Non-Ionizing Radiation Monitor

Warningofhazardousradiation from broadcast transmitters, mobilephonebasestationsand radar systems

The personal monitor Nardalert S3 provides warnings wherever people can be in danger from strong electromagnetic fields, in particular in areas like telecommunications, broadcasting, industry, military and air traffic control. The device is worn on the body and warns its user in good time before the permitted limit values are exceeded. The unique sensor technology in the Nardalert S3 is packaged in a field replaceable housing containing all the electronic data necessary to maintain calibrated operation. This allows your S3 to stay in service without costly logistics to keep multiple units calibrated – a major advantage for any Non-Ionizing Radiation (NIR) Safety Program. Your Nardalert S3 will always be capable of supporting new standards or guidelines, allowing future expandability and extending longevity.

› Wide frequency monitoring up to 100 GHz In **5G**
› accordance with ITU-T Rec. K.145 Field replaceable
› sensor modules Unique True RMS sensor
› technology Full color LCD display Multicolor alarm
› LEDs Loud buzzer and strong vibration alarm
› Immunity at 50/60 Hz up to 100 kV/m RF absorber
› inside minimizes the body effect USB interface for
› data and charging Comprehensive software included
› Interchangeable lanyard or belt clips Option for data
› logging, adjustable alarm thresholds and fiber optic
› interface
›
›

LCD Display

Alarm events are always evident with visual LEDs combined with vibration and audible notifications. However, to provide the user more accurate information than just simple alarms, we have incorporated a top mounted LCD. The LCD simplifies operation, showing key data at start-up such as battery state and sensor information that the operator needs. With RF/ microwave sensors attached, the display indicates to the user the bands (<> 1 GHz) that are being detected. Optioned units use the display to provide even more information such as exposure history, logged data, alarm indications and more.

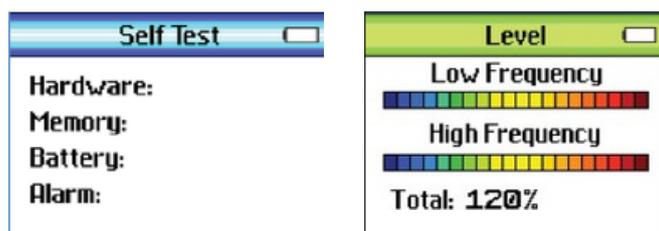*Fig. 1. Top viiew wiitth diispllay and conttrolls*

Fig. 2. Self-test screen and normal operation display

Housing

We packaged everything in a rugged plastic housing that allows you to use it mounted in a common shirt pocket or secure it with the supplied lanyard or belt-clip mounts. We supply a strong silicon rubber skin that provides additional shock protection as a standard accessory.

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Replaceable Standard Battery

TheNardalert S3operates from a single standard typeRCR123A battery. This battery is automatically recharged whenever it is plugged into a computer and we supply a universal charger to accelerate charging from any common AC source or mains plug. The included automotive USB adapter can also be used for charging, so your monitor is always ready to work.

Standard and Optioned Models

TheNardalert S3 can be supplied in one of two different capabilities. Standard units provide all of the basic performance necessary for normal operations. Alarm levels are factory set at 50% and 200% of reference levels and basic screens provide all the information the user needs. Advanced users and applications should consider the additional capabilities of the NS3 Option Key. By entering a software code through the user software you can expand the operation of your Nardalert to store, display and download exposure data, alter alarm modes and levels, display historical data on the Nardalert S3's display and reconfigure the interface for fiber optic connections.

Sensors

Theavailablesensors cover the most common international exposure limits. We offer sensors to follow the RF/microwave frequency limits promoted by the US FCC, IEEE (C95.1), Canada's Safety Code 6 and ICNIRP. Many users around the world will find that one of these limits meets their local requirements for RF and microwave exposures.

Standard/ Guideline	Nardalert S3 with sensor	Sensor alone *
Canada Safety Code 6 (2015)	2271/122	2271/22
EMF Directive 2013/35/EU	2271/131	2271/31
FCC 96-326 (1997)	2271/101	2271/01
ICNIRP 1998	2271/131	2271/31
IEEE C95.1-2019	2271/112	2271/12
Japan RCR-38	2271/101	2271/01

* Requires Nardalert S3 Mainframe P/N 2270/01 to form operable set

Fig. 4. Nardalert S3 mainframe shown with interchangeable sensor

PC Software

The Nardalert S3 software (NS3-TS) is supplied standard with every unit. Readings can be downloaded and displayed numerically (Fig. 5) or graphically (Fig. 6) by simply installing the software and plugging in the supplied USB cable.

