narda
Safety Test Solutions

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

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User's Manual

PMM EP-600

ELECTRIC FIELD PROBE
100 kHz ÷ 9.25 GHz

PMM EP-601

ELECTRIC FIELD PROBE
10 kHz ÷ 9.25 GHz

PMM EP-602

ELECTRIC FIELD PROBE
5 kHz ÷ 9.25 GHz

PMM EP-603

ELECTRIC FIELD PROBE
300 kHz ÷ 18 GHz

PMM EP-604

ELECTRIC FIELD PROBE
300 kHz ÷ 26.5 GHz

SERIAL NUMBER OF THE INSTRUMENT
You can find the Serial Number on the fiber optic holder of the instrument.
The Serial Number is in the form: 000XY00000.
The first three digits and the two letters 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.

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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 *The manufacturer*	**narda Safety Test Solutions S.r.l. Socio Unico**
Indirizzo *Address*	**Via Benessea, 29 / B**
	I-17035 Cisano sul Neva (SV) - Italy

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

EMC - Emissioni: *EMC - Emission:*	**IEC EN 61326-1** (2021)
EMC - Immunità: *EMC - Immunity:*	**IEC EN 61326-1** (2021)
Sicurezza: *Safety:*	**EN 61010-1** (2010)

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

Descrizione Description	**SONDA ISOTROPICA DI CAMPO ELETTRICO** **ISOTROPIC ELECTRIC FIELD PROBE**
Modello Model	**EP-600**

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

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

Cisano sul Neva, 06 December 2022

Egon Stocca

General Manager

narda
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Dichiarazione di Conformità
EC Declaration of Conformity

CE

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.
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Sicurezza: *Safety:*	**EN 61010-1** (2010)

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declares, under its sole responsibility, that the product:

Descrizione Description	**SONDA ISOTROPICA DI CAMPO ELETTRICO** **ISOTROPIC ELECTRIC FIELD PROBE**
Modello Model	**EP-601**

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

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

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General Manager

X	**Safety Consideration**

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Sicurezza: *Safety:*	**EN 61010-1** (2010)

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

Descrizione Description	**SONDA ISOTROPICA DI CAMPO ELETTRICO** **ISOTROPIC ELECTRIC FIELD PROBE**
Modello Model	**EP-602**

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

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Compatibiltà Elettromagnetica *EMC*	**2014/30/EU**
RoHS *RoHS*	**2011/65/EU**

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Egon Stocca

General Manager

EC Conformity **XI**

Dichiarazione di Conformità
EC Declaration of Conformity

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Il costruttore *The manufacturer*	**narda Safety Test Solutions S.r.l. Socio Unico**
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Sicurezza: *Safety:*	**EN 61010-1** (2010)

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

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Modello Model	**EP-603**

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

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

Cisano sul Neva, 06 December 2022

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General Manager

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

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EMC - Immunity: **IEC EN 61326-1** (2021)

Sicurezza:
Safety: **EN 61010-1** (2010)

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

Descrizione
Description **SONDA ISOTROPICA DI CAMPO ELETTRICO**
ISOTROPIC ELECTRIC FIELD PROBE

Modello
Model **EP-604**

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

Bassa Tensione
Low Voltage **2014/35/EU**

Compatibiltà Elettromagnetica
EMC **2014/30/EU**

RoHS
RoHS **2011/65/EU**

Cisano sul Neva, 06 December 2022

Egon Stocca

General Manager

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1 – General

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 Diode-based isotropic electric field probes

This type of probes are made by small antennas terminated on multiple diodes. To ensure optimal isotropy, the antenna elements are configured orthogonally in order to add all of the electromagnetic wave components. They measure the field independently from field polarization and direction.

The diodes feature linear and quadratic responses to level variations.
At low levels of field the output voltages are proportional to the square value of the field (E^2) i.e. to the RMS value.
At higher field levels, up to the saturation, the response becomes linear, thus the output voltages are proportional to the peak value of the field.
The calibration is performed in terms of RMS value in both cases, therefore modulated sources may require a proper correction factor to be taken into account.

1.3 Introduction

The EP-600/601/602/603/604 is a diode-type, three-axis technology-edge isotropic sensor of electric fields.

The spherical plastic housing includes six orthogonal monopole, ON/OFF button, Led, battery, and charger connector.

The EP-600/601/602/603/604 housing includes a not removable fiber optic cable that allow connection to PC or PMM 8053B Portable Field meter (option) or PMM SB-10 Switching Control Box (option).

The Probes Manager provided on software media allow to display live measurements on the screen, show field analysis in graph way (Plot), change settings (internal digital filter, reading rate, frequency correction, etc), and saving data in text or table format .

The EP-600/601/602/603/604 includes an E^2PROM that stores serial number, calibration factors, firmware release and address.

Three Analog/Digital converters – one for each axis - read the electric field simultaneously; the sensors consist in 6 monopoles mounted orthogonally. Another Analog/Digital converter internal to the microcontroller provides the battery voltage and temperature measurements.

The EP-600/601/602/603/604 is supplied by an internal rechargeable battery that ensure up to 100 hours of operation.

The following list shows the EP-60X models available on the market:

TABLE 1-1 EP-60X Models		
Field Probes	**Frequency range**	**Level range**
ELECTRIC FIELD PROBE EP-600	100 kHz – 9.25 GHz	0.14 - 140 V/m
ELECTRIC FIELD PROBE EP-601	10 kHz – 9.25 GHz	0.5 - 500 V/m
ELECTRIC FIELD PROBE EP-602	5 kHz – 9.25 GHz	1.5 - 1500 V/m
ELECTRIC FIELD PROBE EP-603	300 kHz – 18 GHz	0.17 – 170 V/m
ELECTRIC FIELD PROBE EP-604	300 kHz – 26.5 GHz	0.4 - 800 V/m

Fig. 1-1 EP-600/601/602/603

Fig. 1-2 EP-604

NOTE

The Flatness is valid for mean of measurements when the probe is rotated 360° around the probe shaft axis (as PH position in IEEE 1309-2013) and without taking into account anisotropicity at the related frequencies.

NOTE

The flatness frequency specification in the upper frequency band is not valid for single X, Y and Z axis maximum reception alignment position.

1.4 Specifications EP-600 This condition applies to all specifications:
• The operating ambient temperature range must be -10° to 50 °C.

TABLE 1-2 Specifications of the electric field probe PMM EP-600

Frequency range	100 kHz – 9.25 GHz
Level range	0.14 – 140 V/m
Overload	> 300 V/m
Dynamic range	60 dB
Linearity	0.4 dB @ 50 MHz/0.3 – 100 V/m
Resolution	0.01 V/m
Sensitivity	0.14 V/m
Flatness	1 – 150 MHz 0.8 dB 0.5 – 6000 MHz 1.6 dB 0.3 – 7500 MHz 3.2 dB (With frequency correction OFF) 0.3 – 7500 MHz 0.4 dB (Typical with frequency correction ON)
Isotropicity	0.5 dB (0.3 dB typical @ 50 MHz)
Sensors	Six monopoles
X/Y/Z reading	Simultaneous sampling of the components
Battery reading	10 mV res.
Temperature reading	0.1 °C res.
Internal data memory	Serial number Date calibration Calibration Factor SW release.
Battery	Panasonic ML621S 3V 5mA/h rechargeable Li-Mn
Operation time	100 h @ 0.4 S/sec 28 Hz filter 60 h @ 3 S/sec 28 Hz filter
Recharge time	48h for maximum autonomy
Dimensions	21 mm sphere 16 mm sensor 53 mm overall
Weight	23g including FO weight (1m)
Operating temperature	-10° ÷ +50° C
Software for PC	YES
Optical fiber connector	HFBR-0500
Tripod adapter	1/4 - 20 UNC female

1.5 Typical frequency response with correction OFF EP-600

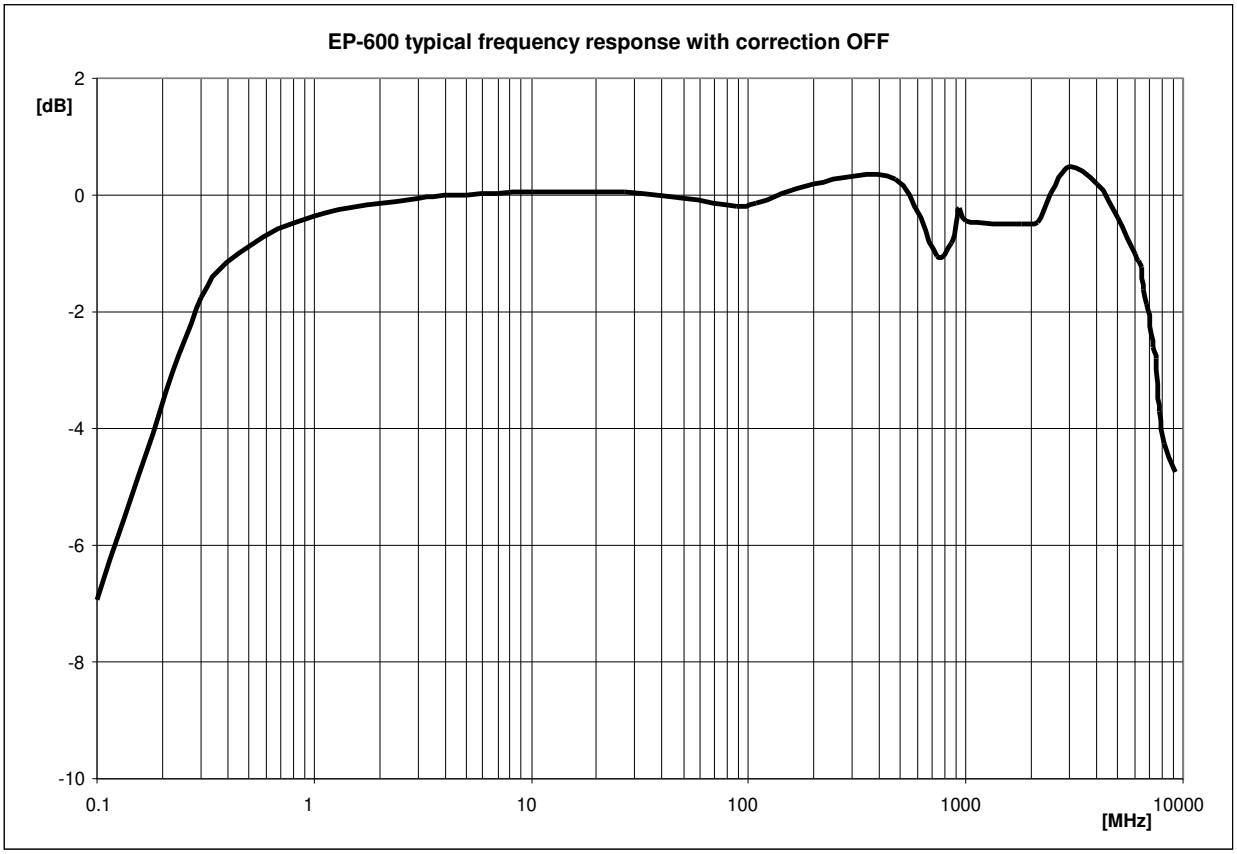


Fig. 1-3 EP-600 typical frequency response with correction OFF

1.6 Specifications EP-601 This condition applies to all specifications:
• The operating ambient temperature range must be -10° to 50 °C.

TABLE 1-3 Specifications of the electric field probe PMM EP-601

Frequency range	10 kHz – 9.25 GHz
Level range	0.5 – 500 V/m
Overload	> 1000 V/m
Dynamic range	60 dB
Linearity	0.4 dB @ 50 MHz/1 – 500 V/m
Resolution	0.01 V/m
Sensitivity	0.5 V/m
Flatness	0.1 – 150 MHz 0.4 dB 0.05 – 6000 MHz 1.6 dB 0.03 – 7500 MHz 3.2 dB (With frequency correction OFF) 0.05 – 7500 MHz 0.4 dB (Typical with frequency correction ON)
Isotropicity	0.5 dB (0.3 dB typical @ 50 MHz)
Sensors	Six monopoles
X/Y/Z reading	Simultaneous sampling of the components
Battery reading	10 mV res.
Temperature reading	0.1 °C res.
Internal data memory	Serial number Date calibration Calibration Factor SW release.
Battery	Panasonic ML621S 3V 5mA/h rechargeable Li-Mn
Operation time	100 h @ 0.4 S/sec 28 Hz filter 60 h @ 3 S/sec 28 Hz filter
Recharge time	48h for maximum autonomy
Dimensions	21 mm sphere 16 mm sensor 53 mm overall
Weight	23g including FO weight (1m)
Operating temperature	-10° - +50° C
Software for PC	YES
Optical fiber connector	HFBR-0500
Tripod adapter	1/4 - 20 UNC female

1.7 Typical frequency response with correction OFF EP-601

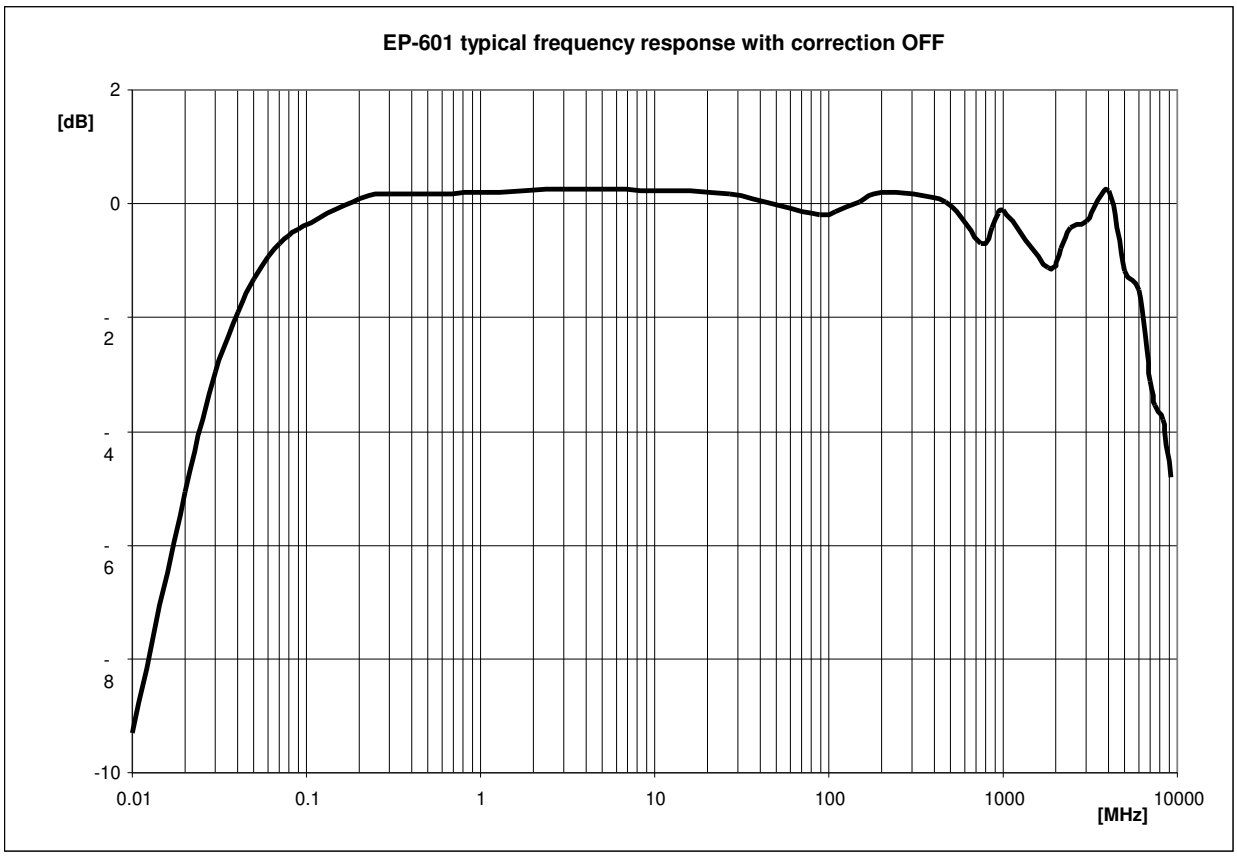


Fig. 1-4 EP-601 typical frequency response with correction OFF

1.8 Specifications EP-602 This condition applies to all specifications:
• The operating ambient temperature range must be -10° to 50 °C.

TABLE 1-4 Specifications of the electric field probe PMM EP-602

Frequency range	5 kHz – 9.25 GHz
Level range	1.5 – 1500 V/m
Overload	> 3000 V/m
Dynamic range	60 dB
Linearity	0.4 dB @ 50 MHz/2.5 – 1000 V/m
Resolution	0.01 V/m
Sensitivity	1.5 V/m
Flatness	0.05 – 150 MHz 0.4 dB 0.05 – 6000 MHz 1.6 dB 0.03 – 7500 MHz 3.2 dB (With frequency correction OFF) 0.05 – 7500 MHz 0.4 dB (Typical with frequency correction ON)
Isotropicity	0.5 dB (0.3 dB typical @ 50 MHz)
Sensors	Six monopoles
X/Y/Z reading	Simultaneous sampling of the components
Battery reading	10 mV res.
Temperature reading	0.1 °C res.
Internal data memory	Serial number Date calibration Calibration Factor SW release.
Battery	Panasonic ML621S 3V 5mA/h rechargeable Li-Mn
Operation time	100 h @ 0.4 S/sec 28 Hz filter 60 h @ 3 S/sec 28 Hz filter
Recharge time	48h for maximum autonomy
Dimensions	21 mm sphere 16 mm sensor 53 mm overall
Weight	23g including FO weight (1m)
Operating temperature	-10° - +50° C
Software for PC	YES
Optical fiber connector	HFBR-0500
Tripod adapter	1/4 - 20 UNC female

1.9 Typical frequency response with correction OFF EP-602

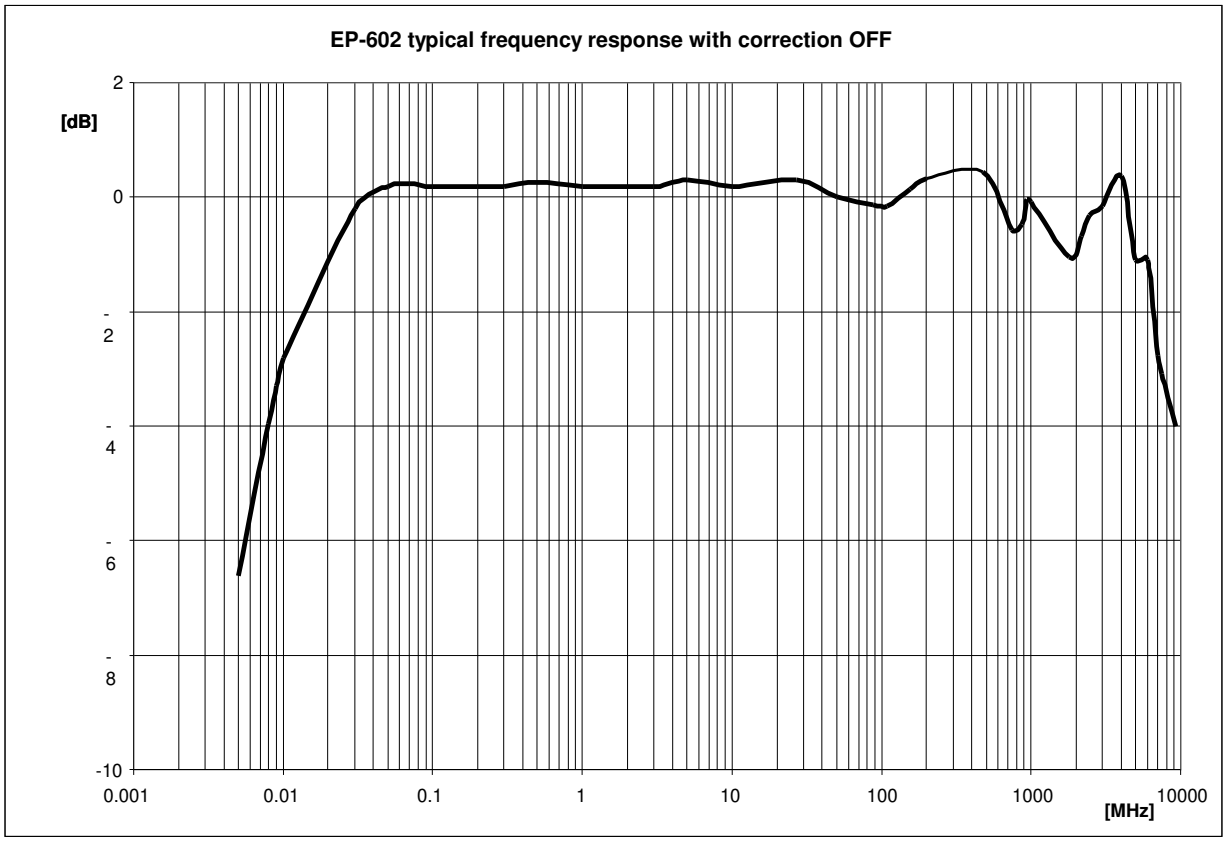


Fig. 1-5 EP-602 typical frequency response with correction OFF

1.10 Specifications EP-603 This condition applies to all specifications:
• The operating ambient temperature range must be -10° to 50 °C.

