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# EmegoView User Guide

## E600602

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■ Consultation

■ Design

■ Prototype

■ Testing

■ Manufacture

■ Technology

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## **Overview**

This document describes the setup and operation of the EmegoView PC application, which is used to configure the Emego Patient Unit and Base Unit.

Setup requires the Emego Base Unit hardware and PC application install files, including the STM Virtual COM Port Driver.

## **Intended Use**

The EmegoView PC software is intended to be used by clinicians to study the EMG signal obtained from an Emego Patient Unit in different situations of use, and configure a paired Patient Unit and Base Unit for a particular application.

## **System Requirements**

Personal Computer (PC)

Desktop or laptop

Colour monitor

USB 2.0 port and cable

Windows 7 with .NET framework 4.5+

or

Windows 10 with .NET framework 4.5+

Emego Patient Unit

Firmware V1.4 or later

Emego Base Unit

Firmware V1.4 or later

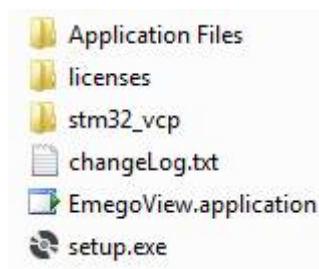
## **Installation**

The .NET framework 4.5+ must be installed before installing EmegoView. This can be downloaded from Microsoft. Users may not have sufficient permissions to install software depending on how Windows has been configured by your organisations IT Support group.

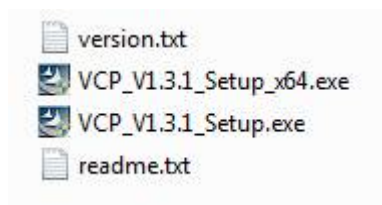
On Windows 7 the user must first install to ST Microelectronics Virtual COM Port (VCP) USB drivers as described in next section. Windows 10 has the VCP driver preinstalled, so next step can be skipped.

### **Installing VCP USB Driver for Windows 7**

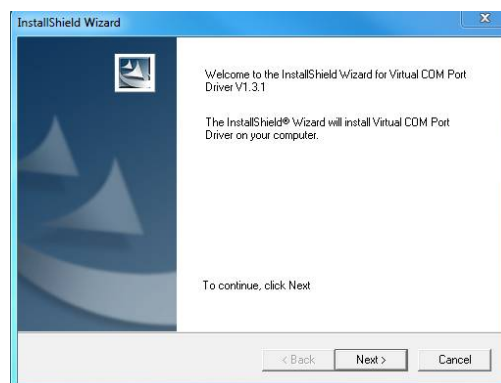
Driver install files for Windows 32-bit & 64-bit can be found in the 'stm32\_vcp' folder of the application zip folder.



Install either "VCP\_V1.3.1\_Setup.exe" for 32-bit operating systems or "VCP\_V1.3.1\_Setup\_x64.exe" for 64-bit operating systems. Check Control Panel>System for System type

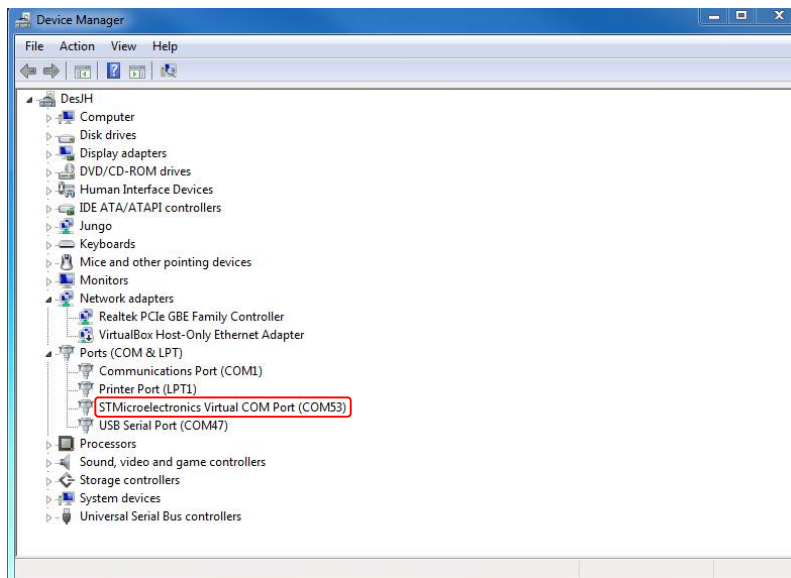


Follow the steps to install the VCP Driver...

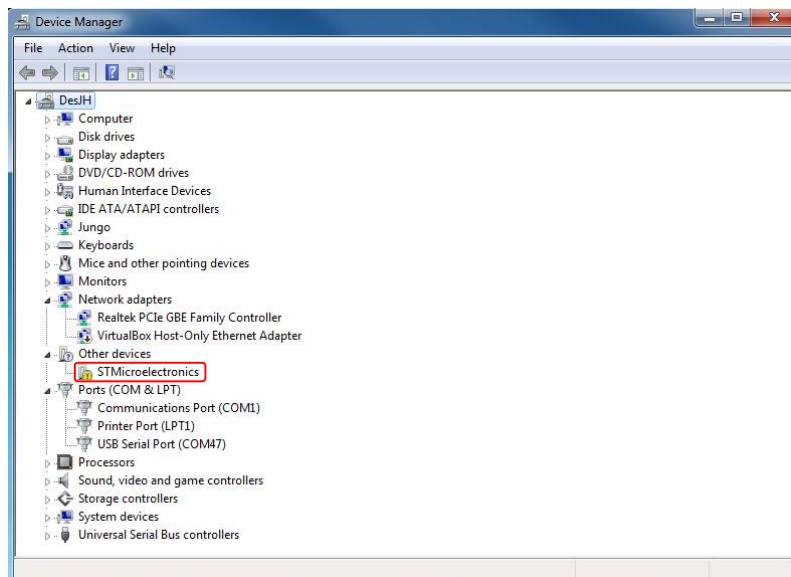


Plug in the Emego Base Unit and wait for the green power LED to illuminate, then open device manager.

