GX Series

XP Power

25KW FAN COOLED

AC-HVDC CONVERTER

The GX series is a range of enclosed, programmable, low ripple, high voltage power supplies capable of supplying voltages up to 100kV and power to 25kW. The GX Series are fast response units with tight regulation. They are air insulated thereby offering a lower cost of life ownership, are lighter and are more environmentally friendly than potted or oil insulated alternatives.

The GX range has been designed for parallel operation up to 200kW and all versions have Arc Quench & Arc Count features to protect both the load and PSU.

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)

Units are CE marked to indicate compliance with the CE EMC, low voltage (LVD) and ROHS directives.

Applications

High Power E-beam | Industrial Electronics | Semiconductor Manufacturing | Technology

Dimensions

19.0” x 11U x 24.0” (482.6 x 11U x 609.6 mm)

Features

- 0 to 100% programmable voltage & current
- Local, analog, & RS232/USB digital control. Ethernet is optional
- 3 phase AC input. 480VAC standard, 380VAC & 415VAC optional
- Output voltage & current regulated
- Voltage & current monitor outputs
- Operating temperature: 0°C to +40°C, no derating
- Short circuit, arc, overload & thermal protection
- Efficiency >80%
- Low ripple <0.1% RMS of rated voltage at full load
- CE marked for EMC, low Voltage (LVD) & ROHS directives
- 1 year warranty

Models & Ratings

Positive Polarity	Negative Polarity	Reversible Polarity[1]	Voltage	Current	Stored Energy	Output Cable
GX001P25.0	GX001N25.0	GX001R25.0	0 – 1kV	25.0A	5J	DS2232
GX1.5P16.5	GX1.5N16.5	GX1.5R16.5	0 – 1.5kV	16.5A	7J	DS2232
GX002P12.5	GX002N12.5	GX002R12.5	0 – 2kV	12.5A	7J	DS2232
GX003P8.3	GX003N8.3	GX003R8.3	0 – 3kV	8.35A	12J	DS2232
GX005P5.0	GX005N5.0	GX005R5.0	0 – 5kV	5.00A	12J	RG-8U
GX006P4.1	GX006N4.1	GX006R4.1	0 – 6kV	4.15A	16J	RG-8U
GX008P3.1	GX008N3.1	GX008R3.1	0 – 8kV	3.15A	12J	RG-8U
GX010P2.5	GX010N2.5	GX010R2.5	0 – 10kV	2.50A	17J	RG-8U
GX012P2.1	GX012N2.1	GX012R2.1	0 – 12kV	2.10A	22J	RG-8U
GX015P1.6	GX015N1.6	GX015R1.6	0 – 15kV	1.65A	17J	RG-8U
GX020P1.2	GX020N1.2	GX020R1.2	0 – 20kV	1.250A	29J	RG-8U
GX025P1.0	GX025N1.0	GX025R1.0	0 – 25kV	1.000A	34J	RG-8U
GX030P835	GX030N835	GX030R835	0 – 30kV	0.835A	48J	RG-8U
GX040P625	GX040N625	GX040R625	0 – 40kV	0.625A	28J	RG-8U
GX050P500	GX050N500	GX050R500	0 – 50kV	0.500A	34J	RG-8U
GX060P415	GX060N415	GX060R415	0 – 60kV	0.415A	41J	RG-8U
GX070P360	GX070N360	GX070R360	0 – 70kV	0.360A	48J	DS2121
GX080P315	GX080N315	GX080R315	0 – 80kV	0.315A	55J	DS2121
GX100P250	GX100N250	GX100R250	0 – 100kV	0.250A	69J	DS2121

Model Configurator

Series Name

Polarity Type
P = Positive
N = Negative
R = Reversible

Standard Options
SS = Slow start
ZR = Zero start
ETH = Ethernet
NC = Blank front panel
38 = 380VAC, 3-Phase input
41 = 415VAC, 3-Phase input

GX|100|P|250|ETH

Output Voltage & Current

001|25.0 = 0 - 1kV/25.0A
1.5|16.5 = 0 - 1.5kV/16.5A
002|12.5 = 0 - 2kV/12.5A
003|8.3 = 0 - 3kV/8.35A
005|5.0 = 0 - 5kV/5.0A
006|4.1 = 0 - 6kV/4.15A
008|3.1 = 0 - 8kV/3.15A
010|2.5 = 0 - 10kV/2.5A
012|2.1 = 0 - 12kV/2.1A
015|1.6 = 0 - 15kV/1.65A
020|1.2 = 0 - 20kV/1.25A
025|1.0 = 0 - 25kV/1.0A
030|835 = 0 - 30kV/0.835A
040|625 = 0 - 40kV/0.625A
050|500 = 0 - 50kV/0.5A
060|415 = 0 - 60kV/0.415A
070|360 = 0 - 70kV/0.36A
080|315 = 0 - 80kV/0.315A
100|250 = 0 - 100kV/0.25A

Notes:

1. For reversible polarity two high voltage chassis will be supplied both; a positive and a negative so usage depends on the required output.

