ITECH

YOUR POWER TESTING SOLUTION

# IT8200

## Regenerative AC/DC Electronic Load

Your contact:

Schulz Electronic
Professional Power Supplies

**Schulz-Electronic GmbH**
Dr.-Rudolf-Eberle-Straße 2
D-76534 Baden-Baden
Fon + 49.7223.9636.0

vertrieb@schulz-electronic.de
www.schulz-electronic.de

*Your Power Testing Solution*

ITECH
YOUR POWER TESTING SOLUTION

# IT8200

## Regenerative AC/DC Electronic Load

Adopting advanced SiC technology, IT8200 Series is a regenerative programmable AC/DC electronic load. It is power regenerative, which not only saves electricity and cooling costs for you, but also good for energy saving and environmental protection. AC load mode supports both rectification andnon-rectification, providing CC/CR/CP/CS/CC+CR/CE operating modes. It can simulate multiple circuit topologies under CE mode such as single-phase rectification RLC Circuit and parallel RLC Circuit. IT8200 can be applied to the test of V2G, EVSE, PCS, UPS, inverter, etc.

IT8200 Series adopt a high power density design, and the power can reach 15kVA in a 3U unit. After parallelconnection, the power can be extended to 960kVA at most.Its LCD touch screen with graphical UI interface can directly define differentwaveforms. Combined with arbitrary waveform editing function and perfect protection function, it is an ideal choice for R&D testing andsystem construction.

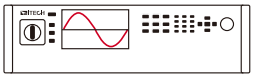
## FEATURE

- Adopt advanced SiC technology
- High power density, 15kVA in 3U unit, 6kVA in 1U/2U
- Measure up to 16 parameters including Vrms/Arms/Freq/ CF/PF/UTHD/ITHD/±Vpeak.
- Master/Slave parallel, power up to 960kVA
- High efficient energy regeneration
- Voltage - 350 VL-N
- Comprehensive working modes selectable: single-phase, three-phase, reversed phase. Rated voltage can be extended to 200% under reversed phase
- Frequency: 16-500Hz
- Support NORMAL/LIST/SWEEP/Surge&Sag modes
- Built-in various waveforms
- Touch screen, simple UI for easy operation
- Built-in USB/CAN/LAN/Digital IO interface, optional GPIB /Analog&RS232
- DC mode supports nine working modes, including CC, CR,CP, and CV
- Support CANopen*3、Modbus、LXI、SCPI communication
- AC mode supports CC/CP/CR/CS/CC+CR/CE multiple working modes, CE mode can simulate 14 circuit topologies such as single-phase rectifier RLC and parallel RLC
- AC mode supports both rectification and non-rectification modes
- DC mode supports 9 working modes such as CC/CR/CP/CV
- Adjustable crest factor: 1.414 ~ 5.0
- Supports phase shift, ranging from -90 º to 90.0 º *1
- The unit power factor1 function allows the current waveform to vary with the voltage waveform and the power factor is as close to 1 as possible
- In three-phase AC mode, two access modes are supported: Y and Δ
- Comprehensive harmonics measurement and analysis, up to 50th. Built-in IEC61000-3-2/3-12 pre-compliance test standard *2
- Support the loading and unloading angle control, the full range of 0-359° can be set
- Various protection functions such as Protect auto clear (UV&FE auto Clear), POVP, POCP, UVP, Software watchdog

* 1 After the rectification function is enabled, the setting range of phase shift is restricted by the peak factor
* 2 Voltage/current harmonic analysis, current harmonic simulation, fundamental wave ≤ 60Hz
* 3 coming soon

