

Operation Manual for

DG-1

24-bit Digitiser



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1. About this Manual

This document describes the installation, operation and maintenance of the DG-1 from Bartington Instruments. It should be read in conjunction with the [product brochure](#) (DS4549) which can be found on the product page of the Bartington Instruments at: [bartington.com](#).

DG-1 software can be downloaded from the [software page](#) of the website.

1.1. Symbols Glossary

The following symbols used within this manual call your attention to specific types of information:



WARNING: Indicates a situation in which serious bodily injury or death could result if the warning is ignored.



Caution: Indicates a situation in which bodily injury or damage to your instrument, or both, could result if the caution is ignored.



This symbol identifies items that must be disposed of safely to prevent unnecessary damage to the environment.

Note: A note provides useful supporting information and sometimes suggests how to make better use of your purchase.

2. Safe Use



WARNING: These products are not qualified for use in explosive atmospheres or life support systems. Consult Bartington Instruments for advice.

3. Important Points to Note Before Using DG-1

3.1. Compatible Sensors

DG-1 is for use only with the devices listed below:

Compatible Products	
Mag-03	CryoMag/CryoMag-IE
Mag-13	Mag610/611 RTUDE/RTPDE
Mag612U	Mag614-FL RTUDE/RTPDE
Mag619U	Mag648/649
Mag690	Mag900/901



Caution: The connection of any other device may cause serious damage and will invalidate the equipment warranty.

3.2. Install the Software Before Connecting the USB Cable



Caution: The DG-1 software, Visual DG-1, must be installed on your PC before attempting to connect the hardware using the USB cable. Connection of the hardware prior to installing the software may cause the DG-1 to malfunction.

DG-1 uses FTDI USB drivers, and these will be installed alongside VisualDG-1.

3.4. Accidental Disconnection of the USB Cable

Note: Disconnection of the USB cable whilst the DG-1 is operating may cause the DG-1 to malfunction. Should this occur, stop the PC program, reconnect the USB cable, wait 15 seconds and then re-start the program.

4. Introduction to DG-1

The DG-1, comprising the DG-1 hardware and software, provides a PC-based, fast, three-channel, 24-bit data acquisition DG-1 with data logger for Bartington Instruments fluxgate sensors. The DG-1 performs simultaneous data acquisition in all three channels and produces time domain plots showing either slow or fast trends for magnetic data in three axes.

The DG-1 is software controlled with connection to the user's PC via a USB interface. Prior to data acquisition, the DG-1 is configured using the DG-1 software. A typical arrangement is shown in **Figure 1**.



Figure 1: The DG-1 connected to a magnetometer.

The DG-1 software records time domain data over a wide frequency range (see the product brochure for details). Data logging with time-stamping is also provided, hence the DG-1 functions as a high-resolution data logger for magnetic measurements.

4.1. Input Channels

When a compatible Bartington Instruments triaxial magnetometer is connected to the DG-1, the X, Y, Z channels correspond to the X, Y, Z axes of the magnetometer.

4.2. Coupling

4.2.1. Magnetometer Inputs

The magnetometer outputs are DC coupled to the inputs of the DG-1.

5. Hardware

The DG-1 unit contains power supply, amplifiers, filters, three simultaneously triggered 24-bit A/D converters and a USB interface. The DG-1 is powered from the USB port of the users PC/ Laptop, and the DG-1 then supplies power to the users magnetometer.

