

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 EL33133A8 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



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

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



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

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

Measurements at a glance with large color display

Meter view – default

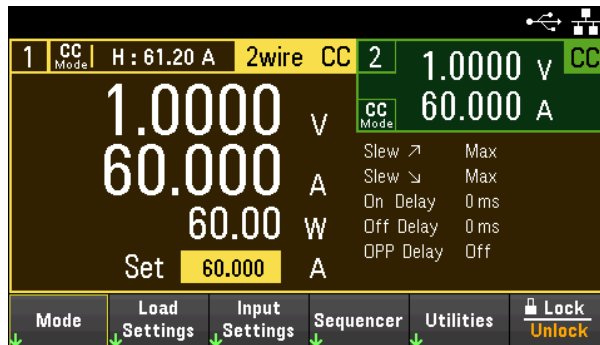


Figure 4. Default view on the EL34243A dual-input DC electronic load display both inputs

Meter view – single input

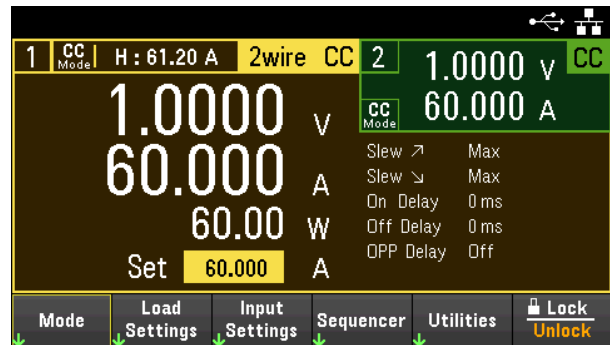


Figure 5. Display more details of the desired channel by selecting single view on the EL34243A dual-input DC electronic load

Scope view function

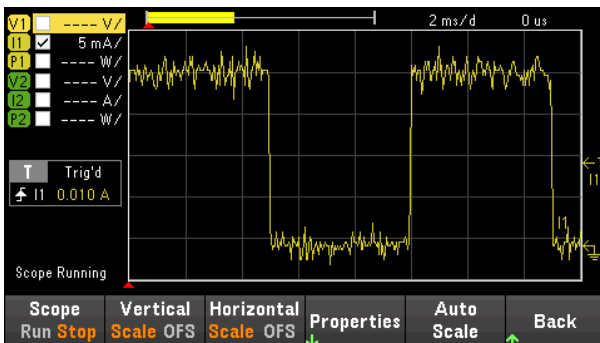


Figure 6. Capture voltage and current waveforms with a 200 kHz digitizer, up to 256k samples

Data logger function

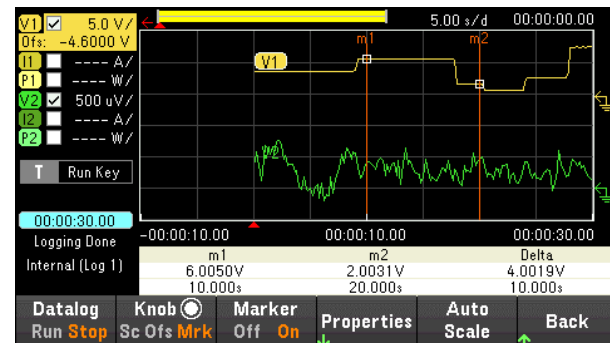


Figure 7. Log data with sample interval 20 μs to 60 s, for up to 10,000 hours or 5 MB of data

Input-independent mode

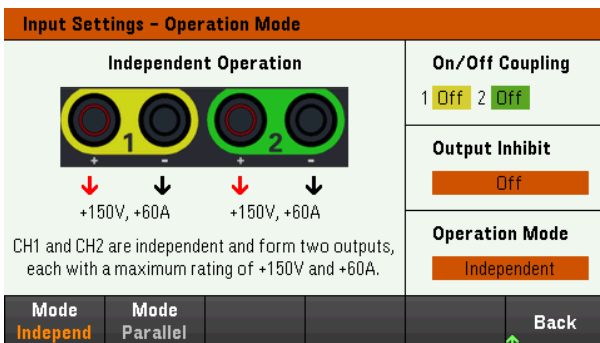


Figure 8. Two electronically isolated inputs allow independent operation like two individual units

