



EMC COMPLIANCE TEST SYSTEMS

ECTS2 SERIES

INTEGRATED TEST SYSTEMS

Key features ECTS2 Systems:

Available Emissions Tests:

- IEC 61000-3-2 Harmonics Emissions
- IEC 61000-3-12 Harmonics Emissions
- IEC 61000-3-3 Flicker Emissions
- IEC 61000-3-11 Flicker Emissions

Available Immunity Test Software:

- IEC 61000-4-11 (Option)
- IEC 61000-4-13 (Option)
- IEC 61000-4-14
- IEC 61000-4-17
- IEC 61000-4-27
- IEC 61000-4-28
- IEC 61000-4-29 (Option)
- IEC 61000-4-34 (Option)

Available Avionics Test Software:

- RTCA/DO160, Section 16
- MIL-STD 704
- Airbus ABD0100.1.8 (A380)
- Airbus ABD0100.1.8.1 (A350)
- Airbus AMD24C (A400M)
- Boeing 787B3-0147

Single or Three Phase Configurations

Regenerative Test Systems Available

Extensive Data Reporting

Easy to Use Windows Software

Choice of Lumped Impedance Networks



**INCLUDES
REGENERATIVE
SYSTEMS**



Three Phase System 90kVA EMC Test System

Overview

Pacific Power Source EMC Compliance Test Systems use a greatly enhanced harmonics and flicker measurement system and newly designed flicker impedance options to support single and three phase AC harmonics, flicker and power line immunity compliance testing up to the maximum required current of 75A per phase.

The measurement system uses a USB interface to the user's laptop or desktop eliminating the need for an integrated PC, monitor and keyboard compared to previous generation Harmonics and Flicker test systems.

AC power to the unit under test is supplied by a Pacific Power Source LMX Series high performance linear power source for systems up to 16A/phase. For higher power systems up to 75A/phase, the compact and efficient AFX Series switch mode power source is used. For **regenerative** test applications, the AZX Series AC & DC Power source models are available.

All tests are computer controlled to eliminate operator errors and ensure consistent applications of the required test in full compliance with the IEC standards. Data is collected to the PC drive for record keeping and a comprehensive test report is generated at the end of the test. The windows based software uses intuitive graphical control elements to select the correct test mode and displays data in real time, while the test is in progress.



FREQUENCY CONVERSION



AEROSPACE



R & D



MILITARY



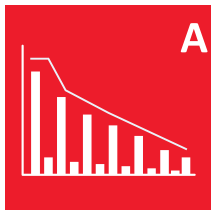
MANUFACTURING



CUSTOM

Fluctuating Harmonics Test Software

The single phase and three phase harmonics and flicker measurement modules (HFMM-1 / HFMM-3) are controlled by the HFa16 or HFa75 control software which fully implements the latest IEC 61000-3-2 & -3-12 Harmonics test standards. The HFMM is a precision power measurement instrument that can be certified to ISO17025 by an accredited lab. The software guides the operator through all necessary steps and acquires, displays and reports on the results. Data is displayed in real-time during the test so the operator can monitor progress and interrupt the test if needed without having to wait till the end of the test run.



HARMONICS

AC Power Source →

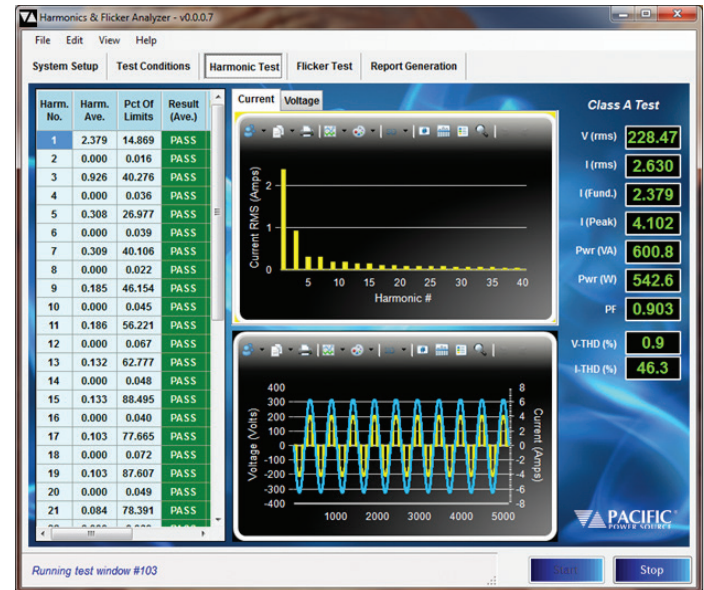
Measurement Unit with
40 A & 74A Flicker
Impedances
3-Phase →