Users can download stored data into a database that is stored in the software for future recall. The six major software controls are:

› **File –** Allows file management (storing, sorting and exporting)
› **Database –** Database management of files stored on computer (Fig. 5)
› **Device Memory –** Data management of readings stored on Nardalert
› **Measurement –** Displays real-time measurements on computer (Fig. 6)
› **Configuration –** Configures Nardalert S3 for use. Set alarm thresholds, logging rate, backlight time, etc.
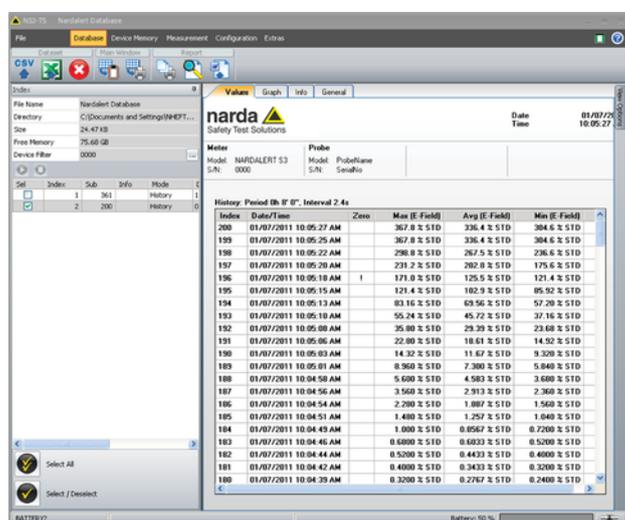› **Extras –** sets unit up for regional preferences, installs options, general settings
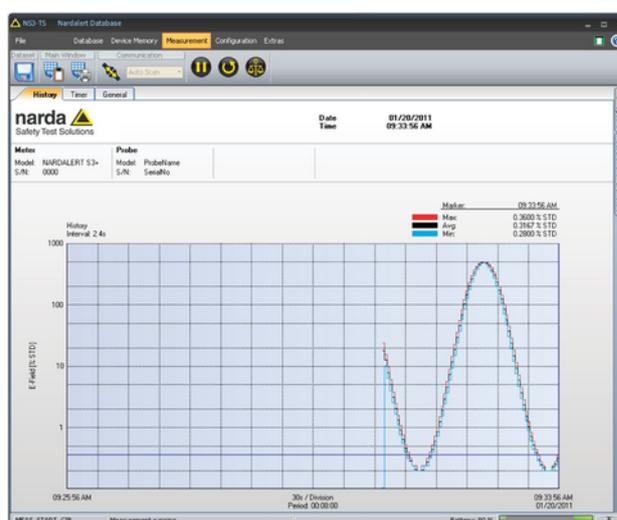

Fig. 5. Numerical read-out of exposure results

Fig. 6. Real-time measurement display of exposure over time

Definitions and Conditions

Conditions

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

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

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

Typical values (typ.)

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

Nominal values (nom.)

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

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

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Specifications [1]

Parameter		Specification
Frequency range		100 kHz to 100 GHz IEEE model: 3 MHz to 100 GHz
Field measured		Electric field, V^2/m^2
Sensor design		Radial field, diode-dipole and thermocouple array
Alarm accuracy [2] (Frequency sensitivity and polarization uncertainty)		+4.5 / -3.0 dB (100 kHz to 30 GHz) +2.5 / -6.0 dB (30 to 50 GHz) +2.5 / -6.0 dB (50 to 100 GHz, nom.)
Monitor range [3]		5% to 200% of standard or guideline
Immunity at 50/60 Hz		100 kV/m
Alarm thresholds	Number of alarms	Standard is two alarms. May be programmed through NS3-TS for one alarm
	Alarm 1, default setting	50% of standard or guideline
	Range of adjustment	10% to 100% (in 5% increments) and OFF
	Alarm 2, default setting	200% of standard or guideline
	Range of adjustment	20% to 200% (in 5% increments)
Alarm indication		Visual (LCD and LED) with audible and/ or vibration alarm
CW overload		3000% of standard or guideline
Peak overload		32 dB above standard or guideline
Display	Type	TFT color LCD, transmissive
	Size	1.77 inches, 28 x 35 mm, 128 x 160 pixels
	Backlight	White LEDs
	Refresh rate	250 msec.
	Displayed items	All units display model information, self-test results, calibration date and real-time readings during operation
NS3 Option Key (P/N 2270/90.01)		Allows access to stored data from NS3-TS and/or LCD screen. Additional items made available include Alarm Mode, Alarm Set, Backlight, Data Log, Fiber Optic Interface, and History
Memory [4]	Size	62,000 events
	Storage rate	4 per second, 1 per 1, 5, 10, 20 or 60 seconds
	Storage time	Variable - from 4.3 hours (4 per second), to 43 days (1 per 60 seconds)
Remote operation	Interface	USB or optical RS-232
	USB	Serial, full-duplex, 57600 baud (virtual com port), USB 2.0 mini B jack
	Optical	Serial, full-duplex, 57600 baud, no parity, 1 start bit, 1 stop bit. Optical connector type RP-02.
Accessories included		Carrying case, AC charger with plugs, car charger adapter, charger/data cable (USB 2.0), belt clip, lanyard clip, screwdriver, manual, NS3-TS software, calibration certificate

General Specifications		
Recommended calibration interval		4 years for mainframe (P/N 2270/01) and 2 years for sensors (2271/XX)
Battery type/ operating time		RCR123A, Li-ion (rechargeable via USB port) / 25 hours
Temperature range	Operating	-10 °C to +50 °C (14 °F to 122 °F)
	Non-operating	-30 °C to +70 °C (-22 °F to 158 °F)
Humidity		5% to 95%, non-condensing (≤ 29 g/m³, IEC 60721-3-2 class 7K2)
Dimensions (H x W x D)		117 mm x 83 mm x 32 mm (4.6 in x 3.25 in x 1.25 in), mainframe with sensor
Weight		230 g (0.5 lb), mainframe with sensor
Country of origin		Germany

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[1] Specifications are given for the unit mounted on the human body facing the emitter.

[2] Accuracy specified as the mean of the radial and vertical orientations (10 to 1600 MHz) and mean of the vertical and horizontal orientations (1600 MHz to 50 GH

[3] Percentages related to the highest power density allowed by standard or guideline (for controlled, occupational or restricted environments).

[4] Memory function only available to "Optioned" units.

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Ordering Information

NardalertS3 - PersonalMonitorSets	Part number
Nardalert S3 Monitor Set without Sensor (requires sensor to form operable set)	**2270/101**
Nardalert S3 Monitor Set with FCC Sensor Module	**2271/101**
Nardalert S3 Monitor Set with IEEE Sensor Module	**2271/112**
Nardalert S3 Monitor Set with SC6 Sensor Module	**2271/122**
Nardalert S3 Monitor Set with ICNIRP Sensor Module	**2271/131**
Each set includes: › Nardalert S3 Mainframe (2270/01), battery included › Carrying Case (2270/90.02) › 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) › Power Supply, USB 5VDC, 100V-240VAC (2259/92.24) › Cable, USB2.0 Master/Slave - A/B mini, 0.9m (2260/90.58) › Calibration Certificate	
Option Key, Nardalert S3 (enables data logging, alarm varying, optical interface and more)	**2270/90.01**

Individual Sensor Modules	Part number
Sensor Module, FCC 1997 "Occupational/ Controlled"	**2271/01**
Sensor Module, IEEE C95.1-2019, "Restricted Environments"	**2271/12**
Sensor Module, Safety Code 6-2015, "Controlled"	**2271/22**
Sensor Module, ICNIRP 1998, "Occupational" [5] (compliant with ICNIRP 2020 for frequencies above 30 MHz)	**2271/31**

Optional Accessories	Part number
Nardalert Weatherproof Pouch Cable, FO	**2270/92.01**
Duplex, RP-02, 2m Cable, FO Duplex, RP-	**2260/91.02**
02, 10m Cable, FO Duplex, RP-02, 20m	**2260/91.07**
Cable, FO Duplex, RP-02, 50m Cable, FO	**2260/91.03**
Duplex, F-SMA to RP-02, 0.3m O/E	**2260/91.04**
Converter RS232, RP-02/DB9 O/E	**2260/91.01**
Converter USB, RP-02/USB Cable,	**2260/90.06**
Adapter, USB2.0 - RS232, 0.8m	**2260/90.07**
	2260/90.53

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[5] ICNIRPversion isalso compliantwith many national and international standards and regulations such as Directive 2013/35/EU, EMFV 2016 (Germany) and VEMF 2016 (Austria).
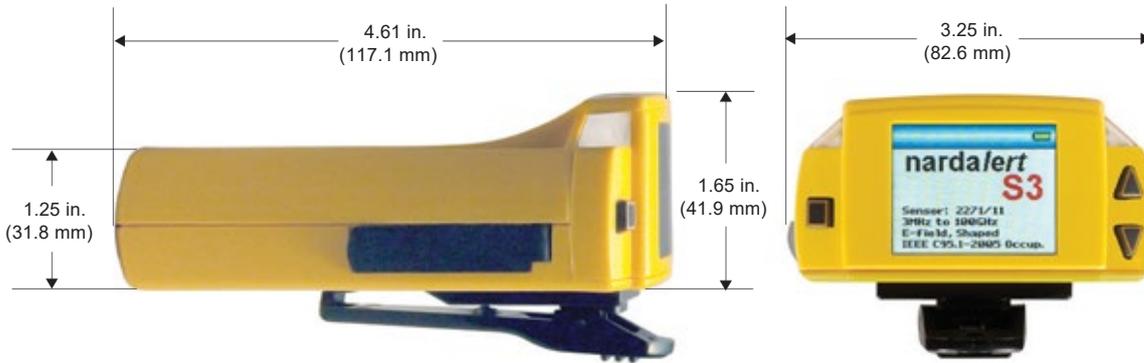
Fig. 7. Dimensions of the Nardalert S3 mainframe

Instruction Manual and NS3-TS Software

Carrying Case

Nardalert S3 connected to laptop computer

Optional Weatherproof Pouch P/N 2270/92.01

Nardalert S3 with silicon rubber skin