DATA SHEET

E36300 Series

Triple Output Bench Power Supply

KEYSIGHT TECHNOLOGIES

Power Your Next Insight

For more than 50 years, Keysight Technologies, Inc. DC power supplies have been changing the way engineers prove their design, understand the issues, and ensure product quality. On the bench, the triple output E36300 series is ready for your application. With low output ripple/noise and accurate voltage/current measurement, you can test with confidence—and power your next insight.

Get more for less

The triple output E36300 Series gives you the performance of system power supplies at an affordable price. There are three models available in the series:

E36311A: This 80 W model offers a simplified user experience and the lowest price of the series. Some of the key differences include channels 2 and 3 are configured in tracking mode only, USB interface only, 2-wire sensing. This model does not offer data logging, output sequencing, list mode and auto parallel/serial voltage or current boost.

E36312A: This 80 W model offers the complete feature set. Channel 2 and 3 are electrically isolated independent channels. Some of the key extended features include; USB, LAN and optional GPIB interface, 2 or 4-wire sensing, data logging, output sequencing, list mode, and auto parallel/serial.

E36313A: This 160 W model offers twice the current of the other models with the same extended feature set as the E36312A model.

Features

Clean, reliable power

- Low output ripple and noise
- Excellent programming/readback accuracy
- Excellent line/load regulation: 0.01%
- 2-wire or 4-wire remote sense
- Over voltage, over current, and over temperature protection

Convenient benchtop capabilities

- Three independent power supplies in one box
- Low 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
- E3631A code compatible
- LAN (LXI), USB and GPIB (optional)

Advance characterization

- Data logging
- Output sequencing
- LIST mode
- Low current range measurement

E36311A 80W Triple Output Power Supply, 6V, 5A & ±25V, 1A, USB

E36312A 80W Triple Output Power Supply, 6V, 5A & 2X 25V, 1A, USB, LAN

E36313A 160W Triple Output Power Supply, 6V, 10A & 2X 25V, 2A, USB, LAN

Confidently supply your DUT with clean, reliable power

Accurate voltage/current programming and readback capability provide excellent control on the power supply and power measurement. The low, normal mode noise specifications assure quality power for precision circuitry applications, enabling you to power your design with confidence. Besides the 0.01% load and line regulation, the E36300 Series can also maintain a steady output when power line and load changes occur, giving you more peace of mind. The built-in capability to measure low range current (<20mA) reduces the need for an external multimeter and simplifies the setup.

Improved measurement accuracy with 4-wire sensing

To further improve the voltage regulation and measurement accuracy of the DC outputs, the E36312/13A models offer 4-wire sensing capability, also called remote sensing, on each of the rear terminals. Remote sensing permits the output module to monitor and regulate its output voltage directly at the DUT input terminals instead of the power supply's output terminals. Four wire sensing is particularly useful for compensating for the voltage drops in the power leads when using the higher output currents generated by the E36313A. For convenience, an internal relay controls switching between 2-wire mode (local sensing) and 4-wire mode (remote sensing) thus eliminating the need for shorting bars or jumpers commonly found on other bench power sources.

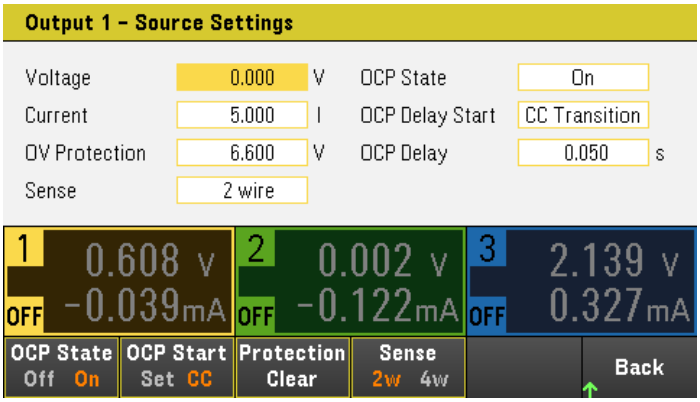

Figure 1. On E36312A or E36313A set 2-wire or 4-wire sensing for output 1 in just one click

Keysight understands that protecting your DUT is crucial to limit testing, so the E36300 Series includes Over Voltage Protection (OVP), Over Current Protection (OCP), and Over Temperature Protection (OTP) to prevent damage.