# Your Power Testing Solution

## IT8200 Regenerative AC/DC Electronic Load



## APPLICATION

### Solar

Grid-connected inverter, Hybrid inverter

### Energy storage

PCS, Micro-grid

### EV

V2G, EVSE, converters

### Power electronics

UPS, AC power supply, frequency converter, generator

### Electronic components

Circuit breaker, fuse, connectors, switches

| Model | Input Vac | | Input Amps/Phs | | Input Pac | Phase | Height | Display |
|---|---|---|---|---|---|---|---|---|
| | V L-N | V L-L | Arms(1Φ) | Arms(3Φ) | | | | |
| IT8202-350-10U-ATE | 350V | 606V | 10A | – | 2kVA | 1Φ | 1U | –– |
| IT8202-350-10U | 350V | 606V | 10A | – | 2kVA | 1Φ | 2U | Touch Screen |
| IT8203-350-30U | 350V | 606V | 30A | – | 3kVA | 1Φ | 3U | Touch Screen |
| IT8204-350-20U-ATE | 350V | 606V | 20A | – | 4kVA | 1Φ | 1U | –– |
| IT8204-350-20U | 350V | 606V | 20A | – | 4kVA | 1Φ | 2U | Touch Screen |
| IT8205-350-30U | 350V | 606V | 30A | – | 5kVA | 1Φ | 3U | Touch Screen |
| IT8206-350-30-ATE | 350V | 606V | 30A | 10A | 6kVA | 1Φ or 3Φ | 1U | –– |
| IT8206-350-30 | 350V | 606V | 30A | 10A | 6kVA | 1Φ or 3Φ | 2U | Touch Screen |
| IT8206-350-90 | 350V | 606V | 90A | 30A | 6kVA | 1Φ or 3Φ | 3U | Touch Screen |
| IT8209-350-90 | 350V | 606V | 90A | 30A | 9kVA | 1Φ or 3Φ | 3U | Touch Screen |
| IT8212-350-90 | 350V | 606V | 90A | 30A | 12kVA | 1Φ or 3Φ | 3U | Touch Screen |
| IT8215-350-90 | 350V | 606V | 90A | 30A | 15kVA | 1Φ or 3Φ | 3U | Touch Screen |
| IT8230-350-180 | 350V | 606V | 180A | 60A | 30kVA | 1Φ or 3Φ | 6U | Touch Screen |
| IT8245-350-270 | 350V | 606V | 270A | 90A | 45kVA | 1Φ or 3Φ | 15U | Touch Screen |
| IT8260-350-360 | 350V | 606V | 360A | 120A | 60kVA | 1Φ or 3Φ | 27U | Touch Screen |
| IT8275-350-450 | 350V | 606V | 450A | 150A | 75kVA | 1Φ or 3Φ | 27U | Touch Screen |
| IT8290-350-540 | 350V | 606V | 540A | 180A | 90kVA | 1Φ or 3Φ | 27U | Touch Screen |
| IT82105-350-630 | 350V | 606V | 630A | 210A | 105kVA | 1Φ or 3Φ | 27U | Touch Screen |
| IT82120-350-720 | 350V | 606V | 720A | 240A | 120kVA | 1Φ or 3Φ | 37U | Touch Screen |
| IT82135-350-810 | 350V | 606V | 810A | 270A | 135kVA | 1Φ or 3Φ | 37U | Touch Screen |
| IT82150-350-900 | 350V | 606V | 900A | 300A | 150kVA | 1Φ or 3Φ | 37U | Touch Screen |
| IT82165-350-990 | 350V | 606V | 990A | 330A | 165kVA | 1Φ or 3Φ | 37U | Touch Screen |

* Please contact ITECH for high power needs.
* The above specifications are subject to update without notice.

# Your Power Testing Solution

## IT8200 Regenerative AC/DC Electronic Load

## Regenerative AC/DC electronic load

The IT8200 series are new regenerative AC Electronic Load with 88% energy recovery capability. Whether in AC mode or DC mode, the power generated by the DUT can be fed back to the grid,rather than being dissipated as heat, which protects the environment and save the cost of electricity, HVAC and cooling infrastructure.

