

DMU Evaluation Kit User Manual

1-10762-001-910



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Document number: 1-10762-001-910

Entitled: DMU Evaluation Kit User Manual

Classification: UNCTD Technology/Tech Data

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1 Introduction

Silicon Sensing produces a range of multi-axis inertial modules including:

- DMU11 - a low cost 6-DOF MEMS Inertial Measurement Unit (IMU)
- DMU41 - a High-Performance 9-DOF MEMS IMU in a smaller package when compared to its predecessor, DMU30, including an in-built magnetometer.

1.1 DMU11

DMU11 is a low cost 6-DOF Precision MEMS Inertial Measurement Unit. It provides three axes of angular rate, 3 axes of linear acceleration, and a temperature output. The output message includes message counter, built-in test results, delta theta and delta velocity information. Data is output on an industry standard RS422 interface for ease of integration. DMU11 is engineered using Silicon Sensing's own unique MEMS VSG5 ring gyroscope and capacitive accelerometer technologies to provide benchmark performance, size and affordability.

DMU11 contains three 5th generation piezoelectric (PZT) gyroscopes and six accelerometers. Outputs from dual accelerometers per axis are combined to improve precision and reduce uncorrelated noise. It has been derived from a previous product, DMU10, as a 'cut down' version of the IMU for higher volume applications where unit cost is paramount.

1.2 DMU41

The latest of a family of High-Performance IMUs (HPIMUs), DMU41 is another ground-breaking, non-ITAR, MEMS IMU for use in applications ranging from unmanned vehicle navigation to surveying and mapping. This latest version offers lower power, smaller size and lighter weight when compared with its predecessor, the DMU30.

It comprises of three of our high performance CHR03 gyros, three of our 5th generation piezoelectric (PZT) gyroscopes and six accelerometers. The dual gyro measurements on each axis are blended together to take advantage of the benefits from each gyro.

2 Evaluation Kits

DMU Evaluation Kits (Figure 1 and Figure 2), enable the output from a DMU to be viewed and logged for testing and evaluation purposes. This user manual covers the DMU11 and DMU41 variants.

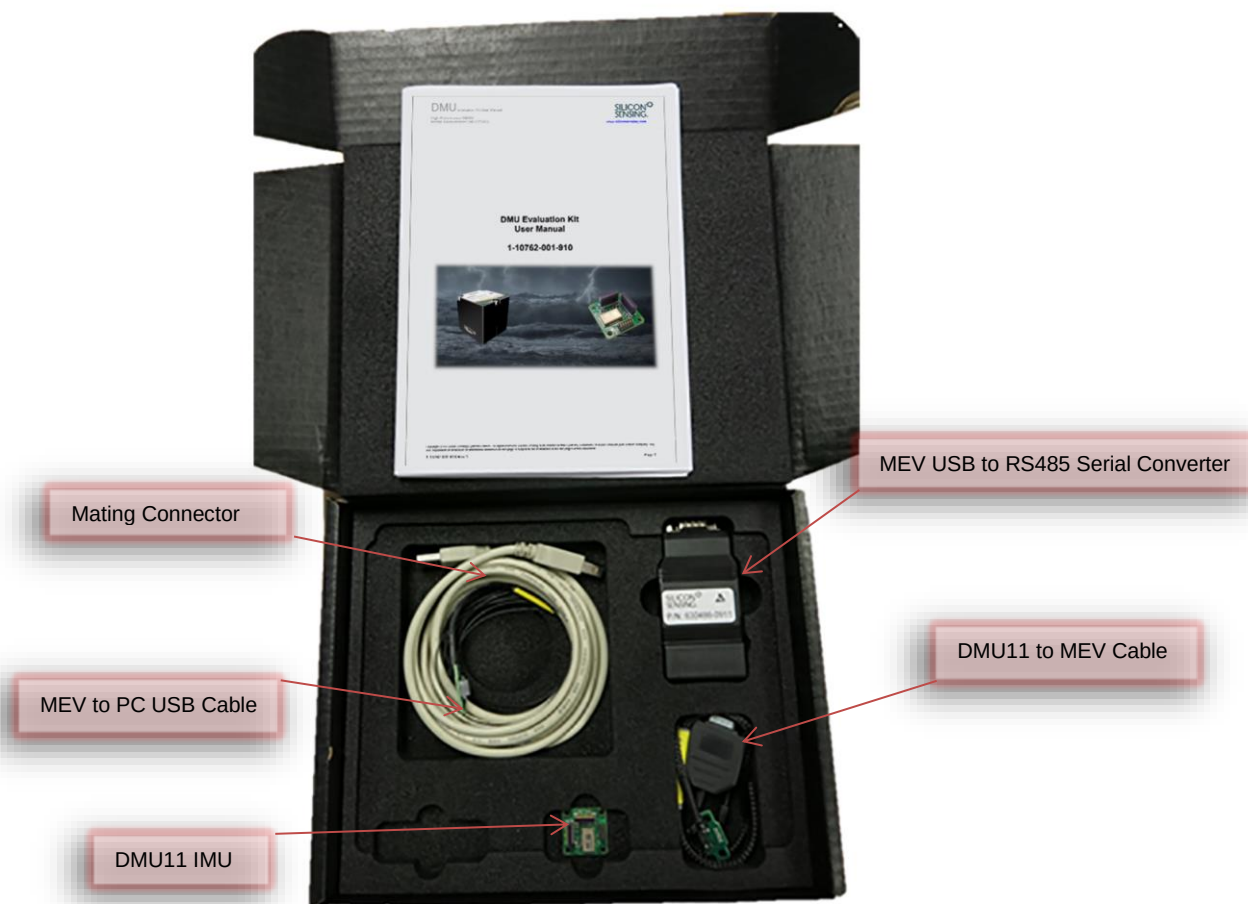


Figure 1: DMU11 Evaluation Kit



Figure 2: DMU41 Evaluation Kit

2.1 Evaluation Kit Downloads

The following are available to download from the Silicon Sensing Website:

DMUXX Evaluation Kit Software:

<http://www.siliconsensing.com/information-centre/downloads-library/>

DMUXX Evaluation Kit User Manual:

<http://www.siliconsensing.com/information-centre/downloads-library/>

The MEV drivers are available to download from the MEV Website:

<http://www.mev.co.uk/pages/Support/Downloads.html>

3 System Requirements

The DMU Evaluation Kit requires a PC with a USB port. The requirements for the PC are as follows:

- Microsoft® Windows® 10 Operating System.
- Minimum of 500 Mb of RAM.
- 500 Mb of free hard drive space plus space for logged data (typical data rate ≈ 50 kbit/s).

For the DMU11 Evaluation Kit, the PC also needs:

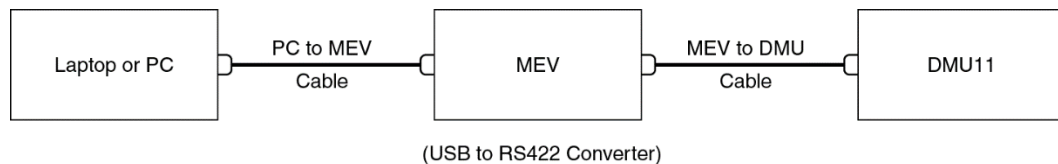
- High power or self-powered USB 2.0 Port.

The DMU41 Evaluation Kit is similar to the DMU11 Evaluation Kit but includes a separate power adapter with interchangeable plugs.

4 Evaluation Kit Contents

The DMU11 evaluation kit contains the following:

- DMU11 IMU
- USB to RS485 (RS422) Serial Converter (MEV or similar)
- Interface Cables.
 - DMU to MEV Cable
 - MEV to PC USB 2.0 Cable
- A Mating Connector Kit with unterminated leads. The kit enables the user to connect the DMU to alternative logging equipment and power supply.



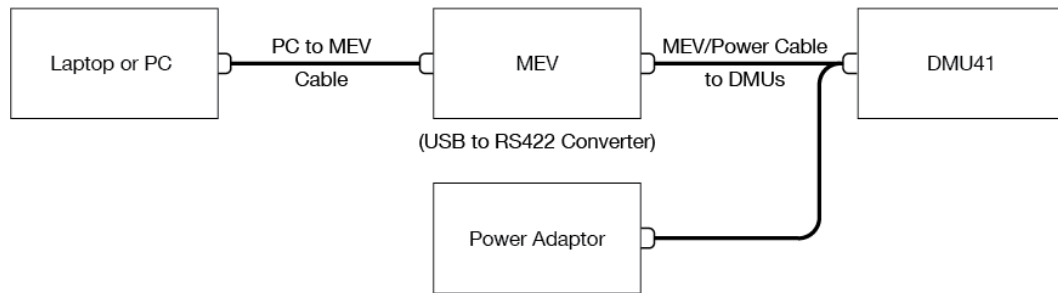
C.G. 18866

Figure 3: DMU11 Kit Interconnection Schematic

The DMU41 Evaluation Kit contains the following:

- USB to RS485 (RS422) Serial Converter (MEV or similar)
- Interface Cables
 - DMU to MEV Cable
 - MEV to PC USB 2.0 Cable
- Power adapter with interchangeable mains plugs to power the DMU41 IMU.

Note: The DMU41 Evaluation Kit does not include a DMU41 IMU.



C.G. 18948

Figure 4: DMU41 Kit Interconnection Schematic

The Evaluation Software to support the kit is available for download at the link provided under Evaluation Kit Downloads.

4.1 DMU

Figure 5 shows an example Dynamic Measurement Unit (DMU11) used with the evaluation kit.

