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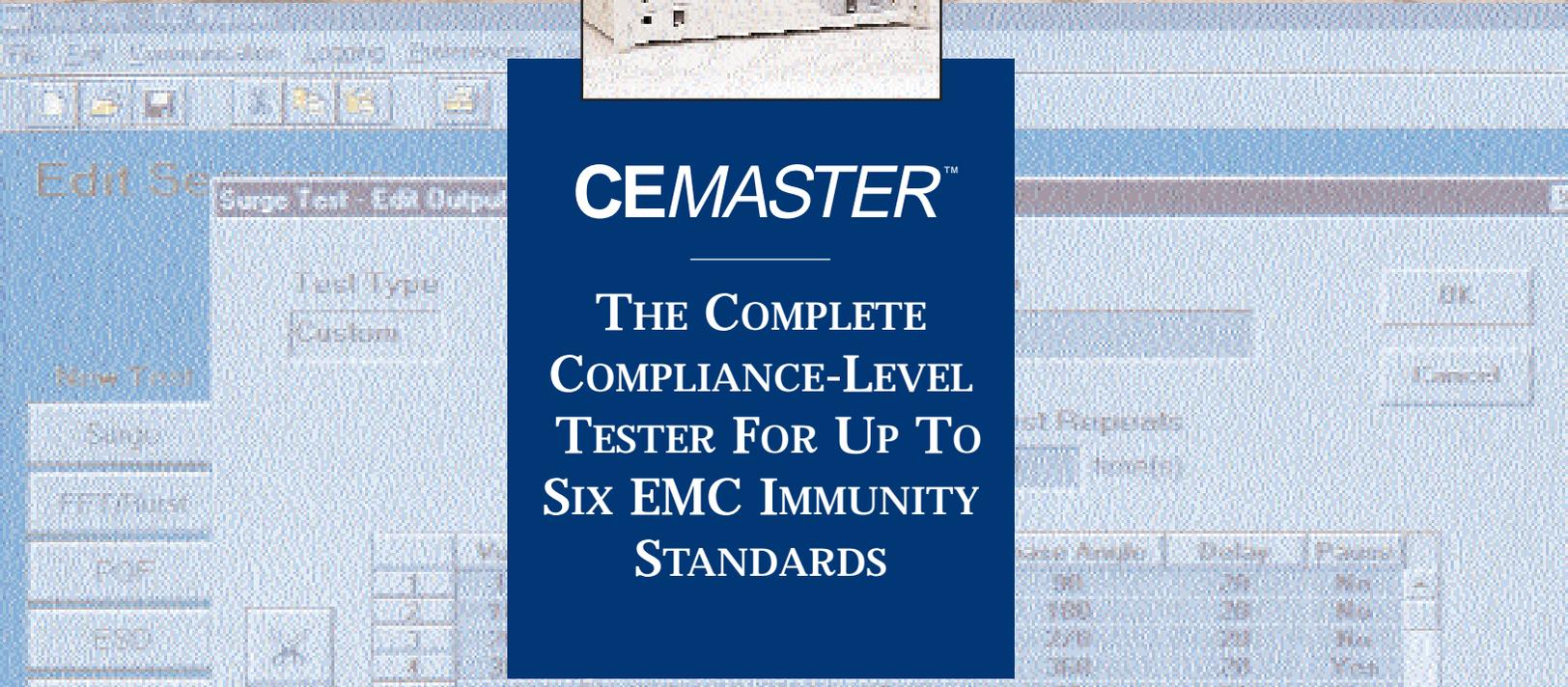
THERMO VOLTEK

EMC COMPLIANCE



CEMASTER™

**THE COMPLETE
COMPLIANCE-LEVEL
TESTER FOR UP TO
SIX EMC IMMUNITY
STANDARDS**



Overview Of The EMC Directive And CE Mark

The European Union's EMC Directive (see inset) became mandatory in January 1996 for all electrical and electronic products shipped to a member state of the European Union.