### Production facility

24hours/day x 7 working days x 52 weeks

| Power (kW) | Electricity saved (appr.USD/year) | CO2 emission reduced (appr.ton/year) |
|---|---|---|
| 15 | 17,428 | 124 |
| 90 | 104,570 | 745 |
| 165 | 191,712 | 1,365 |
| 960 | 1,115,412 | 7,943 |

### R&D lab

8hours/day x 5 working days x 52 weeks

| Power (kW) | Electricity saved (appr.USD/year) | CO2 emission reduced (appr.ton/year) |
|---|---|---|
| 15 | 4,368 | 30 |
| 90 | 26,208 | 177 |
| 165 | 48,048 | 325 |
| 960 | 279,552 | 1,891 |

* The data is based on :
1. approximate electricity price 0.14USD/kWh for industry facility
2. 1kWh power consumption ≈ 0.997 CO2 emission
* The extra cost of air conditioning is not included.

## High power density

From 1U/2U/3U single unit to 27U/37U cabinet, various models of IT8200 series can meet the testing needs from 2k to 165kVA. Its voltage can reach 350V. The size of a 3U/15 kVA is only 1/12 of the traditional AC load, which greatly saves the testing space and brings you a high-power testing instrument that can be placed directly on the bench.

## Master/slave parallel, large capacity free combination

The 3U model of IT8200 can be master-slave paralleled to to reach 960kVA output at most. It can improve the output current and power capacity to meet the requirements of higher power testing. IT8200 comes with synchronous On/Off input and output signals, which ensure the synchronization of paralleling and ensures synchronous current sharing of multiple modules. After paralleling, all functions are retained and there' s no loss of accuracy, making the construction of the power system faster, more flexible, and more economical, either it is a stand-alone test or ATE system.

*350V 3U models with the same power can be connected in parallel, 350V 1U/2U models with the same power can be connected in parallel

1U | 2U | 3U

High efficient power regeneration

Optional interfaces

After parallel, Power up to 960kVA

Multiple operating modes

Single-phase/ Three-phase/ Reverse phase

Various protection functions

# IT8200

15U | 27U | 37U

# Your Power Testing Solution

IT8200 Regenerative AC/DC Electronic Load

## Single-phase, three-phase, reverse-phase

The IT8200 series has single-phase, three-phase, and reverse-phase output modes, which can be selected through the menu. Under reverse mode, the single-phase 350V input voltage can be increased to 700V with the power down to 2/3 of the original. Under the three-phase mode, you can choose a Y-type or a Δ-type connection. The Y-type connection supports the C-phase loss.

