### 5550-33300 VA

### **High Performance Programmable AC and DC Power Source**

### 156-312 V

- Combination AC and DC Power Source
- 16-5,000Hz Output Frequencies
- Arbitrary and Harmonic Waveform Generation
- Built-In Digital Power Analyzer
- Scope Capture Capability
- Power Programming Software
- Constant Power Mode
- Multi-Box Option

### Introduction

The CSW Series represents a new generation of AC/DC power sources that address the increasing demands on test equipment to perform additional functions at a lower cost. By combining a flexible AC/DC power source with a high performance power analyzer, the Compact CSW Series is capable of handling complex applications that have traditionally required multiple systems. The sleek integrated approach of the CSW avoids cable clutter that is commonly found in test systems. All connections are made internally and the need for digital multimeters, power harmonics analyzers, and current shunts or clamps is eliminated.

Since many components in the CSW are shared between the AC/DC source and the power analyzer, the total cost of the integrated system is less than the typical cost of a multiple unit system.

### Easy to use controls

The CSW Series is DSP controlled and can be operated from an easy to use front panel keypad. Functions are grouped logically and are directly accessible from the keypad. This eliminates the need to search through various levels of menus and/or soft keys. A large analog control knob can be used to quickly slew output parameters. This knob is controlled by a dynamic rate change algorithm that combines the benefits of precise control over small parameter changes with quick sweeps through the entire range.



### Applications

The CSW is designed for testing today's complex electronics, including avionics, telecommunications and commercial electronics requiring low profile, light weight power supplies

Other applications include:

- Testing for real world power conditions using different waveforms on all 3 phases (including DC)
- Load susceptibility testing with sequence or event programming and multiple voltage harmonics
- Power line disturbance simulation testing
- MIL-STD-704, DO-160, B787 and ABD100 avionics testing
- Power supply testing for AC-DC, DC-DC converters and UPS's
- Transients on 12 & 24 VDC for automotive applications

### AC, DC or AC+DC Output

A direct coupled, transformerless design allows AC and DC on separate phases or on the same phase. The CSW can be used as a true DC power supply. High DC content waveforms (up to 312 volts) can be created with no derating of output power, even with 100% reactive loads, eliminating the need for a separate DC supply. Waveform programming is easily accomplished using the Graphical Users Interface software. Waveforms can be uploaded and modified from a digital scope. The waveforms can then be downloaded to the CSW and output to precisely simulate real-world conditions.

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AMETEK

Programmable Power 9250 Brown Deer Road San Diego, CA 92121-2267 USA

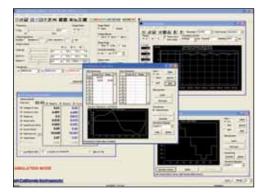


### **Flexability in Power Ranges**

The CSW Series is based on a 5,550VA power source. The CSW features selectable Single or Three Phase output via front panel menu selection or via remote control interface. Utilizing Master / Auxilary arrangement the CSW offers the flexibility to paralled up to power levels of 33,300VA

### **High Crest Factor**

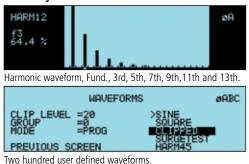
With a crest factor of up to 4.0:1; the CSW Series AC source can drive difficult nonlinear loads with ease. Since many modern products use switching power supplies, they have a tendency to pull high repetitive peak currents. The CSW5550 can deliver up to 52 Amps of repetitive peak current (156 V range) per phase

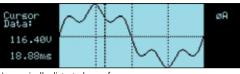


#### Harmonic Waveform Generation

Using the latest DSP technology, the CSW Series programmable controller is capable of generating harmonic waveforms to test for harmonics susceptibility. The Windows Graphical User Interface program can be used to define harmonic waveforms by specifying amplitude and phase for up to 50 harmonics. The waveform data points are generated and downloaded by the GUI to the AC source through the remote interface. Up to 200 waveforms can be stored in nonvolatile memory and given a user defined name for easy recall.

#### Arbitrary Waveform Generation





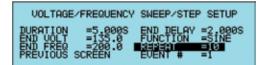
Harmonically distorted waveform.

Using the provided GUI program or custom software, the user also has the ability to define arbitrary AC waveforms. The arbitrary waveform method of data entry provides an alternative method of specifying AC anomalies by providing specific waveform data points. The GUI program provides a catalog of custom waveforms and also allows real-world waveforms captured on a digital oscilloscope to be downloaded to one of the many AC source's waveform memories. Arbitrary waveform capability is a flexible way of simulating the effect of real-world AC power line conditions on a unit under test in both engineering and production environments.

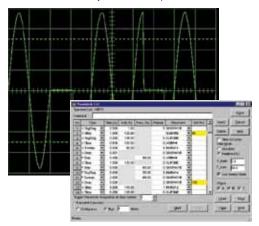
### CSW Series - AC and DC Transient Generation

The CSW Series controller has a powerful AC and DC transient generation system that allows complex sequences of voltage, frequency and waveshapes to be generated. This further enhances the CSW's capability to simulate AC line conditions or DC disturbances. When combined with the multiphase arbitrary waveform capabilities, the AC and DC output possibilities are truly exceptional. Transient generation is controlled independently yet time synchronized on all three phases. Accurate phase angle control and synchronized transient list execution provide unparalleled accuracy in positioning AC output events.

Transient programming is easily accomplished



Transient List Data Entry from the front panel.



Transient List Data Entry in GUI program.

# **CSW** Series

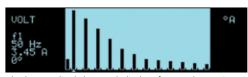
# 5550-33300 VA

from the front panel where clearly laid out menu's guide the user through the transient definition process.

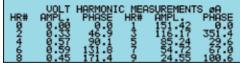
The front panel provides a convenient listing of the programmed transient sequence and allows for transient execution Start, Stop, Abort and Resume operations. User defined transient sequences can be saved to non-volatile memory for instant recall and execution at a later time. The included Graphical User Interface program supports transient definitions using a spreadsheetlike data entry grid. A library of frequently used transient programs can be created on disk using this GUI program.

