Scope

ATevo Battery Charger alarms that appear via front panel display, front panel LEDs, serial communications (optional), Ethernet communications (optional), and dry alarm relay contacts (optional).

Summary

Find any ATevo alarm or status message you see with Table 1: Alarm & Message Lookup Table on page 2 and find out:

- What's happening? (Definition of alarm or status message)
- Why did it happen? (Probable causes for alarm or additional explanation)
- How do I fix it? = (Recommended action(s) for alarm)

A quick overview of how alarms are indicated on the front panel is shown in Figure 1 below. If you want to know how ATevo's alarm system works in detail, see How Alarms Work (page 27).

Figure 1 – Overview of How ATevo Alarms Are Indicated on Front Panel

Alarm & Status Message Lookup

Use the Links (or page numbers) in Table 1: Alarm & Message Lookup Table on the next page to go directly to information about any alarm in Table 2 or status message in Table 3.

Table 1: Alarm Lookup Table

For information about:

- ATevo Alarms, see Table 2 which begins on page 3.

  ATevo Status Messages, see Table 3 which begins on page 25.

Table 2: ATevo Alarms

AC meter fail	What's happening? AC metering option installed is malfunctioning. Why did it happen? A. AC metering board has failed and stopped communicating with Main Control Board (A1). How do I fix it? A. Replace ac metering board.
Ambient temp probe fail	What's happening? Ambient temperature sensor on Main Control Board (A1) has failed and is no longer reporting ambient temperature. Why did it happen? A. Temperature sensor on main control board failed. • This alarm will not affect charger operation. How do I fix it? A. Reset charger. If alarm is no longer present, contact manufacturer for firmware update. If alarm returns, replace Main Control Board (A1).
Analog sampling fault [4]	What's happening? Internal error indicating an analog sampling failure. Why did it happen? A. Static or electrical discharge. • Alarm is logged before resetting charger. Protects against failure caused by static discharge. • Since this alarm causes charger to reset, it cannot be assigned to trigger an aggregate alarm, be read through SCADA, or displayed in alarms list. How do I fix it? A. Charger resets to self-repair this issue.
ANX-Y [1]	What's happening? Analog input Y on AUX I/O board X is asserted and triggered alarm. Why did it happen? A. Customer added this alarm input to cause an alarm when an external signal is out of range.

	• Analog input alarms use this default naming scheme but can be configured by user to display a different name (e.g., temperature transducer). • To be triggered, analog inputs must be enabled.
	How do I fix it? A. Locate external source of problem that triggered this alarm.
BIX-Y [1]	What's happening? Binary input Y on AUX I/O board X is asserted and triggered alarm.
	Why did it happen? A. Customer uses binary input to trigger an alarm on a charger from an external device. • Binary input alarms use this default naming scheme but can be configured by user to display a different name (e.g., H2 1%, H2 2%, Charger shutdown). • To be triggered, binary inputs must be enabled.
	How do I fix it? A. Locate source of problem that triggered this alarm.
Battery discharge [1]	What's happening? Battery is discharging.
	Why did it happen? A. Charger is off dc bus or has lost ac power. Battery current meter detects that the batteries are discharging. • Alarm available only if charger employs battery shunt or HH+ sensor options.
	How do I fix it? B. Verify charger is still connected to the dc bus with no open connections (CB2, branch breakers, dc disconnect switch). Verify charger has ac input voltage and that dc output voltage to the batteries is correct.
Battery overtemp [1]	What's happening? Battery temperature has persisted above "Battery overtemp" set point.
	Why did it happen? A. Temperature at batteries has persisted above "Battery Overtemp" setpoint. • Alarm only appears if condition above occurs with one of the following:

	○ TempCo probe must be installed and enabled. ○ HH+ sensor option is installed & connected to a TempCo probe.
	How do I fix it? A. Investigate why the temperature at the batteries has increased beyond the setpoint.
Battery temp probe fail [1]	What's happening? Main Control Board (A1) senses out-of-range value from TempCo probe. Charger will not be able to monitor battery temperature or provide temperature voltage compensation if it is enabled. ATevo will switch to non-temperature-compensated mode and adjust dc output voltage for 25 °C.
	Why did it happen? A. Charger senses that temperature probe failed or is disconnected. • Alarm only appears if condition above occurs with 1 of the following: ○ TempCo probe must be installed and enabled. ○ HH+ sensor option is installed & connected to a TempCo probe.
	How do I fix it? A. Check temperature probe connections. Replace probe if necessary.
Charger off DC bus [1]	What's happening? For charger using HH+ sensor option, this alarm indicates that charger appears to be off DC bus due to a branch breaker open outside of charger itself.
	Why did it happen? A. Charger senses that it is not connected to the dc bus. • Criteria used: battery discharge is detected, charger's dc breaker (CB2) is closed, and ac supply to charger is present.

	How do I fix it? A. Verify that charger is still connected to dc bus with no open connections (CB2, external branch breakers, dc disconnect switch).
COMMON ALARM	What's happening? Aggregate alarm triggered by other active alarms.
	Why did it happen? A. One or more alarms triggered the common alarm relay. • Alarms that trigger this alarm are user configurable in common alarm menu. • Common alarm has a dedicated relay contact on the main control board as well as a dedicated LED on the front panel. • Common alarm is logged but not displayed in the alarms list. Further details about logging of alarms can be found in JD5137-00. • Common alarm cannot be configured to trigger other aggregate alarms.
	How do I fix it? A. Fix the active alarm(s) that triggered the common alarm relay.
DC output failure + DC OUTPUT FAILURE	What's happening? DC output voltage is below setpoint while charger is not in current limit.
	Why did it happen? A. AC input is tapped incorrectly. B. Blown or tripped ac input overcurrent protection device. C. Defective SCR module. D. Defective Main Control Board (A1). E. Defective transformer (T1). F. Defective dc output circuit breaker (CB2).
	How do I fix it? A. Verify ac input tapped correctly. B. Replace blown or reset tripped ac input overcurrent protection device. C. Use a clamp-on ammeter to measure ac current in wires X1 and X4 between T1 and rectifier. If it is less than 70% of dc

