

# Measuring electric fields from 40 MHz to 40 GHz

using instruments in the NBM-500 family

- ▲ **General public and occupational field exposure**
- ▲ **Broad frequency range with high dynamic range**
- ▲ **Isotropic (non-directional) measurement**

The probe contains three orthogonally arranged dipoles with detector diodes. The diode voltages each correspond to the RMS value of the spatial components. The isotropic measurement result is obtained by addition within the probe.

## APPLICATIONS

The probe detects electric fields from 40 MHz up to 40 GHz. This frequency range covers almost the entire range of high frequency communications, right up to mobile radio and satellite links. The linearity and sensitivity of the probe ensure its suitability for checking human safety limit values in the occupational and general public environments.

## PROPERTIES

The probe is designed with mechanical and electrical properties ideal for field use. The probe head is made of foam material to provide effective protection for the sensors, while having excellent RF characteristics. The detector elements are also largely protected against overload, since their destruction limit is well above all the human safety limit values.

## CALIBRATION

The probe is calibrated at several frequencies. The correction values are stored in an EPROM in the probe and are automatically taken into account by the NBM instrument. Calibrated accuracy is thus obtained regardless of the combination of probe and instrument.



## SPECIFICATIONS <sup>a</sup>

| Probe EF4091  | Electric (E-)Field  |  |
|---|---|--|
| Frequency range   | 40 MHz to 40 GHz  |  |
| Type of frequency response  | Flat  |  |
| Measurement range   | 0.7 to 400 V/m (CW)<br>0.7 to 61.4 V/m (True RMS)   | 130 nW/cm <sup>2</sup> to 42 mW/cm <sup>2</sup> (CW)<br>130 nW/cm <sup>2</sup> to 1 mW/cm <sup>2</sup> (True RMS)  |
| Dynamic range   | 55 dB   |  |
| CW damage level   | 1600 V/m  | 700 mW/cm <sup>2</sup>   |
| Peak damage level <sup>(b)</sup>  | 1900 V/m  | 1 W/cm <sup>2</sup>  |
| Sensor type   | Diode based system  |  |
| Directivity   | Isotropic (Tri-axial)   |  |
| Readout mode / spatial assessment   | Combined 3-axis (RSS)   |  |
| <b>UNCERTAINTY</b>  |   |  |
| Flatness of frequency response <sup>(c)</sup><br>Calibration uncertainty not included | ±3 dB   |  |
| Calibration uncertainty <sup>(d)</sup><br>@ 0.2 mW/cm <sup>2</sup> (27.5 V/m)         | ±0.8 dB (≤ 300 MHz)<br>±1.5 dB (300 MHz to 1.2 GHz)<br>±1.3 dB (≥ 1.2 GHz to 40 GHz)                  |  |
| Linearity<br>Referred to 0.2 mW/cm <sup>2</sup> (27.5 V/m)                            | ±3 dB (1 to 2 V/m)<br>±1 dB (2 to 250 V/m)<br>±2 dB (250 to 400 V/m)                                  | ±3 dB (0.26 to 1 μW/cm <sup>2</sup> )<br>±1 dB (1 μW/cm <sup>2</sup> to 16.5 mW/cm <sup>2</sup> )<br>±2 dB (16.5 mW/cm <sup>2</sup> to 42 mW/cm <sup>2</sup> ) |
| Isotropic response <sup>(e)</sup>   | ±1.25 dB (< 10 GHz)<br>±2 dB (10 GHz to 26.5 GHz)<br>±2 dB typ. (> 26.5 GHz)                          |  |
| Temperature response  | ±0.9 dB (-0.03 dB/K) @ f = 2.45 GHz   |  |
| <b>GENERAL SPECIFICATIONS</b>   |   |  |
| Calibration frequencies   | 27.12/ 40/ 60/ 100/ 200/ 300/ 500/ 750 MHz<br>1/ 1.8/ 2.45/ 3/ 4/ 5/ 6/ 8.2/ 10/ 11/ 18/ 26.5/ 40 GHz |  |
| Recommended calibration interval  | 24 months   |  |
| Temperature range   |   |  |
| Operating   | -10 °C to +50 °C  |  |
| Non-operating (transport)   | -40 °C to +70 °C  |  |
| Humidity  | 5 to 95 % RH @ ≤ 28 °C  | ≤ 26 g/m <sup>3</sup> absolute humidity  |
| Size  | 318 mm x 66 mm Ø  |  |
| Weight  | 90 g  |  |
| Compatibility   | NBM-500 series meters   |  |
| Country of origin   | Germany   |  |

(a) Unless otherwise noted specifications apply at reference condition: device in far-field of source, ambient temperature 23±3 °C, relative air humidity 40 % to 60 %, sinusoidal signal

(b) Pulse length 1μsec, duty cycle 1:100

(c) Frequency response can be compensated for by the use of correction factors stored in the probe memory

(d) Accuracy of the fields generated to calibrate the probes

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

## ORDERING INFORMATION

|  | Part number         |
|--|---------------------|
| Probe EF4091, E-field for NBM, 40 MHz – 40 GHz, isotropic  | <b>2402/19B</b>     |
| Probe EF4091, E-field, ACC - with accredited (DAkkS) calibration up to 18 GHz, basic unit required | <b>2402/19B/ACC</b> |

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