LOGISENSE
Electronic Module Repair Service
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Breezair Evaporative Cooler Diagnostics

Make/Model	Serial #	Date
Breezair – Direct Drive Models (ICON series)	N/A	19/09/2020

Preface

This document assumes you have a basic level of electrical competence, own a suitable multimeter and know how to use it.

Some procedures in this document are potentially dangerous if not followed correctly and with due care. High voltages can be present, which could result in an electric shock, electrocution or damage to test equipment.

Safety Warning

High voltages, up to approximately 420V DC are present inside the control module during operation. This energy can be stored in the control module even after the mains power has been turned off. Under some conditions, this voltage will be present at the 3-pin motor power connector. This could result in an electric shock, electrocution or damage to your multimeter.

Equipment

Suggested Equipment:

- Multimeter with Diode Test Mode
- Medium Flat Screwdriver

Some tests can be performed without the use of a multimeter.

Use the flat-head screw driver to aid in removing the pad frame clips to gain access to the inside of the evaporative cooler.

Preliminary Control Module & Communication Test

Turn on the cooler at the wall control/remote control and put the cooler into Manual and COOL modes (press the **AUTO** or **MODE** button to change to Manual mode, then press the **COOL** or **COOL/VENT** button to change to COOL mode).

Wait 10 minutes and then turn off the cooler. If you find that the pads are dry or that there's no water in the sump at the bottom of the cooler, then you may have a communication problem, faulty solenoid valve or faulty salinity probes.

If you did the above test and found that the pads are now wet, the next test to do is to turn on the cooler and put it in VENT, Manual mode. Leave the cooler on and check if the "POWER" LED on the front of the control module is illuminated. If the "POWER" LED is not illuminated, then the control module has failed. Please contact us if you'd like to have your control module repaired.

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Motor Output Stage Test

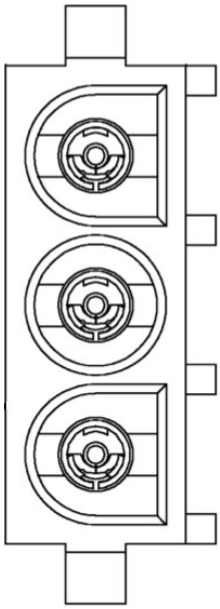
Turn off the control module, using the isolation switch on the front of the module. Wait 30 minutes before proceeding with the following test.

The following set of tests allow you to check the motor power output circuitry within the control module for internal short circuits. This is one of the common failure modes of the control module. If any fault is found while doing these tests, the motor will also need to be checked for short circuits in the windings.

With the multimeter set to diode (⊣▶⊢) test mode, place the positive (+) and negative (-) multimeter probes at the locations shown in the illustration below. Wait for the reading on the multimeter to stabilise before moving on to the next test. It will usually take 5-10 seconds for the first test reading to stabilise.

The following tests should all read as “OL” (over-limit) on the multimeter. Readings of low values indicate an internal short circuit in the motor output circuitry within the control module.

If you believe you have a faulty control module, please contact us to discuss having it repaired.



TEST 1	TEST 2	TEST 3	TEST 4	TEST 5	TEST 6
+	+	-		-	
-		+	+		-
	-		-	+	+

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Direct Drive Motor Tests

The direct drive motors in the Breezair evaporative coolers have been known to develop short circuits in the windings. This is particularly the case with the older green coloured motors.

When short circuits occur in the motor windings, it can also damage the control module.

There are two methods described below to test the motor for short circuits within the windings. There's no need to do both tests, however the resistance test is recommended.

Motor Test 1: The Flick Test

This test does not require any test equipment.

1. Turn off the power to the control module, using the isolation switch on the front of the control module.
2. Wait until all LEDs on the front of the control module have turned off.
3. Disconnect the motor power cable from the control module. This is the round cable that plugs into the second connector from the left at the bottom of the control module.
4. Remove one of the cooling pads to get access to the fan blades.
5. Give the fan a modest flick.

You should get approximately 1 – 1.5 revolutions out of the fan fairly easily. If there's a short circuit in the windings, the motor will stop very quickly, usually within ½ a revolution. The fan motor should spin freely, but will feel heavy. You can confirm whether or not you have a short circuit in the motor windings by checking the winding resistance, as described below:

Motor Test 2: Check Winding Resistance

This test requires a multimeter.

1. Turn off the power to the control module, using the isolation switch on the front of the module.
2. Wait until all LEDs on the front of the control module have turned off.
3. Disconnect the motor power cable from the control module. This is the round cable that plugs into the second connector from the left at the bottom of the control module.
4. Using a multimeter, measure the resistance between pins 1-2, 2-3 and 1-3 at the plug on the end of the motor power cable.

The resistance between all pins should be about the same and within the range of 15 – 25 ohms. Lower values, such as 2.5 ohms, would indicate a short in the motor windings. This would mean that the motor needs to be replaced.

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Water Solenoid Valve Test:

When the cooler is turned on and set to COOL mode, the control module should close the drain valve and then supply approximately 24V AC to the solenoid valve, causing it to open and allow water to fill the tank. There is a small delay of around 15 seconds to allow the drain valve to close before power is sent to the solenoid valve.

By default, the cooler will wait 8 minutes for water to be detected at the salinity probes, before shutting down. As such, if testing takes longer than 8 minutes, you will need to turn off the cooler and re-start it on COOL mode before continuing.

