DATA SHEET

E36200 Series

Autoranging Bench Power Supply



Power Your Next Insight

For more than 50 years, Keysight Technologies. DC power supplies are changing the way engineers prove their design, understand the issues, and ensure product quality. When you need 200 to 400 W of power on the bench, the E36200 series is ready for your application. With low output ripple/noise and layers of device protection, you can test with confidence and power your next insight.

KEYSIGHT TECHNOLOGIES

Designed for Your Power-Hungry Devices

The E36200 Series single and dual output power and are intended for your bench applications that require power up to 400 W. Autoranging technology gives you the highest current available at all output voltage. Power devices with up to 40 A (E36233A) or voltage up to 120 V (E36234A) use an auto-parallel or auto-series to internally connect the two outputs into a single output with twice the power. A single output supply can power devices requiring less than 200 W or two devices are powered simultaneously with a dual output power supply.

- E36231A: Autoranging DC Power Supply 30V, 20A, 200W
- E36232A: Autoranging DC Power Supply 60V, 10A, 200W
- E36233A: Dual Output Autoranging DC Power Supply 30V, 20A, 400W
- E36234A: Dual Output Autoranging DC Power Supply 60V, 10A, 400W

The E36200 Series is fully SCPI programmable power supplies with built-in USB, LAN, and optional GPIB interfaces. Advance features include data logging, LIST mode, and synchronization through input and output triggers. High current applications benefit from an adjustable slew rate and remote 4-wire sense. Adjustable slew rate is necessary to avoid large inrush currents while remote sense ensures the correct output voltage at the DUT compensating for losses in the leads due to the higher currents.

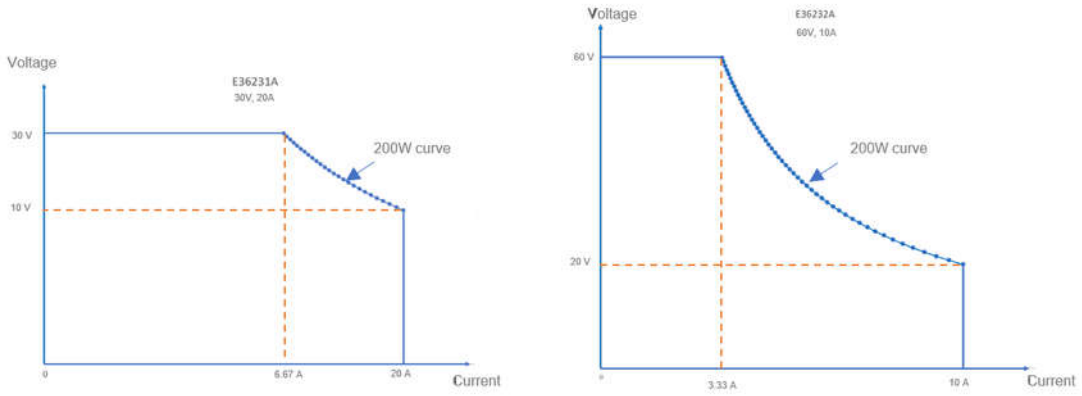

Figure 1. Autoranging technology – E36231A and E36232A

Features

Clean, reliable power

- Low output ripple and noise
- Excellent programming/readback accuracy
- Excellent line/load regulation
- 2-wire or 4-wire remote sense
- Over voltage, over current, and over temperature protection

Convenient benchtop capabilities

- Thermal-control fan speed for lower acoustic noise
- Auto series/parallel connections
- Front and rear output terminal

Intuitive and easy-to-use interfaces

- 4.3-inch LCD color display
- Color coded channels
- Individual knobs for voltage and current
- E3633A and E3634A code compatible
- LAN (LXI), USB and GPIB (optional)

Advance characterization

- Data logging
- Output sequencing
- LIST mode
- Low range current measurement
- Adjustable voltage slew rate



E36231A 200W Autoranging power supply 30V, 20A



E36232A 200W Autoranging power supply 60V, 10A



E36233A 400W Dual Output Autoranging power supply 30V, 20A



E36234A 400W Dual Output Autoranging power supply 60V, 10A

Confidently supply your DUT with clean, reliable power

Making meaningful measurements starts with powering your device correctly. The E36200 Series provides clean power with less than 350 µVrms ripple and noise. Precise output control allows voltage set with 0.03% accuracy and current set with 0.1% accuracy. Similar readback accuracy allows precision measurements to be made from the front panel, eliminating the need for an external multimeter. For currents, a low measurement range of less than 100 mA improves the measurement resolution and accuracy. Load and line regulation better than 0.01% ensure a steady output when power line and load changes occur, giving you more peace of mind.

