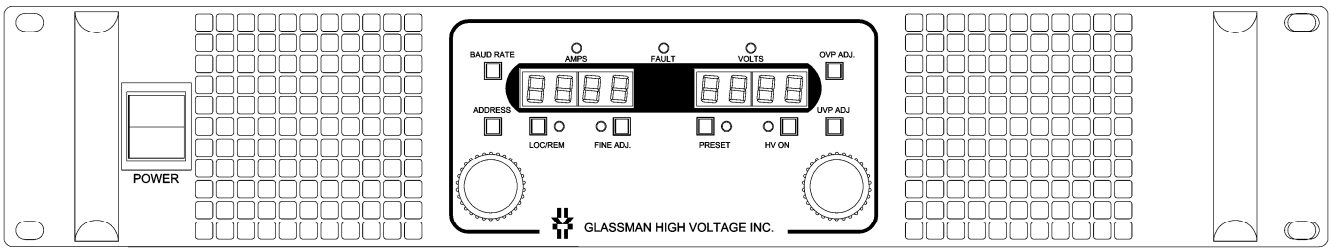
# INSTRUCTION MANUAL
# EV SERIES




XP Power
124 West Main Street, PO Box 317, High Bridge, NJ 08829

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# EV SERIES

# LIMITED WARRANTY

XP Power LLC ("XP Power") provides a limited warranty in lieu of all other warranties. Buyer's exclusive remedies in the event of a defect are limited to repair, replacement, or at XP Power's discretion, refund of the purchase price. The terms of the limited warranty and the Buyer's remedies are described below.

XP Power warrants its standard power supplies to be free from defect in material and workmanship, and XP Power agrees to repair or replace any power supply which fails to perform in accordance with XP Power's written specification within three years after date of shipment from XP Power.

This limited warranty shall not apply to any power supply which has been:

(1) Repaired, worked on, or altered by persons unauthorized by XP Power, which in XP Power's sole judgement, adversely affects the performance, stability, or reliability of the power supply.
(2) Subject to misuse, negligence, or accident; or
(3) Connected, installed, adjusted, or used otherwise than in accordance with instructions furnished by XP Power.

XP Power reserves the right to make any changes in design or construction of its power supply at any time, without incurring any obligation to make any change whatsoever in units previously delivered.

**LIMITATION ON REMEDIES.** Buyer's exclusive remedy in the event of a defect in a power supply is limited to the repair or replacement of any defective power supply or to refund of the purchase price at XP Power's sole discretion. Buyer must return the power supply to the XP Power factory, transportation prepaid by the Buyer, within the warranty period for the warranty claim to be effective. **XP Power is not liable to Buyer or to any third party for consequential or incidental damages** under any circumstances, whether due to defect in the power supply, due to delay or failure of delivery, due to a failure of the power supply to perform as specified, or for any other reason or cause. Buyer and XP Power agree that Buyer's sole remedy and XP Power's sole liability to Buyer is limited to repair, replacement, or refund of the purchase price of the power supply as described herein, whether Buyer's claim arises out of contract or tort.

**DISCLAIMER OF IMPLIED WARRANTIES. This limited warranty excludes all other warranties and is offered and accepted in lieu of any and all other warranties, whether express or implied, including without limitation the implied warranties of merchantability and fitness for a particular purpose.**

The entire contract concerning warranty rights and obligations and concerning Buyer's remedies is embodied in this writing. This writing constitutes the final expression of the parties' agreement, and it is a complete and exclusive statement of the terms of that agreement. No statements or understanding, purporting to modify or vary the terms hereof, shall be binding and cannot be relied upon by Buyer.

# EMC Directive Addendum

**For Model: EV**

Your high voltage power supply has been designed and tested to ensure compliance with the European Community's EMC directives and the UK EMC regulations, when used as described in the instruction manual. However, in regard to the remote interface cables, the following precautions must be followed in order to ensure continued compliance with EMC requirements, as specified in harmonized standards EN 61000-6-4 (CISPR 11 Class A) & EN 61000-6-2 (IEC 61000-4-3, 4-4 & 4-6) and the UK ELECTROMAGNETIC COMPATIBILITY REGULATIONS 2016, SI 2016 NO. 1091.
***(Refer to installation drawings on Page 2.)***

1. The remote Analog & USB interface cables must be of a shielded type with the shields and connector housings terminated at both ends to an adequate ground/common source. At the power supply end, pin 9 of J1 or the "D" connector housing, provides a ground connection for the Analog interface cable shield, and the shell of the "USB" connector housing J3 provides a Common/Return connection for the "USB" connector interface cable shield.

2. The RS232/RS485 interface cable should be an enhanced category 5E or better, UTP/LAN cable. This is connected to J2 IN, the RJ45 connector of the power supply.

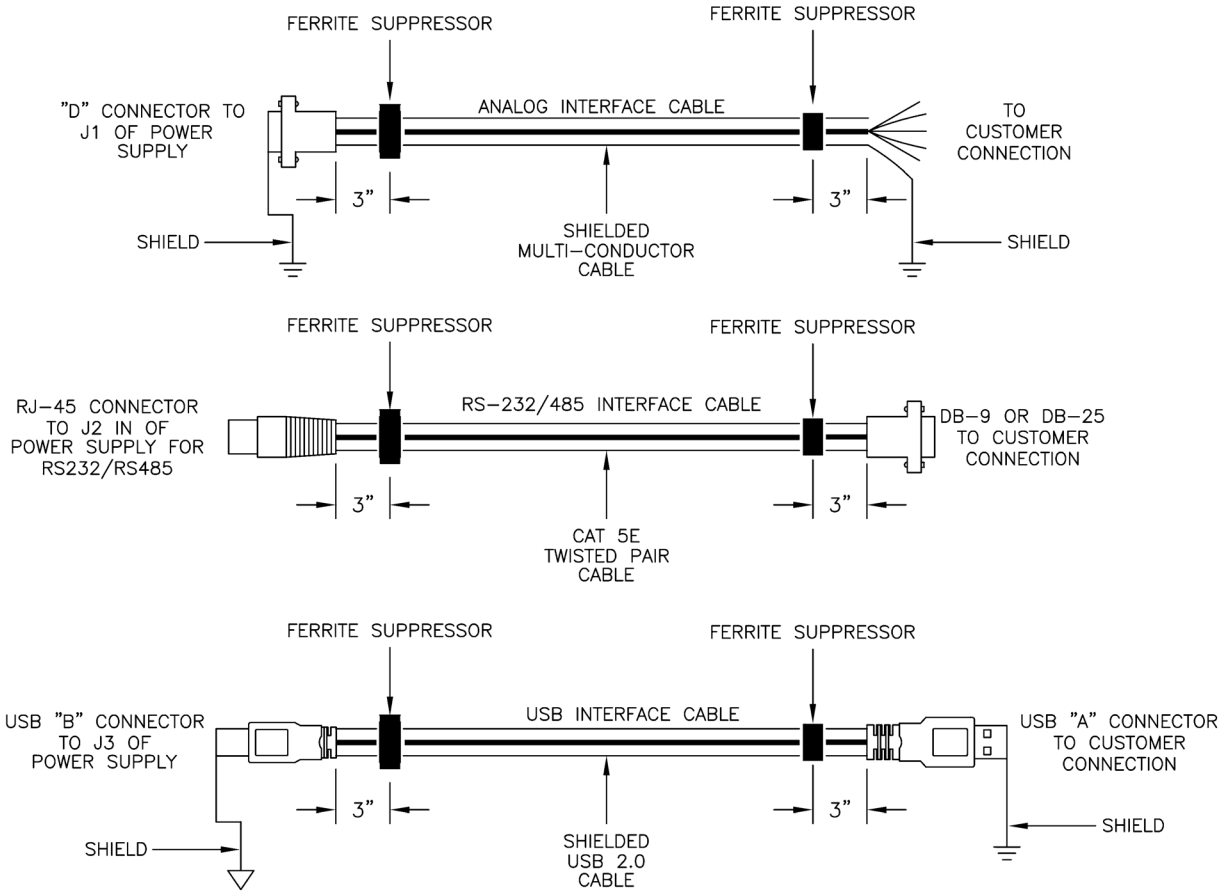
3. A ferrite suppressor must be placed at both ends of each interface cable, over the jacket & shield for Analog or USB & over the jacket for RS232/RS485.
   Note: Not required for the 90 cm (3ft) RS485 link cable.
   These suppressors must be located within 3" of the terminations of each end of the cables (see drawing on sheet 2). The ferrite suppressors should each have the following properties:

   a) Power supply end - impedance should be greater than 5000 ohms at 100 MHz.
   b) Source end - impedance should be greater than 200 ohms at 100 MHz.

4. Any combination of analog (D), RS232/RS485 (J2) & USB connections (J3) made to the power supply will meet the EMC radiated emissions requirements specified above when the recommended ferrites are used & installed as described.

For your convenience, we have made available a kit that contains the required ferrite suppressors. Contact your XP Glassman High Voltage representative for further information.

If your power supply is a modified standard, and contains any additional interface connectors, each additional interface cable must follow the same precautions as stated above.


FERRITE SUPPRESSOR
FERRITE SUPPRESSOR
"D" CONNECTOR TO J1 OF POWER SUPPLY
ANALOG INTERFACE CABLE
TO CUSTOMER CONNECTION
3"
3"
SHIELD
SHIELDED MULTI-CONDUCTOR CABLE
SHIELD
FERRITE SUPPRESSOR
FERRITE SUPPRESSOR
RJ-45 CONNECTOR TO J2 IN OF POWER SUPPLY FOR RS232/RS485
RS-232/485 INTERFACE CABLE
DB-9 OR DB-25 TO CUSTOMER CONNECTION
3"
3"
CAT 5E TWISTED PAIR CABLE
FERRITE SUPPRESSOR
FERRITE SUPPRESSOR
USB "B" CONNECTOR TO J3 OF POWER SUPPLY
USB INTERFACE CABLE
USB "A" CONNECTOR TO CUSTOMER CONNECTION
3"
3"
SHIELD
SHIELD
SHIELDED USB 2.0 CABLE

# SECTION II - GENERAL INFORMATION

## UNPACKING AND INSPECTION

First inspect package exterior for evidence of rough handling in transit. If none, proceed to unpack ... carefully. After removing the supply from its shipping container, inspect it thoroughly for damage.

IMPORTANT! In cases of damage due to rough handling in transit, notify the carrier immediately if damage is evident from appearance of package. Do not destroy or remove any of the packing material used in a damaged shipment. Carrier companies will usually not accept claims for damaged material unless they can inspect the damaged item and its associated packing material. Claims must be made promptly - certainly within five days of receipt of shipment.

## CORRESPONDENCE

Each XP Glassman power supply has an identification label on the chassis that bears its model and serial number. When requesting engineering or applications information, reference should be made to this model and serial number. If specific components or circuit sections are involved in the inquiry, also indicate the component symbol number(s) shown on the applicable schematic diagram.

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## ACCESSORIES (provided)

| QTY | ITEM |
|---|---|
| 2 | HV Output cable, 120", RG8U. |
| 1 | AC input cord, 8’ |
| 1 | HV output cable housing. |
| 1 | Hardware kit for AC and HV housing installation. |
| 1 | USB A/B interconnect cable, 10'. |
| 1 | RS232 interconnect cable, CAT5, RJ45 to 9 pin D, female, 10'. |
| 1 | Master/Slave Data Interconnect Cable, RJ45 to RJ 45, 3'. |
| 1 | Subminiature "D" mating connector kit, 25 pin female. |

# SAFETY

**This symbol, wherever it appears on the supply, alerts you to the presence of uninsulated dangerous voltages - voltages that may be sufficient to constitute a risk of electrical shock**.

**This symbol, wherever it appears on the supply, alerts you to important operating and maintenance instructions in the accompanying literature. Read the manual.**

## TERMS IN THIS MANUAL

**CAUTION** statements identify conditions or practices that could result in damage to the equipment or other property.

**WARNING!** statements identify conditions or practices that could result in injury or loss of life.

## WARNING!

**If this equipment is used in a manner not specified herein, the protection provided by the equipment may be impaired.**

**To avoid the risk of shock or fire do not attempt to service the supply beyond that described in these instructions.**

**To avoid the risk of shock and personal injury, do not remove the product covers while the unit is operating or connected to the AC mains. Wait at least 3 minutes after disconnecting the AC mains power before removing any covers or panels. Wait at least 1 minute before disconnecting the HV cable.**

**Upon loss of protective ground connection(s), all accessible conductive parts can render an electric shock.**

**Use the NRTL listed power cord provided by the manufacturer, or use only a NRTL listed power cord with a separable mains plug rated greater than the input current rating of the unit. For CE and UKCA compliant supplies used in Europe or the UK, the protective conductor/ground wire on the cord must be green/yellow. Use only a cord in good condition.**

**To avoid fire hazard, use only fuses of the correct type, voltage rating, and current rating as specified.**

**To avoid explosion, do not operate this product in an explosive atmosphere.**

**If liquid is spilled on the supply, shut it off immediately and disconnect it from the AC mains.**

**Always maintain adequate supply ventilation. All ventilation openings must remain free from obstruction.**

## Equipment Maintenance

There is no regular maintenance required to be performed on this equipment.

## User Serviceable Components

**There are no user-serviceable components. Return supply to factory for replacement of components by qualified technicians.**

# CONNECTIONS AND CONTROLS

## REAR PANEL ELEMENTS

### J5 AC POWER INPUT

**Unit operates off single phase AC input line, 230VAC (198-264) Vrms, 47–63 Hz.**

**WARNING! The ground (G) terminal of this input should be connected to the AC outlet ground or other good earth ground.**

J5 is an IEC 60320-C20 receptacle with retaining clip (Figure 1).

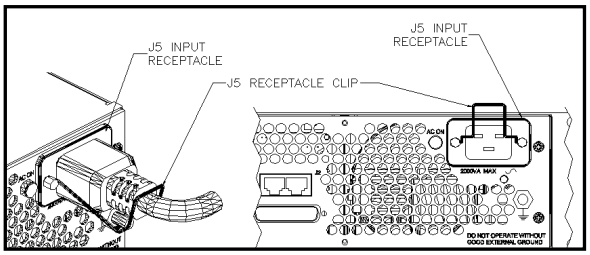



**Figure 1**

An IEC 60320-C19 8 ft mating line cord is provided with a plug for a standard NEMA 6-20 North American grounded outlet (Figure 2). In other regions, the appropriate plug or IEC cord set should be substituted.

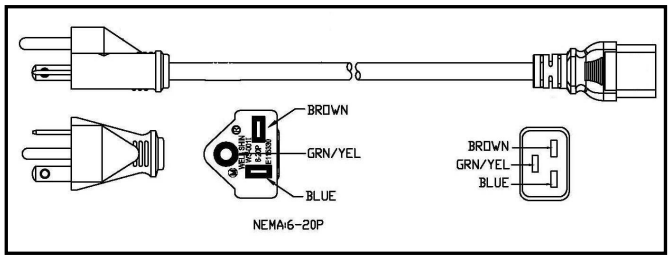



**Figure 2**

If the mains plug is removed from the cord provided, the wires should be connected to a separable, non-locking plug approved for the local mains as follows:

- Green/Yellow - Ground
- Brown - Line
- Blue - Line or Neutral

**CAUTION:** Check to see that your input line voltage and frequency matches the rating of the supply before applying power.

Note: IEC line cords other than the one supplied, may not be compatible with the retaining clip provided.

**For CE and UKCA compliant supplies used in Europe or the UK:** Please refer to the Declaration of Conformity located elsewhere in this manual for installation environment conditions required to conform to 2014/35/EU (Low Voltage Directive) ***and The Electrical Equipment (Safety) Regulations 2016, SI 2016 No. 1101.***

**AC ON INDICATOR**

**WARNING! When this lamp is illuminated, AC power is present. Do not apply or remove any connections to this unit until AC power is removed and the DC output has discharged.**

**JHV1 (V-)**
**JHV2 (V+) HIGH VOLTAGE OUTPUT**

**WARNING! Do not insert or remove the output cable from this connector until AC power is off and the DC output has discharged. Do not touch the pin inside the connector. Potentially lethal voltage is present on this pin.**

JHV1 & JHV2 are HN (UG-496/U) style HV bulkhead receptacles. Two 10 ft mating HN high voltage output cables are provided. Install as follows:

1. Remove the protective housing (if installed).
2. Insert one of the high voltage cables provided into the receptacle. Screw the threaded barrel onto the receptacle. Repeat for second cable.
3. Install or reinstall the protective housing.

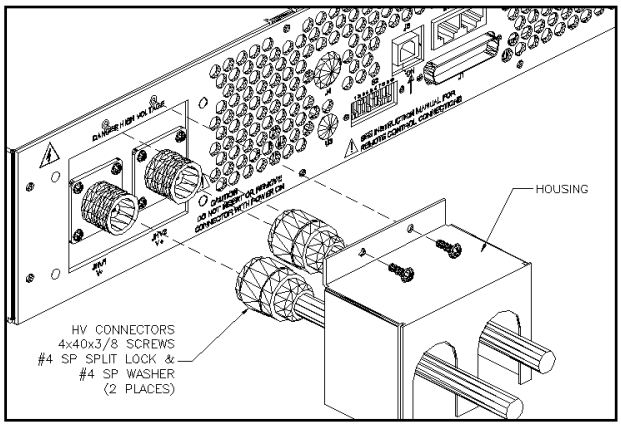



**Figure 3**

The high voltage outputs are isolated from common and ground and either one can be connected to GND to select the polarity. This makes possible the connection to 3 types of load: Positive referenced to GND, Negative referenced to GND, and either positive or negative referenced to a voltage provided from an external power supply.

**CAUTION:** The maximum voltage between either positive or negative output and GND **must** not exceed 1500 V.

## E1 GROUND STUD

**WARNING! Do not operate unit without good external earth ground connected to this point.**

This is the main grounding terminal for the supply and **must** be connected to a good external earth GROUND. This terminal should also be used for the HV load return & the V- or V+ High Voltage Output GND connection when the loads are either "Positive referenced to GND" or "Negative referenced to GND".

## J1 REMOTE CONTROL CONNECTOR

**WARNING! Do not make or remove connections to this connector or any other connector until power is off and the output has discharged.**

This connector provides inputs and outputs for the remote analog control functions. For a description of each of these signals and their application see Figure 4 and the remote analog interface section.

## S2 SWITCH SELECTED CONTROL SIGNALS

S2 is a 10 position DIP switch. The configuration of the switches is user settable and implements the functions described in the Figure 4.

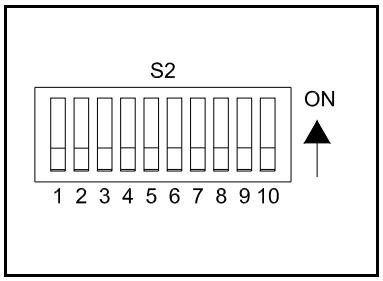
**CAUTION:** Ensure that the output voltage is disabled before making any changes to the S2 switch setting. Use a small flat screwdriver to facilitate switch actuation.

**Figure 4**
**Switch Selected Control Signals**

| POSITION | FUNCTION | DOWN - OFF (DEFAULT) | UP - ON |
|---|---|---|---|
| S2 - 1 | Voltage Remote Analog | LOCAL | REMOTE analog |
| S2 - 2 | Current Remote Analog | LOCAL | REMOTE analog |
| S2 - 3 | V Programming Range | 0 to 5 V | 0 to 10 V |
| S2 - 4 | I Programming Range | 0 to 5 V | 0 to 10 V |
| S2 - 5 | V Monitor Range | 0 to 5 V | 0 to 10 V |
| S2 - 6 | I Monitor Range | 0 to 5 V | 0 to 10 V |
| S2 - 7 | Logic Select | PS FAULT and ENABLE/REMA are active HIGH | PS FAULT and ENABLE/REMA are active LOW |
| S2 - 8 | Over Current Protection | Current limit | Current Trip (CT) |
| S2 - 9 | Slave Select | Unit operates as a master | Unit operates as a slave |
| S2 – 10* | RS232-RS485/Ethernet | RS 232 | RS485/Ethernet |

*** Units with Ethernet option: USB and RS232 inputs are disabled when S2-10 is ON.**

**Figure 5**
**S2 Detail**



## J2 RS232/RS485 CONNECTOR

*(See Figure 6 & 7)*

**WARNING! Do not make or remove connections to this connector or any other connector until power is off and the output has discharged.**

J2 is RJ-45 type double section connector. In a single supply system or in a multiple supply system for the first unit in the chain, the IN section connects to the computer for either RS 232 or RS 485 link. The OUT section is used for an RS 485 link and connects to J2 IN of the next supply in the chain. An RS232 cable (approx. 3 m/10 ft, RJ45 to DB9) and a RS485 interconnect cable (approx. 90 cm/3 ft RJ45 to RJ45) are supplied for this purpose.

**NOTE: RS485 feature is disabled when Ethernet Option is installed. USB and RS232 inputs are disabled when Ethernet input is enabled (S2-10 = ON).**

**Figure 6**
**J2 Double RJ45 Connector**

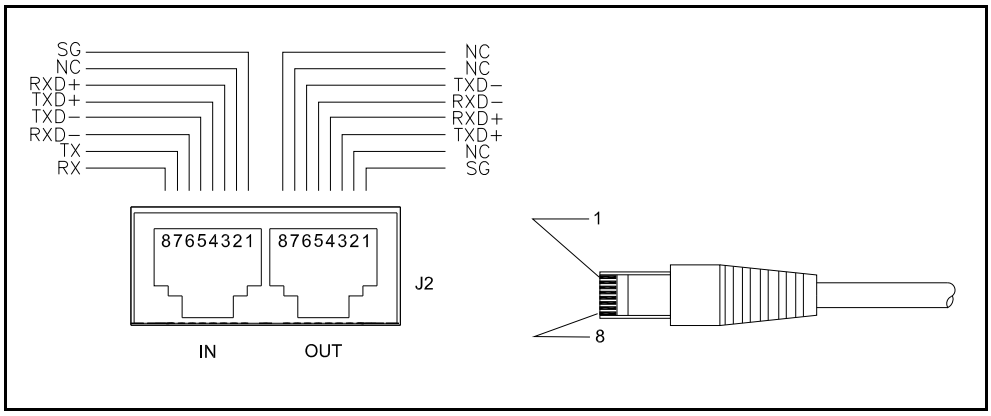



**Figure 7**
**J2 Double RJ45 Signal Assignment**

| CONNECTOR (RJ45 Type) | PIN # | J2 IN | J2 OUT |
|---|---|---|---|
| SIGNAL | 8 | RX | NC |
| | 7 | TX | NC |
| | 6 | RXD - | TXD - |
| | 5 | TXD - | RXD - |
| | 4 | TXD + | RXD + |
| | 3 | RXD + | TXD + |
| | 2 | NC | NC |
| | 1 | SHIELD | SHIELD |

## J3 USB CONNECTOR

*(See Figure 8 & 9)*.

**WARNING! Do not make or remove connections to this connector or any other connector until power is off and the output has discharged.**

This serial link implements USB2.1 communication protocol.
A 3m (10ft) cable is supplied with the unit for this purpose.

**Figure 8**
**J3 USB Connector**

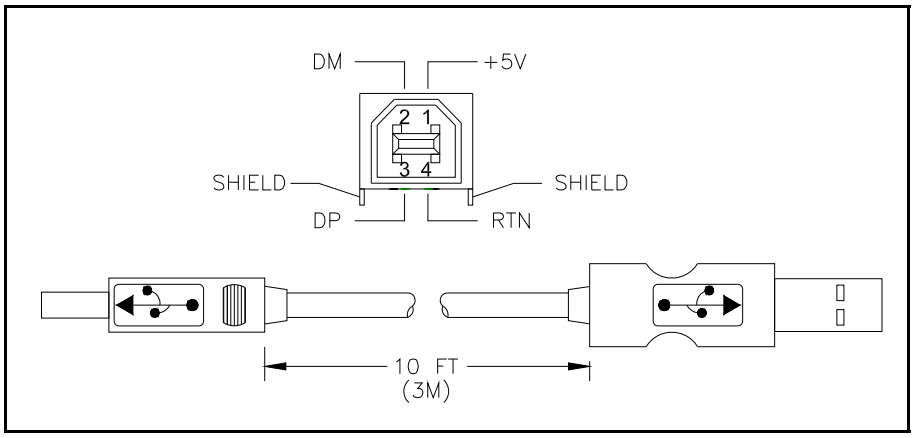



**Figure 9**
**USB Signal Assignments**

| J3 PIN # | USB SIGNAL |
|---|---|
| 1 | +5V |
| 2 | DM |
| 3 | DP |
| 4 | RTN |

## U31 ETHERNET CONNECTOR (OPTIONAL)

**WARNING! Do not make or remove connections to this connector or any other connector until power is off and the output has discharged.**

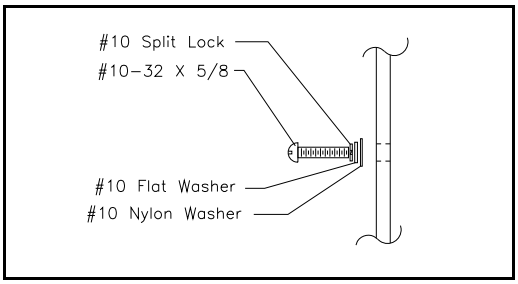
U31 is provided only when ordering the Ethernet option. (More details in the Serial Interface section.).

**NOTES:**
1. **The RS485 feature is disabled when Ethernet Option is installed.**
2. **USB and RS232 inputs are disabled when Ethernet input is enabled (S2-10 = ON).**

# FRONT PANEL ELEMENTS

**Note: When rack mounting the supply, the use of nylon washers is recommended to protect the front panel laminate from damage. The #10 hardware shown (Figure 10) is provided. Equivalent metric hardware may also be used.**

**Figure 10**
**Installation Hardware Detail**




## POWER Switch/Indicator

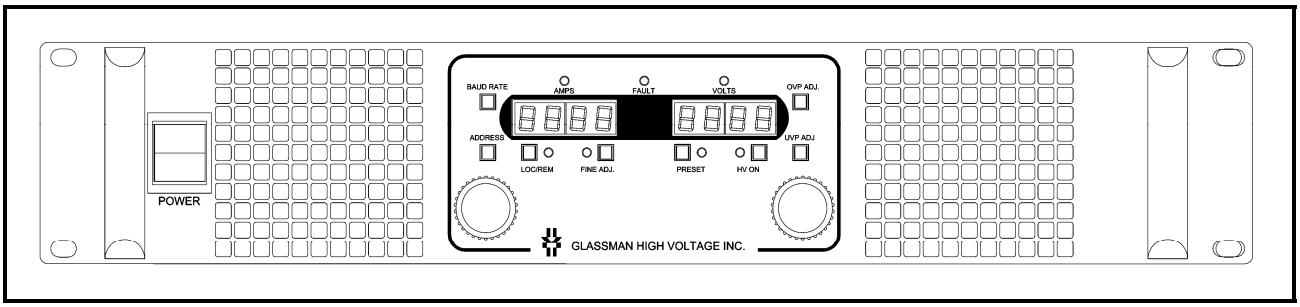
Applies AC power to the unit when in the on ("1") position (as long as power is present at J5). The integral lamp will illuminate when power is present.

**<u>WARNING!</u> Do not apply or remove any connections to this unit when power is on.**

## CONTROL, DISPLAY AND INDICATORS (See Figure 11 & 12)

The description of these elements and the functions they implement is shown in Figure 12.

**Figure 11**
**Front Panel Control, Display, and Indicators**




**Legend:** OVP =Over Voltage Protection, UVP=Under Voltage Protection, CT=Current Trip, HV=High Voltage, OT=Over Temperature, LOC/REM = Local/Remote, V=Voltage, I= Current

**Figure 12**
**Front Panel Control, Display and Indicators**

| | ELEMENT | DEVICE TYPE | FUNCTION | DESCRIPTION |
|---|---|---|---|---|
| 1 | VOLTAGE ENCODER | Optical Rotary | SETS: VOLTAGE PROG, OVP, UVP in FINE or COARSE increments.<br>8 values for ADDRESS, and 4 values for BAUD RATE | 1V /10VResolution for Fine/Coarse Adj<br>Address: from 0 to 7; Baud Rate : 2400, 4800, 9600 and 1920(0 ). (Only 4 digits representation.) |
| 2 | CURRENT ENCODER | Optical Rotary | SETS: CURRENT PROG in FINE or COARSE increments for program | 1mA /10mA Resolution for Fine/Coarse Adjustment |
| 3 | HV ON | Momentary Push Button Latching | Toggles the HV ON or OFF.<br>ON state is indicated by Red LED illumination | With HV ON set only the PRESET button remains active. |
| 4 | PRESET | Momentary Push Button; On Timer* | Allows viewing and setting of the VOLTAGE PROGRAM and the CURRENT PROGRAM.<br>Active state is indicated when Yellow LED is illuminated. | HV ON: Display is routed for previewing the voltage and current program.<br>HV OFF: Full adjustment of V and I settings. |
| 5 | FINE ADJ. | Momentary Push Button Latching | SETS 1V/1mA resolution for FINE adjustment and 10V/10mA resolution for COARSE Adjustment | Affects VPROG, IPROG and OVP and UVP. LED lights green when in FINE mode. |
| 6 | OVP ADJ. | Momentary Push Button; On Timer* | Selects the “amps” section of the display to show the word OUP and the “volts” section to display the actual setting. The voltage encoder sets OVER VOLTAGE THRESHOLD in FINE or COARSE increments from 0 to 105% VMAX | Minimum settable OVP is 5% more than the Voltage setting and is checked in PRESET state.<br>Max OVP is 5% over the rated output voltage. |
| 7 | UVP ADJ. | Momentary Push Button; On timer* | Selects the “amps” section of the display to show the word UUP and the “volts” section to display the actual setting. The voltage encoder sets UNDER VOLTAGE THRESHOLD in FINE or COARSE increments from 0 to 90% VMAX | Minimum settable UVP is 0 and maximum is 10% less than the rated output voltage |

| | ELEMENT | DEVICE TYPE | FUNCTION | DESCRIPTION |
|---|---|---|---|---|
| 8 | LOC/REM | Momentary Push Button Latching | RETURNS THE UNIT TO LOCAL from Remote Serial operation. Remote state, either serial or analog, is signaled with yellow LED lit. Note: Remote serial operation automatically takes control when a command is sent. | Complete Return from the Remote Analog to LOCAL is done by selecting the correspondent switches for voltage and current on the rear panel DIP switch and corresponding logic level on the D25 pin connector. |
| 9 | BAUD RATE | Momentary Push Button; On Timer* | Selects the "amps" section of the display to show the word "baud" and the "volts" section to display the actual setting. Adjustment is performed with the voltage encoder. | The voltage encoder selects the BAUD RATE between 4 options: 2400, 4800, 9600, 19200 (shown as 1920) |
| 10 | ADDRESS | Momentary Push Button On Timer* | Selects the "amps" section of the display to show the word "Addr" and the "volts" section to display the actual setting. Adjustment is performed with the voltage encoder. | The voltage encoder selects the ADDRESS between 8 options: 0– 7. |
| 11 | VOLTAGE | LED Green Indicator | VOLTAGE MODE INDICATOR | The output is controlled as voltage by the Voltage Encoder |
| 12 | CURRENT | LED Green Indicator | CURRENT MODE INDICATOR | The output is controlled as current by the Current Encoder |
| 13 | FAULT | LED Red Indicator | FAULT INDICATOR | Output shuts down for any of: OV, CT (current trip), OT (over temperature), AC INPUT UNDER VOLTAGE, ARC, and INTLK (interlock) faults. LED lit signals fault. |
| 14 | FINE ADJ. | LED Green Indicator | FINE ADJUSTMENT RESOLUTION INDICATOR | COARSE adjustment resolution selected if UNLIT |
| 15 | PRESET | LED Yellow (Amber) Indicator | PRESET MODE ACTIVATION INDICATOR | The actual current and voltage are not displayed for the duration of this mode. Preset = LED lit |
| 16 | LOC/REM | LED Yellow (Amber) Indicator | REMOTE MODE INDICATOR | Unit is in either Remote serial or Remote analog mode when LED is lit |
| 17 | HV ON | LED Red Indicator | HIGH VOLTAGE ENABLED INDICATOR | LED lit = HV output is ON |

*On Timer: A 5 second timer is initialized after pressing the button and is reset continuously while adjusting the optical encoders. At the end of the last uninterrupted cycle of approximately 5 seconds, the display switches back from showing the respective function to the default state (showing actual Voltage and Current outputs).

## Output Meters

3-1/2 digit digital meters display output voltage and current (1500 count maximum for voltage & 4000 count maximum for current).

**WARNING! When system is powered down under light or no load conditions, the output may retain a charge even after power is removed. This charge may not show on the voltage meter. Discharge the output to ground or use an external meter to determine if output has discharged. Or, wait at least 1 minute before making or removing any connections to the supply.**

## INSTALLATION AND OPERATION

This unit is a component type of power supply, and as such, is designed for permanent mounting within an equipment rack that will provide adequate fire and shock protection. As is the case with most rack mounted equipment, this supply might in some cases be used for "Bench-Top" operation.

**WARNING!**
**When used as a "Bench-Top" supply all user controls & monitoring are accessed via the front panel controls. Safety precautions should be taken during the installation to prevent the connections on the rear panel from becoming "Operator Accessible" when power is applied.**

Refer to the OUTLINE AND INTERFACE drawing located in Section III for mechanical mounting specifications and dimensions.

**CAUTION**
Care should be taken when mounting this supply not to block or otherwise impede airflow at inlet and exhaust areas.

**WARNING!**

**NEVER ATTEMPT TO OPERATE THIS UNIT WITHOUT A GOOD EARTH GROUND CONNECTED TO THE GROUND STUD, "E1", ON THE REAR PANEL. THE GROUND WIRE OF THE AC LINE CORD MUST ALSO BE GROUNDED.**

**PER EN61010-1 THE DISCONNECTING DEVICE MUST BE READILY IDENTIFIABLE AND EASILY REACHED BY THE USER. THE DETACHABLE POWER CORD IS THE POWER SUPPLY DISCONNECTING DEVICE. TO DISCONNECT THE POWER SUPPLY FROM THE MAINS, THE POWER SUPPLY CORD MUST BE UNPLUGGED.**

**READ AND FULLY UNDERSTAND THE OPERATING INSTRUCTIONS BEFORE APPLYING POWER TO THIS UNIT.**

**THIS EQUIPMENT EMPLOYS VOLTAGES THAT ARE DANGEROUS. EXTREME CAUTION MUST BE EXERCISED WHEN WORKING WITH THIS EQUIPMENT.**

**DO NOT HANDLE THE LOAD OR EXPOSED HIGH VOLTAGE TERMINATIONS OR ATTEMPT TO MAKE OR REMOVE ANY CONNECTIONS TO THE SUPPLY UNTIL THE LOAD AND/OR SUPPLY HAS BEEN DISCHARGED (GROUNDED). AN UNLOADED SUPPLY MAY TAKE UP TO 1 MINUTE TO FULLY DISCHARGE.**

## INITIAL TURN ON

**WARNING!** **This procedure should only be attempted by qualified personnel who are knowledgeable in methods of safely testing and operating high voltage power supplies and related high voltage equipment. The following steps to connect and operate this equipment should be carried out only after the unit has been placed or mounted in position.**

1. Check the input voltage rating on the rear panel nameplate of the power supply and make certain that this is the rating of the available power source.

2. Check to see that the POWER switch is in the off ("0") position.

3. Ensure that J1-13 and J1-25 are connected together by a switch or jumper (INTERLOCK closed), J1-8 signal is at logic LOW, and S2 has all switches in OFF position.
   **The unit is set now in LOCAL control mode.**

4. Connect the high voltage output cables to the load observing the desired type of connection: floating, positive referenced to GND or negative referenced to GND. Connect the high voltage cables to the receptacles on the rear panel. Install the safety housing over the HV connectors

   **WARNING! Make sure to isolate your HV apparatus/load from any possible contact with other objects and personnel.**

5. Connect the AC input cable provided to J5 and to the power source. **(See Figure 1 and Figure 2)**

6. Apply input power to the supply by setting POWER switch to the on ("1") position.

7. Depress PRESET pushbutton. The PRESET indicator should illuminate.
   Set the desired voltage and current limit using the front panel optical encoders.
   Depress PRESET pushbutton again to return the display to normal state. (Showing the voltage and current monitors.)

8. Depress OVP pushbutton.
   Set the desired over voltage threshold using the voltage encoder.
   Depress OVP pushbutton again to return the display to normal state. (Showing the voltage and current monitors.)
   **Note:** OVP threshold can not be adjusted below the voltage setting. Front panel will indicate OUP when the threshold reached the voltage setting and no further downward adjustment is possible.

9. Depress UVP pushbutton.
Set the desired under voltage threshold using the voltage encoder.
Depress UVP pushbutton again to return the display to normal state.
(Showing the voltage and current monitors).

**Note:** UVP threshold cannot be adjusted above the voltage setting. Front panel will indicate UUP when the threshold reached the voltage setting and no further upward adjustment is possible.

10. Depress ADDRESS pushbutton.
Set the desired address – between 0 and 7 - using the voltage encoder.
Depress ADDRESS pushbutton again to return the display to normal state.
(Showing the voltage and current monitors.)

11. Depress BAUD RATE pushbutton.
Set the desired baud rate – 2400, 4800, 9600 or 19200 - using the voltage encoder. Note that 19200 is displayed with 4 digits as 1920.
Depress BAUD RATE pushbutton again to return the display to normal state.
(Showing the voltage and current monitors.)

12. Depress FINE ADJ. pushbutton to select the fine resolution for the settings made with the optical encoders. The FINE ADJ. indicator should illuminate.
Depress FINE ADJ. pushbutton again to return to coarse resolution.

13. When the desired settings have been selected, depress HV ON pushbutton to enable the high voltage output. The HV ON indicator should illuminate.
Use voltage and current encoders to adjust the output in real time.
Depress HV ON pushbutton to disable the output.
**Note:** In LOCAL mode, with the HV enabled, there are only two pushbuttons that are active: FINE ADJ, which sets the fine or coarse resolution for programs, and PRESET. Depressing PRESET will show the preset values for voltage and current on the displays without the possibility of altering them.

**Note: Last Setting Memory.** The power supply has the last setting memory active for Voltage, Current, Address, Baud Rate, OVP and UVP. At turn on, the settings prior to the most recent turn off event are loaded as preset values and can be viewed and changed by going through the sequence described above. The sequence does not have any particular order. However due to the interdependence between the preset values of voltage and of OVP and UVP minimum and maximum thresholds, logically, the current and voltage should be set first and then the OVP or UVP.
In the present turn on session, the power supply is ready to memorize its settings after the first HV ON action. The subsequent turn off event will write the last settings to memory.

**WARNING:**

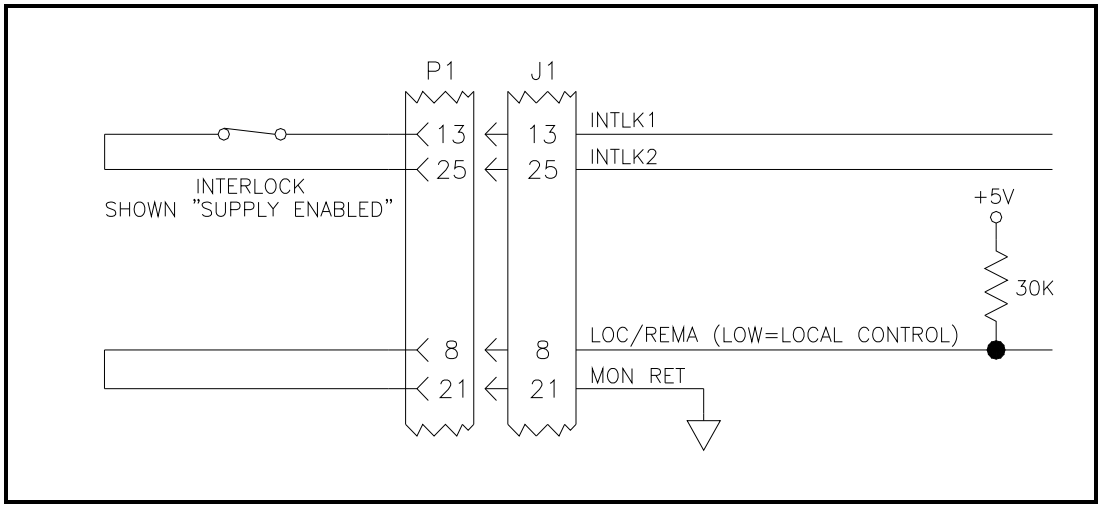
**DO NOT HANDLE THE LOAD OR EXPOSED HIGH VOLTAGE TERMINATIONS OR ATTEMPT TO MAKE OR REMOVE ANY CONNECTIONS TO THE SUPPLY UNTIL THE LOAD AND/OR SUPPLY HAS BEEN DISCHARGED (GROUNDED). AN UNLOADED SUPPLY MAY TAKE UP TO 1 MINUTE TO FULLY DISCHARGE.**

## Power Supply Mode Definitions:

### LOCAL CONTROL (FRONT PANEL)

LOC/REMA signal on J1-8 is LOW. Front Panel controls and indicators are all active. Power supply status signals can be read over the RS232/485/USB serial port or over the Analog Remote Interface (J1 rear connector). When a command, and not a query, is transmitted over the remote serial port, the power supply executes it and switches controls over to this port. Two connections must be made to P1 as shown in figure 13.

**Figure 13**
**Minimum Connections to Enable the EV Supply in Local Control Mode.**




### REMOTE SERIAL CONTROL (VIA J2 OR J3)

**NOTE: The RS485 feature is disabled when Ethernet Option is installed**

Controls are active over RS232/485/USB serial interface. This mode can be initiated only by a command over the RS232/485/USB port providing that the unit is in LOCAL CONTROL mode. The functions still active on the front panel are: PRESET, for viewing the local settings (manual QUERY), LOC/REM (manual COMMAND) for changing the mode to LOCAL CONTROL, and the voltage and current display. Switching to LOCAL will update the output voltage and current with the corresponding preset levels and will turn the supply off if it was on. Switching to LOCAL is possible only by pressing LOC/REM button on the front panel. The serial port remains valid for queries.
**Note:** Although FINE ADJ. is operable, it has no effect on the resolution of the display or remote programs.

## REMOTE ANALOG CONTROL (VIA J1)

Controls are active over the REMOTE ANALOG Interface set on the J1 rear panel connector. To set the Analog remote mode, first select the remote voltage and current (S2-1 and S2-2 on the DIP switch) and then set the correspondent logic level for Analog Remote on the J1 connector (J1-8 set HIGH). The functions still active on the front panel are: PRESET and the voltage and current display. The REMOTE ANALOG setting will override the RS232/485 serial mode. The serial port remains valid for queries. The possible connections for local and remote programming are shown in Figure 15. Connections for a typical Remote Analog Control circuit are shown in Figure 14. **Notes:**

- Although FINE ADJ. is operable, it has no effect on the resolution of the display or remote programs.
- ENABLE/REMA is shown as HIGH = ON as determined by the setting of S2-7 in the OFF position.

**Figure 14**
**Typical Connections for Remote Analog Control**
**(Monitors not required but shown for reference.)**

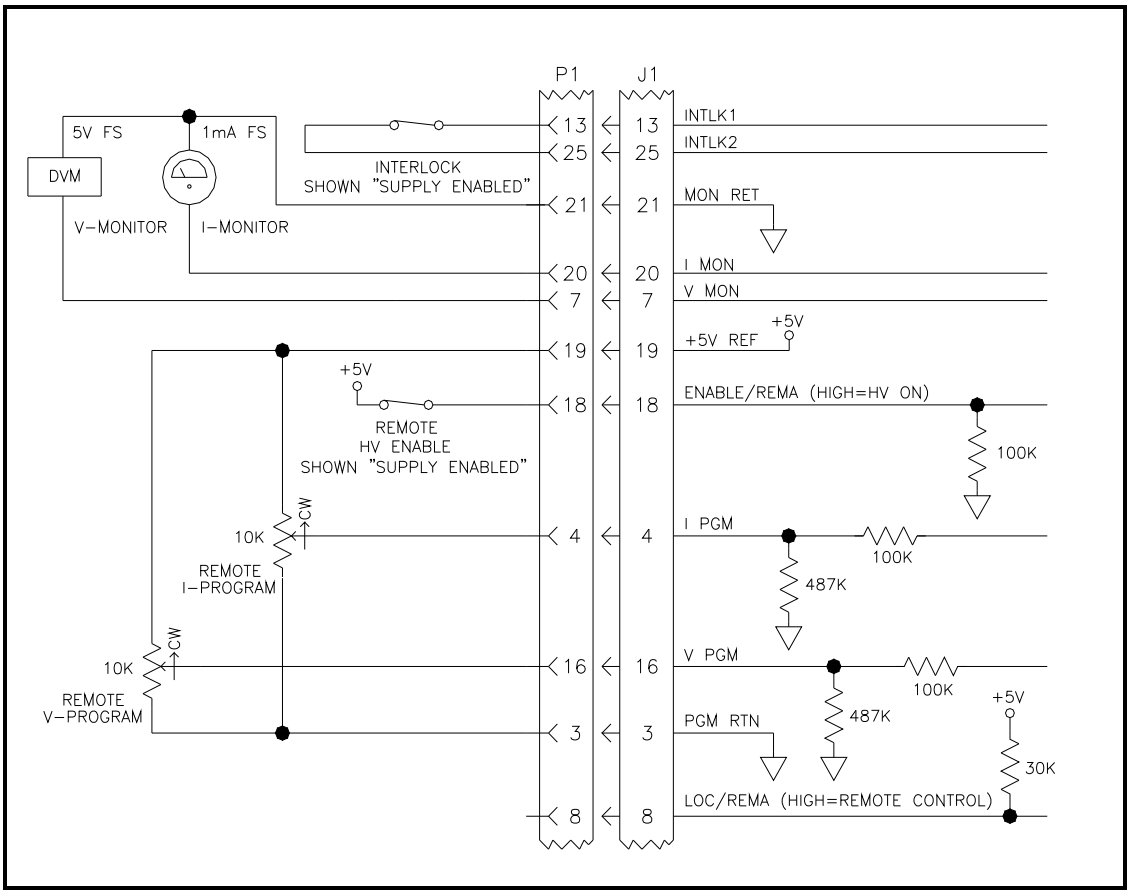


**Figure 15**
**Power Supply Mode Configuration**

| S2 Switch 1 | S2 Switch 2 | J1 pin 8 | Voltage Program | Current Program | Observation |
|---|---|---|---|---|---|
| Down | Down | * | Local | Local | |
| Down | Up | LOW | Local | Remote A | HV ON local |
| | | HIGH | Not Used | Not Used | Not Used |
| Up | Down | LOW | Remote A | Local | HV ON local |
| | | HIGH | Not Used | Not Used | Not Used |
| Up | Up | LOW | Remote A | Remote A | HV ON local |
| | | HIGH | Remote A | Remote A | REM. Analog** |

* Does not matter ** Parallel Operation Setting

## REMOTE ANALOG INTERFACE

***NOTE**: It is recommended that shielded cable(s) be used for these connections and that the shield be terminated to ground.*

***For CE and UKCA compliant supplies used in Europe or the UK:***
*Please refer to the EMC addendum located elsewhere in this manual for shielding, terminating filtering conditions required to conform to 2014/30/EU and the Electromagnetic Compatibility Regulations 2016, No. 1091.*

**WARNING! Do not use J1 connections for main earth ground or load return! E1 ground stud on the rear panel is provided for this purpose.**

The interface connector is J1 on the rear panel. It is a 25 pin, Sub D, male connector. The pin out and their functions are presented in Figure 16.

**Figure 16**
**D25 Analog Remote Terminal**

| J1 PIN | SIGNAL | FUNCTION | OBSERVATION/LOGIC |
|---|---|---|---|
| 1 | V MASTER | Provides voltage program for slave units | Used for master/slave operation only |
| 2 | HV STATUS | Output On/Off status | Used for master/slave operation only |
| 3 | PGM RTN | Program return | |
| 4 | I PGM | Current Program | Referenced to J1-3 |
| 5 | LOC/REM IND | Local/Remote indicator | LOW = Local |
| 6 | V/I MODE | Voltage Mode/Current Mode indication | LOW = CURRENT mode<br>HIGH = VOLTAGE mode |
| 7 | V MON | Voltage Monitor | Measured with respect to J1-21 |
| 8 | LOC/REMA | Selects between Remote Analog and Local Mode | LOW=Local<br>HIGH (OPEN) = Remote Analog |
| 9 | GND | Instrumentation GND | |
| 10 | PS FAULT | PS Shut Down.<br>Sum of 6 faults. | S2-7 selects the logic for active fault |
| 11 | I MASTER | Parallel Operation | I source to slave |
| 12 | PO | Parallel Operation | I share buffer |
| 13 | INTLK1 | INTLK terminal 1 | Relay high side |
| 14 | INTERLOCK RELAY NC | INTERLOCK relay contact. 100 ohm pull-down | Contact for external use. Pulls down when relay is de-energized |
| 15 | V PGM | Voltage Program for Parallel Operation | Measured with respect to J1-3 |
| 16 | V PGM | Voltage Program | Referenced to J1-3 |
| 17 | I PGM | Current Program for Parallel Operation | Measured with respect to J1-3 |
| 18 | ENABLE/REMA | HV ON in remote analog | S2-7 selects the logic for enable. |
| 19 | +5V REF | 10 mA max reference for analog programming. | Referenced to J1-3 |
| 20 | I MON | Current Monitor | Measured with respect to J1-21 |
| 21 | MON RET | Monitor Return | |
| 22 | RESERVED | | |
| 23 | HV STATUS | Output ON or OFF status | HV ON= HIGH<br>HV OFF= LOW |
| 24 | I MON SUM | Parallel Operation | I sum representation |
| 25 | INTLK2 | INTLK terminal 2 | Connected to COMMON |

**J1-9** **GROUND**

This is instrumentation ground connection and should not be used as the main connection to earth ground. Use the main ground terminal, "E1", for that purpose.

**J1-3**
**J1-21** **COMMON**

J1-21 is the monitor reference COMMON. It may also be used as a digital signal return. J1-3 is the COMMON return for the programming analog signals. COMMON is isolated from chassis and GND and it is clamped internally to GND by a bi-directional diode circuit. The inserted drop between COMMON and GROUND should not exceed 15 V, otherwise, erroneous readings may be obtained.

**J1-13**
**J1-25** **INTERLOCK**

INTERLOCK1 (J1-13) must be connected to INTERLOCK2 (J1-25), by means of a jumper or contact closure, to enable the supply. If desired, this jumper on the Sub D mating connector may be replaced by an external switch which must be closed for the supply to operate. If the external switch is opened, the supply output will drop to zero. When the switch is again closed, the output will immediately re-enable.

**J1-7** **V-MONITOR**

A user selectable 0 to 5V or 0 to 10V positive signal (with respect to MON RTN), in direct proportion to the output voltage, is available at this terminal. An internal 4.99 k ohm, 1%, limiting resistance protects the circuitry. Therefore, it is recommended that a digital voltmeter be used to monitor this output. It is also acceptable to use a 1 mA DC full scale instrument (i.e. analog meter) for monitor purposes, when the signal is set for 5 V full scale.

**J1-16** **REMOTE V-PROGRAM**

***Note:*** *When the S2-1 switch is set to the OFF position, this input is disconnected and output voltage programming is set by the front panel control. Power supply is in local control mode.*

*When S2-1 switch is set to the ON position, program voltage must be provided to the REMOTE V-PROGRAM input in order for high voltage to be generated.*

A positive, user selectable 0 to 5V or 0 to 10 V signal (with respect to PGM RTN, J1-3) at J1-16 will program the output voltage proportionally from zero to rated output. This input can be programmed in several ways:

- A user supplied 0 to +5 V or 0 to + 10 V signal.
- For 5V scale factor, a user supplied potentiometer (5-50 k ohms, 10 k nominal) can be connected between the +5 V REFERENCE and PGM RTN, with the wiper connected to the REMOTE V-PROGRAM, J1-16.
- The REMOTE V-PROGRAM input may be jumpered to the +5 V REFERENCE voltage terminal for a fixed output at the maximum voltage.

**J1-20** **I-MONITOR**

A user selectable 0 to 5V or 0 to 10 V signal, positive with respect to MON RTN (J1-21), and in direct proportion to the output current, is available at this terminal. An internal 4.99 k ohm, 1%, limiting resistance protects the circuitry. Therefore, it is recommended that a digital voltmeter be used to monitor this output. It is also acceptable to use a 1 mA DC full scale instrument (i.e. analog meter) for monitor purposes, when the signal is set for 5 V full scale.

**J1-4** **REMOTE I-PROGRAM**

*Note: When the S2-2 switch is set to the OFF position, this input is disconnected and output voltage programming is set by the front panel control. Power supply is in local control mode.*

*When S2-2 switch is set to the ON position, program voltage must be provided to the REMOTE I-PROGRAM input in order for high voltage to be generated.*

A positive, user selectable 0 to 5V or 0 to 10 V signal (with respect to PGM RTN, J1-3) at J1-4 will program the output current proportionally from zero to rated output.
This input can be programmed in several ways.

- A user supplied 0 to +5 V or 0 to +10 V signal.
- For 5V scale factor, a user supplied potentiometer (5-50 k ohms, 10 k nominal) can be connected between the +5 V REFERENCE and PGM RTN, with the wiper connected to the REMOTE I-PROGRAM, J1-4.
- The REMOTE I-PROGRAM input may be jumpered to the +5V REFERENCE terminal for a fixed current limit at the maximum rated current.

**J1-19** **+ 5 V REFERENCE**

The output of this terminal is an ultra-stable, positive, +5 V reference voltage, (with respect to PGM RTN, J1-3) that is supplied for user programming applications. Maximum current drain from this point should be limited to 10mA. (5 mA is recommended)

**J1-18 ENABLE/REMA**

*Note: When LOC/REMA pin (J1-8) is set to TTL HIGH level (or is OPEN) and both S2-1 and S2-2 are ON, the Power Supply is in REMOTE ANALOG state, and a HV enable signal must be provided to J1-18 (ENABLE/REMA) to enable the supply. The combinations of S2-1 different than S2-2 are not used (see Figure 15).*

ENABLE/REMA is an external positive 2.5 to 5 V (5.5 V max) source (with respect to J1-21 COMMON) at J1-18. A 0 to 1.5 V signal at this input will disable the supply. When the power supply is in LOCAL mode this input is tied LOW.

**J1-5 LOC/REM IND**

A 0/5 V status signal. LOW indicates Local Control Mode. HIGH indicates Remote Control Mode - Serial or Analog.

**J1-6 V/I MODE**

A 0/5 V status signal. LOW indicates that Output is ON in Current Mode. HIGH indicates that Output is ON in Voltage Mode

**J1-8 LOC/REMA**

A remote control signal. LOW, 0 to 1.5 V, sets the power supply in local mode, a HIGH, 2.5 to 5V (5.5 V max.), or open, sets the power supply in remote analog mode.

**J1-22 ARC FAULT (OPTIONAL)**

A 0/5 V status signal. Active HIGH. If the rate of consecutive arcs exceeds approximately 2 per second, for at least 5 arcs, the supply will turn off for 2.5 seconds and then automatically return to the previous settings.

**J1-10 PS FAULT**

A 0/5V status signal. Active HIGH, indicates the presence of at least one out of 6 fault conditions that are continuously monitored: Input Under Voltage fault, Over Temperature fault, Over Voltage fault, Over Current fault, Interlock fault or Arc fault.

**J1-23 HV STATUS**

A 0/5V status signal. LOW indicates that Output is OFF. HIGH indicates that Output is ON in either Current Mode or Voltage Mode.

**J1-14 INTERLOCK RELAY NC**

This is one side of a normally closed contact of the interlock relay and is closed when the interlock relay is de-energized. The other side of the contact pulls down to COMMON with a 100 ohm resistor. This contact can be part of a circuit powered with up to 24 VDC above the COMMON. Contact rating is 15 mA maximum. Suggested pull-up resistor is 2.4k, ½ W minimum.

## PARALLEL OPERATION (MASTER/SLAVE)

EV supplies may be connected in parallel to increase the total output current capability.

**CAUTION:** Supplies to be connected in parallel, **MUST** have identical output voltage and current ratings and **MUST** be connected in the same polarity. For the purpose of correct installation, designate one supply as "Master" and the other one as "Slave". (It does not matter which is which.) Refer to the Master/Slave system schematic included with the documentation, and wire J1, JHV1, & JHV2 of the Master and Slave supplies as shown. Set S2 of the Slave only as shown in Figure 17.

**Figure17**
**Slave Settings**

| SLAVE S2 | |
|---|---|
| **SWITCH** | **SETTING** |
| 1 | ON |
| 2 | ON |
| 3 | OFF |
| 4 | SAME AS MASTER S2-6 (I-MONITOR) |
| 5 | DON'T CARE |
| 6 | SAME AS MASTER S2-6 (I-MONITOR) |
| 7 | OFF |
| 8 | OFF |
| 9 | ON |
| 10 | OFF |

Local controls on Slave Supplies are automatically disabled. Signals related to parallel operation are described below.

**J1-1** **V MASTER (MASTER TO SLAVE)**
This output provides a voltage program signal from the Master Supply to the Slave supply. (This output connects to J1-16 of the first Slave Supply.)

**J1-15** **V-PROGRAM (SLAVE TO SLAVE)**
This output provides a voltage program signal from the Slave Supply to the next Slave Supply for parallel operation. (This output connects to J1-16 of the next Slave Supply in line.)

**J1-11** **I MASTER (MASTER TO SLAVE)**
This output provides a current program signal from the Master Supply to the Slave supply. (This output connects to J1-4 of the first Slave Supply)

**J1-17** **I-PROGRAM (SLAVE TO SLAVE)**
This output provides a current program signal from Slave Supply to the next Slave Supply for parallel operation. (This output connects to J1-4 of the next Slave Supply in line.)

**J1-12** **PO MASTER**
This is the current sharing bus. All the units connected in parallel must connect to this pin in order for the total current to be summed and monitored

**J1-24** **I MON SUM MASTER**
This monitor signal represents the sum of all the output currents of all the parallel supplies. NOTE: The current monitor (J1-20) for each supply represents the contribution of that particular supply to the total output current.

**J1-2** **HV STATUS (SLAVE)**
This signal provides the HV enable for the Slave Supply (This output connects to J1-18 of the first or next Slave Supply.)

# REMOTE SERIAL INTERFACE

## EV Computer Interface

This section describes the specific implementation of the XP Glassman High Voltage RS232C/RS485/USB Serial Data Interface for the EV series Power Supplies.

The purpose of this interface is to provide remote monitoring and control capability of all analog and digital functions available for the EV series power supplies, while providing 1000 V RMS voltage isolation between the power supply and the controlling computer. The interface is microcontroller based and built into the control board of the power supply.

The interface uses ASCII encoded character strings for data transmission. Transmission error checking is implemented using modulo 256 checksums. The transmission format uses no parity and one stop bit. The baud rate is 2400, 4800, 9600 or 19200kbps (9600 is the default).

The power supply interface acts strictly as a slave device. It will not transmit any messages over the data link unless it is first commanded to by the customer master computer.

# CONNECTING POWER SUPPLIES TO RS232, RS485 OR USB

## RS232/RS485 Single Power Supply:

**NOTE: The RS485 feature is disabled when Ethernet Option is installed** Using S2-10 on the rear panel, select either RS232 (DOWN) or RS485 (UP). Connect the Computer's RS232 or RS485 port to the rear panel J2 IN connector using one of the following cables as shown in Figure 18, 19 or 20.

**Figure 18**
**RS232 with DB-9 (Provided)**

| DB-9 Female | | RJ45 Connector | |
|---|---|---|---|
| **Pin** | **Signal** | **Pin** | **Signal** |
| 2 | RX | 7 | TX |
| 3 | TX | 8 | RX |
| 5 | Signal Ground | 1 | Signal Ground |

**Figure 19**
**RS232 with DB-25**

| DB-25 Female | | RJ45 Connector | |
|---|---|---|---|
| **Pin** | **Signal** | **Pin** | **Signal** |
| 3 | RX | 7 | TX |
| 2 | TX | 8 | RX |
| 7 | Signal Ground | 1 | Signal Ground |

**Figure 20**
**RS485 with DB-9**

| DB-9 Female | | RJ45 Connector | |
|---|---|---|---|
| **Pin** | **Signal** | **Pin** | **Signal** |
| 9 | TXD- | 6 | RXD- |
| 8 | TXD+ | 3 | RXD+ |
| 1 | Signal Ground | 1 | Signal Ground |
| 5 | RXD- | 5 | TXD- |
| 4 | RXD+ | 4 | TXD+ |

## RS232/RS485 with Multiple Power Supplies:

Up to 8 units can be daisy chained in RS232 or RS485 mode. The first unit gets connected to the computer via RS232 or RS485 and other units connect to the RS485 bus of the first unit. The J2 OUT connector of the first unit gets connected to J2 IN of the second unit using the provided daisy chain cable as shown in Figure 20 & 21.

**Figure 21**
**Daisy Chain Set Up**

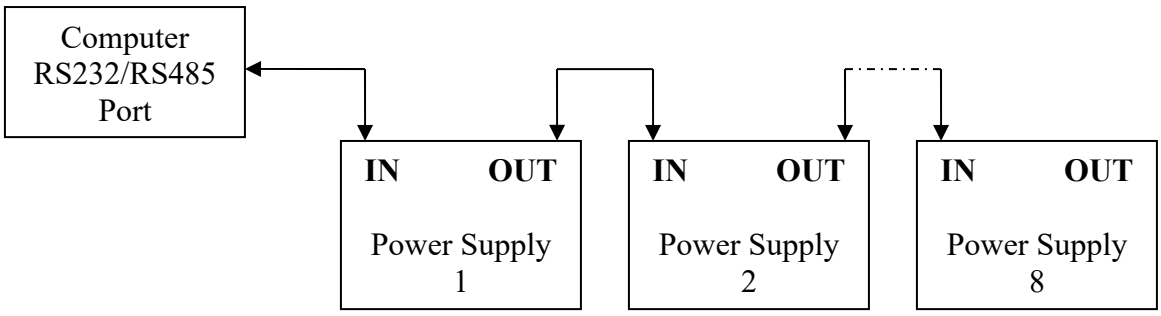



**Figure 22**
**Daisy Chain Cable**

| RJ45 Connector | | RJ45 Connector | |
|---|---|---|---|
| **Pin** | **Signal** | **Pin** | **Signal** |
| 1 | Signal Ground | 1 | Signal Ground |
| 6 | TXD- | 6 | RXD- |
| 3 | TXD+ | 3 | RXD+ |
| 5 | RXD- | 5 | TXD- |
| 4 | RXD+ | 4 | TXD+ |

## USB Connection:

J3 on the rear panel is a USB 'B' connector. The USB connection is detected automatically and it will take precedence over both RS232 and RS485. A standard USB cable is provided. (See Figure 23.)

**Figure 23**
**USB 'B' Connector**

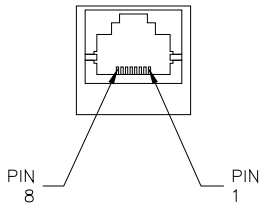
| Pin | Signal |
|---|---|
| 1 | +5V |
| 2 | DM |
| 3 | DP |
| 4 | RTN (Common) |

## Ethernet Connection (Optional):

**NOTES:**
1. **The RS485 feature is disabled when Ethernet Option is installed.**
2. **S2-10 must be set "ON" to enable Ethernet input.**
3. **USB and RS232 inputs are disabled when Ethernet input is enabled.**

U31 is a RJ-45 connector used to connect to an Ethernet network. A standard RJ-45 plug and cat-5e cable may be used for interconnection. (See figure 24, & 25.)

**Figure 24 & 25**
**Ethernet Connector**




| U31 PIN # | SIGNAL |
|---|---|
| 1 | TXD + |
| 2 | TXD - |
| 3 | RXD + |
| 4 | EPWR + |
| 5 | EPWR + |
| 6 | RXD - |
| 7 | EPWR - |
| 8 | EPWR - |

# SERIAL INTERFACE SOFTWARE

## Installation:

The following Serial Interface Software is available for download using the QR code on the unit chassis:

**The following software is provided with the serial interface:**

**Serial Power Supply Control Program (XP FL-EV.exe):** This program can run on Windows XP and later. XP FL-EV.exe should be copied from the downloaded software package to a writeable location on the hard drive in order to store the power supply parameters. Power supply parameters will be stored in XP FL-EV.ini. This file will be created after the program is launched from a writeable location for the first time. Both files must remain in the same folder/sub-directory to recall power supply parameters when launched. If the program is run from the downloaded software package, changes to serial port parameters and output configurations will not be saved. This file is located in the root (\) of the downloaded software package. It is possible to run multiple versions of the software on the same computer using more than one COM port as long as each copy of XP FL-EV.exe and its associated INI file are stored in their own directory.

**USB drivers**: USB communications between a MS Windows computer and the serial interface is implemented using USB drivers installed on the computer. These drivers allow USB communications via a "virtual COM port". USB drivers MUST be installed in order to use the USB communications interface feature. Installation instructions for the USB drivers are provided in a PDF file supplied by the driver vendor. These files are located in the \Drivers\USB\ folder in the downloaded software package. Run Setup.exe to install.

**LabVIEW® Drivers:** LabVIEW® drivers are provided. In addition, a generic sample power supply control template is provided along with application notes. Customizing is done by the user as required to match the power supply features available. These files are located in the \Drivers\Labview folder in the downloaded software package. You must have the LabVIEW® software to use these drivers.

**Ethernet Installation and set-up (units with Ethernet Option only):**

IP Address:

With the power supply connected to the network and powered on, run the Digi Device Discovery program from the downloaded software package. The program must be permitted to access the network by any firewall program in use. The program will locate the power supply by its unique MAC Address. Choose ‘Configure Device Settings’ from the task list on the left. Select ‘Manually configure network settings.’ Set an IP Address, Subnet Mast, and Gateway as required for the local network and save.

Choose ‘Open Web Interface’ from the task list or open a web browser to the IP address of the device (http://xxx.xxx.xxx.xxx). Enter the default login when prompted.

| | |
|---|---|
| User: | root |
| Password: | *The unique default password is printed on a label near the ethernet port. If there is no password label, the default password is:* dbps |

**NOTE:** If the default password is misplaced, contact XP Power. It can be retrieved using your power supply serial number.

**CAUTION:** If the user changes the default password, XP cannot reset to the default password remotely and the supply will need to be returned to the factory for reset. For this reason, changing the default password is not recommended. Additional user profiles with unique passwords can be created if desired. Refer to the DIGI documentation provided in the downloaded software package for more information.

Under Configuration, select 'Serial Ports.' Select 'Port 1' and choose 'Real Port Profile,' then 'Apply.' Logout of the web interface.

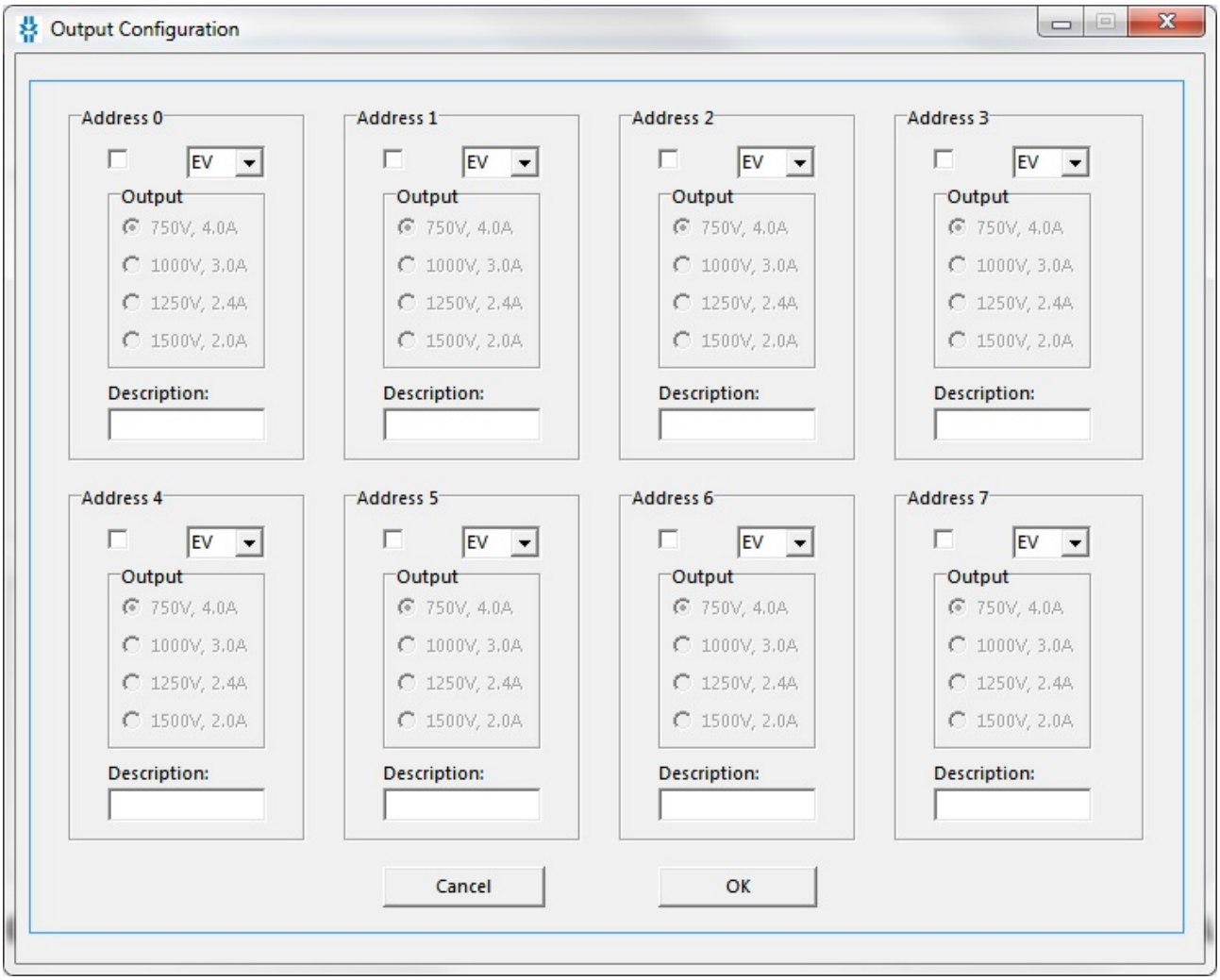
**RealPort Drivers:**
The communication using the Ethernet interface of the power supply and the XP Power control software requires the installation of RealPort Drivers. These drivers allow communication with the power supply via a 'virtual com port.' Installation instructions are provided in the downloaded software package in PDF form. Drivers are provided for Windows XP and later. These files are located in the \Drivers\Ethernet folder in the downloaded software package.

## Serial Power Supply Control Program Operation:

The program consists of a **main window,** (Figure 27) and the **Configuration,** (Figure 26) pull down menu with four options:

- **Serial Port:** Configures the transmission protocol, selects Serial Port COM1 up to COM8, and opens the port. Use the default settings provided, except for the Serial Port, where you should use whichever com port is available in your computer (COM1 to COM8). In order to use the USB interface, the assigned virtual com port, as installed by the USB driver software, must be selected.
  **NOTE:** If run from within the downloaded software package, port configuration changes cannot be saved.
- **Outputs:** Brings up the output configuration screen. This screen allows the user to set the appropriate FL or EV scale factors for each of the eight addresses. The checkbox indicates which power supply address (or addresses in daisy chain mode) is being used. To control multiple power supplies in daisy chain mode, the output scale factors must be set to match the rated voltage and current of the power supply at each corresponding address. Enter a description of the power supply at each address if desired. The description will appear on the main window, underneath the Series name when that address is selected.
  **NOTE:** If run from within the downloaded software package, output configuration changes cannot be saved.
- **Version:** Displays a window with the Software Revision.
- **Exit:** Used to exit the program. It is also possible to exit the program by clicking on the X icon located at the upper right corner of the screen.

**Figure 26**
**Output Configuration**




## Program Main Screen

**Voltage Program** allows entry of values up to the rating of the power supply. For example, for a 1500V power supply, the maximum is 1500. If a greater value is entered, the program will not execute the command and will issue a warning asking that the user enter values within the allowable voltage range.

**Current Program** allows entry of values up to the rating of the power supply. For example, for a 1000 mA power supply, the maximum is 1000. If a greater value is entered, the program will not execute the command and will issue a warning asking that the user enter values within the allowable current range.

**Voltage Readback** displays voltage values sent from the power supply to the computer. The program refreshes this information approximately every 50 milliseconds when the power supply is connected to computer through the interface and operating normally.

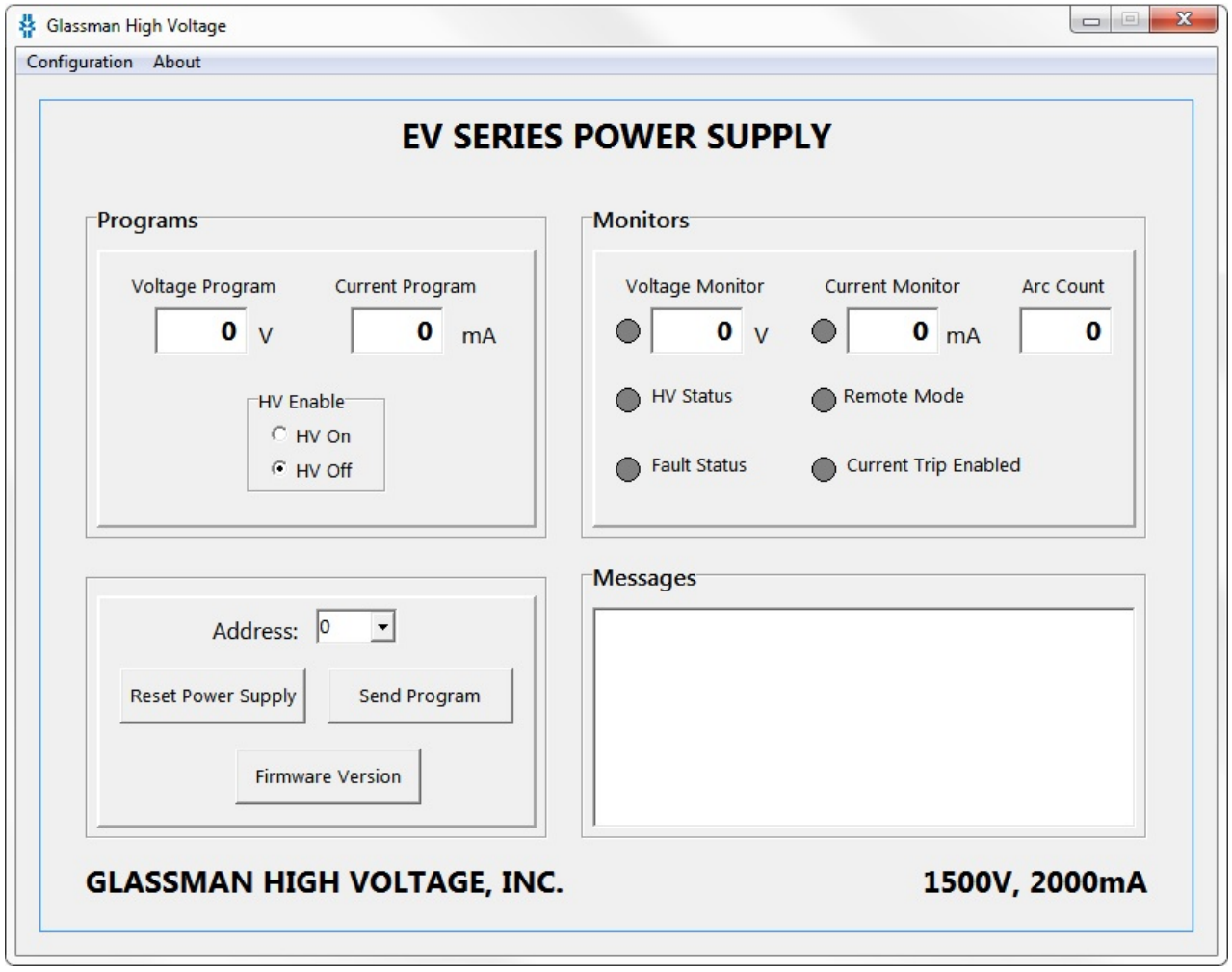
**Current Readback** displays current values sent from the power supply to the computer. The program refreshes this information approximately every 50 milliseconds when the power supply is connected to computer through the interface and operating normally.

**Arc Count** displays a running total of output Arcs up to 255. The count gets reset by issuing a Power Supply Reset command, or cycling the AC power of power supply.

**Status LEDs:**

- **Voltage Mode** – The power supply is in voltage mode when green.
- **Current Mode** – The power supply is in current mode when green.
- **HV Status** – The high voltage is enabled when red.
- **Fault Status** – There is a fault when red. The source of the fault will be displayed in text.
- **Remote Status –** The power supply is in remote mode when yellow.
- **Current Trip Enabled –** Current trip is enabled when green.

**Figure 27**
**Main Window**



**Address** must be set to match the address setting of the power supply to communicate. The monitors and status LEDs are displayed for the power supply at the address selected.
**Send Program Button** is used to send new voltage and current program values or Enable/Disable commands to the power supply. This will switch the power supply to remote mode.
**Power Supply Reset Button** is used to reset the power supply, which will disable the output, reset the programs and reset the arc count. This will switch the power supply to remote mode.
**Firmware Version Button** is used to retrieve the firmware revision of the power supply's computer interface.

**Message Report Window** Displays**:**

1. Commands sent to the power supply
2. Responses from the power supply
3. Communication status and execution errors

## REMOTE MONITORING

The power supply can be monitored remotely by a computer while still in LOCAL control mode. The power supply can be queried by the computer to retrieve both analog and digital status monitors at any time. Issuing either a Set Command or a Power Supply Reset Command will switch the power supply into Remote mode. At that point, the remote Voltage Program, Current Program and HV enable take precedence over the local settings. To switch back to local mode, the LOC/REM button on the power supply front panel must be pressed.

## INTERFACE PROTOCOL

The data interface receives and transmits digital data packets between the customer computer and the XP Glassman HV power supply that represent the analog and digital signals defined below:

**Analog Control Signals sent from Customer Computer to XP Glassman HV Power Supply:**

1. Voltage Program (0-FFF hex represents 0-Vmax output)
2. Current Program (0-FFF hex represents 0-Imax output)

**Digital Control Signals sent** from **Customer Computer to XP Glassman HV Power Supply:**

1. HV On (0=off, 1=on)
2. HV Off(0=on, 1=off)
3. Power Supply Reset

**Analog Monitor Signals** sent **from XP Glassman HV Power Supply to Customer Computer:**

1. Voltage Monitor (0-FFF hex represents 0-Vmax output)
2. Current Monitor (0-FFF hex represents 0-Imax output)

**Digital Monitor and Fault** Signals **sent from XP Glassman HV Power Supply to Customer:**

1. Arc Count (0-FF hex represents 0-255 Arcs)
2. Status Signals
3. Fault Monitors (Fault = HIGH)

*See Figure 28 & 29 for definition of status and fault monitors.*

**Figure 28**
**Status Monitors**

| Signal | Description |
|---|---|
| **Fault** | Power supply Fault (Fault = HI) |
| **Local** | Local/Remote Mode (Remote = HI) |
| **CTS** | Current Trip Enabled (Current Trip = HI) |
| **HV** | High Voltage On Status (HV On = HI) |
| **V/I** | Voltage/Current Mode (Voltage Mode = HI) |

**Figure 29**
**Fault Monitors**

| Signal | Description |
|---|---|
| **IN** | Input Fault |
| **OT** | Over Temperature Fault |
| **CT** | Current Trip |
| **ARC** | Arc Fault |
| **INT** | Interlock Open Fault |

## ADDRESSING

Every command sent from the computer to the power supply will include an ADDRESS byte (0-7). This allows up to eight power supplies to be connected on the same bus in RS485 mode. The default address for RS232 and USB modes will be 0 (30 in ASCII coded hexadecimal).

## SET COMMAND ("S") AND ACKNOWLEDGE ("A") RESPONSE

Prior to sending a Set Command that performs any function other than a Power Supply Reset; the computer should ensure that no fault conditions are existing within the power supply. This is done by first sending a Query Command and examining the returned Response Packet.

Note that it is legal to send a Set Command that does not assert any of the three digital controls. For example, if the HV was on and it was desired to change one or more of the two analog controls, a command packet could be sent containing the new values for the analog controls but with the three

digital control bits set to 0. In this case, the analog values will be changed and the HV will remain on.

If any of the digital monitor fault bits are active, the Set Command packet must include a Power Supply reset assertion.

The protocol for the Set Command is as follows:

The power supply receives the "S" command and performs a checksum comparison and other error checking. If a communication or other error is detected, the power supply will not execute the Set Command but will send an error message back to the computer. If the checksum compares properly and no other errors exist, the power supply will execute the Set Command and return a simple 2 byte Acknowledge message. The computer should then Query the power supply to be sure that the power supply parameters are set as desired.

The data will be ASCII encoded, where scaling is done in the Customer computer. The resolution for the four analog controls is 12 bits, so full scale will be represented by FFF hex. The first byte "SOH", can be entered at the keyboard by the "CONTROL-A" key combination.

All alphabetical entries should use CAPITAL letters only. Use of lowercase letters will result in errors.

The byte definitions of the command message are shown in Figure 30. Note that high order bytes are sent first.

**Figure 30**
**Set Command**

| Byte | Description |
|---|---|
| **1** | Start of message character ('SOH' character, 01 hex) |
| **2** | Address byte (0-7, 30-37 hex) |
| **3** | Command identifier character ('S' character, 53 hex) |
| **4-6** | Voltage program (0-Vmax corresponds to 0-FFF hex) |
| **7-9** | Current program (0-Imax corresponds to 0-FFF hex) |
| **10-12** | Reserved (set to 46 hex) |
| **13-15** | Reserved (set to 30 hex) |
| **16** | Digital control signals |
| **17-18** | Reserved (set to 46 hex) |
| **19-20** | Modulo 256 checksum of bytes 3-18 |
| **21** | End of message character (carriage return, 0D hex) |

An example will illustrate the ASCII data protocol is used. Assume that the customer computer sends a command to the power supply at address 0 that sets the analog power supply parameters to 55% Vmax, 25% Imax, and asserts the digital HV OFF control.

The following 21 byte packet will be sent:

The first byte will contain the ASCII character SOH, which will be sent as 01 hex = 0000 0001 binary (enter CTRL-A at the computer keyboard).

Byte two is the ADDRESS byte, in this case 0. In ASCII, this is 30 hex = 0011 0000 binary (enter 0 at the computer keyboard).

Byte 3 is the Set Power Supply command identifier character "S". In ASCII, this is 53 hex = 0101 0011 binary (enter capital S at the computer keyboard).

Bytes 4 through 6 represent the voltage, 55% of full scale. Full scale with 12 bit resolution is FFF hex. 55% is therefore represented as 8CC hex (within an error of 1 lsb). Bytes 4-6 will be sent containing the ASCII representation of 8CC hex (enter 8CC at the computer keyboard):

Byte 4: 38 hex = 0011 1000 binary
Byte 5: 43 hex = 0100 0011 binary
Byte 6: 43 hex = 0100 0011 binary

Bytes 7 through 9 represent the current, 25% of full scale. Full scale with 12 bit resolution is FFF hex. 25% is therefore represented as 3FF hex (within an error of 1 lsb). Bytes 7-9 will be sent containing the ASCII representation of 3FF hex (enter 3FF at the computer keyboard):

Byte 7: 33 hex = 0011 0011 binary
Byte 8: 46 hex = 0100 0110 binary
Byte 9: 46 hex = 0100 0110 binary

Bytes 10 through 12 are reserved and should be set to FFF hex. Bytes 10-12 will be sent containing the ASCII representation of FFF hex (enter FFF at the computer keyboard);

Byte 10: 46 hex = 0100 0110 binary
Byte 11: 46 hex = 0100 0110 binary
Byte 12: 46 hex = 0100 0110 binary

Bytes 13 through 15 are reserved and should be set to 000 hex. Bytes 13-15 will be sent containing the ASCII representation of 000 hex (enter FFF at the computer keyboard):

Byte 13: 30 hex = 0011 0000 binary
Byte 14: 30 hex = 0011 0000 binary
Byte 15: 30 hex = 0011 0000 binary

Byte 16 represents the digital control data. The digital control byte is assigned as follows (only the least significant four bits are encoded into the ASCII byte):

Bit 0: HV Off (Off = 1)
Bit 1: HV On (On = 1)
Bit 2: Reset (Reset = 1) Sets V = 0, I = 0, Arc Count = 0, HV = Off
Bit 3: Unused

The digital control nibble will therefore contain 0001 binary = 01 hex. The ASCII representation is (enter the number 1 at the computer keyboard):

Byte 16: 31 hex = 0011 0001 binary

Bytes 17 and 18 are reserved and should be set to FF. Bytes 17 and 18 will be sent containing the ASCII representation of FF hex (enter FF at the computer keyboard):

Byte 17: 46 hex = 0100 0110 binary
Byte 18: 46 hex = 0100 0110 binary

The checksum is calculated on bytes 3 through 18. Bytes 19 and 20 will therefore contain the remainder of a modulo 256 addition of bytes 3 through 18. In hex these bytes are:

53 + 38 + 43 + 43 + 33 + 46 + 46 + 46 + 46 + 46 + 30 + 30 + 30 + 31 + 46 + 46 hex = 3EF hex

Since modulo 256 decimal is modulo 100 hex, we can divide 3EF hex by 100 hex. The remainder is EF hex. Therefore EF hex will be sent in bytes 19 and 20 in ASCII representation as 45 hex and 46 hex. Note that the actual implementation of the checksum by the data interface is very simple and requires no actual division. The data bytes are simply added up on an eight bit counter whose carry overflow is ignored. The result stored in the counter will be the checksum remainder (If entering the checksum directly from the computer keyboard, enter E and F):

Byte 19: 45 hex = 0100 0101 binary
Byte 20: 46 hex = 0100 0110 binary

The last byte is the carriage return (press the “Enter” key on the computer keyboard), represented in ASCII as:

Byte 21: 0D hex = 0000 1101 binary

To summarize, the entire 21 byte ASCII character packet will be sent as follows, where the start character, SOH = CTRL-A = 01 hex is the first byte sent and the carriage return = 0D hex is the last byte sent:

Byte Number:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

Entered at the keyboard:
Ctrl-A 0 S 8 C C 3 F F F F F 0 0 0 1 F F E F Enter

Sent in ASCII coded hexadecimal:
01 30 53 38 43 43 33 46 46 46 46 46 46 30 30 30 31 46 46 45 46 0D

(Note that the spaces between bytes are shown for clarity only and are not actually sent.)

The actual data is sent in serial binary format. Each 8-bit byte is framed with 1 start and 1 stop bit. No parity bits are being sent or received. Therefore this data packet is 180 bits long.

The data interface will receive this command and place it in a temporary memory area. Before executing the command, several checks are made. If an illegal condition is detected, the command will not be executed and an error message will be sent back to the computer. The conditions that are checked are described in the Errors section of this document.

If no errors are detected, the data interface will execute the command, and then send a 2 byte Acknowledge Packet back to the computer.

The format of the Acknowledge Packet is:

A <CR> where <CR> indicates the carriage return.

In ASCII coded hexadecimal:

41 0D

**QUERY COMMAND**

The 6 byte command to request power supply status information is the Query ("Q") Command.

The Protocol for the Query Command is as follows:

The power supply will receive a Q command requesting information. If the command is properly received with no errors detected, the power supply will return the Response Packet to the computer. If errors are detected in the command, the power supply will return an appropriate error message, See Figure 31.

**Figure 31**
**Query Command**

| Byte | Description |
|---|---|
| **1** | Start of message character ('SOH' character, 01 hex) |
| **2** | Address byte (0-7, 30-37 hex) |
| **3** | Command identifier character ('Q' character, 51 hex) |
| **4-5** | Checksum of Q |
| **6** | End of message character (carriage return, 0D hex) |

The format of the command is:

| SOH | 0 | Q | Check1 | Check2 | <CR> |
|---|---|---|---|---|---|

Entered at the keyboard:

| Ctrl-A | 0 | Q | 5 | 1 | Enter |
|---|---|---|---|---|---|

Sent in ASCII coded hexadecimal:

| 01 | 30 | 51 | 35 | 31 | 0D |
|---|---|---|---|---|---|

The checksum, which does not include the SOH or Address characters, will always be hex 51, transmitted in two ASCII bytes representing 5 and 1.

**RESPONSE PACKET**

The 16 byte response packet will be returned to the computer in response to a valid Query Command. It will contain status information in the following order as shown in Figure 32.

**Figure 32**
**Query Response**

| Byte | Description |
|---|---|
| **1** | Response identifier character ('R' character, 52 hex) |
| **2-4** | Voltage monitor (0-Vmax corresponds to 0-FFF hex) |
| **5-7** | Current monitor (0-Imax corresponds to 0-FFF hex) |
| **8-9** | Arc Monitor |
| **10-11** | Status Signals |
| **12-13** | Fault Monitors |
| **14-15** | Modulo 256 checksum of all previous bytes except first |
| **16** | End of message character (carriage return, 0D hex) |

The digital status bits are sent in two ASCII bytes:

Byte 10:
Bit 0 – Fault Status (HI = Fault)
Bit 1 – Local/Remote Status (HI = Remote)
Bit 2 – Current Trip Select (HI = On)
Bit 3 – High Voltage Status (HI = HV On)

Byte 11:
Bit 0 – Reserved
Bit 1 – V/I mode (HI = Voltage Mode)
Bit 2 – Unused
Bit 3 – Unused

The Fault monitor bits are sent in two additional ASCII bytes (HI = Fault):

Byte 12: Bit 0 – Interlock
Bit 1 – Over Temperature
Bit 2 – Input Fault
Bit 3 – Reserved

Byte 13: Bit 0 – Reserved
Bit 1 – Reserved
Bit 2 – ARC Fault
Bit 3 – Current Trip

For example, a monitored voltage of 50% Vmax will correspond to 7FF hex, sent with ASCII encoding as follows:

Byte 2: 37 hex = 0011 0111 binary
Byte 3: 46 hex = 0100 0110 binary
Byte 4: 46 hex = 0100 0110 binary

If HV was On and the power supply is in Voltage Mode, the digital status bytes would be:

Byte 10: 38 hex = 0011 1000 binary
Byte 11: 32 hex = 0011 0010 binary
Byte 12: 30 hex = 0011 0000 binary
Byte 13: 30 hex = 0011 0000 binary

## SOFTWARE VERSION REQUEST (“V”) COMMAND AND RESPONSE (“B”)

The 6 byte command to request the software revision level of the power supply’s data interface is the “V” command.

The protocol for the Version Request is as follows:

The power supply will receive a “V” command requesting information. If the command is properly received with no errors detected, the power supply will return the 6 byte Version Response (B) packet back to the computer. If errors are detected in the “V” command, the power supply will return an appropriate error message as shown in Figure 33.

**Figure 33**
**Version Request**

| Byte | Description |
|---|---|
| **1** | Start of message character (‘SOH’ character, 01 hex) |
| **2** | Address byte (0-8, 30-38 hex) |
| **3** | Command identifier character (‘V’ character, 56 hex) |
| **4-5** | Checksum of V |
| **6** | End of message character (carriage return, 0D hex) |

The format of the command is:
SOH 0 V Check1 Check2 <CR>

Entered at the keyboard:
Ctrl-A 0 V 5 6 Enter

Sent in ASCII coded hexadecimal:
01 30 56 35 36 0D

The checksum, which does not include the SOH or Address characters, will always be 56 hex, transmitted in two ASCII bytes representing 5 and 6 as shown in Figure 34.

**Figure 34**
**Version Response**

| Byte | Description |
|---|---|
| **1** | Response identifier character (‘B’ character, 42 hex) |
| **2-3** | Revision level (0-255 corresponds to 0-FF hex) |
| **4-5** | Checksum of revision level bytes |
| **6** | End of message character (carriage return, 0D hex) |

The format of the 6 byte Response Packet (B) is:
B Rev1 Rev2 Check1 Check2 <CR>

For example, if a “V” command was properly received by a data interface with software revision level 25, the following packet will be returned to the computer:
B 2 5 Check1 Check2 <CR>

Sent in ASCII coded hexadecimal:
42 32 35 36 37 0D

The checksum of 32 hex + 35 hex is 67 hex which is transmitted in ASCII as two bytes containing 36 and 37.

## ERROR RESPONSES (E) AND ILLEGAL CONDITIONS

Error responses are messages sent back to the computer in response to a communication error detected on receipt of an S, Q or V command or an illegal setting in an S command as shown in Figure 35.

The format of the 5 byte error response (E) is:

E Error Code Check1 Check2 <CR>

For example, if there was a checksum error in the data received by the power supply:

45 32 33 32 0D

The checksum is only calculated on the 1 byte error code. Therefore for error code 2 (sent as 32 hex), the checksum will always be 33 and 32 as shown in Figure 36.

**Figure 35**
**Error Response**

| Byte | Description |
|---|---|
| **1** | Response identifier character ('E' character, 45 hex) |
| **2** | 1 byte error code (0-6, 30-36 hex) |
| **3-4** | Checksum of error code |
| **5** | End of message character (carriage return, 0D hex) |

**Figure 36**
**Error Codes**

| Error | Description |
|---|---|
| **1** | Unidentified command code |
| **2** | Checksum error |
| **3** | Extra byte(s) received |
| **4** | Illegal digital control byte |
| **5** | Illegal set command with fault active |
| **6** | Processing error |

Unidentified command code – The byte received was not an S, Q or V.

Checksum error – The transmitted checksum did not match the checksum calculated on the received bytes.

Extra byte(s) received – A byte other than the carriage return character was received in the last expected byte position of the command.

Illegal digital control byte – only one digital control command can be sent in a packet:

HV On
HV Off
Power Supply Reset

Illegal set command received with fault active – A set command can not be issued while any of the following faults are active:

- Interlock
- Over Temperature
- Input Fault
- Current Trip
- Arc Fault

Processing error – Data received was valid; however an error occurred when executing the command

## PROTECTIVE FEATURES

**High Voltage Interlock:** An external contact, whose pins are provided at the D25 connector, must be closed for the auxiliary 12V switched rail to be active and to generate output voltage. The device employed for this function is an electromechanical relay. If the contact opens while the unit is operating, the output will shut down and auto-recovers if the closed contact condition is restored. The fault indicator will be activated during the shut down period. (A normally closed contact is provided at J1-14 to monitor the state of the interlock relay.)

**NOTE:** In standard configuration, the interlock contact closes the circuit to COMMON and is therefore referred to as "Low Side Interlock".

Optionally, the interlock contact can close the circuit to 12V rather than COMMON and is therefore referred to as "High Side Interlock".

**Current Trip:** When the rear panel switch, S2-8, is set to "CL" (CURRENT LIMIT - OFF position), the power supply will limit and regulate the load current. When this switch is set to "CT" (CURRENT TRIP - ON position), the unit will shut down and latch off when the load current equals or exceeds the programmed value. The fault indicator will be activated. To reset the unit in local mode, either press the HV On Switch or toggle the AC power switch Off and On. Then start a new turn on sequence by pressing the HV On switch. In remote analog and remote digital mode, toggling ENABLE/REMA Off/On and HV ENABLE Off/On, respectively, will reset the fault and enable the output if a fault condition no longer exists.

**Over Voltage Protection**

**Local Control and Remote Serial Mode**:
In these two cases, the protection is implemented with two functions: Voltage Limit and Over Voltage.

**Voltage limit** will prevent the output voltage from exceeding a preset level. This limitation is implemented in both the Preset mode, and real time voltage adjustment mode (HV ON mode), and is effective when the power supply is in voltage control. The limit can be set between the actual setting and rated voltage.

**Over Voltage** will prevent the output voltage from exceeding a nominal 5% level above the programmed level. This level continuously tracks the program and if the output exceeds this threshold, the unit will shut down and latch off. The fault indicator will be activated. Reset is by cycling the AC power Off/On, and pressing the HV ON button. Maximum settable trip level is 105% of rated.

**Remote Analog Mode**: The unit has a built in absolute voltage limit circuit with a threshold of a nominal 7% above voltage rating, which shuts down and latches the output off upon exceeding this level. In this case, the over voltage fault is generated, regardless of the actual OVP setting. Reset is by cycling the AC power Off/ON. The remote analog control relies solely on this unconditional shut down for the over voltage protection.

**Under Voltage Limit (Local Control Only)**: Will prevent the output from being adjusted below a preset level. The limit can be set between 0 and the actual setting. This limitation is implemented in both the Preset mode and real time voltage adjustment mode. (HV ON mode) and is effective when the Power Supply is in Voltage control. The under-voltage limit is not implemented in Remote Analog mode.

**Over temperature**: Shuts down and latches the unit in OFF state upon exceeding the internally measured temperature threshold. The fault indicator will be activated. Reset is automatic when the fault clears.

**Input (Under Voltage) Fault**: Will prevent the Power Factor Correction circuit from operating with input line voltage below approximately 170 $V_{rms}$ and fully loaded. 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 shut down period.

**Arc Sensing (Count and Recover option):** Internal circuitry senses the number of arcs caused by the external load characteristics. If the rate of consecutive arcs exceeds approximately 2 per second, for at least 5 arcs, the supply will turn off for approximately 2.5 seconds to allow clearance of the faulty condition. The fault indicator will be activated during this period. If the unit is in Serial Remote mode then the number of arcs will be logged and displayed on the computer screen under the “arc count” indicator and will accumulate until the customer resets it. Custom modifications of this feature are available. Consult the factory.

**Arc Sensing (Count and Latch option):** Same as Count and Recover option with the exception that the output will be latched off rather than recover automatically after 2.5 s. The Arc Fault is reset by cycling HV Enable OFF/ON either in LOCAL or REMOTE control mode or by cycling AC Power OFF/ON.

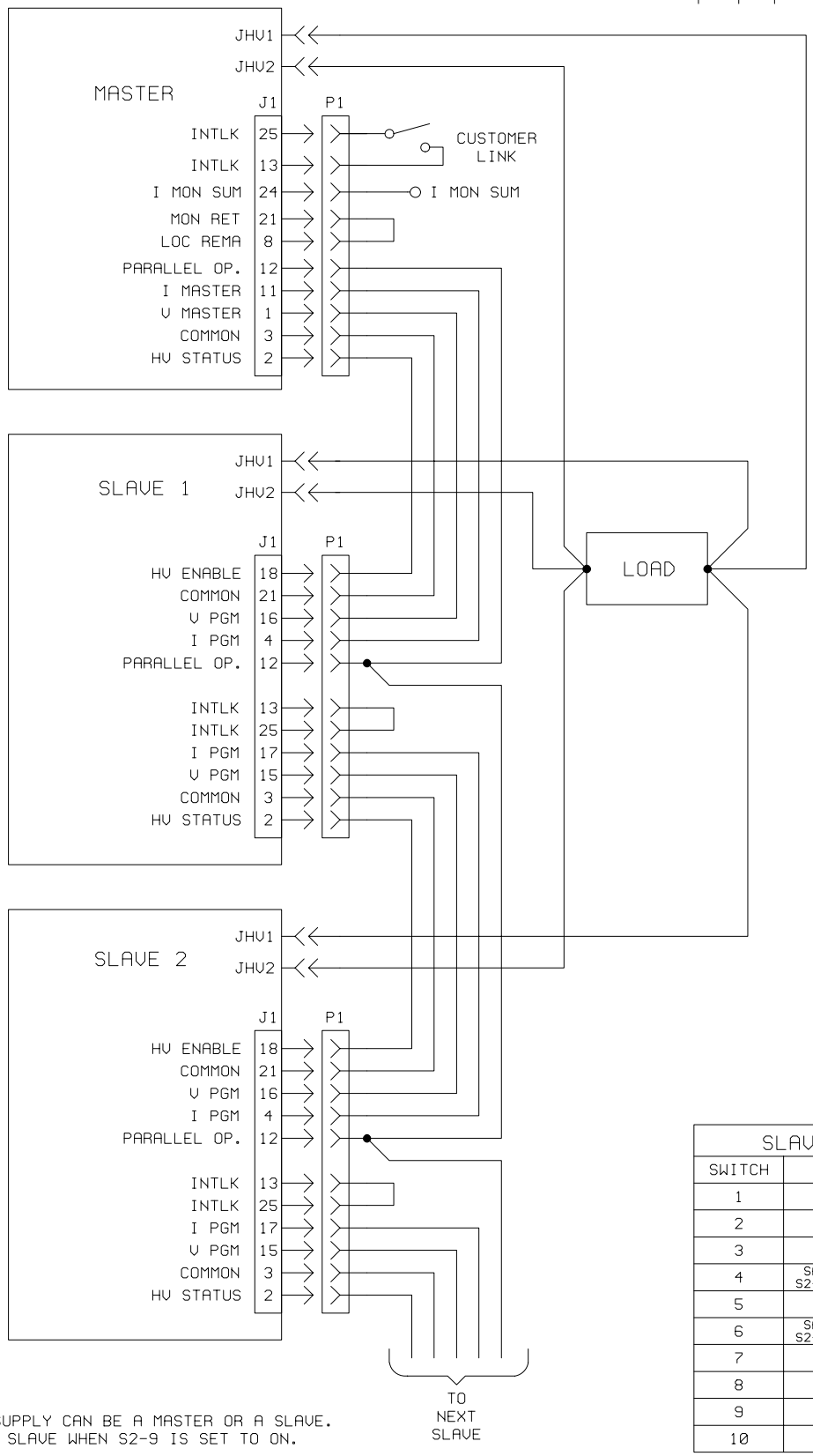
**Arc Quench (option)**: When an arc occurs, the output is inhibited for approximately 20ms to allow clearance of the fault.

**Figure 37**
**Fault List (HI level = "1" in Positive Logic)**

| No: | Abbreviation | Description | Observation | Effect | Reset Sequence |
|---|---|---|---|---|---|
| 1 | INPUT fault | AC line less than 170 VAC | Fault = HI | * SD | Auto** |
| 2 | OT fault | Over Temperature Fault: Critical components OT | Fault = HI | * SD | Auto** |
| 3 | OV fault *** | Over Voltage Fault OV max = 105% x V setting | Tracking 5% above the V setting Fault = HI | * SD | Latches Off AC Power On/Off Reset |
| 4 | ARC fault (Optional) | Exceeding the arc rate limit | Fault =HI | * SD | Auto** after 2.5 sec. or latched |
| 5 | INTLK fault | Interlock relay circuit open | Fault = HI | * SD | Auto** |
| 6 | CT fault | Over Current Trip | Activated by S2 pin 8 Fault =HI | * SD | Latches Off Reset by Toggling HV enable Off/On in remote, pressing the HV ON switch or toggling AC power Off/On in local. |

* SD = Shut-down; **Auto = Output Auto Recovers after the fault is cleared.
*** An unconditional latching shut down can occur when a voltage transient exceeds 7% of the output voltage rating, regardless of the actual OV setting. Reset shut down by cycling the AC power OFF and ON.

| REV | BY | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|---|
| NR-1 | JAG | ADDED WIRING FOR MULTIPLE SLAVES. | 040908 | SD |
| NR-2 | JAG | TYPOS, ADDED NOTE 6. | 120108 | GO |
| NR-3 | JAG | ADDED EV TO DESC. | 111610 | HMS |
| NR-4 | JMC | S2, SWITCH 5, DESC. | 102714 | |




| SLAVE S2 | |
|---|---|
| SWITCH | SETTING |
| 1 | ON |
| 2 | ON |
| 3 | OFF |
| 4 | SAME AS MASTER S2-6 (I MONITOR) |
| 5 | NOT USED |
| 6 | SAME AS MASTER S2-6 (I MONITOR) |
| 7 | OFF |
| 8 | OFF |
| 9 | ON |
| 10 | OFF |

NOTES:

1. ANY EV/FL SERIES SUPPLY CAN BE A MASTER OR A SLAVE. A SUPPLY BECOMES A SLAVE WHEN S2-9 IS SET TO ON.
2. S2 ON ALL SLAVES MUST BE SET AS SHOWN IN TABLE.
3. P1 MASTER IS WIRED TO P1 SLAVE 1 AS SHOWN.
4. P1 SLAVE 1 IS WIRED TO P1 SLAVE 2 AS SHOWN. WIRE EACH ADDITIONAL SLAVE IN THE SAME MANNER.
5. J1-8 MUST BE "HIGH" (NO CONNECTION) ON ALL SLAVES (SET FOR REMOTE ANALOG CONTROL).
6. MASTER SHOWN FOR LOCAL CONTROL. REMOVE CONNECTION FROM P1-8 TO P1-21 FOR REMOTE ANALOG CONTROL.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE:
DEC. XXX± XX ±
DEG. ½

USED WITH:

DO NOT SCALE DRAWING

FILE NO. EXTENSION
\1000\94001#4.SCH

| APPROVALS | DATE |
|---|---|
| DRAWN JAG | 032008 |
| CHECKED JJC3 | 032808 |
| RELEASED | |

GLASSMAN HIGH VOLTAGE, INC.
P.O. BOX 317, HIGH BRIDGE, NJ 08829
(908) 638-3800 FAX (908) 638-3700

TITLE
SCHEMATIC, SYSTEM
EV/FL MASTER/SLAVE

C DWG. NO. 100094-001 REV. NR-4

SCALE NONE SHEET 1 OF 1

| REV | BY | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|---|
| A | TJP | ECN 12413: A4J3 WAS A4J5 | 082224 | RPB |

198–264VAC
47–63HZ
3700VA MAX

GND L/N LINE

J5 TB1 MT3 E1 GROUND

DS1 AC ON E33 E34

W/BRN E6 LINE_OUT
W/BLU E7 NEUTRAL_OUT
BLU E5 NEUTRAL_IN
BRN E4 LINE_IN

A1
APD
BOARD

HT1 J1 J3 J1
T1 B– OV V_FDBK VRMS SPARE T1T2 T2 IAC SPARE GATE_DRIVE_Q4 GATE_DRIVE_Q4_RTN

A6
ACD
BOARD

J2 J2
GATE_DRIVE_Q5_RTN 12V_PRIMARY_RTN INRUSH_DELAY T3T4 12V_PRIMARY SPARE DISABLE T3 SYNC_MASTER T4 SYNC_SLAVE GATE_DRIVE_Q5

HT2 J4

OUT RJ–45 IN
J2: NC NC TXD– RXD– RXD+ TXD+ NC FCOMMON RX TX RXD– TXD– TXD+ RXD+ NC FCOMMON
USB J3: +5V DM DP FCOMMON FCOMMON
ETHERNET U31: TXD+ TXD– RXD+ EPWR+ EPWR+ RXD– EPWR– EPWR–
GROUND

A4
ACI
BOARD

J3 J4 E1 MT1 GROUND
A4P3: VCC_3.5V HV_STATUS_3.3 ISUM/CANS/RESET REM/LOC_3.3 FAULT_3.3 GD_LOCAL RS BDRT_REPD BDRT_REP1 ADD_REPD ADD_REP1 ADD_REP2 ADD_BDRT_RDY COMMON COMMON +12V_CONTROL HV_ENABLE
A4P4: COMMON FAULT_OUT ARC_SENSE VOLTAGE_MONITOR CURRENT_MONITOR IPROG_REM_DIG UPROG_REM_DIG –1.2V_CONTROL RSS CT INTLK_FAULT_3.3 ARC_FAULT_3.3 CTS OT_3.3 INPUT_FAULT_3.3 V/I_3.3V SPARE
A2P2 A2P3 J2 J3 GROUND

A2
ACB
BOARD

–1.2V_CONTROL –1.2V_CONTROL –1.2V_CONTROL –1.2V_CONTROL OT_FAN_BOOST +12V_FANS +12V_FANS +12V_FANS +12V_FANS FAN_C–TROL_OUT FAN_COMMON FAN_C–TROL_GND OTBC –1.2V_CONTROL
J15 J11 J16 J2 J1 J3

A7 AFS BOARD
J4: FAN_LEFT+ FAN_S FAN_LEFT–
J5: FAN_RIGHT+ FAN_S FAN_RIGHT–
A7P4 A7P5

J3 A1P3 A2P10 J10 E20 E1
12V_FANS 12V_FANS SPARE COMMON +5V_CONTROL OT_FAN_BOOST SYNC_MASTER_IN 12V_CONTROL SYNC_SLAVE_IN –1.2V_CONTROL FAN_COMMON INPUT_FAULT

400V_DC_RTN E3 B–
400V_DC E2 B+

B1 B2: RED BLU BLK FAN_S FAN+ FAN–

S1 POWER

FRONT PANEL

25 PIN D–SUB MALE
V MASTER INTERLOCK RELAY NC HV STATUS V PGM PGM RTN VPGM IPGM IPGM LOC/REM IND ENABLE/REMA V/I MODE +5VREF VMON IMON LOC/REMA MON RTN GROUND RESERVED PS FAULT HV STATUS MASTER I MON SUM PD INTLK2 INTLK1
GROUND

10 9 8 7 6 5 4 3 2 1
OFF ON J1 S2
11 12 13 14 15 16 17 18 19 20
RS232/485_SELECT (RSS) SAFE_OPERATION_SELECT CURRENT_TRIP_SELECT FAULT_AND_ENABLE_LOGIC_SELECT/CANS I_MONITOR_RANGE V_MONITOR_RANGE I_PROGRAM_RANGE V_PROGRAM_RANGE I_REM_ANALOG_SELECT V_REM_ANALOG_SELECT

REAR PANEL

HIGH VOLTAGE OUT (V+) JHV2 E28
HIGH VOLTAGE OUT (V–) JHV1 E29

J4 E2 A2P4 OVDIVIDER V_FDBK_RTN SPARE V_FDBK I_FDBK_RTN I_FDBK A3P1 J1

J5 E4 E3 A2P5 ARC_SENSE_RTN ARC_SENSE ARC_SENSE_RTN ARC_SENSE SPARE SPARE A3P2 J2

J6 NC GROUND A2P6 GATECD_S GATECD_F GATEAB_S GATEAB_F

J8 NC A2P8 PSW3 SPARE DC_PRELOAD +12V –12V SPARE A3P10 J10 NC

J7 NC A2P7 IS_CBLEG_F IS_ADCBLEG_S IS_ADLEG_F FAN_CONTROL_OUT FAN_CONTROL_GND FAN_CONTROL_VCC A3P8 J8 GROUND

A3
AP
BOARD

J7 A3P7 NC SPARE E5

B– E2 400V_DC_RTN
B+ E3 400V_DC

T4–F T1–F T1–S T2–F T3–F T4–S T3–S T2–S E24 E26 E25 W10 W11 W12
TB1 TB2 TB3 TB4 TB5 TB6 TB7

A8
APR
BOARD

E1 GROUND

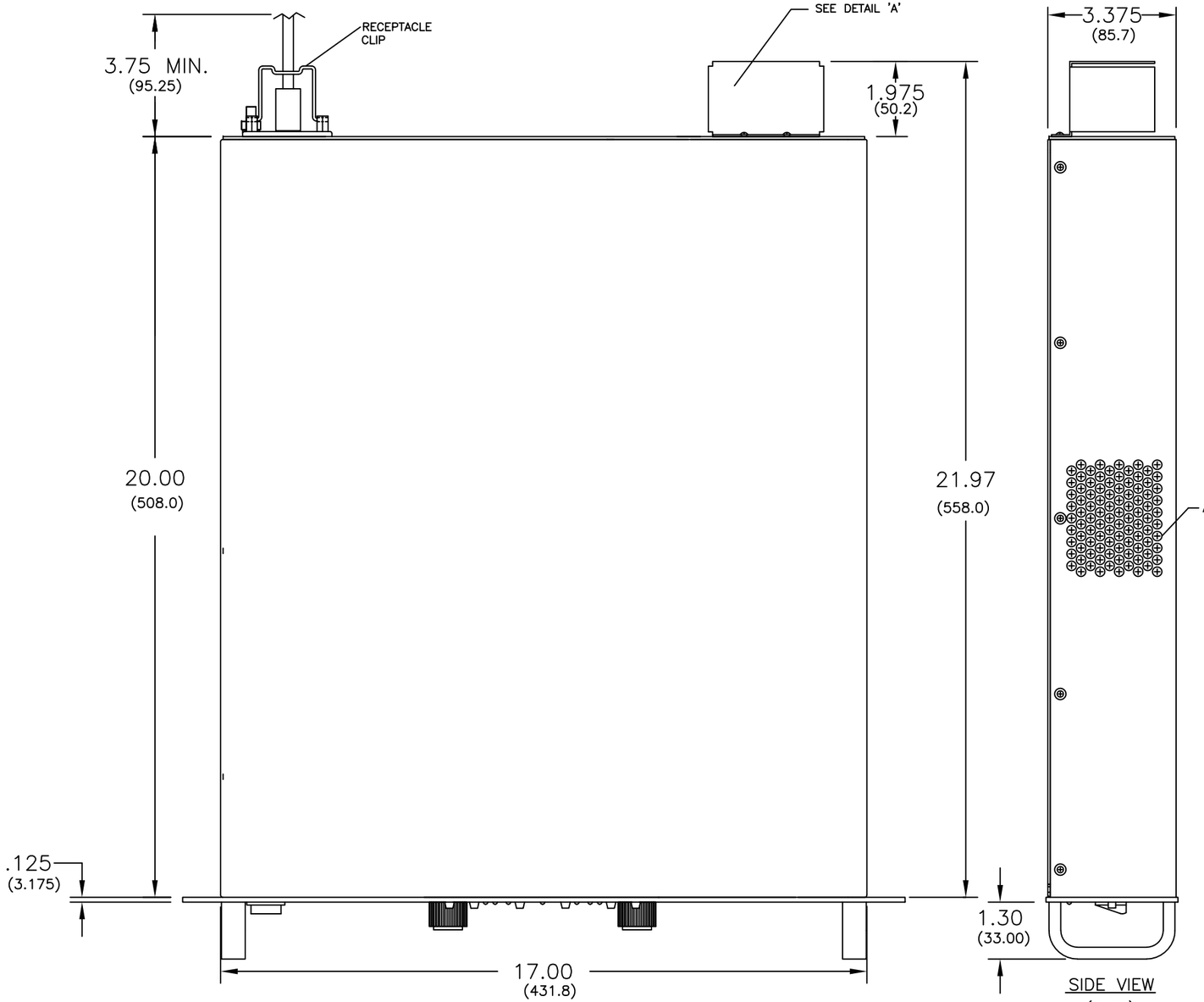
A5P3 A5P1 A5P2
U1 J3 J1 J2 U2
J3: I_CHB 5V_CONTROL SPARE SPARE I_CHA COMMON
J1: V_CHB +5V_CONTROL SPARE SCL COMMON SDA V_CHA I_CHB I_CHA SPARE SPARE GROUND
J2: V_CHB 5V_CONTROL SPARE SPARE V_CHA COMMON

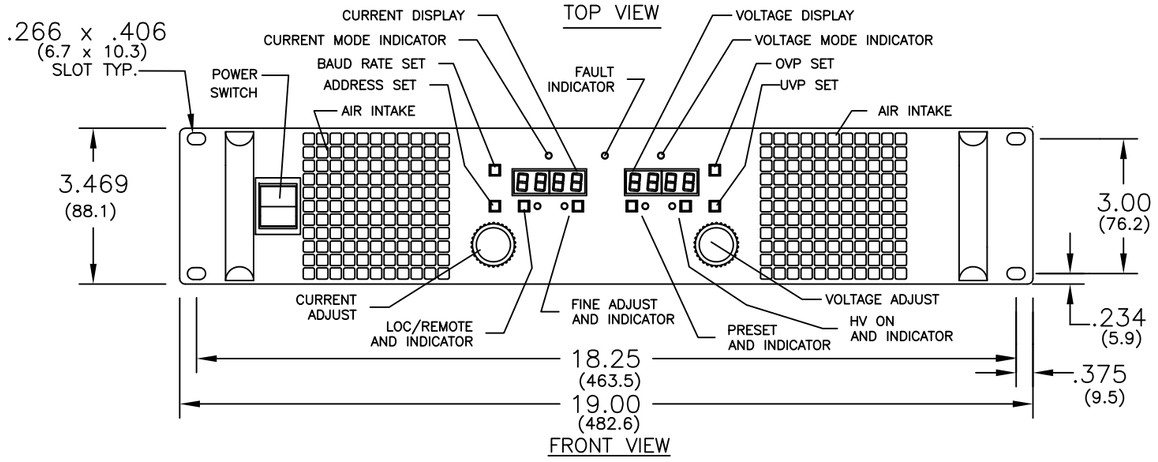
A5
ADM
BOARD

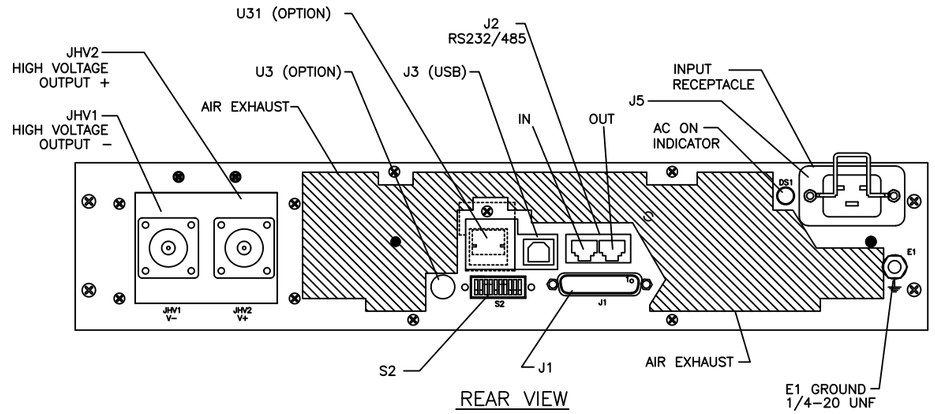
ENCODER_I ENCODER_U

| | | | |
|---|---|---|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: DEC. XXX ± XX ± DEG. % | FILE NO. EXTENSION \2003\11011A.1 | GLASSMAN HIGH VOLTAGE INC. P.O BOX 317, HIGH BRIDGE, N.J. 08829 (908) 638–3800 FAX (908) 638–3700 | |
| USED WITH: | APPROVALS / DRAWN JAG / CHECKED KJD / RELEASED / USED WITH: | DATE 010417 / 011417 | TITLE SCHEMATIC DRAWING AM1–EV/EX |
| DO NOT SCALE DRAWING | | | SIZE D · DWG NO 200311–011 · REV. A · SCALE NONE · SHEET 1 OF 1 |

| REV | BY | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|---|
| A | TJP | ECN 12413: HANDLE DEPTH WAS 1.50 | 082224 | RPB |

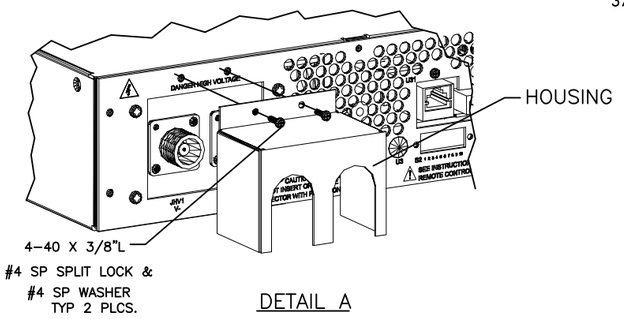



REAR VIEW

INPUT IEC 60320 C20
198–264VAC
47 – 63 HZ
3700 VA MAX




DETAIL A

| J1 LEGEND | | | |
|---|---|---|---|
| 1 | V MASTER | 14 | INTERLOCK RELAY NC |
| 2 | HV STATUS | 15 | V PGM |
| 3 | PGM RTN | 16 | V PGM |
| 4 | IPGM | 17 | I PGM |
| 5 | LOC/REM IND | 18 | ENABLE/REMA |
| 6 | V/I MODE | 19 | +5V REF |
| 7 | VMON | 20 | I MON |
| 8 | LOC/REMA | 21 | MON RTN |
| 9 | GROUND | 22 | RESERVED |
| 10 | PS FAULT | 23 | HV STATUS |
| 11 | I MASTER | 24 | I MON SUM |
| 12 | PO | 25 | INTLK2 |
| 13 | INTLK1 | | |

| J2 LEGEND IN | |
|---|---|
| 1 | RTN |
| 2 | NC |
| 3 | RXD+ |
| 4 | TXD+ |
| 5 | TXD– |
| 6 | RXD– |
| 7 | TX |
| 8 | RX |

| J2 LEGEND OUT | |
|---|---|
| 9 | RTN |
| 10 | NC |
| 11 | TXD+ |
| 12 | RXD+ |
| 13 | RXD– |
| 14 | TXD– |
| 15 | NC |
| 16 | NC |

| J3 LEGEND | |
|---|---|
| 1 | +5V |
| 2 | DM |
| 3 | DP |
| 4 | RTN |

| S2 LEGEND | |
|---|---|
| 1 | V REMOTE ANALOG SELECT |
| 2 | I REMOTE ANALOG SELECT |
| 3 | V PROGRAM RANGE |
| 4 | I PROGRAM RANGE |
| 5 | V MONITOR RANGE |
| 6 | I MONITOR RANGE |
| 7 | FAULT AND ENABLE LOGIC SELECT |
| 8 | CURRENT TRIP SELECT |
| 9 | SLAVE OPERATION SELECT |
| 10 | RS232/485 ETHERNET SELECT |

| U31 LEGEND | |
|---|---|
| 1 | TXD + |
| 2 | TXD – |
| 3 | RXD + |
| 4 | EPWR + |
| 5 | EPWR + |
| 6 | RXD – |
| 7 | EPWR – |
| 8 | EPWR – |

JHV1 : JHV2 – PASTERNACK PE4183 (SHOWN)

0 – 1500V
REVERSIBLE POLARITY

IN
(MM)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE :
DEC. XXX ± XX ±
DEG. ±

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

FILE NO. EXTENSION
\2015\99006A.DWG

| APPROVALS | DATE |
|---|---|
| DRAWN EJM | 031412 |
| CHECKED GO | 031412 |
| RELEASED | |

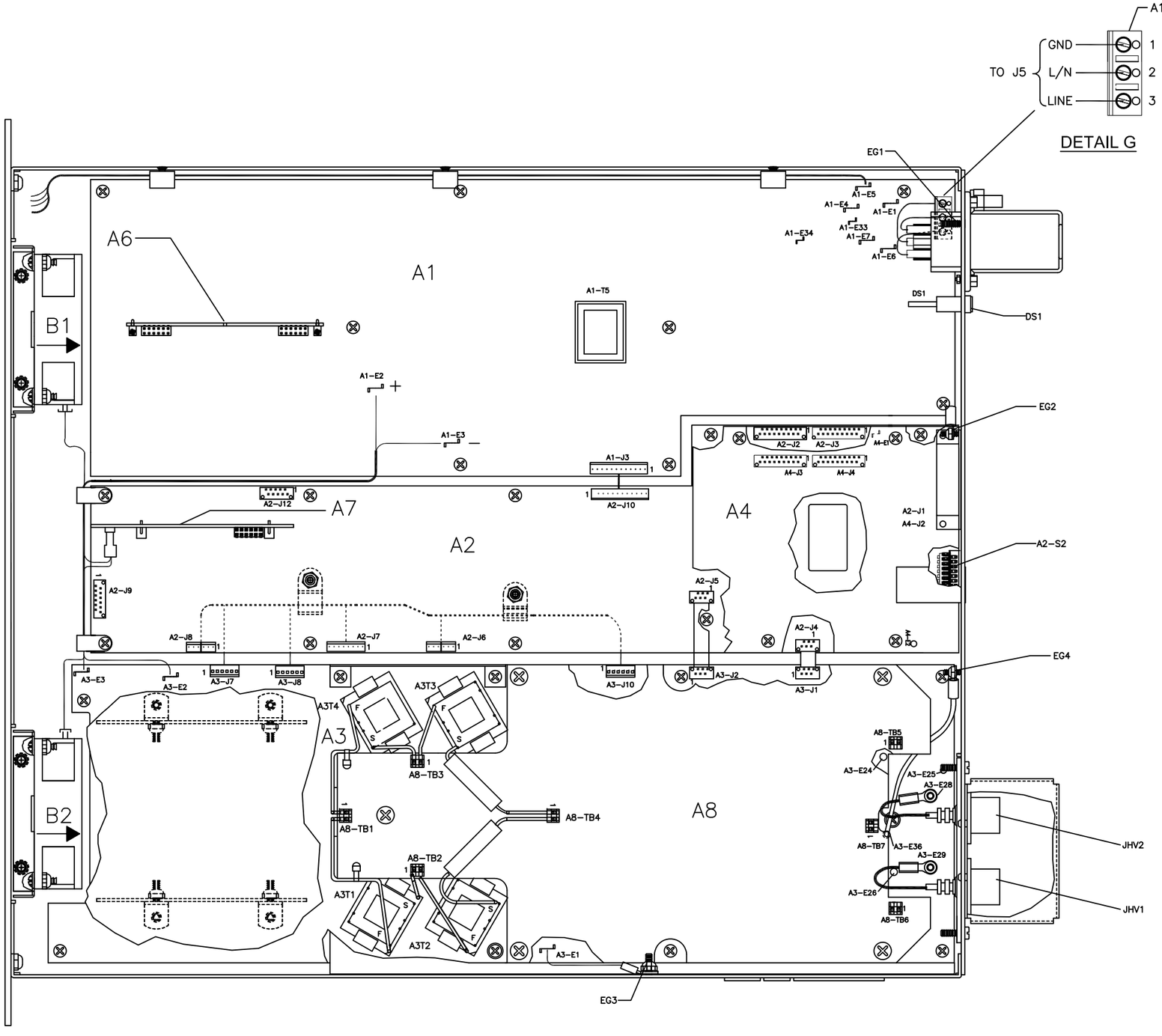
XP XP Power
124 West Main Street, PO Box 317, High Bridge, NJ 08829-317
(908) 638-3800 Fax (908) 638-3700

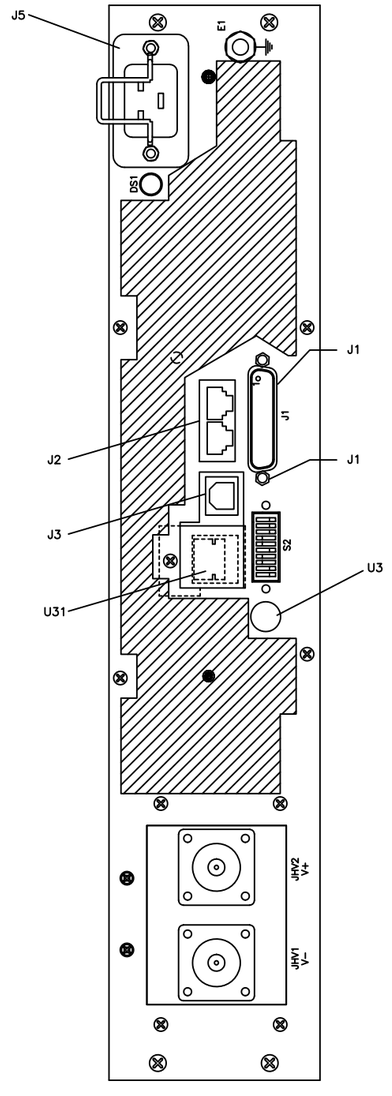
TITLE
OUTLINE & INSTALLATION
EV SERIES

| SIZE | DWG.NO. | REV. |
|---|---|---|
| D | 201599–006 | A |

SCALE NONE SHEET 1 OF 1

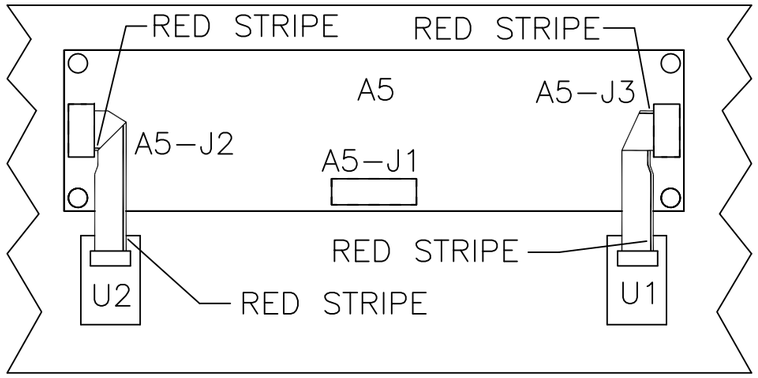
| REV | BY | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|---|
| A | TJP | ECN 9824: REVISED CLAMP DETAIL | 033012 | HMS |
| B | TJP | ECN 12413: A4J3 WAS A4J5 | 082224 | RPB |



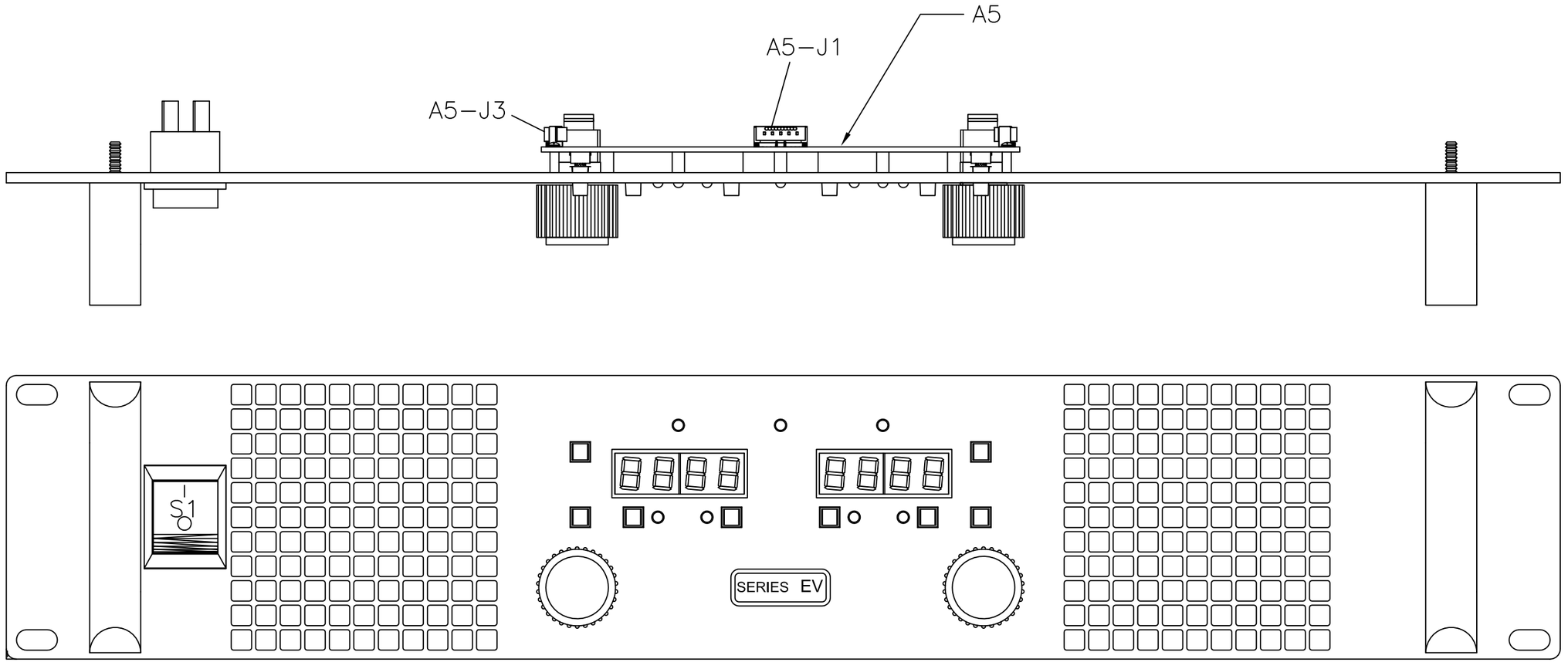




| | | |
|---|---|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE : DEC. XXX ± XXX XX ± XX DEG. ± XXX | FILE NO. EXTENSION \2016\00012B.DWG | XP Power 124 West Main Street, PO Box 317, High Bridge, NJ 08829-317 (908) 638-3600 Fax (908) 638-3700 |
| THIRD ANGLE PROJECTION | APPROVALS / DATE<br>DRAWN EJM 030112<br>CHECKED JMC 032212<br>RELEASED | TITLE: PARTS PLACEMENT DWG AM3–EV |
| DO NOT SCALE DRAWING | | D · DWG.NO. 201600–012 · REV. B |
| | | SCALE NONE · SHEET 1 OF 1 |

| REV | BY | DESCRIPTION | DATE | APPROVED |
|---|---|---|---|---|
| | | | | |




INSIDE VIEW




NOTES:

1 – ALL ITEMS ARE PREFIXED BY "1". EXAMPLE 1S1.

| | | |
|---|---|---|
| UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE :<br>DEC. XXX ± XXX XX ± XX<br>DEG. ± XXX | FILE NO. EXTENSION<br>\2016\01006–.DWG | GLASSMAN HIGH VOLTAGE, INC.<br>P.O. BOX 317, HIGH BRIDGE, NJ 08829<br>(908) 638–3800 FAX (908) 638–3700 |
| THIRD ANGLE PROJECTION | APPROVALS / DATE<br>DRAWN EJM 011311<br>CHECKED<br>RELEASED | TITLE: PARTS PLACEMENT DWG. FRONT PANEL AFP–EV |
| DO NOT SCALE DRAWING | | C · DWG.NO. 201601–006 · REV. NR |
| | | SCALE NONE · SHEET 1 OF 1 |