

HP 8970B-K10
Down Converter



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Noise Figure Meters

Automatic Noise Figure Meter

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- 10 to 1600 MHz (2047 MHz with Option 020)
- Accurate and simple, swept or CW measurements
- Second-stage correction
- Noise figure and gain display

- Calibrated display on oscilloscope, recorder, or plotter
- Powerful special-function enhancements
- Lo control for downconverter test

HP 8970B



HP 8970B

HP 8970B Noise Figure Meter



With the HP 8970B noise figure meter, noise figure measurements are easy, accurate, and repeatable. Automatic second-stage correction makes accurate noise figure readings possible even for low-gain devices. The HP 8970B's dynamic range allows gain measurements of at least 40 dB (higher in some cases) or loss measurements to -20 dB, with no external attenuation or amplification. The HP 8970B can store up to four Excess Noise Ratio (ENR) noise source calibration tables. It also properly interpolates ENR values at each measurement frequency.

Microprocessor and Controller Functions

The HP 8970B takes the mystery out of noise figure measurements. It uses a microprocessor to make the calculations and corrections necessary for truly accurate, convenient, and flexible noise figure measurements. The meter also controls external local oscillators (such as the HP 8370 series synthesizers, the HP 8340 or HP 8360 series synthesized sweepers, or the HP 8350 sweep oscillator) and the HP 8971C noise figure test set. This makes accurate, broadband microwave measurements of amplifiers, mixers, and transistors as simple as RF measurements.

Virtually all of the HP 8970B's front-panel keys and functions are accessible over GPIB, Hewlett-Packard's enhanced version of IEEE-488. The noise figure meter has an independent system interface bus (SIB) to control the HP 8971C and local oscillator. This additional bus frees you from having to write computer code to control an instrument on the SIB (such as the local oscillator) when used in an automated setup. Pass-through capability allows other instrument controllers to send messages through the noise figure meter to any other instrument on the SIB.

Simple Calibration and Second-Stage Correction

Noise figure measurement accuracy is enhanced because the meter measures its own noise figure (and that of the rest of the measurement system) at up to 181 points. It stores this information, interpolates where necessary, and corrects for it when displaying the device under test noise figure. It also measures the test device gain.

Display

The HP 8970B's front-panel LEDs display frequency, gain, and noise figure. Rear-panel BNC connectors allow swept display of noise figure and gain versus frequency on an oscilloscope or x-y recorder. You can also have the noise figure and gain vs. frequency display sent to a digital plotter over the HP 8970B's system interface bus. All display modes are easily and accurately scaled to the desired resolution from the meter's front panel. The swept oscilloscope display allows you to optimize your test device in real time for both noise figure and gain. You can easily change the noise figure display from noise figure to effective noise temperature (Te) or Y factor.

Front Panel and Special Functions

The HP 8970B front-panel keys control number entry, calibration, and measurement. STORE, RECALL, and SEQ keys allow up to nine front-panel settings to be stored and sequenced automatically or manually to save setup time. Smoothing INCREASE and DECREASE keys are used to average up to 512 readings before display. This increases accuracy and eliminates display flicker.

For those who need greater measurement power than that provided by the HP 8970B's simple front panel, more than 200 special functions can be selected by pressing a numerical code and a special function key. Two examples are hot-cold measurements and automatic compensation for losses at the input of the test device. One of the special functions is a catalog that quickly shows you the current special functions being used. Three pull-out cards serve as a mini-reference manual for the instrument. They include most of the special functions, the HP-IB formats and codes, error messages, and typical measurement setups.

HP 8970B Partial Specifications

(See Technical Data Sheet p/n 5091-6049E for complete specifications.)

Noise Figure (Gain) Measurement Range: 0 to 30 dB (-20 to at least 40 dB)

Noise Figure (Gain) Instrumentation Uncertainty: ± 0.1 dB for 0° to 55° C (± 15 dB)

Noise Figure Resolution: 0.01 dB (0.001 dB over GPIB)

Gain Resolution: 0.01 dB (0.001 dB over GPIB)

Frequency Range: Tunable from 10 to 1600 MHz (2047 MHz with Option 020)

Tuning Accuracy (from 10° to 40° C): $\pm (1 \text{ MHz} + 1\% \text{ of frequency})$, ± 6 MHz maximum

Frequency Resolution: 1 MHz

Noise Figure (for input power levels below -60 dBm): <7 dB + 0.003 dB/MHz (+0.002 dB/MHz with option 020)

Input SWR, 50 Ω reference impedance

<1.7 10 MHz to 1600 MHz (SWR < 1.8 with Opt 020)

<2.0 1600 MHz to 2047 MHz (Opt 020 only)

Maximum Operating Input Power: -10 dBm

Maximum Net External Gain: >65 dB between noise source and HP 8970B RF input

Noise Source Drive: 28.0 ± 0.1 V

Operating Temperature: 0° to 55° C

Storage Temperature: -55° to 75° C

Power: 100, 120, 220, or 240 V (+5%, -10%); 48 to 66 Hz; 150 VA maximum

Size: 425 mm W x 143 mm H x 476 mm D (16.75 in x 5.68 in x 18.38 in)

Weight: net, 15.5 kg (34 lb); shipping, 18.5 kg (40 lb)

Key Literature

HP 8970B, 8970S/V, 8971C Noise Figure Measurement Products
Technical Data, p/n 5091-6049E

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