The Directive also hails the beginning of a global EMC (Electromagnetic Compatibility) initiative to harmonize compliance regulations over the next few years. For manufacturers of electronic and electrical products, these directives and regulations will have an enormous impact upon how they conduct business worldwide. At this time, acceptable routes for bringing products affected by the Directive to the marketplace are becoming well defined. Manufacturers who do not adhere to EMC test protocols face the prospect of losing entire markets.

The EMI (Electromagnetic Interference) Phenomena

There are five basic types of EMI-related phenomena that the majority of electrical and electronic products must be tested to:

- **Electrostatic Discharge (ESD)** - charged people or objects that disrupt the operation of or cause damage to electrical or electronic equipment by either making direct contact or within close proximity to cause damage.
- **Electrical Fast Transient (EFT) or Burst** - switching transients coupled into power or I/O lines that may disrupt the operation of or cause damage to electrical or electronic equipment usually as a result of mains power switches from the power stations or within the building.
- **Surge** - nearby lightning strikes that couple relatively high energy transients into power lines that may disrupt the operation of or cause damage to electrical or electronic equipment.
- **RF Fields (Radio Frequency)** - resulting from either intentional radiators such as TV/broadcast stations or mobile radios, or unintentional radiators such as other electronic equipment that may disrupt the operation of or cause damage to electrical or electronic equipment.
- **Power Quality** - dips and interrupts of the mains which are the result of faults in the power distribution system such as a low mains voltage condition caused by an overload at the power station or an open circuit breaker that may cause damage to electrical or electronic equipment.

Products that display a reasonable degree of immunity to these events will generally prove reliable in the field.

Testing and Equipment Requirements

In general, compliance to international immunity regulations can be achieved at lower test levels than required by industry or customer-driven standards. In all cases, test methods must be accurate and repeatable.

For the majority of products, manufacturers can perform in-house testing using an inexpensive immunity tester to

conduct the necessary compliance tests for EMC immunity standards.

Compliance is not a static process: continued legislation and technological changes ensure that test protocols and standards will continue to evolve. Companies with a well-defined EMC test plan which anticipates future regulations, will be in the best position to successfully compete in the global marketplace.

The Routes to Compliance

There are three basic routes to compliance.

I. Declaration of Conformity (also called Manufacturer's Declaration)

This is the route preferred by most manufacturers when tests can be performed in accordance with relevant standards, because it allows them complete control over the testing process. Tests are either performed in-house or at an outside test facility. Upon successful completion of testing and documentation of the results, the manufacturer issues a Declaration of Conformity and affixes the CE Mark to the product. The Declaration of Conformity is filed at the manufacturer's agent/representative in the European Union (EU).

II. Technical Construction File (TCF)

The Technical Construction File is used when tests can not be performed in accordance with relevant standards. This approach is used when standard test procedures are not possible or when alternative test standards and/or methods are used because of the product's constraints. The TCF describes the apparatus in detail, sets out procedures used to insure conformity to the intent of the EMC Directive and includes a technical report or certificate from a Competent Body (currently only European test facilities or subsidiaries designated by member states to have authority). The declaration and marking process is identical to that for a Declaration of Conformity.

III. Type Acceptance

This compliance process is for products designed for the transmission of radio communications as defined by the ITU (International Telecommunications Union). The manufacturer, or its authorized representative in the EU,

must obtain an EU type examination certificate from a Notified Body (a Notified Body is designated by the government - typically one or two per country). The declaration and marking process is identical to that for a Declaration of Conformity.

For further information about specific standards, please contact a Thermo Voltek representative.

