



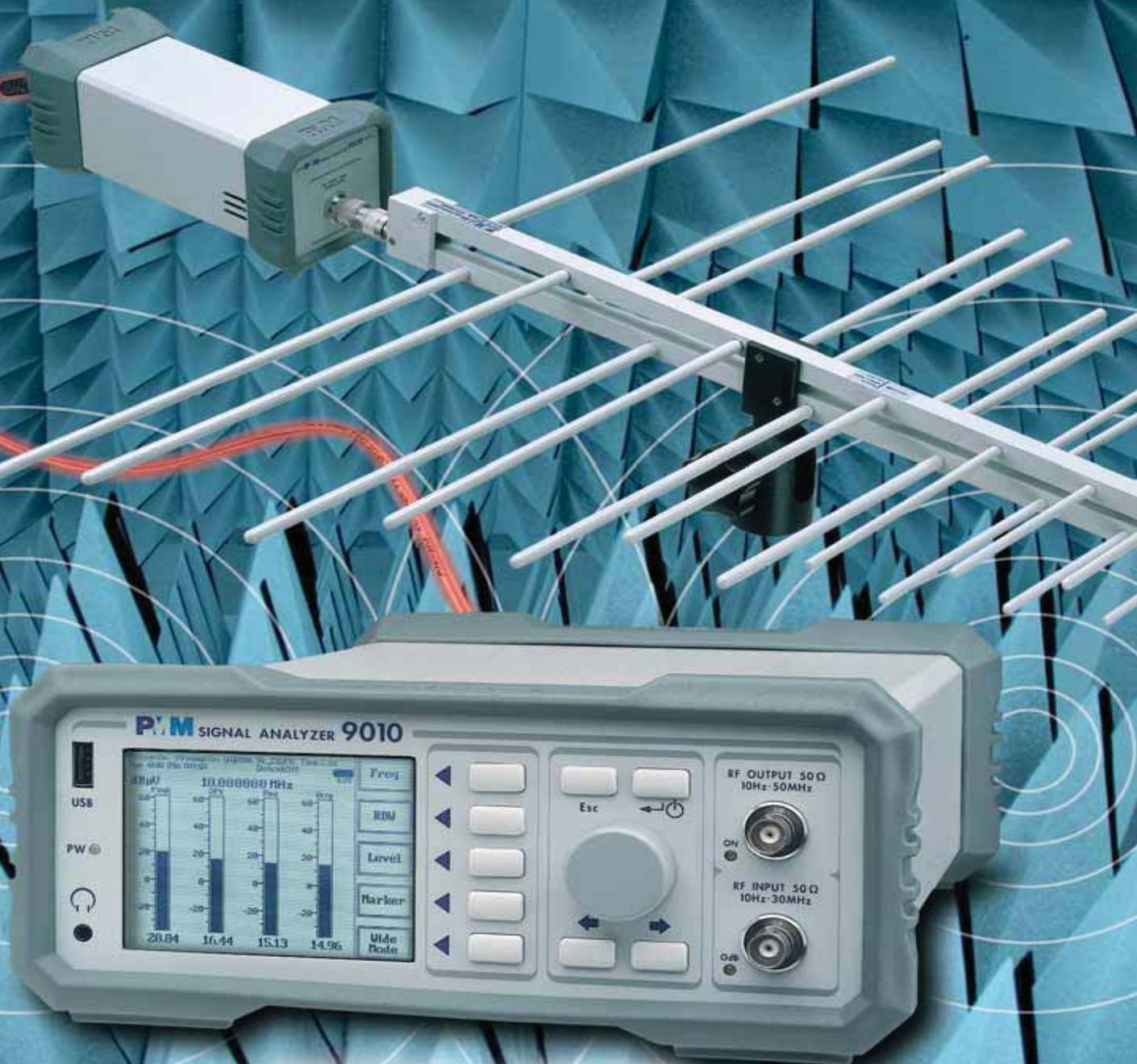
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# PMM 9010 + PMM 9030

## DIGITAL EMC/EMI RECEIVERS

### FULLY CISPR COMPLIANT

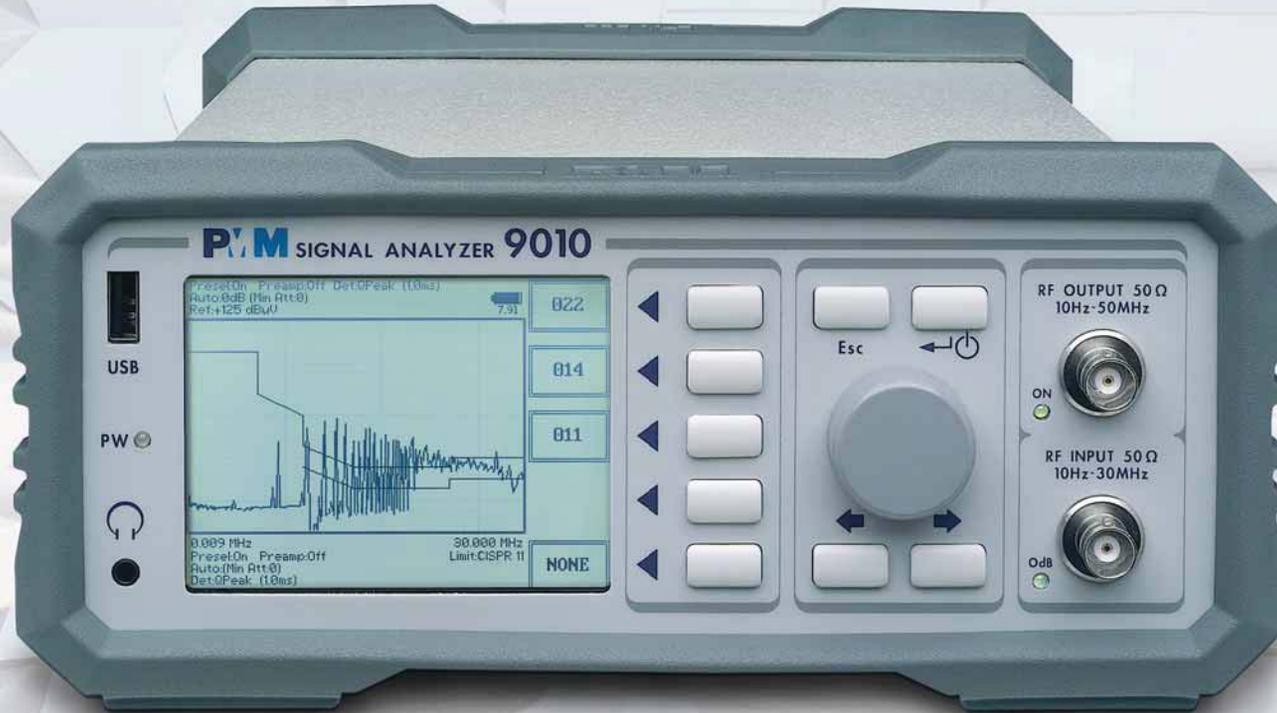
10 Hz – 3 GHz



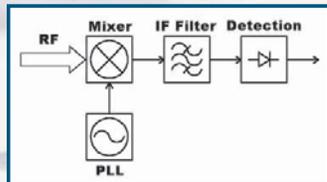
# PMM

# THE NEW FULLY DIGITAL RECEIVER IS HERE!

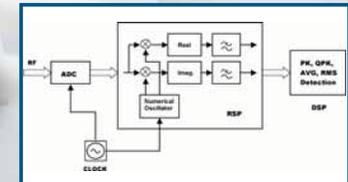
Once more PMM is anticipating market and competition introducing the first Fully Digital Receiver and Analyzer. Every circuit in the receiver is digital now, with the only exception of the preselector that - physically - shall put a limit to the RF energy entering the equipment. This architecture, carefully designed to deliver outstanding performances in a very small volume, is the latest development of PMM R&D Labs, well known all around the world for their original and effective technical solutions. Add the usual "Easy-to-Use" PMM on-board software - always acknowledged for offering the best control of the equipment without unnecessary burdens - and the picture of the new PMM 9010 + PMM 9030 is almost complete. Continuing the tradition of offering solid technology equipments for practical measurements applications, the PMM 9010 - a fully digital receiver in the range 10 Hz to 30 MHz - is the milestone of a



system which grows together with the needs of the User: all EMC conducted measurements will be possible simply upgrading the PMM 9010 with specific options, e.g. Click Meter, accessories - like LISNs and probes - and auxiliary equipments (e.g. the slide bar for radiated power measurements), providing a full compliance with any known international standard or proprietary specifications. Maintenance-free and exceptionally stable, the PMM 9010 EMI Receiver is the ideal solution for reliable measurements day after day, month after month, year after year. The PMM Sales Network is highly qualified and will be your consultant in facing every measurement problem: ask to the experts and "surf the noisy waves" with PMM 9010, the rising reference star in the EMC market.



Traditional Receiver



Innovative Digital Receiver

23,5 cm only

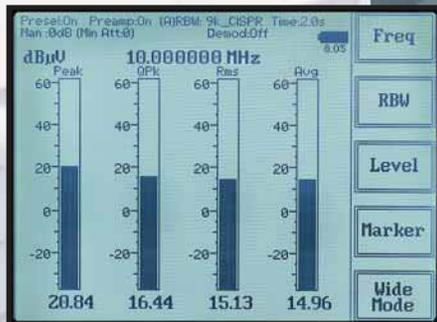
## PMM introduces the first fully digital CISPR Compliant EMC receiver and analyzer

# THE PMM 9010'S FEATURES



**Dynamic Marker**

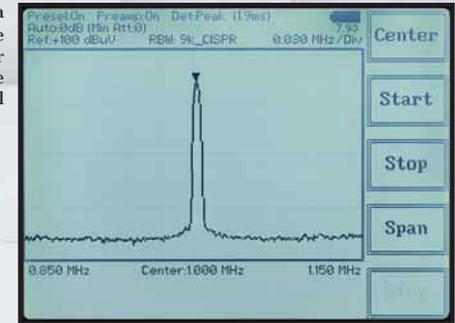
**The Pre-Loaded Limits for Sweep Mode** are stored in a non-volatile memory, providing for CISPR Compliance; just a click away and they're always available for tests and comparisons.



**Manual Mode**

**The Marker** is a very powerful feature, providing an easy-to-read frequency/amplitude value through a simple knob rotation in the window span.

**The Internal Signal Generator** is not a simple tracking generator, but rather a very precise and flexible generator, tracking with the span or independently adjustable at any frequency in the range 10 Hz ÷ 50 MHz. Of course, it is also essential for an easy and precise PMM 9010 self-calibration.



**RF OUT Signal**



## The Controls

The receiver can be operated by the front knob and soft keys through real user-friendly menus, as a stand alone unit, or remotely by a PC connected through USB/RS-232 Serial Interface (Bluetooth optionally).

**The Simultaneous Detectors, QP-PK-AVG-RMS**, for time-coherent measurements, provide parallel indications at every frequency value in the range.

**The Hold Time in Manual mode** is the integration time of the RMS - AVG detectors; it represents the reset time of the PK - QP detectors.

**The Scalar Network Analyzer** is another powerful function useful for designers, providing an easy-to-use scalar network analyzer for characterizing components, filters and far beyond.



**Scalar Network Analyzer**



The **Numeric Local Oscillator** generates pure mathematical signals toward Digital IF Filters, divided into Real and Imaginary parts. The main advantage of this solution is the virtual absence of spurious components, as the computing function replacing the conventional mixer simply cannot generate them, due to the perfection of such a mathematical approach.

like simultaneous detections, demodulations and graphical representation in real time. The number of elementary operations performed by the DSP in the time unit is equivalent to those of a 10 GHz Pentium 4™!

**Built-in Preselector** carefully designed in order to make perfect measurements of all input signals, including pulses. The quality of the preselector, which is one of the very

**Ultra-fast measurements of CISPR - A band (9 - 150 kHz):** the huge internal memory combined with the FFT (Fast Fourier Transform) capability allows a complete scan of the whole A-band performed in only 1 second! It means that, even in those cases when the source is on for very short periods of time - or when the source has an extremely short cycle - it's always possible to get a "picture" of the emissions and then post-process the data later on. That's certainly unique!

**No calibrations,** no adjustments after the A/D converter, which is operating in chain soon after the input attenuator and the preselector, just to take the maximum benefit from the digital approach. The internal frequency reference is temperature compensated and shows a stability better than 1 ppm, with virtually no jitter at all.

**Field Replaceable Internal batteries,** for enhanced portability and also offering the major advantage to be completely disconnected from the mains, for measurements not influenced at all in hostile or noisy environments.



## PMM 9010 OTHER FEATURES

The **Mixed signals translation to DC** allows the use of digital Low Pass filters created with the FIR (Finite Impulse Response) technique: the result is an impressive stability of such filters, a shape controlled to the perfection, due to its mathematical modelling, and a bandwidth independent from the filter slope. The previous design with analogue filters is definitely several steps behind.

The **Pure Mathematical QP-PK-AVG-RMS Detectors** features provide an absolute stability and lifetime calibration-free operation. The response of such RF receiver is no longer dependent from the input signals and the detectors always work exactly as intended.

**High-speed RSP and DSP** for highest precision and simultaneity. A dedicated Receiver Signal Processor handles all the numeric signals within the digital IF, while the Digital Signal Processor (550 MHz clock) provides all of the calculations and signals treatment,

few analogue parts in the receiver and cannot be digitalized, is essential to guarantee the best performances and represents the most important difference between a "true" EMC Receiver, capable of the more reliable results, and a generic Spectrum Analyzer adapted to perform EMI measurements.

The **Auto Attenuator** provides the maximum dynamic range without any distortion. Although analogue, it is controlled by an FPGA (Field Programmable Gate Array) directly driven by the internal DSP (Digital Signal Processor) and provides optimum performances in every testing condition, while protecting the RF input (e.g.: zero dB attenuation is not allowed in auto-attenuation mode).

**Absolute and stable compliance to CISPR** of both 9 kHz and 200 Hz IF digital filters. It's simply amazing the perfection of these filters mathematically created and shaped to meet exactly the CISPR requirements.

Thanks to **very limited dimensions** and lightweight construction, PMM 9030 can also be connected directly to the antenna, just making the dream of many test engineers

come true. Benefits are really a lot, as it is well known that usual RF coaxial cables for antenna to receiver connection do significantly affect measurements, providing errors due to intrinsic cable loss and impedance mismatch; moreover, cables may pick unwanted RF signals along the path from the antenna to the receiver. PMM 9030 overcomes all those error sources through the optical link, thus providing more accurate and reliable measurements.

### The Ultra-fast 30 MHz - 3 GHz receiver PMM 9030

extends the measurement frequency range of PMM 9010 up to the field of Radiated Emissions, thanks to a dedicated RF module. A fast and safe connection with PMM 9010 is guaranteed by a **High Speed Optical Link**, providing a complete immunity of transferred data with respect to external disturbances: only the real measurement data got at the antenna or any other source point reach the detectors! Looking at actual standard evolution, the trend of performing radiated emission tests up to some GHz is always more emerging. PMM has therefore designed a dedicated digital Front End that perfectly matches with PMM 9010 to deliver a compact-size, up-to-date digital receiver up to 3 GHz. PMM 9030 is basically a highly sophisticated auxiliary equipment, which converts the RF input into a digital signal sent to PMM 9010 through a Fiber Optic Cable. The transfer rate is higher than 2.5 Gb/s and a huge amount of information are handled with a proprietary protocol designed for the most advanced test needs. A scan of the whole band can be performed in just 8 seconds!

The **Power Supply** of 9030 is the same Li-Ion plug-in rechargeable battery used for the 9010 unit, so providing maximum interchangeability and noise-free performances. It allows four hours of continuous operation and can be replaced in just few seconds, for increased productivity.

## PMM 9030 FEATURES



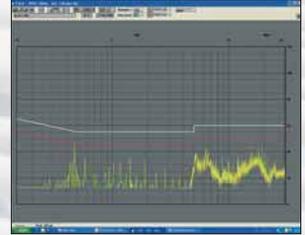


# PMM 9010/9030 EMISSION SOFTWARE

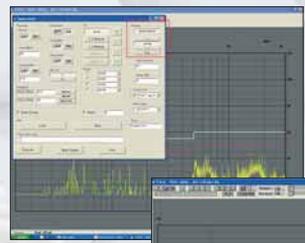
is corresponding to the IF bandwidth the pre-selector is switched on even in Spectrum Analyzer mode.

A powerful Software Utility provides a clear and effective interface to drive PMM 9010 & PMM 9030 receivers during test phases and to collect resulting data both in proprietary format and in most common interchange files.

**Custom Limits** can be easily created and used during the test, where up to two of such limits can be displayed contemporarily in sweep mode. **Antenna Factors and Absorbing Clamp** Calibration Tables can be quickly created and taken into account during measuring phase.

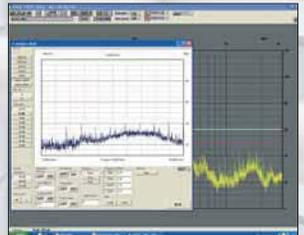


**“Smart Detector” function in Sweep Mode:** those values measured by the fast Peak Detector and found exceeding the limits are immediately measured with the Quasi-Peak detector in the “over-limit zone”, providing an impressive time saving test.



**Life-free upgradable firmware,** simply downloadable from PMM website, to keep the equipment always up-to-date with new limits and new filter shapes required by current and future standards, measuring features and test solutions. Dedicated operating system allows PMM 9010 to be ready to use just few seconds after power-on.

**Spectrum Analyzer Function,** thanks to the very high scan speed (<100 ms for full-span 10 Hz-30 MHz @ IF resolution 300 kHz), is very useful for debugging. Of course, in this Spectrum Mode the pre-selector will be automatically switched off, although – to better protect the input stage – when the span width



**I/O Interfaces.** RS-232 Serial Interface capable of full duplex 115.2 Kb/s transmission rate, programmable User

Port to control auxiliary equipments like LISNs and other remote control devices, High-Speed Optical Link featuring 2.5 Gb/s transfer rate, Bluetooth link, compatible slave USB 1.1 and 2.0 port (rear) for enhanced connectivity and data transfer.



## OPTIONS

- Bluetooth Adapter (9010)
- GPIB (9010)
- Click Meter Feature (9010)
- Additional Rechargeable Battery Pack (9010 / 9030)
- Additional Battery Charger 230 Vac / 12 Vdc (9010 / 9030)
- Spare Optical Cable

## ACCESSORIES

 <i>L3-500 (4 line, 3 phase, 350A LISN)</i>	 <i>L3-32 (3 phase, 32A LISN)</i>	 <i>L3-64/100 (3-phase, 64/100A LISN)</i>
 <i>L1-150 (1 line, 5µH, 150A LISN)</i>	 <i>L2-16A (Single phase, 16A LISN)</i>	
 <i>RF-300 (Van Veen Loop)</i>	 <i>F-201 (Absorbing Clamp, 30 MHz-1 GHz)</i>	 <i>RA-01 (10 kHz-30 MHz, rod antenna)</i>
 <i>SHC-1&amp;SHC-2 (35 or 30 dB probe)</i>	 <i>AS-02 (30 MHz-2.7 GHz Antenna Set)</i>	 <i>VNET-150&amp;TRF-1 (insertion loss LISN &amp; balance to unbalance transformer)</i>

# SPECIFICATIONS

	PMM 9010 - CISPR 16-1-1 Compliant	PMM 9030 - CISPR 16-1-1 Compliant
<b>Frequency range</b> Resolution Reference frequency	10 Hz to 30 MHz 0.1 Hz < 1 ppm	30 MHz to 3 GHz 100 Hz < 2 ppm
<b>RF input</b> VSWR 10 dB RF att. 0 dB RF att. Attenuator Pulse limiter Preamplifier gain	$Z_{in}$ 50 $\Omega$ , BNC fem. < 1.2 < 2 0 dB to 35 dB (5 dB steps) Built in (selectable) 20 dB (after preselector)	$Z_{in}$ 50 $\Omega$ , N fem. < 1.2 ; <2 over 1 GHz < 2 0 dB to 55 dB (5 dB steps) 10 dB
<b>Max input level</b> (without equipment damage) Sinewave AC voltage Pulse spectral density	137 dB $\mu$ V (1 W) 97 dB $\mu$ V/MHz	137 dB $\mu$ V (1 W) 97 dB $\mu$ V/MHz
<b>Preselector</b> Frequency ranges	< 9 kHz 9 kHz to 150 kHz 150 kHz to 500 kHz 500 kHz to 3 MHz 3 MHz to 10 MHz 10 MHz to 20 MHz 20 MHz to 30 MHz (One lowpass filter and six bandpass filters)	30 MHz to 96.6 MHz 96.6 MHz to 311.0 MHz 311.0 MHz to 1000 MHz >1000 MHz (Three tracking filters and one highpass filter)
<b>IF bandwidth</b> 3 dB bandwidth 6 dB bandwidth	3, 10, 30, 100, 300 kHz 0.2 and 9 kHz (CISPR 16-1-1) (other bandwidths available upon request through FW upgrade)	3, 10, 30, 100, 300 kHz - 1 MHz 120 kHz (CISPR 16-1-1)
<b>Noise level</b> (Preamplifier ON)	9 to 150 kHz < - 8 dB $\mu$ V (QP) (200 Hz BW) < -15 dB $\mu$ V (AV) 150 kHz to 30 MHz < - 4 dB $\mu$ V (QP) (9 kHz BW) < - 10 dB $\mu$ V (AV)	30 to 300 MHz < - 1 dB $\mu$ V (QP) (120 kHz BW) < - 5 dB $\mu$ V (AV) 300 to 3000 MHz < 2 dB $\mu$ V (QP) (120 kHz BW) < - 2 dB $\mu$ V (AV)
<b>Measuring Modes</b> Detectors	Peak, Quasi-Peak, Average, RMS, Smart Detector	Peak, Quasi-Peak, Average, RMS, Smart Detector
<b>Level measuring time</b> Peak, Quasi-Peak, RMS and Average (parallel detectors)	1 ms to 30 sec. (CISPR 16 default)	1 ms to 30 sec. (CISPR 16 default)
<b>Display units</b>	dBm, dB $\mu$ V (other units available in future extensions)	dBm, dB $\mu$ V (other units available in future extensions)
<b>Spectrum</b> Span/division	100 Hz $\div$ 3 MHz	
<b>Measurement accuracy</b>	S/N > 20 dB 10 Hz to 9 kHz $\pm$ 1.0 dB Typical 9 kHz to 30 MHz $\pm$ 1.0 dB	S/N > 20 dB 30 to 1000 MHz $\pm$ 1.0 dB 1 to 3 GHz $\pm$ 1.5 dB
<b>RF output</b> (Tracking Generator) Frequency range Level Level accuracy (10 Hz to 30 MHz)	$Z_{out}$ 50, $\Omega$ BNC fem 10 Hz to 50 MHz 60 dB $\mu$ V to 90 dB $\mu$ V (0.1 dB steps) $\pm$ 0.5 dB	
<b>Demodulation</b>	AM	AM (through 9010)
<b>I/O Interface</b>	RS-232 High Speed Optical (2 channels; 2nd channel for future extension) USB Rear USB Front (future extension only) User Port Bluetooth (optional) IEEE-488 (optional)	High Speed Optical RS-232 (for maintenance only)
<b>Click measurements (Optional)</b>	1 to 4 simultaneous channels Full compliant to EN 55014-1	
<b>Operating temperature</b>	0° to 40°C	0° to 40°C
<b>Power supply</b>	10 - 15 Vdc, 2.5A Li-Ion rechargeable & interchangeable battery (8h avg. duration)	10 - 15 Vdc, 2.5A Li-Ion rechargeable & interchangeable battery (4h avg. duration)
<b>Dimensions</b>	235x105x335 mm	235x105x105 mm
<b>Weight</b>	4.1 kg	2 kg



Sales Office  
Via L. da Vinci, 21/23 • 20090 Segrate • Italy  
Tel. +39.02.26952421 • Fax +39.02.26952406  
E-mail: pmm@pmm.it • Internet: <http://www.pmm.it>

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