Reduce space, cost and noise with convenient benchtop capabilities

All three outputs on the E36300 Series can be turned on and off independently, so you are essentially getting three power supplies in one instrument which saves cost on maintenance. It also saves space on the bench as you can power up multiple analog/digital circuitries or devices with a single instrument.

For even more voltage or current, Channel 2 and Channel 3 of the E36312/13A set series or parallel mode on the front panel to double the output voltage (up to 50 V) or current (up to 4 A) respectively.

The E36300 Series is one of the quietest power supplies in its class. It automatically lowers the fan speed under the load/ no load condition to eliminate annoying acoustic noise through a thermal control circuit. At a typical noise level of less than 26 dBA under no load condition and less than 50 dBA under full load condition, it allows you to work in a quiet and undisturbed environment.

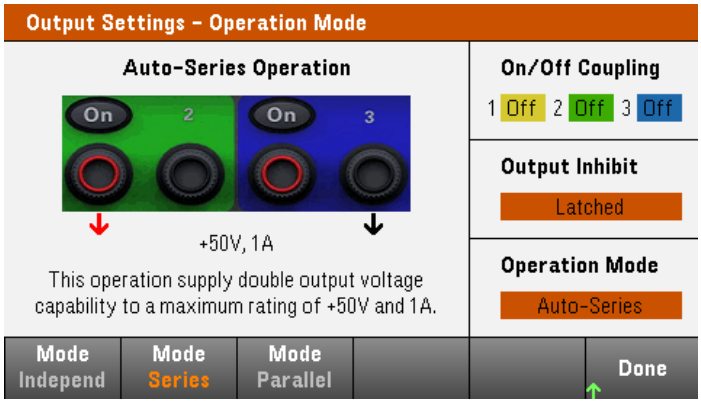

Figure 2. Auto-series operation to double the output voltage

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 three channels with different views. Color coding of the knobs, display and binding posts helps avoid setup and connection errors. Two individual knobs for voltage and current with rotary encoder control for precise setting and keypad allows quick adjustments and configurations in less time.

The E36312/13A also offer rear output terminals for easy wiring, which is ideal for both bench and system setup.

Figure 3. The E36312A and E36313A have rear output terminals for all channels

All models support operation via, SCPI (standard commands for programmable instruments) programming language, IVI (interchangeable virtual instruments) driver, Web Browser or BenchVue. The E36300A series is code compatible with the E3631A to assist in migration to a more modern power supply.

The E36311A ships standard with USB and the E36312/13A with both LAN and USB (GPIB optional).

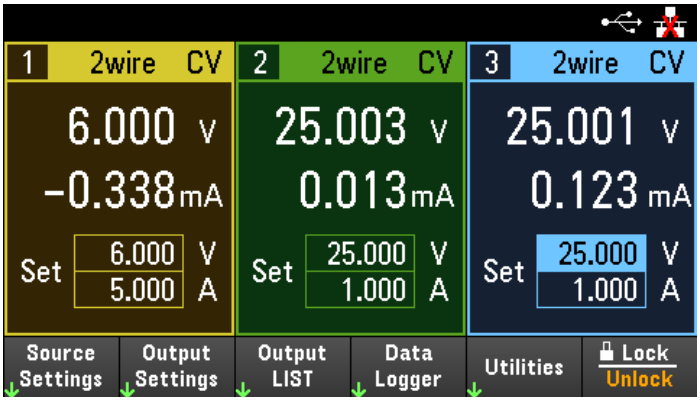

Figure 4. View all three outputs simultaneously.

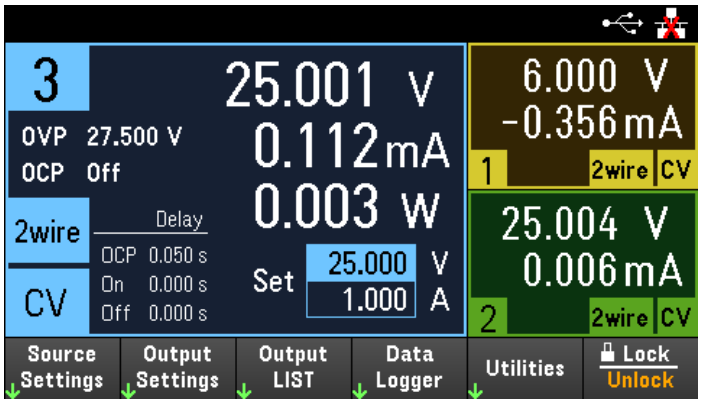

Figure 5. View details of a single channel including the measured power, OVP/OCP condition, and delays.

