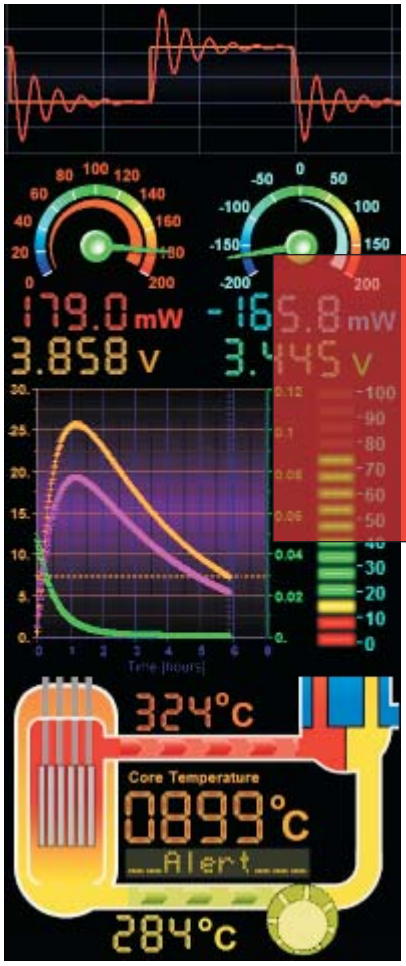
LabRecon - Getting Started with the Measurement Wizard



LabRecon's Measurement Wizard utilizes a built-in database of over 500 commercially available sensors and hundreds of circuit combinations to allow one to quickly configure measurements.

LabRecon

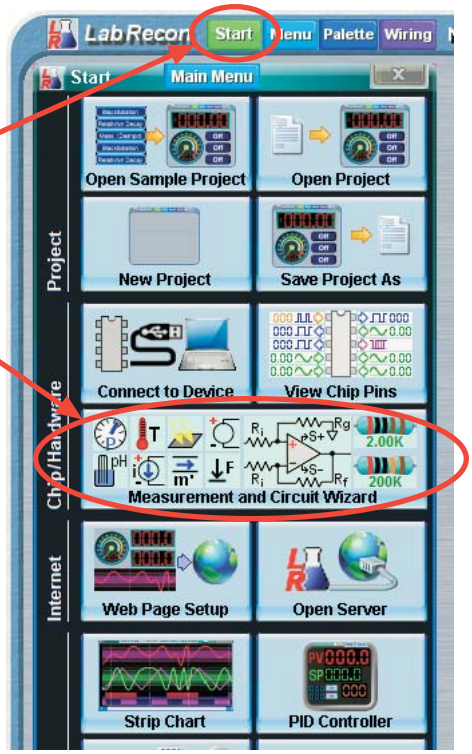
Software and Hardware for Measurement, Control and Simulation

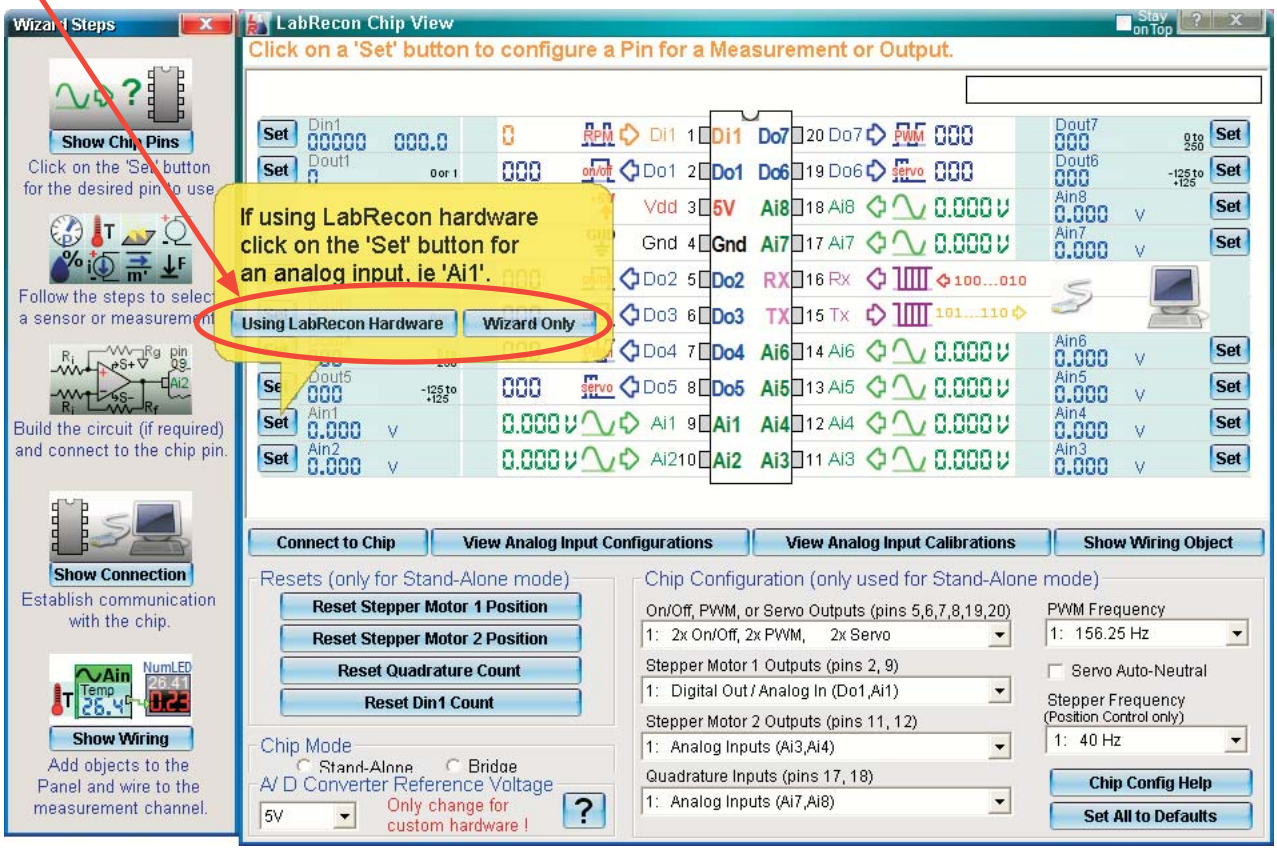
LabRecon's **Measurement Wizard** utilizes a built-in database of over **500 commercially available sensors and hundreds of circuit combinations** to allow one to quickly configure measurements.

Click on the top **"Start"** button and then on the **"Measurement and Circuit Wizard"** tile.

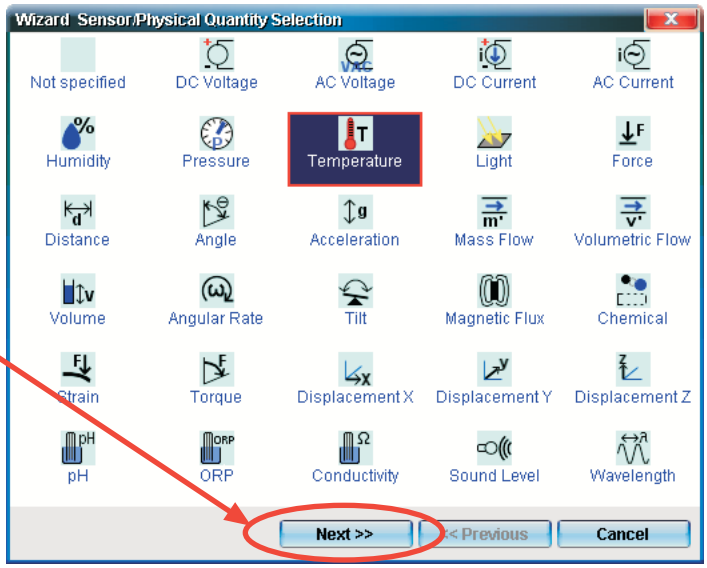
Note that most LabRecon windows have a top **"?"** button for help.

If a channel of a LabRecon chip or LabRecon hardware is being configured, click on **"Using LabRecon Hardware"** and then select the "Set" button for the proper "Ai" channel, otherwise click **"Wizard Only"** to access the feature.

