EL30000 Series
Bench DC electronic loads

Measure, capture and display

The EL30000 Series bench DC electronic loads provide superior performance in compact bench form factor. A single and dual-channel model is available with up to 600W – ideal for design verification of consumer power supplies, batteries, battery modules, solar panels, LED drivers, and power converters. You can easily characterize wide-bandgap semiconductor components such as MOSFET and IGBT.

- Keysight EL33133A[8] single-input DC electronic load: 150V, 40A, 250W
- Keysight EL34143A single-input DC electronic load: 150V, 60A, 350W
- Keysight EL34243A dual-input DC electronic load: 150V, 60A, 300W; total 600W

The EL30000 Series bench DC electronic loads are fully SCPI programmable with built-in USB, LAN, and optional GPIB interfaces. Advance features include scope view, data logging, sequencing, and more, enabling you to measure, capture and quickly display your results.

Measure voltage and current accurately

Each EL30000 Series bench DC electronic loads have a fully integrated voltmeter and ammeter to simultaneously measure the voltage and current for the device under test (DUT). Eliminating external shunt resistors and cables give you accurate voltage, current, and energy measurements.

To further reduce cabling error, the EL30000 Series bench DC electronic loads have remote sense technology to eliminate voltage drops caused by cables connecting to the DUT. All settings and measurements appear on a large 4.3-inch color display.

Capture measurements over time with the built-in data logger

The EL30000 Series bench DC electronic loads can continuously log voltage, current and energy to a data file. The sample rate is adjustable from 20 microseconds to 60 seconds. Store the data file on the internal non-volatile RAM or save externally on a USB memory device as a .CSV file.

Create, capture and display fast transients

Test the transient response of your power source with a dynamic load profile. The built-in scope feature digitizes the voltage and current and displays the results – just like an oscilloscope. The built-in scope function eliminates the need for external current shunts or current probes. This feature greatly reduces measurement set up complexity and provides accurate and fully specified measurements.

Features

Table 1. Choose a single or dual-input model

	EL33133A	EL34143A	EL34243A	
Channel	1	1	1	2
Input power	250 W	350 W	300 W	300 W
DC input voltage	150 V	150 V	150 V	150 V
DC input current	40 A	60 A	60 A	60 A
DC input current (parallel)	-	-	120 A	

Measures accurately

- integrated voltmeter and ammeter
- precise programming / readback accuracy
- built-in 2-wire and 4-wire remote sense technology

Captures, stores, and transfers dynamic waveforms

- data logger that is configurable
- log voltage, current and energy
- internal or external memory storage
- export to .CSV for post analysis

Displays like an oscilloscope for precise analysis

- performs precise transient analysis with a scope function
- digitizes voltage and current
- displays results on a 4.3-inch color LCD screen

Advanced characterization

- use operating modes: constant current (CC), constant voltage (CV), constant resistance (CR), constant power (CP)
- improve measurements with low current range
- dynamic load profiles with *List* (continuous, pulse, or toggle)
- adjust transient steps with programmable slew rate
- modern connectivity: LAN (LXI-core), USB and GPIB (optional)

Figure 1. EL33133A 250 W bench electronic load 150 V, 40 A

Figure 2. EL34143A 350 W bench electronic load 150 V, 60 A

Figure 3. EL34243A 600 W dual input bench electronic load 150 V, 60 A

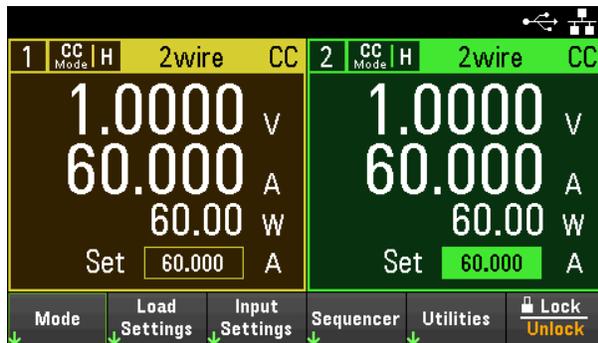# Measurements at a glance with large color display

Meter view – default

Figure 4. Default view on the EL34243A dual-input DC electronic load display both inputs

Meter view – single input

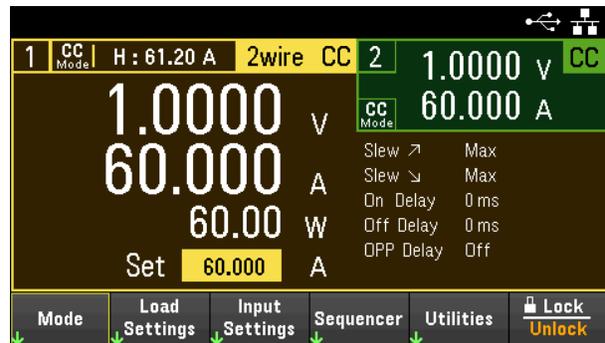
Figure 5. Display more details of the desired channel by selecting single view on the EL34243A dual-input DC electronic load

Scope view function
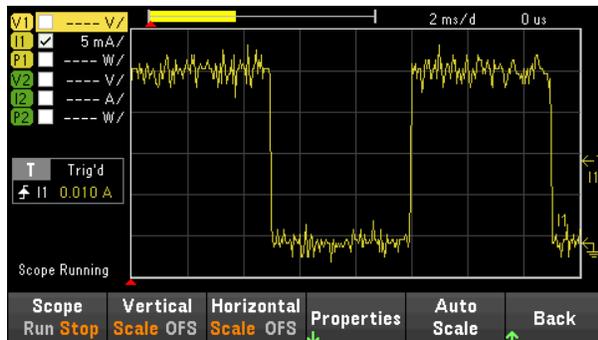

Figure 6. Capture voltage and current waveforms with a 200 kHz digitizer, up to 256k samples

Data logger function

Figure 7. Log data with sample interval 20 us to 60 s, for up to 10,000 hours or 5 MB of data
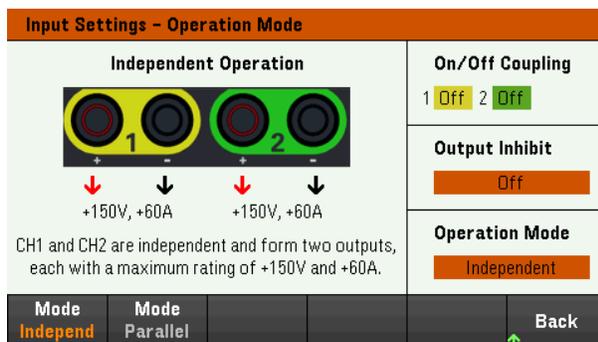
Input-independent mode

Figure 8. Two electronically isolated inputs allow independent operation like two individual units
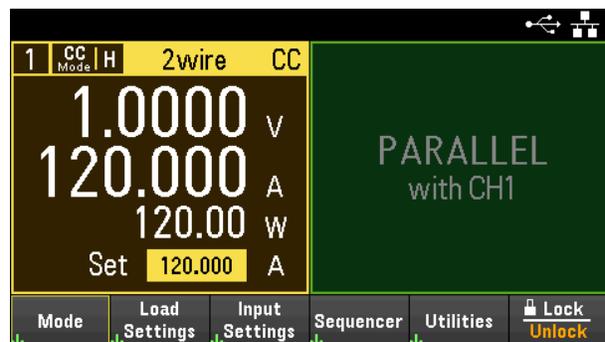
Input-parallel mode

