

AC Power Source Compliance

Annex A, section A.2 of the IEC 61000-3-2 Harmonics test standard defines the minimally acceptable AC source requirements that have to be met during the test. Section 6.3 of the IEC 61000-3-3 Flicker standard does the same for Flicker testing. If the power source used for these tests does not meet these requirements, the results will be understated and a unit under test may pass where it otherwise would have failed.

The table to the right lists the requirements from the IEC standard as well as the actual performance specification of the LMX and AFX Series AC power sources. The LMX and AFX both exceed all requirements and represent some of the highest performing programmable AC power sources for Harmonics and Flicker testing available.

AC power source requirements for IEC 61000-3-11 and -3-12 are more relaxed than those shown in the table so the AFX also meets these to support up 86A/phase.

The compliance of the AC power source with these requirements is monitored during harmonics testing by the power analyzer and this information is available as part of the test report.

Specification	Requirement	LMX/AFX Spec.
Voltage		
Amplitude	230Vac RMS	500Vac RMS max. ¹
Accuracy	± 2.0 %	< 0.25%
Distortion		
Harmonics:	H3 < 0.9 %, H5 < 0.4 % H7 < 0.3 %, H9 < 0.2 % H2-H10 < 0.2 % H11-H40 < 0.1 %	LMX: V _{THD} < 0.1 % AFX: V _{THD} < 0.5 % Individual harmonics checked by HFMM measurement system
Flicker:	V _{THD} < 3.0 %	LMX: V _{THD} < 0.1 % AFX: V _{THD} < 0.5%
Peak Voltage	between 1.40 and 1.42 within 87° to 93° of zero crossing	1.4142 90.0°
Frequency		
Output	50.0 Hz	50.00 Hz
Accuracy		
Harmonics:	± 0.5 %	± 0.01 %
Flicker:	± 0.25 Hz	± 0.005 Hz
Phase Angle (3 Phase EUT)		
Phase error	< 1.5°	± 0.5°
Current		
IEC 61000-3-2, Max.	16A RMS / Ph	16A RMS / Ph
IEC 61000-3-12, Max.	75 A RMS / Ph	86A RMS/ Ph (AFX)

Note 1: Output Transformer Option may be required > 300Vrms

IEC Standard Revision Compliance Matrix

All ECTS2 Compliance Test Systems meet the most recent published editions of the relevant IEC 61000 standards per the table below.

IEC Standard	Category	Description	Supported Version	Edition	Dated
IEC 61000-3-2	Emissions	Limits for harmonic current emissions (equipment input current ≤16 A per phase)	IEC 61000-3-2:2018 RLV	5.0	2018-01-26
IEC 61000-3-3	Emissions	Limitation of voltage changes, voltage fluctuations and flicker ≤ 16 A per phase	IEC 61000-3-3:2013+AMD1:2017 CSV	3.1	2017-05-18
IEC 61000-3-11	Emissions	Limitation of voltage changes, voltage fluctuations and flicker ≤ 75 A and subject to conditional connection	IEC 61000-3-11:2017 RLV	2.0	2017-04-21
IEC 61000-3-12	Emissions	Limits for harmonic currents produced by equipment connected to public low-voltage systems >16 A and ≤ 75 A per phase	IEC 61000-3-12:2011	2.0	2011-05-12
IEC 61000-4-7	Reference	Testing and measurement techniques - General guide on harmonics and interharmonics measurements and instrumentation	IEC 61000-4-7:2002+AMD1:2008 CSV	2.1	2009-10-28
IEC 61000-4-15	Reference	Testing and measurement techniques – Flickermeter – Functional and design specifications	IEC 61000-4-15:2010 RLV	2.0	2010-08-24
IEC 60725	Reference	Reference impedances and public supply network impedances ≤75 A per phase	IEC TR 60725:2012	3.0	2012-06-27
IEC 61000-4-11	Immunity	Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	IEC 61000-4-11:2020 RLV	3.0	2020-01-28
IEC 61000-4-13	Immunity	Harmonics and interharmonics including mains signalling at a.c. power port, low frequency immunity tests	IEC 61000-4-13:2002+AMD1:2009+AMD2:2015 CSV	1.2	2015-12-14
IEC 61000-4-14	Immunity	Voltage fluctuation immunity test for equipment with input current not exceeding 16 A per phase	IEC 61000-4-14:1999+AMD1:2001+AMD2:2009 CSV	1.2	2009-08-12
IEC 61000-4-17	Immunity	Ripple on DC input power port immunity test	IEC 61000-4-17:1999+AMD1:2001+AMD2:2008 CSV	1.2	2009-01-28
IEC 61000-4-27	Immunity	Unbalance, immunity test for equipment with input current not exceeding 16 A per phase	IEC 61000-4-27:2000+AMD1:2009 CSV	1.1	2009-04-07
IEC 61000-4-28	Immunity	Variation of power frequency, immunity test for equipment with input current not exceeding 16 A per phase	IEC 61000-4-28:1999+AMD1:2001+AMD2:2009 CSV	1.2	2009-04-07
IEC 61000-4-29	Immunity	Voltage dips, short interruptions and voltage variations on d.c. input power port immunity tests	IEC 61000-4-29:2000	1.0	2000-08-30
IEC 61000-4-34	Immunity	Voltage dips, short interruptions and voltage variations immunity tests for equipment with mains current more than 16 A per phase	IEC 61000-4-34:2005+AMD1:2009 CSV	1.1	2009-11-26
IEC TR 61000-4-37	Calibration	Calibration and verification protocol for harmonic emission compliance test systems	IEC TR 61000-4-37:2016	1.0	2016-01-07
IEC TR 61000-4-38	Calibration	Test, verification and calibration protocol for voltage fluctuation and flicker compliance test systems	IEC TR 61000-4-38:2015	1.0	2015-08-24

