Fault Finding

HRV 1.5, 1.75, 2, 2.75, 3, 10 & 10M Units

‘ABS’ Models

This document covers part numbers
TP401ABS, TP402ABS, TP403 ABS, TP404ABS, TP408ABS, TP440ABS & TP441ABS.

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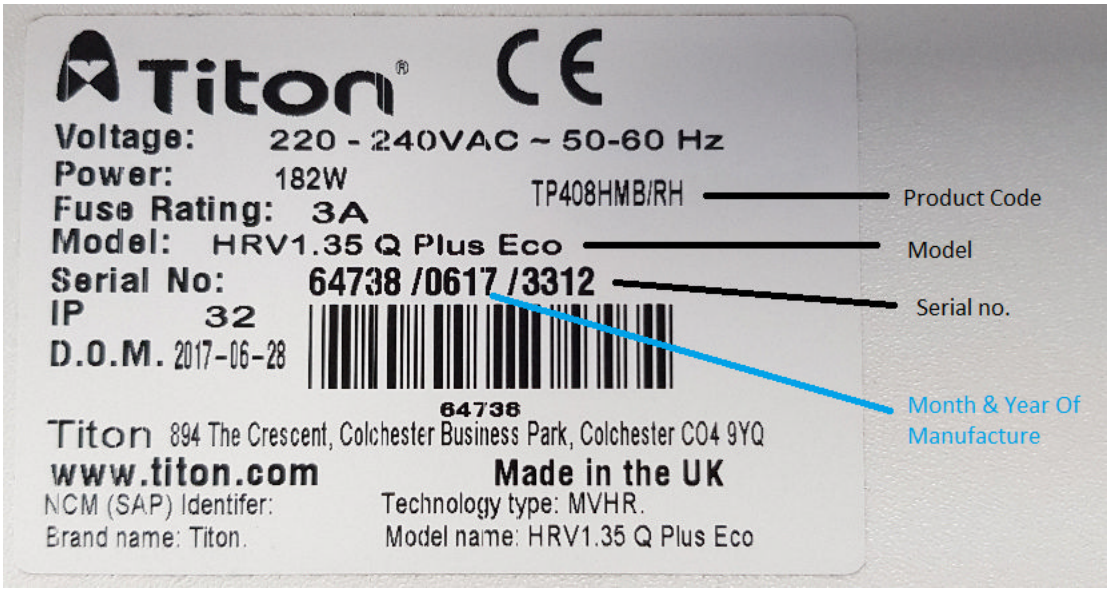
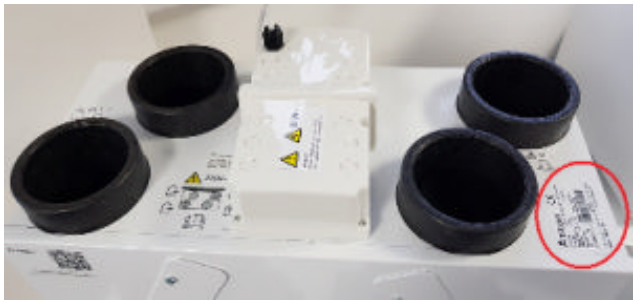
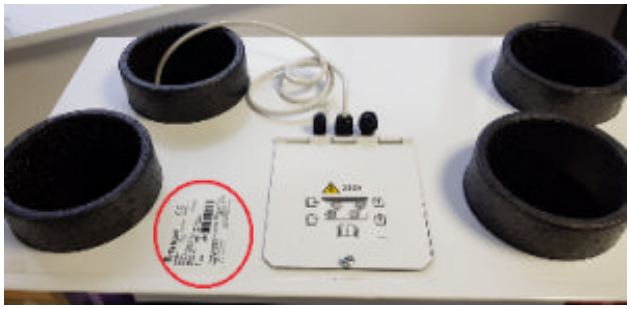
Product Identification







All maintenance/fault finding/repairs must be completed by a competent person.
Safe isolation procedures must be followed when working on these units.

