LOAD CELL TROUBLESHOOTING GUIDE

Follow instructions below to identify and repair potential issue with the load cell. It is recommended that the malfunctioning load cell is removed from the application assembly prior to diagnosing the failing condition. Perform the initial check described next to the condition experienced in application. If condition is confirmed, perform the actions listed to identify potential root cause. If condition of load cell is found to have improved, continue to the Application Troubleshooting section.

POTENTIAL CONDITIONS

1. ZERO BALANCE IS OUT OF SPECIFICATION

Potential Root Cause:

- Excessive load was applied causing plastic deformation
- Thin-film strain gauges were physically damaged
- Sensor was exposed to high temperature

CHECK	SOLUTION
• Measure the voltage output between –OUT and +OUT of the load cell using 10V supply at the +EXC and -EXC leads. • Measure resistance across input leads (+EXC and -EXC) and output leads (+OUT and -OUT). • Inspect thin-film surface under minimum of 5X magnification. Ensure no large or obvious scratches or nicks are present on the surface. Ensure no brown discoloration on thin-film surface.	• If zero balance is stable and returns to new zero balance with exercise, load cell can be used with a new zero balance if possible in application. • If zero balance continues to drift with each sequential load or is unstable, part was excessively deformed and cannot be repaired. • If bridge resistance measures drastically different from spec, part was excessively deformed and cannot be repaired. • If thin-film surface is scratched, wires are broken, and/or black encapsulant has scuffs or nicks, part cannot be repaired.

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	• If abnormal brown discoloration is present on the thin-film surface, part was exposed to excessive temperatures and cannot be repaired. • Contact and return for additional analysis.

2. Unstable Zero Balance

Potential Root Cause:

- Excessive load was applied causing plastic deformation
- Thin-film strain gauges were physically damaged
- Sensor was exposed to high temperature
- Intermittent, shorted or open connections

CHECK	SOLUTION
• Measure resistance across input leads (+EXC and -EXC) and output leads (+OUT and -OUT). • Inspect thin-film surface under minimum of 5X magnification. Ensure no large or obvious scratches or nicks are present on the surface. Ensure no brown discoloration on thin-film surface.	• If bridge resistance measures drastically different from spec, part was excessively deformed and cannot be repaired. • If bridge resistance measures open or shorted circuit, part cannot be repaired. • If thin-film surface is scratched, wires are broken, and/or black encapsulant has scuffs or nicks, part cannot be repaired. • If abnormal brown discoloration is present on the thin-film surface, part cannot be repaired. • Contact and return for additional analysis.

3. Zero Balance Measures Volts Instead Of Millivolts

Potential Root Cause:

- Excessive load was applied causing plastic deformation
- Thin-film strain gauges were physically damaged
- Sensor was exposed to high temperature
- Intermittent, shorted or open connections

CHECK	SOLUTION
• Measure resistance across input leads (+EXC and -EXC) and output leads (+OUT and -OUT). • Inspect thin-film surface under minimum of 5X magnification. Ensure no large or obvious scratches or nicks are present on the surface. Ensure no brown discoloration on thin-film surface.	• If bridge resistance measures drastically different from spec, part was excessively deformed and cannot be repaired. • If bridge resistance measures open or shorted circuit, part cannot be repaired. • If thin-film surface is scratched, wires are broken, and/or black encapsulant has scuffs or nicks, part cannot be repaired. • If abnormal brown discoloration is present on the thin-film surface, part cannot be repaired. • Contact and return for additional analysis.

4. Output Does Not Change With Load

Potential Root Cause:

- Thin-film strain gauges were physically damaged
- Sensor was exposed to high temperature
- Intermittent, shorted or open connections

CHECK	SOLUTION
• Measure resistance across input leads (+EXC and -EXC) and output leads (+OUT and -OUT). • Inspect thin-film surface under minimum of 5X magnification. Ensure no large or obvious scratches or nicks are present on the surface. Ensure no brown discoloration on thin-film surface.	• If bridge resistance measures drastically different from spec, part was excessively deformed and cannot be repaired. • If bridge resistance measures open or shorted circuit, part cannot be repaired. • If thin-film surface is scratched, wires are broken, and/or black encapsulant has scuffs or nicks, part cannot be repaired. • If abnormal brown discoloration is present on the thin-film surface, part cannot be repaired. • Contact and return for additional analysis.

