SMARTS AMC

AREA MONITOR COMPACT

User's Manual

EQUIPMENT SERIAL NUMBER
You can find the Serial Number on the rear panel of the main unit and on the side of the wall support bracket.
Serial Number is in the form: 0000X00000.
The first four digits and the letter are the Serial Number prefix, the last five digits are the Serial Number suffix. The prefix is the same for identical instruments, it changes only when a configuration change is made to the instrument.
The suffix is different for each instrument.

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NOTE:

® Names and Logo are registered trademarks of Narda Safety Test Solutions GmbH – Trade names are trademarks of the owners.

⚠ CAUTION If the instrument is used in any other way than as described in this User's Manual, it may become unsafe.

Before using this product, the related documentation must be read with great care and fully understood to familiarize with all the safety prescriptions.

To ensure the correct use and the maximum safety level, the User shall know all the instructions and recommendations contained in this document.

⚠ WARNING This product is a **Safety Class III** instrument according to IEC classification and has been designed to meet the requirements of EN61010-1 (Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use).

In accordance with the IEC classification, the power supply of this product meets requirements **Safety Class II** and **Installation Category II** (having double insulation and able to carry out mono-phase power supply operations).

It complies with the requirements of **Pollution Class II** (usually only non-conductive pollution). However, occasionally it may become temporarily conductive due to condense on it.

The information contained in this document is subject to change without notice.

EXPLANATION OF ELECTRICAL AND SAFETY SYMBOLS :

You now own a high-quality instrument that will give you many years of reliable service. Nevertheless, even this product will eventually become obsolete. When that time comes, please remember that electronic equipment must be disposed of in accordance with local regulations. This product conforms to the WEEE Directive of the European Union (2002/96/EC) and belongs to Category 9 (Monitoring and Control Instruments). You can return the instrument to us free of charge for proper environment friendly disposal. You can obtain further information from your local Narda Sales Partner or by visiting our website at www.narda-sts.it .

Warning, danger of electric shock

Earth

Read carefully the Operating Manual and its instructions, pay attention to the safety symbols.

Unit Earth Connection

Earth Protection

Equipotential

EXPLANATION OF SYMBOLS USED IN THIS DOCUMENT :

⚠ DANGER **The DANGER sign draws attention to a serious risk to a person's safety, which, if not avoided, will result in death or serious injury. All the precautions must be fully understood and applied before proceeding.**

⚠ WARNING **The WARNING sign indicates a hazardous situation, which, if not avoided, could result in death or serious injury. All the precautions must be fully understood and applied before proceeding.**

⚠ CAUTION **The CAUTION sign indicates a hazardous situation, which, if not avoided, could result in minor or moderate injury.**

NOTICE **The NOTICE sign draws attention to a potential risk of damage to the apparatus or loss of data.**

☞ NOTE **The NOTE sign draws attention to important information.**

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⚠ WARNING | **_SAFETY RECOMMENDATIONS AND INSTRUCTIONS_**

This product has been designed, produced and tested in Italy, and it left the factory in conditions fully complying with the current safety standards. To maintain it in safe conditions and ensure correct use, these general instructions must be fully understood and applied before the product is used.

- When the device must be connected permanently, first provide effective grounding;
- If the device must be connected to other equipment or accessories, make sure they are all safely grounded;
- In case of devices permanently connected to the power supply, and lacking any fuses or other devices of mains protection, the power line must be equipped with adequate protection commensurate to the consumption of all the devices connected to it;
- In case of connection of the device to the power mains, make sure before connection that the voltage selected on the voltage switch and the fuses are adequate for the voltage of the actual mains;
- Devices in Safety Class I, equipped with connection to the power mains by means of cord and plug, can only be plugged into a socket equipped with a ground wire;
- Any interruption or loosening of the ground wire or of a connecting power cable, inside or outside the device, will cause a potential risk for the safety of the personnel;
- Ground connections must not be interrupted intentionally;
- To prevent the possible danger of electrocution, do not remove any covers, panels or guards installed on the device, and refer only to NARDA Service Centers if maintenance should be necessary;
- To maintain adequate protection from fire hazards, replace fuses only with others of the same type and rating;
- Follow the safety regulations and any additional instructions in this manual to prevent accidents and damages.

| VIII | **Safety considerations** |

Dichiarazione di Conformità
EU Declaration of Conformity C E

In accordo alla Decisione 768/2008/EC, conforme alle direttive RED 2014/53/UE, EMC 2014/30/UE, Bassa Tensione 2014/35/UE e RoHS 2011/65/UE, ed anche alle norme ISO/IEC 17050-1 e 17050-2.
In accordance with the Decision 768/2008/EC, compliant to the Directives RED 2014/53/EU, EMC 2014/30/EU, Low Voltage 2014/35/EU and RoHS 2011/65/EU, also compliant to the ISO/IEC standard 17050-1 and 17050-2.

Il costruttore
The manufacturer **narda Safety Test Solutions S.r.l. Socio Unico**

Indirizzo
Address **Via Benessea, 29 / B; I-17035 Cisano sul Neva (SV) - Italy**

sulla base delle seguenti norme europee armonizzate, applicate con esito positivo:
based on the following harmonized European Standards, successfully applied:

EMC:
EMC: **EN 301 489-1** (V2.2.3)**; EN 301 489-17** (V3.2.4)**; IEC EN 61326-1** (2021)

Sicurezza:
Safety: **IEC EN 62368-1** (2020); **EN 61010-1** (2010)

Radio:
Radio: **EN 300 328** (V2.2.2)

Salute:
Health: **IEC EN 62311:2020; IEC EN 62479:2010**

dichiara, sotto la propria responsabilità, che il prodotto:
declares, under its sole responsibility, that the product:

Descrizione **STAZIONE DI MONITORAGGIO COMPATTA**
Description ***AREA MONITOR COMPACT***

Modello **SMARTS AMC/00**
Model

è conforme ai requisiti essenziali delle seguenti Direttive:
conforms with the essential requirements of the following Directives:

Apparecchiature Radio *RED*	2014/53/EU	Compatibiltà Elettromagnetica *EMC*	2014/30/EU
Bassa Tensione *Low Voltage*	2014/35/EU	RoHS *RoHS*	2011/65/EU

Cisano sul Neva, 01 February 2024   **Egon Stocca**

General Manager

EC Conformity | IX |

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Safety considerations

1 – General information

1.1 Documentation

The following documents are included in this Manual:
- A questionnaire to be sent to NARDA together with the apparatus should service be required.
- A checklist of the accessories included in the shipment.

1.2 Introduction

The SMARTS AMC Area Monitor Compact is a flexible and modern solution for continuous monitoring system. It is designed to maintain compact dimensions, so that it is possible to install it almost everywhere.

The AMC performs live measurements and programmable operations (Logger), records and plots the results, and provides on-board acoustic, visual, vibration alarms and optocoupled or relais through DB-15 connector.

It is also an ideal solution for EMC applications, in chambers and TEM/GTEM cells, and in EMF applications.

The AMC consists of a protective case made of material that is transparent to electromagnetic fields and designed to house the main unit and its probe; the cylindrical-shaped diffuser ensures uniform distribution light when the station is on or in alarm.

The Area Monitor Compact is equipped with a series of electric and magnetic field probes in the frequency range from 100 kHz to 60 GHz. The probe is connected to the main unit by a dedicated heavy-duty connector, which features excellent shielding properties and can therefore be used at very high field strengths without interference (see §1.8).

The AMC Main unit has an internal rechargeable battery and connected to a round shaped base (Interface) that encloses an USB-C and RP02 connector, an RJ45 connector for Ethernet LAN with PoE if necessary and DB-15 connector for the Programmable User's Port, as well as a buzzer to increase the range of the sound signal (see §1.6, §1.7, §1.7.1).

The AMC is connected to a PC via optical fiber cable (through USB-OC adapter) or wired USB or Ethernet cable or Wi-Fi connection with Probe Manager (see Chapter 3, 4 and 6) or SMARTS AMC Management software (see Chapter 5).
The Bluetooth connection is available for Android and iOS device through LR-01 Manager App (see Chapter 8 and 9).
In addition to the software delivered with the AMC, the communication and control protocol is freely available so users can fully control the Area Monitor Compact with their usual test software (see Chapter 10).

The MAC address assigned by the manufacturer is located externally on one side of the Wall bracket

The Area Monitor Compact can be installed wall mounted by bracket or suitable for ground installation with the provided Tripod AMC support and the option TR-02A or upside-down if ceiling mounted (see Chapter 2).

| 1-2 | **General information** |

1.3 Standard accessories

Standard accessories included with AMC Area Monitor Compact:
- Main unit
- AMC Interface
- Wall support bracket
- Radome
- Tool Kit of screws and washers
- Expansion plugs
- Tripod AMC support
- 2.5mm and 3mm Allen Key
- USB Cable – USB(A)/USB(C), 2 m long
- AC/DC Converter with plug adapters
- Cable, FO Duplex, RP-02/10, 10 m long
- USB-OC Optical Converter

1.4 Optional accessories

AMC accessories supplied separately (on charge):
- Cable, DB15(m)/DB15(m), 1,8 m
- Ethernet cable, 5 m
- Cable, FO Duplex, RP-02/20, 20 m long
- Cable, FO Duplex, RP-02/40, 40 m long
- Power Over Ethernet injector
- Carrying case
- EHP-2B-05 E and H-Field Sensor
- EHP-2B-06 E and H-Field Sensor
- EHP-2B-07 E and H-Field Sensor
- EHP-2B-08 E and H-Field Sensor
- TR-02A Tripod complete with joint

General information | 1-3 |

1.5 Main specifications

When not differently specified, the following specifications refers to an operating ambient temperature of 23°C and relative humidity of 50%.

Table 1-1 Technical specifications	
Interfaces	Optical (RP-02), USB-C, WiFi (802.11 b/g/n), Bluetooth (5.0), Ethernet 10/100 BaseT (PoE), User's Port
Optical fiber connection	Serial Optical Interface 115200 Baud RP02 connector up to 40 m (USB-OC)
Sampling time	Automatic from 0.3 s
Internal log interval	Settable from 1 sec to 1 hour, manually triggered, on adjustable threshold
Max data storage capability	Up to 250000 points [1]
Probe depending specifications	Frequency range, Frequency flatness, Dynamic range, Resolution, Sensitivity, Accuracy, Overload, Measurement units, Detector, Sampling rate, Acquisition method
GPS module	GNSS module Satellite System GPS + QZSS + GLONASS + GALILEO

Supplementary data
   Battery voltage and capacity
   Data & Time
   Temperature
   Humidity (relative)
   Pressure
   GPS coordinates
   Altitude
   Compass
   Speed
   Acceleration
	Internal sensor for reporting and logging

Warnings and Alarms notifications	Field, Probe, Temperature, Humidity, Battery, Communications
Alarms indication	Acoustic, visual, vibration, data log
Internal memory	256 Mb
Calibration [2]	internal E^{2}PROM
Internal battery	3.7 V / 1320 mAh Li-Ion, rechargeable
Operating time [3]	Stand alone mode up to 100 hours Optical mode [4] up to 60 hours BT mode [4] up to 20 hours WiFi mode [4] up to 10 hours
Recharging time	< 2.5 hours
External power supply	5 VDC, Imax 2A
Firmware updating	Through the optical link
Self test	Automatic at power on
Operating temperature	-20 to +55 °C
Storage temperature	-30 to +75°C
Operating relative humidity [5]	5 to 95 %
Ingress protection	Up to IP42 (Indoor) Up to IP65 (Outdoor)
Dimensions	Ǿ 86mm, Heigh 306mm Wall distance 93mm with support Bracket
Weight	350g only the AMC Wall support bracket and Interface. 800g total weight.

Specification are subject to change without notice
[1] In logger mode extended format
[2] Recommended re-calibration interval 24 month
[3] Operating time depends on the driven probe, measure setting, and communication channel
[4] Continuous communication worst case
[5] Without condensation

1-4	General information

1.6 AMC Main unit
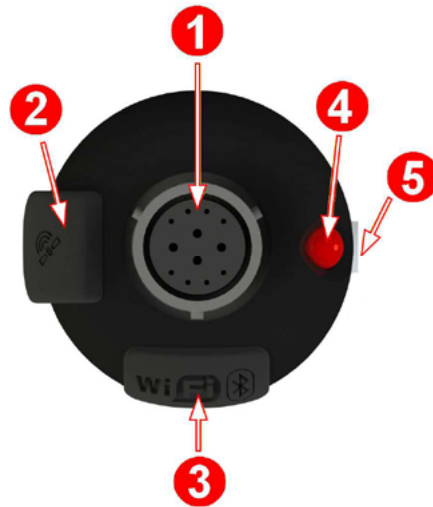
Fig. 1-1 Top panel

Legend:

1. Robust bayonet connector
2. GPS antenna
3. Wireless antennas
4. Visual Led (see §2.7)
5. Manual log button

1.7 AMC Wall support bracket and Interface
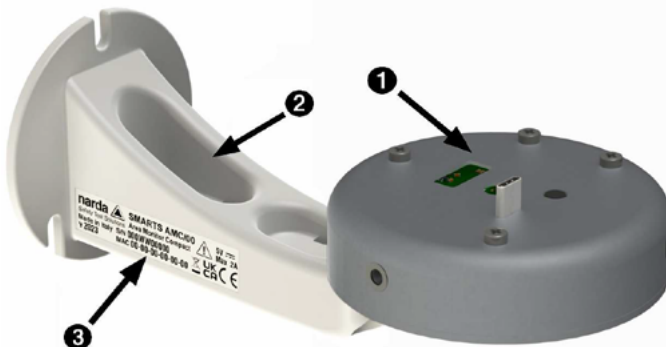
Fig. 1-2 Wall support bracket and AMC Interface (top view)

Legend:

1. AMC Interface
2. Wall bracket
3. Identification label with Serial number, MAC address and safety note
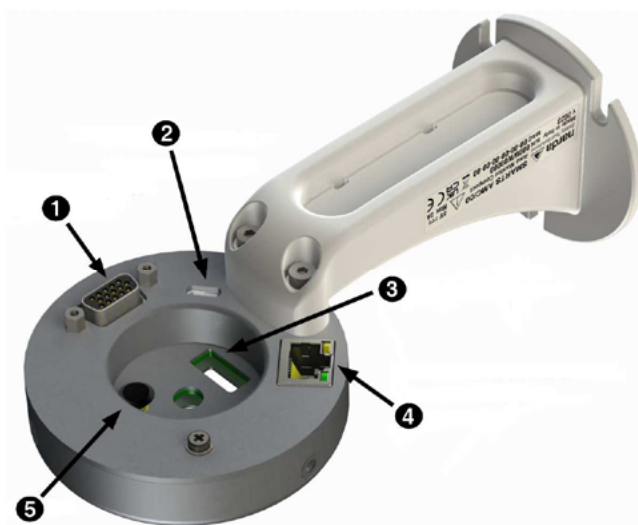
Fig. 1-3 AMC Interface Connectors detail (bottom view)

Legend:

1. User Port (see upcoming paragraph)
2. USB-C connector
3. Ethernet 10/100 BaseT RJ45 connector (PoE ready)
4. Fiber Optic window
5. ON/OFF button

General information | 1-5 |

1.7.1 DB-15 User's Port and application example

The SMARTS AMC Area Monitor Compact is also equipped with DB-15 (HD-15) connector for the Programmable User's Port.
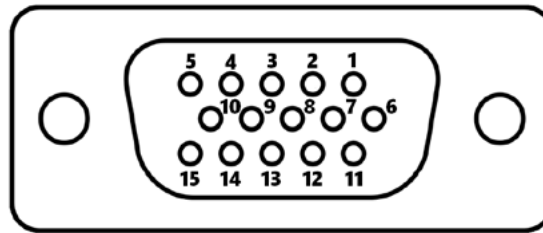
Fig. 1-4 Programmable User's Port HD-15 female connector pinout

1	GND	**6**	+5 Volt power out	**11**	OUT2 Emitter
2	OUT4 N.C Relay	**7**	OUT2 Collector	**12**	OUT1 Emitter
3	OUT4 Com. Relay	**8**	OUT1 Collector	**13**	N.A
4	OUT4 N.O. Relay	**9**	N.A	**14**	N.A
5	OUT3 Com. Relay	**10**	OUT3 N.C Relay	**15**	N.A

There are two optocoupled outputs (OUT1 and OUT2) and two relais output (OUT3 and OUT4).
Then there is a +5 V, 150 mA max protected output supply, and a ground pin.

NOTE

Please, refer to the ?AMCk* and SAMCk para* command on the chapter 10 of this manual for the status and settings of the DB-15 User's port.

Input and output signals of the User's Port are optocoupled or relais protected and can be used to control external devices or to trigger measurements under specific conditions.
When the command **SAMCR para*** is enabled in presence of an alarm the port OUT3 (pin 5 and 10) and port OUT4 (pin2 and 3) of relay are normally closed. The pin 3 and 4 (OUT4) shows a normally open contact of the same relay.
Port OUT1 (pin 8 and 12) and OUT2 (pin7 and 11) are connected to the collector and emitter of the BJT of optocoupler. When the command **SAMC1 para*** is enabled in presence of an alarm the port OUT1 (pin 8 and 12) are closed in the same way the command **SAMC2 para*** close the port OUT2 (pin 7 and 11).
Typical examples are when interfacing: position sensors, movement sensors, interlock etc. Another example could be the activation of an external powerful alarm siren.
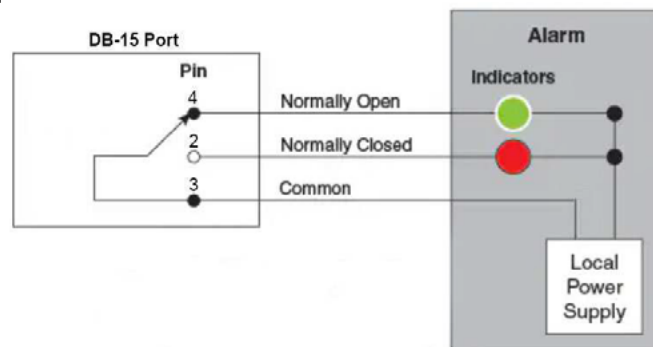
Fig. 1-5 User's Port application example

1-6   General information

Telemeter Electronic GmbH | Joseph-Gaensler-Str. 10 | 86609 Donauwoerth | Phone +49 906 70693-0 | Fax +49 906 70693-50 | www.telemeter.info   16

1.8 Field Probes   The following list shows the Field probes designed for SMARTS AMC Area Monitor Compact

TABLE 1-2 Technical Specifications of SMARTS Area Monitor Compact Field Probes		
Field Probe	**Range of frequency**	**Reading**
ELECTRIC AND MAGNETIC FIELD SHAPED PROBE EHP-2B-05	E: 500 kHz – 9.25 GHz H: 20 MHz – 1 GHz	E: 0.1 (0.5) – 1000 % H: 0.3 (1.5) – 1000 %
ELECTRIC AND MAGNETIC FIELD SHAPED PROBE EHP-2B-06	E: 500 kHz – 60 GHz H: 20 MHz – 1 GHz	E: 0.1 (0.5) – 1000 % H: 0.3 (1.5) – 1000 %
ELECTRIC AND MAGNETIC FIELD SHAPED PROBE EHP-2B-07	E: 1.34 MHz – 9.25 GHz H: 1 MHz – 1 GHz	E: 0.1 (0.5) – 1000 % H: 0.3 (1.5) – 1000 %
ELECTRIC AND MAGNETIC FIELD SHAPED PROBE EHP-2B-08	E: 1.34 MHz – 60 GHz H: 1 MHz – 1 GHz	E: 0.1 (0.5) – 1000 % H: 0.3 (1.5) – 1000 %

NOTE

With EHP-2B shaped models of field probes, after selecting the desired limit, the Area Monitor Compact gives the percentage of level referred to it.
Probes belonging to this group allow measurements compensation based on frequency.
If the frequency of the signal (applicable only for single-tone) to be measured is known, it is possible to apply an automatic flatness correction, and the AMC is also able to properly switch between linear (electric and magnetic field) and quadratic (power density) detection according to the standard and frequency. In other words, the field level evaluation becomes linear under 10 MHz (for both standard ICNIRP98 and SC6) or 30 MHz (for ICNIRP2020).

NOTE

These probes are designed to achieve compact dimensions, useful for area monitoring, therefore resulting a good compromise between size and performance.

General information   1-7

DUAL-BAND ELECTRIC AND MAGNETIC SHAPED FIELD PROBE EHP-2B-05
For ICNIRP 1998 and SC6 2015

			Electric Field	Magnetic Field
Frequency range	**ICNIRP 1998**	**Occupational**	0.5 – 9250 MHz	20 – 1000 MHz
		General Public		
	SC6 2015	**Controlled**	3 – 9250 MHz	
		Uncontrolled		
Level range [1]	**Occupational / Controlled**		0.1 – 1000 %	0.3 – 1000 %
	General Public / Uncontrolled		0.5 – 1000 %	1.5 – 1000 %
Overload			2000 %	
Linearity [2]			+/- 0.5 dB	
Power (Amplitude) dynamic range	**Occupational / Controlled**		40 (80) dB	35 (70) dB
	General Public / Uncontrolled		33 (66) dB	28 (56) dB
Resolution			0.01 %	
Sensitivity	**Occupational / Controlled**		0.1 %	0.3 %
	General Public / Uncontrolled		0.5 %	1.5 %
Frequency flatness [3] **(typ)**	**ICNIRP 1998**	**Occupational**	0.5 – 3 MHz +4/-3 dB	20 – 1000 MHz +/-3 dB
		General Public	3 – 9250 MHz +/-3 dB	
	SC6 2015	**Controlled**	3 – 10 MHz +2/-3 dB 10 – 9250 MHz +/-3 dB	
		Uncontrolled	3 – 9250 MHz +/-3.5 dB	
Anisotropy [4]			+/- 0.5 dB	
Temperature error [4]			0.03 dB/°C	0.01 dB/°C
Temperature sensor			On board	
Field sensor			Triaxial orthogonal dipoles	Triaxial orthogonal loops
A/D convertion			On board	
Calibration [5]			internal E^{2}PROM	
Operating temperature			-20 to +55 °C	
Operating relative humidity [6]			5 to 95 %	
Storage temperature			-30 to +75°C	
Dimensions			165 mm length, 54mm diameter	
Weight			100 g	

Specification are subject to change without notice

When not differently specified the following specifications are referred to operating ambient temperature 23°C and relative humidity 50%.

Note (1): Power density referred.
Note (2): At 50 MHz on related level range 6dB above the noise floor
Note (3): Relative to 10% of the standard limit

Note (4): At 50 MHz / 10% of the standard limit
Note (5): Recommended re-calibration interval 24 month
Note (6): Without condensation

(*) All probes include on board A/D conversion, calibration factors on E$_2$PROM, and temperature sensor

Fig. 1-6 EHP-2B-05 probe

1-8   **General information**

DUAL-BAND ELECTRIC AND MAGNETIC SHAPED FIELD PROBE EHP-2B-06
For ICNIRP 1998 and SC6 2015

			Electric Field	Magnetic Field
Frequency range	ICNIRP 1998	Occupational	0.5 MHz – 60 GHz	20 – 1000 MHz
		General Public		
	SC6 2015	Controlled	3 MHz – 60 GHz	
		Uncontrolled		
Level range [1]	Occupational / Controlled		0.1 – 1000 %	0.3 – 1000 %
	General Public / Uncontrolled		0.5 – 1000 %	1.5 – 1000 %
Overload			2000 %	
Linearity [2]			+/- 0.5 dB	
Power (Amplitude) dynamic range	Occupational / Controlled		40 (80) dB	35 (70) dB
	General Public / Uncontrolled		33 (66) dB	28 (56) dB
Resolution			0.01 %	
Sensitivity	Occupational / Controlled		0.1 %	0.3 %
	General Public / Uncontrolled		0.5 %	1.5 %
Frequency flatness [3] **(typ)**	ICNIRP 1998	Occupational	0.5 – 3 MHz +4/-3 dB 3 – 18000 MHz +/-3 dB 18 – 60 GHz +8/-1 dB	20 – 1000 MHz +/-3 dB
		General Public	3 – 10 MHz +2/-3 dB 10 – 18000 MHz +/-3 dB 18 – 60 GHz +8/-1 dB	
	SC6 2015	Controlled	3 – 9250 MHz +/-3.5 dB 9250 – 18000 MHz +6/0 dB	
		Uncontrolled	18 – 60 GHz +8/-1 dB	
Anisotropy [4]			+/- 0.5 dB	
Temperature error [4]			0.03 dB/°C	0.01 dB/°C
Temperature sensor			On board	
Field sensor			Triaxial orthogonal dipoles	Triaxial orthogonal loops
A/D convertion			On board	
Calibration [5]			internal E^{2}PROM	
Operating temperature			-20 to +55 °C	
Operating relative humidity [6]			5 to 95 %	
Storage temperature			-30 to +75°C	
Dimensions			165 mm length, 54mm diameter	
Weight			100 g	

Specification are subject to change without notice

When not differently specified the following specifications are referred to operating ambient temperature 23°C and relative humidity 50%.

Note (1): Power density referred.
Note (2): At 50 MHz on related level range 6dB above the noise floor
Note (3): Relative to 10% of the standard limit

Note (4): At 50 MHz / 10% of the standard limit
Note (5): Recommended re-calibration interval 24 month
Note (6): Without condensation

(*) All probes include on board A/D conversion, calibration factors on E₂PROM, and temperature sensor

Fig. 1-7 EHP-2B-06 probe

DUAL-BAND ELECTRIC AND MAGNETIC SHAPED FIELD PROBE EHP-2B-07
For ICNIRP 2020 and FCC 96-326*

			Electric Field	Magnetic Field
Frequency range	**ICNIRP 2020**	**Occupational**	5 – 9250 MHz	1 – 1000 MHz
		General Public		
	FCC 96-326	**Occupational**	2 – 9250 MHz	2 – 1000 MHz
		General Pop.	1.34 – 9250 MHz	1 – 1000 MHz
Level range [1]	**Occupational**		0.1 – 1000 %	0.3 – 1000 %
	General P.		0.5 – 1000 %	1.5 – 1000 %
Overload			2000 %	
Linearity [2]			+/- 0.5 dB	
Power (Amplitude)	**Occupational**		40 (80) dB	35 (70) dB
dynamic range	**General P.**		33 (66) dB	28 (56) dB
Resolution			0.01 %	
Sensitivity	**Occupational**		0.1 %	0.3 %
	General P.		0.5 %	1.5 %
Frequency flatness [3] **(typ)**	**ICNIRP 2020**	**Occupational**	5 – 9250 MHz +/-2 dB	1 – 200 MHz +3.5/-1 dB
		General Public		200 – 1000 MHz +3.5/-4 dB
	FCC 96-326	**Occupational**	2 – 9250 MHz +/-3 dB	2 – 1000 MHz +/-3 dB
		General Pop.	1.34 – 9250 MHz +/-3 dB	1 – 1000 MHz +/-3 dB
Anisotropy [4]			+/- 0.5 dB	
Temperature error [4]			0.03 dB/°C	0.01 dB/°C
Temperature sensor			On board	
Field sensor			Triaxial orthogonal dipoles	Triaxial orthogonal loops
A/D convertion			On board	
Calibration [5]			internal E^{2}PROM	
Operating temperature			-20 to +55 °C	
Operating relative humidity [6]			5 to 95 %	
Storage temperature			-30 to +75°C	
Dimensions			165 mm length, 54mm diameter	
Weight			100 g	

Specification are subject to change without notice

When not differently specified the following specifications are referred to operating ambient temperature 23°C and relative humidity 50%.

FCC 96-326 considers the terms general population/uncontrolled and occupational/controlled.

Note (1): Power density referred.
Note (2): At 50 MHz on related level range 6dB above the noise floor
Note (3): Relative to 10% of the standard limit
Note (4): At 50 MHz / 10% of the standard limit
Note (5): Recommended re-calibration interval 24 month
Note (6): Without condensation

(*) All probes include on board A/D conversion, calibration factors on E**2**PROM, and temperature sensor

Fig. 1-8 EHP-2B-07 probe

1-10	**General information**

DUAL-BAND ELECTRIC AND MAGNETIC SHAPED FIELD PROBE EHP-2B-08
For ICNIRP 2020 and FCC 96-326*

			Electric Field	Magnetic Field
Frequency range	ICNIRP 2020	Occupational	5 MHz – 60 GHz	1 – 1000 MHz
		General Public		
	FCC 96-326	Occupational	2 MHz – 60 GHz	2 – 1000 MHz
		General Pop.	1.34 MHz – 60 GHz	1 – 1000 MHz
Level range [1]	Occupational		0.1 – 1000 %	0.3 – 1000 %
	General P.		0.5 – 1000 %	1.5 – 1000 %
Overload			2000 %	
Linearity [2]			+/- 0.5 dB	
Power (Amplitude)	Occupational		40 (80) dB	35 (70) dB
dynamic range	General P.		33 (66) dB	28 (56) dB
Resolution			0.01 %	
Sensitivity	Occupational		0.1 %	0.3 %
	General P.		0.5 %	1.5 %
Frequency flatness [3] **(typ)**	ICNIRP 2020	Occupational	5 – 9250 MHz +/- 2 dB 9250 – 18000 MHz +3/-2 dB 18 – 60 GHz +8/-1 dB	1 – 200 MHz +3.5/-1 dB 200 – 1000 MHz +3.5/-4 dB
		General Public		
	FCC 96-326	Occupational	2 – 18000 MHz +/- 3 dB 18 – 60 GHz +8/-1 dB	2 – 1000 MHz +/- 3 dB
		General Pop.	1.34 – 18000 MHz +/- 3 dB 18 – 60 GHz +8/-1 dB	1 – 1000 MHz +/- 3 dB
Anisotropy [4]			+/- 0.5 dB	
Temperature error [4]			0.03 dB/°C	0.01 dB/°C
Temperature sensor			On board	
Field sensor			Triaxial orthogonal dipoles	Triaxial orthogonal loops
A/D convertion			On board	
Calibration (5)			internal E^{2}PROM	
Operating temperature			-20 to +55 °C	
Operating relative humidity (6)			5 to 95 %	
Storage temperature			-30 to +75°C	
Dimensions			165 mm length, 54mm diameter	
Weight			100 g	

Specification are subject to change without notice

When not differently specified the following specifications are referred to operating ambient temperature 23°C and relative humidity 50%.

FCC 96-326 considers the terms general population/uncontrolled and occupational/controlled.

Note (1): Power density referred.
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Note (5): Recommended re-calibration interval 24 month
Note (6): Without condensation

(*) All probes include on board A/D conversion, calibration factors on E**2**PROM, and temperature sensor

Fig. 1-9 EHP-2B-08 probe

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General information

2 - Installation and use

2.1 Introduction

This section provides the information required for installing and using the SMARTS AMC Area Monitor Compact.

Information is included regarding initial inspection, power requirements, interconnections, work environment, assembly, cleaning, storage and shipment.

2.2 Preliminary inspection

Inspect the packaging for any damage.

NOTICE

If the packaging or anti-shock material have been damaged, check that the contents are complete and that the repeater has not suffered electric or mechanical damage.
Check that all the Accessories are there against the checklist found with the apparatus.
Inform the carrier and NARDA of any damage that has occurred.

2.3 Work environment

The work environment of the Accessories, must come within the following conditions:

- Temperature   From -20° to +55° C (0°C to 40°C for Battery Charger)
- Humidity   < 95% relative

The Area Monitor Compact must be stored in a clean and dry environment, free from acid dusts and humidity.

The storage environment must come within the range of the following conditions:

- Temperature   From -30° to + 75° C (-20°C to 60°C for Battery Charger)
- Humidity   < 95% relative

2.4 Return for repair

When the Area Monitor Compact needs to be returned to NARDA for repair, please complete the questionnaire appended to this User's Manual, filling in all the data that will be useful for the service you have requested.

For reducing the period of time required for the repairs, it is necessary to be as specific as possible in describing the problem. If the problem only occurs in certain circumstances, please describe in detail how it happens.

If possible it is better to reuse the original packaging; making sure that the apparatus is wrapped in thick paper or plastic.

Otherwise, use strong packaging by using a sufficient quantity of shock absorbent material around all sides of the repeater to ensure that it is compact and does not move around inside the package.

In particular, take every precaution to protect the front and rear Main unit panels, Wall support bracket, Interface and Radome.

Finish the package by sealing it up tightly.

Apply a FRAGILE label to the package to encourage greater care in its handling.

2.5 Instrument cleaning

Use a dry, clean and non-abrasive cloth for cleaning the Area Monitor Compact.

NOTICE

Do not use solvents, acids, turpentine, acetone or other similar products for cleaning the repeater in order to avoid damaging it.

Installation and use   2-1

2.6 Installation and use

This section provides the information necessary to install and use the SMARTS AMC Area Monitor Compact in different configuration:
- Area Monitor Compact Wall mounted (see §2.6.1)
- Area Monitor Compact on TR-02A (option) by Tripod support (see §2.6.2)
- Area Monitor Compact on ceiling by Wall bracket (see §2.6.3)
- Area Monitor Compact on ceiling by Tripod AMC support (see §2.6.4)

NOTE

For further information about the use of AMC with Probes Manager software, please refer to the chapter 3, 4 and 6.

NOTE

For further information about the use of AMC with SMARTS AMC Management software, please refer to the chapter 5 .

NOTE

The BLE connection is available for Android and iOS device through the LR-01 Manager App. For further information see Chapter 8 and 9.
To active the Bluetooth communication on the AMC the user must connect the Area Monitor to Narda Probe Manager software and enable the BLE function (see §4.2.7.2 Bluetooth connection).

NOTICE

Correct readings may be conditioned by the nature of the places in which the AMC is installed.
The field sensor is affected by huge metallic masses or other objects that may reflect the signal, if located in the vicinity of the Area Monitor.
Whenever possible, it is a good rule to install the AMC at some distance from walls, high voltage pylons, buildings and other obstacles that could affect the field measuring and the wireless signals reaching the WiFi device.

NOTICE

When measuring fields from transmitting aerials, it is important to place the probe with the supporting handle in line with the polarity of the aerial. This is to avoid any interference with the reading, especially when analysing signals of the megahertz range.

NOTICE

The probe used with the AMC has highly sensitive components. Do not insert the probe in fields which exceed the maximum limit allowed.

NOTICE

In order to avoid interference and the risk of influencing measurements with internal RF module signals (BLE and Wi-Fi), the AMC has been specially designed so that detections are taken when these devices are not radiating.

NOTE

Prior to installing AMC where the WiFi connection is planned to be used, make sure that the point at which the Area Monitor will be placed is adequately covered by the WiFi network.
**The signal strength can be checked using any smartphone capable of indicating the intensity of the WiFi signal. It is also advisable to look for the point at which the signal shows its maximum and, eventually, rotate the AMC along its vertical axis to face the Antenna toward to the point self.**

2-2   Installation and use

2.6.1 Wall mounted Installation

Follow the instructions below:

- Fix the provided three expansion plugs to the wall; for a correct installation refers to the following hole diameter and distance:

Ø 0.23"/ 6mm

≥ 1.77"/ 45mm

1.85" / 47mm

1.65" / 42mm
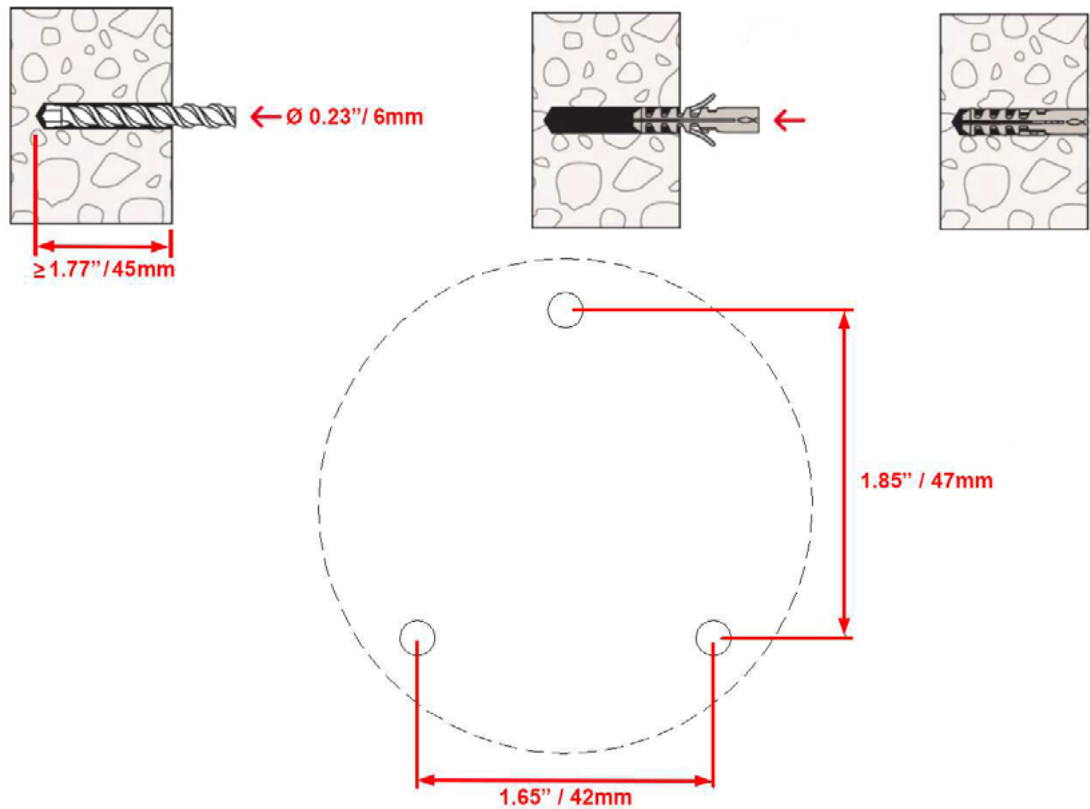
- Assembly the Wall support bracket to the AMC Interface with 2 pcs. socket head cup screws M4x20mm and washers using Allen key 3mm

Installation and use   2-3
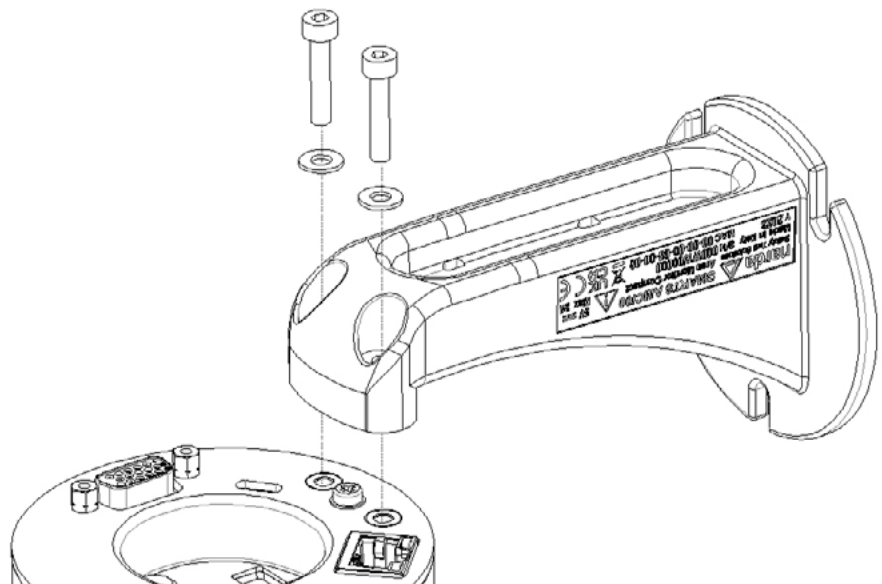
- Install the bracket to the wall and tight the provided 3 pcs. screws 4.5x40mm.
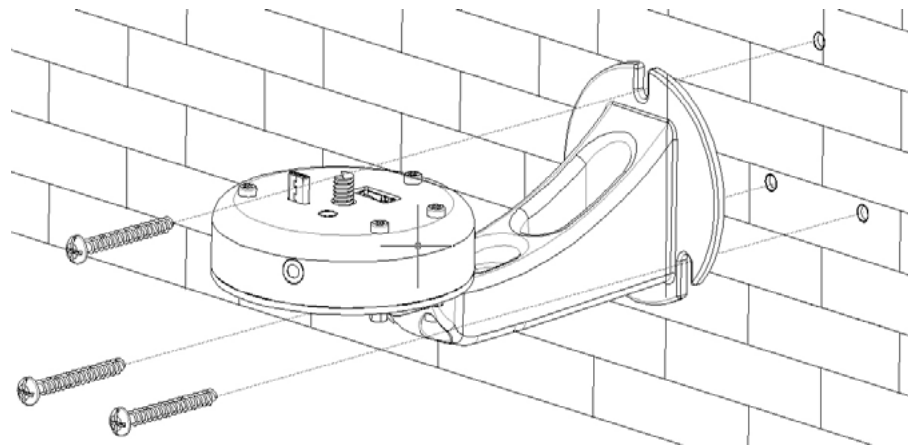
- Turn off the Main unit and plug it into the USB-C connector located on the top of the AMC interface.
Fix the Main unit to the base plate with the provided screws 1/4"x5/8
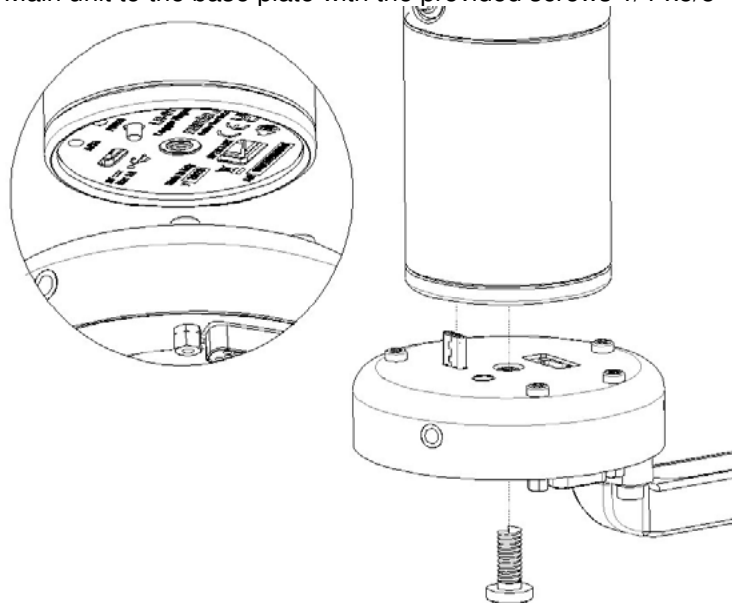
- Connect the probe to the Main unit upper round multipole connector paying attention to the position key and tightening the bayonet joint.

