LAUREL
ELECTRONICS, INC.

Laureate™ Digital Panel Meter for Load Cell & Microvolt Input

Features

- **20, 50, 100, 250 & 500 mV ranges**
- **Span adjust from 0 to ±99,999, zero adjust from -99,999 to +99,999**
- **Selectable fixed right-hand zero with rounding**
- **Isolated 10 Vdc supply to power up to four 350-ohm load cells in parallel**
- **4- or 6-wire hookup to avoid lead resistance effects**
- **1 Gohm input impedance**
- **Up to 60 conversions per second**
- **Peak or valley display**
- **Auto-tare with tare value stored in memory**
- **Universal AC power, 85-264 Vac**
- **1/8 DIN case sealed to NEMA-4X from front panel**
- **Optional serial I/O: Ethernet, USB, RS232, RS485, Ethernet-to-RS485 converter**
- **Optional relay output: dual or quad relays, contact or solid state**
- **Optional isolated analog output: 4-20 mA, 0-20 mA, 0-10V, -10 to +10V**
- **Optional low voltage power: 10-48 Vdc or 12-32 Vac**

Description

The Laureate ™ load cell & microvolt meter is a high-sensitivity monitor and controller for use with load cells, strain gauges and microvolt input signals where high accuracy and stability are required.

- **DC microvoltmeter operation** provides sensitivity down to ±20 mV full scale with 1 µV resolution. A display span of 99,999 counts with sensitivity of 0.2 µV per count can be obtained by applying a digital multiplier of five. A moving average digital filter assures quiet readings in electrically noisy environments.
- **Load cell operation** allows six-wire hookup and scaling for direct readout in engineering units, such as pounds, kilograms or PSI. Scaling can be via front panel pushbuttons or a computer. Zero may be set from -99,999 to +99,999. Range may be scaled from 0 to ±99,999. Digital scaling and calibration eliminate drift caused by potentiometers in non-microcomputer based meters.

Meter accuracy is 0.01% of full scale ± 2 counts with an ideal load cell. Custom curve linearization, which is available with the optional Extended main board, can extend the working range of real-world load cells. Custom curve linearization also allows high accuracy to be achieved with lower cost, less linear load cells.

A built-in isolated 10 Vdc excitation supply can provide up to 120 mA of current at 10V to power four 350-ohm load cells in parallel. The meter operates in a ratiometric mode to eliminate errors due to supply variations. When excitation sense inputs are used in 6-wire connection, the meter compensates for variation in resistance of the transducer leads to allow long cable runs.

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 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 constant 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.

Easy scale and offset are provided by Laureate DC, process and load cell meters by either of two selectable methods:

- **With the coordinate reading method,** the meter reads the high and low signal values, and the user enters the desired high and low reading values. The meter then calculates the span multiplier and offset. This method is ideal if an external calibration reference is available.
- **With the manual coordinate method,** the user enters the high and low input values in Volts plus the desired high and low reading values. This method is suitable if no external calibration reference is available.

Auto-tare is standard for weighing applications to subtract the weight of an empty container and may be controlled by an external pushbutton contact closure or a logic signal. Additional capabilities for weighing applications are provided by the Laureate weight & scale meter.

Designed for system use. Optional plug-in boards include Ethernet and other serial communication boards, dual or quad relay boards, and an isolated analog output board. 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. A built-in isolated 5, 10, or 24 Vdc excitation supply can power transducers and eliminate the need for an external power supply. All power and signal connections are via UL / VDE / CSA rated screw clamp plugs.

Specifications

DC Microvolt Input

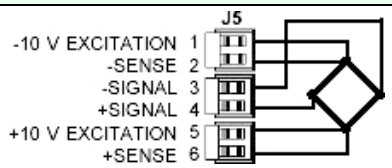
Input Range, mV	Resolution	Input Resistance	Error at 25°C
±20.000 ±50.000 ±100.00 ±250.00 ±500.00	1 µV 1 µV 10 µV 10 µV 10 µV	1 GΩ	0.01% FS ± 2 counts

Load Cell Input

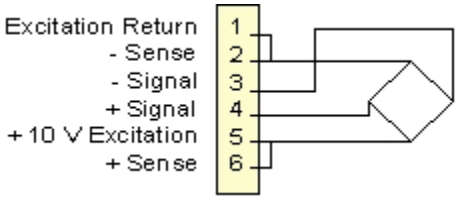
Full-Scale Input, mV	Zero Adjust	Span Adjust	Input Resistance	Error at 25°C
±20.000 ±50.000 ±100.00 ±250.00 ±500.00	-99,999 to +99,999	0 to ±99,999	1 GΩ	0.01% FS ± 2 counts

