BQ Series
10 kW Regulated High Voltage DC Power Supplies

15 kV to 100 kV Rack Mount CE Compliant

Parallelable To 50 kW

200, 380, 415 & 480 VAC input Options

Fully RoHS Compliant

The BQ family are sophisticated, 10 kW, high voltage power supplies with low ripple and noise. They are air insulated, fast response units, with tight regulation.

Please refer to Technology > Applications page on our web site for typical applications.

The BQ Series are fully compliant with the following European Harmonized EMI Directives:

- EN61010/ IEC61010, Safety
- EN61000-6-4, Conducted and Radiated Emissions
- EN61000-6-2:2005, Conducted and Radiated Immunity
- 2011/65/EU, Restriction of the use of Hazardous Substances (RoHS)

Models from 0 to 15 kV through 0 to 100 kV, 12.25" H x 19" W x 24.0" D, 88 lbs.

Features:

Arc Quench. The HV output is inhibited for a short period after each load arc to help extinguish the arc.

Arc Count. Internal circuitry constantly senses and integrates arcs that occur over a given time. In the event a system or load arcing problem develops and exceeds factory-set parameters, the power supply will cycle off in an attempt to clear the fault and then automatically restart after a preset "off dwell time".

Pulse-Width Modulation. Off-the-line pulse-width modulation provides high efficiency and a reduced parts count for improved reliability.

Low Ripple. Ripple is typically less than 0.05% RMS of rated voltage at full load.

Air Insulated. The BQ Series features "air" as the primary dielectric medium. No oil or encapsulation is used to impede serviceability or increase weight.

Input Voltage. 208 VAC standard. 380, 415 & 480 VAC optional.

Parallelable. One master supply and up to 4 slave supplies for a maximum of 50 kW.

Constant Voltage/Constant Current Operation. Automatic crossover from constant-voltage to constant-current regulation provides protection against overloads, arcs, and short circuits.

Constant Current/Current Trip. A rear panel switch allows selection of either current mode.

Redundant Thermal Overload Protection. Thermostats and fan RPM sensing shut down the power supply due to over temperature or reduced fan speeds.

Tight Regulation. Voltage regulation is typically better than 0.005% for allowable line variations and 0.01% for allowable load variations.

Warranty. All power supplies are warranted for three years. A formal warranty statement is available.

Specifications

(Specifications apply from 5% to 100% rated voltage. Operation is guaranteed down to zero voltage with a slight degradation of performance.)

Input: 187 - 228 V RMS, three-phase, 48-63 Hz, 16.0 kVA maximum at full load (less than 45 A/phase). Inrush current is less than 150 A. A five position terminal strip is provided for AC line conection. **Mains service must be protected with fuses or circuit breakers with a maximum rating of 125 A for 208 VAC models & 100 A for 380 through 480 VAC models.**

Efficiency: Typically greater than 80% at full load.

Output: Continuous, stable adjustment from 0 to rated voltage/current by means of panel-mounted 10-turn potentiometers (0.05% resolution), or external 0 to +10 V signals. Repeatability better than 0.1% of setting. Voltage programming accuracy is 0.5% of setting + 0.2% of rated output.

Line Regulation: < +/- 0.005% of rated output for a +/-10% input line variation.

Load Regulation:

<70 kV Models: < +/- 0.01%

70-100 kV Models: < +/- 0.02%

of rated output for a no load to full load change.

Dynamic Voltage Regulation: For load transients from 10% to 99% and 99% to 10%, typical deviation is less than 2% of rated output voltage with recovery to within 1% in 500 µs and recovery to within 0.1% in 1 ms.

Ripple: < 0.05% RMS of rated output voltage.

Voltage Monitor: 0 to +10 V equivalent to 0 to rated voltage. Accuracy: 0.5% of reading + 0.2% of rating. Output impedance is 10 K Ohm.

Current Monitor: 0 to +10 V equivalent to 0 to rated current. Accuracy: 1% of setting plus 0.1% of rated output. Output impedance is 10 K ohm.

Stability: 0.01% per hour after 1/2 hour warm-up, 0.05% per 8 hours.

