



## Laureate™ Pulse or Analog Input Batch Controller



### Features

- Automatic batch control for repetitive liquid fill operations
- Available for turbine flow meter pulse signals from 0 Hz to 1 MHz or analog flow meter signals (4-20 mA, 0-1 mA or 0-10V)
- Selectable display of batch total, grand total, number of batches, or flow rate
- 6-digit LED display scalable to  $\pm 999,999$
- Counts up from 0 to preset or down from preset to 0
- Universal AC power, 85-264 Vac
- Isolated 5, 10 or 24 Vdc excitation supply to power sensors
- NEMA 4X, 1/8 DIN case
- Choice of relay outputs: 2 or 4, contact or solid state
- Optional serial I/O: Ethernet, USB, RS232, RS485, Ethernet-to-RS485 converter
- 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 batch controller** is a low cost, powerful and highly accurate batching controller for repetitive fill operations. It can use the Laureate FR dual channel pulse input signal conditioner for use with turbine flow meters, or the Laureate V-to-F analog signal conditioner for use with 4-20 mA, 0-1 mA or 0-10V conditioned flow meter signals. Relay control can be provided by two or four 8A contact relays, or by two or four 120 mA AC/DC solid state relays. Fill operations are repeated continually with a programmable delay from 10 ms to 199.99 sec, or based on an external control input.

**Three items are tracked** by the batch control software. These can each be scaled to engineering units of total or flow rate and displayed by the controller's six-digit LED display: Item #1 is the current batch total, which can be set up to count up from zero to a preset limit, or down from a preset limit to zero. Item #2 can be assigned to grand total or number of batches. Item #3 is the flow rate.

**Two or four relays can be used.** Relay #1 is assigned to batch total to control the filling operation. Relays #2, #3 and #4 can each be assigned by the user to Items #1, #2 or #3. For example, Relay #2 can be assigned to Item #1 (batch total) with a lower setpoint to serve as a pre-warn and slow down the fill rate near the batch setpoint, and Relay #3 can be assigned to the total number of batches to terminate the batching when a present number of bottles have been filled.

**An optional serial communications board** allows the batch controller to transmit Items #1, #2 and #3, as well as peak for item #3 (rate). If required, all four items can be displayed simultaneously by augmenting the batch controller with up to three Laureate remote displays. Each of these can have its own analog output and relays for alarm or control.

#### Batch Control with Turbine Flowmeters

The pulse-input batch controller utilizes the FR dual channel signal conditioner, which accepts pulses from turbine flow meters and most industrial transducers with a pulse output such as proximity switches with PNP or NPN output, TTL or CMOS logic, or magnetic pickup pulses down to 12 mV. The same signal is applied in parallel to the A and B input channels, which are used

independently. Either channel can accept pulse rates from 0.005 Hz to 250 kHz, which exceeds the working range of turbine flow meters.

- **Channel A** is used for totalizing. The measured total is scaled mathematically for control and display of volume in engineering units, such as liters.
- **Channel B** is used for rate. Pulse frequency is determined by timing an integral number of periods over a specified gate time (plus 30 ms and 0-2 periods), and then taking the inverse of period. The inverse period approach allows greater accuracy and faster update times than conventional rate meters which count signal pulses over a specified time interval. Update times can be up to 25/sec. Rate in engineering units, such as liters per second, is obtained by multiplying the input by a scale factor.

#### Batch Control with Conditioned Flow Signals

The analog input batch controller utilizes the Laureate VF voltage-to-frequency converter signal conditioner board, which converts 4-20 mA, 0-1 mA or 0-1V conditioned flow meter signals to a frequency from 10 kHz to 110 kHz. This allows the counter controller to totalize flow, to count up to a preset value, or to count down to zero from a preset value for batch control. One of the relays is dedicated to On/Off batch control, while the other relay is available to slow down rate near the setpoint or to provide another alarm or control function based on rate or total.

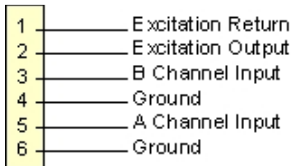
**Designed for system use.** Available plug-in boards include Ethernet and other serial communication boards, dual or quad relay boards, and an isolated analog output board. Laureates may be powered from 85-264 Vac or optionally from 12-32 Vac or 10-48 Vdc. The display is available with red or green 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.