Figure 9. Input-parallel mode enables higher current up to 120 A or power up to 600 W
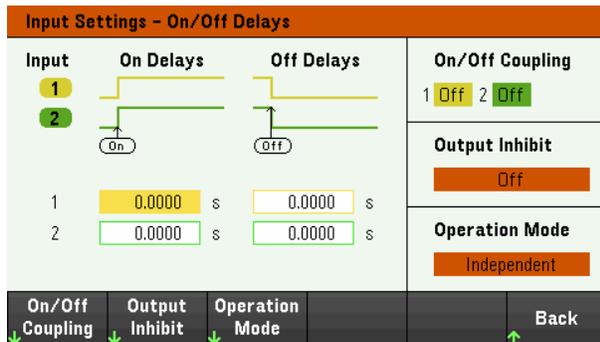
Input-coupling

Figure 10. Synchronize the turning on/off the inputs of the EL34243A dual-input DC electronic load

Programmable slew rate
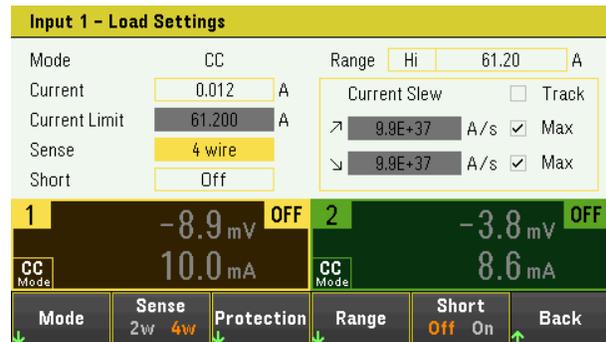
Figure 11. Programmable slew rate controls the rise and fall rate of both voltage and current

Transient *List*

Figure 12. A *List* generates a complex sequence of changes with rapid and precise timing input

Transient continuous
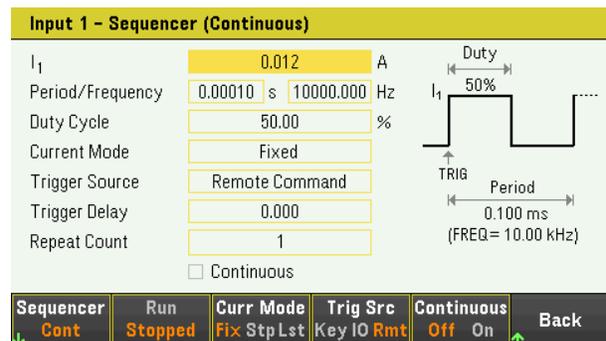
Figure 13. *Continuous mode* generates a repetitive pulse stream that toggles between two load levels

Transient pulse
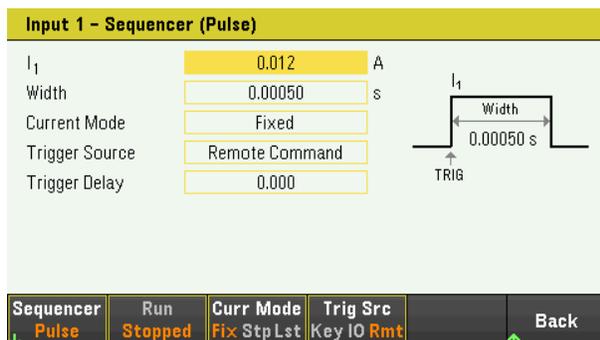
Figure 14. *Pulse mode* generates a load change that returns its original state over time

Transient toggle
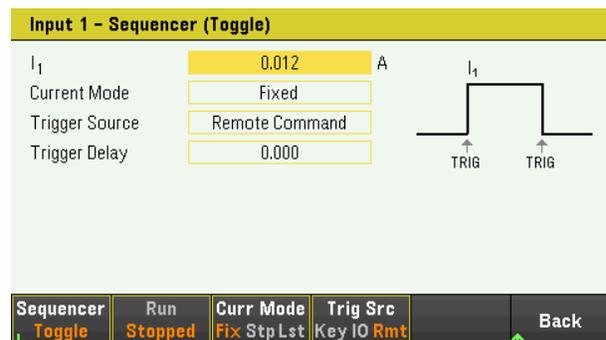
Figure 15. *Toggle mode* generates a pulse that toggles between two load levels with a controlled trigger signal

Operate remotely

Keysight's Pathwave BenchVue software for the PC or a soft front panel via a web interface allows uses to operate the electronic load remotely, execute test sequences, log data, and integrate with other test instruments.

Specifications

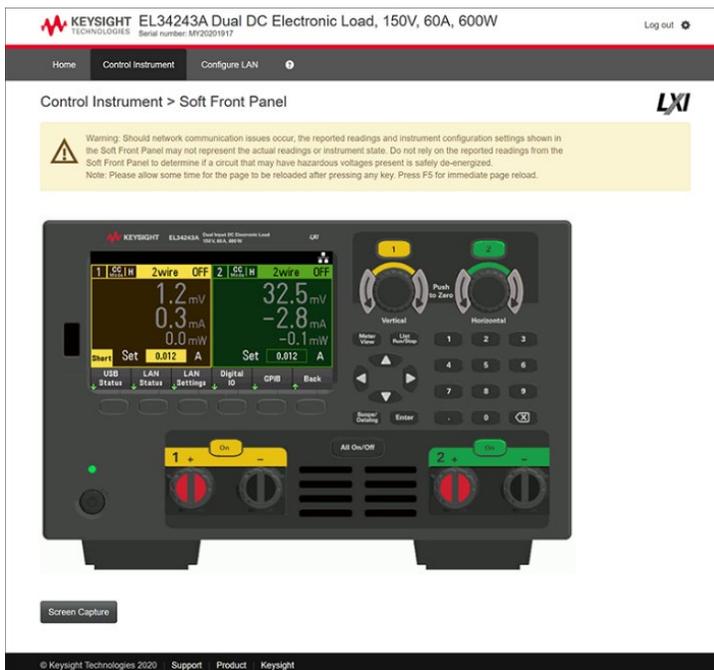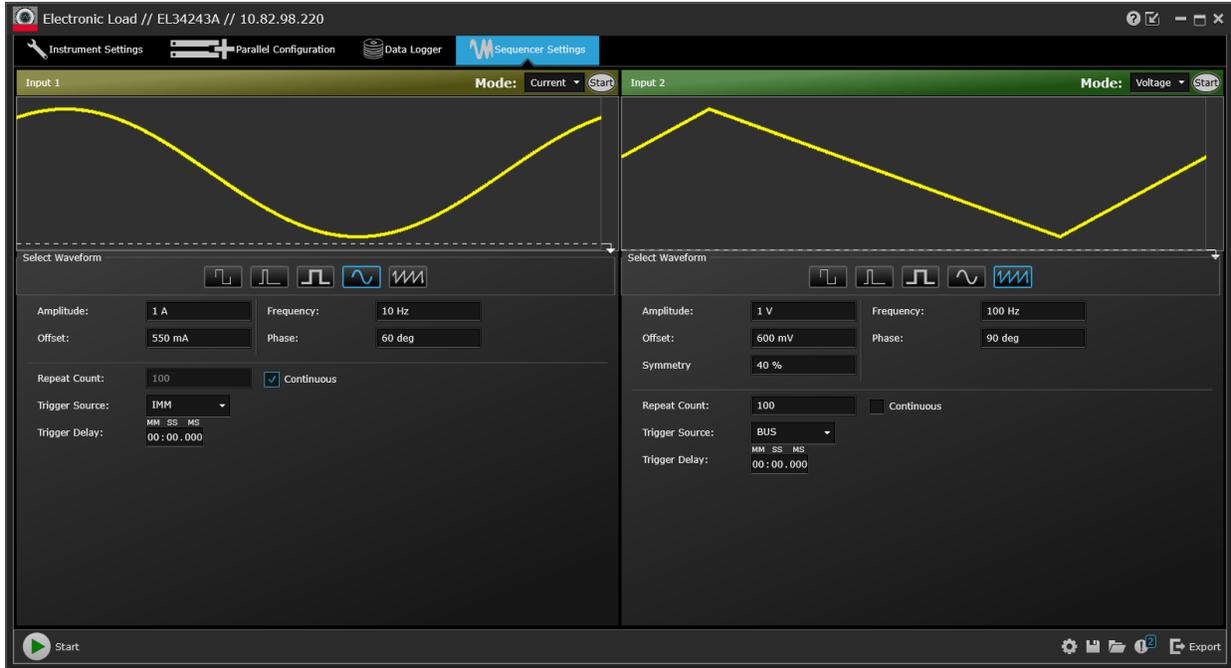| Performance Specifications (23°C ± 5°C)		EL33133A	EL34143A	EL34243A	
Maximum Input Power		250 W	350 W	300 W	300 W
Channel		1	1	1	2
Input Ratings (0 to 40ºC)		0 to 150 V	0 to 150 V	0 to 150 V	0 to 150 V
		0 to 40 A	0 to 60 A	0 to 60 A	0 to 60 A
Parallel Mode Current[1]		NA	NA	120 A	
Programming Accuracy ± (% of output + offset)					
Constant current mode[2]	Low	0.05% + 820 µA	0.04% + 130 µA		
	Medium	-	0.04% + 2 mA		
	High	0.05% + 7.2 mA	0.04% + 12 mA		
Constant voltage mode	Low, 15 V	0.03% + 4.2 mV	0.02% + 3 mV		
	High, 150 V	0.03% + 15 mV	0.02% + 15 mV		
Constant resistance mode[3]	Low, 0.08 / 0.05 Ω to 30 Ω	0.1% + 160 mS	0.1% + 230 mS		
	Medium, 10 Ω to 1.25 kΩ	0.1% + 16 mS	0.1% + 18 mS		
	High, 100 Ω to 4 kΩ	0.1% + 1.8 mS	0.1% + 3.5 mS		
	Ultra-high, 250 Ω to 100 kΩ	-	0.1% + 400 µS		
Constant power mode[4]	Low	0.08% + 18 mW	0.06% + 4 mW		
	Medium	0.08% + 150 mW	0.06% + 260 mW		
	High	0.08% + 1.5 W	0.06% + 1.6 W		
Readback Accuracy ± (% of output + offset)					
Current[2]	Low	0.05% + 820 µA	0.04% + 120 µA		
	Medium	-	0.04% + 1.8 mA		
	High	0.05% + 7.2 mA	0.04% + 9.6 mA		
Voltage	Low, 15 V	0.03% + 4.2 mV	0.02% + 3 mV		
	High, 150 V	0.03% + 15 mV	0.02% + 15 mV		
Power[4]	Low	0.08% + 18 mW	0.06% + 3 mW		
	Medium	0.08% + 150 mW	0.06% + 260 mW		
	High	0.08% + 1.2 W	0.06% + 1.5 W		

