RIGOL

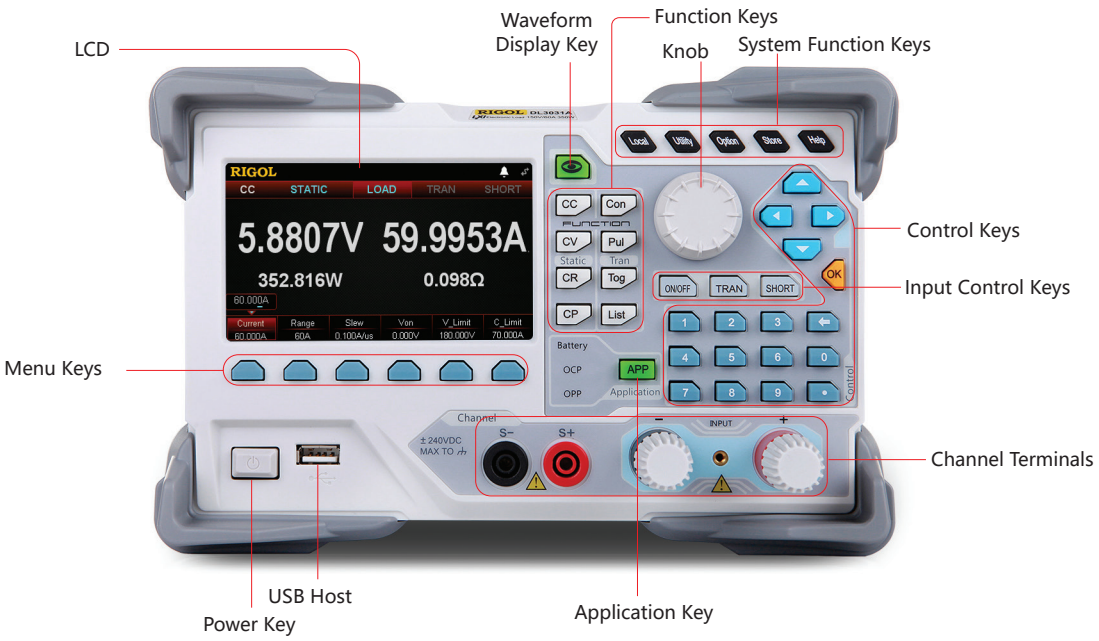
DL3000 Series

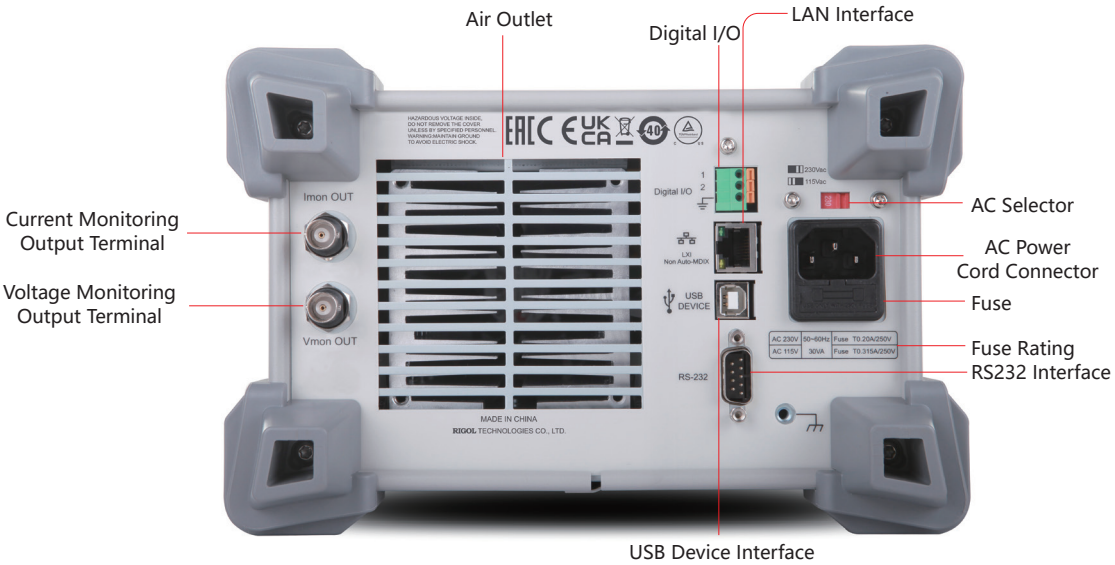
Programmable DC Electronic Load

- DL3021/DL3021A: single channel, DC150 V/40 A, total power up to 200 W
- DL3031/DL3031A: single channel, DC150 V/60 A, total power up to 350 W
- DL3041: single channel, DC 200 V/70 A, total power up to 450 W
- Dynamic mode: up to 30 kHz
- Adjustable current rising speed: 0.001 A/μs to 5 A/μs
- Min. readback resolution: 0.1 mV，0.1 mA
- 4.3-inch TFT LCD, capable of displaying multiple parameters and states simultaneously
- Overvoltage/overcurrent/overpower/overtemperature/reverse voltage protection
- 4 static modes: CC, CV, CR, CP
- 3 dynamic modes: continuous, pulsed, toggled
- List function supports editing as many as 512 steps
- Battery test function, OCP test, OPP test, factory test function, etc.
- Short-circuit test function
- Power-off memory function
- Built-in RS232/USB/LAN communication interface
- USB-GPIB module (optional)

DL3000 is a cost-effective programmable DC electronic load with high performance. With a user-friendly interface and superb performance specifications, DL3000 series provides various interfaces for remote communication to meet your diversified test requirements. It can be widely used in various industries, such as automotive electronics, fuel cells, and etc.

▶ Design Features



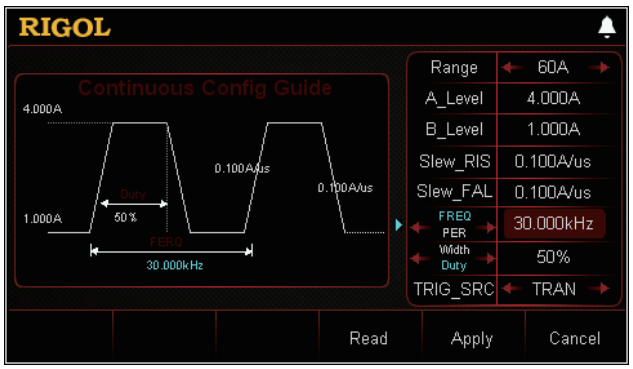


▶ Typical Applications

- General-purpose testing in the R&D lab
- DC power supply industry, such as regulated power supply, constant current power supply, switching mode power supply (SMPS), module power supply, power adapter, etc.
- Battery industry, such as various batteries and cell batteries
- Charger industry, such as battery charger and cell phone charger
- Power electronic device industry, such as MOSFET, IGBT, capacitor, and ballast resistor
- Teaching experiment

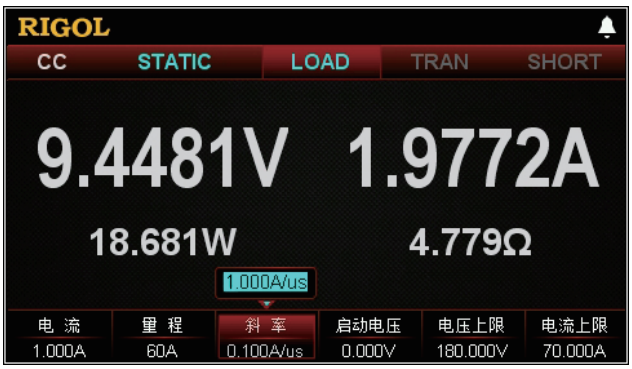
Design Features

30 kHz dynamic mode



Transient test function enables the load to periodically switch between two set levels (Level A and Level B). It can be used to test the transient characteristics of the DUT. The highest frequency can be set to 30 kHz. Besides, in the guide interface, you can configure parameters in the parameter configuration list and view the configuration diagram at the left of the configuration list in the real-time manner.