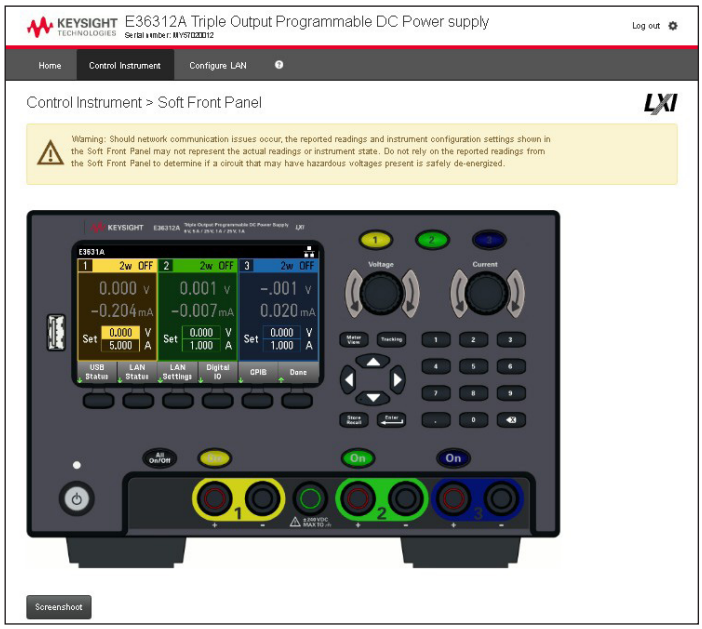

Figure 6 Control the power supply from anywhere with the web graphical user interface which is identical to operating the instrument front panel.

Data logging and output sequencing for increased productivity (available on E36312/13A models only)

Emulating the normal behaviors of your power subsystems early in the design process, including controlling multiple power supply voltage sequences, measuring wide dynamic ranges of current, and varying the speed of the power supply voltage to reflect real circuit characteristics is critical your design's success. The E36312/13A offer additional capabilities for emulating and analyzing power behaviors.

Logging data is key to reviewing test set ups and repeating test conditions. The E36312/13A simultaneously logs data on all three 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, BMP file formats or export the time stamped data as a CSV file for reports and documentation. The built-in battery backup real time clock allows for proper time-stamping of logged data.

Figure 7. In Data Logger View, you can log data on multiple traces. Here the voltage of output 1, output 2 and output 3 are captured over 30 seconds

Simulate power problems or normal operation with either sequencing or list mode. Sequence each channel on the E36312/13A models 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.

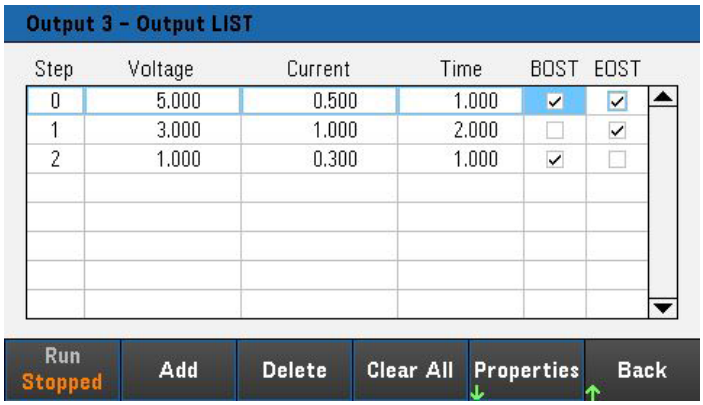

Figure 8. Output sequencing and Output LIST mode setting

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 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

BenchVue software application

Which Model Is For You?

There are three models in the E36300 Series. The chart below compares the features set available in each model.