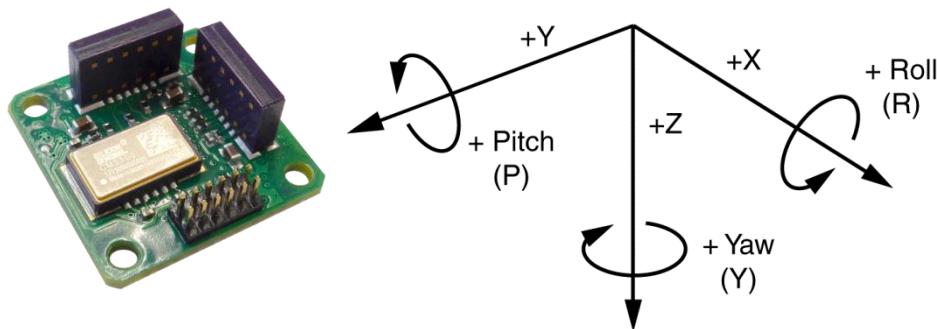


Figure 5: Example DMU

4.2 MEV RS485i USB to RS485 Serial Converter

The USB to RS485 Converter, shown in Figure 6, is manufactured by MEV. Alternative converters may be supplied. Each MEV converter is configured prior to shipment as a RS422. See section 6.2 for more information.



Figure 6: MEV USB to RS485 Converter

The drivers and user manual for the MEV converter are available from the links provided under Evaluation Kit Downloads.

5 Getting Started

5.1 Installation Overview

The software installation program uses the 'ClickOnce' installation format and can therefore be installed onto a PC with administrator rights. Administrator rights are also required whenever the application connects to an individual MEV device for the first time. This is because the application needs to change the MEV default driver settings, which are stored in the HKEY_LOCAL_MACHINE area of the Windows registry. For subsequent connections to that MEV device, the application will not require administrator rights. The recommended installation sequence is therefore:

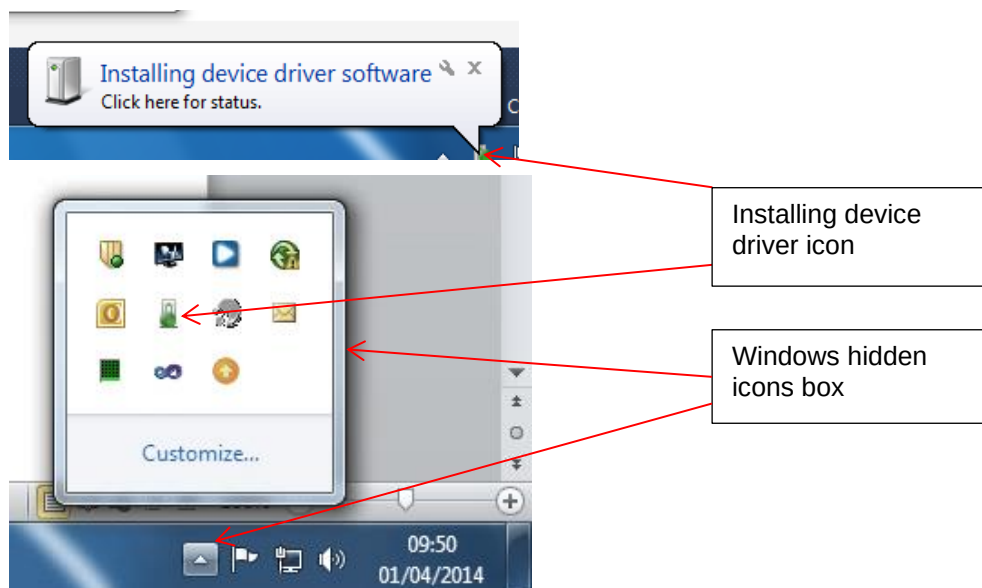
1. Obtain administrator rights on the PC.
2. Install the MEV driver, see section 5.2.
3. Install the software, see section 5.3.
4. The installation procedure automatically runs the application once the installation has completed and at this point you should connect to the installed MEV device using the **Connect** button.

5.2 Installing the MEV RS485i USB Serial Converter Device Driver

5.2.1 Installation Procedure

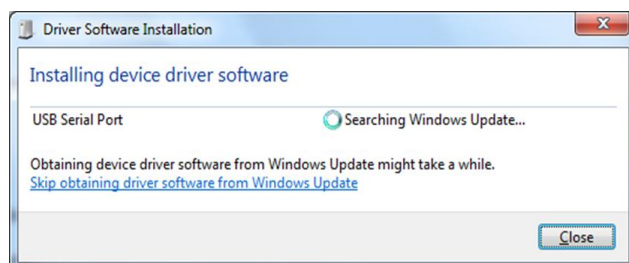
To install the driver, proceed as follows:

1. Ensure that you have administrator rights on the PC.
2. Download `usb_232485_drivers.zip` from the *MEV Drivers* link, see section 2.1. Place the files in a suitable location.
3. Plug the MEV RS485i device into a USB port and when the dialog below appears, be ready to click it or, if it disappears, click the animated icon that it is attached to. Note that in Windows 10 this icon can disappear into the hidden icon box when the dialog disappears.

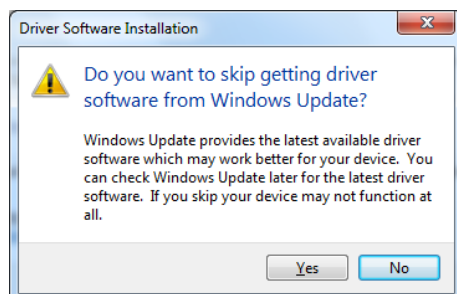


4. When the dialog shown below appears, click **Skip obtaining driver software from Windows Update**.

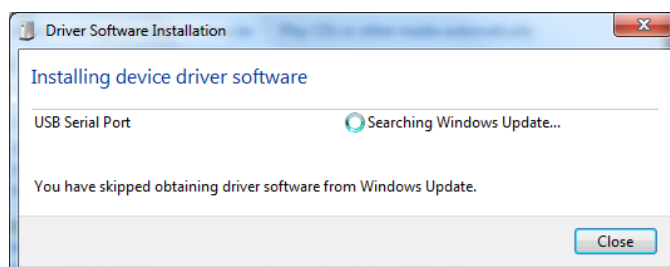
If the PC has an internet connection, you can wait for the latest driver to be found via Windows Update. In which case, you can skip to step 7 of this procedure. Note however that if a newer driver version is loaded, the software may not have been tested with this driver version.



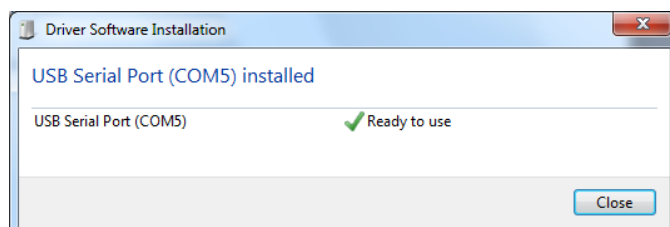
5. Click **Yes** when the following dialog appears.



6. The following dialog should then appear. Do not click **Close** because the installation program has not yet completed.



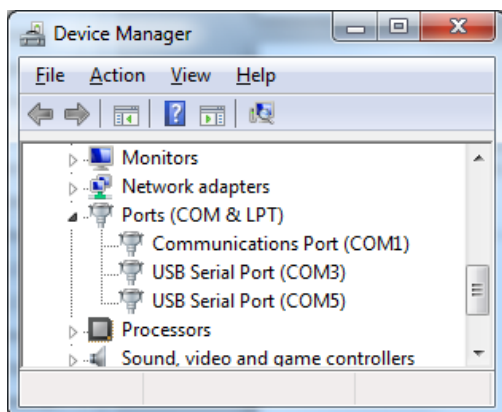
7. The installation program should then locate the previously installed drivers and you should eventually see the following dialog.



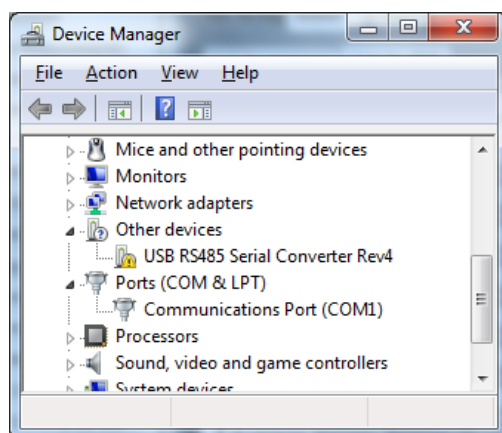
8. Click **Close** on the above dialog.

5.2.2 MEV Installation Troubleshooting

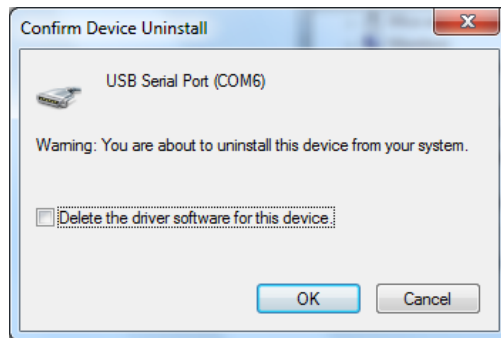
Correctly installed MEV devices should appear in the Windows Device Manager as USB virtual COM ports. These devices will disappear when the USB cable is removed but should re-appear when it is re-inserted. These same COM ports will appear in the DMUXX Utility serial port drop down list, enabling the application to connect to different MEV devices.



Note that each MEV device appears as a separate COM port and you will need to repeat steps 3 to 8 of the installation procedure for each MEV device plugged into the PC. If an MEV device appears under the **Other devices** heading of **Device Manager** instead of the **Ports (COM & LPT)** heading, then the device is in the process of being installed and you should not unplug it (look for the **Installing Driver** icon in the lower icon bar and follow steps 1 to 8 of the installation procedure).



If you encounter problems connecting to an MEV device using the application's **Connect** button, it is possible that the installation failed. You can repeat an installation by right clicking on the device under the **Ports (COM & LPT)** heading and selecting the **Uninstall** option. When the dialog below appears, click **OK**. You must then unplug the USB cable and then plug it back in to restart the installation procedure (steps 3 to 8) again.



