E36441A

Autoranging bench power supply

Power Your Next Insight

Keysight DC power supplies have changed how engineers prove their design and ensure product quality for over fifty years. The E36441A four-output autoranging bench power supply is ready for your next design. With accurate voltage / current measurement and device protection layers, you can test with confidence and power your next insight.



Get More for Less

Introducing our advanced 400 W four-channel DC power supply, engineered for precision and reliability. This solution delivers 400 W across four outputs, each providing 160 W at 32 V / 10 A. Enjoy precise control with accurate programming and readback. Experience stable performance, low ripple and noise, and a fast transient response. It supports both two-wire and four-wire remote sensing for accurate voltage delivery. The user-friendly interface features a seven-inch color display, front and rear terminals, color-coded channels, and individual adjustment knobs. Connectivity is seamless with Local Area Network (LAN) and Universal Serial Bus (USB) interfaces, and an emulator option ensures easy migration from the computer program with third-party power supplies.

Features

Clean and reliable power

- Four outputs – 160 W / 32 V / 10 A per channel, a total of 400 W
- Low output ripple and noise
- Accurate programming/readback capability
- Fast transient response, command processing, and up / down program speed
- two-wire or four-wire remote sense
- Over-voltage, over-current, and over-temperature protection

Intuitive and easy-to-use interface

- Seven-inch Liquid Crystal Display (LCD) color display
- Numerical keypad for precise output setting
- Color-coded channels
- Individual knobs for voltage and current

More productivity features

- Built-in data logger, output sequencing, LIST mode, output tracking, and adjustable voltage slew rate
- Front and rear output terminals
- LAN and USB connectivity
- PathWave BenchVue power supply application software

More Usable Power on a Bench

Four channels, 160 W | 32 V | 10 A per channel

The E36441A four-output power supply addresses a broad range of applications that simultaneously test multiple devices or test points. Each output supplies a maximum of 160 W of power, powering devices with up to 10 A or voltage up to 32 V. It saves space on the bench as you can power up multiple analog/digital circuitries or devices with a single instrument.

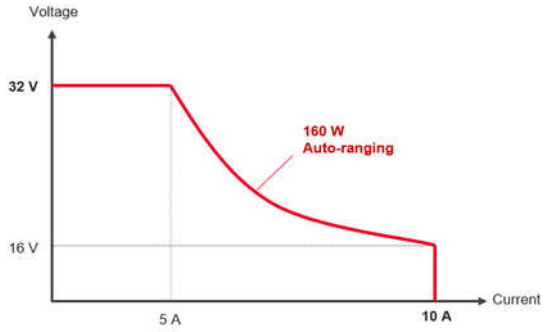


Figure 1. Autoranging technology

All outputs range automatically

The E36441A comes with autoranging capability, which allows you to supply the highest current available at all output voltages. This capability enables you to flexibly configure different output power for each channel for more challenging test configurations, up to 400 W of combined output power.



Figure 2. All outputs are isolated

Independent and isolated outputs

All outputs on the E36441A operate independently with dedicated output selection keys and output ON/OFF keys on the front panel. All the outputs on the E36441A have the same voltage and current range, allowing you to easily configure the power supply to supply the same power to all the devices under test.

Clean, Accurate, and Responsive Power

Low noise, accurate power

Making meaningful measurements starts with powering your device correctly. The E36441A provides clean power with less than 1 mVrms ripple and noise. Precise output control allows voltage to be set with 0.05% accuracy and current to be set with 0.1% accuracy. Similar readback accuracy allows precision measurements from the front panel, eliminating the need for an external multimeter. Load and line regulation better than 0.01% ensures a steady output when power line and load changes occur, giving you more peace of mind. The E36441A also automatically lowers the fan speed under the load / no-load condition to eliminate acoustic noise through a thermal control circuit.

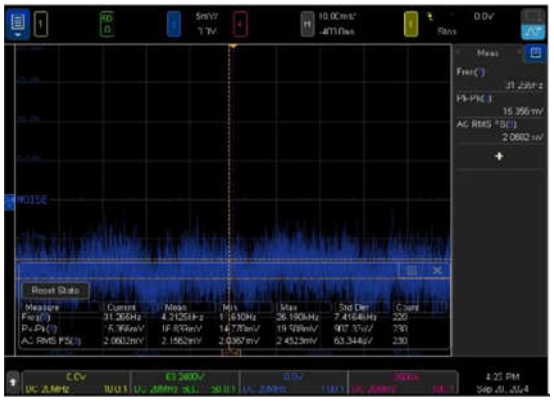


Figure 3. E36441A delivers clean power with low output noise (10x amplification as shown)

Fast transient response

Transient response prevents overshoot (temporary voltage spikes) or sustained ringing in the output as the supply adjusts to the new conditions. The E36441A is capable of a load transient recovery time of less than 55 µs to maintain a stable output voltage even during sudden load change.