Equipment Subject to The EMC Directive

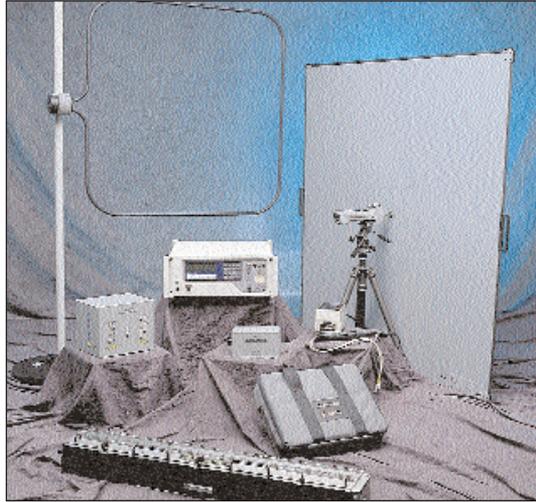
“The Directive applies to apparatus liable to cause electromagnetic disturbance or the performance of which is liable to be affected by such disturbance.”

Source: European Union EMC Directive

Critical European Immunity Standards

- IEC 1000-4-2 ESD
- IEC 1000-4-4 EFT
- IEC 1000-4-5 Surge
- IEC 1000-4-8 Power Frequency Magnetic Field
- IEC 1000-4-9 Pulse Magnetic Field
- IEC 1000-4-11 Dips and Interrupts

A Complete System To Perform Up To Six Immunity Tests In A Single Unit.



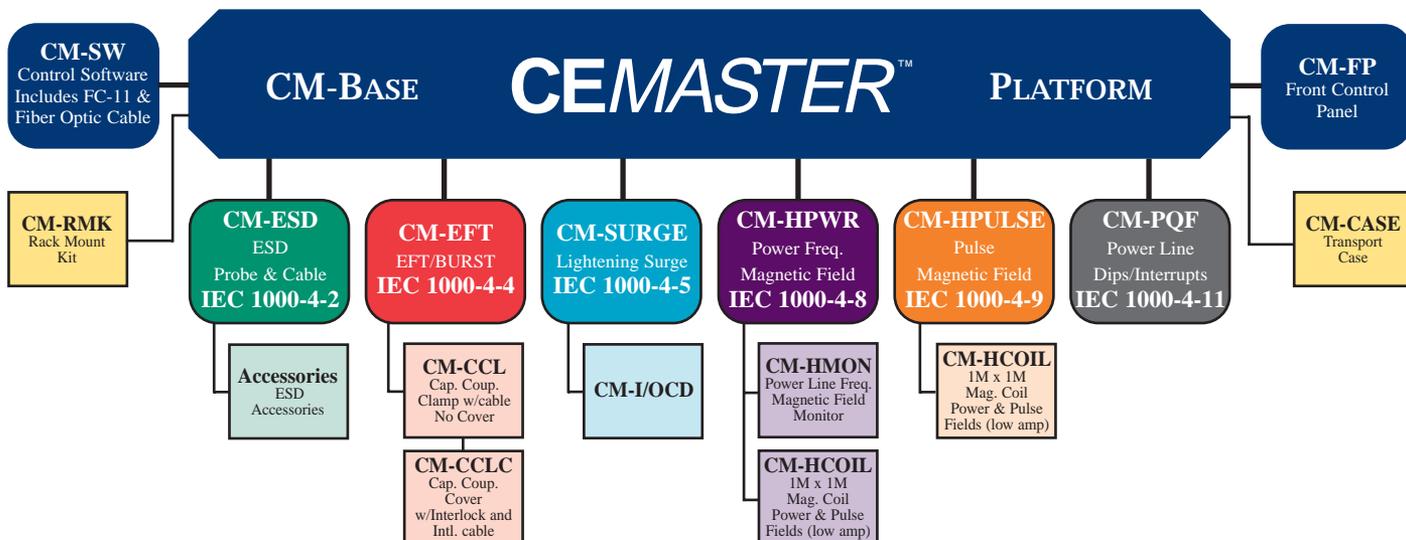
Step-by-Step Approach To Identifying Your Testing Requirements

