



S3 Power Analyzer



- Max Measuring Accuracy: \pm (0.1% of reading + 0.1% of range)
- Bandwidth: DC, from 0.5Hz to 100Hz
- Power Measurement Channels: up to 3
- Voltage, current wide-range: Direct input (from 15 to 600V; from 0.5 to 20A)
- Up to 50 harmonic orders

SUITA ELECTRIC Corporation, founded in Suita, Osaka, Japan, is a company specializing in high-end equipment. Rooted in the technological achievements after years of research and development, the top-notch products of our company, with good quality, apply in many industries such as electric power, energy resource, transportation, automobile, telecommunication, and our advanced, reliable, and comprehensive solutions of test and measurement are provided to many R&D companies and manufacturers, systematic approaches meeting the deep demands of our customers to support the development and continuous update of the global industries.

Power analyzer of S3 series is a powerful instrument for measuring home appliances, OA products (office automation), and equipment with large power and process control automation. It is widely used in the areas such as power industry, office or home appliances testing and evaluation, battery drive test and motor efficiency test. This instrument is also equipped with the functions such as recording real time waveform and the waveform data record and analyzing the harmonic. Small in size, compact in structure, convenient in operation, economical in price but accurate in measurement, it is an ideal instrument working on the bench.



Functions and Advantages

Simultaneously Measuring all Parameters

The power analyzer of this series can measure all DC and AC parameters. It can also measure harmonics and perform integration simultaneously without changing the measurement mode.

Fast Display and Data Update Rate

The fast display and 100ms maximum data update rate of the power analyzer can offer users a shorter test time in their testing procedures.

Peak Hold Function

The maximum values of RMS/MEAN/DC/PEAK, voltage & current, active power, reactive power and apparent power can be held.

Configuration Parameters Saving and Loading

This instrument can save the configuration parameters which can be fast loaded when in similar measurement conditions next time, reducing the time spent by users for parameter access next time.

D/A Output for Measurement Recording

The D/A option can be used to output the Voltage, Current, Power and other measured data and record them in the data loggers or other devices ($\pm 5VDC$ outputs).

Current Sensor Input

The instrument with expanded range of current measurement is equipped with current clamps or current sensors of voltage output model.

Computation Function

Multiple computations are available on this instrument, including performing computations such as efficiency, crest factor, four arithmetic operations and average active power.

Data Storage

The measured data can be stored, and internal free memory space is available up to 4G. And the stored data can be accessed to and analyzed via computer or PC connected instead of being displayed and loaded in the screen of this power analyzer.

SUITA PA Viewer Software

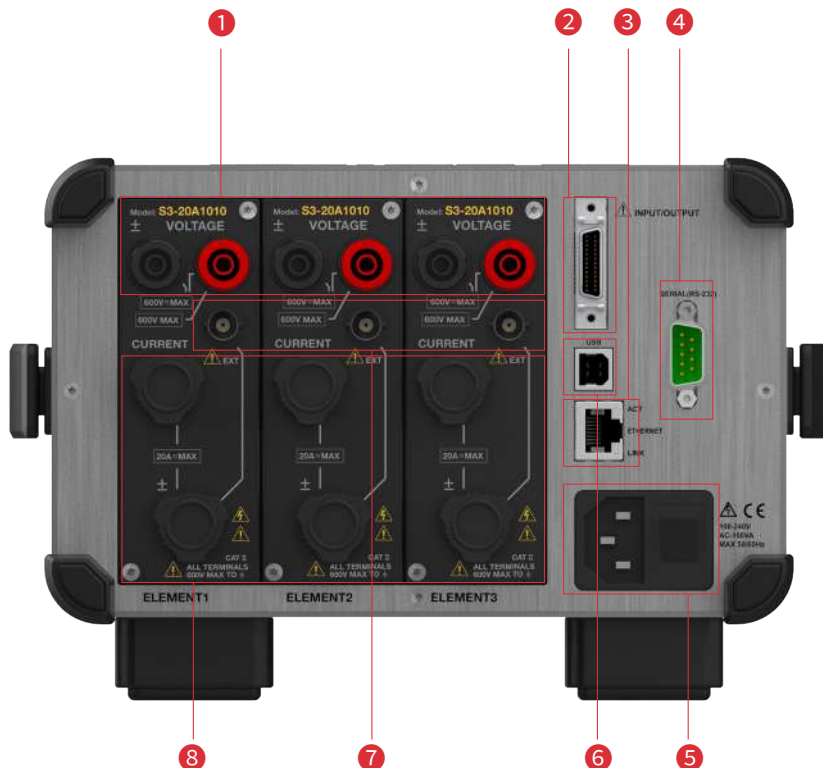
The SUITA PA Viewer is an software installed in PC available to remotely control the power analyzer connected via a communication interface (network port or USB port), and display the results analyzed by the power analyzer in the form of numeric, waveform, trend, vector, and bar graph.



Product Overview



- ① Status display I
- ② Measurement display
- ③ Displayed function settings
- ④ Range setting
- ⑤ Navigation keys
- ⑥ Function settings I
- ⑦ Wiring settings
- ⑧ Function settings II
- ⑨ Integration setup keys
- ⑩ Status display I
- ⑪ Power key



- ① Voltage input terminal
- ② D/A port
- ③ USB port
- ④ GP-IB connector
- ⑤ Power switch and power cord connector
- ⑥ Ethernet port
- ⑦ EXT current sensor input terminal
- ⑧ Current input terminal

Applications

This power analyzer is easy to use, economy and accurate in measurement, widely used in Production, Testing, Evaluation and Research & Development.

Home appliances and Office equipment

Recently, there are more concerns about energy efficiency, such as reducing the power consumption for the civil electrical appliances (such as air conditioner, washing machine, induction cooker, water heater). The power analyzer can be used to test the power produced by home appliances. One piece of the power analyzers of this series can achieve highly effective measurement, without any need to use three pieces of single phase power analyzer at a same time, by measuring the voltage, current, power, frequency, power factor and THD (Harmonic distortion).

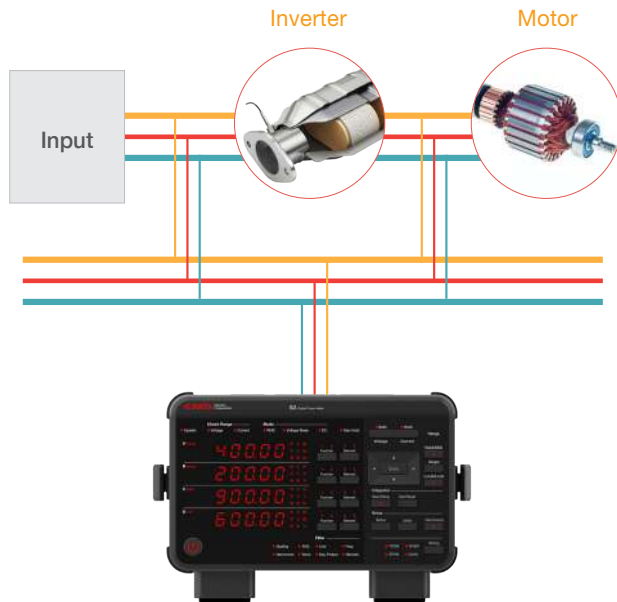




Industrial equipment and Transportation

Automotive - Battery or Driven Device Evaluation

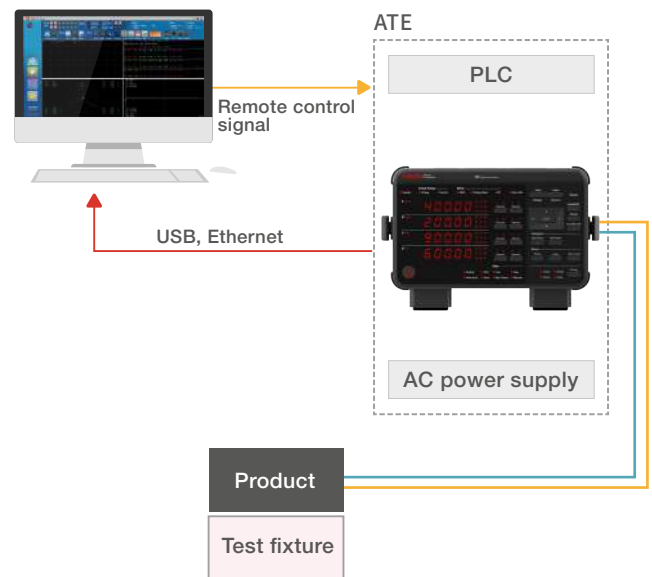
This power analyzer can directly measure the high current up to 20A. This provides an economical and accurate method for testing DC driven devices in vehicles without any extra sensors.



Testing in Production Line

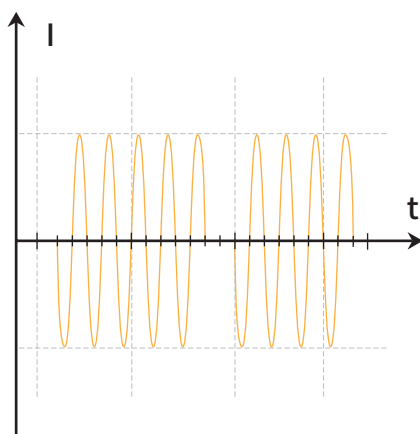
This instrument is so compact in structure to be easily mounted on the shelf for testing during production. Testing platform can be economically set up at a favorable price.

The parameters such as voltage, current, frequency, power factor, and harmonics can be measured by this power analyzer, so as to improve testing efficiency.

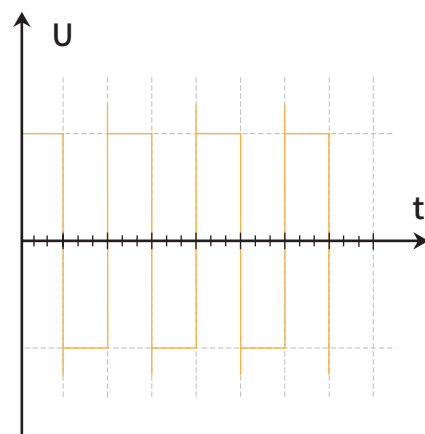


Evaluation Testing of Special Waveform Driven Devices and Distorted Waveforms (including DC Component)

The power analyzer of this series has a broad frequency capability of DC (from 0.5Hz to 100 kHz). It can measure the RMS value of distorted waveforms like square waveforms or special waveform driven devices. The average active power measurement function gives accurate power consumption data for fluctuating power devices such as burst waveform operated devices. Therefore the users can perform accurate distorted waveform measurements without any need to setting special modes.



Inter-harmonics



Square Wave



Technical Specifications

Input

Item	Specification	
Input terminal type	Voltage: Plug-in terminal(safety terminal) Current: Direct input: binding post External current sensor input option: Isolated BNC connector	
Input format	Voltage: Floating input through resistive voltage divider Current: Floating input through shunt	
Measurement range	Voltage	CF3: 15V/30V/60V/150V/300V/600V CF6/6A: 7.5V/15V/30V/75V/150V/300V
	Current Direct input	CF3: 0.5A/1A/2A/5A/10A/20A CF6/6A: 0.25A/0.5A/1A/2.5A/5A/10A
	External current sensor input	EX1(High range) CF3: 2.5V/5V/10V CF6/6A: 1.25V/2.5V/5V EX2(Low range) CF3: 50mV/100mV/200mV/500mV/1V/2V CF6/6A: 25mV/50mV/100mV/250mV/500mV/1V
Input resistance	Voltage	Input resistance: Approximately 2M Ω Input capacitance: Approximately 8pF(paralleled with resistance)
	Current	· Direct input: Input resistance: Approximately 5m Ω Input capacitance: Approximately 0.1 μ H(resistance in series) · External current sensor input (high range): Input resistance: Approximately 100k Ω · External current sensor input (low range): Input resistance: Approximately 20k Ω
Continuous maximum allowable input	Voltage	Peak value of 1.5kV or RMS value of 1kV, whichever is less
	Current	· Direct input Peak value of 100A or RMS value of 30A, whichever is less · External current sensor input Peak value less than or equal to 5 times of the rated range
A/D converter	Simultaneous conversion of voltage and current inputs. Resolution: 16-bit Maximum conversion rate: 10us	
Range selection	manual or auto	
Auto range	Range up(The range is increased when any of the following conditions is met.)	<ul style="list-style-type: none"> Urms or Irms exceeds 110% of the range selected 110%.(When in crest factor 6A, greater than 220%.) When in crest factor 3: Upk or Ipk of the input signal exceeds 330% of the range selected. When in crest factor 6 or 6A: Upk or Ipk of the input signal exceeds 660% of the range selected.

Auto range	Rang down(The range is decreased when all of the following conditions are met.)	<ul style="list-style-type: none"> Urms or Irms is less or equal to 30% of the measurement range. When in crest factor 3: Upk and Ipk of the input signal are less than 300% of the next lower measurement range. When in crest factor 6 or 6A: Upk and Ipk of the input signal are less than 600% of the next lower measurement range.
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Measurement Accuracy

Conditions:Temperature: 23 \pm 5 $^{\circ}$ C; Humidity: 30 to 75%RH; Input waveform: Sine wave; Crest factor: 3; Common-mode voltage: 0V; Scaling function: OFF; Number of displayed digits: 5 digits; Frequency filter: Turn ON to measure voltage or current of 200 Hz or less; After warm-up time has passed; Zero setting before wiring; Frequency f with unit kHz; within half a year after calibrated.

Format: \pm (% of reading + % of range)

Frequency range	Voltage	Current	Active Power
DC	0.1+0.15	0.1+0.15	0.1+0.15
0.5Hz \leq f<45Hz	0.1+0.15	0.1+0.15	0.25+0.2
45Hz \leq f \leq 66Hz	0.1+0.1	0.1+0.1	0.1+0.1
66Hz<f \leq 1kHz	0.1+0.15	0.1+0.15	0.15+0.15
1kHz<f \leq 10kHz	0.06*f+0.3	0.06*f+0.3	0.08*f+0.25
10kHz<f \leq 100kHz	0.04*f+0.5	0.04*f+0.5	0.07*f+0.5

Measurement Conditions

Item	Specification
Crest factor	3 or 6 or 6A
Measurement period	Interval for determining the measurement function and performing calculations The measurement period is set by the zero crossing of the reference signal (When synchronization source is set to be None, measurement period becomes data update interval.)
Synchronization source	Voltage, Current, None
Measurement mode	Select RMS(the true RMS value of voltage and current), MEAN (The rectified mean value calibrated to the RMS value of the voltage and the true RMS value of the current), DC (simple average of voltage and current).
Wiring system	1P2W, 1P3W, 3P3W, 3V3A, 3P4W However, the number of available wiring systems varies depending on the number of installed input elements.
Scaling	When inputting output from external current sensors, VT, or CT, set the current sensor conversion ratio, VT ratio, CT ratio, and power coefficient in the range from 0.001 to 9999.



Line Filter	Select OFF or ON(cutoff frequency of 500Hz)
Frequency Filter	Select OFF or ON(cutoff frequency of 500Hz)
Averaging	Exponential average: Select an attenuation constant from the values of 8, 16, 32, and 64. Linear average: Select the number of averages from the values of 8, 16, 32, and 64. Harmonic measurement: Only exponential averaging is available.
Data update interval	100ms, 200ms, 500ms, 1s, 2s, 5s, Auto
Peak measurement	Measure the peak (max/min) value of voltage, current or power from the instantaneous voltage, instantaneous current or instantaneous power that is sampled.
Zero-level compensation	Remove the internal offset of this power analyzer.

Display

Item	Specification
Display Type	7-segment LED
Displayed Items	Simultaneously display 4 items
Unit Symbols	m, k, M, V, A, W, VA, var, °, Hz, h±, TIME, %
Response Time	At maximum, 2 times the data update rate The time it takes to reach the accuracy of the final value when the displayed value changed from 0 to 100% or 100 to 0% of the rated range.
Hold	Hold the displayed value
Single update	Update the displayed value once each time the SINGLE key is pressed during Hold.

Frequency Measurement Function

Item	Specification														
Measured source	The frequencies of voltages and currents for all input elements can be measured simultaneously.														
Measurement method	Frequency: Reciprocal method														
Frequency measuring range	<table border="1"> <thead> <tr> <th>Data Update Interval</th> <th>Measurement Range</th> </tr> </thead> <tbody> <tr> <td>0.1s</td> <td>25Hz≤f≤100kHz</td> </tr> <tr> <td>0.2s</td> <td>10Hz≤f≤100kHz</td> </tr> <tr> <td>0.5s</td> <td>5Hz≤f≤100kHz</td> </tr> <tr> <td>1s</td> <td>2.5Hz≤f≤100kHz</td> </tr> <tr> <td>2s</td> <td>1.5Hz≤f≤50kHz</td> </tr> <tr> <td>5s</td> <td>0.5Hz≤f≤20kHz</td> </tr> </tbody> </table>	Data Update Interval	Measurement Range	0.1s	25Hz≤f≤100kHz	0.2s	10Hz≤f≤100kHz	0.5s	5Hz≤f≤100kHz	1s	2.5Hz≤f≤100kHz	2s	1.5Hz≤f≤50kHz	5s	0.5Hz≤f≤20kHz
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2s	1.5Hz≤f≤50kHz														
5s	0.5Hz≤f≤20kHz														
Frequency accuracy	Requirements: When the input signal level is 30% or more of the measurement range if the crest factor is set to 3.(60% or more if the crest factor is set to 6) · Frequency filter is ON when measuring voltage or current of 200Hz or less. Accuracy: ±(0.06% of reading)														
Minimum frequency resolution	0.0001Hz														

Integration

Item	Specification
Mode	Select Normal mode or Continuous mode
Timer	Automatically stop integration by setting a timer. Selectable range: 00:00:00 ~ 10000:0:0
Count over	<ul style="list-style-type: none"> If the integration time reaches the maximum integration time, If the integration value reaches maximum/minimum display integration value
Accuracy	Fixed range: ±(Power accuracy (or current accuracy)+0.1% of reading) Auto range: The measurement will not be performed during range change After range changed: ±(power or current accuracy+ timer accuracy)
Timer accuracy	±0.02%

Harmonic Measurement

Item	Specification																								
Measured Item	All installed elements																								
Frequency Range	Fundamental frequency of the PLL source is in the range of 10 Hz to 1.2kHz PLL source: voltage and current of each input element																								
FFT Data Length	1024																								
Sample rate, window width, and upper limit of harmonic analysis	<table border="1"> <thead> <tr> <th>Fundamental Frequency</th> <th>Sample Rate</th> <th>Window Width</th> <th>Upper Limit of Harmonic Analysis*</th> </tr> </thead> <tbody> <tr> <td>10Hz~75Hz</td> <td>f*1024</td> <td>1</td> <td>50</td> </tr> <tr> <td>75Hz~150Hz</td> <td>f*512</td> <td>2</td> <td>32</td> </tr> <tr> <td>150Hz~300Hz</td> <td>f*256</td> <td>4</td> <td>16</td> </tr> <tr> <td>300Hz~600Hz</td> <td>f*128</td> <td>8</td> <td>8</td> </tr> <tr> <td>600Hz~1.2kHz</td> <td>f*64</td> <td>16</td> <td>4</td> </tr> </tbody> </table>	Fundamental Frequency	Sample Rate	Window Width	Upper Limit of Harmonic Analysis*	10Hz~75Hz	f*1024	1	50	75Hz~150Hz	f*512	2	32	150Hz~300Hz	f*256	4	16	300Hz~600Hz	f*128	8	8	600Hz~1.2kHz	f*64	16	4
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Accuracy:±(...% of reading+ ...% of range)	Add the following accuracy to the accuracy at normal measurement. When the line filter is off: <table border="1"> <thead> <tr> <th>Frequency</th> <th>Voltage</th> <th>Current</th> <th>Active Power</th> </tr> </thead> <tbody> <tr> <td>10Hz≤f<45Hz</td> <td>0.15+0.25</td> <td>0.15+0.25</td> <td>0.15+0.5</td> </tr> <tr> <td>45Hz≤f≤440Hz</td> <td>0.15+0.25</td> <td>0.15+0.25</td> <td>0.25+0.5</td> </tr> <tr> <td>440Hz≤f<1kHz</td> <td>0.2+0.25</td> <td>0.2+0.25</td> <td>0.4+0.5</td> </tr> <tr> <td>1kHz≤f<1.2kHz</td> <td>0.8+0.35</td> <td>0.8+0.35</td> <td>1.5+0.6</td> </tr> </tbody> </table>	Frequency	Voltage	Current	Active Power	10Hz≤f<45Hz	0.15+0.25	0.15+0.25	0.15+0.5	45Hz≤f≤440Hz	0.15+0.25	0.15+0.25	0.25+0.5	440Hz≤f<1kHz	0.2+0.25	0.2+0.25	0.4+0.5	1kHz≤f<1.2kHz	0.8+0.35	0.8+0.35	1.5+0.6				
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	440Hz≤f<1kHz	0.2+0.25	0.2+0.25	0.4+0.5																					
	1kHz≤f<1.2kHz	0.8+0.35	0.8+0.35	1.5+0.6																					



D/A Output

Item	Specification
Output Voltage	±5V full scale(approximately ±7.5V maximum) against each rated values.
Number of Output Channels	12 outputs
Output Items	Set for each channel U, I, P, S, Q, λ, Ø, Fu, fl, Upk, lpk, WP, WP±, q, q±, MATH
Accuracy	±(accuracy of each measurement item+0.2% of full scale)(FS=5V)
D/A conversion resolution	16-bit
Minimum load	100kΩ
Update Interval	Same as the data update interval
Temperature coefficient	Temperature coefficient
D/A conversion resolution	16bit

Permitted supply voltage frequency range	From 48 to 63 Hz
Max. power consumption	50VA
Warm-up time	Approximately 30 minutes
Operation environment	Temperature: 5°C ~ 40°C Humidity: from 20% to 80%RH(no condensation)
Operating altitude	2000m or less
Applicable environment	Indoors
Storage environment	Temperature: -25°C ~ 60°C Humidity: from 20% to 80%RH(no condensation)
Weight	Approximately 6kg
Battery backup	Setup parameters are backed up with a lithium battery.

Hardware Interface

Item	Specification
External Clock Input	BNC connector; TTL level; Square waveform with a duty ratio of 50%.
D/A Terminal	D shape connector-parallel 26PIN; TTL level

Communication Interfaces

Item	Specification
Type B USB Interface	Conforms to the USB Rev.2.0; USBTMC-USB488(USB Test and Measurement Class Ver.1.0)
Ethernet Interface	RJ-45 connector; Conforms to IEEE802.3; Ethernet 100BASE-T, 100BASE-TX, 10BASE-T
RS-232 Interface	9-pin, D-Sub (plug); Conforms to EIA-574, standard of 9-pin EIA-232(RS-232)
GP-IB Interface	Confirms to IEEE Standard 488-1978 (JIS C 1901-1987); Confirms to the IEEE Standard 488.2-1992

General Specification

Items	Specifications
External dimensions	407.7mm* 232.2mm*153.9mm
Rated supply voltage	From 100 to 240 VAC
Permitted supply range voltage	From 90 to 264 VAC
Rated supply frequency	50/60Hz

Dimensions of the Instrument


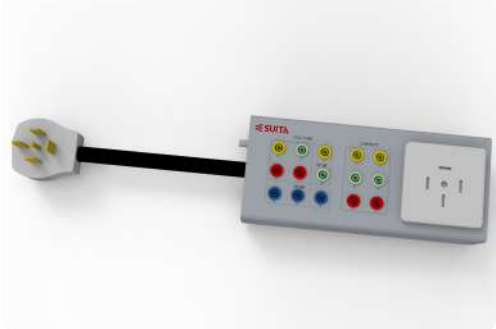


Accessories

Current Sensor of SHT Series

Item \ Model	SHT60	SHT200	SHT600	SHT1000
DC	0-60A	0-200A	0-600A	0-1000A
AC	60Apeak	200Apeak	600Apeak	1000Apeak
Accuracy	$\pm(0.05\% \text{ of rdg} + 15\mu\text{A})$	$\pm(0.05\% \text{ of rdg} + 15\mu\text{A})$	$\pm(0.05\% \text{ of rdg} + 15\mu\text{A})$	$\pm(0.05\% \text{ of rdg} + 15\mu\text{A})$
Measuring bandwidth	DC-500KHz	DC-300KHz	DC-200KHz	DC-150KHz
Ratio K_N	1: 600	1: 1000	1: 1500	1: 2000
Resistance R_m	0--25 Ω	0--25 Ω	0--12 Ω	0 -- 4 Ω
Aperture	\varnothing 28mm	\varnothing 28mm	\varnothing 30.9mm	\varnothing 30.9mm
Connector	DB9	DB9	DB9	DB9
Supply	\pm 12V~ \pm 15V	\pm 12V~ \pm 15V	\pm 15V~ \pm 24V	\pm 15V~ \pm 24V


Boxes

Name	Single-phase Junction Box	Three-phase Junction Box
Model	PG01A	PG02A
Sample		
Usage	It is used for single phase circuit connection to measure power parameters conveniently via power analyzer	It is used for three- phase circuit connection to measure power parameters conveniently via power analyzer

Connectors and Cables

Name	Model	Sample	Specification
Fork terminal adapter	PAC-1001		Used when attaching banana plug to binding post. Specification: 1000V, 20A Color: red, black
BNC Conversion adapter	PAC-1002		Connector: Conversion between safety BNC and banana plug Specification: Ø4mm , 1000V, 1A
Safety adapter	PAC-1003		Connector: Safety adapter; Screw can be used for tightening the test cables. Specification: Ø4mm ,1000V, 20A Color: red, black
Safety adapter	PAC-1004		Connector: safety adapter, spring-hold type Specification: Ø4mm, 600V,10A Color: red, black
Safety clamp	PAC-1005		Connector: hook shape Specification: 1000V Color: red, black
Large alligator adapter	PAC-1006		Connector: safety adapter Specification: Ø4mm , 1000V Color: red, black
Small alligator adapter	PAC-1007		Connector: safety adapter Specification: Ø4mm ,300V Color: red, black
Measurement lead	PAL-1001		Connector: safety connector Specification: Ø4mm , 1m, 600V, 32A Color: red, black
Safety BNC cable	PAL-1002		Connector: BNC plug Specification: 1m Color: black

Case

Sample	Model	Size
	PY01A	456.7mm*565.0mm*290.0mm

Models and Codes

Name	Model	Descriptions
Instrument	S3	Power analyzer
Input Module	S3-20A1010	20A, 600V, 0.1%+0.1%
Function Module (Option)	/DA12	D/A output
	/CE	Ethernet
	/CU	USB
	/CR	RS232 (or GPIB)
	/CG	GP-IB (or RS232)
	/EX1	External current sensor 2.5V-10V (or /EX2)
	/EX2	External current sensor 50mV-2V (or /EX1)
Accessory mounted on the support	/HA	Harmonic measurement
	PAA1003	Used when the instrument mounted on the support
	PAA2003	Used when the instrument mounted on the support(two instruments)

* Product specifications and models are subject to change without notice.