Keysight Technologies
E36300 Series
Programmable DC Power Supplies

Data Sheet



KEYSIGHT TECHNOLOGIES

Unlocking Measurement Insights

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. Three models are available for your needs:

E36311A: 3 outputs, 6 V, 5 A and ±25 V, 1 A, 80 W: USB
E36312A: 3 outputs, 6 V, 5 A and 2x 25 V, 1 A, 80 W: LAN, USB
E36313A: 3 outputs, 6 V, 10 A and 2x 25 V, 2 A, 160 W: LAN, USB

Features

- 4.3-inch LCD color display
- Color-coded channels
- Individual knobs for voltage and current
- LAN (LXI), USB and GPIB
- Digital I/O port
- Individual on/off on all channels
- Electrically isolated channels
- Front and rear output terminals
- Excellent programming/readback accuracy
- Low output ripple and noise
- Excellent line/load regulation: 0.01%
- Fast transient response time: < 50 us
- Small current measurement: 80 uA
- Low acoustic noise
- Auto series/parallel connections
- 2-wire or 4-wire remote sense
- Data logging
- Output sequencing
- Output LIST
- Output coupling
- Tracking
- Triggering
- Over voltage, over current and over temp protection



More confidence to power your design

The accurate voltage/current programming and readback capability provide excellent control on the power supply and power measurement. The low, normal mode noise specifications assures 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.

More convenient and productive with intuitive and easy-to-use front-panel interface

The 4.3-inch LCD color display can show the voltage and current of all three channels at the same time, and the color-coded channel also simplifies manual set-up. Two individual knobs for voltage and current with rotary encoder control for precise setting, and keypad allow quick adjustments and configurations in less time. The user interface is intuitive and makes operation easy and improves your productivity.

More test throughput via connectivity and programming languages

The E36311A ships standard with USB and the E36312A/E36313A with both LAN and USB (GPIB optional). All models support the easy-to-use SCPI (standard commands for programmable instruments) programming language lets you create fast and simple programs with transient response faster than 50 us and fast command processing time less than 10 ms. You can also program the instrument with the power supply's interchangeable virtual instruments (IVI) driver.

More protection for your device under test (DUT)

The E36300 Series is fully integrated with Over Voltage Protection (OVP), Over Current Protection (OCP), and Over Temperature Protection (OTP) in order to prevent damage to the DUT. Security features such as the keypad locking capability precludes accidental front panel usage. The physical lock mechanism ensures secure instrument storage.

Less cost and saves space with independent outputs

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.

Less acoustic noise

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.

More Features (E36312/E36313A only)

Data logger view

The E36312A/E36313A can also function as a data logger. Data can be simultaneously logged to the large color display and to a file on all three DC outputs.

Measurements are spaced by the sample period, which is programmable from 200 milliseconds to 60 seconds. For each DC output, voltage measurements, current measurements, or both can be logged. Each reading is an integrated voltage or current measurement.

The maximum data log file size is ~7 Megabytes. An external USB memory device is required for data logging to start.

The data logger display can be saved as PNG or BMP file formats for use in reports. The logged data can be saved for viewing at a later time. Logged data can also be exported to a CSV file.

The E36312A/E36313A has a built-in battery back-up real time clock. This allows for proper time-stamping of logged data. It is also used to tag files with correct creation dates.



Figure 1. 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.

Output sequencing and Output LIST mode

Each channel on the E36312A/E36313A units can be individually set to turn on or turn off with a delay. By adjusting the delay times and then commanding the turn on, you can set the power supply to sequence in a particular order. The same sequencing capability is available to shut down the modules in a particular order. Delay times can be set from 0 to 3600 seconds delay in 1 ms increments.

On the other hand, LIST mode lets you generate complex sequences of output changes with rapid, precise timing which may be synchronized with internal or external signals.

The LIST can also trigger on internal or external events and be repeated. Once the list of commands is stored in the power supply, the entire list is executed by a single command. This reduces command processing time and simplifies code.

