

Magnetic Calibration

MotionNode Version 1.2

<http://www.motionnode.com/>

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1 Introduction

To get the most accurate orientation output, it may be necessary to calibrate the MotionNode for your location or any hardware mounting. The calibration corrects for any constant offset to the measured intensity of the magnetic field caused by proximity to ferromagnetic material. We recommend an in-location calibration if:

- You are mounting the device to any hardware that contains ferromagnetic material.
- Your application requires extremely accurate absolute orientation measurements.
- The orientation output does not appear to meet the error specification.

2 Procedure

The MotionNode software can automatically calibrate the sensors based a take, recorded binary data streams. Use the following procedure to get the best calibration, and as a result, the most accurate measurements.

1. Start a take. The recorded data is used to calibrate the sensors. Run the command `Node > Start Take` (in the user interface).
2. Rotate the MotionNode in space. The more complete the *coverage*, the better the resulting calibration. Think of *coverage* as the total number of orientations you rotate the MotionNode through. See Figure 1 for an example in 2D, on a circle. You will have to work in 3D, on a sphere, but the concept is the same.

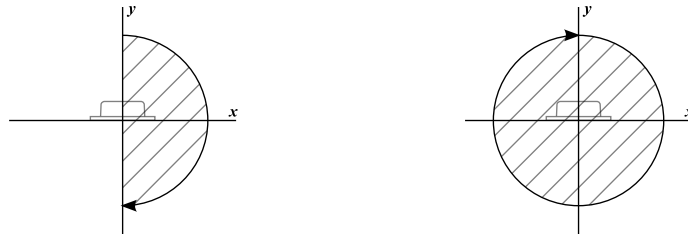


Figure 1: From left to right: 180° of coverage, or 50%. 360° of coverage, or 100%.

The most important orientations to capture are the extrema of each of the three axes, the minimum and maximum values. See Figure 2 for an example in 2D.

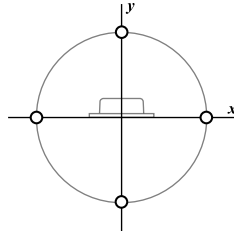


Figure 2: Extrema, minimum and maximum value, of each axis.

Do not worry to much about capturing every orientation and the extrema of every axis. The calibration algorithm finds the best calibration given the the available orientations. The algorithm will still perform well, even without full coverage.

3. After you have enough orientation coverage, stop the take and close all connections. Run the command **Node > Close**.
4. Run the calibration procedure for a single MotionNode. Click on the **Id** field of the device you want to calibrate and run the command **MotionNode > Calibrate From Take**. This will generate the new calibration, copy it into the configuration, and associate the new calibration with your current location.
Note: To use the new calibration on another PC, you must complete the next step and save it to the MotionNode device.
5. [*Optional*] Copy the configuration to the MotionNode device's non-volatile memory. Run the command **MotionNode > Write Configuration**. Now the device has a permanent copy of the new calibration.

The MotionNode software maintains a calibration for each device in each location. When you generate a new calibration it is stored in a database on your PC. A user calibration takes precedent over the default calibration stored on the MotionNode device.