

# Laureate™ Load Cell & Microvolt Panel Meter

20 mV - 500 mV full-scale ranges, 4- or 6-wire connection



## Features

- 20, 50, 100, 250 & 500 mV ranges.
- 5-digit resolution with span from 0 to  $\pm 99,999$
- Zero from -99,999 to +99,999
- Selectable fixed right-hand zero.
- Isolated 10 Vdc supply to power up to four 350-ohm load cells in parallel.
- 4- or 6-wire hookup.
- Ratiometric operation to cancel variations in excitation supply.
- Up to 60 conversions per second.
- Peak value display (standard).
- Auto-tare with tare value stored in memory.
- AC or DC powered.
- Green or red display.
- 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



The Laureate™ load cell and microvoltmeter 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.

Usage as a DC microvoltmeter provides sensitivity down to 20 mV full scale with 1  $\mu$ V resolution. With a digital

multiplier of five, 99,999 counts can be displayed with a sensitivity of 0.2  $\mu\text{V}$  per count. A moving average filter with a time constant of 1.2 sec or greater should then be selected.

Usage as a load cell meter 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  $\pm 99,999$ . Digital scaling and calibration eliminate drift caused by potentiometers in non-microcomputer based meters.

## Built-in Excitation

An isolated 10 Vdc excitation supply can provide up to 120 mA of current to power up to 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, thereby allowing long cable runs.



## Fast Read Rate plus Peak Capture

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

## 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, 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.

## Easy Scaling

All Laureate DC, process and load cell meters allow easy setting of scale and offset by either of two 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 an no external calibration reference is available.

## Auto-tare

For weighing applications, auto-tare is standard. Auto-tare can set the displayed value to zero to subtract the weight of an empty container. Auto-tare may be controlled by an external pushbutton contact closure or logic signal through an input on the power supply connector. The tare value is stored in memory. Additional capabilities for weighing applications are provided by the Laureate weight / scale meter, as described in a separate web page.

## Other Features & Options

Plug-in [isolated analog output](#), [dual setpoint controller](#), [RS232/485 serial data I/O](#), or [parallel BCD output](#) boards can upgrade the Laureate from a stand-alone monitor to system interface and control. The [1/8 DIN case](#) of Laureate meters and counters meets NEMA 4X (IP-65) standards from the front for high pressure wash-down when panel mounted.

# Specifications

## DC Microvoltmeter Inputs

Input Range mV	Resolution	Error at 25°C
±20.000 ±50.000 ±100.00 ±250.00 ±500.00	1.0 µV 2.5 µV 5.0 µV 12.5 µV 25 µV	0.01% FS ±1 count

## Load Cell Inputs

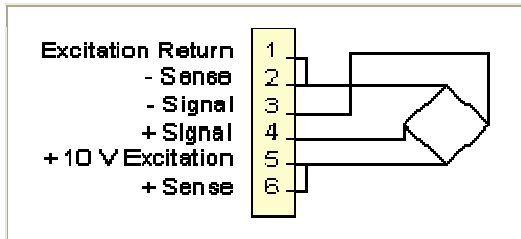
Full-Scale Input, mV	Zero Adjust	Span Adjust	Error at 25°C
±20.000 ±50.000 ±100.00 ±250.00 ±500.00	-99,999 to +99,999	0 to ±99,999	0.01% FS ±1 count

## DC Microvolts & Load Cell

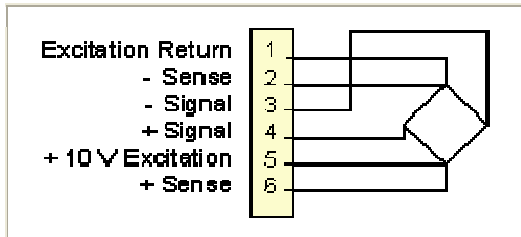
Accuracy	
Span Tempco Zero Tempco	0.0015% of reading/°C 0.1 µV/°C
Noise Rejection	
CMR, DC to 60 Hz NMR at 50/60 Hz	130 dB 90 dB with min filtering
A-to-D Conversion	
Technique A-to-D Rate Output Update Display Update	Concurrent Slope™ (Pat 5,262,780) 60/s at 60 Hz, 50/s at 50 Hz 56/s at 60 Hz, 47/s at 50 Hz 3.5/s at 60 Hz, 3/s at 50 Hz
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
Power	
Voltage, std. Voltage, opt.	85-264 Vac and 90-370 Vdc 8-28 Vac and 9-37 Vdc

