

# Laureate™ Process, Strain & Potentiometer Follower Meters

*Digital panel meters with a scalable readout & control outputs for process, strain, pressure, level, flow, 4-20 mA signals...*



## Features

- 0.2, 2, 20, 200 and 660 V ranges.
- 2, 20, 200 mA and 5 A ranges.
- All ranges factory calibrated.
- 4 1/2 to 5 digit resolution.
- Scalable via front panel pushbuttons or computer for display in engineering units.
- Span adjust from 0 to  $\pm 99,999$
- Zero adjust from -99,999 to +99,999
- Peak value display and auto-tare.
- Up to 60 conversions per second.
- Selectable fixed right-hand zero with rounding.
- 5, 10 or 24 Vdc transducer excitation supply.
- Ratiometric compensation for variations in excitation voltage.
- External controls for reset, meter hold, decimal points, and tare.
- Choice of isolated plug-in options for control and computer interface:  
[dual relays](#), [4-20 mA & 0-10 V analog output](#), [RS-232/485 I/O](#), [parallel BCD output](#), [low voltage AC & DC power](#).
- [NEMA 4X, 1/8 DIN case](#).
- Certified to UL 3101-1, CAN/CSA-C22.2, EN 61010-1 (CE Mark).

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## Description



Laureate™ digital process and strain panel meters are a cost-effective solution to a wide variety of monitoring

and control applications which require a scalable readout from strain gauges or from process signals such as 4-20 mA, 0-5 V or 0-10 V. They are also ideal for use in potentiometer follower applications, where the transducer output is a changing resistance.

## Scalable to Five Full Digits

The display may be scaled to five full digits from -99,999 to +99,999 from the front panel to read directly in engineering units, such as PSI. Three scaling methods are selectable: scale and offset, two-point method, and system-level calibration using actual transducer signals. All ranges are precalibrated at the factory, so that recalibration is not needed when changing ranges or signal conditioners.

With the Laureate process meter, strain gauges with a 20 mV output can be scaled to display up to 10,000 counts, while outputs of 200 mV can be scaled to 99,999 counts.

With the [Laureate load cell meter](#), strain gauges with a 20 mV output can be scaled to the full 99,999 counts.

## Isolated Excitation Supply

5, 10, and 24 Vdc isolated excitation outputs are standard to power strain gauge bridges and 4-20 mA transmitters, eliminating the need for an external supply. When powering strain gauges or potentiometers, the 5 or 10 Vdc excitation is monitored by the meter to eliminate errors caused by excitation voltage variations.



## Fast Read Rate and Signal Filtering

The displayed readings and the data outputs can be separately selected to be either unfiltered or filtered.

- **An unfiltered selection** updates after each conversion for fastest response, up to 60/sec, while integrating the input signal over a full power cycle. Fast read rate provides true peak readings and aids in control applications.
- **A batch-average filter** selection averages each 16 conversions for an update every 1/4 sec.
- **An adaptive moving average filter** selection provides a choice of 8 time constants from 80 ms to 9.6 s. When a significant change in signal level occurs, the filter adapts by briefly switching to the shortest time to follow the change, then reverts back to its selected time constant. Another choice is Auto, which provides an automatic time constant selection based on the signal noise characteristics.

## Advanced Meter Features

- **Auto-tare** allows the display to be zeroed for any input signal. This is normally achieved by applying a switch closure or logic signal at the rear connector. The tare value is stored in non-volatile memory and is retained when power is removed.
- **Peak value** of the input signal is automatically captured and may be displayed via a front panel pushbutton command or control signal at the rear connector. Other controls via the rear connector include meter hold, meter reset, peak reset, and decimal point selection.

## Interface Options

Plug-in [isolated analog output](#), [dual setpoint controller](#), [RS-232/485 communications](#), or [BCD output](#) boards can upgrade the Laureate from a simple monitor to system interface and control.

## Rate & Custom Curve Fit Options

An Extended Laureate computer board can display rate based on successive readings. It also allows exceptionally accurate custom curve linearization, for example to read out liquid volume or rate of flow in a horizontal cylindrical tank based on level reported by a 4-20 mA transmitter. For setup, up to 240 data points can be input into a computer spreadsheet or text file by the user. The computer then calculates spline-fit segments, which are downloaded into the meter via RS-232.

## Built-in Flexibility & Safety

Laureates may be powered from [85-264 Vac and 90-370 Vdc](#), or optionally from [8-28 Vac and 9-37 Vdc](#). They are available with red or green LEDs. They are housed in a [1/8 DIN case](#) that meets NEMA 4X (IP65) specifications from the front when panel mounted. Any setup functions and front panel keys may be locked out for simplified usage and security.