Voltage Rise/Decay Time Constant: 200 ms typical, using either HV enable or remote programming control with a 6% minimum load.

Temperature Coefficient: 0.01%/° C.

Ambient Temperature: -20 to +40° C, operating; -40 to +85° C, storage.

Polarity: Available with either positive, negative or reversible polarity.

Protection: Automatic current regulation protects against all overloads, including arcs and short circuits. Thermal switches and rpm sensing fans protect against thermal overload. Circuit breaker, fuses, surge-limiting resistors, and low energy components provide ultimate protection.

Arc Quench. An arc quench feature provides sensing of each load arc and quickly inhibits the HV output for approximately 20 ms after each arc.

Arc Count: Internal circuitry senses the number of arcs caused by external load discharges. If the rate of consecutive arcs exceeds approximately one arc per second for five arcs, the supply will turn off for approximately five seconds to allow clearance of the fault. After this period, the supply will return automatically to the programmed output voltage value with the voltage rise time constant indicated. If the load fault still exists, the above cycle will be repeated.

Current Limit: In current limit mode the power supply will regulate the load current at the programmed current level with automatic crossover between voltage and current regulating modes.

Current Trip: A switch located on the rear of the control panel assembly allows the selection of current limit or current trip operation. When the switch is set to current trip mode, the HV output will disable and latch off when the load current reaches the programmed current level. Reset is accomplished by either cycling the AC power, toggling the HV enable signal, or by pushing the HV off/reset and then the HV on switches.

Front Panel Elements: The front panel contains all local control functions and indicators. These are: AC power on/off circuit breaker and indicator light, separate 10-turn controls with locking vernier dials used to set voltage and current levels, high voltage on switch, and high voltage off/reset switch. LED's indicate: when high voltage is on, output polarity, interlock, fault status, and whether the supply is operating in a voltage or current regulating mode. Output levels are indicated by voltage and current digital meters.

Rear Panel Elements: The rear panel contains the AC mains input connections with safety cover, AC power indicator, HV output, ¼-20 ground return stud, CL/CT switch, 25 pin "D" interface connector, and a 12 position terminal strip. The terminal strip provides local/remote signal selection, interlock, and remote HV ON/OFF functions.

Slave Front Panel Elements (20 - 50 kW Models): AC power on/off circuit breaker and indicator light, Bias, Tracking (Overvoltage), System, and thermal overload/low fan speed indicators and Slave voltage and current test points.

Remote Control Interface: All BQ family power supplies provide a standard user's remote interface.

The signals provided are:

Inputs: Safety interlock, output voltage and current program signals, high voltage enable and connections for remote HV on and off pushbuttons

Outputs: Output voltage and current monitor signals, HV enable status, I/V regulation mode status, fault status, and a +10 V reference source. Signal common and ground reference terminals are also provided.

Optional Interfaces:

RS-232/USB/Ethernet computer interface (external add on assembly).

External Interlock: Open = off, closed = on. Normally latching except for "NC" option supplies where it is non-latching. The interlock indicator LED is lit when the interlock is open.

HV Enable:

Remote Mode: 0 - 1.5 V = OFF, 2.5 - 15 V = ON.

Local Mode: The HV output is permanently enabled.

HV Status, Fault and I/V Regulation Status: Each are a set of form "C" relay contacts.

Accessories: Detachable, 8 foot, shielded high voltage coaxial cable is provided. A 25 pin D-subminiature connector for customer or computer interface is provided.

Size: 12.25"H X 19"W X 24"D rack mounted chassis. Forced air cooling is employed.

Weight: 88 lbs.

Options

Symbol	Description
200	180 to 220 VRMS, 3-phase input, 48-63 Hz, derate output current by 10%
380	342 to 440 VRMS, 3-phase input, 48-63 Hz
415-50	370 to 460 VRMS, 3-phase input, 48-52 Hz
480-60	430 to 530 VRMS, 3-phase input, 57-63 Hz
5VC	0-5 V voltage and current program/monitor.
NC	Blank front panel, AC power breaker/switch and indicator only,

Symbol	Description
SS	Slow start ramp. Specify standard times of 5, 10, 15, 20, or 30 seconds ± 20% .
ZR	Zero start interlock. Voltage control, local or remote, must be at zero before HV will enable.
K01	RS-232/USB control and monitor
K02	RS-232/USB/Ethernet control and monitor

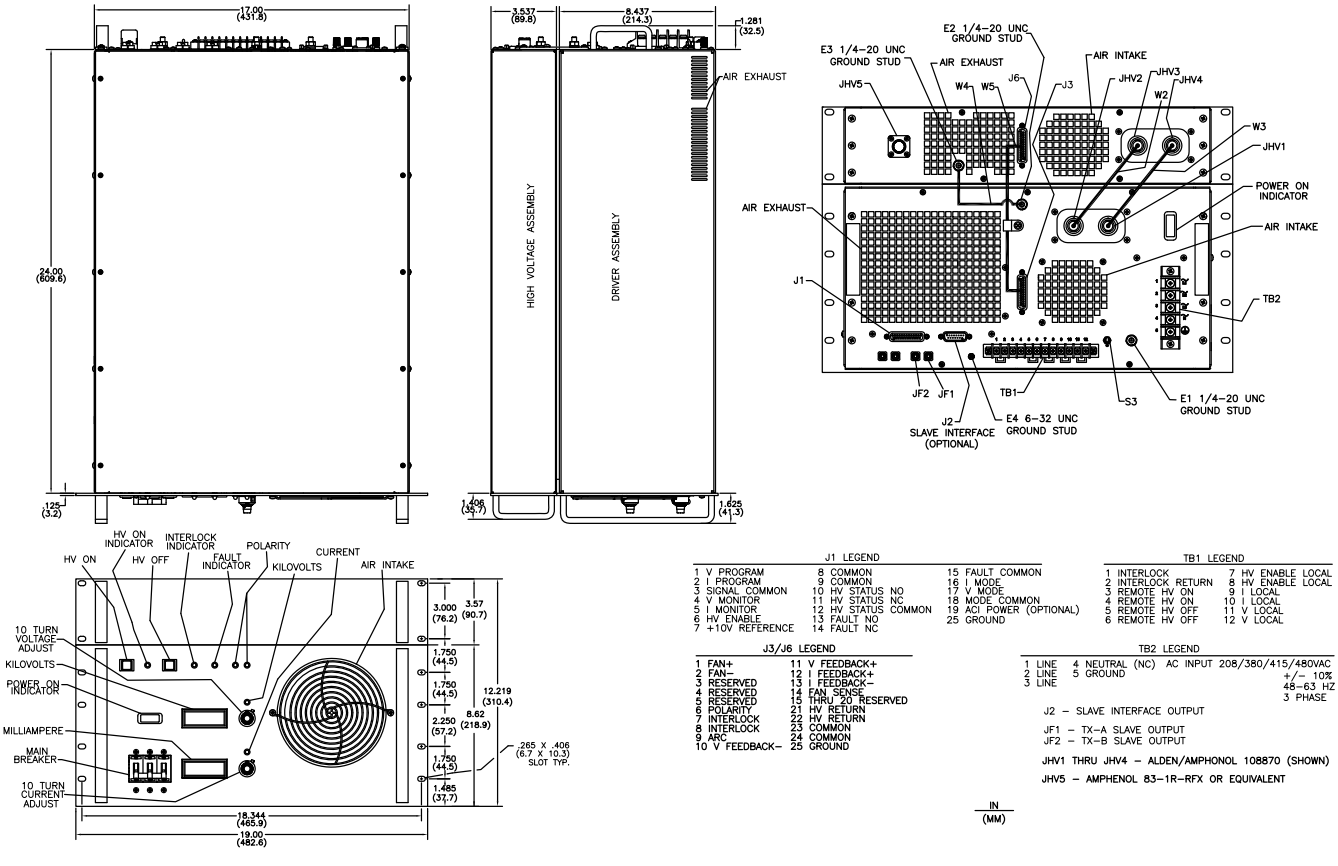
Please consult factory for special requirements.

Models

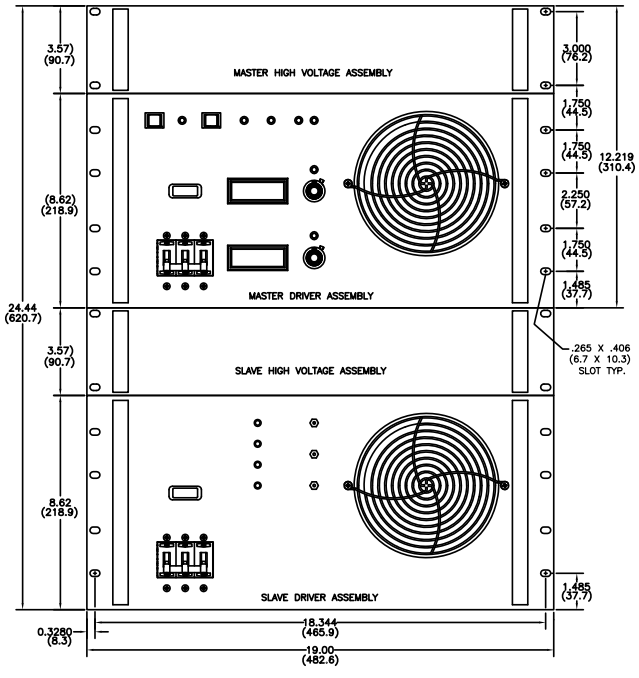
Positive Polarity	Negative Polarity	Reversible Polarity	Output Voltage (kV)	Output Current (mA)	Max Stored Energy (J)	Output Cable
BQ15P670	BQ15N670	BQ15R670	0 - 15	0 - 670	13	DS2124
BQ20P500	BQ20N500	BQ20R500	0 - 20	0 - 500	19	DS2124
BQ25P400	BQ25N400	BQ25R400	0 - 25	0 - 400	20	DS2124
BQ30P340	BQ30N340	BQ30R340	0 - 30	0 - 340	24	DS2124
BQ40P250	BQ40N250	BQ40R250	0 - 40	0 - 250	21	DS2124
BQ50P200	BQ50N200	BQ50R200	0 - 50	0 - 200	27	DS2124
BQ60P170	BQ60N170	BQ60R170	0 - 60	0 - 170	32	DS2124
BQ70P145	BQ70N145	BQ70R145	0 - 70	0 - 145	38	DS2124
BQ80P125	BQ80N125	BQ80R125	0 - 80	0 - 125	43	DS2124
BQ100P100	BQ100N100	BQ100R100	0 - 100	0 - 100	60	DS2124

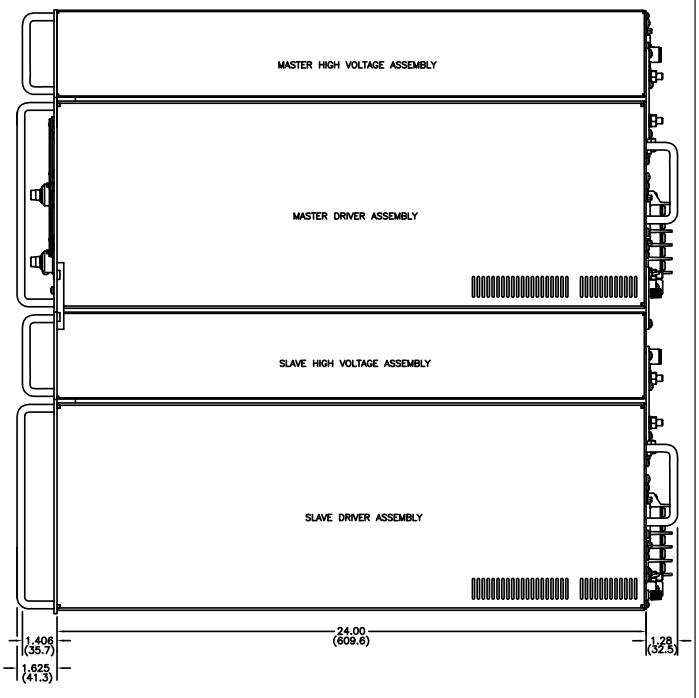
Outline

For Models Greater Than 10 kW, Please Consult Factory.

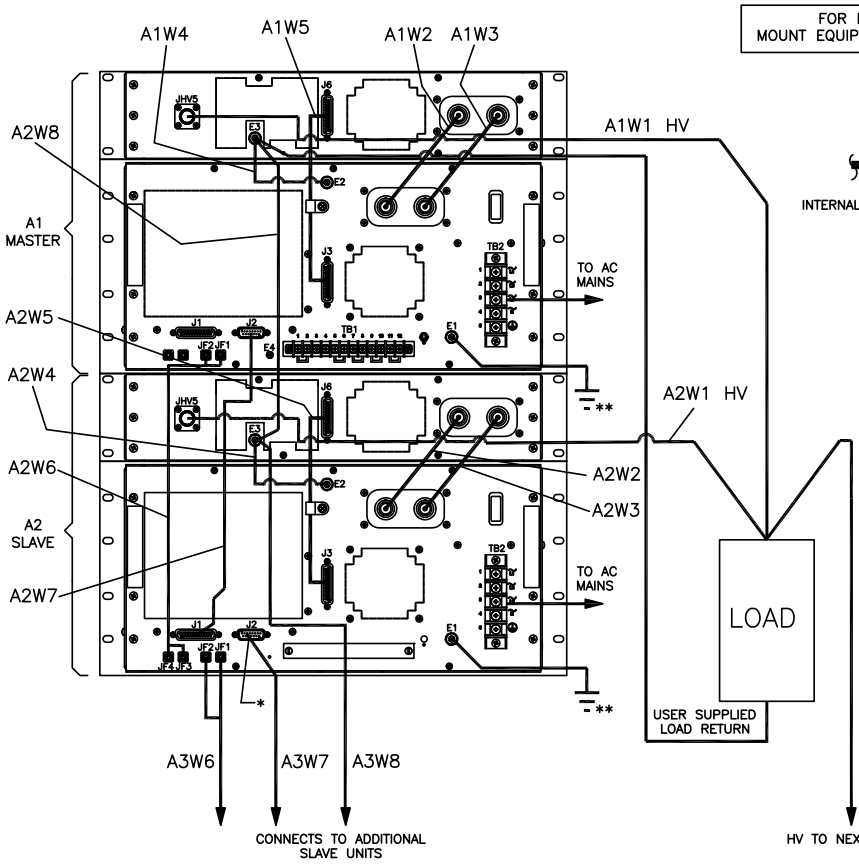


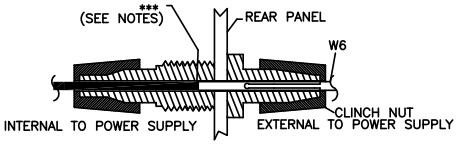
Slave and System Outline





FOR PROPER INSTALLATION, IT IS RECOMMENDED TO MOUNT EQUIPMENT IN A RACK CABINET OR BENCH TOP ENCLOSURE





JF1 THRU JF4 DETAIL
(FOR FIBER OPTIC CABLE INSTALLATION)

MASTER

E1	–	EARTH GROUND
E2	–	GROUND
E3	–	LOAD RETURN GROUND
E4	–	GROUND
JHV1–JHV4	–	HIGH VOLTAGE AC
JHV5	–	HIGH VOLTAGE OUTPUT
J1	–	SIGNAL INTERFACE
J2	–	SLAVE INTERFACE OUTPUT
J3/J6	–	FEEDBACK INTERFACE
TB1	–	SIGNAL INTERFACE
TB2	–	AC INPUT
JF1	–	TX–A OUTPUT
JF2	–	TX–B OUTPUT

SLAVE(S) TYP.

E1	–	EARTH GROUND
E2	–	GROUND
E3	–	GROUND
JHV1–JHV4	–	HIGH VOLTAGE AC
JHV5	–	HIGH VOLTAGE OUTPUT
J1	–	SLAVE INTERFACE INPUT
*J2	–	SLAVE INTERFACE OUTPUT
J3/J6	–	FEEDBACK INTERFACE
TB2	–	AC INPUT
JF1	–	TX–A OUTPUT
JF2	–	TX–B OUTPUT
JF3	–	RX–A INPUT
JF4	–	RX–B INPUT