Electric and Magnetic Field Measurement

NBM Series Probes

- **New Rugged Construction**
- **Imbedded EEPROM Stores Details**
- **Lightweight, Accurate**
- **Flat or Shaped Response**
- **Electric or Magnetic Fields**
- **Fully Interchangeable**

Description

Narda's new NBM Series of probes provide Electric or Magnetic and Flat or Shaped response coverage. Detection is performed by diode, thermocouple or compensated diode with thermocouple for the highest accuracy obtainable. New to this series is the addition of an internal eeprom to each probe to identify the probe to the meter and provide all calibration and measurement range data.

We've combined the best solutions from the EMR and 8700 series of probes and developed our new generation by building on past success. All probes are more rugged in their design and feature improved specifications. Unlike previous designs that incorporated a preamplifier in the handle to minimize cable flex variations, the NBM series removes that measurement variable and always operate directly connected to the meter. This new design improves low-level stability, reduces weight and improves reliability.

For uses where the probe needs to be separated from the meter, Narda offers the NBM-520 meter's fiber optic output to connect to the NBM-550, or directly to a computer. The following pages will give you a better understanding of our current offerings of probes for the NBM series.

Applications

Narda probes measure the mean-squared field strength, so that no matter what units you use they maintain their accuracy in the near or far fields. Below is a partial list of their uses;

- Radar Measurements
- Satellite Uplinks
- Wireless Communication Sites
- Television and Radio Broadcast
- Industrial Heating or Vinyl Heating
- Semiconductor Processing
- Induction Heating

NBM Series Probes

Preliminary Specifications

Probe Model No.	Probe Ordering No.	Frequency Range [a]	Measurement Range	Linearity	Frequency Sensitivity [c, d]
Probe EF 0391, E-Field, Flat	2402/01	100 kHz to 3 GHz	0.2 to 320 V/m	±0.5 dB (1.2 to 200 V/m) ±0.7dB (200 to 320 V/m)	±0.5 dB (100 kHz to 100 MHz) ±1.4 dB (100 MHz to 3 GHz)
Probe EF 1891, E-Field, Flat	2402/02	3 MHz to 18 GHz	0.8 to 1000 V/m	±3 dB (0.8 to 1.65 V/m) ±1 dB (1.65 to 3.3 V/m) ±0.5 dB (3.3 to 300 V/m) ±0.8 dB (300 to 1000 V/m	±1.5 dB (10 to 100 MHz) ±2.4 dB (100 MHz to 8 GHz) ±3.0 dB (8.0 to 18 GHz)
Probe EF 5091, E-Field, Flat	2402/03	300 MHz to 50 GHz	8 to 614 V/m	±1 dB (8 to 27 V/m) ±0.3 dB (> 27 V/m)	+1.25 / -3 dB (0.3 to 1.0 GHz) ±1.25 dB (1 to 50 GHz)
Probe EF 5092, E-Field, Flat	2402/11	300 MHz to 50 GHz	18 to 1370 V/m	±1 dB (18 to 61.4 V/m) ±0.3 dB (> 61.4 V/m)	+1.25 / -3 dB (0.3 to 1.0 GHz) ±1.25 dB (1 to 50 GHz)
Probe EF 6091, E-Field, Flat	2402/04	100 MHz to 60 GHz	0.7 to 300 V/m	±3 dB (0.7 to 2 V/m) ±1 dB (2 to 250 V/m) ±2 dB (250 to 400 V/m)	+3.0 / -7.0 dB (100 MHz to 60 GHz) ±3 dB (300 MHz to 40 GHz)
Probe HF 3061, H-Field, Flat	2402/05	300 kHz to 30 MHz	0.017 to 16 A/m	±3 dB (0.017 to 0.033 A/m) ±1 dB (0.033 to 0.068 A/m) ±0.5 dB (0.068 to 3 A/m) ±1 dB (3 to 16 A/m)	±0.5 dB (500 kHz to 30 MHz)
Probe HF 0191, H-Field, Flat	2402/06	27 MHz to 1 GHz	0.026 to 16 A/m	±3 dB (0.026 to 0.05 A/m) ±1 dB (0.05 to 0.1 A/m) ±0.5 dB (0.1 to 3 A/m) ±1dB (3 to 16 A/m)	±0.5 dB (27 to 300 MHz) ±0.65 dB (300 to 750 MHz) ±1.2 dB (750 MHz to 1 GHz)
Probe EA 5091, E-Field, Shaped FCC	2402/07	300 kHz to 50 GHz	0.5 to 600% of FCC "Occupational/Controlled" limits	±3 dB (0.5 to 6%) ±1 dB (6 to 100%) ±2 dB (100 to 600%)	±2.0 dB from Standard
Probe EB 5091, E-Field, Shaped IEEE	2402/08	3 MHz to 50 GHz	0.5 to 600% of IEEE C95.1-2005 for People in Controlled Environments		
Probe EC 5091, E-Field, Shaped SC 6 Canada	2402/09	300 kHz to 50 GHz	0.5 to 600% of Safety Code 6 for RF/Microwave Workers		
Probe ED 5091, E-Field, Shaped ICNIRP	2402/10	300 kHz to 50 GHz	0.5 to 600% of ICNIRP Recommendations for Occupational Exposures		

