

# NBM-520

## Narda Broadband Field Meter

Operating Manual



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# 1

## Useful information

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This chapter contains basic information about measuring electromagnetic fields and about using the NBM-520.

- 1.1 [Measuring electromagnetic fields \(page 2\)](#)**
- 1.2 [About this instrument \(page 2\)](#)**
- 1.3 [About this operating manual \(page 4\)](#)**

## 1.1 Measuring electromagnetic fields

In today's world, practically everyone lives and works in an environment surrounded by technical equipment that generates electromagnetic fields. Our recognition of the problems associated with such fields and our depth of information in this area has increased as the effects of such fields on the human body have been examined more closely. Various authorities have long defined limit values designed to protect users from the dangers of exposure to such emissions.

## 1.2 About this instrument

The Narda Broadband Field Meter NBM-520 provides virtually everyone concerned with this subject with an instrument for measuring non-ionizing radiation with utmost accuracy within the frequency range from 100 kHz to 60 GHz (depending on the probe used). The instrument features very simple operation, a handy design in a robust casing, long battery life, and high measurement accuracy.

Probes for various measurement applications are connected to the NBM-520 basic unit. Flat frequency response probes are available, as well as so-called shaped probes that evaluate the field according to a specific human safety standard. These probes are calibrated separately from the measuring instrument, and include a non-volatile memory containing the probe parameters and calibration data. They can therefore be used with any instrument in the NBM-500 family without any loss in calibration accuracy.

The PC software supplied with the instrument allows you to remote control the NBM-520 and to configure the instrument settings.

### Applications

The NBM-550 makes precision measurements for human safety purposes, particularly in workplace environments where high electric or magnetic field strengths are likely. It can also be used to demonstrate the electromagnetic compatibility (EMC) of devices and equipment.

Examples:



- Measuring field strengths as part of general safety regulations
- Measuring the field strengths around transmitting and radar equipment to establish safety zones and for monitoring during operations
- Measuring the field strength emanating from mobile phone repeaters and satellite communications systems to ensure compliance with human safety limit values
- Measuring the field strength in the industrial workplace environment, such as plastics welding equipment, RF heating, tempering, and drying equipment
- Measurements to ensure the safety of persons using diathermy equipment and other medical equipment that generates high frequency radiation
- Field strength measurements in TEM cells and absorber chambers.

## 1.3 About this operating manual

### Characters and symbols used

Various elements are used in this operating manual to indicate special meanings or particularly important passages in the text.

### Symbols and terms used in warnings

	<b>Danger</b> This symbol indicates a danger when used with a warning:
<b>CAUTION</b>	Indicates a danger that could result in damage to the instrument.
<b>WARNING</b>	Indicates a danger that could result in damage to the instrument as well as in injury.
<b>DANGER</b>	Indicates a danger that could result in damage to the instrument as well as in severe injury or death.
 <b>DANGER</b>	<b>Dangerous voltage</b> Indicates a danger due to electrical current that could result in damage to the instrument as well as in severe injury or death.
<b>!</b>	<b>Important instruction</b> Indicates an instruction that must be followed to avoid danger.

## Symbols and marks used in this document

✓	<p><b>Requirement</b></p> <p>Indicates a requirement that must be met before the next instruction can be carried out, e.g.</p> <p>✓ The instrument is switched off.</p>
⇒	<p><b>Instruction</b></p> <p>Indicates a single instruction, e.g.</p> <p>⇒ Switch the instrument on.</p>
1. 2. 3.	<p><b>Sequence of instructions</b></p> <p>Indicates a sequence of instructions that must be carried out in the order given.</p>
↵	<p><b>Result</b></p> <p>Indicates the result of carrying out an instruction, e.g.</p> <p>↵ The instrument starts a self test.</p>
<b>Bold type</b>	<p><b>Control element</b></p> <p>Indicates a control element on the instrument, e.g.</p> <p>⇒ Press the MODE key</p>
<b>Blue type</b>	<p><b>Cross reference (in PDF document only)</b></p> <p>Indicates a cross reference to another part of the document. Click on the blue type in the PDF document to jump directly to the cross reference.</p>

## Terminology

The term “dry battery” as used in this operating manual refers to a non-rechargeable battery.



# 2

## Safety instructions

---

This chapter contains important instructions on how to use the NBM-520 safely. Please therefore read this chapter carefully and follow the instructions closely.

- 2.1 Using this operating manual (page 8)**
- 2.2 Proper use (page 8)**
- 2.3 Improper use (page 8)**
- 2.4 Dangers from electromagnetic fields (page 9)**
- 2.5 AC Adapter / Charger (page 9)**
- 2.6 Rechargeable batteries (page 10)**

## 2.1 Using this operating manual

- ! Carefully read this entire operating manual before you start using the instrument.
- ! Keep this operating manual so that it is available to everyone who uses the instrument, and ensure that this operating manual is with the instrument if you pass it on to a third party.