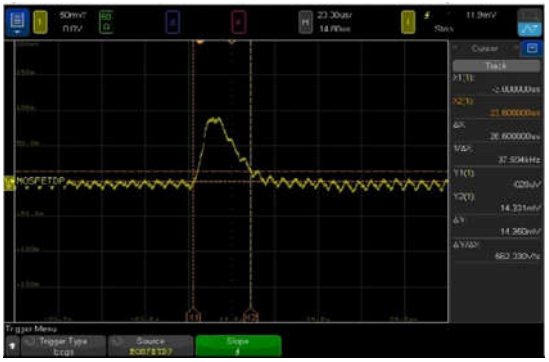


Figure 4. E36441A has fast recovery time

Two-wire and four-wire sensing

To further improve the voltage regulation and measurement accuracy of the DC outputs, the E36441A offers you a four-wire remote sensing capability along with the convenience of two-wire local sensing on all outputs. Remote sensing requires adding a second set of leads to monitor the voltage at the test device. It is particularly useful for compensating for the voltage drops in the power leads when using the higher output currents.

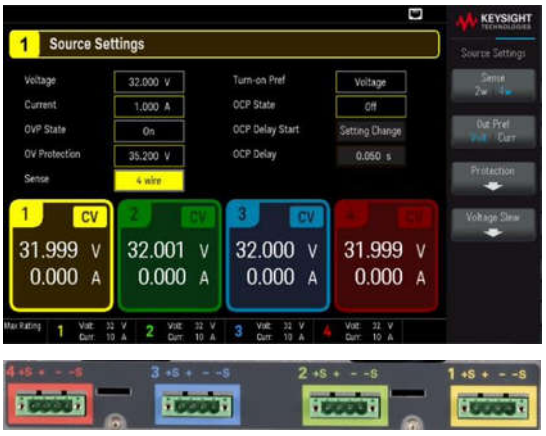


Figure 5. E36441A offers four-wire remote sensing for more accurate power delivery

Layer Device Protection with Over-Voltage and Over-Current Protection

Keysight understands that your devices are expensive and need protection. Protection begins with setting a current limit. The test device does not have the capability to draw current beyond this limit. The E36441A offers three types of current limits:

1. Constant current, which outputs the set current
2. Delayed over-current protection outputs current at or above the limit for the selected period
3. Over-Current Protection (OCP) shuts the output down at the current limit.

Also, Over-Voltage Protection (OVP) and Over-Temperature Protection (OTP) are useful for protecting your device.



Figure 6. E36441A provides OVP, OCP, and OTP protections

Information-packed Seven-inch Color Display and Intuitive Front Panel Increase Productivity

The seven-inch color LCD on the E36441A display shows the voltage and current of all channels with different views. Color coding of the buttons, display, and binding posts helps avoid setup and connection errors. Two individual knobs for voltage and current with rotary encoder control for precise settings and instrument keypad allow quick adjustments and configurations in less time. The E36441A also has rear output terminals for easy wiring, which is ideal for both bench and system setups.



Figure 7. Color-coded outputs, display and buttons ensure easy test configuration

Data logging, output sequencing, LIST mode, adjustable slew rate, and more

You can easily create data log measurements over a specific time frame. The E36441A simultaneously logs data on all DC outputs, both voltage and current measurements, spaced by a programmable sample period, to the large color display and a file. You can export the data logger display in Portable Network Graphics (PNG) and BitMap (BMP) file formats or export the time-stamped data as a Comma-Separated Values (CSV) file for reports and documentation. The built-in memory allows data logging without a USB drive.