Frequency Power isolation	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 $\pm 5\%$ , 100 mA max 10 Vdc $\pm 5\%$ , 120 mA max 24 Vdc $\pm 5\%$ , 50 mA max 50 Vdc to meter ground
<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

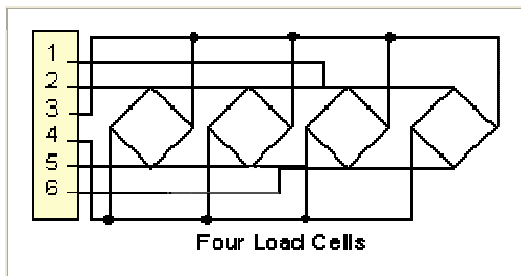
## Load Cell Meter Connections



**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.

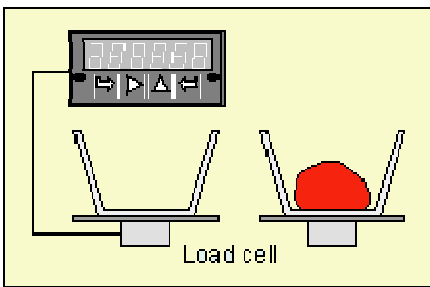


**In 6-wire connection**, the sense lines are separate from the excitation lines, thereby eliminating effects due to variations in lead resistance. This allows long cable runs in outdoor environments with temperature extremes.



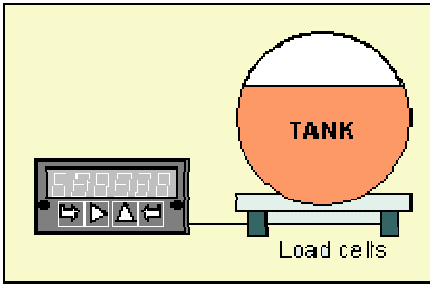
**For large scales**, up to four 350 ohm load cells can be powered by a single Laureate, whose excitation output is rated 120 mA at 10 V. The excitation and sense points of the four bridges are connected in parallel through a summing box.

## Sample Load Cell Meter Applications



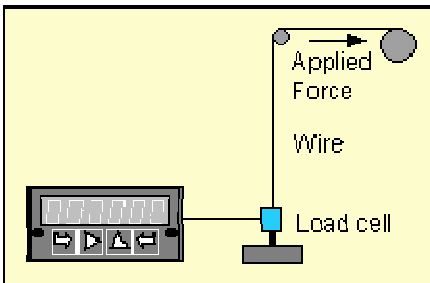
### Auto-Tare

To read the net weight of an object, the empty container is first weighed, and an external button is pushed to zero out the display. The meter will then read net weight when an object is added to the empty container. The tare value is stored in memory for subsequent readings.



### Determining Volume Using Load Cells

An easy way to determine volume of an irregularly shaped tank with no need for linearizing is to weigh the tank using load cells. The meter will automatically tare out the weight of the empty tank and then scale the load cell signals to units of volume, such as gallons.



### Peak Capture for Testing the Tensile Strength of Wire

Peak readings are automatically captured at rates up to 60 per second, while the display updates at a legible 3.5 per second. The peak reading can be recalled at the push of a button or be always displayed. It can also be transmitted to a computer via RS-232 or RS-485.

## Ordering Guide

### Laureate™ Load Cell & Microvolt Panel Meters

Create a model number in this format: **L10010WM**. 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 load cell signal conditioner with default scaling set for 0-20 mV = 0-100.00. Includes plug-in screw terminals.

<b>DPM Type</b>	<input type="checkbox"/> L	Digital Panel Meter.	\$210
<b>Main Board</b>	<input type="checkbox"/> 1	Standard Main Board, Green LEDs.	
	<input type="checkbox"/> 2	Standard Main Board, Red LEDs.	NC
	<input type="checkbox"/> 3	Extended Main Board, Green LEDs.	NC
	<input type="checkbox"/> 4	Extended Main Board, Red LEDs.	\$40
<b>Note:</b> 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.			
<b>Power</b>	<input type="checkbox"/> 0	Isolated 85-264 Vac & 90-370 Vdc	\$40
	<input type="checkbox"/> 1	Isolated 8-28 Vac & 9-37 Vdc.	NC
<b>Setpoint Output</b>	<input type="checkbox"/> 0	None.	NC
	<input type="checkbox"/> 1	Dual 10A Contact Relays.	\$80
	<input type="checkbox"/> 2	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.		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>Load Cells (6-wire ratio)</b>		
	<input type="checkbox"/> <b>WM</b> Default Scaling. 0-20 mV = 0-100.00.		\$55
	<input type="checkbox"/> <b>WM1</b> 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.	
<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