## 2.2 Proper use

The NBM-520 is designed to measure and evaluate electromagnetic fields.

- ! Only use the instrument for the purpose and under the conditions for which it has been designed.
- ! In particular, observe the technical data given in the **Specifications** on page 39.

Proper use also includes:

- ! observing any national accident prevention regulations at the place of use,
- ! ensuring that the instrument is used only by appropriately qualified and trained persons.

## 2.3 Improper use

The NBM-520 is not a warning device that gives active notice of the existence of dangerous fields by means of a visible or audible warning signal.

- ! Remember that this instrument is a measuring device, not a warning device.
- ! Carefully observe the actual measurement displayed when you are approaching an unknown field source.
- ! If in doubt, use an additional warning device such as “RadMan” or “Nardalert”, available from Narda Safety Test Solutions.

## 2.4 Dangers from electromagnetic fields

- Strong fields** Very high field strengths can occur in the vicinity of some radiation sources.
- ! Do not cross or ignore safety barriers or markings.
  - ! Persons with electronic implants (e.g. heart pacemakers) must avoid danger zones.
- Malfunction** Metallic labels (stickers) affixed to the yellow sensor area of the probe can lead to measurement errors, usually an underestimation of the electromagnetic field strength.
- ! Labels of any type should only be affixed to the black probe shaft.
- The field strength may also be underestimated if the instrument is not working properly.
- ! If the instrument malfunctions, take it out of service and contact your Narda Service Center. The addresses are listed at the end of this operating manual and on the Internet at <http://www.narda-sts.com>

## 2.5 AC Adapter / Charger

- Electric shock** Parts carrying dangerous voltages that could cause injury by electric shock may be exposed if the AC Adapter / Charger is damaged.
- ! Never use a damaged AC Adapter / Charger.
- Destruction** The AC Adapter / Charger could be destroyed if the AC line voltage is not correct, or if condensation is present, or if there is insufficient ventilation to ensure proper cooling.
- ! Before you connect the AC Adapter / Charger to the AC line, make sure that the AC line voltage matches the operating voltage of the AC Adapter / Charger.

- ! Do not use the AC Adapter / Charger if condensation has formed on it. If condensation is unavoidable, e.g. when it is moved from a cold to a warm room, make sure it is completely dry before you connect it up.
- ! Only use the AC Adapter / Charger indoors and at temperatures between 0 °C and +40 °C.

## 2.6 Rechargeable batteries

- Replacing rechargeable batteries** The NBM-520 must only be operated from rechargeable NiMH batteries (AA, Mignon).
- ! Do not use dry batteries.
  - ! Do not replace individual batteries but always replace the entire set.
  - ! Do not mix battery types. Always use identical batteries.
- Short circuit** The batteries and their surroundings can overheat, explode or catch fire if you short circuit the batteries.
- ! Never touch both poles of the batteries simultaneously with a metal object as this will short circuit the battery.
- Reverse charging** NiMH batteries can explode if you charge them up the wrong way round.
- ! Make sure you insert the batteries correctly as shown on the base of the battery compartment.
- Open battery compartment** A short circuit can occur if you use the instrument with the battery compartment open.
- ! Always close the battery compartment immediately. Never use the NBM-520 with the battery compartment open.

# 3

## Preparing the NBM-520 for use

---

This chapter describes all you need to do before starting to use the NBM-520.

- 3.1 Unpacking (page 12)**
- 3.2 Instrument overview (page 14)**
- 3.3 Using rechargeable batteries and the AC Adapter / Charger (page 16)**
- 3.4 Connecting the probe (page 18)**

## 3.1 Unpacking

### Packaging

The packaging is designed to be re-used as long as it has not been damaged.

⇒ Keep the original packaging and use it whenever the instrument needs to be shipped or transported.

### Items included

- ⇒ Check that all the following items have been delivered:
- NBM-520 (including 2 x NiMH Mignon/AA batteries)
  - Case
  - Probe (type and quantity as ordered)
  - AC Adapter / Charger
  - Shoulder strap
  - NBM-TS PC software
  - Operating manual
  - Calibration certificate
  - O/E converter
  - Cable, fiber optic duplex (1000 µm) RP-02, 2m

### Transport damage

⇒ Check the instrument and all accessories for damage when you have unpacked them.

Damage is likely if the packaging is clearly damaged.

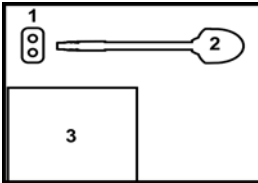
**NOTICE:**

Do not try to use an instrument that is damaged. If the instrument is damaged, contact your Narda Service Center. The addresses are listed at the end of this operating manual and on the Internet at <http://www.narda-sts.com>

## Equipping the case

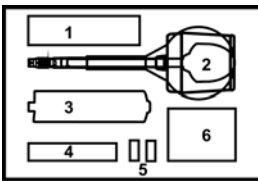
You can use the case provided to store a wide range of optional accessories in addition to the items supplied. The figures below show the compartments in the case lid and case base.

### Case lid



1	Rechargeable batteries	3	Compartment for cables, operating manual, and installation CD
2	Probe		

### Case base



1	Table top tripod	4	Shoulder strap
2	Probe	5	O/E converter
3	NBM-520 basic unit	6	AC Adapter / Charger

## After transport and storage

Condensation can form on an instrument that has been stored at a low temperature when it is brought into a warm room.

⇒ Wait until all visible condensation has evaporated from the instrument surface to avoid damaging the instrument.

The instrument is not ready for use until it has reached a temperature within the operating range of -10 to +50 °C.

## 3.2 Instrument overview



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**1 Probe connector socket**

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**2 Display**

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**3 Operating panel**

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**Hold or Start / Stop button**

Freezes the display value, or start / stop measurement for spatial measurements.

**Mode button**

Selects the display mode for the measured values.

**Units button**

Selects the display units.

**ON / OFF or Clear button**

Switches the instrument on or off.

**Charge Charge state**

---

Indicates the charge state (red = rapid charging, green = trickle charging).

**Status Operating status**

Indicates the instrument operating status:

- Green = normal operation
- Red = remote operation
- Flashing red =
  - Firmware unavailable or faulty
  - Alarm limit exceeded

---

**4 Rubber cover**

---

**5 Tripod bush**

---

**6 Electrical and optical connectors**

**6a** AC Adapter / Charger

**6b** Optical connector

---

**7 Battery compartment (on back of instrument)**

---

**8 Stand**

---

**Probe (various models available)**

---

**9 Probe head**

---

**10 Probe plug**

---

## 3.3 Using rechargeable batteries and the AC Adapter / Charger

### Power supply

The power supply is normally taken from the batteries provided. You can use the AC Adapter / Charger supplied as an alternative power source.

**Note:** We do not recommend that you operate the instrument with the AC Adapter / Charger connected, as this can significantly degrade the measurement performance of the NBM-520. The measurement accuracy figures given in the specifications cannot then be guaranteed.

### Charge state and power source indicator

The battery charge state and the power source used are indicated at the top right of the display:

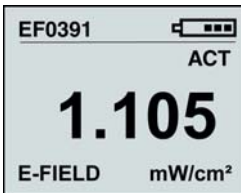





Table 1 Charge state and power source indication

	<p>Power is supplied by the rechargeable batteries.</p> <ul style="list-style-type: none"> <li>• Continuous display: Charge level = 10%</li> <li>• Flashing display: Charge level <math>\leq</math> 5%</li> </ul> <p>If the charge level drops to <math>\leq</math> 5%, the instrument will switch off automatically within a few minutes.</p>
	<p>Power is supplied by the rechargeable batteries.</p> <p>The charge level is indicated in 20% steps by black bars within the battery symbol. The batteries are fully charged when all five bars are shown.</p>
	<p>Power is supplied by the AC Adapter / Charger.</p> <p>The batteries are charged at the same time.</p>

## Operation from rechargeable batteries

**Note:** The batteries are supplied pre-charged. You must fully charge them before using them the first time.

### Charging the batteries

**NOTICE:** You must use only the AC Adapter / Charger supplied to charge the batteries.

A complete charge cycle takes about 2 hours (with the instrument switched off).

#### Starting the charge cycle

- ✓ The AC line voltage must match the operating voltage of the AC Adapter / Charger.
- 1. Connect the AC Adapter / Charger to the charging socket of the NBM-520.
- 2. Connect the AC Adapter / Charger to the AC line.
  - ↳ The charge cycle starts.
  - ↳ The **Charge** LED glows red during the entire charge cycle.

As soon as the batteries are fully charged, the AC Adapter / Charger switches to trickle charge mode and the **Charge** LED glows green.

### Proper handling of rechargeable batteries

⇒ Observe the following precautions when handling rechargeable batteries:

- Always handle the batteries with care.
- Do not drop or damage the batteries or expose them to excessively high temperatures.
- Do not leave the batteries inside or outside the instrument for more than one or two days in a very warm place (e.g. in an automobile).
- Do not leave the discharged batteries in the unused instrument for a long period of time.
- Do not store the batteries for more than six months without discharging and recharging them in the meantime.
- Avoid deep discharging the batteries as this could cause the cells to reverse polarity and make them useless.

## 3.4 Connecting the probe

There are many different probes available for different applications for the NBM-520. You can find more information about the order numbers and specifications of the probes under [Ordering information](#) on page 43, as well as in the NBM-520 data sheet and brochure. These documents can also be downloaded from the Narda web site on the Internet at <http://www.narda-sts.com>.

**NOTICE:** Always hold the probe at the metal plug end **(10)** to avoid damaging the probe head **(9)**.

### Connecting the probe

- ✓ The red dot on the probe plug **(10)** is pointing towards the front of the instrument.
- ⇒ Push the probe plug **(10)** straight down into the probe socket **(1)** until it clicks into place.
  - ↳ The NBM-520 detects the probe type automatically. The probe type is displayed top left when you switch on the instrument.

