NIM-511 / NIM-513

Narda Industrial Field Meter

Operating Manual

narda
Safety Test Solutions

Narda Safety Test Solutions GmbH
Sandwiesenstraße 7
72793 Pfullingen, Germany

This product is protected by the following patents:

United States Patent US6084551

Order no.: 2403/98.22

Edition: 03/03.2023, A...
Previous edition: 02/01.2022, A...

Subject to change.

Our normal guarantee and delivery terms apply.

Printed in Germany

Contents

1 Useful information

This chapter contains basic information about measuring electromagnetic fields and about using the NIM-51x.

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 Industrial Meters 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 (NIM-510) and a probe (NIM-511 or NIM-513) that contains sensors to measure both the electric (E) and magnetic (H) field components of an electromagnetic wave.

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 broader sensor that operates from 10 MHz to 100 MHz and is adjusted to the reference calibration frequency at 13.56 MHz.

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.

Examples:

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

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 Standard for enforcement of non-ionizing radiation safety for ISM frequencies (Industrial, Scientific and Medical).

The Exposure Reference Levels (ERLs) for Restricted Environments are:

Table 1 IEEE C95.1 2019 ERLs for restricted environments

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

For countries which follow the ICNIRP recommendations the exposure limits are:

Table 2 ICNIRP 1998 Reference levels for occupational exposure (extract)

Frequency f	E Field (V/m)	H Field (A/m)
10 - 400 MHz	61	0.16

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

According to the American National Standard ANSI Z535.6-2006, the following warnings, symbols, and terms are used in this document:

	The general danger symbol warns of risk of serious injury when used with the signal words **CAUTION**, **WARNING**, and **DANGER**. Follow all the instructions in order to avoid injuries or death.
NOTICE	Indicates a danger that results in damage to or destruction of the instrument.
CAUTION	Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
WARNING	Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
DANGER	Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

Structure of warnings

All warnings are structured as follows:

⚠ SIGNAL WORD

Type and source of danger

Consequences of failure to observe warning

⇒ Instructions for preventing danger

Symbols and marks used in this document

!	**Important instruction** Indicates an instruction that must be followed to avoid danger.
✓	**Requirement** Indicates a requirement that must be met before the next instruction can be carried out, e.g. ✓ The instrument is switched off.
⇒	**Instruction** Indicates a single instruction, e.g. ⇒ Switch the instrument on.
1. 2. 3.	**Sequence of instructions** Indicates a sequence of instructions that must be carried out in the order given.
↳	**Result** Indicates the result of carrying out an instruction, e.g. ↳ The instrument starts a self test.
Bold type	**Control element** Indicates a control element on the instrument, e.g. ⇒ Press the MODE key
Blue type	**Cross reference** (in PDF document only) 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.

Terminology

Item	Meaning
Battery	Rechargeable battery
Dry battery	Non-rechargeable battery

2 Safety instructions

This chapter contains important instructions on how to use the NIM-51x safely. Please therefore read this chapter carefully and follow the instructions closely.

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 NIM-51x 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 43.

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 NIM-51x 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 XT”, 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.

Measurement Errors

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.

⇒ Affix labels of any type only to the black probe shaft.

⇒ 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.**

Probe is not operating properly

Possibly present high radiation values are not recognized.

⇒ Check probes for proper operation with a signal source before using this measuring instrument..

⇒ Before beginning any RF radiation measurement, always inform yourself of the frequencies and field strengths that you could expect to encounter.

2.5 Dangers when handling rechargeable batteries

When handled improperly, rechargeable batteries can overheat, explode, or ignite.

⇒ Only use the NIM-51x with NiMH rechargeable batteries (AA, Mignon).

⇒ Do not use dry batteries.

⇒ Do not replace individual batteries; always replace the entire set.

⇒ Always use identical batteries.

⇒ Never touch both poles of the batteries simultaneously with a metal object.

⇒ Make sure you insert the batteries correctly as shown on the base of the battery compartment.

⇒ Always close the battery compartment immediately after replacing batteries.

⇒ Never use the NIM-51x with the battery compartment open.

2.6 Dangers from AC adapter/charger

You could experience electric shock from the AC adapter/charger.

⇒ Do not use the instrument when the casing is damaged because parts carrying dangerous voltages could be exposed.

