

KEPCO'S HIGH VOLTAGE BHK-MG SERIES



FULL HALE



No matter how you rack it, we deliver the power.



BHK-MG models are designed for bench or rack mount use with both front and rear output terminals. Two operating modes are available: conventionally filtered (slow mode) for use as a fixed or slowly varied voltage source. In this mode, the output capacitor provides excellent energy storage to support transient loads. A fast mode is also available. In fast mode, the output capacitor is disconnected and the power supply depends on its fast-responding feedback loop to suppress ripple and noise. Fast mode is ideal for operation as a current source or as

a rapidly programmed voltage source where the energy storage of a conventional output capacitor would inhibit the output voltage's agility.

Control is either analog or digital. Analog control is based on the idea of an operational amplifier in which the power supply output is programmable from zero to maximum with a 0-10V signal. Digital control is IEEE 488.2 using a built-in interface that supports SCPI. Resolution is 12 bits and controls both voltage and current. A front panel keypad provides local

control. Both digital control (local or remote) and analog control can be inputted simultaneously.

The display is an alphanumeric two-line LCD which provides both setting values and actual voltage and current readings.

BHK-MG use a solid state FET-based high voltage output stage.

BHK-MG comply with EN61010-1 safety standard for measurement control and laboratory use equipment and carry the CE mark.

BHK-MG MODEL TABLE

| MODEL | d-c OUTPUT RANGE | | MAXIMUM OUTPUT POWER (WATTS) | OUTPUT IMPEDANCE SLOW MODE STRAPPING | | | | OUTPUT IMPEDANCE FAST MODE STRAPPING | | | |
|---------------------------|------------------|-------------------|------------------------------|--------------------------------------|--------------------|----------------------|---------|--------------------------------------|--------------------|----------------------|---------|
| | VOLTS | mA ⁽¹⁾ | | VOLTAGE MODE SERIES R | SLOW MODE SERIES L | CURRENT MODE SHUNT R | SHUNT C | VOLTAGE MODE SERIES R | FAST MODE SERIES L | CURRENT MODE SHUNT R | SHUNT C |
| 40 WATT HALF RACK | | | | | | | | | | | |
| BHK 300-130MG | 0-300 | 0-130 | 39 | 0.115Ω | 1.5mH | 15.4MΩ | 6.6μF | 0.115Ω | 2mH | 15.4MΩ | 9nF |
| BHK 500-80MG | 0-500 | 0-80 | 40 | 0.313Ω | 2.5mH | 41.7MΩ | 3μF | 0.313Ω | 3.6mH | 41.7MΩ | 8nF |
| BHK 1000-40MG | 0-1000 | 0-40 | 40 | 1.25Ω | 5mH | 166MΩ | .94μF | 1.25Ω | 6mH | 166MΩ | 2nF |
| BHK 2000-20MG | 0-2000 | 0-20 | 40 | 5Ω | 32mH | 666.7MΩ | 0.2μF | 5Ω | 35mH | 666.7MΩ | 1nF |
| 200 WATT FULL RACK | | | | | | | | | | | |
| BHK 300-0.6MG | 0-300 | 0-600 | 180 | 0.025Ω | 1.2mH | 3.33MΩ | 20μF | 0.025Ω | 2mH | 3.33MΩ | .013μF |
| | | 0-60 | 18 | | | 33.3MΩ | | | | 33.3MΩ | .008μF |
| BHK 500-0.4MG | 0-500 | 0-400 | 200 | 0.0625Ω | 2mH | 8.3MΩ | 10μF | 0.0625Ω | 3.6mH | 8.3MΩ | .012μF |
| | | 0-40 | 20 | | | 83MΩ | | | | 83MΩ | .007μF |
| BHK 1000-0.2MG | 0-1000 | 0-200 | 200 | 0.25Ω | 4mH | 33MΩ | 4μF | 0.25Ω | 6mH | 33MΩ | .005μF |
| | | 0-20 | 20 | | | 333MΩ | | | | 333MΩ | .003μF |
| BHK 2000-0.1MG | 0-2000 | 0-100 | 200 | 1Ω | 30mH | 133MΩ | 2μF | 1Ω | 35mH | 133MΩ | .002μF |
| | | 0-10 | 20 | | | 1333MΩ | | | | 1333MΩ | .001μF |

(1) The full rack BHK-MG have 10:1 current ranging. By command selection from the keypad or GPIB, the full 12-bit control resolution is available across 0-10% of the current rating.

Kepeco's BHK-MG are high voltage linear voltage-current stabilizers offered in two sizes: a 40 watt half-rack design and a 200 watt full-rack power supply. Outputs range from 0-300 volts to 0-2000 volts. Both digital and analog programming control is featured.

FEATURES

- Two sizes: half-rack 40 watts, full-rack 200 watts.
- FET output stage.
- Conventional filtering or fast response.
- Fast analog programming mode.
- Rapid recovery current mode in fast mode.
- Local control from panel-mounted keypad.
- Built-in GPIB, IEEE 488.2, 12 bits.
- Support for SCPI language.
- 2-line 16 character LCD display.
- Full read back of voltage and current on the bus.
- Increased resolution and accuracy (x10) for reading small current.
- Versatile output on/off port (40W only).
- Extensive protection circuitry.



BHK-MG are CE marked per the Low Voltage Directive (LVD), EN61010-1 and the EMC Directives.

| BHK-MG INPUT CHARACTERISTICS | | | | |
|---|------------------------------|---|-----------|---|
| SPECIFICATIONS | | RATING/DESCRIPTION | | CONDITION |
| | | 40W | 200W | |
| a-c Voltage | nominal | 115/230V a-c | | Single phase, switch selectable |
| | range | 105-125/210-250V a-c | | |
| Frequency | nominal | 50/60Hz | | |
| | range | 47-63Hz | | |
| Current | 115V a-c | 1A | <4.0A a-c | At nominal output power |
| | 230V a-c | 0.6A | <2.1A a-c | |
| Withstand Voltage | (All models) | 1350V a-c/1 min. | | Between shorted inputs and chassis |
| | 300V models | 1950V d-c/1 min. | | |
| | 500V models | 2250V d-c/1 min. | | Between shorted outputs and chassis |
| | 1000V models 2000V models | 2800V d-c/1 min. | | |
| Chassis Connection to Ground Resistance | | 100 mohms max. | | Between ground input connection and chassis @ 30A |
| Leakage Current | | 25 μ A rms/100 μ A p-p, for 115V a-c input voltage(chassis to earth-ground) | | |

| BHK-MG GENERAL (ENVIRONMENTAL) SPECIFICATIONS | | |
|---|--|--|
| SPECIFICATIONS | RATING/DESCRIPTION | CONDITION |
| Temperature | Operating | 0° to +50°C |
| | Storage | -20° to +75°C |
| Humidity | 0 to 95% RH | Non condensing operating & storage |
| Shock | 20g, 11msec \pm 50% half sine | Non operating, 3-axes 3 shocks each axis |
| Vibration | 5-10Hz 10mm double amplitude | Non operating, 3-axes 1 hour each axis |
| Cooling | Built-in fan, exhaust air to rear | |
| Remote Error Sensing (Default state is local sensing) | Provisions for 4-terminal (Kelvin) connections to load | |

| BHK-MG PHYSICAL CHARACTERISTICS | | | | |
|---------------------------------|---------|---|--|--|
| SPECIFICATIONS | | RATING/DESCRIPTION | | CONDITION |
| | | 40W | 200W | |
| Dimensions | English | 5.22" x 8.35" x 15.9" | 5.22" x 19" x 15" | Excludes handles, feet and connectors |
| | Metric | 133 x 212 x 404mm | 133 x 482.6 x 381mm | |
| Weight | English | 26 lbs. | 45 lbs. | Unpacked |
| | Metric | 12 Kg | 20 Kg | |
| a-c source connections | Front | Circuit breaker, 2-pole | | Interlock switch (200W)/proximity detector (40W) protects rear connections |
| | Rear | Detachable IEC 3-wire type connector interlock switch (200W only) | | |
| d-c output terminals | Front | Jacks (2) | | \pm Output |
| | Rear | Terminal blocks (11 positions) | | \pm Output, \pm sense, ground, grounding network, internal capacitor (-) |
| Control | Local | Digital control using front panel keypad | | |
| | Remote | Digital control using rear panel IEEE 488 bus (24 pin female connector). Analog control using two rear panel terminal strips (10 positions each) for voltage and current. | | |
| Digital display front panel | | Voltage, current, mode, status, menu, program | 2 x 16 character alphanumeric LCD, LED backlight | |
| Output display | | Output voltage is displayed with two decimals for 300 and 500V models and one decimal for 1000 and 2000V models. Output current for 200W (high current scale) and 40W (300V model) is displayed with two decimals. 200W (low current scale) and all other 40W models are displayed with three decimals. | | |



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BHK-MG OUTPUT CHARACTERISTICS

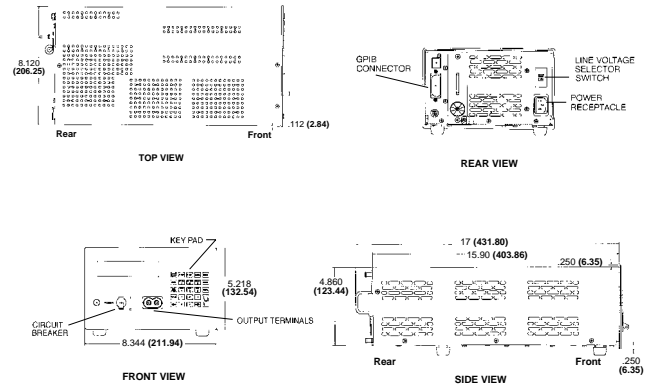
| SPECIFICATIONS | | RATING/DESCRIPTION | CONDITION |
|---|--|---|---|
| Type of Stabilizer | | Linear/automatic crossover | Voltage/Current |
| Adjustment Range | Voltage | 0 to 100% E_o max | Analog or digital, 12 bit |
| | Current (Source) | 0 to 100% I_o max | Use menu program to change current scale |
| | | 0 to 10% I_o max (200W models only) | |
| Current (Sink) | 50% I_o max (200W) 100% I_o max (40W) | Fixed value not calibrated | |
| Programming Resolution | Voltage | 0.025% E_o max | Current measurement requires a calibrated shunt |
| | Current | 0.025% I_o max | |
| Programming Accuracy | Voltage | <0.025% E_o max | Both current scales (200W models) |
| | Current | <0.05% I_o max | |
| Data Readback Accuracy | Voltage | <0.05% E_o max | Both current scales (200W models) |
| | Current | <0.05% I_o max | |
| Source Effect | Voltage | <0.001% E_o max | Input voltage 105-125/210-250V a-c |
| | Current | <0.002% I_o max | |
| Load Effect | Voltage | <0.005% E_o max | no load-full load short-full load |
| | Current | <0.015% I_o max | |
| Temperature Effect | Voltage | <0.01% E_o max | Per °C (0 to 50°C) |
| | Current | <0.02% I_o max | |
| Time Effect | Voltage | <0.01% E_o max | 0.5-8.5 hours |
| | Current | <0.02% I_o max (5) | |
| Ripple/Noise | Fast Mode | 0.002%/0.02% E_o max | See Note 6 |
| | Slow Mode | 0.001%/0.01% E_o max | |
| Programming Rise/Fall Time (Fast mode) | Voltage | 180 μ sec | See Note 1 |
| | Current | 200 μ sec | |
| Transient Voltage Recovery Time for Load Change | Fast Mode | 1 msec | See Note 2 |
| | Slow Mode | 15 msec | |
| Small Signal 3dB Bandwidth | Voltage | 2.5KHz | See Note 3 |
| | Current | 2.3KHz | |
| Slew Rate of the Output Voltage (Fast mode) | Voltage | >0.015 x E_o max V/ μ sec | High range |
| | Current | >0.03 x E_o max V/ μ sec | |
| Overshoot | | None | Turn ON/OFF |
| Remote Sensing Range | | 0.5V d-c per lead | |
| d-c Isolation Voltage | 300V models | 1KV d-c or p-p plus max. output voltage | Between each output terminal and chassis |
| | 500V models | | |
| | 1000V models | | |
| Enable/Disable Output Power | Local | Front panel keypad | See Note 7 |
| | Remote | IEEE 488 (GPIB) bus | |
| Output Display | | Local 2 x 16 character alphanumeric backlit LCD | |
| Series Connection | | Automatic or master-slave operation, limited by the d-c isolation limit voltage | For slave unit, use analog programming only |
| Parallel Connection | | Automatic or master-slave operation | For slave unit, use analog programming only |

OUTLINE DIMENSIONAL DRAWINGS

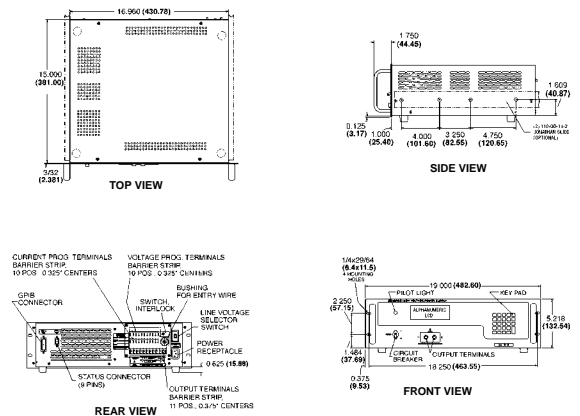
Fractional dimensions in light face type are in inches, dimensions in bold face type are in millimeters.

Tolerance: $\pm 1/64"$ (0.4) between mounting holes, $\pm 1/32"$ (0.8) other dimensions

BHK-MG HALF-RACK MODELS



BHK-MG FULL-RACK MODELS



Note 1: Load = E_o max / I_o max. V_{out} between 0- E_o max. The programming time is measured between 10% and 90% of E_o max or I_o max.

Note 2: Voltage mode, load switched from open circuit to I_o max. at $E_o = 200V$. Current mode, load switched from short circuit to 200V at I_o max.

Note 3: For maximum load (E_o max / I_o max) with a d-c bias of 200V set by the keypad and an analog input sinusoid = 0.2V rms measured at the analog input terminals.

Note 4: For maximum load (E_o max / I_o max) with a d-c current bias = 200 x I_o max / E_o max set by the keypad and an analog input sinusoid = 0.2V rms measured at the analog input terminals.

Note 5: 0.05% for BHK 300-0.6MG.

Note 6: With minus terminal grounded, common mode current does not flow through either the load or the current sensing resistor.

Note 7: 200W models: Acts on digital programming only; 40W models: Versatile output on/off port (digital/relay contacts) acts on both analog and digital programming.