5A. TEMPERATURE PROBE CHECK

For M9-001 thru -019 & M11-001 thru -019, see 5A below.
For M9-020 & M11-022, see 5B to the right.

5A. For M9-001 thru -019 & M11-001 thru -019

A shorted Temperature Probe can cause the following symptoms:
• The sterilizer will not "boot up" and will sound a steady beep.
• The display will show a steady temperature reading of ~30˚ without changing (this is not normal). The sterilizer will then continue into the sterilize mode and will ultimately overheat, causing in an error code to be displayed.

Disconnect the Temperature Probe from the Control PC Board and measure the resistance at room temperature:
• The resistance between the BLACK and WHITE wires should read between 3.0 Meg Ohms and 6.0 Meg Ohms. If resistance readings are not met, replace the Temperature Probe.
• The resistance between the BLACK and RED wires should read between 3.0 Meg Ohms and 6.0 Meg Ohms. If resistance readings are not met, replace the Temperature Probe.
• The resistance between the WHITE and RED wires should read between 70 K Ohms and 80 K Ohms. If resistance readings are not met, replace the Temperature Probe.

Connect the Temperature Probe to the Control PC Board and power up the sterilizer.
• Verify presence of 5 VDC on the temperature probe between the BLACK and WHITE (ground) wires.
• If voltage is not present check ground connections. (See #3 "Proper Ground Connection" on the previous page.)
• If voltage reading is not 5 VDC, replace Control PC Board. M9: (RPI Part #MIB130) and M11: (RPI Part #MIB131).

Temperature Probe available from RPI:
• M9-001 thru -019: Temperature Probe (RPI Part #MIP050)
• M11-001 thru -019: Temperature Probe (RPI Part #MIP050)

5B. TEMPERATURE SENSOR CHECK

5B. M9-020 & -022 and M11-020 & -020

• Disconnect the Temperature Sensor from the Control PC Board and measure the resistance between the RED and WHITE wires. Resistance should read ~1.07K to 1.1K Ohms at room temperature. If readings are out of range, replace the Temperature Sensor.

• Reconnect the Temperature Sensor to the Control PC Board and power up the sterilizer. Place the black meter lead to TP2 on the PC Board, and the red meter lead to TP4. The voltage should read 5 VDC ±1 VDC. If voltage reading is out of range, replace Control PC Board (RPI Part #MIB129).

Temperature Sensor available from RPI:

• M9-020 & -022: Temperature Sensor (RPI Part #MIS121)
• M11-020 & -022: Temperature Sensor (RPI Part #MIS121)

DON'T FORGET ...
ALSO AVAILABLE FROM RPI

Main Harness
RPI Part #MIH238
• The RPI Main Harness includes both the main harness and the hi limit Jumper Wire (RPI Part #MIJ328).
Fits Models:
• M9-020 & -022   • M11-020 & -022

RPI Field Service Calibration Kit
RPI Part #MIK074
• This Kit was designed to calibrate and service the M9-001 thru -019 and M11-001 thru -019 sterilizers, and contains detailed instruction on the calibration of those older sterilizers. Detailed instructions are also available on the RPI website, under RPI Field Service Calibration Kit (RPI Part #MIK074).
• This Kit also includes a Test Pressure Gauge (RPI Part #RPG461) and a Max Register Thermometer (RPI Part #RPT113) which will aid in verification of the newer Midmark models M9-020 & -022 and M11-020 & -022 sterilizer's operation.
Fits Models:
• M9-001 thru -019   • M11-001 thru -019

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CONTROL PC BOARDS
RPI PART #MIB129, MIB130, MIB131 & MIB132

IMPORTANT NOTE
Before shipping a non-operational PC Board to RPI, or installing a replacement PC Board, please read inside *"TROUBLESHOOTING GUIDE TO PROTECT YOUR REPLACEMENT PC BOARD "*. The information presented explains simple diagnostics that **MUST BE PERFORMED** and evaluated before removing the non-operational PC Board and before installing the new replacement PC Board. The non-operational PC Board may have been damaged because of the failure of another component. Failure to properly identify the cause of damage to the existing PC Board may cause the replacement PC Board to be damaged as well, potentially **VOIDING THE WARRANTY** for the replacement PC Board.

