

# Technical Specification

No. E-TRA3000.doc  
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## 1 Tester Type TRA3000-System

TRA3000 is a technically advanced CE tester. Individual modules or any combination of modules can be fitted ON-SITE to give the most flexible and cost efficient system available today. TRA3000 includes all circuits and a single phase CDN to carry out immunity tests on power supply in accordance with IEC 61000-4-4 Ed.2, -5 Ed.2, -11 Ed.2, -16 Ed1.2.

Adding accessories expands test capability to comply with IEC 61000-4-2, -8, -9, -29.

Genecs software is a remote control package for programming from a PC.

TRA3000 also includes a web server and Ethernet interface for direct communication without the need for expensive interfaces or specialist software.

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## 1.1 Introduction

The one box solution for full compliance transient immunity testing. TRA3000 is a flexible equipment for transient immunity tests on power supplies of 110V or 230V using the internal CDN.

The TRA3000 can be configured to include any combination of available test circuits and represents exceptional value for money.

- Environmentally friendly
- Modular architecture
- Magnetic field up to full levels
- Protocol using web server
- Ethernet and USB interfaces
- Common mode testing in both continuous and short duration.
- Semi-conductor high voltage switches to improve reliability and reproducibility

## 2 General

### 2.1 Brief description of the generator

TRA3000 circuits are modular and can be easily configured on site without the need for upgrade work of re-calibration. ESD, EFT, SURGE, Dips, Variation and common-mode immunity tests can all be performed. In addition outstanding features are:

- Web server for easy protocol of all test results.
- Display information using any operating system with any web browser.
- 400Hz CDN for military and avionics work.
- Expansion to 3-phase system up to 100A.
- Remote control of PS3 power supplies for easier testing
- Choice of internal variac, external variac or PS3 for voltage variation and magnetic field tests
- Internal module for common mode test in accordance with IEC 61000-4-16

### 2.2 EUT connection (equipment under test)

The EUT is connected on the front panel of the TRA3000 tester.

### 2.3 Standards, applications

IEC Basic standard	EMC PARTNER Generators	Remarks	EN Standards
61000-4-2 Ed.2	TRA3000 plus EXT-TRA3000 E	Fully compliant	EN 61000-4-2
61000-4-4 Ed.2	TRA3000 F	Fully compliant	EN 61000-4-4
61000-4-5 Ed.2	TRA3000 S	Fully compliant	EN 61000-4-5
61000-4-8 Ed 2	TRA3000 V + MF1000-1	Fully compliant	EN 61000-4-8
61000-4-9	TRA3000 S + MF1000-1	Fully compliant	EN 61000-4-9
61000-4-11 Ed.2	TRA3000 D-V	Fully compliant	EN 61000-4-11
61000-4-16 Ed1.2	TRA3000 C	Fully compliant	EN 61000-4-16
61000-4-29	TRA3000 D + PS3	Fully compliant	EN 61000-4-29

### 3 Generator circuit, Technical Data

#### 3.1 Mechanical dimensions, climatic conditions

The Tester TRA3000 is a 19" plug-in system for a 19" rack.

Type	Dimension [ mm ]	Weight	Version
	width x depth x height [ mm ]	[ kg ]	
TRA3000	520 x 433 x 180 mm	28	19" 4UH

The power line input is located at the rear side of the TRA3000.

Voltage between phase and neutral	230 V ( 50 Hz ) 115 V ( 60 Hz )	± 10 % ± 10 %
Power consumption	operation mode < 800 VA Standby < 50 VA Power OFF < 10 VA	( 230 V, 50 Hz ) ( 115 V, 60 Hz )

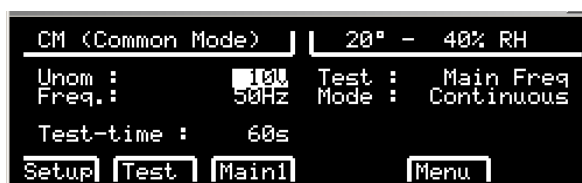
Following power cords can be ordered:

Europe ( CEE-7/VII )    England ( BS-1363 )    Switzerland ( SEV Type 12 )    USA ( NEMA5-15P )

Environment conditions		
Temperature range	°C	0 to 35 °C
Humidity	rh %	25 to 80%
Pressure	kPa	86 to 106



TRA3000



Display

#### Accessories included:

- Power cord (1 x 2m): D Schuko (16A), CH (10A), USA (16A), UK (13A), IN (10A)
- MC cables with protected banana plugs; black, blue and green/yellow (3 x 2m)
- Remote control cable 25/9 pole (1 x 3m)
- Ethernet cable
- User manual (1 pce) including:
  - Declarations of conformity: EMC, LVD, BASIC
  - Verification protocol EMC PARTNER
  - USB stick for data transfer

### 3.2 Technical data

#### 3.2.1 TRA3000 BASE

#### 3.2.2 Coupling / De-coupling Network

Maximum EUT power supply voltage	280Vac & 110Vdc		
Maximum EUT current rating	16Aac & 16Adc		
Internal CDN frequency range	50 to 400Hz		
Power frequency synchronization	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		

#### 3.2.3 Control features

Internal web server			
Communication Interfaces	Ethernet, USB		
Accessory Control Interface	RS485		
Atmospheric measurement	Temperature & Humidity		With ATS Temperature, Humidity & Pressure
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 60 minutes		

### 3.3 Fast Transient circuit ( F )

Voltage waveform into 50 Ω:	Impulse Output		IEC 61000-4-4 Ed.2
Rise time	5 ns	± 30%	
Half time value	50 ns	± 30%	
<b>Voltage waveform into 1000 Ω:</b>			
Risetime	5 ns	± 30%	
Half time value	50 ns	- 15 ns	+ 100 ns
<b>Adjustable voltage range</b>			
Adjustable voltage range	250 V to 4400 V		
Voltage amplitude into 50 Ω	125 V to 2000 V	± 10%	
Voltage amplitude into 1000 Ω	250 V to 4000 V	± 20%	
Source impedance	50 Ω	± 10%	
Spike frequency	1 kHz up to 1 MHz		
Maximum Spikes per seconds	8'000 at 1000 V		1000 at 4000 V
Burst duration	0.01 ms up to 30 ms		
Burst repetition	1 up to 1000 ms		
Polarity	positive / negative		
Ramps	-Voltage, -Spike frequency, - Synchronisation, - Burst duration		

#### 3.3.1 EXT-TRA3000 E ESD accessory

Voltage range „air discharge“	0.5 to 16 kV	± 10%	
Voltage range „contact discharge“	0.5 to 10 kV	± 10%	
Continuous firing mode	0.5 to 16kV	± 10%	
Voltage step increments	1 volt steps		
Contact discharge repetition	0.05 up to 30s		
Discharge Polarity	positive / negative; alternating		
Number of discharges	-preselectable		1 - 29999
Detection of the number of discharges	-count every pulse -count discharge only.		
Ramps	voltage amplitude, alternate polarity		
Discharge modes:	-Air discharge -Contact discharge		

**3.3.2 SURGE circuit ( S )**

Voltage range	0.25 up to 4.1kV	±10%	
Front time	1.2 µs	± 30%	
Time to half value	50 µs	± 20%	
Current range	0.125 up to 2.05kA	±10%	
Front time	8 µs	± 20%	
Time to half value	20 µs	± 20%	
Output impedance Umax / Imax	2 Ω	± 20%	
Pulse repetition	Up to 20 / minute		
Polarity	positive / negative / alt		
Ramps	-Voltage -Polarity -Synchronisation		

**Attention !** The CDN-SURGE 1,2 / 50; 8 / 20 µs is designed for maximum power consumption at 280Vrms.

If using coupling de-coupling network other than from EMC PARTNER, the maximum power dissipation of the TRA3000 must be considered. Power Line voltages higher than specified can destroy the impulse forming devices in the TRA3000. Please contact EMC PARTNER AG or a representative before using an unknown Coupling Network.

**3.3.3 AC DIPS circuit ( D )**

Voltage range a.c.	0 to 260 V		
Frequency range with variac	48 Hz to 60 Hz		external Source PS3
Nominal current	16A		100% to 0% UT
Inrush current	> 500 A Peak	- 0%, +30%	
Interruption time	50 µs to 30 s		phase angle selectable
Amplitude interruptions with the internal variac	continuously selectable 0 to 100 %	Max. 5A	IEC: 0 %, 40 %, 70 %, 80%
Phase angle for turn ON and OFF of the EUT selectable	0 to 360°	± 5°	
Voltage variation with the internal variac	0 to 110 %	Max. 5A	2 s to 30000 s
Voltage variation with external variac	0 to 110 %	Max 16A	2 s to 30000 s
Less than 1 period	Interruption within one period. Input as angle		
More than one period	Interruption longer then one period. Input in ms		
Ramps	-Voltage -Synchronisation angle -Interruption time		



For 0 to 100% interruptions the internal Variac is not used, the test can be carried out up to 16 A.  
 Interruption with UT =EUT Power 1 voltage not zero, using the internal variac limits the EUT power current.  
 The maximum current values are listed in the table below.  
 Different load types influence the maximum current capability.

**Interruption and Voltage Variation with internal Variac:**

Types of loads:		Variable power consumption maximum 2.6 kW at UT 230 V. With reduction of the voltage the current is also reduced. Examples: Ohmic -, inductive -, capacitive -, mixed loads	Constant power consumption maximum 1,2 kW at UT = 220V. With reduction of the voltage the current is increased. Example: switched power supply	voltage change in % of UT at current change 0 to 100 % UT= voltage at EUT Power 1
switching from	to			
UT	% UT	current range r.m.s	current range r.m.s	% of UT
100 %	0 %	0 to 16A	0 to 16A	0.7 %
100%	80%	0 to 10 A	0 to 5A	4%
100%	70%	0 to 9 A	0 to 6 A	4%
100%	40%	0 to 5 A	0 to 10 A	5%

Note: all values apply for switching time at %UT < 5 s

**Interruption and Voltage Variation with external Variac**

Types of loads:		Variable power consumption maximum 3.7 kW at UT 230 V. With reduction of the voltage the current is also reduced. Examples: Ohmic -, inductive -, capacitive -, mixed loads	Constant power consumption maximum 3,7 kW at UT = 220V. With reduction of the voltage the current is increased. Example: switched power supply	voltage change in % of UT at current change 0 to 100 % UT= voltage at EUT Power 1
switching from	to			
UT	% UT	current range r.m.s	current range r.m.s	% of UT
100 %	0 %	0 to 16A	0 to 16A	0.7 %
100%	80%	0 to 12.8 A	0 to 20A	4%
100%	70%	0 to 11.2 A	0 to 23 A	4%
100%	40%	0 to 6.5 A	0 to 40 A	5%

Note: all values apply for switching time at %UT < 5 s

**3.3.4 DC DIPS circuit ( D )**

Voltage range d.c.	0 to 110 V	EUT Power	Power supply e.g. PS3
Current range	0 up to 16A		
Interruption time	1ms up to 29999 ms		
Rise and fall time at 100 Ohm load	1 µs to 5 µs		

**3.3.5 Common mode circuit ( CM )**

Long duration voltage tests	Up to 30Vrms		
Voltage setting range	0.1 to 30V		
Source impedance	50 Ohm		
Sync turn on for AC	0°		
DC switching time	1 to 5 µs		
Power frequency tests	DC, 16.7Hz, 50Hz, 60Hz		
Power harmonic tests	15Hz to 150kHz		
Sweep time	1 decade / minute		
Short duration tests	Up to 300Vrms		With accessories

**3.3.6 Variation circuit ( V )**

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

**3.3.7 Overview modules**

STANDARDS	TRA3000 MODULES							ACCESSORIES					
	TRA3000 MAINFRAME	ESD	EFT	SURGE	DIPS (INTERRUPT)	VARIAC	COMMON MODE INT	VAR-EXT1000	MF1000-1 or 2 or 3	CN16(T)	CN-EFT1000	PS3	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 (at least one must be selected)

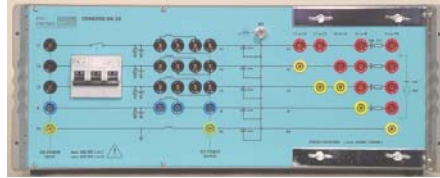
Notes

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 at 50/60Hz
4. Requires 2 x PS3

## 4 Overview accessories

### 4.1 Accessories to power supply

CDN2000-06-32  
Three phase coupling  
de-coupling filter



Manually operated coupling path selection.

CDN2000-06A-32  
Three phase coupling  
de-coupling filter



Automatically operated coupling paths selection

CDN2000-06A-32  
Three phase coupling  
de-coupling filter



Automatically operated coupling paths selection

### 4.2 Accessories to telecom and data line coupling

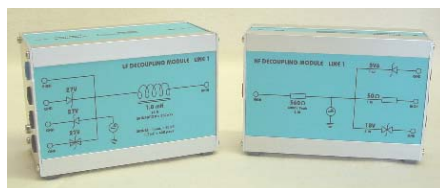
CDN-UTP  
Telecom coupling de-  
coupling filter



CWG and 10/700  $\mu$ s - SURGE  
coupling onto data lines up to 6 kV.

**Application** for high speed telecom  
connections

CDN-KIT1000  
universal coupling de-  
coupling kit



CWG and 10/700  $\mu$ s - SURGE  
coupling onto data lines up to 6 kV.

**Application** for common mode lines  
only , no telecom data lines

NW-K44PC  
Power contact network

TRA OPTION NW-  
K44PI  
Power induction network



Requires Dip circuit in TRA3000

PCPI160E  
Power contact current  
limiting resistor matrix.



Set of 2 (one only shown).  
Together with NW-K44PC.

### 4.3 Accessories to 3-Phase DIPS & Interrupts

PFS  
AC & DC interrupts up  
to 480V / 754A  
PFS32 to 32A  
PFS63 to 63A  
PFS75 to 75A

SRC  
Source to enable 3-  
phase dip testing  
SRC32 to 32A  
SRC63A to 63A  
SRC75 to 75A



Automatic control from TRA3000

Together with PFS

#### 4.4 ESD Accessories

EXT-TRA3000 E  
ESD module external to  
TRA3000



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#### 4.5 General Accessories

ATS  
Temperature, Humidity  
and Pressure sensor