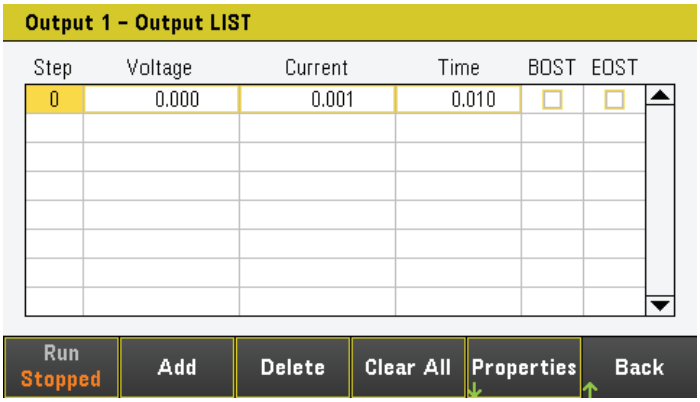


Figure 2. Output sequencing and Output LIST mode setting

Auto series/parallel mode

Channel 2 and Channel 3 of the E36312A and E36313A can be set to series or parallel mode to double the output voltage (up to 50 V) or current (up to 4 A) respectively. The setting is done through the front panel display with graphical user interface instructions. No external wiring between channels is required.

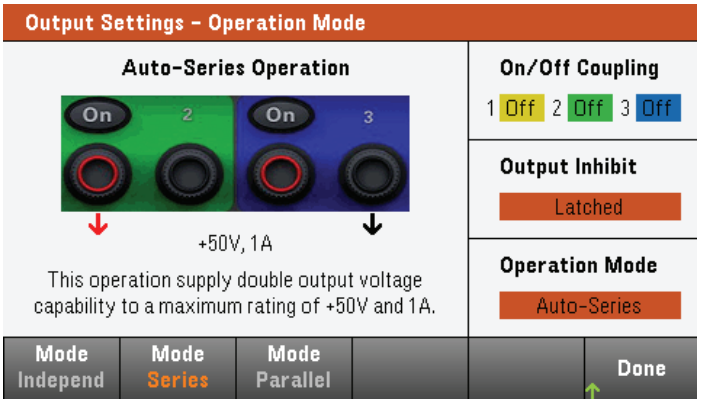


Figure 3. Auto-series operation to double the output voltage

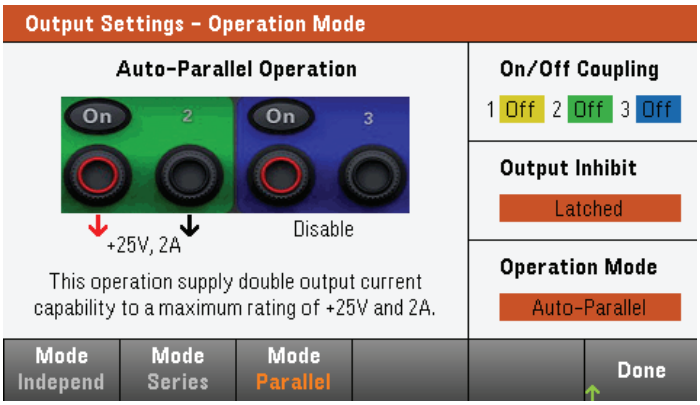


Figure 4. Auto-parallel operation to double the output current

Improved measurement accuracy with 4-wire sensing

To improve the voltage measurement accuracy and regulation of the DC outputs, the Keysight E36312A/E36313A offer 4-wire sensing capability, also called remote sensing, on each of the rear terminals. 4-wire remote sensing is useful when the DUT draws high current and you want to account for voltage drop in the power leads to achieve tight regulation and high voltage measurement accuracy.

