

COMBINATION & RING WAVES

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WHEN QUALITY IS AN ISSUE, THE CHOICE IS HAEFELY EMC



COMBINATION & RING WAVES
SURGE PLATFORM[®] TEST SYSTEM SOLUTION

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COMBINATION & RING WAVE SYSTEMS

GENERAL

Combination waves or Hybrids, are used in a wide range of test applications. The most common use is to simulate lightning impulses coupled onto the domestic single or three phase supplies. Standards such as IEC 61000-4-5 and ANSI C62.41 require this type of impulse.

Ring waves, are used to simulate lightning or switching effects in domestic single or three phase supplies within an adequately protected building. The waveform has similar characteristics in both open and short circuit conditions. The ring wave is characterised as a bipolar damped oscillating wave. Standards such as IEC 61000-4-12 and ANSI C62.41 require this type of waveform.

FEATURES

- Full combination (hybrid) and ring waveform according to the latest IEC and ANSI standards
- 2 Ω source impedance for combination waveform
- Reliable semiconductor discharge switch
- Integrated output voltage and current monitor
- Accurate phase angle synchronisation
- Flexible test parameters
- Three source impedances to meet IEC and ANSI requirements for ring waveform
- Fully automated single phase CDN
- Fully automated three phase CDN

SINGLE AND THREE PHASE POWER SUPPLY APPLICATION

Combination wave

- 7.4 kV open circuit voltage, 3.7 kA short circuit current
- 1.2/50 μ s open circuit, 8/20 μ s short circuit

Ring wave

- 7.4 kV open circuit voltage
- Output impedance 12 Ω , 30 Ω & 200 Ω
- Hybrid wave form
- 0.5 μ s risetime, 100 kHz frequency

Coupling

- Single connect system speeds the test process. Automatic coupling units for single, three phase power lines and 4 wire telecom applications, enable routing of impulses to multiple EUT ports without changing test configuration.

BENEFITS

- Ease of use
- Plug and play technology
- Totally reproducible test results
- Easy verification of impulse
- A modular expandable system that grows with your application needs
- Faster testing
- Shorter test time
- Cost effective investment
- No reconfiguration during testing "single connect testing"
- Integrated personnel & test object safety
- Automatic test report generation
- Investment can be shared between compliance and development departments

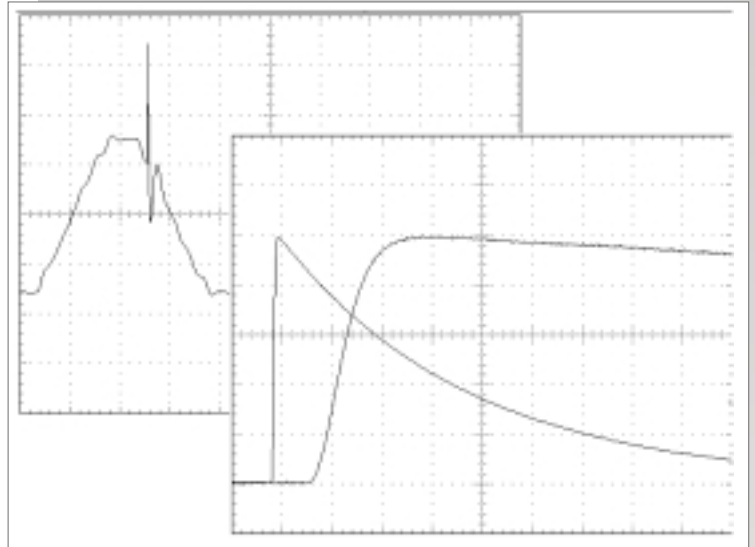
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COMBINATION (HYBRID) SYSTEM MODULE SPECIFICATION

PIM 100 Hybrid module, uses a highly reliable semiconductor switch (unlimited lifetime, maintenance-free) to achieve a clean oscillation free impulse, which can be synchronised to within $\pm 1^\circ$ of programmed phase angle.

