



# LAUREATE™ Counter Series

## Instruments with Scalable Readout & Control

### Signal Conditioners

#### Dual-channel pulse input

- Contact closures, AC, NPN or PNP transistors, digital logic to 1 MHz.
- For frequency, period, rate, time interval, stopwatch, phase angle, square root, up/down total, ratio, draw, A+B, A-B, A\*B, A/B, A/B-1, batching, custom curves.

#### Process rate & total input

- 0-1 mA, 4-20 mA, 0-10 V analog.
- For rate, totalized rate, batch control, 1/rate, (time), custom curves.

#### Quadrature input

- Low-level differential or single-ended logic level. Count x1, 2 or 4 to 250 kHz plus zero channel.
- For position or speed.

### Standard Features

- Six scalable LED digits
- 85-264 Vac or 90-300 Vdc power
- Isolated sensor excitation
- NEMA-4X, 1/8 DIN front panel
- Screw-terminal connectors

### Options

#### Relay outputs

- Dual/quad 8 A, 250 V contact relays
- Dual/quad AC/DC solid state relays

#### Isolated analog output

- 4-20 mA, 0-10 V or -10 to +10 V
- 16 bits, isolated & linearized

#### Isolated serial communications

- RS232
- USB2.0
- USB-to-RS485 converter
- RS485 with Laurel protocol
- RS485 with Modbus protocol

#### Isolated low-voltage power

- 10-48 Vdc or 12-32 Vac

#### Extended main board

- Custom curve linearization
- Rate from successive readings



Laureate™ counters are low-cost solutions to a wide range of monitoring and control applications related to frequency, rate, timing, pulse or analog totalizing, batch control, position or speed.

Exceptional flexibility is provided by modular architecture with a choice of assemblies for display boards, power supplies, signal conditioners, analog output, relay outputs, and communications. Advanced electronics and software provide exceptional performance and programmable features not available in similarly low priced instruments.

#### FR Version: Dual-channel Counter, Timer, Ratemeter

Two channels accept PNP or NPN outputs, TTL or CMOS logic signals, magnetic pickups, contact closures, low level outputs from turbine flow meters, or AC line inputs up to 250 Vac. Inverse period is used to calculate frequency or rate up to six places. The basic version can measure two rates or totals (up or down) simultaneously, and perform timing operations.

The Extended version is capable of the above plus simultaneous rate and total for one channel, rate of one channel and total of the other, up/down counting with external control for count direction, square root of rate and total, phase angle, duty cycle, two-channel arithmetic functions (A+B, A-B, A\*B, A/B, A/B-1), batch control, and linearization of nonlinear inputs.

#### VF Version: Process Totalizer

This version accepts 0-1 mA, 4-20 mA or 0-10 V analog inputs, which it can then totalize or display as rate. For example, the total in gallons or rate in gallons/minute may be displayed from a 4-20 mA flow meter signal. The Extended version adds batch control and custom curve linearization.

#### QD Version: Quadrature Input

Accurate position is displayed in engineering units from -999999 to +999999 by counting 1, 2 or 4 transitions from quadrature encoders at a combined rate to 250 kHz. Zero index error correction is standard. The Extended version can also display speed.

#### Isolated Excitation Power

An isolated 5, 10 or 24 Vdc output is standard and can eliminate the need for an external power supply.

#### Isolated Relay Output Options

Setpoint options for alarm and control: are dual or quad 8A Form C contact relays, and dual or quad optoisolated AC/DC 130 mA Form A solid state relays. The relays can each be latching or nonlatching, and operate in a hysteresis or band deviation mode.

#### Isolated Analog Output Option

Single or dual isolated 16-bit 4-20 mA, 0-10V, or -10 to +10V isolated analog outputs are available for transmission to other instruments or to a central control room. The output are linearized and scaled to the meter reading or to an internally stored value.

#### Isolated Communication Options

RS232, RS485 or USB serial interface boards allow Laureates to communicate with computers, PLCs or printers. The Modbus protocol (RTU or ASCII) is fully supported, as is the simpler Laurel ASCII protocol. Windows-based Instrument Setup software is standard.

