Control Board Diagnostics#

SELF DIAGNOSTICS

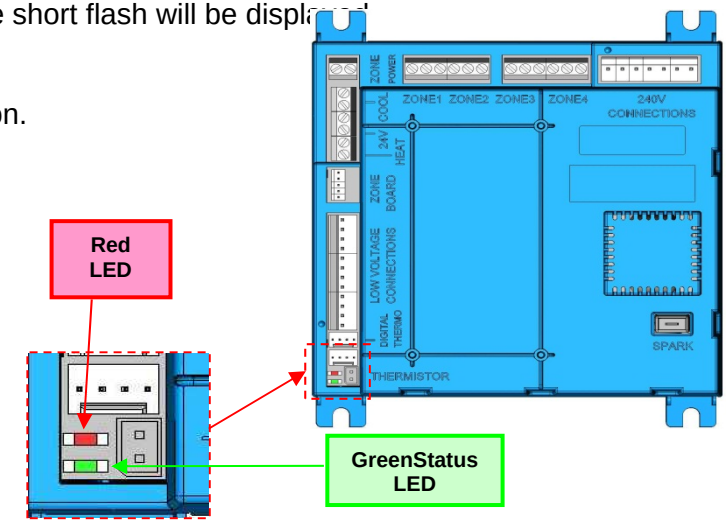
The main control board displays a coded message if normal & operational faults occur.

For normal operation on an **MB5** in an idle state, the green LED will display display five short flashes, **MB4** will have 4 short flashes.. When in normal operation with the thermostat (R & W or Digital) closed and calling for heat one short flash will be displayed.

Refer to the table on the following pages for diagnostic fault codes.

NOTE: The GREEN LED flashing sequence indicates controller status or fault condition.

NOTE: The RED LED when ON indicates pressure switch contacts are closed.



IF THE HEATER WILL NOT OPERATE

- Check that there is power and gas supplied to the heater.
- Check that thermostat set temperature is set above room temperature by at least 2°C. (Note at maximum room temp of 32°C the unit will not operate)
- Check gas supply pressures at the test point.
- Check that the green LED is lit on the main control board and is flashing five slow steady flashes. If no LED visible, check that power is available at the GPO, check the circuit breaker, check the heater transformer output voltage, and check the transformer fuse.
- If the LED flash sequence is not as described above then check the control board fault codes as tabled on the following pages for a diagnosis.
- If the heater still fails to operate correctly, contact your nearest Climate Technologies Technical support team member for assistance.

LED Patterns are divided into groups to aid the troubleshooting.

The presence of a LONG pulse always indicates that the unit is in a lockout.

The number of long pulses in an LED pattern indicates the category of the lockout and the number of the following short pulses in an LED pattern points to the actual cause of a lockout:

- Short pulses only: normal operation and non-lockout faults. Additionally in the IDLE state, the type of the heater detected is displayed: five pulses for MB5.

Control Board Diagnostics#

- 1 LONG pulse followed by short pulses:
    - Lockouts caused by external switches and sensors e.g., thermistor, over temperature switch, pressure switch or flame sensor.
- 2 LONG pulses followed by short pulses:
    - Lockouts caused by the unit's hardware, ignition failure or by main gas valve.
- 3 LONG pulses followed by short pulses:
    - Lockouts caused by "Safe start check" faults or ground connection faults.

Control Board Diagnostics#

Control Board Diagnostics / Information			ERR Code Lockout	
LED Indication	Description	Fault Cause(s)	ERR	Reason
5 x SHORT:	**Normal Idle** – [standby] Unit is functioning normally with the thermostat (manual or digital) open, or if fan is running, may be in overheat cool down.	Normal Operation indicating the process	**NIL**	
1 x SHORT	**Normal Heating** - Unit is functioning normally, with the thermostat (Manual or digital) closed.	Normal Operation indicating the process	**NIL**	
2 x SHORT	**Overheat prevention cool down** - duct temperature reached 70°C and the heater is now in auto cool down state.	Check; Thermistor is correctly positioned 2-3m from heater outlet, ductwork, & system static pressure is in the range of 60-120Pa, burner pressure is correct; Indoor fan is operating at correct speed.	**21**	After 10 Misses
3 x SHORT	**Overheat condition -** Overheat in progress 120/90°C over temperature switch or thermistor reports temperature higher than +85°C	Check; Over temp switch & connecting wiring is not disconnected or open circuit, thermistor is correctly positioned 2-3m from heater outlet, duct work & system static pressure, burner pressure is correct, Indoor fan is operating at correct speed. NOTE: If fan motor is tripping out on overload after X-time, this may give this fault but O/L resets after lock-out and fault not present when tech is onsite?	**21**	After 3 tries
6 x SHORT	**Primary Pressure Switch Fault 1** - closed in idle state.	Shows at start-up. Check; Short in p/switch wiring or faulty p/switch. Could be control board if combustion fan always running	**23**	If closed for 4 Minutes

