narda Safety Test Solutions
an L3 Communications Company
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User's Manual

PMM EP600

ELECTRIC FIELD PROBE
100 kHz ÷ 9.25 GHz

PMM EP601

ELECTRIC FIELD PROBE
10 kHz ÷ 9.25 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:

If the instrument is used in any other way than as described in this Users 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.

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 battery charger 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.

KEY TO THE ELECTRIC AND SAFETY SYMBOLS:

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

Warning, danger of electric shock

Earth

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

Unit Earth Connection

Earth Protection

Equipotential

KEY TO THE SYMBOLS USED IN THIS DOCUMENT:

DANGER	**The DANGER sign draws attention to a potential risk to a person's safety. All the precautions must be fully understood and applied before proceeding.**
WARNING	**The WARNING sign draws attention to a potential risk of damage to the apparatus or loss of data. All the precautions must be fully understood and applied before proceeding.**
CAUTION	**The CAUTION sign draws attention against unsafe practices for the apparatus functionality.**
NOTE:	**The NOTE draw attention to important information.**

Contents

Figures

Tables

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.

EC Conformity Certificate

(in accordance with the Directives: EMC 89/336/EEC and Low Voltage 73/23/EEC)

This is to certify that the product: EP600 Electric field Probe

Produced by: NARDA S.r.l.
Safety Test Solution
Via Benessea 29/B
17035 Cisano sul Neva (SV) – ITALY

complies with the following European Standards:
Safety: CEI EN 60950 - CEI EN 60950/A4 – CEI EN 60950/A11
EMC: EN 61326-1 - EN 61326/A1

This product complies with the requirements of the Low Voltage Directive 73/23/EEC, amended by 93/68/EEC, and with the EMC Directive EMC 89/336/EEC amended by 92/31/EEC, 93/68/EEC, 93/97/EEC.

NARDA S.r.l..

EC Conformity Certificate

(in accordance with the Directives: EMC 89/336/EEC and Low Voltage 73/23/EEC)

This is to certify that the product: EP601 Electric field Probe

Produced by: NARDA S.r.l.
Safety Test Solution
Via Benessea 29/B
17035 Cisano sul Neva (SV) – ITALY

complies with the following European Standards:
Safety: CEI EN 60950 - CEI EN 60950/A4 – CEI EN 60950/A11
EMC: EN 61326-1 - EN 61326/A1

This product complies with the requirements of the Low Voltage Directive 73/23/EEC, amended by 93/68/EEC, and with the EMC Directive EMC 89/336/EEC amended by 92/31/EEC, 93/68/EEC, 93/97/EEC.

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1 – General

1.1 Documentation

This Manual includes:

- Questionnaire to resend together with the instrument to service.
- Check list of supplied accessories.

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 EP600/EP601 is a diode-type, three-axis technology-edge isotropic sensor of electric fields: from 0.14 to 140 V/m in the frequency range 100 kHz - 9.25 GHz (EP600) and from 0.5 to 500 V/m in the frequency range 10 kHz - 9.25 GHz (EP601)
The spherical plastic housing includes: 6 orthogonal cones (one for each monopole) that allow for an easy identification of the electric field vectors; the ON/OFF button and LED; the battery and the charger connector.

A plastic fiber optic (not removable) is fixed to the EP600/EP601 housing; at its extremity two connectors compatible with PMM devices allow for connection to PC (via optical adapter) or to the hand-held meter PMM 8053B to display the measurements and to set the proper filter for optimizing noise reduction, sampling time and battery autonomy. The hand-held meter PMM 8053B allows for storing the measurements and then, via PC, to convert the same in text format.

The EP600/EP601 includes an E^2PROM that stores serial number, calibration data, calibration factors and Firmware version.
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 is supplied by an internal rechargeable battery capable of up to 80 hours of operation.

Fig. 1-1 EP600/EP601

1.4 Specifications EP600 This condition applies to all specifications:

- The operating ambient temperature range must be -10° to 50 °C.

TABLE 1-1 Specifications of the electric field probe PMM EP600	
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 0.8dB 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	80 h @ 0.4 S/sec 28 Hz filter 60 h @ 5 S/sec 28 Hz filter
Recharge time	48h for maximum autonomy
Dimensions	17 mm sphere 17 mm sensor 53 mm overall
Weight	23g including FO weight (1m)
Operating temperature	-10° - +50°
Software for PC	YES
Optical fiber connector	HFBR-0500
Tripod adapter	¼ - 20 UNC female

1.5 Correction Factor

EP600

Typical values:

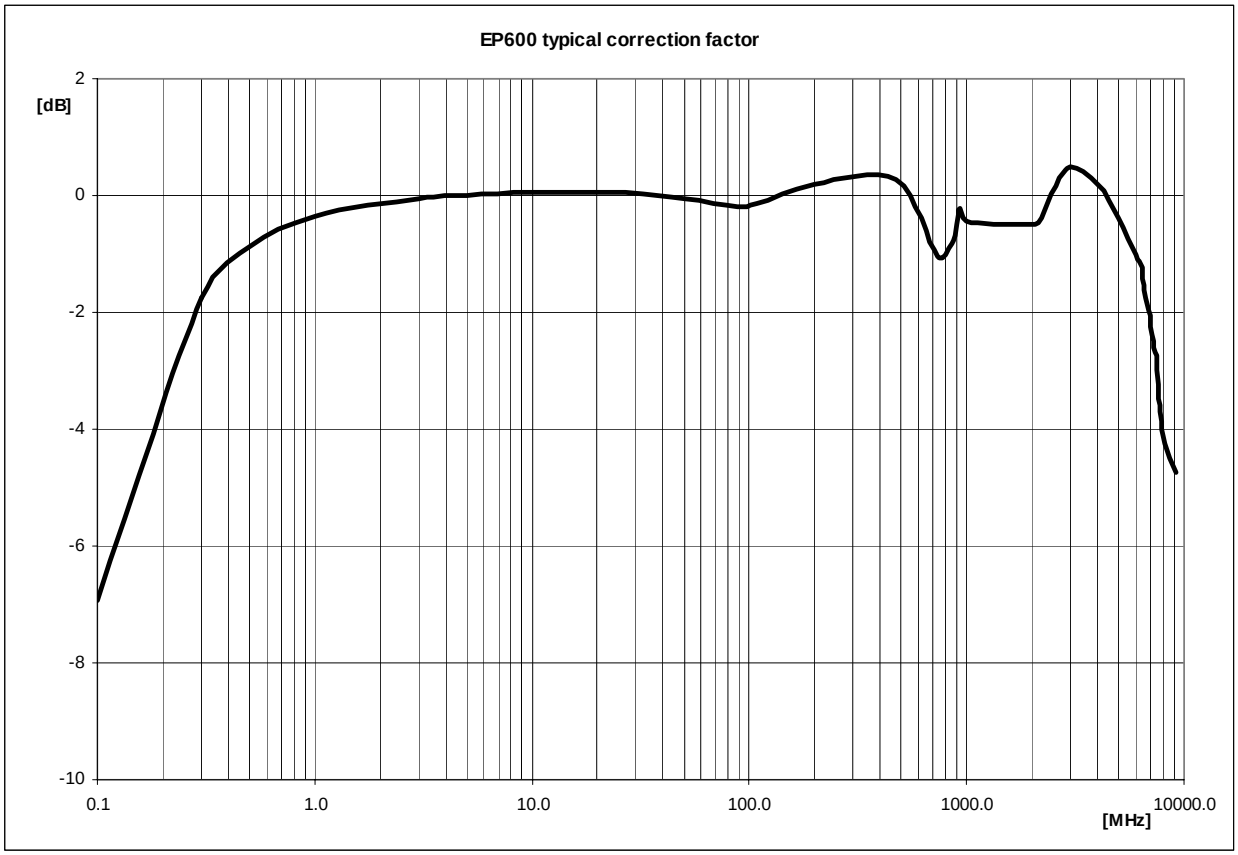

Fig. 1-2 Correction Factor

1.6 Specifications EP601 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 EP601

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 0.4dB 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	80 h @ 0.4 S/sec 28 Hz filter 60 h @ 5 S/sec 28 Hz filter
Recharge time	48h for maximum autonomy
Dimensions	17 mm sphere 17 mm sensor 53 mm overall
Weight	23g including FO weight (1m)
Operating temperature	-10° - +50°
Software for PC	YES
Optical fiber connector	HFBR-0500
Tripod adapter	¼ - 20 UNC female

1.7 Correction Factor

EP601

Typical values:

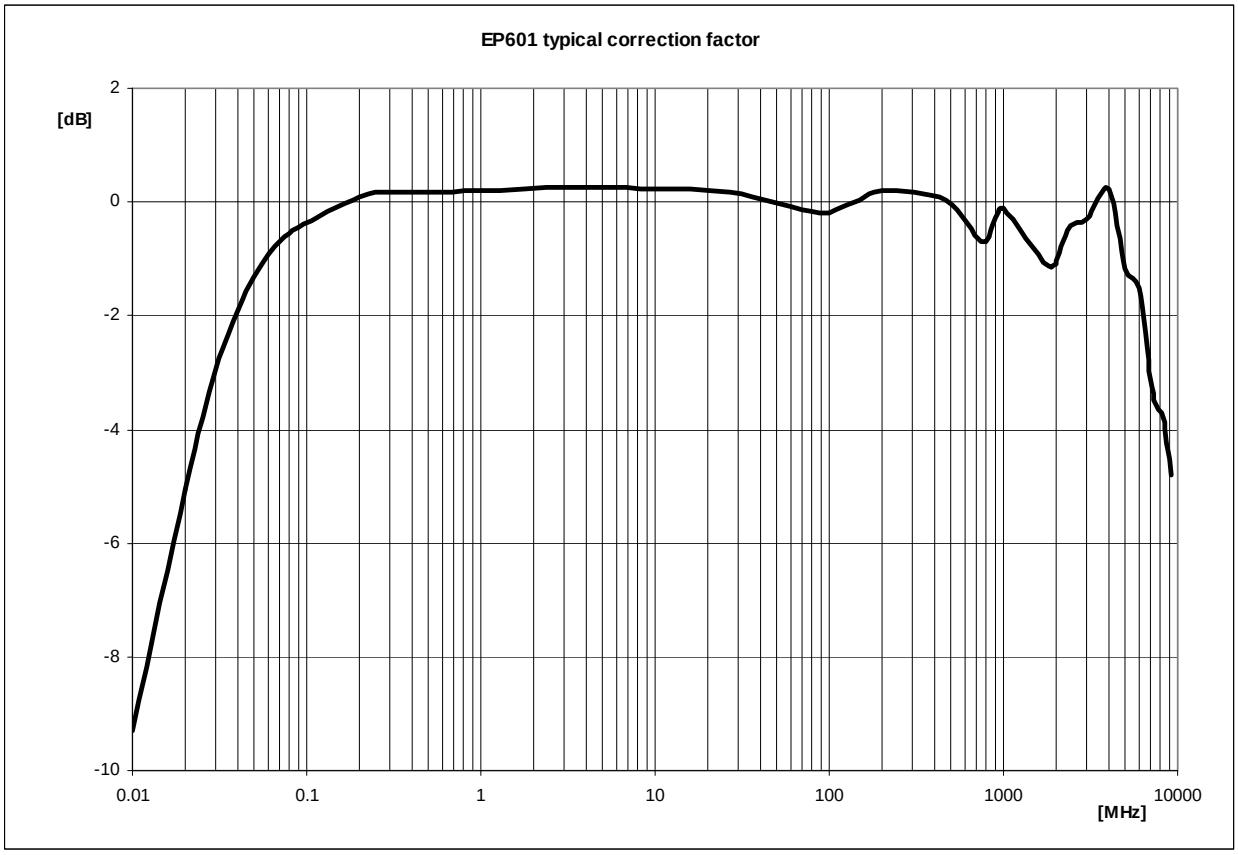

Fig. 1-3 Correction Factor

1.8 Housing and connectors

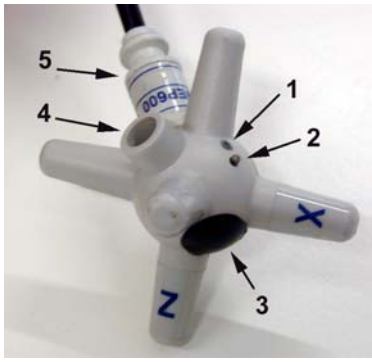

Fig. 1-4 Plastic housing

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

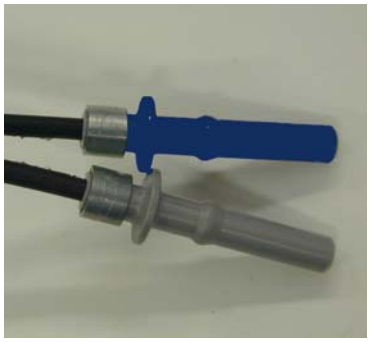

Fig. 1-5 Optical connectors

BLUE = Transmitter

GREY = Receiver

1.9 Standard accessories

Accessories and documents supplied with PMM EP600/EP601:

- Battery charger EP-600 CHARGER
- AC adapter EP-600 CHARGER
- International plugs (Australia, UK, USA, Italy)
- Fiber optic adapter, Blue
- Fiber optic adapter, Grey
- Fiber optic cable FO-EP600/10 (length: 10m)
- Optical-RS232 converter 8053-OC
- USB-RS232 converter
- Tripod mounting adapter
- Mini tripod
- Nylon adapter ¼'' Withworth
- Carrying case
- Software CD-ROM
- Operating Manual
- Calibration Certificate
- Service form

1.10 Options

Options to order separately:

- PMM 8053B Hand-held metering unit
- PMM SB-10 Switching Control Box
- Fiber optic cable FO-EP600/10 (length: 10m)
- Fiber optic cable FO-EP600/20 (length: 20m)
- Fiber optic cable FO-EP600/40 (length: 40m)
- Optical-RS232 converter 8053-OC
- 8053-OC-PS Power Supply
- TR-02A tripod
- TT-01 Telescopic extension

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2 - Operation

2.1 Foreword

None

2.2 Inspection

Once received the instrument, check:
- packing integrity
- instrument and accessories integrity
- contents, according to the check list attached to this manual

WARNING

If anything is found damaged or missed, immediately contact your Dealer.