	output current, one of SCRs or diodes is defective. Replace Rectifier. D. Turn off (open) both front panel circuit breakers. Restart by turning on ac breaker (CB1) before turning on dc breaker (CB2). If dc output voltage and current are normal but DC OUTPUT FAILURE LED is still on, replace Main Control Board (A1). E. Use an ac voltmeter to measure secondary potential from T1-X1 to X4. It is normally 50% to 80% higher than rated dc output voltage. If it is too low, check primary tap wiring. If secondary voltage is 0 Vac, replace main power transformer (T1). F. Shut down ATevo and disconnect battery. Connect a light dc load to ATevo and turn on (close) dc circuit breaker (CB2). Measure voltage between input and output terminals of dc breaker. It is normally no more than 50 millivolts. If near rated dc output voltage, replace dc output circuit breaker (CB2).
DC short circuit	What's happening? Charger is in current limit and dc output voltage is less than 20% of setpoint.
	Why did it happen? A. Charger has excessive load that appears to be a short circuit.
	How do I fix it? A. Investigate dc bus for excessive loads.
DC supply failure	What's happening? Main Control Board (A1) is not sensing power from the charger's dc voltage source, an internal DC-to-DC Converter that supplies power to the charger electronics from the battery on the dc bus. • Charger will continue to operate and charge batteries as usual despite this failure. • If there is a dc supply failure, however, the charger will shut down when there is no ac power.
	Why did it happen? A. Failure of DC-to-DC Converter.
	How do I fix it? A. De-energize charger and check that DC-to-DC Converter is fully seated on Power Board (A2). If this does not resolve alarm, replace DC-to-DC Converter.

End of discharge	What's happening? DC bus voltage sensed by the Main Control Board (A1) is lower than End of Discharge Alarm set point. • Further battery discharge beyond this manufacturer-specified limit may damage the battery.
	Why did it happen? A. Alarm is activated when dc bus voltage sensed by Main Control Board (A1) is lower than End of Discharge Alarm set point.
	How do I fix it? A. Review Alarm List on charger to identify why charger is not providing necessary voltage to maintain dc bus voltage at required level. Troubleshoot according to alarms detected.
Excessive ripple	What's happening? AC ripple voltage measured by Main Control Board (A1) is higher than "Ripple alarm" set point.
	Why did it happen? A. Battery is disconnected or defective. B. Battery too small for charger dc current rating. C. External device(s) such as an inverter may be source of ripple. D. One or more defective dc filter capacitors. • Refer to JD5013-00. • Ripple alarm setpoint is adjustable from 50 to 500 millivolts.
	How do I fix it? A. Confirm battery, which lowers ripple, is connected. Inspect battery according to manufacturer's instructions. B. Measure ripple voltage on dc output and compare value against specification for your ATevo model. Listed ripple rating is for a battery ampere-hour rating which is four (4) times the charger ampere rating. For a smaller battery, ripple may be higher. C. Turn off inverter (if present); see if ripple is now in range. D. Shut down ATevo and wait several minutes to allow capacitors to discharge. Open ATevo and locate blue cylindrical electrolytic filter caps. Test each with a capacitance meter. Replace dc filter capacitors (C1 and/or C2) as needed.
HLD potentiometer fail	What's happening? Device that controls hardware setpoints for High Level Detect, Low Level Detect, and HLD Shutdown failed.
	Why did it happen? A. Main control board experienced a hardware failure.

	• This alarm will not affect charger operation; however, it will not be able to detect a high-level or low-level alarm.
	How do I fix it? A. Replace Main Control Board (A1).
HLD shutdown	What's happening? Charger's dc output has been shut down by "High level detect" hardware circuit which is independent of microprocessor control.
	Why did it happen? A. Float/Equalize Voltage setpoint is higher than High Level Detect setpoint, which triggered this shutdown. B. Charger is experiencing a failure that is causing high voltage, triggering this shutdown. • This alarm (and charger shutdown) will only occur if "HIGH LEVEL DETECT SHUTDOWN" jumper (located on back of Main Control Board (A1) is in "EN" position while a "High level detect" alarm is active. • This alarm is latching. It can only be cleared (and charger's dc output resumed) by resetting charger through power cycle or by pressing reset button on Main Control Board (A1).
	How do I fix it? A. Increase High Level Detect setpoint (in Advanced Settings) to be higher than Float/Equalize Voltage setpoint (in Basic Settings). B. Review Alarm List on charger to identify why charger is producing a dc output voltage higher than HLD setpoint. Troubleshoot according to alarms detected.
HVDC shutdown	What's happening? Charger's dc output has been shut down by software due to high voltage dc persisting for 30 seconds or more.
	Why did it happen? A. Equalize Voltage setpoint is higher than High DC Alarm setpoint, which triggered this shutdown. B. Charger is experiencing a failure that is causing high voltage, triggering this shutdown. • This alarm (and charger shutdown) will only occur if "HVDC shutdown" setting is "enabled" while a "High DC voltage" alarm is also active.

	How do I fix it? A. Increase High DC Alarm setpoint (in Basic Settings) to be higher than Equalize Voltage setpoint (in Basic Settings). B. Review Alarm List on charger to identify why charger is producing a dc output voltage higher than High DC Alarm setpoint. Troubleshoot according to alarms detected.
HH+ sensor fail [1]	What's happening? Can only be generated on a charger using an HH+ sensor. Active when HH+ fails to answer Modbus polls by the charger.
	Why did it happen? A. Interconnecting cable between charger and HH+ sensor is open or wired incorrectly. B. HH+ Serial Communications Board (EN5063) in charger has failed. C. HH+ Control Board (EN5066) has failed. • Charger must have discovered HH+ device for alarm to activate. Enabling "Modbus Mstr" in "Communications" menu alone will not cause alarm to occur if HH+ sensor has never been discovered. • Will persist if HH+ sensor was discovered then subsequently removed from DC system. Can be cleared in this case by selecting "Forget HH+ sensor" in "Administer Battery History" menu.
	How do I fix it? A. Verify communication cable from charger to HH+ sensor is properly connected. B. Check LEDs on HH+ Serial Communications Board (EN5063) in charger. Contact factory for replacement If needed. C. Check LEDs on HH+ Control Board (EN5066). Contact factory for replacement If needed.
HH+ Vbat probe err [1]	What's happening? Can only be generated on a charger using a HH+ sensor. Active when charger detects that HH+ sensor Vbat + probe is not connected to positive battery terminal.
	Why did it happen? A. Interconnecting wire between HH+ and Batt(+) is disconnected.

