

## **Advanced Test Equipment Rentals** www.atecorp.com 800-404-ATEC (2832)

## **IEC AC Option**

## IEC 61000-4 AC Immunity Test Routines

### **Available Features:**

Includes Complete Test Sequences for the following IEC 61000-4 Conducted Immunity Test Standards:

- IEC 61000-4-11, Voltage dips, short interruptions and voltage variations immunity tests for equipment with mains current less than 16 A per phase
- **IEC61000-4-13,** Harmonics and inter harmonics including mains signaling at AC power port, low frequency immunity tests
- IEC61000-4-14, Voltage fluctuation immunity test
- IEC61000-4-27, Unbalance, immunity test for equipment with input current not exceeding 16 A per phase
- IEC61000-4-28, Variation of power frequency, immunity test for equipment with input current not exceeding 16 A per phase
- IEC 61000-4-29p, Voltage dips, short interruptions and voltage variations on DC input power port immunity tests
- IEC61000-4-34, Voltage dips, short interruptions and voltage variations immunity tests for equipment with mains current more than 16 A per phase

Common Features for all IEC 61000-4 Test Sequences Provided:

- Pre-set test sequences and test levels conform to IEC 61000-4 test standards, ready to test out of the box. No need for any programming by the end-user saves time.
- Immunity tests can be run continuously or in single step mode to allow close observation of EUT performance. Enables detailed review of EUT behavior to help implement needed design changes.
- Measurements such as voltage and current are recorded at each test step and included in test reports. Documents and validates correct EUT behavior during and after test runs.
- User guided prompts the operator through entire test procedure. No IEC Standards knowledge required on the part of the operator, less chance of mistakes.
- Reports are generated in Rich Text Format for compatibility with most word processors allowing customization of test reports. Makes it easy to meet documentation requirements and augment technical construction files with test reports.
- All test sequences are fully customizable by user if needed to create custom version or special purpose test variations as desired. Accommodate changing IEC standards if needed. Test sequences can be locked down with a password to insure integrity of the tests applied.











FREQUENCY CONVERSION

AFROSPAC



## **IEC Immunity Testing**

The EMC Directive is one of the 'New Approach' Directives and applies across all 27 member states of the European Union (EU). The Directive applies to all electronic or electrical products liable to cause or be disturbed by electromagnetic interference (EMI). As a result a large number of manufacturers in the electronics or electrical industries need to ensure that their products are compliant with the requirements of the Directive and be able to demonstrate that this is the case in order to affix the CE Mark.

To verify compliance with these directives, the International Electrotechnical Commission (http://www.iec.ch) has issued a number of harmonized standards that describe test methods, test levels and pass or fail criteria. A number of these test standards cover immunity to commonly found AC line anomalies that are known to occur on the public Low Voltage (LV) network. These conducted immunity standards are numbered IEC 61000-4-nn. These IEC 61000-4 standards are not product specific but rather generic and may be applied to numerous product categories to ensure compliance with CE mark requirements.

There are additional product specific IEC standards that cover individual product types. To determine the IEC 61000-4 tests that apply to a particular product category, refer to the relevant product standard. For example, the IEC EMC product standard that applies to programmable AC power sources is IEC 61326-1, "Electrical equipment for measurement, control and laboratory use - EMC requirements". It calls out which IEC 61000-4 tests must be performed, what product class if applicable and any specific set of test levels and pass/fail criteria. Consult the product specific EMC immunity standard for the product you intend to test. Copies of these standards can be purchased at the IEC web store (http:// webstore.iec.ch).

All standards included in Pacific Power Source's IEC Test option package relate to AC conducted immunity except for IEC 61000-4-29 which is a DC Test.

## Standard and Editions included in the IEC AC Immunity Option

The Pacific Power Source IEC AC Immunity Test option includes predefined test sequences for all relevant IEC 61000-4 standards. This option provides a complete solution for IEC AC conducted immunity testing when combined with an AMX, ASX or MS Series AC Power Source. As of the date of publication of this data sheet, all test sequences conform to the latest standard revisions that are in effect. A summary of standard numbers, descriptions, editions and publication dates is provided in the table below.

### **Common Features**

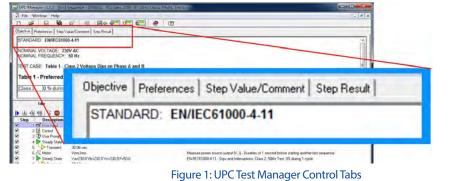
All IEC test sequences share a common user interface and controls making it easy for an operator to perform multiple tests on a given EUT. The underlying execution platform for the IEC AC Immunity test option is the UPC Test Manager program which is a component of the Pacific Power Source UPC Studio suite of Windows software.

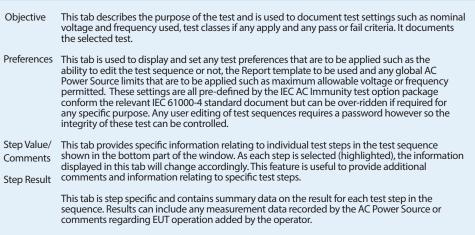
The UPC Studio software provides an easy to use Windows based control and execution environment that allows the operator to control and document all aspects of compliance testing. The Test Manager component adds advanced capabilities for controlling not only the AC Power Source but also additional test equipment that may be needed to perform specific EUT tests.

All IEC tests are controlled from the UPC Test Manager main window (Figure 1) which offers four individual tabs. The tabs listed in the table to the right are avaliable the user.

IEC Standard	Description	Edition	PPS P/N
IEC61000-4-11	Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests (AC, <16A)	Edition 2.0, 2004-03	149117
IEC61000-4-13	Testing and measurement techniques – Harmonics and inter harmonics including mains signaling at AC power port, low frequency immunity tests	Edition 1.1, 2009-07	149123
IEC61000-4-14	Testing and measurement techniques – Voltage fluctuation immunity test	Edition 1.2, 2009-08	149120
IEC61000-4-27	Testing and measurement techniques - Unbalance, immunity test for equipment with input current not exceeding 16 A per phase	Edition 1.1 Consol. with am1, 2009-04	149121
IEC61000-4-28	Testing and measurement techniques - Variation of power frequency, immunity test for equipment with input current not exceeding 16 A per phase	Edition 1.2 Consol. with am1&2, 2009-04	149119
IEC61000-4-29p	Testing and measurement techniques - Voltage dips, short interruptions and voltage variations on DC input power port immunity tests (pre-compiance)	Edition 1.0, 2000-08	149129
IEC61000-4-34	Testing and measurement techniques – Voltage dips, short interruptions and voltage variations immunity tests for equipment with mains current more than 16 A per phase	Edition 1.1, 2009-11	149118







These control elements are identical for all IEC 61000-4 test sequences contained in this option package. For more details on UPC Studio and UPC Test Manager operation, refer to the UPC Software Product Brochure.



#### UPC Studio Software Suite Master the Power of the Wave!

The IEC AC Immunity test sequences are installed as part of the UPC Studio Software and provide preprogrammed AC Immunity test sequences per the various IEC 61000-4 test standards. This allows the operator to quickly and easily apply required immunity tests and generate detailed test reports verifying compliance of the EUT. With the combination of UPC Test Manager and the IEC AC test sequence option, our graphical interface controls all areas of your AC Immunity testing with simple presets, user prompts, test sequences, test plans and reports.

## IEC AC Option

### IEC 61000-4-11 Voltage Dips, Interruptions and Variations

Voltage Dips and Interruptions immunity applies to virtually all electrical products that require the CE mark. This requires testing per IEC 61000-4-11 to determine the ability of the equipment under test to withstand such AC line anomalies. Actual test levels and durations depend on the product class. Products are categorized into four classes, 1, 2, 3 and X, with X being a class defined by individual product committees with the restriction that they cannot be less severe than class 2. Test levels for class 1 and X are not specified in the IEC 61000-4-11 standard itself. Testing levels for these classes are defined in product specific IEC standards which refer to the generic IEC 61000-4-11 standard for test methods and equipment to be used.

The IEC 61000-4-11 test sequences contained in the IEC AC Option package cover all defined classes and nominal voltage and frequency permutations for single, split or three phase products as detailed in Table 2.