2.3 Ambient

Store instrument and accessories in clean, dry environment free of dust and acid vapours.
Follow requirements for temperature and humidity:

Operation:

• Temperature	-10° to +40° C
• Humidity	< 90% RH

Storage:

• Temperature	-20° to + 70° C
• Humidity	< 95% RH

2.4 Return for service

Every part of the instrument, included the battery, can only be replaced by NARDA, when the instrument needs repair or is malfunctioning, please contact the NARDA Support center.
When the instrument needs to be sent to NARDA for repairs please complete the questionnaire enclosed with this Operating Manual making sure you fill in all the details relative to the service requested.
In order to minimize repair time, please describe the nature of the failure. If the failure occurs only under certain conditions, please provide details on how we may recreate the same condition in order to identify the fault.
If possible, please reuse the original packaging, making sure the instrument in wrapped in heavy paper or plastic.
Alternatively, use a strong box filled with shockproof material, place enough material all around the equipment so that the unit is stable and firmly blocked inside the box.
Whilst packing, pay special care in protecting the unit's front panel.
Seal the box firmly before shipment.
Mark the box: FRAGILE HANDLE WITH CARE.

2.5 Cleaning

To clean the equipment use only dust-free, non-abrasive dry cloths.

WARNING

To avoid damage never use any kind of solvent, acid, or similar to clean the instrument.

2.6 Probe support

The conical holder and the extension fiber optic FO-EP600/10 are essential for proper operation. The optional tripod PMM TR-02 is highly recommended for positioning the EP600/EP601 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 EP600/EP601 perfectly meets these requirements.

2.10 Connecting PMM EP600/EP601

2.10.1 RS232 Connection

Requirements to connect the probe PMM EP600/EP601 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

- Connect the two fiber optic connectors of the EP600/EP601 to the 8053-OC receptacle **OPTIC LINK** respecting the colour correspondence:

- Single optical connector, GRAY → BLACK receptacle of 8053-OC
- Single optical connector, BLUE → BLUE receptacle of 8053-OC

WARNING

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 EP600/EP601

2.10.2 USB Connection

Requirements to connect the probe PMM EP600/EP601 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.

WARNING

Install the supplied driver software before connecting the USB-RS232 adapter.

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

- Connect the two fiber optic connectors of the EP600/EP601 to the 8053-OC receptacle **OPTIC LINK** respecting the colour correspondence:
  - Single optical connector, GRAY → BLACK receptacle of 8053-OC
  - Single optical connector, BLUE → BLUE receptacle of 8053-OC

WARNING

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 EP600/EP601

2.10.3 Connection of fiber optic extension FO-EP600/10

The 10 m extension FO-EP600/10 is supplied with the PMM EP600/EP601 as standard accessory, together with the two fiber optic adapters – grey and blue (see picture below) - to connect to the optical/RS232 adapter 8053/OC.

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").

WARNING

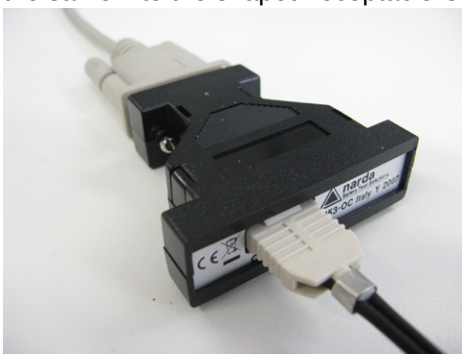
Do not connect/disconnect the optic fibre by applying force to the fiber optic cable directly: this may damage the optical connection. Always hold the connectors with your fingers firmly to connect/disconnect the optic fibre.
Presence of dust, dirt or particles of any nature on the optical connecting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

Either for RS232 o USB please make sure to:

- match the colors of the EP600/EP601 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.



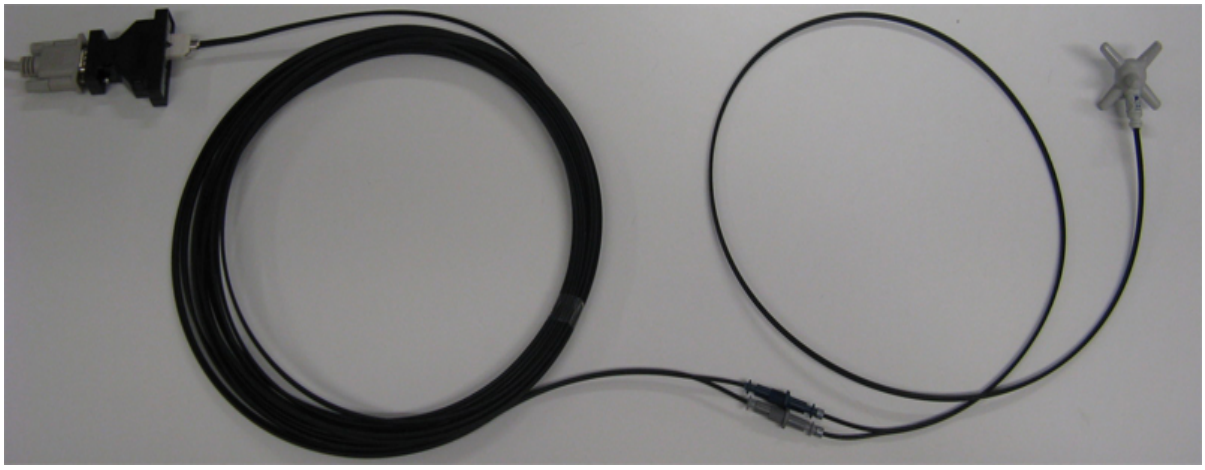


Fig. 2-3 RS232 connection of EP600/EP601 with FO-EP600/10 extension

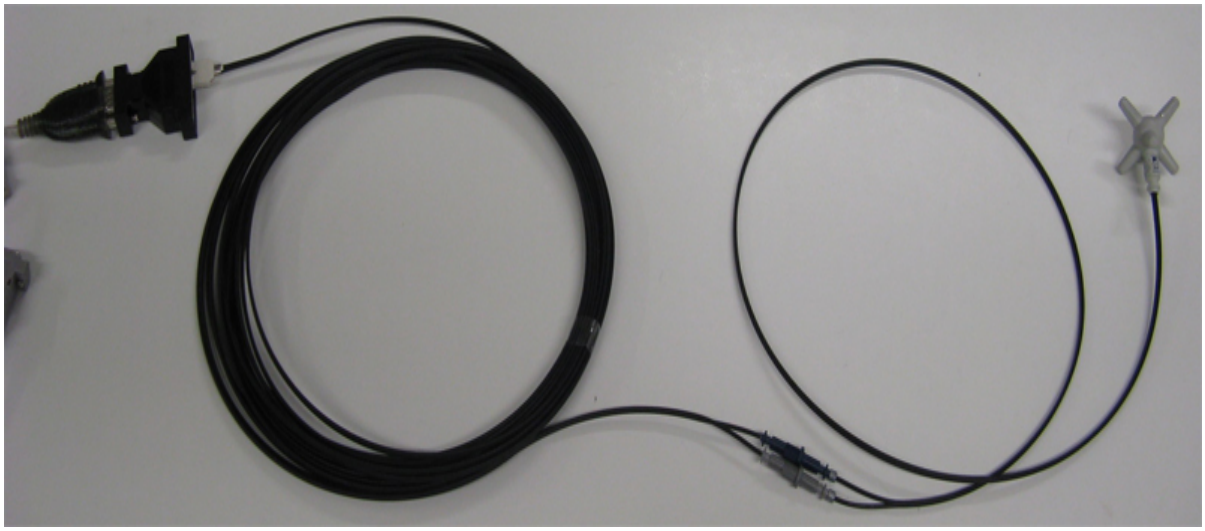


Fig. 2-4 USB connection of EP600/EP601 with FO-EP600/10 extension

2.11 EP600/EP601 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 EP600/EP601 installation on the conical holder

Using the conical holder supplied with the PMM EP600/EP601 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 EP600/EP601 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. 2-5 EP600/EP601 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 EP600/EP601 removal from the conical holder

To remove the PMM EP600/EP601 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 EP600/EP601 removal from conical holder is completed.

2.11.2 EP600/EP601 installation on tripod PMM TR-02

It is recommended to make use of the optional tripod PMM TR-02 to position the PMM EP600/EP601 as required by the reference standards. Maintaining the same hardware configuration contributes to improbe the measurement repeatability (see chapter “Accessories”).
Fix the EP600/EP601 conical holder to the tripod TR-02A by means of the screw at the top or by means of the swivel PMM 8053-SN.

Fig. 2-6 EP600/EP601 on TR-02A

Fig. 2-7 EP600/EP601 on TR-02A with PMM 8053-SN

3 – Measurements

3.1 Foreword

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

3.2 Preliminary

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 Void

3.8 Void

3.9 PMM EP600/EP601 operation

The EP600/EP601 field probe is allocated in a spherical plastic housing with 6 orthogonal monopoles that allow for immediate identification of the electric field vectors (axis).

The PMM EP600/EP601 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 EP600/EP601 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 EP600/EP601 is ready for the operation.

NOTE

The PMM EP600/EP601 cannot be switched OFF by the pushbutton.

The PMM EP600/EP601 automatically turns OFF when:

- after 30 sec. the fiber optic is disconnected

- after 30 sec. the communication with PC is not established

- when the battery voltage is below 2.05V (the battery voltage is displayed by the software WinEP600).

- when the Software WinEP600 is closed

WARNING

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.

WARNING

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 EP600/EP601 and to the fiber optic cable itself. Dust and dirt must be prevented to be in between the optical connections.

NOTE

The EP600/EP601 can be connected to the PC via fiber optic either when ON or OFF.

NOTE

PMM EP600/EP601 firmware upgrades are downloadable from the web page www.narda-sts.it.

NOTE

When making measurements with PMM EP600/EP601 the power supply must be ALWAYS removed.

WARNING

The min. battery voltage allowed for proper operation is of 2,05 V; it is displayed by the PC software WinEP600. Lower values do require recharging the battery.

WARNING

The max. battery autonomy is of approx. 80 hours, according to the filter setting.

WARNING

The internal battery can be replaced at factory only; in case of damage or incorrect operation contact your Dealer.

WARNING

It is recommended to fully recharge the battery before long-term storage of the probe; a full recharge shall be performed every 4 months since then.

3.10 Applications

The PMM EP600/EP601 field probe is connected to the user's PC via fiber optic and the optic to serial converter.

