MDT USB Magnetometer Android Graphical User Interface Operation Manual

Overview

MDT USB Magnetometers are a family of single-axis and three-axis digital magnetometer products used to measure low frequency magnetic fields.　These magnetometers use Hall sensors for high magnetic field measurements and high-precision TMR sensors for low magnetic field measurements.　Both high and low field magnetometers are smart USB plug and play devices. The Android version of the MDT USB Magnetometer graphical user interface (GUI) is a simplified implementation of the Windows PC GUI, including magnetic field measurement, probe calibration, COM terminal emulation, and the ability to export data to a file.

Hardware Requirements

- MDT USB Magnetometer
- Android Device with powered OTG USB port capability
  (Android phones, tablets and other Android Devices)
- Android OTG cable or Adapter (Android interface to USB Type-A port)
  Note: Type-C converting cable or Micro USB converting cable , adapter needs to be configured by the user

Software Requirements

- Android OS >= Version 4.2
- USBMag_VX.X_release_XXXXXX.apk（USBMag App installation file）

Software Installation

First, copy the USBMag.apk from the [Magnetometer Documentation] to Android device and install it. After installation, the USBMag App icon will appear on the Android device, as shown below:

Hardware Configuration

Connect the MDT USB magnetometer to an Android Device using an Android OTG data cable or Adapter.

Software Operating Instructions

First, confirm the Hardware Configuration is correct, then open USBMag, a pop-up prompt will appear. Click 'OK' to allow access to the USB device, as shown below:
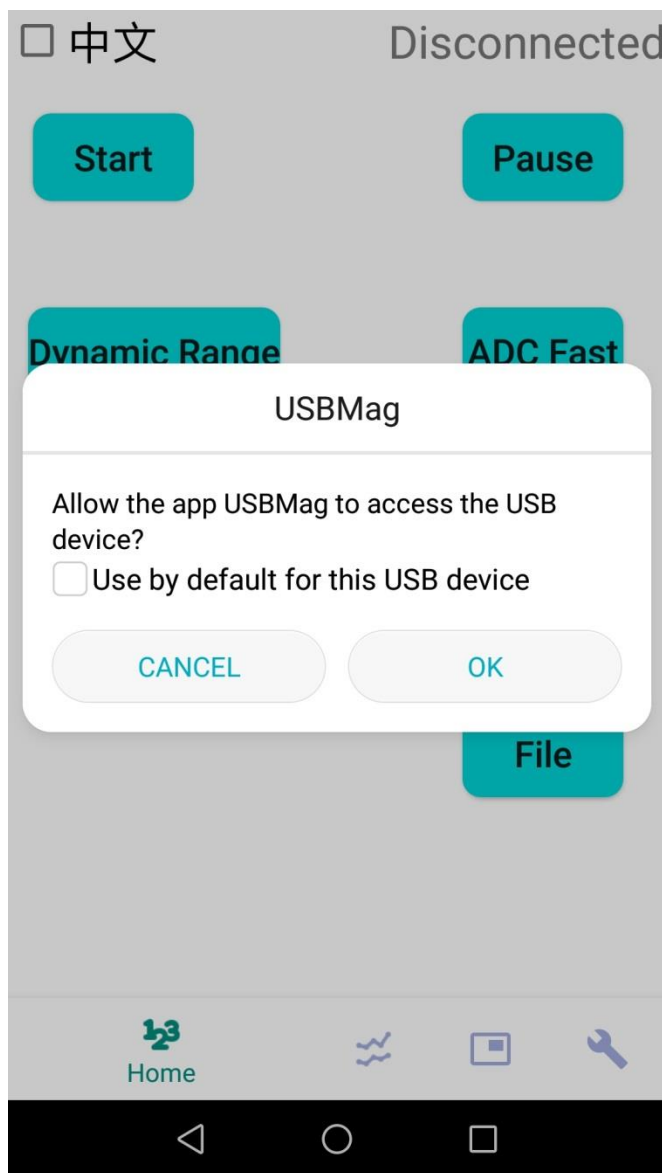