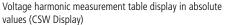
### Harmonic Analysis

The CSW Series provides detailed amplitude and phase information on up to 50 harmonics of the fundamental voltage and current (up to 16 kHz). Harmonic content can be displayed in both tabular and graphical formats on the front panel LCD for immediate feedback to the operator. Alternatively, the included GUI program can be used to display, print and save harmonic measurement data. Total harmonic distortion of both voltage and current is calculated from the harmonic data.



Absolute amplitude bar graph display of current harmonics with cursor positioned at the fundamental (CSW Display).

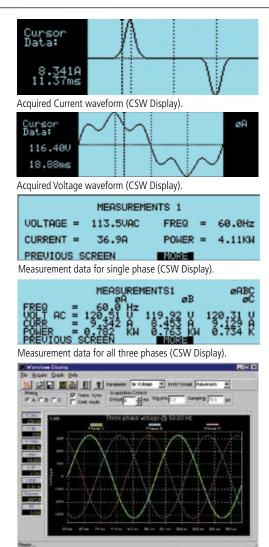




### Waveform Acquisition

The measurement system is based on real-time digitization of the voltage and current waveforms using a 4K deep sample buffer. This time domain information provides detailed information on both voltage and current waveshapes. Waveform acquisitions can be triggered at a specific phase angle or from a transient program to allow precise positioning of the captured waveform with respect to the AC source output.

The front panel LCD displays captured waveforms with cursor readouts. The included GUI program also allows acquired waveform data to be displayed, printed, and saved to disk.



Acquired three phase voltage waveforms display on PC.

### **Multi-Box Option**

In many applications high power is required for a small portion of the testing while a majority of the tests are performed at reduced power levels. The controller architecture of the CSW provides the end-user with a wide array of configuration options that often eliminate the need to purchase different AC or DC power systems to meet a variety of applications. The Multi-Box option is available which allows multiple channel systems to be separated into individually controlled stand alone power sources. By simply connecting the interface cable between multiple sources the hardware automatically sets itself to the system configuration offering Plug and Play performance. There is no need to modify configuration settings from the front panel or hardware jumpers located internally to the source. The multi-box feature is ideal for end-users planning to increase power levels or separate a system into multiple smaller sources.

# **CSW Series : Product Specifications**

Input	
Voltage Ranges	Factory configured 187 to 264 Vrms, 3ø L-L (3 wire), or 342 to 457 Vrms, 3ø L-L (4 wire). A chassis ground is also required.
Power Factor	PFC Input, 0.99PF
Frequency Range	47 to 440 Hz
Efficiency	70% min, at full load
Ride Through	10 ms minimum
Output	
Power	5550 VA: 1ø or 3ø (systems up to 33,000 VA)
AC or DC Output Voltage	0 to156 Vrms L-N, low range; 0 to 312 Vrms L-N, high range
Current Per Phase	16A to 115V in 156V range; 8A to 230V in 312V range per, 1850 VA module.
Power Factor of Load	0 lagging to 0 leading (0-unity)
Crest Factor	3.25 (peak output current to rms output current))
Frequency Range	DC or 16Hz to 5 kHz. Specifications apply DC, 40Hz to 5kHz. For output frequencies greater than 1 kHz, the max slew rate allowed is 1 kHz per second.
Max Total Harmonic Distortion	(Full Linear Load or No Load): 0.25% max, 40 to 100 Hz; 0.5% max to 500 Hz; and 1% max to 1 kHz plus 1%/kHz to 5 kHz
AC Noise Level	>60 dB rms below full output voltage
Amplitude Stability With Remote Sense	±0.1% of full scale over 24 hours at constant line, load and temperature
Line Regulation	(DC, or 40 Hz to 5 kHz): ±0.015% of full scale for a ±10% input line change
Load Regulation	±0.025% of full scale voltage for a full resistive load to no load; above 1 kHz, add ±0%/kHz
Voltage Accuracy	±0.1% of range. Above 1 kHz, add 0.2%/kHz. Add ±0.1% of full scale for "AC PLUS DC" mode. Valid for 5 to 156 Vrms and 10 to 312 Vrms at 25°C
Voltage Resolution	1mV (0.1V) Full Scale
Frequency Accuracy	±0.01% at 25°C ±0.001%/°C
Frequency Resolution	16 Hz to 81.91 Hz (0.01 Hz) 81.90 Hz to 819 Hz (0.01 Hz) 820 Hz to 5000 Hz (1 Hz)
Phase Accuracy, Phase-to-Phase Balanced Linear Resistive Load	±1% of Programmed value
Phase Angle Resolution	0.1°
Remote Output Voltage Sense	5 Vrms total lead drop, max
Common Intput and Outputs	
Remote Inhibit	A logic Low or High contact closure input to inhibit the outputs
External Amplitude Modulation	0 to 5 VRMS provides 0 to 20% output amplitude modulation (±2% of full scale output).
External Drive Input	Acts as Amplifier, 0 to 5 VRMS (DC to 5 kHz) or $\pm$ 5 VDC input for zero to full scale programmed voltage output ( $\pm$ 2% of full scale output). Individual inputs for an external signal for each of the three phases.
Remote Programming Voltage	0 to $\pm$ 7.07 VDC provides zero to full scale programmed voltage output ( $\pm$ 2% of full scale output).
External Input Impedance	40K (ohm symbol) for each of the three inputs.
Externaly Sync	External Sync allows the output frequency of the AC source to be synchronized to an external TTL level clock signal.
LKM	Clock and Lock Master. Enables synchronizing outputs of two or more California Instruments sources, one acts as master.
LKS	Clock and Lock Auxiliary
Front Panel Trigger, BNC Connector	Output available at the front panel BNC connector that provides a negative going pulse for any programmed voltage or frequency change. The trigger can be reassigned as an output when running list transients.
Front Panel Phase A, B and C, BNC connectors	These three outputs are representive of the programmed output waveform, magnitude and frequency. 0 to 4.86 Vrms represents 0 to a full-scale output voltage.