	How do I fix it? A. Check this wire for continuity between HH+ and Batt(+).
High DC voltage + HIGH DC VOLTAGE	What's happening? DC voltage is higher than "High DC Alarm" setpoint.
	Why did it happen? A. HVDC alarm and Equalize voltage settings are mismatched. B. Defective SCR module. C. Defective Main Control Board (A1).
	How do I fix it? A. Confirm High DC Voltage alarm setting is higher than Equalize voltage setting. B. Disconnect ribbon cable(s) from Main Control Board (A1). Restart ATevo. If you measure dc output voltage, SCR module (A16) is defective. Replace Rectifier. C. Turn off (open) both front panel breakers. Turn on ac breaker (CB1) first, followed by ac breaker (CB2). If charger's dc output voltage is normal, but HIGH DC VOLTAGE indicator is still on, replace Main Control Board (A1).
High Level Detect	What's happening? High dc output voltage detected by independent hardware circuit that does not depend on microprocessor control.
	Why did it happen? A. High Level Detect and Equalize voltage settings are mismatched. B. Defective Main Control Board (A1). C. Defective ribbon cable. D. Defective Rectifier.
	How do I fix it? A. Confirm High Level Detect and Equalize voltage settings are mismatched. B. Turn off (open) both front panel breakers. Turn on ac breaker (CB1) first, followed by dc breaker (CB2). If charger's dc output voltage is normal, but High Level Detect alarm is still on, replace Main Control Board (A1). C. Replace ribbon cable(s).

	D. Disconnect ribbon cable(s) from Main Control Board (A1). Restart ATevo. If you measure dc output current, replace Rectifier.
High priority alarm	What's happening? Aggregate alarm triggered by other active alarms.
	Why did it happen? A. Another alarm triggered it. • Alarms that trigger this alarm are user configurable in High Priority Alarm menu. • It cannot be configured to trigger other aggregate alarms. • This alarm is logged but not displayed in charger's alarms list because only the alarm(s) that triggered the high priority alarm is displayed.
	How do I fix it? A. Take corrective actions necessary to clear active alarm(s) that triggered the high priority alarm.
Loadshare comm failure[1]	What's happening? Communication between chargers configured to share load has failed.
	Why did it happen? A. Cable that connects the two chargers for load sharing has an open or mis-wired connection. B. Secondary charger in parallel with primary charger is off.
	How do I fix it? A. Check wiring at EN5034-00 serial communications board on both chargers, make sure it matches per JA5054-50 Installation & Operating Instruction. B. Turn on charger in parallel that will be sharing the load. If parallel charger cannot be turned on, disable Forced Load Sharing protocol in Communications submenu.
Loadshare not ready [1]	What's happening? Primary charger cannot share load with a secondary charger. Alarm can only occur on primary charger in load share configuration.
	Why did it happen? A. Because one of the following alarms is active in either charger: • NO AC input. • High DC voltage. • High level detect. • HLD shutdown. • HVDC shutdown.

	• Low AC shutdown. • Low AC supply. • Open DC breaker. • Open AC breaker. • Shutdown commanded by binary input.
	How do I fix it? A. Check if one of the alarms above is active on either charger; if so, troubleshoot according to details for that alarm found in this table.
Low AC shutdown + AC INPUT FAILURE	What's happening? Charger's dc output is shut down.
	Why did it happen? A. AC input voltage is less than 65% of nominal ac input rating. B. AC input is tapped incorrectly.
	How do I fix it? A. Check ac supply is present at charger input terminals and greater than 65% of nominal ac input rating. B. Verify ac input is tapped correctly. • Do not confuse this with Low AC supply or No AC Input alarms.
Low AC supply + AC INPUT FAILURE	What's happening? AC input voltage is less than 75% of the nominal ac input rating. Charger will remain on but will not be able to meet its demands.
	Why did it happen? A. AC supply is not present at charger input terminals or is not supplying greater than 75% of nominal ac input rating. B. AC input is tapped incorrectly. C. Loose wire connection in ac supply feed.
	How do I fix it? A. Check ac supply is present at charger input terminals and greater than 75% of nominal ac input rating. B. Verify ac input is tapped correctly. C. Tighten loose ac supply feed wire(s). • Do not confuse this with Low AC shutdown or No AC Input alarms.
Low DC voltage + Low DC Voltage	What's happening? DC voltage is lower than "Low DC Alarm" setpoint.
	Why did it happen?

	A. Battery is discharged. B. Low DC voltage and Float voltage settings are mismatched. C. Defective SCR module. D. Defective Main Control Board (A1). E. Defective dc output circuit breaker (CB2).
	How do I fix it? A. After an ac power failure, or battery discharge for any reason, it may take several hours to recharge battery. It is normal for this alarm to be on until battery voltage is above Low DC Alarm setting. B. Make sure Low DC voltage alarm setting is lower than Float voltage setting. C. Use a clamp-on ammeter to measure ac current in wires X1 and X4 between T1 and rectifier. If it is less than 70% of dc output current, one of SCRs or diodes is defective. Replace Rectifier. D. Turn off (open) both front panel circuit breakers. Restart by: Turning on ac breaker (CB1); Turning on dc breaker (CB2). If dc output voltage is normal but Low DC Voltage LED is still on, replace Main Control Board (A1). E. Shut down ATevo and disconnect battery. Connect a light dc load to ATevo and turn on (close) dc circuit breaker (CB2). Measure voltage between input and output terminals of dc breaker. It is normally no more than 50 millivolts. If it is near rated dc output voltage, replace dc output circuit breaker (CB2).
Low Level Detect	What's happening? Low DC output voltage detected by independent hardware circuit that does not depend on microprocessor control.
	Why did it happen? A. DC voltage is lower than set point. B. Low Level Detect alarm and Float voltage settings are mismatched. C. Defective Main Control Board (A1). D. Defective ribbon cable. E. Defective Power Board (A2), which may be attached to Rectifier.
	How do I fix it? A. Refer to "How do I fix it?" for Low DC Voltage. B. Confirm Low Level Detect Alarm and Float voltage settings are mismatched.

