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ERROR CODE	POSSIBLE CAUSES	SOLUTIONS
ERROR 1	**Sensor is disconnected**	1. To check if the sensor has been disconnected, first switch the circuit breaker off. 2. Remove the cover where the control panel is located 3. Once the cover has been removed, locate the CPU board. 4. There are 2 sensor wires (1 red and 1 green/black) that attach to the TC1 connections on the CPU board. TC1 can be found on the side of the CPU board closest to you and is labeled TC1. a. Note that there are three connections on TC1. The connections are TC1-1, TC1-2, TC1-3. b. A screwdriver is needed to properly attach/remove the sensor wires. 5. The red wire should be connected to TB1-2 and the green/black wire should be connected to TB1-3. 6. If the sensor is properly connected as stated in the previous step, skip to Step B titled Defective sensor. If there is a loose wire, proceed to Step 7. 7. If a wire is loose, loosen the connection terminal's screw using a screwdriver, slide the end of the wire under the screw, then tighten the screw to secure the wire. 8. The sensor is now properly connected.
	Sensor is defective	1. To check if the sensor is defective, turn off the circuit breaker. 2. Using an ohmmeter, check sensor resistance by placing one ohmmeter probe on the metal lead of each wire. 3. If sensor resistance is over 10 Mohms, the sensor is defective and needs to be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725.
	CPU board is defective	1. To check if the CPU is defective, turn off the circuit breaker. 2. Using an ohmmeter, check sensor resistance by placing one ohmmeter probe on the metal lead of each wire. 3. If sensor resistance is between 3 and 9 ohms, the CPU board is defective and needs to be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725.
ERROR 2	**Temporary electrical noise**	Run a power cycle and check for Error 2 again 1. Turn off circuit breaker 2. Turn on circuit breaker 3. Set target temperature to 0°C and start the cycle in fixed temperature mode. 4. If error 2 occurs, proceed to Step B titled Defective SSR. If error 2 does not occur, you have successfully completed troubleshooting.
	SSR is defective	1. Turn off circuit breaker 2. Turn on circuit breaker and start the cycle 3. Check output voltage on the CPU board. Look for the CN2 label and measure the voltage at CN2-1 and CN2-2. a. Note that you must perform step 3 before error 2 occurs. b. If the voltage is about 0V DC, the SSR is defective and must be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725. (i Note: Turn off circuit breaker and use a thermal compound when installing a replacement SSR)
	CPU is defective	1. Turn off circuit breaker 2. Turn on circuit breaker 3. Check output voltage on the CPU board. Look for the J10-1 and J10-3 labels. a. Note that you must perform step 3 before error 2 occurs. b. If the voltage is about 1.0V DC, the CPU is defective and must be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725.

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ERROR CODE	POSSIBLE CAUSES	SOLUTIONS
ERROR 3	Disconnected wires	1. Turn off circuit breaker. 2. Check all wiring that is directly connected to the heater circuit. Refer to the product's manual for the wiring diagram. 3. If all wires are connected correctly, skip to Step B titled Defective heater(s). 4. If wiring is incorrect, re-wire according to the wiring diagram. 5. Turn on circuit breaker then start cycle. 6. If error 3 still occurs, please contact Yamato Scientific technical support. If error 3 does not occur, you have successfully completed troubleshooting.
	Defective heater(s)	1. Using an a multimeter, check heater resistance by testing heater resistance at T-2 and T-4. To locate T-2 and T-4, please refer to the product manual. 2. If heater resistance reads correctly, skip to Step C titled Defective main relay (X). 3. If heater resistance is large (e.g. O.L., 10 Mohms, etc), the heater is defective and needs to be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725.