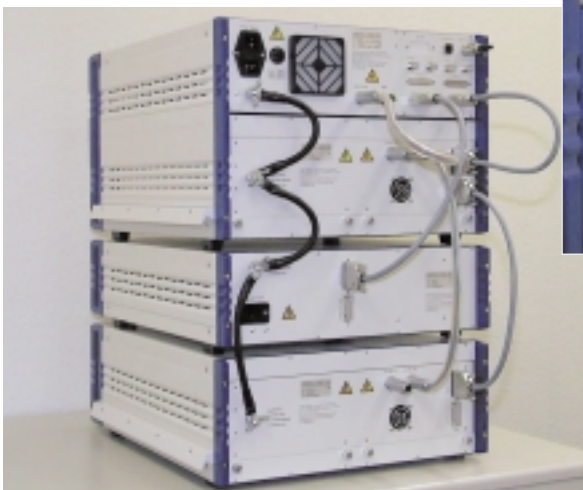
A discharge switch has two functions. It must have a DC voltage withstand capability that allows the energy storage capacitor to be charged and then discharged through wave shaping networks. Ideally, the switch should have infinite resistance during the charge cycle and zero resistance during discharge. Triggering of the switch can be very accurately controlled from the gate terminal. A trigger signal is derived from the test object power supply or any other relevant source.

The most significant advantage of semiconductor switches is clean switching. There is no pre-discharge as with electro-mechanical switches and no unwanted high frequency disturbances. Characteristics of the semiconductor switch do not change from impulse to impulse, resulting in a high degree of impulse integrity



PIM 100

	Voltage	Current		
Impulse Output	1.2/50 μ s	8/20 μ s	Repetition rate	up to 12 pulses / minute
	7.4 kV max.	3.7 kA max.	Polarity	Positive / Negative
			Floating output	max 460 Vac
Impedance	2 Ω		Phase sync accuracy	$\pm 1^\circ$
			Pulse undershoot	30% max



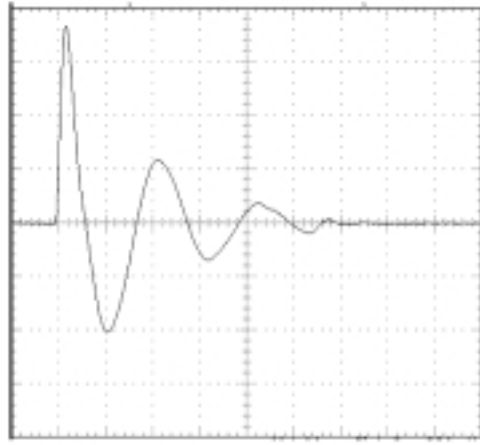
PREPARED TO MEET THE FUTURE

RING SYSTEM MODULE SPECIFICATION

PIM 110 Ring wave module, uses a highly reliable semiconductor switch (unlimited lifetime, maintenance-free) to achieve a clean oscillation free impulse which can be synchronised to within $\pm 1^\circ$ of programmed phase angle.

ANSI C62.41 defines a ring wave with two output impedances, 12 Ω and 30 Ω . IEC 1000-4-12 adds 200 Ω impedance. The 12 Ω and 30 Ω impedances are used for testing either mains power or communication ports with surge protection devices fitted. The follow on current as a result of protection elements conducting, is sufficient to test the circuits without destroying them. 200 Ω is only used on communication ports where no protection devices are fitted.

Semiconductor switches produce clean waveforms with no pre discharge as with electro-mechanical switches and no unwanted high frequency disturbances. Characteristics of the semiconductor switch do not change from impulse to impulse, resulting in a high degree of impulse integrity.



COMBINATION & RING WAVES

PIM 110

	Voltage	Current		
Rise time	0.5 μ s	1.0 μ s	Repetition rate	up to 12 pulses / minute
Frequency	100 kHz	100 kHz	Polarity	Positive / Negative
Output	7.4 kV max.		Floating output	max 460 Vac
Impedance	12 Ω , 30 Ω and 200 Ω		Phase sync accuracy	$\pm 1^\circ$
			Damping rate	60% of previous peak

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Subject to change
without prior notice 02.00

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