If the MEV is not detected when the USB cable is plugged into the PC, refer to the “USB232/485 Instruction Manual” included in usb_232_485_drivers.zip from the *MEV Drivers* link under Evaluation Kit Downloads.

5.3 Installing the Evaluation Kit Software

The Evaluation Software is available on the Silicon Sensing website given under Evaluation Kit Downloads.

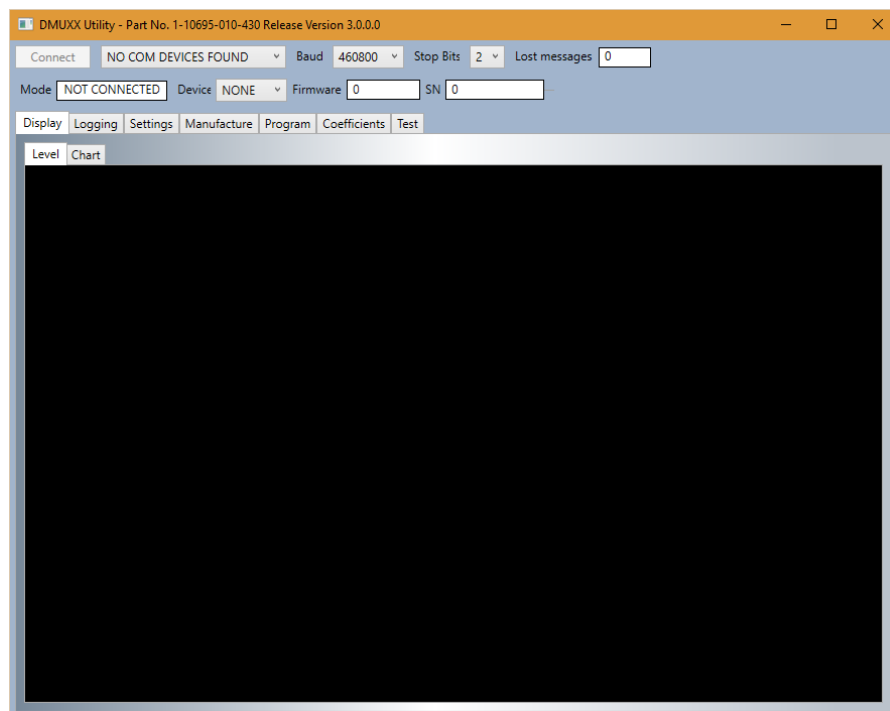
5.3.1 Installation Procedure

5.3.1.1 Uninstalling Previous Versions

If a previous version of the Utility has been installed on the PC, you should un-install it first to prevent two different revisions appearing. There are two methods to uninstall a previous version, depending on whether it's a legacy or current version:

For Legacy Versions

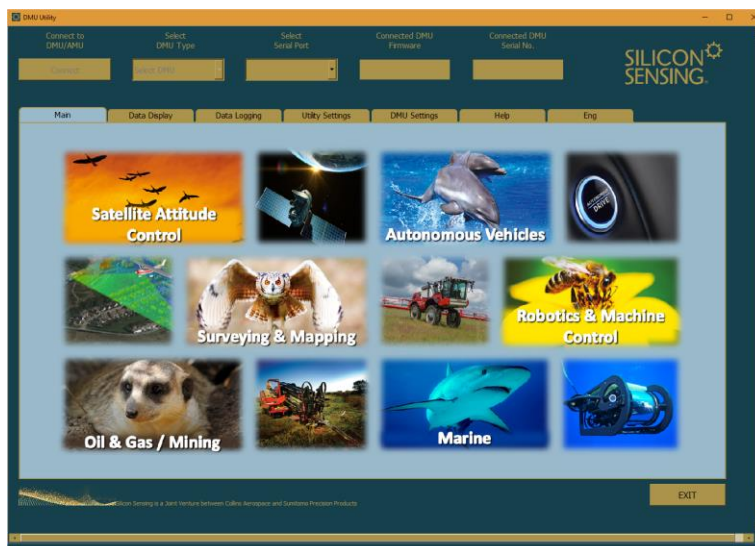
Legacy versions of the Utility are identifiable by their title bars which begin ‘DMUXX Utility – Part No. ...’, see illustration below.



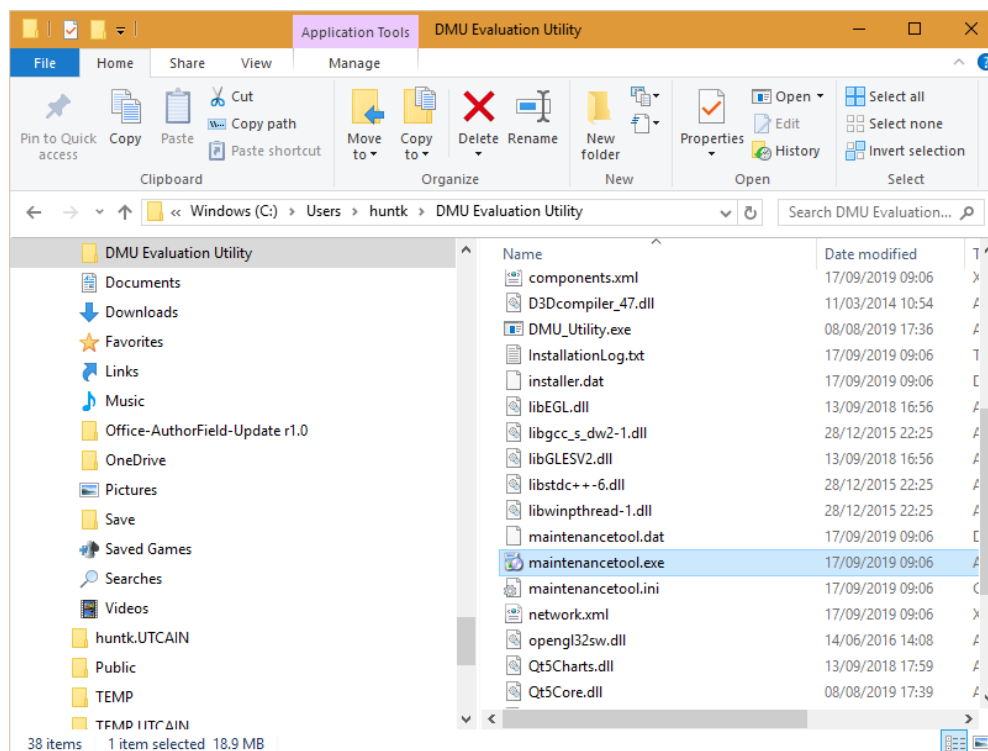
1. To uninstall a legacy version select Control Panel | Programs | Uninstall a program to open the Uninstall or change a program dialog.
2. Left click on the DMUXX program, select Uninstall/Change and click OK to remove the application from the PC.

For Current Versions

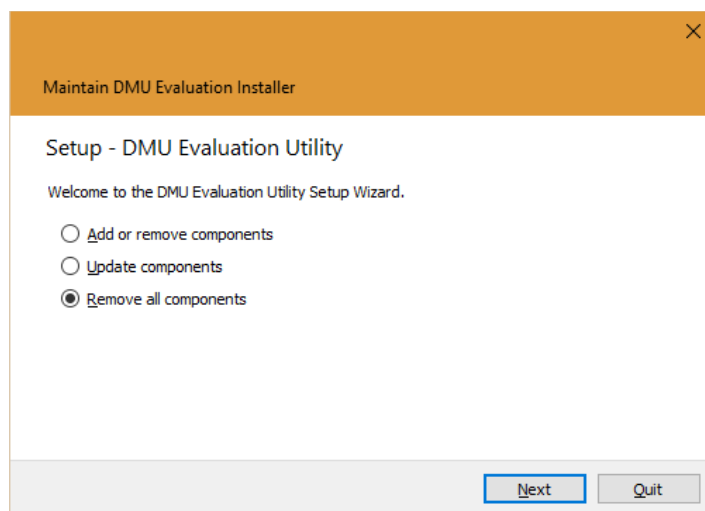
Current versions of the Utility are identifiable by their title bars which begin 'DMU Utility', see illustration below.



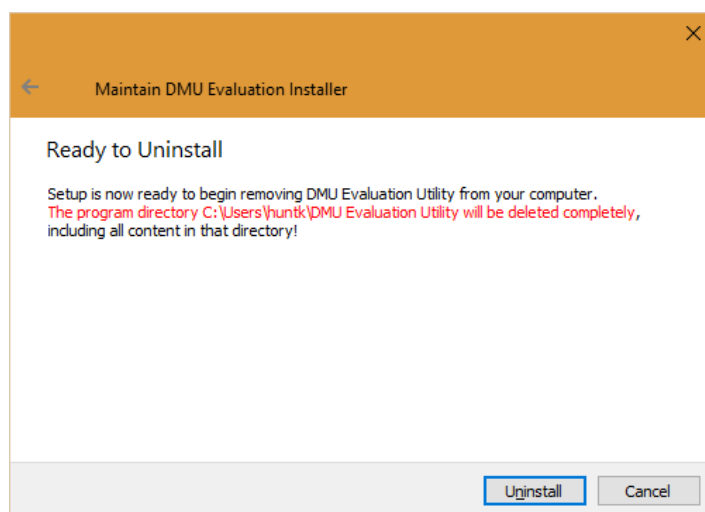
1. To uninstall a current version locate the existing installation directory and click on file 'maintenancetool.exe'.