TABLE 1-5 Specifications of the electric field probe PMM EP-603

Frequency range	300 kHz – 18 GHz
Level range	0.17 – 170 V/m
Overload	> 350 V/m
Dynamic range	60 dB
Linearity	0.4 dB @ 50 MHz/0.3 – 170 V/m
Resolution	0.01 V/m
Sensitivity	0.17 V/m
Flatness	3 – 8200 MHz 1.4 dB 1 – 12000 MHz 2.4 dB 0.6 – 18000 MHz 3.8 dB (With frequency correction OFF) 0.3 – 18000 MHz 0.4 dB (Typical with frequency correction ON)
Isotropicity	0.4 dB (0.2 dB typical @ 50 MHz)
Sensors	Six monopoles
X/Y/Z reading	Simultaneous sampling of the components
Battery reading	10 mV res.
Temperature reading	0.1 °C res.
Internal data memory	Serial number Date calibration Calibration Factor SW release.
Battery	Panasonic ML621S 3V 5mA/h rechargeable Li-Mn
Operation time	100 h @ 0.4 S/sec 28 Hz filter 60 h @ 3 S/sec 28 Hz filter
Recharge time	48h for maximum autonomy
Dimensions	21 mm sphere 16 mm sensor 53 mm overall
Weight	23g including FO weight (1m)
Operating temperature	-10° - +50° C
Software for PC	YES
Optical fiber connector	HFBR-0500
Tripod adapter	1/4 - 20 UNC female

1.11 Typical frequency response with correction OFF EP-603

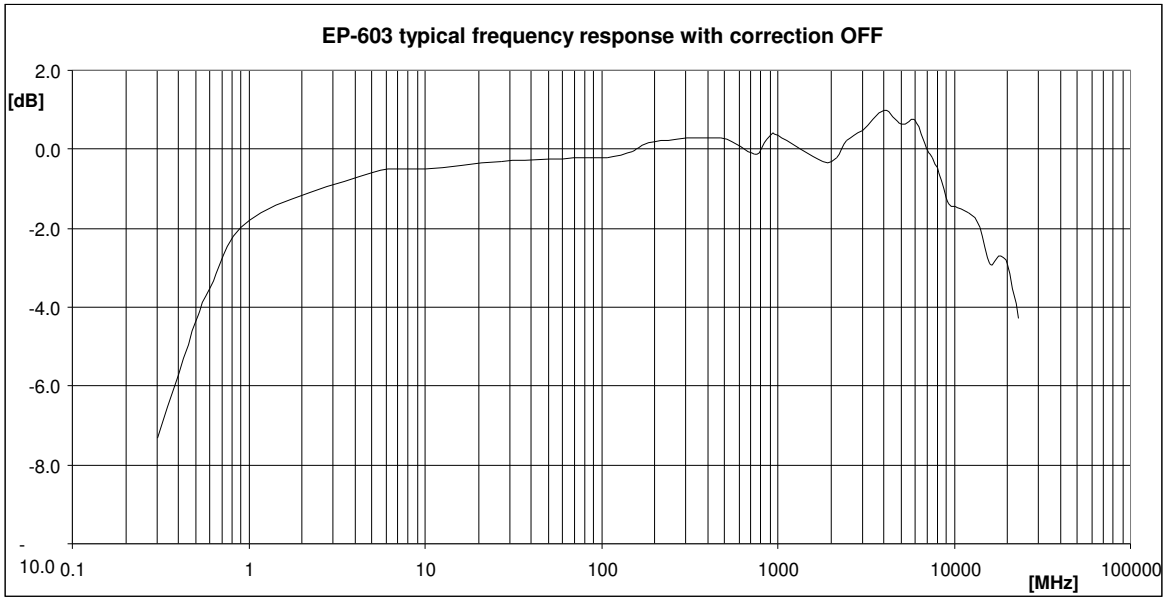


Fig. 1-6 EP-603 typical frequency response with correction OFF

1.12 Typical anisotropicity @ 50 MHz EP-603

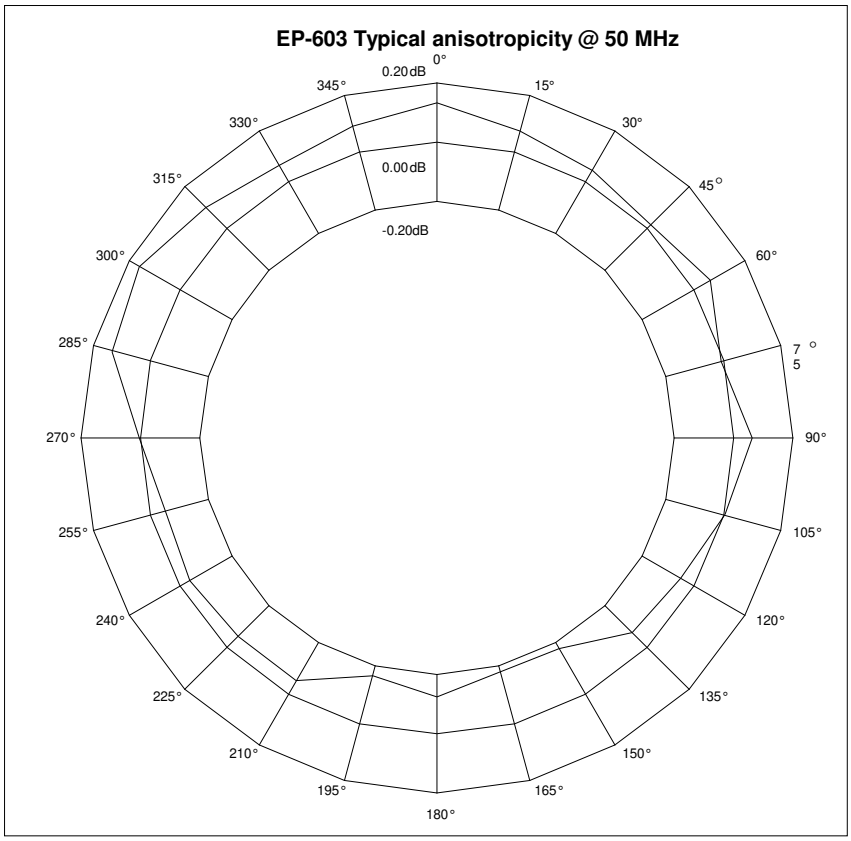


Fig. 1-7 EP-603 Typical anisotropicity @ 50 MHz

1.13 Housing and connectors EP-600/601/602/603

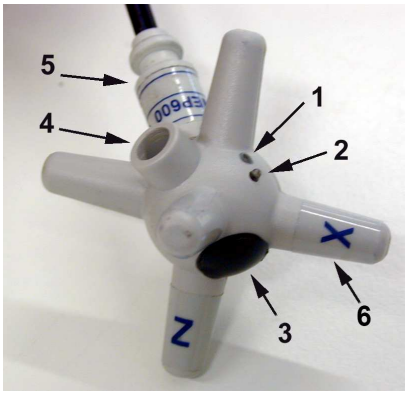


Fig. 1-8 EP-600/601/602/603 Plastic housing

1. ON-OFF Led
2. ON-OFF pushbutton
3. Battery compartment
4. Charger connector
5. Fiber optic holder and ID label
6. Axis label

Fig. 1-9 EP-600/601/602/603 Optical connectors

BLUE = Transmitter

GREY = Receiver

1.14 Specifications EP-604 This condition applies to all specifications:
• The operating ambient temperature range must be -10° to 50 °C.

TABLE 1-6 Specifications of the electric field probe PMM EP-604

Frequency range	300 kHz – 26.5 GHz
Level range	0.4 – 800 V/m
Overload	> 1600 V/m
Dynamic range	66 dB
Linearity	0.4 dB @ 50 MHz/0.8 – 800 V/m
Resolution	0.01 V/m
Sensitivity	0.4 V/m
Flatness	10 – 18000 MHz 1.8 dB 3 – 23000 MHz 3.2 dB (With frequency correction OFF) 0.3 – 26500 MHz 0.4 dB (Typical with frequency correction ON)
Isotropicity	0.4 dB (0.2 dB typical @ 50 MHz)
Sensors	Six monopoles
X/Y/Z reading	Simultaneous sampling of the components
Battery reading	10 mV res.
Temperature reading	0.1 °C res.
Internal data memory	Serial number Date calibration Calibration Factor SW release.
Battery	Panasonic ML621S 3V 5mA/h rechargeable Li-Mn
Operation time	100 h @ 0.4 S/sec 28 Hz filter 60 h @ 3 S/sec 28 Hz filter
Recharge time	48h for maximum autonomy
Dimensions	21 mm sphere 12 mm sensor 45 mm overall
Weight	22g including FO weight (1m)
Operating temperature	-10° - +50° C
Software for PC	YES
Optical fiber connector	HFBR-0500
Tripod adapter	1/4 - 20 UNC female

1.15 Typical frequency response with correction OFF EP-604

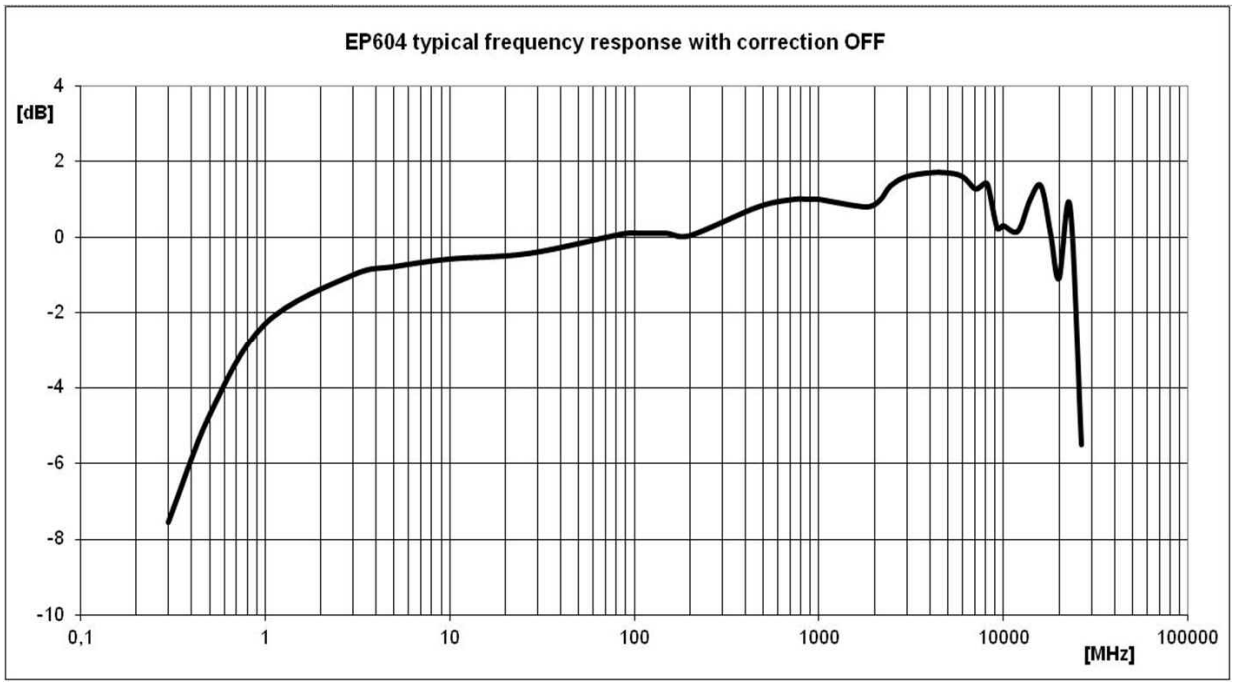


Fig. 1-10 EP-604 typical frequency response with correction OFF

1.16 Housing, connectors and axes EP-604

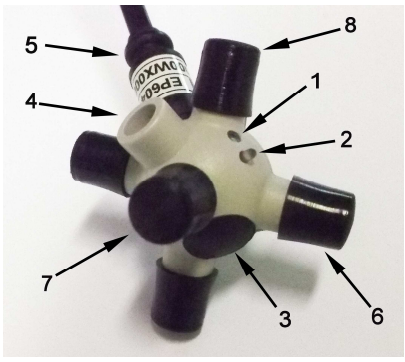


Fig. 1-11 Plastic housing

1. ON-OFF Led
2. ON-OFF pushbutton
3. Battery compartment and closure
4. Charger connector receptacle
5. Fiber optic holder and ID label
6. X axis
7. Y axis
8. Z axis

Fig. 1-12 Optical connectors

BLUE = Transmitter

GREY = Receiver

1.17 Battery management

EP-600/601/602/603/604 has an internal rechargeable Li-Mn battery that can be recharged with the battery charger supplied with the probe (Chapter 4).

Ensure that the batteries are fully charged before using the probe for long operation time.

The battery status is shown on Probes Manager software main window (see Chapter 5)

The following table indicate the discharge time depending on the Settings and Charge time.

TABLE 1-7 Battery management

	Filter 28Hz Rate 0.33 sec [3 Sample/sec]	Filter 28 Hz Rate 2.5 sec [0.4 Sample/sec]
Charge time [h]	**Discharge time [h]**	**Discharge time [h]**
1	3	5
2	4	8
4	8	12
8	13	21
12	18	31
24	32	56
36	45	70
48	60	100

1.18 Standard accessories

Standard accessories included with EP-600/6010/602/603/604:

- EP-600 CHARGER
- Battery Charger + Power cable
- Fiber optic adapter, Blue
- Fiber optic adapter, Grey
- FO-EP600/10 fiber optic 10m
- 8053-OC Optical Converter
- USB-RS232 Converter
- TR-02A tripod
- Mini tripod
- Nylon adapter 1/4" Withworth
- Carrying case
- Software Media including user's manual
- Calibration Certificate

1.19 Optional accessories

Accessories supplied separately (on charge):

- PMM 8053B Portable Field meter
- PMM SB-10 Switching Control Box
- FO-EP600/10 fiber optic 10m
- FO-EP600/20 fiber optic 20m
- FO-EP600/40 fiber optic 40m
- 8053-OC Optical converter
- 8053-OC-PS Power Supply
- TR-02A tripod
- TT-01 Telescopic extension

2 – Installation and use

2.1 Introduction

This section provides the information required for installing and using the EP-600/601/602/603/604 Electric Probe.
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 -10° to +40° C (0°C to 40°C for Battery Charger)
- Humidity < 90% relative

The EP-600/601/602/603/604 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 -20° to + 70° C (-20°C to 60°C for Battery Charger)
- Humidity < 95% relative

2.4 Return for repair

Any part of the instrument, including the batteries, can only be replaced by NARDA, therefore, in case of damage to parts and/or malfunctions, please contact the NARDA Service Center.
When the instrument has to be returned to NARDA for repairs, please complete the form included in this User's Manual, filling in all the information necessary for the service requested.
To reduce the time necessary for the repair, be as specific as possible in describing the malfunction. If the problem only occurs under specific conditions, detail in the best possible way how to reproduce these conditions.
Whenever possible, it is preferable to use the original packing for return, making sure to wrap the device in heavy paper or plastic (see section 6 for detailed packaging instructions). In alternative, pack the equipment in a sturdy cardbox with plenty of impact absorbing material all around the equipment, to ensure a tight fit and prevent it from moving inside the box. Take special precautions to protect the solar cells and GSM modem antenna. Seal the package securely and write FRAGILE on the outside to encourage careful handling.

NOTE

Nowadays there are restrictions on the shipment of hazardous materials, eg. some types of lithium batteries.
Please, check the proper, safe, shipping mode, with the help of your courier, in the case the product is equipped with batteries.

2.5 Instrument cleaning

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

NOTICE

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

2.6 Probe support

The conical holder and fiber optic FO-EP600/10 are essential for proper operation. The optional tripod PMM TR-02A is highly recommended for positioning the EP-600/601/602/603/604 at the required height and distance.

2.7 Coupling between probe and conductive surfaces

Close proximity of the probe to conductive surfaces can cause direct coupling (capacitive or inductive) with the field sensing dipoles.
Additional measurement uncertainty due to coupling can be limited to 1dB by respecting these minimum distances between the probe and any conductive surface:

- 250 mm, for frequencies 100 kHz - 3 MHz
- 150 mm, for frequencies 3 MHz - 10 MHz
- 100 mm, for frequencies > 10 MHz

2.8 Coupling between probe and operator's body

Accuracy characteristics are referred to non-perturbed electric fields. Always use a fiber optic extension of proper length to keep the probe far away from operator's body.

2.9 Multiple sources

Measuring complex electromagnetic fields as produced by multiple RF sources of different frequencies does require isotropic and broadband field probes, as well as fiber optic connections to eliminate errors due to scattering and pick-up effects. PMM EP-600/601/602/603/604 perfectly meets these requirements.

2.10 Connecting EP-600/ 601/602/603/604

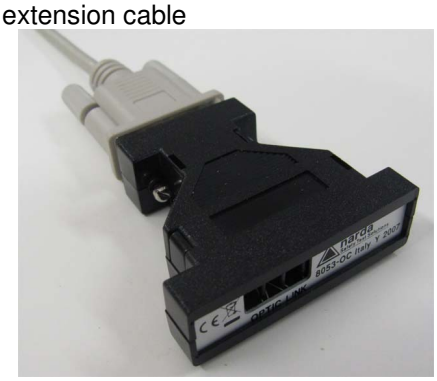
2.10.1 RS232 Connection

Requirements to connect the probe PMM EP-600/601/602/603/604 to PC RS232 port:

NOTE

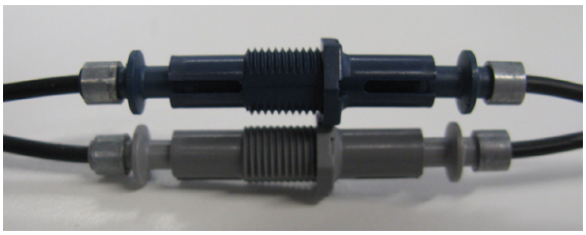
Some PC models may not provide enough power through the DB9 connector to supply the optical/RS232 adapter 8053-OC. In such cases install the separate power adapter model 8053-OC-PS between the optical/RS232 adapter 8053-OC and the PC (see chapter "Accessories").

- Connect the 8053-OC to the first available PC RS232 port, directly or with the supplied serial extension cable

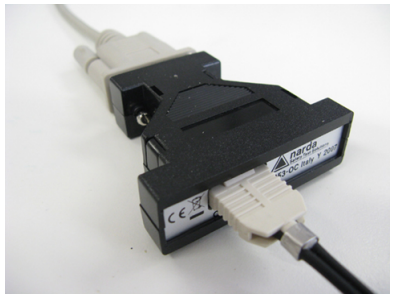


- match the colors of the EP-600/601/602/603/604 fiber optic connectors with the colors of the fiber optic adapters:

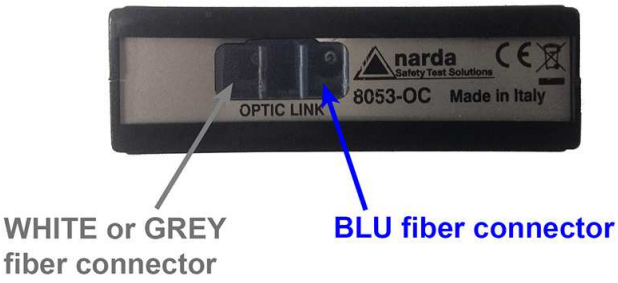
- match the colors of the extension connectors with colors of the fiber optic adapters:



- at one extremity the extension optic cable FO-EP600/10 or FO-EO600/20 is terminated with a shaped connector. Respect the connection sense when connecting the same into the shaped receptacle OPTIC LINK of the 8053-OC adapter.



In case of 40m Fiber Optic Optional Cable **FO-EP600/40**, differently from what available for the 10m and 20m fiber, the “white plug” is not provided on one side of the fiber for 8053-OC Adapter matching.
In fact for FO-EP600/40 the fiber optic cable is made of special “glass”, which is not allowing a proper mechanical matching with same “white plug” used for the plastic made 10m and 20m fiber.
The FO-EP600/40 the fiber optic cable is provided instead with same “BLUE-GREY” connectors on both sides
These connectors can be easily plugged into the 8053-OC Adapter directly, just taking care about proper orientation, as for the following picture, until a “click” is felt while gently pushing connectors inside each corresponding hole:



NOTICE

Do not connect/disconnect the optic fibre by applying force to the fiber optic cable directly: this may damage the optical connection. Always hold the connectors with your fingers firmly to connect/disconnect the optic fibre.
Presence of dust, dirt or particles of any nature on the optical connecting surfaces must be carefully prevented.