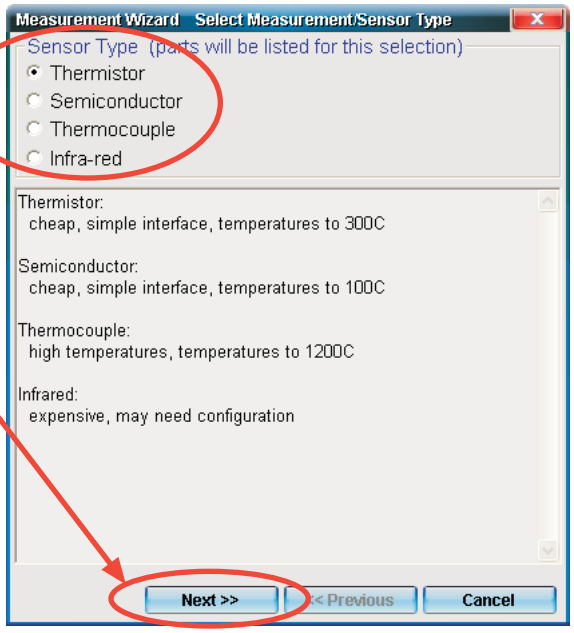




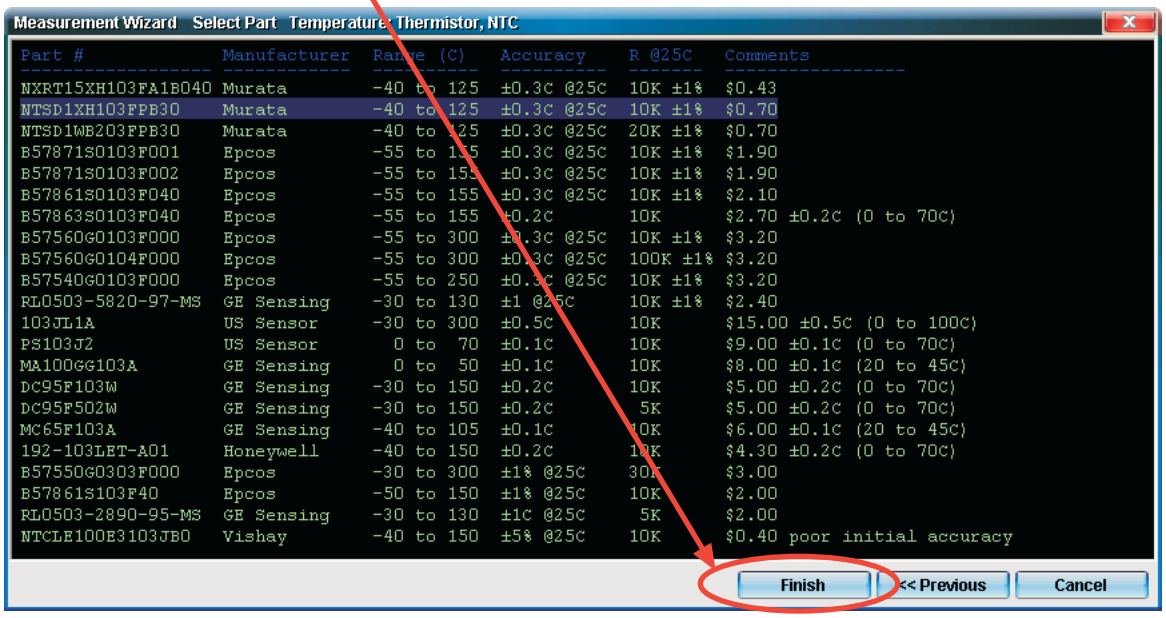
Select a physical quantity and click **"Next"**.



The sensors or circuit types for some physical quantities are grouped according to sensor types. Select the desired sensor type and click **"Next"**.



Select the desired sensor from the list and click **"Finish"**. One can also click **"Previous"** to go back to select a different sensor type.



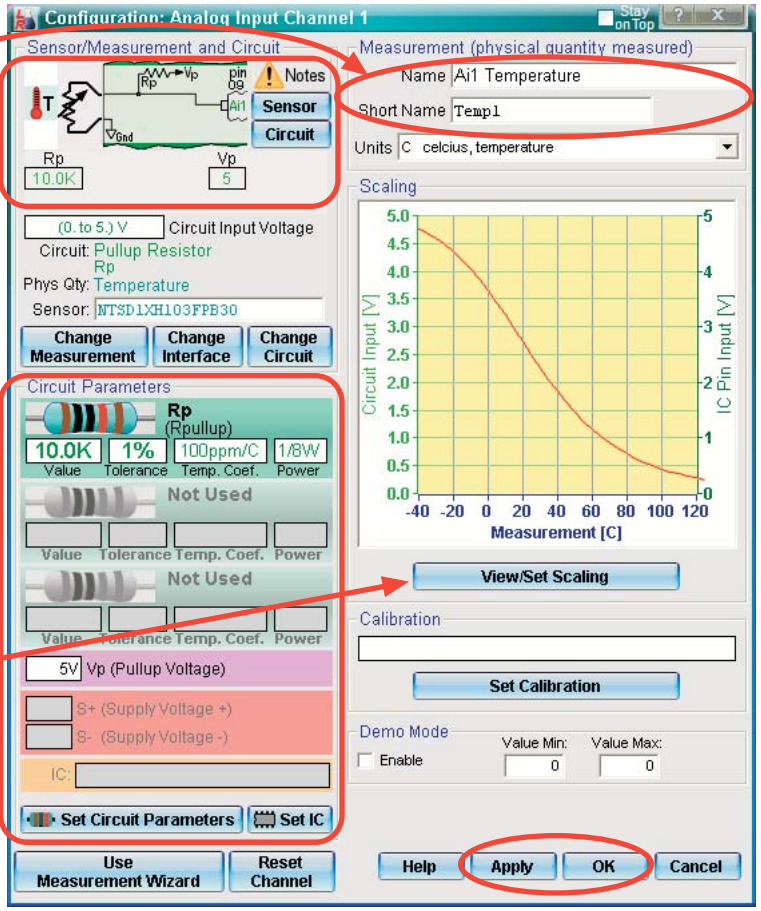
If desired, new names can be entered for the channel. The **"Short Name"** will be used on the **"Wiring"** window.

The resultant circuit is presented with **"Sensor"** and **"Circuit"** buttons to open information windows.

Circuit components, including resistor color codes, is presented for circuit construction.

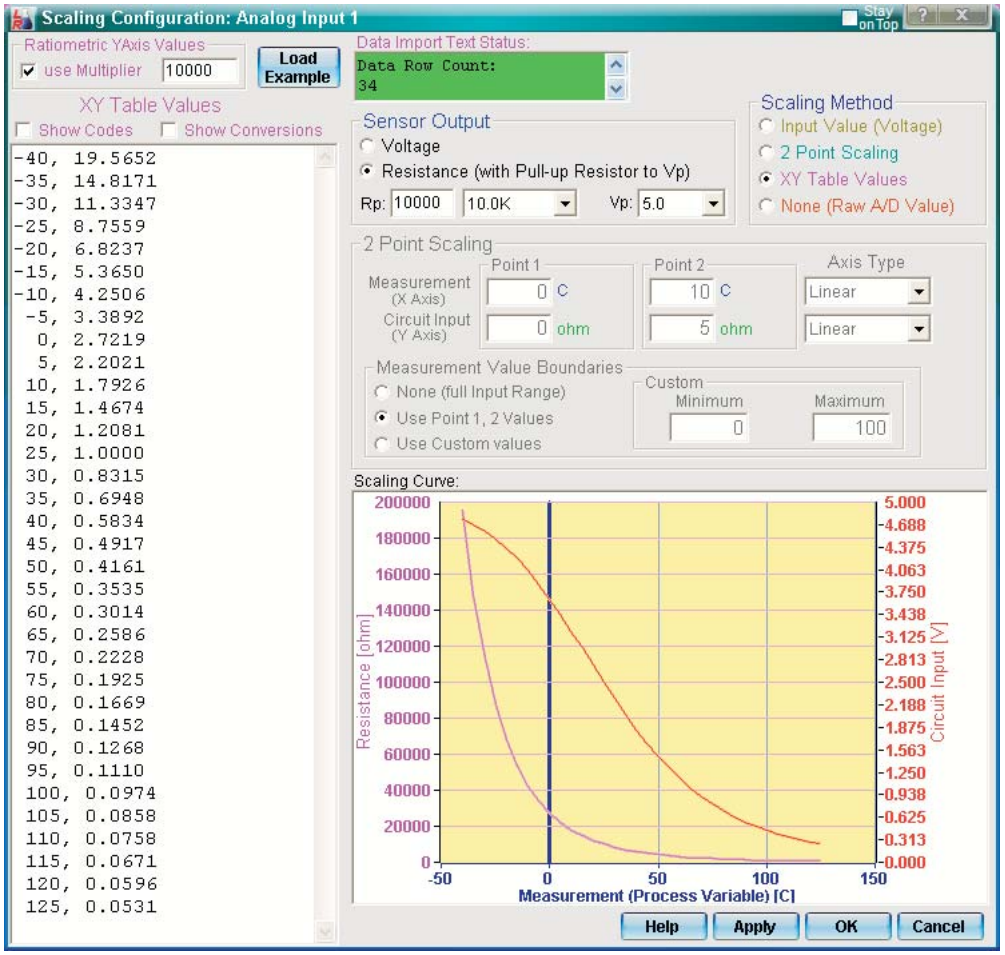
Click the bottom **"Apply"** button and then **"OK"** to close this window. The Wizard can be entered again to configure additional channels.

If desired, **"View/Set Scaling"** can be clicked to open the Scaling window shown below.



This window allows viewing and editting of scaling parameters for the channel. After using the wizard, the resultant scaling will be shown. One can also skip the wizard to manually configure scaling by entering parameters or pasting table data.

The scaling/linearization can be defined either by table data or 2 points on linear or logarithmic scales or by table data. For resistive sensors, such as thermistors, calculations for the specified bias resistance are performed.