Feature	E36311A 80 W Economy Model	E36312A 80 W Full-Featured Model	E36313A 160 W High Current Model
Channels	Tracking Only	Fully Independent	Fully Independent
Electrically isolated channels	Not available	Standard	Standard
Remote Sensing	2 Wire Only	2 and 4-Wire	2 and 4-Wire
Auto series/parallel	Not available	Standard	Standard
Data Logging	Not available	Standard	Standard
Output Sequencing	Not available	Standard	Standard
List Mode	Not available	Standard	Standard
USB port for data logging/storage	Not available	Standard	Standard
Digital triggers	Not available	Standard	Standard
Rear output terminals	Not available	Standard	Standard
Earth ground reference at rear panel	Not available	Standard	Standard
Digital I/O port	Not available	Standard	Standard
Connectivity	USB	USB and LAN Standard, GPIB Optional	USB and LAN Standard, GPIB Optional
Recessed binding posts	Optional	Optional	Optional
Keypad locking	Standard	Standard	Standard
Benchtop lock	Standard	Standard	Standard

Specifications

Performance specifications	**E36311A**			**E36312A**			**E36313A**		
Power output	80 W			80 W			160 W		
DC output rating (0 to 40°C)	1	2	3	1	2	3	1	2	3
	0 to 6 V	0 to +25 V	0 to -25 V	0 to 6 V	0 to 25 V	0 to 25 V	0 to 6 V	0 to 25 V	0 to 25 V
	0 to 5 A	0 to 1 A	0 to 1 A	0 to 5 A	0 to 1 A	0 to 1 A	0 to 10 A	0 to 2 A	0 to 2 A
Series mode voltage	NA				50 V			50 V	
Parallel mode current	NA				2A			4A	
Load regulation ± (% of output + offset)									
Voltage	< 0.01% +2 mV			< 0.01% +2 mV			< 0.01% +4 mV		
Current	< 0.01% +250 uA			< 0.01% +250 uA			< 0.01% +500 uA		
Line regulation ±(% of output + offset)									
Voltage	< 0.01% +1 mV			< 0.01% +1 mV			< 0.01% +1 mV		
Current	< 0.01% +250 uA			< 0.01% +250 uA			< 0.01% +500 uA		
Output ripple and noise (20 Hz to 20 MHz)									
Normal mode voltage	< 350 uVrms/2 mVpp			< 350 uVrms/2 mVpp			< 350 uVrms/ 2 mVpp	< 1 mVrms/ 5 mVpp	
Accuracy 12 months (23 °C ± 5 °C) Programming accuracy ±(% of output + offset)									
Voltage	0.1% +5 mV	0.05% +20 mV		0.03% +2 mV	0.03% +5 mV		0.03% +3 mV	0.03% +5 mV	
Current	0.1% + 10 mA	0.1% +4 mA		0.04% +3 mA	0.04% +2 mA		0.05% +4 mA	0.04% +3 mA	
Readback accuracy ±(% of output + offset)									
Voltage	0.1% +5 mV	0.05% +10 mV		0.04% +2mV	0.04% +5 mV		0.04% +3 mV	0.03% +5 mV	
Current	0.1% +10 mA	0.1% +4 mA		0.04% +3 mA	0.04% +3 mA		0.05% +5 mA	0.04% +3 mA	
Low range current [1]	NA			0.25% +80 uA			0.25% +80 uA		
Load transient recovery time (Time to recover to 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			15 mV			15 mV	30 mV	15 mV
Voltage settling band (parallel mode)	NA				30 mV			30 mV	
Time	< 50 uS								

