LAUREL
ELECTRONICS, INC.

Laureate™ Scale Meter for Weighing Applications

Features

- **Digital panel meter optimized for weighing applications**
- **Scaling from 0 to 99,999, plus fixed zero for display to 999,990**
- **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**
- **Setpoint control with offset compensation for filling applications**
- **6-wire load cell hookup or 4-wire ratiometric DC hookup**
- **Isolated 10 Vdc supply to power up to four 350 ohm load cells in parallel**
- **Up to 60 conversions per second**
- **Universal AC power, 85-264 Vac**
- **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™ Scale Meter is compact, inexpensive, and extremely accurate digital panel meter with special firmware for weighing applications. It is available with the Laureate load cell or DC signal conditioner board.

The load cell signal conditioner board accepts full-scale ranges of 20, 50, 100, 250 and 500 mV with 4- or 6-wire load cell hookup to display up to 99,999 counts. With 4 wires, the meter operates in a ratiometric mode to eliminate errors due to supply variations. With 6 wires, it also compensates for variations in transducer lead resistance, thereby allowing long cable runs in changing temperature environments. The built-in, isolated excitation supply can power up to four 350-ohm load cells in parallel at 10 Vdc.

The DC signal conditioner board can be jumpered for ratiometric strain gauge voltage ranges ±200 mV, ±2V or ±20V. With this board, a 20 mV strain gauge output can be scaled to display up to 10,000 counts, while a 200 mV output can be scaled to display up to 99,999 counts. Meter accuracy is 0.01% of full scale ± 2 counts.

Display & Setpoint Functions for Weighing Applications

- **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.control signal at the rear connector, or be transmitted as serial data.
- **Fixed zero.** The display can be shifted to the left for a fixed zero to the right, allowing 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 fare functions: 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 a front panel button toggles the display between gross weight (total weight on the scale) and net weight (gross weight with tare subtracted).

Easy scale calibration is achieved 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 read rates to 60/sec are provided for weigh-in-motion systems, setpoint control, and computer interface. Concurrent Slope (Pat 5,262,780) is a method of analog-to-digital conversion which allows up to 60 conversions per second while integrating the input signal over a full AC 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 also automatically select the best filter setting for maximum noise rejection and minimum response time. Peak and valley capture are standard.

Designed for flexibility. Plug-in isolated analog output, dual setpoint controller, and serial communications boards can upgrade Laureates from a simple monitor to system interface and control. Any setup functions and front panel keys can be locked out for simplified usage and security.

Specifications

With Load Cell Signal Conditioner

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

With DC Signal Conditioner

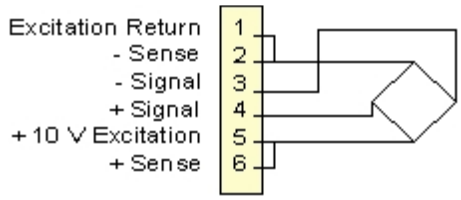
Full-Scale Input	Zero Adjust	Span Adjust	Error at 25°C
± 200.00 mV ± 2.0000 V ± 20.000 V ± 20.000 mA	-99,999 to +99,999	0 to ±99,999	0.01% FS ± 2 counts

With Load Cell or DC Signal Conditioner

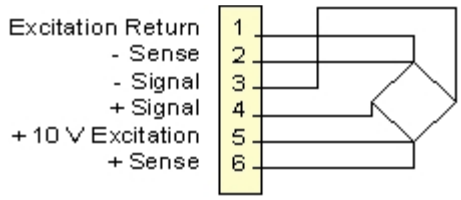
Display	
Readout Range Rounding Indicators	5 LED digits, 7-segment, 14.2 mm (.56"), red or green -99999 to +99999 or -999990 to +999990 (with fixed selectable right-hand zero) Count by 1, 2, 5, 10, 20, 50, 100 Four LED lamps
Accuracy	
Error at 25°C Span Tempco Zero Tempco Calibration Method	0.01% FS ± 2 counts 0.0015% of reading/°C 0.1 µV/°C (use auto-zero when temperature changes) 2 points using zero weight and known weight
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
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)	
5 Vdc 10 Vdc 24 Vdc 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 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	Two Form C contact relays, SPDT Two Form A, AC/DC solid state relays, SPST (NO)
Current Ratings	8A at 250 Vac or 24 Vdc for contact relays 120 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
Serial Data I/O (optional)	
Board Selections	RS232, RS485, Modbus RS485, USB, USB-to-RS485 converter, Ethernet, Etherned-to-RS485 converter.
Protocols	Modbus RTU, Modbus ASCII, simpler Laurel ASCII protocol
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
Environmental	
Operating Temp.	0°C to 55°C
Storage Temp.	-40°C to 85°C
Relative Humidity	95% at 40°C, non-condensing
Protection	NEMA-4X (IP-65) when panel mounted

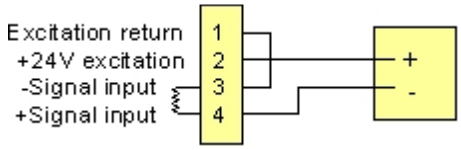
Electrical Connections & Setpoint Offset



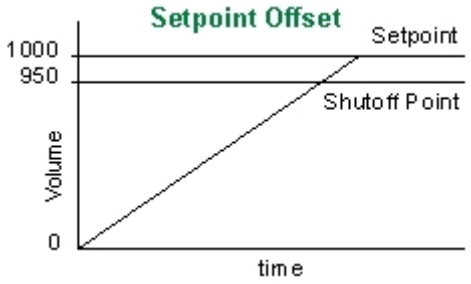
In 4-wire DC or load cell connection, the excitation and sense lines are tied together. The meter can make ratiometric corrections for supply voltage variations, but not compensate for variations in lead resistance. This connection is often used with short cable runs.



In 6-wire load cell 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.

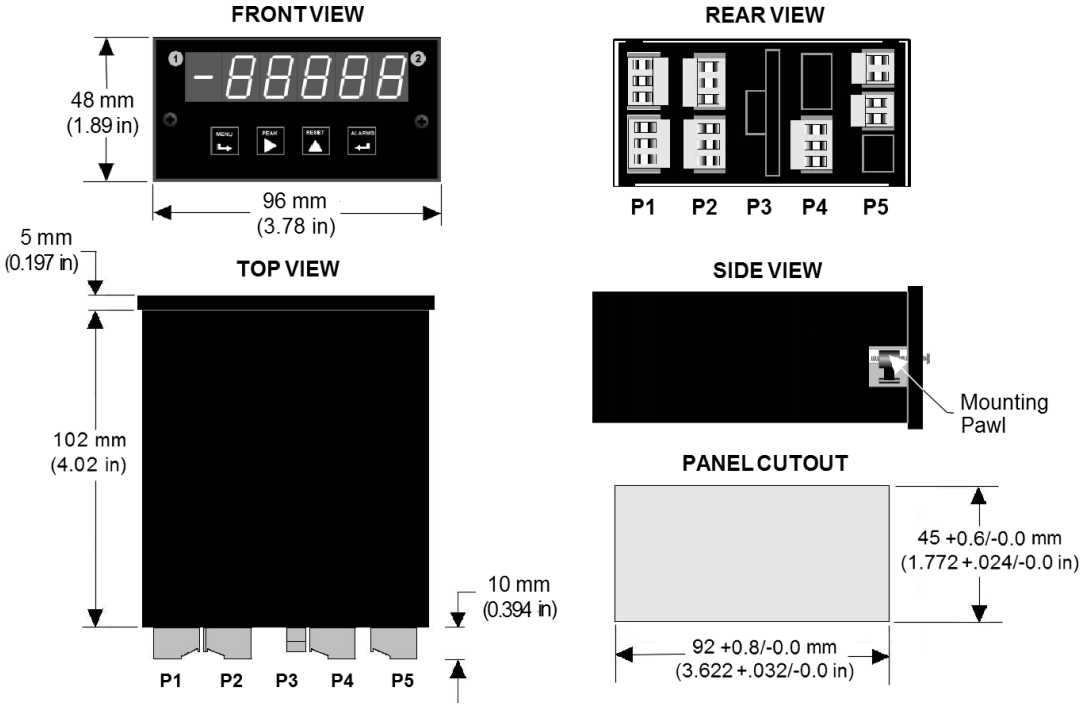


The DC signal conditioner board can also be utilized to accept preconditioned 4-20 mA or 0-10 V scale signals. In two-wire 4-20 mA transmitter connection, the same two wires are used to apply voltage and carry the output current.



In a repetitive fill operation (as illustrated by example), a setpoint offset of -50 allows 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.

Mechanical



Ordering Guide

Create a model a model number in this format: **LW10000P, IPC**

DPM Type	**LW** Laureate Scale Meter. Only used with DC or load cell signal conditioner.
Display Color	**1** Meter with green LED **2** Meter with red LED **3** Extended meter, green LED **4** Extended meter, red LED
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 Solid State Relays
Analog Output (isolated)	**0** None **1** Isolated 0-20 mA & 0-10 V
Digital Interface (isolated)	**0** None **1** Isolated RS232 **2** Isolated RS485 **5** USB **6** USB-to-RS485 converter **7** Ethernet **8** Ethernet-to-RS485 converter
Signal Input (isolated)	**Process Signals** (e.g., 4-20 mA, 0-5 V) **P** Default Scaling. 4-20 mA = 0-100.00 **P1** Custom Scaling. In the write-in field of your order, specify min input, min reading; max input, max reading.
	Strain Gage, Potentiometer (4-wire ratio) **SG** Default Scaling. 0-200 mV = 0-100.00. Most sensitive scale is 0 to ±200 mV. **SG1** Custom Scaling. In the write-in field of your order, specify min input, min reading; max input, max reading.
	Note: The same DC signal conditioner board can be user-configured for process, strain gauge, potentiometer follower, DC Volts, or DC Amps. It is precalibrated in EEPROM for all Laureate DC Volt and Amp ranges.
	Load Cells (4- or 6-wire ratio) **WM** Default Scaling. 0-20 mV = 0-100.00. Most sensitive scale is 0 to ±20 mV. **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