

# Laureate™ DC Voltage & Current Panel Meters

High accuracy, high read rate, control outputs



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## Features

- 0.2, 2, 20, 200 and 660 V ranges.
- 2, 20, 200 mA and 5 A ranges.
- All ranges factory calibrated.
- 99.99% full scale accuracy.
- 4 1/2 digit resolution to  $\pm 19,999$  for direct readout in mV, V, mA or A.
- 1 Gohm input impedance on 200 mV and 2 V scales.
- Field scalable from front panel to  $\pm 99,999$  for use with external current shunts.
- Up to 60 conversions per second.
- Peak value display.
- Selectable adaptive digital filter.
- Selectable fixed zero or active least significant digit.
- 5, 10 or 24 Vdc excitation supply.
- External controls for reset, meter hold and decimal points.
- 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

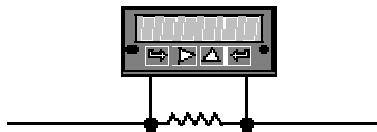


Laureate™ DC voltage and current panel meters with a DC signal conditioner board combine high accuracy with high read rate and a wide range of isolated output options for computer interface and control. Accuracy is 99.99% of full scale  $\pm 1$  count.

Used as a direct-reading DC voltmeter, the Laureate provides a full-scale readout of  $\pm 20,000$  counts and five full-scale voltage ranges from 200.00 mV with 10 mV resolution to 660.0 V with 100 mV resolution. The 200.00 mV and 2.000 V ranges provide a high input impedance of 1 Gohm so as to minimize the load on the voltage signal. The maximum voltage which can be applied on the 20, 200 and 660 Vdc ranges is 660 Vac.

Used as a DC ammeter, the Laureate provides a full-scale readout of  $\pm 20,000$  counts and four full-scale direct-reading current ranges from 2.0000 mA with 0.1 mA resolution to 5.000 A with 1 mA resolution. The 5.000 A range measures the IR drop across a built-in 10 mW current shunt.

### Use with External Current Shunts



The Laureate can be used with external current shunts, which typically produce 50 mV or 100 mV at their rated maximum current. Scaling from millivolts to amperes for a specific shunt value is easily accomplished from the front panel of the meter. The scalable readout is five full digits up to  $\pm 99,999$  counts. Since the voltage signal from a current shunt can be noisy, the Laureate provides a selectable, adaptive moving-average digital filter, as explained below.

### All Ranges Precalibrated

All voltage and current ranges are calibrated at the factory, with calibration factors for each range stored in an internal EEPROM. This allows ranges to be changed without recalibrating the meter.



### High Read Rate and Peak Capture

All Laureate voltmeters use Concurrent Slope (US Pat 5,262,780) analog-to-digital conversion, which allows up to 60 or 50 conversions per second while integrating the signal over a full power cycle. High read rate is ideal for peak capture, real-time computer interface, and control.

The peak value of the input signal is automatically captured and may be displayed via a front panel pushbutton command or a control signal at the rear connector since the last meter reset. Other controls at the rear connector include meter hold, meter reset, and decimal point selection

### Selectable 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.
- **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.

## Isolated Excitation Supply

5, 10 and 24 Vdc isolated excitation outputs are standard to power external devices, such as transducers or transmitters. In many cases, these outputs can eliminate the need for an external supply.

## 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.

## 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

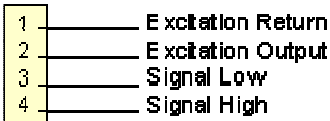
DC Voltage Range	Resolution	Input Ohms	Error at 25°C ±1 count
200.00 mV	10 µV	1 G	0.01% FS
2.000 V	100 µV	1 G	0.01% FS
20.000 V	1 mV	1 M	0.01% FS
200.00 V	10 mV	1 M	0.01% FS
660.0 V	100 mV	1 M	0.03% FS

## 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 Color Range Indicators	5 digits, 7-segment, 14.2 mm (.56") Red or green LED -99999 to +99999 or -99990 to +99990 (count by 10 with rounding) Minus sign, 2 red LED lamps
<b>A-to-D Conversion</b>	
Technique A-to-D Rate Output Update Display Update	Concurrent Slope™ (Pat 5,262,780) 60/s at 60 Hz, 50/s at 50 Hz 56/s at 60 Hz, 47/s at 50 Hz 3.5/s at 60 Hz, 3/s at 50 Hz
<b>Accuracy</b>	
Span Tempco Zero Tempco	0.003% of reading/°C 0.1 counts/°C
<b>Noise Rejection</b>	
CMR, DC to 60 Hz NMR at 50/60 Hz	130 dB 90 dB with min filtering
<b>Maximum Signal</b>	
Max applied voltage Overcurrent protection	660 Vac for 20, 200 and 600 V ranges, 125 Vac for other ranges 25x for 2 mA, 8x for 20 mA, 2.5x for 200 mA, 1x for 5 A
<b>Power</b>	
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
<b>Excitation Output</b>	
5 Vdc 10 Vdc 24 Vdc Output isolation	5 Vdc ±5%, 100 mA max 10 Vdc ±5%, 120 mA max 24 Vdc ±5%, 50 mA max 50 Vdc to meter ground
<b>Connector Pin Assignments</b>	
	
<b>Environmental</b>	
Operating Temperature Storage Temperature Relative Humidity Protection	0°C to 55°C -40°C to 85°C 95% at 40°C, non-condensing NEMA-4X (IP-65) when panel mounted

# Ordering Guide

## Laureate™ DC Voltage & Current Panel Meters

Create a model number in this format: **L10010DCV1**. 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 ±200.00 mV. Includes plug-in screw terminals.

<b>DPM Type</b>	<input checked="" type="checkbox"/> <b>L</b> Digital Panel Meter.		\$210
<b>Main Board</b>	<input type="checkbox"/> <b>1</b> Standard Main Board, Green LEDs.		NC
	<input type="checkbox"/> <b>2</b> Standard Main Board, Red LEDs.		NC
<b>Power</b>	<input checked="" 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 checked="" 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 checked="" 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 checked="" type="checkbox"/> <b>0</b> None.		
	<input type="checkbox"/> <b>1</b> Isolated RS-232.		NC
	<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>DC Volts</b>		
	<input type="checkbox"/> <b>DCV1</b> ±200.00 mV.		NC
	<input type="checkbox"/> <b>DCV2</b> ±2.0000 V.		
	<input type="checkbox"/> <b>DCV3</b> ±20.000 V.		
	<input type="checkbox"/> <b>DCV4</b> ±200.00 V.		
	<input type="checkbox"/> <b>DCV5</b> ±660.0 V.		
	<b>DC Amps</b>		
	<input type="checkbox"/> <b>DCA1</b> ±2.0000 mA.		NC
	<input type="checkbox"/> <b>DCA2</b> ±20.000 mA.		
	<input checked="" type="checkbox"/> <b>DCA3</b> ±200.00 mA.		
<input type="checkbox"/> <b>DCA4</b> ±5.000 A.			
<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