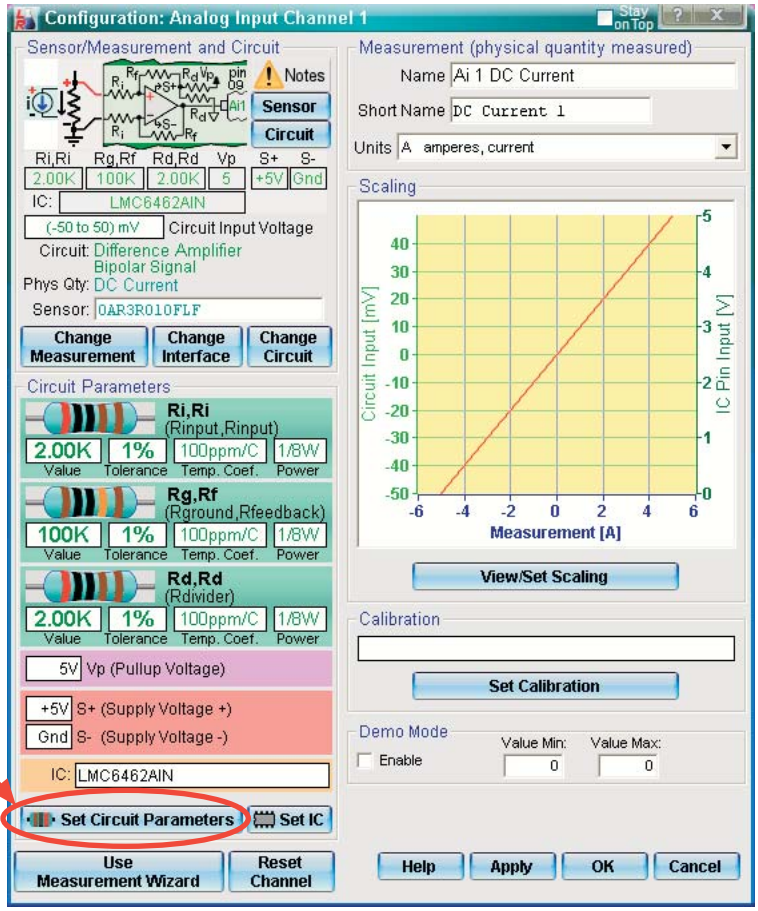
This is the resultant Channel Configuration window for a **DC Current** (bipolar) measurement using a 0.01 ohm shunt.

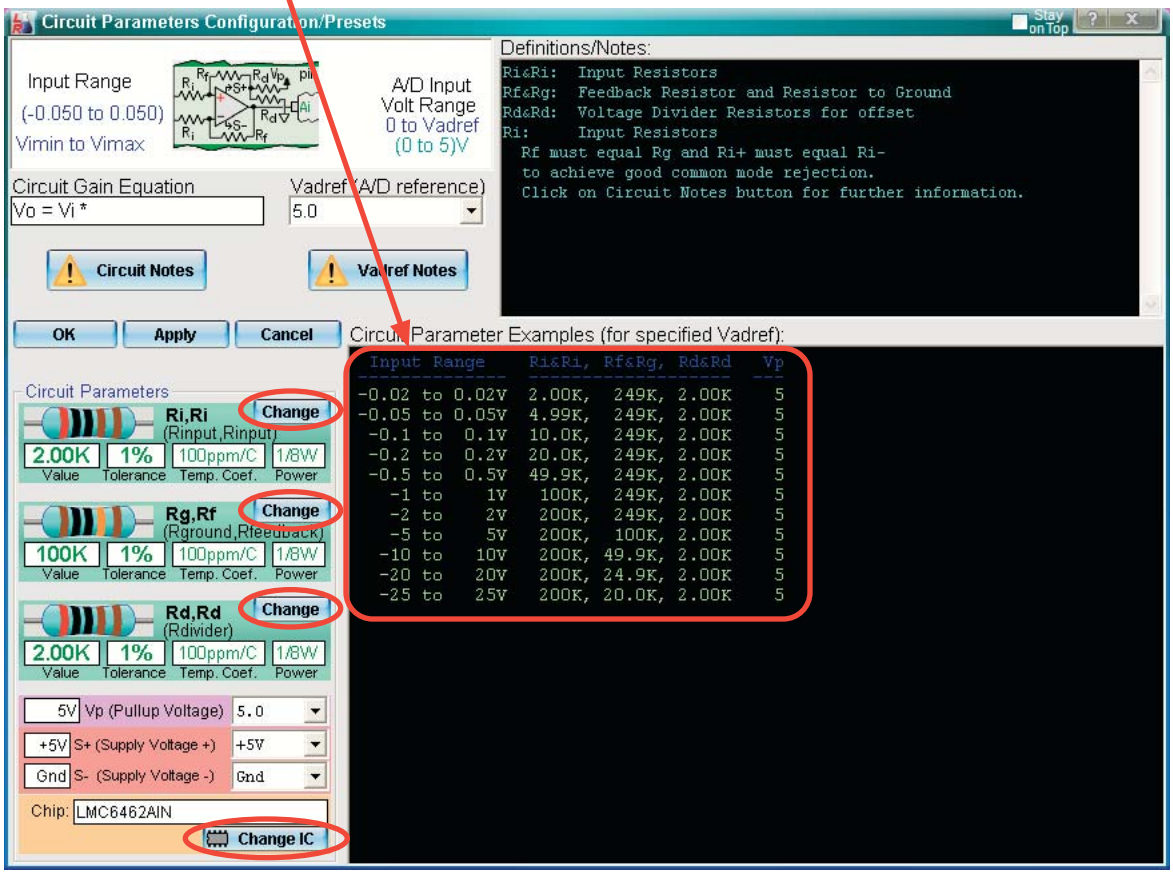
The presented circuit consists of 3 resistors and an op-amp.

Note that commonly available 1% resistors are recommended by default, but more expensive 0.1% resistors (with a lower temperature coefficient) if desired. A part number of a precision op-amp with rail-to-rail inputs/outputs is also recommended.

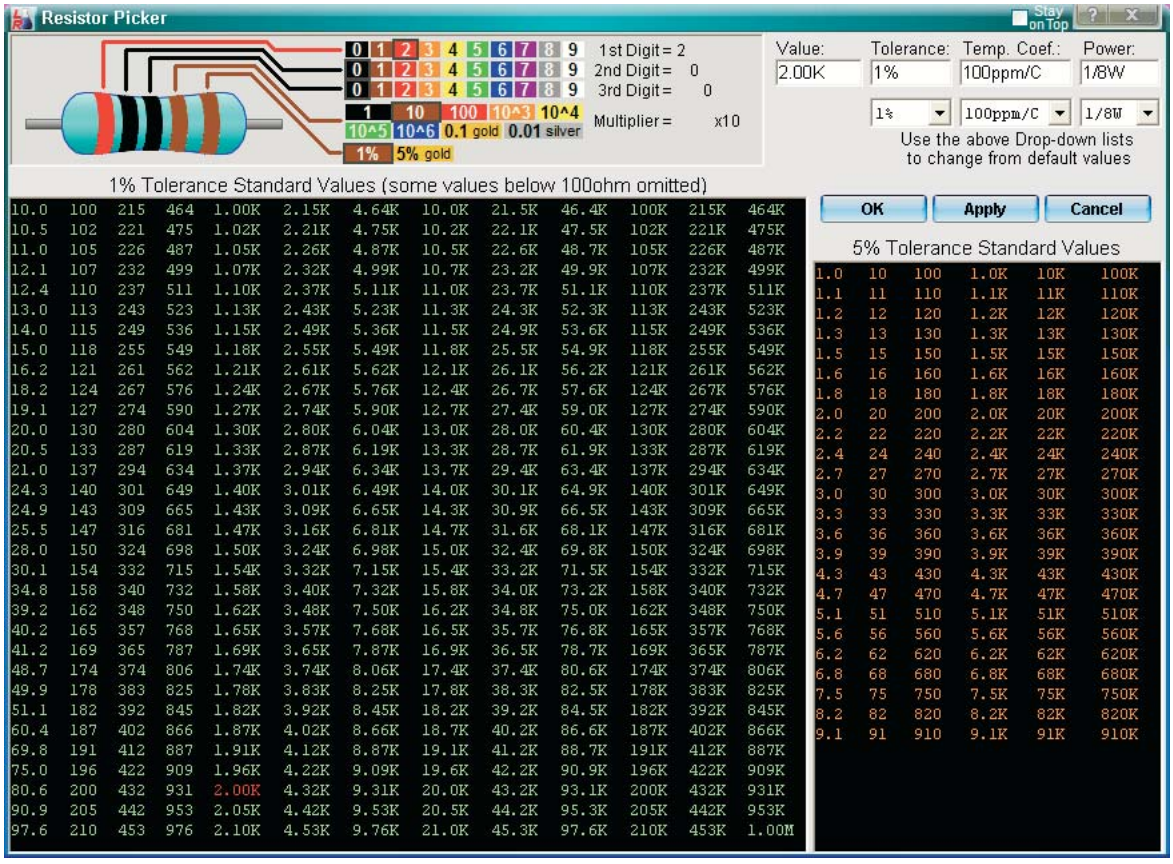
If desired, one can click on **"Set Circuit Parameters"** will open the below window to modify parameters.

For many circuits a list of **input range options** can be selected from and new resistor values will be calculated. Optionally, one can adjust individual resistor values using its **"Change"** button. The bottom **"Change IC"** button presents op-amp options.

