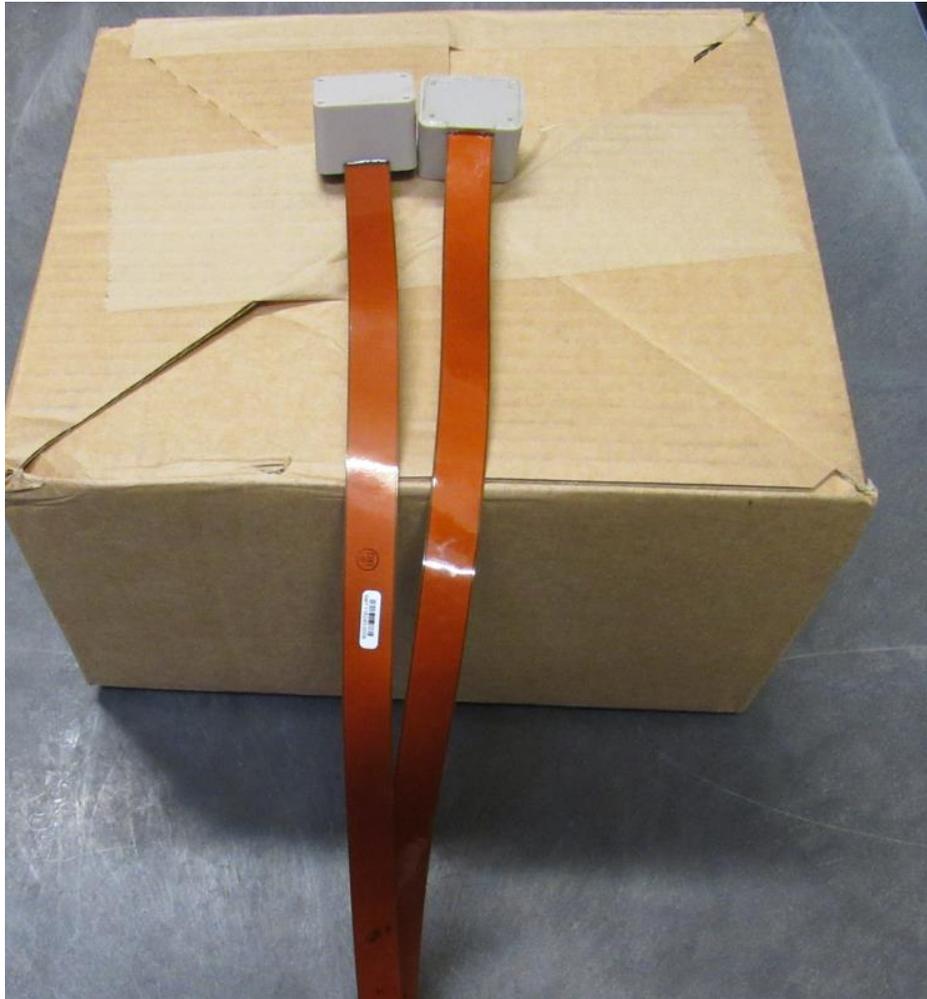


# MFAM Sensor Diagnosis

## 1. One or both sensors have 0 readings

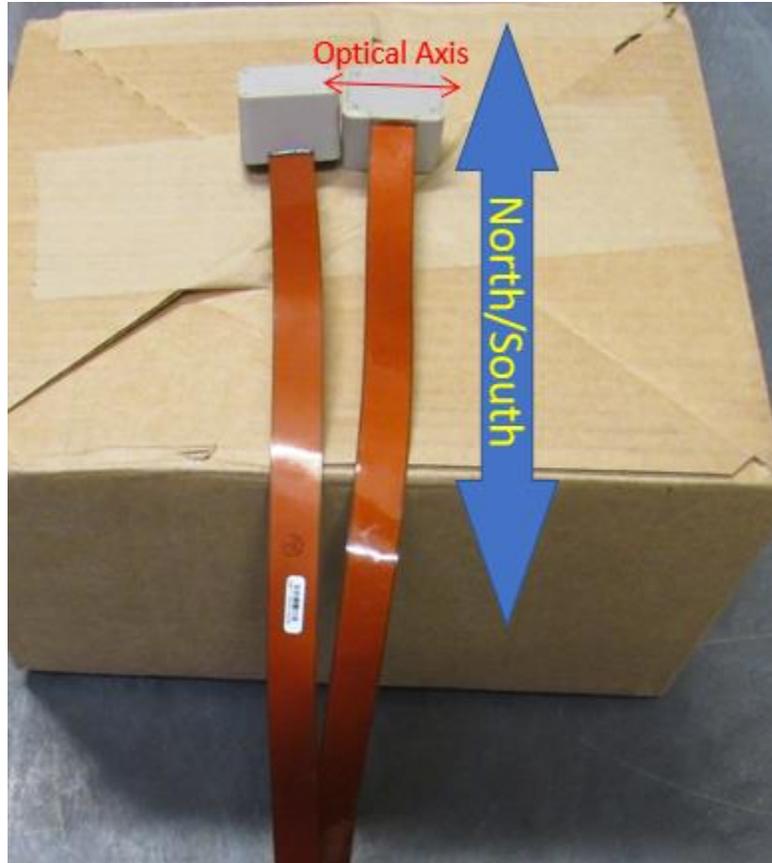
### A. Make sure that the sensor is NOT too close to any magnetic targets

