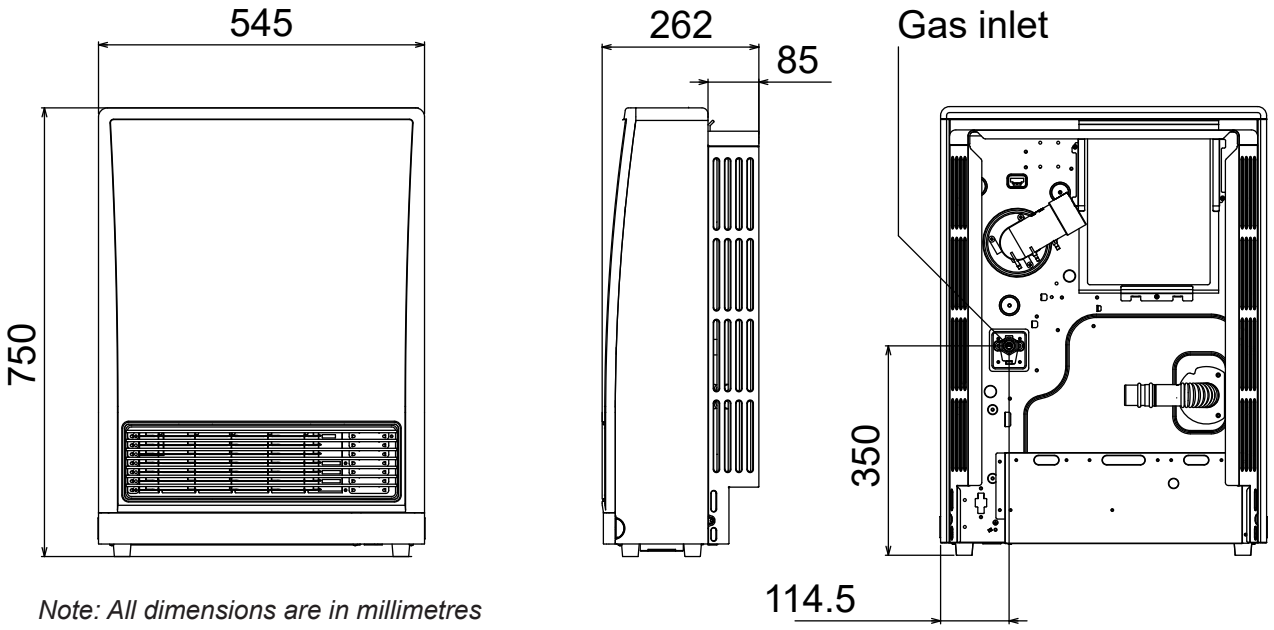
Energysavers must not be built in, for example into a bookcase or into walls.

| | |
|---|---|
| **Code - NG** | RHF561FT3WN |
| **Code - LPG** | RHF561FT3WL |
| **Efficiency[1]** | 82.9% |
| **Input[1]** | 9-23 MJ/h |
| **Output[2]** | 2.2-5.3 kW |
| **Humidifier tray capacity** | 1.0 L |
| **Noise level** | 34-42 dB(A) |
| **Power consumption** | Approx. 36 W (high), < 1 W on standby |
| **Temperature range** | 16-26 °C |
| **Gas connection** | 15 mm BSP male thread |
| **Injectors NG** | 4 x Ø1.25 mm |
| **Injectors ULPG** | 4 x Ø0.82 mm |
| **Data plate position** | Lower right hand side |
| **Weight** | 23 kg |
| **Features** | Preheat, dual timers, manual control, electronic ignition, economy, fan filter, overheat safety device, and lock |
| **Market release** | NG model Oct 2023, LPG model Jul 2025 |

[1] Input, output, and efficiency will vary depending on gas type and flue length.

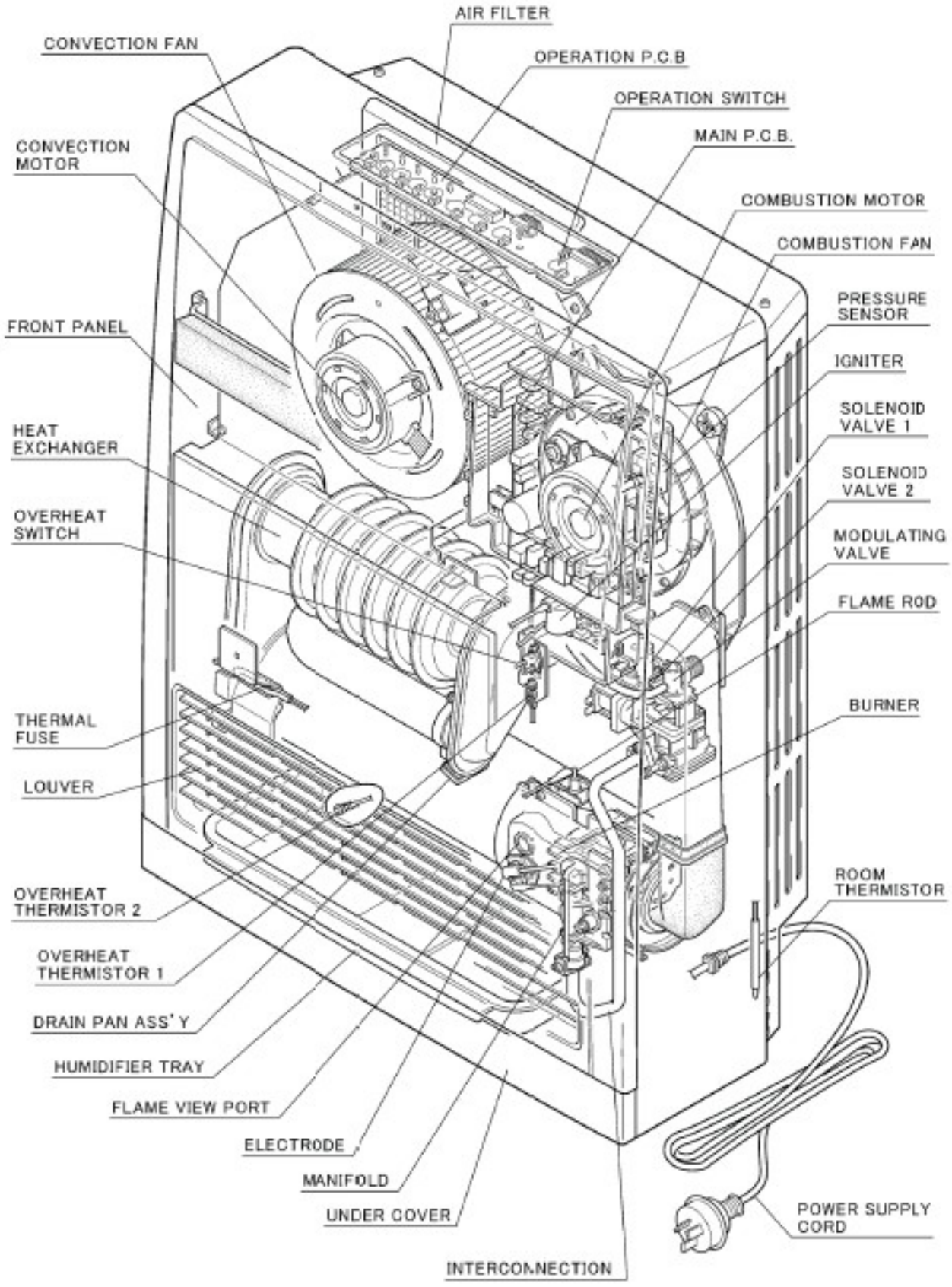
For gas pressures and gas type, refer to the data plate on the lower right hand side of the unit