# **CSW Series : Product Specifications**

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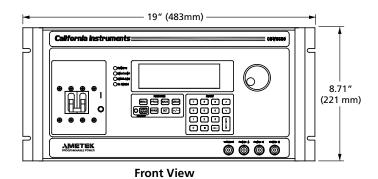
(AC Measurements) $                                      $	Storage Temperature         -40°C to 70°C (40°F to 158°F)           Cooling         Ari is drawn in from the top, born, and sides and exhausted through the rear           Humidaty (Neuroandensing)         0 to 85% at 25°C (77°F), drants to 50% at 40°C (104°F)           Allude         Operating 10000 (In one operating 40,000 (In one operating 40,000 (In opera 40,000 (In oper	Environmental								
Colling       Air is drawn in from the top, bottom, and sides and exhausted through the rear         Humidity (Mon-condensing)       0 to 85% at 25°C (77°F; denate to 50% at 40°C (104°F;)         Operating 10,000 ft, non operating 40,000 ft         Pysical         Dimensions         Width 19° (483 mm) Height: 8.75° (222 mm) Depth: 23.5° (597 mm)         Desting Weight       CSW 5500 127 Bs (57.5 kg)         Silipping Weight - US       CSW 1600 1bs (72.40)         Ket       Multi Chassis systems, dimension and weight are approximately x2, x3, x4, x5 and x6 CSW Specifications         Measurements       Multi Chassis systems, dimension and weight are approximately x2, x3, x4, x5 and x6 CSW Specifications         Measurements       Multi Chassis systems, dimension and weight are approximately x2, x3, x4, x5 and x6 CSW Specifications         Measurements       Sondard         AC Measurements)       If an mode (-1)         I a mode (-2)       0.1% + 1.00 Itz         I a mode (-1)       0.1% + 1.01 Itz         AC Measurements       Sondard         Mite       I a mode (-1)         I a mode (-1)       0.1% + 1.01 Itz         AC Measurements       Sondard         Marce       Sondard         Marce       So 1.91 Itz         I a mode (-1)       0.1% + 1.01 Itz         I a m	Scoling       Air is drawn in from the top, bottom, and sides and exhausted through the rear         umindly (Mon-condensing)       0 to 85% at 25°C (27°F); detains to 80% at 40°C (104°F)         Windsh       Operating 10,000 ft, non operating 40,000 ft         Physical       Width: 19° (433 mm)         Unrestions       Width: 19° (433 mm)         Highit 6.75° (222 mm)       Dept: 23.5° (597 mm)         Dept: 23.5° (597 mm)       Dept: 23.5° (597 mm)         Weight       CSW 5500 - 127 ke (575 kg)         ohree       Multi Chassis systems, dimension and weight are approximately x2, x3, x4, x5 and x6 CSW Specifications         Weasurements       Measurements         Measurements       45-100 Hz       0-300 V       0-56 A       0-6 kW       0.6 kVA       0.0         AC Measurements       Starting 10, 110 Hz (10, 117 Hz)       10-100 Hz       0-300 V       056 A       0.6 kVA       0.0         AC Measurements       Starting 10, 111 Hz (10, 117 Hz)       10-100 Hz       0.5 kr + 30 M       0.6 kVA       0.0 kr + 30 kr + 30 Kr       0.5 kr + 30 Kr	Operating Temperature	0°C to 45°C (3	0°C to 45°C (32°F to 113°F)						
unidity (Non-condensing)         0 to 85% at 25°C (77°F); derate to 50% at 40°C (104°F)           Unidudity (Non-condensing)         0 to 85% at 25°C (77°F); derate to 50% at 40°C (104°F)           Unidudity (Non-condensing)         Operating 10,000 ft, non operating 40,000 ft           hysical         Immedian           unidations         Width: 19° (483 mm)           Height 8.75° (223 mm)         Departs 235° (567 mm)           Departs 235° (567 mm)         Operating 27° (567 mm)           Orde         Multi Chassis systems, dimension and weight are approximately x2, x3, x4, x5 and x6 CSW Specifications           OdeSurrements         Range         Frequency         Phase         Voltage (AC)         Current (AC rm)         Real Power         Apparent         Frequency           Range         45° 81 91 1/z         45° 100 1/z         0.300 V         0.50 A         0.6 kW         0	amidity (Non-condensing) 0 to 85% at 25°C (77°F), derate to 50% at 40°C (104°F) 11titude Operating 10,000 ft, non-operating 40,000 ft hysical mensions Widdt: 19° (483 mm) Height 255° (22 mm) Depth: 235° (52 mm) Depth: 255° (52	torage Temperature	-40°C to 70°C (-40°F to 158°F)							
titlude       Operating 10,000 ft, non operating 40,000 ft         thysical       Width: 19° (483 mm) Height: 8.13° (222 mm) Depth: 2.3° (597 nm) Depth: 2.3° (597 nm)         Depth: 2.3° (597 nm) Depth: 2.3° (597 nm)       Source         Multi Chassis systems, dimension and weight are approximately x2, x3, x4, x5 and x6 CSW Specifications         Acsurements         Kossements)         Nonsements)         In emode (3)         In emode (3)         In emode (3)         In emode (3)         In esolution*         Operating 10,000 Hz         Sold (2)         In emode (3)         In esolution*         In esolution*         In emode (3)         In esolution*         In esoluti	Intrude       Operating 10,000 ft, non operating 40,000 ft         https://dimensions       Width: 19 7 (423 mm) height 25 7 (527 mm) Depth: 23 5 7 (527 mm)         Additional operating Weight - US       CSW 550 - 127 bis (72 kg)         Algosterments       Multi Chassis systems, dimension and weight are approximately x2, x3, x4, x5 and x6 CSW Specifications         Adeasurements       Multi Chassis systems, dimension and weight are approximately x2, x3, x4, x5 and x6 CSW Specifications         Adeasurements       Rameter       Frequency         Range       45-100 Hz       0-30 V       0-50 A       0-6 kW       0.6 kVA       0.0         Accuracy" (x)       ta mode (-1)       11%       100-100 Hz       0-30 V       0-50 A       0-6 kW       0.6 kVA       0.0         a mode (-1)       0.1% + 1 digit       0.5%       0.5% + 250 mV       0.15% + 3W       0.15% + 9W       0.15% + 9W       0.15% + 3W       0.0         a mode (-3)       0.1 k / 1	ooling	Air is drawn in	from the top, bottom,	, and sides and	exhausted throug	gh the rear			