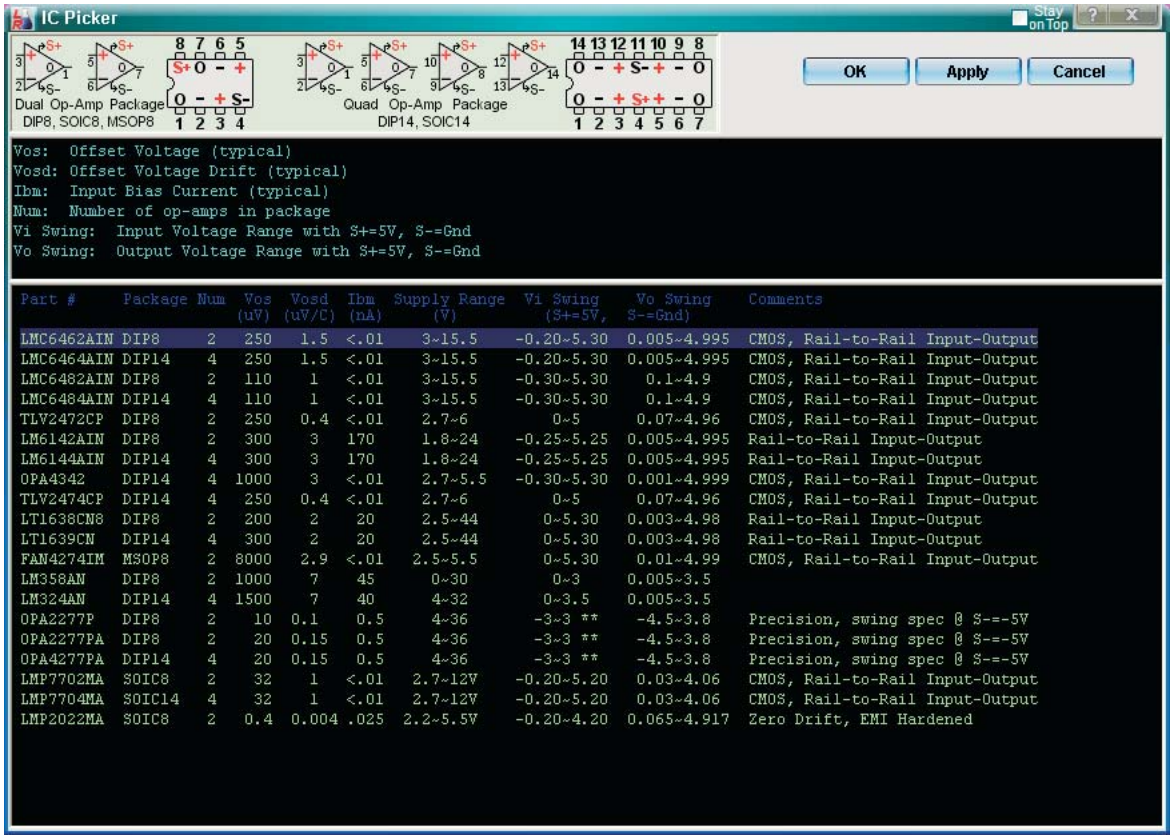




The Resistor Picker allows one to select from common resistor values.



When the **"Change IC"** button is clicked this window presents a list of common precision op-amps.

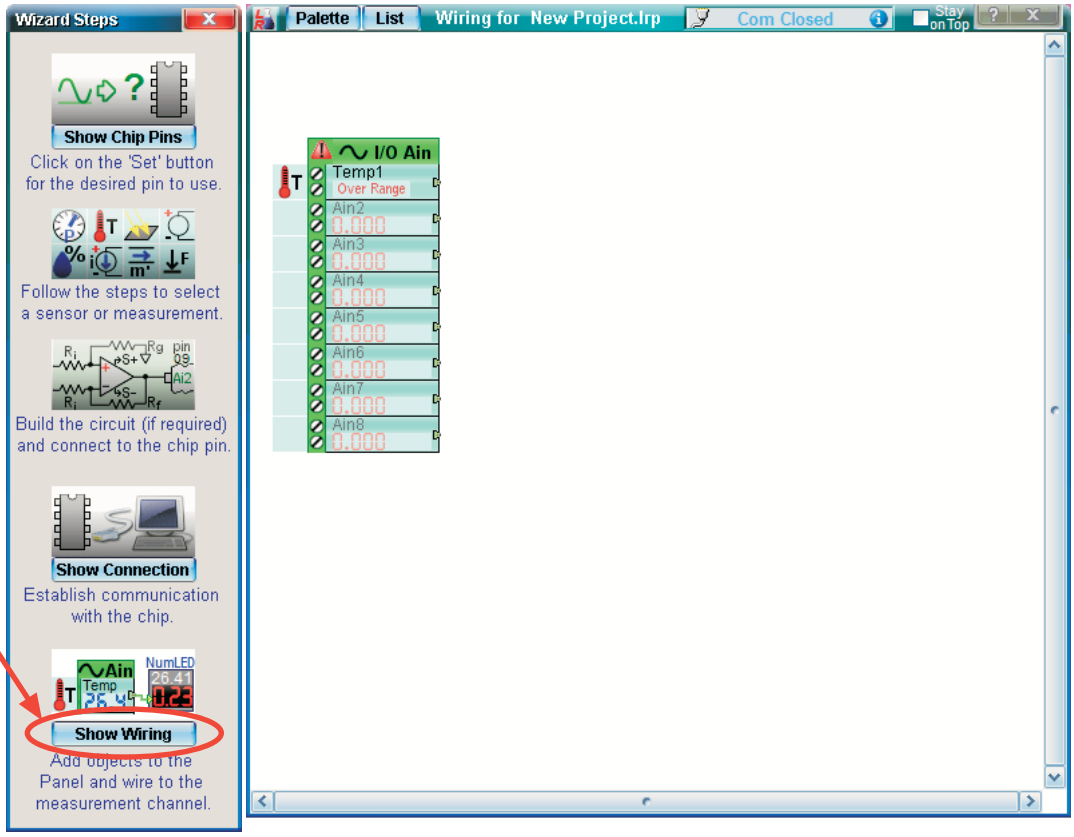


Part #	Package	Num	Vos (uV)	Vosd (uV/C)	Ibm (nA)	Supply Range (V)	Vi Swing (S+=5V, S-=Gnd)	Vo Swing	Comments
LMC6462AIN	DIP8	2	250	1.5	<.01	3~15.5	-0.20~5.30	0.005~4.995	CMOS, Rail-to-Rail Input-Output
LMC6464AIN	DIP14	4	250	1.5	<.01	3~15.5	-0.20~5.30	0.005~4.995	CMOS, Rail-to-Rail Input-Output
LMC6482AIN	DIP8	2	110	1	<.01	3~15.5	-0.30~5.30	0.1~4.9	CMOS, Rail-to-Rail Input-Output
LMC6484AIN	DIP14	4	110	1	<.01	3~15.5	-0.30~5.30	0.1~4.9	CMOS, Rail-to-Rail Input-Output
TLV2472CP	DIP8	2	250	0.4	<.01	2.7~6	0~5	0.07~4.96	CMOS, Rail-to-Rail Input-Output
LM6142AIN	DIP8	2	300	3	170	1.8~24	-0.25~5.25	0.005~4.995	Rail-to-Rail Input-Output
LM6144AIN	DIP14	4	300	3	170	1.8~24	-0.25~5.25	0.005~4.995	Rail-to-Rail Input-Output
OPA4342	DIP14	4	1000	3	<.01	2.7~5.5	-0.30~5.30	0.001~4.999	CMOS, Rail-to-Rail Input-Output
TLV2474CP	DIP14	4	250	0.4	<.01	2.7~6	0~5	0.07~4.96	CMOS, Rail-to-Rail Input-Output
LT1638CN8	DIP8	2	200	2	20	2.5~44	0~5.30	0.003~4.98	Rail-to-Rail Input-Output
LT1639CN	DIP14	4	300	2	20	2.5~44	0~5.30	0.003~4.98	Rail-to-Rail Input-Output
FAN4274IM	MSOP8	2	8000	2.9	<.01	2.5~5.5	0~5.30	0.01~4.99	CMOS, Rail-to-Rail Input-Output
LM358AN	DIP8	2	1000	7	45	0~30	0~3	0.005~3.5	
LM324AN	DIP14	4	1500	7	40	4~32	0~3.5	0.005~3.5	
OPA2277P	DIP8	2	10	0.1	0.5	4~36	-3~3 **	-4.5~3.8	Precision, swing spec @ S-=-5V
OPA2277PA	DIP8	2	20	0.15	0.5	4~36	-3~3 **	-4.5~3.8	Precision, swing spec @ S-=-5V
OPA4277PA	DIP14	4	20	0.15	0.5	4~36	-3~3 **	-4.5~3.8	Precision, swing spec @ S-=-5V
LMP7702MA	SOIC8	2	32	1	<.01	2.7~12V	-0.20~5.20	0.03~4.06	CMOS, Rail-to-Rail Input-Output
LMP7704MA	SOIC14	4	32	1	<.01	2.7~12V	-0.20~5.20	0.03~4.06	CMOS, Rail-to-Rail Input-Output
LMP2022MA	SOIC8	2	0.4	0.004	.025	2.2~5.5V	-0.20~4.20	0.065~4.917	Zero Drift, EMI Hardened

Wiring (graphical programming)

