ThermoScientific EMCPro PLUS

Multi-Function Solution for Conducted Immunity Testing (EMC)

Product

The Thermo Scientific EMCPro Plus Supports Testing for EU CE Marking, Related Global Regulatory Compliance, and QA/Product Performance Testing. The EMCPro Plus Supports International EMC Standards (IEC/EN) and ANSI, UL and IEEE® Standards and Recommendations. It Provides a Test Solution for Full Compliance to the Latest Revisions of:

- IEC 61000-4-4 (EFT/Burst)
- IEC 61000-4-5 (Surge)
- IEC 61000-4-8 (Power Freq. Mag. Field)
- IEC 61000-4-9 (Pulsed Mag. Field)
- IEC 61000-4-11 (Dips/Interrupts)

FEATURES/:

- Portable, mid-range EMC test system for design integrity testing
- Resident capabilities for compliance testing up to 7 IEC/EN standards
- Also addresses many ANSI/IEEE, ITU, ETSI and UL standards
- Surge testing to 6kV with Combination, Telecom, and Ring Waves
- EFT testing to 4kV
- Monitors surge voltage and current at the output terminals
- Monitors output of the coupling unit and automatically switches connections according to coupling mode

The Thermo Scientific™ EMCPro PLUS™ EMC Test System is the answer to manufacturers' demands for a mid-range, multi-capability EMC immunity test instrument. It operates via our easy-to-use Microsoft Windows®-based PC software or from the front panel, and is easily configured to meet immunity standards required for CE Marking and related global regulatory compliance testing requirements.
A portable and low-cost test instrument solution, the EMCPro PLUS system is ideal for companies who require integrated test capability and versatility.

The EMCPro PLUS features surge testing to 6kV with the most common surge requirements: Combination Wave, Telecom Wave and Ring (Oscillatory) Wave.

The EMCPro Plus can also be configured for custom test protocols to meet specific test requirements using the software and a full line of options and accessories, which include 3ø AC/DC Mains and I/O line Coupling/Decoupling, Networks, Magnetic Field Monitors, Magnetic Loop Coil, EFT Verification Loads, Differential High Voltage Probes and more.

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Thermo Scientific EMCPro PLUS

Model: PRO-BASE

System Operating Voltage: 90-240VAC, 50/60Hz

Integrated EUT Mains Coupler/Decoupler (CDN):

AC Voltage:	1 phase, 50 - 250 VAC
Frequency:	50/60 Hz
DC Voltage:	100 VDC, Max
Current:	16 A, Max AC @250VAC 10A, Max DC to 100VDC 16A, Max to 48VDC

EUT Connectors: NEMA, British, Schuko, India, Australia, China

Control Interface:

Manual	Via Front Panel VDU
Computer	Via RS232/USB Fiber-optic interface

Safety Features:
External Interlock for users
Interlock for CCL connector
External stop input

Environmental Operating Conditions:

Temperature	+15°Cto +40°C
Humidity	10 - 75%, non-condensing
Altitude	8000 ft. maximum

Physical Specifications:

Height:	22.9 cm (8.7 in)
Width:	43.4 cm (17.1 in)
Depth:	64.8cm(25.5in)
Weight:	39 kg (85 lb)

CE Marking: Safety (LVD) and EMC Directives

Surge Waveform Monitoring:

Monitors are switched automatically to match generator coupling mode.

Voltage monitor provides 1000:1 ±10% attenuation factor

Current monitor provides 200:1 ±10% attenuation factor

Model: PRO-EFT

EFT Testing per IEC 61000-4-4, Ed.3; EN 61000-4-4; ANSI C62.41.2; ANSI C62.45

Voltage Waveform (into 50Ω load):
5 ns RT ±1.5ns; 50ns PW ±15ns; Burst Duration 15ms ±3ms @5kHz, 0.75ms ±0.15ms @100kHz; Burst Period 300ms ±60ms; V_{pk} 125V-2kV

Voltage Waveform (into 1000Ω load):
5 ns RT ±1.5ns; 50ns PW -15, +100ns; Burst Duration 15ms ±3ms @5kHz; 0.75ms ±0.15ms @100kHz; Burst Period 300ms ±60ms; V_{pk} 240V-4kV

Frequency: 1-100 kHz, in 0.5k Hz steps, ±10%

Coupling Capacitor: 10 nF (internal)

PRO-EFT Accessories & Options:

CCL
Capacitive Coupling Clamp conforming to IEC 61000-4-4, Ed.3

CCLC
Capacitive Coupling Clamp Cover

CCL-VERIFY
Capacitive Coupling Clamp Transducer Plate for verification of capacitive clamp, conforming to IEC 61000-4-4, Ed.3

EFT-ATTN-CAL
For EFT verification: Set of one 50Ω and one 1000Ω precision loads having >400MHz BW, one 20dB Attenuator with 1GHz BW

CM-3CD-EFT/32
Three phase, 32A External CDN for EFT

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Model: PRO-SURGE

Surge per IEC 61000-4-5, Ed. 3, EN 61000-4-5, ANSI C62.41.2 Cat A & B, UL 1449 Ed. 3 Sect. 37; ANSI C62.45

Direct Output Specifications[1]:

OC Voltage Waveform:	1.2µs Front Time ±30% Duration 50µs ±20%
SC Current Waveform:	8µs Front Time ±20% Duration 20µs ±20%
Peak OC Voltage:	250V - 6.0kV±10%, 2Ω or 12Ω mode
Peak SC Current[2]:	125 A - 3.0kA ±10% 2Ω mode 20.8 - 500A ±10% 12Ω mode
Impulse Repetition Rate:	Up to 2 impulses/min @6kV (~24 Sec Charge Time)
Voltage Undershoot:	30% Max
Coupling Capacitor:	18µF (Internal to generator)

Specifications at EUT Output of CDN[1]:

OC Voltage Waveform:	1.2µs Front Time ±30% Duration 50µs ±10µs
SC Current Waveform:	
Diff Mode (L-L) (18µF / 2Ω)	8µs Front Time ±20% Duration 20µs ±20%
Comm Mode (L-PE) (9µF / 12Ω)	8µs Front Time ±20% Duration 2.5µs ±30%
Peak OC Voltage:	Set voltage ± 10% either mode (2Ω or 12Ω)
Voltage Undershoot:	N/A at CDN
Residual Surge Voltage:	≤ 15% of Set Voltage or ≤ 480V, whichever is higher

Notes:
1 – Specifications listed are from IEC 61000-4-5, Edition 3. This option also meets specifications from EN 61000-4-5 Edition 2, ANSI C62.41.2 Cat A&B, UL 1449 Ed. 3 Sect. 37. Calibration records may indicate overlapping tolerances.
2 – Short circuit current available is a function of the set output voltage ÷ series impedance (2Ω or 12Ω).

PRO-RING

Ring Wave Surge per ANSI C62.41.2, Cat A, B; IEC 61000-4-12 and EN 61000-4-12; ANSI C62.45

OC Voltage Waveform:	100kHz Damped Cosine RT = 0.5µs ±30% Damping = 40%/peak
Peak OC Voltage:	250V - 6.0kV ±10%, 12Ω or 30Ω mode
Peak SC Current[2]:	200A ±10% 30Ω mode 500A ±10% 12Ω mode
Impulse Repetition Rate:	Up to 2 impulses/min @6kV (~24 Sec Charge Time)

Notes:
1 – Specifications listed are from ANSI C62.45. This option also meets specifications from ANSI C62.41.2 Cat A&B and IEC 61000-4-12, except Rep Rate is ≤ 2 impulses/min whereas IEC 61000 -4-12 specifies ≤ 60. Calibration records may indicate overlapping tolerances.
2 – Short circuit current available is a function of the set output voltage ÷ series impedance (12Ω or 30Ω).
3 – PRO-TELECOM and PRO-RING cannot be installed simultaneously.

PRO-SURGE Accessories & Options

CM-3CD-SRG/32 — **3**-phase, 32A External CDN for Surge

CM-I/OCD — External 8-wire coupler/decoupler for I/O signal lines

PK1001D — Differential High Voltage Probes

Current Monitor Probe

PRO-TELECOM

Surge per IEC 61000-4-5, Ed. 3, EN 61000-4-5

Direct Output Specifications[1]:

OC Voltage Waveform:	10µs Front Time ±30% Duration 700µs ±20%
SC Current Waveform:	5µs Front Time ±20% Duration 320µs ±20%
Peak OC Voltage:	250V – 6kV ±10% 15Ω or 40Ω (using 3T25 Ext. 25Ω Box) Mode
Peak SC Current:	6.25 – 150A ±10% 40Ω (with 3T25 Ext. 25Ω Box) Mode
Repetition Rate:	1 impulse per/min @6kV (~48 Sec Charge Time)

Notes:
1 – Specifications listed are from IEC 61000-4-5, Edition 3. This option also meets all or most parts of specifications from EN 61000-4-5 Edition 2, TIA-968-B and ITU K.44, K.45. Calibration records may indicate overlapping tolerances.
2 – Short circuit current available is a function of the set output voltage ÷ series impedance (40Ω).
3 – PRO-TELECOM and PRO-RING cannot be installed simultaneously.
4 – External dual 25Ω Resistor box, Model 3T25 is included with any PRO-TELECOM option.

CM-TELCD — External coupler for Telecom Lines.

Model: PRO-PQF

Voltage Dips, Interruptions per IEC 61000-4-11, Ed.2

Voltage Dips:	40%, 70%, 80% residual voltage ±5%
Short Interrupts:	0% residual voltage, ±5%
Transition Time:	RT, FT ≥1µs & ≤5µs with 100Ω resistive load
Phase Angle Accuracy:	0° to 360° with <±10° phase error between interrupt and power frequency
Input Voltage/Current:	50-250VAC, 50/60Hz, 16A Max
PQF Sync Output:	+5V TTL signal for oscilloscope trigger

PQF-QUAL — Optional circuit per IEC 61000-4-11 to verify in-rush current of AC source to the PQF

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PRO-HPOWER

Power Frequency Magnetic Field per IEC 61000-4-8, Ed. 2 and EN 61000-4-8

Frequency of Magnetic Field:	50 or 60 Hertz
Amplitude of Magnetic Field:	0.5 to 4A/m in 0.25A steps, ±10%
Coil Factor	0.65 to 1.0 (Works with coils from many manufacturers)
Duration	1 to 9999 seconds

PRO-HPULSE

Pulse Magnetic Field per IEC 61000-4-9, Ed. 2 & Ed. 1.1 and EN 61000-4-9

Field Pulse Type:	8/20µs
Amplitude of Pulsed Field:	100 to 1000A/m in 5A steps, ±10%
Coil Factor:	0.65 to 1.0 (Works with coils from many manufacturers)
Time Between Tests:	15 to 999 seconds
Number of Sequential Tests:	1 to 999
Coil Types:	Same as PRO-HPOWER

EMCPro PLUS Options Cross-Reference Chart

		EMCPro-PLUS						
		PRO-SURGE (to ±6Kv)	PRO-RING (Up to 2 Impulses/ Min @±6KV)	PRO-EFT (to ±4Kv)	PRO-TELECOM (to ±6Kv)	PRO-HPOWER (to 4A/m)	PRO-HPULSE (to 1000A/m)	PRO-PQF
Standard #:	Standard Name/Scope:							
IEC 61000-4-4	Elect. Fast Transient Burst Immunity			●				
IEC 61000-4-5	Surge Immunity	●			●			
IEC 61000-4-8	Power Frequency Magnetic Field Immunity					●		
IEC 61000-4-9	Pulsed Magnetic Field Immunity						●	
IEC 61000-4-11	Voltage Dips/Short Interrupts							●
IEC 61000-4-12	Ring Wave Immunity		●					
ANSI C62.41.2, CAT A & B	Recommended Practice on Characterization of Surges in Low Voltage AC Power Circuits	●	●	●				
C37.90.1	Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Power Apparatus			●				
C62.45	Recommended Practice on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits	●	●	●				
Telcordia GR-1089 CORE	EMC and Electrical Safety - Generic Criteria for Network Telecommunications Systems	●		●	●			
UL 1449	Standard for Safety Surge Protective Devices	●						

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Model: CM-3CDEFT-32 Three Phase, 32A, Coupler/Decoupler for EMCPro PLUS

Pulse Specifications:

- EFT Full compliance to IEC 61000-4-4, Ed. 3, 2012
- 4.4kV Maximum Peak Voltage
- 5.5ns Rise Time, ±1.5ns
- 45ns Pulse Width, ±15ns
- Semi-Manual Operation
  - Couple to all lines simultaneously, Common Mode (L1, L2, L3, N) to PE
  - Couple to individual lines, Common Mode
- Back filter reduces pulses on source to <10%

Electrical Specifications:

- System power configurable in two ranges:
  - 100 – 120VAC, 50/60Hz
  - 220 – 240VAC, 50/60Hz
  - 1A @ 120VAC; 0.5A @ 240VAC
- EUT Power Rating:
  - AC: 50 -250VAC line to ground; 50 - 433VAC line to line, 32A/Phase, 3-phase, 5-wire, 50/60Hz
  - DC:
    - 0 – 48VDC, 25A
    - 49 – 100VDC, 8A
    - 101 – 220VDC, 1.2A
    - 221 – 440VDC, 0.3A

  Over-current protection includes phase-balance detection. When using for single phase or two phase loads the over-current protection will trip at a load current of 85% of the CM-3CDEFT-32 rating.

Physical Specifications:

- Environmental:
  - Operating:
    - Temperature 15 – 40 C^{o}
    - Relative Humidity 10 – 85%, Non-Condensing
    - Altitude 10,000 Feet, max
  - Storage:
    - Temperature 0 – 60 C^{o}
    - Relative Humidity 10 – 90%, Non-Condensing
    - Altitude 10.000 Feet, max
- Dimensions:
  - 17”W
  - 22”D including handles; 19.25”D without the handles
  - 7”H
- Weight:
  - 27 Lbs.

Model: CM-3CDSRG-32 Three Phase, 32A, Coupler/Decoupler for EMCPro PLUS

Pulse Specifications:

- Surge Full compliance to IEC 61000-4-5, Ed. 2
- Semi-Manual Operation
- Single Line Coupling
- Back filter reduces pulses on source to <10%

Electrical Specifications: Identical to CM-3CDEFT-32 (see above)

Physical Specifications: Identical to CM-3CDEFT-32 except Weight = 35lbs (see above)

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CM-3CDEFT-32 and CM-3CDSRG-32 (Views)

Rear View

Isometric View

Model: CM-TELCD

The CM-TELCD is a single box test system designed for application of surge pulses to unshielded and balanced signal lines per IEC 61000-4-5. Coupling, decoupling and clamping circuits are provided for five wire interfaces (two balanced pairs plus ground).

ELECTRICAL SPECIFICATIONS:

Surge Parameters:

Input Waveforms:	1.2×50µs and 10×700µs per IEC 1000-4-5
Maximum Voltage:	4.4kV
Coupling Modes:	Line to ground and line to line per IEC 1000-4-5
Coupling Resistors:	N×25Ω per line for the 10×700µs N×40Ω per line for the 1.2×50µs N=1, 2, 3, or 4 surged lines
Coupling Arrestors:	Selectable 90V or 300V
Coupling Capacitors:	Selectable 0.1µF
Decoupling Inductors:	Current compensated 20mH
Maximum Input Clamp Voltage:	4.4kV Pulse

Clamp Type	Clamp Voltage
20	30
225V	325V
Capacitor	10V, Pre-Surge Cap Voltage Equals 0V

Cap Clamp Bias Voltage:	0V-210V per capacitor
Cap Clamp Bias Current:	40mA @ 210V per capacitor

Signal Parameters:

Interface Capacity:	5 wire, 2 balanced pairs plus ground
Maximum Voltage:	200V
Maximum Current:	1A
Maximum Frequency:	To 100kHz without significant degradation

MECHANICAL SPECIFICATIONS:

Height:	40.0cm (44.4cm with bumpers and handle)
Width:	40.5cm
Depth:	12.0cm
Weight:	9.55kg

ENVIRONMENTAL SPECIFICATIONS:

Operating Limits:

Temperature:	15°C-40°C
Humidity:	10%-90%, non-condensing
Altitude:	3000m maximum

Storage Limits:

Temperature:	0°C-50°C
Humidity:	10%-90%, non-condensing
Altitude:	3000m maximum

Model: CM-I/OCD

The CM-I/OCD is a single box test system designed for application of surge pulses to unshielded and asymmetric signal lines. Coupling, decoupling and clamping circuits are consistent with IEC 61000-4-5 requirements. It provides the capability to manually test nine wire (eight lines plus ground) interfaces.

ELECTRICAL SPECIFICATIONS:

Surge Parameters:

Input Waveform:	1.2×50µs OCV, 8×20µs SCI, ≤2Ω impedance
Maximum Voltage:	4.4kV
Coupling Modes:	Single line to line, single line to ground
Coupling Resistor:	40Ω
Coupling Arrestors:	Selectable 90V or 300V in series with 40Ω
Coupling Capacitors:	Selectable 0.1µF or 0.5µF in series with 40Ω
Standard Decoupling:	20mH
Optional Decoupling:	400Ω, 200Ω, or 100Ω in parallel with 20mH

Voltage Amplitude Loss into 20kΩ Load:

Parallel R	Coupling	Loss
400Ω	L-L	5.1%
400Ω	L-G	9.7%
200Ω	L-L	9.5%
200Ω	L-G	17%
100Ω	L-L	17%
100Ω	L-G	29%
1MΩ	L-L	0.2%
1MΩ	L-G	0.4%

Maximum Input Clamp Voltage, 4.4kV Pulse:

Clamp Type	Clamp Voltage
20V	25V
225V	265V
Capacitor	7V, Pre-Surge Voltage = 0V

Cap Clamp Bias Voltage:	0V-210V per capacitor
Cap Clamp Bias Current:	40mA @ 210V per capacitor

Signal Parameters:

Interface Capacity:
Maximum Voltage:
Maximum Current:
Voltage Amplitude Loss, 100kHz Sine Wave:

Parallel R	Load	Loss
400Ω	5kΩ	7.4%
400Ω	1kΩ	29%
200Ω	5kΩ	3.8%
200Ω	1kΩ	17%
100Ω	5kΩ	2.0%
100Ω	1kΩ	9.1%
1MΩ	5kΩ	63%
1MΩ	1kΩ	92%

MECHANICAL SPECIFICATIONS:

Height:	40.0cm (44.4cm with bumpers and handle)
Width:	40.5cm
Depth:	12.0cm
Weight:	9.55kg

ENVIRONMENTAL SPECIFICATIONS:

Operating Limits:

Temperature:	15°C-40°C
Humidity:	10%-90%, non-condensing
Altitude:	3000m maximum

Storage Limits:

Temperature:	0°C-50°C
Humidity:	10%-90%, non-condensing

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Model: PK1001D / PK1002D

Differential High-Voltage Surge and Transient Probe

Can be used with Most Oscilloscopes	**PK1001D**	6kv <10ns Risetime
Unique Interlock System for Operator Safety	**PK1002D**	10kV <15ns Risetime
Low EMI Sensitivity		

ELECTRICAL:

Each Input:

Input Resistance	10K ±2%
Peak transient voltage, repetitive	0 to ±6kV, PK1001D 0 to ±10kV,
PK1002D	
Transient duration	1 ms max
Rise Time	<10 ns
Overshoot	<5% typical
Maximum steady-state input	277V rms or dc
Transient repetition rate:	
Maximum with max steady-state input superimposed	10 pulses/minute
Maximum with zero steady-state input superimposed	120 pulses/minute.

Each Output:

Impedance	50 ohms ±2% (Use 1 MΩ scope input impedance)
Attenuation	200:1 ±3%
Compensation Adjustments	None

Recommended Oscilloscope: 500 MHz BW, Min, with high impedance 1 MΩ inputs which are adjustable to a ratio of 200:1.

Safety:

The interlock Unit opens connections between the high voltage probes and the pins and shells of the BNC coax connectors intended for scope connection, until:

1. both BNC's are connected to the oscilloscope
2. the oscilloscope is connected, via its power cord, to earth ground.

Panel lights indicate "ready" and "not ready" status.

Power: 100/120/220/240V, 10W, 50-60 Hz

FOR ADDITIONAL INFORMATION OR TO PLACE AN ORDER

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