⇒ Do not use an AC adapter/charger that has been moved from a cold to a warm room, thereby forming condensation.

⇒ Only use the AC adapter/charger indoors and at temperatures between 0 °C and +40 °C.

The AC adapter/charger could be destroyed if the voltage specification on the AC adapter/charger does not match the AC line voltage.

⇒ Only use the AC adapter/charger if the voltage specification on the AC adapter/charger matches the AC line voltage.

3 Preparing the NIM-51x for use

This chapter describes all you need to do before starting to use the NIM-51x.

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:
- NIM-510 Basic unit
- 2 x NiMH Mignon/AA batteries for NIM-510 (packaged separately)
- Probe NIM-511 or NIM-513 (as ordered)
- Case
- AC Adapter / Charger
- Shoulder strap
- Operating manual
- Calibration certificate

Transport damage

NOTICE

Instrument/accessories damaged during transportation

Using damaged instrument/accessories can lead to subsequent damage.

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

⇒ If the instrument is damaged, contact your Narda Service Center.

The addresses of your Narda Service Center are listed at the end of this operating manual and on the Internet at **http://www.narda-sts.com**.

After transport and storage

NOTICE

Condensation on an instrument can lead to damage

Condensation can form on an instrument that has been stored at a low temperature when it is brought into a warm room. It may be damaged if used.

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

Note: 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

1	**Probe connector socket**	
2	**Display**	
3	**Operating panel**	
		**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
		**Hold and Mode button simultaneously** Switches the field type between E-field and H-field display
		**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 update
4	**Rubber cover**	
5	**Tripod bush**	
6	**Electrical and optical connectors**	
	6a	AC Adapter / Charger
	6b	Optical connector (for service only)
7	**Battery compartment (on back of instrument)**	
8	**Stand**	

Probe	
9	**Probe head**
10	**Probe plug**
11	**Probe handle**

3.3 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 NIM-51x. The measurement accuracy figures given in the specifications cannot then be guaranteed.

Operation from rechargeable batteries

The rechargeable NiMH batteries for this device are packaged separately. You must insert the batteries into the device and then charge them up fully before using the device. The charging cycle takes about 2 hours. Do not use dry batteries in this device.

NOTICE

Improper pole positions

The batteries can explode and damage the instrument if you put the batteries in the wrong way round.

⇒ Observe the positions of the positive and negative poles marked in the battery compartment.

Inserting the batteries

1. Open the battery compartment cover underneath the device by undoing the two screws with a screwdriver or the edge of a coin.
2. Take the NiMH batteries provided out of their protective foil and insert them into the battery compartment. Make sure you put them in the right way round. The positions of the positive and negative poles are marked in the battery compartment by "+" and " –" respectively. Match the markings to the markings on the batteries.
3. Close the battery compartment cover and do up the two screws again to secure it.

Charging the batteries

If the device is probably not going to be used for several weeks, it should be recharged before being stored to avoid the possibility of deep discharge of the batteries. If storage is likely to be for a period of more than two months, remove the batteries from the device after recharging them.

Note: Deep discharge can significantly reduce the battery capacity. This is indicated by unusually short charging cycles. If this happens, the nominal capacity can be restored by discharging and recharging the batteries several times. Regeneration usually takes four to five recharging cycles.

⚠WARNING

Charging the batteries with wrong AC Adapter / Charger

Overheating, explosion, or ignition of rechargeable batteries/batteries or their surroundings

⇒ You must use only the AC Adapter / Charger supplied to charge the batteries.

Note: 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 NIM-51x.
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.

Charge state and power source indicator

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

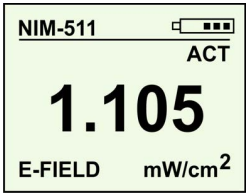


Table 3 Charge state and power source indication

	Power is supplied by the rechargeable batteries. • Continuous display: Charge level = 10% • Flashing display: Charge level ≤ 5% If the charge level drops to ≤ 5%, the instrument will switch off automatically within a few minutes.
	Power is supplied by the rechargeable batteries. 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.
	Power is supplied by the AC Adapter / Charger. The batteries are charged at the same time.

3.4 Connecting the probe

⚠ WARNING

Probe is not operating properly

Possibly present high radiation values can not be recognized when a probe is defective.

⇒ Check probes for proper operation with a signal source before using this measuring instrument.