ECTS2 System Components

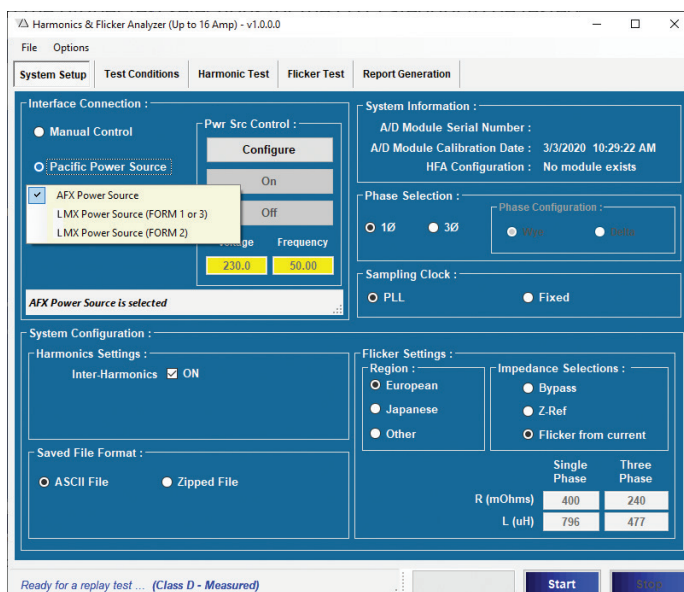
This saves the operator time by allowing them to interrupt the testing when a fault is found in the Equipment Under Test (EUT).

The screen below shows the current harmonics of the EUT during a test run. Color is used to highlight peak values, average values and IEC test limit values. This helps diagnose possible issues on equipment that does not pass early on. Since all acquired data is recorded, the user has the ability to scroll back and forth through time, frame by frame, to narrow in on any failure condition.

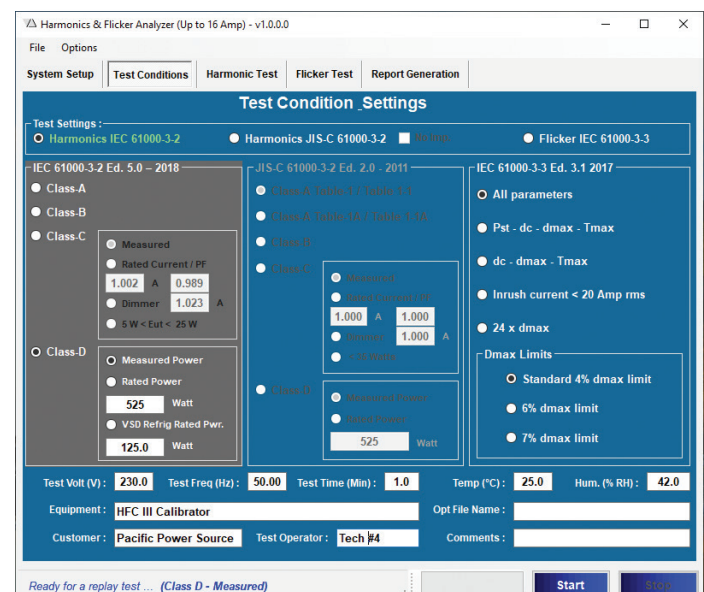


Harmonics Display showing use of color to highlight information

Intuitive operation guides the operator through the proper test selections for the EUT category to be tested:



System Setup selects AC Source, Flicker Impedance as needed



Test Conditions selection for IEC Standard applied and EUT Class

Flicker Test Software

Flicker tests are set up and executed using the same logical step process shown for Harmonics. Both IEC 61000-3-3 and -3-11 standards are supported. Since flicker tests may have to run for up to two hours, the real time display of intermediate measurements data such as short term flicker (Pst) and instantaneous flicker sensations (IFS) can be helpful in predicting the possible outcome of the test early on. This helps reduce wasted time on tests that will fail.



FLICKER

Harmonics & Flicker Analyzer (Up to 16 Amp) - v1.0.0.0

File Options

System Setup | Test Conditions | Harmonic Test | Flicker Test | Report Generation

Test Condition Settings

Test Settings:

- ☒ Harmonics IEC 61000-3-2
- ☐ Harmonics JIS-C 61000-3-2
- ☐ No limit
- ☐ Flicker IEC 61000-3-3

IEC 61000-3-2 Ed. 5.0 - 2018

- ☐ Class A
- ☐ Class B
- ☐ Class C
- ☐ Class D

Class C settings:

- ☒ Measured
- ☐ Rated Current / PF
- ☐ Dimmer
- ☐ 5 W < Eut < 25 W

Class D settings:

- ☐ Measured Power
- ☐ Rated Power
- ☐ VSD Refrig Rated Pwr.

JIS-C 61000-3-2 Ed. 2.0 - 2011

- ☐ Class A Table 1-7 Table 1-1
- ☐ Class A Table 1-7 Table 1-1A
- ☐ Class C
- ☐ Class D

Class C settings:

- ☒ Measured
- ☐ Rated Current / PF
- ☐ Dimmer
- ☐ 5 W < Eut < 25 W

Class D settings:

- ☐ Measured Power
- ☐ Rated Power

IEC 61000-3-3 Ed. 3.1 2017

- ☐ All parameters
- ☐ Pst - dc - dmax - Tmax
- ☐ dc - dmax - Tmax
- ☐ Inrush current < 20 Amp rms
- ☐ 24 x dmax
- ☐ Dmax Limits
- ☐ Standard 4% dmax limit
- ☐ 6% dmax limit
- ☐ 7% dmax limit

Test Volt (V): 230.0 Test Freq (Hz): 50.00 Test Time (Min): 1.0 Temp (°C): 25.0 Hum. (% RH): 42.0

Equipment: HFC III Calibrator Opt File Name:

Customer: Pacific Power Source Test Operator: Tech #4 Comments:

Ready for a replay test ... (Class D - Measured)

Start Stop

Flicker Test Conditions selected from right hand side panel

Built-in Report Generator

Properly documenting the results of IEC compliance tests performed on a unit under test is very important. The HfA16 and HfA75 programs generate reports automatically. A three page sample report for Harmonics is shown below. The report format used is Rich Text File (RTF) which is easily converted to other formats as needed.