	C. Turn off (open) both front panel breakers. Turn on ac breaker (CB1) first, followed by dc breaker (CB2). If charger's dc output voltage is normal, but Low Level Detect alarm is still on, replace Main Control Board (A1). D. Replace ribbon cable. E. Replace Power Board (A2)
Low priority alarm	What's happening? Aggregate alarm triggered by other active alarms.
	Why did it happen? A. Another alarm in this table triggered it. • Alarms that trigger this alarm are user configurable in the Low Priority Alarm menu. Low priority alarm cannot be configured to trigger other aggregate alarms. • Low priority alarm is logged but not displayed in the alarms list because only the alarm(s) that triggered the low priority alarm will be displayed.
	How do I fix it? A. Take corrective actions necessary to clear active alarm(s) that triggered the low priority alarm.
Main I2C memory fail	What's happening? Memory chip on main board that retains configuration has failed.
	Why did it happen? A. Memory chip on main board that retains configuration has failed.
	How do I fix it? A. Reset charger. If alarm persists, replace Main Control Board (A1). • If settings were backed up on SD memory card, they can be restored after Main Control Board (A1) is replaced.
IMMEDIATE ACTION "Main Processor Failure" (won't show on display because display is dead)	What's happening? Communication between main processor and user interface has failed. • Common alarm relay will close, and all AUX relay contacts will assert in alarm state 12s after main processor fails.
	Why did it happen? A. Main processor failure.
	How do I fix it? A. Replace main processor.

<table>
<tr>
<td rowspan="3">No AC input
+
AC INPUT FAILURE</td>
<td>What's happening?
Loss of AC input source, detected by no zero crossing on ac input. If a 3-phase charger, zero cross can be on one or more phases of the input.
• Active 4s after first detected.</td>
</tr>
<tr>
<td>Why did it happen?
A. Site/installation ac power failure.
B. ATevo's AC breaker is open.
C. Tripped upstream ac distribution breaker and/or fuse.
D. Defective wiring.
E. Defective Main Control Board (A1).</td>
</tr>
<tr>
<td>How do I fix it?
A. Restore site/installation ac power.
B. Close ac input circuit breaker (CB1).
C. Make sure front panel ac input circuit breaker (CB1) is closed. Measure ac voltage across L1 and L2 (User ac input connections). If it is 0 Vac, check upstream ac distribution breakers and/or fuses.
D. Measure ac voltage at the transformer primary taps (T1-H1 and T1-H5). It should be same as ac input supply voltage.
E. Turn off (open) both front panel circuit breakers. Restart by turning on ac breaker (CB1) first, then dc breaker (CB2). If AC ON and AC INPUT FAILURE indicators are still on, replace Main Control Board (A1).
• Do not confuse this with Low AC Supply or Low AC shutdown alarms.</td>
</tr>
<tr>
<td rowspan="2">Neg gnd fault critical [2]
+
NEGATIVE (-) GROUND
or
Neg gnd fault warning</td>
<td>What's happening?
Critical ground fault condition:
• Impedance between negative leg and ground is less than the "Ground fault crit" or the "Ground fault warn" setpoint.
• Neg gnd fault warning alarm may appear in advance of this alarm but will not illuminate front panel LED.</td>
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<tr>
<td>Why did it happen?
A. External ground fault on dc bus.
B. DC output circuit breaker (CB2) is open and POS NEG indicator is on.
C. Alarm setpoint may be too high.
D. Defective internal charger wiring.
E. Defective Main Control Board (A1).
F. Paralleled ATevos are shut down.
G. Charger may be detecting other 3rd party ground-fault-detection devices (Refer to JD5032-00).</td>
</tr>
</table>

	How do I fix it? A. ATevo is functioning properly! ☺ It has correctly detected a site ground fault external to the charger. Shut down and disconnect ATevo from battery and dc bus. Isolate battery, loads, and any other components on dc bus. Check each component individually for possible ground faults. Refer to Application Note JD5032-00 for assistance. B. If ATevo has been placed into "standby" by opening dc breaker (CB2), ground detection circuit supplies an erroneous alarm. This is an abnormal condition and is not recommended. Close dc breaker (CB2) and alarm should end. To place ATevo in "standby", open both front panel circuit breakers (CB1/CB2). C. Reset ATevo's ground fault detection sensitivity using Ground Alarm menu, if necessary. Refer to JA5124-09 for assistance. D. Turn off (open) both front panel circuit breakers. Disconnect ATevo from battery and dc bus. Restart ATevo. Measure voltage from TB1(+) to chassis, and then from TB1(-) to chassis. Voltage readings should be equal, each approximately half of total output voltage (Vdc). If there is more than a 10% imbalance, shut down ATevo. Inspect all wiring from TB1(+/-) to dc circuit breaker (CB2), and from rectifier (A16) to dc filter inductor (L1). Look for evidence of insulation damage, wires run too close to metal edges, or insufficient spacing between terminals and chassis. E. Turn off (open) both front panel circuit breakers. Restart by turning on ac breaker (CB1) first, followed by dc breaker (CB2). If you are sure there is no ground fault on external bus or within ATevo, but NEG (-) GND indicator is still on, replace Main Control Board (A1). F. Restart all other ATevos connected in parallel with unit that is experiencing ground fault alarm. Otherwise, disconnect and lock out from the dc bus all shut down ATevos. G. Ensure only 1 ground-fault-detection device is enabled (refer to JD5032-00).
Open AC breaker [1]	What's happening? Main Control Board (A1) senses AC Input Circuit Breaker (CB1) is open.
	Why did it happen? (If CB1 does not trip): A. AC breaker is open. B. AC breaker aux switch is defective. Why did it happen? (If CB1 trips immediately): C. Shorted rectifier diode or SCR in module. D. Defective transformer. Why did it happen? (If CB1 trips after a few minutes): E. Loose connection to ac breaker.

	F. Wrong ac voltage or T1 taps mis-wired.
	How do I fix it? (if CB1 does not trip) A. Close ac breaker. B. If ac breaker is closed and wiring appears intact, replace auxiliary switch on ac breaker. How do I fix it? (if CB1 trips immediately) C. Turn off and isolate charger. Measure resistance across each ac line, and if a short is found, replace Rectifier. D. Check spacing of terminals. Check wiring for signs of insulation damage, burns, etc. Repair as necessary. If breaker still trips, disconnect secondary leads X1 and X4 from Power Board and measure ac input current to transformer. How do I fix it? (if CB1 trips after a few minutes) E. Check wiring connections to ac input circuit breaker (CB1). Tighten as required. F. Check ac input source voltage at charger and compare to T1 taps. Correct if needed.
Open battery	What's happening? Battery is not present in DC system. Alarm is triggered by different means depending on if HH+ sensor option is installed and used or not. A. If HH+ Sensor option is not installed: Detected by failure of ATevo's manual battery open test, or ATevo's periodic battery open test based on "Battery Open Test" settings. o Test lowers charger voltage and verifies whether battery can assume present dc load. o Test fails and alarm generated if dc bus drops below a configurable voltage set point. B. If HH+ Sensor Option is installed: o HH+ sensor continuously monitors battery current to determine if battery is present.
	Why did it happen? A. Charger detects battery is not present at battery shunt. B. Charger detects battery is not present at HH+ Sensor.
	How do I fix it? A. Verify battery is connected to battery shunt. B. Verify battery is connected to HH+ sensor.
Open DC breaker	What's happening? Main Control Board (A1) senses open DC Output Circuit Breaker (CB2).
	Why did it happen? (if CB2 does not trip)

