Datawell
MkIII / DWR4
Buoy tester
Manual

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1 Introduction

Assuring, that everything is functioning as it should, never hurts. Therefore Datawell has created the Buoy tester software. One simple tool that can quickly and easily show you the state of your buoy's sensors. By representing the data in multiple ways you can get a decent overview of the information a Datawell MkIII or DWR4 buoy provides.

2 Installation

2.1 Procedure

2.1.1 Preparations

Before installing the buoy tester program, make sure that no other programs are active and that the computer has enough free harddisk space for the installation. The minimum system requirements are

Operating system	: Windows 7 or higher
Free harddisk space	: 500 MByte
Processor speed	: 1GHz
Free RAM	: 512 MByte
Screen resolution	: 1024x768

2.1.2 Installation

Execute the file setup.exe and follow the instructions on the screen.

3 Buoy tester

3.1 Usage

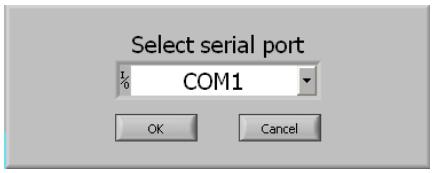
3.1.1 Connect and disconnect

The Buoy tester program requires the use of the buoys serial port or console.

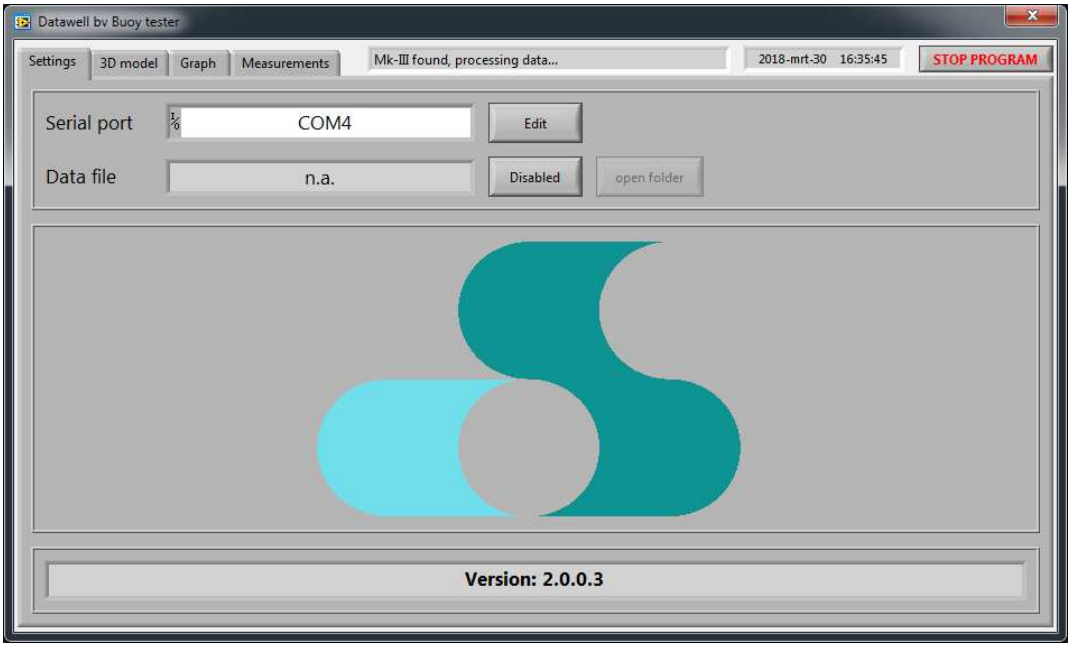
Make sure that the buoy is switched on and connected to the computer serial port before starting the buoy tester program. Also stop/exit the program before disconnecting the serial cable, if not the electronics unit will remain in the startraw(MkIII) or rawout (DWR4) operating mode until the power is cycled or the electronics unit is set into normal mode using the command “stopraw” (MkIII) or “stdout” (DWR4).

