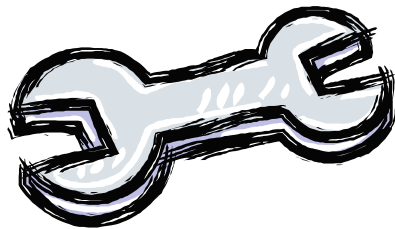


Isar

HE Series

Fault Finding

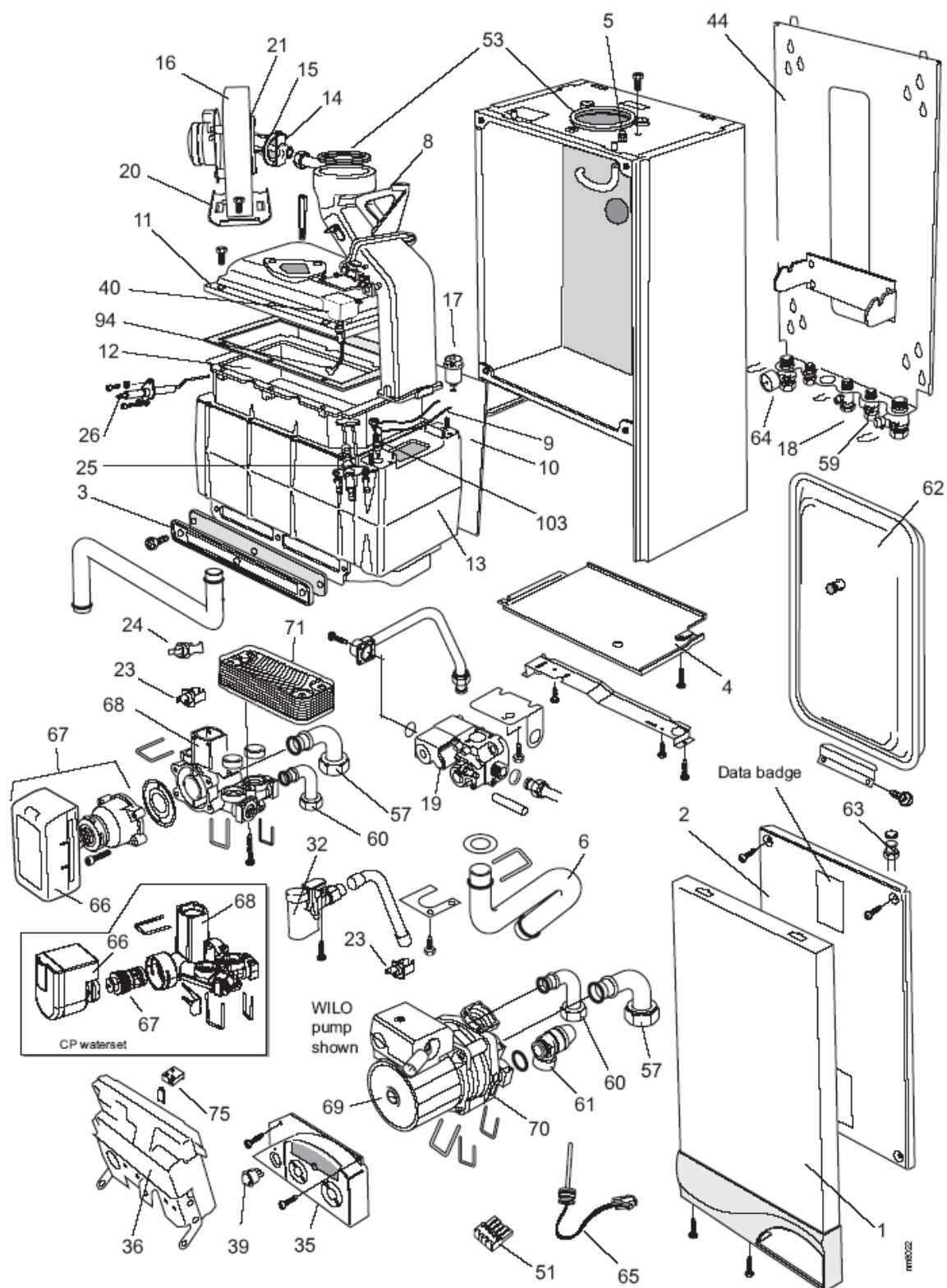


Fault Finding Codes

M Series Fault Codes		
Blocking Codes alternating with 'H' (Reset by powering boiler off/on)		
1	Flow sensor open	Check sensor / check loom
1.	Flow sensor shorted	Check sensor / check loom
2	Return sensor open	Check sensor / check loom
2.	Return sensor shorted	Check sensor / check loom
3	Dhw sensor open	Check sensor / check loom
3.	Dhw sensor shorted	Check sensor / check loom
4	Flue gas sensor open or Dry fire thermistor	Check sensor / check loom
4.	Flue gas sensor shorted or Dry fire thermistor	Check sensor / check loom
5	Jumper link fault	Check jumper links fitted correctly
9	Flue gas block error	Temperature of flue gas too high > 107C, Check circumstances, loom, sensor HE range (after 8.3.04) temperature > 95C
A	C Htg Max Block Error	The water temperature from the heat exchanger has exceeded 100C or perhaps the flow/sensor cabling is faulty. Check accordingly
b	Reset button error	Check button is not stuck, change user control
E	No communication with watchdog	This is a fault internal to control box. Change primary control
E	E2 prom read error	This is a fault internal to control box. Change primary control
E	AD convertor error	This is a fault internal to control box. Change primary control
E	50Hz error	This is a fault internal to control box. Change primary control
F	Flame detected with a closed gas valve	This suggests either a faulty flame detection signal perhaps due to a high resistance path between electrode & chassis or a sticking gas valve
F.	Ionisation pin shorted	Check for short circuit between ionisation pin & chassis, cable from ionisation electrode to control box
N	Phase & Neutral reversed	Check wiring to mains connector, loom between mains connector and control box & front on/off switch

