

# Narda FieldMan®

All-in-one electromagnetic field meter ranging from 0 Hz to 90 GHz



The Narda FieldMan performs highly accurate measurements of non-ionizing high-frequency radiation and low-frequency fields. Equipped with digital probes for measuring electric or magnetic field strengths, it covers the range from static and low-frequency fields in medical and industrial applications to mobile radio frequencies and millimeter waves. Flat frequency response probes (“flat probes”), as well as so-called shaped probes that evaluate the field strength on the basis of a human safety standard are available. Probes with built-in FFT analysis enable spectral measurements along with time domain analyses up to frequencies of 400 kHz. All probes have a digital interface that transmits the measurement data to the basic device in a fail-safe manner. This eliminates the need to calibrate the basic unit.

The FieldMan is available in two device variants, one with radio communication and voice recording and a radio-free device without microphone.

- › Non-directional measurement using isotropic probes for applications in the frequency range 0 Hz (DC) to 90 GHz
- › Large sunlight readable color display 5” diagonal with 1280x720 HD resolution
- › Digital probe interface for broadband and selective probes – no more meter calibration
- › Powerful time and frequency domain analysis for low frequency fields up to 400 kHz including Weighted Peak measurements
- › Variant with optional WiFi / Bluetooth interface for remote control via smartphone app
- › Built-in GPS receiver and rangefinder for easy location determination (Option)
- › Fast data transmission
  - › optical interface
  - › Ethernet
  - › USB-C



reddot winner 2023

# Applications

The Narda FieldMan is used to make precision measurements to establish human safety, particularly in workplace environments where high electric or magnetic field strengths are likely to occur. An essential task is to demonstrate compliance with general safety regulations, such as FCC, IEEE, ICNIRP or EMF Directive 2013/35/EU. Examples of measurement environments are:

- › Radiocommunication base stations (e.g. IEC / EN 62232)
- › Broadcasting systems (e.g. IEC 62577)
- › Radar and satellite communications systems
- › Induction heating and melting (e.g. EN 50519)
- › Household appliances (e.g. IEC / EN 62233)
- › Electric welding equipment (e.g. IEC / EN 62822)
- › Railroad operations (e.g. EN 50500)
- › Automotive operations (e.g. IEC 62764)
- › Energy supply systems (e.g. IEC / EN 62110)
- › Electrical medical devices (e.g. IEC / EN 60601)
- › TEM cells and absorber chambers to demonstrate electromagnetic compatibility (EMC)

# Digital Probes

A large number of isotropic field probes are available for the FieldMan. All of them transmit their information and measurement data as a digital signal to the FieldMan, either via an electrical USB interface or via an optical COM interface. In this way, interference is significantly reduced compared to high-resistance analog interfaces. The specially developed screw connectors and electrical contacts are extremely robust and resilient.

The probes are automatically recognized after connection to the FieldMan. Sensors inside the probe record the temperature of the measuring location and transmit it to the FieldMan display. In addition to the automatic offset correction, the temperature measurement is also used to compensate for the typical temperature dependency of the sensor diodes. The advantages are uninterrupted measurements without zero adjustment and higher measurement accuracy over wide temperature ranges.

An automatic self-test function can even detect possible errors in the sensor system, which means that additional checking with a test generator is superfluous. Only the digital probes are calibrated. You can continue to use your FieldMan during this time.

There are probes for many different applications with the appropriate frequency and level ranges. The following table gives an overview of common areas of application.










Frequency range	DC up to 1 kHz	Up to 400 kHz	Up to 400 kHz	Up to 30 MHz	Up to 1 GHz	Up to 6 GHz	Up to 40 GHz	Up to 90 GHz	Up to 50 GHz
Field type, magnetic (H) or electric (E)	H	E+H	H	H	H	E	E	E	E Shaped
Probe models	HP-01	EHP-50F/G	BFD-400-1 (100 cm <sup>2</sup> ) BFD-400-3 (3 cm <sup>2</sup> )	HFD-3061	HFD-0191	EFD-0391 EFD-0392 EFD-0691 EFD-0692	EFD-1891 EFD-4091	EFD-5091 EFD-6091 EFD-9091	EAD-5091 EBD-5091 ECD-5091 EDD-5091
									
5G mobile radio / telecommunications				●	●	●	●	●	●
Broadcast radio / TV				●	●	●	●		●
Satellite communications							●	●	●
Radar							●	●	●
Industry: Heating and tempering				●		●			
Industry: Plastics welding				●		●			
Industry: Semiconductor production				●		●			
Medicine: Diathermy, hyperthermy						●			●
Leak location							●	●	●
Household appliances			●						
Electric welding equipment		●	●						
Railroad operations	●	●	●						
Automotive operations	●		●						
Energy supply systems		●	●						
Electric medical devices	●	●	●						
Accredited calibration included				●		●	●	●	●
Probe interface	Optical connection			Digital probe interface					

Fig. 1. Areas of application and suitable probe models

## Use and benefit

During the development of the FieldMan, special attention was paid to achieving simple, well-structured and fluid operation. The arrangement of many display elements known from smartphones, the self-explanatory symbols and the FieldMan processes, which are perfectly tailored to the measurement tasks, offer maximum ease of use. The large, anti-glare HD color display shows the measured values numerically and graphically with all important additional information in a clear form and is easy to read even in bright sunlight. From simple broadband measurements to sophisticated time signal recording in real time or spectral frequency analysis of low-frequency fields, you have the right operating modes at your disposal.

Measurement results can be commented on by text or voice\* and can be saved as a screen copy at the push of a button. Built-in sensors record the current environmental conditions as well as the position data and automatically add them to the measurement result. The built-in distance meter (option) shows you the measuring height above the ground, which makes the exact positioning of the measuring device much easier. For a better overview, the measurement results can be assigned to freely definable projects, which is particularly helpful when the measurement locations change frequently. If you want to document your measurement results with photos and videos, the FieldMan smartphone app will help you. For example, the app wirelessly\* transfers media files created with the smartphone to the project directory on the FieldMan's memory card or internal memory. A newly developed, extremely powerful PC software "Narda-TSX" is available for documenting the measurement results, media and other information. It is Narda's new software platform for device configuration, measurement data evaluation and documentation, which in addition to the FieldMan will also support other Narda products in the future.

\* depending on the device variant



Fig. 2. FieldMan display and controls



Fig. 3. The FieldMan is supplied with a robust transport case

# Definitions and Conditions

## Conditions

Unless otherwise noted, specifications apply after 30 minutes warm-up time within the specified environmental conditions. The product is within the recommended calibration cycle.

### Specifications with limits

These describe product performance for the given parameter covered by warranty. Specifications with limits (shown as <, ≤, ≥, ±, max., min.) apply under the given conditions for the product and are tested during production, considering measurement uncertainty.

### Specifications without limits

These describe product performance for the given parameter covered by warranty. Specifications without limits represent values with negligible deviations, which are ensured by design (e.g. dimensions or resolution of a setting parameter).

## Typical values (typ.)

These characterize product performance for the given parameter that is not covered by warranty. When stated as a range or as a limit (shown as <, ≤, ≥, ±, max., min.), they represent the performance met by approximately 80% of the instruments. Otherwise, they represent the mean value. The measurement uncertainty is not taken into account.

## Nominal values (nom.)

These characterize expected product performance for the given parameter that is not covered by warranty. Nominal values are verified during product development but are not tested during production.

## Uncertainties

These characterize the dispersion of the values attributed to the measurands with an estimated confidence level of approximately 95%. Uncertainty is stated as the standard uncertainty multiplied by the coverage factor k=2 based on the normal distribution. The evaluation has been carried out in accordance with the rules of the "Guide to the Expression of Uncertainty in Measurement" (GUM).