Technical Specifications

AC OUTPUT - LMX Based ECTS2 Systems		
Power	Systems are available at various power levels. Starting at 4000VA single phase and 6000VA three phase.	
Number of Phases		
Single Phase	Phase A and Neutral	
Three Phase	Phase A, B, C and Neutral	
Frequency		
Range	20.00 Hz to 5000 Hz	
Resolution	0.01 Hz < 100 Hz	
Accuracy	0.01 %	
Voltage		
	Single Phase	Three Phase
Low Range	0-135 V L-N	0-135 V L-N 0-234 V L-L
High Range	0-270V L-N	0-338 V L-N 0-585 V L-L
Current		
Low Range	32 Arms	Starting at 16 Arms / phase
High Range	16 Arms	Starting at 8 Arms / phase

AC OUTPUT - AFX Based ECTS2 Systems		
Power	Systems are available at various power levels. From 15 kVA through 60 kVA single phase and three phase.	
Number of Phases		
Single Phase	Phase A and Neutral	
Three Phase	Phase A, B, C and Neutral	
Frequency		
Range	15.00 Hz to 1200 Hz	
Resolution	0.01 Hz < 100 Hz	
Accuracy	0.01 %	
Voltage		
	Single Phase	Three Phase
Range	0-400V L-N	0-400 V L-N 0-690 V L-L
Current		
Max.	125 Arms	Up to 167A /phase

AC INPUT - LMX Based ECTS2 Systems		
Type	Three Phase, 4 Wire (L1,L2,L3, Gnd)	
Frequency	47Hz - 63 Hz	
Voltage	380Vac ± 10%, L-L Delta	
Input Current	Max.	Required Service
4 kVA System	12A _{RMS} /phase	20A/phase
12 kVA System	32A _{RMS} /phase	40A/phase
Note: Consult factory for alternative power level systems and AC input configurations		

AC INPUT - AFX Based ECTS2 Systems		
Type	Three Phase, 4 Wire (L1,L2,L3, Gnd)	
Frequency	47Hz - 63 Hz	
Voltage	380Vac-480Vac ± 10%, L-L Delta	
Input Current	Max.	Required Service
	Refer to AFX Series Datasheet	
Note: Consult factory for alternative power level systems and AC input configurations		

MEASURED PARAMETERS	
Amplitude	Vrms, Irms, W, VA, PF, CF
Time	Frequency, Phase, Fundamental, Harmonics & Inter Harmonics
AC frequency synchronization	Phase Locked Loop

MEASUREMENT SPECIFICATIONS - HFMM		
Frequency		
Range	5 Hz - 20 kHz	
Resolution	0.05 Hz < 100 Hz	
Accuracy	0.01 %	
Voltage	HFMM-1	HFMM-3
No Inputs	1	3
Ranges	500Vrms (1500V pk-pk)	
Accuracy	0.1 % + 10 mV	
Current	HFMM-1	HFMM-3
Internal CT's	1	3
CT Rating	± 50 A pk	±150 A pk
Range	Multi Range, Auto Select	
Accuracy	0.1 % R _{dg} + 3 mA	
Phase		
Range	0.00° - 359.99°	
Accuracy	0.1° + (0.2° x kHz)	
Power		
Accuracy	0.15 % + 0.5 W	
Crest Factor		
Range	2 - 20 depending on rms input level	
Other		
IEC Modes	IEC 61000-3-2, IEC 61000-3-3, IEC 61000-3-11, 61000-3-12 (Harmonics & Flicker)	
Application Modes	Fluctuating Harmonics, Flicker Meter	



Model 140LMXT Linear - 4kVA



Model 3150AFX Switch Mode - 15kVA

Standard AFX Based Systems	
ECTS2-360F-n	6 kVA System, Single Phase, 26 Arms @ 230V + LFZ-1-16 Impedance
ECTS2-3150F-n	15 kVA System, Single, Split and Three Phase, 21.7 Arms/Phase @ 230V in 3 Phs Mode + LFZ-3-16 Impedance
ECTS2-3300F-n	30 kVA System, Single, Split and Three Phase, 43.3 Arms/Phase @ 230V in 3 Phs Mode + LFZ-3-40 Impedance
ECTS2-3450F-n	45 kVA System, Single, Split and Three Phase, 65.0 Arms/Phase @ 230V in 3 Phs Mode, LFZ-3-40 & LFZ-3-75 Impedances
ECTS2-3600F-n	60 kVA System, Single, Split and Three Phase, 86.9 Arms/Phase @ 230V in 3 Phs Mode, LFZ-3-40 & LFZ-3-75 Impedances
ECTS2-3750F-n	75 kVA System, Single, Split and Three Phase, 108 Arms/Phase @ 230V in 3 Phs Mode, LFZ-3-40 & LFZ-3-75 Impedances
ECTS2-3900F-n	90 kVA System, Single, Split and Three Phase, 130 Arms/Phase @ 230V in 3 Phs Mode, LFZ-3-40 & LFZ-3-75 Impedances
Included Hardware	AC Power Source, Measurement System, Lumped Flicker Impedance, Receptacle Panel, System Wiring, Power Input Terminals, Cabinet
Included Software ¹	HFa or HFa75 Software for Harmonics and Flicker Testing ¹ , PPSC Studio AC Source Control, PPSC Test Manager License, IEC-AC-4xx Test Sequences Bundle (IEC 61000-4-11, IEC 61000-4-14, IEC 61000-4-17, IEC 61000-4-27, IEC 61000-4-28, IEC 61000-29 and IEC 61000-4-34)
Documentation	User Manuals (PDF Format). Calibration Certificates

Note 1: Systems capable of 16A current per phase include HFa16 software license. System capable of more than 16A/phase include HFa75 software license. Either license can be added as an option.

ECTS2-3xxxF-n Cabinet Specifiers	
None	No cabinet included. For bench use or customer cabinet installation
A	All components installed in 18U Cabinet
B	All components installed in 28U Cabinet
C	All components installed in one or two 36U Cabinets

Options	
HFa	Harmonics & Flicker test software for EUT's up to 16A per phase
HFa75	Harmonics & Flicker test software for EUT's up to 75A per phase
-413	IEC 61000-4-13 Harmonics and Inter Harmonics test option, includes Interharmonics Generator in AC Source and test sequences
EPTS-xx-1 / -3	IEC 61000-4-11 / IEC 61000-4-34 Electronic Power Transfer Switch
Avionics Test Sequences	Various standards available. Consult factory for available options
Customization	Alternative configurations, power levels, outlet panels etc. are possible. Consult factory for custom configurations

Service and Support

Pacific Power Source's customer support is second to none. Our Customer Support Program provides the training, repair, calibration, and technical support services that our customers value. So, in addition to receiving the right test equipment, our customers can also count on excellent support before, during and after the sale. With company owned support and service centers around the world, support is never far away.

Complete calibration and repair services are offered at our US, European and Chinese manufacturing facilities (see contact info below). Calibrations are to original factory specifications and are traceable to NIST (National Institute of Standards and Technology).

NORTH & SOUTH AMERICA

PPST Solutions, Inc.
Irvine, USA
Phone: +1(888) 239-1619
Email: sales@ppstsolutions.com

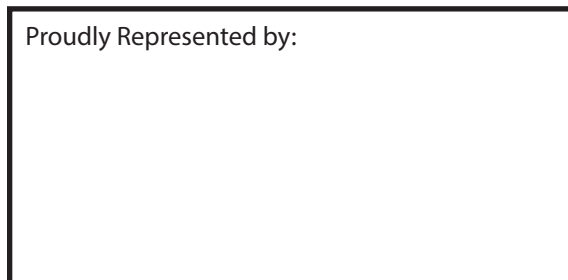
EUROPE

Caltest Instruments GmbH.
Kappelrodeck, Germany
Phone: +49(0)7842-99722-00
Email: info@caltest.de

CHINA

PPST Shanghai Co. Ltd.
Shanghai, China
Phone: +86-21-6763-9223
Email: info@ppst.com.cn

Proudly Represented by:



17692 Fitch, Irvine, CA 92614 USA
Phone: +1 949.251.1800
Fax: +1 949.756.0756
Toll Free: 800.854.2433
E-mail: sales@pacificpower.com
www.pacificpower.com