A guide to using the Hyperion Emeter PC Interface software

By Rod Badcock for Hyperion HK

What does this software do?

Using an Hyperion Emeter and Hyperion PC interface cable it allows real-time measurements to be displayed, stored and recalled for analysis. This can be useful for many applications:

- Motor characterisation (efficiency and static thrust)
- Battery discharge / charge analysis
- Matching appropriate propellers to your motor-battery-controller combination
- And more…

What are the software and hardware requirements?

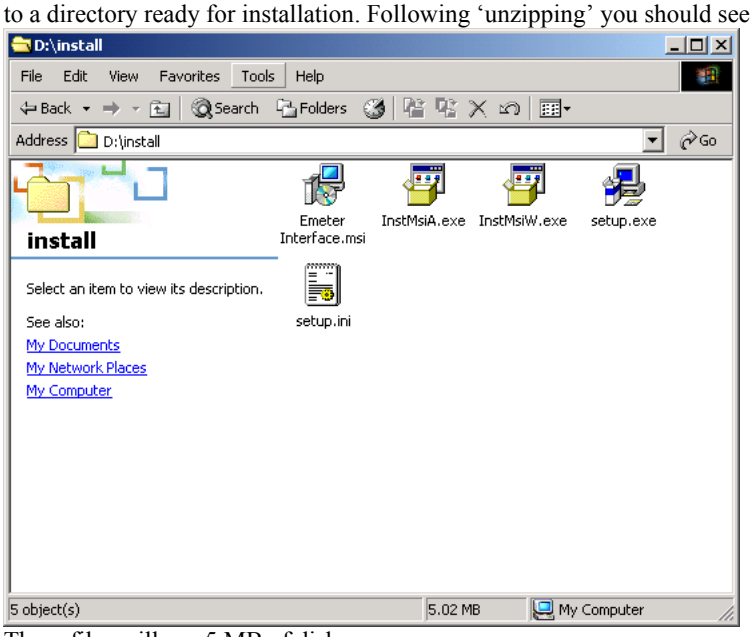
- An Hyperion Emeter
- The Hyperion PC interface cable

The software will run on very simple hardware, common even in older laptops:

- A PC with Intel Pentium processor (equivalent, or higher)
- A free serial port (a USB to serial adapter can be used)
- 5 MB free hard disk space
- 32 MB memory
- Windows 98 or higher OS (Windows 2000, NT, XP)

Installation

The software is supplied as a compressed ‘zip’ file in order to save space. Please save this file and ‘unzip’ the contents to a directory ready for installation. Following ‘unzipping’ you should see the following installation files:



These files will use 5 MB of disk space.

