



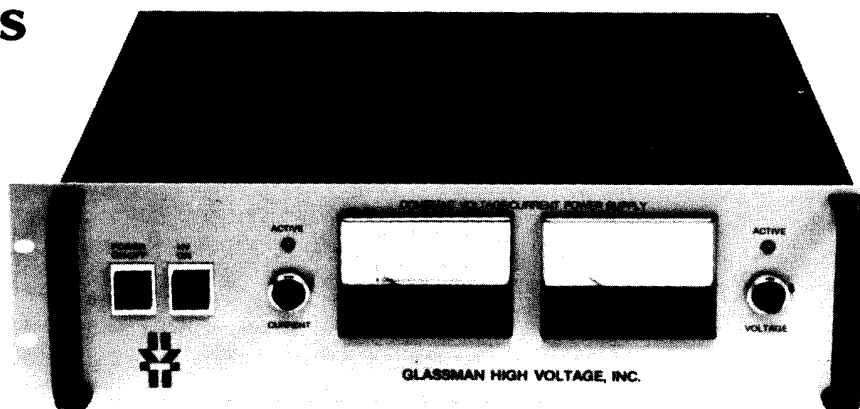
# Series WG

## 300 Watt

### High Frequency Switch-Mode

### High Voltage DC

### Power Supplies



#### FEATURES

- Light weight, compact.
- Low stored energy, for maximum personnel/equipment safety.
- Primary contactor — additional safety feature, prevents self-turn-on after power outage.
- Adjustable current limits, output surge-limiting resistors provide additional margins of safety.
- Off-the-line configuration results in full load efficiency better than 75% — low internal dissipation, very high reliability.
- Stable, high frequency, ferrite-core-transformer switching regulator design — minimizes power loss.
- Remote and front panel monitoring and programming of both DC output voltage and current.
- Regulation better than 0.005% — line and load.
- Less than 3 msec recovery for 50% load transient.
- Wide range and variety of standard options.

#### APPLICATIONS

- **Manufacturing Processes:** Spraying and Flocking Systems, Ion Implantation, Fault Detection, Corona Testing, Precipitation and Deposition Systems.
- **Displays:** Image Intensification, Radar Displays, Flying Spot Generators and Scanners, Waveform Generators, Large Screen CRT Display, Oscilloscopes, Projection TV.
- **R & D Instrumentation:** Mass Spectrometers, Electron Microscopes, Air Pollution Instrumentation, Capacitor Bank Charging, Nuclear Apparatus, Radiation Counters, Laser, Voltmeter/Voltbox Calibrators, Plasma and Pinch System.
- **Powering HV Devices:** X-ray Sources, Photomultipliers, BWO/TWT/Klystron Tubes, Radiation Detectors, Accelerators, Electron Gun Devices.

*Innovations in high voltage power supply technology*  
**GLASSMAN HIGH VOLTAGE INC.**

**Voltage-Current Regulation with Automatic Cross-Over:** All models feature *both* voltage and current regulation, with automatic crossover to voltage or current mode, as determined by the magnitude of the load. Ten-turn controls with locking readout dial and pilot light mode indicators are provided on the front panel for both functions.

**Remote Programming and Monitoring:** Remote programming capability is provided for both voltage and current control function. Programming is accomplished by either a potentiometer (using the power supply internal reference system), or an external 0-10 volt positive programming voltage, with return to case ground. 0-10 volt DC monitor circuitry is provided with both output voltage and output current.

**Pulse Width Modulator:** Eliminates large, heavy, power transformer, allows working directly off the line.

**Metering:** All power supplies in this series are equipped with large, accurate, directly calibrated, linear-scale panel meters that display both the output voltage and the output current. 2% full scale accuracy is provided.

**Modular Construction:** All major functional circuitry, including power transistors, are mounted on printed circuit boards, for ease of maintenance and repair. The high voltage circuitry in this entire family of power supplies is also constructed from modular subassemblies, so that replacement or repair, if required, is simple and economical.

**Protection:** The new off-the-line circuitry provides inherent self protection against four of the most common problems encountered in earlier high voltage power supply designs: failure to re-start after overload; damage from overload, from shorts, transient input spikes, etc.; loss of reliability due to stress at high output after over-voltage in remote programming mode. In addition, overload, short-circuit, and arc protection is provided by automatic current regulation, and by careful surge limiting design. A self-locking primary contactor prevents restart after line outage.

**High Efficiency:** Efficiency is typically better than 75% at full load, which ensures low internal dissipation and thereby increases reliability.

**Low Stored Energy:** Like all high frequency power supplies, WG Series is inherently safer to operate than line-frequency high voltage supplies, because the output capacitance is extremely low so that the total stored energy available is quite small . . . on the order of 1 Joule in some models. Safety for external equipment, personnel, and the power supply itself is far greater than in other types of design.