3.10.1 EMC

The wide frequency range and small size allow for using the PMM EP600/EP601 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:

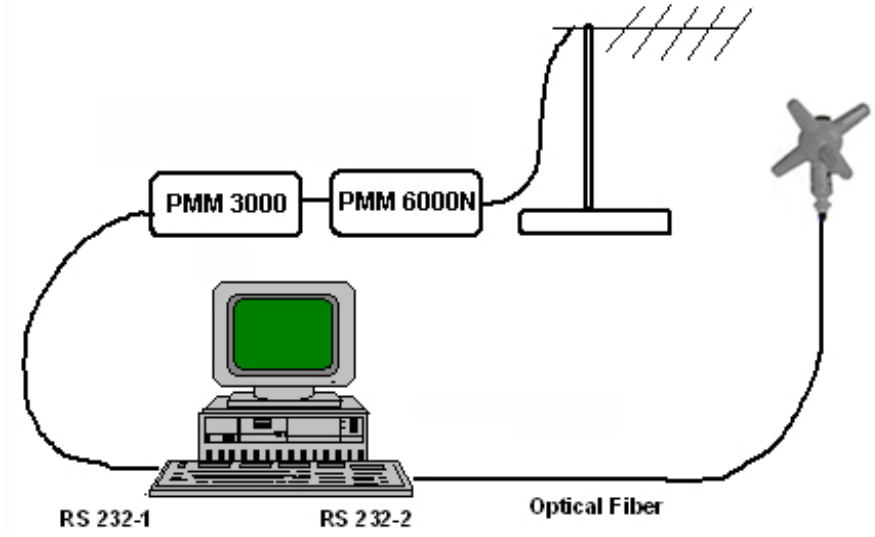


Fig. 3-1 PMM EP600/EP601 in open site

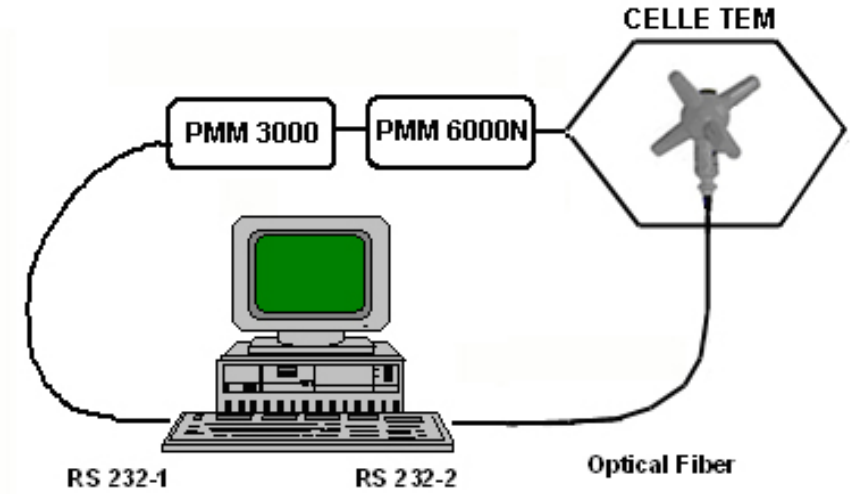


Fig. 3-2 PMM EP600/EP601 in TEM cell

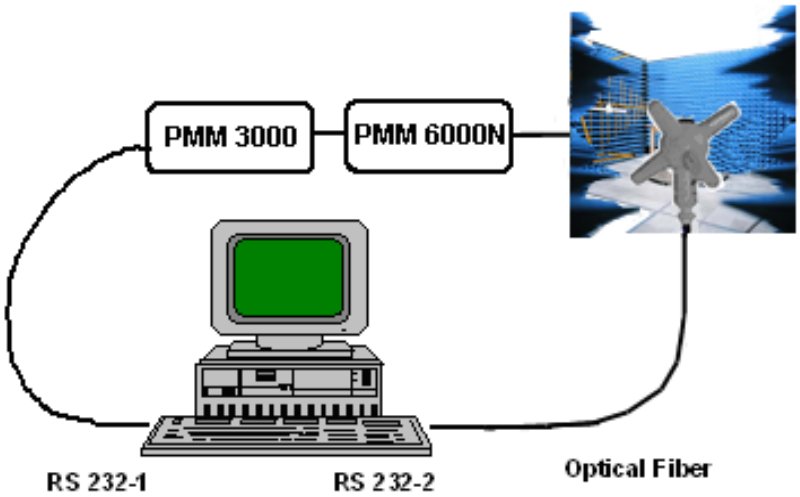


Fig. 3-3 PMM EP600/EP601 in Anechoic Chamber

3.10.2 Void

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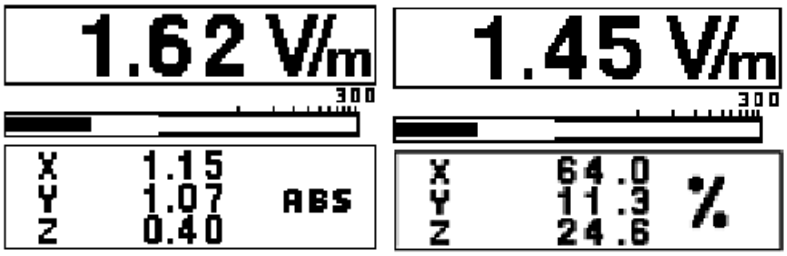
3.11 Operating PMM EP600/EP601 with 8053B (Option)

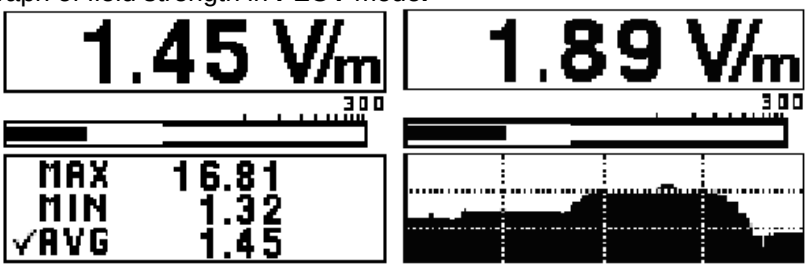
The EP600/EP601 can be directly connected and operated by the meter PMM 8053B.

Fig. 3-4 EP600/EP601 with 8053B

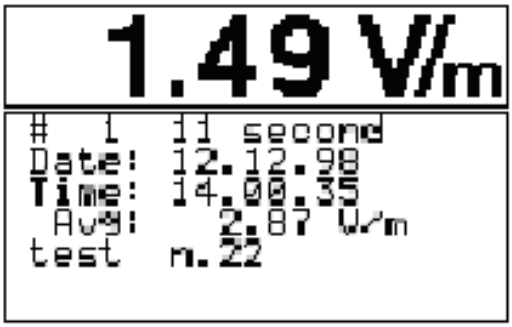
- Display of field strength in **ABS/%, MIN-MAX/AVG, MIN-MAX/RMS** modes.



- 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.

3.12 Operating EP600/EP601 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.

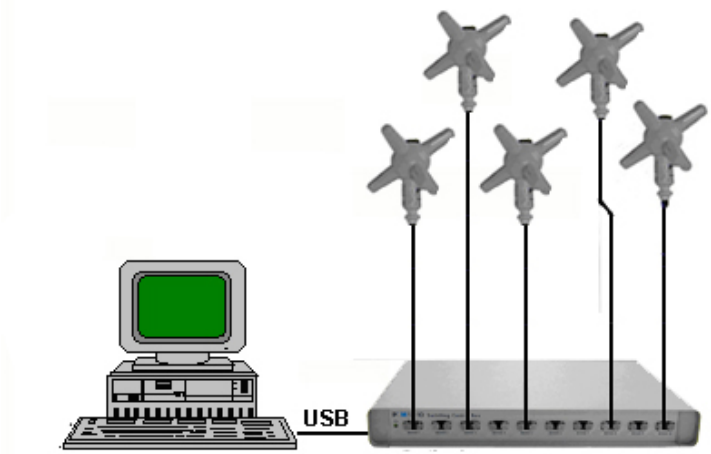


Fig. 3-5 PMM EP600/EP601 with one SB-10

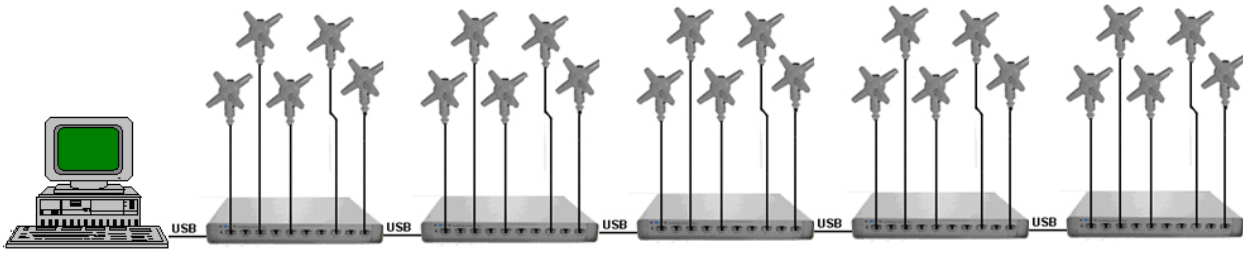


Fig. 3-6 PMM EP600/EP601 with five SB-10

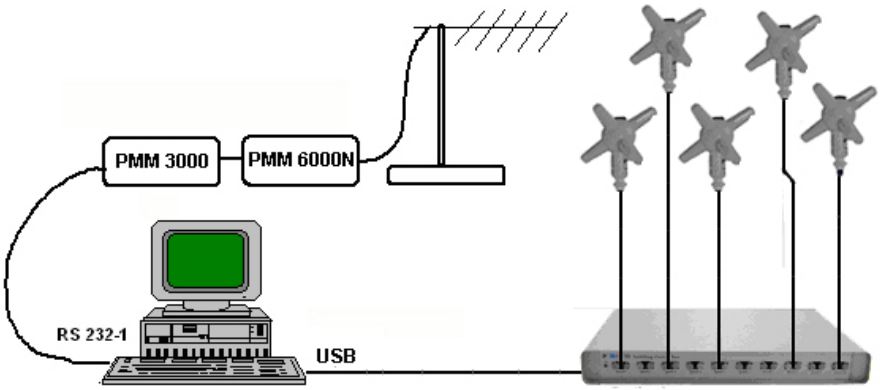
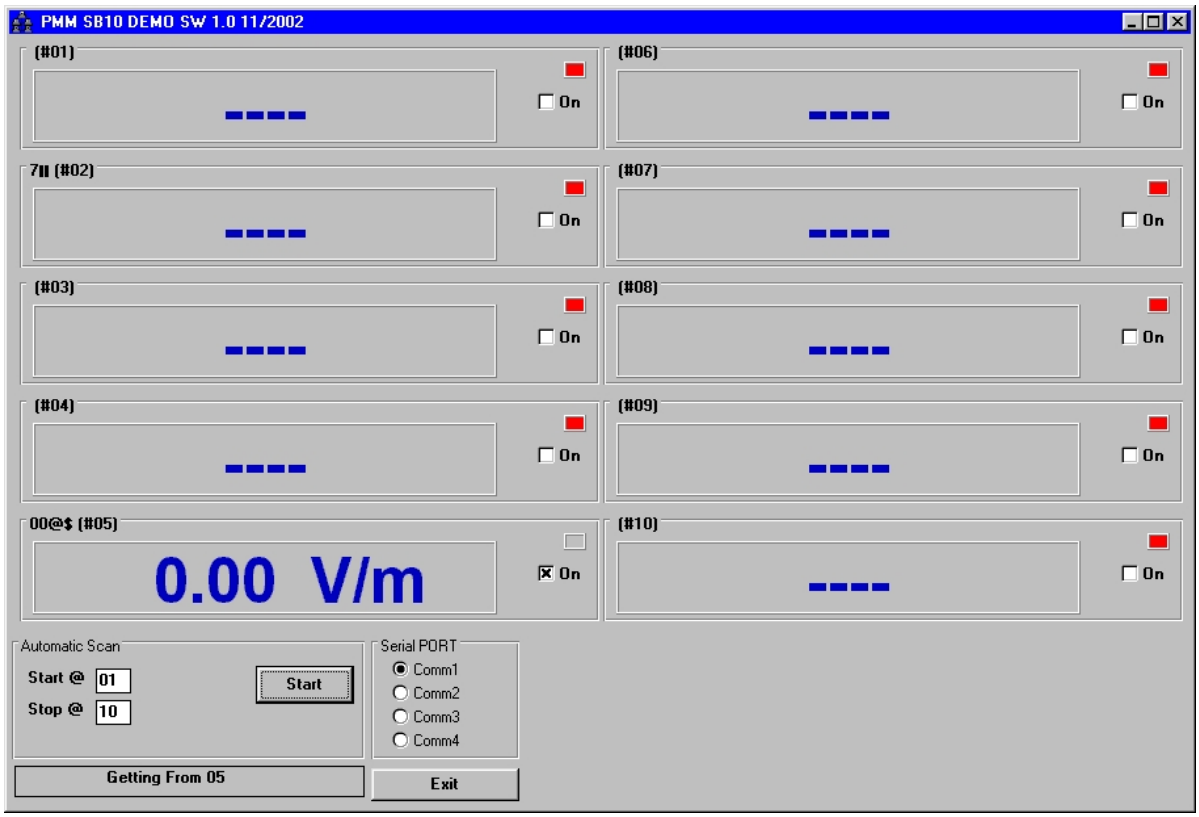


Fig. 3-7 PMM EP600/EP601 with SB-10 in open site

The PC software supplied with the PMM SB10 allows for simultaneous displaying of the field strength measured by each single field probe.



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4 – Battery charger EP600 CHARGER

4.1 Foreword

The probe EP600/EP601 internal circuitry is supplied by a rechargeable Li-Mn internal battery to recharge by means of the battery charger EP600 CHARGER connected to the mains by means of the supplied adapter.
The EP600 CHARGER is intended for this application only; any other use or application is strictly forbidden.

EP600 CHARGER is intended for operation on desk; its special design allows for keeping the probe under charging in correct and safe position. Inside the EP600 CHARGER a microprocessor controls and checks the recharging operation.
The LED shows the charging status.

The adapter supplied with the EP600 CHARGER works with mains voltages from 100 to 240 VAC, 50/60 Hz.
Different socket adapters are supplied with.

Fig. 4-1 AC adapter

Fig. 4-2 EP600 CHARGER

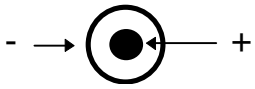
4.2 AC adapter

Always connect the AC adapter to the mains prior to connect to the PMM EP600 CHARGER.