DC Microvolts & Load Cell

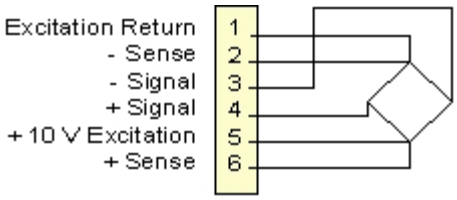
Accuracy	
Error at 25°C Span tempco Zero tempco Load cell linearization	0.01% FS ± 2 counts 0.0015% of reading/°C 0.1 µV/°C Provided by Extended meter version
Noise Rejection	
CMR, DC to 60 Hz NMR at 50/60 Hz	130 dB 90 dB with min filtering
A-to-D Conversion	
Technique A-to-D rate Output update rate Display update rate	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
Display	
Readout Range Indicators	5 LED digits, 7-segment, 14.2 mm (.56"), red or green. -99999 to 99999 or -99990 to 99990 (count by 10) Minus sign, 2 red LED lamps
Power	
Voltage, standard Voltage, optional Frequency Power isolation	85-264 Vac or 90-300 Vdc (DC operation not UL approved) 12-32 Vac or 10-48 Vdc DC or 47-63 Hz 250V rms working, 2.3 kV rms per 1 min test
Excitation Output (standard)	
Selectable levels Output isolation	5 Vdc ± 5%, 100 mA; 10 Vdc ± 5%, 120 mA; 24 Vdc ± 5%, 50 mA 50 Vdc to meter ground
Analog Output (optional)	
Output Levels Current compliance Voltage compliance Scaling Resolution Isolation	4-20 mA, 0-20 mA, 0-10V, -10 to +10V (jumper selectable) 2 mA at 10V (> 5 kOhm load) 12V at 20 mA (< 600 Ohm load) Zero and full scale adjustable from -99999 to +99999 16 bits (0.0015% of full scale) 250V rms working, 2.3 kV rms per 1 min test
Relay Outputs (optional)	
Relay types Current ratings Output common Isolation	2 Form C contact relays or 4 Form A contact relays (NO), 2 or 4 Form A, AC/DC solid state relays (NO) 8A at 250 Vac or 24 Vdc for contact relays 120 mA at 140 Vac or 180 Vdc for solid state relays Isolated commons for dual relays or each pair of quad relays 250V rms working, 2.3 kV rms per 1 min test

Serial Data I/O (optional)	
Board selections	Ethernet, Ethernet-to-RS485 server, USB, USB-to-RS485 server, RS485 (dual RJ11), RS485 Modbus (dual RJ45), RS232.
Protocols	Modbus RTU, Modbus ASCII, Laurel ASCII protocol
Data rates	300 to 19200 baud
Digital addresses	247 (Modbus), 31 (Laurel ASCII),
Isolation	250V rms working, 2.3 kV rms per 1 min test
Signal Connections	
	
Environmental	
Operating temperature	0°C to 60°C
Storage temperature	-40°C to 85°C
Relative humidity	95% at 40°C, non-condensing
Protection	NEMA-4X (IP-65) when panel mounted

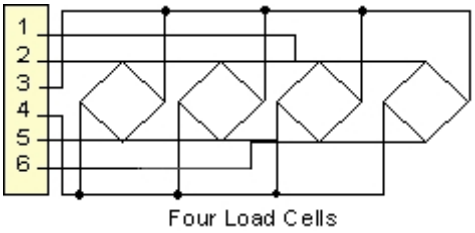
Load Cell Meter Connections



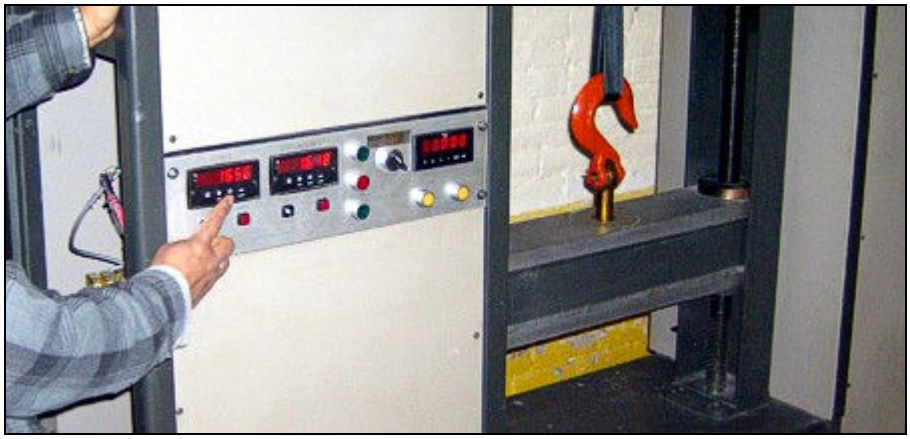
In 4-wire connection, the excitation and sense lines are tied together. The meter can make ratiometric corrections for supply voltage variations, but not compensate for variations in lead resistance. This connection is often used with short cable runs.