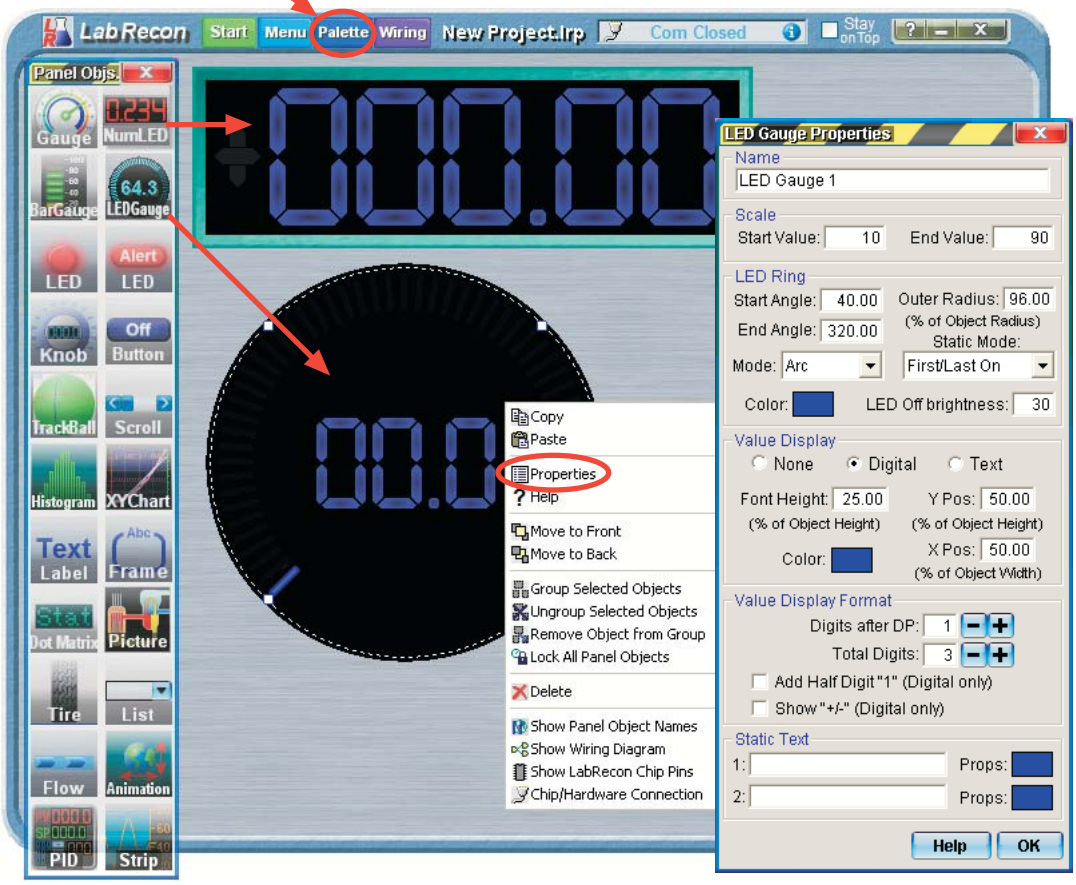
Clicking on **"Show Wiring"** button will open the **Wiring** window and will add the **Ain (Analog Inputs) wiring object**.

Note that clicking on the Panel's top **"Wiring"** button will also open the **Wiring** window.



Clicking on the Panel's top **"Palette"** button will open the **Panel Objects** palette. Objects can be dragged onto the Panel.

Right-clicking on any object and selecting **Properties** will allow one to customize the object.

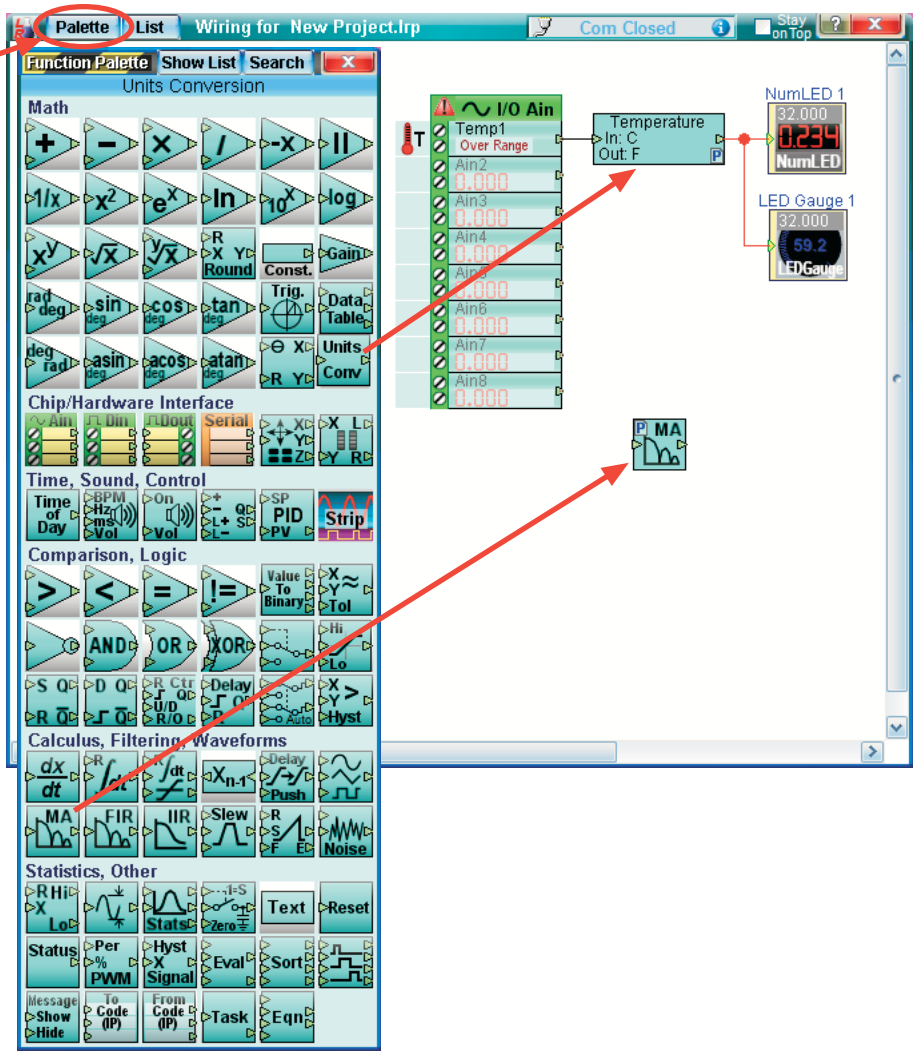


Clicking on the top **"Palette"** button allows one to drag objects onto the **Wiring** window.

Right-clicking on a Wiring object and selecting **"Properties"** allows one to configure the object.

A **Units Conversion** object was added and wired between the configured channel and the **Panel objects added on the Panel**.

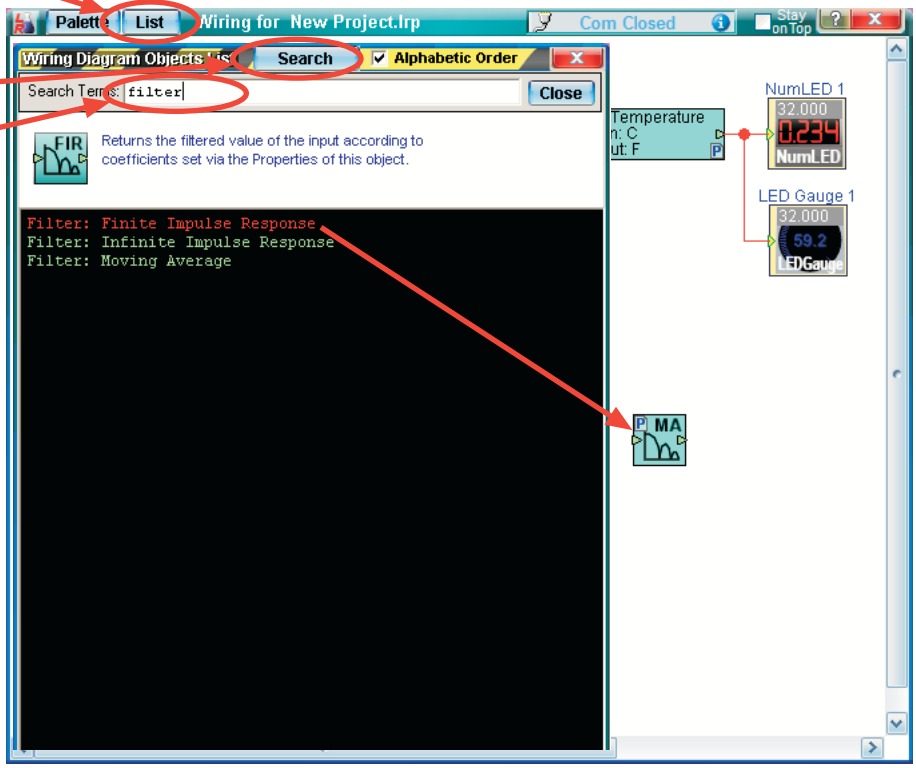
Optionally a **Moving Average Filter** object can be added in series to filter noisy measurements.



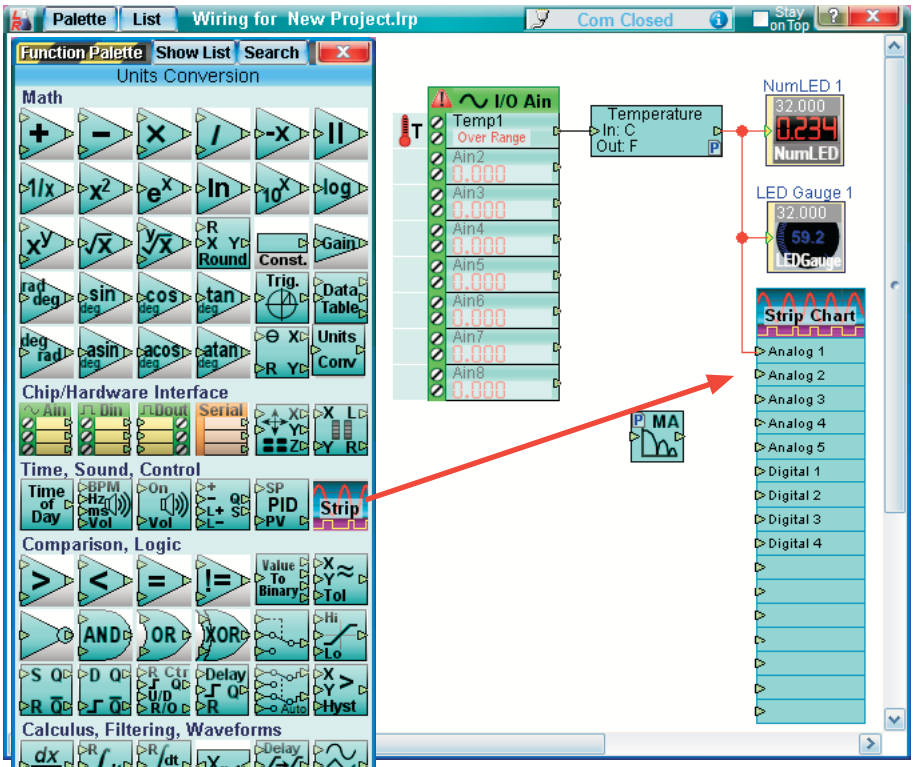
An alternative method to find objects is to click the top **"List"** button.