If the device shows up under “Device Manager>Ports (COM & LPT)” as below, then the device is ready to use, skip the rest of the VCP Driver install steps.

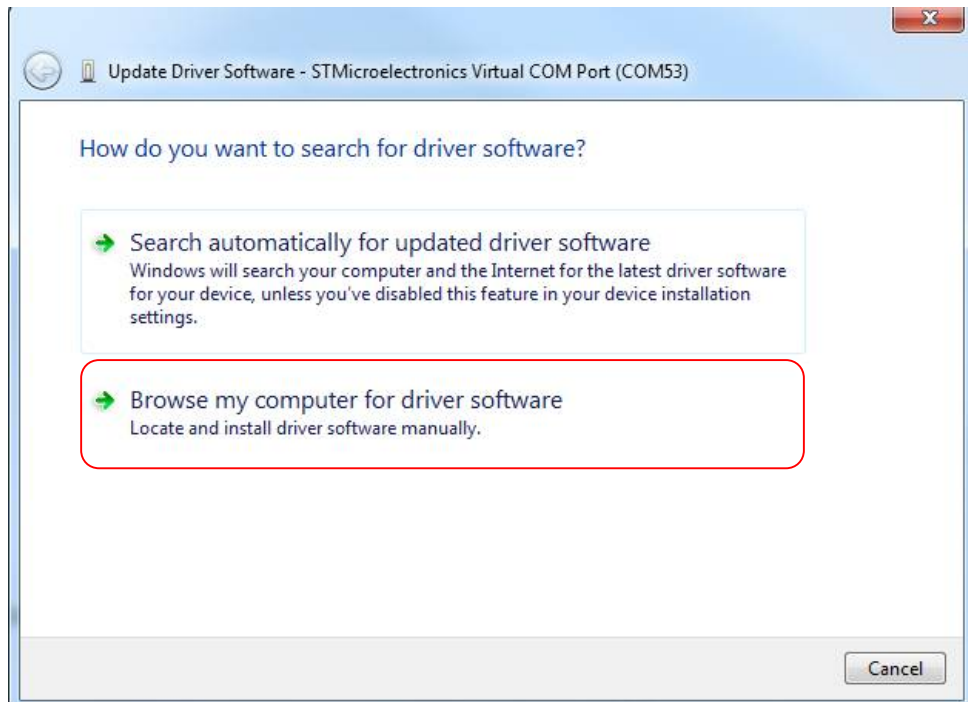


If the device is showing under “Device Manager->Other devices”, as below, the VCP Driver has not been recognised and must be manually re-installed by following further steps.

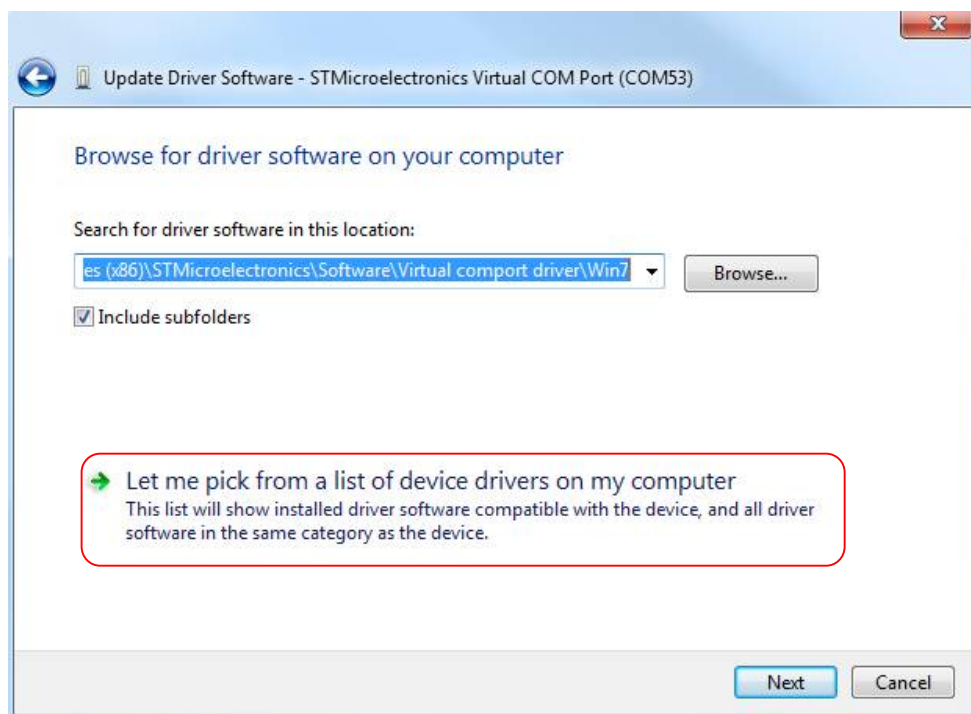


Steps to complete failed VCP Driver install:

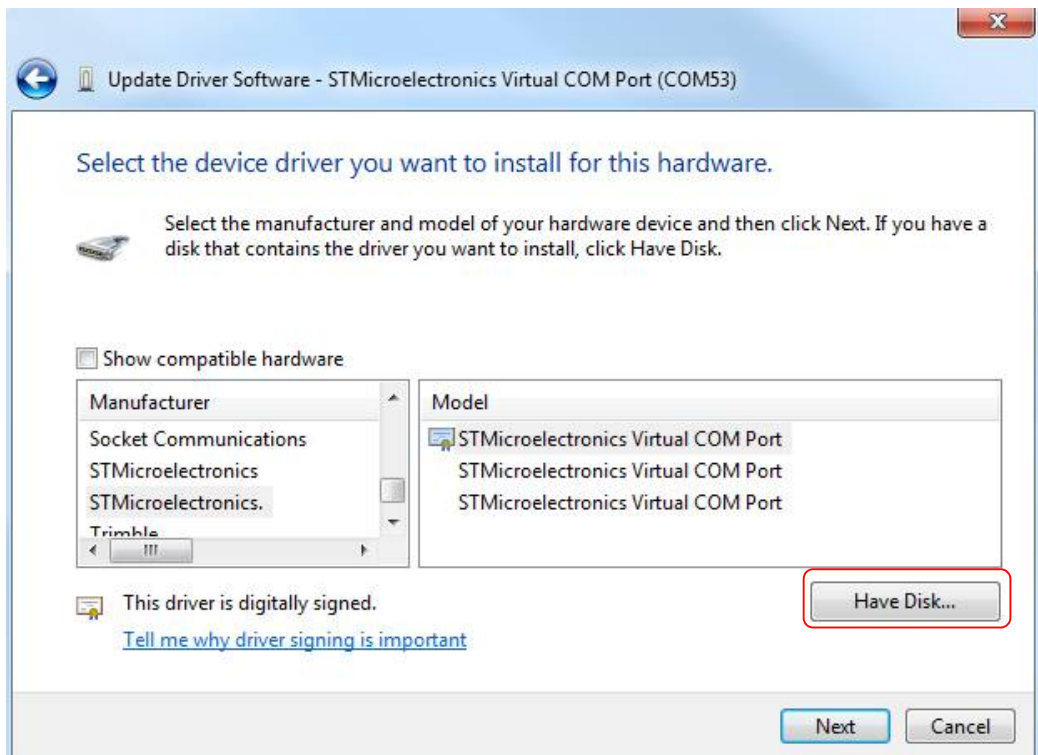
Select "Browse my computer for driver software"



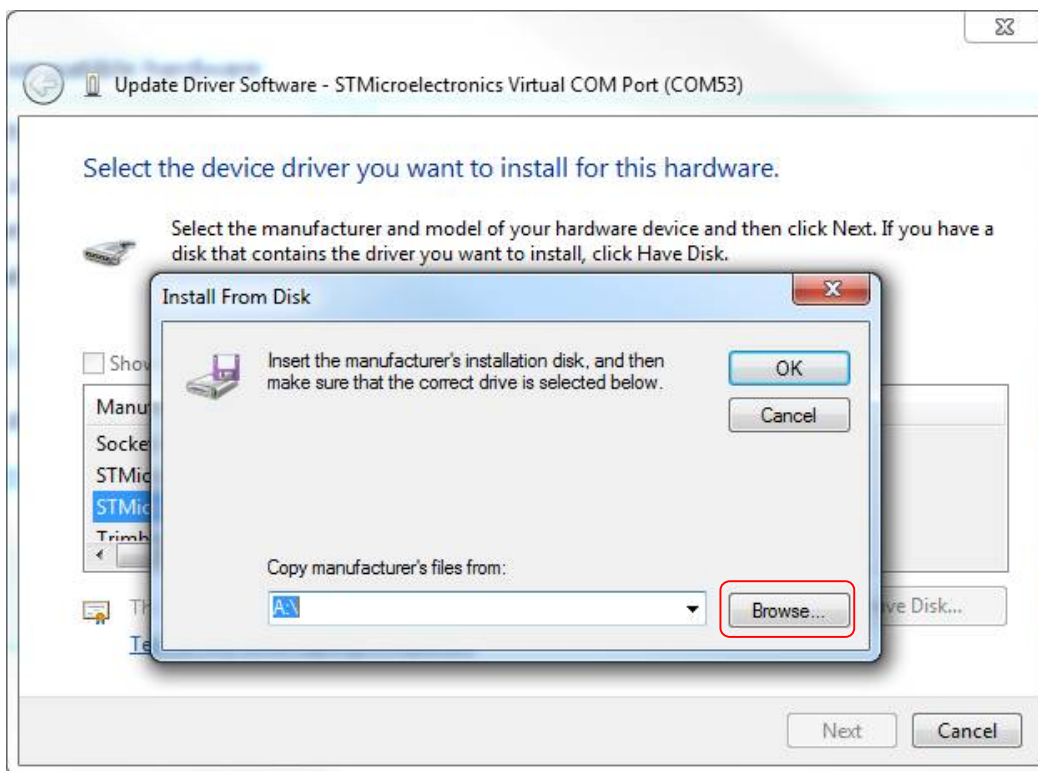
Select "Let me pick from a list of device drivers on my computer"



