146-1968A

MORE WATTS PER VERTICAL INCH

Load up on the SERIES EL ELECTRONIC LOADS from Kepco

Model EL 2K-200-200
Single Channel Unit

Model EL 1K-200-100D
Dual Channel Unit

• 1KW - 5KW Modules • 4U Height • Parallel Operation

• Up to 600 Volts DC • Up to 800 Amperes/Module • Constant E, I, P, I/E, E/I • Air Cooled

• Local, Remote Analog Control and USB Standard • GPIB and Ethernet Optional

AN ISO 9001 COMPANY
KEPCO®
THE POWER SUPPLIER™
SINCE 1946

THE KEPCO SERIES EL ELECTRONIC LOADS

The EL Series is a line of modular air-cooled, DC electronic loads used to test power sources such as batteries, power supplies, generators, chargers, fuel cells, etc. Power ratings start at 1KW; standard models have maximum test capabilities of 50, 200, 400 and 600 volts. Individual modules are capable of up to 5KW and 800 amperes (see chart). High current and power operation are achieved via parallel connection in a master/slave configuration.

The EL Series offers unique Functional Modularity. Functional Modularity allows the load to be retrofitted to increase load power/current as required for undefined future applications. Purchase the capability needed today with assurance of future power/current upgrades. The result is an Electronic Load maximizing the most important specification:

VALUE = $/Watt

When the requirements increase, the load may be upgraded.

All EL loads operate as master or slave and can come with or without front panel control and readouts. Up to 15 additional loads can be driven with one acting as a master.

INDIVIDUAL LOAD CHARACTERISTICS

- Base Unit - Includes front panel controls and indicators for Amps, Volts and KW
- Computer-operated LabVIEW™ capable
- Constant current, voltage, power, resistance, conductance and short circuit modes
- Readback voltage, current, power and load status
- USB and RS-232 are standard
- GPIB or Ethernet Control via single optional interface card
- Comprehensive SCPI command set
- Monitor load current via computer or analog output
- Use unique test patterns from an Arbitrary Waveform Generator via the external analog input
- Remote voltage sense eliminates error caused by voltage drop in test leads
- Transient capability, 100 microseconds to 10 seconds
- Repeating transients, repeating every 100 microseconds to 10 seconds, from 2 to 10,000 times
- Programmable leading and trailing ramps on output changes, from 100 microseconds to 10 seconds

SYSTEM INTEGRATION IS SIMPLE

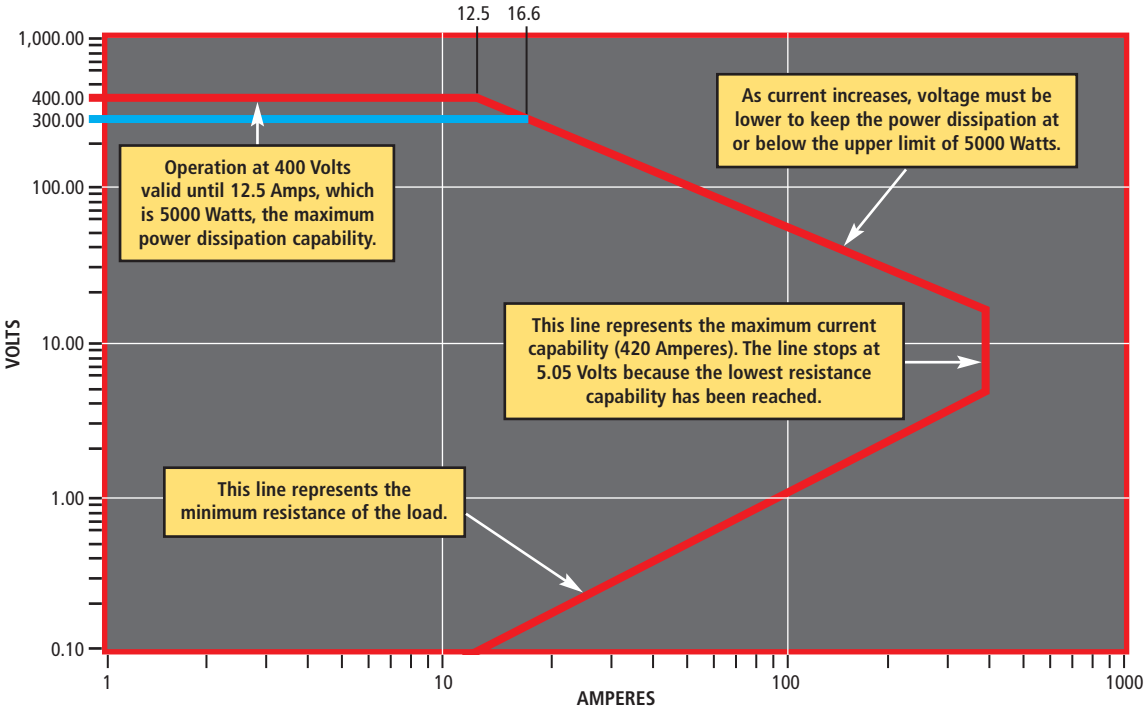
- Up to 60KW into one 8 ft. rack
- Control up to 15 slaves with one master (75KW)
- Computer controlled and/or front panel operation with display for voltage, current, power and status
- Simple operation - no deep menus to contend with