3.1.2 Settings

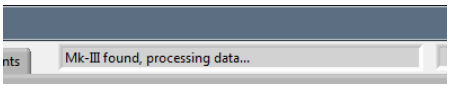
The Buoy tester program uses the serial port of the computer, depending on the configuration of your system this serial port can be a “real” serial port or a virtual serial port created by a “USB to serial port” adapter. The first time you start this program, you are asked to select the serial port that you want to connect to the electronics unit of the buoy.

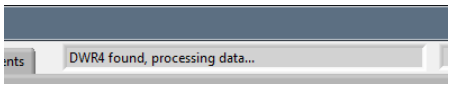


This selection is saved, therefore you don’t have to do this every time you use this program. If you want to change to a different serial port, then click the “edit” button in the settings screen. Be aware that, choosing a different serial port, requires the program to restart.



Visible above all screens is a status indicator. This indicator shows if the computer is receiving valid data from a buoy. It starts with the text “Initializing…” and will (depending on the data received) show MkIII or DWR4 found once valid data is received.





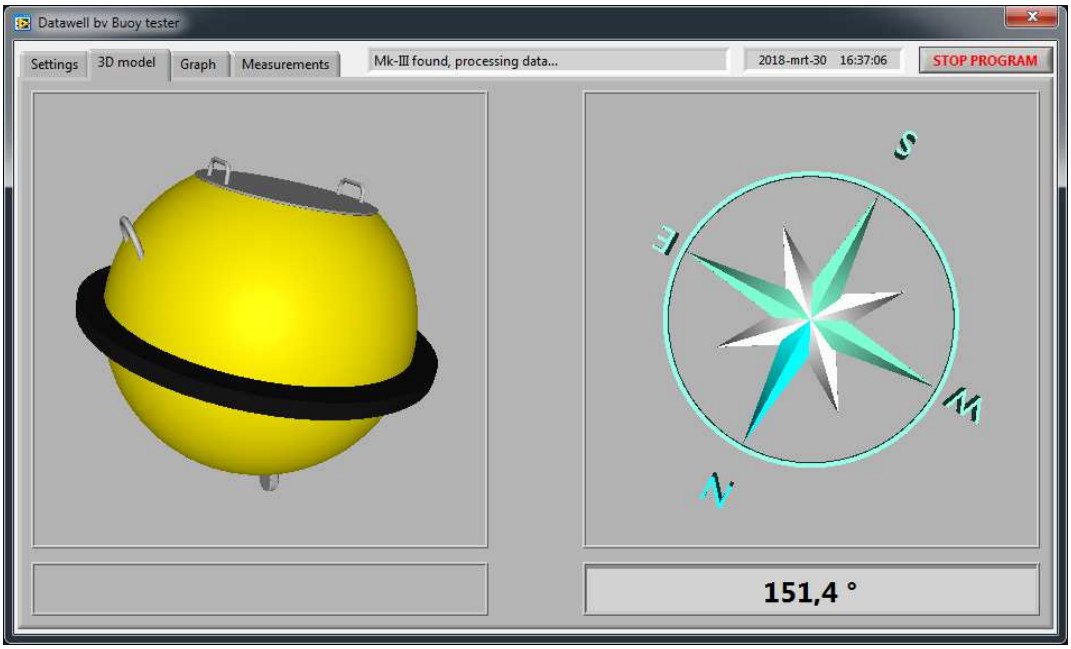
When the electronics unit of the buoy isn’t connected or the electronics unit is not in the startraw (MkIII) or rawout (DWR4) mode then the indicator will show the text “Searching for electronics unit…”. Then the buoy tester program (re)sends the “startraw” and “rawout” commands to the electronics unit. It repeats this, every 5 seconds, until data is received.

When the Buoy tester program is stopped/closed, the command “stopraw” and “stdout” are automatically send to the buoy. This stops the rawout messages and returns the buoy to its normal state. If for some reason the buoy does not receives this command (for example the serial connection was already removed) then the buoy remains in the rawout-mode. This does not affect the functionality of the buoy, however it makes further use of the console impossible. In order to manually terminate the rawout mode simply type the command “stopraw” (MkIII) or “stdout” (DWR4) in your terminal screen or remove power from the electronics unit for at least 10 seconds.