Figure 1

The functions of the buttons on the main window (Home) are as follows:
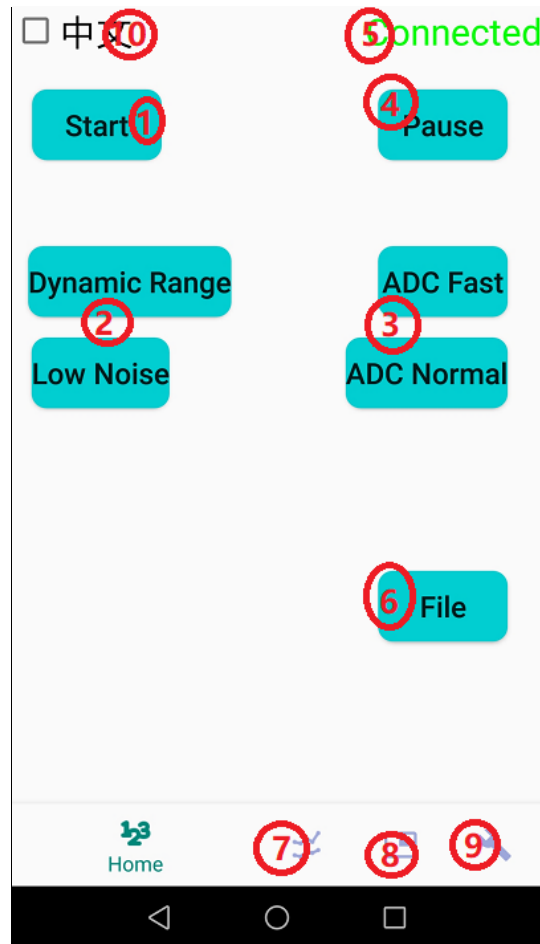

Figure 2

1. Press to access the magnetic field measurement window and begin measurement
2. ADC Acquisition Low Noise Mode (Default)/Wide Dynamic Range Mode
3. ADC Acquisition High Speed (13-bit) Mode/ADC Normal (16-bit) Mode
4. Pause/Resume Measurement Button
5. USB Connection Status
6. Switch to the Data Export Setup Window (data file name, export path, etc.)
7. Switch to the Probe Calibration Window
8. Switch to the COM Terminal Emulation Window
9. Switch to the Data Export Setup Window (data file name, export path, etc.)
10. Checkbox to Change GUI Language. Checked is Chinese, and unchecked is English

● **Magnetic Field Measurement**

Procedure: Starting from the Home window in Figure 2, select the desired ADC configuration options, then press Start. The real time chart window shown in Figure 3 below will appear.
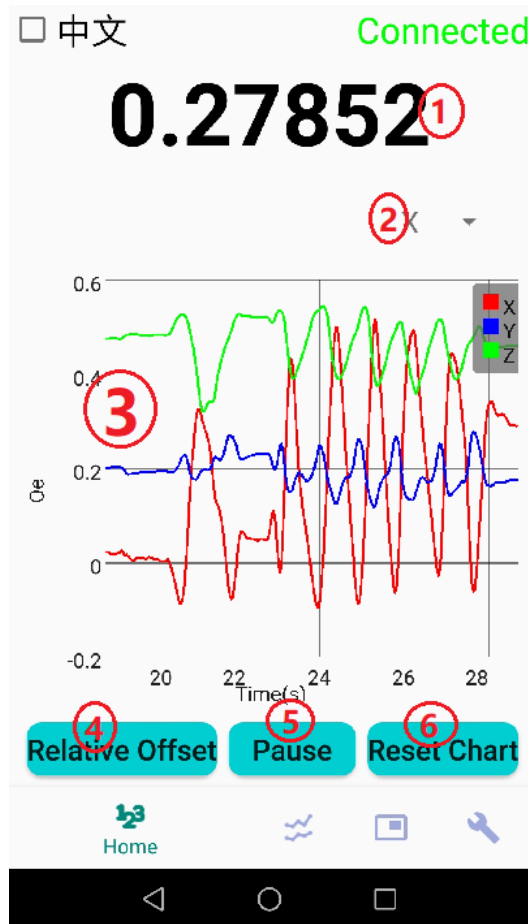

Figure 3

1. Digital Display of X, Y, or Z Component of the Magnetic Field, or the Magnitude of the Magnetic Field
2. Drop down menu used to select the X, Y, or Z Component of the Magnetic Field, or the Magnitude of the Magnetic Field for the Digital Display (1)
3. Real-time Chart of all Magnetic Field Components as a Function of Time
4. Relative Offset, Used to Zero the Magnetic Field
5. Begin/Start Magnetic Field Measurement, Resets Chart Data
6. Pause/Resume Data Measurement Without Deleting Chart Data
7. Clear the Chart and Reset Time to Zero

● **Magnetometer Calibration**

Before performing magnetometer calibration, make sure that the Magnetic Field Measurement function is working properly. In the main panel of Figure 2, click on button 7 to enter the probe calibration window:
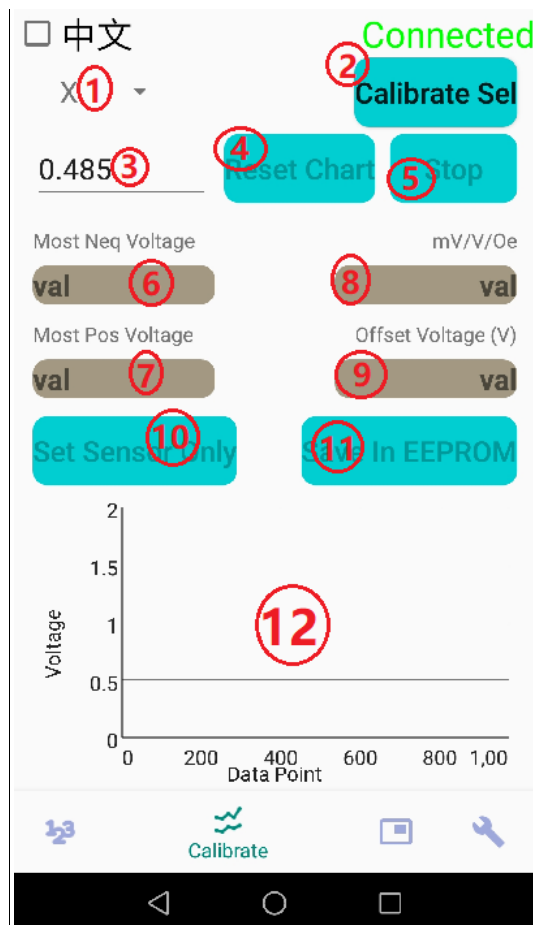

Figure 4

1. X/Y/Z Magnetic Field Component to be Calibrated
2. Calibrate the Selected Component
3. Value of the Calibration Magnetic Field Source, 0.485 Oe is Default
4. Reset Chart, Used to Clear and Restart Calibration Data Acquisition
5. Stop Acquiring Calibration Data
6. Most Negative Voltage Acquired During Calibration Data Acquisition
7. Most Positive Voltage Acquired During Calibration Data Acquisition
8. Calculated Sensitivity (mV/V/Oe)
9. Calculated Offset Voltage (mV/V)
10. Write Sensitivity and Offset to the Sensor for Immediate Use
11. Write Sensitivity and Offset to the EEPROM for Future Use
12. Chart of Sensor Voltage as a Function of the Number of Data Points

First, enter the value of the calibration magnetic field standard in box 3.