Pacific Power Source, Inc. 11/21/2017 3:20 PM

ECTS COMPLIANCE TEST SYSTEM

Test data file: H-20171010_001.data

BUT: 550 Watt Class-A product

Test class: IEC 61000-3-2 Class-A Test data file: H-20171010_001.data

Test Result: Pass

Test date: 10/10/2017

Start time: 6:50:28 PM

End time: 6:54:19 PM

Test duration (min): 2

Comment: Test @ 230 V 50 Hz - field size max 60 characters

Customer: PT 61000-3-18 field size max 60 characters

Tested by: Matthew CNA field size max 60 characters

Source qualification: Compliant with IEC 61000-3-2

General BUT Test Data:

V rms (Vohm): 230.04

I RMS (Amps): 2.432

1 Fund (Amps): 2.383

Frequency(Hz): 50.00

1 Peak (Amps): 4.132

Pwr (VA): 529.5

Pwr (Watts): 548.0

PF: 0.905

V-THD (%): 0.32

I-THD (%): 46.3

Harmonic spectrum

Voltage & current waveforms

PPS - HPMS - version 1.1 Page 1 of 3

Pacific Power Source, Inc. 11/21/2017 3:20 PM

ECTS COMPLIANCE TEST SYSTEM

Test data file: H-20171010_001.data

Current harmonics

Harmon #	V/V2	% of Limit	Max	% of Max	Status
2	0.001	0.0	0.002	0.0	Pass
3	0.029	45.0	0.026	28.0	Pass
4	0.001	0.0	0.001	0.0	Pass
5	0.008	37.0	0.008	18.0	Pass
6	0.001	0.0	0.001	0.0	Pass
7	0.004	45.1	0.004	28.0	Pass
8	0.001	0.0	0.001	0.0	Pass
9	0.001	0.0	0.001	0.0	Pass
10	0.001	0.0	0.001	0.0	Pass
11	0.001	0.0	0.001	0.0	Pass
12	0.001	0.0	0.001	0.0	Pass
13	0.001	0.0	0.001	0.0	Pass
14	0.001	0.0	0.001	0.0	Pass
15	0.001	0.0	0.001	0.0	Pass
16	0.001	0.0	0.001	0.0	Pass
17	0.001	0.0	0.001	0.0	Pass
18	0.001	0.0	0.001	0.0	Pass
19	0.001	0.0	0.001	0.0	Pass
20	0.001	0.0	0.001	0.0	Pass
21	0.004	78.1	0.004	83.3	Pass
22	0.001	0.0	0.001	0.0	Pass
23	0.004	88.0	0.004	87.7	Pass
24	0.001	0.0	0.001	0.0	Pass
25	0.001	0.0	0.001	0.0	Pass
26	0.001	0.0	0.001	0.0	Pass
27	0.001	0.0	0.001	0.0	Pass
28	0.001	0.0	0.001	0.0	Pass
29	0.001	0.0	0.001	0.0	Pass
30	0.001	0.0	0.001	0.0	Pass
31	0.001	0.0	0.001	0.0	Pass
32	0.001	0.0	0.001	0.0	Pass
33	0.004	79.2	0.004	83.1	Pass
34	0.001	0.0	0.001	0.0	Pass
35	0.004	88.1	0.004	87.0	Pass
36	0.001	0.0	0.001	0.0	Pass
37	0.004	79.3	0.004	83.0	Pass
38	0.001	0.0	0.001	0.0	Pass
39	0.001	0.0	0.001	0.0	Pass
40	0.001	0.0	0.001	0.0	Pass

PPS - HPMS - version 1.1 Page 2 of 3

Pacific Power Source, Inc. 11/21/2017 3:20 PM

ECTS COMPLIANCE TEST SYSTEM

Test data file: H-20171010_001.data

Power Source Verification Data

Harmon	V rms	% of Limit	Status
2	0.047	10.0	Pass
3	0.056	28.0	Pass
4	0.031	6.8	Pass
5	0.071	7.7	Pass
6	0.022	4.7	Pass
7	0.054	9.3	Pass
8	0.013	2.8	Pass
9	0.043	9.3	Pass
10	0.008	1.6	Pass
11	0.007	30.0	Pass
12	0.014	6.1	Pass
13	0.007	29.0	Pass
14	0.007	3.2	Pass
15	0.079	32.4	Pass
16	0.008	2.7	Pass
17	0.003	27.3	Pass
18	0.013	5.7	Pass
19	0.079	24.6	Pass
20	0.007	10.0	Pass
21	0.066	28.5	Pass
22	0.008	3.3	Pass
23	0.007	35.2	Pass
24	0.009	3.8	Pass
25	0.064	20.6	Pass
26	0.005	2.3	Pass
27	0.076	33.0	Pass
28	0.007	3.0	Pass
29	0.076	32.8	Pass
30	0.007	3.0	Pass
31	0.007	30.0	Pass
32	0.007	3.0	Pass
33	0.072	31.4	Pass
34	0.005	2.6	Pass
35	0.069	30.2	Pass
36	0.005	3.3	Pass
37	0.067	29.2	Pass
38	0.007	3.1	Pass
39	0.077	33.4	Pass
40	0.024	10.4	Pass

PPS - HPMS - version 1.1 Page 3 of 3

Test Reports are generated at the completion of each test covering all data and setting information - Harmonics Sample Shown

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 and AZX also meet these to support up 86A/phase.

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

Specification	Requirement	LMX/AFX/AZX Spec.
Voltage		
Amplitude	230V _{LN} RMS	500V _{LN} 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/AZX: V _{THD} < 0.5% Individual harmonics checked by HFMM measurement system
Flicker:	V _{THD} < 3.0 %	LMX: V _{THD} < 0.1 % AFX/AZX: 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	AFX: 86A RMS/Ph AZX: 130A RMS/Ph

Note 1: Output Transformer Option may be required > 333V_{LN} on AFX or > 360V_{LN} on AZX

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 – Flicker meter – 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	3.0	2020-05-28
IEC 61000-4-13	Immunity	Harmonics and interharmonics including mains signaling 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 6 kVA through 90 kVA	
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 ¹		
	Single Phase	Three Phase
Range	0-300V L-N	0-300 V L-N 0-520 V L-L
Current		
Model Specific.	Refer to AFX Series Datasheet	

Note 1: Higher Voltage available using Transformer options

AC OUTPUT - AZX Based ECTS2 Systems		
Power	Systems are available at various power levels. From 30 kVA through 100 kVA	
Number of Phases		
Single Phase	Phase A and Neutral	
Three Phase	Phase A, B, C and Neutral	
Frequency		
Range	15.00 Hz to 1000 Hz	
Resolution	0.01 Hz < 100 Hz	
Accuracy	0.01 %	
Voltage		
	Single Phase	Three Phase
Range	0-360V L-N	0-360 V L-N 0-624 V L-L
Current		
Model Specific.	Refer to AZX Series Datasheet	

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		
Fundamental Range	45 Hz - 65 Hz	
Measurement BW	5 Hz - 20 kHz	
Resolution	0.05 Hz < 100 Hz	
Accuracy	0.01 %	
Voltage	HFMM-1	HFMM-3
No Inputs	1	3
Ranges	500Vrms (1000V pk-pk)	
Accuracy	0.1 % Rdg + 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 % Rdg + 3 mA	
Phase		
Range	0.00° - 359.99°	
Accuracy	0.2° + (0.2° per 100Hz)	
Power		
Accuracy	0.15 % + 0.1 W	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 140LMX Linear



Model 3150AFX Switch Mode

Technical Specifications

REMOTE CONTROL		
Equipment	AC Source	HFMM
Digital	LAN, USB, RS232 & GPIB	USB
Analog Inputs	Aux, Modulation	
Analog Outputs	Transient Trigger Transient Pedestal Clock and Lock (A 0°)	
Software		
Included	PPSC or UPC Studio	HFa16 or HFa75
Optional	UPC or PPSC Test Manager	

ENVIRONMENTAL		
Equipment	AC Source	HFMM
Temperature	0 - 40°	
Relative Humidity	0-95 % non-condensing	
Altitude	6500 ft / 2000 m (operating)	
Heat Dissipation	6.5 kBTU / 6kVA Higher power systems proportionally higher	n/a

MECHANICAL	
Cabinet Dimensions (H x W x D)	
Single Phase, 4 kVA	28U Cabinet, 1220 x 801 x 573 mm 48" x 31.5" x 22.5"
Three Phase, 12 kVA	36U Cabinet, 1700 x 801 x 573 mm 67" x 31.5" x 22.5"
Higher Power Systems	Consult Factory
Cabinet Weight -LMX Based Systems (M)	
Single Phase, 4 kVA	419 lbs / 190 Kg
Three Phase, 12 kVA	871 lbs / 395 Kg
Cabinet Weight -AFX Based Systems (F)	
Three Phase, 12 kVA	
Three Phase, 15 kVA	
Higher Power Systems	Contact Factory
Note: Weights are approximate and may vary based on installed options.	

Lumped Flicker Impedance (LFZ) + HFMM

The requisite lumped impedance required during voltage flicker testing is included as part of the test system. Either a single phase impedance or a three phase impedance is installed, depending on system configuration. Flicker Impedances for IEC 61000-3-3 of 16A rms per phase and for IEC 61000-3-11 up to 75A rms per phase are available.

The LFZ-x-40 and LZF-x-75 Flicker impedances support dual impedance values for either Zref or Ztest. The correct impedance is selected by the HFa75 Software based on the flicker standard selected by the user.

Model	Specification	
Compliance	IEC 61000-3-3, IEC 61000-4-15, IEC 60725	
Available Impedance Modules (LFZ)		
Single Phase	Models LFZ-1-16, LFZ-1-40	
Three Phase	Models LFZ-3-16, LFZ-3-40, LFZ-3-75	
Impedance - Model LFZ-x-16		
Phase	R = 0.24 Ω	jX = 0.15 Ω @ 50 Hz
Neutral	R = 0.16 Ω	jX = 0.10 Ω @ 50 Hz
Impedance - Models LFZ-x-40 and LFZ-x-75 Zref / Ztest		
Phase ¹	R = 0.24 Ω / 0.15 Ω	jX = 0.15 Ω @ 50 Hz
Neutral ¹	R = 0.16 Ω / 0.10 Ω	jX = 0.10 Ω @ 50 Hz
Current Rating		
LFZ-x-16	16 Arms per phase - IEC 61000-3-3 Zref	
LFZ-x-40, LFZ-x-75	40 Arms per phase - IEC 61000-3-11 Zref	
LFZ-x-75	75 Arms per phase - IEC 61000-3-11 Ztest	

Note 1: Impedance setting selected by HFa Control software for IEC 61000-3-3 or IEC 61000-3-11 based standard selection mode

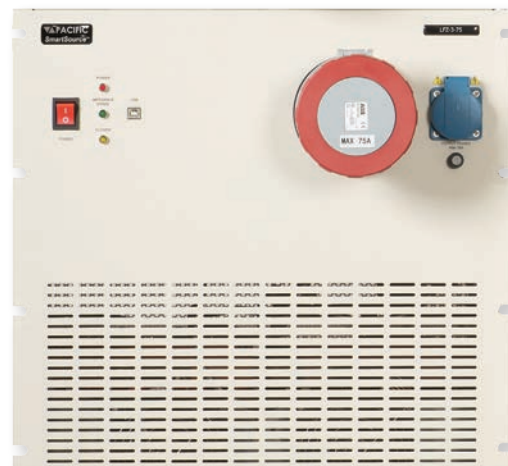
Note that the HFMM hardware is integrated in the LFZ chassis so the HFMM chassis is eliminated when ordering an ECTS2 system with any LFZ flicker impedance with exception of the 75A impedances.



LFZ-1-16 /
LFZ-3-16



LFZ-1-40 /
LFZ-3-40



LFZ-1-75 /
LFZ-3-75

IEC IMMUNITY TEST CAPABILITIES

IEC 61000-4-11/-29/-34 Voltage Dips, Interruptions and Variations

Voltage Dips Transfer Switch Option

The IEC VOLTAGE DIPS module uses solid state electronic transfer switch technology to meet the IEC 61000-4-11 and IEC 61000-4-34 Test requirement for voltage dips and short interruptions with voltage slew rates less than 5 μ sec. This allows full compliance testing of equipment for CE compliance.

IEC 61000-4 Voltage Dips

The EPTS Series of Electronic Power Transfer Switches are designed to support full-compliance voltage dip testing for any dip level. It requires the use of AC mains or fixed AC generator for the nominal 100% test level and a programmable AC power source for the dip level needed. For IEC 61000-4-29 DC Dips and Variations testing, an AFX or AZX based ECTS system and an additional DC power supply may be required.

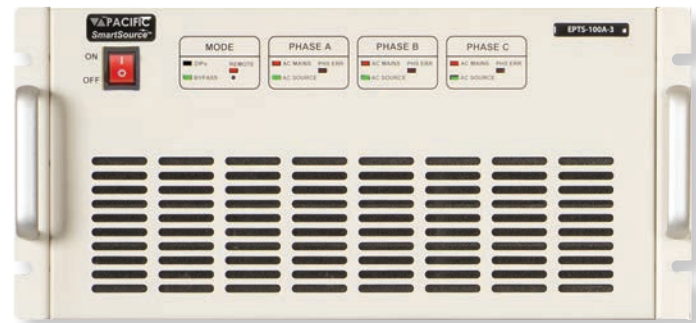
Power Connections

All power connections are made at the rear panel of the EPTS chassis. There are no user controls on the front other than the power On/Off switch. Status and Error indicators are provided for each phase. The EPTS generates a phase sync signal from the AC Main input to synchronize the programmable AC source. All control of the programmable AC power source and the EPTS is done using the included Windows IEC Test software.

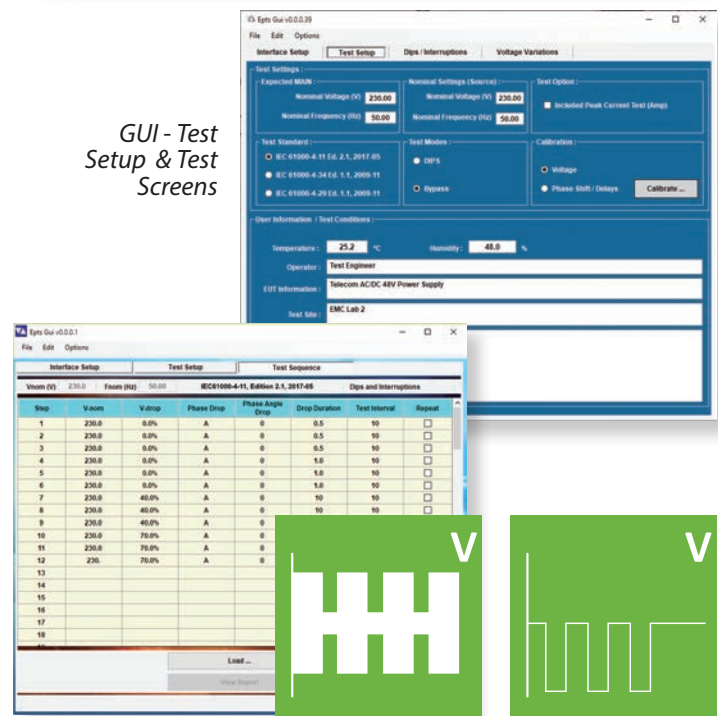
Available Models:

Model	Description
EPTS-16A-1	Transfer Switch, 16A, Single Phase
EPTS-16A-3	Transfer Switch, 16A/phase, Three Phase
EPTS-32A-1	Transfer Switch, 32A, Single Phase
EPTS-32A-3	Transfer Switch, 32A/phase, Three Phase
EPTS-75A-1	Transfer Switch, 75A, Single Phase
EPTS-75A-3	Transfer Switch, 75A/phase, Three Phase
EPTS-100A-1	Transfer Switch, 100A, Single Phase
EPTS-100A-3	Transfer Switch, 100A/phase, Three Phase

Refer to EPTS Option Datasheet for technical specifications.



GUI - Test
Setup & Test
Screens



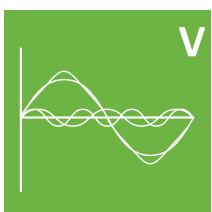
AC VOLTAGE DIPS

DC VOLTAGE DIPS

IEC 61000-4-13 Harmonics & Interharmonics

This immunity test is available as an option (Option -413) to any ECTS2 test system. It adds the required interharmonics generator to the AC power sources and includes all IEC 61000-4-13 test sequences.

Test coverage is shown in the table to the right.



HARM & INTERHARM

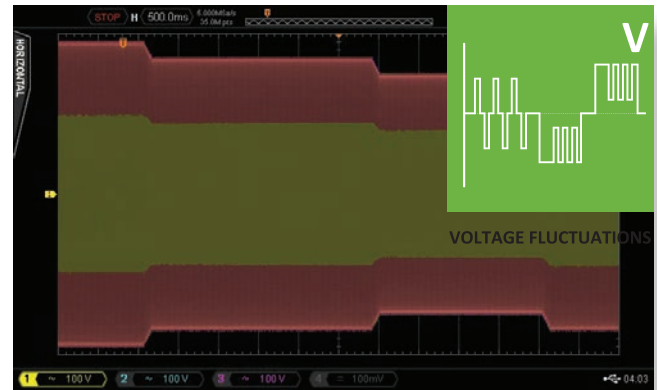
IEC 61000-4-13 Table	Test	Voltage $V_{IN} / V_{IL} (V_{RMS})$	Frequency (Hz)	Class/Test Level	Phase Mode
Table 1, 2 & 3	Odd Harmonics	115 / 208Vac	60 Hz	Class 1, 2 & 3	1 ϕ , 3 ϕ
		230 / 400Vac	50 Hz	Class 1, 2 & 3	1 ϕ , 2 ϕ , 3 ϕ
Table 4	Inter Harmonics	115 / 208Vac	60 Hz	Class 1, 2 & 3	1 ϕ , 3 ϕ
		230 / 400Vac	50 Hz	Class 1, 2 & 3	1 ϕ , 2 ϕ , 3 ϕ
Table 7	Flat Curve	115 / 208Vac	60 Hz	Class 1, 2 & 3	1 ϕ , 3 ϕ
		230 / 400Vac	50 Hz	Class 1, 2 & 3	1 ϕ , 2 ϕ , 3 ϕ
Table 8	Over Swing	115 / 208Vac	60 Hz	Class 1, 2 & 3	1 ϕ , 3 ϕ
		230 / 400Vac	50 Hz	Class 1, 2 & 3	1 ϕ , 2 ϕ , 3 ϕ
Table 9	Frequency Sweep	115 / 208Vac	60 Hz	Class 1, 2 & 3	1 ϕ , 3 ϕ
		230 / 400Vac	50 Hz	Class 1, 2 & 3	1 ϕ , 2 ϕ , 3 ϕ
Table 11	Meister Curve	115 / 208Vac	60 Hz	Class 2	1 ϕ , 3 ϕ
		230 / 400Vac	50 Hz	Class 2	1 ϕ , 2 ϕ , 3 ϕ
		230 / 400Vac	50 Hz	Class 2	1 ϕ , 2 ϕ , 3 ϕ

IEC IMMUNITY TEST CAPABILITIES (continued)

IEC 61000-4-14 Voltage Fluctuations

The IEC 61000-4-14 standard applies a series of repetitive voltage fluctuations. The required IEC 61000-4-14 test sequences are included in the IEC AC Immunity test suite and cover all defined classes and nominal voltage and frequency permutations for single, split or three phase products. Test coverage is shown in the table below.

IEC 61000-4-14	Test	Voltage V_{LN}/V_{LL} (V_{RMS})	Frequency (Hz)	Class / Test Level	Phase Mode
Table 1	Voltage Fluctuations	115 / 208Vac	60 Hz	Class 2 & 3	1 ϕ , 3 ϕ
		230 / 400Vac	50 Hz	Class 2 & 3	1 ϕ , 2 ϕ , 3 ϕ

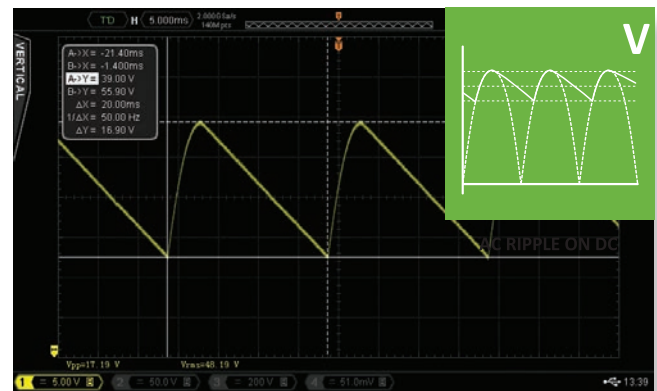


IEC 61000-4-17 Ripple on DC input

The IEC 61000-4-17 standard applies a series of AC ripple levels to a DC powered EUT. The required IEC 61000-4-17 test sequences and AC ripple waveshapes are included in the IEC AC Immunity test suite and cover all defined classes and nominal voltage and ripple frequency and amplitude permutations.

Note: This DC immunity test is **not** available on LMX Source based systems.

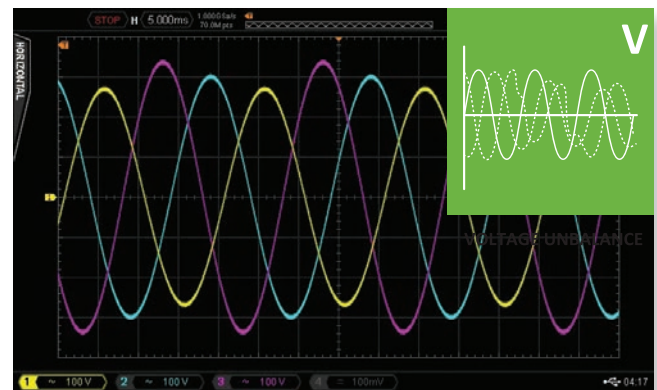
IEC 61000-4-17	Test Levels	% of nom. Vdc
Table 1	1	2
	2	5
	3	10
	4	15



IEC 61000-4-27 Voltage Unbalance

The IEC 61000-4-27 standard applies to three phase EUT's only and is concerned with the affects of phase voltage unbalance on the EUT. This test can only be performed on three phase ECTS2 System configurations as it requires a three phase AC Source.

IEC 61000-4-27	Test	Voltage V_{LN}/V_{LL} (V_{RMS})	Frequency (Hz)	Classes	Phase Mode
Table 1	Voltage Unbalance	115 / 208Vac	60 Hz	Class 2, 3 & x	1 ϕ , 3 ϕ
		230 / 400Vac	50 Hz	Class 2, 3 & x	1 ϕ , 3 ϕ



IEC 61000-4-28 Power Frequency Variations

The IEC 61000-4-28 standard is concerned with the affects of frequency variations that may occur on public grids on the EUT. Test coverage is shown in the table below.

IEC 61000-4-28	Test	Voltage V_{LN}/V_{LL} (V_{RMS})	Frequency (Hz)	Test Levels	Phase Mode
Table 1	Voltage Unbalance	115 / 208Vac	60 Hz	2, 3, 4 & x	1 ϕ , 3 ϕ
		230 / 400Vac	50 Hz	2, 3, 4 & x	1 ϕ , 3 ϕ



Ordering Information

LMX Based ECTS2 System Ordering Information:

LMX Series based ECTS2 systems are intended for lower power EMC test applications where high EUT currents are not present. These systems use the linear LMX Series AC power sources which offer high bandwidth and very low voltage distortion, well below the IEC 61000-3-2 requirements.

Both single phase and three phase systems up to 16Arms per phase are available.



Standard LMX Based System Configurations

Standard LMX Based Systems	
ECTS2-108L	750 VA Test System, Single Phase, 3 Arms @ 230V + LFZ-1-16. ECTS2-108L: No Cabinet. No cabinet. This inexpensive, low power system is ideally suited for lighting product (Class C) harmonics and flicker test requirements
ECTS2-140L-A	4 kVA Test System, Single Phase, 16 Arms @ 230V + LFZ-1-16. ECTS2-140L-A, Installed in 18U Cabinet.
ECTS2-160L-A	4 kVA Test System, Single Phase, 16 Arms @ 230V + LFZ-1-16. ECTS2-160L-A, Installed in 18U Cabinet. <i>Note: For single phase avionics test applications, 48A is available @115Vrms</i>
Included Hardware	AC Power Source, Measurement System, Lumped Flicker Impedance, Receptacle Panel, System Wiring, Power Input Terminals
Included Software	HFa16 Software for IEC 61000-3-2 Harmonics and IEC 61000-3-3 Flicker Testing, PPSC Manager AC Source Control, PPSC Test Manager License, IEC-AC-4xx Test Sequences Bundle (IEC 61000-4-11, IEC 61000-4-14, IEC 61000-4-27, IEC 61000-4-28, IEC 61000-4-34, IEC 61000-4-34, IEC 61000-4-34, Korean standards KS_C_9610-4-11 and KS_C_9610-4-29) Korean standard KS_C_9610-4-11)
Documentation	User Manuals (PDF Format), Calibration Certificates

LMX Based System Options

Options	
-EPTS-xxA-x	Electronic Power Transfer Switch option for IEC 61000-4-11/-4-29/-4-34. See page 7 for models.
-413	IEC 61000-4-13 Harmonics and Inter Harmonics test option, includes Interharmonics Generator in AC Source and test sequences
EPTS-16A-1	Transfer Switch, 16A, Single Phase
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

AFX Based ECTS2 System Ordering Information:

AFX Series based ECTS2 systems are intended for medium to high power EMC test applications that do not require the AC source to support energy regeneration to the grid. These systems use the compact, high density AFX Series AC & DC power sources which support both AC and DC based IEC test standards.

Both single phase and three phase systems up to 130Arms per phase are available.



Standard AFX Based System Configurations

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	HFa16 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, IEC 61000-4-34, Korean standards KS_C_9610-4-11 and KS_C_9610-4-29)
Documentation	User Manuals (PDF Format). Calibration Certificates

ECTS2-3xxxF-n Cabinet Specifiers (n =)	
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 36U Cabinet. Note: Systems over 60kVA are installed in two 19" cabinets

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 option.

AFX Based System Options

Options	
HFa16	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
-EPTS-xxA-x	Electronic Power Transfer Switch option for IEC 61000-4-11/-4-29/-4-34. See page 7 for models.
-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

AZX Based ECTS2 System Ordering Information:

AZX Series based ECTS2 systems are intended for high power EMC test applications that do require the AC source to support energy regeneration to the grid. These systems use free standing, regenerative AZX Series AC & DC power sources that support both AC and DC based IEC test standards.

All AZX systems are three phase and are available with currents up to 100Arms per phase.



Standard AZX Based System Configurations

Standard AZX Based Systems	
ECTS2-3300Z-n	30 kVA System, Single, Split and Three Phase, 43.5 Arms/Phase @ 230V in 3 Phs Mode + LFZ-3-40 Impedance
ECTS2-3500Z-n	50 kVA System, Single, Split and Three Phase, 75.0 Arms/Phase @ 230V in 3 Phs Mode + LFZ-3-75 Impedance
ECTS2-3600Z-n	60 kVA System, Single, Split and Three Phase, 87.0 Arms/Phase @ 230V in 3 Phs Mode + LFZ-3-75 Impedance
ECTS2-31000Z-n	100 kVA System, Single, Split and Three Phase, 150.0 Arms/Phase @ 230V in 3 Phs Mode + LFZ-3-75 Impedance
Included Hardware	AC Power Source, Measurement System, Lumped Flicker Impedance, Receptacle Panel, System Wiring, Power Input Terminals, Cabinet
Included Software ¹	HFa16 or HFa75 Software for Harmonics and Flicker Testing (see footnote 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, IEC 61000-4-34, Korean standards KS_C_9610-4-11 and KS_C_9610-4-29)
Documentation	User Manuals (PDF Format). Calibration Certificates

ECTS2-3xxxZ-n Cabinet Specifiers - AZX Power Source consists of its own cabinet	
None	No cabinet included. For bench use or customer cabinet installation
A	All components except the AZX power source installed in 18U Cabinet
B	All components except the AZX power source installed in 28U Cabinet

Note 1: All AZX based systems include HFa75 75A/phase software license. HFa16 16A/phase software license can be added as option.

AZX Based System Options

Options	
HFa16	Harmonics & Flicker test software for EUT's up to 16A per phase
-EPTS-xxA-x	Electronic Power Transfer Switch option for IEC 61000-4-11/-4-29/-4-34. See page 7 for models.
-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).

ISO 17025 Accredited Calibration Services for Harmonics & Flicker Systems

Pacific Power Source and its affiliated subsidiaries provide ISO 17025 Calibration services for its own as well as third party harmonics and flicker test systems. This calibration covers H&F measurement calibration, lumped impedance verification as well as verification of all IEC 61000-4-xx immunity test stimulus. For high power H&F Systems, this calibration service can be performed on site. We will ship our H&F Calibrator and supporting calibration equipment to your location and send our calibration technicians on-site. This service is currently available in Asia and Europe. In the US, ISO 17025 calibration is an available option for new systems only.

Harmonics and Flicker calibrations are performed to standards IEC TR 61000-4-37 (Harmonics calibration) and IEC TR 61000-4-38 (Flicker calibration). Contact one of our regional service centers listed below for a quotation.

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: sales@caltest.de

CHINA

PPST Shanghai Co. Ltd.
Shanghai, China
Phone: +86-21-6763-9223
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