RELIABLE AND RUGGED

- High power semiconductors are heat sinked for cool operation
- Very low internal resistance ensures fast and clean switching operation
- Power devices individually fused for complete protection
- Internal thermal sensors ensure uniform power distribution for long reliability
- Isolated test bus allows a wide range of source (DUT) configurations

LabVIEW is a trademark of National Instruments Corp.

EXAMPLE OF SAFE OPERATING AREA FOR EL 5K-400-420



The load may be operated at any given input condition that is within the red line boundary.

For example:
If a 300 Volt source is to be tested, select the 300 Volt line (blue) and note the range of current allowable along that line.

In this example, the load may be operated at currents from near zero to a maximum of 16.6 Amperes @300V.

Refer to www.kepcopower.com/el-opcurve.pdf for operating curves of all EL models.

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Model EL 2K-200-200

Model EL 1K-200-100D

SERIES EL MODEL TABLE

MODEL NUMBER (1)(2)	OPERATING LIMITS			OVERLOAD PROTECTION			MINIMUM ON RESISTANCE ALL MODES Ohms	INPUT IMPEDENCE Ohms
	RATED POWER Watts	RATED VOLTAGE Volts	RATED CURRENT ALL MODES Amps	POWER (3) Watts	VOLTAGE (3) Volts	CURRENT (4) Amps		
1000 WATT MODELS AND 1000 WATT DUAL CHANNEL MODELS (5)								
EL 1K-50-125(5)	1000	50	125	1050	52.5	135	0.006	80K
EL 1K-200-100(5)	1000	200	100	1050	210	105	0.014	160K
EL 1K-400-70(5)	1000	400	70	1050	420	73.5	0.046	200K
EL 1K-600-30(5)	1000	600	30	1050	630	31.5	0.017	320K
2000 WATT MODELS AND 2000 WATT DUAL CHANNEL MODELS (5)								
EL 2K-50-250(5)	2000	50	250	2100	52.5	265	0.004	80K
EL 2K-200-200(5)	2000	200	200	2100	210	210	0.007	160K
EL 2K-400-140(5)	2000	400	140	2100	420	147	0.023	200K
EL 2K-600-60(5)	2000	600	60	2100	630	63	0.083	320K
3000 WATT MODELS								
EL 3K-50-400	3000	50	400	3150	52.5	420	0.0035	80K
EL 3K-200-300	3000	200	300	3150	210	315	0.005	160K
EL 3K-400-210	3000	400	210	3150	420	220.5	0.015	200K
EL 3K-600-90	3000	600	90	3150	630	94.5	0.056	320K
4000 WATT MODELS								
EL 4K-50-600	4000	50	600	525	52.5	630	0.002	80K
EL 4K-200-500	4000	200	500	2100	210	525	0.003	160K
EL 4K-400-350	4000	400	350	4200	420	367.5	0.009	200K
EL 4K-600-150	4000	600	150	4200	630	157.5	0.033	320K
5000 WATT MODELS								
EL 5K-50-800	5000	50	800	5250	52.5	835	0.002	80K
EL 5K-200-600	5000	200	600	5250	210	630	0.002	160K
EL 5K-400-420	5000	400	420	5250	420	441	0.008	200K
EL 5K-600-200	5000	600	200	5250	630	210	0.028	320K