⇒ Before beginning any RF radiation measurement, always advise yourself of the frequencies and field strengths that you could expect to encounter.

NOTICE

Wrong handling of the probe

Damage of the probe head

⇒ Always hold the probe at the probe handle (**11**).

Connecting the probe

✓ Make sure the guide lug 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)** and tighten the threaded coupling using your thumb and forefinger. Never tighten the coupling using pliers or other tools.

Disconnecting the probe

⇒ Undo the threaded coupling using your thumb and forefinger and then pull the probe upwards to release it.

4 Measuring with the NIM-51x

This chapter describes how to make measurements using the NIM-51x.

4.1 Avoiding measurement errors

The measurement result can be falsified by external influences when measuring electromagnetic fields. Considerable measurement deviations can occur under certain circumstances, particularly when measuring low field strengths. The following tips may be of assistance in recognizing sources of interference so as to avoid measurement errors. The following factors can affect the measurement result:

- Electrostatic charges
- Changes in temperature
- Strong low frequency fields (e.g. due to high tension lines)

Electrostatic charges

The following effect will be noted with all field strength meters: If you move the probe quickly, excessive field strength values will be displayed which do not reflect the actual field conditions. This effect is caused by electrostatic charges.

The NIM has been designed in a way that minimizes this effect. However, if you move the probe very quickly, field strengths on the order of a few V/m can be displayed.

Recommendation: Hold the device steady during the measurement. Delete the stored maximum values and average values by pressing **Clear** before using the **MAX** or **AVG** result types. Do not touch the probe at any time during the measurement.

Changes in temperature

Ambient temperature changes as well as warming by direct sunlight will create offset voltages that may impact the measurement result. Zeroing eliminates offset voltages within the instrument only. Offset voltages caused by the probe can not be eliminated.

Recommendation: Try to avoid heating caused by direct sunlight during measurements . Consider an adequate settling time for stabilization of the probe in case of temperature changes.

Strong low frequency fields

The result display when measuring high frequency electromagnetic fields can be falsified by low frequency fields. Wideband probes will detect signals even if the frequency is well outside the specified measurement range (out-of-band attenuation is 20 dB/decade). Very high field strengths of several thousand V/m can occur in the vicinity of high tension lines. The NIM-51x would therefore register several V/m.

Recommendation: Thoroughly inspect every measurement location before any measurement and make a note of any possible sources of interference, such as high tension lines in the vicinity. Keep a critical eye on any possible increase in the minimum display value (noise floor) which may indicate interfering factors. Increase the distance from the source of low frequency interference, if possible.

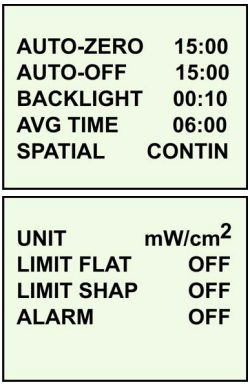
4.2 Switching on

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 displays the instrument settings and performs a self test.

4.3 Displaying the instrument configuration



The factory configuration of the instrument is displayed after the instrument is turned on. The configuration can't be changed by the user.

⇒ Press the **Hold** button to “freeze” the display of settings or to resume measurements.

↳ After a few seconds, the self test starts.

The configuration settings are explained briefly below.

AUTO-ZERO **15 minutes**

This value determines how often automatic zeroing is performed.

AUTO-OFF **15 minutes**

To prevent discharging the batteries unnecessarily, the instrument will be switched off automatically after 15 minutes without activity.

BACKLIGHT **10 seconds**

The display backlight is activated each time you press a button and switches off after a specified time to prevent discharging the batteries unnecessarily.

AVG TIME **6 minutes**

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

SPATIAL **Continuous**

This item displays the measurement method for determining the spatial average. The measurement values are recorded and averaged continuously when started until the **HOLD** button is pressed.

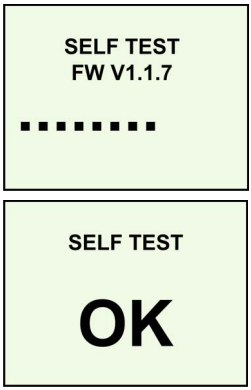
More information on spatial averaging is found under **"SPATIAL (spatial average)"** on page 34.

UNIT The UNIT item displays the last unit used.