The settings page also shows a “Data file” indicator. This indicator shows the filename of the data file that is being generated by the program. This data file is described further on in the manual.

3.1.3 3D model

This screen holds display the buoys sensor information in the most intuitive manor. When you tilt the buoy you will immediately see 3D representation of the buoy tilt in the same direction. Also rotating the buoy will cause the 3D model to rotate as well as the compass. The 3D model of the buoy shows pitch, roll and yaw and the compass shows the yaw or to be more precise, the orientation. Below the compass is the orientation of the buoy shown in degrees, the front of the buoy is looking into that direction.



The compass must be interpreted in the following way. Visualise yourself that the display showing the compass is placed flat onto the buoy where the top of the screen is pointing towards the serial number of the hull. In that situation the compass will always point with the N towards North, just as if you’ve placed a real compass on top of the buoy.

3.1.4 Graph

This screen holds display the buoys sensor information in a graph. Graphs can be useful to indicate the trend of signals that change slowly over time. The screenshot shows the situation where a stationary buoy is moved into various a different positions.

The axis scale(s) of the graphs are not always of the preferred value. Sometimes the signals are simply too small to properly see, in that case the scale of the graph needs to be adjusted. There are two ways to do this. One way would be to automatically rescale the graph based on the displayed data. Select this mode by moving your mouse onto the Y-axis of the graph and by pressing the right-mouse button a menu will appear. Now select the automatic mode for the desired axis, the graph will now automatically adjust the axis scale to fit the graph.

Another method would be by manually changing the values of the axis scale. Just move the mouse pointer to the min. or max. value of the graph. Then click the left mouse button, you will now be able to edit the scale value to any value.

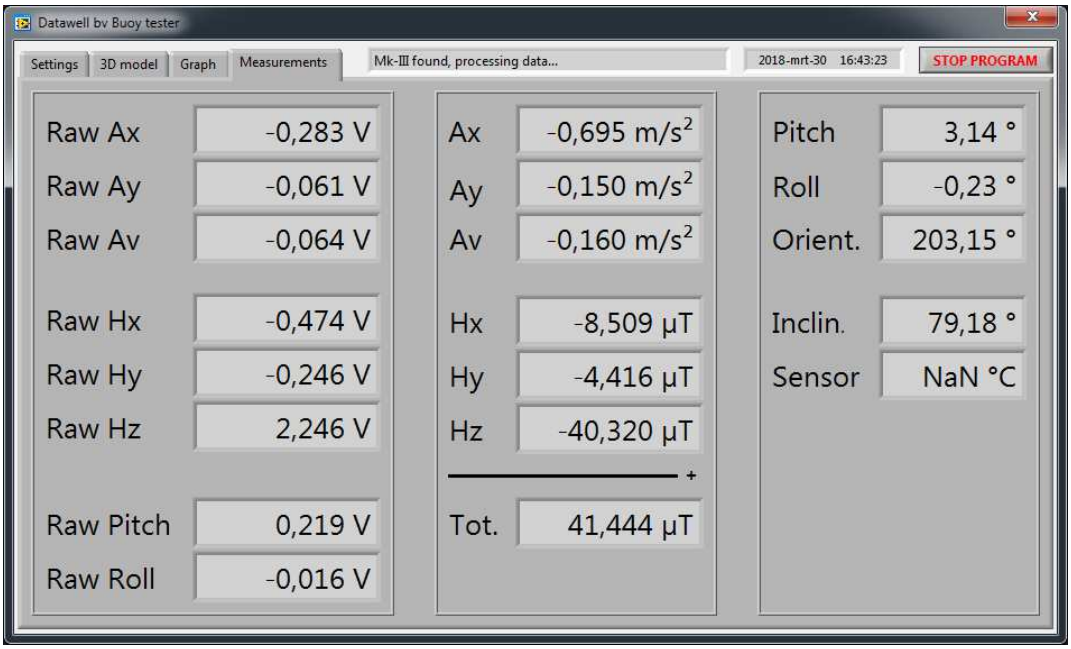
The changes to the graphs axis scale(s) are not saved, meaning that the next time the program is started, the scales will look like the screen as shown in the image above.

