

# GX Series 25 kW Regulated High Voltage DC Power Supplies

## 1 kV to 100 kV Rack Mount

## CE Compliant

## Fully RoHS Compliant

The GX family of power supplies are sophisticated, 25 kW through 200 kW 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 GX Series are fully compliant with the following European Directives:

EN61010-1/IEC61010-1, Safety  
EN61000-6-4, Conducted and Radiated Emissions  
EN61000-6-2, Conducted and Radiated Immunity  
2011/65/EU, Restriction of the use of Hazardous Substances (RoHS)



Models from 0 to 1 kV through 0 to 100 kV, 19.25" H x 19" W x 24" D, 120 lbs.

### Features:

**Input.** 480 VAC 3 phase standard. 380 & 415 VAC optional.

**Controls and Interface.** Microcontroller based Front Panel Control and Communication Interface.

Integral RS232/USB serial ports and optional Ethernet Interface.

High resolution voltage and current programming with either front panel digital encoders or analog remote interface.

**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.

**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 a 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 time interval.

**Cooling.** Forced air, enhanced reliability system with redundant thermal overload protection including temperature sensing and fan speed monitor.

**Parallel Operation.** Master/Slave configuration up to 200kw. Please consult the factory for additional details.

**Last Setting Memory.** The unit stores power supply parameters at each AC turn off sequence. Stored parameter are: Output Voltage Setting and Output Current Setting.

**Low Ripple.** Ripple is typically less than 0.1% RMS of rated voltage at full load.

**Air Insulated.** Air is the prime dielectric medium. No oil or encapsulation is used to impede serviceability or increase weight.

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

## Specifications

The specifications herein apply from 5% to 100% of rated voltage for a 25kW standalone power supply.

**Input Rating:** Standard 3 Phase, 480VAC (+/-) 10%, 48-63Hz, 35 kVA max, less than 45 A RMS per phase. Inrush current is less than 50 A peak. A five position terminal strip is provided for AC line connection. **Mains service must be protected with fuses or circuit breakers with a maximum rating of 175 A**

**Efficiency:** Typically > 80% at full load.

**Output:** Continuous, stable adjustment, from 0 to rated voltage or current by panel mounted optical rotary encoder or by external 0 to +10V signals. Voltage programming accuracy is 0.5% of setting + 0.2% of rated. Optical rotary encoder resolution: 0.025% of rated with "Fine Adjustment" mode selected. 0.25% of rated with "Coarse Adjustment" mode (default).

**Line Regulation:** Better than 0.01% of rating for +/-10% input variation, constant load.

**Static Voltage Load Regulation:** Better than 0.01% rating + TBD mV/A for full load to no load variation.

**Current Regulation:** Better than 0.5% of the rating for short circuit to rated output voltage variation, at any load condition.

**Dynamic Voltage Regulation:** Typical deviation is:

- 8 to 100 kV: 2% of rating.

- 1 to 6 kV: TBD% of rating.

The recovery to within 1% of rating is 500  $\mu$ s and within 0.1% in 1 ms for load transients from 10% to 100% and 100% to 10%.

**Ripple (RMS):**

- 5kV to 100kV: Max. 0.1% of rated voltage at full load +1V RMS.

- 1kV to 3kV: Max. TBD% of rated voltage at full load +TBD V RMS.

**Temperature Coefficient:** Max. 100ppm per deg C following 30min warm up.

**Stability:** Max. 0.05% of rated over 8 hours' time interval, following 30min warm up.

**Voltage Rise Time Constant:** Typical 200 ms for 15kV to 100kV models and 50ms for 1kV to 12kV models, using any HV enable.

**Voltage Decay Time Constant:** Decay time constant is function of the applied load. The decay time constant will be equal to the rise time constant with a minimum load of 5%.

**Polarity:** Available with either Positive or Negative polarity with respect to chassis ground.

**Parallel operation:** Up to 8 units can be con-

nected in parallel providing active current sharing with dedicated master – slave configuration.

**Analog Voltage Monitor:** 0 to +10 V, equals 0 to rated voltage, with an accuracy of .5% of reading + 0.2% of rated. Output impedance is 10kOhm.

**Analog Current Monitor:** 0 to +10 V, equals 0 to Rated current, with an accuracy of:

- 1 to 6kV: 1.5% of reading + .5% of rated.

- 8 to 100kV: 1% of reading + .5% of rated.

Output impedance is 10kOhm.

**RS232/485 Programming and Monitor**

**Accuracy:**

**Resolution:** 0.025% of full scale for both the voltage and the current channels.

**Remote setting accuracy:** Voltage setting accuracy is better than 0.5% of setting + 0.2% of rated. Current setting accuracy is better than 0.5% of setting + 0.5% of rated.

**Remote reading accuracy:** Voltage reading accuracy is 0.5% of reading + 0.2% of rated. Current reading accuracy is:

- 1 to 6kV: 1.5% of reading + .5% of rated.

- 8 to 100kV: 1% of reading + .5% of rated.

**High Voltage Interlock:** An external contact, referenced to Common. It is a "must make" contact for the output to be enabled. (Open = Output Off; Closed = Output ON). The interlock is normally a latching function for the High Voltage ON (HV ON) command. It defaults to a non-latching toggle function when the "NC" option is selected or when the HV ON button on the front panel is bypassed for the alternative remote command.

**Current Limit:** When the rear panel switch, S1, is set to CURRENT LIMIT (CL), the power supply will limit and regulate the load current with automatic crossover between voltage and current regulating modes.

**Current Trip:** When this switch is set to CURRENT TRIP (CT), the unit will shut down and latch off when the load current equals or exceeds the programmed value.

**Over temperature:** Shuts down and latches the unit in OFF state upon exceeding the internally measured temperature threshold or sensing a defective fan. The fault indicator will be activated.

**Input Under Voltage:** Will prevent the Power Stage circuit from operating without all 3 line voltages active. When this happens, the output will shut down and recovers automatically when the normal input line condition is restored. The fault indicator will be activated during the shutdown period.

**DC Under Voltage (DCUV):** Will prevent the Power Stage circuit from operating with DC bus voltage below the operating level When this hap-

pens, the output will shut down and recovers automatically when the normal input line condition is restored. The fault indicator will be activated during the shutdown period.

**Power Block Desaturation:** The IGBT power block control has the capability to sense an excessive current variation rate in its conduction state and turn off the conversion cycle to avoid a shoot thru condition.

**Arc Count:** Internal circuitry senses the number of arcs caused by the external load characteristics. If the rate of consecutive arcs exceeds approximately 1 per second, for at least 5 arcs, the supply will turn off for approximately 5 seconds to allow clearance of the faulty load condition. Custom modifications of this feature are available. Consult the factory.

**Arc Quench:** When an arc occurs, the output is inhibited for approximately 20ms to allow clearance of the fault.

**Front Panel Elements.**

Output voltage display: 3.5 Digits.

Output current display: 3.5 Digits.

**Indicators:**

Current Mode Indicator: Green LED,

Voltage Mode Indicator: Green LED,

Fault Indicator: Red LED,

Fine Adjustment Indicator: Amber LED,

Preset Indicator: Amber LED,

Remote Program Indicator: Green LED,

Remote Enable Indicator: Green LED

Polarity + Indicator: Green LED

Polarity - Indicator: Green LED

HV ON Indicator: Red LED.

HV OFF Indicator: Amber LED

AC Power On lamp: Amber.

Switches (momentary): Remote Program,

Remote Enable, Fine Adjustment, Preset, HV ON, HV OFF.

Rotary Encoders: Voltage, Current, fine or

coarse adjustments

AC Power Circuit Breaker

**Rear Panel Elements.**

DRIVER CHASSIS, MASTER/STAND ALONE: AC

Power Terminal Block: Screw Terminal with

safety cover; GND stud; AC ON indicator; 15

pin "D" connector for HV signals; 9 pin "D"

connector for HV fans; 25 pin "D" connector for

customer interface; 3 pin Interlock terminal

block; RS232/RJ45 connector; USB connector;

Ethernet Port.(Optional); CL/CT switch; Four

HVAC output connectors that connect the dri-

ver to the HV Chassis, 15 pin "D" Slave

Interface connector; 9 pin "D" Slave Control

connector.

DRIVER CHASSIS, SLAVE: AC Power Terminal Block: Screw Terminal with safety cover; GND stud; AC ON indicator; 15 pin "D" connector for HV signals; 9 pin "D" connector for HV fans; 2 X 15 pin "D" Slave Interface connector; 2 X 9 pin "D" Slave Control connector; Four HVAC output connectors that connect the driver to the HV Chassis.

HV CHASSIS: 4 x HVAC input connectors; ¼-20 GND return stud; 15 pin "D" HV signal connector; 9 pin "D" HV fan connector; HV output connector.(See Model Chart)

**Analog Customer Interface (Driver, Rear panel J3 connector)**

**Analog control signals:** 0 to 10 V, Voltage Program and Monitor, Current Program and Monitor and 10V Reference.

**Logic Control Signals:** Implemented with TTL compatible, 0 to 5.5 V CMOS, positive logic circuitry.

HV ON RMT: implemented by a "Dry Contact" function. The momentary connection of these pins will bypass the HV ON button on the front panel and turn the output HV on.

HV ENABLE input: Active in Remote Analog control. HIGH for HV Output Enable.

MODE STATUS indicator: LOW / HIGH indicates that output is in Current/ Voltage Mode.

FAULT indicator: Active HIGH, indicates a fault condition. The continuously monitored faults are: Input under-voltage, DC under-voltage, Over Temperature, Power Module and Fan failure.

HV STATUS indicator: LOW /HIGH indicates that Output is OFF/ ON.

**Operating Temperature:** 0 to +40 deg C, full load.

**Operating Humidity:** 30 – 90% RH (no condensation)

**Storage Temperature:** -20 to +70 deg C

**Storage Humidity:** 10 – 95 % RH (no condensation)

**Altitude:** For operation at Max. 5,000 ft.

**Cooling:** Forced air cooling with internal fans

**Dimensions (W X H X D):**

**DRIVER** 19" X 14" X 24"

**HV CHASSIS** 19" X 5.25" X 24"

Refer to the outline drawing.

**Weight:** 120 lbs (55 kg)

**Accessories:** Accessories: Remote interface mating connector; detachable, 8 foot, shielded high voltage coaxial cable. (See Model Chart for cable type); 10' null-modem RS232 cable; 10' A/B –STD USB cable. Terminator Plug; Software CD. All chassis interconnect cables are provided.

## Options

**380VAC** 3 Phase Input, 380VAC +/- 10%. The RMS rated current is less than 60A@345Vrms

**415VAC** 3 Phase Input, 415VAC +/- 10%. The RMS rated current is less than 55A@375Vrms

**ZR** Zero start Interlock. Voltage control, local or remote, must be at zero before HV will enable.

**SS** Slow Start Ramp. Fixed value settable in firmware, Specify standard times of 5, 10, 15, 20, or 30 seconds.

**NC** Blank front panel

**5VC** 0 - 5V voltage and current program/monitor.

**ETH** Virtual RS-232 com port over ethernet network. Requires compatible OS (eg Windows).

## Models

Positive Polarity	Negative Polarity	Reversible Polarity	Voltage (kV)	Current (A)	Stored Energy (J)	Output Cable/ Connector
GX1P25.0	GX1N25.0	GX1R25.0	0 – 1kV	25.0	TBD	TBD
GX1.5P16.5	GX1.5N16.5	GX1.5R16.5	0 – 1.5kV	16.5	TBD	TBD
GX2P12.5	GX2N12.5	GX2R12.5	0 – 2kV	12.5	TBD	TBD
GX3P8.35	GX3NP8.35	GX3RP8.35	0 – 3kV	8.35	TBD	TBD
GX5P5.0	GX5N5.0	GX5R5.0	0 – 5kV	5.00	12	RG-8U
GX6P4.15	GX6N4.15	GX6R4.15	0 – 6kV	4.15	16	RG-8U
GX8P3.15	GX8N3.15	GX8R3.15	0 – 8kV	3.15	12	RG-8U
GX10P2.5	GX10N2.5	GX10R2.5	0 – 10kV	2.50	17	RG-8U
GX12P2.10	GX12N2.10	GX12R2.10	0 – 12kV	2.10	22	RG-8U
GX15P1.65	GX15N1.65	GX15R1.65	0 – 15kV	1.65	TBD	RG-8U
GX20P1.25	GX20N1.25	GX20R1.25	0 – 20kV	1.250	TBD	RG-8U
GX25P1.0	GX25N1.0	GX25R1.0	0 – 25kV	1.000	TBD	RG-8U
GX30P835	GX30N835	GX30R835	0 – 30kV	0.835	TBD	RG-8U
GX40P625	GX40N625	GX40R625	0 – 40kV	0.625	28	RG-8U
GX50P500	GX50N500	GX50R500	0 – 50kV	0.500	34	RG-8U
GX60P415	GX60N415	GX60R415	0 – 60kV	0.415	41	RG-8U
GX70P360	GX70N360	GX70R360	0 – 70kV	0.360	48	DS2121
GX80P315	GX80N315	GX80R315	0 – 80kV	0.315	55	DS2121
GX100P250	GX100N250	GX100R250	0 – 100kV	0.250	69	DS2121

## Outline

### 50 kW Models