- Be sure that the Main unit is well connected and the probe connector is well locking.

- Connect the AMC to the PC through USB-C or Fiber Optic or Ethernet port located on the bottom of the AMC interface.
A programmable User's Port is available for external devices or trigger measurements under specific conditions (see §1.7.1).

The USB-C connection provides also the charging of the internal Li-ion battery. Please check the PC port shows enough current to guarantee this service.

NOTICE   **Please, always use the supplied USB cables and chargers.**

2-4   **Installation and use**

In case of Fiber Optic connection, connect the RP-02 cable to the interface port taking care that the spigot matches the housing. Connect the other side of the fiber optic to the provided USB-OC (taking care that the grip recess points towards the centre of the device). Connect the converter to a PC port.

NOTICE **The USB-OC standard accessory connected to the AMC allows a 40m maximum fiber length; the standard length supplied is 10 m.**

NOTICE **The DB15 and Ethernet cables are optional accessory. Please contact your local Narda distributor for details.**

- Install the protective cover to the AMC baseplate and tight the 3 pcs. button head screws M4x10mm and plastic washer using Allen key 2.5mm

- The four oval shaped holes allow user to fasten the cables to the wall bracket using 2 pcs plastic straps (not provided).
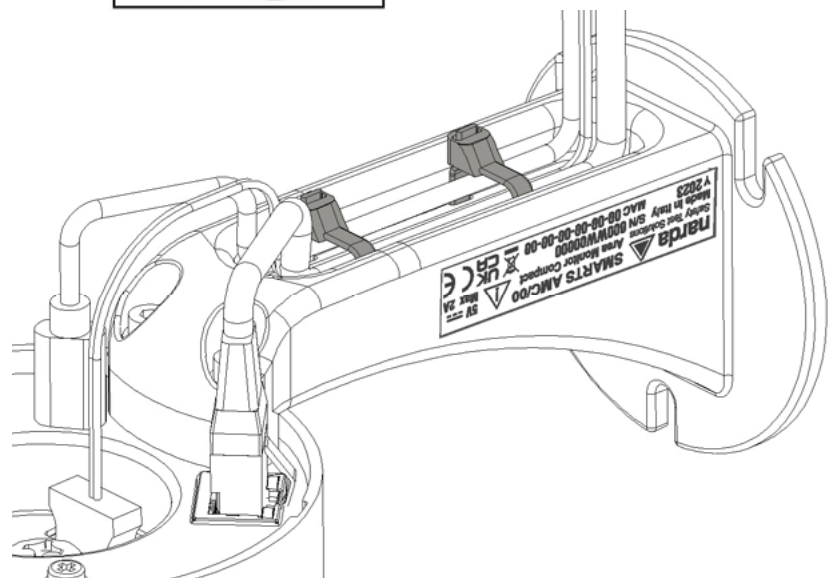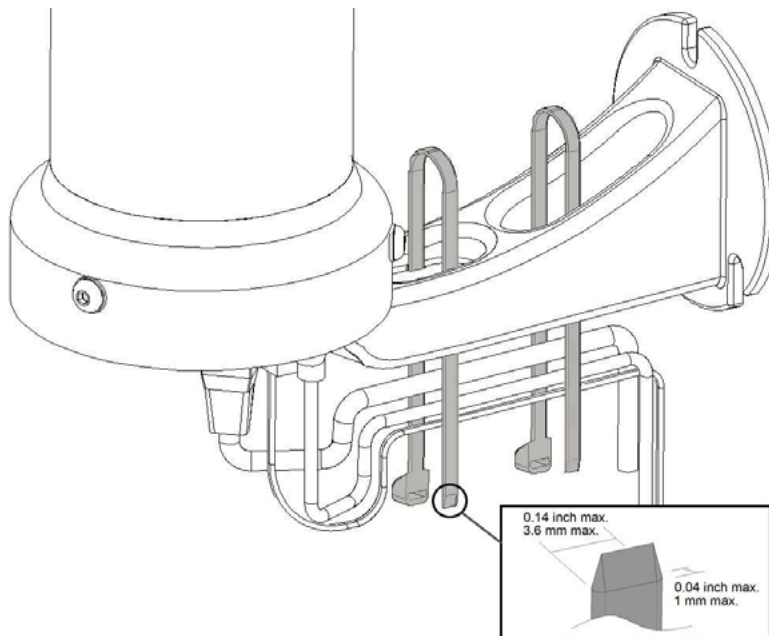
0.14 inch max.
3.6 mm max.

0.04 inch max.
1 mm max.

Installation and use 2-5

- Switch the unit on by pushing the button for a short while and check the Visual Led status (see §2.7)

NOTE

Pressing the button for more than 4 seconds forces the SMARTS AMC to shut down if it is not supplied by USB-C cable or PoE Injector. Then, it is necessary to wait some seconds before switching the AMC on again.

- Install the Probes Manager (see chapter 3) or SMARTS AMC Management (see chapter 5) on PC from the supplied Software Media.

- Configure the AMC with Narda Probes Manager (see chapter 4) or SMARTS AMC Management (see chapter 5) or custom software (see Chapter 10).
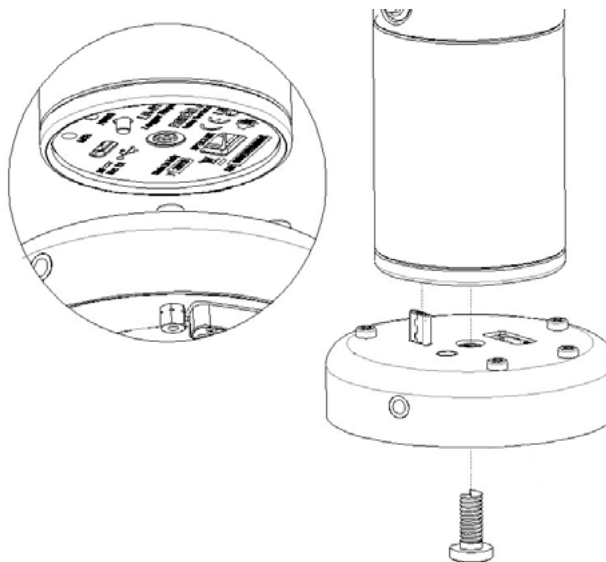

Fig. 2-1 AMC - Wall mounted

| 2-6 | Installation and use |

2.6.2 Tripod mounted installation

- Install the TR-02A Tripod (optional) on the site to be monitored.

- Turn off the Main unit and plug it into the USB-C connector located on the top of the AMC interface. Fix the Main unit to the base plate with the provided screws 1/4"x5/8

- Assembly the Tripod AMC support to the AMC Interface with 2 pcs. socket head cup screws M4x12mm and washers using Allen key 3mm
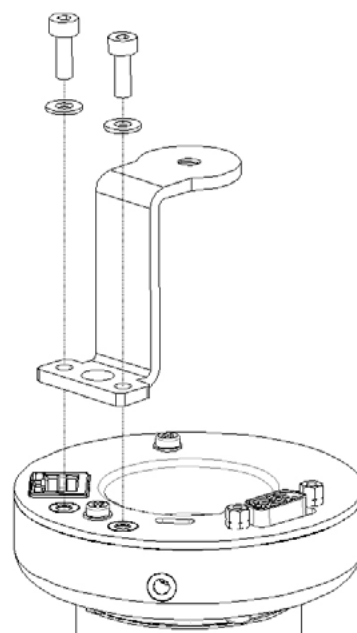
- Connect the probe to the Main unit upper round multipole connector paying attention to the position key and tightening the bayonet joint.

- Be sure that the Main unit is well connected and the probe connector is well locking.

Installation and use   **2-7**

- Screw the AMC to the TR-02A Tripod by its metallic threaded insert and tighten firmly while holding the base plate.
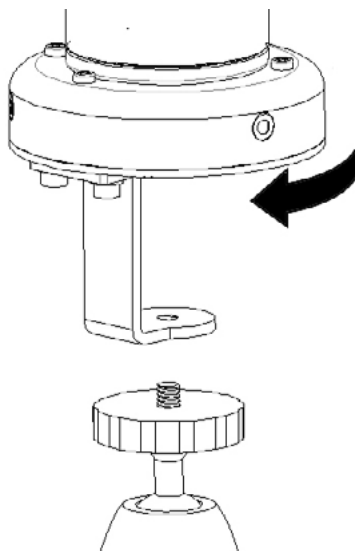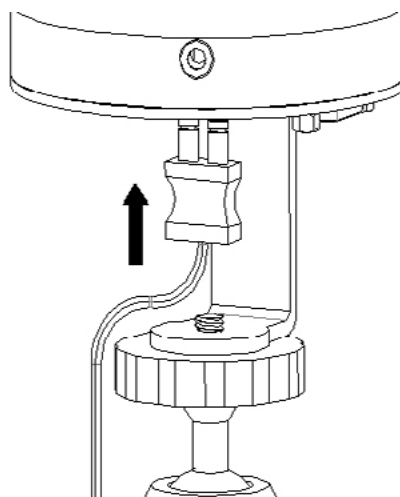
NOTICE   **Please, always use the supplied USB cables and chargers.**

NOTICE   **The DB15 and Ethernet cables are optional accessory. Please contact your local Narda distributor for details.**

It is advisable to use the Fiber Optic connection to prevent the AMC from affecting the measurement.
The fiber connector can be easily plugged into the Optic Link port directly, just taking care about proper orientation, as for the following picture, until a "click" is felt while inserting inside the window.

2-8   **Installation and use**

Telemeter Electronic GmbH | Joseph-Gaensler-Str. 10 | 86609 Donauwoerth | Phone +49 906 70693-0 | Fax +49 906 70693-50 | www.telemeter.info   30

Connect the other side of the fiber optic to the provided USB-OC (taking care that the grip recess points towards the centre of the device). Connect the converter to a PC port.

NOTICE

The USB-OC standard accessory connected to the AMC allows a 40m maximum fiber length; the standard length supplied is 10 m.

- Install the protective cover to the AMC baseplate and tight the 3 pcs. button head screws M4x10mm and plastic washer using Allen key 2.5mm

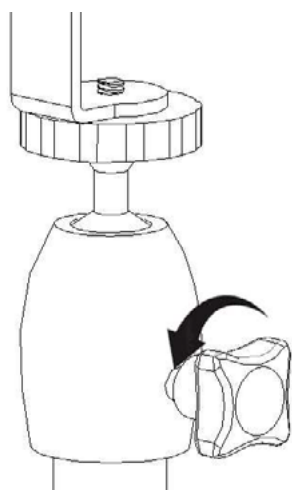- Unscrew the TR-02A knob without losing it completely and turn the unit in any angle.

Fig. 2-2 AMC on TR-02A

- Switch the unit on by pushing the button for a short while and check the Visual Led status (see §2.7)

NOTE

Pressing the button for more than 4 seconds forces the SMARTS AMC to shut down if it is not supplied by USB-C cable or PoE Injector. Then, it is necessary to wait some seconds before switching the AMC on again.

- Install the Probes Manager (see chapter 3) or SMARTS AMC Management (see chapter 5) on PC from the supplied Software Media.

- Configure the AMC with Narda Probes Manager (see chapter 4) or SMARTS AMC Management (see chapter 5) or custom software (see Chapter 10).

Installation and use   **2-9**

2.6.3 Ceiling mounted installation by Bracket

For additional information refer to paragraph 2.6.1

Fig. 2-3 AMC on ceiling by Bracket

2.6.4 Ceiling mounted installation by Tripod AMC

- Fix the expansion plugs 6x30 to the ceiling (refers to the following hole diameter)

- Install the Tripod AMC support to the ceiling and tight the screw 4.5x40mm.

For additional information refer to paragraph 2.6.2

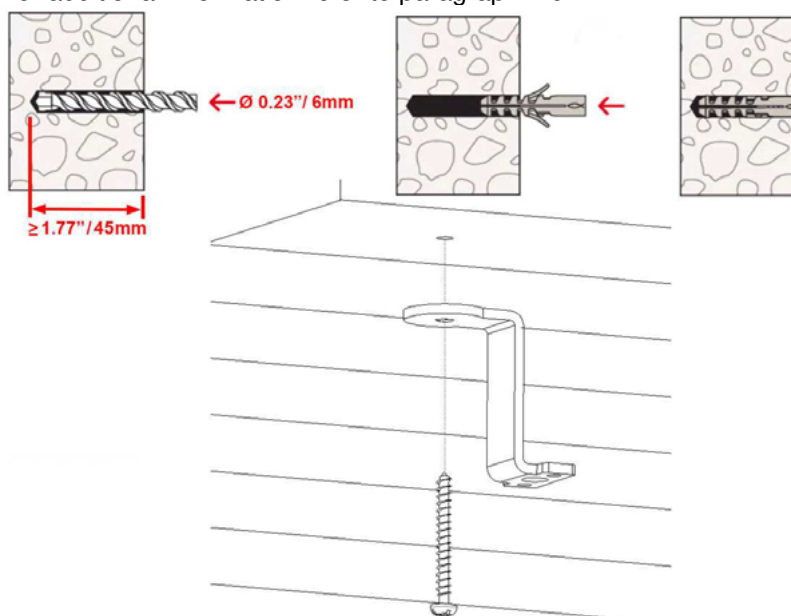**Fig. 2-4** AMC on ceiling by Tripod AMC support

| 2-10 | Installation and use |

2.6.5 Example of installation
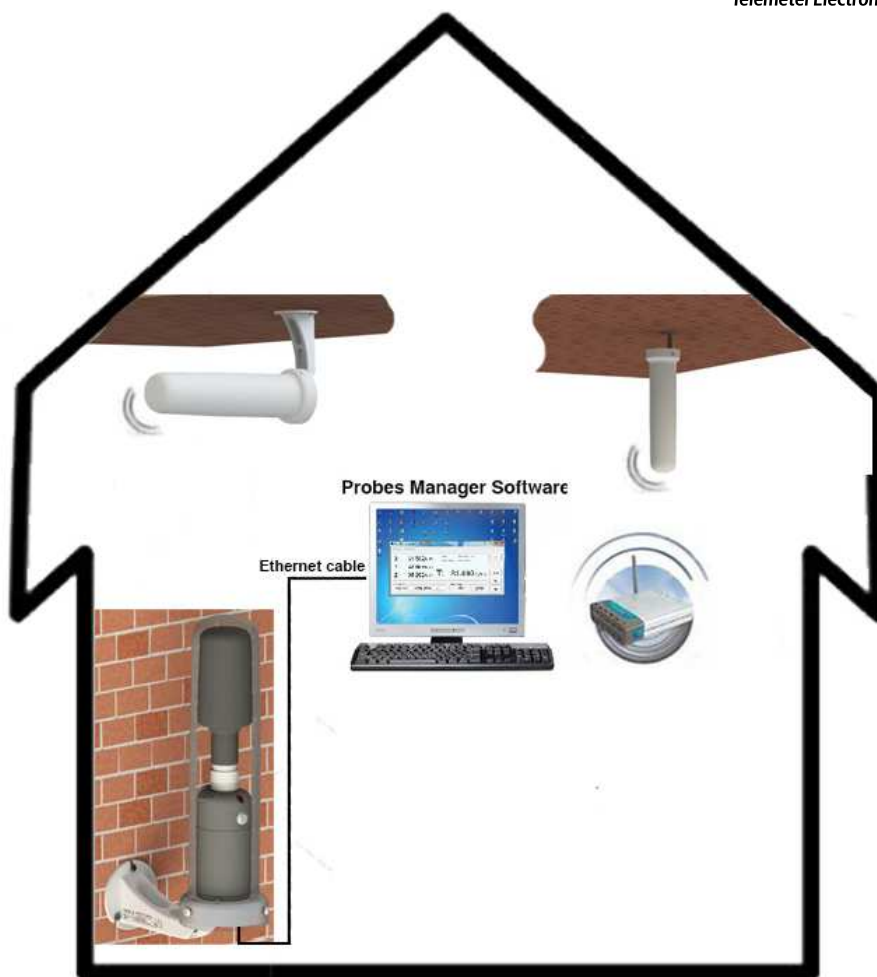
Fig. 2-5 AMC in a multi-probe configuration

Fig. 2-6 AMC link with Wi-Fi communication

Installation and use   2-11

Fig. 2-7 AMC link with Bluetooth communication by smartwatch
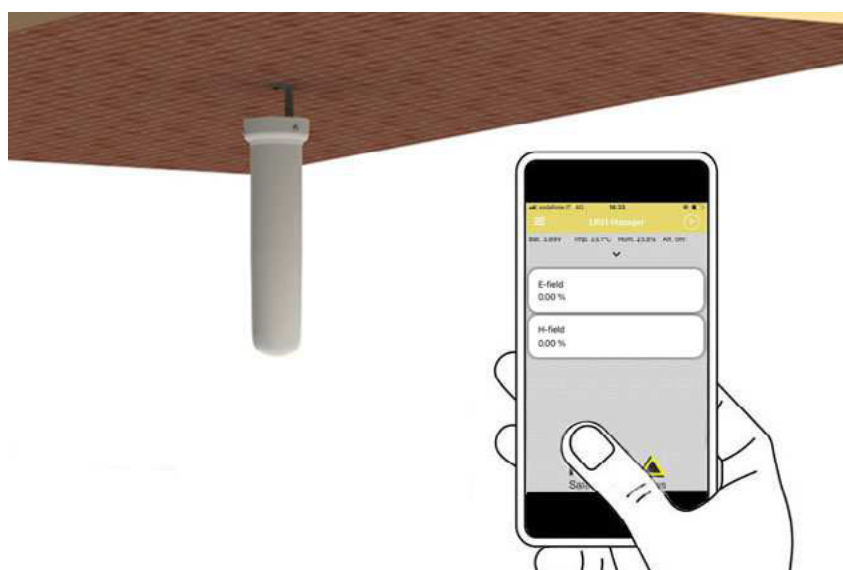
Fig. 2-8 AMC link with Bluetooth communication by mobile device
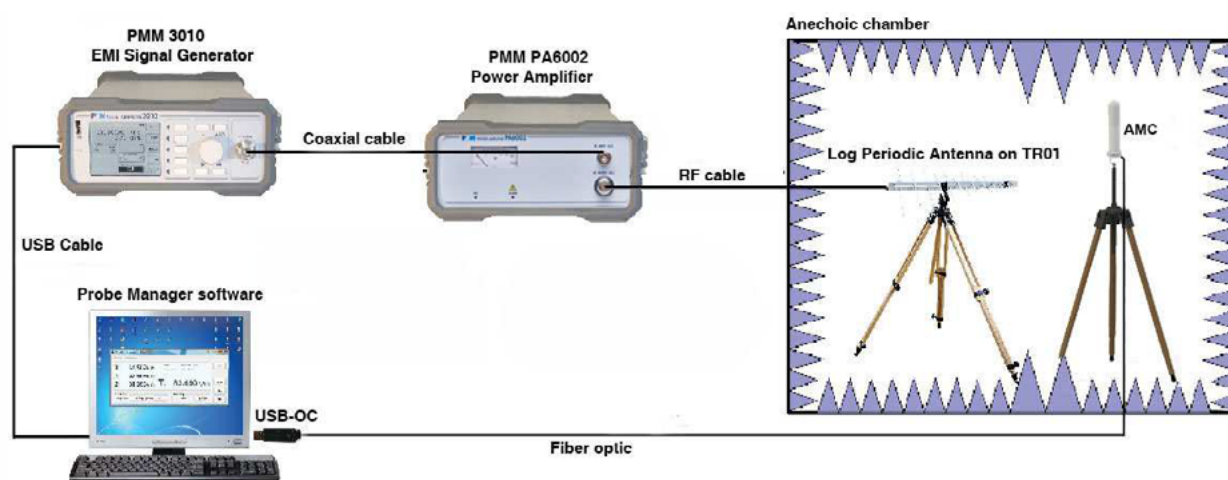
Fig. 2-9 AMC Typical Immunity test irradiation configuration

2-12   **Installation and use**

2.6.6 Use with Power Over Ethernet (optional)

The optional Power Over Ethernet, such as TL-POE150S or equivalent products is available. It delivers power, data and network connection over the same cable to the SMARTS AMC Area Monitor Compact through the Ethernet port available on the bottom of the baseplate (Ethernet cable optional).

Fig. 2-10 AMC with Power Over Ethernet

NOTE

For additional information refer to §11.9

Installation and use   2-13

2.7 Visual Led status, Manual log button, Buzzer and Accelerometer

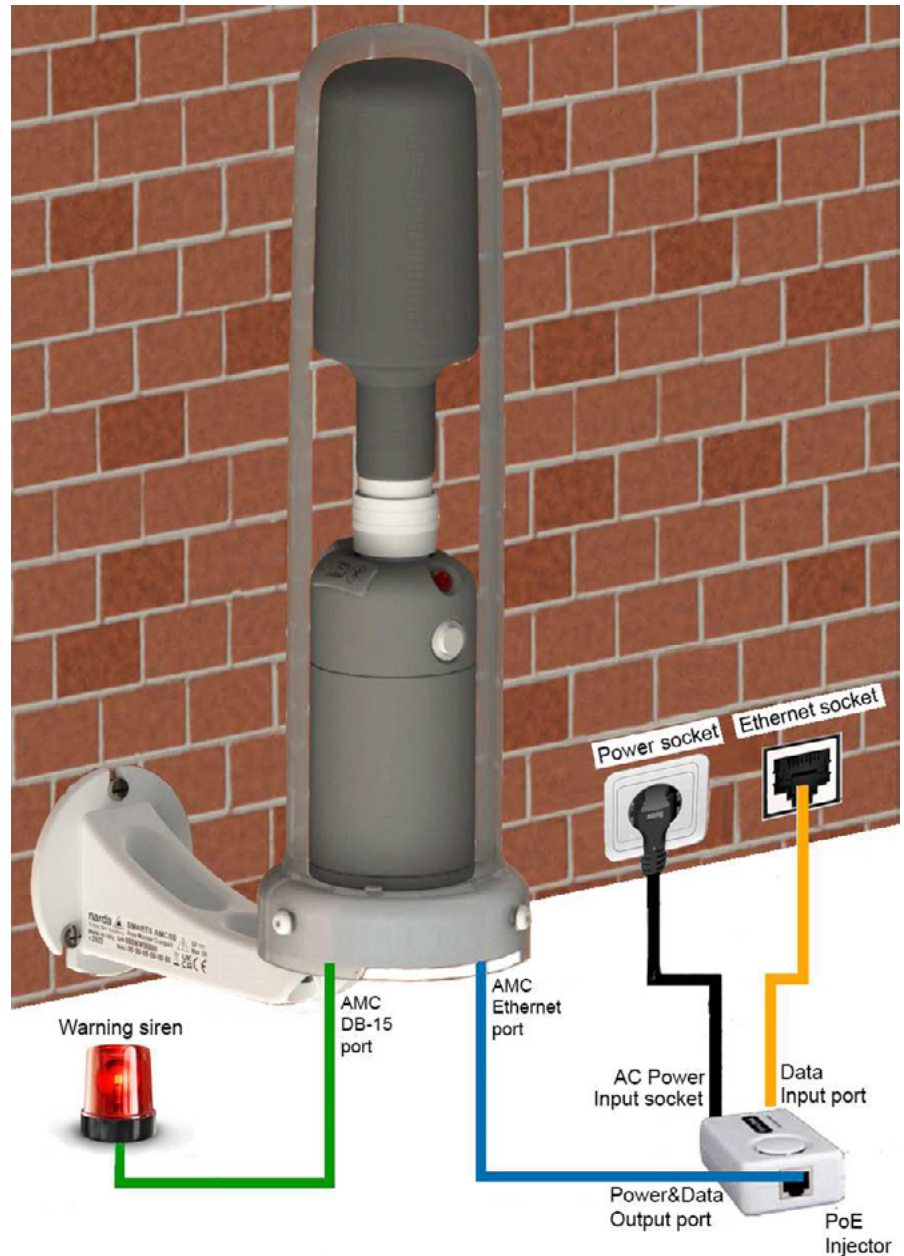| TABLE 2-1 Visual Led status			
LED	**LED flashing speed**	**LED color**	**Description**
VISUAL LED	The Visual led begins flashing for 30 seconds and then blinks every 5 seconds	Red	The Area Monitor Compact is ready to communicate
	Solid		Update firmware or Alarm or Warning threshold exceeded.

Visual Led status during Logger acquisition:

TABLE 2-2 Visual Led status in Logger mode			
LED	**LED flashing speed**	**LED color**	**Description**
VISUAL LED	Solid	Red	Alarm or warning threshold exceeded. If the log is in progress, the LED goes off for one second during the log. If the Log can be activated (AQ_ command with a rate other than 0), prolonged pressure (> 5 s) of the button recognized with the button pressed and not released (Log activated but not started yet).
	Low speed		If the Log can be activated (AQ_ command with a rate other than 0), press of the button before the actual recognition of the start of the log (pressing the button for less than 5 s).
	Fast speed		Button pressed when the Logger is disabled and it is not possible to activate it (AQ_ command with rate equal to 0).
	Single flash		Log acquisition, or (also accompanied by a short audible alarm) Logger start with deletion of the Logs previously saved in memory.
	Flashing (with rate dictated by the probe reading speed)		If the Log is in progress with acquisition not based on time (AQ_-1) and the alarm or warning threshold is continuously exceeded, the LED turns on during the log (and sound alarm always on).

NOTE

If Area Monitor Compact is not supplied by USB-C cable or PoE Injector, the unit automatically turns OFF when after 30 min. the fiber optic/Ethernet has been disconnected or the communication with PC is not established.

NOTE

The fiber optic of the AMC can be disconnected and reconnected while in use. The communication will be restarted automatically.

2-14   **Installation and use**

A manual button allows user to start logging or measurement acquisition or reboot the Area Monitor.

| Table 2-3 Manual log button status	
Manual log button	**Description**
Pressing for more than 5 s	Logger start with deletion of the previously saved Logs (after setting the Logger by means of the AQ_ command). Pressing long enough is notified by the fixed LED lighting up (big red LED) until the button is released.
Short pressing	Logger measurement acquisition (after setting the Logger by means of the AQ_ command). The pressing is notified by the big red LED lighting up. It will turn off when the record is saved.
Pressing while turning on the unit	Reset to default settings with flash save and reboot of the instrument.

The repeater is equipped with a buzzer, useful for emitting sound alerts.

Table 2-4 Buzzer status	
Buzzer	**Description**
Long sound	Field level Alarm threshold exceeded.
Short sound	Logger starting.

NOTE

Buzzer sound and vibration are not continuous but intermittent, 600ms on and 400ms off.

The repeater is also equipped with an internal Accelerometer that measures acceleration, which in practical terms means changes in speed or direction. It is expressed in hundredths of g for each of the three axes.

Table 2-5 Accelerometer axes orientation

Fig. 2-11 Accelerometer axes orientation
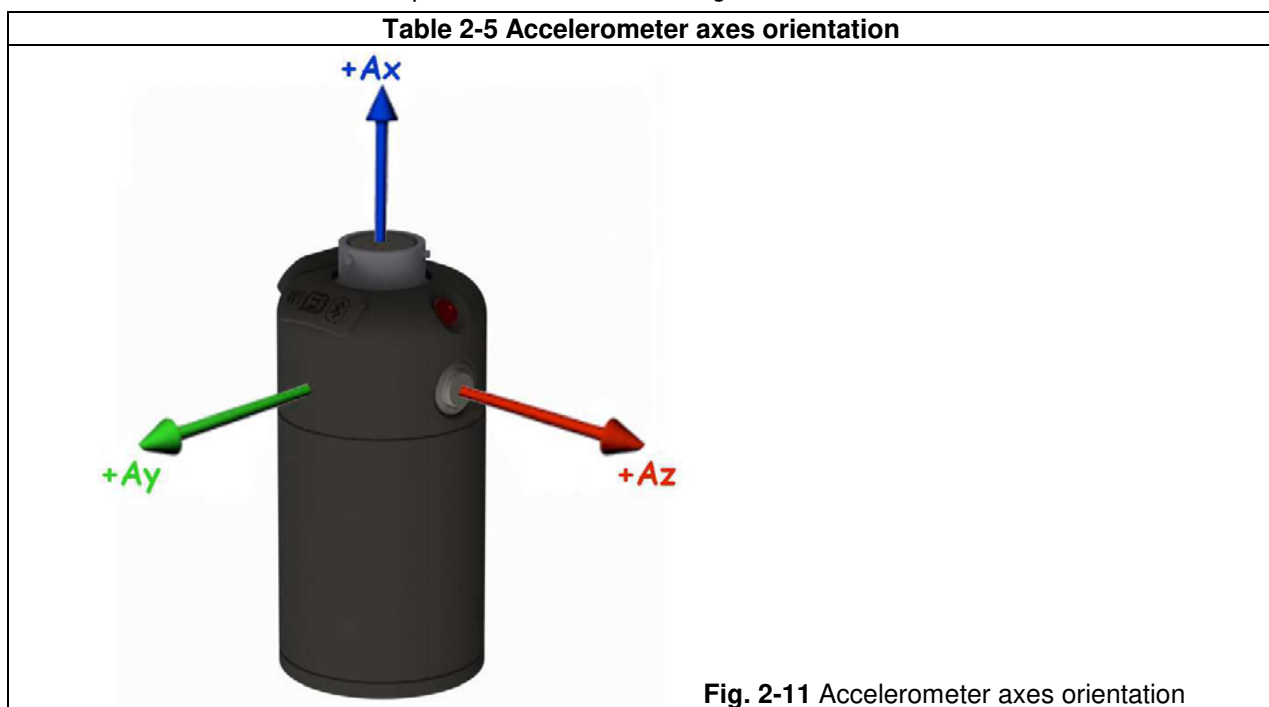
2.8 Power supply and battery recharging

AMC has an internal rechargeable Lithium-ion battery that can be recharged with the USB battery charger supplied with it.

The AC/DC battery charger can be used with a power frequency at either 50 Hz or 60 Hz with a supply voltage between 100 and 240 AC Volt. International AC plug adapters are provided according to the various national standards and it can be easily removed from the battery charger to be replaced by a different one.

Ensure that the batteries are fully charged before using the Area Monitor Compact for longest battery operation time.

The battery status is reported by the Probes Manager software and displayed in Volt and in percentage. It shows the residual autonomy during measurements and the achieved autonomy during charging

Bat.: 65 %

ALWAYS connect the battery charger to the power supply BEFORE connecting it to the USB-C port located on the AMC Interface bottom. The battery charger has an internal protective circuit that will limit the output of current if there is any load when connecting to the mains.

Battery charger:
output: DC, 5 V, 600 mA max

Connector:

In order to safeguard the features of the batteries, it is crucial to have a 80% recharge before storing them for periods longer than 4 months. Therefore, it is warmly suggested recharging the batteries at least every 4 months even though the device has not been used.

The minimum voltage level for operation is about 3,0 V. The batteries must be recharged for lower voltages. Below such voltage the AMC will turn OFF automatically.

The time required for recharging the batteries is about 2,5 hours.

To take reliable measurements, it is advisable to ALWAYS remove the battery charger from AMC.

| 2-16 | Installation and use |

3 – Probes Manager software installation

3.1 Introduction

This chapter is the installation and operation guide of the PC Software Probes Manager supplied with the SMARTS AMC Area Monitor Compact.

The Probes Manager is a software instrument that integrates the SMARTS AMC Area Monitor Compact and allows displaying the measured field level directly on a Personal Computer screen.

3.2 Hardware requirements

To ensure the proper operations of the Probes Manager software, the minimum hardware requirements of the Personal Computer are
- Processor Core i3
- 2 GB RAM
- 10 GB free space on hard disk;
- Windows Operating system™ Win7 and Win10

To obtain firmware or program updates for AMC, please contact your NARDA distributor or download it directly from the NARDA Web site http://www.narda-sts.it
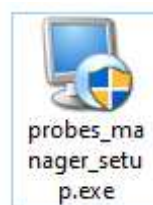
3.3 Installation

To install the Probes Manager on PC from the supplied Software Media as follows.

Do not connect the AMC to the PC until the installation is completed.
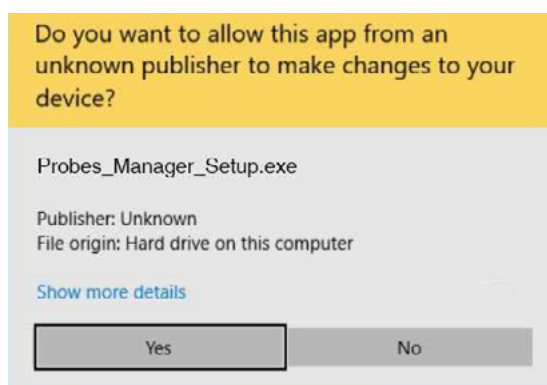
Browse the Software Media in Computer Resources and double click on the Probes Manager Setup.exe file to start the installation

Click Yes when requested.

Probes Manager software installation | 3-1

Click **Next** to proceed installing.

The installation can be aborted by clicking **Cancel** button:
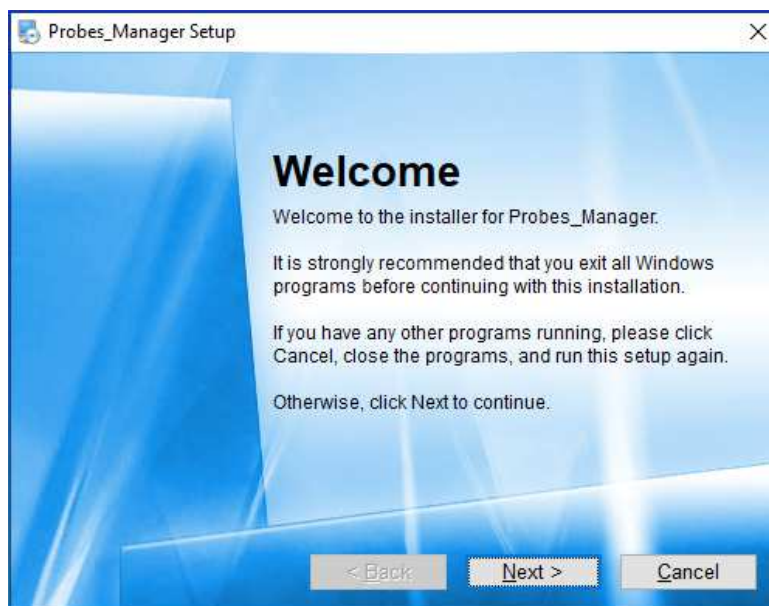
3-2　　　**Probes Manager software installation**
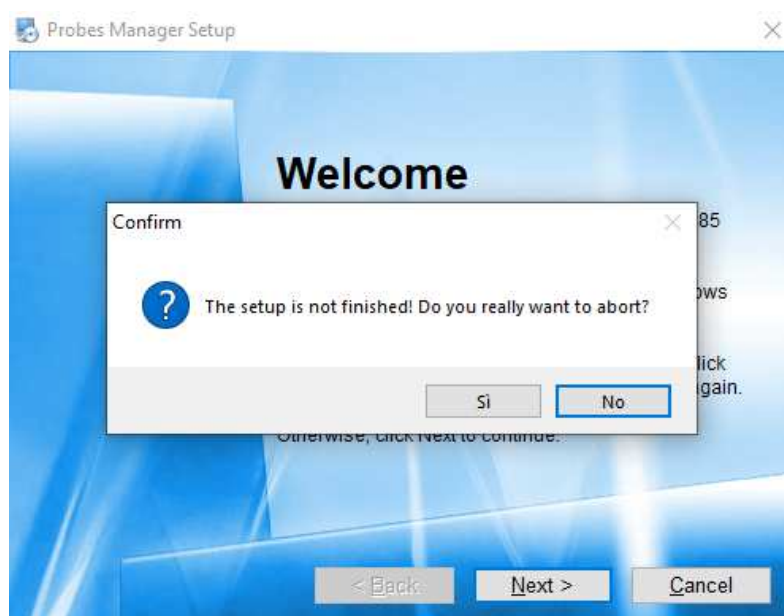
Click **Next** to confirm the default folder or **Change** to modify.
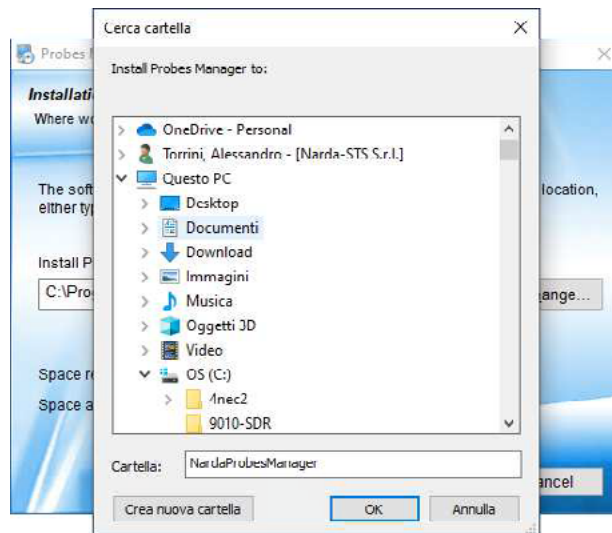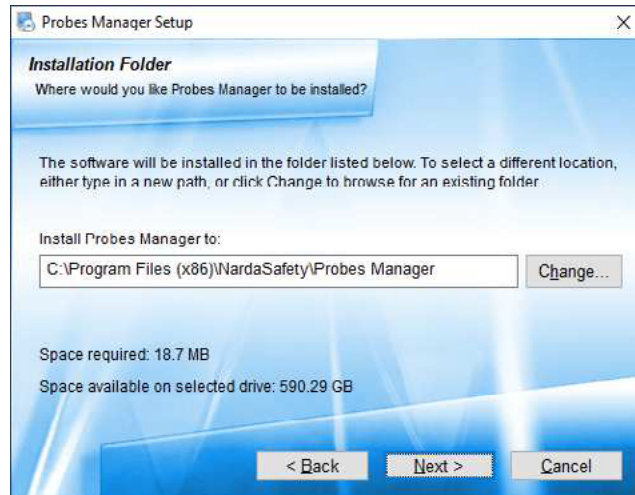
Click **Next** to proceed installing.
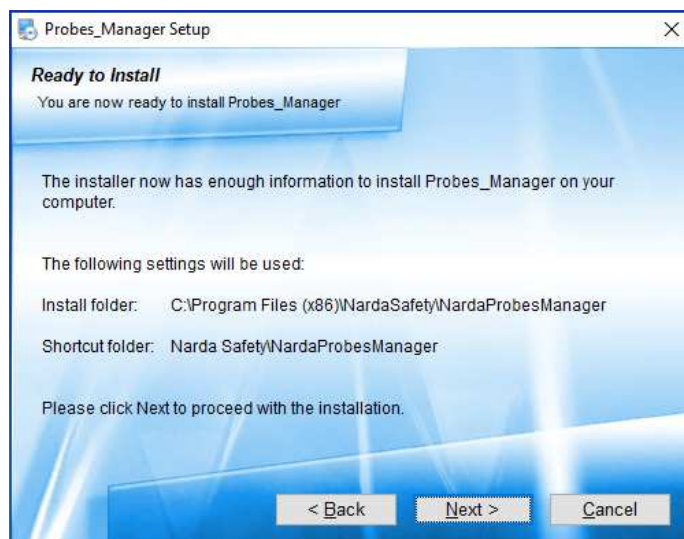
Probes Manager software installation　　　**3-3**

The installing status is displayed then:
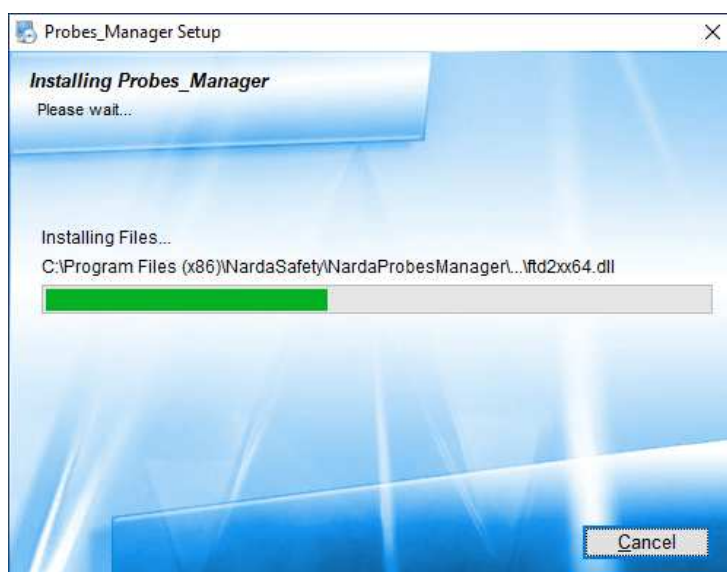
Click **Finish** to complete and exit the installer.