M Series Fault Codes		
Lockout Codes alternating with 'L' (Reset by pressing reset button)		
8	Fan Error	Check operation of fan, condition / connection of loom. May also be a faulty internal to control box
9	Flue gas lock error	Temperature of flue gas too high > 117C check circumstances, loom, sensor HE (after 8.3.04) temperature > 105C
A	Overheat thermostat open	Water temperature exceeded safety stat limit, check thermostat operation, circumstances & connection
E	Poor earth / no earth	Check main earth & detection harness (it will produce 'grandfather clock' ticking noise – first generation boilers only)
E	Safety relay error – not open	This is a fault internal to the control box Change primary control
E	Gas valve relay not open error	This is a fault internal to the control box Change primary control
E	Gas valve relay not closed error	This is a fault internal to the control box Change primary control
E	Ram Error	This is a fault internal to the control box Change primary control
E	E2 prom contents are damaged	This is a fault internal to the control box Change primary control
E	E2 prom contents are incorrect in regard to the main software version	This is a fault internal to the control box Change primary control
E	State error (software error)	This is a fault internal to the control box Change primary control
E	Stack error (Main processor stack overflow)	This is a fault internal to the control box Change primary control
E	Software error	This is a fault internal to the control box Change primary control
E	Invalid codes	This is a fault internal to the control box Change primary control
F	Ignition error after 3 attempts still no flame detected	Check gas supply, connection, position and gap of ignition electrode & flame detection probe
F.	Flame out too late error (the burner is still on 10 seconds after closing the gas valve}	Check gas supply, connection and position of flame detection electrode
F.	Too many flame failures within a demand for heat three times – flame loss detected	Check gas supply, connection and position of flame detection electrode

8 BOILER ASSEMBLY - Exploded View



7 BOILER ASSEMBLY - Exploded View Legend

1. Front casing panel.	19. Gas control valve.	59. Flow restrictor.
2. Boiler sealing panel.	20. Fan bracket.	60. DHW inlet/outlet pipe.
3. Sump cover.	21. Orifice plate.	61. Pressure relief valve.
4. Bottom casing panel.	23. Control thermistor (flow/return)	62. Expansion vessel.
5. Flue sensing nipple.	24. Overheat thermostat.	63. Expansion vessel pipe.
6. Return pipe.	25. Ignition electrode.	64. Pressure gauge.
8. Flue manifold.	26. Flame detection electrode.	65. DHW thermistor.
9. Flue manifold fixing.	32. Kit - Trap and seal.	66. *Diverter valve head.
10. Interpanel.	35. User control.	67. *Diverter valve.
11. Burner.	36. Primary controls (PCB).	68. *Diverter valve manifold.
12. Combustion chamber insulation.	39. Mains switch.	69. *Pump (Wilo pump shown).
13. Heat exchanger.	44. Piping frame.	70. Pump manifold.
14. Injector and housing.	51. Mains connector.	71. DHW plate heat exchanger.
15. Venturi assembly.	53. Turret gasket kit.	75. Control box clamp.
16. Fan assembly.	54. Spark generator.	103. Dry fire thermistor.
17. Automatic air vent.	55. Ignition lead.	
18. Gas service cock.	57. CH stub pipe.	

**Note. Two waterset assemblies are used on this appliance, WILO and CP. These units are not interchangeable.*

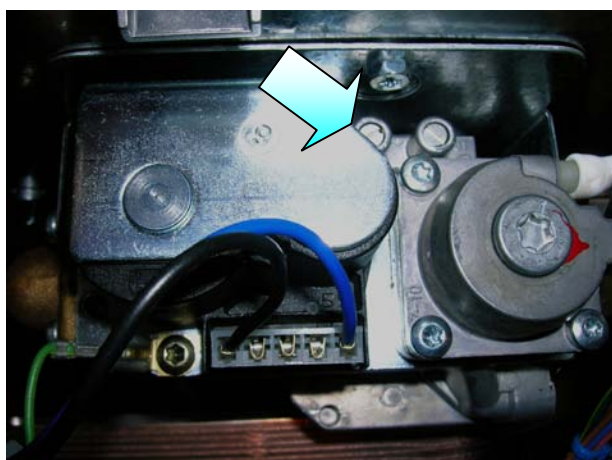
Fault Code L:F – Flame Detection Error

Symptom: Flame not detected – Boiler goes through 3 ignition attempts and then fails displaying fault code L:F

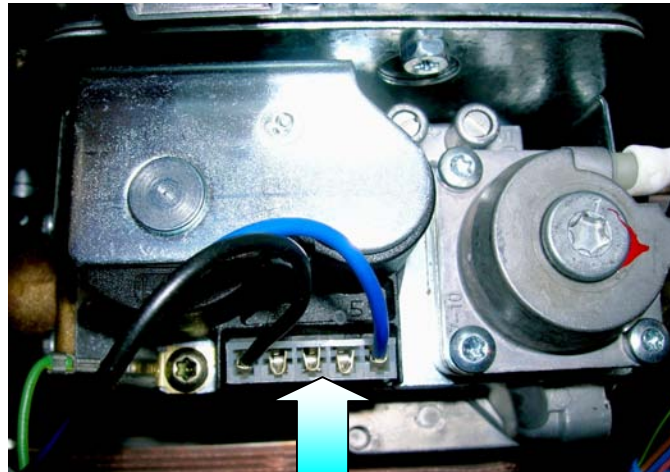
Checks:

- Check gas to the appliance – requires a minimum of 15 mbars

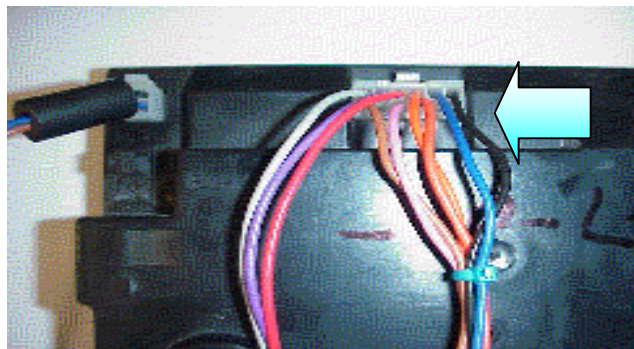
Check inlet gas pressure – if incorrect rectify the supply.



- Check voltage at gas valve – set multimeter to measure DC volts and measure across blue and black wires located in the molex connector on the gas valve body, when the boiler is turned on (see below). Due to the waveform of the rectified voltage, the reading will vary depending on the type of meter used (some may measure the possible peak voltage of 339v). In general a reading greater than 150v indicates that the correct voltage is supplied to the gas valve.