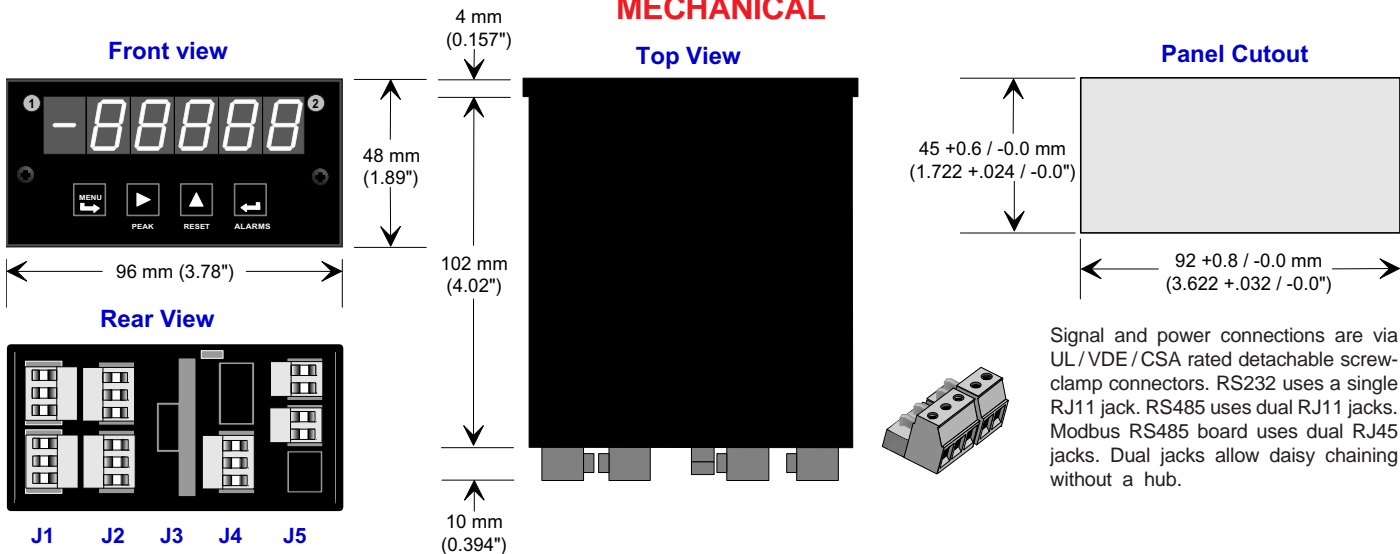
#### Easy Setup

All Laureate meters can be programmed from the front panel or via Windows-based Instrument Setup Software on a PC.

## SPECIFICATIONS

<p><b>Display</b>                  Type ..... Six 7-segment, 14.2 mm (.56") high LED digits plus LED indicators                  Display color ..... Red or green                  Display range ..... -999999 to 999999</p> <p><b>Frequency Conversion</b>                  Technique ..... 1/period                  Update ..... Gate time + 30 ms + 2 input periods                  Gate Time ..... Selectable 0 to 199.99 sec                  Scale factor ..... <math>\pm 10^{-10}</math> to <math>\pm 10^6</math></p> <p><b>FR Signal Conditioner</b>                  Inputs .AC, pulses from NPN or PNP transistors, contact closures, magnetic pickups                  Channel A frequency ..... 0 Hz to 1 MHz                  Channel B frequency ..... 0 Hz to 250 kHz                  Crystal time base calibration ..... <math>\pm 2</math> ppm                  Span tempco ..... <math>\pm 1</math> ppm/<math>^{\circ}</math>C (typ)                  Long term drift ..... <math>\pm 5</math> ppm/year</p> <p><b>VF Signal Conditioner</b>                  Inputs ..... 0-10 V, 0-1 mA, 4-20 mA                  Span error ..... 0.01% of full scale <math>\pm 1</math> count</p>	<p><b>QD Signal Conditioner</b>                  Inputs ..... Quadrature encoders to 250 kHz                  Polarity ..... Differential or single-ended                  Error correction ..... Zero index (Z-channel)</p> <p><b>Excitation Output (isolated)</b>                  Output levels ..... 120 mA @ 10 Vdc                  100 mA @ 5 Vdc, 50 mA @ 24 Vdc                  Scaling ..... <math>\pm 999999</math> for zero &amp; full scale</p> <p><b>Contact Relay Options</b>                  Number of relays ..... 2 or 4                  Load rating ..... 8A at 250 Vac or 24 Vdc</p> <p><b>AC/DC Solid State Relay Options</b>                  Number of relays ..... 2 or 4                  Load rating ..... 130 mA at 140 Vac or 180 Vdc</p> <p><b>Analog Output Options (isolated)</b>                  Number of outputs ..... 1 or 2                  Output levels ..... 0-10V, 0-20 mA, 4-20 mA                  Compliance ..... 2 mA at 10V, 12V at 20 mA                  Scaling resolution ..... 16 bits</p>	<p><b>Serial Data I/O Options (isolated)</b>                  Formats ..... RS232, USB, RS485, Modbus RS485                  Protocols ..... Modbus (RTU or ASCII), Laurel ASCII                  Data rates ..... 300 to 19,200 baud</p> <p><b>Meter Isolation</b>                  CMV, DC to 60 Hz ..... 250 Vac working,                  2.3 kV rms for 1 minute test</p> <p><b>Operating Power</b>                  Voltage (std) ..... 85-264 Vac or 90-300 Vdc                  Voltage (opt) ..... 12-34 Vac or 10-48 Vdc                  Power frequency ..... DC or 47-440 Hz</p> <p><b>Environmental</b>                  Operating temperature ..... 0<math>^{\circ}</math>C to 60<math>^{\circ}</math>C                  Storage temperature ..... -40<math>^{\circ}</math>C to 85<math>^{\circ}</math>C                  Relative humidity ..... 95% at 40<math>^{\circ}</math>C, non-condensing                  Protection ..... NEMA-4X when panel mounted</p>
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## MECHANICAL