### Disconnecting the probe

- ⇒ Slide the sleeve on the probe plug **(10)** upwards and pull the probe upwards to remove it.

# 4

## Measuring with the NBM-520

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This chapter describes how to make measurements using the NBM-520.

- 4.1 Switching on (page 20)**
- 4.2 Self test (page 20)**
- 4.3 Displaying the instrument settings (page 20)**
- 4.4 Overview of the display (page 23)**
- 4.5 Selecting the result type (page 23)**
- 4.6 Selecting the units (page 26)**
- 4.7 Freezing a result (page 27)**
- 4.8 Changing the field type measurement (page 27)**
- 4.9 Using the alarm function (page 27)**
- 4.11 Switching off (page 29)**

## 4.1 Switching on

You can switch the instrument on as soon as you have prepared it for use.

- ⇒ Press the **ON/OFF** button to switch the instrument on.
  - ↳ The instrument performs a self test.

## 4.2 Self test



The self test takes a few seconds. During this time, the firmware version is also displayed. If the test is successful, the message **OK** is displayed on the screen.

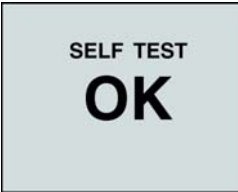
The instrument then displays the preset instrument settings.

### If an error message is displayed:

- ⇒ Press the **ON/OFF** button again to switch the instrument off and then switch it on again.

### If an error message is displayed again:

- ⇒ Switch the instrument off and contact your nearest Narda Service Center.



## 4.3 Displaying the instrument settings

AUTO-ZERO	15:00
AUTO-OFF	30:00
BACKLIGHT	00:30
AVG TIME	06:00
SPATIAL	DISCRETE

After completing the self test, the instrument displays various settings. You can change these settings with the aid of the PC software (see [PC software](#) on page 31).

- ⇒ Press the **Hold** button to “freeze” the display of settings or to resume measurements.
  - ↳ The instrument will automatically start to make measurements after a few seconds.

The settings are explained briefly below.

UNIT	mW/cm <sup>2</sup>
LIMIT FLAT	2.00
LIMIT SHAP	200%
ALARM	ON

**AUTO-ZERO** This value determines how often automatic zeroing is performed.

The following settings are possible:

- **6 minutes**: auto zero every 6 minutes
- **15 minutes**: auto zero every 15 minutes
- **30 minutes**: auto zero every 30 minutes
- **60 minutes**: auto zero every 60 minutes
- **off**: auto zero function disabled

The default setting is **15 minutes**.

**AUTO-OFF** To prevent discharging the batteries unnecessarily, the instrument can be switched off automatically after a specified time without activity. This time is set by the **AUTO-OFF** value.

The following settings are possible:

- **6 minutes**: auto off after 6 minutes
- **15 minutes**: auto off after 15 minutes
- **30 minutes**: auto off after 30 minutes
- **60 minutes**: auto off after 60 minutes
- **off**: auto off function disabled

The default setting is **15 minutes**.

**BACKLIGHT** The display backlight is activated each time you press a button and switches off after a specified time to prevent discharging the batteries unnecessarily. This time is set by the **BACKLIGHT** value.

The following settings are possible:

- **off**: backlight is switched off permanently
- **5 s**: auto off after 5 seconds
- **10 s**: auto off after 10 seconds
- **30 s**: auto off after 30 seconds
- **60 s**: auto off after 60 seconds
- **permanent**: backlight is switched on permanently

The default setting is **10 seconds**.

**AVG TIME** This value specifies the time period over which the results are averaged.

You can use the PC software to set this time period between 4 s and 30 min in steps of 2 s.

**SPATIAL** This item displays the measurement method currently selected for determining the spatial average.

The following settings are possible:

- **Spatial Discrete**  
Individual measurement values are recorded and averaged.
- **Spatial Continuous**  
The measurement values are recorded and averaged continuously.

More information on spatial averaging is found under **SPATIAL (spatial average)** on page 25.

**UNIT** The UNIT item displays the last unit used. This unit is also used for the limit value of the alarm function.

**LIMIT FLAT/  
LIMIT SHAP** These items show the limit value settings for the audible and visible alarm function.

- **LIMIT FLAT**  
Limit value for normal (flat) probes.
- **LIMIT SHAP**  
Limit value for shaped probes.

More information on the alarm function is found under **Using the alarm function** on page 27.

**ALARM** This item shows whether the alarm function is switched on or off.

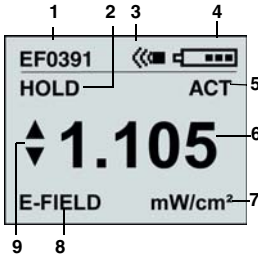
The following settings are possible:

- **ON**  
The alarm function is switched on.
- **OFF**  
The alarm function is switched off.

