

INDUSTRIAL FIELD METER

**NIM-511, NIM-513**

# Measuring electric and magnetic fields simultaneously

- ▲ **Complete Measurement System with Dual Electric and Magnetic Field Probe for Frequencies up to 100 MHz**
- ▲ **Covers Most Industrial Equipment**
- ▲ **Fast and Reliable Measurements**
- ▲ **Extremely Easy to Use**
- ▲ **Low Cost, Compact and Lightweight**
- ▲ **RMS Detection**

## Applications

- RF Heat Sealers and Vinyl Welders
- Semiconductor Process Equipment and Glass Deposition
- RF Induction Heating
- Dielectric Dryers and Heaters
- Plasma Generation Systems



## DESCRIPTION

The Narda Models NIM-511 and NIM-513 combine an unprecedented ease of operation with powerful measurement capabilities. It provides the industrial plant manager and safety professional with an accurate and inexpensive solution for proving compliance with regulations that cover exposure to RF radiation. Both models provide a complete measurement system comprised of an extremely easy to operate meter and a probe that contains sensors to measure both the electric (E) and magnetic (H) field components of an electromagnetic wave.

## OPERATION

The NIM-511 and the NIM-513 were designed to make measurements a simple process that does not allow the most common mistakes to happen.

**NO CHANGING PROBES TO MEASURE THE ELECTRIC AND MAGNETIC FIELDS** - the probe contains two sets of sensors that separately measure each field. Simply press the E/H Field key combination to change the field that you are measuring.

**NO RANGE CHANGES** - the meter automatically displays a numeric value over the probe's entire measurement range.

**NO CONFUSING SCALES** - simply read the digital display, including the unit of measure.

**NO DIFFICULT ZEROING** - Auto Zero is executed repetitively every 15 minutes.

**NO FORGETTING THAT YOU ARE IN THE MAXIMUM HOLD MODE** - the meter clearly displays the word "Max" when you are in the maximum hold mode.

## APPLICATIONS

Major safety standards worldwide require that both the electric and the magnetic field components (E and H fields) be measured for equipment operating below 300 MHz. Most high power industrial equipment operates at one of the frequencies allocated for Industrial, Scientific, and Medical (ISM) applications. Two ISM frequencies - 27.12 MHz and 13.56 MHz – are used extensively. The majority of heat sealers and induction heaters operate at 27.12 MHz while most semiconductor processing equipment operates at 13.56 MHz. The NIM-513 operates from 10 MHz to 42 MHz and is adjusted to the reference calibration frequency at 27.12 MHz. The NIM-511 has a much broader sensor that operates from 300 kHz to 100 MHz and is adjusted to the reference calibration frequency at 13.56 MHz.

RF energy can cause the body to be heated beyond its ability to thermally regulate itself. Since 1987 OSHA has had the authority to cite employers for exceeding the limits specified by "state-of-the-art, scientific standards." OSHA has chosen the IEEE C95.1-2005 Standard for enforcement of non-ionizing radiation safety. This IEEE standard includes many changes from earlier standards and is considerably more complex. The Maximum Permissible Exposure (MPE) limits for Controlled Environments are:

Frequency	E Field (mW/cm <sup>2</sup> )	H Field (mW/cm <sup>2</sup> )
13.56 MHz	4.89	54.4
27.12 MHz	1.22	13.6
40.68 MHz	1.00	6.04

Table: IEEE C95.1-2005 exposure limits for controlled environment

For countries which follow the ICNIRP recommendations the exposure limits are 1 mW/cm<sup>2</sup> for the frequencies mentioned above.

## SPECIFICATIONS

	NIM-511	NIM-513
<b>DISPLAY AND FUNCTIONS</b>		
Display type	Transflective LCD, monochrome, LED backlight	
Display size	4 cm (1.5"), 128 x 64 dots	
Refresh rate	400 ms	
Result display	E-field or H-field value (selectable, 4 digits)	
Result units	mW/cm <sup>2</sup> , W/m <sup>2</sup> , V/m, A/m	
Result types (isotropic, RSS)	ACT - displays the actual value MAX - holds the maximum of the measured values AVG - displays the 6 min time averaged result SPATIAL - displays a spatially averaged result	
Hold	Hold button to freeze the value that is currently displayed	
Zeroing	Automatic zeroing after power-on and repetitively every 15 min	
<b>MEASURING</b>		
Field type	Electric (E-) field and magnetic (H-) field	
Frequency range	300 kHz to 100 MHz	10 MHz to 42 MHz
Measurement range	E-field: 0.1 to 100 mW/cm <sup>2</sup> (20 to 614 V/m) H-field: 0.2 to 200 mW/cm <sup>2</sup> (0.073 to 2.3 A/m)	
CW damage level	50 W/cm <sup>2</sup>	
Sensor type	Two diode based systems for E-field and H-field	
Directivity	Isotropic (Tri-axial)	
Readout mode / spatial assessment	Combined 3-axes (RSS)	
<b>UNCERTAINTY</b>		
Flatness of frequency response <small>Calibration uncertainty not included</small>	E-field: ±0 dB @ 13.56 MHz ±1.5 dB (300 kHz to 100 MHz)  H-field: ±0 dB @ 13.56 MHz ±0.6 dB (300 kHz to 100 MHz)	E-field: ±0 dB @ 27.12 MHz ±1.0 dB (10 MHz to 42 MHz)  H-field: ±0 dB @ 27.12 MHz ±0.6 dB (10 MHz to 42 MHz)
Calibration uncertainty	±0.5 dB	
Linearity <small>Referred to 10 mW/cm<sup>2</sup></small>	±1 dB (0.5 to 2 mW/cm <sup>2</sup> ) ±0.5 dB (2 to 100 mW/cm <sup>2</sup> )	
Isotropic response	±1 dB	
Temperature response	+0.8 dB (10°C to 40°C)	
<b>CALIBRATION</b>		
Calibration frequencies	0.5/ 13.56/ 27.12/ 90 MHz	13.56/ 27.12/ 40.68 MHz
Recommended calibration interval	24 months	

This product is protected by the following patents:  
United States Patent US6084551

GENERAL SPECIFICATIONS	
Battery	NiMH rechargeable batteries, 2 x AA size (Mignon), 2500 mAh, included
Operation time	Approx. 22 hours
Charging time	2 hours
Battery level display	100%, 80%, 60%, 40%, 20%, 10%, low level (< 5%)
Temperature range	
Operating	-10 °C to +50 °C
Non-operating (transport)	-30 °C to +70 °C
Humidity	5 to 95 % RH @ ≤28 °C, non condensing ≤26 g/m <sup>3</sup> absolute humidity (IEC 60721-3-2 class 7K2)
Size (h x w x d)	
Meter	1.5" x 2.0" x 8.1" (38 x 52 x 205 mm)
Probe	16 inches long (410 mm)
Cable	44 inches long (1.1 m)
Weight	
Meter	0.66 lbs (300 g)
Probe	0.68 lbs (310 g)
Accessories (included)	Hard case, power supply, rechargeable batteries, shoulder strap, operating manual, certificate of calibration
Country of origin	Germany

## ORDERING INFORMATION

Model/ Description	Part Number (P/N)
NIM-511 Industrial Field Meter (0.3 to 100 MHz)	2400/511
NIM-513 Industrial Field Meter (10 to 42 MHz)	2400/513
NIM-511 and NIM-513 include: <ul style="list-style-type: none"> <li>- NIM-510 Basic unit</li> <li>- NIM-511 or NIM-513 E/H Field Probe</li> <li>- Hard case</li> <li>- Power supply, 9VDC, 100V-240VAC</li> <li>- Shoulder strap, 1 m</li> <li>- Operating manual</li> <li>- Certificate of calibration</li> </ul>	
ACCESSORIES	
Test generator, 27 MHz, hand-held	2244/90.38
Protective pouch for the basic unit	2403/90.01