

ACTION POWER High Power Grid Simulator AGS, AGL, HGS series OV to 46kV, 300kVA to 10MVA



Regenerative AC Source & Load

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HIGH POWER CAPACITY WITH PARALLEL OPERATION

단일 용량 구성을 300kVA 에서부터 1MW 까지 가능하며, 병렬연결구성으로 최대 10MVA 까지 용량 확장이 가능



여러대의 단일용량 AC POWER SUPPLY 판넬을 각각 사용하여 다출력 모드로 사용 하거나, 또는 Master/Slave 연결하여 병렬모드로 유연하게 사용 가능

FULLY TEST AC POWER WITH 4-QUADRANT

완전한 4사분면 제어로 원하는 전압과 전류를 안정적이고 효율적으로 변환할 수 있으며, 전력을 계통으로 회생시켜 AC 부하기능이 가능



COMPREHENSIVE PHASE CONTROL

0.1° 단위로 359.9° 까지 3상을 동시에 제어 할 수 있을 뿐만 아니라 R, S, T 각각의 위상각 을 0.1% 정확도로 변경 가능

Ratings, types and voltages

AGS series Regenerative Grid Simulator

Model	Output Power [kVA]	Voltage Range [V] @ L-N	Frequency Range [Hz]	Max. Current [A] @ 3 phase	Size (WHD) [mm]	Weight [kg]
AGS-30-4505	300	0-450	40-70	454	2400x1950x1200	2,630
AGS-40-4506	400	0-450	40-70	606	2400x1950x1200	2,920
AGS-50-4508	500	0-450	40-70	757	3400x1950x1400	3,860
AGS-60-4509	600	0-450	40-70	910	3400x1950x1400	4,410
AGS-75-4512	750	0-450	40-70	1136	3400x1950x1400	5,310
AGS-100-4516	1000	0-450	40-70	1515	6800x1950x1400	7,720
AGS-30-7003	300	0-700	40-70	286	2400x1950x1200	2,560
AGS-40-7004	400	0-700	40-70	380	2400x1950x1200	2,770
AGS-50-7005	500	0-700	40-70	476	2400x1950x1200	2,960
AGS-60-7006	600	0-700	40-70	572	3400x1950x1200	3,670
AGS-75-7007	750	0-700	40-70	714	3400x1950x1400	5,080
AGS-100-7010	1000	0-700	40-70	1000	3400x1950x1400	5,810
AGS-H30-8603	300	0-860	40-70	286	2400x1950x1200	2,560
AGS-H40-8604	400	0-860	40-70	380	2400x1950x1200	2,770
AGS-H50-8605	500	0-860	40-70	476	2400x1950x1200	2,960
AGS-H60-8606	600	0-860	40-70	572	3400x1950x1200	3,670
AGS-H75-8607	750	0-860	40-70	714	3400x1950x1400	5,080
AGS-H100-8610	1000	0-860	40-70	1000	3400x1950x1400	5,810

HGS series High Voltage Grid Simulator

Model	Output Power [kVA]	Voltage [kV] @ L-L	Nominal Voltage [kV] @ L-L	Max. Current [A]	Frequency [Hz]
HGS-20-3512	2000	0-46 / 0-13	0-35 / 0-10	33A@35kV / 115A@10kV	45-65
HGS-30-3518	3000	0-46 / 0-13	0-35 / 0-10	38A@35kV / 173A@10kV	45-65
HGS-40-3523	4000	0-46 / 0-13	0-35 / 0-10	66A@35kV / 231A@10kV	45-65
HGS-60-3535	6000	0-46 / 0-13	0-35 / 0-10	100A@35kV / 346@10kV	45-65
HGS-75-3543	7500	0-46 / 0-13	0-35 / 0-10	124A@35kV / 433A@10kV	45-65

Ratings, types and voltages

AGL series Regenerative AC Source & Load

Model	Output Power [kVA]	Voltage Range [V] @ L-N	Frequency Range [Hz]	Max. Current [A] @ 3 phase	Size (WHD) [mm]	Weight [kg]
AGL-30-4505	300	0-450	40-70	454	2900x1950x1200	2,930
AGL-40-4506	400	0-450	40-70	606	2900x1950x1200	3,220
AGL-50-4508	500	0-450	40-70	757	4400x1950x1400	4,360
AGL-60-4509	600	0-450	40-70	910	4400x1950x1400	4,910
AGL-75-4512	750	0-450	40-70	1136	4400x1950x1400	6,160
AGL-100-4516	1000	0-450	40-70	1515	8800x1950x1400	8,720
AGL-30-7003	300	0-700	40-70	286	2900x1950x1200	2,860
AGL-40-7004	400	0-700	40-70	380	2900x1950x1200	3,040
AGL-50-7005	500	0-700	40-70	476	2900x1950x1200	3,260
AGL-60-7006	600	0-700	40-70	572	4400x1950x1200	4,170
AGL-75-7007	750	0-700	40-70	714	4400x1950x1400	5,880
AGL-100-7010	1000	0-700	40-70	1000	4400x1950x1400	6,610
AGL-H30-8603	300	0-860	40-70	286	2900x1950x1200	2,860
AGL-H40-8604	400	0-860	40-70	380	2900x1950x1200	3,040
AGL-H50-8605	500	0-860	40-70	476	2900x1950x1200	3,260
AGL-H60-8606	600	0-860	40-70	572	4400x1950x1200	4,170
AGL-H75-8607	750	0-860	40-70	714	4400x1950x1400	5,880
AGL-H100-8610	1000	0-860	40-70	1000	4400x1950x1400	6,610

AGS series	Specification	
AC input		
Voltage, Phases	380V±15%, 3ph+PE	
Frequency	47Hz to 63Hz	
Harmonic current	<3%	
Power Factor	0.99	
AC output voltage		
Accuracy	±0.1% F.S.	
Resolution	0.01V	
Load regulation	±0.05% F.S. @ Linear load	
Line regulation	±0.05% F.S. @10%	
Voltage slew rate	AC>1.0V/us	
Response time	<1ms (10%-90%Umax)	
	Less than 0.5% @50Hz/60Hz \ge 220V for no-load	
Veltere distantion	Less than 1% @50Hz/60Hz \ge 220V for linear load	
voltage distortion	Less than 1.0% @ other frequency \ge 220V for no-load	
	Less than 1.5% @ other frequency \ge 220V for linear load	
AC output current		
Accuracy	±0.2% F.S.	
Resolution	0.01A	
Output frequency		
Accuracy	±0.01%	
Resolution	0.001Hz	
Range	40-70Hz	
Phase angle control		
Accuracy	±0.3°	
Resolution	±0.1°	
Phase angle range	0 - 359.9°	
Phase control	Single-phase, Three-phase, Three-phase independent	
Voltage ride through		
Mode	ZVRT / LVRT / HVRT	
Setting parameter	voltage, frequency, phase, rise time, hold time, trigger phase angle and pulse output	

AGS series	Specification
Harmonic Injection	
Order	50th@50Hz/60Hz
	Max 40% for 2-10 single harmonics, less than 40% for 2-10 total harmonics
	Max 20% for 10-20 single harmonics, less than 20% for 10-20 total harmonics
Content	Max 10% for 21-30 single harmonics, and no more than 10% for total harmonics
	Max 5% for 31-50 single harmonics, and no more than 5% for total harmonics
	It can simultaneously synthesis 49 harmonics
Amplitude error	±5% harmonic of set value
Preview function	Harmonic synthesis waveform can be previewed
Editing mode	import, export, read, storage
Inter Harmonic	
Frequency range	1Hz-3,000Hz, content <10%
Programming steps	100 steps
Programming parameters	content, start frequency, end frequency, step length, execution time, interval time, cycle times and sequence
Editing mode	add, delete, import, export, store, read
Flicker	
Flicker level	1.0-10.0, totally 10 levels in total, and one-key calling
Adjustment step length	1
Accuracy	±0.2
Preview function	Preview of flicker trend chart, pst can be visualized
Resolution	0.01V
Three-phase unbalance	
Adjustment mode	three-phase voltage, single phase; unbalance factor
Unbalance factor range (%)	1~100
Unbalance factor step length (%)	1
Accuracy (%)	±0.5%
Preview function	three-phase unbalance trend chart can be previewed
Measurement	
Voltage accuracy	±0.1% F.S.
Frequency accuracy	±0.01%
Current accuracy	±0.2% F.S.
Active power accuracy	±0.3% F.S.
Apparent power accuracy	±0.3% F.S.

HGS series	Specification
AC input	
Voltage range	AC35kV±10% / AC10kV±10%
Phases	3ph+PE
Frequency	50Hz / 60Hz ±5%
Power Factor	0.99
AC output voltage	
Accuracy	±0.5%
Resolution	0.01kV
Voltage L-L	0-46kV & 0-13kV according to the requirements of high voltage ride through tests
Voltage distortion	<1%@50Hz, 35/10kV no-load & linear load
AC output current	
Accuracy	±1%F.S.
	110% @le max 60s
Overcurrent protection	110%~140% @le inverse time limit
	140% @le immediate protection
Output frequency	
Accuracy	±0.01%
Resolution	0.001Hz
Range	45-65Hz
Phase angle control	
Accuracy	±0.3°
Resolution	±0.1°
Phase angle range	0 - 359.9°
Phase control	Single-phase, Three-phase, Three-phase independent
Harmonic Injection	
Order	50th @ 50Hz total harmonic content less than 10%
	Max 5% for 2-10 single harmonics, less than 10% for total harmonics
Content	Max 3% for 11-25 single harmonics, less than 5% for total harmonics
	Max 2% for 26-50 single harmonics, less than 5% for total harmonics
Inter-harmonic	
Frequency range	45Hz~2500Hz, content <2%
Programming steps	100
Programming parameters	content, initial frequency, end frequency, step length, execution time, and interval time
Editing mode	add, delete, store, and read

HGS series	Specification
Flicker	
Flicker level	1.0-10.0, totally 10 levels in total, and one-key calling
Adjustment step length	1
Accuracy	±0.2
Preview function	Preview of flicker trend chart, pst can be visualized
Three-phase unbalance	
Adjustment mode	Three-phase voltage, single phase; unbalance factor
Unbalance factor range (%)	1~100
Unbalance factor step length (%)	1
Accuracy (%)	±0.5%
Voltage ride through	
Mode	ZVRT / LVRT / HVRT
Setting parameter	voltage, phase, rise time, hold time, trigger phase angle, and trigger pulse output
Minimum voltage of zero voltage ride through test	≤+5%UN (no load)
Minimum voltage adjustment step length	≤1%Un
Stable-state voltage accuracy of HVRT test	≤2%Un
Response time	<10ms
Programmable	
Programming steps	100 steps
Setting parameter	voltage, frequency, phase, rise time, hold time, trigger phase angle, and trigger pulse output
Rise time range	100us-999s
Flat top time range	100us-999s
Minimum programming time step	100µs
Editing mode	add, delete, store, and read
Relevant functions	List / Step / Pulse programming, with three-phase unbalance, flicker, sag, interruption, H&LVRT etc.

AGL series	Specification_Source Mode		
AC input			
Voltage, Phases	380V±15%, 3ph+PE		
Frequency	47Hz to 63Hz		
Harmonic current	<3%		
Power Factor	0.99		
AC output voltage			
Accuracy	±0.1%		
Resolution	0.01V		
Load regulation	±0.05% F.S. @ Linear load		
Line regulation	±0.05% F.S. @10%		
Voltage slew rate	AC>1.0V/us		
Response time	<1ms (10%-90%Umax)		
	Less than 0.5% @50Hz/60Hz \ge 220V for no-load		
	Less than 1% @50Hz/60Hz \ge 220V for linear load		
voltage distortion	Less than 1.0% @ other frequency \ge 220V for no-load		
	Less than 1.5% @ other frequency \ge 220V for linear load		
AC output current			
Accuracy	±0.2%F.S.		
Resolution	0.01V		
Output frequency			
Accuracy	±0.01%		
Resolution	0.001Hz		
Range	40-70Hz		
Phase angle control			
Accuracy	±0.3°		
Resolution	±0.1°		
Phase angle range	0 - 359.9°		
Phase control	Single-phase, Three-phase, Three-phase independent		
Voltage ride through			
Mode	ZVRT / LVRT / HVRT		
Setting parameter	voltage, frequency, phase, rise time, hold time, trigger phase angle and pulse output		

AGL series	Specification_Source Mode			
Harmonic Injection				
Order	50th@50Hz/60Hz			
	Max 40% for 2-10 single harmonics, less than 40% for 2-10 total harmonics			
	Max 20% for 10-20 single harmonics, less than 20% for 10-20 total harmonics			
Content	Max 10% for 21-30 single harmonics, ar	nd no more than 10% for total harmonics		
	Max 5% for 31-50 single harmonics, and	d no more than 5% for total harmonics		
	It can simultaneously synthesis 49 harmonics			
Amplitude error	±5% harmonic of set value			
Preview function	Harmonic synthesis waveform can be pr	reviewed		
Editing mode	import, export, read, storage			
Inter Harmonic				
Frequency range	1Hz-3,000Hz, content <10%			
Programming steps	100 steps			
Programming parameters	content, start frequency, end frequency, step length, execution time, interval time, cycle times and sequence			
Editing mode	add, delete, import, export, store, read			
Flicker				
Flicker level	1.0-10.0, totally 10 levels in total, and one-key calling			
Adjustment step length	1			
Accuracy	±0.2			
Preview function	Preview of flicker trend chart, pst can be visualized			
Resolution 0.01V				
Three-phase unbalance				
Adjustment mode three-phase voltage, single pl		le phase; unbalance factor		
Unbalance factor range (%)	1~100			
Unbalance factor step length (%)	1			
Accuracy (%)	±0.5%			
Preview function	Three-phase unbalance trend chart can be previewed			
Measurement	Accuracy Resolution			
Voltage	±0.1% F.S.	0.01V		
Frequency	±0.01%	0.001Hz		
Current	±0.2% F.S.	0.1A		
Active power	±0.3% F.S.	1W		
Apparent power	±0.3% F.S.	-1.00~+1.00		

AGL series	Specification_Load Mode	
Load mode		
Linear load	CC: Current, power factor, load type, current slope, output waveform CP: Apparent power, power factor, load type, power slope, output waveform CR: Resistance value RLC: RLC connection mode R+L+C, R//L//C, (R//C)+L, (R+L)//C, (R+C)//L Resistance value, inductance value and capacitance value can be set	
Nonlinear load	Current, power, peak factor, current slope, power slope	
Zero-voltage start	Simulate on-load start, switch seamlessly to CC or CP after start, with configurable switching condition	
Voltage		
Voltage distortion limit	Uthd <10% below 20th	
Current		
Resolution	0.01A	
Accuracy	±0.2% F.S. @ CC mode	
Waveform	sine, square wave, triangular wave, clipping wave, customized waveform	
Current distortion	<2%@50Hz@ full load under rated voltage	
Current slew rate	10%~90% nominal current > 1A/us	
Response time	< 1ms@10%~90% nominal current	
Frequency		
Range	40–70Hz	
Accuracy	±0.01Hz	
Harmonic Injection		
Order	50th@50Hz/60Hz	
	Max 40% for 2-10 single harmonics, and no more than 40% for 2-10 total harmonics	
Content	Max 20% for 10-20 single harmonics, and no more than 20% for 10-20 total harmonics	
Conton	Max 10% for 21-30 single harmonics, and no more than 10% for total harmonics	
	Max 5% for 31-50 single harmonics, and no more than 5% for total harmonics	
Power		
Resolution	1VA	
Resolution (VA)	±0.5% F.S. @ CP mode	
Power factor		
Power factor	-1 to 1(resistance inductance, resistance capacity and current direction can be set)	
Resolution	0.01	
Crest factor		
Scope	1.414 to 4	
Resolution	0.001	

High Power Scalable Design

AGS, AGL, HGS 시리즈는 대용랑 병렬 확장 및 안정적인 전원 공급을 위해 DMPS(Digital Matrix Parallel System) 방식을 적용하였으며, 이는 고속 광섬유 통신방식으로 최소 300kVA 부터 1MA 단위로 병렬연결하여 최대 10MVA 까지 용량 확장이 가능합니다. 특히, 병렬 연결된 판넬은 사용자 필요에 따라 출력을 분리하여 다출력모드 (multi-output mode) 로 사용이 가능하여 동시에 여러 시험장비를 테스트 할 수 있어 사용자의 편의성을 극대화 하고, 많은 비용을 절감할 수 있습니다.



Output Expansion up to 10MVA with Master / Slave Control





Action Power 양방향 AC Power Supply는 독자적인 기술과 최적의 성능으로 다양한 응용 분야에 사용되는 혁신적인 제품입니다. Action Power 제품은 양방향 AC 전원공급을 하면서 회생형 AC 부하로서의 역할이 가능하고, 이는 ESS 시험, PV 인버터 시험, 풍력발전기 시험, 전기차 DC 충전 스테이션 등 다양한 계통연계 시험을 포함한 장기 신뢰성 테스트 응용 분야에 활용할 수 있습니다. 특히 AC 전원 특성을 모사할 때 정확하고 아주 빠른 응답속도가 필요한 분야에 독보적인 성능을 자랑합니다.





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AC/DC Power Supply Testing

Power HiL



EV Charger & EVSE Testing

4-Quadrant control

4-quadrant 제어를 통해 PV 인버터, V2G, 전기차 충전기, EVSE, 배터리, UPS 및 AC/DC 전원 공급 장치를 테스트할 수 있습니다. PRE 시리즈는 기본으로 Load 옵션이 내장되어 있으며, 프로그래밍 가능한 위상 제어를 통해 모든 사분면에서 작동할 수 있습니다. 이는 inductive 부하 및 capacitive 부하를 시뮬레이션할 수 있어서 완전한 AC 전원 부하를 시험할 수 있습니다.



High Dynamics

The output voltage slew rate of power supply is up to 1V/us, 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 interharmonic 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





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 Lowe 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.



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 A 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 mode : voltage amplitude transient change and power factor adjustment



CR mode : resistance transient change



Zero-voltage startup to CP

RLC Load Network Topology



CR mode : voltage amplitude, phase, frequency Transient change



Voltage amplitude change in CC mode



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



CP mode : voltage amplitude transient change CF=2.5

MV Grid Simulation Source

In 2020, ActionPower launched the first generation HGS grid simulator, aiming to simulate the various characteristic of grid on-site, specifically for 10kV/35kV voltage level grid accreditation for field power plant. In 2022, ActionPower launched the second generation HGS grid simulator product, with stronger environmental adaptability, 10kV full power output and other characteristics, and launched series products according to the power of the local power station. It mainly carries out grid adaptability tests and fault ride through tests for green energy power stations connected to 35kV/10kV grid. The tests includes voltage adaptability test, frequency adaptability test, three-phase voltage unbalance adaptability test, flicker adaptability test, harmonic/inter-harmonic adaptability test, high/low voltage fault ride through test, etc. The equipment is of container structure, it meets the requirements of domestic highway transportation and it can be arranged at various power stations for field tests. Through the specific design of the heat dissipation air tube, rainwater and sandstones can be prevented from entering the equipment, so that the equipment can still operate normally in harsh environments such as sandstorm, rain and snow. The HGS MV grid simulator still has parallel function, and the maximum capacity can reach 15MW.



Test regulation

Tests of HGS grid simulators meet the following regulations:

Technical Specification for Connecting Wind Power Plant to Power System - Part 1 (GB/T 19963.1-2021) Wind Turbines - Test Procedure of Voltage Fault Ride Through Capability (GB/T 36995-2018) Wind Turbines - Test Procedure of Grid Adaptability (GB/T 36994-2018) Test Procedure of Wind Turbine High Voltage Ride Through Capability (NB/T 31111-2017) Technical Requirements for Connecting Photovoltaic Power Plant to Power System (GB/T 19964-2012) Testing Code for Photovoltaic Power Plant Connected to Power Grid (GB/T 31365-2015) Technical Rule for Electrochemical Energy Storage System Connected to Power Grid (GBT 36547-2018) Test Specification for Electrochemical Energy Storage System Connected to Power Grid (GBT 36548-2018)

Powerful Software



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

AGS 그리드 시뮬레이터는 전용 소프트웨어를 통해 LVRT 테스트 패턴 등과 같은 시험을 손쉽게 시뮬레이션이 가능하고, 사용자 정의 파형을 정확 하게 제어하고 출력하는데 사용되며, 사용자 환경에 맞게 소프트웨어 기능을 추가할 수 있습니다.



ACTION POWER

For more information , please contact your local ACTION POWER representative or visit

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