

Products by Type

Digital Panel Meters
Electronic Counters
Programmable Timers
Transmitters, 4-20 mA
Transmitters, Modbus
Large Digit Displays
Bar Graph Displays
Meter/Counter Options
Meter Accessories
Data Logging Systems
Serial-to-Analog
4-20 mA Loop Splitters

Meters by Application

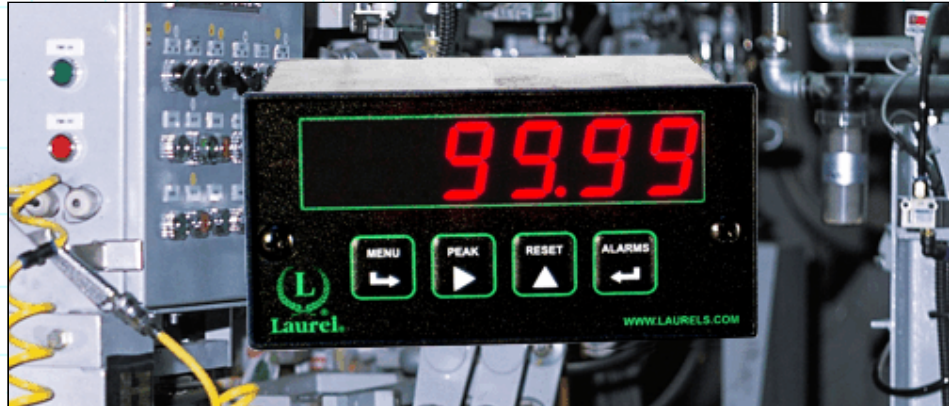
DC Volts & Amps
AC Power Monitoring
Process Meters
Flow Rate Total Batch
Weight, Load, Stress
Frequency, Rate, RPM
Temperature Control
Resistance in Ohms
Pulse & Analog Totals
Timing Products
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Laureate™ Duty Cycle Meter

For display of ON or OFF period in percent



Standard Features

- Measures ON or OFF period as a percentage of total period.
- Resolution of 1%, 0.1% or 0.01%.
- 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.
- Frequency from 0.005 Hz to 10 kHz.
- 6-digit red or green LED display.
- Isolated 5, 10 or 24 Vdc excitation output to power sensors.
- NEMA 4X, 1/8 DIN case.
- Certified to UL 61010C-1 (UL mark), EN 61010-1 (CE mark), and RoHS

Options:

- Low voltage power: 10-48 Vdc or 12-32 Vac
- 2 or 4 output relays, electromechanical or solid state
- 1 or 2 isolated analog outputs: 4-20 mA, 0-20 mA, 0-10V, -10 to +10V
- Serial communications: RS232, RS485, Modbus RS485, USB, USB-to-RS485 converter

Description



Duty cycle is a measure of ON or OFF period as a percentage of total period. Duty cycle is determined by averaging an integral number of periods over a gate time which is selectable from 10 ms to 199.99 s. The same signal is applied to Channels A and B. The meter divides the average pulse width by the period between pulses and expresses this ratio in percent. A resolution of 1%, 0.1% or 0.01% is selectable. By selecting leading or falling pulse edges, the ON or OFF duty cycle can be displayed.

Duty cycle measurement is used to monitor modulated proportional control systems and pulse-modulated systems, such as radar, lasers or packet radio. The Laureate duty cycle meter uses the FR dual-channel signal conditioner board and Extended counter main board. For time intervals longer than 199.99 s, duty cycle can be measured by using the A and B channels of to totalize AC line cycles and having the counter display the ratio of the two totals scaled in percent.

The Laureate dual-channel signal conditioner accepts inputs from proximity switches with an PNP or NPN output, TTL or CMOS logic, magnetic pickups, contact closures, and AC 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.



Designed for flexibility. Optional plug-in boards for communications and control include single or dual analog output boards, dual or quad relay boards, and serial communications boards. 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.

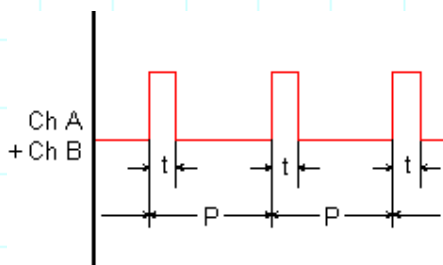
Specifications

Duty Cycle Mode	
Item Displayed	ON or OFF duty cycle of periodic pulse waveshape
Display Units	1%, 0.1%, 0.01%
Frequency Range	0.005 Hz to 10 kHz
Accuracy	0.01%, 0.005 Hz to 500 Hz, 0.1% at 5 kHz, 1% at 10 kHz
Maximum Timing Interval	199.99 s
Display	
Readout	6 LED digits, 7-segment, 14.2 mm (.56"), red or green
Range	-999999 to +999999
Indicators	Four LED lamps
Inputs	
Types	AC, pulses from NPN, PNP transistors, contact closures, magnetic pickups.
Signal Ground	Common ground for channels A & B.

Minimum Signal	Nine ranges from (-12 to +12 mV) to (+1.25 to +2.1V)
Maximum Signal	250 Vac
Maximum Frequency	1 MHz, 30 kHz, 250 Hz (selectable)
Contact Debounce	0, 3, 50 ms (selectable)
Update Rate	
Conversion Interval	Gate time + 30 ms + 0-2 signal periods
Gate Time	Selectable 10 ms to 199.99 s
Time Before Zero Output	Selectable 10 ms to 199.99 s
Power	
Voltage, standard	85-264 Vac or 90-300 Vdc (DC operation not UL approved)
Voltage, optional	12-32 Vac or 10-48 Vdc
Frequency	DC or 47-63 Hz
Power Isolation	250V rms working, 2.3 kV rms per 1 min test
Excitation Output (standard)	
5 Vdc	5 Vdc \pm 5%, 100 mA
10 Vdc	10 Vdc \pm 5%, 120 mA
24 Vdc	24 Vdc \pm 5%, 50 mA
Output Isolation	50 Vdc to meter ground
Analog Output (optional)	
Output Levels	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)
Current compliance	2 mA at 10V (> 5 kOhm load)
Voltage compliance	12V at 20 mA (< 600 Ohm load)
Scaling	Zero and full scale adjustable from -99999 to +99999
Resolution	16 bits (0.0015% of full scale)
Isolation	250V rms working, 2.3 kV rms per 1 min test (dual analog outputs share the same ground)
Relay Outputs (optional)	
Relay Types	2 Form C contact relays or 4 Form A contact relays (NO) 2 or 4 Form A, AC/DC solid state relays (NO)
Current Ratings	8A at 250 Vac or 24 Vdc for contact relays 130 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
Protocols	Modbus RTU, Modbus ASCII, simpler Laurel ASCII
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 Temperature	0°C to 60°C
Storage Temperature	-40°C to 85°C
Relative Humidity	95% at 40°C, non-condensing
Protection	NEMA-4X (IP-65) when panel mounted
Signal Connections	
<pre> 1 ———— Excitation Return 2 ———— Excitation Output 3 ———— B Channel Input 4 ———— Ground 5 ———— A Channel Input 6 ———— Ground </pre>	

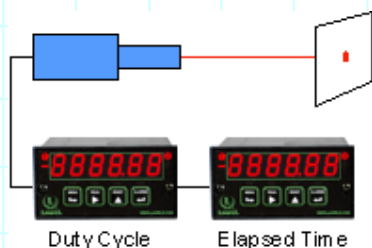
Applications

Duty Cycle Mode



Duty cycle indicates the ON or OFF time in percent from 0% to 100% of period for repetitive pulse train. In the illustration, duty cycle is $100 \times t/P$. The same signal is applied to the A and B channels.

Duty Cycle and Elapsed Time of a Laser



Duty cycle can be used to indicate the ON time of a pulsed laser in relation to total time. Laureate counters can also measure elapsed time, the number of pulses, average width in μs , the number of pulses, and total energy applied.

Ordering Guide Laureate Duty Cycle Meter

Select the buttons to build a model number in this format: **L70000FR, IPC**

		Quantity	1
Main Board	<input type="radio"/> L7 Extended Main Board, Green LEDs		\$270
	<input type="radio"/> L8 Extended Main Board, Red LEDs		\$270
Note: Use of the Extended Main Board makes this counter also suitable for A-B time interval, stopwatch, frequency, rate, period, square root of rate, up or down total, arithmetic functions, simultaneous rate and total, phase angle, batching, and custom curve linearization.			
Power	<input type="radio"/> 0 Isolated 85-264 Vac		NC
	<input type="radio"/> 1 Isolated 12-32 Vac or 10-48 Vdc		\$30
Relay Output	<input type="radio"/> 0 None		NC
	<input type="radio"/> 1 Two 8A Contact Relays		\$80
	<input type="radio"/> 2 Two Solid State Relays		\$55
	<input type="radio"/> 3 Four 8A Contact Relays		\$100
	<input type="radio"/> 4 Four Solid State Relays		\$75
Analog Output	<input type="radio"/> 0 None		NC
	<input type="radio"/> 1 Single isolated 4-20 mA, 0-20 mA, 0-10 V, -10 to +10V		\$90
	<input type="radio"/> 2 Dual isolated 4-20 mA, 0-20 mA, 0-10V		\$135
Digital Interface	<input type="radio"/> 0 None		NC
	<input type="radio"/> 1 Isolated RS-232		\$60
	<input type="radio"/> 2 Isolated RS-485		\$80
	<input type="radio"/> 4 Isolated Modbus RS-485		\$90

	<input type="radio"/> 5 USB <input type="radio"/> 6 USB Cable, A to B	\$60 \$100
Input Type	<input type="radio"/> FR Dual-Channel Pulse Input Signal Conditioner	NC
Add-on Options	<input type="checkbox"/> BL Blank lens without button pads <input type="checkbox"/> CBL01 RJ11-to-DB9 cable <input type="checkbox"/> CBL02 USB-to-DB9 adapter <input type="checkbox"/> CBL05 USB Cable, A to B <input type="checkbox"/> IPC Clear front panel cover sealed to NEMA 4X / IP65 <input type="checkbox"/> BOX1 NEMA-4X wall-mount enclosure with 1/8 DIN cutout <input type="checkbox"/> BOX2 BOX1 plus IPC	NC \$19 \$39 \$15 \$40 \$140 \$180



Laurel Electronics, Inc.
Industrial Instrumentation & Displays

3183-G Airway Avenue
Costa Mesa, CA 92626, USA



Tel: (714) 434-6131
Fax: (714) 434-3766



Email sales@laurels.com

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