	A. DC breaker is open. B. DC breaker aux switch wiring is disconnected. C. DC breaker aux switch is defective. Why did it happen? (if CB2 trips immediately) D. Battery connected with reverse polarity. E. Defective polarity diode. F. Defective wiring. Why did it happen? (if CB2 trips after a few minutes) G. Loose connection to breaker. H. SCR not controllable.
	How do I fix it? (if CB2 does not trip) A. Close dc breaker. B. Inspect signal wires 46 and 48 from dc breaker to Rectifier. If disconnected, reconnect these wires. C. If dc breaker is closed and wiring appears intact, replace auxiliary switch on dc breaker. How do I fix it? (if CB2 trips immediately) D. Check battery wiring. Correct if necessary. If dc breaker continues to trip, reverse polarity diode was damaged from reverse battery connections. E. If batteries were connected to charger with reverse polarity and breaker continues to trip after this has been corrected, then polarity diode is shorted. Replace Rectifier. F. Check spacing of terminals. Check wiring for signs of insulation damage, burns, etc. Repair as necessary. How do I fix it? (if CB2 trips after a few minutes) G. Check wiring connections to dc output circuit breaker (CB2). Tighten as required. H. Disconnect ribbon cable(s) from Main Control Board (A1). Restart ATevo. If you measure dc output voltage, SCR module is defective. Replace Rectifier.
Open DC output	What's happening? Charger internal failure.
	Why did it happen? A. Open inductor L1. B. Open inductor L2. C. Open wiring between L1 and L2. D. Defective Power Board (which may be attached to Rectifier)
	How do I fix it? A. Measure resistance between L1-1 and L1-2 on Power Board (A2). Tighten loose connections. If there is an open circuit, replace inductor L1.

	B. Measure resistance between L2-1 and L2-2 on Power Board (A2). Tighten loose connections. If there is an open circuit, replace inductor L2. C. Measure resistance between L1-2 and L2-1 on Power Board (A2). Tighten loose connections. If there is an open circuit, replace Power Board (A2). D. If there are no open connections in steps A-C, a component in the feedback circuit on Power Board (A2) has failed. Replace Power Board (A2).
Open external feedback	What's happening? Main Control Board (A1) senses that Vext, the voltage read at the filtered output of the charger, is out of range. • Charger uses analog feedback to regulate DC voltage output to the DC voltage setpoint. DC Analog voltage readings are taken at two points in the charger: Vint and Vext. • Vint is the voltage read before filtering. Vext is the voltage read at the filtered output of the charger. • Vext sensing point is before DC breaker in some chargers, but outside of DC breaker in others. Charger normally regulates DC output to analog value read at Vext, however under certain circumstances it will regulate to value read at Vint.
	Why did it happen? A. Jumper for remote sensing is enabled without remote sense wires. B. Defective Rectifier. C. Defective Main Control Board (A1).
	How do I fix it? A. Check remote sense jumpers and confirm they are set in the correct position. B. Replace Rectifier. C. Replace Main Control Board (A1).
Open internal feedback	What's happening? Main Control Board (A1) senses that Vint, the voltage read before filtering, is out of range. • Charger uses analog feedback to regulate DC voltage output to the DC voltage setpoint. DC Analog voltage readings are taken at two points in the charger: Vint and Vext. • Vint is the voltage read before filtering. Vext is the voltage read at the filtered output of the charger.

	• Vext sensing point is before DC breaker in some chargers, but outside of DC breaker in others. Charger normally regulates DC output to analog value read at Vext, however under certain circumstances it will regulate to value read at Vint.
	Why did it happen? A. Defective Rectifier. B. Defective Main Control Board. • Voltage on internal feedback circuit does not appear to be correct.
	How do I fix it? A. Replace Rectifier. B. Replace Main Control Board (A1).
PBD I2C memory fail	What's happening? Configuration stored on memory chip on Power Board cannot be read by Main Control Board.
	Why did it happen? A. Memory chip on power board that retains configuration has failed. B. Main Control Board or ribbon cable has failed (Rect Temp Sense Fail will also display if this is the cause).
	How do I fix it? A. Replace power board. B. Replace Main Control Board(A1) and/or ribbon cable.
Pos gnd fault critical [2] + POSITIVE (+) GROUND or Pos gnd fault warning [2]	What's happening? Critical ground fault condition: • Impedance between positive leg and ground is less than the "Ground fault crit" or "Ground fault warn" setpoint. • Pos gnd fault warning alarm may appear in advance of this alarm but will not illuminate front panel LED.
	Why did it happen? A. External ground fault on dc bus. B. DC output circuit breaker (CB2) is open and POS GND indicator is on. C. Alarm setpoint may be too high. D. Defective internal charger wiring. E. Defective Main Control Board (A1). F. Paralleled ATevo is shut down. G. Charger may be detecting other 3rd party ground-fault-detection devices (refer to JD5032-00).