Then, select the desired x/y/z axis to be calibrated from drop down menu 1. Next, click the "Calibrate Selected" button 2. The select component drop down menu 1 and the "Calibrate Selected" button 2 will be disabled, and buttons "Reset Chart" 4 and "Stop" 5 will become enabled. The real time chart 12 will begin to display the corresponding magnetic field value as the magnetometer is moved with respect to the calibration source, you can set the <ADC Normal> button in area 3 of figure 2 when the real time chart become slow because of adc fast.And the values of areas 6, 7, 8, and 9 will be calculated according to the real time data, as shown below:
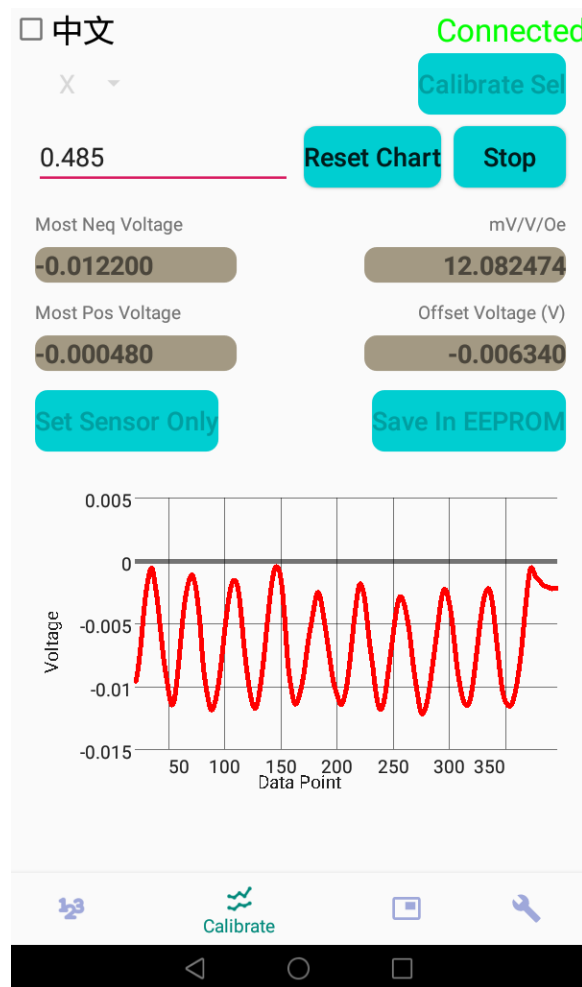

Figure 5

After starting the calibration, click "Reset Chart" to clear old data or filtering artifacts, then move the magnetometer to adjust the corresponding value. Whether a standard calibration magnet (Hall magnetometer) or the Earth's field (TMR magnetometer) is used as the calibration standard, it is important to move the magnetometer with respect to the source such that the desired axis achieves the most positive and most negative possible voltage values. After sufficient data has been acquired, click the "Stop" button. The "Set Sensor Only" and "Save in EEPROM" buttons will become enabled, as shown below:
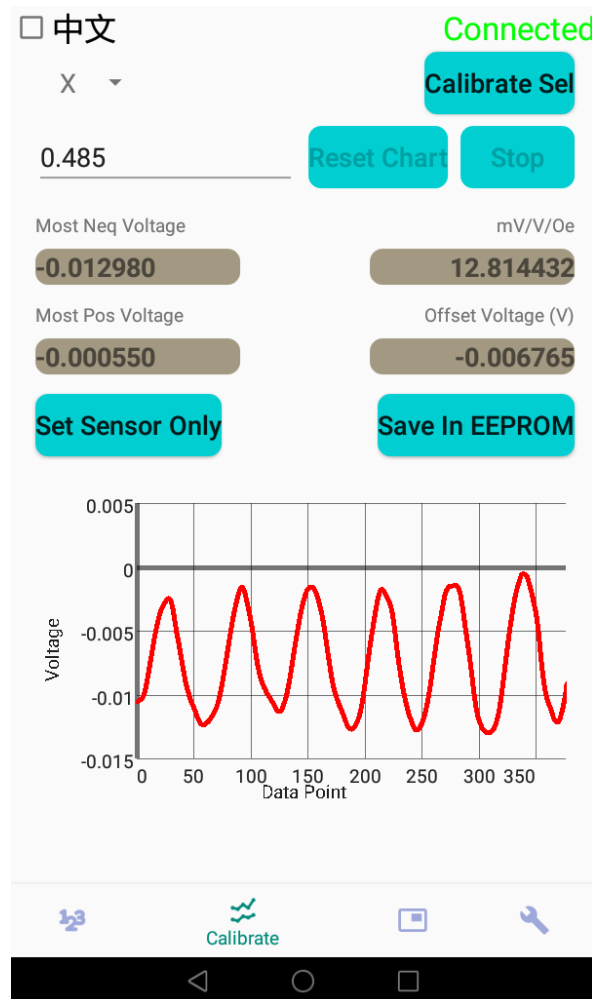

Figure 6

Click "Set Sensor Only" for immediate use of the calibration value. Click "Save in EEPROM" to store the calibration values in EEPROM for future use. Does not click "Save in EEPROM" if you do not want to permanently overwrite the calibration values. To calibrate another axis or recalibrate, click "Calibrate Selected", and restart the calibration procedure.

