

nardalert S3

Personal Monitor

User's Guide



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Safety Test Solutions

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Personal Monitor

User's Guide

⚠ WARNING

Strong electromagnetic fields

High-level electromagnetic fields may be hazardous to your health. This monitor cannot protect you from all electromagnetic hazards that you could encounter.

- ⇒ This User's Guide is a subset of the complete Operating Manual you will find on the NS3-TS CD-ROM.
- ⇒ This Monitor should only be used after you have read the Operating Manual, understood how it operates and consulted with your company's safety officer.

This User's Guide is a subset of the complete Operating Manual you will find on the NS3-TS CD-ROM. For additional information about the NS3 and the supplied software, please consult the complete Operating Manual.



Contents

1	Useful information.....	7
1.1	Measuring electromagnetic fields.....	7
1.2	About this monitor	8
	Applications.....	9
1.3	About this User's Guide	9
	Characters and symbols used	9
	Symbols and terms used in warnings	9
	Structure of warnings	10
	Symbols and marks used in this document.....	10
2	Preparing the Nardalert S3 for use	11
2.1	Unpacking	12
	Packaging	12
	Items included.....	12
	Transport damage.....	13
	After transport and storage.....	13
2.2	Battery Installation.....	13
2.3	Instrument overview	14
2.4	Connecting the sensor	16
	Wrong handling of the sensor.....	17
3	Getting started.....	18
3.1	Initial display screens	19
	Normal operation.....	20
	Alarm indication.....	20
3.2	Checking monitor functions.....	20
	Performing a function test:.....	20
	Appropriate test sources	21

3.3	Screen navigation.....	21
3.4	Additional capabilities of optioned units.....	23
	Menu selection screens	23
	Navigating sub-menu screen example	25
4	Operation overview	27
4.1	Normal operation.....	28
4.2	Nardalert S3 default alarm levels	29
4.3	Special environmental operations	29
	Heavy rain or snow.....	29
	High RF/microwave environments	30
4.4	Using the Nardalert S3 as an area monitor	30

1 Useful information

This chapter contains basic information about measuring electromagnetic fields, about using the Nardalert S3, and about the structure of this User's Guide.

- 1.1 Measuring electromagnetic fields
- 1.2 About this monitor
- 1.3 About this User's Guide

1.1 Measuring electromagnetic fields

In today's world, many industries utilize equipment that generates electromagnetic fields. Our modern need for communications as well as the efficiency of electromagnetic heating systems and the safety that radar systems provide us are just a sample of the applications that are benefitted by exploitation of the electromagnetic spectrum. We also have various engineering considerations as well as regulatory requirements to use the electromagnetic spectrum wisely. Various authorities have long defined limit values designed to protect users from the dangers of exposure to such emissions, and the Nardalert S3 is an effective tool to help companies and individuals demonstrate compliance.

1.2 About this monitor

The Nardalert S3 (“NS3”) provides virtually everyone concerned with this subject with an instrument for monitoring non-ionizing radiation that a body might be exposed to within the frequency range from 100 kHz to 100 GHz (depending on the sensor used). The NS3 has a wide range of functions, yet it is very easy to use. It also features a handy design, robust casing, long battery life, and high measurement accuracy.

The NS3 features multiple types of sensors to accurately monitor human exposures while worn on the body. It can be used off the body to detect fields also. Shaped sensors that evaluate the field according to a specific human safety standard are connected to the NS3 basic unit. These sensors are calibrated separately from the basic unit and include a non-volatile memory containing the sensor parameters and calibration data. They can therefore be used with any NS3 without any loss in calibration accuracy. The PC software supplied with the monitor allows you to configure and remote control the NS3, as well as to export saved measurement data and to analyze the results (if unit is configured for that option).

Applications

The NS3 performs measurements for human safety purposes, particularly in workplace environments where high electric or magnetic field strengths are likely. It can also be configured to function as a stand-alone area monitor.

1.3 About this User's Guide

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:

	<p>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.</p>
<p>NOTICE</p>	<p>Indicates a danger that results in damage to or destruction of the instrument.</p>
<p>CAUTION</p>	<p>Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.</p>
<p>WARNING</p>	<p>Indicates a hazardous situation which, if not avoided, could result in death or serious injury.</p>
<p>DANGER</p>	<p>Indicates a hazardous situation which, if not avoided, will result in death or serious injury.</p>

Structure of warnings

All warnings are structured as follows:

⚠ SIGNAL WORD
<p>Type and source of danger</p> <p>Consequences of failure to observe warning</p> <p>⇒ Instructions for preventing danger</p>

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 Enter key.
CAPITALS	Menu name - Indicates a menu name, e.g. ⇒ Open the MAIN menu.
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.