3.1.5 Measurements

This screen holds the most basic representation of the buoys sensor data. The screen is divided into 3 separate columns. The first column shows the raw values, the sensor data is represented in volts. Because the buoy digitizes these signals directly from the sensor a breakout box is no longer required to get this information when using this program. This program shows you a complete overview of all measured signals in raw and processed format, where in the breakout box you would require a least 8 voltmeters in order to get the raw information.

But raw information (mostly) isn't very practical, therefore it is also shown in the proper units visible in the second column. This column also shows a "Total" value. This value is the total of the magnetic flux passing through the compass of the buoy. Considering that the magnetic flux passing through the compass is the same for all possible positions of the compass, this value is a great indicator to show the functional state of the 3 channels of the compass. If this total varies greatly, when rotating/tilting the buoy, then the compass has a defect or the magnetic field around the buoy is greatly distorted (caused by for instance: nearby large/heavy metal objects, strong magnets, powerful electric machinery).

The third column shows the information derived/calculated from the raw sensor data. Also the sensor temperature is shown (DWR4 buoy only). This is the temperature of the accelerometer sensor, as long as this value is between -5°C and +40°C your sensor is safe.



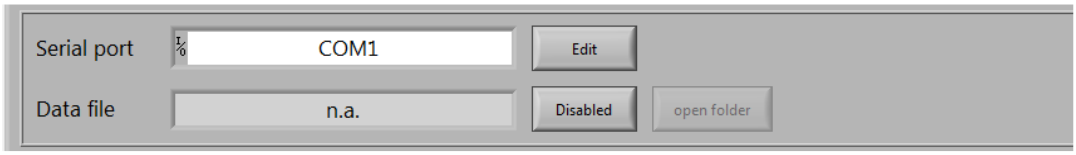
Note: the values in the image above are not representing a real-life situation

4 Data file

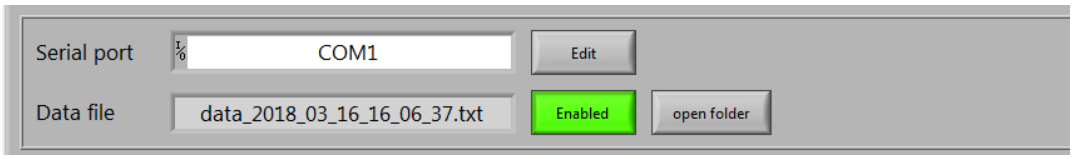
In some cases, showing the data on a screen, is not enough. Therefore the buoy tester software also can store the data received from the buoy to a data file. This allows for further processing of the data from the buoy.

All the data that is shown in the “measurements” page is stored to a data file. But this is not by default. In order to enable the saving of the buoys data to the data file, the user must enable this by clicking on the enable/disable button in the “settings” page.

Shown below is the situation where the saving of the data is disabled. The indicator with the filename of the data file is set to n.a. (not applicable).



Shown below is the situation where the saving of the data is enabled. The indicator with the filename is filled with the name of the file and the enable/disable button is bright green. The button “open folder” is also enabled and by clicking this button an explorer window is opened to the path of the data files, allowing the user easy access to all data files.



When the saving of data has been enabled and the user has enough data then the saving of data can be disabled by clicking on the enable/disable button. The user may also directly stop the buoy tester program, by closing the program window or by pressing the “stop program” button.

4.1 File location

The data file generated by the buoy tester software is saved to the “my documents” folder on the PC. This folder is a folder directly coupled to the login name of the user and allows the user to read/write and modify without authorisation problems. To indicate the path of this file the “settings” page has an indicator showing the filename of the data file.

The filename is automatically generated. And to prevent overwriting previous files, a timestamp is embedded in the filename. This way the files will be always sorted in correct order and can be easily found. The filename looks like: data_<YYYY>_<MM>_<DD>_<HH>_<MM>_<SS>.txt
The timestamp indicates the moment of the first line of data in the file.