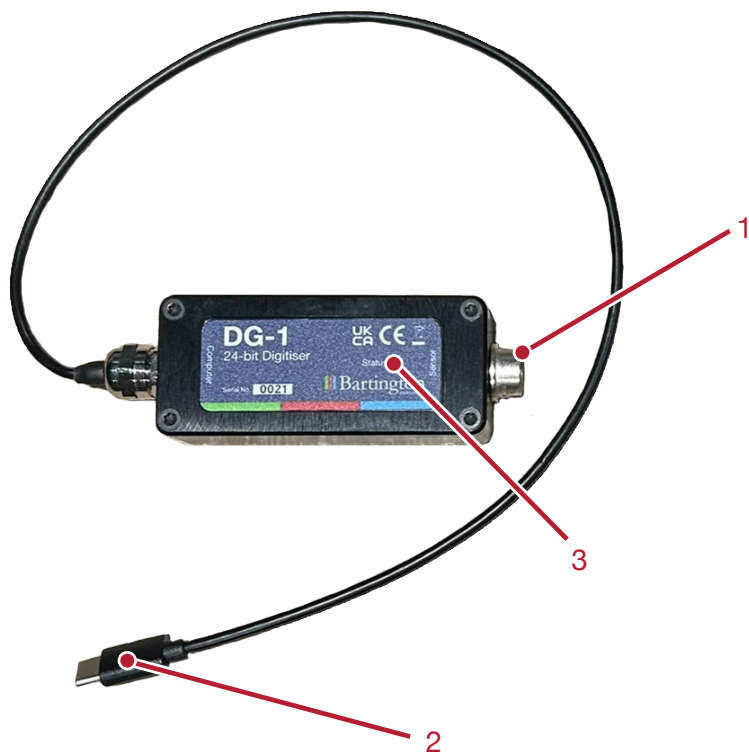


Figure 2: DG-1 front panel.

Key to Figure 2

1. Magnetometer connector
2. USB cable/connector to PC
3. Status LED (red)

5.1. Status LED

The RED status LED will illuminate once the DG-1 is plugged into a USB port. This confirms that the unit has power.

6. Software

The DG-1 is supplied complete with dedicated data acquisition software. Consult Bartington Instruments for the minimum hardware requirements and installation instructions.

Available versions of the DG-1 software can be downloaded from bartingtondownloads.com.

7. Connecting DG-1 to the Computer

Note: The DG-1 unit should only be connected to a computer running Windows.

After installing the software, connect the DG-1 USB cable to the PC. The Status LED should illuminate. Your sensor can be connected to the DG-1 before or after this process.

The VisualDG-1 software can now be started.

To disconnect, carry out the reverse of the above process.