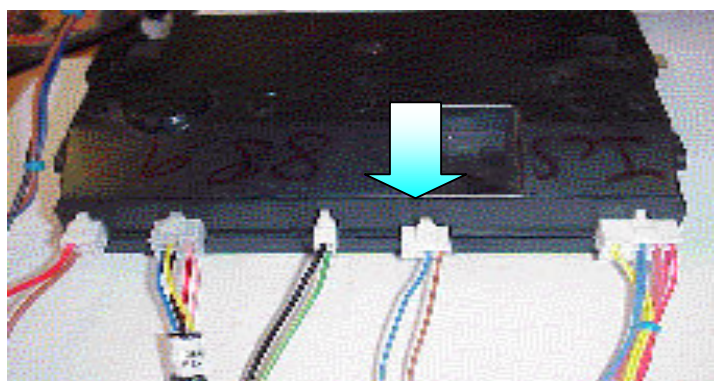
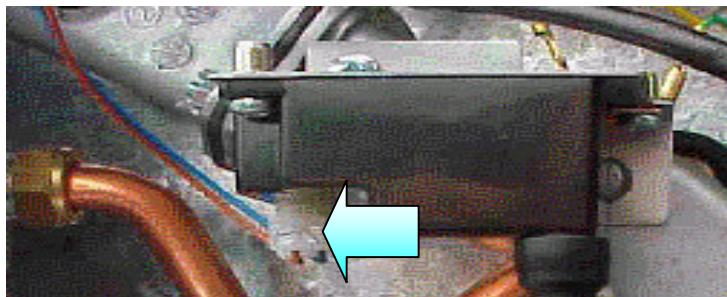


- If no voltage to the gas valve check condition and continuity of the gas valve harness and that the connections into the molex plugs are intact.

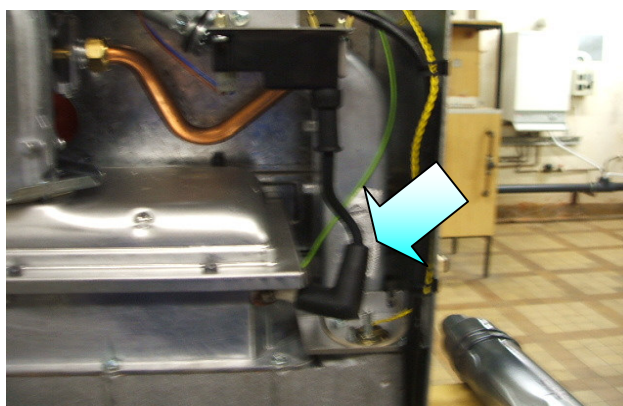


- If continuity ok check voltage is leaving the board (measure across blue & black), if not replace primary control board.

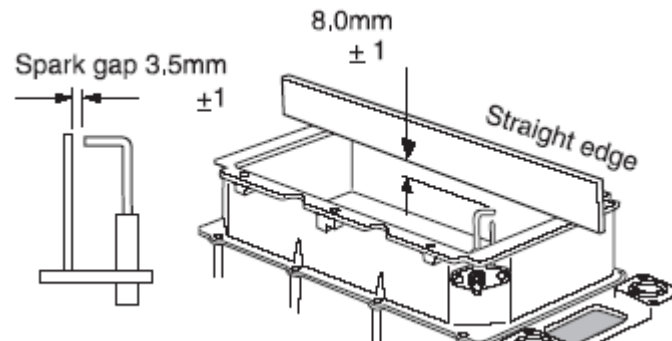
- Check operation of the spark generator, the input voltage should be between 190 and 230v ac at the point of generating the spark. Check condition and molex connections of the pcb to spark generator harness and that the molex plugs are fully pushed home.



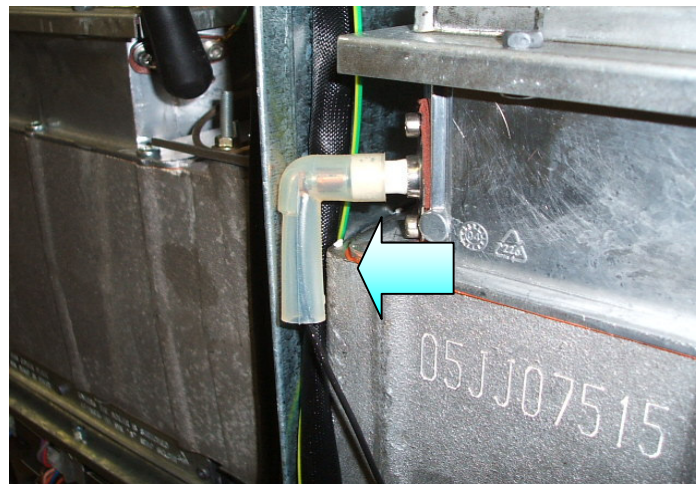
- If no voltage from pcb molex replace primary control board
- Check condition of ignition electrode and HT lead replace if damaged. Check that the lead is fully pushed home and making contact.



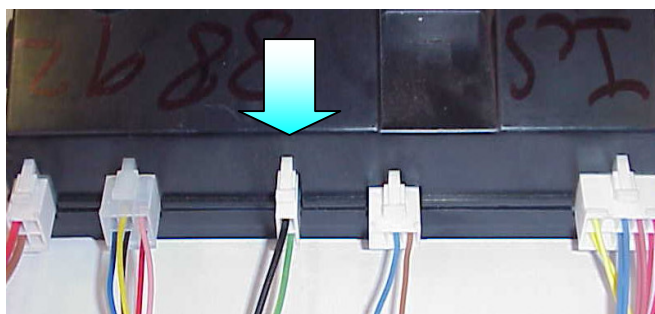
- Remove the electrode from the combustion chamber and check the spark gap and condition of the probe i.e. cracked or damaged ceramic etc. Replace probe as necessary.



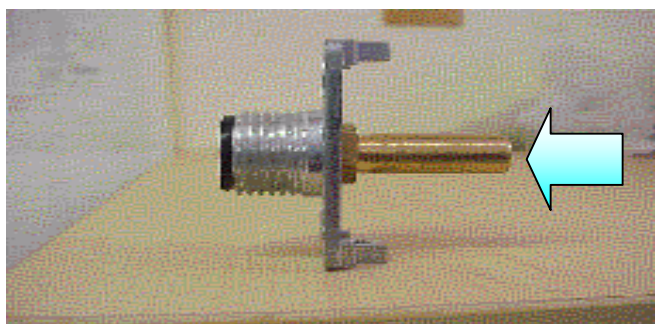
- To check for spark whilst the probe is removed from the combustion chamber, turn off the gas supply at the gas cock, attach probe to HT lead and earth wire, hang outside of combustion chamber and power up boiler.
NB: Do not handle electrode whilst carrying out this test.
- If after successfully carrying out these tests on the spark generator and the ignition electrode no spark is generated, replace the spark generator.
- Check condition and continuity of the flame sensing / detection electrode and ensure connector is fully pushed home and making contact.