Select the "Have Disk..." option

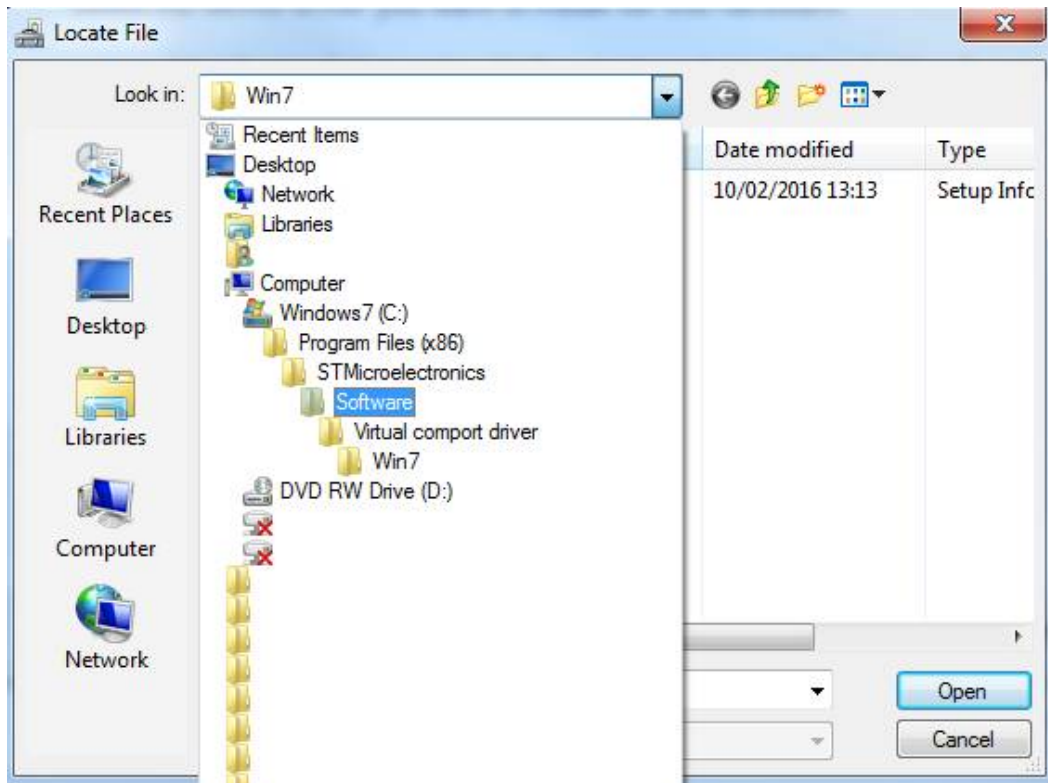


Select "Browse"

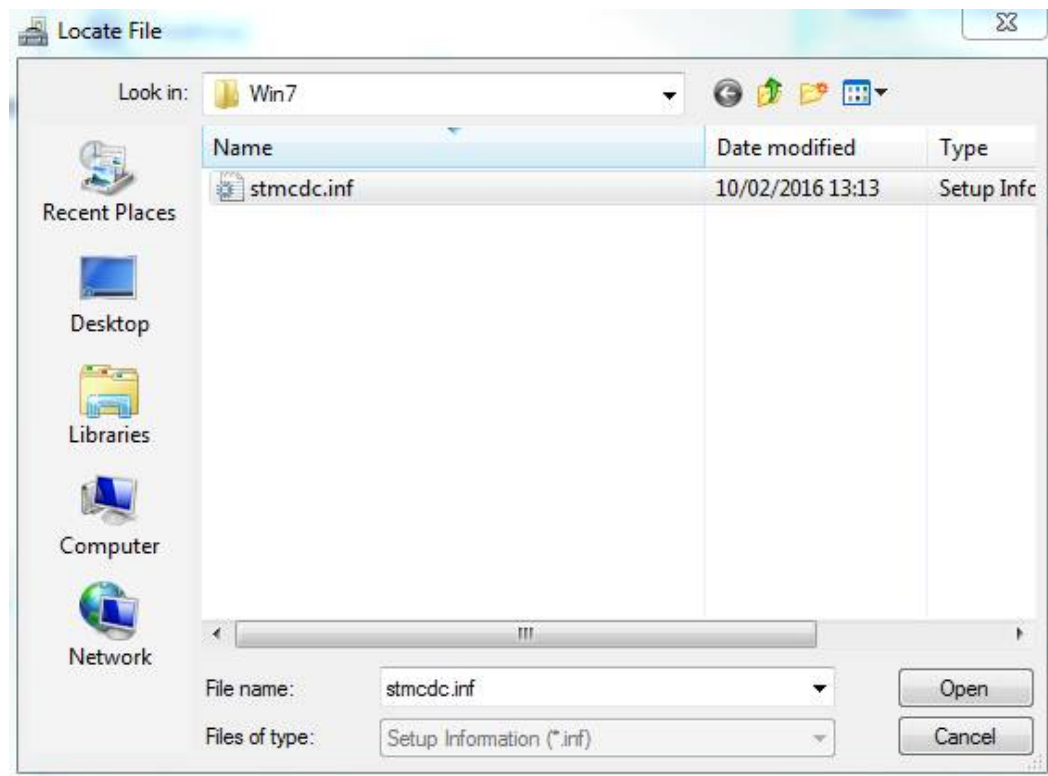


Select the VCP Driver setup file located at:

“C:\Program Files (x86)\STMicroelectronics\Software\Virtual COM Port Driver”



Click “Open”

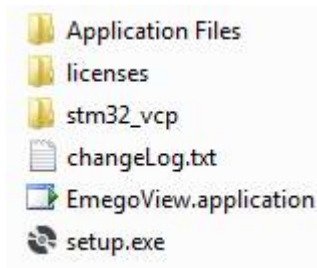


If installation is successful the device should now appear under “Device Manager->Ports (COM & LPT” as described earlier in this section.