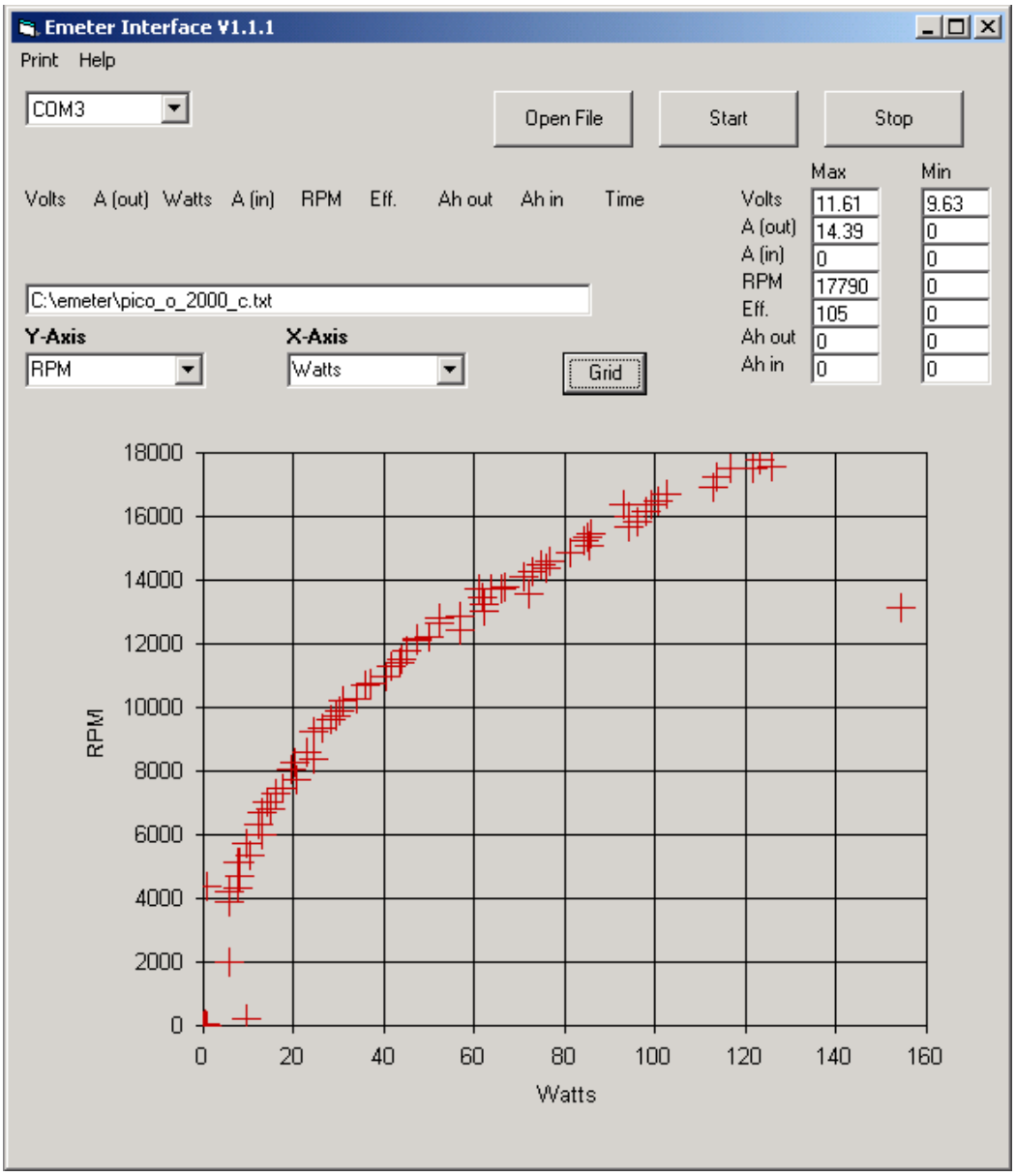
To start the installation of the software ‘double-click’ the setup program ‘setup.exe’ and follow the on-screen instructions.

The installation program will create the following:

- A shortcut called ‘Emeter’ on the desktop
- An entry on the start menu of ‘Emeter’ under ‘Hyperion’
- A directory on your first hard disk called ‘emeter’ (i.e. c:\emeter) for file storage

Running the software

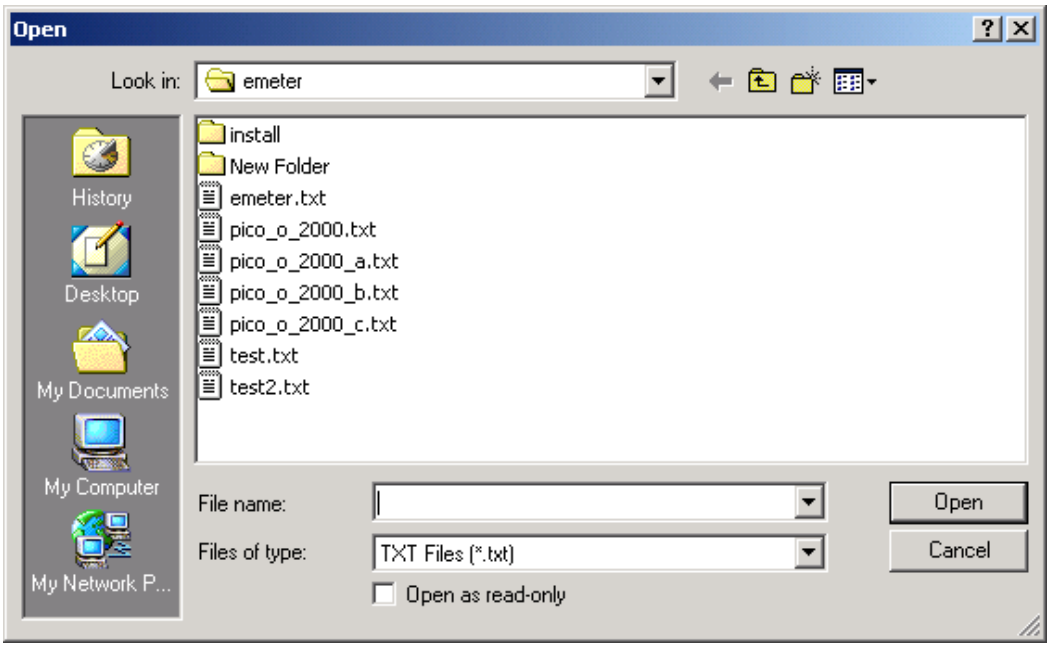
From the ‘start’ menu of Windows select ‘Programs’, ‘Hyperion’, ‘Emeter’ and click on the Emeter listing. This will start the software and you will be presented with the software front-panel similar to that below (with a blank graph).



