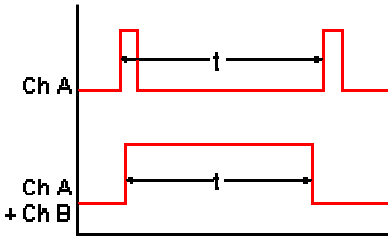
Laureate™ Stopwatch Timers

Resolution to 0.2 µs for time measurement of single events

Features

- **Times single events from 1 µs to 999,999 hrs.**
- **Timing resolution to 0.2 µs.**
- **Selectable display of single event time or accumulated time of all events.**
- **6-digit red or green LED display.**
- **Selectable H, M or S decimal format.**
- **Selectable HH.MM.SS clock format.**
- **Inputs from NPN or PNP proximity switches, contact closures, digital logic, magnetic pickups down to 12 mV, or AC inputs up to 250 Vac.**
- **Triggers on positive or negative pulse edges.**
- **Isolated 5, 10 or 24 Vdc excitation output to power sensors.**
- **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).**

Description



Stopwatch Mode

The Laureate stopwatch meter is designed to time single events, such as sporting events or processes, which produce start and stop pulses. It can also time the width of a single pulse. Highest resolution is 0.2 µs. For long intervals, the display is updated continuously during timing.

- **A-A Stopwatch Mode.** Time can be measured between a start pulse and a stop pulse, both on Channel A, from either the positive or negative edges.
- **A-B Stopwatch Mode.** Time can also be measured between a start pulse on Channel A (positive or negative edge) and a stop pulse on Channel B (positive or negative edge). This mode allows inputs from different sources. In addition, the A and B inputs can be tied together to start the stopwatch with one polarity and stop it with the other polarity.

Timing is achieved by counting 5.5 MHz clock pulses. Laureate™ stopwatch timers use the FR dual-channel signal conditioner and Extended counter main board.

Display

The event time (Item #1) may be displayed H, M or S format with six-digit resolution. The longest single-event timing interval is 999,999 hours. The highest resolution is 0.2 µs. The event time may also be displayed in HH.MM.SS clock format with 1 s resolution.

The stopwatch display is updated during timing at a rate controlled by a gate time, up to 25/s. It is reset to zero when the next start pulse occurs. Accumulated time from multiple events (Item #2) is also tracked and may be displayed up to 999,999 hours.

Universal Signal Conditioner

The dual-channel signal conditioner used for pulse detection accepts inputs from proximity switches with PNP or NPN output, TTL or CMOS logic, magnetic pickups, contact closures, and other signals from 12 mV to 250 Vac. Jumper selections provide optimum operation for different sensor types and noise conditions.

A built-in isolated 5, 10, or 24 Vdc excitation supply can power proximity switches and other sensors, and eliminate the need for an external power supply.

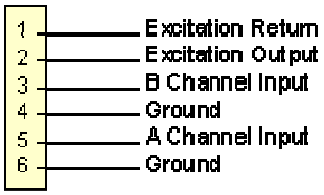
Other Features and Options

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

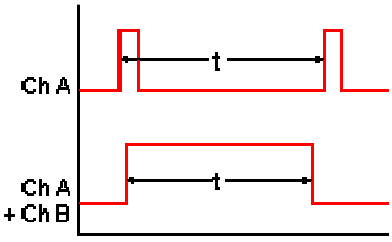
Display	
Readout	6 digits, 7-segment, 14.2 mm (.56")
Color	Red or green LED
Range	-999999 to +999999
Indicators	Four LED lamps
Inputs	
Types	AC, pulses from NPN, PNP transistors, contact closures, magnetic pickups.
Grounding	Common ground for channels A & B
Selectable Hysteresis	-12 to +12 mV, +30 to +60 mV, -30 to -20 mV, -150 to +150 mV, +350 to +600 mV, -600 to -350 mV, -1.15 to +1.15, +1.25 to +2.1 V, -2.1 to -1.25 V
Rolloff Filter	Selectable: 1 MHz, 30 kHz, 250 Hz
Debounce Time	Selectable: 0, 3, 50 ms
Stopwatch Mode	
Timing Modes:	
With CH A only	+ to + edge, or - to - edge.
With CH A tied to CH B	+ to - edge, or - to + edge.
With CH A and CH B	+ edge of A to + edge of B, + edge of A to - edge of B, - edge to A to - edge of B, - edge of A to - edge of B
Timing Interval	1 µs to 999,999 hrs
Timing Resolution	0.2 µs to 1 hr
Selectable Decimal Time	999999 H, M or S format with decimal point

Selectable Clock Time Output & Display Update Gate Time	HH.MM.SS format Gate time + 30 ms Programmable from 10 ms to 199.99 s
Accuracy	
Time Base Span Tempco Long-term Drift	Crystal calibrated to ±2 ppm ±1 ppm/°C (typ) ±5 ppm/year
Power	
Voltage, std. Voltage, opt. Frequency Power isolation	85-264 Vac and 90-370 Vdc 8-28 Vac and 9-37 Vdc 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
Excitation Output	
5 Vdc 10 Vdc 24 Vdc Output isolation	5 Vdc ±5%, 100 mA max 10 Vdc ±5%, 120 mA max 24 Vdc ±5%, 50 mA max 50 Vdc to meter ground
Environmental	
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
Electrical Connections	



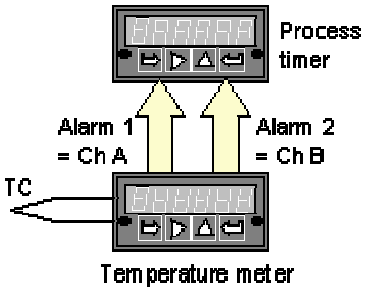
Applications

Stopwatch Mode



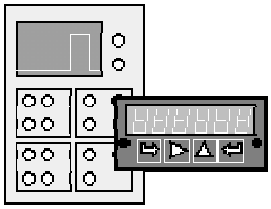
The stopwatch mode is used to time single events between start and stop pulses on the same channel. Duration of a single wave shape can be measured by tying the A and B channels together.

Timing Process Dynamics



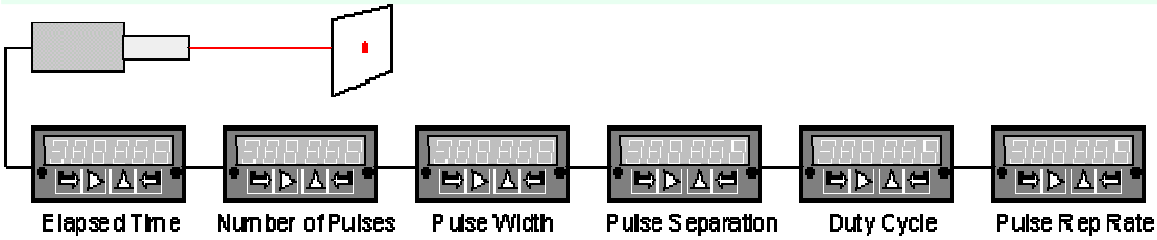
The start and stop pulses used for timing can be generated by the dual relay board in a Laureate analog panel meter or digital counter. For instance, the start and stop pulse edges can be created as temperature passes two alarm setpoints, or temperature cycles in a hysteresis control mode.

Replacing an Oscilloscope with a Laureate Meter



An oscilloscope is great for viewing and timing pulses in a lab. However, in fixed installations where digital timing accuracy and control outputs are required, a low-cost Laureate time interval meter will be the instrument of choice. Resolution to 0.2 µs is feasible.

Instrumenting a Pulsed Laser System



Some of the many possibilities in instrumenting a pulsed laser system with Laureate dual-channel counters: elapsed time, number of pulses, pulse width, pulse separation, duty cycle, and pulse rep rate.

Ordering Guide

Laureate™ Stopwatch Meters

Create a model number in this format: **L80101FR**. This example calls out a Laureate counter with an extended main board with red LEDs, 85-264 Vac power, dual 10 A contact relays, no second output, RS-232 serial output, and a dual-channel frequency signal conditioner. Includes plug-in screw terminals.

Main Board	☐ **L7** Extended Main Board, Green LEDs.	$260
	☐ **L8** Extended Main Board, Red LEDs.	$260
	Note: Use of the Extended Main Board makes this counter also suitable for A-B time interval, frequency, rate, period, square root of rate, up or down total, arithmetic functions, simultaneous rate and total, phase, duty cycle, batching, and custom curve linearization.	
Power	◉ **0** Isolated 85-264 Vac & 90-370 Vdc	NC
	☐ **1** Isolated 8-28 Vac & 9-37 Vdc.	$30
Setpoint Output	◉ **0** None.	NC
	☐ **1** Dual 10A Contact Relays.	$80
	☐ **2** Isolated Dual Solid State Relays.	$55
Second Output	◉ **0** None.	NC
	☐ **1** Isolated 0-20 mA & 0-10 V.	$90
		$50

Digital Interface	☐ **2** Batch Relay. Only used with pulse-input batching operation.		NC
	◉ **0** None.		$60
	☐ **1** Isolated RS-232.		$80
	☐ **2** Isolated RS-485.		$105
	☐ **3** Isolated Parallel BCD Output.		
Input Type	◉ **FR** Dual-Channel Pulse Input Signal Conditioner.		NC
Add-on Options	☐ **EB** Extra Bright Red LED Display.	☐ Unselected.	$30
	☐ **BL** Blank Lens without Button Pads.	☐ Unselected.	NC