4.2 File size

The buoy tester software generates data at a rate of 2.5Mbyte/hour. Though for modern standards this is not much. However it is something to be kept for situations where the program is to be used for long periods of time, because the buoy tester program does not remove these data files when hard-disk space runs low. It is up to the user to maintain the data in the “my documents” folder and to manually remove files if hard disk space runs low.

4.3 File contents

The data file is set up as a text file, were the data is defined in columns and each column is separated by a tab.

The first line is a header line and shows the meaning and unit of each column. Because of the %-sign the header line can be ignored automatically by some spreadsheets and/or data processing software. For instance the program “octave” will ignore everything behind the %-sign and will therefore not process the first line.

The second line holds the first set of data, this line is the data sampled at the moment of the timestamp as used in the file name. The data sampled after that is appended to the file. Data is sampled (and added to the file) at a rate of 5.12Hz.

Below an example of the data file

%Raw_Ax(V)	Raw_Ay(V)	Raw_Av(V)	Raw_Hx(V)	Raw_Hy(V)	Raw_Hz(V)	Raw_Pitch(V)	Raw_Roll(V)	Ax(m/s2)	Ay(m/s2)	Av(m/s2)	Hx(uT)	Hy(uT)	Hz(uT)	Total(uT)	Pitch(deg)	Roll(deg)	Orient(deg)	Incl(deg)	Sensor(C)
-0.153	-0.231	-0.025	-0.051	0.619	2.076	0.203	-0.168	-0.377	-0.567	-0.062	-0.920	11.110	-37.276	38.954	2.92	-2.40	106.59	75.75	17.1
-0.153	-0.231	-0.025	-0.051	0.619	2.076	0.204	-0.168	-0.376	-0.566	-0.061	-0.920	11.114	-37.276	38.907	2.92	-2.40	106.51	75.73	17.1
-0.153	-0.231	-0.025	-0.051	0.619	2.076	0.203	-0.168	-0.376	-0.566	-0.061	-0.920	11.114	-37.276	38.908	2.92	-2.40	106.50	75.73	17.1
-0.153	-0.231	-0.025	-0.051	0.619	2.076	0.203	-0.168	-0.376	-0.566	-0.061	-0.920	11.114	-37.269	38.908	2.92	-2.41	106.50	75.73	17.1
-0.153	-0.231	-0.025	-0.052	0.619	2.076	0.203	-0.168	-0.376	-0.567	-0.062	-0.927	11.110	-37.273	38.902	2.91	-2.41	106.50	75.73	17.1
-0.153	-0.231	-0.025	-0.051	0.619	2.076	0.204	-0.168	-0.376	-0.566	-0.062	-0.924	11.114	-37.269	38.904	2.92	-2.40	106.56	75.73	17.1
-0.153	-0.231	-0.025	-0.051	0.619	2.076	0.203	-0.168	-0.376	-0.566	-0.062	-0.924	11.110	-37.273	38.902	2.91	-2.40	106.51	75.73	17.1
-0.153	-0.231	-0.025	-0.051	0.619	2.076	0.204	-0.168	-0.376	-0.567	-0.062	-0.917	11.114	-37.276	38.904	2.92	-2.41	106.55	75.74	17.1
-0.153	-0.231	-0.025	-0.051	0.619	2.076	0.203	-0.168	-0.376	-0.566	-0.062	-0.924	11.110	-37.269	38.908	2.92	-2.41	106.49	75.73	17.1
-0.153	-0.231	-0.025	-0.051	0.619	2.076	0.203	-0.168	-0.376	-0.567	-0.062	-0.920	11.114	-37.269	38.901	2.91	-2.40	106.50	75.73	17.1
-0.153	-0.231	-0.025	-0.051	0.619	2.076	0.203	-0.168	-0.376	-0.567	-0.062	-0.924	11.114	-37.269	38.902	2.92	-2.40	106.50	75.72	17.1