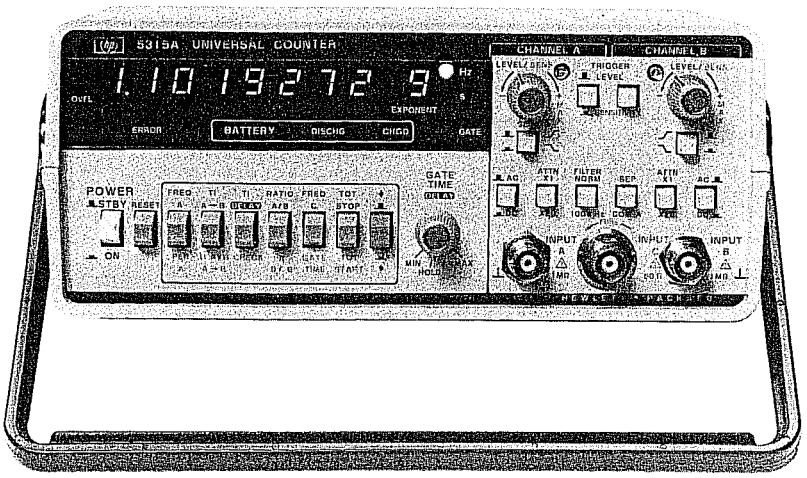
ELECTRONIC COUNTERS

Universal Counter

Model 5315A/B

- 100 MHz/Reciprocal
- 100 ns Time interval
- Portable
- 1 GHz optional
- Trigger lights
- Delay (Hold-off)



5315A with Opt 003

Description

All the universal counter capability you've come to expect, and more, is included in the smart, portable 5315A Universal Counter. And just as important, this advanced capability and high technology costs much less than you might expect. This achievement is possible by the utilization of HP's unique state-of-the art LSI counter-on-a-chip and 2 standard commercial LSI circuits (a single chip microprocessor and a display driver chip).

The 5315A offers frequency or period measurements to 100 MHz, frequency to 1 GHz optional, 3 time interval measurement modes (single shot time interval to 100 ns, time interval with delay, and time interval average to 10 ps), ratio, 2 totalize modes (manual or electrically controlled), as well as input signal conditioning that is optimized for not only frequency measurements but also for time interval measurements. Additional features of the 5315A include reciprocal counting (high resolution frequency measurements at low frequencies), continuously variable gate time, tri-state trigger lights, and a conservative, low component count design for years of reliable service.

The 5315B is identical to the 5315A except for the package. The package of the 5315B is a metal System II package for rack mounting or stacking applications. This metal package is also recommended when a lower level of RFI (radio frequency interference) is desired.

5315A/B Specifications

Input Characteristics (Channel A and Channel B)

Range: DC coupled 0 to 100 MHz.
AC coupled 30 Hz to 100 MHz.
Sensitivity: 10 mV rms sine wave to 10 MHz.
25 mV rms sine wave to 100 MHz.
75 mV peak-to-peak pulse at minimum pulse width of 5 ns.

Sensitivity can be varied continuously up to 500 mV rms *NOMINAL* by adjusting sensitivity control. In sensitivity mode, trigger level is automatically set to 0 V *NOMINAL*.

Dynamic range:
30 mV to 5 V peak-to-peak, 0 to 10 MHz.
75 mV to 5 V peak-to-peak, 10 to 100 MHz.
Coupling: AC or DC, switchable.
Filter: Low pass, switchable in or out of Channel A. 3 dB point of *NOMINALLY* 100 kHz.
Impedance: 1 MΩ *NOMINAL* shunted by less than 40 pf.
500 KΩ *NOMINAL* shunted by less than 70 pf (COMMON A).
Signal operating range: +2.5 Vdc to −2.5 Vdc.
Attenuator: X1 or X20 *NOMINAL*.
Trigger level: Variable between +2.5 Vdc and −2.5 Vdc.
Slope: Independent selection of + or − slope.
Channel input: SEPARATE or COMMON A.
Damage level:

AC & DC x 1:	
DC to 2.4 kHz	250 V (DC + AC rms)
2.4 kHz to 100 kHz	6×10^5 V rms Hz/FREQ
>100 kHz	6 V rms
AC & DC x 20:	
DC to 28 kHz	500 V (DC + AC peak)
28 kHz to 100 kHz	1×10^7 V rms Hz/FREQ
>100 kHz	100 V rms

Frequency (Channel A)

Range: .1 Hz to 100 MHz (burst or CW).
LSD displayed: 10 Hz to 1 n Hz depending upon gate time and input signal. At least 7 digits displayed per second of gate time.

Period

Range: 10 ns to 10^5 s.
LSD displayed: 100 ns to 1 fs depending upon gate time and input signal. At least 7 digits displayed per second of gate time.

Time Interval

Range: 100 ns to 10^5 s.
LSD displayed: 100 ns.

Time Interval Average

Range: 0 ns to 10^5 s.
LSD displayed: 100 ns to 10 ps depending upon gate time and input signal. See table in definitions section.
Number of intervals averaged (N): N = Gate Time x FREQ.
Minimum dead time (stop to start): 200 ns.

Time Interval Delay (Holdoff)
Front panel gate time knob inserts a variable delay of *NOMINALLY* 500 μs to 20 ms between START (Channel A) and enabling of STOP (Channel B). Electrical inputs during delay time are ignored. Delay time may be digitally measured by simultaneously pressing T.I. Averaging, T.I. Delay and blue key. Other specifications of T.I. Delay are identical to Time Interval.

Ratio
Range: 0.1 Hz to 100 MHz, both channels
LSD: $\frac{2.5 \times \text{Period A}}{\text{Gate Time}} \times$ Ratio. (rounded to nearest decade)

Totalize
Manual:
Range: 0 to 100 MHz.
A gated by B:
Totalizes input A between two events of B. Instrument must be reset to make new measurement. Gate opens on A slope, closes on B slope. Range: 0 to 100 MHz.

General
Check: Counts internal 10 MHz reference frequency over gate time range *NOMINALLY* 500 μs to 20 ms.
Error light: LED warning light activated if logic error is found during instrument turn-on self-check.
Display: 8 digit amber LED display, with engineering units annunciator.
Overflow: Only frequency and totalize measurements will overflow. In case of overflow, eight least significant digits will be displayed and amber front panel overflow LED will be actuated.
All other measurements which would theoretically cause a display of more than 8 digits will result in the display of the 8 most significant digits.
Gate time: Continuously variable, *NOMINALLY* from 60 ms to 10 s or 1 period of the input, whichever is longer.
Sample rate: Up to 5 readings per second *NOMINAL* except in time interval mode, where it is continuously variable *NOMINALLY* from 250 ms to 10 s via Gate Time Control.
Operating temperature: 0° to 50°C.
Power requirements: 100, 120, 220, 240 V (+5%, −10%) 48–66 Hz; 15 VA maximum
Weight: Net, 2.2 Kg (4 lbs. 12 oz.); shipping, 4.1 Kg (9 lbs).
Dimensions: 238 mm W x 98 mm H x 276 mm D (9⅜ x 3⅞ x 10⅞ in.)
Time Base:
Frequency: 10 MHz.
Aging rate: < 3 parts in 10^7/mo.
Temperature: ≤ 5 parts in 10^6, 0 to 50°C.
Line voltage: ≤ 1 part in 10^7 for ± 10% variation.