	How do I fix it? A. ATevo is functioning properly! ☺ It has correctly detected a site ground fault external to the charger. Shut down and disconnect ATevo from battery and dc bus. Isolate battery, loads, and any other components on the dc bus. Check each component individually for possible ground faults. Refer to Application Note (JD5032-00) for assistance. B. If ATevo has been placed into "standby" by opening dc breaker (CB2), ground detection circuit supplies an erroneous alarm. This is an abnormal condition and is not recommended. Close dc breaker (CB2) and alarm should end. To place ATevo in "standby", open both front panel circuit breakers (CB1/CB2). C. Reset ATevo's ground fault detection sensitivity using Ground Alarm menu, if necessary. Refer to (JA5124-09) for assistance. D. Turn off (open) both front panel circuit breakers. Disconnect ATevo from battery and dc bus. Restart ATevo. Measure voltage from TB1(+) to chassis, and then from TB1(-) to chassis. Voltage readings should be equal, each approximately half of total output voltage (Vdc). If there is more than a 10% imbalance, shut down ATevo. Inspect all wiring from TB1(+/-) to dc circuit breaker (CB2), and from rectifier (A16) to dc filter inductor (L1). Look for evidence of insulation damage, wires run too close to metal edges, or insufficient spacing between terminals and chassis. E. Turn off (open) both front panel circuit breakers. Restart by turning on ac breaker (CB1) first, followed by dc breaker (CB2). If you are sure there is no ground fault on external bus or within ATevo, but POS (+) GND indicator is still on, replace Main Control Board (A1). F. Restart all other ATevos connected in parallel with unit that is experiencing ground fault alarm. Otherwise, disconnect and lock out from the dc bus all shut down ATevos. G. Ensure only 1 ground-fault-detection device is enabled (refer to JD5032-00).
Rectifier temp sense fail	What's happening? Rectifier temperature sensor is no longer reporting rectifier temperature.
	Why did it happen? A. Temperature sensor on Rectifier has failed.
	How do I fix it? A. Replace Rectifier.

Rectifier over temp	What's happening? One or more rectifier temperature sensors is reading a temperature greater than rectifiers can tolerate. Why did it happen? A. One or more SCRs are hot. B. Fan failed (on fan-cooled charger). C. Vent(s) obstructed. D. High ambient temperature. How do I fix it? A. Replace Rectifier. B. Repair or replace fan. C. Clear vent(s). D. Install air conditioning.
Relay failure [1]	What's happening? Relay state feedback does not match relay state. Why did it happen? A. Defective relay on board. B. Defective feedback circuit. How do I fix it? A. Replace Auxiliary Alarm Board or Main Control Board (A1), depending on which relay is defective. B. Replace Auxiliary Alarm Board or Main Control Board (A1), depending on which feedback circuit is defective.
IMMEDIATE ACTION "UI processor failure" (won't show on display because display is dead)	What's happening? Main processor can no longer communicate with UI processor and assumes that it failed. • Hindle Health "Immediate Action" red LED blinks on front panel, but alarm will not appear on UI display. • Can trigger common alarm and be reported through SCADA. Why did it happen? A. UI processor failure.

	How do I fix it? A. Replace Main Control Board (A1)
Vgnd imbalance critical [2] or Vgnd imbalance warning	What's happening? Indicates a ground fault as a voltage imbalance between dc legs and ground rather than impedance between dc leg and ground. • Generated when voltage imbalance between Gnd and one of dc legs is greater than "Vgnd imbalance crit" or "Vgnd imbalance warning" setpoint.
	Why did it happen? A. Refer to "Pos gnd fault" or Neg gnd fault" section, depending on which fault has triggered this alarm. • Vgnd imbalance warning alarm may appear in advance of Vgnd imbalance critical alarm.
	How do I fix it? A. Refer to JD5032-00.

1 Alarm is related to an optional feature.
2 Ground fault is measured in impedance (ohms). It is adjustable between 1k and 50k ohms.
3 Vgnd (voltage ground) imbalance is measured in volts. Adjustable range is based on dc output of charger.
4 Alarm is not configurable to activate a relay.
5 Not logged

Table 3: ATevo Status Messages

What you'll see	Answers to Status Message Questions
AC loss, auto equalize [4]	What's happening? Equalize charge mode was triggered automatically when ac power was restored after loss of ac power for a time period exceeding the "Auto equalize after" setpoint. • This event is monitored the same way as alarms but is only logged. Common alarm not triggered. • It cannot be assigned as a trigger for aggregated alarms nor is it displayed in the alarms list.
	Why am I seeing this? If the charger loses ac power and Equalize Method is set for "Auto Timed", the charger will operate in Equalize Charge Mode once power is restored.
Current limit	What's happening? Charger's dc output is in current limit.
	Why am I seeing this? When battery isn't fully charged, such as after ac power is restored following a failure, the charger may go into current limit to get the battery back to full charge.
Dynamic current limit	What's happening? Charger's dc output current is actively being reduced to less than "Current Limit" setpoint to lower rectifier temperature to prevent permanent damage/failure to the rectifiers.
	Why am I seeing this? Charger is operating in ambient temperature above 50 °C. • Alarm generated only if "Dynamic current limit" setting is "on". • Dynamic current limit not available on all charger models.
Equalize active	What's happening? Active when charger equalize mode is active.
	Why am I seeing this? Charger mode has been changed to equalize mode – charging the battery at a higher voltage than float voltage – in an attempt to equalize the voltages in all cells making up the battery.

What you'll see	Answers to Status Message Questions
Equalize disabled [4]	What's happening? Equalize mode is locked out, preventing it from being activated.
	Why am I seeing this? Can be triggered by an AUX I/O binary input. • Logged but cannot be configured directly to trigger an alarm. • To do so, use the binary input that triggered this notification to trigger the alarm.
Loadshare indep. Mode [1]	What's happening? Chargers in load share configuration are operating independently.
	Why am I seeing this? Because total load is too light for load to be shared between chargers.
Open battery test [1,5]	What's happening? There are 2 tests for an open battery that can be conducted depending on whether a HindleHealth+ monitor is installed with the charger: • The native Open Battery Test run by ATevo chargers not connected to HH+ can be run manually and/or scheduled periodically. This test lowers the charger voltage to verify whether the battery can assume the present dc load. • If a HindleHealth+ monitor is connected to an ATevo, then the native ATevo Open Battery test will be disabled. The HH+ will monitor Float Current continually, and if it drops below the threshold value, it will conduct an Open Battery test. The HH+ Open Battery test determines if the battery is connected by monitoring current flow into/out of a shunt, which shows that the battery is charging/discharging. If zero shunt current is found, the battery is not connected to ATevo.
	Why am I seeing this? To be aware that open battery condition is being monitored continuously.

1 Alarm is related to an optional feature.
2 Ground fault is measured in impedance (ohms). It is adjustable between 1k and 50k ohms.
3 Vgnd (voltage ground) imbalance is measured in volts. Adjustable range is based on dc output of charger.
4 Alarm is not configurable to activate a relay.
5 Not logged.