To use 4-wire sensing in addition to your power leads, you must connect two low current sensing leads between the DUT input terminals and 4-wire sense terminal located on the rear of the power supply. This 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. Then it automatically adjusts its output voltage to compensate for voltage drops across the resistance in the power leads.

For convenience, switching between 2-wire mode (local sensing) and 4-wire mode (remote sensing) is done via an internal relay inside the power supply, eliminating the need for shorting bars or jumpers commonly found on other bench power sources.

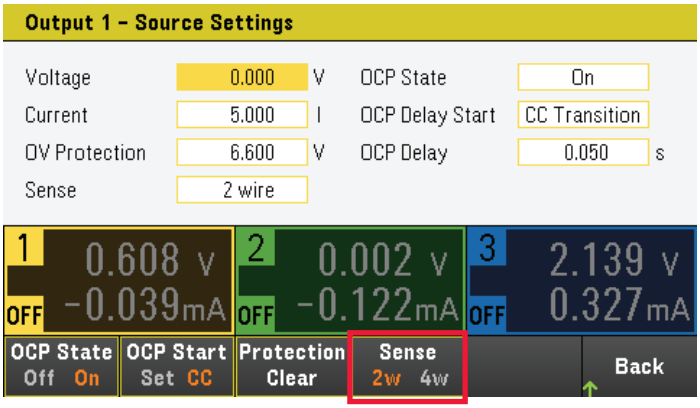


Figure 5. Setting 2w or 4w sensing for Output 3 in just one press

Electrically isolated outputs

The three outputs on the E36312A/E36313A are electrically isolated from each other and from ground, minimizing the interference between circuits-under-test.

Digital I/O port

The E36312A/E36313A has digital I/O port on the rear panel for triggering and fault inhibit control. It can also be used to turn on/off the coupling.

Convenient front and rear output terminals

The E36300 series uses 3-way binding posts on the front panel for connection to the DUT. The binding posts accept standard banana plugs, bare wire, and spade-lug connectors. To avoid setup and connection errors, the binding posts are color-coded to the control keys and the display.

The E36312A/E36313A also offer rear output terminals for easy wiring, which is ideal for both bench and system setup.



Figure 6. Rear output terminals for all channels, convenient for system setup

Front panel USB

The E36312A/E36313A provides a convenient front panel USB port designed exclusively for data storage devices, such as USB memory devices. You can save test setups, test results, screen images, and log data directly to the USB device plugged into the front panel



Figure 7: USB port on the front panel

Recessed binding post option

In addition to the standard banana binding post, the E36300 series offers an option of recessed binding posts. This option allows complete insulation of front panel connections for extra safety.

More Measurement Capabilities

Voltmeter/ammeter: meter view

The E36300 series power supplies have built-in voltmeter and ammeter functions used to make measurements without additional wires or the added complexity of current sense resistors or current shunts.

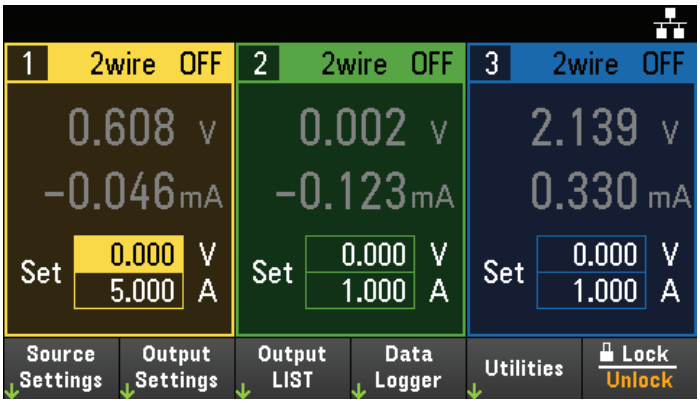


Figure 8. In Normal View, all 3 outputs can be viewed simultaneously. The measured values and setting for voltage/current are displayed for each output.

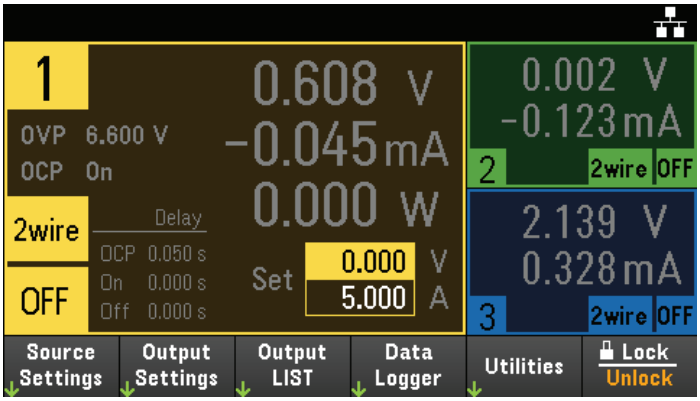


Figure 9. In Meter View, you can view an enlarged view of the selected channel with a lot more details, including the measured power, OVP/OCP condition and delays. The other two channels show only the measured voltage/current.

Enabling the E3631A mode

The E3631A mode allows you to change the programmatic identity of the E36300 Series back to E3631A for code compatibility and enables it to works like the E3631A in existing applications.

Control from any browser

The E36300 series can be controlled via a standard web browser. The Web GUI operation is identical to operating the real front panel on power supplies.



Figure 10. Control your E36300 series anywhere from a web browser

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

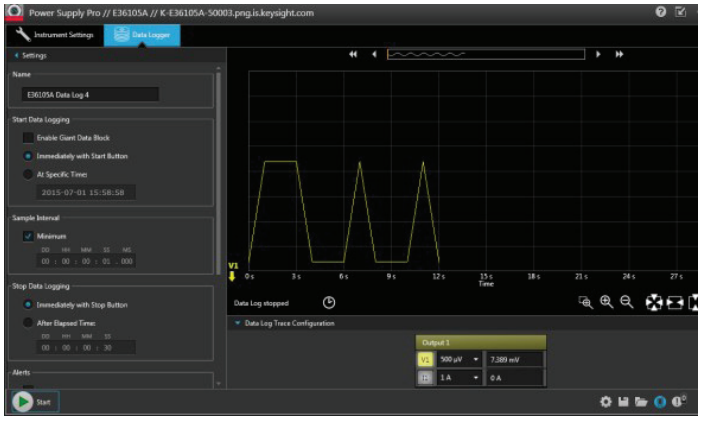


Figure 11. BenchVue software application

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 (25 + 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	
Small current	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
Time	< 50 uS			< 50 uS			< 50 uS		
Voltage settling band (parallel mode)	NA				30 mV			30 mV	
Time (parallel mode)	NA				< 50 uS			< 50 uS	

Specifications *continued*

Typical characteristics	**E36311A**			**E36312A**			**E36313A**		
	80 W			80 W			160 W		
	1	2	3	1	2	3	1	2	3
Resolution									
Programming									
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									
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
Small current	NA			5 uA	1 uA		5 uA	1 uA	
Programming (meter)									
Voltage	1 mV			1 mV			1 mV		
Current	1 mA			1 mA			1 mA		
Readback (meter)									
Voltage	1 mV	10 mV		1 mV			1 mV		
Current	1 mA			1 mA			1 mA		
Small current	NA			1uA			1uA		
Output ripple and noise (20 Hz to 20 MHz)									
Normal mode current	< 2mArms	< 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%+0.5mA		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			1V			1V		
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	
I/O Interfaces									
	USB			USB/LAN Opt-GPIB			USB/LAN Opt-GPIB		

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 below
Dimensions	Refer to below

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

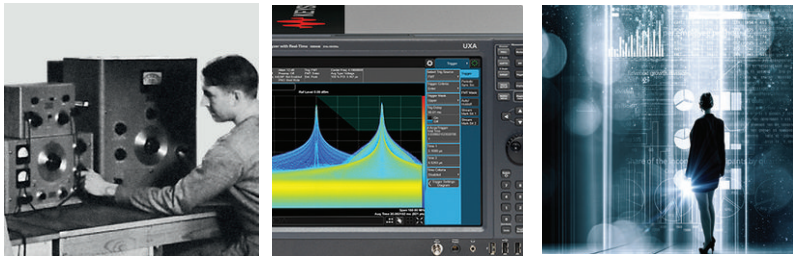
Opt. 0E3	230 VAC ±10%
Opt. 0EM	115 VAC ±10%
Opt. 0E9	100 VAC ±10%
Opt. RBP	Recessed binding posts, not upgradable
Opt. GPB	GPIB module
Opt. UK6	Commercial calibration with test result data
Opt. SEC	NISPOM and file security
BV0003B	Power Supply Control & Automation

Upgrade (post purchase)

E363GPBU	GPIB user installable interface module for E36312A, E36313A

Evolving

Our unique combination of hardware, software, support, and people can help you reach your next breakthrough. We are unlocking the future of technology.



From Hewlett-Packard to Agilent to Keysight

myKeysight

myKeysight
www.keysight.com/find/mykeysight
A personalized view into the information most relevant to you.

KEYSIGHT SERVICES
Accelerate Technology Adoption.
Lower costs.

Keysight Services
www.keysight.com/find/service
Our deep offering in design, test, and measurement services deploys an industry-leading array of people, processes, and tools. The result? We help you implement new technologies and engineer improved processes that lower costs.

STANDARD 3 YR WARRANTY

Three-Year Warranty
www.keysight.com/find/ThreeYearWarranty
Keysight's committed to superior product quality and lower total cost of ownership. Keysight is the only test and measurement company with three-year warranty standard on all instruments, worldwide. And, we provide a one-year warranty on many accessories, calibration devices, systems and custom products.

CALIBRATION UP TO 10 YEARS WARRANTY
ASSURANCE PLANS

Keysight Assurance Plans
www.keysight.com/find/AssurancePlans
Up to ten years of protection and no budgetary surprises to ensure your instruments are operating to specification, so you can rely on accurate measurements.

Keysight Channel Partners
www.keysight.com/find/channelpartners
Get the best of both worlds: Keysight's measurement expertise and product breadth, combined with channel partner convenience.

www.keysight.com/find/e36300
www.keysight.com/find/e36311A
www.keysight.com/find/e36312A
www.keysight.com/find/e36313A
www.keysight.com/find/e36300firmware

For more information on Keysight Technologies' products, applications or services, please contact your local Keysight office. The complete list is available at:
www.keysight.com/find/contactus

Americas

Canada	(877) 894 4414
Brazil	55 11 3351 7010
Mexico	001 800 254 2440
United States	(800) 829 4444

Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 11 2626
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Other AP Countries	(65) 6375 8100

Europe & Middle East

Austria	0800 001122
Belgium	0800 58580
Finland	0800 523252
France	0805 980333
Germany	0800 6270999
Ireland	1800 832700
Israel	1 809 343051
Italy	800 599100
Luxembourg	+32 800 58580
Netherlands	0800 0233200
Russia	8800 5009286
Spain	800 000154
Sweden	0200 882255
Switzerland	0800 805353
	Opt. 1 (DE)
	Opt. 2 (FR)
	Opt. 3 (IT)
United Kingdom	0800 0260637

For other unlisted countries:
www.keysight.com/find/contactus
(BP-2-23-17)

DEKRA Certified
ISO9001 Quality Management System

www.keysight.com/go/quality
Keysight Technologies, Inc.
DEKRA Certified ISO 9001:2015
Quality Management System

KEYSIGHT TECHNOLOGIES
Unlocking Measurement Insights

This information is subject to change without notice.
© Keysight Technologies, 2017
Published in USA, April 21, 2017
5992-2124EN
www.keysight.com