

# PowerPROview

## How to Guide

26 January, 2008

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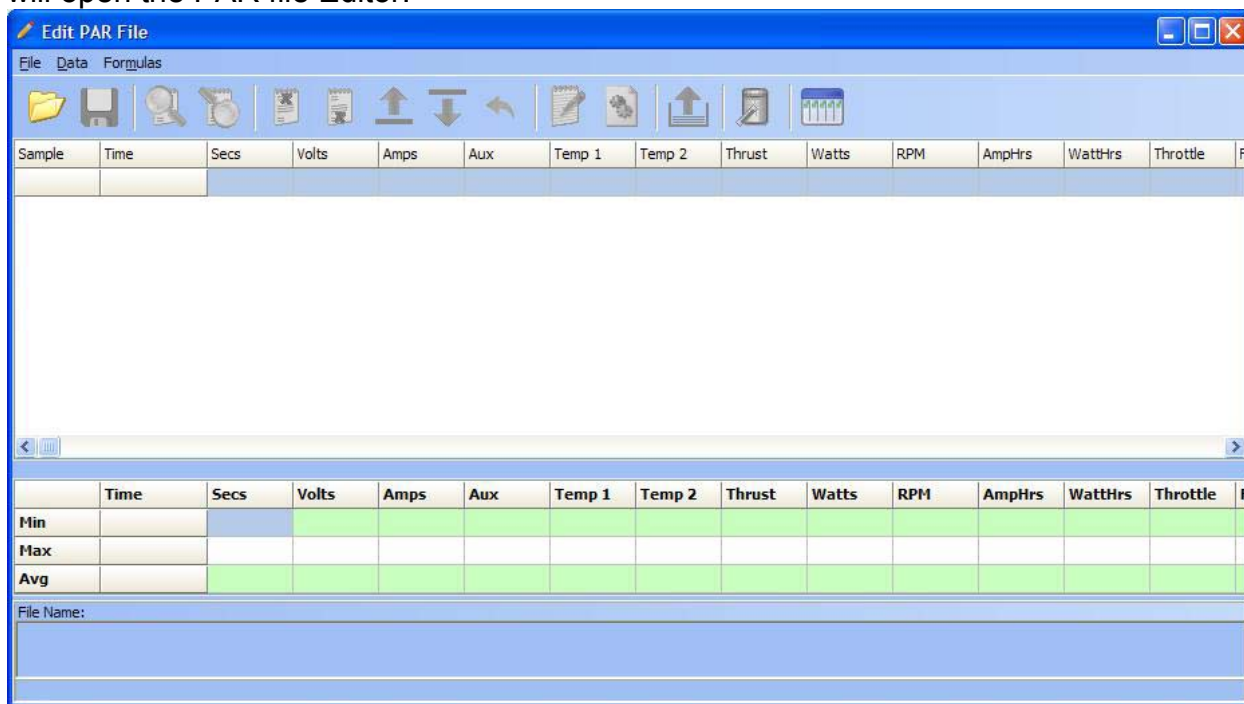
### Introduction

This document covers various aspects of using the PowerPROview software. Please refer to the PowerPROview Software Users Guide for operating details.

### How To Export Saved Data

Once you have recorded and saved your data to a file on disk you will want to do something with it. You can display the data on a graph object in a data view or you can export it to an Excel spreadsheet or one of several text file formats. In exporting the file to an Excel spreadsheet you can use the Excel graphing/charting features to display your data. NOTE: To export to an Excel spreadsheet you must have Excel installed on your computer. Saved data is kept in files with the extension “.PAR” (Power Analyzer Recording”).

To export your data click on the Edit/Export button  on the Real time toolbar. This will open the PAR file Editor.



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Next click on the Open button and select your saved data file.