LIMIT FLAT/ LIMIT SHAP Not used

ALARM Not used

4.4 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.

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.

4.5 Setting the contrast

You can change the display contrast dependent of the environment lighting in order to achieve optimal instrument read-out.

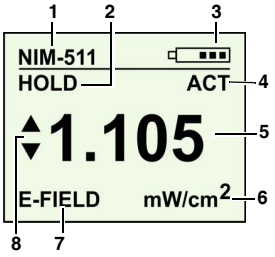
✓ The instrument is turned on and the self test is finished.

⇒ Press the **ON/OFF** button and **Mode** button simultaneously to increase the contrast.

⇒ Press the **ON/OFF** button and **Units** button simultaneously to decrease the contrast.

4.6 Overview of the display

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



1	Probe model
2	Measured value “frozen” (hold) / **Zero** displays during zeroing / Elapsed time counter in **SPATIAL** mode
3	Battery charge status
4	Result type
5	Measured value
6	Measured value units
7	Field type E-field or H-field (more information on page 35)
8	Value is outside probe measurement range

4.7 Selecting the result type

The NIM-51x can display the results in various ways:

- **ACT (Actual) (page 33)**
- **MAX (Maximum) (page 33)**
- **AVG (Average) (page 33)**
- **SPATIAL (spatial average) (page 34)**

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 4 Symbols indicating value outside range limits.

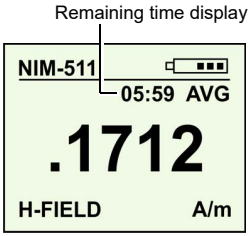
▾.0001	The measured value is below the measurement range of the probe.
▴380.2	The measured value is above the measurement range of the probe.
>9999	The measured value is above the instrument display range.

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 following averages are determined:

- Linear average of power values (e.g. W/m^2 or mW/cm^2)
- Root mean square (RMS) of field strength values (e.g. V/m or A/m)

Both types of average give the same result. The averaging process conforms to current safety standards for high frequency fields and normally takes place over a period of 6 minutes. The units of the measured value can be switched at any time without affecting the results already averaged.

The period of time over which the average is taken is 6 minutes. 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.

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.

To measure spatially averaged values

1. Press the **Mode** button repeatedly until the result type **SPATIAL** is displayed.
2. Press the **Hold** button to start the measurement.
   ↳ The elapsed measurement time is shown top left in the display.
3. Move the probe 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 probe smoothly, an audible signal is output once every second.

4.8 Selecting the units

The NIM-51x can display the results in several different measurement units.

- V/m
- A/m
- W/m^2
- mW/cm^2

To select the units

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

Note: Field strength units (V/m or A/m) will change automatically when selecting another field type
(V/m for E-field, A/m for H-field).

4.9 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.

4.10 Changing the field type

The NIM probe can measure electric (E) as well as magnetic (H) 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).

4.11 Switching off

To switch the instrument off

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

↳ The instrument switches off.

5 Instrument maintenance

This chapter describes how to clean the instrument, replace the batteries, dispose the instrument and check the instrument for proper operation.

5.1 Cleaning the instrument

NOTICE

Damage to the instrument from liquids

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.

NOTICE

Solvents

Solvents can corrode the surfaces of basic unit, probe and AC Adapter / Charger.

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

Cleaning the instrument:

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.

5.2 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.

⚠ WARNING

Improper replacement of batteries

Overheating, explosion, or ignition of rechargeable batteries/batteries or their surroundings

⇒ Only use the NIM-51x with NiMH rechargeable batteries (AA, Mignon).
⇒ Do not use dry batteries.
⇒ Do not replace individual batteries; always replace the entire set.
⇒ Always use identical batteries.

⚠ WARNING

Short circuiting the batteries

Overheating, explosion, or ignition of rechargeable batteries or their surroundings

⇒ Never touch both poles of the batteries simultaneously with a metal object.
⇒ Always close the battery compartment immediately after replacing batteries.
⇒ Never use the NIM-51x with the battery compartment open.

⚠ WARNING

Reverse charging of rechargeable batteries

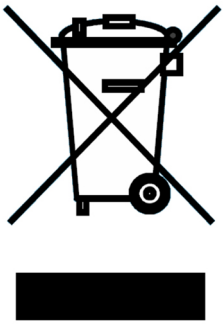
NiMH batteries can explode if you charge them with reversed poles.

⇒ Make sure you insert the batteries correctly as shown on the base of the battery compartment.

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).

5.3 Disposal



Disposal of used equipment

The crossed-out wheeled garbage can symbol indicates that this product is subject to the European WEEE Directive 2012/19/EU on the disposal of waste electrical and electronic equipment and must be disposed of separately from household waste in accordance with your national regulations.

In the European Union, all electronic measuring systems purchased from Narda after August 13, 2005 can be returned at the end of their useful life.

⇒ For more information, please contact your Narda distributor.

Disposal of removable batteries

Batteries must not be disposed of in household waste, but must be disposed of separately from the product in accordance with the applicable regulations. They can be returned free of charge to the appropriate collection points, your dealer or directly via Narda.

⇒ Please discharge the batteries before disposal.

Disposal of permanently installed batteries

There are no permanently installed batteries in this device.

Deleting private data

⇒ Make sure that you delete any stored private data before passing on or disposing of the device.

5.4 Checking for proper operation

⚠WARNING

Probe is not operating properly

Possibly present high radiation values are not recognized.

⇒ Check probes for proper operation with a signal source before using this measuring instrument.

⇒ Before beginning any RF radiation measurement, always advise yourself of the frequencies and field strengths that you could expect to encounter.

Performing a function test:

1. Connect the probe to the instrument (see **"Connecting the probe"** on page 25).
2. Switch the instrument on and immediately thereafter press and hold down the **Units** key for 2 – 3 seconds to activate the probe function test.
   - ↳ After the self test the measured field strength will be displayed separately for all 3 input channels (Ch1...3).
3. Bring an appropriate signal source near the probe head.
4. Switch the signal source on.
   - ↳ The Ch1...3 display increases: **Function test OK** Briefly press the **ON/OFF** button to change to the measurement mode.
   - ↳ The Ch1...3 display does not increase: **Function test not OK.** Do not use the probe any more. Contact the responsible service center.

Note: Do not use this function test for measurements. This test is suitable only for checking probes.
All 3 channels must respond to the field source.
Ch1 is related to the E field sensors.
Ch2...3 are related to the H field sensors and will show identical values.

6 Specifications

This chapter lists the specifications of the NIM-51x.

The technical specifications may change due to product developments. The latest technical specifications can be found in the datasheet of the product. The datasheet can be downloaded from the Narda website **www.narda-sts.com** under the corresponding product page.

6.1 Display and Functions

Display type	Transflective LCD, monochrome, LED backlight
Display size	4 cm (1.5"), 128 x 64 dots
Refresh rate 400 ms	400 ms
Result display	E-field or H-field value (selectable, 4 digits)
Result units	mW/cm^2, W/m^2, V/m, A/m
Result types (isotropic, RSS)	**ACT:** Display of the actual value **MAX:** Holds the maximum of all measured values **AVG:** Display of the result averaged over 6 minutes **SPATIAL:** Display of the 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

6.2 Measurement

Field type	Electric (E-) field and magnetic (H-) field with switchable display
Frequency range	NIM-511: 10 MHz to 100 MHz NIM-513: 10 MHz to 42 MHz
Measurement range (True RMS)	E-field: 0.1 to 100 mW/cm^2 (20 to 614 V/m) H-field: 0.2 to 200 mW/cm^2 (0.073 to 2.3 A/m)
CW damage level	50 W/cm^2
Sensor type	Two diode based systems for E-field and H-field
Directivity	Isotropic (Tri-axial)
Readout mode / spatial assessment	Combined 3-axes (RSS)

6.3 Uncertainty

NIM-511

Flatness of frequency response (Calibration uncertainty not included)	E-field:	±0 dB @ 13.56 MHz ±1.0 dB (10 MHz to 42 MHz) ±1.5 dB (42 MHz to 100 MHz)
	H-field:	±0 dB @ 13.56 MHz +0.6/-1 dB (10 MHz to 30 MHz) +0.6/-1 dB (42 MHz to 100 MHz)
Linearity (Referred to 10 mW/cm^2)		±1 dB (0.5 to 2 mW/cm^2) ±0.8 dB (2 to 100 mW/cm^2)
Isotropic response		±1 dB
Temperature response		+0.8 dB (10 °C to 40 °C)

NIM-513

Flatness of frequency response (Calibration uncertainty not included)	E-field:	±0 dB @ 27.12 MHz ±1.0 dB (10 MHz to 42 MHz)
	H-field:	±0 dB @ 27.12 MHz +0.6/-1 dB (10 MHz to 30 MHz) +0.6/-1 dB @ 40.68 MHz
Linearity (Referred to 10 mW/cm^2)		±1 dB (0.5 to 2 mW/cm^2) ±0.8 dB (2 to 100 mW/cm^2)
Isotropic response		±1 dB
Temperature response		+0.8 dB (10 °C to 40 °C)

6.4 Calibration

NIM-511

Calibration frequencies	10 / 13.56 / 27.12 / 90 / 100 MHz
Recommended calibration interval	24 months, for the first time 24 months after initial startup

NIM-513

Calibration frequencies	10 / 13.56 / 27.12 / 40.68 / 42 MHz
Recommended calibration interval	24 months, for the first time 24 months after initial startup

6.5 General specifications

Recommended calibration interval		24 months
MTBF		>10 years (basic unit with probe)
Batteries		Standard rechargeable NiMH batteries, 2 x AA (Mignon) type, 2700 mAh
Operating time		approx. 22 hours
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 @ ≤28 °C, no condensation ≤26 g/m³ absolute humidity (IEC 60721-3-2 class 7K2)
Immunity to radiated electromagnetic fields		200 V/m (100 kHz to 60 GHz)
Size	Meter (h x w x d) Probe Cable	1.5” x 2.0” x 8.1” (38 x 52 x 205 mm) 16 inches long (410 mm) 44 inches long (1.1 m)
Weight	Meter Probe	0.66 lbs (300 g) 0.68 lbs (310 g)
Accessories (included)		Rigid shell case, AC adapter/charger, shoulder strap, operating manual, calibration certificate

6.6 Standards compliance

Climatic	Storage	1K3 (IEC 60721-3) extended to -10 °C to +50 °C
	Transport	2K4 (IEC 60721-3) restricted to -30 °C to +70 °C
	Operating	7K2 (IEC 60721-3) for the basic unit extended to -10 °C to +50 °C
Mechanical	Storage	1M3 (IEC 60721-3)
	Transport	2M3 (IEC 60721-3)
	Operating	7M3 (IEC 60721-3)
Ingress Protection		IP 42 (IEC 60529)

6.7 AC Adapter / Charger Unit

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

6.8 Declaration of Conformity

Hereby, Narda STS declares that this device is in compliance with the directives 2014/30/EU, EN 61326-1:2021, 2014/35/EU, EN 61010-1:2010, and 2011/65/EU.

The full text of the EU declaration of conformity is available at **www.narda-sts.com**.

6.9 Declaration of origin

Country of origin:	**Germany**

7 Ordering information

This chapter lists the ordering information for the NIM-51x.

NIM-511 Narda Industrial Field Meter, 10 to 100 MHz	**2400/511A**
NIM-513 Narda Industrial Field Meter, 10 to 42 MHz	**2400/513**

NIM-511 and NIM-513 Sets include:

- NIM-510 Basic unit (2403/02)
- E/H Field Probe NIM-511 (2402/15E) or E/H Field Probe NIM-513 (2402/13D)
- Hard case
- Power supply, 9 VDC, 100 V - 240 VAC (2259/92.06)
- Shoulder strap, 1 m (2244/90.49)
- Operating manual
- Certificate of calibration

Index

T

U

Narda Safety Test Solutions GmbH
Sandwiesenstrasse 7
72793 Pfullingen, Germany
Phone +49 7121 97 32 0
info@narda-sts.com

Narda Safety Test Solutions
North America Representative Office
435 Moreland Road
Hauppauge, NY11788, USA
Phone +1 631 231 1700
info@narda-sts.com

Narda Safety Test Solutions S.r.l.
Via Benessea 29/B
17035 Cisano sul Neva, Italy
Phone +39 0182 58641
nardait.support@narda-sts.it

Narda Safety Test Solutions GmbH
Beijing Representative Office
Xiyuan Hotel, No. 1 Sanlihe Road, Haidian
100044 Beijing, China
Phone +86 10 6830 5870
support@narda-sts.cn

www.narda-sts.com

narda
Safety Test Solutions

2403/98.22
03/03.2023, A...
English