Hardware Issues Detected

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The device information module performs up to five basic analog input hardware checks when the module loads.

If any of these tests are failing, disconnect all external connections from the device. Exit Kipling, connect the device to your computer using the USB connector, and then re-start Kipling. Then, using the USB connection type, open the device information module again to re-run the test and follow the rest of the steps outlined in the basic troubleshooting section.

T7 Ground Offset Check

1. Remove all connections from the T7 except for USB. This includes ANY and ALL connections to screw terminals or DB15/DB37 ports.
2. Check that you are using current versions of software. Update if needed, and then check that firmware is up-to-date using the Device Updater tab. In fact use the latest beta versions of software and firmware, if any are available, so you are running the same as us.
3. Disconnect & re-connect USB to power-cycle the device.
4. Install a small jumper wire securely from FIO2 to SPC to cause a factory reset on next boot.
5. Disconnect & re-connect USB to power-cycle the device.
6. Remove the FIO2 - SPC jumper.
7. Disconnect & re-connect USB to power-cycle the device.
8. Allow time for the powered device to stabilize at room temperature.
9. Use a DMM to measure the voltage from any VS to any GND and confirm it is 4.75 to 5.25 volts. Note that a conductor (e.g. DMM probe) must be securely clamped in the screw terminal.
10. Open Kipling and connect to the device.
11. Go to the Register Matrix tab and add the following registers: AIN15, AIN15_RANGE, and AIN15_RESOLUTION_INDEX.
12. Leave range set to 0 or 10, which is the default ±10 volt range.
13. Observe the readings from AIN15 with ResIndex=7, and also the reading with ResIndex=11. This is the ground offset and should be -0.002000 to +0.002000 volts. Also confirm the noise level is normal. Most readings (1 standard deviation) should be within 45 and 7.5 microvolts respectively.
14. If either ground reading is outside ±0.002V, initiate a return. Note that this procedure was followed and what values you observed.

What is tested?
Check Cal Constants
This test reads the device's calibration constants and makes sure they are reasonably close to being accurate. This verifies that the calibration constants have not been corrupted and there are no issues communicating to the flash chip. More information about the device's flash chip can be found in the T-Series datasheet in section 20.0 Internal Flash. This test is performed on the T4, T7, and T7-Pro.

AIN15 Noise Check
This test reads AIN15 (see section 14.2 Extended Channels) which is connected the T7's internal GND plane 10 times and verifies that the values aren't static and makes sure the values are within 0.004V of 0V. On the T7, this is only performed at resolution index 1 which tests the high speed ADC. On the T7-Pro, this is performed at resolution index 1 and 9 which tests both the high speed and high resolution ADCs. This test verifies that an analog signal is passing through the negative channel mux chip as well as the rest of the T7’s analog input front-end. This test is not performed on the T4.

Note: Due to the nature of this test, test can potentially return false-positives in cases when the device is connected to external circuitry. Before reporting this issue, disconnect the device from ALL sensors, actuators, or external circuitry, re-start Kipling, and then try opening the device again.

Check Temperature Sensor
This test is performed on the T4, T7, and T7-Pro and simply reads the "TEMPERATURE_DEVICE_K" register and makes sure that it returns a value between -40C and 85C. For the T7 and T7-Pro, this verifies that an analog input signal is passing through the positive channel mux chip as well as the rest of the T7’s analog input front-end. This is true for the T7 because the internal temperature sensor's raw voltage reading is available on AIN14.

AIN14 Noise Check
This test is performed on only the T7 and T7-Pro. It is similar to the temperature sensor test, however this test is performed using resolution indices 1 and 9 testing both the high speed (T7 and T7-Pro) as well as the high resolution (T7-Pro only).

HS/HR Comparison Test
Since the -Pro has 2 different ADCs connected to the same signal chain, their readings can be compared to detect a possible problem. It is possible for 1 converter to be damaged but the other converter and rest of the signal chain to be fine. This test collects data from AIN channels 14 and 15 using resolution indices 7 and 11 and alerts if different by more than 0.004 volts.

Versions of Kipling
Kipling 3.1.13 and later performs the above tests.