Edit PAR File													
File Data Formulas													
Sample	Time	Secs	Volts	Amps	Aux	Temp 1	Temp 2	Thrust	Watts	RPM	Amphrs	WattHrs	Throttle
1	00:00:00.2294	0.2294	11.995	3.190	0.000	32.0	0.0	0.0	38.264	6100	0.0	0.0	157
2	00:00:00.4588	0.4588	11.995	3.190	0.000	32.0	0.0	0.0	38.264	6100	0.0	0.0	157
3	00:00:00.6881	0.6881	11.970	3.580	0.000	32.0	0.0	0.0	42.853	6625	0.0	0.0	156
4	00:00:00.9175	0.9175	11.970	3.770	0.000	32.0	0.0	0.0	45.127	6625	0.0	0.0	157
5	00:00:01.1469	1.1469	11.960	3.910	0.000	32.0	0.0	0.0	46.764	6625	0.0	0.0	157
6	00:00:01.3763	1.3763	11.940	4.230	0.000	32.0	0.0	0.0	50.506	6625	0.0	0.0	160
7	00:00:01.6056	1.6056	11.915	4.480	0.000	32.0	0.0	0.0	53.379	6625	0.0	0.0	160
8	00:00:01.8350	1.8350	11.905	5.040	0.000	32.0	0.0	0.0	60.001	10050	0.0	0.0	160
9	00:00:02.0644	2.0644	11.880	5.260	0.000	32.0	0.0	0.0	62.489	10050	0.0	0.0	159
10	00:00:02.2938	2.2938	11.870	5.740	0.000	32.0	0.0	0.0	68.124	10050	0.0	0.0	160
	Time	Secs	Volts	Amps	Aux	Temp 1	Temp 2	Thrust	Watts	RPM	Amphrs	WattHrs	Throttle
Min	00:00:00.229	0.2294	9.560	0.040	0.000	32.0	0.0	0.0	0.430	0	0.0	0.0	106
Max	00:04:15.066	255.0661	11.995	55.170	0.000	32.0	0.0	0.0	527.425	26075	1.4	13.9	197
Avg			10.507	19.116	0.000	32.0	0.0	0.0	196.696	19501	0.8	8.1	165
File Name: C:\Documents and Settings\medusa.MEDUSA-LAPTOP2\My Documents\My Power Analyzer Data\MR-028-040-2500-17T.PAR 1112 Samples 0.229376 Secs per Sample Data Length = 255.0661 Secs Average = NONE 1 Sample Per Average Time Offset = 0 Samples Time Offset = 0.0 Secs Channels = VOLTS AMPS TEMP1 RPM Unit Name = ORACLE 0													

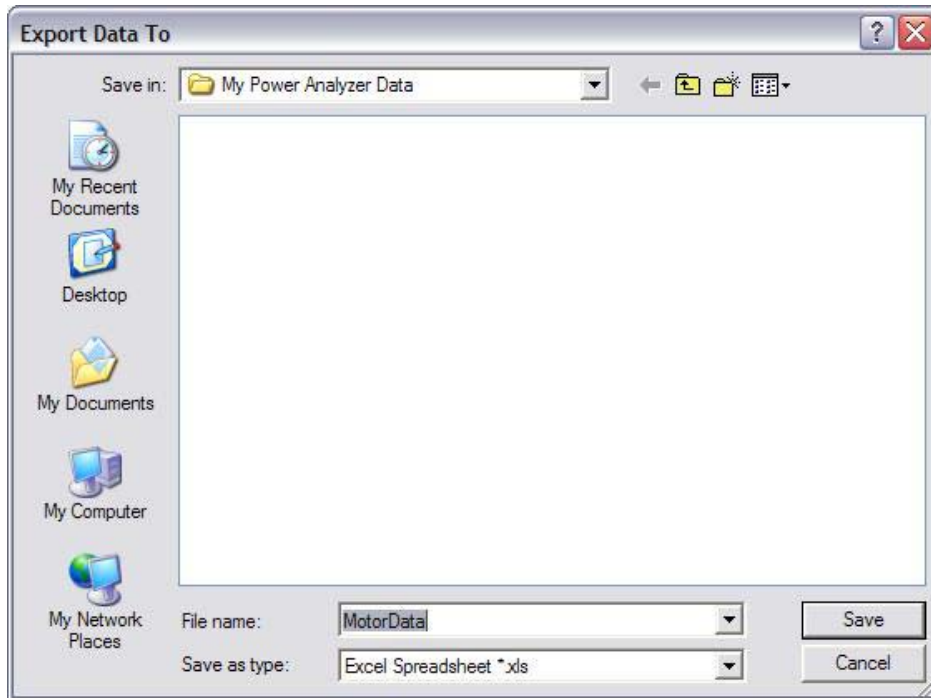
You will see you data appear in the window. If your file is large it will take a little time to load it.

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Now click on the Export button to open the export dialog.



Enter a name for the file and select the “Save as type” for the format you wish to export to. Here we have selected Excel Spreadsheet (.XLS) format. Click the save button and your data will be exported.