Furthermore, one can click **"Search"** and then type a description to display matching objects.

The desired object can then be dragged onto the Wiring window.

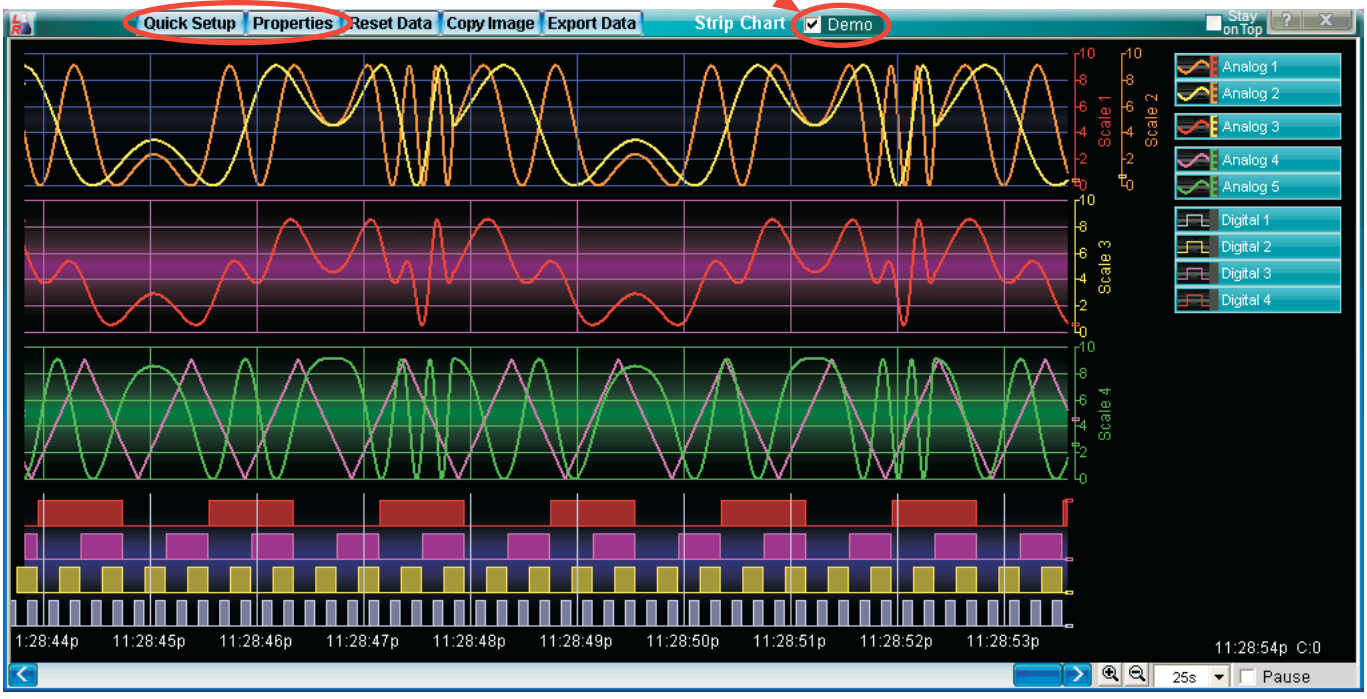


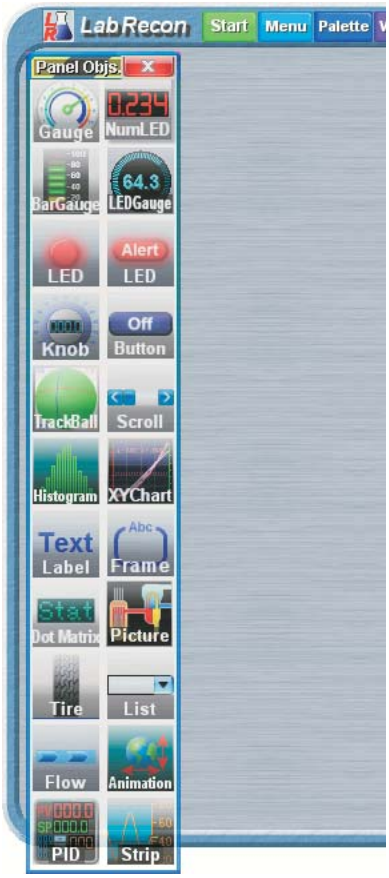
The **"Strip"** object can also be dragged onto the **Wiring** window and wired to multiple signals.



Note that the Stripchart shown below has **"Demo"** checked to show how analog and digital traces can look.

The **"Quick Setup"** or **"Properties"** buttons open configuration windows.





Additional objects can be dragged from the **Panel Object Palette** onto the Panel. Below is a Panel that was created for a Photovoltaic-Lithium Ion-LED lamp, which includes **Gauges, XY Charts, Animations, and Pictures** for imported graphics.

Right-clicking on and object and opening **"Properties"** allows many customizations.

Note that the **XYCharts** were also configured to calculate and display **curve fits**.

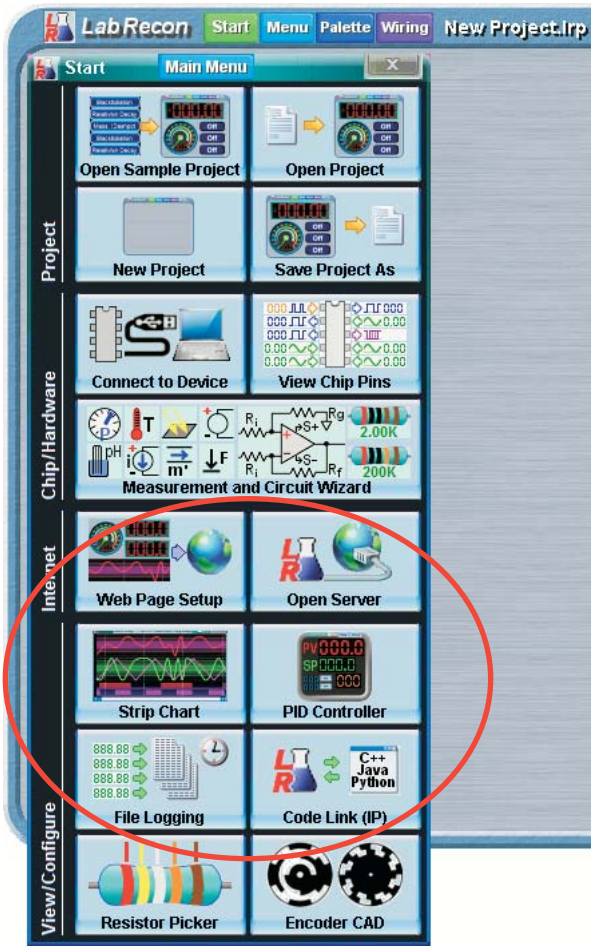
Control objects, such as **Buttons, Scrolls, Knobs, Dropdown Lists, and Trackballs,** can also be added to control devices. Below a button and scroll was added to the upper left of the Panel to control the light source.

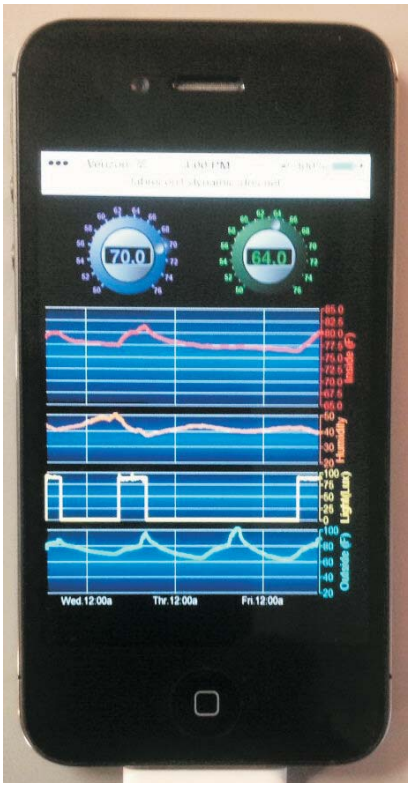
Internet Web page generation is one of LabRecon's most powerful features, which allows any Panel to be accessed over the Internet from a smart phone, tablet, or computer. Below is a photograph of an **iPhone displaying a smart thermostat** created in LabRecon.

LabRecon generates HTML/HTML5, CSS, and Javascript based on the Panel and includes a **built-in server** to allow access. The document **"LabRecon-Getting Started with IoT (Internet of Things).pdf"** covers this feature.

Other features, that can be accessed from the **Start** menu, include **PID Control, File Logging,** and **Code Linking**.

The **Code Link** features allows measurement and control variables on the Wiring window to be shared with code, such as **C/C++, Java, Javascript, Python**, developed by the user.



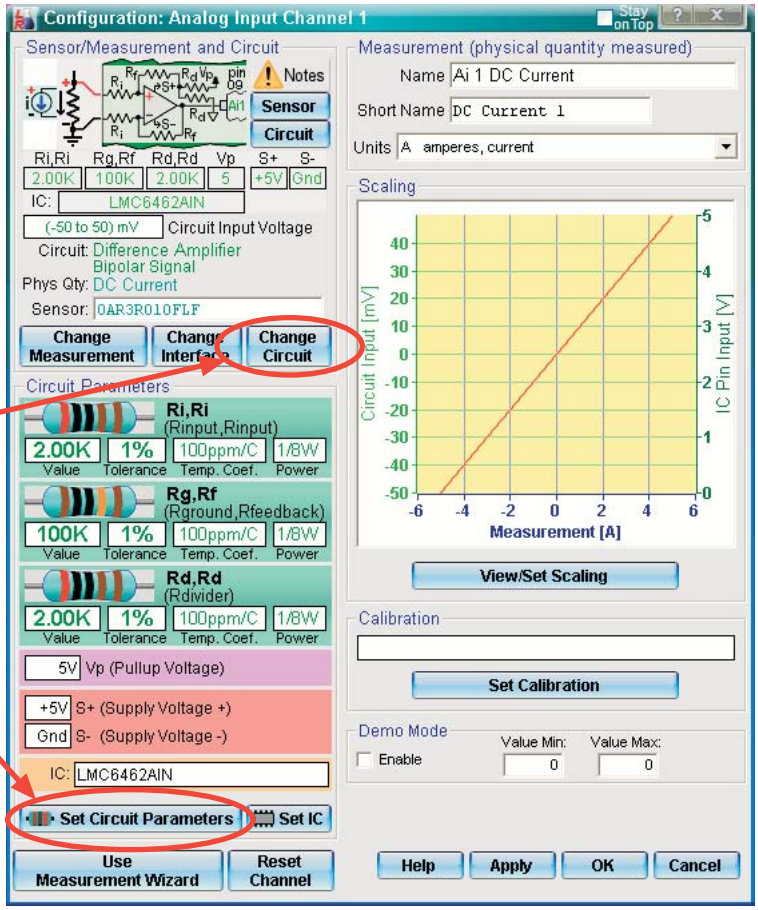


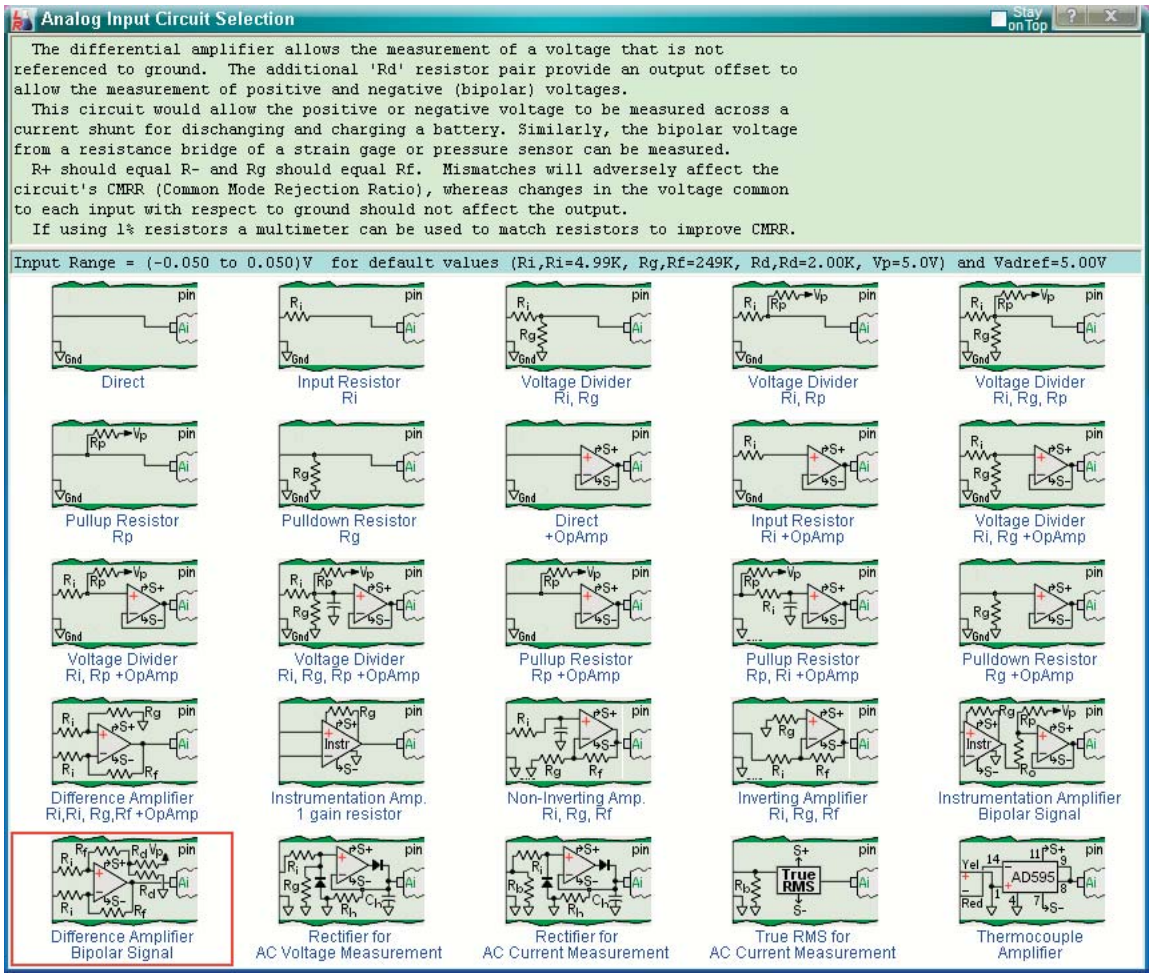
Advanced Measurement Configuration

As shown ealier, the **Analog Input Channel Configuration** window shows measurement and circuit parameters determined by the Measurement Wizard.

One can click on **"Change Circuit"** to open the **Analog Input Circuit Selection** window, shown below, to select a different circuit.

As shown previously, clicking **"Set Circuit Parameters"** will allow one to select from gain presets or change resistor values.