SHIPPING A NON-OPERATIONAL PC BOARD TO RPI

1) Please read the "**IMPORTANT NOTE**" at the top of this page.
2) Enclosed is a box to ship a non-operational PC Board (Core) to RPI. A UPS pre-paid return label has been placed on the outside of this box for your convenience. Using this box and label, you will not pay for shipping the PC Board to RPI. If additional boxes are needed, please contact RPI.
3) Refer to the chart below regarding the Mounting Bracket.
4) Seal the box for shipping. Do not cover the UPS return label.
5) Present the box to your UPS driver, drop it off at a UPS store, or call UPS at (800) 742-5877 to arrange a pick up at your location.
6) Once the non-operational board has been received by RPI and verified that it is in reasonable condition without burn holes, a replacement PCB will be shipped to you. Your invoice will reflect the cost of the board plus the $100 credit for the Core.

Follow these shipping instructions to be eligible for the $100 PC Board Core Credit from RPI. *Note: If returning a New Style PCB without the Mounting Bracket, then a total credit of only $75 will be issued.*		
Do not include the Mounting Bracket if shipping an *Old Style* PCB:	**Include the Mounting Bracket** if shipping a *New Style Green PCB*:	**Include the Mounting Bracket** if shipping a *New Style Red PCB*:
• *M9-001 thru -019* *Serial # Prefixes* CZ, DA, DB, DX, DY, FD & OM *(RPI Part #MIB130)*	• *M9-020 & -022* *Serial # prefixes* RN, RR & Serial # V2200 thru V1697649 (RPI Part #MIB129)	• *M9-020 & -022* *Serial # V1697650 thru Present (RPI Part #MIB132)*
• *M11-001 thru -019* *Serial # Prefixes* ES, ET, FP, FR & GB *(RPI Part #MIB131)*	• *M11-020 & -022* *Serial # prefixes* RS, RV & Serial # V2200 thru V1697649 (RPI Part #MIB129)	• *M11-020 & -022* *Serial # V1697650 thru Present (RPI Part #MIB132)*

INSTALLING THE REPLACEMENT CONTROL PC BOARD

Removal of old PC Board:
1) Please read the "**IMPORTANT NOTE**" at the top of the page.
2) Disconnect power to sterilizer.
3) Disconnect wire harnesses and ribbon cable. Cut the cable tie on the pressure sensor hose and disconnect the hose. Remove the old PC Board.
4) **Important Note:** If shipping the non-operational PC Board to RPI for Core credit, please refer to the shipping instructions above. Depending on the model, you may or may not need to include the Mounting Bracket to be eligible for the $100 Core credit.
Installation of replacement PC Board:
1) To ensure proper grounding, inspect and clean the ground contact points on the sterilizer chassis and on the mounting bracket.

2) Install the replacement PC Board onto mounting bracket (if not already assembled), connect wire harnesses and ribbon cable. Attach the pressure hose using a High Temp Cable Tie (RPI Part #RPT480).
Note: Although the MIB130 and MIB131 PC Boards (M9-001 thru -019 and M11-001 thru -019) have already been calibrated, additional calibration may be necessary after installation. (See back page for information about the RPI Smart Kit® (RPI Part #MIK074) which includes the tools needed to calibrate and service these sterilizers.)
Note: Steps #3-6 below (setting the chamber size and type) apply ONLY to RPI Part #'s MIB129 and MIB132 Control PC Boards that fit the M9-020 & -022 and M11-020 & -022). For all others, go directly to Step #7.

3) Move Switch #2 (located on the "OPTIONS" switch bank on the PC Board) to the "ON" position.

4) Connect power to the sterilizer and power up.

5) Once Switch #2 is set to "ON", the following configuration steps will automatically be displayed: STEP 1: [CHAMBER DIAMETER] for M9 enter [9 INCH] and for M11 enter [11 INCH]. Following the prompts on the display, use the Touch Pad: [+] [-] buttons to select settings then press the [P] button when completed.

STEP 2: [FULL FEATURED] for the standard M9/M11 and [DEFEATURED] for the M9D/M11D, then press the [P] button when completed. (This feature may not apply to all Control PC Board versions).

6) Disconnect power to the sterilizer and move Switch #2 to the "OFF" position. Further calibration is not necessary.

7) Connect power to sterilizer and run several test cycles.

TROUBLESHOOTING GUIDE TO PROTECT YOUR REPLACEMENT PC BOARD

*This Troubleshooting Guide explains simple diagnostics **YOU MUST PERFORM** and evaluate before removing the non-operational PC Board and installing a replacement PC Board. The non-operational PC Board may have been damaged due to the failure of another component. Failure to properly identify the cause of damage to the existing PC Board may cause the replacement PC Board to be damaged as well, potentially **VOIDING THE WARRANTY** for the replacement PC Board.*

CONTROL PC BOARD (REFURBISHED)
RPI Part #MIB129
Fits New Style (Green PC Board)
• *M9-020 & -022 Serial # prefixes RN, RR & Serial # V2200 thru V1697649 (OEM Part #022-0762-00)*
• *M11-020 & -022 Serial # prefixes RS, RV & Serial # V2200 thru V1697649 (OEM Part #022-0762-00)*

CONTROL PC BOARD (REFURBISHED)
RPI Part #MIB132
Fits New Style (Red PC Board)
• *M9-020 & -022 Serial # V1697650 thru Present (OEM Part #002-1992-00)*
• *M11-020 & -022 Serial # V1697650 thru Present (OEM Part #002-1992-00)*

CONTROL PC BOARD (REFURBISHED)
RPI Part #MIB130
Fits Old Style:
• *M9-001 thru -019 Serial # Prefixes CZ, DA, DB, DX, DY, FD & OM (OEM Part #002-0434-00)*
• *M9-001 thru -019 Serial # Prefixes CZ, DA, DB, DX, DY, FD & OM (OEM Part #002-0434-03)*

CONTROL PC BOARD (REFURBISHED)
RPI Part #MIB131
Fits Old Style:
• *M11-001 thru -019 Serial # Prefixes ES, ET, FP, FR & GB (OEM Part #002-0501-00)*

IMPORTANT. Perform the following troubleshooting and evaluations on the Heater Element and Pulse Solenoid (if present) before removing your existing Control PC Board (or after installing your new Control PC Board). These items can help you identify additional symptoms of Control PC Board failure. Some of these symptoms, when remedied, can actually bring your existing Control PC Board back to life! These checks and observations will also ensure proper operation of your new replacement Control PC Board and can help you identify other components you may need to properly complete the repair.

1. HEATER ELEMENT RESISTANCE CHECK

WARNING: The failure of the Heater Element can be fatal to your Control PC Board!

• Perform a resistance check, looking for a short circuit.

The resistance of the heater element should read as follows:
M9: Heater Element Assembly (RPI Part #MIH048) ~10 Ohms
M11: Heater Element Assembly (RPI Part #MIH049) ~10 Ohms

If the resistance reading between the heater terminals is near zero ohms, the heater is shorted and **MUST BE REPLACED BEFORE INSTALLING THE NEW REPLACEMENT CONTROL PC BOARD! FAILURE TO REPLACE A SHORTED HEATER WILL DAMAGE YOUR NEW REPLACEMENT CONTROL PC BOARD AND CAN VOID YOUR WARRANTY!**

1. HEATER ELEMENT *(continued)*

If the resistance between chassis ground and the heater terminals is near zero ohms, the heater is shorted and **MUST BE REPLACED BEFORE INSTALLING THE NEW REPLACEMENT CONTROL PC BOARD! FAILURE TO REPLACE AN "OPEN" HEATER WILL DAMAGE YOUR NEW REPLACEMENT CONTROL PC BOARD AND CAN VOID YOUR WARRANTY!**

If the resistance between the heater terminals reads "OPEN" (no resistance present), the heater is "open" and must be replaced before installing the new replacement Control PC Board. The sterilizer will not function properly without replacing the heater.

Heater Harness also available from RPI:
• *M9-001 thru -019: Heater Harness (RPI Part #MIH135)*
• *M11-001 thru -019: Heater Harness (RPI Part #MIH135)*
• *M9/M11-020 thru -022: Heater Wire Harness (RPI Part #MIH327)*
• *M9/M11-020 thru -022: Jumper Wire (RPI Part #MIJ328)*

2. PULSE SOLENOID RESISTANCE CHECK

WARNING: The failure of the Pulse Solenoid (if present) can be fatal to your Control PC Board!

• If a Pulse Solenoid is present, perform a resistance check. First disconnect the two wires to the coil, then perform the resistance check, looking for a short circuit.

The resistance of the coil should read as follows:
M9-001 thru -019 with Serial # prefixes CZ, DA, DB, DX, DY, FD & OM: (Blue coil) Pulse Solenoid (RPI Part #MIS044) ~14.6 Ohms
M11-001 thru -019 with Serial # prefixes ES, ET, FP, FR & GB: (Black coil) Pulse Solenoid (RPI Part #MIS079) ~11.6 Ohms

If the resistance reading of the Coil is near zero ohms, the Coil is shorted and **MUST BE REPLACED BEFORE INSTALLING THE NEW REPLACEMENT CONTROL PC BOARD! FAILURE TO REPLACE A SHORTED COIL WILL DAMAGE YOUR NEW REPLACEMENT CONTROL PC BOARD AND CAN VOID YOUR WARRANTY!**

3. PROPER GROUND CONNECTION CHECK

A "Poorly Grounded or Lost Ground" Control PC Board can cause the machine to malfunction in many different ways, mimicking other part malfunctions (such as a lost or intermittent 5 Volts to the water level sensor or temperature probe) and causing the technician many hours of troubleshooting frustration.

Poor PC Board grounding can also cause the fill solenoid valve to continually fill the chamber with water, preventing the sterilizer from going into the sterilize mode.

3. GROUND CONNECTION CHECK *(continued)*

• Verify that the Bracket & Ground Screws (RPI Part #MIK160) used to mount the PC Board to the mounting bracket and to attach the mounting bracket to the chassis, are present. Clean contact points of any rust or corrosion using a wire brush or sandpaper (if necessary) and ensure that all hardware is present and properly tightened. Once the ground points have been cleaned and reestablished, many intermittent errors can be eliminated.

• RPI also offers a PC Board Mounting Kit (see below) which includes all mounting and grounding hardware as well as the plastic PC Board mounting standoffs needed to mount the PC Board to the Mounting Bracket, and to mount the Bracket to the chassis for all versions M9 and M11 Control PC Boards.

PC Mounting Board Kits available from RPI:
• *All versions of M9 and M11: PCB Mounting Kit (RPI Part #MIK159) (Note: This mounting kit does not fit the red colored PC Board with green LCD display RPI Part #MIB132).*

4. WATER LEVEL SENSOR CHECK

With the sterilizer powered-up:

• Verify the presence of 5 Volts DC between the sensor's 1/4" Quick Connect terminal and chassis ground. If the voltage reading is not 5 VDC, check for proper grounding (See #3 above "Proper Ground Connection").

• If voltage is not present check for shorted water level sensor (If the resistance reading between the water level sensor and the chassis ground is near zero ohms, the water level sensor is shorted and must be replaced).

If ensuring proper ground connection does not remedy these problems, replace the Control PC Board.

Note: A shorted water level sensor will trick the Control PC Board into thinking that the chamber is full of water. The sterilizer will then continue into the sterilize mode and will ultimately overheat, causing in an error code to be displayed. This condition can be caused by a loose water level sensor (allowing water to leak past the insulating bushing and short the sensor) or by physical breakdown of the insulating bushing itself.

• If the Water Level Sensor is not shorted, verify continuity of the Water Level Harness (ensure that there are no shorts or breaks in the wiring). RPI also offers the Water Level Harness, see below.

Water Level Harnesses and Sensor are available from RPI:
• *M9-001 thru -019: Water Level Harness (RPI Part #MIH136)*
• *M9-020 & -022: Water Level Harness (RPI Part #MIH145)*
• *M11-001 thru -019: Water Level Harness (RPI Part #MIH136)*
• *M11-020 & -022: Water Level Harness (RPI Part #MIH145)*
• *M9 and M11: Water Level Sensor (RPI Part #MIS075)* ***Continued***