It is possible that a hidden iron bar can disable the sensor operation by generating a local field out of the sensor's operating range (magnitude or gradient). It is recommended to place a non-magnetic object (>20cm) under the sensor.



## B. Make sure that the sensor is NOT in its dead-zone

- a) Anywhere in the world, the sensor orientation shown below is outside its dead-zone. For other sensor orientations at different locations, please refer to Fig. 7 and 8 in our Dev Kit user guide.



- b) Data output from MFAM may help you avoid the dead-zone. In the Aux Field (refer to MFAM user guide), when the identifier is “101”, Aux Field Word1 and Word3, to be more precise, (28160-Word1) and (28160-Word3) are indicators of the Larmor signal strength of the sensor 1 and 2, respectively. When  $(28160\text{-Word1/3}) = 0$ , the sensor is in its dead-zone. The larger the number, the stronger the Larmor signal. Typically, the signal strength indicator can reach 23000 when the sensor is in its optimal orientation.

## 2. One sensor has readings and then drops out (0 readings)

- A. Check whether the sensor is in dead-zone, especially if this happens during mobile applications.

If the signal strength indicator, as discussed in the previous section, is 10000 or less when the sensor has readings, the sensor is oriented too close to its dead-zone. The optical axis (long side) of the sensor needs to be rotated by 90 degrees.

## B. Check whether one of the lasers is unlocked.

This information can be found in the “Mag Status”. If the “Sensor Fault ID” is 10 or 11, probe or pump laser is unlocked. Please refer to the page 7 of the MFAM user guide for more details. In general, a power cycle will fix this problem. But if this happens often, the MFAM module may need to be sent back to Geometrics for repair. It is possible that the repair can be done remotely if the customer has one of the two following tools. (Please note that the following functions are only enabled for MFAMs shipped in December 2020 or later.)

- i. A Geometrics MFAM development kit. In this case, install the MFMA in the Dev Kit and load the Ethernet firmware. Then download the laser testing program from our website. Power the Dev Kit using the external AC adapter and run the testing program. The testing program can automatically detect and fix the laser problem.
- ii. The customer is able to send commands to the MFAM through the SPI input (refer to the page 10, 11 and 12 of the MFAM user guide).

**Step 1:** Use the table below to identify which laser has the problem.

	Laser ID
Mag0 Status: Sensor Fault ID is 10	0
Mag0 Status: Sensor Fault ID is 11	1
Mag1 Status: Sensor Fault ID is 10	2
Mag1 Status: Sensor Fault ID is 11	3

**Step 2:** Power cycle (the command will be ignored if the mag is already in the fault status) and send the following command to the MFAM. Note that the Param2 is the laser ID. **Please note that the MFAM is looking for LSByte first and MSBit first.** For example, the Identifier 0xF5A0C396 should be sent as 96-C3-A0-F5 in the MFAM\_MISO line (pin9, MFAM is the SPI master).

Name	Size(bytes)	Description
Identifier	4	0xF5A0C396 if command is to be sent, else X
Command	4	Defined in the Command Table
Param0	4	Optional, dependent on command
Param1	4	Optional, dependent on command
Param2	4	Optional, dependent on command
Param3	4	Optional, dependent on command
Reserved	4	Not Used

Command(Hex)	Param0	Param1	Param2	Param3
10	2	1	0/1/2/3	C000 0000

**Step 3:** After sending the command, keep the MFAM power on for at least 10 hours. Then power off and wait ~ 30 minutes to power it back on to check whether the issue is fixed.

If the issue is NOT fixed but improved, repeat step 2 and 3, but change Param3 to F000 0000 in step 2 or/and increase the power on time to 20 hours.