Here is the data just exported opened in Excel:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Time	Secs	Volts	Amps	Aux	Temp1	Temp2	Thrust	Watts	RPM	Amphrs	WattHrs	Throttle
2	00:00:00.2294	0.229376	11.855	2.23	0	0	0	0	26.43665	45762	0.00014208	0.00168436	0
3	00:00:00.4588	0.458752	11.855	2.23	0	0	0	0	26.43665	45762	0.00028416	0.00336872	0
4	00:00:00.6881	0.688128	12.075	0.11	0	0	0	0	1.32825	45762	0.000291169	0.003453346	0
5	00:00:00.9175	0.917504	12.1	0.13	0	0	0	0	1.573	79323	0.000299451	0.003553567	0
6	00:00:01.1469	1.14688	12.09	0.09	0	0	0	0	1.0881	65536	0.000305186	0.003622893	0
7	00:00:01.3763	1.376256	12.105	0.07	0	0	0	0	0.84735	65536	0.000309645	0.00367688	0
8	00:00:01.6056	1.605632	11.945	1.48	0	0	0	0	17.6786	65536	0.000403941	0.004803238	0
9	00:00:01.8350	1.835008	12.04	0.59	0	0	0	0	7.1036	77373	0.000441531	0.00525583	0
10	00:00:02.0644	2.064384	12.09	0.08	0	0	0	0	0.9672	65536	0.000446629	0.005317453	0
11	00:00:02.2938	2.29376	12.1	0.07	0	0	0	0	0.847	65536	0.000451088	0.005371418	0
12	00:00:02.5231	2.523136	12.09	0.05	0	0	0	0	0.6045	65536	0.000454274	0.005409933	0
13	00:00:02.7525	2.752512	12.095	0.08	0	0	0	0	0.9676	31298	0.000459371	0.005471582	0
14	00:00:02.9819	2.981888	12.095	0.05	0	0	0	0	0.60475	65536	0.000462557	0.005510112	0
15	00:00:03.2113	3.211264	12.095	0.06	0	0	0	0	0.7257	65536	0.00046638	0.005556349	0
16	00:00:03.4406	3.44064	12.095	0.05	0	0	0	0	0.60475	65536	0.000469565	0.005594879	0
17	00:00:03.6700	3.670016	12.105	0.07	0	0	0	0	0.84735	100109	0.000474025	0.005648866	0
18	00:00:03.8994	3.899392	12.095	0.05	0	0	0	0	0.60475	65536	0.000477211	0.005687397	0
19	00:00:04.1288	4.128768	12.105	0.07	0	0	0	0	0.84735	65536	0.000481671	0.005741384	0

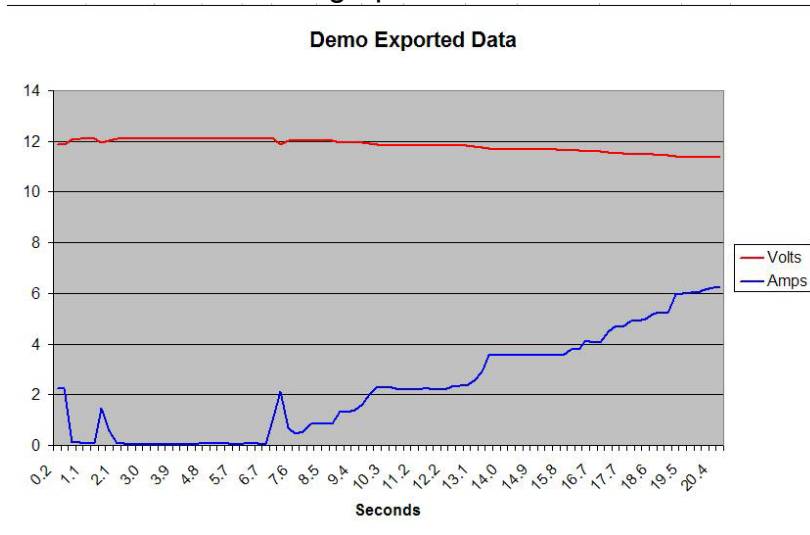
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NOTE: The decimal character used in the exported files (except excel) can be changed to a comma or any character you want in the System Options configuration.

NOTE: The character used to separate fields in the CSV export format (usually a comma) can be changed to any character you want in the System Options configuration.

