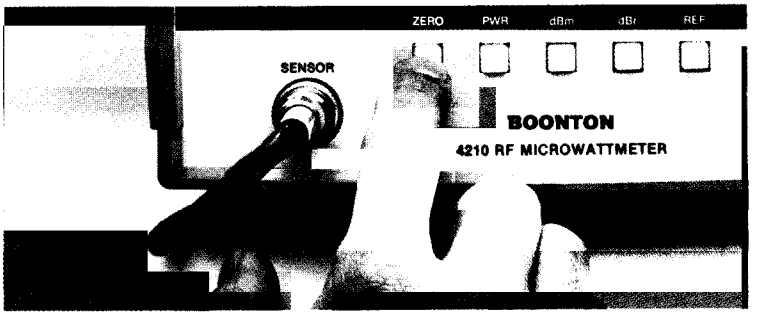
BOONTON

SIMPLE, BUT POWERFUL

Many microprocessor-based instruments, designed primarily for programmable applications, are overly complex and difficult to operate in manual applications. The 4210 is microprocessor-based, but with a difference. Designed to replace older power meters in non-programmed applications, the 4210 features the simplicity of 5-button control.

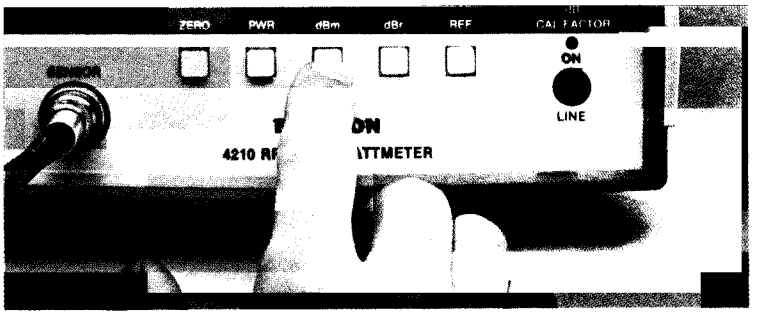
AUTOMATIC ZEROING

Under control of the ZERO key the 4210 instantly stores range offsets and uses them to correct all future readings. This method is both faster and more accurate than manual zeroing.



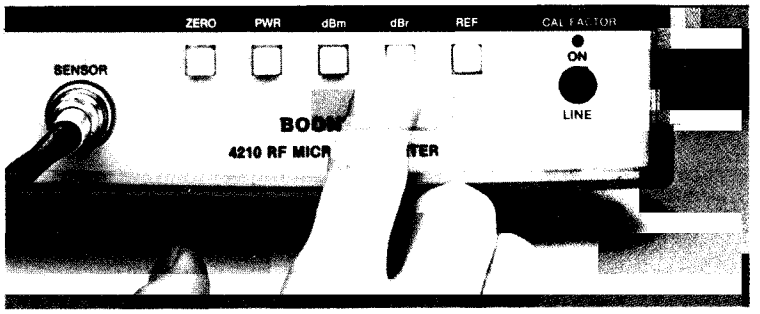
AUTOMATIC RANGING

Power or dBm readings can be selected. The 3-1/2 digit LED display with full annunciators is automatically ranged for optimum resolution. Over each decade power range the resolution varies from 0.1% at full scale to 1% at one-tenth full scale; in the dBm mode the resolution is a constant 0.01 dB.



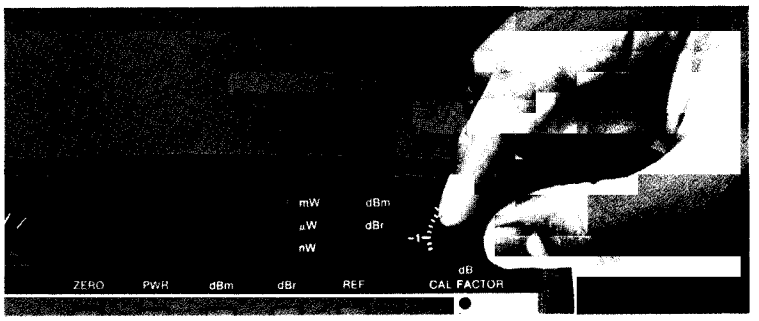
AUTOMATIC OFFSET

Any dBm reading can be stored as a reference and future dBr readings then automatically offset by that reference. This feature is particularly useful when making insertion loss or gain measurements.



CALIBRATION FACTOR

All power sensors require a frequency-dependent correction to account for high-frequency losses caused by sensor inefficiencies and mismatch loss. A simple rotary control, calibrated in 0.1 dB increments, corrects the 4210 display for these losses. The required corrections are printed on the sensor for every 1 GHz increment.



SIMPLE MAINTENANCE, TOO

The 4210 is not only simple to operate, it is also simple to maintain. There is a total of only twelve easily-accessible internal adjustments. Two adjustments are in the power supply; eight are in the analog section, where the low level d.c. from the sensor is converted to a 94 Hz signal by a solid-state chopper and amplified; one adjustment is in the digital section, where the data is converted and manipulated; and one adjustment is on the display board.

Free-running signature-analysis techniques are used in the microprocessor circuitry to trace the data streams, mode-by-mode, as a troubleshooting aid.

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SPECIFICATIONS

FREQUENCY RANGE: 200 kHz to 18 GHz (depending on power sensor used)

MODES:

Power: Display in nW, μW, or mW

dBm: Display in dB relative to 1 mW

dBr: Display in dB relative to the previous dBm display

POWER RANGE:

With all 4210-4 series sensors: 70 dB dynamic range with 7 full-scale ranges of -50, -40, -30, -20, -10, 0, and +10 dBm (10 nW to 10 mW, f.s.)

With all 4210-5 series sensors: 70 dB dynamic range with 7 full-scale ranges of -40, -30, -20, -10, 0, +10, and +20 dBm (100 nW to 100 mW, f.s.)

With 4210-7E sensor: 40 dB dynamic range with 4 full-scale ranges of -20, -10, 0, and +10 dBm (10 μW to 10 mW, f.s.)

Ranging: Automatic

INSTRUMENTATION ACCURACY: (Uncertainties include instrumentation, sensor non-linearity, range zero corrections, and noise.)

Ranges	All But Lowest (All Sensors)	Lowest (4210-4 & -5 Sensors)	Lowest (4210-7E Sensor)
PWR Mode	±1.5% rdg. ±0.1% f.s.	±2% rdg. ±1.5% f.s.	±1% rdg. ±3% f.s.
dB Modes	$\pm 0.07\ \text{dB} \pm \frac{dB_{f.s.} - dB_{rdg.}}{250}$	$\pm 0.15\ \text{dB} \pm \frac{dB_{f.s.} - dB_{rdg.}}{15}$	$\pm 0.1\ \text{dB} \pm \frac{dB_{f.s.} - dB_{rdg.}}{10}$

ZERO: Automatic, operated by front-panel key switch

Zero drift:

With all 4210-4 series sensors: 1 nW/h, max., on 10 nW range

With all 4210-5 series sensors: 10 nW/h, max., on 100 nW range

With 4210-7E sensor: 1 μW/h, max., on 10 μW range

Temperature effect:

Range	Instrument	Sensor
21° C to 25° C	0 dB	0 dB
18° C to 30° C	0 dB	±0.1 dB
10° C to 40° C	±0.2 dB	±0.2 dB

GENERAL:

Cal Factor: Range 1.10 dB to -1.10 dB, entered via calibrated front-panel control

Waveform response:

With all 4210-4 series sensors: True average power to 20 μW; above 20 μW, average power of sine wave

With all 4210-5 series sensors: True average power to 200 μW; above 200 μW, average power of sine wave

With 4210-7E sensor: True average power

Measurement speed:
With 4210-4 and -5 sensors: Typically 1.0 to 2.5s. Worst case below -40 dBm, 8s for increasing and 27s for decreasing levels

With 4210-7E sensor: Typical 2 to 8s for increasing levels and 1s to 13s for decreasing levels

Display: 4 digit LED. 3-1/2 digit display of power, 4 digit display of dB with 0.01 dB resolution

Auxiliary analog display, uncalibrated, proportional to power (PWR mode) or dB (dB mode)

Annunciators: LED display of nW, μW, mW, dBm, and dBr

Error indication: Display shows overrange condition

Power consumption: 100, 120, 220, 240 V, 50 - 400 Hz, 18 VA

Weight: 5 lbs. (2.27 kg)

Size: 8.5" wide (21.6 cm), 4.5" high (11.4 cm), 10.1" deep (25.7 cm)

POWER SENSORS

Sensor Type	Full-wave diode						Thermocouple Type
Model	4210-4A	4210-4B	4210-4C	4210-4E	4210-5B	4210-5E	4210-7E
Input	50Ω	50Ω	75Ω	50Ω	50Ω	50Ω	50Ω
Frequency Range	200kHz-7GHz	200kHz-12.4GHz	200kHz-1GHz	200kHz-18GHz	200kHz-12.4GHz	200kHz-18GHz	10 MHz-18GHz
Power Range	1 nW to 10 mW fs				10 nW to 100 mW fs		1μW to 10 mW fs
Sum of Calibration Factor Uncertainties	1%, 0.2-300 MHz 1.3%, 300MHz-2GHz 3.0% 2GHz-4GHz 3.5%, 4GHz-7GHz	1%, 0.2-300MHz 1.3%, 300MHz-2GHz 3.0%, 2GHz-4GHz 3.5%, 4GHz-8GHz 4.0%, 8GHz-10GHz 4.5%, 10GHz-12GHz 6.0%, 12GHz-18GHz Add 0.05 dB/mW above 4 GHz			1%, 0.2-300MHz 1.3%, 300MHz-2GHz 3.0%, 2GHz-4GHz 3.5%, 4GHz-8GHz 4.0%, 8GHz-10GHz 4.5%, 10GHz-12GHz 6.0%, 12GHz-18GHz Add 0.005 dB/mW above 4 GHz		1%, 10-300MHz 1.3%, 10-300MHz 3.0%, 2GHz-4GHz 3.5%, 4GHz-8GHz 4.0%, 8GHz-10GHz 4.5%, 10GHz-12GHz 6.0%, 12GHz-18GHz
Max. SWR	1.12, 200kHz-2GHz 1.2, 2GHz-4GHz 1.4, 4GHz-7GHz	1.12, 200kHz-2GHz 1.2, 2GHz-4GHz 1.4, 4GHz-11GHz 1.6, 11GHz-12.4GHz	1.18, 200kHz-1GHz	1.3, 200kHz-4GHz 1.5, 4GHz-10GHz 1.7, 10GHz-18GHz	1.07, 200kHz-1GHz 1.10, 1GHz-2GHz 1.12, 2GHz-4GHz 1.18, 4GHz-12.4GHz	1.07, 200kHz-1GHz 1.10, 1GHz-2GHz 1.12, 2GHz-4GHz 1.18, 4GHz-12.4GHz 1,28, 12.4GHz-18GHz	1.5, 10MHz-15MHz 1.35, 15MHz-10GHz 1.6, 10GHz-18GHz
Max. Average Power	10 mW (+10 dBm)				100 mW (+20 dBm)		10 mW (+10 dBm)
Overload Rating	300 mW (+25 dBm)				2W (+33 dBm)		30 mW (+14 dBm)*
RF Connector	Precision Type N male						
Calibration Factor	Individually calibrated at up to 9 frequencies, depending on sensor.						

*While this sensor will withstand short periods of overload, extended overload operation may result in permanent change in characteristics, or even burnout.

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Printed in USA