Unless otherwise noted, specifications apply at reference condition:
device in the far-field of source, ambient temperature 23 ±3°C, relative humidity 25 - 75%, sinusoidal signal

Probes Model Numbers beginning with EF or HF are flat frequency response and employ diode sensors, except EF 5091 and EF 5092, which employ thermocouple sensors

NOTES:

[a] Cutoff frequency at approximately -3 dB (-6 dB for EF 6091)

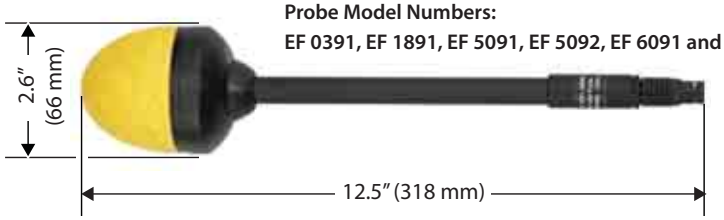
[b] Pulse Length 1 µsec., duty cycle 1:100 (1:1000 for EF5091 and EF 5092)

[c] Frequency Sensitivity can be compensated for by the use of correction factors stored in the probes' memory.

[d] Accuracy of the fields generated to calibrate the probes is 1 dB (<400 MHz), 1.5 dB (400 MHz to 1.8 GHz), 1 dB (≥1.8 GHz).

[e] Uncertainty due to varying polarization (verified by type approval test for meter with probe). Ellipse ratio included and calibrated for each probe.

[f] Frequencies above 30 MHz.

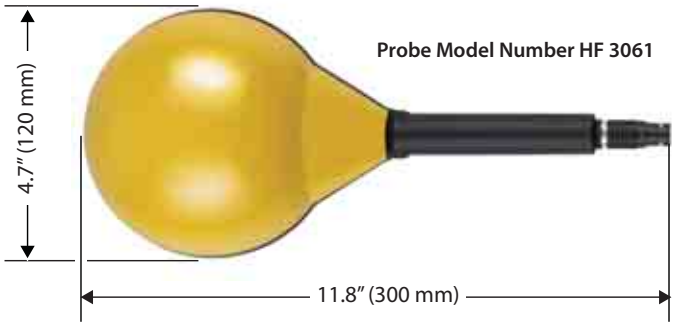


Probe Model Numbers:
EF 0391, EF 1891, EF 5091, EF 5092, EF 6091 and HF 0191

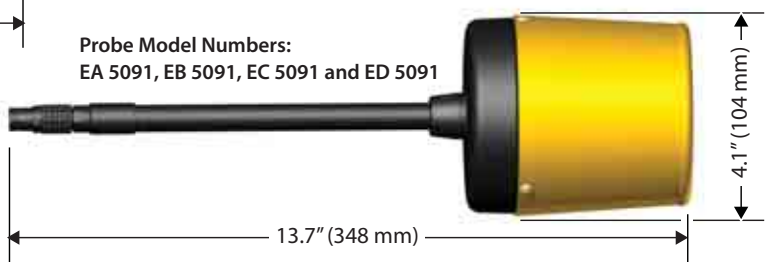
NBM Series Probes

Preliminary Specifications

Isotropic Response [e]	CW Overload	Peak Overload [b]	Calibration Frequencies	Thermal Response	Humidity	Weight
±1 dB for f > 1 MHz	170 mW/cm^2	17 W/cm^2	0.1, 0.2, 0.3, 1.0, 3.0, 10, 27.12, 100, 200, 300, 500, 750, 1000, 1800, 2450, 2700, 3000 MHz	+0.2 / -1 dB	5 to 95% RH @ ≤ 25°C	3.2 oz., 90 gms.
±1.5 dB (10 MHz to 8 GHz) ±2.0 dB (f > 8 GHz)	170 mW/cm^2	17 W/cm^2	3, 10, 27, 100, 200, 300, 500, 750 MHz 1.0, 1.8, 2.45, 3.0, 4.0, 5.0, 6.0, 7.0, 8.2, 9.3, 10, 11, 18 GHz	+0.2 / -1.5 dB (±0.025 dB/K @ 10 to 50° C)	5 to 95% RH @ ≤ 28°C	3.2 oz., 90 gms.
±0.75 dB	600 mW/cm^2	200 W/cm^2	300, 750 MHz, 1.0, 1.8, 2.45, 4.0, 8.2, 9.3, 10, 11, 18, 26.5, 40, 45.5 GHz	±0.0 dB	5 to 95% RH @ ≤ 25°C	3.2 oz., 90 gms.
±0.75 dB	1500 mW/cm^2	600 W/cm^2	300, 750 MHz, 1.0, 1.8, 2.45, 4.0, 8.2, 9.3, 10, 11, 18, 26.5, 40, 45.5 GHz	±0.0 dB	5 to 95% RH @ ≤ 25°C	3.2 oz., 90 gms.
±1.0 dB	680 mW/cm^2	1 W/cm^2	27, 50, 80, 100, 200, 300, 500, 750 MHz 1.0, 1.7, 2.45, 3.0, 4.0, 5.0, 6.0, 7.0, 8.2, 10, 11, 18, 26.5, 40, 45.5, 60 GHz	±0.9 dB (-0.03 dB/K)	5 to 95% RH @ ≤ 25°C	3.2 oz., 90 gms.
±1.0 dB	> 35 A/m	> 350 A/m	0.1, 0.15, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.2, 1.5, 2.0, 3.0, 4.0, 5.0, 10, 15, 20, 25, 27.12, 30 MHz	+0.2 / -0.8 dB (±0.025 dB/K @ 10 to 50° C)	5 to 95% RH @ ≤ 28°C	6.7 oz., 190 gms.
±1.0 dB	> 20 A/m	> 200 A/m	10, 15, 20, 27.12, 30, 35, 40, 50, 60, 70, 80, 90, 100, 120, 150, 180, 200, 250, 300, 400, 433, 500, 600, 700, 800, 900, 1000 MHz	+0.5 / -0.8 dB (±0.025 dB/K @ 10 to 50° C)	5 to 95% RH @ ≤ 28°C	3.2 oz., 90 gms.
±2.0 dB[f]	3000% of Standard	32 dB above Standard	0.3, 3.0, 10, 30, 100, 300, 750 MHz, 1.0, 1.8, 2.45, 4.0, 8.2, 10, 18, 26.5, 40, 45.5 GHz	±0.5 dB	5 to 95% RH @ ≤ 25°C	7.3 oz., 206 gms



Probe Model Number HF 3061



Probe Model Numbers:
EA 5091, EB 5091, EC 5091 and ED 5091

NBM Series Probes

Shaped Probes

The goal in designing and manufacturing a traditional, "flat" frequency response probe is to make the probe equally responsive to energy at every frequency within its rated frequency range. In contrast, Narda's patented shaped frequency response probes are designed and manufactured so that their sensitivity mirrors a particular standard (or guidance) as closely as possible. For example, many of the major guidances and standards in the world set E-field limits for maximum human exposure at 614 V/m (1000 W/m^2) at lower frequencies (~1 MHz). At frequencies of 10 to 400 MHz the limits are typically much less, 61.4 V/m (10 W/m^2), a difference of 20 dB (100 times the power). A shaped frequency response probe designed for such limits is 100 times more sensitive in the 100 MHz region, than at 1 MHz.

If you were performing a survey of a site with a flat frequency response probe that has both of the above frequency ranges and your survey indicated 137 V/m (or 50 W/m^2), it would be difficult to determine if the site was out of compliance without turning one of the emitters off. Again, given the example above, the site could be generating anywhere from 5% to 500% of the human exposure limit. There are many sites with multiple emissions (rooftops, flight lines, broadcast towers) that have emitters at different exposure limits.

If your interest is general safety measurements, to know if you comply with an exposure limit or not, you will find shaped probes easy to use in any environment. The display of total field strength with shaped probes is not in terms of V/m or W/m^2, it is "% of Std." So at a multiple emitter site, a result of 15% is simple to understand. The total detected field strength of each emitter (to its limit, at its frequency) has added up to 15%. An additional use of these probes is for Military (classified) environments, since you no longer have the "need to know" the frequency when using a shaped probe.

Probe Selection Guide

Frequency Range	100 kHz – 3 GHz	3 MHz -18 GHz	300 MHz – 50 GHz		100 MHz – 60 GHz	300 kHz – 30 MHz	27 MHz – 1 GHz	300 kHz – 50 GHz
Type of Field	E	E	E		E	H	H	E Shaped
Probe Model*	**EF0391**	**EF1891**	**EF5091**	**EF5092**	**EF6091**	**HF3061**	**HF0191**	**EX5091**
Mobile/ Telecommunication	♦	♦				♦	♦	♦
Broadcasting	♦	♦				♦	♦	♦
Satellite Communication			♦	✧	♦			✧
Radar Signals			✧	♦	♦			✧
Industry Heating and Hardening	♦					♦		
Industry Plastic Welding	♦					♦		
Industry Semiconductor Production	♦					♦		
Medicine Diathermy / Hyperthermia	♦							✧
Leak Detection		♦	♦		♦			✧
General Public Exposure Levels	♦	♦	♦	✧	♦	♦	✧	✧
Occupational Exposure Levels		♦	♦	♦	♦	♦	♦	♦

♦ = best use for ✧ = partially suitable for

* Probe Ordering Number listed on preceeding page.