The default setting is OFF.

## 4.4 Overview of the display

The image below shows the items that can be displayed during a measurement.



- 
- |   |  |
|---|--|
| 1 | Probe used                               |
| 2 | Measured value “frozen” (hold)           |
| 3 | Alarm function is switched on            |
| 4 | Battery charge status                    |
| 5 | Result type                              |
| 6 | Measured value                           |
| 7 | Measured value units                     |
| 8 | Field type                               |
| 9 | Value is outside probe measurement range |
- 

## 4.5 Selecting the result type

The NBM-520 can display the results in various ways:

- [ACT \(Actual\) \(page 24\)](#)
- [MAX \(Maximum\) \(page 24\)](#)
- [AVG \(Average\) \(page 24\)](#)
- [SPATIAL \(spatial average\) \(page 25\)](#)

These different result display modes are described in the sections indicated above.

### To select a result type:

⇒ Press the **Mode** button repeatedly until the desired result type is displayed.

## ACT (Actual)

The actual field strength value measured at the moment is displayed.

If the measured value is outside the instrument's measurement range or if it cannot be shown correctly on the display, appropriate symbols are displayed on the left to indicate this.

Table 2 Symbols indicating value outside range limits.

▼.0001	The measured value is below the measurement range of the probe.
▲380.2	The measured value is above the measurement range of the probe.
>9999	The measured value is above the instrument display range.

## MAX (Maximum)

The maximum value measured during the current measurement is always displayed. Measurement of the maximum value starts as soon as you switch on the instrument. The measured value memory is cleared if you change the probe or press the "Clear" button.

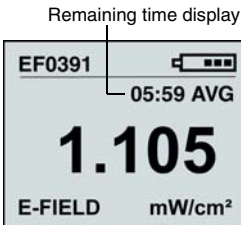
⇒ Press the **Clear** button to reset the maximum value and restart the measurement.

## AVG (Average)

The average value is determined from the current measurement values and then displayed. The period of time over which the average is taken can be set using the PC software.

The progress of forming the average is shown by the remaining time display. The time counts down to 0. When the averaging time has elapsed, the remaining time display is no longer shown.

⇒ Press the **Clear** button to reset the average value and restart the measurement.



## SPATIAL (spatial average)

The spatial average function allows you to determine the spatial average value of the field strength. This measurement mode is used, for example, to determine the degree to which the human body is exposed to electromagnetic radiation.

Two measurement methods are provided:

- **Discrete**

Individual (discrete) measurement values are recorded and averaged. This allows you to measure at specific locations.

- **Continuous**

Measurement values are recorded and averaged continuously while the probe is moved through the area of interest. This allows you to measure the field strength affecting an entire room.

You can set the measurement method using the PC software.

### To measure discrete values

- ✓ You have set the **Measurement method** to **Discrete** using the PC software.
- 1. Press the **Mode** button repeatedly until the result type **SPATIAL** is displayed.
- 2. Press the **Hold** button.
  - ↳ The first measurement value is displayed.  
#1 indicates that one value has been measured so far.
- 3. Press the **Hold** button again for each further measurement you want to make.
  - ↳ The average value of all the measurements made so far is displayed.  
#... indicates the number of measurements made so far.
- 4. If necessary press the **Clear** button to reset the average value.

**To measure values continuously**

✓ You have set the **Measurement method** to **Continuous** using the PC software.

1. Press the **Mode** button repeatedly until the result type **SPATIAL** is displayed.
2. Press the **Hold** button to start the measurement.
3. Move the NBM-520 smoothly through the volume to be measured and then press the **Hold** button again to end the measurement.  
↳ The spatial average value is shown on the display.
4. To perform a further measurement, press the **Hold** button again. This automatically resets the last average value.

**Note:** To help you move the NBM-520 smoothly, an audible signal is output once every second.

## 4.6 Selecting the units

The NBM-520 can display the results in several different measurement units.

The following units can be displayed for normal (flat) probes:

- V/m
- A/m
- W/m<sup>2</sup>
- mW/cm<sup>2</sup>

The results from shaped probes are always displayed in %.

**To select the units**

⇒ Press the **Units** button repeatedly until the desired units are displayed.

**Note:** If the unit is changed, the limit value setting of the alarm function will be automatically adjusted.

## 4.7 Freezing a result

1. Press the **Hold** button to hold the measurement value that is currently displayed.
2. Press the **Hold** button again to resume measuring.

## 4.8 Changing the field type measurement

The E-field and H-field probes can only measure the field type for which they were designed. The field type is selected automatically according to the probe used.

Combination probes can measure electric as well as magnetic fields. You will need to select the field type on the instrument. The field type is shown at the bottom left of the display.

### To change the field type

⇒ Press the **Hold** and **Mode** buttons simultaneously (toggle function).

## 4.9 Using the alarm function

The alarm function allows you to enter a limit value. The instrument outputs an audible signal and the Status LED flashes red when this limit value is exceeded.

This function is useful for checking limit values or for early detection of dangerous field strengths, for example.

### To activate the alarm function


⇒ Set the parameter **ALARM** to **ON** using the PC software.

### To set the alarm limit

For normal (flat) probes:

⇒ Select the desired limit value for **LIMIT FLAT** using the PC software.


Setting range: 100 mV/m to 100 kV/m (in 1 dB steps)

↳ The symbol  is shown in the display when the alarm function is activated (see [Overview of the display](#) on page 23).

For shaped probes:

⇒ Select the desired limit value (percentage of the standard value) for **LIMIT SHAP** using the PC software.

Setting range: 0.1% to 10,000% (in 1 dB steps)

↳ The symbol  is shown in the display when the alarm function is activated (see [Overview of the display](#) on page 23).

### To deactivate the alarm function

⇒ Set the parameter **ALARM** to **OFF** using the PC software.

## 4.10 Remote control

The NBM-520 can be remote controlled using the NBM-TS software or from an NBM-550 measuring set. This allows you to use the NBM-520 in places that are difficult to reach and read the results without needing to see the actual display on the NBM-520.

### To remote control the NBM-520 from an NBM-550 measuring set

1. Set the NBM-550 to controller operating mode (see NBM-550 operating manual).
2. Switch on the NBM-520 and connect it to the NBM-550 using a fiber optic cable.
  - ↳ The NBM-520 can be used as an extended probe handle.
  - ↳ All the measurement functions of the NBM-550 can be used.

**Note:** The probe must be connected to the NBM-520. Probes connected to the NBM-550 will be ignored.

**To remote control the NBM-520 using the NBM-TS software**

1. Connect the NBM-520 to the PC (see [Connecting the NBM-520](#) on page 32).
2. Use the NBM-TS software to control the instrument (see [Working with the PC software](#) on page 33).

## 4.11 Switching off

**To switch the instrument off**

⇒ Press and hold down the **ON/OFF** button for about three seconds.

The instrument switches off.



# 5

## PC software

---

This chapter gives you some basic information about the NBM-TS PC software. It explains the possible applications of the software, how to connect the NBM-520 to the PC and the settings you need to make on the NBM-520. It also describes how to update the NBM-520 software using the PC software.

You can find detailed information about the PC software itself in the on-line help for the PC software.

- 5.1 [Using the PC software \(page 32\)](#)**
- 5.2 [Connecting the NBM-520 \(page 32\)](#)**
- 5.3 [Working with the PC software \(page 33\)](#)**
- 5.4 [Changing the instrument settings \(page 33\)](#)**
- 5.5 [Updating the firmware \(page 33\)](#)**

## 5.1 Using the PC software

The NBM-TS PC software is included with the NBM-520.

The software provides the following functions:

- Changing the instrument settings
- Remote control of the NBM-520 (including live signals on the PC)
- The PC software is essential for performing a firmware update

### Minimum system requirements

The following minimum system requirements must be met:

- Windows 2000 SP4 or Windows XP SP2
- Microsoft.NET Framework 2.0 (installed automatically if needed)
- USB driver (installed with the software)

## 5.2 Connecting the NBM-520

You can connect the NBM-520 to the PC using the optical interface and the O/E converter. Use the 2 m long optical data cable supplied with the NBM-520 for this purpose. Longer cables are available as accessories.

## 5.3 Working with the PC software

The following conditions must be fulfilled before you can work with the PC software:

- ✓ The PC is ready to use and the PC software has been installed successfully.
- ✓ The NBM-520 is ready to use.
- ✓ NBM-520 and PC are connected together by an optical cable.

Start the PC software and use it to operate the NBM-520. Information on using the PC software is found in the on-line help for the PC software.

## 5.4 Changing the instrument settings

### Changing the instrument settings

1. Start the software.
2. Select the **Configuration** tab.
3. Select the **Setups** tab.
4. Set the values as required.

You can alter the following values (see [Displaying the instrument settings](#) on page 20):

- AUTO-ZERO
- AUTO-OFF
- BACKLIGHT
- AVG TIME
- SPATIAL
- UNIT
- LIMIT FLAT
- LIMIT SHAPED
- ALARM

## 5.5 Updating the firmware

You can update the firmware of the NBM-520 in order to make use of new or improved functions.

You can only update the firmware using a PC on which the NBM-TS PC software has been installed.

**Tip:** Operate the NBM-520 from the AC Adapter / Charger during the update to avoid possible interruption due to loss of battery power.

### Updating the firmware



1. Save the latest firmware for the NBM-520 on the PC.  
The latest firmware is available from the Narda web site at <http://www.narda-sts.com>.

The NBM-TS software automatically directs you with a simple mouse click to the corresponding web site in order to search for a newer version of both the NBM-520 firmware as well as the NBM-TS software.



