

Laureate™ Time Interval Meters

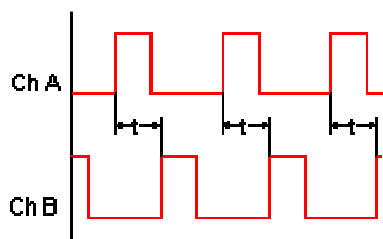
Resolution to 0.2 μ s for time measurement of periodic events



Features

- For periodic events from 1 μ s to 199.999 s.
- Display resolution to 0.2 μ s.
- Inputs from NPN or PNP proximity switches, contact closures, digital logic, magnetic pickups down to 12 mV, or AC inputs up to 250 Vac.
- Trigger on positive or negative pulse edges.
- 6-digit red or green LED display.
- Isolated 5, 10 or 24 Vdc excitation output to power sensors.
- 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).

Description



A-to-B Time Interval Mode

The Laureate™ time interval meter can display pulse width or time delay between individual pulses to a resolution of 0.2 μ s. It can also display average pulse width or average time delay between multiple pulses.

Time interval is measured between inputs on channels A and B. Timing starts when a pulse is applied to Channel A (selectable positive or negative edge), and ends when a pulse is applied to Channel B (selectable positive or negative edge). In case of a single pulsed signal, the A and B inputs can be tied together. A positive or negative slope may be selected to start timing, and the opposite slope must be selected to stop timing. Timing is achieved by counting 5.5 MHz clock pulses. Multiple integral time intervals are averaged over a gate time which is selectable from 10 ms to 199.99 s and also controls the display update time.

The Laureate time interval meter uses the FR dual-channel signal conditioner board and the standard (non-extended) counter main board.

Display

Time interval can be displayed in seconds, milliseconds, or microseconds with 6-digit resolution. In the typical

application, time is displayed in milliseconds with 1 μ s resolution. For times less than 100 ms, display resolution down to 0.2 μ s can be achieved by applying a multiplier of 10, moving the decimal point by one position, and averaging many time intervals.

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.



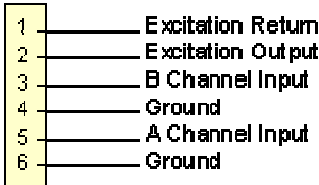
A built-in isolated 5, 10, or 24 Vdc excitation supply can power proximity switches and other sensors, and eliminate the need for an external power supply.

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.

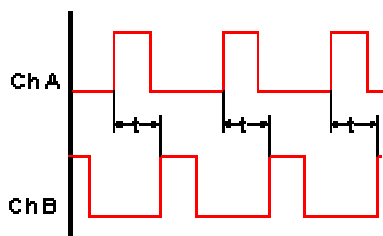
Specifications

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
Channel A Frequency	0.005 Hz to 1 MHz
Channel B Frequency	0.005 Hz to 250 kHz
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 V, +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
Time Interval Mode	
Timing Start	Channel A pulse, + or - edges
Timing Stop	Channel B pulse, + or - edges
Periodic Timing Interval	Gate time + 30 ms + 0-2 time intervals
Gate Time	Selectable 10 ms to 199.99 s
Timeout	Selectable 10 ms to 199.99 s
Same as periodic timing interval	
Resolution	
0 - 199.999 s	1 ms
0 - 99.9999 s	100 μ s
0 - 9.99999 s	10 μ s
0 - .999999 s	1 μ s

0 - .099999 s	0.2 μ s
Accuracy	
Time Base Span Tempco Long-term Drift	Crystal calibrated to ± 2 ppm ± 1 ppm/ $^{\circ}$ 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 $\pm 5\%$, 100 mA max 10 Vdc $\pm 5\%$, 120 mA max 24 Vdc $\pm 5\%$, 50 mA max 50 Vdc to meter ground
Environmental	
Operating Temperature Storage Temperature Relative Humidity Protection	0 $^{\circ}$ C to 55 $^{\circ}$ C -40 $^{\circ}$ C to 85 $^{\circ}$ C 95% at 40 $^{\circ}$ C, non-condensing NEMA-4X (IP-65) when panel mounted
Electrical Connections	
	

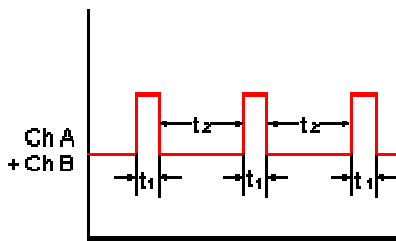
Applications

Time Interval Mode for Time Delay



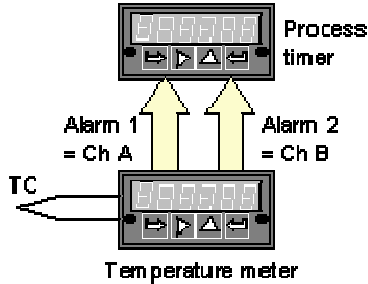
For periodic pulses applied to A and B channels, time delays can be measured down to 0.2 μ s resolution from the rising or falling edge of A to the rising or falling edge of B (selectable).

Time Interval Mode for Pulse Width



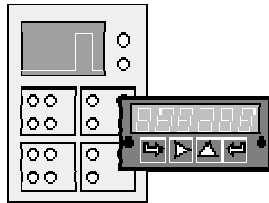
The width of periodic pulses (t_1 or t_2) can be measured by tying the A and B channels together. As for time delay, readings are averaged over a user-selectable gate time.

Timing Process Dynamics with a Panel Meter and Time Interval Meter



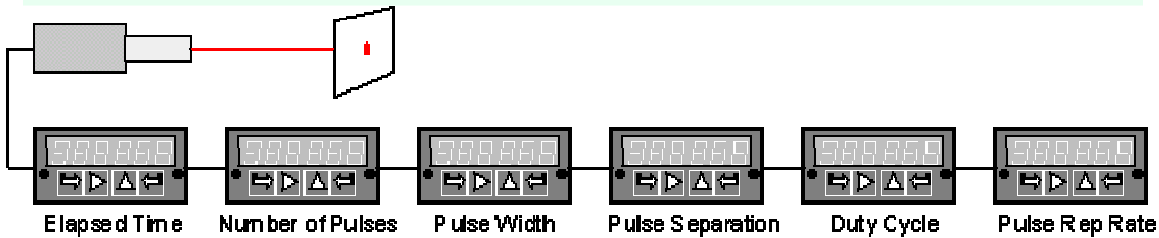
The start and stop pulses used for timing can be generated by the dual relay board in a Laureate panel meter or digital counter. For instance, the start and stop pulse edges can be created as temperature passes two alarm setpoints, or temperature cycles in a hysteresis control mode.

Replacing an Oscilloscope with a Laureate Time Interval 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 $0.2 \mu\text{s}$ is feasible.

Instrumenting a Pulsed Laser System Using Laureate Counters



Some of the many possibilities in instrumenting a pulsed laser system with Laureate dual-channel counters.

Ordering Guide

Laureate™ Time Interval Meters

Create a model number in this format: **L60101FR**. This example calls out a Laureate counter with a standard 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	<input type="checkbox"/> L5	Standard Main Board, Green LEDs.	\$220
	<input type="checkbox"/> L6	Standard Main Board, Red LEDs.	\$220
Note: In addition to A-to-B time interval, the Standard Main Board handles frequency, rate, period, square root of rate, and up or down total.			
Power	<input type="checkbox"/> 0	Isolated 85-264 Vac & 90-370 Vdc	NC
	<input type="checkbox"/> 1	Isolated 8-28 Vac & 9-37 Vdc.	\$30

Setpoint Output	<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
Second Output	<input type="checkbox"/> 0 None.		NC
	<input type="checkbox"/> 1 Isolated 0-20 mA & 0-10 V.		\$90
Digital Interface	<input type="checkbox"/> 0 None.		NC
	<input type="checkbox"/> 1 Isolated RS-232.		\$60
	<input type="checkbox"/> 2 Isolated RS-485.		\$80
	<input type="checkbox"/> 3 Isolated Parallel BCD Output.		\$105
Input Type	<input type="checkbox"/> FR Dual-Channel Pulse Input Signal Conditioner.		NC
Add-on Options	<input type="checkbox"/> EB Extra Bright Red LED Display.	<input type="checkbox"/> Unselected.	\$30
	<input type="checkbox"/> BL Blank Lens without Button Pads.	<input type="checkbox"/> Unselected.	NC