# Specifications

Metrics	
Electric and magnetic fields	Measurement control and result display for the following probes and analyzers. Frequency range and level range depending on the probe/ analyzer.
Broadband probes	100 kHz to 90 GHz (see list of digital broadband probes)
Selective probes	1 Hz to 400 kHz, B-field (see list of digital selective probes)
Probe model EHP-50F/G	1 Hz to 400 kHz, E-field and B-field (FFT-Analyzer, see separate datasheet)
Probe model HP-01	0 Hz to 1 kHz, B-field (Magnetometer/ FFT-Analyzer, see separate datasheet)
Electric field units	V/m, mW/cm <sup>2</sup> , W/m <sup>2</sup> , % of standard (depending on the connected probe)
Magnetic field units	A/m, Tesla, Gauss, mW/cm <sup>2</sup> , W/m <sup>2</sup> , % of standard (depending on the connected probe)
Temperature <sup>1</sup>	Logging of the ambient temperature at the time of measurement (-40 °C to +85 °C) in °C or °F
Humidity <sup>1</sup>	Logging of the ambient relative humidity at the time of measurement (0% to 100% RH)
Air pressure	Logging of the ambient air pressure at the time of measurement (300 to 1100 hPa)
Distance (Option)	An ultrasonic rangefinder on the bottom side measures the distance to ground or to an object (0.25 m to 4 m) in m, ft, in or yd. Coverage ratio ≈ Distance / 4.
Geolocation (Option)	Built-in GNSS receiver for determining latitude, longitude and altitude (MSL). 72 channels with the support of GNSS systems (GPS / QZSS, Galileo, GLONASS, BeiDou) and the SBAS extension system (WAAS, EGNOS, MSAS, GAGAN). Position accuracy: Autonomous 2.5 m CEP.
Display	
Display type	Sunlight readable 5" color TFT-LCD anti-glare display (HD 1280 x 720 pixels)
Brightness	Manual control or automatic control via brightness sensor
Operating languages	Largely language-independent measurement control via symbols. Menu languages: English, German, more are planned.

<sup>1</sup> The permissible operating range of the device and probe must not be exceeded. The temperature sensor is located in the probe.

Operating Modes				
Mode description	Field Strength	Broadband field measurements. Numerical results with time curve or bar graph display.		
	Spatial Average	Procedure for spatial averaging of broadband measurements over several measurement positions.		
	Timer Logging	Time-controlled broadband measurement of the field strength in a definable period.		
	Spectrum	FFT analysis with spectrum display, marker evaluation and display of the broadband level.		
	Shaped Time Domain	Time domain assessment (WPM, WRM) with digital filtering related to a selected safety limit.		
	Scope	Triggered measurement of the field curve over time with pretrigger feature.		
Available modes	Broadband Probes Digital Interface 100 kHz to 90 GHz	Selective Probes Digital Interface 1 Hz to 400 kHz	Model EHP-50F/G Optical Interface 1 Hz to 400 kHz	Model HP-01 Optical Interface DC to 1 kHz
Field Strength	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Spatial Average	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Timer Logging	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Spectrum		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Shaped Time Domain		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Scope		<input checked="" type="checkbox"/>		
Features				
Probe features	Recognition	Probes are automatically recognized after being plugged in.		
	Operating principle	Measurement signals are sampled and processed inside the probe and provided as digital values.		
	Offset compensation	Automatic offset compensation enables gapless RF measurements without zero adjustment.		
	Self-test	Functional test including the sensor function of each measuring axis for digital interface probes.		
Signal detection	RMS detection, Peak detection for WPM measurements and selectable detection RMS/Peak with BDF-400 probes.			
Numerical display	Total field (isotropic) and field components X, Y, Z (for probes up to 18 GHz).			
Result types	Field Strength	Actual, Max, Min, Avg (average) and Max Avg		
	Spectrum	Actual or Max or Avg		
	Shaped Time Domain	Actual, Max and Min		
	Scope	Actual, Max and marker for dB/dt		
Average mode	Moving average over time of the square values of the field strength.			
Averaging time	Field Strength, Timer Logging	1 s, 3 s, 10 s, 30 s, 1 min, 3 min, 6 min, 10 min, 30 min, 1 h, 6 h, or 24 h		
	Spectrum	4, 8, 16, 32 or 64 number of averages		
Graphical display with marker function	Field Strength	Actual and Avg trace vs. time, time span selectable from 48 s to 24 hours.		
	Spatial Average	Bar graph of results for each measurement position ( $\leq 100$ ) and the spatial average line.		
	Timer Logging	Timeline during measurement, results as a graph vs. time after measurement.		
	Spectrum	Frequency spectrum and selectable limit line. All axes are measured, one can be displayed.		
	Shaped Time Domain	Exposure index (WPM or WRM) in % vs. time, time span selectable from 4 min to 24 h.		
	Scope	Sign-based recorded signal with 25 % pretrigger. Recording time selectable from 1 ms to 30 s.		
Screenshots	Manually initiated screenshot or automatically when saving a measurement result.			
Comments	Voice and/or text comments can be assigned to a measurement result.			
Alarm	Alarm sound and alarm message when an adjustable field strength is exceeded.			
Audible field indicator	Acoustic hotspot search with field strength-dependent audio frequency (available for RF-probes).			
Scheduled measurements	Mode Timer Logging with automatic wake-up and shutdown after measurement. Start time pre-selection: up to 24 h or immediate start Timer duration: up to 100 h Storage interval: 1s to 6 min (in 11 steps, up to 32000 intervals)			
Correction factors	Post-processing for broadband probes to increase the accuracy at a known field frequency (direct frequency entry, interpolation between calibration points)			