## ORDERING GUIDE

*One entry required per box. Configure a model number in this format: L50010FR. Laurel Electronics reserves the right to change pricing at any time.*

<p><input type="checkbox"/> <b>L</b> .... Laureate™ with plug-in screw terminal connectors .... \$230</p> <p><input type="checkbox"/> <b>Main Board</b></p> <p>5 ..... Meter with green LEDs .. NC                  6 ..... Meter with red LEDs ..... NC                  7 ..... Extended, green LEDs .. \$40                  8 ..... Extended, red LEDs ..... \$40</p> <p><input type="checkbox"/> <b>Power</b></p> <p>0 ..... 85-264 Vac ..... NC                  1 ..... 12-34 Vac, 10-48 Vdc ... \$30</p> <p><input type="checkbox"/> <b>Setpoint Output</b></p> <p>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</p> <p><input type="checkbox"/> <b>Analog Output</b></p> <p>0 ..... None ..... NC                  1 ..... 4-20 mA, 0-10 V ..... \$90</p>	<p>2 ..... Dual analog out ..... \$135</p> <p><input type="checkbox"/> <b>Digital Interface</b></p> <p>0 .. None ..... NC                  1 .. RS232 ..... \$60                  2 .. RS485 ..... \$80                  4 .. Modbus RS485 ..... \$105                  5 .. USB ..... \$60                  6 .. USB-to-RS485 converter \$100</p> <p><input type="checkbox"/> <b>Input Type</b></p> <p>FR .. Frequency ..... NC</p> <p><i>With main boards 5 &amp; 6:</i>                  Scalable to <math>\pm 999,999</math> for frequency, rate, square root of rate, up or down total, timing.</p> <p><i>With main boards 7 &amp; 8:</i>                  Above plus rate and total simultaneously, arithmetic functions (A+B, A-BA*B, A/B, A/B-1), phase angle, duty cycle, up/down counting, batch control, custom curve linearization.</p>	<p>VF1 .... 4-20 mA ..... NC                  VF2 .... 0-1 mA ..... NC                  VF3 .... 0-10 V ..... NC                  VF4 .... Special ranges ..... Factory</p> <p><i>With main boards 5 &amp; 6:</i> V-to-F converter for rate, totalizing, and square root of rate from differential pressure flow meters.</p> <p><i>With main boards 7 &amp; 8:</i> Above plus linearization of nonlinear inputs, batch counting, 1/rate (time).</p>	<p><b>QD</b> .... Quadrature ..... \$30</p> <p><i>With main boards 5 &amp; 6:</i> Scalable to <math>\pm 999,999</math> to read out position or length from shaft encoders.</p> <p><b>QDR</b> ... Quadrature rate ..... \$30</p> <p><i>With main boards 7 &amp; 8:</i> Scalable to <math>\pm 999,999</math> to read out rate or position from shaft encoders.</p>
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*Your Laurel Electronics Distributor:*



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