# Troubleshooting Guide

# Sensor Testing

## How to Test a Sensor

### Checking the Sensor

- Check sensor if getting sensor short, sensor open or reading does not make sense
- You will need the following to check a sensor
- Terminal screwdriver
- Misc other tools if you have to remove covers for junction boxes
- Colored tape and pen so you can mark the wires
- Manual for sensor
- Ohm meter that can measure 2,000,000 Ohms or 2 MOhms

### What Is the Source of the Error so I Know What to Replace?

- The source of the error can be in 1 of 3 places
- Sensor itself could be bad
- There could be something in the wiring like a bad splice, nail or staple driven through it
- Control itself could have failed and is no longer reading the sensor properly
- The only way to know which is the source is to start measuring

### Is It the Control?

- Step 1: mark the wire that goes into the sensor terminal
- Step 2: remove the wire and measure the resistance between the wire and the common
- Step 3: compare reading to the chart showing temperature and resistance
- If the resistance reading is accurate based on the chart than we need to replace control. In the case the resistance reading is not accurate we need to go to next step. If it's the control put the wire back and get a new control.

**⚠ WARNING**

As with any electrical product, care should be taken to guard against potential risks, including electric shock or personal injury.

### Is It the Sensor?

- Now that we have established it's either sensor or sensor wiring it's time to test the sensor.
- **Step 1:** locate the sensor
- **Step 2:** mark the wires where they connect to the sensor
- **Step 3:** undo splices if any to isolate sensor
- **Step 4:** measure the readings and compare to manual in chart.
- If the reading is not accurate than we have a bad sensor. If the reading is accurate than we have wiring issue and you are looking at doing some wire tracing to check all the splices, look for staples driven through the wires etc.

### Notes

- If the sensor has a home run to the control (no splices) than the source of error is either control or sensor
- Splices must be mechanically and electrically strong. A high resistance splice may throw the reading off
- Sensor placement is critical. Check applications for where sensors should be placed. Is a boil supply sensor on a mixing loop? Is an outdoor air temperature sensor beside a furnace exhaust vent?

### Temperature Vs Resistance

Call customer service if you need assistance with technical details.

| TEMPERATURE | | RESISTANCE | TEMPERATURE | | RESISTANCE | TEMPERATURE | | RESISTANCE | TEMPERATURE | | RESISTANCE |
|---|---|---|---|---|---|---|---|---|---|---|---|
| °F | °C | Ω | °F | °C | Ω | °F | °C | Ω | °F | °C | Ω |
| -50 | -46 | 490,813 | 20 | -7 | 46,218 | 90 | 32 | 7,334 | 160 | 71 | 1,689 |
| -45 | -43 | 405,710 | 25 | -4 | 39,913 | 95 | 35 | 6,532 | 165 | 74 | 1,538 |
| -40 | -40 | 336,606 | 30 | -1 | 34,558 | 100 | 38 | 5,828 | 170 | 77 | 1,403 |
| -35 | -37 | 280,279 | 35 | 2 | 29,996 | 105 | 41 | 5,210 | 175 | 79 | 1,281 |
| -30 | -34 | 234,196 | 40 | 4 | 26,099 | 110 | 43 | 4,665 | 180 | 82 | 1,172 |
| -25 | -32 | 196,358 | 45 | 7 | 22,763 | 115 | 46 | 4,184 | 185 | 85 | 1,073 |
| -20 | -29 | 165,180 | 50 | 10 | 19,900 | 120 | 49 | 3,760 | 190 | 88 | 983 |
| -15 | -26 | 139,403 | 55 | 13 | 17,436 | 125 | 52 | 3,383 | 195 | 91 | 903 |
| -10 | -23 | 118,018 | 60 | 16 | 15,311 | 130 | 54 | 3,050 | 200 | 93 | 829 |
| -5 | -21 | 100,221 | 65 | 18 | 13,474 | 135 | 57 | 2,754 | 205 | 96 | 763 |
| 0 | -18 | 85,362 | 70 | 21 | 11,883 | 140 | 60 | 2,490 | 210 | 99 | 703 |
| 5 | -15 | 72,918 | 75 | 24 | 10,501 | 145 | 63 | 2,255 | 215 | 102 | 648 |
| 10 | -12 | 62,465 | 80 | 27 | 9,299 | 150 | 66 | 2,045 | 220 | 104 | 598 |
| 15 | -9 | 53,658 | 85 | 29 | 8,250 | 155 | 68 | 1,857 | 225 | 107 | 553 |



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