- I. Identify the Basic EMC Standards that must be met for your product per the EMC Directive 89/336/EEC for acquiring the CE Mark.
 - A) Refer to the Product Standard under which your product is categorized for a list of the Basic EMC Standards and levels to which your product must be tested. Product Standards apply to specific products, such as “Measuring Relays and Protection Equipment.”
 - B) If a Product Standard does not exist for your product, look for applicable Product Family Standards which may apply, and perform the listed Basic EMC Standards to the levels specified. Product Family Standards apply to categories of products, such as “Household Appliances and Power Tools” (EN 55014-2).
 - C) If Product Standards or Product Family Standards do not exist for your product, testing must be conducted according to the Generic Standards.
 1. The Generic Standards are divided into two categories: Immunity and Emissions.
 - a. The Generic Immunity Standards are EN 50082-1, Residential, Commercial and Light Industrial, and EN 50082-2, Industrial Environment.
 - b. The Generic Emissions Standards are EN 50081-1 and EN 50081-2.
- II. Establish a detailed test plan for acquiring the CE Mark.
The Product, Product Family and Generic Standards define four fundamental items a manufacturer will need to identify in a test plan.
 - A) Identify the types of tests required for your product in accordance with the appropriate standards such as ESD and EFT.
 - B) Determine the levels to be met for each test to be conducted.
 - C) Determine the Basic EMC Standards for applying the tests such as IEC 1000-4-2 and IEC 1000-4-4.
 - D) Identify the performance criteria level which the equipment under test must meet or exceed for a “pass” status.
- III. Configure the CEMASTER™ to meet your testing needs.
 - A) Select the appropriate test capabilities to acquire the CE Mark for your product(s). (Refer to the flow chart on the opposite page.)
 - B) Select the appropriate measurement options for verifying waveform performance and calibration as described in the appropriate CEMASTER data sheet.
 - C) Select one or both of the following control features:
 1. Front panel control and operation (CM-FP).
 2. Remote control and operation via Windows® application software (CM-SW).
- IV. Contact your local KeyTek representative to confirm your CEMASTER configuration.

Standards may be obtained directly from the issuing body - IEC or CENELEC - or from your national standards organization. In the United States it is the American National Standards Institute (ANSI) at 212-642-4900 or The Document Center at 415-591-7600. In the United Kingdom it is the British Standards Institute (BSI).

In order to maintain an up-to-date Standards file, contact ERA Technology Ltd. in the United Kingdom at +(44) 1372 367018 and request a subscription to the Safety and EMC newsletter.

CONFIGURATION GUIDE



The CEMASTER is a customer configured tester that allows you to purchase a system specific to your needs and budget. Starting with a base platform, you add only the functions outlined in your product test plan. If, in the future, your testing requirements change, your CEMASTER may be upgraded to incorporate the additional functions required to meet your testing parameters.

Using the diagram and descriptions below as a configuration guide, create a CEMASTER that will optimize your company's testing objectives.

PLATFORM

- **CM-BASE** - CEMASTER base platform includes: built-in, 10A coupler/decoupler for AC and DC; external interlock, EUT output connection (NEMA 5-15, CEE7 "Schuko," or BS 1363 British Standard).
- **CM-SW** - Easy to use Windows® application software with predefined IEC routines and the ability to run any sequence of tests in a single "Run" operation. The CM-SW also allows users to formulate their own test routines. User must purchase either software, front panel or both.
- **CM-FP** - Front Panel keypad and graphics display for local operation and control with predefined IEC routines. User must purchase either front panel, software or both.
- **CM-RMK** - Rack Mount Kit for mounting the CEMASTER base platform in a 19" rack.
- **CM-CASE** - Transportation case for simple and reliable shipment of the CEMASTER and selected accessories.

ESD Testing

- **CM-ESD** - Computer controlled ESD Simulator in conformance with IEC 801-2, IEC 1000-4-2 and EN 61000-4-2. Includes predefined IEC routines, single shot, 1pps, 20pps; 8.8kV air discharge and 4.4kV contact mode discharge. Also includes carrying case with a DIN connector cable, ground strap, air discharge tip and contact tip.
- **ESD Accessories** - Various ESD accessories. See CM-ESD Accessory data sheet.