hysical       Widht: 19* (483 mm)         Wight       CSW 550-127 lbs (57.5 kg)         hipping Weight - US       CSW - 160 lbs (72 kg)         lote       Multi Chassis systems, dimension and weight are approximately s2, s3, s4, s5 and x6 CSW Specifications         Messurements       Range         Resurements       Plasse         Veight       US         AC Messurements)       Plasse         Resurements)       Plasse         AC Messurements)       Plasse         Vietage (AC)       Current (AC ms)         AC Messurements)       Plasse         Vietage (AC)       Olsse + 300 mV         AC Messurements)       Olsse + 300 mV         Model (1)       D1% + 1 digit         Accuracy (1)       16 mod (1)         115.0 - 116 Me	Shysical         Width: 19* (483 mm)           Width: 10* (483 mm)         Height 8.35* (22 mm)           Degit: 2.35* (597 mm)         Degit: 2.35* (597 mm)           Weight         CSW 5550 - 127 bis (57.5 kg)           Singing Weight - US         CSW - 106 bit (2 kg)           Kote         Multi Chassis systems, dimension and weight are approximately x2, x3, x4, x5 and x6 CSW Specifications           Measurements         Range         Frequency         Phase         Voltage (AC)         Current (AC mo)         Real Power         Apparent         Psecifications           Accuracy* (a)         1 made (1)         1 % + 1 digit         0.5% + 250 mV         0.5% + 250 mV         0.1% + 150 mA         0.15% + 9 VA         0.0           1 mode (1)         0.1% + 1 digit         0.5%         0.1% + 150 mA         0.15% + 3 VA         0.0           1 mode (1)         0.1% + 1 digit         0.5%         200 mV         0.1% + 150 mA         0.15% + 3 VA         0.0           1 mode (1)         0.1% + 1 digit         0.5%         200 mV         0.1% + 15 mA         113 A         0.0           1 mode (1)         0.1% + 16 mA         0.15% + 3 VA         0.0         1.1% A         0.0           2 mode (2)         0.1% / 16 mA         0.15% + 3 VA         0.0         1.1% A	lumidity (Non-condensing)	0 to 85% at 25	°C (77°F); derate to 5	0% at 40°C (10	)4°F)				
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Multi Chassis systems, dimension and weight are approximately x2, x3, x4, x5 and x6 CSW Specifications         Measurements       Parameter       Frequency       Phase       Voltage (AC)       Current (AC mc)       Real Power       Apparent       Frequency         AC Measurements       Parameter       Frequency       Phase       Voltage (AC)       Current (AC mc)       0.6 kW       0.15% + 39 K       0.6 kW       <	Accuracy is presented interestion and weight are approximately x2, x3, x4, x5 and x6 CSW Specifications         Measurements       Parameter       frequency       Phase       Voltage (AC)       Current (AC rms)       Real Power       Apparent       Pow	Veight	CSW 5550 - 12	7 lbs (57.5 kg)						
Measurements       Parameter       Frequency       Phase       Voltage (AC)       Current (AC rms)       Real Power       Apparent       Apparent       Power       Apparent       Power       Apparent       Power       Apparent       Power       Apparent       Power       Appare	Measurements       Parameter       Frequency       Phase       Voltage (AC)       Current (AC rms)       Real Power       Apparent Power       Power         AC Measurements       Parameter       Frequency       Phase       Voltage (AC)       0-50A       0-6 kW       0.0         AC Measurements       Accuracy* (a)       10-1000 Hz       0-300 V       0-50A       0-6 kW       0.0         Accuracy* (a)       1       a mode (-1)       0.1% + 1 digit       0.5%       0.5% + 20A       0.0         1       a mode (-2)       0.1% + 1 digit       0.5%       0.5% + 20A       0.0       0.1% + 9 W       0.15% + 9 W       0.15% + 9 W       0.15% + 9 W       0.15% + 3 W       0.0         Resolution       In earde (-1)       0.1% + 1 digit       0.5%       0.5%       0.1% + 10 mX       11 mA       11 W       1VA       0.0         Resolution       In earde (-1)       0.1% + 10 mX       In A       0.15% + 3 W       0.0       0.5%       9 W       0.15% + 3 W       0.0         Constant Power AC Mode       Soft       Store acuracy applies for PF > 0.5 and V > 500 mA       Inservice acuracy applies for PF > 0.5 and V > 500 mA       Inservice acuracy applies for PF > 0.5 and V > 500 mA       Inservice acuracy applies for PF > 0.5 and V > 500 mA       Inservice acuracy applies f	hipping Weight - US	CSW - 160 lbs	(72 kg)						
Measurements - Standard       Parameter       Frequency       Phase       Voltage (AC)       Current (AC rms)       Real Power       Apparent       F         AC Measurements)       Range       45-81.91 Hz       45-100 Hz       0-300 V       0-50 A       0-6 kW       0-6 kW       0       0-5 kV       0       0-6 kW       0       0-6 kW       0       0.1% + 150 mA       0.15% + 9W, 0       0.15% + 9VA, 0       0       0.1% + 150 mA       0.15% + 9VA, 0       0       0.1% + 150 mA       0.15% + 9VA, 0       0       0.1% + 150 mA       0.15% + 9VA, 0       0       0.1% + 150 mA       0.15% + 9VA, 0       0       0.1% + 150 mA       0.15% + 9VA, 0       0       0       0       0       0       0.1% + 30 mA       0.15% + 9VA, 0       0 <td>Ac Measurements - Standard Ac Measurements)       Parameter       Frequency       Phase       Voltage (AC)       Current (AC rms)       Real Power       Apparent       Power         Ac Measurements)       Range       45-81.91 Hz       45-100 Hz       0.300 V       0.50 A       0-6 kW       0.6 kW       0.0         &gt; 818 Hz       100-1000 Hz       0.300 V       0.50 A       0.6 kW       0.15% + 9 W       0.15% + 9 W       0.0         &gt; 818 Hz       10.0 1% + 1 digit       0.5°       0.5% + 250 mV       0.1% + 10 mA       0.1% + 10 m</td> <td>Vote</td> <td>Multi Chassis s</td> <td>ystems, dimension an</td> <td>d weight are a</td> <td>proximately x2, x</td> <td>(3, x4, x5 and x6 C</td> <td>SW Specificatio</td> <td>ons</td> <td></td>	Ac Measurements - Standard Ac Measurements)       Parameter       Frequency       Phase       Voltage (AC)       Current (AC rms)       Real Power       Apparent       Power         Ac Measurements)       Range       45-81.91 Hz       45-100 Hz       0.300 V       0.50 A       0-6 kW       0.6 kW       0.0         > 818 Hz       100-1000 Hz       0.300 V       0.50 A       0.6 kW       0.15% + 9 W       0.15% + 9 W       0.0         > 818 Hz       10.0 1% + 1 digit       0.5°       0.5% + 250 mV       0.1% + 10 mA       0.1% + 10 m	Vote	Multi Chassis s	ystems, dimension an	d weight are a	proximately x2, x	(3, x4, x5 and x6 C	SW Specificatio	ons	
Measurements - Standard       Parameter       Frequency       Phase       Voltage (AC)       Current (AC rms)       Real Power       Apparent       Power	AccMeasurements - Standard AccMeasurements)       Parameter       Frequency       Phase       Voltage (AC)       Current (AC rms)       Real Power       Apparent       Power         AccMeasurements)       Range       45-81.91 Hz       45-100 Hz       0.300 V       0.50 A       0-6 kW       0-6 kW       0.0         Accuracy* (a)       I to mode (1)       0.1% + 1 digit       0.5°       0.5% + 20 mV       0.1% + 10 mA       0.15% + 9W       0.15% + 9W       0.15% + 9VA       0.0         Note and the standard of the standard apple above       10 Hz / 0.1 Hz / 11 Hz       0.17% + 10 mA       11W       1VA       0.0         Resolution       0.1 Hz / 0.1 Hz / 11 Hz       0.1 Hz / 0.1 Hz / 11 Hz       0.1 Hz / 0.1 Hz / 11 Hz       0.1 Hz / 0.1 Hz       0.1 Hz / 0.1 Hz       0.1 Hz /	Veasurements								
AC Measurements)       AC Measurements)     Image     Image<	AC Measurements) Range $\frac{45\cdot81\cdot91}{82\cdot0410.1}$ Hz $\frac{45\cdot100}{1000}$ Hz $\frac{1000}{1000}$		Parameter	Frequency	Phase	Voltage (AC)	Current (AC rms)	Real Power	Apparent	Power
$\frac{1}{2 \operatorname{ccuracy}^{n}(x)} = \frac{1}{2 \operatorname{ccuracy}^{n}(x)} = $	a) a) b)					<b>3</b> · · ·			Power	Factor
$\frac{1}{3} \text{ or mode} (-1) \\ \frac{1}{3} \text{ or mode}$	$\frac{1}{3} \text{ mode } (1) \\ \frac{3}{2} \text{ mode } (2) \\ \frac{3}$		Range	82.0-819.1 Hz		0-300 V	0-50 A	0-6 kW	0-6 kVA	0.00-1.00
Resolution*       Int Hz / 0.1 Hz / 1.1 Hz       Int / 1.1 ma       Int / 1.0 mov       Int /	$\frac{  \mathbf{k}  _{\mathbf{k}}   \mathbf{k} _{\mathbf{k}}  $		1 ø mode (-1)	0.1% + 1 digit		0.5% + 250 mV		-	1	0.03
*Accuracy specifications are in % of reading and apply above 100 counts. For multi-chassis configurations, current, power range and accuracy specifications are in % of reading and apply above 100 counts. For multi-chassis configurations, current, power range and accuracy specification valid for output > 30 Vms. Constant Power AC Mode          5550 CSW Operating Area per Phase <ul> <li></li></ul>	*Accuracy specifications are in % of making and apply above 100 counts for multi-chasis configurations, carrent, power mappe and accuracy specifications are in % of making and apply above 100 counts for multi-chasis configurations, carrent, power mappe and accuracy specifications are in % of making and apply above 100 counts for multi-chasis configurations, carrent, power mappe and accuracy specification area. Frequency measurement specification valid for output > 30Vms.          Source specification are in % of making and apply above 100 counts for multi-chasis configurations, carrent, power mappe and accuracy specification area. Frequency measurement specification valid for output > 30Vms.         Source specification are in % of making and apply above 100 counts for multi-chasis configurations, carrent, power mappe and accuracy specification area. Frequency measurement specification valid for output > 30Vms.         Source specification are in % of making and apply above 100 counts for multi-chasis configurations, carrent, power mappe and accuracy specification area. Frequency measurement specification valid for output > 30Vms.         Source specification are in % of making and apply above 100 counts for multi-chasis configurations, carrent, power mapped and accuracy specification area. Frequency measurement specification area. Frequency for an area for multi-chasis configuration and apply above 100 and apply above 100 and apply above 115 and 115 and 200		. ,	.01 Hz / 0.1 Hz / 1 Hz	-	10 mV				0.01
RMS Voltage         Aramotic Measurements         Parameter       Range       Accuracy (±)       Resolution         irequency fundamental       16.00 - 1000 Hz       2 counts       0.01 Hz to 1 Hz         irequency harmonics       32.00 Hz - 16 kHz       2° typ.       0.5°         voltage       Fundamental       0.25V + 0.1% + 0.1%/kHz       0.01V	RMS Voltage         Arameter       Resolution         Parameter       Range       Accuracy (±)       Resolution         requency fundamental       16.00 - 1000 Hz       2 counts       0.01 Hz to 1 Hz         requency fundamental       32.00 Hz - 16 kHz       2° typ.       0.5°         /oltage       Fundamental       0.25V       0.1V         /urrent       Harmonic 2 - 50       0.25V + 0.1% + 0.1%/kHz       0.01V         Current       Fundamental       0.05A + 0.1% + 0.1%/kHz       0.01A         Harmonic 2 - 50       0.05A + 0.1% + 0.1%/kHz       0.01A	Constant Power AC Mode	times three. Po		CSW Oper	ating Area se — Lov	v Range			
Harmonic Measurements         Range         Accuracy (±)         Resolution           Parameter         16.00 - 1000 Hz         2 counts         0.01 Hz to 1 Hz           irrequency fundamental         16.00 - 1000 Hz         2 counts         0.01 Hz to 1 Hz           irrequency harmonics         32.00 Hz - 16 kHz         2° typ.         0.5°           /oltage         Fundamental         0.25V         0.01V           Harmonic 2 - 50         0.25V + 0.1% + 0.1%/kHz         0.01V	Harmonic Measurements       Accuracy (±)       Resolution         Parameter       16.00 - 1000 Hz       2 counts       0.01 Hz to 1 Hz         irequency fundamental       16.00 - 1000 Hz       2 counts       0.01 Hz to 1 Hz         irequency harmonics       32.00 Hz - 16 kHz       2° typ.       0.5°         /oltage       Fundamental       0.25V       0.01V         Harmonic 2 - 50       0.25V + 0.1% + 0.1%/kHz       0.01V         Current       Fundamental       0.05A       0.01A         Harmonic 2 - 50       0.05A + 0.1% + 0.1%/kHz       0.01A         Harmonic 2 - 50       0.05A + 0.1% + 0.1%/kHz       0.01A	Constant Power AC Mode	16.0A 16.0A 11.8A 8.0A		CSW Oper	ating Area se — Lov	v Range			
Parameter         Range         Accuracy (±)         Resolution           Frequency fundamental         16.00 - 1000 Hz         2 counts         0.01 Hz to 1 Hz           Frequency harmonics         32.00 Hz - 16 kHz         2° typ.         0.5°           /oltage         Fundamental         0.25V         0.01V           Harmonic 2 - 50         0.25V + 0.1% + 0.1%/kHz         0.01V	Parameter         Range         Accuracy (±)         Resolution           requency fundamental         16.00 - 1000 Hz         2 counts         0.01 Hz to 1 Hz           requency harmonics         32.00 Hz - 16 kHz         2° typ.         0.5°           /oltage         Fundamental         0.25V         0.01V           Harmonic 2 - 50         0.25V + 0.1% + 0.1%/kHz         0.01V           Current         Fundamental         0.05A         0.01A           Harmonic 2 - 50         0.05A + 0.1% + 0.1%/kHz         0.01A	Constant Power AC Mode	16.0A 16.0A 11.8A 8.0A	5550	CSW Oper per Pha	ating Area se	v Range h Range			
requency fundamental         16.00 - 1000 Hz         2 counts         0.01 Hz to 1 Hz           requency harmonics         32.00 Hz - 16 kHz         2° typ.         0.5°           /oltage         Fundamental         0.25V         0.01V           Harmonic 2 - 50         0.25V + 0.1% + 0.1%/kHz         0.01V	requency fundamental       16.00 - 1000 Hz       2 counts       0.01 Hz to 1 Hz         requency harmonics       32.00 Hz - 16 kHz       2° typ.       0.5°         /oltage       Fundamental       0.25V       0.01V         Harmonic 2 - 50       0.25V + 0.1% + 0.1%/kHz       0.01V         Current       Fundamental       0.05A       0.01A         Harmonic 2 - 50       0.05A + 0.1% + 0.1%/kHz       0.01A         Harmonic 2 - 50       0.05A + 0.1% + 0.1%/kHz       0.01A         Harmonic 2 - 50       0.05A + 0.1% + 0.1%/kHz       0.01A	Constant Power AC Mode	16.0A 16.0A 11.8A 8.0A	5550	CSW Oper per Pha	ating Area se	v Range h Range			
requency harmonics         32.00 Hz - 16 kHz         2° typ.         0.5°           /oltage         Fundamental         0.25V         0.01V           Harmonic 2 - 50         0.25V + 0.1% + 0.1%/kHz         0.01V	Image: requency harmonics       32.00 Hz - 16 kHz       2° typ.       0.5°         /oltage       Fundamental       0.25V       0.01V         Harmonic 2 - 50       0.25V + 0.1% + 0.1%/kHz       0.01V         Current       Fundamental       0.05A       0.01A         Harmonic 2 - 50       0.05A + 0.1% + 0.1%/kHz       0.01A         Harmonics frequency range in three-phase mode is 32 Hz - 16 kHz. Accuracy specifications are multiplied by the number of power sources in multi-source systems with		16.0A 16.0A 11.8A 8.0A	5550	CSW Oper per Pha	ating Area se	v Range h Range			
/oltage         Fundamental         0.25V         0.01V           Harmonic 2 - 50         0.25V + 0.1% + 0.1%/kHz         0.01V	Voltage       Fundamental       0.25V       0.01V         Harmonic 2 - 50       0.25V + 0.1% + 0.1%/kHz       0.01V         Current       Fundamental       0.05A       0.01A         Harmonic 2 - 50       0.05A + 0.1% + 0.1%/kHz       0.01A         Harmonics frequency range in three-phase mode is 32 Hz - 16 kHz. Accuracy specifications are multiplied by the number of power sources in multi-source systems with	Harmonic Measurements	16.0A 16.0A 11.8A 8.0A 5.9A	5550	CSW Oper per Pha	ating Area se Lov Hig 230V age	v Range h Range	Resolutior		
/oltage         Fundamental         0.25V         0.01V           Harmonic 2 - 50         0.25V + 0.1% + 0.1%/kHz         0.01V	/oltage       Fundamental       0.25V       0.01V         Harmonic 2 - 50       0.25V + 0.1% + 0.1%/kHz       0.01V         Current       Fundamental       0.05A       0.01A         Harmonic 2 - 50       0.05A + 0.1% + 0.1%/kHz       0.01A         Harmonics frequency range in three-phase mode is 32 Hz - 16 kHz. Accuracy specifications are multiplied by the number of power sources in multi-source systems with	Harmonic Measurements Parameter	16.0A 11.8A 5.9A Range	5550	CSW Oper per Pha 5V 156V RMS Volt Accur	ating Area se Lov Hig 230V age acy ( ± )	v Range h Range			
Harmonic 2 - 50         0.25V + 0.1% + 0.1%/kHz         0.01V	Harmonic 2 - 50     0.25V + 0.1% + 0.1%/kHz     0.01V       Current     Fundamental     0.05A     0.01A       Harmonic 2 - 50     0.05A + 0.1% + 0.1%/kHz     0.01A       Harmonics frequency range in three-phase mode is 32 Hz - 16 kHz. Accuracy specifications are multiplied by the number of power sources in multi-source systems with	Harmonic Measurements Parameter Frequency fundamental	16.0A 11.8A 10.0A 11.8A 5.9A 5.9A 10.00 10.0	5550 	CSW Oper per Pha 5V 156V RMS Volt Accur 2 cour	ating Area se Lov Hig 230V age acy ( ± )	v Range h Range	0.01 Hz to		
	Fundamental     0.05A     0.01A       Harmonic 2 - 50     0.05A + 0.1% + 0.1%/kHz     0.01A       Harmonics frequency range in three-phase mode is 32 Hz - 16 kHz. Accuracy specifications are multiplied by the number of power sources in multi-source systems with	Harmonic Measurements Parameter requency fundamental requency harmonics	16.0A 11.8A 11.8A 5.9A 5.9A 16.00 - 1000 H 32.00 Hz - 16 k	5550 	CSW Oper per Pha 5V 156V RMS Volt 2 cour 2° typ	ating Area se Low Hig 230V age acy ( ± )	v Range h Range	0.01 Hz to		
	Harmonic 2 - 50         0.05A + 0.1% + 0.1%/kHz         0.01A           Harmonics frequency range in three-phase mode is 32 Hz - 16 kHz. Accuracy specifications are multiplied by the number of power sources in multi-source systems with	Harmonic Measurements Parameter Frequency fundamental Frequency harmonics	16.0A 11.8A 11.8A 5.9A 16.00 - 1000 H 16.00 - 1000 H 32.00 Hz - 16 k Fundamental	5550 11 z Hz	CSW Oper per Pha 5V 156V RMS Volt 2 cour 2 cour 2 cour 0.25V	ating Area se Lov Hig 230V age acy ( ± )	v Range h Range 312V	0.01 Hz to 0.5° 0.01V		
	larmonics frequency range in three-phase mode is 32 Hz - 16 kHz. Accuracy specifications are multiplied by the number of power sources in multi-source systems with	Harmonic Measurements Parameter Parameter Parequency fundamental Parequency harmonics Voltage	16.0A 11.8A 11.8A 5.9A 5.9A 16.00 - 1000 H 32.00 Hz - 16 k Fundamental Harmonic 2 - 5	5550 11 z Hz	CSW Oper per Pha 5V 156V RMS Volt RMS Volt 2 cour 2° typ 0.25V 0.25V	ating Area se Lov Hig 230V age acy ( ± )	v Range h Range 312V	0.01 Hz to 0.5° 0.01V 0.01V		
	3-phase (30) or the number of sources times 3 in the 1-phase (10) mode. Measurement handwidth is limited to 16 Khz	Harmonic Measurements Parameter requency fundamental requency harmonics roltage	16.0A         16.0A         11.8A         11.8A         10.0A         11.8A         10.0A         11.8A         10.0A         11.8A         10.0A         10.0A         11.8A         8.0A         5.9A         5.9A         16.00 - 1000 H         32.00 Hz - 16 H         Fundamental         Harmonic 2 - 5         Fundamental	5550 5550 11 z Hz 0	CSW Oper per Pha 5V 156V RMS Volt RMS Volt 2 cour 2 cour 2 cour 2 cour 2 cour 0.25V 0.25V	ating Area se Low Hig 230V age acy ( ± ) hts + 0.1% + 0.1%/k	v Range h Range 312V	0.01 Hz to 0.5° 0.01V 0.01V 0.01V 0.01A		
s phase (so) of the number of sources times s in the r phase (no) mode i measurement bundwidth s innited to ro this.		Harmonic Measurements Parameter Frequency fundamental Frequency harmonics Voltage Current Harmonics frequency range in three	16.0A         11.8A         11.8A         11.8A         8.0A         5.9A         5.9A         16.00 - 1000 H         32.00 Hz - 16 k         Fundamental         Harmonic 2 - 5         e-phase mode is 32 Hz -	5550 5550 11 2 11 2 11 12 0 0 0 16 kHz. Accuracy spe	CSW Oper per Pha 5V 156V RMS Volt 2 cour 2 cour 2 cour 2 cour 0.25V 0.25V 0.25V 0.05A 0.05A 0.05A	ating Area se Low Hig 230V age acy ( ± ) hts + 0.1% + 0.1%/ hultiplied by the	v Range h Range 312V kHz number of power s	<ul> <li>0.01 Hz to</li> <li>0.5°</li> <li>0.01V</li> <li>0.01V</li> <li>0.01V</li> <li>0.01A</li> <li>0.01A</li> </ul>	1 1 Hz	
Model CSW5550 CSW1100 CSW16650 CSW22200 CSW17750 CS	Multiplier 30/1 Ø         1/3         2/6         3/9         4/12         5/15         66	Harmonic Measurements Parameter Frequency fundamental Frequency harmonics Voltage Current Harmonics frequency range in three 3-phase (30) or the number of sc	16.0A         11.8A         11.8A         11.8A         8.0A         5.9A         16.00 - 1000 H         32.00 Hz - 16 K         Fundamental         Harmonic 2 - 5         e-phase mode is 32 Hz - ources times 3 in the 1-p	5550 5550 11 11 2 11 12 11 11 11 11 11 11 11 11 1	CSW Oper per Pha 5V 156V RMS Volt 2 cour 2 cour 2 cour 2 cour 0.25V 0.25V 0.25V 0.25V 0.05A 0.05A	ating Area se Low Hig 230V age acy ( $\pm$ ) nts $\pm 0.1\% \pm 0.1\%/l$ nultiplied by the i dwidth is limited i	v Range h Range 312V kHz number of power store of the sto	0.01 Hz to 0.5° 0.01V 0.01V 0.01A 0.01A 0.01A sources in multi	1 Hz -source systems	with the
CSW5550 CSW1100 CSW16650 CSW22200 CSW17750 CS		surements ental ics	16.0A         11.8A         11.8A         11.8A         8.0A         5.9A         16.00 - 1000 H         32.00 Hz - 16 K         Fundamental         Harmonic 2 - 5         e-phase mode is 32 Hz - ources times 3 in the 1-p	5550 5550 11 11 2 11 12 11 11 11 11 11 11 11 11 1	CSW Oper per Pha 5V 156V RMS Volt 2 cour 2 cour 2 cour 2 cour 0.25V 0.25V 0.25V 0.25V 0.05A 0.05A	ating Area se Low Hig 230V age acy ( $\pm$ ) nts $\pm 0.1\% \pm 0.1\%/l$ nultiplied by the i dwidth is limited i	v Range h Range 312V kHz number of power store of the sto	0.01 Hz to 0.5° 0.01V 0.01V 0.01A 0.01A 0.01A sources in multi	1 Hz -source systems	

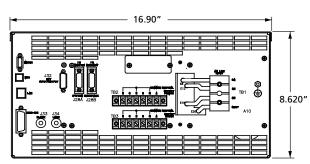
sales.ppd@ametek.com

# **CSW Series : Product Specifications**

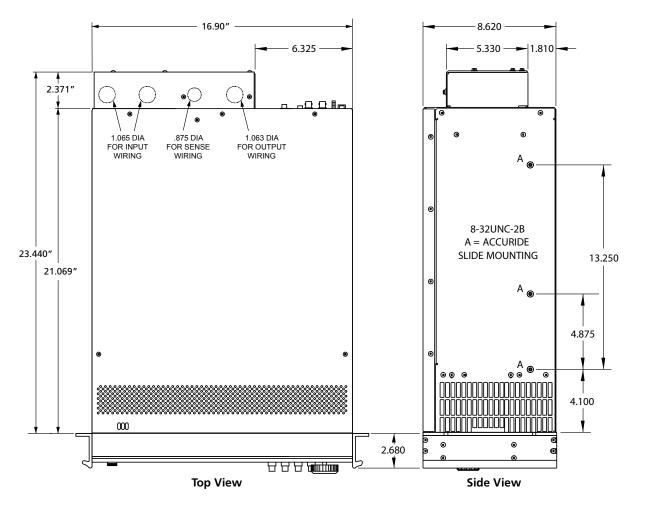
Protection And Safety	
Overvoltage Shutdown	Programmable for 15V to 255V peak, 156V range; 30V to 510V peak, 312V range
Programmable Current Limit Shutdown	Settable to 0.01 ARMS Resolution
Programmable Current Limit with Timed Shutdown	Settable to 1% of range: the timeout is settable from 100 ms to 10s.
Over temperature Shutdown	Automatic, not programmable
Regulatory Compliance	<ul> <li>EN 61010</li> <li>EN 55011</li> <li>UL 3111</li> <li>EN 50082-2</li> <li>EN 61000-4-3, EN 61000-4-4</li> <li>FCC Part 15, Class A</li> <li>CE Mark Designed to meet: <ul> <li>EN 61010</li> <li>EN 55011</li> <li>UL 3111</li> <li>EN 50082-2</li> <li>EN 61000-4-3, EN 61000-4-4</li> <li>FCC Part 15, Class A</li> </ul> </li> </ul>

### 5550-33300 VA





**Rear View** 



# **CSW Series**

Model Number Description

# CSW5550 - 208 - XXX - XXX

Power Level



Input Power -

Options	
Options Code	Description
-160	RTCA/DO-160D, Change 2, EuroCAE-14D and Airbus test firmware.
-704F	Mil. Std. 704A-F tests
-ABD	Airbus Directive 0100.1.8 tests.
-AMD	Airbus AMD24 tests.
-A350	Airbus A350 tests.
-B787	Boeing 787B3-0147 tests.
-AIRB	Airbus ABD0100.1.8, AMD 24 and A350 combination test software suite
-LAN	LXI Ethernet LAN Interface (Rj45 Connector)
-LKM	Clock/Lock Master
-LKS	Clock/Lock Auxiliary
-413	IEC61000-4-13 Harmonics and Interharmonics test firmware and hardware.
-411	IEC61000-4-11 test firmware. See also EOS1/3.
-WHM	Watt-Hour Measurement option.
-MB	Multi-Box. Adds controller to auxiliary chassis of multi-chassis systems
Input Options	
-400	342-457 Volt Line to Line AC input.
Output Options	
-LF	Limits output frequency to 500 Hz.
Cabinet Options	
-RMS	Rackmount Slides. Recommended for rack mount applications.
C prefix	Cabinet System. Installed and pre-wired in 19" cabinet.

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