2

Preparing the Nardalert S3 for use

This chapter describes all you need to do before starting to use the Nardalert S3.

- 2.1 Unpacking
- 2.2 Battery Installation
- 2.3 Instrument overview
- 2.4 Connecting the sensor

2.1 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:

Carrying Case (2270/90.02)

Nardalert S3 Mainframe (2270/01), Battery included

Silicon Sleeve (2270/90.03), attached to the mainframe

Lanyard Clip, non-conductive (2270/90.04)

Belt Clip, non-conductive (2270/90.05)

Screwdriver Phillips 0 (2270/90.06)

User's Guide and CD-ROM with Software NS3-TS (2270/90.07)

Car Charger Adapter, USB 5V (2259/92.20)

Cable, USB2.0 Master/Slave - A/B mini, 0.9m (2260/90.58)

Power Supply, USB 5VDC, 100V-240VAC (2259/92.24, packed separately)

Calibration Certificate, Mainframe

Sensor Module with Calibration Certificate (2271/XX, packed separately)



Transport damage

Instrument/accessories damaged during transportation

Check for completeness and damages:

- ⇒ Remove device and accessories from the case and check for completeness as well as any transport damages.
CAUTION! Do not operate a damaged device.
- ⇒ In the event of an incomplete delivery and damages to the device or accessories, please contact your Narda sales partner. You can find the Narda sales partner responsible for you on the Narda website at www.narda-sts.com.

After transport and storage

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 °C to +50 °C.

2.2 Battery Installation

The main operating battery (Narda P/N 2259/92.25) is a 3.6 Volt, lithium-ion rechargeable battery, Type RCR123A. The battery needs to be inserted into the NS3 before charging.

1. Unscrew battery door screw and insert battery with the positive (+) side towards the battery door (see picture on next page).
2. Hold battery door closed while tightening screw.
3. Charge unit with supplied AC or DC chargers and verify operation before attempting to use.

Insert battery with positive (+) side towards battery door



! Do not insert battery backwards. You could damage the battery door and/or the system will not charge.

2.3 Instrument overview

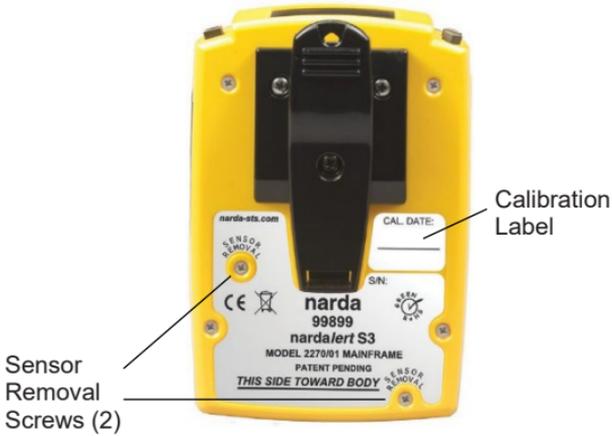
Top Panel



Front Panel



Rear Panel



Side Panels



2.4 Connecting the sensor

WARNING

Strong electromagnetic fields

If the Sensor is not operating properly, or if the proper sensor is not chosen, you could be exposed to high field levels without your knowledge.

- ⇒ Refer to Operating Manual on CD-ROM to select appropriate sensor(s).
- ⇒ Follow instructions below to properly connect sensor.

The NS3 is designed to monitor the presence of the sensor and that the sensor is functional. In order to simplify the turn-on procedure, it is recommended that the sensor be connected to the NS3 and the battery fully charged before beginning.

- ⇒ Ensure that the sensor is attached properly to the basic unit. The sensor is positioned so that it easily can be inserted and secured to the basic unit by tightening the two screws shown on page 15 (Rear Panel). Sensor is designed to be even with the surface of the basic unit and to pass a functional test at turn-on. If in doubt, cycle unit off and then on again to perform connection test. If the sensor is defective, not installed or failing pre-test, it will cause the system to not proceed to measurement mode.
- ⇒ Charging of the monitor is accomplished by attaching the proper AC mains plug to the charger and then the supplied USB cable to the charger and NS3. The unit will be rapidly charged when using the supplied USB charger and at a slower rate (longer time) if plugged into a computer. Charging time is approximately 4 hours for a full charge. Note the battery icon in the top right of the display when the unit is energized, indicating the amount of charge.