How Alarms Work

The ATevo Battery Charger monitors a variety of conditions in the charger and the dc system. When an alarm related to one of these monitored conditions becomes active, the user should take action to determine the cause of the alarm and correct it if necessary. Each alarm, when it is active, will appear on the display. Most also will appear in the Alarms list that displays when the Alarms button is pressed, can be configured, and will be logged. Additionally, ATevo provides strong attention activators – solid red LEDs, a blinking red LED, and more – to help ensure that users notice alarms – especially higher priority conditions.

Hindle Health Status Indicators

It's easy to tell when ATevo is performing as it should. No red alarm LEDs will appear on the front panel face, and the solid green LED indicator labeled "Healthy Operation" will be illuminated (Figure 2A). When the red LED is illuminated it indicates "Action Required," and when it blinks it indicates "Immediate Action" is required (Figure 2B). Details on how alarms activate Hindle Health (HH) status indicators are provided later.

Figure 2A – Status LED for Healthy Operation

Figure 2B – Status LED for Action Required

Standard Alarms (IEEE Standard 2405 which replaces NEMA-PE5) with Front Panel LED Indicators

Six (6) individual alarms have become standard alarms for all chargers based on IEEE Standard 2405.2022. These six alarms – listed in Table 4 and pictured in Figure 3 (see next page) – all have dedicated solid red LED lights on the right side of the charger's front panel. Generally, these conditions are serious, requiring prompt attention. By default, when any of these alarms are active, the Common Alarm LED, which is located on the front panel below the 6 individual alarm LEDs, will also illuminate. That is because these individual alarms are set by default to be members of the "common alarm" aggregate alarm which triggers the common alarm relay and

common alarm LED. The common alarm configuration can be changed by the user, if desired. Aggregate alarms such as the common alarm are discussed in more detail below.

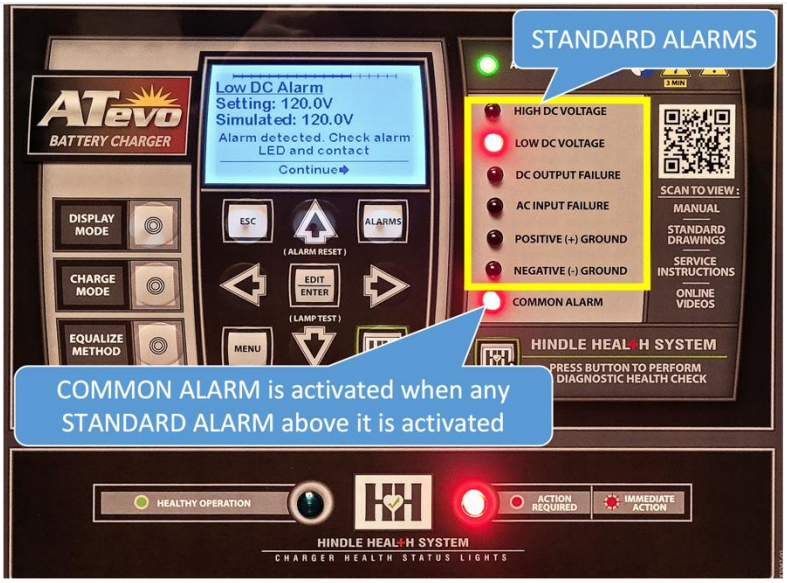

Table 4: Standard Alarms with Front Panel LED Indicators

- High DC voltage (p.11)
- Low DC Voltage (p.13)
- DC output failure (p.6)
- AC input failure (p.13, p.13, p.16)
- Positive (+) Ground (p.21)
- Negative (-) Ground (p.16)

Figure 3 – Standard (Legacy) Alarms & Common Alarm

Aggregate Alarms - Overview

Aggregate alarms are alarms that are triggered when any member of the aggregate, or grouping of alarms, is active. Aggregate alarms are another way ATevo can provide enhanced alerts for conditions the user considers to be high priority.

ATevo has 3 aggregate alarms that can be configured via the Alarm Triggers menu either via the front panel or from a desktop interface via an optional Ethernet connection. These aggregate alarms are logged, but not displayed in the alarms list:

- Common – Triggers the common alarm relay and corresponding front panel LED.
- Low Priority – Can be configured to activate a relay on an AUX I/O board. May be read via SCADA when a communications board is installed.
- High Priority – Can be configured to activate a relay on an AUX I/O board. May be read via SCADA when a communications board is installed.

In Figure 4, a view of these 3 configurable aggregate alarms is shown; Figure 4A shows the default configuration while Figure 4B shows a custom configuration where a user has selected fewer alarms per aggregate, reflecting their priorities for notification.