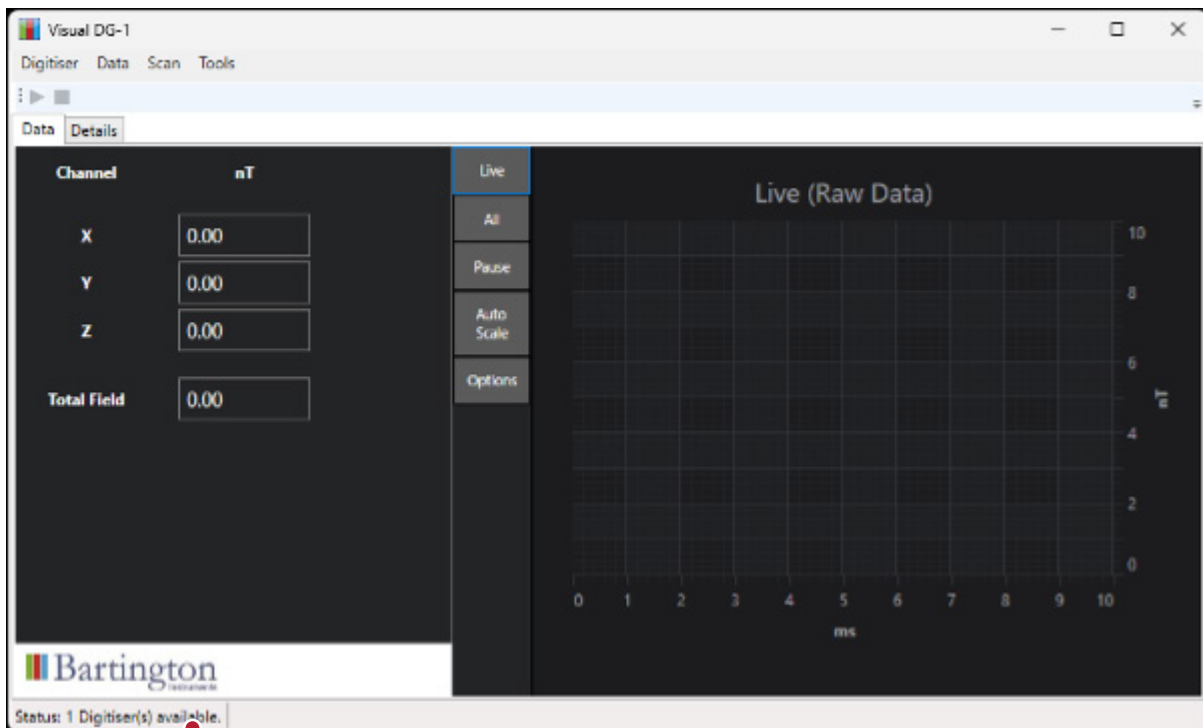
8. VisualDG-1 Software

8.1. Connecting DG-1 to VisualDG-1

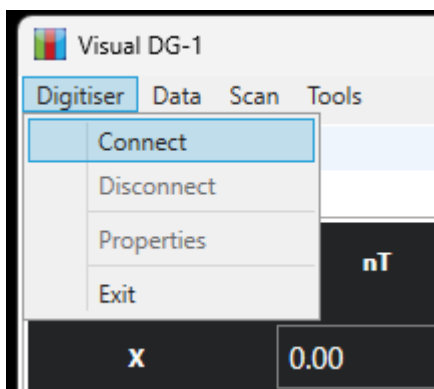
Double click the software icon to start the software.



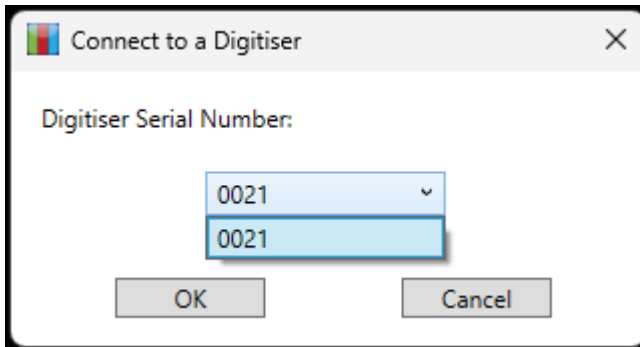
The software will inform the user if there are any DG-1s connected to the PC (bottom left of application window).



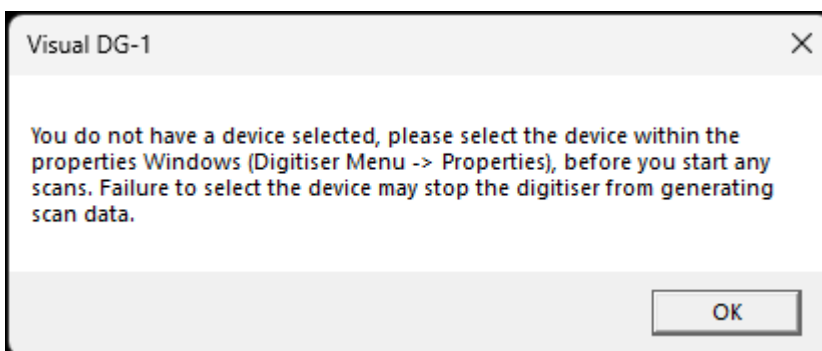
Next, press “Digitiser”, then “Connect”.



A window will appear that will automatically detect the DG-1, or multiple DG-1s, connected to the PC. Select the appropriate serial number from the drop-down menu and press OK.



A message may appear, reminding the user to select a “device” before attempting to perform any scans. Press OK.