- ⇒ Confidence testing of RF/microwave sensors can be accomplished with a simple 2-way radio that generates more than 1Watt. An upscale indication should be noticed on the display when the radio is transmitting close to the sensor housing. The NS3 provides a menu screen "Self Test", to evaluate the output from the three detectors used in the RF/microwave sensors.
- ⇒ Before beginning any RF radiation measurement, always try to verify the frequencies and field strengths that you could be expected to encounter.

There are different sensors available for different applications and use with the NS3. You can find more information about the order numbers and specifications of the sensors in the Operating Manual included on the CD-ROM. These documents can also be downloaded from the Narda website on the internet at: www.narda-sts.com.

Wrong handling of the sensor

Damage of the sensor antennas

- ⇒ Always try to store the sensor in the carrying case when not installed in the NS3. This should help protect it from excessive shock and vibration, as well as environmental extremes.

3 Getting started

This chapter describes how to switch on the Nardalert S3 and verify it is operating properly.

- 3.1 Initial display screens
- 3.2 Checking monitor functions
- 3.3 Screen navigation
- 3.4 Additional capabilities of optioned units

3.1 Initial display screens

The NS3 is switched on by depressing and holding the **On/Off** button on the left side of the display. The alarm LEDs will illuminate and the vibrator will activate before the splash screen (Figure 1) is displayed.



Figure 1: Splash Screen



Figure 2: Self Test Screen



Figure 3: Configuration Screen



Figure 4: Calibration and Date Screen

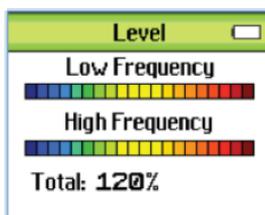


Figure 5: Normal Operation Display

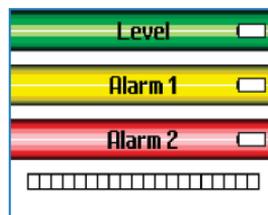


Figure 6: Alarm levels and color changes (not actual screen)

The NS3 shows each screen for a few seconds as it performs a self test, verifies the monitor and sensor's information and date of calibration before beginning to measure and display detected fields.

- ⇒ If the sensor is defective or not attached to the basic unit, the start-up sequence will be stopped – screens in Figures 4 and 5 will not be displayed
- ⇒ If the calibration is more than 2 years old for the sensor, or 4 years old for the basic unit the calibration screen (Figure 4) will have a red background and one of the buttons needs to be depressed to continue.

Normal operation

The operation screen (Figure 5) displays the detected fields from the low and high frequency sensors separately to provide information to the wearer about the type of source creating the display. The display considers 1 GHz (approximately) as the separator between low and high frequencies.

Alarm indication

If an alarm threshold is exceeded (Figure 6) the top color bar will change from Green to Yellow (Alarm 1) and from Yellow to Red (Alarm 2), if two alarms are used. If only one alarm is used, then the color bar will change from Green to Red (Alarm). The wearer also receives audible, vibrate and LED visual indications when alarm thresholds are exceeded (factory defaults).

3.2 Checking monitor functions

Performing a function test:

1. Connect the sensor to the NS3. Turn monitor on, insure it completes its POST (Power On, Self Test) and then set menu to Self Test.
2. Use an appropriate check source to generate an upscale indication for that sensor's display on the NS3.
3. An upscale indication indicates an OK Function Test.
4. If no indication is seen on monitor display, verify that the unit passes its turn-on tests and verify the test source is operating properly.

Note: Do not use this function test for verifying calibration. This test is only suitable for checking sensors and their connection to the NS3. The readings displayed on the monitor depend on the type of sensor and are irrelevant for this test, and as such cannot be used to verify calibration.

Appropriate test sources

A convenient method to test the RF/microwave sensors in the NS3 is to use a common two-way radio. In many countries “family radios” generate enough power to produce a full-scale reading if held very close to the sensor itself. The commonly used frequency of 433 MHz will produce an upscale indication for both the low and high frequency sensors, providing a more complete verification.

