



**California  
Instruments™**

# TAHOE SERIES

Precision Programmable AC and DC Sources

# TAHOE SERIES

PRECISION PROGRAMMABLE AC AND DC SOURCES



## THE MOST ADVANCED PLATFORM OF POWERFUL AC SOLUTIONS

The California Instruments Tahoe Series combines intelligence and flexibility with high power to create an advanced platform of AC solutions. Using a state-of-the-art SiC power switching architecture and Digital Signal Processing, the Tahoe Series combines a robust, high-power AC/DC source with an advanced power analyzer in a single floor standing chassis.

This easy-to-configure power product covers a wide spectrum of single and multi-phase AC or single channel and multi-channel DC power applications at an affordable cost. With add-on test application routines for military and commercial avionics testing, the Tahoe Series can fulfill your power test requirement.

LXI | CE

### FEATURES AND CAPABILITIES

- High Power AC and DC Power Source
- Auto paralleling for higher power system expansion
- Single and three phase modes
- Arbitrary & Harmonic Waveform Generation
- Standard LXI LAN, USB, and RS-232, Optional GPIB
- 500uS time resolution for Transients
- Complete avionics test suites
- 15kVA to 1MVA Power Levels
- Intuitive 5" color display for ease of navigation
- Internationally accepted test routines for EM/EMC, Safety compliance

# KEY BENEFITS

## Simple Operation

The Tahoe Series can be operated completely from its menu driven front panel controller. The full color- touch display shows menus, setup data, and read-back measurements. RS-232C, USB and LAN remote control interfaces and instrument drivers for popular ATE programming environments are available. This allows the Tahoe Series to be easily integrated into an automated test system. With the programmable arbitrary waveform generator, the user can generate application specific waveforms, obtain time and frequency domain measurements, and capture actual voltage and current waveforms.

## Configurations

The Tahoe Series offers five single chassis configurations: 15kVA, 22.5kVA, 30kVA, 45kVA and 90kVA. For higher power requirements, multi-cabinet models are available. These systems offer Reflex capability, allowing flexible user reconfiguration as needed. This ability to reconfigure the system greatly expands your test coverage and is not commonly found in power systems.

## Choice of Voltage Ranges

The Tahoe Series offers dual range 0 - 166V & 0 - 333V line to neutral direct coupled output. These models provide a maximum 3 phase output capability of 287 VAC & 576 VAC line to line respectively. For applications requiring more than 333 V L-N (or 576 V L-L), the optional -XVC400 output transformer provides an additional 0 - 442 V L-N and 0 - 766 V L-L output range for use in AC mode only. For custom applications, the user defined XVC option is available.



## KEY BENEFITS

### High Crest Factor

With support for high crest factor loads, the Tahoe can drive difficult nonlinear loads with ease. Since many modern products use switching power supplies, they tend to pull high repetitive peak currents. The TA30 with a crest factor rating of 4.5, for example, can deliver up to 300 Amps of repetitive peak current (166 V AC range) per phase to handle three phase loads. Refer to the specifications for peak repetitive currents for each model.

### Remote Control

Standard RS232C, USB, and LAN, along with optional GPIB remote control interfaces, allow programming of all instrument functions from an external computer. The popular SCPI command protocol is used for programming.

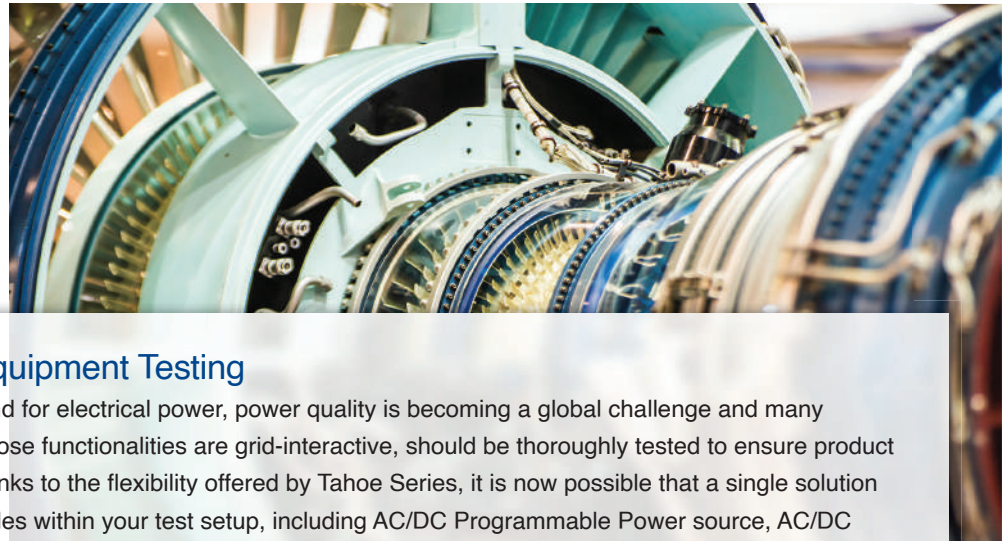
### Hardware In the Loop

The External Drive (-EXTD) feature allows external analog signal control of the source while in AC operation, turning the source into a high bandwidth amplifier. Most common applications include hardware in the loop (HIL) simulation of power plants, hybrid electric vehicles, and renewable energy generation and their effect on the utility grid. Combining an HIL simulator with the Tahoe grid simulator results in as little as 100uS delay, meaning the overall solution is real time.

## Tahoe Series Back Panel



# TESTING APPLICATIONS



## Power Conditioning Equipment Testing

With the ever-increasing demand for electrical power, power quality is becoming a global challenge and many power conversion solutions, whose functionalities are grid-interactive, should be thoroughly tested to ensure product performance and reliability. Thanks to the flexibility offered by Tahoe Series, it is now possible that a single solution can support a wide variety of roles within your test setup, including AC/DC Programmable Power source, AC/DC Grid Simulator, or AC/DC Resistive or Complex Electronic load. With the ability to change most parameters during the test and the ability to synchronize the waveform with internal or external drive signals, Tahoe provides multiple methods of validation for R&D Testing.



## Avionics & Shipboard Electronics Testing

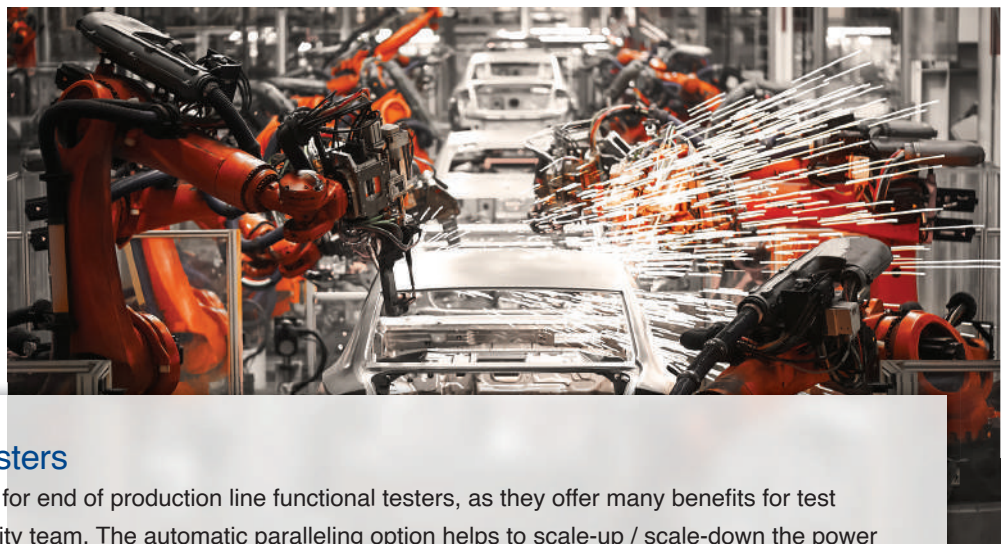
Optional test suites for avionics power quality standards like MIL-STD 704, RTCA DO-160, and MIL STD 1399 shipboard power bus emulation save time in creation of test cases and help to quickly pre-validate the product compliance. With fundamental frequency support up to 905Hz with the high frequency (HF) option, Tahoe can simulate a wide array of electrical power supplies in most aircrafts and shipboard electrical systems.

## TESTING APPLICATIONS



### Regulatory Compliance Testing

As governments and regulatory bodies expand enforcement of product quality standards, regulatory compliance testing has become a requirement for manufacturers. The Tahoe Series is designed to meet AC source requirements for use in compliance testing such as IEC 61000-3-2, 3-3, 3-11, 3-12, to name a few. Tight integration with Virtual Panels software facilitates easy generation of test sequence for various safety, compliance and EMI tests, as per various UL, IEC, IEEE standards, and national electric grid code of conduct/compatibility.



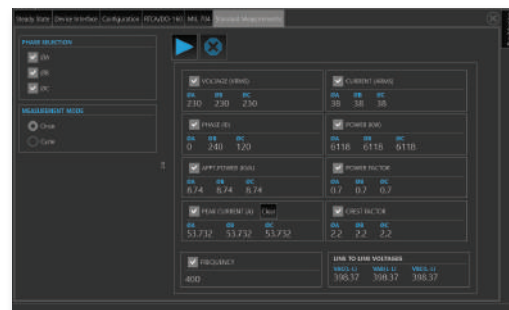
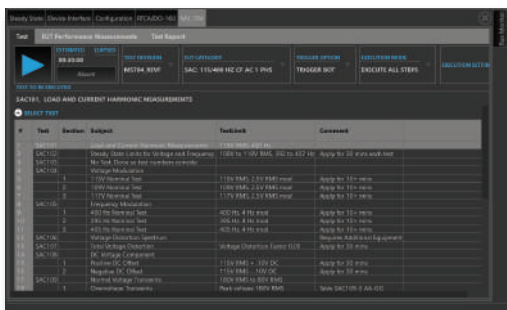
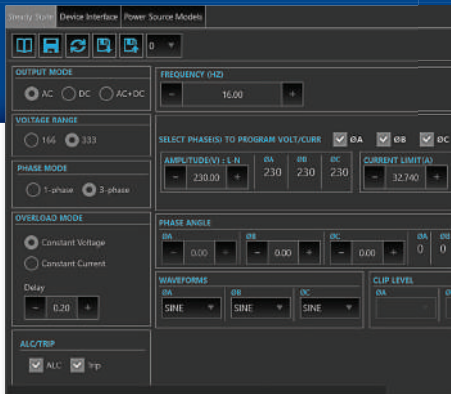
### Manufacturing Line Testers

The Tahoe Series are a good fit for end of production line functional testers, as they offer many benefits for test developers, operators, and quality team. The automatic paralleling option helps to scale-up / scale-down the power capacities, dynamically, to safeguard the investment on infrastructure. Full support for SCPI commands, availability of NI LabVIEW drivers, and IVI Drivers, helps test automation developers to choose their comfortable development environment. Load dependent variable fans help reduce the acoustic noise and improve occupational health.

# VIRTUAL PANELS™

## Graphical User Interface

Virtual Panels allow remote control of the Tahoe Series as well as programming communication and monitoring without front panel display.



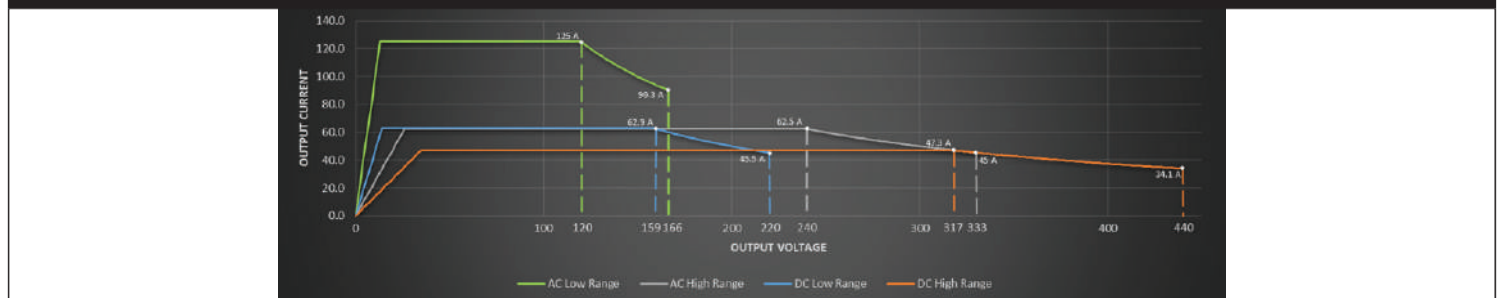
# TAHOE SERIES

## PRECISION PROGRAMMABLE AC AND DC SOURCES

OUTPUT SPECIFICATIONS					
PARAMETER	TA0015	TA0022	TA0030	TA0045	TA0090
Power	15kVA / 15kW <sup>[1]</sup> 1Φ	22.5kVA / 22.5kW <sup>[1]</sup> 1 or 3Φ	30kVA / 30kW 1 or 3Φ	45kVA / 45kW <sup>[1]</sup> 1 or 3Φ	90kVA / 90kW <sup>[1]</sup> 1 or 3Φ
Modes	AC, DC, AC+DC (Source mode only)				
Voltage Range (AC)	Low Range: 0-166 Vrms L-N High Range: 0-333Vrms L-N				
Voltage Range (DC)	Low Range: 0-220Vdc High Range: 0-440Vdc				
Output Coupling	Standard configurations: DC coupled. Optional 3rd AC coupled range: 0-444, 555, 666, or 721Vrms L-N				
Voltage Accuracy	AC and DC Modes: $\pm 0.2\%$ FS; AC+DC Mode: $\pm 0.3\%$				
Voltage Resolution	0.1V, AC, DC, AC + DC modes				
Voltage Distortion	<66Hz: 0.5%, 66-500Hz: 1%, >500Hz: 1.5%				
Current per Φ (FSV)	90.3/45 Arms 45.5/34.1 Adc	45/22.5 Arms 22.7/17 Adc	60/30 Arms 30.3/22.7 Adc	90.3/45 Arms 45.5/34.1 Adc	180.7/90.1 Arms 91/68.2 Adc
Current per Φ (max)	125/62.5 Arms 62.9/47.3 Adc	62.5/31.3 Arms 31.4/23.6 Adc	83/41.5 Arms 41.9/31.5 Adc	125/62.5 Arms 62.0/47.3 Adc	250/125 Arms 125.8/94.6 Adc
Constant Power Mode	Operation at higher currents but constant power is possible from 72% of Voltage range (138% of rated current) declining to 100% of rated current at 100 % of voltage range.				
Load Regulation (Source Mode)	DC, $\leq 100\text{Hz}$ : 0.25% FS >100Hz: 0.5%				
Line Regulation	0.1% for a 10% line change				
Phase Programming Accuracy	$\leq 100\text{Hz}$ : $\pm 1.5^\circ$ , 100-500Hz: $\pm 2^\circ$ , >500Hz: $\pm 4^\circ$				
Phase Programming Resolution	0.1°				
Frequency Range	DC, 16-550Hz, DC, 16-905Hz with HF Option				
Frequency Accuracy	$\pm 0.01\%$ + (resolution/2)				
Frequency Resolution	$\leq 81.91\text{Hz}$ : 0.01Hz, 82.0 to 819.1Hz: 0.1Hz, >819.1Hz: 1Hz (With LKM/LKS option, 1Hz from 16 Hz to 905 Hz)				
Voltage Stability	0.25% over 8 hours at constant line, load, & temperature, with external sense leads connected				

<sup>1</sup> In AC+DC and DC modes, derate to 66% of max power.

### CONSTANT POWER MODE - AVAILABLE MAX AC OR DC CURRENT VS. PROGRAMMED VOLTAGE



### MEASUREMENT SPECIFICATIONS

PARAMETER	RANGE	ACCURACY ( $\pm$ ) <sup>[1]</sup>	RESOLUTION
Frequency	16.00 - 905.0 Hz	0.01% + 0.01 Hz	0.01 to 81.91 Hz, 0.1 to 905 Hz
RMS Voltage	0 - 333 Volts	0.1% + 0.2% FS	0.01 Volt
DC Voltage	0 - 440 Volts	0.1% + 0.2% FS	0.1 V
RMS Current	TA15, 22, 30, & 45: 0 - 125 Amps TA90: 0 - 250 Amps	0.3% + 0.5% FS	0.1 Amp
DC Current	TA15, 22, 30, 45: 0 - 100 Amps TA90: 0 - 200 Amps	0.3% + 0.5% FS	0.1 Amp
Peak Current	TA15, 22, 30, 45: 0 - 375 Amps TA90: 0 - 750 Amps	2%, <100 Hz, 4A + 0.02%, 100-905Hz	0.01 Amp
VA Power	TA15, 22, 30, 45: 0 - 15 KVA TA90: 0 - 30 KVA	1% FS, <100 Hz, 2% FS, $\geq 100$ Hz	10 VA
Real Power / DC Power	TA15, 22, 30, 45: 0 - 15 KW TA90: 0 - 30 KW	1% FS, <100 Hz, 2% FS, $\geq 100$ Hz	10 W
Power Factor (>0.2kVA) <sup>2</sup>	0.00 - 1.00	0.01, <100 Hz, 0.02, 100-820 Hz	0.01

<sup>1</sup> Accuracy specifications are valid above 100 counts. For current and power measurements, specifications apply from 10% to 100% of measurement range. Current and Power range and accuracy, and resolution specifications given are for the TA0045 are times three for TA22.5, TA30, TA45 operated in single phase mode. TA90 Current and Power range and resolution are times two. For the multi chassis models the current and power range, accuracy, and resolution, specifications are to be multiplied by No. of chassis.

<sup>2</sup> Power factor accuracy applies for PF > 0.5 and VA > 50 % of max.



HARMONIC MEASUREMENTS			
PARAMETER	RANGE <sup>[2]</sup>	ACCURACY ( $\pm$ ) <sup>[1]</sup>	RESOLUTION
Frequency Fundamental	16.00 - 905 Hz	0.03% + 0.03 Hz	0.01 Hz
Frequency Harmonics	32.00 Hz – 16 KHz	0.03% + 0.03 Hz	0.01 Hz
Phase	0.0 - 360.0°	2° typ.	0.5°
Voltage	Fundamental	0.75V	0.01V
	Harmonic 2 - 50	0.75V + 0.3% + 0.3%/kHz	0.01V
Current	Fundamental	0.5A	0.1A
	Harmonic 2 - 50	0.15A + 0.3% + 0.3%/kHz	0.1A

<sup>1</sup> Accuracy specifications are valid above 100 counts. For current and power measurements, specifications apply from 10% to 100% of measurement range. Current and Power range and accuracy specifications are times three for TA22.5, TA30, TA45 operated in single phase mode.

<sup>2</sup> For the multi chassis models, the current and power range accuracy specifications are to be multiplied by No. of chassis.

INPUT SPECIFICATIONS						
PARAMETER		TA0015	TA0022	TA0030	TA0045	TA0090
Voltage (3- $\Phi$ , 3-wire + gnd (PE))		208 V <sub>LL</sub> $\pm$ 10% <sup>[1]</sup> , 230 V <sub>LL</sub> $\pm$ 10% <sup>[1]</sup> , 380 V <sub>LL</sub> $\pm$ 10% <sup>[2]</sup> , 400 V <sub>LL</sub> $\pm$ 10%, 480 V <sub>LL</sub> $\pm$ 10%				
Frequency		47 - 63Hz				
Line VA		18kVA	26kVA	37kVA	53kVA	106kVA
Line Current (Arms)	187V L-L	58	89	116	175	–
	207V L-L	52	79	105	157	–
	342V L-L	Not available	49	64	95	190
	360V L-L	30	46	60	90	180
	432V L-L	25	38	50	75	150
Efficiency		85% (typical) depending on line and load				
Power Factor		0.95 (typical) / 0.99 at full power				
Inrush Current (A <sub>pk</sub> )	208V L-L	77	153	230	230	–
	230V L-L	73	146	220	220	–
	342V L-L	Not available	94	140	140	280
	400V L-L	44	87	132	132	264
	480V L-L	37	73	110	110	220
Hold-up Time		>10mSec				
Isolation Voltage		2200VAC Input-to-Output, 1350VAC Input-to-Chassis				

<sup>1</sup> Not available on TA0090.    <sup>2</sup> Not available on TA0015.

# TAHOE SERIES

## PRECISION PROGRAMMABLE AC AND DC SOURCES

OPERATIONAL CHARACTERISTICS	
PARAMETER	CHARACTERISTIC
Parallel Operation	Multi-chassis configurations are automatically accomplished when the chassis are interconnected with the interface cables, and require no user setup, except to wire the inputs and outputs. Maximum power is limited to 270 kVA with the TA45 and 1.08MVA with the TA90.
Output Relays	Isolation and range relays are provided internally to automatically configure the outputs, turn the output on/off, and disconnect the load from the output amplifier when in the off state.
1-Phase and 3-Phase mode selection	Switches between 1 and 3 phase outputs. This mode is available TA22.5, TA30 and TA45 models only.
Non-Volatile Memory	16 complete instrument setups and transient lists, 100 events per list.
Waveform Management	TA Series employs independent arbitrary waveform generator for each phase, this allows the user to create custom waveforms. In addition, three standard waveforms sine, square and clipped are always available.
Fault Identification	On-board diagnostics identify when an assembly has experienced a fault.
Emergency Stop	This mushroom style switch is installed on the front panel of each chassis. When pushed in, the amplifiers will be disabled, the voltage will be programmed to 0V and the output relay(s) will open. Note that the controller (and front panel display) will still be powered up, but no power is available to the amplifiers and there will be no output power.
Calibration	Calibration interval is 1 year; calibration is firmware-based through the digital interface or Virtual Panels.
Current Limit Modes	Two selectable modes of operation: Constant Voltage (CV) & Constant Current (CC). In CC mode, the voltage folds back with automatic recovery during an over-current event. In CV mode, the output is programmed to 0V and the output relays open with an over current event.
Automatic Level Control (ALC)	User-selectable ALC operation enables a digitally implemented feedback control loop to precisely regulate the RMS value of the output voltage.
Transient Generator	Output could be controlled to produce transient events with 500 $\mu$ s programming resolution: Voltage: drop, step, sag, surge, sweep; Frequency: step, sag, surge, sweep; Voltage and Frequency: step, sweep.
External Drive	0-7.00V <sub>rms</sub> aux input.

OPTIONS	DESCRIPTION
HF	Increases the maximum output frequency range to 905Hz
HF-FC	This option adds the HF option and changes the frequency accuracy to $\pm 0.25\%$ of program frequency
EHF	The Extended High Frequency option extends the maximum output frequency range to 1500 Hz
EHF-FC	This option adds the EHF option and changes the frequency accuracy to $\pm 0.25\%$ of program frequency
LKM	Clock and Lock, Master
LKS	Clock and Lock, Auxilliary
AVSTD	Includes RTCA/DO160 E/F/G, MIL-STD 704 A/B/C/D/E/F, Airbus ADB100.1.8 D/E, Airbus ADB100.1.8.1 B/C
AVALL	Includes RTCA/DO160 E/F/G, MIL-STD 704 A/B/C/D/E/F, Airbus ADB100.1.8 D/E, Airbus ADB100.1.8.1 B/C, B787B3-0147, AMD24C
MIL1399	MIL-STD 1399-300B Shipboard Power Test
LNS	Synchronizes the output frequency to the input line frequency
GPIB	GPIB Interface
XVC	Optional AC coupled voltage range (specifications below)
Air Filter	Adds dust filters to the front panel air inlet
Chill Door	Adds rear mounted water cooled environment chiller (Tahoe 90 only)
CTSHL	Adds the Harmonics and Flicker Test System with integrated PC

XVC444 SPECIFICATIONS					
PARAMETER	TA0015	TA0022	TA0030	TA0045	TA0090
Voltage Range	0-440 Vrms L-N				
Voltage Resolution	0.1 V				
Voltage Accuracy	$\pm 0.25\%$ FS				
Power	15kVA	22.5kVA	30kVA	45kVA	90kVA
Current per $\Phi$ (max)	46 Arms	23 Arms	31 Arms	46 Arms	93 Arms

ENVIRONMENTAL SPECIFICATIONS	
PARAMETER	SPECIFICATIONS
Operating Temperature	0° to +40° C (+32° to +104° F)
Storage Temperature	-40° to +85° C (-40° to +185° F)
Altitude	< 2000 meters
Relative Humidity	0-95 % RAH, non-condensing maximum for temperatures up to 31°C decreasing linearly to 50% at 40°C.

REGULATORY COMPLIANCE	
PARAMETER	SPECIFICATIONS
EMC	CE marked for EMC Directive 2014/30/EU per EN 61326-1:2013 Class A for Emissions and Industrial Immunity levels as required.
Safety	CE marked for LVD compliance 2014/35/EU to EN 61010-1, Edition 3.1
CE Mark LVD Categories	Installation Overvoltage Category: II; Pollution Degree: 2; indoor use only.
RoHS	CE marked for compliance with RoHS3 EU Directive 2015/863/EU for Restriction of Hazardous Substances in Electrical and Electronic Equipment.

PHYSICAL CHARACTERISTICS	
PARAMETER	SPECIFICATIONS
TA0015 Dimensions / (H x W x D)	Net: 31.75" x 28.75" x 34.5" (806 x 610 x 711 mm) / Shipping: 44.0" x 31.0" x 44.0" (1118 x 788 x 889 mm)
TA0015 Weight	Net: 600 lbs. (272 kg) Shipping: 700 lbs. (317.5 kg)
TA22/30/45 Dimensions / (H x W x D)	Net: 45.5" x 29.0" x 36.0" (1155.7 x 736.6 x 914.4 mm) / Shipping: 55.375" x 34.625" x 44.125" (1407 x 880 x 1121 mm)
TA0022/30/45 Weight	Net: 1016 lbs. (461 kg) Shipping: 1378 lbs. (625 kg)
TA0090 Dimensions / (H x W x D)	Net: 70.0" x 33.5" x 46.0" (1778 x 851 x 1169 mm) / Shipping: 85.25" x 38.9" x 51.5" (2166 x 988 x 1308 mm)
TA0090 Weight	Net: 2500 lbs. (1133 kg) Shipping: 2862 lbs. (1298 kg)

**ORDERING INFORMATION**

TA 0045 A 1 D 1 - 0 0 0 0 0 0 0

Series Tahoe  
Power VA/1000  
Number of Chassis  
Input  
Optional Output AC Vrange  
Frequency Options  
Interface Options  
Clock/Lock Options  
Regulatory Test Options  
Power Quality Test Options  
Hardware Options

Input  
C - 208V L-L [3]  
D - 400V L-L  
E - 480V L-L  
F - 230V L-L [3]  
G - 380V L-L [2]

Optional Output AC Vrange  
1 - None  
2 - XVC444  
3 - XVC555 [1]  
4 - XVC666  
5 - XVC721 [1]

Frequency Options  
0 - Standard  
1 - HF  
2 - HF-FC  
3 - EHF  
4 - EHF-FC

Interface Options  
0 - Standard  
1 - GPIB  
2 - GPIB-MC

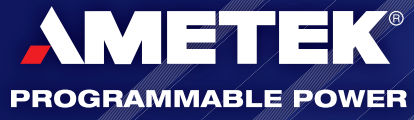
Clock/Lock Options  
0 - None  
A - LKM, Clock/Lock Leader  
B - LKS, Clock/Lock Follower

Regulatory Test Options  
0 - None  
A - IEC  
B - IEC-MC  
C - LNS, Line Sync  
D - LNS-MC  
E - IEC+LNS  
F - IEC+LNS-MC  
G - CTSHL  
H - CTSHL+IEC  
J - CTSHL-ALL

Power Quality Test Options  
0 - None  
A - AVSTD  
B - AVSTD-MC  
C - AVALL  
D - AVALL-MC  
E - MIL1399  
F - MIL1399-MC  
G - MIL1399+AVSTD  
H - MIL1399+AVSTD-MC  
J - MIL1399+AVALL  
K - MIL1399+AVALL-MC

Hardware Options  
0 0 - None  
0 A - Front panel Air Filter  
2 C - Chill Door[1]

**Notes**  
[1] Available only on Tahoe 90 Configurations  
[2] Not available on Tahoe 15 Configurations  
[3] Not available on Tahoe 90 Configurations



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