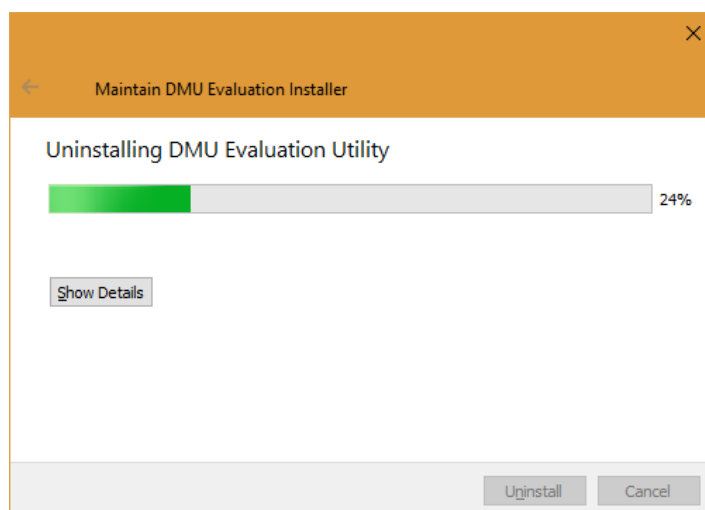
2. Select 'Remove all components' and click **Next**.



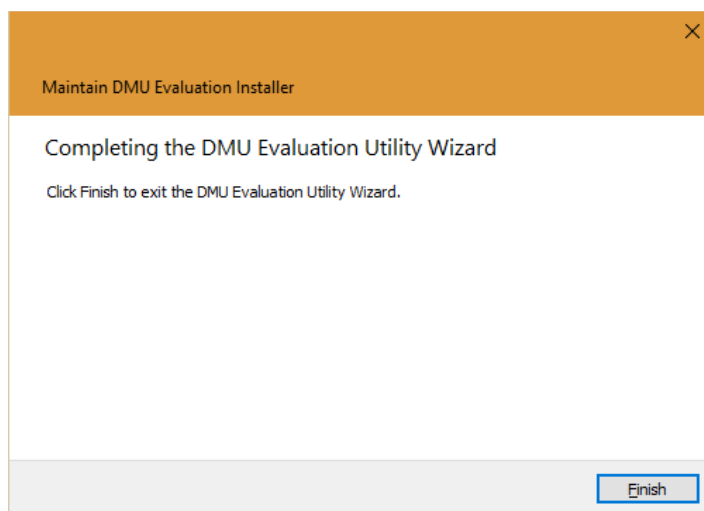
3. At the 'Ready to Uninstall' window, click **Uninstall**. The current version will now uninstall.



4. The current version commences its uninstall process



- Click **Finish** to complete the uninstall process.



5.3.1.2 Installing a New Version

- If you have not already installed the MEV device driver, you should do this now (see section 5.2), and then ensure that the MEV device is plugged into a USB port on the PC.
- To download the current Evaluation Software, refer to the links listed previously under Evaluation Kit Downloads. Follow the steps shown below to download the correct software.

Home > Information Centre > Downloads Library

Downloads Library

Navigate your way through the document tree below to find the documents relevant to your product selection, then click on the document to open it. Below this is a set of general documentation also available for download.

Products

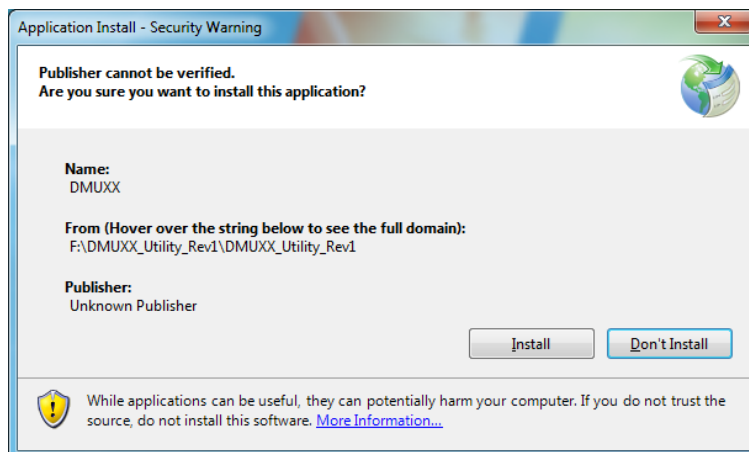


Note: The current Evaluation software is common across the DMU/AMU range. The DMU11 route shown is one method to obtain the download.

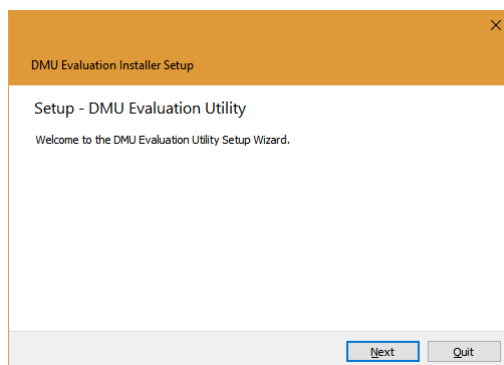
- Invoke the 'DMUEvalUtilInstaller.exe' file.

Depending on how administrator rights are managed on some installations, you may need to select Setup.exe in its folder (it must be highlighted) and then right click and select the **Run as administrator** option in order to ensure that the installation is run with administrator rights.

You may see the following message displayed because the software is proprietary to Silicon Sensing Systems Ltd and has not been registered with Microsoft.

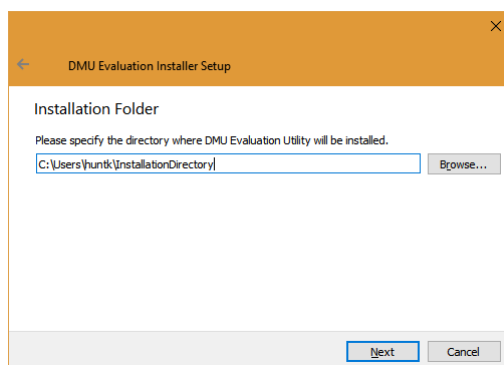


4. Click **Install** to run the DMU Evaluation Utility Setup Wizard. The installation should then proceed with the following dialog:



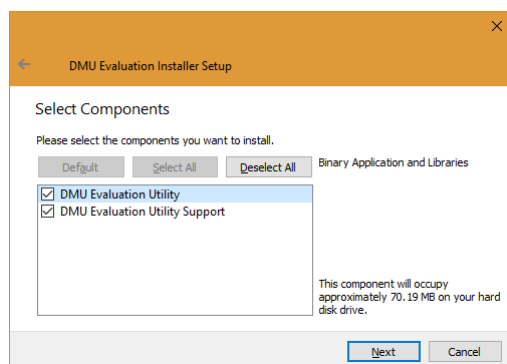
Click **Next**.

5. Select the required location of the Installation folder:



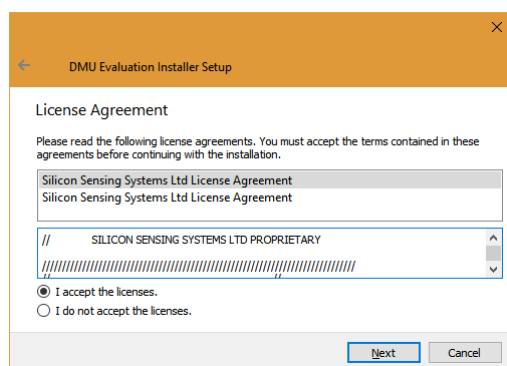
Click **Next**.

6. Select both required components to install:



Click **Next**.

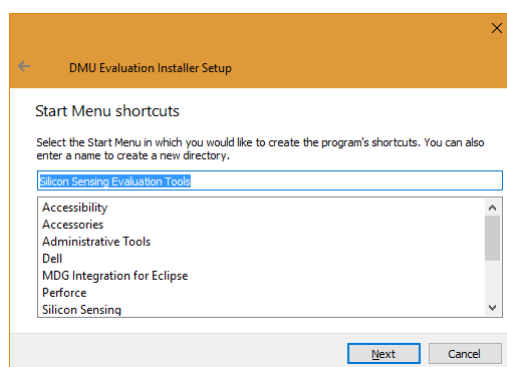
7. Check the License Agreement:



You must accept the terms contained in the agreements before continuing with the installation.

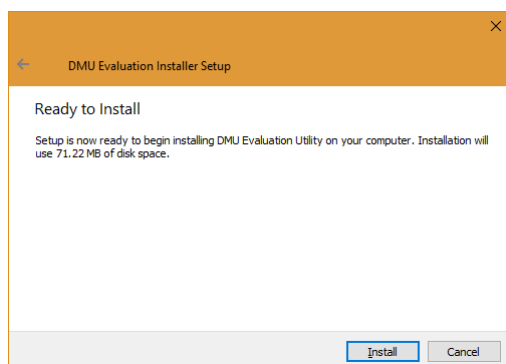
Click **Next**.

8. Select Menu Shortcuts:



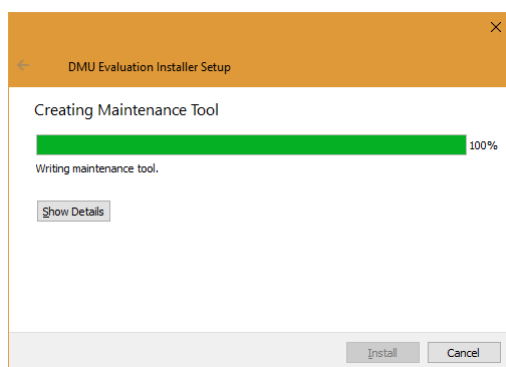
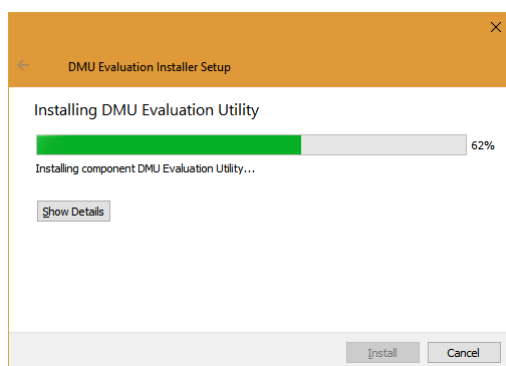
Click **Next**.

The setup is now ready to install.

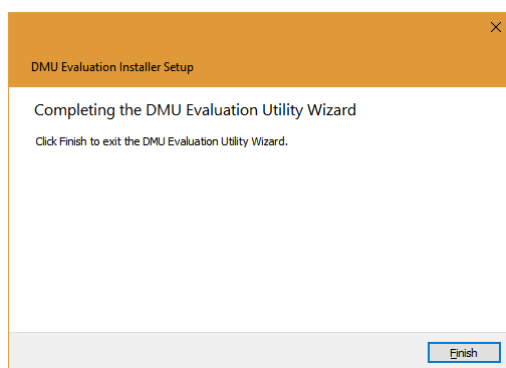


Click **Install**.

The software will install at the folder location chosen in step 5.



Allow installation of the Maintenance Tool



Click **Finish**.

9. The software installation process is now complete.

5.4 Using the Evaluation Utility

5.4.1 Starting the Evaluation Utility and Validating the DMU Connection

1. Connect the DMU to a PC as shown in the relevant schematic. For DMU11, refer to Figure 3 and for DMU41, refer to Figure 4.
2. To start the application in Windows 10, click the Start icon, , navigate to the shortcut selected under Installation Procedure, Step 8 and select the '**DMU_UTILITY**' shortcut icon. Alternatively, navigate to the installation directory (Installation Procedure, Step 8) and click on file '**DMU_UTILITY.exe**'.
3. Select the required DMU type from the 'Select DMU Type' drop down menu, refer to Figure 7.
4. Ensure the correct serial port is selected.
5. Ensure the correct configuration of serial Baud Rate and Stop Bits is selected (see Utility Settings Tab).
6. Click **Connect** to establish connection.

The above steps commence validation of the DMU connection and ensures the functionality of all the tab options is available. Once the DMU connection is validated the Firmware and Serial No. is displayed (as shown in Figure 7).

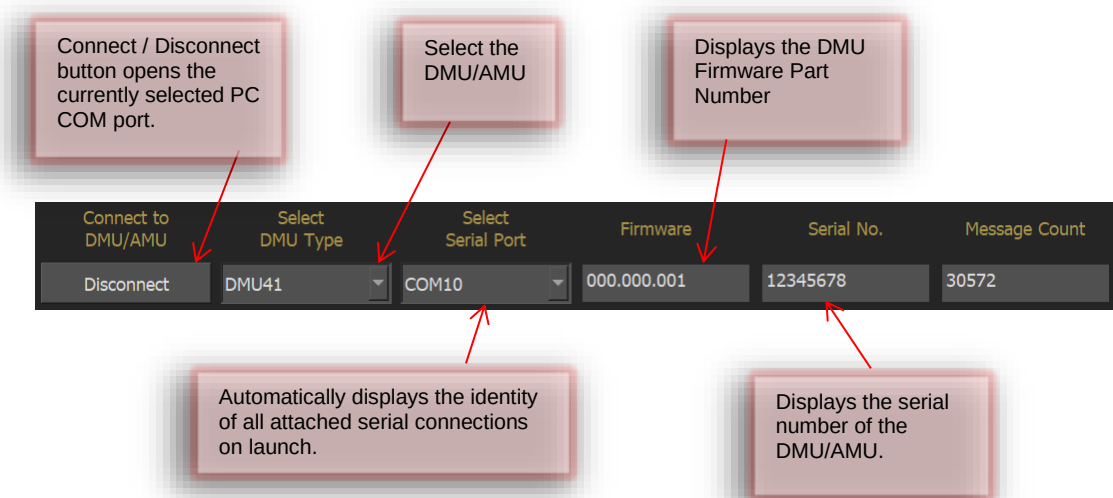


Figure 7: Common Controls

The above controls always remain visible and are used by all Tab pages. Tool tips (help text that appears when you hover the mouse cursor over an enabled control) are provided for each control.

5.4.2 The Evaluation Utility Display

An example of The Evaluation Utility, when operational, is shown in Figure 8.

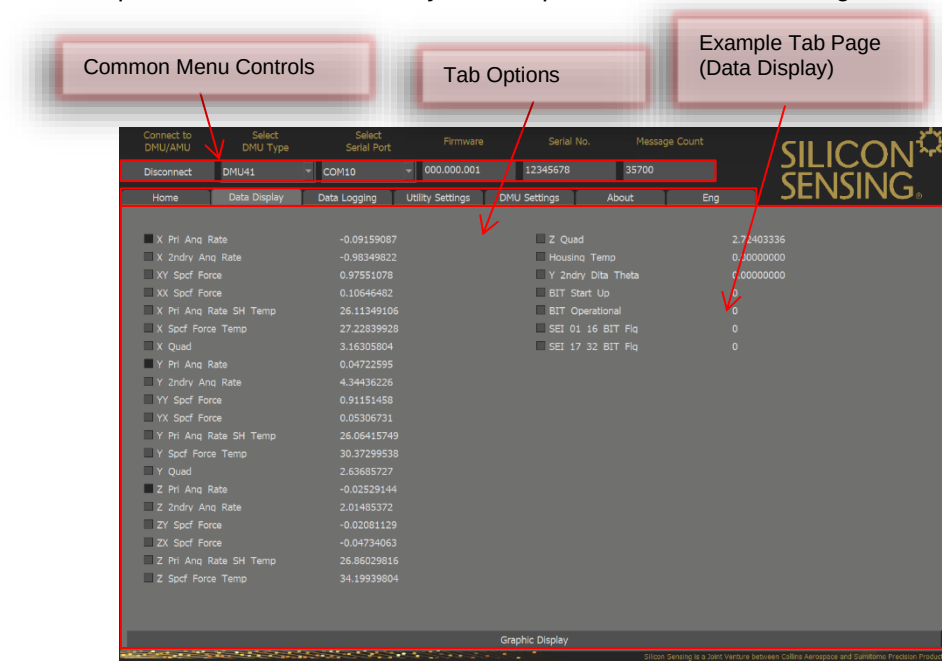


Figure 8: The Evaluation Utility Display

5.4.2.1 Tab Options

There are seven tab options as shown in Figure 8: The Evaluation Utility Display :

- Home
- Data Display
- Data Logging
- Utility Settings
- DMU Settings
- Help
- Eng

The following sections describe each tab in detail.

5.4.3 Home Tab

The **Home** tab is the landing page for the utility.

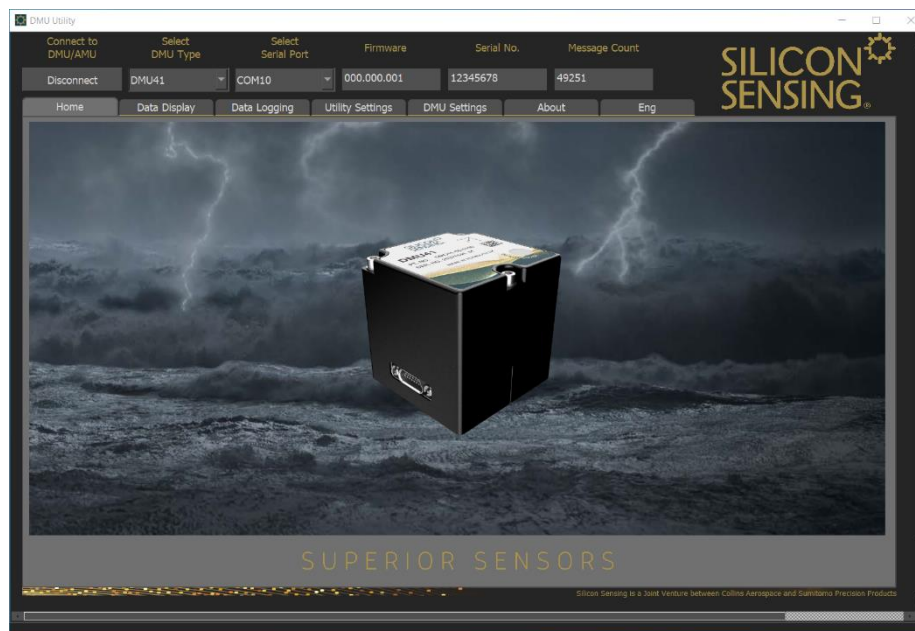


Figure 9: Main Tab

5.4.4 Data Display Tab

The **Data Display** tab displays the DMU/AMU output data in numerical or graphical formats.

5.4.4.1 Numerical Display

The Numerical display shows all the Data Items in a single Message Frame.

The check boxes are used to select groups of Data Items for graphical display.

The DMU Message Frame No appears as the first output in every Message Frame. The Message Frame number resets to zero at 65535.



Figure 10: Numerical Display

5.4.4.2 Graphics Display

The Graphics display shows the outputs from the selected group of Data Items.

The X- axis shows the number of samples over the time period.

The Y-axis shows the current data item limits.



Figure 11: Graphics Display

5.4.5 Data Logging Tab

The **Data Logging** tab enables the DMU data output to be logged in real or averaged time, by count or period for evaluation purposes.



Figure 12: Data Logging Tab Overview

Logging preferences are selected from a settings table which can be saved to, or read from, file. The resultant log file can be saved to a name and location of the user's choice.

	Sample Count	Sample Time	Avg Rate	Msg Rate	Baud Rate	Stop
Row 0	200	1	1	200	480600	2
Row 1	200	1	1	200	480600	2
Row 2	200	1	1	200	480600	2
Row 3	200	1	1	200	480600	2
Row 4	200	1	1	200	480600	2
Row 5	200	1	1	200	480600	2
Row 6	200	1	1	200	480600	2
Row 7	200	1	1	200	480600	2

Select row (click in any row):

Current Row Select: 1

OK Cancel

Figure 13: Settings Table

5.4.5.1 Log File Format

The data is logged in a CSV format. This can be imported into an Excel spreadsheet (see Figure 14) or read using MATLAB® or other similar analysis tools. When the File is imported into MS Excel, the Worksheet is formatted in Columns in accordance with Figure 14: Example Log File. The table shows a typical Message Frame, sent from the Evaluation Kit to the PC, output at 200 Hz, therefore the time between each Message Frame is typically 5 ms.

20191216.csv - Excel

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	AMU30	191301010	0.23.1																					
2	SmpL_Chr	X_Bind_Rate	X_Accel	Y_Bind_Rate	Y_Accel	Z_Bind_Rate	Z_Accel	Aux_Is_V	Ang_CRHS2_Temp	X_Bind_Dtla	Thera	X_Dtla_Vel	Y_Bind_Dtla	Thera	Y_Dtla_Vel	Z_Bind_Dtla	Thera	Z_Dtla_Vel	SS_BIT	Fig	50_BIT	F	SEL_01_16_BIT	Fig
3	24143	-4.27E-02	6.58E-03	-1.73E-02	-8.84E-04	-1.08E-01	-1.10E+00	1.40E-02	3.20E+01	2.13E-04	3.21E-04	-8.84E-05	-3.33E-05	-5.38E-04	-4.91E-02	0	0	0	1.43E-01	2.87E-01	1.85E+02	-5.05E-01	5.33E-02	7.17E-01
4	24144	-5.78E-02	5.83E-03	2.38E-02	-8.89E-04	5.84E-02	-9.98E-01	1.43E-02	3.20E+01	-2.89E-04	2.88E-04	1.29E-04	-4.38E-05	2.92E-04	-8.89E-02	0	0	0	1.43E-01	2.87E-01	1.85E+02	-4.98E-02	5.38E-02	7.22E-01
5	24145	-5.06E-02	6.95E-03	-1.83E-02	-2.59E-03	2.59E-02	-9.99E-01	1.43E-02	3.20E+01	-2.53E-04	1.40E-04	9.22E-05	-1.27E-04	1.29E-04	-4.90E-02	0	0	0	1.43E-01	2.87E-01	1.85E+02	-5.04E-01	5.38E-02	7.28E-01
6	24146	-2.68E-02	8.10E-03	4.57E-02	-3.17E-03	3.59E-02	-1.10E+00	1.39E-02	3.20E+01	1.34E-04	5.97E-04	2.28E-04	-1.55E-04	1.80E-04	-4.90E-02	0	0	0	1.43E-01	2.87E-01	1.85E+02	-5.06E-01	4.97E-02	7.22E-01
7	24147	-3.49E-02	5.03E-03	2.83E-02	-1.72E-03	-3.39E-02	-1.10E+00	1.40E-02	3.20E+01	-1.75E-04	2.46E-04	1.43E-05	-6.45E-05	-3.70E-04	-4.90E-02	0	0	0	1.43E-01	2.87E-01	1.85E+02	-5.03E-01	5.08E-02	7.22E-01
8	24148	3.29E-02	7.37E-03	3.18E-02	-1.38E-03	-6.40E-02	-9.99E-01	1.40E-02	3.20E+01	1.65E-04	1.61E-04	1.58E-04	-6.88E-05	-4.20E-04	-4.90E-02	0	0	0	1.43E-01	2.87E-01	1.85E+02	-5.03E-01	5.08E-02	7.22E-01
9	24149	-4.25E-02	6.66E-03	1.32E-02	4.38E-04	-7.51E-03	-1.10E+00	1.43E-02	3.20E+01	-2.12E-04	3.26E-04	5.50E-06	2.14E-05	-3.75E-05	-4.90E-02	0	0	0	1.43E-01	2.87E-01	1.85E+02	-5.01E-01	4.83E-02	7.21E-01
10	24150	-8.74E-03	7.93E-03	-2.61E-02	-1.75E-03	2.98E-02	-9.99E-01	1.39E-02	3.20E+01	-4.37E-05	3.88E-04	1.20E-04	-6.37E-05	1.46E-04	-4.89E-02	0	0	0	1.43E-01	2.87E-01	1.85E+02	-5.03E-01	5.44E-02	7.21E-01
11	24151	1.77E-02	7.88E-03	7.99E-02	-2.13E-03	-2.78E-02	-9.98E-01	1.40E-02	3.20E+01	8.84E-05	3.91E-04	3.99E-04	-1.05E-04	-1.39E-04	-4.89E-02	0	0	0	1.43E-01	2.87E-01	1.85E+02	-5.07E-01	5.53E-02	7.14E-01
12	24152	1.28E-01	7.51E-03	-1.50E-02	-2.18E-03	-8.72E-03	-1.10E+00	1.40E-02	3.20E+01	6.42E-04	1.68E-04	-5.50E-04	-1.07E-04	-4.34E-05	-4.90E-02	0	0	0	1.43E-01	2.87E-01	1.85E+02	-5.01E-01	5.14E-02	7.22E-01
13	24153	-1.17E-01	7.61E-03	-8.61E-03	-7.44E-04	-7.86E-02	-1.10E+00	1.43E-02	3.20E+01	-5.82E-04	3.75E-04	-4.45E-05	-3.64E-05	-3.93E-05	-4.90E-02	0	0	0	1.43E-01	2.87E-01	1.85E+02	-5.01E-01	5.14E-02	7.22E-01
14	24154	5.73E-02	6.62E-03	-6.63E-03	-2.31E-03	3.61E-02	-1.10E+00	1.40E-02	3.20E+01	2.86E-04	3.24E-04	-3.31E-05	-1.13E-04	1.80E-04	-4.90E-02	0	0	0	1.43E-01	2.88E-01	1.85E+02	-5.01E-01	5.14E-02	7.21E-01
15	24155	-1.14E-02	7.12E-03	-4.48E-02	-1.89E-03	-1.50E-02	-9.99E-01	1.39E-02	3.20E+01	-5.81E-05	3.49E-04	-2.24E-04	-9.28E-05	-7.51E-05	-4.89E-02	0	0	0	1.43E-01	2.88E-01	1.85E+02	-4.99E-01	5.67E-02	7.22E-01
16	24156	1.34E-02	6.61E-03	-1.88E-02	-1.78E-03	-3.70E-02	-1.10E+00	1.40E-02	3.20E+01	6.71E-05	3.94E-04	-5.90E-05	-9.71E-05	-1.89E-04	-4.90E-02	0	0	0	1.43E-01	2.88E-01	1.85E+02	-4.99E-01	5.67E-02	7.19E-01
17	24157	-2.35E-02	6.70E-03	6.29E-02	-1.42E-03	4.42E-02	-1.10E+00	1.39E-02	3.20E+01	-1.17E-04	3.28E-04	3.14E-04	-6.95E-05	2.21E-04	-4.90E-02	0	0	0	1.43E-01	2.88E-01	1.85E+02	-4.99E-01	5.67E-02	7.19E-01
18	24158	-3.59E-02	7.49E-03	1.94E-02	-2.12E-03	-8.22E-02	-9.99E-01	1.43E-02	3.20E+01	-1.80E-04	1.67E-04	9.87E-05	-9.91E-05	-4.10E-04	-4.89E-02	0	0	0	1.43E-01	2.88E-01	1.85E+02	-5.02E-01	5.14E-02	7.29E-01
19	24159	7.39E-03	7.69E-03	-4.08E-02	-2.11E-03	1.20E-02	-1.10E+00	1.40E-02	3.20E+01	5.69E-05	3.75E-04	2.04E-04	-1.03E-04	3.99E-05	-4.90E-02	0	0	0	1.43E-01	2.88E-01	1.85E+02	-5.01E-01	5.44E-02	7.22E-01
20	24160	-2.04E-02	7.61E-03	-3.31E-02	-2.90E-03	-8.12E-02	-1.10E+00	1.40E-02	3.20E+01	-1.02E-04	3.75E-04	-1.66E-05	-1.42E-04	-4.06E-04	-4.91E-02	0	0	0	1.43E-01	2.87E-01	1.85E+02	-4.99E-01	5.44E-02	7.23E-01
21	24161	-1.14E-02	6.10E-03	-7.54E-03	-1.95E-03	8.08E-02	-1.10E+00	1.40E-02	3.20E+01	-5.89E-05	2.99E-04	-3.77E-05	-9.37E-05	4.04E-04	-4.90E-02	0	0	0	1.43E-01	2.87E-01	1.85E+02	-4.99E-01	5.44E-02	7.23E-01

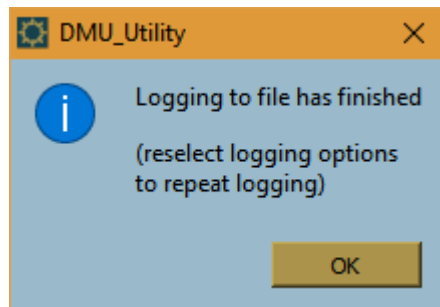
Figure 14: Example Log File

The first line of the log file identifies the type, serial number and firmware version of the DMU/AMU from which data is logged. A comprehensive description, in terms of data types and units, is provided in the Technical Datasheet for each DMU.

5.4.5.2 Log to File

The location that log files are stored in can be set by the user at the File Dialogue box which appears for this tab.

Confirmation that logging to file has finished is indicated by the following message:



Click **OK** to continue.

5.4.6 Utility Settings Tab (Not available in this release)

The Utility Setting tab enables the user to:

1. View the communication settings of a connected DMU/AMU (following validation):
 - a. Baud Rate
 - b. Stop Bits
2. Configure the communication settings of the DMU following a DMU upload:
 - a. Baud Rate
 - b. Stop Bits
 - c. Msg Rate (Hz) (future requirement)

Communication preferences are selected from a settings table which can be saved to, or read from, file. This feature shares the Settings Table illustrated in Figure 13: Settings Table.

3. Configure the messages output in a DMU message frame selecting from a displayed list of available messages.



Figure 15: Utility Settings Tab

5.4.7 DMU Settings Tab (*Not available in this release*)

The **DMU Settings** tab enables the user to configure DMU Coefficients as required (this is a password protected feature).

Note: A valid DMU connection must be in current operation.

Changes are validated against the connected DMU (or file, as selected) before uploading to the connected DMU if required.



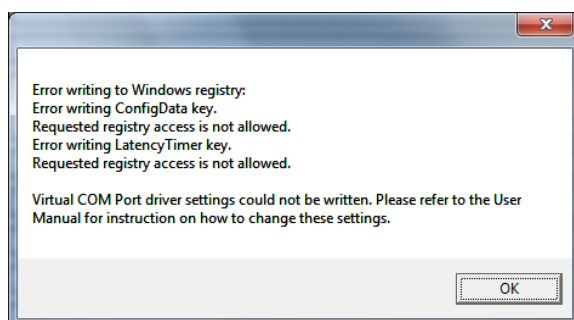
Figure 16: DMU Settings Tab

5.4.7.1 Changing the MEV 485i Driver Settings

To perform correctly the DMUXX evaluation software requires non-default MEV 485i driver settings.

The software will attempt to change them if it detects that they are incorrect.

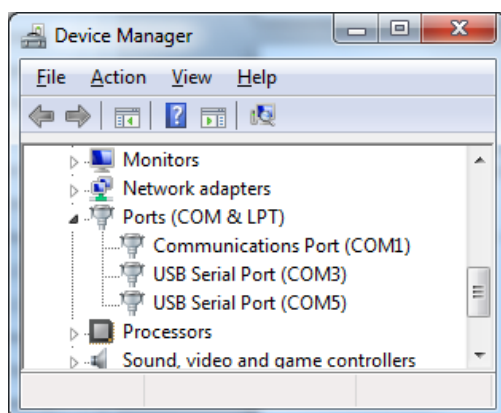
If the software cannot change these settings, it will inform the user by displaying a message.



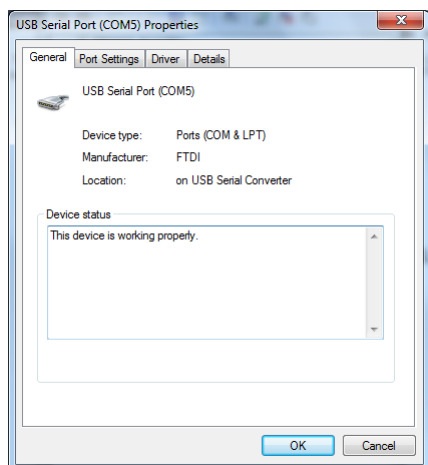
If a message like this appears, follow the procedure below to change the settings:

1. Open **Windows Device Manager**.

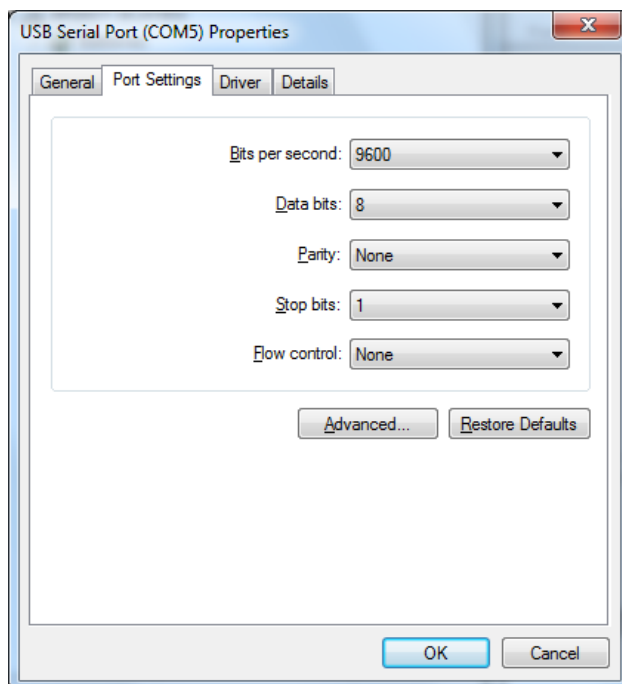
2. Open **Ports (COM & LPT)**.



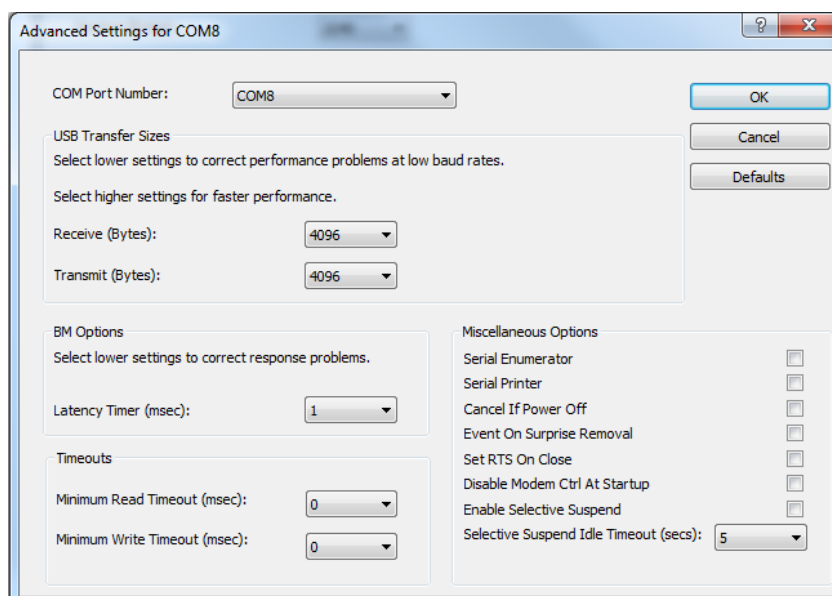
3. Double click the port that requires changing (the COM port that the DMUXX Utility will connect to).



4. Select the **Port Settings** tab.



5. Click **Advanced**. If this results in a message informing you that you do not have write privileges for the registry then you must obtain Administrator rights before continuing with this procedure. Otherwise, change the **Latency Timer (msec)** value to 1 (as shown below).



6. Click **OK** to save these settings.

5.4.8 About Tab

The **About** tab provides software version information and User Help (for future development).

The 'About' box displays the software part number and version:

In the example below, Part number = 1_10762_001_430, Version number = _3



Figure 17: Help Tab

The 'About' box is a feature for future development.

5.4.9 Eng Tab

The **Eng** tab provides progress and status during validation of the connected DMU. For future development.



Figure 18: Eng Tab

6 Troubleshooting

6.1 Recommended PC Setup

The USB interface on the PC can result in errors in the USB Message Stream introduced by interruptions by the operating system, resulting in possible loss of partial or complete messages. Such errors, if they occur, can be minimised as follows:

1. Minimising the number of other applications and software running on the PC.
2. Disconnecting the PC from a network or wireless connection.
3. Ensure sufficient PC processing power.
4. Temporarily disabling scheduled virus scans.
5. Disabling all PC power saving options.

Any disruption to the message stream can be observed in the logged files using the message counter, checking for lost data.

6.2 MEV Jumper Settings

The MEV has a number of jumpers on its circuit board numbered JP1-5. These jumpers change the settings of the MEV, details of which can be found in the MEV User Manual. The MEV jumpers can be accessed by opening the MEV at one of the four access points on the side.

You should receive your MEV with the following jumper settings:

Jumper	Setting
1	1-2
2	2-3
3	2-3
4	1-2
5	2-3

These are the settings necessary for correct operation. If you find your MEV has different jumper settings, change them to the settings shown above. Using the MEV with different settings from the table above may result in communication issues between the DMU and the DMUXX software.

6.3 MEV 485i Driver Settings

The MEV 485i driver is for the FTDI USB to serial hardware chip. This is in common use by USB to serial devices. The settings automatically applied by the DMU Utility (or manually by following the procedure described in section 5.4.7.1) are to allow this driver to perform correctly with the DMU Evaluation Software. It is possible that these settings will not be suitable for other USB to serial devices that are using this driver.

If the PC used to run the DMUXX Evaluation Software will be used for other applications that use this driver then it may be necessary to undo (or change) the settings described in section 5.4.7.1.

Note that the performance of the driver software may change between different versions of hardware and software for both the device and the PC. So experimentation with different settings may be required if the settings described in section 5.4.7.1 do not work.

7 Electrical Connections

7.1 DMU11

The interface cable shown in Figure 19 enables the DMU11 to be connected directly to the MEV interface allowing the application to be used immediately.

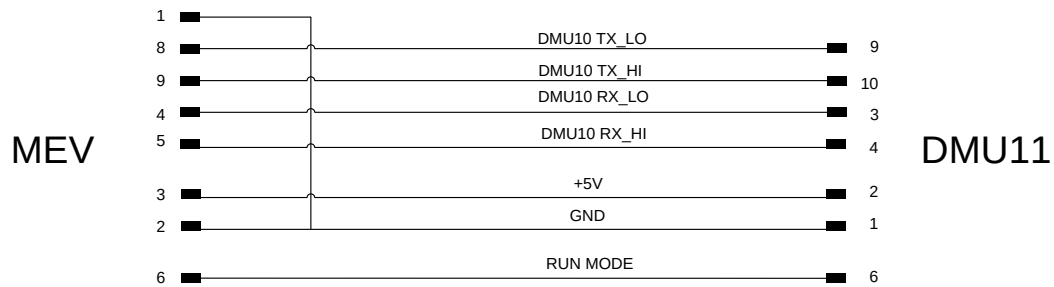


Figure 19: Interface Cable 630486-0941

Should the user wish to connect the DMU to an alternative power supply and logging software, a separate cable is provided within the evaluation kit. This is un-terminated at one end for connection to the Users' equipment and has a connector to connect to the DMU on the other end. Figure 20 and Figure 21 show the pin numbering for the cable.

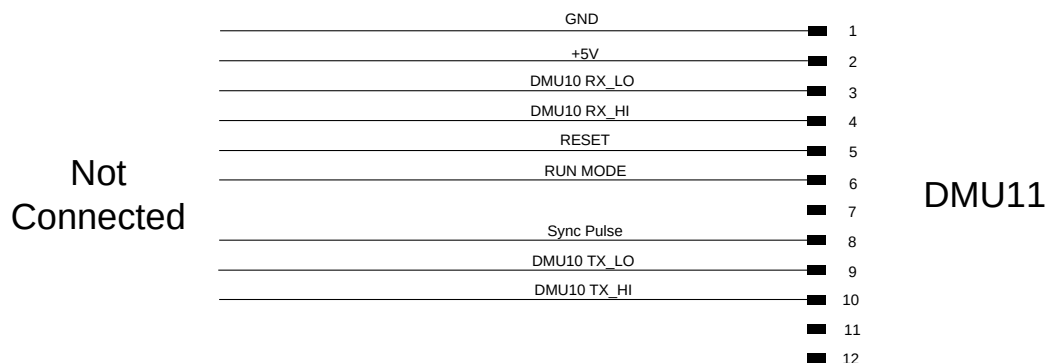


Figure 20: Blank Connector for Customer Use

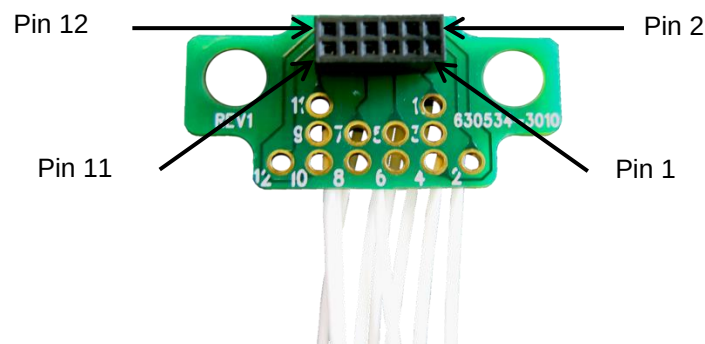


Figure 21: Pin Numbering of the Blank Cable Connector

7.2 DMU41

The interface cable shown in Figure 22 enables the DMU41 to be connected directly to the MEV interface allowing the application to be used immediately.

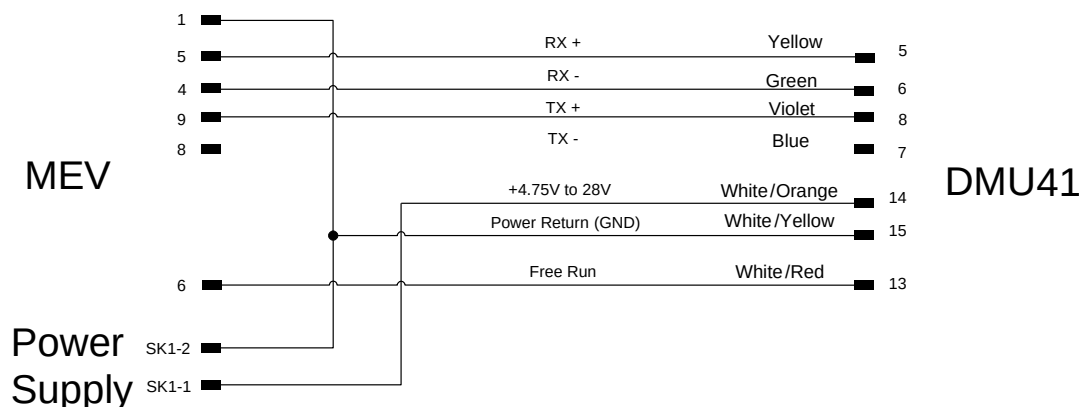


Figure 22: Interface Cable 630567-0941

Should the user wish to connect to the DMU41 to a separate power supply and/or logging software, a 15-way micro D-type connector will need to be purchased (manufacturer part number **MWDM2L-15P-6E5-18**), as it is not included in the evaluation kit. Figure 23 highlights pin numbering of the socket on the DMU41, as seen from above.

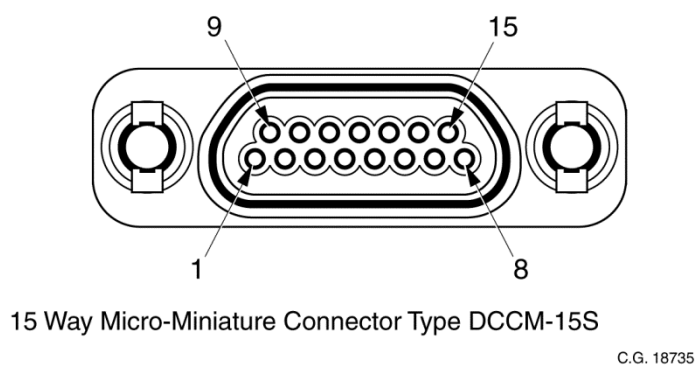


Figure 23: Pin numbering of the DMU41 socket

The interface cable (part number **630567-0941**) has a power plug coming from it. This should be connected to the DMU41 power supply.

8 Mechanical Installation

8.1 DMU11

The installation drawing for DMU11 is shown in Figure 24.

The PCBA is intended to be secured to the host platform using four mounting holes provided. The holes are clearance holes for use with M2.0 machine screws. To provide sufficient clearance it is recommended that spacers are used, these must not extend beyond 'Keep Out' shaded areas indicated on the installation drawing.

The DMU11 mounting screw torque settings will be dependent on the host application; it will for example vary depending on the specification of the screw, the material of the host structure and whether a locking compound is used. When securing a DMU11 unit to the host system using steel M2 screws and a thread locking compound the suggested torque setting is 0.1 Nm for securing to an aluminium host structure. This information is provided for guidance purposes only, the actual torque settings are the responsibility of the host system designer.

During manufacture of DMU11 Silicon Sensing performs internal sensor alignment calibration between the axes of the three combi sensors. This alignment calibration is performed with reference to the Yaw Plane (Z-Axis) via the mounting holes. For best results it is recommended that during installation the DMU11 is aligned to the host platform by the customer by electronically trimming out any difference between DMU11 axes and system level axes.

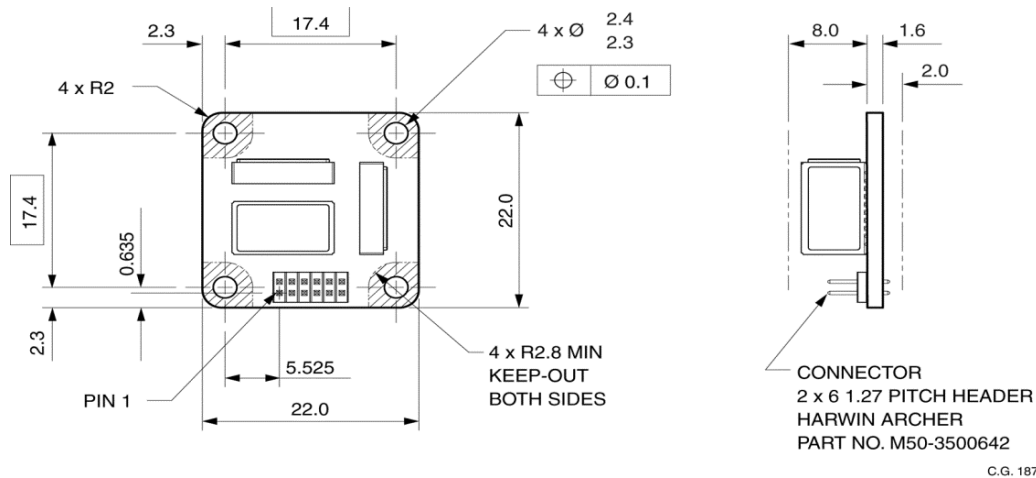


Figure 24: DMU11 Installation

8.2 DMU41

The installation drawing for DMU41 is shown in Figure 25.

Figure 10.1 shows the installation drawing for the DMU41. DMU41 is designed to accommodate 3-point mounting from either the top (standard) or bottom (bulkhead) of the unit. Standard M3 screws should be used when standard mounting is used, with a minimum length of 50mm. Bulkhead mounting uses M4 screws, where the thread engagement is located 14.4mm down the length of the hole. There is a thread depth of 8.0mm available for thread engagement.

The use of dowel holes are critical to achieve alignment and repeatability. Alignment of the part should be with respect to these, using dowel pins. The dowel holes are designed to be used with two Ø3mm (in accordance with BS EN ISO 8734 or BS EN ISO 2338) dowel pins provided by the host.

The DMU41 mounting screw torque settings will be dependent on the host application; it will for example vary depending on the specification of the screw, the material of the host structure and whether a locking compound is used. The suggested torque setting for securing a DMU41 to an aluminium host structure using steel screws and a thread locking compound is 0.2Nm. This information is provided for guidance purposes only. The actual torque settings are the responsibility of the host system designer. The DMU41 should not be disassembled. This could compromise the calibration and will invalidate the warranty.

9 Contact Details

If you require any additional information about the DMU EVK or any other products please contact Silicon Sensing via:

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Hyogo 6600891
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NOTES

GLOSSARY

AHRS	Attitude Heading Reference System
AMU	Attitude Measurement Unit
BIT	Built In Test
COM	Serial port interface
CSV	Comma Separated Variables
DMU	Dynamic Measurement Unit
DOF	Degrees of Freedom
EVK	Evaluation Kit
FOG	Fibre Optic Gyro
GND	Ground
HPIMU	High Performance Inertial Measurement Unit
IMU	Inertial Measurement Unit
ITAR	International Traffic in Arms Regulations
kbit/s	kilobits per second
LPT	Parallel port interface
MB	Mega Bytes
MEMS	Micro-machined Electro-Mechanical System
ms	milliseconds
PC	Personal Computer
PCBA	Printed Circuit Board Assembly
PZT	Piezoelectric
RAM	Random Access Memory
RLG	Ring Laser Gyro
Rx	Receive
Tx	Transmit
USB	Universal Serial Bus

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Printed in England
Date 2/2/2022

1-10762-001-910 Rev 3
DCR No. CO-UK0003623