- Check that the detection probe lead is plugged into the primary control and that the connections are intact into the molex plug.



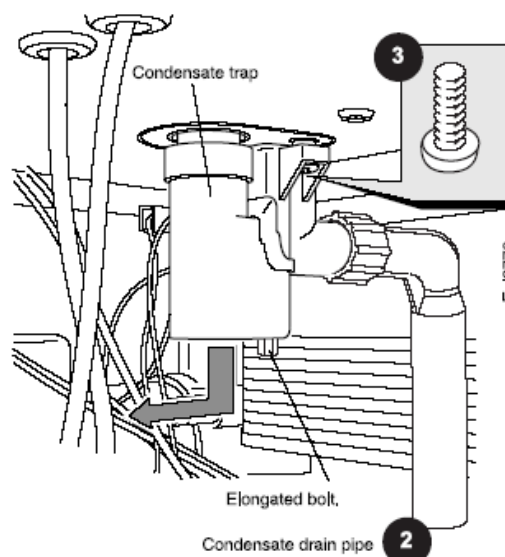
- Check that injector is not blocked e.g. insect, spiders web etc.



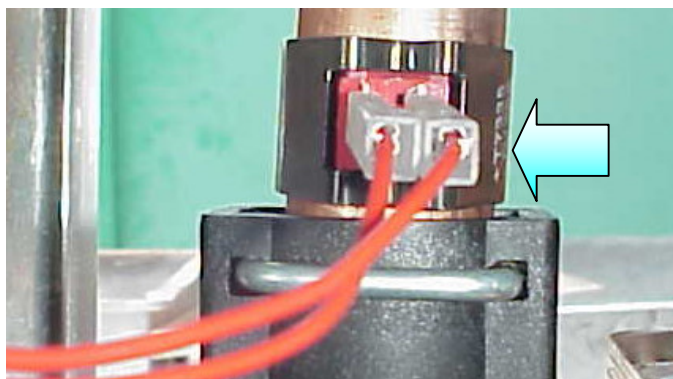
- Check that siphon trap or condensate drainage pipe work is not blocked.

49 CLEANING THE CONDENSATE 'S' TRAP

1. Swing the control box down into the servicing position. Refer to Frame 46.
2. Disconnect the condensate drain pipe.
3. Remove the screw and elongated bolt, pull the trap down and forward to remove.
4. Flush out any deposits with clean water.

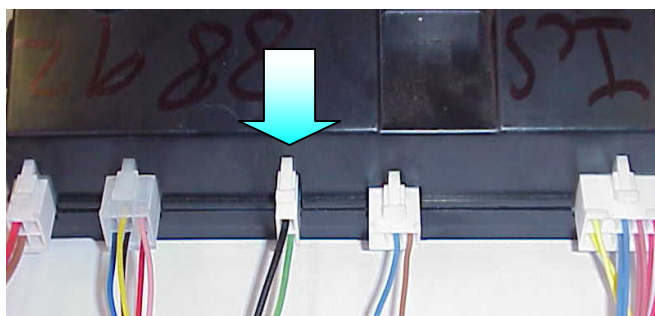


- Check that the flow thermistor is clipped on to the flow pipe correctly.



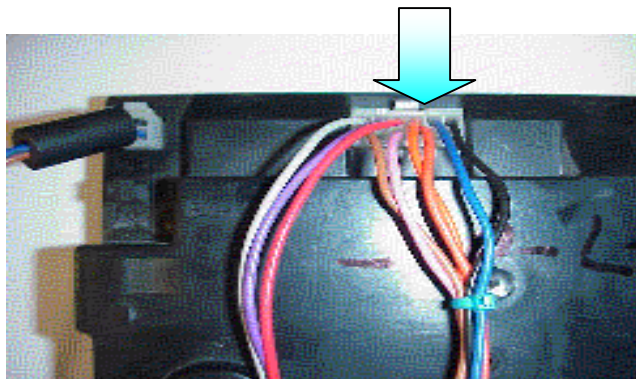
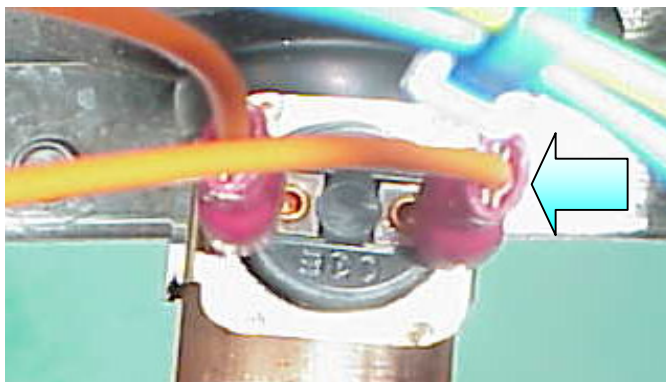
Fault Code L:E

- Check integrity of all earth connections i.e. earth post, detection probe etc.



- Check overheat thermostat leads are connected correctly and continuity of the overheat thermostat

- **NB:** When firing up from cold should the overheat thermostat leads be disconnected or the thermostat open circuit the software in the primary control board will indicate a fault code of L:E rather than the normal code of L:A if the temperature within the heat exchanger is below 70 degrees C.



- If all the above checks are satisfactory replace the primary control board (internal fault)

Fault Code H:E – Inoperative

- This would normally indicate an internal fault within the primary control board, however, before changing the board check the resistance of the fan coil (expected resistances shown below). The resistance should be taken with the boiler powered down and Isolated. Remove the fan molex plug from the pcb and measure across the red and blue wires. Low resistance continuity indicates a short circuit.

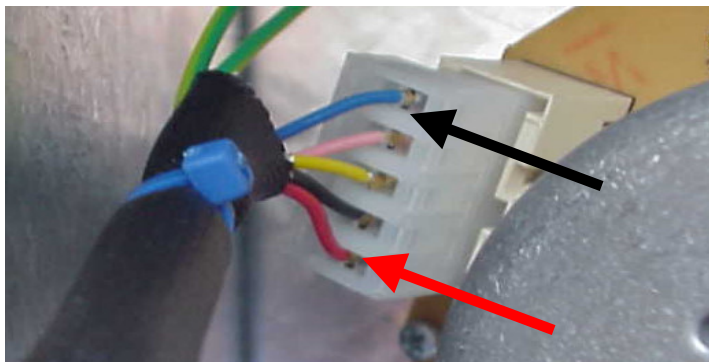
Expected resistances:

HE24 & HE30 Fan model FIME PX 130/0047 = 110/130Ω

HE24 & HE30 Fan model FIME PX 130/0081 = 113Ω

HE35 Fan model FIME PX 130/0064 = 105/115Ω

Check for fan model on label affixed to fan scroll.