Improved measurement accuracy with 4-wire sensing

To further improve the voltage regulation and measurement accuracy of the DC outputs, the E36200 Series offers you a 4-wire remote sensing capability along with the convenience or 2-wire local sensing on all outputs. Remote sensing requires the addition of 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. Internal relays ease switching between 2-wire local sensing and 4-wire remote sensing thus eliminating the need for shorting bars or jumpers commonly found on other bench power supplies.

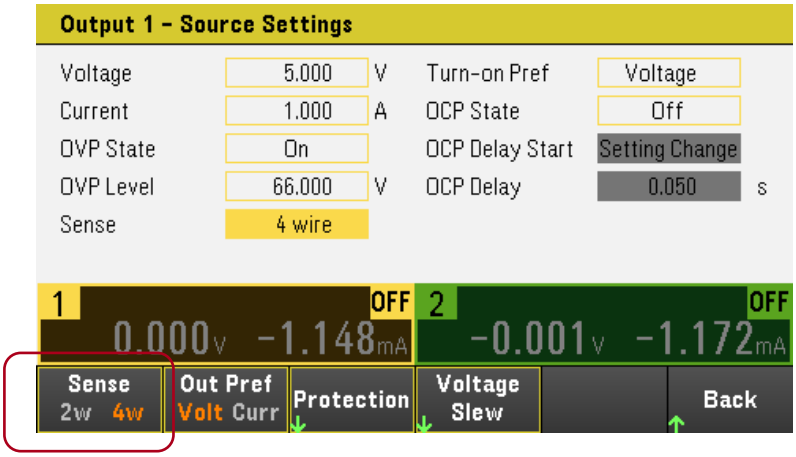

Figure 2. E36200 set 2-wire or 4-wire sensing for output 1 in just one click

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 E36200 Series 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 to protect your device.

Reduce space, cost, and noise with convenient benchtop capabilities

The two outputs on the E36233A and E36234A are controllable independently and are completely isolated. You are getting two power supplies in one instrument which saves maintenance cost. It also saves space on the bench as you can power up multiple analog/digital circuitries or devices with a single instrument.

The two outputs on these models can also set to series or parallel mode on the front panel to double the current up to 40 A (E36233A) and voltage up to 120 V (E36234A). The binding posts on the E36233A are specifically designed to handle high current, ensuring the safety of your setup.

The E36200 Series automatically lowers the fan speed under the load/ no-load condition to eliminate annoying acoustic noise through a thermal control circuit.

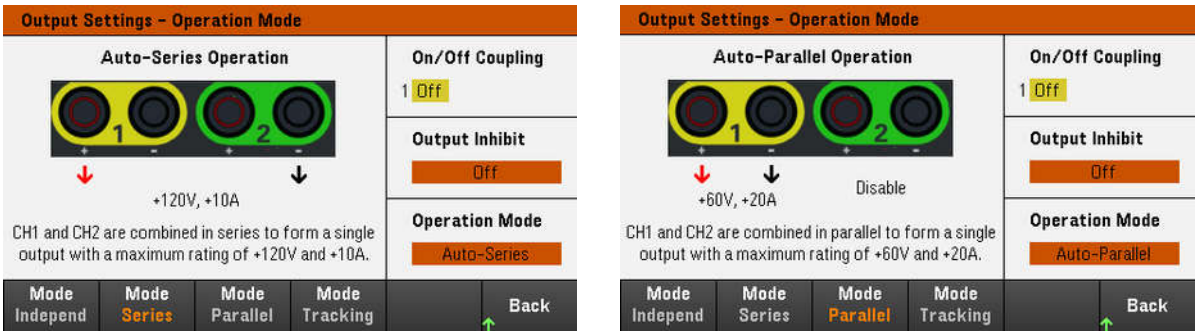

Figure 3. Auto-series and parallel operation together doubles the output voltage/current



Figure 4. E36233A high current binding post

Simplify set up and operation with an intuitive and easy-to-use front-panel interface and connectivity

The 4.3-inch LCD color display shows the voltage and current of all channels with different views. Color coding of the knobs, display, and binding posts help avoid setup and connection errors. Two individual knobs for voltage and current with rotary encoder control for precise setting and instrument keypad allows quick adjustments and configurations in less time.

The E36200 Series also gives you rear output terminals for easy wiring, which is ideal for both bench and system setup.

All models support operation via, SCPI (standard commands for programmable instruments) programming language, IVI (interchangeable virtual instruments) driver, web browser, or BenchVue. The E36200 Series ships standard with LAN and USB. GPIB is also an available option.



Figure 5. Rear output terminals for easy wiring for both bench and system setup

Code compatible with E3633A and E3634A

The E36231A and E36232A are code compatible with the E3633A and E3634A to assist in migration to a more modern power supply.

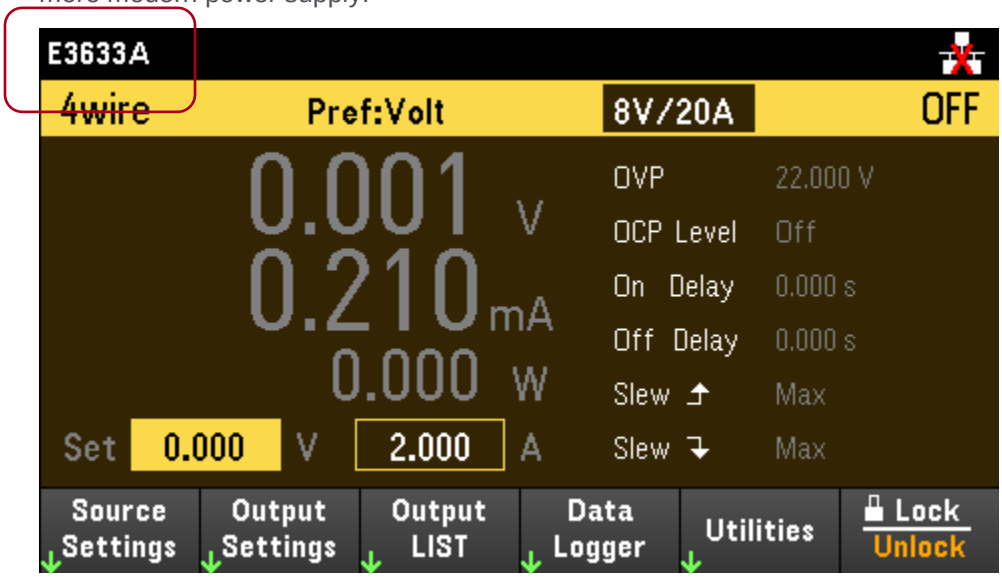

Figure 6. Enable E3633A/E3634A mode on the E36231A and E36232A

Data logging, output sequencing, and slew rate adjustment for increased productivity

You can easily create data logging measurements over a specific time frame. The E36200 Series 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. Export the data logger display in PNG and BMP file formats or export the time-stamped data as a .CSV file for reports and documentation. The built-in memory allows logging data without a USB drive.

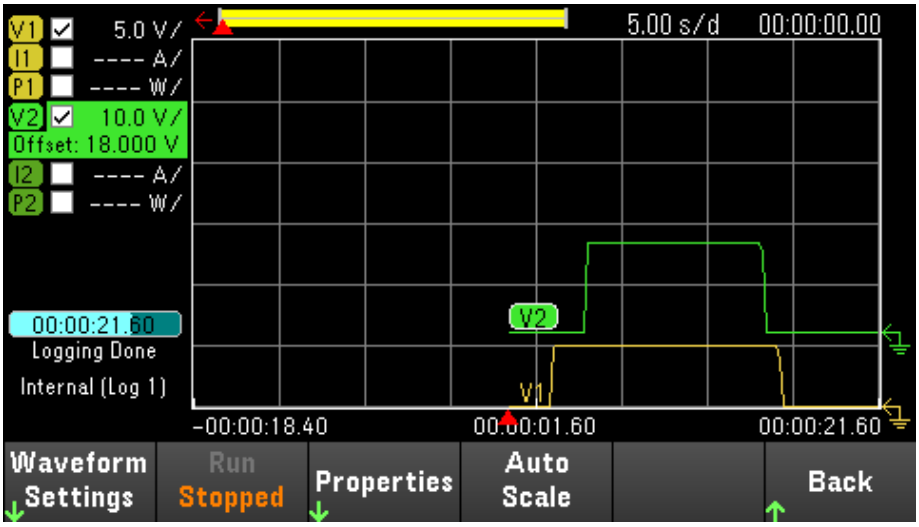

Figure 7. View and log data on multiple traces to the internal memory or external USB drive in the data logger view

You can simulate power problems or normal operation with either sequencing or list mode. Sequence each channel on the E36200 Series individually to turn on or turn off with a delay. Generate complex sequences of output changes with rapid, precise timing synchronized with internal or external signals by using LIST mode. The adjustable voltage slew rate allows easy control on 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.

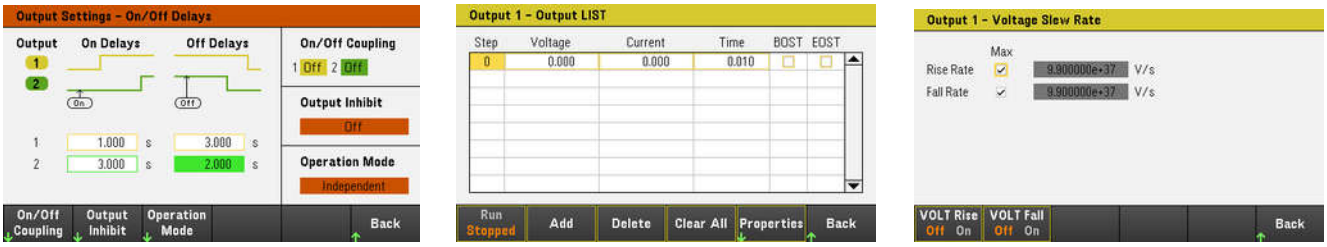

Figure 8. Output sequencing and output LIST mode, with slew rate setting

BenchVue Control and Visualization

BenchVue software for the 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 screen shots, and save a system's state

– Recall a past state of your bench to replicate results

– Export measurement data in desired format fast

– Quickly access manuals, drivers, FAQs, and videos

– Monitor and control your bench from mobile devices

Specifications

Performance specifications	**E36231A**	**E36232A**	**E36233A**		**E36234A**	
Power output	200 W	200 W	400 W		400 W	
DC output rating (0 to 40 ºC)	1	1	1	2	1	2
	0 to 30 V	0 to 60 V	0 to 30 V	0 to 30 V	0 to 60 V	0 to 60 V
	0 to 20 A	0 to 10 A	0 to 20 A	0 to 20 A	0 to 10 A	0 to 10 A
Series mode voltage	NA	NA	60 V		120 V	
Parallel mode current	NA	NA	40 A		20 A	
Load regulation ± (% of output + offset)						
Voltage	< 0.01% +2 mV					
Current	< 0.01% +250 uA					
Line regulation ±(% of output + offset)						
Voltage	< 0.01% +2 mV					
Current	< 0.01% +250 uA					
Output ripple and noise (20 Hz to 10 MHz)						
Normal mode voltage	< 350 uVrms/4.5 mVpp	< 350 uVrms/3.5 mVpp	< 350 uVrms/4.5 mVpp		< 350 uVrms/3.5 mVpp	
Accuracy 12 months (23 ºC ± 5 ºC) Programming accuracy ± (% of output + offset)						
Voltage	0.03% +4 mV	0.03% +8 mV	0.03% +4 mV		0.03% +8 mV	
Current	0.1% + 6 mA	0.1% +3 mA	0.1% + 6 mA		0.1% +3 mA	
Readback accuracy ± (% of output + offset)						
Voltage	0.03% +4 mV	0.03% +8mV	0.03% +4 mV		0.03% +8mV	
Current	0.1% +6 mA	0.1%+3 mA	0.1% +6 mA		0.1%+3 mA	
Low range current[1]	0.25% +160 uA	0.25% +80 uA	0.25% +160 uA		0.25% +80 uA	
Load transient recovery time (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	< 50 uS					

1. ≤100mA for E36231A and E36233A; ≤50mA for E36232A and E36234A

Specifications *continued*

Typical characteristics	**E36231A**	**E36232A**	**E36233A**		**E36234A**	
	200 W	200 W	400 W		400 W	
	1	1	1	2	1	2
Resolution						
Programming remote						
Voltage	1 mV	3 mV	1 mV		3 mV	
Current	1 mA	0.5 mA	1 mA		0.5 mA	
Readback remote						
Voltage	0.5 mV	1.5 mV	0.5 mV		1.5 mV	
Current	1 mA	0.5 mA	1 mA		0.5 mA	
Low range current[1]	20 uA	10 uA	20 uA		10 uA	
Programming front panel						
Voltage	1 mV					
Current	1 mA					
Readback front panel						
Voltage	1 mV					
Current	1 mA					
Low range current[1]	1 uA					
Output ripple and noise (20 Hz to 10 MHz)						
Normal mode current	< 1 mArms					
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 OVP or OCP condition occurs)						
Overvoltage (OVP)	< 5 ms					
Overcurrent (OCP)	< 5 ms					
Command processing time						
	< 10 ms					
Programming temperature coefficient per ºC (% of output + offset)						
Voltage	0.01% +0.6 mV					
Current	0.01% +0.2 mA					
Readback temperature coefficient per ºC (% 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	50 msec
Up no load	50 msec
Down full load	30 msec
Down no load	100 msec
Connectivity	
	USB/LAN Option GPIB

1. ≤100mA for E36231A and E36233A, ≤50mA for E36232A and E36234A)

Typical Characteristics

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 = 0.5V @ 4mA Maximum low-level sink current = 4mA Typical high-level leakage current = 1mA @ 16.5 VDC
Pins 1 – 3 as digital/trigger outputs (pin 4 = common)	Maximum low-level output voltage = 0.5V @ 4mA; 1V @ 50mA; 1.75V @ 100mA Maximum low-level sink current = 100mA Typical high-level leakage current = 0.8mA @ 16.5 VDC
Pins 1 – 3 as digital/trigger inputs and pin 3 as inhibit input (pin 4 = common)	Maximum low-level input voltage = 0.8V Minimum high-level input voltage = 2V Typical low-level leakage current = 2mA @ 0V (internal 2.2k pull-up) Typical high-level leakage current = 0.12mA @ 16.5 VDC

Data logger function

Measurement interval from 200 ms to 60 sec with a maximum duration of 20,000 hours

Voltage slew rate

E36231A/E36233A: Control from 50 ms to 15,000 sec for 0 to max V transition

E36232A/E36234A: Control from 50 ms to 20,000 sec for 0 to max V transition

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	–20 to 70 °C			
Relative humidity	80%RH at temperature 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 edition, CAN/CSA-C22.2 No. 61010-1-12, IEC 61010-1:2010 3rd edition			
Acoustic noise declaration	Sound pressure Lp <70 dB(A), at operator position, Normal Operation, According to EN 27779			
AC input	~100 VAC – 240VAC (± 10%), 50/60Hz, E36231A/E36232A – 400VA, E36233A/E36234A – 800VA			
Net weight	Refer to below			
Dimensions	Refer to below			
Model	E36231A	E36232A	E36233A	E36234A
Overall dimension, mm (H x W x D)	136.2 x 216.5 x 388.4	136.2 x 216.5 x 388.4	136.2 x 216.5 x 397.8	136.2 x 216.5 x 388.4
Net dimension (without feet, strap handle and GPIB module), mm (H x W x D)	114.5 x 212.8 x 388.4	114.5 x 212.8 x 388.4	114.5 x 212.8 x 397.8	114.5 x 212.8 x 388.4

Ordering Information

Keysight E36200 Series Power Supplies

E36231A	Autoranging DC power supply 30V, 20A, 200W
E36232A	Autoranging DC power supply 60V, 10A, 200W
E36233A	Dual output autoranging DC power supply 30V, 20A, 400W
E36234A	Dual output autoranging DC power supply 60V, 10A, 400W

Standard Shipped Accessory

AC power cord (based on destination country)

Connectors

E36231A/32A
- One 10A, 3.5 mm female 4-pin terminal block connector
- One 20A, 7.62 mm female 4-pin terminal block connector

E36233A
- One 10A, 3.5 mm female 4-pin terminal block connector
- Two 41A, 7.62 mm female 4-pin terminal block connector

E36234A
- One 10A, 3.5 mm female 4-pin terminal block connector
- Two 20A, 7.62 mm female 4-pin terminal block connector

Ordering Options

Option SEC	NISPOM and file security
Option UK6	Commercial calibration with test result data

Upgrade (post purchase)

E363GPBU	GPIB user installable interface module

Rackmount Kit

1CM116A	Rack mount flange kit with one flange bracket, one half-module bracket
1CM104A	Rack mount flange kit with two flange brackets
1CM105A	Rack mount flange kit without handles and two flange brackets
1CN107A	Handle kit with two front handles
1CP108A	Rack mount flange and handle kit with two brackets and front handles

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