

Understanding the Data Files Format

D.1 Overview

In this appendix the meaning of each data column in a measurement data file generated by the MPMS3 system is explained in some details.

D.2 Data File Columns Descriptions

Table D-1. Standard Measurement File Data Columns

| COLUMN | DESCRIPTION |
|----------------------|---|
| General Items | |
| Comment | Any comments entered into the data file. Comments can be entered either directly using the Measure → Datafile Comment... menu entry or inside a sequence using the Measurement Commands → VSM → Datafile Comment sequence command. |
| Time Stamp (sec) | The absolute time stamp for the current row of data. Timestamps can be converted into date & time values using the Utilities → Status Calculator menu item in MultiVu (enter the timestamp from the data file into the Time text field and click State? to convert the value). |
| Temperature (K) | The sample temperature for the current data row. This is the sample temperature, taking into account thermal history and current measurement options (e.g., it might be the temperature of the oven sample holder when performing measurements with the oven option active). |

| COLUMN | DESCRIPTION |
|--|--|
| Magnetic Field (Oe) | <p>The magnetic field for the current data row.</p> <p>This value takes into account current measurement options (e.g., field reported by the Ultra-Low Field Option).</p> |
| DC Scan Related Items | |
| <p>DC Moment Fixed Ctr^{Error! Bookmark not defined.} DC Moment Err Fixed Ctr^{Error! Bookmark not defined.}</p> | <p>Amplitude of the moment and associated standard error for DC scan measurements (fixed center)</p> <p>The “Fixed Center” values denote the analysis result where the sample position is determined by the AutoTracking algorithm, the moment thus being the only free parameter for the fit to the raw data.</p> |
| <p>DC Moment Free Ctr^{Error! Bookmark not defined.} DC Moment Err Free Ctr^{Error! Bookmark not defined.}</p> | <p>Amplitude of the moment and associated standard error for DC scan measurements (free center)</p> <p>The “Free Center” values denote the analysis result where both, the sample location and the sample moment, are free parameters for the fit to the raw data.</p> |
| <p>DC Fixed Fit DC Free Fit</p> | <p>Quality of fit of the raw data to the dipole response function for the “Fixed Center” and “Free Center” fits, respectively</p> <p>Values range from 0 to 1 with 1 being a perfect fit and 0 being random data with no correlation to the expected response function</p> |
| <p>DC Calculated Center (mm) DC Calculated Center Err</p> | <p>Calculated sample position and associated estimated error for the “Free Center” fit to the DC scan raw data</p> <p>This value uses the same coordinate system as the “Center Position (mm)” value – for perfectly centered samples and clean signals those two values should match within the resolution of the transport encoder.</p> |
| DC Scan Length (mm) | Scan length of the current data point (as selected by the user in the “Measure” menu) |
| DC Scan Time (s) | Scan time of the current data point (as selected by user in the “Measure” menu) |
| DC Number of Points | Number of points in the raw DC scan waveform |
| DC SQUID Drift | SQUID drift calculated from the subtraction of the up and down measurement scans |
| <p>DC Min V (V) DC Max V (V)</p> | <p>Maximum and minimum voltage reported by the SQUID module during the DC scan.</p> <p>These values represent the uncorrected values without taking into account drifts. Values are reported as raw voltage multiplied by the SQUID range as reported in the next column (i.e., maximum reported value can be as high as ± 5000 in range 1000).</p> |
| Range | <p>Range setting of the SQUID module for the current data point.</p> <p>Possible values are 1, 10, 100, and 1000 (with 1 being the most sensitive setting).</p> |
| Diagnostic Items | |

| COLUMN | DESCRIPTION |
|--|--|
| Min. Temperature (K) Max. Temperature (K) | Minimum and maximum sample temperature readings over the time required to measure the current data point. These values are especially useful when measuring while sweeping temperature as they give an indication about the temperature accuracy for the data point. |
| Min. Field (Oe) Max. Field (Oe) | Minimum and maximum sample field readings over the time required to measure the current data point. |
| Mass (grams) | Total mass of moving parts obtained from the DC component of the motor force. This includes the armature inside the linear motor, the sample rod, sample holder, and the sample itself. |
| Motor Lag (deg) | Phase lag between motor drive current and actual motor position. |
| Pressure (Torr) | Pressure inside the sample chamber for the current data point. |
| Measure Count | Total number of waveforms used to calculate the current data point. This number indicates the quality of the data point – in perfect conditions, it should be (<i>Frequency x Averaging Time</i>) but can be reduced due to waveform rejection inside the SQUID module (e.g., SQUID resets occurring during the measurement). If the Measure Count drops below 50% of the expected value, the data point will be rejected and not logged in the data file. |
| Measurement Number | Measurement repetition number for MvsH and MvsT measurements. |
| SQUID Status (code) | Internal status codes as reported by the SQUID module. |
| Motor Status (code) | Internal status codes as reported by the motor module. |
| Measure Status (code) | 0 OK 1 SQUID voltage railed |
| Motor Current (amps) | AC component of the motor current. Value is proportional to the force required to achieve the requested vibration amplitude. |
| Motor Temp. (C) | Temperature of the heat sink inside the motor module. This temperature is used internally from the motor module to prevent damage to the module and the motor. If the temperature exceeds a maximum value, the motor will stop moving and an error will be logged into the event log. |
| Temp. Status (code) | Temperature status code as reported by the temperature control subsystem. Status codes can be translated into corresponding status text using the Utilities → Status Calculator... menu entry in MultiVu (enter the status code from the data file into the Temp. text field and click State? to convert the value). |

| COLUMN | DESCRIPTION |
|-----------------------|---|
| Field Status (code) | <p>Field status code as reported by the magnet power supply.</p> <p>Status codes can be translated into corresponding status text using the “Utilities → Status Calculator...” menu entry in MultiVu (enter the status code from the data file into the Magnet text field and click State? to convert the value).</p> |
| Chamber Status (code) | <p>Chamber status code as reported by the Gas handling controller.</p> <p>Status codes can be translated into corresponding status text using the “Utilities → Status Calculator...” menu entry in MultiVu (enter the status code from the data file into the Chamber text field and click State? to convert the value).</p> |
| Chamber Temp (K) | <p>Chamber temperature for the current data point.</p> <p>This value is the instantaneous temperature reported by the chamber thermometer on the sample tube and will be different from the sample temperature reported earlier as this does not take thermal history into account.</p> <p>When the oven option is active, the chamber temperature should be stable at about 280 K and can be used to diagnose oven performance issues.</p> |
| Redirection State | <p>0 No redirection 1 Oven option active and controlling temperature</p> |
| Map 01 ... Map 16 | <p>Mappable data columns (varying content).</p> <p>Additional data columns available for logging advanced diagnostic data (see section B.3.3 in the SVSM User Manual). Actual column titles in the data file will reflect the data being recorded when the data file was first created.</p> |