Specification

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, 35kVA max, less than 45A RMS per phase. Inrush current is less than 50A 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 175A .**

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 + 5mV/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 2% of rating.
The recovery to within 1% of rating is 500µs and within 0.1% in 1 ms for load transients from 10% to 100% and 100% to 10%.

Ripple (RMS)
0.1% of rated voltage +1V RMS at full load.

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 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 connected 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% of reading + 0.5% of rated. Output impedance is 10kOhm.

RS232/USB/Ethernet Programming and Monitor Resolution
0.025% of full scale for both the voltage and the current channels.

RS232/USB/Ethernet setting accuracy
Voltage setting accuracy is better than 0.5% of setting + 0.2% of rated.

RS232/USB/Ethernet reading accuracy
Voltage reading accuracy is 0.5% of reading + 0.2% of rated. Current reading accuracy is 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 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.

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

Specification (continued)

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. Arc Quench can be removed as an option.

Front Panel Elements
Output voltage display: 3.5 Digits.

Output current display: 3.5 Digits.

Indicator
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 connector; USB connector; Ethernet Port.(Optional); CL/CT switch; Four HVAC output connectors that connect the driver 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°C

Operating Humidity 30 – 90% RH (no condensation)

Storage Temperature -20 to +70°C

Storage Humidity 10 – 95% RH (no condensation)

Altitude For operation at Max. 5,000 ft.

Cooling Forced air cooling with internal fans.

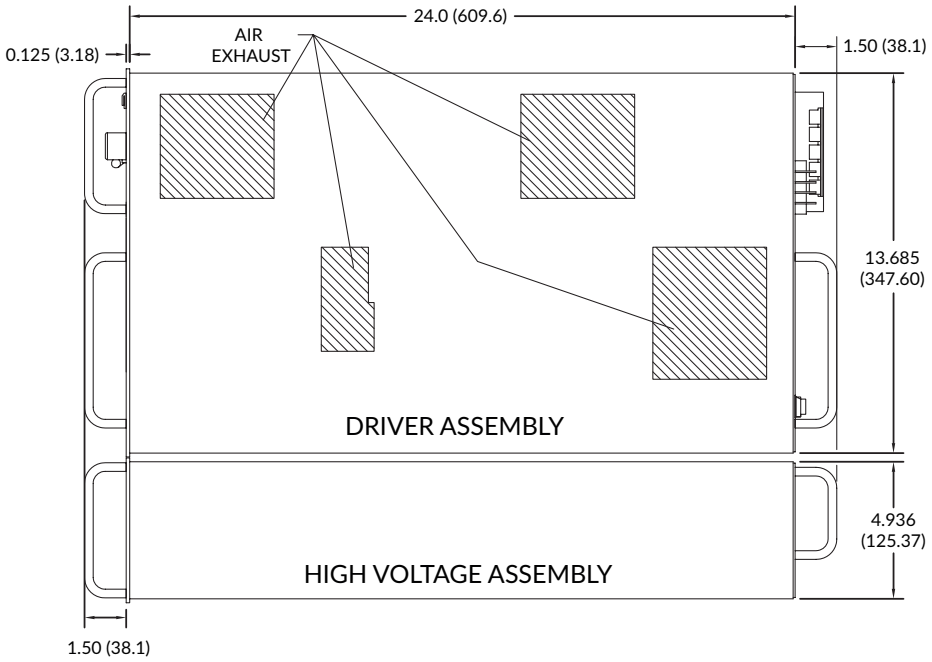
Dimensions: (W X H X D)
DRIVER: 19" X 14" X 24" (482.6 x 355.6 x 609.6mm)

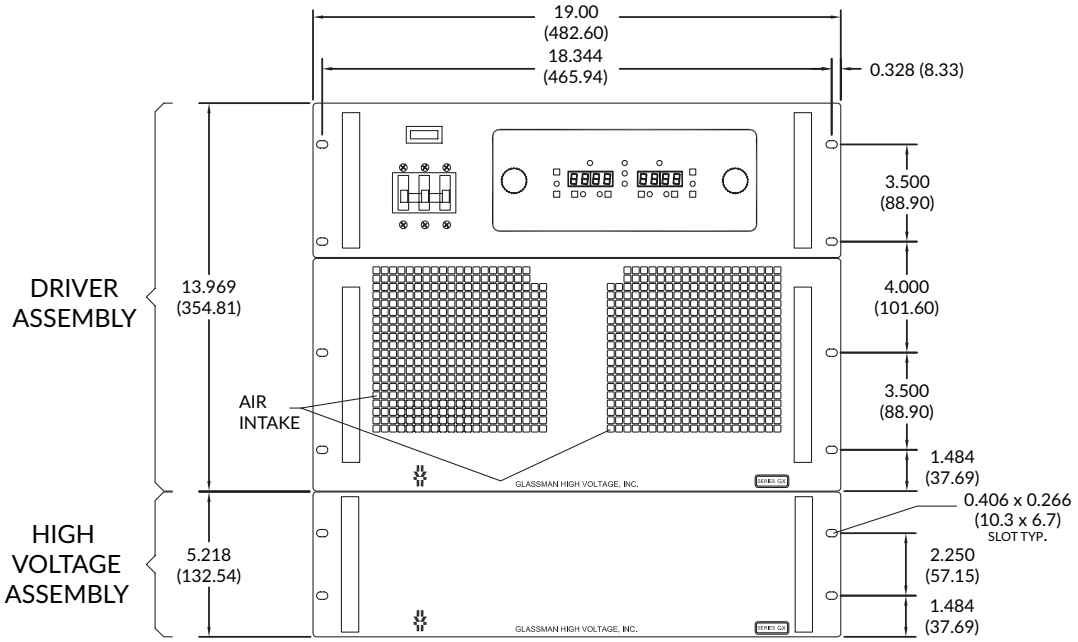
HV CHASSIS: 19" X 5.25" X 24" (482.6 x 133.35 x 609.6mm)
Refer to the outline drawing.

Weight: 120 lbs (55 kg)

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.

Mechanical Details

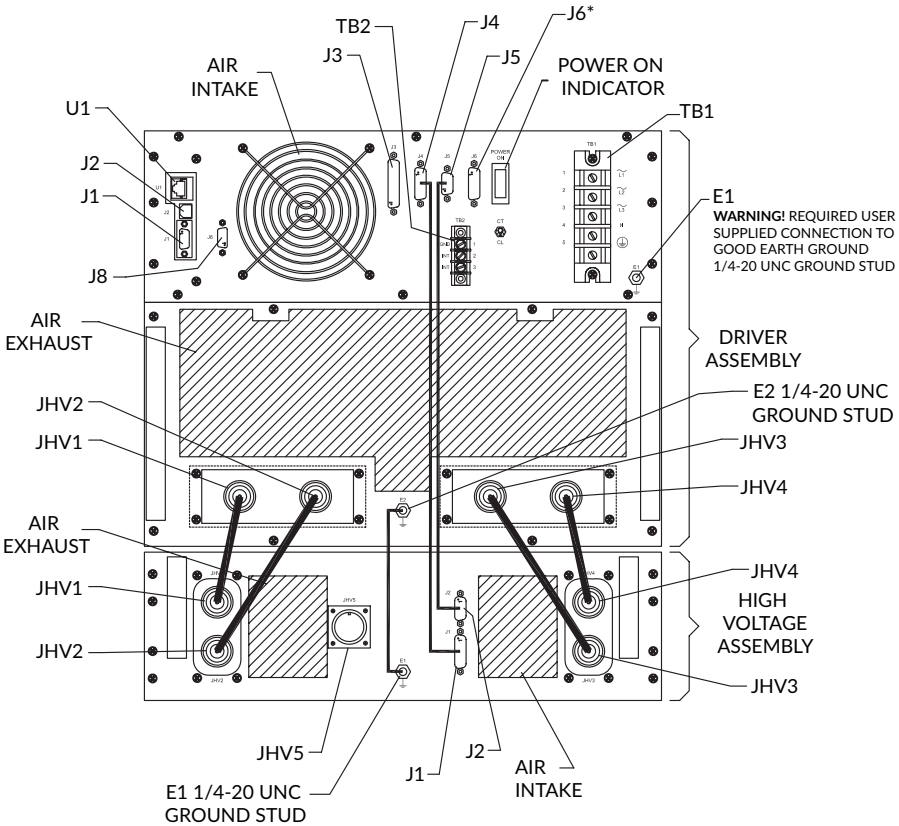




Notes:

1. Dimensions are in inches (mm).
2. High voltage assembly shown for 15-100kV.

Mechanical Details



Key	Function
E1	Ground
E2	Ground
J1	RS232 Interface
J2	USB Interface
J3	Analog Remote Interface
J4	High Voltage Interface
J5	High Voltage Interface
J6	Master/Slave Interface Out
J8	Slave Control Out

Key	Function
JHV1	High Voltage AC
JHV2	High Voltage AC
JHV3	High Voltage AC
JHV4	High Voltage AC
JHV5	High Voltage Output
TB1	AC Input
TB2	Signal Interface
U1	Ethernet (option)