# Unit dimensions

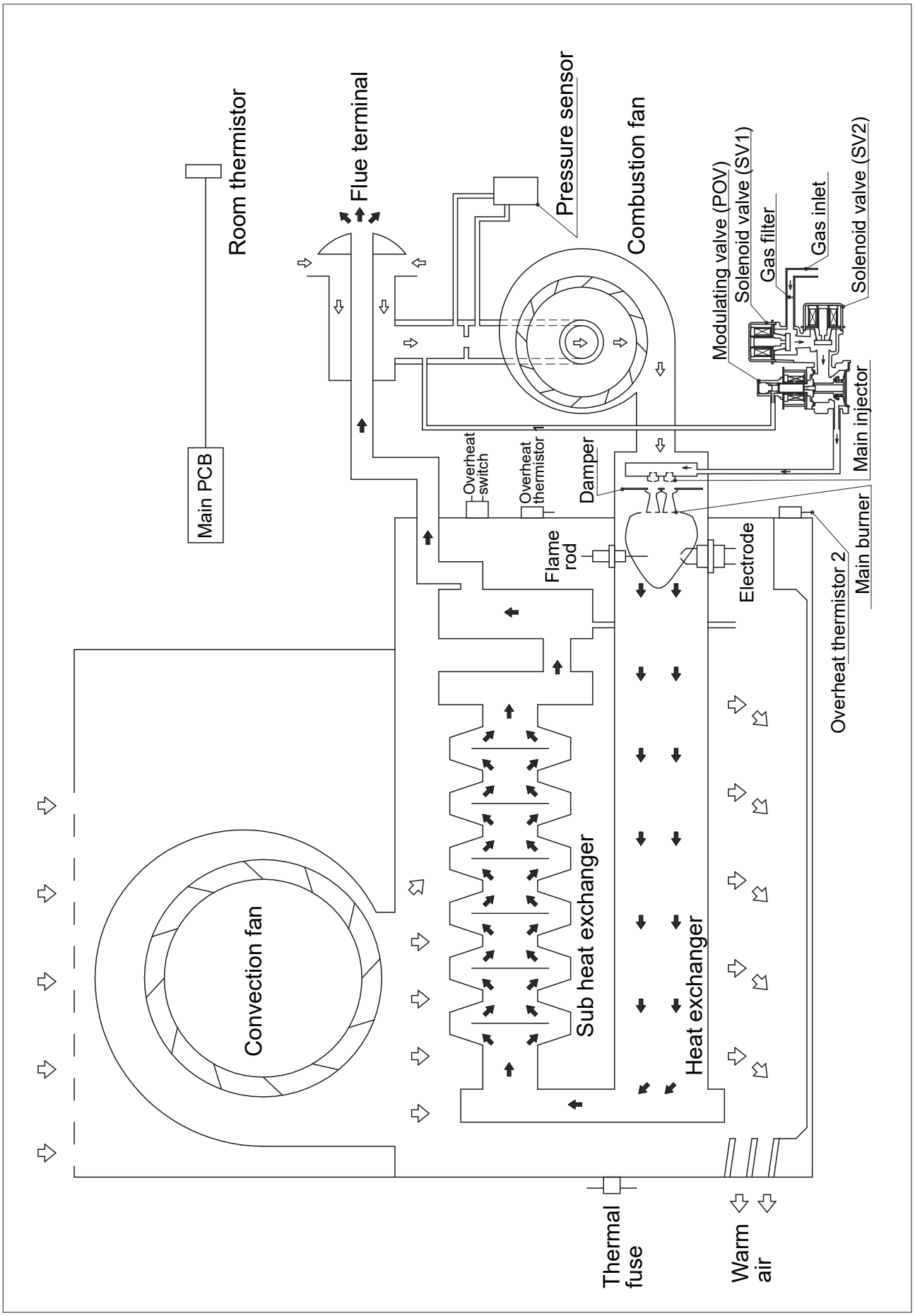



*Note: All dimensions are in millimetres*

# Cutaway diagram



# Schematic operation



# Safety devices

**Overheat switch**
This device automatically shuts the gas supply off if the heater exceeds a predetermined temperature. This is normally caused by an obstruction in front of the louvres, or a blocked fan filter.

If the overheat switch operates, turn the unit ‘OFF’, remove the obstruction (clean filters) and allow the unit cool off for 10-15 minutes before re-operating.

**Fusible links**
The fusible link activates under conditions of severe overheating and shuts off the gas supply. A service call will be required to repair the appliance.

**Flame failure device**
If the flame goes out during operation this device shuts off gas to the burner. To reset, turn the unit ‘OFF’, then ‘ON’ again. If this happens repeatedly a service call is required.

**Electrical fuse**
The electrical circuits are protected by an electric fuse. When the fuse blows, the heater will not operate. The fuse must be replaced by an authorised person.

**Power failure**
In the event of a power failure or power cut, the gas valves will automatically close. This unit will NOT re-light after the power is re-instated. The time of day will need to be reset to the correct current time.

**Blocked flue pressure module**
In the event the flue is blocked the, unit will not start. If the flue becomes blocked while the unit is on, it will shut off automatically.

# Error codes

| Error code | Likely cause | Comments |
|---|---|---|
| 00 | Power failure | When power failure is sensed operation stops. |
| 11 | Ignition failure | Check gas supply, check sparker, and gas solenoids. |
| 12 | Flame failure | Check adequate gas supply, check flame rod, and check flueing. |
| 14 | Overheat | Check air filter, convection fan (clean if dusty). Check burner pressures—if 14 comes up before unit is on, check thermal fuse. |
| 16 | Room overheat | Lower room temperature to less than 40 °C. If the units detects 40 °C for over ten minutes, the unit will stop operating. |
| 30 | Overheat temp. sensor faulty | |
| 31-32 | Room temp. sensor faulty | Check resistance, refer diagnostics page for values. |
| 33-34 | Overheat temp. sensor faulty | Check resistance, refer diagnostics page for values. |
| 40 | Sensor sensing tube failure | Confirm commissioning has been completed in accordance with instructions. Ensure tht the pressure check tube is not blocked, pinched or crushed. |
| 49 | Pressure module not activated | Check voltage to pressure module pressure hoses are connected correctly and for flue obstructions. |
| 53 | Erratic spark | Check spark gap, spark lead, and spark electrode insulation cap. |
| 61 | Combustion fan failure | Replace combustion fan |
| 62 | Convection fan failure | Replace convection fan (rev counter faulty) |
| 70 | Faulty on/off switch | Remove Control PCB and check and check for anything causing tracking across the tracks, if ok, replace board. |
| 71 | Faulty solenoid circuit detected | Check wire connections between main PCB and solenoids. |
| 72 | Faulty flame rod | Check for cracked ceramic and lead. |
| 73 | Communication error | Make sure all of the connectors on main PCB are in place , Turn power off and on if still faulty change main PCB. |
| 81 | Faulty solenoids | |
| 99 | Pressure module not activated | Check for flue obstruction. Check gas type and flue length settings are set correctly. |