## **Installing PC Application**

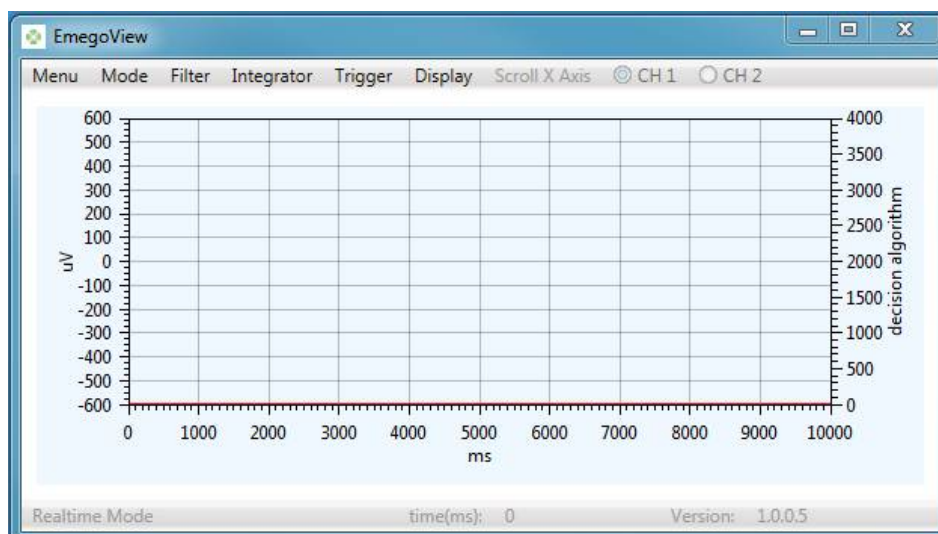
Install by double clicking the setup.exe file in the application zip folder.



Follow the steps provided by the installer to complete the installation. The application can be uninstalled via "Control Panel->Programs and Features". If an earlier version of this application is already installed, then this process should simply update the existing version, uninstalling is not required in this instance.

## **Using the Application**

Run the application from your computer's 'Start Menu->Emego' folder, the application should display as below (or similar, depending on version), with the version displayed in the bottom right of the application.



Left Hand Vertical Scale show the EMG ADC signal amplitude. The data is stored as 12-bit ADC units (0-4095) but scaled nominally into microvolts for display purposes.

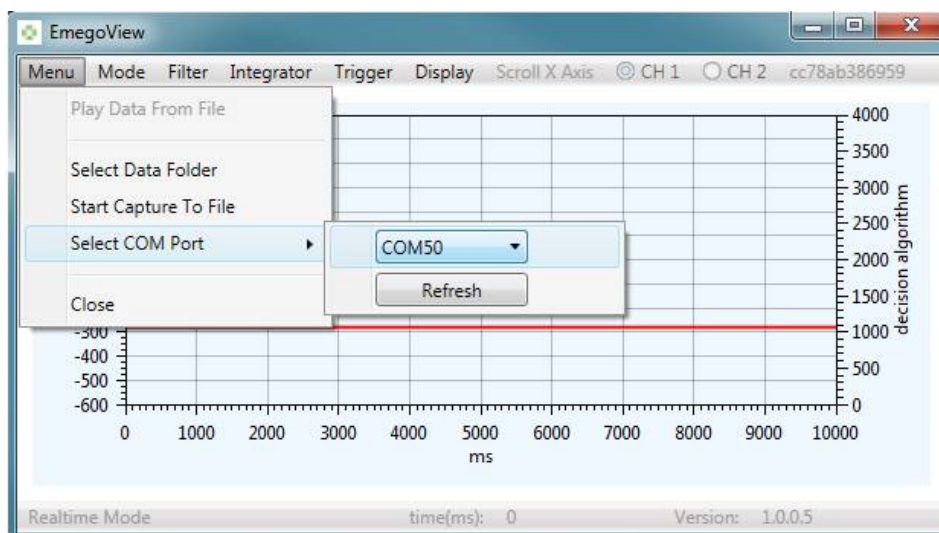
Right Hand Vertical Scale shows the processed signal amplitude used for making trigger decisions in arbitrary units

Horizontal Scale is time base in milliseconds

## **Realtime Mode**

Realtime mode allows the Realtime data from the Emego Patient Unit to be viewed on screen and captured to an EMG file. The EmegoView application can select to stream data from one of two Patient Units connected to either channel 1 or channel 2.

Using the "Mode" menu item, select "Realtime", then from the "Menu" menu item select the COM port corresponding to the Base Unit device.



Once a COM port is selected and the Base Unit and Patient Unit are paired, push the corresponding channel button (1 or 2) on the Base Unit to start streaming data from Patient Unit to Base Unit to EmegoView. The MAC address of the streaming Emego Patient Unit will be displayed in the top right of the screen.

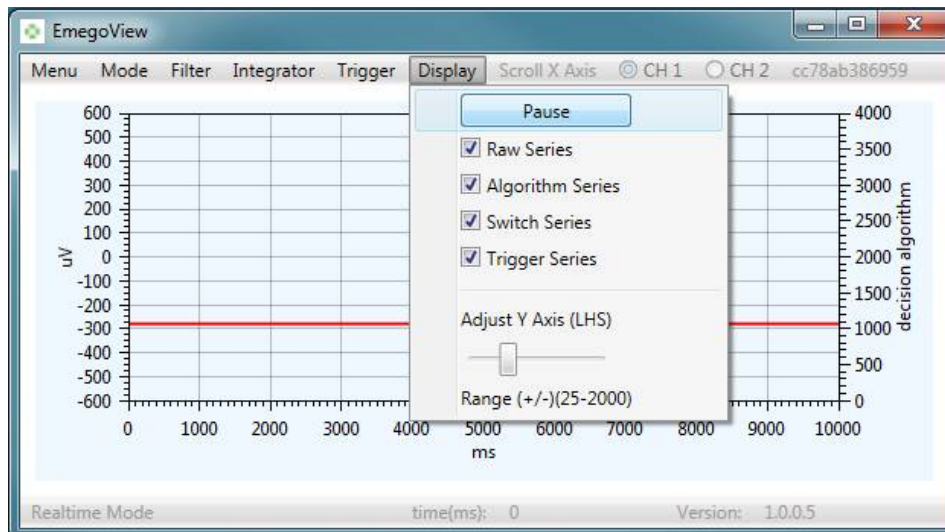
If data communications are lost momentarily the screen will show a "flat-line" until streaming resumes.