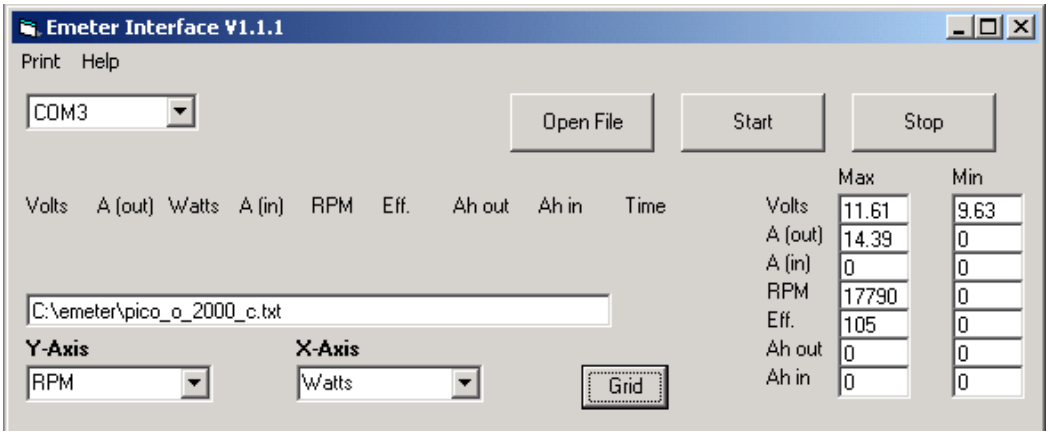
This software will allow new measurements to be recorded, data from previous tests to be reloaded, analyses the data for minimum and maximum figures and selection of graph axes.

Displaying previously recorded data

Clicking the ‘Open File’ button will open a windows dialog box to select the file from the emeter directory:

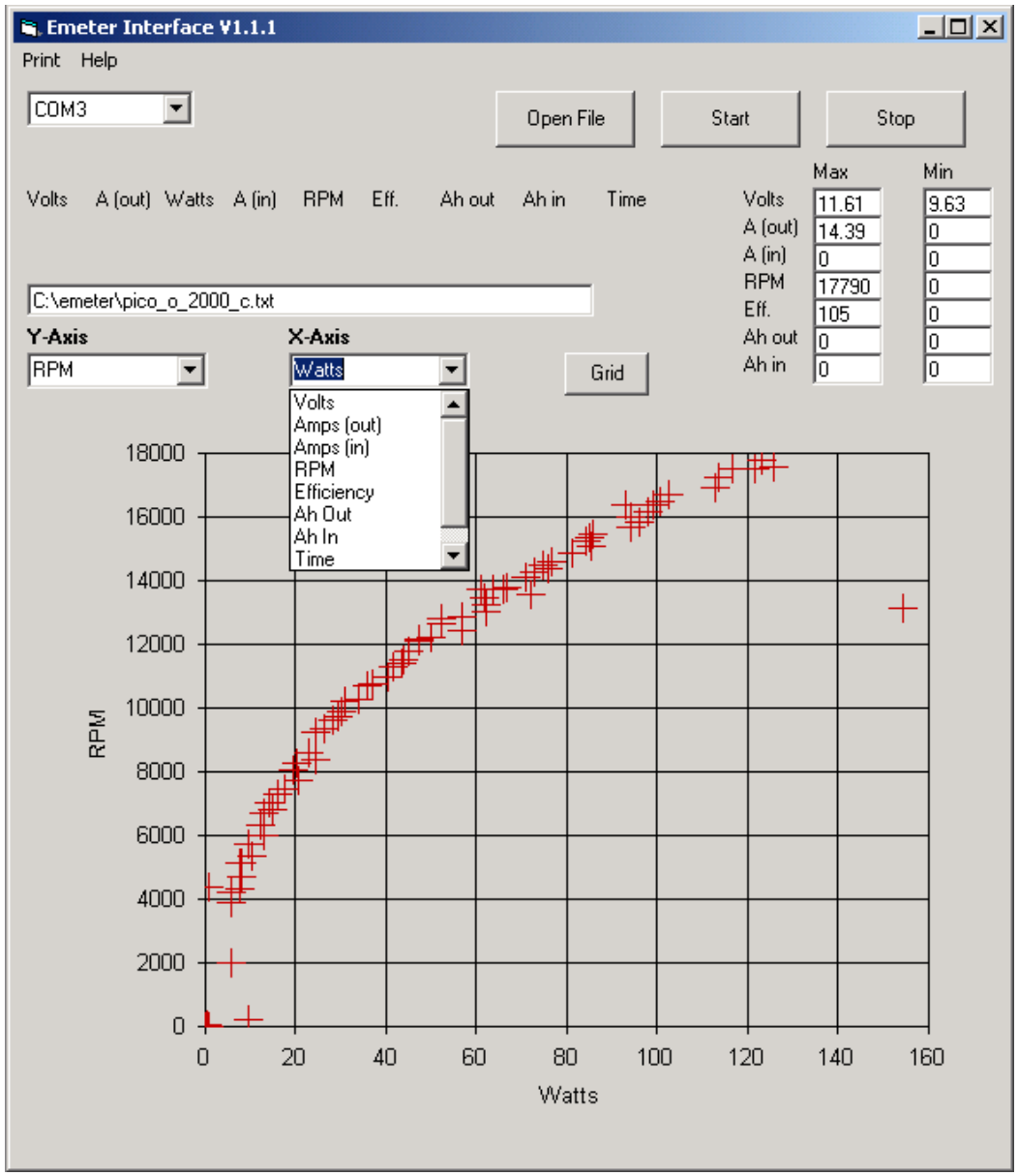


To select the required file ‘double click’ on the item in the list. The top of the display will now change similar to that below:



Displayed on the right will be the measured maximum and minimum recorded values, and on the left will be shown the path and filename opened (being analysed). A default graph of ‘Amps’ against ‘Volts’ will also be displayed.

The axes of the graph can be selected from the two drop-down boxes labelled ‘Y-Axis’ and ‘X-Axis. The options for both boxes are shown below:



These options are:

- 'Volts' – measured voltage
- 'Amps (out)' – current from source to load
- 'Amps (in)' – current from load to source
- 'RPM' – measured RPM
- 'Efficiency' – measured motor efficiency
- 'Ah (out)' – the charge drained from source to load
- 'Ah (in)' – the charge drained from load to source
- 'Time' – time
- 'Watts' – the electrical power being delivered to the load

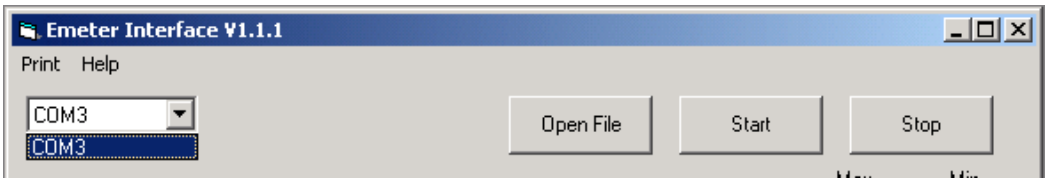
Selection of any new graph axis causes the graph to be redrawn. The 'Grid' control box will display (or remove) gridlines from the graph.

Selecting the 'Print' menu option will display a printer dialog box where the printer can be selected and the graph printed.

Recording from the Emeter

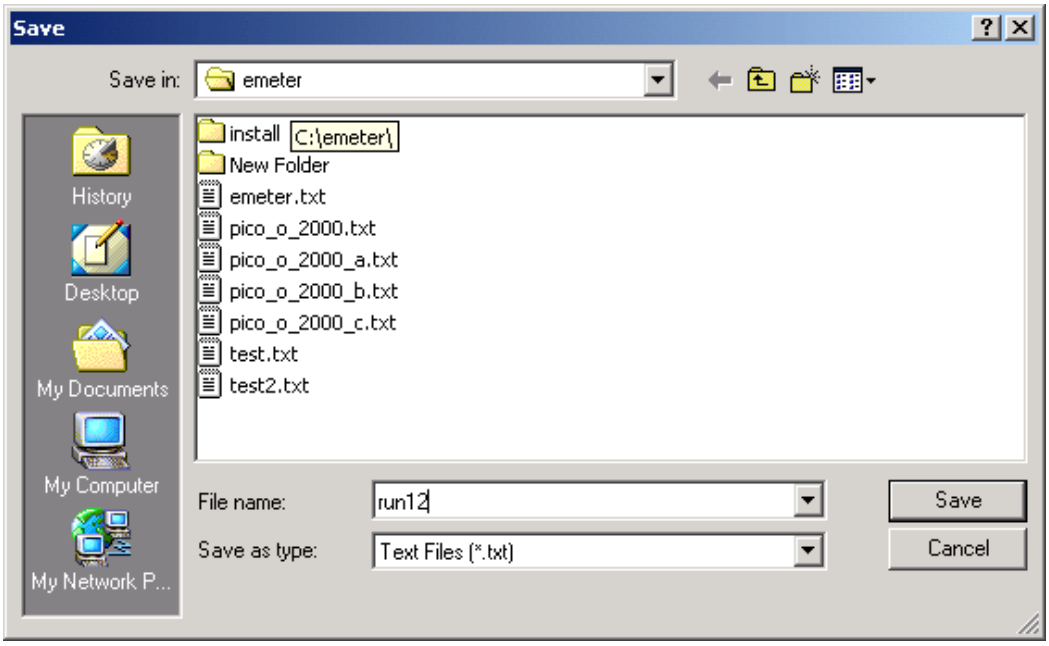
Before starting to record data please connect the Emeter to the PC with the dedicated interface cable and turn the Emeter switch 'ON'.