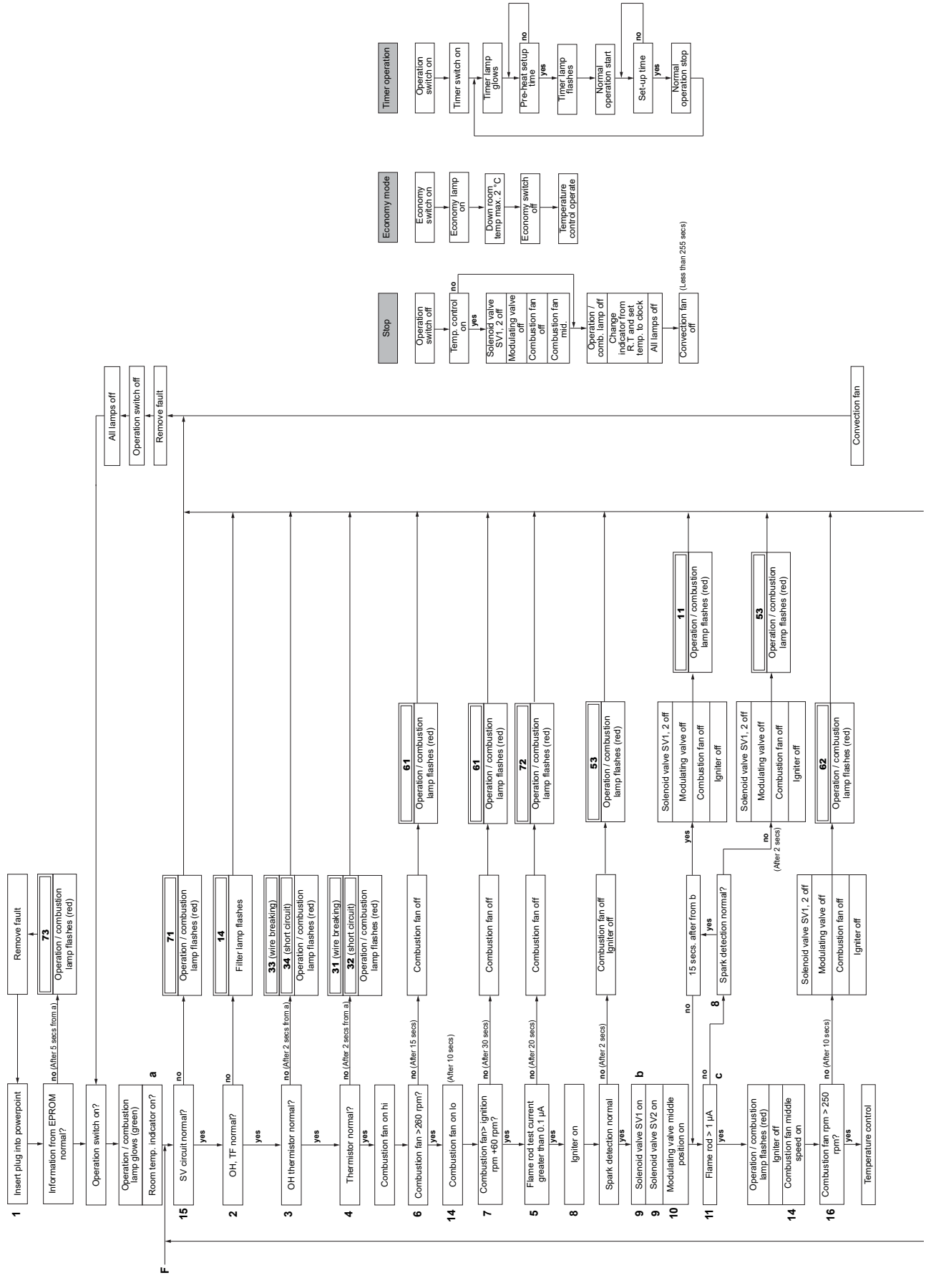
# Fault finding

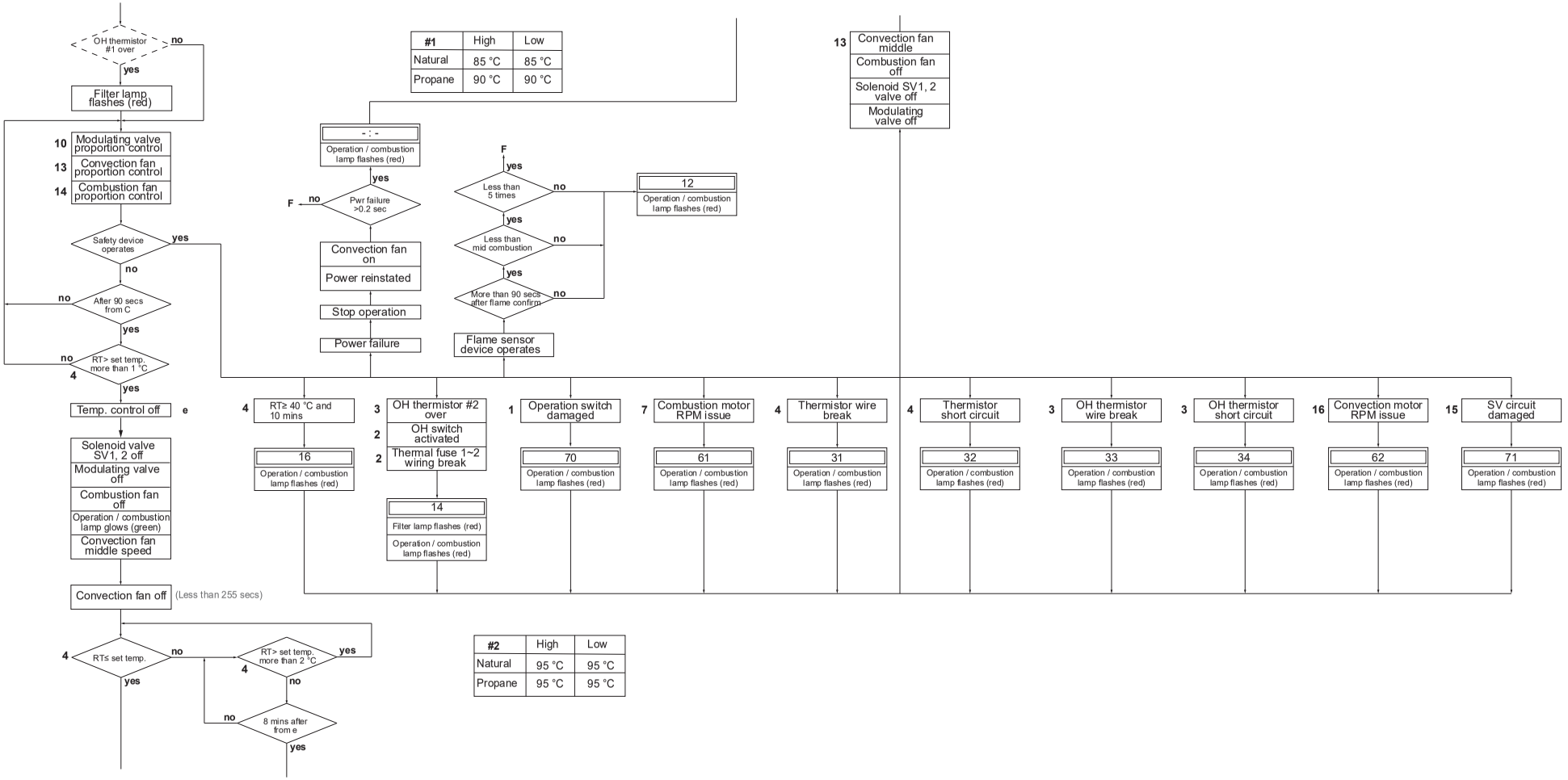

- All electrical supply MUST BE disconnected before servicing or repairing the heater.
- 230 V potential exposure. Isolate appliance and reconfirm with a neon screwdriver or multimeter.

| | No power on / combustion indicator | Burner doesn't ignite | Unusual combustion | Combustion stops during operation | Smell of gas | Noisy ignition | |
|---|---|---|---|---|---|---|---|
| Not plugged in | ● | ● | | | | | Plug in power cord and press the control panel on/off button. |
| Power cut | ● | ● | | ● | | | Re-ignite manually after power is restored. |
| Initial installation, air in gas pipe | | ● | | | | | Purge air (installer). |
| Gas filter blocked | | ● | ● | | | | |
| Mis-ignition | ● | ● | | | | | |
| Flue terminal obstructed | | | ● | ● | | ● | Clear obstruction. |
| Flue manifold not connected | | | | | ● | ● | |
| Louvre obstructed | | | | ● | | | Clear obstruction. |
| Air filter blocked | | | | ● | | | Clean and advise customer to regularly clean. |
| Gas escape | | | | | ● | | |
| On timer is set | | ● | | | | | Cancel on timer or press the override button. |
| Gas turned off at meter | | ● | | | | | Turn gas on |
| Function / child lock set | | ● | | | | | Cancel function / child lock |
| Flue outlet blocked / obstructed | | ● | | ● | | | Clear obstruction |

| Symptom | Explanation |
|---|---|
| **At ignition** | |
| Warm air does not start when the burner lights | The fan is started automatically after a short delay. This is to allow the heat exchanger to warm up, helping to avoid cold draughts. |
| Smoke or strange smells are produced on the first trial light up after installation. | This is caused by grease or oil from the manufacturing process on the heat exchanger and dust, and will stop after a short time. |
| Sharp clicking noises at ignition, or when the unit cuts down on the thermostat, or goes out. | Expansion noise from the metal heat exchanger, this is normal. |
| **During combustion** | |
| Clunking noise when the thermostat operates. | This is the sound of the solenoid gas valves opening and closing. |
| **When the unit is turned off** | |
| Convection fan continues to run after turning ‘OFF’ | This is to remove the residual heat from the heat exchanger. The fan will stop when the unit cools down. |
| **Other** | |
| Steam is discharged from the flue terminal. | High efficiency appliances tend to discharge water vapour on cold days. This is normal. |
| Heater does not start even when ‘ON’ button is pushed and thermostat is on HIGH. | Check timer. Timer must be in the “OFF” position for manual operation. Room temperature is hotter than ‘High’ setting. |
| **Timers** | |
| Timers do not operate at set time. | Timers may either be inactivated or incorrectly programmed. Repeat programming. |
| Timer operates for 30 seconds then cuts out. | Room temperature may be higher than set temperature. Adjust temperature upwards if desired. |