## **Capturing Data to file**

In Realtime mode it is possible to capture EMG data to a file for later playback (in Playback Mode) or analysis using other software. The channel selected for streaming Realtime data will be captured.

To capture data use the "Menu" menu, then select "Start Capture to File". Files are created in a folder selected in "Menu" menu, then select "Select Data Folder". To stop capture use the "Menu" menu, then select "Stop Capture to File". Capturing data will also stop if the selected channel (1 or 2) is changed on the Base Unit keypad or if communications are lost for more than 5 seconds. If data is lost momentarily the data will show a "flat-line" until data streaming resumes

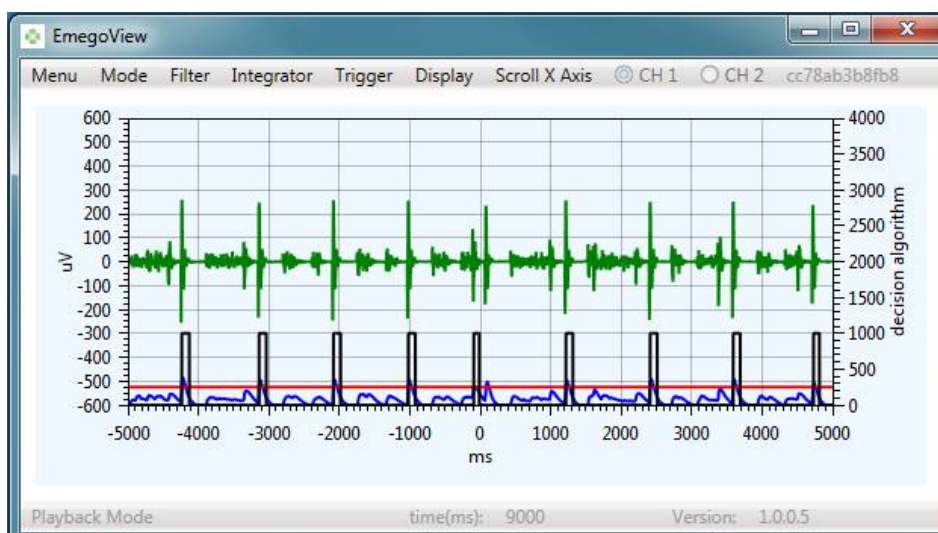
The "Display" menu item allows the selection of which data traces are visible on screen and allows the user to pause the capture display. When paused; if capturing data to a file, data will still be written to the output file.



Using the 'Adjust Y Axis (LHS)' slider the user can adjust the vertical scale in  $\mu\text{V}$ .

By selecting/deselecting different traces these will be added/removed from the Emegoview application screen. The traces are;

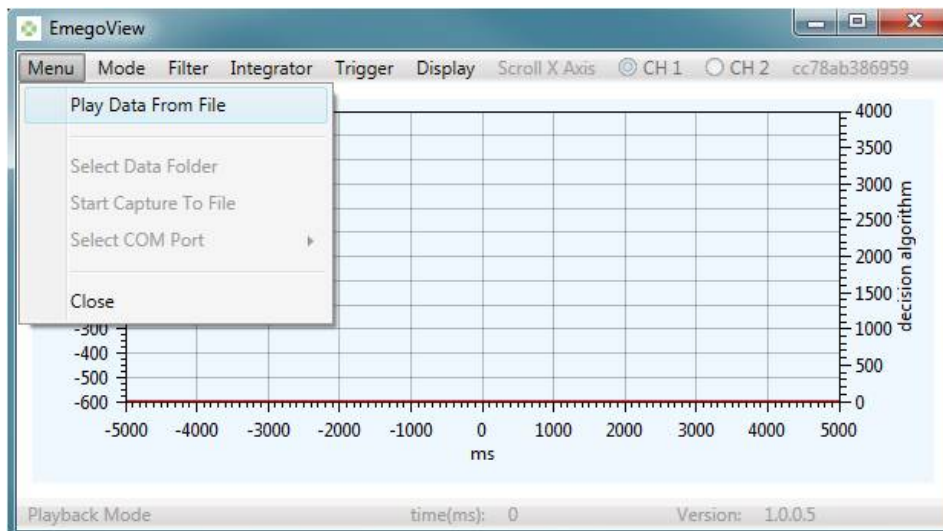
- Raw Series = green trace,
- Algorithm Series = blue trace,
- Switch Series = black trace
- Trigger Series = red trace



