NARDA
Safety
Test
Solutions
S.r.l. Socio Unico

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# User's Manual

# LR-01

## LOGGER REPEATER

**EQUIPMENT SERIAL NUMBER**
You can find the Serial Number on the rear panel of the instrument.
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.

**NOTE:**



**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**

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

**Earth Protection**

**Earth**

**Unit Earth Connection**

**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.**


**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.

narda
Safety Test Solutions

# Dichiarazione di Conformità
# *EC Declaration of Conformity*

In accordo alla Decisione 768/2008/EC, conforme alle direttive 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 EMC 2014/30/UE, Low Voltage 2014/35/UE and* RoHS 2011/65/EU*, also compliant to the ISO/IEC standard 17050-1 and 17050-2*

| | |
|---|---|
| Il costruttore<br>*The manufacturer* | **narda Safety Test Solutions S.r.l. Socio Unico** |
| Indirizzo<br>*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:<br>*EMC:* | **EN 301 489-1** (V2.2.3)**; EN 301 489-17** (V3.2.4)**; IEC EN 61326-1** (2021) |
| Sicurezza:<br>*Safety:* | **IEC EN 62368-1** (2020); **EN 61010-1** (2010) |
| Radio:<br>*Radio:* | **EN 300 328** (V2.2.2) |
| Salute:<br>*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<br>*Description* | **Ripetitore Registratore – Logger Repeater** |
| Modello<br>*Model* | **LR-01** |

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

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

**Cisano sul Neva, 12 September 2022**

**Egon Stocca**

**General Manager**

narda
Safety Test Solutions

# Dichiarazione di Conformità
# *EU Declaration of Conformity*

CE

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<br>*The manufacturer* | **narda Safety Test Solutions S.r.l. Socio Unico** |
| Indirizzo<br>*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:***

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| EMC:<br>*EMC:* | **EN 301 489-1** (V2.2.3)**; EN 301 489-17** (V3.2.4)**; IEC EN 61326-1** (2021) |
| Sicurezza:<br>*Safety:* | **IEC EN 62368-1** (2020); **EN 61010-1** (2010) |
| Radio:<br>*Radio:* | **EN 300 328** (V2.2.2) |
| Salute:<br>*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<br>*Description* | **STAZIONE DI MONITORAGGIO COMPATTA**<br>***AREA MONITOR COMPACT*** |
| Modello<br>*Model* | **SMARTS AMC/00** |

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

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

**Cisano sul Neva, 01 February 2024**

**Egon Stocca**

**General Manager**

| | |
|---|---|
| **X** | **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 LR-01 Logger Repeater

LR-01 is a programmable logger repeater connected to a Personal Computer via optical fiber cable (through USB-OC adapter) or wired USB cable or Wi-Fi connection with Probe Manager software (see Chapter 3, 4 and 5). The Bluetooth connection is available for Android and iOS device through LR-01 Manager App (see Chapter 7 and 8). With its internal rechargeable battery, it measures electric and magnetic fields through more than 32 different probes and immediately records and plots the results. The probes can be attached to the dedicated heavy-duty connector on the LR-01 via the specific adapter, which also features excellent shielding properties and can therefore be used at very high field strengths without interference. In addition to the standard Narda Probes Manager software delivered with the Logger Repeater, the communication and control protocol is freely available so users can fully control the LR-01 with their usual test software.
LR-01 provides also programmable on-board acoustic, visual and vibration alarms. It is an ideal solution for EMC applications, in chambers and TEM/GTEM cells, and in EMF applications.

**Fig. 1-1** LR-01 Adapter and Probes

NOTE

**It is also available on the market the LR-01 Logger Repeater configured as a very compact Area Monitor Station (SMARTS AMC). Please refer to §10.13 of this manual for further information.**

### 1.3 LR-01 Standard accessories

Standard accessories included with LR-01 are:

- USB Cable – USB(A)/USB(C) 2m
- AC/DC Converter with plug adapters
- Cable, FO Duplex, RP-02, 10 m
- USB-OC Optical Converter
- Conical Tripod support
- Software Media including User's Manual;
- Certificate of Calibration

### 1.4 LR-01 Optional accessories

LR-01 accessories supplied separately (on charge):

- LR01-8053 Adapter
- LR01-8059 Adapter
- Connectors cover kit including:
  - 1 pc. Connector cover
  - 1 pc. Screws 1/4"x5/8
- Cable, FO Duplex, RP-02/20, 20 m long
- Cable, FO Duplex, RP-02/40, 40 m long
- Carrying case
- EP-105 E-Field Sensor
- EP-183 E-Field Sensor
- EP-201 E-Field Sensor
- EP-300 E-Field Sensor
- EP-301 E-Field Sensor
- EP-330 E-Field Sensor
- EP-333 E-Field Sensor
- EP-33A E-Field Sensor
- EP-33B E-Field Sensor
- EP-33C E-Field Sensor
- EP-33M E-Field Sensor
- EP-408 E-Field Sensor
- EP-44M E-Field Sensor
- EP-645 E-Field Sensor
- EP-745 E-Field Sensor
- HP-032 H-Field Sensor
- HP-050 H-Field Sensor
- HP-051 H-Field Sensor
- HP-102 H-Field Sensor
- EP-1B-01 E-Field Sensor
- EP-1B-03 E-Field Sensor
- EP-1B-04 E-Field Sensor
- EP-1B-05 E-Field Sensor
- EP-1B-06 E-Field Sensor
- EP-1B-08 E-Field Sensor
- EP-3B-01 E-Field Sensor
- EP-4B-01 E-Field Sensor
- EP-4B-02 E-Field Sensor
- HP-1B-01 H-Field Sensor
- EHP-2B-01 E and H-Field Sensor
- EHP-2B-02 E and H-Field Sensor
- EHP-2B-03 E and H-Field Sensor
- EHP-2B-04 E and H-Field Sensor
- TT-01 Fiber Glass Telescopic Support
- TR-02A Tripod complete with joint
- Shoulder Sling, Neck Belt for LR-01 (Safety lanyard 1/4" thread)
- Android, WearOS (Smartwatch) and iOS Utility

### 1.5 Other accessories

Other accessories available on the market, like::

- SMARTS AMC Area Monitor Compact
- Antennas and Loops;

## 1.6 LR-01 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 | |
|---|---|
| **Probe compatibility** | 8053 and 8059 standards |
| **Interfaces** | Optical (RP-02), USB (USB-C), WiFi (802.11 b/g/n), Bluetooth (5.0) |
| **Optical fiber connection** | Serial Optical Interface 115200 Baud<br>RP02 connector up to 40 m (USB-OC) |
| **Sampling time** | Automatic from 0.3 s to 1 s (1) |
| **Internal log interval** | Settable from 1 sec to 1 hour, manually triggered, on adjustable threshold |
| **Max data storage capability** | Up to 250000 points (2) |
| **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**<br>**Battery voltage and capacity**<br>**Data & Time**<br>**Temperature**<br>**Humidity (relative)**<br>**Pressure**<br>**GPS coordinates**<br>**Altitude**<br>**Compass**<br>**Speed**<br>**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 (3)** | internal $E^2$PROM |
| **Internal battery** | 3.7 V / 1320 mAh Li-Ion, rechargeable |
| **Operating time (4)** | Stand alone mode up to 100 hours<br>Optical mode (5) up to 60 hours<br>BT mode (5) up to 20 hours<br>WiFi mode (5) up to 10 hours |
| **Recharging time** | < 2.5 hours |
| **External supply** | 5 VDC, Imax 600 mA |
| **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 (6)** | 5 to 95 % |
| **Ingress protection** | IP42<br>IP54 (7) |
| **Dimensions** | ϕ 54 mm, L 116 mm |
| **Weight** | 300 g |
| **Tripod support** | Threaded insert 1/4” |

Specification are subject to change without notice

(1) Probe depending
(2) In logger mode extended format
(3) Recommended re-calibration interval 24 month
(4) Operating time depends on the driven probe, measure setting, and communication channel
(5) Continuous communication worst case
(6) Without condensation
(7) LR-01 with Cover Connector kit optional accessory

## 1.7 LR-01 panels

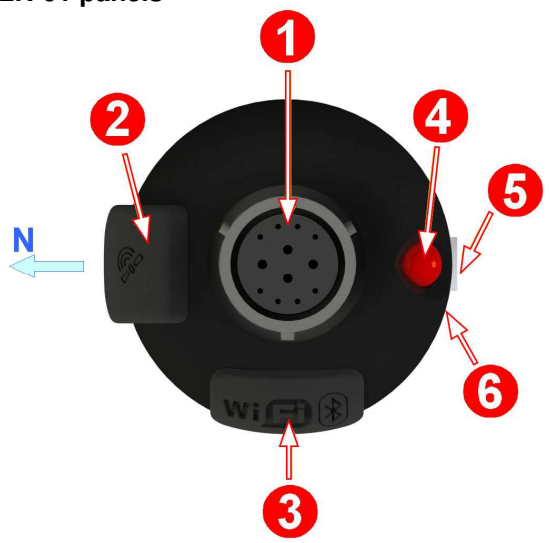



**Fig. 1-2** Top panel

**Legend:**

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

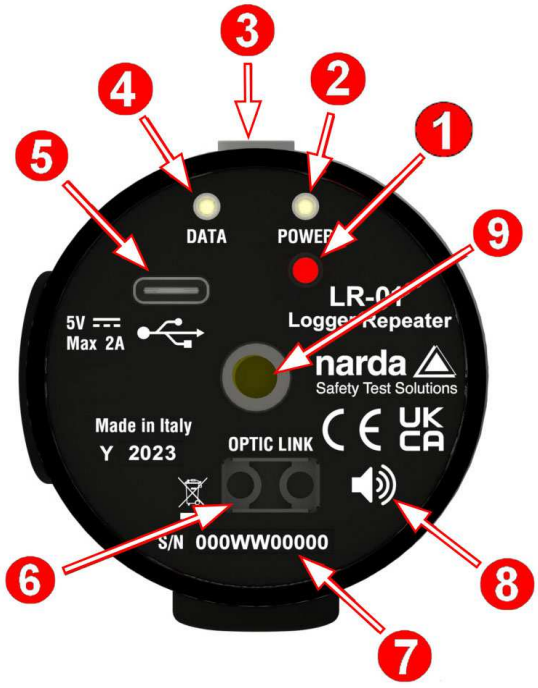



**Fig. 1-3** Bottom panel

**Legend:**

1. ON/OFF button
2. Power ON LED
3. Manual log button
4. Status LED
5. USB-C connector
6. Fiber Optic connector
7. Serial Number
8. Acoustic alarm
9. Threaded insert UNC 1/4“

NOTE **Compass heading 0 degrees (North) corresponds to the direction where the GPS antenna is located.**

## 1.8 Field Probes

LR-01 can measure and log fields detected by many electric and magnetic field probes.
Both the probes of the 8059 family and the probes of the 8053 family are compatible with the Logger Repeater, by means of the appropriate adapter. In addition, a series of probes, aimed at the use of Area Monitors has been developed, specifically for LR-01.

Narda EMF Area Monitor AMB-8059 has a set of electric and magnetic probes covering the frequency range from 10 Hz to 60 GHz.

PMM 8053B measurement system is complete with a series of electric and magnetic field probes in the frequency range from 5 Hz to 40 GHz.

LR-01 measurement system is equipped with a series of electric and magnetic field probes in the frequency range from 500 kHz to 60 GHz

The following list shows the 8059 probes:

| TABLE 1-2 8059 Field Probes | | |
|---|---|---|
| **Field Probe** | **Range of frequency** | **Reading** |
| ELECTRIC FIELD PROBE EP-1B-01 | 100 kHz – 3 GHz | 0.2 – 200 V/m |
| TRI-BAND ELECTRIC FIELD PROBE EP-3B-01 | 100 kHz – 3 GHz | 0.2 – 200 V/m |
| MAGNETIC FIELD PROBE HP-1B-01 | 10 Hz – 5 kHz | 50 nT – 200 µT |
| QUAD-BAND ELECTRIC FIELD PROBE EP-4B-01 | 100 kHz – 3 GHz | 0.03 – 200 V/m |
| ELECTRIC FIELD PROBE EP-1B-03 | 100 kHz – 7 GHz | 0.2 – 200 V/m |
| QUAD-BAND ELECTRIC FIELD PROBE EP-4B-02 | 100 kHz – 7 GHz | (0.03) 0.2 – 200 V/m |
| ELECTRIC FIELD PROBE EP-1B-04 | 10 Hz – 5 KHz | 5 V/m – 20 kV/m |
| ELECTRIC FIELD PROBE EP-1B-05 | 300 kHz – 18 GHz | 0.5 – 800 V/m |
| ELECTRIC FIELD PROBE EP-1B-06 | 300 kHz – 40 GHz | 0.5 – 800 V/m |
| ELECTRIC FIELD PROBE EP-1B-08 | 100 kHz – 8 GHz | 0.2 – 200 V/m |
| ELECTRIC AND MAGNETIC FIELD SHAPED PROBE EHP-2B-01 | E: 500 kHz – 9.25 GHz<br>H: 20 MHz – 1 GHz | E: 0.1 (0.5) – 1000 %<br>H: 0.3 (1.5) – 1000 % |
| ELECTRIC AND MAGNETIC FIELD SHAPED PROBE EHP-2B-02 | E: 500 kHz – 60 GHz<br>H: 20 MHz – 1 GHz | E: 0.1 (0.5) – 1000 %<br>H: 0.3 (1.5) – 1000 % |
| ELECTRIC AND MAGNETIC FIELD SHAPED PROBE EHP-2B-03 | E: 1.34 MHz – 9.25 GHz<br>H: 1 MHz – 1 GHz | E: 0.1 (0.5) – 1000 %<br>H: 0.3 (1.5) – 1000 % |
| ELECTRIC AND MAGNETIC FIELD SHAPED PROBE EHP-2B-04 | E: 1.34 MHz – 60 GHz<br>H: 1 MHz – 1 GHz | E: 0.1 (0.5) – 1000 %<br>H: 0.3 (1.5) – 1000 % |

NOTE

**With EHP-2B shaped models of field probes, after selecting the desired limit, the repeater 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 LR-01 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).**

The following list shows the 8053 probes:

| TABLE 1-3 8053 Field Probes | | |
|---|---|---|
| **Field Probes** | **Frequency range** | **Level range** |
| ELECTRIC FIELD PROBE EP-105 | 100 kHz - 1000 MHz | 0.05 - 50 V/m |
| ELECTRIC FIELD PROBE EP-300 | 100 kHz - 3 GHz | 0.1 - 300 V/m |
| ELECTRIC FIELD PROBE EP-330 | 100 kHz - 3 GHz | 0.3 - 300 V/m |
| ELECTRIC FIELD PROBE EP-301 | 100 kHz - 3 GHz | 1 - 1000 V/m |
| ELECTRIC FIELD PROBE EP-333 | 100 kHz – 3.6 GHz | 0.15 - 300 V/m |
| ELECTRIC FIELD PROBE EP-183 | 1 MHz – 18 GHz | 0.8 - 800 V/m |
| ELECTRIC FIELD PROBE EP-408 | 1 MHz – 40 GHz | 0.8 - 800 V/m |
| ELECTRIC FIELD PROBE EP-44M | 100 kHz - 800 MHz | 0.25 - 250 V/m |
| ELECTRIC FIELD PROBE EP-33M | 700 MHz - 3 GHz | 0.3 - 300 V/m |
| ELECTRIC FIELD PROBE EP-33A | 925 MHz - 960 MHz | 0.03 - 30 V/m |
| ELECTRIC FIELD PROBE EP-33B | 1805 MHz - 1880 MHz | 0.03 - 30 V/m |
| ELECTRIC FIELD PROBE EP-33C | 2110 MHz - 2170 MHz | 0.03 - 30 V/m |
| ELECTRIC FIELD PROBE EP-201 | 60 MHz – 12 GHz | 3 – 500 V/m |
| ELECTRIC FIELD PROBE EP-645 | 100 kHz – 6.5 GHz | 0.35 – 450 V/m |
| ELECTRIC FIELD PROBE EP-745 | 100 kHz – 7 GHz | 0.35 – 450 V/m |
| MAGNETIC FIELD PROBE HP-032 | 0.1 - 30 MHz | 0.01 - 20 A/m |
| MAGNETIC FIELD PROBE HP-102 | 30 - 1000 MHz | 0.01 - 20 A/m |
| MAGNETIC FIELD PROBE HP-050 | 10 Hz – 5 kHz | 10 nT – 40 µT |
| MAGNETIC FIELD PROBE HP-051 | 10 Hz – 5 kHz | 50 nT – 200 µT |

NOTE

**The probes of the 8053 family 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.**

The following list shows the LR-01 specific probes, designed for SMARTS Area Monitor Compact:

| TABLE 1-4 SMARTS AMC 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<br>H: 20 MHz – 1 GHz | E: 0.1 (0.5) – 1000 %<br>H: 0.3 (1.5) – 1000 % |
| ELECTRIC AND MAGNETIC FIELD SHAPED PROBE EHP-2B-06 | E: 500 kHz – 60 GHz<br>H: 20 MHz – 1 GHz | E: 0.1 (0.5) – 1000 %<br>H: 0.3 (1.5) – 1000 % |
| ELECTRIC AND MAGNETIC FIELD SHAPED PROBE EHP-2B-07 | E: 1.34 MHz – 9.25 GHz<br>H: 1 MHz – 1 GHz | E: 0.1 (0.5) – 1000 %<br>H: 0.3 (1.5) – 1000 % |
| ELECTRIC AND MAGNETIC FIELD SHAPED PROBE EHP-2B-08 | E: 1.34 MHz – 60 GHz<br>H: 1 MHz – 1 GHz | E: 0.1 (0.5) – 1000 %<br>H: 0.3 (1.5) – 1000 % |

NOTE

**The probes of this family are designed to achieve compact dimensions, useful for area monitoring, therefore resulting a good compromise between size and performance.**

**TABLE 1-5 Technical Specifications of 8059 Field Probes**

## ELECTRIC FIELD PROBE EP-1B-01

| | |
|---|---|
| **Frequency range** | 0.1 – 3000 MHz |
| **Reading range** | 0.2 – 200 V/m |
| **Overload** | 600 V/m |
| **Dynamic range** | > 60 dB |
| **Linearity** | ± 0.5 dB (0.5 to 100 V/m) @ 50 MHz |
| **Resolution** | 0.01 V/m |
| **Sensitivity** | 0.2 V/m |
| **Flatness @ 20V/m** | 1 – 200 MHz ±0.8 dB<br>150 kHz - 3 GHz ±1.5 dB |
| **Anisotropy @ 6V/m** | ± 0.8 dB @ 50 MHz<br>(typical 0.6 dB) |
| **Rejection of magnetic field** | > 20 dB |
| **Temperature error** | 0.1 dB/°C |
| **A/D conversion** | On board |
| **Calibration factors** | On board $E^2$prom |
| **Temperature sensor** | On board |
| **Dimensions** | Length 450mm, diameter 55mm |
| **Weight** | 180g |

**Fig. 1-4** EP-1B-01 probe

## TRI-BAND ELECTRIC FIELD PROBE EP-3B-01

| | Wide band | Low pass | High pass |
|---|---|---|---|
| **Frequency range** | 0.1 – 3000 MHz | 0.1 – 862 MHz | 933 – 3000 MHz |
| **Reading range** | 0.2 – 200 V/m | | |
| **Overload** | 600 V/m | | |
| **Dynamic range** | > 60 dB | | |
| **Linearity** | ± 0.5 dB (0.5 to 100 V/m) @ 50 MHz | ± 0.5 dB (0.5 to 100 V/m) | ± 0.5 dB (0.5 to 100 V/m) |
| **Resolution** | 0.01 V/m | | |
| **Sensitivity** | 0.2 V/m | | |
| **Flatness @ 20V/m** | 1 – 200 MHz ±0.8 dB<br>150 kHz - 3 GHz ±1.5 dB | 1 – 200 MHz ±0.8 dB<br>150 kHz - 862 MHz ±1.5 dB | 933 – 3000 MHz ±1.5 dB |
| **Anisotropy @ 6V/m** | ± 0.8 dB @ 50 MHz<br>(typical 0.6 dB) | | +/- 0.8 dB @ 1 GHz<br>(typical 0.6 dB) |
| **Attenuation out of band** | Not applicable | 933 MHz – 3 GHz > 23 dB<br>(respect to 50 MHz) | 0.1 – 862 MHz > 23 dB<br>(respect to 1 GHz) |
| **Rejection of magnetic field** | > 20 dB | | |
| **Temperature error** | 0.1 dB/°C | | |
| **A/D conversion** | On board | | |
| **Calibration factors** | On board $E^2$prom | | |
| **Temperature sensor** | On board | | |
| **Dimensions** | Length 450mm, diameter 55mm | | |
| **Weight** | 180g | | |

**Fig. 1-5** EP-3B-01 Probe

## MAGNETIC FIELD PROBE HP-1B-01

| | |
|---|---|
| **Frequency range** | 10 Hz – 5 kHz |
| **Reading range** | 50 nT – 200 µT |
| **Overload** | > 1 mT |
| **Dynamic range** | > 72 dB |
| **Linearity** | ± 0.5 dB (200 nT to 100 uT) @ 50 Hz |
| **Resolution** | 1 nT |
| **Sensitivity** | 50 nT |
| **Flatness @ 40 Hz - 1 kHz** | 1 dB (typical 0.6) |
| **Anisotropy @ 50 Hz 3µT** | 0.3 dB |
| **Rejection of electric field** | > 20 dB |
| **A/D Conversion** | On board |
| **Calibration factors** | On board $E^2$prom |
| **Temperature sensor** | On board |
| **Dimensions** | Length 83 mm, diameter 53 mm |
| **Weight** | 110g |

**Fig. 1-6** HP-1B-01 Probe

## QUAD-BAND ELECTRIC FIELD PROBE EP-4B-01

| | Wide band | EGSM 900 Band pass | EGSM 1800 Band pass | UMTS Band pass |
|---|---|---|---|---|
| **Frequency range** | 0.1 – 3000 MHz | 925 – 960 MHz | 1805 – 1880 MHz | 2110 – 2170 MHz |
| **Level range** | 0.2 – 200 V/m | 0.03 – 30 V/m | | |
| **Dynamic range** | > 60 dB | > 60 dB | | |
| **Linearity** | ± 0.5 dB (0.5 to 100 V/m) | ± 0.5 dB (0.06 to 20 V/m) | | |
| **Resolution** | 0.01 V/m | | | |
| **Sensitivity** | 0.2 V/m | 0.03 V/m | | |
| **Flatness @ 6 V/m** | 1 – 200 MHz +/-0.8 dB<br>0.15 MHz - 3 GHz +/-1.5 dB | 925 – 960 MHz<br>+0.5 / -2.5 dB | 1805 MHz – 1880 MHz<br>+0.5 / -2.5 dB | 2110 – 2170 MHz<br>+0.5 / -2.5 dB |
| **Anisotropy @ 3 V/m** | ± 0.8 dB @ 50 MHz<br>(typical 0.6 dB) | ± 0.8 dB (typical 0.6 dB)<br>@ 942.5 MHz | ± 0.8 dB (typical 0.6 dB)<br>@ 1842.5 MHz | ± 0.8 dB (typical 0.6 dB)<br>@ 2140 MHz |
| **Out band attenuation** | not applicable | Rejection<br>to 1842 GSM = 25 dB<br>to 2140 UMTS = 25 dB | Rejection<br>to 942 GSM = 15 dB<br>to 2140 UMTS = 13 dB | Rejection<br>to 942 GSM = 17 dB<br>to 1842 GSM = 10 dB |
| **H filed rejection** | > 20 dB | | | |
| **Temperature error** | 0°C÷50°C = ± 0.3 dB | -20°C÷0°C = - 0.1 dB / °C | | |
| **Center frequency drift** | not applicable | 40°C÷60°C = ± 100 kHz | -20°C÷40°C = -100 kHz / °C | |
| **A/D conversion** | On board | | | |
| **Calibration factors** | On board $E^2$prom | | | |
| **Temperature sensor** | On board | | | |
| **Size** | Length 450 mm, diameter 55 mm | | | |
| **Weight** | 210g | | | |

**Fig. 1-7** EP-4B-01 probe

## ELECTRIC FIELD PROBE EP-1B-03

| | |
|---|---|
| **Frequency range** | 0.1 – 7000 MHz |
| **Reading range** | 0.2 – 200 V/m |
| **Overload** | 600 V/m |
| **Dynamic range** | > 60 dB |
| **Linearity** | ± 0.5 dB (0.5 to 100 V/m) @ 50 MHz |
| **Resolution** | 0.01 V/m |
| **Sensitivity** | 0.2 V/m |
| **Flatness @ 20V/m** | 3 MHz - 200 MHz +/-0.8 dB<br>0.15 MHz - 3 GHz +/-1.5 dB<br>0.1 MHz - 6 GHz +/-2 dB |
| **Anisotropy @ 6V/m** | ± 0.8 dB @ 50 MHz<br>(typical 0.6 dB) |
| **Rejection of magnetic field** | > 20 dB |
| **Temperature error** | 0.1 dB/°C |
| **A/D conversion** | On board |
| **Calibration factors** | On board $E^2$prom |
| **Temperature sensor** | On board |
| **Dimensions** | Length 450mm, diameter 55mm |
| **Weight** | 180g |

**Fig. 1-8** EP-1B-03 probe

## QUAD-BAND ELECTRIC FIELD PROBE EP-4B-02

| | Wide band | EGSM 900 Band pass | EGSM 1800 Band pass | UMTS Band pass |
|---|---|---|---|---|
| **Frequency range** | 0.1 – 7000 MHz | 925 – 960 MHz | 1805 – 1880 MHz | 2110 – 2170 MHz |
| **Level range** | 0.2 – 200 V/m | 0.03 – 30 V/m | | |
| **Dynamic range** | > 60 dB | > 60 dB | | |
| **Linearity** | ± 0.5 dB (0.5 to 100 V/m) @ 50 MHz | ± 0.5 dB (0.1 to 20 V/m) | | |
| **Resolution** | 0.01 V/m | | | |
| **Sensitivity** | 0.2 V/m | 0.03 V/m | | |
| **Flatness @ 6 V/m** | 3 – 200 MHz +/-1.5 dB<br>0.15 MHz - 3 GHz +/-2 dB<br>0.1 MHz – 7 GHz +/- 3 dB | 925 – 960 MHz<br>+0.5 / -2.5 dB | 1805 MHz – 1880 MHz<br>+0.5 / -2.5 dB | 2110 – 2170 MHz<br>+0.5 / -2.5 dB |
| **Anisotropy @ 3 V/m** | ± 0.8 dB @ 50 MHz<br>(typical 0.6 dB) | ± 0.8 dB @ 942.5 MHz<br>(typical 0.6 dB) | ± 0.8 dB @ 1842.5 MHz<br>(typical 0.6 dB) | ± 0.8 dB @ 2140 MHz<br>(typical 0.6 dB) |
| **Out of band attenuation** | not applicable | Rejection<br>to 1842 GSM = 25 dB<br>to 2140 UMTS = 25 dB | Rejection<br>to 942 GSM = 15 dB<br>to 2140 UMTS = 13 dB | Rejection<br>to 942 GSM = 17 dB<br>to 1842 GSM = 10 dB |
| **H filed rejection** | > 20 dB | | | |
| **Temperature error** | 0°C÷50°C = ± 0.3 dB | | -20°C÷0°C = - 0.1 dB / °C | |
| **Center frequency drift** | not applicable | 40°C÷60°C = ± 100 kHz | -20°C÷40°C = -100 kHz / °C | |
| **A/D conversion** | On board | | | |
| **Calibration factors** | On board $E^2$prom | | | |
| **Temperature sensor** | On board | | | |
| **Size** | Length 450 mm, diameter 55 mm | | | |
| **Weight** | 210g | | | |

**Fig. 1-9** EP-4B-02 probe

## ELECTRIC FIELD PROBE EP-1B-04

| | |
|---|---|
| **Frequency range** | 10 Hz – 5 kHz |
| **Level range** | 5 V/m – 20 kV/m |
| **Overload** | > 30 kV/m |
| **Dynamic range** | > 72 dB |
| **Resolution** | 0.1 V/m |
| **Sensitivity** | 5 V/m |
| **Flatness @ 100 V/m (40 Hz - 1 kHz)** | 1 dB (typical 0,5 ) |
| **Anisotropy @ 100 V/m** | 0.5 dB @ 50 Hz |
| **Rejection of magnetic field** | > 20 dB |
| **A/D Conversion** | On board |
| **Calibration factors** | On board $E^2$prom |
| **Temperature sensor** | On board |
| **Dimensions** | Length 77 mm, diameter 53 mm |
| **Weight** | 110g |

**Fig. 1-10** EP-1B-04 probe

## ELECTRIC FIELD PROBE EP-1B-05

| | |
|---|---|
| **Frequency range** | 0.3 MHz – 18 GHz |
| **Reading range** | 0.5 – 800 V/m |
| **Overload** | 1200 V/m |
| **Dynamic range** | > 64 dB |
| **Linearity** | ±0.5 dB (±0.3 typical) (1.2 V/m to 200 V/m) @ 200 MHz |
| **Resolution** | 0.01 V/m |
| **Sensitivity** | 0.5 V/m |
| **Flatness @ 6 V/m** | 1 MHz to 1 GHz ±1.5 dB<br>1 GHz to 12 GHz ±3 dB<br>12 GHz to 18 GHz ±4 dB |
| **Anisotropy @ 200 MHz** | ±0.8 dB (typical 0.5 dB @ 930 and 1800 MHz) |
| **Rejection of magnetic field** | > 20 dB |
| **Temperature error** | 0.02 dB/°C |
| **A/D conversion** | On board |
| **Calibration factors** | On board $E^2$prom |
| **Temperature sensor** | On board |
| **Dimensions** | Length 450mm, diameter 55mm |
| **Weight** | 180g |

**Fig. 1-11** EP-1B-05 probe

## ELECTRIC FIELD PROBE EP-1B-06

| | |
|---|---|
| **Frequency range** | 0.3 MHz – 40 GHz |
| **Reading range** | 0.5 – 800 V/m |
| **Overload** | 1200 V/m |
| **Dynamic range** | > 64 dB |
| **Linearity** | ±0.5 dB (±0.3 typical) (1.2 V/m to 200 V/m) @ 200 MHz |
| **Resolution** | 0.01 V/m |
| **Sensitivity** | 0.5 V/m |
| **Flatness @ 6 V/m** | 1 MHz to 1 GHz ±1.5 dB<br>1 GHz to 12 GHz ±3 dB<br>12 GHz to 23 GHz ±4 dB<br>23 GHz to 40 GHz ±5 dB |
| **Anisotropy @ 200 MHz** | ±0.8 dB (typical 0.5 dB @ 930 and 1800 MHz) |
| **Rejection of magnetic field** | > 20 dB |
| **Temperature error** | 0.02 dB/°C |
| **A/D conversion** | On board |
| **Calibration factors** | On board $E^2$prom |
| **Temperature sensor** | On board |
| **Dimensions** | Length 450mm, diameter 55mm |
| **Weight** | 180g |

**Fig. 1-12** EP-1B-06 probe

## ELECTRIC FIELD PROBE EP-1B-08

| | |
|---|---|
| **Frequency range** | 0.1 MHz – 8 GHz |
| **Reading range** | 0.2 – 200 V/m |
| **Overload** | 600 V/m |
| **Dynamic range** | > 60 dB |
| **Linearity** | ±0.5 dB (0.5 V/m to 100 V/m) @ 50 MHz |
| **Resolution** | 0.01 V/m |
| **Sensitivity** | 0.2 V/m |
| **Flatness @ 20 V/m** | 3 MHz - 200 MHz ±0.8 dB<br>0.15 kHz - 6 GHz ±2 dB<br>0.1 kHz - 8 GHz ±3 dB |
| **Anisotropy @ 6 V/m** | ±0.8 dB (typical 0.6 dB @ 50 MHz) |
| **Rejection of magnetic field** | > 20 dB |
| **Temperature error** | 0.1 dB/°C |
| **A/D conversion** | On board |
| **Calibration factors** | On board $E^2$prom |
| **Temperature sensor** | On board |
| **Dimensions** | Length 450mm, diameter 55mm |
| **Weight** | 180g |

**Fig. 1-13** EP-1B-08 probe

# DUAL-BAND ELECTRIC AND MAGNETIC SHAPED FIELD PROBE EHP-2B-01
# For ICNIRP 1998 and SC6 2015 *

| | | | Electric Field | Magnetic Field |
|---|---|---|---|---|
| **Frequency range** | **ICNIRP 1998** | **Occupational** | 0.5 – 9250 MHz | 20 – 1000 MHz |
| | | **General Public** | 3 – 9250 MHz | |
| | **SC6 2015** | **Controlled** | | |
| | | **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/-2 dB<br>3 – 9250 MHz +/-3 dB | 20 – 1000 MHz +/-3 dB |
| | | **General Public** | 3 – 10 MHz +2/-3 dB<br>10 – 9250 MHz +/-3 dB | |
| | **SC6 2015** | **Controlled** | 3 – 9250 MHz +/-3.5 dB | |
| | | **Uncontrolled** | | |
| **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** | | | 450 mm length, 55mm diameter | |
| **Weight** | | | 200 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. 1-14** EHP-2B-01 probe

## DUAL-BAND ELECTRIC AND MAGNETIC SHAPED FIELD PROBE EHP-2B-02
## 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** | 3 MHz – 60 GHz | |
| | **SC6 2015** | **Controlled** | | |
| | | **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/-2 dB<br>3 – 18000 MHz +/-3 dB<br>18 – 60 GHz +8/-1 dB | 20 – 1000 MHz +/-3 dB |
| | | **General Public** | 3 – 10 MHz +2/-3 dB<br>10 – 18000 MHz +/-3 dB<br>18 – 60 GHz +8/-1 dB | |
| | **SC6 2015** | **Controlled** | 3 – 9250 MHz +/-3.5 dB<br>9250 – 18000 MHz +6/0 dB<br>18 – 60 GHz +8/-1 dB | |
| | | **Uncontrolled** | | |
| **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** | | | 450 mm length, 55mm diameter | |
| **Weight** | | | 200 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. 1-15** EHP-2B-02 probe

# DUAL-BAND ELECTRIC AND MAGNETIC SHAPED FIELD PROBE EHP-2B-03
# 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) dynamic range** | **Occupational** | | 40 (80) dB | 35 (70) dB |
| | **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<br>200 - 1000 MHz +3.5/-4 dB |
| | | **General Public** | | |
| | **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** | | | 450 mm length, 55mm diameter | |
| **Weight** | | | 200 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 E2PROM, and temperature sensor

**Fig. 1-16** EHP-2B-03 probe

## DUAL-BAND ELECTRIC AND MAGNETIC SHAPED FIELD PROBE EHP-2B-04
## 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) dynamic range** | **Occupational** | | 40 (80) dB | 35 (70) dB |
| | **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<br>9250 – 18000 MHz +3/-2 dB<br>18 – 60 GHz +8/-1 dB | 1 – 200 MHz +3.5/-1 dB<br>200 – 1000 MHz +3.5/-4 dB |
| | | **General Public** | | |
| | **FCC 96-326** | **Occupational** | 2 – 18000 MHz +/-3 dB<br>18 – 60 GHz +8/-1 dB | 2 – 1000 MHz +/-3 dB |
| | | **General Pop.** | 1.34 – 18000 MHz +/-3 dB<br>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** | | | 450 mm length, 55mm diameter | |
| **Weight** | | | 200 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 E2PROM, and temperature sensor

**Fig. 1-17** EHP-2B-04 probe

**TABLE 1-6 Technical Specifications of LR-01 and SMARTS Area Monitor Compact Field Probes**

## 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** | 3 – 9250 MHz | |
| | **SC6 2015** | **Controlled** | | |
| | | **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<br>3 – 9250 MHz +/-3 dB | 20 – 1000 MHz +/-3 dB |
| | | **General Public** | | |
| | **SC6 2015** | **Controlled** | 3 – 10 MHz +2/-3 dB<br>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. 1-18** EHP-2B-05 probe

# 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<br>3 – 18000 MHz +/-3 dB<br>18 – 60 GHz +8/-1 dB | 20 – 1000 MHz +/-3 dB |
| | | **General Public** | 3 – 10 MHz +2/-3 dB<br>10 – 18000 MHz +/-3 dB<br>18 – 60 GHz +8/-1 dB | |
| | **SC6 2015** | **Controlled** | 3 – 9250 MHz +/-3.5 dB<br>9250 – 18000 MHz +6/0 dB<br>18 – 60 GHz +8/-1 dB | |
| | | **Uncontrolled** | | |
| **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. 1-19** 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) dynamic range** | **Occupational** | | 40 (80) dB | 35 (70) dB |
| | **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<br>200 – 1000 MHz +3.5/-4 dB |
| | | **General Public** | | |
| | **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 E2PROM, and temperature sensor


**Fig. 1-20** EHP-2B-07 probe

# 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) dynamic range** | **Occupational** | | 40 (80) dB | 35 (70) dB |
| | **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<br>9250 – 18000 MHz +3/-2 dB<br>18 – 60 GHz +8/-1 dB | 1 – 200 MHz +3.5/-1 dB<br>200 – 1000 MHz +3.5/-4 dB |
| | | **General Public** | | |
| | **FCC 96-326** | **Occupational** | 2 – 18000 MHz +/- 3 dB<br>18 – 60 GHz +8/-1 dB | 2 – 1000 MHz +/- 3 dB |
| | | **General Pop.** | 1.34 – 18000 MHz +/- 3 dB<br>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.
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

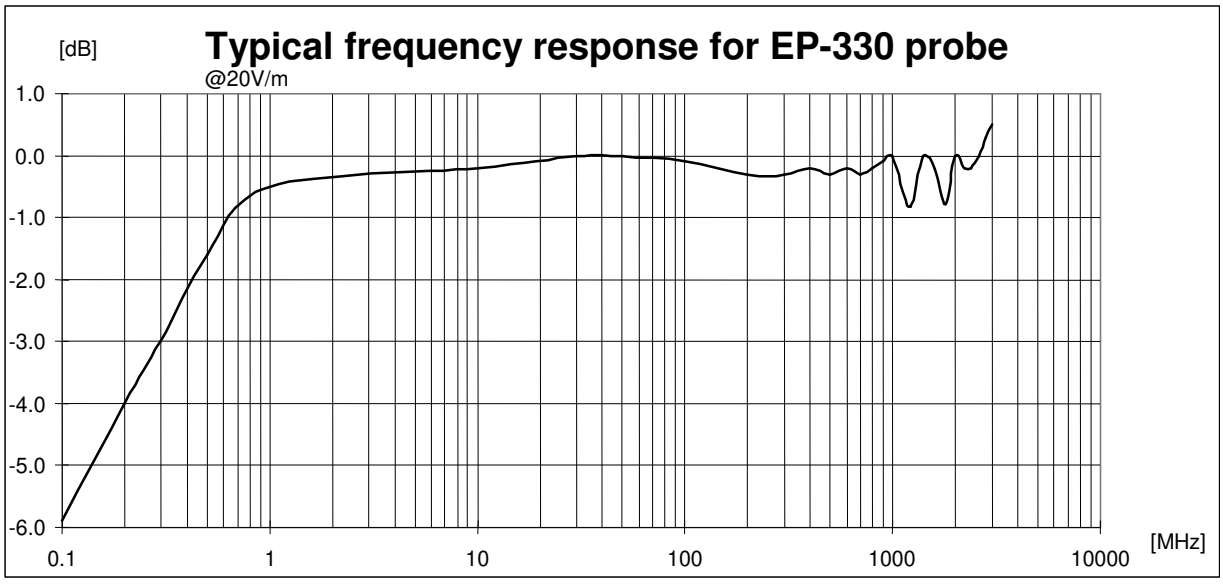
(*) All probes include on board A/D conversion, calibration factors on E2PROM, and temperature sensor

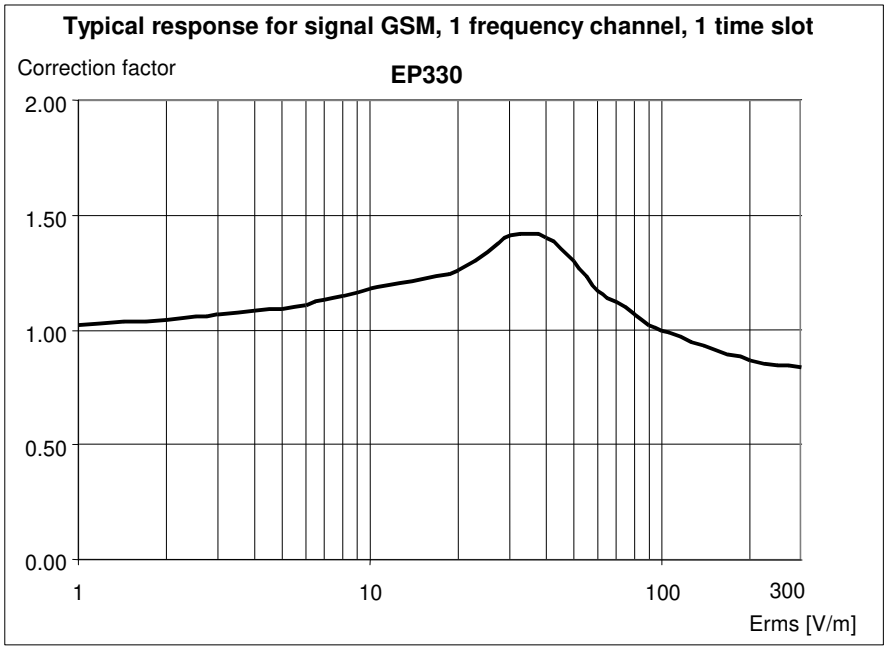

**Fig. 1-21** EHP-2B-08 probe

**TABLE 1-7 Technical Specifications of 8053 Field Probes**

## ELECTRIC FIELD PROBE EP-330

| | |
|---|---|
| Frequency range | 100 kHz - 3 GHz |
| Level range | 0.3 - 300 V/m |
| Overload | > 600 V/m |
| Dynamic range | > 60 dB |
| Resolution | 0.01 V/m |
| Sensitivity | 0.3 V/m |
| Absolute error @ 50 MHz 20 V/m | ± 0.8 dB |
| Flatness (10 - 300 MHz) | ± 0.5 dB |
| Flatness (3 MHz - 3 GHz) | ± 1.5 dB |
| Isotropicity | ± 0.8 dB (typical ± 0.5 dB @ 930 and 1800 MHz) |
| H-field rejection | >20 dB |
| Temperature error | 20°C ÷ 60°C = ±0.1 dB<br>0°C ÷ 20°C = -0.05 dB/°C<br>-20°C ÷ 0°C = -0.15 dB/°C |
| Calibration | Internal into $E^2$PROM |
| Size | 317 mm length, 58 mm diameter |
| Weight | 100 g |






| Erms [V/m] | Edisplay [V/m] | Correction factor |
|---|---|---|
| 1 | 0.98 | 1.02 |
| 2 | 1.91 | 1.05 |
| 3 | 2.82 | 1.06 |
| 4 | 3.70 | 1.08 |
| 5 | 4.58 | 1.09 |
| 6 | 5.40 | 1.11 |
| 7 | 6.17 | 1.13 |
| 8 | 6.96 | 1.15 |
| 9 | 7.75 | 1.16 |
| 10 | 8.50 | 1.18 |
| 20 | 15.84 | 1.26 |
| 30 | 21.3 | 1.41 |
| 40 | 28.6 | 1.40 |
| 50 | 38.5 | 1.30 |
| 60 | 51.3 | 1.17 |
| 70 | 62.5 | 1.12 |
| 80 | 75.1 | 1.07 |
| 90 | 88.1 | 1.02 |
| 100 | 99 | 1.01 |
| 200 | 227 | 0.88 |
| 300 | 361 | 0.83 |

NOTE

**This test is carried out with a signal currently used in laboratory for maximize the reading error to make a comparison of the performances of the probe with a common base.**
**Actually the radio base station use eight time slots of each channel so the effective error of the measurement is negligible.**

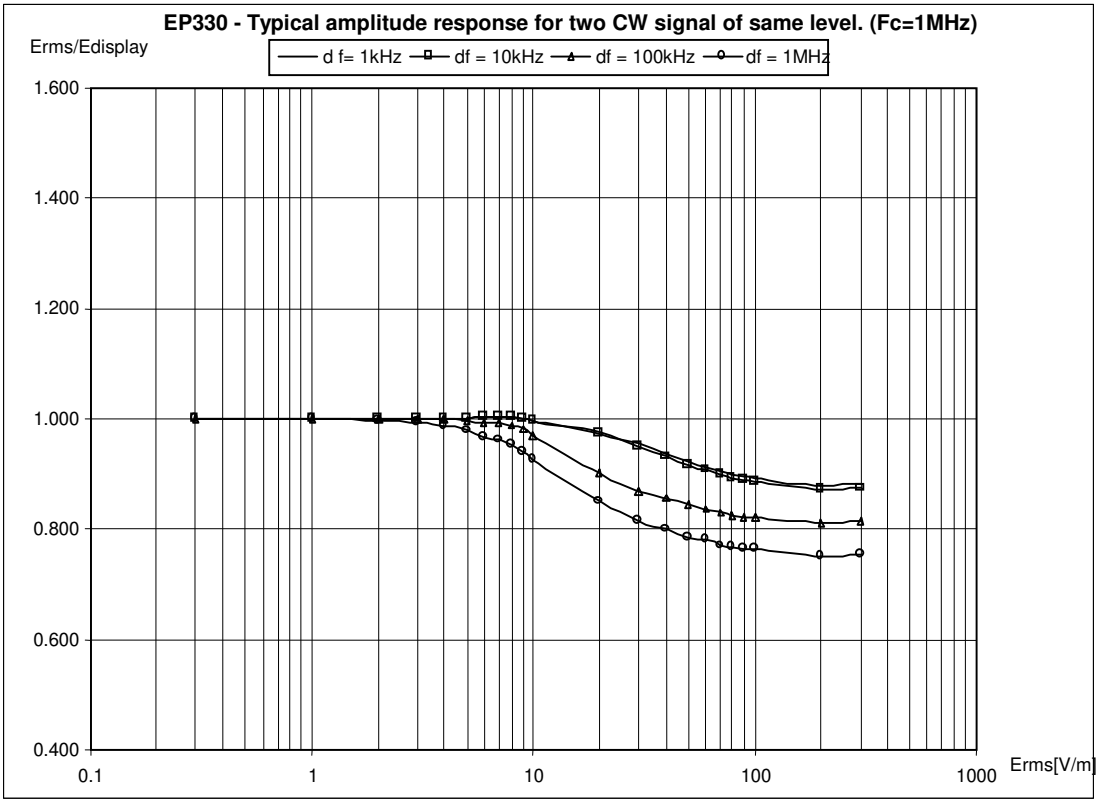



**Fig. 1-22** EP-330 probe

## ELECTRIC FIELD PROBE EP-33M

| | |
|---|---|
| Frequency range | 700 MHz - 3 GHz |
| Level range | 0.3 - 300 V/m |
| Overload | > 600 V/m |
| Dynamic range | > 60 dB |
| Resolution | 0.01 V/m |
| Sensitivity | 0.3 V/m |
| Absolute error @ 930 MHz 20 V/m | ± 1 dB |
| Flatness (900 MHz - 3 GHz) | ± 1.5 dB |
| Isotropicity | ± 0.8 dB (typical ± 0.5 dB @ 930 and 1800 MHz) |
| H-field rejection | > 20 dB |
| Temperature error | 0.05 dB/°C |
| Calibration | Internal into E²PROM |
| Size | 317 mm length, 58 mm diameter |
| Weight | 100 g |

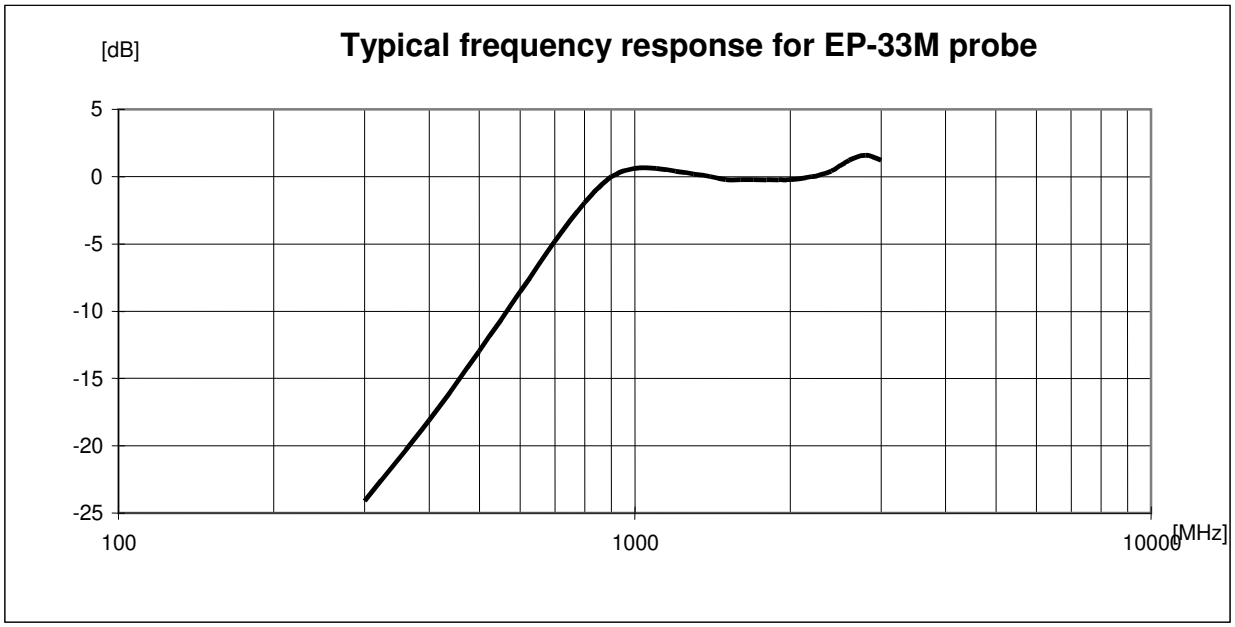



**Fig. 1-23** EP-33M probe

## MAGNETIC FIELD PROBE HP-102

| | |
|---|---|
| Frequency range | 30 - 1000 MHz |
| Level range | 0.01 - 20 A/m |
| Overload | > 40 A/m |
| Dynamic range | > 60 dB |
| Resolution | 1 mA/m |
| Sensitivity | 0.01 A/m |
| Absolute error @ 50 MHz 2 A/m | ± 1 dB |
| Flatness (50 - 900 MHz) | ± 1 dB |
| Isotropicity | ± 0.8 dB (typical ± 0.5 dB @ 930 MHz) |
| E-field rejection | > 20 dB |
| Temperature error | 0.05 dB/°C |
| Calibration | Internal into $E^2$PROM |
| Size | 317 mm length, 58 mm diameter |
| Weight | 110 g |

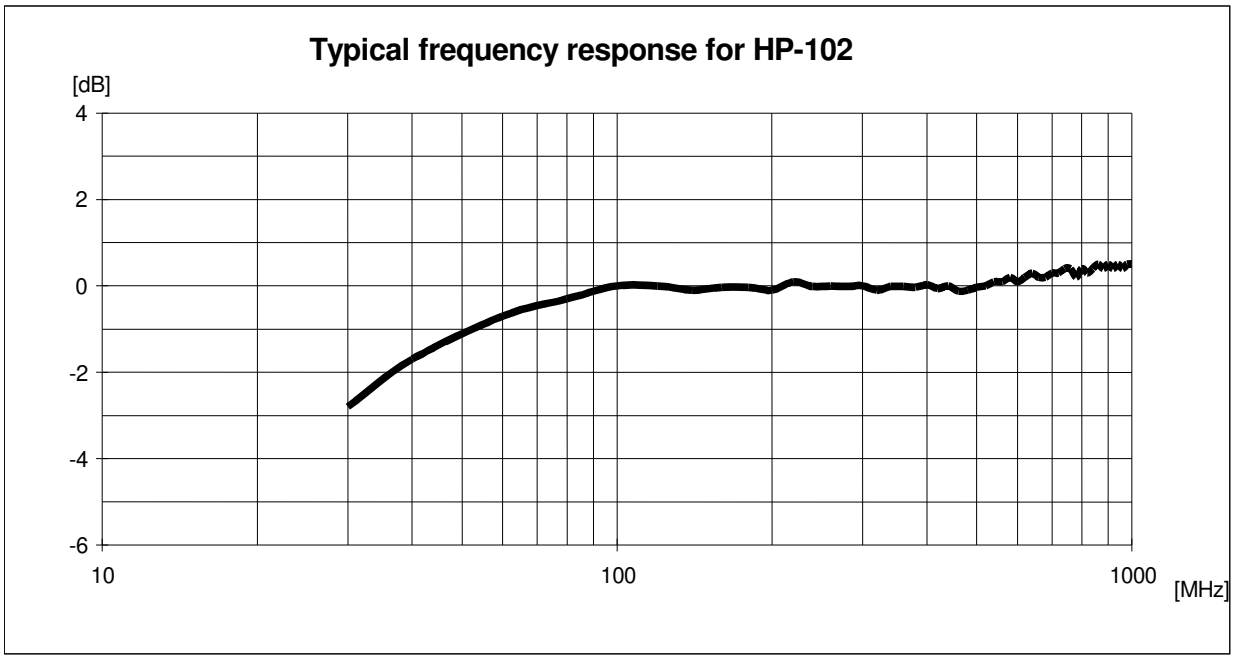



**Fig. 1-24** HP-102 probe

## ELECTRIC FIELD PROBE EP-105

| | |
|---|---|
| Frequency range | 100 kHz - 1000 MHz |
| Level range | 0.05 - 50 V/m |
| Overload | > 100 V/m |
| Dynamic range | > 60 dB |
| Resolution | 0.01 V/m |
| Sensitivity | 0.05 V/m |
| Absolute error @ 50 MHz 6 V/m | ± 0.8 dB |
| Flatness (10 - 300 MHz) | ± 0.5 dB |
| Flatness (300 kHz - 1 GHz) | ± 1 dB |
| Isotropicity | ± 0.8 dB (typical ± 0.5 dB @ 930 MHz) |
| H-field rejection | > 20 dB |
| Temperature error | 0.05 dB/°C |
| Calibration | Internal into E²PROM |
| Size | 350 mm length, 133 mm diameter |
| Weight | 290 g |

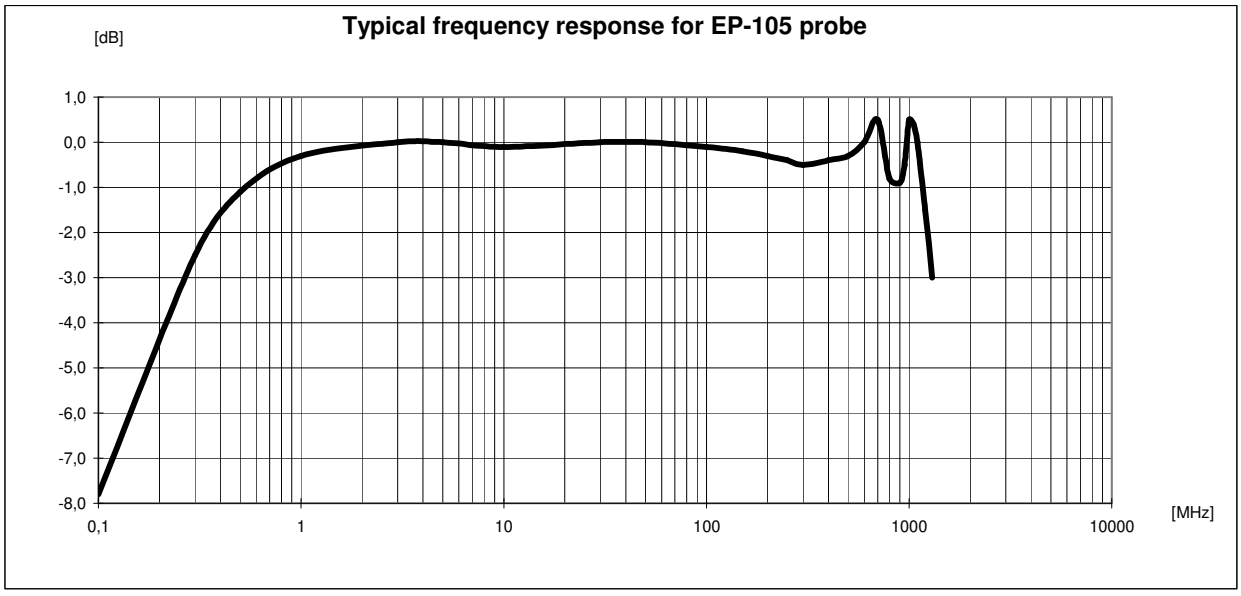



**Fig. 1-25** EP-105 probe

## MAGNETIC FIELD PROBE HP-032

| | |
|---|---|
| Frequency range | 0.1 - 30 MHz |
| Level range | 0.01 - 20 A/m |
| Overload | > 40 A/m |
| Dynamic range | > 60 dB |
| Resolution | 1 mA/m |
| Sensitivity | 0.01 A/m |
| Absolute error @ 1 MHz 2 A/m | ± 1 dB |
| Flatness (1 -25 MHz) | ± 1 dB |
| Isotropicity | ± 0.8 dB (typical ± 0.5 dB @ 1 MHz) |
| E-field rejection | > 20 dB |
| Temperature error | 0.05 dB/°C |
| Calibration | Internal into $E^2$PROM |
| Size | 350 mm length, 133 mm diameter |
| Weight | 400 g |

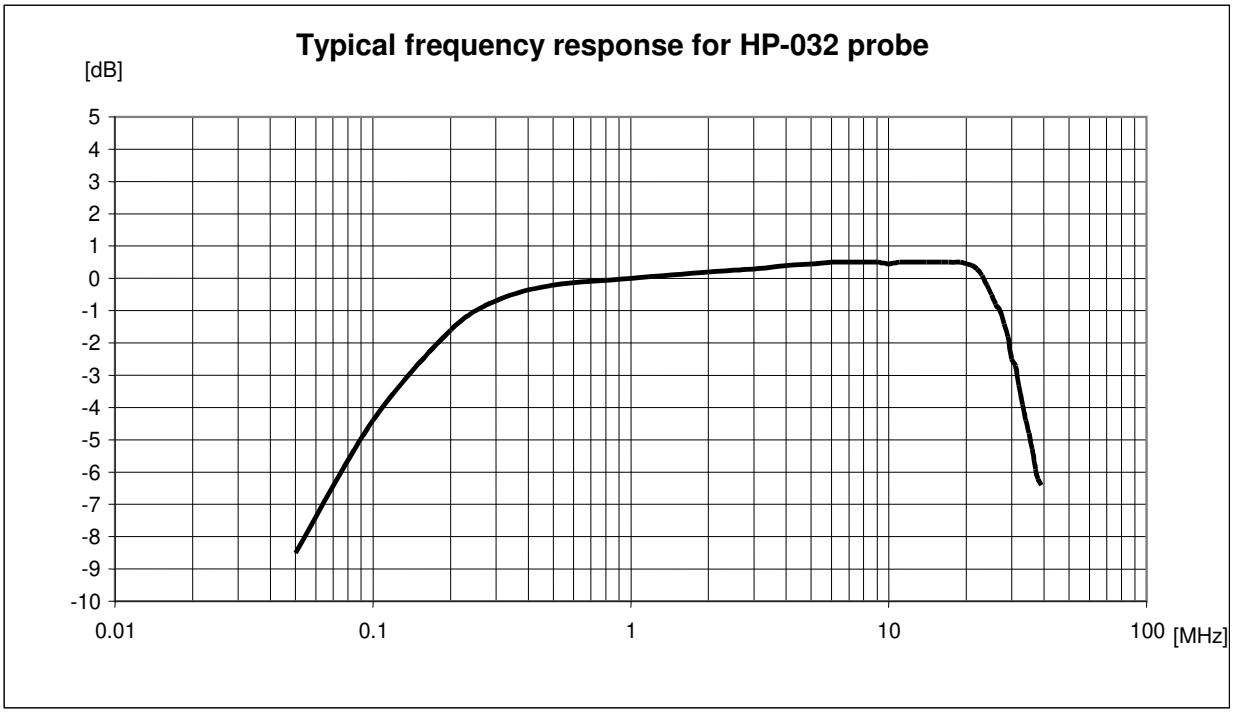



**Fig. 1-26** HP-032 probe

## ELECTRIC FIELD PROBE EP-301

| | |
|---|---|
| Frequency range | 100 kHz - 3 GHz |
| Level range | 1 – 1000 V/m |
| Overload | > 1200 V/m |
| Dynamic range | > 60 dB |
| Resolution | 0.1 V/m |
| Sensitivity | 1 V/m |
| Absolute error @ 50 MHz 20 V/m | ± 0.8 dB |
| Flatness (10 - 300 MHz) | ± 0.5 dB |
| Flatness (3 MHz - 1 GHz) | ± 1.5 dB |
| Isotropicity | ± 0.8 dB (Typical ± 0.5 dB @ 930 and 1800 MHz) |
| H-field rejection | > 20 dB |
| Temperature error | 0.05 dB/°C |
| Calibration | Internal into E²PROM |
| Size | 317 mm length, 58 mm diameter |
| Weight | 100 g |

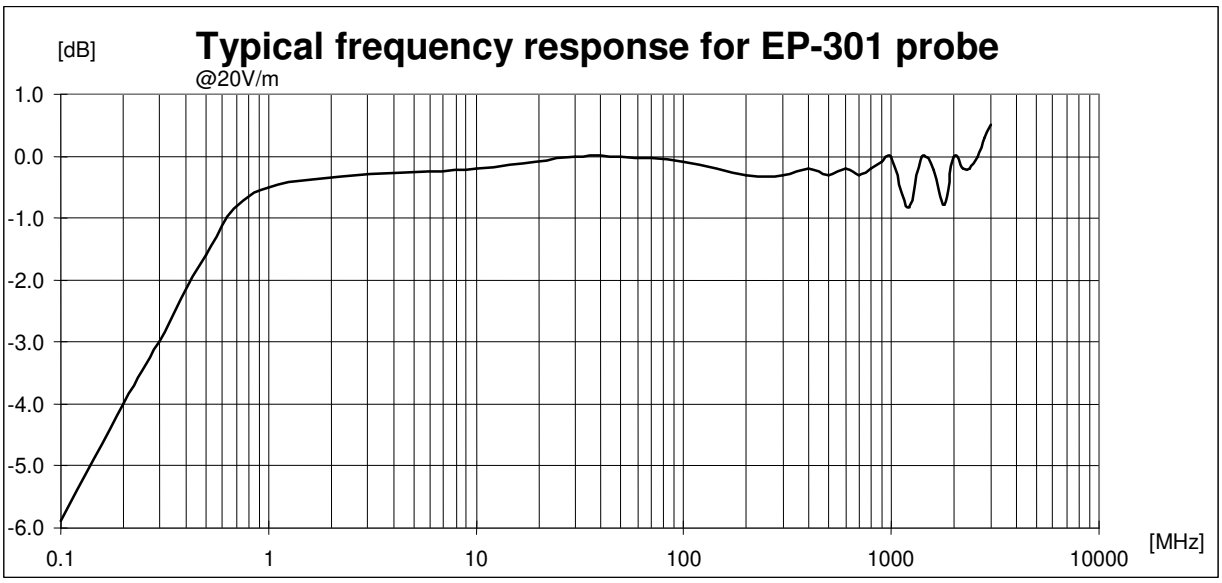



**Fig. 1-27** EP-301 probe

## ELECTRIC FIELD PROBE EP-183

| | |
|---|---|
| Frequency range | 1 MHz - 18 GHz |
| Level range | 0.8 - 800 V/m |
| Overload | > 1200 V/m |
| Dynamic range | > 60 dB |
| Resolution | 0.01 V/m |
| Sensitivity | 0.8 V/m |
| Absolute error @ 200 MHz 6 V/m | ± 0.8 dB |
| Flatness (1 MHz - 1 GHz) | ± 1.5 dB |
| Flatness (1 - 3 GHz) | ± 2.0 dB |
| Flatness (3 - 18 GHz) | ± 2.5 dB |
| Isotropicity @ 200 MHz | ± 0.8 dB (typical ± 0.5 dB @ 930 and 1800 MHz) |
| H-field rejection | > 20 dB |
| Temperature error | 0.02 dB/°C |
| Calibration | Internal into $E^2$PROM |
| Size | 317 mm length, 50 mm diameter |
| Weight | 90 g |

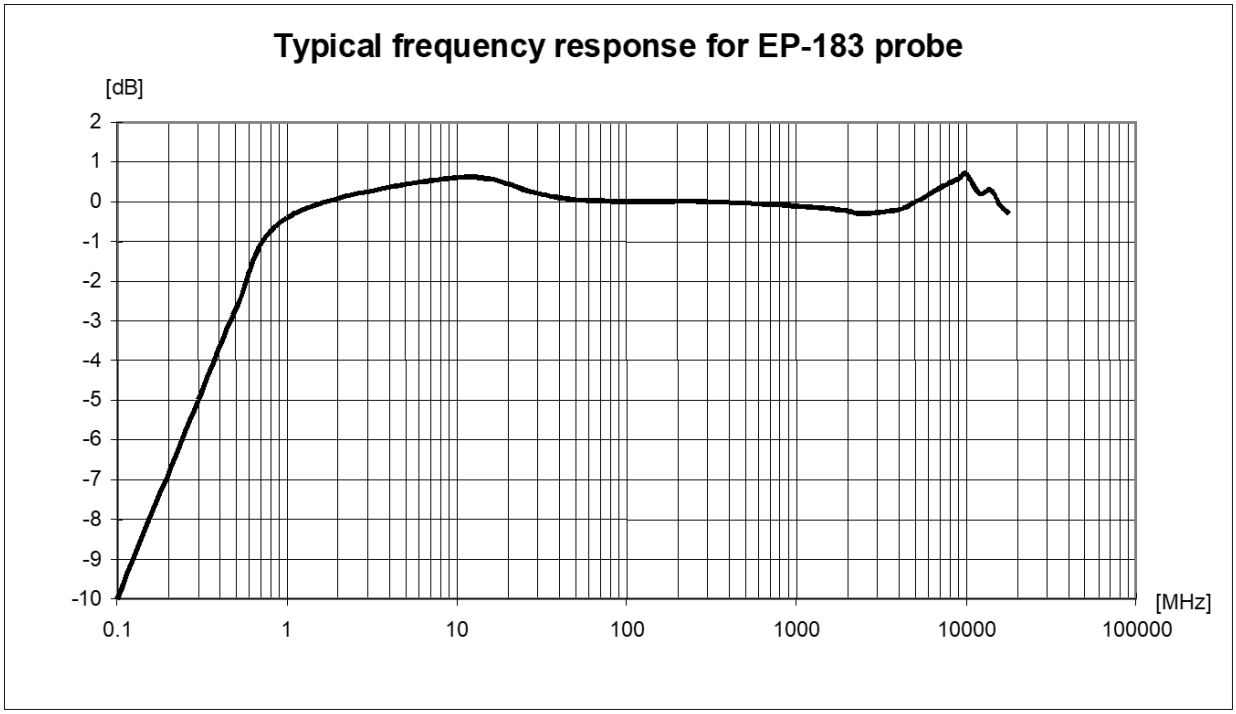



**Fig. 1-28** EP-183 probe

## ELECTRIC FIELD PROBE EP-408

| | |
|---|---|
| Frequency range | 1 MHz - 40 GHz |
| Level range | 0.8 - 800 V/m |
| Overload | > 1000 V/m |
| Dynamic range | > 60 dB |
| Resolution | 0.01 V/m |
| Sensitivity | 0.8 V/m |
| Absolute error @ 200 MHz 6 V/m | ± 0.8 dB |
| Flatness (1 MHz - 1 GHz) | ± 1.5 dB |
| Flatness (1 - 3 GHz) | ± 2 dB |
| Flatness (3 - 18 GHz) | ± 2.5 dB |
| Flatness (18 - 26.5 GHz) | ± 3 dB |
| Flatness (26.5 - 40 GHz) | ± 4 dB |
| Isotropicity @ 200 MHz | ± 0.8 dB (typical ± 0.5 dB @ 930 and 1800 MHz) |
| H-field rejection | > 20 dB |
| Temperature error | 0.02 dB/°C |
| Calibration | internal into E²PROM |
| Size | 317 mm length, 52 mm diameter |
| Weight | 90 g |

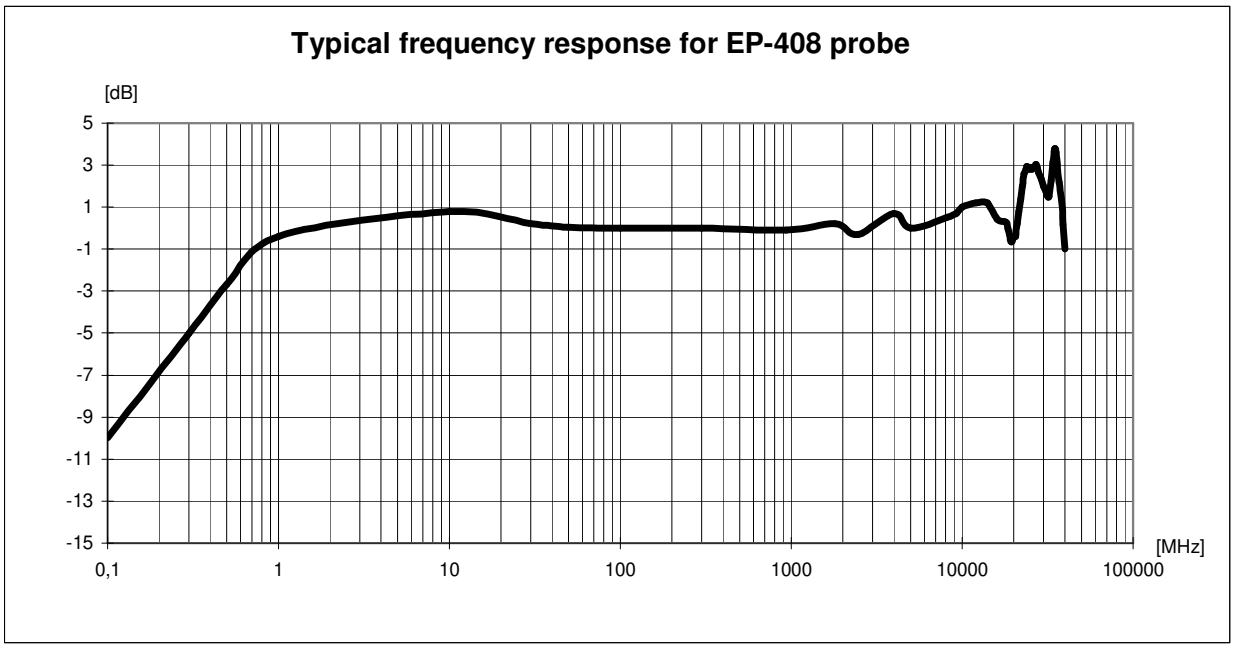



**Fig. 1-29** EP-408 probe

## ELECTRIC FIELD PROBE EP-44M

| | |
|---|---|
| Frequency range | 100 kHz - 800 MHz |
| Level range | 0.25 - 250 V/m |
| Overload | > 500 V/m |
| Dynamic range | > 60 dB |
| Resolution | 0.01 V/m |
| Sensitivity | 0.25 V/m |
| Absolute error @ 50 MHz and 6 V/m | ± 0.8 dB |
| Flatness | |
| (10 MHz - 200 MHz) | ± 1.5 dB (typical ± 0.8 dB) |
| (200 MHz - 800 MHz) | ± 2.0 dB (typical ± 1.5 dB) |
| Isotropicity | ± 0.8 dB (typical ± 0.5 dB @ 740 MHz) |
| Out band attenuation respect to 50 MHz | |
| 900 MHz – 3 GHz | > 12 dB (typical >15 dB) |
| H-field rejection | > 20 dB |
| Temperature error | 0.02 dB/°C |
| Calibration | Internal into $E^2$PROM |
| Size | 317 mm length, 58 mm diameter |
| Weight | 100 g |

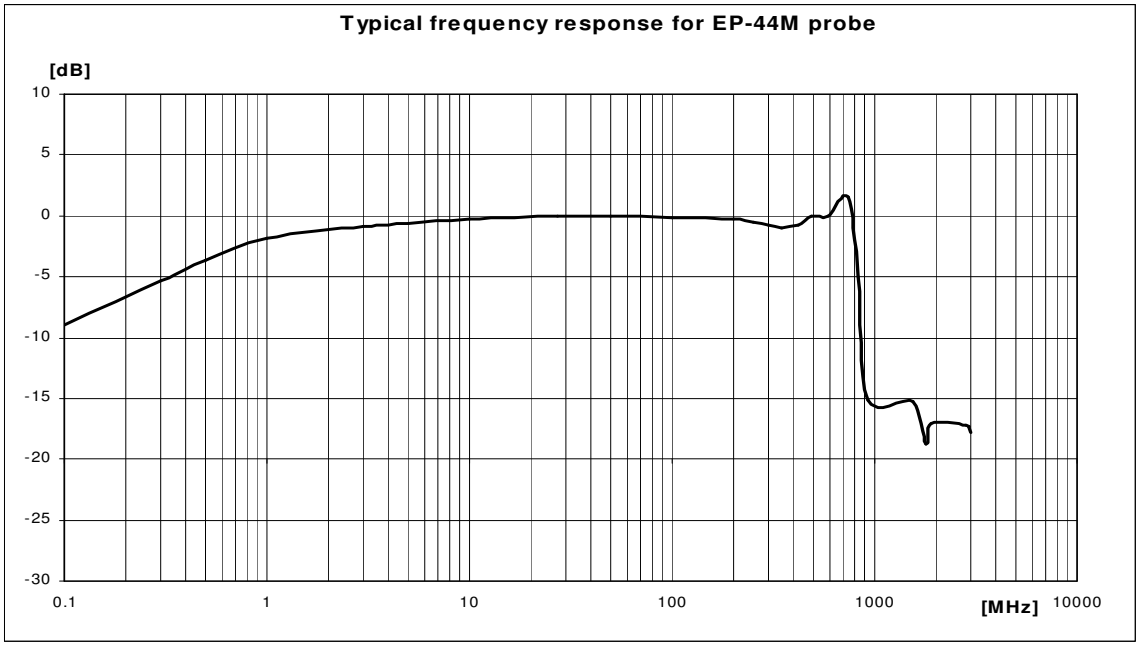



**Fig. 1-30** EP-44M probe

## MAGNETIC FIELD PROBE HP-050

| | |
|---|---|
| Frequency range | 10 Hz – 5 kHz |
| Level range | 10 nT – 40 µT |
| Overload | 400 µT |
| Dynamic range | > 72 dB |
| Resolution | 1 nT |
| Sensitivity | 10 nT |
| Absolute error @ 50 Hz 200 nT 25 °C | ± 0.4 dB |
| Flatness (40 Hz – 1kHz) | ± 1 dB |
| Isotropicity @ 50 Hz 200 nT | ± 0.3 dB |
| Electric field rejection | > 20 dB |
| Temperature error | 0.015 dB/°C |
| Calibration | Internal into E²PROM |
| Size | 350 mm length, 133 mm diameter |
| Weight | 400 g |

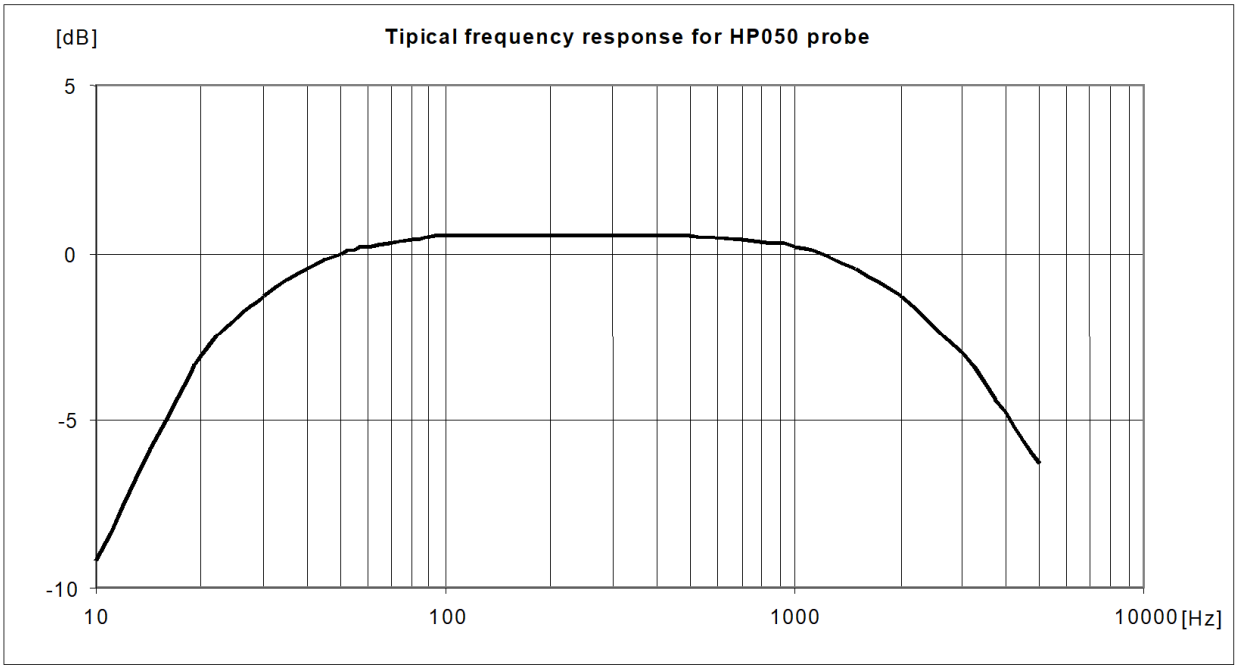



**Fig. 1-31** HP-050 probe

## ELECTRIC FIELD PROBE EP-300

| | |
|---|---|
| Frequency range | 100 kHz - 3 GHz |
| Level range | 0.1 - 300 V/m |
| Overload | > 600 V/m |
| Dynamic range | > 66 dB (typical >70 dB) |
| Resolution | 0.01 V/m |
| Sensitivity | 0.15 V/m (typical >0.1V/m) |
| Absolute error @ 50 MHz 20 V/m | ± 0.8 dB |
| Flatness (10 - 300 MHz) | ± 0.5 dB |
| Flatness (3 MHz - 3 GHz) | ± 1.5 dB |
| Isotropicity | ± 0.8 dB (typical ± 0.5 dB @ 930 and 1800 MHz) |
| H-field rejection | >20 dB |
| Temperature error | 20°C ÷ 60°C = ± 0.1 dB<br>0°C ÷ 20°C = -0.05 dB/°C<br>-20°C ÷ 0°C = -0.15 dB/°C |
| Calibration | Internal into $E^2$PROM |
| Size | 317 mm length, 58 mm diameter |
| Weight | 100 g |

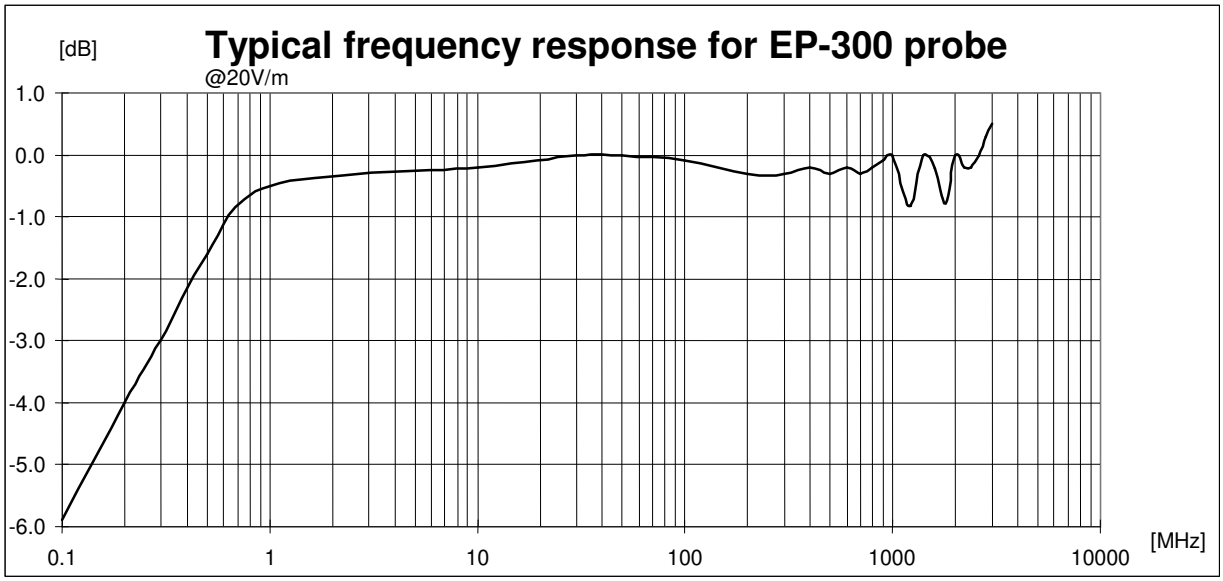
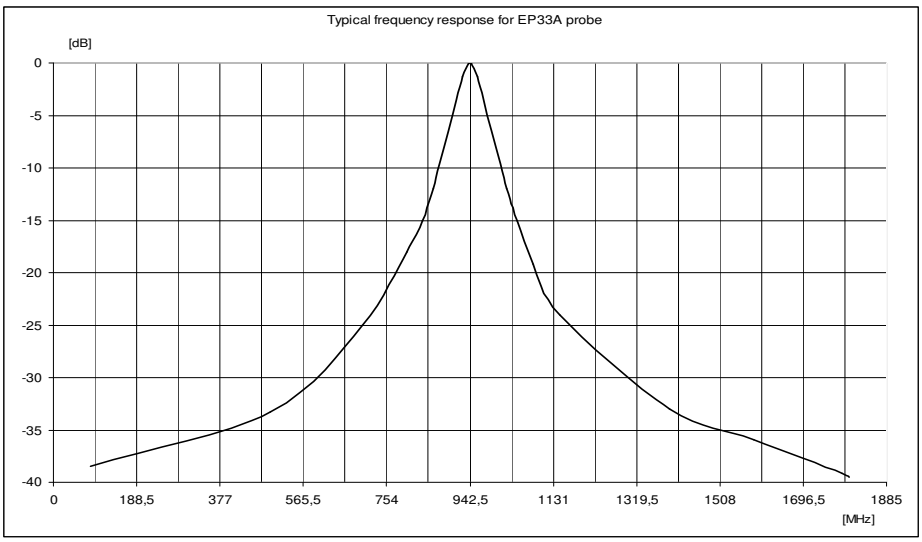
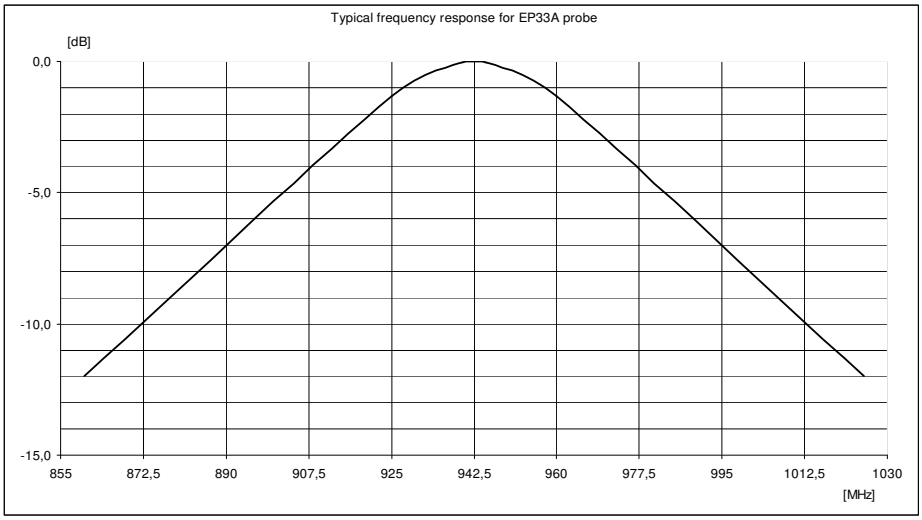


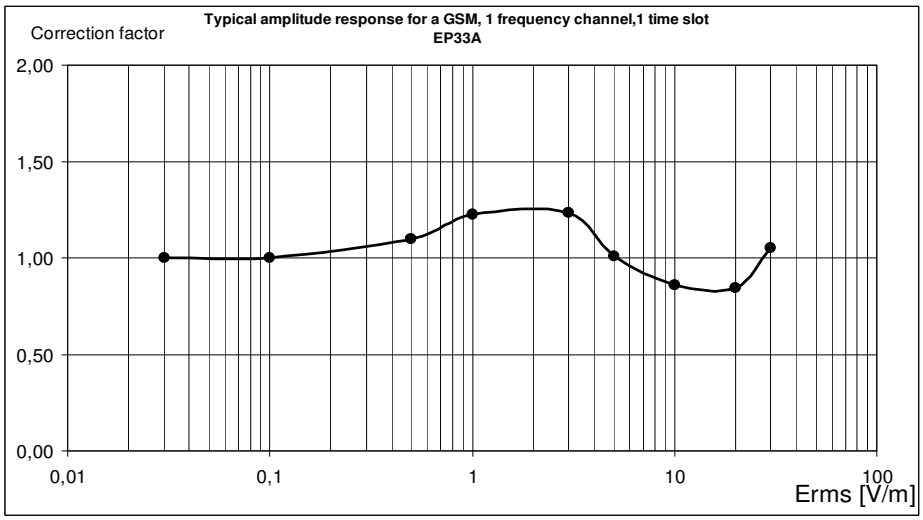

**Fig. 1-32** EP-300 probe

## ELECTRIC FIELD PROBE EP-33A

| | |
|---|---|
| Frequency range | 925 MHz - 960 MHz |
| Level range | 0.03 – 30 V/m |
| Overload | > 120 V/m |
| Dynamic range | > 60 dB |
| Resolution | 0.001 V/m |
| Sensitivity | 0.03 V/m |
| Absolute error @ 942.5 MHz and 2 V/m | ± 1 dB |
| Flatness (925 - 960 MHz) | + 0.2 dB / -1.8 dB |
| OFF Band attenuation respect to 942.5 MHz | |
| 860 MHz | > 10 dB |
| 1025 MHz | > 10 dB |
| Isotropicity | ± 0.8 dB (typical ± 0.5 dB) |
| Rejection to H field | > 20 dB |
| Temperature error | 0°C ÷ 60°C = ± 0.2 dB |
| | -20°C ÷ 0°C = -0.1 dB/°C |
| Drift Frequency Vs Temperature | 40°C ÷ 60°C = ± 100 kHz |
| | -20°C ÷ 40°C = -100 kHz/°C |
| Calibration | $E^2$PROM internal |
| Size | 317 mm length, 58 mm diameter |
| Weight | 100 g |





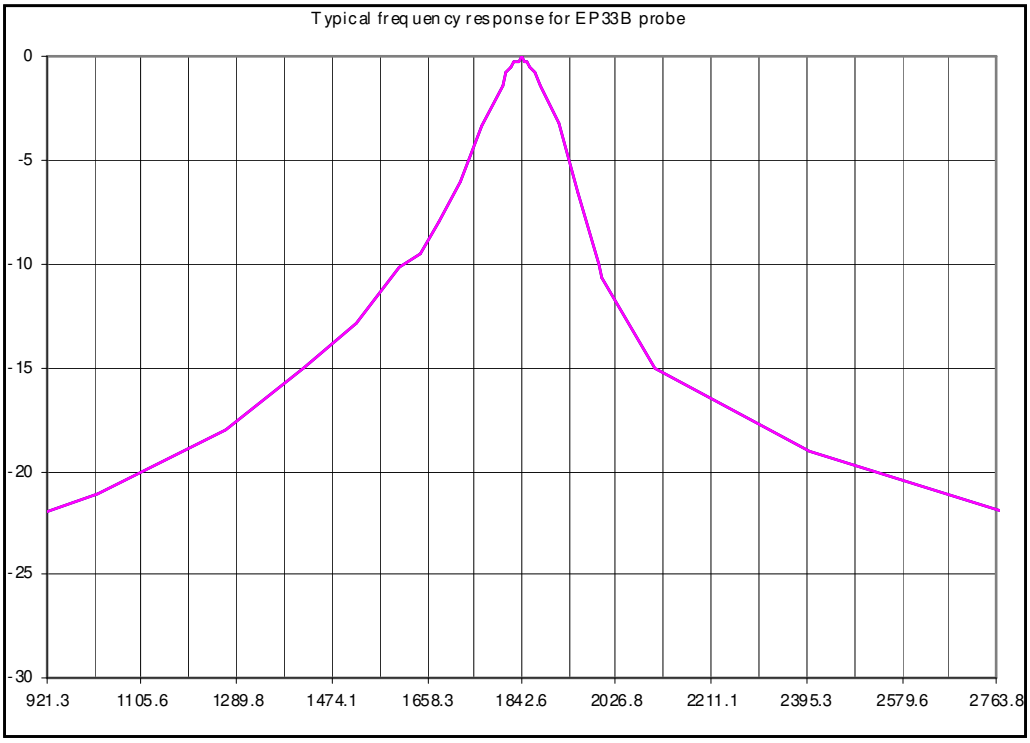

NOTE

**This test is carried out with a signal currently used in laboratory for maximize the reading error to make a comparison of the performances of the probe with a common base.**
**Actually the radiobase station use eight time slots of each channel so the effective error of the measurement is negligible.**

**Fig. 1-33** EP-33A probe

## ELECTRIC FIELD PROBE EP-33B

| | |
|---|---|
| Frequency range | 1805 MHz – 1880 MHz |
| Level range | 0.03 – 30 V/m |
| Overload | > 120 V/m |
| Dynamic range | > 60 dB |
| Resolution | 0.001 V/m |
| Sensitivity | 0.03 V/m |
| Absolute error @ 1842.5 MHz and 2 V/m | ± 1 dB |
| Flatness (1805 - 1880 MHz) | + 0.2 dB / -1.8 dB |
| OFF Band attenuation respect to 1842.5 MHz | |
| 1580 MHz | > 10 dB |
| 2010 MHz | > 10 dB |
| Isotropicity | ± 0.8 dB (typical ± 0.5 dB) |
| Rejection to H field | > 20 dB |
| Temperature error | 0°C ÷ 60°C = ± 0.2dB |
| | -20°C ÷ 0°C = -0.1 dB/°C |
| Drift Frequency Vs Temperature | 40°C ÷ 60°C = ± 100 kHz |
| | -20°C ÷ 40°C = -100 kHz/°C |
| Calibration | E²PROM internal |
| Size | 317 mm length, 58 mm diameter |
| Weight | 100 g |



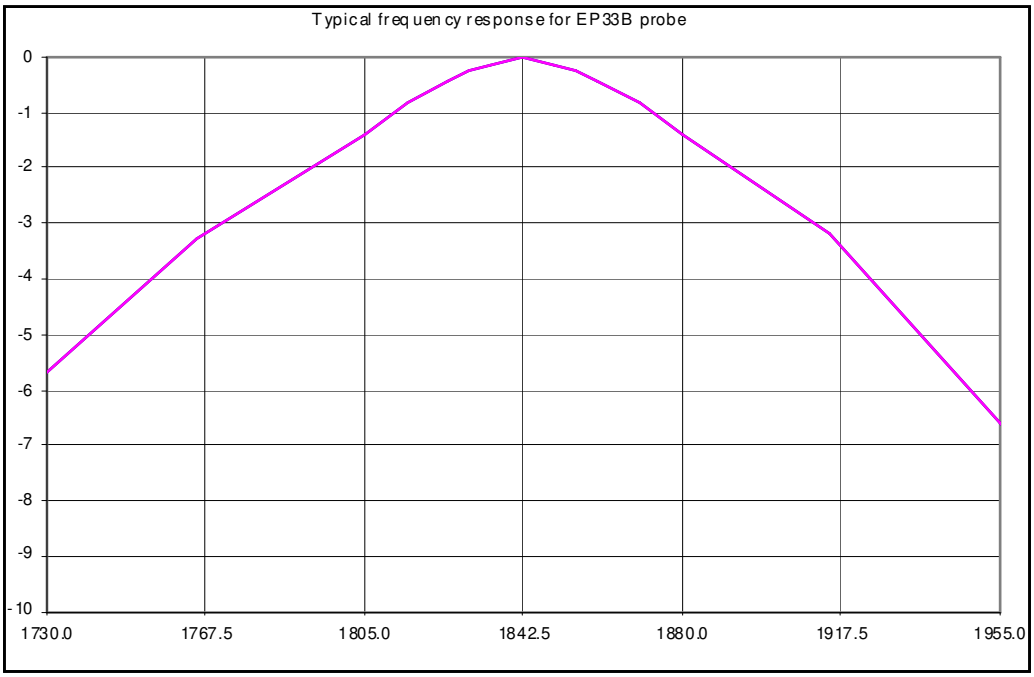
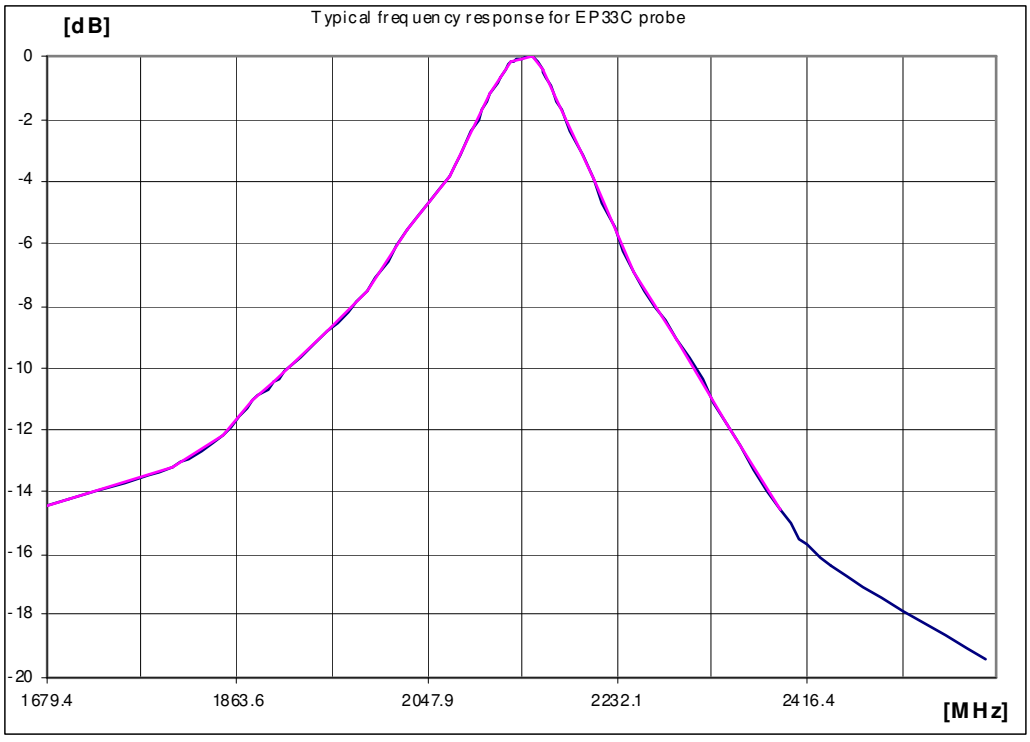



**Fig. 1-34** EP-33B probe

## ELECTRIC FIELD PROBE EP-33C

| | |
|---|---|
| Frequency range | 2110 MHz – 2170 MHz |
| Level range | 0.03 – 30 V/m |
| Overload | > 120 V/m |
| Dynamic range | > 60 dB |
| Resolution | 0.001 V/m |
| Sensitivity | 0.03 V/m |
| Absolute error @ 2140 MHz and 2 V/m | ± 1 dB |
| Flatness (2110 - 2170 MHz) | + 0.2 dB / -1.8 dB |
| OFF Band attenuation respect to 2140 MHz | |
| 1880 MHz | > 10 dB |
| 2320 MHz | > 10 dB |
| Isotropicity | ± 0.8 dB (typical ± 0.5 dB) |
| Rejection to H field | > 20 dB |
| Temperature error | 0°C ÷ 60°C = ± 0.2dB |
| | -20°C ÷ 0°C = -0.1 dB/°C |
| Drift Frequency Vs Temperature | 40°C ÷ 60°C = ± 100 kHz |
| | -20°C ÷ 40°C = -100 kHz/°C |
| Calibration | E²PROM internal |
| Size | 317 mm length, 58 mm diameter |
| Weight | 100 g |



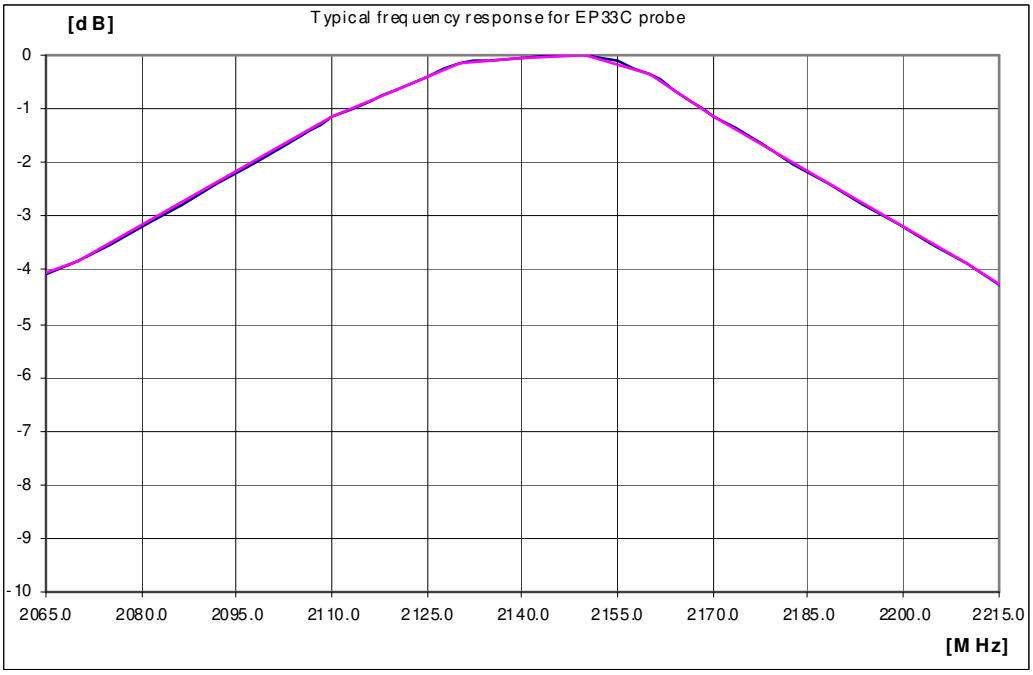



**Fig. 1-35** EP-33C probe

## MAGNETIC FIELD PROBE HP-051

| | |
|---|---|
| Frequency range | 10 Hz – 5 KHz |
| Level range | 50 nT – 200 µT |
| Dynamic range | > 72 dB |
| Overload | 400 µT |
| Resolution | 1 nT |
| Sensitivity | 50 nT |
| Absolute error @ 50 Hz - 3 µT - 25°C | ± 0.4 dB |
| Flatness @ 40 Hz – 1 KHz | ± 1 dB |
| Isotropicity @ 50 Hz – 3 µT | ± 0.3 dB |
| Electric field rejection | > 20 dB |
| Calibration | Internal into $E^2$PROM |
| Temperature error | 0.015 dB/°C |
| Size | 350 mm length, 133 mm diameter |
| Weight | 400g |

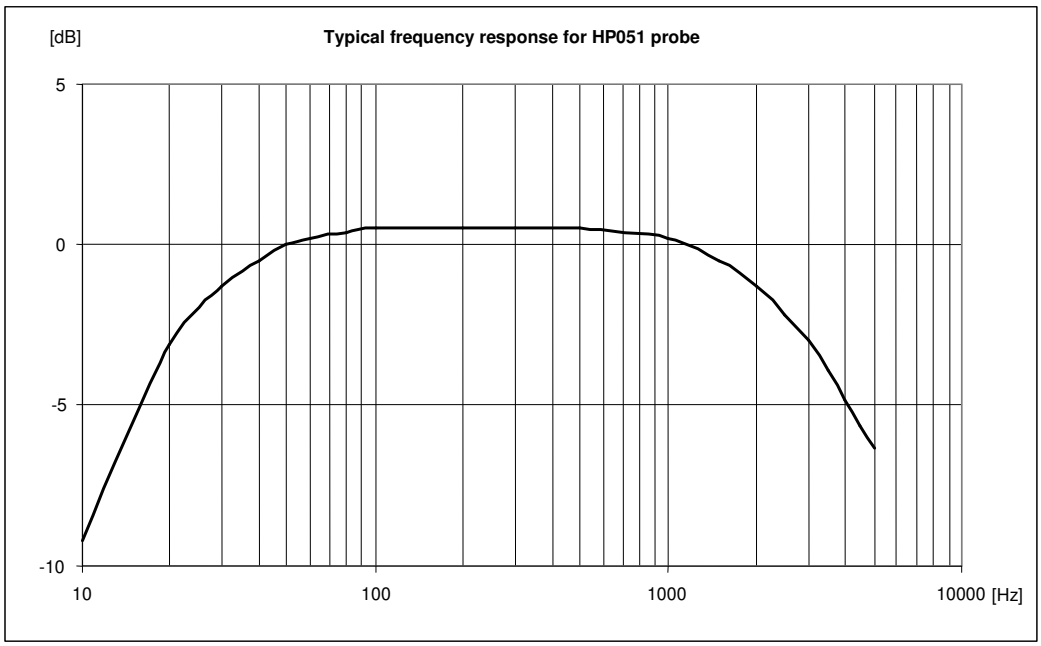
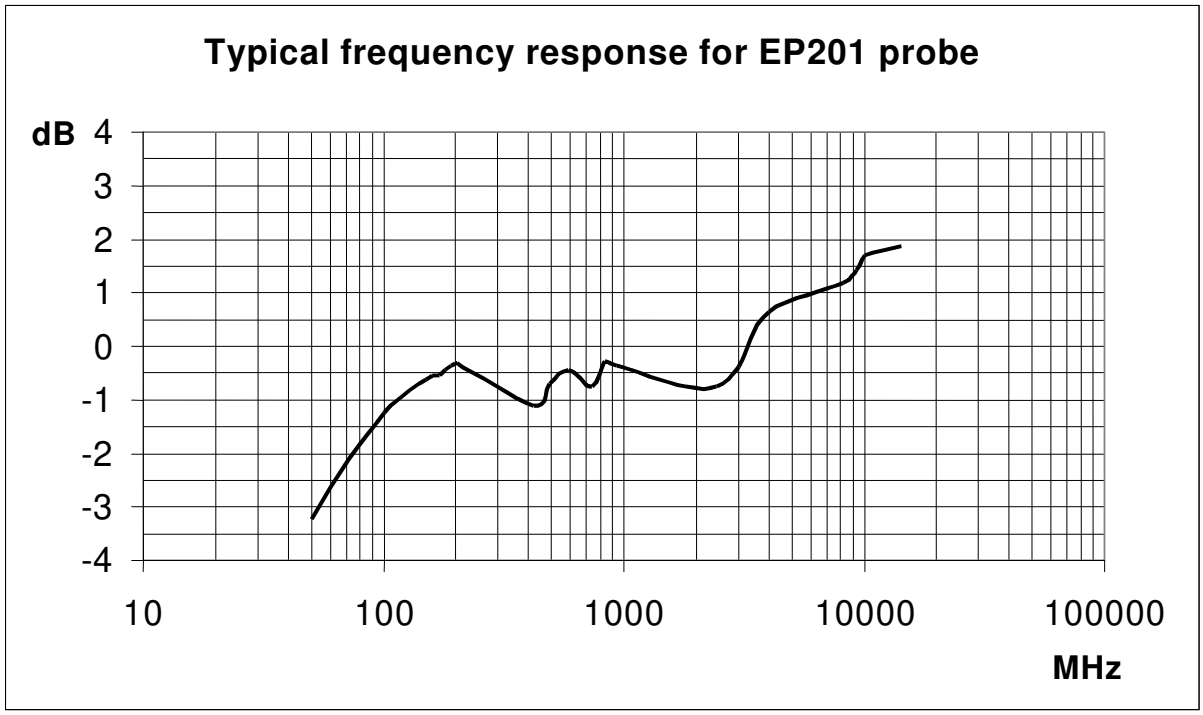



**Fig. 1-36** HP-051 probe

## ELECTRIC FIELD PROBE EP-201

| | |
|---|---|
| Frequency range | 60 MHz – 12 GHz |
| Level range | 3 – 500 V/m |
| Overload | > 1000 V/m |
| Dynamic range | > 45 dB |
| Resolution | 0.1 V/m |
| Sensitivity | 8 V/m (instantaneous measurement with filter 10 Hz)<br>3 V/m (RMS or AVG 30 sec with filter 10 Hz) |
| Flatness @ 40 V/m | ± 1.5 dB (150 MHz – 9.25 GHz)<br>± 3 dB (60 MHz – 12 GHz) |
| Isotropicity @ 40 V/m @ 200 MHz | ± 0.6 dB |
| H-field rejection | > 20 dB |
| A/D Conversion | one converter for every axis |
| Calibration | On board EEPROM |
| Microcontroller | On board |
| Volume sensor | 3 mm diameter sphere |
| Size tube | 180mm length x 4 mm diameter |
| Size | 300 mm length x 18 mm diameter |
| Weight | 85 g |



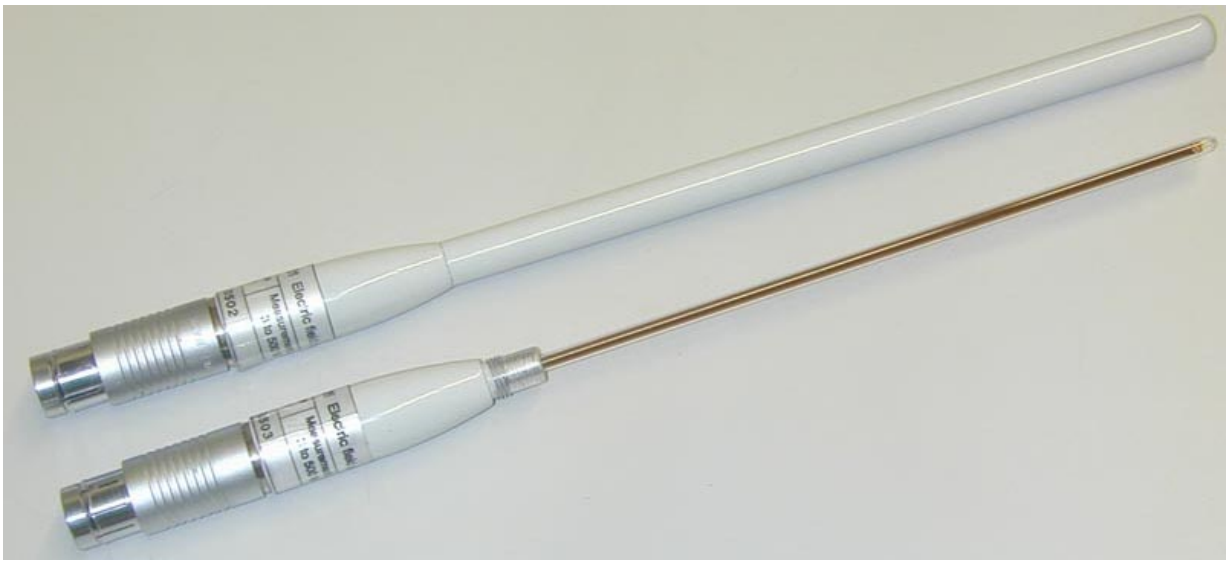


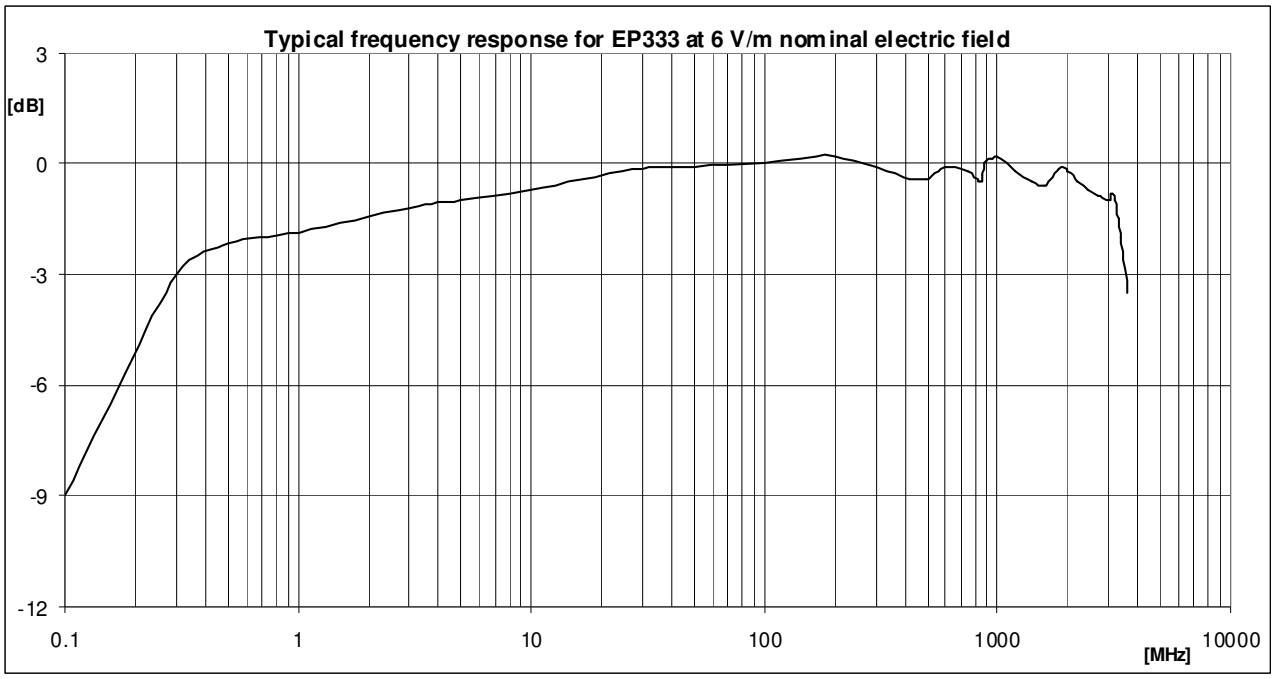
**Fig. 1-37** EP-201 probe

NOTE

**A more accurate measurement with EP333 and EP201 probes is achieved setting the filter to 10Hz.**

# ELECTRIC FIELD PROBE EP-333 TRUE RMS

| | |
|---|---|
| Frequency range | 0.1 – 3600 MHz |
| Level range | 0.15 – 300 V/m |
| Overload | 600 V/m |
| Dynamic range | > 66 dB |
| Resolution | 0.01 V/m |
| Sensitivity | 0.15 V/m |
| Flatness | 0.3 MHz – 3500 MHz 3.0 dB<br>3.5 MHz – 3200 MHz 1.5 dB<br>20 MHz – 500 MHz 0.75 dB |
| Isotropicity | 0.8 dB (typical 0.5 dB) |
| H-field rejection | > 20 dB |
| Calibration | On board EEPROM |
| Temperature error | 20°C ÷ 60°C ±0.1 dB<br>0°C ÷ 20°C -0.05 dB/°C<br>-20°C ÷ 0°C -0.15 dB/°C |
| Size | 385 mm length 133 mm diameter |
| Weight | 293 g. |



The EP-333 has been developed for RMS measurement of digital signals with high crest factor for which traditional diode detectors tend to overestimate.
It is a particular diodes based detector circuital configuration that allows high sensitivity compared to the RMS termocouple detectors.
Tests on COFDM signal (FFT8k, Constellation 64QAM, Crest factor 13dB, guard interval 1/32) have shown that the overestimation is less than 0.5 dB up to 75 V/m on the entire frequency range of the probe.

NOTE

**A more accurate measurement with EP333 and EP201 probes is achieved setting the filter to 10Hz.**

**Fig. 1-38** EP-333 probe

## ELECTRIC FIELD PROBE EP-645

| | |
|---|---|
| Frequency range | (0.1) 0.3 – 6500 MHz |
| Level range | 0.35 – 450 V/m |
| Overload | 900 V/m |
| Dynamic range | > 62 dB |
| Resolution | 0.01 V/m |
| Sensitivity | 0.35 V/m |
| Flatness | 3 MHz – 10 MHz 1.5 dB<br>10 MHz – 1000 MHz 1.0 dB<br>1000 MHz – 3000 MHz 1.5 dB<br>3000 MHz – 5500 MHz 2.5 dB |
| Isotropicity | 0.8 dB (typical 0.5 dB) |
| H-field rejection | > 20 dB |
| Calibration | On board EEPROM |
| Temperature error | 20°C ÷ 60°C ±0.1 dB<br>0°C ÷ 20°C -0.05 dB/°C<br>-20°C ÷ 0°C -0.15 dB/°C |
| Size | 317 mm length 58 mm diameter |
| Weight | 100 g. |

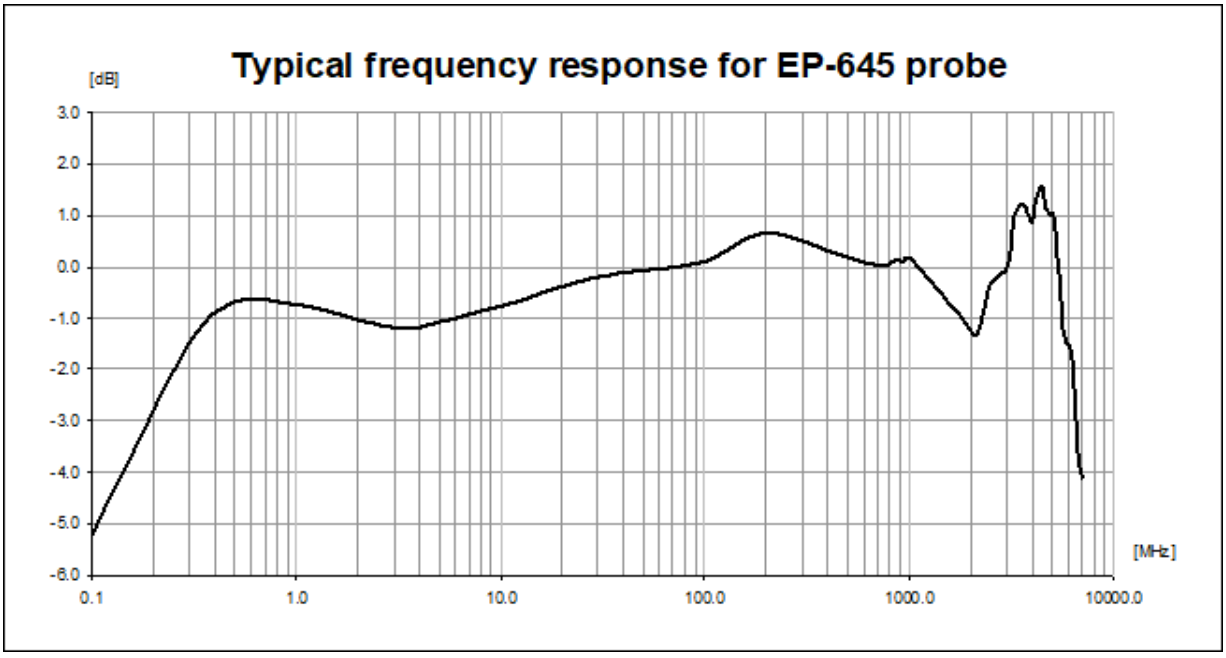



**Fig. 1-39** EP-645 probe

## ELECTRIC FIELD PROBE EP-745

| | |
|---|---|
| Frequency range | 0.1 – 7000 MHz |
| Level range | 0.35 – 450 V/m |
| Overload | 900 V/m |
| Dynamic range | > 62 dB |
| Resolution | 0.01 V/m |
| Sensitivity | 0.35 V/m |
| Flatness | 3 MHz – 10 MHz 1.5 dB<br>10 MHz – 1000 MHz 1.0 dB<br>1000 MHz – 3000 MHz 1.5 dB<br>3000 MHz – 6000 MHz 2.5 dB |
| Isotropicity | 0.8 dB (typical 0.5 dB) |
| H-field rejection | > 20 dB |
| Calibration | On board EEPROM |
| Temperature error | 20°C ÷ 60°C ±0.1 dB<br>0°C ÷ 20°C -0.05 dB/°C<br>-20°C ÷ 0°C -0.15 dB/°C |
| Size | 317 mm length 58 mm diameter |
| Weight | 100 g. |

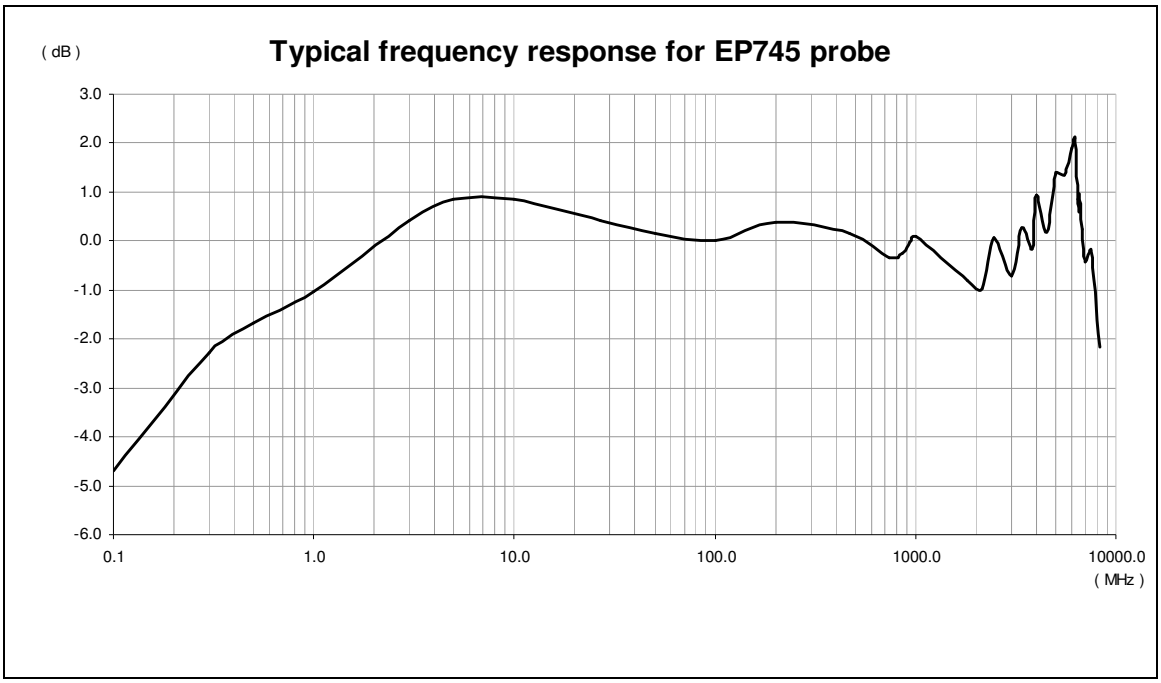



**Fig. 1-40** EP-745 probe

# 2 - Installation and use

## 2.1 Introduction

This section provides the information required for installing and using the LR-01 Programmable Logger Repeater.
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.

**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.**

NOTICE

**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
- Humidity — < 95% relative

The repeater 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
- Humidity — < 95% relative

## 2.4 Return for repair

When the repeater 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 panels.
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 repeater.

NOTICE

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

## 2.6 LR-01 Installation

Turn off the LR-01 and insert the LR01-8053 or LR01-8059 Adapter in the Logger Repeater multipole connector, paying attention to the position key and tightening the bayonet joint. Connect the proper probe into the adapter (taking care of the red dot alignment in the 8053 probes).


**For further information about the use of LR-01 with Probes Manager software, please refer to the chapter 3, 4 and 5 of this Manual.**


**The BLE connection is available only for Android and iOS device through the LR-01 Manager App. For further information see Chapter 7 and 8.**
**To active the Bluetooth communication on the LR01 the user must connect the repeater to Narda Probe Manager software and enable the BLE function (see §4.2.7.2 Bluetooth connection).**


**Correct readings may be conditioned by the nature of the places in which the repeater 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 unit.**
**Whenever possible, it is a good rule to install the unit 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.**


**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.**


**The probe used with the LR-01 have highly sensitive components. Do not insert the probe in fields which exceed the maximum limit allowed.**


**In order to avoid interference and the risk of influencing measurements with internal RF module signals (BLE and Wi-Fi), the LR-01 has been specially designed so that detections are taken when these devices are not radiating.**


**Prior to installing LR-01 where the WiFi connection is planned to be used, make sure that the point at which the repeater 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 repeater along its vertical axis to face the Antenna toward to the point self.**

### 2.6.1 LR-01 Installation with Fiber optic cable

Connect the supplied fiber optic to the **OPTIC LINK** connector 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.


**Fig. 2-1** LR-01 link with USB-OC adapter

NOTE

**The USB-OC standard accessory connected to the LR-01 allows a 40m maximum fiber length; the standard length supplied is 10 m.**

NOTE

**Please, always use the supplied optical fiber.**

### 2.6.2 LR-01 Installation with USB cable

Turn off the LR-01, connect the supplied USB cable to the USB connector. Plug the other side of the cable to PC port.

**Fig. 2-2** LR-01 link with USB cable

NOTE

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

NOTE

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

### 2.6.3 LR-01 installation with Wi-Fi connection


**Fig. 2-3** LR-01 link with Wi-Fi communication

### 2.6.4 LR-01 installation with BLE connection


**Fig. 2-4** LR-01 link with Bluetooth communication

## 2.7 LR-01 on, Led status, Manual log button, Buzzer and Accelerometer


Turn on LR-01 by pushing the red **POWER** button for a short while.
The Data LED will show the following sequence, while the instrument performs a diagnostic test to check everything is working properly: briefly flash **green**, then goes **off**, then lights up **red** and then becomes **orange**; after that it begins **flashing green**, to indicate the instrument is ready to Log or communicate.
Afterwards the led will provide the following information:

**TABLE 2-1 Led status**

| LED | LED flashing speed | LED color | Description |
|---|---|---|---|
| **DATA** | Medium speed | Red | Probe not detected |
| | Solid | Orange | Loading probe |
| | Medium speed | Green | Probe loaded and read with a rate equal to the flashing period |
| | - | Off | Not expected with unit turned on |
| **POWER** | Medium speed | Green | Powered by USB with battery charge completed |
| | Medium speed | Orange | Powered by USB with battery under charging |
| | Medium speed | Red | Powered by internal battery, which is almost discharged |
| | - | Off | Powered by internal battery, sufficiently charged |
| **VISUAL LED** | Solid | Red | Update firmware or Alarm or Warning threshold exceeded. If the log is in progress, the LED goes off for one second during the log.<br>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 **Pressing the POWER down button for more than 4 seconds forces the hardware of the apparatus to shut down. Then, it is necessary to wait some seconds before switching it on again.**

NOTE **LR-01 automatically turns OFF when after 30 min. the fiber optic has been disconnected or the communication with PC is not established.**

NOTE **The fiber optic of the LR-01 can be disconnected and reconnected while in use. The communication will be restarted automatically.**

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

| Table 2-2 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).<br>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).<br>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 from the rear panel where indicated by the icon.

| Table 2-3 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 2-4 Accelerometer axes orientation**

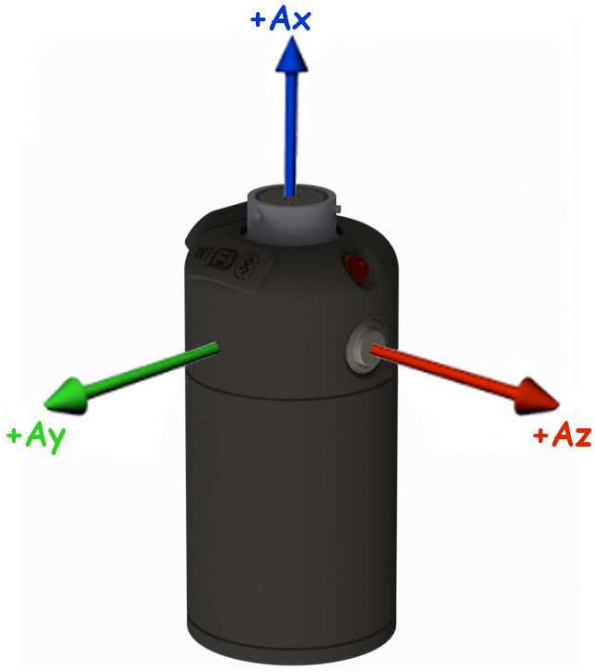



**Fig. 2-5** Accelerometer axes orientation

## 2.8 Power supply and battery recharging

LR-01 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 Logger Repeater for longest battery operation time.

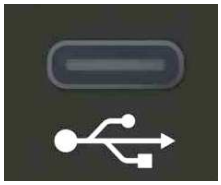

The battery status is reported by the Probes Manager software and displayed in Volt and in percentage. It shows the residual autonomy during measurements and the achieved autonomy during charging



**ALWAYS connect the battery charger to the power supply BEFORE connecting it to the LR-01.**
**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 repeater will turn OFF automatically.**


**The time required for recharging the batteries is about 2,5 hours. When the recharge is complete, this is indicated by the Power Led of the LR-01, with a blinking green light.**


**To take reliable measurements, it is advisable to ALWAYS remove the battery charger from LR-01.**

## 2.9 LR-01 Applications

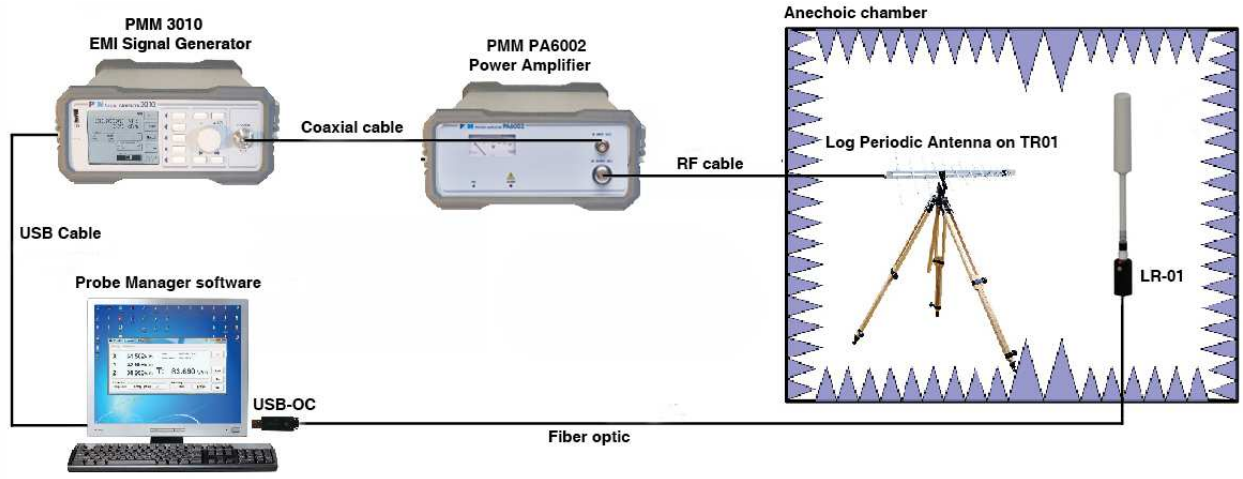



**Fig. 2-6** Typical Immunity test irradiation configuration

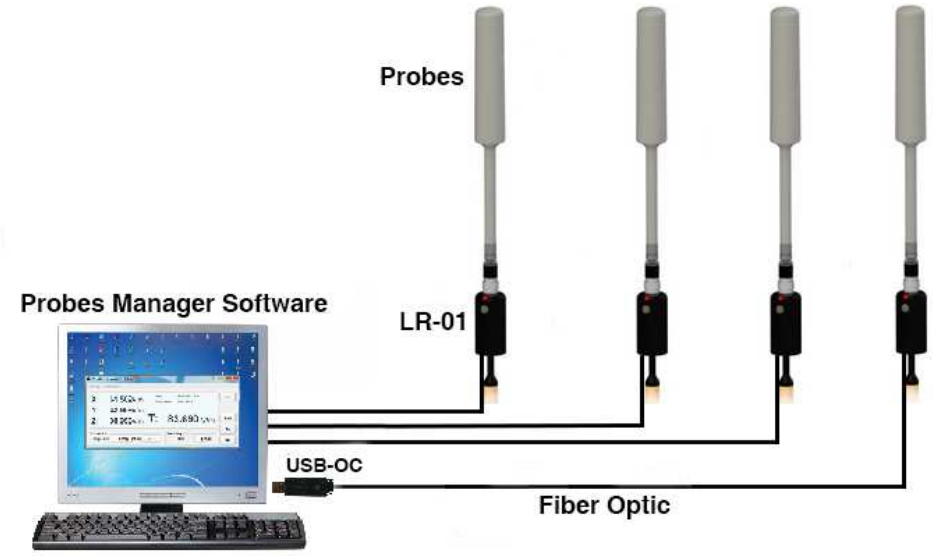



**Fig. 2-7** LR-01 in a multi-probe configuration

NOTE

**For further information about the use of LR-01 with Probes Manager software, please refer to the chapter 3, 4 and 5 of this Manual.**

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# 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 LR-01 programmable Logger Repeater.

The Probes Manager is a software instrument that integrates the LR-01 Logger Repeater 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

NOTE

**To obtain firmware or program updates for LR-01, please contact your NARDA distributor or download it directly from the NARDA Web site http://www.narda-sts.it**

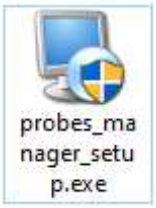
## 3.3 Installation

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

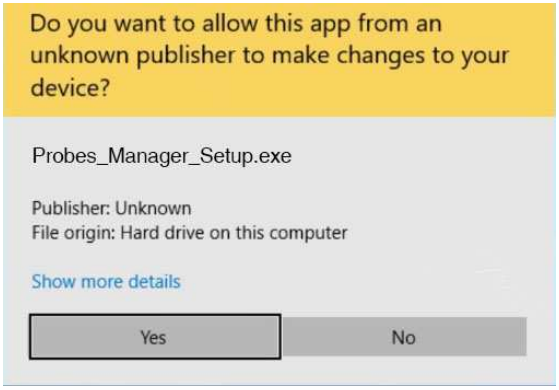
NOTE

**Do not connect the LR-01 to the PC until the installation is completed.**

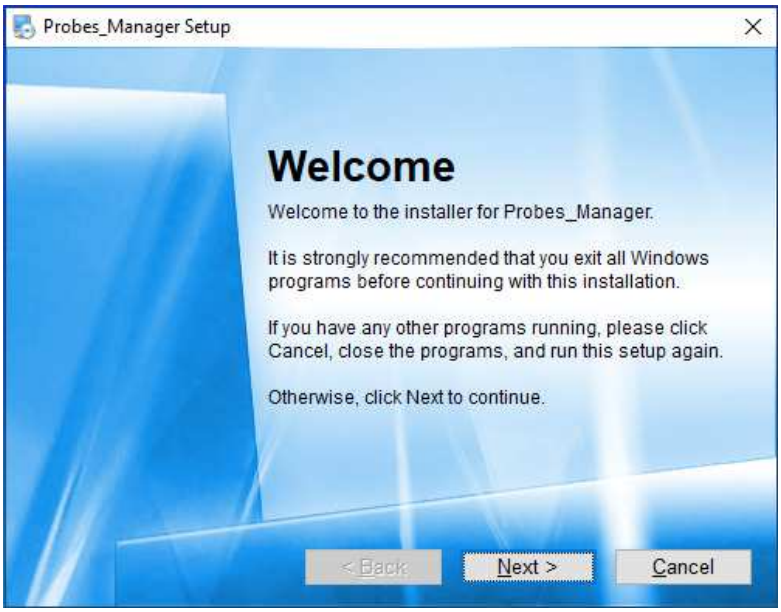
Browse the Software Media in Computer Resources and double click on the Probes Manager Setup.exe file to start the installation



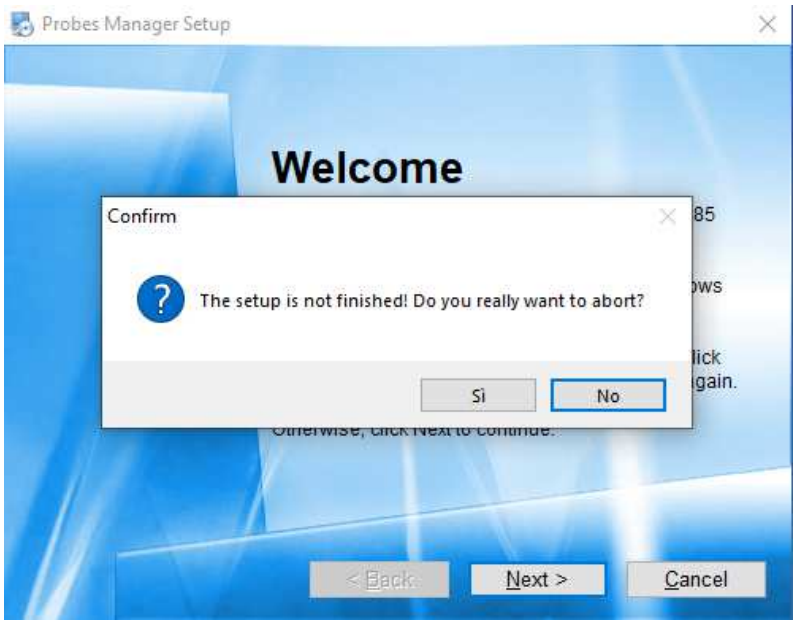

Click Yes when requested.



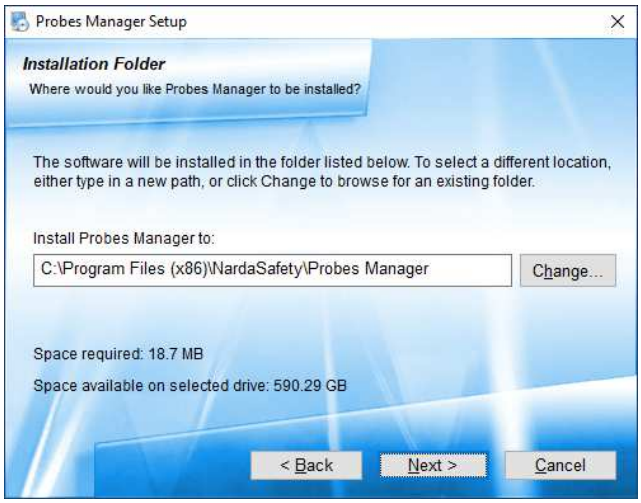
Click **Next** to proceed installing.

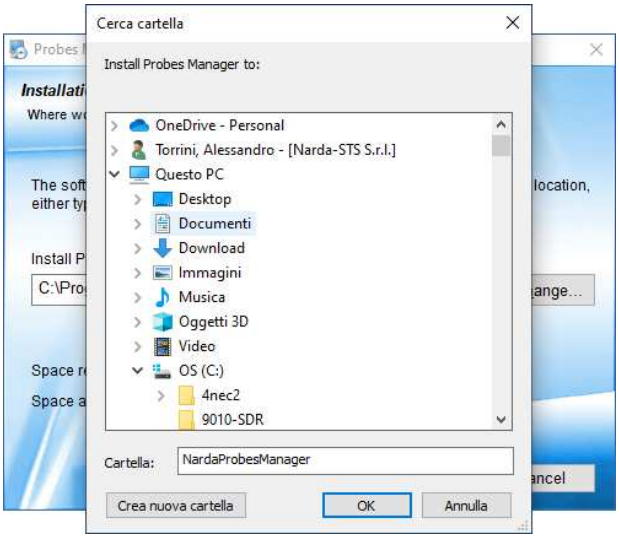



The installation can be aborted by clicking **Cancel** button:

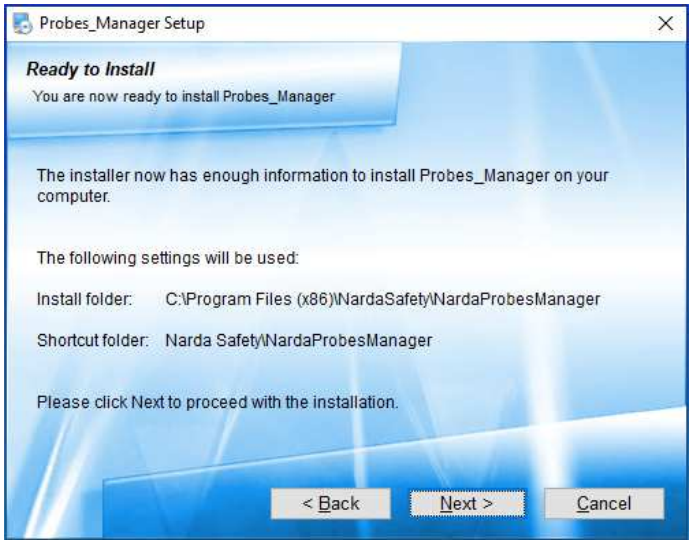


Click **Next** to confirm the default folder or **Change** to modify.

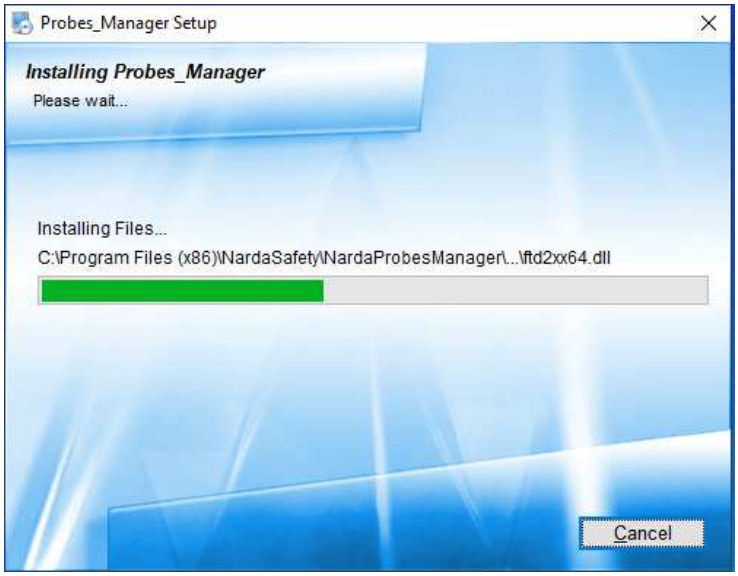


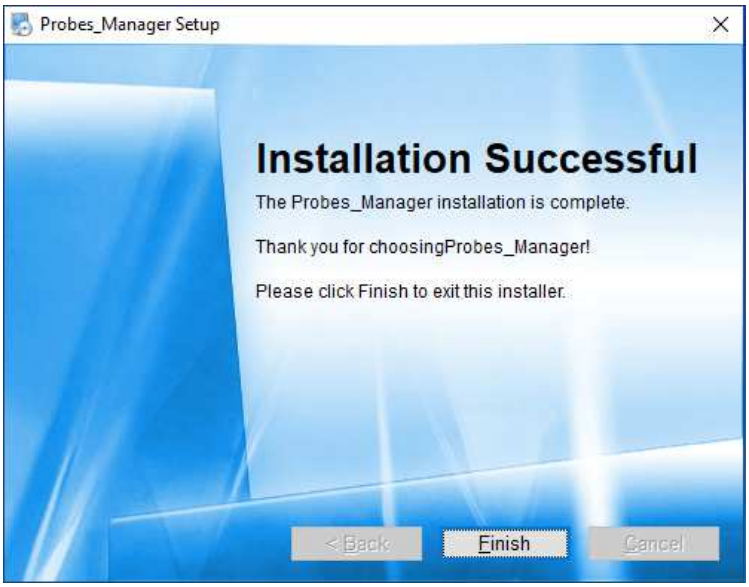

Click **Next** to proceed installing.



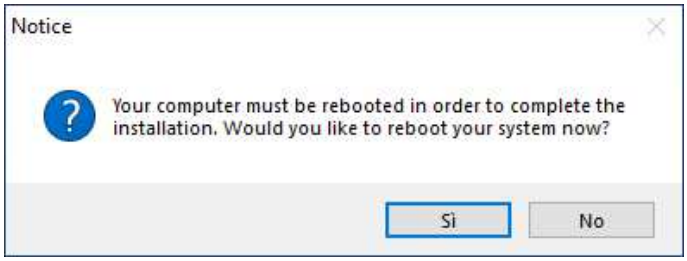
The installing status is displayed then:




Click **Finish** to complete and exit the installer.




When asked for, reboot your system to complete installation



The folder **Probes Manager** is created under **Programs\Narda Safety** with **Probes Manager** (see Chapter 4) and **LR-01UP** (see Chapter 5) 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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# 4 – Probes Manager Operating instructions

## 4.1 Introduction

This section provides the information necessary to use the Probes Manager software with the LR-01 programmable Logger Repeater.

NOTE **To obtain firmware or program updates for LR-01, please contact your NARDA distributor or download it directly from the NARDA Web site http://www.narda-sts.it**

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

NOTE **If the attempt to communicate over any of the available channels (fiber optic, Wi-Fi, USB or Ethernet) was not successful, the LR-01 will automatically switch off after about 30 minutes to preserve the battery charge.**

NOTE **The LR-01 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 7 and 8.**

NOTE **Ethernet connection is available only for SMARTS AMC models.**

At the first connection, connect the LR-01 to PC via optical or wired connection (see §2.6), switch the unit on, check the Led status (see §2.7) and click the **Probes Manager** icon on desktop.


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

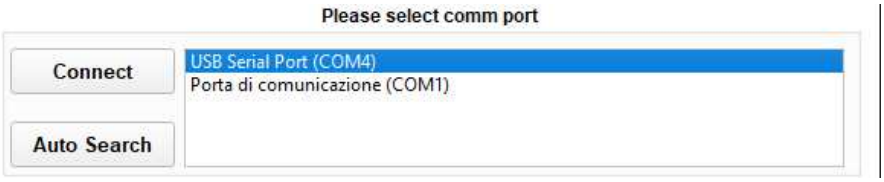
This window is displayed:


- If the LR-01 is connected to PC via USB wired connection, the device appears as "**Serial USB device (COMn)**".

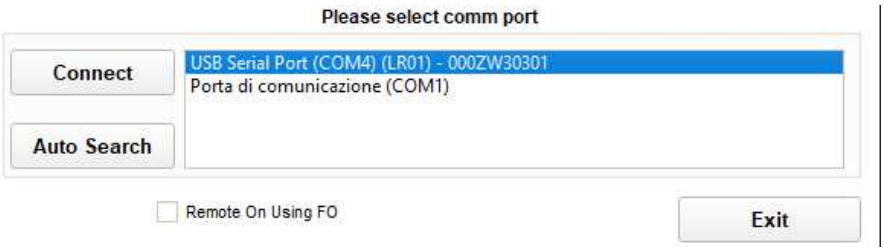
- If the LR-01 is connected to PC via optical connection (through USB-OC), the device appears as "**USB Serial Port (COMn)**".

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 repeater on the list port with its serial number.

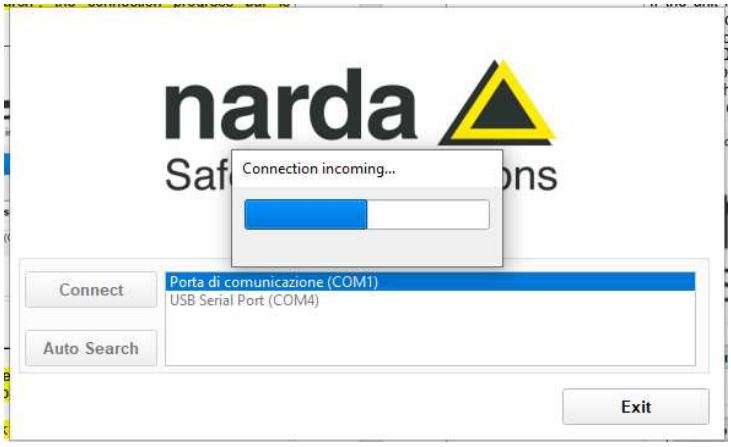


Instead, using the "**Auto Search**" button the software automatically detects the COM port to which LR01 is connected, display the repeater on the list port with its serial number and, in case of using fiber optic connection, enable the **Remote On using FO** box

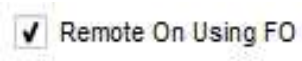
NOTE

If the LR-01 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 repeater 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 unit on the site to be monitored, run the software, tick √ the **Remote On using FO** box, press **Connect** to switch on the LR-01 and open the software.

☑ 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 LR-01 is switched on again, the module will return in the same condition since the wireless is enable.

☑ Ethernet

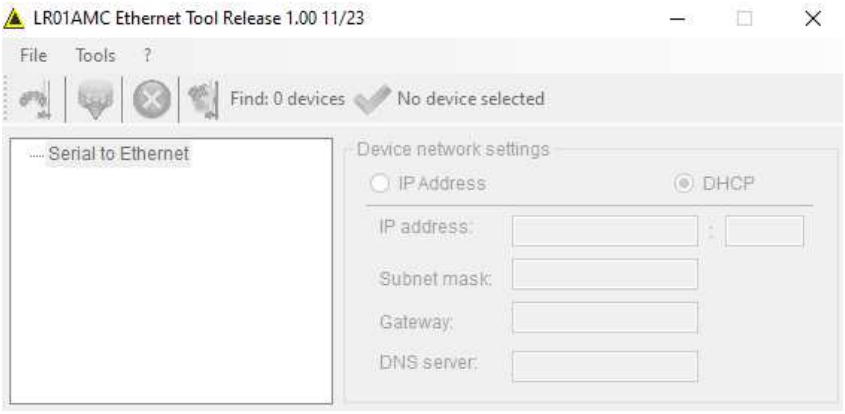
Ethernet communication is available only for SMARTS AMC solution.
Place the Area Monitor Compact on the site to be monitored, run the software, tick √ **Ethernet** box, press **Connect** to start the communication.


The image above showed the default Ethernet parameters. Using button **Read** and **Write** is possible check and set the parameters in the unit.

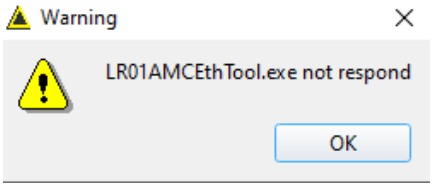
NOTE

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

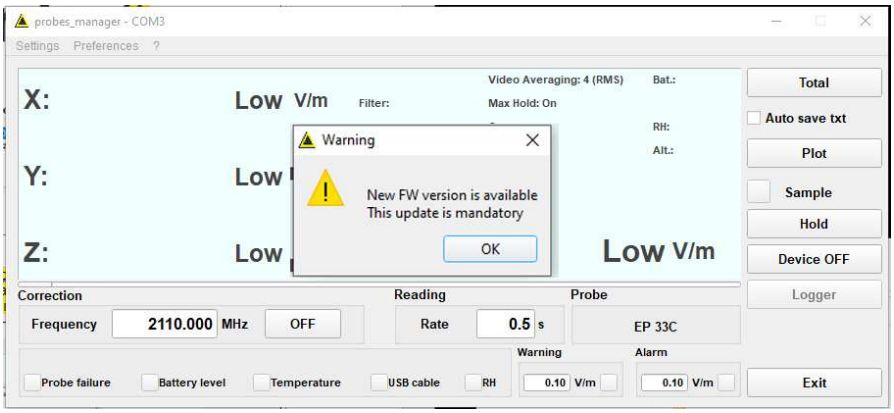
The Ethernet tool enables the communication between PC and device.




If Ethernet cable is not properly connected or the parameters are wrong 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 5 Update Firmware.

## 4.2 Probe manager control window

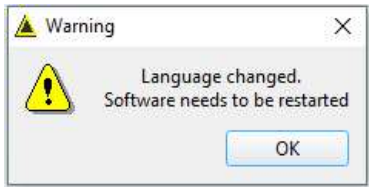

Commands description:

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. Total/XYZ readings
11. Auto save txt/csv function
12. Plot (graph view)
13. Sample indication
14. Hold/Run readings
15. Button to turns off the unit, exit and quit the program
16. Logger settings
17. Exit and quit the program (LR-01 remains on)

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

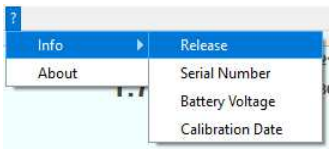
### 4.2.1 Languages


- Select the desired language under **Preferences** tab → **Languages**. A confirmation message will be display:

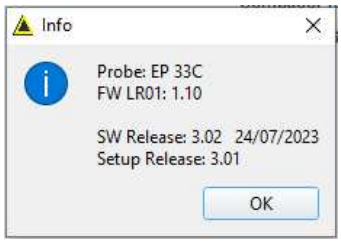



Confirm with **OK** and restart the software with the new language.

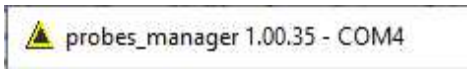
### 4.2.2 Release



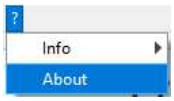

- Make sure the latest software and setup release are installed on the PC and the latest firmware is stored on LR-01. Click on **?** tab → **Info** → **Release**.




The software release is also available on the title bar with the COM port connected to the LR-01.

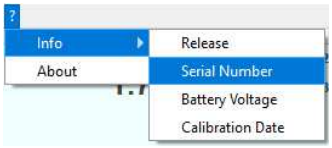



### 4.2.3 About



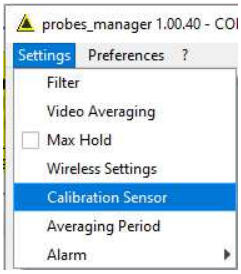

Manufacturer information is included on **?** tab → **About**


### 4.2.4 Serial number

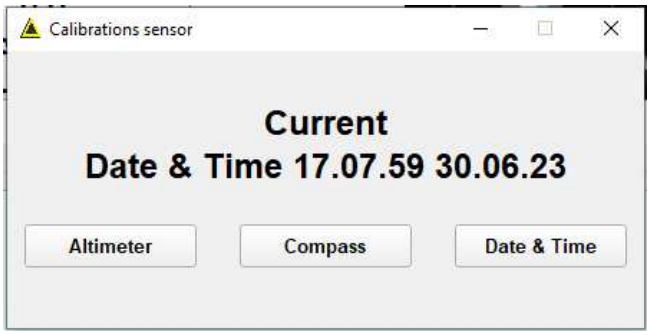



For the LR-01 Serial number click on **?** tab → **Info** → **Serial Number**

### 4.2.5 Calibrations sensor




- Set to zero the internal **Altimeter** reference, calibrate the internal **Compass** for more location accuracy and synchronized the LR-01 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.**

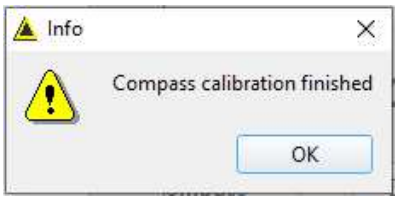
To set to zero the internal Altimeter, click on **Altimeter.** A confirmation message will be display:

### 4.2.5.2 Compass

Compass

To improve the LR-01 location accuracy, the user must calibrate the compass clicking on **Compass**.
While holding the LR-01 and following the method shown on screen, move the repeater 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.




The Optic link 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

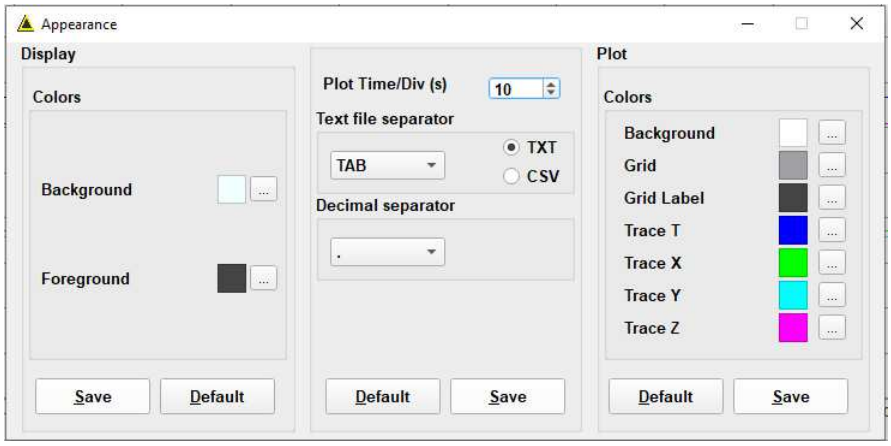
To transfer the current date of the PC to the station, click on **Date&Time.** A confirmation message will be display:

### 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**.

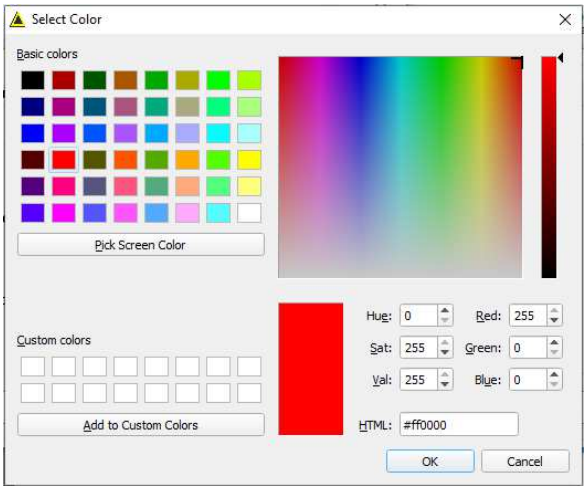
This command is also used to set horizontal scale of the graph (**Plot Time/Div**), save measurements in .TXT or .CSV format (**TXT**/**CSV**), define column (**Text file separator)** and decimal separator (**Decimal separator**).


It is suggested to export in csv format with "**;**" text file separator for a data alignment even more precise.

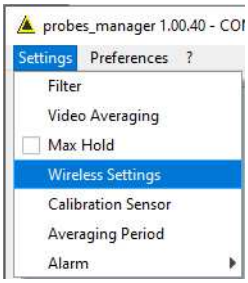
The corresponding button 

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.

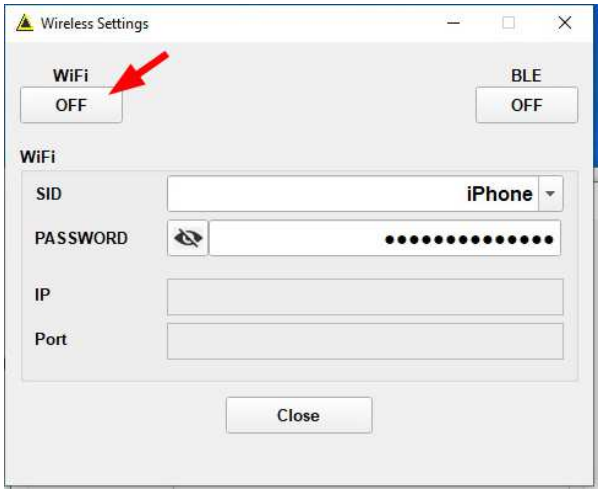
### 4.2.7 Wireless settings



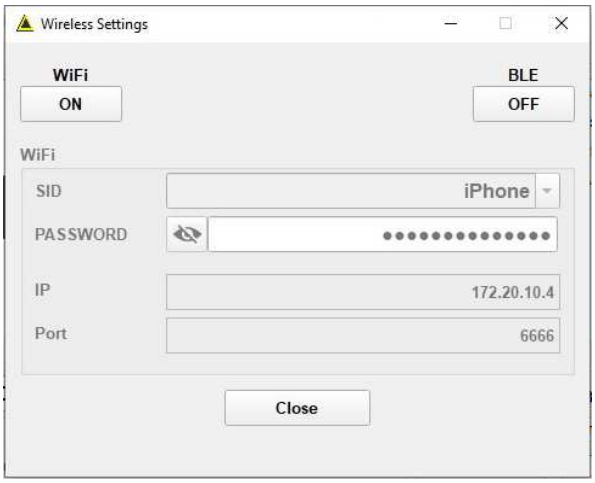

- Enable or disable the **Wifi** or **Bluetooth** communication on the LR-01 under **Wireless settings** tab.

To enable the **WiFi** connection on the LR-01:
- 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

#### 4.2.7.1 Wifi connection

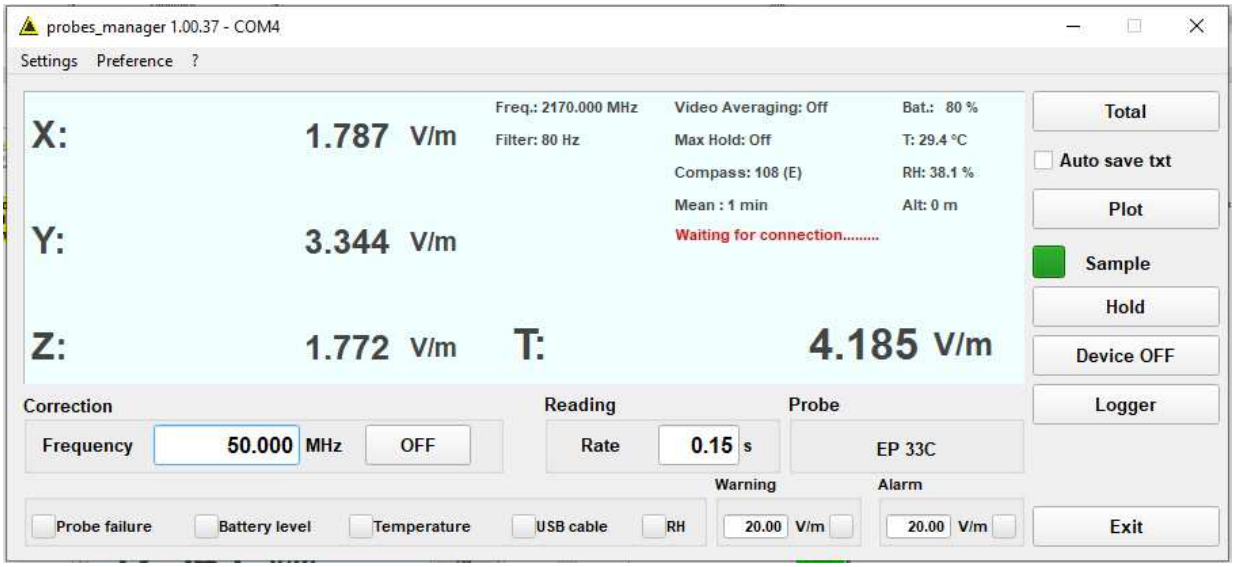


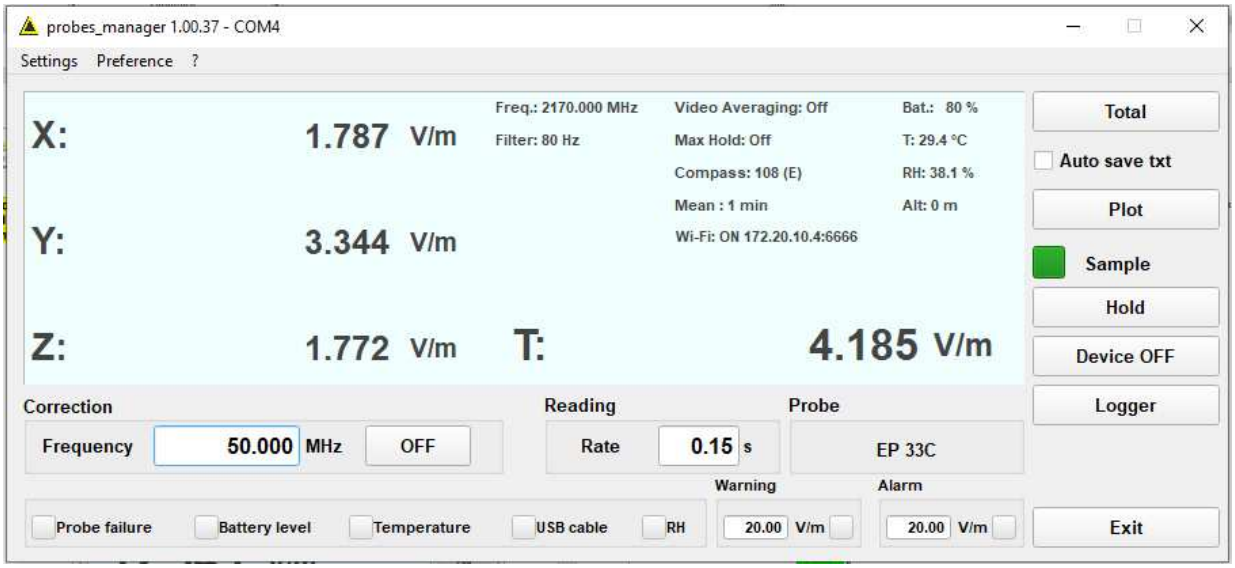

When enabled the function, the LR-01 will attempts to connect to the Wi-Fi network. Once the link has been successfully established, the IP address and the Port number will be automatically assigned to the LR-01:




- Confirming with **Close**

- 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 LR-01 is switched on, the module will return in the same condition since the wireless is set **ON** in the **settings**.

- Disconnected the cable.

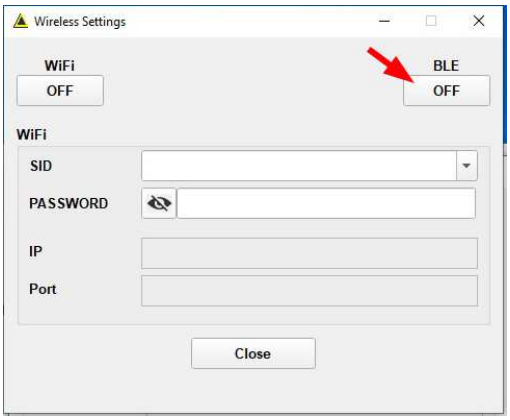
If a command is sent while the WiFi communication is enable and the Fiber optic or USB cable is connected, the priority is given to the wired connection. The wireless connection turns OFF to keep power consumption low until to the repeater is switched on again.

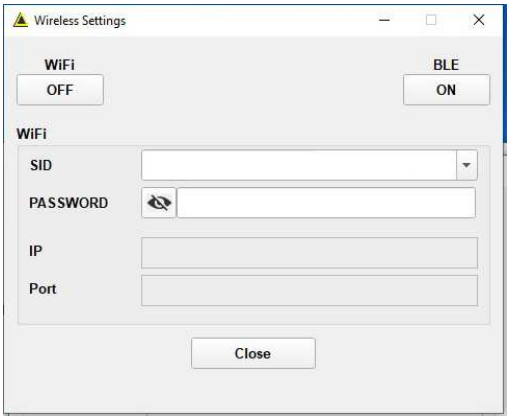
- At the next connection, active the wireless communication by simply ticking √ the WiFi box on Probe Manager software and press Connect (see §4.2.7.1 Wi-Fi Communications)

#### 4.2.7.2 Bluetooth connection

To enable the **Bluetooth (BLE)** connection on the LR-01:

- 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 LR-01 is switched on again, the module will return in the same condition since the BLE is set **ON** in the **settings**.

- Disconnected the cable.

If a command is sent while the BLE communication is enable and the Fiber optic or USB cable is connected, the priority is given to the wired connection. The Bluetooth connection turns OFF to keep power consumption low until to the repeater is switched on again.

- 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)

NOTE

**The Bluetooth connection is available only for Android and iOS device through LR-01 Manager App. For further information see Chapter 7 and 8.**

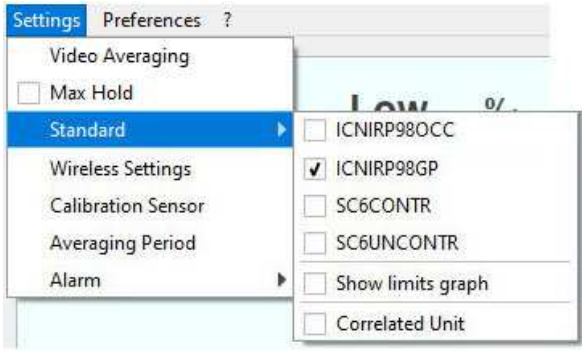
### 4.2.8 Standard (for EHP-2B probes only)

- 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.**

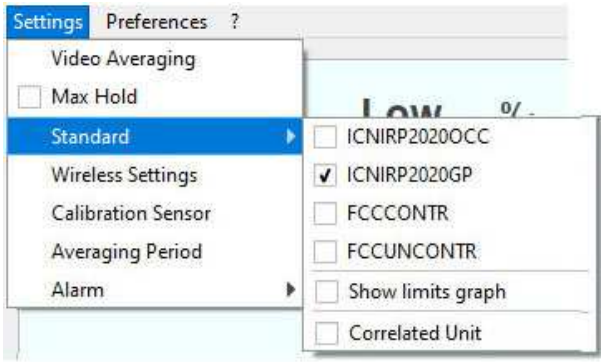
The limit list depends on the EHP-2B model probe connected, as follows:

- EHP-2B-01 and EHP-2B-02 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-03 and EHP-2B-04 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

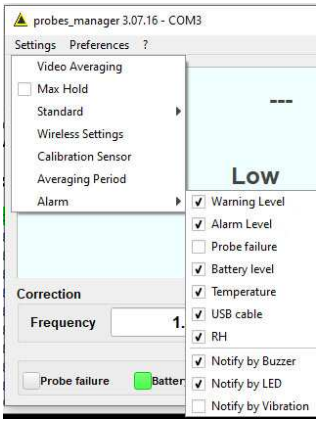
NOTE

**The Standard function is enable only when an EHP-2B model probe is connected to the LR-01**.

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 LR-01 (see §4.3.5 for further information).**

### 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 LR-01 will always be able to record any alarm occurred during logger acquisition.


**- Warning Level** next page

**- Alarm Level** next page

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

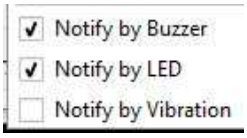
**- Battery level:** The internal control system of the LR-01 features a voltmeter for continuous measurement of the battery voltage. This function ensures constant control of the power situation for correct operation of the repeater.
The square turns red when the value is equal or below the 3.25V.

**- Temperature:** The LR-01 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 LR-01 under charging an alarm will be notify.

**- RH (Relative Humidity):** The LR-01 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 repeater.

This function also allows the user to set which device(s) should be enabled for **Alarm Level** notification only.
Enable the device to notify alarm 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

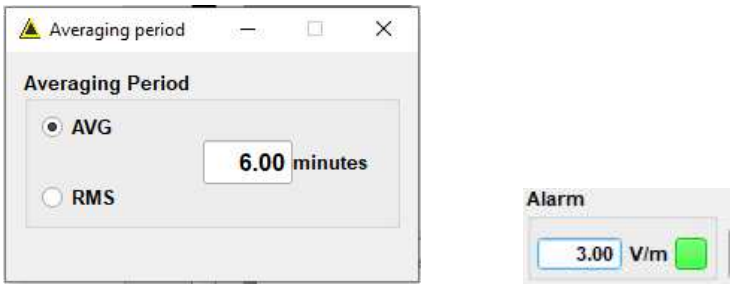
The LR-01 features two warnings: averaged field strength thresholds that can be set to define “WARNING” and “ALARM” conditions:
**- Warning:** set the field level threshold for Warning notification.
**- Alarm:** set the field level threshold for Alarm notification


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 threshold.

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.

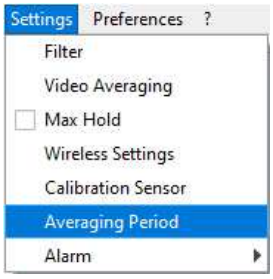
When the field value returns below the set value, the square window returns green, the led goes off and the device(s) return in the previous condition.

In the below example, the alarm is actived 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 averaged value does not exceed 3 V/m.

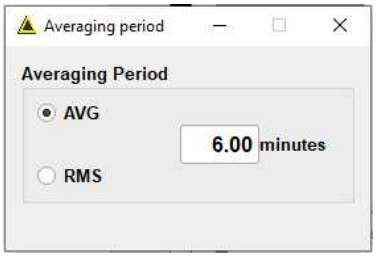



In case of using DualBand Electric and Magnetic probe, both field value are continuously compared with the Alarm thresholds, set by the user, to determine whether any field alarm condition is occurring.

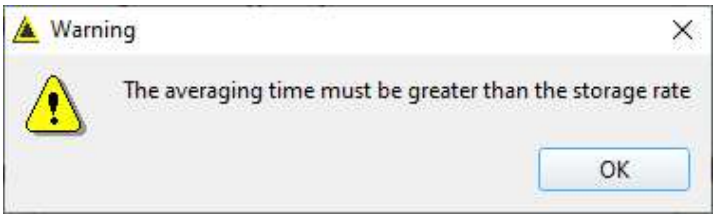
### 4.2.10 Averaging Period



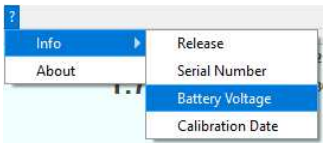

- Define the average type and the time period on which the averaged field will be calculated during the Logger acquisition (see §4.6 Logger).
The result will also be compared with the enabled thresholds.
The average can be arithmetic (**AVG**) or quadratic (**RMS**).




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 LR-01 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.

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)
- LR-01 programmable operation (Logger) (see §4.6)

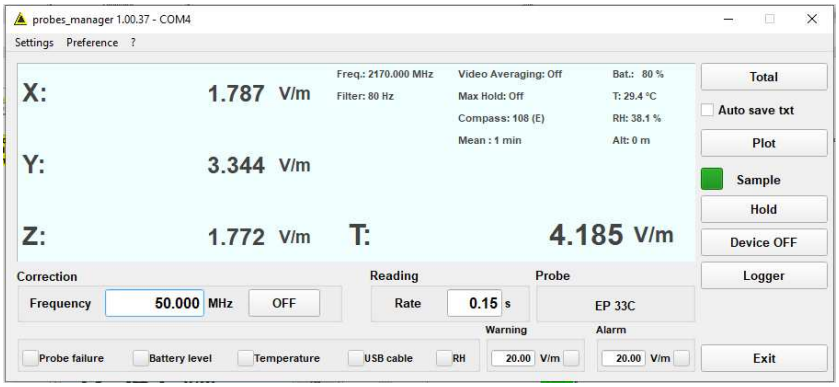
## 4.3 Display Live measurements on the main window

During live measurements the value is displayed with three decimals on the main window and the unit depends on the probe model connected.

### 4.3.1 XYZ/Total

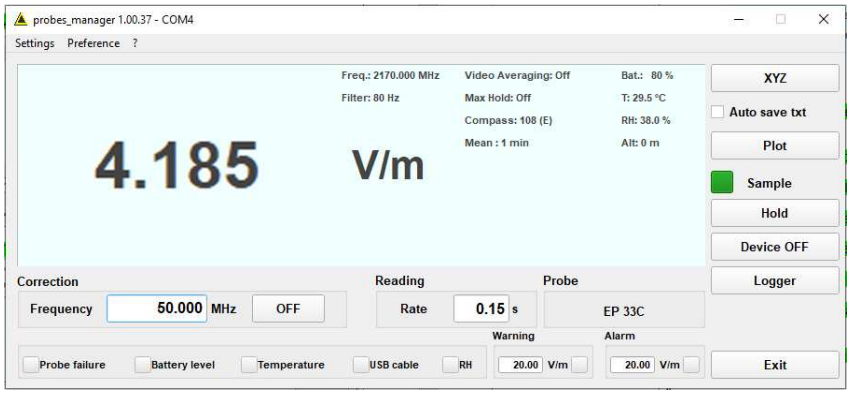
Use **XYZ/Total** button to toggle between Total field value or contemporary X - Y - Z axis readings


Mode X - Y - Z





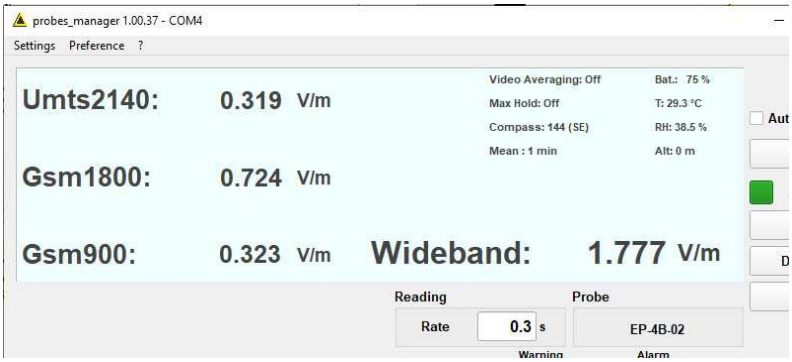
Mode Total




In case of using PMM 8053 probes, the **Total** value is calculated with the following formula which uses every single axis value:

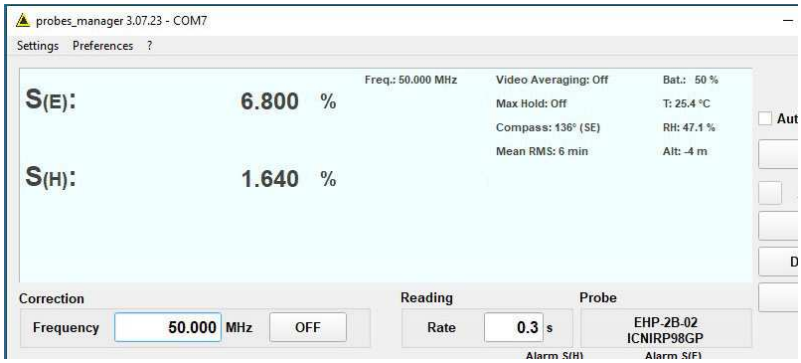
$$V/m_{tot} = \sqrt{E_x^2 + E_y^2 + E_z^2}$$

Only some models of probe show the Total and the levels of the three independent Axis.
For others type of probe, for example, in case of Quadriband probe the Wideband, UMTS2140, GSM1800 and GSM900 field probe value will be shown.




Instead, in case of 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




NOTE

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 §4.3.5 for further information).

NOTE

**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, 880 V/m for EP-183).

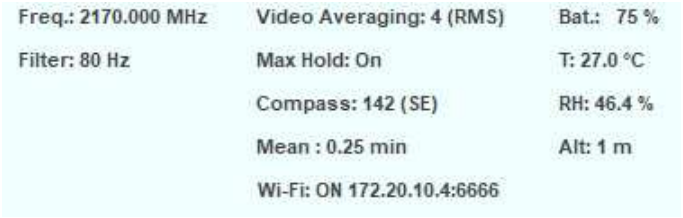
**Field value marked in red:** the field level is between 100% and 110% of the probe nominal maximum level (for example, from 800 to 880 V/m for EP-183).

**Field value marked in blue:** the field level is between the probe nominal minimum level and its 20% higher (for example, from 0.8 to 0.96 V/m for EP-183).

**Low :** the field level is lower than probe nominal minimum level.

- For example, 0.8 V/m for EP-183

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




Description:

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

- **Filter:** internal digital filter selected, or OFF when disable.

- **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 LR-01 and Port used by the repeater

- **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.

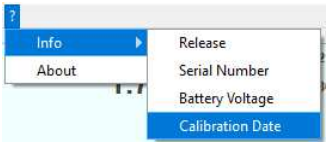
- **RH:** percentage of relative humidity.

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

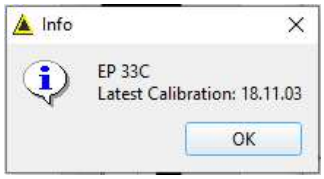
NOTE

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


The probe connected to the LR01 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").

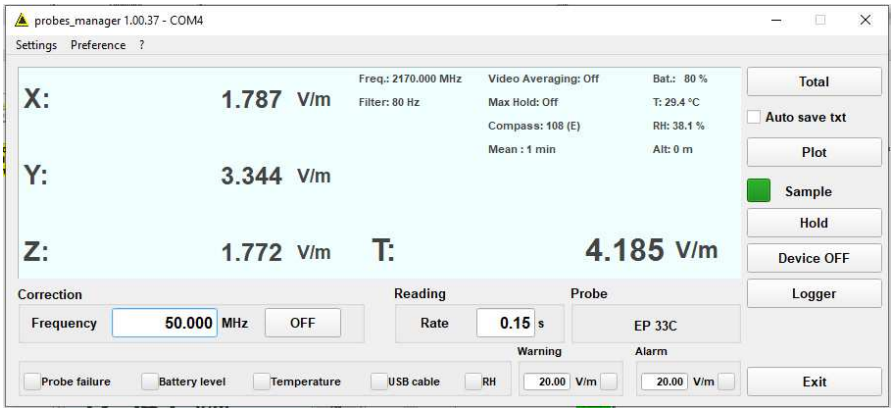

The latest calibrated data is displayed on **?** tab → **Info** → **Calibration Date**



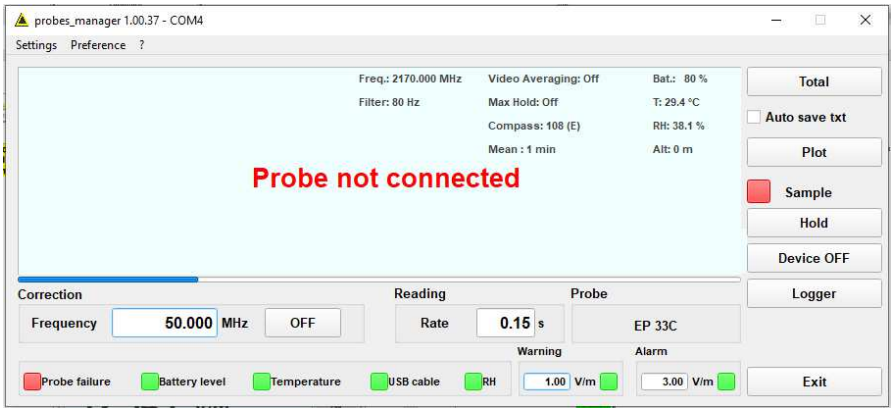
The probe of the LR-01 can be disconnected and reconnected while in use. The communication will be restarted automatically.

After replacing the field probe with the proper adapter, the LR-01 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.



### 4.3.2 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

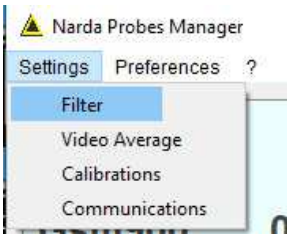
### 4.3.3 Reading Rate

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 minimum time interval depends on the Filter setting (see §4.3.4 Filter) and 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.

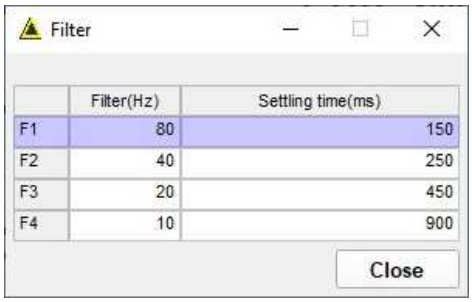

### 4.3.4 Filter (for 8053 probes only)




The probe connected to the LR-01 is also used to monitor and control the field level inside the anechoic chambers for electromagnetic measurement and testing.

A low filter setting allows fast reading and continuous monitoring fields but increase the noise and reduce the sensitivity.

The LR-01 features internal digital filters from the faster (F1) to the slower (F4) and can be selected to find the correct compromise:



### 4.3.5 Correction Frequency, Correlated Unit and Show Limits graph

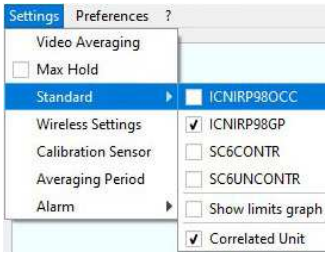
Some models of probe have flatness compensation factors on board that can be applied when the signal source frequency is known, in order to make the measurement even more accurate. To recall the **Correction frequency** factor (in MHz):
- Clicking on **OFF**, the button toggles to **ON** for enabling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

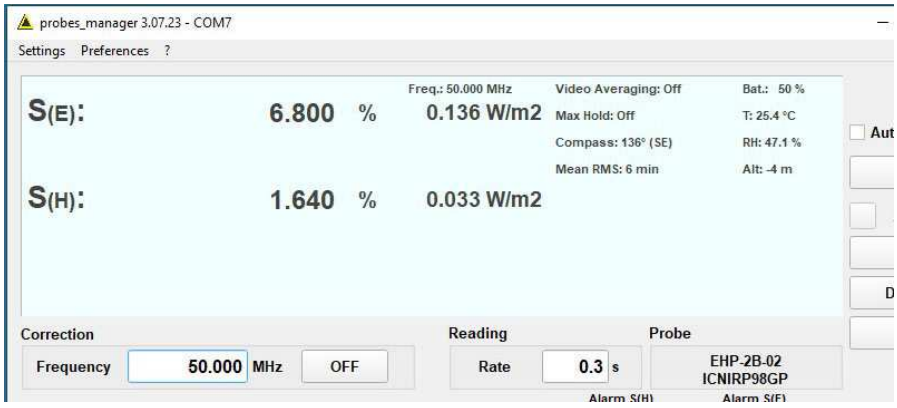
To disable the Correction Frequency click **ON** button, it toggles to **OFF** for disabling the function

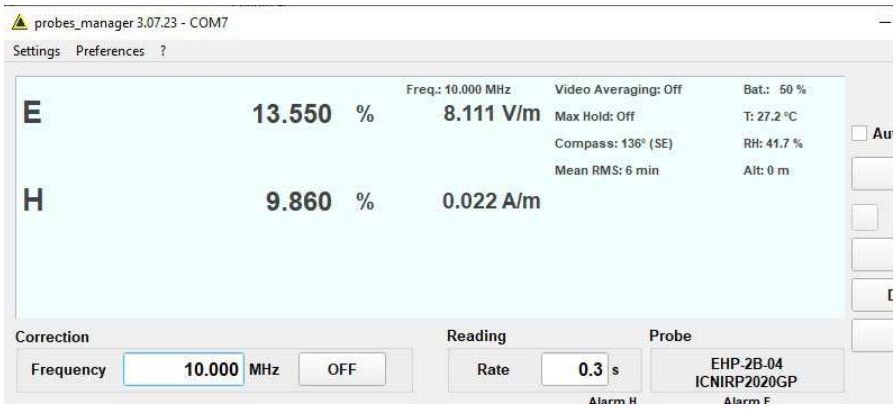
In case of using DualBand Electric and Magnetic probe, the repeater perform the Power density or Electric/Magnetic detection in function of frequency and standard.

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.

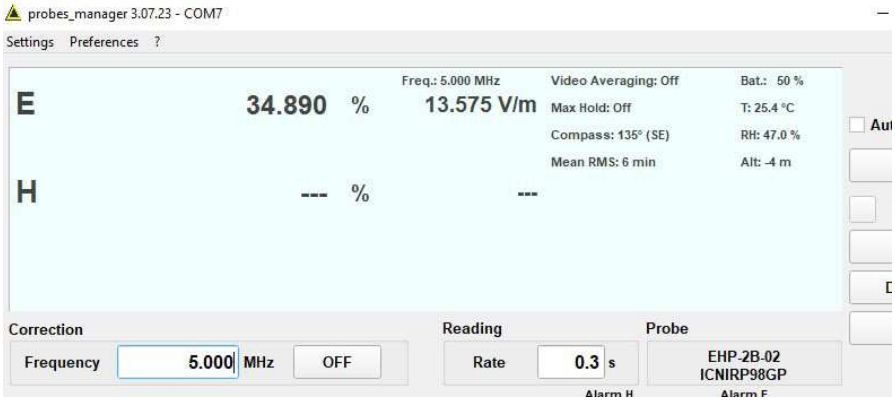


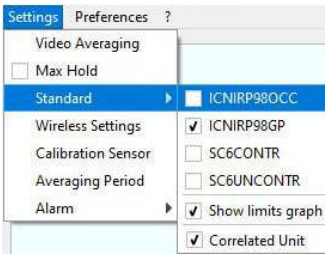



The Electric/Magnetic detection is related to standard selected for frequencies lower than:

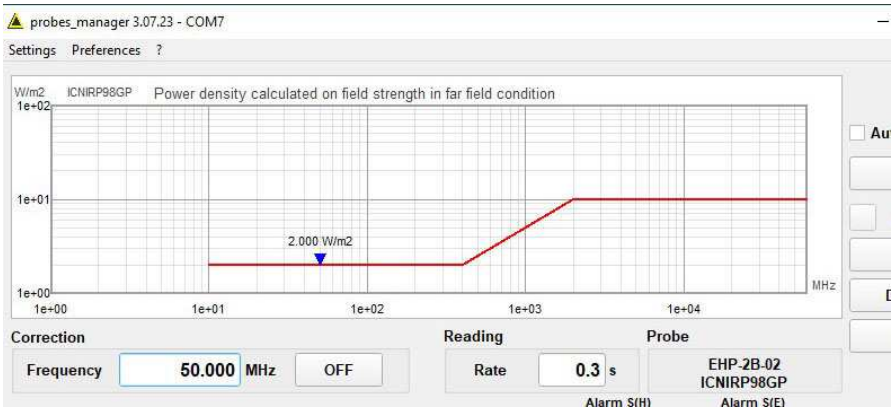
- 10 MHz for both standard ICNIRP98 and SC6
- 30 MHz for ICNIRP2020
- Never, always Power density is apply, for FCC

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.



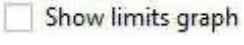




If the **Show Limits graph** function is active (√) on **Standard** menu, the software shows the limit according to the Standard and Correction Frequency set.



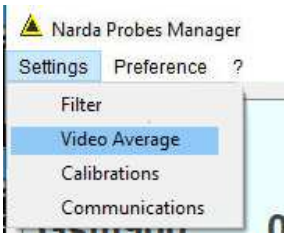


Using **E** or **H** button on the upper right of the graph during Electric/Magnetic field detection, the user can display the Electric or Magnetic limit.


Disable the function to exit from the limit graph.

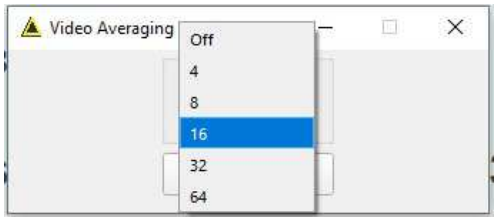
### 4.3.6 Video Averaging



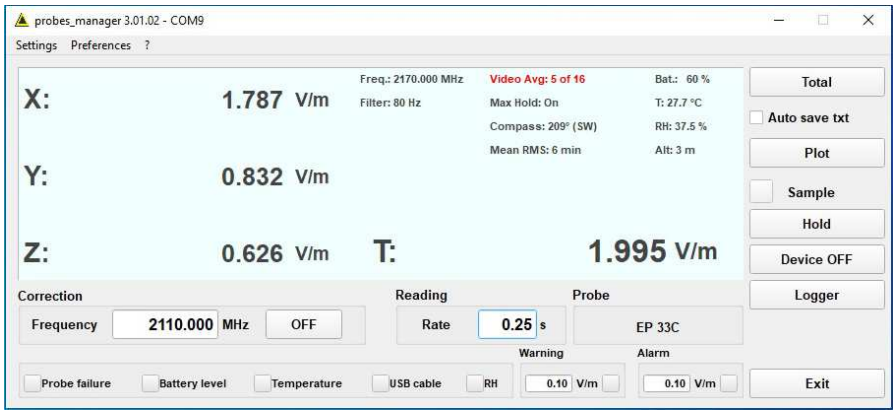

While live measurements are performed, the user can also display the RMS averaged field using the **Video Averaging** function.

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.

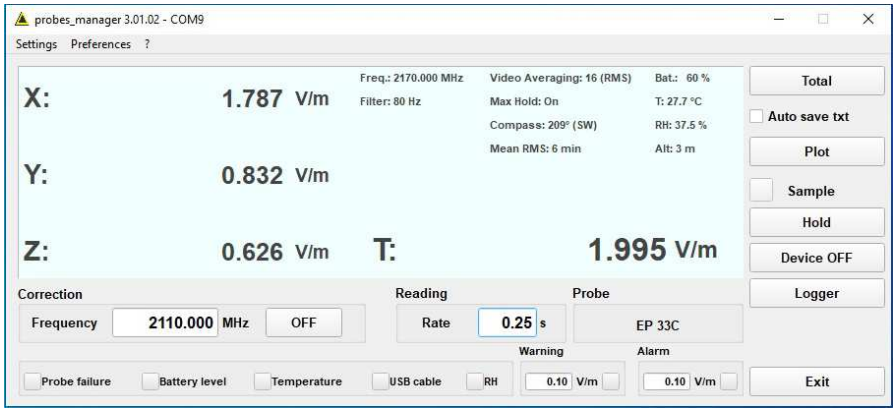
In the below example the Video Averaging is set to **16**.




Once selected, the **Avg** counter is started and displayed in red on the main window:

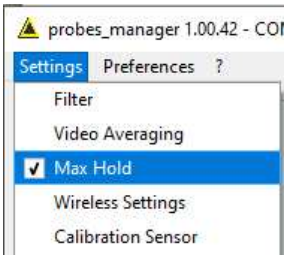



When the process is ended, the preset value is shown; the RMS averaged field is displayed on the main window and updated at the Reading rate setting since the function was activated.



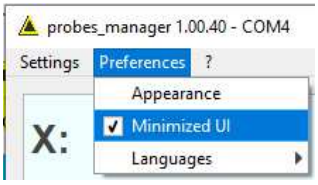

When a different Video Average value is selected or a parameter is changed or toggling from TOT to XYZ mode or viceversa, the calculations is restarted.

### 4.3.7 Max Hold

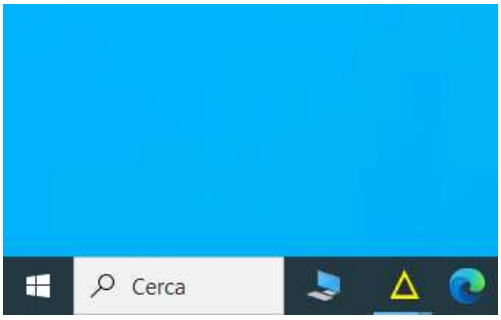



At any time the maximum field strength value can be retained and displayed since the Max Hold has been activated √ on Settings tab.
It is therefore updated only if the new value is greater than the previously displayed one showing thus the maximum in the frequency range since the Max hold function was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

### 4.3.8 Minimized UI




Enable √ this function to keep the Total field readings displayed on desktop when minimizing the main window on the tray by control window button (**Preferences** tab → **Minimized UI**).





The control window buttons located on the title bar also allow to enlarge/restore the main window and exit the program.

### 4.3.9 Hold/Run





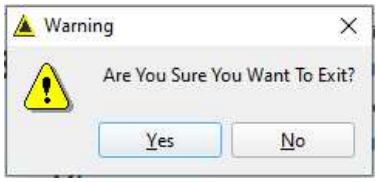
While live measurements are performed, the user can freeze the readings pressing **Hold** button. Press the button again to Resume.

### 4.3.10 Device OFF


**Device OFF** button can be very convenient for turning the instrument 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.

### 4.3.11 Exit


Press **Exit** to exit and quit the program (the LR-01 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

## 4.4 Saving Live measurements

While the live measurements are performed, the software allows collecting measurements directly in the internal memory of the repeater 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**).

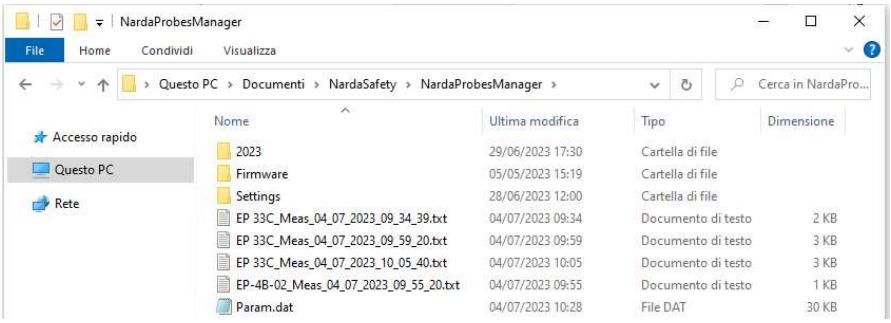
### 4.4.1 Auto save txt/csv

In the upper-right main window enable the function √ to start saving the measurements at the Reading rate set:

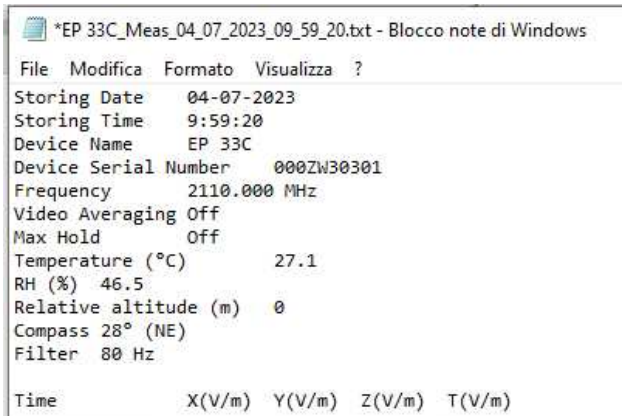

Clicking the box again disable the function and causes the end of saving measurements.


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:



Description:

**Storing Date:** working session date.

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

**Device Name:** probe type connected to the LR-01

**Device Serial Number:** Serial number stored on LR-01

**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

**Filter:** internal digital filter selected, or OFF when disable

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

**X Y Z:** field value on x, y and z axis. If the **XYZ** mode is not enable, the three columns will no appear on text report.

**T:** Total field value; between brackets is reported the unit.

NOTE

**The above labels may change in case of using different probes or configuration (EP-33C and EHP-2B-08 probe are shown below as example).**

*EP 33C_Meas_04_07_2023_09_59_20.txt - Blocco note di Windows

File Modifica Formato Visualizza ?

```
Storing Date    04-07-2023
Storing Time    9:59:20
Device Name     EP 33C
Device Serial Number    000ZW30301
Frequency       2110.000 MHz
Video Averaging Off
Max Hold        Off
Temperature (°C)        27.1
RH (%)  46.5
Relative altitude (m)   0
Compass 28° (NE)
Filter  80 Hz

Time            X(V/m)  Y(V/m)  Z(V/m)  T(V/m)
09:59:20.400    1.787   Low     Low     1.787
09:59:20.732    1.787   Low     Low     1.787
09:59:21.013    1.787   Low     Low     1.787
09:59:21.327    13.716  5.019   8.156   Ovr
09:59:21.611    1.789   1.665   Low     1.787
09:59:21.954    1.788   1.663   Low     1.787
09:59:22.236    1.789   1.665   1.772   1.787
```

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

File Modifica Formato Visualizza ?

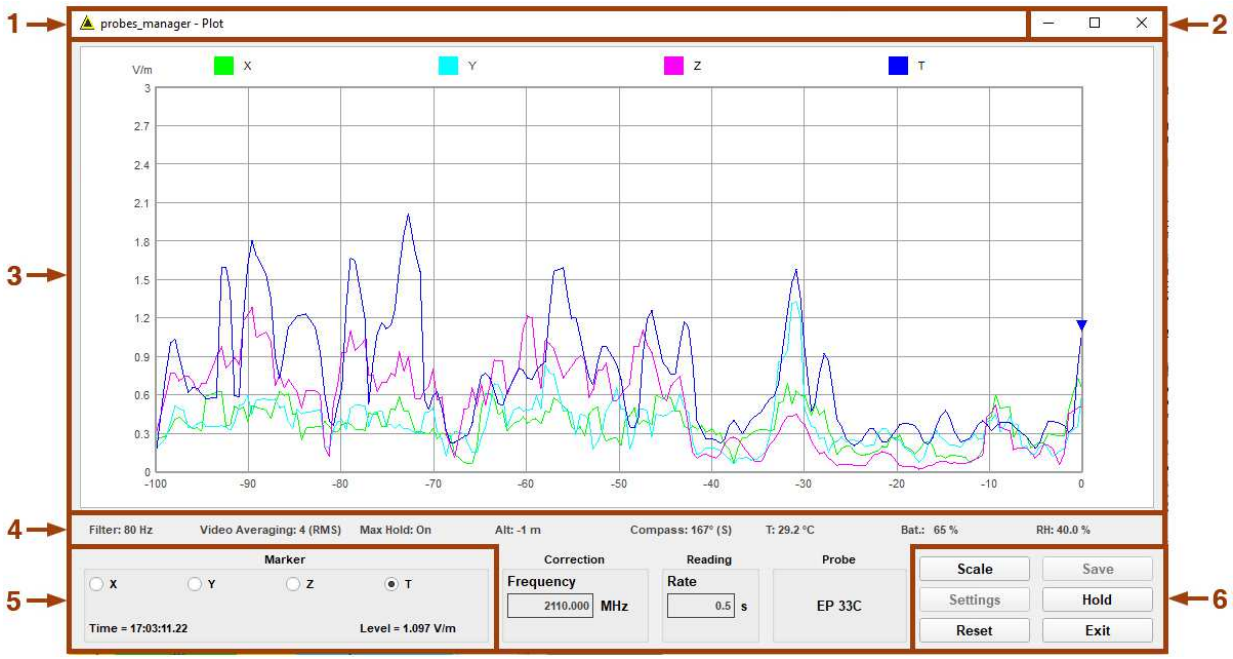
```
Storing Date    04/04/2024
Storing Time    17:31:00
Device Name     EHP-2B-08
Standard        ICNIRP2020OCC
Device Serial Number    000ZW30308
Frequency       50.000 MHz
Video Averaging Off
Max Hold        Off
Temperature (°C)        26.4
RH (%)  43.5
Relative altitude (m)   0
Compass 123° (SE)

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
```

If the field measured is outside the nominal level range, the value is displayed with **Ovr** or **Low** (see Pag.4-19).

## 4.5 Display Live measurements on the graph (PLOT)

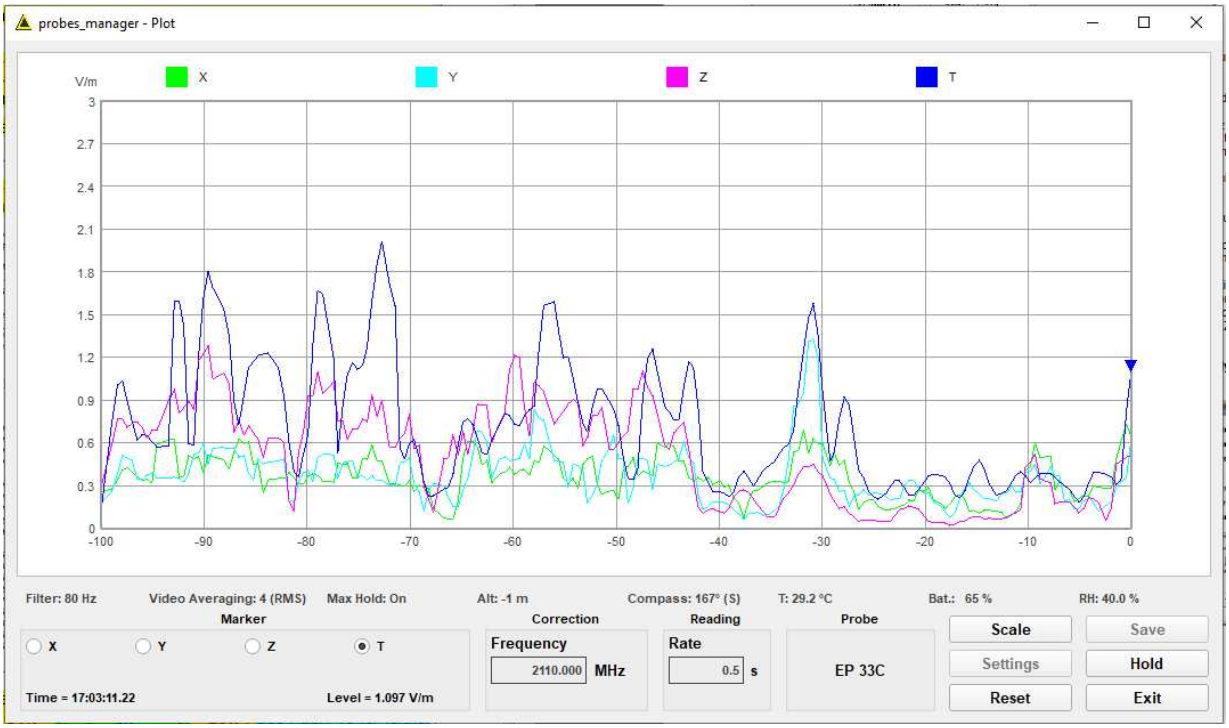
The **PLOT** function performs Time Domain measurements and showing how the signal level changes over time.
The screen displays a continue running graph at the Reading Rate setting.


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




Some parameters and technical data are shown in the lower part of the control window (see Pag.4-20).

### 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.

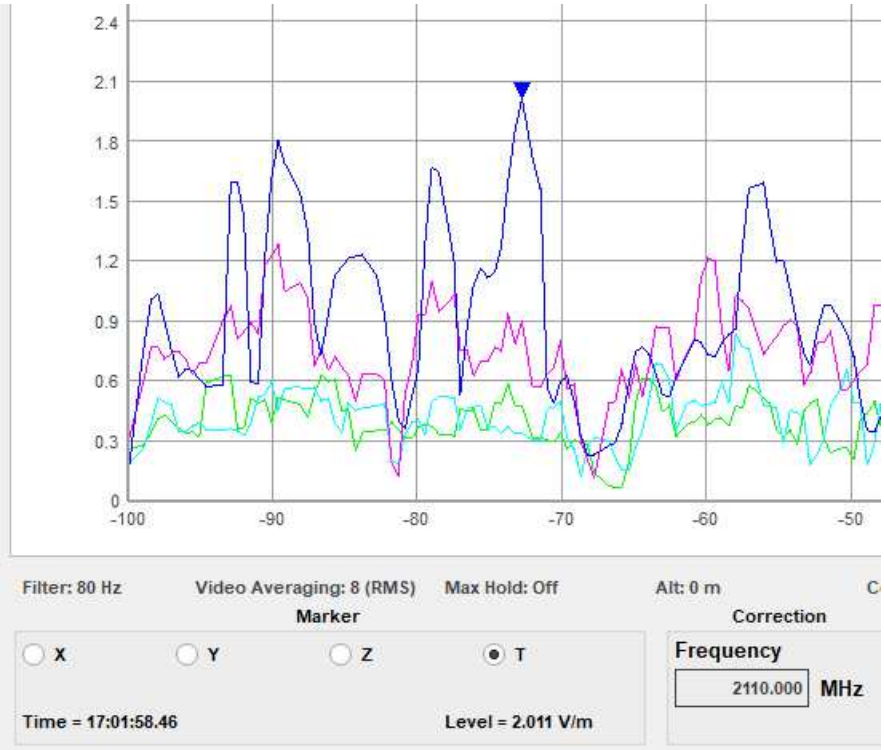
### 4.5.3 Reset

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**

### 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.



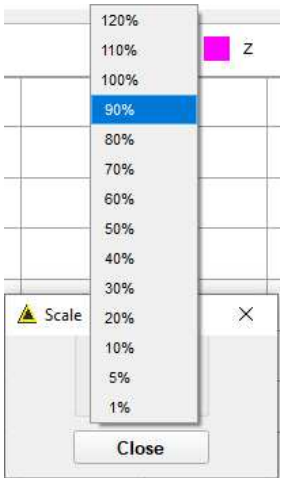

If the **XYZ** mode is not enable, the X, Y and Z axis will be disable.

NOTE

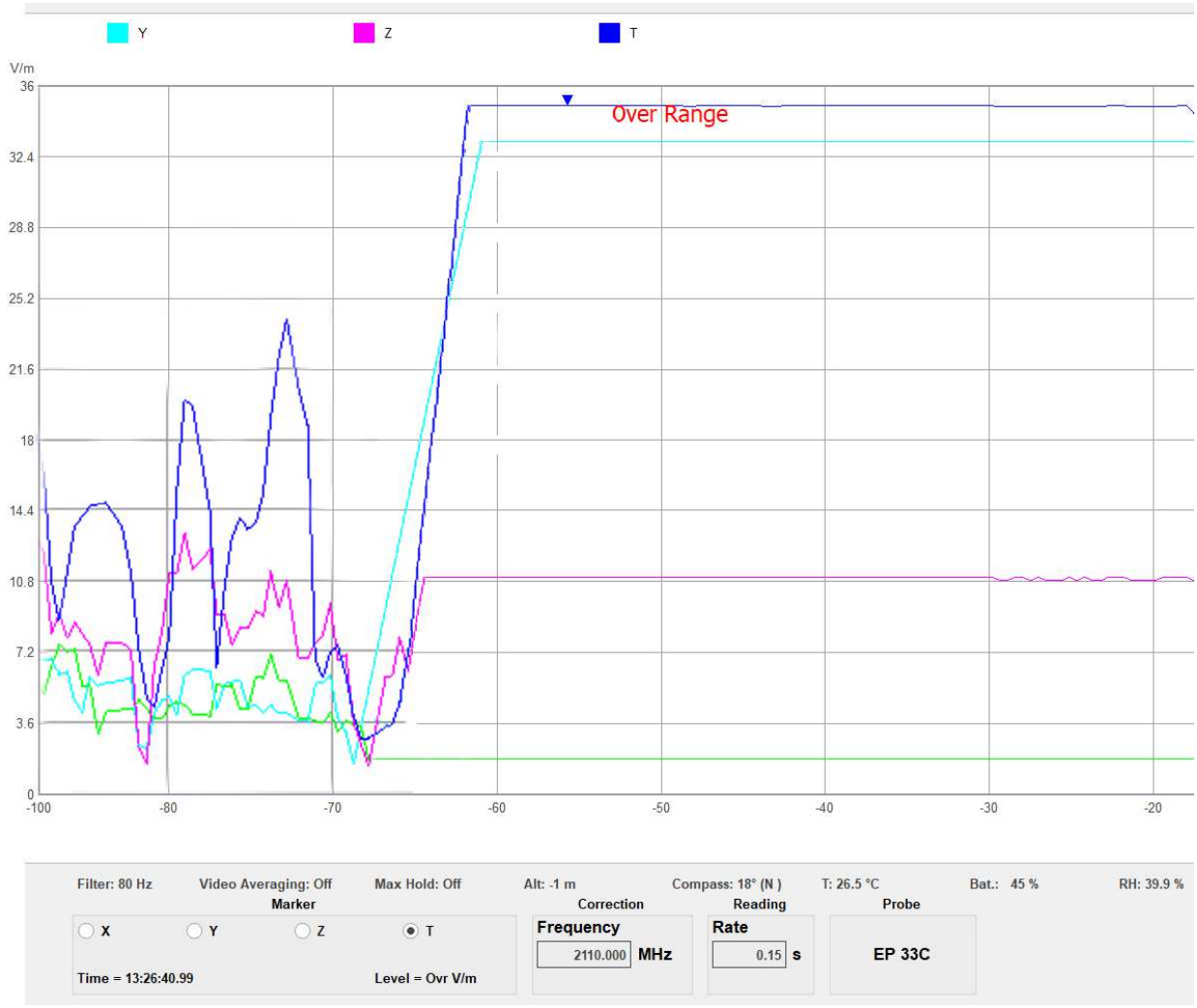
**The above labels may change in case of using different probes or configuration.**

### 4.5.5 Scale

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



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.

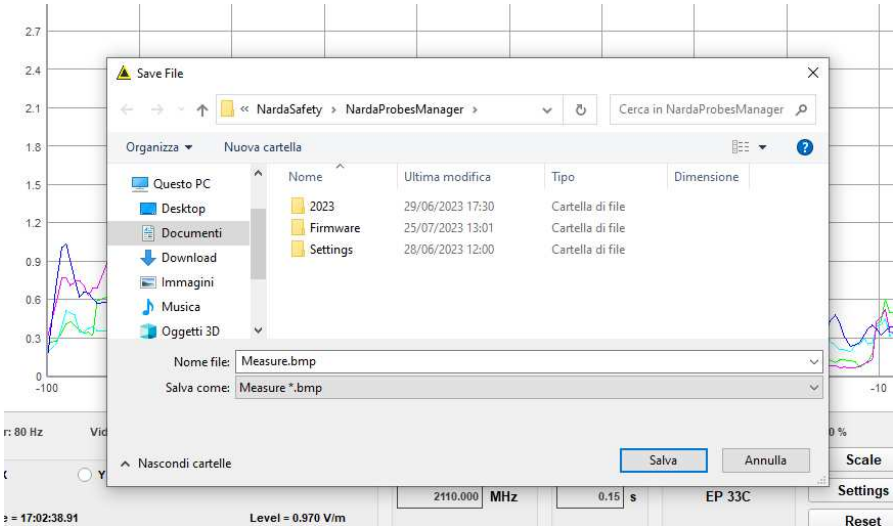



Notice the **T : Ovr** indication will appear on the main window and the Y axis value will turn **red** because the field level is between 100% and 110% of the probe nominal maximum level.

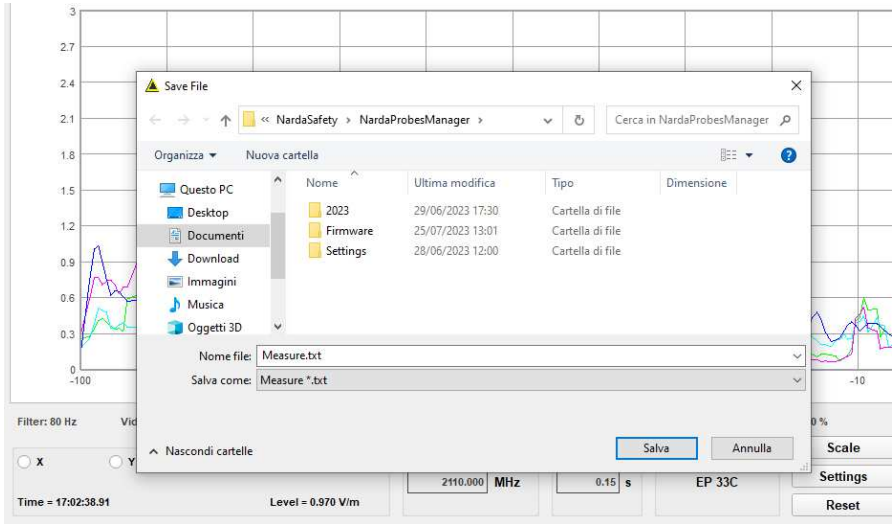
### 4.5.6 Save

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).

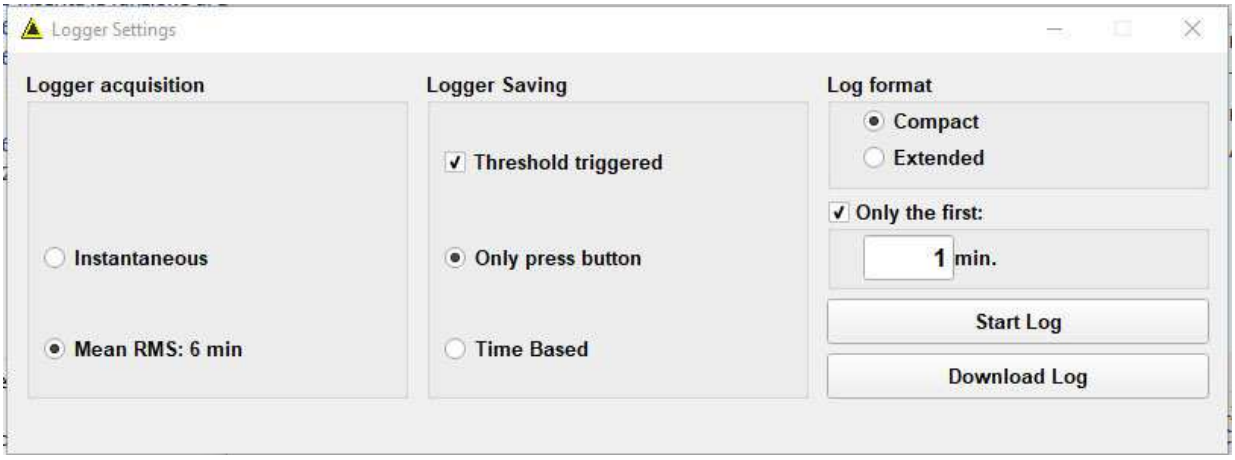
### 4.5.7 Exit

Click **Exit** button to go back to the main window

## 4.6 Storing measurements on the LR-01 memory (Logger)


LR01 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 LR-01 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.

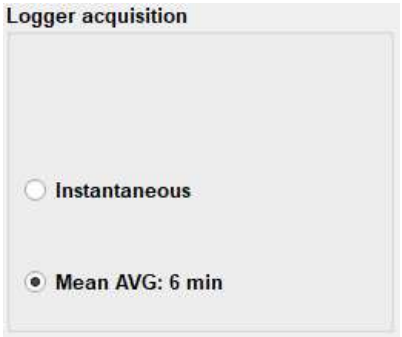
Clicking **Logger** button, this window will appear:




### 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 interval (**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:

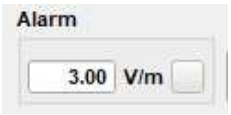

**NOTICE**

**As above example, when "Threshold triggered" and "Only press button" or "Time base" function is enable, priority is given to the Threshold triggered**

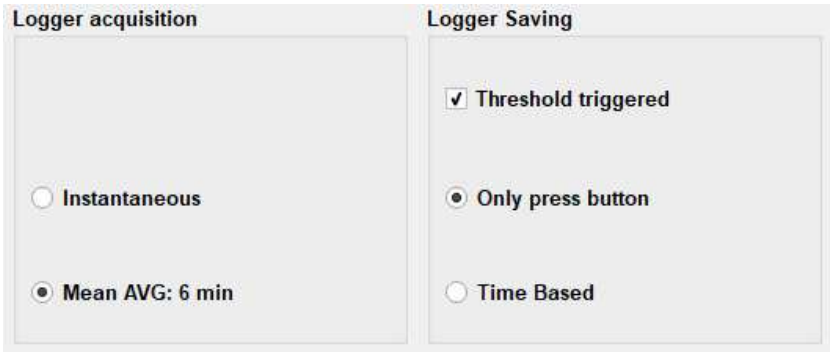
**NOTICE**

**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 LR-01 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 below 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 averaged value does not exceed 3 V/m.





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.

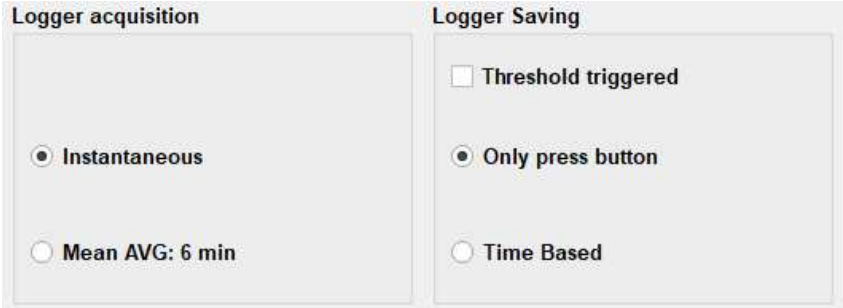
### 4.6.3 Only press button

- **Only press button**: When active ◉, the acquired field level (instantaneous or averaged) is stored in the LR-01 internal memory each time the Manual Log button is pressed


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.**

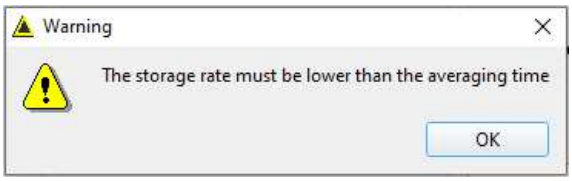
In the below example, the instantaneous (not averaged) field value will be saved in the LR-01 internal memory each time the Manual Log button is pressed.




### 4.6.4 Time based (Every):

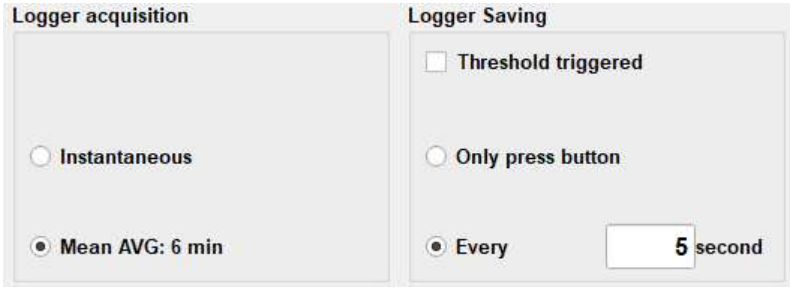
- **Time based (Every)**: When active ◉, the acquired measurements (instantaneous or averaged) will be stored in the LR-01 internal memory at the interval set in seconds each.


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.





In the below example, the averaged field value calculated in the last 6 minutes will be saved in the LR-01 internal memory at the interval of 5 seconds each.



### 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 LR-01 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 LR-01 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 LR-01 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 LR-01 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 LR-01 internal memory can be downloaded pressing Download Log button, otherwise will not be available anymore.

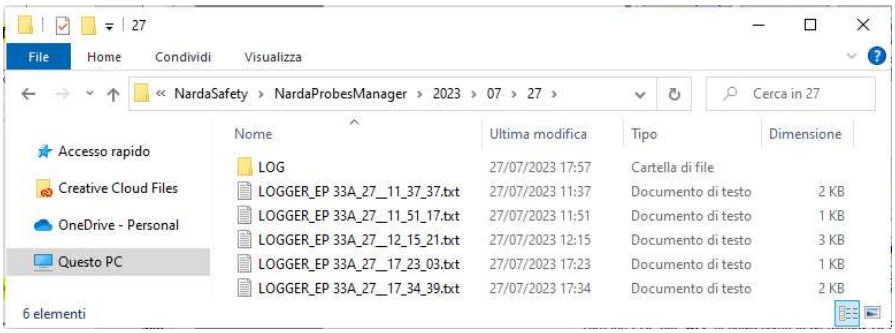
### 4.6.8 Only the first function and Download Log button

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**

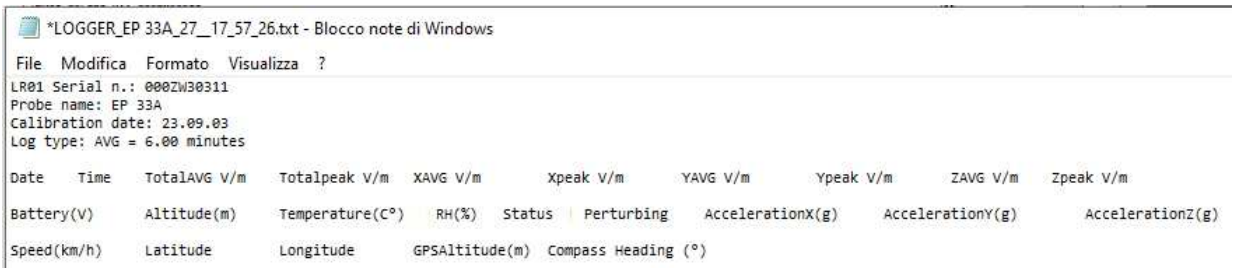
If the function **Only the first** is not enable, the data are download from starting to stopping log data.


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


Save the file 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 LR-01
- **Probe name:** Probe type connected to the LR-01
- **Calibration date:** Latest probe calibration
- **Log type:** Log acquisition method
- **Standard**: Reference standard (for EHP-2B probe model only)
- **Date:** Working session date in dd/mm/yyyy format

- **Time:** Hour, minute, second of the measurement acquisition
- **TotalAVG:** Shows the average calculated in the Total
- **Totalpeak:** Shows the peak calculated in the Total
- **XAVG:** Shows the average calculated in the X axis
- **Xpeak:** Shows the peak value measured in X axis
- **YAVG:** Shows the average calculated in the Y axis
- **Ypeak:** Shows the peak value measured in Y axis
- **ZAVG:** Shows the average calculated in the Z axis
- **Zpeak:** Shows the peak value measured in Z axis
- **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 LR-01 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 LR-01 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.

Only some models of probe show the Total and the levels of the three independent Axis.

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

For others type of probe, for example, in case of Quadriband probe the Wideband, UMTS2140, GSM1800 and GSM900 field probe value will be shown (in the below example the EP-4B-02 is show in **Compact Log** format).

The differences are:

**WideAVG:** shows the average calculated, in this example of the AVG type, in the Averaging Period (set in this example as 6 minutes) of the signal read by the wide band sensor

**Widepeak:** shows the peak value measured in the wide band

**2140AVG:** shows the average calculated in the UMTS Band pass

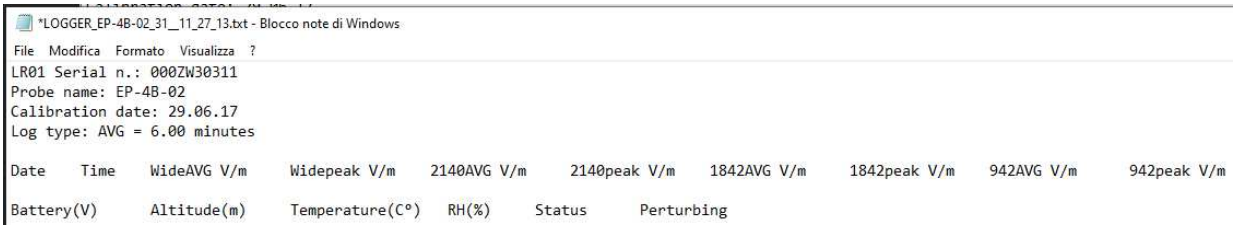
**2140peak:** shows the peak value measured in the UMTS Band pass

**1842AVG:** shows the average calculated in the EGSM 1800 Band pass

**1842peak:** shows the peak value measured in the EGSM 1800 Band pass

**942AVG:** shows the average calculated in the EGSM 900 Band pass

**942peak:** shows the peak value measured in the EGSM 900 Band pass



*LOGGER_EP-4B-02_31__11_27_13.txt - Blocco note di Windows

File Modifica Formato Visualizza ?

```
LR01 Serial n.: 000ZW30311
Probe name: EP-4B-02
Calibration date: 29.06.17
Log type: AVG = 6.00 minutes

Date    Time    WideAVG V/m     Widepeak V/m    2140AVG V/m     2140peak V/m    1842AVG V/m     1842peak V/m    942AVG V/m      942peak V/m

Battery(V)      Altitude(m)     Temperature(C°)   RH(%)     Status      Perturbing
```

Instead, in case of using DualBand Electric and Magnetic probe, the report will display both field value (in the below example the EHP-2B-02 is show in **Extended Log** Format).

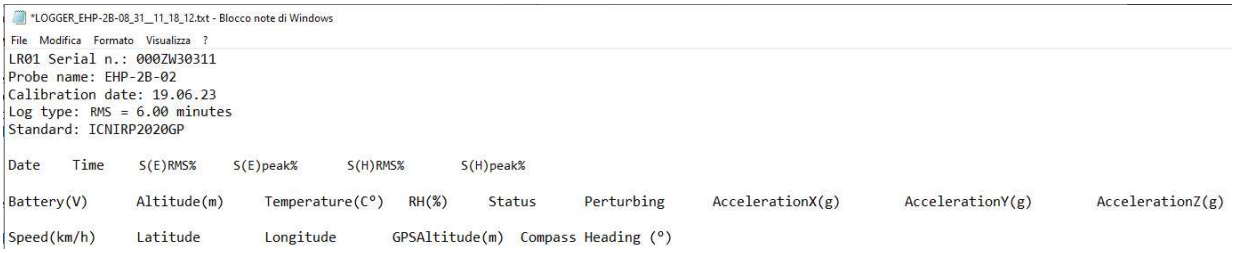
The differences are:

**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

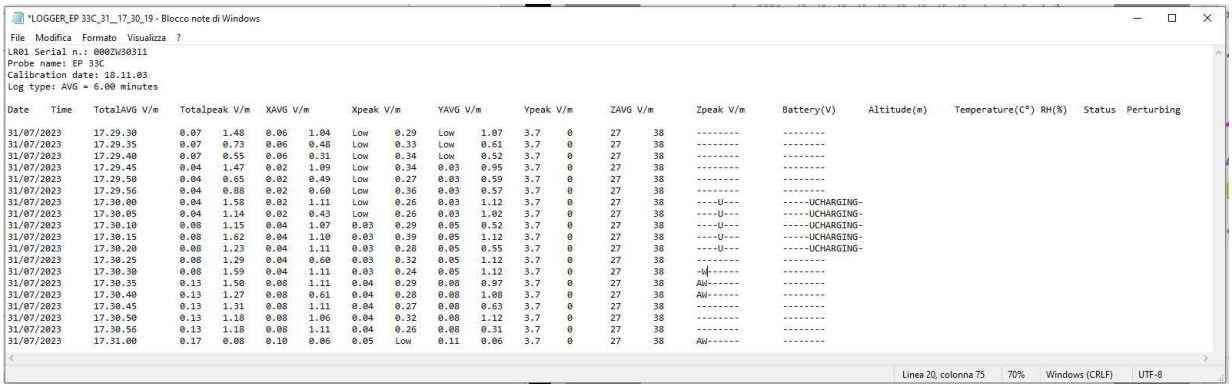


*LOGGER_EHP-2B-08_31__11_18_12.txt - Blocco note di Windows

File Modifica Formato Visualizza ?

```
LR01 Serial n.: 000ZW30311
Probe name: EHP-2B-02
Calibration date: 19.06.23
Log type: RMS = 6.00 minutes
Standard: ICNIRP2020GP

Date    Time    S(E)RMS%    S(E)peak%       S(H)RMS%        S(H)peak%

Battery(V)      Altitude(m)     Temperature(C°)   RH(%)     Status      Perturbing      AccelerationX(g)        AccelerationY(g)        AccelerationZ(g)

Speed(km/h)     Latitude        Longitude       GPSAltitude(m)  Compass Heading (°)
```

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



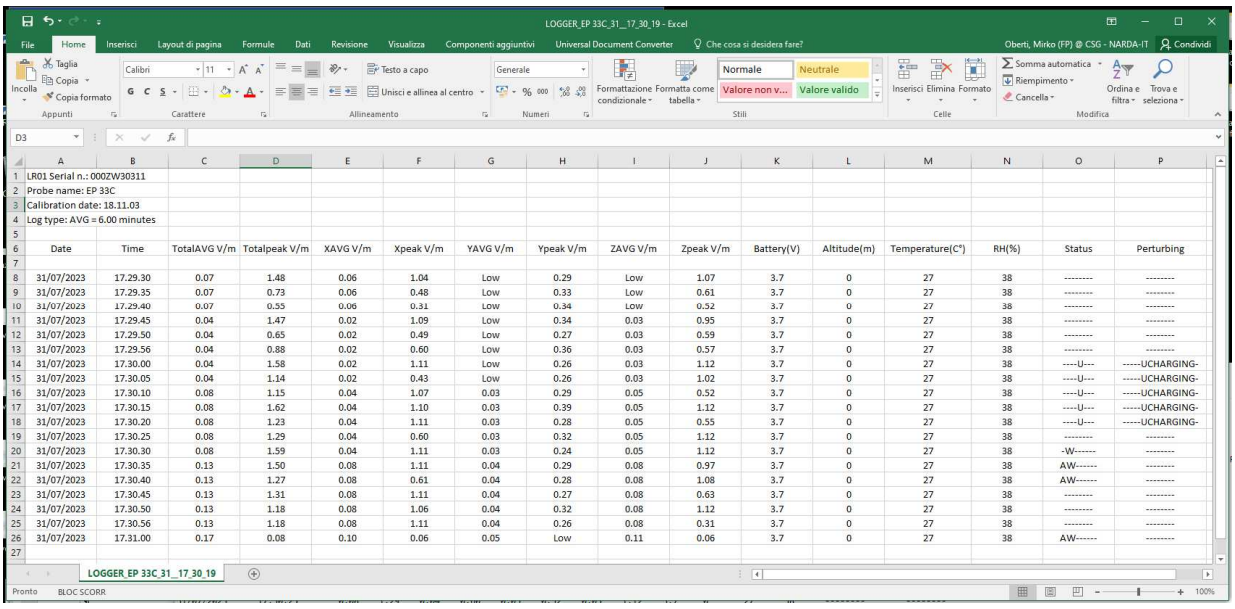
*LOGGER_EP 33C_31__17_30_19 - Blocco note di Windows

File Modifica Formato Visualizza ?

```
LR01 Serial n.: 000ZW30311
Probe name: EP 33C
Calibration date: 18.11.03
Log type: AVG = 6.00 minutes

Date    Time    TotalAVG V/m    Totalpeak V/m    XAVG V/m    Xpeak V/m    YAVG V/m    Ypeak V/m    ZAVG V/m    Zpeak V/m    Battery(V)    Altitude(m)    Temperature(C°) RH(%)    Status  Perturbing

31/07/2023      17.29.30        0.07    1.48    0.06    1.04    Low     0.29    Low     1.07    3.7     0       27      38      --------        --------
31/07/2023      17.29.35        0.07    0.73    0.06    0.48    Low     0.33    Low     0.61    3.7     0       27      38      --------        --------
31/07/2023      17.29.40        0.07    0.55    0.06    0.31    Low     0.34    Low     0.52    3.7     0       27      38      --------        --------
31/07/2023      17.29.45        0.04    1.47    0.02    1.09    Low     0.34    0.03    0.95    3.7     0       27      38      --------        --------
31/07/2023      17.29.50        0.04    0.65    0.02    0.49    Low     0.27    0.03    0.59    3.7     0       27      38      --------        --------
31/07/2023      17.29.56        0.04    0.88    0.02    0.60    Low     0.36    0.03    0.57    3.7     0       27      38      --------        --------
31/07/2023      17.30.00        0.04    1.58    0.02    1.11    Low     0.26    0.03    1.12    3.7     0       27      38      ----U---        -----UCHARGING-
31/07/2023      17.30.05        0.04    1.14    0.02    0.43    Low     0.26    0.03    1.02    3.7     0       27      38      ----U---        -----UCHARGING-
31/07/2023      17.30.10        0.08    1.15    0.04    1.07    0.03    0.29    0.05    0.52    3.7     0       27      38      ----U---        -----UCHARGING-
31/07/2023      17.30.15        0.08    1.62    0.04    1.10    0.03    0.39    0.05    1.12    3.7     0       27      38      ----U---        -----UCHARGING-
31/07/2023      17.30.20        0.08    1.23    0.04    1.11    0.03    0.28    0.05    0.55    3.7     0       27      38      ----U---        -----UCHARGING-
31/07/2023      17.30.25        0.08    1.29    0.04    0.60    0.03    0.32    0.05    1.12    3.7     0       27      38      --------        --------
31/07/2023      17.30.30        0.08    1.59    0.04    1.11    0.03    0.24    0.05    1.12    3.7     0       27      38      -W------        --------
31/07/2023      17.30.35        0.13    1.50    0.08    1.11    0.04    0.29    0.08    0.97    3.7     0       27      38      AW------        --------
31/07/2023      17.30.40        0.13    1.27    0.08    0.61    0.04    0.28    0.08    1.08    3.7     0       27      38      AW------        --------
31/07/2023      17.30.45        0.13    1.31    0.08    1.11    0.04    0.27    0.08    0.63    3.7     0       27      38      --------        --------
31/07/2023      17.30.50        0.13    1.18    0.08    1.06    0.04    0.32    0.08    1.12    3.7     0       27      38      --------        --------
31/07/2023      17.30.56        0.13    1.18    0.08    1.11    0.04    0.26    0.08    0.31    3.7     0       27      38      --------        --------
31/07/2023      17.31.00        0.17    0.08    0.10    0.06    0.05    Low     0.11    0.06    3.7     0       27      38      AW------        --------
```

Linea 20, colonna 75 | 70% | Windows (CRLF) | UTF-8

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



LOGGER_EP 33C_31__17_30_19 - Excel

| | A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | LR01 Serial n.: 000ZW30311 | | | | | | | | | | | | | | | |
| 2 | Probe name: EP 33C | | | | | | | | | | | | | | | |
| 3 | Calibration date: 18.11.03 | | | | | | | | | | | | | | | |
| 4 | Log type: AVG = 6.00 minutes | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | |
| 6 | Date | Time | TotalAVG V/m | Totalpeak V/m | XAVG V/m | Xpeak V/m | YAVG V/m | Ypeak V/m | ZAVG V/m | Zpeak V/m | Battery(V) | Altitude(m) | Temperature(C°) | RH(%) | Status | Perturbing |
| 7 | | | | | | | | | | | | | | | | |
| 8 | 31/07/2023 | 17.29.30 | 0.07 | 1.48 | 0.06 | 1.04 | Low | 0.29 | Low | 1.07 | 3.7 | 0 | 27 | 38 | -------- | -------- |
| 9 | 31/07/2023 | 17.29.35 | 0.07 | 0.73 | 0.06 | 0.48 | Low | 0.33 | Low | 0.61 | 3.7 | 0 | 27 | 38 | -------- | -------- |
| 10 | 31/07/2023 | 17.29.40 | 0.07 | 0.55 | 0.06 | 0.31 | Low | 0.34 | Low | 0.52 | 3.7 | 0 | 27 | 38 | -------- | -------- |
| 11 | 31/07/2023 | 17.29.45 | 0.04 | 1.47 | 0.02 | 1.09 | Low | 0.34 | 0.03 | 0.95 | 3.7 | 0 | 27 | 38 | -------- | -------- |
| 12 | 31/07/2023 | 17.29.50 | 0.04 | 0.65 | 0.02 | 0.49 | Low | 0.27 | 0.03 | 0.59 | 3.7 | 0 | 27 | 38 | -------- | -------- |
| 13 | 31/07/2023 | 17.29.56 | 0.04 | 0.88 | 0.02 | 0.60 | Low | 0.36 | 0.03 | 0.57 | 3.7 | 0 | 27 | 38 | -------- | -------- |
| 14 | 31/07/2023 | 17.30.00 | 0.04 | 1.58 | 0.02 | 1.11 | Low | 0.26 | 0.03 | 1.12 | 3.7 | 0 | 27 | 38 | ----U--- | -----UCHARGING- |
| 15 | 31/07/2023 | 17.30.05 | 0.04 | 1.14 | 0.02 | 0.43 | Low | 0.26 | 0.03 | 1.02 | 3.7 | 0 | 27 | 38 | ----U--- | -----UCHARGING- |
| 16 | 31/07/2023 | 17.30.10 | 0.08 | 1.15 | 0.04 | 1.07 | 0.03 | 0.29 | 0.05 | 0.52 | 3.7 | 0 | 27 | 38 | ----U--- | -----UCHARGING- |
| 17 | 31/07/2023 | 17.30.15 | 0.08 | 1.62 | 0.04 | 1.10 | 0.03 | 0.39 | 0.05 | 1.12 | 3.7 | 0 | 27 | 38 | ----U--- | -----UCHARGING- |
| 18 | 31/07/2023 | 17.30.20 | 0.08 | 1.23 | 0.04 | 1.11 | 0.03 | 0.28 | 0.05 | 0.55 | 3.7 | 0 | 27 | 38 | ----U--- | -----UCHARGING- |
| 19 | 31/07/2023 | 17.30.25 | 0.08 | 1.29 | 0.04 | 0.60 | 0.03 | 0.32 | 0.05 | 1.12 | 3.7 | 0 | 27 | 38 | -------- | -------- |
| 20 | 31/07/2023 | 17.30.30 | 0.08 | 1.59 | 0.04 | 1.11 | 0.03 | 0.24 | 0.05 | 1.12 | 3.7 | 0 | 27 | 38 | -W------ | -------- |
| 21 | 31/07/2023 | 17.30.35 | 0.13 | 1.50 | 0.08 | 1.11 | 0.04 | 0.29 | 0.08 | 0.97 | 3.7 | 0 | 27 | 38 | AW------ | -------- |
| 22 | 31/07/2023 | 17.30.40 | 0.13 | 1.27 | 0.08 | 0.61 | 0.04 | 0.28 | 0.08 | 1.08 | 3.7 | 0 | 27 | 38 | AW------ | -------- |
| 23 | 31/07/2023 | 17.30.45 | 0.13 | 1.31 | 0.08 | 1.11 | 0.04 | 0.27 | 0.08 | 0.63 | 3.7 | 0 | 27 | 38 | -------- | -------- |
| 24 | 31/07/2023 | 17.30.50 | 0.13 | 1.18 | 0.08 | 1.06 | 0.04 | 0.32 | 0.08 | 1.12 | 3.7 | 0 | 27 | 38 | -------- | -------- |
| 25 | 31/07/2023 | 17.30.56 | 0.13 | 1.18 | 0.08 | 1.11 | 0.04 | 0.26 | 0.08 | 0.31 | 3.7 | 0 | 27 | 38 | -------- | -------- |
| 26 | 31/07/2023 | 17.31.00 | 0.17 | 0.08 | 0.10 | 0.06 | 0.05 | Low | 0.11 | 0.06 | 3.7 | 0 | 27 | 38 | AW------ | -------- |
| 27 | | | | | | | | | | | | | | | | |

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# 5 – Update Firmware

## 5.1 Update Firmware

This section provides the information necessary to update the LR-01 firmware.

It is important to update the LR-01 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 LR-01, please contact your NARDA distributor or download it directly from the NARDA Web site http://www.narda-sts.it**

To update the LR-01 firmware proceed as follows:

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

NOTE

**The LR-01 cannot be update via USB wired or Wireless connection.**

- Turn off the LR-01

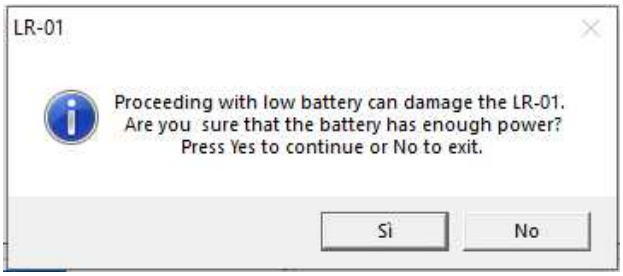
- Click the **LR-01UP** icon on desktop.


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

This window is displayed.

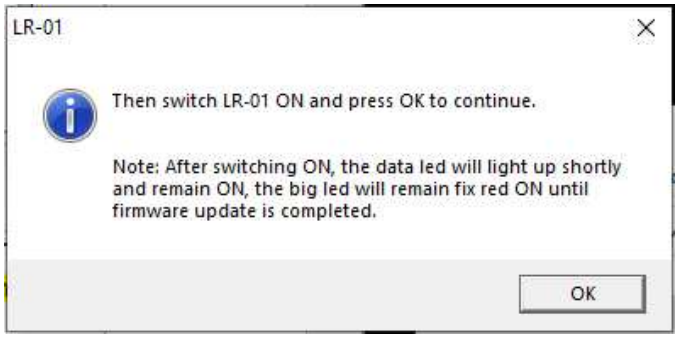

- Pressing the **USB-OC** button, the LR-01UP utility automatically detects the COM port to which LR01 is connected.
The User can manually select the COM port assigned to the repeater using the RS232 drop-down menu (the device appears as "**USB Serial Port (COMn)**".
Select the **RS232** button to confirm.


- Once selected the COM port, make sure the LR-01 has enough battery level to perform the Update Firmware and proceed with **Yes**.

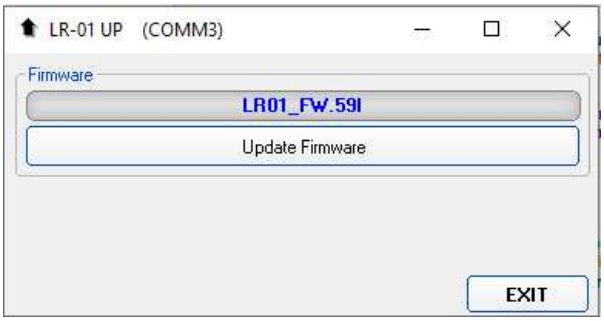



- A message will inform to turn the LR-01 off. Press **OK** to confirm.

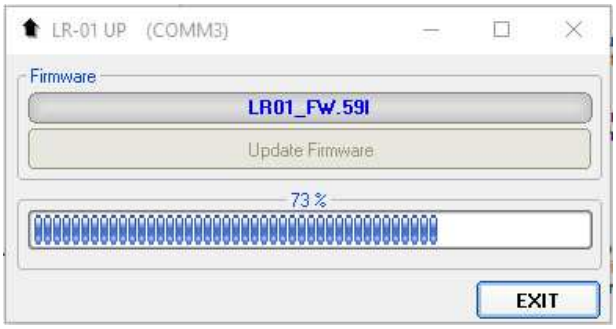
- Then switch the LR-01 on, check the data and big led status and press **OK** to continue.



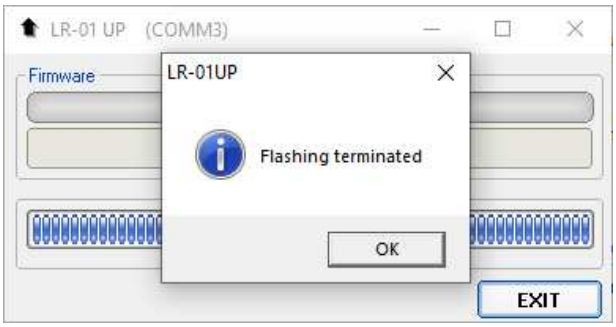

- A window is displayed. Click on **Update Firmware** button to proceed.




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 LR-01 off and turn it on again.
The new firmware release can be displayed in the Probe Manager software (see chapter 4).

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# 6 – Uninstalling driver and software

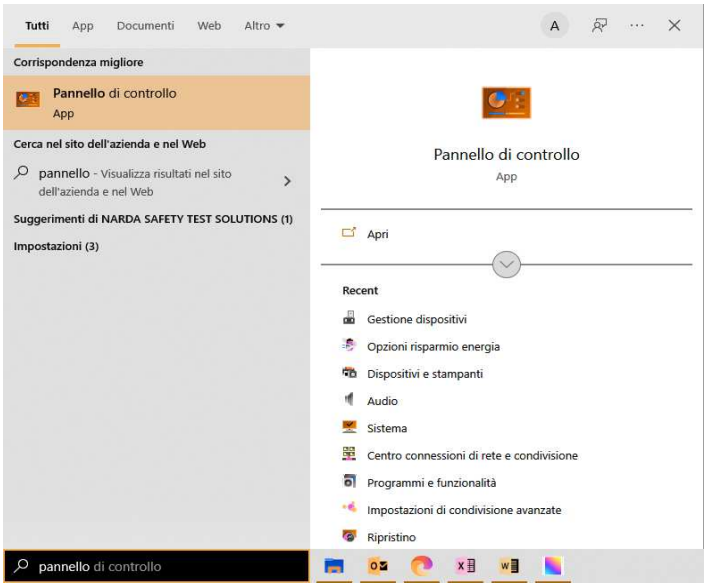
## 6.1 Uninstalling driver for the USB-OC

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

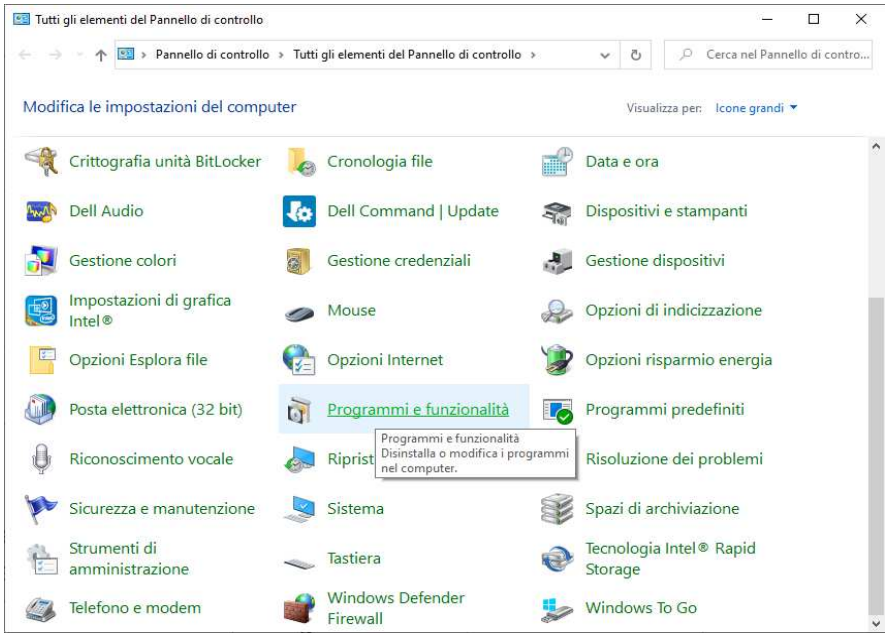
Open the Windows Control Panel.

NOTE

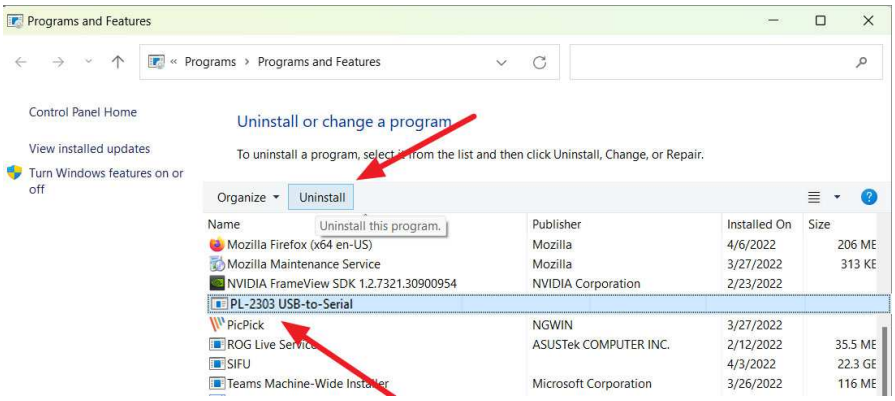
**The following procedure shows how to remove the driver in Windows 10 environment. It may be different depending on the operating system in use.**




Double click “Programs and Features”.



From the application list select “PL-2303 USB-to-Serial”, click “Uninstall” and follow the instructions.

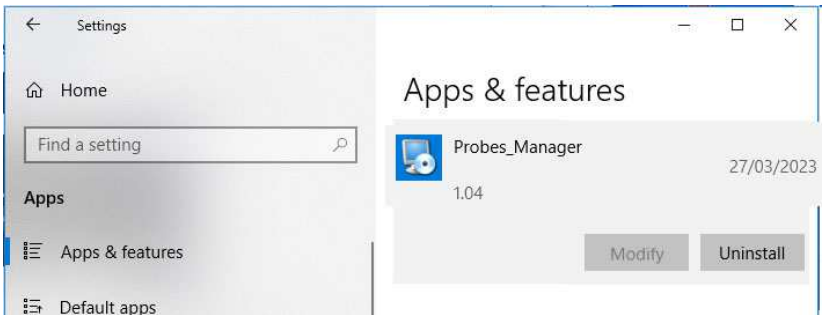



## 6.2 Uninstalling Narda Probes Manager

Press **EXIT** to quit Narda Probes Manager, disconnect the LR01 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 – LR01 Manager APP Operating instructions

## 7.1 Introduction

Narda introduces an innovative way to perform the LR-01 measurements on mobile device by a dedicated App. This section provides the information necessary to use the LR01 Manager application.

## 7.2 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 LR01 and the device.**

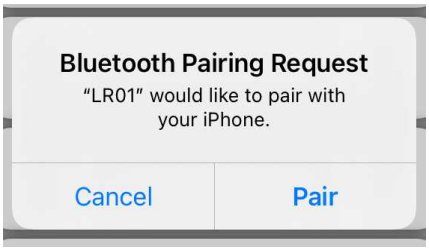
**NOTICE** **To active the Bluetooth communication on the LR01 the user must connect the repeater to Narda Probe Manager software and enable the BLE function (see §4.2.7.2 Bluetooth connection).**

**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.**

Turn on LR-01 and wait some seconds while the instrument performs a diagnostic test (see §2.7). After that it begins **flashing green**, to indicate the instrument is ready to communicate.

Clicking on the icon to run the application, the Bluetooth pairing request will appear. Select "**Pair**" to confirm.

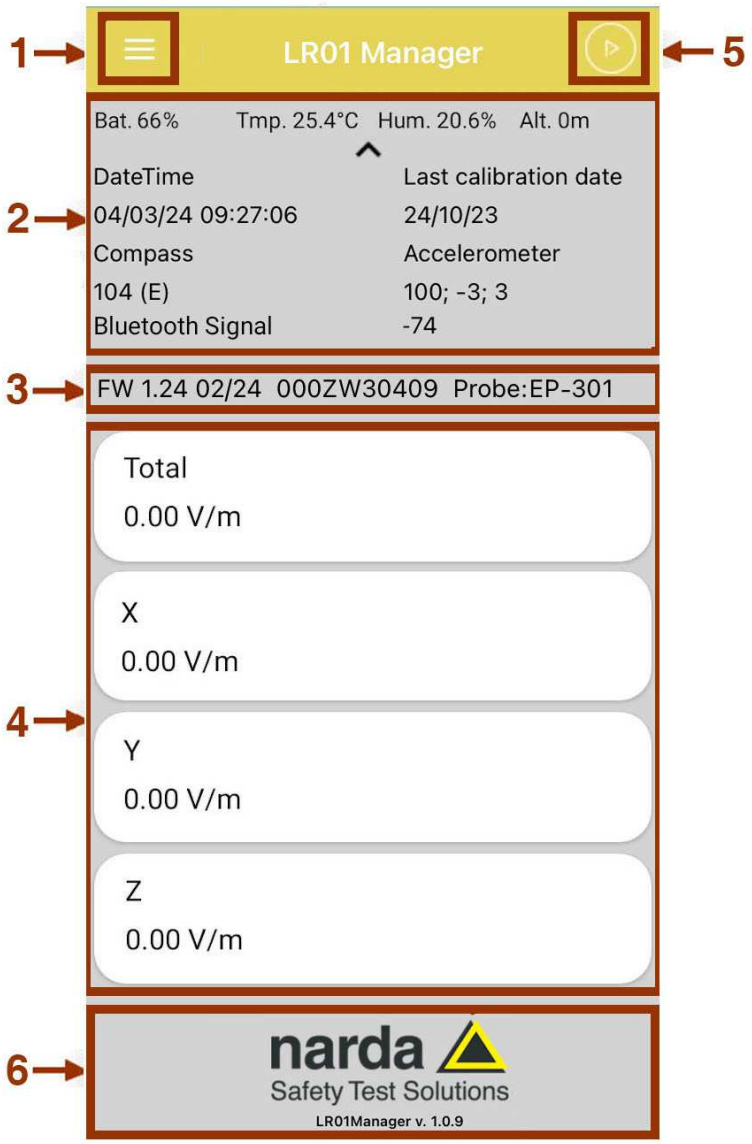


### 7.3 LR01 Manager Main window

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

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.**




Commands description:

1. Menu
2. Technical data
3. Unit's identifier and Probe type
4. Measurements window
5. Logger button
6. Info

### 7.3.1 Menu

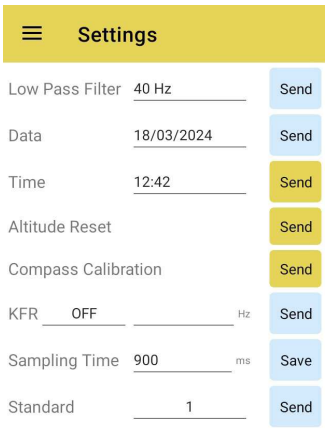

Commands:

**- Device:** to display the Main window.

**- Settings:** allows to modify the LR-01 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.

### 7.3.1.1 Settings




**Settings** window allows to:

- Set the internal digital **Filter.**

- Set the LR-01 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 LR-01 memory or OFF when disabled. When the KFR is ON the measured field value turns blue in the main window (for further information see §4.3.5).


- **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-01 and EHP-2B-02 Standard limit list:

**1 → ICNIRP 1998 Occupational;**
**2 → ICNIRP 1998 General Public;**
**3 → SC6 2015 Controlled;**
**4 → SC6 2015 Uncontrolled.**

- EHP-2B-03 and EHP-2B-04 Standard limit list:

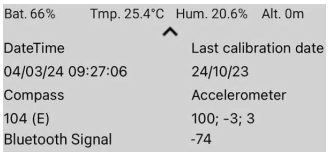
**1 → ICNIRP 2020 Occupational;**
**2 → ICNIRP 2020 General Public;**
**3 → FCC-96 326 Occupational;**
**4 → FCC-96 326 General Public.**


**The Standard function is enable only when an EHP-2B model probe is connected to the LR-01**.

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.

### 7.3.2 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 LR-01.

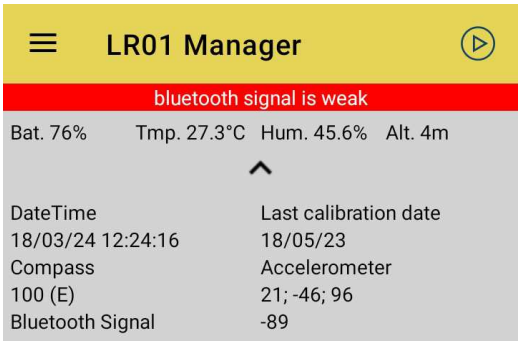
- **Last Calibration date:** Latest probe calibration.

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

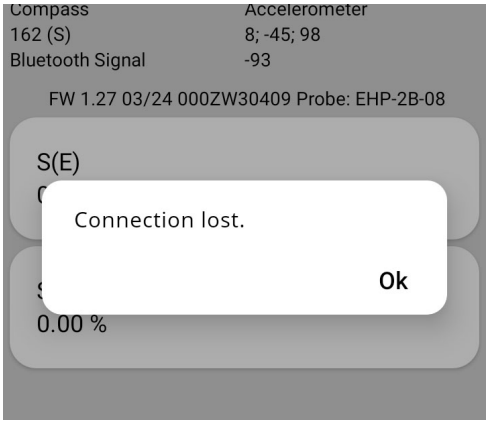
- **Accelerometer:** Gravitational acceleration is expressed in hundredths of g for each of the three axes. For Accelerometer axes orientation see §2.7.

**- 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 LR-01 is established again, the pairing request will appear.

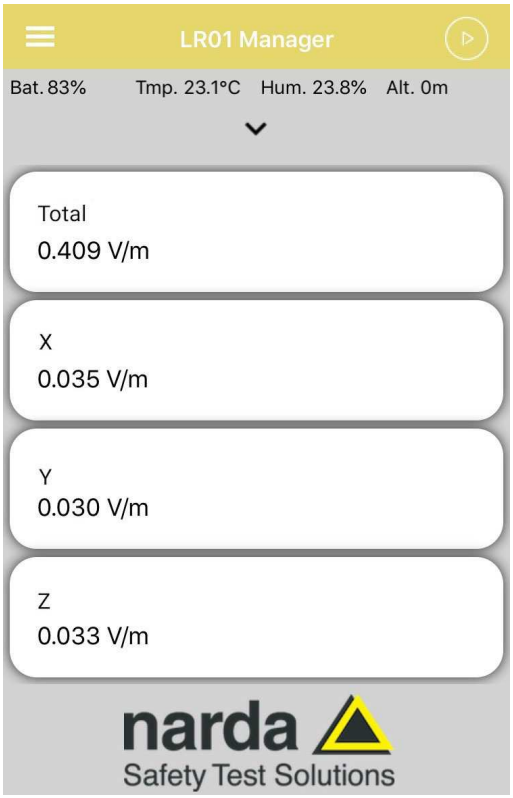
### 7.3.3 Live Measurements

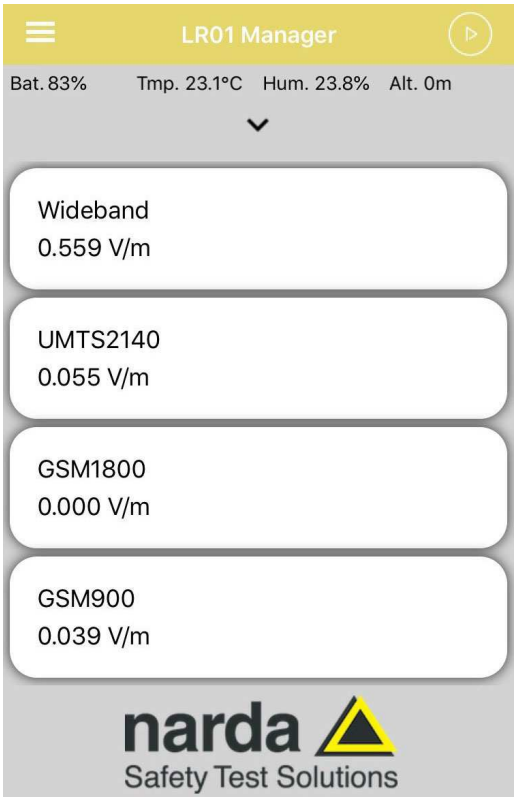
The mobile device performs live measurements and display the data with all other related information in the LR-01 Manager main window:

- **Field values** as X - Y - Z and/or Total.

Only some models of probe show the Total and the levels of the three independent Axis.
For others type of probe, for example, in case of Quadriband probe the Wideband, UMTS2140, GSM1800 and GSM900 field probe value will be shown.
The chapter 1 of this manual includes the list of the field probes available and their technical specifications.

- **Measuring unit** the electric or magnetic field measuring unit depend on the probe model connected.



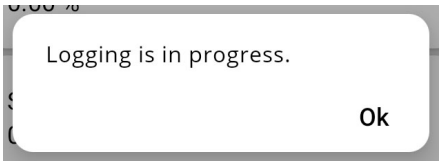

NOTE

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

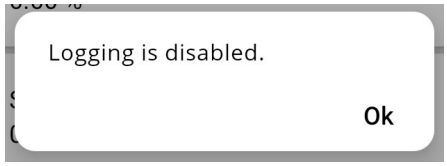
### 7.3.4 Logger and Save measurements

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:



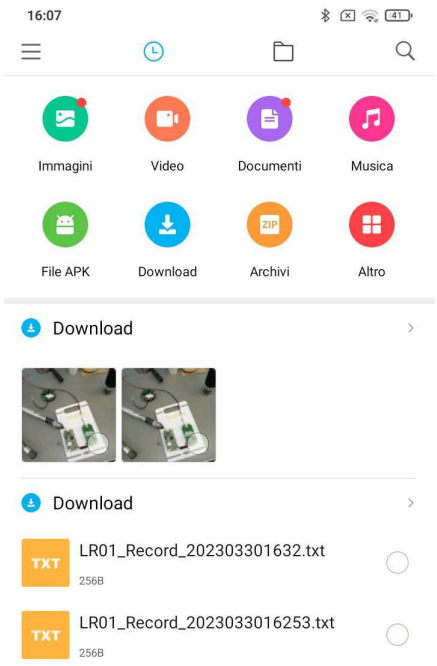

**NOTICE**

**Starting a new log, all the data of the previous one will be deleted. No data is saved in the internal memory of LR01; see §4.6 Storing measurements on the LR-01 memory (Logger)**


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 1.00 03/23 000ZE20901 Probe: EP 333 - Unit: V/m - GPS: 44.0748283627698, 8.15976771948191 - Date: 28/03/2023
Time      Total     X         Y         Z
```

- Firmware version and released data (**FW 1.00 03/23)**

- LR-01 Serial Number (**000ZE20901)**

- Probe connected to the LR-01 (**Probe EP333)**

- Measurement unit (**Unit: V/m)**

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

- Working session date in dd/mm/yyyy format (**Date: 28/03/2023)**

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

- **TOTAL X Y Z:** Total and XYZ axis field value .
Only some models of probe allow the possibility to show the Total and the levels of the three independent axis.

Example with EP-330 probe

```
FW 1.00 03/23 000ZE20301 Probe: EP-330 - Unit: V/m - GPS: 24.0743232, 12.0596932 - Date: 23/03/2023

Time      Total     X         Y         Z
20:32:12  0.232     0.032     0.005     0.039
20:32:13  0.406     0.011     0.040     0.035
20:32:14  0.222     0.022     0.003     0.035
20:32:15  0.123     0.037     0.001     0.037
20:32:16  0.050     0.030     0.004     0.050
```

Example with EP-4B-02 probe

```
FW 1.00 03/23 000ZE20901 Probe: EP-4B-02 - Unit: V/m - GPS: 44.0747558, 8.1596996 - Date: 30/03/2023

Time      Wideband  UMTS2140  GSM1800   GSM900
16:19:59  0.499     0.054     0.000     0.039
16:20:00  0.513     0.056     0.000     0.035
16:20:01  0.513     0.055     0.000     0.035
16:20:02  0.506     0.054     0.000     0.037
16:20:03  0.545     0.039     0.000     0.050
```


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

### 7.3.5 Info

Contents:

- Manufacturer information and Software release;

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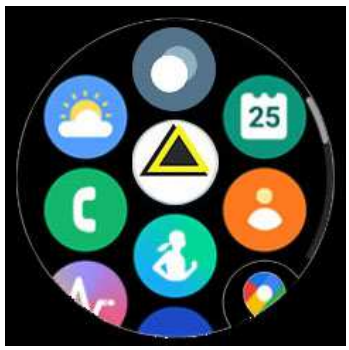
# 8 – Using of LR-01 with WearOS (Smartwatch) Operating instructions

## 8.1 Introduction

This section provides the information necessary to use the LR-01 programmable Logger Repeater with the optional Smartwatch.

## 8.2 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**

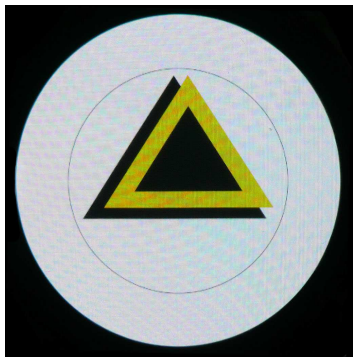
If the App has already been installed, tap on **Recent Apps** and make sure the software is not running to avoid communication errors (see §8.3.4 Close the App).

**NOTICE**

Also make sure turning on the Bluetooth on LR01 and Smartwatch.
**To active the Bluetooth communication on the LR01, the user must connect the repeater to Narda Probe Manager software and enable the BLE function (see §4.2.7.2 Bluetooth connection).).**

Turn on LR-01 and wait some seconds while the instrument performs a diagnostic test (see §2.7). After that it begins **flashing green**, to indicate the instrument is ready to communicate.

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.



## 8.3 Operations

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

NOTE

### 8.3.1 Live Measurements

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


The live measurements displayed in the main window are:

- **Field values** as X - Y - Z and/or Total.

Only some models of probe show the Total and the levels of the three independent Axis.
For others type of probe, for example, in case of Quadriband probe the Wideband, UMTS2140, GSM1800 and GSM900 field probe value will be shown.
The chapter 1 of this manual includes the list of the field probes available and their technical specifications.

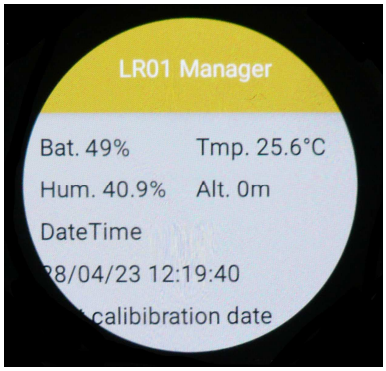
- **Measuring unit** the electric or magnetic field measuring unit depend on the probe model connected.

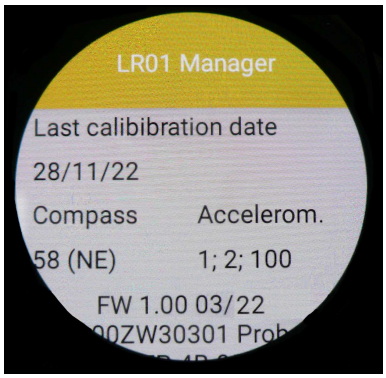
Swipe to the left or right to enter on **Technical data** or **Settings** panel; see the upcoming paragraph.

### 8.3.2 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 LR-01

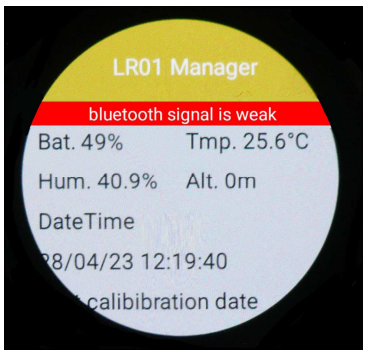
- **Last Calibration date:** Latest probe calibration

- **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".**

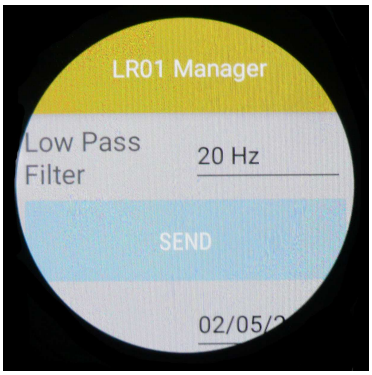
When the Bluetooth communication with the LR-01 is established again, the pairing request will appear.

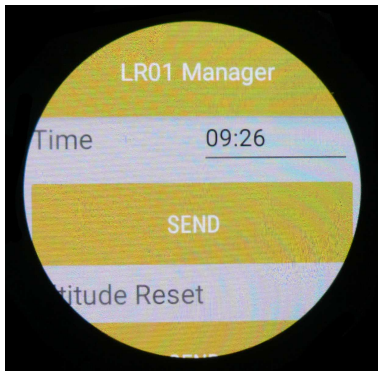
- Firmware and data release, Serial Number and Probe model

### 8.3.3 Settings

Enter on the **Settings** panel.

Swiping upwards or downwards on the screen, all settings are shown:




- Set the internal digital **Filter**

- Set the LR01 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 LR-01 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-01 and EHP-2B-02 Standard limit list:

**1 → ICNIRP 1998 Occupational;**
**2 → ICNIRP 1998 General Public;**
**3 → SC6 2015 Controlled;**
**4 → SC6 2015 Uncontrolled.**

- EHP-2B-03 and EHP-2B-04 Standard limit list:

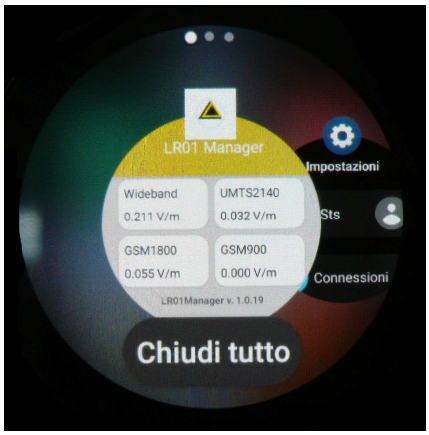
**1 → ICNIRP 2020 Occupational;**
**2 → ICNIRP 2020 General Public;**
**3 → FCC-96 326 Occupational;**
**4 → FCC-96 326 General Public.**


**The Standard function is enable only when an EHP-2B model probe is connected to the LR-01**.

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

### 8.4 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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# 9 - Command protocol

## 9.1 Introduction

This chapter provides the information required to control the LR-01 programmable Logger Repeater 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 LR-01 can be in wired USB, 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 LR-01 unit. To connect to a specific unit, a #nn should be used instead. Where nn is the address of the unit 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 unit 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.

At power ON, LR-01 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 LR-01 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, LR-01 sends answers to the received commands, according to the communication protocol described below.
The LR-01 automatically turns off 30 minutes after receiving the last command, to save battery.


**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.**

## 9.2 List of commands

**Table 9-1 Query COMMANDs list**

| Syntax | Function |
|---|---|
| **?ADR** | Requests the unit'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 unit's identification. |
| **?IDNF** | Requests unit'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 unit'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. |
| **?WME**i**[fv]** | Requests % value related to i-th standard. |
| **?WRN** | Requests warning threshold. |
| **?WVR** | Requests firmware version of the internal Wi-Fi + BLE module. |

**Table 9-2 Setting COMMANDs list**

| Syntax | Function |
|---|---|
| **SADR**a | Sets unit's address. |
| **SALR**s | 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. |
| **SAVG**l;r | Selects the averaging time and type |
| **SBDR** b | Sets baud rate. |
| **SBLE**x | Switches Bluetooth ON or OFF. |
| **SCLD**d.m.y | Sets the RTC date. |
| **SCLT** h.m.s | Sets the RTC time. |
| **SCPC**t | Runs compass calibration. |
| **SDCM**c | Sets the preferred communication channel at power on. |
| **SGCSA**h | Automatic time set. |
| **SGCSM** | Manual time set. |
| **SGOF** | Switches OFF the GPS module. |
| **SGOOFF** | Switches OFF the unit. |
| **SGOI** | Switches ON the GPS module. |
| **SIDN** i | Sets the units 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. |
| **SMSK**m | Sets the warnings and alarms mask. |
| **SPWD**p | Sets Wi-Fi password. |
| **SREBOOT** | Reboots the unit. |
| **SRST** | Restores default configuration. |
| **SRSTR** | Restores default configuration and logger rate. |
| **SSID**i | Sets Wi-Fi network ID. |
| **SSTS**i | Set the reference standard (for EHP-2B model probe only) |
| **SWFI**x | Wi-Fi connection. |
| **SWRN** s | Sets warning threshold. |

## 9.3 Query commands

Using these commands the LR-01 can be queried with a series of requests to which the repeater responds.
Query commands are characterized by the character **?** in the string.

**TABLE 9-3 Query commands meaning**

| | |
|---|---|
| **?ADR** | This query command **#LR?ADR*** requests the unit's address that represents the additional prefix that can be set by the User to distinguish a specific unit. It will be accepted and recognized, by that specific unit only, in the same way as the default prefix "LR" which is always valid for all units.<br><br>The reply is a string showing a number between 0 and 99.<br>Example of reply**: ADR=00** which means that the address of the unit is 00. |
| **?ALR** | This query command **#LR?ALR*** requests the Alarm threshold.<br><br>The reply provides the threshold in the current unit followed by the averaging time, in minutes.<br>When the connected probe is a EHP-2B-xx, it returns the alarm threshold for the Electric Field.<br>When the connected probe is a weighted model, the unit shown is %.<br><br>Examples of reply**: ALR=6.0 uT; 6.00 min.**<br>**ALR=25000.00%; 30.00 min.** |
| **?ALT** | This query command **#LR?ALT*** requests the relative altitude.<br><br>The reply provides the altitude in meters relative to the reference position which is acquired when the LR-01 is switched on or when the SALT command is sent or when a new Log begins.<br>The adopted formula is: alt=(2.0*1006.0)/(7.0*9.81)*Tk*LN(ref_Press/cur_Press)<br><br>Example of reply**: ALT=30** |
| **?AMCk** | This query command **#LR?AMCk*** requests the output status of the option Area Monitor Compact. The argument "k" can be as following:<br>• k=B Request Buzzer status<br>• k=1 Request A1 output status (Pin 2 and 8 on DB15 connector)<br>• k=2 Request A2 output status (Pin 1 and 7 on DB15 connector)<br>• k=R Request Relè output status (Pin 10,12,13,14,15 on DB15 connector)<br><br>Example of reply with **#LR?AMCR* :**<br>**AMCR----------**<br>In this case any alarm is not enable on Relè output<br><br>Examples of reply with **#LR?AMCB* :**<br>**AMCB-W---------**<br>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.<br><br>If the "k" index entered is A, all four output status are provided.<br>Examples of reply with **#LR?AMCA* :**<br>**AMCR--U--------**<br>**AMC2-----T-----**<br>**AMC1---V-------**<br>**AMCB-W---------**<br><br>Please, refer to **SAMCk para** command for Alarm and Warning masking.<br><br>If the index 'k' entered is not correct or the Area Monitor Compact is not present, the reply is: **AMCK=ERR** |
| NOTE | **See §10.13.6 for User's Port HD-15 female connector pinout list .** |

| | |
|---|---|
| **?AMS** | This query command **#LR?AMS*** requests the C4 and C3 input status of the option Area Monitor Compact. The format is as follows:<br>**AMS=C4[OFF/ON]; C3[OFF/ON];**<br>ON\|OFF indicates if the related input is triggered or not.<br>Examples of reply with **#LR?AMS***<br>**AMS:C4=OFF; C3=OFF; <13><10>** |
| **?AMV** | This query command **#LR?AMV*** requests the AMC release version and date.<br>Examples of reply with **#LR?AMV***<br>**AMV:A.10;19/01/23<13><10>**<br>If the Area Monitor Compact is not present, the reply is:<br>**AMV:Fail** |
| **?ANY** | This query command **#LR?ANY*** requests the device mask for field strength alarm notification.<br>The reply format is: **ANY=BLV** where:<br>• B = Buzzer;<br>• L = Visual Led<br>• V = Vibration<br>A dash "-" means that specific Device is not enable.<br>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.<br>The reply format is: **AQ_=m; x; t** where:<br>• **m** is the Logger acquisition mode: **A**= AVG; **R**=RMS; **I**=Instantaneous<br>• **x** represents the logger rate, in seconds,<br>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).<br>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).<br>• **t** is the Logger format: **32** = compact, **64** = extended<br>Example of reply**: AQ_=R; 30; 32** which means that the unit 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.<br>The reply is as follows: **AVG=**L;R where:<br>L is the averaged time period in minutes<br>R shows the acquisition mode setting: **A**= AVG; **R**=RMS<br>Example of reply**: AVG=6.00;A** which means that the unit is averaging over 6 minutes and the average type is AVG. |
| **?BAT** | This query command **#LR?BAT*** requests the current battery voltage.<br>The reply provides the battery voltage in Volt with 10 mV resolution, formatted as **BAT=V.vv**<br>Example of reply**: BAT=3.82** |

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

| | |
|---|---|
| **?CPS** | This query command **#LR?CPS*** requests the compass and accelerometer readings.<br><br>The reply is formatted as following:<br>**Heading:** bearing **(**orientation**); G:**x**;** y**;** z<br><br>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.<br><br>Note: compass heading 0 (North) corresponds to the direction where the GPS antenna is located.<br><br>Note: it is advisable to query this command at a rate lower than 3 times per second.<br><br>Example of reply**: Heading: 35 (NE); G:-1; 100; 7**<br><br>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.<br>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.<br><br>The reply provides the preferred channel at power on, as follows:<br>• DCM=0 for wireless channel disabled at power on;<br>• DCM=1 for Wi-Fi communication enabled at power on;<br>• DCM=2 for BLE communication enabled at power on.<br><br>Example of reply**: DCM=2** which means that each time the unit will be turned on, the BLE module will be activated. |
| **?GCS** | This query command **#LR?GCS*** requests the Real Time Clock setting status.<br><br>The reply is as follows:<br>• M for manual time setting (refer to SCLT and SCLD commands)<br>• A:x for automatic time setting where x is the time zone (integer value between -12 and 12)<br><br>Examples of reply**: GCS=M** which means that RTC is set manually<br>**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. |

| | |
|---|---|
| **?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.<br>RMC NMEA strings are reported in full, starting with **$GPRMC** and/or **$GNRMC**, and ending with the checksum followed by CR LF.<br><br>GGA NMEA strings are reported in full, starting with **$GPGGA** and/or **$GNGGA**, and ending with the checksum followed by CR LF.<br><br>When a position has not yet been acquired, the reply is:------VOID<br><br>Example of reply**:**<br>**$GPRMC,154452.000,A,4404.4843,N,01047.9412,E,0.28,152.18,270122,,,A*6E**<br>**$GPGGA,154453.000,4341.1507,N,01047.9413,E,1,7,1.00,6.2,M,47.8,M,,*5B**<br><br>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:<br>4404.4843 → Take the NMEA Latitude position.<br>0.4843 * 60 = 29.058 → Multiply by 60 the NMEA Latitude second part.<br>440429.058 → The product is added to the NMEA Latitude first part for making 6 digits long first part.<br>04 * 60 = 240 → Take the second two digits of the first part and multiply by 60.<br>(240+29.058)/3600=0.074738 → The product is added to the last first part and the total divided by 3600.<br>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 unit's identifier.<br><br>The reply provides the unit's name followed by the serial number, in the format:<br>**IDN=**name;S/N where name is the identification string stored with command SIDN, and S/N is the serial number of the unit, factory stored.<br><br>Example of reply**: IDN=Cisano;000WE20501** |
| **?IDNF** | This query command **#LR?IDNF*** requests the extended unit's identifier .<br><br>The reply provides the unit's name followed by additional information as follows:<br>• name<br>• model<br>• firmware release<br>• Serial Number<br>A semicolon ; is used as separator between fields.<br><br>The format is: **IDN=**name;model;R.rr MM/YY;S/N<br>Where: Name is the identification string stored with command SIDN,<br>Model is the type of the unit,<br>R.rr shows the firmware version and MM/YY its date of release,<br>S/N is the serial number of the unit, factory stored.<br><br>Example of reply**: IDN=Cisano;LR01;A0.0 10/21;000WE20501** which identifies the unit 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:<br>• KFR=OFF when the correction is not active<br>• KFR=NA when the correction is not available<br>• KFR=f;[fH] u when the correction is active for frequency f expressed in the unit u.<br>if an Electric and Magnetic probe is connected, also the frequency for magnetic measurement is shown.<br><br>Examples of reply**: KFR=6.500 MHz**<br>**KFR=6.500;1.000 MHz** |

| | |
|---|---|
| **?LFA[S]** | This query command **#LR?LFA*** requests the latest average field value.<br>The reply provides the value (or values) with current unit, followed by the averaging period in minutes (the same as per AVG command).<br><br>When a passive probe is installed, the command provides the field levels of the three axes, followed by the total value.<br><br>When the special probe EP-333 (RMS type) is in use, the command provides the RMS level.<br><br>When the Electric and Magnetic Field probe EHP-2B-xx is installed, the command provides the levels for both fields.<br><br>Examples of reply**:**<br>**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.<br><br>**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.<br><br>NOTE: It works via USB and Optic port only. Please, refer to command ?WLOG to download data via one of the wireless connections.<br><br>The reply starts with string **LOG_S** and is terminated by the string **LOG_E.**<br>The first 128 bytes (LOG_S included) represent the header; the following data represent the records of 32 (or 64) bytes each.<br><br>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.<br><br>The reply is the index value, for the selected filter, related to the list:<br>• 0: 10 Hz<br>• 1: 20 Hz<br>• 2: 40 Hz (default)<br>• 3: 80 Hz<br><br>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.<br><br>The reply is:<br>• LST=1 Logger active<br>• LST=0 Logger disabled<br><br>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.<br><br>Example of reply:<br>**MAC=60:8A:10:D2:71:02** |

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

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

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| **?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.<br><br>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.<br><br>This command can be useful, for example, to be able to record separately all the elementary data used by the instrument.<br><br>Three-band probe:<br>• **MES=W;L;H;V/m;** where:<br>• W is the wideband probe field level;<br>• L is the low-pass probe field level (e.g. < 862 MHz)<br>• H is the high-pass probe field level (e.g. > 933 MHz)<br>• V/m is the measurement unit label<br>Four-band probe:<br>• **MES=W;A;B;C;V/m;** where:<br>• W is the wideband probe field level;<br>• A is the band-1 probe field level (e.g. 2140 MHz)<br>• B is the band-2 probe field level (e.g. 1800 MHz)<br>• C is the band-3 probe field level (e.g. 900 MHz)<br>• V/m is the measurement unit label<br>Single-band probe:<br>• **MES=W;;V/m;** where:<br>• W is the field level;<br>• V/m is the measurement unit label<br>Passive probe:<br>• **MES=T;X;Y;Z;U** where:<br>• T is the Total field level;<br>• X is the X axes field level;<br>• Y is the Y axes field level;<br>• Z is the Z axes field level;<br>• U is the measurement unit label<br>Electric and Magnetic probe EHP-2B-xx:<br>• **MES=E;H;%;** where:<br>• E. is the Electric field level;<br>• H is the Magnetic field level;<br>• % is the measurement unit label |

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| | Following is the standard NMEA GPRMC and/or GNRMC string that reports the information:<br>• Time (UTC)<br>• Navigation receiver warning A = OK, V = warning<br>• Latitude (deg. min North/South)<br>• Longitude (deg. min East/West)<br>• Speed over ground (Knots)<br>• Course Made Good<br>• Date (UTC)<br>• Magnetic variation (deg)<br>• Mandatory checksum<br><br>Following is the standard NMEA GPGGA and/or GNGGA string that reports the information:<br>• Time (UTC)<br>• Latitude (deg. min North/South)<br>• Longitude (deg. min East/West)<br>• Position Fix<br>• Satellites in use<br>• Horizontal Dilution of Precision<br>• MSL Altitude in m<br>• Geoid Separation in m<br>• Mandatory checksum<br><br>The reply is terminated by the string "-->" followed by date and time from the unit.<br><br>Example of reply**: MES=10.66; ; V/m; 3.53V;**<br>**$GPRMC,144550.000,A,4341.1465,N,01047.9383,E,1.38,185.31,280122,,,A*67**<br>**;$GPGGA,144551.000,4341.1462,N,01047.9386,E,1,6,1.29,16.9,M,47.8,M,,*60**<br>**; -->28/01/22 15:45:50***<br><br>The NMEA degrees minutes can be convert to decimal degree (see ?GPS command).<br><br>Note: to disable the continuous transmission, simply send command **?MESs**<br><br>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 (%)<br><br>Example of reply**: MES=10.68; ; V/m; 3.53V;**<br>**$GPRMC,144457.000,A,4341.1494,N,01047.9397,E,0.21,191.83,280122,,,A*6F**<br>**;$GPGGA,144458.000,4341.1493,N,01047.9397,E,1,6,1.30,16.4,M,47.8,M,,*63**<br>**;Heading: 164 (S); g:-15; 76; 68;24.95;36.41*; -->28/01/22 15:44:57*** |
| **?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.<br><br>It produces a single reply as per the ?MES command. |

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| **?MSK** | This query command **#LR?MSK*** requests the alarms Mask.<br><br>The reply provides a string with every armed alarm, with the format:<br>**MSK=AWUVPTCawvp SERIAL ALRTRG**<br>where the meaning of the symbols is similar to the ?STA command, as follows:<br>• A = Field Level exceeded Alarm;<br>• W = Field Level exceeded warning;<br>• U = USB cable connected Alarm;<br>• V = Low Battery Alarm;<br>• P = Probe failure Alarm;<br>• T = OverTemperature Alarm;<br>• C = Relative Humidity Alarm;<br>• a = end of Field Level Alarm situation;<br>• w = end of Field Level Warning situation;<br>• v = end of Low Battery Alarm;<br>• p = end of Probe Alarm;<br>• SERIAL = Alarms or logger transmission enabled via the serial port<br>• ALRTRG = any Alarm or warning triggers the Logger, if enabled.<br><br>A dash "-" means that specific Alarm (or warning) is not armed.<br><br>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.<br>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.<br>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).<br><br>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.<br><br>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.**<br><br>Example of reply:<br>**NET=OK**<br>**[ ] SSID:Redmi Note 8 Pro -41dB**<br>**[X] SSID:FRITZ!Box 7490 -79dB**<br>**[ ] SSID:DWR-921-B5BC -83dB**<br>**[ ] SSID:TP-LINK_F788 -67dB**<br><br>**[X]** mark indicates the default network but not the successful connection.<br><br>Please refer to command ?WFI to find out the connection status. |

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

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| **?SNS** | This query command **#LR?SNS*** requests data from the environmental sensor.<br><br>The reply, in the format **SNS=T;H;P** provides:<br>• T: Temperature, in Celsius degrees (°C)<br>• H: Relative Humidity in percentage (%)<br>• P: Atmospheric Pressure (hPa)<br><br>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.<br><br>The reply is in the format:<br>SST=l where l is the RSSI value, expressed in dBm, for the wireless network which the unit is connected to.<br>When no network is detected, or the unit is disconnected, it returns SST=ERR<br><br>Example of reply: **SST=-67** |
| **?STA** | This query command **#LR?STA*** requests the alarms status, regardless of the MSK setting.<br><br>The reply provides a string showing the following labels: **STA=AWUVPTCawvp**<br>• W: Warning level exceeded;<br>• A= ALARM threshold exceeded;<br>• w= end of Warning situation;<br>• a= end of Alarm situation;<br>• P= Probe failure ALARM;<br>• p= end of Probe Alarm;<br>• V= Low Battery ALARM;<br>• v= end of Low Battery Alarm;<br>• T= OverTemperature ALARM;<br>• U= USB Connection Warning;<br>• C= Relative Humidity ALARM<br>Note: each alarm is replaced by dash "-" when not active.<br><br>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.<br><br>Please, refer to ?MSK command for alarm masking.<br><br>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. |

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| **?STM** | This query command **#LR?STM*** requests the active alarms condition.<br><br>The reply provides a string showing the active alarms (they must be activated by SMSK command) as following: STA=AWUVPTCawvp<br>• W: Warning level exceeded;<br>• A= ALARM threshold exceeded;<br>• w= end of Warning situation;<br>• a= end of Alarm situation;<br>• P= Probe failure ALARM;<br>• p= end of Probe Alarm;<br>• V= Low Battery ALARM;<br>• v= end of Low Battery Alarm;<br>• T= OverTemperature ALARM;<br>• U= USB Connection Warning;<br>• C= Relative Humidity ALARM<br>Note: each alarm is replaced by dash "-" when not active.<br><br>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.<br><br>Please, refer to ?MSK command for alarm masking.<br><br>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.<br><br>The reply is in the format:<br>SST=i where i is index of the covered standards list.<br><br>This value affects Alarms and Warnings, the value saved in the log and the reply to the ?MES command.<br><br>Example of reply: **STS=1** |
| **?TMP** | This query command **#LR?TMP*** requests temperature and humidity to the unit.<br><br>The reply, in the format **TMP=T;H** provides:<br>• T: Temperature, in Celsius degrees (°C)<br>• H: Relative Humidity in percentage (%)<br><br>Example of reply: **TMP=23.9;38.8** |

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| **?VST[V]** | This query command **#LR?VST*** requests the power supply status.<br><br>The reply provides the code as follows:<br>• 0 for battery supply<br>• 1 for external supply connected and battery charge completed<br>• 2 for external supply connected and battery under charging<br><br>Example of reply: **VST=1** which indicates the external 5V supply is connected and the battery is fully charged.<br><br>Note: it is possible to obtain the information including the description, issuing the command **#LR?VSTV***<br><br>Example of reply: **VST=0 (Battery)** |
| **?WFI** | This query command **#LR?WFI*** requests the status of the Wi-Fi module<br><br>The reply is as follows:<br>• **WFI=OFF** when the module is switched OFF;<br>• **WFI=BLE** when the Bluetooth LE is active;<br>• **WFI=ON**<br>**SSID :** stringSSID<br>**Signal Strenght :** dBm<br>**Local IP Address :** IPv4_Address:Port<br><br>If no IP address has yet been assigned to the unit, or it has not been possible to connect to the network, Local IP Address shows “waiting for connection”.<br><br>Examples of reply:<br>**WFI=ON**<br>**SSID : Redmi Note 11**<br>**Signal Strenght : -87**<br>**Local IP Address : 192.168.0.21:6666**<br>Which means that the unit 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.<br><br>NOTE: It works via BLE and Wi-Fi ports only. Please, refer to command ?LOG to download data via fiber optic or USB connection.<br><br>The reply starts with string **LOG_S** and is terminated by the string **LOG_E.**<br>The first 128 bytes (LOG_S included) represent the header; the following data represent the records of 32 (or 64) bytes each.<br><br>Please, refer to the binary Log file paragraph at the end of this chapter for further details about the binary file. |

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

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| | 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 (%)<br><br>Example of reply**: WME=46.47;1930.61;%;*;3.79V;**<br>**$GPRMC,163230.000,A,4341.1574,N,01047.9386,E,0.01,25.87,190822,,,D*54**<br>**;$GPGGA,163305.992,,,,,0,3,,,M,,M,,*4B**<br>**;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.<br><br>The reply provides the threshold in the current unit followed by the averaging time, in minutes.<br>When the connected probe is a EHP-2B-xx, it returns the alarm threshold for the Magnetic Field.<br>When the connected probe is a weighted model, the unit shown is %.<br><br>Examples of reply**: WRN=6.0 uT; 6.00 min.**<br>**WRN=25000.00%; 30.00 min.** |
| **?WVR** | This query command **#LR?WVR*** requests the firmware version of the WIFI+BLE WINC3400 internal module.<br><br>The reply format is as follows: WVR=Major.Minor.Patch BuildDate BuildTime<br><br>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.**<br><br>Example of reply: **WVR=1.3.1 Jun 28 2019 13:46:26** |

**9.4 Setting commands** These commands are intended for making settings on the LR-01.

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

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| **SAQ**_m;x;t | This setting command sets the Logger parameters.<br><br>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.<br><br>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).<br>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.<br>Please refer to command SMSK for the Alarm Mask and SALR for the field level threshold.<br>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.<br>If the Logger rate **x=0** disables the Logger.<br><br>Argument **t** represents the Logger format.<br>• **t=32** selects the compact version of the log, with no position information. Each record occupies 32 bytes.<br>• **t=64** selects the extended versione of the log, complete of GPS data. Each record takes 64 bytes.<br><br>The reply is the same as per ?AQ_ command.<br>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).<br><br>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.<br><br>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.<br><br>The Log remains active until the unit 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. |

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

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| **SCLD**d.m.y | This setting command sets the date of the Real Time Clock.<br>Each parameter must be two digits, as following:<br>• d is the day (01 to 31)<br>• m is the month (01 to 12)<br>• y is the year (00 to 99)<br><br>The reply is the same as per ?CLK command.<br><br>Example: **#LRSCLD31.05.22*** which means that the RTC date will be set to May, 31th 2022. |
| **SCLT**h.m.s | This setting command sets the time of the Real Time Clock.<br>Each parameter must be two digits, as following:<br>• h for hours (00 to 23)<br>• m for minutes (00 to 59)<br>• s for seconds (00 to 59)<br><br>The reply is the same as per ?CLK command.<br><br>Example: **#LRSCLT16.25.00*** which means that the RTC time will be set to 4:25 PM. |
| **SCPC**t | This setting command is used to start the compass calibration procedure.<br><br>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.<br><br>A typical reply is:<br>Compass found (code 0xC7): Magnetometer calibration: Please rotate the device next 30 seconds ( 90 Readings)<br><br>89<br>88<br>87<br>…<br>0<br>Calibration Done<br><br>Then calibration data for debug purposes are added.<br><br>Note: compass heading 0 (North) corresponds to the direction where the GPS antenna is located.<br><br>Example: **#LRSCPC30*** which means that the RTC time will be set to 4:25 PM. |

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| **SDCM**c | This setting command selects the wireless communication channel active at power on, as follows:<br>• c=0 to disable all wireless channels at power on;<br>• c=1 to enable Wi-Fi module at power on;<br>• c=2 to enable BLE module at power on.<br><br>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.<br>This setting is saved in the internal flash memory.<br>Note: before any setting, with the unit blank, the communication is enabled, by default, on both channels.<br><br>The reply DCM=OK indicates that the command has been granted.<br><br>Example: **#LRSDCM1*** which means that each time the unit will be turned on, the Wi-Fi module will be automatically activated. |
| **SGCSA**h | This setting command selects the automatic RTC synchronization, taking advantage of the GPS signal.<br>The argument h represents the time zone, an integer value in hours between -12 and 12.<br>Please set your Country time zone and pay attention to the possible daylight saving time.<br><br>The reply is:<br>GCS=OK if the command has been granted<br>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.<br><br>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<br><br>Example: **#LRSGCSA2*** which sets the automatic RTC synchronization, using GPS module and a +2 hours time zone (Rome, in summer time).<br><br>Note: the command for manual RTC setting is SGCSM |
| **SGCSM** | This setting command **#LRSGCSM** selects the manual RTC update.<br>Choosing this mode, time and date must be set using SCLT and SCLD commands.<br><br>The reply GCS=OK indicates that the command has been granted.<br><br>Example: **#LRSGCSM*** which sets the manualc RTC setting.<br><br>Note: the command for automatic RTC setting is SGCSA |

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| **SGOF** | This setting command switches immediately off the internal GPS module.<br><br>The reply GOF=OK indicates that the command has been granted.<br><br>Example: **#LRSGOF*** |
| **SGOOFF** | This setting command turns immediately off the unit.<br><br>Note: since the instrument goes suddenly off after having received the command, no reply is returned.<br><br>Example: **#LRSGOOFF*** |
| **SGOI** | This setting command turns immediately on the internal GPS module.<br>It will stay on up to the first FIX or until the timeout of 4 minutes will expire.<br><br>The reply GOI=OK indicates that the command has been granted.<br><br>Example: **#LRSGOI*** |
| **SAMCk para**<br><br>NOTE | The setting command **#LRSAMCk para*** set the output of the option Area Monitor Compact and the alarm on which the output self works .<br>The argument “k” can be as following:<br>• k=B Set Buzzer<br>• k=1 Set A1 output (Pin 8 and 12 of DB15 connector)<br>• k=2 Set A2 output (Pin 7 and 11 of DB15 connector)<br>• k=R Set Relè output (Pin 2, 3, 4, 5, 10 of DB15 connector)<br><br>The parameter “para” allows the user to set which alarm should be enabled:<br>• W= Warning level exceeded<br>• A= ALARM threshold exceeded<br>• P= Probe failure ALARM<br>• V= Low Battery ALARM<br>• T= OverTemperature ALARM<br>• C= Relative Humidity ALARM<br>• U= USB Connection Warning<br><br>For example, the command **#LRSAMCB WT*** enable the Warning Level and Alarm OverTemperature on the Buzzer and provide the response:<br>**AMB-W---T-----**<br><br>The dot ( - ) means the specific alarm is not active<br><br>If the index ‘k’ entered is not correct or the Area Monitor Compact is not present, the reply is:<br>**AMCK=ERR**<br><br>**See §10.13.6 for User’s Port HD-15 female connector pinout list .** |
| **SIDN** i | This setting command sets the unit’s identifier. Its maximum length is 20 characters.<br><br>The reply is the same as per ?IDN command.<br><br>Example: **#LRSIDN Cisano*** which means that the unit name will become Cisano. |

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| **SKFR** f | This setting command sets the frequency for flatness correction.<br>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.<br><br>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.<br><br>Each time a probe is inserted, the frequency correction is automatically disabled.<br><br>The reply is:<br>KFR=OK in case the correction in frequency was set successfully<br>KFR=NA in case the correction in frequency was not available<br><br>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.<br>The argument f must be between 0 and 3 and represents the index of the following list of available filters:<br>• 0: 10 Hz<br>• 1: 20 Hz<br>• 2: 40 Hz (default)<br>• 3: 80 Hz<br><br>The reply is:<br>LPF=OK if the command has been granted<br>LPF=ERR if the command has been refused<br><br>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.<br>The argument l must be:<br>• 0: stops the Log immediately<br>• 1: starts the Log immediately<br><br>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.<br><br>The Logger parameters must be set via the SAQ_ command before sending this starting command.<br><br>Example:<br>**#LRSLST 1*** starts the Logger, deleting the previous saved one.<br>The reply is:<br>**LST=OK** if the SLST 1 command has been granted<br><br>Example:<br>**#LRSLST 0*** stop the Logger.<br>The reply is:<br>**LST=OK\r\nLog Ended – SLST 0** if the SLST 0 command has been granted<br><br>The reply is:<br>**LST=SERR** when issuing a SLST 0 command while the unit was not running in Logger mode. |

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| **SMSK**m | This setting command sets the Alarms and Warnings mask.<br>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.<br>• W = Warning level exceeded;<br>• A = ALARM threshold exceeded;<br>• w = end of Warning situation;<br>• a = end of Alarm situation;<br>• P = Probe failure ALARM;<br>• p = end of Probe Alarm;<br>• V = Low Battery ALARM;<br>• v = end of Low Battery Alarm;<br>• T = OverTemperature ALARM;<br>• U = USB connected Warning;<br>• C = Relative Humidity ALARM;<br>• L = Logger activation;<br>• S = Alarm notification via serial port enable.<br>Note: do not add the corresponding label to disarm any specific alarm.<br><br>Adding the S symbol, any Alarm will be transmitted via the serial port (optical and USB) 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.<br>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).<br><br>Please, refer to ?STA command for reading alarm status.<br><br>The reply is the same as per the ?MSK command.<br><br>Examples:<br>**#LRSMSK*** disarms all alarms and warnings;<br>**#01SMSK**AV***** tells unit 01 to arm the Field level Alarm and the Low Battery Alarm. |
| **SPWD**p | This setting command sets the password for the Wi-Fi connection. The security is under the standard WPA-PSK.<br>• p = alphanumeric password up to 64 characters long.<br><br>The parameter is kept when the unit is switched OFF.<br><br>The reply PWD=OK indicates that the command has been granted.<br><br>Example: **#LRSPWDP@$$w0rd*** which sets P@$$w0rd as the Wi-Fi password. |
| **SREBOOT** | This setting command forces the unit to reboot.<br><br>Note: since the instrument goes suddenly in reset procedure after having received the command, no direct reply is returned.<br>During restart, the unit outputs to the serial ports the results of the initial diagnostics.<br><br>Example: **#LRSREBOOT*** |

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

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

## 9.5 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 unit (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.

### 9.5.1 Log file data

All figures in this document are **BIG ENDIANNESS.**

#### 9.5.1.1 Passive Probes Structure description

| Tot_avg | | Tot_Peak | | Reserved | | | |
|---|---|---|---|---|---|---|---|
| Hi<br>Byte 1 | Lo<br>Byte 2 | Hi<br>Byte 3 | Lo<br>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<br>Byte 17 | Lo<br>Byte 18 | Hi<br>Byte 19 | Lo<br>Byte 20 | Hi<br>Byte 21 | Lo<br>Byte 22 | Hi<br>Byte 23 | Lo<br>Byte 24 |

| Z_avg | | Z_Peak | | Altitude | | Seconds | RH |
|---|---|---|---|---|---|---|---|
| Hi<br>Byte 25 | Lo<br>Byte 26 | Hi<br>Byte 27 | Lo<br>Byte 28 | Byte 29 | Byte 30 | Byte 31 | Byte 32 |

#### 9.5.1.2 Single and Three Bands Active Probes Structure description

**(Bands in red are present only for three band Probes)**

| Wide_avg | | Wide_Peak | | Reserved | | | |
|---|---|---|---|---|---|---|---|
| Hi<br>Byte 1 | Lo<br>Byte 2 | Hi<br>Byte 3 | Lo<br>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<br>Byte 17 | Lo<br>Byte 18 | Hi<br>Byte 19 | Lo<br>Byte 20 | Hi<br>Byte 21 | Lo<br>Byte 22 | Hi<br>Byte 23 | Lo<br>Byte 24 |

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

#### 9.5.1.3 4-Bands Active Probes Structure description

| Wide_avg | | Wide_Peak | | Reserved | | | |
|---|---|---|---|---|---|---|---|
| Hi<br>Byte 1 | Lo<br>Byte 2 | Hi<br>Byte 3 | Lo<br>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<br>Byte 17 | Lo<br>Byte 18 | Hi<br>Byte 19 | Lo<br>Byte 20 | Hi<br>Byte 21 | Lo<br>Byte 22 | Hi<br>Byte 23 | Lo<br>Byte 24 |

| 942_avg | | 942_Peak | | Altitude | | Seconds | RH |
|---|---|---|---|---|---|---|---|
| Hi<br>Byte 25 | Lo<br>Byte 26 | Hi<br>Byte 27 | Lo<br>Byte 28 | Byte 29 | Byte 30 | Byte 31 | Byte 32 |

#### 9.5.1.4 EHP2B Electric Magnetic Active Probe Structure description

| E_avg | | E_Peak | | H_avg | | H_Peak | |
|---|---|---|---|---|---|---|---|
| Hi<br>Byte 1 | Lo<br>Byte 2 | Hi<br>Byte 3 | Lo<br>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<br>Byte 17 | Lo<br>Byte 18 | Hi<br>Byte 19 | Lo<br>Byte 20 | Hi<br>Byte 21 | Lo<br>Byte 22 | Hi<br>Byte 23 | Lo<br>Byte 24 |

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

### 9.5.2 Field data

**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 (LR01 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.

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***)***

### 9.5.3 Additional GPS Structure description

| 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<br>Byte 41 | Lo<br>Byte 42 | Hi<br>Byte 43 | Lo<br>Byte 44 | Hi<br>Byte 45 | Lo<br>Byte 46 | Hi<br>Byte 47 | Lo<br>Byte 48 |

| Latitude int | | Latitude Fract | | Longitude int | | Longitude Fract | |
|---|---|---|---|---|---|---|---|
| degree<br>Byte 49 | minute<br>Byte 50 | Hi<br>Byte 51 | Lo<br>Byte 52 | degree<br>Byte 53 | minute<br>Byte 54 | Hi<br>Byte 55 | Lo<br>Byte 56 |

| MSL Altitude | | Heading | | RES | RES | RES | RES |
|---|---|---|---|---|---|---|---|
| Hi<br>Byte 57 | Lo<br>Byte 58 | Hi<br>Byte 59 | Lo<br>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

**9.5.3.1 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 - Accessories

## 10.1 Introduction

This section provides information required for installing and using accessories of the LR-01 programmable Logger Repeater.
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.

## 10.2 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.**

## 10.3 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

## 10.4 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 panels.
Finish the package by sealing it up tightly.
Apply a FRAGILE label to the package to encourage greater care in its handling.

## 10.5 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.**

## 10.6 *USB-OC Optical USB Converter*

### 10.6.1 Introduction

USB-OC is an standard accessory of the LR-01 programmable Optical Repeater.
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

### 10.6.2 Installation

Insert USB-OC in the connector of a free USB port of the PC, connect the fiber optic coming from the repeater 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 10-1 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. 10-1** USB-OC adapters

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

## 10.7 *LR01-8059 Adapter*

### 10.7.1 Introduction


LR01-8059 Adapter is an optional accessory of the LR-01 Programmable Optical Repeater.
It provides the connection for the 8059 family of field probes. They are the probes developed for the AMB-8059 remote station which specifications and performances are described in chapter 1 of this manual.


**Fig. 10-2** LR-01 with its 8059 adapter

### 10.7.2 Installation

Insert the LR01-8059 Adapter in the connector of the LR-01 Logger Repeater, paying attention to the position key and tightening the bayonet joint.
The adapter is self powered directly by the LR-01 and it shows a very low consumption. This means no maintenance is needed.
Then connect the desired field probe.

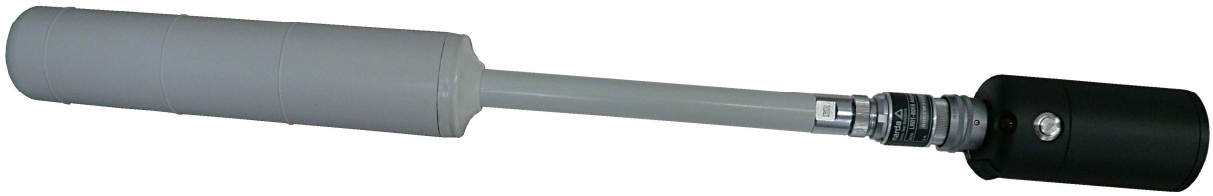


**Fig. 10-3** LR-01 with 8059 adapter e probe

| Table 10-2 Technical specifications of the LR01-8059 Adapter | |
|---|---|
| **Length** | 64 mm |
| **Weight** | 59 g |
| **Probe connector** | 8 pin round with key |

**Probe connector**

**Key:**

Connector for all AMB-8059 Probes models


**LR-01 connector**

**Key:**

Connector to LR-01 input

**Fig. 10-4** LR01-8059 Adapter connectors

## 10.8 *LR01-8053 Adapter*

### 10.8.1 Introduction

LR01-8053 Adapter is an optional accessory of the LR-01 Optical Programmable Repeater.


It provides the connection for the 8053 family of field probes. They are the probes developed for the Narda 8053 portable field meter, which specifications and performances are described in chapter 1 of this manual.

**Fig. 10-5** LR01 with its 8053 adapter

### 10.8.2 Installation

Insert the LR01-8053 Adapter in the connector of the LR-01 Logger Repeater, paying attention to the position key and tightening the bayonet joint.
The adapter is self powered directly by the LR-01 and it shows a very low consumption. This means no maintenance is needed.
Then connect the desired field probe.

**Fig. 10-6** LR-01 with 8053 adapter and probe

| Table 10-3 Technical specifications of the LR-01-8053 Adapter | |
|---|---|
| **Length** | 74 mm |
| **Weight** | 80 g |
| **Probe connector** | 12 pin round with key |

**Probe side panel**

Connector for all 8053 Probes models


**LR-01 side panel**

Connector to LR-01 input

**Fig. 10-7** LR-01-8053 Adapter connectors

## 10.9 *TR-02A Tripod*

### 10.9.1 Introduction

TR-02A is an Optional Accessory of the LR-01 Programmable Optical Repeater. It allows LR-01 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 10-4 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:

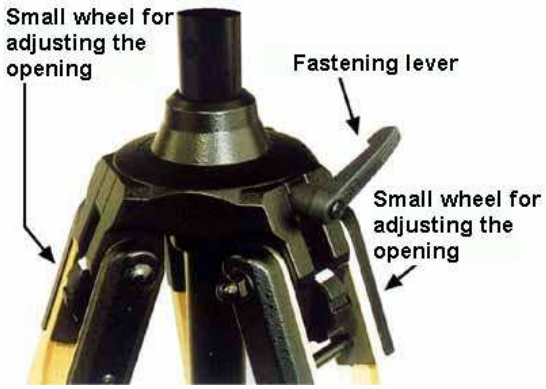



**Fig. 10-8** TR-02A Tripod

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.

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

- full height: 8 cm
- weight: 160 g
- load capacity: 10 kg
- Threaded insert ¼ “

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

**Fig. 10-9** LR-01 with 8053 adapter and probe on the TR-02A Tripod

## 10.10 *TT-01 Fiber Glass Telescopic Support*

### 10.10.1 Introduction

TT-01 is an Optional Accessory of the LR-01 Programmable Logger Repeater. It allows LR-01 Repeater to be easily supported during field measurements.

This device, on the top part of its container, has a screw to fix the relative apparatus.

**The design and materials of the TT-01 have been specially selected to prevent it from disturbing the sensors and, therefore, the measurements taken.**

| Table 10-5 Technical specifications of the TT-01 Fiber Glass Telescopic Support | |
|---|---|
| • **Diameter** | 32 mm |
| • **Minimum height:** | 120 cm |
| • **Maximum height:** | 420 cm |
| • **Weight** | 500 g |

TT-01 Fiber Glass Telescopic Support with soft carrying case.
The height of the TT-01 can be adjusted extending the telescopic elements as desired.

**Fig. 10-10** TT-01 Fiber Glass Telescopic Support

## 10.11 AC/DC USB Power Supply and battery charger

### 10.11.1 Introduction

Wall plug regulated switchmode AC/DC power supply is an standard accessory of the LR-01 Programmable Logger Repeater.
It is provided with the USB(A)/USB(C) cable to supply the LR-01 Logger Repeater 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.

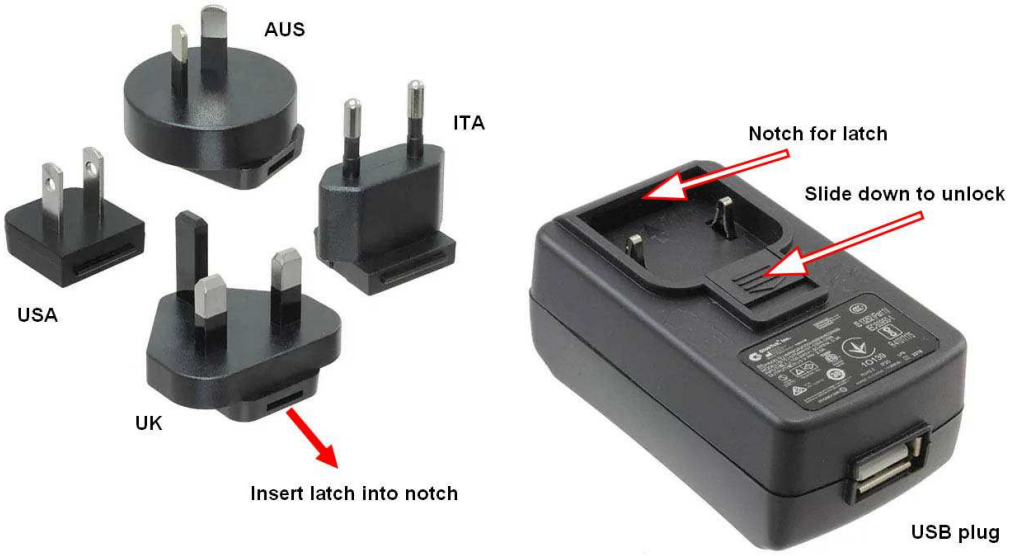



**Fig. 10-11** AC/DC Power Supply / battery charger

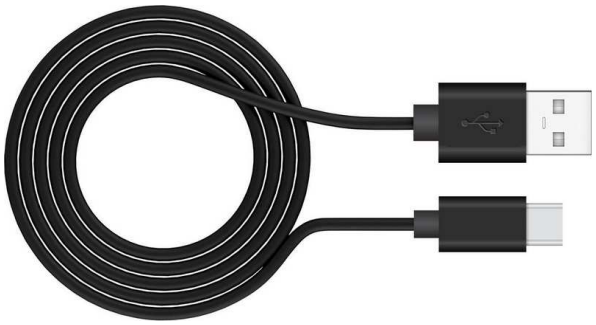


**Fig. 10-12** USB Cable – USB(A)/USB(C)

| Table 10-6 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 10-7 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 |

## 10.12 *Shoulder sling*

### 10.12.1 Introduction

Equipment Strap - adjustable and Comfortable shoulder sling, neck belt is an Optional Accessory of the LR-01 Programmable Logger Repeater. It is provided to carry the Logger Repeater in a comfortable way.
The strap is equipped with a standard 1/4 " threaded bolt that screws into the bottom of the repeater.
It can be configured and used as a neck belt or simply as a shoulder sling or wrist lanyard.

**Fig. 10-13** Shoulder sling

| Table 10-8 Technical specifications of the Shoulder Sling | |
|---|---|
| **Threaded bolt** | 1/4“ standard |
| **Color:** | black |
| **Max Length** | 2 m |
| **Load capacity** | > 2 kg |

.


Detail of the standard 1/4 " threaded bolt

## 10.13 SMARTS AMC Area Monitor Compact

**These are the basic operations to follow to work with the AMC Area Monitor Compact. All additional information and explanations can be found on SMARTS AMC manual.**

### 10.13.1 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.

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.

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 or SMARTS AMC Management software.
The Bluetooth connection is available for Android and iOS device through LR-01 Manager App.
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.

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 .

### 10.13.2 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

### 10.13.3 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

### 10.13.4 Main Specifications

| Table 10-9 Technical specifications of the SMARTS AMC Area Monitor Compact | |
|---|---|
| **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<br>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**<br>**Battery voltage and capacity**<br>**Data & Time**<br>**Temperature**<br>**Humidity (relative)**<br>**Pressure**<br>**GPS coordinates**<br>**Altitude**<br>**Compass**<br>**Speed**<br>**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<br>Optical mode (4) up to 60 hours<br>BT mode (4) up to 20 hours<br>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)<br>Up to IP65 (Outdoor) |
| **Dimensions** | Ø 86mm, Heigh 306mm<br>Wall distance 93mm with support Bracket |
| **Weight** | 350g only the AMC Wall support bracket and Interface.<br>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

### 10.13.5 AMC Main unit

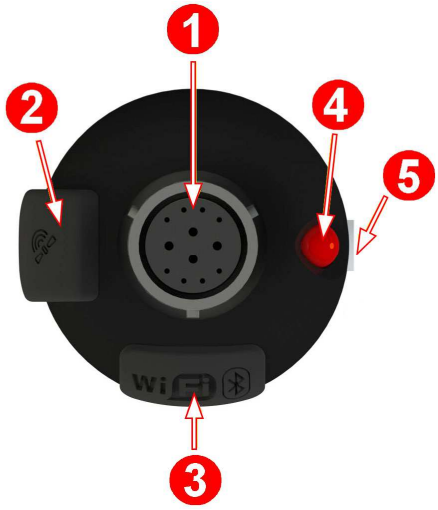



**Fig. 10-14** AMC Main unit

**Legend:**

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

### 10.13.6 AMC Wall support bracket and Interface

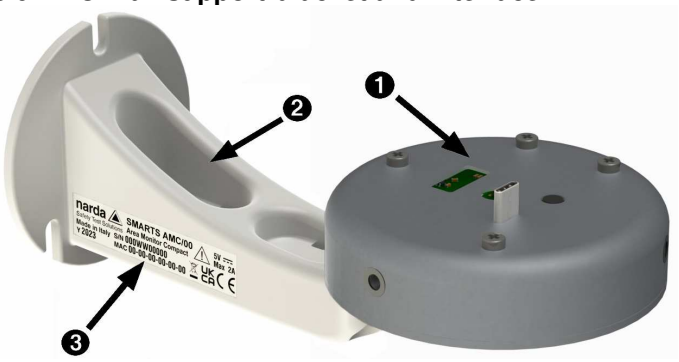



**Fig. 10-15** Wall support bracket and AMC Interface (top view)

**Legend:**

1. AMC Interface
2. Wall bracket
3. Identification label with Serial number, MAC address and safety note

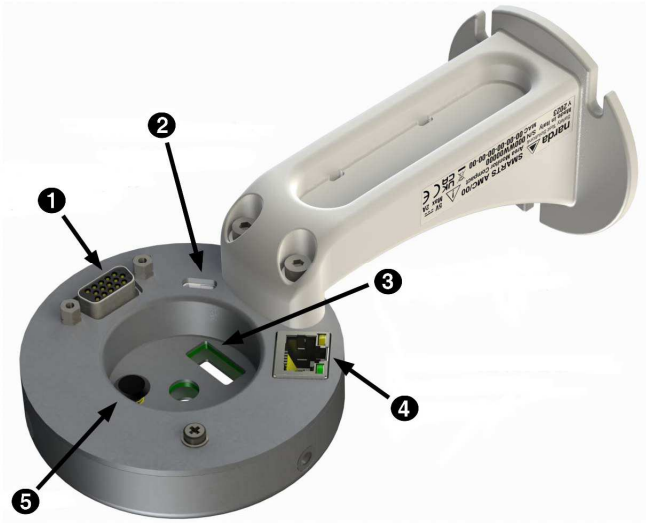



**Fig. 10-16** AMC Interface Connectors detail (bottom view)

**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

### 10.13.6.1 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.

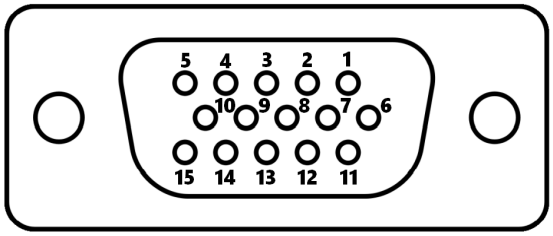



**Fig. 10-17** Programmable User's Port HD-15 female connector pinout

| | | | | | |
|---|---|---|---|---|---|
| **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 SMARTS AMC 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.

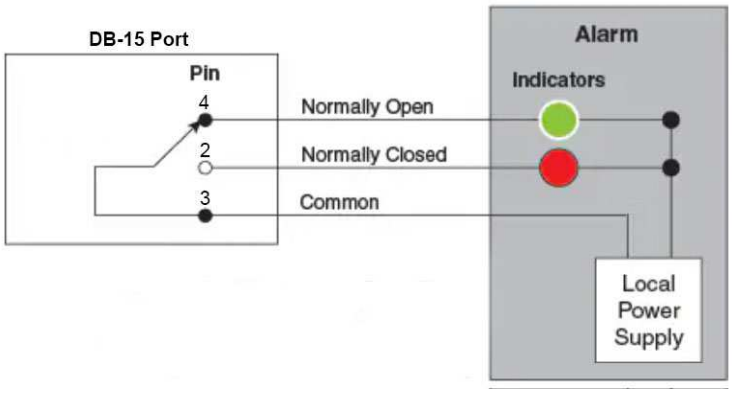



**Fig. 10-18** User's Port application example

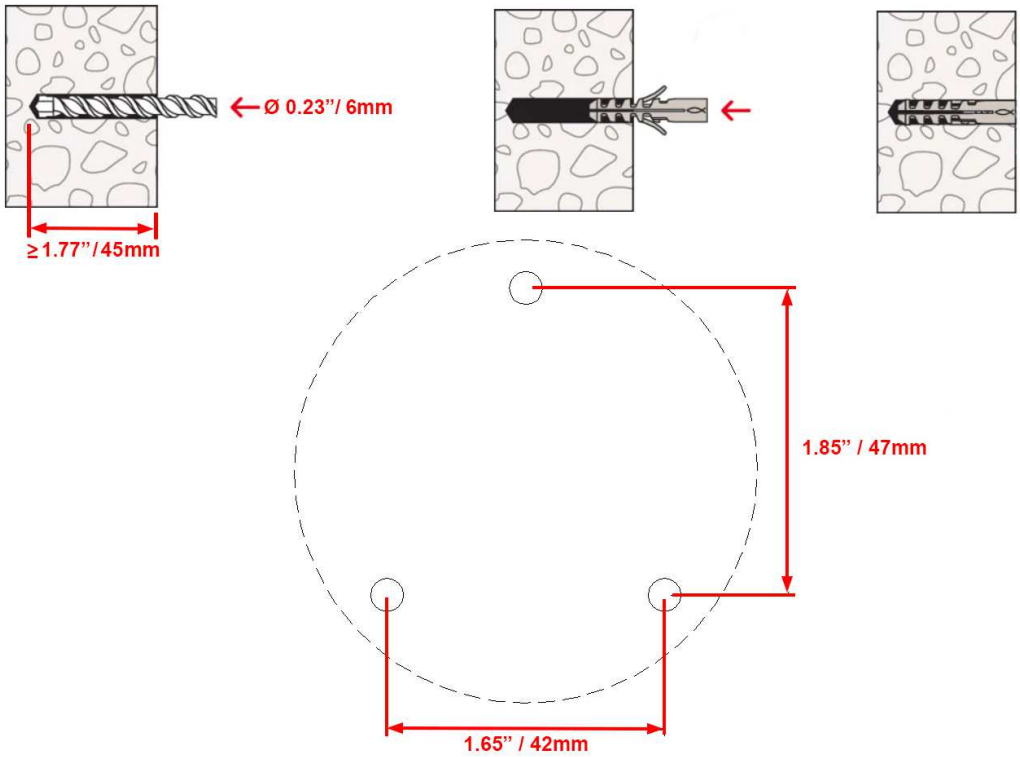
### 10.13.7 Installation and first use

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 §10.13.7.1)
- AMC on TR-02A (option) by Tripod support (see §10.13.7.2)
- Area Monitor Compact on ceiling by Wall bracket (see §10.13.7.3)
- Area Monitor Compact on ceiling by Tripod AMC support (see §10.13.7.4)

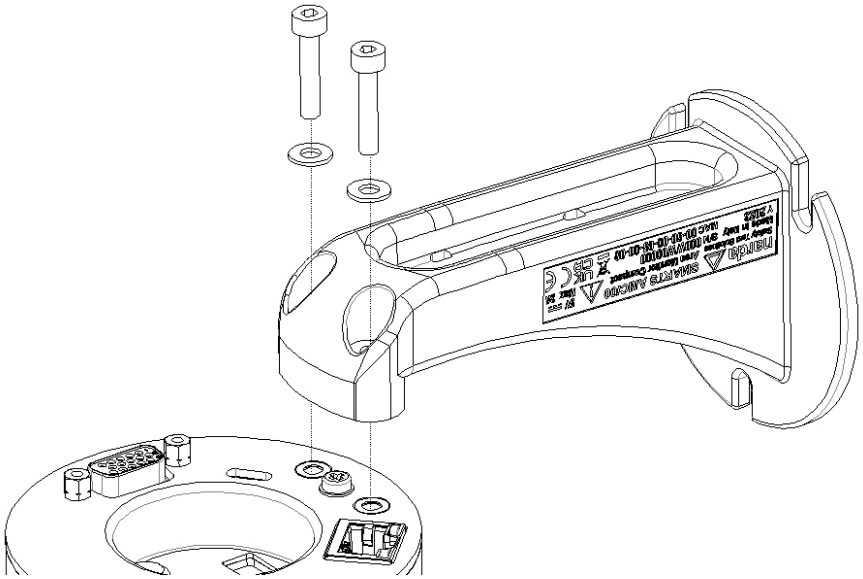
### 10.13.7.1 Wall mounted Installation

Follow the instructions below:

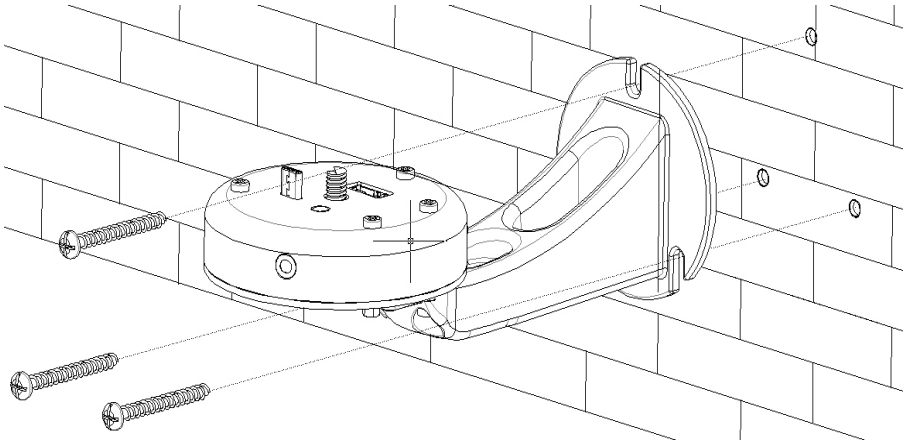
- Fix the provided three expansion plugs to the wall; for a correct installation refers to the following hole diameter and distance:



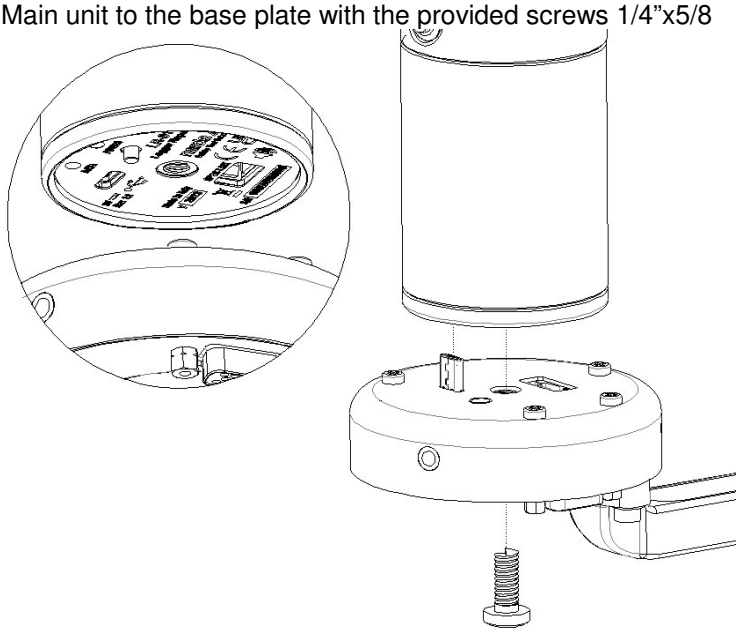

- Assembly the Wall support bracket to the AMC Interface with 2 pcs. socket head cup screws M4x20mm and washers using Allen key 3mm



- 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.

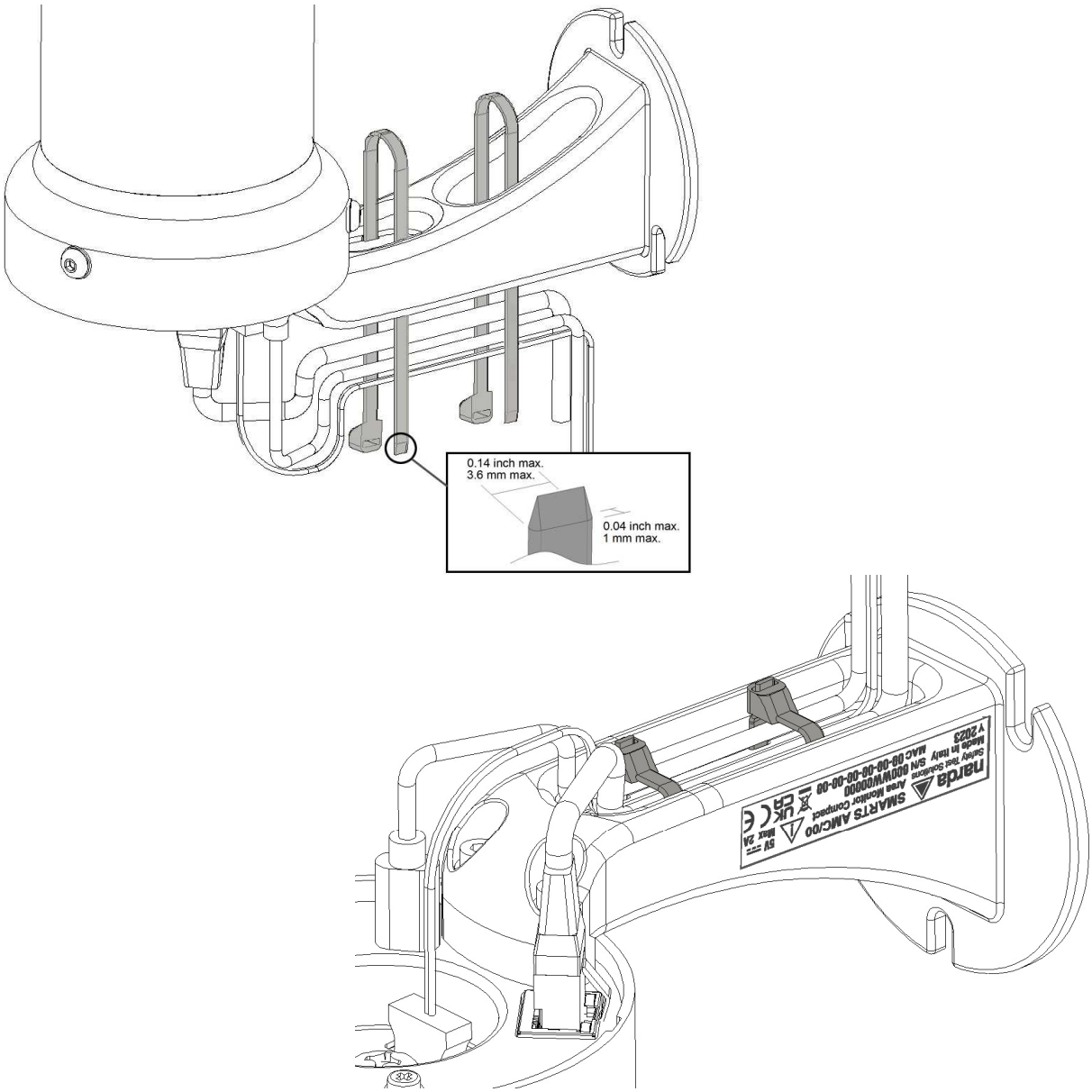
- Connect the AMC to the PC through USB-C or Fiber Optic or Ethernet port located on the bottom of the AMC interface.
A programmable User’s Port is available for external devices or trigger measurements under specific conditions .

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.

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.

- 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).



- Switch the unit on by pushing the button for a short while and check the Visual Led status.

- Install the Probes Manager or SMARTS AMC Management software on PC from the supplied Software Media.

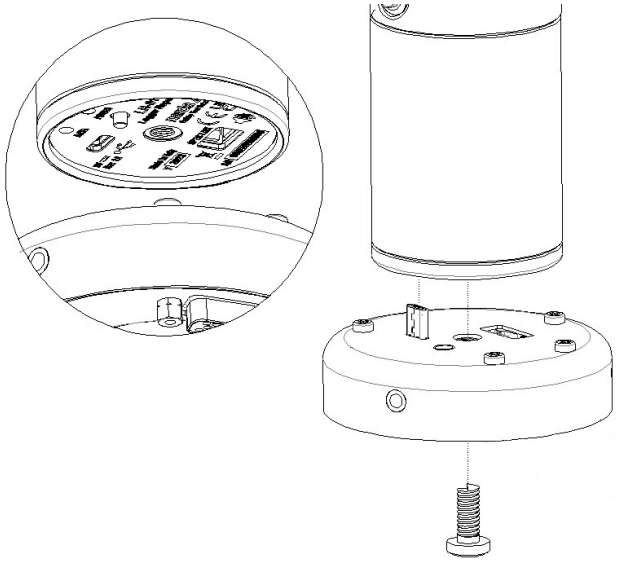
- Configure the AMC with Narda Probes Manager or SMARTS AMC Management or custom software.

**Fig. 10-19** AMC - Wall mounted

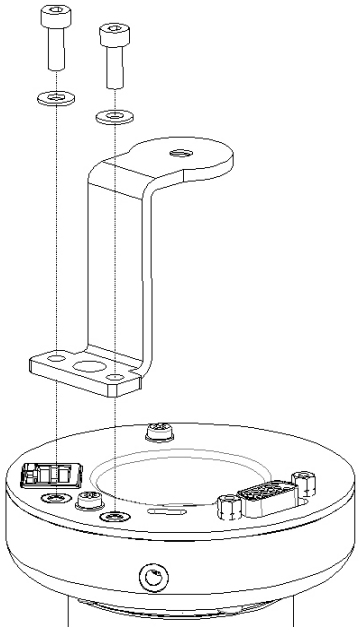
**10.13.7.2 Tripod mounted installation**

- 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



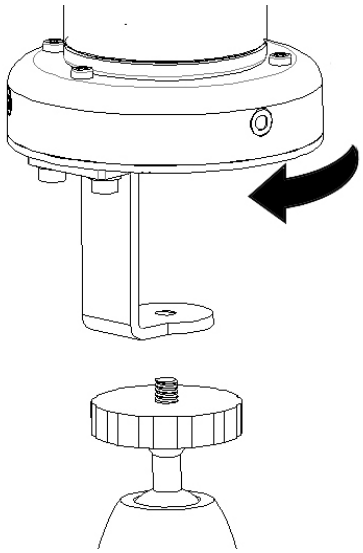
- Assembly the Tripod AMC support to the AMC Interface with 2 pcs. socket head cup screws M4x12mm and washers using Allen key 3mm



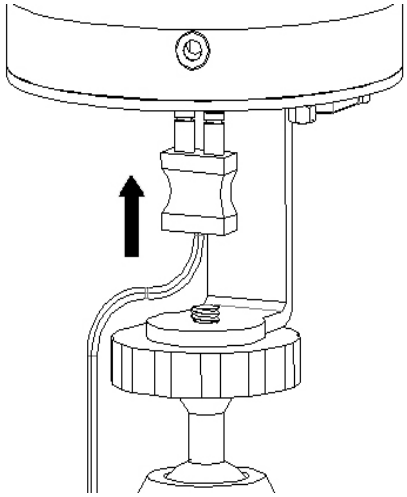
- Connect the probe to the Main unit upper round multipole connector paying attention to the position key and tightening the bayonet joint.

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

- Screw the AMC to the TR-02A Tripod by its metallic threaded insert and tighten firmly while holding the base plate.



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.



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.

- 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.

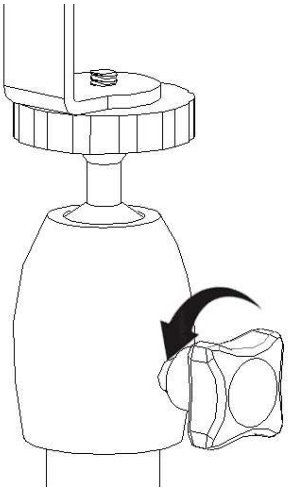


**Fig. 10-20** AMC on TR-02A

- Switch the unit on by pushing the button for a short while and check the Visual Led status.

- Install the Probes Manager or SMARTS AMC Management software on PC from the supplied Software Media.

- Configure the AMC with Narda Probes Manager or SMARTS AMC Management or custom software.

### 10.13.7.3 Ceiling mounted installation by Bracket

For additional information refer to §10.13.7.1

**Fig. 10-21** AMC on ceiling by Bracket

### 10.13.7.4 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 §10.13.7.2 .

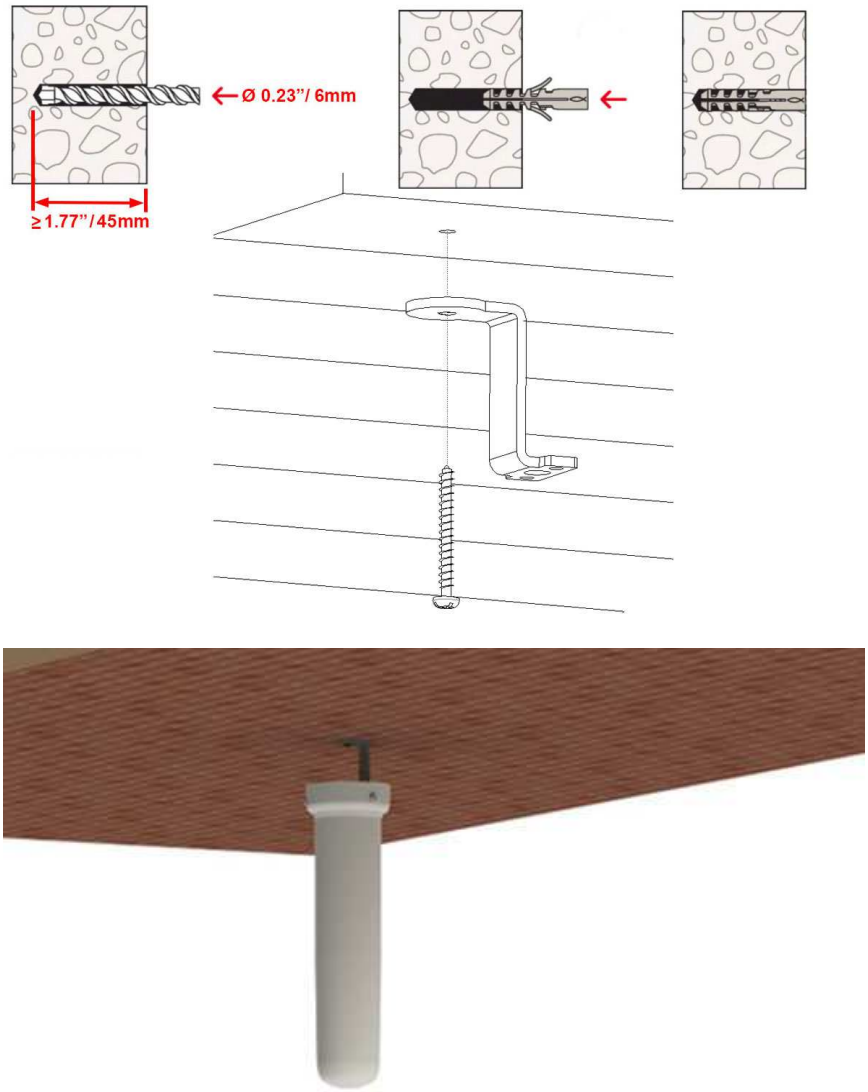



**Fig. 10-22** AMC on ceiling by Tripod AMC support

### 10.13.8 Example of installation

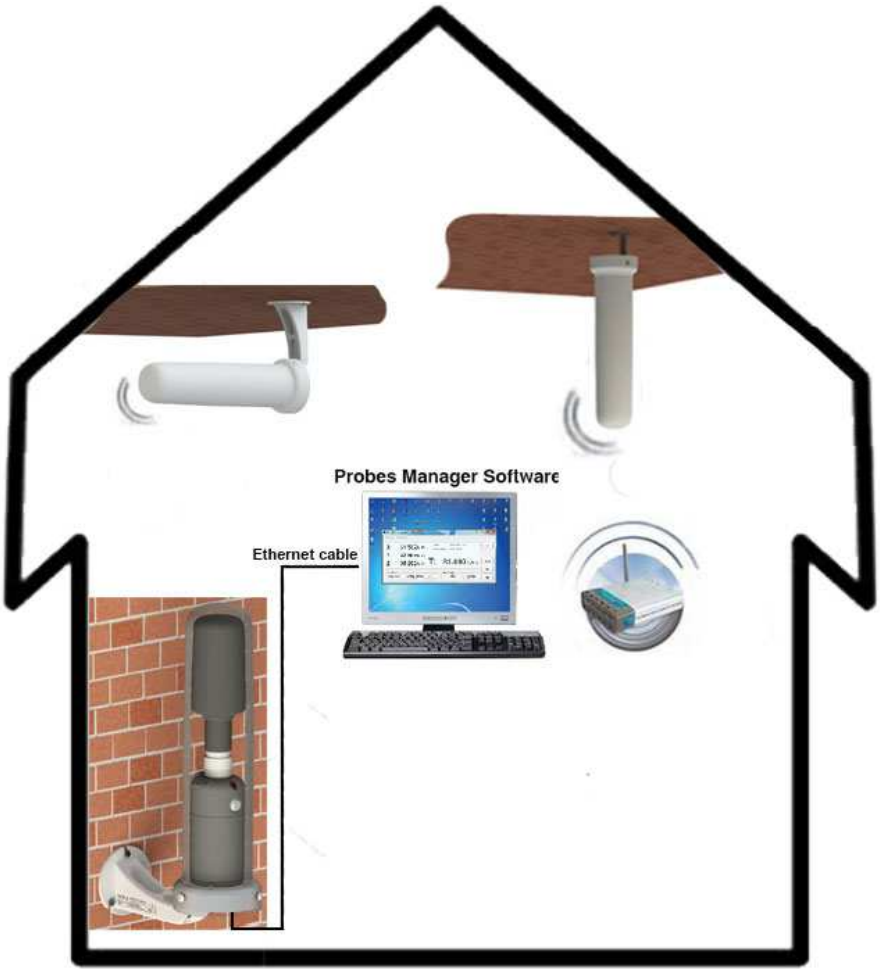



**Fig. 10-23** AMC in a multi-probe configuration


**Fig. 10-24** AMC link with Wi-Fi communication


**Fig. 10-25** AMC link with Bluetooth communication by smartwatch

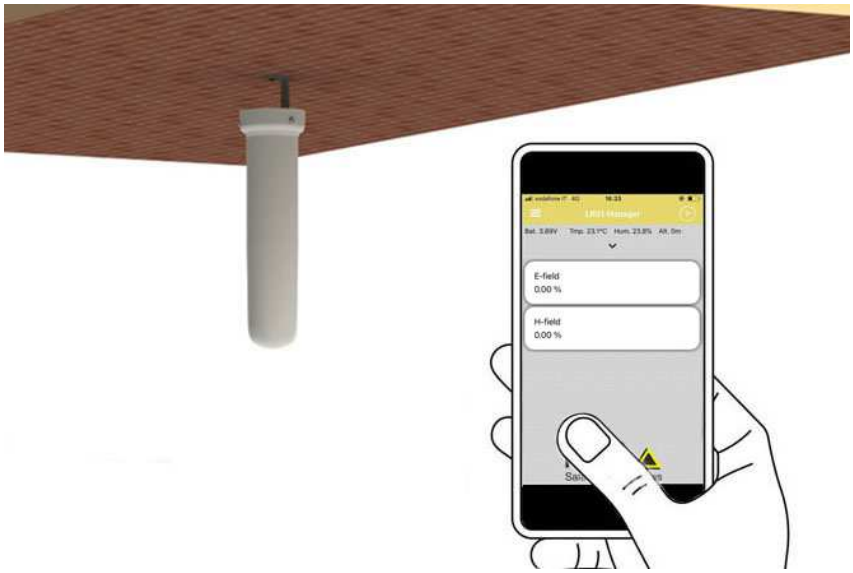



**Fig. 10-26** AMC link with Bluetooth communication by mobile device

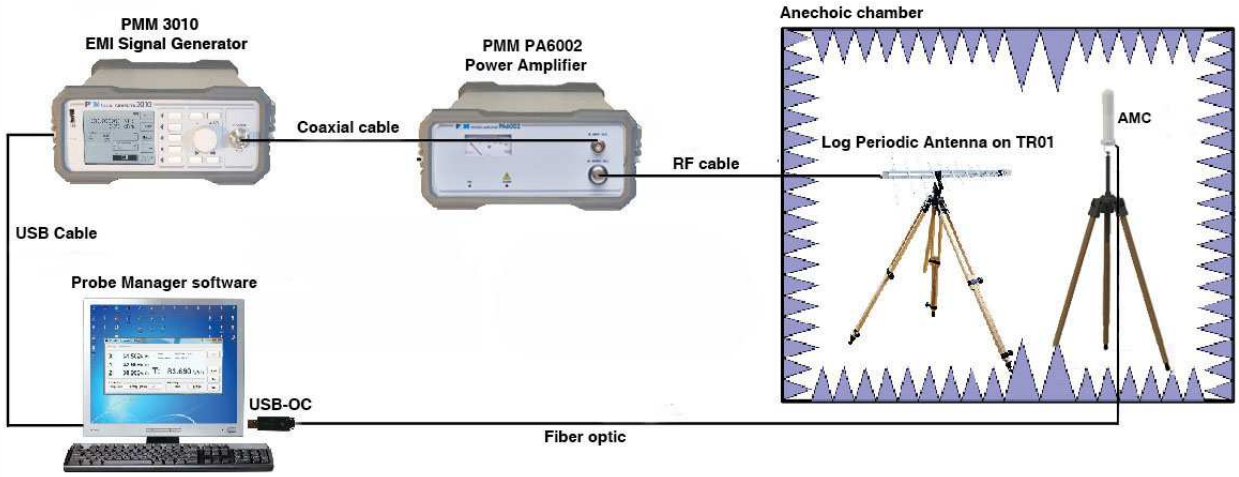



**Fig. 10-27** AMC Typical Immunity test irradiation configuration

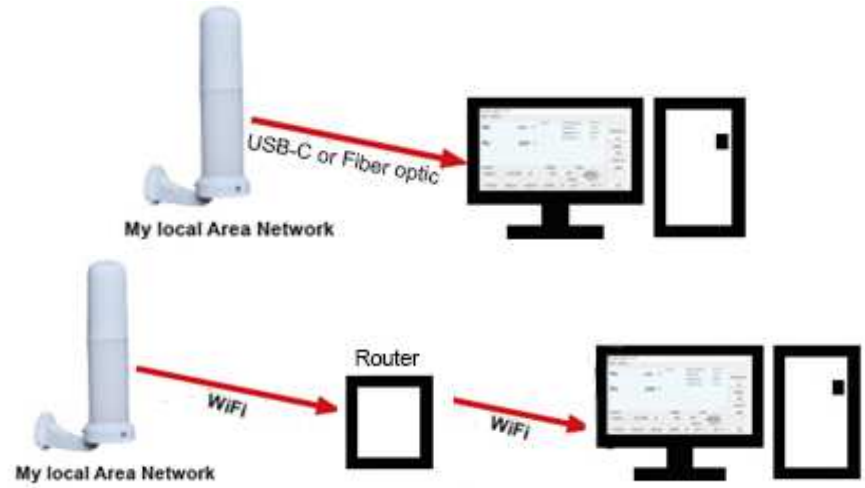



**Fig. 10-28** Local Area Network with SMARTS AMC Management software

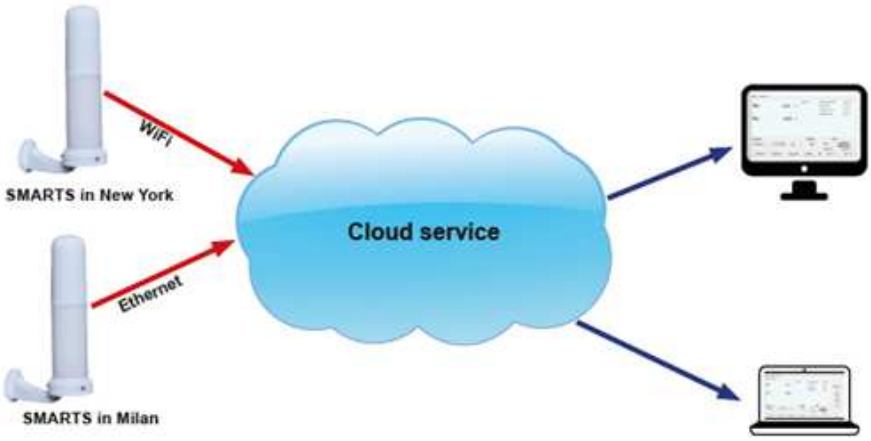



**Fig. 10-29** External network with SMARTS AMC Management software

### 10.13.9 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).

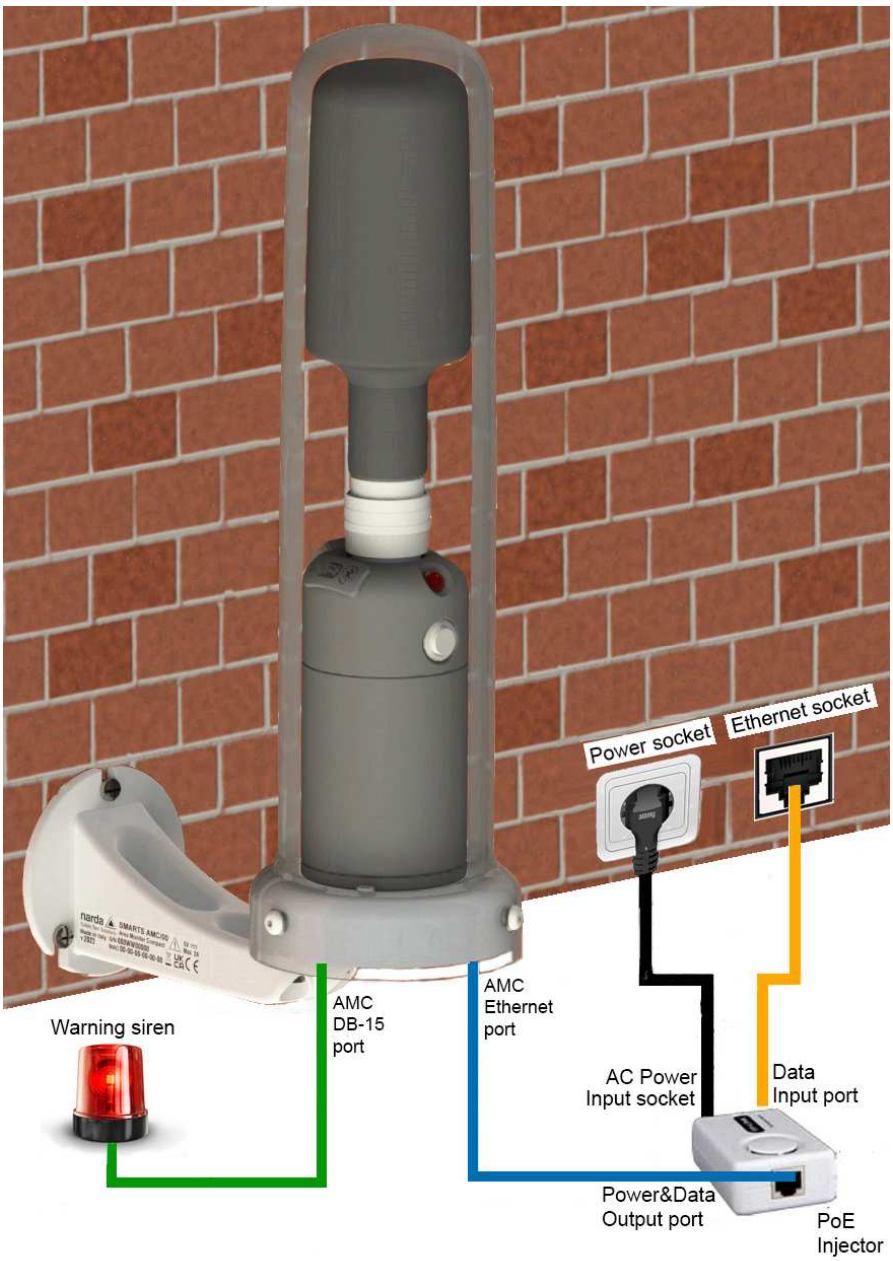



**Fig. 10-30** AMC with Power Over Ethernet

# 11 – Service

## 11.1 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**

When the battery voltage is low, the unit sends the string:

**WRN: Low Battery**

When the battery voltage is deeply low, the unit sends the string:

*****VOID BATTERY*****
**switching off**

Then, the unit is turned off.

When the unit does not receive any command for 30 minutes, and the Logger is not enabled, it sends the string:

*****No ACTIVITY*****
**switching off**

Then, the unit is turned off.

## 11.2 Initial diagnostic

Just after turning on the unit, 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 LR-01.

```
#OR$OPTFRK*

LR01: FW A1.9 06/22, L A1.8 06/22, W A1.0
Sensing Flash memories
1 found
1 Flash Memory sensed

SNS=27.7;42.9;1004.0 [Cel.Deg., %, hPa]
Battery:4.20V
RTC: +   17.6 ppm   Cal Date:11.02.22-19.01.22
USB:Disconnected
Compass found (code 0xC7): Heading: 178 (S); G:5; 100; 100
Check Probe...


Loading active probe


PRB=EHP-2B-
01:08.06.22;%:100.00:1000.00:0.10:0.49:9250.00:1000.00:0.50
:20.00:1000.00:MHz:S
```

Here is another example of the initial diagnostic text, with a single band passive probe connected to the LR-01.

```
#OR$OPTFRK*

LR01: FW A1.7 05/22, L A1.6 05/22, W A1.0
Sensing Flash memories
 1 found
1 Flash Memory sensed

SNS=26.8;49.8;703.2 [Cel.Deg., %, hPa]
Battery:3.86V
RTC: +   28.6 ppm   Cal Date:31.12.31-23.15.39
USB:Disconnected
*** WRN: Compass not responding ***
Heading: 90 (E); G:0; 0; 0
Check Probe...


Loading passive probe


PRB=EP645:17.09.10;
V/m:100.00:300.00:0.25:0.09:3000.00:MHz:S

Calibrating...
Z Y X, G=     0
Z Y X, G=     1
Z Y X, G=     2
Z Y X, G=     3
Z Y X, G=     4
Z Y X, G=     5
Z Y X, G=     6
Z Y X, G=     7
Calibration OK

Checking Probe Diode...
 Z 1.38:Ok
 Y 1.62:Ok
 X 1.40:Ok

F:10.0 Hz
Zero= 3BD93B:3B98DA:3BDE3B  Scale=2DB32D      0
Zero= 3B9FBE:3BC43B:3B9FC0  Scale=2DDE64      1
Zero= 3BA13B:3B9FA7:3BA93B  Scale=2D2D2D      2
Zero= 3B9F8C:3B933B:3B9F8F  Scale=2DDE66      3
Zero= 3B4D3B:3BA455:3B453B  Scale=2DFC2D      4
Zero= 3BADB5:3BC03B:3BADA2  Scale=2E08AF      5
Zero= 3B193B:3BC00A:3B453B  Scale=2EF12E      6
Zero= 3BE33D:3B293B:3BE36B  Scale=2F9C97      7
Decimal:
Zero= -1.34:Zero= -1.33:Zero= -1.34:  Scale=-1.61      0
Zero= -1.33:Zero= -1.34:Zero= -1.33:  Scale=-1.60      1
Zero= -1.34:Zero= -1.33:Zero= -1.34:  Scale=-1.61      2
Zero= -1.33:Zero= -1.34:Zero= -1.33:  Scale=-1.60      3
Zero= -1.34:Zero= -1.33:Zero= -1.34:  Scale=-1.61      4
Zero= -1.33:Zero= -1.34:Zero= -1.33:  Scale=-1.60      5
Zero= -1.34:Zero= -1.33:Zero= -1.34:  Scale=-1.59      6
Zero= -1.33:Zero= -1.34:Zero= -1.33:  Scale=-1.57      7
```

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**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.**

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☐ 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:*

***Suggerimenti / Commenti / Note:***
*Suggestions / Comments / Note:*