

ACTIONPOWER

Perfect Grid Simulator

PRO series

0V to 900V, 90kVA to 4MVA



Programmable AC Source & Load

actionpowertest.com

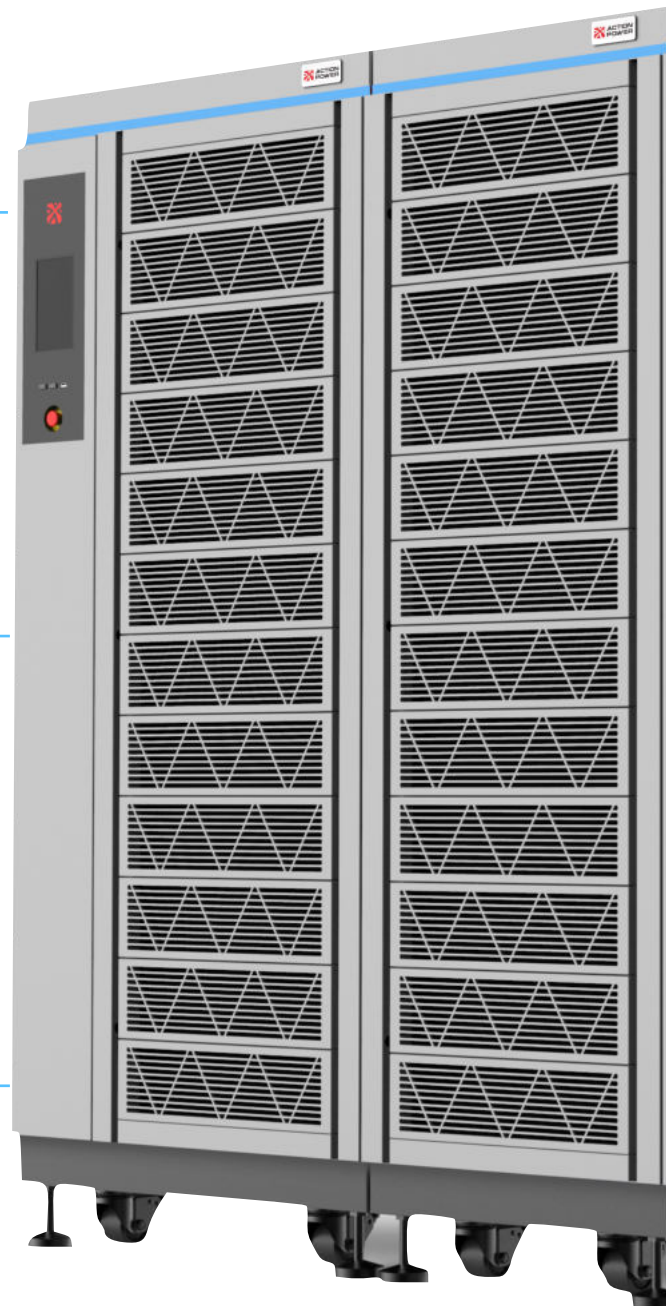
HIGH POWER CAPACITY WITH PARALLEL OPERATION

With 90kVA - 675kVA of unit capacity,
the total capacity can be expanded up
to 4MVA by parallel connections.

900V
MAXIMUM
AC OUTPUT
VOLTAGE

4MVA
MAXIMUM
AC OUTPUT
POWER

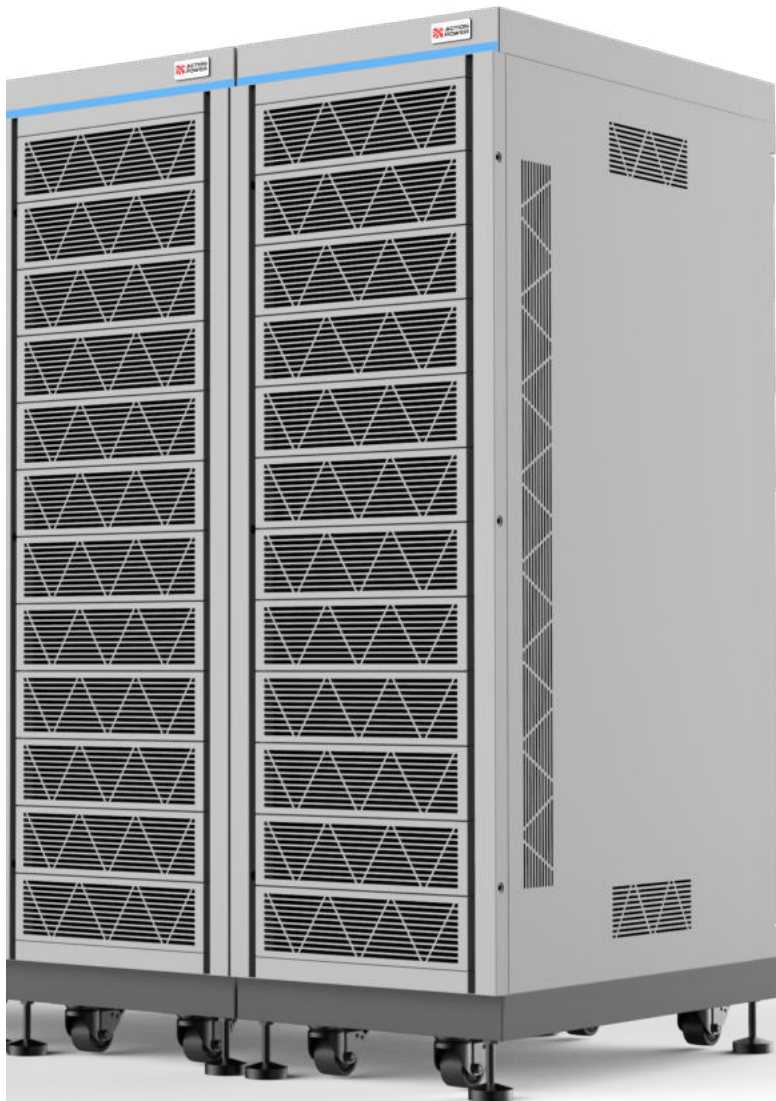
1000V/ms
SLEW RATE



Multiple AC power supply cabinets can individually operate in single mode to configure multi-channel output, or in Master/Slave mode to configure single-channel output with combined capacity.

FULLY TEST AC POWER WITH 4-QUADRANT

Full four-quadrant control enables reliable and efficient conversion of desired voltage and current, and AC load function with power regenerated to the grid.



RLC
**REGENERATIVE
AC LOAD**

0.1°
**PHASE ANGLE
RESOLUTION**

359.9°
**PHASE ANGLE
CONTROL**

COMPREHENSIVE PHASE CONTROL

Simultaneous control of three phases up to 359.9° by unit angle of 0.1°, and phase angle of each of R, S, and T can be changed with the accuracy of 0.1%.