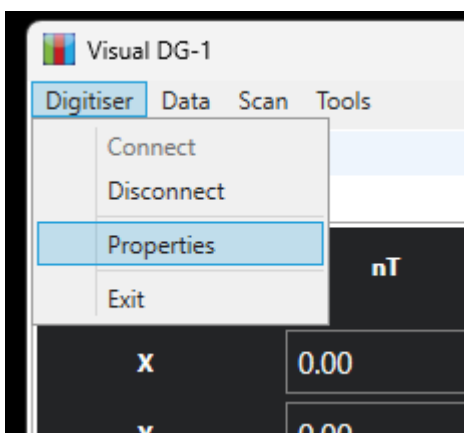


The DG-1 is now connected to the software, and a device can now be selected.

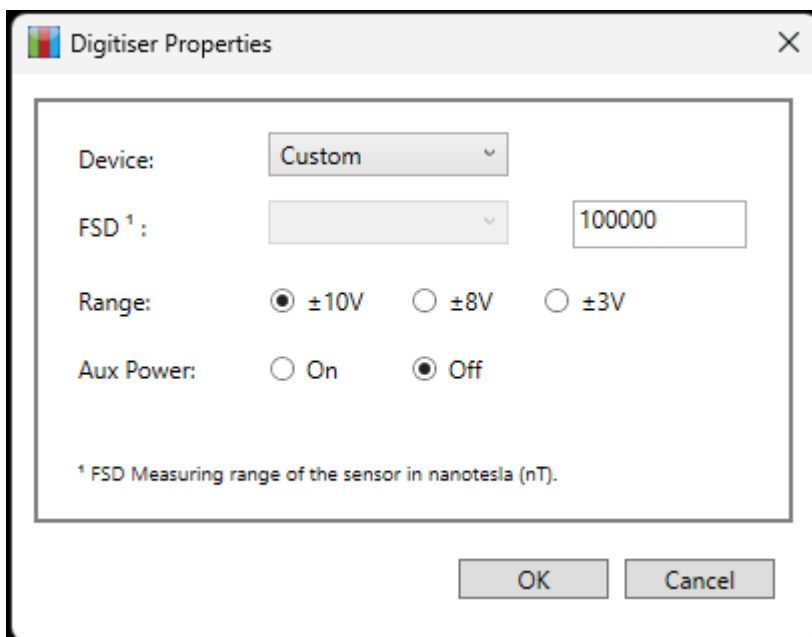
Note: If VisualDG-1 is closed down and re-opened, the DG-1 will need to be reconnected using the above proce

8.2. Selecting a Device (Magnetometer)

Press “Digitiser”, then “Properties”.



A window will appear with customisable settings for the magnetometer connected to the DG-1.

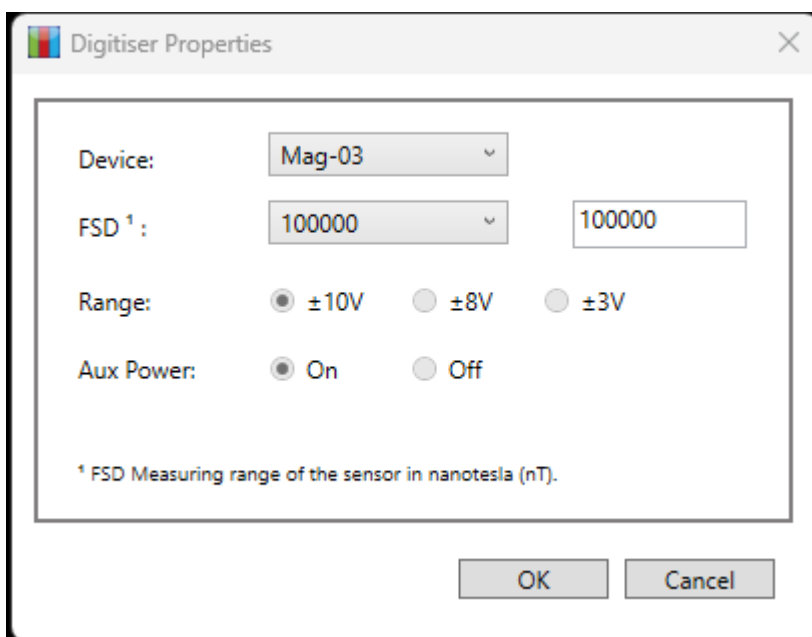


VisualDG-1 cannot automatically detect the magnetometer connected to the DG-1.

First, select the magnetometer you have connected to the DG-1. For example, a Mag-03.

VisualDG-1 will automatically select the correct voltage “Range” and enable “Aux Power”. The FSD must be selected depending on the measuring range of your magnetometer in nanoTeslas (nT).

For example, a Mag-03MC100 has a measuring range of $\pm 100\mu T$, therefore an FSD of 100000 must be selected.



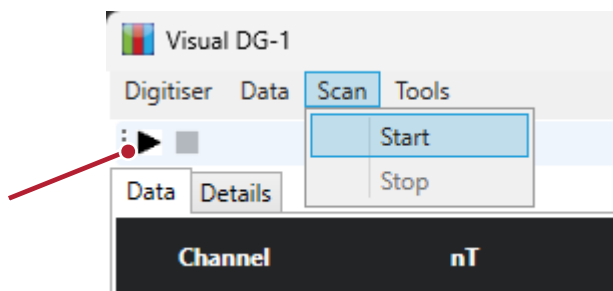
Once the device and FSD have been selected, press OK.

VisualDG-1 is now configured for measurements using default values.

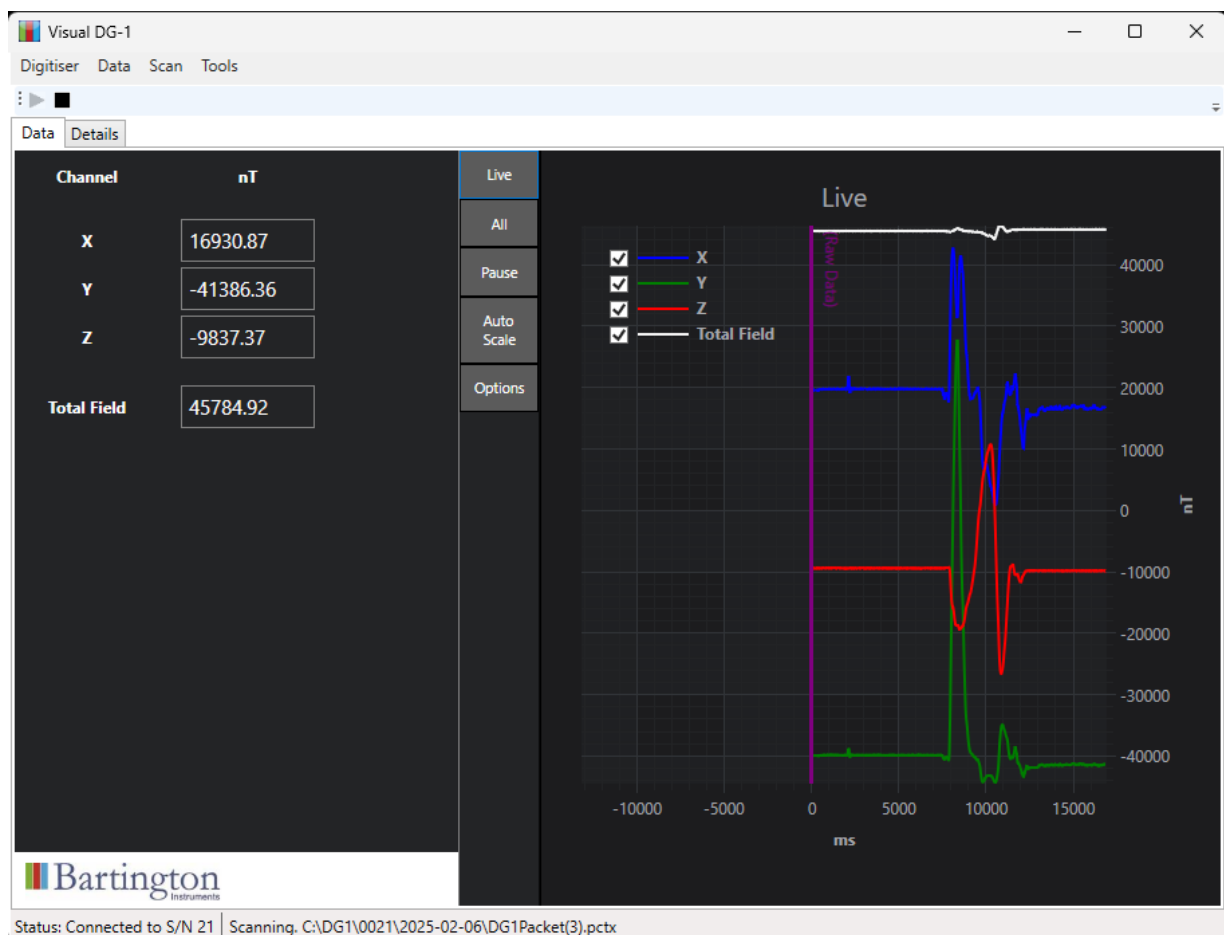
Note: If VisualDG-1 is closed down and re-opened, the software will remember the last device settings used.

8.3. Scanning

With the software configured as per sections 8.1 and 8.2, a scan can be started using default settings by pressing the black triangle or clicking “Scan” and then “Start”.



The graph will begin plotting X, Y, Z and Total Field data, and the data tables will continually update with the latest value.

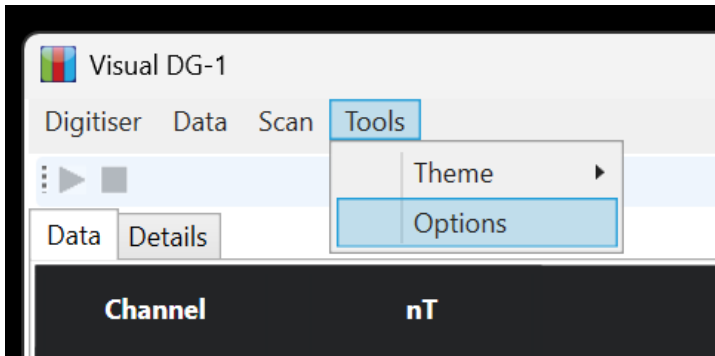


The default location for scan data is C:\DG1.

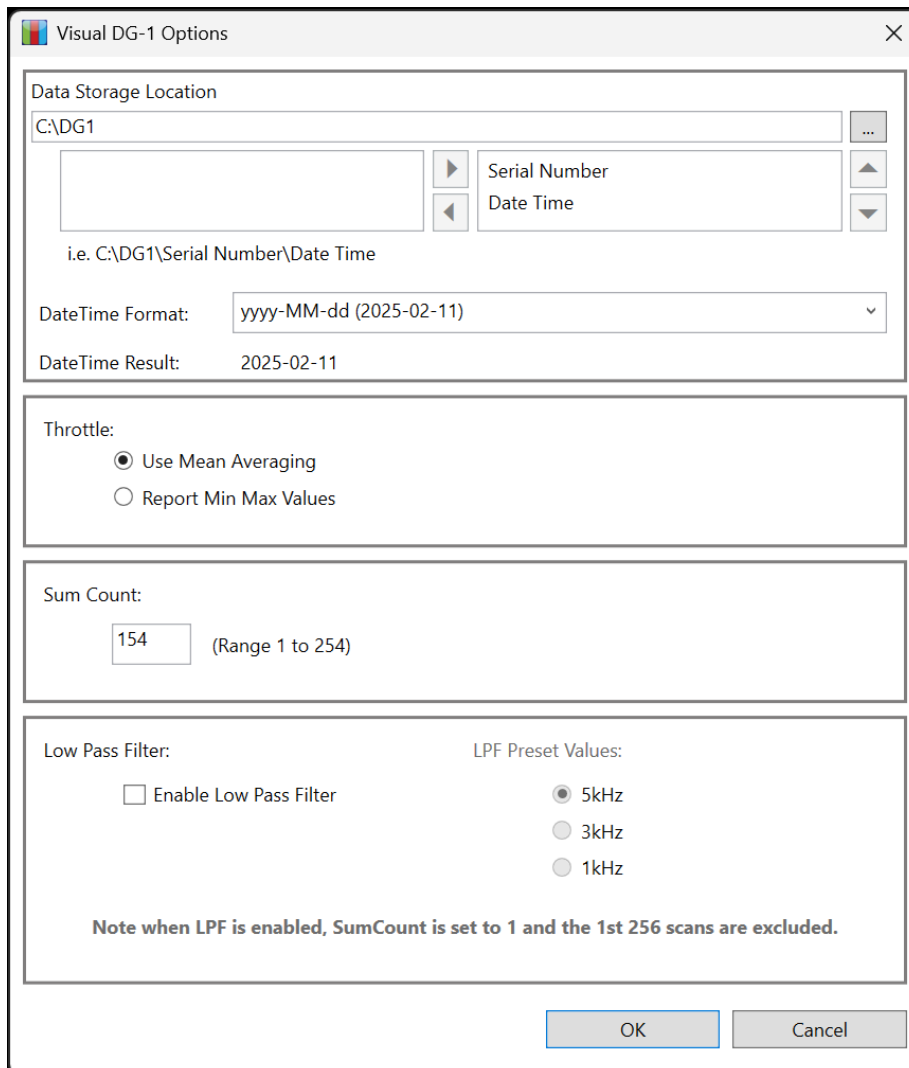
To stop the scan, press the black square or press “Scan”, then “Stop”.

8.4. Custom Scan Settings

VisualDG-1 has a number of custom scan settings that can be accessed under “Tools”, “Options”.



The following window will open:



8.4.1 Data Storage Location

This section controls the location and filename format of the scan data.

The default location for scan data is C:\DG1.

8.4.2 Throttle

The Throttle is an automated software process that is used to protect the integrity of the scan data recorded. It applies only to the graph while scanning.

If the software detects that the user's PC is not keeping up with data storage, and graphing, then it'll apply a "Throttle" to the graph.

If "Mean Averaging" is selected, then the software will average a number of scans and display a single value.

If "Min Max Values" is selected, then the software will display the highest or lowest value in a group of scans and display that single value.

Throttle does not apply to the data that is recorded.

8.4.3 Sum Count

The DG-1 has a fixed sample rate of 32kHz, per channel (X, Y and Z). 3 ADCs individually handle X, Y and Z respectively.

The "Sum Count" controls the averaging of the magnetic field data, and the data output rate as follows:

$$\text{Data Output Rate} = \frac{32,000}{\text{Sum Count}}$$

For example, with the Sum Count set to 1, the data output rate will be 32kHz. With the Sum Count set to 2, the data output rate will be 16kHz, and so on.

Depending on the specifications of the user's PC, and the Sum Count settings, the Throttle may cause the VisualDG-1 graph to slow down or appear inaccurate. This is intentional to preserve CPU processing power for recording the magnetic field data in the data file at the required data output rate.

8.4.4 Low Pass Filter

The DG-1 contains an FIR digital low pass filter with a selectable 5kHz, 3kHz, and 1kHz corner frequency.

Press “Enable Low Pass Filter” and select the corner frequency required.

9. Troubleshooting

The system works reliably but bad data can be collected if the USB interface is interrupted or initially connected when the DG-1 unit is not switched ON.

To restore correct operation:

- close the VisualDG-1 program
- disconnect the USB cable
- connect the USB cable and wait 10–15 seconds before restarting the program.

Note: see also [Important Points to Note Before Using the DG-1](#).

10. Maintenance

The DG-1 unit requires no routine maintenance. Re-calibration of the system by Bartington Instruments is recommended at two-yearly intervals.

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The specifications of the products described in this brochure are subject to change without prior notice.

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