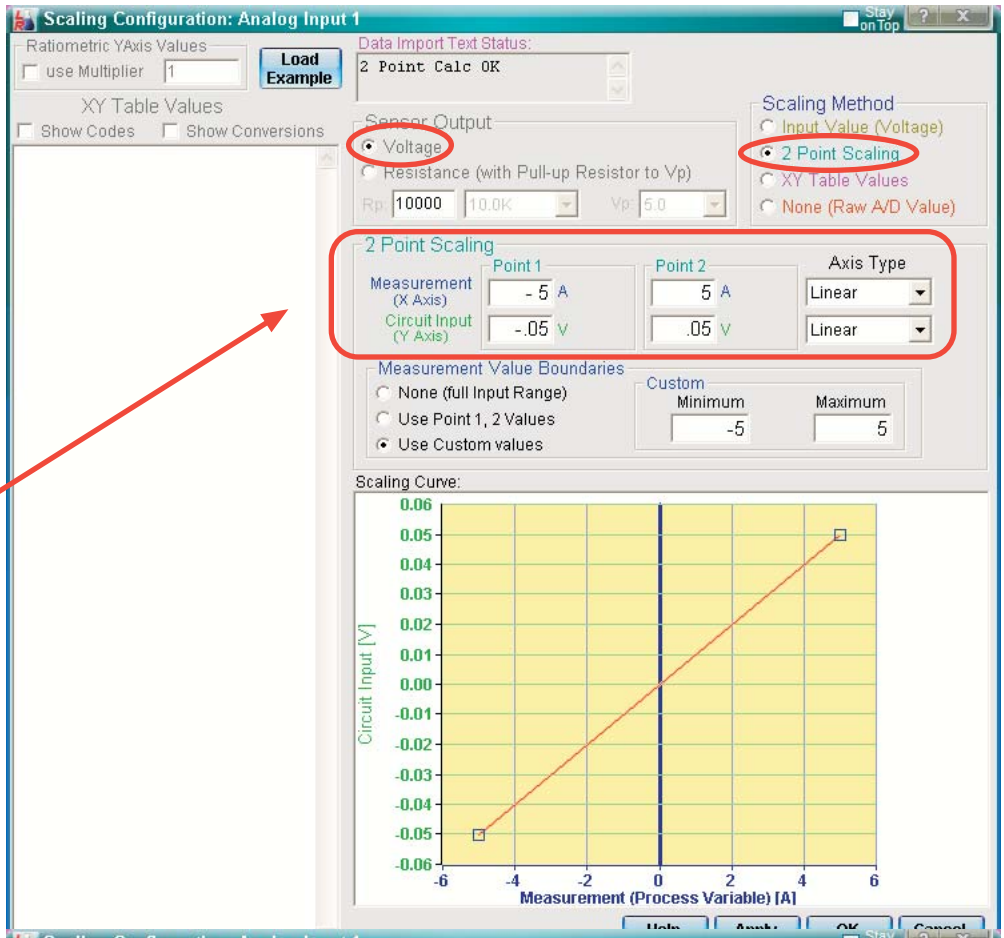




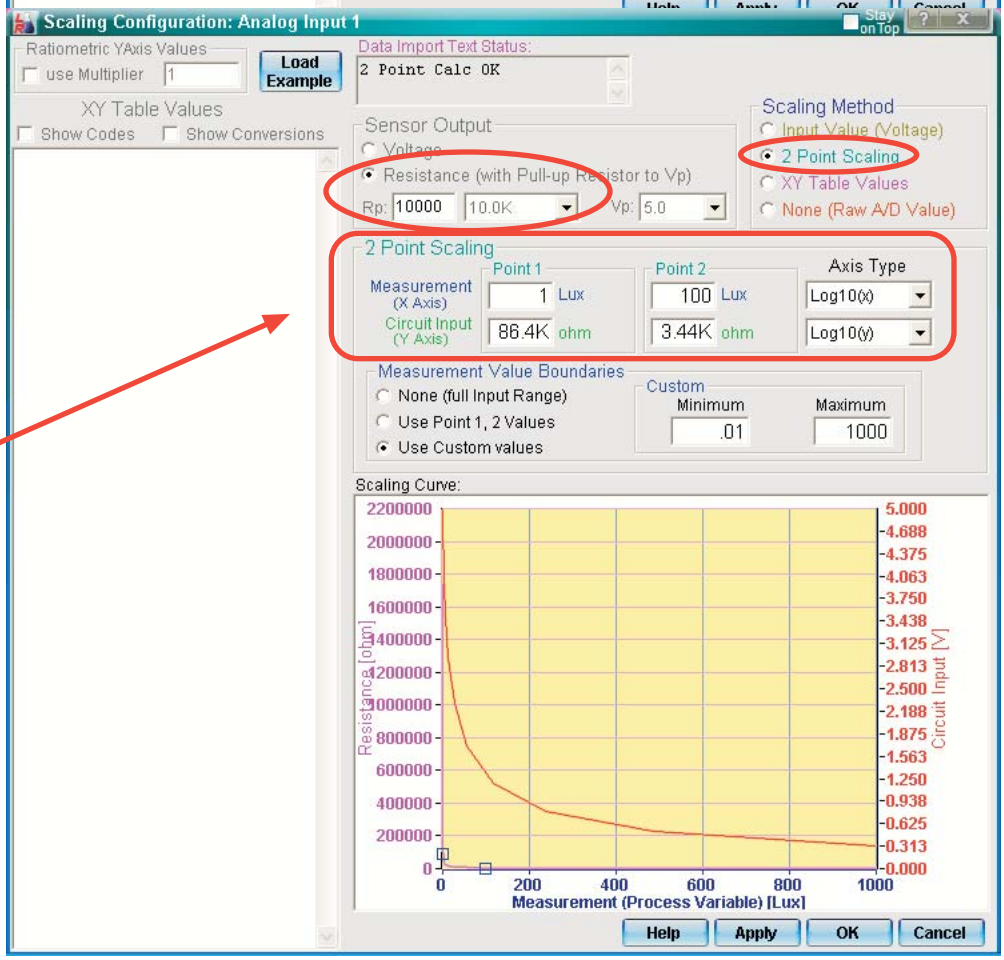
Advanced Measurement Configuration, cont.

This window, as shown ealier, used table data for a thermistor temperature measurement.

Here is an example of a **linear relationship** for a bipolar DC current measurement. It is defined by **2 points** on **2 linear axes**. The **Sensor Output** is set to **Voltage** because there is no bias resistor, as used with a thermistor.

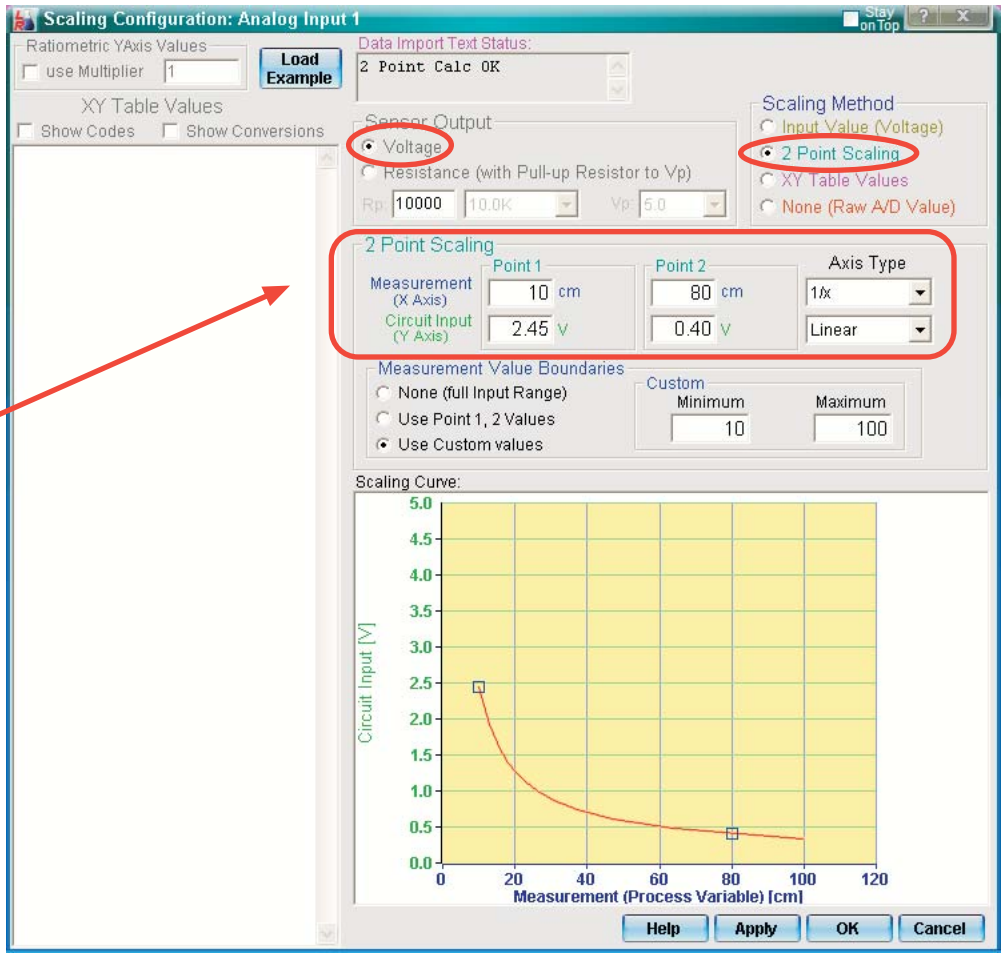


Here is an example of a **logarithmic relationship** for a CdS photocell light measurement. It is defined by **2 points** on **2 Log base10 axes**. The **Sensor Output** is set to **Resistance** and **10K** for a bias resistor.



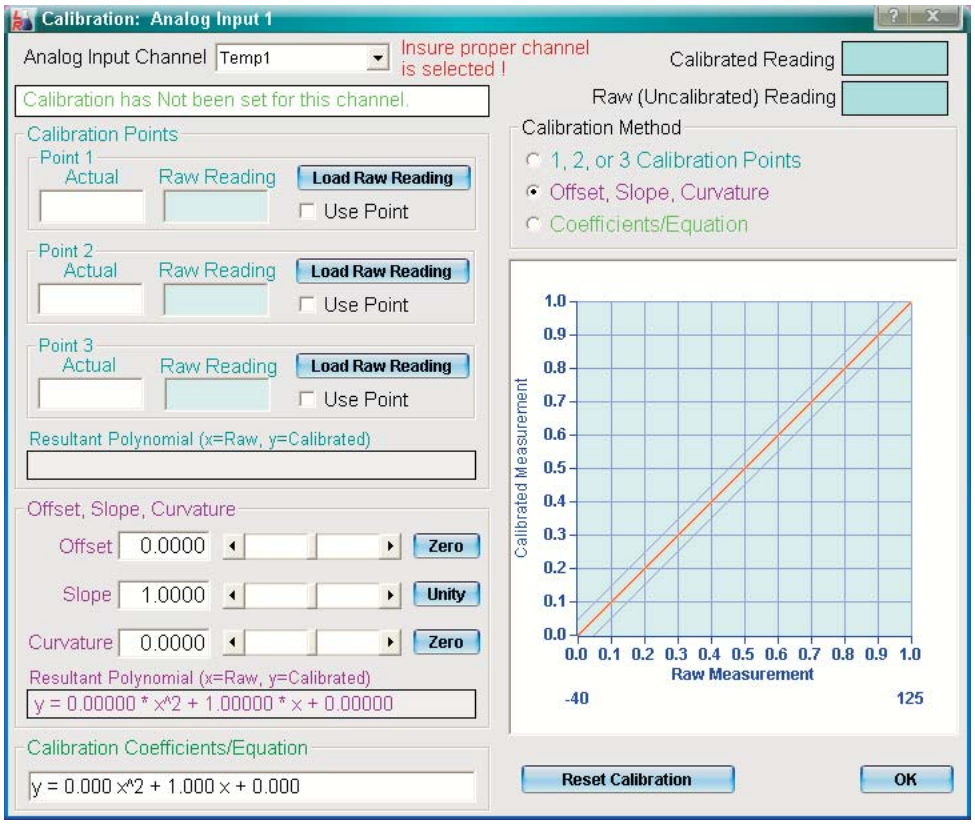
Advanced Measurement Configuration, cont.

Here is an example of a **reciprocal relationship** for a triangulation distance sensor. It is defined by **2 points** on **a reciprocal (1/x) and a linear axis**. The **Sensor Output** is set to **Voltage** because there is no bias resistor.



In many applications this window may not be used, but it allows for minor calibration adjustments to correct for sensor and/or circuit component inaccuracies.

The Channel Configuration window on the previous page also has a **"Set Calibration"** button to open this window. Various methods are available to adjust calibration parameters Click "?" for help on using the various methods.



Documents at www.LabRecon.com/Documents

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Revisions to this Document

Rev 0 Initial release

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