NOTE

Output: DC, 10 - 15 V, ~ 500 mA

Connector polarity:



4.2.1 AC mains plug

If required to replace the AC mains plug, remove the installed and install the proper one.

4.3 EP600 CHARGER

The following conditions apply to all specifications:

- Operating temperature: -10° to +50 °C.

4.3.1 Specifications

TABLE 4-1 Characteristics and specifications of the battery charger EP600 CHARGER	
Characteristics	
Charging is stopped when removing the probe	
Microprocessor control with autostart	
Charging status Led	
Self-test	
Safety timer	
AC adapter 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

4.3.2 EP600 CHARGER components

Description:

1 – Spring holder

2 – Charging connector

3A – Charging status Led

3B – DC Supply connector

Fig. 4-3 EP600 CHARGER components

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

NOTE **The internal battery of EP600/EP601 can be replaced by the Factory only. In case of failure or incorrect operation please contact the Dealer.**

NOTE **The minimum voltage level for proper operation is of 2,05V; lower voltages do require recharging the battery.**

NOTE **It is recommended to fully recharge the battery before long-term storage of the probe; a full recharge shall be performed every 4 months since then.**

NOTE **The max. battery autonomy is of approx. 80 hours, according to the filter setting.**

NOTE **When making measurements with PMM EP600/EP601 the power supply must be ALWAYS removed.**

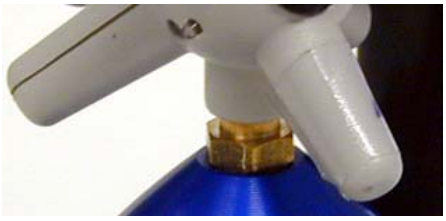
4.4 Installing PMM EP600/EP601 on EP600 CHARGER

A first complete charging cycle is recommended to achieve the max autonomy.

To install the probe EP600/EP601 on the battery charger EP600 CHARGER:

- place the EP600 CHARGER on a flat, stable surface
- hold the EP600 CHARGER as shown in figure and flex outward the elastic holder

- Insert the EP600/EP601 on the EP600 CHARGER in correspondence of the threaded contact pin. Do not spin the probe to avoid damaging the contact pin.

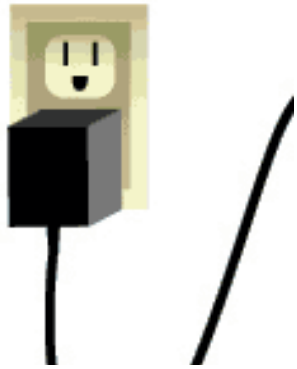


NOTE

- Release progressively the elastic holder until it holds the EP600/EP601 housing downwards.

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

- Plug the AC adapter to the mains



- Check the Led status as per the table below:

Fig. 4-4 EP600/EP601 on EP600 CHARGER

Table 4-2 EP600 CHARGER Led status		
Fix	Green	The EP600 CHARGER is supplied but without load (battery not present or disconnected).
Blinking	Green	The battery is under charge
Fix	Red	The charging circuit is overloaded (the output is OFF for 30 seconds before attempting a new charging cycle).
Blinking	Orange	Charge has been completed after 48 hours (the timer is paused when disconnecting the supply).

NOTE

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

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5 – WinEP600 and SetAddEP600 Operating instructions

5.1 Foreword

This chapter is the installation and operation guide of the PC Softwares WinEP600 and SetAddEP600 Utility supplied with the PMM EP600/EP601 field probe.

The SetAddEP600 is a utility that integrates the PMM SB10 Switching Control Box and the PMM EP600/EP601.
When several PMM EP600/EP601 are connected to the PMM SB-10 each of them need to be set with a different address.
With the SetAddEP600 Utility you can associate an address at each PMM EP600/EP601 connected to the PMM SB-10.

5.2 PC minimum requirements

- Processor: Pentium
- 16 Mb RAM
- 10 Mb free space on hard disk;
- Operating system Windows™, XP/Vista.

NOTE

Software and Utility updates can be downloaded from the web page www.narda-sts.it.

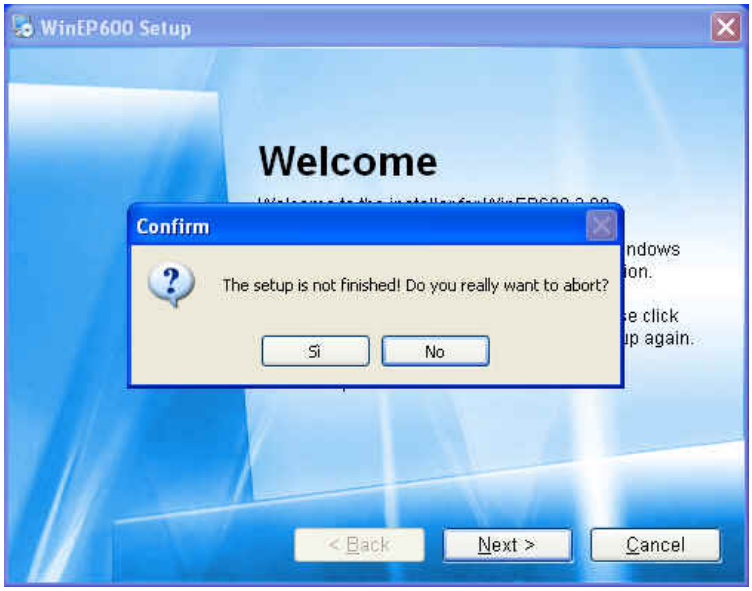
5.3 Installation

To install the WinEP600 and the SetAddEP600 on PC from the supplied CD-ROM proceed as follows:

NOTE **Do not connect the PMM EP600/EP601 to the PC until the installation is completed.**

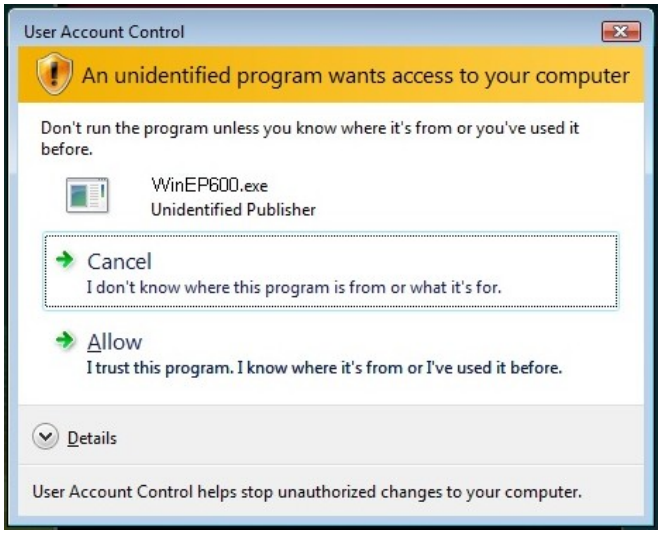
Insert the WinEP600 CD into the PC CD-ROM driver.
In Computer Resources double click on the corresponding CD-ROM driver.
To start the installation double click on the **WinEP600** icon.

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

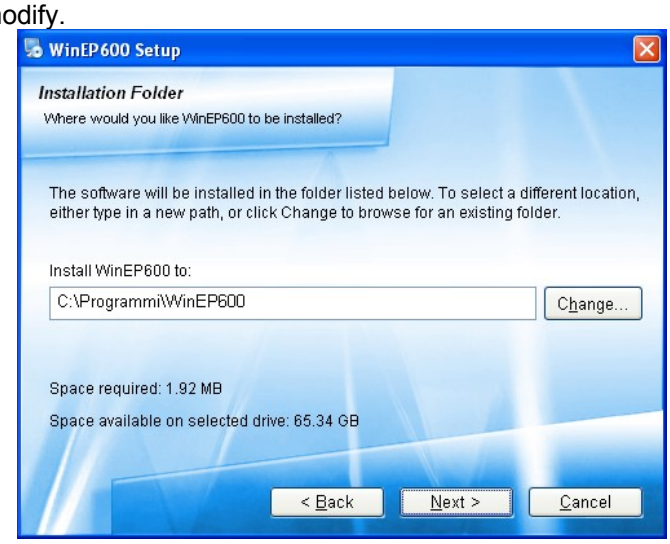


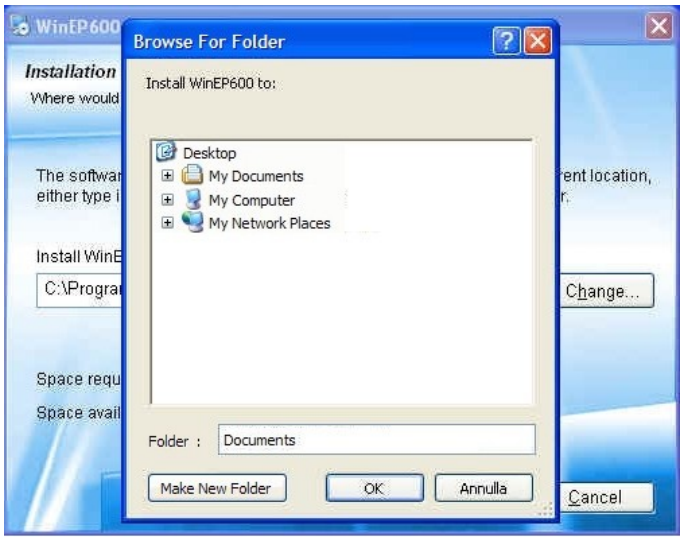
NOTE

In Windows Vista most programs are blocked for computer protection. To start the installation correctly it might be necessary to authorize the operation.

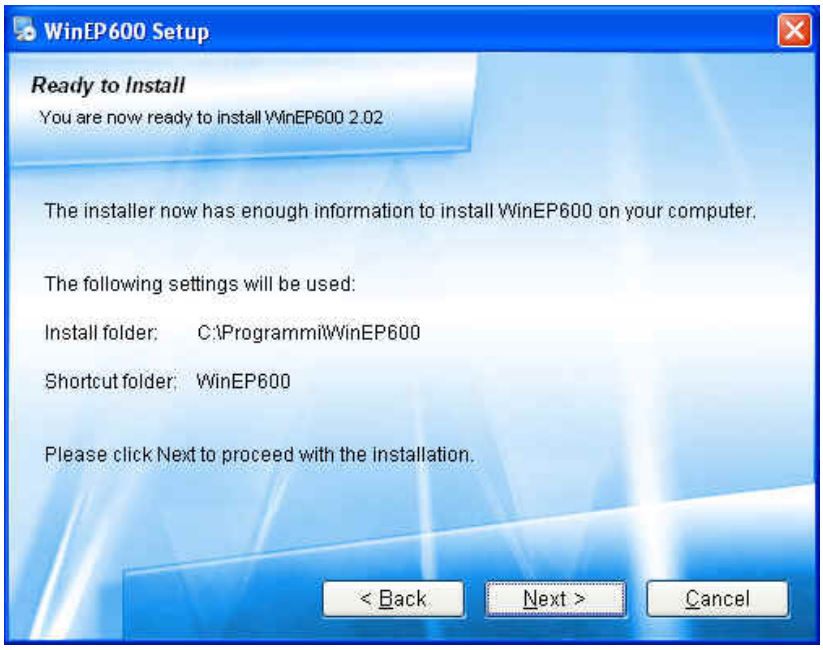


The installation folder must be specified. Click **Next** to confirm the default folder or **Change** to modify.

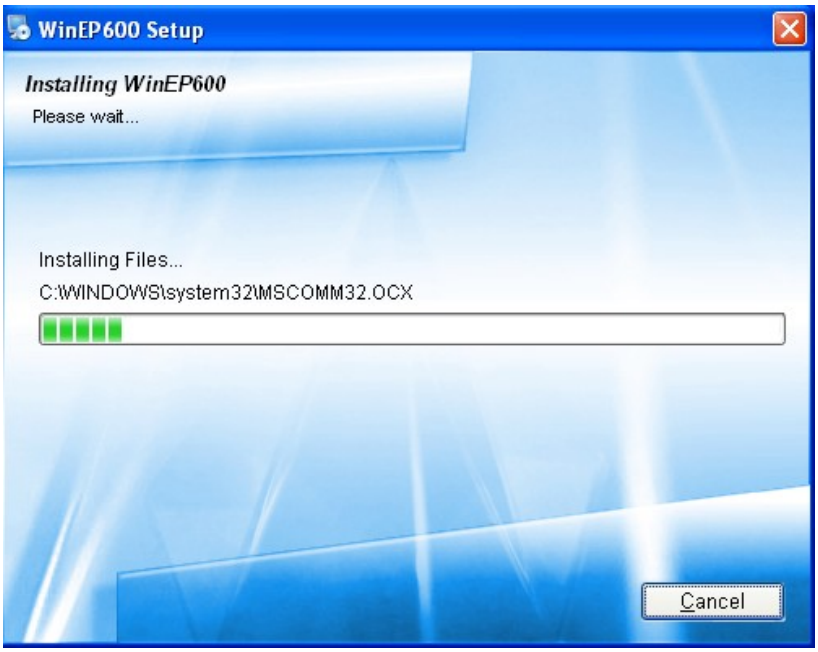




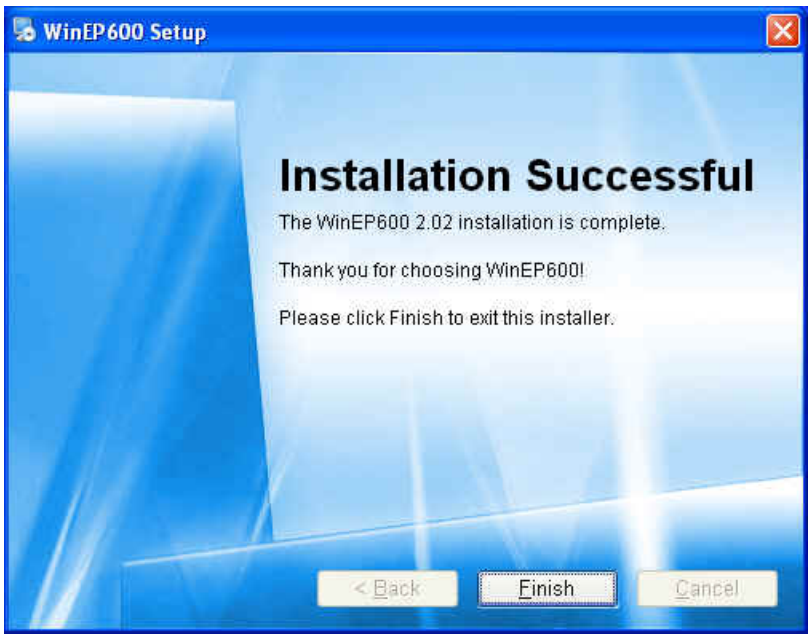
Click **Next** to proceed installing.