3.3 Screen navigation

Navigation is accomplished by using the **Up/Down** Arrows and the **Enter** Key. The NS3 responds to two types of key depression, “tap” or “hold”. “Tap” commands are completed by depressing the key for less than one second, while “hold” is for depressing the key for more than one second. Key use is further defined in the table on the next page.

Key	Function <i>Before Menu Interface</i>	Function <i>Menu Selection Screen</i>	Function <i>Sub-Menu Screen</i>
 Enter Tap	Light the backlight.	Performs the operation of the item that the arrow icon is pointing to.	<ol style="list-style-type: none"> 1. If the arrow icon is pointing to the parameter line and the selection process is not active, start the selection process. 2. If the arrow icon is pointing to the parameter line and the selection process is active, accept the current parameter and place it in hold. 3. If the arrow icon is pointing to the Cancel and Exit line, return to the Menu Selection Screen without implementing the change. 4. If the arrow icon is pointing to the Save and Exit line, implement the parameter change, save the new parameter in memory and return to the Menu Selection Screen.
 Enter Hold (>2 sec.)	Start power down process.	Start power down process.	Start power down process.
 Up Arrow Tap	Light the backlight.	Move the arrow icon up to the previous item on the Menu Selection Screen. Scroll the text if necessary.	<ol style="list-style-type: none"> 1. If the selection process is active, scroll to the previous parameter choice. 2. If the selection process is not active, move the arrow icon up to the previous item.
 Up Arrow Hold (1 sec.)	Scroll to next screen if unit is not in a safety alarm state.		
 Down Arrow Tap	Light the backlight.	Move the arrow icon down to the next item on the Menu Selection Screen. Scroll the text if necessary.	<ol style="list-style-type: none"> 1. If the selection process is active, scroll to the next parameter choice. 2. If the selection process is not active, move the arrow icon down to the next item.
 Down Arrow Hold (1 sec.)	Scroll to previous screen if unit is not in a safety alarm state.		

3.4 Additional capabilities of optioned units

Your NS3 can be upgraded at any time to a full featured monitor that displays additional information as well as stores exposure data. This upgrade can be accomplished by entering a special code through the NS3-TS software and enabling the upgrade.

Menu selection screens

Below are the various menu screens and their functions.



Alarm Indication

Allows for altering of the alarm indication between Audible and Vibrate, Audible only or Vibrate only. Factory default is Audible and Vibrate.

Alarm Threshold

Allows alarm threshold levels to be altered. Alarm 1 can be set from 10% to 100% and OFF. Alarm 2 can be set from 20% to 200%. Factory default is Alarm 1 at 50% and Alarm 2 at 200%.

Backlight

Allows setting of display backlight times to OFF, 5 seconds, 10 seconds, 30 seconds, 1 minute and Permanent ON. Factory default is 10 seconds. Longer backlight times result in lower operating time.

Data Log

Sets data logging rate from 4 per second, 1 per second, 5 seconds, 20 seconds or 1 minute. Factory default is 1 sample per second.

Factory Defaults

Resets all monitor functions back to Factory Default values.

F/O Interface

Sets fiber optic interface for communication or remote vibrator operation. Factory default is the communication setting.

History

Displays maximum, minimum and average readings for the last 6 minutes.

Last Calibration

Displays last calibration dates for sensor and monitor.

Model Information

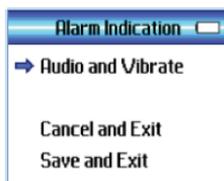
Displays information about the monitor and firmware version as well as sensor information.

Sensor Test

Displays individual sensor output for user to self-test system for proper function.

Navigating sub-menu screen example

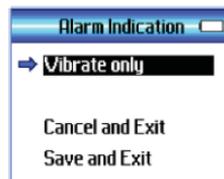
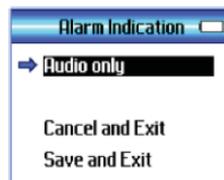
1. Tap the  Button when arrow is pointing at **Alarm Indication**.
 ↳ NS3 display changes to:



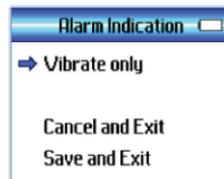
2. Tap the  key again to select item to be modified.
 ↳ Item is highlighted to confirm selection.



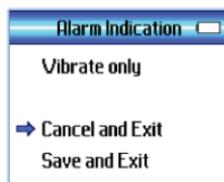
3. Tap either the  or  arrow to cycle through choices.



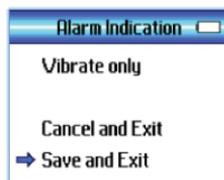
4. Tap the  again to select choice. Choice is not confirmed until you "Save and Exit."



5. Tap the  arrow once to get to the “Cancel and Exit” selection. Tap  to leave the function without implementing the parameter change.



6. To implement the change and to store it in memory so the next time the unit is powered up it will recall the setting, move the arrow icon to the “Save and Exit” line (by tapping  twice). Tap the  key to return to the menu selection screen.



4 Operation overview

- 4.1 Normal operation
- 4.2 Nardalert S3 default alarm levels
- 4.3 Special environmental operations
- 4.4 Using the Nardalert S3 as an area monitor

4.1 Normal operation

The NS3 should be fully charged and configured for your personal use. The factory provides both a lanyard attachment and a belt clip for your convenience, and a silicon skin to help provide protection for the unit against shock.

Once you have verified the proper mounting configuration and have charged the unit you should verify that the alarm levels shown on the second start-up screen meet with your company's policy. The NS3 was designed to be mounted with the reverse side towards your body. Some customers prefer to wear the unit mounted to a waist belt while others prefer a lanyard attachment. Either method of attachment is acceptable as long as the unit is normally kept close to the body to improve the radial field sensor's performance.

The default setting for the LCD backlight is to extinguish after 10 seconds, in order to save battery life. You can depress any button to activate the LCD backlight, but the display should be visible in direct sunlight without the backlight. An LED will briefly flash every 10 seconds to indicate the unit is operating properly.

The NS3 samples the sensor's output approximately every 32 msec., and uses the average of 8 samples to log at its fastest rate. The display is updated every second, so the level displayed is an average of the four logs. The monitor can be set to log at a rate as fast as 4 times per second for high speed situations.

Alarms are indicated by the screen, LEDs, audible and vibrate alarms. In an Alarm 1 situation the tone and vibrator alternate at an approximate 1 second rate. Red and Amber LEDs will also illuminate on one side of the display. Exceeding the Alarm 2 threshold will cause the audible alarm to step through 5 tones while the vibrate rate is doubled from the Alarm 1 rate. Red and Amber LEDs on both sides of the display will illuminate alternately. If customers choose to employ only one alarm, it will indicate Alarm 2 characteristics.

The battery icon is always displayed on the unit. When the battery displays a "Red" background there is less than 20% life left and the unit should be charged immediately. If the battery level falls below

10%, audible and LED alarms will be generated without vibration or LCD backlight.

4.2 Nardalert S3 default alarm levels

The NS3 is supplied from the factory with Alarm 1 set at 50% and Alarm 2 set at 200% of RF/microwave Exposure limits for Occupational or Controlled limits. Standards and guidance's normally recommend conservative exposure limits that are both time and spatially averaged and relate to a 100% reading on the NS3. However, the NS3 cannot typically perform time and spatial averaging when being used as a wearable monitor. Therefore, Narda has historically recommended that a 50% alarm be used to warn the wearer of the presence of strong fields and a 200% reading to warn the wearer to leave the area. While it might be possible that a 200% reading is still compliant with standards once readings are time and spatially averaged, it is beyond the capability of the NS3 to determine that in normal use.

4.3 Special environmental operations

Heavy rain or snow



The NS3 was designed to be water resistant. It is recommended to employ the optional Weatherproof Pouch, P/N 2270/92.01 as a minimum measure to keep water from accumulating within the unit. It is NOT recommended to wear the monitor inside of clothing as wet garments can seriously attenuate microwave field levels the unit may need to detect.

Extreme low temperatures will cause the LCD to respond slowly and for the battery life to be degraded, however the unit will continue to function to -20°C .

High RF/microwave environments

The NS3 has not, at the time of this writing, developed a high power sensor for use with RF clothing. Persons wearing RF clothing should not use this monitor under the clothing. Currents flowing through the clothing could cause the monitor to false alarm.

4.4 Using the Nardalert S3 as an area monitor

The NS3 functions as an effective, stand-alone area monitoring device. It may be operated continuously from the USB supply while employing the Fiber Optic interface for communicating field level information back to a computer. See Operating Manual included on the CD-ROM for part numbers given for fiber optic cables as well as the F.O. to USB adapter that would be required in order to provide area monitoring operation.



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