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Product Features

Model	HRV1.5 Q plus	HRV1.75 Q plus	HRV2 Q plus	HRV2.75 Q plus	HRV3 Q plus	HRV10 Q plus	HRV10M Q plus
Part Number	TP403ABS	TP404ABS	TP401ABS	TP405ABS	TP402ABS	TP440ABS	TP441ABS
Automatic Setback Speed	●	●	●	●	●	●	●
Continuous Speed	●	●	●	●	●	●	●
Boost Speed with Overrun timer	●	●	●	●	●	●	●
SummerBoost	●	●	●	●	●	●	●
Summer Bypass	●	●	●	●	●	●	●
Duct Heater Connection	●	●	●	●	●	●	●
Constant Volume Fans			●		●		
Ø100 & Ø125mm Ducting	●	●					
Ø125 & Ø150mm Ducting	●	●	●	●	●	●	●
Independent Adjustment of fans	●	●	●	●	●	●	●
Automatic Frost Projection	●	●	●	●	●	●	●

Auto 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.

Continuous Speed

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

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. If the unit is left Boost (latching switch) for longer than 2 hours the Overrun Timer is disabled meaning the HRV will return to Continuous Speed as soon as the switch holding the unit in Boost is released.

Summer Bypass

Summer Bypass is designed to operate during hot periods where fresh air can be vented straight into the property without being preheated by the extracted stale air. Summer Bypass operation is automatically controlled. The Summer Bypass mechanism diverts the stale air being extracted from the dwelling around the heat cell so that its heat energy is not transferred to the fresh air being supplied to the property.

SUMMERboost®

An optional SUMMERboost® facility is available that allows
both the supply and extract fans to run at full speed
whenever the Summer Bypass is activated.
By default SUMMERboost® is disabled by a Link Wire, see Wiring Diagrams.
Removal of the link wire will enable SUMMERboost®.

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When SUMMERboost® is trigged by Summer Bypass the increased fan speed can be prevented 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. SUMMERboost® will only operate when the temperature has exceeded the thermostat setting. Should the room temperature fall below the thermostat setting, then SUMMERboost® will not operate.

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.

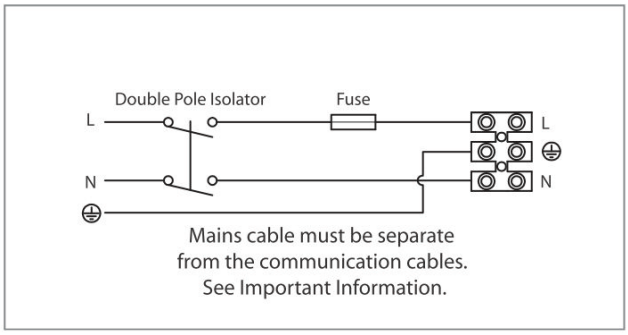
Duct Heater

To maintain ventilation flow rates where prolonged periods of very low temperatures occur, the facility for the control of a Duct Heater is provided, MAX 1000W. This is achieved using an electrically powered Duct Heater placed in-line between the outside supply vent and the From Atmosphere terminal on the HRV
Q Plus. In these applications, the heater is used to pre-warm the outside fresh air supply before it enters the HRV *Q Plus*. During Duct Heater operation fan speeds are not changed. However if the temperatures fall below a predetermined level Automatic Frost Protection will engage to protect the heat cell.