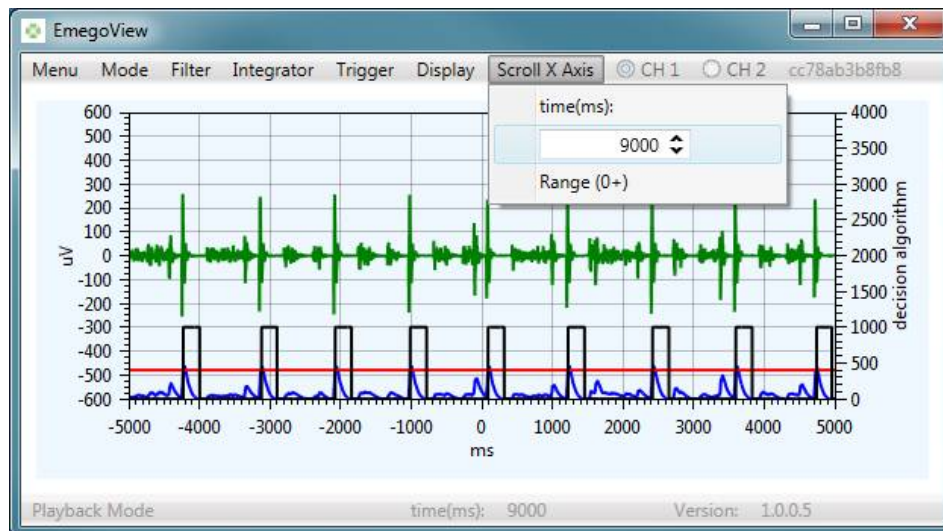
## Playback Mode

Playback mode allows captured EMG files, created in Realtime mode, to be replayed on screen.

Once playback mode is enabled, from the main “menu” item, only “Play Data From File” is available. This allows the selection of a previously captured data file which is read in for review.



Once a file is read in, the “Scroll X axis” menu item will be enabled, allowing the user to select a specific time in the data or scroll through the data 1 second at a time. The selected time is now displayed at the centre of the graphical display.



The Filter, Integrator and Trigger menu items are still available in this mode and can be adjusted to determine the outcome of changing the various parameters on a set of static data. This allows settings to be optimised for best trigger response on the same sample of data.

## Decision Algorithm Parameters

### Filter Menu

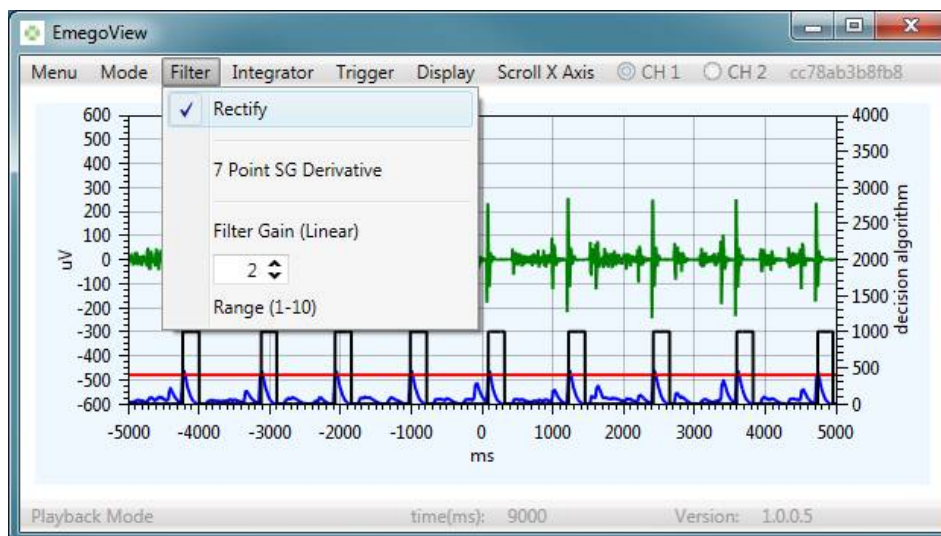
The “Filter” menu item allows the selection of which algorithm is used to filter the raw data.

The “Rectify” option creates a digital absolute value i.e. making all data values positive instead of positive or negative values in the raw data.

The “7 Point SG Derivative” option creates an absolute differential rate of change from the raw data after first applying a rolling 7ms window Savitzky-Golay digital smoothing filter to the data.

“Rectify” is useful when patient signals are small, however the baseline is increased where background noise levels are high which can make it harder to set a reliable Trigger Level. “7 Point SG Derivative” produces a smaller output signal, compared to “Rectify”, but is less susceptible to background noise.

A linear Filter Gain can also be applied to the output of the selected filter. This is a scaling factor to make visualising small signals easier. This does not affect the Human Interface Device (HID) output of the Emego Base Units.

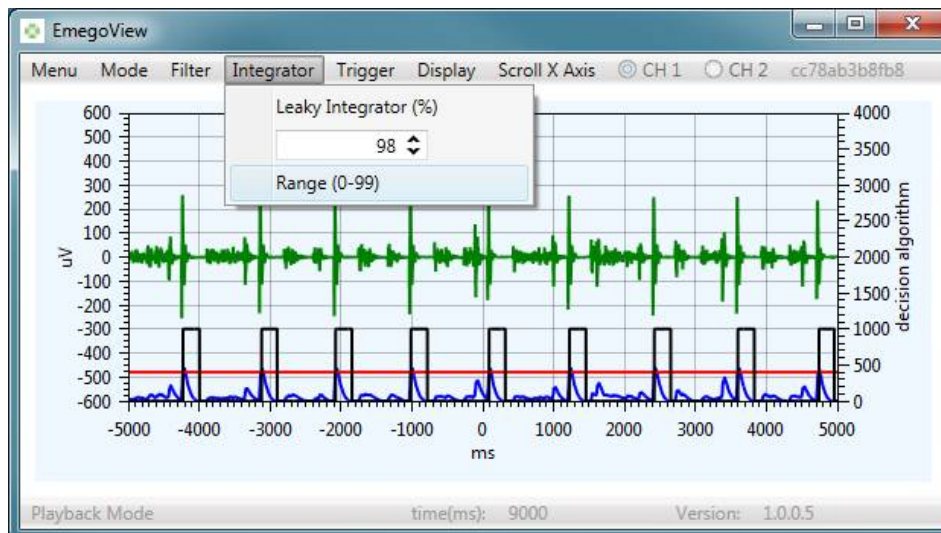


## “Integrator” Menu

To remove noise from the raw data a “leaky integrator” digital smoothing algorithm is applied to the data after the selected filter.