# Operational flow chart




OH thermistor #1 over
no
yes
Filter lamp flashes (red)
10 Modulating valve proportion control
13 Convection fan proportion control
14 Combustion fan proportion control
Safety device operates
yes
no
After 90 secs from C
no
yes
RT> set temp. more than 1 °C
4
no
yes
Temp. control off
e
Solenoid valve SV1, 2 off
Modulating valve off
Combustion fan off
Operation / combustion lamp glows (green)
Convection fan middle speed
Convection fan off
(Less than 255 secs)
4 RT≤ set temp.
no
yes
4 RT> set temp. more than 2 °C
yes
no
no
8 mins after from e
yes
#1 High Low
Natural 85 °C 85 °C
Propane 90 °C 90 °C
- : -
Operation / combustion lamp flashes (red)
yes
F no Pwr failure >0.2 sec
Convection fan on
Power reinstated
Stop operation
Power failure
F
yes
Less than 5 times
no
12
Operation / combustion lamp flashes (red)
yes
Less than mid combustion
no
yes
More than 90 secs after flame confirm
no
Flame sensor device operates
13 Convection fan middle
Combustion fan off
Solenoid SV1, 2 valve off
Modulating valve off
4 RT≥ 40 °C and 10 mins
16
Operation / combustion lamp flashes (red)
3 OH thermistor #2 over
2 OH switch activated
2 Thermal fuse 1~2 wiring break
14
Filter lamp flashes (red)
Operation / combustion lamp flashes (red)
1 Operation switch damaged
70
Operation / combustion lamp flashes (red)
7 Combustion motor RPM issue
61
Operation / combustion lamp flashes (red)
4 Thermistor wire break
31
Operation / combustion lamp flashes (red)
4 Thermistor short circuit
32
Operation / combustion lamp flashes (red)
3 OH thermistor wire break
33
Operation / combustion lamp flashes (red)
3 OH thermistor short circuit
34
Operation / combustion lamp flashes (red)
16 Convection motor RPM issue
62
Operation / combustion lamp flashes (red)
15 SV circuit damaged
71
Operation / combustion lamp flashes (red)
#2 High Low
Natural 95 °C 95 °C
Propane 95 °C 95 °C

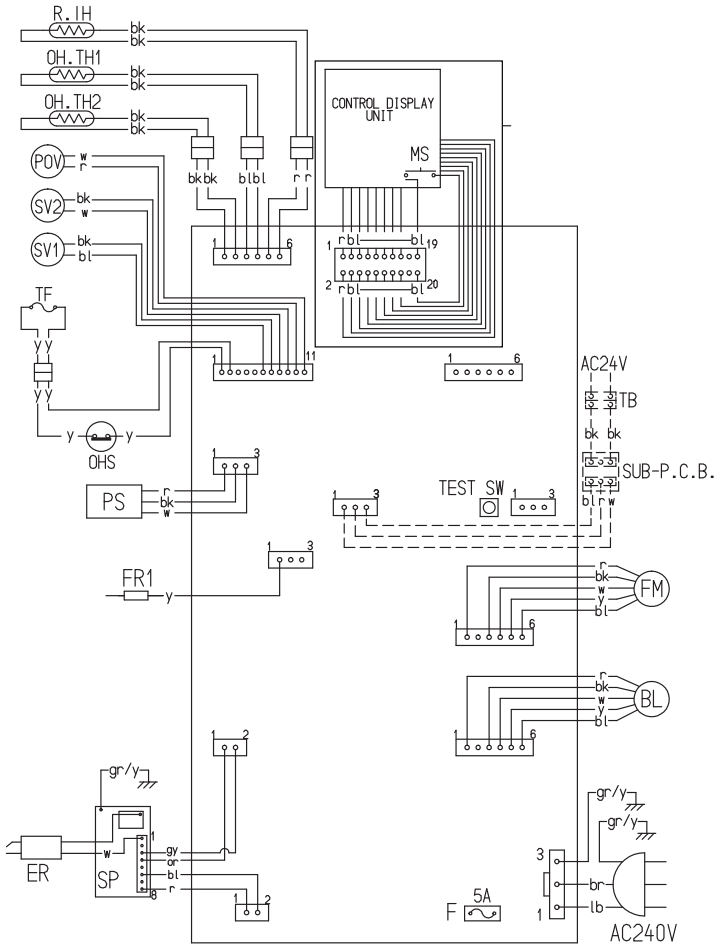
# Diagnostic points


| Component | Wire | | |
|---|---|---|---|
| Control panel | Red - Blue | | DC0-5V (pulsed voltage)<br>The resistance is infinity but the current flow when the switch is pushed. |
| | Blue - Blue | | |
| Hi-Limit SW etc. | White - White | | Below DC 1V, Below 1Ω |
| | Blue or Yellow – White (OHS1) | | |
| | Blue or Yellow – White (OHS2) | | |
| | White - White (TF) | | |
| Hi-Limit TH1 | Blue (Black) – Blue (Black) | | 0.64-630.1kΩ (<0.64kΩ:Short, >630.1kΩ:Open) |
| | Temperature | | 0.64-558.8kΩ(<0.64kΩ:Short, >558.8kΩ:Open) |
| | Blue (Black)<br>Blue (Black)<br>(Filter sign) | High | NG: Flashes below 3.90kΩ, LP: Flashes below 3.90kΩ |
| | | Low | NG: Flashes below 8.62kΩ, LP: Flashes below 8.62kΩ |
| | Blue (Black)<br>Blue (Black)<br>(TH operate) | High | NG: Operates below 2.92kΩ, LP: Operates below 2.92kΩ |
| | | Low | NG: Operates below 5.29kΩ, LP: Operates below 5.29kΩ |
| Hi-Limit TH2 | Black (Black) - Black (Black) | | 0.64-558.8kΩ (<0.64kΩ:Short, >558.8kΩ:Open) |
| | Temperature | | 0°C:213.7kΩ, 20°C:78.2kΩ, 50°C:21.5kΩ, 80°C:7.29kΩ, 100°C:3.90kΩ,135°C:1.52kΩ” |
| | Black (Black)<br>Black (Black)<br>(TH operate) | High | NG: Operates below 8.62kΩ, LP: Operates below 8.62kΩ |
| | | Low | NG: Operates below 8.62kΩ, LP: Operates below 8.62kΩ |
| RT TH | Red (Black) - Red (Black) | | 1.37-580.6kΩ (<1.37kΩ:Short, >580.6kΩ:Open) |
| | Temperature | | 0°C:112.8kΩ 20°C:38.6kΩ, 30°C:23.5kΩ, 40°C:14.6kΩ |
| FR | Yellow - FR terminal | | Below 0.1μA (when stopped) |
| Sparker | Red - Blue | | AC187-264V |
| Combustion fan (in case of short vent) | White-Black | | DC13.5-16.5V |
| | Blue - Black | | Below ignition revolution +2Hz |
| | Ignition revolution | Initial | LP: 56Hz, NG: 65Hz |
| | | Re-attempt | LP: 56Hz, NG: 65Hz |
| | Normal revolution | High | LP: 116Hz, NG: 114Hz |
| | | Low | LP: 65Hz, NG: 70Hz |
| Combustion fan (in case of long vent) | White - Black | | DC13.5-16.5V |
| | Blue - Black | | Below ignition revolution +2Hz |
| | Ignition revolution | Initial | LP: 59Hz, NG: 68Hz |
| | | Re-attempt | LP: 59Hz, NG: 68Hz |
| | Normal revolution | High | LP: 120Hz, NG: 118Hz |
| | | Low | LP: 70Hz, NG: 75Hz |
| Convection fan | White - Black | | DC13.5-16.5V |
| SV1, 2 | Blue - Black | | DC10-14V34-42Ω |
| | White - Black | | |
| POV | Red - White | | DC1-14V (Low-High) 65-90Ω |
| Pressure sensor | White - Black | | DC0.25-4.8V |
| | Red - Black | | DC4.75-5.25V |

# Wiring diagram

**HAZARDOUS VOLTAGE**
Risk of electrical shock

Disconnect all sources of supply prior to servicing

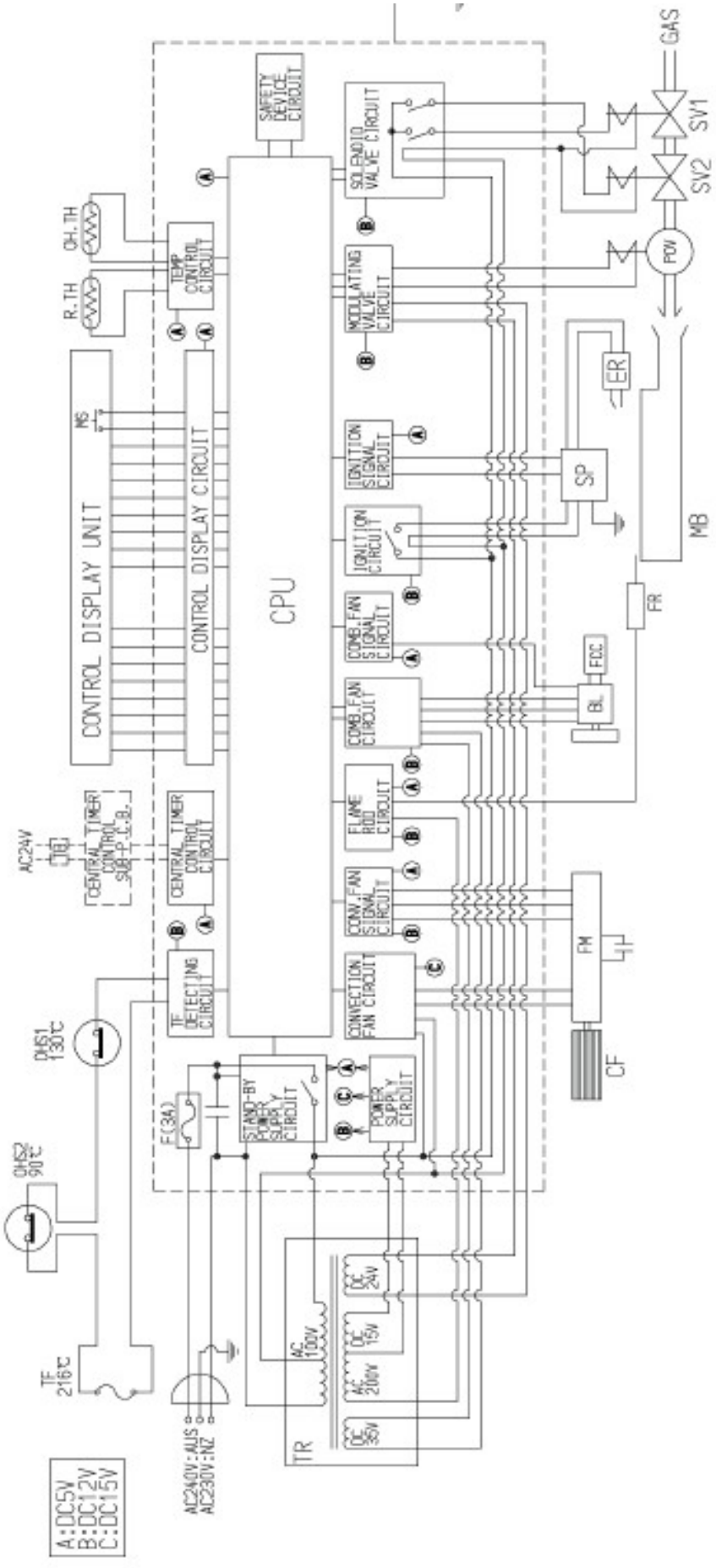



**RHFE-309FT3 / RHFE-559FT3 / RHFE-561FT3**

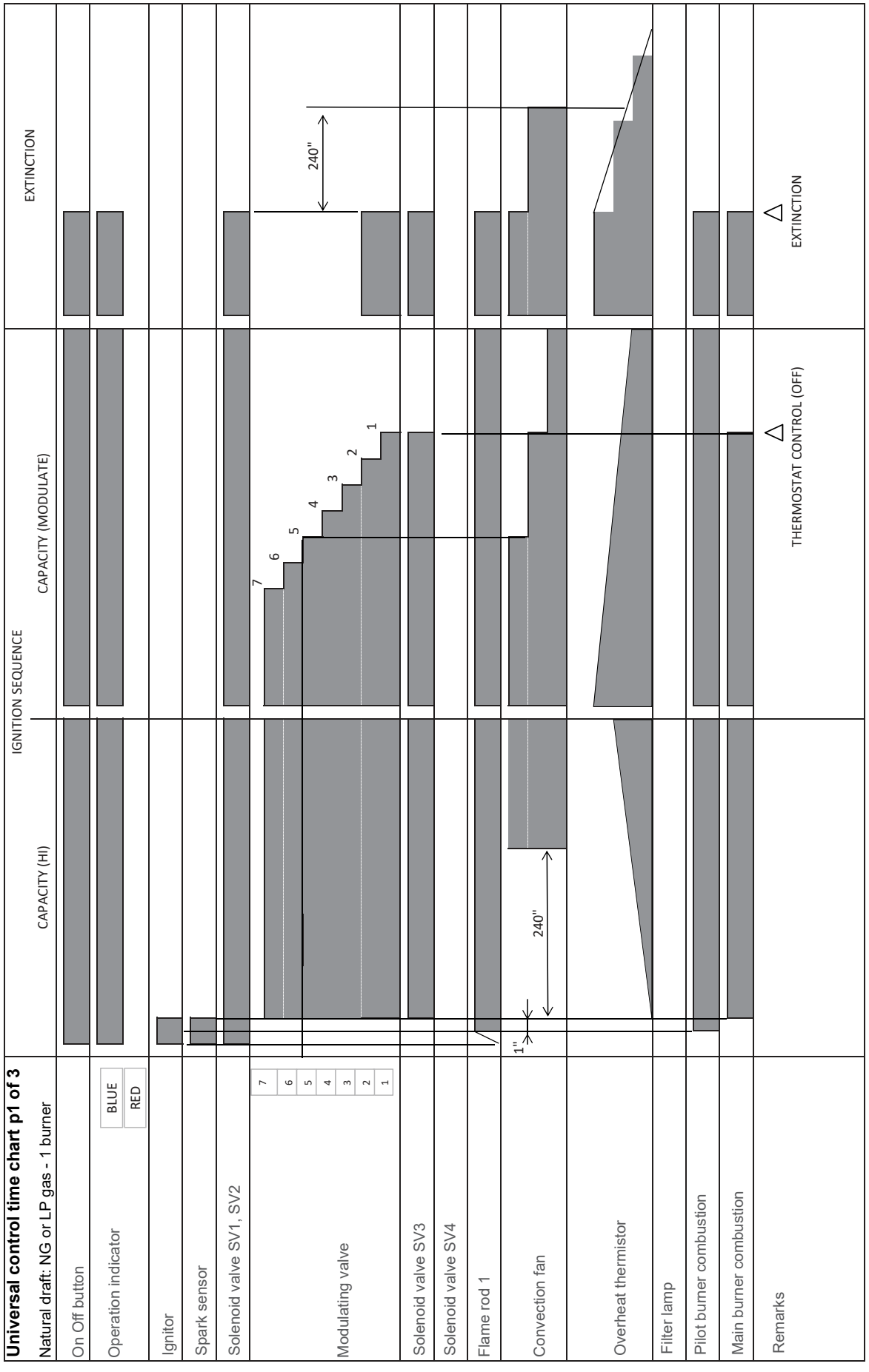
| MARK | NAME |
|---|---|
| MS | Main switch |
| R. TH | Thermistor |
| TF | Thermal fuse |
| F | Fuse |
| ER | Electrode |
| POV | Modulating solenoid valve |
| OH, TH1, 2 | OH thermistor 1, 2 |
| OHS | OH switch |
| FM | Convection fan motor |
| SP | Sparker |
| SV1, 2 | Main SV 1, 2 |
| BL | Combustion fan motor |
| FR | Flame rod |
| TB | Terminal block |
| PS | Pressure sensor |

| CODE | COLOUR | CODE | COLOUR |
|---|---|---|---|
| bk | black | w | white |
| bl | blue | y | yellow |
| lb | light blue | gy | grey |
| gr/y | green/yellow | or | orange |
| r | red | br | brown |

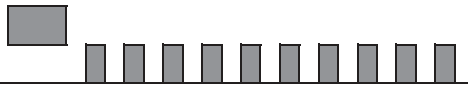
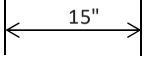
# Block diagram



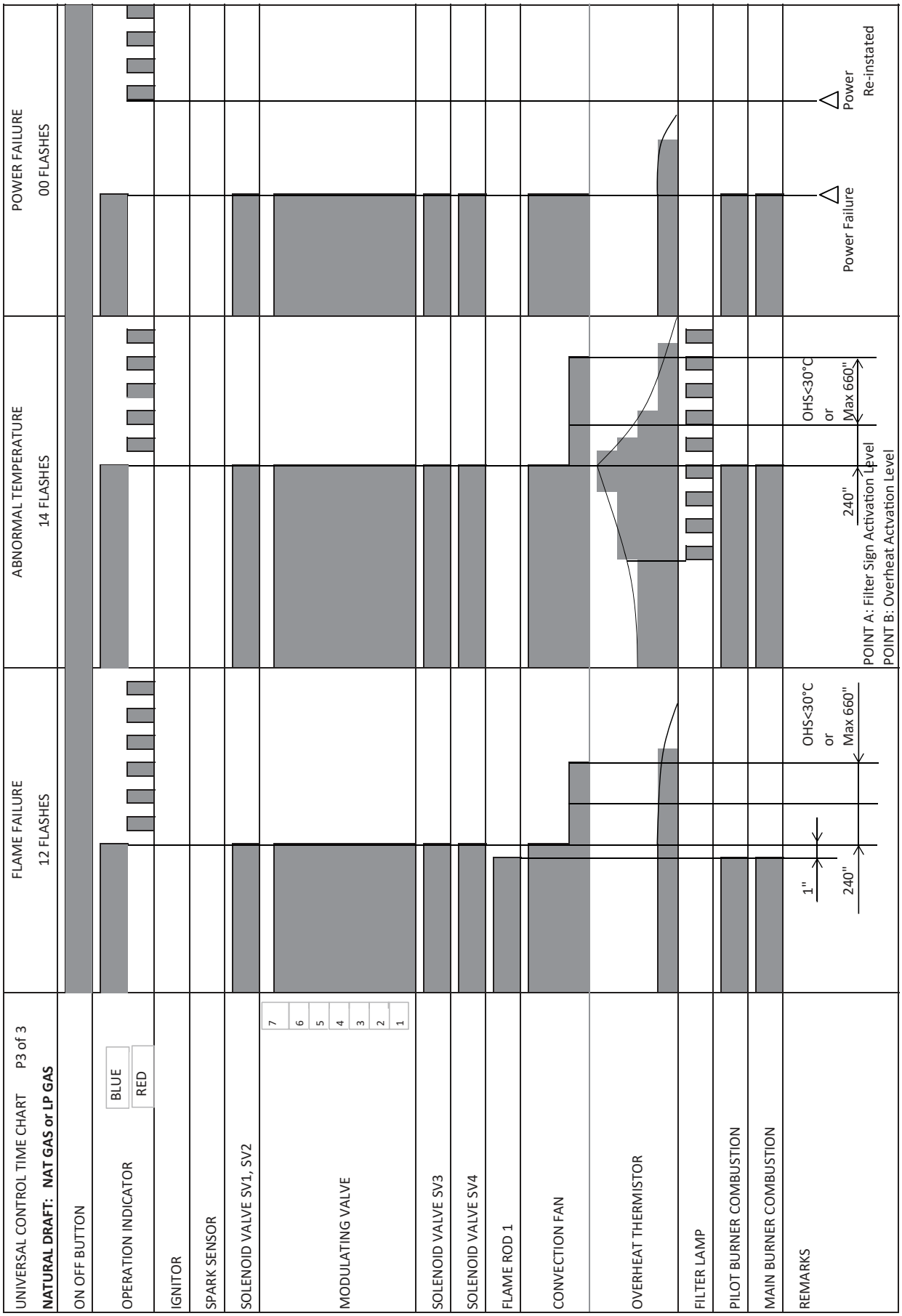
# Time charts (1 of 3)



# Time charts (2 of 3)

| UNIVERSAL CONTROL TIME CHART P2 of 3<br>**NATURAL DRAFT: NAT GAS or LP GAS** | MIS-FIRE<br>11 FLASHES | SPARK CATCH MISTAKE<br>53 FLASHES | |
|---|---|---|---|
| ON OFF BUTTON |  |  | |
| OPERATION INDICATOR BLUE / RED |  |  | |
| IGNITOR |  |  | |
| SPARK SENSOR |  |  | |
| SOLENOID VALVE SV1, SV2 |  | | |
| MODULATING VALVE 7 6 5 4 3 2 1 | | | |
| SOLENOID VALVE SV3 | | | |
| SOLENOID VALVE SV4 | | | |
| FLAME ROD 1 | | | |
| CONVECTION FAN | | | |
| OVERHEAT THERMISTOR | | | |
| FILTER LAMP | | | |
| PILOT BURNER COMBUSTION | | | |
| MAIN BURNER COMBUSTION | | | |
| REMARKS |  |  | |

# Time charts (3 of 3)



# Dismantling for service


**To secure metallic panel**
8g Pan Head - self taper

**Front/side panel louvre**
8g Pan Head - self taper with captive star washer

**Gas connecting tube**
Pan Head M4 with captive spring washer

**Earthing lead**
Pan Head M4 with captive star washer

**To secure plastics, exhaust pipe**
Flat Head 8g - self taper

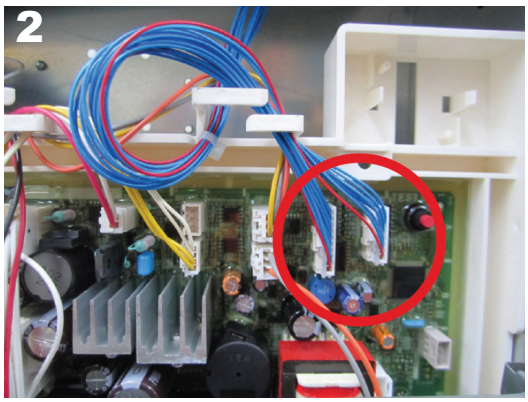
**To secure air intake tube**
Flat Head M4

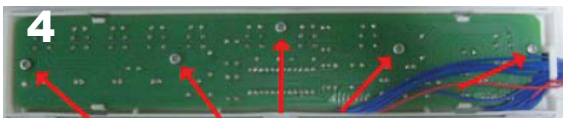
### Removal of front panel

1. Grip sides of skirt and pull forward to remove.
2. Remove five screws to release louvre and front panel.
3. Remove the louvre.
4. Grip bottom left and right corners of the front panel, lift and pull forward to release.

### Removal of top panel, control panel, and control panel PCB

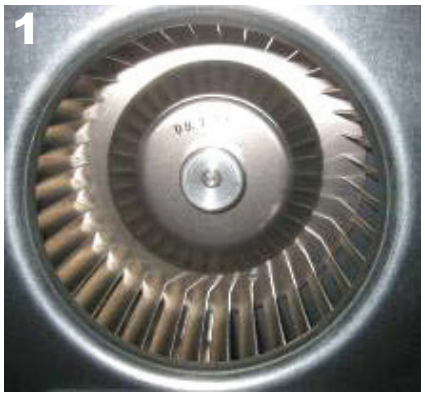
1. Remove two screws, one each side of the control panel.
2. Release the three multi-pin connectors from main PCB, releasing the control panel harness from wire clip on man PCB casing.
3. Pull forward of control panel and lift both sides to remove.
4. Unscrew five screws to remove control PCB from control panel.

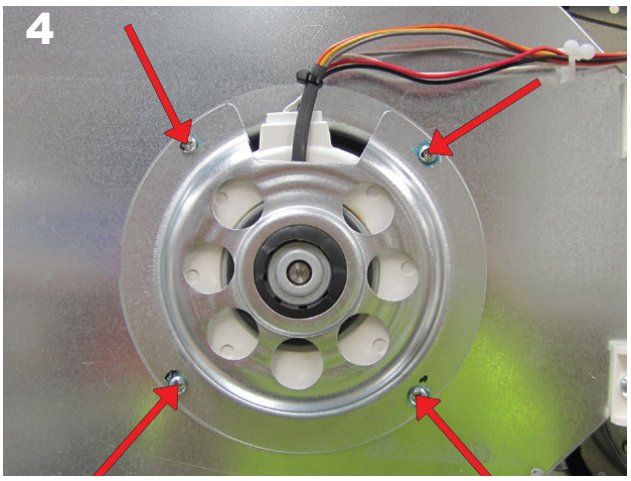


**Removal of convection fan motor**

1. Loosen Allen screw securing the fan blade to the fan motor shaft using a 3 mm Allen key from the back of the unit.
2. Remove the securing bracket (two screws).
3. Remove the four screw securing the motor to the casing and remove fan motor cover.



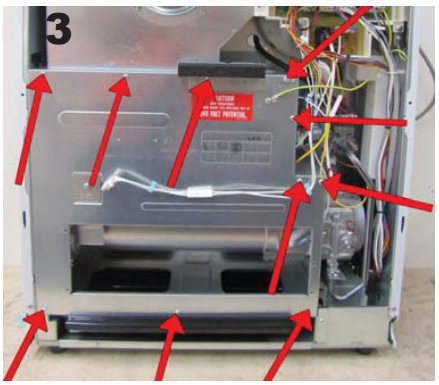



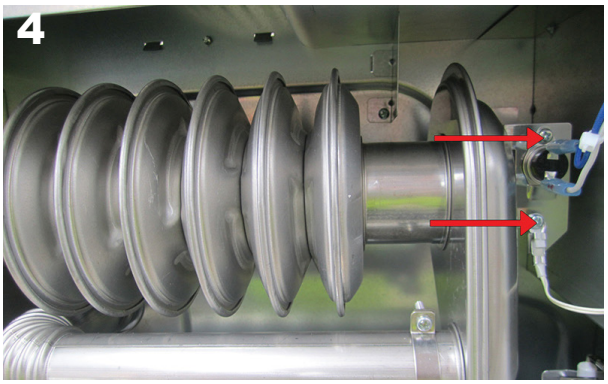

**Removal of heat exchanger**

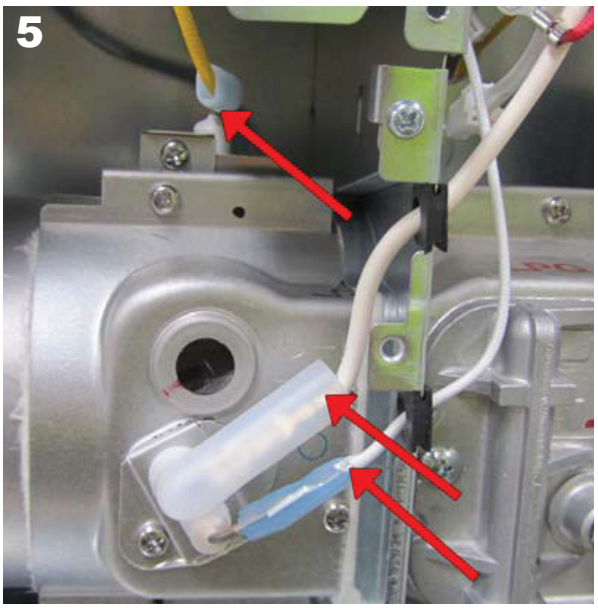
IMPORTANT The combustion tube gasket must be replaced whenever a burner tube cover plate has been removed.

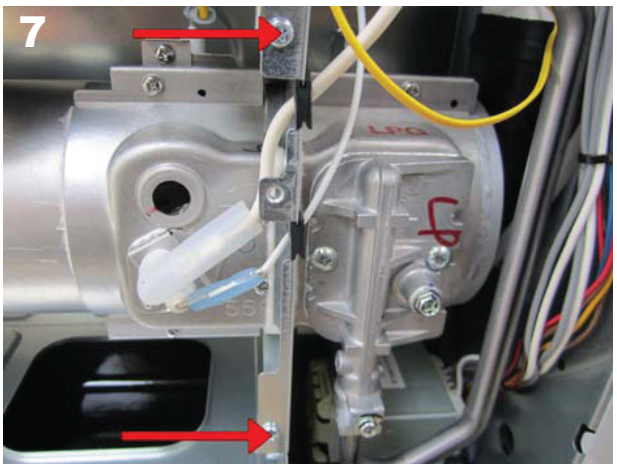
Take care not to damage o-ring on gas supply tube when removing right hand side of heat exchanger assembly.

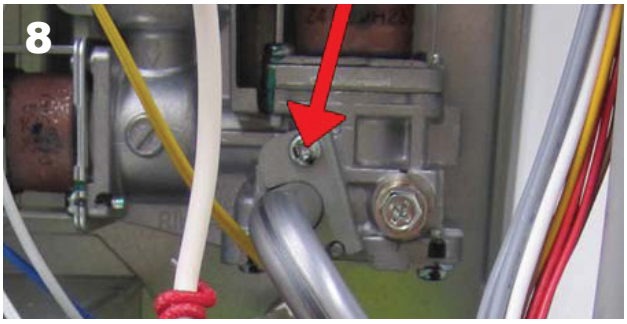
1. Remove earth connection on front of heat shield.
2. Release fusible link.
3. Release ten screws securing the heat shield.
4. Disconnect overheat switch and thermistor, two screws.
5. Disconnect flame sensing lead (pull hard). Carefully remove spark sensing lead and high tension lead.
6. Remove top panel (three screws), and right hand side panel (three screws).
7. Remove blanking panel (two screws).
8. Remove gas supply tube securing screw (gas control side) and two air intake tube securing screws.
9. Remove two burner securing screws to remove the gas supply tube.
10. Disengage gas supply tube and manifold.
11. Remove flue spigot (three screws).
12. Remove the heat exchanger securing screws. Grip the heat exchanger and pull forward to remove.



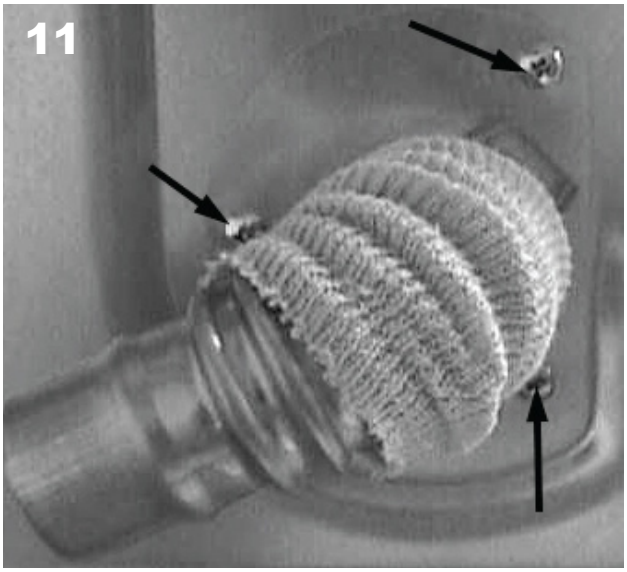



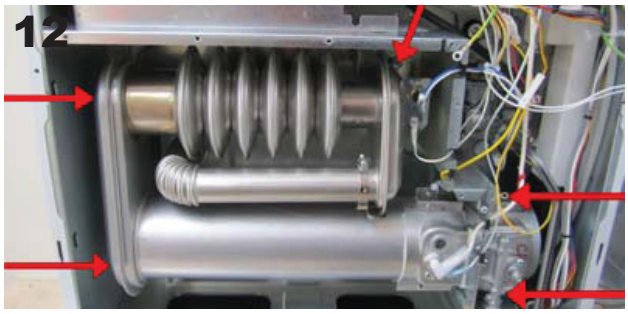




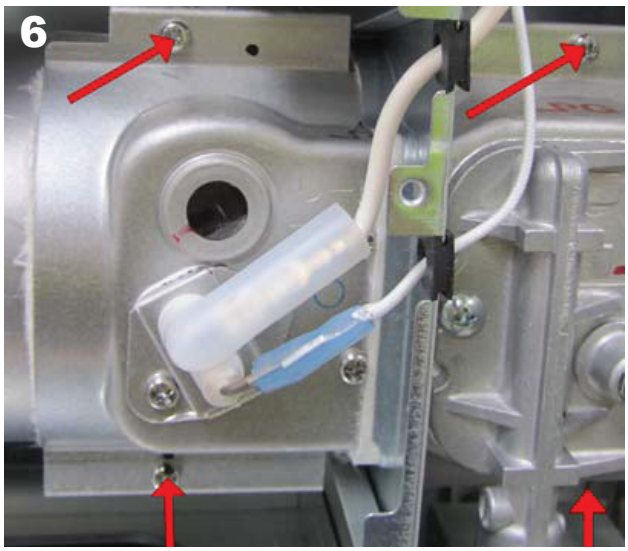


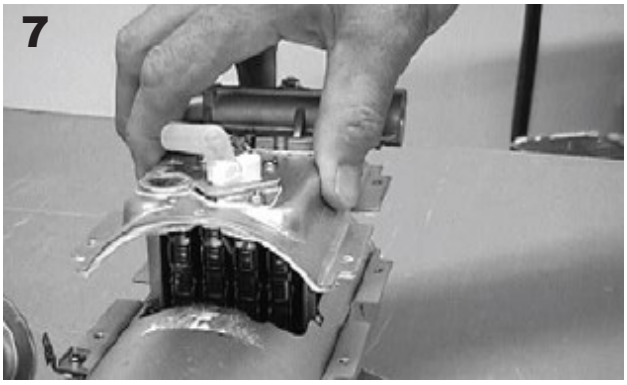




**Removal of burner**

IMPORTANT When reassembling the burner replace gasket to ensure an airtight burner chamber.

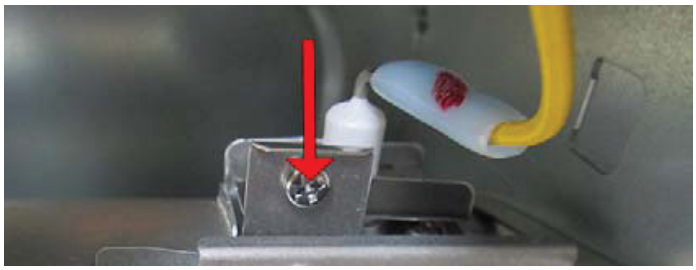
1. Remove front heat shield.
2. Remove blanking panel, two screws.
3. Remove spark sensing lead, and high tension lead (pull off gently).
4. Remove two gas supply tube securing screws.
5. Disengage gas supply tube.
6. Remove burner cover screws (four)
7. Gently manoeuvre burner and cover forward and out of the burner chamber by pulling on manifold. Take care not to damage the gasket.



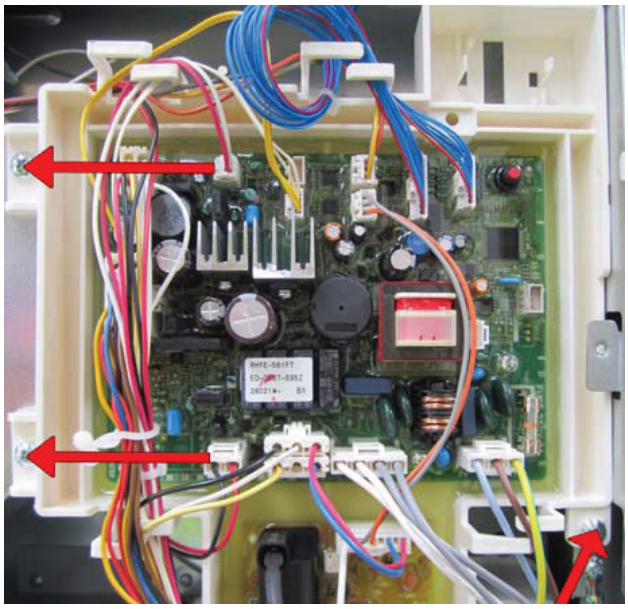

**Removal of flame rod**

Remove the one screw securing the flame rod, and lift flame rod.



**Removal of main PCB**

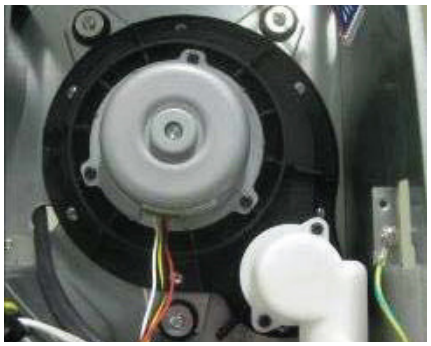
1. Remove securing bracket—two screws.
2. Disconnect all multi-pin connectors and wire harness from clips of PCB casing.
3. Remove earth connection on front of heat shield.
4. Release PCB by removing the three screws. Lift PCB on RHS and gently manoeuvre it out.



### Removal of combustion fan

IMPORTANT Arrow must be aligned when fan assembly is replaced.

Remove main PCB. Remove combustion fan securing screws (4). Grip fan motor plate and pull forward to remove fan from casing. Remove connector from fan motor.



### Removal of main transformer

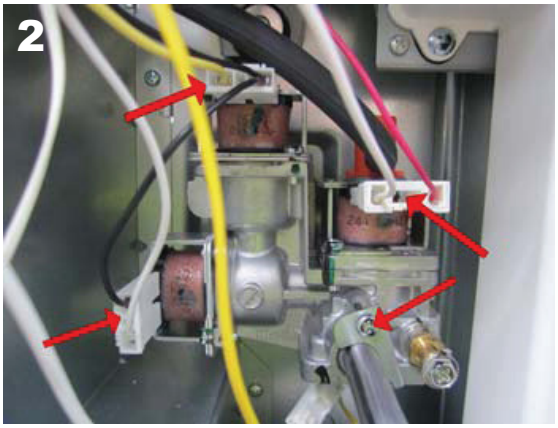
Disconnect electrical supply.

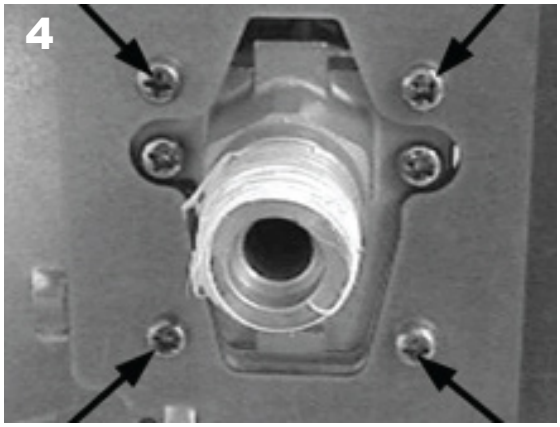
1. Remove front blanking panel screw on transformer.
2. Release the two multi-pin connectors from the main PCB.
3. Remove securing screw from transformer mounting bracket.
4. Pull forward.


### Removal of gas control

Ensure gas supply is turned off at the meter and the appliance is disconnected. Ensure test point screw is fitted to gas controls, if fitting a new control.

1. Remove front panel assembly.
2. Release solenoid connectors, gas supply tube securing screw, and gas supply tube. Take care with the o-ring.
3. Remove the screws surrounding the gas inlet at the back of the heater (4).
4. Pull gas control assembly forward to remove.



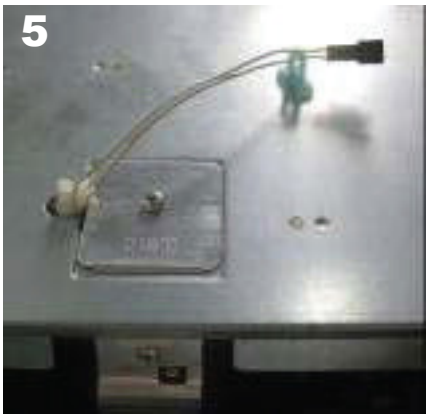
**Removal of room thermistor**
The room temperature thermistor and heat exchanger overheat thermistor are on one harness. After removing the front panel, and rear spacer panels, unclip the thermistor from purse locks behind the appliance.

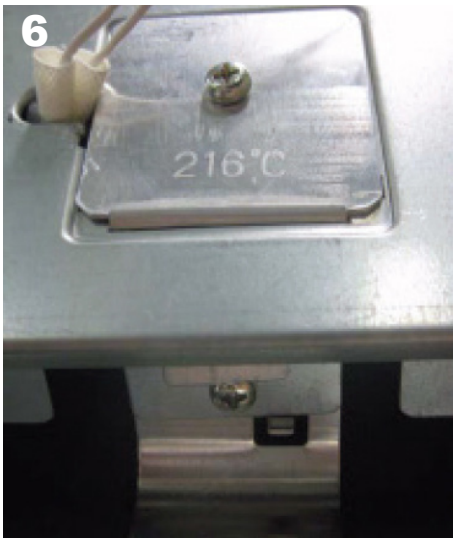
Remove one earth connection on the front of the heat shield. Release fusible link.

Remove the ten screws securing the heat shield and lift heat shield off. remove overheat thermistor.

**Removal of thermal fuse**
Turn off gas meter and disconnect appliance from installation.

1. Remove front, and rear spacer panels.
2. Remove earth connection on front of heat shield.
3. Release fusible link.
4. Release the ten screws securing the heat shield.
5. Disconnect wire connector along harness to release completely from appliance.
6. Remove two screws securing the thermal fuse.
7. Release thermal fuse from appliance.



# Notes

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