2. Click on the Firmware Update icon and follow the instructions displayed on the screen.
  - ↳ The firmware transfer is indicated by the flashing status LED.
  - ↳ The NBM-520 restarts automatically if the transfer is successful.

**Note:** A firmware update takes about 5 minutes.

# 6

## Instrument maintenance

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This chapter describes how to clean the instrument and how to replace the batteries.

- 6.1** [Cleaning the instrument \(page 36\)](#)
- 6.2** [Replacing / removing the batteries \(page 36\)](#)
- 6.3** [Disposal \(page 38\)](#)

## 6.1 Cleaning the instrument



**CAUTION**

---

### Damage to the instrument

The instrument may be damaged or destroyed if liquids are allowed to get inside the casing.

**!** Make sure that no liquid gets inside the instrument.

---

### Cleaning the instrument

**NOTICE:**

You must not use solvents to clean the basic unit, probe, and AC Adapter / Charger.

1. Use a soft cloth to clean the instrument. You can use lukewarm water to which a little detergent solution has been added as a cleansing agent.
2. To prevent streaks and spots, wipe off the instrument with a dry cloth while it is still damp.

## 6.2 Replacing / removing the batteries

The rechargeable batteries have a useful life of about 1000 charge cycles or 3 years (whichever occurs soonest).

Replace the batteries if the operating time is significantly reduced although the batteries are fully charged.



**CAUTION**

---

### Exchanging the batteries

The NBM-520 must be operated from rechargeable NiMH batteries (AA, Mignon) only.

**!** Do not use dry batteries.

**!** Do not replace individual batteries. Always replace the whole set.

**!** Do not mix battery types, i.e. rechargeable and dry batteries or different types of rechargeable battery.

---



**CAUTION**

**Short circuiting the batteries can cause them or their surroundings to overheat, explode or catch fire.**

**!** Never short circuit the battery contacts by touching both poles simultaneously with a metal object.

---



**NiMH batteries can explode if they are charged the wrong way round.**

! Make sure the batteries are inserted correctly according to the diagram on the base of the battery compartment.

---



**Using the instrument with the battery compartment open can lead to a short circuit.**

! Always close the battery compartment immediately. Never use the NBM-520 with the battery compartment open.

---

### Replacing the batteries

1. Switch off the instrument and disconnect it from all other devices (AC Adapter / Charger, optical cable).
2. Open the battery compartment on the back of the instrument.
3. Remove the old batteries and dispose of them according to the waste disposal ordinances applicable in your country.
4. Insert the new batteries.  
Make sure you insert them the right way round according to the diagram on the base of the battery compartment.
5. Close the battery compartment.
6. Connect the AC Adapter / Charger and charge the batteries (a complete charge cycle takes about 2 hours).



## 6.3 Disposal

### Rechargeable batteries

Do not dispose of the batteries with the normal household waste. You should dispose of old batteries that are no longer required in accordance with the waste disposal ordinances in your country.

### Instrument

This product is subject to European Guideline 2002/96/EC governing the disposal of waste electrical and electronic equipment (WEEE).

Do not dispose of this instrument with the normal household waste. You should dispose of it in accordance with the waste disposal ordinances in your country.

Within the European Union, all electronic measuring systems purchased from Narda after 13th August 2005 can be returned when they reach the end of their useful life. The measuring systems that come under this regulation or the documents that accompany them are clearly marked with the symbol of a garbage bin crossed out with black lines.

You can obtain further information from your local Narda Sales Partner or at [www.narda-sts.com](http://www.narda-sts.com).



# 7

## Specifications

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This chapter lists the specifications of the NBM-520.

- 7.1 Display (page 40)**
- 7.2 Measurement functions (page 40)**
- 7.3 Interfaces (page 40)**
- 7.4 General specifications (page 41)**
- 7.5 AC Adapter / Charger Unit (page 41)**

## 7.1 Display

Display type	Transflective LCD panel, monochrome
Display size	4 cm (1.5"), 128 x 64 pixels
Backlight	LEDs, selectable illumination time (OFF, 5 s, 10 s, 30 s, 60 s, PERMANENT)
Display refresh rate	every 400 ms

## 7.2 Measurement functions

Result units	mW/cm <sup>2</sup> , W/m <sup>2</sup> , V/m, A/m (for flat probes) % (for shaped probes)
Display range	0.01 to 9999 V/m 0.0001 to 265.3 A/m 0.0001 to 9999 W/m <sup>2</sup> 0.0001 to 9999 mW/cm <sup>2</sup> 0.0001 to 9999 %
Measurement modes (isotropic, RSS)	Instantaneous (actual) value (ACT), maximum (MAX), average (AVG), spatial average (SPATIAL)
Averaging time (AVG)	4 s to 30 min (in 2 s steps) averaging time selectable using PC software
Spatial averaging (SPATIAL)	Discrete or continuous sampling selectable using PC software
Alarm function	2 kHz warning tone (4 Hz repetition rate) threshold selectable using PC software