Fault Code L:8 – Fan Error

- Check voltage across the blue and red wires at the molex plug in the primary control board with the boiler powered on and as the reset button is pressed the voltage should be a nominal 330v **DC**.



- Turn boiler electrical supply off. Set multimeter to read resistance (Ω). Check wiring harness for continuity measuring resistances across fan harness red, black, pink, blue and yellow wires individually between fan connector and the corresponding molex connector on the primary control board. Continuity should be measured on each wire. Also disconnect fan connector and measure resistance between wires. Low resistance continuity indicates a short circuit.
- Reconnect the fan connector. With the boiler switched on and calling for heat is 14v **DC** present across the yellow and pink wires (hall sensor) at the fan connector.
- If there is correct voltage to the fan – replace the fan.
- If no continuity through fan harness – replace harness.
- If no voltage to the fan yet the continuity checks are satisfactory change the primary control board.

Fault Code H:1 - Control/Flow Thermistor Error

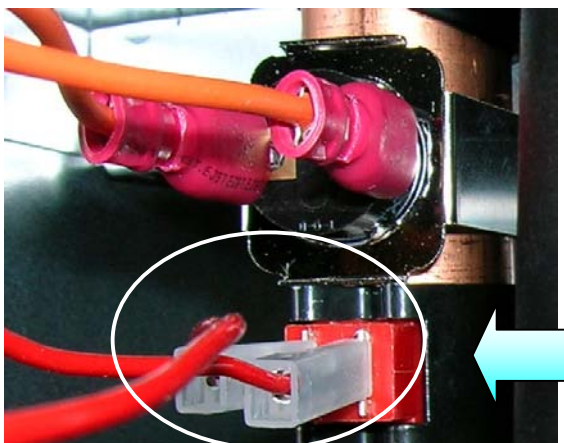
Symptom: Boiler inoperative and displaying fault code H:1

- Unclip control thermistor from the flow pipe and disconnect thermistor wires.
- Check resistance across the thermistor this should be:
At 25C 9.7 to 10.3 K Ω
At 60C 2.4 to 2.8 K Ω
At 85C 1.0 to 1.1 K Ω
- If OK check the continuity of both red leads on the thermistor harness

Action: If thermistor resistance is outside of the band replace thermistor.

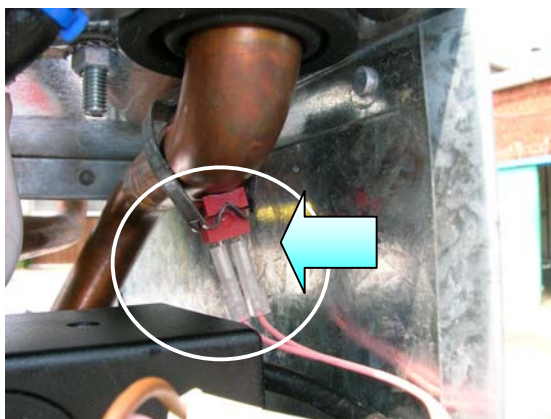
If no continuity on harness replace or repair harness

If all the above are satisfactory then replace the primary control pcb



Fault Code H:2 – Control/Return Thermistor error

Symptom: Boiler inoperative and displaying fault code H:2



- Unclip control thermistor from the return pipe and disconnect thermistor wires.
- Check resistance across the thermistor this should be:
At 25C 9.7 to 10.3 K Ω
At 60C 2.4 to 2.8 K Ω
At 85C 1.0 to 1.1 K Ω
- If OK check the continuity of both pink leads on the thermistor harness

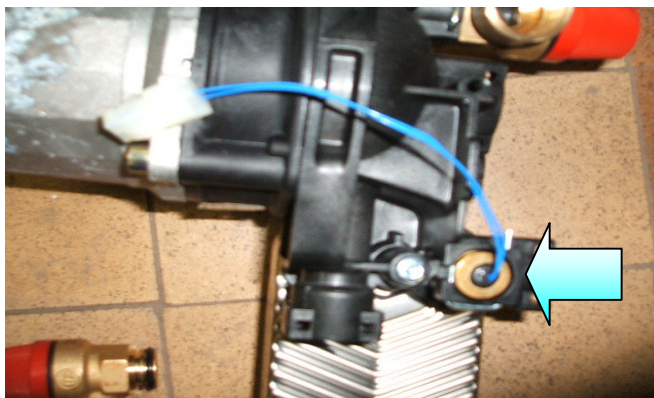
Action: If thermistor resistance is outside of the band replace thermistor.

If no continuity on harness replace or repair harness

If all the above are satisfactory then replace the primary control pcb

Fault Code H:3 – Dhw Thermistor error

Symptom: Boiler inoperative and displaying fault code H:3



- The dhw thermistor is wetsided – isolate and drain down the boiler and remove the thermistor from the plate heat exchanger. Disconnect the inline wiring harness connector and check the resistance across the thermistor. The resistances should be:
At 25C 9.7 to 10.3 K Ω
At 60C 2.4 to 2.8 K Ω
At 85C 1.0 to 1.1 K Ω
- If OK check the continuity of both blue (or black) leads on the thermistor harness

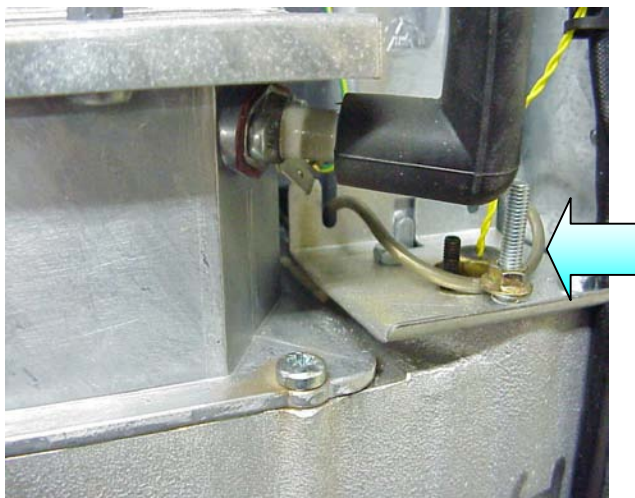
Action: If thermistor resistance is outside of the band replace thermistor.

If no continuity on harness replace or repair harness

If all the above are satisfactory then replace the primary control pcb

Fault Code H:4 – Dry Fire / Flue Thermistor Error

From 8.3.04



Prior to 8.3.04



- Ensure the system is filled and vented and all isolation valves are open.
- Unplug the thermistor from the inline connector and check for continuity from the molex plug to the thermistor (black wires).
- Check the resistance across the thermistor this should be:

At 25C 9.7 to 10.3 K Ω

At 60C 2.4 to 2.8 K Ω

At 85C 1.0 to 1.1 K Ω

- Check for continuity on the 2 yellow wires from the inline connector to the pcb molex.
- Check the heat exchanger / flueways for blockage or damage. Clean or replace as necessary

Action: If thermistor resistance is outside of the band replace thermistor.

If no continuity on harness replace or repair harness

If all the above are satisfactory then replace the primary control pcb

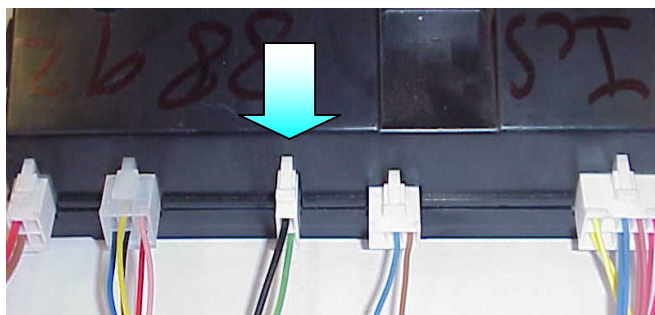
Fault Code H:A – C H Max Temperature Error

Symptom: Boiler inoperative displaying fault code H:A

- Is the boiler filled with water and all isolation valves open
- Does the pump give a differential across the flow and return pipes of the boiler in excess of 25°C – if yes check that the pump is rotating freely – spin off or replace pump
- Reset boiler – set CH control knob to maximum. If fault H:A is displayed again measure the flow temperature If under 90°C check integrity of the control thermistor.
- If new installation check transit plugs have not been left in the pipe tails.

Fault Code H:F – Flame detection Error

- Switch off power supply to boiler and remove the flame detection probe molex from the primary control board



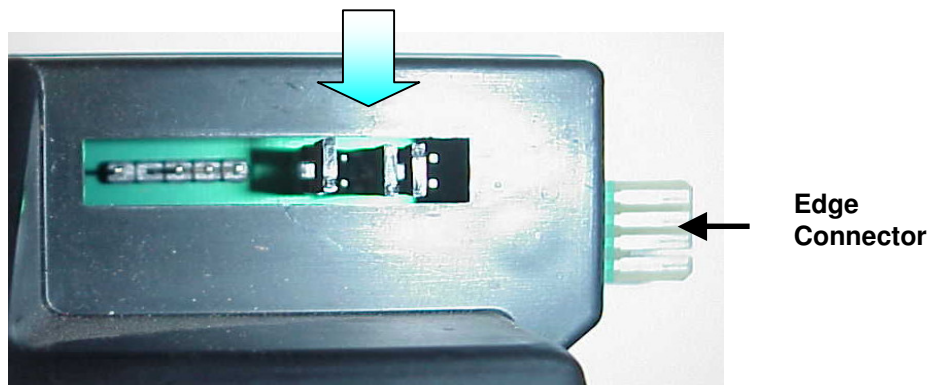
- Check for continuity between the 2 terminal pins on the flame sensing lead. – If this test shows continuity change the sensing probe and lead.
- Check for continuity of the flame detection probe harness measure between the tip of the electrode and the black wire in the molex connector and also measure from chassis earth point to green/yellow wire in the molex connector.

Fault Code H5 – Link Error

Symptom: Inoperative displaying fault code H:5

Checks:

- Check jumper links are fitted on the link field in the primary control board.



- Check that the links are in there correct configuration – see below

Isar HE

Boiler Model	5	4	3	2	1
HE24		Link	Link		
HE30	Link		Link		
HE35	Link			Link	

(Pin 5 is nearest to the edge connector)

Boiler Model	Identification No.
HE24	7
HE30	5
HE35	4

(This number appears for a short period on the display, when power is first supplied to the boiler, to identify the model/size of the boiler the software is programmed for. If incorrect check jumper link positions)

Isar M30100

Boiler Model	5	4	3	2	1
M30100	Link		Link		

(Pin 5 is nearest to the edge connector)

Boiler Model	Identification No.
M30100	5

- If after above checks the links are fitted and are in the correct configuration – replace the primary control board.

Fault Code H:b – Reset Button Error

Symptom: Boiler inoperative displaying fault code H:b

- This is normally down to the user control being damaged – as such the user control should be replaced to rectify the problem.

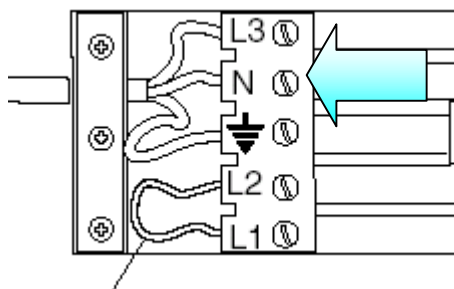


Fault Code H:n – (Phase Reversal Error)

Symptom: Boiler inoperative displaying fault code H:n

Checks:

- Check voltage mains live to earth should be 230v AC
- Check voltage mains neutral to earth should be < 10v AC
- Correct wiring as necessary



Fault Code H9 or L9 – Heat Exchanger Overheat Condition

Symptom: Boiler has fired and reached an overheat temperature (H9 >95C / L9 > 105C)

Checks:

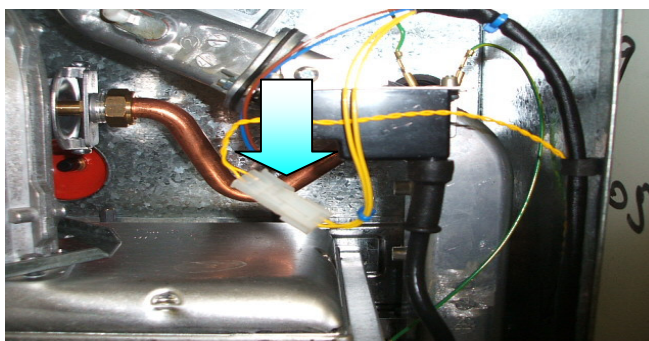
- Check the system is filled with water and vented and that all of the isolation valves are open
- Check that the pump is operating correctly and flowing correctly through the system. Spin off pump if necessary.
- Check the resistance reading across the dry fire thermistor terminal pins (disconnect in-line connector, check across the 2 yellow wires to the thermistor) these should be:

At 25°C expect 9.7 to 10.3 K Ω

At 60°C expect 2.4 to 2.6 K Ω

At 85°C expect 1.0 to 1.1 K Ω

If readings are incorrect replace the dry fire thermistor.