Once selected, the corresponding test screen is displayed allowing a test to be started. A typical IEC 61000-4-11 test sequence is shown in Figure 3. Text execution is normally continuous but the user has the option of single stepping through the sequence.

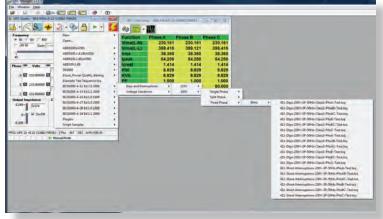
A typical IEC 61000-4-11 Phase-to-Phase voltage dip of  $\frac{1}{2}$  cycle duration is shown in Figure 4.

### AC Source Requirements – IEC 61000-4-11

Table 4 in Section 6.1.1 of the IEC 61000-4-11 standard specifies AC generator performance requirements. The AMX and ASX AC sources meet or exceed these requirements with only one exception as indicated in table 3.

IEC 61000-4-11 Table	Test	Voltage V <sub>LN</sub> /V <sub>LL</sub> (V <sub>RMS</sub> )	Frequency (Hz)	Class / Test Level	Phase Mode
Table 1	Voltage Dips	115/208Vac	60 Hz	Class 2	1ø,3ø
				Class 3	1ø,3ø
		230 / 400Vac	50Hz	Class 2	1ø, 2ø, 3ø
				Class 3	1ø, 2ø, 3ø
	Short Interruptions		60 Hz	Class 2	1ø,3ø
				Class 3	1ø,3ø
		230/400Vac	50Hz	Class 2	1ø, 2ø, 3ø
				Class 3	1ø, 2ø, 3ø
Table 3	Voltage Variations	115 / 208Vac	60 Hz	V = 70%	1ø,3ø
		230 / 400Vac	50Hz	V = 70%	1ø, 2ø, 3ø

Table 2: IEC 61000-4-11 Test Coverage





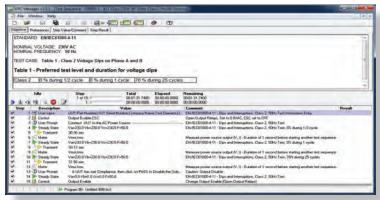


Figure 3: IEC 61000-4-11 Test Execution Control Screen

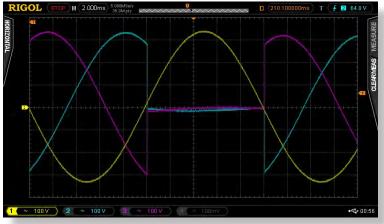


Figure 4: IEC 61000-4-11 1/2 Cycle Phase-to-Phase Voltage Dip

# Voltage Rise and Fall Time Requirement Clarification

The requirement to meet a 1 to 5 µsec rise and fall time of the AC voltage has been the cause of much confusion over the years as it necessitated the use of multi-tap transformers and electronic transfer switches to meet this requirement, adding excessive cost and economic burden to test labs and other end users of EMC compliance equipment. As the actual voltage dips and interruptions called out in product standards that reference the IEC 61000-4-11 standard are all performed at zero crossings of the AC sine wave (0° or 180° phase angle). At that point, no rise or fall time is applicable. The IEC SC77A Working Group 6 that is responsible for the IEC 61000-4-11 has issued an interpretation sheet that addresses this long standing controversy.

Document 77A/720/DC states the following:

- 1. In IEC 61000-4-11 Ed 2, Table 4 (Generator Specifications) does not apply to EUT (Equipment Under Test) testing. Table 4 is for generator calibration and design only.
- With reference to Table 1 and Table 2 (Test Levels and Durations), there is no requirement in 61000-4- 1 Ed 2 for rise-time and fall-time when testing an EUT; therefore, it is not necessary to measure these parameters during tests.
- 3. With reference to Table 4 (Generator Specifications), all of the requirements apply to design and calibration of the generator. The requirements of Table 4 only apply when the load is a non-inductive 100-ohm resistor. The requirements of Table 4 do not apply during EUT testing.

As such, it is not necessary to burden the AC Power Source used for IEC 61000-4-11 testing with this requirement.

## Three Phase EUT Voltage Dip Testing

For three phase EUT testing, the voltage dips and interruptions applied are different between Delta and WYE configurations. Figure 5 shows an example of the output of the AC source during a 70% voltage dip test on a three phase Delta AC product. For three phase delta systems, each phase-to-phase voltage must be dropped and phase shifted to accomplish the required resulting vector voltage drop. This requires three tests to be run (Phase A-B, Phase A-C and Phase B-C).

On three phase Y systems (with Neutral), each individual phase must be dropped but also each combination of phase-to-phase voltage. This requires six tests. All six test sequences are provided in the IEC AC Immunity test option.

Parameter	IEC 61000-4-11	AMX/ASX with UPC
	Requirement	Controller Compliance
Output voltage at no load	0 to 100%, ±5% of residual voltage	Voltage Accuracy: ±0.5%
Voltage change with load at the output of generator 100% output, 0A – 16A 80% output, 0A – 20A 70% output, 0A – 23A 40% output, 0A – 40A	Less than 5% of $U_{T}$	Load Regulation: 0.25%
Output current capability	Capable of supporting current stated in row 2 of this table for 5 sec at 80% of U and 3 sec at 70% or 40% of U. This requirement may be reduced according to EUT rated steady state supply current.	Model dependent. See ASX/AMX Data sheet for Current/Voltage rating chart by model.
Peak Inrush current capability. (no requirement for voltage variation tests)	Not to be limited by generator. However, maximum peak capability need not exceed 1000A for 250V to 600V or 500A for 200V to 240V, or 250A for 100V to 120V mains.	Model dependent. See ASX/AMX Data sheet for Current/Voltage rating chart by model.
Instantaneous peak overshoot/undershoot of the actual voltage, generator loaded with 100 Ohm resistive load.	Less than 5% of U <sub>T</sub>	< 2%
Voltage rise and fall time during abrupt change, generator loaded with 100 Ohm resistive load.	Between 1 μs and 5 μs.	Exception. However, not relevant to actual voltage dips and interruption testing of products. Refer to IEC issued clarification statement 77A/720/DC on this topic.
Phase Shifting	0° to 360°	0° to 360°
Phase relationship of voltage dips and interruptions with the power frequency	Less than ±10°	±0.5°
Zero crossing control of the generator	±10°	±0.5°

Table 3: IEC 61000-4-11 Section 6.1.1, Table 4 Generator Requirements



Figure 5: IEC 61000-4-11 Phase BC Voltage Dip to 70% of UT

## IEC AC Option

## IEC 61000-4-13 Harmonics and Inter Harmonics

The objective of the IEC 61000-4-13 standard is to ensure that products are impervious to the effects of signaling frequencies that may be present on the public utility power grid. Signaling over AC power lines is often used to remotely control switch gear or other devices.

The IEC 61000-4-13 test requirements are rather extensive compared to the other IEC 61000-4 tests. It also requires a second, asynchronous wave form generator capable of generating inter harmonics. Inter harmonics are not harmonically related to the fundamental power frequency (50Hz or 60Hz) and therefore, it is mandatory that a separate oscillator is used to generate these frequencies. In case of the IEC AC Immunity test option, an SCU-UPC32-413 three phase capable external controller is used to accomplish this.

The IEC 61000-4-13 test sequences contained in the IEC AC Option package cover all defined classes and nominal voltage and frequency permutations for single, split or three phase products. Harmonics and Inter Harmonics frequency ranges are swept using pre-scribed frequency step sizes resulting in long test times.

The appropriate IEC 61000-4-13 test sequence can be selected from the UPC Test Manager pull down menu based on nominal voltage, frequency, phase mode and test level or EUT class.

Once selected, the corresponding test screen is displayed allowing a test to be started. A typical IEC 61000-4-13 test sequence is shown in Figure 6. Text execution is normally continuous but the user has the option of single stepping through the sequence.

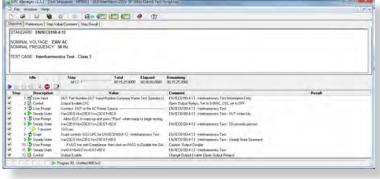
A typical IEC 61000-4-13 three phase interharmonic frequency sweep tests is shown in Figure 7.

## SCU-UPC32 Inter Harmonics Generator

To perform the inter harmonics tests included in the IEC 61000-4-13 test standard, a fully independent single or three phase waveform generator – model SCU-UPC32-413 - is required in addition to the main AC Power Source generator which produces the fundamental and harmonics frequency components of the test signal. This additional generator is housed in a 19" inch wide chassis (3U panel height) that can be placed near or on top of the AC Power Source used. All interactions with this external inter harmonic generator are controlled through the IEEE-488 interface so its operation is transparent to the operator. The same unit is used for both single, two or three phase applications.

IEC 61000-4-13 Table	Test	Voltage V <sub>LN</sub> / V <sub>LL</sub> (V <sub>RMS</sub> )	Frequency (Hz)	Class/Test Level	Phase Mode
Table 1, 2 & 3	Odd .	115 / 208Vac	60 Hz	Class 1, 2 & 3	1ø,3ø
	Harmonics	230/400Vac	50 Hz	Class 1, 2 & 3	1ø, 2ø, 3ø
Table 4	Inter Harmonics	115 / 208Vac	60 Hz	Class 1, 2 & 3	1ø,3ø
	Harmonics	230 / 400Vac	50 Hz	Class 1, 2 & 3	1ø, 2ø, 3ø
Table 7	Flat Curve	115 / 208Vac	60 Hz	Class 1, 2 & 3	1ø,3ø
		230/400Vac	50 Hz	Class 1, 2 & 3	1ø, 2ø, 3ø
Table 8	Over Swing	115 / 208Vac	60 Hz	Class 1, 2 & 3	1ø,3ø
		230/400Vac	50 Hz	Class 1, 2 & 3	1ø, 2ø, 3ø
Table 9	Frequency	115 / 208Vac	60 Hz	Class 1, 2 & 3	1ø,3ø
	Sweep	230/400Vac	50 Hz	Class 1, 2 & 3	1ø, 2ø, 3ø
Table 11	Meister	115 / 208Vac	60 Hz	Class 2	1ø,3ø
	Curve	230/400Vac	50 Hz	Class 2	1ø, 2ø, 3ø
		230/400Vac	50 Hz	Class 2	1ø, 2ø, 3ø

Table 4: IEC 61000-4-13 Test Coverage





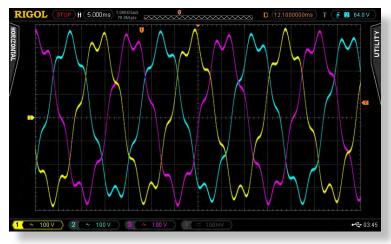


Figure 7: IEC 61000-4-13 Inter Harmonic Frequency Sweep Test



Figure 8: Model SCU-UPC32-413 Inter Harmonic Generator-3 Phase

## **IEC AC Option**

## AC Source Requirements-IEC 61000-4-13

Table 5 of the IEC 61000-4-13 standard specifies AC generator performance requirements. The AMX and ASX AC sources meet or exceed these requirements as indicated in table 5.

In addition to the AC Source requirements shown in Table 5, the AC voltage distortion of the AC Power Source output under load must meet the same requirements as for IEC 61000-3-2 Harmonics emissions testing. For best performance, the AMX series linear AC sources are recommended.

### Voltage Distortion Check-HAS Option

To verify compliance with this voltage distortion requirement, the HAS option may be used to run a pretest on the AC Source with the EUT connected. This can be done prior to running any of the IEC 61000-4-13 test sequences. If no suitable Harmonics and Flicker analyzer is available, this test can be performed by the Pacific Power Source AC Source itself as long as the Waveform Harmonic Analysis and Synthesis (HAS) option is installed. See the HAS option data sheet for more details.

http://www.pacificpower.com/Resource/Documents/ Has%20Option0712.pdf

Parameter	IEC 61000-4-13 Requirement	AMX/ASX with UPC Controller Compliance
Fundamental Voltage:		
- Magnitude U1 - Frequency - Angle between phases	Nominal main voltage ±2% single phase Nominal main voltage ±2% three phase $50Hz \pm 0.5\%$ or $60Hz \pm 0.5\%$ $120^{\circ} \pm 1.5^{\circ}$ (star connection)	Voltage Accuracy: $\pm 0.5\%$ single phase Voltage Accuracy: $\pm 0.5\%$ three phase $50Hz \pm 0.01\%$ $120^{\circ} \pm 0.5^{\circ}$
Individual Harmonics:		
- Order	2 to 40	2 to 51
-Magnitude Uh Range Accuracy	0% - 14% Larger of ±5% or 0.1% U1	0% to 100% Meets
- Phase angle h = 2 to 9 Accuracy of zero phase crossing with respect to fundamental	0°, 180° ±2° of fundamental	Programmable 0° to 359° ±0.5° of fundamental
Inter Harmonics		
-Magnitude Range Accuracy	0% to 10% Larger of ±5% or 0.1% U1	0% to 100% Meets
-Frequency Range Steps for adjusting Maximum error of adjusted value	0.33 x f1 to 40 x f1 0.1 x f1 to 0.5 x f1 ±0.5% f	0.33 x f1 to 80 x f1 Exceeds requirements ±0.01% f

Table 5: IEC 61000-4-13, Table 5 Generator Requirements

## 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 option package and cover all defined classes and nominal voltage and frequency permutations for single, split or three phase products.

The appropriate IEC 61000-4-14 test sequence can be selected from the UPC Test Manager pull down menu based on nominal voltage, frequency, phase mode and test level or class.

Once selected, the corresponding test screen is displayed allowing a test to be started. A typical IEC 61000-4-14 test sequence is shown in Figure 9. Text execution is normally continuous but the user has the option of single stepping through the sequence.

A typical IEC 61000-4-14 three phase voltage fluctuation test is shown in Figure 10.

### AC Source Requirements- IEC 61000-4-14

Table 2 of the IEC 61000-4-14 standard specifies AC generator performance requirements. The AMX and ASX AC sources meet or exceed these requirements as indicated in table 7.

IEC 61000-4-14	Test	$\begin{array}{c} \text{Voltage} \text{V}_{_{\text{LN}}} / \text{V}_{_{\text{LL}}} \\ (\text{V}_{_{\text{RMS}}}) \end{array}$	Frequency (Hz)	Class / Test Level	Phase Mode
Table 1	Voltage	115 / 208Vac	60 Hz	Class 2 & 3	1ø,3ø
	Fluctuations	230 / 400Vac	50 Hz	Class 2 & 3	1ø, 2ø, 3ø

#### Table 6: IEC 61000-4-14 Test Coverage

		Lagrance: GRIEN L - 454 Vertage Rockarios Text 2 514 37	Torne Court Serbing	
3.54	a Window Marp.	the second se		
	P 11 9	a i i i i i i i i i i i i i i i i i i i		
See. 4	-+ Protocours I Yoan V	Also-Counteri   Shap Result		
	MANEY TANECOM			
lares.	SERVED TREELETED	4.54		
<b>INON</b>	ANAL VOLTAGE 25	W AC		10.0
NON	ANAL FREQUENCY	50 Hz		
	TOART Change in	dags Chartention Immunity Tast		
1.00	a control of the state	staffs a softendar tentenda tant		141
	1.80	Ad 34 - Con 15 45 (100) DO (C) (01)	Flamanery	
		Ad 34 - 00 19 45 1200 00 00 00	0000 000 100 42 12000	
10he		Value	Former Band	
	1 PM Gam loand	Unit Fait Mandes UNIT Yana Humbus Company Harve Task Open		
2	2 14 Cornit	Themade Francis Cold	Open Output Relation for to R PORC 25C per to 00P	
14C	TO TALLAND Procession	Concept US/T to the AC Plane Databa	ENGICETOD # 14 Some Party man from the second land	
- T-	4.54 Cirmid	Consul Erable	Charger Outerd Evalue (Chare Evalue Network)	
×	5 P Linedi Late	Washington Constraint Wood and Difference	Electricities a 14 Vintage Factorers temperary Fact Penting uptage at 1925 of Warm in 62	
× .	d. Teaman	1277-06 heat		
1	of California	Viewslaws	Mission power policy adjust (V, 11 Diaments of Tremmed Indiam studing control and emperation	
e .	· · ·	Visit,730.0 Visit130.0 V/vi230.0 Fa/03.0	ETC/WT/S14014-14 - W/Rate Fluctuation immedia 7 and	
× .	To Transmit	Photo and		
× .	till Contaction	View.Brev	Measure power source soluted IV, II - Directory of 1 record before starting another test responder	
w	11 Denasta Elater	1/art.(30 T) Vise2 W G Vise2 RD D E eND D	EXCRECENCE 4.14 (Adapt Partnessed Text) Induity RD ancients pay delays at 2807	
H	12 -D Tianuare	\$77.06 sec		
iel i	A.B. Minter	Viper, Iring	Measure points source sarped IV, II- Duration of T second before sharing another test sequence	
91	14 P Linade Linte	Ward REP IN VEHICITED IN VEHICIES OF WHICH D	ETA/IN CRITICI & 1.8 Youth regio Plantmanthe Internationaly Tartin, Including coldinger at 2022, of Venine Rev RD 1	
w .	15 D Transed	177.0K pm;		
×	And Address	Marie Saine	Measure power interior induity (2, 1). Distribute of 1 incident before strating another tool proposition	
in .	10 Printer Titate	Wax22810 V0+230 0 10+230 0 Fe50 0	ENds Child 6-14 - Solinger Portugation Immunity Test	
~	tit Present	14.94 mil		
× .	TO UT, Strated	Visit, Send	Remarked powers tokene builded (V, 1): Diversion of 1 second before stating another test appenden-	
×	(A) 🕨 Stearty State.	Vac2350Vb+22001Vac2350F4500	EM/ECC109-014 - Solinger Factorisation (Investigin Text) - Realing With seconds gain default at 20057	
8. I.	21 President	177.0% seal		
×.	27 Kime	Vance State of Vance	His state access provide tadpact (V, 11) Distance of a previous distance charing sending has been accessed.	
- C	24 Street Size	TANDED CONSTRUCTION OF THE PARTY OF THE PART	Ein/ECA1014.14 Juniogr Factories Investment Fact - tenderg - taken at 1122 of Venet India	
2	25 IV. Mader	TYT OR LONG	Historical assess totation taiload IV. UP Disasteri of T second before starting wellion best programme	
÷	Children States	Vac2300 Ver230 il Ver230 il Petri il Petri il	Electronic control target to the second term and the second terms of an electronic terms and an electronic terms and the second terms and te	
	At Interest	A MANAGE STREAM AND A STREAM AND	The second	
2	20 C. Mater	Ward Aller	Measure primer pource instant IV, Or Struggert pt 7 secured instance its string would be test testamoure	
÷	29 De Manufe Silate	Variable Variaties working the Parties of	A MATCH 100 & 14 - Voltage Placements Front Andrew States of Party and American Advance of 2005	
	The Logitzer	172.00 sec	a construction of the second sec	
2.	D1 (107 Manage	A PARTY AND A PART	Munique pourse require output fr. in Durmann in 7 minuted impair maring worked two outputs a	
÷.	31 Unit Present	A DUF has not Compliance, that phile, on Philip Is Double ma	Const English Delast Couldre	
£	23 P Taxado Chate	Yaddya-00y-007-800	ENANCED OF \$15. We have the maximum improvements Taxat	
G	In 18 County	O some il reside	Concept Debad & outlin Disers Debad Rennet	
		Pagager 30 (2-stilled KSC) incl.		

Figure 9: IEC 61000-4-14 Test Execution Control Screen



Figure 10: IEC 61000-4-14 Three Phase Voltage Fluctuation Test

Parameter	IEC 61000-4-14 Requirement	AMX/ASX with UPC Controller Compliance
Output voltage capability	Un ± 25%	Maximum voltage is a function of the AC Power Source model used. Actual test levels do not exceed Un+12% so a 260Vrms L-N or L-L voltage range is sufficient for Un = 230Vrms.
Voltage accuracy	±1%	± 0.5%
Zero crossing accuracy	250 msec at zero voltage crossover	< 1 msec
Output current capability	Able to supply enough current to EUT at test voltage	Model dependent. See ASX/ AMX Data sheet for Current/ Voltage rating chart by model.
Voltage overshoot/ undershoot	Less than 5% of the change in voltage	Meets requirement
Voltage rise/ fall time during switching	< 1 µsec	< 1 µsec
Maximum interphase error (Three Phase)	2.5°	0.5°
Frequency accuracy	2.5% of fn (50 Hz of 60 Hz)	0.01% of fn (15 Hz – 150 Hz)

Table 7: IEC 61000-4-14, Table 2 Generator Requirements

### IEC 61000-4-27 Voltage Unbalance

The IEC 61000-4-27 standard applies only to 50Hz or 60Hz three-phase powered electrical and/or electronic equipment with rated line current up to 16Arms per phase. It establishes a reference for evaluating the immunity of such equipment when subjected to an unbalanced power supply voltage. This test can only be performed using a three phase AC Power Source. An error message will be generated when attempting to execute any of these tests on a AC Power Source in single phase or split phase mode and the test will not start.

The IEC 61000-4-27 test sequences included in the IEC AC Immunity option package covers class 2 and 3 for nominal voltage and frequency permutations and in three phase mode only.

The appropriate IEC 61000-4-27 test sequence can be selected from the UPC Test Manager pull down menu based on nominal voltage, frequency and test level or EUT class.

Once selected, the corresponding test screen is displayed allowing a test to be started. A typical IEC 61000-4-27 test sequence is shown in Figure 11. Text execution is normally continuous but the user has the option of single stepping through the sequence.

A typical IEC 61000-4-27 three phase voltage unbalance test is shown in Figure 12.

### AC Source Requirements – IEC 61000-4-27

Table 2 of the IEC 61000-4-27 standard specifies AC generator performance requirements. The AMX and ASX AC sources meet or exceed these requirements as indicated in table 9.

IEC 61000-4-27	Test	$\frac{\text{Voltage V}_{\text{LN}} / \text{V}_{\text{LL}}}{(\text{V}_{\text{RMS}})}$	Frequency (Hz)	Class / Test Level	Phase Mode
Table 1	Voltage	115/208Vac	60 Hz	Class 2 & 3	3ø
	Unbalance	230 / 400Vac	50 Hz	Class 2 & 3	3ø

#### Table 8: IEC 61000-4-27 Test Coverage

6. FB	Wenters Halp					-18
3	1 U 1	9 3 80 4		<ul> <li>OT</li> </ul>		
Series in	Palesnices   Step V	when Comment   Step French		1.00		
SYA	IDARD ENJECTION	4.77				
-	HERE'S EVENELISTICS	and a second s				
	INAL VOLTAGE 23					
NON	INAL FREQUENCY	50 Mz				
TES	LEASE Voltage an	d Phase Unbalance To	Cam 3			
-	the second second second					
-	bille.	Shep	Total	Elapsed	Remaining	
		ALE2 -	00.27.52.1800	00.00000000	00.27 \$2,1000	
r 11		2				
544			Value		Compati	Hend
1	1 III User legal 2 14 Contra	UUT Part Number LIUT Se Duppel Evable CSC	sal Nusber Dorpany Nat	as Test Operator.	ENDECETIO 4-27 - Vallage and Phone Unbalance Test Information Entry Diper Guijed Related Set to U OVAC, CSC set to DFF	
	0 D Low Prompt	Carper Lill? to the AC P	- time		EXAE CE100.4 27 - Valiage and Please United ance Text	
	4 Date Date	Va+230.0 Vb+230.0 Vo+2			ENALCENDE-27 Vallage and Phase United and Tail - 10 second pre-ted	
	5 - Tracinger	10.0 mm	ALC: PROVING		These controls of a little was compared on the control of the own	
	E Mater	Vinc Ine			Méasure power pource output (V. I) - Dutation of 1 second before starting another text sequence	
	P. B. Streets Date	Va-236.0 Vb-236.0 Vc-2	0.07-500		EN/IECK1004-27 - Voltage and Phase Unbalance Fast - Text 1	
	0 Transent	60.02 sec				
÷	William Matter	Vana Sime			Measure power innece output IV. II. Duration of 1 second before itlating another left requirement	
	10 Steady State	Vac20010-2300W-2	00F-500		EN//EC0300-8-27 / Voltage and Phase Chibidance Text / 180 seconds sequence delay:	
	11 Transmed	180.0 imit.				
5	12 Mater	Venu, Stern			Measure power source output (V, I) - Duration of 5 second before studing endless tenguence	
÷ .	12 Steady Shate	Va+230.0 Vb+230.0 Vo+2	0.0 7-50.0		ENV/ECKID0-4-27 - Visitage and Phase Undatance Text - Text 1	
	14 Transme	30.02 sec				
	15 Meter	Ving.inst.	and a line		Measure power source subput (V.I) : Duration of 1 second before sharing another test sequence	
	18 Sinaly Date	Va=236 8 Vb=236 8 Vc=2	0.0 F =50.0		EN/AEO/1004.27 / Voltage and Phare Unbelance Text 180 encode implement delays	
2	17 Transmen	180.0 mm				
	18 Mater	Van Jim Van 200 0 Vin 200 0 Vin 2	and the second second		Nearan gover loade output (V, R): Dealers of Lancord before stating another hall region to EN/ECEIDD-6-27 (Velage and Phase Unbalance Test - Test 1	
	20 Travient	Wan20.0 Vbn230.0 Vcn2. 60.02 mc	0.0 / -/0.0		ENDECRIDD#37 - Vistage and Phase Orbidance Text - Text 1	
	21 Mater	Mana lines			Measure power source output (V, I) - Duration of T record before starting another list sequence	
	22 Steads State	Vac2810 Voc2810 Voc2	NO E-END		ENJECTION-4-22 - Voltage and Phase Unbalance Test - TIID second) requerce delays	
ε.	23 Transer	180.0 мес	10001-0000		extended of a standard and cause because a last - too seconds before a such	
÷	24 Kines	Visit Ser			Meanure power mance indext (V, I) - Chalaton of 1 second below stating another test sequence	
	Of the Hands Make	Ve-236.0 Ve-236.8 Ve-23	00 P-100		EN/ECK10G4-27 Voltage and Phase Undularise Text. 10 seconds pretent	
P	26 Frances	1000 unc	Ter and			
÷ .	27 Mater	Ves lesi			Minister power space output (V, 1) - Dutation of 1 second before starting another test sequence	
÷.	28 P Steady Sinte	Vax200.01/bx200.01/cx2	0.0 F=50.0		ENUIEO0004-27 / Voltage and Phase Unitatiance Text - Text 2	
	29 Transient	15.02 mm			the second second second second second	
	30 Meter	Vest, line			Measure power source curput (V. I) Duration of 3 second before starting another text requesce	
0	21 P Stendy State	V=230.0V=230.0V=2	0.0 F-50.0		EN//ECE/00.4-27 / Voltage and Phase Diribatance Test - 190 seconds requence datast	
	32 Transmit	180.0				

#### Figure 11: IEC 61000-4-27 Test Execution Control Screen

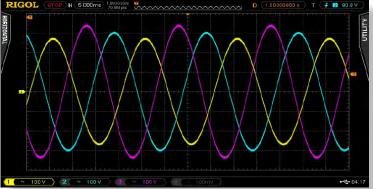


Figure 12: IEC 61000-4-27 Three Phase Voltage Unbalance Tes

rigare 12.1200	1000-4-27 Three Phase V	5
Parameter	IEC 61000-4-27 Requirement	AMX/ASX with UPC Controller Compliance
Output Voltage Capability	Un ± 50%	Maximum voltage is a function of the AC Power Source model used. Actual test levels do not exceed $Un+10\%$ so a 260Vrms L-N or L-L voltage range is sufficient for Un = 230Vrms.
Output Voltage Accuracy	± 2% of Un	± 0.5%
Output Current Capability	Sufficient to supply the EUT under all test conditions	Model dependent. See ASX/ AMX Data sheet for Current/ Voltage rating chart by model.
Voltage overshoot / undershoot, generator loaded with 100 Ohm resistive load	Less than 5% of the change in voltage	Meets requirement
Voltage rise/fall time during switching, generator loaded with 100 Ohm resistive load	1 μsec to 5 μsec	See comment under IEC 61000-4-11, Table 3.
Total armonic distortion of the output voltage	Less than 3%	ASX Series: Less than 0.25%, 15Hz – 1200Hz AMX Series: Less than 0.1%, 45Hz-1000Hz
Phase Shifting	0°, 120°, 240° ± 30°	0°, 120°, 240° ± 30°
Phase Accuracy	1° between any two phases	0.5° between any two phases
Frequency Accuracy	0.5% of f1 (50 Hz of 60 Hz)	0.01% of f1 (15 Hz – 150 Hz)

Table 9: IEC 61000-4-27, Table 2 Generator Requirements

### IEC 61000-4-28 Frequency Variations

The IEC 61000-4-28 standard is intended to evaluate the effect of power frequency variations on equipment which may be sensitive to such disturbances. These effects are generally instantaneous. To this end, these tests apply frequency variations using specific frequency slew rates to the EUT.

The IEC 61000-4-28 test sequences included in the IEC AC Immunity option package covers test levels 1, 2, 3 and 4 for nominal voltage and frequency permutations and in single, split or three phase mode. These test levels relate to product Classes 1, 2 and 3 per section 5 of the standard.

The appropriate IEC 61000-4-28 test sequence can be selected from the UPC Test Manager pull down menu based on nominal voltage, frequency, phase mode and test level.

Once selected, the corresponding test screen is displayed allowing a test to be started. A typical IEC 61000-4-28 test sequence is shown in Figure 13. Text execution is normally continuous but the user has the option of single stepping through the sequence.

A typical IEC 61000-4-28 three phase frequency variation test is shown in Figure 14. Since the frequency change is very gradual, it is near impossible to see on a digital scope. A frequency counter is required to measure the actual frequency changes.

### AC Source Requirements – IEC 61000-4-28

Table 2 of the IEC 61000-4-28 standard specifies AC generator performance requirements. The AMX and ASX AC sources meet or exceed these requirements as indicated in table 11.

## IEC 61000-4-29p DC Voltage Dips & Interruptions

The IEC 61000-4-29 standard is intended to evaluate the effect of voltage dips and interruptions on equipment which may be sensitive to such disturbances. Note that this is a DC tests and requires use of the optional DCR hardware available from Pacific Power Source (not included with IEC Option software).

### DC Source Requirements – IEC 61000-4-29

This test requires the use of the DCR option to produce the required DC voltage output. Not all DC source requirements can be met with the DCR option so this test is included for pre-compliance test purposes only.

Parameter	IEC 61000-4-29 Requirement	AMX with DCR Compliance
Output voltage range (Uo)	up to 360 V	up tp 600Vdc%
Output voltage variation with the load (0 to rated current)	less than 5 %	less than 1 % of FS.
Ripple content	less than 1% of the output voltage	Complies for test voltage Uo > 20Vdc
Rise and fall time of the voltage change, generator loaded with 100 Ohm resistive load	between 1 µs and 50 µs	Does not comply.
Overshoot/undershoot of the output voltage (100. Ohm Rload)	less than 10 % of the change in voltage	Partial compliance only
Output current (steady state)	up to 25 A	up to 20 A

IEC 61000-4-27	Test	$\begin{array}{l} \text{Voltage V}_{\text{\tiny LN}} / \text{V}_{\text{\tiny LL}} \\ (\text{V}_{\text{\tiny RMS}}) \end{array}$	Frequency (Hz)	Class / Test Level	Phase Mode
Table 1	Voltage	115/208Vac	60 Hz	Class 2, 3 & 8	1ø, 3ø
	Unbalance	230/400Vac	50 Hz	Class 2, 3 & 4	1ø, 3ø

Table 10: IEC 61000-4-28 Test Coverage

<b>N</b> 6	ie Window Help			20
0	1 II II	fi 🖷 🛃 🐖 🚝 🥔 🕐		
Obect		due/Comment Step Result		
STA	MIDARD: EN/IEC6100	0.4.28		
1		i a l		
	MINAL VOLTAGE 23			
pos	MMAL FREQUENCY	50 Hz		
m-	A GREAT WORKSON	28 Frequency Variations Test on Phase A. B. C		
1.00	TO DE REALING	re riedonich annuoun test out man ic tr c		
_				
-	ldie		Remaining	
		AU 12 1 00 10 12 0600 D0 00 00 000	Remaining 00.1912.0600	
SM		AU 12 1 00 10 12 0600 D0 00 00 000		Rend
		NE 12 3 00 10 12 0600 00 00 00 00 0000	00.1012.0600	Besult
*	np Description	Al 12 1 00 00 10 10 00 00 00 00 00 00 00 00 0	00.10.12.0000	Result
*	Description	N 12 1 00 00 00 000 Value UUT Par Number UUT Send Number Despany Name, Terr Operation U	00.10112.0609 Commont EVAIDES2000.4.29: Firequency Vacanors Test Level 4 Information Entry	Rest
*	p Description 1 III Une Hour 2 III Control	All 12:1 Bit 18:12 DEBL BODD BUDD BUDD Value UUT Part Namber UUT Send Number Despary Name, Test Operation,U Dugue Enable: COL	00:1912:0000 Examined EXADECS100.4.29: Frequency Vaciations Test Level Enforcement Entry Open Output Parking: Set to 10:0444_CSC ent to ISF	Besult
*	np Description 3 User Input 2 D Control 3 D User Prompt	AV 12.1 00 10 12 0000 00 0000 0000 Value UUT Park Number UUT Sensit Number Campany Name, Terr Operator U Dugar Enable CSU Connect UUT In the ALP Nove Source	00.1912.0009. Commont EAACCC0000.429: Frequency Vacanon Trait Level 4 lyteramone Entry Open Output All 29: Frequency Vacanon Fail Level 4 EAACCC000.429: Frequency Vacanon Fail Level 4	Result
*****	Perception Percep	Nel 12:1         00:10:12:0600         D0:00:0010000           Value         Value         Value         Value           UUT Prie Namber UUT Smith Namme Chimpsony Name, Terr Openine U         Dogue Tradie: CFC         Common UUT in the JC Private Sauga           Value2000 Vid-2000 F-2000         F-2010         Value Sauga         Value Sauga	00.1912.0009. Commont EAACCC0000.429: Frequency Vacanon Trait Level 4 lyteramone Entry Open Output All 29: Frequency Vacanon Fail Level 4 EAACCC000.429: Frequency Vacanon Fail Level 4	
*****	Portigion     Description     Description     Description     Description     Description     Description     Seads State     Seads State     S     Tassued	Value         Op 11:12 0000         D0 00:00 00:0000           UUT Park Number UUT Seart Number Disropany Name, Test Openess UU Dougs Franklin, 550         Convert, UUT I seart Number Disropany Name, Test Openess UU Dougs Franklin, 550           Convert, UUT I with He AC Power Sauja         Mac2000 Vec/2000 Fr4000         Sauja           Vec/2000 Vec/2000 Fr4000         Sauja         Mac2000 Vec/2000 Fr4000	00.1912.0009 Common DMCCD2000.4.3.F. Freezency Visions 1 wil (swel Crystemator: Drag Open Ouzya Priling: Set to BMC, CSY on to CSF DMCCD2000.4.3.F. Preszency Visions en USF DMCCD2000.4.3.F. Preszency Visions Traf Lend 4 (155 Prepare; Drange)	
*******	Description     Description     Use Hour     Use Hour     Use Hour     Use Hour     Deschil     Stack State     Stack State     Stack State     South Sta	NH 12:1         00:10:12:0000         00:00:00:0000           Value         Value         00:00:00:0000           U/U Part function U/U Seam Number Company Name, Terr Operator/U Dougs / ander CO company Value 20:00 Vie-20:00 F-80:00 Seat 20:00         00:00:00:0000           Seat 20:00 Vie-20:00 Vie-20:00 F-80:00 Views/Imme         Views/Imme         Views/Imme	Common	
*******	Description     Description     Def Certai     Def Certai     Def Certai     Def Certai     Def Certai     Seady State     Seady State     Seady State	VA 12.3         Value           VV         Value           VII 7 bar Aproder UUT Start Russen Enterrore Visions Terr Opension U.         Dayso Friedda Sci           Dayso Friedda Sci         Dayson Friedda Sci           Dayson Friedda Sci         Dayson Friedda Sci           Dayson Friedda Sci         Dayson Friedda Sci           Ver2000 VV-02000 VV-02000 Friedda         Head           Ver2000 VV-02000 VV-02000 Friedda         Head	Common	
********	Description     Descripti     Descripti     Description     Description     Description	M 12.3         Bit 10 2 0000         Bit 00 0000 00000           Value         Value         Value         Value           U/U For Hundes U/U T Sent Hundes Groups Vises, Tyrr Openes/U         Downer U/U Hin R // Prove Sustain           Value         Value         Value         Value	Committee	
St	np Description 2 Use Your 2 Dochui 3 Use Youry 4 Steady Usen 5 Taosand 5 Myles 7 Doudy Stam 8 Taosand 8 Myles	MTC 1         Winter 12 data         Debtes and           D17 for Hands         Winter         Debtes and         Debtes and	00.1112.000. Detection 01.25. Engineery Transmiss Test Level (Thermation Entry Detection 01.25. Engineery Transmiss Test Level 4 Detection 02.25. Thermany Vision Test Level 4 DETECTION 25. Thermany Vision Test Level 41(5): Thermany Denny Mensure power souch objet (V). Dynamic of 1 visions before faiting and/or test response DETECTION 25. Thermany Visions of 1 visions before faiting and/or test response DETECTION 25. Thermany Visions of 1 visions before faiting and/or test response DETECTION 25. Thermany Visions of 1 visions before faiting and/or test response DETECTION 25. Thermany Visions of 1 visions before faiting and/or test response DETECTION 25. Thermany Visions of 1 visions before faiting and/or test responses DETECTION 25. Thermany Visions of 1 visions before faiting and/or test responses DETECTION 25. Thermany Visions of 1 visions of 1 visions before faiting and/or test responses DETECTION 25. Thermany Visions of 1 visions of 1 visions before faiting and/or test responses DETECTION 25. Thermany Visions of 1 visions of 1 visions before faiting and/or test responses DETECTION 25. Thermany Visions of 1 visions of 1 visions before faiting and/or test responses DETECTION 25. Thermany Visions of 1 visions of 1 visions before faiting and/or test responses DETECTION 25. Thermany Visions of 1	

Figure 13: IEC 61000-4-28 Test Execution Control Screen

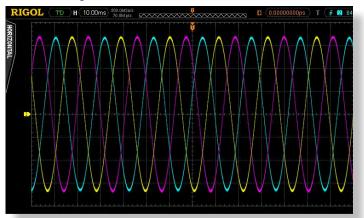


Figure 14: IEC 61000-4-28 Frequency Variation Test

Parameter	IEC 61000-4-28 Requirement	AMX/ASX with UPC Controller Compliance
Output voltage accuracy	± 2%	± 0.5%
Output voltage and current capability	Able to supply enough voltage and current according to the type of EUT	Model dependent. See ASX/AMX Data sheet for Current/Voltage rating chart by model.
Phase accuracy for each phase	2° (0.5% of 360°)	0.5°
Frequency accuracy	0.3% of f1 (50 Hz of 60 Hz)	0.01% of f1 (15 Hz – 150 Hz)
Frequency capability range	f1 ±20%	Exceeds requirements
Test duration accuracy	±10%	± 0.01%

Table 11: IEC 61000-4-28, Table 2 Generator Requirements

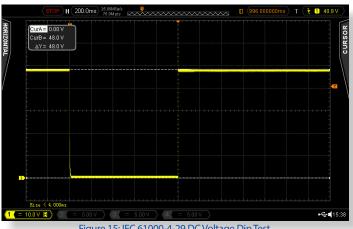


Figure 15: IEC 61000-4-29 DC Voltage Dip Test

## IEC 61000-4-34 Voltage Dips, Interruptions and Variations

The IEC61000-4-34 is closely related to the IEC 61000-4-11 standard as both cover Voltage dips, short interruption and voltage variations. The main difference is that the IEC 61000-4-11 standard only covers products requiring no more than 16 Arms per phase while the IEC 61000-4-34 covers products with higher current requirements.

IEC 61000-4-34 tests are used to determine the ability of the equipment under test to withstand short duration voltage dips and variations. Products test levels and durations are categorized into four classes, 1, 2, 3 and X with X being a class defined by individual product committees with the restriction that they cannot be less severe than class 2. Test levels for class 1 and X are not specified in the IEC 61000-4-34 standard itself. Testing levels for these classes are defined in product specific IEC standards which refer to the generic IEC 61000-4-34 standard for test methods and equipment to be used.

The IEC 61000-4-34 tests covers all defined classes and nominal voltage and frequency permutations for single, split or three phase products. Both Voltage Dips and Voltage Variations are covered.

The appropriate IEC 61000-4-34 test sequence can be selected from the UPC Test Manager pull down menu based on nominal voltage, frequency, phase mode and test level or EUT class.

Once selected, the corresponding test screen is displayed allowing a test to be started. A typical IEC 61000-4-34 test sequence is shown in Figure 15. Text execution is normally continuous but the user has the option of single stepping through the sequence.

A typical IEC 61000-4-34 three phase voltage variation test is shown in Figure 17.

IEC 61000-4-34 Table	Test	Voltage V <sub>LN</sub> / V <sub>LL</sub> (V <sub>RMS</sub> )	Frequency (Hz)	Class/Test Level	Phase Mode
Table 1	able 1 Voltage Dips	115 / 208Vac	60 Hz	Class 2	1ø,3ø
				Class 3	1ø,3ø
		230 / 400Vac	50 Hz	Class 2	1ø, 2ø, 3ø
				Class 3	1ø, 2ø, 3ø
Table 2	Short		60 Hz	Class 2	1ø,3ø
	Interruptions			Class 3	1ø,3ø
		230 / 400Vac	50 Hz	Class 2	1ø, 2ø, 3ø
				Class 3	1ø, 2ø, 3ø
Table 3	Voltage	115 / 208Vac	60 Hz	V = 70%	1ø,3ø
	Variations	230 / 400Vac	50 Hz	V = 70%	1ø, 2ø, 3ø

#### Table 12: IEC 61000-4-11 Test Coverage

-		Seguence - GPBB: 1 - 434-Dips-2304 (# 50HS-Class)-PhBC-Test	well	
1	te Weidow Help	and the second se		1.00
0		8 9 8 4 5 6 6 0		
New Y	dve Platescer Step's	wawCovered Fing Revuil		
STA	MIDARD: EMIECOTO	94.34		-
	MINAL VOLTAGE 23			
		lass 3 Voltage Dips on Phase B and C		
1123	si GASE Table 1-0	lass 3 Voltage Dips on Phase B and C		
Tal	ble 1 - Preferred t	est level and duration for voltage dips		
-		the second s		
Cla	asis 3 0 % during	1 cycle 40 % during 10 cycles 70 % durin	ng 25 cycles 80 % during 250 cycles	
-				
	Ide	Step Total Elapsed A418 - 0012174000 000000000	Remaining (0102-17-4000	
1	1 - 1 - 1 - 2 - 2 - 1 - 1 - 2 - 2 - 1 - 2 - 2		DOTE. 17 MINU	
SM	ep Description	Value	Commont Result	
	1 m Urm input	UUT PartNumber UUT Setal Number Company Name, Test Operator U.		
	7 Corma	Dubu Enable CSC	Open Durput Relays. Set to DOVAC, CSC set to DFF	
	3 Diret Prompt	Connect ULT to the AC Power Source	EN//ECE1000-434 - Dips and Intersphore, Dave '3 50Hz Test	
	4 Steedy State	Va~230.0/Vb~230.0/Vc~230.0/F-50.0	EN//E081000-434 - Dips and Interruptions, Class 3, 50Hz Test, 0% during 1 cycle	
	5 - Topolieri			
		30.12 on:		
	6 Kinin	30.12 vec Vena Jana	Measure power source output (V, 1). Duration of 1 second before diating another last requirece	
	5 Meter 7 Steady State		Measure power source output (V, 1) - Datation of 1 second before starting another ket inspanses i EM/EC61030-4-34 - Data and Weinsphore. Climi 3, 50Hz T ent. 4/33 during 10 cycles	
		Vesclera		
	7 Steedy State 9 Toleswert 9 (C. Meter	Ves280.8V5+230.0Vo+230.0F+50.0		
	7 Steady State	Vinc.)mc Vin-230.8 Vb+230.0 Vc+230.0 F+50.0 30.66 Let:	EN/EC61080-4-34 - Dipe and Interruptions, Class 3, 50Hz Test, 48% during 10 cycles	
	7 Steedy State 9 Toleswert 9 (C. Meter	Venc.lenz Venc.200 IV6=4200 DVc=230 0 F=50 0 30 66 set	ENARC610004-34 ; Dipe and Memophons, Cleve 3, 50Hz T ent. 403 during 10 cycles Meanule power toxace pulped (V. II - Duation of T second before studing another test sequence.	
	7 Staady State 9 Tutersent 9 Mater 10 Staady State 11 Tutersent 12 Mater	Veraller Va-230 IV-220 DV-220 DF-500 Veraller Veraller Veraller Veraller Veraller Veraller	ENARC610004-34 ; Dipe and Memophons, Cleve 3, 50Hz T ent. 403 during 10 cycles Meanule power toxace pulped (V. II - Duation of T second before studing another test sequence.	
	7 Standy State 9 Mater 10 Sandy State 11 Sandy State 12 Unline 13 Standy State	Venuline Venuline Venuline Venuline Venuline Venuline Venuline Venuline Venuline	DMAECK10004-34 - Dips and Internations. Dank 3, 50Hz Tent, 405 adamp 10 godes. Meanura power seazes output IV, III-Danation II.1 second Darlier starting another limit seasence. DMAECK10004-34 - Dips and tremmations. Dank 3, 50Hz Tent, 70E dang 25 cycles.	
	7 Staady State 9 Tutersent 9 Mater 10 Staady State 11 Tutersent 12 Mater	Veraller Va-230 IV-220 DV-220 DF-500 Veraller Veraller Veraller Veraller Veraller Veraller	DMEED0304.34 . Ope and Hempstom, Dark 3, 5991; Terr, 495 along 10 quite. Massace power leases about VI. 1: Duators 11 terrorothetine staring andhet reit respanses DMEED19006.434 - Ope and Hempsteine, Dark 3, 5991; Terr, 700 along 20 quite Massace power assace about VI. 1: Duator 11 terrorothetin staring andhet het sequence	
	7 Standy State 9 Mater 10 Sandy State 11 Sandy State 12 Unline 13 Standy State	Venuline Venuline Venuline Venuline Venuline Venuline Venuline Venuline Venuline	DMEED0304.34 . Ope and Hempstom, Dark 3, 5991; Terr, 495 along 10 quite. Massace power leases about VI. 1: Duators 11 terrorothetine staring andhet reit respanses DMEED19006.434 - Ope and Hempsteine, Dark 3, 5991; Terr, 700 along 20 quite Massace power assace about VI. 1: Duator 11 terrorothetin staring andhet het sequence	
*******	7 Stady State 9 Tolevent 9 Motor 10 Stady State 11 Toposet 12 Gala 13 Stady State 14 Tolevent	Venuline Venuli	DARECOMBIDARI Day existences on Dark 2004 Fee. 400 Auny 10 Option Massaca power savot a dark 11: 10-2004 feet of savot particle start for inspance. 2004/2000/00-34: 2006 existences down 2004 Feet 70: 10: 2006 grafts Massaca power savot a dapk 11: 10: 2004 ml 11: reception land a dark grafts the languages EXISECCOMD-34: 2016 existences Davis 10: 10: 10: 10: 10: 40: 00: 00: 00: 00: EXISECCOMD-34: 2016 existences thank 2017 Davis 10: 10: 10: 10: 10: 00: 00: 00: 00: 00:	
	7 Stady State 9 Tolevert 9 (C Moon 10 Stady State 11 Tolevert 12 Moin 13 Stady State 14 Tolevert 15 (C Moon	Vencalme Venc201 VV-200 IV-200 IV-200 2016 venc201 VV-201 IV-2010 V-200 IF-200 21 56 ven Venc201 IV-200 VV-200 IF-200 41 56 venc Venc201 IV-200 IV-200 IF-200 41 56 venc Venc201 IV-200 IV-200 IF-200 41 56 venc Venc201 IV-200 IV-200 IV-200 Venc201 IV-200 IV-200 Venc201 IV-200 Venc2	DARECOMBIDARI Day existences on Dark 2004 Fee. 400 Auny 10 Option Massaca power savot a dark 11: 10-2004 feet of savot particle start for inspance. 2004/2000/00-34: 2006 existences down 2004 Feet 70: 10: 2006 grafts Massaca power savot a dapk 11: 10: 2004 ml 11: reception land a dark grafts the languages EXISECCOMD-34: 2016 existences Davis 10: 10: 10: 10: 10: 40: 00: 00: 00: 00: EXISECCOMD-34: 2016 existences thank 2017 Davis 10: 10: 10: 10: 10: 00: 00: 00: 00: 00:	



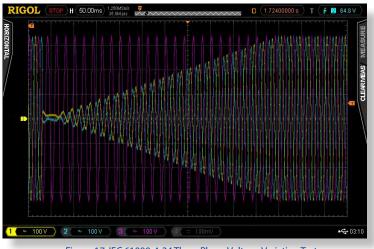


Figure 17: IEC 61000-4-34 Three Phase Voltage Variation Test

## **IEC AC Option**

### AC Source Requirements – IEC 61000-4-34

Due to the similarities between the IEC 61000-4-11 and IEC 61000-4-34 Voltage Dips and Interruptions test standards, source requirements are similar with the obvious exception of the current capability of the AC Power Source used. Table 4 in Section 6.1.1 of the IEC 61000-4-34 standard specifies AC generator performance requirements. The AMX and ASX AC Power Sources meet or exceed these requirements with only one exception as indicated in table 13.

## Model 3060-MS for High Current Test Applications

To support the high currents required for IEC 61000-3-34 testing or large EUT's, the 3060-MS with a 270Vrms high voltage range option should be considered as the AC Power Source to run these tests.

### **Test Reports**

To document product compliance to IEC test standards, it is necessary to fully document the tests performed and results from the test. To this end, the IEC AC option provides a comprehensive report generation capability. IEC Test reports are created in a Rich Text Format which is compatible with a wide range of word processors including those contained in MS Office, OpenOffice or LibreOffice. Templates can be customized with company logos and descriptions as desired.

At the end of a test run, the test reports documents the tests applied to the EUT as well as any measurement results and comments added by the operator as prompted by the program. An on-screen copy of the report is displayed and then saved to the Reports directory on disk.

A sample IEC 61000-4-14 Test Report is shown in Figure 18.

Parameter	IEC 61000-4-34 Requirement	AMX/ASX with UPC Controller Compliance
Output voltage at no load	0 to 100%, ±5% of residual voltage	Voltage Accuracy: ±0.5%
Voltage at the output of generator during equipment test	±10% of residual voltage value, measured as rms value every ½ cycle.	Meets requirements
Output current capability	On phases that are not dipped, 200% of rated current. On phases that are dipped, sufficient current to maintain test voltage within ±10% of UT	Model dependent. See ASX/AMX Data sheet for Current/Voltage rating chart by model.
Peak Inrush current capability. (no requirement for voltage variation tests)	Not to be limited by generator. However, maximum peak capability need not exceed 1000A for 250V to 600V or 500A for 200V to 240V, or 250A for 100V to 120V mains.	Model dependent. See ASX/AMX Data sheet for Current/Voltage rating chart by model.
Instantaneous peak overshoot/ undershoot of the actual voltage, generator loaded with 100, 50 or 25 Ohm resistive load.	Less than 10% of UT	< 2%
Voltage rise and fall time during abrupt change, generator loaded with 100 Ohm resistive load.	Between 1 and 5 msec for current < 75A	Exception. However, not relevant to actual voltage dips and interruption testing of products. Refer to IEC clarification statement 77A/720/DC on this topic.
Phase angle at which the voltage dip begins and ends.	0° to 360° with a maximum resolution of 5°	0° to 360°, resolution 0.1°
Phase relationship of voltage dips and interruptions with the power frequency	Less than ±5°	±0.5°
Zero crossing control of the generator	±10°	±0.5°

Table 13: IEC 61000-4-34 Section 6.1.1, Table 4 Generator Requirements

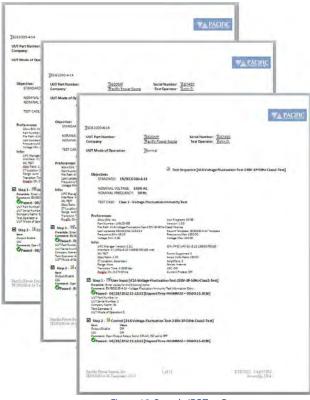


Figure 18: Sample IEC Test Report

### Requirements

To deploy the IEC AC Immunity test option, the following items are required in addition to the IEC-AC-4XX Option itself:

- UPC Studio Windows Software: Available at no charge to all Pacific Power Source customers and can be downloaded from our website. (www.pacificpower.com)
- UPC Test Manager: This is a cost option and not included as part of the IEC AC Immunity test option package. If you do not already own UPC Test Manager, contact Pacific Power Source to order a copy.
- Pacific Power Source AC Power Source with either UPC1/UPC3 or UPC12/UPC32 controller.
- A user provided Windows XP or Windows 7 PC with either a National Instruments GPIB/IEEE-488 controller or RS232 interface is required to run UPC Studio software. A pre-configured Laptop PC with all software pre-installed is available as an option through Pacific Power Source if needed.
- For IEC 61000-4-13, an inter harmonics generator is required in the form of the SCU-UPC32-413. This additional controller is controlled by the IEC 61000-4-13 test sequence using a second IEEE-488 address. It is only required for IEC 61000-4-13 and sold separately. This option includes the required wire harness to interface to the ASX, AMX or 3060-MS AC power source Auxiliary inputs. Customer must have a National Instruments GPIB Interface controller in the PC used to run UPC Studio to use the SCU-UPC32-413 controller.
- Testing per IEC 61000-4-29p requires the optional DCR module. This DCR module is **not** included in the IEC-AC-4XX option package and must be ordered seperately.

### **Ordering Information**

Required options needed to support the following tests:

Item	Description	Details	
UPC Studio	AC Power Source Control Software	Available to all PPS customers at no charge.	
UPC Test Manager	Test Manager Option	Required to use IEC AC-4XX software and SCU-UPC32-413 options.	
IEC-AC-4XX	IEC 61000-4 AC Immunity Test Sequences	Includes 4-11, 4-14, 4-27, 4-28, 4-29 and 4-34. Excludes 4-13 option.	
SCU-UPC32-413	IEC 61000-4-13 Inter Harmonic Generator	Required to run 4-13 tests. Includes 4-13 software.	
Prog Z Option	Programmable Output Impedance	Required when using ASXT or AMXT in transformer coupled mode.	
HAS Option	Harmonic Analysis and Synthesis option	Suggested for use with IEC 61000-4-13 testing if no Harmonics and Flicker or Power analyzer is available.	

#### Order Example

IEC-AC-4XX SCU/UP32-413

- Option IEC 61000-4-XX test software
- Option IEC 61000-4-13 test hardware and software
- Assumes user already owns UPC Studio and UPC Test
  Manager Software

#### Parts of the Standard Delivery

- Distribution CD ROM
- IEC AC Immunity Test Option User Manual, P/N 149151
- Compatible with UPC Studio Software
- SCU/UPC32-413 (P/N P001156) includes US Line cord and required cabling (P/N 150219) between SCU/ UPC32 and AC Power Sources; UPC32 controller.
   Note: This option requires a GPIB/IEEE-488 Interface.



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