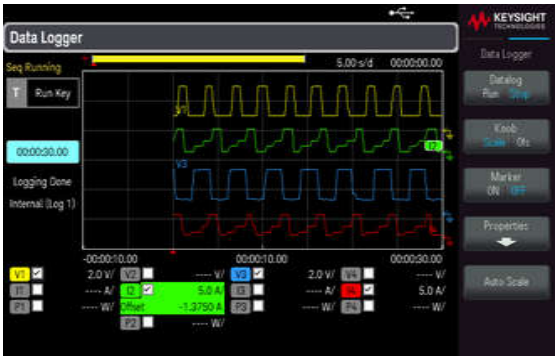


Figure 8. Data logger mode

With either sequencing or LIST mode, you can simulate power problems or normal operations. Sequence each channel on the E36441A individually to turn on or off with a delay. Use LIST mode to generate complex sequences of output changes with rapid, precise timing synchronized with internal or external signals. The adjustable voltage slew rate allows easy control of the speed at which the output slews from one voltage to another. All these are programmable through the front panel or computer control for maximum productivity.



Figure 9. LIST mode

The E36441A provides 0 to 32 V tracking outputs. In the track mode, four voltages from Output one to Output four track each other to conveniently vary the symmetrical voltages needed by operational amplifiers and other circuits using balanced positive and negative inputs.



Figure 10. Track mode

Programming and Emulator mode

The E36441A is a fully SCPI-programmable power supply with built-in USB and LAN interfaces. A simple command provides a code compatibility switch, which allows you to select the R&S HMP4040 code compatibility mode. In this mode, the E36441A instrument emulates the remote commands for the R&S HMP4040 power supply.



Figure 12. LAN and USB are standard connectivity on E36441A

BenchVue Control and Visualization

PathWave BenchVue software for the Personal Computer (PC) makes it simple to connect, control, and view Keysight power supplies simultaneously with other Keysight bench instruments without programming.

- Visualize the output of multiple power supplies simultaneously
- Log data, capture screenshots, and save a system's state
- Recall a past state of your bench to replicate results
- Effortlessly export measurement data in the desired format
- Quickly access manuals, drivers, FAQs, and videos
- Monitor and control your bench from mobile devices

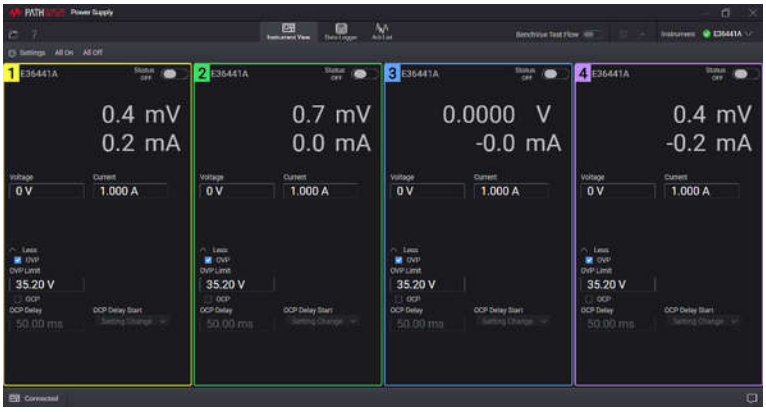


Figure 13. PathWave BenchVue power supply software application

Specifications

Performance specifications	E36441A			
Power output	400 W			
DC output ratings (0 to 40 ºC)				
Channel	1	2	3	4
Power	160 W	160 W	160 W	160 W
Voltage	0 to 32 V	0 to 32 V	0 to 32 V	0 to 32 V
Current	0 to 10 A	0 to 10 A	0 to 10 A	0 to 10 A
Load regulation (0 to 40 ºC) ± (% of output + offset)				
Voltage	< 0.01% + 2 mV			
Current (nominal)	< 0.1% + 5 mA			
Line regulation (0 to 40 ºC) ± (% of output + offset)				
Voltage	< 0.01% + 2 mV			
Current (nominal)	< 0.1% + 5 mA			
Output ripple and noise				
Normal mode voltage, Vpp (20 Hz to 20 MHz)	< 10 mV			
Normal mode voltage, Vrms (20 Hz to 4 MHz)	< 1 mV			
Accuracy 12 months (23 ºC ± 5 ºC) Programming accuracy ± (% of output + offset)				
Voltage	0.06% + 6 mV			
Current (nominal)	0.1% + 6 mA			
Readback accuracy ± (% of output + offset)				
Voltage	0.05% + 5.5 mV			
Current (nominal)	0.1% + 3.5 mA			
Load transient recovery time (at approximately 23 ºC ± 5 ºC) (Time to recover within the settling band following a load change from 50% to 100%; and from 100% to 50% of full load)				
Voltage settling band	15 mV			
Time	< 55 uS			

1. Accuracy specifications are after 1 hour warm up with no load and calibrated at 23 ºC ± 5 ºC.
2. This specification may degrade when the unit is subjected to an RF field ≥ 3 V/meter.

Typical characteristics

Typical characteristics	
Programming resolution	
Voltage	1 mV
Current	1 mA
Readback resolution	
Voltage	0.5 mV
Current	1 mA
Programming the front panel	
Voltage	1 mV
Current	1 mA
Readback front panel	
Voltage	1 mV
Current	1 mA
Output ripple and noise (20 Hz to 10 MHz)	
Normal mode current	< 4 mA_{rms}
Overvoltage protection (OVP) ± (% of output + offset)	
Programming accuracy	0.2% + 0.4 V
Activation time (average time for the output to start to drop after the OVP or OCP condition occurs)	
Overvoltage (OVP)	< 5 ms
Overcurrent (OCP)	< 5 ms
Command processing time	< 10 ms
Programming temperature coefficient per °C (% of output + offset)	
Voltage	0.01% + 0.6 mV
Current	0.01% + 0.2 mA
Readback temperature coefficient per °C (% of output + offset)	
Voltage	0.01% + 0.04 mV
Current	0.01% + 0.2 mA
Remote sense (maximum voltage in load lead)	0.7V
Up/Down programming settling time to within 1% of the total excursion	
Up full load	80 ms
Up no load	80 ms
Down full load	60 ms
Down no load	500 ms
Others	
Connectivity	USB and LAN
Interface capabilities	
LXI compliance	Class C
USB 2.0	Requires Keysight IO library version 17.2.208 and up
10 Mb/s LAN, 100 Mb/s LAN	Requires Keysight IO library version 17.2.208 and up

Typical characteristics

Digital control characteristics	
Maximum voltage ratings	+ 16.5 VDC/-5 VDC between pins (pin 4 internally connected to chassis ground)
Pin 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
Pin 1 – 3 as digital/trigger outputs (pin 4 as common)	Maximum low-level output voltage = 0.5 V @ 4 mA; 1 V @ 50 mA; 1.75 V @ 100 mA Maximum low-level sink current = 100 mA Typical high-level leakage current = 0.8 mA @ 16.5 VDC
Pin 1 – 3 as digital/trigger inputs and pin 3 as inhibit (pin 4 as common)	Maximum low-level input voltage = 0.8 V Minimum 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 V
Data logger function	Measurement interval from 200 ms to 60 sec with a maximum duration of 20,000 hours
Voltage slew rate	Control from 50 ms to 15,000 sec, from 0 V to max V transition
Environmental conditions	
Operating environment	Indoor use, installation category II (for AC input), pollution degree 2
Operating temperature range	0 ºC to 40 ºC
Storage temperature range	-20 ºC to 70 ºC
Relative humidity	80% RH at temperatures up to 40 ºC, 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 editions CAN/CSA-C22.2 No. 61010-1-12 IEC 61010-1:2010 3rd edition Sound pressure Lp < 70db(A) at operator position Normal operation according to EN 27779
AC input	~ 100 VAC to 240 VAC (±10%), 50/60 Hz, < 900 VA
Net weight	11 kg
Bench dimensions, mm (H x W x D)	165 x 314 x 281

Ordering Information

Standard shipped items:

- AC power cord (based on destination country)
- Four 5.08 mm female four-pin terminal block connectors
- One 3.5 mm four-pin female terminal block digital IO connector
- One Input Output (IO) cable

Accessories

Optional accessories available	
E364RMK	Rack mount kit



Figure 14. E364RMK rack mount kit

Definitions

Specification (spec)

The warranted performance of a calibrated instrument that has been stored for a minimum of two hours within the operating temperature range of 0 °C to 55 °C, and after a 90-minute warm-up period. All specifications include measurement uncertainty and were created in compliance with ISO-17025 methods. Data published in this document are specifications (spec) only where specifically indicated.

Typical (typ)

The characteristic performance, which 80% or more of the manufactured instruments will meet. This data is not warranted, does not include measurement uncertainty, and is valid only at room temperature (approximately 23 °C).

Nominal (nom)

The mean or average characteristic performance, or the value of an attribute determined by design, such as a connector type, physical dimension, or operating speed. This data is not warranted and is measured at room temperature (approximately 23 °C).

Measured (meas)

An attribute measured during development is used to communicate the expected performance. This data is not warranted and is measured at room temperature (approximately 23 °C).

For more information

For more information about Keysight's power supplies, please visit:
https://www.keysight.com/us/en/products/power_supplies.html

Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.

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