[1] Do not connect the dual inputs on EL34243A in series, parallel mode is only allowed for CC, CR and CP.
[2] Current ranges:
   EL33133A – Low = 4 A; High = 40 A
   EL34143A/EL34243A – Low = 0.6 A; Medium = 6 A; High = 60 A
[3] Does not apply to current setting <0.05% of full scale current, minimum voltage = 0.5V.
   Low range   – full scale current = 40 A / 60 A, maximum voltage = 15 V, maximum power = maximum input power;
                       EL33133A = 0.08 Ω to 30 Ω; EL34143A and EL34243A = 0.05 Ω to 30 Ω
   Medium range – full scale current = 40 A / 60 A, maximum voltage = 150 V, maximum power = maximum input power
   High range   – full scale current = 4 A / 6 A, maximum voltage = 150 V, maximum power = maximum input power
   Ultra-high range – full scale current = 0.6 A, maximum voltage = 150 V, maximum power = 10% of maximum input power
[4] Power ranges:
   EL33133A – Low = 0.02 W – 5 W; Medium = 0.15 W – 25 W; High = 1.5 W – 250 W
   EL34143A – Low = 0.02 W – 8 W; Medium = 0.3 W – 35 W; High = 2 W – 350 W
   EL34243A – Low = 0.02 W – 7 W; Medium = 0.3 W – 30 W; High = 2 W – 300 W

Typical Characteristics		EL33133A	EL34143A	EL34243A	
Channel		1	1	1	2
Input Characteristic[5]					

60A Range Min Operating Voltage vs Current — EL34143A & EL34243A Individual Channel / EL34243A Parallel 2 Channels

6A Range Min Operating Voltage vs Current — EL34143A & EL34243A Individual Channel / EL34243A Parallel 2 Channels

0.6A Range Min Operating Voltage vs Current — EL34143A & EL34243A Individual Channel / EL34243A Parallel 2 Channels

Typical Minimum Operating Voltage at Full Scale Current and for Full Dynamic			
Current[2]	Low	0.15 V	0.15 V
	Medium	-	0.15 V
	High	1.5 V	1.5 V
Programming Resolution			
Constant current mode[2]	Low	45 µA	7 µA
	Medium	-	70 µA
	High	450 µA	700 µA
Constant voltage mode	Low, 15 V	170 µV	170 µV
	High, 150 V	1.7 mV	1.7 mV
Constant resistance mode[3]	Low, 0.08 / 0.05 Ω to 30 Ω	450 µS	700 µS
	Medium, 10 Ω to 1.25 kΩ	450 µS	700 µS
	High, 100 Ω to 4 kΩ	45 µS	70 µS
	Ultra-high, 250 Ω to 100 kΩ	-	7 µS
Constant power mode[4]	Low	675 µW	105 µW
	Medium	6.75 mW	10.5 mW
	High	67.5 mW	105 mW
Readback Resolution			
Current[2]	Low	70 µA	15 µA
	Medium	-	100 µA
	High	700 µA	1 mA
Voltage	Low, 15 V	270 µV	270 µV
	High, 150 V	2.7 mV	2.7 mV

[5] For below the typical minimum operating voltage of 1.5 V at constant current high range and medium range, the current decreases linearly base on the rate of its minimum operating resistance 0.025 Ω.
For below the typical minimum operating voltage of 0.15 V at constant current low range, the current decreases linearly base on the rate of its minimum operating resistance 0.25 Ω.

Typical Characteristics		EL33133A	EL34143A	EL34243A	
Channel		1	1	1	2
Slew Rates[6]					
Constant current mode[2]	Low	200 kA/s	40 kA/s		
	Medium	-	400 kA/s		
	High	3.7 MA/s	4.8 MA/s		
Constant voltage mode	Low, 15 V	79 kV/s	79 kV/s		
	High, 150 V	310 kV/s	310 kV/s		
Minimum Programmable Operating Point					
Constant current mode[2]	Low	1 mA	200 µA		
	Medium	-	2 mA		
	High	10 mA	12 mA		
Constant voltage mode	Low, 15 V	5 mV	3 mV		
	High, 150 V	20 mV	15 mV		
Constant resistance mode[3]	Low, 0.08 / 0.05 Ω to 30 Ω	0.08 Ω	0.05 Ω		
	Medium, 10 Ω to 1.25 kΩ	10 Ω	10 Ω		
	High, 100 Ω to 4 kΩ	100 Ω	100 Ω		
	Ultra-high, 250 Ω to 100 kΩ	-	250 Ω		
Constant power mode[4]	Low	0.02 W	0.02 W		
	Medium	0.15 W	0.3 W		
	High	1.5 W	2 W		
Maximum Programmable Power Operating Point					
Constant power mode[4]	Low	5.1 W	8.16 W	7.14 W	
	Medium	25.5 W	35.7 W	30.6 W	
	High	255 W	357 W	306 W	
Programmable Short / Open					
Programmable short		37.5 mΩ (4 A / 40 A)	25 mΩ (6 A/ 60 A) / 250 mΩ (0.6 A)		
Input off impedance		824 kΩ	824 kΩ		
Ripple and Noise					
Current (rms)		3 mA	2 mA		
Voltage (rms)		5 mV			
Measurement Small Signal Bandwidth (-3 dB typical)					
Voltage / Current		30 kHz			
Measurement Small Signal Bandwidth (-1 dB typical)					
Voltage / Current		17.5 kHz			
Command Processing Time					
		< 10 ms			

[6] Typical maximum slew rate changes in current over time from 10% to 90% or 90% to 10%.

Typical Characteristics		EL33133A	EL34143A	EL34243A	
Channel		1	1	1	2
Temperature Coefficients - Programming / Readback					
Constant current mode[2]	Low	0.009%/°C + 16 µA/°C	0.008%/°C + 3 µA/°C		
	Medium	-	0.008%/°C + 30 µA/°C		
	High	0.008%/°C + 200 µA/°C	0.008%/°C + 300 µA/°C		
Constant voltage mode	Low, 15 V	0.006%/°C + 110 µV/°C	0.004%/°C + 100 µV/°C		
	High, 150 V	0.006%/°C + 600 µV/°C	0.004%/°C + 600 µV/°C		
Constant resistance mode[3 / 7]	Low, 0.08 / 0.05 Ω to 30 Ω	0.01%/°C + 3 mS/°C	0.01%/°C + 6 mS/°C		
	Medium, 10 Ω to 1.25 kΩ	0.01%/°C + 250 µS/°C	0.01%/°C + 320 µS/°C		
	High, 100 Ω to 4 kΩ	0.01%/°C + 25 µS/°C	0.01%/°C + 35 µS/°C		
	Ultra-high, 250 Ω to 100 kΩ	-	0.01%/°C + 6 µS/°C		
Constant power mode[4]	Low	0.015%/°C + 1 mW/°C	0.012%/°C + 1 mW/°C		
	Medium	0.015%/°C + 3 mW/°C	0.012%/°C + 5 mW/°C		
	High	0.015%/°C + 30 mW/°C	0.012%/°C + 40 mW/°C		
Protection					
Fixed OCP[2]	Low	4.35 A ± 25 mA	0.65 A ± 4 mA		
	Medium	-	6.5 A ± 40 mA		
	High	42 A ± 250 mA	63 A ± 0.2 A		
Programming OCP[2 / 7]	Low	0.2% + 50 mA	0.2% + 7 mA		
	Medium	-	0.2% + 70 mA		
	High	0.2% + 80 mA	0.2% + 100 mA		
OVP	Low, 15 V	16.5 V +/- 85 mV	16.5 V +/- 60 mV		
	High, 150 V	165 V +/- 600 mV	165 V +/- 350 mV		
OPP[4]	Low	5.5 W	8.8 W	7.7 W	
	Medium	27.5 W	38.5 W	33 W	
	High	275 W	385 W	330 W	
Protection Activation Time					
INH input		< 5 us			
Fault on coupled output		< 10 us			
Mainframe Oscilloscope Measurement Accuracy					
Constant current mode[2]	Low	0.04% + 3 mA	0.04% + 1 mA		
	Medium	-	0.04% + 4 mA		
	High	0.04% + 10 mA	0.04% + 15 mA		
Constant voltage mode	Low, 15 V	0.02% + 15 mV	0.02% + 15 mV		
	High, 150 V	0.02% + 40 mV	0.02% + 40 mV		

[7] CV mode only.

Environmental Conditions	
Operating environment	Indoor use, installation category II (for AC input), pollution degree 2
Operating temperature range	0 °C to 40 °C
Storage temperature	–40 to 70 °C
Relative humidity	Up to 85% RH at temperature up to 40 °C (non-condensing)
Altitude	Up to 2000 meters
Electromagnetic compatibility	Compliant with EMC Directive (2014/30/EU) IEC 61326-1:2012/EN 61326-1:2013 Group 1 Class A Canada: ICES-001:2004 Australia/New Zealand: AS/NZS South Korea KC mark
Safety	UL 61010-1 3rd edition, CAN/CSA-C22.2 No. 61010-1-12, IEC 61010-1:2010 3rd edition
Acoustic noise declaration	Sound pressure Lp <65 dB(A) at operator position, Lp <70 dB(A) at bystander position Sound power, Lw <70 dB(A)
AC input	100 VAC to 240 VAC (±10%), 50/60Hz

Interface Capabilities	
GPIB	SCPI-1999, IEEE 488.2 compliant interface
LXI compliance	Class C
USB 2.0	Requires Keysight IO Library version 17.2.208 and up
10/100 LAN	Requires Keysight IO Library version 17.2.208 and up

Digital Control Characteristics	
Maximum voltage ratings	+16.5 VDC/ -5 VDC between pins (pin 4 internally connected to chassis ground)
Pins 1 and 2 as fault output	Maximum low-level output voltage = 0.5 V @ 4 mA Maximum low-level sink current = 4 mA Typical high-level leakage current = 1 mA @ 16.5 VDC
Pins 1 - 3 as digital/trigger outputs (pin 4 = common)	Maximum low-level sink current = 100 mA Typical high-level leakage current = 0.8 mA @ 16.5 VDC
Pins 1 - 3 as digital/trigger inputs and pin 3 as inhibit input (pin 4 = common)	Maximum low-level input voltage = 0.8 V Maximum high-level input voltage = 2 V Typical low-level leakage current = 2 mA @ 0 V (internal 2.2k pull-up) Typical high-level leakage current = 0.12 mA @ 16.5 VDC

Remote Sense Capabilities

Inputs can maintain specifications with up to a 5-volt drop per load lead.
The load lead drop reduces the maximum available voltage at the load.

Weight and Dimensions

Model	EL33133A	EL34143A	EL34243A
Weight, kg	6.50	6.50	8.42
Overall dimension, mm (H x W x D)	144.85 x 215.90 x 457.60	144.85 x 215.90 x 476.01	
Net dimension (without feet, strap handle and GPIB module), mm (H x W x D)	132.51 x 212.80 x 457.60	132.51 x 212.80 x 458.48	

Ordering Information

Keysight EL30000 Series bench DC electronic loads

EL33133A[8]   Single-input DC electronic load: 150 V, 40 A, 250 W   **Buy Now**

EL34143A   Single-input DC electronic load: 150 V, 60 A, 350 W

EL34243A   Dual-input DC electronic load: 150 V, 60 A, 300 W; total 600 W

[8] The EL33133A is only available through Keysight's Buy Online store in the US and Canada

Standard Shipped Accessory

- AC power cord
- Connectors and quantity:

Description	EL33133A / EL34143A	EL34243A
10A, 3.5mm female 4-pin terminal I/O block connector	1	1
8A, 3.5mm 2-pin terminal sense block connector	1	2
85A, 12mm 2-pin input connector	1	2

Options

Option SEC   NISPOM and file security

Option UK6   Commercial calibration with test result data

Keysight GPIB module and rackmount kits

EL34GPBU   GPIB user-installable interface module (EL34143A & EL34243A Only)

1CM104A   Rack mount flange kit with two flange brackets

1CM105A   Rack mount flange kit without handles and two flange brackets

1CM116A   Rack mount flange kit with one flange bracket, one half-module bracket

1CN107A   Handle kit with two front handles

1CP108A   Rack mount flange and handle kit with two brackets and front handles

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