Interfaces	
Probe interface	Digital probe interface for direct connection or via the optional extension cable.
Optical port	Serial, full duplex, $\geq 1$ Mbit/s, to connect the Field Analyzer EHP-50F/G, the Magnetometer HP-01 or the Digital Broadband Probe Repeater. Recommended interface for PC controlled measurements.
USB 2.0	USB-C connection for battery charging, remote control and data transfer.
Ethernet	Gigabit Ethernet LAN connectivity for remote control and data transfer.
Bluetooth (Option, only for 2460/01)	BT 2.1 for remote control via smartphone app (Android).
WiFi (Option, only for 2460/01)	WLAN connectivity for remote control and data transfer.
AUX	MMCX connector, reserved for future use.

Result Storage	
Storage triggers	Manual (by keypress) or scheduled (Timer Logging Mode).
Storage medium	Removable micro SD card for storing measurement data, setups, comments, media data and user standards (recommended). For operation without a memory card, it is possible to switch to the internal memory area.
Storage capacity	Up to 128 GB with memory card, $\sim 750$ MB with internal memory. 16 GB micro SD card included.
Screenshots	Screenshots can be saved for documentation as PNG files.
Voice recorder (FieldMan 2460/01 only)	Voice comments can be added to measurement results (recording and playback).
Text editor	Text comments can be added to measurement results (integrated virtual keyboard).
Photos/videos (WiFi/BT Option, only for 2460/01)	Photos and videos from a smartphone can be transferred to the device using the FieldMan app.
Printouts (WiFi/BT Option, only for 2460/01)	Saved measurement results can be printed locally by using the FieldMan Android app for on-site documentation (requires a compatible wireless printer).

General Specifications		
Recommended calibration interval	Calibration of the basic unit is not required. Only the probes are calibrated.	
Power supply	internal	Li-Ion rechargeable battery pack, included and user-replaceable
	external	USB-C PD (maximum 12 V / 3A, compatible with BC1.2 and QC 3.0)
Operating time (nom.)	16 hours (with broadband probes and analyzers)	
Charging time (nom.)	4 hours (80% charged in 2½ h)	
RF Immunity	200 V/m (100 kHz to 60 GHz); can be below the permissible measuring range of a probe.	
Operation in static magnetic fields	$\leq 30$ mT (to avoid high force on the device)	
Dimensions (H x W x D)	51 mm x 93 mm x 312 mm without probe	
Weight	695 g (without probe)	
Country of origin	Germany	