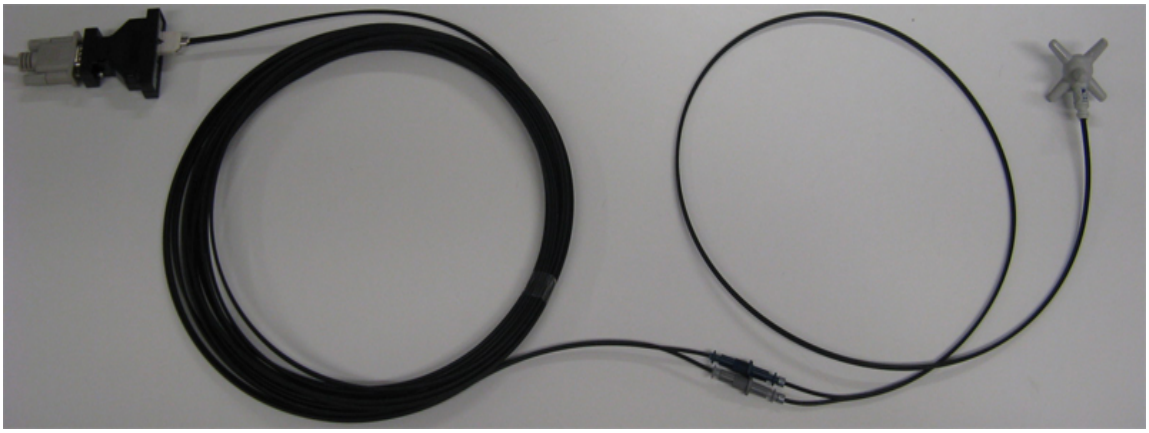


Fig. 2-1 RS232 connection of EP-600/601/602/603 with FO-EP600/10 extension

2.10.2 USB Connection

Requirements to connect the probe PMM EP-600/601/602/603/604 to PC USB:

NOTE

In some cases the 8053-OC connected with an USB HUB or USB extension might not work properly. Connect the 8053-OC to an USB port of PC directly.

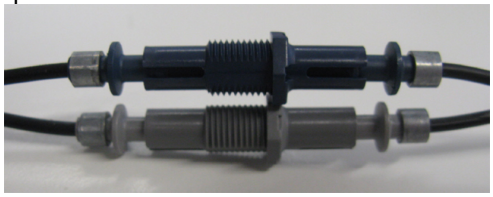
NOTE

Install the supplied driver software before connecting the USB-RS232 adapter; for driver download refer to the manufacturer of the product

- Connect the USB-RS232 adapter to the first available PC USB port
- Connect the 8053-OC to the USB-RS232 converter

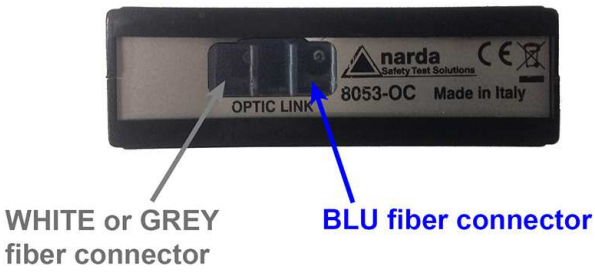
- match the colors of the EP-600/601/602/603/604 fiber optic connectors with the colors of the fiber optic adapters:

- match the colors of the FO-EP600/10 extension connectors with colors of the fiber optic adapters:



- at one extremity the extension optic cable FO-EP600/10 is terminated with a shaped connector. Respect the connection sense when connecting the same into the shaped receptacle OPTIC LINK of the 8053-OC adapter.

In case of 40m Fiber Optic Optional Cable **FO-EP600/40**, differently from what available for the 10m and 20m fiber, the “white plug” is not provided on one side of the fiber for 8053-OC Adapter matching.
In fact for FO-EP600/40 the fiber optic cable is made of special “glass”, which is not allowing a proper mechanical matching with same “white plug” used for the plastic made 10m and 20m fiber.
The FO-EP600/40 the fiber optic cable is provided instead with same “BLUE-GREY” connectors on both sides
These connectors can be easily plugged into the 8053-OC Adapter directly, just taking care about proper orientation, as for the following picture, until a “click” is felt while gently pushing connectors inside each corresponding hole:



NOTICE

Do not connect/disconnect the optic fibre by applying force to the fiber optic cable directly: this may damage the optical connection. Always hold the connectors with your fingers firmly to connect/disconnect the optic fibre.
Presence of dust, dirt or particles of any nature on the optical connecting surfaces must be carefully prevented.

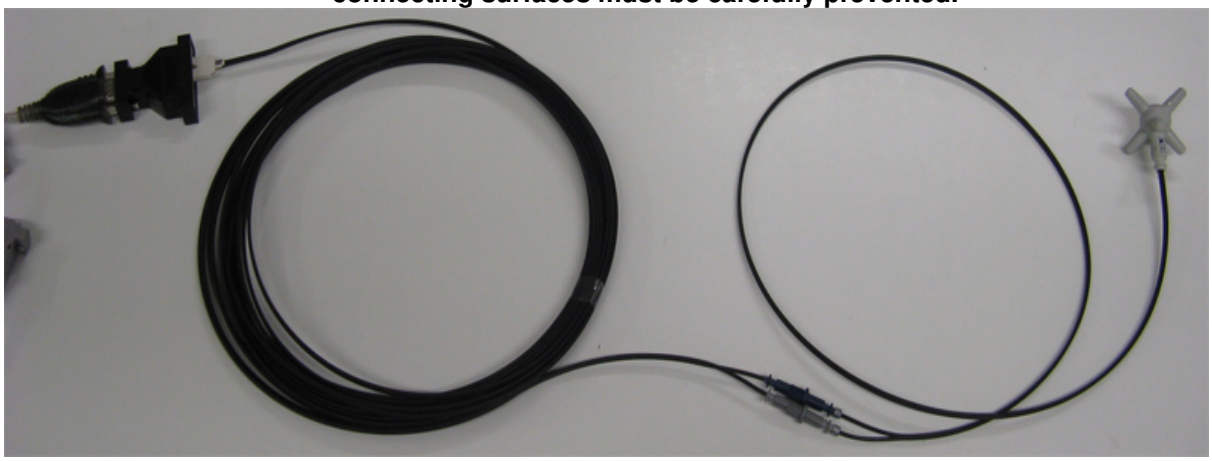


Fig. 2-2 USB connection of EP-600/601/602/603 with FO-EP600/10 extension

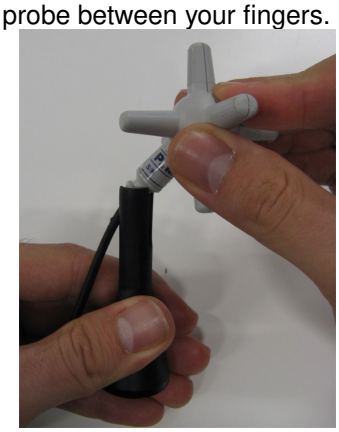
2.11 EP-600/601/602 /603/604 installation

Unexpected variations of the probe position may vary the field measurements. Make sure the probe is steadily installed by using the recommended standard or optional accessories.

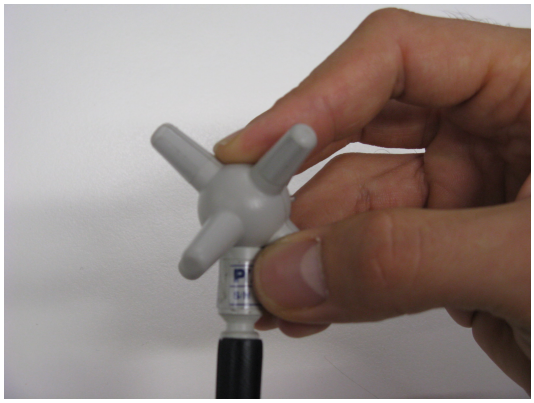
2.11.1 EP-600/601/ 602/603/604 installation on the conical holder

Using the conical holder supplied with the PMM EP-600/601/602/603/604 as support for the same is essential for correct measurements.
An inadequate support might significantly influence the measurements results; hence it is highly recommended to make use of the supplied conical holder as support for the probe.
To mount the PMM EP-600/601/602/603/604 on the conical holder:
- place the conical holder vertical on a stable surface

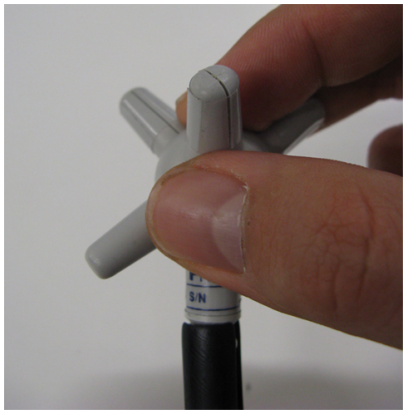
- Apply the probe to the conical holder as shown in the picture, having the fiber optic passing through the slot of the conical holder. The picture below shows how to hold the probe between your fingers.



- Rotate the probe 45° counterclockwise:



- Pull the probe gently downwards until the probe plug is locked in the conical holder top.



- The installation is now completed.

Fig. 2-3 EP-600/601/602/603 mounted on conical holder

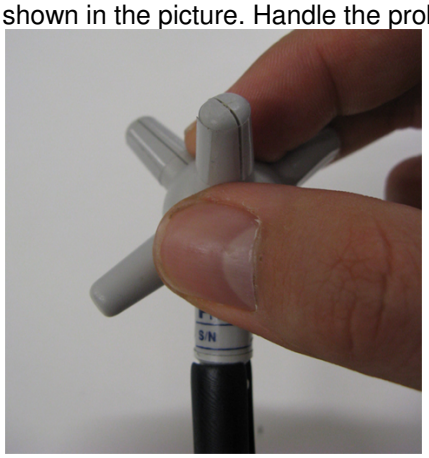
Fig. 2-4 EP-604 mounted on conical holder

NOTE

As a general rule, when measuring the field from a transmitting antenna it is advisable to position the probe supporting devices perpendicular to the antenna polarization, particularly for frequencies in the range of megahertz.

2.11.1.1 EP-600/601/602 603/604 removal from the conical holder

To remove the PMM EP-600/601/602/603/604 correctly from the conical holder:
- Hold the probe and conical holder in vertical position
- Hold the probe as shown in the picture. Handle the probe with care.



- With the conical holder in vertical position, gently rotate the probe of 45° clockwise. The probe will be automatically released from the conical holder.

- The removal from conical holder is completed.

2.11.2 EP-600/601/602/603/604 installation on tripod PMM TR-02

It is recommended the use of the optional PMM TR-02A to position the PMM EP-600/601/602/603/604 as required by the reference standards; keeping the same configuration improve the measurement repeatability (see chapter “Accessories”).
Fix the EP-600/601/602/603/604 conical holder to the tripod TR-02A by means of the screw on the top or the adjustable swivel.

Fig. 2-5 EP-600/601/602/603 on TR-02A

Fig. 2-6 EP-604 on TR-02A

Fig. 2-7 EP-600/601/602/603 on TR-02A with adjustable swivel

Fig. 2-8 EP-604 on TR-02A with adjustable swivel

3 – Measurements

3.1 Introduction

The following procedures and measurement methods apply to electromagnetic field sources present in industrial, medical, research, residential and telecommunication applications.

3.2 Preliminary operation

Before starting measuring electromagnetic fields (EMF) potentially dangerous, it's advisable to determine the known characteristics of the sources and their possible propagation characteristics.
This will allow for a better evaluation of the field distribution and for selecting the correct measuring equipments and procedures.

The source characteristics may include:
- type of generator and radiated power
- carrier frequency or frequencies (i)
- modulation
- polarization of transmitting antenna
- duty cycle, width and repetition frequency for pulsed modulations
- type of antenna and characteristics (gain, size, radiation diagram etc.)
- the number of sources, including those out of the probe bandwidth

To know for propagation evaluation:
- distance between source and point of measurement
- presence of RF absorbing or reflecting structures that may influence the field intensity.

3.2.1 Spurious signals

The operation with diode-based field sensors does require considering possible effects due to spurious signals, like:

- Multiple sources. Diodes feature RMS response only for low level signals. In presence of two or more strong signals the probe readings are higher than the real RMS value of the field in the corresponding bandwidth.

- Pulse modulation. At high levels the diode response is linear. Consequently, in presence of pulsed signals of low duty cycle the probe tends to read values higher than the real average value. This must be particularly considered for radar signals.

- Sensitivity to light. The Schottky diodes employed in some field probes are sensitive to light, including infrared. In such cases it's advisable to avoid direct exposition to the light sources.

- Perturbing structures . Metallic and in general conductive surfaces and structures can influence the field probe readings. Field probes must be operated at a proper distance from such structures.

3.3 General requirements

The basic components of a field measuring equipment are:
- field probe (field sensor and transducer)
- connecting cables
- metering and data processing equipment

3.3.1 Probes

As a general rule the field probes must respect the following conditions:
- High rejection to spurious signals
- No perturbation of the field surrounding the sensors
- Such connecting cables e.g. fiber optics that do not perturb the field to measure
- Known response to the operating ambient

3.3.2 Connections

The connection between field probe and metering equipment transfer the data relevant to the measurements and the probe/converter settings without influencing the measure.
Also, unwanted couplings and noise pick-up must be avoided.
Fiber optic connections do perfectly meet the requirements.

3.3.3 Metering equipment

The metering/data processing equipment is designed so that the probe signals or data are properly read, displayed and stored.

3.4 Basic functional checks

Some basic functional checks are:
- check of the proper probe operation
- check for the readings not varying significantly when rotating the probe along one of its axis

3.5 Measurement procedures

The measurement procedures must minimize:
- Risks of exposure of personnel to hazardous electromagnetic fields
- Measurement errors
- Interferences
- Damages to the equipment

3.6 Preventing measurement errors

To prevent influencing the field measurements the operator, vehicles etc. should stay away of 5 meters from the field sensor; the same should not be located near metallic or conductive surfaces and objects.

From the definition of difference of potential between two points:

$$V_{21} = -\int_{r_1}^{r_2} \overline{E}\, dr$$

NOTE

We obtain that, with constant difference of potential, when the distance between the two given points diminishes, the field strength increases.
Example: the field strength present between the two plates of a condenser at a distance of 0,1 m and with 100 V applied is of:

$$E = \frac{100V}{0{,}1m} = 1\, KV/m$$

To remark that a voltage of 100 V applied in these conditions produces a field strength of 1000 V/m, i.e. much higher than the applied voltage.

3.7 PMM EP-600/601/ 602/603/604 operation

The EP-600/601/602/603/604 field probe is allocated in a spherical plastic housing with 6 orthogonal monopoles that allow immediate identification of the field vectors (axis).

The PMM EP-600/601/602/603/604 is supplied from an internal battery that can be recharged by the charge EP600 CHARGER supplied with.

NOTE

One full charge cycle before operation is recommended to obtain the maximum autonomy.

The PMM EP-600/601/602/603/604 can be switched ON by shortly pressing the pushbutton, after that the LED is sequentially turned on with **green, red and blue indications** as a test for the same; then the LED will blink **red,** this meaning the EP-600/601/602/603/604 is ready for the operation.

NOTE

The PMM EP-600/601/602/603/604 cannot be switched OFF by the pushbutton.

The PMM EP-600/601/602/603/604 automatically turns OFF when:

- after 180 sec. the fiber optic has been disconnected or the communication with PC is not established; use the setting command **#00e n*** (see chapter 6) to set the time before the EP-600/601/602/603/604 auto-switches off.

NOTE

The command #00e n* is available with Firmware release 1.12 or higher

- When use the setting command **#00!** (see chapter 6).

- when the battery voltage is below 2.05V (the battery voltage is displayed by the software Probes Manager).

NOTICE

Do not expose the probe to a field higher than the max. allowed.
Field strengths exceeding the allowed may cause severe probe damage whether it is connected or not, either turner ON or OFF.

NOTICE

The fiber optic must be connected or disconnected by holding it by the connectors only. Pulling the fiber optic cable may cause severe damages to the PMM EP-600/601/602/603/604 and to the fiber optic cable itself.
Dust and dirt must be prevented to be in between the optical connections.

NOTE

The PMM EP-600/601/602/603/604 can be connected to the PC via fiber optic either when ON or OFF.

3.8 Applications

The PMM EP-600/601/602/603/604 field probe is connected to the PC via fiber optic and the optic to serial converter (see chapter 2).

3.8.1 EMC

The wide frequency range and small size allow for using the PMM EP-600/601/602/603/604 in EMC applications for monitoring the field strength during radiated immunity tests in open site, TEM/GTEM and anechoic chamber.

The optional accessory PMM SB10 allows for controlling up to 10 field probes at the same time. Up to five PMM SB10 can be connected together to control up to 50 field probes.

Examples of measuring configurations:

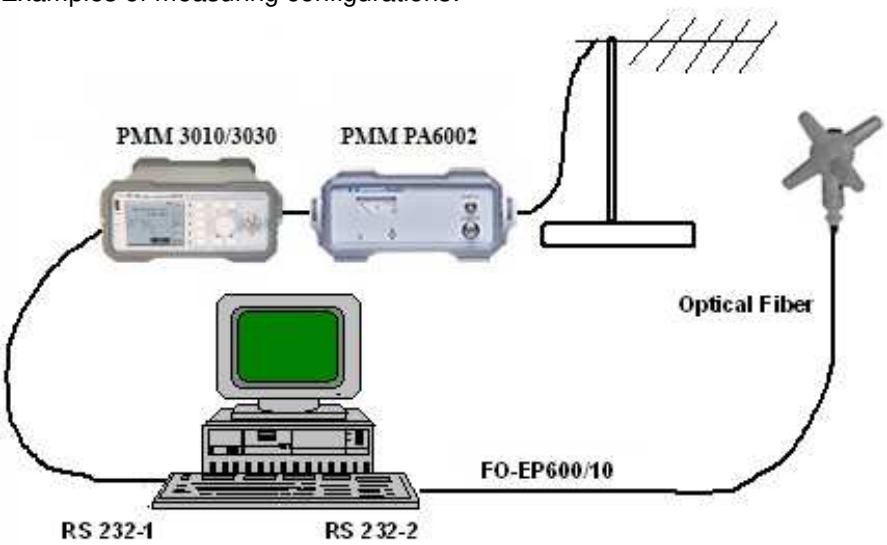


Fig. 3-1 PMM EP-600/601/602/603/604 in open site

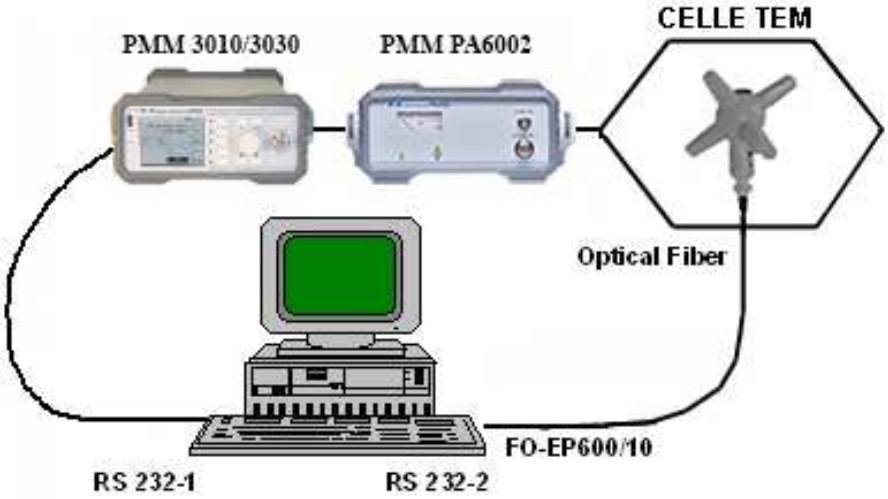


Fig. 3-2 PMM EP-600/601/602/603/604 in TEM cell

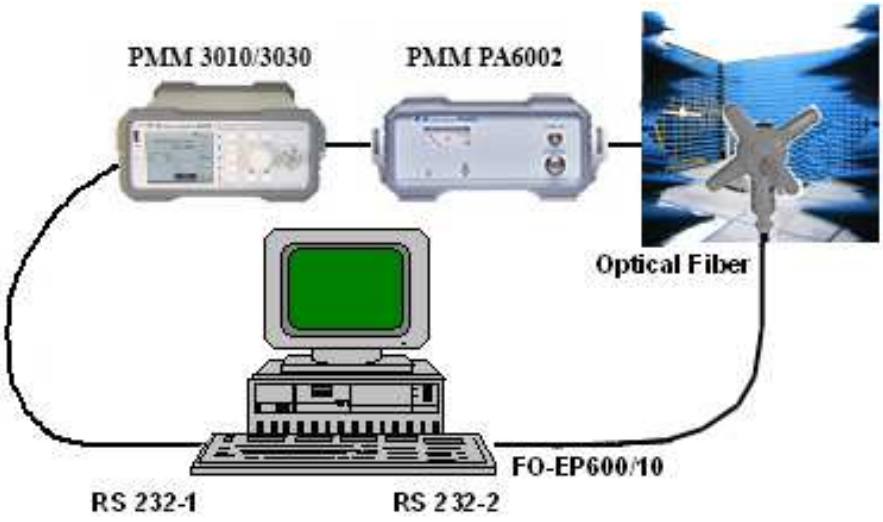


Fig. 3-3 PMM EP-600/601/602/603/604 in Anechoic Chamber

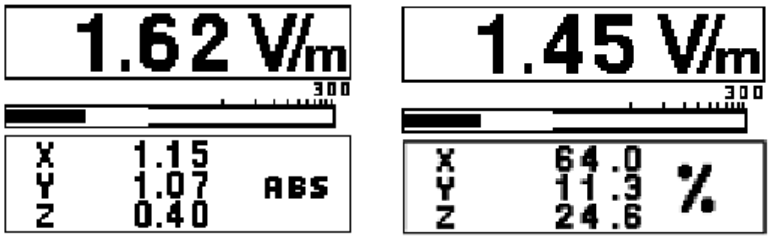
3.9 Operating PMM EP-600/601/602/603/604 with PMM 8053B (Option)

The EP-600/601/602/603/604 can be connected and operated by the PMM 8053B Portable Field meter

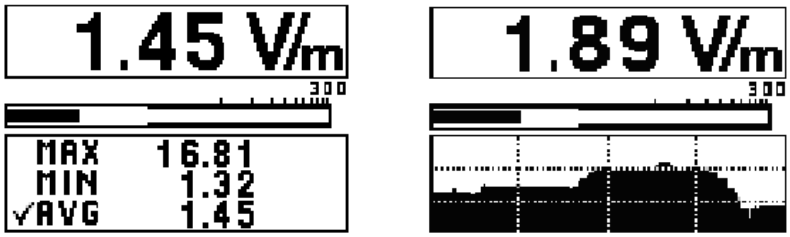
Fig. 3-4 EP-600/601/602/603 with 8053B

Fig. 3-5 EP-604 with 8053B

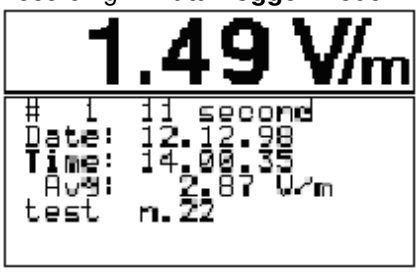
- Display of field strength in **ABS/%, MIN-MAX/AVG, MIN-MAX/RMS** modes.



- Graph of field strength in **PLOT** mode**.**



- Field strength data recording in **Data Logger** mode.



NOTE

For further information on configuration and operation with PMM 8053B, please refer to the operation manual supplied with it.

3.10 Operating EP-600/ 601/602/603/604 with PMM SB10 (Option)

The optional accessory PMM SB10 allows for controlling up to 10 field probes at the same time. Up to five PMM SB10 can be connected together to control up to 50 field probes.

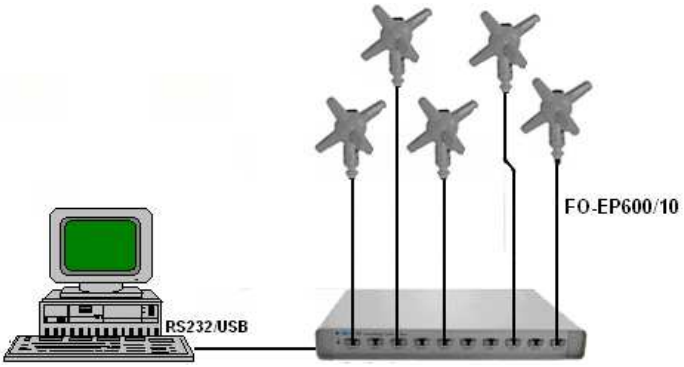


Fig. 3-6 PMM EP-600/601/602/603/604 with one SB-10

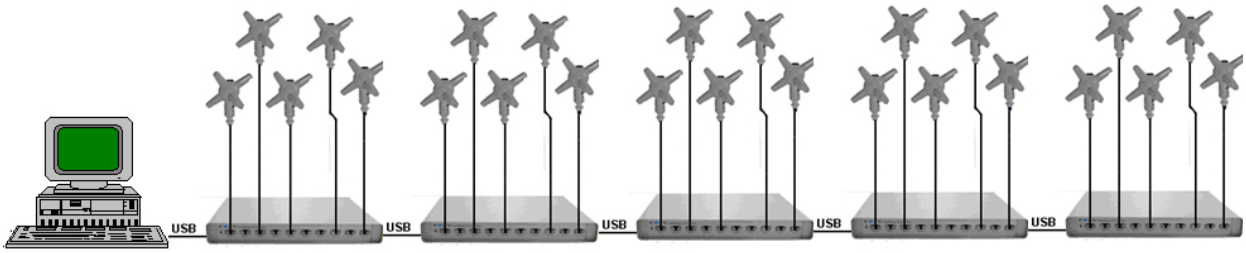


Fig. 3-7 PMM EP-600/601/602/603/604 with five SB-10

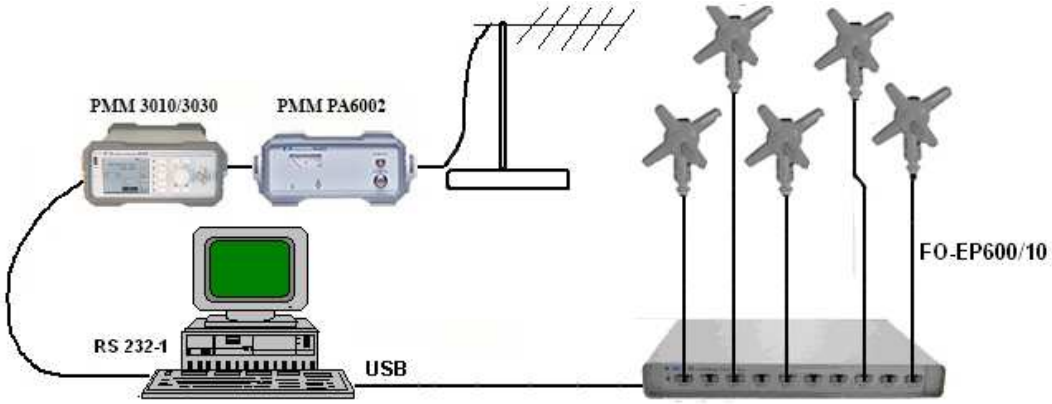
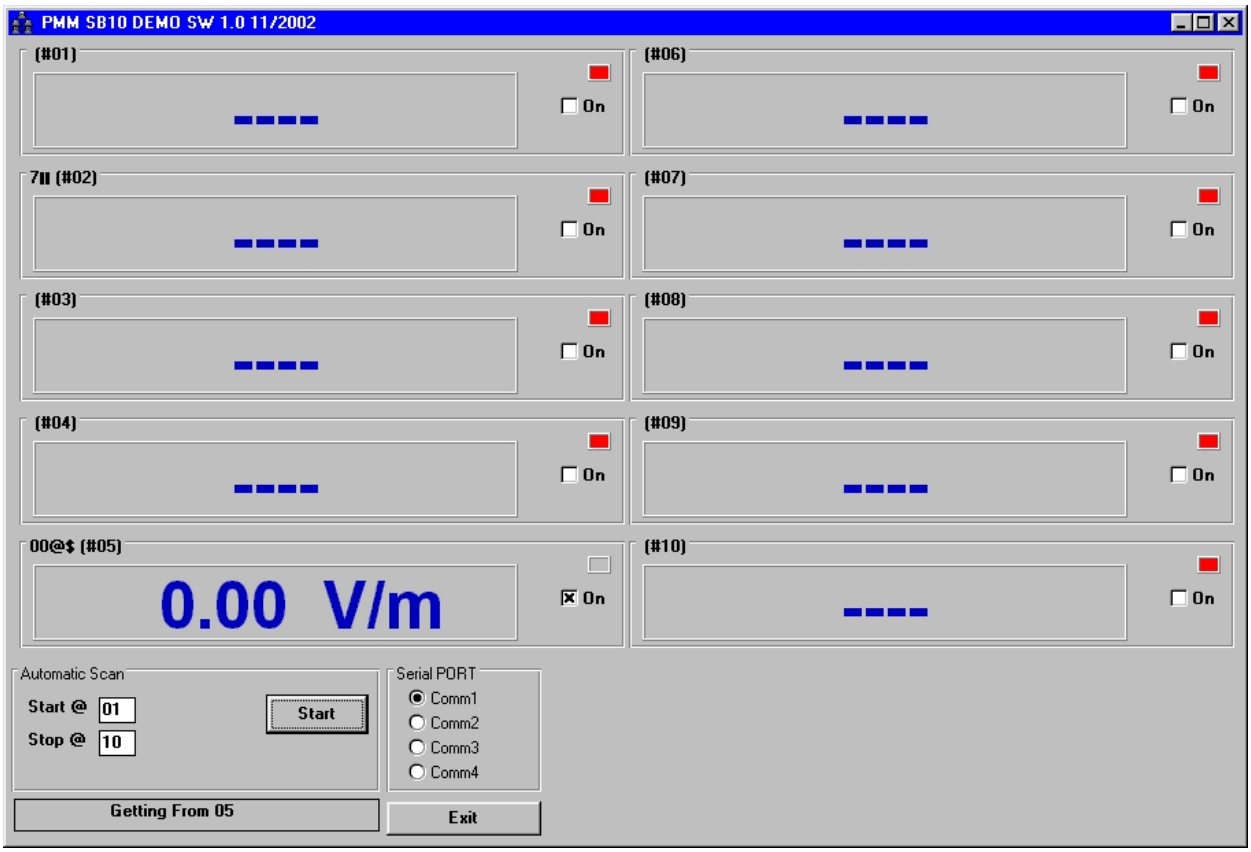


Fig. 3-8 PMM EP-600/601/602/603/604 with SB-10 in open site

The PC software supplied with the PMM SB-10 allows for simultaneous displaying of the field strength measured by each single field probe.



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4 –EP600 CHARGER

4.1 Power supply and battery recharging

EP-600/601/602/603/604 has an internal rechargeable Li-Mn battery that can be recharged with the EP600 Charger and AC/DC Adapter supplied with it.

EP600 CHARGER is intended to operate on the desk and keep the probe under charging in correct and safe position. EP600 charger is managed internally with a microprocessor that controls the battery charging and a Led shows the operation status.

The AC/DC Adapter can be used with a power frequency at either 50 Hz or 60 Hz with a supply voltage between 100 and 240 AC Volt.

Ensure that the batteries are fully charged before using the probe for longest battery operation time.

CAUTION

Use only AC/DC Converter provided with the instrument. In general, the user must operate only with the accessories supplied by the manufacturer.

NOTICE

Any part of the instrument, including the batteries, can only be replaced by NARDA, therefore, in case of damage to parts and/or malfunctions, contact the NARDA Service Center.

CAUTION

Attempting to charging batteries of different types or dry cells may cause explosion of the same and is strictly forbidden.

NOTE

ALWAYS connect the battery charger to the power supply BEFORE connecting it to the EP-600/601/602/603/604.
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, 10 - 15 V, ~ 500 mA

Connector polarity:

NOTE

The minimum voltage level for operation is about 2,05 V and the value is shown by the Probes Manager software. The batteries must be recharged for lower voltages. Below such voltage the probe will turn OFF automatically.

NOTE

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.

NOTE

The maximum battery autonomy is about 100 hours with Filter 28 Hz and Rate 2.5 sec.

NOTE

To take reliable measurements, it is advisable to ALWAYS remove the battery charger from EP-600/601/602/603/604.

4.2 Specifications

TABLE 4-1 Characteristics and specifications of the EP600 CHARGER	
Characteristics	
Charging is stopped when removing the probe	
Microprocessor control with autostart	
Charging status Led	
Self-test	
Safety timer	
AC/DC adapter and power cable supplied	
Specifications	
Supply voltage	3.8V 5mA (Max)
Supported battery type	Panasonic ML621S 3V 5mA/h Li-Mn
Max. recharging time for max. autonomy	48h
Operating temperature	-10° ÷ +50°
Dimensions (LxDxH)	60x60x75mm
Weight	130 g

4.3 Components

Fig. 4-1 EP600 CHARGER

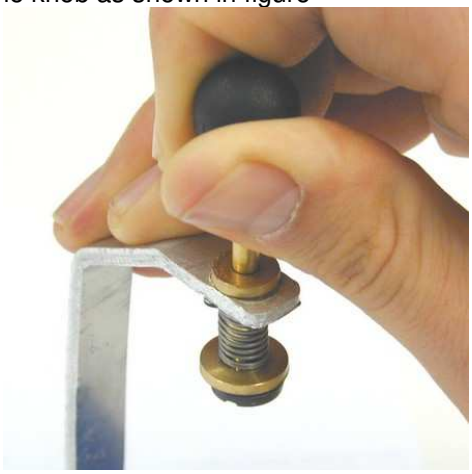
EP600 Charger components description:
1 – Knob and Spring
2 – Charging connector
3A – Charging status Led
3B – DC Supply connector

Fig. 4-2 AC/DC Adapter

Fig. 4-3 Power cable

4.4 Installing EP-600/601 /EP602/603/604 on EP600 CHARGER

A first complete charging cycle is recommended to achieve the max autonomy.
To install the probe EP-600/601/602/603/604 on the battery charger EP600 CHARGER:
- place the EP600 CHARGER on a flat, stable surface
- hold and lift up the knob as shown in figure



- Insert the EP-600/601/602/603/604 on the EP600 CHARGER in correspondence of the threaded contact pin. Do not spin the probe to avoid damaging the contact pin.

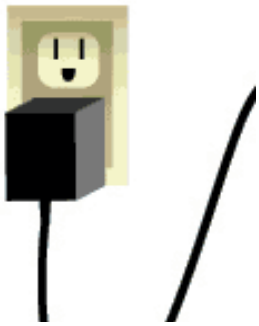
NOTE

- Release progressively the knob until rubber tip holds the EP-600/601/602/603/604 housing downwards.

- Connect the AC adapter to the EP600 CHARGER first, then to the mains.

- Plug the power cable to the AC adapter

- Plug the power cable to the mains



- Check the Led status as the table on the next page:

Fig. 4-4 EP-600/601/602/603
on the EP600 CHARGER

Fig. 4-5 EP-604
on the EP600 CHARGER

Table 4-2 EP600 CHARGER Led status - Start up phase		
LED status	**LED color**	**Description**
Fix	Green	The EP600 CHARGER is supplied but without load (battery not present or disconnected or completely full) *.
Fix	Orange	Charge ended after 10 minutes of no load (led fix green) ***
Fix	Red	The charging circuit is overloaded (the output is OFF for 30 seconds before attempting a new charging cycle). The central contact has been shorted **

Table 4-3 EP600 CHARGER Led status - Charger phase		
LED status	**LED color**	**Description**
Blinking	Green	The battery is under charge
Fast Blinking	Red	Charge ended for maximum time limit reached [60 hours]
Slow Blinking	Orange	Charge ended for maximum time limit reached without 12 hours of stabilisation.
Fast Blinking	Orange	Charge ended for maximum time limit reached with 12 hours of stabilisation.

NOTE

The complete charging cycle is of 48 hours; the charge is completed when the Led of EP600 CHARGER blinks orange.

*** The led status, of the blue conic charger, is based on current consumption.**
When the current is very low, the charger interprets this as "no load" on it and the LED is fixed green.
In case the battery is fully charged the led on the charger is immediately green without blinking because the current absorbed by the probe, is very low.

**** The red status of the led happens when there is an overloading or a short circuit on the pin of the blue conic charger.**
In this case you have to remove the ac/dc charger from the blue cone to give it the possibility to restore itself, just some seconds are more than enough

***** Available from June 2018, for new products or after repair & calibration service**

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5 – Probes Manager and SetAddEP600 Operating instructions

5.1 Introduction

This chapter is the installation and operation guide of the Probes Manager software and SetAddEP600 Utility supplied with the PMM EP-600/601/602/603/604 field probe.

The supplied Probes Manager software allow to display live measurements on the screen, show field analysis in graph way (Plot), change settings (internal digital filter, reading rate, frequency correction, etc), and saving data in text or table format .

The Electric Probe need to be set with different address by the SetAddEP600 Utility provided on Software media for working with PMM SB-10 Switching Control box (see §3.10).

5.2 Hardware requirements

To ensure the proper operations of the Probes Manager software and SetAddEP600 utility, 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, Win10 and Win11

To obtain Software and Utility updates for EP-600 family, please contact your NARDA distributor or download it directly from the NARDA Web site http://www.narda-sts.it

The Software and Utility are able to manage the Electric field probe via an fiber optic cable connect to RS232 or USB port with the provided converter.

In some PC models, the power delivered through the DB9 connector may be not enough to supply the 8053-OC. In such cases, the optional 8053-OC-PS power supply adapter must be connected between the PC and the optical converter.

If the attempt to communicate over any of the available channels (fiber optic or USB) was not successful, the Probe will automatically switch off after 3 minutes to preserve the battery charge.

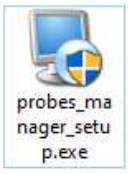
Do not connect the EP-600/601/602/603/604 to the PC until the software and utility installation is completed.

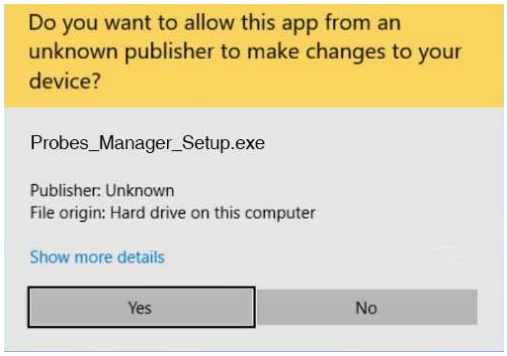
5.3 Probes Manager software and SetAddEP600 utility installation

To install the Probes Manager and SetAddEP600 on PC from the supplied Software Media as follows.

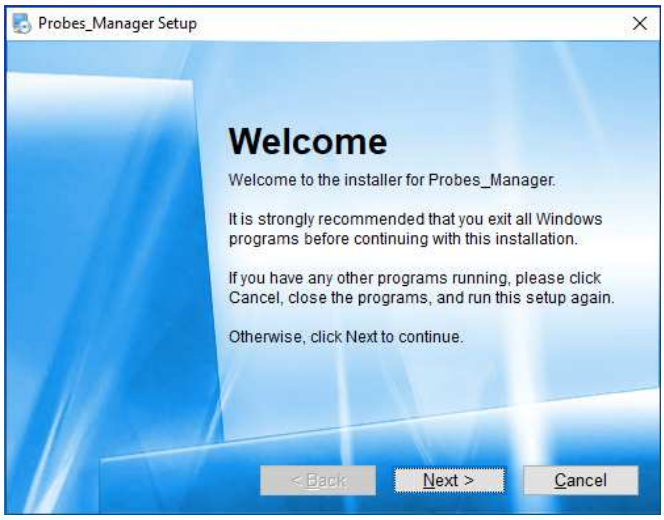
Browse the Software Media in Computer Resources and double click on the Probes Manager Setup.exe file to start the installation.
Click **Yes** when requested.

NOTE

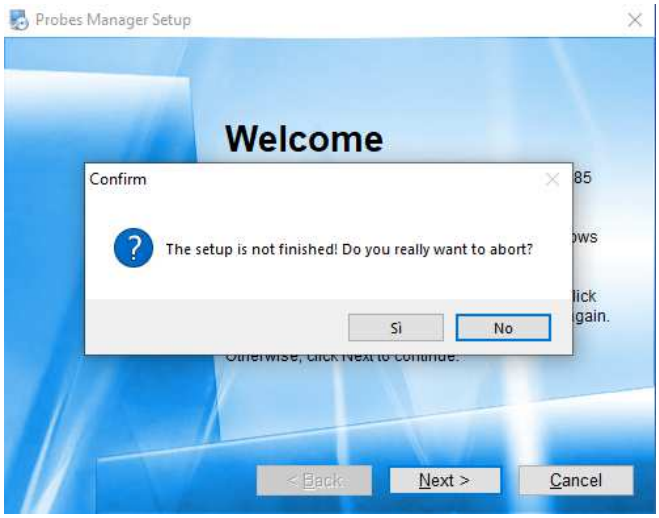




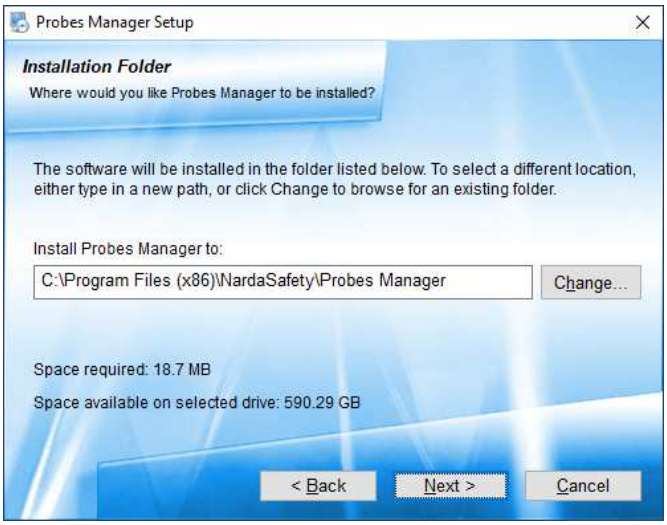
Click **Next** to proceed installing.

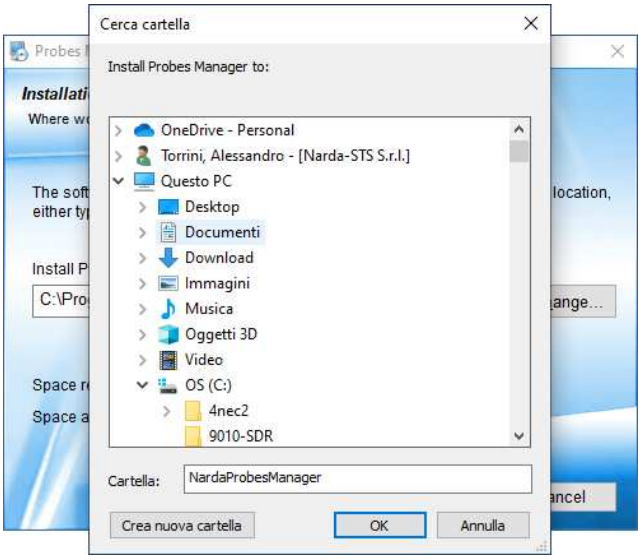


The installation can be aborted by clicking **Cancel** button:

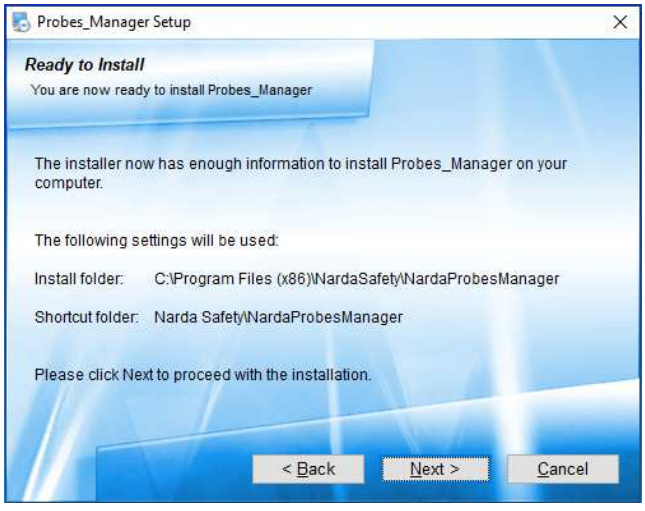


Click **Next** to confirm the default folder or **Change** to modify.

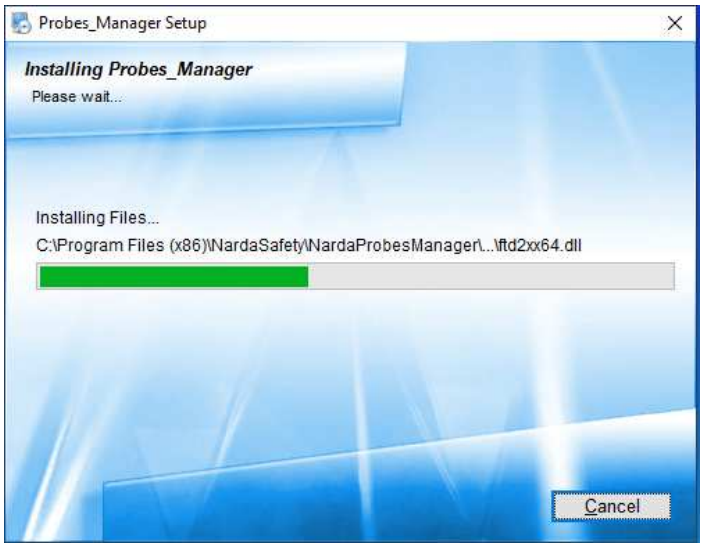




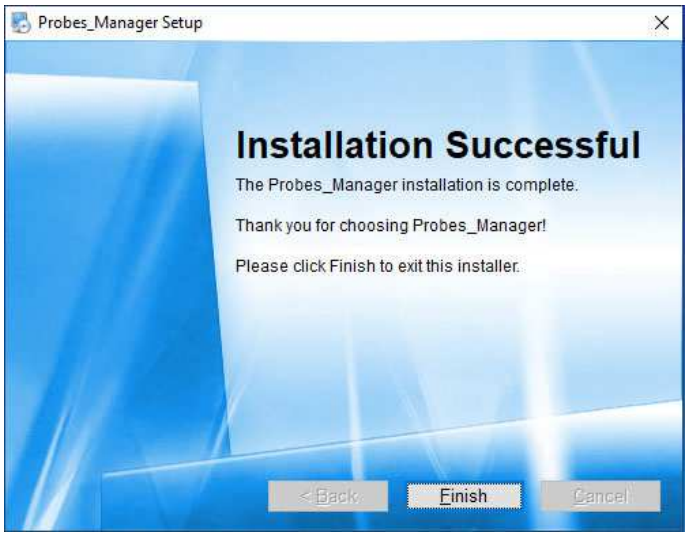
Click **Next** to proceed installing.



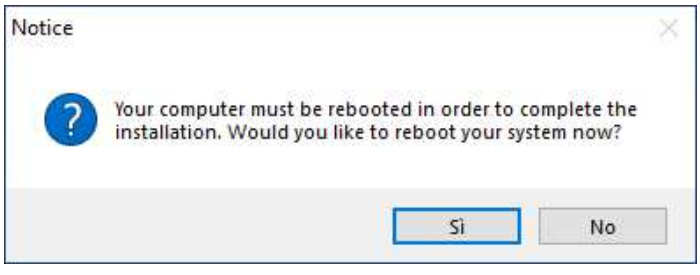
The installing status is displayed then:



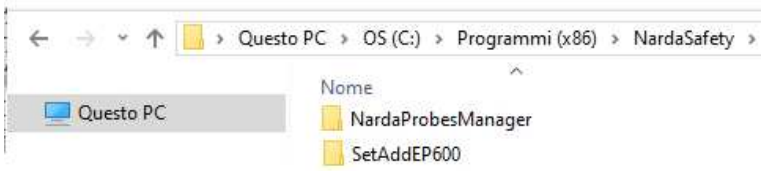
Click **Finish** to complete and exit the installer.



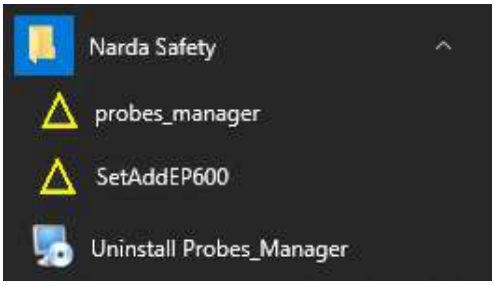
When asked for, reboot your system to complete installation



The folder **NardaProbesManager** and **SetAddEP600** is created under **Programs\Narda Safety**



Another item is created in the Programs list at Start Menu, which is "**Narda Safety**", where the **probes_manager** and **SetAddEP600** must be run from.



The **probes_manager** and **SetAddEP600** icon will be available on desktop.

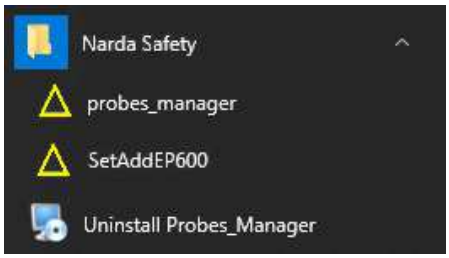
Probes Manager software

5.4 Probes Manager software running

This section provides the information necessary to use the Probes Manager software with the EP-600/601/602/603/604 Electric field probe.

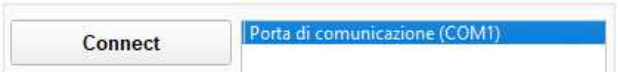
Connect the EP-600/601/602/603/604 to PC (see §2.9), switch the probe on, check the Led status (see §3.7) and click the **Probes Manager** icon on desktop.

Alternatively (Windows 10 and windows 11): **Start → All Programs → Narda Safety → Probes Manager**.



This window is displayed:

- If the EP-600/601/602/603/604 is connected to PC RS232 port (through 8053-OC converter), the device appears as "**Porta di comunicazione (COMn)**".

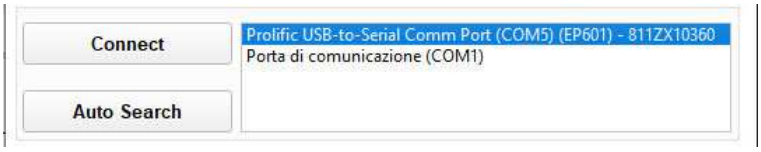


- If the EP-600/601/602/603/604 is connected to the PC USB port (through USB-RS232 converter), the device appears as "**Prolific USB to Serial Comm Port (COMn)**".

In Windows 7, Windows 10 and Windows 11 the USB-RS232 converter 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.

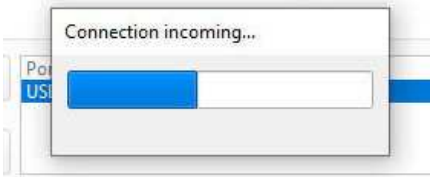
Select the port on the list and click **Connect** button**.**

At the next connection the software will display the probe on the list port with its serial number.



Instead, using the **Auto Search** button the software automatically detects the COM port to which the EP60X is connected and display the probe on the list port with its serial number.

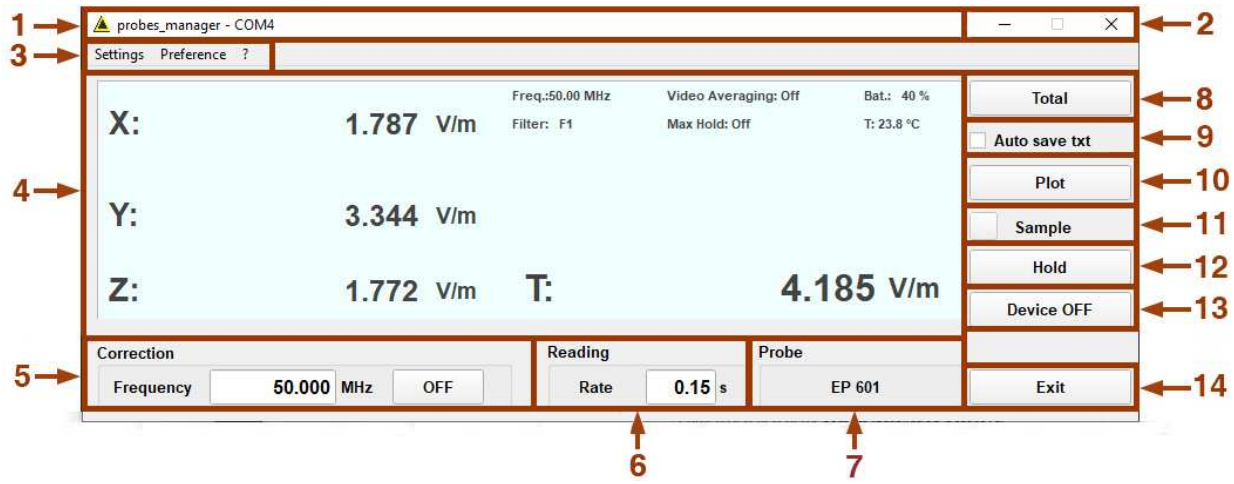
When the Probe is also replaced with other device or viceversa without removing the USB-RS232, select **Auto Search** button to detect the new instrument. The connection progress bar is displayed on main window.



When the EP-600/601/602/603/604 communication is not established, the error message will appear:

5.5 Main window

Once connected the main window is displayed:



Commands description:

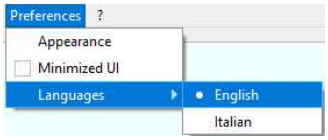
1. Title bar
2. Control window buttons
3. Menu: Settings, Preference and ? tags ribbon
4. Main window: Measurements, parameters and technical data
5. Correction frequency
6. Reading rate
7. Probe type
8. Total/XYZ readings
9. Auto save txt/csv function
10. Plot (graph view)
11. Sample indication
12.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

NOTE

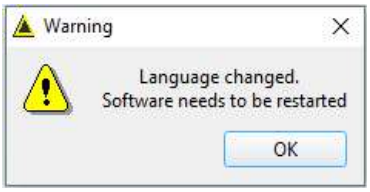
The above labels may change in case of using different configuration.

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

5.5.1 Languages

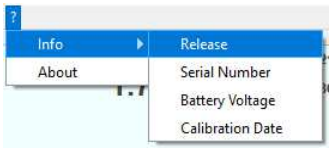


- Select the desired language under **Preferences** tab → **Languages**. A confirmation message will be display:

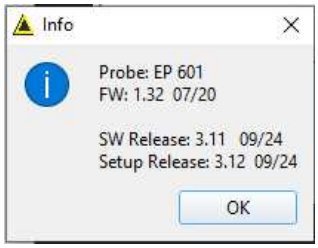


Confirm with **OK** and restart the software with the new language.

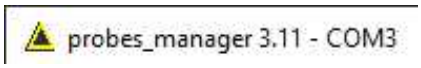
5.5.2 Release



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

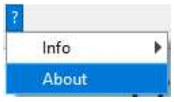


The software release is also available on the title bar with the COM port connected to the LR-01.



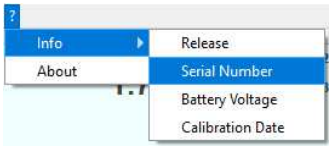
5.5.3 About

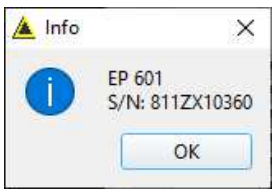
Manufacturer information is included on **?** tab → **About**



5.5.4 Serial number

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



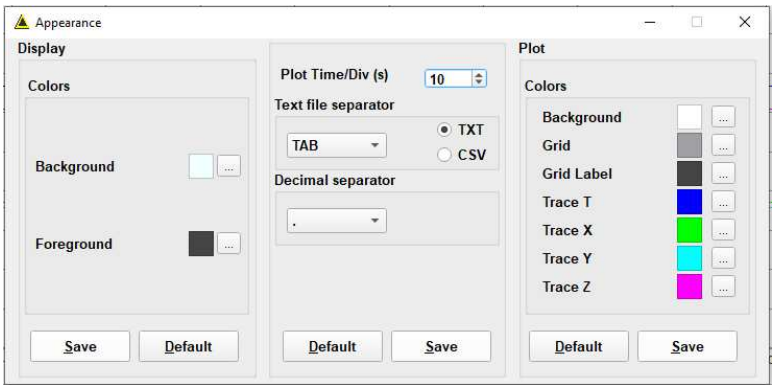


5.5.5 Appearance

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

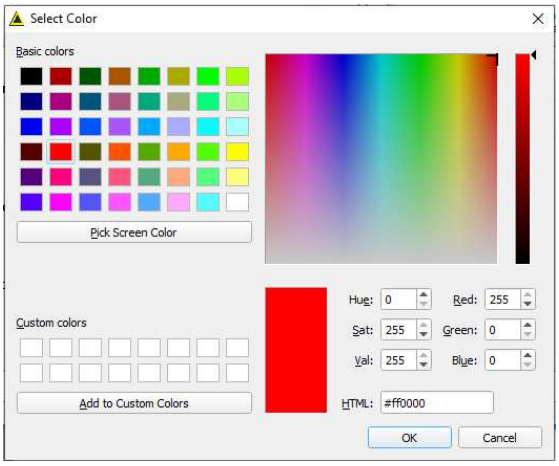
Different color combinations of the background, text, grid and traces are available under **Preferences** tab → **Appearance**.

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**.

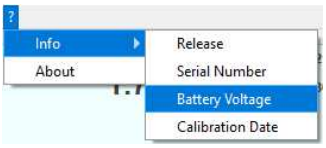


Save the new settings with **Save** button.

Default button to set appearance to the initial aspect.

5.5.6 Battery voltage

- Make sure the EP-600/601/602/603/604 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 0.1V). For example, the 2.1V 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 §5.5)
- Saving Live measurements on the text file (see §5.6)
- Display Live measurements in graph way (Plot) (see §5.7)

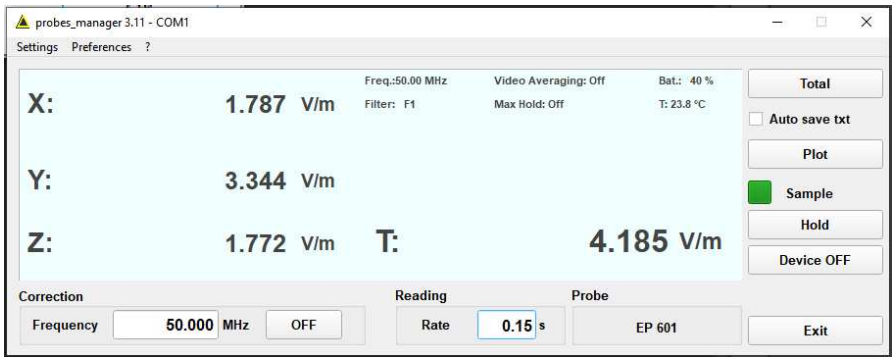
5.6 Display Live measurements on the main window

During live measurements the field value (in V/m unit) is displayed with three decimals on the main window.

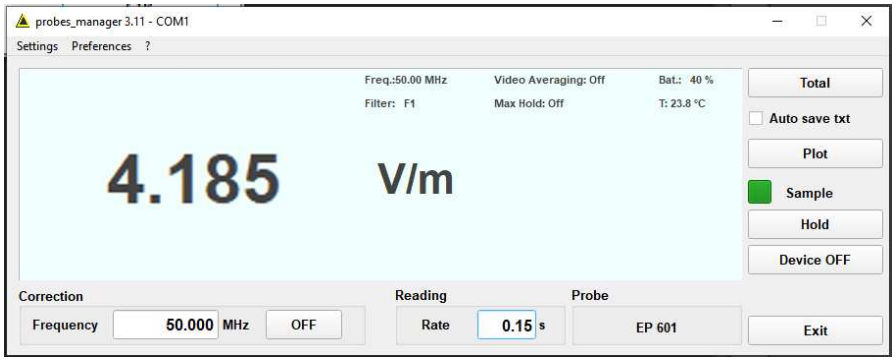
5.6.1 XYZ/Total

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

Mode X - Y - Z



Mode Total



The **Total** value is calculated with the following formula which uses every single axis value:

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

NOTE

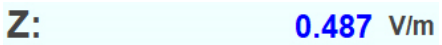
The chapter 1 of this manual includes the list of the EP-600 models available and their technical specifications.

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, 550 V/m for EP-601).

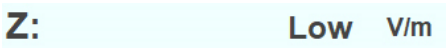
Field value marked in red: the field level is between 100% and 110% of the probe nominal maximum level (for example, from 500 to 550 V/m for EP-601).

Field value marked in blue: the field level is between the probe nominal minimum level and its 20% higher (for example, from 0.4 to 0.49 V/m for EP-601).

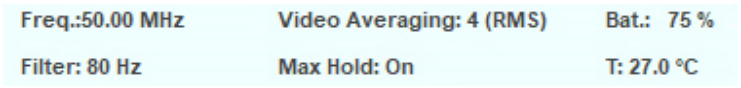


Low : the field level is lower than probe nominal minimum level.

- For example, <0.4 V/m for EP-601



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 averaged field (RMS) is calculated during live measurements or OFF when disable

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

- **Bat:** residual battery autonomy

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

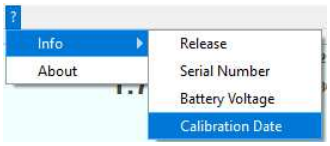
NOTE

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

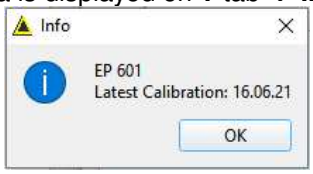
5.6.2 Probe

The EP-600 model connected to PC is displayed on the **Probe** box

5.6.3 Calibration date



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

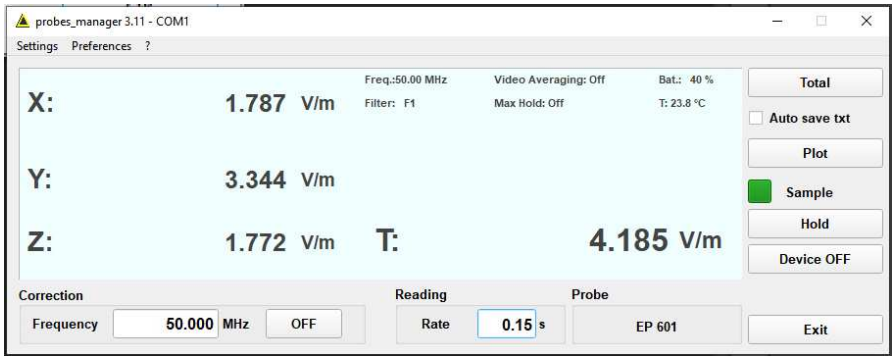


The probe can be disconnected and reconnected while in use.

The following message appears:

Afterwards this message is displayed:

Click **Yes** to establish the link; the live measurements are displayed in the main window again:



In case of absence or malfunction of the probe, the message "**The probe is not connected……..**" will appear again.

5.6.4 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

5.6.5 Reading Rate

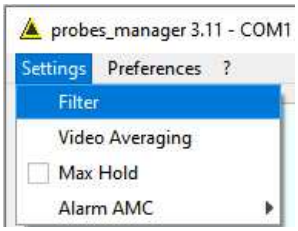
The field value is displayed on the Main window and on the Plot (Graph) at the interval (Reading Rate) set in seconds.

If **Auto save txt/csv** is enable, the data are also saved on the text/table file at the same interval (see §5.6.1)

The minimum time interval depends on the Filter setting (see §5.5.6) 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.

5.6.6 Filter

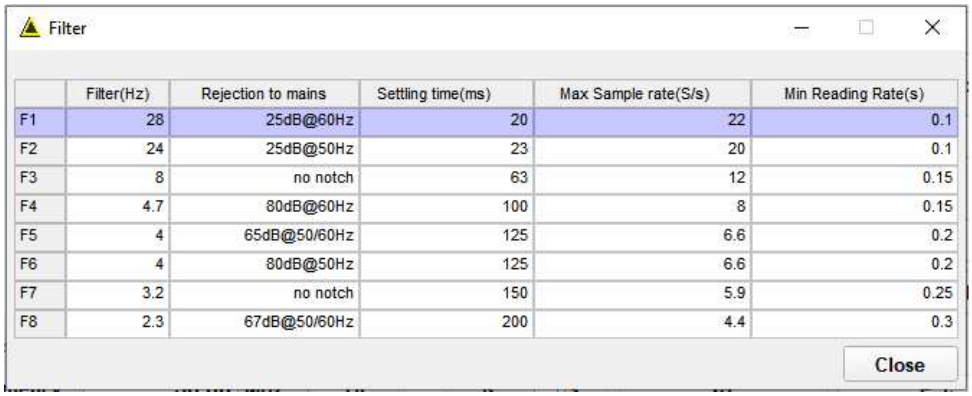


The Electric Probe is also used to monitor and control the field level inside the anechoic chambers for electromagnetic measurement and testing.

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

The EP-600 probe models features internal digital filters from the faster (F1) to the slower (F8) and can be selected to find the correct compromise:

Click on the corresponding line (which turns blue) to select the required filter and press **Close**. It will be displayed in the main window with the others parameters and technical data.



	Filter(Hz)	Rejection to mains	Settling time(ms)	Max Sample rate(S/s)	Min Reading Rate(s)
F1	28	25dB@60Hz	20	22	0.1
F2	24	25dB@50Hz	23	20	0.1
F3	8	no notch	63	12	0.15
F4	4.7	80dB@60Hz	100	8	0.15
F5	4	65dB@50/60Hz	125	6.6	0.2
F6	4	80dB@50Hz	125	6.6	0.2
F7	3.2	no notch	150	5.9	0.25
F8	2.3	67dB@50/60Hz	200	4.4	0.3

Filter(Hz): internal digital filter

Rejection to mains: some filters feature notch filtering at mains frequency to reducing interference

Settling time (ms): time required for getting a complete reading

Max Sample rate (S/s): maximum number of samples per second

Min Reading Rate (s): minimum time interval between field readings

NOTE

The F4 and F5 filter may offer a good compromise in terms of power consumption, sensitivity, settling time and rejection to mains.

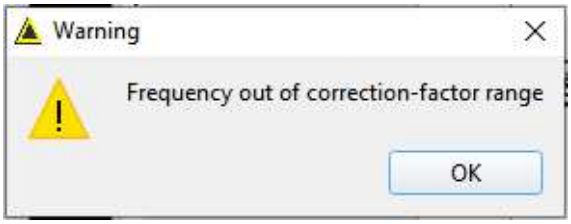
5.6.7 Correction Frequency

EP-600/601/602/603/604 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.

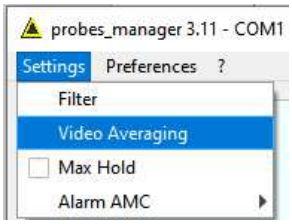
To recall the **Correction frequency** factor (in MHz):
- Clicking on **ON** button for enabling the function.
- Insert the Frequency correction value

Click **OFF** to disable the Correction Frequency; the button will toggle to **ON** again for enabling the function when required.

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



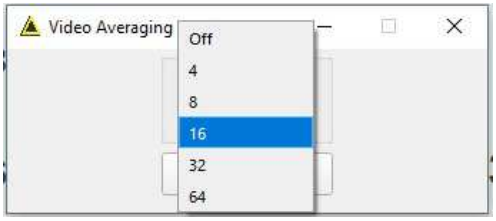
5.6.8 Video Averaging



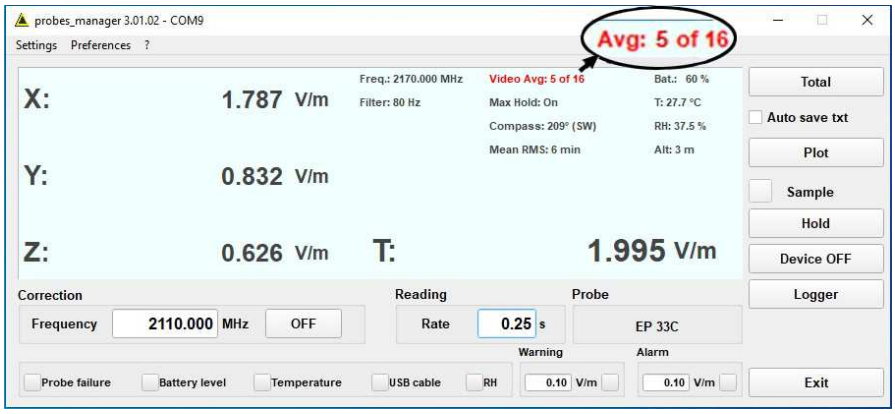
While live measurements are performed, the user can also display the Arithmetic averaged field (RMS) using the **Video Averaging** function.

The number of the readings on which the 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**.

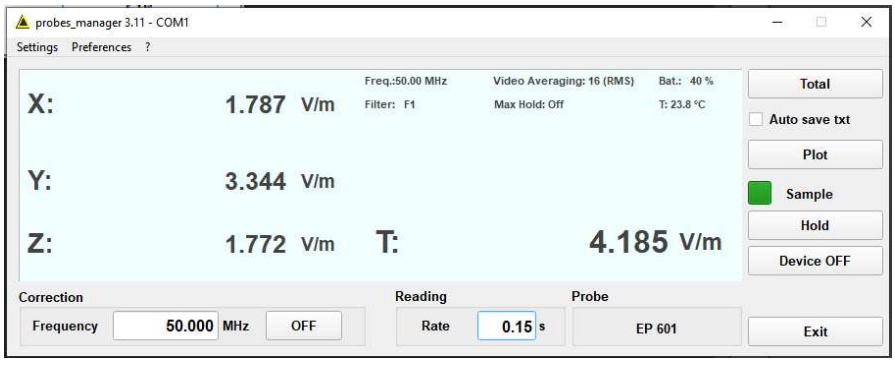


Once selected, the **Video Avg** counter is started and displayed in red on the main window:



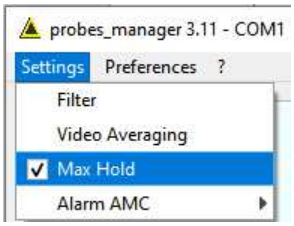
When the counter is ended, the preset value is shown and the average value of the last 16 field readings will be displayed.

Then the process continues in moving average mode: the older of the 16 readings block is discarded, the latest is added at the interval of the Reading Rate setting and the average result is shown on main windows at the same interval.



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

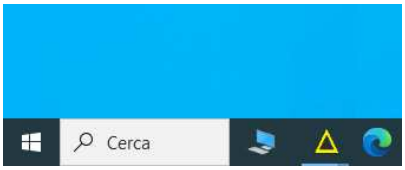
5.6.9 Max Hold



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

5.6.10 Minimized UI

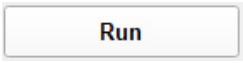
Enable √ this function to keep the Total field readings displayed on desktop when minimizing the main window on the tray by control window button (**Preferences** tab → **Minimized UI**).



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

5.6.11 Hold/Run

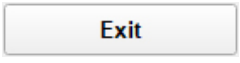
While live measurements are performed, the user can freeze the readings pressing **Hold** button. Press the button again to Resume.



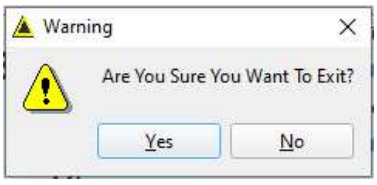
5.6.12 Device OFF

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.

5.6.13 Exit



Press **Exit** to exit and quit the program (the Probe remains on).
The current settings are saved and will be recalled at the next start.



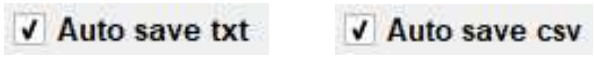
Press **Yes** to close the software or **No** to continue using the software

5.7 Saving Live measurements

While the live measurements are performed, the software allows collecting probe measurements 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**).

5.7.1 Auto save txt/csv

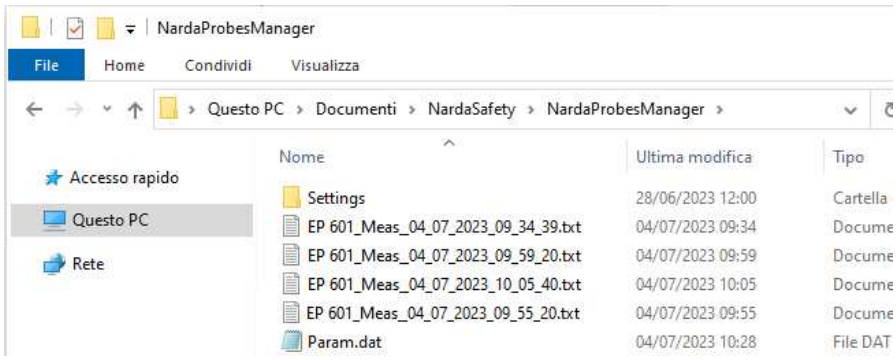
In the upper-right main window enable the function √ to start saving the measurements at the Reading rate set:



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: EP600 probe model

Device Serial Number: Serial number stored on probe

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.

Filter: internal digital filter selected, or OFF when disable

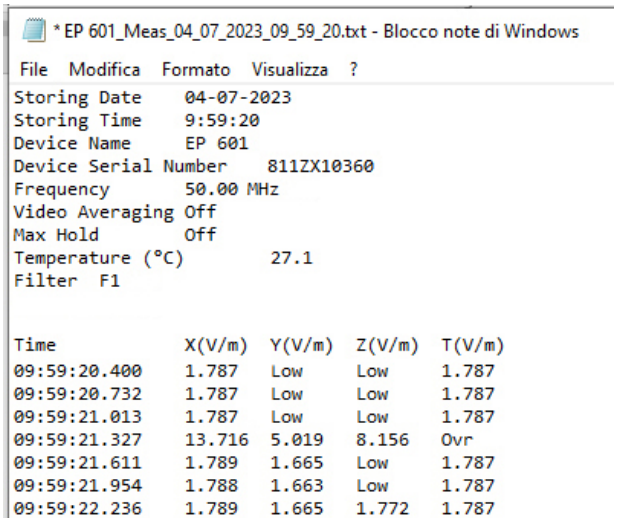
Time: hour, minute, second, thousandths of a second of the measurement acquisition

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 configuration

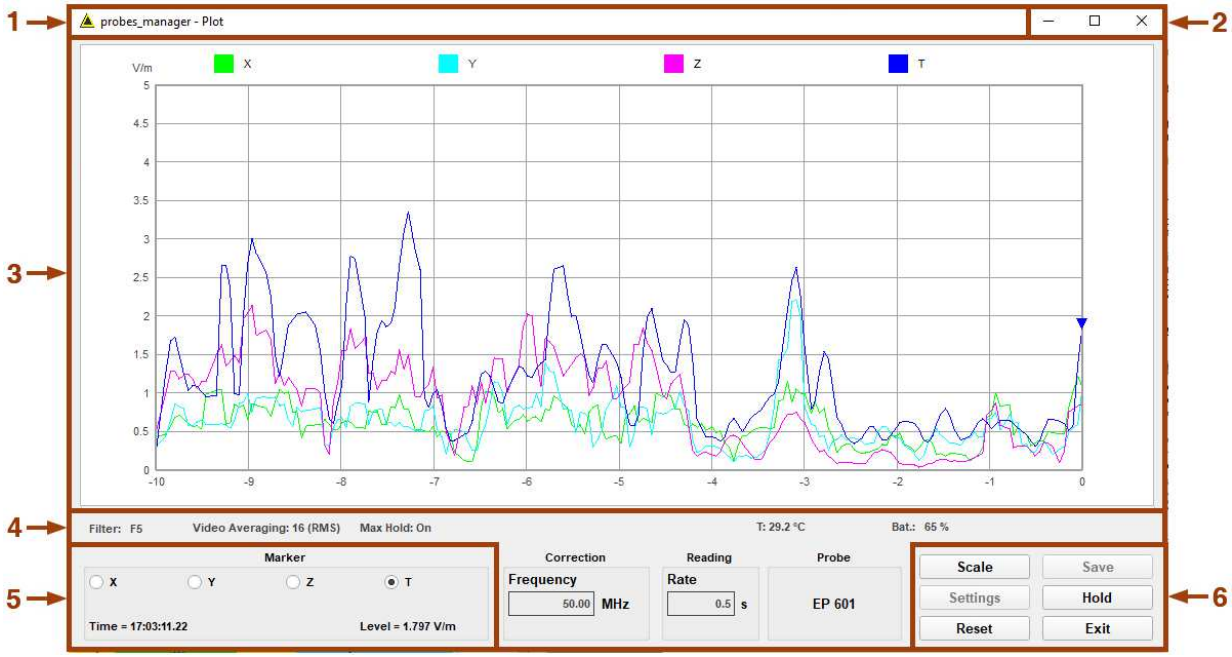


If the field measured is outside the nominal level range, the value is displayed with **Ovr** or **Low** (see Pag.3-12).

5.8 Display Live Measurements on the graph (PLOT)

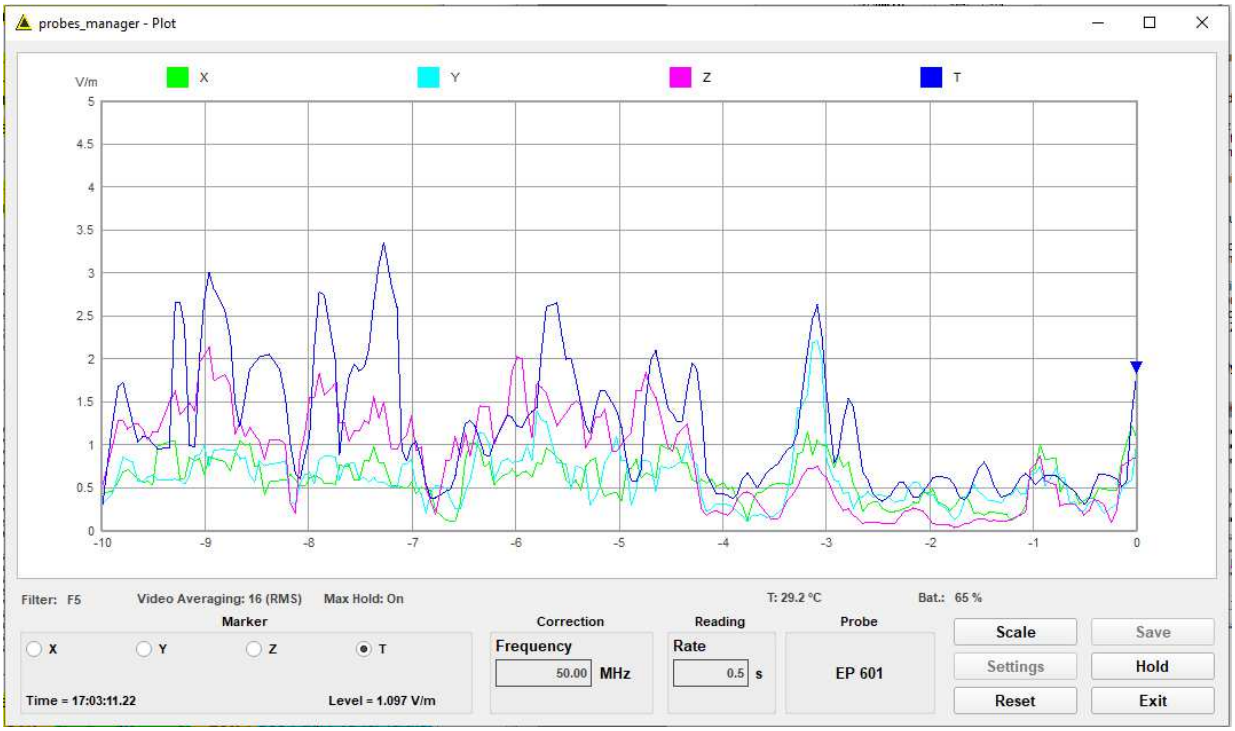
The **PLOT** function performs Time Domain measurements and showing how the signal level changes over time.
The screen displays a continue running graph at the Reading Rate setting.

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.5-12).

5.8.1 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.

5.8.2 Hold/Run

Press **Run** to resume the analysis.

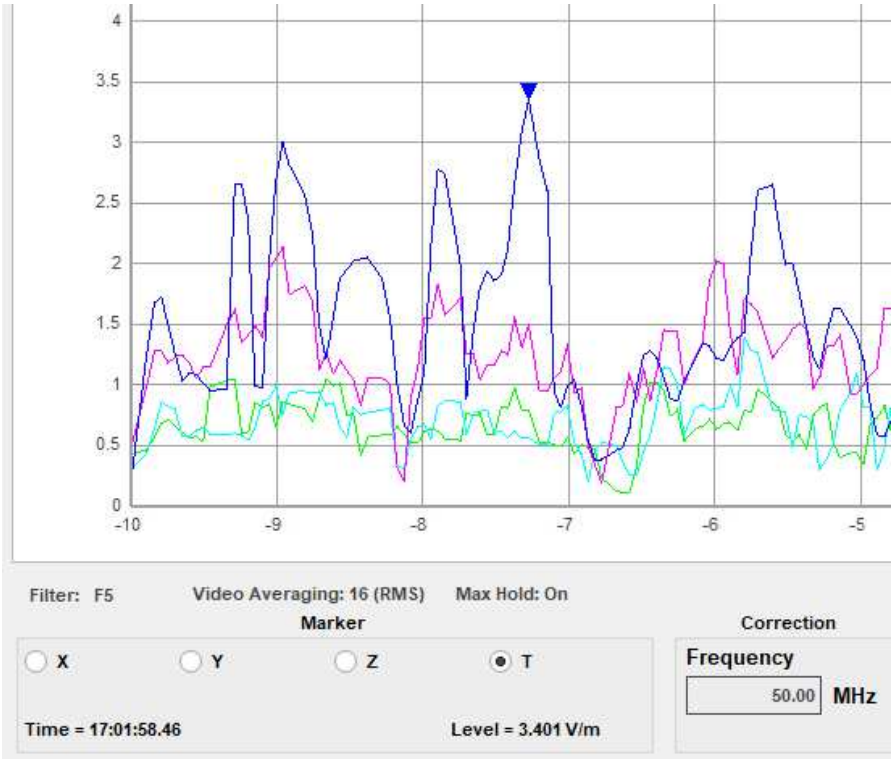
5.8.3 Reset

NOTICE

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 §5.8.6).

5.8.4 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.



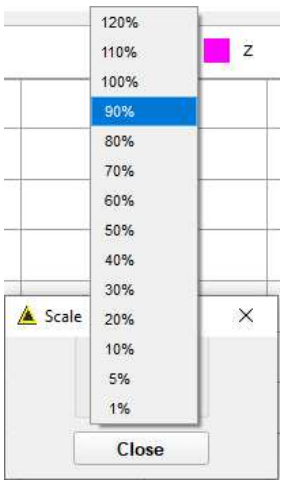
If the **XYZ** mode is not enable, the X, Y and Z axis will be disable.

NOTE

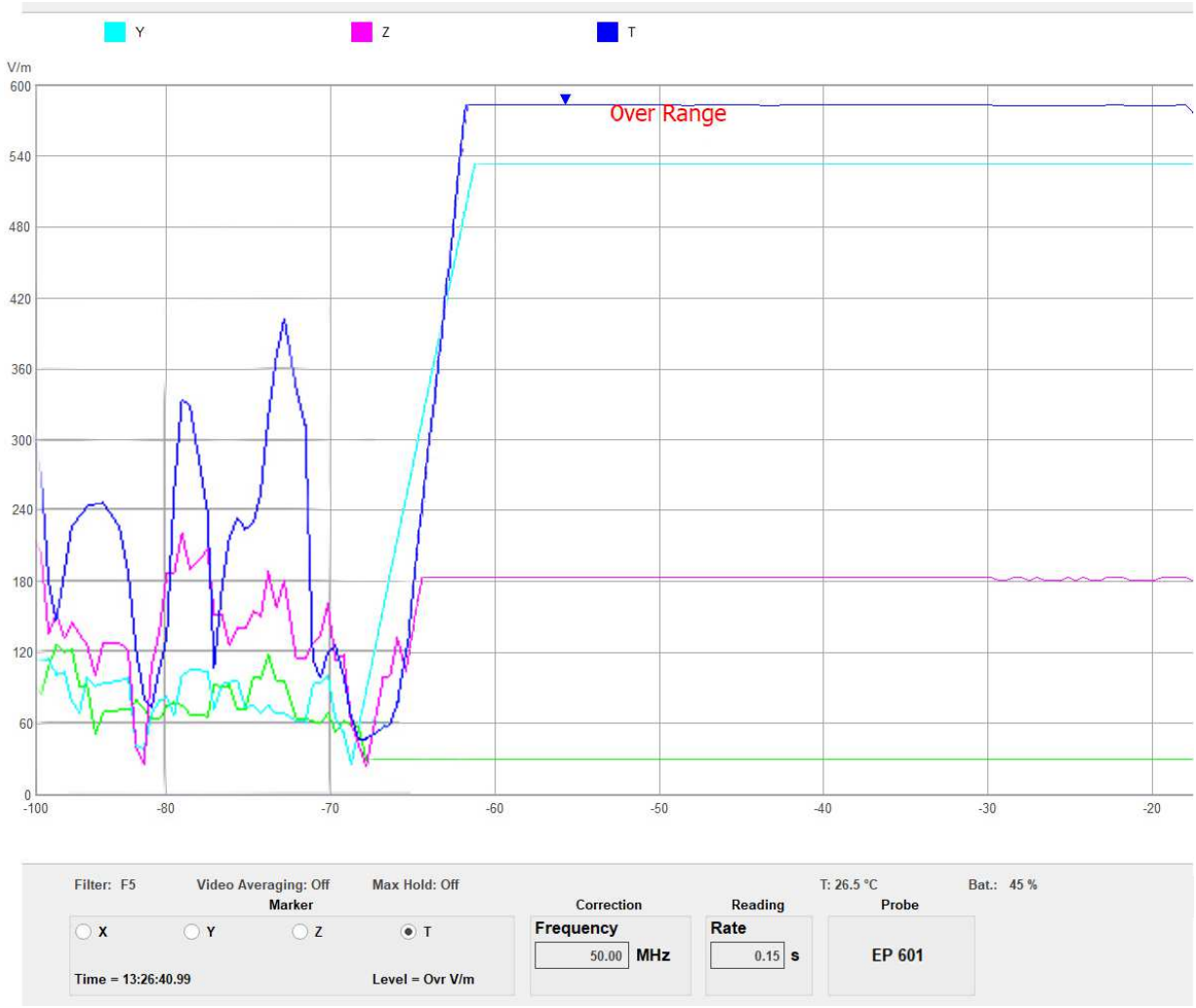
The above labels may change in case of using different configuration.

5.8.5 Scale

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



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.

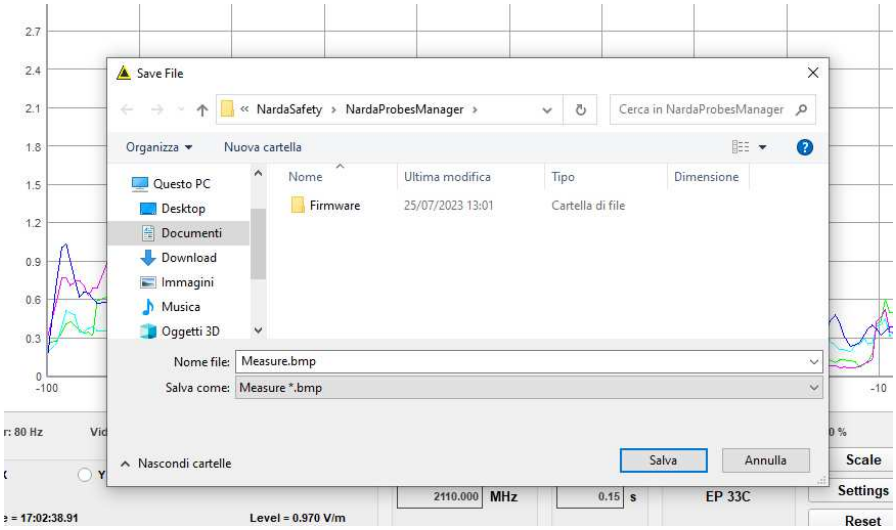


Notice the **T : Ovr** indication will appear on the main window and the Y axis value will turn **red** because the field level is between 100% and 110% of the probe nominal maximum level.

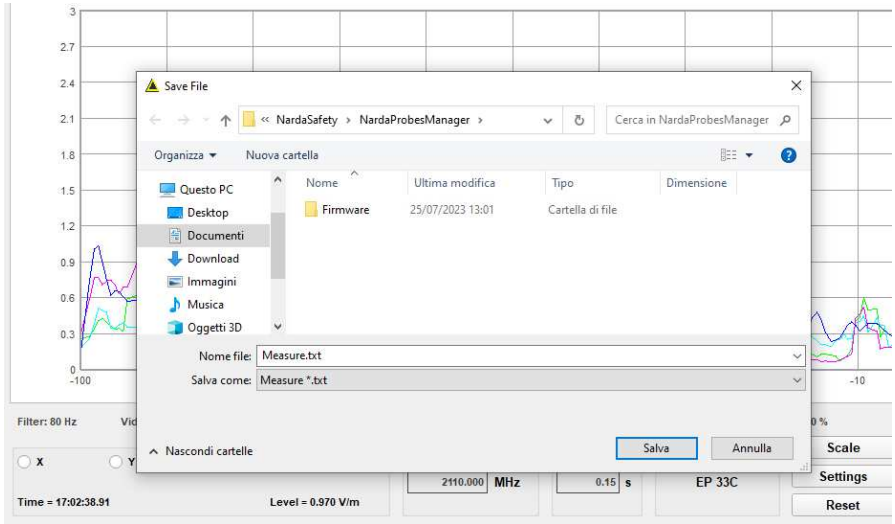
5.8.6 Save

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.

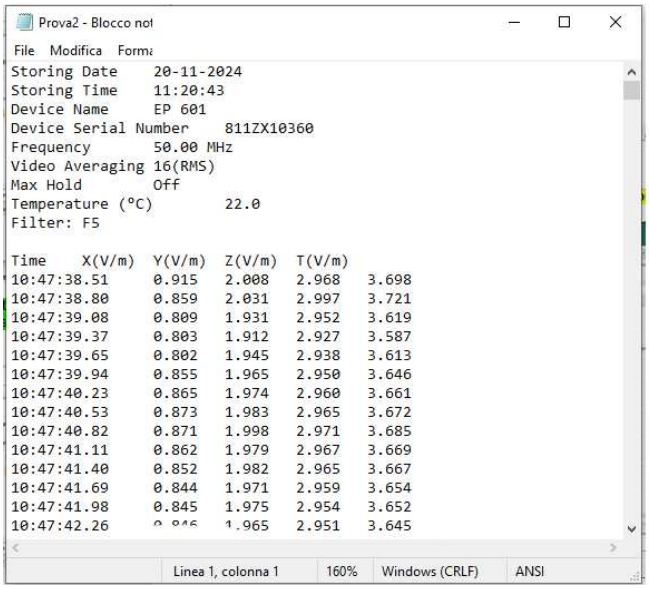


When the table is opened, an huge amount of data are available; the text file has the same format as the **Auto save txt/csv** function (see §5.6.1).

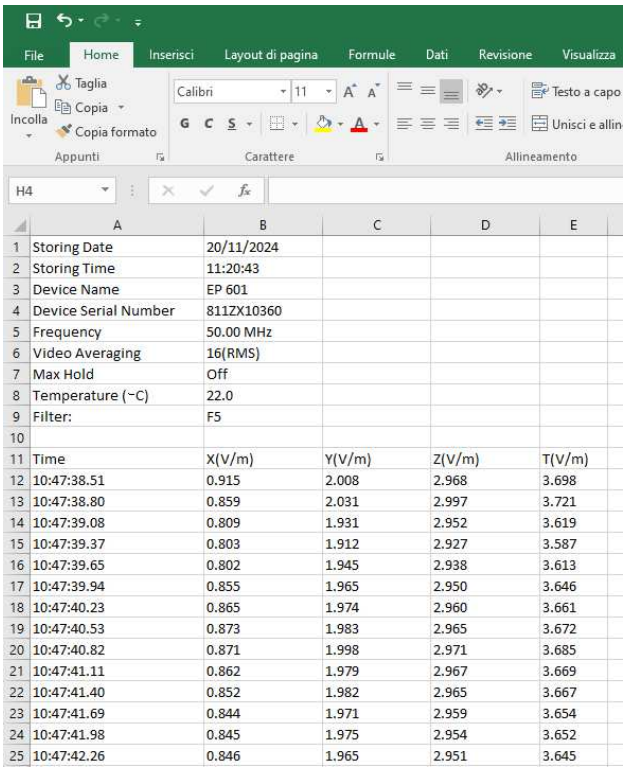
5.8.7 Exit

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

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



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



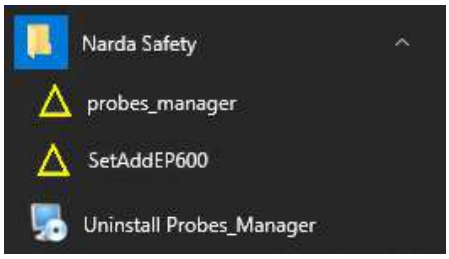
	A	B	C	D	E
1	Storing Date	20/11/2024			
2	Storing Time	11:20:43			
3	Device Name	EP 601			
4	Device Serial Number	811ZX10360			
5	Frequency	50.00 MHz			
6	Video Averaging	16(RMS)			
7	Max Hold	Off			
8	Temperature (~C)	22.0			
9	Filter:	F5			
10					
11	Time	X(V/m)	Y(V/m)	Z(V/m)	T(V/m)
12	10:47:38.51	0.915	2.008	2.968	3.698
13	10:47:38.80	0.859	2.031	2.997	3.721
14	10:47:39.08	0.809	1.931	2.952	3.619
15	10:47:39.37	0.803	1.912	2.927	3.587
16	10:47:39.65	0.802	1.945	2.938	3.613
17	10:47:39.94	0.855	1.965	2.950	3.646
18	10:47:40.23	0.865	1.974	2.960	3.661
19	10:47:40.53	0.873	1.983	2.965	3.672
20	10:47:40.82	0.871	1.998	2.971	3.685
21	10:47:41.11	0.862	1.979	2.967	3.669
22	10:47:41.40	0.852	1.982	2.965	3.667
23	10:47:41.69	0.844	1.971	2.959	3.654
24	10:47:41.98	0.845	1.975	2.954	3.652
25	10:47:42.26	0.846	1.965	2.951	3.645

SetAddEP600 utility

5.9 SetAddEP600 utility running

Connect the EP-600/601/602/603/604 to PC (see §2.9), switch the probe on, check the Led status (see §3.7), select with right click mouse the **SetAddEP600** icon on desktop, then **Properties → Shorcut**.

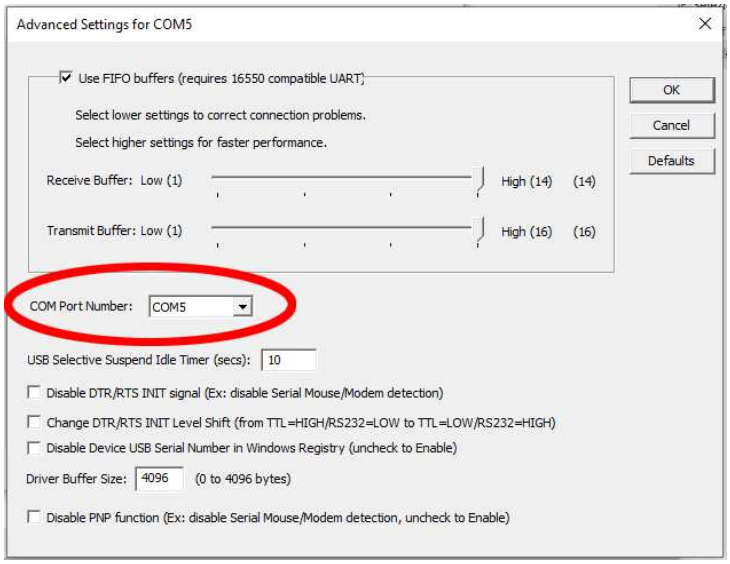
Alternatively (Windows 10 and Windows 11): **Start → All Programs → Narda Safety → SetAddEP600**.



In Windows 7, Windows 10 and Windows 11 the USB-RS232 converter 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.

Make sure the assigned COM port is between 1 and 9 in Device Manager via control panel. In case of USB connection the COM port can be found in **Ports (COM & LPT) – Prolific USB to Serial Comm Port (COMx)**. Otherwise, if you are using the PC serial port check on **Porta di comunicazione** (**COMx**).

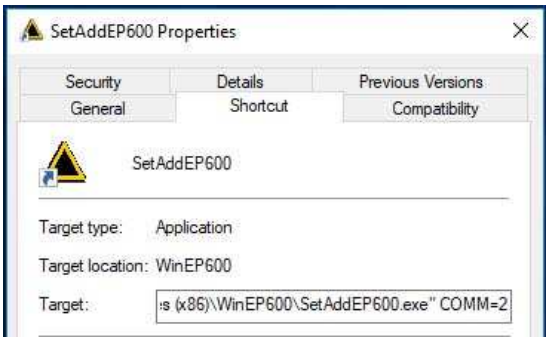
If the COM port number is NOT comprised between 1 and 9, double click on the corresponding line, enter in **Port settings → Advanced** and select the first **COM port Number** available on the required range; click **OK**.



Add the command **COMM=X** preceded by a space (in capital letters) at the end of the Destination field where **X** indicates the COM port number assigned previously on the advanced settings.

NOTE

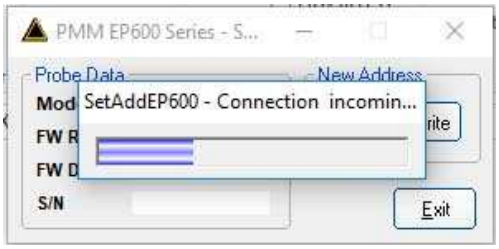
In some operating system the Destination field is enclosed in double quotation marks (“); in this case, the command COMM=X, <u>preceded by a space</u> must be outside as in the example below;



Confirm by selecting **Apply** and **OK.**

Run the software with double click on **Set AddEP600** icon or select the utility in the Programs list.

The connection progress bar is displayed.



When the communication is not established, the error message will appear:

Select **Yes** to quit or **No** to retry.

5.9.1 Main window

Once connected the main window is displayed:

1. Title bar
2. Probe Data
3. New Address
4. Exit

5.9.2 Title bar

The utility name is shown on the title bar and the control window buttons allows to enlarge/restore the main window and exit the program.

5.9.3 Probe data and New Address

The EP600 probe data and current address are shown on main window (default 00).

Enter the new address on the 

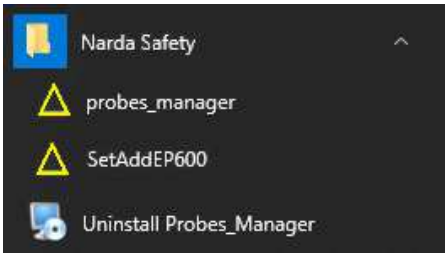
field and press **Write** button to store it in the internal probe memory.

Press **Exit** to quit the program.

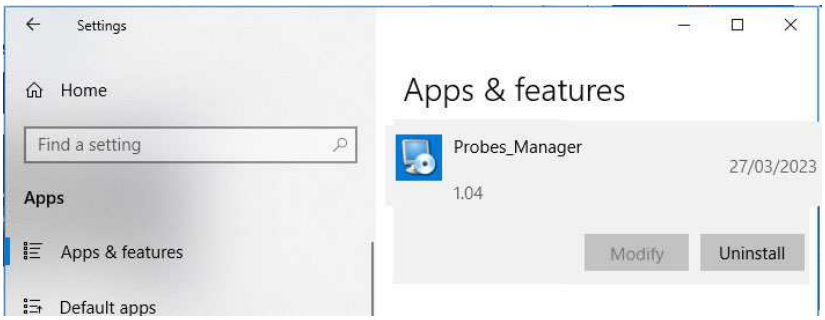
5.10 Uninstalling Narda Probes Manager and SetAddEP600

Disconnect the Electric Probe from the PC and uninstall the Narda Probes Manager software and SetAddEP600 Utility.

Click **Start, NardaProbesManager,** then **Uninstall Probes_Manager** and follow the instructions.



Or 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.

5.11 Uninstalling driver for the RS323-USB Converter

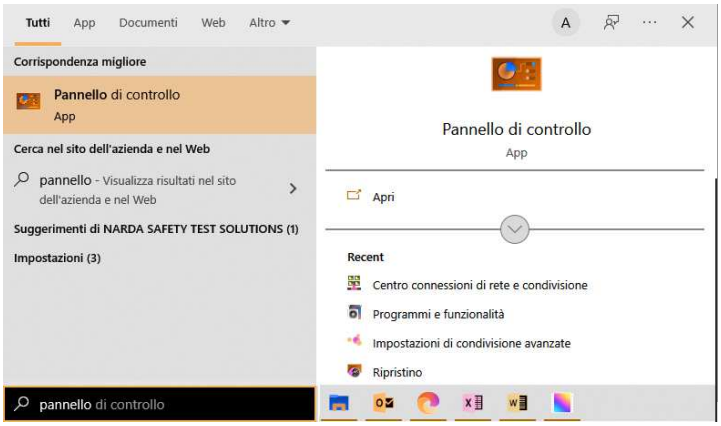
Apply this method if the driver uninstaller (normally supplied with the converter) is not available.

It is possible to remove the RS232-USB driver from the PC according to the following procedure:

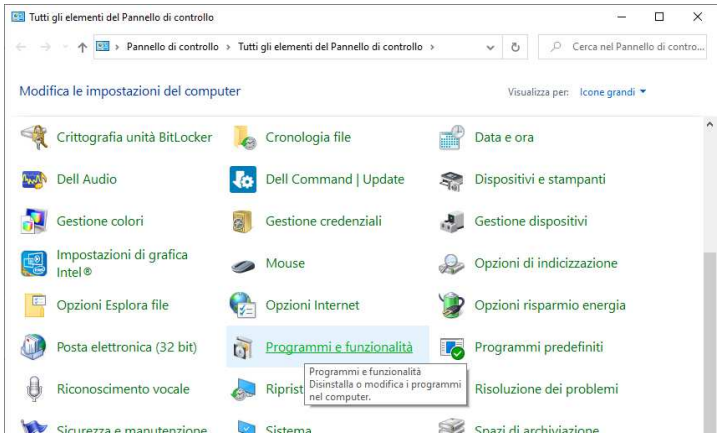
Open the Windows Control Panel.

NOTE

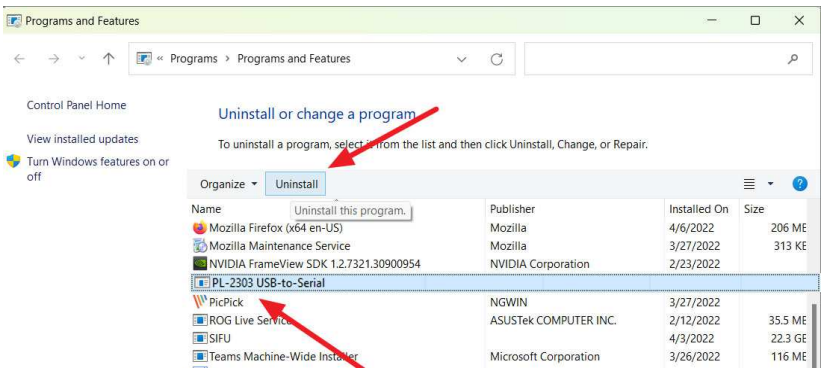
The following procedure shows how to remove the driver in Windows 10 and Windows 11 environment. It may be different depending on the operating system in use.



Click on “Programs and Features”.



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



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6 - Communication protocol

6.1 Introduction

This chapter provides the information required to control the PMM EP-600/601/602/603/604 via the fiber optic connected to a PC and by means of user's own PC software applications. Narda STS S.r.l supports the correctness of the information only, and disclaim for any consequence the use of such information may cause to anybody. The inclusion of Narda's communication protocol into user's or third party software is entirely at the user's risks and responsibility. In no way Narda STS S.r.l shall be liable for damages of any kind consequent to the use of the information provided in this chapter.

All the following examples are indifferently referred to the PMM EP-600, EP-601, EP-602, EP-603 and EP-604.

6.2 Protocol

The serial communication between PC and PMM EP-600/601/602/603/604 is the RS232 standard or USB (via the USB-RS232 converter). Specifications:

- Rate 9600 Baud
- Start 1 bit
- Stop 1 bit
- No Parity

The commands are composed by an ASCII string delimited by **"#"** (0x23) and "*" (0x2A)
Up to FW 1.02 each command must begin with the address which is made of the string "00".
From FW 1.10 each command starts sending the address which is made of two characters string in the range "00" to "99".
The address "00" is a special one as it is considered Broadcast while all others must match the address stored in the unit (see command "**I**").
In other words the EP-600 will always grant all commands starting with "#00" regardless its own address stored.
Broadcast mode is intended when using the EP-600 in a NON-BUS way, typically PC directly linked to EP-600, or for setting the new address (see command "**I**"). In this mode the address can be changed even without knowing the current address.
Careful must be taken, however, when the EP-600 works on a BUS (for example via SB10) as using the broadcast address all the device sharing the BUS would answer at the same time creating thus a conflict.
Hereafter all example are made using the broadcast address but, of course, they work also using different address. The only restriction is that the address must be made of two characters and the range is "00" to "99"

The answer can be either in ASCII or Binary, according to the command sent. The first character is always like the character sent, and can be used as control marker or synchronization for the answer.

The available commands are of three categories:

- **Query COMMANDs**
- **Setting COMMANDs**
- **Operative COMMANDs**

The commands have this format:
#00Qcommand(parameters)* where:

# = command string start
00 = string always present
Q = **?** for query commands
S for setting commands
Command = command string
(parameters) = setting parameters value (where present)
***** = command string end

At power ON the EP-600/601/602/603/604 is in Master mode, as required by the communication with the hand-held unit 8053B; the EP-600/601/602/603/604 will continue to send the measurement data independent from receiving the commands. For this might be not useful when interfacing to other software, send the command #00?v* to turn the EP-600/601/602/603/604 in Slave mode to answer only when receiving a query.
To save battery the EP-600/601/602/603/604 automatically turns off 180 seconds after receiving a command; use the operative command #00e n* (see table 6-2) to set the time before the EP-600 auto-switches off.

6.3 Query Commands

Table 6-1 Query Commands	
Command	Description
?v	This query command **#00?v*** sends back a string containing information about model, release and date of firmware. Example of reply to the command **#00?v***: **"vEP600:1.02 10/05;"**
?p	This query command **#00?p*** sends back a string containing information about date of calibration. Example of reply to the command **#00?p***: **"10/05;"**
?b Battery	This query command **#00?b*** sends back 3 bytes containing information about the voltage of EP-600 battery. The array is made of 3 bytes in which the first is the character 'b' followed by 2 bytes expressing a 16bit unsigned integer (**nn**) in **Big** Endian notation. To get the battery voltage use the following formula: V_battery= **3 * (nn** / **1024 * 1.6)**
?t Temperature	This query command **#00?t*** sends back 3 bytes containing information about the temperature of EP-600 probe. The array is made of 3 bytes in which the first is the character 't' followed by 2 bytes expressing a 16bit unsigned integer (**nn**) in **Big** Endian notation. To get the temperature in degrees Centigrade use the following formula: T_ep600= **((nn** / **1024 * 1.6) - 0.986) * 1000** / **3.55**
?s Serial Number	This query command **#00?s*** sends back a string containing the serial number of the device Example of reply to the command **#00?s***: **"s123456789AAAA"**
?T Total Field	This query command **#00?T*** sends back 5 bytes containing information about the **total** field strength measured by EP-600. The array is made of 5 bytes in which the first is the character 'T' followed by 4 bytes expressing a 32bit IEEE floating point number(**ff**) in **Little** Endian notation. The figure **(ff)** represents the square of total field strength (isotropic measure) To get the field strength, the square root must be taken: **V/m=√ff**
?A All Field Components	This query command **#00?A*** sends back 13 bytes containing information about field strength measured by EP-600 of every **single axis**. The array is made of 13 bytes in which the first is the character 'A' followed by 12 bytes expressing 3 (X,Y,Z) 32bit IEEE floating point number(**ff**) in **Little** Endian notation. The 3 figures **(fx,fy,fz)** directly represent the field strength of related axis and are expressed in V/m.

6.4 Setting Commands

Table 6-2 Setting Commands	
Command	Description
k fr	This setting command **#00k frq*** sets the frequency(**frq**) to which refer the correction factor. The figure **fr** is the ASCII string representing the **integer** frequency multiplied by 100 giving thus the resolution of 10kHz. Once the EP-600 has received and granted this command, all measurements will be corrected using the factor stored in factory related to this frequency. Sending a frequency which is out of EP-600 range disables frequency correction factor function. The reply is an array made of 5 bytes in which the first is the character 'k' followed by 4 bytes expressing a 32bit IEEE floating point number(**ff**) in **Little** Endian notation. The figure **(ff)** represents the frequency used by the EP-600 Example of command **#00k 10000***: (Set the internal frequency to 100MHz)
f n	This setting command **#00fn*** sets the processing filter (**n**) used for measurements. The index **n** must be between 0 and 7. For further information on filters please refer to separated document Example of command **#00f2***
e n	This setting command **#00e n*** sets the time before the EP-600 auto-switches off after receiving a recognized command. Note that this setting is **not permanent** and it will be kept only while the EP-600 is ON. Every time the EP-600 is turned off, the default 180 second is taken. The argument **n** is expressed in second e should be lower than 10800 (3 hours). The replay to this command is 'e' if it has been granted and 'x' if the argument is out of range (in which case the default 180 is taken). Example of command **#00e 600*** : (sets the switch off time to 10 minutes)
!	This setting command **#00!*** switches the probe OFF. Once it is OFF there is no way to turn it ON via remote command Example of command **#00!***

6.5 Operative Commands

Table 6-3 Operative Commands	
Command	Description
@c	This setting command **#00@c*** temporarily puts the EP-600 in “Storing Mode” allowing thus storing a new address. As this permission lasts only for 1 second, the command “I” should be issued closely. This command has not a reply. Example of command **#00@c***
@Iaddr	This setting command **#00@Iaddr*** sets the address used for communication protocol. It is made of a 2 character string int range “00” to “99”. Neither spaces nor punctuation are allowed between “#@00” and addr . This setting command is executed only if sent within 1 second since the command “c” The reply is the address itself if it has been granted otherwise “ERR” if the EP-600 was not in Storing Mode Example of command **#00@0I53*** which sets the address to “53”. Therefore, all following commands starting with **#53……*,** in addition to **#00….*,** will be granted.

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7 – DLL Function reference guide

All the following examples are indifferently referred to the PMM EP-600, EP-601, EP-602, EP-603 and EP-604.

The DLL library manages only the broadcast address ("00").

7.1 C language

7.1.1 PMM_CreateProbe()

int PMM_CreateProbe(const char *name, HANDLE *probeHandle, const char *commPort);

Purpose:
Establishes communications with a specified probe.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
const char *name: PMM EP-60X model name Ex.: EP-601
const char *commPort: Serial communication port name Ex.: COM1, COM3…COM99

Output Parameters:
HANDLE * Handle

Use #include<windows.h> for the HANDLE type data.

Special value that is used to refer to this probe for subsequent function calls after it is created.

7.1.2 PMM_RemoveProbe()

int PMM_RemoveProbe(const HANDLE probeHandle);

Purpose:
Closes the communications port and releases memory back to the system.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
HANDLE probeHandle; as returned from the *CreateProbe* function

Output Parameters:
None

7.1.3 PMM_Firmware()

int PMM_Firmware(const HANDLE probeHandle, char *firmware, int *arraySize);

Purpose:
Gets the probe's firmware version.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
HANDLE probeHandle; as returned from the *CreateProbe* function

Output Parameters:
Pass-by-reference character string: Specifying the length of string

7.1.4 PMM_ProbeName()

int PMM_ProbeName(const HANDLE probeHandle, char *name, int *arraySize);

Purpose:
Return the probe name identification information.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
HANDLE probeHandle; as returned from the *CreateProbe* function

Output Parameters:
The name is placed in the user allocated string buffer.

7.1.5 PMM_Model()

int PMM_Model(const HANDLE probeHandle, char *model, int *arraySize);

Purpose:
Return the probe model identification information.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
HANDLE probeHandle; as returned from the *CreateProbe* function

Output Parameters:
The model is placed in the user allocated string buffer.

7.1.6 PMM_CalibrationDate()

int PMM_CalibrationDate(const HANDLE probeHandle, char *calibrationDate, int *arraySize);

Purpose:
Returns the probe's the last calibration date. Not available on older probes.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
HANDLE probeHandle; as returned from the *CreateProbe* function

Output Parameters:
Pass-by-reference character string: calibrationDate: probe's calibration date.
arraySize: the length of the string.

7.1.7 PMM_ReadBattery()

int PMM_ReadBattery(HANDLE probeHandle, float *battery);

Purpose:
This function reads the probe's battery status.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
HANDLE probeHandle

Output Parameters:
Pass-by-reference float battery: Is the battery's status in Volt.

7.1.8 PMM_ReadTemperature()

int PMM_ReadTemperature(HANDLE probeHandle, float *temperature);

Purpose:
This function reads the probe's internal temperature.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
HANDLE probeHandle

Output Parameters:
Pass-by-reference float temperature. The numeric value of the probe internal temperature in degrees Celsius.

7.1.9 PMM_SerialNumber()

int PMM_SerialNumber(const HANDLE probeHandle, char *serialNumber, int *arraySize);

Purpose:
Returns the probes serial number.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
HANDLE probeHandle

Output Parameters:
Pass-by-reference character string serialNumber: probe's serial number.
arraySize: the length of the string.

7.1.10 PMM_SetFrequency()

int PMM_SetFrequency(const HANDLE probeHandle, int Frequency);

Purpose:
Sets the frequency to which refer the correction factor. Once the EP-600 has received and granted this command, all measurements will be corrected using the factor stored in factory related to this frequency.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
HANDLE probeHandle, int Frequency multiplied by 100 giving thus the resolution of 10kHz.
Sending a frequency which is out of EP-600 range disables frequency correction factor function.

Output Parameters:
None

7.1.11 PMM_SetFilter()

int PMM_SetFilter(const HANDLE probeHandle, int FILTER);

Purpose:
Sets the processing filter (n) used for measurements.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
HANDLE probeHandle, int range Accepts values 0 – 7

Output Parameters:
None

7.1.12 PMM_SetTimeout()

int PMM_SetTimeout(int tout);

Purpose:
Sets the communication timeout with PMM EP-600 series.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
int tout in milliseconds. Default value is 500 ms.

Output Parameters:
None

7.1.13 PMM_SetAutoOffTime()

int PMM_SetAutoOffTime(const HANDLE probeHandle, int Time);

Purpose:
Sets the time before the EP-600 auto-switches off after having received a recognized command.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
HANDLE probeHandle, int time in seconds. Accepts values 180(3 minutes) – 10800(3 hours)

Output Parameters:
None

7.1.14 PMM_ReadTotalField()

int PMM_ReadTotalField (const HANDLE probeHandle, float &XYZField);

Purpose:
Returns the total combined field of the X, Y and Z Axis.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
HANDLE probeHandle; as returned from the *CreateProbe* function

Output Parameters:
Pass-by-reference float. The combined fields of X, Y and Z axis.

7.1.15 PMM_ReadAxisField

PMM_ReadAxisField (const HANDLE probeHandle, float *xField, float *yField, float *zField);

Purpose:
To read the field values from the X-axis, Y-axis and Z.

Return Value:
Returns an integer status code. The numeric value of 0 indicates no error occurred. See Status Code chapter for an error code description.

Input Parameters:
HANDLE probeHandle

Output Parameters:
Pass-by-reference float. Returns the X, Y and Z fields.

7.2 Visual Basic

From the Project menu, select References to call up the References dialog box, and then click Browse to find your new type library (PMM_EP60X.tlb). Once you have located it, press OK. Visual Basic will automatically register the library for you the first time you reference it. Make sure that your library ("PMM_EP60X") has been checked in the references List, and then close the dialog box.

7.3 Status Code

TABLE 7-1 Status Code

0	OK
1	Bad Handle
2	Unable to open port
3	Not connected
4	Wrong response
5	No response
6	Invalid parameter
7	COMM port busy
8	Timeout
9	COMM port error
10	Problem writing COMM port
11	Read COMM port error
12	Bad connection string
13	Value cannot be set
14	Probe not supported
15	Probe over range
16	Probe under range
17	Error closing COMM port
18	Error purging COMM port

The file PMM_EP60X.DLL and PMM_EP60X.TLB are installed automatically by the Probes Manager software in the system folder C:\Windows\System32\.

8 - Accessories

8.1 Introduction

This section provides information required for installing and using accessories of the EP-600/601/602/603/604 Electric Probe.
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.

8.2 Preliminary inspection

Inspect the packaging for any damage.

NOTICE

If the packaging or anti-shock material have been damaged, check that the contents are complete and that the 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.

8.3 Work environment

Unless otherwise specified, the work environment of the Accessories, must come within the following conditions:

- Temperature From -10°C to +40° C (0°C to 40°C for Battery Charger)
- Humidity < 90% 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 -20°C to + 70°C (-20°C to 60°C for Battery Charger)
- Humidity < 95% relative

8.4 Return for repair

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

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

8.5 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.

8.6 *PMM 8053-OC Optical RS232 Converter*

8.6.1 Introduction

8053-OC is a standard accessory of the EP-600/601/602/603/604 Electric Probe. It converts the signals of some of the system's accessories, which are only connected via fiber optic, into RS-232-compatible signals. It, therefore, makes it possible to link the following items up to the serial port of any Personal Computer to operate them in conjunction with specific application software:

8.6.2 Installation

Insert 8053-OC in the connector of a free serial port of the PC and connect the fiber optic coming from the probe or other Accessories treating the locating key with care.
Considering the very low consumption of the device, the power required by 8053-OC is taken directly from the serial port of the PC. This means no maintenance is needed.

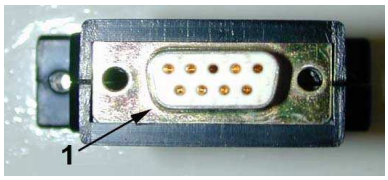
Table 8-1 Technical specifications of the 8053-OC Optical Converter	
Max allowed fiber optic length	80 m
RS 232 connector	9 pin DB9

NOTE **The energy available on the DB9 connector of some PC model could be not sufficient to guarantee a good link with 80 meter fiber.**

NOTE **The energy available on the DB9 connector of some PC model could be not sufficient to guarantee a link with 8053-OC. In this case, is necessary use 8053-OC-PS between the converter and PC.**

Front panel

1 – fiber optic connector



Rear panel

1 – RS232 DB9 female connector

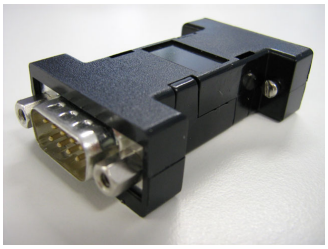
Fig. 8-1 8053-OC Panels

8.6.3 Power supply

The PMM 8053-OC is powered from the PC serial port directly.

8.7 *8053-OC-PS Power Supply*

8.7.1 Introduction



8053-OC-PS is an optional accessory of the EP-600/601/602/603/604 Electric Probe..

8053-OC-PS is indispensable for some PC model does not have sufficient energy on the Serial Port to guarantee a link with 8053-OC.

8.7.2 Installation

Insert 8053-OC-PS in the connector of a free serial port of the PC or serial cable and connect the 8053-OC to 8053-OC-PS. To supply the 8053-OC-PS with 230Vac - 9Vdc Wall Adapter. Connect the fiber optic coming from the probe or other Accessories to 8053-OC.

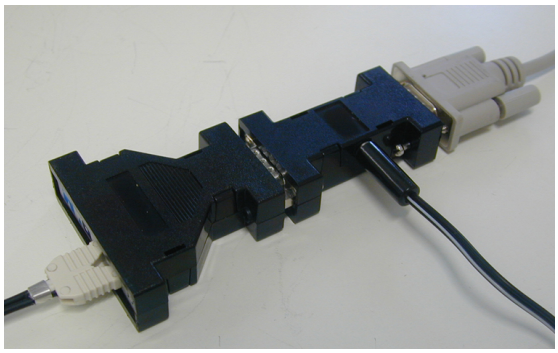
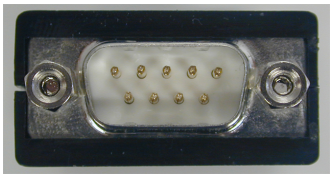
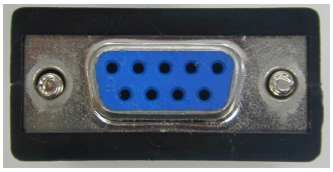


Table 8-2 Specifications of the 8053-OC-PS Power Supply	
RS 232 Connectors	9 pin DB9



Front panel

RS232 male DB9 connector



Rear panel

RS232 female DB9 connector

Side

Supply male connector

Fig. 8-2 8053-OC-PS

8.7.3 Power supply

8053-OC-PS is supplied by the 230Vac - 9Vdc Wall Adapter.

8.8 *TR-02A Tripod*

8.8.1 Introduction

TR-02A is an optional accessory of the EP-600/601/602/603/604 Electric Probe. It allows the Probe 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 adjustable 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 8-3 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:

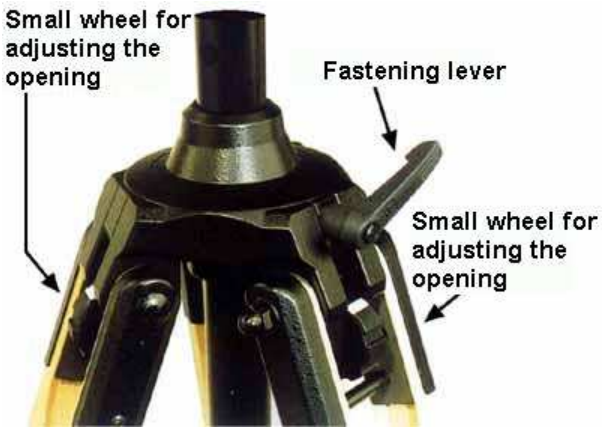


Fig. 8-3 TR-02A Tripod

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.

Screw the provided conical holder to the tripod TR-02A by means of the screw on the top or the adjustable swivel and fix the EP-600 (see §2.11).

Fig. 8-4 EP-600/601/602/603 on TR02A

Fig. 8-5 EP-604 on TR02A

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

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

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

Fig. 8-6 EP-600/601/602/603 on adjustable swivel

Fig. 8-7 EP-604 on adjustable swivel

8.9 *PMM TT-01 Telescopic extension*

8.9.1 Introduction

TT-01 is an Optional Accessory of the EP-600/601/602/603/604 and allows the Electric Probe to be easily supported during field measurements.

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 8-4 Technical specifications of the TT-01 Fiber Glass Telescopic Support	
• **Diameter**	32 mm
• **Minimum height:**	120 cm
• **Maximum height:**	420 cm
• **Weight**	500 g

The height of the TT-01 can be adjusted.

Fig. 8-8 TT-01 Fiber Glass Telescopic Support

Screw the provided conical holder to the TT-01 Telescopic extension by means of the screw on the top and fix the EP-600 (see §2.11).

Fig. 8-9 TT-01 with EP-600/601/602/603 installed on the top.

Fig. 8-10 TT-01 with EP-604 installed on the top.

8.10 *PMM SB-10 Switching Control Box*

NOTE **Please refer to SB-10 User's manual.**

Fig. 8-11 SB-10 front view

Fig. 8-12 SB-10 rear view

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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: