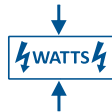


Introducing the RLS Series

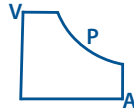
The Industry's Most Flexible,
 High Performing, and Intelligent
 Regenerative AC & DC
 Electronic Load



Regenerative



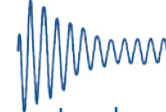
Power
 Density



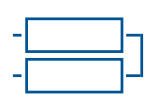
Constant
 Power



High
 Current



Inrush
 Current
 Control



Scalable
 Power

Key Features

- Regenerative Electronic Load
 - » 4-Quadrant AC & DC Load
 - » Fully Programmable
- High Power Density – Up to 21kW in 4U; Parallel up to 189kVA/kW per Cabinet, or Multiple Cabinets up to 252kW
- AC, DC
- Single, Split, Three-Phase; Multi-Channel Configurations
 - » Isolated Neutrals independent channel modes
- Input Voltage Range:
 350Vac L-N/606Vac L-L or $\pm 500\text{Vdc}$
- Wide Load Input Frequency Range 15Hz - 1200Hz
- Galvanic Isolation from Facility AC Input to Load Input and Between Input Phases / Channels
- Dynamic, Quiet and Efficient Operation Using Silicon Carbide (SiC) Based Technology
- High AC Current Capability
- Waveform Capture and Scope Display
- Powerful Current Transient Programming Tools
 - » Generate Harmonics and Interharmonics Currents
 - » Analog I/O Signals Standard
- Intuitive User Interface Using Softkeys & Shuttle
- **SmartSource Suite:** Web Browser Control

RLS Series

Regenerative 4-Quadrant AC and DC Load

The RLS Regenerative Load Simulator is designed to emulate real-world normal and abnormal load conditions for testing a wide range of AC or DC power generating or conversion equipment. The RLS's high-power density provides 6kVA/kW up to 21kVA/kW in a 4U chassis and can parallel up to 189kVA/kW in a single 19" cabinet. Dual cabinets can parallel up to 252kVA/kW.

The RLS Series is modular by design and scalable in power. Its flexible channel inputs and advanced control and programming capabilities make it ideal for generating complex user-defined current waveforms.

Full operator control of current, power and power factor allows for testing a wide range AC or DC power sources. The RLS can also support testing your Power Generating Equipment to regulatory compliance standards.

Application Examples:

- EV Charger Load Testing, On Board Chargers (OBC), Wallboxes, V2G, V2H, V2X, and EV Charging Cables
- Solar PV/Grid-Tied Inverters RLC Loading for Anti-Islanding
- Energy Storage Systems (ESS), Home ESS Load Testing
- UPS Products and PDUs AC Load Testing
- EV Battery Discharge Testing
- Aerospace Power and Converter Testing
- Utility Power Quality and Grid Usage
- Burn-In Testing



Flexible Control

Regenerative Power > 90%

The RGS Regenerative load provides over 90% energy efficiency and significant cost savings. Energy is returned to the facility or the grid rather than converting to heat.

Consider a burn-in test requiring 10 kW for 10 hours. In this simplified example to the right, the use of regenerative loads results in an energy savings of 189 kWh, which significantly reduces both electricity and HVAC costs.

Simplified Example of Regenerative Load Cost Savings

Resistive Load:

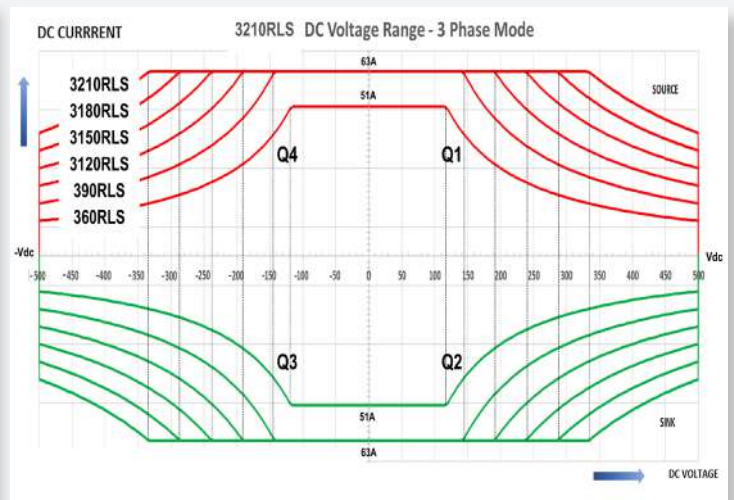
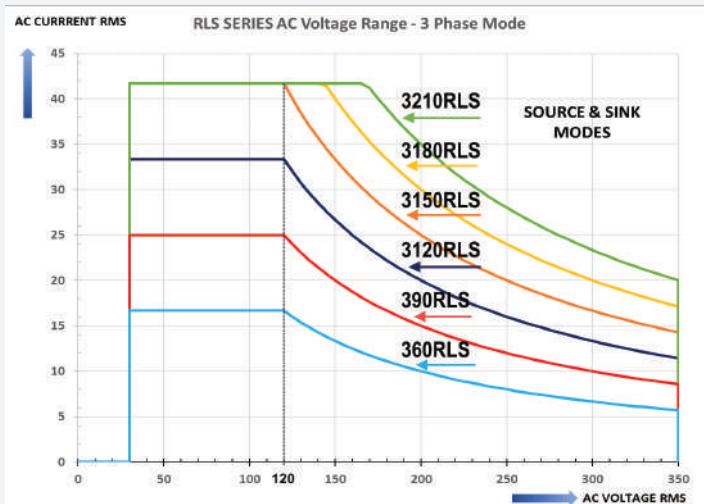
- Energy Consumed = 10 kW * 10 hours = 100 kWh
- HVAC Energy (Assuming 1:1 ratio for simplicity) = 100 kWh
- Total Energy = 200 kWh

Regenerative Load:

- Energy Consumed = 10 kW * 10 hours = 100 kWh
- Energy Recycled (Assuming 90% efficiency) = 90 kWh
- Net Energy Consumed = 10 kWh
- HVAC Energy (Minimal due to low heat output) ≈ 1 kWh
- Total Energy = 11 kWh

Wide Input Voltage Range

The RLS Series uses a single, constant power voltage input range for both higher current at lower voltage and higher voltage at lower current load testing, eliminating the need to switch between multiple voltage ranges. This capability allows for testing a broad range of conditions and test requirements without interruption.

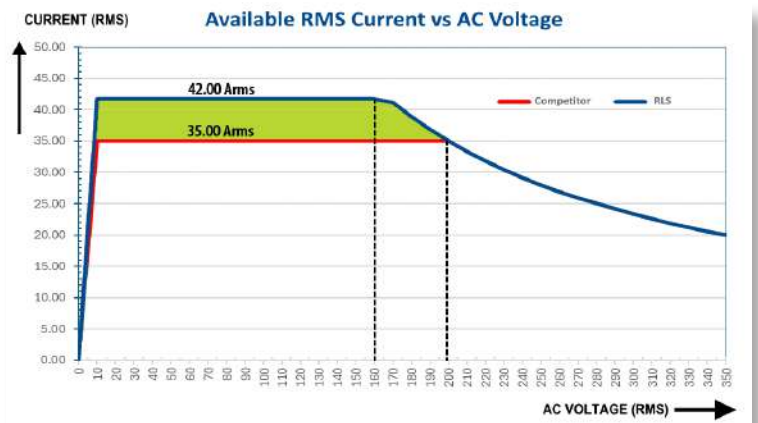


Supports More Current at Low Voltage

The RLS supports a broader range of load current from the UUT.

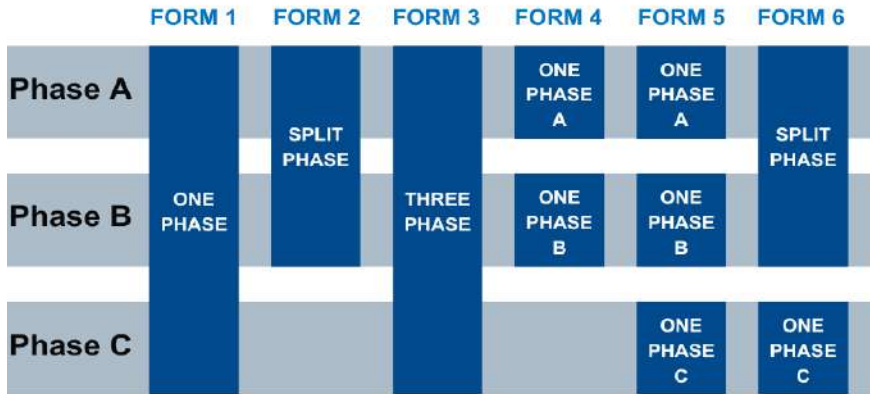
- Eliminate the risk of over or under sizing the load.
- Reduce the need for additional capital investment.

The RLS is capable of sinking 20% more current from 120V to 200V when compared to a typical unit that maxes out at 35A/phase as shown to the right.



Ultimate Flexibility with Six Input Configurations

Simultaneous AC & DC Operation on Individual Phases



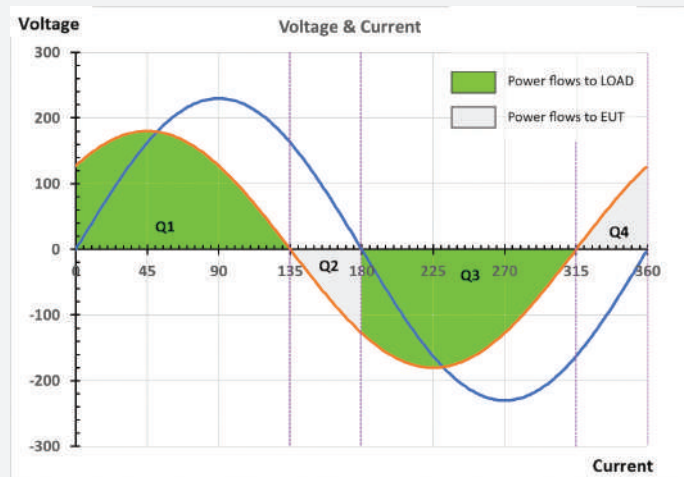
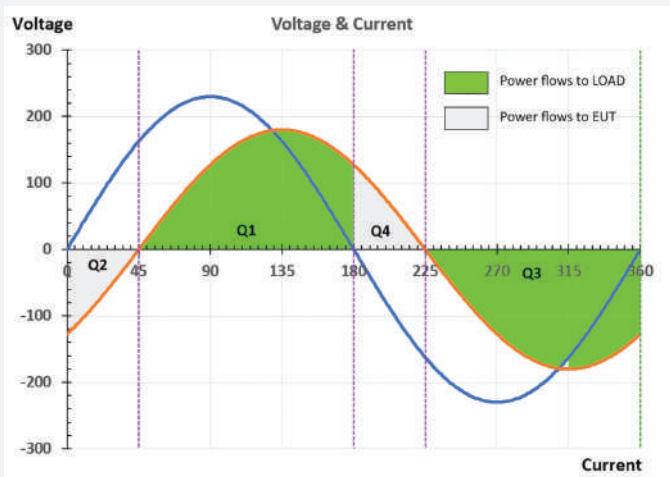
Automatic Switching of Operation Modes

Flexibly test a wide range of EUTs selecting from six different load input configurations.

- Unique input configuration modes allow different functions per phase: AC mode, DC mode or both.
- Forms 1 through 3 are typical for single, split or three-phase AC connections.
- The RLS Series has three isolated neutral connections, one for each phase/channel. This supports testing up to three independent sources.

Fully Test AC Power with 4-Quadrant Load

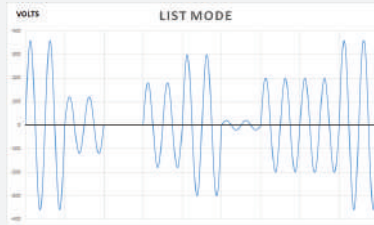
Simulate AC and DC loads for testing PV inverters, V2G, EV Chargers, EVSE, batteries, UPS, and AC/DC power supplies. Fully operate in all four quadrants using programmable phase shift in CC or CS modes. This allows simulation of inductive and capacitive loads to fully test AC power sources, as shown in the leading and lagging power factor examples.



Powerful Waveform & Measurement Tools

The RLS Series has a built-in waveform digitizer with scope function.

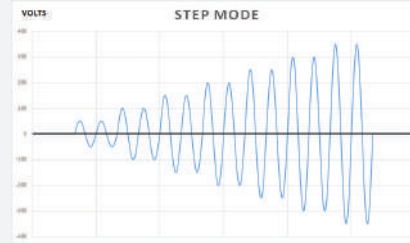
- Fast transient capabilities at **200µsec** time resolution
- LIST, PULSE and STEP Transients
- Waveforms: 10 Standard, Sine, Square, Triangle, Clipped
- Includes both Harmonics AND Interharmonics generation
- Capture advanced measurements and waveforms.



List Mode



Pulse Mode



Step Mode

Several AC/DC Load Operating Modes

Simulate AC/DC linear and non-linear loads (rectified), inductive and capacitive loads.

AC Modes:

- Constant Current,
- Constant Power &
- Apparent Power,
- Constant Resistance,
- Constant Voltage
- CC+CR
- CC / CS Rectifier Mode 1 ϕ & 3 ϕ

DC Modes:

- Constant Current
- Constant Power
- Constant Resistance
- Constant Voltage
- CR+CC

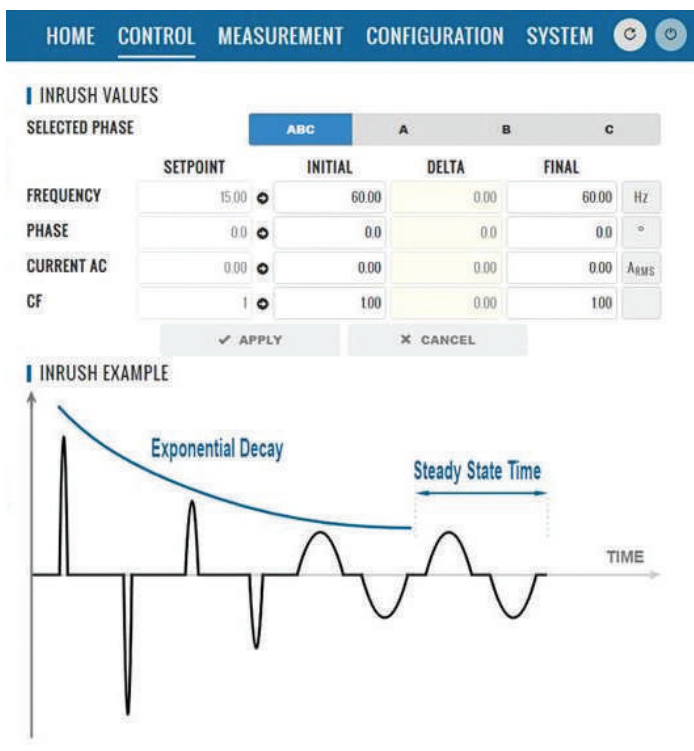
AC Load Modes			
	Constant Current (CC)		CR + CC
	Constant Power (CP)		CC / CS Rectifier 1 Phase
	Constant App Power (CS)		CC / CS Rectifier 3 Phase
	Constant Resistance (CR) RMS or Instantaneous Mode		
	Constant Voltage (CV)		

DC Load Modes	
	Constant Current (CC)
	Constant Power (CP)
	Constant Resistance (CR) RMS or Instantaneous Mode
	Constant Voltage (CV)
	CC + CC

User Friendly Control Options

Multiple integrated control options include:

- Intuitive Touch Screen LCD Display with Soft Key driven Menus
- SmartSource Suite Web Interface
- LAN, GPIB, RS232 & USB Interfaces, and ModBus (optional)
- Supports external touch screen monitor via Video Output Interface



Simplify Test Automation with SmartSource Suite Remote Control Platform

Easily monitor, control, and manage testing with the RLS's SmartSource Suite remote control platform. Use the embedded, web browser interface with real-time control. Access control panels and test sequences on-premises or on any mobile device (laptop, phone, tablet) via secure client access.

- Full control and measurement capability
- Program settings and measurement read back including digital scope and harmonics data
- Extensive safety protection settings
- Advanced load function control screens such as Inrush Current programming shown here
- Waveform selection, preview and edit modes
- Execution of user's custom test sequences
- Transient data entry and execution screen using a spreadsheet layout

Built-in Galvanic Isolation Reduces Safety Risks

The RLS provides both facility-to-input isolation, and phase to phase or channel to channel isolation. Galvanic isolation provides complete separation between the facility power input and the load's inputs so there is no electron flow between channels.

- Channel to channel isolation provides flexibility to use each phase as its own independent power source with FULL frequency and voltage control.
- Fully isolated design reduces safety risks for the operator and prevents unexpected UUT damage by preventing unwanted current or ground loops. This built-in capability doesn't require a transformer which saves significant costs and space.

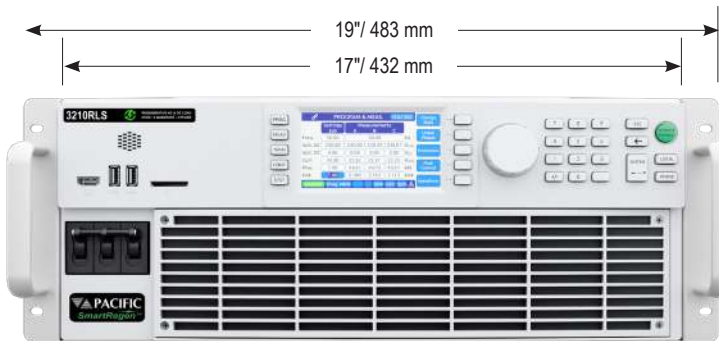
Modular Power up to 189kW / 378A per Cabinet

The RLS Series provides modular and scalable power to meet changing test requirements. Easily parallel multiple chassis to reach **up to 189kW with 378Amps per cabinet**. Cabinets can be paralleled up to 252kW.

- The ease of reconfiguration allows for flexible test set ups and reduces down-time for repairs or maintenance.
- Shallow depth allows units to fit into typical 31.5-inch / 800.1mm depth cabinets with ample room for air-flow and wiring.
- Right-sized; Scale power later as test requirements change



RLS Dimensions & Accessories

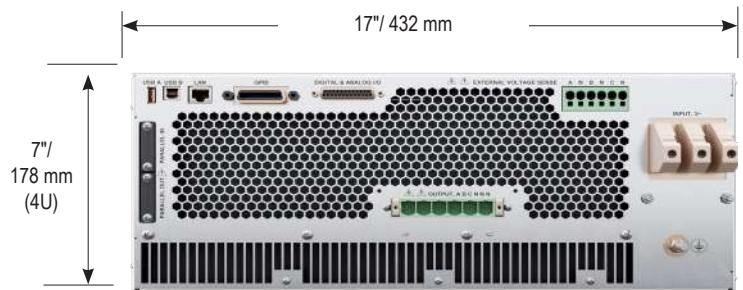


The RLS is designed for bench top or 19" equipment rack operation. Product is shown with included rack mount handles.

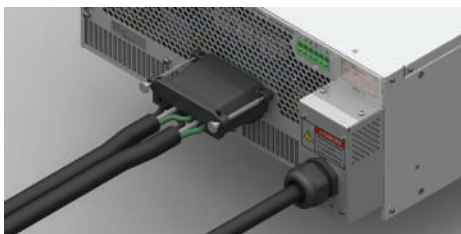
Depth of chassis is only 25.0 inch / 635mm.

Note: Units can be zero-stacked in 19" EIA cabinet when using optional rack-slides. When using L-brackets, allow 1U space between units.

The RLS Rear Panel provides connections for AC Grid Input, AC or DC Load Input, External Sense, Aux I/O and remote control interfaces.



Safety Cover & Strain Relief Kit Option



This optional kit includes covers for AC Grid input and AC & DC Input connections. Both covers include wire strain relief to prevent accidental release of input or output wiring.

Note: AC Grid input and AC or DC load wiring is NOT included.

Technical Specifications

MODEL:	360RLS-4U	390RLS-4U	3120RLS-4U	3150RLS-4U	3180RLS-4U	3210RLS-4U
Modes of Operation						
Constant Current, Constant Power & Apparent Power, Constant Resistance, Constant Voltage, CC+CR, CC / CS Rectifier Mode						
AC or DC Input Power						
Phase Modes (Form)	1, 2 or 3	1, 2 or 3	1, 2 or 3	1, 2 or 3	1, 2 or 3	1, 2 or 3
Maximum Power ¹ (Total)	6 kW/kVA	9 kW/kVA	12 kW/kVA	15 kW/kVA	18 kW/kVA ¹	21 kW/kVA ¹
Per Phase / Channel	2 kW/kVA	3 kW/kVA	4 kW/kVA	5 kW/kVA	6 kW/kVA	7 kW/kVA
Load Input Voltage						
Input Range	AC Range: 30 - 350 V _{LN} / 50 - 606 V _{LL} RMS (Sync Mode) DC Range: 0 - ±500 V _{DC}					
Resolution	0.01			Accuracy:		± 0.25% F.S
Line Regulation	< 0.1% for 10% Line Change					
Current Regulation	± 0.02% (CSC Mode)					
Phase Angle - Range (B, C)	0 - 359.9°				Resolution:	0.1°
Maximum Current						
3 & 2 Phase modes AC / DC	17.0 ARMS/ 17.0 ADC	25.0 ARMS/ 21.0 ADC	34.0 ARMS/ 21.0 ADC	42.0 ARMS/ 21.0 ADC	42.0 ARMS/ 21.0 ADC	42.0 ARMS/ 21.0 ADC
1 Phase mode AC / DC	51.0 ARMS/ 51.0 ADC	75.0 ARMS/ 63.0 ADC	100.0 ARMS/ 63.0 ADC	126.0 ARMS/ 63.0 ADC	126.0 ARMS/ 63.0 ADC	126.0 ARMS/ 63.0 ADC
Current Crest Factor (AC)	6.2 : 1	4.2 : 1	3.0 : 1	2.5 : 1	2.5 : 1	2.5 : 1
Load Input Frequency						
Range	15.00 – 1200Hz					
Mains Input						
Input Voltage Range / Freq	380Vac – 480Vac ± 10%, 4 Wire, L1, L2, L3 and PE / 47 - 63 Hz					
Nom. Phase Current @ 400Vac / 480Vac	10ARMS/8ARMS	14ARMS/12ARMS	19ARMS/16ARMS	24ARMS/20ARMS	29ARMS/24ARMS	34ARMS/28ARMS
Input Power Factor	0.99				Efficiency:	> 0.90
Measurements						
Vrms Range / Accuracy	0 – 350 V _{LN} / 0-606 V _{LL} / ± 0.25% F.S.					
Irms Range ² / Accuracy	17.0 A / ± 0.5% F.S.	25.0 A / ± 0.5% F.S.	34.0 A / ± 0.5% F.S.	42.0 A / ± 0.5% F.S.	42.0 A / ± 0.5% F.S.	42.0 A / ± 0.5% F.S.
Power Range ² / Accuracy	2 kW / ± 1.5 % F.S.	3 kW / ± 1.5 % F.S.	4 kW / ± 1.5 % F.S.	5 kW / ± 1.5 % F.S.	6 kW / ± 1.5 % F.S.	7 kW / ± 1.5 % F.S.
Scope Function	Sample Rate: 54932.47 Hz / Window: 1024 Samples / Bandwidth: 1200 Hz					
Transient Functions						
Programming	200 Steps / 400 Segments, LIST, PULSE & STEP Modes, Current AC, Current DC, Waveform, Ramp Time, Dwell Time. Time range: 0.1 - 10000000.0 ms, Time resolution 0.2 ms					
Execution	Run from step # to step #, Run, Step, Restart, Stop			Storage:	Non-volatile, 100 Programs + Transients	
PARAMETERS / FUNCTIONS SPECIFICATIONS						
Remote Control Interfaces						
USB Type B, LAN (LXI), GPIB / IEEE488, RS232, all on rear panel						
External USB WIFI adapter / ModBus TCP / CAN/CAN-FD						
Analog & Digital I/O						
Analog Inputs (4) / Outputs (4)	Analog Inputs: Current phs A,B,C			Analog Outputs: Vmeas A, B, C, Pmeas all Phases		
Digital Inputs (6) / Outputs(6)	Remote Inhibit, Trans. Trig., Phase Sync, User			Output Relay, Transient, Function Strobe, Sync		
Environmental						
Cooling	Variable speed fan, front intake, rear exhaust			Energy Modes:	Standby & Sleep	
Temperature	Operating:	0 to 40 °C / 32 to 104 °F		Storage:	-20 to 70 °C / -4 to 158 °F	
Humidity	< 80%, non-condensing			Altitude:	2000 m / 6500 feet	
System Features						
USB Ports	2 on Front Panel, 1 on Rear Panel, All Type A			SD Card:	32 GB max. Capacity	
Video Output Port	Monitor Out, Front Panel					
Dimensions & Weights						
Chassis Size H x W x D	7.0" x 17.0" x 25.0" / 178 x 432 x 635 mm			Shipping: 20" x 27" x 38" / 508 x 686 x 965 mm		
Weight Single 4U Height Unit	Net:	111.2 lbs. / 50.4 kg		Shipping: 151 lbs / 68.5 kg		
Regulatory Compliance						
Safety	IEC 61010-1:2010 (Edition 3)					
EMC - Emissions / Immunity	EN 55011:2009+A1:2010 / EN 61000-4-2, -4-3, -4-4, -4-5, -4-6, -4-8 and EN 61000-4 -11					
Product Category	EN 61326-1:2013 (Measurement, Laboratory and Control Equipment)					
Agency Approvals	CE Mark, NRTL Nemko US/Canada			RoHS (2011/65/EU):	EN50581:2012	

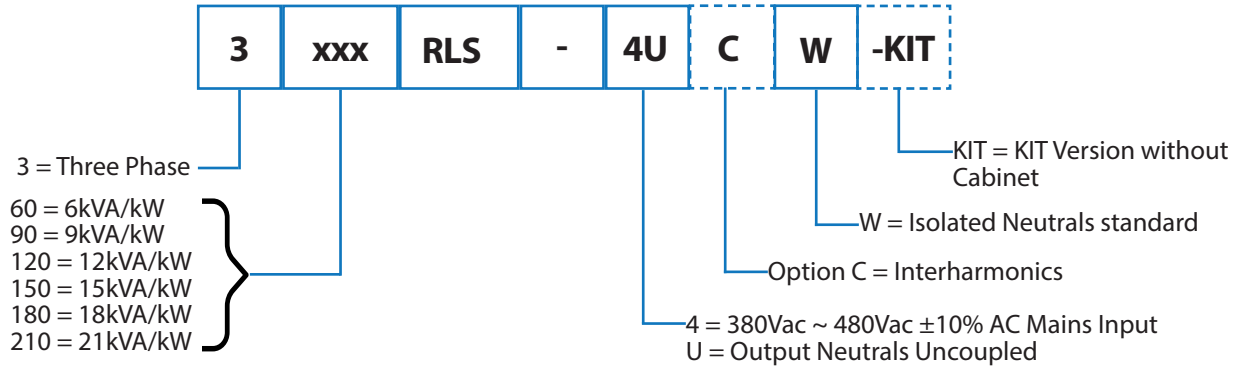
Note 1: Maximum Power rating is reduced below 40Hz on 3180RLS and 3210RLS models

Note 2: Measurement range is times three in single phase mode.

Ordering Information

RLS Series Model Number Encoder:

Note: Solid outlined fields must be specified. Dashed outlined fields are optional.



NOTE: 4U indicates that the shorting bar for output neutrals will be installed on the units by default. If Option W is selected, the units will be shipped with shorting bar for neutrals removed and provided in the ship kit instead.

Parallel load Kits:

These kits are available in power ratings of 24kW, 30kW, 36kW, 42kW and higher in increments of 21kW up to 252kW (12 chassis) max. For turnkey, integrated parallel load cabinet systems, contact factory.

Order Example

3210RLS-4W

- Bench Model, 21 kVA, 3-Phase, Regenerative Electronic Load, USB, RS232, LAN, GPIB & AUX I/O, Isolated Neutrals

Typical Delivery Items

- Electronic Load
- Rack Mount Handles
- Certificate of Compliance

Available Accessories

- Input shorting adapter for single phase input mode use. P/N 160086 (not for W)
- Paralleling Cable, 1 Ft. (Included with Aux NC models). P/N 778036
- Rack slides. P/N 703251

Auxiliary Models (No controller) Order Example: 3210RLS-4UNC

Service & Support

NORTH AMERICA

Pacific Power Source, Inc.
Irvine, USA

Phone: +1(949) 251-1800

Fax: +1 (949) 756-0756

Email: sales@pacificpower.com

Web: www.pacificpower.com

EUROPE

Pacific Power Source
Europe GmbH.

Kappelrodeck, Germany

Phone: +49 7842 99722-20

Fax: +49 7842 99722-29

Email: info@pacificpower.eu

UNITED KINGDOM

Caltest Instruments Ltd.
Petersfield, UK

Phone: +44 (0) 1483 302 700

Email: sales@caltest.co.uk

CHINA

PPST Shanghai Co. Ltd.
Shanghai, China

Phone: +86-21-6763-9223

Fax: +86-21-5763-8240

Email: info@ppst.com.cn

2802 Kelvin Avenue, Suite 100
Irvine, CA 92614 -5897 USA
Phone: +1 949.251.1800
Toll Free: 800.854.2433
E-mail: sales@pacificpower.com
Web: www.pacificpower.com