

3110 Series Temperature Sensor Information

This document provides basic information about the proper operation and function of the temperature sensor in the 3110 Series CO₂ incubator. The sensor description, location, method for testing, and common error types are outlined.

3110 Series CO ₂ Incubators
Revision Date: October 27, 2014
Temperature Sensor Information



3110 Series CO2 Temperature Sensor

- The control and overtemperature (safety) sensors are thermistors.
- The glass bead thermistor is sealed inside a stainless steel protective sheath.
- These devices have a negative temperature coefficient (NTC). This means that as the measured temperature goes higher, the resistance of the sensor (thermistor) goes lower.
- The full range of the temperature display is 0.0C to +60.0C
- If either sensor fails in an OPEN electrical state, the temperature display will read 0.0C plus any positive offset from previous temperature calibration stored in memory.
- If either sensor fails in a SHORTED electrical state, the temperature display will read +60.0C.

Photo of temperature/overtemperature sensor, part number (290184):



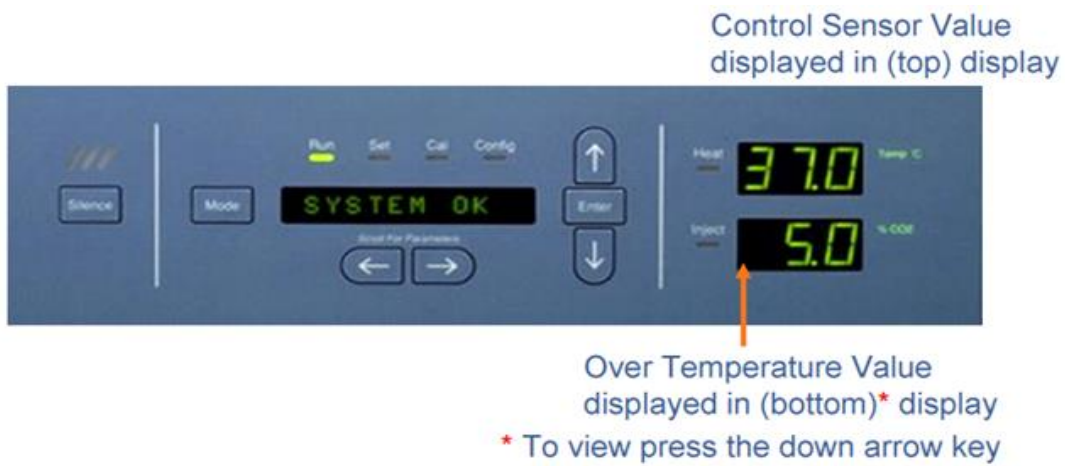
Location:

- Both sensors are inserted into blower scroll in overhead chamber area.



Viewing temperature sensor values:

- Control temp sensor value is displayed in upper display.
- Overtemperature sensor value is displayed in lower display when “Down” arrow key is pressed.



Temperature Related Error Messages

SYS IN OTEMP- Cabinet at or above overtemperature setpoint.

Possible cause:

- Actual chamber temperature is greater than OTEMP setpoint.
- Temp setpoint too close to ambient. Reduce ambient temperature or increase setpoint to at least +5C above ambient.
- Temp setpoint moved to a value lower than cabinet actual. Open door to cool chamber or allow time for temp to stabilize.
- Temp sensor failure.
- Temp control failure.
- Excessive internal heat load. Remove source of additional heat (i.e. shaker, stirrer, etc.)

TSNSR1 or TSNSR2 ERROR- Voltage from control or overtemp sensor circuit out of range.

Possible cause:

- Sensor unplugged.
- Poor electrical connection at temp sensor.
- Open sensor. Replace sensor.
- Shorted sensor. Replace sensor.

TEMP IS LOW- Cabinet temp at or below TEMP LOW TRACKING ALARM.

Possible cause:

- Extended door opening.
- Broken door contact (disables heaters).
- Temp control failure.
- Heater failure.

Actual temperature does not match displayed value.

- Incorrect calibration of temp probe. See below for calibration instructions.
- Defective temp sensor. See testing procedure below.
- Error in reference measuring equipment.
- Internal heat load changed. (i.e. heated sample, shaker or other small accessory running in chamber.)



Temperature Sensor Calibration:

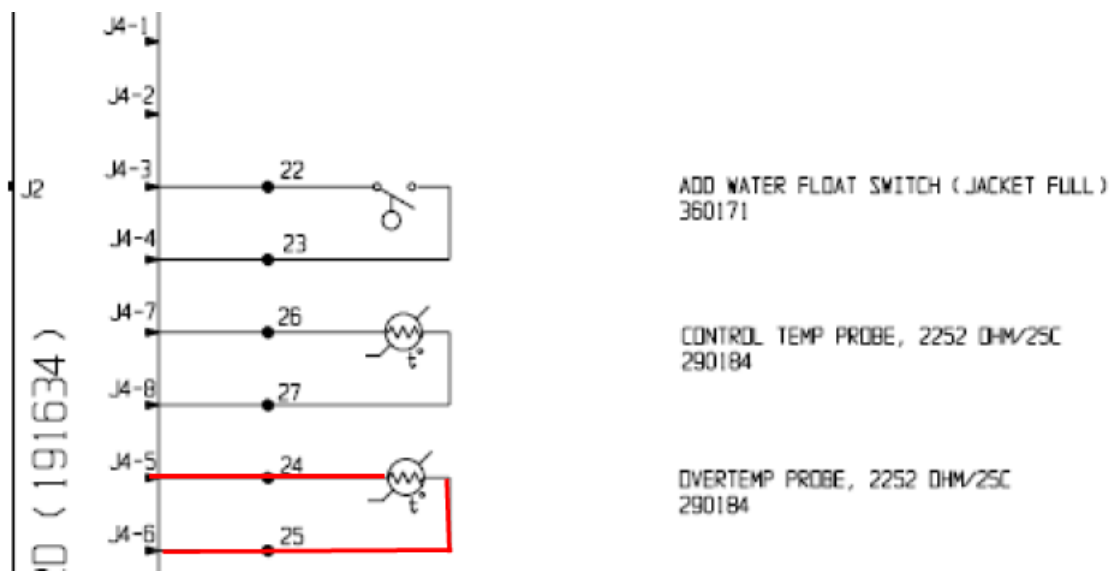
- Place the calibrated instrument in the center of the chamber. The measuring instrument should be in the airflow, not against the shelf.
- Before calibration, allow the cabinet temperature to stabilize.
 - The recommended stabilization time from a cold start-up is 12 hours.
 - The recommended stabilization time for an operating unit is 2 hours.
- Press the MODE key until the CAL indicator is illuminated.
- Press the RIGHT ARROW key until TEMP CAL XX.X appears in the display.
- Press the UP or DOWN arrow to match the display to a calibrated instrument.
 - Note: If unable to change the display in the desired direction it is likely that a maximum offset has already been entered during a previous calibration. Test the sensor per instructions below and replace sensor if necessary.
- Press ENTER to store the calibration into memory.
- Press the MODE key to return to RUN mode.



Testing Temperature Sensors:

- The temperature sensor resistance value can be measured with an ohmmeter at a specific chamber temperature.
- **The unit should be disconnected from electrical power.**
- Connector J4 should be disconnected from main pcb.
- The measured resistance value can be compared to the chart below.
- The nominal resistance at **25C is 2252 ohms.**
- Control sensor (**yellow wires**) can be tested at main pcb connector **J4 pins 7 and 8.**
- Overtemp sensor (**red wires**) can be tested at main pcb connector **J4 pins 5 and 6.**

Electrical Schematic:



Thermistor Temperature vs Resistance (2252 Ohms at 25C)

DEG C	OHMS	DEG C	OHMS	DEG C	OHMS	DEG C	OHMS
-80	1660C	-40	75.79K	0	7355	40	1200
-79	1518K	-39	70.93K	1	6989	41	1152
-78	1390K	-38	66.41K	2	6644	42	1107
-77	1273K	-37	62.21K	3	6319	43	1064
-76	1167K	-36	58.30K	4	6011	44	1023
-75	1071K	-35	54.66K	5	5719	45	983.8
-74	982.8K	-34	51.27K	6	5444	46	946.2
-73	902.7K	-33	48.11K	7	5183	47	910.2
-72	829.7K	-32	45.17K	8	4937	48	875.8
-71	763.1K	-31	42.42K	9	4703	49	842.8
-70	702.3K	-30	39.86K	10	4482	50	811.3
-69	646.7K	-29	37.47K	11	4273	51	781.1
-68	595.9K	-28	35.24K	12	4074	52	752.2
-67	549.4K	-27	33.15K	13	3886	53	724.5
-66	506.9K	-26	31.20K	14	3708	54	697.9
-65	467.9K	-25	29.38K	15	3539	55	672.5
-64	432.2K	-24	27.67K	16	3378	56	648.1
-63	399.5K	-23	26.07K	17	3226	57	624.8
-62	369.4K	-22	24.58K	18	3081	58	602.4
-61	341.8K	-21	23.18K	19	2944	59	580.9
-60	316.5K	-20	21.87K	20	2814	60	560.3
-59	293.2K	-19	20.64K	21	2690	61	540.5
-58	271.7K	-18	19.48K	22	2572	62	521.5
-57	252K	-17	18.40K	23	2460	63	503.3
-56	233.8K	-16	17.39K	24	2354	64	485.8
-55	217.1K	-15	16.43K	25	2252	65	469
-54	201.7K	-14	15.54K	26	2156	66	452.9
-53	187.4K	-13	14.70K	27	2064	67	437.4
-52	174.3K	-12	13.91K	28	1977	68	422.5
-51	162.2K	-11	13.16K	29	1894	69	408.2
-50	151K	-10	12.46K	30	1815	70	394.5
-49	140.6K	-9	11.81K	31	1739	71	381.2
-48	131K	-8	11.19K	32	1667	72	368.5
-47	122.1K	-7	10.60K	33	1599	73	356.2
-46	113.9K	-6	10.05K	34	1533	74	344.5
-45	106.3K	-5	9534	35	1471	75	333.1
-44	99.26K	-4	9046	36	1412	76	322.3
-43	92.72K	-3	8586	37	1355	77	311.8
-42	86.65K	-2	8151	38	1301	78	301.7
-41	81.02K	-1	7741	39	1249	79	292
						80	282.7