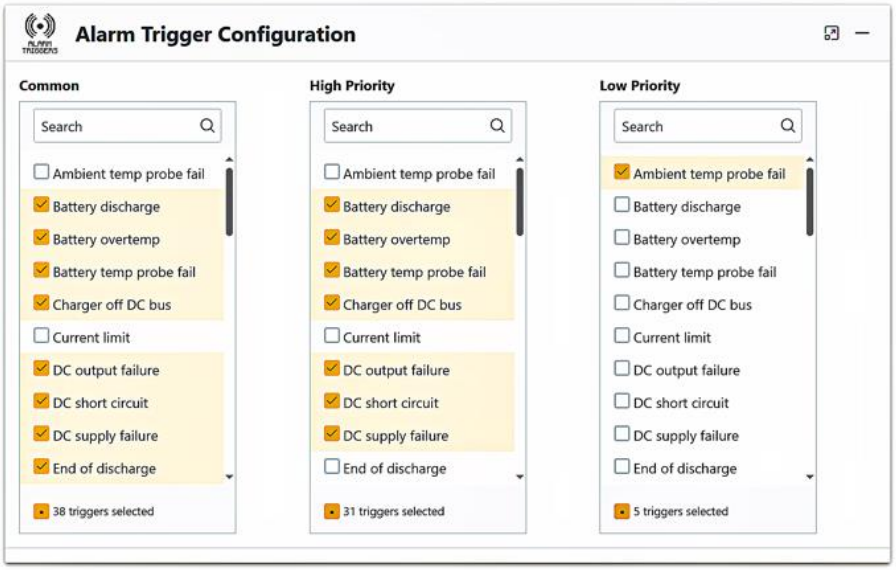

Figure 4A – Default Alarm Configuration

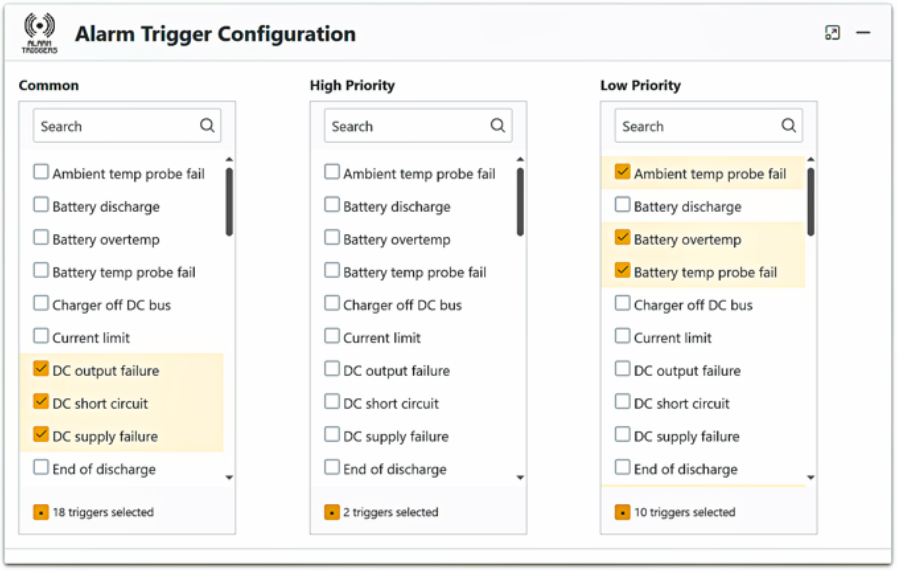

Figure 4B – Example Custom Alarm Configuration

Common Alarm (Aggregate Alarm)

As seen in Table 5, by default, many alarms, known as Advanced Alarms, are set to trigger the common alarm.

Table 5: Default Alarms that Trigger Common Alarm LED

Ambient temp probe fail (p.3)	HLD potentiometer fail (p.8)	Open DC breaker (p.18)
ANX-Y$_1$ (p.3)	HLD shutdown (p.9)	Open DC Output (p.19)
BIX-Y $_1$ (p.4)	HVDC shutdown (p.9)	Open external feedback (p.20)
Battery discharge$_1$ (p.4)	High level detect (p.11)	Open internal feedback (p.20)
Battery overtemp$_1$ (p.4)	Low AC shutdown (p.13)	PBD I2C memory fail (p.21)
Battery temp probe fail$_1$ (p.5)	Low AC supply (p.13)	Rectifier over temp (p.23)
Charger off DC bus$_1$ (p.5)	Low Level Detect (p.14)	Rectifier temp sense fail (p.22)
DC short circuit (p.7)	Main processor failure (p.15)	Relay failure$_1$ (p.23)
DC supply failure (p.7)	Open AC breaker (p.17)	UI Processor Failure (p.23)
End of discharge (p.8)	Open battery$_1$ (p.18)	Vgnd imbalance critical$_3$ (p.24)

1 Alarm is related to an optional feature.
2 Ground fault is measured in impedance (ohms). It is adjustable between 1k and 50k ohms.
3 Vgnd (voltage ground) imbalance is measured in volts. Adjustable range is based on dc output of charger.
4 Alarm is not configurable to activate a relay.
5 Not logged.

As seen in Figure 5, when any of these alarms are active, the Common Alarm LED will illuminate. Most of these alarms will also cause the Hindle Health "Action Required" LED to illuminate; however, several of these will instead cause the "Immediate Action" LED to blink. These alarms will also display on the LCD screen and in the Alarm List and be logged.

Figure 5 – Advanced Alarm That Triggers the Common Alarm

High Priority & Low Priority (Aggregate Alarms)

High Priority and Low Priority aggregate alarms are available through the Alarm Triggers menu as a way for a user to configure groupings of alarms according to their own response priority. Some users configure these alarm groupings to trigger a specific alert mechanism – such as a siren – or to be readable over SCADA. These means of alerts are useful when the user is not nearby the charger and able to see its front panel display or LEDs.

Status Messages

As seen in Table 6, by default, some Advanced Alarms are not set to trigger the common alarm, so they will not illuminate the Common Alarm LED on the front panel or the red Hindle Health Status LED (which are activated by common alarm relay). Many of these, as indicated by a footnote in the table, are not true alarms but instead are Status Messages. These do, however, appear on the LCD display and in the Alarm List, and will be logged.

Table 6: Alarms & Status Messages that DO NOT Trigger Common Alarm LED

AC loss, auto equalize[4,6] (p.25)	Equalize disabled[4,6] (p.26)	Loadshare not ready [1] (p.12)
AC meter fail[1] (p.3)	Excessive ripple (p.8)	Main I2C memory fail (p.15)
Analog sampling fault[4] (p.3)	HH+ sensor fail[1] (p.10)	Neg ground fault warning[2] (p.16)
Current limit[6] (p.25)	HH+ Vbat probe[1] (p.10)	Open battery test active[1,5,6] (p.26)
Dynamic current limit[6] (p.25)	Loadshare comm failure[1] (p.12)	Pos gnd fault warning[2] (p.21)
Equalize active[6] (p.25)	Loadshare indep. mode [1,6] (p.26)	Vgnd imbalance warn [3] (24)

1 Alarm is related to an optional feature.
2 Ground fault is measured in impedance (ohms). It is adjustable between 1k and 50k ohms.
3 Vgnd (voltage ground) imbalance is measured in volts. Adjustable range is based on dc output of charger.
4 Alarm is not configurable to activate a relay.
5 Not logged.
6 Status message. Not an alarm.

With few exceptions, all alarms are logged, readable through SCADA, displayed in the “Alarms” display on the charger front panel, and can be configured to close a relay on the AUX I/O board. Exceptions are noted in the alarm descriptions by footnote.

References

Additional information about ATevo alarms is available from the following sources:

- JA5011-51 – Operations Manual (6-25 Adc, Single Phase Inputs)
- JA5011-52 – Operations Manual (30-100 Adc, Single Phase Inputs)
- JA5011-53 – Operations Manual (All Three Phase Inputs)
- JD5013-01 – Clarifying Ripple Specifications Using IEEE Standard 2405.2022
- JD5032-00 – Ground Fault Detection in the Real World
- JA5124-09 – ATevo Series Battery Charger Everything You Always Wanted to Know About... Grounding
- JD5137-00 – ATevo Event Logging