



DTC P0A9C - Battery Thermistor Fault

Orion Product	Fault Supported
Orion BMS [Original] (24 - 180 Cell)	YES
Orion BMS 2 (24 - 180 Cell)	YES
Orion JR (16 Cell)	YES

FAULT DESCRIPTION

A thermistor fault is triggered detected if the analog voltage measured from the battery thermistor is outside of the normal thermal operating range. This error can be triggered if the temperature of the thermistor rises above 85C or drops lower than -40C. A shorted or open wire can result in artificially high or low measurements that would result in this error code. Additionally the use of an incompatible thermistor can cause inaccurate readings and trigger this error code.

Fault Code	Fault Description	Possible Trouble Area
P0A9C: Subcode 1-8	One or more thermistors are in fault state (the subcode indicates which thermistor ID)	<ul style="list-style-type: none"> • Thermistor Wire Assembly • Configuration Settings
P0A9C: Subcode 100 - 10A	CANBUS communication was lost with an enabled external Thermistor Expansion Module (TEM).	<ul style="list-style-type: none"> • Thermistor Expansion Module • CANBUS Wiring or Baud-rate • Configuration Settings (On BMS or Thermistor Expansion Module)

P0A9C: Subcode 300 - 30A	A thermistor fault was detected on external Thermistor Expansion Module (TEM).	<ul style="list-style-type: none"> • Thermistor Expansion Module Thermistor Wiring • Configuration Settings (Thermistor Expansion Module)
P0A9C: Subcode 1000	An internal error occurred in the thermistor processing logic onboard the BMS.	<ul style="list-style-type: none"> • Internal BMS Fault • Configuration Settings

FAULT BEHAVIOR

This fault is **Primarily Informational**, however if a particular thermistor does generate a fault, the BMS will ignore that thermistor until the fault is cleared or the BMS is power cycled.

FAULT THRESHOLDS

Fault will trigger when ONE of the following conditions are satisfied	(a) OR (b) OR (c) OR (d)
(a) One or more populated thermistors is in an error state	If a thermistor is reading an invalid value (greater than 85C or less than -40C) for more than 2 seconds this will trigger a Thermistor Fault for it and the BMS will ignore that particular thermistor.
(b) A communication timeout with an external Thermistor Expansion Module	If the BMS loses CANBUS communications with an external Thermistor Expansion Module that it is expecting this will trigger a Thermistor Fault.

<p>(c) One or more thermistors loaded on an external Thermistor Expansion Module is in an error state</p>	<p>If a thermistor loaded on an external Thermistor Expansion Module is reading an invalid value (greater than 85C or less than -40C) this will trigger a Thermistor Fault.</p>
<p>(d) An internal processing (logic) error in the thermistor calculation software</p>	<p>If an internal logic processing fault occurs in the thermistor measurement handler this will trigger a Thermistor Fault.</p>

DIAGNOSTIC STEPS

<p>1.</p>	<p>Determine if the BMS should have the faulted thermistor loaded.</p> <p>If the application does not have the faulted thermistor actually connected to the BMS (it is not loaded) yet it is populated (enabled) in the BMS settings, then the BMS will continue to throw a fault. In this situation the thermistor should be disabled in the BMS profile settings (on the "Thermal Settings" tab for the Orion Standard and the "General Settings" tab for the Orion JR).</p> <p>If the fault is related to an external Thermistor Expansion Module, verify that the external Thermistor Expansion Module is intact connected and present. If it is not available in the application then it can be disabled in the BMS profile settings (under "Addon Settings").</p>
<p>2.</p>	<p>Verify thermistor connector is plugged in.</p> <p>If the thermistor connector was not inserted into the BMS when it was powered up this will cause a Thermistor Fault. Make sure that the thermistor connector is securely plugged in and try clearing the error codes or restart the BMS to see if the fault codes return. If so, continue to the next step.</p>
<p>3.</p>	<p>Download the freeze frame for the fault code using the BMS Utility.</p> <p>The BMS will normally produce a freeze frame on the "Diagnostic Trouble Codes" screen in the BMS Utility when this fault code occurs that contains a comprehensive list of BMS data parameters at the time the fault occurred. It is strongly recommended that the freeze frame be downloaded from the BMS and saved to disk before the fault is cleared again as this data may assist in the future if further diagnostics are required. <u>Additionally this freeze</u></p>

	<p><u>frame data may be requested by Technical Support if further assistance is required.</u></p> <p>NOTE: Only Fault Codes with a (F) next to them have freeze frame data available for download. If there is no (F) next to the fault, there is no stored freeze frame available and this step can be skipped.</p> <p>Steps to download the Freeze Frame:</p> <ol style="list-style-type: none"> 1) Connect to the BMS using the Orion BMS utility. 2) Click the "Diagnostic Trouble Codes" tab at the top. 3) Select the correct fault code by clicking on the ID on the left side of the screen to initiate the Freeze Frame retrieval. 4) Once the retrieval process is complete, click the "Export (CSV)" button to save the freeze frame data to the computer disk.
<p>4.</p>	<p>For thermistor faults on the main BMS unit, inspect the thermistor wiring.</p> <p>Carefully inspect the wiring for the identified thermistor.</p> <ol style="list-style-type: none"> 1. Inspect the entire length of cable for the thermistor (both leads) for any signs of breakage, cuts or shorts. Also look for slits in the insulation covering. If either of the thermistor leads are shorting together or potentially shorting to anything else (such as ground) that can completely distort the thermistor value being read. 2. Wiggle the thermistor wiring to see if the problem changes. This can help identify loose or intermittent connections. 3. Verify that the thermistor leads go to the correct thermistor inputs on the BMS itself. 4. Using the Orion BMS utility, go to "Live Text Data" and select "Temperature Parameters" from the drop-down menu at the bottom to see the individual thermistor values reported by the BMS. The displayed temperature value for the faulted thermistor may help diagnose problems further. <ul style="list-style-type: none"> o A value of -41C likely indicates either an open (break) in the line or that it is shorted to the BMS power supply input voltage. o A value of 85C or higher likely indicates that the thermistor lead is likely shorted to ground (the wire could be punctured or pinched by something that is grounded). 5. Using a multimeter, measure the resistance across the thermistor at the connector to the BMS. It should read approximately 10K Ohms at 25 degrees Celsius. A significantly different reading at 25 degrees Celsius could indicate a failure of the thermistor itself or help diagnose a wiring problem.
<p>5.</p>	<p>For Thermistor Expansion Module related faults, inspect the Thermistor Expansion Module connections and wiring.</p>

	<p>Based on which subcode is set, carefully inspect the wiring for the external Thermistor Expansion Module (CANBUS communication wires, power inputs and actual thermistor wiring harnesses).</p> <p>Use the built in Thermistor Expansion Module utility (by clicking the "Expansion Modules" menu item at the top of the Orion BMS utility and then "Thermistor Expansion Utility") to further diagnose any potential issues with the Thermistor Expansion Module itself.</p>
6.	<p>If the problem persists, contact technical support.</p> <p>If all above steps fail to determine the cause of the fault then additional support is needed.</p> <p>Please contact the company or reseller that the BMS was originally purchased from for additional questions, warranty claims, repair requests and technical support.</p>