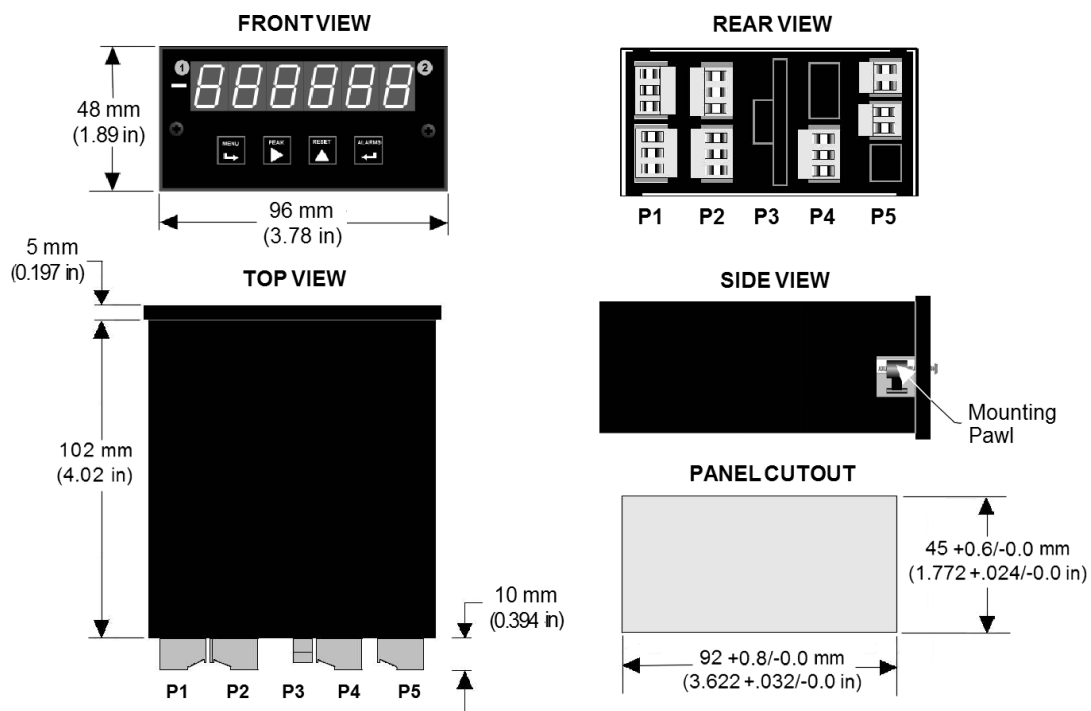
## Specifications

<b>Display</b>	
Readout Display Range Zero Adjust Span Adjust Indicators	6 LED digits, 7-segment, 14.2 mm (.56"), red or green -999999 to +999999, XXXXEX scientific notation beyond 999999 -999999 to +999999 0 to 999999 Four LED lamps
<b>Pulse Inputs</b> (FR signal conditioner)	
Signal Types Ch A Frequency, Max Ch B Frequency, Max Signal Ground Minimum Signal Maximum Signal Maximum Frequency Conversion Technique Delay between batches	AC, pulses from NPN, PNP transistors, contact closures, magnetic pickups. 1 MHz 250 kHz Common ground for channels A & B Nine ranges from (-12 to +12 mV) to (+1.25 to +2.1V) 250 Vac 1 MHz, 30 kHz, 250 Hz (selectable) Inverse period Selectable 10 ms to 199.99 s
<b>Analog Input</b> (V-to-F signal conditioner)	
Signal Types Conversion Technique Update Rate Gate Time	0-1 mA, 4-20 mA, 0-10V Inverse period applied to 10 kHz- 110 kHz 50 ms (max) Selectable 10 ms to 199.99 s
<b>Power</b>	
Voltage, standard Voltage, optional Power frequency Power consumption (typical, base meter) Power isolation	85-264 Vac or 90-300 Vdc 12-32 Vac or 10-48 Vdc DC or 47-63 Hz 1.2W @ 120 Vac, 1.5W @ 240 Vac, 1.3W @ 10 Vdc, 1.4W @ 20 Vdc, 1.55W @ 30 Vdc, 1.8W @ 40 Vdc, 2.15W @ 48 Vdc 250V rms working, 2.3 kV rms per 1 min test
<b>Excitation Output</b> (standard)	