The software will automatically query your computer and identify what serial ports are present in your PC (COM1-8), with the first available port being displayed in the drop down box:



Please identify which serial port is connected to the Emeter via selection of the appropriate port in the drop-down box and press the 'Start' button. [If you find no serial ports listed in the drop-down box, it may be that your PC is set in "CMOS Setup" to disable all serial ports. Consult your PC manual for instructions on entering CMOS Setup mode. Most modern PCs have an "automatic" setting for serial ports in CMOS, and this should be tried first. We do not support PC setup questions, so ask a friend if you get stuck, please.]

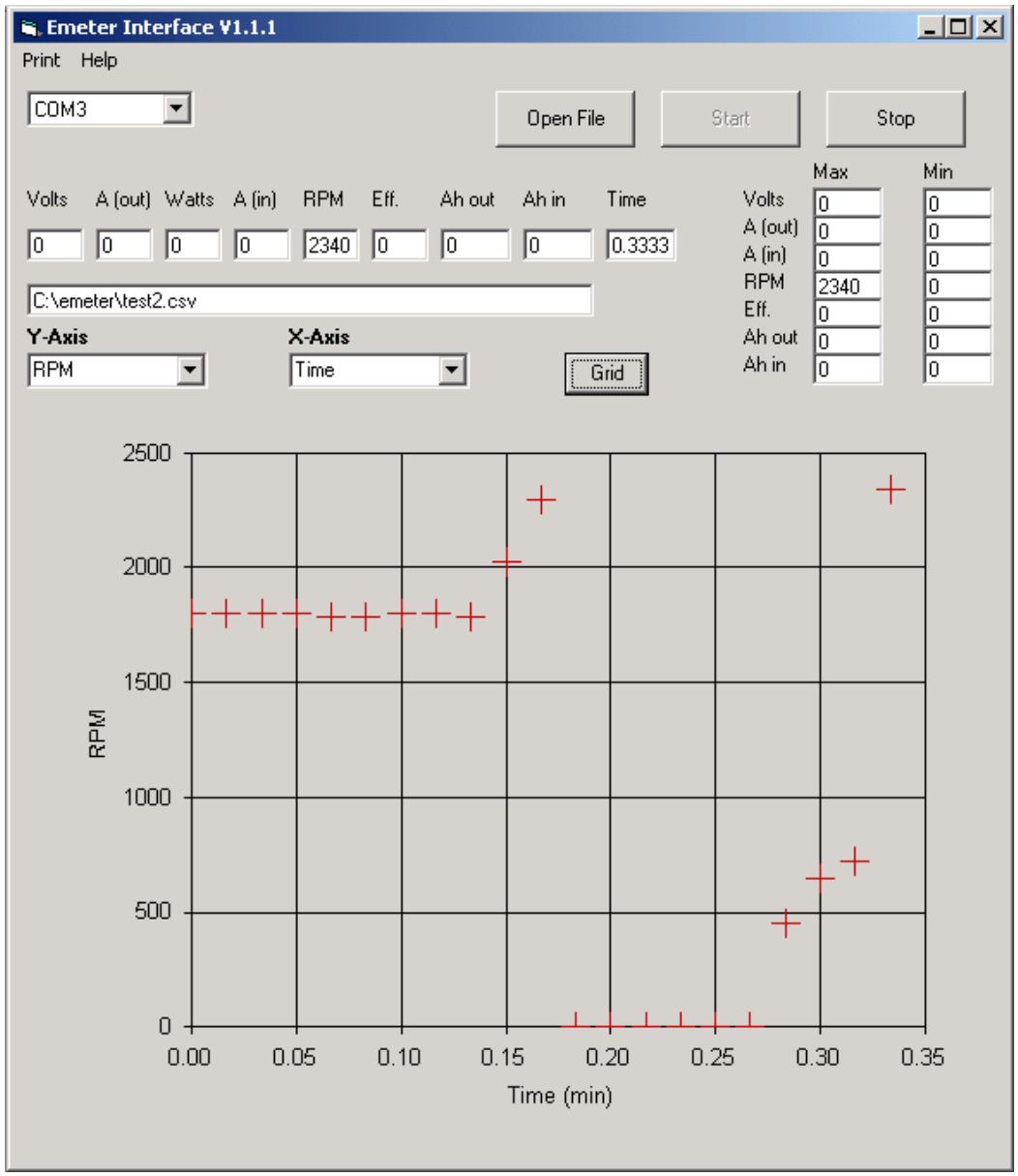
A Windows file dialog box will be opened in which you should enter the filename you wish to use for the recorded data and press 'Save':