In some cases, the solenoid valve may only open for approximately 10 seconds, and then shut off. If this happens, it is usually due to a fault within the control module.

The solenoid valve can become stuck in either the open or closed state or not open fully. It is common for the valve to become stuck closed, in which case no water can enter the cooler. If the water flow is restricted, this is usually due to the solenoid valve only opening partially, which requires that the solenoid valve be replaced. The solenoid valve is supposed to open fully and allow the cooler to fill up quickly.

To determine if the solenoid valve is faulty, first ensure that the cooler has been drained of all water. You can do this by pressing the **DRAIN** button on the wireless remote, or by turning off the cooler on the hard-wired remote and the pressing and holding the “UP” and “DOWN” buttons together, until **dr** starts flashing on the display. Alternatively, you can turn off the power to the cooler for 10 seconds, then turn it back on, and the cooler should drain (when operating on default settings).

Once the water has been drained, turn on the cooler and put it into Manual and COOL mode. After approximately 15 seconds, the solenoid valve should be energised and water should flow into the cooler. The cooler will generally fill most of the way within 30-45 seconds. If the cooler takes a long time to fill, the solenoid valve is probably faulty.

If no water enters the cooler, then using a multimeter and with the cooler still turned on, check that there is 24V AC present at the solenoid valve terminals. If 24V AC is present, but no water is flowing into the cooler, then the water supply to the cooler may be turned off or the solenoid valve may have failed.

If 24V AC is not present at the solenoid valve terminals, disconnect the solenoid cable from the control module and check if there is 24V AC present at the solenoid valve connector on the control module. If there is 24V AC present, then the cable going to the solenoid valve should be repaired or replaced. If 24V AC is not present, then the control module is likely faulty, though this fault is rare.

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Salinity Probe Test:

The salinity probes are used to sense the presence of water in the cooler as well as how electrically conductive the water is. The cooler will not start the pump unless water is detected by the salinity probes.

When there is no water in the cooler, the “SAL” LED should be solid red.
When the cooler is full of water, the “SAL” LED should blink red once every 5 seconds.

If the cooler is full of water, but the “SAL” LED is solid red, then the salinity probes are faulty or that the salinity sensing circuitry inside the control module has failed.

There are currently two different versions of the salinity probes.

Test the 2-prong version by ensuring that the black and blue wires each have continuity to one of the metal contacts on the bottom of the probe assembly. Resistance would normally be less than 1 ohm. The brown wire is not used and can be ignored.

Test the 3-prong version by ensuring that there is continuity from each wire in the cable to one of the metal contacts on the bottom of the probe assembly.

Drain Valve:

The most common failure of the drain valve is that the bucket inside the drain valve assembly continually moves up and down, rather than either staying in the up position (open) or down position (closed).

If the drain valve exhibits this behaviour, the drain valve will need to be replaced.

Pump:

The pump will only start once the control module senses that water has been present at the salinity probes for approximately 30 seconds. If the control module is unable to sense the presence of water at the salinity probes, either due to faulty salinity probes or a fault in the salinity sensing circuitry inside the control module, the pump will not start.

Under normal circumstances, the pump will run for 4 minutes to pre-wet the pads before the fan is started.

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Fault Codes:

Fault codes can be displayed on the hard-wired indoor controller and on MagIQtouch touchscreen controllers. The wireless remote control does not have the ability to display fault codes.

Fault codes can also be read from the front of the control module (inside the cooler) once the cooler shuts down due to a fault. Under normal operation, the “DIAG” LED on the front of the control module is green and will continually flash twice, followed by a longer pause. This sequence repeats indefinitely.

When a fault condition has been detected by the control module, the “DIAG” LED will turn red and then flash a number of times before a longer pause. One red flash would mean fault code 1, two red flashes would mean fault code 2, and so on. The flashing sequence will repeat until the cooler is turned off and back on again.

Be mindful not to confuse the “DIAG” LED with the “SAL” LED. The “SAL” LED is always red and this is normal.

Fault Code List & Explanations:

Fault Code 1: Communications problem. Check the communication cable between wall control and cooler for damage.

Fault Code 2: Water not detected at the salinity probes. The water supply to the cooler may be turned off, the solenoid valve may be stuck closed and not allowing water into the cooler, the salinity probes may be faulty, or the control module salinity sensing circuitry may be faulty.

If you receive fault code 2 within 10-15 seconds of turning the cooler on, then you likely have a faulty control module.

Fault Code 3: EEPROM failure. The control module stores a small amount of data related to settings for the operation of the cooler. If this data becomes corrupt, you will often receive fault code 3. The control module will need to be repaired.

Fault Code 4: The cooler has failed to drain the water from the tank/sump. After waiting 4 minutes for the water to drain, water was still detected by the salinity probes. This suggests either a faulty drain valve (not opening) or a blockage in the drain pipe.

Fault Codes 5 & 6 aren't documented and probably aren’t possible.

Fault Code 7: Mains power supply frequency is incorrect. In Australia, we have a nominal 50Hz power supply frequency. Fault code 7 will be produced if the mains frequency is outside the limits of 46-54Hz. This can be caused by contamination to the circuit board inside the control module (eg. spiders and other insects), generators, a loose/bad connection at the power entry connector or other internal faults. Electrical arcing on the cooler circuit in the premises can generate this fault as well.

Fault Code 8: A brief power failure has been detected (nothing to worry about in general).