(1) For GPIB interface, add suffix "G" to the model number. The GPIB interface is in addition to the standard RS-232 and USB interfaces, except for dual channel models the GPIB interface replaces the standard RS-232 and USB interfaces.
(2) For Ethernet interface (in addition to the standard RS-232 and USB interfaces), add suffix "E" to the model number.
(3) Maximum operating power and/or current may be reduced when ambient temperature exceeds 35°C depending on air flow, duty cycle of load operation and other situational specific conditions.
(4) Each FET is individually fused. Blown fuses are reported in unit status.
(5) For dual channel models (these models include two completely independent loads in a single chassis) add suffix "D" to the model number. Specifications listed are per channel for dual channel models.

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SERIES EL SPECIFICATIONS

SPECIFICATION		RATING/DESCRIPTION (1)	CONDITION
MODE CHARACTERISTICS			
Linearity vs. Programming Command			5-100% of Full Scale (3)
Constant Current Accuracy		±0.25%	
Constant Power Accuracy		±2%	
Constant Voltage Accuracy		±0.25%	
Constant Resistance Accuracy		±1%	
Constant Conductance Accuracy		±1%	
Regulation (2)			5-100% of Full Scale (3)
Constant Current		±0.25%	
Constant Power		±1%	
Constant Voltage		±0.25%	
Constant Resistance		±1%	
Constant Conductance		±1%	
Resolution (Via Computer Control)		14 Bits	
Current Readback (Current Mode)	Computer Accuracy	±0.25%	5-100% of Full Scale (3)
	Computer Resolution	±15 Bits	
Parameter Readback (Current and Voltage)	Accuracy	±0.25%	5-100% of Full Scale (3)
	Resolution	±15 Bits	
CONTROL CHARACTERISTICS			
USB Interface		Uses IEEE 488.2 and SCPI commands and queries	Requires no cost downloadable driver
RS 232 Interface			Baud rate: 38400 Parity: None Data Bits: 8 Stop Bits: 1 Echo: OFF
GPIB Interface			Add suffix "G" to model number for GPIB
Ethernet Interface			Add suffix "E" to model number for Ethernet
GENERAL CHARACTERISTICS			
a-c Line Power Input		120-240V a-c (108 to 264V a-c limits) 50-60 Hz, 200 Watts	
Operating Temperature		0°C to 40°C	
Dimensions (Load)		19"W x 7"H x24.5"D	
Weight (Load)		88 lbs.	
Storage Requirements		-20 to +60°C, 15 to 80% RH	Relatively dust free environment

(1) Specifications measured @ 23°C ambient.
(2) Regulation specified after 15 minutes of operation at set power level.
(3) Accuracy and regulation specifications are valid from 5% to 100% of full scale.
Accuracy is relative to full scale value and not the setpoint.

CE

1 YEAR WARRANTY

APPLICATIONS

AUTOMOTIVE - LIFE-CYCLE TESTING OF HYBRID CONTROL MODULES • FUEL CELL TEST
WINDMILL CHARACTERIZATION AND PERFORMANCE TESTING • WEAPONS BATTERY TESTS
HELICOPTER POWER GENERATOR FLIGHT LINE TEST
POWER SUPPLY TESTING • HIGH PERFORMANCE BATTERY TEST

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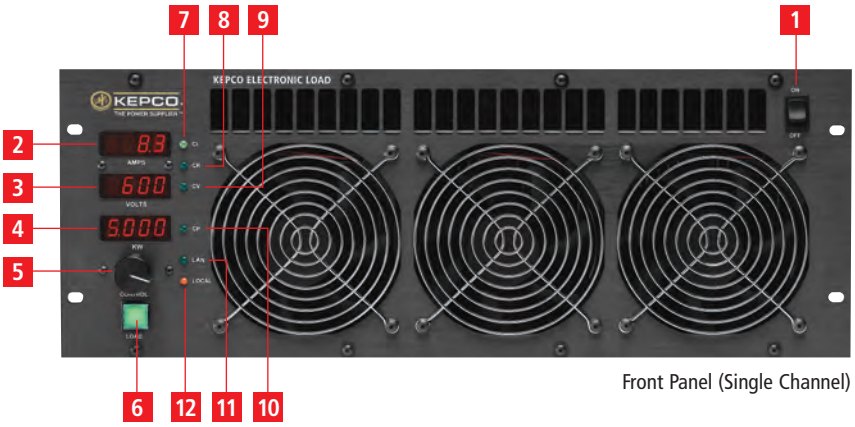
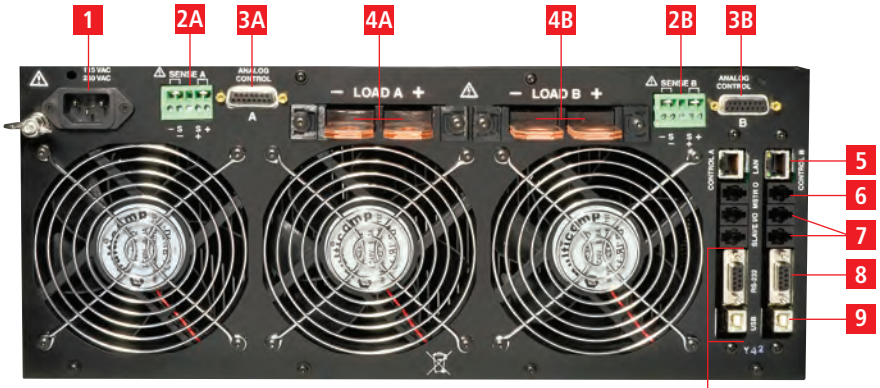
CONFIGURING AND OPERATING YOUR EL ELECTRONIC LOAD



Front Panel (Single Channel)



Rear Panel (Dual Channel, A & B)

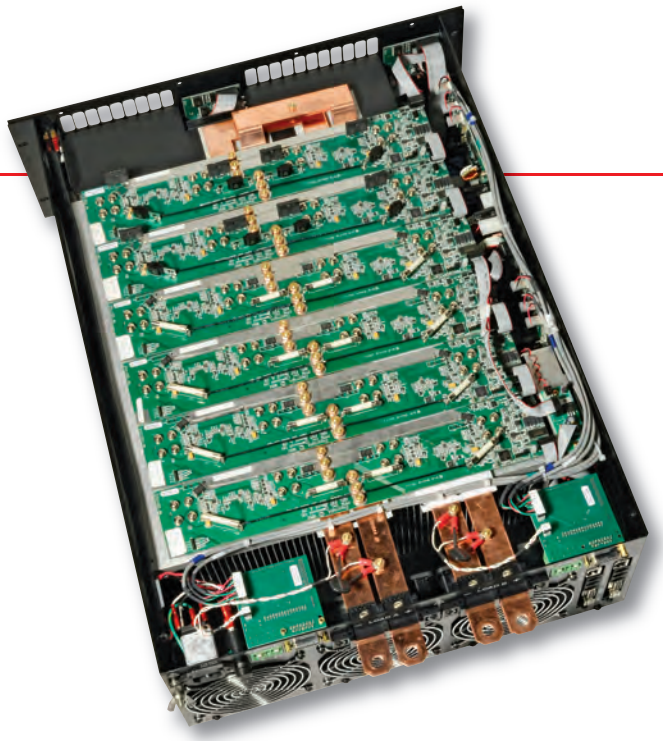
FRONT PANEL (SINGLE CHANNEL) CONTROLS AND INDICATORS

1. Power Switch
2. Current Display (Autorange)
3. Voltage Display (Autorange)
4. Power Display (Autorange)
5. Multifunction Control Knob
   Press to Select Mode
   Turn for Set Point
6. LOAD - Green for Standby
   Amber for Engaged
   Press to Engage/Disengage
   Flashing Red for Fault
7. LED Constant Current Mode (CI)
8. LED Constant Resistance Mode (CR)
   Blinks for Constant Conductance Mode (CS)
9. LED Constant Voltage Mode (CV)
10. LED Constant Power Mode (CP)
11. LED LAN (Lit When LAN Connected)
12. LED Local

All Mode LEDs Blinking ON - Short
All Mode LEDs OFF - Mode Off

REAR PANEL (DUAL CHANNEL, A & B) LAYOUT AND CONNECTIONS

1. a-c Input
2. Remote Sense Terminals
3. External Analog Control
4. Laminated Copper Buss
   LOAD Connection
5. Ethernet Option
6. Master (Out to Slave)
7. Slave Input/Output
8. RS-232 Interface
9. USB Port
10. GPIB Option (Not Shown)



UPGRADABLE AND DYNAMICALLY CONFIGURABLE

- Expand capability by adding Power FET modules
- Upgradable due to load's modular nature
- Interface enables field retrofits of firmware upgrades ensuring system is up-to-date
- Ethernet option facilitates remote access

Model EL 2K-600-60DE/Dual Channel Unit
This unit has all 6 FET modules in place.

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TABLE OF SAMPLE SOFTWARE COMMANDS FROM OVER 1000 IN YOUR SYSTEM

FUNCTION	PURPOSE	COMMAND EXAMPLE
OPERATION MANAGEMENT		
Mode	Selection of operating mode	MODE CURRent, MODE VOLTage, MODE POWer, MODE RESistance, MODE CONDuctance, MODE SHORt, MODE OFF
Load ON/Load OFF	Engage/Disengage load with device under test	INPut 1=ON, INPut 0=OFF
Set Parameter Value	Set current, voltage, power, resistance, conductance values	CURRent xxxx, POWer xxxx
Measure	Measure Voltage, Current, Power	MEASure:CURRent?, MEASure:VOLTage?
Protection	Allows setting maximum parameter values to protect the device under test as needed as well as minimum voltage	VOLTage:PROTection:UNDer xxxx VOLTage:PROTection:OVER xxxx
Damping Selection	12 different damping settings to allow optimizing the user's test	SYSTem:PFModule:DAMPing x, SYSTem:DAMPing x Where x is a number from 0 to 5 (min - max)
Transient Operation	To create a transient input change to a new level for a period of time and then return to the original setting. Can also be used to create multiple transients.	CURR:TRAN 10,.1,5,8 create 8-5 second transients. Each transient is .1 seconds at 10 amperes then return to original set point for 4.9 seconds.
Ramps	To change the fast response time of the EL (under 50 microseconds) to a period of 100 microseconds to 10 seconds.	SYST:RAMP.1 This is an absolute time of change and not in amperes per second to reduce calculation load on the test software.
SYSTEM MANAGEMENT		
Power FET Modules Installed	List power FET modules installed in EL	SYSTem:PFModule:LIST?
Display Power FET Status	Display FET temperatures, currents and fuse status	SYSTem:PFModule:STATus?
External Analog Control On/Off	Turn external analog input OFF or to one of two inputs: A high-speed hazardous input or isolated SELV	SYSTem:EXTernal 0 (disabled) SYSTem:EXTernal 1 (hazardous enabled) SYSTem:EXTernal 2 (isolated SELV enabled)

NOTE: System responds to short forms of all commands and queries. See instruction manual for details.

3/4 View
Single Channel Unit

3/4 View
Dual Channel Unit

A 60KW configuration. Consists of one 5kW master and 11 5kW slaves.

For more information visit
www.kepcopower.com/el.htm

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