5. Output At Full Scale Is Out Of Specification

Potential Root Cause:

- Excessive load was applied causing plastic deformation

CHECK	SOLUTION
• Measure the voltage output between –OUT and +OUT of the load cell using 10V supply at the +EXC and -EXC leads.	• If zero balance continues to drift with each sequential load or is unstable, part was excessively deformed and cannot be repaired. • Contact and return for additional analysis.

6. Performance Of Load Cell Is Non-Linear

Potential Root Cause:

- Excessive load was applied causing plastic deformation

CHECK	SOLUTION
• Measure the voltage output between –OUT and +OUT of the load cell using 10V supply at the +EXC and -EXC leads.	• If zero balance continues to drift with each sequential load or is unstable, part was excessively deformed and cannot be repaired. • Contact and return for additional analysis.

APPLICATION TROUBLESHOOTING

If condition of load cell is found to be performing to required specifications, follow instructions below to identify and repair potential issue with the extended load cell assembly.

POTENTIAL CONDITIONS

1. Zero Balance is out of specification
2. Unstable zero balance
3. Zero balance output measures volts instead of millivolts
4. Output does not change with load
5. Output at rated load is out of specification
6. Performance of load cell is non-linear

1. Zero Balance is out of specification

Potential Root Cause:

- A pre-load is being applied from the extended assembly.

CHECK
• Check assembly for interference of components. • Ensure weight of assembly is account for in load cell output. • Ensure torque applied at bolts/screws does not exceed SMD's recommended torque

2. Unstable Zero Balance

Potential Root Cause:

- The extended assembly is unstable or vibrating.
- Electrical noise is being introduced into the output via grounding issues.
- Intermittent, open, or shorted connection at lead outs.

CHECK
• Ensure the extended assembly is stable and adequately secured. • Ensure the load cell is properly grounded. • Perform continuity check on the load cell cable for open or short circuits. Check cable integrity from sensor by moving the cable and monitoring output.

3. Zero Balance Measures Volts Instead Of Millivolts

Potential Root Cause:

- Improper wiring of the load cell to the system.
- Intermittent, open, or shorted connection at lead outs.

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CHECK
• Ensuring load cell wiring schematic matches expected input of the system. • Perform continuity check on the load cell cable for open or short circuits. Check cable integrity from sensor by moving the cable and monitoring output. • Measure resistance across input leads (+EXC and -EXC) and output leads (+OUT and -OUT) for open or short circuit.

4. Output Does Not Change With Load

Potential Root Cause:

- An excessive pre-load is being applied causing the load cell to prematurely hit the overload stop
- Improper wiring of the load cell to the system
- Intermittent, open, or shorted connection at lead outs.
- Extended assembly is fixed and does not allow the load cell to deflect with load.

CHECK
• Ensure there is adequate clearance between the load cell and the next assembly including space below and to the side of the sensor. • Ensure that the fixturing does not excessively deflect under load. • Ensuring load cell wiring schematic matches expected input of the system. • Perform continuity check on the load cell cable for open or short circuits. Check cable integrity from sensor by moving the cable and monitoring output. • Ensure extended assembly is free to move when loaded.

5. Output At Full Scale Is Out Of Specification

Potential Root Cause:

- An excessive pre-load is being applied causing the load cell to prematurely hit the overload stop
- Load cell is load sharing with the extended assembly.
- Load cell is inadequately supported causing the mechanical ground to deflect under load.

- Extended assembly does not allow the load cell to fully deflect with the full scale load applied.

CHECK
• Ensure there is adequate clearance between the load cell and the next assembly including space below and to the side of the sensor. • Ensure the extended assembly does not contact anything during the full range of motion of the load cell. • Ensure extended assembly provides adequate support during loading.

6. Output At Full Scale Is Out Of Specification

Potential Root Cause:

- An excessive pre-load is being applied causing the load cell to prematurely hit the overload stop
- Load cell is load sharing with the extended assembly.
- Load cell is inadequately supported causing the mechanical ground to deflect under load.
- Extended assembly does not allow the load cell to fully deflect with the full scale load applied.

CHECK
• Ensure there is adequate clearance between the load cell and the next assembly including space below and to the side of the sensor. • Ensure the extended assembly does not contact anything during the full range of motion of the load cell. • Ensure extended assembly provides adequate support during loading.