Here is the same data graphed in Excel:



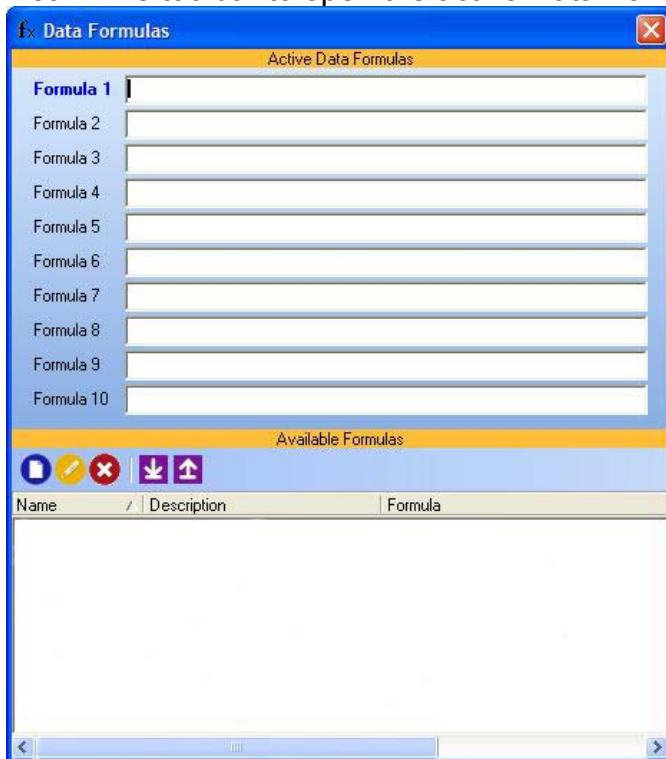
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### How To Create a Data Formula

Data Formulas are a very powerful feature of PowerPROview. They allow you to calculate, even in real time, data results based upon measured data (i.e. volts, amps, etc) and a formula you create. These newly calculated results can be displayed on a Data View and even recorded and saved with the actual measured data. Formulas in a Saved Data file can be edited or added and deleted with the results being recalculated and saved with the original data or even to a new file. This means that you can go back and perform new or different calculations on any of your saved data.

To access the currently active data formulas click on the Formula button  on the Real Time toolbar to open the active Data Formulas window.




Currently we do not have any formulas active or formulas created.

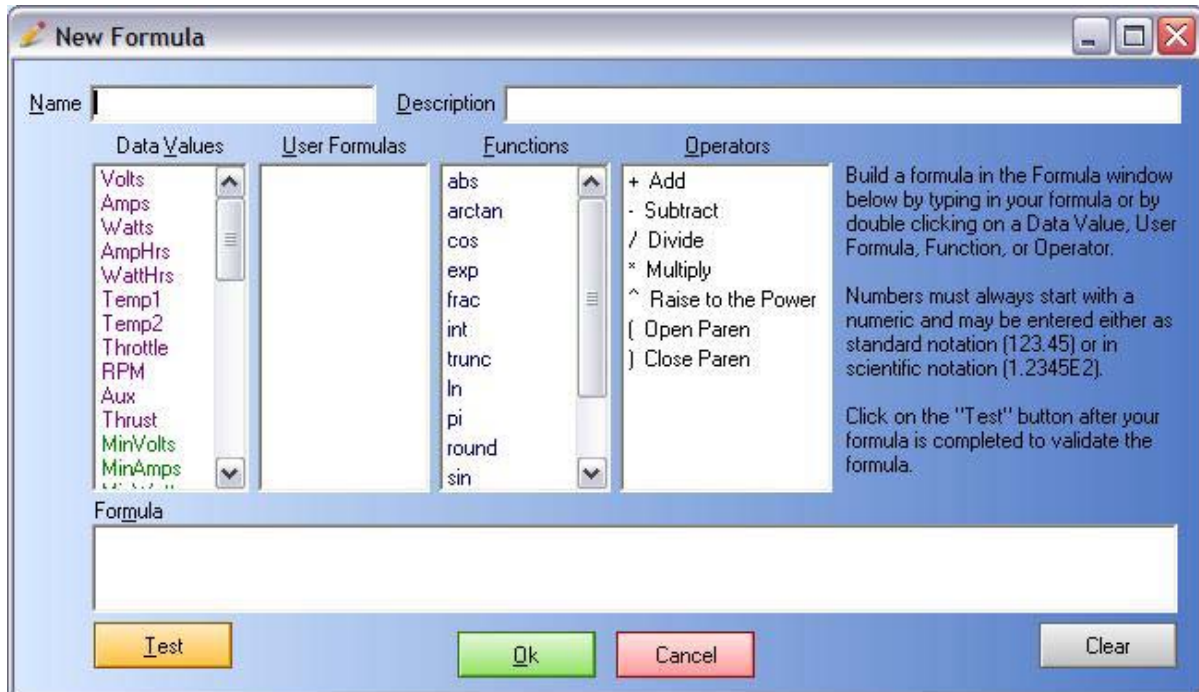
For this example we will create a formula to calculate Kv. We will use the simple version of the formula which is RPM/Volts.



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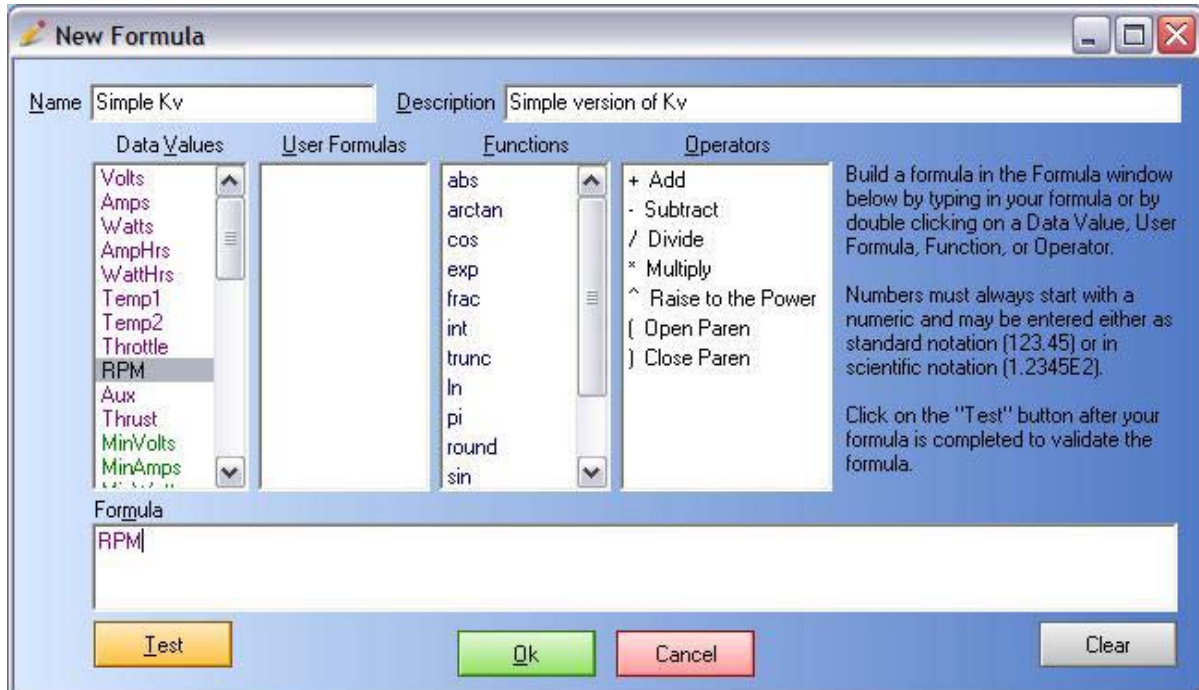
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Click on the new formula button  to open the Formula editor creating a new formula:



The "New Formula" dialog box is shown. It has a title bar with a pencil icon and the text "New Formula". Below the title bar are two input fields: "Name" and "Description". The main area is divided into four panes: "Data Values", "User Formulas", "Functions", and "Operators". The "Data Values" pane contains a list of items: Volts, Amps, Watts, AmpHrs, WattHrs, Temp1, Temp2, Throttle, RPM, Aux, Thrust, MinVolts, and MinAmps. The "Functions" pane contains a list of mathematical functions: abs, arctan, cos, exp, frac, int, trunc, ln, pi, round, and sin. The "Operators" pane contains a list of operators: + Add, - Subtract, / Divide, \* Multiply, ^ Raise to the Power, ( Open Paren, and ) Close Paren. To the right of these panes is a text area with instructions: "Build a formula in the Formula window below by typing in your formula or by double clicking on a Data Value, User Formula, Function, or Operator. Numbers must always start with a numeric and may be entered either as standard notation (123.45) or in scientific notation (1.2345E2). Click on the 'Test' button after your formula is completed to validate the formula." Below the panes is a large text area labeled "Formula". At the bottom are four buttons: "Test", "Ok", "Cancel", and "Clear".

Enter the formula name "Simple Kv" and a description. Next, find the RPM item in the Data Values list and double click it. You will see RPM entered in the formula area.