**Low Ripple:** The high operating frequency makes it relatively easy to achieve low ripple in these supplies. Standard ripple is 0.15%, and even lower ripple is available on special order.

**Excellent Transient Response:** The typical recovery time from a 50% load transient is less than 3 milliseconds . . . a considerable improvement over conventional RF voltage supplies. Line transients are effectively attenuated by the switching regulator and may generally be ignored.

**Tight Static Regulation:** Both line and load regulation are better than 0.005% over the entire rated range of input voltage and output current.

**Radio Frequency Interference:** A conducted-noise line filter is provided.

Positive Polarity Model	Negative Polarity Model	Reversible Polarity Model	Output Voltage (kV)	Output Current (mA)	Panel Height (inches)
WG3P75	WG3N75	WG3R75	0—3	75	5¼
WG5P60	WG5N60	WG5R60	0—5	60	5¼
WG10P30	WG10N30	WG10R30	0—10	30	5¼
WG20P15	WG20N15	WG20R15	0—20	15	5¼
WG30P10	WG30N10	WG30R10	0—30	10	5¼
WG40P7.5	WG40N7.5	WG40R7.5	0—40	7.5	5¼
WG50P6	WG50N6	WG50R6	0—50	6	5¼
WG60P5	WG60N5	WG60R5	0—60	5	5¼
WG75P3	WG75N3	WG75R3	0—75	3	5¼

Symbol	Description
220	220 Volt input: rated for 210 to 250 volts RMS, 50-60 HZ.
100	100 Volt input: rated for 90 to 110 volts RMS, 50-60 HZ.
400	400 HZ input.
B	Bi-polar operation: any two supplies of the same voltage rating but with opposite polarity may be operated as a bi-polar pair. (They may also be operated independently.)

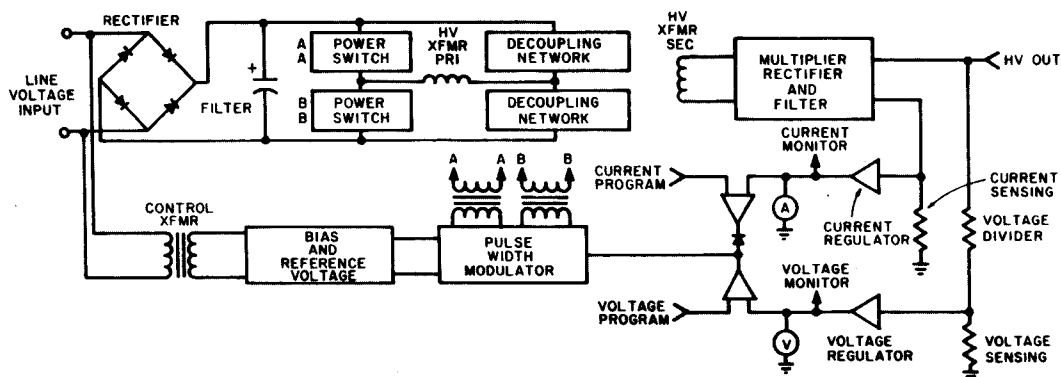
CT	Current Trip: supply turns off when overload occurs. Manual reset required to return to normal operation.
DM	4½-digit LED displays for both voltage and current readouts.
DP	Digital Programming: consult factory.
TTL	TTL compatible "enable" line.

The AC power line is fed through the rectifier/filter to the RF switching stage. The switching stage is driven by a pulse-width modulator in accordance with the regulation requirements. At one extreme, the effective impedance of switch A to switch B is very high; in the other extreme, the impedance is reversed. Note that no regulating or buffering circuitry is required for the main power input, which is reduced to simply a "brute-force" configuration. This scheme applies minimum dissipation to the power switching transistors and uses the high-gain loop into the modulator to accomplish both line and load regulation. One further note: conventional low-power regulator circuitry is used in the block marked BIAS AND REFERENCE VOLTAGE. This circuit requires excitation from a small, control transformer . . . not to be confused with the massive power transformer used in ordinary high-voltage RF designs.

The switcher controls the amplitude of the low RF voltage supplied to the primary of a step-up transformer. The secondary of the transformer supplies the input to a set of multiplier/rectifier/filter circuits (i.e., voltage doublers, triplers, quadruplers, etc., as required by the output voltage rating) that develop the HVDC output.

The voltage-regulating amplifier derives its input from a high voltage divider, connected directly to the power-supply output.

The current-regulating amplifier derives its input from a current sensing resistance in the low end return path of the high voltage. The crossover diode functions to sink the voltage amplifier signal, as required to maintain current regulation. Voltage and current monitoring are derived from buffers in the respective loops.



# SPECIFICATIONS

**Input:** 105-125Vrms; 50-60 Hz, single phase. Also see options.

**Output:** See model list for individual ratings. Continuous, stable adjustability from 0 to rated voltage and current. 10-turn panel voltage and current controls with resolution and readability better than 1000 PPM. Linear to 1%. Control dial can be locked.