Input-parallel mode

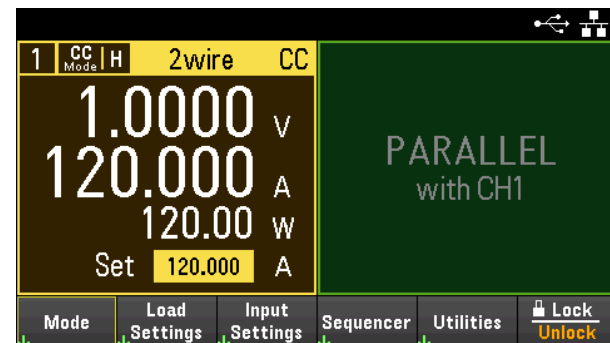


Figure 9. Input-parallel mode enables higher current up to 120 A or power up to 600 W

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

| Step | Current | Time | BOST | EOST |
|------|---------|-------|--------------------------|--------------------------|
| 0 | 0.500 | 1.000 | <input type="checkbox"/> | <input type="checkbox"/> |
| 1 | 1.000 | 1.000 | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 | 2.000 | 1.000 | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 | 3.000 | 1.000 | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 | 4.000 | 1.000 | <input type="checkbox"/> | <input type="checkbox"/> |

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

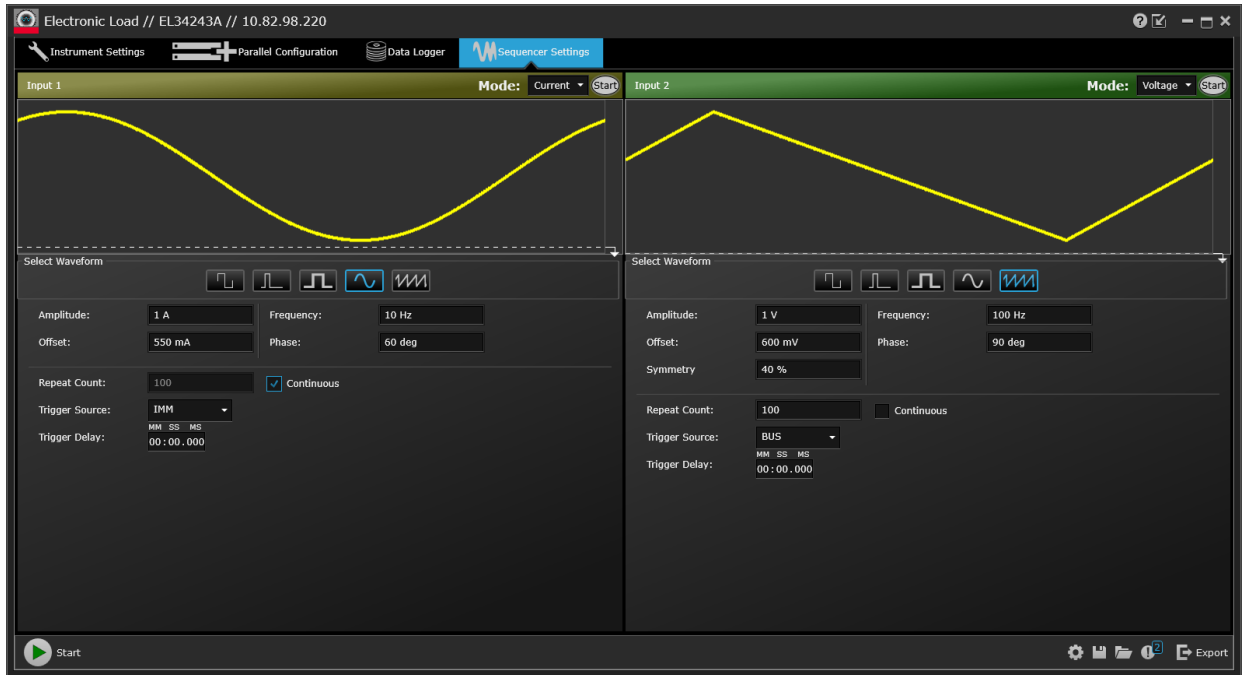
Figure 14. Pulse mode generates a load change that returns its original state over time

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 users 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 |
| Channel | | 1 | 1 | 2 |
| Input Ratings (0 to 40°C) | | 0 to 150 V | 0 to 150 V | 0 to 150 V |
| | | 0 to 40 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

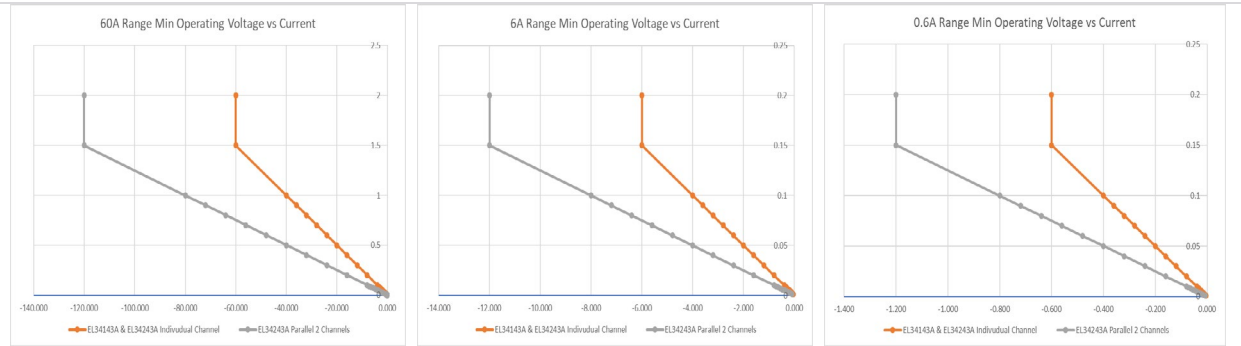
EL33133A

EL34143A

EL34243A

| | | | | |
|---------|---|---|---|---|
| Channel | 1 | 1 | 1 | 2 |
|---------|---|---|---|---|

Input Characteristic⁵



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 μ A | 7 μ A |
| | Medium | - | 70 μ A |
| | High | 450 μ A | 700 μ A |
| Constant voltage mode | Low, 15 V | 170 μ V | 170 μ V |
| | High, 150 V | 1.7 mV | 1.7 mV |
| Constant resistance mode ³ | Low, 0.08 / 0.05 Ω to 30 Ω | 450 μ S | 700 μ S |
| | Medium, 10 Ω to 1.25 k Ω | 450 μ S | 700 μ S |
| | High, 100 Ω to 4 k Ω | 45 μ S | 70 μ S |
| | Ultra-high, 250 Ω to 100 k Ω | - | 7 μ S |
| Constant power mode ⁴ | Low | 675 μ W | 105 μ W |
| | Medium | 6.75 mW | 10.5 mW |
| | High | 67.5 mW | 105 mW |

Readback Resolution

| | | | |
|----------------------|-------------|-------------|-------------|
| Current ² | Low | 70 μ A | 15 μ A |
| | Medium | - | 100 μ A |
| | High | 700 μ A | 1 mA |
| Voltage | Low, 15 V | 270 μ V | 270 μ V |
| | 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 Rates⁶ | | | | |
| 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 μ A |
| | 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 k Ω | 10 Ω | | 10 Ω |
| | High, 100 Ω to 4 k Ω | 100 Ω | | 100 Ω |
| | Ultra-high, 250 Ω to 100 k Ω | - | | 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 m Ω (4 A / 40 A) | | 25 m Ω (6 A / 60 A) / 250 m Ω (0.6 A) |
| Input off impedance | | 824 k Ω | | 824 k Ω |
| 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 | 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 |

| 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 | | | |
| GPIO | 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 GPIO 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

- EL33133A8 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
- Connector(s)

| Connectors and quantity | 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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