5 A/μs current rising speed

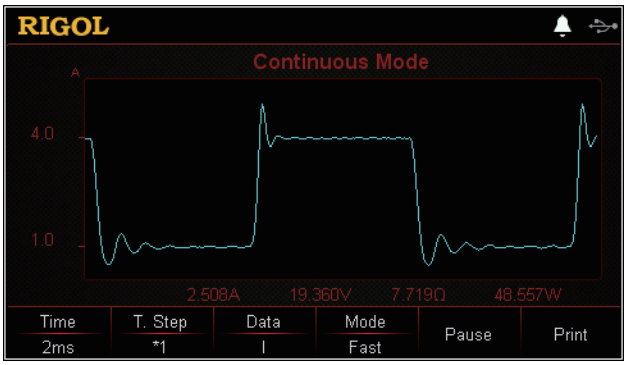


Current rising speed is defined as the speed of transition from one setting to another. You can set the actual transition time from one setting to another by changing the current rising speed. Adjustable current rising speed: 0.001 A/μs to 5 A/μs.

Powerful list operation function

You can generate complex sequences by editing the setting value for each step, the dwell time, and slew rate (the slew rate can only be edited in CC mode) to meet the complex test demands.

Powerful waveform display function



The electronic load provides the waveform display function and supports the following operations for the waveform, such as pausing the waveform, recording the waveform, and capturing the waveform. Therefore, you can dynamically observe the trend of parameters changes.

Easy-to-use function of file storage and recalling

The load allows you to save different types of files to the internal and external memories. You can recall and read them when necessary.

Sound OVP/OCP/OPP/OTP/Reverse Voltage Protection

When OVP/OCP/OPP/OTP/reverse voltage protection occurs, the load will immediately turn off the input automatically and stop sinking. Then, a prompt message is displayed.

▶ Specifications

Unless otherwise noted, all specifications are guaranteed within the temperature range of 25°C±5°C with warm-up time of 30 minutes.

DC Input (0℃ ~40℃)

Model	Voltage	Current	Maximum Power	Minimum Operating Voltage (DC)
DL3021	0~150 V	0~40 A	200 W	1 V@40 A
DL3021A				
DL3031	0~150 V	0~60 A	350 W	1.3 V@60 A
DL3031A				
DL3041	0 ~ 200 V	0 ~ 70 A	450 W	1.5 V@70 A

CC Mode

Model	Range	Programmable Resolution	Programmable Accuracy[1]	Temperature Coefficient[2]
DL3021	0~4 A	1 mA	0.1%+0.004A	100 ppm/°C
	0~40 A		0.1%+0.04A	
DL3021A	0~4 A	1 mA	0.05%+0.002A	
	0~40 A		0.05%+0.02A	
DL3031	0~6 A	1 mA	0.1%+0.006A	100 ppm/°C
	0~60 A		0.1%+0.06A	
DL3031A	0~6 A	1 mA	0.05%+0.003A	
	0~60 A		0.05%+0.03A	
DL3041	0~7 A	1 mA	0.05%+0.0035A	100 ppm/°C
	0~70 A		0.05%+0.035A	

CV Mode[3]

Model	Range	Programmable Resolution	Programmable Accuracy	Temperature Coefficient[2]
DL3021	0~15 V	1 mV	0.05%+0.003V	50 ppm/°C
	0~150 V	5 mV	0.05%+0.0375V	
DL3021A	0~15 V	1 mV	0.05%+0.003V	
	0~150 V	5 mV	0.05%+0.0375V	
DL3031	0~15 V	1 mV	0.05%+0.003V	50 ppm/°C
	0~150 V	5 mV	0.05%+0.0375V	
DL3031A	0~15 V	1 mV	0.05%+0.003V	
	0~150 V	5 mV	0.05%+0.0375V	
DL3041	0~25 V	1 mV	0.05%+0.00625V	50 ppm/°C
	0~200 V	5 mV	0.05%+0.05V	

CR Mode[4]

