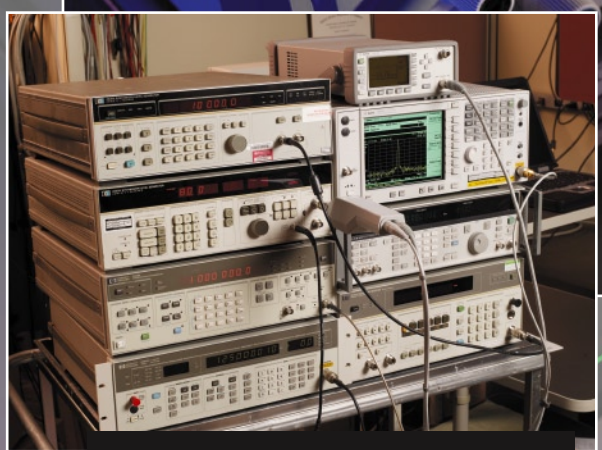
FLUKE®

9640A RF Reference Source

Calibration made simpler



Existing solution

New solution

Preliminary Document

The 9640A Reference Source



Broad workload coverage

The Fluke 9640A Reference Source can help you simplify the RF calibration process. The 9640A can help calibrate a broad range of RF test equipment:

- Spectrum analyzers
- Modulation meters and analyzers
- RF power meters and sensors
- Measurement receivers
- Frequency counters
- Attenuators
- And more

Designed for RF calibration

Choosing a signal source for calibrating spectrum analyzers, modulation analyzers and other RF measurement equipment can be a frustrating task. You need a source that has broad frequency coverage, signal purity, accurate attenuation and 50 or 75 Ohm output. However, most signal sources are not designed for calibration, so they cannot provide the accuracy and performance you need in these areas, without using additional equipment to characterize the source.

Some newer signal sources include extra "features" that you pay for but may not actually need. However, the features you do need aren't available — at least not in a single instrument. Signal sources that offer a wide frequency range may not meet the required specifications for level or attenuation accuracy. Sources with good level accuracy may not have the frequency range you need. Add the need for a wide dynamic range and the search becomes almost impossible.

Given all the problems involved in finding a signal source that can do the job, it is no wonder that many calibration professionals continue to use their old signal sources for as long as possible. However, as manufacturers stop supporting older instruments, the cost of ownership begins to rise.



A unique combination of level accuracy, dynamic range and frequency in a single instrument

The Fluke 9640A Reference Source features a unique combination of level accuracy, dynamic range and 4 GHz frequency capability to calibrate the broadest range of RF measurement workload. It has been designed specifically for metrology applications where the combination of level accuracy and dynamic range is important.

The 9640A replaces the level generator, power meter and sensors, and signal generator commonly used in RF calibration. It gives you the signal range and precision you need in a single, easy-to-use instrument. You need fewer pieces of equipment, simplifying the calibration process and, ultimately, saving time and resources.

For even greater time savings, the 9640A can be automated with MET/CAL® *Plus* Calibration Management Software. MET/CAL *Plus* software has become the de facto industry standard for automating the calibration process and managing cal lab inventory, because it provides a complete, scalable and affordable solution.

A global network of support

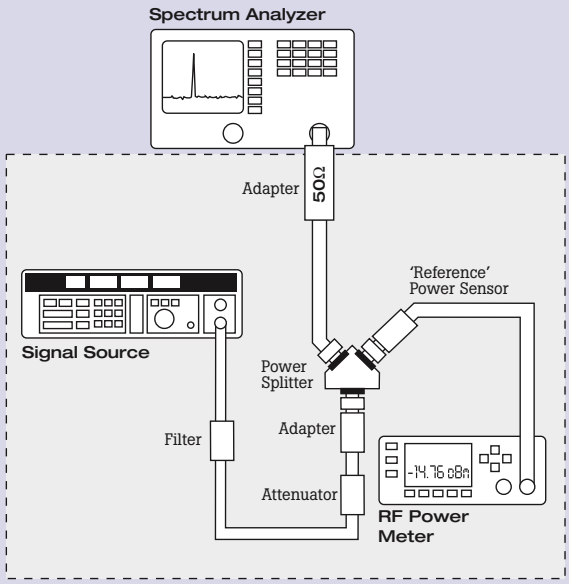
Fluke supports your instrument investment with a range of services, software and training. Our developers are continuously releasing new MET/CAL procedures to help you cover your workload in the most efficient manner possible. And, of course, we offer a broad range of calibrators and standards to handle a wide portion of your dc/low frequency, temperature and humidity, power, pressure and process calibration needs.

Only Fluke offers so many solutions, matching your calibration needs, workload and budget with the best tools to do the job.

A history of innovation

Fluke is no stranger to high frequency calibration. Since its founding in 1948, Fluke has developed many unique technologies, helping calibration professionals to keep the world up and running. These technologies resulted in products like a line of high frequency signal generators and, more recently, a range of oscilloscope calibration solutions to 6 GHz and beyond. Procedures for calibrating RF equipment have been developed for MET/CAL *Plus* software, demonstrating our understanding of the metrology required in RF calibration.





In this figure, the instruments in the grey area are typically used to deliver precision level when testing spectrum analyzer frequency response. The Fluke 9640A Reference Source has the level precision without the need for external power meter characterization, to help simplify spectrum analyzer and other RF workload calibration.

Besides improving test efficiency, the multi-functional capabilities and precision leveling head attenuation of the 9640A make it easier to use manually or automate your RF calibration system.

Capability and performance, in a single, cost-effective solution





High signal purity

The 9640A generates a pure sinusoidal signal with extremely low harmonics, and spurious. This ensures that level accuracy will be maintained when you make measurements with wideband or narrow band detectors, or when the 9640A is intercomparing peak and RMS sensing instruments. You will avoid differences between the wideband/narrow band and peak/RMS sensors, without requiring additional filters.

The importance of low phase noise on signal sources is often overlooked. The low phase noise specification of the Fluke 9640A can be used to measure spectrum analyzer close-in response and residual FM, and similar applications.

Level accuracy and broad frequency coverage in one instrument

Calibration often involves use of several popular signal sources spanning a wide range of frequencies. Some of these signal sources are now obsolete. You would normally need three signal generators, plus a power meter and sensors, to cover the entire frequency range of today's workload with the required accuracy.

The Fluke 9640A is designed to handle the broadest portion of the RF calibration workload, providing frequency coverage from 10 Hz up to 4 GHz. The signals are extraordinarily accurate across the entire frequency range.

Having a single output source reduces the cost of ownership, because you have fewer instruments to calibrate and repair. A single instrument is also easier to use manually or automate.

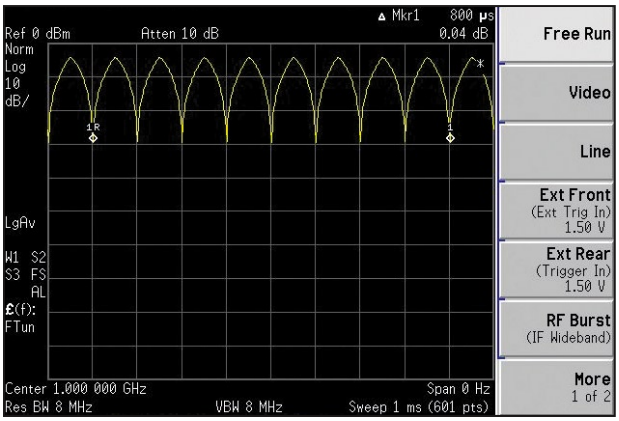
Precision leveling head minimizes mismatch errors

A rugged, precision leveling head delivers the 9640A signals directly to the unit under test, minimizing losses, noise and mismatch errors, and maintaining the integrity of low-level signals. The head maintains signal precision and noise immunity throughout a 154 dB dynamic range, down to the very lowest levels at –130 dBm.

By integrating signal leveling and attenuation within the leveling head, the 9640A eliminates the need for separate, difficult-to-automate step attenuators, simplifying automation and reducing cost of ownership. It also eliminates the need to use an external power meter and sensors to characterize the output at different frequency and levels.

VSWR and mismatch errors are often the dominant source of measurement uncertainty in RF applications. Connecting the leveling head output directly to the load minimizes transmission line length and VSWR degradation due to cabling, allowing the full potential of its accuracy specifications to be realized at the load across the entire frequency range.

The 9640A-STD is supplied with a 50 Ohm leveling head and the 9640A-STD/75 has an additional 75 Ohm leveling head. Mainframe and heads are calibrated together as a system.



Triangular modulation simplifies spectrum analyzer sweep testing.

Internal AM and FM modulation

The 9640A Reference Source's internal modulation capability makes it suitable for applications that require precision modulation to be applied to the output signal, such as modulation analyzer calibration. You don't need additional function generators as a low frequency modulation source – the 9640A delivers it all.

Frequency modulation is available at rates up to 300 kHz for applications such as modulation analyzer testing.

Amplitude modulation is available at depths of up to 99 % and rates up to 200 kHz.

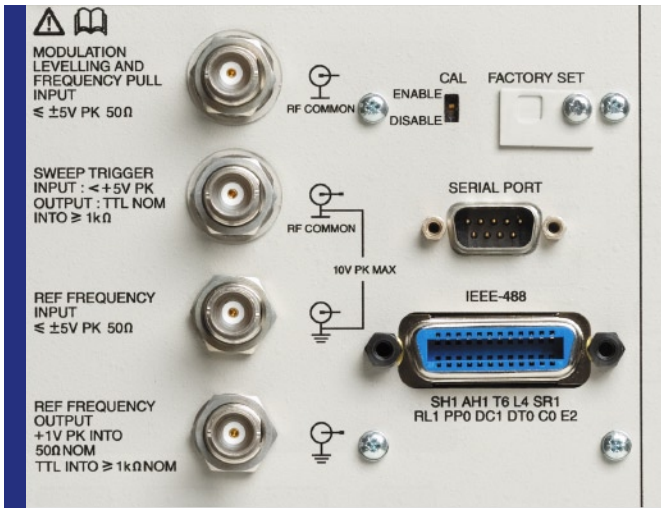
Sweep function

RF applications often require a frequency sweep. The 9640A's sweep functions simplify the application of spectrum analyzer flatness as well as filter response testing.

External frequency reference input/output

Selectable external frequency reference input is available on the rear panel of the 9640A. The input allows you to lock the frequency output to an external reference, such as the Fluke 910R Rubidium Standard, for applications where high clock accuracy or use of a common reference frequency is important.

The frequency reference output allows a UUT to be frequency locked to the 9640A internal reference clock. This configuration is often required to reduce frequency offset errors that may occur between the reference source and the UUT.



9640A rear panel remote interface and i/o.

HP 3335A command emulation

The discontinued HP 3335A Synthesizer/Level Generator is an essential component in many RF calibration systems. By early 2007, an easy to install software upgrade downloadable from the Fluke website will allow users to add HP 3335A command emulation to the 9640A. With emulation the 9640A will respond to the core HP 3335A commands, greatly simplifying integration into existing systems. Fluke is committed to the 964X platform of instrument and will continue to develop its emulation capabilities for this and other applications.



HP 3335A RF cal lab work-horse

An RF calibration solution that sets new standards for usability

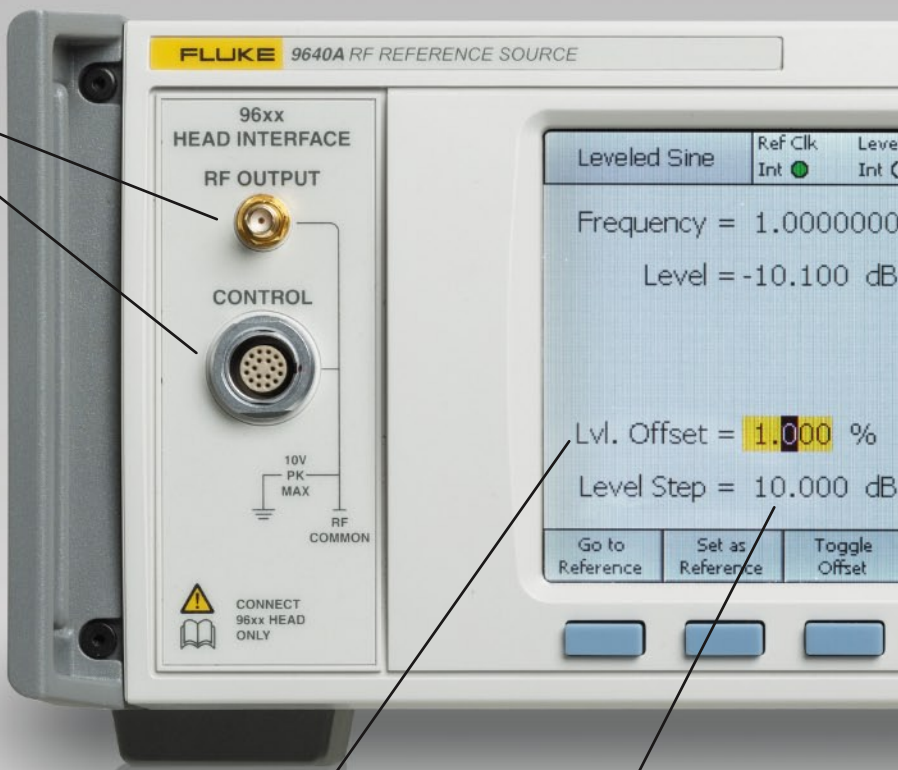


The 9640A front panel is equipped with dedicated function keys, context-sensitive softkeys, and a bright, easy-to-read color display that make it easy to learn and operate. Output levels may be set in terms of power (watts or dBm), voltage (RMS or peak to peak) using familiar multipliers and exponent forms. You can move easily between voltage, power and dBm units without losing entered values or accuracy.

The user interface is designed to simplify common calibration processes for typical items in your workload, such as spectrum analyzers, RF level meters and receivers. Offset, stepping, relative and error modes allow calibration technicians and metrologists to work quickly, accurately and efficiently, following familiar calibration procedures and making it easy to determine performance and tolerances of units under test.



The 9640A system includes a 50 Ohm or optional 75 Ohm precision leveling head. The head delivers fully floating signals directly to the UUT to ensure the accuracy and integrity of the reference generator's output signals at the device under test input.



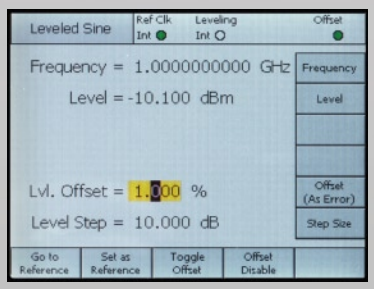
Level offset function provides UUT or source error.

Level step function enables repetitive measurements to be performed quickly.

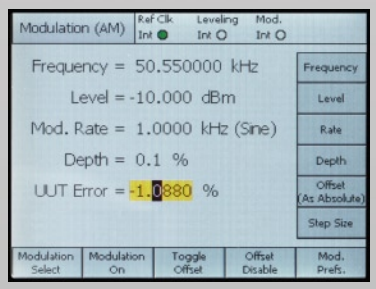


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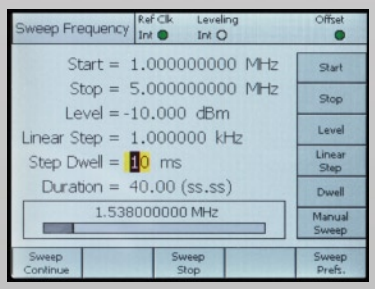
Sine



Modulation

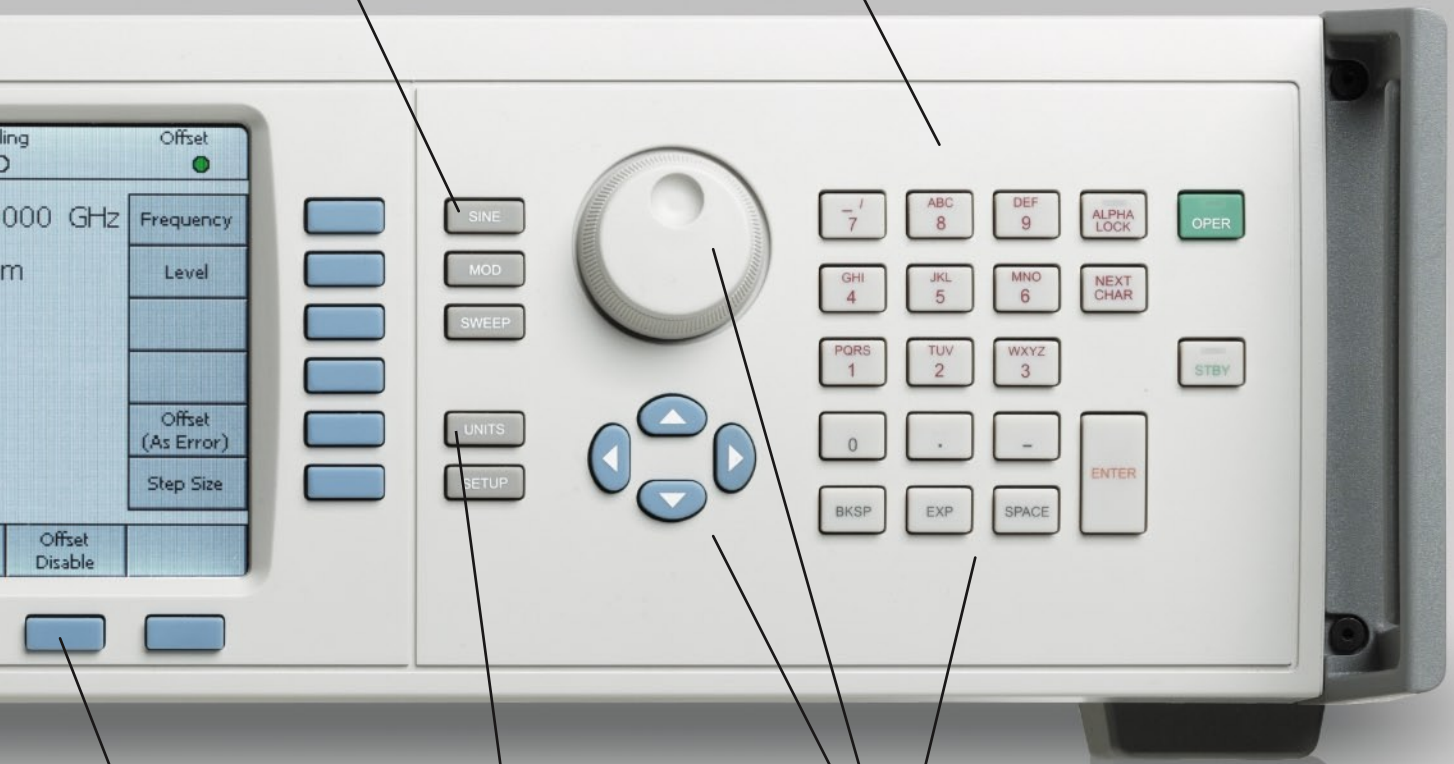


Sweep



Primary function keys select sine, modulation or sweep.

Clean, simple front panel with a large display screen makes the 9640A easy to learn and straightforward to use. The color LCD display clearly indicates output conditions and simplifies operator execution.



Soft menu keys adapt to required function.

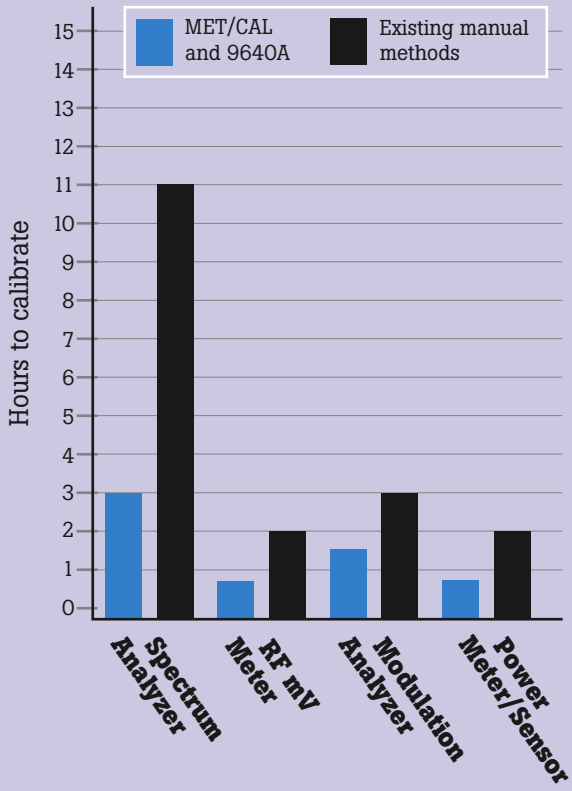
User defined context sensitive measurement units.

Operator can select from spinwheel, cursor keys or use direct numeric entry.

Automation and support



Productivity improvements with MET/CAL® software and the 9640A.



MET/CAL *Plus* automates the calibration process and allows you to manage your calibration assets efficiently

This powerful software also documents calibration procedures, processes and results, for greater ease in complying with ISO 17025 and similar quality standards.

Fluke maintains a procedure library with thousands of procedures that can be used as-is or modified to meet your specific needs. These procedures are also valuable as examples to guide you through creating your own. A rich set of statements and functions give the procedure writer complete control of the calibration process, even for complex items such as spectrum analyzers and signal generators.

A wide variety of accessory products exist to perform batch updates using bar code readers or scanners; view data over the Internet; log temperature and humidity data and import it directly into MET/CAL.

The support you need, when you need it

When you register MET/CAL *Plus*, you are enrolled automatically in the MET/SUPPORT Silver program for 60 days of free support via telephone, fax, and email — to help get you up and running quickly and easily. But the support doesn't stop there. Enroll in the annual MET/SUPPORT Gold program and receive additional premium support and services to help keep you as productive as possible. In addition to priority support by telephone, fax or email, you get free access to the Fluke library of Warranted Procedures, software updates and upgrades, discounts on training courses and more. Even if you use only a few of the Gold services, you can easily recover more than the cost of your membership fee.

Fluke also operates global calibration and repair facilities to keep your hardware in top working order. A variety of service programs are available, including the Priority Gold CarePlan, which features priority turnaround on calibration and repairs plus a host of additional features.

If you need to arrange for training for yourself or your staff, Fluke can help there too, with a broad range of classes on metrology principles, lab management, software use, procedure writing and more.

Fluke's commitment to support provides additional benefits as well, including invitations to software user group meetings and conferences, periodic email bulletins and a newsletter.


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Summary specifications



Frequency range	10 Hz to 4 GHz		
Frequency resolution	<100 MHz: 0.001 Hz, >100 MHz: 11 digits		
Frequency accuracy	± 0.25 ppm over 5 years		
Frequency sweep	10 Hz to 4 GHz, linear or logarithmic.		
External reference input	1 MHz to 20 MHz at integer values ± 100 ppm		
Frequency reference output	1 MHz or 10 MHz, user selectable.		
Amplitude range	**Into 50 Ω:,** –130 dBm to +24 dBm (0.2 µV to 10 V pk-pk) >125 MHz: +20 dBm >1.4 GHz: +16 dBm	**Into 75 Ω:** –136 dBm to +18 dBm >125 MHz: +20 dBm >1.4 GHz ≤ 2 GHz: +16 dBm	
Amplitude resolution	0.001 dB		
Absolute level accuracy into 50 Ohm	**100 kHz:**	**100 MHz:**	**4 GHz:**
	+24 to –48 dBm ± 0.05 dB	+24 to –48 dBm ± 0.07 dB	+16 to –48 dBm ± 0.7 dB,
	–48 to –60 dBm ± 0.2 dB	–48 to –70 dBm ± 0.1 dB	–48 to –80 dBm ± 0.9 dB
	–60 to –70 dBm ± 0.5 dB	–70 to –100 dBm ± 0.2 dB	
	–70 to –100 dBm ± 1.5 dB	–100 to –130 dBm ± 0.5 dB	
Output impedance	50 Ω with precision N-series male connector (Optional 75 Ω leveling head available)		
VSWR	≤125 MHz: ≤1.1, >125 MHz: ≤1.2		
Spectral purity	Harmonics ≤–60 dBc. Spurious ≤–75 dBc, >3 kHz offset		
Phase noise	500 MHz to 1 GHz: 10 kHz offset –114 dBc/Hz, 1MHz offset –132 dBc/Hz		
Internal modulation	AM: sinusoidal and triangular waveform FM: sinusoidal only		
AM rate	20 Hz to 200 kHz, Fm≤ 1 % Fc Accuracy: 0.25 ppm ± 0.1 mHz		
AM depth	≤99 % Accuracy: 0.25 % of setting, 50 % AM, Fc <125 MHz		
AM THD	0.05 % (66 dB) 200 Hz to 20 kHz rate, 50 % AM, Fc <125 MHz		
FM rate	20 Hz to 300 kHz, Accuracy: 0.25 ppm ± 0.1 mHz		
FM deviation	20 Hz to 300 kHz. Fm≤2 % Fc. Accuracy: 0.25 %		
FM THD	0.06 % (65 dB) at ≤10 kHz rate, ≥20 kHz deviation		
Temperature	Operating: 0 °C to 50 °C, 23 °C ± 5 °C for specified performance Storage: –20 °C to +60 °C		
Calibration interval	All specifications apply to a 1 year calibration interval at a nominal calibration temperature of 23 °C.		
Standard interfaces	IEEE488.2 (GPIB)		
Dimensions	433 mm (17.0 in) wide, 381 mm (15.0 in) high and 559 mm (22.0 in) deep. Mounts within industry-standard 483 mm (19 in) rack-mount frames when fitted with Y9600 rack mounting kit.		
Weight	18 kg, (40 lbs)		

Ordering information

Models

9640A-STD	4 GHz RF Reference Source including 50 Ω leveling head
9640A-STD/75	4 GHz RF Reference Source including 50 Ω and 75 Ω leveling head

Accessories

9600CASE	Rugged Transit Case
Y9600	Rack Mount Kit (Slides)
96XXCONN	Adaptor/Torque kit

Software

MET/BASE-7	Calibration Software Database System. One or more MET/CAL, 5500/CAL and/or MET/TRACK 7 license disks required for use.*
MET/BASE-7J	Japanese version of MET/BASE. One or more MET/CAL, 5500/CAL and/or MET/TRACK 7 license disks required for use.
MET/CAL-L	License disk for MET/CAL. Includes capabilities of 5500/CAL and MET/TRACK 7. MET/BASE 7 or earlier version required.*
MET/CAL-LU	License disk upgrade. MET/BASE 7 and serial number for prior version (5 or newer) of MET/CAL required.*
MET/TRACK-L	License disk for MET/TRACK metrology property management software. MET/BASE 7 or earlier version required.
MET/TRACK-LU	License disk upgrade. MET/BASE 7 and serial number for prior version (5 or newer) of MET/TRACK required.*

Upgrades and support plans

9640A-75 UG	Upgrade 9640A-STD to 9640A-STD/75
GCP9640-STD**	One-year Gold CarePlan with annual standard calibration.
GCP9640-ACR**	One-year Gold CarePlan with annual accredited calibration.

* Stand alone workstation requires one MET/BASE and one license (MET/CAL-L or MET/TRACK-L). Additional workstations can be added on a network by applying additional licenses to a single MET/BASE server.
** Gold CarePlans are available for 1, 3 and 5 years. Contact your local sales office for information.



Adapters and torque wrench kit as supplied with 96XXCONN



Visit Fluke online for more information

Go to the 9640A product pages on **www.fluke.com** for detailed information, including links to these publications:

- *A Guide to Calibrating Your Spectrum Analyzer*
- *Signal Sources Required for Spectrum Analyzer Calibration*
- Detailed product specifications

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Fluke. *Keeping your world up and running.*

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