- **COM Terminal Emulator**

In the main panel of Figure 2, click on the menu area 8 to enter the COM terminal emulator window. This emulator is used to send and receive ASCII commands and responses from the USB Magnetometer. It can be used to access many of the magnetometer functions available in the Windows PC version of the GUI, such as filtering, AC measurement, manual triggering, averaging, etc.
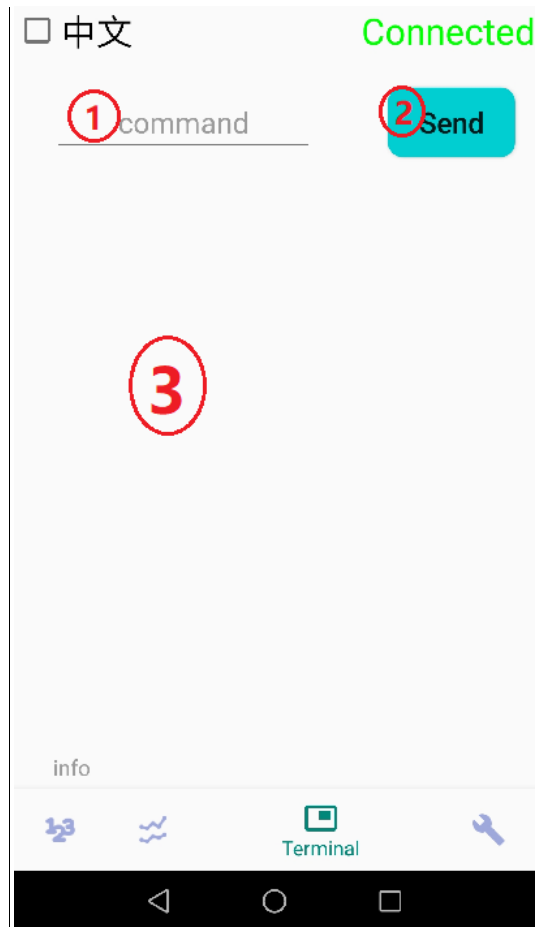

Figure 7

1. The text command to be sent to the magnetometer
2. Button that must be clicked to send the text command
3. Text box displaying data as it is returned from the magnetometer

● **Data Export Setup Window**

Click on menu item "Setup" 9 to enter the data export setup window, shown in Figure 8.
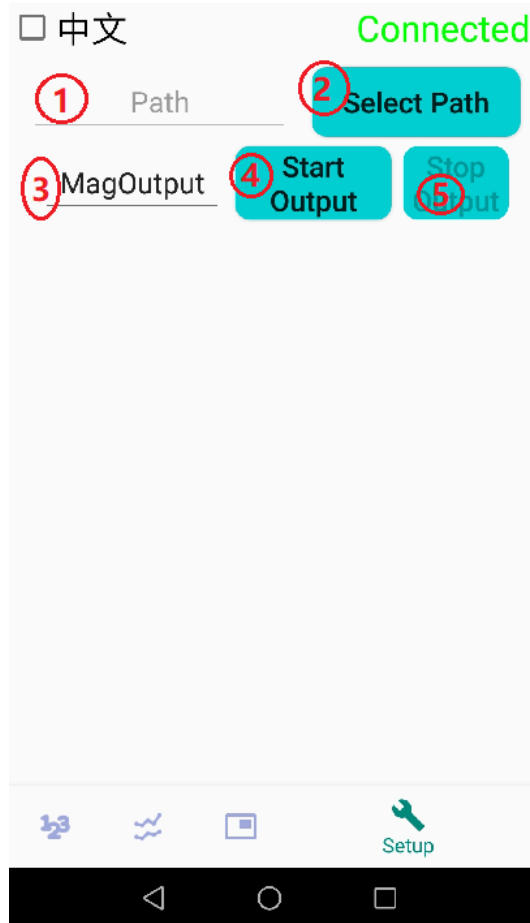

Figure 8

1. The Path of the Selected Directory
2. Button Used to Change the Selected Directory
3. Data File Name. Default is MagOutput.
4. Button Used to Begin Exporting Data to the File.
5. Button Used to Stop Exporting Data.