Model	Range[5]	Programmable Resolution	Programmable Accuracy[6]
DL3021	0.08 Ω~15 Ω (0.0667 S~12.5 S)	2 mA/Vsense	Vin/Rset*(0.2%)+0.2%IFS
DL3021A	2 Ω~15 kΩ (0.0000667 S~0.5 S)		
DL3031	0.08 Ω~15 Ω (0.0667 S~12.5 S)	2 mA/Vsense	Vin/Rset*(0.2%)+0.2%IFS
DL3031A	2 Ω~15 kΩ (0.0000667 S~0.5 S)		
DL3041	0.08 Ω~15 Ω (0.0667 S~12.5 S) 2 Ω~15 kΩ (0.0000667 S~0.5 S)	2 mA/Vsense	Vin/Rset*(0.2%)+0.2%IFS

CP Mode[4]

Model	Range	Resolution
DL3021	0~200 W	100 mW
DL3021A		
DL3031	0~350 W	100 mW
DL3031A		
DL3041	0 ~ 450 W	100 mW

Con Mode

Model	Frequency Range	Frequency Resolution	Frequency Accuracy	Duty Cycle Range
DL3021	0.001 Hz~15 kHz	0.8%	±0.5%	5%~95%，1%
DL3021A	0.001 Hz~30 kHz			
DL3031	0.001 Hz~15 kHz			
DL3031A	0.001 Hz~30 kHz			
DL3041	0.001 Hz~30 kHz			

Current Slew Rate[7]			
Model	Range	Resolution	Accuracy
DL3021	0.001 A/μs~1 A/μs	0.001 A/μs	5%+10 μs
DL3021A	0.001 A/μs~1 A/μs		
DL3031	0.001 A/μs~1 A/μs	0.001 A/μs	5%+10 μs
DL3031A	0.001 A/μs~1 A/μs		
DL3041	0.001 A/μs~5 A/μs	0.001 A/μs	5%+10 μs

Readback Current				
Model	Range	Resolution	Accuracy	Temperature Coefficient[2]
DL3021	0 ~ 40 A	1 mA	±(0.1%+0.1%FS)	50 ppm/°C
DL3021A		0.1 mA	±(0.05%+0.05%FS)	
DL3031	0 ~ 60 A	1 mA	±(0.1%+0.1%FS)	50 ppm/°C
DL3031A		0.1 mA	±(0.05%+0.05%FS)	
DL3041	0 ~ 70 A	0.1 mA	±(0.05%+0.05%FS)	50 ppm/°C

Readback Voltage				
Model	Range	Resolution	Accuracy	Temperature Coefficient[2]
DL3021	0~150 V	0.1 mV	±(0.05%+0.02%FS)	20 ppm/°C
DL3021A				
DL3031	0~150 V	0.1 mV	±(0.05%+0.02%FS)	20 ppm/°C
DL3031A				
DL3041	0 ~ 200 V	0.1 mV	±(0.05%+0.02%FS)	20 ppm/°C

Readback Resistance		
Model	Range	Resolution
DL3021	0.08 Ω~15 kΩ (0.0000667 S~12.5 S)	2 mA/Vsense
DL3021A		
DL3031	0.08 Ω~15 kΩ (0.0000667 S~12.5 S)	2 mA/Vsense
DL3031A		
DL3041	0.08 Ω~15 kΩ (0.0000667 S ~12.5 S)	2 mA/Vsense

Readback Power		
Model	Range	Resolution
DL3021	0~200 W	100 mW
DL3021A		
DL3031	0~350 W	100 mW
DL3031A		
DL3041	0 ~ 450 W	100 mW

Protection Function
Overcurrent protection (OCP), overvoltage protection (OVP), overpower protection (OPP), overtemperature protection (OTP), as well as local/remote reverse voltage (LRV/RRV) protection.

Stability[8]		
Model	Current	Voltage
DL3021	±(0.01%+10 mA)	±(0.01%+10 mV)
DL3021A		
DL3031	±(0.01%+10 mA)	±(0.01%+10 mV)
DL3031A		
DL3041	±(0.01%+10 mA)	±(0.01%+10 mV)

Input Resistance
350 kΩ

Mechanical	
Dimensions	239 mm(W) x 157 mm(H) x 442 mm(D)
Weight	Net weight: DL3021/3021A/3031/3031A: 7.58 kg DL3041: 7.80 kg
Power	
AC Input (50 Hz~60 Hz)	115 Vac±10%, 230 Vac±10% (max: 250 Vac)
Maximum Input Power	<30 VA
Interface	
USB Device Interface	1
USB Host Interface	1
LAN Interface	1(optional)
RS232	1
Digital I/O	1(optional)
GPIB	1 ((optional, GPIB extended from the USB-GPIB interface module)
Environment	
Cooling Method	Fan Cooled
Operating Temperature	0°C~40°C
Storage Temperature	-40°C~70°C
Humidity	5%~80% RH (without condensation)
Altitude	Below 2,000 m
Certification Information	
EMC	Complies with the requirements of the following directive and standards. EMC Directive 2014/30/EU EN 61326-1 EN 61000-3-2 EN 61000-3-3
	Under following condition. The maximum length of all connecting cables and wires to the DL3000 series are less than 3 m.
Safety	Complies with the requirements of the following directive and standard. Low Voltage Directive 2014/35/EU EN 61010-1:2010 IP Degree: IP20 Pollution Degree: PD 2 Over Voltage Category: OVC II Operation Location: Indoor use only; not for wet condition

Note[1]: Data measured after 30-second current sinking at the programming value (applicable to the programming accuracy in CC mode and CV mode). The fixed value of programming accuracy is calculated based on FS (full scale).
Note[2]: Gain and zero temperature coefficient within the ranges of 0°C~20°C and 30°C~40°C. For example, at 40°C, the programming accuracy is ±[(0.1%+10°C*100 ppm/°C)*1A+(0.1%+10°C*100 ppm/°C)*4 A] under the following conditions: CC mode, 0-4A range, sink current 1 A.
Note[3]: The CV mode should be used with a CC source. When using “CV to CC” source, the current should be limited to 0.2 A; otherwise, the constant voltage and constant current switching may cause damage to the load.
Note[4]: The input voltage/current value should not be smaller than 10% of the full scale.
Note[5]: The input voltage for the low range in CR mode should be smaller than 8 V.
Note[6]: The programming accuracy in CR mode is also determined by the input voltage accuracy.
Note[7]: Current slew rate: rising slew rate for 10%~90% of the current (0-maximum current). Due to design changes, different voltage levels correspond to different maximum current slew rates: 9 V and above: 5 A/μs; 8 V: 4 A/μs; 7 V: 2.5 A/μs; 6 V: 1.25 A/μs; 5 V: 0.5 A/μs; 3 V: 0.2 A/μs.
Note[8]: Following a steady 30-minute current sinking, change in current/voltage sinking over 8 hours under constant load, line, and ambient temperature.

➤ Order Information

	Description	Order No.
Model	Programmable DC Electronic Load (single channel, DC 150 V/40 A 200 W 15 kHz 1.0 A/μs)	DL3021
	Programmable DC Electronic Load (single channel, DC 150 V/40 A 200 W 30 kHz 1.0 A/μs)	DL3021A
	Programmable DC Electronic Load (single channel, DC 150 V/60 A 350 W 15 kHz 1.0 A/μs)	DL3031
	Programmable DC Electronic Load (single channel, DC 150 V/60 A 350 W 30 kHz 1.0 A/μs)	DL3031A
	Programmable DC Electronic Load (single channel, DC 200 V/70 A 450 W 30 kHz 5.0 A/μs)	DL3041
Standard Accessories	Power Cord	-
	Either one of the following fuses: · Fuse 50T-0200H 250 V 0.20 A (AC selector: 230 Vac) · Fuse 50T-0315H 250 V 0.315 A (AC selector: 115 Vac)	-
	Shield	-
Software Options[1]	LAN Interface	LAN-DL3
	Digital I/O Option	DIGITALIO-DL3
	Readback Resolution	HIRES -DL3
	High Frequency Option	FREQ-DL3
Accessories	9-Pin RS232 Cable (female-to-female, cross-over)	CB-RS232-A
	Shield#DL3000#F	SC-DL3
	USB-GPIB Module	USB-GPIB-L
	Sense Cable	CB-SENSE
	20 A Test Lead	CB-20A-780MM
	40 A Test Lead	CB-40A-780MM
	60 A Test Lead	CB-60A-780MM
	80 A Test Lead	CB-80A-780MM
	DL3000 Series Rack Mount Kit (for a single instrument)	RM-1-DP800
	DL3000 Series Rack Mount Kit (for two instruments)	RM-2-DP800

Note[1]: The A-plus instrument models (DL3021A/DL3031A) and DL3041 have been installed with software options before leaving the factory.

Note:

- When the DUT outputs large currents, please use the specified test leads provided in the optional accessories.
- The color schemes for the interfaces of A-plus instrument models (DL3021A/DL3031A/DL3041) and those models without A (DL3021/DL3031) are different.
- For all the accessories and options, please contact the local office of **RIGOL**.

▶ Accessories Description

20 A/40 A/60 A/80 A Test Lead

Model	20 A Test Lead	40 A Test Lead	60 A Test Lead	80 A Test Lead
Maximum Current	20 A	40 A	60 A	80 A
Maximum Voltage	150 V	150 V	150 V	200 V
Terminal	M8/M8	M8/M8	M8/M8	M8/M8
Wire Gauge	AWG14	AWG14×2	AWG14×3	6 AWG
Length	780 mm	780 mm	780 mm	780 mm
Exterior Design				

Sense Cables

Enable the sense function. Then, use the sense cables to connect the sense terminals and the output terminals of the DUT to compensate for the voltage drop caused by the load leads.
Cable length: 780 mm

USB-GPIB Interface Converter

Use the USB-GPIB interface converter to extend the GPIB interface, and then use the GPIB cable to connect the load to the PC to build communication with the PC for remote control.

Shield

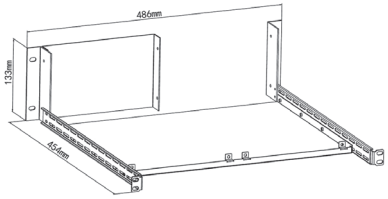
For safety considerations, a shield shall be installed.

9-Pin RS232 Cable

To realize remote control, use the 9-pin RS232 cable to build communication between the load and the PC via the RS232 interface on the rear panel of the load.

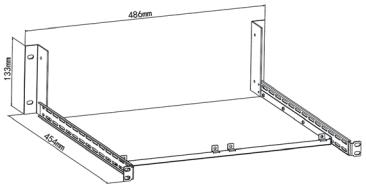
Rack Mount Kit for a single instrument

It is used for installing a single instrument.



Rack Mount Kit for two instruments

It is used for installing two instruments.



Warranty Period

Three years for the mainframe.

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HEADQUARTER

RIGOL TECHNOLOGIES CO., LTD.
No.8 Keling Road, New District,
Suzhou,JiangSu, P.R.China
Tel: +86-400620002
Email: info-cn@rigol.com

EUROPE

RIGOL TECHNOLOGIES EU GmbH
Friedrichshafener Str. 5
82205 Gilching
Germany
Tel: +49(0)8105-27292-21
Email: info-europe@rigol.com

NORTH AMERICA

RIGOL TECHNOLOGIES, USA INC.
10220 SW Nimbus Ave.
Suite K-7
Portland, OR 97223
Tel: +1-877-4-**RIGOL**-1
Email: sales@rigol.com

JAPAN

RIGOL JAPAN CO., LTD.
5F,3-45-6,Minamiotsuka, Toshima-Ku,
Tokyo,170-0005,Japan
Tel: +81-3-6262-8932
Fax: +81-3-6262-8933
Email: info.jp@rigol.com

KOREA

RIGOL KOREA CO,. LTD.
5F, 222, Gonghang-daero,
Gangseo-gu, Seoul, Republic of Korea
Tel: +82-2-6953-4466
Fax: +82-2-6953-4422
Email: info.kr@rigol.com

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Email: info.int@rigol.com

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