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User's Manual

PMM VDH-01

VAN DER HOOFDEN ANTENNA

SERIAL NUMBER OF THE INSTRUMENT

You can find the Serial Number on the rear panel of the instrument.

Serial Number is in the form : 0000X00000.

The first four digits and the letter are the Serial Number prefix, the last five digits are the Serial Number suffix. The prefix is the same for identical instruments, it changes only when a configuration change is made to the instrument.

The suffix is different for each instrument.

NOTE:

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



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.



This products are a **Safety Class I** and **Installation Category II** 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).

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

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

EXPLANATION OF ELECTRICAL AND SAFETY SYMBOLS :



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



Warning, danger of electric shock



Earth



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



Unit Earth Connection



Earth Protection



Equipotential

EXPLANATION OF SYMBOLS USED IN THIS DOCUMENT :



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.



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.



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



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;
- 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;
- Follow the safety regulations and any additional instructions in this manual to prevent accidents and damages.

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:

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

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

Descrizione
Description **ANTENNA VAN DER HOOFDEN
VAN DER HOOFDEN ANTENNA**

Modello
Model **PMM VDH-01**

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

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

RoHS
RoHS **2011/65/EU**

Cisano sul Neva, 6 March 2024

Egon Stocca
General Manager



1 - General Information

1-1 Documentation

Enclosed with this manual are a service questionnaire to send back to NARDA in case of equipment service is needed, and an accessories check list to verify all accessories enclosed in the packaging.

1-2 Introduction to PMM VDH-01

The objective of the EMF radiation tests discussed here is to define the amplitude of current I_c and Voltage V_c induced by the Device Under Test (DUT) onto a kind of phantom simulating what would happen if a human being was there.

PMM's Antenna VDH-01 is a Van der Hoofden test-head designed to meet the specification of the IEC 62493 standard for the EMF assessment of lighting products.

PMM VDH-01 is a conductive sphere of 210mm diameter which simulates a man's head, a connecting wire to simulate the neck and a network to both protect the receiver and match the impedance into 50 Ohm.

The PMM VDH-01 is suited to perform measurements on induced currents in the frequency range from 20 kHz to 10 MHz.

Uncompromised design and construction for reliable and safe operation together with PMM EMI receivers like the PMM 9010F, ER8000, ER9000 or any other suited RF receiver.

The main functions performed by the Van Der Hoofden transducer are:

- Simulate the presence of a human being as close to the DUT as the standard requires;
- Convert the induced currents into readable RF signals;
- Protect the input of the EMI Receiver from high induced voltages;
- route the EMI (Electro Magnetic Interference) of the DUT to the receiver, matching the impedance to the standard 50 Ohm nominal value.

Schottky diodes are used in the protection network to prevent the high induced voltages to reach the receiver.

PMM VDH-01 is provided with standard BNC female connector and coaxial cables are available upon request.

1-3 PMM VDH-01 for induced RF measurement

As described above, an Antenna is primarily a transducer to take out RF signals and transform them into electrical ones. Some EMC recommendations might require that the Device Under Test shall be proven to satisfy an emission limit of radiated signals and PMM VDH-01 is designed to this purpose.

The following figure shows the IEC equivalent circuit.

Fig. 1-1 IEC equivalent circuit

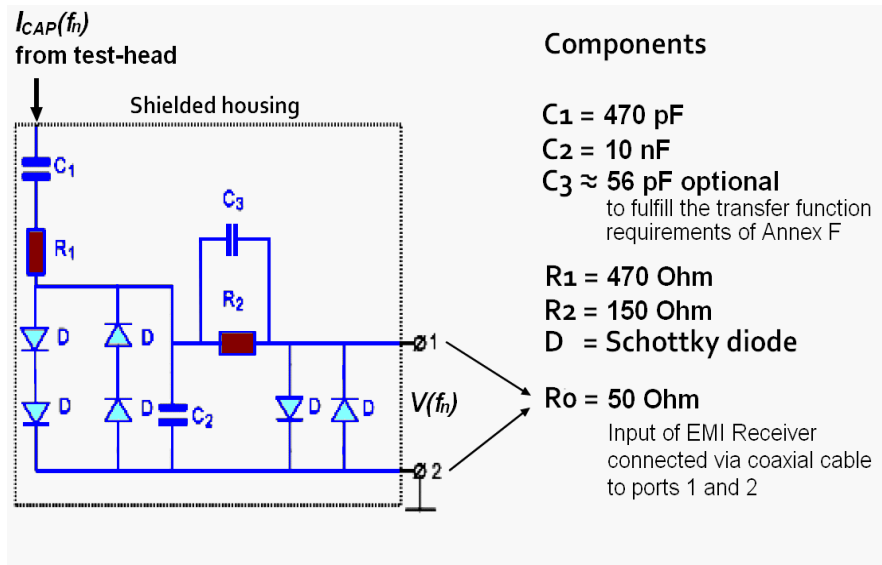


Fig. 1-2 Typical frequency response of the Protection Network (IEC standard)

Theoretical characteristic

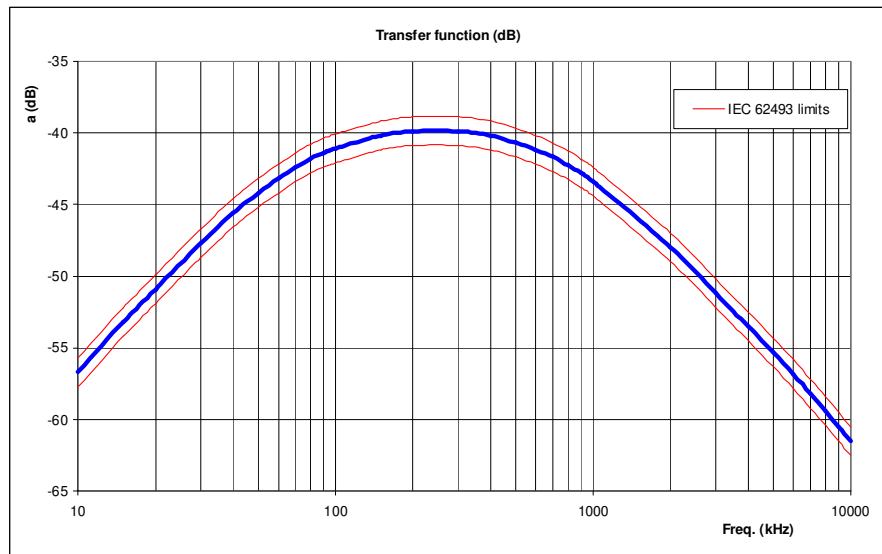
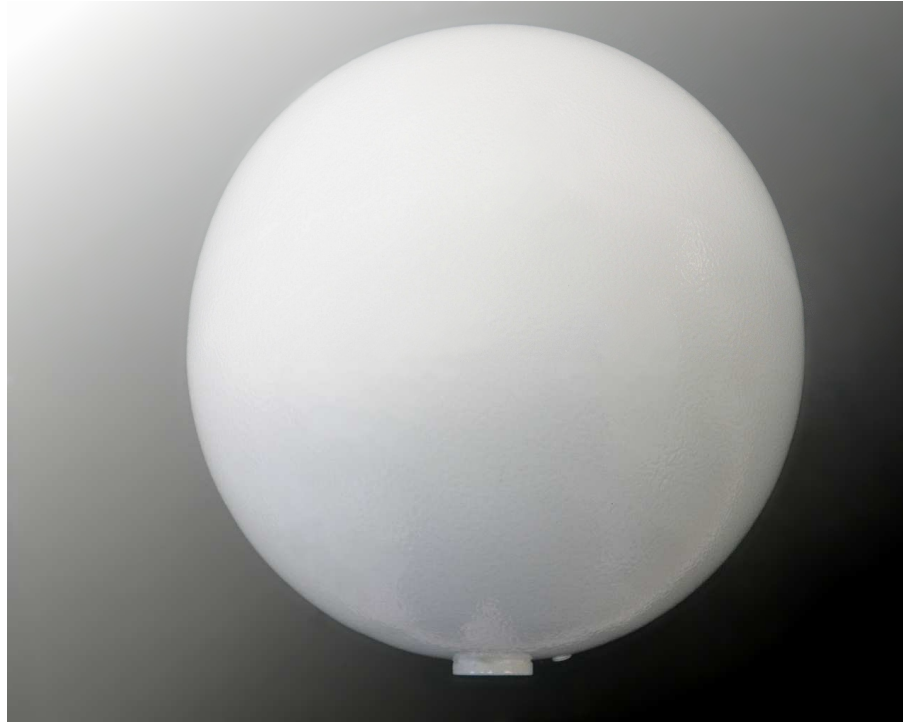


Fig. 1-3 PMM VDH-01
Sphere
(test-head)



**1-4 Shipping
components**

- PMM VDH-01 system is composed by the following parts:
- PMM VDH-01 Conductive Sphere (test-head, 210mm diameter)
 - Protection Network
 - Connecting Wire (neck simulator)
 - BNC RF Coaxial cable (2m long)
 - Certificate of Calibration
 - User's manual

**1-5 Related instruments
and optional
accessories**

- Instruments that can be ordered separately:
- PMM 9010F EMI Receiver
- Optional accessories
- TR-01 Wooden Tripod



See PMM 9010 EMI Receiver User's manual as example.

1-6 Environment

The operating environment is specified to be within the following limitations:

- Temperature 0° to +45° C
- Humidity < 90% relative

The instrument should be stored in a clean, dry environment

The storage and shipping environment is specified to be within the following limitations :

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

1-7 Return for service

If the instrument should be returned to NARDA for service, please complete the service questionnaire enclosed with the Operating Manual and attach it to the instrument.

To minimize the repair time, be as specific as possible when describing the failure. If the failure only occurs under certain conditions, explain how to duplicate the failure.

If possible, reuse of the original packaging to ship the equipment is preferable.

In case other package should be used ensure to wrap the instrument in heavy paper or plastic.

Use a strong shipping container and use enough shock absorbing material around all sides of the equipment to provide a firm cushion and prevent movement in the container.

Seal the shipping container securely with shipment tape.

Mark the shipping container FRAGILE to encourage careful handling.

1-8 Equipment cleaning

Use a clean, dry non abrasive cloth for external cleaning of the equipment.

NOTICE

To clean the equipment do not use any solvent, thinner, turpentine, acid, acetone or similar matter to avoid damage to external painted surfaces.

2 - Main specifications

2-1 Main specifications

Table 2-1 lists the PMM VDH-01 Antenna performance specifications. The following conditions apply to all specifications :

TABLE 2-1 Main specifications	
Frequency range:	20 kHz to 10 MHz
Measuring Output:	50 Ohm
Protection network equivalent circuit:	Compliant to IEC 62493
RF input connector (Sphere)	BNC female
RF output connector:	BNC female
Diameter of the sphere (test-head):	210 mm
Connection Wire length:	300 mm
Tripod mount	1/4"
Fixture clamp for rods with a diameter of:	25 mm
Rated temperature:	-10° to + 45° C
Storage temperature:	- 20° to + 70° C
Weight: (tripod excluded)	1.7 kg

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3 - Installation

3-1 Introduction

This section provides the information needed to install the PMM VDH-01 system. Included it is information pertinent to initial inspection, interconnections, environment, instrument mounting, cleaning, storage and shipment.

3-2 Initial inspection



To avoid hazardous electrical shock, do not use the instrument when there are signs of shipping damage to any portion of it.

3-3 Packing Unpacking

Inspect the shipping container for damage.

If the shipping container or cushion material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically.

Verify the accessories availability in the shipping container referring to the accessories check list enclosed with the Operating Manual.

Notify any damage to the carrier as well as the NARDA Representative.

3-4 Preparation for use

This is a Safety Class I equipment.

Before connecting this instrument, ensure that an uninterruptible safety earth ground is provided from the main power source to the receiver connected to the protection network.



If this instrument is to be connected to other equipment or accessories, prior to energizing either unit verify that a common ground exists between them.

Any interruption or loosening of the protective earth ground conductor, either inside or outside the unit or in an extension cable will cause a potential shock hazard that could result in personal injury. Verify the safety earth ground functionality before operation.

3-5 Operating PMM VDH-01

To operate PMM VDH-01, please complete the following steps:

- Position and open the non-conductive tripod;
- install the Test-Head onto the insulated rod of the tripod screwing the ¼" insert;
- connect the Ordinary wire to the test-head screwing the 3MA screw;
- Fix the Protection Network onto the insulated rod by means of the opposite clamp;
- Fit the height of the fixing to the length of the wire in the meanwhile of connecting the BNC termination of the conductor;
- Locate the test-head in the right position for the measurement
- Connect the output of the Protection Network to the input of the EMI Receiver via a BNC coaxial cable.
- Run the test

NOTICE

To avoid any damage caused by transient current pulses or high induced voltages, do not connect directly the Test-Head to the Receiver but use always the protection network.

NOTICE

To avoid any damage caused by transient current pulses, disconnect the test Signal Analyzer input before switching AC supply on or off.

3-6 Installation Check list

Before operation ensure the following steps are taken:

- Check the prescriptions to ensure the compatibility with the equipment requirements.
- Protection earth line is connected to mains supply for the measuring Receiver.
- Verify that 50 ohm coaxial line to the EMI Signal Analyzer input be disconnected before switch on or off the supply line.
- Prior to energizing either unit verify that a common ground connection exists between all equipment in the test setup and safety protection earth.

Fig. 3-1 PMM VDH-01

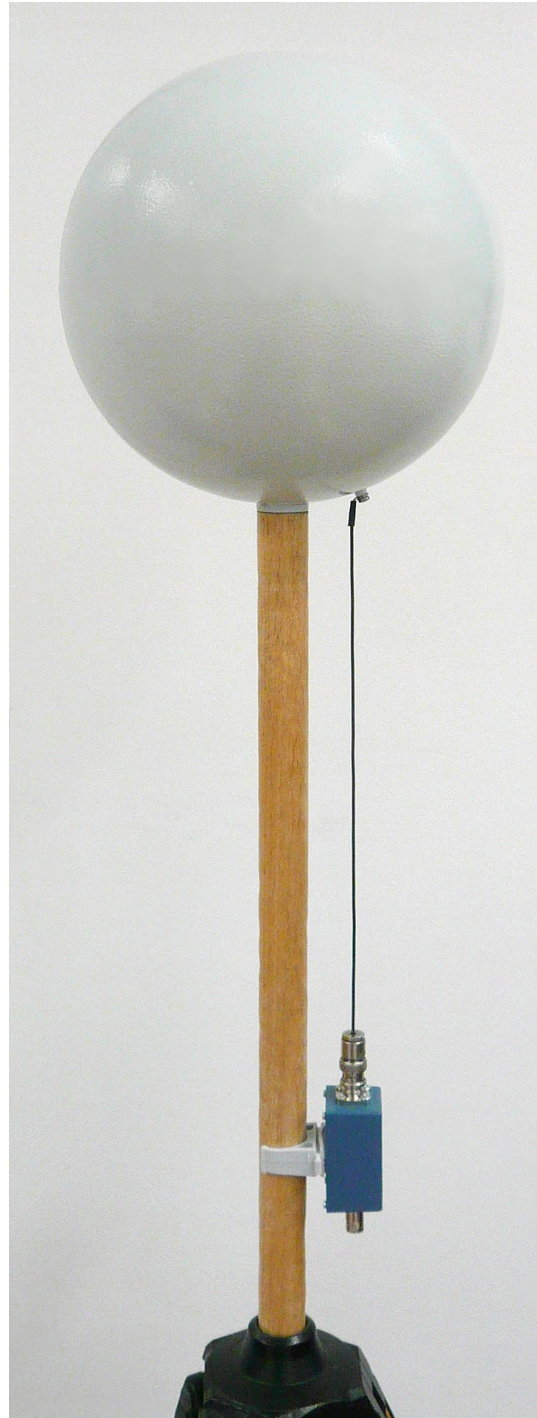


3.7 VDH-01 Equipment

The PMM VDH-01 setup is composed by:

- PMM VDH-01 Conductive Sphere (test-head, 210mm diameter)
- Connecting Wire (neck simulator)
- Protection Network
- Coaxial BNC cable
- EMI Receiver
- Insulated tripod

Fig. 3-2 VDH-01 Setup



NOTICE

Please be careful to respect the input and output connectors of the Protection Network.

The input connector for the Test-Head is labelled "SPHERE" and the output connector for the EMI Signal Analyzer is labelled "RECEIVER".

Fig. 3-3 Protection Network



NOTICE

Position the PMM VDH-01 where it will be installed, making sure it is leveled to ensure stability.

Fig. 3-4 VDH-01 Installation



4 - Operating PMM VDH-01 Antenna

4-1 Test Set-Up Considerations

Measurement repeatability is the main concern of standards and regulations, that exactly define the test set-up for interference measurements.

The PMM VDH-01 system complies with IEC 62493 regulation.

Electro Magnetic Interference (EMI) is a topic related to the ability of a Device Under Test (DUT) that can be any electric or electronic piece of equipment, to work properly without causing unacceptable interferences to all living organisms and other equipment in its environment.

IEC 62493 international standard refers to **"Assessment of lighting equipment related to human exposure to electromagnetic fields"**.

Lighting equipment for general lighting fall under this rule, except for those used in transportation vehicles.

Limits are set (ICNIRP/IEEE) in the range of the Short Waves for the currents density allowed.

The test location must be an Anechoic Chamber.

It is recommended that the DUT is operated with a prescribed stabilization time prior to the test. It must be positioned in accordance with the requirements of the standard.

The distance of the DUT from any metallic part may affect the measurement of the induced current values; IEC exactly define the dimensions and distances for the test configurations, by means of the following drawing:

Fig. 4-1 Typical test set-up

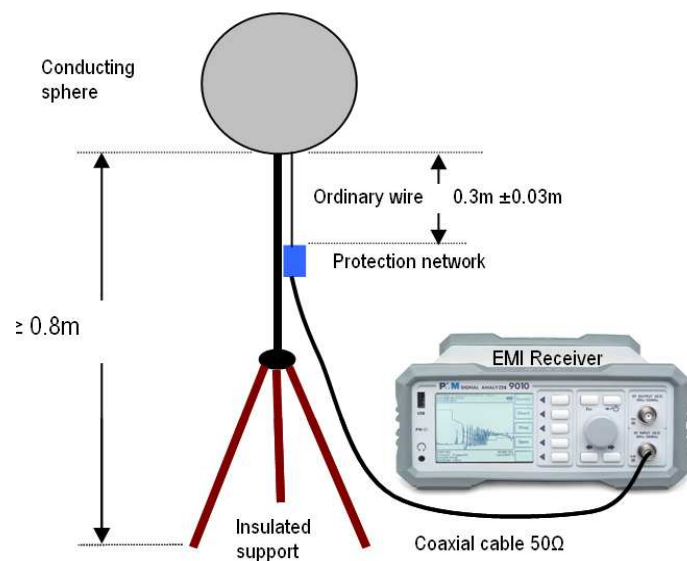


Notes:

DUT = Device Under Test

Position and distance of EUT must follow the rules of the Standard.

The EMI Receiver (or spectrum analyzer) ground must be connected to the protective earth.



The standard also defines which is the instrument to measure the induced current captured by the test-head.

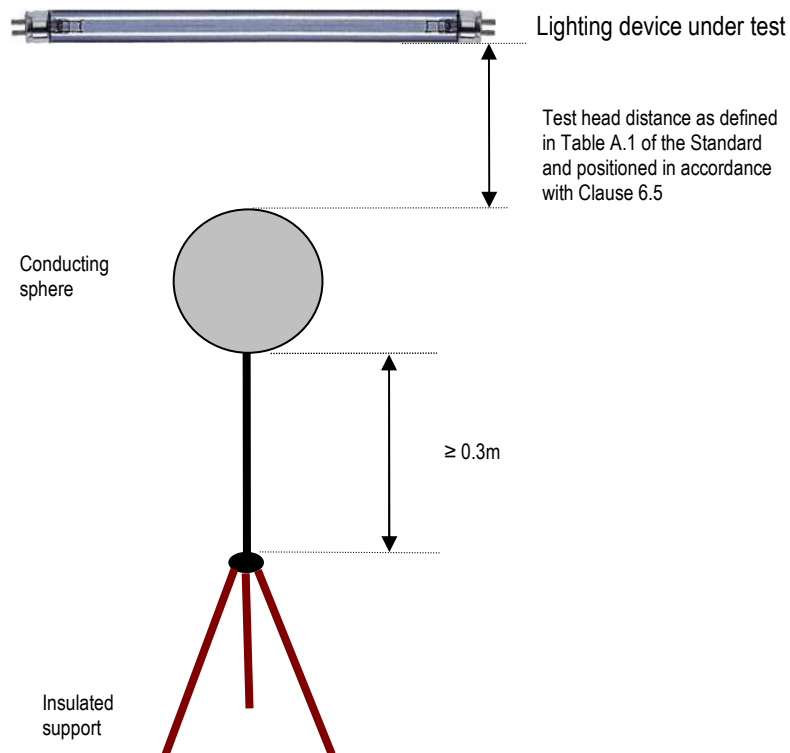
An EMI Receiver according to CISPR-1-1 is needed to run the test, operated with the settings defined by the rule.

Please refer to the IEC 62493 Standard for all information concerning the test setup, measurements, Factor F calculation, results and reports.

The above figure describes the test configuration and the interconnection of a lighting DUT, according to the above mentioned IEC specification, where:

1. The location is an Anechoic Chamber;
2. Device Under Test (DUT) is the lighting equipment under investigation;
3. The Conductive Sphere is the test-head;
4. The ordinary wire connects the test-head to the protection network;
5. The Protection Network preserves the input stages of the receiver and matches the impedance.
6. The 50 Ohm coaxial cable must satisfy the standard in terms of insertion loss and dc resistance;
7. RFI measuring receiver;

Fig. 4-2 Typical location of test set-up



Internal hardware checks and repairs shall be performed only by authorized assistance and service centers.

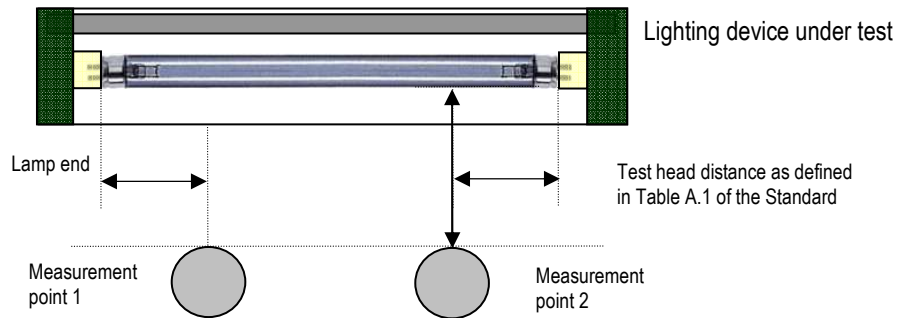
NOTICE

The manufacturer, the worldwide distributors and the national distributors shall not be responsible and kept liable for damages to goods, to instruments or persons caused during unauthorized operations on the instrument, or by manumitted instrument.

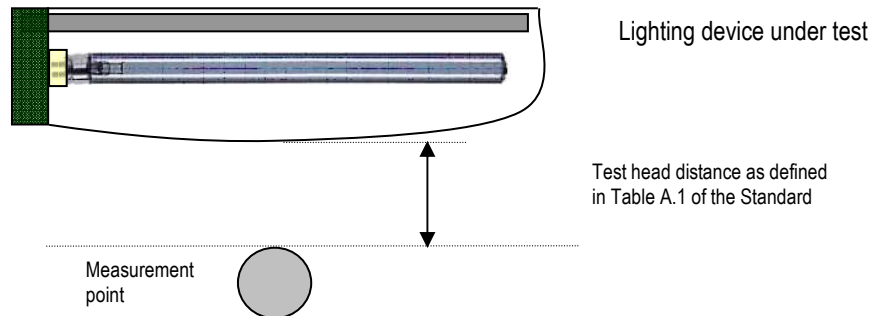
4-2 Examples of different types of DUTs

Locations of measurement test-head for different kinds of DUTs as described by IEC.

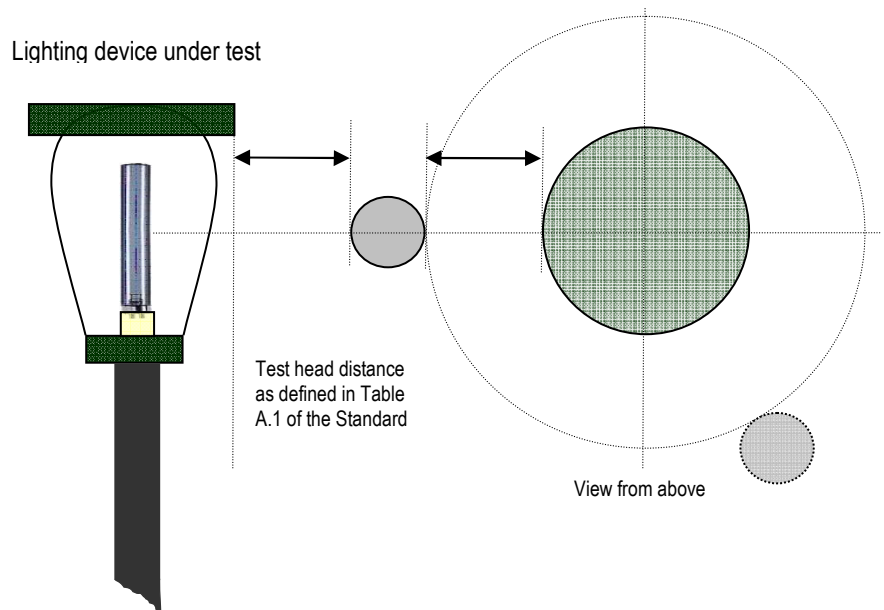
Location of measurement points for lighting equipment with double capped fluorescent lamp(s) (recessed, surface or pole mounted).



Location of measurement point for lighting equipment with single capped lamp(s) (recessed, surface or pole mounted).



Location of measurement points for lighting equipment with single capped lamp (360° illumination).

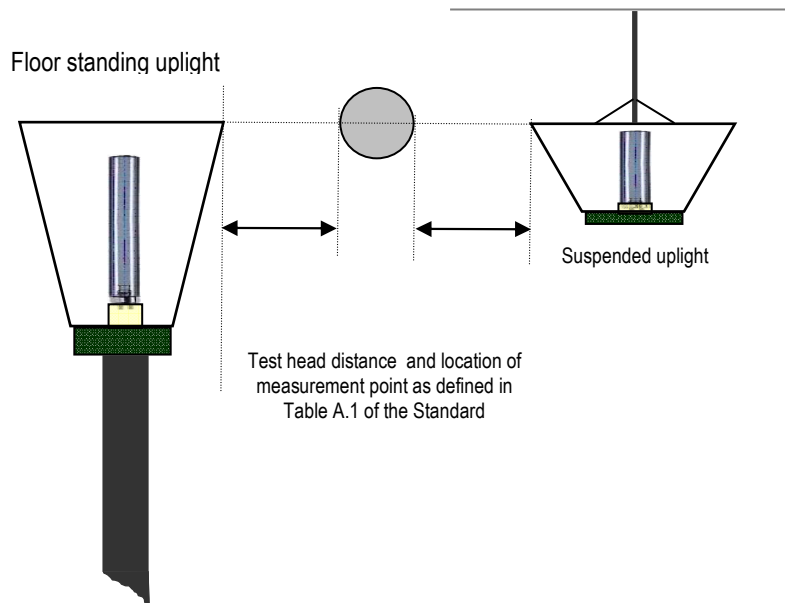
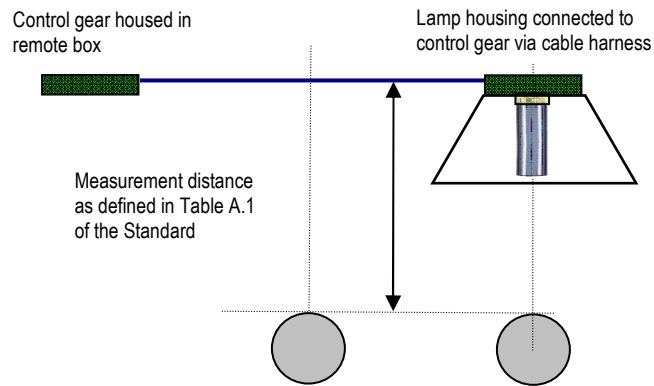


Note: additional measurement points may be applied around the perimeter of the lighting equipment.

Location of measurement points for lighting equipment with a remote gear.

Location of measurement points are:

1. Central to the source of illumination.
2. At a distance mid-way along the cable harness.



Typical examples of lighting equipment are all those such as indoor and outdoor lamps for illumination purposes with AC or battery power supply. Industrial, residential, public and street lighting are included. Also all accessories exclusively for the use with lighting systems must fulfill the same requirements as luminaries themselves.

Some exemptions are instead: lighting equipment for aircrafts, airfields, road vehicles, boats, vessels, and also for agriculture, photocopiers, slide projectors.



IEC 62493 standard also defines the operating conditions for the DUT: ageing, supply voltage and the ambient temperature.

4-3 Network verification and maintenance

To verify proper operation of the PMM VDH-01 Protection Network use the following test procedure:

Test equipment needed:

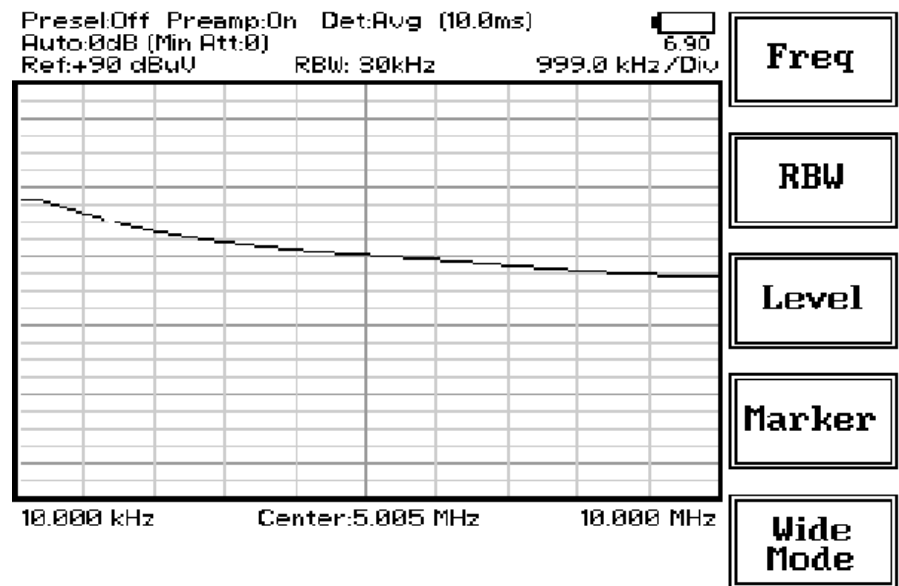
1. RF Generator and level measuring calibrated instrument or
2. Spectrum Analyzer with Tracking Generator.

In both cases, instrument shall be working in the range from 10 kHz to 10 MHz.

Verification test procedure:

1. Connect the RF signal (or tracking signal) to the input connector of the Protection Network, labeled “Sphere” by means of a BNC coaxial cable.
2. Connect the Output of the Network, labeled “Receiver” to the input of the Level Meter or Signal Analyzer, using another BNC coaxial cable.

The insertion loss of the protection network should follow the curve on the plot below where the output level was 90 dBμV.



NOTICE

Since the test setup suggested above dramatically differs from what should be the right approach (please see IEC guide) it is not proof of a failure if there were differences of some dBs between the observed response and the reference graph above.

The aim of this test is to detect substantial faults in the circuit that are clearly revealed by losses of tens of dBs with respect to the reference.

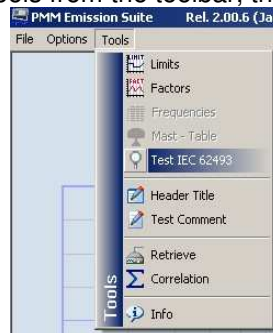
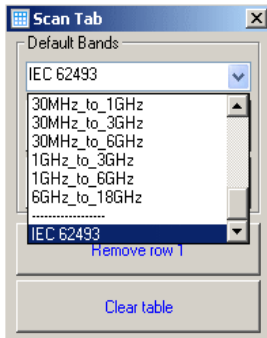
4.4 PMM VDH-01 with PMM Emission Suite

It is also possible, in a similar way, to run the performance test IEC 62493 in the PC, using the **PMM Emission Suite** provided with the PMM EMI Receiver.

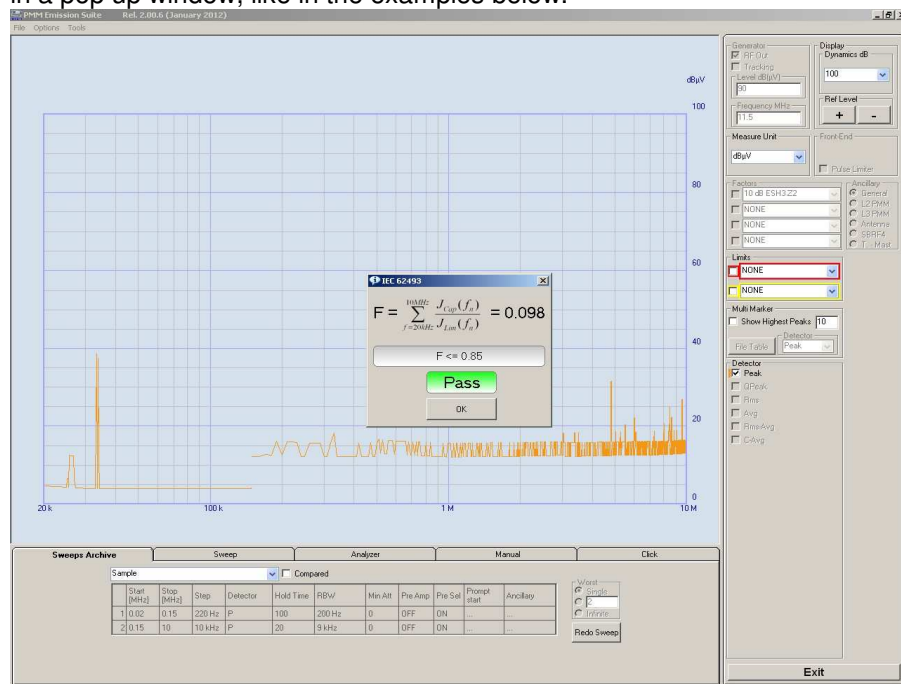
In the Scan Table the parameters must at least fulfill the ones imposed by the standard or eventually go further. It is also possible to select the preloaded IEC 62493 values and then simply run the sweep after having properly prepared the test setup.

When the sweep ends, the tool allows to make automatically the calculation of the F Factor, also showing if the DUT passes the test (it is under the limit for the standard) or not.

In Sweep archive, select Tools from the toolbar, then click on Test IEC 62493.



In this way the software will automatically make a precise calculation, using the measurements of the active sweep, and the result will be shown, after a while, in a pop up window, like in the examples below.



Example of passed IEC 62493 standard test.



For further information, please refer to the PEMS user's manual; It can be downloaded from the Web site www.narda-sts.it or requested directly from NARDA Sales Centers

Caro cliente

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

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

Dear Customer

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

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

Servizio richiesto: *Service needed:*

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

Ditta:

Company:

Indirizzo:

Address:

Persona da contattare:

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:
