

# Laureate™ Scale Meter for Weighing Applications

High accuracy weight, low cost, plus control outputs



## Features

- Setpoint control with offset compensation for filling applications.
- 5-digit resolution with scaling from 0 to 99,999.
- Display to 999,990 with fixed zero.
- Auto-tare or manual tare, with tare value stored in non-volatile memory.
- Auto-zero display function.
- Display toggle between gross or net weight.
- Count by 1, 2, 5, 10, 20, 50 or 100 with rounding.
- Easy scale calibration using known weight.
- Isolated 10 Vdc supply to power up to four 350 ohm load cells.
- AC and DC input powered.
- 4- or 6-wire hookup.
- Up to 60 conversions per second.
- Green or red LED 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™ Weight Meter is more compact and less expensive than available alternatives. It provides a choice of two signal conditioner boards: the Laureate load cell signal conditioner board, which provides full-scale ranges of 20, 50, 100, 250 and 500 mV with 4- or 6-wire load cell hookup, and the Laureate DC signal conditioner board, which

allows the meter to accept preconditioned signals such as 0-10 V or 4-20 mA. Options include setpoint control, analog output and digital communication boards.

## Display & Setpoint Functions

- **Setpoint Offset.** The ON/OFF setpoint control action can be programmed to occur with a specified offset. For instance, if bags are to be filled to 100 lbs and the material delivery spout is known to hold and dispense an additional 2.5 lbs following shut-off, an offset of -2.5 lbs can be programmed. The setpoint can then be set to 100 lbs, and the filling valve will be automatically shut off when the measured weight reaches 97.5 lbs.
- **Count-by Function.** The weight meter can be programmed so that the display is rounded off to multiples of 1, 2, 5, 10, 20, 50 or 100. For example, if count-by 10 is selected, the meter will display 20 for an internal count of 15 to 24.
- **Fixed Zero.** The display can be shifted left to allow a fixed zero to be displayed to the right. This allows values up to 999,990 to be displayed.
- **Auto-zero Function.** An auto-zero limit from 0 to 9 counts can be programmed to compensate for load cell drift. Whenever the meter comes to rest within that limit from zero, it will auto-zero. Entering 0 disables auto-zero.
- **Two Tare Functions.** The weight meter offers two types of tare: auto-tare and manual tare. In auto-tare, an input line is grounded by an external pushbutton. This causes the current weight, which is normally the empty weight of the container to be stored in memory as an offset. In manual tare, the tare value can be entered manually via the front panel or a computer. For instance, the tare value may be the stated empty weight of a truck or rail car. Pressing the Reset button on the front panel toggles the display between gross weight (total weight on the scale) and net weight (gross weight with tare subtracted).

## Load Cell Connection

The load cell signal conditioner, which is normally used with the weight meter, is designed for 4- or 6-wire hookup. In 4-wire hookup, the meter operates in a ratiometric mode to eliminate errors due to supply variations. In 6-wire hookup, it also compensates for variations in transducer lead resistance, thereby allowing long cable runs in changing temperature environments. The built-in isolated 10 Vdc excitation supply can power up to four 350-ohm load cells in parallel.



## Easy Scale Calibration

The weight meter is normally set up using a simple two-point calibration method. First, the desired LO IN reading is set to 0, and the desired HI IN reading is set to a desired value. With no weight on the scale, a button is pushed for LO IN. With a known weight on the scale, that button is pushed again for HI IN. The meter then automatically computes scale and offset for readout up to five digits in weight units.

## Fast Response

The Laureate weight meter offers extremely fast read rates. These are ideal for weigh-in-motion systems, setpoint control, and computer interface applications. Concurrent Slope (Pat 5,262,780) is a method of analog-to-digital conversion that allows up to 60 conversions per second, while integrating the input signal over a full line cycle.

An adaptive digital filter can be set for time constants from 17 ms to 9 s, yet responds rapidly to a change in input signal level exceeding a threshold value. The meter can automatically select the best filter setting for maximum noise rejection and minimum response time. Control and interface outputs can be derived from the filtered signal or, for quicker response, from the unfiltered signal. Display of peak value is standard in the Laureate series.

