Products by Type

- Digital Panel Meters
- Electronic Counters
- Programmable Timers
- Transmitters, 4-20 mA
- Transmitters, Modbus
- Large Digit Displays
- Bar Graph Displays
- Meter/Counter Options
- Meter Accessories
- Data Logging Systems
- Serial-to-Analog
- 4-20 mA Loop Splitters

Meters by Application

- DC Volts & Amps
- AC Power Monitoring
- Process Meters
- Flow Rate Total Batch
- Weight, Load, Stress
- Frequency, Rate, RPM
- Temperature Control
- Resistance in Ohms
- Pulse & Analog Totals
- Timing Products
- Position Length Speed
- Mixing, Ratio, Sum
- Remote Serial Display

Resource Pages

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Custom Curve Linearization

Easy Programming for Custom Nonlinear Curve Fits

Applicable to Laureate™ Process, Strain Gauge, Load Cell Meters, Frequency / Rate Meters, Totalizers

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Features

- **Achieves exceptional accuracy with low-cost transducers.**
- **Extends transducer operating range on high and low ends.**
- **Solves application problems involving non-linear relationships.**
- **Available with Extended versions of Laureate digital panel meters, counters and timers.**
- **Easy setup by entering data points into a computer spreadsheet, or typing in desired readings for actual signal inputs.**
- **Exceptional accuracy from 0.1% to 0.01% of full scale with few data points, made possible by curvilinear spline fits.**

Description

Custom curve linearization is a feature available with the Extended option version of all Laureate digital panel meters, counters and timers, excluding only the temperature meter, which already has built-in linearization curves. Custom curve linearization can provide exceptional accuracy from low cost transducers of these are repeatable. It can extend the working range of transducers on their high and low ends. It can also solve special application problems where there is a non-linear relationship between the input and the desired readout.

Linearizing is implemented in the form of 20 nonlinear spline-fit segments, which provide better accuracy than a larger number of straight line segments. The typical error will be from 0.1% to 0.01% of full scale, depending on the number of data points used

for setup, the error in the data points, and the severity of non-linearities or discontinuities.

Easy Setup

Setup of a Laureate Linearizing Process Meter requires an external PC, which is connected to the meter via RS232 or USB cable, and utilizes linearizing software furnished by Laurel Electronics. To download, go to our Software Download Page. A serial communications board is required, but can be removed from the meter following setup. Three meter programming methods are offered:

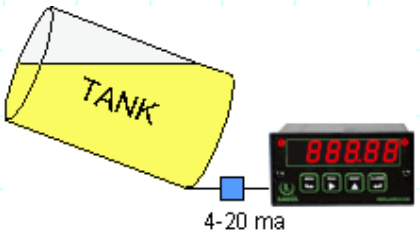
1. **Spreadsheet Method:** Data points consisting of the input signal in Volts or Amps and the desired reading are entered into an Excel spreadsheet or into a text file using a space, comma or tab as the delimiter. There can be up to 180 data points. Laurel's software then calculates 20 spline-fit segments and downloads their coefficients into the meter.
2. **Actual Input Method:** The meter is hooked up to the actual signal source, and the user enters the desired readings for different signal levels. There can be up to 180 input / reading combinations. Laurel's software then calculates 20 spline-fit segments and downloads their coefficients into the meter. This method automatically compensates for any errors in the transducer.
3. **Polynomial Method:** The mathematical formula relating the input to the output is entered into the computer, which then uses this data to calculate the spline-fit segments. This method is ideal if the mathematical relationship is knows, for example to calculate the contents of a tank based on the known geometry of the tank.

Application Examples

- **Altimeters,** since the relationship between pressure and altitude is very non-linear.
- **Rate of ascent** based on successive altimeter readings.
- **Volume of irregularly-shaped tanks,** such as horizontal cylinders, based on measured liquid level or liquid pressure at the base of the tank.
- **Non-linear transducers,** such as thermistors or CdS cells.
- **Fine-calibration of linear transducers,** since even nominally linear transducers will have nonlinear components.
- **Extending the working range of transducers,** since many transducers become nonlinear at their low and high ends.
- **Compensating for inaccuracy of low-cost transducers.**

Measuring tank volume

The Extended Laureate process meter can display the volume of irregularly shaped tanks based on measured tank level or static pressure at the base of the tank. Examples are a cylindrical tank lying on its side, or tank that has been tilted to facilitate drainage, as illustrated.