Environmental Conditions		
Range of application	Suitable for outdoor use and an operating altitude of up to 5000 m	
Operating temperature	-20 °C to +50 °C during normal operation with battery 0 °C to 40 °C during the charging process with an external charger	
Humidity	$< 29$ g/m <sup>3</sup> ( $< 93$ % RH at +30 °C), non-condensing	
Ingress protection	IP54 (probe screwed on, protective flap closed, stand folded in)	
Climatic conditions	Storage	1K4 (IEC 60721-3) extended to -30 °C to +70 °C (battery removed) 1K3 (IEC 60721-3) extended to -20 °C to +50 °C (battery inserted)
	Transport	2K3 (IEC 60721-3) extended to -30 °C to +70 °C
	Operating	7K2 (IEC 60721-3) extended to -20 °C to +50 °C
Mechanical conditions	Storage	1M3 (IEC 60721-3)
	Transport	2M3 (IEC 60721-3)
	Operating	7M3 (IEC 60721-3)

Compliance		
EMC	European Union	
	FieldMan 2460/01:	2014/53/EU (RED), EN 301489-1 V1.9.2, V2.2.3, V3.2.4, EN 300 328 V2.2.2, EN 61326-1:2021
	FieldMan 2460/02:	2014/30/EU, EN 61326-1:2021
	Immunity	IEC/EN: 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-5, 61000-4-6, 61000-4-8, 61000-4-11
	Emissions	IEC/EN: 61000-3-2 Class A, 61000-3-3, IEC/EN 55011 (CISPR 11) Class B
Safety	Complies with European Low Voltage Directive 2014/35/EU and IEC/EN 61010-1:2010	
Material	Complies with European RoHS Directive 2011/65/EU and (EU)2015/863	

## ORDERING INFORMATION

### Instrument Sets

Description	Part number
<b>FieldMan Basic Set</b> <i>– Probes are not included –</i> <b>Includes:</b> <ul style="list-style-type: none"> <li>› FieldMan Basic Unit 2460/01</li> <li>› Hard Case for FieldMan and up to 5 Probes</li> <li>› Power Supply USB-C PD, AU/EU/UK/US Plugs</li> <li>› Cable, 2x USB-C(M), 3 A, 2 m</li> <li>› Shoulder Strap, 1 m</li> <li>› Marking Rings for FieldMan Probes</li> <li>› Quick Start Guide</li> <li>› Safety Instructions</li> <li>› USB Stick: Manuals and Documents</li> <li>› Software Narda-TSX (free download)</li> </ul>	<b>2460/101</b>  only available in countries with corresponding radio approval
<b>FieldMan Basic Set (radio-free)</b> <i>– Probes are not included –</i> <b>Includes:</b> <ul style="list-style-type: none"> <li>› FieldMan Basic Unit 2460/02 (radio-free)</li> <li>› Hard Case for FieldMan and up to 5 Probes</li> <li>› Power Supply USB-C PD, AU/EU/UK/US Plugs</li> <li>› Cable, 2x USB-C(M), 3 A, 2 m</li> <li>› Shoulder Strap, 1 m</li> <li>› Marking Rings for FieldMan Probes</li> <li>› Quick Start Guide</li> <li>› Safety Instructions</li> <li>› USB Stick: Manuals and Documents</li> <li>› Software Narda-TSX (free download)</li> </ul>	<b>2460/201</b>

