

# Multi CE7

Compact EMC-tester



According to	
IEC 61000-4-4 : 2012	BURST 5kV
IEC 61000-4-5 : 2014	SURGE 7kV, 3.5kA
IEC 61000-4-8 : 2010	Magnetic field 50/60 Hz
IEC 61000-4-9 : 2001	Magnetic field 8/20 $\mu$ s
IEC 61000-4-11 / 29 : 2004	Voltage dips/variation
IEC 61000-4-12	Ringwave Generator 7kV
ITU, FCC part 68 and IEC 61000-4-5	Telecom Surge 7kV

The Multi-CE7 is a compact EMC test unit designed for testing electromagnetic immunity against pulsed and conducted interference. Demonstrating such immunity is generally a requirement for compliance with the European EMC directive, a necessary step leading to the CE mark.

In its basic configuration, the Multi-CE7 includes an Electrical Fast Transient Generator (EFTG-CE5), a Combination Wave Generator (CWG-CE7) and a Coupling-/Decoupling Network (CDN) for single-phase power supply lines.

The Electrical Fast Transient Generator fully compliant to IEC 61000-4-4, delivers fast transient pulses with waveform 5/50 ns and a maximum burst frequency of 1 MHz. It is used for immunity testing of electronic systems and devices. The four standard IEC 61000-4-4 test levels may be easily selected by push button or all parameters may be adjusted individually.

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The Combination Wave Generator fully compliant to IEC 61000-4-5 and IEEE 587 delivers a standard impulse voltage with waveform 1.2/50  $\mu$ s and a standard impulse current with waveform 8/20  $\mu$ s. It is a combined impulse-current-/impulse-voltage generator for high-impedance loads  $RL > 100\Omega$  and may be used for surge testing of components and devices, as well as for galvanic coupling of surges to cable shields, shielded enclosures and cabinets.

The built-in capacitive Coupling-/Decoupling Network allows superimposition of the combination wave generator output to the mains voltage of the device under test.

The simulation of voltage dips and voltage variations acc. to IEC 61000-4-11 can be included as an option. Additional accessories allow the testing of immunity against both pulsed and power frequency magnetic fields according to IEC 61000-4-8 and IEC 61000-4-9.

Optionally the Multi-CE7 can include a trigger able power supply switch which allows the simulation of the voltage dips as specified in the standard IEC 61000-4-11. The variation of power supply voltage is controlled by use of an external motor driven variac. The control of the external power source is included in the mainframe.

Another option is the high-voltage pulse generator producing Ring Wave 0.5  $\mu$ s / 100 kHz acc. to IEC 61000-4-12. The output peak voltage can be preset continuously from 0.25 - 7 kV. Rise time 0.5 $\mu$ s to the first peak, ringing frequency 100 kHz.

As well as the high-voltage pulse generator creating standard impulse voltages with waveform 10/700  $\mu$ s. It is designed for dielectric testing of components and systems as well as testing of the electromagnetic compatibility of electronic systems and devices acc. to CCITT-K17/K20/K22, ITU-T/K44, IEC 61000-4-5 etc.

An Induction Coil in conjunction with the Combination Wave Generator output, is used to simulate pulsed magnetic fields according to IEC 61000-4-9. Combined with the external power source, the Induction Coil can be used to simulate power frequency magnetic fields according to IEC 61000-4-8.

Additional Coupling-/Decoupling Networks covering three-phase power supply lines, DC supply lines and signal lines are also available, as well as a Capacitive Coupling Clamp for coupling to shielded interconnection lines.

The Multi-CE7 excels by its compact design, simple handling and precise reproducibility of test impulses. It features a microprocessor controlled user interface and a 7" touch screen unit for ease of use. The microprocessor allows the user to execute either standard test routines or a "user defined" test sequence. A standard USB port provides the ability to print a summary of the test parameters as well as the results to an USB stick.

The software program CE-REMOTE allows full remote control of the test generator via Ethernet light guide as well as documentation and evaluation of test results, accordingly to the IEC 17025. To record definite impulses, it is equipped with an Impulse Recording Function (IRF).

Moreover all generator functions including the built-in Coupling-/Decoupling Network, may be computer controlled via the isolated optical interface.

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info@absolute-emc.com

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## System configuration

The Multi-CE7 and its sub-units are available in different configurations:

Variations	Description
<b>Multi-CE7 1</b>	including SURGE and BURST
<b>Multi-CE7 2</b>	including SURGE, BURST and POWER FAIL SWITCH
<b>EFTG-CE5</b>	Stand-alone BURST generator
<b>CWG-CE7</b>	Stand-alone SURGE generator
<b>PFS-CE-16</b>	Stand-alone POWER FAIL SIMULATOR Including a power fail switch and a variable power source

### Typical configurations:

Multi-CE7 1 + CDN 7416  
for 3-phase testing

Multi CE7 2 + VPS 250-16  
for testing surge, burst, power fail,  
voltage dips and variation

It is possible to build all  
devices in a 19" rack cabinet.

Options	Multi CE7
<b>Software CE-REMOTE Test, for remote control</b>	
With Impulse Recording Function (IRF)	
( XP, WIN7, WIN10 ) incl. 5 m fibre optic cable and PC Ethernet interface	
<b>External power source VPS 250-16</b>	
Output voltage, adjustable	0 - 250 V
Rated current	16 A
Control via interface of Multi CE7	
<b>Induction Coil HI 200 acc. to IEC 61000-4-8/9: 2010/2001</b>	
Dimensions: W * H * D	1000*1000*600 mm <sup>3</sup>
Coil factor	1.5 / m
<b>EFTC2012 Coupling Clamp acc. to IEC 61000-4-4:2012 Ed 3.0</b>	
Dimensions: W * H * D	140 * 180 *1100 mm <sup>3</sup>
Incl. Connection cable, Fischer Koax Connector	1 m long
Maximum cable diameter:	ca. 42mm

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TECHNICAL SPECIFICATIONS		Multi CE7
<b>Mainframe</b>		
Microprocessor controlled touch panel		7", capacitive
Optical Ethernet Interface for remote control of the generator		optional
Interface for saving reports		USB
External trigger input/ output		Switch/ 10 V
Coupling-/decoupling network for power supply lines		L1, N, PE (ISO, optional ANSI)
Nominal voltage, nominal current		250 V, 16 A ≈ / 16 A =
Coupling impedance (depending on the generator)		33 nF / 18 μF / 9μF+10Ω
Connector for external safety interlock loop		24 V =
External red and green warning lamps		230 V, 60W
Mains power		90V - 264V, 50/60 Hz
Dimensions of desk top case W * H * D		450*330*500 mm <sup>3</sup>
Weight		25 kg
<b>BURST</b> acc. to IEC 61000-4-4: 2012		
Pulse output voltage, adjustable		0.2 - 5.0 kV ± 10 %
Waveform		5/50 ns
Source impedance		50 Ω
Polarity, selectable		pos/neg/alt
Burst frequency, adjustable		1.0 kHz - 1.0 MHz
Burst duration, adjustable		0,01 ms - 25 ms
Burst period, adjustable		10 ms - 1000 ms
HV output for external coupling devices		coaxial
Monitor output for pulse output voltage		ratio = 100:1 ± 5%, 50 Ω
<b>SURGE</b> acc. to IEC 61000-4-5: 2014		
Test voltage (open circuit condition)		0.25 - 7.0 kV ± 10 %
Waveform acc. to IEC 60060		1.2 / 50 μs ± 20 %
Test current (short circuit condition)		0.25 - 3.5 kA ± 10 %
Waveform acc. to IEC 60060		8 / 20 μs ± 20%
Polarity of output voltage/current, selectable		pos/neg/alt
Maximum stored energy		250 Joule
Charging time for max. charging voltage		< 20 s
HV output isolated from ground		HV-OUT, 4mm
Mains synchronous triggering, phase shifting, digitally selectable		0 - 359°, step 1°
Monitor output for pulse output voltage		ratio = 1000 : 1 ± 5%
Monitor output for pulse output current		10 V ≡ 5 kA ± 5%

<b>POWER FAIL (option) acc. to IEC 61000-4-11: 2004</b>	
Rated current / Inrush current, max.	16 A / 500A
Monitor output for mains voltage and mains current	built-in
Display of mains voltage, mains current and inrush current	
Interface for control of an external power source	
<b>RINGWAVE (option) acc. to IEC 61000-4-12: 2004</b>	
Impulse output voltage, adjustable	0.25 - 7.0 kV $\pm$ 10 %
Output wave form acc. to IEC 61000-4-12	0.5 $\mu$ s /100 kHz
Oscillation frequency	100 kHz $\pm$ 10%
Voltage rise time to the first peak (open)	0.5 $\mu$ s $\pm$ 30%
Current rise time to the first peak (short)	$\leq$ 1 $\mu$ s
Decaying voltage	0,4 < Ratio of <i>PK2</i> to <i>PK1</i> < 1,1 0,4 < Ratio of <i>PK3</i> to <i>PK2</i> < 0,8 0,4 < Ratio of <i>PK4</i> to <i>PK3</i> < 0,8
Polarity of output voltage	pos / neg, selectable
Maximum stored energy	12 J
Repetition rate, max.	60 transients per minute
High-voltage output HV-OUT, impedance selectable:	
PFN 1: Series resistor	12 $\Omega$ (10+2 $\Omega$ )
PFN 2: Series resistor	30 $\Omega$ (10+20 $\Omega$ )
Impulse voltage divider integrated	ratio = 1000:1 $\pm$ 5%
Mains synchronous trig.: Phase shifting, digitally selectable	0 - 360 $^{\circ}$ $\pm$ 5 $^{\circ}$
<b>TSURGE (option) acc. to ITU, FCC part 68 and IEC 61000-4-5</b>	
Peak value of impulse output voltage, adjustable, 1 V steps	0.25 - 7.0 kV $\pm$ 10 %
Waveform of impulse output voltage, acc. to IEC 60600	
Surge waveform, acc. IEC60600-1	10/700 $\mu$ s $\pm$ 30/ $\pm$ 20%
Energy storage capacitor $C_S$	20 $\mu$ F
Max. stored energy $W_E$	490 J
Discharging resistor $R_E$	50 $\Omega$
Damping Resistor $R_D$	15 $\Omega$
Load capacitance $C_B$	0.2 $\mu$ F
Resistor in series to the output $R_S$	4 * 25 $\Omega$
Outputs: 1xdirect; 4x25 $\Omega$	$R_{Ges}=R_D+R_S = 40\Omega$
Output polarity, selectable	pos / neg /alt
Repetition time, selectable	20-1000 s
Impulse voltage divider, built-in	ratio= 1000:1 $\pm$ 2 %
Current Sense:	
Threshold value, selectable	1-2500 $\mu$ As
Current sense working range	0.25 kV - 7kV-max
HV output, HV-OUT	HV connectors
Mains synchronous triggering, phase shifting, digitally selectable	0 - 360 $^{\circ}$ , step 1 $^{\circ}$