	Defective main relay (X	1. Unplug wires from contact terminal of X relay (main power relay) a. Note: Insulate terminals of unplugged wires to avoid electrical sparks or shock. 2. Turn on circuit breaker. 3. Set target temperature to maximum then start cycle 4. Before error 3 occurs, check resistance on the X relay (main power relay) contact terminals. a. If resistance is around 0 ohms, ignore Step 4b and continue to Step 5. b. If resistance is large (e.g. O.L., 10 Mohms, etc), check the voltage on the terminal coil on the X relay before error 3 occurs. To locate the terminal coil, please refer to the product manual. i. If the voltage is over 100V AC, the X relay is defective and needs to be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725. ii. If the voltage is around 0V AC, please skip to Step F titled Defective CPU board. 5. Turn off circuit breaker. 6. Plug the wires back into the X1 relay (main power relay). 7. Turn on circuit breaker and start the cycle. 8. Before error 3 occurs, check the current on the heater line. a. If the current is over 0 amps (calculate current volume from heater wattage and voltage), skip to Step E. titled Defective CT sensor. b. If the current is around 0 amps, continue to Step 9. 9. Before error 3 occurs, check the output voltage at CN2-1 and CN-2 on the power CPU. a. If the voltage is around 0 V DC, skip to Step
	Defective SSR	If you have followed troubleshooting Steps A through C and were directed here, the SSR is defective and needs to be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725. Note: Turn off circuit breaker and use a thermal compound when installing a replacement SSR
	Defective CT sensor	1. Turn off circuit breaker 2. Unplug CN1 from CPU board. a. CN1 is labeled on the CPU board. If you are unable to locate CN1, please refer to the product manual. 3. Turn on circuit breaker and start the cycle. 4. Check the voltage at CN1-1 and CN1-2 on the unplugged wire before error 3 occurs. a. If voltage is over 0V DC, skip to Step b. If voltage is around 0V DC, the CT sensor is defective. Continue to Step 5. 5. Turn off circuit breaker. 6. The CT sensor is defective and needs to be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725
	Defective CPU board	If you have followed troubleshooting Steps A through C(4-b-ii) and were directed here, the CPU board is defective and needs to be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725.

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ERROR CODE	POSSIBLE CAUSES	SOLUTIONS
ERROR 7	**Incorrect OH parameter**	1. To properly set the OH parameter, set it to your target temperature + 15 degrees C or higher. a. Press the Submenu key. b. Use the up/down arrow keys until OH is displayed on the screen. c. Press Enter. d. Use the up/down arrow keys to set the OH temperature. Note: A minimum of 15 degrees above your target temperature is recommended to avoid false overheating errors. e. Press Enter f. If your OH parameter is properly set, skip to Step C. titled Incorrect calibration offset parameter. 2. Turn off circuit breaker. 3. Turn on circuit breaker and start the cycle. 4. If error 7 remains, continue to Step B.
	Disconnected harness	Check wiring. Refer to the product manual for proper wiring. a. If the wire (harness) is connected correctly, skip to Step C titled Defective CPU board. b. If the wire (harness) is not connected correctly, refer to the product manual connect the wire. c. Turn on circuit breaker. d. If error 7 remains, please email technical support at technical@yamato-usa.com
	Incorrect calibration offset parameter	1. To properly set the calibration offset parameter, it must be set to 0. a. Press the Submenu key b. Use the up/down arrow keys until Cal is displayed on the screen. c. Press Enter. d. Use the up/down arrow keys to set Cal to 0. Note: Unless required by your experiment, the calibration offset parameter should remain at 0 to avoid false overheating errors. e. Press Enter f. If your calibration offset parameter is properly set, skip to Step D. titled Disconnected sensor. 2. Turn off circuit breaker. 3. Turn on circuit breaker and start the cycle. 4. If error 19 remains, continue to Step D.
	Disconnected sensor	1. To check if the sensor has been disconnected, first switch the circuit breaker off. 2. Remove the front cover where the control panel is located. 3. Once the cover has been removed, locate the CPU board. 4. There are 2 sensor wires (1 red and 1 green/black) that attach to the TB1 connections on the CPU board. TB1 can be found on the side of the CPU board closest to you and I labeled TB1. a. Note that there are three connections on TB1. From left to right, the connections are TB1-1, TB1-2, TB1-3. b. A screwdriver is needed to properly attach/remove the sensor wires. 5. The red wire should be connected to TB1-2 and the green/black wire should be connected to TB1-3. 6. If the sensor is properly connected as stated in the previous step, skip to Step E titled Defective CPU board. If there is a loose wire, proceed to Step 7. 7. If a wire is loose, loosen the connection terminal's screw using a screwdriver, slide the end of the wire under the screw, then tighten the screw to secure the wire.
	Defective CPU board	1. To check if the CPU board is defective, turn off the circuit breaker. 2. Using an ohmmeter, check sensor resistance by placing one ohmmeter probe on the metal lead of each wire. a. If the sensor resistance is between 3 to 9 ohms, the CPU board is defective and needs to be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725. b. If the sensor resistance is large (e.g. O.L., 10 Mohms, etc), continue to Step F titled Defective sensor.
	Defective Sensor	If you have followed troubleshooting Steps A through E and were directed here, the sensor is defective and needs to be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725.

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ERROR CODE	POSSIBLE CAUSES	SOLUTIONS
ERROR 15	Defective CPU	1. Turn off circuit breaker. 2. The CPU is defective and needs to be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725.
ERROR 17	Internal communi-cation failure	1. Turn off circuit breaker. 2. The CPU board and temperature sensor(s) need to be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725.
ERROR 19	Too much material in chamber	Make sure not to overload the chamber. Refer to the product manual for proper material spacing in the chamber.
	Incorrect OH parameter	1. To properly set the OH parameter, set it to your target temperature + 15 degrees C or higher. a. Press the Submenu key. b. Use the up/down arrow keys until OH is displayed on the screen. c. Press Enter. d. Use the up/down arrow keys to set the OH temperature. Note: A minimum of 15 degrees above your target temperature is recommended to avoid false overheating errors. e. Press Enter f. If your OH parameter is properly set, skip to Step C. titled Incorrect calibration offset parameter. 6. Turn off circuit breaker. 7. Turn on circuit breaker and start the cycle. 8. If error 19 remains, continue to Step C.
	Incorrect calibration offset parameter	1. To properly set the calibration offset parameter, it must be set to 0. a. Press the Submenu key b. Use the up/down arrow keys until Cal is displayed on the screen. c. Press Enter. d. Use the up/down arrow keys to set Cal to 0. Note: Unless required by your experiment, the calibration offset parameter should remain at 0 to avoid false overheating errors. e. Press Enter f. If your calibration offset parameter is properly set, skip to Step D. titled Disconnected sensor. 2. Turn off circuit breaker. 3. Turn on circuit breaker and start the cycle. 4. If error 19 remains, continue to Step D.
	Disconnected sensor	1. To check if the sensor has been disconnected, first switch the circuit breaker off. 2.Remove the front cover where the control panel is located. 3.Once the cover has been removed, locate the CPU board. 4.There are 2 sensor wires (1 red and 1 green/black) that attach to the TB1 connections on the CPU board. TB1 can be found on the side of the CPU board closest to you and I labeled TB1. a. Note that there are three connections on TB1. From left to right, the connections are TB1-1, TB1-2, TB1-3. b. A screwdriver is needed to properly attach/remove the sensor wires. 5.The red wire should be connected to TB1-2 and the green/black wire should be connected to TB1-3. 6.If the sensor is properly connected as stated in the previous step, skip to Step E titled Defective CPU board. If there is a loose wire, proceed to Step 7. 7.If a wire is loose, loosen the connection terminal's screw using a screwdriver, slide the end of the wire under the screw, then tighten the screw to secure the wire. 8.The sensor is now properly connected.
	Defective CPU board	1. To check if the CPU board is defective, turn off the circuit breaker. 2. Using an ohmmeter, check sensor resistance by placing one ohmmeter probe on the metal lead of each wire. a. If the sensor resistance is between 3 to 9 ohms, the CPU board is defective and needs to be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725. b. If the sensor resistance is large (e.g. O.L., 10 Mohms, etc), continue to Step F titled Defective sensor.
	Defective Sensor	If you have followed troubleshooting Steps A through E and were directed here, the sensor is defective and needs to be replaced. To order a replacement part, please contact Yamato Scientific customer service at (408) 235-7725.