When asked for, reboot your system to complete installation
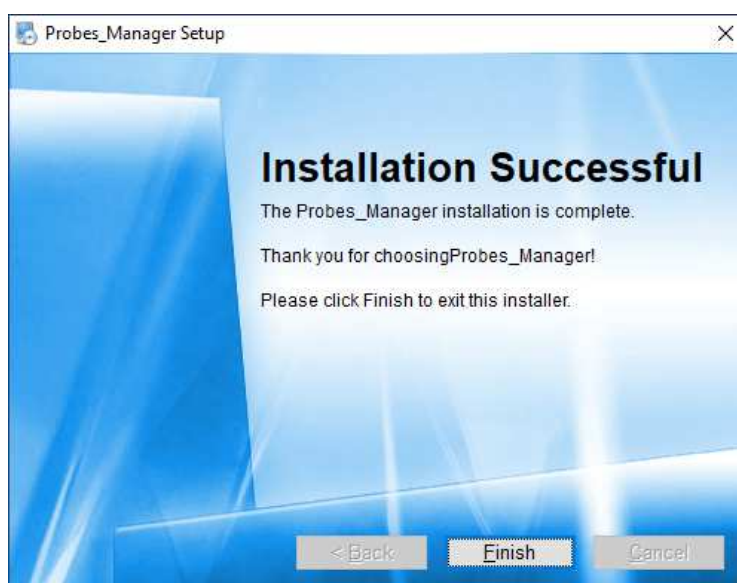
| 3-4 | Probes Manager software installation |
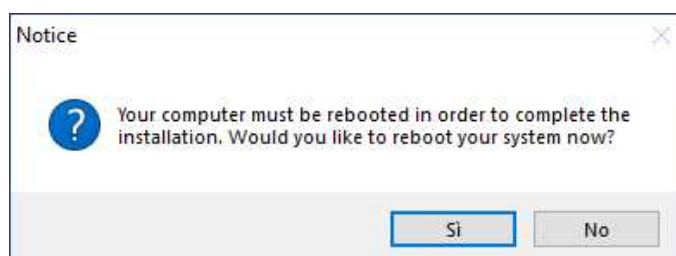
The folder **Probes Manager** is created under **Programs\Narda Safety** with **Probes Manager** (see Chapter 4) and **LR-01UP** (see Chapter 6) executable**.**

Another item is created in the Programs list at Start Menu, which is "**Narda Safety**", where the "**probes_manager**" and "**LR-01 Update Firmware**" programs must be run from.
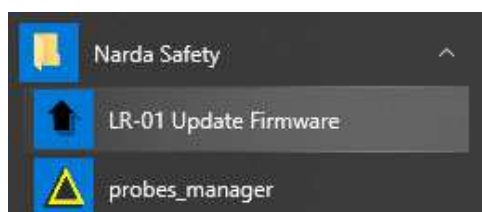
The **probes_manager** and **LR-01UP** icon will be available on desktop.

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3-6   **Probes Manager software installation**

4 – Probes Manager Operating instructions

4.1 Introduction

This section provides the information necessary to use the Probes Manager software with the SMARTS AMC Area Monitor Compact.

To obtain firmware or program updates for AMC, please contact your NARDA distributor or download it directly from the NARDA Web site http://www.narda-sts.it

The software is able to manage the AMC via an optical connection (fiber optic), via a wired connection (i.e. USB or Ethernet) and via Wi-Fi connection.

If Area Monitor Compact is not supplied by USB-C cable or PoE Injector, the unit automatically turns OFF when after 30 min. the fiber optic/Ethernet has been disconnected or the communication with PC is not established.

The AMC cannot be connected to PC via Bluetooth. The BLE connection is available only for mobile device through the LR-01 Manager App; for further information, see chapter 8 and 9.

At the first connection, connect the AMC to PC via optical or wired connection (see §2.6), switch the Area Monitor Compact on, the Visual led begins **flashing red** for 30 seconds and then **blinks red** every 5 seconds to indicate the Area Monitor Compact is ready to communicate and click the **Probes Manager** icon on desktop.

probes_manager

Alternatively (Windows 10): **Start → All Programs → Narda Safety → Probes Manager**.

Narda Safety
LR-01 Update Firmware
probes_manager

Probes Manager operating instructions | **4-1**

This window is displayed:

- If the AMC is connected to PC via USB wired connection, the device appears as "**Serial USB device (COMn)**".

- If the AMC is connected to PC via optical connection (through USB-OC), the device appears as "**USB Serial Port (COMn)**".

In Windows 7 and Windows 10 the USB-OC should be automatically installed on your computer.
The Narda Probe Manager installation folder also includes the file requested for the driver installation on path \(folder installation)\Driver USB-Serial.

Select the port on the list and click **Connect.**
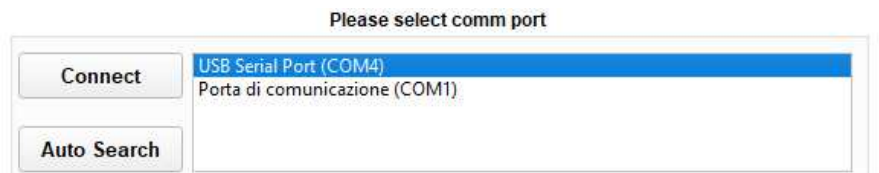
At the next connection the software will display the AMC on the list port with its serial number.

| 4-2 | **Probes Manager operating instructions** |

Instead, using the "**Auto Search**" button the software automatically detects the COM port to which AMC is connected, display the Area Monitor Compact on the list port with its serial number and, in case of using fiber optic connection, enable the **Remote On using FO** box

NOTE

If the AMC is replaced with other device or viceversa without removing the USB-OC, the **Auto Search** button must be used to detect the new instrument.

Once selected the button, the connection progress bar is displayed.

Select the port on the list and click **Connect**

The **Remote On using FO** box can be very convenient for turning the AMC on from remote, when it is located far away or in places that are not easily accessible (i.e. inside anechoic chambers etc.).
Place the Area Monitor Compact on the site to be monitored, run the software, tick √ the **Remote On using FO** box, press **Connect** to switch on the AMC and open the software.

Probes Manager operating instructions | **4-3**

☑ Wi-fi

If the WiFi connection has been enabled previously (see §4.2.7.1 Wi-Fi Communications), it will be possible to activate the corresponding communication, if desired, by ticking √ the Wi-Fi box.

When the WiFi connection is enable, the Wireless module is placed in "stand-by" condition and, If no action is taken in the last 10 minutes, it turns OFF.
Every time the AMC is switched on again, the module will return in the same condition since the wireless is enable.

NOTE

If AMC is supplied by USB-C cable or PoE Injector, the Wireless module will not automatically switch off after 10 minutes and remains always on.

☑ Ethernet

Place the AMC on the site to be monitored, run the software, tick √ **Ethernet** box, press **Connect** to start the communication.
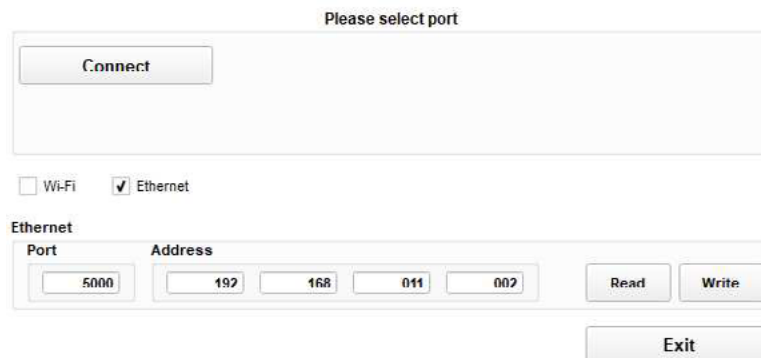
The image above showed the default Ethernet parameters. Using button **Read** and **Write** is possible check and set the parameters in the AMC.

NOTE

When the Ethernet communication is switched on, the optical port is not available.

| 4-4 | Probes Manager operating instructions |

The Ethernet tool enables the communication between PC and AMC.

If Ethernet cable is not properly connected or the parameters are not correct the software returns the following message:
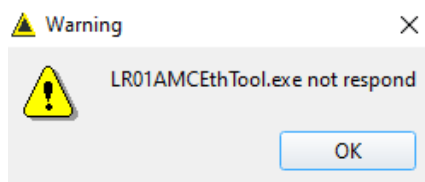
When the control window is opened and the stored Firmware version is older than what is available, the software will inform you that an update is needed.
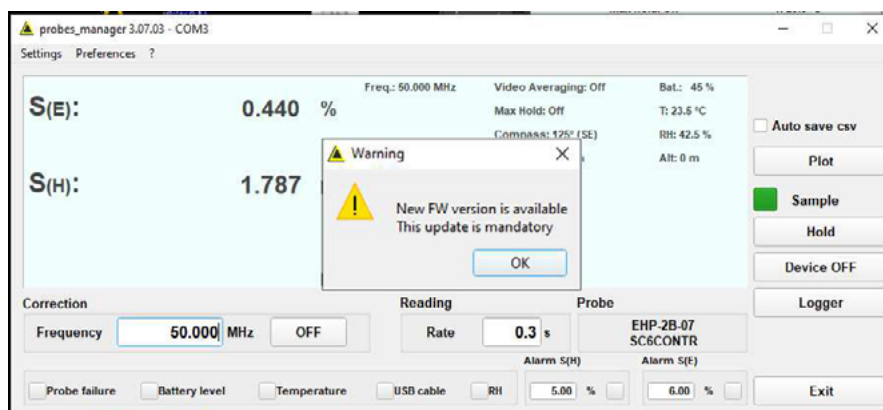
Confirm with **OK** to exit and quit the program; see chapter 6 Update Firmware.

Probes Manager operating instructions   4-5

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4.2 Probe manager control window
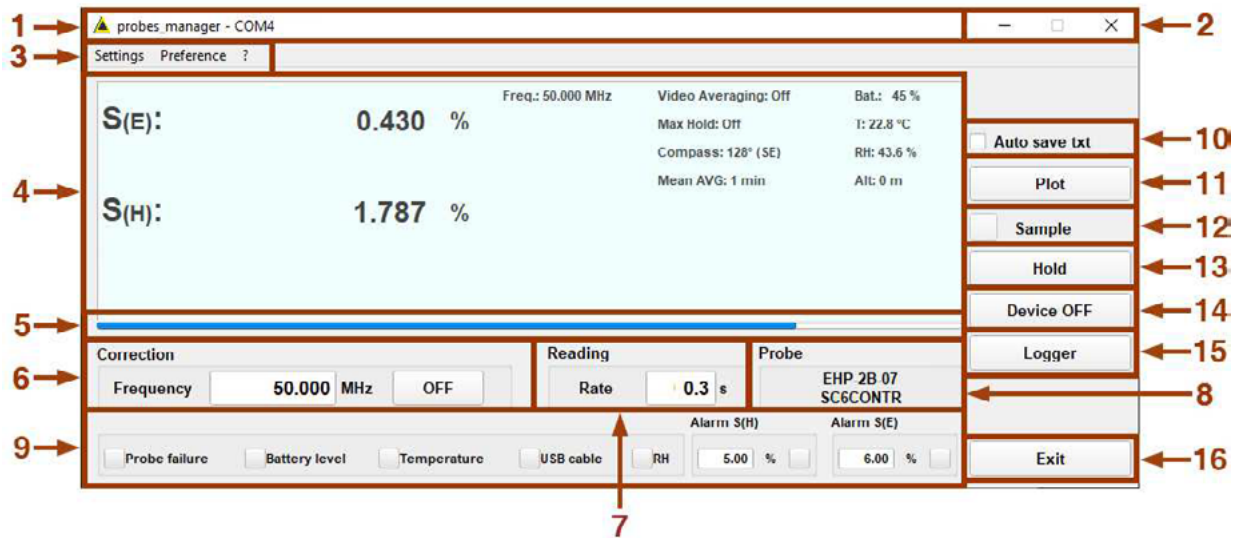
Commands description:

1. Title bar
2. Control window buttons
3. Menu: Settings, Preference and ? tags ribbon
4. Main window: Measurements, parameters and technical data
5. Progress bar
6. Correction frequency
7. Reading rate
8. Probe type
9. Alarms/Warnings
10. Auto save txt/csv function
11. Plot (graph view)
12. Sample indication
13. Hold/Run readings
14. Button to turns off the AMC, exit and quit the program
15. Logger settings
16. Exit and quit the program (AMC remains on)

NOTE

The above labels may change in case of using different probes or configuration.

4-6   **Probes Manager operating instructions**

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Before starting the analysis, some parameters and technical data should be checked as follow:

4.2.1 Languages

- Select the desired language under **Preferences** tab → **Languages**. A confirmation message will be display:
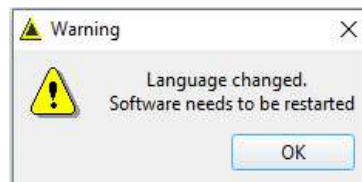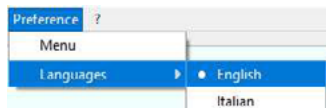
Confirm with **OK** and restart the software with the new language.

4.2.2 Release

- Make sure the latest software and setup release are installed on the PC and the latest firmware is stored on AMC. Click on **?** tab → **Info** → **Release**.
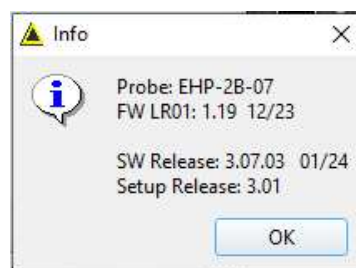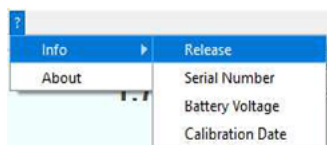
The software release is also available on the title bar with the COM port connected to the AMC.

4.2.3 About

Manufacturer information is included on **?** tab → **About**
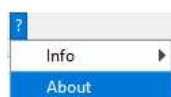
4.2.4 Serial number

For the AMC Serial number click on **?** tab → **Info** → **Serial Number**

Probes Manager operating instructions   **4-7**
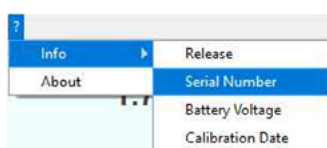
4.2.5 Calibrations sensor - Set to zero the internal **Altimeter** reference, calibrate the internal **Compass** for more location accuracy and synchronized the AMC internal **Date&Time** to the PC. Click on **Settings** tab → **Calibrations sensor**.
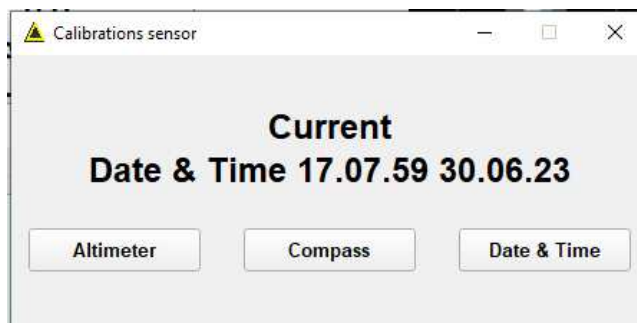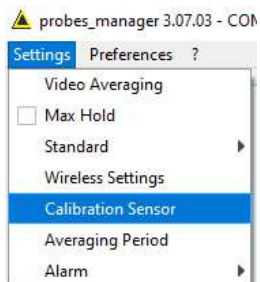
4.2.5.1 Altimeter
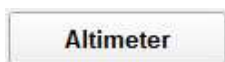
The **Altimeter** can be useful in applications where the height of measurements are relevant, such as, for example, base transceiver station.

The Altimeter works in relative mode. It returns the difference, in meters, from the height where the device was calibrated. It is a barometric altimeter that allows higher accuracy, precision and resolution than GPS. It must be considered that it is subject to variations in atmospheric pressure and therefore it is necessary to calibrate it at each different measurement session.

To set to zero the internal Altimeter, click on **Altimeter.** A confirmation message will be display:

4-8   **Probes Manager operating instructions**

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4.2.5.2 Compass
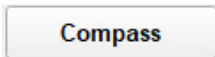
Compass

To improve the AMC location accuracy, the user must calibrate their compass clicking on **Compass**.

While holding the AMC by Radome and following the method shown on screen, move it around different times, tracing a figure eight in the process.

The percentage in the upper left part of the main window and the blue bar indicate the progress of the calibration.

At the end of the process, a message informs the calibration has been successfully performed.

NOTE
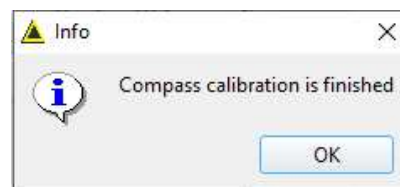
The AMC Interface Optic port represents the compass needle and, for example, it is towards the North cardinal point, the Compass field will shows **Compass: 1° (N)** on the main window.

4.2.5.3 Date&Time

Date & Time

To transfer the current date of the PC to the AMC, click on **Date&Time.** A confirmation message will be display:

Probes Manager operating instructions   **4-9**

4.2.6 Appearance   - Customize the Control window, Plot(Graph) and Report file appearance.

Different color combinations of the background, text, grid and traces are available under **Preferences** tab → **Appearance**.

This command is also used to set horizontal scale of the graph (**Plot Time/Div**), save measurements in .TXT or .CSV format (**TXT/CSV**), define column (**Text file separator)** and decimal separator (**Decimal separator**).
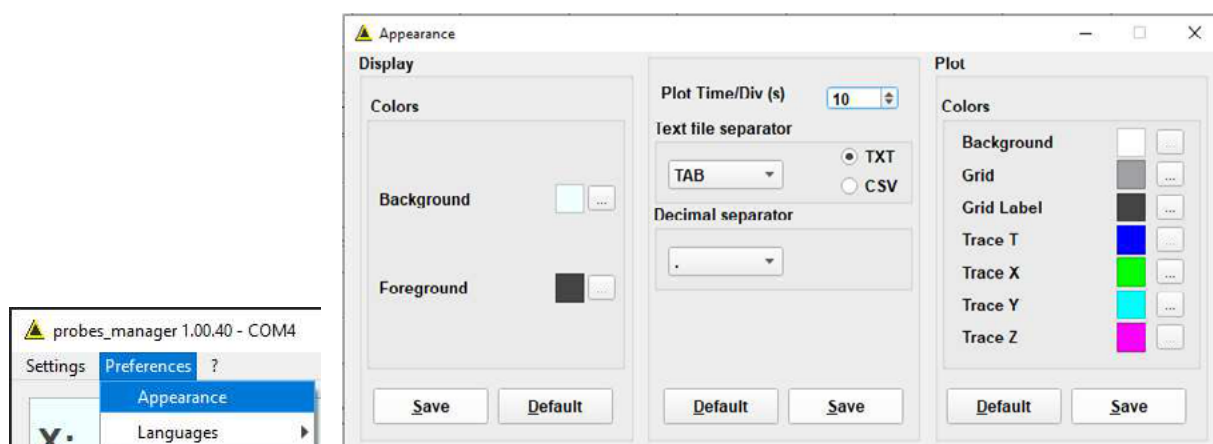
It is suggested to export in csv format with "**;**" text file separator for a data alignment even more precise.

The corresponding button [...] allows selection from a color palette; confirm with **OK**.
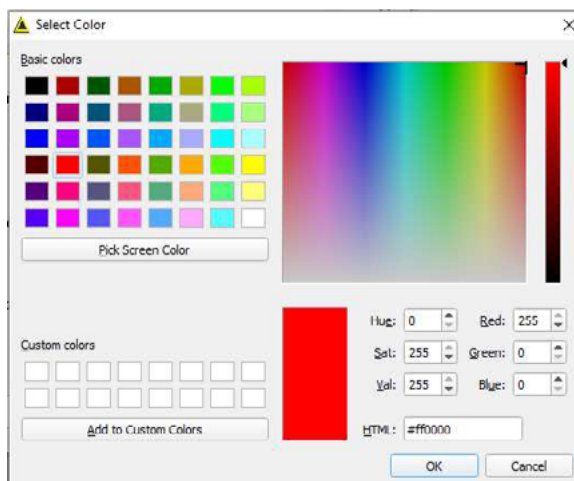
Save the new settings with **Save** button.

Default button to set appearance to the initial aspect.

4-10   **Probes Manager operating instructions**

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4.2.7 Wireless settings

4.2.7.1 Wifi connection
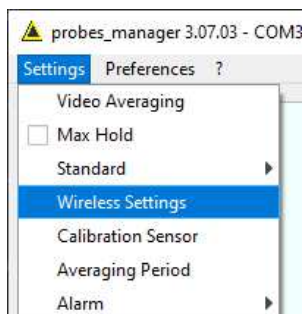
- Enable or disable the **Wifi** or **Bluetooth** communication on the AMC under **Wireless settings** tab.

To enable the **WiFi** connection on the AMC:
- Connect the PC to the Wi-Fi network you intend to use
- Enter the name of the Wi-Fi network (**SID**)
- Enter the password of the Wi-Fi network (**Password**)
- Clicking on **OFF**, the button toggles to **ON** for enabling the function
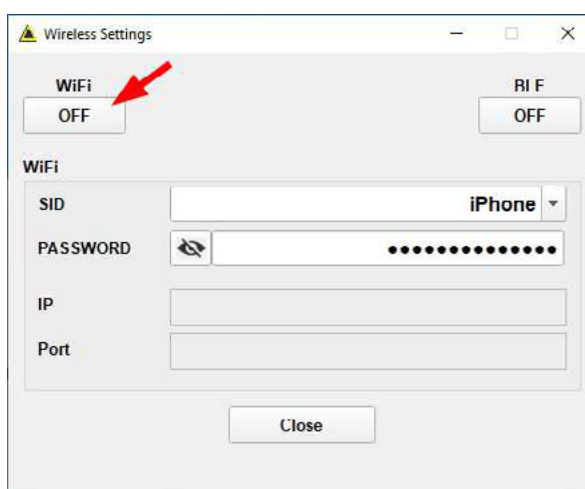
When enabled the function, the AMC will attempts to connect to the Wi-Fi network. Once the link has been successfully established, the IP address and the Port number will be automatically assigned to the Area Monitor Compact.

- Confirming with **Close**

Probes Manager operating instructions   **4-11**
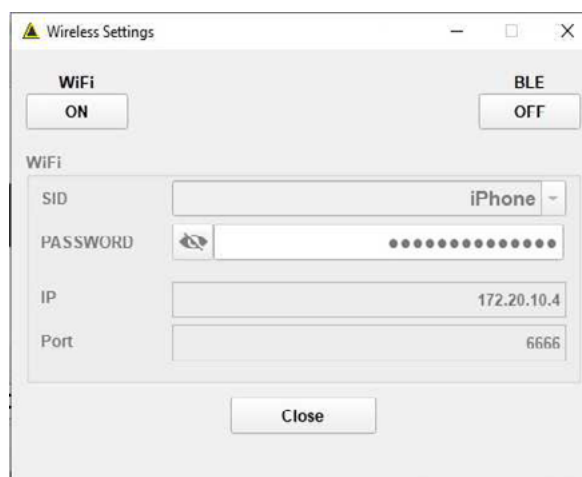
- The IP address and the Port number will also appear on the main window after a brief **Waiting for connection** message in red.
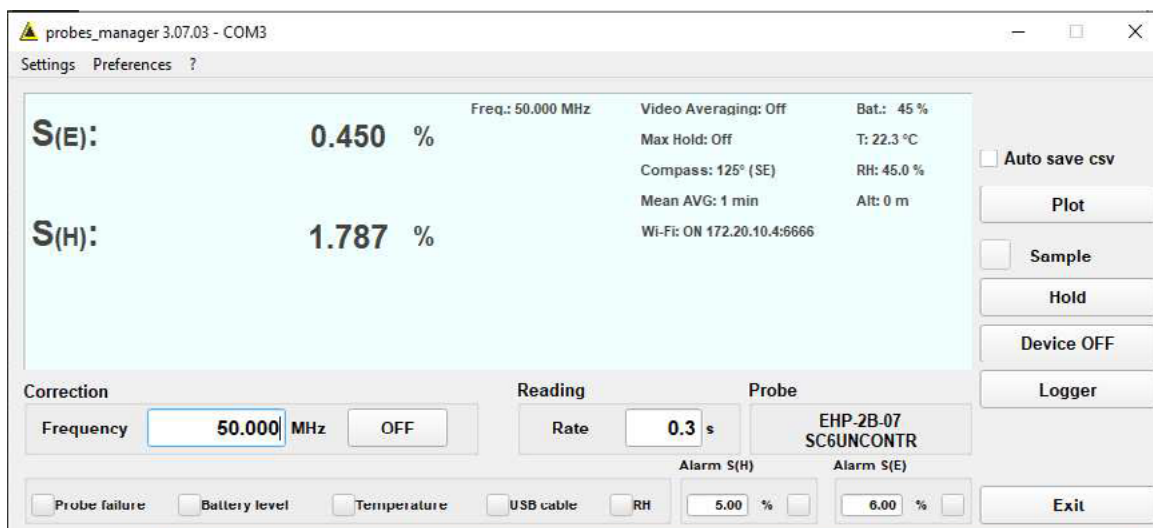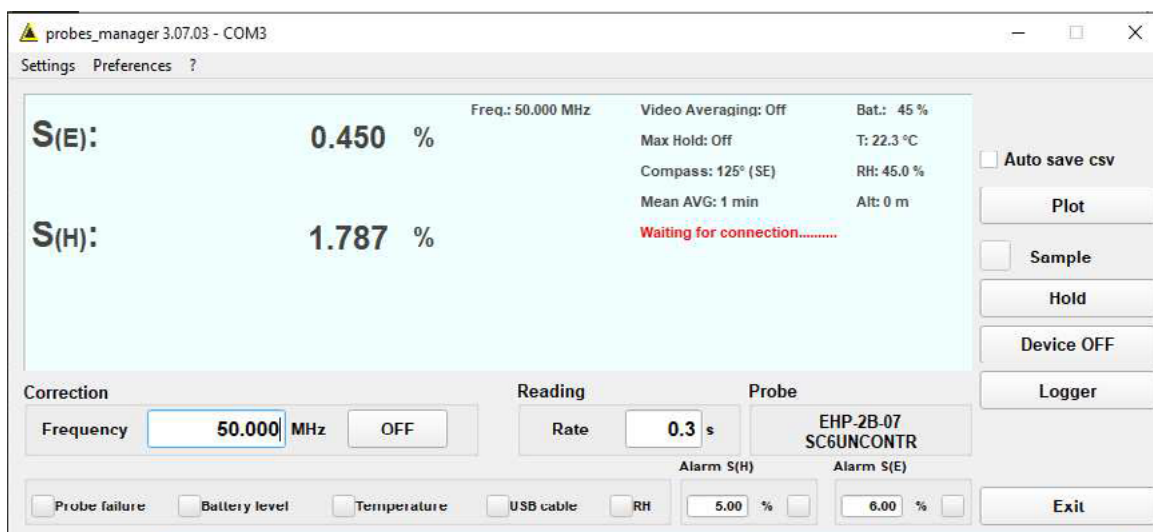
The WiFi module is placed in "stand-by" condition and, If no action is taken in the last 10 minutes, the wireless connection turns off.
Every time the AMC is switched on, the module will return in the same condition since the wireless is set **ON** in the **settings**.

NOTE: If AMC is supplied by USB-C cable or PoE Injector, the Wireless module will not automatically switch off after 10 minutes and remains always on.

NOTE: If a command is sent while the WiFi communication is enable and the Fiber optic or USB or Ethernet cable is connected, the priority is given to the wired connection.

- Disconnected the cable.

- At the next connection, active the wireless communication by simply ticking √ the WiFi box on Probe Manager software and press Connect (see §4.2.7.1 Wi-Fi Communications)

4-12   **Probes Manager operating instructions**

4.2.7.2 Bluetooth connection

To enable the **Bluetooth (BLE)** connection on the AMC:

- Clicking on **OFF**, the button toggles to **ON** for enabling the function.
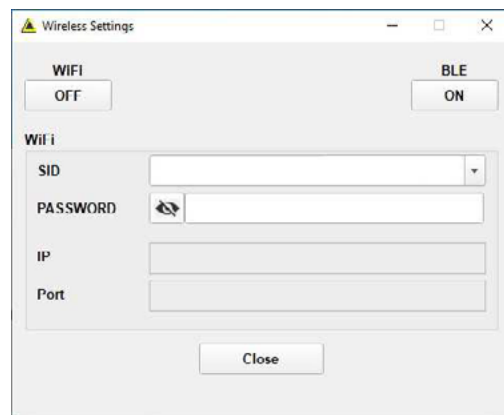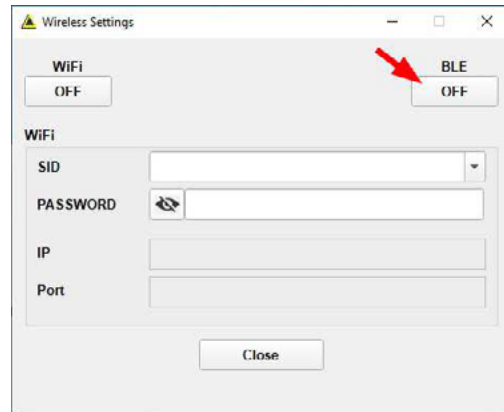
- Confirming with **Close**

The BLE module is placed in "stand-by" condition and, If no action is taken in the last 10 minutes, the Bluetooth connection turns off.
Every time the AMC is switched on again, the module will return in the same condition since the BLE is set **ON** in the **settings**.

If AMC is supplied by USB-C cable or PoE Injector, the Wireless module will not automatically switch off after 10 minutes and remains always on.

If a command is sent while the BLE communication is enable and the Fiber optic or USB or Ethernet cable is connected, the priority is given to the wired connection.

- Disconnected the cable.

- At the next connection, active the wireless communication by simply ticking √ the WiFi box on Probe Manager software and press Connect (see §4.2.7.1 Wi-Fi Communications)

The Bluetooth connection is available only for Android and iOS device through LR-01 Manager App. For further information see Chapter 8 and 9.

Probes Manager operating instructions | **4-13**

| 4.2.8 Standard (for EHP-2B probes only) | - Load a default standard limit saved into the EHP-2B probe memory at the factory. |

To enable the limit, mark with √ the corresponding box available on **Settings** tab → **Standard.**

The limit list depends on the EHP-2B model probe connected, as follows:

- EHP-2B-05 and EHP-2B-06 Standard limit list:
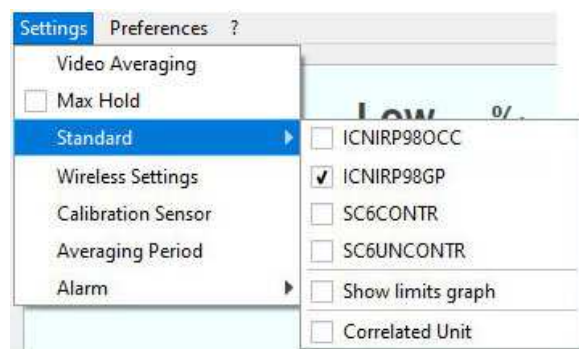
ICNIRP 1998 Occupational; select the ICNIRP 1998 Occupational limit
ICNIRP 1998 General Public; select the ICNIRP 1998 General Public limit
SC6 2015 Controlled; select the SC6 2015 Controlled limit
SC6 2015 Uncontrolled; select the SC6 2015 Uncontrolled limit

- EHP-2B-07 and EHP-2B-08 Standard limit list:
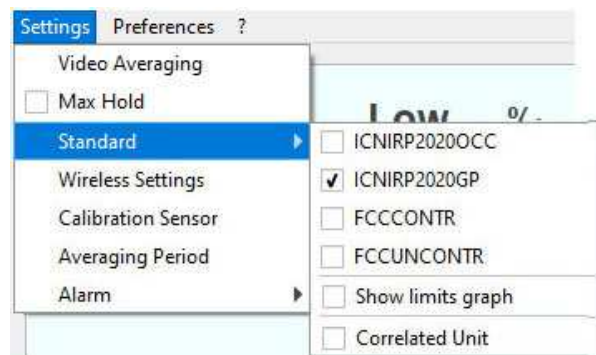
ICNIRP 2020 Occupational; select the ICNIRP 2020 Occupational limit
ICNIRP 2020 General Public; select the ICNIRP 2020 General Public limit
FCC-96 326 Occupational; select the FCC-69 329 Occupational limit
FCC-96 326 General Public; select the FCC-69 329 General Public limit

NOTE

The Standard function is enable only when an EHP-2B model probe is connected to the AMC.

NOTE

The "Show limits graph" and "Correlated unit" functions are enable only when the Correction Frequency is ON and EHP-2B model probe is connected to the AMC (see §4.3.3 for further information).

| 4-14 | Probes Manager operating instructions |

4.2.9 Alarms
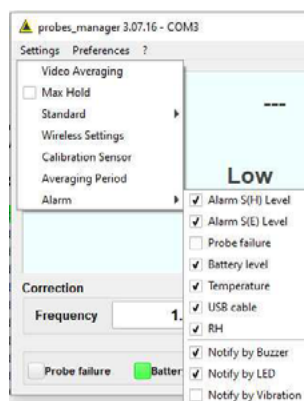
The software provides 7 alarms and for each one of them there is a square in the control window that will show the alarm current status:

🟥 **RED**: alarm condition occurred;

🟩 **GREEN**: alarm control active.

⬜ **EMPTY**: alarm control not active

Enable the software to notify alarms by ticking √ the corresponding box available on **Settings** tab → **Alarms**.
Leave empty when no action is taken (Probe failure in the example).

The **Alarms** shown on the main window and the **Status** column reported in the report (see §4.6.8 Download Log) are independent of each other. Doesn't matter If the control of alarms are active or not, the AMC will always be able to record any alarm occurred during logger acquisition.
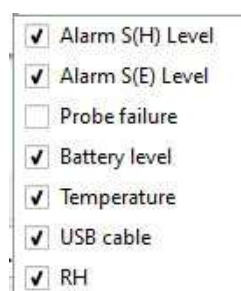
- **Alarm S(H)/H Level** next page

- **Alarm S(E)/E Level** next page

- **Probe failure:** In case of absence or malfunction of the probe an alarm will be notify.

- **Battery level:** The internal control system of the AMC features a voltmeter for continuous measurement of the battery voltage. This function ensures constant control of the power situation for correct operation of the Area Monitor Compact.
The square turns red when the value is equal or below the 3.25V.

- **Temperature:** The AMC features a thermometer for the measurement of the internal temperature, in order to have constant control upon the environmental conditions affecting the correct operation of the repeater.

- **USB cable:** In case USB cable connected and/or AMC under charging an alarm will be notify.

- **RH (Relative Humidity):** The AMC also features a hygrometer for the measurement of the internal Relative Humidity, in order to have constant control upon the environmental conditions affecting the correct operation of the Area Monitor Compact.

This function also allows the user to set which device(s) should be enabled for both **Alarm Level** notifications.
Enable the device to notify alarms by ticking √ the corresponding box or leave empty when no action is taken (Vibration in the example):
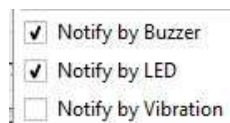
- **Notify by Buzzer:** Enable the Buzzer for alarm level notification

- **Notify by LED:** Enable the Visual Led for alarm level notification

- **Notify by Vibration:** Enable the Vibration for alarm level notification

Probes Manager operating instructions | **4-15** |

Using DualBand Electric and Magnetic probe, both field value are continuously compared with the Alarm thresholds, set by the user, to determine whether any field alarm condition is occurring.

- Alarm S(H) / **Alarm H:** set the Magnetic field level threshold for Alarm notification

- Alarm S(E) / **Alarm E:** set the Electric field level threshold for Alarm notification

The averaged field will be calculated in order to the average type and time period set on **Average period** (see §4.2.10 Averaging Period) and compared with the enabled thresholds.

On exceeding one of these thresholds, the corresponding square turns red and, if the corresponding box "**Notify by…**" is enable √, Visual Led lights up red, on-board acoustic and vibration alarms will also provide.

When the field value returns below the set value, the square window returns green, the led goes off and the device return in the previous condition.

In the below example, the alarm is actived when the Magnetic field exceeds 5% averaged and/or Electric field exceeds 6% on the last 6 minutes. Thus, brief but intense field variations will not necessarily cause the alarm if the <u>averaged value</u> does not exceed the H and/or E threshold.

| 4-16 | **Probes Manager operating instructions** |
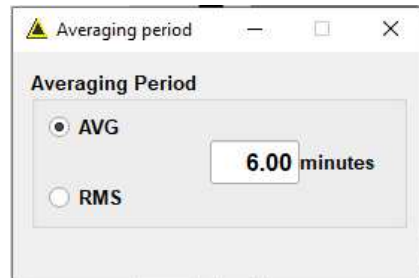
4.2.10 Averaging Period

- Define the average type and the time period on which the averaged field will be calculated during the Logger acquisition (see §4.6 Logger).
The result will also be compared with the enabled thresholds.
The average can be arithmetic (**AVG**) or quadratic (**RMS**).
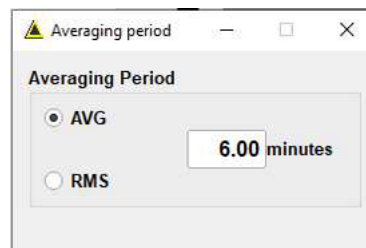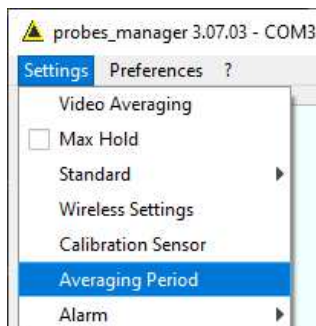
If the value entered is lower than the **Time based (Every)** set on Logger acquisition mode, a warning message will appear and the nearest correct storing rate will be set by the software.
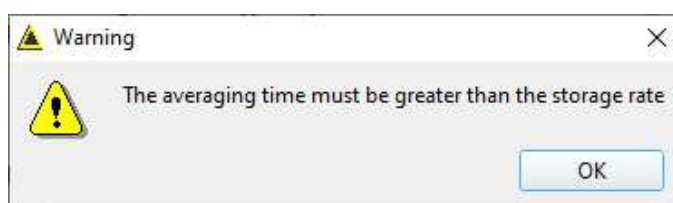
4.2.11 Battery voltage

- Make sure the AMC has enough battery level to perform the analysis on **?** tab → **Info** → **Battery voltage**. It shows the residual autonomy during measurements or the achieved autonomy during charging (resolution of 0.01V). For example, the 3.10V corresponds to the 5% displayed in red on the main window.