## 7.3 Interfaces

Optical interface	For remote control and instrument configuration serial, full duplex, 115 kbaud, no parity, 1 start bit, 1 stop bit
Probe connection	Plug and play with automatic recognition, compatible with all NBM-series probes

## 7.4 General specifications

Recommended calibration interval	24 months
Batteries	Standard rechargeable NiMH batteries, 2 x AA (Mignon) type, 2500 mAh
Operating time	approx. 22 hours (without backlight) approx 16 hours (with permanent backlight)
Charging time	2 hours
Battery status indicator	100%, 80%, 60%, 40%, 20%, 10%, low (<5%)
Temperature range	Operational: -10 °C to +50 °C Non-operational (transport): -30 °C to +70 °C
Humidity	5 to 95% relative humidity, no condensation ≤29 g/m <sup>3</sup> absolute humidity (IEC 60721-3-2 class 7K2)
Dimensions (H x B x T)	38 x 52 x 195 mm (without probe)
Weight	approx. 300 g (without probe)
Accessories (included in set)	rigid shell case, AC adapter / charger, shoulder strap, O/E converter, fiber optic cable (2 m), NBM-TS software, operating manual, calibration certificate

## 7.5 AC Adapter / Charger Unit

AC line voltage range	100 – 240 V AC
Nominal AC line frequency range	50 – 60 Hz
Output voltage	9 V DC
Maximum output current	1.5 A
Temperature range	
• Storage	-40 °C – 70 °C
• Operation	0 – 40 °C



# 8

## Ordering information

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This chapter lists the ordering information for the NBM-520, probes and accessories.

- 8.1** [NBM-520 \(page 44\)](#)
- 8.2** [Probes \(page 44\)](#)
- 8.3** [Accessories \(page 45\)](#)

## 8.1 NBM-520

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**NBM-500 Set 2, Narda Broadband Field Meter****2400/102****contains:**

- NBM-520 Basic Unit (incl. 2 x NiMH batteries, AA / Mignon type)(2403/01)
- Rigid shell case for basic unit and up to two probes (2400/90.07)
- AC Adapter / Charger, 9 VDC, 100 - 240 VAC, all plug types (2259/92.06)
- Shoulder strap, 1 m (2244/90.49)
- Cable, fiber optic, duplex (1000  $\mu$ m) RP-02, 2m (2260/91.02)
- O/E converter
- Software, NBM-TS, PC transfer (2400/93.01)
- Operating manual NBM-520
- Calibration certificate

**Probes are not included in the set**

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## 8.2 Probes

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Probe EF0391, E-field for NBM, 100 kHz – 3 GHz, isotropic	<b>2402/01</b>
Probe EF1891, E-field for NBM, 3 MHz – 18 GHz, isotropic	<b>2402/02</b>
Probe EF5091, E-field for NBM, thermocouple, 300 MHz – 50 GHz, isotropic	<b>2402/03</b>
Probe EF6091, E-field for NBM, xxx MHz – 60 GHz, isotropic	<b>2402/04</b>
Probe HF3061, H-field for NBM, 300 kHz – 30 MHz, isotropic	<b>2402/05</b>
Probe HF0191, H-field for NBM, 27 MHz – 1 GHz, isotropic	<b>2402/06</b>
Probe EA5091, Shaped E-field, FCC for NBM, 300 kHz – 50 GHz, isotropic	<b>2402/07</b>
Probe EB5091, Shaped E-field, IEEE for NBM, 300 kHz – 50 GHz, isotropic	<b>2402/08</b>
Probe EC5091, Shaped E-field, SC6 Canada for NBM, 300 kHz – 50 GHz, isotropic	<b>2402/09</b>
Probe ED5091, Shaped E-field, ICNIRP for NBM, 300 kHz – 50 GHz, isotropic	<b>2402/10</b>
Probe EF5092, E-field for NBM, thermocouple, 300 kHz – 50 GHz, high power, isotropic	<b>2402/11</b>

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## 8.3 Accessories

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Test generator, 27 MHz, hand-held	<b>2244/90.38</b>
Tripod (non-conducting), 1.65 m, with carrying bag	<b>2244/90.31</b>
Tripod extension (non-conducting), 0.50 m (for 2244/90.31)	<b>2244/90.45</b>
Extension handle (non-conducting), 0.42 m	<b>2250/92.02</b>
O/E converter, RS232, RP-02/DB9	2260/90.06
Cable, fiber optic, duplex (1000 $\mu$ m) F-SMA to RP-02, 0.3 m	<b>2260/91.01</b>
Cable, fiber optic, duplex (1000 $\mu$ m) RP-02, 2 m	<b>2260/91.02</b>
Cable, fiber optic, duplex (1000 $\mu$ m) RP-02, 20 m	<b>2260/91.03</b>
Cable, adapter USB 2.0 - RS232, 0.8 m	<b>2260/90.53</b>

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