**Voltage Regulation:** Load, better than  $\pm 0.005\% \pm 1$  volt for full load variation; line, better than  $\pm 0.005\% \pm 1$  volt.

**Current Regulation:** Load, better than 100 Microamperes from short circuit to rated voltage at any load condition. Line, better than  $\pm 0.005\% \pm 1$  volt.

**Ripple:** Better than 0.15% of rated voltage at full load for most models. Ripple voltage is proportional to load current and decreases linearly to 0.03% rms of rated voltage at no load.

**Stability:** 0.01%  $\pm 1$  volt per hour after 1/2 hour warm-up. 0.05%  $\pm 2$  volts per 8 hours.

**Temperature Coefficient:** 0.01%/°C  $\pm 1$  volt.

**Ambient Temperature:** -20°C to +60°C, operating; -40°C to +85°C storage.

**Polarity:** Reversible or Fixed. Units available with positive, negative, or reversible high voltage with respect to chassis ground. (Separate HV modules used for reversible polarity models.)

**Protection:** Automatic current regulation protects power supply against all overload conditions, including arcs and short circuits. Fuses, surge limiting resistors, and low energy components provide the ultimate protection. Primary contactor prevents automatic reset of power supply after line outage.

**AC Power:** ON/OFF pushbutton switch and pilot lamp.

**HV "On":** Momentary pushbutton and pilot lamp.

**Output Kilovoltmeter:**  $\pm 2\%$  accuracy.

**Output Millimeter:**  $\pm 2\%$  accuracy.

**Voltage Control:** 10-turn with locking vernier readout, and mode indicator.

**Current Control:** 10-turn with locking vernier readout, and mode indicator.

**Line Cord:** 6-foot, with standard 3-pin grounded plug.

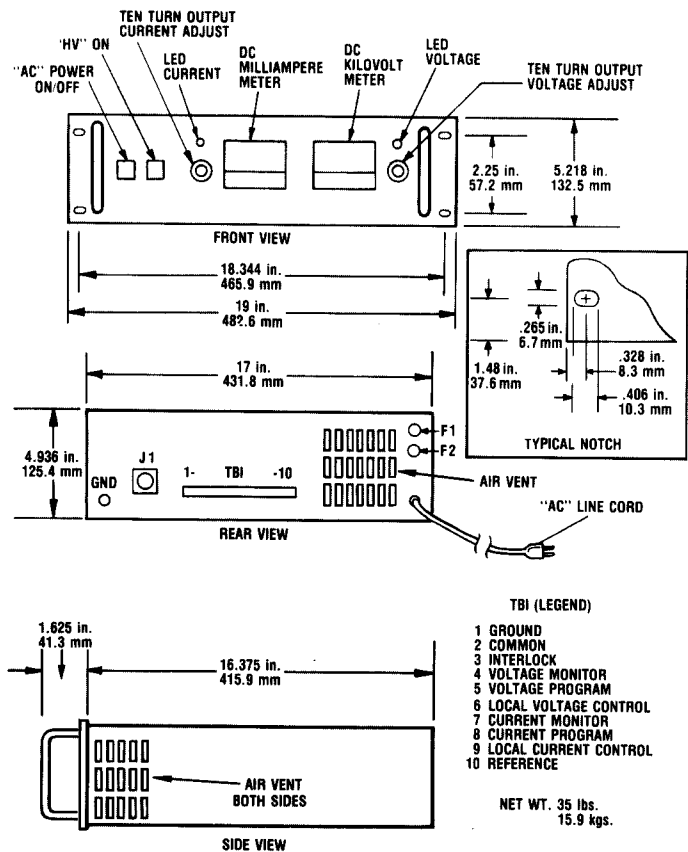
**Output:** Receptacle for high voltage coaxial cable. 8-foot, shielded, mating cable provided.

**External Interlock Terminals:** Output voltage is maintained at zero when external contact pair "opens". External contact pair must be "closed" for normal operation.

**Remote Voltage and Current Readout Terminals:** Provides 0-10VDC full scale signal with 10 kilohm impedance.

**Remote Voltage and Current Control:** Three terminals for either potentiometer or "remote programming" voltage. Supply designed for rated output with +10V input, with better than 1% control linearity from 10% to 100% of output. Supply protected against remote programming over-voltage up to 50V.

**Protection:** Fuses on rear panel.



## WARRANTY

Glassman High Voltage Inc. warrants all power supplies it manufactures to be free from all defects in materials and factory workmanship, and agrees to repair or replace any power supply that fails to perform as specified within one year after date of shipment. Formal warranty available upon request.

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Route #22 (East), Salem Industrial Park, P.O. Box 551, Whitehouse Station, N.J. 08889 • (201) 534-9007 • TWX 710-480-2839

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