Ratings, types and voltages

PRO AC Source & Load

Model	Power [kVA]	Output Voltage [V]	Frequency [Hz]	Output Current [A]	DC Output Voltage [V_DC]	DC Output Current [A_DC]	Size (WDH) [mm]	Weight [kg]
PRO-A09-4702	90	470	DC,0.001-2000.0	200	±650	±600	800x1000x1950	600
PRO-A18-4704	180	470	DC,0.001-2000.0	400	±650	±1200	800x1000x1950	800
PRO-A22-4705	225	470	DC,0.001-2000.0	500	±650	±1500	800x1000x1950	900
PRO-A27-4706	270	470	DC,0.001-2000.0	600	±650	±1800	1400x1000x1950	1,310
PRO-A36-4708	360	470	DC,0.001-2000.0	800	±650	±2400	1400x1000x1950	1,510
PRO-A45-4710	450	470	DC,0.001-2000.0	1000	±650	±3000	1400x1000x1950	1,710
PRO-A54-4712	540	470	DC,0.001-2000.0	1200	±650	±3600	2000x1000x1950	2,220
PRO-A63-4714	630	470	DC,0.001-2000.0	1400	±650	±4200	2000x1000x1950	2,420
PRO-A67-4715	675	470	DC,0.001-2000.0	1500	±650	±4500	2000x1000x1950	2,520
PRO-A09-4701	90	900	DC,0.001-2000.0	100	±1250	±300	800x1000x1950	600
PRO-A18-4702	180	900	DC,0.001-2000.0	200	±1250	±600	800x1000x1950	800
PRO-A27-4703	270	900	DC,0.001-2000.0	300	±1250	±900	1400x1000x1950	1,310
PRO-A36-4704	360	900	DC,0.001-2000.0	400	±1250	±1200	1400x1000x1950	1,510
PRO-A45-4705	450	900	DC,0.001-2000.0	500	±1250	±1500	1400x1000x1950	1,710
PRO-A54-9006	540	900	DC,0.001-2000.0	600	±1250	±1800	2000x1000x1950	2,220
PRO-A63-9007	630	900	DC,0.001-2000.0	700	±1250	±2100	2000x1000x1950	2,420

Technical data

PRO series		Specification
AC Input		
Voltage, Phases	380V±15%, 3ph+PE	
Frequency	47Hz to 63Hz	
Harmonic current	<3%	
Power factor	≥0.96	
AC Output voltage		
Setting resolution	0.01V	
Accuracy	±0.1% F.S.	
DC Component	<50mV	
Load regulation	±0.05% F.S.	
Line regulation	±0.05% F.S.@10%variable	
Voltage slew rate	AC>1.0V/us	
3ph unbalance	Does not exceed half of the requirements of GB/T 15543-2008 (negative sequence voltage does not exceed 1%, short-term does not exceed 2%)	
AC Output Current		
Accuracy	±0.1%+0.1% F.S. @15-200Hz	
Output Frequency		
Range	DC, 0.001Hz-200.0Hz	
Setting resolution	0.001Hz	
Accuracy	±0.01%	
Phase Angle Control		
Phase control	A=0°, B=240°, C=120°(Default)	
Phase angle range	Programmable range 0 - 359.9° individual adjustable	
Accuracy	±0.1°@15-70Hz, ±0.5°@70-200Hz,	
Setting resolution	±0.1°	
Internal Resistor		
R range	0-10Ω(Impedance at steady-state output)	
L range	0-2mH	
Setting resolution	0.001	
Accuracy	0.1%+0.2% F.S.	

Technical data

PRO series		Specification
Harmonic Injection		
Order	100th@40Hz-70Hz, 25th@70Hz-200Hz	
Content	40% for individual, total content max.40%	
Phase angle range	0 - 359.9°	
Amplitude error	±5% @0.1% of the set value or fundamental value	
Preview function	The superimposed waveform of harmonics can be previewed	
Editing mode	import, export, read, store	
Programmable		
Mode	List, Wave, Step, Pulse, Advanced, Harmonic, Inter-harmonic	
Step	100 steps	
Cycle	0 ~ 9,999,999	
Parameter	V oltage, Frequency, Phase, Variable period, Hold period, Phase angle, Phase pulse	
Uptime range	100μs - 999s	
Flat top range	100μs - 999s	
Minimum Programming step	100μs	
Trigger output and enable	Output a low-voltage trigger signal isolated electrically from other parts within the device, synchronized with the changes in power supply output parameters; single-step, single-cycle, single-shot triggering; (pulse).	
Edition	Import; Export; Read; Store	
Operation mode	Run, stop, major cycle (9999999) + minor cycle nested programming (9999999)	
Trigger source	Local software, external hardware	
Trigger mode	Automatic, manual, external	
DC Output Voltage		
Setting resolution	0.01V	
Accuracy	±0.1% F.S.	
Ripple	<1.5Vrms@(DC-60kHz)	
Load regulation	±0.05% F.S.	
Line regulation	±0.01% F.S.@10%variable	
Slew rate	DC>1.0V/μs	



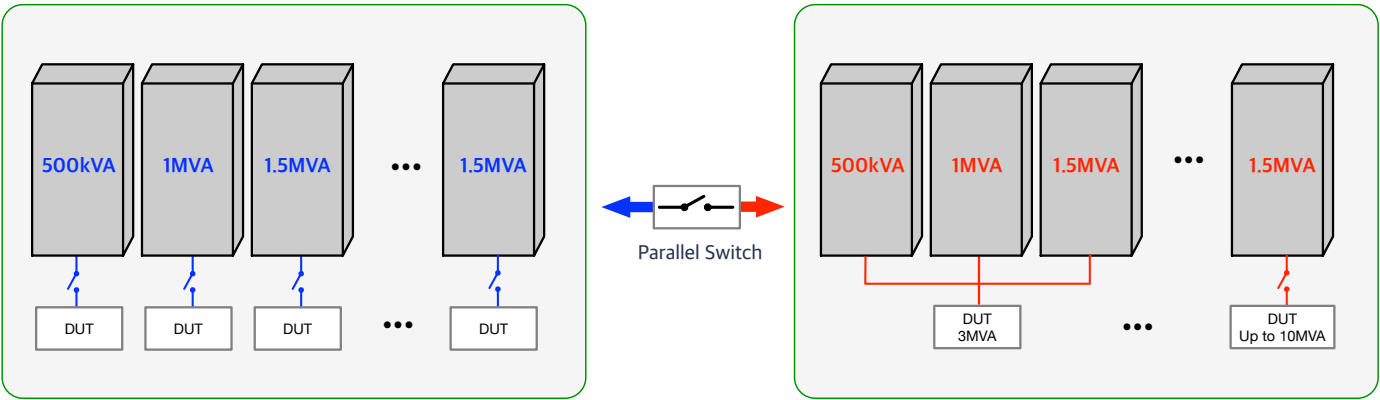
Technical data

PRO series		Specification	
DC Output Current			
Setting resolution	0.01A		
Accuracy	±(0.1%+0.1% F.S.)		
RLC Load			
Resistance range (Ω) : 0.001 to 1000	Resistance resolution (Ω) : 0.001	Resistance accuracy : ±0.1% F.S.	
Inductors range (mH) : 0.1 to 5000	Inductors resolution (mH) :0.001	Inductors accuracy : ±0.1% F.S.	
Capacitance range (mF) : 1 to 5000	Capacitance resolution (mF) : 0.1	Capacitance accuracy : ±0.1% F.S.	
Crest factor range : 1.000 to 5.000		Crest resolution : 0.001	
Power factor range : -1.000 to 1.000		Power resolution : 0.001	
Measurment			
Voltage accuracy	±0.1% F.S.		
Frequency accuracy	±0.01%		
Current accuracy	±(0.1%+0.2% F.S.)		
Active power accuracy	±0.5% F.S.		
Apparent power accuracy	±0.5% F.S.		
Others			
Protection	Input under-voltage/over-voltage/over-frequency/phase loss protection Output over-voltage/over-current/over-power/over-temperature protection		
Communication interface	USB, LAN, RS485, CAN		
Multi-function interface	“Anyport” see the user manual for more details		
Operation	Local touchscreen control, remote host control; display voltage, current, frequency, power.		
Cooling mode	Air Cooling		
Noise	≤70dB		
Operation temperature	-10°C~50°C		
Humidity	10% ~ 90% RAH		
Altitude	≤2000m		



High Power Scalable Design

The PRO series supports large-scale parallel expansion and stable power supply, which enables capacity expansion up to 4MVA by connecting in parallel with unit capacity of 90kVA-675kVA through a high-speed optical fiber communication method. In particular, the parallel-connected panels can be used in multi-output mode by separating the outputs according to the user's needs, allowing multiple test equipment to be tested at the same time, maximizing user convenience and saving a lot of costs.



Multi-Output Mode

Parallel Mode



900V

90kVA-180kVA
100A-200A



270kVA-450kVA
300A-500A



540kVA-630kVA
600A-700A

470V

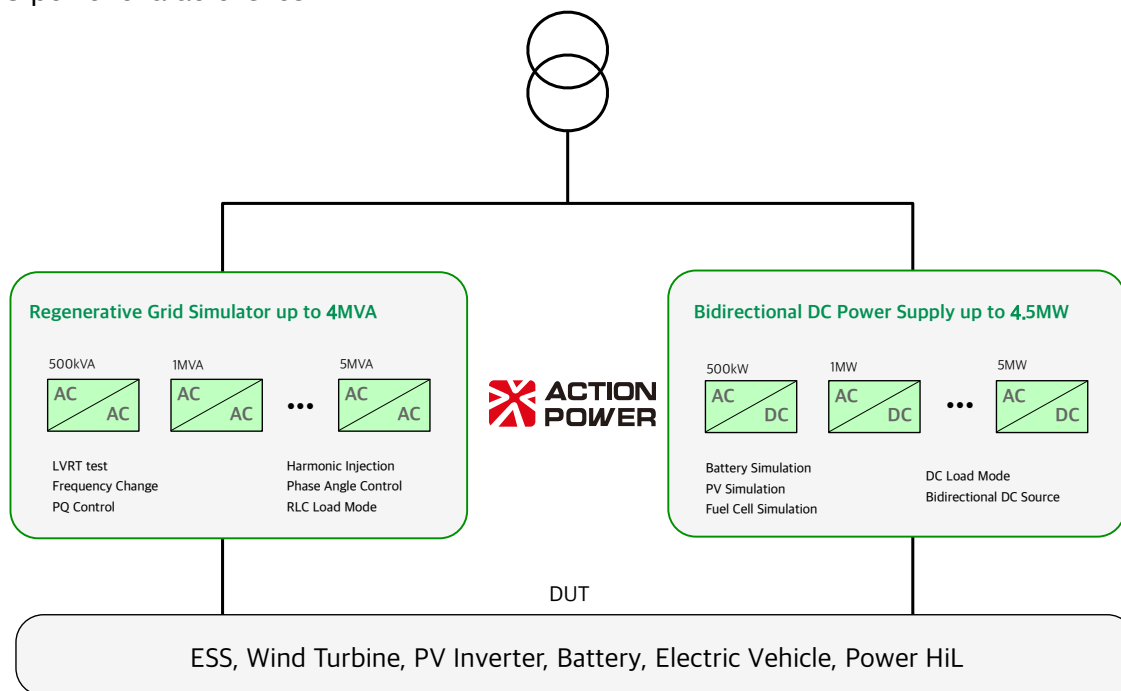
45kVA-225kVA
100A-500A

270kVA-450kVA
600A-1000A

540kVA-675kVA
1200A-1500A

Application

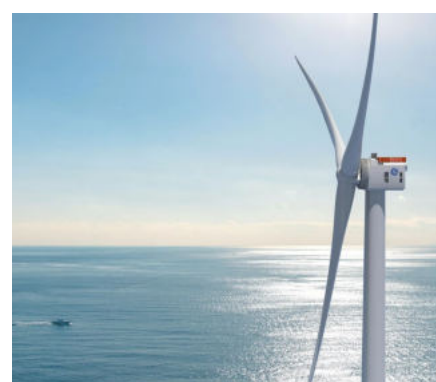
The PRO series are innovative products used in a variety of applications due to its unique technology and optimal performance. It can perform bidirectional AC power supply and act as regenerative AC loads, which can be utilized for long-term reliability testing applications including tests for ESS, PV inverter, wind turbine, electric vehicle DC charging stations, and a variety of grid-connected systems. They are particularly well suited for applications that require accurate and extremely fast response times when simulating AC power characteristics.



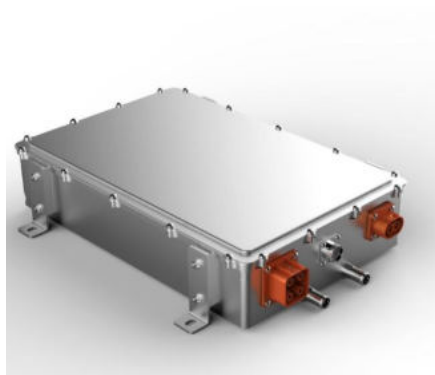
ESS Testing



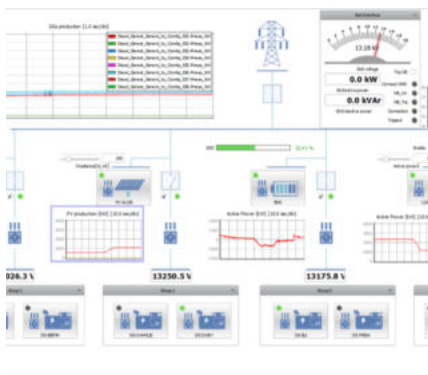
PV Inverter Testing



Wind Turbine Testing



AC/DC Power Supply Testing



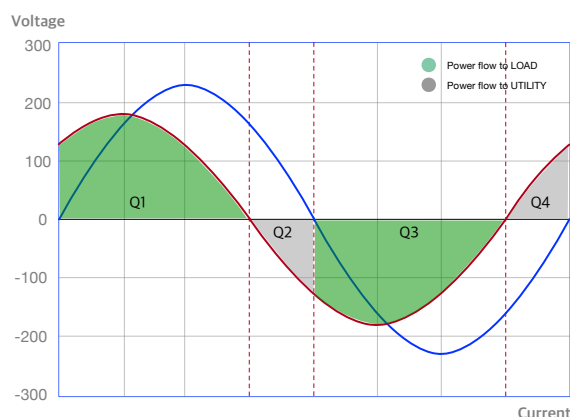
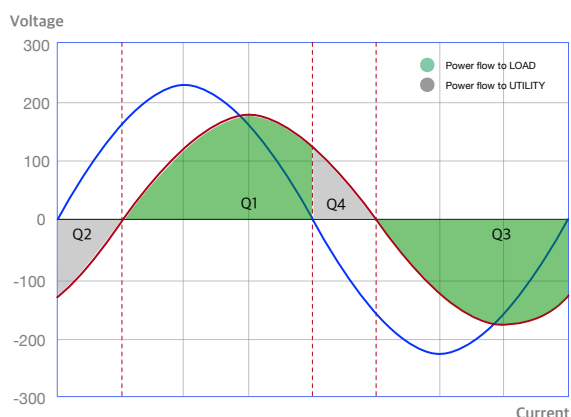
Power HiL



EV Charger & EVSE Testing

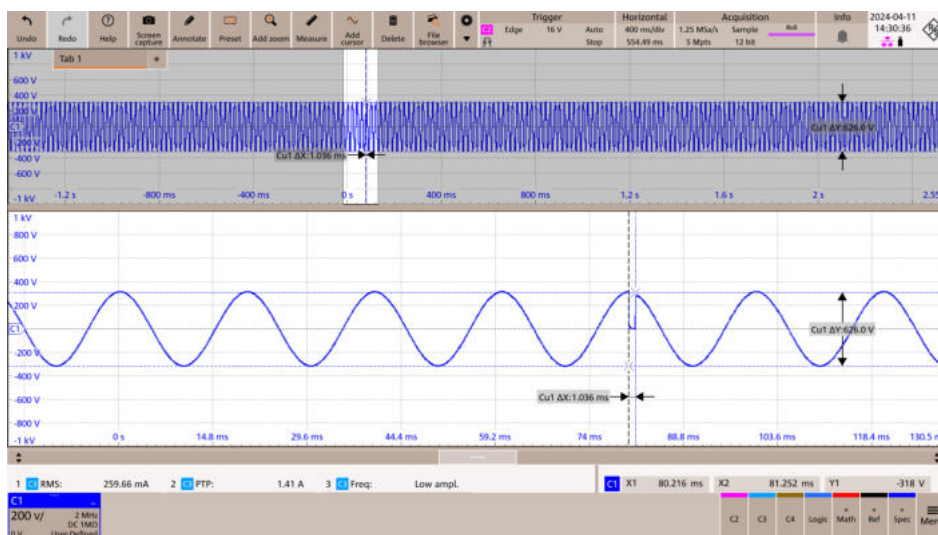
4-Quadrant control

With four-quadrant control, PRO series can test PV inverters, V2G, EV chargers, EVSE, batteries, UPS, and AC/DC power supplies. It has a built-in load option as standard and can operate in any four-quadrant with programmable phase control. It can simulate inductive and capacitive loads, allowing you to test a full range of AC power loads.



High Dynamics

The output voltage slew rate of power supply is up to 1000V/ms, which can simulate the 1ms continuous interruption of the grid.

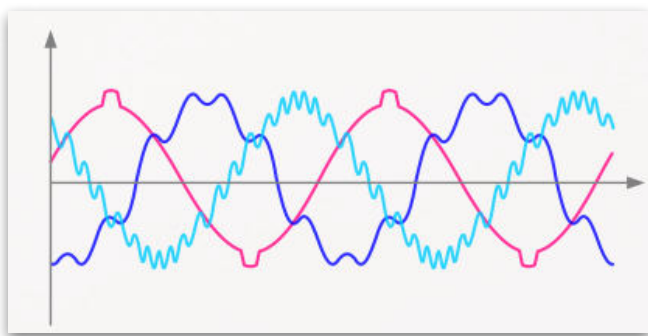


1ms Interruption

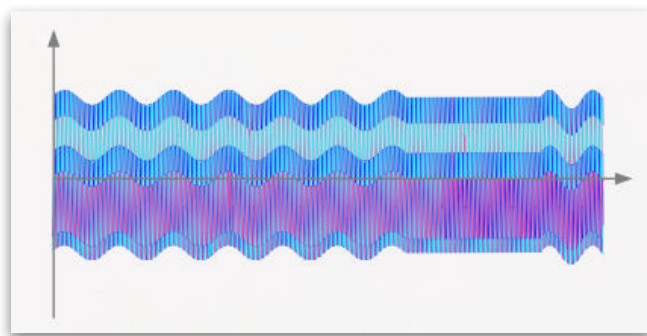
Harmonics / Inter-harmonics

The 49 harmonics can be superimposed simultaneously, and the total harmonic content can be set up to 40%

The power supply has two harmonic injection modes, the three-phase independent injection and the three-phase linkage injection, allowing the superimposition of 2-50th of harmonics with 50Hz or 60Hz basic frequency, or allowing the superimposition of 1Hz-3000Hz inter-harmonics to form the distorted waveform of output voltage. It can be used for the tests under GB/T 14549-1993, and GB/T 24337-2009. The power supply has 27 built-in DST waveforms and 100 customized waveforms that can be called by one click.

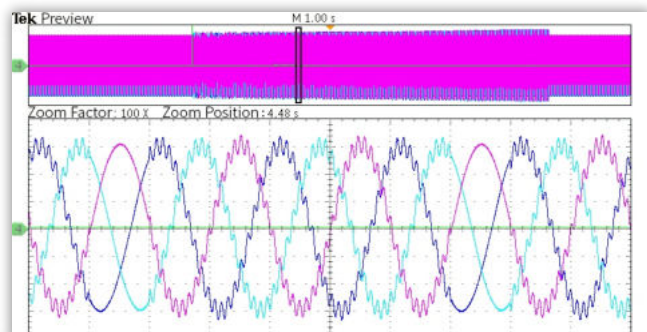
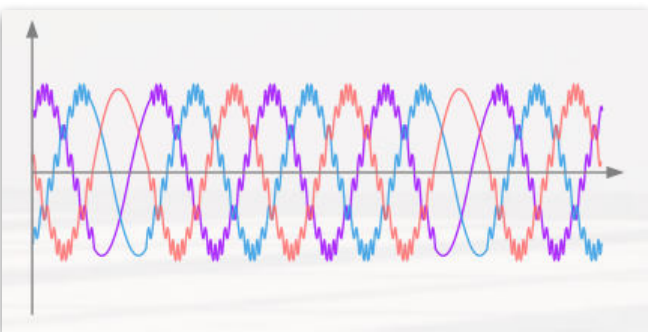


Harmonic Superposition Waveform



Inter-harmonic Superposition Waveform

Starting frequency, ending frequency, interval and the like can be set for inter-harmonics to test the inter-harmonic sweep frequency, so as to meet the tests of IEC61000-4-13 standard.

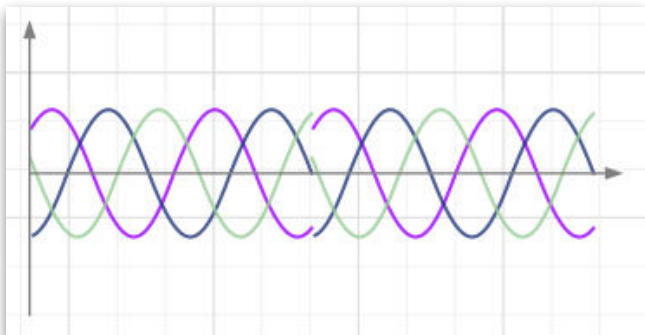


Inter-harmonic Sweep

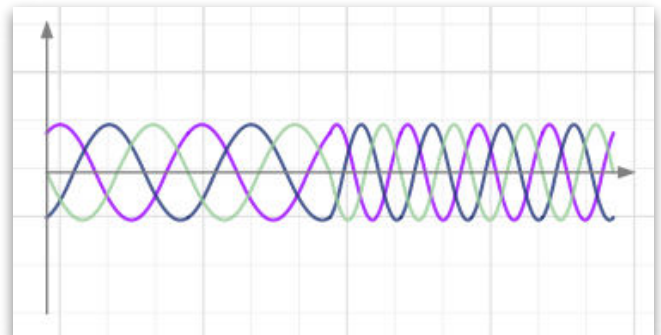
Independent setting of three phases

Simulate normal and abnormal characteristics of various power grids

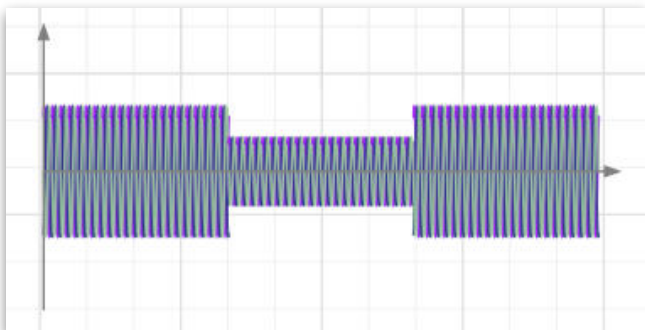
The three-phase output of the power supply can be set independently, which can simulate the normal and abnormal characteristics of three-phase balance or unbalance of various power grids. It can be set by individual or multiple programmable output on voltage, phase etc. of both single-phase and multi-phase.



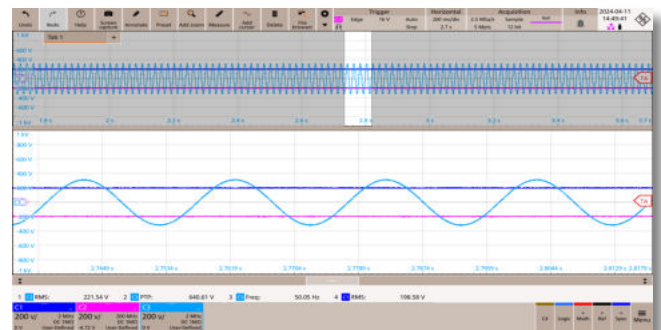
Phase Change



Frequency Change



Voltage Change

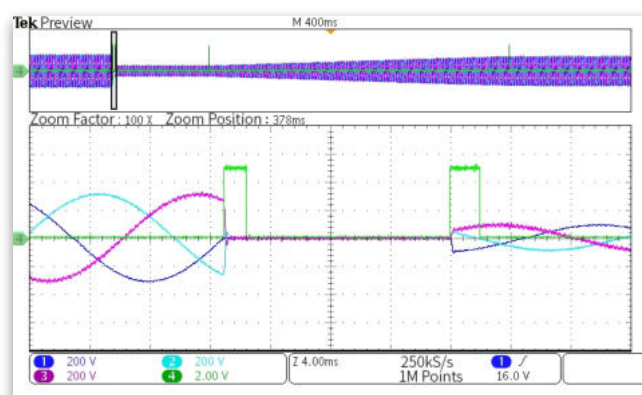
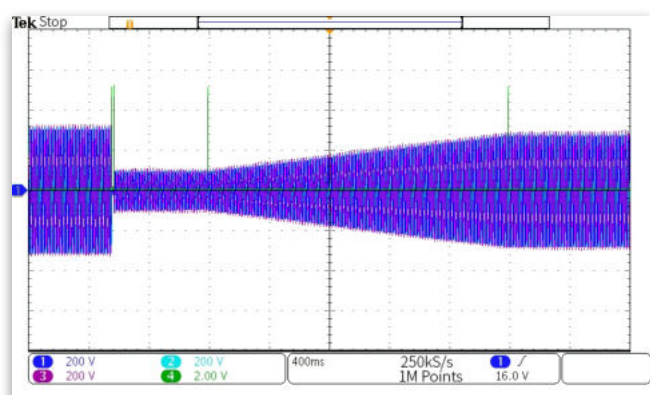


Phase Split

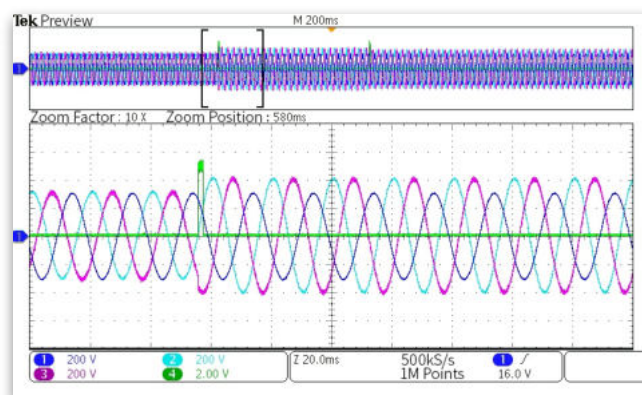
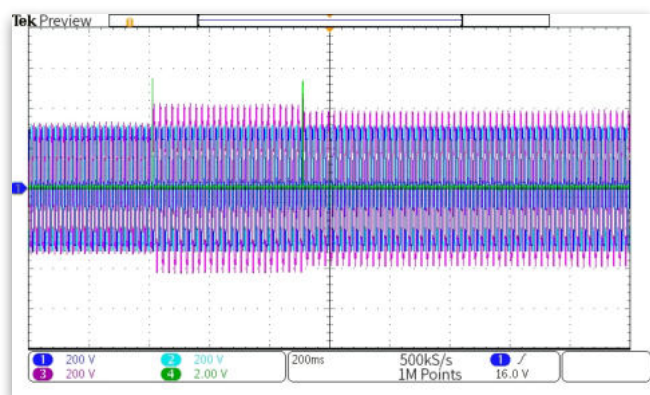
Voltage Ride Through

Typical rise / fall time within 1ms

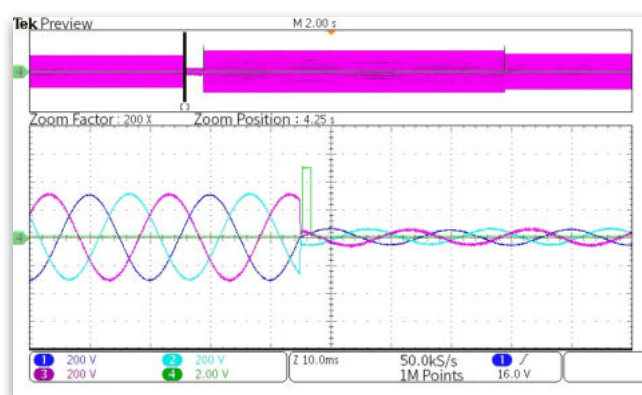
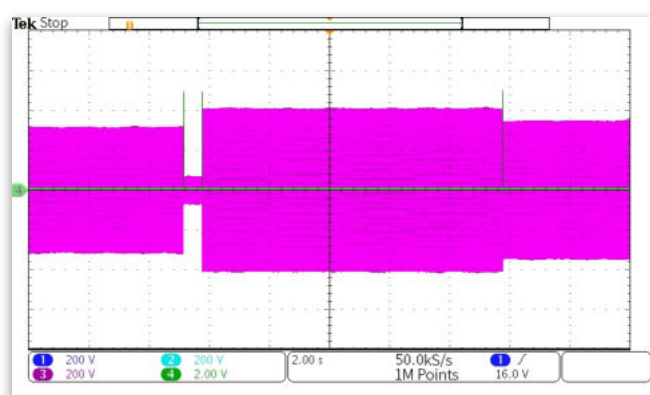
The single-phase, two-phase, and three-phase H/LVRT tests can be performed for the power supply. The trigger phase angles of the ride through points can be set for the power supply to meet the requirements of tests under various standards. The minimum setting voltage of power supply is less than 5V, and the rise/fall time is 1ms.



Three-Phase Low Voltage Ride Through



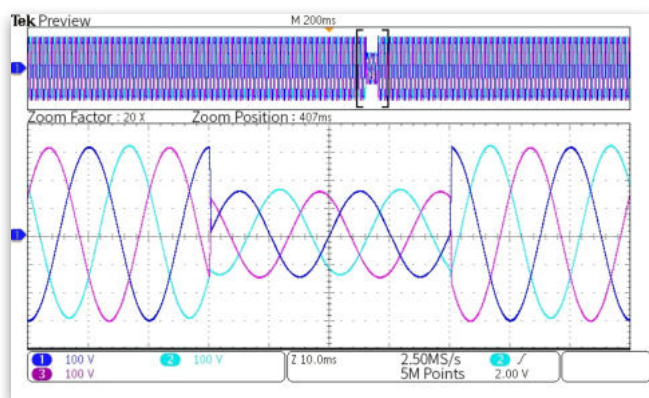
Single-Phase High Voltage Ride Through



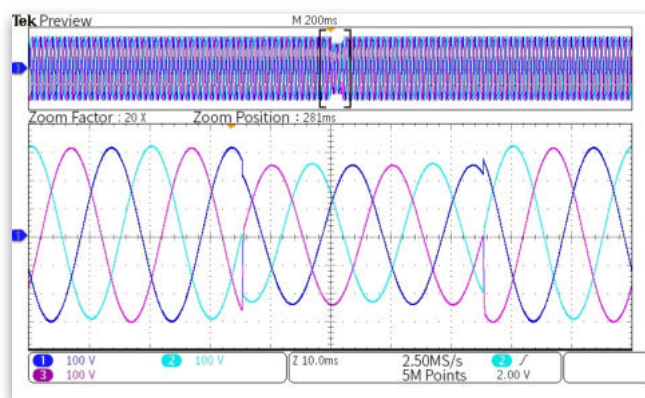
Three-Phase High Voltage Ride Through

Voltage Ride Through

Phase A, B and C can be changed at the same time for low voltage ride through, phase B and C can be switched for low voltage ride through, so as to meet the tests of VDE-AR-N 4105 regulations.



Three-Phase Change LVRT

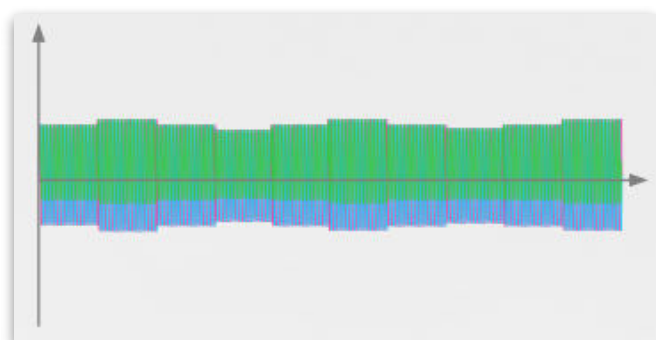


B-C Phase Shift LVRT

Flicker Simulation

Levels 1~10 can be called directly

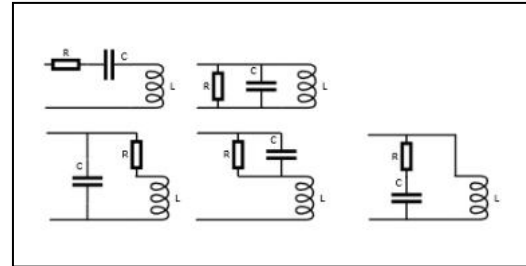
The power supply supports the setting of flicker levels: the flicker trend chart can be previewed, and the pst can be visualized. The flicker characteristics of the power grid can be easily simulated to test flicker adaptability of the test object.



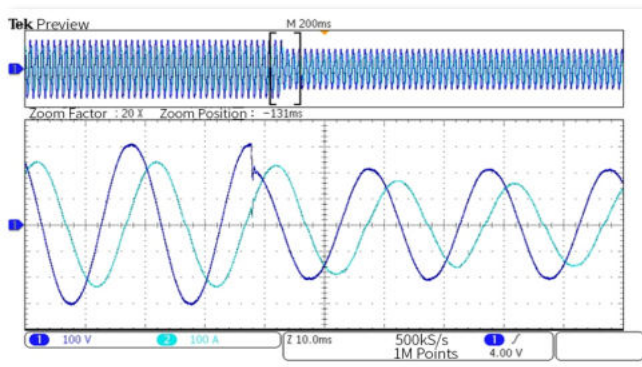
Flicker simulation waveform

Linear load characteristic simulation

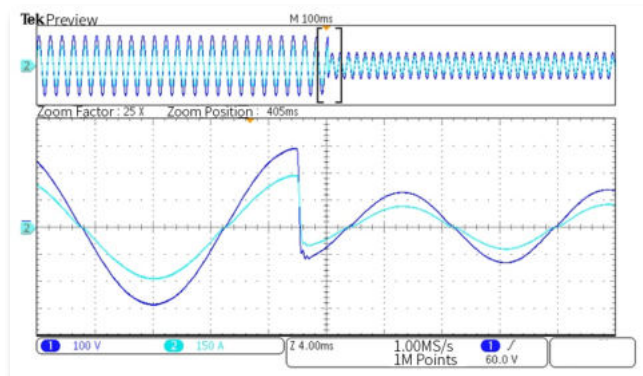
The PRO series feedback AC source & load integrated machine has 5 built-in RLC network models, which can flexibly adjust the parameters to simulate the linear load characteristics, in order to fully validate the product performance in different impedance modes.



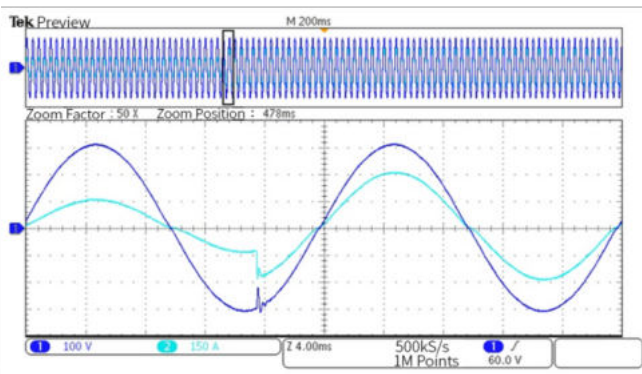
RLC Load Network Topology



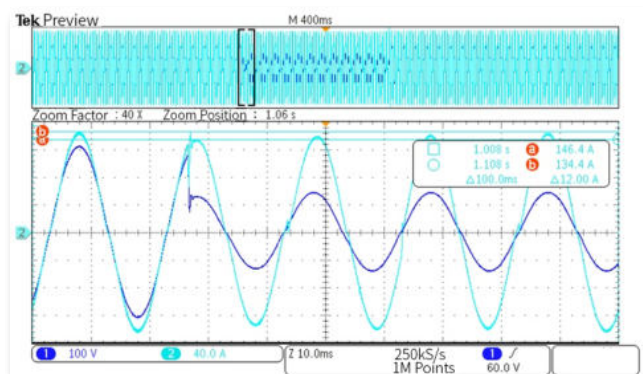
RLC mode : voltage amplitude transient change and power factor adjustment



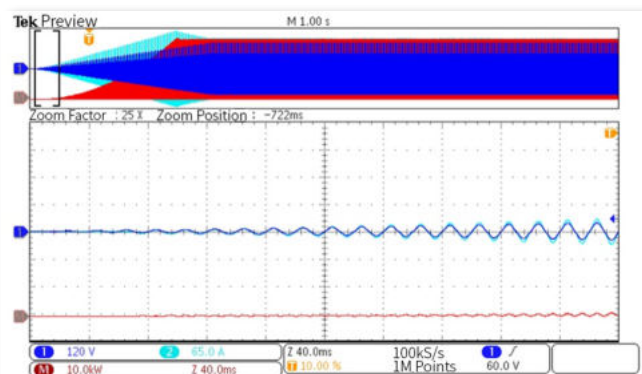
CR mode : voltage amplitude, phase, frequency Transient change



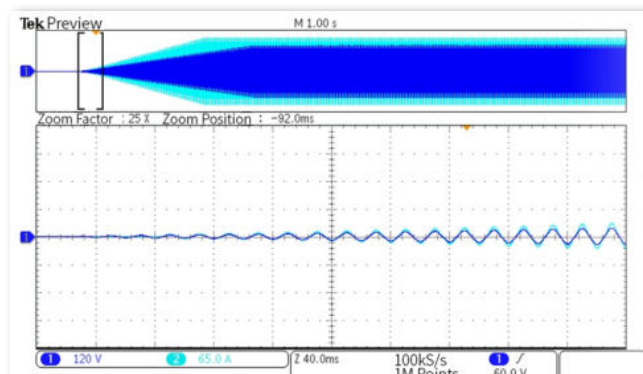
CR mode : resistance transient change



Voltage amplitude change in CC mode

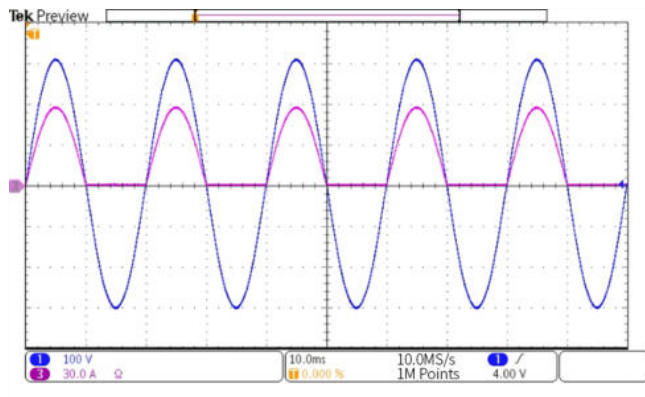


Zero-voltage startup to CP

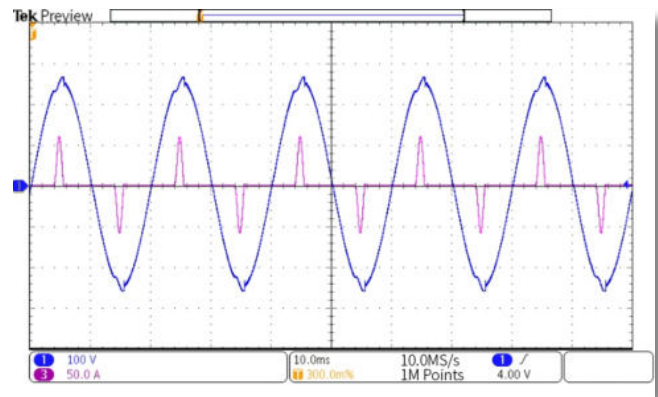


Zero-voltage startup to CC

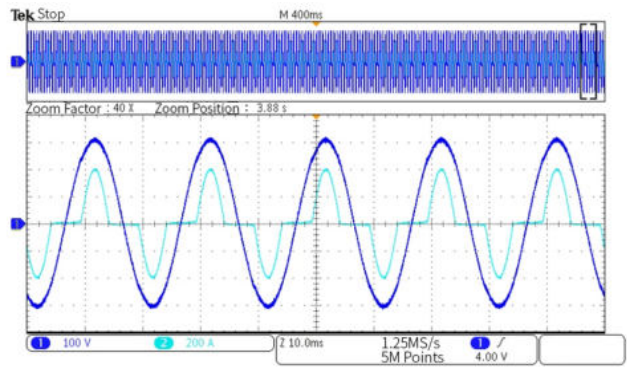
Nonlinear load characteristic simulation



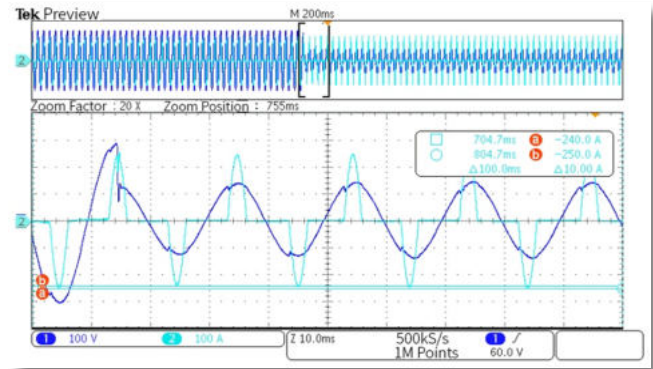
Rectified load : half-wave rectification waveform



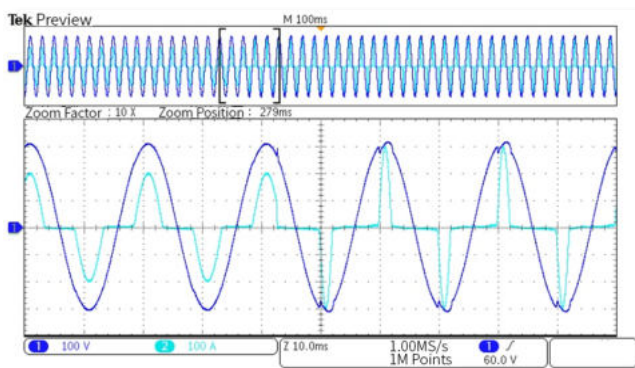
Rectified load : CF=4 waveform



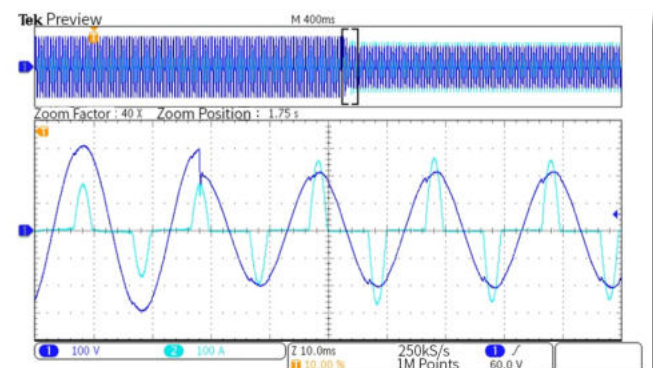
CF=2 single-phase current in CC mode



Rectified load in CC mode CF=2
Voltage amplitude transiently changes by 120V at
90° position



CF sudden change in CC mode :
CF changed from 2 to 3



CP mode : voltage amplitude transient change
CF=2.5

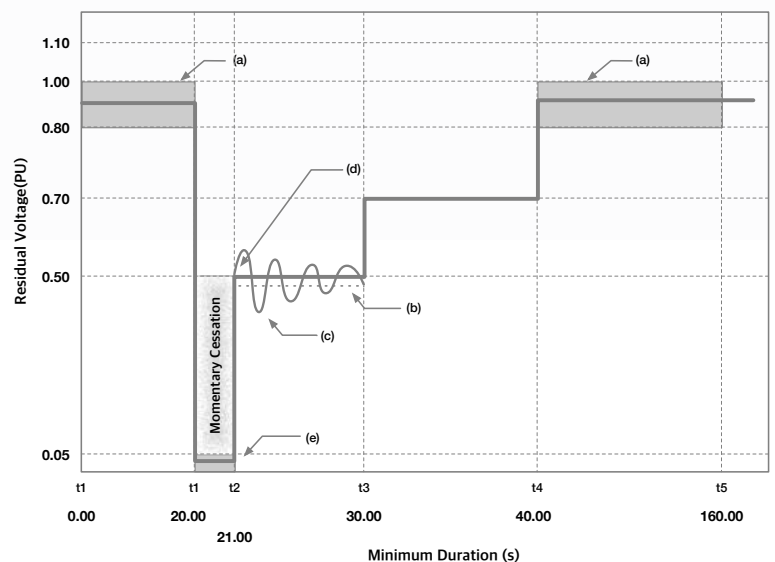
Powerful Software



Provides Diverse Simulation Modes

Low Voltage Ride-Through (LVRT) and Area Electrical Power System (EPS) Disturbance Simulation

AGS series can easily simulate tests such as LVRT test patterns with provided software, accurately control user-defined waveforms, and add features depending on the test environments.



ACTIONPOWER

For more information, please contact
your local ACTIONPOWER representative or visit

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