single phase AC

single phase DC

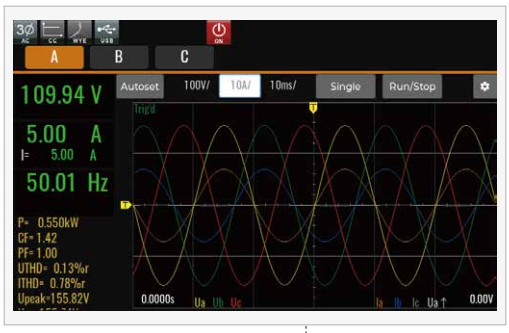
three phase AC

reverse phase AC

△-type connection three phase

Y-type connection three phase

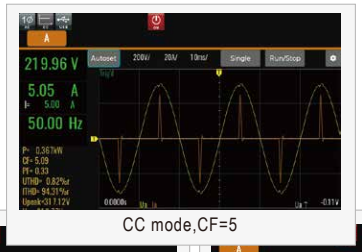
Y-type phase loss



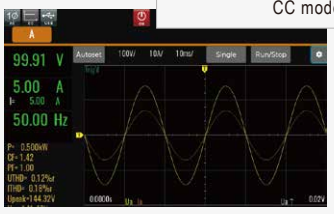

Y-type phase loss

## CF 1.414-5.0

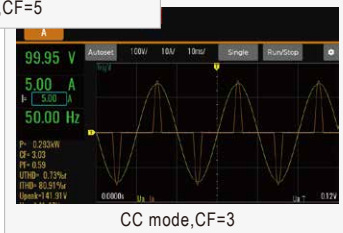
The crest factor indicates the extreme peaks of the waveform. For applications that require a pure sine wave, it is desirable to have a CF value of the load current waveform of 1.414 or as close as possible. However, in practical applications, the peak shape of the current waveform of the load may become very sharp and its CF is often higher than 1.414. At this time, the starting point of the sine wave starts to shift from 0 degrees to the positive degree. So you need to correct the waveform. The Crest Factor of the IT8200 can be adjusted from 1.414 to 5.0, and it also allows to set the phase shift angle from -90 °~90 °, correct the resulting amplitude, and keep the RMS unchanged. This enables more accurate simulation of field test conditions to ensure the reliability of the unit under test (UUT).



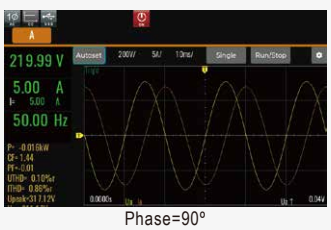

CC mode,CF=5



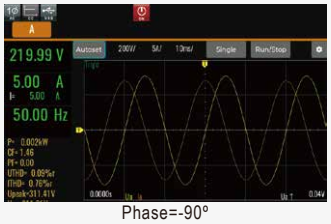

CC mode,CF=1.414




CC mode,CF=3




Phase=90°




Phase=-90°

CC phase leading / lagging

## IT8200 Regenerative AC/DC Electronic Load

### AC/DC load conditions emulation

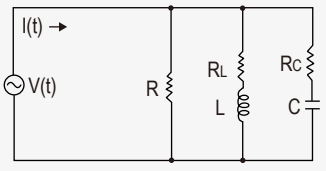
**DC load mode**

- Constant Voltage (CV)
- Constant Current (CC)
- Constant Resistance (CR)
- Constant Power (CP)
- CC+CV
- CR+CV
- CP+CV
- CC+CR
- CP+CV+CR+CC

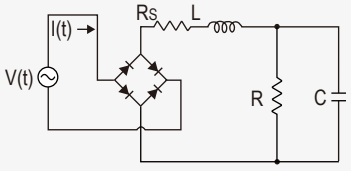
**AC load mode**

- Constant Current (CC)
- Constant Resistance (CR)
- Constant Power (CP)
- Constant apparent power (CS)
- CC+CR
- CE RLC

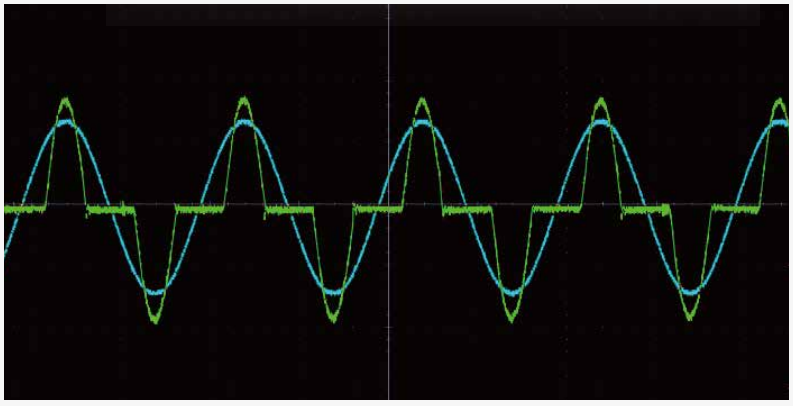
**14 circuit topologies**



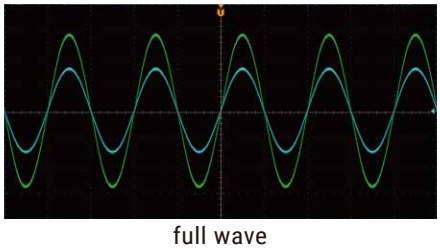

Parallel rlc



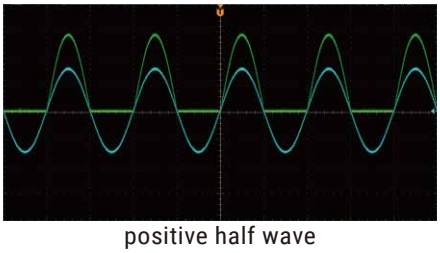

Rectifier single phase rlc



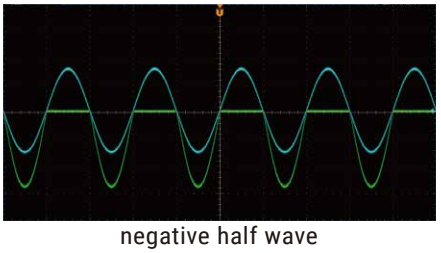
IT8200 AC electronic load can enable the 'Rectified' function in AC mode, so that the load works in the first and third quadrants to ensure that the voltage and current flow always in the same direction. At this time, full wave, positive half wave, or negative half wave can be freely selected.



full wave



positive half wave



negative half wave

# Waveform

## Oscilloscope function

The IT8200 series has built-in digital oscilloscope functions, which can collect time domain signals of voltage and current, phase relationship, and perform waveform triggering, etc. Its sampling rate is as high as 10us, up to 6 oscilloscope curves can be displayed at the same time, and instantaneous analysis can be completed.
Further more, with its data recording function, you can observe the output for a long time, and store the obtained data to an external storage device for secondary analysis. A wide variety of test requirement can be met even without a data acquisition instrument or an oscilloscope.

## Data record

Thanks to the data record function, the IT8200 series can continuously record data for up to 7 hours at the fastest time interval of 100ms, and provides you with a 'trend' graph to check the curve of the entire test process. Up to 6 curves can be displayed simultaneously. In addition, you can also observe the precise data at a certain moment in the trend graph by sliding on the front panel. This function helps to analyze the abnormality of DUT during long-term testing, inflection point under loading, etc. Test data can be exported by a USB for further analysis.

## Harmonic analysis

Harmonic analysis functions include both voltage and current harmonic measurement. In the harmonic mode, the voltage and current total harmonic distortion (THD) and the phase difference test of the harmonic to the fundamental wave can be realized. In addition, you can make multiple harmonic measurements. The test results are displayed in a list, histogram or vector diagram, easy to check. In the meantime, IT8200 AC electronic load also has built-in IEC 61000-3-2 / 61000-3-12 regulations, which can be recalled directly for pre-compliance testing.

## Built-in multiple waveforms

IT8200 has built-in sine, triangle, square, trapezoidal and clipped-sine wave. These waveforms can be recalled through the menu and displayed on the screen. Further more, the complex testing requirement can be met by further editing the relevant parameters.

## Harmonic simulation

Harmonic test is one of the important test items for EMC immunity. IT8200 series has built-in 30 THD waveforms for quick recall. Thanks to the high-speed DSP technology, IT8200 series can also customize THD waveform. By setting the amplitude and phase, it can simulate up to 50th order harmonics (fundamental frequency is 50Hz or 60Hz), forming a periodic distortion waveform.

## Intuitive software interface

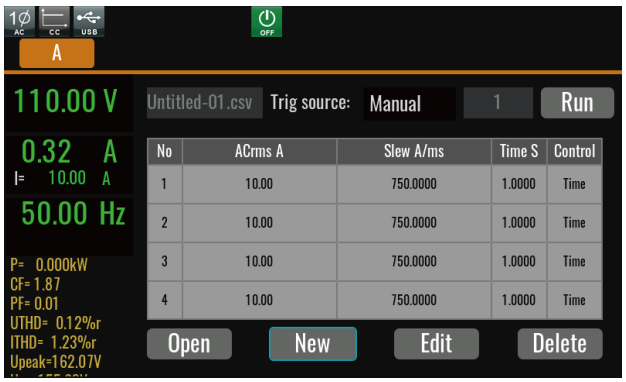
IT8200 series provides free PC software PV8200 with an intuitive GUI. Meanwhile, it allows remote control, even the ATE models without display screen can be programmed, communicated and monitored.

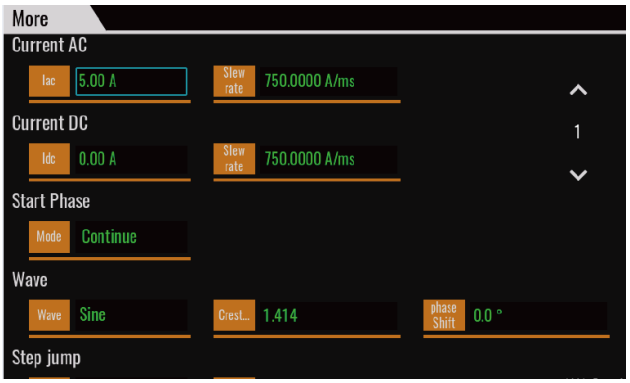
# Your Power Testing Solution

IT8200 Regenerative AC/DC Electronic Load

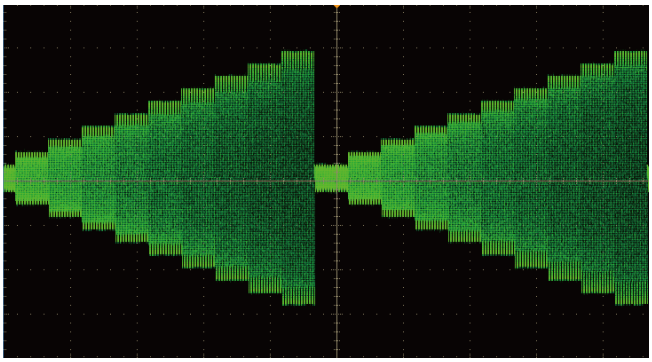
## LIST/SWEEP/Surge&Sag

IT8200 series supports NORMAL,LIST and SWEEP mode. Each mode can work with Surge&Sag function.
In LIST mode, you can edit multiple steps and any waveform can be selected for each step. One List file can contain maximum 200 steps. Parameters such as frequency, amplitude, running time, and rising slope of each waveform can be edited.

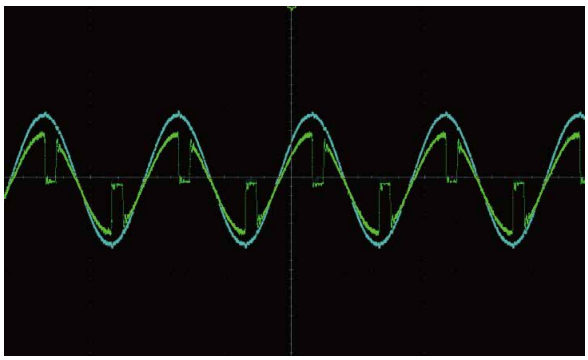



The SWEEP function helps to test the efficiency of the switching power supply in AC mode, grab the voltage and frequency of the maximum power point, and make the setting parameters change step by step.



Surge&Sag works in each mode of NORMAL/LIST/SWEEP. Use trigger or cycle to control the drop of surge and sag, set the starting angle of the drop, and support waveform smoothing, symmetrical and asymmetrical waveform operations. Waveforms can be quickly created to reproduce waveform distortions or transient events such as spikes, dropouts or any other anomalies.



| IT8215-350-90 | | | |
|---|---|---|---|
| AC parameter | | | |
| AC Input | Wiring connection | 3phase 3wire + ground(PE) | |
| | Line voltage | RMS | ( 200 ~ 220 V) ±10% *1 ( 380 ~ 480V ) ±10% |
| | Line current | RMS | < 34A |
| | Apparent power | < 17kVA | |
| | Frequency | 45 ~ 65Hz | |
| | Power factor | typ | 0.98 |
| Input | | | |
| AC mode | Input voltage | VLN | 30 ~ 350V |
| | | VLL | 51.96 ~ 606V(3phase)/60 ~ 700V(reverse) |
| | Input frequency | 16 ~ 500Hz | |
| | Input current | RMS | 90A(1phase)/30A(3phase/reverse) |
| | | Peak | 270A(1phase)/90A(3phase/reverse) |
| | | Crest Factor *2 | 5 |
| | Input power | Per Phase | 5kVA |
| | | Max. Power | 10kVA(reverse phase)/15kVA(1phase/3phase) |
| CC mode setting | | | |
| | Current range | RMS | 90A(1phase)/30A(3phase/reverse) |
| | Resolution | 0.01A | |
| | Accuracy*3 | <0.1% + 0.2% F.S.(DC,16Hz～150Hz)/<0.2% + 0.3% F.S.(150.1Hz ~ 500Hz *4 ) | |
| CP mode setting | | | |
| | Range | Max. Power | 15kW(1phase/3phase)/10kW(reverse phase) |
| | | Per Phase | 5kW(3phase) |
| | Resolution | 0.001kW | |
| | Accuracy | <0.4% +0.4% F.S.(DC,16Hz～500Hz) | |
| CS mode setting | | | |
| | Range | Max. Power | 15kVA(1phase/3phase)/10kVA(reverse phase) |
| | | Per Phase | 5kVA(3phase) |
| | Resolution | 0.001kVA | |
| | Accuracy | <0.4% +0.4% F.S.(DC,16Hz～500Hz) | |
| CR mode setting | | | |
| | Range | 0.334～388.88Ω(1phase) / 1.002～1166.6Ω (3phase/reverse phase) | |
| | Resolution | 0.001Ω | |
| | Accuracy*5 | 0.4%+0.4%F.S. | |
| Circuit Emulation(CE)-Parallel rlc | | | |
| | R Range | 0.334～388.88Ω(1phase) / 1.002～1166.6Ω(3phase/reverse phase) | |
| | L Range | 1 ~ 2000mH(1phase)/3 ~ 2000mH(reverse phase)/3 ~ 2000mH(3phase) | |
| | C Range | 0.001 ~ 9900uF(1phase)/0.001 ~ 3300uF(reverse phase)/0.001 ~ 3300uF(3phase) | |
| | Rc Range | 0.334～388.88Ω(1phase) / 1.002～1166.6Ω(3phase/reverse phase) | |
| | RL Range | 0.334～388.88Ω(1phase) / 1.002～1166.6Ω(3phase/reverse phase) | |
| | IL Range | 0 ~ 272.7A(1phase)/0 ~ 90.90A(reverse phase)/0 ~ 90.90A(3phase) | |
| | Max peak current | 272.7A(1phase)/90.9A(reverse phase)/90.9A(3phase) | |
| Circuit Emulation(CE)-Rectifier single phase rlc | | | |
| | R Range | 0.334～388.88Ω(1phase) / 1.002～1166.6Ω(3phase/reverse phase) | |
| | L Range | 0.1 ~ 2000mH(1phase)/0.3 ~ 2000mH(reverse phase)/0.3 ~ 2000mH(3phase) | |
| | C Range | 0.001 ~ 9900uF(1phase)/0.001 ~ 3300uF(reverse phase)/0.001 ~ 3300uF(3phase) | |
| | RS Range | 0～388.88Ω(1phase) / 0～1166.6Ω(3phase/reverse phase) | |
| | Vcap Range | 0 ~ 499.924V(1phase)/0 ~ 499.924V(reverse phase)/0 ~ 499.924V(3phase) | |
| | Vdiode RangeL | 0 ~ 5V(1phase)/0 ~ 5V(reverse phase)/0 ~ 5V(3phase) | |
| | Max peak current | 272.7A(1phase)/90.9A(reverse phase)/90.9A(3phase) | |

* 1 (200~220) ±10%, models of 12Kw and above output 60% of rated power.
* 2 Under the input frequency of 50Hz/60Hz, the maximum CF is 5 without exceeding the peak current; under the condition of full current and full power, the maximum CF is 3.
* 3 For frequency <150Hz, the minimum current for accuracy test is 1%F.S., for frequency>150Hz, the minimum current for accuracy test is 3%F.S.
* 4 When LoopSpeed is Low, it is more adaptable to the load; when LoopSpeed is Fast, the dynamic response is faster; when the frequency is high, use Fast mode.
* 5 Under condition： I >10%F.S., F<150Hz.
* The above specifications are subject to update without notice.

| | | |
|---|---|---|
| AC mode | Phase angle setting | |
| | Range | -82.8°~+82.8°(Rectified Mode *6) |
| | | -90°~+90° |
| | Resolution | 0.01° |
| | Accuracy | 1% F.S. |
| | CF setting | |
| | Range | 1.414 ~ 5.0 |
| | Resolution | 0.001 |
| DC mode | Voltage | 30 ~ 499V |
| | Current | 0 ~ 90A(1phase) |
| | Current rising time | 200μs |
| Measure Parameter | | |
| Voltage RMS | Range | 0 ~ 350Vrms |
| | Resolution | 0.01 |
| | Accuracy | < 0.1%+0.1% F.S.(DC,16Hz～500Hz) |
| Current RMS | Range | 0 ~ 90A |
| | Resolution | 0.01A |
| | Accuracy | < 0.1% + 0.2% F.S.(DC,16Hz～150Hz)/< 0.2% + 0.3% F.S.(150.1Hz ~ 500Hz) |
| Peak current | Range | 0 ~ 270A |
| | Resolution | 0.1A |
| | Accuracy | < 0.3% + 0.6% F.S.(16Hz ~ 500Hz) |
| Input active power | Range | 0 ~ 15kW |
| | Resolution | 0.001kW |
| | Accuracy | < 0.4% +0.4% F.S. |
| Input reactive power | Range | 0 ~ 15kVAR |
| | Resolution | 0.001kVAR |
| | Accuracy | < 0.4% +0.4% F.S. |
| Input apparent power | Range | 0 ~ 15KVA |
| | Resolution | 0.001KVA |
| | Accuracy | < 0.4% +0.4% F.S. |
| CF | Range | 1 ~ 5 |
| | Resolution | 0.01 |
| PF | Range | 0.1 ~ 1 |
| | Resolution | 0.01 |
| | Accuracy | 1%F.S. |
| Harmonic | Max.harmonic analysis | up to 50orders(50/60Hz) |
| Power regeneration | | |
| Regenerative Pmax | | 15kVA |
| Output current THD | | < 5% |
| Other | | |
| Efficiency | typ | 88% |
| Protection | | OVP, OCP, OPP, OTP, FAN,ECP |
| Dimension | | 483.00mm (W)*151.3mm (H)*700mm (D) (841.6mm cover and holder included) |
| Weight | | 42kg |
| Working temperature | | 0℃~50℃ |
| Programming response time | | 2ms |

* 6 In the rectifier load mode, the setting range of the phase angle is related to CF. The larger the CF, the larger the settable range of the phase angle.

* The above specifications are subject to update without notice

Your contact:


Schulz Electronic
Professional Power Supplies

**Schulz-Electronic GmbH**
Dr.-Rudolf-Eberle-Straße 2
D-76534 Baden-Baden
Fon + 49.7223.9636.0

vertrieb@schulz-electronic.de
www.schulz-electronic.de