User's Manual
PMM CA0010

CLICK ANALYZER
150 kHz ÷ 30 MHz

Including description of:

- PMM Click Analysis software

- PMM Click Generation software

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.

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

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

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

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

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

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

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

EXPLANATION OF ELECTRICAL AND SAFETY SYMBOLS :

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

Warning, danger of electric shock	**Earth**
Read carefully the Operating Manual and its instructions, pay attention to the safety symbols.	**Unit Earth Connection**
Earth Protection	**Equipotential**

EXPLANATION OF SYMBOLS USED IN THIS DOCUMENT :

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

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

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

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

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

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> **⚠ WARNING** | ***SAFETY RECOMMENDATIONS AND INSTRUCTIONS***
>
> This unit has been designed and tested in Italy, according to IEC 348 standard and has left the manufacturer's premises in a state fully complying with the safety standards ; in order to maintain the unit in a safe state and to ensure safe operation, the following instructions must be reviewed and fully understood before operation.
>
> - When the unit is to be permanently cabled, first connect an uninterruptible protective earth ground conductor before making any other connections.
> - If the unit is to be connected to other equipment or accessories, prior to energizing either unit verify that a common ground exists between them.
> - For permanently cabled unit without built-in fuses, automatic circuit breakers or similar protective facilities, the power supply line shall be provided with fuses or protections rated to the unit.
> - Verify that the unit is set to match the available mains voltage and correct fuse rating is installed before applying power.
> - The Safety Class I units provided with disconnectible AC supply cable and plug may only be operated from a power socket with protective earth ground connection.
> - 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.
> - The protective earth ground conductor shall not be interrupted intentionally.
> - To avoid electrical shock do not remove protections or covers of the unit , refer to qualified NARDA Servicing Center for maintenance of the unit.
> - To maintain adequate protection against fire hazard, replace fuses only with others of the same type and rating;
> - Observe safety regulations and rules and also the additional safety instructions specified in this manual for prevention of accidents.

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Safety Test Solutions

Dichiarazione di Conformità
EU Declaration of Conformity CE

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

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

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

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

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

Descrizione *Description*	**ANALIZZATORE DI DISTURBI DI COMMUTAZIONE** ***CLICK ANALYZER***
Modello *Model*	**PMM CA0010**

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

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

Cisano sul Neva, 19 June 2024   **Egon Stocca**

General Manager

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Safety considerations

1 – General Information

1.1 Documentation

Enclosed with this manual are:
- a service questionnaire to send back to NARDA in case an equipment service is needed
- an accessories checklist to verify all accessories enclosed in the packaging.

1.2 Introduction

PMM CA0010 a powerful EMI Click Analyzer, fully CISPR 14 compliant, to measure conducted interferences at the four stated frequencies of 150, 500 kHz, 1.4 and 30 MHz when matched with PMM 9010F or ER9000 EMI Receiver unit (optional). All measurements performed by the Receiver are according to the most accepted standards like IEC, CISPR, EN (EuroNorm), FCC, VDE, etc.

Thanks to its built-in generator, PMM CA0010 is also suitable for characterizing and testing any Click analyzer.

The CA0010 has been designed as three instruments in one: an input preselector and attenuator for the EMI Receiver 9010F or ER9000, a Line Insulation Stabilization Network, and a RF Generator.

1.3 Instrument Items   PMM CA0010 includes the following items:
- CA0010 Click Analyzer from 150 kHz up to 30 MHz;
- Ground connection kit;
- AC/DC Converter with plug adapters;
- Flexible black cover/accessories holding;
- LISN Mains Cable;
- BNC-BNC coaxial cable 0,30 m length;
- DB9m to DB9m cable 0,25 m length for 9010F or ER9000 connection;
- USB cable, 2m;
- 9010F Click option dongle code;
- Software Media incl. user's manual;
- Certificate of Compliance.

1.4 Optional accessories   PMM CA0010 can be used with several optional accessories, the most common being the following:
- PMM ER8000 EMI Receiver from 9 kHz up to 30 MHz (opt.00) or 9 kHz to 3000 MHz (opt.01);
- PMM ER9000 EMI Receiver from 10 Hz up to 30 MHz (opt.00) or 10 Hz to 3000 MHz (opt.01)
- L2-16B: Two lines, Single phase, 16A LISN, (50Ω//5 Ω+50μH);
- L3-32: Four lines, 3-phase, 32A LISN, (50Ω//5 Ω+50μH);
- L3-64: Four lines, 3-phase, 64A LISN, (50Ω//5 Ω+50μH);
- L3-64/690: Four lines, 3-phase, 64A - 690Vac LISN, (50Ω//5 Ω+50μH);
- L3-100: Four lines, 3-phase, 100A LISN, (50Ω//5 Ω+50μH);
- L1-150M: Single line LISN, 150A (50Ω//1 Ω+5μH);
- L1-150M1: Single line LISN, 150A (50Ω//1 Ω+5μH);
- L1-500: Single line LISN, 500A LISN, (50Ω//5 Ω+50μH);
- L3-500: Four lines, 3-phase, 500A LISN, (50Ω//5 Ω+50μH);
- SBRF4 RF Switching Box (Switching Box for LISNs and Loop Antennas)
- PMM 9010-RMA Rack Mount Adapter for Rack 19"
- LISN Service Kit (AC-BNC adapter for LISNs verification and calibration)

1.5 Other accessories   Of course, the PMM CA0010 can be used with other accessories available on the market, like:
- LISNs, any type;
- Click analyzers, any type;

1.6 Main Specifications   Table 1-1 lists the PMM CA0010 performance specifications.
The following conditions apply to all specifications:
- The ambient temperature shall be -5°C to 45°C

TABLE 1-1 Main Specifications	
Frequency range	150 kHz; 500 kHz; 1.4 MHz; 30 MHz
RF input	Z_{in} 50 Ω, Internal switch from LISN or BNC fem.
VSWR	< 1.2
Attenuator	0 dB to 35 dB (5dB steps) one per channel, independent setting
Preamplifier	15 dB one per channel, independent setting
RF output	Z_{out} 50 Ω, BNC fem.
VSWR	< 1.2
Max input level (without equipment damage)	140 dBuV (2 W)
Preselector (permanent built-in) Four bandpass filters	150 kHz / 60 kHz BW@6dB 500 kHz / 120 kHz BW@6dB 1.4 MHz / 220 kHz BW@6dB 30 MHz / 180 kHz BW @6dB
Insertion loss (with 0 dB Attenuation)	< 10 dB

RF generator
CW
  Frequency range
  Frequency resolution
  Accuracy
  Amplitude range
  Amplitude resolution
	
	150 kHz to 30 MHz
	100 Hz
	10 ppM
	20 to 95 dBμV
	0.1 dB

Click (OOK)
  Minimum ON time
  Minimum separation
  Time resolution
	
	100 μs
	100 μs
	10 μs

CISPR PULSES
  Spectral density range
  Amplitude resolution
  Flatness
  PRF
  PRF resolution
	
	80 to 101 dBμV/MHz
	0.1 dB
	1.8 dB from 150 kHz to 30 MHz
	1 to 500 Hz
	1 Hz

RF output	Internal switch or BNC fem.

Autocalibration	Embedded generator for autocalibration and system test
CISPR conformity	CISPR 14-1, CISPR 16-1-1, CISPR 16-1-2
I/O interface	RS-232, USB
Application software	PCA - PMM Click Analysis software. Four channels IF and QP time diagram with click detection and analysis. Measurement log and report. PCG - PMM Click Generation software. CISPR 16-1-1 standard, annex F and user's definable test generation.
Power supply Voltage and max current consumption	12 Vdc, 0.7 A
Built-in LISN Measuring frequency range Maximum rated output current Operating voltages AC supply frequency range CISPR equivalent circuit Test item connector Line plug connector Artificial hand connector RF output port	150 kHz to 30 MHz 16 A continuous 230 Vac nominal, 255 Vac max; 325 Vdc max DC to 60 Hz 50 Ω // 50 µH Type F SCHUKO connector IEC 60320 C20 4 mm plug Internal switch or BNC fem.
Operating temperature	-5° to 45°C
Dimensions (W x H x D)	235 x 105 x 335 mm
Weight	4.1 kg

1.7 Front Panel

Fig. 1-1 Front Panel

Legend from left to right:

- **LED indications**
Line, power on;
Data RX and TX show the serial communication flux
Generator: ON, shows stand-by status,
CLICK shows when OOK is ON,
PULSE C. when CISPR pulses are being generated.
LISN L1 and L2 to show which one of the internal LISN lines is selected

- **Artificial Mains Network 16A** It is the mains socket where the supply of the EUT must be connected
to for measuring its conducted emissions.
The line comes through the internal LISN and is capable of handling
16 A max current.

- **Artificial Hand**
standard 4 mm socket

- **Earth ground connector**

- **Input and Output connectors** LISN OUT to connect the internal LISN directly to a receiver, analyzer
CAL OUT: internal generator output
RF OUTPUT to be connected to the 9010F or ER9000 RF Input
RF INPUT for external ancillaries

- **LISN OUT EN LED**
ON when the LISN output is internally switched to the BNC connector,
OFF when the LISN output is internally switched to the RF Input

- **CAL OUT EN LED**
ON when the internal generator output is switched to the BNC conn.,
OFF when the internal generator output is switched to the RF Input

- **RF INPUT EN LED**
ON when the analyzer RF Input is routed to the BNC connector
OFF when the analyzer Input is connected to the internal LISN.

1.8 Rear Panel

Fig. 1-2 Rear Panel

Legend from left to right:

- **Mains socket**   IEC 60320 C20 to supply the EUT through the internal LISN.

- **RS232**   9 pin, DB9 connector

- **USB**   Fully functional USB 2.0 Port

- **Earth ground connector**   4 mm socket

- **Power Supply**   12 V Power Supply connector.

- Product Label and Serial Number

- **On-Off switch**   Power switch

1.9 Functional Description

The PMM CA0010 features a useful, versatile architecture, which puts together three instruments in one, as shown in the diagram below.
The PMM CA0010 diagram is shown in Fig. 1-3
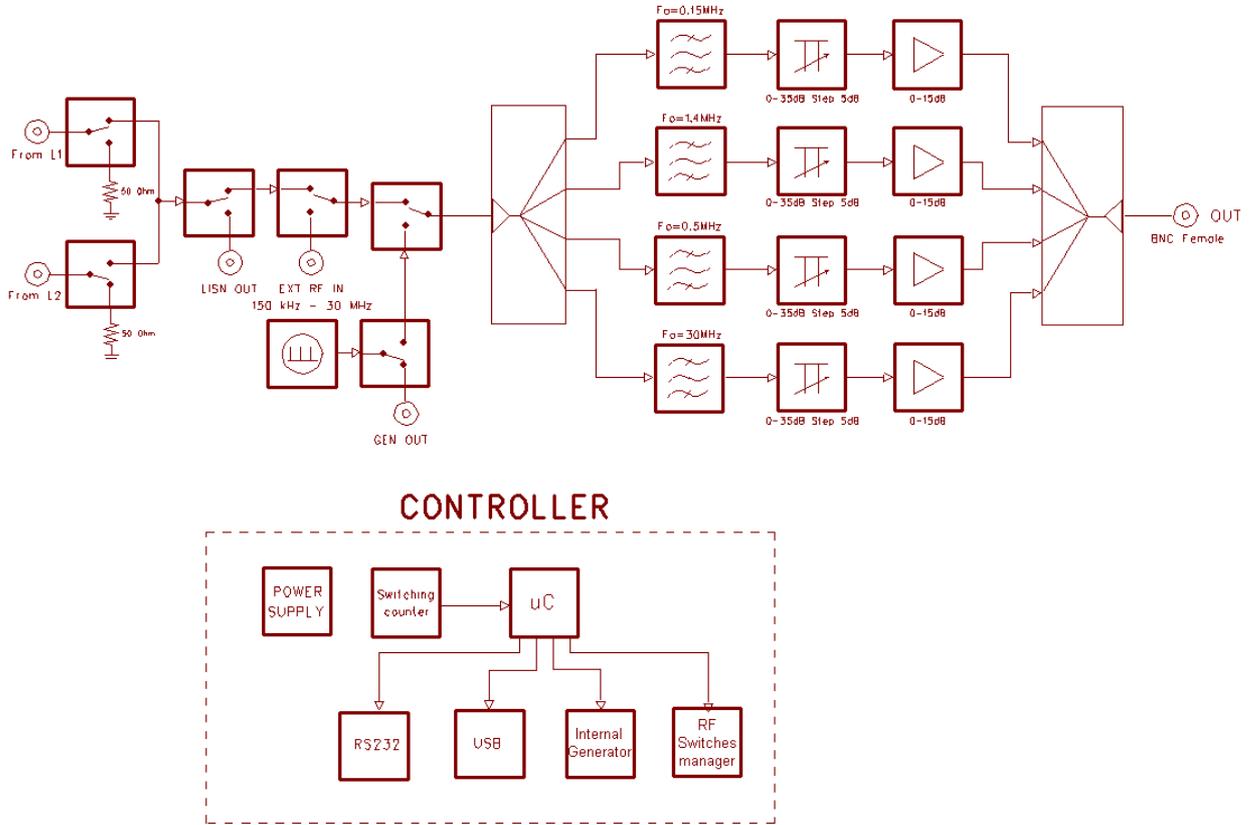
Fig. 1-3 PMM CA0010 Functional BLOCK Diagram

1.10 Emission measurements

All electric and electronic devices are potential generators of Electro-Magnetic Interference (EMI).

The term EMI thus refers to the electromagnetic energy emitted by a device which propagates itself along cables or through the air and couples with other devices that are present in the surroundings.

These electromagnetic fields (conducted or radiated interferences) may generate interfering currents and voltages into nearby equipment and therefore can cause possible malfunctions.

In order to prevent and control such interferences there are nowadays a number of national and international standards, like IEC and CISPR, which specifies limits and methods of tests. Moreover, within the European Union the application of several European Norms on Electromagnetic Compatibility is enforced by law and therefore the commercialization and use of all the electric and electronic equipment is subject to the measurement of the EMC characteristics, which must be within well defined limits.

The design approach adopted for the PMM CA0010 is that the instrument shall be full compliant with all the relevant standards and at the same time simple and reliable to use, to be the best ancillary for the 9010F or ER9000 EMI Receiver and to allow the evaluation of any possible other click meter.

The need to precisely measure the conducted and radiated EMI noises forces the equipment manufactures to use reliable equipment to verify the limits imposed by the relevant standards and/or enforced by local rules.

In this view the PMM 9010F or ER9000 Receiver is the ideal solution from prototype debugging to final certification, as it fully meets all the performance criteria dictated by these standards, although it remains small, lightweight and very easy to use.

The PMM Click Analysis and PMM Click Generation software packages allow an immediate use of the instrument without any training or special difficulties: the operator can concentrate just on analyzing the measurement results.

Moreover, these pieces of software have also been designed for a fast and easy installation on a suitable PC running Windows™ operating system and with at least one free USB port.

The device under test (DUT) must be installed according to the procedures indicated in the constructor's manual and normal operating conditions respected.

NOTICE

Be sure not to overload PMM CA0010: the input signal should not exceed the maximum level indicated in the specifications (see § 1.6).

2 - Installation

2.1 Introduction

This section provides the information required for installing and using the PMM CA0010 Click Analyzer.

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

2.2 Preliminary inspection

Inspect the packaging for any damage.

NOTICE

If the packaging or anti-shock material have been damaged, check that the contents are complete and that the PMM CA0010 has not suffered electric or mechanical damage.
Check that all the Accessories are there against the checklist found with the apparatus.
Inform the carrier and NARDA of any damage that has occurred.

NOTICE

To avoid further damage, do not turn on the instrument when there are signs of shipping damage to any portion of it.

2.3 Environment

The operating environment of the receiver is specified to be within the following limits:

- Temperature   -5° to +45° C
- Humidity   < 90% relative
- Altitude   4000 meters

The instrument should be stored and shipped in a clean, dry environment which is specified to be within the following limitations:
- Temperature   -40° to + 50° C
- Humidity   < 95% relative
- Altitude   15.000 meters

2.4 Return for repair

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

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

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

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

In particular, take every precaution to protect the front and rear panels.