## Specifications

### DC Voltage

DC Voltage Range	Resolution	Input Ohms	Error at 25°C ±1 count
±200.00 mV	10 µV	1 G	0.01% FS
2.000 V	100 µV	1 G	0.01% FS
20.000 V	1 mV	1 M	0.01% FS
200.00 V	10 mV	1 M	0.01% FS
660.0 V	100 mV	1 M	0.03% FS

### DC Current

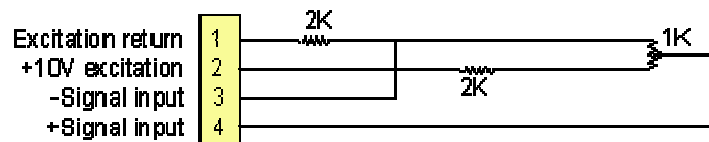
DC Current Range	Resolution	Input Ohms	Error at 25°C ±1 count
2.0000 mA	0.1 µA	100	0.01% FS
20.000 mA	1.0 µA	10	0.01% FS
200.00 mA	10 µA	1	0.01% FS
5.000 A	1.0 mA	0.01	0.04% FS

### DC Voltage & Current

Display	
Readout	5 digits, 7-segment, 14.2 mm (.56")
Color	Red or green LED
Range	-99999 to +99999 or -99990 to +99990 (count by 10 with rounding)
Indicators	Minus sign, 2 red LED lamps
A-to-D Conversion	
Technique	Concurrent Slope™ (Pat 5,262,780)
A-to-D Rate	60/s at 60 Hz, 50/s at 50 Hz
Output Update	56/s at 60 Hz, 47/s at 50 Hz
Display Update	3.5/s at 60 Hz, 3/s at 50 Hz
Accuracy	
Span Tempco	0.003% of reading/°C
Zero Tempco	0.1 counts/°C
Noise Rejection	

Maximum Signal	
Max applied voltage Overcurrent protection	660 Vac for 20, 200 & 600 V ranges, 125 Vac other ranges. 25x for 2 mA, 8x for 20 mA, 2.5x for 200 mA, 1x for 5 A.
Power	
Voltage, std. Voltage, opt. Frequency Power isolation	85-264 Vac and 90-370 Vdc 8-28 Vac and 9-37 Vdc DC or 49-440 Hz Safety-rated to 250 Vac, meter ground to earth ground, DC to 60 Hz, 4.2 kVp per High Voltage Test
Excitation Output	
5 Vdc 10 Vdc 24 Vdc Output isolation	5 Vdc $\pm$ 5%, 100 mA max 10 Vdc $\pm$ 5%, 120 mA max 24 Vdc $\pm$ 5%, 50 mA max 50 Vdc to meter ground
Connector Pin Assignments	
Environmental	
Operating Temperature Storage Temperature Relative Humidity	0°C to 55°C -40°C to 85°C 95% at 40°C, non-condensing NEMA-4X (IP-65) when panel mounted

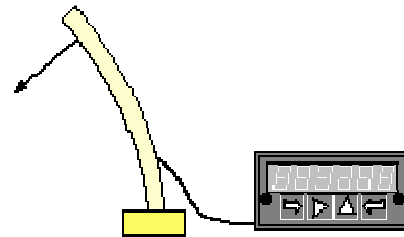
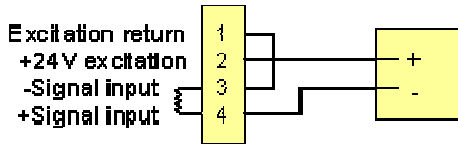
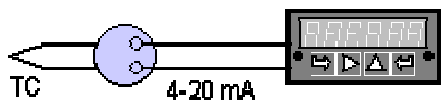
## Application Examples



### Potentiometer Application

In potentiometric (or pot follower) applications, the signal from a sliding contact voltage divider can be converted to engineering units such as position, level or percentage. By operating in a ratiometric mode, the meter will remove any effects caused by variations in the excitation supply output.

For use with a 1 kohm potentiometer, the recommended applied excitation voltage is 10 V, and a 2 kohm resistor should be placed in series with the excitation output and excitation return leads. This will allow the meter's 2.0000 V scale with a high input impedance of 1 Gohm to be used.

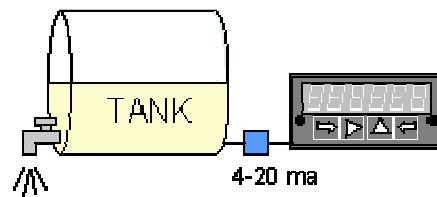
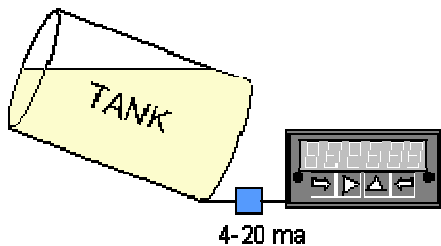


## Powering two-wire transmitters

The isolated 24 Vdc, 50 mA excitation output, which is standard with all Laureate meters, is ideal for powering two-wire, 4-20 mA transmitters. The same two wires are used to apply voltage and carry the output current. Inside the meter, the 4-20 mA current is dropped across a 10 ohm resistor and sets up a 40-200 mV voltage, which is then sensed by the meter and scaled to engineering units.

## Testing with peak detection

Destructive testing is an ideal application for the Laureate strain meter. Peak readings are automatically captured at rates up to 60 per second, while the display updates at a legible 3.5 readings per second. The peak reading can be recalled at the push of a button or be transmitted via RS-232 or RS-485. The meter provides isolated 10 Vdc power for up to four (4) the strain gauges and can be scaled to read out directly in engineering units from -99,999 to +99,999.



## Custom curve linearization

The Laureate DC meter with the Extended main board option allows exceptionally accurate custom curve linearization. For setup, up to 240 data points can be entered into a spreadsheet. The system then creates multiple non-linear spline-fit segments, which provide much better accuracy than linear segments.

One application, as illustrated, is the readout of volume of irregularly shaped tanks based on measured liquid level or pressure. Altimeters and thermistors are further applications.

## Rate from successive readings

The Extended computer board allows the display of rate based on successive readings, for instance flow rate based on changes in liquid level or static pressure in a tank.

In the above illustration, the meter displays the rate in gallons at which a horizontal tank is being emptied. The input to the meter can be nonlinear, since only the linearized readings are compared for the determination of rate.

# Ordering Guide

## Laureate™ Process, Strain & Potentiometer Follower Meters

Create a model number in this format: **L10010P**. This example calls out a Laureate panel meter with a standard main board with green LEDs, 85-264 Vac & 90-370 Vdc power, no setpoint output, 0-20 mA & 0-10 V analog outputs, no digital interface, and a DC signal conditioner set for the default process scaling of 4-20 mA = 0-100.00. Includes plug-in screw terminals.

<b>DPM Type</b>	L Digital Panel Meter.	\$210
<b>Main Board</b>	1 Standard Main Board, Green LEDs.	NC
	2 Standard Main Board, Red LEDs.	\$40
		\$40

	<input type="checkbox"/>	<b>3</b> Extended Main Board, Green LEDs.	
	<input type="checkbox"/>	<b>4</b> Extended Main Board, Red LEDs.	
	<b>Note:</b> 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.		
<b>Power</b>	<input type="checkbox"/>	<b>0</b> Isolated 85-264 Vac & 90-370 Vdc	NC
	<input type="checkbox"/>	<b>1</b> Isolated 8-28 Vac & 9-37 Vdc.	\$30
<b>Setpoint Output</b>	<input type="checkbox"/>	<b>0</b> None.	NC
	<input type="checkbox"/>	<b>1</b> Dual 10A Contact Relays.	\$80
	<input type="checkbox"/>	<b>2</b> Isolated Dual Solid State Relays.	\$55
<b>Analog Output</b>	<input type="checkbox"/>	<b>0</b> None.	NC
	<input type="checkbox"/>	<b>1</b> Isolated 0-20 mA & 0-10 V.	\$90
<b>Digital Interface</b>	<input type="checkbox"/>	<b>0</b> None.	NC
	<input type="checkbox"/>	<b>1</b> Isolated RS-232.	\$60
	<input type="checkbox"/>	<b>2</b> Isolated RS-485.	\$80
	<input type="checkbox"/>	<b>3</b> Isolated Parallel BCD Output.	\$105
<b>Signal Input</b>	<b>Process Signals</b> (e.g., 4-20 mA, 0-5 V)		
	<input type="checkbox"/>	<b>P</b> Default Scaling. 4-20 mA = 0-100.00.	NC
	<input type="checkbox"/>	<b>P1</b> Custom Scaling. In the write-in field of your invoice, specify min input, min reading; max input, max reading.	\$10
	<b>Strain Gage, Potentiometer Follower</b> (4-wire ratio)		
	<input type="checkbox"/>	<b>SG</b> Default Scaling. 0-200 mV = 0-100.00.	NC
	<input type="checkbox"/>	<b>SG1</b> Custom Scaling. In the write-in field of your invoice, specify min input, min reading; max input, max reading.	\$10
<b>Note:</b> The same DC signal conditioner board can be user-configured for process, strain, potentiometer follower, DC Volts and DC Amps. It is precalibrated in EEPROM for all Laureate DC Volt and DC Amp ranges.			
<b>Add-on Options</b>	<input type="checkbox"/>	<b>EB</b> Extra Bright Red LED Display.	<input type="checkbox"/> Unselected. \$30
	<input type="checkbox"/>	<b>BL</b> Blank Lens without Button Pads.	<input type="checkbox"/> Unselected. NC