Ordering Guide

Laureate™ Custom Curve Linearizing Process Meters

Main Board	Compatible Signal Conditioner
L3 or L4	DC, P, SG, WM
L7 or L8	FR, VF

Select the buttons to build a model number in this format: **JR1000DCV1, IPC**

		Quantity 1
Main Board	○ **L3** Extended DPM Main Board, Green LEDs.	$260
	○ **L4** Extended DPM Main Board, Red LEDs.	$260
	○ **L7** Extended Counter Main Board, Green LEDs.	$270
	○ **L8** Extended Counter Main Board, Red LEDs.	$270
	Note: Extended capability is required for custom curve linearization or for display of time rate of change, such as flow rate from changing tank level or acceleration from changing speed. Not applicable to temperature meters.	
Power	○ **0** Isolated 85-264 Vac	NC
	○ **1** Isolated 12-32 Vac or 10-48 Vdc	$30
Relay Output	○ **0** None	NC
	○ **1** Two 8A Contact Relays	$80
	○ **2** Two Solid State Relays	$55
	○ **3** Four 8A Contact Relays	$100
	○ **4** Four Solid State Relays	$75
Analog Output	○ **0** None	NC
	○ **1** Isolated 0-20 mA & 0-10 V	$90
	○ **2** Dual isolated output, 4-20 mA, 0-20 mA, 0-10V	$135
Digital Interface	○ **0** None	NC
	○ **1** Isolated RS232	$60
	○ **2** Isolated RS485	$80
	○ **4** Isolated RS485 Modbus	$90
	○ **5** USB	$60
	○ **6** USB-to-RS485 converter	$100
Signal Input	**DC Volts** ○ **DCV1** ±200.00 mV ○ **DCV2** ±2.0000 V ○ **DCV3** ±20.000 V ○ **DCV4** ±200.00 V ○ **DCV5** ±300.0 V	NC
	DC Amps ○ **DCA1** ±2.0000 mA ○ **DCA2** ±20.000 mA ○ **DCA3** ±200.00 mA ○ **DCA4** ±5.000 A	NC
	Process Signals (e.g., 4-20 mA, 0-5 V) ○ **P** Field scalable. Default scaling is 4-20 mA = 0-100.00	NC
	Strain Gage, Potentiometer (4-wire ratio) ○ **SG** Field scalable. Default scaling is 0-200 mV = 0-100.00	NC
	Note: The same DC signal conditioner board can be user-configured for DC Volts, DC Amps, process, or strain. Precalibrated in EEPROM for all DC Volt and DC Amp ranges listed.	
	Load Cells (6-wire ratio) ○ **WM** Field scalable. Default scaling is 0-20 mV = 0-100.00	$55
	Pulse Rate or Totalizing ○ **FR** Dual-Channel Frequency. Scalable to ±999,999 for frequency or	NC

	rate.	
	Voltage-to-Frequency Converter ○ **VF1** V-to-F Converter, 4-20 mA ○ **VF2** V-to-F Converter, 0-1 mA ○ **VF3** V-to-F Converter, 0-10 V ○ **VF4** V-to-F Converter, Special Range. Specify min input, min reading; max input, max reading. Component changes by the factory may be required.	 NC NC NC $35
Add-on Options	☐ **EB** Extra-bright Red LED Display ☐ **BL** Blank Lens without Button Pads ☐ **CBL01** RJ11-to-DB9 Cable ☐ **CBL02** USB-to-DB9 Adapter ☐ **CBL05** USB Cable, A to B ☐ **IPC** Splash-proof Cover ☐ **BOX1** NEMA-4 Enclosure ☐ **BOX2** NEMA-4 Enclosure plus IPC	$30 NC $19 $39 $15 $40 $140 $180

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