Control Board Diagnostics#

Control Board Diagnostics / Information			ERR Code Lockout	
LED Indication	Description	Fault Cause(s)	ERR	Reason
7 x SHORT	**Secondary Pressure Switch Fault 1** - closed in idle state.	Shows 30 seconds after start-up. Could be control board if combustion fan always on.	**24**	If closed for 4 Minutes
8 x SHORT	**Primary Pressure Switch Fault 2** - open during pre-purge.	Shows 30 seconds after start-up. Check; Leaking heat exchanger, blocked flue, combustion fan motor running slow or not at all, wire off p/switch, leaking pressure tube to switch or faulty p/switch. Could be control board if combustion fan always running. Can be sticking contacts.	**25**	If open for 4 Minutes
9 x SHORT	**Primary Pressure Switch Fault 3** - closed after post purge.	Check; Short in p/switch wiring or faulty p/switch. Sticking contacts	**26**	
10 x SHORT	**Secondary Pressure Switch Fault 2** – closed after post purge	Check; Short in p/switch wiring or faulty p/switch. Sticking contacts	**27**	
11 x SHORT	**Post Purge** - Unit forced to purge cycle by an incorrect sequence of events.	Normal Operation indicating the process	**NIL**	
12 x SHORT	**Manual thermostat** – closed on power up. - Check;	Thermostat is ON. This could happen after a power outage. Turn thermostat OFF then ON to clear.	**NIL**	
13 x SHORT	**Condensation Level** - Condensate level too high. MB4,5 ONLY	MB4,5 – Loom damage or resistor not reading MB5 - Check; Condensate drain is not blocked, condensate sensor leads wires cut & shorted or sensor t/block wet & or shorted.	**13**	Immediate

Control Board Diagnostics#

Control Board Diagnostics / Information			ERR Code Lockout	
LED Indication	Description	Fault Cause(s)	ERR	Reason
14 x SHORT	**Condensation sensor fault** - Condensation sensor open circuit. MB4,5 ONLY	MB4 – Loom damage or resistor not reading MB5 - Check Sensor lead(s) disconnected or cut, faulty sensor, or harness connection fault, harness damage. Change heat exchanger half of the loom. Check resistance for both wet and dry values.	**14**	After 45 Seconds of detection.
15 x SHORT	**Frequency check fault - Check of mains frequency failed at start-up**	Check; blown 240V fuse, high voltage connection fault, electrical noise on power supply or internal problem with control board. Causes can be Solar power invertors, generators or battery backup power supplies.	**15**	Immediate
1 x LONG	**Thermistor Lockout** - Thermistor temperature failed to rise at start of a heat cycle.	**Thermistor Lockout** - Thermistor temperature failed to rise at start of a heat cycle. Up to version 10 this thermistor check is done once at the power up. Version 10 onwards thermistor check is done every time the heater starts up. Check thermistor values	**17**	Immediate
1 x LONG + 1 x SHORT	**Thermistor O/C Lockout** - Thermistor reporting temperature below 20°C before start-up.	Check; Thermistor is installed in outlet duct & plugged into control correctly, thermistor open circuit or faulty.	**18**	Immediate

Control Board Diagnostics#

Control Board Diagnostics / Information			ERR Code Lockout	
LED Indication	Description	Fault Cause(s)	ERR	Reason
1 x LONG + 2 x SHORT	**Thermistor S/C Lockout** - Thermistor detected temperature above 120°C before start-up	Check; Thermistor short circuit or faulty.	**19**	Immediate
1 x LONG + 3 x SHORT	**Overheat Lockout** - Over temperature switch [120°C or 90°C] or Thermistor [85°C] detected overheat condition and unit did not cool down in allowed time.	Check; Indoor fan is working, blockage in return air ductwork & system static pressure too high or dampers all closed & burner pressure is correct. NOTE: If fan motor is tripping out on overload after X-time, this may give this fault but O/L resets after lock-out and fault not present when tech is onsite?	**20**	After 8 Minutes of detection
1 x LONG + 4 x SHORT	**Overheat Lockout** - Number of overheat events exceeded 10.	Check; Indoor fan is working, blockage in return air ductwork & system static pressure too high or dampers all closed & burner pressure is correct. Pre V10 will fault once over temperature has been hit 3 times	**21**	Thermistor hits 85°C 10 times
1 x LONG + 5 x SHORT	**Frequency Lockout** - Supply frequency outside of operating limits	Check; Mains power for noise or internal problem with control board. This check is completed every time a heating cycle is started.	**22**	Immediate
1 x LONG + 6 x SHORT	**Primary Pressure Switch Lockout 1** - Closed in idle state.	Refer to 6 x SHORT	**23**	After 4 Minutes
1 x LONG + 7 x SHORT	**Secondary Pressure Switch Lockout 1** - Closed in idle state.	Refer to 7 x SHORT	**24**	After 4 Minutes

Control Board Diagnostics#

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LED Indication	Description	Fault Cause(s)	ERR	Reason
1 x LONG + 8 x SHORT	**Primary Pressure Switch Lockout 2 -** Did not close during pre-purge.	Refer to 8 x SHORT	**25**	After 4 Minutes
1 x LONG + 9 x SHORT	**Primary Pressure Switch Lockout 3** - Did not open after post purge was completed	Refer to 9 x SHORT	**26**	After 4 Minutes
1 x LONG + 10 x SHORT	**Secondary Pressure Switch Lockout 2** - Did not open after post purge was completed.	Refer to 10 x SHORT	**27**	After 4 Minutes
2 x LONG	**Flame Strength Lockout** - Flame strength readings too low.	Cause; internal controller fault replace board. Check the flame sensor – DC Current	**29**	Immediate
2 x LONG + 1 x SHORT	**Ignition Lockout 1** - Maximum number of re-ignition attempts reached. Unit will light but the flame is not stable after 5 seconds	Check; Spark lead connected, no damage to spark lead, spark at burner OK, gas is turned on & gas valve opens, gas pressure OK, no foreign material on/inside injectors or inside burners & controller produces a spark. Becket burner alignment and cross lighting, [also see “Flame Strength Lockout” checks]	**30**	After 5 Attempts
2 x LONG + 2 x SHORT	**Ignition Lockout 2** - Maximum number of unstable flame occurrences reached.	Check; Combustion fan operating, combustion pressure (at start up and after indoor fan starts is >-180Pa), flue pipe work is clear & suitable flue cowl fitted. [also see “Flame Strength Lockout” & “ Ignition Lockout 1 ”checks]	**31**	After 5 Attempts

Control Board Diagnostics#

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LED Indication	Description	Fault Cause(s)	ERR	Reason
2 x LONG + 3 x	**Ignition Lockout** - Maximum number of lost flame during heating reached	Check; see “Flame Strength Lockout” & “ Ignition Lockout 1 & 2” checks.	**32**	After 5 Attempts
2 x LONG + 4 x SHORT	**Modulation Coil Lockout** - Gas valve modulation failed check.	Check; Valve modulation coil is disconnected, valve coil open circuit or coil current readings are too low. Current can only be measured on high. Valve always starts at full rate	**33**	Immediate
2 x LONG + 5 x SHORT	**Modulation Coil Safety Lockout** - Gas valve modulation failed check.	Check; Valve modulation coil connection short circuit, valve coil short circuit or coil current too high. Check resistance.	**34**	Immediate
2 x LONG + 6 x SHORT	**Main Valve Lockout** – Gas valve Main coil detection failure	Check; Pressure switch tube is not leaking or other type of leak in P/Switch circuit, valve main plug not fitted correctly, is disconnected or coil is open circuit, controller relay contacts failed to close, controller triac fault. Could be circuit board or extra current draw from the gas valve	**35**	Immediate
3 x LONG	**Ground Fault Lockout 1** - Poor earth connection to chassis ground.	Check; Short to earth on flame sense lead or controller earth wire disconnected. Earth wire damaged or not connected. Check connection block	**38**	Immediate
3 x LONG + 1 x SHORT	**Ground Fault Lockout 2** - Flame detected when no flame signal should be present.	Check; Controller earth wire disconnected, bad earth at GPO, power in earth circuit or earth wiring fault.	**39**	Immediate

Control Board Diagnostics#

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LED Indication	Description	Fault Cause(s)	ERR	Reason
3 x LONG + 2 x SHORT	**Safe Start Lockout 1a** - False Flame sensed during Idle state.	False flame sensing. Controller may have internal fault. Replace.	**40**	Immediate
3 x LONG + 3 x SHORT	**Safe Start Lockout 1b** - False Flame sensed in Idle state but cleared itself after circulation fan turned off.	Check for BAD earth or NO earth Controller may have internal fault. Replace.	**41**	Immediate
3 x LONG + 4 x SHORT	**Safe Start Lockout 2a** - Timing error during SSG test.	Controller may have internal fault. Replace.	**42**	Immediate
3 x LONG + 5 x SHORT	**Safe Start Lockout 2b** - Secondary Safeguard Timing fault.	Controller may have internal fault. Replace.	**43**	Immediate
3 x LONG + 6 x SHORT	**Safe Start Lockout 3** – Main Secondary Safeguard Timing fault.	Controller may have internal fault. Replace.	**44**	Immediate
3 x LONG + 7 x SHORT	**Safe Start Lockout 4** – Main Secondary Safeguard check failed for unknown reason.	Controller may have internal fault. Replace.	**45**	Immediate