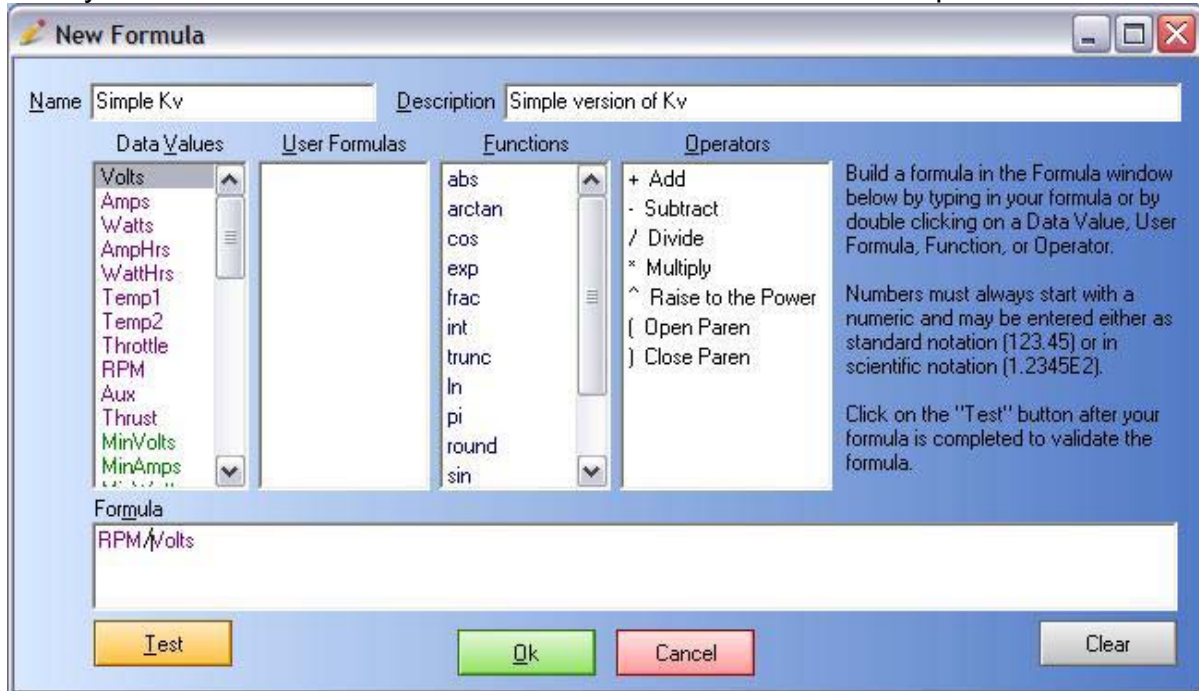
The "New Formula" dialog box is shown again, but now with the "Simple Kv" name and "Simple version of Kv" description entered. The "RPM" item in the "Data Values" list is highlighted. The "Formula" text area now contains "RPM". The other panes and buttons remain the same as in the previous image.



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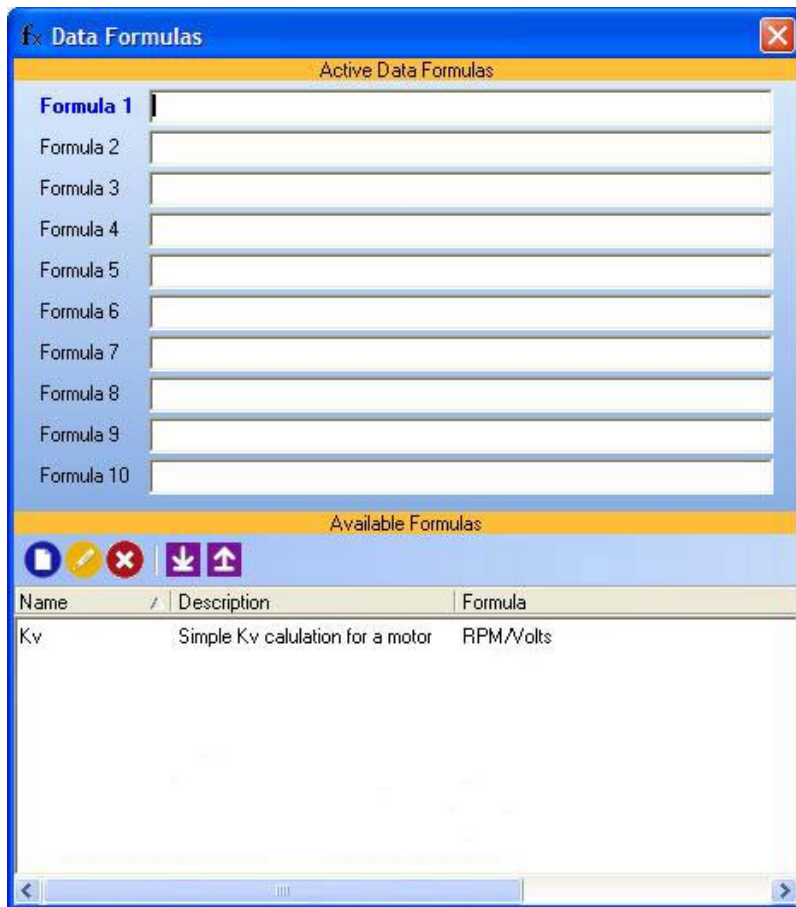
Next type a forward slash "/" or double click the Divide item in the Operators list. Finally double click on the Volts item in the data values list to complete the formula.