1. 20mA for CH1, 10mA for CH2 and CH3

Specifications *continued*

Typical characteristics	**E36311A**			**E36312A**			**E36313A**		
	80 W			80 W			160 W		
	1	2	3	1	2	3	1	2	3
Resolution									
Programming remote									
Voltage	0.5 mV	1.5 mV		0.36 mV	1.5 mV		0.36 mV	1.5 mV	
Current	0.5 mA	0.1 mA		0.3 mA	0. 1mA		0.6 mA	0.5 mA	
Readback remote									
Voltage	0.5 mV	1.5 mV		0.24 mV	1 mV		0.24 mV	1 mV	
Current	0.5 mA	0.1 mA		0.2 mA	160 uA	80 uA	0.2 mA	320 uA	160 uA
Low range current[1]	NA			10 uA	3 uA	2 uA	10 uA	3 uA	2 uA
Programming front panel									
Voltage	1 mV			1 mV			1 mV		
Current	1 mA			1 mA			1 mA		
Readback front panel									
Voltage	1 mV	10 mV		1 mV			1 mV		
Current	1 mA			1 mA			1 mA		
Low range current [1]	NA			10 uA	3 uA	2 uA	10 uA	3 uA	2 uA
Output ripple and noise (20 Hz to 20 MHz)									
Normal mode current	< 2 mArms	< 500 uArms		< 2 mArms	1 mArms	500 uArms	< 4 mArms	2 mArms	1 mArms
Overvoltage protection (OVP) ± (% of output + offset)									
Programming accuracy	0.20% +0.1 V	0.20% +0.4 V		0.20% +0.1 V	0.20% +0.4 V		0.20% +0.1 V	0.20% +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 °C (% of output + offset)									
Voltage	0.01% +2 mV	0.01% +3 mV		0.01% +0.18 mV	0.01% +0.6 mV		0.01% +0.18 mV	0.01% +0.6 mV	
Current	0.02% +3 mA	0.02%+0.5 mA		0.01% +0.25 mA	0.01% +0.2 mA	0.01% +0.1 mA	0.01% +0.5 mA	0.01% +0.4 mA	0.01% +0.2 mA
Readback temperature coefficient per °C (% of output + offset)									
Voltage	NA			0.01% +20 uV	0.01% +40 uV		0.01% +20 uV	0.01% +40 uV	
Current	NA			0.01% +0.25 mA	0.01% +0.2 mA	0.01% +0.1 mA	0.01% +0.5 mA	0.01% +0.4 mA	0.01% +0.2 mA
Remote sense (max. voltage in load lead)									
	NA			1 V			1 V		
Up/down programming settling time to within 1% of total excursion									
Up Full Load	11 msec	50 msec		11 msec	50 msec		15 msec	50 msec	
Up No load	10 msec	20 msec		10 msec	20 msec		15 msec	25 msec	
Down Full load	13 msec	45 msec		13 msec	45 msec		13 msec	45 msec	
Down No load	200 msec	400 msec		100 msec	150 msec		100 msec	150 msec	
Connectivity									
	USB			USB/LAN Opt-GPIB			USB/LAN Opt-GPIB		

1. 20 mA for CH1, 10 mA for CH2 and CH3

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

Environmental conditions

Operating environment	Indoor use, installation category II (for AC input), pollution degree 2
Operating temperature range	0 to 40°C
Storage temperature	–20 to 70°C
Relative humidity	Up to 95%
Altitude	Up to 2000 meters
Electromagnetic compatibility	Compliant with EMC Directive (2004/108/EC) 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
AC input	100, 115, or 230 V input (±10%), 50/60 Hz, 250 VA for E36311A and E36312A; 600 VA for E36313A
Net weight	Refer to the table
Dimensions	Refer to the table

	E36311A	E36312A	E36313A
Weight	8.1 kg	8.3 kg	9.8 kg
Overall dimension (H x W x D)	145 x 216 x 364 mm	145 x 216 x 367 mm	145 x 216 x 367 mm
Net dimension (without feet, strap handle and GPIB module) (H x W x D)	133 x 213 x 364 mm	133 x 213 x 364 mm	133 x 213 x 364 mm

Ordering Information

Keysight E36300 Series power supplies

E36311A	80 W DC power supply, triple-output, 6 V, 5 A and ±25 V, 1 A, USB
E36312A	80 W DC power supply, triple-output, 6 V, 5 A and 2x 25 V, 1 A, LAN, USB
E36313A	160 W DC power supply, triple-output, 6 V, 10 A and 2x 25 V, 2 A, LAN, USB

Standard shipped accessory

AC power cord (based on destination country)

Connectors

E36311A – None

E36312A/13A

Connector kit (P/N: E36312-89001)

- One 10 A, 3.5 mm female 4-pin terminal block connector
- One 12 A, 5 mm female 4-pin terminal block connector
- One 15 A, 5 mm female 8-pin terminal block connector

Ordering options

Option 0E3	230 VAC ±10%
Option 0EM	115 VAC ±10%
Option 0E9	100 VAC ±10%
Option RBP	Recessed binding posts, not upgradable
Option GPB	GPIB module
Option UK6	Commercial calibration with test result data
Option SEC	NISPOM and file security
BV0003B	Power Supply Control & Automation

Upgrade (post purchase)

E363GPBU	GPIB user installable interface module for E36312A, E36313A

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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