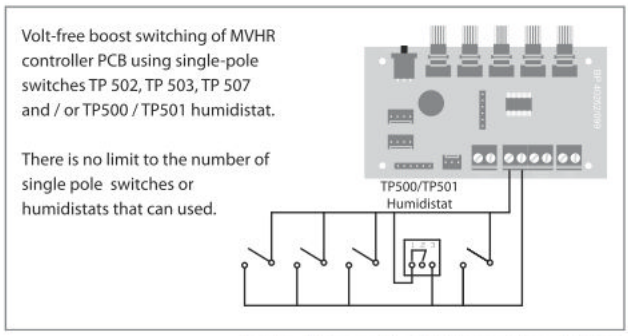
Constant Volume Fans

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

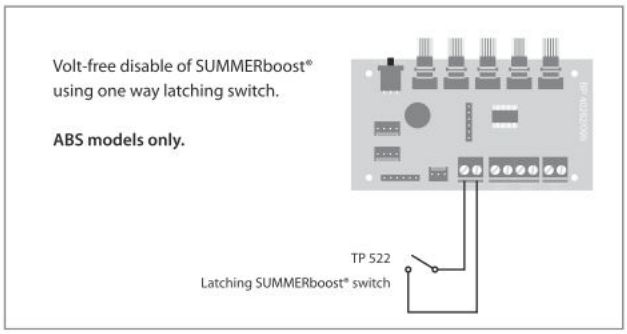
Wiring Diagrams



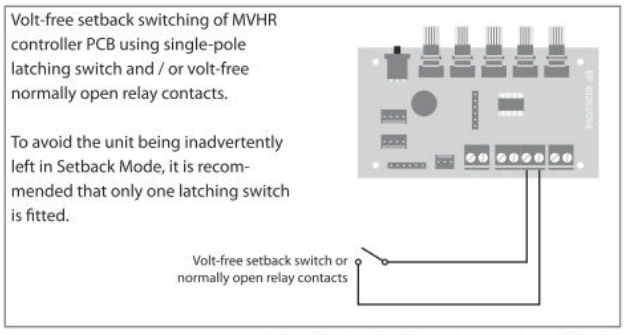
Supply wiring diagram 230V~50Hz ref EE141



Boost switching and Humidistat connection ref EE 142



SUMMERboost® switch connection ref EE 150



Setback Mode switching and connection ref EE 143

Check the Control PCB has the correct version of software
The PCB should be marked 'FW0005-…..', see fig 5.

Fault Finding

Unit Not Running

1. Check the continuity across the fuse & that mains power is present at the two pole spur. (Fig 2 & wiring Diagrams)
2. Check power at 'Mains Supply' Connection (Fig 4). N.B. some units are fitted with a suppression filter (Fig 3) before the power PCB, power needs to be check on the input and output sides of the filter.
3. Check continuity of the Power PCB fuse (Fig 4)

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4. Check power at the Power PCB (Fig 4) at 'power supply to fans' terminals.
5. Isolate power at spur, remove front cover or ducting from stale air to atmosphere and fresh air to habitable rooms spigots. Check if fans will run freely. Check for obstructions.
6. KEEPING Hands away from the unit switch on power, wait approx. 40 sec and look to see if fans are spinning, 'kicking' or are stationary
7. If 'kicking' or are stationary there is a likely to be a PCB or fan fault.
8. Disconnect fan 1 Molex (Supply) connector from the PCB (Fig 5), does fan 2 run? If yes fan 1 faulty. If no reconnect.
9. Disconnect fan 2 Molex (Extract) connector from the PCB, does fan 1 run? If yes fan 2 faulty. If no reconnect.
10. If disconnecting fans has not resolved the issue, then either the PCB and/or both fans are faulty.
11. Check fan runs (see Fig 1), turning the potentiometer adjusts speed from max to min or vice versa.
12. Check resistance across boost, setback and SummerBoost terminals on 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 PCB is supplied from the factory with a link between the SummerBoost terminals.

Unit Trips RCD Or MCB

1. Disconnect both fans from the 'power supply to fans' terminals Fig 4. Try powering up the unit, if the power does not trip there is a fault with one fan or both fans. If it trips then there is an issue with the power supply PCB, supply cable, external wiring or filter (where fitted).
    - If it has not tripped connect in turn both fans back into the mains supply terminal Fig 4, Try powering up with each fan, to determine which fan(s) is causing the fault.
    - If it has tripped Disconnect the mains supply from the Power PCB fig 4, place the cables into suitable terminal block (3A or greater). Try powering up, if the power does not trip the Power PCB is faulty, if it does trip the fault is with the cable, external wiring or filter (where fitted).

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

- The ducting has not been insulated, as required by DVCG
- The condensation drain has not been sealed, as required in the manual.