Options
Opt. 001: High Stability Time Base (TCXO)
Frequency: 10 MHz.
Aging rate: < 1 part in 10^7/mo.
Temperature: ≤ 1 part in 10^6, 0° to 40°C.
Line voltage: ≤ 1 part in 10^8 for ± 10% variation.
Opt. 002: Battery (5315A only)
Type: Rechargeable lead-acid (sealed).
Capacity: TYPICALLY 4 hours of continuous operation at 25°C.
Recharging time: TYPICALLY 16 hours to 98% of full charge, instrument non-operating. Charging circuitry included with Option. Batteries not charged during instrument operation.
Low voltage indicator: Instrument turns itself off automatically when low battery condition exists. *Discharge* LED flashes slowly when this happens. *Discharge* LED is on whenever battery is supplying power to instrument.
Charge LED indicates state of charge of battery during charging only and is on whenever battery is charged to 95% *NOMINAL* of capacity. *Charge* LED flashes when 90% *NOMINAL* of charge taken out is replaced. *Charge* LED is off if charge is less than 70% *NOMINAL* of capacity.
Line failure protection: Instrument automatically switches to battery in case of line failure.
Weight: Opt. 002 adds 1.4 Kg (3 lbs.) to weight of instrument.
Option 003: C Channel
Input characteristics
Range: 50 to 1000 MHz, prescaled by 10.
Sensitivity: 15 mV rms sinewave (−23.5 dBm) to 650 MHz.
75 mV rms sinewave (−9.5 dBm) to 1000 MHz.
Sensitivity can be decreased continuously by up to 20 dB *NOMINAL*, 50 to 500 MHz and 10 dB *NOMINAL*, 500 to 1000 MHz by adjusting sensitivity control. Trigger level is fixed at 0 V *NOMINAL*.
Dynamic range: 15 mV to 1 V rms (36 dB), 50 to 650 MHz.
75 mV to 1 V rms (20 dB), 650 to 1000 MHz.
Signal operating range: +5 Vdc to −5 Vdc.
Coupling: AC
Impedance: 50 Ω *NOMINAL* (VSWR, < 2.5:1 TYPICAL).
Damage level: ±8 V (DC + AC peak), fuse protected. Fuse located in BNC connector.
Frequency (Channel C)
Range: 50 to 1000 MHz (burst or CW).
LSD displayed: 100 Hz to 1 Hz depending upon gate time. At least 7 digits per second of gate time.

5315B:
Rack and stack metal case with rear panel, switchable AC power line module. Specifications same as 5315A except as follows:
Rack mount: 5315B is recommended for rack mounting via Rack Mount Kit 5061–0072.
Oscillator output: 10 MHz, 50 mV pk-pk into 50 Ω load, on rear panel.
External frequency standard input: 10 MHz, 1 V RMS into 500 Ω, on rear panel. Not available with option 001.
Dimensions: 212 mm W x 88 mm H x 345 mm D (8⅜ x 3½ x 13¾ in.).
Weight: Net, 3.2 Kg (7 lbs. 2 oz.); shipping, 4.5 Kg (10 lbs.).

Definitions
Least significant digit (LSD) displayed:
Frequency: (2.5 x 10^{-7}/Gate Time) x FREQ, FREQ < 10 MHz.
2.5/Gate Time, FREQ ≥ 10 MHz.
Period: (2.5 x 10^{-7}/Gate Time) PER, PER > 100 ns.
(2.5/Gate Time) x PER^2, PER ≤ 100 ns.
All above calculations should be rounded to nearest decade (i.e., 0.5 Hz will become 1 Hz and 0.4 ns will be 0.1 ns).

Time interval average:	LSD
1 to 25 intervals	100 ns
25 to 2500 intervals	10 ns
2500 to 250,000 intervals	1 ns
250,000 to 25,000,000 intervals	100 ps
> 25,000,000 intervals	10 ps

Time Interval Average is a statistical process. LED displayed is calculated for 1 standard deviation (σ) confidence level.

Options	Price
001 High Stability Time base	add $100
002 Battery (available with 5315A only)	add $225
003 C Channel	add $250
All 5315A orders must include one (1) of these line power options:	
Option 100: 90-105 VAC	N/C
Option 120: 108-126 VAC	N/C
Option 220: 198-231 VAC	N/C
Option 240: 216-252 VAC	N/C
5315A 100 MHz/100 ns Universal Counter	**$800**
5315B 100 MHz/100 ns Universal Counter in Metal Rack/Stack Package	**$950**