EFT Testing

- **CM-EFT** - Computer controlled EFT simulator in conformance with IEC 801-4, IEC 1000-4-4 and EN 61000-4-4, for coupling to AC/DC power ports and I/O signal lines via model CM-CCL capacitive coupling clamp. Includes predefined IEC 1000-4-4 routines.
- **CM-CCL** - Capacitive Coupling Clamp for coupling EFT transients to data lines as required by IEC 1000-4-4.
- **CM-CCLC** - Interlocked Capacitive Coupling Clamp Cover and cable to be used with Model CM-CCL for increased safety.

Surge Testing

- **CM-SURGE** - Computer-controlled Surge simulator in conformance with IEC 801-5, IEC 1000-4-5 and EN 61000-4-5, for coupling to AC/DC power ports and I/O signal lines via model CM-I/OCD. Includes predefined IEC 1000-4-5 routines.
- **CM-I/OCD** - External I/O signal lines and telecom coupler/decoupler with auxiliary clamping protection in conformance with IEC 1000-4-5 and EN 61000-4-5.

Power Frequency Magnetic Field Testing

- **CM-HPWR** - Power Frequency Magnetic Field in conformance with Level 2 of IEC 1000-4-8 and EN 61000-4-8 and calibrated to the CM-HCOIL when purchased with the CEMASTER.
- **CM-HMON** - Magnetic Field measurement apparatus for measuring Power Frequency Magnetic Fields as specified in IEC 1000-4-8.
- **CM-HCOIL** - 1 meter by 1 meter coil for generating magnetic fields in accordance with IEC 1000-4-8 and 1000-4-9.

Pulse Magnetic Field Testing

- **CM-HPULSE** - Pulse Magnetic Field in conformance with IEC 1000-4-9 and EN 61000-4-9. The CM-HPULSE is calibrated to the CM-HCOIL when purchased with the CEMASTER.
- **CM-HCOIL** - 1 meter by 1 meter coil for generating magnetic fields in accordance with IEC 1000-4-8 and 1000-4-9.

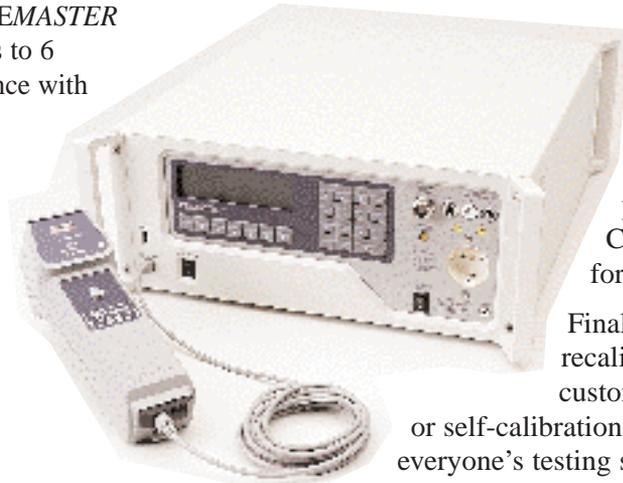
Dips and Interrupts Testing

- **CM-PQF** - Automatic control of Dips and Interrupts in conformance with IEC 1000-4-11 and EN 61000-4-11. Supports automatic control of dips to 70% and 40% and interruptions to 0% short and open of the EUT mains with a built-in transformer. No external hardware required. Transition times are 1-5µsec into a 100 ohm load, and the unit is capable of switching inrush currents >500A as required by IEC 1000-4-11.

The Lowest Cost Multi-Standard Compliance-Level CE Immunity Tester On The Market.

The CEMASTER is an ideal test system for those in need of the CE Mark. The CEMASTER performs compliance-level tests to 6 immunity standards in accordance with European Norm requirements:

- IEC 1000-4-2 ESD
- IEC 1000-4-4 EFT
- IEC 1000-4-5 Surge
- IEC 1000-4-8 Power Frequency Magnetic Field
- IEC 1000-4-9 Pulse Magnetic Field
- IEC 1000-4-11 Dips and Interrupts

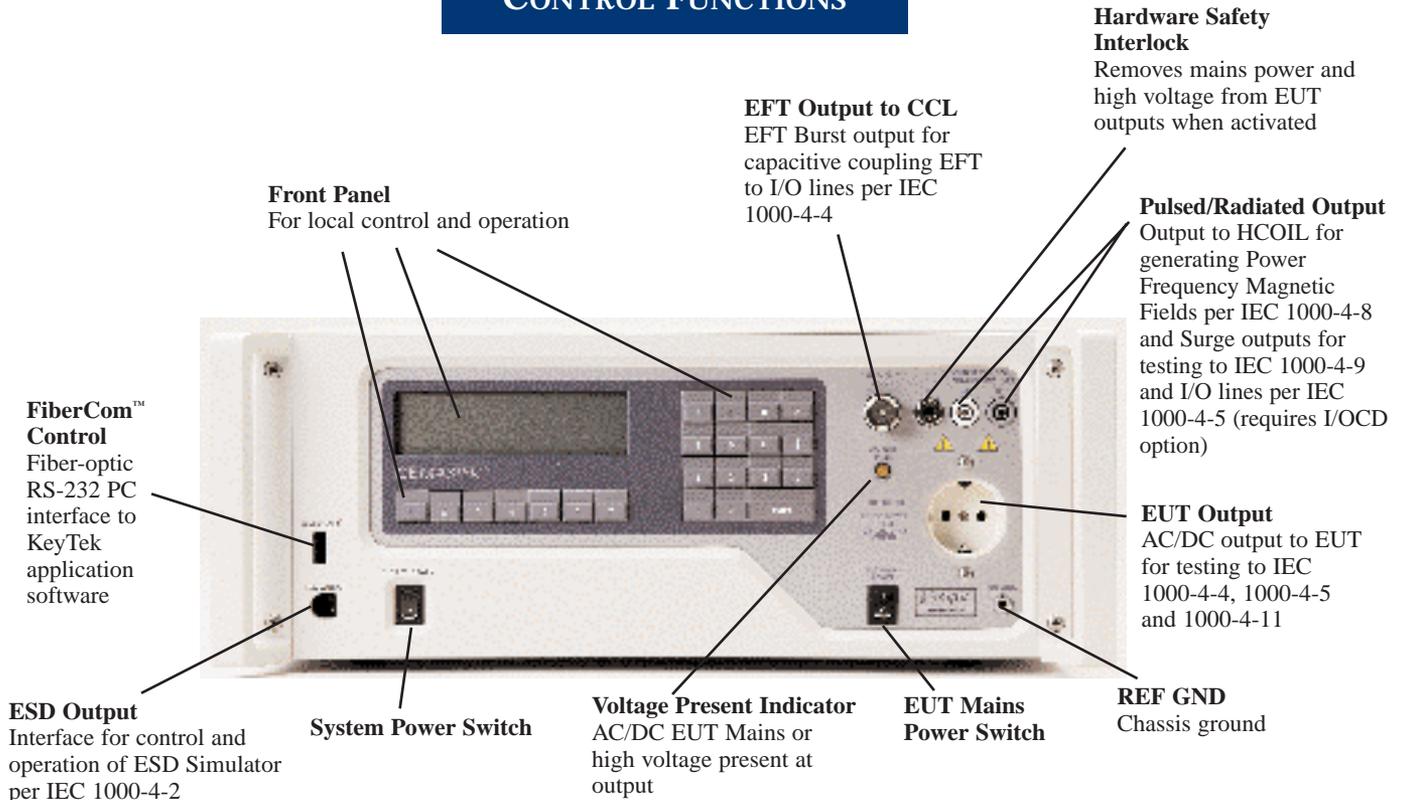


The CEMASTER is the only combination EMC immunity tester that includes built-in dips and interrupts, internal IEC 1000-4-8 capability, computer-controlled ESD tester and simplified, predefined test routines. The CEMASTER is also the only EMC immunity tester that customers configure to meet their own testing needs.

By offering custom configurations, growing companies are now able to afford in-house compliance testing and larger manufacturers may purchase multiple units for various departments. The CEMASTER is a perfect solution for test houses seeking to complement their high-end test systems and offer their customers on-site testing capabilities as an additional service. As a user-friendly, portable immunity tester, the CEMASTER is the ideal solution for rental companies.

Finally, when the CEMASTER needs recalibration, KeyTek offers their customers the choice of factory, on-site or self-calibration programs to accommodate everyone's testing schedule and budget.

CONTROL FUNCTIONS



Fully Configured CEMASTER™

MAXIMUM TEST LEVELS AS REQUIRED IN THE GENERIC STANDARDS FOR ACQUIRING THE CE MARK

Test Type	Basic Test Standard	Maximum stress level required by EN 50082-1	Maximum stress level required by EN 50082-2
ESD	IEC 1000-4-2	4kV Contact, 8kV Air	4kV Contact, 8kV Air
EFT	IEC 1000-4-4	1kV	2kV
Surge	IEC 1000-4-5	2kV	2kV
Power Frequency Magnetic Field	IEC 1000-4-8	3A/m	30A/m
Pulse Magnetic Field	IEC 1000-4-9	200A/m*	1000A/m*
Dips & Interrupts	IEC 1000-4-11	100%, 70%, 40%, 0%	100%, 70%, 40%, 0%

GENERAL SPECIFICATIONS

Test Type	Model	Standard	Feature	Range	Resolution	Accuracy	Compliant
ESD	CM-ESD	IEC 1000-4-2	Peak Air Discharge	500V - 8.8kV	1 Volt	+/-5%	
			Peak Contact Discharge Repetition Rates	500V - 4.4kV Single Shot, 1 pulse/sec and 20 pulses/sec	1 Volt	+/-5%	
EFT	CM-EFT	IEC 1000-4-4	Waveform	200V - 2.5kV 1-100kHz	1 Volt	+/-10%	Yes
			Peak Voltage Frequency			+/-10%	
Surge	CM-SURGE	IEC 1000-4-5	Waveform	1.2/50µs 250V - 2.5kV 8/20µs 125A - 1.25kA	1 Volt	+/-10%	Yes
			Voltage Waveform				
			Peak Voltage				
			Current Waveform				
Power Frequency Magnetic Field	CM-HPWR	IEC 1000-4-8	Peak Current	To 6 per minute at 500V	1 Amp	+/-10%	Yes
			Waveform Repetition Rate				
Pulse Magnetic Field	CM-HPULSE	IEC 1000-4-9	Field Frequency Magnetic Field	50/60Hz 0.5A/m - 4A/m		+/-10%	
			Field Pulse Amplitude Field Test Parameters	8/20µs 50A/m - 800A/m		+/-10%	Yes
Dips & Interrupts	CM-PQF	IEC 1000-4-11	Dips Interrupts Transition Time Inrush	70%, 40% 0% (Short or Open) 1µs - 5µs >250Amps @ 120V, >500Amps @ 240V			
			AC Mains Monitor Test Parameters	0 - 265VAC	+/-2%	Yes	

Power Requirements

Input Voltage 90 - 250VAC
Input Current 1A at 120V;
0.5A at 240V

Coupler/Decoupler Ratings

AC Voltage Ratings 50 - 250VAC
AC Current Ratings 10A continuous,
>16A start-up
DC Voltage Ratings 0 - 100VDC
DC Current Ratings 10Amps

Environmental Specifications

Operating Temperature 15°C to 35°C
Operating Humidity 10% to 75%
non-condensing

Physical

Height 17.8cm (7.0in)
Width 47cm (18.5in)
Depth 56cm (22in)
Weight 29kg (64 lbs)

* Not mandatory

Authorized Representative



For detailed technical information about CEMASTER models and options, see the appropriate data sheets. For additional data sheets, call or fax the numbers listed below, attn.: Sales Department.



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