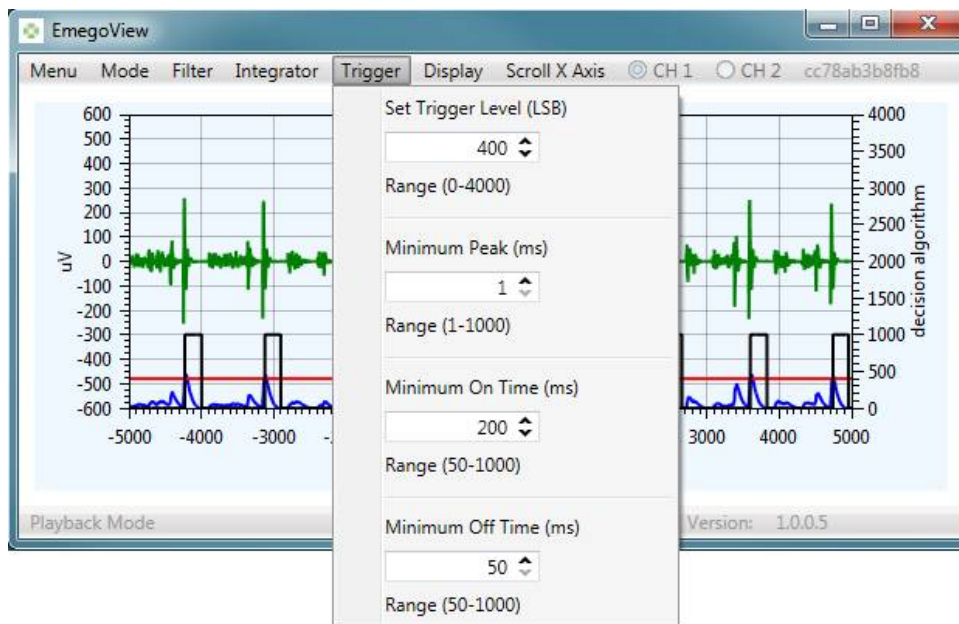
The “Integrator” menu item allows the weighting of the integrated data to be adjusted between 0 (no integration, latest data point has 100% weighting) to 99 (latest data point has 1% weighting).

The default setting of 98% is recommended for most applications. Reducing the setpoint will rapidly reduce filter peak amplitudes and introduce significant Realtime time delays to the data.



## “Trigger” Menu

The “Trigger” menu item allows the adjustment of 4 decision parameters.



Trigger Level – The threshold at which an event is detected.



The example above has a peak of 452 with a Trigger Level set to 430, therefore creating an event.

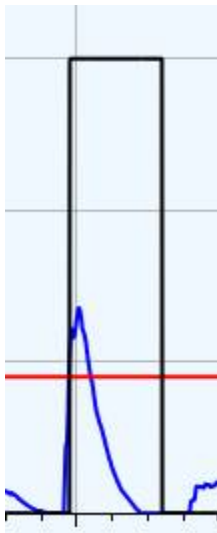
Minimum Peak – the time that the event must last for it to be considered intentional.



The example above has a peak of 452 with a Trigger Level set to 430, but with a Minimum Peak time of 50ms therefore creating an event after the peak has been higher than the Trigger Level for 50ms.

This parameter is used to eliminate very short EMG pulses which are not intentional triggers

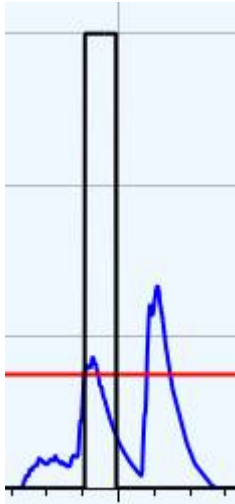
Minimum On Time – the minimum time that the event will cause a trigger ON event.



The example above has Minimum On Time of 200ms, therefore the output will stay enabled for 200ms from the first point of trigger. This time period will be extended if the signal stays above the threshold for an extended period or only drops below if momentarily.



Minimum Off Time – the minimum time after an On Time that the device cannot be retriggered.



The example above, has a Minimum Off Time of 150ms, as the second peak has happened before the 150ms timeout, the peak is ignored.

This parameter is used to prevent multiple pulses when only a single pulse is intended.

### **Exiting PC application**

To exit the application, press the 'x' close button in the top right corner of the application or select "close" from the main "menu" item.

### **Captured EMG Data Files**

Captured streamed data is stored in CSV (comma separated variable) ASCII format with file names ending ".emg". Each sample point is a separate line of data. File names are created automatically based on the PC system clock time.

The format of data in the \*.emg files is as following:

ms from start	Sample time in milliseconds from start of recording
ms from Unix epoch	Sample time in milliseconds from midnight on 1 <sup>st</sup> Jan 1970
Raw ADC data	ADC value 0-4095 where 2048 represent zero signal (0V)
filtered data	ADC value after selected Filter and Integration settings applied
trigger level	Trigger level selected
trigger boolean	Trigger (True or False) after selected Trigger Level and times applied

For example:

37958,1460643384039,1660,2,1,1

## **Revision History**

Version	Date	Author	Summary of changes
A	24/04/2017	JPH	Initial Release for EmegoView V1.0.0.2
B	12/07/2017	TE	Amended for EmegoView V1.0.0.5

*End of Document*