- Inspect heat exchanger flue ways for blockage or damage – clean or replace as necessary
- On new installations check that the transit plugs have been removed from the pipe tails.

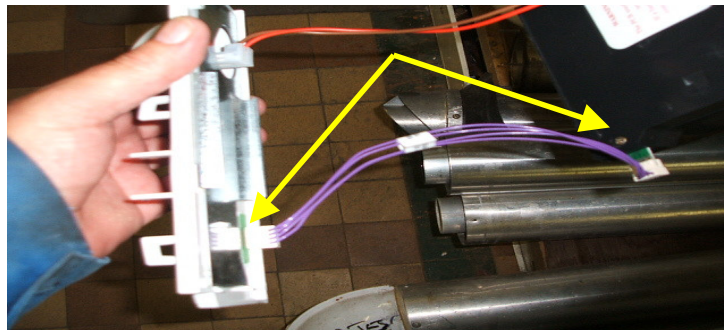
- Check that a heat leak is available during the pump over run period after boiler shutdown. This can be provided by either an automatic bypass valve or a heat leak radiator, (no trv), of at least 10% of the minimum boiler output.

Fault single dash and burner led on

Symptom: Boiler inoperative displaying a single dash with the burner led on.

Checks:

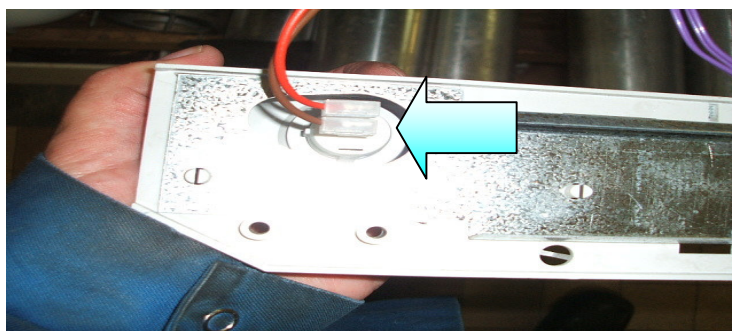
- Is the purple multi wire lead properly connected between the primary and secondary control



- Check lead for continuity across each of the 4 wires individually
- If above all OK replace the user control and if necessary the primary control in that order

Fault – No Display

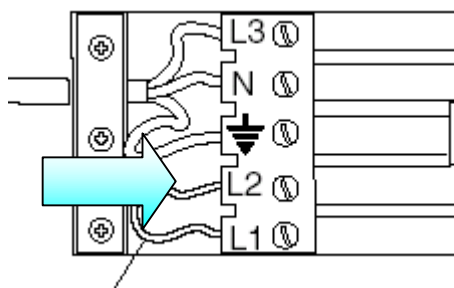
- Check power supply to boiler i.e. 230v AC on terminal L3
- Check all points as detailed in 'fault single dash & led on' above
- Check wiring for rocker switch connected correctly and not damaged



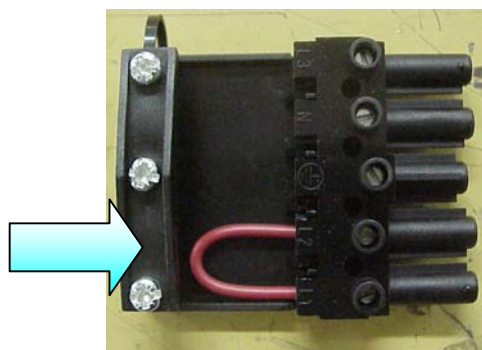
Fault No Central heating – Domestic hot water ok

Checks:

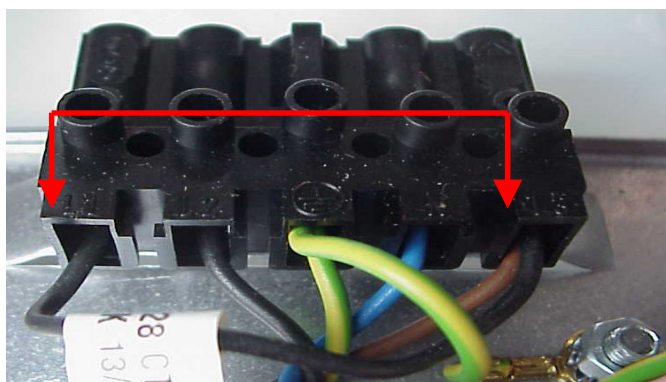
- Check 230v AC at terminal L2 on incoming mains connector



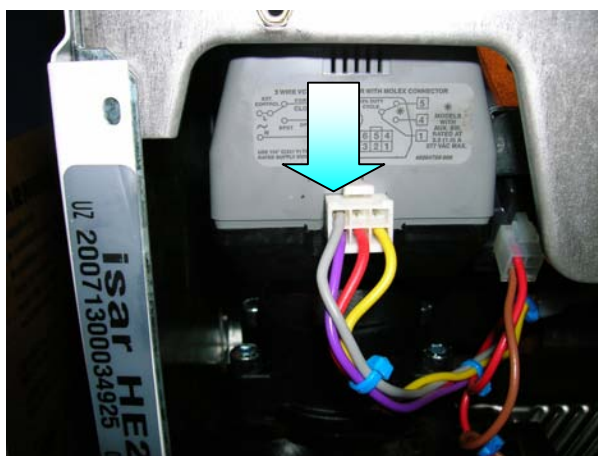
- If no voltage on L2, remove external wiring and fit a link between L1 and L2. If boiler then fires for central heating check supply from fused spur, programmer and room thermostat and rectify as necessary.



- If above checks satisfactory check that the internal 'black' link is fitted correctly i.e. 230v AC at terminals L3 and L1. If not isolate from mains supply and correct link.