## Add-on Functions & Options

Plug-in [isolated analog output](#), [dual setpoint controller](#), [RS-232/485 communications](#), and [parallel BCD output](#) boards can upgrade the Laureate weight meter to system interface and control.

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# Specifications

## With Load Cell Signal Conditioner

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	0.0030% of reading /°C

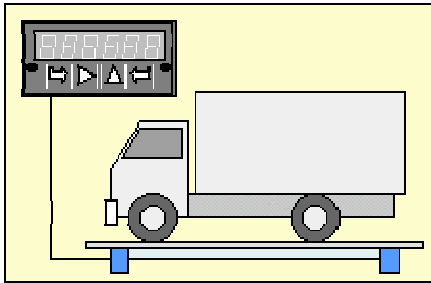
## With DC Signal Conditioner

Full-Scale Input	Zero Adjust	Span Adjust	Error at 25°C
±200 mV ±2 V ±20 V ±20 mA	-99,999 to +99,999	0 to ±99,999	0.01% FS ±1 count

## With Load Cell or DC Signal Conditioners

Accuracy, Load Cell Signal	
Span Tempco	0.0030% of reading/°C
Zero Tempco	Auto-zero
Calibration Method	2 points using zero weight and known weight
Accuracy, DC Signal	
Span Tempco	0.01% FS ±1 count
Zero Tempco	Auto-zero
Calibration Method	2 points using zero weight and known weight
Noise Rejection	
CMR, DC to 60 Hz	130 dB
NMR at 50/60 Hz	90 dB with min filtering
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
Display	
Readout	5 digits, 7-segment, 14.2 mm (.56")
Color	Red or green LED
Range	-99999 to +99999 -999990 to +999990 (with fixed selectable right-hand zero)
Rounding	Count by 1, 2, 5, 10, 20, 50, 100
Indicators	Four LED lamps
Power	
Voltage, std.	85-264 Vac and 90-370 Vdc
Voltage, opt.	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



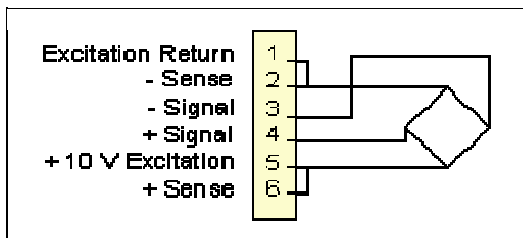
## Weighing the Load on a Truck

This application illustrates some of the capabilities of the Laureate weight meter. The single Laureate can power all four 350 ohm load cells of the scale with its 10 V, 120 mA isolated excitation output. Six-wire connection eliminates the effects of lead resistance and allows long cable runs from the control room to the scale.

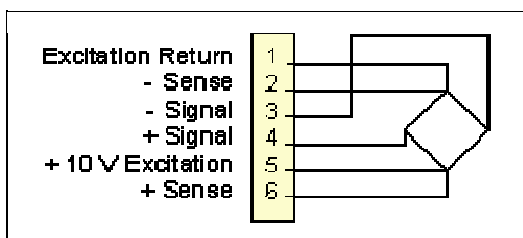
The five-digit meter can be scaled to display truck weight up to 99,999 lbs with 1 lb resolution or 999,990 lbs with 10 lb resolution. Accuracy is 0.01% of full scale at 25°C. To avoid the effects of system-level noise, different filter settings as well as "count by" of 1, 2, 5, 10, 20, 50 or 100 with rounding are selectable.

To read out net weight of the load, the truck can first be weighed empty, and this weight can be entered as tare at the push of a button in an auto-tare mode. Or the nominal tare value of the truck can be entered manually. Display of net weight or gross weight is at the push of a button. The gross weight and net weight can be alarmed, be transmitted to a computer via RS-232 or RS-485, or be transmitted via a 4-20 mA analog signal.

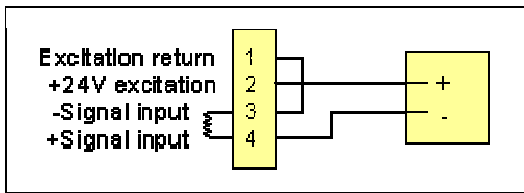
## Electrical Connections & Setpoint Offset



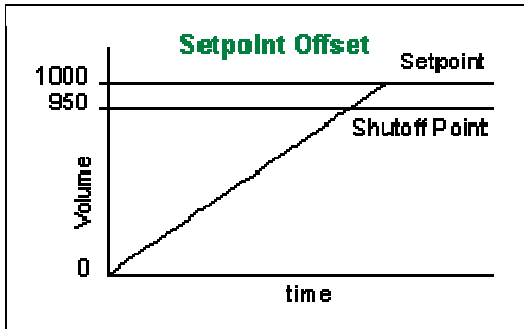
**In 4-wire connection**, the excitation and sense lines are tied together. The meter can make ratiometric corrections for supply voltage variations, but not compensate for variations in lead resistance. This connection is often used with short cable runs.



**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.



The DC signal conditioner board can be utilized to accept preconditioned 4-20 mA or 0-10 V scale signals. In two-wire 4-20 mA transmitter connection, the same two wires are used to apply voltage and carry the output current.



In a repetitive fill operation (as illustrated by example), a setpoint offset of -50 will allow a shutoff setpoint to be set for 1000 and actual shutoff to occur at 950 if it is known that 50 units will still flow following shutoff. An offset can also be applied to emptying operations.

## Ordering Guide

### Laureate™ Scale Meters for Weighing Applications

Create a model number in this format: **LW10101WM1**. This example calls out a Laureate scale meter with a standard main board with green LEDs, 85-264 Vac & 90-370 Vdc power, dual relay outputs, no analog output, an RS-232 digital interface, and a 6-wire load cell signal conditioner. Includes plug-in screw terminals for power and signal.

<b>DPM Type</b>	<input checked="" type="checkbox"/> LW Scale Meter. Only used with DC or load cell signal conditioner.	\$250
<b>Main Board</b>	<input type="checkbox"/> 1 Standard Main Board, Green LEDs.	NC
	<input type="checkbox"/> 2 Standard Main Board, Red LEDs.	NC
	<input type="checkbox"/> 3 Extended Main Board, Green LEDs.	\$40
	<input type="checkbox"/> 4 Extended Main Board, Red LEDs.	\$40
<b>Note:</b> Extended capability is required for custom curve linearization or for display of time rate of change, such as flow rate from changing tank level or acceleration from changing speed. Not applicable to temperature.		
<b>Power</b>	<input type="checkbox"/> 0 Isolated 85-264 Vac & 90-370 Vdc	NC
	<input type="checkbox"/> 1 Isolated 8-28 Vac & 9-37 Vdc.	\$30
<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 type="checkbox"/> 0 None.	NC
	<input type="checkbox"/> 1 Isolated 0-20 mA & 0-10 V.	\$90
<b>Digital Interface</b>	<input type="checkbox"/> 0 None.	NC
	<input type="checkbox"/> 1 Isolated RS-232.	\$60
	<input type="checkbox"/> 2 Isolated RS-485.	\$80
		\$105

Signal Input	<input type="checkbox"/> <b>3</b> Isolated Parallel BCD Output.		
	<b>Process Signals</b> (e.g., 4-20 mA, 0-5 V)		
	<input type="checkbox"/> <b>P</b> Default Scaling. 4-20 mA = 0-100.00.		NC \$10
	<input type="checkbox"/> <b>P1</b> Custom Scaling. In the write-in field of your order, specify min input, min reading; max input, max reading.		
<b>Strain Gage, Potentiometer</b> (4-wire ratio)			
<input type="checkbox"/> <b>SG</b> Default Scaling. 0-200 mV = 0-100.00.		NC \$10	
<input type="checkbox"/> <b>SG1</b> Custom Scaling. In the write-in field of your order, specify min input, min reading; max input, max reading.			
<b>Note:</b> The same DC signal conditioner board can be user-configured for process, strain, potentiometer follower, DC Volts, or DC Amps, It is precalibrated in EEPROM for all Laureate DC Volt and Amp ranges.			
<b>Load Cells</b> (6-wire ratio)			
<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.			
Add-on Options	<input type="checkbox"/> <b>EB</b> Extra Bright Red LED Display.	<input type="checkbox"/> Unselected.	\$30 NC
	<input type="checkbox"/> <b>BL</b> Blank Lens without Button Pads.	<input type="checkbox"/> Unselected.	