

### 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

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# Laureate™ DC Voltage & Current Digital Panel Meters

High accuracy, high read rate, control outputs



## Standard Features

- 0.2, 2, 20, 200, 300V & 600V DC voltage ranges
- 2, 20, 200 mA and 5A DC current ranges
- All ranges factory calibrated
- 99.99% full scale accuracy
- 4-1/2 digit resolution to  $\pm 19,999$  for readout in mV, V, mA or A
- 1 Gohm input impedance on 200 mV and 2 V scales
- Front panel scalable to  $\pm 99,999$  for external current shunts
- Up to 60 conversions per second
- Peak or valley capture & display
- Selectable adaptive digital filter
- Selectable fixed zero or active least significant digit
- Universal AC power, 85-264 Vac
- 5, 10 or 24 Vdc excitation supply
- External controls for reset, meter hold and decimal points
- NEMA 4X, 1/8 DIN case
- Certified to UL 61010C-1 (UL mark), EN 61010-1 (CE mark), and RoHS)

### Options:

- Low voltage power: 10-48 Vdc or 12-32 Vac
- 2 or 4 output relays, electromechanical or solid state
- Analog output: Isolated, 4-20 mA, 0-20 mA, 0-10V, -10 to +10V
- Serial communications: RS232, RS485, Modbus RS485, USB, USB-to-RS485 converter

## Description



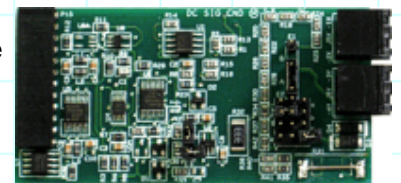
**Laureate™ DC voltage and current panel meters** with a DC signal conditioner board combine high accuracy with high read rate and a wide range of isolated output options for computer interface and control. Accuracy is 99.99% of full scale  $\pm 2$  counts.

- **DC voltmeter operation** (selected by jumpers) provides six full-scale voltage ranges from 200.00 mV with 10 mV resolution to 600.0 V with 100 mV resolution. The 200.00 mV and 2.000 V ranges provide a high input impedance of 1 Gohm to minimize the load on the voltage signal.
- **DC ammeter operation** (selected by jumpers) provides four full-scale 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 milliohm current shunt.

**All voltage and current ranges are factory calibrated**, with calibration factors for each range stored in an EEPROM on the signal conditioner board. This allows ranges and signal conditioner boards to be changed in the field without recalibrating the meter.

**External current shunts are fully supported.** Scaling from full-scale millivolts, such as 50 mV or 100 mV, to amperes is easily accomplished from the front panel of the meter. The scalable readout is five full digits up to  $\pm 99,999$  counts.

**High read rates at up to 60 or 50 conversions per second** while integrating the signal over a full power cycle are provided by Concurrent Slope (US Pat 5,262,780) analog-to-digital conversion. High read rates are ideal for peak or valley capture, real-time computer interface, and control. Peak and valley values are automatically captured. These may be displayed via a front panel pushbutton command or a control signal at the rear connector, or be transmitted as serial data.



**Digital filtering is selectable for electrically noisy environments**, including a batch averaging filter and an adaptive moving average filter which provides a choice of 8 time constants from 80 ms to 9.6 s. When a significant change in signal level occurs, that filter adapts by briefly switching to the shortest time to follow the change, then reverts back to the selected time constant. In a selectable Auto filter mode, the filter time constant is automatically selected based on detected signal noise.

**An isolated 5, 10 or 24 Vdc isolated excitation output** is standard to power external transducers and transmitters. In many cases, this output can eliminate the need for an external power supply.

**Designed for flexibility.** Optional plug-in boards for communications and control include an analog output board, dual or quad relay boards, and serial communications boards. Laureates may be powered from 85-264 Vac or optionally from 12-32 Vac or 10-48 Vdc. The display is available with red or green LEDs. The 1/8 DIN case meets NEMA 4X (IP65) specifications from the front when panel mounted. Any setup functions and front panel keys can be locked out for simplified usage and security.

# Specifications

## DC Voltage

DC Voltage Range	Resolution	Input Resistance	Error at 25°C ± 2 cts
200.00 mV	10 µV	1 GΩ	0.01% FS
2.000 V	100 µV	1 GΩ	0.01% FS
20.000 V	1 mV	10 MΩ	0.01% FS
200.00 V	10 mV	10 MΩ	0.01% FS
600.0 V *	100 mV	10 MΩ	0.02% FS
300.0 V	100 mV	10 MΩ	0.02% FS

\* Range does not include U/L certification.

## DC Current

DC Current Range	Resolution	Input Resistance	Error at 25°C ± 2 cts
2.0000 mA	0.1 µA	100 Ω	0.01% FS
20.000 mA	1.0 µA	10 Ω	0.01% FS
200.00 mA	10 µA	1 Ω	0.01% FS
5.000 A	1.0 mA	0.01 Ω	0.04% FS

## DC Voltage & Current

Display	
Readout	5 LED digits, 7-segment, 14.2 mm (.56"), red or green.
Range	-99999 to 99999 or -99990 to 99990 (count by 10)
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	
Error at 25°C	0.01% FS ± 2 counts (except 5A range)
Span Tempco	0.003% of reading/°C
Zero Tempco	0.1 count/°C
Noise Rejection	
CMR, DC to 60 Hz	130 dB
NMR at 50/60 Hz	90 dB with min filtering
Maximum Signal	
Max applied voltage	600 Vac for 20, 200 and 300 V ranges, 125 Vac for other ranges
Current protection	25x for 2 mA, 8x for 20 mA, 2.5x for 200 mA, 1x for 5 A
Power	
Voltage, standard	85-264 Vac or 90-300 Vdc (DC operation not UL approved)
Voltage, optional	12-32 Vac or 10-48 Vdc
Frequency	DC or 47-63 Hz
Power Isolation	250V rms working, 2.3 kV rms per 1 min test
Excitation Output (standard)	
5 Vdc	5 Vdc ±5%, 100 mA
10 Vdc	10 Vdc ±5%, 120 mA
24 Vdc	24 Vdc ±5%, 50 mA
Output Isolation	50 Vdc to meter ground

<b>Analog Output (optional)</b>	
Output Levels	4-20 mA, 0-20 mA, 0-10V, -10 to +10V (jumper selectable)
Current compliance	2 mA at 10V (> 5 kOhm load)
Voltage compliance	12V at 20 mA (< 60 ohm load)
Scaling	Zero and full scale adjustable from -99999 to +99999
Resolution	16 bits (0.0015% of full scale)
Isolation	250V rms working, 2.3 kV rms per 1 min test
<b>Relay Outputs (optional)</b>	
Relay Types	2 Form C contact relays or 4 Form A contact relays (NO) 2 or 4 Form A, AC/DC solid state relays (NO)
Current Ratings	8A at 250 Vac or 24 Vdc for contact relays 130 mA at 140 Vac or 180 Vdc for solid state relays
Output common	Isolated commons for dual relays or each pair of quad relays
Isolation	250V rms working, 2.3 kV rms per 1 min test
<b>Serial Data I/O (optional)</b>	
Board Selections	RS232, RS485, Modbus RS485, USB, USB-to-RS485 converter
Protocols	Modbus RTU, Modbus ASCII, simpler Laurel ASCII
Data Rates	300 to 19200 bps
Digital Addresses	247 (Modbus), 31 (Laurel ASCII),
Isolation	250V rms working, 2.3 kV rms per 1 min test
<b>Signal Connections</b>	
<b>Environmental</b>	
Operating Temp.	0°C to 60°C
Storage Temp.	-40°C to 85°C
Relative Humidity	95% at 40°C, non-condensing
Protection	NEMA-4X (IP-65) when panel mounted

## Ordering Guide

### Laureate™ DC Voltage & Current Panel Meters

Select the buttons to build a model number in this format: **L10000DCV1, IPC**

		Quantity
		1 <input type="text"/>
<b>DPM Type</b>	<input checked="" type="radio"/> <b>L</b> Digital Panel Meter	\$220
<b>Main Board</b>	<input type="radio"/> <b>1</b> Standard Main Board, Green LEDs	NC
	<input type="radio"/> <b>2</b> Standard Main Board, Red LEDs	NC
<b>Power</b>	<input type="radio"/> <b>0</b> Isolated 85-264 Vac	NC
	<input type="radio"/> <b>1</b> Isolated 12-32 Vac or 10-48 Vdc	\$30
<b>Relay Output</b>	<input type="radio"/> <b>0</b> None	NC
	<input type="radio"/> <b>1</b> Two 8A Contact Relays	\$80
	<input type="radio"/> <b>2</b> Two Solid State Relays	\$55
	<input type="radio"/> <b>3</b> Four 8A Contact Relays	\$100
	<input type="radio"/> <b>4</b> Four Solid State Relays	\$75
<b>Analog Output</b>	<input type="radio"/> <b>0</b> None	NC
	<input type="radio"/> <b>1</b> Isolated 4-20 mA, 0-20 mA, 0-10 V, -10 to +10V	\$90
<b>Digital Interface</b>	<input type="radio"/> <b>0</b> None	NC

	<input type="radio"/> 1 Isolated RS232 <input type="radio"/> 2 Isolated RS485 <input type="radio"/> 4 Isolated RS485 Modbus <input type="radio"/> 5 USB <input type="radio"/> 6 USB-to-RS485 converter	\$60 \$80 \$90 \$60 \$100
<b>Signal Input</b>	<b>DC Volts</b> <input type="radio"/> <b>DCV1</b> ±200.00 mV <input type="radio"/> <b>DCV2</b> ±2.0000 V <input type="radio"/> <b>DCV3</b> ±20.000 V <input type="radio"/> <b>DCV4</b> ±200.00 V <input type="radio"/> <b>DCV5</b> ±600.0 V (range does not include U/L certification) <input type="radio"/> <b>DCV6</b> ±300.0 V	NC
	<b>DC Amps</b> <input type="radio"/> <b>DCA1</b> ±2.0000 mA <input type="radio"/> <b>DCA2</b> ±20.000 mA <input type="radio"/> <b>DCA3</b> ±200.00 mA <input type="radio"/> <b>DCA4</b> ±5.000 A	NC
<b>Add-on Options</b>	<input type="checkbox"/> <b>BL</b> Blank Lens without Button Pads <input type="checkbox"/> <b>CBL01</b> RJ11-to-DB9 Cable <input type="checkbox"/> <b>CBL02</b> USB-to-DB9 Adapter <input type="checkbox"/> <b>CBL05</b> USB Cable, A to B <input type="checkbox"/> <b>IPC</b> Splash-proof Cover <input type="checkbox"/> <b>BOX1</b> NEMA-4 Enclosure <input type="checkbox"/> <b>BOX2</b> NEMA-4 Enclosure plus IPC	NC \$19 \$39 \$15 \$40 \$140 \$180



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