The top part of the display will now change and present live data values, together with the maximum and minimum values. The graph will start to display the data points being measured.

In the same way as for opening data files the graph axes can be selected for the parameters of interest.

Following test completion pressing the 'Stop' button will finish recording and finalise the recorded file.



File storage formats

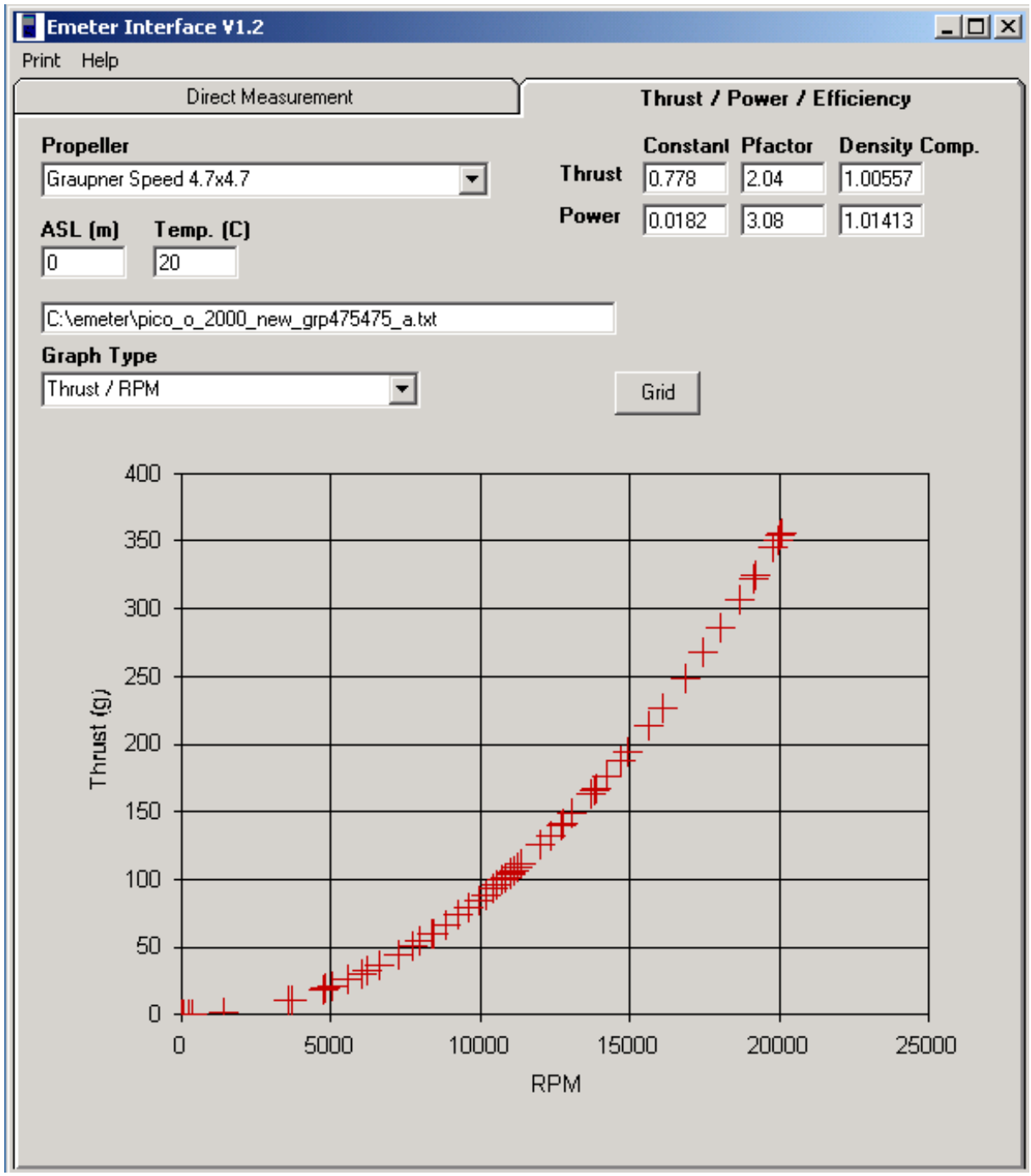
Files are stored in the emeter directory in three formats:

- **'.txt.'** - text file containing the raw data from the Emeter
- **'.csv'** – comma separated variable files that contain the processed data in a universally accepted format that can be read by most packages.
- **'.xls'** – Microsoft Excel spreadsheet containing the processed data

Thrust / Power / Efficiency analysis

This is a new and experimental feature that has been included in the software that will allow estimations for the following (with a specified propeller):

- Thrust
- Power absorbed by propeller
- Motor efficiency

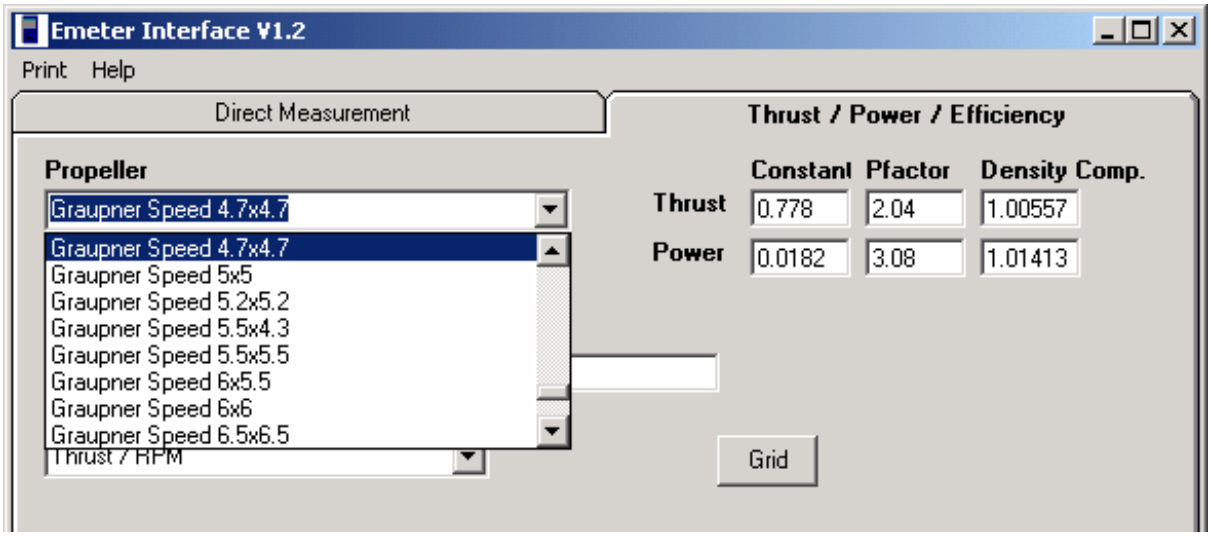


This mode can be selected by pressing the 'Thrust / Power / Efficiency' tab at the top of the window. If a file has been recorded, or loaded, then the propeller used for testing should be selected from the drop-down box.

Please note: The propeller database is not yet complete; the propeller coefficients rely on a series of labour intensive thrust-stand and dynometer measurements of various propellers. It is with gratitude that I thank Phil Millener (Doc Kiwi) for the thrust data to-date and the Hyperion team for the dynometer measurements. As such you will find that

some of the props listed only have coefficients for absorbed power and some for thrust only. As testing progresses an updated database file will be available for download from www.hyperion.hk. This file ('*coeffs.csv*') should be downloaded and placed in the 'emeter' directory of your hard disk and will automatically update the software database. Please be patient – this testing will take some time. At this time this is an unsupported feature in the software.

Selection of the propeller is shown below. Selecting a propeller causes the Thrust and power coefficients for a prop to be loaded. The power coefficients can also be manually entered into the Emeter for stand-alone efficiency analysis.



These coefficients are of the form:

Thrust or Power = Constant x (RPM/1000)^Pfactor

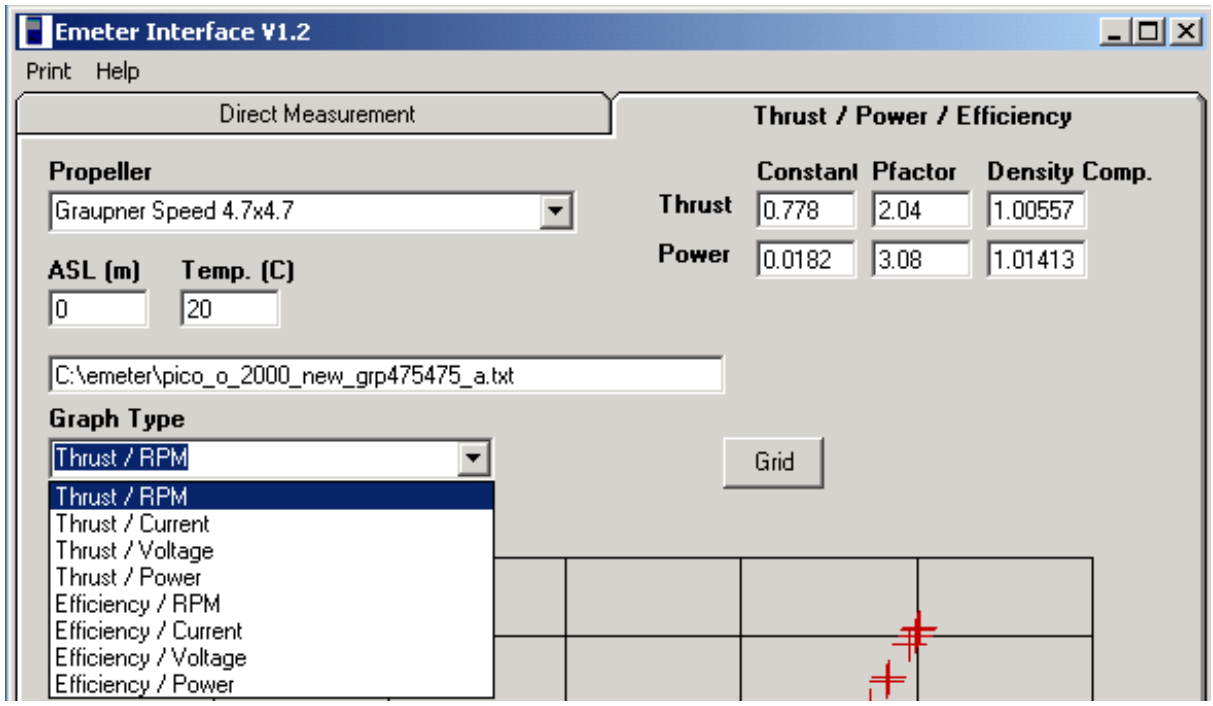
Where Pfactor is ~ 2 for Thrust estimation and Pfactor ~ 3 for Power estimation.

In order to maximise the accuracy of the estimation, compensation is available for the air density in relation to the reference measurements. The default selection is 0 metres Above Sea Level (ASL) and a temperature of 20 °C. Entry of alternate figures in these boxes causes the graph to be re-drawn and the Density Compensation figures to be calculated. In general this compensation is carried out as:

Thrust or Power =Density Compensation x Constant x (RPM/1000)^Pfactor

The selection of the graph type is shown below. There are eight graphs available (for props with both sets of constants measured):

- **Thrust / RPM.** The calculated thrust against measured RPM for the prop.
- **Thrust / Current.** The calculated thrust against measured current for the prop.
- **Thrust / Voltage.** The calculated thrust against measured voltage for the prop.
- **Thrust / Power.** The calculated thrust against measured power for the prop.
- **Efficiency / RPM.** The calculated motor efficiency against measured RPM for the prop.
- **Efficiency / Current.** The calculated motor efficiency against measured current for the prop.
- **Efficiency / Voltage.** The calculated motor efficiency against measured voltage for the prop.
- **Efficiency / Power.** The calculated motor efficiency against measured power for the prop.



…. And finally

The Emeter, interface and software provide a unique analysis toolset that will make you wonder how you 'made do' without it before. This software will be under constant development - if there is something that you want to see in this software then get in touch!