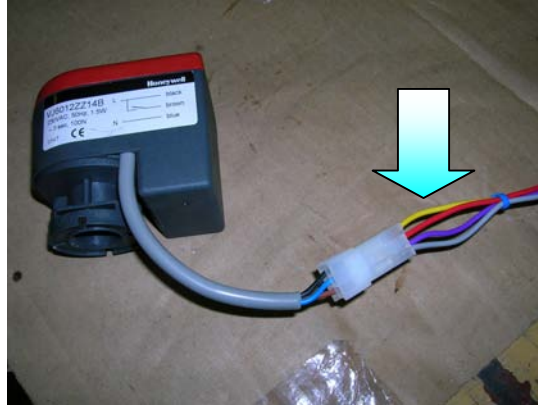


- Check diverter valve for 230v AC across the red & grey wire (Wilo water set)



Wilo water set / diverter valve

- Check diverter valve, the grey wire is not used on the CP water set, in the central heating mode the valve will be de-energised across the red and the violet wire, (the yellow wire is a permanent live).



CP water set / diverter valve

- Check diverter valve cartridge to ensure not sticking – replace if necessary & check water quality within the system



CP cartridge



Wilo cartridge

Fault Central heating OK but no Domestic hot water

- Check diverter valve for 230v AC across the red and violet wires (Wilco & CP water set) (see photograph above)
- Check diverter valve cartridge to ensure not sticking – replace if necessary & check water quality within the system
- Failed dhw thermistor which would display H:3
- Failed return thermistor which would display H:2
- New installations check transit plug not left in pipe work tails
- New installations – check dhw inlet and outlet pipes not crossed over

Electrical Checks / Measurements

Resistance

All measurements are from the wiring harness connectors, with the relevant wiring harnesses disconnected from the primary control. The meter should be set to measure resistance (Ω), auto ranging or manual if appropriate. These measurements must be carried out under, powered down and isolated conditions.

Test	Description	Measurement Points	Approx Value
1a	Fan Coil PX130/0047	J7 Pins 1 and 3	110 - 130 Ω
1b	Fan Coil PX130/0081	J7 Pins 1 & 3	113 Ω
1c	Fan Coil PX130/0064	J7 Pins 1 and 3	105 - 115 Ω
2	Pump Coil	J2 pins 4 & 6	220 Ω
3	Gas Valve Coils	J2 Pins 7 & 8	4.2 K Ω
4a	Diverter Valve Coil – Wilco water set	J2 Pins 10 and 11 or 12	7.7 K Ω
4b	Diverter Valve Coil – CP water set	J2 Pins 10 and 11 or 12	xxx
5	Overheat thermostat	J2 Pins 1 & 3	0.0 Ω
6	Flow sensor	J4 Pins 1 & 6	12K Ω @21°C
7	Return Sensor	J4 Pins 2 & 7	12K Ω @21°C
8	Dhw Sensor	J4 Pins 3 & 8	12K Ω @21°C
9	Flue Sensor	J4 Pins 5 & 10	12K Ω @21°C

Voltage:

All measurements are from the wiring harness connectors on the primary control board with the connectors in place. The meter should be set to measure volts AC or volts DC as indicated, auto ranging or manual if appropriate. The boiler must be in a static state with no demand for C Htg or DHW.

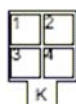
Note: Care must be taken when probing the crimps within the crimp housings so as to avoid any physical damage.



SAFETY

Warning: Care must be taken during these measurements so as to avoid potential electric shock, if you are unsure of this procedure do not attempt it. Hazardous conditions exist and actions could cause bodily harm or death.

Test	Description	Measurement Points	Approx Value
1	Pump Coil	J2 Pins 4 & 6	230 V AC
2	Gas Valve Coils	J2 Pins 7 & 8	340V DC Peak 200V DC Average
3	Diverter Valve Coil	J2 Pins 10 and 11 or 12	240V AC
4	Flow Sensor	J4 Pins 1 & 6	0.7V 1.84VDC @21°C
5	Return Sensor	J4 Pins 2 and 7	0.7V 1.84VDC @21°C
6	Dhw Sensor	J4 Pins 3 & 8	0.7V 1.84VDC @21°C
7	Flue Sensor	J4 Pins 5 & 10	0.7V 1.84VDC @21°C
8	Mains Live to Earth	Appliance connector	240V AC
9	Mains Neutral to Earth	Appliance connector	<10V AC

J1 MAINS INPUT

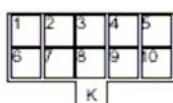
Pin	Description
1	Neutral In
2	nc
3	Switched Live In
4	Live In

J9 MAINS SWITCH/NEON

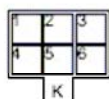
Pin	Description
1	nc
2	Fused Live Out
3	Neutral Out
4	Switched Live In

J2 APPLIANCE CONNECTOR

Pin	Description
1	Overheat Stat
2	nc
3	Overheat Stat
4	Pump Neutral
5	nc
6	Pump Live
7	Gas Valve Out 300V DC+
8	Gas valve Out 300V DC-
9	nc
10	Diverter Valve Neutral
11	Diverter Valve Live 1
12	Diverter Valve Live 2

J4 SENSOR INPUT CONNECTOR

Pin	Description
1-6	Flow Sensor
2-7	Return Sensor
3-8	DHW Sensor
4-9	nc
5-10	Flue Gas Sensor

J7 FAN

Pin	Description
1	Coil
2	Hall Sensor Output
3	Coil
4	Hall Sensor OV
5	Hall Sensor 12V
6	300V DV

Nominal resistance v temperature for NTC - 10K @25C			
Temp deg C	Resistance Kohms	Temp deg C	Resistance Kohms
1	31.04	46	4.20
2	29.51	47	4.04
3	28.06	48	3.88
4	26.69	49	3.74
5	25.40	50	3.60
6	24.18	51	3.46
7	23.02	52	3.34
8	21.92	53	3.21
9	20.99	54	3.09
10	19.90	55	2.99
11	18.97	56	2.87
12	18.03	57	2.77
13	17.26	58	2.67
14	16.47	59	2.58
15	15.71	60	2.48
16	15.00	61	2.40
17	14.32	62	2.31
18	13.68	63	2.23
19	13.07	64	2.15
20	12.49	65	2.08
21	11.94	66	2.01
22	11.42	67	1.94
23	10.92	68	1.87
24	10.45	69	1.81
25	10.00	70	1.75
26	9.57	71	1.69
27	9.16	72	1.63
28	8.77	73	1.59
29	9.40	74	1.53
30	8.05	75	1.48
31	7.72	76	1.43
32	7.40	77	1.38
33	7.09	78	1.34
34	6.61	79	1.29
35	6.53	80	1.25
36	6.26	81	1.21
37	6.01	82	1.17
38	5.77	83	1.14
39	5.54	84	1.10
40	5.32	85	1.07
41	5.11	86	1.03
42	4.91	87	1.00
43	4.72	88	0.97
44	4.54	89	0.94
45	4.35	90	0.91

Notes: