

**XL4000EB  
60kV**

**ELECTRON BEAM  
RACK POWER SUPPLY**

**GENVOLT HIGH VOLTAGE POWER SUPPLIES**

60kV - 4kW - 4U



- ✓ Electron Beam Welding
- ✓ 60kV and 4kW
- ✓ Multiple Configurations & Lower Power Models
- ✓ 3D and Additive Printing
- ✓ X-Ray Systems & Semiconductor Processing

## General Description & Features

The XL4000EB is an all-new design air-cooled high voltage power supply, capable of delivering 60kV @ 66.67mA (4kW), specifically designed with the electron beam welder market in mind having low stored energy, high frequency ripple and a spark-quenching clamp circuit. The XL4000 does not use large encapsulated blocks but relies instead on smaller epoxy-encapsulated modules. Consequently, it is light enough to be easily handled without lifting equipment.

The module-blocks also allow the polarity of the unit to be changed in the field using basic tools. Consult the factory if this is required as it is important to do it correctly.

The unit has a compact chassis design that measures 4U (178mm) in height and is intended as a direct replacement for other units that have been 'in the field' for a number of years.

Using the latest technology available the unit has been designed to be reliable and easy to maintain on-site, with on-site modular repair as one of the features. The unit is fitted with a special termination device that absorbs the energy of the output cable if the load end sparks. This dramatically reduces the charge that flows in the spark and also reduces the voltage stresses at the power supply.

The XL4000 has active Power Factor Correction and consequently injects little distortion of the mains input current.

The unit is available from the factory with either a positive or negative output, as per the customer's request. Additional options include a choice of HV output connector as well as three-phase and single-phase power connections.

It has two modes of control:

1. A set of front panel controls that allow the user to set and monitor the output voltage and current limits by means of ten-turn potentiometers, digital panel meters and push-button switches. This is referred to as 'Local' mode.
2. When a switch on the front panel is clicked to the right, it sets the unit into 'Remote' mode in which it is possible to operate the unit by means of an analogue/digital interface on the rear of the unit.

The interface is provided by means of a 37-way 'D' type connector.

A LAN (Local Area Network) interface is also provided which permits communication with the power supply through a simple web server or using a UDP (User Datagram Protocol) conversation to communicate with a proprietary diagnostic panel.

The LAN interface can be used with a fixed IP (Internet Protocol) address or via a DHCP (Dynamic Host Configuration Protocol) to have an address automatically assigned to it by the server. Currently there is no facility to control the power supply through the LAN interface, but this could be offered in the future through the current development and enhancement program. This is not such an issue as may be perceived due to the fact Electron Beam welding is a very punishing environment due to the frequency of sparking in the electron gun. The sparks can induce voltage transients that can upset or damage routers.



## SPECIFICATIONS

### Input Voltage

#### Standard

200-250VAC, 50/60Hz, single phase. 20A nominal @ 230VAC  
0.97 power factor, <10% harmonic distortion

#### Options

3-phase star (380/230VAC, four wire, UK, EU etc.)  
3-phase delta (220/115VAC, three wire, USA, etc.)

### Output Current

#### Single Output

60kV, 66.67mA or 4,000W  
Available as either positive or negative output

### Local Output Controls

Voltage and current are continuously adjustable over entire range via ten-turn potentiometers with lockable counting dials.

### LAN Interface

A LAN is provided although this is only partly implemented. It permits communication with the unit through a basic web server or using a UDP conversation to communicate with a proprietary PC based diagnostic panel.

### Voltage Regulation

Load: 0.05% of full voltage +500mV for full load change.  
Line: 0.05% of full voltage +500mV over specified input range.

### Current Regulation

Load: 0.05% of full current  $\pm 100\mu\text{A}$  for any voltage change.  
Line: 0.05% of full current over specified input range.

### Output Parameters

Ripple: 0.3% p-p at 120kHz at full voltage/current  
Stability: 0.02%hr. after 1 hour warm-up.  
Temperature Coefficient: 100ppm/ $^{\circ}\text{C}$  nominal.  
Stored Energy: <15J at full voltage (excluding output cable).

## ENVIRONMENTAL and MECHANICAL

#### Temperature Range

Operating: 0 $^{\circ}\text{C}$  to 40 $^{\circ}\text{C}$   
Storage: -20 $^{\circ}\text{C}$  to 50 $^{\circ}\text{C}$

#### Humidity

10% - 90% RH, non-condensing

#### Cooling

Forced air; inlet through side panels, outlet at rear panel,  
must operate in a clean, dust free environment

### High Voltage Output Cable

The high voltage output connection is available in three options. The standard format is compatible with the HV cable as used on the Hitek OL4000 in order to ease substitution. This includes a small extension collar that is fitted to the rear of the XL4000. Where compatibility is not required, it is recommended to use the 'Genvolt' format which does not require the extension collar. In either case, the unit is shipped with 3m of Dielectric Sciences' C2125 coaxial high voltage cable, terminated to suit the XL4000 and cut square at the other end. Longer cables may be supplied at nominal additional cost up to 20m.

The third option is where a Federal Standard 75kV 3-pin receptacle is fitted as the HV output connector. In this case, the corresponding cable must be purchased separately, either through Genvolt or a third party.



## MEASUREMENTS

### Dimensions (Metric)

Length (Not including protrusions) 642.50mm, Width of main power unit 432mm, Height 177mm  
Length (Including protrusions) 687.50mm, Width of whole unit 482.60mm, Height 177mm

### Weight (Metric)

35Kg

### Dimensions (Imperial)

Length (Not including protrusions) 25.29". Width of main power unit 17", Height 6.96"  
Length (Including protrusions) 27", Width of whole unit 19", Height 6.96"

### Weight (Imperial)

77lbs

## Metering

### Digital Panel Meters

Digital voltage and current meters, accurate to within 1%

## Control

The XL4000EB has 2 modes of control as follows:

1. A basic set of front panel controls allowing the user to set and monitor the output voltage and current limits by means of 10 turn potentiometers, digital panel meters and push-button switches.
2. A switch on the front panel is moved across to engage 'Remote' mode, enabling operation via the digital/analogue interface on the rear of unit (37-way female 'D' connector). The signals on this connector are compatible with the Hitek Power OL4000 thus allowing substitution with minimal rewiring necessary.

## Regulatory Approvals

2004/108/EC, the EMC Directive and 2006/95/EC, the Low Voltage Directive. RoHS compliant.

## Typical Applications

- Electron Beam Welding
- 3D and Additive Printing
- Ion Beam Implantation
- Capacitor Charging
- X-Ray Systems
- Semiconductor Processing

## Configuration Options

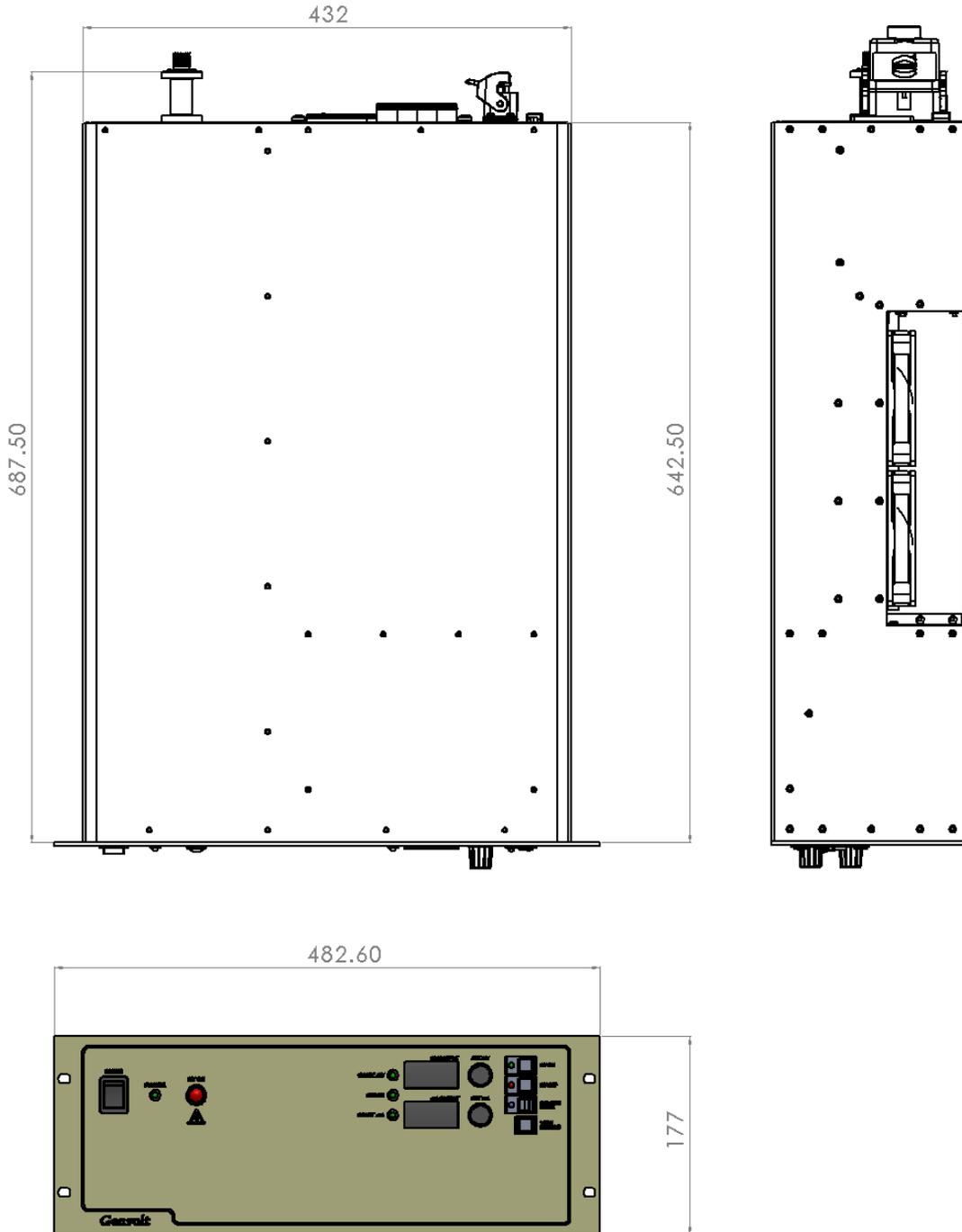
1. Lower power models: XL1300 (1300W), XL2600 (2600W), XL4000 (4000W)
2. Other outputs: 20kV (First suffix = 'A'), 30kV ('B'), 40kV ('C'), 50kV ('D'), 60kV ('E')
3. Input types: 230V nominal single-phase (Second suffix = 'B'), 400/230V 3-phase, 4-wire star ('C'), 220/115V 3-phase, 3-wire delta ('D')

## Other options:

- Output polarity (positive or negative)
- Federal Standard 75kV 3-pin receptacle
- OL4000-compatible HV connector (standard format, allows use of Hitek HV cable)
- Genvolt HV connector (lower profile, no rear-panel extension)
- Remote only: no front panel meters or controls (LED status indicators only)

The most common configuration is the XL4000EB. 'E' = 60kV, 'B' = single phase. Without other options specified at the time of ordering, the HV output is Hitek-compatible and the polarity negative.

XL4000 Dimensions



ALSO AVAILABLE

Grid and Filament Power Supply (XL4000GF)

This is a unit designed to complement the XL4000 and is designated as the XL4000GF. It provides floating outputs for a filament (12.5VDC, 12.5A) and a beam control electrode ('grid', 'bias' or 'Wehnelt') up to 1250VDC. This latter output is regulated in a closed loop manner to control the level of the beam in EB systems. An additional feature is that it may be used with most HV sources up to 60kV and has its own beam current sensing and thus does not require a current signal from the HV power supply. It will control current up to the limit of the XL4000EB 60kV/66.7mA HV PSU.

PLEASE CONTACT US FOR MORE DETAILS ABOUT THIS UNIQUE NEW PRODUCT.

## Worldwide Locations



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