Supply Fan (fan1) Running Slow

1. Is the unit in frost protection mode? The fan is slowed down to give priority to the extracts fan, to stop the cell freezing. The Thermistor will measure greater than 25.03KΩ but lower than 29.73KΩ.
   N.B. the unit can be forced into Frost Protection by attaching a variable resister network to the Control PCB Thermistor terminals (see fig 5) and adjusting resistance until it is within the resistances stated above, see fig 11 for resistor network.

Supply Fan (fan1) Not Running

1. Check Molex connector Fan 1 is firmly pushed onto PCB (fig 5)
2. Is the unit in frost protection mode? The Thermistor will measure greater than 29.73KΩ.
   N.B. the unit can be forced into Frost Protection by attaching a variable resister network to the Control PCB Thermistor terminals (see fig 5) and adjusting resistance until it is above the resistances stated above, see fig 11 for resistor network.
3. Isolate power at spur, remove front cover or ducting from fresh air to habitable rooms spigots. Check 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 fans are spinning, 'kicking' or are stationary.
5. Disconnect the Molex connectors for both fans, put Molex connector from fan 1 onto the PCB connector for fan 2. If the fan runs then the PCB is faulty if the fan does not run the motor is faulty.
6. Check fan runs (see Fig 1), turning the potentiometer adjusts speed from max to min or vice versa.
7. Check resistance across boost, setback and SummerBoost terminals on 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 PCB is supplied from the factory with a link between the SummerBoost terminals.

Extract Fan (fan 2) Not Running

1. Check Molex connector 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 fans 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 fans are spinning, 'kicking' or are stationary.
4. If still not running disconnect the Molex connectors for both fans, put Molex connector from fan 1 onto the PCB connector for fan 2. If the fan runs then the PCB is faulty if the fan does not run the motor is faulty.
5. Check fan runs (see Fig 1), turning the potentiometer adjusts speed from max to min or vice versa.
6. Check resistance across boost, setback and SummerBoost terminals on 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 PCB is supplied from the factory with a link between the SummerBoost terminals.

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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 is has no trap and is not air sealed.

Unit Will Not Boost

1. Is a boost setting required – is the 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 speed, therefore no audible difference.
    - Check flow rates at continuous and boost to see if there is a difference.
    - Change units speed to determine if the difference is then audible.

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 – decrease speed
Turning Clockwise – increase speed

3. Is the unit already running at full speed?
4. Is a boost switch fitted?
5. Are 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.
    - Function can be tested by bridging the terminals, using a link wire See Fig 7
7. If using momentary switches is over run timer set to zero?
8. Is the unit in commissioning mode? Programming switch should be in the central Run 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 terminals (with 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). N.B. the PCB is supplied from the factory with a link between the SummerBoost terminals.

Unit Will Not Drop Out Of Boost

1. Is the unit in boost commissioning mode? Programming switch should be in the central Run 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. Boost switch wiring or switch fault – permanent continuity at boost terminals.
5. 230v has been applied to boost terminals – control circuitry has been damaged (see Fig 6).
6. If fitted, proximity sensors are continuously being triggered by movement. If fitted.
7. Is the unit in SummerBoost mode? This can be confirmed by checking the voltage across the 'Power to Bypass Terminals' on the Power PCB, if 230v is present the unit is in Bypass.

N.B. If the mains cable and boost cables are run in close proximity it is possible the 230v 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.

Unit Speed Drops Below Normal Running Level

1. Is the unit in setback mode, check switches/wiring? check switches/wiring Fig 5 & wiring diagrams.
2. Is the unit in frost protection mode? The Thermistor will measure greater than 25.03KΩ but lower than 29.73KΩ.
3. If the thermistor temperature is incorrect replace the thermistor.

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 duct sized correct?
    - Are external terminals (roof terminals or air bricks) suitable for the application?
    - Have ceiling terminals be 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.

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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 fans speed drops 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.
2. Check position of the potentiometers – N.B. Boost cannot be set lower than Continuous & Continuous cannot be set higher than Boost. Check manual for factory reset information.
3. Has 230v been applied to the boost terminals? See Fig 6
4. HRV2 & 3 Remove the ducting from the unit and check if the speed then respond

Unit Does Not Go Into Bypass

1. Is the measured resistance of the thermistor between 10.38 & 12.09 KΩ. Thermistor must be disconnected from the PCB when checking).
2. Has the thermistor become disconnected or its cable damaged Fig 5.
3. Is the ribbon cable attached (check continuity of the cable) Fig 4 & 5.
4. Is there 240v across the Bypass terminals Fig 4)

N.B. the unit can be forced into Bypass by attaching a variable resister network to the Control PCB thermistor input (see fig 5) and adjusting the resistances until it is between the resistances stated above, see fig 11 for resistor network. Once Bypass is activated it will remain in Bypass for an hour then drop about, then re monitor. Switching the unit off for 20 seconds will reset the unit.

Required Fan Rates Cannot Be Achieved

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

Moisture/Water On Or Around Unit

1. Are the ducts to atmosphere 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 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 pipe sealed to the trap?
8. Dose the condensation drain run have a minimum of 5º fall?
9. Has the ducting been connected to the correct unit spigots?

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.

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.
3. The unit has been triggered into SummerBoost,
    - Check if the factory fitted link wire is still in place.
    - If an override switch is fitted is it enabled?

Cold Air is Being Blown Into The Habitable Rooms

1. Has the air temperature been measured and compared with the air temperature in the wet rooms. The difference should be approx. 2-3ºC. *Moving air does feel cold!*
2. Are the correct type of ceiling terminals fitted?
3. If the ducts from the unit to the wet rooms and the habitable rooms pass through a cold void are they insulated?

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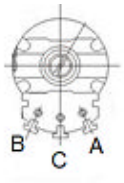
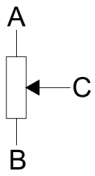
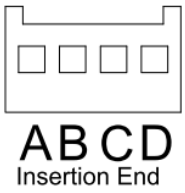
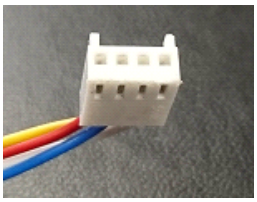
4. Is the unit in bypass mode?
5. Are the supply and extract rates balance, i.e. is the supply rate dramatically higher than the extract rate.

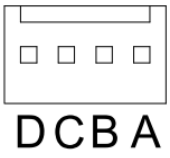
Fig 1 Molex Connectors







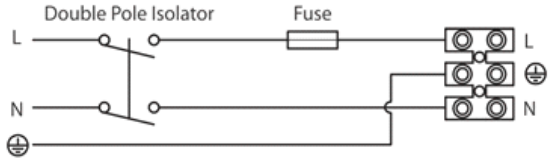




10KΩ Potentiometer Connections	Molex Fan Connector A - 10V, B - 0V, C - PWM & D - Tacho	PCB Connector

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.

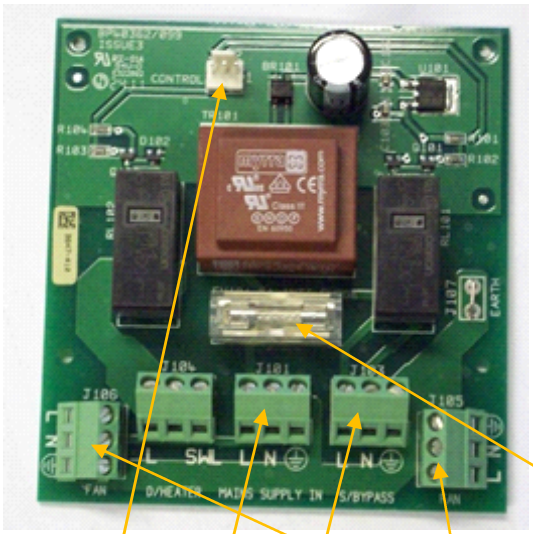
Fig 2 Mains Connector

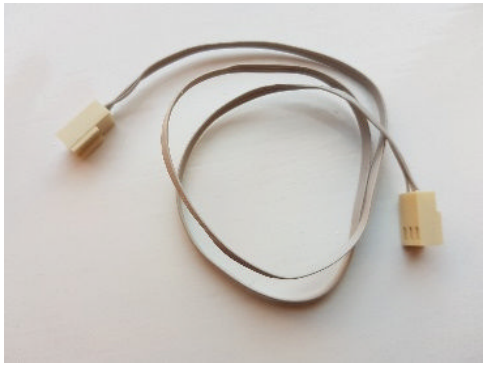


Mains Connection

Fig 3 Mains Filter

Fig 4 Power PCB





Ribbon Cable

Ribbon Cable Connector

Fuse

Mains Supply

Power Supply To Fans

Power To Bypass Supply

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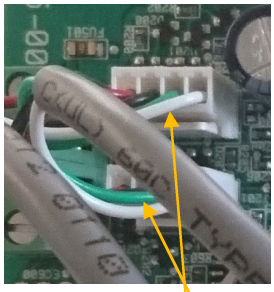
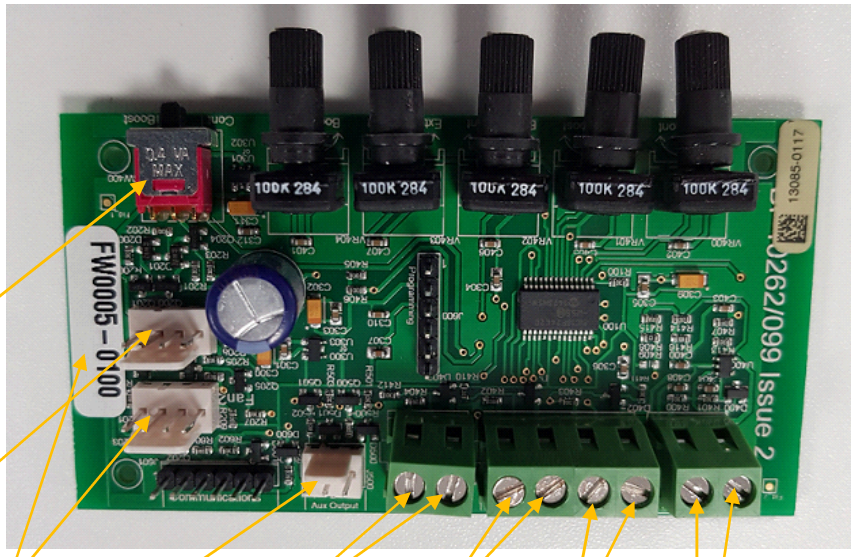
Fig 5 Control PCB





Commissioning Switch

Molex Fan 1 Supply

Molex Fan 2 Extract

Ribbon Cable Connector

Summer Boost Switch

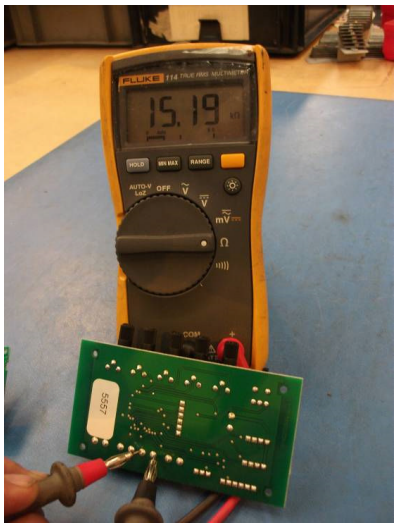
Boost (thermostat switch)

Setback Switch

Thermistor

Firmware Version

Fig 6 Testing PCB Inputs

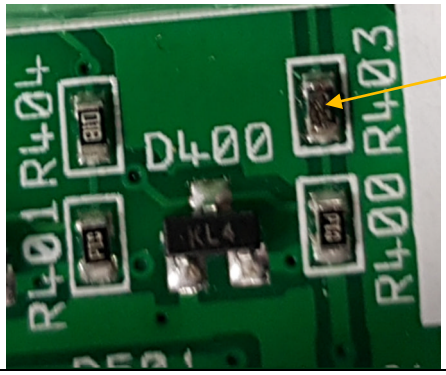


Measure resistance across the terminals, this is easier across the soldered joints rather than the terminals block.

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

If reading is approx. 15kΩ, 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 resister is damaged / burnt

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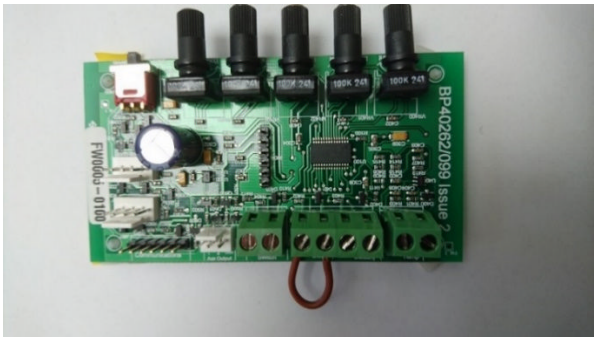
Fig 7 Boost Link Test



Boost link across SW1

Fig 8 Thermistor Values

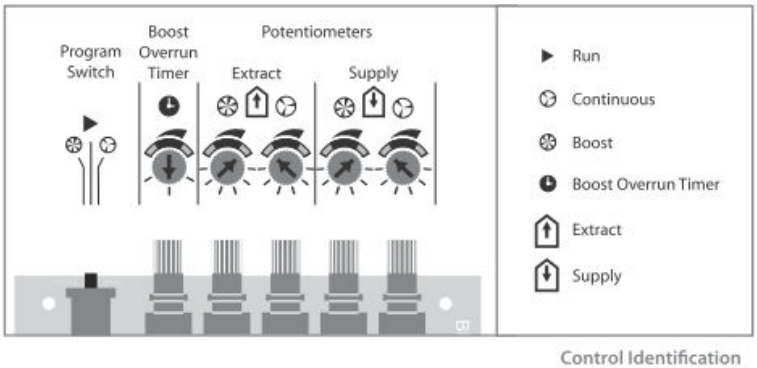
Temp ºC	Resistance (KΩ)
-10	42.47
-9	40.57
-8	38.77
-7	37.06
-6	35.44
-5	33.90
-4	32.44
-3	31.05
-2	29.73
-1	28.48
0	28.48
1	26.13

Temp ºC	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 ºC	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



Control Identification

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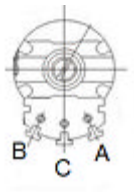
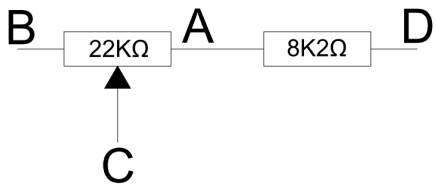
Fig 11 Resistor Network

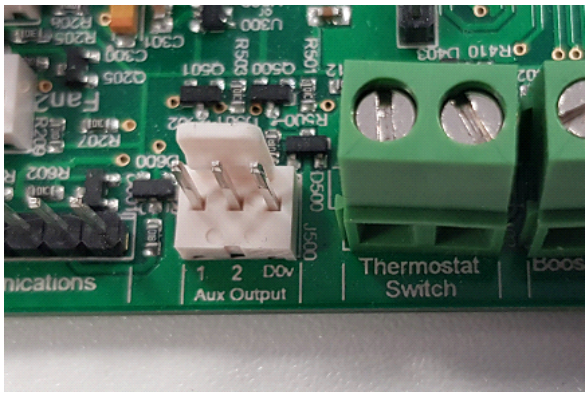


Variable Resistor Wiring



Connect C & D to Thermistor Inputs On Control PCB

Fig 12 Ribbon Cable Connection



N.B. For simplicity the photo's show the ribbon cable disconnected, however measurement should be taken with it connected.

Voltage Measurement	
SummerBypass disengaged	12v will be present across terminal 1 & D0v
SummerBypass engaged	0v will be present across terminal 1 & D0v
Duct Heater Off	12v will be present across terminal 2 & D0v
Duct Heater On	0v will be present across terminal 2 & D0v

Reference Documents

Approved Document Part F
Domestic Ventilation Compliance Guide (DVCG)

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

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