Click the Test button to check the formula, then click Ok to save the formula to the formula library.

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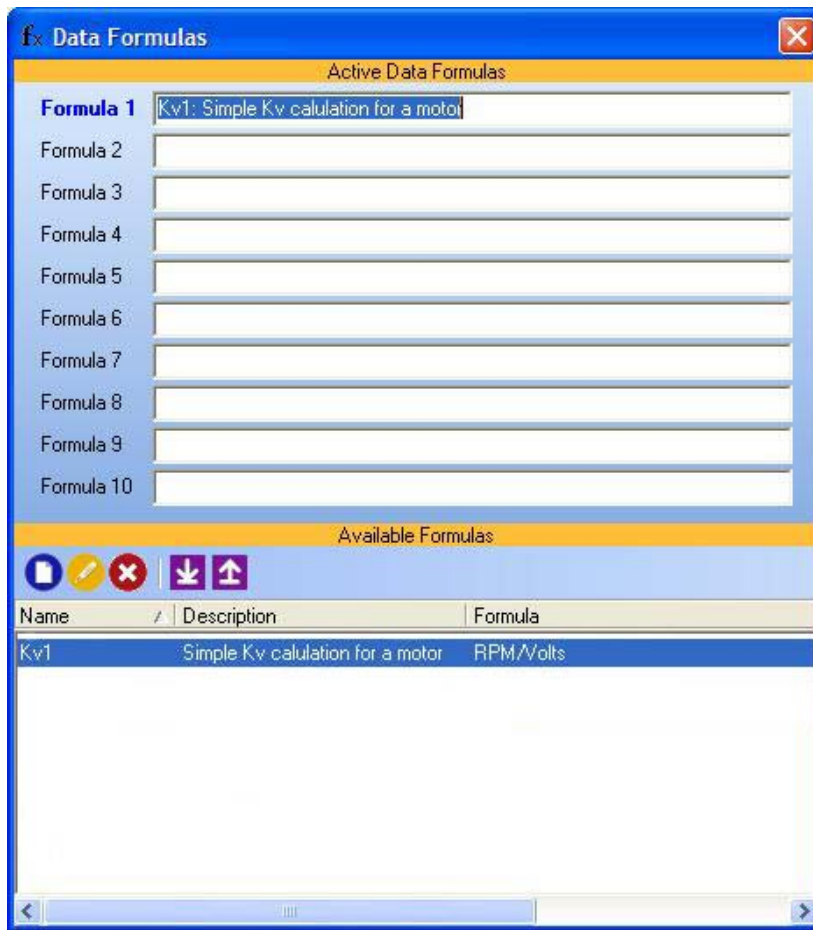


You can create any number of formulas in the formula library ("Available Formulas").

Next, using the left mouse button, drag and drop the Kv formula from the Available Formulas to the Formula 1 position above.

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Now the Kv formula is active. You can have up to ten (10) formulas active at any one time. Any active formulas will be saved with any saved data. The formulas saved with the data can be changed at any time by using the data editor.

Formulas can even reference each other formulas. Keep in mind that Formula 1 will be calculated before Formula 2, etc. which means that you should always reference other formulas that are above the referring formula.

NOTE: Active formulas are a copy of the Available Formulas. Any changes made to an Available Formula WILL NOT change the Active Formula. To update the Active Formula you must replace it with the new modified version of the formula by dragging and dropping the modified Available Formula to the Active Formula position.

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### How to Use Data Formulas

Once you have assigned formulas to the active formula positions they will calculate whenever data is streaming. When adding a data object to a Data View you can select any of the active formulas as the data to display in that data object. Whenever data is recorded the calculated formula results are also recorded. When the data is saved to a file the active formulas are also saved with the data. Formulas in a saved file can be changed, added, or deleted and the results recalculated as needed using the data editor. This means that you can go back to any recorded data and perform additional calculations, or modified calculations after the data has already been recorded. You can use Data Formulas to calculate almost anything you can imagine from a simple Kv calculation to advanced low pass filtering or other sophisticated calculations. One formula can reference other formulas and formulas can also be just a constant value.