Finish the package by sealing it up tightly.

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

NOTE

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

2.5 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 plastic or display surfaces.**

2.6 Power supply   The AC/DC power adapter, supplied with the receiver, can work at either 50 Hz or 60 Hz with a supply voltage rated between 100 and 240 Volt.
It is supplied with different connectors to fit all the possible outlets in accordance with the various national standards.

- → ⊙ — +   Power supply: DC, 12 V, ~ 800 mA
=> DC Connector

To replace the mains connector, simply remove the one installed on the battery charger sliding it off, and insert the one that fits the outlets in use.

2.7 Preparation for use

NOTICE	**To allow correct equipment ventilation ensure that the vent grids on the bottom of the analyzer are free by any obstructing object.**

⚠ WARNING	**This is a Safety Class I apparatus and it is also equipped with a couple of protective/functional earth terminals, both on the rear and front panels. A good safety/functional ground connection should be provided before to operate the analyzer.**

⚠ CAUTION	**The installation and use of the instrument must be performed only by qualified persons.**

⚠ CAUTION	**Use only AC/DC Converter and LISN Mains cable provided with the instrument. In general, the user must operate only with the accessories supplied by the manufacturer.**

⚠ CAUTION	**Use the appropriate EUT cable size according to the load current of the device under test.**

| ☞ NOTE	**To use the PMM 9010F with the CA0010 it is necessary the Receiver runs a firmware release 1.64 or higher.** **Updated firmware and software releases can be freely downloaded from the official Narda website at http://www.narda-sts.it**

2.8 Hardware installation and switch on

As required by the relevant standards, the discontinuous measurement (Click) test set up shall be the same adopted for continuous disturbances, therefore, usually, a LISN is used to sample the RF signal to be measured.

In both case the rate N is to be evaluated from the RF signal measurements and from the switching operations counting, it needs the only connections between the PMM CA0010 Click Analyzer and 9010F or ER9000 EMI Receiver, since the internal LISN is properly routed automatically.

Remove the CA0010 from its cardboard shipping box and connect the AC/DC power supply. With the units switched OFF, connect the instrument to the 9010F or ER9000 EMI Receiver through the supplied DB9m-DB9m cable (the RS232 port are located on the rear panel of the two instruments). Furthermore, the CA0010 RF Output must be connected to the RF Input of the Receiver using the supplied BNCm-BNCm coaxial cable shown in Fig.2-1.

The EUT Power Connector will be used to feed the EUT through the CA0010 internal 16A LISN.

to Mains network

(with proper isolation transformer)

to EUT supply
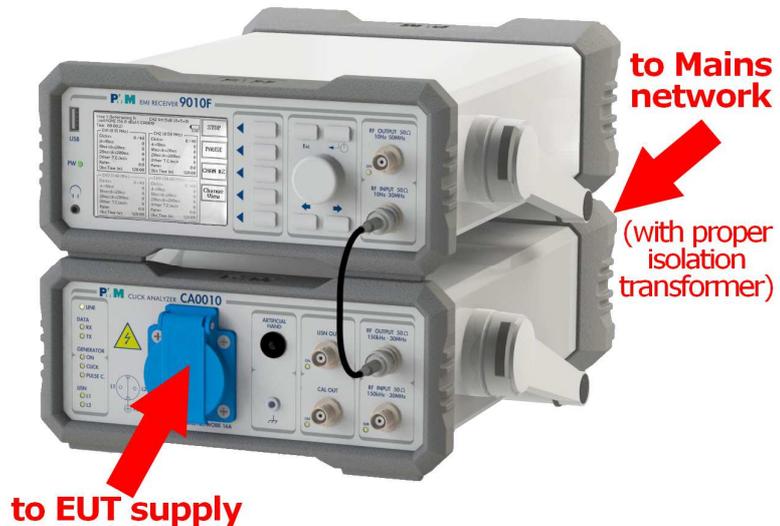
Fig. 2-1 PMM CA0010 and 9010F connection

In case the CA0010 shall be bonded to the ground plane, the user can use the provided Ground connection kit. Before installing it on the bottom of the analyzer, remove the soft protective case, and rotate and position the handle on the upper side.
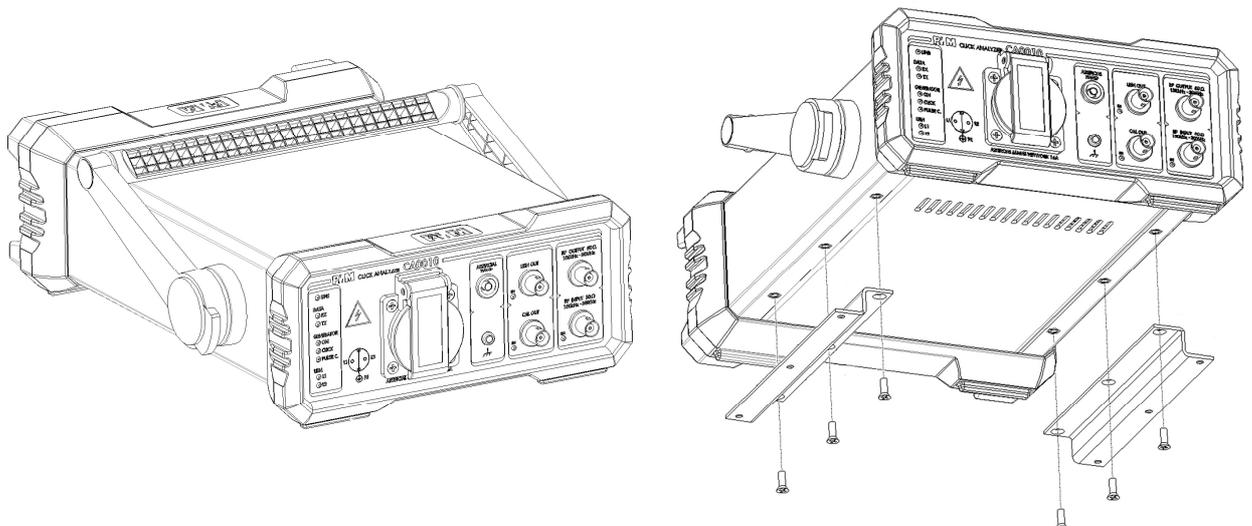
Fig. 2-2 Ground connection kit installation

A general test layout for a simple table top EUT is according to figure 2-2 (some product may prescribe different requirements).

The EUT shall be placed 0,4m from a ground reference plane of at least 2m x 2m in size, either horizontal or vertical. If the measurements are made in a shielded room, the EUT shall be placed 0,4m from either one of the walls of the room or the conducting floor.

All other earthed conducting surfaces shall be at least 0,8m apart from the EUT.

As the CA0010 carries the internal LISN, it shall be placed 0,8m from the EUT and bonded to the ground reference plane by the Ground connection kit standard accessory (see previous page for the installation).

Floor-standing EUTs are subject to the same provisions as above with the exception that they shall be placed on a floor, the points of contact being consistent with normal use. In this case the ground reference plane end shall extend at least 50 cm beyond the boundaries of the EUT and have minimum dimensions of 2m by 2m. The floor standing EUT shall be isolated by the ground reference floor and kept at a maximum distance of 0,15m.

The power cable should be 1m long; longer cable should be centrally bundled for at least 0,4m.

EUTs without a PE (Protective Earth) conductor and handheld DUTs shall be measured in conjunction with an auxiliary screen or an "Artificial Hand", as duly specified in the relevant standards.
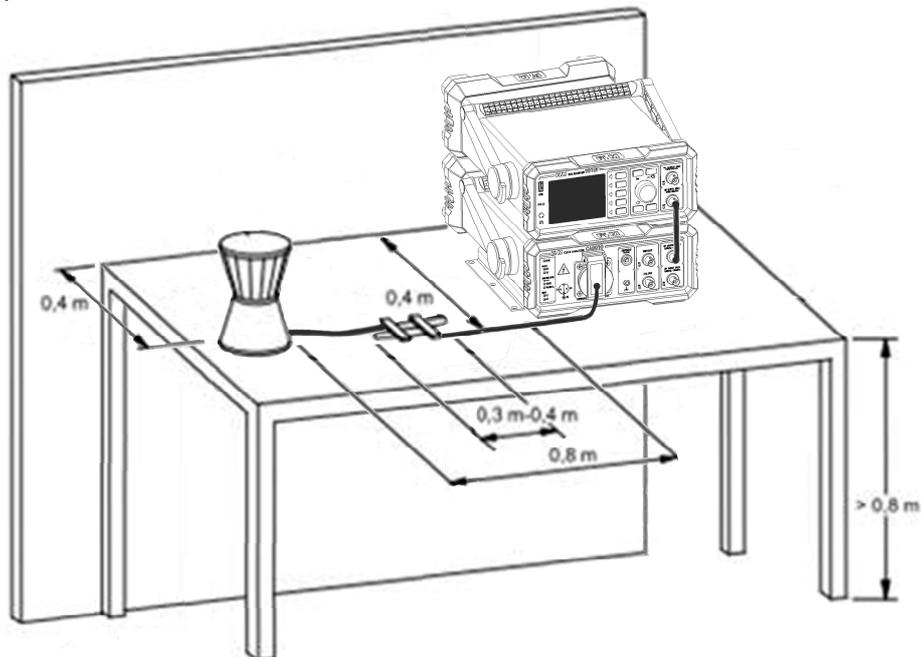
Fig. 2-3 PMM CA0010 Click analysis setup

Shift the CA0010 back toggle switch to the "ON" position, and after a short time switch ON also the Receiver.

After having been switched ON, the front panel LINE Led lights up. The PMM CA0010 boots with its internal BIOS and runs the firmware which manages the analyzer. At the beginning, the instrument performs an internal diagnostic test to check if everything is working properly. The boot sequence is very fast and the receiver is ready to use in less than one second after having switched it ON.

During the switch-on procedure, if the PC or an active 9010F or ER9000 is connected to the analyzer, it is normal to hear the click of an internal relay commutation. When the sequence is completed, the unit is ready to operate.

For further information on using the receiver with PMM CA0010, please refer to Chapter 3.

2.9 Using an external Artificial Mains Network (AMN or LISN)

When the PMM CA0010 analyzer is connected to an external LISN to perform conducted interference measurements of the EUT (see Fig. 2-4), the RF output of the LISN shall be connected to the RF input of the analyzer.

When using a PMM LISN, it is possible to control the lines from the receiver, and automatically switch between them by using a dedicated cable (not provided) between the User Port of the receiver and the LISN remote control input.

Using the PMM Click Analysis software, it is possible to carry out an automatic measurement on all mains lines.
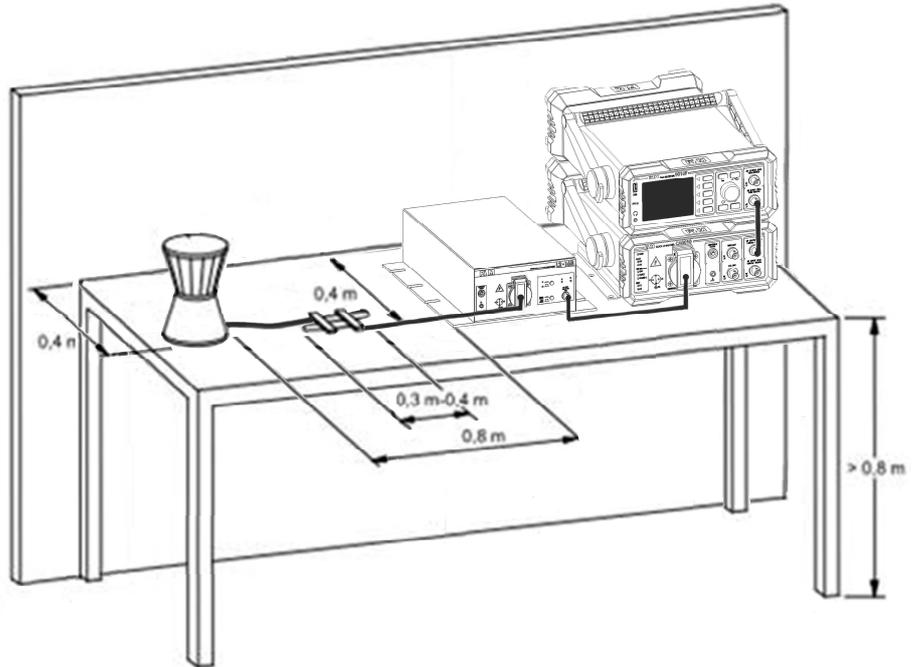
Fig. 2-4 CA0010 with external PMM L2-16B LISN

| NOTICE | In order to avoid the unwanted tripping of the protection devices, an insulation transformer shall always be used between the mains supply and a LISN. |

| NOTICE | When using an external Artificial Mains Network, to reduce the probability of damages caused by transient voltage pulses, always disconnect the PMM CA0010 RF input before switching Equipment Under Test supply ON or OFF. |

| NOTE | Click Meter Reports can be remotely downloaded to the PC both using the PMM Click Analysis and PMM Emission Suite Software. |

| NOTICE | Be sure not to overload PMM CA0010: the input signal should not exceed the maximum level indicated in the specifications (see § 1.6). |

| NOTE | Please refer to chapter 4 for software installation. |

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3 – Standalone usage

3.1 Introduction

Click

3.2 Click Mode Activation Procedure

NOTE

NOTE

The **CLICK mode** allows the User to make in a fast, easy and fully automatic way a complex test like the Discontinuous Disturbances measurement, as defined by current CISPR standards.

The Click mode is an optional function for the 9010F or ER9000 EMI Receiver that can be purchased separately.

For further information on software installation and activation, please refer to the 9010F or ER9000 User's Manual.

To enable the Click mode on 9010F use the 9010 Set code Utility

9010F-FW - 2.64 24/03/18   7.86

SDRAM 64 MB -> OK
Found CPLD ---->(ID=0x13)
FPGA Loaded ---->(ID=0x1053)
RSP OK
Serial Flash Ok (512 Mb found)
Main Board ID=000WE50324
RF Generator Found
KeyPad OK
SerDes Code=0x1c

Analyzer
Sweep
Manual
Click
Setup
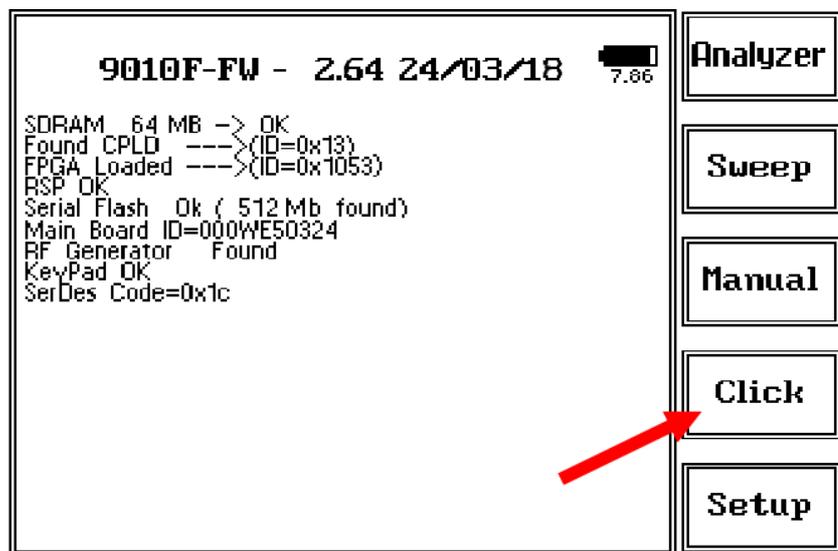
Fig. 3-1 9010F Click Mode

When the 9010F Click option has been successfully activated, the 4th menu button appears as indicated in the picture above.

NOTE

The procedure below refers to the use of CA0010 with 9010F only.

3.3 Enter the Click Mode

NOTE

To enter **Click Mode**, press the corresponding key in the main menu, and immediately the first window opens as following:

To use the PMM 9010F with the CA0010 it is necessary the Receiver runs a firmware release 1.64 or higher.
Updated firmware and software releases can be freely downloaded from the official Narda website at http://www.narda-sts.it

After having installed the system for the first time, or in case of Auto-test, it is suggested to perform the Autocalibration procedure (see §3.12).


Fig. 3-2 Click
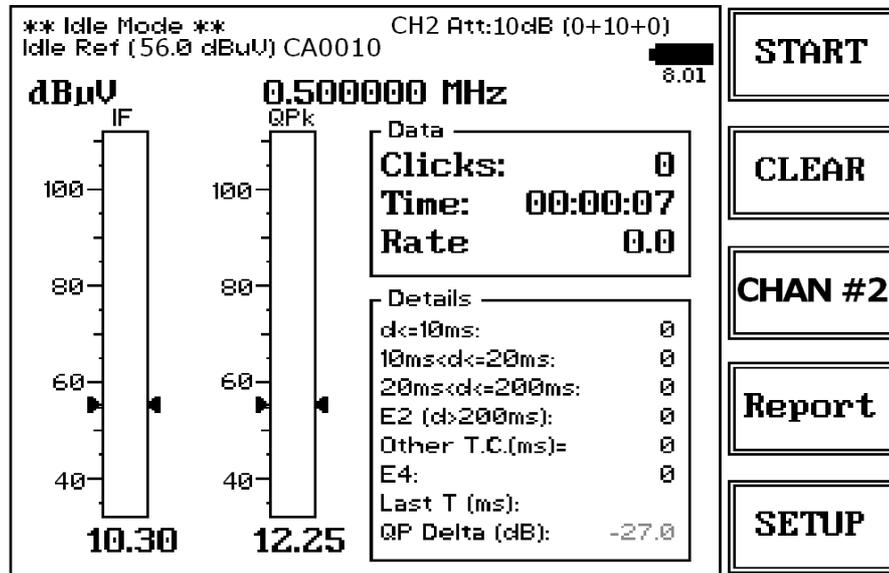
This is the **IDLE** function, which allows a preliminary, free running evaluation, at the selected frequency and level.
The displayed frequency (channel) can be changed by pressing the CHAN #n function key.

The Click mode function has five commands:

- **Start:** to run the acquisition
- **Clear**: cancel and reset all data to start an idle test;
- **CHAN #n**: changes the displayed channel
- **Report** : shows the latest stored measurement report
- **SETUP**: to set the measurement parameters

Always use Esc button to return to the previous view/condition.
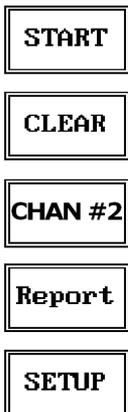
To increase test productivity the PMM CA0010 and 9010F system has some very unique features: it allows collecting measurements of the four standard channels simultaneously, and skipping the second step, as it may predict how many clicks would overcome the Lq limit and may also advice the User if the next step would fail.
Moreover, it makes a true Qpeak measurement and not a mere threshold comparison, as only a fully digital receiver can detect whether a Qpeak level came from an unsaturated signal or not; an analogue analyzer only has the final weighted Qpeak.

3.4 Introduction to the discontinuous disturbance (click) measurement

Mechanical or electronic switching procedures - e.g. those due to thermostats or program controls – may unintentionally generate broadband discontinuous disturbances with a repetition rate lower than 1 Hz.

Indeed, CISPR 16-1-1 and CISPR 14-1 define a discontinuous disturbance, also called "click", as a disturbance the amplitude of which exceeds the quasi-peak limit of continuous disturbance, the duration of which is not longer than 200 ms and which is separated from a subsequent disturbance by at least 200 ms. The durations are determined from the signal which exceeds the IF reference level of the measuring receiver.

A click may also contain a number of impulses; in which case the relevant time is that from the beginning of the first to the end of the last disturbance.

The test procedures and the test setup for click measurement are indicated in CISPR 16-1-1 and in CISPR 14-1 standards.

It basically consists in the measurement of the number of clicks exceeding a certain level determined as function of the click number and duration.

The PMM 9010F has a better then 500µs time resolution, as requested by the standard.

Moreover, several "exceptions" shall be dealt with by the click analyzer in order to make the test as per the standard.

To better understand the click measurement process – automatically made by PMM 9010F - it could be useful also to know few more definitions:

- *switching operation*: one opening or closing of a switch or contact;
- *minimum observation time T*: the minimum time necessary when counting clicks (or switching operations) to provide firm evidence for the statistical interpretation of the number of click (or switching operations) per time unit;
- *click rate N*: number of clicks or switching operations within one minute (this figure is being used to determine the click limit);
- *Click limit Lq*: the relevant limit L for continuous disturbance for the measurement with the quasi-peak detector, increased by a certain value (offset) determined from the click rate N. The click limit applies to the disturbance assessed according to the upper quartile method;
- *Upper quartile method*: a quarter of the number of the clicks registered during the observation time T is allowed to exceed the click limit Lq. In the case of switching operations a quarter of the number of switching operations registered during the observation time T is allowed to produce clicks exceeding the click limit Lq.
- *short click 1*: a disturbance not longer than 10 ms;
- *short click 2 (E3)*: a disturbance between 10 ms and 20 ms;
- *click*: a disturbance longer than 10 ms and not longer than 200 ms;
- *other than click*: the total duration of disturbances longer than 200 ms.

With reference to the mentioned standards, a schematic process flow of the measurement is the following:

- Determination of the click rate *N*
- Pass/fail decision if instantaneous switching and if N>=30
- Check conformity to definitions
- Apply Exceptions (whenever applicable)
- Calculate Limit Quartile
- Measurement using Upper Quartile Method
- Pass/fail using Upper Quartile criterion
- Repeat for next frequency

As PMM 9010F manages all these steps in a completely automatic way, a detailed step by step description is here given before to describe each command and function.

3.4.1 Determination of the click rate

The first step of the measuring process is to determine the click rate N in the minimum observation time. This is done measuring the time needed to count up to 40 clicks or 40 switching operations; the maximum time allowed is anyway 2 hours (120 minutes), unless the cycle is determined by a program, which needs additional time to be terminated.

Therefore, if the equipment has a cycle and in this cycle less than 40 clicks appear, then the cycle shall be repeated until 40 clicks are counted or until the observation time is 2 hours.

If the equipment has a cycle and in this cycle more than 40 clicks appear, the observation time is anyway determined by the cycle.

When the minimum observation time has been defined, it is possible to calculate the click rate N using the simple relationship:

$$N = \frac{n_1}{T}$$

where n_1 is the number of clicks measured and T is the minimum observation time.

However, in certain conditions – see CISPR 14-1 for further reference – the click rate N must be calculated using a different approach:

$$N = \frac{n_2 \cdot f}{T}$$

where n_2 is the number of switching operations and f is a factor dictated in the standard. Such a factor can be taken into account for automatic calculations if its value is properly set in the main setup page.

The click rate shall be determined at two frequencies: 150 kHz (CH1) and 500 kHz (CH2). The system with the PMM CA0010 Click Analyzer is able to carry out the test simultaneously at these two, or even all the four, frequencies.

3.4.2 Preliminary Conformity and Exceptions

Once the number of clicks – or switching operations – has been determined, then some preliminary controls can be made to verify if the rate is greater than 30 (fail conditions); if the measured clicks are conforming to the definition of the standard; if there are exceptions applicable.

Thanks to its digital architecture, PMM 9010F can easily record and store all the relevant parameters, keeping trace of all the events occurring during the test and allowing the User to post-process all these data; PMM 9010F will also notify immediately the test results to the User. The free PMM Click Analysis software can be used to collect the full time trace of the acquired signal, and to be able to investigate it after recording.

3.4.2.1 Old and New exceptions

The "Click" test also requires verifying if exceptions E1 to E4 are applicable. While E1 and E2 are "old" exceptions, easy to deal with, the new E3 and, in particular, E4 are calling for a new hardware structure: an old click analyzer is no longer compliant.

E4 is very demanding in terms of hardware requirements: a memory for storing each disturbance duration and interval is required in order to post-elaborate them, and it is mandatory to provide all the data in the test report. Moreover, as the application of E4 is conditional to the final click rate N - which in turn may prevent using E4 – the test flow significantly changes.

Only new analysers specifically designed – like the PMM 9010F - can successfully meet the requirements of the standard and be compliant with the new Click test criteria.

3.4.2.1.1 E4 exception in 9010F Click Analyzer

According to current standard CISPR 16-1-1, the click analyser should be able to manage exception E4 (refrigerator rule): "For appliances which have a click rate less than 5 click/minute, any two disturbances each having a maximum duration of 200 ms, shall be evaluated as two clicks even when the separation between the disturbances is less than 200 ms".

At the end of the first run, the 9010F analyses the rate of occurrences. In case (i) the rate is less than 5 click/minute, and (ii) an "other than click" (*otc*), a discontinuous disturbance longer than 200 ms, has been accumulated, the 9010F analyses back whether the *otc* is made of clicks separated by less than 200 ms. If this is the case, the *otc* duration is reduced by the durations of the two clicks plus the separation between them. The clicks are sorted and added to the related counters according to their duration. This is the standard behaviour when the option "Use E4: Yes" has been chosen. However, the splitting operation affects the click rate itself. If "Use E4: Y(es) RR" has been chosen in the 9010F, the rate is then recalculated according to the new click number. If the new rate value is still below the 5 click/minute threshold, all the above computations are kept. On the contrary, if the newly calculated rate is equal or higher than 5 click/minute, the described computations are discarded and thus the original *otc* is accounted.

The 9010F operates similarly in the first and the second run when treating exception E4. However, according to CISPR 14-1 the click rate shall be evaluated for the first run only, *otcs* in the second run are analysed based upon the rate calculated in the first run.

👉 **NOTE**

This way of implementing E4 exception allows the User to be flexible as desired and thus covering, in the meanwhile, both current standard interpretation and possible future developments and amendments, without the need of make any modification.

3.4.3 Calculate Limit Quartile

When the click rate N has been determined, it is possible to calculate the click limit Lq by increasing the relevant limit (quasi-peak) L for continuous disturbances with:

- 🖎 44 dB for N<0,2, or
- 🖎 20 log (30/N) dB for 0,2<N<30

Therefore

$$L_q = L + 20 \cdot Log \frac{30}{N}$$

3.4.4 Measurement vs. Lq limit

Now the test can be done at the 4 fixed frequencies dictated by the standard: 150 kHz, 500 kHz, 1.4 MHz, 30 MHz, and the results compared with the limit Lq.

If less than 25% of the clicks measured exceeds the limit Lq, then the test is positive, otherwise it fails.

The PMM 9010F can now produce an extensive report with all the relevant data.

The system with PMM CA0010 is able to perform the measurements of the four channels at the same time, thus saving a lot of time for the job, and reducing EUT stress.

The PMM Click Analysis software adds an even more detailed test final report capability.

3.5 Start

`Step 1: Determining N`

As soon as the Setup has been done (see § 3.8), it is possible to start the test.

First of all the PMM CA0010 and 9010F will determine the click rate N, and – if all the conditions apply – after that the analyzer will immediately continue measuring the number of clicks exceeding the upper quartile limit L_q.

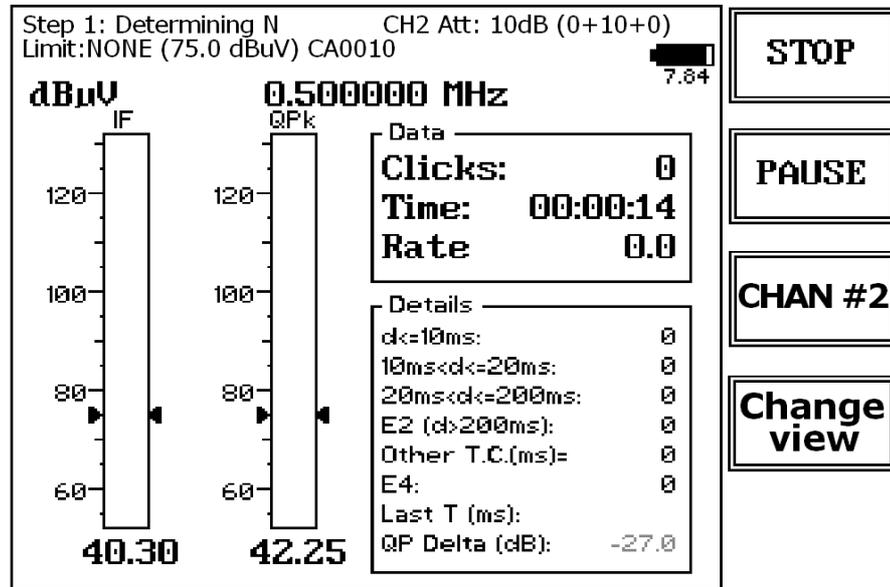Simply select **Start**: the PMM 9010F will automatically take care of all the necessary data, reporting at the end of the test all the relevant results.

Fig. 3-3 Start

During the test, the evolution of the measurements can be continuously controlled in the Data and Details windows, where all the info are duly provided.

At any time, it is possible to **Stop** the measure or to **Pause** it.

The PMM CA0010 and 9010F does the determination of the click rate at the two frequencies of 150 kHz (**CH1**) and 500 kHz (**CH2**) simultaneously.

👉 NOTE

Be sure the battery of the Receiver is fully charged, or the provided AC/DC adapter is supplying the unit, before running a measurement.

`Step 2:Testing (allowed:1)` After the RUN1 is completed, the RUN2 begins automatically, carrying out the measurements vs Lq limit, or, in other words, performing the heart of the test itself.

In brackets, it is reported the max clicks number allowed (25% of the clicks measured during Step 1).

NOTE **RUN2, when carried out, always involves all four frequencies. The maximum duration will be the same of the first run.**

NOTE At the right upper corner of the screen, you can find the input attenuation indication.

CH2 Att: 10dB (0+10+0)

In the example above, the total attenuation is 10 dB, divided in 0 dB inside the 9010F + 10 dB inside the CA0010 + 0 dB external. The value of the external attenuator can be introduced into the main Settings page, as explained later in this chapter.

NOTE The analyzer sets the internal attenuation automatically as required

NOTE The total amount of available internal attenuation is 80 dB in Click mode, 35 dB by the CA0010 and 45 dB by the 9010F, because also the pulse limiter 10 dB pad is used.

NOTICE **Please remember that the maximum input signal allowed is 10 V (140 dBμV), and that a click test may result in a potentially dangerous condition for the input stage of the Receiver.**
Before to apply an unknown signal to the PMM CA0010 and the Receiver, use an oscilloscope or a wide band RF voltmeter to measure it.
If needed, add a coaxial attenuator to the input signal line.

3.5.1 Stop and Pause

ABORT Test

Next Step   **Resume**

If Stop has been selected during a measurement, the test can then be aborted or it is possible to go immediately to the next step.

If Paused, the test can be resumed at any convenient time.

3.6 Report

After a Click test the PMM 9010F reports all the relevant data.
Due to the complexity of the test and to the various conditions that may happen during the measurement, several reports may be issued.
Here following some examples well representing the completeness and the accuracy of the analyzer.

3.6.1 Fail during determination of the click rate N

In case a fail is recorded during the determination of the click rate N at the frequency of 150 kHz, a report like the following is displayed (which is just an example with a not-realistic N number):

Lq Calculation									
Freq	Limit	10ms	20ms	0.2s	E4	o.t.c	Total	Time	N	+Lq
0.15	66.0	338	3	907	0	412	1249	2.9	428.5	FAIL

If the fail occurs during the determination of the click rate at 500 kHz, the report may be like this:

Lq Calculation									
Freq	Limit	10ms	20ms	0.2s	E4	o.t.c	Total	Time	N	+Lq
0.50	56.0	169	85	280	0	753	535	1.5	364.7	FAIL

3.6.2 Report after a successful test with less than 5 instantaneous switching at one frequency

If the determination of the click rate N shows that at a given frequency (500 kHz in this examples) there are less than 5 instantaneous switching operations, there is no need of any further test at that frequency or frequencies (the investigation frequencies are 150 kHz for the interval from 150 to 500 kHz, and 500 kHz for the interval from 500 kHz to 30 MHz).
In the example, L_q is calculated for 150 kHz and no tests are done at the other frequencies, as the number in instantaneous switching at 500 kHz during the observation time is less than 5.

Lq Calculation									
Freq	Limit	10ms	20ms	0.2s	E4	o.t.c	Total	Time	N	+Lq
0.15	66.0	0	0	0	(30)	600	1	1.0	1.0	29.5
0.50	56.0	0	0	0	0	0	0	1.0	0.0	PASS

Final Test Report									
Freq	Lq	10ms	20ms	0.2s	E4	o.t.c.	Total	Time	Max	P/F
0.15	95.5	0	0	0	0	0	0	2.2	0	Pass

To complete the test of the example above, both the two runs were performed.

3.6.3 Report after a successful test at 4 frequencies

The following example shows a report for a test done on all the defined frequencies, from RUN1 to RUN2.
All the relevant information is provided.

Lq Calculation

Freq	Limit	10ms	20ms	0.2s	E4	o.t.c	Total	Time	N	+Lq
0.15	66.0	0	0	0	(50)	341	1	1.0	1.0	29.5
0.50	56.0	0	0	0	(24)	311	1	1.0	1.0	29.5

Final Test Report

Freq	Lq	10ms	20ms	0.2s	E4	o.t.c.	Total	Time	Max	P/F
0.15	95.5	0	0	0	0	0	0	1.0	0	Pass
0.50	85.5	0	0	0	0	0	0	1.0	0	Pass
1.40	85.5	0	0	0	0	0	0	1.0	0	Pass
30.00	89.5	0	0	0	0	0	0	1.0	0	Pass

3.6.4 PMM LISN line remote selection

The system composed of PMM CA0010, PMM 9010F and any PMM LISN can automatically select the mains line to be investigated, controlling the LISN through the User Port.
When the CA0010 internal LISN is used, no further connection is needed but the normal DB9m-DB9m cable to the PMM 9010F .

After having chosen the desired line, the analyzer starts with the normal test flow (determination of N, etc.) measuring on that specific line.

3.7 Setup

Due to the complexity of the discontinuous disturbance test, this panel is rather complex, as many parameters shall be defined.
However, the PMM 9010F has been designed to be extremely user-friendly and to take care in a fully automatic way of all the necessary steps of the test.

NOTE

Due to the fact that the Standard fixes the frequencies at which the test shall be done, these frequencies have been uniquely assigned by factory and the User cannot modify them.

From the main Click window, select SETUP and the main Setup panel will be displayed.
The User can navigate through the different parameters rotating the control knob.

Click SETUP

Frequency 1:	0.150 MHz
Frequency 2:	0.500 MHz
Frequency 3:	1.400 MHz
Frequency 4:	30.000 MHz
Extern Att.:	0 dB
Limit:	CISPR 11
Calc N on:	Clicks
Factor f:	1.00
Stop on FAIL:	End of Step
Terminate on:	40 Clicks/Time
LINE:	NONE
Max Time:	120 min
Idle/Search Freq:	0.500 MHz
Idle lev:	75 dBuV
Single RUN:	No
Use E4:	No
Rates/Quartiles:	2/2 [STD]

Extern Att. (dB)
0

0 1 2 3 4
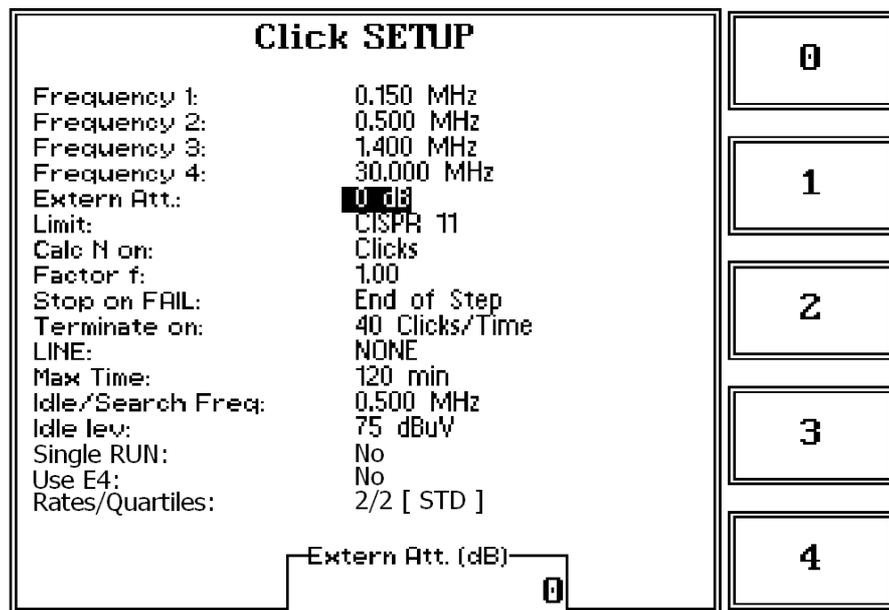
Fig. 3-4 Click Setup

3.7.1 External attenuator

```
┌─Extern Att. (dB)─┐
│                3 │
└──────────────────┘
```

CH2 Att: 13dB (0+10+3)

In case an external attenuator is used to protect the input of the analyzer, the value of this attenuator can be entered, in order to have the PMM 9010F taking into account the value in all calculations of measured levels.

The way to enter the value of the attenuator is the same adopted in all the other modes (see for examples §15.3.3.1 of PMM 9010F User's Manual).

The inserted value will be displayed together with the others automatically adjusted by the receiver; all such attenuations values will be resumed between brackets at the top right of the screen, where the External Attenuator value will appear as the last shown number.

The 1st and the 2nd values between brackets are automatically assigned by the system, according to the selected Limit, in order to guarantee the proper input sensitivity and dynamic defined by the Standard.

The 1st value refers to the attenuator located into the 9010F receiver, while the 2nd value is the attenuator located into the CA0010.

The 3rd value refers to the external attenuator.

NOTE

The external attenuator parameter can be used also to let the system take into account of cables and other ancillaries cumulative losses.

3.7.2 Limit
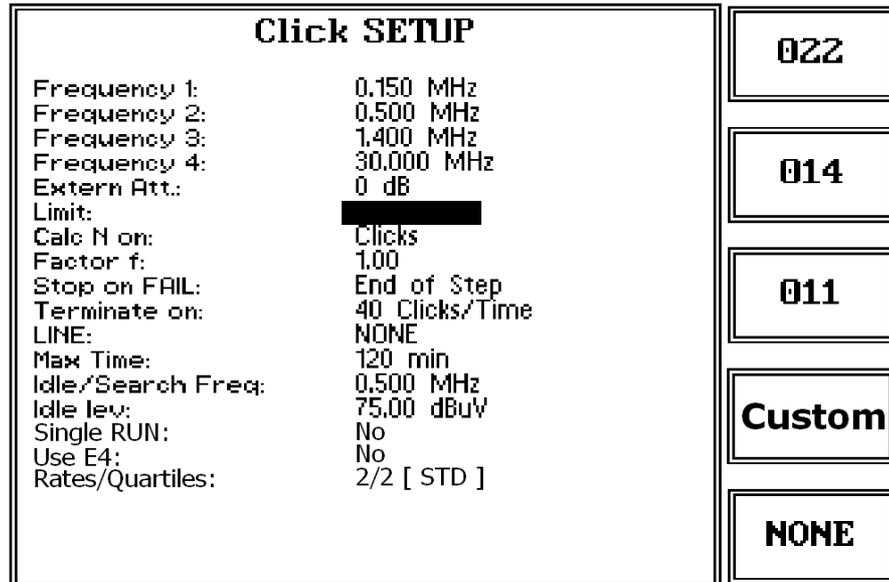
Fig. 3-5 Limit

Three most used limits are built-in into the analyzer: CISPR 14, CISPR22 and CISPR11.
Either one can be selected simply by pressing the relevant key.
The limit will be loaded and all the calculations will be done with reference to the selected limit:

The Reference Standard for Click tests is always EN 55014-1 (or equivalent CISPR 14-1), which defines 4 different Limit Curves for Q-Peak according to Table 1, with following cross-correlation as for names assigned on 9010F :

014-1 --> Limit in Column 2
014-2 --> Limit in Column 6
014-3 --> Limit in Column 8
014-4 --> Limit in Column 10

NOTE

Limit in Column 4 of Tab.1 is not used for Click test, as referred to Load and Auxiliary terminals.

3.7.3 Determination of N

As required by the standard, N may be determined either by counting the clicks, or by counting the switching operations.

```
                 Click SETUP
Frequency 1:              0.150 MHz
Frequency 2:              0.500 MHz
Frequency 3:             1.400 MHz
Frequency 4:            30.000 MHz
Extern Att.:            0 dB
Limit:                  CISPR 11
Calc N on:              Clicks
Factor f:               1.00
Stop on FAIL:           End of Step
Terminate on:           40 Clicks/Time
LINE:                   NONE
Max Time:               120 min
Idle/Search Freq:       0.500 MHz
Idle lev:               75 dBuV
Single RUN:             No
Use E4:                 No
Rates/Quartiles:        2/2 [ STD ]
```
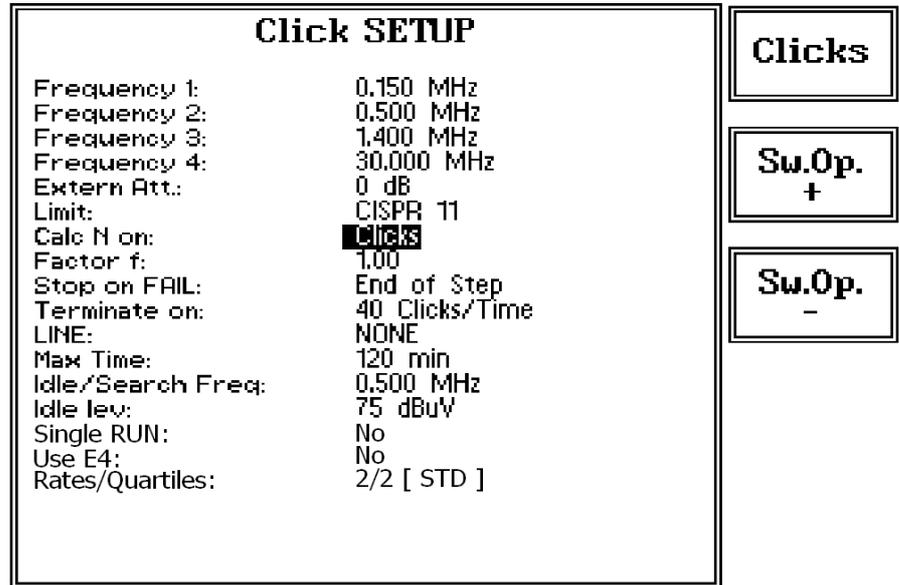
Clicks

Sw.Op.
+

Sw.Op.
−

Fig. 3-6 Calculate N

Select **Clicks** if N has to be calculated on the number of clicks, or select **Sw.Op.+** or **Sw.Op.-** to determine N on the number of switching operations, going up and down the list of the available options in terms of switched current: 10mA; 20 mA; 50 mA; 100mA; 200mA; 500mA; 1A; 2A and 5A. The current threshold value must be chosen in relation to the DUT declared consumption.

Refer to §3.9 for the connections to the internal LISN, required when you need to measure the switching operations.

3.7.4 Factor f

```
┌─ f Factor ──────────┐
│                   0 │
└─────────────────────┘
```

The applicable standard may require a certain factor f to be used to calculate the click rate N (see §3.5.1). For example, table A2 of the CISPR14 gives the factor f for several products.

This factor depends on the nature of the EUT and shall be entered by the User in the normal way (see §3.8).

3.7.5 Stop on Fail

The Click test may be rather long, as the observation time and EUT cycle can take as long as 120 minutes.

In order to save time and increase productivity, the PMM 9010F can stop the test as soon as a fail condition is achieved.

Two options are therefore available: stop immediately as the fail condition occurs (Right away) or anyway at the End of Step.

Press Change to flip from one to the other option.

Click SETUP

		Change

Frequency 1:   0.150 MHz
Frequency 2:   0.500 MHz
Frequency 3:   1.400 MHz
Frequency 4:   30.000 MHz
Extern Att.:   0 dB
Limit: CISPR 11
Calc N on: Clicks
Factor f: 1.00
Stop on FAIL: **Right away**
Terminate on: 40 Clicks/Time
LINE: NONE
Max Time: 120 min
Idle/Search Freq: 0.500 MHz
Idle lev: 75 dBuV
Single RUN: No
Use E4:   No
Rates/Quartiles: 2/2 [STD]
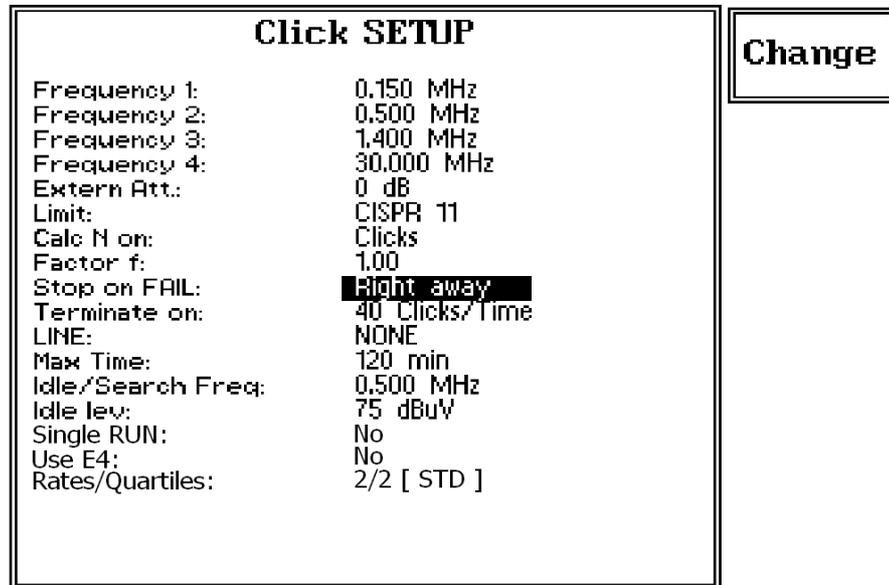
Fig. 3-7 Stop on Fail

3.7.6 Terminate on

To define the automatic stop condition, it is possible to select between two options: 40 Clicks/Time and Time/Manually.
In the first case, the stop of the current run either happens after 40 clicks or after the defined time has elapsed; in the second case, the step is not terminated when reaching 40 clicks (thus allowing to test EUTs that are commanded by a program) but only when the defined time has elapsed. It is always possible to stop the step, and even the test, manually.

Press Change to flip from one to the other option.

```
                    Click SETUP                    ┌─────────┐
                                                   │ Change  │
   Frequency 1:              0.150 MHz             └─────────┘
   Frequency 2:              0.500 MHz
   Frequency 3:              1.400 MHz
   Frequency 4:              30.000 MHz
   Extern Att.:              0 dB
   Limit:                    CISPR 11
   Calc N on:                Clicks
   Factor f:                 1.00
   Stop on FAIL:             Right away
   Terminate on:            ▓Time/Manually▓
   LINE:                     NONE
   Max Time:                 120 min
   Idle/Search Freq:         0.500 MHz
   Idle lev:                 75 dBuV
   Single RUN:               No
   Use E4:                   No
   Rates/Quartiles:          2/2 [ STD ]
```

3.7.7 Line

When using a PMM LISN, it's possible to select the Line on which to perform the test through the Setup Menu, just selecting "LINE" and accessing the related sub-menu, as per the following:

```
                    Click SETUP                    ┌─────────┐
                                                   │   Set   │
   Frequency 1:              0.150 MHz             └─────────┘
   Frequency 2:              0.500 MHz
   Frequency 3:              1.400 MHz
   Frequency 4:              30.000 MHz
   Extern Att.:              0 dB
   Limit:                    CISPR 11
   Calc N on:                Clicks
   Factor f:                 1.00
   Stop on FAIL:             End of Step
   Terminate on:            40 Clicks/Time
   LINE:                    ▓NONE▓
   Max Time:                 120 min
   Idle/Search Freq:         0.500 MHz
   Idle lev:                 75 dBuV
   Single RUN:               No
   Use E4:                   No              ┌─────────┐
   Rates/Quartiles:          2/2 [ STD ]    │ Default │
                                            └─────────┘
```

In case a 3rd party LISN would be used, just leave "NONE" in the menu.

Once the PMM LISN sub-menu has been selected, a choice is available to define if to run the test on a specific Line (L1, L2, L3, N)

| L2 PMM |
| L3 PMM |
| L2 CA0010 |

| NONE |

Click SETUP

Frequency 1:	0.150 MHz
Frequency 2:	0.500 MHz
Frequency 3:	1.400 MHz
Frequency 4:	30.000 MHz
Extern Att.:	0 dB
Limit:	CISPR 11
Calc N on:	Clicks
Factor f:	1.00
Stop on FAIL:	End of Step
Terminate on:	40 Clicks/Time
LINE:	NONE
Max Time:	120 min
Idle/Search Freq:	0.500 MHz
Idle lev:	75 dBuV
Single RUN:	No
Use E4:	No
Rates/Quartiles:	2/2 [STD]

| L2 PMM |
| L3 PMM |
| L2 CA0010 |

| NONE |

Click SETUP

Frequency 1:	0.150 MHz
Frequency 2:	0.500 MHz
Frequency 3:	1.400 MHz
Frequency 4:	30.000 MHz
Extern Att.:	0 dB
Limit:	CISPR 11
Calc N on:	Clicks
Factor f:	1.00
Stop on FAIL:	End of Step
Terminate on:	40 Clicks/Time
LINE:	L2-CA0010 L1
Max Time:	120 min
Idle/Search Freq:	0.500 MHz
Idle lev:	75 dBuV
Single RUN:	No
Use E4:	No
Rates/Quartiles:	2/2 [STD]

| L1 |
| L2 |
| L3 |
| N |
| ALL |

and finally execute the complete test on that specific Line.

3.7.8 Max Time

```
┌Click MAX time (min)┐
│                    │
│                  0 │
└────────────────────┘
```

To define the duration of the test it is enough to enter the relevant time in minutes in the usual way.

3.7.9 Idle Frequency

```
┌Idle freq───────────┐
│                    │
│                  0 │
└────────────────────┘
```

Any frequency within the receiver range can be selected for preliminary investigation in Idle Mode.

0,15 – 0,5 – 1,4 – 30 MHz are the standard channels, preset at the factory, for the final test procedure.

3.7.10 Idle Level

```
┌Idle lev. (dBuV)────┐
│                    │
│                  0 │
└────────────────────┘
```

An arbitrary Level for the Emission Limit can be chosen in Idle Mode, just to apply a certain tolerance in the debugging phase with respect to the limit, which will be mandatory at the final test stage.
The threshold level allowed ranges from 31 up to 120 dBμV.

3.7.11 Single Run

The "Single Run" is a PMM CA0010 unique feature, which allows a relevant time saving in Click measuring approach.
It is usually very difficult to measure QuasiPeak values for pulsed signals, in a way that linearity of the receiver could normally not fulfill such a special measurement's requirement.
PMM 9010F used together with the PMM CA0010 Click Analyzer, can trace and memorize eventual saturation, instead, just got during automatic measurement test procedure, in a way that, in case no saturation conditions at all have been detected, the test result can be used directly to soon calculate the new limit Lq, without the need of repeating the test for it (that is to say, making possible to totally skip the second Run).
At the end of a Single Run measurement, the operator can clearly define if the test has to be repeated with the new Lq Limit or if not repeating it at all in case of failure at this first step, so saving time and soon starting with further debugging of the EUT.
The operator can face, then, two different situations:
- "No", where such a function is not used at all, and the test is carried out in the two canonical runs;
- "Yes", where the measurement is normally performed until the end of the first run, then the new Limit Lq is calculated and the recorded signal is evaluated, taking such a new Limit into account, without acquiring a second run.

3.8 Diagnostic

In case the PMM CA0010 unit is not connected – or anyway non properly functioning – the display of the PMM 9010F, after entering the Click window, will show again one of the channels in Idle mode, but without the indications "CH*n"* in the middle of the first line, just on the left of the Attenuator indication, and "CA0010" in the center of the second line.
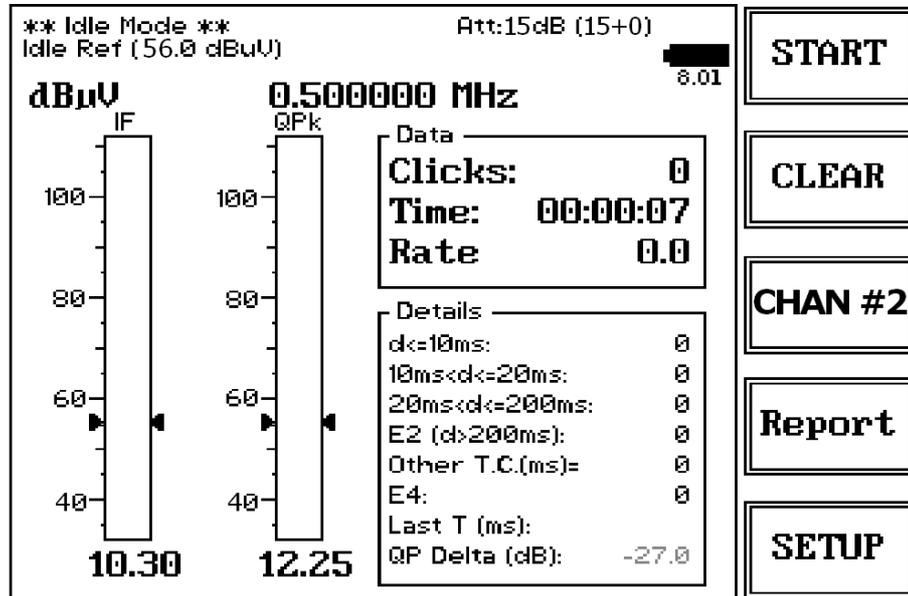
Fig. 3-8 Diagnostic

In the situation above, the PMM 9010F is working as a single channel Click Analyzer.

In case of unexpected conditions, please check both HW connections and SW settings at first.

3.9 Click reports with PMM Emission Suite or PMM Click Analysis software

The PMM Emission suite and PMM Click Analysis supplied softwares provide both an easy tool to download Click measurements from the analyzer.

Here is an example of what the Suite screen can show when a Click report has been downloaded.

PMM Emission Suite   Rel. 2.17 (March 2014)

File   Options   Tools

Untitled Click Report

Lq Calculation

Frequency MHz	Limit dBµV	<=10ms	<=20ms	<=0.2s	From Exception E4	Other than click ms	Total Clicks	Time min.	N rate	+Lq dB
0.15	75.0	0	0	3		0	3	10.0	0.3	40.0
0.50	75.0	0	0	10		0	10	10.0	1.0	29.5

Final Test Report

Frequency MHz	Limit Quartile dBµV	<=10ms	<=20ms	<=0.2s	From Exception E4	Other than click ms	Total Clicks	Time min.	Max Click Allowed	Pass Fail
0.15	115.0	0	0	0		0	0	10.0	0	Pass
0.50	104.5	0	0	0		0	0	10.0	2	Pass
1.40	104.5	0	0	0		0	0	10.0	2	Pass
30.00	104.5	0	0	0		0	0	10.0	2	Pass

| Sweeps Archive | Sweep | Analyzer | Manual | Click |

Retrieve 9010 Report

Open Click Report

Save TXT
Save TXT
Save PDF
☐ Include Click Details

Save BMP To Clipboard
Lq Calculation
Final Test Report
All Table

Save As BMP or JPG File
Lq Calculation
Final Test Report
All Table

Exit

Fig. 3-9 Report

NOTE

For further information about how to use the Click analyzer in conjunction with the provided Emission Suite, PC software, please refer to the PMM Emission Suite User's Manual.

3.10 Autocal

The PMM CA0010 Click Analyzer and PMM 9010F Emi Receiver system is equipped with a sophisticated autocalibration process.
To run the autocalibration, please follow the simple instructions below:
- Install the setup as indicated in §2.8
- switch the PMM CA0010 on, then after a short while switch also the Receiver on,
- press the Setup function key,
- press the Right Arrow key,
- press the CA0010 Autocal function key
- please wait for the necessary time and, at the end, press OK function key

PMM 9010F begins to control the system and automatically performs the autocalibration, using the PMM CA0010 internal precise signal generator as a reference.
The self-calibration process takes about 3 minutes to be completed.

Fig. 3-10 Autocal

NOTE
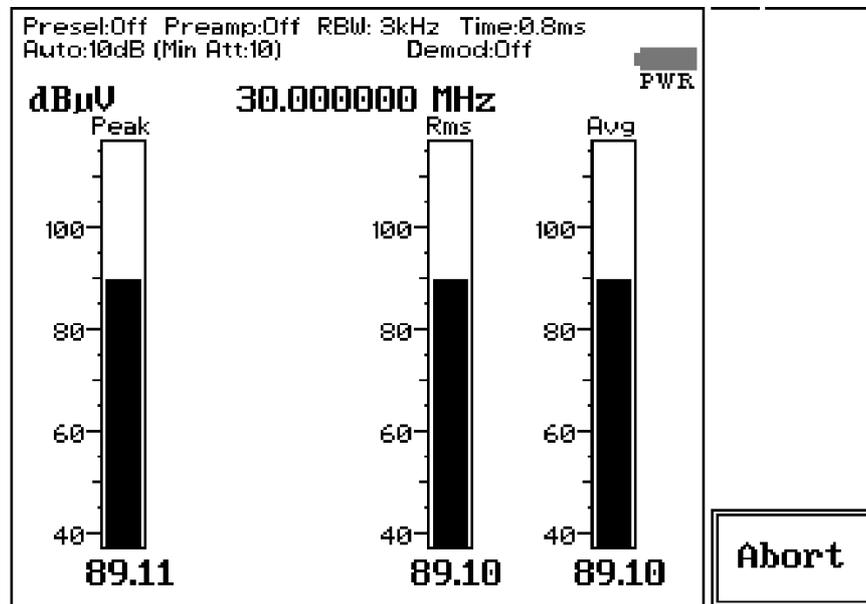
To interrupt the self-calibration, press the function key labeled Abort.

When the self-calibration is successfully finished, a message like in the following picture is displayed:

```
                                           ▬         ┌─────────┐
                                          PWR        │   OK    │
                                                     └─────────┘
            CA0010 CALIBRATION
               Successfully
                Terminated
```
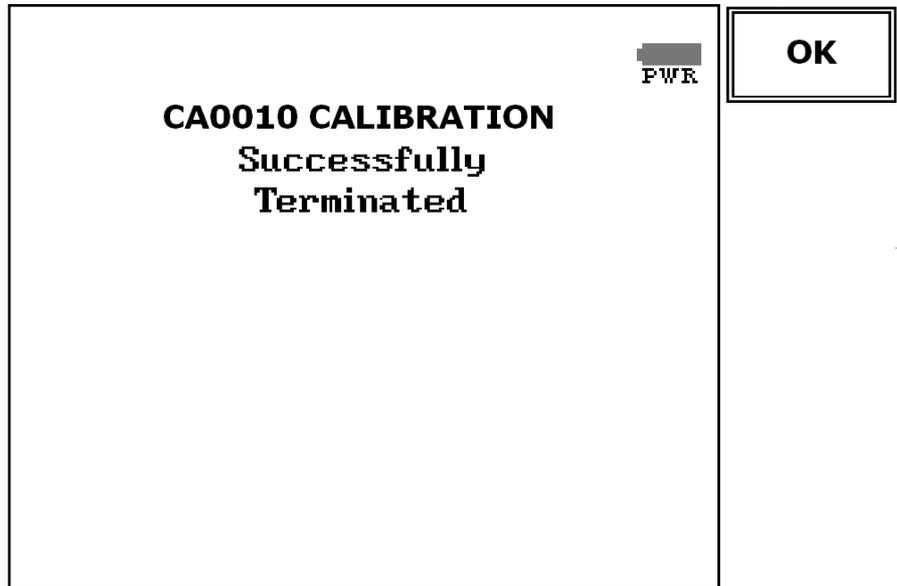
NOTE **In order to avoid any possible external influence, it is suggested to disconnect all cables from the PMM 9010F RF ports during the self-calibration process.**

NOTE **After having installed the system for the first time, or in case of Auto-test, it is suggested to perform the Autocalibration procedure.**

NOTE **If, during calibration process, anything goes wrong, a proper warning message will pop-up on the screen.**

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4 – PMM Click Analysis software Operating Instructions

4.1 Installation

The **PMM Click Analysis (PCA)** software is used to operate the PMM CA0010 in conjunction with the PMM 9010F or ER9000 EMI Receiver, as a powerful 4 channels click meter.

4.1.1 System requirements

Minimum PC requirements:

- Processor: Pentium or equivalent
- 4 GB RAM
- At least 64 GB of free space on hard disk
- 1 free USB port
- 64 bit Windows Operating system™ Win7/Win8.1/Win10

NOTE

The User might have the need of administrator privileges to install the software. For further information, please see the next paragraph.

NOTE

The new releases can be requested to narda distributors, which list can be found in the official website: http://www.narda-sts.it

4.1.2 Installing CA0010 Software

Before connecting the Click Analyzer to PC, the CA0010 software installation should be performed:

Double click on the file "CA0010 Setup.exe" included in Software Media

PMM CA0010 Setup.exe

Fig. 4-1 Setup icon

NOTE	**The User must have administrator privileges to install the CA0010 software; right click on the program .exe file and click "Run as administrator" to temporarily run the program or application as an administrator, until closing it (Windows 7 also allows to mark an application so that it always runs with administrator rights).**
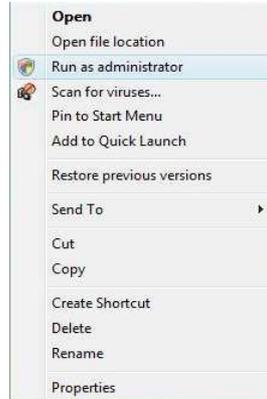
Fig. 4-2 Run as administrator

Follow set-up program instructions

Fig.4-3 CA0010 installation

Fig.4-4 Installation folder
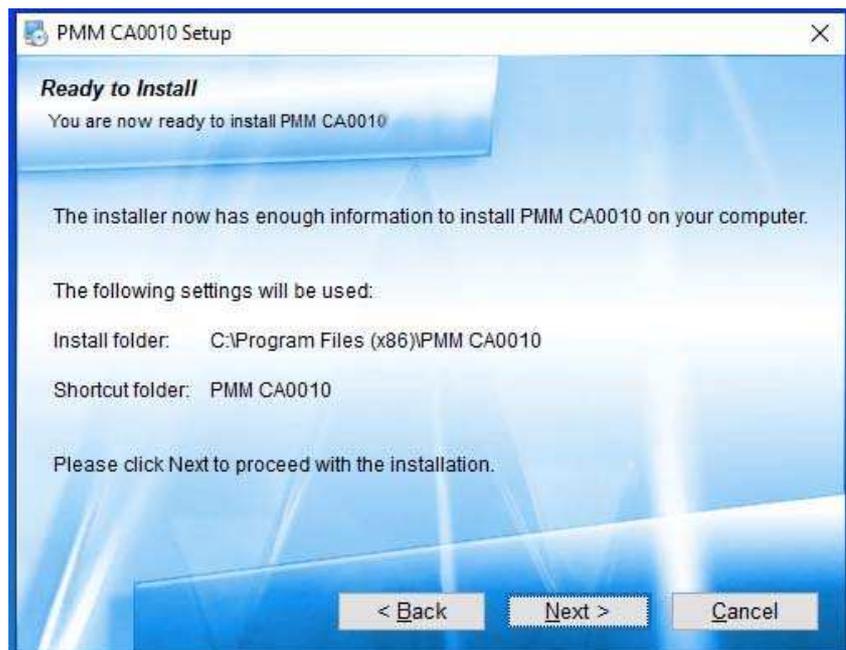
Fig.4-5 Ready to install
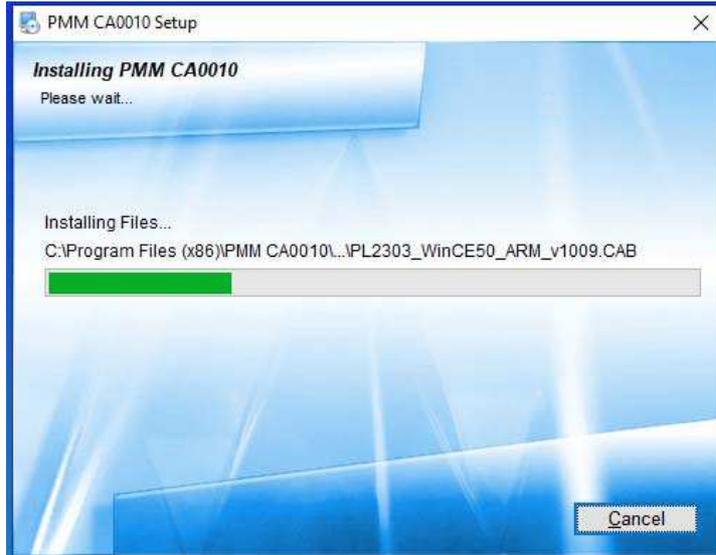
Fig.4-6 Installing CA0010
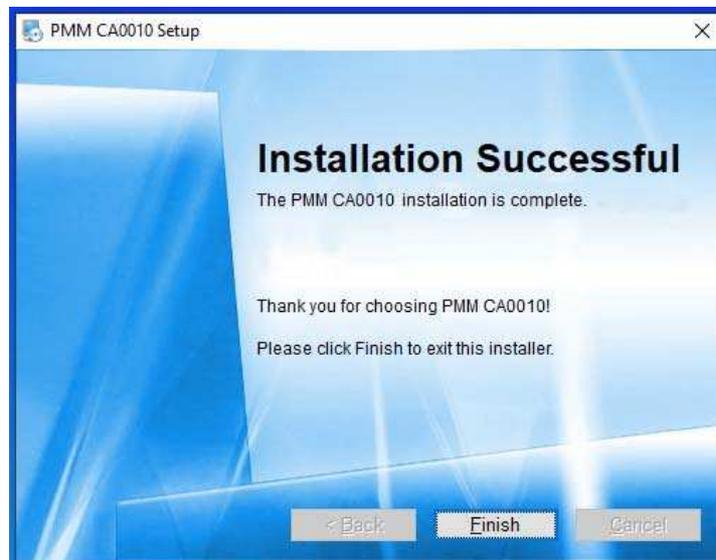
Fig.4-7 Installation successful
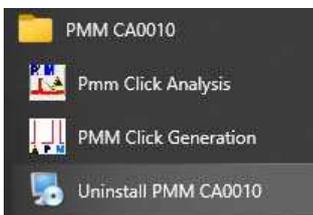
The **PMM Click Analysis (PCA)** and the **PMM Click Generation (PCG)** software are now installed in your PC.
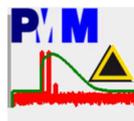
PMM Click Analysis (PCA) icon   **PMM Click Generator (PGA) icon**

Remove it, if needed, simply running the "Uninstall PMM CA0010" application (see §4-8).

4.2 Introduction

The PMM CA0010 software package contains the **PMM Click Analysis (PCA)** application and the **PMM Click Generation (PCG)** application.
The PCG is described in chapter 5 of this manual.
The measurement reports can also be downloaded using the PMM Emission Suit. Please refer to 9010F or ER9000 User's Manual for additional information.

4.2.1 PMM Click Analysis

The **PMM Click Analysis (PCA)** software is used to operate the PMM CA0010 in conjunction with the PMM 9010F or ER9000 EMI Receiver, as a powerful 4 channels click meter. To enter this mode, simply run the software by double clicking its icon. Immediately the main window pops up and allows the operator to set the parameters for the scan or to retrace a saved measurement. All the automatic settings (RBW, frequencies, limits, time) refer to the CISPR standard.
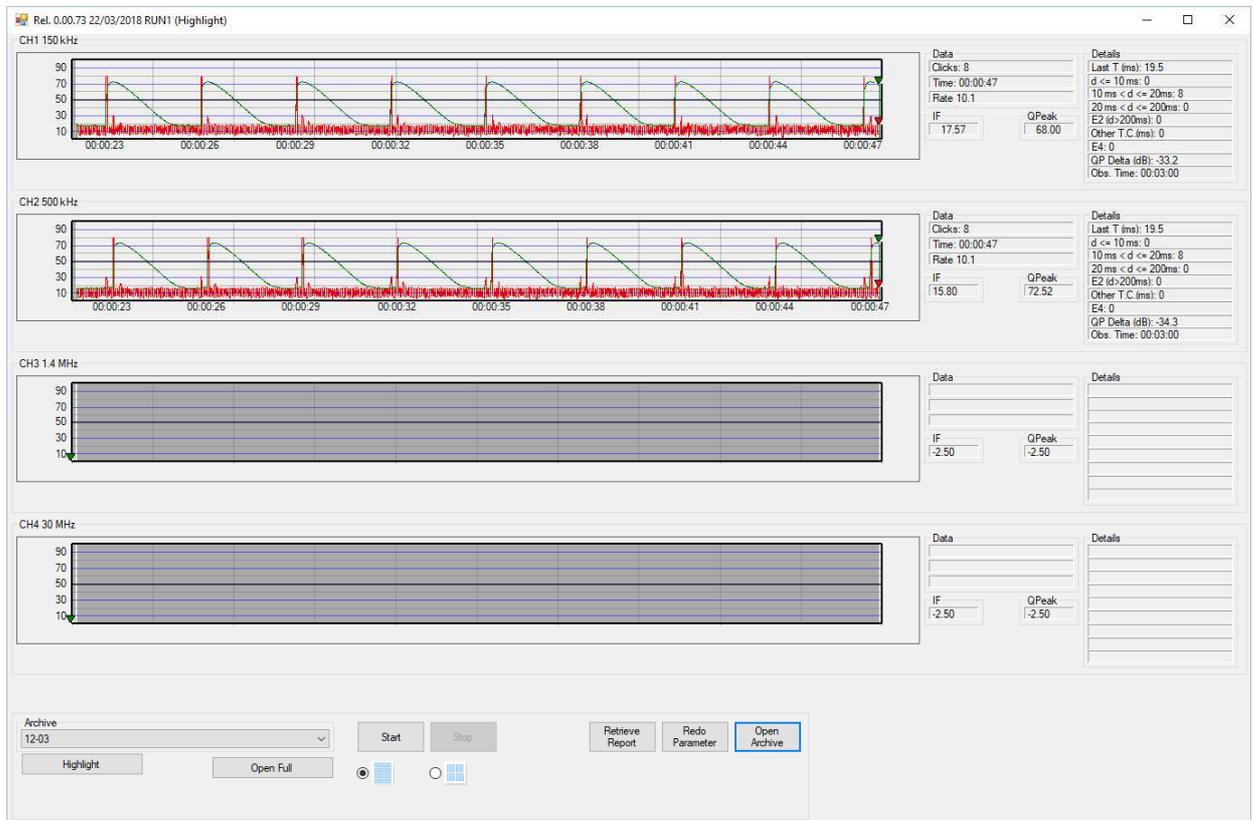
Fig. 4-8 Scan

All the relevant information are reported on the screen.
From left to right, the User can see the time trace of the selected frequencies (also called channels), and the corresponding data and details.

Preselection filters, attenuators and resolution bandwidth are set automatically by the analyzer as required.

Below the graphs, in the bottom area, there is the Archive frame, where it is possible to reload an existing measurement or start a new one.

4.3 Highlight – Open Full

Archive
23-03

Highlight   Open Full

An archived measurement can be loaded in **Highlight** mode or in **Full** mode. Highlight mode is a powerful and quick way to trace and put in evidence the relevant events occurred during the acquisition of the disturbances.

Click the Open Full software button to load the entire measurement; it takes a longer time than the highlight one, and it shows the complete trace of the signal along the total time duration.

NOTE

Highlight function may not show all the detected clicks. In case of doubts, please reload the measurement in Open Full mode. The final report shows always the correct count.

4.3.1 Data

Data
Clicks: 32
Time: 01:04:20
Rate 0.5

IF   QPeak
34.77   38.44
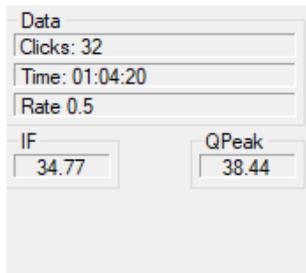
The Data frame collects the count of the occurred clicks, the elapsed time, the rate (total clicks per minute). The lowest two boxes show the current readings for IF and Quasi Peak detectors, in dBµV.

4.3.2 Details

Details
Last T (ms): 19.5
d <= 10 ms: 0
10 ms < d <= 20ms: 31
20 ms < d <= 200ms: 0
E2 (d>200ms): 0
Other T.C.(ms): 0
E4: 0
QP Delta (dB): -27.9
Obs. Time: 02:00:00
Ref (49.0)
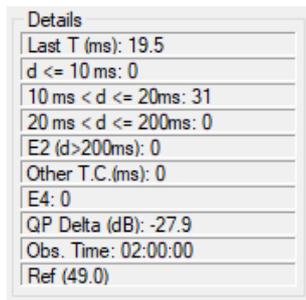
The Details frame contains the characteristics of the latest event detected. The parameters are described below:

- **Last T**: the duration in milliseconds of the latest click disturbance
- **D<= 10 ms**: current count of clicks which duration is less than 10 ms
- **10 ms < D<= 20 ms**: current count of clicks which duration is between 10 and 20 ms
- **20 ms < D<= 200 ms**: current count of clicks which duration is between 20 and 200 ms
- **E2 (d>200ms)** : current count of Exception 2 occurrences
- **Other T.C. (ms)**: total duration in milliseconds of Other Than Clicks
- **E4**: current count of Exception 4 occurrences
- **QP Delta (dB)**: difference in dB between the measured max Quasi Peak level and the set limit level
- **Obs. Time**: set time duration for current Run
- **Ref.** : the level of the reference limit in dBµV.

4.4 Start

The **Start** soft button is used to set the scan parameters and to run a new measurement.
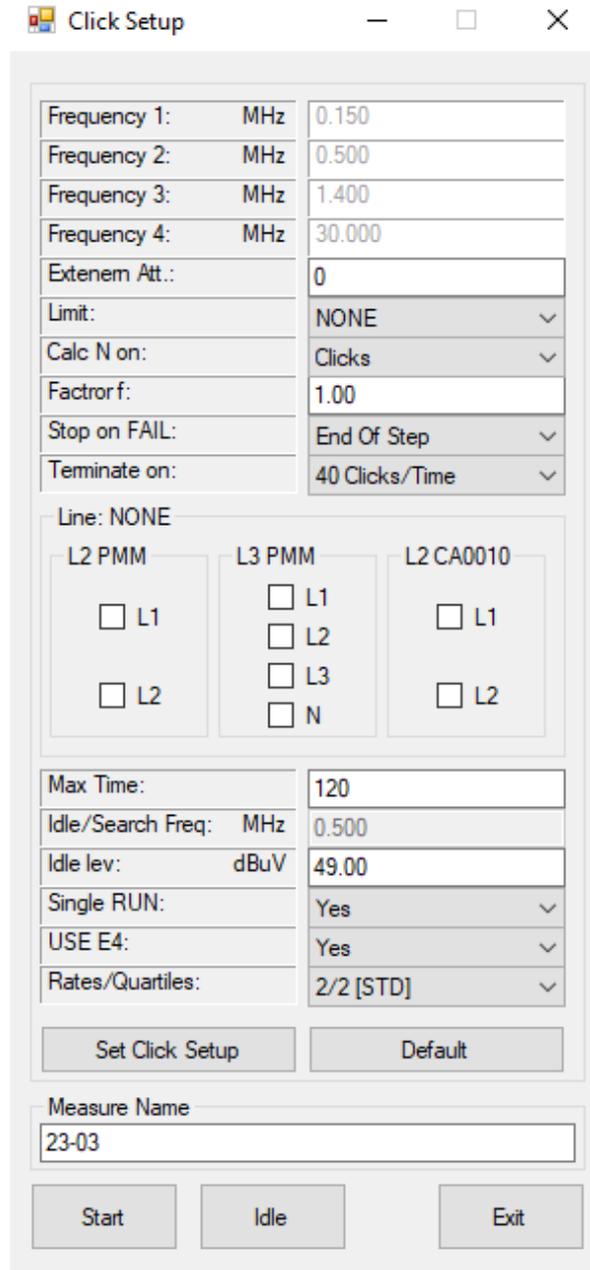
Fig. 4-9 Click Setup

4.4.1 Setup

When the software button is clicked, the Click Setup window pops up. Here it is possible to:

Extenem Att.:

- set the value in dB of a possible external attenuator,

Limit:

- choose the standard limit,

Calc N on:

- set if rate calculation will be based on RF signal measurement (Clicks) or on switching operations (current consumption threshold),

Factror f:

- set the f factor, when needed, as given in specific CISPR 14 Annex,

Stop on FAIL:

- choose if terminate current step or go on anyway, when the test has failed,

Terminate on:

- choose if terminate current run manually during acquisition, or alternatively when 40 clicks are reached. In any case the step terminates when the expected observation time is elapsed,

Line: NONE

- in the Line frame it is possible to select the desired line of a PMM LISN, if used in the test setup. PMM LISNs can be automatically controlled by the Receiver via the User Port connection,

Max Time:

- set the maximum observation time,

Idle lev: dBuV

- set Idle threshold level in dBμV. This is the threshold level, for clicks detection, when a standard limit is not selected,

Single RUN:

- choose if Single Run smart function will be adopted or not,

USE E4:

- choose if use Exception 4, as provided by the standard,

Rates/Quartiles:

- select if rate calculation is based on the current (when this manual was edited for the first time) standard edition (2 channels, 2 quartiles), or taking into account 2 channels, and then 4 quartiles, or even considering a possible future regulation with 4 channels and 4 quartiles,

Set Click Setup

- Set Click Setup soft button sends the settings to the analyzer when clicked,

Default

- Default button retrieves a base standard set of parameters.

Measure Name
23-03

- digit the Name of the measurement to be executed and, consequently, archived,

Start

- Start soft button runs the acquisition after being clicked,

Idle

- Idle soft button is used to enter the Idle mode, for EUT initial evaluation, debug and testing purposes,

Exit

- Exit soft button to close the Start window without running a new measurement.

Once the scan starts, it can be stopped at any time during the execution by clicking the **Stop** function key that appears during the scan.

4.5 Stop
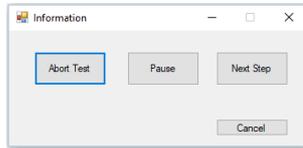
When clicking the **Stop** button, a popup choice appears on the screen.
It allows deciding if definitively aborting current test, pausing it or proceeding to the following step.
When paused, the step can be resumed by clicking the proper soft button.

NOTICE

Using 0 dB attenuation, PMM 9010F has no input protection.
This is a potentially dangerous condition for the input stage of the receiver.
Use 0 dB attenuation only if you are very sure that your input signal is less than 3.2 V (or 130 dBμV).
Before to apply an unknown signal to PMM 9010F receiver, use an oscilloscope or a wide band RF voltmeter to measure it.
The CA0010 sets its internal attenuator automatically as function of the threshold level for the measurement. The User can verify the adopted attenuation.
If needed, add an external coaxial attenuator in the input signal line.

NOTE

In case it is required, add an external attenuator to carry on the measurement, without overpassing the declared limit for continuous power or spectral density.

NOTE

When the PMM CA0010 is used the **Preselector** filters are always enabled.

The **Preselector** is composed by a group of filters automatically selected by the analyzer. The aim of the preselector is to reduce the amount of out-of-band energy entering in the receiver, thus helping a lot in reducing saturation risks, intermodulation problems and similar undesired behaviors.
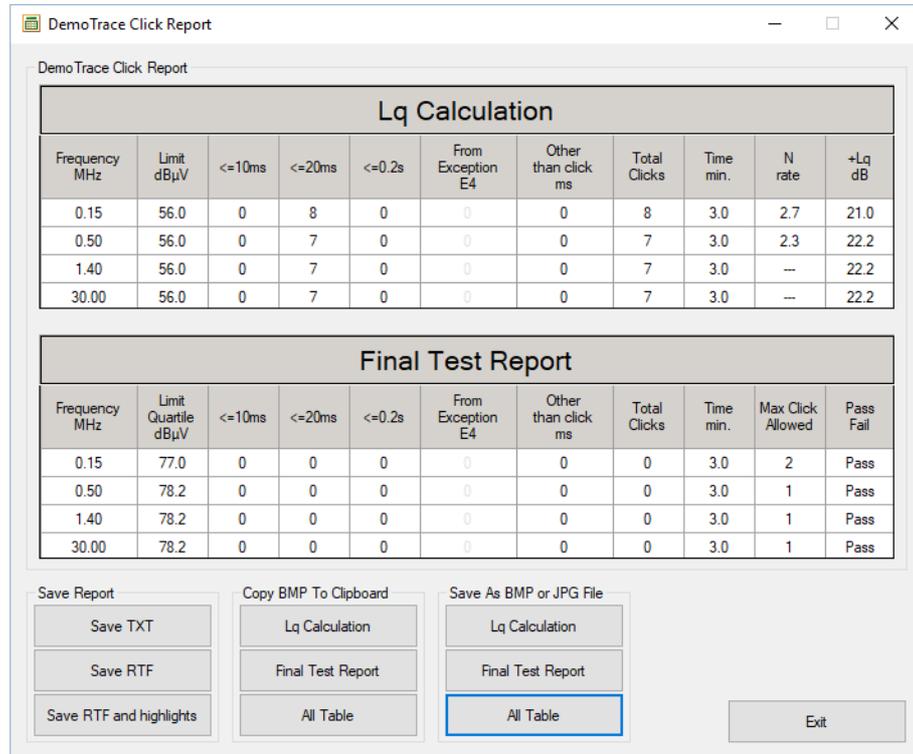.

NOTE

It is suggested to turn off the internal Generator, when it is not used, to achieve the maximum sensitivity.
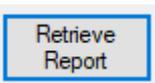
4.6 Report

Open Report

When a measurement is completed, both if passed and failed, the analyzer prepare a detailed test report, in table form, where all the test information are shown.


Fig. 4-10 Report

The Lq Calculation refers the the first run while the Final Test Report is the outcome of the second run.

When Open Report soft button is clicked, the program opens the last saved report, referring to the latest completed measurement.

**Retrieve Report**

Retrieve Report soft button can be used to load the report still saved in the Receiver, which refers to the latest completed measurement.

4.6.1 Save Report
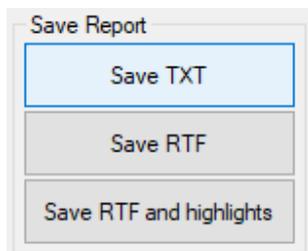
When a test report is opened, it can be saved in many forms, as desired by the User.
It can be saved as a .txt ascii text file, as a Rich Text Format document, and as a Rich Text Format complete of the highlights details.
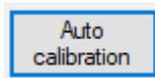
Copy BMP To Clipboard

- Lq Calculation
- Final Test Report
- All Table
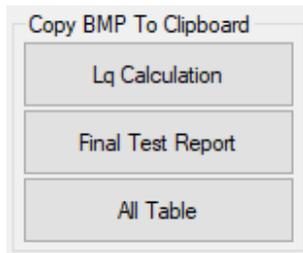
It is also possible to copy the shown report tables to the Windows clipboard (and then paste it where wished).

Save As BMP or JPG File

- Lq Calculation
- Final Test Report
- All Table
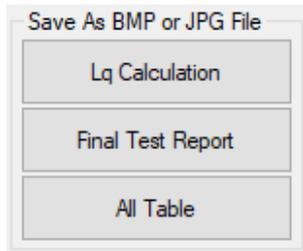
The report tables can be also saved as images, in Bitmap or JPG file format.

4.7 Autocalibration

Auto calibration

The PMM CA0010 Click Analyzer and the EMI Receiver system is equipped with a sophisticated autocalibration process.
To run the autocalibration, please follow the simple instructions below:
- Install the setup as indicated in §2.8
- Switch the PMM CA0010 on, then after a short while switch also the Receiver on,
- Click the Auto Calibration soft button,
- Please wait for the necessary time and, at the end, click Exit soft button

The Receiver begins to control the system and automatically performs the autocalibration, using the PMM CA0010 internal precise signal generator as a reference.
The self-calibration process takes about 3 minutes to be completed.

When the self calibration starts, a pop up window appears, showing the status as it procedes.
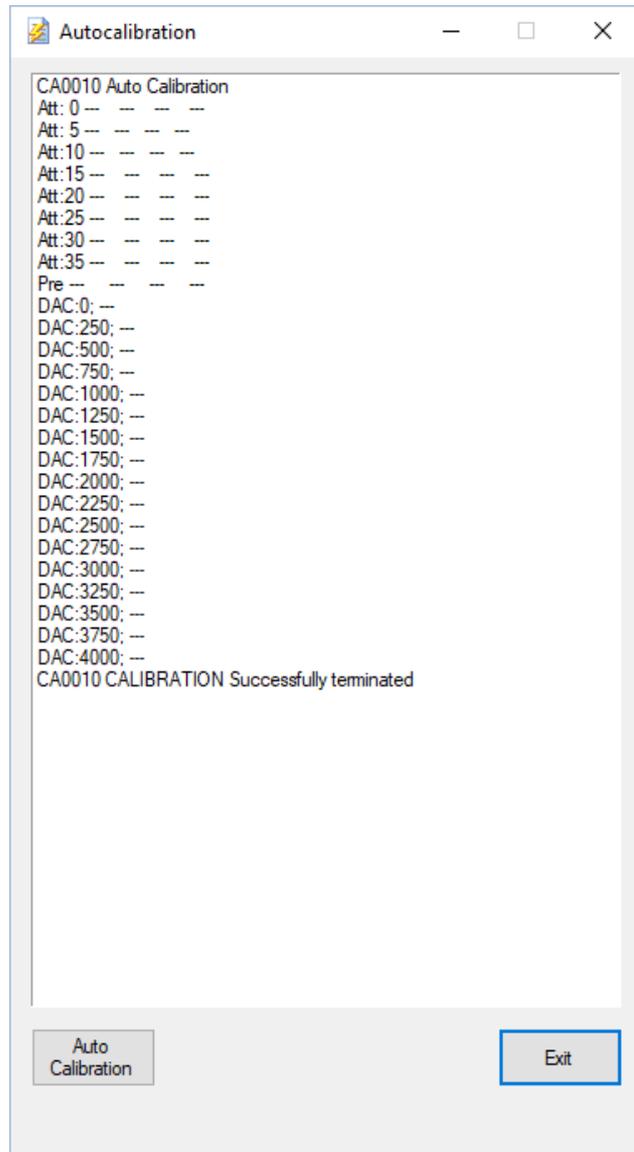
Fig. 4-11 Autocalibration

If everithing goes well, at the end a message like in the picture above appears, showing that the calibration was succesfully terminated.

4.8 Uninstalling Software

It is possible to remove the CA0010 software from the PC according to the following procedure:

Run the **Uninstall PMM CA0010** utility.
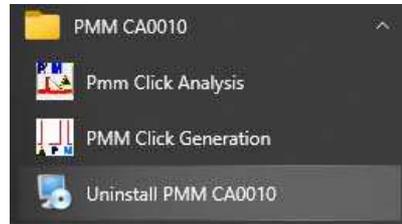
Follow the uninstaller instructions.

The software is now removed from the system; click **Finish** to close uninstaller utility

5 – PMM Click Generation Operating Instructions

5.1 Introduction

The **PMM Click Generation (PCG)** software is used to operate the PMM CA0010 as a powerful instrument capable of generating the discontinuous disturbances (clicks) dictated by the CISPR standard.

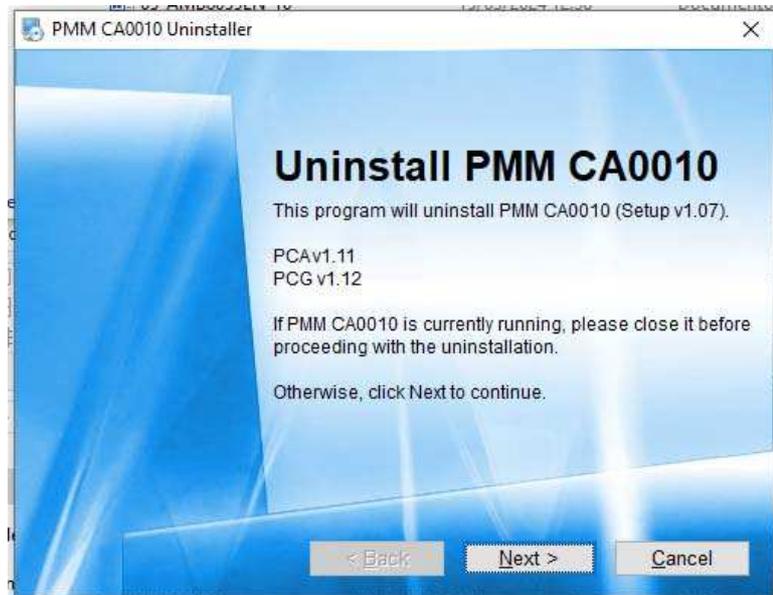In details the PCG is able to generate all the CISPR 16-1-1 "Standard tests" and "Annex-F Tests".

It is also available the possibility of generating an arbitrary sequence of pulses, not related to the ones dictated by the standard.

With this easy to use piece of software, the CA0010 becomes an useful test that can be used both for checking the system itself and for verifying and calibrating other click meters.

To enter this mode, simply run the software by double clicking its icon. Immediately the main window pops up and allows the operator to choose the test to be performed.

NOTE

The PCG (PMM Click Generation) program is installed together with the PCA (PMM Click Analysis software). Please follow the instructions detailed in chapter 4 to install the package.

5.2 Signal generator

The internal **signal generator** is a high stability and accuracy, 50Ω RF generator ranging from 150 kHz to 30 MHz.

It is not simply one generator but three in one!
It is capable of generating CW signals and also On-Off-Keyed signals and CISPR Pulses.
It covers all of the four frequencies used for discontinuous disturbance measurements: 150 kHz, 500 kHz, 1.4 MHz and 30 MHz.

As usual, to set a given frequency it is therefore enough to choose it from the drop-down menu in the software.

It is able also to produce OOK modulated signals and CISPR Pulses simultaneously. In this way, the unit can satisfy all the tests of the standard, both for the base Table and the Annex F Table.

Levels, ON duration and OFF duration (separation) can be set as desired, by entering the values in the corresponding boxes.

If a higher or lower level is needed, the User shall adopt either an external amplifier or an external attenuator.
The internal generator is extremely useful for several applications: first of all it is essential to calibrate the system itself, thanks to the automatic internal routines specifically developed to this extention; then it can also be used to transform the PMM CA00010 in a complete click meter test set.

5.3 Test Setup

For the system to work properly, another connection only is required. Please connect the CAL OUT and RF INPUT of the CA0010.
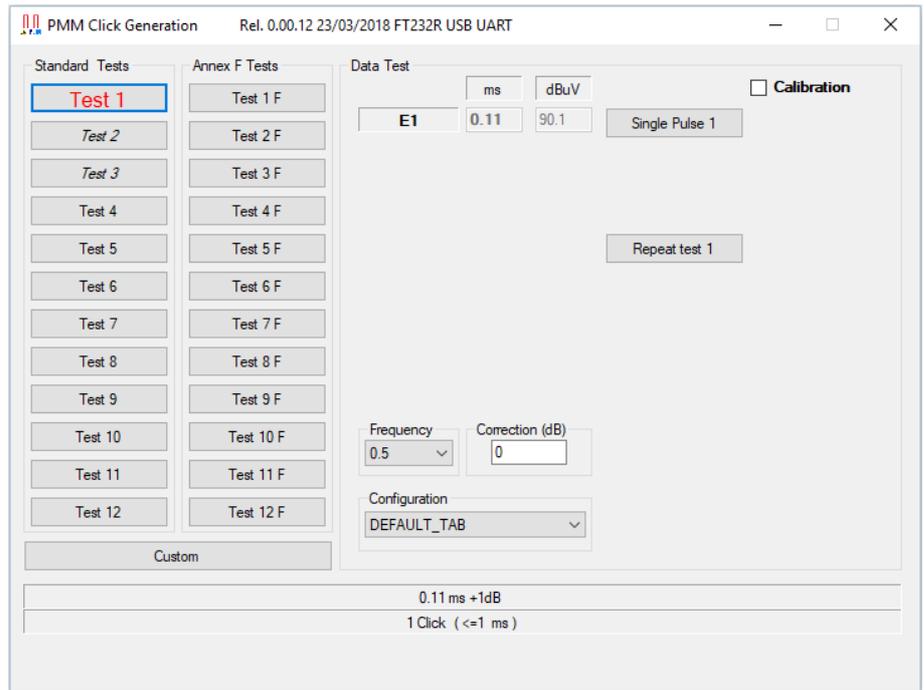

Fig. 5-1 Test Setup

⚠ **CAUTION** **The installation and use of the instrument must be performed only by qualified persons.**

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

narda
Safety Test Solutions

5.4 Software

Fig. 5-2 PMM Click Generation

NOTE

The DEFAULT_TAB configuration file contains the CISPR 16-1-1 standard tests of the base Table and of the Annex F Table.
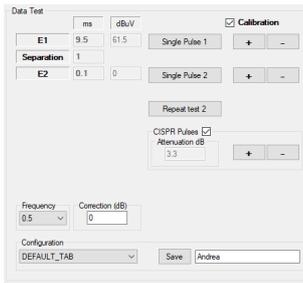**To be preserved as reference, this default file cannot be deleted or edited within the software.**

5.4.1 Standard Tests

On the screen, all the relevant information are reported.
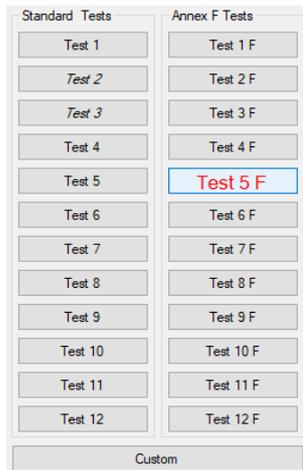
From the upper left corner, the User can see the buttons to select the specific test to be generated.

5.4.2 Data Test

In the middle, the Data Test frame reports the signal parameters:

- E1 (Event 1) with its duration, in milliseconds, and level, in dBμV;
- Separation (between Event 1 and 2, if present) with its duration, in milliseconds;
- E2 (Event 2) with its duration, in milliseconds, and level, in dBμV;
- etc.

In the lower part of the Data Test frame there is the drop down menu to choose the carrier frequency, among the four ones of the standard.

There is also a Correction box where, for example, the User can enter the value of an external attenuator in dB.

At the bottom there is the frame used to select the configuration file.

On the left it is the drop down menu used to select the file to be loaded and on the right there is the box where the User can digit the name of a customized configuration file to be saved.

NOTE

It is suggested to turn off the Generator when it is not in use, to achieve the maximum sensitivity in the receiving section.
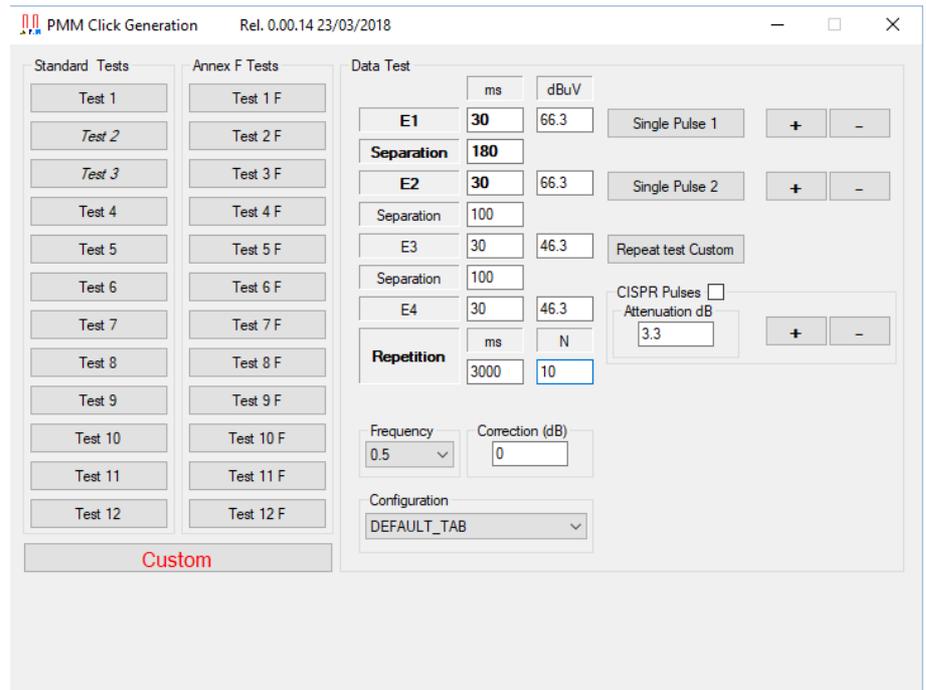
5.4.3 Custom signals

In addition to being able to generate all the standard tests, the system allows to create an arbitrary sequence of disturbances as desired.

The internal generator consists in a high performance circuit, capable of producing pulsed signals which duration and level can be set with an optimal precision and resolution.

It is also possible to generate, in the same time, wide band CISPR pulses, at the standard repetition frequency, which level can be adjusted independently.

Custom

When clicked, the Custom soft button enables a set of parameters that can be edited as desired, within the limits of the main specifications.

Fig. 5-3 Custom signals
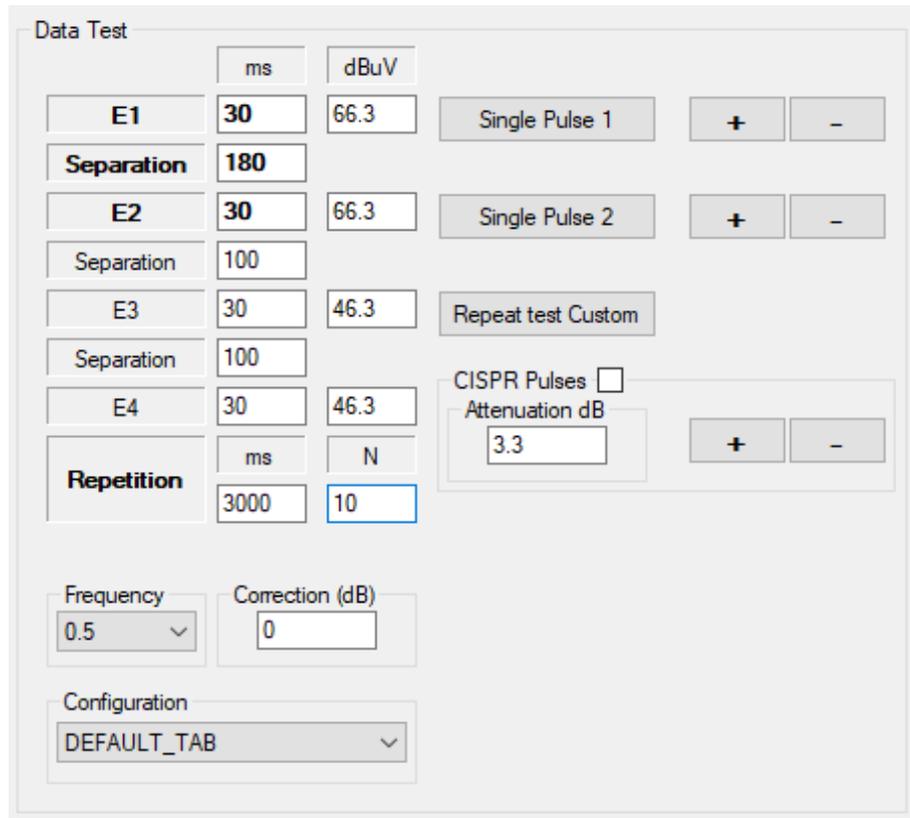
Custom

When clicked, the Custom soft button enables a set of parameters that can be edited as desired, within the limits of the main specifications.

Fig. 5-4 Custom signals parameters

In the Data Test frame, for the custom disturbance generation, it is possible to set the duration of up to 4 events, each one with its amplitude, and a different separation interval between them.
The Repetition box can be used to set a time interval to program an automatic N times redo of the events sequence.
Set the duration to 0 ms for each unwanted event.

In the example above, the disturbance generated will be as following described:
- the carrier frequency will be 500 kHz (Frequency tab),
- external correction factor (for cables, attenuators etc) will be zero,
- wideband CISPR pulses are switched OFF,
- at first the carrier will be ON for 30 ms, with an amplitude of 66.3 dBµV (E1),
- then will be OFF for 180 ms (Separation),
- again ON for 30 ms, with an amplitude of 66.3 dBµV (E2),
- then will be OFF for 100 ms (Separation),
- again ON for 30 ms, with an amplitude of 46.3 dBµV (E3),
- OFF for 100 ms (Separation),
- ON for 30 ms, with an amplitude of 46.3 dBµV (E4),
- The sequence above will be repeated every 3 seconds, for 10 times (Repetition)

5.4.4 CISPR Pulses
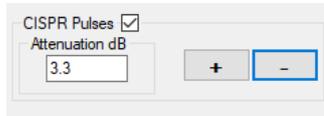
The powerful internal generator implements also a section able to generate wideband CISPR pulses, without the need of additional external expensive equipment.

The amplitude attenuation for CISPR Pulses can be set inside the appropriate frame in the software.

The maximum output level is available for 0.0 dB attenuation.

When a lower amplitude is needed, please enter the desired attenuation value.

The + and – soft buttons can also be used to precisely trim the desired level.

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6 – PMM 9010-RMA Rack Mount Adapter for Rack 19" (Option)

6.1 Introduction

A **19-inch rack** is a standardized frame or enclosure for mounting multiple equipment modules. Equipment designed to be placed in a rack is typically described as **rack-mount** or simply **chassis**; the height of the electronic modules is standardized as multiples of 1.75 inches (44.5 mm) or one rack unit or "U". Each module has a front panel that is 19 inches (482.6 mm) wide, including edges that protrude on each side which allow the module to be fastened to the rack frame with screws.

6.2 Instrument Items

PMM 9010-RMA Rack Mount Adapter includes the following items:

• Rack Mount kit (screws, plastic round washers and cage nuts).
• Return for Repair Form.

6.3 Optional accessories

PMM 9010-RMA Rack Mount Adapter can be used with several optional accessories, the most common being the following:

• PMM 9010F EMI Receiver 10 Hz÷ 30 MHz;
• PMM 9010/03P EMI Receiver 30 MHz ÷ 300 MHz
• PMM 9010/30P EMI Receiver 30 MHz ÷ 3 GHz;
• PMM 9010/60P EMI Receiver 30 MHz ÷ 6 GHz

6.4 PMM 9010-RMA Main Specifications

Table 6-1 lists the PMM 9010-RMA specifications.

TABLE 6-1 Technical Specifications	
Environment temperature	0° to 40°C
Rack unit	3U
Dimensions	483 x 410 x 132.5 mm (WxDxH)
Weight	5,5 Kg (without instruments)

6.5 PMM 9010-RMA Front view
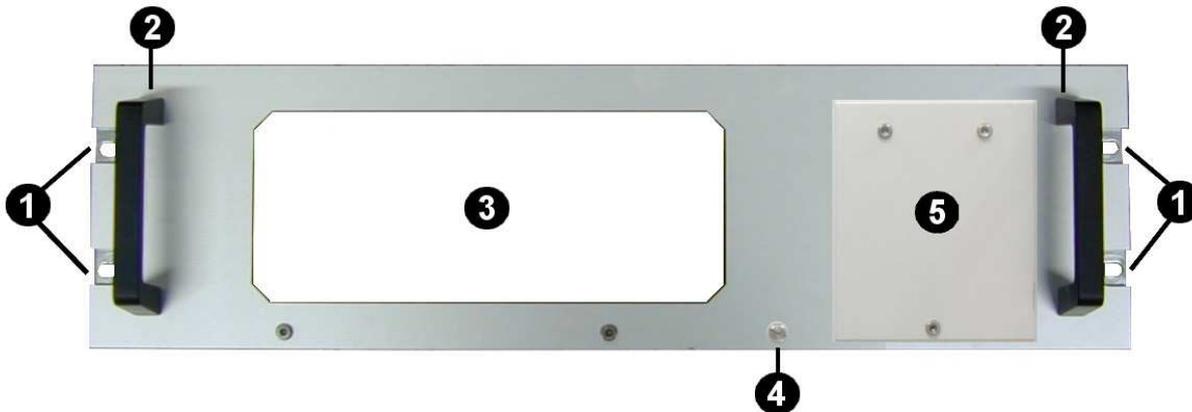
Fig. 6-1 Front view

Legend::
- **1 –** Holes Flanges used to fix the Rack Mount to the Rack
- **2 –** Handles used to carry the Rack Mount
- **3 –** PMM CA0010, 9010F, 9010/03P/30P/60P window
- **4 –** Milled knob used to fix the frontal panel to the Rack
- **5 –** Cover for future implementation

6.6 PMM 9010-RMA Inside view

Fig. 6-2 Inside view

Legend::
- **1 –** Round holes of service
- **2 –** Rectangular holes used to put CA0010, 9010F, 9010/03P/30P/60P Instrument;
- **3** – CA0010, 9010F, 9010/03P/30P/60P straps;
- **4 –** Rectangular holes for future implementation;
- **5 –** Straps for future implementation.

6.7 Rack Requirements   The rack must be of the following type:

- Standard 19 inch (483 mm) with mounting rails that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992.

- The minimum vertical rack space per chassis must be 3U (rack units), equal to 3 inches (132.5 cm).

6.8 Required Equipment   Before you begin the installation, ensure that you have the following items:

- Crosshead screwdriver (not provided)

- Flat-blade screwdriver or rack-insertion tool (not provided)

- Tape measure and level (not provided)

- Rack Mount kit (provided)

6.9 Moving chassis   When lifting the chassis, be aware of its weight, and follow these guidelines:

- Disconnect all power and external cables before lifting the chassis.

- Remove all instruments from the chassis before lifting.

NOTE

- **Make sure that the milled knob well locking.**

- Using the two handles, lift the PMM 9010-RMA slowly keeping your back straight. Lift with your legs, not with your back. Bend at the knees, not at the waist.

6.10 Installation guidelines

When installing the chassis, follow these guidelines:

- Plan your site configuration and prepare the site before installing the chassis.

- Ensure that there is adequate space around the rack to allow for servicing the chassis and for airflow.

- If the rack has wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized

NOTE **- For a round hole (tapped) rack, use clip nuts with M6x16 screw (not provided).**
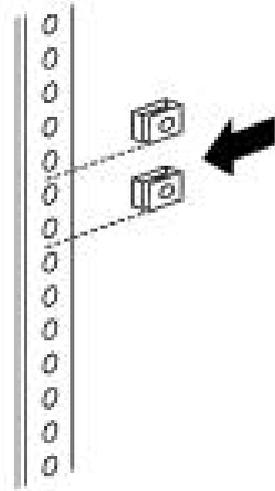
NOTE **- For a square hole (untapped) rack (shown below), use M6x16 screws, plastic round washers head screws and M6 cage nut (provided).**

**6.11 Installing the
      PMM 9010-RMA**

This section describes how to install the PMM 9010-RMA Rack Mount Adapter:

- Insert the cage nuts <u>behind</u> the vertical rails with respect to the Rack Unit Boundary and the distance show below:
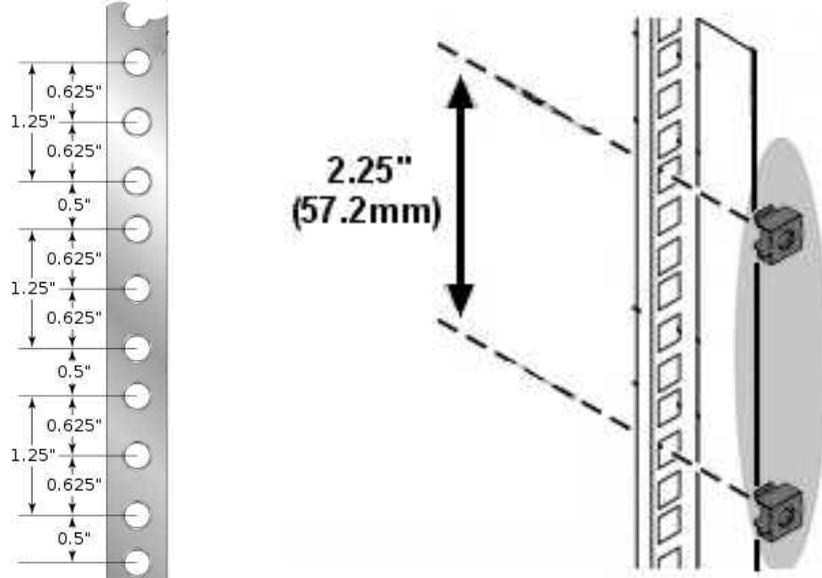
- Use a rack-insertion tool or a flat-blade screwdriver to install the cage nuts.
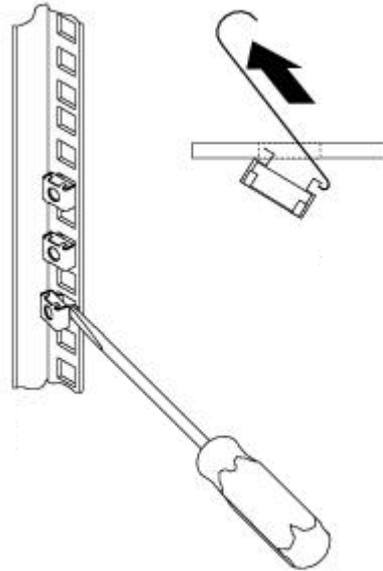
- Insert the chassis into the rack.

- Slide the chassis into the rack until the front flange is flat against the cage nuts.

- Using the four screws and black plastic washers, fix the chassis by its flanges to the rack.

6.12 Use of the PMM 9010-RMA with PMM CA0010

The following procedure is indifferently referred to the CA0010, 9010F, 9010/03P/30P/60P.

This section provides the information needed to install your instrument in the PMM 9010-RMA Rack Mount Adapter.

- Remove the frontal panel from the Rack unscrewing the milled knob without loosing it completely.

- <u>Using the handles</u>, open the PMM 9010-RMA slowly.

- Place the instrument by the rectangular holes and <u>drag the instrument in contact with the frontal panel</u>.

- To ensure the necessary stability, the instrument must be fastened to the unit using the straps.

- Connect the cables on the rear panel (see "Installation" chapter for further information)

- To fix the rear cables to the Rack Mount insert plastic straps by of the round holes.

- <u>Using the handles</u>, close the PMM 9010-RMA slowly.

Fig. 6-3 PMM 9010-RMA with 9010F Instrument

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

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

Ditta:
Company:

Indirizzo:
Address:

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

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

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

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

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

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

_____

_____

_____

_____

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

_____

_____

_____

_____

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