5 Vdc 10 Vdc 24 Vdc Output Isolation	5 Vdc $\pm$ 5%, 100 mA 10 Vdc $\pm$ 5%, 120 mA 24 Vdc $\pm$ 5%, 50 mA 50 Vdc to meter ground
<b>Analog Output</b> (optional)	
Output Levels Current compliance Voltage compliance Scaling Resolution Isolation	4-20 mA, 0-20 mA, 0-10V, -10 to +10V (single-output option) 4-20 mA, 0-20 mA, 0-10V (dual-output option) 2 mA at 10V ( > 5 k $\Omega$ load) 12V at 20 mA ( < 600 $\Omega$ 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 (dual analog outputs share the same ground)
<b>Relay Outputs</b> (minimum of 2 relays required)	
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
<b>Serial Data I/O</b> (optional)	
Board Selections Protocols Data Rates	Ethernet, Ethernet-to-RS485 server, USB, USB-to-RS485 server, RS485 (dual RJ11), RS485 Modbus (dual RJ45), RS232. Modbus RTU, Modbus ASCII, Laurel ASCII protocol 300 to 19200 baud

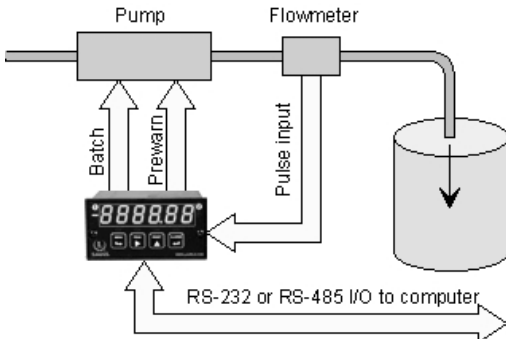
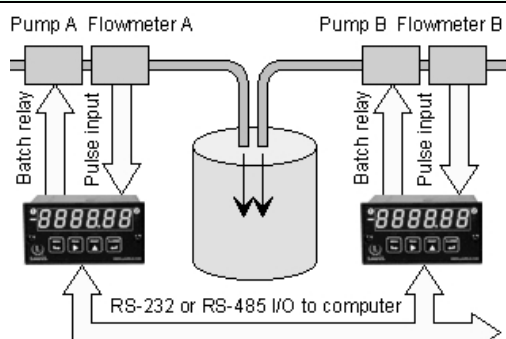
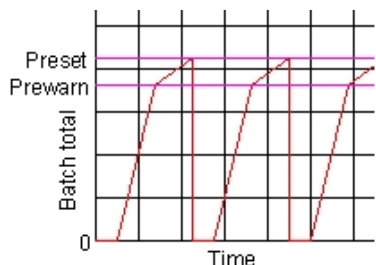

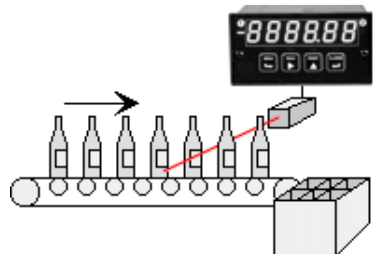


Digital Addresses Isolation	247 (Modbus), 31 (Laurel ASCII), 250V rms working, 2.3 kV rms per 1 min test
<b>Environmental</b>	
Operating Temperature	0°C to 55°C
Storage Temperature	-40°C to 85°C
Relative Humidity	95% at 40°C, non-condensing
Protection	NEMA-4X (IP-65) when panel mounted
<b>Signal Connections</b>	
	

## Mechanical



## Application Examples

Drum Filling Application Utilizing Two Relay Outputs	
	<p>In this drum filling application, the Laureate pulse-input batch controller utilizes its two relays to control a pump. The Prewarn relay slows down the pump near the preset to avoid overshoot. The Batch relay stops the pump at the preset.</p>
Controlling Chemical Mixing of Materials	
	<p>Multiple Laureate batch controllers can be used in combination to control the mixing of materials in the proper ratio. Each feed line is equipped with its own pump, flowmeter, and Laureate.</p> <p>Controller setup and monitoring of the mixing operation are facilitated by optional serial communications. RS-485 allows a single data line to handle multiple controllers.</p>
Up-Counting & Down-Counting Batch Control	
	<p>In up-counting batch control, the Laureate counts up from zero to a preset maximum. A prewarn level is available to slow down filling near the preset to avoid overshoot. A time delay can be programmed from the end of each batch to the start of the next batch.</p>
	<p>In down-counting batch control, the Laureate counts down from the preset maximum to zero. A prewarn level is available to slow down filling or emptying near zero. Again, a time delay can be programmed from the end of each batch to the start of the next batch.</p>
Discrete Filling and Batch Counting	
	<p>The Laureate batch controller is ideal for discrete manufacturing as well as repetitive fill operations. In this example, the Laureate counts bottles which it then groups into sixpacks. Its Grand Total capability can be used to track bottles or sixpacks.</p>



## Ordering Guide

Create a model number in this format: **L70100FR, IPC**

<b>Main Board</b>	<b>L7</b> Extended Main Board, Green LEDs <b>L8</b> Extended Main Board, Red LEDs
<b>Power</b>	<b>0</b> Isolated 85-264 Vac <b>1</b> Isolated 12-32 Vac or 10-48 Vdc
<b>Relay Output</b> (isolated)	<b>0</b> None <b>1</b> Two 8A Contact Relays <b>2</b> Two 120 mA Solid State Relays <b>3</b> Four 8A Contact Relays <b>4</b> Four 120 mA Solid State Relays
<b>Analog Output</b> (isolated)	<b>0</b> None <b>1</b> Single isolated 4-20 mA, 0-20 mA, 0-10V, -10 to +10V <b>2</b> Dual isolated 4-20 mA, 0-20 mA, 0-10V
<b>Digital Interface</b> (isolated)	<b>0</b> None <b>1</b> RS232 <b>2</b> RS485 (dual RJ11 connectors) <b>4</b> RS485 Modbus (dual RJ45 connectors) <b>5</b> USB <b>6</b> USB-to-RS485 converter <b>7</b> Ethernet <b>8</b> Ethernet-to-RS485 converter
<b>Input Type</b>	<b>Pulse Rate or Totalizing</b> <b>FR</b> Dual-Channel Pulse Input Signal Conditioner  <b>Voltage-to-Frequency Converter</b> <b>VF1</b> V-to-F Converter, 4-20 mA <b>VF2</b> V-to-F Converter, 0-1 mA <b>VF3</b> V-to-F Converter, 0-10 V <b>VF4</b> V-to-F Converter, Special Range For special range, specify min input, min reading; max input, max reading. Component changes by the factory may be required.
<b>Add-on Options</b>	<b>CBL01</b> RJ11-to-DB9 cable. RJ11 to DB9. Connects RS232 ports of meter and PC. <b>CBL02</b> USB-to-DB9 adapter cable. Combination of CBL02 and CBL01 connects meter RS232 port to PC USB port. <b>CBL03-1</b> 6-wire data cable, RJ11 to RJ11, 1 ft. Used to daisy chain meters via RS485. <b>CBL03-7</b> 6-wire data cable, RJ11 to RJ11, 7 ft. Used to daisy chain meters via RS485. <b>CBL05</b> USB cable, A-B. Connects USB ports of meter and PC. <b>CBL06</b> USB to RS485 adapter cable, half duplex, RJ11 to USB. Connects meter RS485 port to PC USB port. <b>CASE1</b> Benchtop laboratory case for one 1/8 DIN meter <b>CASE2</b> Benchtop laboratory case for two 1/8 DIN meters <b>IPC</b> Splash-proof cover <b>BOX1</b> NEMA-4 Enclosure <b>BOX2</b> NEMA-4 enclosure plus IPC <b>BL</b> Blank Lens without button pads <b>NL</b> Meter lens without button pads or Laurel logo