Examples of some formulas:


<u>Name</u>	<u>Description</u>	<u>Formula</u>
LipoCells	Number of LiPo cells in pack being tested	3
LiPoDCR	Calculate DC resistance of a LiPo pack	$(\text{LipoCells} * 3.7 - \text{Volts}) / \text{Amps}$
Kv1	Simple Kv calculation for a motor	RPM/Volts
Rm	Motor Winding Resistance (Ohms)	0.007
Kv2	A more accurate Kv Calculation	$\text{RPM} / (\text{Volts} - (\text{Amps} * \text{Rm}))$
Pinion	Heli Pinion	13
Spur	Heli Spur Gear	172
HeadSpeed	Heli Head Speed	$\text{RPM} * \text{Pinion} / \text{Spur}$

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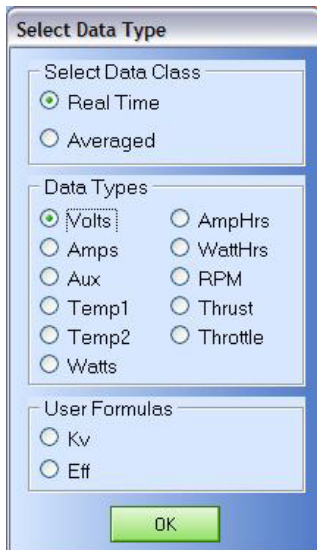
### How To Create a Data View

The Data View is another of the powerful features of PowerPROview. You can have up to five (5) Data Views at one time. Usually you would not need that many but they are available. Each Data View you create can be saved and used at a later date. You can literally have hundreds of Data Views saved loading only those you need at that time.

To create or edit a Data View click on the Enter Design Mode button  on the Data View toolbar. When in Design mode the object selector will be visible.



From the Object selector you can drag and drop (or double click) any of the data objects to add it to the view.

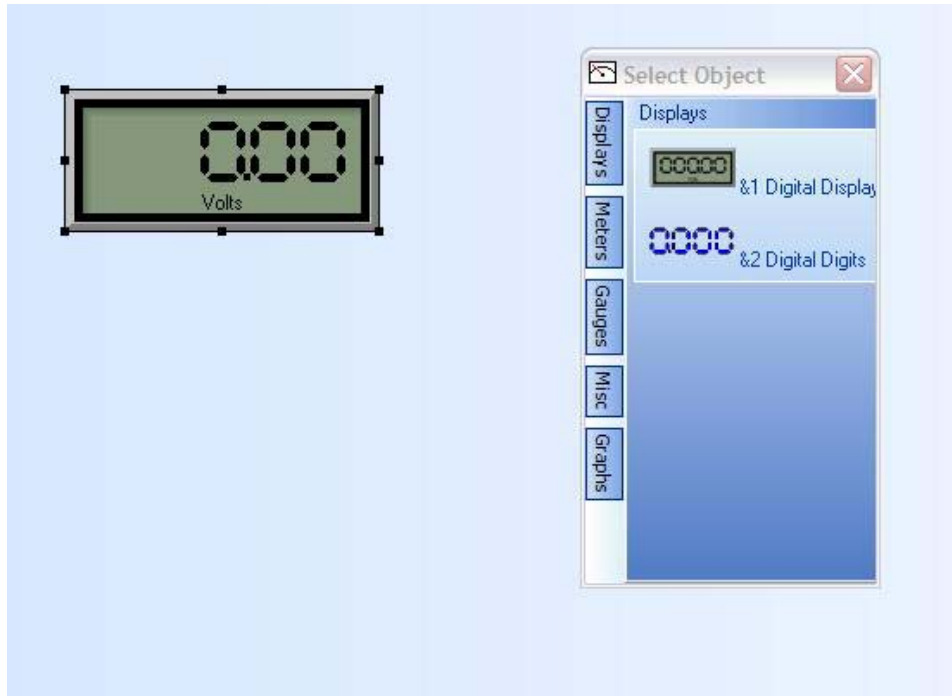


Upon adding a data object to the view the data type dialog appears. Select the Data Class and Data Type or Formula that you wish to display the data for.


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Here is the result:



The dots around the data object mean that it is selected and using the dots you can resize the data object. You can also drag the object to any position on the data view.

When you are done adding data objects to the view you can exit Design mode by clicking on the Exit Design Mode button  on the Data View toolbar or by clicking on the X in the upper right hand corner of the Select Object window.

Once your view is designed click the save button  to save it to disk for later usage.

NOTE: For convenience, you can configure the system, In the System Options, to always load the views that were opened when PowerPROview was last closed.

NOTE: The Data View status  will show which views are loaded (Views 1 and 3) and which view is currently selected (View 1).

NOTE: Whenever a view is empty the Medusa logo watermark will appear in the center of the view area.

