



# Transient 3000

<b>Brief Overview of Phenomena.</b>	<b>. . . . . 2</b>
<b>Applicable Standards</b>	<b>. . . . . 3</b>
<b>Test System Overview.</b>	<b>. . . . . 4</b>
<b>Generator Specifications.</b>	<b>. . . . . 10</b>
<b>Accessories and Options.</b>	<b>. . . . . 14</b>
<b>Software</b>	<b>. . . . . 18</b>
<b>EMC PARTNER's Product Range</b>	<b>. . . . . 19</b>

# Brief Overview of Phenomena

Transient 3000 Test System generates EMC events that can be observed in the low power distribution system, telecommunication or data lines.

Transient 3000 Test System replicates the following phenomena:



- **Electrostatic Discharges (ESD)**

A person becomes electrostatically charged by walking over an insulating floor surface. The capacity of the body can be charged to several kilovolts and is discharged when contact is made with an electronic unit or system. The discharge is visible as a spark in many cases and can be felt by the person concerned, who receives a „shock“. The discharges are harmless to humans, but not to sensitive, electronic equipment. The resulting currents cause interference or even component damage.



- **Electric Fast Transients (EFT) / Burst**

Industrial measurement and control equipment nearly always use conventional control units containing relays or other electro-mechanical switching devices. Fluorescent lamp ballast units, insufficiently suppressed motors (hair dryers, vacuum cleaners, drills, etc.) are found everywhere in the public power supply. All of these are primarily inductive loads which generate interference when switched on or off. EFT events, can cause microprocessor units to malfunction or reset, with corresponding disruption to normal operation.



- **Combination Wave Generator (CWG)**

Surge events can be generated by lightning phenomena, switching transients or the activation of protection devices in the power distribution system. A surge itself is influenced by the propagation path taken so that impulses from the same event may have different forms depending upon where a measurement is taken. Combination Wave Generators (CWG) simulate a surge event in power lines close to or within buildings. Mostly the disturbances are tolerable because they are single events.



- **Voltage Dips/Interruptions**

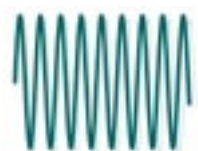
Voltage failures occur following switching operations, short-circuits, response of fuses and when running up heavy loads.

The quality of the electrical power supply is increasingly becoming a central topic of discussion. The interference sources in the mains, caused by electronic power control with non-linear components e.g. thyristors are used more frequently in domestic appliances such as hotplates, heating units, washing machines, television sets, economy lamps, PCs and industrial systems with speed-controlled drives.



- **Voltage Variations**

Voltage variations are caused by continuously varying loads connected to the power network. The voltage change takes place over a short period of time and depends upon the load. Abrupt variations have the characteristic of a voltage dip with a slow return to nominal voltage.



- **Power Frequency and Pulse Magnetic Fields**

AC current generates a steady magnetic field so that equipment, such as monitors, close to AC power lines could suffer interference.

Lightning strokes or short circuit fault currents in the power network can generate high level short duration magnetic fields.



- **Common Mode**

Common mode disturbances originate from power line currents and return leakage currents in the earthing system. The disturbances are transmitted into equipment interfaces through capacitive, inductive or resistive coupling. The interference can appear on power and signal ports. Disturbance levels can be relatively high compared to the nominal value but are usually only of short duration.

# Applicable Standards

## International Electrotechnical Committee (IEC)

IEC 61000-4-2 (Ed2:2008): Testing and measurement techniques - Electrostatic discharge immunity test.

IEC 61000-4-4 (Ed2:2004): Testing and measurement techniques - Electrical fast transient / burst immunity test.

IEC 61000-4-5 (Ed2:2005): Testing and measurement techniques - Surge immunity test.

IEC 61000-4-8 (Ed2:2009): Testing and measurement techniques - Power frequency magnetic field immunity test.

IEC 61000-4-9 (Ed1.1:2001): Testing and measurement techniques - Pulse magnetic field immunity test.

IEC 61000-4-11 (Ed2:2004): Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests.

IEC 61000-4-16 (Ed1.2:2009): Testing and measurement techniques - Test for immunity to conducted, common mode disturbances in the frequency range 0Hz to 150kHz.

IEC 61000-4-29 (Ed1:2000): Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests.



## European Standard (EN)

The same standards are applicable as for IEC (see above).



## International Telecommunications Union (ITU)

K.44 (2003): Resistibility tests for telecommunications equipment exposed to overvoltages and overcurrents - Basic recommendation

K.20 (2000): Resistibility of telecommunication equipment installed in a telecommunications centre to overvoltages and overcurrents

K.21 (2003): Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents.

K.45 (2003): Resistability of telecommunication equipment installed in the access and trunk networks to overvoltages and overcurrents.



## American National Standards Institute (ANSI)

C62.41 (1991): IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.



# Test System Overview

## Test System Features

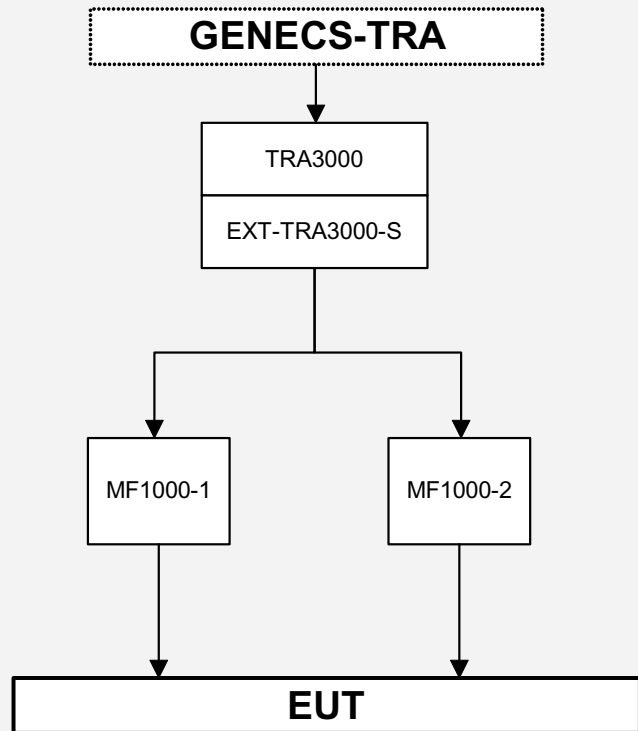
Transient 3000 CE Test System has many unique and outstanding features:

- Modular design, user configurable
- Environmentally friendly
- Humidity, pressure and temperature sensor measure lab environment
- Automatic frequency detection for mains synchronisation (50 to 400Hz)
- Internal web server
- Ethernet Port for control, communication and report generation
- USB Port: Secure transfer of files, test reports and service data
- Common Mode Disturbances DC to 150kHz 30V continuous, 300V short duration
- ESD 16kV air / 10kV contact discharge
- ESD 16kV continuous firing mode.
- EFT/Burst up to 4kV
- CWG surge up to 4kV/2kA
- AC Magnetic Field up to 1000A/m (with external antenna)
- Impulse Magnetic Field 1200A/m
- AC Interrupt 260V/16A
- AC DIP and VARIATION with internal, external variac or PS3 power supply
- DC Interrupt 110V/16A
- RS485 Port for control of external accessories
- Control of up to two external PS3 power supplies

## User Benefits

The technical excellence and many unique features translate directly into benefits for the user:

- Optimized investment. Feature expansion by on-site upgrades
- No down time: Modules removed for calibration
- Unparalleled reliability and system up-time
- Display information in any operating system with any web browser
- Customized test report, logo import, graphics, time and date
- Test report includes laboratory environmental conditions
- No proprietary software needed: HTML Report viewable with all browsers
- Active energy control system: Low power consumption, less noise, less heat
- Backwards compatibility: Existing accessories can be used with all models
- 400Hz CDN use for military and avionics testing
- Optimized for CE transient testing: Fulfills IEC basic standard requirements
- Clear menu overview: Structure automatically adjusts to hardware configuration
- Expansion to 3-phase test system up to 100A
- Operating history stored in generator for service
- Modern communication interfaces connect TRA3000 to the world
- Save operator time with the automated test routines and test report facility



## Generator Specifications

### Module Guide

TRA3000	Modules
TRA3000	BASIS
EXT-TRA3000 C	COMMON MODE
EXT-TRA3000 D	AC & DC INTERRUPTION
EXT-TRA3000 E	ELECTROSTATIC DISCHARGE
EXT-TRA3000 F	ELECTRIC FAST TRANSIENT
EXT-TRA3000 S	SURGE
EXT-TRA3000 V	AC VARIATION

### TRA3000 BASE

Supply voltage range	80 to 260V / 50Hz & 60Hz
Standby current	50VA
Internal CDN voltage rating	280Vac & 110Vdc
Internal CDN current rating	16Aac & 16Adc
Internal CDN frequency range	50 to 400Hz
Power frequency synchronisation	16Hz up to 400Hz
Coupling path selection EFT	L, N, PE, L+N, L+PE, N+PE, L+N+ PE
Coupling path selection surge	L - N, L - PE, N - PE
Internal web server	
Communication Interfaces	Ethernet, USB & RS232
Accessory control interface	RS485

Memory locations	
Atmospheric measurement	Temperature & Humidity
Test report format	HTML
PS3 control	DC, 16.7Hz, 50Hz, 60Hz, 400Hz
EUT Power monitor	10V = 400Vac
Surge voltage monitor	10V = 4kV
Surge current monitor	10V = 2kA
Trigger	BNC maximum 12V
Trigger mode	Auto, manual
Synchro source	Power, external
Power synchro on/off	0 - 360°
Power switching before / after test	0 up to 60min.

## COMMON MODE

Long Duration Voltage Tests	up to 35Vrms
Voltage setting range	0.1 to 35V
Source Impedance	50ohm
Sync turn on for AC	0°
DC switching time	1 up to 5µs
Power frequency tests	DC, 16.7Hz, 50Hz & 60Hz
Power harmonic tests	1Hz up to 150kHz
Sweep time	1 decade / 10 up to 1000s
Step size	2 up to 10%
Short duration tests (with accessories)	up to 300Vrms

## DIPS (Interrupt) AC

Voltage range	0 up to 260Vrms
Frequency range	48 up to 60Hz
Rated current	16A (100% to 0% UT)
DIP current 80%	20A (100% to 80% UT & external variac)
DIP current 70%	23A (100% to 70% UT & external variac)
Switching time	1 up to 5µs
DIP modes	< 1 period, > 1 period
Event duration < 1 period	1 up to 29999 dips
Event duration > 1 period	1 up to 29999ms
Inrush current	> 500A
Phase angle switching	0 to 360°
Interrupt type	Synchronous and Asynchronous
Dip impedance	High & Low

## DIPS (Interrupt) DC

Voltage range	0 up to 110V
Rated Current	16A
Switching time	1 up to 5µs
Event duration	1 up to 29999ms
Dip impedance	High & Low

## FAST TRANSIENT

Voltage range	0.25 up to 4.4kV
Source impedance	50ohm
Pulse front time at 50ohm	5ns
Pulse duration at 50ohm	50ns
Spike repetition frequency	up to 1MHz
Programmable parameter ramps	voltage, spike frequency, burst duration, synchronisation
Spike distribution	IEC burst pattern and random
Burst duration	0.01 up to 30ms
Burst repetition	1 up to 1000ms

Polarity	Positive and Negative
----------	-----------------------

### **SURGE Combination Wave Generator (CWG)**

Voltage Range	0.25 up to 4.1kV
Pulse front time at open circuit	1.2µs
Pulse duration at open circuit	50µs
Source Impedance	2ohm
Current range	0.125 up to 2.05kA
Pulse front time at short circuit	8µs
Pulse duration at short circuit	20µs
Pulse repetition	up to 20 pulses per minute
Programmable parameter ramps	voltage, polarity, synchronisation

### **VARIATION**

Voltage range	0 up to 260V
Rated current	6A (100% to 0% UT)
Test modes	Abrupt, Adjust
Switching time abrupt	1 up to 5µs
Ramp transition time	25 up to 999 periods

### **EXT-TRA3000 E**

Air discharge	0.5 up to 16kV
Contact discharge	0.5 up to 10kV
Voltage increment resolution	1 volt steps
Contact discharge repetition interval	0.05 to 30s
Continuous firing mode (Air)	0.5 up to 16kV
Discharge detection	every pulse or real discharges only
Discharge counter	1 to 29999
Discharge polarity	positive, negative and alternating
Holding time	5s
Programmable parameter ramps	voltage, polarity
Discharge trigger	manual or automatic

STANDARDS	TRA3000 BASE	EFT/Burst	SURGE	DIPS (INTERRUPT)	VARIAC	COMMON MODE (INT)	VAR-EXT1000	MF1000-1	CN16 (T)	CN-EFT1000	PS3	EXT-TRA3000 E	COMMON MODE (EXT)
IEC61000-4-2	●											●	
IEC61000-4-4	●	●								●			
IEC61000-4-5	●		●				□						
IEC61000-4-8	●				□			●			□ <sup>1</sup>		
IEC61000-4-9	●		●					●					
IEC61000-4-11	●			●	□ <sup>2</sup>		□ <sup>2</sup>				□ <sup>3</sup>		
IEC61000-4-16	●					●			●				□
IEC61000-4-29	●			●							● <sup>4</sup>		

● = necessary      □ = options

1. PS3 can be used for magnetic field testing including 16.7Hz

2. Internal and external variac >500A inrush current

3. PS3 ca. 100A inrush current





PS3



PS3 SOFT-EXT

## PS3

Easy to use power supply for common voltage/frequencies. Control from TRA3000. Output selected between 230V/50Hz, 115V/60Hz, 230V/16.7Hz and 115V/400Hz. 3000W capability.

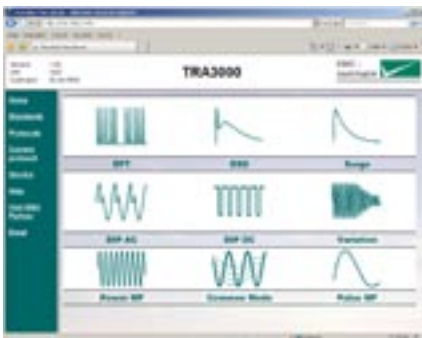
For use with TRA3000 for AC and DC DIPS testing.

## PS3SOFT-EXT

PS3SOFT-EXT extends PS3 for applications such as IEC 61000-4-28 and magnetic field at 16.7Hz.

# Software

Software is an integral part of every modern test system. TRA3000 introduces a new dimension to transient test equipment. Two layers of software increase user access and comfort.



## Web Server

Use any PC with any operating system and internet browser to connect to the internal web server. This enables access to test report and service data either directly on a PC internet browser or using the USB memory stick. Customize the test report by uploading company logo and test information from the USB memory stick. This will be applied to every report generated by TRA3000. Conversely, by simply selecting the GOTO USB button, test report and service information can be saved directly to the USB memory stick. Communication with a PC is by Ethernet, which again reduces dependency on obsolete or expensive interfaces.

Remote control from a PC is best achieved with the OPTICAL LINK and the GENECS-TRA software package.



## GENECS-TRA

Providing backwards compatibility with all existing EMC PARTNER test instrumentation, GENECS-TRA accepts ethernet IP addresses. GENECS-TRA has been extended to include test sequencing and enhanced reporting functionality enabling complex sequences of up to 99 tests to be linked. In addition to remote programming and control of the generators, test report information is available to word processing or other evaluation programs such as EXCEL.



## OPTICAL LINK

The 10m long fibre optic cable provides EMC isolation between TRA3000 and a remote control PC. The remote control PC will not be disturbed by the impulses generated by TRA3000 and the operator can locate the PC in a less hostile environment. The optical isolation allows up to 4 TRA3000 generators with Ethernet connections to be linked to one PC.