The installing status is displayed then:



Click **Finish** to complete and exit the installer.
The folder **WinEP600 and SetAddEP600** are created under **Programs** with the icon **WinEP600** on desktop.



Create the **SetAddEP600** shortcut on your desktop.

5.4 COM port settings with 8053-OC

Connect the 8053-OC to the PC first serial port available (for more details see chapter “Installation”).

NOTE

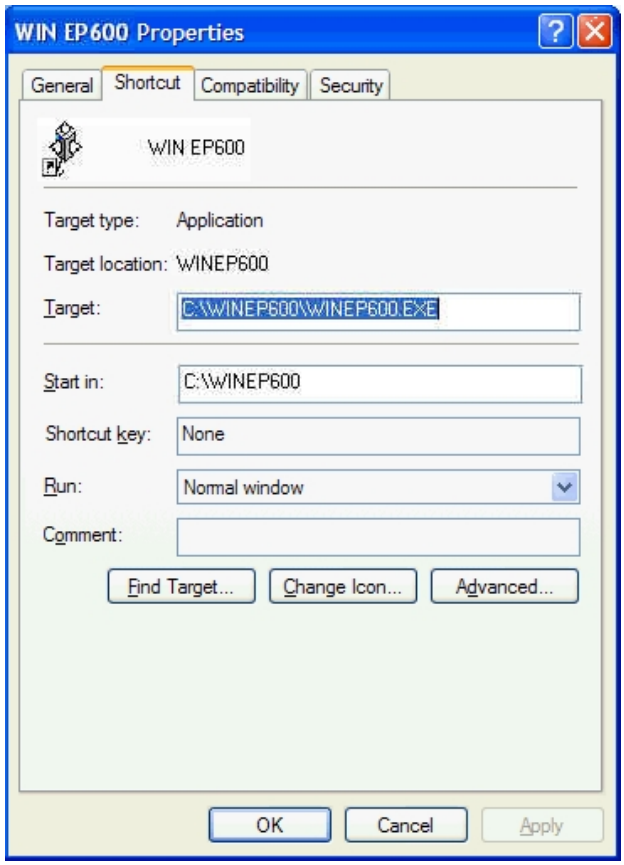
In some PC models the power delivered through the DB9 connector may be not enough to supply the optical/serial converter 8053-OC. In such cases, the external power supply adapter mod. 8053-OC-PS must be connected between the PC and the optical/serial converter 8053-OC.

NOTE

With the 8053-OC optical/serial converter the software search for the probe PMM EP600/EP601 on the first available serial port.
To set a specific serial port:

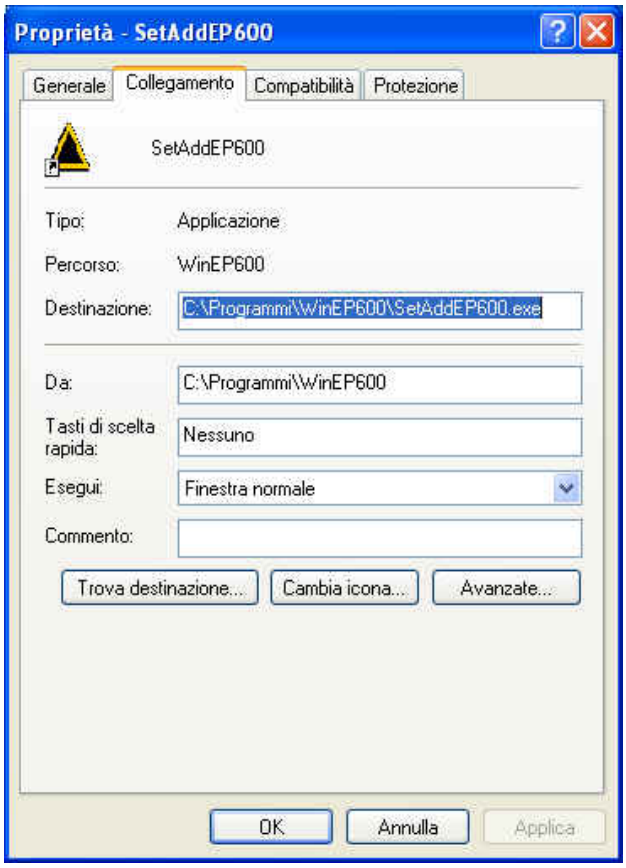
5.4.1 WinEP600 COM port settings

- Right click the icon **WinEP600** to display **Properties**
- In the field **Destination** enter the command line:
  C:\Programs\WinEP600\WinEP600.exe COMM=N
  (N = between 1 and 9)
  IMPORTANT: the command line must be **upper case**
- Click "**Apply**" then “**OK**”



5.4.2 SetAddEP600 COM port settings

- Right click the icon **SetAddEP600** to display **Properties**
- In the field **Destination** enter the command line
  C:\Programs\WinEP600\SetAddEP600.exe COMM=N
  (N = between 1 and 9)
  IMPORTANT: the command line must be **upper case**
- Click "**Apply**" then "**OK**"



5.5 COM port setting with adapter USB-RS232

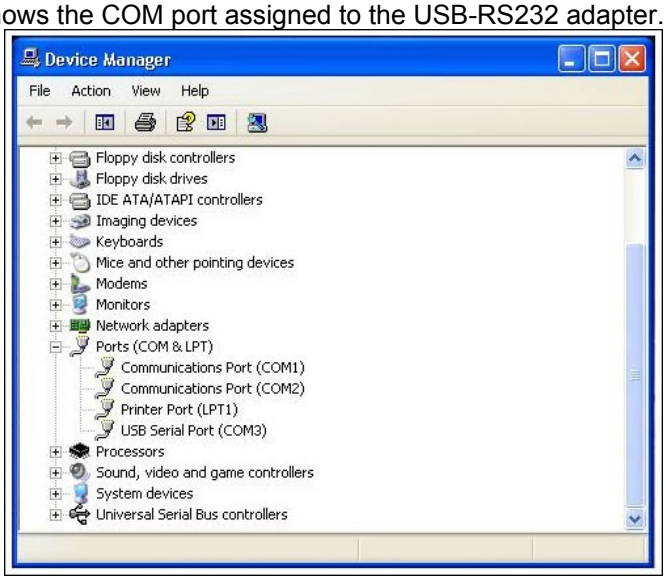
Connect the USB-RS232 adapter to the PC USB port and wait for the "**new hardware installation"** procedure. Drivers supplied with the adapter can be sued as well.

NOTE

After having installed the USB-RS232 adapter, make sure the assigned COM port nr. is comprised between 1 and 9:

- Enter in **Peripheral management** (**Start** > **Settings**> **Control Panel** > **System**>**Hardware**> **Device Manager**).
  The assigned COM can be found in **Ports (COM & LPT) – USB Serial Port (COMx)**.

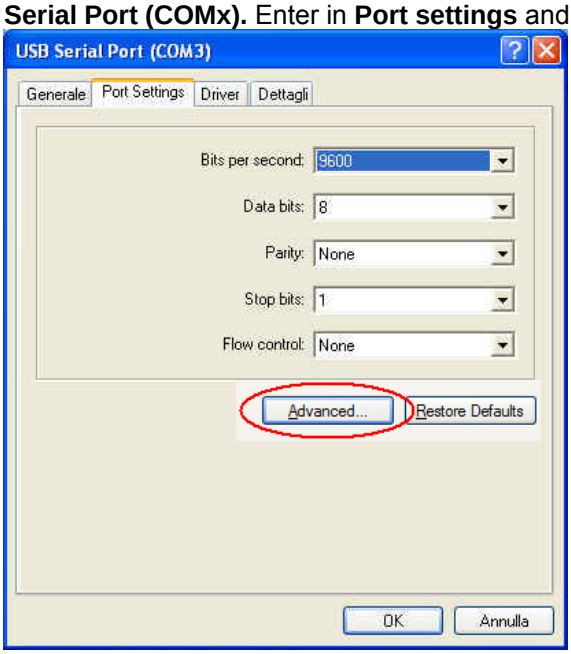
COMx shows the COM port assigned to the USB-RS232 adapter.



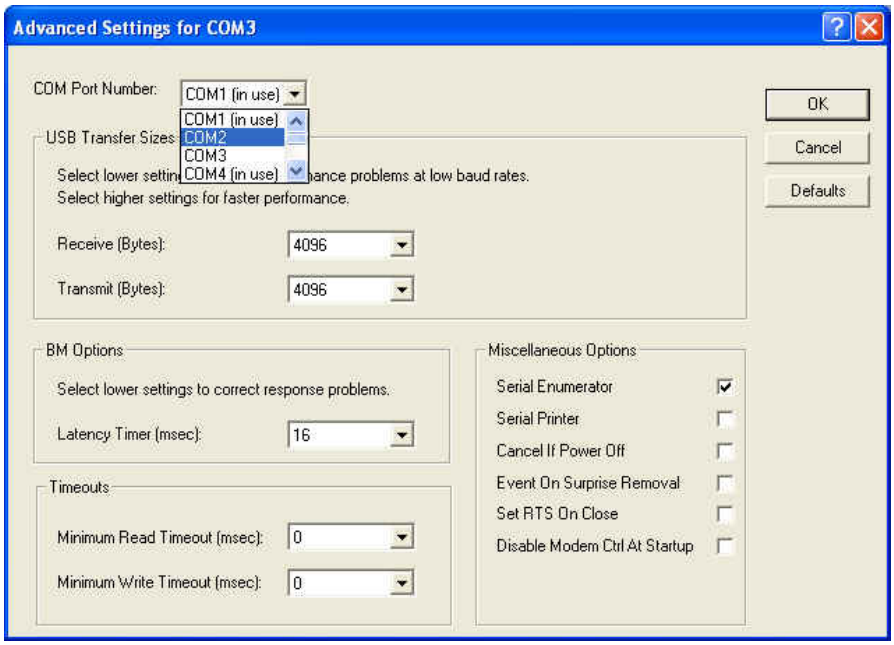
NOTE

If the adapter is set for a COM port nr. Not comprised between 1 and 9, the settings can be changed as follows:

- To change the **COMx** port, double click the line **Ports (COM & LPT)** and **USB Serial Port (COMx).** Enter in **Port settings** and **Advanced**.

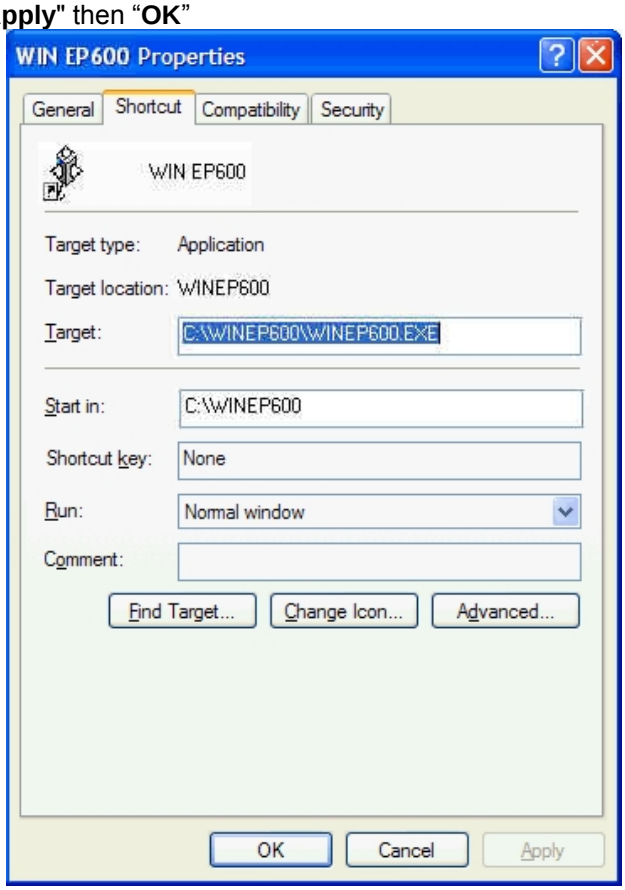


- In **Advanced Settings** select the first COM port available; click **OK**.



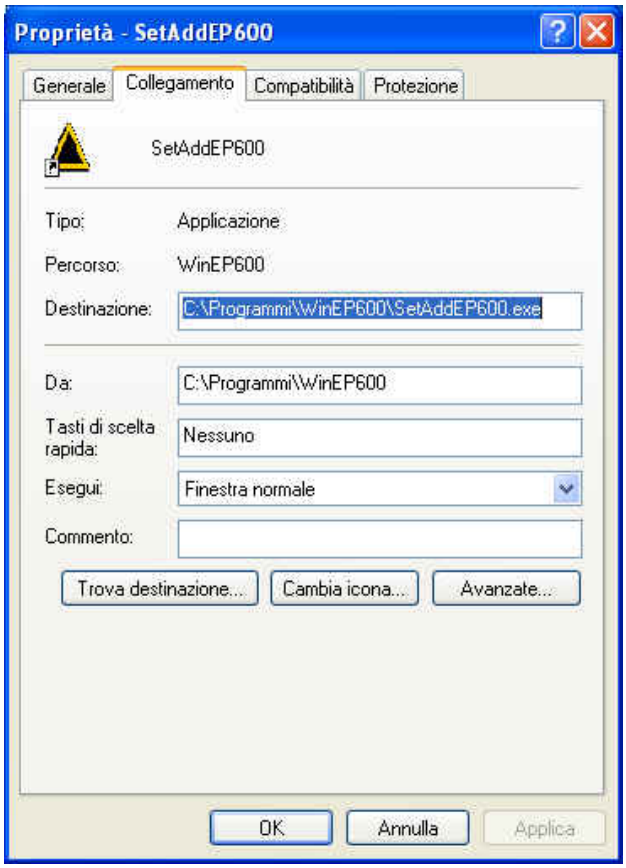
5.5.1 SetAddEP600 COM port settings

- Right click the icon **WinEP600** to display **Properties**
- In the field **Destination** enter the command line: **C:\WINEP600\WINEP600.EXE COMM=N** (N = between 1 and 9)
- **IMPORTANT:** the command line must be **upper case**
- Click "**Apply**" then "**OK**"



5.5.2 SetAddEP600 COM port settings

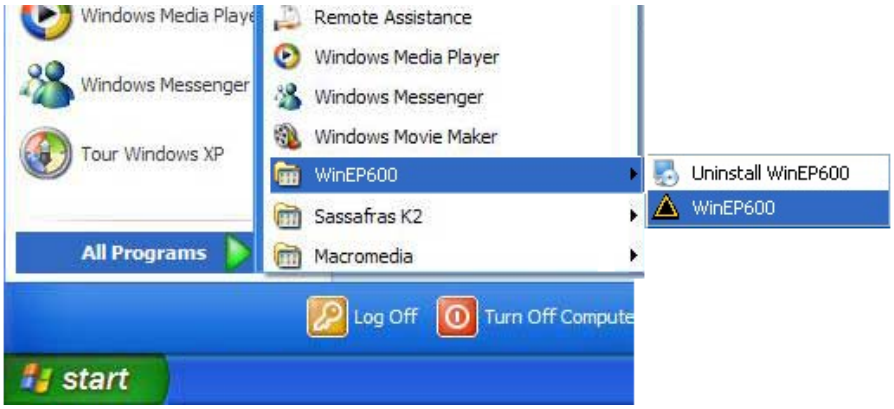
- Right click the icon **SetAddEP600** to display **Properties**
- In the field **Destination** enter the command line
  C:\Programs\WinEP600\SetAddEP600.exe COMM=N
  (N = between 1 and 9)
  IMPORTANT: the command line must be **upper case**
- Click "**Apply**" then "**OK**"



5.6 Running WinEP600

Connect the PMM EP600/EP601 to PC an click the icon on desktop.

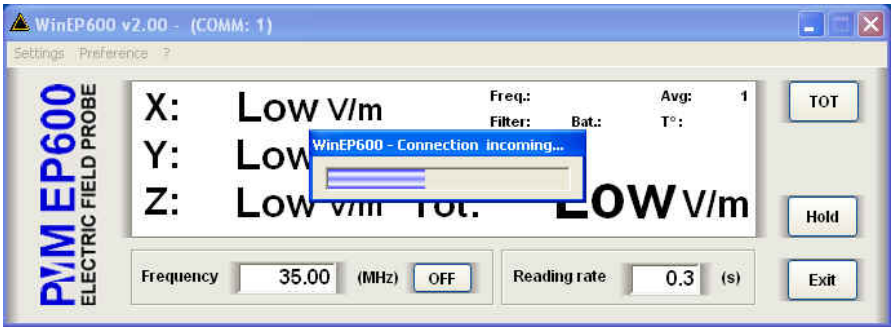
Alternatively (Windows XP): **Start**, **All Programs**, **WinEP600**, **WinEP600**.



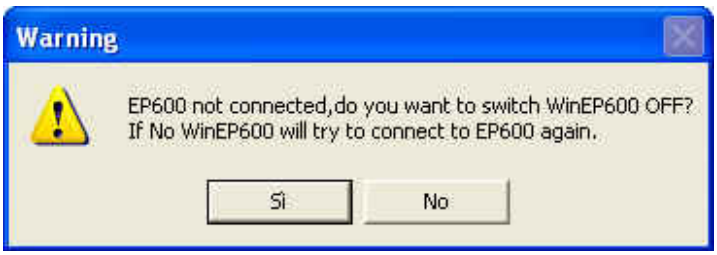
Windows Vista: Click **Windows** ( ), **Programs**, **WinEP600, WinEP600**.

This window is displayed first:

Then, the main window is displayed together with the **WinEP600 - Connection Incoming** indication of the correct communication with the probe.



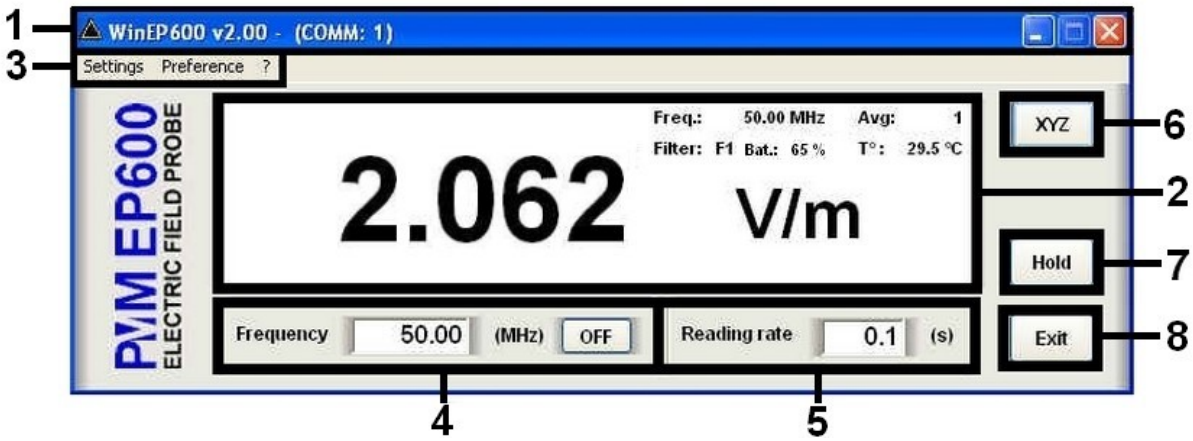
This message appears when PMM EP600/EP601 is not connected or the communication is not established:



Select **YES** to quit the WinEP600 – the EP600/EP601 is switched OFF.
Select **NO** to retry establishing the communication (check the EP600/EP601 correct installation before).

5.7 Main window contents

Once connected the main window is displayed:



Commands description:

1. Title bar
2. Measurements and settings
3. Settings selection
4. Correction frequency setting in MHz
5. Reading rate in seconds (s)
6. Toggle between total field value or contemporary x - y – z axis readings
7. Hold/run readings
8. Exit and quit the program

5.7.1 Title bar

The software release is shown here, together with the serial port as set in the program properties.

The control buttons allow to minimize to icon, enlarge/restore the main window and exit the program:

When minimizing the main window the information is displayed in the Windows application bar at the bottom of screen.

The field measurement remains displayed on desktop meanwhile.

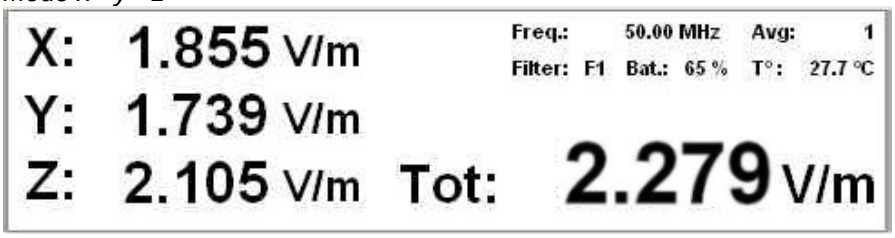
For more information see par. “Setting/Preference/Minimized UI”.

5.7.2 Main window displayed measurements

The measurements displayed in the main window are:

- **electric field values** as x - y - z or total (see par. “XYZ / TOT”)

Mode x - y - z



Mode Total

- **Measuring unit** shows the electric field measuring unit; the value is displayed with three decimals. Min. value displayed: 0.010 V/m.

- **Correction frequency** see par. “Frequency setting”
Default*: Freq: 50.00 MHz*

- **Average and Filter** see par. “Settings”
Default*: Avg: 1 Filter: F1*

- **Battery status** displayed in 5% steps. It shows the residual autonomy during measurements and the achieved autonomy during charging.

- EP600/EP601 internal temperature in °C

5.7.3 Frequency correction setting

This setting in MHz recalls the corresponding frequency correction factor stored in the EP600/EP601 memory.

NOTE **The graph in chapter 1 shows the correction factor in db as a function of the working frequency.**

NOTE **The setting displayed at the first run is the default; the last setting will be displayed then.**

The frequency is displayed with two decimals, max. resolution of 0.01 MHz. Press the enter key to enter the set frequency value.

To disable the frequency correction, click OFF; the button toggles to ON for enabling the function when required.

NOTE **When entering the frequency correction value or enabling the function, the "Frequency value" will be updated according to the Reading Time setting.**

NOTE **When entering the frequency correction value while in HOLD mode, la the new value will be not displayed until the HOLD is released.**

NOTE **The following message will appear when entering frequencies out of the PMM EP600/EP601 range:**

ù

5.7.4 Reading Rate setting

It shows the time interval (in seconds) between subsequent readings.
Setting resolution of 0.1 s.
Press the enter key to enter the set frequency value.

NOTE **The setting displayed at the first run is the default; the last setting will be displayed then.**

NOTE **The minimum time interval between readings is in function of the filter setting. The table Filter (Settings/Filter) show the minimum reading rate allowed.**

NOTE **The max. time interval between readings is of 30 s regardless of the filter setting.**

NOTE **Entering a reading rate not allowed will cause a warning message to appear:**

5.7.5 XYZ / TOT

Button for selecting the x - y - z or Total mode.
Max. display resolution: 0.001 V/m.

NOTE

Click on the button to toggle from XYZ to TOT.

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

Ovr : the field level is higher than 110% of the nominal maximum level (550 V/m for EP601).

! : the field level is between 100% and 110% of the nominal maximum level (from 500 to 550 V/m for EP601). The symbol is close to the value.

*** :** the field level is lower than nominal minimum level. The symbol is close to the value.

- 0.5 V/m per EP601 on the total;
- 0.5 / √3 per EP601 on the single axis.

Low : the field level is lower than 1/15 of the nominal minimum level.

- 0.5 / 15 per EP601 on the total;
- (0.5 / 15) x √3 per EP601 on the single axis.

WARNING

The field value outside the nominal level range could be unreliable.

5.7.6 HOLD / RUN

Press HOLD to freeze the readings.
Click on the button to toggle from HOLD to RUN
The button XYZ/TOT is active even when in HOLD.

NOTE

If the program is exit when in HOLD mode, it will restart in RUN mode.

5.7.7 EXIT

Press **EXIT** to end the program. The current settings are saved and will be recalled at the next start.
Message:

Press **YES** to exit and turn the EP600/EP601 off.
Press **NO** to abort exiting.

5.7.8 Settings menu

Commands:

- Settings: set Average and Filter

- Preference: select program skin and enable the function **Minimized UI**

- ? (Info): software and product information

5.7.8.1 Settings

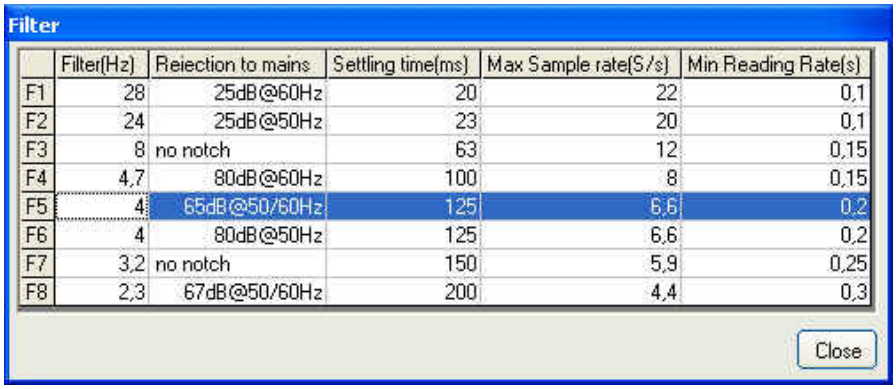
Settings options:

- Filter: the EP600/EP601 internal A/D Sigma-Delta converters feature digital filters to improve resolution and sensitivity, as well to reducing interferences.
The filters can be selected according to the application requirements: from the faster (F1) to the slower (F8).

To set the required filter click on the corresponding line, which turns blue. The selected filter will be displayed in the main window.

NOTE

When selecting a new filter while in HOLD mode, the filter setting indication in the main window will be updated only after toggling to RUN mode.



	Filter(Hz)	Reiection 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): indication of the filter characteristics

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): A/D conversion speed

Min Reading Rate (s): min. time interval between readings of electric field

Normally a fast field measurement is required for faster response and better stability when the field probe controls as feedback for a preset field value the radiated power of a system composed by antenna and RF generator.
However, as faster the measurements as higher the noise is, with consequent reduction of sensitivity.
Slower measurements increase sensitivity but increase the response time and the power consumption.
The PMM EP600/EP601 features eight different filters to help finding the most suitable combination of the a.m. parameters for each specific application:

F	Settling time	Power consumption	Sensitivity	Rejection @ 50Hz	Rejection @ 60Hz
0	Very fast	Very low	Low	-----	low
1	Very fast	Very low	Average	Low	------
2	Fast	Low	Good	------	-------
3	Average	Average	High	Good	Very high
4	Average	Average	High	High	High
5	Average	Average	High	Very high	Good
6	Slow	High	Very high	good	Good
7	Slow	Very high	Very high	High	High

NOTE

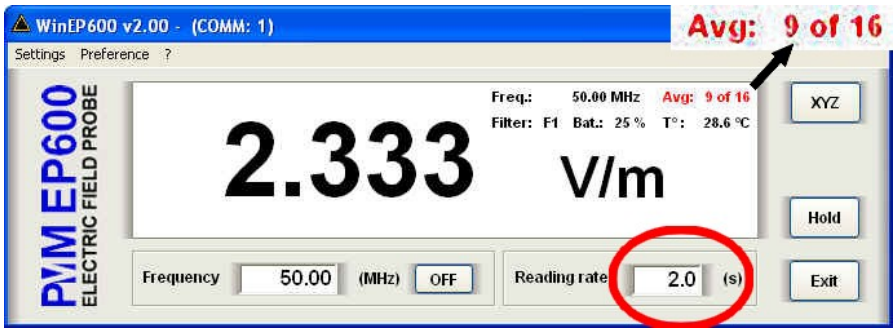
In normal operation setting the filters F4 - F5 may offer a good compromise in terms of power consumption, sensitivity, settling time and rejection @ 50Hz.

- Average: setting of the number (1, 4, 16, 32 or 64) of readings to calculate the arithmetic average (AVG)**.**

NOTE

When setting Average = 1, the readings are not averaged and the current measurements are displayed.

In the example, the average value of the last 16 field readings will be displayed. The **"Avg"** counter shows the progressing of the average calculation, updating according to the "Reading rate" time interval setting.



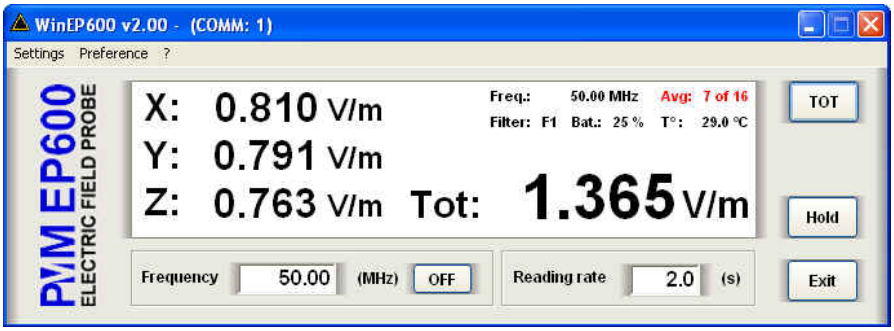
The message **AVG: OK** will be displayed shortly after completion of the averaging process, then followed by the indication of the preset averaging **Avg: 16 .**

Then the process continues in moving Average mode: of the 16 readings block, the older is discarded and the latest is added at the speed of the Reading rate setting.

The process is restarted from the beginning when setting a different Average value.

NOTE

When toggling from TOT to XYZ mode the Average is reset to re-calculate the field values for each single axis.

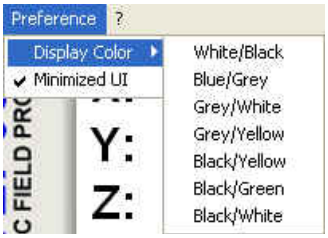


NOTE

When in HOLD mode, the new Average value is displayed in the main window and is updated only when the HOLD is released.

5.7.8.2 Preference

Functions of the **Settings** menu:



- Display Color: selection of different color combinations of the main window among:

Background / readings and units

- Blue/Grey
- Grey/White
- Grey/Yellow
- Black/Yellow
- Black/Green
- Black/White

NOTE

The color of the settings of Freq, Avg, CorFact e Offset will be displayed accordingly.

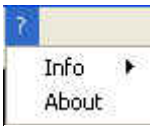
- **Minimized**: enable the function **Minimized UI (Unit Interface)** to keep the field readings displayed on desktop when minimizing the main window on the tray.

This window can be moved anywhere on the desktop, keeping its final position even at the next minimizing of the main window.

NOTE

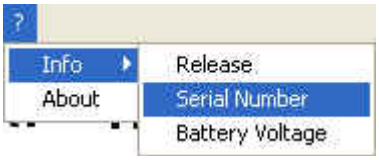
To close this window, restore the main window from the tray and deselect the "Minimized UI" function.

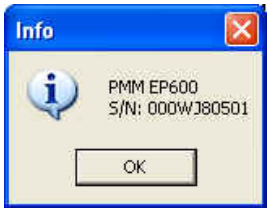
5.7.8.3 ? (Info)



Contents:
- **Info:** current EP600/EP601 firmware version and date, serial number and battery voltage.

Click OK to exit.





Click OK to exit.

NOTE

Battery voltages below 2.11V (5% of charge) are displayed red.

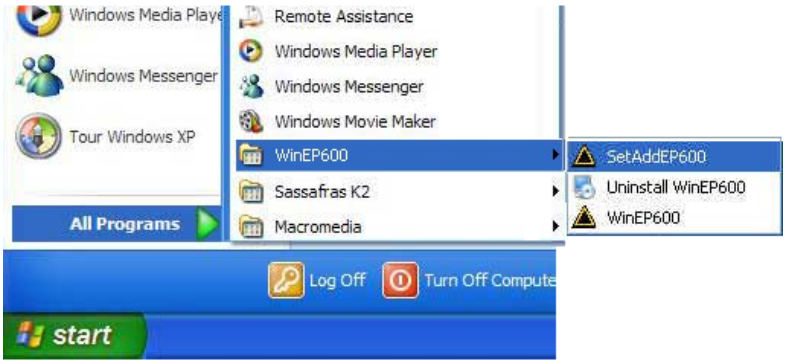
Click Close to exit.

- **About:** Manufacturer information.

5.8 Running SetAddEP600

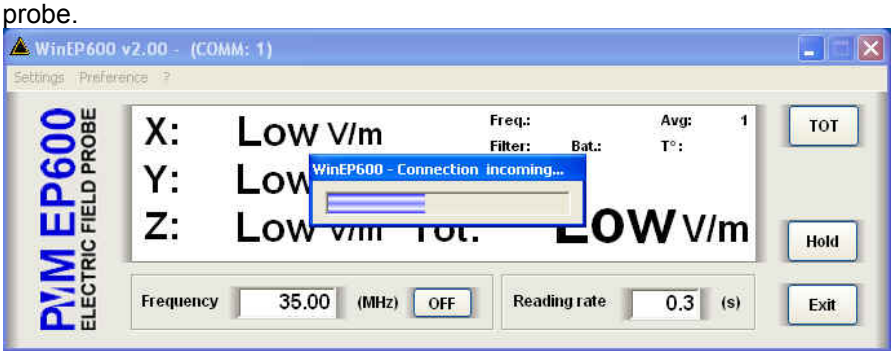
Connect the PMM EP600/EP601 to PC an click the icon on desktop.

Alternatively (Windows XP): **Start**, **All Programs**, **WinEP600**, **SetAddEP600**.

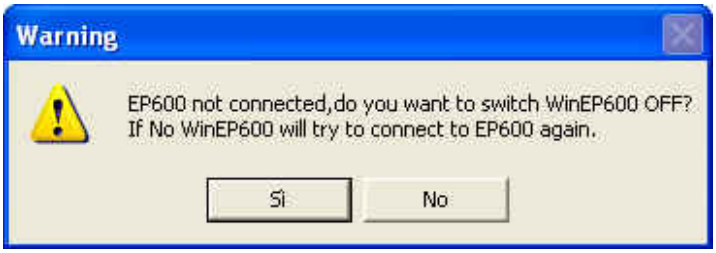


Windows Vista: Click **Windows** (), **Programs**, **WinEP600, SetAddEP600**.

Then, the main window is displayed together with the **SetAddEP600 - Connection Incoming** indication of the correct communication with the probe.



This message appears when PMM EP600/EP601 is not connected or the communication is not established:



Select **YES** to quit the SetAddEP600 – the EP600/EP601 is switched OFF. Select **NO** to retry establishing the communication (check the EP600/EP601 correct installation before).

5.9 Main window contents

Once connected the main window is displayed:

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

5.9.1 Title bar

The title bar displays the name of the program.

The control buttons allow to minimize to icon and exit the program:

When minimizing the main window the information is displayed in the Windows application bar at the bottom of screen.

5.9.2 Probe data

When the communication is established, the probe data displays: probe model, release and data firmware and serial number.

5.9.3 New Address

When the communication is established, the window 00 displays the current probe address.

Enter new address 05 and press Write to store it.

The software will inform that the address program has been successfully stored:

5.9.4 Exit

Press Exit to close the program.

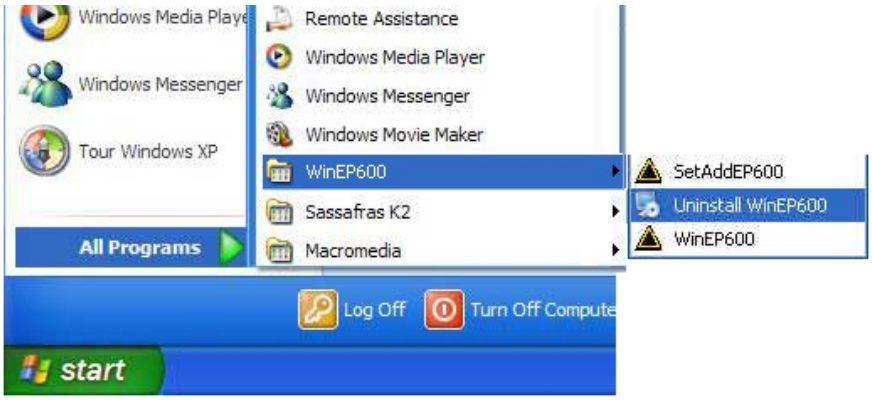
5.10 Uninstalling WinEP600 and SetAddEP600

Disconnect the USB cable (the procedure of “safe disconnection” is unnecessary).

Windows XP: click **Start**

in Windows Vista: click **Windows**

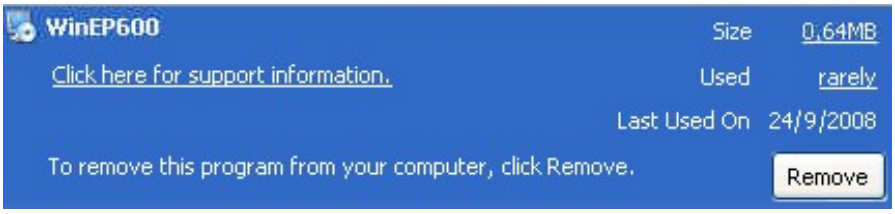
Then **All Programs**, **WinEP600**, **Uninstall WinEP600**.



NOTE

If the Uninstaller is not available:

Disconnect the USB cable (the procedure of “safe disconnection” is unnecessary).
Click **Start**, **Settings**, **Control Panel** and **Add or Remove Programs** (**Programs and functions** for Windows Vista).
Find WinEP600 then click **Remove** and follow the instructions.



WARNING

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

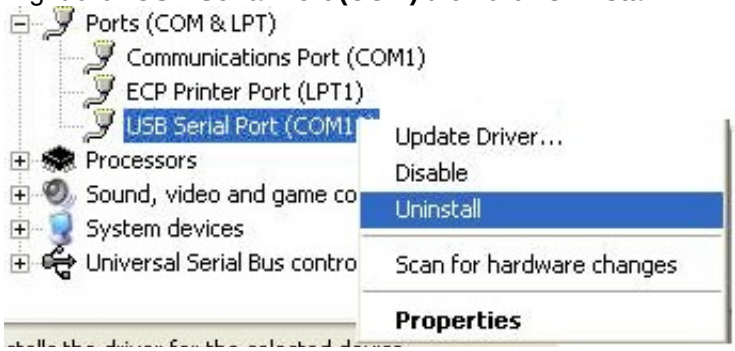
5.11 Uninstalling the driver of RS232-USB adapter

NOTE

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

Right click **My computer** to access **Properties**

Select **Hardware** and **Device Manager.**
Click **+** to expand **Port (COM and LPT).**
Right click **USB Serial Port (COM)** then click **Uninstall**



Click **OK** to end.

Once the uninstall is completed the peripheral **USB Serial Port (COM)** will be removed.

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6 - Communication protocol

6.1 Disclaimer

This chapter provides the information required to control the PMM EP600/EP601 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.

6.2 Protocol

The serial communication between PC and PMM EP600/EP601 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)
Commands must start with "#00".

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 two categories:

- **Query COMMANDs**
- **Setting 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

NOTE

At power ON the EP600/EP601 is in Master mode, as required by the communication with the hand-held unit 8053B; the EP600/EP601 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 EP600/EP601 in Slave mode to answer only when receiving a query.
The EP600/EP601 automatically turns off 30 seconds after receiving a command to save battery.

Table 6-1 Query Commands	
Command	Description
?v	**#00?v*** answer is a string with information on model nr., firmware date and release. Example of answer to command **#00?v***: "**vEP600:1.02 10/05;**"
?p	**#00?p*** answer is a string with calibration information. Example of answer to command **#00?p***: "**10/05;**"
?b Battery	**#00?b*** answer is a series of 3 bytes with information on EP600/EP601 internal battery voltage, in Little Endian format. The first byte is the character 'b' followed by 2 bytes coding an integer (nn) of 16 bit without sign. Calculation to obtain the battery voltage: V_battery = 3 * (nn / 1024 * 1.6)
?t Temperature	**#00?t*** answer is a series of 3 bytes with information on EP600/EP601 internal temperature, in Little Endian format. The first byte is the character 't' followed by 2 bytes coding an integer (nn) of 16 bit without sign. Calculation to obtain the temperature in °C: T_ep600= ((nn / 1024 * 1.6) - 0.986) * 1000 / 3.55
?s Serial Number	**#00?s*** answer is a string with EP600/EP601 serial number. Example of answer to command **#00?s***: "**s123456789AAAA**"
?T Total Field	**#00?T*** answer is a series of 5 bytes with information of the total measured field strength, in Little Endian format. The first byte is the character 'T' followed by 4 bytes expressing a floating point number (ff) of 32 bit. (ff) represents the square of the field strength (isotropic measurement). Calculation to obtain the field strength: V/m=√ff
?A All Field Components	**#00?A*** answer is a series of 13 bytes with information of the field strength measured by each single axis, in Little Endian format. The first byte is the character 'A' followed by 12 bytes expressing the 3 axis (X,Y,Z) as floating point number (ff) of 32 bit. The symbols (fx,fy,fz) express directly the field strength in V/m of the relevant axis.

Table 6-2 Setting Commands	
Command	Description
k fr	**#00k frq*** sets the frequency (**frq**) the correction factor is referred to. **fr** is the ASCII string expressing the **integer value** of the frequency multiplied by 100 so giving resolution of 10kHz. After the EP600/EP601 has received this command, all measurements shall be applied of the correction factor relevant to that frequency, as stored into the EP600/EP601 at Factory. Such frequency values out of the EP600/EP601 frequency range will disable this function. The answer is a series of 5 bytes of Big Endian format; first the character 'k' followed by 4 bytes expressing a floating point number (**ff**) of 32bit. **(ff)** express the frequency used by the EP600/EP601. Example of command **#00k 10000***: (set the frequency correction factor for 100MHz)
f n	**#00f n*** sets the filter (**n**) to use. **n** must be specified between 0 and 7. See chapter 3 for more information on how to select filters. Example of command **#00f 2***

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7 - Accessories

7.1 Foreword

This chapter explains how to use the accessories of PMM EP600/EP601.
The following general indications apply to all accessories.

7.2 Inspection

Check the packing integrity.

WARNING

If anything is found damaged or missed, immediately contact your Dealer.
Check the accessories with reference to the packing list included in the package.

7.3 Ambient

Store the accessories in clean, dry environment free of dust and acid vapours.
Follow requirements for temperature and humidity:

Operation:

- Temperature -10° to +40° C
- Humidity < 90% RH

Storage:

- Temperature -20° to + 70° C
- Humidity < 95% RH

7.4 Return for service

Every part of the accessories, included batteries, can only be replaced by NARDA, when the instrument needs repair or is malfunctioning, please contact the NARDA Support center.
When an accessory needs to be sent to NARDA for repairs please complete the questionnaire enclosed with this Operating Manual making sure you fill in all the details relative to the service requested.
In order to minimize repair time, please describe the nature of the failure. If the failure occurs only under certain conditions, please provide details on how we may recreate the same condition in order to identify the fault.
If possible, please reuse the original packaging, making sure the accessory is wrapped in heavy paper or plastic.
Alternatively, use a strong box filled with shockproof material, place enough material all around the equipment so that the unit is stable and firmly blocked inside the box.
Whilst packing, pay special care in protecting the unit's front panel.
Seal the box firmly before shipment.
Mark the box: FRAGILE HANDLE WITH CARE.

7.5 Cleaning

To clean the equipment use only dust-free, non-abrasive dry cloths.

WARNING

To avoid damage never use any kind of solvent, acid, or similar to clean the instrument.

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7.6 *PMM 8053-OC Optical-Serial converter*

This accessory of the field probe PMM EP600/EP601 allows the fiber optic to be connected to the PC RS-232 serial port.

Installation

Connect the PMM 8053-OC to a free serial port of PC; connect the fiber optic of the probe respecting the optical connector insertion key.
The PMM 8053-OC is powered from the PC serial port directly.

Table 7-1 Specifications of PMM 8053-OC	
Max allowed fiber optic length	80 m (see notes below)
RS 232 connector	9 pin DB9

NOTE

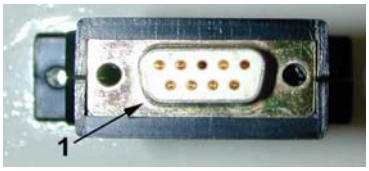
For some PC models the power available at the DB9 connector may be not enough to allow the 8053-OC for driving fiber optics up to 80 m.

NOTE

For some PC models the power available at the DB9 connector may be not enough to guarantee the correct operation of the 8053-OC. In such cases apply the 8053-OC-PS between 8053-OC and PC.

Front panel

1 – fiber optic connector



Rear panel

1 – RS232 DB9 female connector

Fig. 7-1 8053-OC Panels

Power supply

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

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7.7 *8053-OC-PS Power Supply*

This accessory of the field probe PMM EP600/EP601 allows for providing the power supply to the 8053-OC converter whenever the PC serial port power supply is not sufficient or absent.

Installation

Connect the 8053-OC-PS to the PC serial port (or serial cable) and to the 8053-OC. Connect the 8053-OC-PS to the mains by the AC adapter (supplied). Connect the fiber optic to the 8053-OC.

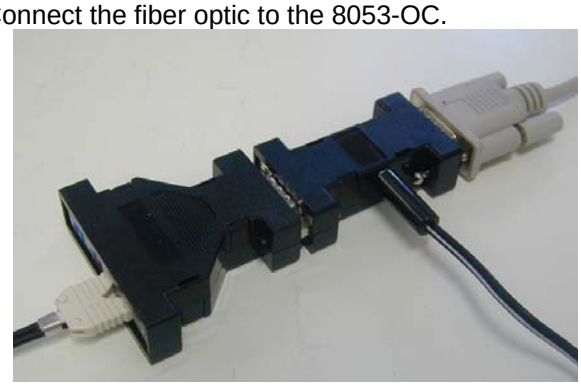

Table 7-2 Specifications of 8053-OC-PS Power Supply	
RS 232 Connectors	9 pin DB9

Front panel

DB9 M connector

Rear panel

DB9 F connector

Side

M connector for DC supplì

Fig. 7-2 8053-OC-PS

Power supply

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

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7.8 *PMM TR-02A Tripod*

This accessory allows for standing the PMM EP600/EP601 field probe or the PMM 8053B hand held unit by means of the fixing screw.
The swivel PMM 8053-SN is supplied together with the tripod.

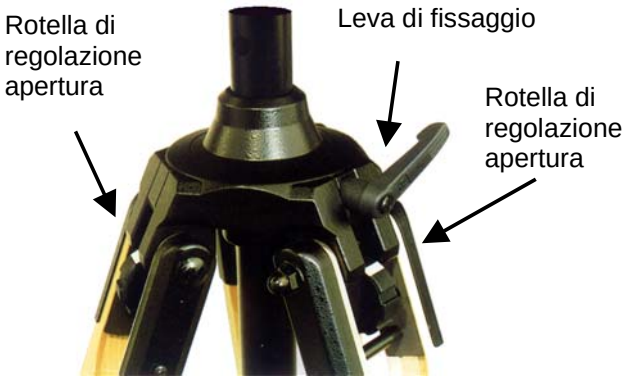
The PMM TR-02A has been specifically designed to prevent influencing the field measurements.

The extensible legs allow for setting the required height; the feet are designed to provide stability on most of the surfaces. The height of the central rod can be set as well.

The PMM TR-02 is supplied in a robust carrying bag.

Table 7-3 Characteristics of PMM TR-02A	
• 3 legs of 3 extensible sections	
• Transport encumbrance:	76 x 12 x 12 cm
• Minimum height:	60 cm
• Maximum height:	180 cm
• Weight	2,8 kg
• Max load:	10 kg
• Screw connection	¼”

Details:



The inclination of each leg can be set in three different positions:

- Fixed 20°: white mark
- Fixed 45°: red mark
- Variable: no marks visible.

The central support can be set and locked by the handle.

Fig. 7-3 TR02A

The swivel **PMM 8053-SN** can be mounted on the PMM TR-02A top.

- height: 8 cm
- weight: 160 g
- Load max: 10 kg
- Screw: ¼ “

Fig. 7-4 adjustable swivel

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7.9 *PMM TT-01 Telescopic extension*

PMM TT-01 allows for extending the distance between field probe and operator or measuring instrument.
The TT-01 top is provided with the screw to fix the conical adapter. The length can be adjusted at any value between minimum and maximum.

The PMM TT-01 is made of fibreglass and has been specifically designed to prevent influencing the field measurements.

Table 7-4 Characteristics of TT-01	
• Diameter	32 mm
• Minimum length:	120 cm
• Maximum extension:	420 cm
• Weight	500 g

Fig. 7-5 TT-01 Fiberglass telescopic extension with EP600/EP601 installed on the top.

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7.10 *PMM SB-10 Switching Control Box*

NOTE

PLEASE REFER TO THE RELEVANT OPERATION MANUAL

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narda Safety Test Solutions
an L3 Communications Company
http://www.narda-sts.it

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Mod. 18-1

Caro cliente
grazie per aver acquistato un prodotto NARDA! Sei in possesso di uno strumento che per molti anni ti garantirà un'alta qualità di servizio. NARDA riconosce l'importanza del Cliente come ragione di esistenza; ciascun commento e suggerimento, sottoposto all'attenzione della nostra organizzazione, è tenuto in grande considerazione. La nostra qualità è alla ricerca del miglioramento continuo. Se uno dei Suoi strumenti NARDA necessita di riparazione o calibrazione, può aiutarci a servirla più efficacemente compilando questa scheda e accludendola all'apparecchio.
Tuttavia, anche questo prodotto diventerà obsoleto. In questo caso, ti ricordiamo che lo smaltimento dell'apparecchiatura deve essere fatto in conformità con i regolamenti locali. Questo prodotto è conforme alle direttive WEEE dell'Unione Europea (2002/96/EC) ed appartiene alla categoria 9 (strumenti di controllo). Lo smaltimento, in un ambiente adeguato, può avvenire anche attraverso la restituzione del prodotto alla NARDA senza sostenere alcuna spesa. Può ottenere ulteriori informazioni contattando i venditori NARDA o visitando il nostro sito Web www.narda-sts.it.

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

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

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

Ditta:
Company:

Indirizzo:
Address:

Persona da contattare:
Technical contact person:

Telefono:
Phone n.

Modello:
Equipment model:

Numero di serie:
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: