

HRV 1, 1.25, 1.5, 1.75, 2, 2.75, 2.85, 3, 10 & 10M Units

‘A’ Models



This document covers part numbers
TP400A, TP401A, TP402A, TP403A, TP404A, TP405A, TP406A, TP407A, TP440A & TP441A

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Product Identification



All maintenance/fault finding/repairs must be completed by a competent person.

Safe isolation procedures must be followed when working on these units.



Product Features

Model	HRV1 Q+	HRV1.25 Q+	HRV1.5 Q+	HRV1.75 Q+	HRV2 Q+	HRV2.75 Q+	HRV2.85 Q+	HRV3 Q+	HRV10 Q+	HRV10M Q+
Part number	TP400A	TP406A	TP403A	TP404A	TP401A	TP405A	TP407A	TP402A	TP440A	TP441A
Continuous Speed	●	●	●	●	●	●	●	●	●	●
Setback Speed	●	●	●	●	●	●	●	●	●	●
Boost Speed-With Overrun Timer	●	●	●	●	●	●	●	●	●	●
Summer Mode	●	●	●	●	●	●	●	●	●	●
Ø100 & Ø125mm Ducting	●	●								
Ø125& Ø150mm Ducting			●	●	●	●	●	●	●	●
Constant Volume Fans					●			●		
Independent Adjustment Of Fans	●	●	●	●	●	●	●	●	●	●
Step Less Fan Speed Setting	●	●	●	●	●	●	●	●	●	●
Automatic Frost Protection	●	●	●	●	●	●	●	●	●	●

Continuous Speed

Continuous Speed is the normal continuous extract and supply air flow running speed of the units.

Setback Speed

Setback Speed is used to reduce ventilation rates. Setback Speed is automatically set at the mid point between minimum possible continuous speed and the selected continuous speed. The Setback Speed can be enabled by connection of a volt free one-way switch, or combined with the Boost Speed with the 3 position switch TP 508.

Boost Speed with Overrun Timer

Boost Speed increases the extract and supply air flow. Boost Speed is configured with Step-less independent fan controls and includes an Overrun Timer variable between 0 and 60 minutes. The Boost Speed can be triggered by any device which provides a volt free one-way switch, such as a PIR, thermostat, humidistat or a standard one-way switch.

Summer Mode

In properties where it is desirable to reduce the supply of warm fresh air during hot weather the optional Summer Mode operation is available.

Summer Mode operates by stopping the supply fan. Summer Mode can be triggered either manually or automatically:

Manual - This is by means of a volt-free switch wired directly into the controller PCB Automatic - This is by means of a dedicated wall mounted room thermostat. In this configuration Summer Mode will only operate when the temperature within the room has exceeded the dedicated thermostat setting. When Summer Mode is selected the supply fan will remain off even if the HRV10 is placed into Boost. Summer Mode must not be installed in dwellings where open flue combustion appliances are used.

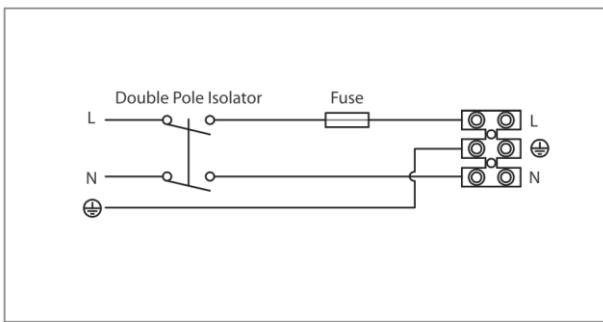
Constant Volume Fans

These automatically adjust their speed depending upon the system resistance, thus ensuring that the required airflow is always maintained.

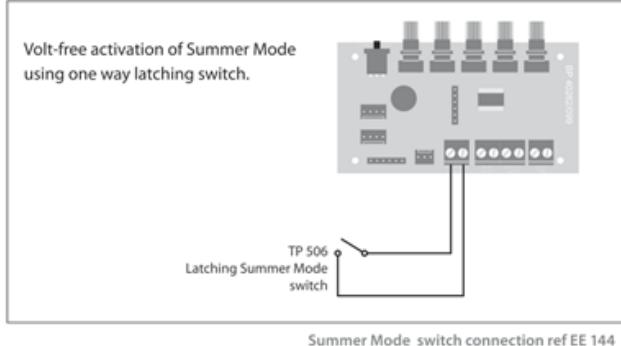
Automatic Frost Protection

During very cold weather, Automatic Frost Protection will detect temperatures that could form ice inside the unit. It will reduce the supply ventilation rate to prevent ice build up within the heat cell. Automatic Frost Protection reduces the flow rate of cold air, thus allowing the warmer stale air to raise the temperature within the heat cell to such a level that prevents the formation of ice. As internal temperatures rise Automatic Frost Protection will increase the supply ventilation flow rate back to the commissioned settings.

Wiring Diagrams



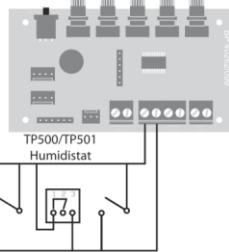
Supply wiring diagram 230V~50Hz ref EE 141



Summer Mode switch connection ref EE 144

Volt-free boost switching of MVHR controller PCB using single-pole switches TP 502, TP 503, TP 507 and / or TP500 / TP501 humidistat.

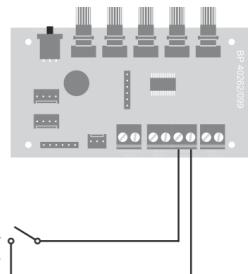
There is no limit to the number of single pole switches or humidistats that can be used.



Boost switching and Humidistat connection ref EE 142

Volt-free setback switching of MVHR controller PCB using single-pole latching switch and / or volt-free normally open relay contacts.

To avoid the unit being inadvertently left in Setback Mode, it is recommended that only one latching switch is fitted.



Setback Mode switching and connection ref EE 143

Check the Control PCB has the correct version of software

The PCB should be marked 'FW0001-.....', see fig 5.

Fault Finding

Unit Not Running

1. Check there is continuity across the fuse & that mains power is present at the spur. (Fig 2 & wiring diagrams)
2. Check mains power is present at the three way terminal block (Fig 3). N.B. some units are fitted with a mains filter before the terminal block (Fig 4), where fitted, check there is mains is present on the input and output sides of the filter.
3. Isolate the power at the spur, remove the front cover or the ducting from stale air to atmosphere and fresh air to habitable rooms spigots. Check if the fans will run freely. Check for obstructions.
4. KEEPING Hands away from the unit switch on power, wait approx. 40 sec and look to see if the fans are spinning, 'kicking' or are stationary

If 'kicking' or are stationary there is a likely to be a PCB or fan fault.

Check fans

- o Disconnect fan 1 Molex (Supply fan) connector from the PCB (Fig 5), does fan 2 run? If yes then fan 1 is faulty. If no reconnect.
- o Disconnect fan 2 Molex (Extract Fan) connector from the PCB (Fig 5), does fan 1 run? If yes then fan 2 is faulty. If no reconnect.

Fans can be independently checked by connecting them to a potentiometer, as detailed in Fig1. N.B. there needs to be power to the unit. If they fail to respond they are faulty. If they both respond there is fault with the control PCB.

PCB Check

- o Check the resistance across the boost, setback and SummerMode terminals on the PCB (this checks if the circuit has been damaged and caused a knock on affect to the PCB's operation), see fig 6. N.B. The above

PCB test only checks the switch inputs, if it passes this test it could still be faulty. There are no other checks that can easily be carried out.

Unit Trips RCD Or MCB

1. Disconnect both fans from the mains supply terminal Fig 3. Try powering up the unit, if the power does not trip there is a fault with one fan or both fans.
 - o If it trips then there is an issue with the supply cable, external wiring or mains filter, where fitted.
 - o If it did not trip, connect in turn both fans back into the mains supply terminal Fig 3, Try powering up with each fan, to determine which fan(s) is causing the fault.

N.B. The most common reason for tripping the unit is water/moisture in the fan(s). There are generally two causes:-

- o The ducting has not been insulated, as required by DVCG
- o The condensation drain has no trap and/or is not air sealed, as required in the manual.

Supply Fan (1) Not Running

1. Is the unit in summer mode? Is a switch fitted to activate Summer Mode, and is it ON, see fig 5 or wiring diagrams for connections.
2. Is the unit in frost protection mode? Disconnect the thermistor fig 5, if the fan then responds the unit is in frost protection mode. Check the resistance across the thermistor, if higher than 29.75KΩ, then the unit should be in frost protection mode. When the stale air temperature after the cell drops to 2°C the supply fan speed will be decreased, if the temperature continues to drop to -2°C the fan will be stopped.
3. Check the Molex connector for Fan 1 is firmly pushed onto PCB (fig 5)
4. Isolate the power at the spur, remove the front cover or the ducting from fresh air to habitable rooms spigot. Check the fan will run freely. Check for obstructions.
5. KEEPING Hands away from the unit switch on the power, wait approx. 40 sec and look to see if fan is spinning, 'kicking' or is stationary.

If 'kicking' or stationary.

Check the fan

- o Disconnect fan 2 (Extract) Molex connector from the PCB (Fig 5), then disconnect fan 1 (supply) Molex connector from the PCB (Fig 5), Connect Supply Fan 1 Molex on the connector for Fan 2. If the Supply fan runs then there is a PCB fault if it fails to run then the fan is faulty, this can be further checked by connecting the fan to a potentiometer as detailed in Fig 1. N.B. there needs to be power to the unit.

PCB Check

- o Check the resistance across the boost, setback and Summermode terminals on the PCB (this checks if the circuit has been damaged and caused a knock on affect to damage the PCB operation, see fig 6).

N.B. The above PCB test only checks the switch inputs, if it passes this test it could still be faulty. There are no other checks that can easily be carried out.

Extract Fan (2) Not Running

1. Check Molex connector for Fan 2 is firmly pushed onto PCB (fig 5)
2. If still not running isolate power at spur, remove front cover or ducting from stale air to atmosphere spigot. Check the fan will run freely. Check for obstructions.
3. KEEPING Hands away from the unit switch on power, wait approx. 40 sec and look to see if fan is spinning, 'kicking' or are stationary.

If 'kicking' or stationary.

Check the fan

- o Disconnect fan 1 Molex (Supply) connector from the PCB (Fig 5), then disconnect fan 2 Molex (Extract) connector from the PCB (Fig 5), Connect Extract Fan 2 Molex on the connector for Fan 1. If the Extract fan runs then there is a PCB fault if it fails to run then the fan is faulty, this can be further checked by connecting the fan to a potentiometer as detailed in Fig 1. N.B. there needs to be power to the unit.

PCB Check

- o Check the resistance across the boost, setback and SummerBoost terminals on the PCB (this checks if the circuit has been damaged and caused a knock on affect to the PCB's operation), see fig 6. N.B. the PCB is supplied from the factory with a link across the SummerBoost terminals.

N.B. The above PCB test only checks the switch inputs, if it passes this test it could still be faulty. There are no other checks that can easily be carried out.

N.B. The most common reasons for the extract fan failing are, that the duct to atmosphere is not fully insulated or the condensation drain has no trap fitted and/or is not air sealed.

Unit Will Not Boost

1. Is a boost setting required – is continuous requirement higher or the same as the boost requirement?
2. Is it actually boosting but the boost speed is just higher or the same as continuous, therefore no audible difference.
 - o Check the flow rates at continuous and boost to see if there is a difference.
 - o Change units speed to determine if difference is then audible.



The unit speeds can be determined by looking at the top of the relevant potentiometer and seeing where the arrows point. If the arrows on the continuous and boost pots are in the same or similar positions the flow rates and noise will be similar.

Turning Anticlockwise – decreases speed

Turning Clockwise – increases speed

3. Is the unit already running at full speed?
4. Is a boost switch fitted?
5. Are the boost cables connected to correct terminals (fig 5 & wiring diagrams)?
6. Is the boost switch providing a connection across the boost terminals?

- Disconnect the boost wires and check for continuity, with a continuity tester or multimeter.
- The boost function can be tested by bridging the terminals, using a link wire, see Fig 7

7. If using momentary switches is the overrun timer set to zero?
8. Is the unit in commissioning mode? Programming switch should be in the central position see fig 5 & 10
9. Has 230v been incorrectly applied to the PCB (all switching is volt free). The PCB may show signs of damage but not always. If a voltage has been applied, this can be proved by measuring the resistance across the boost terminals (with boost cables removed), if open circuit then a voltage has been applied. If a voltage has been applied the PCB will require replacing. It may also result in one or both of the fans requiring replacing, depending whether damage has been limited to the PCB or not (Fig 6).

Unit Will Not Drop Out Of Boost

1. Is the unit in boost commissioning mode? Programming switch should be in the central position see fig 5 & 10.
2. Are all boost switches in the OFF position?
3. Is overrun timer set high? After resetting, switch the unit off for 20 seconds and switch back on.
4. Is there a boost switch wiring or switch fault – disconnect the boost cables and check for continuity.
5. Has 230v been applied to boost terminals – control circuitry has been damaged, check as Fig 6
6. If an external humidity sensors is fitted, is the humidity within property sufficiently high to trigger boost unit.
7. If a proximity sensors is fitted is it continuously being triggered by movement.

N.B. If the mains cable and boost cables are run in close proximity it is possible the 230v cables can induce a voltage into the boost cables and result in the unit not dropping out of boost. Five core cable – live, neutral, earth and two for boost must not be used.

HRV2&3. The set speeds may be correct but resistance is causing the fans to run at a faster speed to achieve the required flow rate (constant volume motors). Remove ducting to the unit, one duct at a time. If the fan speeds drop dramatically then there is excessive resistance in that duct run.

Unit Speed Drops Below Normal Running Level

1. Is the unit in setback mode, check switches/wiring (fig 5 & wiring diagrams)
2. Is the unit in frost protection mode? Disconnect the thermistor fig 5, if the fan then responds the unit is in frost protection mode. Check the resistance across the thermistor, if higher than 29.75KΩ, then the unit should be in frost protection mode. When the stale air temperature after the cell drops to 2°C the supply fan speed will be decreased, if the temperature continues to drop to -2°C the fan will be stopped.

Excessive Fan/Unit Noise

1. Has the unit been set to the correct continuous flow rates and running in continuous mode, if yes are the speeds higher than predicted (reference unit fan curves – available on our web site). If yes check for excess resistance/leakage:-
 - Is there excess flexible ducting or tight bends?
 - Are all ducts connected and sealed?
 - Are ducts the correct size?
 - Are external terminals (roof terminals or air bricks) suitable for the application?
 - Have ceiling terminals been wound too far in?
 - Are there any deviations from the design?
 - Are there any blockages in the ducting or in the air ways in the unit?
 - Has the unit been mounted on a stable surface using the mounting brackets provided?
 - Is the unit horizontally & vertically square?
2. Isolate power at spur, remove front cover or ducting from stale air to atmosphere and fresh air to habitable rooms spigots. Check fans will run freely, with no unexpected bearing noise or signs the fan is hitting/rubbing against its housing.

HRV2&3. The set speeds may be correct but resistance is causing the fans to run at a faster speed to achieve the required flow rate (constant volume motors). Remove ducting to the unit, one duct at a time. If the fan speeds drop dramatically then there is excessive resistance in that duct run.

Unit Will Not Respond When Commissioning

1. Unit not in the commissioning mode – program switch has not been moved, see fig 10.
2. Check position of the potentiometers – N.B. Boost cannot be set lower than Continuous & Continuous cannot be set higher than Boost.
3. If in doubt follow PCB Reset.
4. Has 230v been applied to the boost terminals? Fig 5.
5. HRV2 & 3 Models, Remove the ducting from the unit and check if the fans then respond.

Unit Ramps Up Without Manual Switches Being Operated

1. If room or in duct humidity sensors are fitted, has the humidity within property increased sufficiently to trigger boost. Increase the humidity trigger point to maximum, then switch the unit off for 20 seconds then put back on.
2. If PIR's are fitted are these being triggered.

Required Fan Rates Cannot Be Achieved

1. Incorrect unit selected – refer to unit literature for unit capacities.
2. Excess resistance/leakage:-
 - o Is there excess flexible ducting and/or tight bends?
 - o Are ducts sizes correct?
 - o Are external terminals (roof terminals or air bricks) suitable for the application?
 - o Have the ceiling terminals been wound too far in?
 - o Are there any deviations from the design?
 - o Are ducting joints sealed (silicone or other recognised method)?
 - o Are there any deviations from the design?
 - o Are there any blockages in the ducting or in the air ways in the unit?

Cold Air Is Being Supplied Into Habitable Room

1. Has the air temperature been measured and compared with the air temperature in the wet rooms? The difference should be approx. 2-3°C. *Moving air does feel cold!*
2. If the ducts from the unit to the wet rooms and/or those to the habitable rooms pass through a cold void, are they fully insulated?
3. Are the supply and extract rates balance, i.e. is the supply rate dramatically higher than the extract rate.

Moisture/Water On Or Around Unit

1. Are the ducts to atmosphere fully insulated from the top of the unit to the underside of the roof (roof terminal) or to the brickwork (airbrick)?
2. If the stale to atmosphere rises vertically to a roof terminal is a condensation trap fitted?
3. If the ducts from the unit to the wet rooms and/or those to the habitable rooms pass through a cold void, are they fully insulated?
4. Is the internal condensation tray split?
5. Is the unit fitted square both horizontally and vertically?
6. Is the condensation drain fitted?
7. Is the condensation drain fitted with a proprietary trap and the pipe sealed to the trap?
8. Does the condensation drain run have a minimum of 5° fall?
9. Has the ducting been connected to the correct unit spigots?
10. Is there moisture on or inside the ducts?

Moisture Inside The Unit

During normal running it is usual to find water within the heat recovery cell and traces of moisture in the condensation tray adjacent to extract fan. The level of water within the cell and in the condensation tray will be higher if there is currently or has been recently high humidity within the Kitchen or wet rooms. The higher the flow through the faster the unit will dry out. Insufficient flow rate may result in water being present for prolonged periods.

If water is found in the fan scrolls, underneath the tray, around the fan EPP or in the vicinity of the PCB's this indicates there is an issue with the installation.

Check the following.

1. Are the ducts to atmosphere fully insulated from the top of the unit to the underside of the roof (roof terminal) or to the brickwork (airbrick)?
2. If the stale to atmosphere rises vertically to a roof terminal is a condensation trap fitted?
3. If the ducts from the unit to the wet rooms and/or those to the habitable rooms pass through a cold void, are they insulated?
4. Is the internal condensation tray split?
5. Is the unit fitted square both horizontally and vertically?
6. Is the condensation drain fitted?
7. Is the condensation drain fitted with a proprietary trap and the pipe sealed to the trap?
8. Does the condensation drain run have a minimum of 5° fall?
9. Has the ducting been connected to the correct unit spigots?
10. Is there moisture on or inside the ducts?

Unit Performance Has Dropped

1. The filters have become clogged.
2. Flexible ducting has been crushed.
3. Rigid ducting has been knocked or moved resulting in air leakage.
4. Ceiling terminals have been tampered with.
5. Airbricks and /or roof terminals have become blocked or restricted.

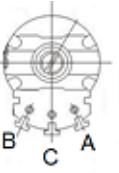
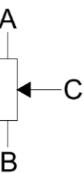
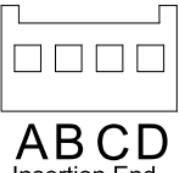
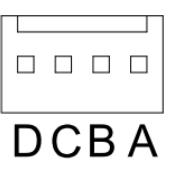
PCB Reset

1. Rotate the Supply and Extract Continuous Speed potentiometers fully anticlockwise
2. Rotate Supply and Extract Boost Speed potentiometers fully clockwise move the Run/Program Switch from the Run position to the Continuous position, from the Continuous position to the Boost position and back to the Run position. To ensure that the reset switch movements are registered by the controller wait two seconds between each switch movement.
3. Rotate the overrun timer fully anticlockwise
4. Rotate the humidity sensor fully clockwise

Switch the power off to the unit for a minimum of 20 seconds then switch back on.

The unit will go through a ramp up routine then after approx. 40 seconds it will run as determined by any internal/external inputs.

Fig 1 Molex Connectors

				
10KΩ Potentiometer Connections	Molex Fan Connector A - 10V, B - 0V, C - PWM & D - Tacho		PCB Connector	

Connect a 10KΩ Potentiometer across the terminals shown and rotate to check if the fan will respond. If this is not possible, try bridging the A and C terminals on the fan connector, the fan should then run at full speed.

Fig 2 Mains Connector

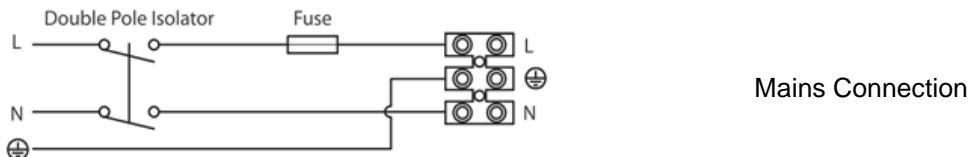


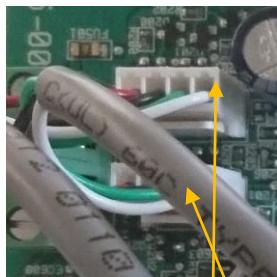
Fig 3 Mains Terminal Block



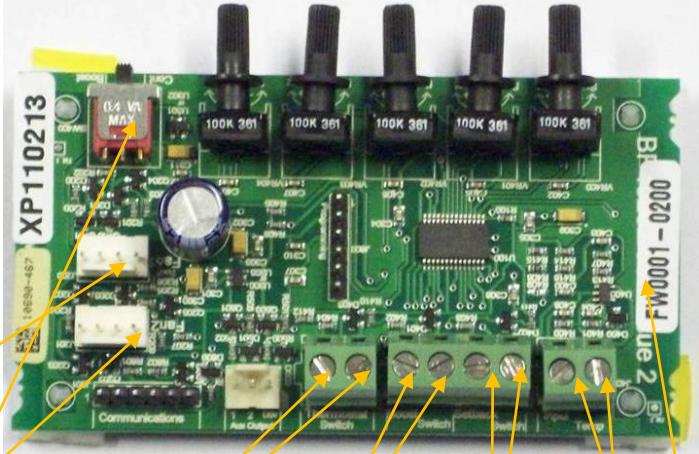
Fig 4 Mains Filter



Fig 5 Control PCB



Molex - Fan 1
Supply
Molex - Fan 2
Extract
Programming switch



Thermistor (input Temp)
Push Switch
Firmware Version
Unit Specific

Fig 6 Testing PCB Inputs

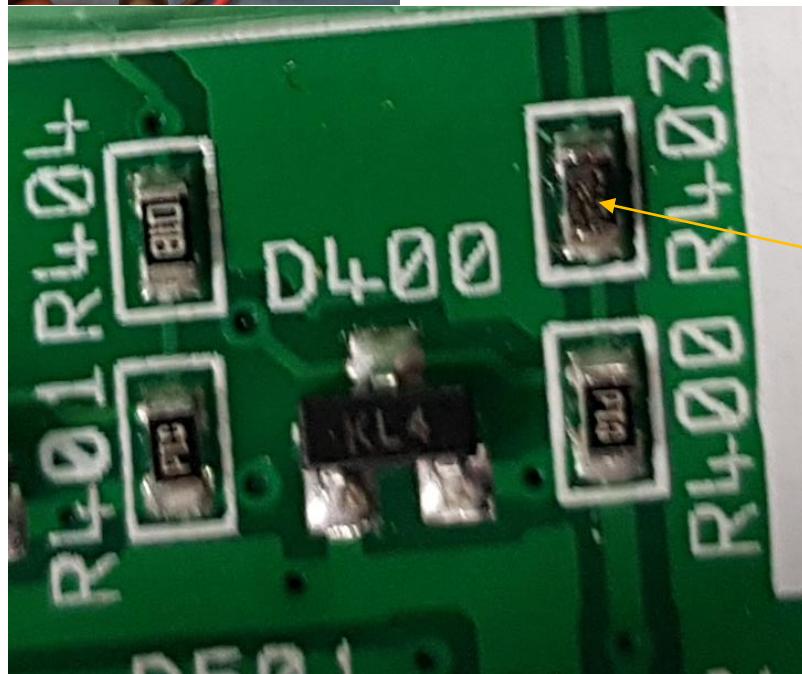


Measure resistance across the boost terminals, this is easier across the soldered joints rather than the terminals block.

If reading is open circuit, it is probable that 230v has been applied.

If reading is approx. $15\text{k}\Omega$, then the circuit is ok.

This only checks the boost circuit and does not prove overall functioning i.e. PCB may still be faulty if reading is approx. 15kΩ



Damaged component. The failure is often very difficult to see. The surface of the resistor is damaged / burnt

Fig 7 Boost Link Test



Boost Link

Fig 8 Thermistor Values

Temp °C	Resistance (KΩ)
-10	42.47
-9	40.57
-8	38.77
-7	37.06
-6	35.44
-5	33.90
-4	32.44
-3	31.05
-2	29.73
-1	28.48
0	28.48
1	26.13

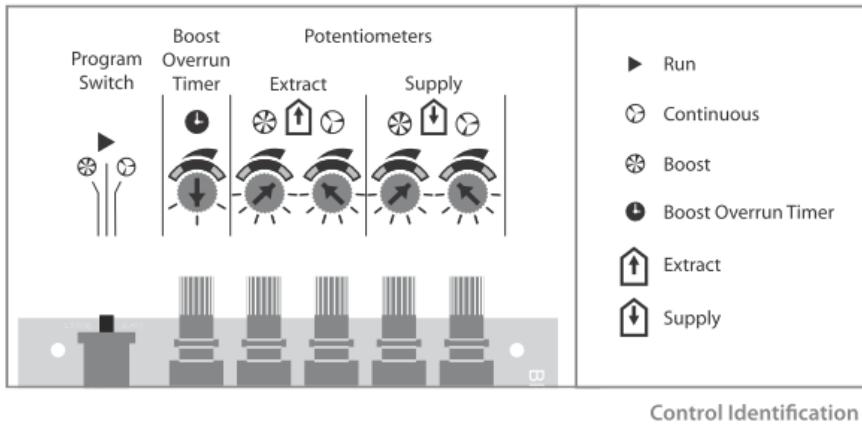
Temp °C	Resistance (KΩ)
2	25.03
3	23.99
4	23.00
5	22.05
6	21.15
7	20.30
8	19.48
9	18.70
10	17.96
11	17.24
12	16.56
13	15.90

Temp °C	Resistance (KΩ)
14	15.28
15	14.69
16	14.12
17	13.58
18	13.06
19	12.56
20	12.09
21	11.63
22	11.20
23	10.78
24	10.38
25	10.00
26	9.63

Fig 9 Thermistor



Fig 10 Control PCB Functions



Reference Documents

Approved Document Part F
Domestic Ventilation Compliance Guide (DVCG)

Available from <https://www.gov.uk/government/publications/ventilation-approved-document-f>