### Digital Broadband Probes

Description	Part number
Probe HFD-3061, H-Field, 300 kHz–30 MHz	<b>2462/05</b>
Probe HFD-0191, H-Field, 27 MHz–1 GHz	<b>2462/06</b>
Probe EFD-0391, E-Field, 100 kHz–3 GHz	<b>2462/01</b>
Probe EFD-0392, E-Field, High Power, 100 kHz–3 GHz	<b>2462/12</b>
Probe EFD-0691, E-Field, 100 kHz–6 GHz	<b>2462/14</b>
Probe EFD-0692, E-Field, 600 MHz–6 GHz	<b>2462/20</b>
Probe EFD-1891, E-Field, 2 MHz–18 GHz	<b>2462/02</b>
Probe EFD-1891, E-Field, Fast Response, 2 MHz–18 GHz	<b>2462/23</b>
Probe EFD-4091, E-Field, 3 MHz–40 GHz	<b>2462/19</b>
Probe EFD-5091, E-Field, 300 MHz–50 GHz, Thermocouple	<b>2462/03</b>
Probe EFD-6091, E-Field, 100 MHz–60 GHz	<b>2462/17</b>
Probe EFD-9091, E-Field, 100 MHz–90 GHz	<b>2462/18</b>
Probe EAD-5091, FCC 1997 Controlled, Shaped, 300 kHz–50 GHz, E-Field	<b>2462/07</b>
Probe EBD-5091, IEEE 2019 Restricted, Shaped, 3 MHz–50 GHz, E-Field	<b>2462/21</b>
Probe ECD-5091, SC 6 2015 Controlled, Shaped, 300 kHz–50 GHz, E-Field	<b>2462/16</b>
Probe EDD-5091, ICNIRP 2020 Occ, Shaped, 1 MHz–50 GHz, E-Field (compliant with ICNIRP 1998 above 30 MHz)	<b>2462/22</b>

Note: Separate data sheets are available for the probes

## Digital Selective Probes

Description	Part number
Probe BFD-400-1, B-Field, 100 cm <sup>2</sup> , 1 Hz–400 kHz, selective	2463/01
Probe BFD-400-3, B-Field, 3 cm <sup>2</sup> , 1 Hz–400 kHz, selective	2463/02

Note: Separate data sheets are available for the probes

## Field Analyzers

Description	Part number
EHP-50F E&H Field Analyzer Set, 1 Hz–400 kHz (no Transport Case included)	2404/105
EHP-50F E&H Field Analyzer Set, 1 Hz–400 kHz, Stand-alone/PC use	2404/104
HP-01 Magnetometer Set DC–1 kHz	2405/101

## Options

Description	Part number
Option, Narda-TSX Live Measurements, for FieldMan Digital Probes (expected from Q2 2024)	2460/95.01
Option, GPS/ Range Finder for FieldMan	2460/95.11
Option, WiFi/ Bluetooth for FieldMan (expected from Q2 2024), <b>only for devices with radio</b> (2460/01, Set 2460/101)	2460/95.12

## Accessories

Description	Part number
Digital Broadband Probe Repeater	2464/01
A/D Probe Converter for NBM Probes	2465/01
Tripod, Non-Conductive, 1.65 m, with Carrying Bag	2244/90.31
Tripod, Benchtop, 0.16 m, Non-Conductive	2244/90.32
Tripod Extension, 0.50 m, Non-Conductive (for 2244/90.31)	2244/90.45
Handle, Non-Conductive, 0.42 m	2250/92.02
Car Charger Adapter, USB-C PD	2259/92.28
Cable, Digital Probe Extension, 2 m	2460/90.02
Cable, Digital Probe to USB 2.0 (Type A), 3 m	2460/90.03
Cable, Digital Probe to USB 2.0 (Type A), 5 m	2460/90.08
Cable, FO Duplex (1000 μm) RP-02, 2 m	2260/91.02
Cable, FO Duplex (1000 μm) RP-02, 5 m	2260/91.09
Cable, FO Duplex (1000 μm) RP-02, 10 m	2260/91.07
Cable, FO Duplex (1000 μm) RP-02, 20 m	2260/91.03
Cable, FO Duplex (1000 μm) RP-02, 50 m	2260/91.04
Cable, FO Duplex, F-SMA to RP-02, 0.3 m	2260/91.01
O/E Converter RS232, RP-02/DB9	2260/90.06
O/E Converter USB, RP-02/USB	2260/90.07
Cable, Adapter USB 2.0 - RS232, 0.8 m	2260/90.53

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