

MULTI-WAVELENGTH METER

428 Series



Test your WDM signals with the confidence that results from reliable accuracy.

The 428 Series Multi-Wavelength Meter from Bristol Instruments combines proven Michelson interferometer-based technology with fast Fourier transform analysis in order to measure the wavelength, power, and OSNR of as many as 1000 discrete optical signals. With features such as high accuracy, straightforward operation, and rugged design, the model 428 provides precise and reliable wavelength testing of laser transceivers and WDM signals.

Two versions of the 428 Multi-Wavelength Meter are available. The model 428A is the most precise, providing an accuracy of ± 0.3 pm. For less exacting test requirements, the model 428B is a lower-priced alternative with a wavelength accuracy of ± 1.0 pm. Continuous calibration with a built-in wavelength standard ensures the utmost confidence in the test results.

The rugged design of the 428 Multi-Wavelength Meter provides long-term reliable operation, backed by a five-year warranty on all parts and labor. This results in less downtime and the lowest cost of ownership available.

Key Features:

- Wavelength accuracy as high as ± 0.3 pm.
- Continuous calibration with a built-in wavelength standard.
- Measurement confidence level of $\geq 99.7\%$.
- Traceable to NIST standards.
- Power measured to an accuracy of ± 0.5 dB.
- Automatically calculates OSNR to > 40 dB.
- Operates with CW and modulated signals.
- Interfacing via SCPI using USB, Ethernet, or GPIB.
- Rugged design for manufacturing environments.
- Five-year warranty covers all parts and labor.

SPECIFICATIONS

428 Series

MODEL	428A	428B
OPTICAL SIGNAL	CW and modulated	
WAVELENGTH	1270 – 1650 nm (182 – 236 THz)	
Range	1270 – 1650 nm (182 – 236 THz)	
Accuracy ^{1,2,3}	± 0.2 parts per million (± 0.3 pm at 1550 nm)	± 0.65 parts per million (± 1.0 pm at 1550 nm)
Differential Accuracy ⁴	± 0.15 parts per million	± 0.5 parts per million
Minimum Resolvable Separation ^{3,4}	10 GHz (equal power lines input)	
Repeatability ^{4,5,6}	± 0.03 parts per million (± 0.05 pm at 1550 nm)	± 0.1 part per million (± 0.15 pm at 1550 nm)
Calibration	Continuous - built-in stabilized single-frequency HeNe laser	Continuous - built-in standard HeNe laser
Display Resolution	0.0001 nm	
Units ⁷	nm, cm ⁻¹ , THz	
POWER		
Calibration Accuracy	± 0.5 dB (± 30 nm from 1310 and 1550 nm)	
Flatness ⁴	± 0.2 dB (1270 – 1600 nm), 30 nm from any wavelength	
Linearity ⁴	± 0.3 dB (1270 – 1600 nm), lines above -30 dBm	
Polarization Dependence	± 0.5 dB (1270 – 1600 nm)	
Display Resolution	0.01 dB	
Units ⁷	dBm, mW, μW	
SIGNAL-TO-NOISE RATIO ^{4,8}	> 40 dB (100 averages), ≥ 100 GHz channel spacing	> 35 dB (100 averages), ≥ 50 GHz channel spacing
OPTICAL INPUT SIGNAL		
Sensitivity	Single-line input Multiple-line input ⁴	-40 dBm (1270 – 1600 nm), -30 dBm (1600 – 1650 nm) 30 dB below total input power, but not less than single-line input sensitivity
Maximum Power	+ 10 dBm, sum of all lines input (displayed level), + 18 dBm, sum of all lines input (safe level)	
Return Loss	35 dB (UPC connector), 50 dB (APC connector)	
Maximum Number of Lines ⁹	1000	
MEASUREMENT RATE (TIME) ¹⁰	4 Hz (0.25 s)	
MEASUREMENT MODES		
Data Mode	Single channel, list by wavelength table, list by power table	
Delta Mode	Delta wavelengths from ITU grid, delta wavelengths and powers from reference channel	
Drift Mode	Maximum, minimum, delta (max-min) of wavelengths and powers over time Current, start, drift (current-start) of wavelengths and powers over time	
INPUTS/OUTPUTS		
Optical input	9/125 μm single-mode fiber (FC/UPC or FC/APC)	
Instrument Interface	Library of commands (SCPI) via USB 2.0, Ethernet, and optional GPIB	
ENVIRONMENTAL ⁴		
Warm-Up Time	< 15 minutes	None
Temperature Pressure Humidity	+15°C to +30°C (-10°C to +70°C storage) 500 – 900 mm Hg ≤ 90% R.H. at + 40°C (no condensation)	
DIMENSIONS AND WEIGHT	3.5" x 17.0" x 15.0" (89 mm x 432 mm x 381 mm) 17 lbs (7.65 kg)	
POWER REQUIREMENTS	90 - 264 VAC, 47 - 63 Hz, 80 VA max	
WARRANTY	5 years (parts and labor)	

- (1) Defined as measurement uncertainty, or maximum wavelength error, with a confidence level of ≥ 99.7%.
- (2) Traceable to an NIST standard (SRM 2517a).
- (3) For multi-wavelength measurement, ≥ 15 GHz channel separation is required to achieve specified wavelength accuracy.
- (4) Characteristic performance, but non-warranted.
- (5) For 428A, standard deviation for a 10 minute measurement period.
- (6) For 428B, standard deviation for a 1 minute measurement period. Maximum long-term measurement variation < ± 0.4 ppm.
- (7) Data in units of nm and cm⁻¹ are given as vacuum values.
- (8) For lines above -25 dBm, 0.1 nm noise bandwidth.
- (9) OSNR is reduced as the number of lines is increased.
- (10) For single-line input. Multiple-line input may reduce the measurement rate.



Bristol Instruments reserves the right to change the specifications as may be required to permit improvements in the design of its products. Specifications are subject to change without notice.