Probes Manager operating instructions | **4-17**

Once all settings and parameters are set, the software provides:
- Display Live measurements on the main window (see §4.3)
- Saving Live measurements on the text file (see §4.4)
- Display Live measurements in graph way (Plot) (see §4.5)
- AMC programmable operation (Logger) (see §4.6)

4.3 Display Live measurements on the main window

During live measurements the value is displayed with three decimals on the main window.

Using DualBand Electric and Magnetic probe, the screen will display both field value in percentage (EHP-2B-02 as example):

- S(E) / **E** Power density calculated in far field condition   or Electric field strength

- S(H) / **H** Power density calculated in far field condition   or Magnetic field strength
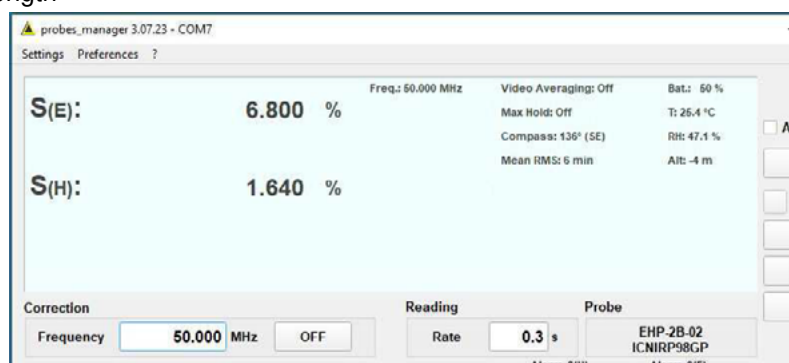
The corresponding value in W/m² (Power density)   or   V/m-A/m (Electric-Magnetic field) unit is also displayed on the main window (see §4.3.3 for further information).
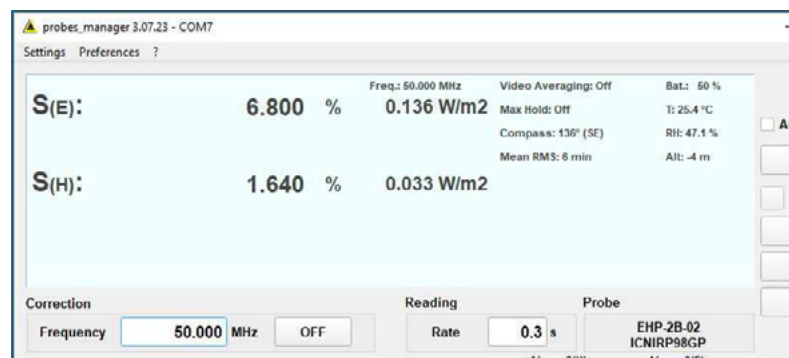
The chapter 1 of this manual includes the list of the field probes available and their technical specifications.

If the field value of the probe is outside the nominal level range, the following messages are displayed:

Ovr : the field level is higher than 110% of the probe nominal maximum level (for example, 1100 % for EHP-2B-07).

Field value marked in red: the field level is between 100% and 110% of the probe nominal maximum level (from 1000 to 1100 % for EHP-2B-07).

Field value marked in blue: the field level is between the probe nominal minimum level and its 20% higher (for example, from 0.1 to 0.12 % for EHP-2B-07).

Low : the field level is lower than probe nominal minimum level.
   • For example, 0.1 % for EHP-2B-07

Some parameters and technical data are shown in the upper right part of the main window:

Freq.: 2170.000 MHz	Video Averaging: 4 (RMS)	Bat.: 75 %
	Max Hold: On	T: 27.0 °C
	Compass: 142 (SE)	RH: 46.4 %
	Mean : 0.25 min	Alt: 1 m
	Wi-Fi: ON 172.20.10.4:6666	

Description:

- **Freq:** frequency chosen for correction, or OFF when disabled.

- **Video Averaging:** number of the readings on which the RMS average is calculated during Live measurements or OFF when disable

- **Max Hold:** ON when enable, or OFF when disable.

- **Compass:** compass heading in degrees and cardinal directions.

- **Mean (Averaging Period):** time period on which the averaged field is calculated

- **Wifi:** Wifi status, IP Address of the AMC and Port used by the Area Monitor Compact

- **Bat:** the residual battery autonomy during measurements or the achieved autonomy during charging in 5% steps; battery voltage below 5% of charge are displayed in red.
The numeric value is available on **?** tab → **Info** → **Battery voltage** with resolution of 0.01V (for example, the 3.10V corresponds to the 5%).

- **T:** temperature in degrees Celsius.

- **RH:** percentage of relative humidity.

- **Alt:** relative altitude in meters.

The above labels may change in case of using different probes or configuration.

The probe connected to the AMC is displayed on the **Probe** box and, in case of using DualBand Electric and Magnetic probe, the reference standard set is shown together with the model (see §4.2.8 Standard").
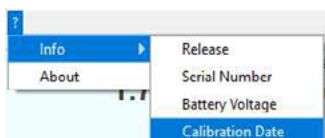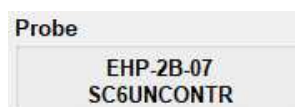
The latest calibrated data is displayed on **?** tab → **Info** → **Calibration Date**

Probes Manager operating instructions | 4-19
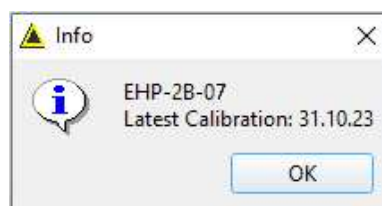
The probe of the AMC can be disconnected and reconnected while in use. The communication will be restarted automatically and the AMC performs a diagnostic test while a progress bar shows the process.
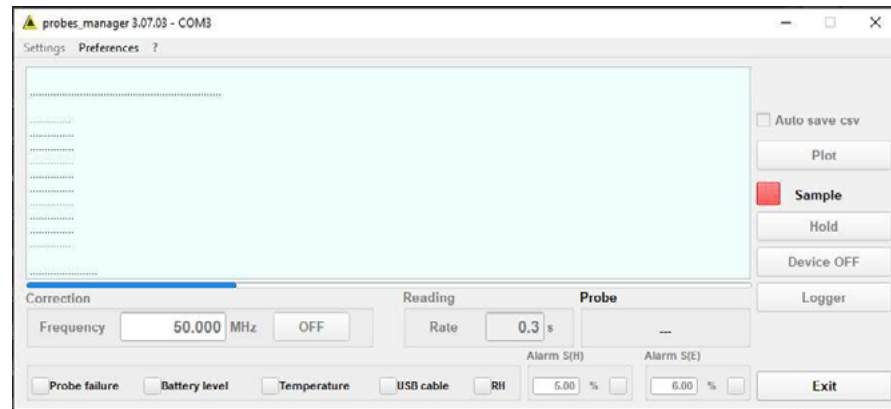
Once a link has been established, the live measurements are displayed in the main window again:
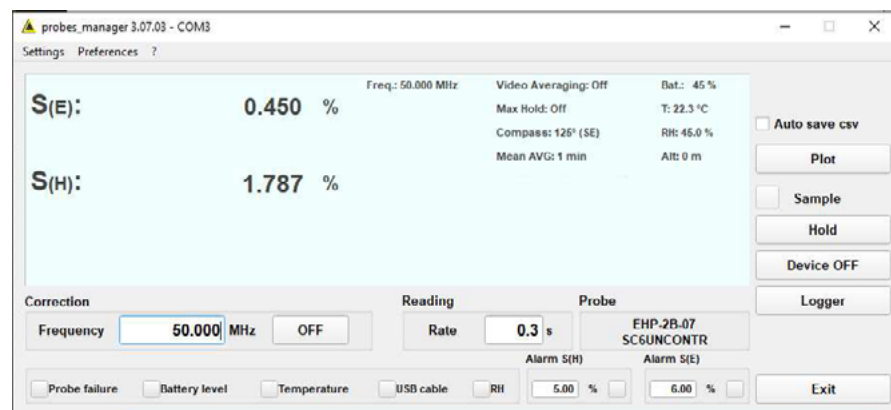
In case of absence or malfunction of the probe, the message "Probe not connected" appears on the main window.

If enable √, a Probe failure alarm will be notify (see §4.2.9 Alarms) as shown in the below example.
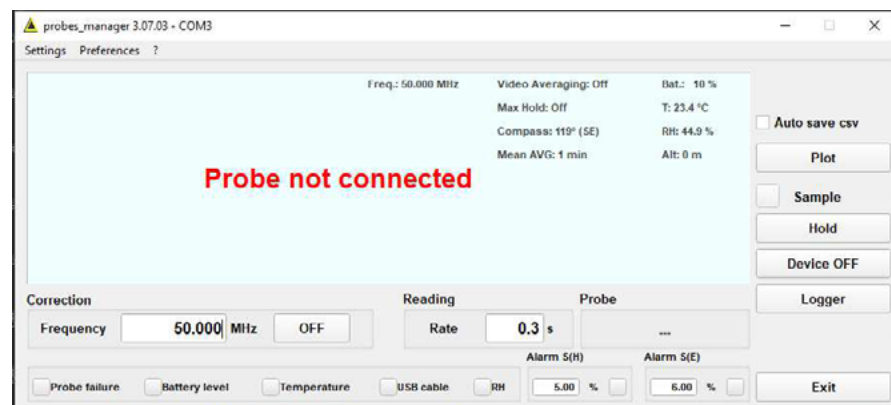
4-20   **Probes Manager operating instructions**

4.3.1 Sample

In the control window the **Sample** square blinks at the Reading rate set and shows by its color the current status of the data acquisition:

RED: data acquisition is still in progress or paused

GREEN: data acquired

4.3.2 Reading Rate

The field value is displayed on the Main window and Plot (Graph) at the Reading Rate set in seconds.
If **Auto save txt/csv** is enable, the data are also saved on the text/table file at the same interval (see §4.4.1 Auto save txt/csv)
The maximum value settable is 30 seconds .

Insert the Reading rate value and press Enter key to confirm.

If the value entered is not allowed, a warning message will appear and the nearest correct value will be set by the software.

4.3.3 Correction Frequency, Correlated Unit and Show Limits graph

Some models of probe have flatness compensation factors on board that can be applied when the signal source frequency is known, in order to make the measurement even more accurate. To recall the **Correction frequency** factor (in MHz):
- Clicking on **OFF**, the button toggles to **ON** for enabling the function.
- Insert the Frequency correction value

If the value entered is not allowed, a warning message will appear and the nearest correct value will be set by the software

To disable the Correction Frequency click **ON** button, the button toggles to **OFF** for disabling the function

In case of using DualBand Electric and Magnetic probe the AMC perform the Power density or Electric/Magnetic detection in function of frequency and standard.

The screen show the percentage indication of the standard in power density calculated on electric "**S(E)**" and magnetic "**S(H)**" field strength in far field condition or Electric "**E**" and magnetic "**H**" field.

If the Correction Frequency is ON and the **Correlated unit** function is active (√) on **Standard** menu, the corresponding value in W/m² (power density) or V/m-A/m (Electric-Magnetic field) unit is also displayed on the screen and report.

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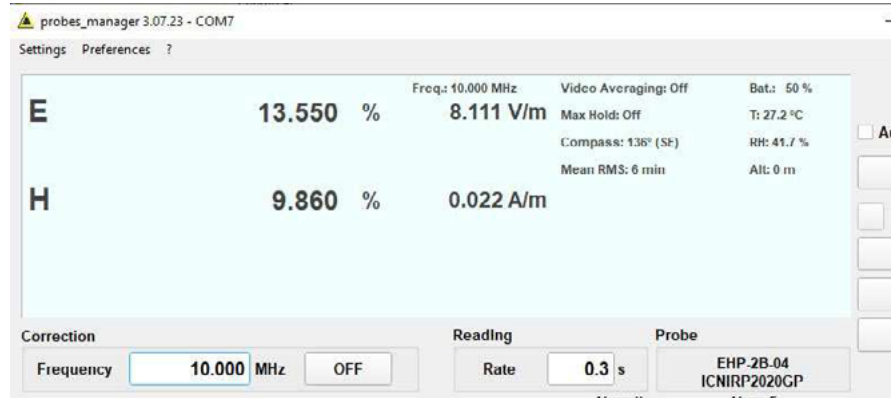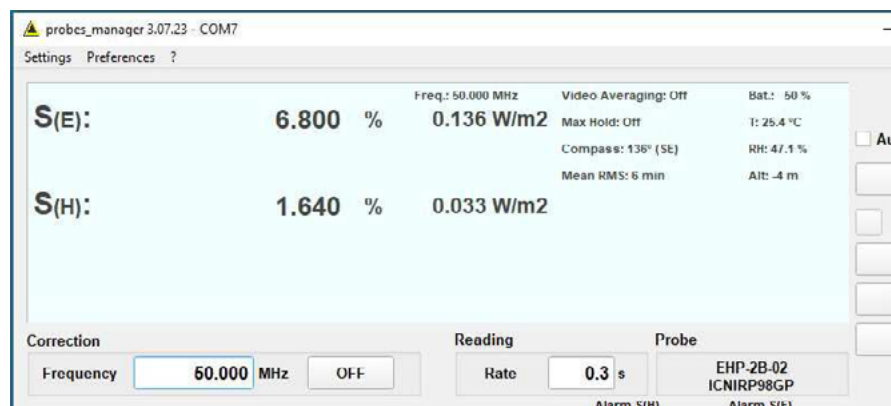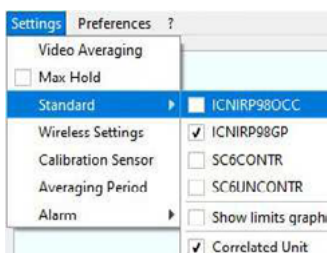
The Electric/Magnetic detection is related to standard selected for frequencies lower than:
- 10 MHz for both standard ICNIRP98 and SC6
- 30 MHz for ICNIRP2020
- Never, always Power density is apply, for FCC

If the frequency correction is enabled but out of range of calibration table stored on probe in use, the indication show the result "---" instead of the value.
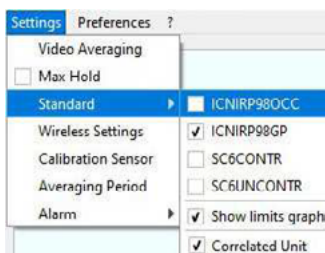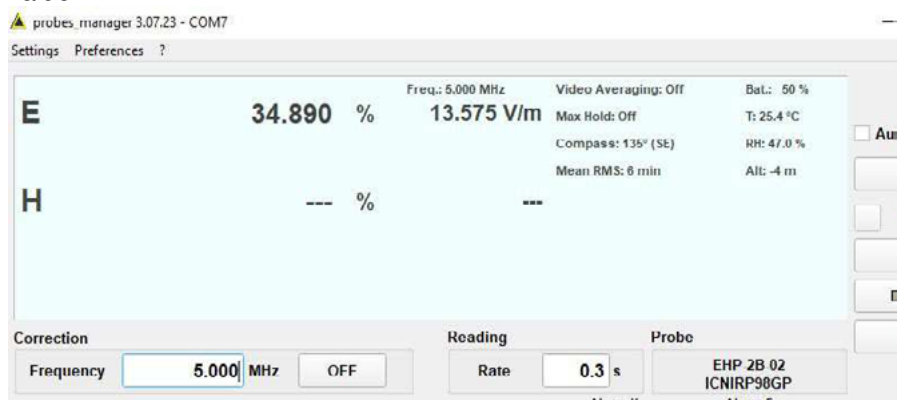
If the **Show Limits graph** function is active (√) on **Standard** menu, the software shows the limit according to the Standard and Correction Frequency set.
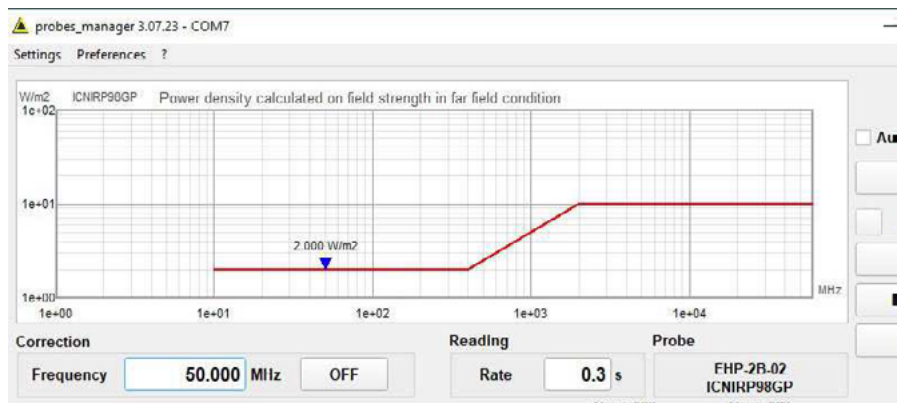
Using **E** or **H** button on the upper right of the graph Electric/Magnetic field detection, the user can display the Electric or Magnetic field limit.

Disable the function to exit from the limit graph.

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4.3.4 Video Averaging

While live measurements are performed, the user can also display the RMS averaged field using the **Video Averaging** function.
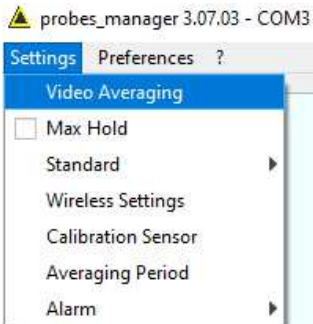
The number of the readings on which the RMS average is calculated is available on the **Video Averaging** drop-down menu: 4, 8, 16, 32, 64. or OFF when disable.

In the below example the Video Averaging is set to **16**.
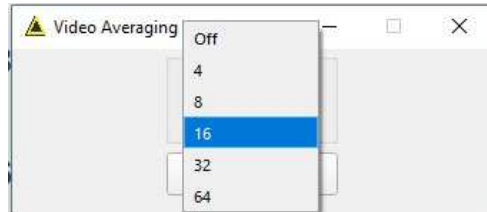
Once selected, the **Avg** counter is started and displayed in red on the main window:
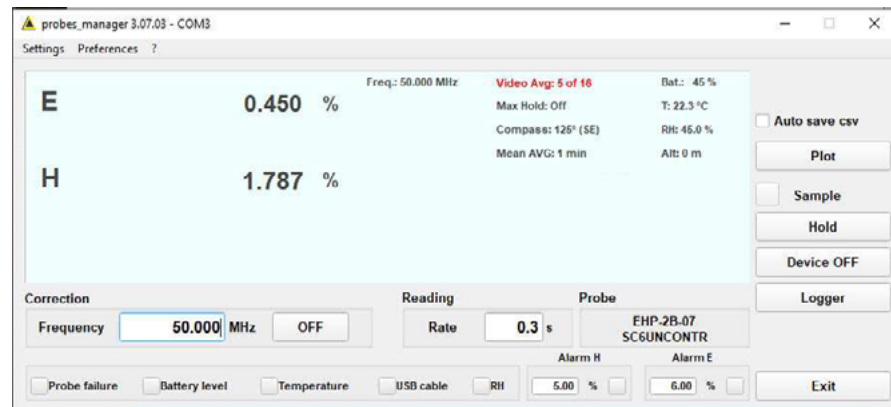
When the process is ended, the preset value is shown; the RMS averaged field is displayed on the main window and updated at the Reading rate setting since the function was activated.

When a different Video Average value is selected or a parameter is changed, the calculations is restarted.

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4.3.5 Max Hold
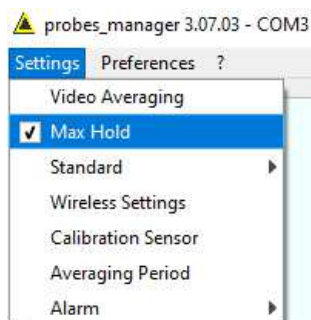
At any time the maximum field strength value can be retained and displayed since the Max Hold has been activated √ on Settings tab.
It is therefore updated only if the new value is greater than the previously displayed one showing thus the maximum in the frequency range since the Max hold function was activated

4.3.6 Hold/Run

While live measurements are performed, the user can freeze the readings pressing **Hold** button. Press the button again to Resume.

4.3.7 Device OFF

Device OFF button can be very convenient for turning the AMC off from remote, when it is located far away or in places that are not easily accessible (i.e. inside anechoic chambers etc.) and quit the program.

4.3.8 Exit
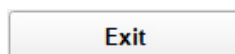
Press **Exit** to exit and quit the program (the AMC remains on).
The current settings are saved and will be recalled at the next start.
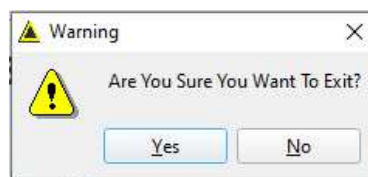
Press **Yes** to close the software or **No** to continue using the software

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4.4 Saving Live measurements	While the live measurements are performed, the software allows collecting measurements directly in the internal memory of the AMC and saving in a report file using the **Auto save txt** or **Auto save csv** function (the format depends on the Text file separator set on **Preferences** tab → **Appearance**).

4.4.1 Auto save txt/csv	In the upper-right main window enable the function √ to start saving the measurements at the Reading rate set:

Clicking the box again disable the function and causes the end of saving measurements.

A text report file will be created with a specific name **Probemodel_Meas_dd_mm_yyyy_hh_mm_ss.txt** and saved on the folder: *Documents\NardaSafety\NardaProbesManager*

For every working session (from starting to ending saving) a new text file will be created on *NardaProbesManager* folder :
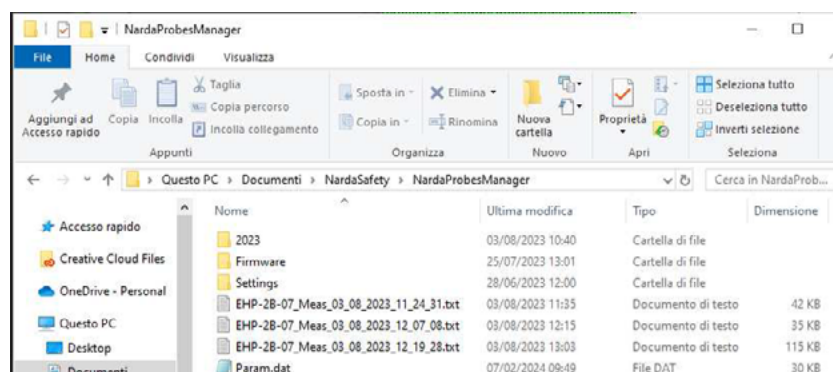
When the file is saved in .txt format and the table is opened, an huge amount of data are available.
The following headline will be created on each report:

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Description:

Storing Date: working session date.

Storing Time: start measurements campaign (hour, minute, second).

Device Name: probe type connected to the AMC

Device Serial Number: Serial number stored on AMC

Frequency: frequency correction in MHz, or OFF when disabled.

Video Averaging: (RMS) if enable, OFF if disable

Max Hold: ON if enable, OFF if disable

Temperature: temperature in degrees Celsius.

RH: percentage of relative humidity.

Relative Altitude: relative altitude in meters.

Compass: compass heading in degrees and cardinal directions

Time: hour, minute, second, thousandths of a second of the measurement acquisition

- **S(E)** / **E-field   S(H)** / **H-field:** Power density calculated in far field condition or Electric/Magnetic field strength; between brackets the unit. The corresponding value in W/m^2 (Power density) or V/m-A/m (Electric-Magnetic field) unit is also displayed (see §4.3.3 for further information).

NOTE

NOTE

The above labels may change in case of using different probes or configuration.

*EHP-2B-08_Meas_04_04_2024_17_31_00 - Blocco note di Windows

File Modifica Formato Visualizza ?

```
Storing Date      04/04/2024
Storing Time      17:31:00
Device Name       EHP-2B-08
Standard          ICNIRP2020OCC
Device Serial Number   000ZW30308
Frequency         50.000 MHz
Video Averaging Off
Max Hold          Off
Temperature (°C)        26.4
RH (%)  43.5
Relative altitude (m)     0
Compass 123° (SE)
```

Time	S(E)(%)	S(H)(%)	S(E)(W/m2)	S(H)(W/m2)
17:31:00.540	1.11	0.52	0.111	0.052
17:31:00.840	1.11	0.51	0.111	0.051
17:31:01.139	1.11	Ovr	0.111	Ovr
17:31:01.470	1.11	0.52	0.111	0.052
17:31:01.756	1.10	0.51	0.110	0.051
17:31:02.072	1.11	0.54	0.111	0.054
17:31:02.357	1.10	0.51	0.110	0.051
17:31:02.655	Low	Low	Low	Low
17:31:02.972	1.11	0.51	0.111	0.051
17:31:03.296	1.12	0.41	0.112	0.041
17:31:03.595	Ovr	0.51	Ovr	0.051
17:31:03.890	1.11	0.51	0.111	0.051
17:31:04.743	1.10	0.54	0.110	0.054

*EHP-2B-08_Meas_04_04_2024_17_30_44 - Blo...   —   □

File Modifica Formato Visualizza ?

```
Storing Date      04/04/2024
Storing Time      17:30:45
Device Name       EHP-2B-08
Standard          ICNIRP2020OCC
Device Serial Number   000ZW30308
Frequency         10.000 MHz
Video Averaging Off
Max Hold          Off
Temperature (°C)        26.4
RH (%)  43.5
Relative altitude (m)     0
Compass 123° (SE)
```

Time	E(%)	H(%)	E(V/m)	H(A/m)
17:30:45.456	Low	6.27	Low	0.031
17:30:45.539	10.96	6.38	14.433	0.031
17:30:45.840	10.94	5.96	14.407	0.029
17:30:46.156	Ovr	Ovr	Ovr	Ovr
17:30:46.455	10.96	6.49	14.433	0.032
17:30:46.756	10.94	6.27	14.407	0.031
17:30:47.056	Low	Low	Low	Low
17:30:47.389	10.91	6.38	14.367	0.031
17:30:47.674	10.94	5.96	14.407	0.029
17:30:47.990	Ovr	6.17	Ovr	0.030
17:30:48.290	10.94	6.27	14.407	0.031
17:30:48.593	10.96	6.07	14.433	0.030
17:30:48.926	10.94	6.49	14.407	0.032

If the field measured is outside the nominal level range, the value is displayed with **Ovr** or   **Low** (see Pag.4-18).

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4.5 Display Live measurements on the graph (PLOT)

The **PLOT** function performs Time Domain measurements and showing how the signal level changes over time.
The screen displays a continue running graph at the Reading Rate setting.
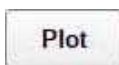
Once selected the **PLOT** button, the following graph will appear:
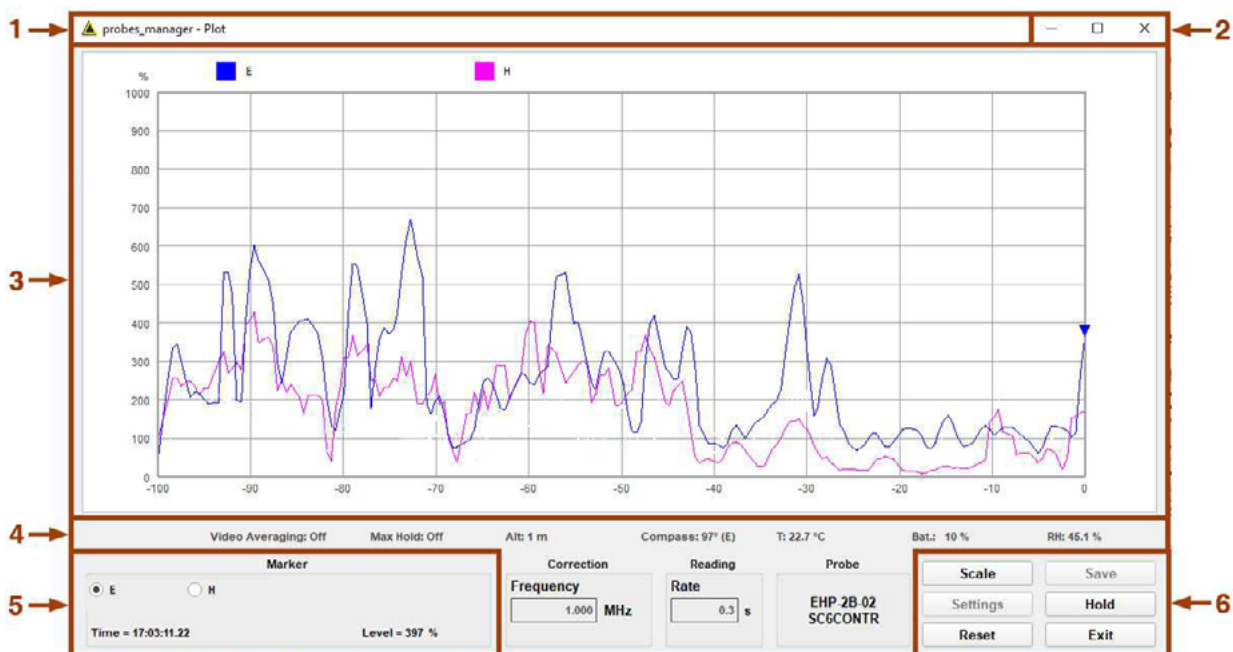
Commands description:

1. Title bar

2. Control window buttons

3. Plot (Graph)

4. Parameters and technical data

5. Marker

6. Button function

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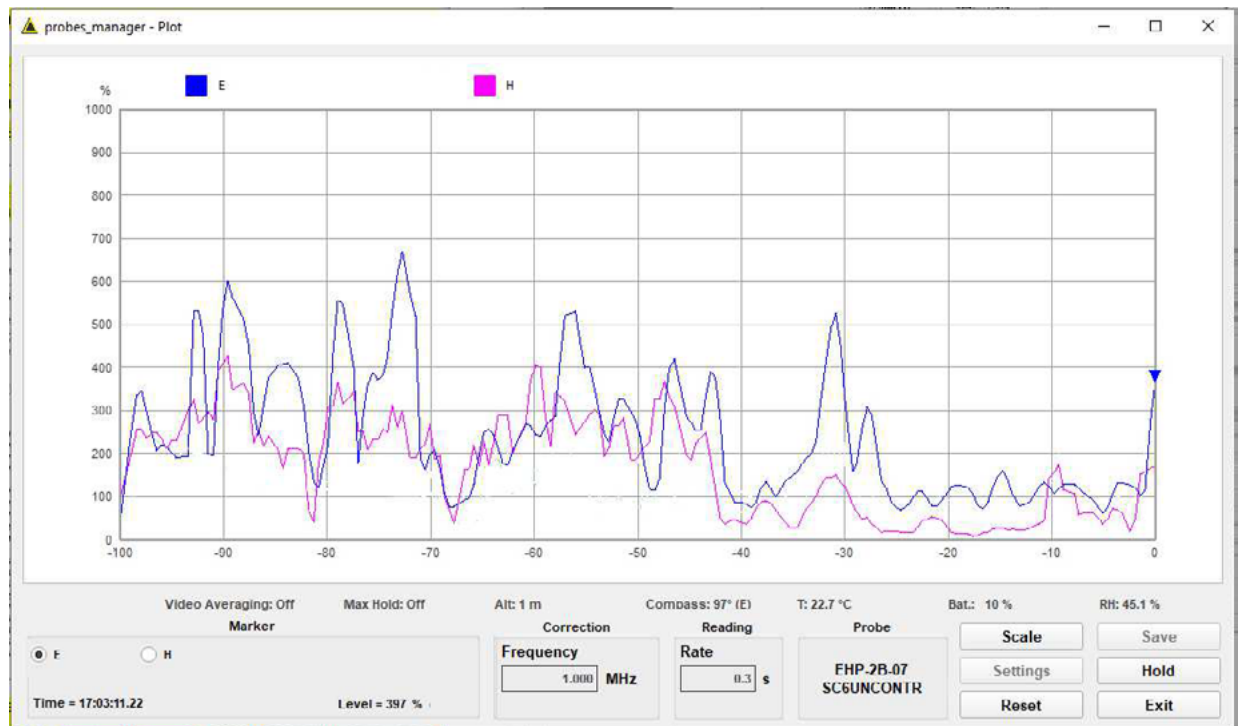
Some parameters and technical data are shown in the lower part of the control window (for explanation see Pag.4-19).

4.5.1 Settings

The Plot and Time/Div setting appear as set on **Preferences** tab → **Appearance**.

Both can be changed with **Settings** button in the bottom right corner of the plot; to enable this command the graph must be paused by clicking **Hold** button.

4.5.2 Hold/Run

Press **Run** to resume the analysis.

4.5.3 Reset

At any time the user can restart the analysis by clicking **Reset** button.

All the data previously displayed will no longer be available for new download. It is therefore suggested to save any measurement result before resetting (see §4.5.6 Save).

NOTICE

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4.5.4 Marker   For a detailed analysis of the graph, a marker appears on the screen as a colored arrow. In the **Marker** window the user can select on which trace to place the marker and move it to any point holding the left mouse key down. In the same window is shown the level marked and the instant in which the measurement is made.
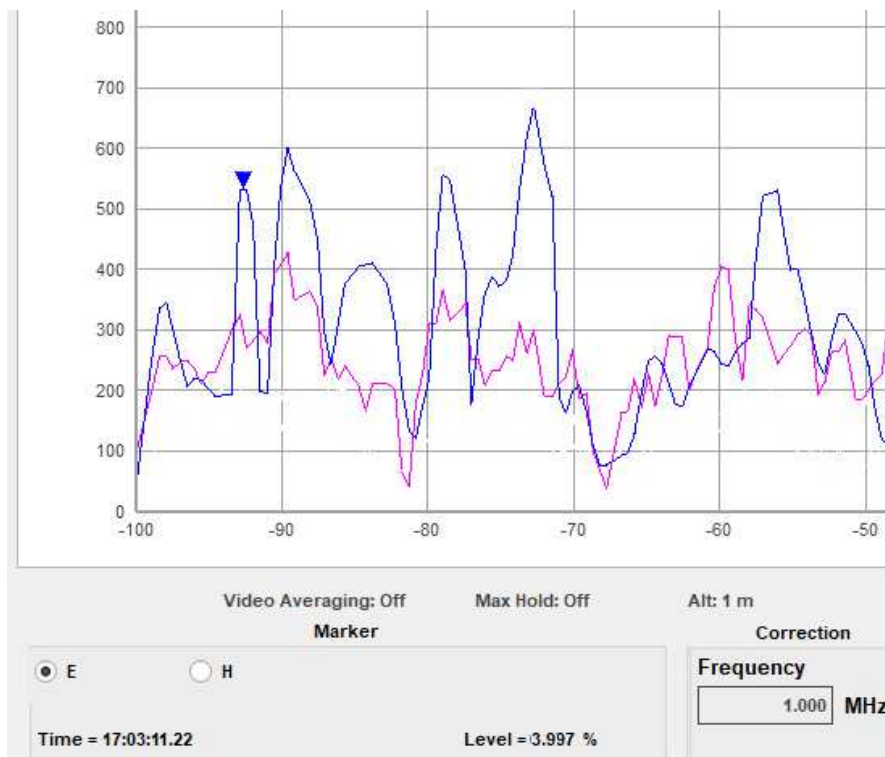
NOTE   **The above labels may change in case of using different probes or configuration.**

4.5.5 Scale   When the level is close or over the limit, It is suggested to select Scale button to increase the scale.

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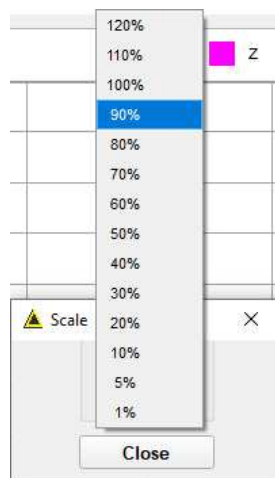
If the field level is higher than 110% of the probe maximum nominal level, a red **Over Range** message will be display on the center top of the graph.

In the Marker window is shown **Level = Ovr** and the instant in which the measurement is made.
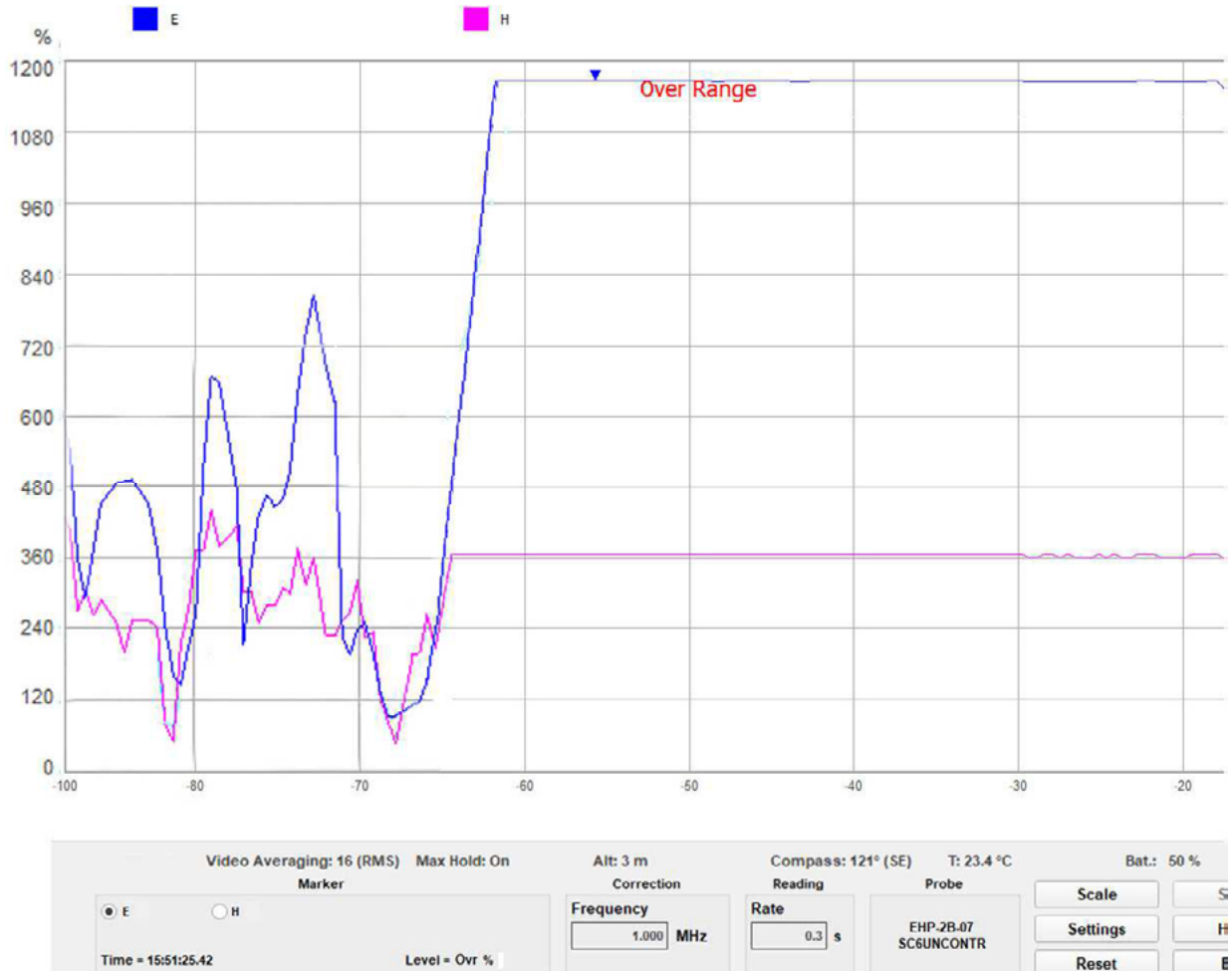
Notice the **E : Ovr %** indication will also appear on the main window:

4.5.6 Save

Press **Save** button to save the plot as bitmap image or text file (the graph must be paused by clicking **Hold** button):

- Save the graph displayed as a bitmap image (.bmp) for insertion in other applications such as a Word Processor or Image Editor.
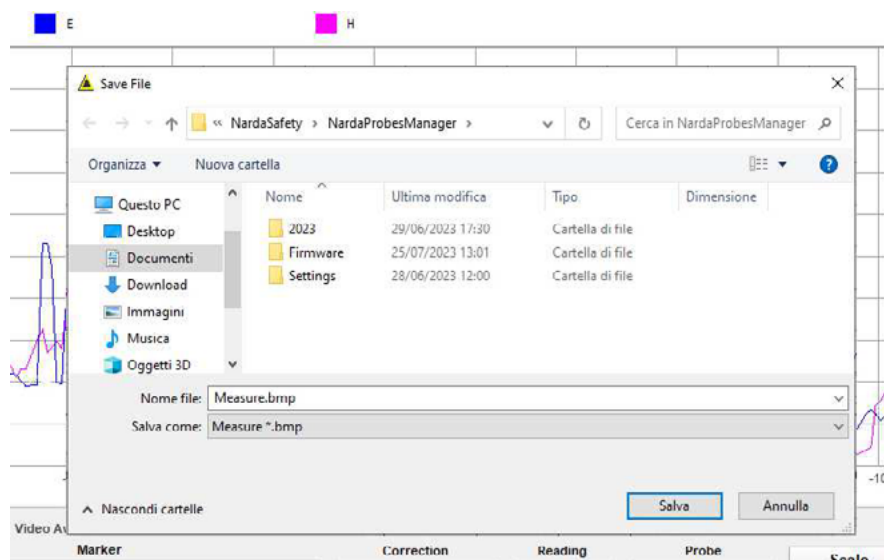
- Save in text format (.txt) a table containing the data shown since the software is opened or since the graph has been restarted with **Reset** button.
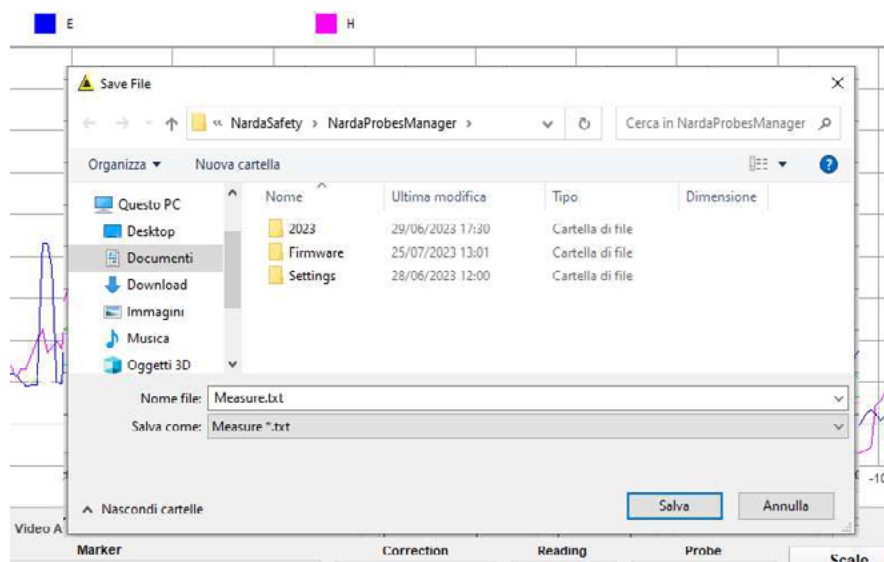
When the table is opened, an huge amount of data are available; the text file has the same format as the **Auto save txt/csv** function (see §4.4.1).

4.5.7 Exit

Click **Exit** button to go back to the main window
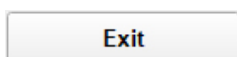
4.6 Storing measurements on the AMC memory (Logger)

Logger

AMC is suitable for short-term, medium and, especially, long survey thanks to high capacity internal battery. In Logger acquisition mode it is possible to program the Area Monitor Compact for collecting and storing data directly in its internal memory.

The Logger settings provides:
- Set Logger acquisition method;
- Transfer to PC the data acquired;
- Save data in text format and display as a table.

Clicking **Logger** button, this window will appear:
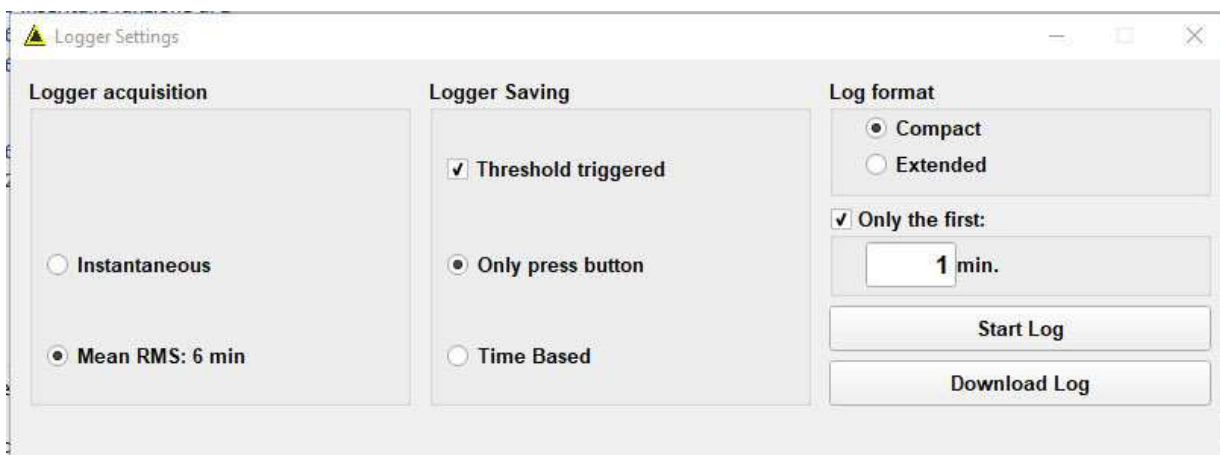
4.6.1 Logger acquisition

To perform programmable acquisition follow the instructions step-by-step:
- Set Logger acquisition method (**Logger acquisition**)
- Choose the storing mode (**Logger saving**)
- Select the Download data format (**Log format**)
- Set Download period (**Only the first**)
- Start Logging data (**Start log**)
- Stop Logging data (**Stop log**)
- Export measurement results in text file (**Download Log**)
- Display the data as a table

The **Logger acquisition** method available:
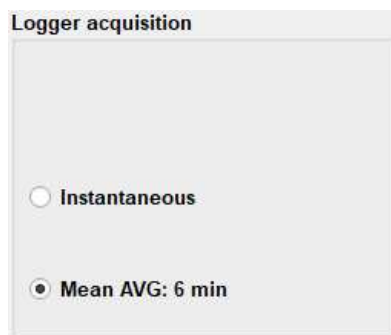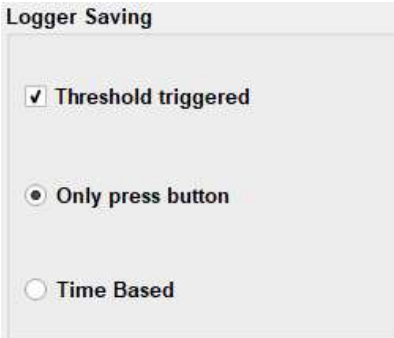
- **Instantaneous**: to acquire the instantaneous field level, not averaged.

- **Mean RMS/AVG:** *m* **min**: to acquire the averaged field level calculated in the interval set.
The average type and the time period are set on **Settings** tab → **Averaging period**

4.6.2 Logger saving   Then, select the **Logger saving** mode:
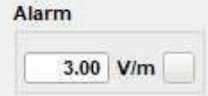
NOTICE   As above example, when "Threshold triggered" and "Only press button" or "Time base" function is enable, priority is given to the **Threshold triggered**

NOTICE   The internal memory capacity and battery duration are affected by:
- the storing Rate (Time Based)
- how often the alarm is triggered (Threshold triggered)
- How often Manual Log button is pressed (Only press button)

- **Threshold triggered:** when active √, the acquired measurement (instantaneous or averaged) will be stored in the AMC internal memory only when the measured field is above the alarm level set on **Alarms** box (doesn't matter if active or not on **Settings** tab).

In the above example the storing process is triggered when the field exceeds 3 V/m averaged on the last 6 minutes. Thus, brief but intense field variations will not necessarily cause the alarm if the <u>averaged</u> value does not exceed 3 V/m.

In the above example, in case of using DualBand Electric and Magnetic probe, the field value is continuously compared with both alarm thresholds set by the user. On exceeding one of these thresholds, the storing process is triggered.

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4.6.3 Only press button

- **Only press button**: When active ⊙, the acquired field level (instantaneous or averaged) is stored in the AMC internal memory each time the Manual Log button is pressed

⊙ Only press button

NOTICE

Pressing the Manual Log button for more than 5s will delete all previous saved data.
Pressing long enough is notified by the fixed big red led lighting up until the button is released.

In the below example, the instantaneous (not averaged) field value will be saved in the AMC internal memory each time the Manual Log button is pressed.

Logger acquisition

⊙ Instantaneous

○ Mean AVG: 6 min

Logger Saving

☐ Threshold triggered

⊙ Only press button

○ Time Based

4.6.4 Time based (Every):

- **Time based (Every)**: When active ⊙, the acquired measurements (instantaneous or averaged) will be stored in the AMC internal memory at the interval set in seconds each.

⊙ Every   5 second

If the value entered is higher than the **Averaging period** (see §4.2.10) or the maximum allowed (900 sec.), a warning message will appear and the nearest correct value will be set by the software.

⚠ Warning   ✕
⚠ The storage rate must be lower than the averaging time
OK

⚠ Warning   ✕
⚠ Value out of range
OK
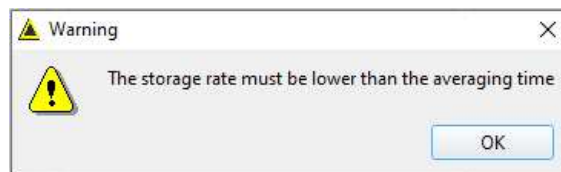
In the below example, the averaged field value calculated in the last 6 minutes will be saved in the AMC internal memory at the interval of 5 seconds each.

Logger acquisition

○ Instantaneous

⊙ Mean AVG: 6 min

Logger Saving

☐ Threshold triggered

○ Only press button

⊙ Every   5 second

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4.6.5 Log format   Also the **Log format** can be set:

- **Compact** The file does not contain Acceleration, Speed, Latitude, Longitude, GPS, and Compass information. Each data record is 32 bytes in size and allows storing in the AMC internal memory up to 125k measurements.

- **Extended** The file contains all data. Each data record is 64 bytes in size and allows storing in the AMC internal memory up to 250k measurements.

For further information, see §4.6.8 Download Log button.

4.6.6 Start Log   Once all parameters are set, press **Start Log** button to start logging measurements and the following message will appear:
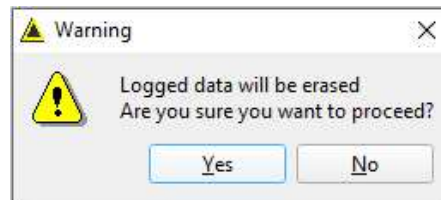
It is suggested press **No** and download the previous data before starting a new measurements campaign.

Clicking **Yes,** all the data of the previous one will be deleted and afterwards the AMC provides simultaneously a brief Visual Led lights up red, on-board acoustic and vibration alarm when start logging measurements.

When the data is saved in the AMC internal memory, the Visual Led lights up red at the storing rate set (Every) or only when the Alarm level is triggered or the Manual Log button is pressed.

4.6.7 Stop Log   When the analysis is ended, press Stop Log button to stop logging measurements and the following message will appear:

Confirm with Yes.

After stopping the Log, the measurements stored in the AMC internal memory can be downloaded pressing Download Log button, otherwise will not be available anymore.

4.6.8 Only the first function and Download Log button

The **Download Log** button downloads the data stored on AMC internal memory to a PC and save them as a text file with a specific name: **LOGGER_Probemodel_dd__hh_mm_ss.txt**

If the function **Only the first** is not enable, the data are download from starting to stopping log data.

If enabled (√) the results can be stored on PC in the data interval set from the **Start** Log to user selectable time period (in minutes); it is therefore possible to export the desired time range without downloading the entire working session

The file is stored in the following the path:
NardaProbesManager\Year\Months\Day.
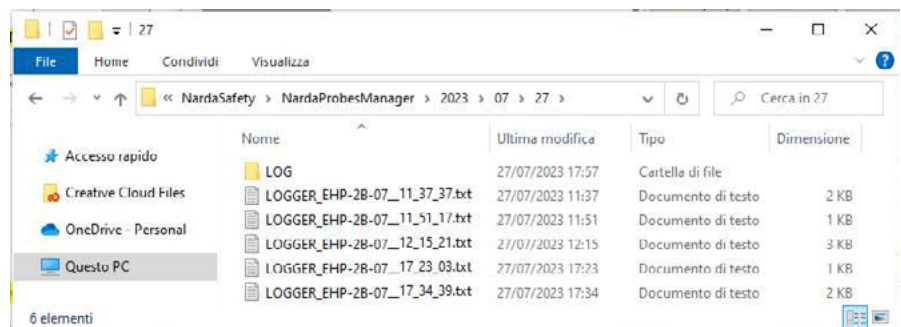
The following headline will be created on each report.
Depends on the **Log format**, the Acceleration, Speed, Position and Compass information are not included.

Descriptions:

- **LR01 Serial n.:** Serial number stored on AMC

- **Probe name:** Probe type connected to the AMC

- **Calibration date:** Latest probe calibration

- **Log type:** Log acquisition method

- **Standard**: Reference standard (for EHP-2B probe model only)

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- **Date:** Working session date in dd/mm/yyyy format

- **Time:** Hour, minute, second of the measurement acquisition

- **S(E) / E-field RMS:** shows the RMS average calculated on electric "**S(E)**" field strength in far field condition   or   Electric "**E**" field

- **S(E) / E-field peak:** shows the peak value measured on electric "**S(E)**" field strength in far field condition   or   Electric "**E**" field

- **S(H) / H-field RMS:** shows the RMS average calculated on magnetic "**S(H)**" field strength in far field condition   or   Magnetic "**H**" field

- **S(H) / H-field peak:** shows the peak value measured on magnetic "**S(H)**" field strength in far field condition   or   Magnetic "**H**" field

- **Battery:** Battery voltage

- **Altitude:** Relative altitude in meters.

- **Temperature:** Temperature in degrees Celsius.

- **RH:** Percentage of relative humidity.

- **Status**: any alarms occurred during the monitoring activity is marked with:
A = Field Level exceeded Alarm;
W = Field Level exceeded Warning;
U = USB cable connected Alarm;
V = Low Battery Alarm;
P = Probe failure Alarm;
T = OverTemperature Alarm;
C = Relative Humidity Alarm;
"-" means that specific Alarm (or warning) is not armed.

The **Status** column in the text report and the **Alarms** shown on the Main window are independent of each other. Doesn't matter if active or not on **Settings** tab, the AMC will always be able to record any alarm occurred during Logger acquisition.

- **Perturbing:** any data affected by disturbance activity will be marked with:
U = USB cable connected;
UCHARGING = USB cable connected and AMC under charging.
"-" means that specific Perturbing activity is not armed.

NOTICE **Use of the battery charger is not recommended during measurement, as it may introduce noises that could noticeably affect the readings.**

NOTICE **The presence of one of the above marker indicates that the measurement result could have been affected by the related occurrence and the plausibility of the result should be verified.**

- **AccelerationX(g):** Gravitational acceleration in hundredths of g for X axis

- **AccelerationY(g):** Gravitational acceleration in hundredths of g for Y axis

- **AccelerationZ(g):** Gravitational acceleration in hundredths of g for Z axis
For Accelerometer axes orientation see §2.7.

- **Speed(km/h):** speed measured during mobile operation

- **Latitude:** North–South position

- **Longitude:** East/West position

- **GPSAltitude(m):** height in meters above mean sea level

- **Compass Heading:** compass heading in degrees and cardinal directions.

NOTE **Some labels may also change in case of using different probes or configuration**.

4-38   **Probes Manager operating instructions**

In the example below, it is shown the .txt file format


```
LOGGER-EHP-2B-07_03__17_29_20.txt - Blocco note di Windows                    —
File  Modifica  Formato  Visualizza  ?
LR01 Serial n.: 000ZW30311
Probe name: EHP-2B-07
Calibration date: 19.06.23
Log type: RMS = 1.00 minutes
Standard: SC6CONTR

Date     Time      S(E)RMS%    S(E)peak%   S(H)RMS%   S(H)peak%   Battery(V)   Altitude(m)   Temperature(C°) RH(%)   Status  Perturbing

03/08/2023   17.29.30   0.07   1.48   0.06   1.04   3.7   0   27   38   --------   --------
03/08/2023   17.29.35   0.07   0.73   0.06   0.48   3.7   0   27   38   --------   --------
03/08/2023   17.29.40   0.07   0.55   0.06   0.31   3.7   0   27   38   --------   --------
03/08/2023   17.29.45   0.04   1.47   0.02   1.09   3.7   0   27   38   --------   --------
03/08/2023   17.29.50   0.04   0.65   0.02   0.49   3.7   0   27   38   --------   --------
03/08/2023   17.29.56   0.04   0.88   0.02   0.60   3.7   0   27   38   --------   --------
03/08/2023   17.30.00   0.04   1.58   0.02   1.11   3.7   0   27   38   ----U---   -----UCHARGING-
03/08/2023   17.30.05   0.04   1.14   0.02   0.43   3.7   0   27   38   ----U---   -----UCHARGING-
03/08/2023   17.30.10   0.08   1.15   0.04   1.07   3.7   0   27   38   ----U---   -----UCHARGING-
03/08/2023   17.30.15   0.08   1.62   0.04   1.10   3.7   0   27   38   ----U---   -----UCHARGING-
03/08/2023   17.30.20   0.08   1.23   0.04   1.11   3.7   0   27   38   ----U---   -----UCHARGING-
03/08/2023   17.30.25   0.08   1.29   0.04   0.60   3.7   0   27   38   --------   --------
03/08/2023   17.30.30   0.08   1.59   0.04   1.11   3.7   0   27   38   -W------   --------
03/08/2023   17.30.35   0.13   1.50   0.08   1.11   3.7   0   27   38   AW------   --------
03/08/2023   17.30.40   0.13   1.27   0.08   0.61   3.7   0   27   38   AW------   --------
03/08/2023   17.30.45   0.13   1.31   0.08   1.11   3.7   0   27   38   --------   --------
03/08/2023   17.30.50   0.13   1.18   0.08   1.06   3.7   0   27   38   --------   --------
03/08/2023   17.30.56   0.13   1.18   0.08   1.11   3.7   0   27   38   --------   --------
03/08/2023   17.31.00   0.17   0.08   0.10   0.06   3.7   0   27   38   AW------   --------
```

In the example below, it is shown the .csv file format

Date	Time	S(E)RMS%	S(E)peak%	S(H)RMS%	S(H)peak%	Battery(V)	Altitude(m)	Temperature(C°)	RH(%)	Status	Perturbing
03/08/2023	17.29.30	0.07	1.48	0.06	1.04	3.7	0	27	38	--------	--------
03/08/2023	17.29.35	0.07	0.73	0.06	0.48	3.7	0	27	38	--------	--------
03/08/2023	17.29.40	0.07	0.55	0.06	0.31	3.7	0	27	38	--------	--------
03/08/2023	17.29.45	0.04	1.47	0.02	1.09	3.7	0	27	38	--------	--------
03/08/2023	17.29.50	0.04	0.65	0.02	0.49	3.7	0	27	38	--------	--------
03/08/2023	17.29.56	0.04	0.88	0.02	0.60	3.7	0	27	38	--------	--------
03/08/2023	17.30.00	0.04	1.58	0.02	1.11	3.7	0	27	38	----U---	-----UCHARGING-
03/08/2023	17.30.05	0.04	1.14	0.02	0.43	3.7	0	27	38	----U---	-----UCHARGING-
03/08/2023	17.30.10	0.08	1.15	0.04	1.07	3.7	0	27	38	----U---	-----UCHARGING-
03/08/2023	17.30.15	0.08	1.62	0.04	1.10	3.7	0	27	38	----U---	-----UCHARGING-
03/08/2023	17.30.20	0.08	1.23	0.04	1.11	3.7	0	27	38	----U---	-----UCHARGING-
03/08/2023	17.30.25	0.08	1.29	0.04	0.60	3.7	0	27	38	--------	--------
03/08/2023	17.30.30	0.08	1.59	0.04	1.11	3.7	0	27	38	-W------	--------
03/08/2023	17.30.35	0.13	1.50	0.08	1.11	3.7	0	27	38	AW------	--------
03/08/2023	17.30.40	0.13	1.27	0.08	0.61	3.7	0	27	38	AW------	--------
03/08/2023	17.30.45	0.13	1.31	0.08	1.11	3.7	0	27	38	--------	--------
03/08/2023	17.30.50	0.13	1.18	0.08	1.06	3.7	0	27	38	--------	--------
03/08/2023	17.30.56	0.13	1.18	0.08	1.11	3.7	0	27	38	--------	--------
03/08/2023	17.31.00	0.17	0.08	0.10	0.06	3.7	0	27	38	AW------	--------

Probes Manager operating instructions   4-39

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Probes Manager operating instructions

5 – SMARTS AMC Management software

5.1 Introduction

This section provides the information necessary to install and use the SMARTS AMC Management software with the SMARTS AMC Area Monitor Compact.

The SMARTS AMC Management software allows user to manage **the SMARTS AMC Area Monitor Compact accessible locally (Local Area Network)** and wherever located in the world **(External network)** simultaneously.

The **Local Area Network** is a direct connection between the AMC and the PC using the wired cable or Wi-Fi through router. All information and data are acquired in real time and stored on own computer.
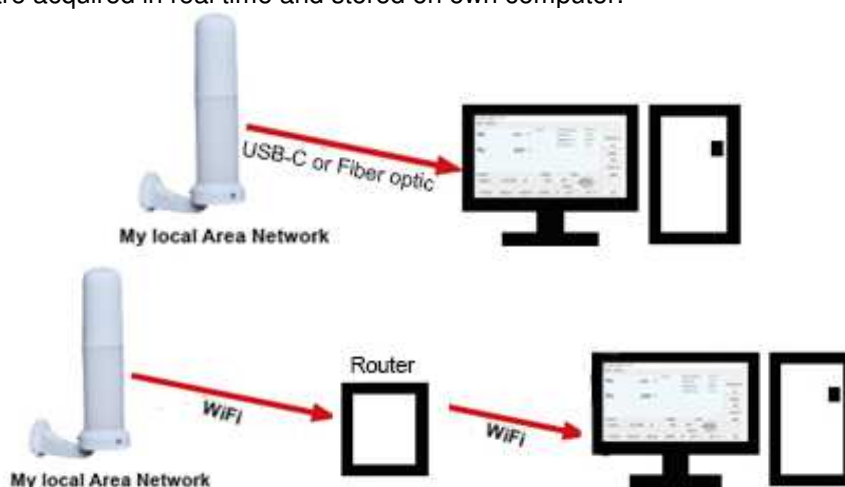
In **External network** there is no direct connection between the AMC and the PC. The user, wherever located in the world, can perform live measurements and store data with the AMC connected in local net or remotely by cloud. All results of EMF monitoring can be downloaded on own computer or shared publicly and free of charge online (via a web-based solution).
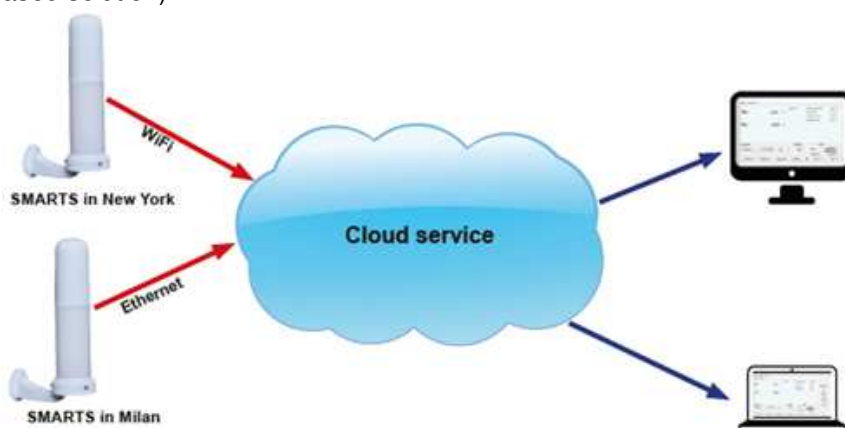
Each records contains measurement result average, peak and their comparison with fixed threshold, address, geographical position and an image of the station for easy identification. Whenever the level exceed the thresholds set, the SMARTS AMC Management software sends an alarm to the control center by e-mail addresses, or by hardware alarm.

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SMARTS AMC Management software | **5-1** |

5.2 Hardware requirements

To ensure the proper operations of the SMARTS AMC Management software, the minimum hardware requirements of the Personal Computer are

- Processor Core i3
- 2 GB RAM
- 10 GB free space on hard disk;
- Windows Operating system™ Win7 and Win10

 NOTE

To obtain firmware or program updates for AMC, please contact your NARDA distributor or download it directly from the NARDA Web site http://www.narda-sts.it

 NOTE

Windows server and database services is required for using Cloud based.

5.3 Installation

To install the SMARTS AMC Management software on PC from the supplied Software Media as follows.

 NOTE

Do not connect the AMC to the PC until the installation is completed.

Browse the Software Media in Computer Resources and double click on the **SMARTSAMCManagement Setup.exe** file to start the installation
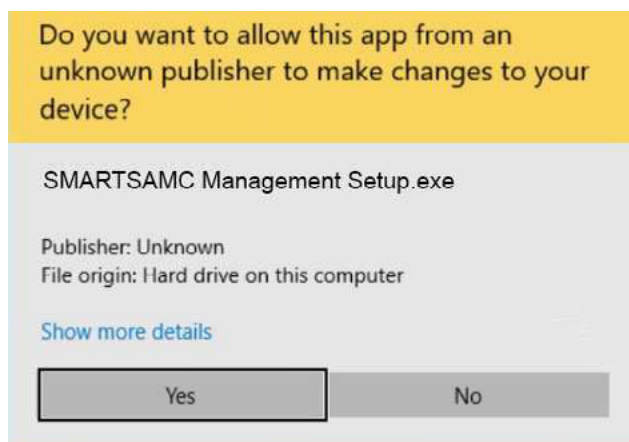
SMARTSAMC Management Setup

Click **Yes** when requested.

5-2　　　　　**SMARTS AMC Management software**

Click **Next** to proceed installing.

The installation can be aborted by clicking **Cancel** button:

SMARTS AMC Management software   5-3

Click **Next** to confirm the default folder or **Change** to modify.

Click **Next** to proceed installing.

5-4	SMARTS AMC Management software
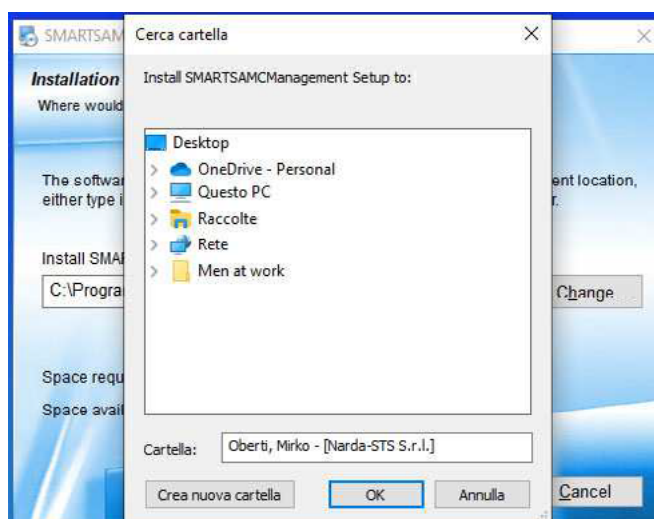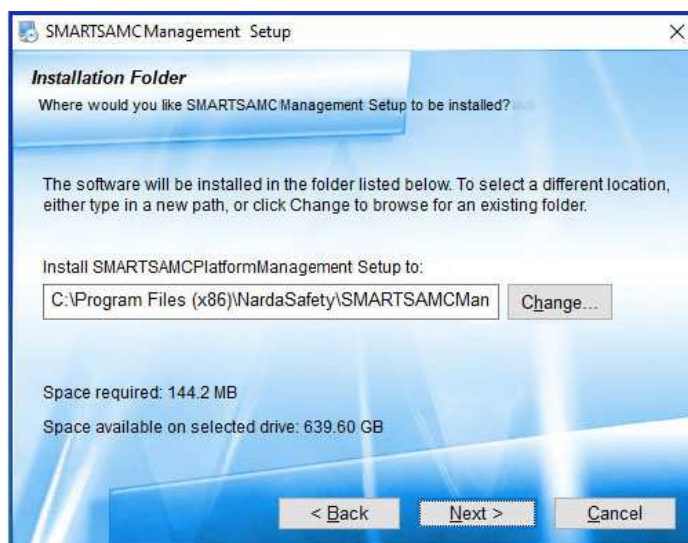
The installing status is displayed then:
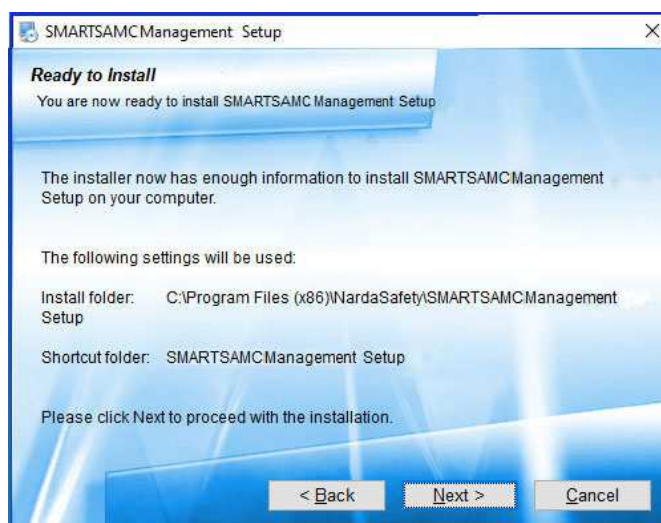
Click **Finish** to complete and exit the installer.
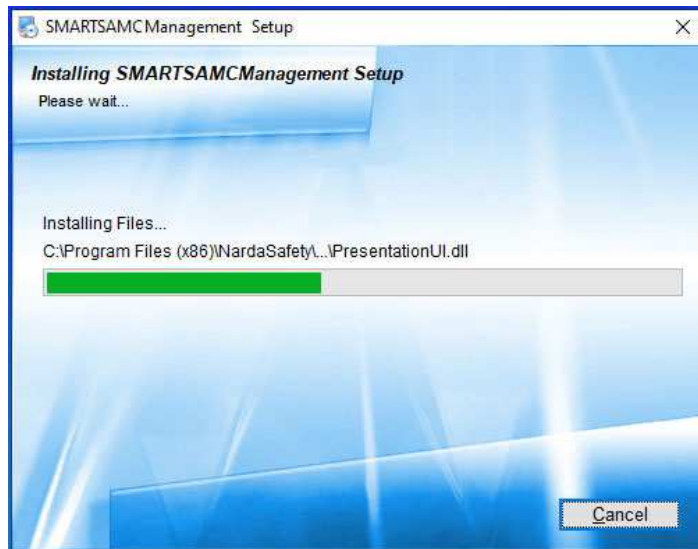
When asked for, reboot your system to complete installation
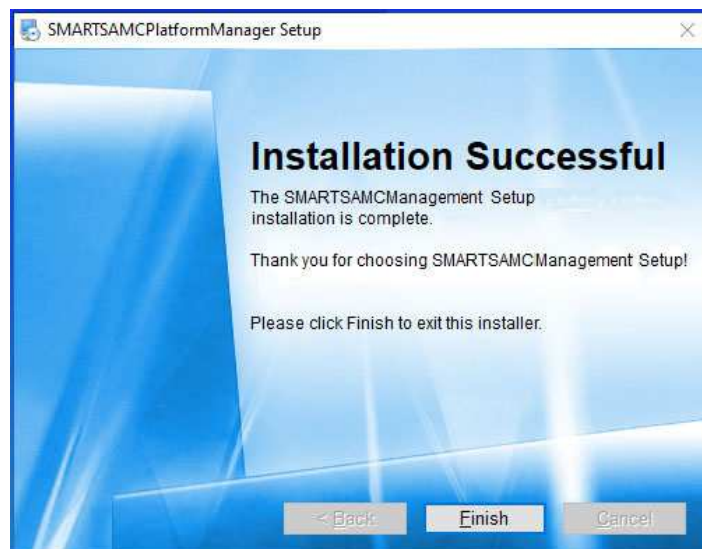
SMARTS AMC Management software   **5-5**
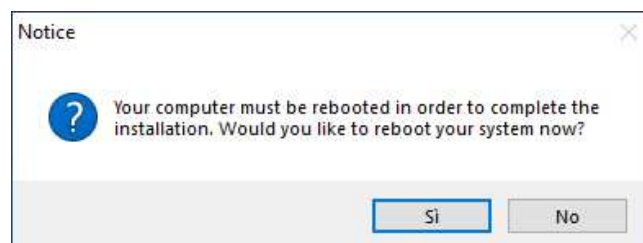
The folder **SMARTSAMCManagement Setup** is created under **Programs\Narda Safety** with **SMARTSAMCManagement** executable**.**

Another item is created in the Programs list at Start Menu where the "**SMARTSAMCManagement Setup**" programs must be run from.
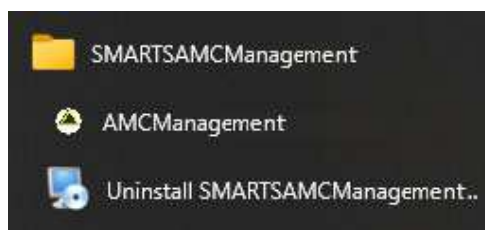
The **AMCManagement** icon will be available on desktop.

AMCManagement

> **NOTE**
>
> **The software is able to manage the AMC via an optical connection (fiber optic), via a wired connection (i.e. USB or Ethernet) and via Wi-Fi connection.**

> **NOTE**
>
> **If Area Monitor Compact is not supplied by USB-C cable or PoE Injector, the unit automatically turns OFF when after 30 min. the fiber optic/Ethernet has been disconnected or the communication with PC is not established.**

> **NOTE**
>
> **The AMC cannot be connected to PC via Bluetooth. The BLE connection is available only for mobile device through the LR-01 Manager App; for further information, see chapter 8 and 9.**

| 5-6 | **SMARTS AMC Management software** |

5.4 AMCManagement control window

- Click the **AMCManagement** icon on desktop.

AMCManagement

Alternatively (Windows 10): **Start → All Programs → SMARTSAMCManagement Setup → AMCManagement**.

SMARTSAMCManagement
AMCManagement
Uninstall SMARTSAMCManagement..
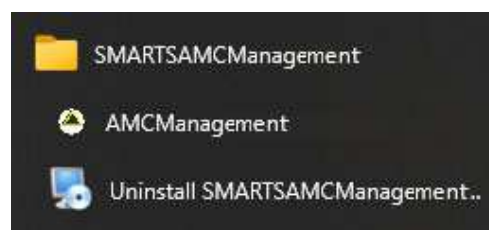
Commands description:

1. Title bar
2. Control window buttons
3. Local Area Network main window (see §5.1)
4. External Network main window (see §5.1)
5. Info

SMARTS AMC Management software   **5-7**

Add LR

- Click on **Add LR** button and enter the IP address assigned for each AMC present on **Local Area** and **External network (Remote).**

- Once the link has been successfully established, the following main window will appear:

- Enter the SMARTS AMC name on the **Location** column

| 5-8 | **SMARTS AMC Management software** |
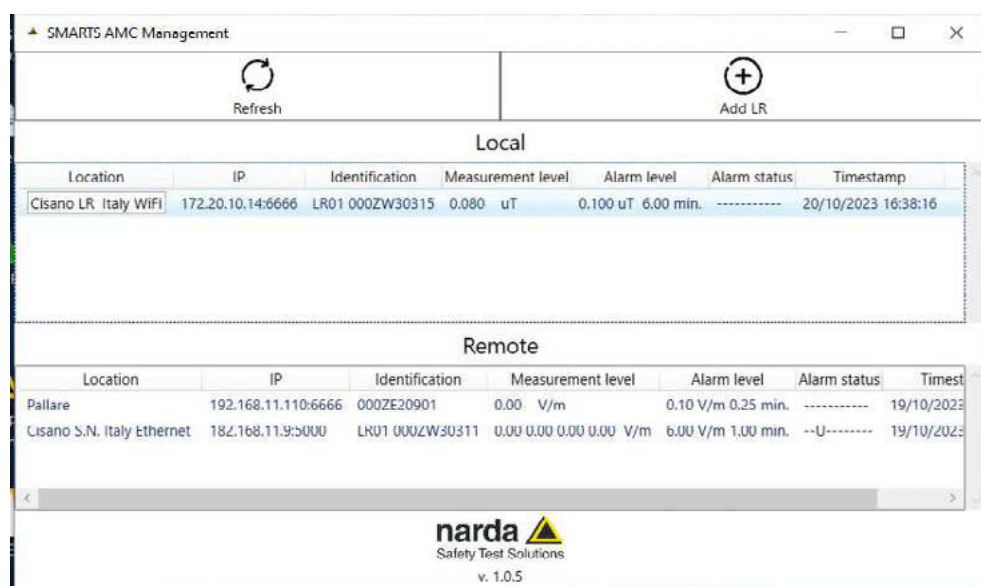
Descriptions:

- **Location:** SMARTS AMC name
- **IP:** IP address assigned to the AMC and the number of the port.
- **Identification:** AMC Serial Number
- **Measurement level:** The averaged field calculated in order to the average time set
- **Alarm level:** field level threshold for alarm notification

- **Alarm Status**: any alarms occurred during the monitoring activity is marked with:
A = Field Level exceeded Alarm;
W = Field Level exceeded Warning;
U = USB cable connected Alarm;
V = Low Battery Alarm;
P = Probe failure Alarm;
T = OverTemperature Alarm;
C = Relative Humidity Alarm;
"-" means that specific Alarm (or warning) is not armed.

NOTICE

The presence of one of the above marker indicates that the measurement result could have been affected by the related occurrence and the plausibility of the result should be verified.

- **Timestamp:** The date and time of the last measurement acquired.

- At any time the user can refresh the screen with **Refresh** button on control window buttons

Refresh

Info contents: Manufacturer information and Software release;

narda
Safety Test Solutions
v. 1.0.11

SMARTS AMC Management software   5-9

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5-10 SMARTS AMC Management software

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6 – Update Firmware

6.1 Update Firmware

This section provides the information necessary to update the AMC firmware.

It is important to update the AMC firmware in order to use all the new functions added and eliminate any bugs in the software.

NOTE

To obtain firmware or program updates for AMC, please contact your NARDA distributor or download it directly from the NARDA Web site http://www.narda-sts.it

To update the AMC firmware proceed as follows:

- Connect the AMC to PC via Fiber Optic connection (through USB-OC).

NOTE

The AMC cannot be update via USB wired or Wireless connection.

- Turn off the AMC

- Click the **LR-01UP** icon on desktop.

Alternatively **Start → All Programs → Narda Safety → LR-01 Update Firmware**

Update Firmware | 6-1

This window is displayed.

- Pressing the **USB-OC** button, the LR-01UP utility automatically detects the COM port to which AMC is connected.
The User can manually select the COM port assigned to the Area Monitor Compact using the RS232 drop-down menu (the device appears as "**USB Serial Port (COMn)**".
Select the **RS232** button to confirm.

- Once selected the COM port, make sure the AMC has enough battery level to perform the Update Firmware and proceed with **Yes**.
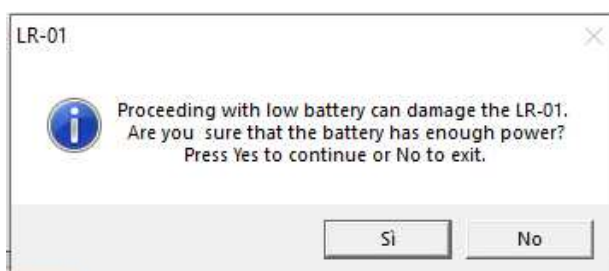
- A message will inform to turn the AMC off. Press **OK** to confirm.

| 6-2 | Firmware Update |

- Then switch the AMC on, check the big led status and press **OK** to continue.
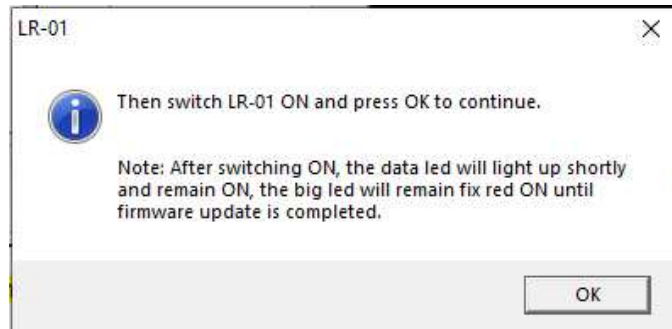
- A window is displayed. Click on **Update Firmware** button to proceed.
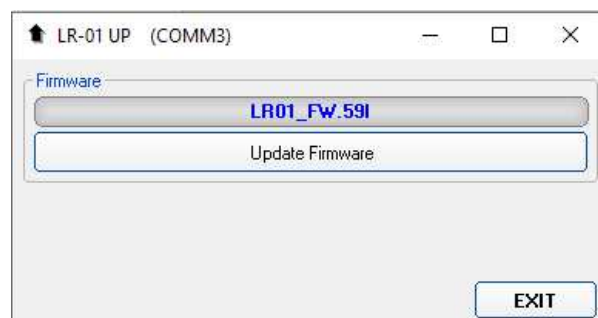
Once a link has been established, a colored progress bar indicating the process.
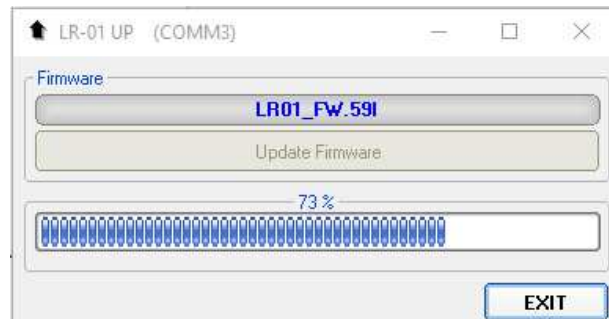
At the end of the process, the following message will appear:
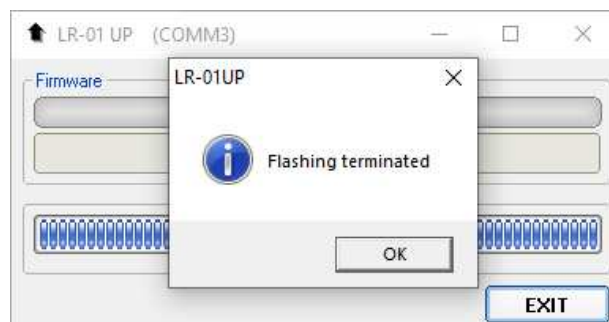
- Press **OK**, turn the AMC off and turn it on again.
The new firmware release can be displayed in the Probe Manager software (see chapter 4).

Update Firmware   6-3

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| 6-4 | **Firmware Update** |

7 – Uninstalling driver and software

7.1 Uninstalling driver for the USB-OC

It is possible to remove the USB-OC driver from the PC according to the following procedure:

Open the Windows Control Panel.

The following procedure shows how to remove the driver in Windows 10 environment. It may be different depending on the operating system in use.
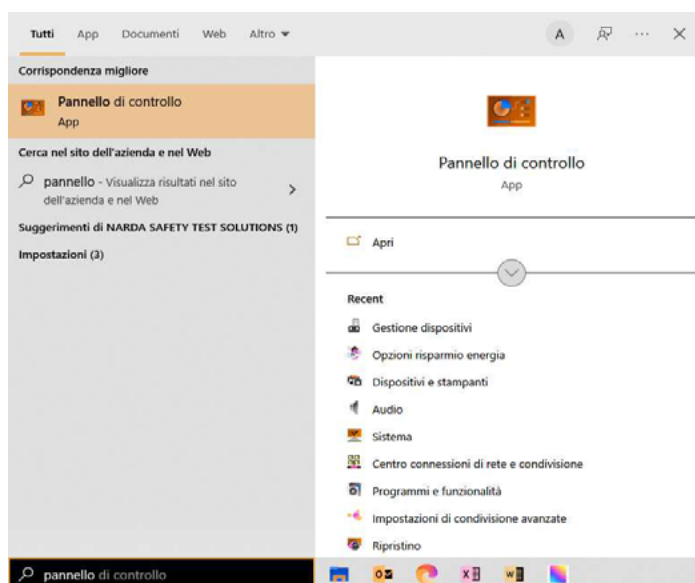
Double click "Programs and Features".

Uninstalling driver and software | 7-1

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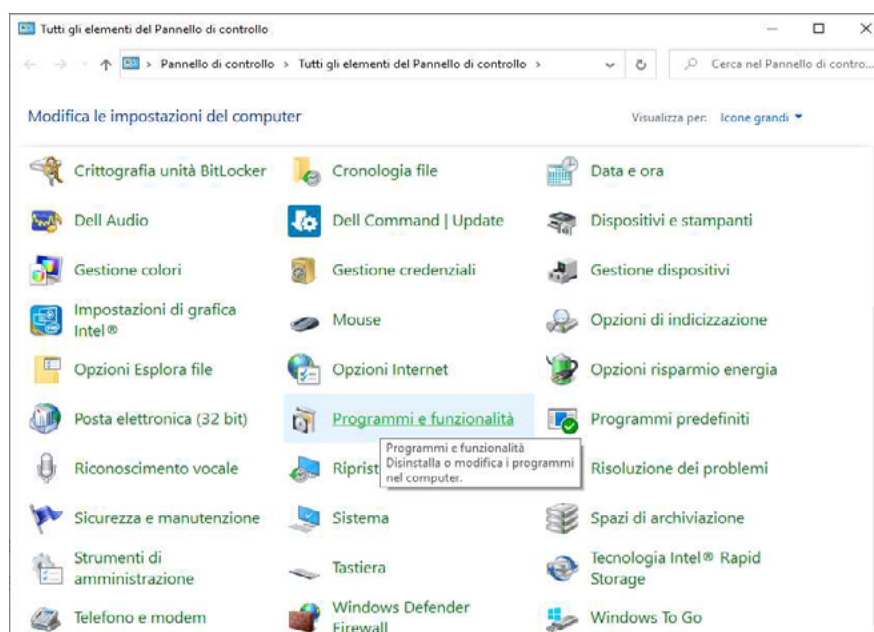
From the application list select "PL-2303 USB-to-Serial", click "Uninstall" and follow the instructions.
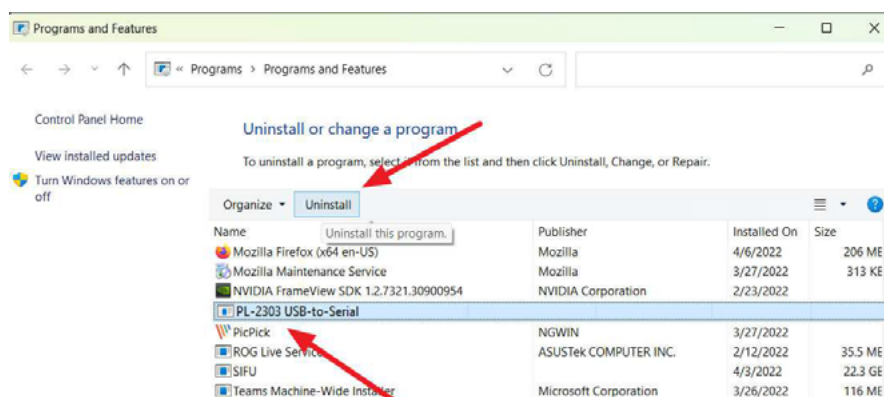
7.2 Uninstall Narda Probes Manager

Press **EXIT** to quit Narda Probes Manager, disconnect the AMC from the PC and uninstall the software.

In Win7 click **Windows** , **NardaProbesManager,** then **Uninstall Probes_Manager** and follow the instructions.

In Win10 click **Start** , **Settings**, **App&Features,** find and select **Probes_Manager**, click **Uninstall** and follow the instructions.
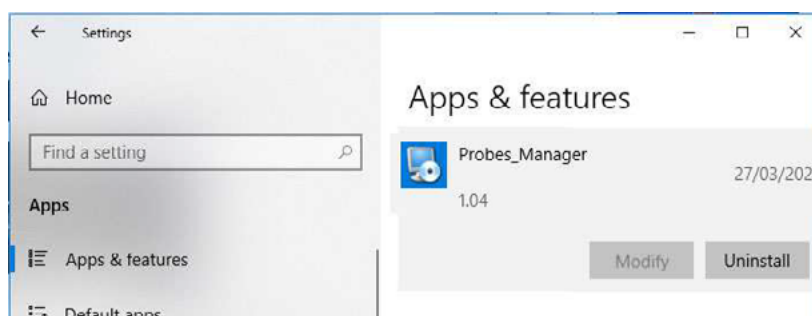
NOTICE

When asked if removing the shared files, answer NO to prevent other programs not to run correctly.

| 7-2 | Uninstalling driver and software |

8.1 Introduction

Narda introduces an innovative way to perform the AMC measurements on mobile device by a dedicated App. This section provides the information necessary to use the LR01 Manager application.

8.2 Installation

Download and install the LR01 Manager application on your device from Google or Apple store. Once the application is successfully installed, the LR01 Manager icon is displayed on home screen.
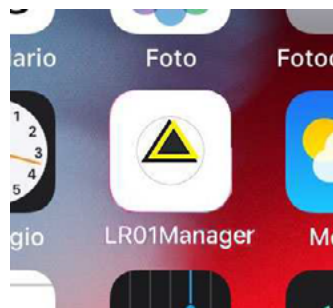
NOTICE   Android release 10.0 or higher must be installed on the device to use the LR01 Manager App.

NOTICE   iOS release 11.0 or higher must be installed on the device to use the LR01 Manager App.

NOTICE   Make sure turning on the Bluetooth on AMC and the device.

NOTICE   To active the Bluetooth communication on the AMC the user must connect the Area Monitor Compact to Narda Probe Manager software and enable the BLE function (see §4.2.7.2 Bluetooth connection).

NOTICE   To active the Bluetooth communication on the device, refer to the instructions of its manufacturer.

NOTICE   If the App has already been installed on the device, before starting the App make sure the software is not running to avoid communication errors.

Turning on AMC, the Visual led begins **flashing red** for 30 seconds and then **blinks red** every 5 seconds to indicate the Area Monitor Compact is ready to communicate (see §2.7)
Clicking on the icon to run the application, the Bluetooth pairing request will appear. Select "**Pair**" to confirm.

LR-01 Manager operating instructions   **8-1**
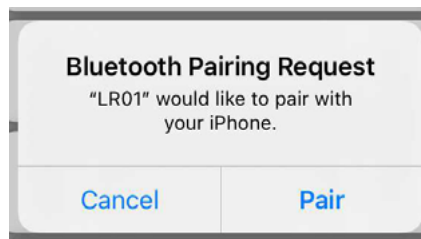
8.3 LR01 Manager Main window

Once the link has been successfully established, the LR-01 Manager app provides the following features:
- Changing AMC settings.
- Performing live measurements.
- Logging and saving data.

These are the basic operations to follow to work with the LR01 Manager. All additional information and explanations can be found on chapter 4.
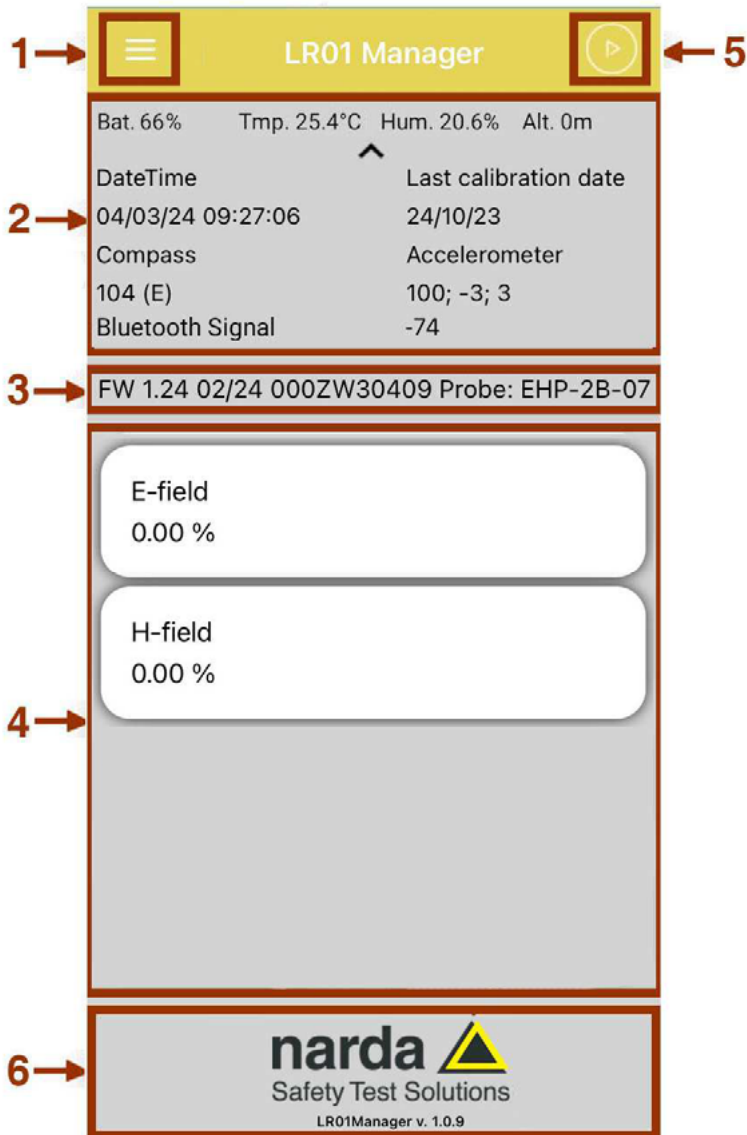
Commands description:

1. Menu

2. Technical data

3. Unit's identifier and Probe type

4. Measurements window

5. Logger button

6. Info

8.3.1 Menu

Device

Settings

Save
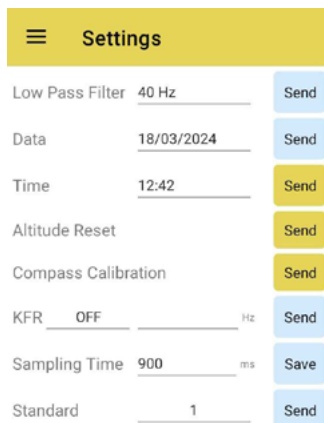
Commands:

- Device: to display the Main window.

- Settings: allows to modify the AMC settings.

- Save: allows to take a photo of the site monitored and generates an email with attached the last working session log file and the picture.

8.3.1.1 Settings

Settings window allows to:

- Set the AMC internal clock with the **Date** and **Time** of the PC.

- Set to zero the internal **Altimeter** reference.

- Calibrate the internal **Compass Calibration** for more accuracy.

- Recall the **Frequency correction factor** (in Hz) stored in the AMC memory or OFF when disabled. When the KFR is ON the measured field value turns blue in the main window (for further information see §4.3.3).

- **Sampling time**: Set the time interval (in milliseconds) between subsequent readings.

- Standard: Load a default standard limit saved into the EHP-2B probe memory at the factory.
The limit list depends on the EHP-2B model probe connected, as follows:

- EHP-2B-05 and EHP-2B-06 Standard limit list:
1 → **ICNIRP 1998 Occupational;**
2 → **ICNIRP 1998 General Public;**
3 → **SC6 2015 Controlled;**
4 → **SC6 2015 Uncontrolled.**

- EHP-2B-07 and EHP-2B-08 Standard limit list:
1 → **ICNIRP 2020 Occupational;**
2 → **ICNIRP 2020 General Public;**
3 → **FCC-96 326 Occupational;**
4 → **FCC-96 326 General Public.**

NOTE

The Standard function is enable only when an EHP-2B model probe is connected to the AMC.

The new setting can be saved pressing the corresponding **Send** or **Save** button; once the value is stored, the button turns blue.
Select **Menu** button and then **Device** to return to the Main window.

LR-01 Manager operating instructions   8-3

8.3.2 Technical data

In the upper part of the main screen, some technical data are shown.

- **Bat:** It shows the residual autonomy during measurements and the achieved autonomy during charging.

- **Tmp:** followed by the temperature in degrees Celsius.

- **Hum:** followed by the percentage of relative humidity.

- **Alt:** followed by the relative altitude in meters.

- **DateTime**: Date and time set on AMC.

- **Last Calibration date:** Latest probe calibration.

- **Compass:** followed by the compass heading in degrees and cardinal directions.

- **Accelerometer:** Gravitational acceleration is expressed in hundredths of g for each of the three axes. For Accelerometer axes orientation see §2.7.

- **Bluetooth Signal:** It shows the quality of the Bluetooth connection

In situations where the Bluetooth connection is poor, a red "**bluetooth signal is weak**" message will be display on the top of the LR-01 Manager main window.

Instead, If the Bluetooth connection get lost, the following message is shown:
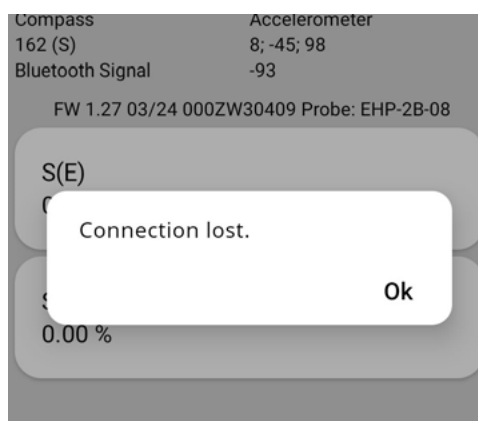
Click **"Ok".**
When the Bluetooth communication with the AMC is established again, the pairing request will appear.

| 8-4 | LR-01 Manager operating instructions |

8.3.3 Live Measurements The mobile device performs live measurements and display the data with all other related information in the LR-01 Manager main window.

The screen show the percentage indication of the standard in power density (quadratic scale) calculated on electric "**S(E)**" and magnetic "**S(H)**" field strength in far field condition   or   Electric "**E-field**" and magnetic "**H-field**" (linear scale).

The chapter 1 of this manual includes the list of the field probes available and their technical specifications.

NOTE **These are the basic operations to follow to work with the LR01 Manager. All additional information and explanations can be found on chapter 4 .**

LR-01 Manager operating instructions   8-5

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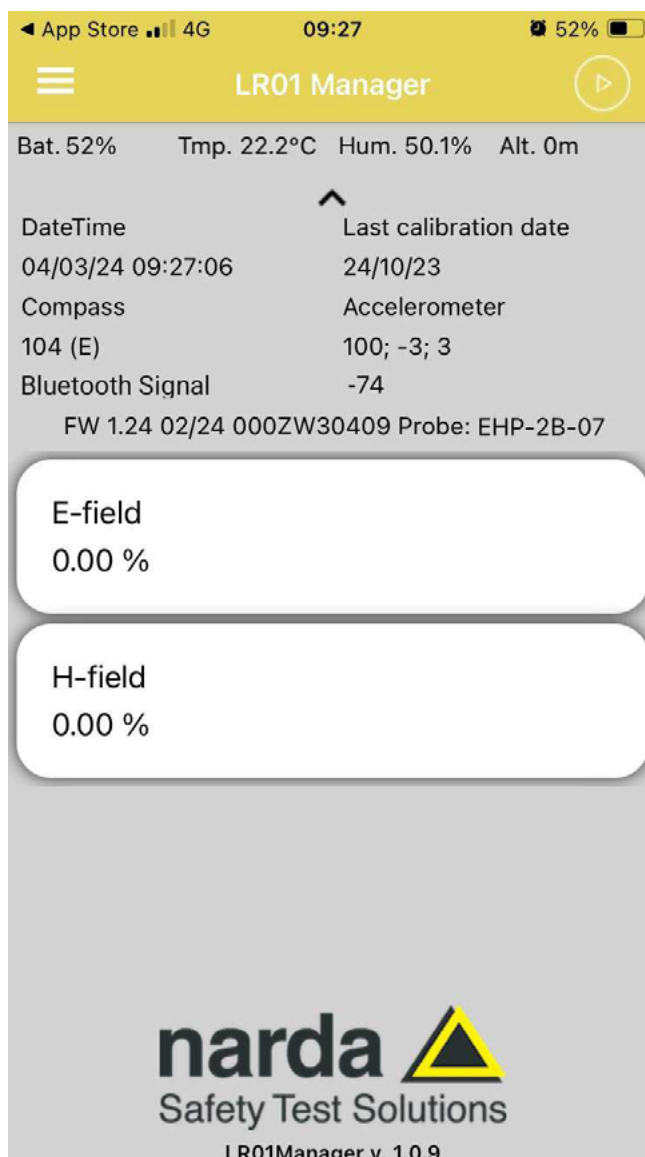
8.3.4 Logger and Save Measurements

In addition to the live measurements, the App allows logging measurements on mobile phone, saving on its internal memory and sending by email in a simple and reliable way:

Click the button in the upper-right main window to start the measurements log. The following message will appear:
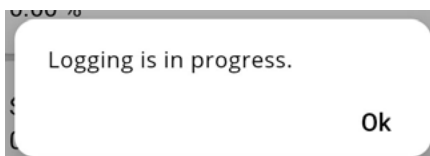
Clicking the button causes the end of measurements log and a message pops up telling:
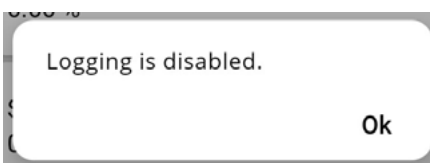
NOTICE

Starting a new log, all the data of the previous one will be deleted.
No data is saved in the internal memory of AMC; see §4.6 Storing measurements on the AMC memory (Logger)

 Save

After stopping the Log, the measurements acquired can be downloaded pressing the **Save** button (Menu → Save) otherwise will not be available anymore. This button allows to take a photo of the site monitored and generates an email with attached the .txt data log file and the picture.

NOTICE

On Android device only, when the working session is stopped the data and, if taken, the picture are saved in the **Download** directory.
A new **.TXT** file will be created with a specific name: **LR01_Record_yyyymmddhhmmss.txt**.
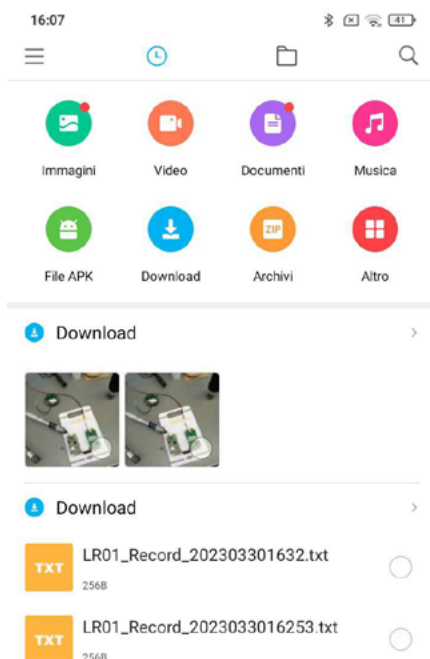
When the file is saved in .txt format and the table is opened, a huge amount of data are available. For every working session (from starting to closing logging) the following headline will be created in the txt file:

```
FW 1.21 01/24 000ZW30304 Probe: EHP-2B-07 - Unit: % - GPS: 44.07489013, 8.15974998 - Date: 05/02/2024

Time     E-field   H-field
```

- Firmware version and released data (**FW 1.21 01/24)**

- AMC Serial Number (**000ZW30304)**

- Probe connected to the AMC (**Probe EHP-2B-07)**

- Measurement unit (**Unit: %)**

- Measurements GPS coordinates (**GPS: 44.07….., 8.15…..)**

- Working session date in dd/mm/yyyy format (**Date: 05/02/2024)**

- Hour, minute, second of the measurement acquisition (**Time)**

- **S(E)** / **E-field**   **S(H)** / **H-field:** Power density calculated in far field condition and Electric/Magnetic field strength. Between brackets is reported the unit.

Example with EHP-2B-07 probe

```
FW 1.21 01/24 000ZW30304 Probe: EHP-2B-07 - Unit: % - GPS: 44.07489013, 8.15974998 - Date: 05/02/2024

Time      E-field   H-field
18:07:25  0.00      0.00
18:07:26  0.00      0.00
18:07:27  0.70      0.00
18:07:28  0.00      1.00
18:07:29  0.00      0.00
18:07:30  0.90      0.00
18:07:31  0.00      1.10
```

☞ NOTE **The recorded data can be viewed either as a graph or as a table using common software as an example Word or Excel application.**

8.3.5 Info   Contents:

- Manufacturer information and Software release;

narda Safety Test Solutions
LR01Manager v. 1.0.38

LR-01 Manager operating instructions   **8-7**

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8-8   **LR-01 Manager operating instructions**

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9 – Using of LR-01 with WearOS (Smartwatch) Operating instructions

9.1 Introduction

This section provides the information necessary to use the AMC SMARTS Area Monitor Compact with the optional Smartwatch.

9.2 Installation

Download and install the LR01 Manager application on your smartwatch from Google or Apple store.

Once the application is successfully installed, swipe **Upwards** on the watch screen the user will be able to view the LR01 Manager icon displayed on the **Apps screen.**
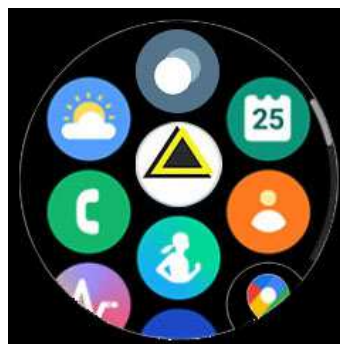
NOTICE

WearOS release 3.0 or higher must be installed on the Smartwatch to use the LR01 Manager .

NOTICE

If the App has already been installed, tap on **Recent Apps** and make sure the software is not running to avoid communication errors (see §9.4 Close the App).

NOTICE

Also make sure turning on the Bluetooth on AMC and Smartwatch.
To active the Bluetooth communication on the AMC, the user must connect the Area Monitor Compact to Narda Probe Manager software and enable the BLE function (see §4.2.7.2 Bluetooth connection).

Turning on AMC, the Visual led begins **flashing red** for 30 seconds and then **blinks red** every 5 seconds to indicate the Area Monitor Compact is ready to communicate (see §2.7)

Tap on the LR01 Manger icon to run the application; a welcome screenshot will show for a few seconds, then the "Searching for LR01" indication appears.
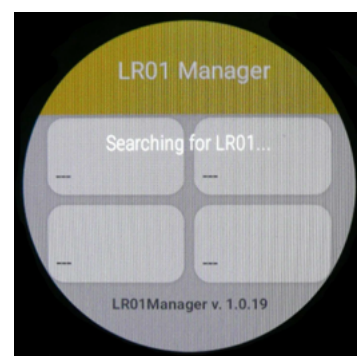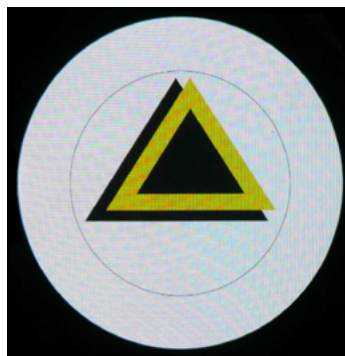
Smartwatch   **9-1**

9.3 Operations

NOTE

These are the basic operations to follow to work with the LR01 Manager. All additional information and explanations can be found on chapter 4

9.3.1 Live Measurements

Once the link has been successfully established, the Main window is displayed showing the live measurements together with software release.

The screen show the percentage indication of the standard in power density (quadratic scale) calculated on electric "**S(E)**" and magnetic "**S(H)**" field strength in far field condition   or   Electric "**E-field**" and magnetic "**H-field**" (linear scale)

The chapter 1 of this manual includes the list of the field probes available and their technical specifications.

Swipe to the left or right to enter on **Technical data** or **Settings** panel; see the upcoming paragraph.

| 9-2 | Smartwatch |

9.3.2 Technical data

Enter on the **Technical data** panel.

Swiping upwards or downwards on the screen, further technical data are shown:

- **Bat:** It shows the residual autonomy during measurements and the achieved autonomy during charging.

- **Tmp:** followed by the temperature in degrees Celsius.

- **Hum:** followed by the percentage of relative humidity.

- **Alt:** followed by the relative altitude in meters.

- **DateTime**: Date and time set on AMC

- **Last Calibration date:** Latest probe calibration

- **Compass:** followed by the compass heading in degrees and cardinal directions.

- **Accelerometer:** Gravitational acceleration is expressed in hundredths of g for each of the three axes. For Accelerometer axes orientation see §2.7.

- **Bluetooth Signal:** It shows the quality of the Bluetooth connection

In situations where the Bluetooth connection is poor, a red "**bluetooth signal is weak**" message will be display on the top of the LR-01 Manager main window.

Instead, If the Bluetooth connection get lost, the message "**Connection lost**" is shown; click **"Ok".**

When the Bluetooth communication with the LR-01 is established again, the pairing request will appear.

- Firmware and data release, Serial Number and Probe model

Smartwatch   9-3

9.3.3 Settings

Enter on the **Settings** panel.

Swiping upwards or downwards on the screen, all settings are shown:
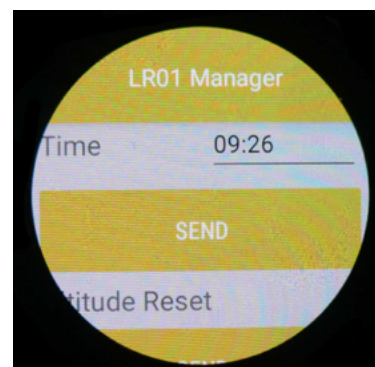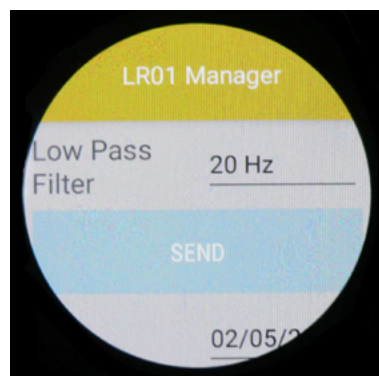
- Set the internal digital **Filter**
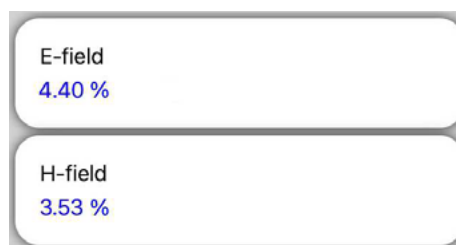
- Set the AMC internal clock with the **Date** and **Time** of the PC

- Set to zero the internal **Altimeter** reference

- Calibrate the internal **Compass Calibration** for more accuracy

- Recall the **Frequency correction factor** (in Hz) stored in the AMC memory or OFF when disabled

- **Sampling time**: Set the time interval (in milliseconds) between subsequent readings

- **Standard**: Load a default standard limit saved into the EHP-2B probe memory at the factory.
The limit list depends on the EHP-2B model probe connected, as follows:

- EHP-2B-05 and EHP-2B-06 Standard limit list:
1 → **ICNIRP 1998 Occupational;**
2 → **ICNIRP 1998 General Public;**
3 → **SC6 2015 Controlled;**
4 → **SC6 2015 Uncontrolled.**

- EHP-2B-07 and EHP-2B-08 Standard limit list:
1 → **ICNIRP 2020 Occupational;**
2 → **ICNIRP 2020 General Public;**
3 → **FCC-96 326 Occupational;**
4 → **FCC-96 326 General Public.**

NOTE

The Standard function is enable only when an EHP-2B model probe is connected to the AMC.

The new setting can be saved pressing the corresponding **Send** or **Save** button; once the value is set, the button will turn blue.

9-4   **Smartwatch**

9.4 Close the App

On the **Apps screen**, tap ⭕ (Recent apps).
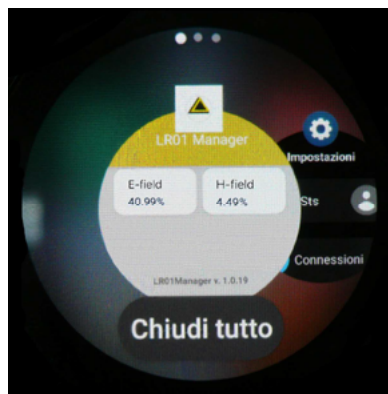
Use the bezel or swipe left or right on the screen to move to the app to close.

Swipe upwards on the app to close it or Tap on **Close all** to close all running apps.

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Smartwatch

10 - Command protocol

10.1 Introduction

This chapter provides the information required to control the SMARTS AMC Area Monitor Compact via one of the communication ports (e.g. the fiber optic) connected to a PC and by means of user's own PC software applications.

The communication between the host and the AMC can be in wired USB or Ethernet, in optic USB (USB-OC) or wireless (Wi-Fi or Bluetooth).

Serial communication protocol is the following:
- Baud: 115200 (default, or other speeds selectable)
- Parity: NONE
- Length: 8 bit
- Bit Stop: 1

The commands have the following general format:
#LRcommand* where:

#LR = opens the command string;
? = for query commands only;
Command = command string;
***** = closes the command string.

#LR prefix is a wildcard to establish a communication with every AMC. To connect to a specific Area Monitor Compact, a #nn should be used instead. Where nn is the address of the Area Monitor Compact desired, which can be set by the SADR command.

The commands available are divided into two main categories:
- **Query COMMANDs**;
- **Setting COMMANDs**.

Commands are made of ASCII strings delimited by the character "#" (0x23) and the character "*"(0x2A).
The replies are terminated with <CR><LF> (0x0D)(0x0A).

An example to request the unit's name is as follows: **#LR?IDN***
The answer is like: IDN=Cisano;000WE20501

Another example, to read the temperature at the AMC with address 01:
#01?TMP*

The Baud Rate is set at 115200 baud as default.
To switch to one of the other speeds available, please refer to command SBDR.
It is possible to return to a 115200 bps by following the same procedure.

Command protocol   10-1

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At power ON, AMC is automatically set to listen to both the USB and the optic port for incoming commands.

The optic port will be always available for communicating with the unit.

User's own software can ask for measurement data when desired or can switch the Area Monitor Compact to master mode where measurement data are continuously sent over the communication port, without the need of asking for each.

At any time the operation mode can be switched back to slave mode.

While operating in slave mode, AMC sends answers to the received commands, according to the communication protocol described below.

If Area Monitor Compact is not supplied by USB-C cable or PoE Injector, the SMARTS AMC automatically turns off 30 minutes after receiving the last command.

NOTE

Please, do not try any commands not covered in this manual, as random poking can cause the system to crash or lose data and calibrations.

| 10-2 | **Command protocol** |

10.2 List of commands

	Table 9-1 Query COMMANDs list
Syntax	Function
?ADR	Requests Area Monitor Compact's address.
?ALR	Requests alarm threshold.
?ALT	Requests relative altitude.
?AMC	Requests the Area Monitor Compact output status.
?AMS	Requests the Area Monitor Compact input status.
?AMV	Requests the Area Monitor Compact release and date.
?ANY	Requests the devices mask for alarm notification
?AQ_	Requests logger settings.
?AVG	Requests the averaging mode setting.
?BAT	Requests battery voltage.
?BDR	Requests optic port speed (baud rate).
?BLE	Requests the state of the BLE connection.
?CKG	Requests GPS status.
?CLK	Requests date and time.
?CPS	Requests compass and accelerometer readings.
?DCM	Requests the automatic communication setting at power on.
?GCS	Requests the Real Time Clock setting status.
?GPS	Requests position information.
?IDN	Requests Area Monitor Compact's identification.
?IDNF	Requests Area Monitor Compact's extended identification.
?KFR	Requests the setting for the correction depending on the frequency.
?LFA[S]	Requests the latest average field value.
?LOG	Requests binary log file via wired connection.
?LPF	Requests Low Pass Filter setting for passive probes.
?LST	Requests Logger status.
?MAC	Requests the Wireless MAC address.
?MES	Requests the instantaneous field level.
?MESS	Requests the instantaneous field level with continuous transmission.
?MESR[v]	Requests the instantaneous field level + position and sensors data, continuous.
?MESf	Requests the instantaneous field level + position and sensors data.
?MESs	Disables continuous transmission activated by MESR[v] command.
?MSK	Requests the alarms mask.
?NET	Requests the list of the Wi-Fi available networks.
?PRB	Requests probe information.
?S/N0	Requests the Area Monitor Compact's serial number.
?SID	Requests the stored Wi-Fi network name.
?SNS	Requests environment sensor data: temperature, relative humidity and pressure.
?SST	Requests the Wi-Fi signal level.
?STA	Requests all alarms status.
?STM	Requests masked alarms status.
?STS	Request the reference standard (for EHP-2B model probe only).
?TMP	Requests environment temperature and relative humidity.
?VST[V]	Requests power supply and battery charging status.
?WFI	Requests the state of the Wi-Fi connection.
?WLOG	Requests binary log file via wireless connection.
?WMEi[fv]	Requests % value related to i-th standard.
?WRN	Requests warning threshold.
?WVR	Requests firmware version of the internal Wi-Fi + BLE module.

Command protocol | 10-3

Table 10-2 Setting COMMANDs list	
Syntax	Function
SADRa	Sets Area Monitor Compact's address.
SALRs	Sets alarm threshold.
SALT	Resets the reference altitude.
SAMCk para	Set the Area Monitor Compact output and alarm(s)
SANY	Sets the device for alarm notification
SAQ_m**;**x;t	Sets the logger parameters.
SAVGl;r	Selects the averaging time and type
SBDR b	Sets baud rate.
SBLEx	Switches Bluetooth ON or OFF.
SCLDd.m.y	Sets the RTC date.
SCLT h.m.s	Sets the RTC time.
SCPCt	Runs compass calibration.
SDCMc	Sets the preferred communication channel at power on.
SGCSAh	Automatic time set.
SGCSM	Manual time set.
SGOF	Switches OFF the GPS module.
SGOOFF	Switches OFF the Area Monitor Compact.
SGOI	Switches ON the GPS module.
SIDN i	Sets the Area Monitor Compact's identifier.
SKFR f	Sets the frequency correction value and makes it active.
SLPF f	Selects the Low Pass Filter for passive probes.
SLST l	Instantly activates or deactivates the log.
SMSKm	Sets the warnings and alarms mask.
SPWDp	Sets Wi-Fi password.
SREBOOT	Reboots the Area Monitor Compact.
SRST	Restores default configuration.
SRSTR	Restores default configuration and logger rate.
SSIDi	Sets Wi-Fi network ID.
SSTSi	Set the reference standard (for EHP-2B model probe only)
SWFIx	Wi-Fi connection.
SWRN s	Sets warning threshold.

10-4   **Command protocol**

10.3 Query commands   Using these commands the AMC can be queried with a series of requests to which the Area Monitor Compact responds.
Query commands are characterized by the character **?** in the string.

<table>
<tr><td colspan="2" align="center">TABLE 10-3 Query commands meaning</td></tr>
<tr>
<td>?ADR</td>
<td>This query command #LR?ADR* requests the AMC's address that represents the additional prefix that can be set by the User to distinguish a specific Area Monitor Compact. It will be accepted and recognized, by that specific Area Monitor Compact only, in the same way as the default prefix "LR" which is always valid for all stations.

The reply is a string showing a number between 0 and 99.
Example of reply: ADR=00 which means that the address of the Area Monitor Compact is 00.</td>
</tr>
<tr>
<td>?ALR</td>
<td>This query command #LR?ALR* requests the Alarm threshold.

The reply provides the threshold in the current unit followed by the averaging time, in minutes. When the connected probe is a EHP-2B-xx, it returns the alarm threshold for the Electric Field. When the connected probe is a weighted model, the unit shown is %.

Examples of reply: ALR=6.0 uT; 6.00 min.
ALR=25000.00%; 30.00 min.</td>
</tr>
<tr>
<td>?ALT</td>
<td>This query command #LR?ALT* requests the relative altitude.

The reply provides the altitude in meters relative to the reference position which is acquired when the AMC is switched on or when the SALT command is sent or when a new Log begins. The adopted formula is: alt=(2.0*1006.0)/(7.0*9.81)*Tk*LN(ref_Press/cur_Press)

Example of reply: ALT=30</td>
</tr>
<tr>
<td>?AMCk</td>
<td>This query command #LR?AMCk* requests the output status of the Area Monitor Compact. The argument "k" can be as following:
  •   k=B   Request Buzzer status
  •   k=1   Request A1 output status (Pin 2 and 8 on DB15 connector)
  •   k=2   Request A2 output status (Pin 1 and 7 on DB15 connector)
  •   k=R   Request Relè output status (Pin 10,12,13,14,15 on DB15 connector)

Example of reply with #LR?AMCR* :
AMCR-----------
In this case any alarm is not enable on Relè output

Examples of reply with #LR?AMCB* :
AMCB-W---------
In this case the Warning level alarm is enable on the Buzzer; whenever the level exceed the threshold set, an acoustic alarm will be emitted.

If the "k" index entered is A, all four output status are provided.
Examples of reply with #LR?AMCA* :
AMCR--U--------
AMC2-----T-----
AMC1---V-------
AMCB-W---------

Please, refer to SAMCk para command for Alarm and Warning masking.

If the index 'k' entered is not correct or the Area Monitor Compact is not present, the reply is: AMCK=ERR</td>
</tr>
<tr>
<td>NOTE</td>
<td>See §1.7.1 for User's Port HD-15 female connector pinout list .</td>
</tr>
</table>

Command protocol   10-5

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?AMS	This query command **#LR?AMS*** requests the C4 and C3 input status of the Area Monitor Compact. The format is as follows: **AMS=C4[OFF/ON]; C3[OFF/ON];** ON|OFF indicates if the related input is triggered or not. Examples of reply with **#LR?AMS*** **AMS:C4=OFF; C3=OFF; <13><10>**
?AMV	This query command **#LR?AMV*** requests the Area Monitor Compact release version and date. Examples of reply with **#LR?AMV*** **AMV:A.10;19/01/23<13><10>** If the Area Monitor Compact is not present, the reply is: **AMV:Fail**
?ANY	This query command **#LR?ANY*** requests the device mask for field strength alarm notification. The reply format is: **ANY=BLV** where: • B = Buzzer; • L = Visual Led • V = Vibration A dash "-" means that specific Device is not enable. Examples of reply : **ANY=BL-** which means that the field strength alarm will be notify by Buzzer (B) and Visual Led (L) but not with Vibration
?AQ_	This query command **#LR?AQ_*** requests the Logger settings. The reply format is: **AQ_=m; x; t** where: • **m** is the Logger acquisition mode: **A**= AVG; **R**=RMS; **I**=Instantaneous • **x** represents the logger rate, in seconds, The minimum value is 1s; the maximum value is 900s in instantaneous mode and it vary according to the AVG or RMS setting (please refer to SAVG command). When x=0, the Logger is disabled. When x=-1, the Logger is triggered only by pressing the Button and, just in case, by the Alarm (please refer to MSK command). • **t** is the Logger format: **32** = compact, **64** = extended Example of reply**: AQ_=R; 30; 32** which means that the AMC is set to store data every 30 seconds, the averaging is RMS and the Log format is Compact type where each record has a size of 32 bytes and does not contain position information.
?AVG	This query command **#LR?AVG*** requests the current averaging mode. The reply is as follows: **AVG=**L;R where: L is the averaged time period in minutes R shows the acquisition mode setting: **A**= AVG; **R**=RMS Example of reply**: AVG=6.00;A** which means that the AMC is averaging over 6 minutes and the average type is AVG.
?BAT	This query command **#LR?BAT*** requests the current battery voltage. The reply provides the battery voltage in Volt with 10 mV resolution, formatted as **BAT=V.vv** Example of reply**: BAT=3.82**

<table>
<tr><td>**10-6**</td><td>**Command protocol**</td></tr>
</table>

?BDR	This query command **#LR?BDR*** requests the current Baud Rate of the optical port, where the code returned indicates: • 10: 9600 bps • 11: 38400 bps • 12: 57600 bps • else: 115200 bps Example of reply**: BDR=3** which means that the optic serial port is set to 115200 bps.
?BLE	This query command **#LR?BLE*** requests the status of the Bluetooth Low Energy module. The reply indicates: **BLE=ON** internal BLE module is switched ON **BLE=OFF** internal BLE module is switched OFF **BLE=WIFI** internal BLE module is switched ON in WIFI mode Example of reply**: BLE=OFF** which means that the internal BLE module is switched OFF.
?CKG	This query command **#LR?CKG*** requests the status of the GPS module. The reply indicates: • 2: GPS locked • 1: GPS connection in progress • 0: GPS switched OFF • -2: GPS not available Example of reply**: CKG=0**
?CLK	This query command **#LR?CLK*** requests the date and time to the internal RTC. The reply provides the requested information formatted as: **CLK=**HH.mm.ss;DD.MM.YY • HH: hours • mm: minutes • ss: seconds • DD: day • MM: month • YY: year (last two digits) Example of reply**: CLK=20.02.09;19.05.22**

?CPS	This query command **#LR?CPS*** requests the compass and accelerometer readings. The reply is formatted as following: **Heading:** bearing **(**orientation**); G:**x**;** y**;** z Bearing is expressed in degrees and orientation as per the compass rose cardinal points. Gravitational acceleration is expressed in hundredths of g (cm/s^2) for each of the three axes. Note: compass heading 0 (North) corresponds to the direction where the GPS antenna is located. Note: it is advisable to query this command at a rate lower than 3 times per second. Example of reply**: Heading: 35 (NE); G:-1; 100; 7** For Accelerometer axes orientation see §2.7.
?DCM	This query command **#LR?DCM*** requests the setting for the preferred wireless communication channel at power on. If DCM=1 or DCM=2, the corresponding wireless communication channel will be kept active for 60 seconds. Any command received via the wireless channel will keep it active for another 60 seconds. Otherwise, at the end of this period, the communication is deactivated. This setting is saved in the internal flash memory. The reply provides the preferred channel at power on, as follows: • DCM=0 for wireless channel disabled at power on; • DCM=1 for Wi-Fi communication enabled at power on; • DCM=2 for BLE communication enabled at power on. Example of reply**: DCM=2** which means that each time the AMC will be turned on, the BLE module will be activated.
?GCS	This query command **#LR?GCS*** requests the Real Time Clock setting status. The reply is as follows: • M for manual time setting (refer to SCLT and SCLD commands) • A:x for automatic time setting where x is the time zone (integer value between -12 and 12) Examples of reply**: GCS=M** which means that RTC is set manually **GCS=A:2** which means that RTC is set automatically and the time zone is +2 hours corresponding to the time zone of Rome during summertime.

10-8   **Command protocol**

?GPS	This query command **#LR?GPS*** requests the latest RMC and GGA NMEA phrases (NMEA 0183 ver 3.01) detected by the internal GPS module. RMC NMEA strings are reported in full, starting with **$GPRMC** and/or **$GNRMC**, and ending with the checksum followed by CR LF. GGA NMEA strings are reported in full, starting with **$GPGGA** and/or **$GNGGA**, and ending with the checksum followed by CR LF. When a position has not yet been acquired, the reply is:------VOID Example of reply**:** **$GPRMC,154452.000,A,4404.4843,N,01047.9412,E,0.28,152.18,270122,,,A*6E** **$GPGGA,154453.000,4341.1507,N,01047.9413,E,1,7,1.00,6.2,M,47.8,M,,*5B** The format for NMEA coordinates is ddmm.mmmm (d=degrees and m=minutes); The NMEA degrees minutes can be convert to decimal degree as follows: 4404.4843 → Take the NMEA Latitude position. 0.4843 * 60 = 29.058 → Multiply by 60 the NMEA Latitude second part. 440429.058 → The product is added to the NMEA Latitude first part for making 6 digits long first part. 04 * 60 = 240 → Take the second two digits of the first part and multiply by 60. (240+29.058)/3600=0.074738 → The product is added to the last first part and the total divided by 3600. 44+0.074738 → Add the result to the first two digits. The total is Latitude expressed in decimal degree.
?IDN	This query command **#LR?IDN*** requests the AMC's identifier. The reply provides the Area Monitor Compact's name followed by the serial number, in the format: **IDN=**name;S/N where name is the identification string stored with command SIDN, and S/N is the serial number of the Area Monitor Compact, factory stored. Example of reply**: IDN=Cisano;000WE20501**

?IDNF	This query command **#LR?IDNF*** requests the extended AMC's identifier .
	
	The reply provides the Area Monitor's name followed by additional information as follows:
	• name
	• model
	• firmware release
	• Serial Number
	A semicolon ; is used as separator between fields.
	
	The format is: **IDN=**name;model;R.rr MM/YY;S/N
	Where: Name is the identification string stored with command SIDN,
	        Model is the type of the Area Monitor Compact,
	        R.rr shows the firmware version and MM/YY its date of release,
	        S/N is the serial number of the Area Monitor Compact, factory stored.
	
	Example of reply**: IDN=Cisano;LR01;A0.0 10/21;000WE20501** which identifies the AMC named Cisano, model LR-01, with firmware version A0.0 released on October 2021. Its serial number is 000WE20501.

?KFR	This query command **#LR?KFR*** requests the setting for the correction depending on the frequency. The reply is:
	• KFR=OFF when the correction is not active
	• KFR=NA when the correction is not available
	• KFR=f;[fH] u when the correction is active for frequency f expressed in the unit u.
	        if an Electric and Magnetic probe is connected, also the frequency for magnetic measurement is shown.
	
	Examples of reply**: KFR=6.500 MHz**
	                KFR=6.500;1.000 MHz

?LFA[S]	This query command **#LR?LFA*** requests the latest average field value. The reply provides the value (or values) with current unit, followed by the averaging period in minutes (the same as per AVG command). When a passive probe is installed, the command provides the field levels of the three axes, followed by the total value. When the special probe EP-333 (RMS type) is in use, the command provides the RMS level. When the Electric and Magnetic Field probe EHP-2B-xx is installed, the command provides the levels for both fields. Examples of reply**:** **LFA= V/m;58.56;58.56;58.56;101.43;1 min.** which means that the average level for the latest 1 minute is 58.56 V/m for each of the three axes, X, Y, Z with a total of 101.43 V/m. **LFA= V/m;1.23; 0.868 uT; 6 min.** which means that the average field level for the latest 6 minuts is 0.868 µT (H) and 1.23 V/m (E).
?LOG	This query command **#LR?LOG*** requests the binary Log file. NOTE: It works via USB and Optic port only. Please, refer to command ?WLOG to download data via one of the wireless connections. The reply starts with string **LOG_S** and is terminated by the string **LOG_E.** The first 128 bytes (LOG_S included) represent the header; the following data represent the records of 32 (or 64) bytes each. Please, refer to the binary Log file paragraph at the end of this chapter for further details about the binary file.
?LPF	This query command **#LR?LPF*** requests Low Pass Filter setting for passive probes. The reply is the index value, for the selected filter, related to the list: • 0: 10 Hz • 1: 20 Hz • 2: 40 Hz (default) • 3: 80 Hz Example of reply**: LPF=2** which means that a 40 Hz low pass filter is applied.
?LST	This query command **#LR?LST*** requests the Logger status. The reply is: • LST=1 Logger active • LST=0 Logger disabled Example of reply**: LST=1** which means that the Logger function is running.
?MAC	This query command **#LR?MAC*** requests the Wireless MAC address assigned by the manufacturer. Example of reply: **MAC=60:8A:10:D2:71:02**

10-10	**Command protocol**

?MES	This query command **#LR?MES*** requests the instantaneous (not averaged) field level.
	The reply is the elementary value for each band, in the format: Three-band probe: **MES=W;L;H;V/m;** where: - W is the wideband probe field level; - L is the low-pass probe field level (e.g. < 862 MHz) - H is the high-pass probe field level (e.g. > 933 MHz) - V/m is the measurement unit label Four-band probe: **MES=W;A;B;C;V/m**; where: - W is the wideband probe field level; - A is the band-1 probe field level (e.g. 2140 MHz) - B is the band-2 probe field level (e.g. 1800 MHz) - C is the band-3 probe field level (e.g. 900 MHz) - V/m is the measurement unit label Single-band probe: **MES=W;;V/m;** where: - W is the field level; - V/m is the measurement unit label Passive probe: **MES=T;X;Y;Z;U** where: - T is the Total field level; - X is the X axes field level; - Y is the Y axes field level; - Z is the Z axes field level; - U is the measurement unit label Electric and Magnetic probe EHP-2B-xx: **MES=E;H;%;** where: E. is the Electric field level; - H is the Magnetic field level; % is the measurement unit label It should be noted that, due to the delay for data transfer from Probe -> AMC -> Optic, USB, Ethernet, Wireless, the reading refers to the acquisition value of the previous sampling (minimum ≥ 3 seconds, maximum < 6 seconds). Example of reply**: MES=10.76; ; V/m;**

Command protocol   10-11

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?MESS	This query command **#LR?MESS*** activates the continued issuing of the instantaneous (not averaged) field level.
	The reply is the elementary value for each band, like ?MES command, but with enabling for the continuous data transfer as soon as they are available, in the format:
	This command can be useful, for example, to be able to record separately all the elementary data used by the AMC.
	Three-band probe:
	• **MES=W;L;H;V/m;** where:
	• W is the wideband probe field level;
	• L is the low-pass probe field level (e.g. < 862 MHz)
	• H is the high-pass probe field level (e.g. > 933 MHz)
	• V/m is the measurement unit label
	Four-band probe:
	• **MES=W;A;B;C;V/m;** where:
	• W is the wideband probe field level;
	• A is the band-1 probe field level (e.g. 2140 MHz)
	• B is the band-2 probe field level (e.g. 1800 MHz)
	• C is the band-3 probe field level (e.g. 900 MHz)
	• V/m is the measurement unit label
	Single-band probe:
	• **MES=W;;V/m;** where:
	• W is the field level;
	• V/m is the measurement unit label
	Passive probe:
	• **MES=T;X;Y;Z;U** where:
	• T is the Total field level;
	• X is the X axes field level;
	• Y is the Y axes field level;
	• Z is the Z axes field level;
	• U is the measurement unit label
	Electric and Magnetic probe EHP-2B-xx:
	• **MES=E;H;%;** where:
	• E. is the Electric field level;
	• H is the Magnetic field level;
	• % is the measurement unit label
	The reply is terminated by the string "-->" followed by date and time from the AMC.
	Example of reply**: MES=7.81;4.42;4.65;7.81 V/m; 3.77V; ;; -->28/01/22 09:26:36***
	Note: to disable the continuous transmission, simply send command **?MESs**

?MESR[v]	This query command **#LR?MESR*** activates the continued issuing of the instantaneous (not averaged) field level with position (GPS) and other sensors (compass, thermometer, hygrometer, barometer, accelerometer) information. The reply is the elementary value for each band, like ?MES command, plus GPS (and sensors) information, with enabling for the continuous data transfer as soon as they are available, in the following format. This command can be useful, for example, to be able to record separately all the elementary data used by the AMC. Three-band probe: • **MES=W;L;H;V/m;** where: • W is the wideband probe field level; • L is the low-pass probe field level (e.g. < 862 MHz) • H is the high-pass probe field level (e.g. > 933 MHz) • V/m is the measurement unit label Four-band probe: • **MES=W;A;B;C;V/m;** where: • W is the wideband probe field level; • A is the band-1 probe field level (e.g. 2140 MHz) • B is the band-2 probe field level (e.g. 1800 MHz) • C is the band-3 probe field level (e.g. 900 MHz) • V/m is the measurement unit label Single-band probe: • **MES=W;;V/m;** where: • W is the field level; • V/m is the measurement unit label Passive probe: • **MES=T;X;Y;Z;U** where: • T is the Total field level; • X is the X axes field level; • Y is the Y axes field level; • Z is the Z axes field level; • U is the measurement unit label Electric and Magnetic probe EHP-2B-xx: • **MES=E;H;%;** where: • E. is the Electric field level; • H is the Magnetic field level; • % is the measurement unit label

Command protocol   10-13

Following is the standard NMEA GPRMC and/or GNRMC string that reports the information:
- Time (UTC)
- Navigation receiver warning A = OK, V = warning
- Latitude (deg. min North/South)
- Longitude (deg. min East/West)
- Speed over ground (Knots)
- Course Made Good
- Date (UTC)
- Magnetic variation (deg)
- Mandatory checksum

Following is the standard NMEA GPGGA and/or GNGGA string that reports the information:
- Time (UTC)
- Latitude (deg. min North/South)
- Longitude (deg. min East/West)
- Position Fix
- Satellites in use
- Horizontal Dilution of Precision
- MSL Altitude in m
- Geoid Separation in m
- Mandatory checksum

The reply is terminated by the string "-->" followed by date and time from the AMC.

Example of reply**: MES=10.66; ; V/m; 3.53V;
 $GPRMC,144550.000,A,4341.1465,N,01047.9383,E,1.38,185.31,280122,,,A*67
;$GPGGA,144551.000,4341.1462,N,01047.9386,E,1,6,1.29,16.9,M,47.8,M,,*60
; -->28/01/22 15:45:50***

The NMEA degrees minutes can be convert to decimal degree (see ?GPS command).

Note: to disable the continuous transmission, simply send command **?MESs**

Adding the "**v**" character, so that the command becomes **?MESRv**, it is possible to include in the automatic response string the additional values of heading (degrees), acceleration (g), temperature (° C) and humidity (%)

Example of reply**: MES=10.68; ; V/m; 3.53V;
 $GPRMC,144457.000,A,4341.1494,N,01047.9397,E,0.21,191.83,280122,,,A*6F
;$GPGGA,144458.000,4341.1493,N,01047.9397,E,1,6,1.30,16.4,M,47.8,M,,*63
;Heading: 164 (S); g:-15; 76; 68;24.95;36.41*; -->28/01/22 15:44:57***

Command	Description
?MESf[v]	Same as ?MESR[v] command but with single reply.
?MESs	This query command **#LR?MESs*** disables the continuous data transmission set with ?MESS, ?MESR or ?MESRv commands. It produces a single reply as per the ?MES command.

10-14   **Command protocol**

?MSK	This query command **#LR?MSK*** requests the alarms Mask. The reply provides a string with every armed alarm, with the format: **MSK=AWUVPTCawvp SERIAL ALRTRG** where the meaning of the symbols is similar to the ?STA command, as follows: - A = Field Level exceeded Alarm; - W = Field Level exceeded warning; - U = USB cable connected Alarm; - V = Low Battery Alarm; - P = Probe failure Alarm; - T = OverTemperature Alarm; - C = Relative Humidity Alarm; - a = end of Field Level Alarm situation; - w = end of Field Level Warning situation; - v = end of Low Battery Alarm; - p = end of Probe Alarm; - SERIAL = Alarms or logger transmission enabled via the serial port - ALRTRG = any Alarm or warning triggers the Logger, if enabled. A dash "-" means that specific Alarm (or warning) is not armed. The presence of the "SERIAL" string means that any Alarm will be transmitted via the serial port (optical and USB) formatted as the reply to ?STA command. If the LOGGER is active, the presence of the "SERIAL" string means that the binary data, relating to each single acquisition, will be sent to the serial port. The presence of the ALRTRG string means that, if the LOGGER is active, the alarm triggers the saving of the measurement record, either on a time basis (AQ_ with a rate greater than zero) or continuously (AQ_ with a rate of -1). Example: **MSK=AW-VPTCawvp** which means that all Alarms and warnings are armed, except for the USB cable connection Alarm. They are not sent automatically via the serial port. The Logger is not triggered by alarms.
?NET	This query command **#LR?NET*** requests the list of the Wi-Fi networks available. Note: to work, the command needs the module to have been powered up via the SWFI command. If not so, the unit replies with: **NET=ERR.** Example of reply: **NET=OK** **[ ] SSID:Redmi Note 8 Pro -41dB** **[X] SSID:FRITZ!Box 7490 -79dB** **[ ] SSID:DWR-921-B5BC -83dB** **[ ] SSID:TP-LINK_F788 -67dB** **[X]** mark indicates the default network but not the successful connection. Please refer to command ?WFI to find out the connection status.

Command protocol | 10-15

?PRB	This query command **#LR?PRB*** requests information of the connected probe. The reply provides probe model, latest calibration date, measurement unit, divider in the following format: • **Three-band probe:** PRB=Name:Dd.Mm.Yy; Unit:Divider:Range:MinLevel:MinFreq:MaxFreq:CorrFreqUnit • **Four-band probe:** PRB=Name:Dd.Mm.Yy; Unit:Divider:Range:MinLevelWide:MinFreq:MaxFreq:CorrFreqUnit:4:MinLevelSubBand • **Single-band probe:** PRB=Name:Dd.Mm.Yy; Unit:Divider:Range:MinLevel:MinFreq:MaxFreq:CorrFreqUnit:S • **Electric and Magnetic probe EHP-2B-xx:** PRB=Name:Dd.Mm.Yy; Unit:Divider:RangeE:MinLevelE:MinFreqE:MaxFreqE:RangeH:MinLevelH:MinFreqH:MaxFreqH:CorrFreqUnit:S Note: If the correction in frequency is not available, CorrFreqUnit field will be "---". Examples of reply: **PRB=EP-3B-01:14.09.15; V/m:100.00:200.00:0.20:0.09:3000.00:MHz** **PRB=EP-4B-02:08.07.19; V/m:10.00:200.00:0.10:0.09:3000.00:MHz:4:0.02** **PRB=HP-1B-01:15.07.19; uT :100.00:200.00:0.04:9.99:5000.00:Hz :S** **PRB=EP745:04.10.19; V/m:100.00:450.00:0.35:0.09:7000.00:MHz:S** **PRB=EP645:15.07.09; V/m:10.00:360.00:0.01:0.09:3000.00:MHz:S** **PRB=EHP-2B-03:12.09.22;%:10.00:1000.00:0.10:4.99:9250.00:1000.00:0.50:1.00:1000.00:MHz:S**
?S/N0	This query command **#LR?S/N0*** requests the serial number of the AMC. Example of reply: **S/N0=000WE20501**
?SID	This query command **#LR?SID*** requests the Wi-Fi network Service Set Identifier, that is to say the name stored in memory. Reply: SID=stringSSID When a network name has not yet been stored, the *stringSSID* corresponds to DEMO_AP Example of reply: **SID=Redmi Note 8 Pro**

10-16   **Command protocol**

?SNS	This query command **#LR?SNS*** requests data from the environmental sensor. The reply, in the format **SNS=T;H;P** provides: • T: Temperature, in Celsius degrees (°C) • H: Relative Humidity in percentage (%) • P: Atmospheric Pressure (hPa) Example of reply: **SNS=23.9;38.8;1013.6**
?SST	This query command **#LR?SST*** requests the level of the signal for the wireless channel. The reply is in the format: SST=l where l is the RSSI value, expressed in dBm, for the wireless network which the AMC is connected to. When no network is detected, or the Area Monitor is disconnected, it returns SST=ERR Example of reply: **SST=-67**
?STA	This query command **#LR?STA*** requests the alarms status, regardless of the MSK setting. The reply provides a string showing the following labels: **STA=AWUVPTCawvp** • W: Warning level exceeded; • A= ALARM threshold exceeded; • w= end of Warning situation; • a= end of Alarm situation; • P= Probe failure ALARM; • p= end of Probe Alarm; • V= Low Battery ALARM; • v= end of Low Battery Alarm; • T= OverTemperature ALARM; • U= USB Connection Warning; • C= Relative Humidity ALARM Note: each alarm is replaced by dash "-" when not active. Note: when an EHP-2B-xx probe is connected, "A" refers to the alarm in field E while "W" refers to the alarm in field H. Please, refer to ?MSK command for alarm masking. Example of reply: **STA=-W-V-------** which means that the alarms for Field level Warning and for Low Battery voltage are active. The probe has just detected a level exceeding the warning threshold and the battery voltage is lower than 3.0 V, that is to say it is almost exhausted.

Command protocol   10-17

?STM	This query command **#LR?STM*** requests the active alarms condition. The reply provides a string showing the active alarms (they must be activated by SMSK command) as following: STA=AWUVPTCawvp • W: Warning level exceeded; • A= ALARM threshold exceeded; • w= end of Warning situation; • a= end of Alarm situation; • P= Probe failure ALARM; • p= end of Probe Alarm; • V= Low Battery ALARM; • v= end of Low Battery Alarm; • T= OverTemperature ALARM; • U= USB Connection Warning; • C= Relative Humidity ALARM Note: each alarm is replaced by dash "-" when not active. Note: when an EHP-2B-xx probe is connected, "A" refers to the alarm in field E while "W" refers to the alarm in field H. Please, refer to ?MSK command for alarm masking. Example of reply: STA=-W-V------- which means that the alarms for Field level Warning and for Low Battery voltage are active. The probe has just detected a level exceeding the warning threshold and the battery voltage is lower than 3.0 V, that is to say it is almost exhausted.
?STS (for EHP-2B model probe only)	This query command **#LR?STS*** requests the index of the standard for EHP-2B-xx probes. The reply is in the format: SST=i where i is index of the covered standards list. This value affects Alarms and Warnings, the value saved in the log and the reply to the ?MES command. Example of reply: **STS=1**
?TMP	This query command **#LR?TMP*** requests temperature and humidity to the AMC. The reply, in the format **TMP=T;H** provides: • T: Temperature, in Celsius degrees (°C) • H: Relative Humidity in percentage (%) Example of reply: **TMP=23.9;38.8**

10-18	**Command protocol**

| ?VST[V] | This query command **#LR?VST*** requests the power supply status.

The reply provides the code as follows:
  - 0 for battery supply
  - 1 for external supply connected and battery charge completed
  - 2 for external supply connected and battery under charging

Example of reply: **VST=1** which indicates the external 5V supply is connected and the battery is fully charged.

Note: it is possible to obtain the information including the description, issuing the command **#LR?VSTV***

Example of reply: **VST=0 (Battery)** |
|---|---|
| ?WFI | This query command **#LR?WFI*** requests the status of the Wi-Fi module

The reply is as follows:
  - **WFI=OFF** when the module is switched OFF;
  - **WFI=BLE** when the Bluetooth LE is active;
  - **WFI=ON**
    SSID : stringSSID
    Signal Strenght : dBm
    Local IP Address : IPv4_Address:Port

If no IP address has yet been assigned to the AMC, or it has not been possible to connect to the network, Local IP Address shows "waiting for connection".

Examples of reply:
WFI=ON
SSID : Redmi Note 11
Signal Strenght : -87
Local IP Address : 192.168.0.21:6666
Which means that the AMC is connected to the Redmi Note 11 Wi-Fi network. The radio signal strength is -87 dBm and the assigned IP address is 192.168.0.21. The connection is through the port 6666. |
| ?WLOG | This query command **#LR?WLOG*** requests the binary Log file via wireless communication.

NOTE: It works via BLE and Wi-Fi ports only. Please, refer to command ?LOG to download data via fiber optic or USB connection.

The reply starts with string **LOG_S** and is terminated by the string **LOG_E.**
The first 128 bytes (LOG_S included) represent the header; the following data represent the records of 32 (or 64) bytes each.

Please, refer to the binary Log file paragraph at the end of this chapter for further details about the binary file. |

Command protocol 10-19

?WMEifv
(for EHP-2B model probe only)
	This query command **#LR?WME**i* requests the instantaneous % level related to the desired standard.
	
	i=1: Reference Standard (same reading as per ?MES command)
	i=2: Standard 2
	i=3: Standard 3
	i=4: Standard 4
	
	The order of the standards is:
	- for -01 and -02 models: ICNIRP98OCC, ICNIRP98GP, SC6CONTR, SC6UNCONTR.
	- for -03 and -04 models ICNIRP2020OCC, ICNIRP2020GP, FCCCONTR, FCCUNCONTR.
	
	The reply is in the format:
	    WME=E.EE;H.HH;Unit;*; where:
	   • **E.EE** is the value for the Electric field;
	   • **H.HH** is the value for the Magnetic field
	   • **Unit** % is the measurement unit label (the "%" change in "&" when the frequency correction is enabled and the percentage indication is linear rather than quadratic)
	
	    WME=NA for probes other than EHP-2B-xx
	
	Example of reply**: WME=45.96;2137.43;%;*;** which indicates the E field is at almost 46%, H field is 2137% of the selected standard.
	
	By adding the **f** character after the index **i**, it is possible to include battery voltage and GPS data to the reply.
	
	Following is the standard NMEA GPRMC and/or GNRMC string that reports the information:
	   • Time (UTC)
	   • Navigation receiver warning A = OK, V = warning
	   • Latitude (deg. min North/South)
	   • Longitude (deg. min East/West)
	   • Speed over ground (Knots)
	   • Course Made Good
	   • Date (UTC)
	   • Magnetic variation (deg)
	   • Mandatory checksum
	Following is the standard NMEA GPGGA and/or GNGGA string that reports the information:
	   • Time (UTC)
	   • Latitude (deg. min North/South)
	   • Longitude (deg. min East/West)
	   • Position Fix
	   • Satellites in use
	   • Horizontal Dilution of Precision
	   • MSL Altitude in m
	   • Geoid Separation in m
	   • Mandatory checksum
	
	The reply is terminated by the string "-->" followed by date and time from the AMC.
	
	Example of reply**: WME=46.13;1969.20;%;*;3.78V;**
	 $GPRMC,162842.710,A,4341.1585,N,01047.9364,E,0.09,255.44,190822,,,A*69
	;$GPGGA,162842.710,4341.1585,N,01047.9364,E,1,9,0.99,38.3,M,47.8,M,,*6A
	; -->23/09/22 00:07:00*
	
	The NMEA degrees minutes can be convert to decimal degree (see ?GPS command)

10-20   **Command protocol**

	Adding the "**v**" character, at the end of the command, so that it becomes **?WMEifv**, it is possible to include in the reply string the additional values of heading (degrees), acceleration (g), temperature (° C) and humidity (%) Example of reply**: WME=46.47;1930.61;%;*;3.79V;** **$GPRMC,163230.000,A,4341.1574,N,01047.9386,E,0.01,25.87,190822,,,D*54** **;$GPGGA,163305.992,,,,,0,3,,,M,,M,,*4B** **;Heading: 209 (SW); G:18; -97; 48;0.00;0.00*; -->24/09/22 00:11:23***
?WRN	This query command **#LR?WRN*** requests the Warning threshold. The reply provides the threshold in the current unit followed by the averaging time, in minutes. When the connected probe is a EHP-2B-xx, it returns the alarm threshold for the Magnetic Field. When the connected probe is a weighted model, the unit shown is %. Examples of reply**: WRN=6.0 uT; 6.00 min.** **WRN=25000.00%; 30.00 min.**
?WVR	This query command **#LR?WVR*** requests the firmware version of the WIFI+BLE WINC3400 internal module. The reply format is as follows: WVR=Major.Minor.Patch BuildDate BuildTime Note: to work, the command requires that the module has been turned on via one of the two SBLE or SWFI commands. Otherwise, it returns the reply: **WVR=ERR.** Example of reply: **WVR=1.3.1 Jun 28 2019 13:46:26**

Command protocol   10-21

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10.4 Setting commands   These commands are intended for making settings on the AMC.

TABLE 9-4 Setting commands meaning	
SADRa	This setting command sets the specific address for the AMC. It represents the additional prefix that will be accepted and recognized by that specific Area Monitor only, in the same way as the default prefix "LR" which is always valid for all stations. The reply is: ADR=OK if the command has been granted ADR=ERR if the command has been refused Note: the address must be a numeric, two digits, value between 00 and 99. Example**: #LRSADR00*** which means that the address of the AMC will be 00.
SALRs	This setting command sets the Alarm threshold. Argument s is the threshold value, expressed in the current unit. When the connected probe is a EHP-2B-xx, it refers to the Electric Field. When the connected probe is a weighted model, the unit is %. The reply is the same as per ?ALR command. Example: **#LRSALR6*** which means the new Alarm threshold will be 6 in the current unit.
SALT	This setting command resets the reference altitude. Just after having issued the command, the altitude at that location will be 0 meters. The reply is: ALT=OK if the command has been granted ALT=ERR if the command has been refused Example: **#LRSALT***
SANY	The setting command **#LRSANY k*** allows the user to set which device(s) should be enabled for field strength alarm notification. The argument "k" can be as following: • B = Buzzer; • L = Visual Led • V = Vibration For example, the command **#LRSANY BL*** enable the Buzzer and Visual Led to notify field strength alarm but not the Vibration; the reply is: **ANY=BL-*** A dash "-" means that specific Device is not enable. If the index 'k' entered is not correct, the reply is: **ANY=SERR** The command **SANY** will take effect only if sent before the field strength alarm notification.

10-22   **Command protocol**

SAQ_m;x;t	This setting command sets the Logger parameters. Argument **m** represents the Logger acquisition mode: **I**=Instantaneous and **M**=Average. The Average time and type are settable by SAVG command and the alarm is compared on it. Argument **x** represents the storing rate in seconds. The minimum value is 1s; the maximum value is 900s in instantaneous mode and it vary according to the AVG or RMS settings (please refer to SAVG command). If **x** is set to **-1**, the Logger is activated but the trigger event becomes the pressing of the button or, if enabled (SMSK L), the exceeding of the alarm threshold. In other words, when x=-1 the logger does not have a fixed time rate. Please refer to command SMSK for the Alarm Mask and SALR for the field level threshold. If the Logger rate **x is greater than 0**, and the logger is armed on crossing the alarm threshold (SMSK L), the log is carried out with the predetermined time interval and only if the alarm threshold has been exceeded. If the Logger rate **x=0** disables the Logger. Argument **t** represents the Logger format. • **t=32** selects the compact version of the log, with no position information. Each record occupies 32 bytes. • **t=64** selects the extended versione of the log, complete of GPS data. Each record takes 64 bytes. The reply is the same as per ?AQ_ command. Example: **#LRSAQ_M;30;32*** which means that the Logger type is logger is set to save a measurement every 30 seconds, of the compact type (32 bytes). If it is set that the alarm is also generated on the **serial port** (S field in the SMSK command), the binary file corresponding to the record is sent to the serial port at the preset logger rate. Note: setting the Logger via the SAQ_ command does not correspond to the actual start of the Logger, which instead occurs by pressing the button for more than 5 seconds, or via the SLST 1 command. This event erases the entire memory and the previously acquired logs are deleted. The Log remains active until the AMC is turned off or the maximum number of storable records is reached. This number depends on the Log format; i.e. 125k in compact mode and 250k in extended.

Command protocol   10-23

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SAVGl;r	This setting command sets the averaging time and type. • **l** is the time length in minutes, between 0.25 and 30 with 0.25 minutes resolution up to 1 minute; 1 minute up to 15 minutes and always 30 minutes over 15. • **r** is the averaging type. **A** for AVG, **R** for RMS . Example: **#LRSAVG1;R*** which means the unit is set to average over 1 minute with a RMS average type. The reply is the same as per ?AVG command.
SBDR b	This setting command sets the optic serial port speed. The parameter b is a code for the bit rate; in details: • **b=10**: 9600 bps • **b=11**: 38400 bps • **b=12**: 57600 bps • **else**: 115200 bps The reply is: BDR=OK if the command has been granted BDR=ERR if the command has been refused Example: **#LRSBDR 10*** which means the optical port speed is set to 9600 bps. Default speed is 115200 bps. The parameter is kept also when the AMC is switched OFF. Like other essential settings, it can be reset when the Area Monitor Compact is turned on by keeping the button pressed.
SBLEx	This setting command switches the internal BLE (Bluetooth Low Energy) module ON or OFF as following: • x = ON: switches the module ON and starts the "advertising" procedure, making the unit visible to other Bluetooth devices. • x = OFF closes any open channel and turns OFF the module. Once the pairing process has started, the password to connect is "123456". The reply BLE=OK indicates that the command has been granted. Example: **#LRBLEOFF*** which means that any open wireless channel will be closed and the module will be turned off. If the Wireless firmware release is older than 1.3.0, the reply is preceded by the string: *****WARNING LEGACY WIRELESS FIRMWARE***\r\n**

10-24   **Command protocol**

SCLDd.m.y	This setting command sets the date of the Real Time Clock. Each parameter must be two digits, as following: • d is the day (01 to 31) • m is the month (01 to 12) • y is the year (00 to 99) The reply is the same as per ?CLK command. Example: **#LRSCLD31.05.22*** which means that the RTC date will be set to May, 31th 2022.
SCLTh.m.s	This setting command sets the time of the Real Time Clock. Each parameter must be two digits, as following: • h for hours (00 to 23) • m for minutes (00 to 59) • s for seconds (00 to 59) The reply is the same as per ?CLK command. Example: **#LRSCLT16.25.00*** which means that the RTC time will be set to 4:25 PM.
SCPCt	This setting command is used to start the compass calibration procedure. In order for the compass to be accurate, it must first be calibrated using the appropriate command where **t** is the calibration time in seconds. During this period, the unit must be oriented in all possible directions in order to extrapolate the magnetic offset. A count down is displayed on the terminal to help understanding both the frequency of the readings and the time left. Calibration is stored in the internal flash memory. A typical reply is: Compass found (code 0xC7): Magnetometer calibration: Please rotate the device next 30 seconds (90 Readings) 89 88 87 … 0 Calibration Done Then calibration data for debug purposes are added. Note: compass heading 0 (North) corresponds to the direction where the GPS antenna is located. Example: **#LRSCPC30*** which means that the RTC time will be set to 4:25 PM.

SDCMc	This setting command selects the wireless communication channel active at power on, as follows: • c=0 to disable all wireless channels at power on; • c=1 to enable Wi-Fi module at power on; • c=2 to enable BLE module at power on. If DCM=1 or DCM=2, the corresponding wireless communication channel will be kept active for 60 seconds. Any command received via the wireless channel will keep it active for another 60 seconds. Otherwise, at the end of this period, the communication is deactivated. This setting is saved in the internal flash memory. Note: before any setting, with the AMC blank, the communication is enabled, by default, on both channels. The reply DCM=OK indicates that the command has been granted. Example: **#LRSDCM1*** which means that each time the AMC will be turned on, the Wi-Fi module will be automatically activated.
SGCSAh	This setting command selects the automatic RTC synchronization, taking advantage of the GPS signal. The argument h represents the time zone, an integer value in hours between -12 and 12. Please set your Country time zone and pay attention to the possible daylight saving time. The reply is: GCS=OK if the command has been granted GCS ERROR if the command has been refused (e.g. the value was out of range). In this case the RTC will be set for manual update. The success of the RTC update operation depends on the quality of the GPS signal received. Each time the clock update operation is successful, the complete list of all available events is updated with a string like: Auto Set:hh:mm:ss;dd/mm/yy Example: **#LRSGCSA2*** which sets the automatic RTC synchronization, using GPS module and a +2 hours time zone (Rome, in summer time). Note: the command for manual RTC setting is SGCSM
SGCSM	This setting command **#LRSGCSM** selects the manual RTC update. Choosing this mode, time and date must be set using SCLT and SCLD commands. The reply GCS=OK indicates that the command has been granted. Example: **#LRSGCSM*** which sets the manualc RTC setting. Note: the command for automatic RTC setting is SGCSA

10-26	**Command protocol**

SGOF	This setting command switches immediately off the internal GPS module. The reply GOF=OK indicates that the command has been granted. Example: **#LRSGOF***
SGOOFF	This setting command turns immediately off the AMC. Note: since the Area Monitor goes suddenly off after having received the command, no reply is returned. Example: **#LRSGOOFF***
SGOI	This setting command turns immediately on the internal GPS module. It will stay on up to the first FIX or until the timeout of 4 minutes will expire. The reply GOI=OK indicates that the command has been granted. Example: **#LRSGOI***

SAMCk para	The setting command **#LRSAMCk para*** set the output of the Area Monitor Compact and the alarm on which the output self works .
	The argument "k" can be as following:
	  • k=B Set Buzzer
	  • k=1 Set A1 output (Pin 8 and 12 of DB15 connector)
	  • k=2 Set A2 output (Pin 7 and 11 of DB15 connector)
	  • k=R Set Relè output (Pin 2, 3, 4, 5, 10 of DB15 connector)
	
	The parameter "para" allows user to set which alarm should be enabled:
	  • W= Warning level exceeded
	  • A= ALARM threshold exceeded
	  • P= Probe failure ALARM
	  • V= Low Battery ALARM
	  • T= OverTemperature ALARM
	  • C= Relative Humidity ALARM
	  • U= USB Connection Warning
	
	For example, the command **#LRSAMCB WT*** enable the Warning Level and Alarm OverTemperature on the Buzzer and provide the response:
	AMB-W---T-----
	
	The dot (-) means the specific alarm is not active
	
	If the index 'k' entered is not correct or the Area Monitor Compact is not present, the reply is:
	AMCK=ERR
	
	☞NOTE **See §1.7.1 for User's Port HD-15 female connector pinout list .**

SIDN i	This setting command sets the AMC's identifier. Its maximum length is 20 characters. The reply is the same as per ?IDN command. Example: **#LRSIDN Cisano*** which means that the Area Monitor name will become Cisano.

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SKFR f	This setting command sets the frequency for flatness correction. Argument f represents the frequency in Hz at which the correction is to be applied, or 0 whenever it is desired to disable the correction. In the case of an Electric and Magnetic probe, both correction frequencies are set to the indicated value. These values will then be adapted according to the frequency limits of the probe itself and therefore may differ. Each time a probe is inserted, the frequency correction is automatically disabled. The reply is: KFR=OK in case the correction in frequency was set successfully KFR=NA in case the correction in frequency was not available Example: **#LRSKFR 1000000*** which enables the correction factor associated to the frequency of 1 MHz.
SLPF f	This setting command sets the Low Pass Filter for the passive probes. The argument f must be between 0 and 3 and represents the index of the following list of available filters: • 0: 10 Hz • 1: 20 Hz • 2: 40 Hz (default) • 3: 80 Hz The reply is: LPF=OK if the command has been granted LPF=ERR if the command has been refused Example: **#LRSLPF 2*** sets the filter to 40Hz, which is the fastest filter able to cut the disturbances coming from the mains network.
SLST l	This setting command activates or stops the Logger immediately. The argument l must be: • 0: stops the Log immediately • 1: starts the Log immediately Note: starting the Logger (l=1) causes the immediate deletion of the Log previously saved in memory. SLST 1 is equivalent to a prolonged pressure (longer than 5s) of the button. The Logger parameters must be set via the SAQ_ command before sending this starting command. Example: **#LRSLST 1*** starts the Logger, deleting the previous saved one. The reply is: **LST=OK** if the SLST 1 command has been granted Example: **#LRSLST 0*** stop the Logger. The reply is: **LST=OK\r\nLog Ended – SLST 0** if the SLST 0 command has been granted The reply is: **LST=SERR** when issuing a SLST 0 command while the unit was not running in Logger mode.

10-28   **Command protocol**

SMSKm	This setting command sets the Alarms and Warnings mask. The mask must contain the mnemonic symbols that represent the individual alarms as shown in the following table. They can be written in any order. • W = Warning level exceeded; • A = ALARM threshold exceeded; • w = end of Warning situation; • a = end of Alarm situation; • P = Probe failure ALARM; • p = end of Probe Alarm; • V = Low Battery ALARM; • v = end of Low Battery Alarm; • T = OverTemperature ALARM; • U = USB connected Warning; • C = Relative Humidity ALARM; • L = Logger activation; • S = Alarm notification via serial port enable. Note: do not add the corresponding label to disarm any specific alarm. Adding the S symbol, any Alarm will be transmitted via the serial port (Optical, USB and Ethernet) formatted as the reply to ?STA command. If the LOGGER is active (AQ_ command), with the S label the binary data, relating to each single acquisition, will be sent to the serial port. Adding the L symbol, if the LOGGER is active, the alarm triggers the saving of the measurement record, either on a time basis (AQ_ with a rate greater than zero) or continuously (AQ_ with a rate of -1). Please, refer to ?STA command for reading alarm status. The reply is the same as per the ?MSK command. Examples: **#LRSMSK*** disarms all alarms and warnings; **#01SMSK**AV* tells Area Monitor Compact 01 to arm the Field level Alarm and the Low Battery Alarm.
SPWDp	This setting command sets the password for the Wi-Fi connection. The security is under the standard WPA-PSK. • p = alphanumeric password up to 64 characters long. The parameter is kept when the AMC is switched OFF. The reply PWD=OK indicates that the command has been granted. Example: **#LRSPWDP@$$w0rd*** which sets P@$$w0rd as the Wi-Fi password.
SREBOOT	This setting command forces the AMC to reboot. Note: since the Area Monitor goes suddenly in reset procedure after having received the command, no direct reply is returned. During restart, the AMC outputs to the serial ports the results of the initial diagnostics. Example: **#LRSREBOOT***

SRST	This setting command restores the default configuration. The command resets the main parameters as follows: • All Alarms masked; • Averaging period of 6 minutes; • Running average cleared; • Averaging type: RMS; The reply RST=OK indicates that the command has been granted. Example: **#LRSRST*** restarts the unit.
SRSTR	This setting command restores the default configuration, logger rate included. The command resets the main and logger parameters as follows: • Logger rate of 6 minutes; • All Alarms masked; • Averaging period of 6 minutes; • Running average cleared; • Averaging type: RMS; The reply "Reset to Default Factory Setting and Reboot" indicates that the command has been granted, and is followed by the restarting diagnostics. Note: extreme attention must be used as this command invalidates any data already stored making them meaningless. Example: **#LRSRSTR*** resets the logger and restarts the AMC.
SSIDi	This setting command sets the Wi-Fi network name for wireless 802.11 b/g/n connection. it is an alphanumeric string, up to 64 characters long. The parameter is kept also when the AMC is switched OFF. The reply is: SID=OK if the command has been granted SID=ERR if the command has been refused Example: **#LRSSIDNardaWIFI*** which means that the SSID of the access point to connect to is NardaWIFI.
SSTSx (for EHP-2B model probe only)	Set the reference standard for EHP-2B probe The format is as follows: **#LRSSTSx*** where **X** is an index that goes from 1 to 4: "1" = Standard 1 (ICNIRP98OCC for EHP-2B-01/02/05/06 and ICNIRP2020OCC for 03/04/07/08) "2" = Standard 2 (ICNIRP98GP for EHP-2B-01/02/05/06 and ICNIRP2020GP for 03/04/07/08) "3" = Standard 3 (SC6CONTR for EHP-2B-01/02/05/06 and FCCCONTR for 03/04/07/08) "4" = Standard 4 (SC6UNCONTR for EHP-2B-01/02/05/06 and FCCUNCONTR for 03/04/07/08) Example **#LRSSTS1*** returns the response: **#LRSSTS=OK*** confirming that the EHP-2B probe is set to Standard 1. This index represents the reference standard for alarms, warnings, report and ?MES command response. The index is permanent and stored in the Flash. If the index entered is not correct, the response string is: **STS=SERR**

10-30   **Command protocol**

SWFIx	This setting command switches the Wi-Fi module to the desired mode. The argument x can be as following: • x= ON: turns on the module and starts the connection procedure; • x= OFF: closes any connection and turns off the module, including BLE; • x = AP to make a Wi-Fi network where the AMC acts as an access point (SSID DEMO_AP, no password) SSID and password must be set before with commands SSID and SPWD. The reply is: WFI=OK if the command has been granted WFI=ERR if the command has been refused Example: **#LRSWFION*** which turns on the module and starts the connection Note: when the connection is established (parameter ON) the reply is followed by the IP address assigned to the AMC, as in the following example: **Wi-Fi IP is 192.168.0.9:6666** If the Wireless firmware release is older than 1.3.0, the reply is preceded by the string: ******WARNING LEGACY WIRELESS FIRMWARE***\r\n***
SWRNs	This setting command sets the Warning threshold. Argument s is the threshold value, expressed in the current unit. When the connected probe is a EHP-2B-xx, it refers to the Magnetic Field. When the connected probe is a weighted model, the unit is %. The reply is the same as per ?WRN command. Example: **#LRSWRN19.9*** which means the new Warning threshold will be 19.9 in the current unit.

Command protocol   10-31

10.5 Log file

Header

The binary file begins with a 128 bytes header, structured as follows:
- first 8 bytes are always 0x4C 0x4F 0x47 0x5F 0x53 0x20 0x0D 0x0A [0-7]
- 24 bytes reporting the serial number of the AMC (if it is shorter, a zero-padding is performed) [8-31]
- 94 bytes showing the name of the probe (if it is shorter, a zero-padding is done) [32-126]
- 1 bytes for Logtype of the Logger [127]

The LogType byte [127] encloses all the setting information.
A bit masking is needed to decode the settings, as follows:
(LogType & 1) is for the averaging mode (LSB)
- 0: Average (AVG)
- 1: Root Mean Squared (RMS)

(LogType & 2) is for compact or extended records
- 0: compact Log with 32 bytes records
- 2: extended Log with 64 bytes records, including position and speed data

(LogType & 4) is for averaged/instantaneous value
- 0: Average
- 4: Instantaneous value

(LogType & 8) is the Alarm activation flag
- 0: Log following an Alarm, disabled
- 8: Log following an Alarm, enabled

Data

The Log file contains, from the 129th byte [128], the records made up of 32 (Compact Log) or 64 (Extended Log) bytes each. Every type of probe contains a specific data structure capable of expressing all the values measured during the log, recorded in the first 32 bytes. Please, refer to paragraph Log File Data for details. Any additional 32 bytes contain the position and speed data. Please, refer to the Additional GPS Structure description paragraph for details.

End of Log file

The Log file ends with the checksum byte followed by the string "\r\nLOG_E\r\n\r\n" (corresponding to 0x0D 0x0A 0x4C 0x4F 0x47 0x5F 0x45 0x0D 0x0A 0x0D 0x0A).
The checksum byte consists of the modulo 256 sum of the hexadecimal values of all the bytes sent, related to the data. In other words, all bytes that make up the measurement records, starting from [128] are added together.

10-32   **Command protocol**

10.5.1 Log file data   All figures in this document are **BIG ENDIANNESS.**

**10.5.1.1 Passive Probes
Structure description**

Tot_avg		Tot_Peak		Reserved			
Hi Byte 1	Lo Byte 2	Hi Byte 3	Lo Byte 4	Byte 5	Byte 6	Byte 7	Byte 8

Battery	Temp.	Alarm	PERTS	MISC	DateTime		
Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15	Byte 16

X_avg		X_Peak		Y_avg		Y_Peak	
Hi Byte 17	Lo Byte 18	Hi Byte 19	Lo Byte 20	Hi Byte 21	Lo Byte 22	Hi Byte 23	Lo Byte 24

Z_avg		Z_Peak		Altitude		Seconds	RH
Hi Byte 25	Lo Byte 26	Hi Byte 27	Lo Byte 28	Byte 29	Byte 30	Byte 31	Byte 32

**10.5.1.2 Single and Three Bands Active Probes Structure description
(Bands in red are present only for three band Probes)**

Wide_avg		Wide_Peak		Reserved			
Hi Byte 1	Lo Byte 2	Hi Byte 3	Lo Byte 4	Byte 5	Byte 6	Byte 7	Byte 8

Battery	Temperature	Alarm	PERTS	MISC	DateTime		
Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15	Byte 16

L_B_Avg		L_B_Peak		H_B_Avg		H_B_Peak	
Hi Byte 17	Lo Byte 18	Hi Byte 19	Lo Byte 20	Hi Byte 21	Lo Byte 22	Hi Byte 23	Lo Byte 24

Reserved		Reserved		Altitude		Seconds	RH
Byte 25	Byte 26	Byte 27	Byte 28	Byte 29	Byte 30	Byte 31	Byte 32

Command protocol   **10-33**

10.5.1.3 4-Bands Active Probes Structure description

Wide_avg		Wide_Peak		Reserved			
Hi	Lo	Hi	Lo				
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8

Battery	Temperature	Alarm	PERTS	MISC	DateTime		
Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15	Byte 16

2140_Avg		2140_Peak		1842_Avg		1842_Peak	
Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo
Byte 17	Byte 18	Byte 19	Byte 20	Byte 21	Byte 22	Byte 23	Byte 24

942_avg		942_Peak		Altitude		Seconds	RH
Hi	Lo	Hi	Lo				
Byte 25	Byte 26	Byte 27	Byte 28	Byte 29	Byte 30	Byte 31	Byte 32

10.5.1.4 EHP2B Electric Magnetic Active Probe Structure description

E_avg		E_Peak		H_avg		H_Peak	
Hi	Lo	Hi	Lo				
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8

Battery	Temperature	Alarm	PERTS	MISC	DateTime		
Byte 9	Byte 10	Byte 11	Byte 12	Byte 13	Byte 14	Byte 15	Byte 16

Reserved		Reserved		Reserved		Reserved	
Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo
Byte 17	Byte 18	Byte 19	Byte 20	Byte 21	Byte 22	Byte 23	Byte 24

Reserved		Reserved		Altitude		Seconds	RH
Byte 25	Byte 26	Byte 27	Byte 28	Byte 29	Byte 30	Byte 31	Byte 32

10-34	Command protocol

Field data are represented as 16 bit. Such a figure should be considered as a big-endian unsigned 15 bit integer multiplied by the typical probe divider (see dedicated **?PRB** command). In the particular case in which the figure is equal to **0xFFFF** then the value must be considered invalid (AMC was not able to get a measure) and all the data (all 32 bytes) are meaningless.

If, for example, 16 bit figure named **Tot_avg** is 0x0244 and the divider 100 then the **RMS** (or AVG) field strength value related to broadband channel will be 5.80 (0x0244 in decimal notation is 580).

Most significant bit (D15) **INFL** flag gives the information whether in the period the measurement was influenced (Bit High) or not (Bit Low) by external cable or disturbing activity. Therefore it is not part of field strength and has to be masked.

Indeed, this is just a flag which informs that the measure could have been influenced by the system itself.

Bit 15 is INFL flag which informs the user that the measurement could have been **influenced** by a sum of external issues such as Wireless transmission, charging cable, USB cable & activity.

INFL flag is the LR of all single flags which refer to its own disturbing part (see **PERTs** byte).

Note that the presence of this flag informs the measurement can be heavily disturbed and thus could not be reliable at all.

Battery is the voltage of the battery. The number should be considered as an unsigned 8 bit integer. To get the correct value of the battery voltage the following formula is used: Volt = **Voltage*(0.132)**

If, for example, 8 bit figure named **Battery** is 0x1A (decimal 26) then the battery voltage will be 3.4 V

Temp is the Temperature recorded in the interval. The number should be considered as an unsigned 7 bit integer. In order to avoid negative figure an offset of 40 degrees centigrade is added thus, to get the correct value of the temperature, the following formula is used: T Centigrade = **Temp - 40.**

SPR Flag is a reserved one and should be masked (for example **Temp & 0x7F**).

If, for example, 8 bit figure named **Temp** is 0x3f (decimal 63) then the temperature will be 23°C

Alarm is the block of alarms recorded in the interval. Each bit should be considered individually as follows:

- Bit D07   When High it flags that the battery voltage was out of the safe limits.
- Bit D06   When High it flags that the relative humidity is out of working range.
- Bit D05   When High it flags that the temperature was out of working range.
- Bit D04   When High it flags that the USB cable was connected.
- Bit D03   Reserved
- Bit D02   When High it flags that a Probe failure was detected.
- Bit D01   When High it flags that the broadband field value overcame Warning threshold.
- Bit D00   When High it flags that the broadband field value overcame Alarm threshold.

PERT is the block of every single perturbing occurrence recorded in the interval. Each bit should be considered individually as follows:

- Bit D07   Reserved
- Bit D06   Reserved
- Bit D05   Reserved
- Bit D04   Reserved
- Bit D03   Reserved
- Bit D02   When High it flags that the USB connection was ON during sampling.
- Bit D01   When High it flags that the external Charger was connected by cable during sampling.
- Bit D00   Reserved

Note that the presence of one of the above flags indicates that the record has been perturbed by external influence and the result, in the best case, could be unreliable.

Figures **MISC** and **DateTimes** must be read together.

<div align="right">

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</div>

The 16 bit figure named **MISC** is shown as follows:

	D07	D06	D05	D04	D03	D02	D01	D00	D07	D06	D05	D04	D03	D02	D01	D00
MISC Byte 13/14	Reserved	AVGPeriod_Dec 2 bit uint		NOB		AVGPeriod Min 4 bit unsigned integer				MONTHS 7 bit unsigned integer						

This figure (**MISC**) should be considered as four different data as follows:
- Reserved. The Most significant bit is reserved.
- **AVGPeriod_Dec** is a 2 bit unsigned integer which shows the decimal part of the interval value related to the time span used to get the average (RMS or AVG). This figure is expressed in 15s, i.e., 01 means 15s.
- **NOB** is a 2 bit unsigned integer which informs how many bands (fields for EHP2B) are present in the record.
- **AVGPeriod Min** is a 4 bit unsigned integer which shows the interval (expressed in minute) related to the time span used to get the average (RMS or AVG). An exception is AVGPeriod = 0 in which case the averaging time is 30 minute.
- **MONTHS** is a 7 bit unsigned integer which indicates how many months have been elapsed since 1st January 2022. Being the range limited to 127 the overlapping period is more than 10 years.

If, for example, **MISC** is **0x0083** then the meaning will be:
- AVGPeriod=1 (1 minute). Indeed (**0x0083 >> 7) & 0xF = 0x01**
- MONTHS =3 (April 2022). Indeed **0x0083 & 0x7F = 0x03**

The 16 bit figure named **DateTime** is shown as follows:

	MI15	MI14	MI13	MI12	MI11	MI10	MI9	MI8	MI7	MI6	MI5	MI4	MI3	MI2	MI1	MI0
DateTime Byte 15/16	**DateTime**															

DateTime should be considered as a big-endian unsigned 16 bit integer and indicates how many minutes have been elapsed since the beginning of the current month (previous MONTHS data).
If, for example, **DateTime** is 0x95AE (decimal 38318) then the record will be related to the 27th of the month at 14:38.
Indeed :

Day = 1 +Int(**DateTime** / 1440) = 1 +Int (38318 / 1440) = 27
Hour = Int((**DateTime** Mod (1440)) / 60) = Int ((38318 Mod (1440)) / 60) = 14
Minute = (**DateTime** Mod (1440)) Mod 60)= (38318 Mod (1440)) Mod 60) = 38

Merging the data with **MONTHS** we can get the full date of acquisition which is 14:38 27/04/2022. Time indications with second resolution is given in **Seconds.**

Altitude value is the relative Altitude and is expressed in m. This value is referred to the altitude measured when the log has started. The number should be considered as a 16 bit integer.

Seconds represent the time in seconds (modulo 60) at which the log has been saved. The number should be considered as an unsigned 8 bit integer.

RH value is the relative Humidity and is expressed in percent . The number should be considered as an unsigned 8 bit integer.
If, for example, 8 bit figure named **RH** is 0x32 (decimal 50) then the value of RH would be 50%

Figures **Standard [byte 18]** reflects the standard used **(**same as ?WME*i* command*)*

10-36	**Command protocol**

RES	RES	RES	Validity	Acceleration X		Acceleration Y	
Byte 33	Byte 34	Byte 35	Byte 36	Byte 37	Byte 38	Byte 39	Byte 40

Acceleration Z		RES	RES	Speed		Reserved	
Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo
Byte 41	Byte 42	Byte 43	Byte 44	Byte 45	Byte 46	Byte 47	Byte 48

Latitude int		Latitude Fract		Longitude int		Longitude Fract	
degree	minute	Hi	Lo	degree	minute	Hi	Lo
Byte 49	Byte 50	Byte 51	Byte 52	Byte 53	Byte 54	Byte 55	Byte 56

MSL Altitude		Heading		RES	RES	RES	RES
Hi	Lo	Hi	Lo				
Byte 57	Byte 58	Byte 59	Byte 60	Byte 61	Byte 62	Byte 63	Byte 64

Validity represents data validity – **0**:Valid   **Else**:Unvalid.

Acceleration X, Y, Z expressed in hundreths of [g]. For Accelerometer axes orientation see §2.7

Speed value is expressed in tenths of knoots, must be divided by 10 to get the speed in [kn]

Position information next page

MSL Altitude is the Mean Sea Level Altitude in tenths of meter, must be divided by 10 to get the altitude in [m]

Heading is the direction in tenths of degree, so 0° (or 360°) indicates a direction toward North

Command protocol   10-37

10.5.3.1 Position Information   The 16 bit figure named **Latitude int** is shown as follows:

Byte 49/50	Degree	N/S	V	Minute

The figure named **Latitude int** is made of 4 fields and represents the integer part of the GPS Latitude.
- **Degree** is a 8 bit unsigned integer which indicates the degree of latitude.
- **N/S** (D7) is a flag which indicates whether the latitude is North or South. When referred to North N/S=0 while if N/S=1 the latitude is South.
- **V** (D6) is a flag, which indicates whether data is valid, or not. When coordinates are valid V=0. When V=1 the GPS was not able to correctly get the position.
- **Minute** is a **6 bit** unsigned integer which indicates the minute integer part   of latitude.

The 16 bit figure named **Latitude Fract** is shown as follows:

	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Byte 51/52	**Ten thousandths of a minute**															

The figure named **Latitude Fract** is a **Big-endian** unsigned 16 bit integer and indicates the fractionary part of the GPS Latitude and it is expressed in Ten-thousandths of a minute.
Merging the previous data **Latitude int** and this figure the full latitude can be obtained.
If, for example, **Latitude int=0x2c04** and **Latitude Fract=0x12a9** then the GPS latitude would be:
44 degree, 04.4777 minute North.
Indeed, 0x2c=44, 0x04=04 and 0x12a9=4777. N/S is 0 then the latitude is North.

The 16 bit figure named **Longitude int** is shown as follows:

Byte 53/54	Degree	E/W	res	Minute

The figure named **Longitude int** is made of 4 fields and represents the integer part of the GPS Longitude.
- **Degree** is a 8 bit unsigned integer which indicates the degree of latitude.
- **E/W** (D7) is a flag which indicates whether the Longitude is East or West. When referred to East E/W=0 while if E/W=1 the Longitude is West.
- **D6** is reserved and have to be masked out.
- **Minute** is a **6 bit** unsigned integer which indicates the minute integer part of Longitude.

The 16 bit figure named **Longitude Fract** is shown as follows:

	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Byte 55/56	**Ten thousandths of a minute**															

The figure named **Longitude Fract** is a **Big-endian** unsigned 16 bit integer and indicates the fractionary part of the GPS Longitude and it is expressed in Ten-thousandths of a minute.
Merging the previous data **Longitude int** and this figure the full Longitude can be obtained.
If, for example, **Longitude int=0x0809** and **Longitude Fract=0x16b3** then the GPS Longitude would be:
8 degree, 09.4777 minute East.

Note that position is valid only when **Flag V** of **Latitude int** is zero.

10-38	Command protocol

11 - Accessories

11.1 Introduction

This section provides information required for installing and using accessories of the SMARTS AMC Area Monitor Compact.
Information is included regarding initial inspection, power requirements, interconnections, work environment, assembly, cleaning, storage and shipment.
The following general information is applicable to all accessories.

11.2 Preliminary inspection

Inspect the packaging for any damage.

If the packaging or anti-shock material have been damaged, check that the contents are complete and that the product has not suffered electric or mechanical damage.
Check that all the Accessories are there against the checklist found with the apparatus.
Inform the carrier and NARDA of any damage that has occurred.

NOTICE

11.3 Work environment

Unless otherwise specified, the work environment of the Accessories, must come within the following conditions:
- Temperature   From -20°C to +55° C (0°C to 40°C for Battery Charger)
- Humidity   From 5 to 95% relative

The Accessories must be stored in a clean and dry environment, free from dust, acids and humidity.
The storage environment must come within the range of the following conditions:
- Temperature   From -30°C to + 75°C (-20°C to 60°C for Battery Charger)
- Humidity   < 95% relative

11.4 Return for repair

When the Accessories need to be returned to NARDA for repair, please complete the questionnaire appended to this User's Manual, filling in all the data that will be useful for the service you have requested.

For reducing the period of time required for the repairs, it is necessary to be as specific as possible in describing the problem. If the problem only occurs in certain circumstances, please describe in detail how it happens.
If possible it is better to reuse the original packaging; making sure that the apparatus is wrapped in thick paper or plastic.
Otherwise, use strong packaging by using a sufficient quantity of shock absorbent material around all sides of the product to ensure that it is compact and does not move around inside the package.
In particular, take every precaution to protect the front and rear Main unit panels, Wall support bracket, Interface and Radome.
Finish the package by sealing it up tightly.
Apply a FRAGILE label to the package to encourage greater care in its handling.

11.5 Cleaning

Use a dry, clean and non-abrasive cloth for cleaning the instruments.

NOTICE

Do not use solvents, acids, turpentine, acetone or other similar products for cleaning the devices in order to avoid damaging them.

Accessories   11-1

USB-OC Optical USB Converter

11.6.1 Introduction

USB-OC is a standard accessory of the SMARTS AMC Area Monitor Compact.

It converts the signals of some of the system's accessories, which are only connected via fiber optic, into USB-compatible signals. It, therefore, makes it possible to link the following items up to the USB port of any Personal Computer to operate them in conjunction with specific application software and for firmware updating.

Either USB-OC or USB cable is indispensable for updating the internal firmware via a Personal Computer and update software is available on NARDA's Web site at: http://www.narda-sts.it

11.6.2 Installation

Insert USB-OC in the connector of a free USB port of the PC, connect the fiber optic coming from the AMC or other accessories paying attention to the locating key.

Considering the very low consumption of the device, the power required by USB-OC is taken directly from the USB port of the PC. This means no maintenance is needed.

Table 11-1 Technical specifications of the USB-OC Optical USB Converter	
Max. length of the fiber optic	40 m (standard 10 m; 2 to 40 m optional)
USB Connector	Type A Male

NOTICE

The link between USB-OC and a HUB USB device or USB cable extension could not work properly. It is advisable to connect the USB-OC directly to the PC.

Front view

Key:

Fiber optic RP-02 connector

Rear view

Key:

USB Type A Male

Fig. 11-1 USB-OC adapters

Power supply   USB-OC is powered directly from the USB port of the PC.

11-2	**Accessories**

11.7.1 Introduction

TR-02A is an Optional Accessory of the SMARTS AMC Area Monitor Compact. It allows AMC to be easily supported during field measurements. Each of these instruments has a securing screw, usually placed on the bottom part of its container that enables it to be easily and quickly put into place through the 8053-SN swivel supplied with the tripod.

The design and materials of the TR-02A tripod have been specially selected to prevent it from disturbing the sensors and, therefore, the measurements taken.

The height of the tripod can be adjusted by means of its extendable legs and it is furnished with special feet that are able adapt to all surfaces thereby improving stability. The height of its central support can also be adjusted.

It is supplied with a small protective carrybag to make it easy to carry.

Table 11-2 Technical specifications of the TR-02A Tripod	
• **Legs**	3 legs x 3 extendable sections
• **Transport size:**	76 x 12 x 12 cm
• **Minimum height:**	60 cm
• **Maximum height:**	180 cm
• **Weight**	2.8 kg
• **Load capacity:**	10 kg
• **Tripod support**	Threaded insert ¼ "

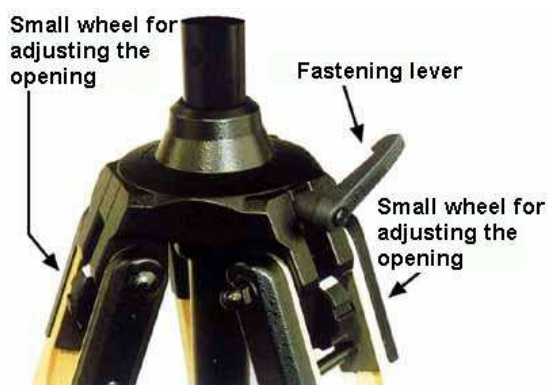Details of the mounting head of the central column of the support and its adjustments:

Fig. 11-2 TR-02A Tripod

The angle for opening each leg into three different positions can be adjusted by using special small adjustable wheels:

- fixed opening of 20°: White adjustment indicator is visible (as in the Figure);
- fixed opening of 45°: Red adjustment indicator is visible;
- variable opening: no indicator is visible.

The central support can be adjusted and blocked by means of a special fastening lever.

Accessories   11-3

Details of the swivel for fastening to the **Tripod Joint**:

- full height: 8 cm
- weight: 160 g
- load capacity: 10 kg
- Threaded insert 1/4"

The adjustable swivel makes mounting and fastening the instrument easy as well as changing the angle in any directions via the locking knob.

Fig. 11-3 AMC on the TR-02A Tripod

<div style="border:1px solid;padding:4px;">11-4</div> **Accessories**

11.8 *AC/DC USB Power Supply and battery charger*

11.8.1 Introduction

Wall plug regulated switchmode AC/DC power supply is a standard accessory of the SMARTS AMC Area Monitor Compact.

It is provided with the USB(A)/USB(C) cable to supply the AMC and for charging the internal battery.

This is a Class II / Double insulated device for indoor use only.

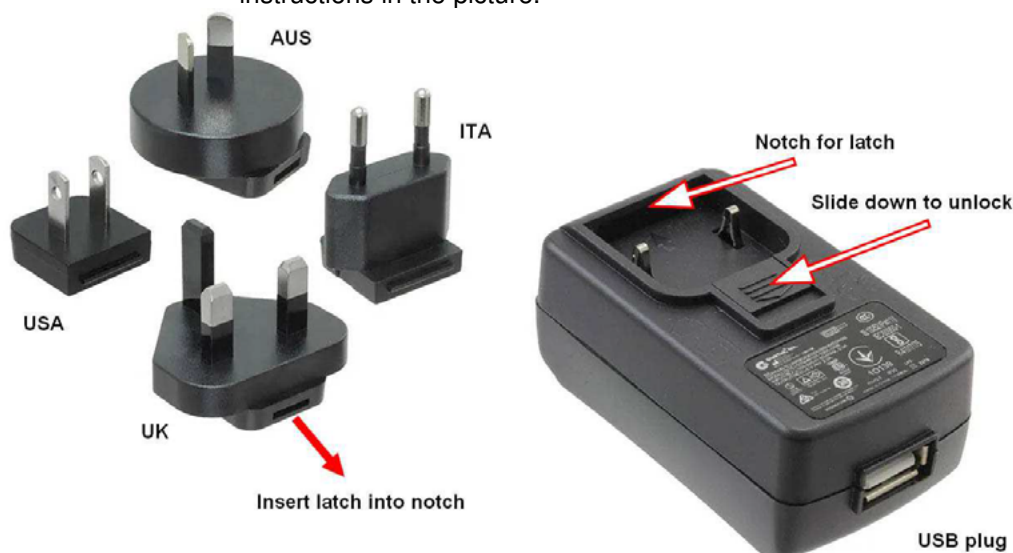Please, adopt the terminal suitable for your Country, following the brief instructions in the picture.
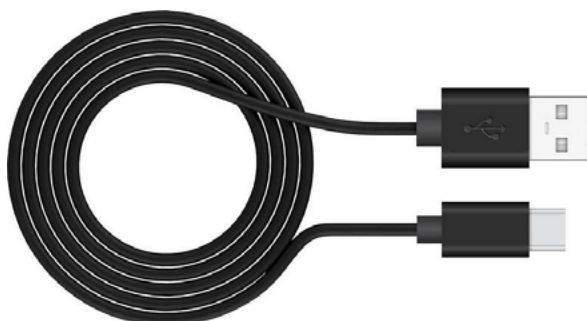

Fig. 11-4 AC/DC Power Supply / battery charger

Fig. 11-5 USB Cable – USB(A)/USB(C)

Table 11-3 Technical specifications of the AC/DC Power Supply	
Rated Input	100 – 240 Vac; 50 – 60 Hz; 0,3 A
Volt output:	5.0 Vdc
Max current:	2.0 A
Power:	10 W
Output connector	USB-A Female; pin1=+V, pin2=NC; pin3=NC; pin4=GND

Table 11-4 Technical specifications of the USB Cable – USB(A)/USB(C)	
Input connector	USB-A male
Output connector	USB-C male
Max current:	2.0 A
Power:	10 W
Length	2 m

Accessories   11-5

11.9   *PoE Injectior*

11.9.1 Introduction

The Power Over Ethernet, such as TL-POE150S or equivalent products is an Optional Accessory of the SMARTS AMC Area Monitor Compact. It delivers power, data and network connection over the same cable to the SMARTS AMC Area Monitor Compact throught the Ethernet port available on the bottom of the AMC baseplate.

Fig. 11-6 PoE Injector

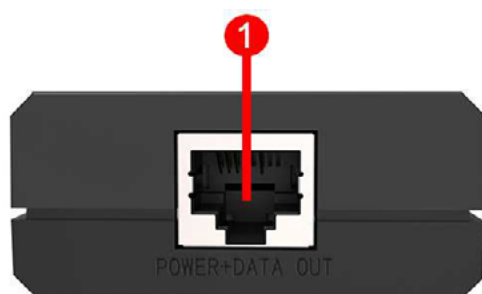| Table 11-5 Technical specifications	
Interface	n°1 10/100/1000 Mbps RJ45 LAN port (LAN IN) n°1 10/100/1000 Mbps RJ45 PoE port (Power+Data OUT) n°1 Power socket (DC IN)
Power supply	15.4W (Max. 48VDC)
Dimensions (W x D x H)	80.8 x 54 x 24 mm

Fig. 11-7 TL-POE150S Front panel

TL-POE150S Front view

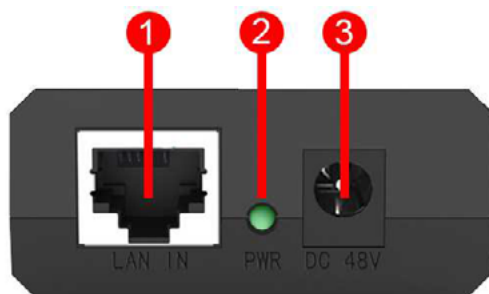**Key:**

1) 10/100/1000 Mbps Power&Data Output Port

Fig. 11-8 TL-POE150S Rear panel

TL-POE150S Rear view

Key:

1) 10/100/1000 Mbps Data Input Port
2) Led Power
3) AC Power Input Socket

NOTE

For additional information, refer to the instructions of its manufacturer.

11-6	**Accessories**

12.1 Miscellaneous messages

There are some messages that are generated automatically in specific circumstances.

When the GPS module does not respond, the unit sends the string:

GPS Not Available

If Area Monitor Compact is not supplied by USB-C cable or PoE Injector and the internal battery voltage is low, the SMARTS AMC sends the string:

WRN: Low Battery

If Area Monitor Compact is not supplied by USB-C cable or PoE Injector and the internal battery voltage is below 3.0 V, the SMARTS AMC sends the string:

VOID BATTERY
switching off

Then, the SMARTS AMC is turned off.

If Area Monitor Compact is not supplied by USB-C cable or PoE Injector and does not receive any command for 30 minutes, and the Logger is not enabled, the AMC sends the string:

No ACTIVITY
switching off

Then, the SMARTS AMC is turned off.

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Service **12-1**

12.2 Initial diagnostic

Just after turning on the AMC, it sends automatically the initial diagnostic results during the boot sequence.
The ASCII text is self-explained.

The following is an example where an Electric and Magnetic probe is connected to the AMC Area Monitor Compact.

```
#LR$OPTFRK*

LR01: FW 1.21 01/24, L A5.3 01/24, W 1.3 09/23
Sensing Flash memories
1 found
1 Flash Memory sensed

SNS=24.9;37.6;1024.5 [Cel.Deg., %, hPa]
Battery:4.52V
RTC: +   26.4 ppm   Cal Date:15.31.34-01.03.23
USB:Connected
Compass found (code 0xC7): Heading: 42 (NE); G:0; -100; 36
AMC option:1.10;11/01/24
No LAN Connection Detected
Check Probe...

Loading active probe

PRB=EHP-2B-
05:08.06.22;%:100.00:1000.00:0.10:0.49:9250.00:1000.00:0.50
:20.00:1000.00:MHz:S
BLE=OK
```

12-2   **Service**

Caro cliente

grazie per aver acquistato un prodotto NARDA! Sei in possesso di uno strumento che per molti anni ti garantirà un'alta qualità di servizio. NARDA riconosce l'importanza del Cliente come ragione di esistenza; ciascun commento e suggerimento, sottoposto all'attenzione della nostra organizzazione, è tenuto in grande considerazione. La nostra qualità è alla ricerca del miglioramento continuo. Se uno dei Suoi strumenti NARDA necessita di riparazione o calibrazione, può aiutarci a servirla più efficacemente compilando questa scheda e accludendola all'apparecchio.

Tuttavia, anche questo prodotto diventerà obsoleto. In questo caso, ti ricordiamo che lo smaltimento dell'apparecchiatura deve essere fatto in conformità con i regolamenti locali. Questo prodotto è conforme alle direttive WEEE dell'Unione Europea (2002/96/EC) ed appartiene alla categoria 9 (strumenti di controllo). Lo smaltimento, in un ambiente adeguato, può avvenire anche attraverso la restituzione del prodotto alla NARDA senza sostenere alcuna spesa. Può ottenere ulteriori informazioni contattando i venditori NARDA o visitando il nostro sito Web www.narda-sts.it.

Dear Customer

thank you for purchasing a NARDA product! You now own a high-quality instrument that will give you many years of reliable service. NARDA recognizes the importance of the Customer as reason of existence; in this view, any comment and suggestion you would like to submit to the attention of our service organization is kept in great consideration. Moreover, we are continuously improving our quality, but we know this is a never ending process. We would be glad if our present efforts are pleasing you. Should one of your pieces of NARDA equipment need servicing you can help us serve you more effectively filling out this card and enclosing it with the product.

Nevertheless, even this product will become obsolete. When that time comes, please remember that electronic equipment must be disposed of in accordance with local regulations. This product conforms to the WEEE Directive of the European Union

(2002/96/EC) and belongs to Category 9 (Monitoring and Control Instruments). You can return the instrument to us free of charge for proper environment friendly disposal. You can obtain further information from your local NARDA Sales Partner or by visiting our website at **www.narda-sts.it**.

☑ **Servizio richiesto:** ☑ *Service needed*:

☐ Solo taratura   ☐ Riparazione   ☐ Riparazione & Taratura   ☐ Taratura SIT   ☐ Altro:
☐ Calibration only   ☐ Repair   ☐ Repair & Calibration   ☐ Certified Calibration   ☐ Other:

Ditta:
Company:

Indirizzo:
Address:

Persona da contattare: **Telefono:**
Technical contact person: *Phone n.*

Modello: **Numero di serie:**
Equipment model: *Serial n.*

☑ *Accessori ritornati con l'apparecchiatura:* ☐ **Nessuno**   ☐ **Cavo(i)**   ☐ **Cavo di alimentazione**   **Altro:**
☑ *Accessories returned with unit:*   ☐ None   ☐ Cable(s)   ☐ Power cable   Other:

☑ *Sintomi o problemi osservati:* ☑ *Observed symptoms / problems*:

☑ *Guasto*: ☐ **Fisso**   ☐ **Intermittente**   *Sensibile a :* ☐ **Freddo**   ☐ **Caldo**   ☐ **Vibrazioni**   ☐ **Altro**
☑ *Failure*: ☐ Continuous   ☐ Intermittent   *Sensitive to*: ☐ Cold   ☐ Heat   ☐ Vibration   ☐ Other

Descrizione del guasto/condizioni di funzionamento:
Failure symptoms/special control settings description:

Se l'unità è parte di un sistema descriverne la configurazione:
If unit is part of system please list other interconnected equipment and system set up: