

Use of Grad601 in NMEA Format

The new version of the Bartington Instruments DL601 datalogger features a dual-boot mode, either the standard Grid mode or NMEA mode.

Operation in standard Grid mode is identical to that of existing dataloggers. Data is saved on the datalogger, in grids of set sizes of 10x10, 20x20, 30x30 or 40x40m, for download at the end of the survey, using either Bartington download software or third party software such as TerraSurveyor used for download and processing.

In NMEA mode, data is not recorded directly on the logger. Instead it is streamed in NMEA format via the RS232 port to an external logger where it is stored, usually alongside GPS positioning data. Third party software from Geomar Software allows gradiometer and GPS data to be logged simultaneously, using an Archer rugged field computer and TrackMaker601 (for a single Grad601-2 instrument), or a laptop running MLGrad601/MultiGrad601 for logging and processing data from multiple DL601 dataloggers (9 maximum, allowing up to 18 Grad-01-1000L sensors to be logged).

Both software packages allow data to be acquired either with or without a GPS tag.

If the sampling frequency of gradiometer data (1-10Hz in increments of 1Hz) is different from the GPS sampling (1 or 2Hz), the processing software allows the position of intermediate data to be allocated by extrapolating the known GPS location (assuming a constant speed between the points).

Data will be sorted individually per sensor and stored in the format shown below.

//Easting [m],	Northing [m],	Rdg[nT/m],	Quality,	Sat.,	HDOP,	Time
610664.273	4830005.172	88.00	8	12	2.00	12:41:28.929
610664.279	4830005.229	110.00	8	12	2.00	12:41:29.038
610664.285	4830005.287	87.00	8	12	2.00	12:41:29.148
610664.291	4830005.344	118.00	8	12	2.00	12:41:29.256
610664.297	4830005.401	104.00	8	12	2.00	12:41:29.366
610664.303	4830005.458	71.00	8	12	2.00	12:41:29.474
610664.309	4830005.516	110.00	8	12	2.00	12:41:29.584
610664.315	4830005.573	90.00	8	12	2.00	12:41:29.694
610664.321	4830005.630	61.00	8	12	2.00	12:41:29.802
610664.327	4830005.688	94.00	8	12	2.00	12:41:29.912
610664.333	4830005.745	91.00	8	12	2.00	12:41:30.021
610664.339	4830005.802	110.00	8	12	2.00	12:41:30.129

This can then be imported into display software for visualisation.

If no GPS signal is used, then the data will be stored in the format: Datalogger number, sensor number, position, gradient data for the sensor, time.



Each line increment is marked in the data. See example below:

Datalogger	sensors	position	sensor1	sensor2	time
1	1 & 2	22.750	.00	.00	09:29:51.961
1	1 & 2	23.000	.00	.00	09:29:52.070
1	1 & 2	23.250	.00	.00	09:29:52.179
1	1 & 2	23.500	.00	.00	09:29:52.273
1	1 & 2	23.750	.00	.00	09:29:52.381
1	1 & 2	24.000	.00	.00	09:29:52.491
1	1 & 2	24.250	.00	.00	09:29:52.585
1	1 & 2	24.500	.00	.00	09:29:52.694
1	1 & 2	24.750	.00	.00	09:29:52.803

Paused Measurements at: 09:29:52.897

Survey Line: 2.00

Start Station: 24.75

Station Increment: -0.250

Date: 24/11/2014 Time: 09:29:57

End of Survey Line header

1	1 & 2	24.750	.00	.00	09:29:58.885
1	1 & 2	24.500	.00	.00	09:29:58.993
1	1 & 2	24.250	.00	.00	09:29:59.086
1	1 & 2	24.000	.00	.00	09:29:59.196
1	1 & 2	23.750	.00	.00	09:29:59.305
1	1 & 2	23.500	.00	.00	09:29:59.398
1	1 & 2	23.250	.00	.00	09:29:59.493
1	1 & 2	23.000	.00	.00	09:29:59.601

Note that in this mode, data can be acquired in any shape of grid. It is however essential to go in straight lines between the start and end of the line, and ideally to have a position for these points in order to position the lines/grids accurately.

In the case of acquisition without GPS points, some calculations are required to work out the suitable pace for a given required spacing and sampling frequency. For example, a 25cm separation is obtained by setting an increment of 0.25 in the software, a sampling frequency of 4Hz (4 samples per second) on the DL601 and a walking pace of 1m/s.

When dealing with GPS based data, the data will be sorted individually per sensor and displayed as shown overleaf. This can then be imported into display software for visualisation.

The software noted above, especially the MLGrad601, is the basis of a cart survey system using the Grad-01-1000L sensors. It is especially practical if customers are looking to reuse existing Grad601-2 instruments with their cart. Existing dataloggers will require an upgrade together with some extra accessories (cables) and software.