In 6-wire connection, the sense lines are separate from the excitation lines, thereby eliminating effects due to variations in lead resistance. This allows long cable runs in outdoor environments with temperature extremes.

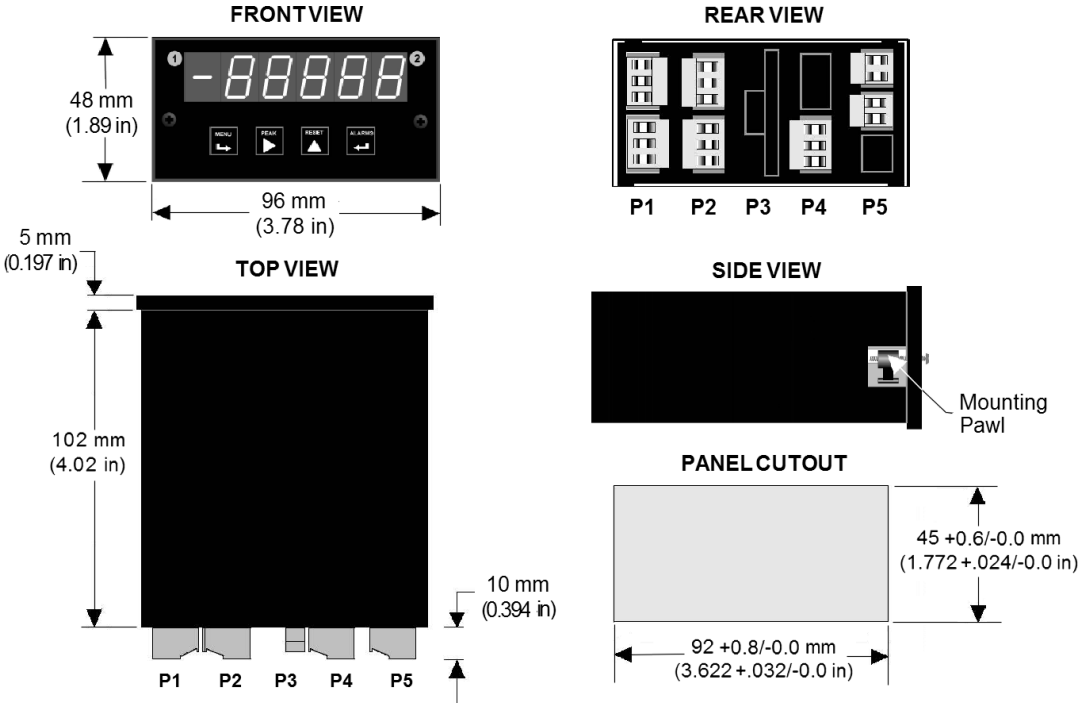


For large scales, up to four 350 ohm load cells can be powered by a single Laureate, whose excitation output is rated 120 mA at 10 V. The excitation and sense points of the four bridges are connected in parallel through a summing box.



Seat belt tensile strength testing using Laureate digital panel meters.
The three meters display Force, Displacement and Speed.

Mechanical



Ordering Guide

Create a model a model number in this format: **L10000WM, IPC**

DPM Type	**L** Laureate Digital Panel Meter
Main Board	**1** Standard Main Board, Green LEDs **2** Standard Main Board, Red LEDs **3** Extended Main Board, Green LEDs **4** Extended Main Board, Red LEDs
	Note: Extended capability is only required for custom curve linearization or for display of time rate of change, such as flow rate from changing tank weight.
Power (isolated)	**0** 85-264 Vac **1** 12-32 Vac or 10-48 Vdc
Relay Output (isolated)	**0** None **1** Two 8A Contact Relays **2** Two 120 mA Solid State Relays **3** Four 8A Contact Relays **4** Four120 mA Solid State Relays
Analog Output (isolated)	**0** None **1** Isolated 4-20 mA, 0-20 mA, 0-10 V, -10 to +10V
Digital Interface (isolated)	**0** None **1** RS232 **2** RS485(dual RJ11 connectors) **4** RS485 Modbus (dual RJ45 connectors) **5** USB **6** USB-to-RS485 device server **7** Ethernet **8** Ethernet-to-RS485 device server
Signal Input (isolated)	**Load Cell** (6-wire ratio) **WM** Field Scalable. Default scaling is 0-20 mV = 0-100.00 **WM1** Custom Scaling. In the write-in field of your order, specify min input, min reading; max input, max reading. Full-scale input is 20-500 mV. Excitation is 10 V for up to four 350-ohm load cells.
Add-on Options	**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