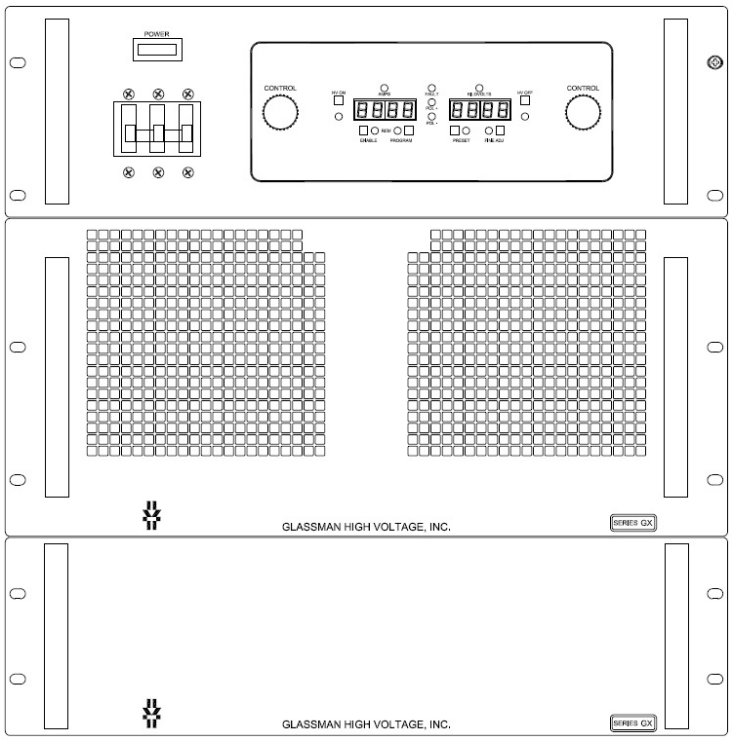
INSTRUCTION MANUAL

GX SERIES



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

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GX 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: GX

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 radiated emissions & immunity requirements, as specified in the harmonized standard 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 and text on Page 2 & 3).

1. The remote Analog, TB Interlock, RS232 & 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 Driver assembly end, TB2 pin 1 provides a ground connection for the Interlock interface cable shield. Pin 25 of J3 or its 25 pin "D" connector housing, provides a ground connection for the Analog interface cable shield. The shell of the 9 pin "D" connector housing J1, provides a ground connection for the RS232 interface cable shield, and the shell of the "USB" connector housing J2, provides a Common/Return connection for the "USB" connector interface cable shield.

2. If the power supply is provided with the Ethernet Option installed, the Ethernet interface cable should be an enhanced category 5E or better, shielded UTP/LAN cable. This is connected to U1, the RJ45 connector of the power supply.

3. A ferrite suppressor must be placed over the jacket & shield at the Power Supply end of the Ethernet cable and over the jacket & shield at both ends of the Analog, Interlock, RS232 and USB interface cables.

   These suppressors must be located within 3" of the terminations at the end of the cables (see drawings on sheets 2). The ferrite suppressors should each have the following properties:

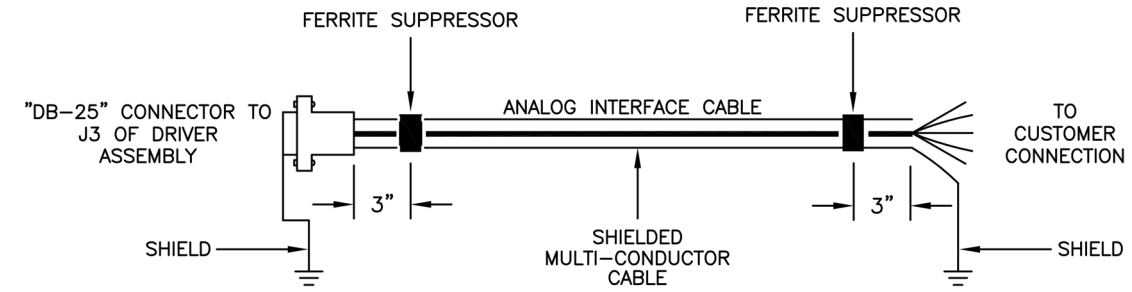
   A) Analog, TB Interlock, RS232, USB, & Ethernet - impedance should be greater than 200 ohms at 100 MHz.

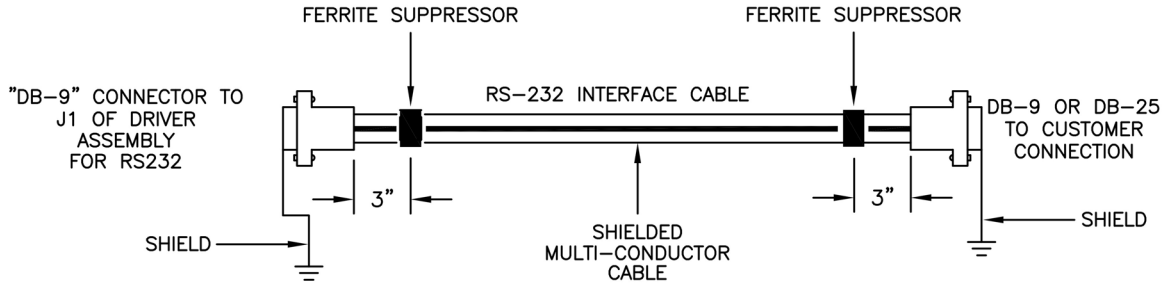
4. Any combination of Analogs, Interlock, RS232, USB, or Ethernet connections made to the power supply will meet the EMC radiated emissions & immunity requirements specified above when the recommended ferrites are used & installed as described and when the shielding as described on page 3 is installed.

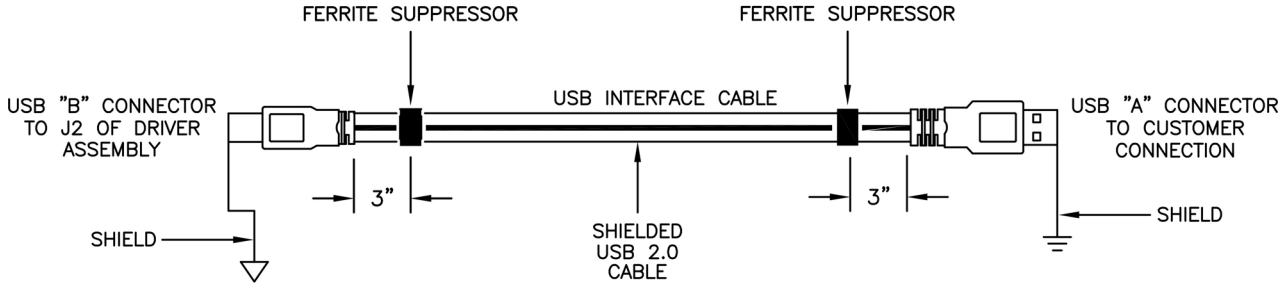
For your convenience, included with your power supply is a kit (SPK-CE-021) that contains the required ferrite suppressors.

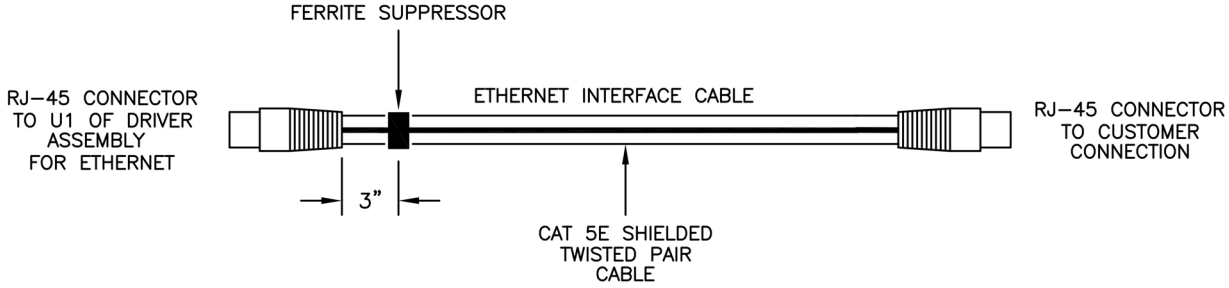
If your power supply is a modified standard, and contains any additional interface connectors, each additional interface cable must follow the same precautions as stated above.

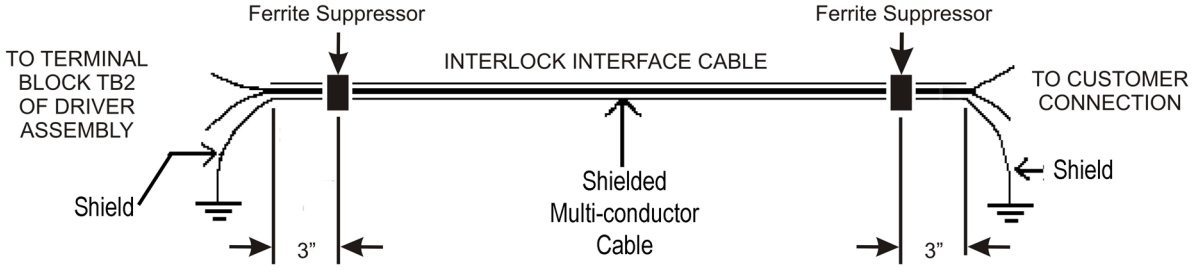
Contact your XP Glassman High Voltage representative for further information.


FERRITE SUPPRESSOR
FERRITE SUPPRESSOR
"DB–25" CONNECTOR TO J3 OF DRIVER ASSEMBLY
ANALOG INTERFACE CABLE
TO CUSTOMER CONNECTION
3"
3"
SHIELD
SHIELDED MULTI–CONDUCTOR CABLE
SHIELD


FERRITE SUPPRESSOR
FERRITE SUPPRESSOR
"DB–9" CONNECTOR TO J1 OF DRIVER ASSEMBLY FOR RS232
RS–232 INTERFACE CABLE
DB–9 OR DB–25 TO CUSTOMER CONNECTION
3"
3"
SHIELD
SHIELDED MULTI–CONDUCTOR CABLE
SHIELD


FERRITE SUPPRESSOR
FERRITE SUPPRESSOR
USB "B" CONNECTOR TO J2 OF DRIVER ASSEMBLY
USB INTERFACE CABLE
USB "A" CONNECTOR TO CUSTOMER CONNECTION
3"
3"
SHIELD
SHIELDED USB 2.0 CABLE
SHIELD


FERRITE SUPPRESSOR
RJ–45 CONNECTOR TO U1 OF DRIVER ASSEMBLY FOR ETHERNET
ETHERNET INTERFACE CABLE
RJ–45 CONNECTOR TO CUSTOMER CONNECTION
3"
CAT 5E SHIELDED TWISTED PAIR CABLE


Ferrite Suppressor
Ferrite Suppressor
TO TERMINAL BLOCK TB2 OF DRIVER ASSEMBLY
INTERLOCK INTERFACE CABLE
TO CUSTOMER CONNECTION
Shield
Shielded Multi-conductor Cable
Shield
3"
3"

The GX design requirements necessitate a separate high voltage chassis with external HVAC connecting cables. This could result in electrostatic radiation from the HVAC cables at approximately 25 kHz. In order to ensure continued compliance with the EMC radiated emissions requirements, the high voltage/driver assembly must be externally shielded by placing it within a shielded rack, enclosure, area or building. Since the HVAC cables cannot be separately shielded, it is recommended as a general precaution that ½" distance be maintained between the HVAC cabling & enclosure/shielding or other cabling to eliminate the possibility of corona.

Shielding may consist of a conductive or semi conductive material placed around the unit and connected to ground or may consist of similar material placed on the surrounding walls in which the unit is housed.

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.

CAUTION. Both the power supply Control Chassis and Driver Chassis are equipped with four handles, two front & two rear. Due to the weight of the unit, always lift or carry using a minimum of two handles.

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 Power HV 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
1	High Voltage Output Cable, (W1)
4	HVAC Interconnect Cables, (W2, W3, W4, & W5).
1	Driver Assembly to High Voltage Assembly, Ground Cable, (W6).
1	Driver Assembly to High Voltage Assembly, Signal Cable, (W7).
1	Driver Assembly to High Voltage Assembly, Signal Cable, (W8).
1	USB A/B cable, 10’ (W9).
1	RS232 Serial cable, 10’ (W10).
1	Subminiature "D" mating connector kit, 25 pin female.
1	Master to Slave Interconnect Cable 1 (One per slave, Master/Slave Systems only).
1	Master to Slave Interconnect Cable 2 (One per slave, Master/Slave Systems only).
1	Master to Slave Ground Cable (One per slave, Master/Slave Systems only).
1	Subminiature "D" 25 pin female terminator connector (One per System).

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 6 minutes before disconnecting the HV cable.

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

Use only a NRTL listed power cord with a separable mains plug of the proper voltage, rated greater that 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.

(For instructions on changing the polarity in reverse polarity models see POLARITY REVERSAL Section elsewhere in this manual).

CONNECTIONS AND CONTROLS
(Refer to Schematic, Interface and O&I Drawings)

The power Supply consists of two chassis assemblies, the driver chassis and the high voltage chassis. All input and interface connections are made to the driver assembly. The HV output is provided on the high voltage assembly.

CAUTION: *All interconnections between the driver and high voltage chassis must be installed with the cables provided before AC line power is applied.*

REAR PANEL ELEMENTS

Master Driver Assembly

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

TB1 AC POWER INPUT

GX units operate off 480 VAC +/-10%, 3 phase, (Delta or Wye connectable), 48-63Hz. (Unless ordered with 380V or 415V options, see option spec control provided).

WARNING! The ground (TB1-5) terminal of this input should always be connected to the AC mains ground.

TB1 is an NRTL approved terminal block rated for 600V, 60 A & 90 Deg. C. The power cord provided by the user should be an NRTL approved, 4 or 5/C, 6AWG, 600VAC, 45 A, 90 Deg. C. **minimum rating**.
For 380VAC thru 415VAC options the power cord provided by the user should be an NRTL approved, 4 or 5/C, 4AWG, 600VAC, 60 A, 90 Deg. C. **minimum rating**.
The line cord wires should be connected as follows:

TB1-1 Line 1 (Brown)
TB1-2 Line 2 (Black)
TB1-3 Line 3 (Grey)
TB1-4 Neutral (Blue)
TB1-5 Ground (Green/Yellow)

Colors indicated are for CE and UKCA compliant supplies.

Note: Master/Slave supplies have one additional set of AC input terminals per slave chassis. A separate NRTL approved line cord must be provided for each module.

It is recommended that an NRTL approved Separable Plug be installed on each power cord to connect & disconnect from the Mains. This plug should also be rated for the required Input VAC & Current of the supply.

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

MAINS SERVICE MUST BE PROTECTED WITH FUSES OR CIRCUIT BREAKERS WITH A MAXIMUM RATING OF 175 A FOR 380 THRU 480 VAC MODELS

For CE and UKCA compliant supplies used in Europe or the UK:
Multi-phase equipment is required to have a Safety Disconnect switch or circuit-breaker from the supply source. This should be installed in the MAINS SERVICE connected to the unit and meet the following requirements.

- The switch or circuit breaker must meet the relevant requirements of IEC60947-1 & IEC60947-3
- The switch or circuit breaker should be rated for the load requirements of the supply or supplies connected to it.
- The Disconnect must be in close proximity to the supply and within easy reach of the operator.
- It must be marked as the disconnecting device for the supply or supplies.

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.

TB2 REMOTE INTERLOCK TERMINAL STRIP

This connector provides the Safety Interlock function. For a description of this connection see INTERFACE DIAGRAM Figure 1 and the REMOTE CONTROL section of this manual.

POWER 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.

E1 GROUND STUD

WARNING! Do not operate unit without good 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!

E2 GROUND STUD

This ground terminal **must** be connected to E1 of the High Voltage chassis (via W6).

S1 CURRENT LIMIT/TRIP SWITCH

This switch allows selection of two modes of operation as follows:

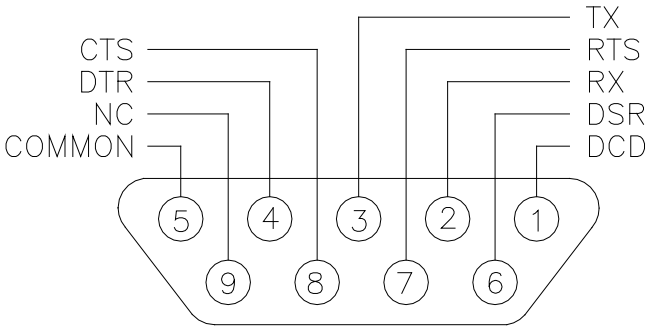
1. CURRENT TRIP (CT): When the switch is set to the CT position the HV output will trip and latch off when the load current exceeds the programmed level. Reset is by toggling the HV ON/OFF buttons, HV ENABLE signal or by cycling the AC power.

2. CURRENT LIMIT (CL): When the switch is set to the CL position, the load current is regulated at the programmed level when the unit is operating in current mode.

J1 RS232 DB9 CONNECTOR

(See INTERFACE DIAGRAM FIG 10, Table 1, and figure below)

J1 is a 9 pin female connector used to connect to a serial computer interface. A null modem RS232 cable (approx. 3m/10ft) DB9 (male) to DB9 (female) is supplied for interconnection.



DB9 RS232 CONNECTOR

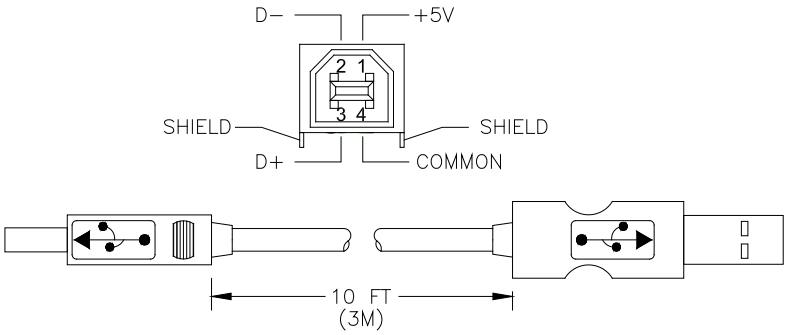
SIGNAL NAME	DB-9 PINOUT	DB-25 EQUIV	COMMENTS (PINS REFER TO DB-9)
Data Carrier Detect (DCD)	1	8	shorted to pins 4 and 6
Receive Data (RxD)	2	3	power supply transmit line
Transmit Data (TxD)	3	2	power supply receive line
Data Terminal Ready (DTR)	4	20	shorted to pins 1 and 6
Signal Ground (GND)	5	7	signal ground
Data Set Ready (DSR)	6	6	shorted to pins 1 and 4
Request To Send (RTS)	7	4	shorted to pin 8
Clear To Send (CTS)	8	5	shorted to pin 7
Ring Indicator (RI)	9	22	not used

Table 1 DB-9 Pinouts

J2 USB CONNECTOR

(See INTERFACE DIAGRAM FIG 10, Table 2, and figure below)

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



USB CABLE

SIGNAL NAME	B PINOUT
VBUS	1
D-	2
D+	3
Ground	4

Table 2 USB B Pinouts

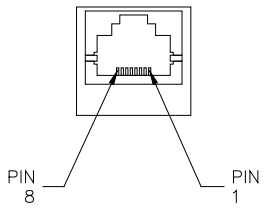
J3 ANALOG CONTROL CONNECTOR

This connector provides inputs and outputs for the analog remote control functions. For a description of each of these signals and their application see INTERFACE DIAGRAM Figures 2 - 11 and the REMOTE CONTROL section.

Note: When the LOCAL/REMOTE switches are set to the REMOTE position and there are no digital computer connections, signals must be provided to the REMOTE V-PROGRAM, I-PROGRAM, & HV ENABLE inputs of J3 in order for high voltage to be generated.

U1 ETHERNET CONNECTOR OPTION
(See INTERFACE DIAGRAM FIG 10 and figure below)

U1 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.



ETHERNET CONNECTOR

J4, J5 HIGH VOLTAGE INTERFACE CONNECTORS

These connectors receive the high voltage interface signals from J1 & J2 (via W7 & W8) of the High Voltage chassis. *(See the SCHEMATICS, OUTLINE & INSTALLATION and SYSTEM INSTALLATION drawings).*

JHV1, JHV2, JHV3, JHV4
High Voltage AC Connectors

CAUTION
All HVAC interconnect cable plugs must be properly fully seated in JHV1 thru JHV4 before applying power to the system. Faulty installation may damage the supply.

These connectors provide the multiplier drive signals to the corresponding connectors on the High Voltage chassis (via W2 thru W5) *(See the SCHEMATICS, OUTLINE & INSTALLATION and SYSTEM INSTALLATION drawings).*

J6, J8 MASTER/SLAVE CONNECTORS

These connectors provide the interface signals needed for parallel operation to J3 & J7 of the first Slave Driver chassis on Master/Slave systems. For standalone operation of the Master unit, J6 has a terminator plug installed *(See the SCHEMATICS, OUTLINE & INSTALLATION and SYSTEM INSTALLATION drawings).*

REAR PANEL ELEMENTS

Master High Voltage Assembly:

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

JHV5 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.

This is the high voltage output of the supply. Engage the connector as follows: Insert the high voltage cable provided into the receptacle. Screw the threaded barrel onto the receptacle.

E1 GROUND STUD

E1 on the High Voltage chassis **must** be connected to E2 on the Driver chassis (via W6). Unless otherwise indicated, this terminal should also be used for the HV load return *(See SYSTEM SCHEMATIC AND OUTLINE & INSTALLATION drawings)*.

J1, J2 HIGH VOLTAGE INTERFACE CONNECTORS

These connectors provide the high voltage interface signals to J4 & J5 of the Driver chassis (via W7 & W8) *(See the SCHEMATICS, OUTLINE & INSTALLATION and SYSTEM INSTALLATION drawings).*

JHV1, JHV2, JHV3, JHV4
High Voltage AC Connectors

CAUTION
All HVAC interconnect cable plugs must be properly fully seated in JHV1 thru JHV4 before applying power to the system. Faulty installation may damage the supply.

These connectors receive the multiplier drive signals from the corresponding connectors on the Driver chassis (via W2 thru W5). *(See the SCHEMATICS OUTLINE & INSTALLATION and SYSTEM INSTALLATION drawings).*

REAR PANEL ELEMENTS

SLAVE MODULE, Driver Assembly (Master/Slave Systems Only):

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

TB1 AC Power Input

Refer to TB1 of Driver chassis above.

POWER 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.

E1 GROUND STUD

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

This is the main grounding terminal for the slave supply and **must** be connected to a good external earth ground!

E2 GROUND STUD

This ground **must** be connected to E1 of the High Voltage chassis (via W6).

J4, J5 HIGH VOLTAGE INTERFACE CONNECTORS

These connectors receive the high voltage interface signals from J1 & J2 of the High Voltage chassis (via W7 & W8). *(See the SCHEMATICS, OUTLINE & INSTALLATION and SYSTEM INSTALLATION drawings).*

JHV1, JHV2, JHV3, JHV4
High Voltage AC Connectors

CAUTION
All HVAC interconnect cable plugs must be properly fully seated in JHV1 thru JHV4 before applying power to the system. Faulty installation may damage the supply.

These connectors provide the multiplier drive signals to the corresponding connectors on the High Voltage chassis (via W2 thru W5). *(See the SCHEMATICS, OUTLINE & INSTALLATION and SYSTEM INSTALLATION drawings).*

J3, J7 MASTER/SLAVE CONNECTORS

These connectors provide the interface signals needed for parallel operation to J6 & J8 of the Master or previous Slave Driver chassis *(See the SCHEMATICS, OUTLINE & INSTALLATION and SYSTEM INSTALLATION drawings).*

J6 SLAVE/SLAVE CONNECTOR

This connector provides the interface signals needed for parallel operation to J3 of the next Slave Driver chassis. A terminator plug is connected to J6 in the last Slave Driver in Master/Slave systems. *(See the SCHEMATICS, OUTLINE & INSTALLATION and SYSTEM INSTALLATION drawings).*

REAR PANEL ELEMENTS

SLAVE MODULE, High Voltage Assembly (Master/Slave Systems Only):

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

JHV5 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.

This is the high voltage output of the supply. Engage the connector as follows: Insert the high voltage cable provided into the receptacle. Screw the threaded barrel onto the receptacle.

E1 GROUND STUD

E1 on the high voltage chassis **must** be connected to E2 on the Driver chassis (via W6). This should also be connected to E1 of the Master or previous Slave High Voltage chassis. *(See SYSTEM SCHEMATIC AND OUTLINE & INSTALLATION drawings)*.

J1, J2 HIGH VOLTAGE INTERFACE CONNECTORS

These connectors provide the high voltage interface signals to J4 & J5 of the Driver chassis (via W7 & W8). *(See the SCHEMATICS, OUTLINE & INSTALLATION and SYSTEM INSTALLATION drawings).*

JHV1, JHV2, JHV3, JHV4
High Voltage AC Connectors

CAUTION
All HVAC interconnect cable plugs must be properly fully seated in JHV1 thru JHV4 before applying power to the system. Faulty installation may damage the supply.

These connectors receive the multiplier drive signals from the corresponding connectors on the Driver chassis (via W2 thru W5). *(See the SCHEMATICS, OUTLINE & INSTALLATION and SYSTEM INSTALLATION drawings).*

FRONT PANEL ELEMENTS

(Refer to the Schematics and Outline & Installation Drawings).

Master Driver Assembly

POWER BREAKER

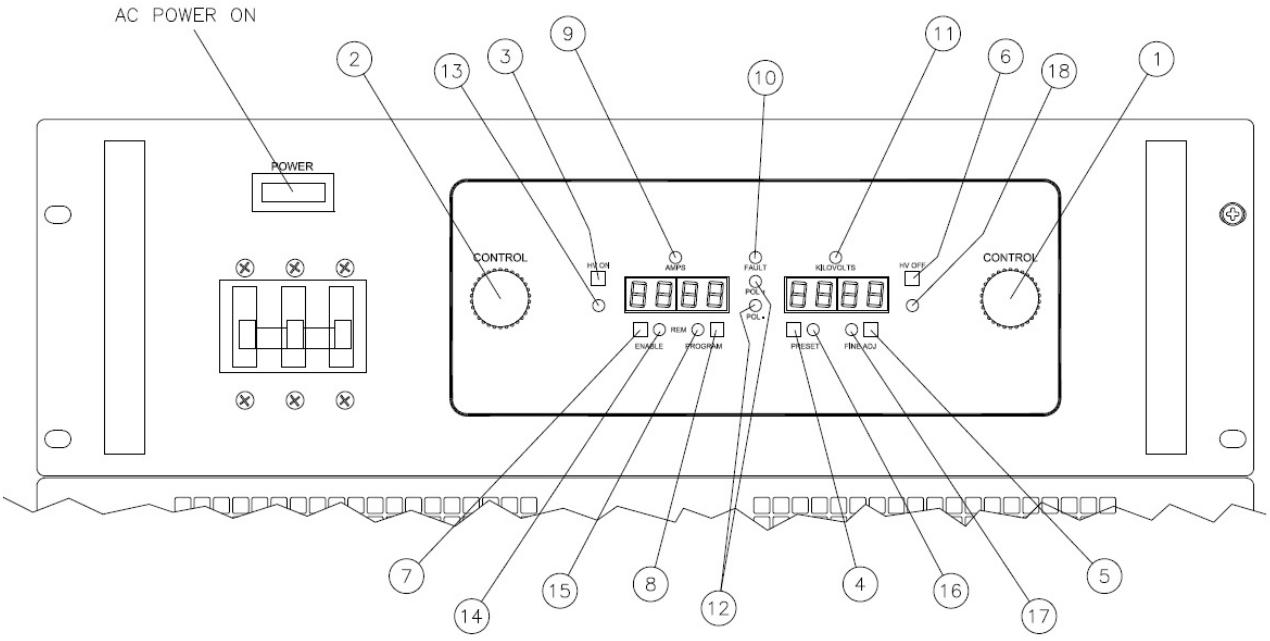
Applies AC power to the unit when in the ON/1 position (as long as power is present at TB1).

WARNING! Do not apply or remove any connections to this unit when power is on.

POWER INDICATOR

The AC POWER ON indicator lamp will illuminate when power is present and POWER BREAKER is in the ON / 1 position.

WARNING! Do not apply or remove any connections to this unit when power is on.



GX
Front Panel Control, Display, and Indicators

Table 3
Front Panel Control, Display and Indicators

	ELEMENT	DEVICE TYPE	FUNCTION	DESCRIPTION
1	VOLTAGE ENCODER	Optical Rotary	Sets: VOLTAGE PROGRAM in FINE or COARSE increments.	0.025% / 0.25% Resolution for Fine/Coarse Adjustment.
2	CURRENT ENCODER	Optical Rotary	Sets: CURRENT PROGRAM in FINE or COARSE increments.	0.025% / 0.25% Resolution for Fine/Coarse Adjustment.
3	HV ON	Momentary Pushbutton; Latching	Turns the HV ON and lights LED. (Item 13)	TTL Signal must also be present to Enable the output. See Item 7 for TTL Enable.
4	PRESET	Momentary Pushbutton; Toggle On Timer*	Allows viewing and setting of the VOLTAGE PROGRAM and the CURRENT PROGRAM and lights LED. (Item 16)	When the PRESET button is pressed, the values of the voltage and current programs are displayed on the front panel meters.
5	FINE ADJ.	Momentary Pushbutton; Toggle	Sets 0.025% resolution for FINE adjustment and 0.25% resolution for COARSE Adjustment and lights LED. (Item 17)	Affects only VOLTAGE PROGRAM and CURRENT PROGRAM.
6	HV OFF	Momentary Pushbutton; Latching	Places unit in Standby Mode. Turns off HV output and HV ON LED. (Item 13).	Resets Current Trip and Arc Latch (Optional)
7	ENABLE REM/LOC	Momentary Pushbutton; Toggle	Toggles HV Enable (TTL) signal from local to remote and lights LED. (Item 14)	In local mode, HV is always enabled. Remote is analog by default. Connecting a computer running control software while in remote Enable will switch control from remote analog to remote digital automatically.
8	PROGRAM REM/LOC	Momentary Pushbutton; Toggle	Switches the voltage and current programs between local and remote operation and lights LED. (Item 14)	Remote is analog by default. Connecting a computer running control software while in remote Program will switch control from remote analog to remote digital automatically.
9	CURRENT	LED Green Indicator	LED indicates Current Mode	The output is controlled as current by the Current Encoder or remote current program. Indicates Current Trip has occurred if lit while the output is off.

	ELEMENT	DEVICE TYPE	FUNCTION	DESCRIPTION
10	FAULT	LED Red Indicator	LED indicates an active FAULT	Output shuts down for any of: OT, AC input under voltage, and fan failure.
11	VOLTAGE	LED Green Indicator	LED indicates Voltage Mode	The output is controlled as voltage by the Voltage Encoder or remote voltage program.
12	POLARITY	LED Green Indicators	LEDs indicate polarity of the HV output.	These are always functional as long as the AC power switch is ON.
13	HV ON	LED Red Indicator	LED indicates HV ON function is enabled.	HV ON LED indicates that the Interlock is closed and the HV ON button has been pressed (or Remote HV ON pins on J3 have been connected). HV Enable is a separate function, and must also be enabled in order to produce HV.
14	ENABLE REM/LOC	LED Green Indicator	LED indicates Remote Enable	Remote is analog by default. Connecting a computer running control software while in remote Enable will switch control from remote analog to remote digital automatically.
15	PROGRAM REM/LOC	LED Green Indicator	LED indicates Remote Programming	Remote is analog by default. Connecting a computer running control software while in remote Program will switch control from remote analog to remote digital automatically.
15	ENABLE REM/LOC	LED Green Indicator	LED indicates Remote Enable	Remote is analog by default. Connecting a computer running control software while in remote Enable will switch control from remote analog to remote digital automatically.
16	PRESET	LED Yellow (Amber) Indicator	LED indicates PRESET Mode	
17	FINE ADJ.	LED Yellow (Amber) Indicator	LED indicates FINE adjustment mode	
18	HV OFF	LED Green Indicator	LED indicates HV is OFF and unit is in Standby.	

*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 (1299 count maximum).

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 6 minutes before making or removing any connections to the supply.

FRONT PANEL ELEMENTS

(Refer to the Schematics and Outline & Installation Drawings).

SLAVE MODULE, Driver Assembly (Master/Slave Systems Only):

POWER INDICATOR

The AC POWER ON indicator lamp will illuminate when power is present at TB1 on the Slave Modules and the slave POWER BREAKER is in the ON / 1 position.

TP-CURRENT TEST POINT

A 0 to 10V service test point for measuring the relative output current of the slave module.

TP-VOLTAGE TEST POINT

A 0 to 10V service test point for measuring the relative output voltage of the slave module.

TP-COMMON TEST POINT

The COMMON return point for measuring TP-CURRENT and TP-VOLTAGE test points.

BIAS INDICATOR

This indicator is normally not illuminated when the AC power is applied. It will light if any of the following conditions are present:

- An internal bias voltage is missing.
- Insufficient AC line voltage is present.
- An over-temperature condition has occurred.

FAN INDICATOR

This indicator will illuminate when one or more of the cooling fans are slow or inoperative.

TRACKING INDICATOR

This indicator will illuminate if the slave module is not tracking the master. The tracking circuit will latch and shutdown the supply if the condition persists for more than approximately 2 seconds. TRACKING shutdown can only be reset by powering down the AC, either by the master module power breaker or by disconnecting the supply from the AC mains. It is normal for this indicator to illuminate during load or programming transients.

SYSTEM INDICATOR

This indicator will illuminate if the master & slave polarities do not match. (This applies only to reversible supplies).

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. **These supplies are not intended for tabletop use**. Rack cabinets generally provide louvers and/or forced air cooling and result in additional EMI shielding. In order to ensure continued compliance with EMC directive radiated emissions requirements, the power supply must be installed in a standard rack cabinet as indicated above. If the supply is to be used in an OEM configuration, consideration must be given to EMI shielding as well as cooling and safety.

WARNING!
When used in an OEM configuration, 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 INSTALLATION drawing(s) located in Section III for mechanical mounting specifications and dimensions.

CAUTION
Each Driver & High Voltage chassis in this power supply is equipped with multiple handles on the front and rear. Due to the weight of the unit, always lift or carry one chassis at a time using a minimum of two handles.

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 DRIVER CHASSIS. (INCLUDING E1 OF EACH SLAVE DRIVER CHASSIS ON MASTER/SLAVE SUPPLIES).

ALWAYS MAKE CERTAIN THAT MULTI-CHASSIS SUPPLIES HAVE THEIR INTER-CHASSIS GROUNDING STRAPS AND/OR BUSSBARS INSTALLED AS SHOWN IN THE OUTLINE & INSTALLATION DRAWING(S) SUPPLIED.

THE GROUND WIRE OF THE AC LINE CORD OR CORDS SHALL BE GROUNDED FROM THE MAINS AC GROUND TO TB1-5 (GROUND) AND ON ALL TB1-5 (GROUNDS) FOR MASTER/SLAVE SUPPLIES.

MAKE SURE THAT ALL INTERCONNECT CABLES AND GROUNDS ARE PROPERLY INSTALLED BETWEEN THE DRIVER ASSEMBLY AND HIGH VOLTAGE ASSEMBLY. IN A MASTER/SLAVE SYSTEM, ALSO MAKE SURE ALL THE INTERCONNECTS AND GROUNDS ARE PROPERLY INSTALLED BETWEEN THE MASTER AND SLAVE SUPPLIES.

PER EN61010-1 THE DISCONNECTING DEVICE MUST BE READILY IDENTIFIABLE AND EASILY REACHED BY THE USER. THE EXTERNAL SAFETY DISCONNECT (CIRCUIT BREAKER OR SWITCH) INSTALLED BY THE USER, IS THE POWER SUPPLY DISCONNECTING DEVICE. TO DISCONNECT THE POWER SUPPLY FROM THE MAINS, THE CIRCUIT BREAKER OR SWITCH MUST BE TURNED OFF.

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 6 MINUTES TO FULLY DISCHARGE.

UNLESS OTHERWISE INDICATED, ALWAYS MAKE CERTAIN THE RETURN SIDE OF THE LOAD IS CONNECTED TO THE GROUND STUD E1 OF THE HIGH VOLTAGE ASSEMBLY. FOR MASTER/SLAVE SUPPLIES, THE LOAD RETURN SHALL BE CONNECTED TO E1 (GROUND STUD) ON THE MASTER HIGH VOLTAGE ASSEMBLY.

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.**

It is suggested that the operator become familiar with the operation of the unit under local (front panel) control and then add the remote functions as desired. Thus, the initial turn on sequence described below assumes that there are no signals applied to the customer interface connector J3 and that the common and interlock terminals are strapped together (TB2-2 TO TB2-3).

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

Please verify the following:

1. That the AC power is disconnected from the unit, either by the disconnecting of an appropriate three phase plug/jack combination or, if the supply is wired directly to the mains, by setting the power breaker or safety switch to OFF.
2. That there are no signals applied to J3 until remote control operation is desired.
3. That a good earth ground is connected to the ground stud, E1 of the Driver Chassis or Master Driver Chassis, as described in the WARNING! statement above.
4. That the proper grounding straps and/or buss bars have been installed between chassis as shown in the installation drawing.
5. That all inter-chassis wires and cables have been installed in accordance with the schematic/interface drawings supplied.
6. That the front panel breaker is in the OFF/0 position.
7. That the rear panel CT/CL switch is set for Current Limit.

Attach load as follows (optional):

1. Connect the high voltage output cable to your HV apparatus and ground the return lead of the load to E1 on the High Voltage chassis or E1 on the Master High Voltage chassis of Master/Slave supplies. Connect the high voltage cable to the receptacle on the rear panel.

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

Power up sequence:

1. Connect the AC input cable provided by the user to TB1 and to the MAINS power source.
2. Set the POWER breaker on the front panel to the ON / 1 position. The following indicators should be illuminated:

   - POWER
   - HIGH VOLTAGE OFF
   - KILOVOLT CONTROL
   - POS or NEG POLARITY

3. Make sure the PROGRAM and ENABLE REM/LOC switches are set to local. The REM/LOC indicators should be extinguished.
4. Press the PRESET button, and the PRESET indicator will illuminate. Rotate VOLTAGE ENCODER counterclockwise until the kilovolt meter reads zero. This is optional, but desirable so as to prevent damage to external equipment caused by inadvertent overvoltage setting. Not required if correct setting has already been established.
5. Press the PRESET button, and the PRESET indicator will illuminate. Rotate the CURRENT ENCODER clockwise to a level that is greater than the amount that the connected load will require (any setting above zero if no load is connected). Note: A setting above zero is required for HV generation even if no load is connected. Press the PRESET button again (or wait 5 seconds) to return to reading the actual HV output voltage.
6. Depress HV ON pushbutton. The HV ON indicator should illuminate.
7. Rotate VOLTAGE ENCODER (or increase external V-PROGRAM signal) until voltage meter indicates desired output voltage.
8. To shut the HV OFF, press the HV OFF button. The HV ON indicator will extinguish.
9. To shut down supply, set POWER SWITCH to the off (“0”) position.

FOR REMOTE ANALOG CONTROL:

1. Using the supplied "D" connector kit, connect external pots or control signals to REMOTE V-PROGRAM and REMOTE I-PROGRAM terminals. Connect HV ENABLE to REFERENCE. *See INTERFACE DIAGRAM figures 2, 3, 4, 10, & 11.*
2. Set the POWER breaker on the front panel to the ON / 1 position. The following indicators should be illuminated:

   - POWER
   - HIGH VOLTAGE OFF
   - KILOVOLT CONTROL
   - POS or NEG POLARITY

3. Make sure the PROGRAM and ENABLE REM/LOC switches are set to remote. The REM/LOC indicators should be illuminated. (Not applicable for "NC" option)

   Note: With a computer connected via RS-232, USB, or Ethernet control will switch from Remote Analog to Remote Digital automatically.

4. Set external V-PROGRAM pot to zero volts. This is optional, but desirable so as to prevent damage to external equipment caused by inadvertent overvoltage setting. Not required if correct setting has already been established.
5. Set external I-PROGRAM pot to a level that is greater than the amount that the connected load will require (any setting above zero if no load is connected). Note: A setting above zero is required for HV generation even if no load is connected.
6. Depress HV ON pushbutton. The HV ON indicator should illuminate. ("NC" option users: **WARNING!** HV is generated upon AC power on)
7. Rotate external V-PROGRAM pot until voltage meter indicates desired output voltage.
8. To shut the HV OFF, press the HV OFF button. The HV on indicator will extinguish. (Not for "NC" option units)
9. To shut down supply, set POWER SWITCH to the off ("0") position.

FOR REMOTE DIGITAL CONTROL:

1. Connect a digital interface (RS-232, USB or optional Ethernet) to a control computer. Using the supplied "D" connector kit, make connections as shown in figure 11 of the INTERFACE DIAGRAM.
2. Set the POWER breaker on the front panel to the ON / 1 position. The following indicators should be illuminated:

   - POWER
   - HIGH VOLTAGE OFF
   - KILOVOLT CONTROL
   - POS or NEG POLARITY

3. Make sure the PROGRAM and ENABLE REM/LOC switches are set to remote. The REM/LOC indicators should be illuminated. (Not applicable for "NC" option)
4. Launch the downloaded software on the connected computer.
5. Depress HV ON pushbutton. The HV ON indicator should illuminate. ("NC" option users: HV is generated upon AC power on)
6. Using the downloaded software, set voltage and current programs to desired levels. Select HV ON, then Send Program.
7. To shut the HV OFF, press the HV OFF switch. The HV on indicator will extinguish. (Not for "NC" option units)
8. To shut down supply, set POWER SWITCH to the off ("0") position.

   Refer to page 32 for complete REMOTE DIGITAL CONTOL operating instructions.

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 6 MINUTES TO FULLY DISCHARGE.

REVERSE POLARITY

Reversible Polarity Supplies:

WARNING!

TO AVOID THE RISK OF SHOCK AND PERSONAL INJURY, WAIT AT LEAST 6 MINUTES AFTER DISCONNECTING THE AC MAINS POWER BEFORE DISCONNECTING ANY CABLES.

Two High Voltage chassis of opposite polarity are provided with each supply (and slave where applicable). To verify the polarity of the High Voltage assembly, refer to the label on the side of the High Voltage chassis.

It is required that the two High Voltage chassis be exchanged to reverse the output polarity. This may be done in the following manner

1. If the supply has been running, the output must be discharged or allowed to bleed down for a minimum of 6 minutes.
2. Disconnect the AC power from the supply.
3. Disconnect all cables from the High Voltage chassis.

   BE SURE AC POWER IS DISCONNECTED AND HV IS DISCHARGED!
4. Remove the High Voltage chassis from rack or installed location.
5. Insert the opposite polarity High Voltage chassis in the same location.
6. Reconnect all E1 connections to Driver chassis, load return, and slave chassis if applicable.
7. Reconnect J1, J2, JHV1, JHV2, JHV3, JHV4, and output cable, JHV5.

CAUTION: *All High Voltage chassis in master/slave systems must be installed for the same polarity. The supplies will not operate if this is not the case.*

WARNING!

DO NOT HANDLE 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 6 MINUTES TO FULLY DISCHARGE.

FRONT PANEL FUNCTION OPERATION

For "NC" Option, there are no controls on the front panel – only the Power switch.

HV ON Pushbutton:

A momentary press turns HV ON. Pressing this button again while the HV is still ON will have no effect. Reset to standby is by pressing the HV OFF button *(see HV OFF button description)* or by toggling the AC power switch OFF, waiting for power to turn off, then turning power switch back ON.

A fault will not inhibit operation of the HV ON function, but will inhibit HV generation via the PWM enable line. When the fault clears, the HV will automatically re-enable.

The HV will not turn ON if the interlock is open. If the interlock is opened while the HV ON function is active, the unit will trip to and latch in standby and once the interlock is closed will require the HV ON button to be pressed again (or Remote HV ON terminals on J3 to be momentarily closed) to turn the HV back ON.

WARNING!
For the NC option the HV ON pushbutton is continuously bypassed so that the HV is turned ON immediately when the AC power is turned ON. With this option the interlock will trip the unit to standby but not latch it so that immediately upon reconnecting the interlock jumper, the HV will turn ON.

HV ON Indicator:

Red LED indicator that is lit whenever the HV ON function is active. This light remains ON when the HV is inhibited either by a fault, HV enable, CT trip, or optional arc inhibit.

PRESET Pushbutton:

A momentary press switches the front panel displays to read the existing settings of the voltage and current adjustment encoders. This function operates in both local and remote modes but only presets the local encoders.

The displays will switch back to reading the actual output levels when either the HV ON button is pressed, (if in standby), the PRESET button is pressed a second time, or automatically 5 seconds after pressing it. As long as the preset controls are being adjusted the timer is reset to zero and the displays will continue to read the preset levels. If HV ON is active and PRESET is pressed, the meters will display the present PRESET settings, but they cannot be adjusted unless unit is first returned to standby.

PRESET Indicator:

Yellow (Amber) LED indicator that is lit whenever the displays are reading the preset values.

FINE ADJ Pushbutton:

Momentarily pressing the button will increase the encoder controls resolution by a factor of ten (from 0.25% to 0.025% per step) to allow more precise setting of the output voltage and current levels.

Upon pressing the button the control encoders are set to fine resolution and remain in the condition until the FINE ADJ button is again pressed to return the resolution to coarse.

FINE ADJ Indicator:

Amber LED indicator that is lit whenever the unit is in fine adjust mode.

PROGRAM REM/LOC Pushbutton:

Pressing this button toggles the voltage and current programs between local and remote. It functions either in standby or when the HV is ON.

Remote program is analog by default. When the RS232, USB, or optional Ethernet connector is connected to a computer running control software, operation will automatically switch from analog to digital when in remote mode. The USB will take priority over the RS232 when the USB connector is connected, and the Ethernet (optional) will take priority over both the RS232 and the USB when connected. When in local mode the monitors and status can still be read over any digital connection.

Upon turning the AC power switch ON the unit will default to the previous setting of the switch when the unit was last powered.

The NC option requires continuous remote operation. However the digital/analog remote priorities remain the same.

PROGRAM REM/LOC Indicator:

Green LED indicator that is lit whenever the unit is in remote program mode.

ENABLE REM/LOC Pushbutton:

Pressing this button toggles the HV enable between Local and Remote. It functions either in standby or when the HV is ON.

The HV Enable is switched from always on (local) to external analog or digital. The remote HV Enable is analog by default and requires an active pull-up to generate HV output. When the RS232, USB, or optional Ethernet connector is connected, operation will automatically switch from analog to digital when in remote mode. The USB will take priority over the RS232 when the USB connecter is connected and the Ethernet (optional) will take priority over both the RS232 and the USB when connected.

Upon turning the AC power switch ON the unit will default to the previous setting of this switch when the unit was last powered.

The NC option requires continuous remote operation. However the digital/analog priorities remain the same.

ENABLE REM/LOC Indicator:

Green LED indicator that is lit whenever the unit is in remote enable mode.

POLARITY Indicators:

Green LEDs that indicate the polarity of the HV output voltage. One is for + polarity and one is for –polarity.

Polarity indicators are always active whenever AC power is ON.

VOLTAGE/CURRENT Mode Indicators:

Green LEDs that indicate whether the output control is voltage or current. One LED indicates voltage control and the other current control.

Mode indicators are always active whenever AC power is ON.

When in standby, the default will be the voltage control indicator no matter where the control encoders or remote programming are set.

If CT operation is selected the current mode indicator will illuminate when latched. If the arc option is provided, since it is neither voltage nor current mode, both the voltage and current mode indicators will be lit. Pressing the standby switch will provide a CT or arc latch reset.

FAULT Indicator:

Red LED that indicates a fault inside the unit. These faults will inhibit HV generation. The fault indicator is functional whenever the AC power is ON.

Faults are defined as over temperature, fan failure, and under voltage/rail fault. Interlock, CT and optional Arc trip are NOT considered faults.

HV OFF Pushbutton:

Pressing this switch will perform the following actions:

1. The unit will be set to standby and the HV ON indicator will extinguish.
2. A reset of the CT and/or arc latch option will be performed.

VOLTAGE and CURRENT Encoders:

Infinitely variable multi-turn controls to control the voltage and current from zero to rated. Since there are no mechanical stops the PRESET function enables determining their settings. Turning the encoder past its end of range will not advance or reduce the output any further. The encoder will continue to turn but the output will remain at the maximum or minimum rated value.

When in local mode, upon power-up, the encoders will both be set to the last settings of the encoders at the prior power down. When switching from local to remote mode the control settings will be retained so that when it is switched back to local the output settings will return to the former values.

ANALOG REMOTE CONTROL INTERFACE - MASTER
(Refer to Schematic, Interface and O&I drawings)

***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.

DRIVER CHASSIS TB2 CONNECTIONS:

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

WARNING! Do not use TB2 connections for main earth ground or load return! E1 ground stud on the Driver rear panel is provided for this purpose.

TB2-1 GROUND

This is the instrumentation ground connection. It is connected directly to the chassis and is provided for cable shield termination. This terminal should not be used as the main connection to earth ground. Use the main ground terminal, "E1", for that purpose.

TB2-2 INTERLOCK
TB2-3

These terminals must be connected to each other for the high voltage to be enabled. The supply is shipped with these terminals tied together by means of a terminal jumper. This jumper may be removed and a pair of wires may be installed in its place, which then may be connected to a switching device, such as a door interlock switch.

The interlock circuit will not allow the high voltage to be activated either by the front panel HIGH VOLTAGE ON button or by the REMOTE HV ON contact closure. When the INTERLOCK terminals are again connected together, the system will revert back to the normal standby condition.

If the high voltage is already enabled, an open circuit at the INTERLOCK terminals will disable the high voltage. Even if the open interlock is reconnected, the high voltage will remain off until a HIGH VOLTAGE ON command is received either by the front panel HIGH VOLTAGE ON button or by the REMOTE HV ON contact closure. *(See INTERFACE DIAGRAM figure 7).*

DRIVER CHASSIS J3 CONNECTIONS:

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

WARNING! Do not use J3 connections for main earth ground or load return! E1 ground stud on the Driver Chassis rear panel is provided for this purpose.

J3-25 GROUND

These terminals should not be used as the main connection to earth ground or for load return. Use the main ground terminal, "E1", for that purpose.

J3-25 terminal is provided for an instrumentation ground connection.

J3-2 DIGITAL COMMON
J3-11

Digital Signals, such as HV ENABLE and status indicator signal returns, should be connected to J3-2 or J3-11 DIGITAL COMMON and all analog monitor/programming returns should be connected to SIGNAL COMMON (J3-8).

J3-8 SIGNAL COMMON

This terminal is provided for all programming and measuring instrument returns. This separate COMMON return is provided so that the digital and HV return currents cannot create a voltage drop that could cause an error in the program monitor/signals. It is connected internally to the same COMMON as J3-2 and J3-11.

NOTE:
INTERFACE DIAGRAM FIG 10 is just one example of the many possible interface configurations.

INTERFACE DIAGRAM FIG 11 shows the minimum number of connections to completely enable the supply. In this configuration, output voltage and current are controlled by the front panel controls (except on "NC" option units which have no front panel controls). No external signals are required.

J3-10 I-MONITOR

A 0-10 V signal, positive with respect to SIGNAL COMMON, and in direct proportion to the output current, is available at this terminal. An internal 10 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 ***(See INTERFACE DIAGRAM FIG 6).***

J3-7 REMOTE I-PROGRAM

Note: When the PROGRAM REM/LOC switch is set to the LOCAL position, this input is disconnected and output current programming is set by the front panel control.

When the PROGRAM REM/LOC switch is set to the REMOTE position, and a digital signal connection is not made, program voltages must be provided to the REMOTE V-PROGRAM and I-PROGRAM inputs of J3 in order for high voltage to be generated.

"NC" OPTION USERS: Programming is always remote; no switch is provided.

When the PROGRAM REM/LOC switch is set to the REMOTE position, a positive 0-10 V signal (with respect to SIGNAL COMMON at J3-8) will program the output current proportionally from zero to rated output. This input can be programmed in several ways *(**See INTERFACE DIAGRAM FIG 4**):*

* A user supplied 0 - +10 V signal.

* A user supplied potentiometer (5-50 k ohms, 10 k nominal) can be connected between the +10 V REFERENCE and SIGNAL COMMON, with the wiper connected to the REMOTE I-PROGRAM terminal.

* The REMOTE I-PROGRAM input may be jumpered to the +10 V REFERENCE voltage terminal for a fixed current limit at the maximum rated current.

J3-9 V-MONITOR

A 0-10V positive signal with respect to SIGNAL COMMON, in direct proportion to the output voltage, is available at this terminal. An internal 10 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. *(**See INTERFACE DIAGRAM FIG 5**)*.

J3-6 REMOTE V-PROGRAM

Note: When the PROGRAM REM/LOC switch is set to the LOCAL position, this input is disconnected and output voltage programming is set by the front panel control.

When PROGRAM REM/LOC switch is set to the REMOTE position, and a digital signal connection is not made, program voltages must be provided to the REMOTE V-PROGRAM and I-PROGRAM inputs of J3 in order for high voltage to be generated.

"NC" OPTION USERS: Programming is always remote, no switch is provided.

When the PROGRAM REM/LOC switch is set to the REMOTE position, a positive 0-10 V signal (with respect to SIGNAL COMMON at J3-8) will program the output voltage proportionally from zero to rated output. This input can be programmed in several ways *(**See INTERFACE DIAGRAM FIG 3**)*:

* A user supplied 0 - +10 V signal.

* A user supplied potentiometer (5-50 k ohms, 10 k nominal) can be connected between the +10 V REFERENCE and SIGNAL COMMON, with the wiper connected to the REMOTE V-PROGRAM terminal.

* The REMOTE V-PROGRAM input may be jumpered to the +10 V REFERENCE voltage terminals for a fixed output at the maximum voltage.

J3-12 +10 V REFERENCE

The output of this terminal is an ultra-stable, positive, +10 V reference voltage (with respect to SIGNAL COMMON) that is supplied for user programming applications. Maximum current drain from this point should be limited to 4 mA.

J3-20 HV ENABLE

Note: When the ENABLE REM/LOC switch is set to the LOCAL position, this input is disconnected and HV ENABLE is always ON.

When the ENABLE REM/LOC switch is set to the REMOTE position, and a digital signal connection is not made, the HV ENABLE signal must be provided J3 in order for high voltage to be generated.

NC Option Users: This input must be jumpered to REFERENCE (J3-12) if no external HV ENABLE signal is used.

When the ENABLE REM/LOC switch is set to the REMOTE position, an external positive 2.5-15 V source (with respect to COMMON at J3-11) will enable the supply. A 0-1.5 V signal at this input will disable the supply.
*(**See INTERFACE DIAGRAM FIG 2**)*.

J3-21 HV STATUS

When the supply is enabled to produce HV, the HV status signal goes from a low to a high state and stays high until the HV is disabled.

High is a 1k resistor pull up to +5V.
Low is 0V (common) and can sink up to 5mA.

J3-22 FAULT STATUS

During normal operation, this signal is low and goes high when a fault occurs. It stays high until the fault is cleared. If the supply is enabled and generating HV when the fault occurs, the HV will be disabled and consequently the HV status signal will go low as well as the fault signal going high.

A fault can be either under voltage, over temperature, a faulty fan, or a slave fault in a Master/Slave system.

High is a 1k resistor pull up to +5V.
Low is 0V (common) and can sink up to 5mA.

J3-23 MODE STATUS

During operation in voltage mode, this signal will be low. During operation in current mode, this signal will be high.

High is a 1k resistor pull up to +5V.
Low is 0V (common) and can sink up to 5mA.

J3-24 ARC STATUS

If the supply includes ARC Quench, when an ARC discharge occurs this signal will transition from Low to High for a 20ms duration (20ms high pulse for each ARC). An ARC is defined as an instantaneous HV output discharge that exceeds 15-30% of the supply voltage rating.

High is a 1k resistor pull up to +5V.
Low is 0V (common) and can sink up to 5mA.

J3-15, J3-16 REMOTE HV ON

These terminals when momentarily jumped initiate HV ON. This is the remote equivalent of pushing the HV ON button on the front panel.

There are three ways to connect these terminals:

1. Leaving them open allows normal HV ON from the front panel only. The HV OFF button turns the HV OFF and resets any faults.
2. Placing a momentary switch across these terminals allows turning the HV ON either locally (front panel) or remotely. The HV OFF button turns the HV OFF and resets any faults.
3. Placing a jumper between these terminals bypasses the front panel HV ON button and the HV will turn ON as soon as the AC power switch is turned on. The HV OFF button will not turn the HV OFF. The interlock will turn the HV OFF but it will turn ON as soon as the interlock is closed.

Open circuit voltage is 2V. Closed current is 2mA.

REMOTE DIGITAL INTERFACE

Computer Interface

This section describes the specific implementation of the XP Power High Voltage RS2323/USB/Ethernet Serial Data Interface for the GX series power supplies. The Ethernet interface (U1) is optional and is not included with standard power supplies.

The purpose of this interface is to provide remote monitoring and control capability of all analog and digital functions available for these 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 with a baud rate of 9600.

The power supply interface acts strictly as a slave device. It will not transmit any messages over the data link unless it receives a request from the master computer.

Note that the Interlock on TB2 must be satisfied and the HV ON function must be operated by either pressing the front panel HV ON button or using the Remote HV ON pins on J3, before being able to control the unit with the digital interface.

SERIAL INTERFACE CONNECTIONS

(SEE FIGURE 9 ON INTERFACE DRAWING)

RS232:
Using the provided Null Modem cable, attach the control computer's serial port to J1 on the rear panel of the power supply.

USB:
J2 on the rear panel is USB "B" connector. The USB connection is detected automatically and it will take precedence over RS232. A standard USB cable is provided.

ETHERNET (optional):
Using a CAT5e Ethernet cable, attach U1 on the rear panel of the power supply to the local network. Alternately, the power supply can be connected directly to a computer's Ethernet port using a crossover Ethernet cable. The Ethernet connection is detected automatically and it will take precedence over both RS232 and USB.

Serial Interface Software

Installation:

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

Serial Power Supply Control Program (XP.exe): This program can run on Windows XP and later. XP.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.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. This file is located in the root (\) of the downloaded software package.

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 on 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 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 on 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.' Next, select 'GPIO' also under Configuration. Change Pin 2 mode to 'Out,' Initial Output State to 'asserted,' then 'Apply.' Logout of the web interface.

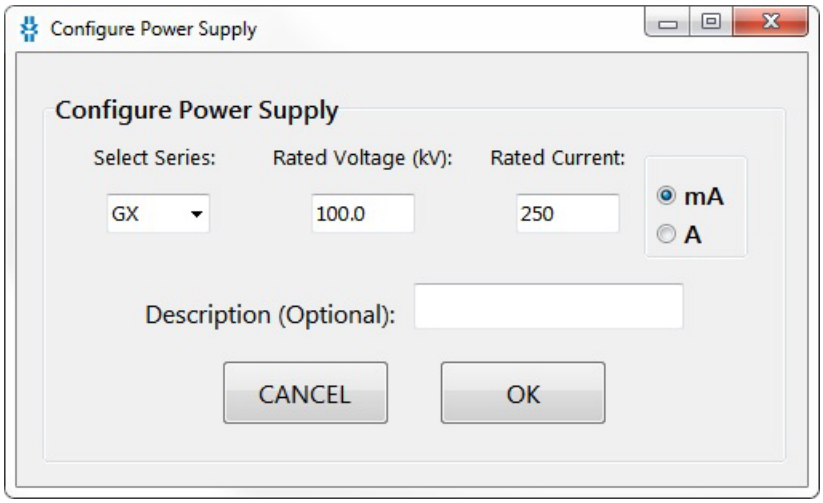
Note: In order to switch back to either RS232 or USB control, the above process must be repeated and GPIO pin 2 output must be de-asserted.

RealPort Drivers:

The communication using the Ethernet interface of the power supply and the XP 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**, Configuration, and About menus:

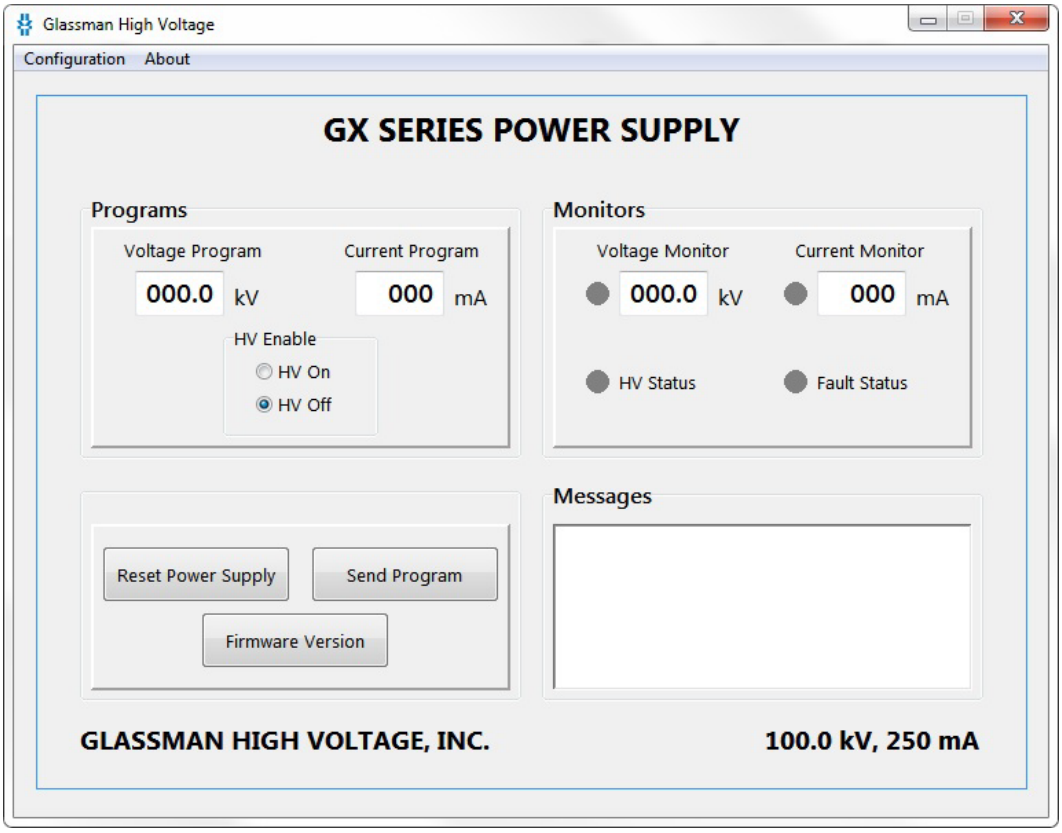


Configuration - Power Supply: On the initial run (or any run without XP.ini present in the directory with XP.exe), the Power Supply Configuration window will launch immediately. Choose the appropriate Series from the pull down menu or manually enter the Series letters if it is not in the list. Enter the Voltage in kilovolts and the Current in either milliamps or Amps exactly as they appear on the power supply label without any polarity indication. Enter a description of the power supply if desired. The description will appear on the main window, underneath the Series name. Clicking 'OK' will set the scale factors and resolution for both Voltage and Current. Be sure to check these numbers on the Confirmation pop-up. The Power Supply Configuration window can be accessed any time through the Configuration menu.

Configuration - Com Port: Allows for selection of the Serial Port Com 1 up to Com 10 and opens/closes the port. 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, Power Supply and Com Port configuration changes cannot be saved.

About - Software Version: Displays a window with the Software Revision.



The **Program Main Screen** displays four data entry and display text boxes, three control buttons, one HV enable/disable selector, and up to four status indicators. See series specific manual for available status indicators.

Voltage Program allows entry of values up to the rating of the power supply. For example, for a 3 kV power supply, the maximum is 3.00. 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 400 mA power supply, the maximum is 400. 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 250 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 250 milliseconds when the power supply is connected to the computer through the interface and operating normally.

Send Program Button is used to send new voltage & current program values or Enable/Disable commands to the power supply.

Power Supply Reset Button is used to reset the power supply, so that the output voltage is disabled, and voltage and current programs are set to zero.

Firmware Version Button is used to display the current firmware version of the interface.

Voltage Control Status Indicator is used to indicate that the power supply is operating in voltage regulation mode.

Current Control Status Indicator is used to indicate that the power supply is operating in current regulation mode (or current trip where applicable).

PS Fault Status Indicator is used to indicate that the power supply HV enable is inhibited due to a Fault condition. Refer to the instruction manual text for a description of conditions which cause a Fault.

HV On Status Indicator is used to indicate that the power supply HV is on.

Message Report window displays:

1. Commands that the program sends to the power supply.
2. Responses sent from the power supply to the program.
3. Program status and execution errors.

Please refer to the XP Power Serial Interface Specification for firmware commands, responses and error reports.

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. In order to remotely control the programs or HV enable, the corresponding front panel remote/local button must be switched to remote.

SERIAL INTERFACE COMMAND PROTOCOL

CHARACTER SENT	ASCII CODE (Hexadecimal)	COMMENTS
SOH	1	Start of header (Ctrl-A)
<CR>	0D	Carriage return (Enter)
0	30	
1	31	
2	32	
3	33	
4	34	
5	35	
6	36	
7	37	
8	38	
9	39	
A	41	CAPITAL letters only!
B	42	
C	43	
D	44	
E	45	
F	46	
Q	51	
R	52	
S	53	
V	56	

Table 5. Relevant ASCII Codes

NOTE: The power supply has a communication timeout of 1.5 seconds built in for safety. When writing custom software, the program must send a data packet to the power supply in intervals of less than 1.5 seconds or the high voltage will turn off and the remote digital programs will be reset to zero. The recommended method is to send a "Query" command once per second to keep the remote monitors and status signals updated. The timeout can be disabled for debugging purposes via the Configure Command.

SIGNAL SUMMARY

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

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

1. Voltage Control (0 – FFF hex represents 0 – Vmax output)
2. Current Control (0 – FFF hex represents 0 – Imax output)

Internal to the power supply interface, the D/A converters have an analog output range of 0 to + 5 volts DC, where FFF hex represents full scale.

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

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

Programming a digital control bit to a "1" will generate an internal 250 millisecond pulse that will assert the desired function.

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

1. Voltage Monitor (0 – 3FF hex represents 0 – Vmax output)
2. Current Monitor (0 – 3FF hex represents 0 – Imax output)

Internal to the power supply interface, the A/D converters have an analog input range of 0 to +5 volts DC, where 3FF hex represents full scale.

Digital Monitor Signals sent from XP Power HV Power Supply to Customer Computer:

1. Power Supply Fault (1 = fault) when available.
2. HV On Status, (1 = on, 0= off) when available.
3. Control Mode Status (V mode = 1, I mode = 0) when available.

COMMAND STRUCTURE

The general operation of the data link is described in this section.

The Customer computer can send three possible commands to the XP Power HV power supply:

SET POWER SUPPLY (S) command

QUERY POWER SUPPLY (Q) command

SOFTWARE VERSION LEVEL REQUEST (V) command

A Set command contains a total of 18 bytes and instructs the power supply to change any or all of its control signals. The power supply will execute the Set command and respond with a simple 2 byte **ACKNOWLEDGE (A)** packet, or, if errors are detected, the power supply will not execute the Set command but will return a 5 byte **ERROR (E)** packet.

A Query command contains a total of 5 bytes, and is used to request that the power supply return an information packet containing the analog and digital information that it monitors. The power supply responds by sending back a 16 byte **RESPONSE (R)** packet.

In response to a 5 byte Version Request command, the power supply will return a 6 byte **SOFTWARE VERSION LEVEL RESPONSE (B)** packet to the computer.

For all these commands, if communication errors or illegal conditions are detected by the power supply, the command will not be executed and the appropriate 5 byte **ERROR (E)** packet will be sent back to the computer.

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 analog 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 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 ("CTRL-A").

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

The byte definitions of the command message are shown in Table 6. Note that high order bytes are sent first.

BYTE	DESCRIPTION
1	Start of message character (“SOH” character: hex 01)
2	Command Identifier Character (S character, hex 53)
3 - 5	Voltage command (0 – Vmax corresponds to 0 – FFF hex)
6 - 8	Current command (0 – Imax corresponds to 0 – FFF hex)
9 -14	Not implemented
15	Digital control data (HV On, HV Off, Power Supply Reset)
16 -17	Modulo 256 Checksum of all previous bytes except start character
18	End of message character (carriage return, hex 0D)

Table 6. SET Command Byte Contents

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

The following 18 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 2 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 3 through 5 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 3-5 will be sent containing the ASCII representation of 8CC hex (enter 8CC at the computer keyboard):

Byte 3: 38 hex = 0011 1000 binary
Byte 4: 43 hex = 0100 0011 binary
Byte 5: 43 hex = 0100 0011 binary

Bytes 6 through 8 represent the current, 25% of full scale. Full scale with 12 bit resolution if FFF hex. 25% is therefore represented as 3FF hex (within an error of 1 lsb). Bytes 6 – 8 will be sent containing the ASCII representation of 3FF hex (enter 3FF at the computer keyboard):

Byte 6: 33 hex = 0011 0011 binary
Byte 7: 46 hex = 0100 0110 binary
Byte 8: 46 hex = 0100 0110 binary

Bytes 9 through 14 are not implemented, and all are set to 30 hex = 0 decimal.

Byte 15 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	Perform Reset (reset = 1). Sets V = 0, I = 0 & HV Enable = 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 15: 31 hex = 0011 0001 binary

The checksum is calculated on all bytes before it except the SOH character. Bytes 16 and 17 will therefore contain the remainder of a modulo 256 addition of bytes 2 through 15. In hex, these bytes are:

53 + 38 + 43 + 43 + 33 + 46 + 46 + 30 + 30 + 30 + 30 + 30 + 30 + 31 hex = 321 hex

Since modulo 256 decimal is modulo 100 hex, we can divide 321 hex by 100 hex. The remainder is 21 hex. Therefore 21 hex will be sent in bytes 16 and 17 in ASCII representation as 32 hex and 31 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 the numbers 2 and 1):

Byte 16: 32 hex = 0011 0010 binary
Byte 17: 31 hex = 0011 0001 binary

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

Byte 18: 0D hex = 0000 1101 binary

To summarize, the entire 18 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

Entered at the keyboard:

Ctrl-A	S	8	C	C	3	F	F	0	0	0	0	0	0	1	2	1	Enter

Sent in ASCII coded hexadecimal:

01	53	38	43	43	33	46	46	30	30	30	30	30	30	31	32	31	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 Error Responses 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 ("Q")

The 5 byte command to request power supply status information is the Query ("Q") command.

The protocol for the Query command will be 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 back to the computer. If errors are detected in the command, the power supply will return an appropriate error message.

The format of the command is:

SOH	Q	Check1	Check2	<CR>

Entered at the keyboard:

Ctrl-A	Q	5	1	Enter

Sent in ASCII coded hexadecimal:

01	51	35	31	0D

where the checksum, which does not include the SOH character, will always be hex 51, transmitted in two ASCII bytes representing 5 and 1.

RESPONSE PACKET ("R")

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:

BYTE #	DESCRIPTION
1	Response identifier character "R"
2-4	Voltage monitor (0 – Vmax) corresponds to (0 – 3FF) hex.
5-7	Current monitor (0 – Imax) corresponds to (0 – 3FF) Hex.
8-10	Reserved, Set to 0 decimal = 30 hex.
11-13	Digital monitors (12 bits encoded in three ASCII bytes)
14-15	Modulo 256 checksum of bytes 2 –13
16	End of message character (carriage return, hex 0D)

Table 7. Response Packet Byte Contents

Note that the analog monitors have 10 bit resolution, therefore, full scale is represented in hexadecimal as 3FF. The checksum is calculated on bytes 2 through 13.

The 12 digital monitor status bits are sent as three ASCII characters. The bit assignments are as follows:

Byte 11:
- Bit 0 Control Mode: Voltage Mode = 0, Current Mode = 1
- Bit 1 Power Supply Fault (1 = Fault)
- Bit 2 HV On Indicator (1 = on)
- Bit 3 Unused=

Byte 12:
- Bit 0 Unused=
- Bit 1 Unused=
- Bit 2 Unused =
- Bit 3 Unused =

Byte 13:
- Bit 0 Unused =
- Bit 1 Unused =
- Bit 2 Unused =
- Bit 3 Unused =

For example, a monitored voltage of Vmax will correspond to 3FF hex, sent with ACII encoding as follows:

Byte 2: 33 hex (00110011 binary)
Byte 3: 46 hex (01000110 binary)
Byte 4: 46 hex (01000110 binary)

If HV was On, and the Current Mode was set, the digital status bytes will be:

Byte 11: 35 hex (00110101 binary)
Byte 12: 30 hex (00110000 binary)
Byte 13: 30 hex (00110000 binary)

SOFTWARE VERSION REQUEST ("V") COMMAND AND RESPONSE ("B")

The 5 byte command to request the software revision level of the power supply's data interface is the "V" command.

The protocol for the V command will be 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.

The format of the V command is:

SOH	V	Check1	Check2	<CR>

Entered at the keyboard:

Ctrl-A	V	5	6	Enter

Sent in ASCII coded hexadecimal:

01	56	35	36	0D

where the checksum, which does not include the SOH character, will always be hex 56, transmitted in two ASCII bytes representing 5 and 6.

The format of the 6 byte Response Packet (B) will be:

B	2 byte revision level	2 byte checksum	<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	25	2 byte Checksum	<CR>

Sent in ASCII coded hexadecimal:

42	32	35	36	37	0D

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

POWER SUPPLY CONFIGURE COMMAND ("C")

WARNING! The timeout should be disabled for software debugging purposes only. Use extreme caution when disabling the timeout. For the safety of the user, it is recommended to always re-enable the timeout once software debugging is complete.

The 6 byte command to enable/disable the communication timeout is the "C" command. The 1.5 second communication timeout is enabled at the factory by default. If the user disables the timeout feature, the power supply will continue to produce high voltage during a loss of communication. This setting is stored in the power supply and will be recalled at turn on. A proper command, with no errors will result in an Acknowledge Response ("A").

The timeout enable/disable is toggled via Byte 3. The bit assignments are as follows:

Byte 3:

Bit 0 0 = Timeout Enabled, 1 = Timeout disabled
Bit 1 unused
Bit 2 unused
Bit 3 unused

The format of the "C" command to disable the timeout is:

SOH	C	1	Check 1	Check 2	<CR>

Entered at the keyboard:

Ctrl-A	C	1	7	4	Enter

Sent in ASCII coded hexadecimal:

01	43	31	37	34	0D

where the checksum, which does not include the SOH character, will always be 74 to disable the time out.

The command to re-enable the timeout is:

Ctrl-A	C	0	7	3	Enter

Sent in ASCII coded hexadecimal:

01	43	30	37	33	0D

where the checksum, which does not include the SOH character, will always be 73 to re-enable the timeout.

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. The 5 byte error response packet takes the following form:

E 1 byte error code 2 byte checksum >CR>

The checksum is only calculated on the 1 byte error code. For example, for error 5, the error byte will be transmitted as 35 hex. The checksum of 35 hex is 35 hex which is transmitted in ASCII as two bytes containing 33 and 35 to represent the 3 digit and 5 digit, respectively.

Error Codes Are:

1. Undefined Command Code – the command character received was not an S, Q, or V. The power supply will send back this error message if the second character of the received command packet is not an S, Q, or V. The error packet that will be returned to the computer will be:

Characters sent:	E	1	3	1	<CR>
In ASCII coded hexadecimal:	45	31	33	31	0D

2. Checksum Error – the transmitted checksum received in the command packet did not match the checksum calculated on the received bytes. The error packet that will be returned to the computer will be:

Characters sent:	E	2	3	2	<CR>
In ASCII coded hexadecimal:	45	32	33	32	0D

3. Extra Byte(s) Received – a byte other than the carriage return character was received in the last expected byte position of the command. The error packet that will be returned to the computer will be:

Characters sent:	E	3	3	3	<CR>
In ASCII coded hexadecimal:	45	33	33	33	0D

4. Illegal Digital Control Byte In Set Command – only one of the following three conditions can be set in the digital control byte of the Set command at any one time:

   HV On
   HV Off
   Power supply Reset

If the computer requests that the power supply set more than one of the above three conditions simultaneously, error 4 will be generated. The error packet that will be returned to the computer will be:

Characters sent:	E	4	3	4	<CR>
In ASCII coded hexadecimal:	45	34	33	34	0D

5. Illegal Set Command Received While a Fault is Active – if a fault is active at the time a Set command is received. The command must assert the Power Supply Reset line.

6. If the computer attempts to turn HV On or HV Off, or to change only the analog control signals while a fault is active, the command will be rejected and error 5 will be generated. The error packet that will be returned to the computer will be:

Characters sent:	E	5	3	5	<CR>
In ASCII coded hexadecimal:	45	35	33	35	0D

7. Processing Error: Data received was valid, however an error was detected when executing the Command. The error packet that will be returned to the computer will be:

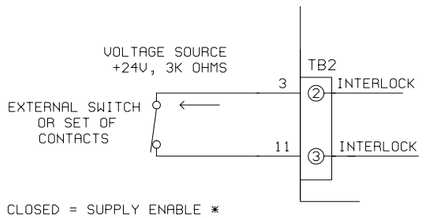
Characters sent:	E	6	3	6	<CR>
In ASCII coded hexadecimal:	45	36	33	36	0D

The fault signals that are checked are:

Power Supply Fault (when available)

REV	BY	DESCRIPTION	DATE	APPROVED
A	JAG	ECN 11372: REMOVED (OPTIONAL)	072318	

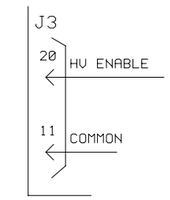
REMOTE INTERLOCK — FIGURE 1



CLOSED = SUPPLY ENABLE *
OPEN = SUPPLY DISABLE

* (REFER TO INSTRUCTION MANUAL)

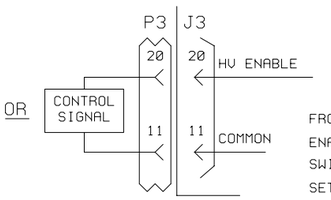
ANALOG REMOTE HV ENABLE — FIGURE 2



HV CONTINUOUSLY ENABLED

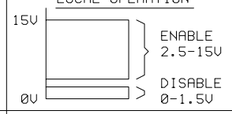
FRONT PANEL ENABLE RMT/LCL SWITCH SET TO LOCAL

OR



FRONT PANEL ENABLE RMT/LCL SWITCH SET TO REMOTE

LOCAL OPERATION

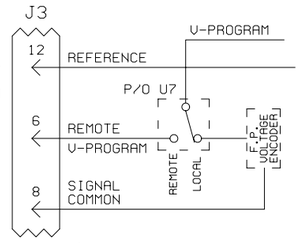


REMOTE OPERATION

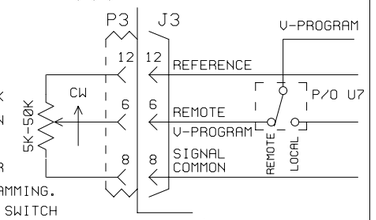
INPUT CHARACTERISTICS:
>20K OHMS @ 0-5VDC
1mA @ 15VDC

ANALOG REMOTE/LOCAL VOLTAGE PROGRAMMING — FIGURE 3

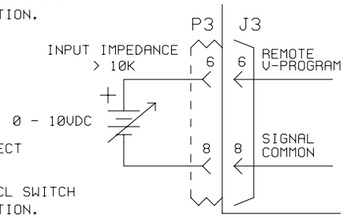
LOCAL VOLTAGE PROGRAMMED BY SETTING FRONT PANEL PROGRAM RMT/LCL SWITCH TO LOCAL POSITION AND BY USING THE FRONT PANEL KV ADJUST ENCODER.



REMOTE VOLTAGE PROGRAMMED BY ATTACHING A 5K TO 50K POTENTIOMETER BETWEEN REFERENCE AND SIGNAL COMMON WITH THE WIPER ARM TO VOLTAGE PROGRAMMING. F.P. PROGRAM RMT/LCL SWITCH SET TO REMOTE POSITION.

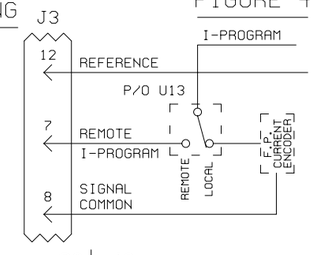


THE SUPPLY MAY BE PROGRAMMED WITH A REMOTE 0-10VDC VOLTAGE WHICH IS POSITIVE WITH RESPECT TO SIGNAL COMMON. F.P. PROGRAM RMT/LCL SWITCH SET TO REMOTE POSITION.

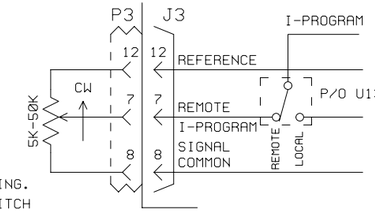


ANALOG REMOTE/LOCAL CURRENT PROGRAMMING — FIGURE 4

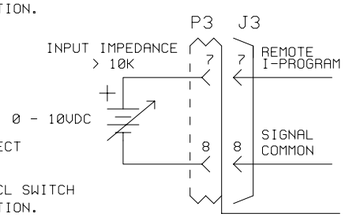
LOCAL CURRENT PROGRAMMED BY SETTING FRONT PANEL PROGRAM RMT/LCL SWITCH TO LOCAL POSITION AND BY USING THE FRONT PANEL mA ADJUST ENCODER.



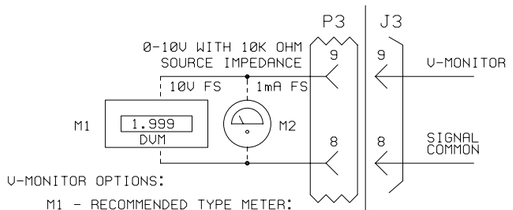
REMOTE CURRENT PROGRAMMED BY ATTACHING A 5K TO 50K POTENTIOMETER BETWEEN REFERENCE AND SIGNAL COMMON WITH THE WIPER ARM TO CURRENT PROGRAMMING. F.P. PROGRAM RMT/LCL SWITCH SET TO REMOTE POSITION.



THE SUPPLY MAY BE PROGRAMMED WITH A REMOTE 0-10VDC VOLTAGE WHICH IS POSITIVE WITH RESPECT TO SIGNAL COMMON. F.P. PROGRAM RMT/LCL SWITCH SET TO REMOTE POSITION.



ANALOG VOLTAGE MONITOR — FIGURE 5

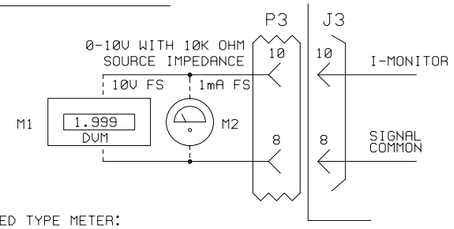


V-MONITOR OPTIONS:

M1 - RECOMMENDED TYPE METER:
0 - 10VDC DIGITAL VOLTMETER.
0 - 10V IS DIRECTLY PROPORTIONAL TO 0 - MAX KV RATING.

M2 - ALTERNATE TYPE METER:
0 - 1mA FULL SCALE CURRENT METER.
0 - 1mA IS DIRECTLY PROPORTIONAL TO 0 - MAX KV RATING.

ANALOG CURRENT MONITOR — FIGURE 6

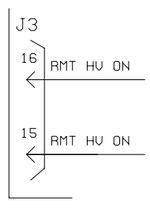


I-MONITOR OPTIONS:

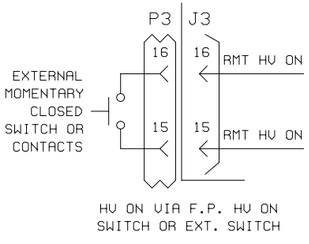
M1 - RECOMMENDED TYPE METER:
0 - 10VDC DIGITAL VOLTMETER.
0 - 10V IS DIRECTLY PROPORTIONAL TO 0 - MAX mA RATING.

M2 - ALTERNATE TYPE METER:
0 - 1mA FULL SCALE CURRENT METER.
0 - 1mA IS DIRECTLY PROPORTIONAL TO 0 - MAX mA RATING.

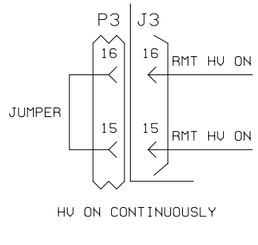
REMOTE HV ON — FIGURE 7



HV ON VIA F.P. HV ON SWITCH



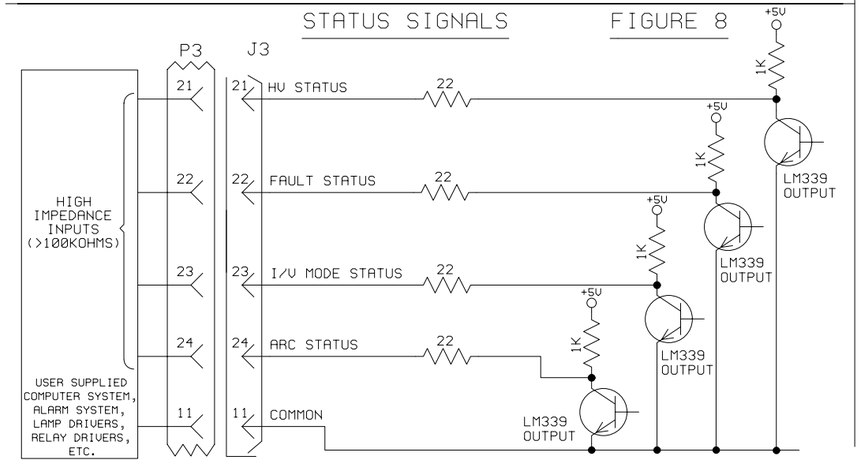
HV ON VIA F.P. HV ON SWITCH OR EXT. SWITCH



HV ON CONTINUOUSLY

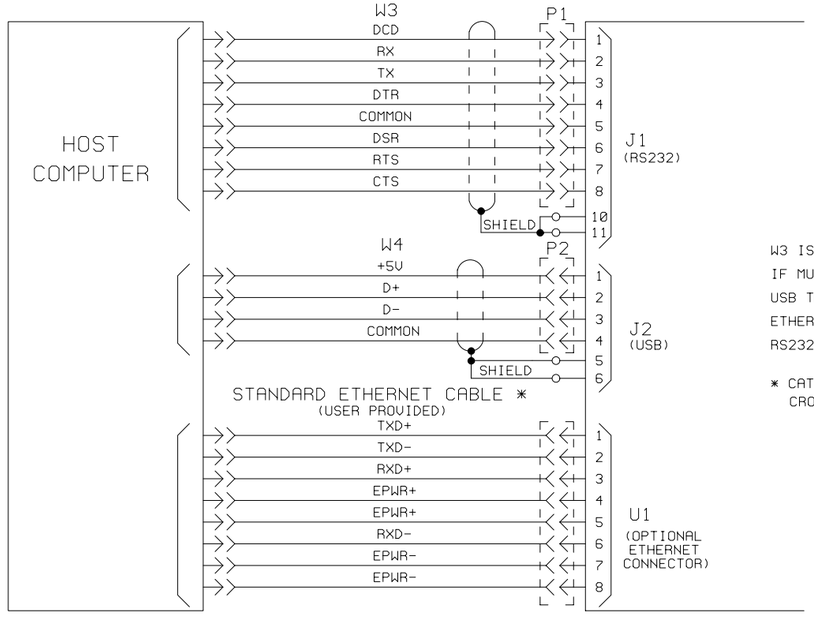
INPUT CHARACTERISTICS:
PIN 15: 1K OHM PULLUP TO +3.5V
PIN 16: COMMON

STATUS SIGNALS — FIGURE 8



DIGITAL REMOTE INTERFACE — FIGURE 9

BOTH F.P. ENABLE AND PROGRAM RMT/LCL SWITCHES MUST BE IN REMOTE POSITION.



W3 IS A NULL MODEM CABLE.
IF MULTIPLE CONNECTIONS ARE MADE THE PRIORITY IS:
USB TAKES PRIORITY OVER RS232.
ETHERNET (OPTIONAL) TAKES PRIORITY OVER BOTH RS232 AND USB.

* CAT 5 ETHERNET CABLE IF CONNECTED TO A NETWORK, CROSSOVER CABLE IF CONNECTED DIRECTLY TO A COMPUTER.

FILE NO. EXTENSION	GLASSMAN HIGH VOLTAGE
\2003\13005A.SCH	124 WEST MAIN STREET, P.O. BOX 317, HIGH BRIDGE, NJ 08829-0317 (908) 638-3000 FAX (908) 638-3700
APPROVALS / DATE	TITLE: INTERFACE DIAGRAM GX SERIES
DRAWN TJP 042616	
CHECKED KJD 042616	D — DWG. NO. 200313-005 — REV. A
RELEASED	
	SCALE NONE — SHEET 1 OF 2

REV	BY	DESCRIPTION	DATE	APPROVED

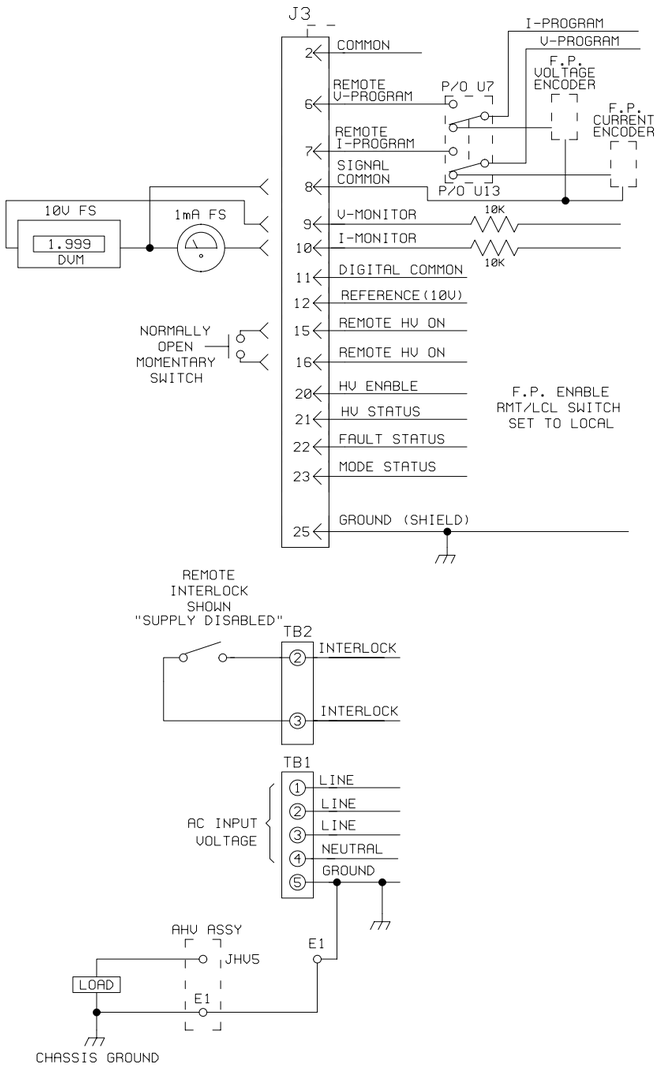
A TYPICAL INSTALLATION WITH ANALOG INTERFACE *

FIGURE 10

WARNING
DO NOT OPERATE WITHOUT
GOOD EXTERNAL GROUND

*
THIS INSTALLATION USES:

* REMOTE V & I MONITOR
* LOCAL V & I-PROGRAM & HV ENABLE BOTH F.P. ENABLE AND PROGRAM RMT/LCL SWITCHES SET TO LOCAL POSITIONS.
* REMOTE INTERLOCK CONTACT OR SWITCH
* HIGH VOLTAGE RETURN GROUNDED
* REMOTE HV ON SWITCH



MINIMUM NUMBER OF CONNECTIONS IN ORDER TO COMPLETELY ENABLE THE SUPPLY. *

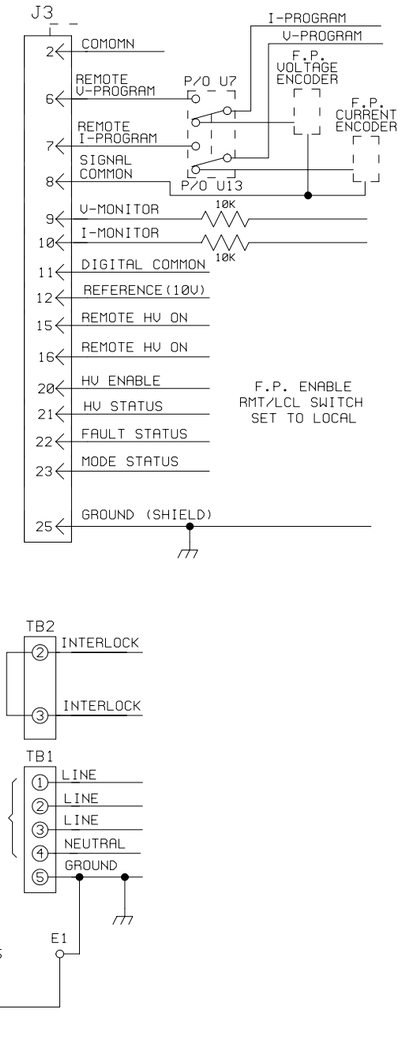
FIGURE 11

WARNING
DO NOT OPERATE WITHOUT
GOOD EXTERNAL GROUND

* NOT APPLICABLE FOR "NC" OPTION.

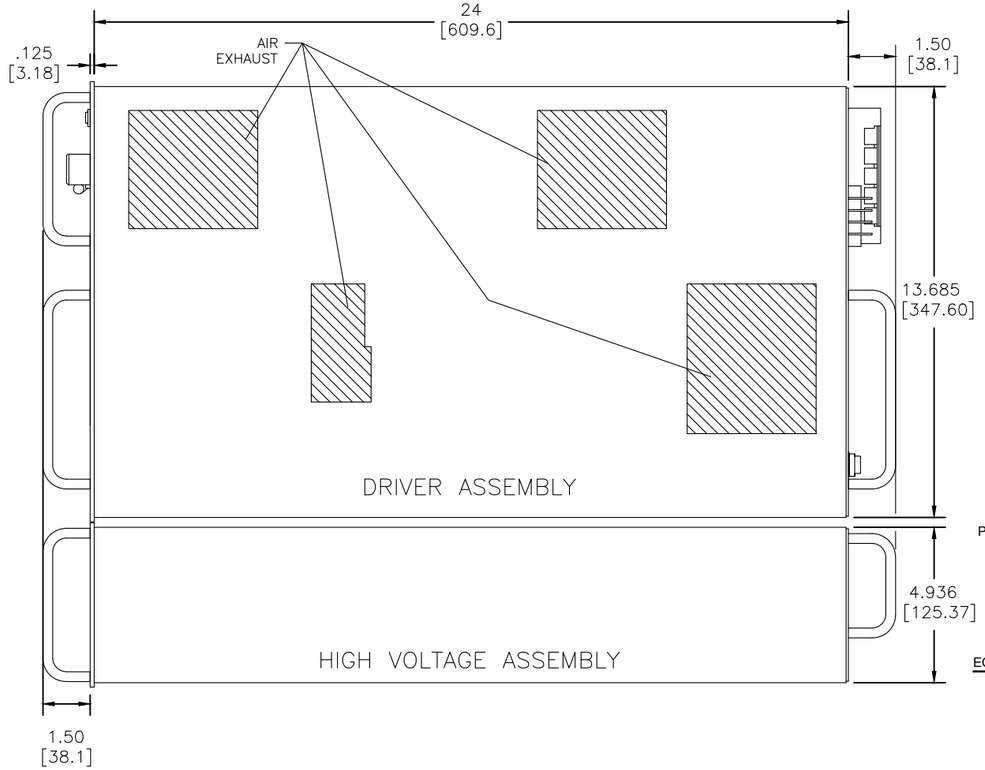
MINIMUM CONNECTIONS:

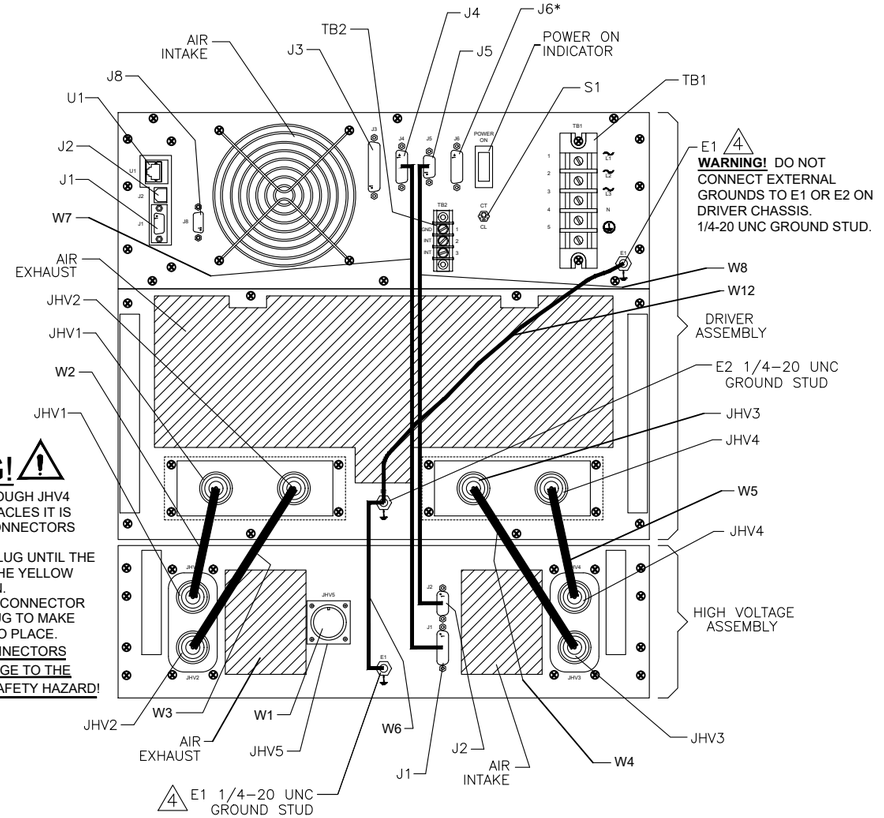
* BOTH F.P. ENABLE AND PROGRAM RMT/LCL SWITCHES SET TO LOCAL POSITIONS.
* LOCAL ADJUSTABLE CURRENT PROGRAMMING
* LOCAL HV ENABLE
* LOCAL ADJUSTABLE VOLTAGE PROGRAMMING
* INTERLOCK ENABLED BY JUMPER
* F.P. HV ON SWITCH TURNS HV ON



FILE NO. EXTENSION	GLASSMAN HIGH VOLTAGE	
\2003\13005A.SCH	124 WEST MAIN STREET, P.O. BOX 317, HIGH BRIDGE, NJ 08829-0317 (908) 638-3800 FAX (908) 638-3700	
APPROVALS / DATE	TITLE	INTERFACE DIAGRAM GX SERIES
DRAWN TJP 042616		
CHECKED KJD 042616	D DWG. NO.	200313-005 REV. A
RELEASED	SCALE NONE	SHEET 2 OF 2

REV	BY	DESCRIPTION	DATE	APPROVED
		SEE SHEET 2 FOR REV.		

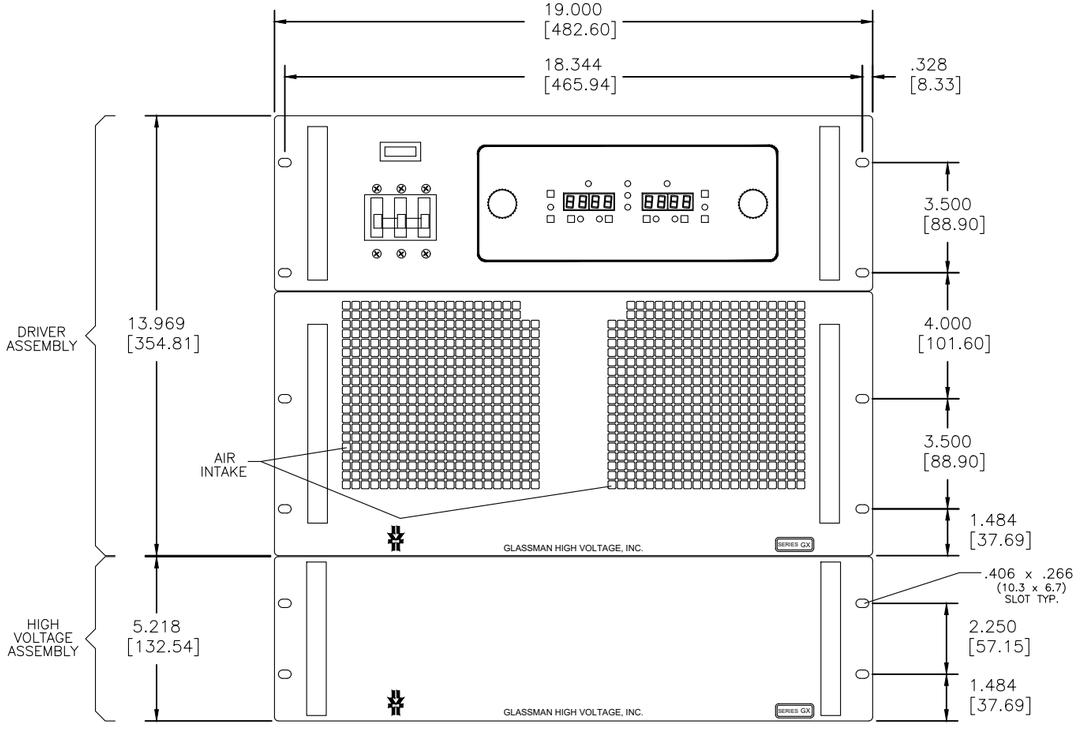




WARNING! CONNECT GOOD EARTH GROUND, LOAD RETURN, AND ALL OTHER GROUNDS TO E1 ON HV CHASSIS.

⚠ WARNING! ⚠

WHEN INSERTING THE JHV1 THROUGH JHV4 CONNECTORS INTO THE RECEPTACLES IT IS CRUCIAL THAT THE TWIST-LOK CONNECTORS LOCK INTO PLACE.
PUSH THE CONNECTOR ONTO THE PLUG UNTIL THE LOCKING RING TURNS SO THAT THE YELLOW INDEXING MARKS ALIGN.
AFTER SEATING AND LOCKING THE CONNECTOR GIVE THE CONNECTOR BODY A TUG TO MAKE SURE IT IS FIRMLY LOCKED INTO PLACE.
FAILURE TO SECURE THESE CONNECTORS PROPERLY CAN RESULT IN DAMAGE TO THE EQUIPMENT AND POSE A POSSIBLE SAFETY HAZARD!



DRIVER ASSEMBLY

J1 LEGEND	
1	DCD
2	RX
3	TX
4	DTR
5	COMMON
6	DSR
7	RTS
8	CTS
10	GND/SHIELD
11	GND/SHIELD

J2 LEGEND	
1	+5V
2	D–
3	D+
4	COMMON

J3 LEGEND	
2	COMMON
6	REMOTE VOLTAGE PROGRAM
7	REMOTE CURRENT PROGRAM
8	SIGNAL COMMON
9	VOLTAGE MONITOR
10	CURRENT MONITOR
11	COMMON
12	+REF
15	REMOTE HV ON
16	REMOTE HV ON
20	HV ENABLE
21	HV STATUS
22	FAULT STATUS
23	MODE STATUS
24	ARC STATUS
25	GROUND

E1 – GROUND STUD
E2 – GROUND STUD

TB1 LEGEND	
1	LINE
2	LINE
3	LINE
4	NEUTRAL
5	GROUND

AC INPUT 380, 415 OR 480VAC
+/– 10%
48–63 HZ
3 PHASE

TB2 LEGEND	
1	GROUND
2	INTERLOCK
3	INTERLOCK

U1 OPTION LEGEND	
1	TXD+
2	TXD–
3	RXD+
4	E POWER+
5	E POWER+
6	RXD –
7	E POWER–
8	E POWER–

J4 – HIGH VOLTAGE INTERFACE
J5 – HIGH VOLTAGE INTERFACE
J6 – MASTER/SLAVE INTERFACE OUT *
J8 – SLAVE CONTROL OUT

JHV1 THROUGH JHV4 – ALDEN/AMPHONOL 108870 (SHOWN)

*** CAUTION!** J6 MUST BE TERMINATED WITH CONNECTOR PROVIDED.

HIGH VOLTAGE ASSEMBLY

J1 – HIGH VOLTAGE INTERFACE
J2 – HIGH VOLTAGE INTERFACE

JHV1 THROUGH JHV4 – ALDEN/AMPHONOL 108870 (SHOWN)

JHV5 – HIGH VOLTAGE OUTPUT CONNECTOR
40–60KV AMPHENOL TYPE 83–1R OR EQUIVALENT
70–100KV TYPE MS 3102A–18 (SHOWN)

E1– **WARNING!** LOAD RETURN GROUND STUD

NET WEIGHT: 125 lbs. 46.66 kg.

IN
(MM)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE :
DEC. XXX ± .005 XX ± .01
DEG. ±
THIRD ANGLE PROJECTION
DO NOT SCALE DRAWING

FILE NO. EXTENSION
\2016\98001D.DWG

APPROVALS	DATE
DRAWN EJM	041715
CHECKED GO	041715
RELEASED	

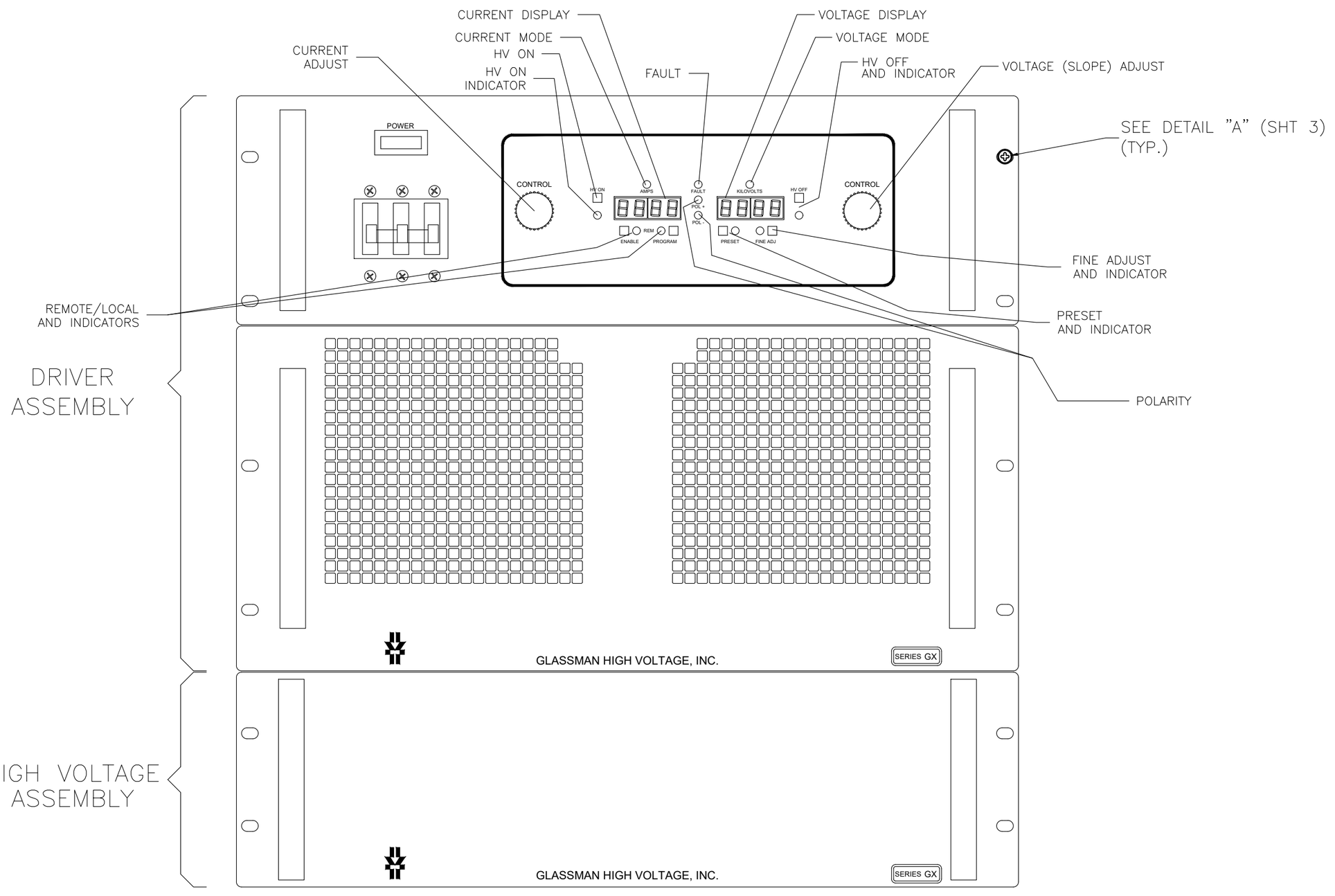
XP Power
124 West Main Street, PO Box 317, High Bridge, NJ 08829-317
(908) 638-3800 Fax (908) 638-3700

TITLE: OUTLINE & INSTALLATION
GX SERIES, 15–100KV
MASTER SYSTEM

D | DWG.NO. 201698–001 | REV. D

SCALE NONE | SHEET 1 OF 3

REV	BY	DESCRIPTION	DATE	APPROVED
NR-1	EJM	WEIGHT ADDED	110215	JMC
NR-2	JAG	SWAPPED ENABLE & PROGRAM LABELS	031616	JMC
NR-3	EJM	J8 SHOWN	040616	KJD
NR-4	EJM	J6 NOTES ADDED	082316	KJD
A	EJM	ECN 10865: JHV5 DESC	091216	JMC
B	TJP	ECN 11372: J3-24 WAS RESERVED	072418	KJD
B-1	MAL	TITLE BLOCK DESC. UPDATED & J1 IS FEMALE	121018	JMC
C	MM	ECN 11856: ADDED TWIST-LOK NOTE	020421	TJP
D	BB	ECN 12473: ADDED W12, NOTE 4 & UPDATED WARNING	010225	JMM



IN
(MM)

NET WEIGHT: 125 lbs. 46.66 kg.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE :
DEC. XXX ± .005 XX ± .01
DEG. ±

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

FILE NO. EXTENSION
\2016\98001D.DWG

APPROVALS	DATE
DRAWN EJM	041715
CHECKED GO	041715
RELEASED	

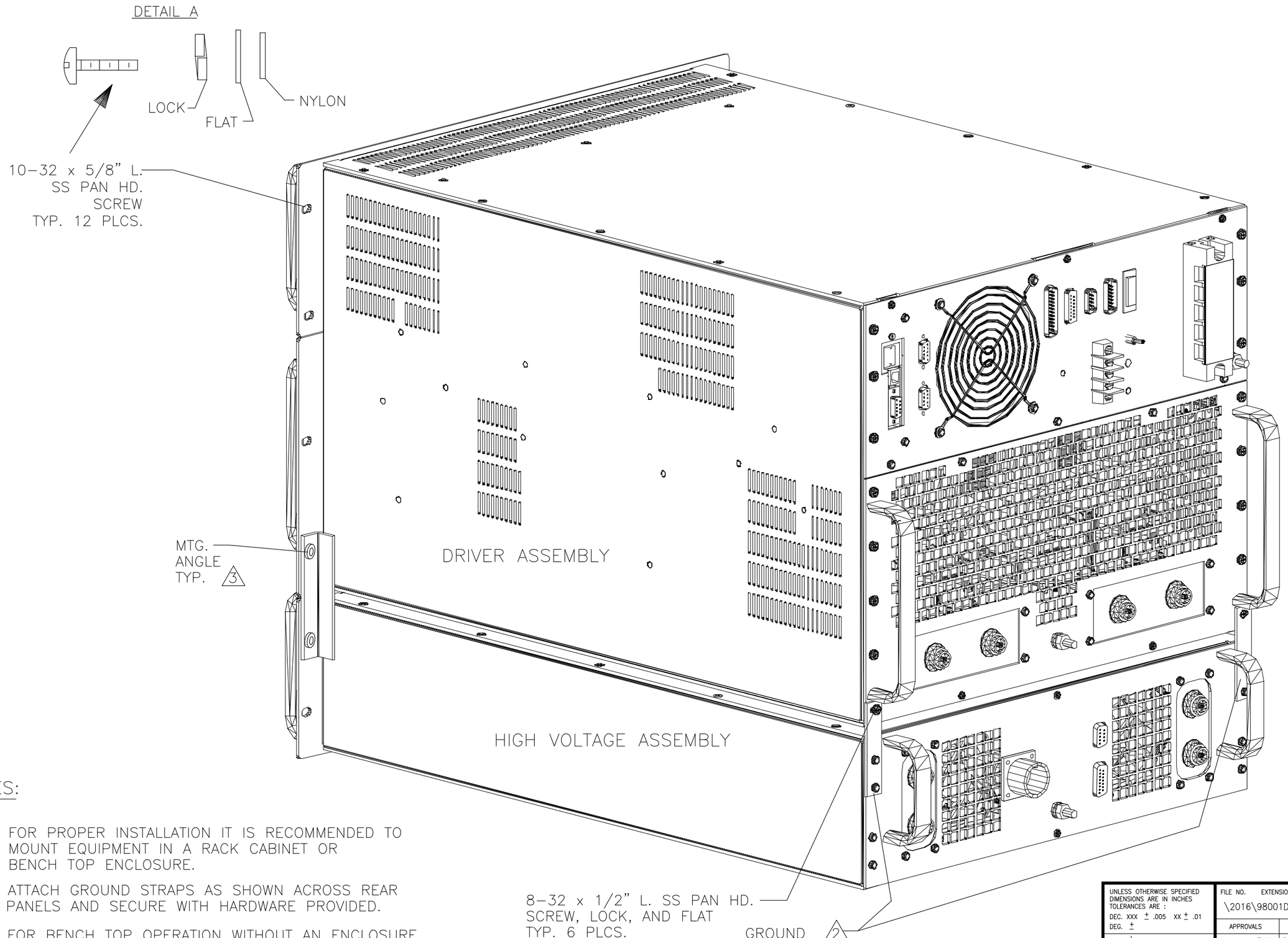
XP XP Power
124 West Main Street, PO Box 317, High Bridge, NJ 08829-317
(908) 638-3800 Fax (908) 638-3700

TITLE OUTLINE & INSTALLATION
GX SERIES, 15-100KV
MASTER SYSTEM

D | DWG.NO. 201698-001 | REV. D

SCALE NONE | SHEET 2 OF 3

REV	BY	DESCRIPTION	DATE	APPROVED



NOTES:

1 – FOR PROPER INSTALLATION IT IS RECOMMENDED TO MOUNT EQUIPMENT IN A RACK CABINET OR BENCH TOP ENCLOSURE.

2 – ATTACH GROUND STRAPS AS SHOWN ACROSS REAR PANELS AND SECURE WITH HARDWARE PROVIDED.

3 – FOR BENCH TOP OPERATION WITHOUT AN ENCLOSURE, ATTACH MOUNTING ANGLES AS SHOWN.

4 – CONNECT EXTERNAL GROUNDS TO HV CHASSIS E1 ONLY.

NET WEIGHT: 125 lbs. 46.66 kg.

IN
(MM)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE :
DEC. XXX ± .005 XX ± .01
DEG. ±

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

FILE NO. EXTENSION
\2016\98001D.DWG

APPROVALS		DATE
DRAWN	EJM	041715
CHECKED	GO	041715
RELEASED		

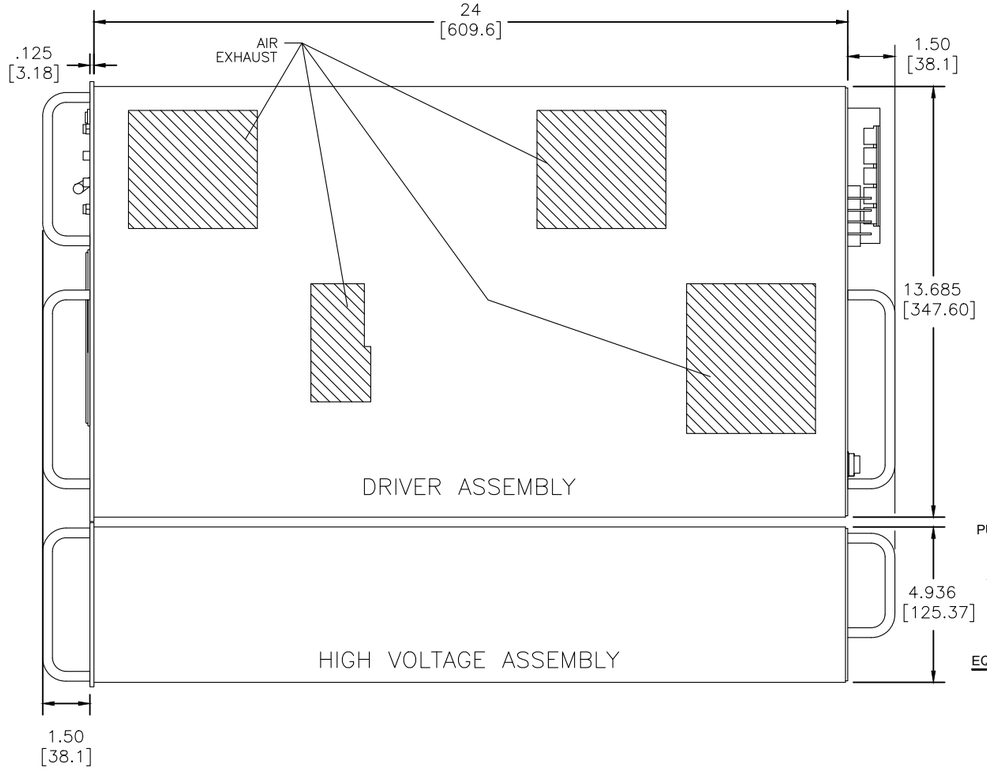
XP Power
124 West Main Street, PO Box 317, High Bridge, NJ 08829-317
(908) 638-3800 Fax (908) 638-3700

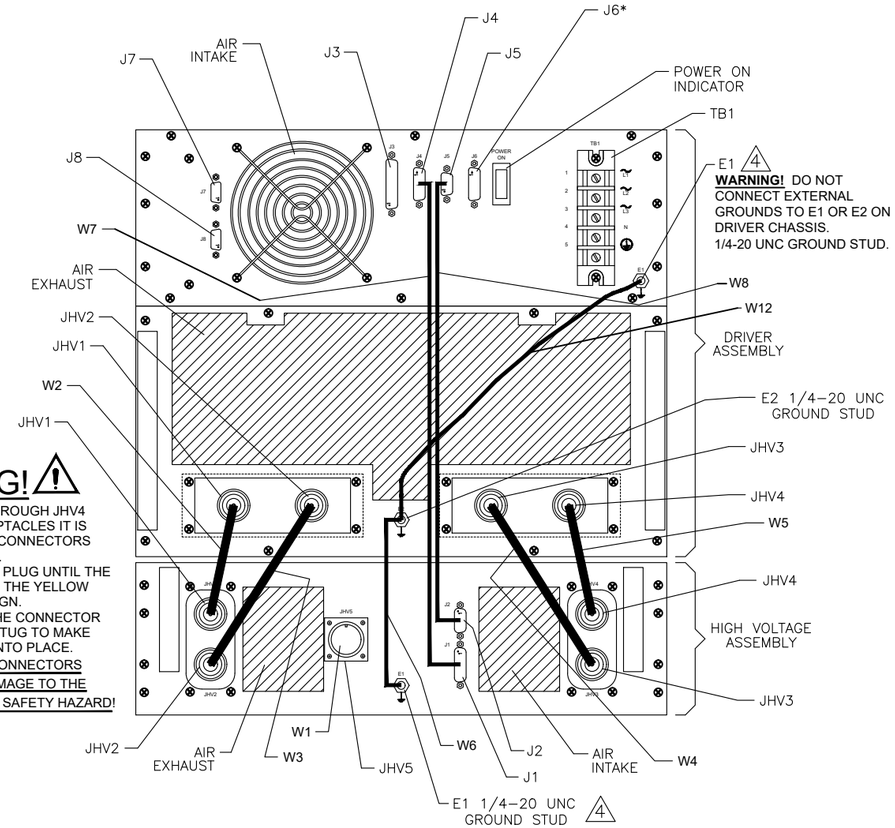
TITLE OUTLINE & INSTALLATION
GX SERIES, 15–100KV
MASTER SYSTEM

D | DWG.NO. 201698–001 | REV. D

SCALE NONE | SHEET 3 OF 3

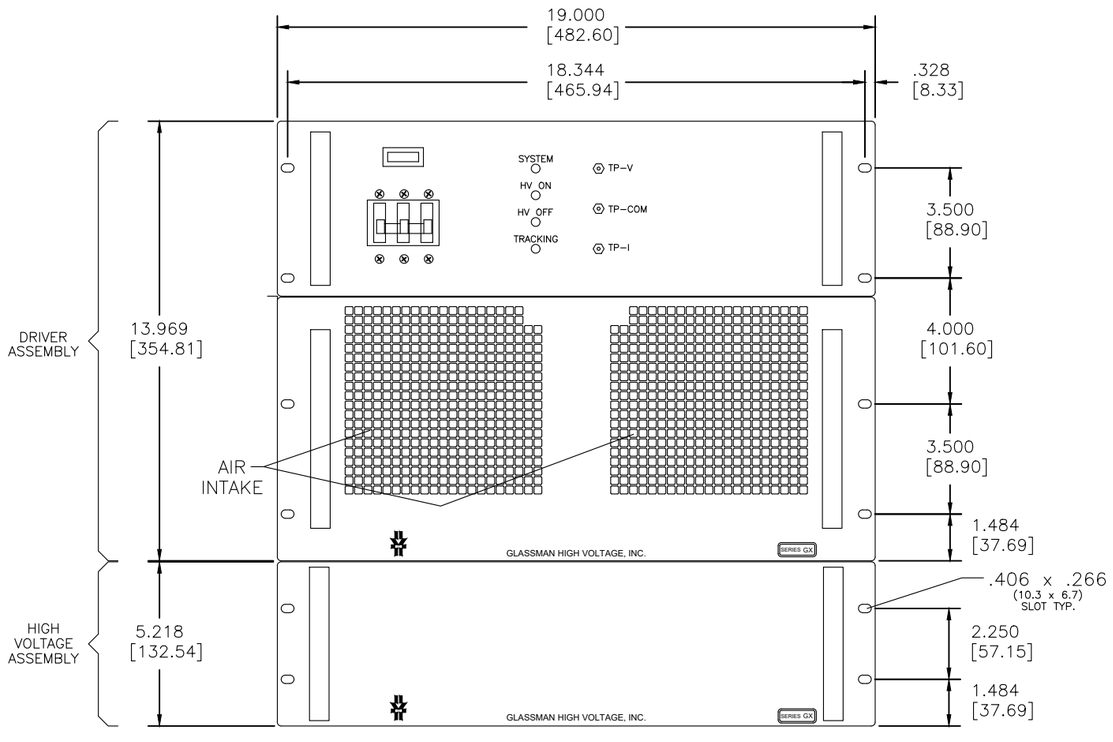
REV	BY	DESCRIPTION	DATE	APPROVED
		SEE SHEET 2 FOR REV.		





⚠ WARNING! ⚠

WHEN INSERTING THE JHV1 THROUGH JHV4 CONNECTORS INTO THE RECEPTACLES IT IS CRUCIAL THAT THE TWIST-LOK CONNECTORS LOCK INTO PLACE.
PUSH THE CONNECTOR ONTO THE PLUG UNTIL THE LOCKING RING TURNS SO THAT THE YELLOW INDEXING MARKS ALIGN.
AFTER SEATING AND LOCKING THE CONNECTOR GIVE THE CONNECTOR BODY A TUG TO MAKE SURE IT IS FIRMLY LOCKED INTO PLACE.
FAILURE TO SECURE THESE CONNECTORS PROPERLY CAN RESULT IN DAMAGE TO THE EQUIPMENT AND POSE A POSSIBLE SAFETY HAZARD!



WARNING! CONNECT GOOD EARTH GROUND, LOAD RETURN, AND ALL OTHER GROUNDS TO E1 ON HV CHASSIS.

DRIVER ASSEMBLY

J3 LEGEND

1 SLAVE FAULT
2 HV ON SLAVE
3 RESERVED
4 HV ENABLE SLAVE
5 OPTION
6 POLARITY SLAVE
7 LVL CS
8 CURRENT MONITOR SLAVE
9 S COMMON
10 VOLTAGE PROGRAM SLAVE
11 CURRENT PROGRAM SLAVE
12 COMMON
15 GROUND

E1 – GROUND STUD
E2 – GROUND STUD

TB1 LEGEND

1 LINE
2 LINE
3 LINE
4 NEUTRAL
5 GROUND

AC INPUT 380, 415 OR 480VAC +/– 10% 48–63 HZ 3 PHASE

J4 – HIGH VOLTAGE INTERFACE
J5 – HIGH VOLTAGE INTERFACE
J6 – MASTER/SLAVE INTERFACE OUT *
J7 – SLAVE CONTROL IN
J8 – SLAVE CONTROL OUT

JHV1 THROUGH JHV4 – ALDEN/AMPHONOL 108870 (SHOWN)

*** CAUTION!** J6 MUST BE TERMINATED WITH CONNECTOR PROVIDED.

HIGH VOLTAGE ASSEMBLY

J1 – HIGH VOLTAGE INTERFACE
J2 – HIGH VOLTAGE INTERFACE

JHV1 THROUGH JHV4 – ALDEN/AMPHONOL 108870 (SHOWN)

JHV5 – HIGH VOLTAGE OUTPUT CONNECTOR 40–60KV AMPHENOL TYPE 83–1R OR EQUIVALENT 70–100KV TYPE MS 3102A–18 (SHOWN)

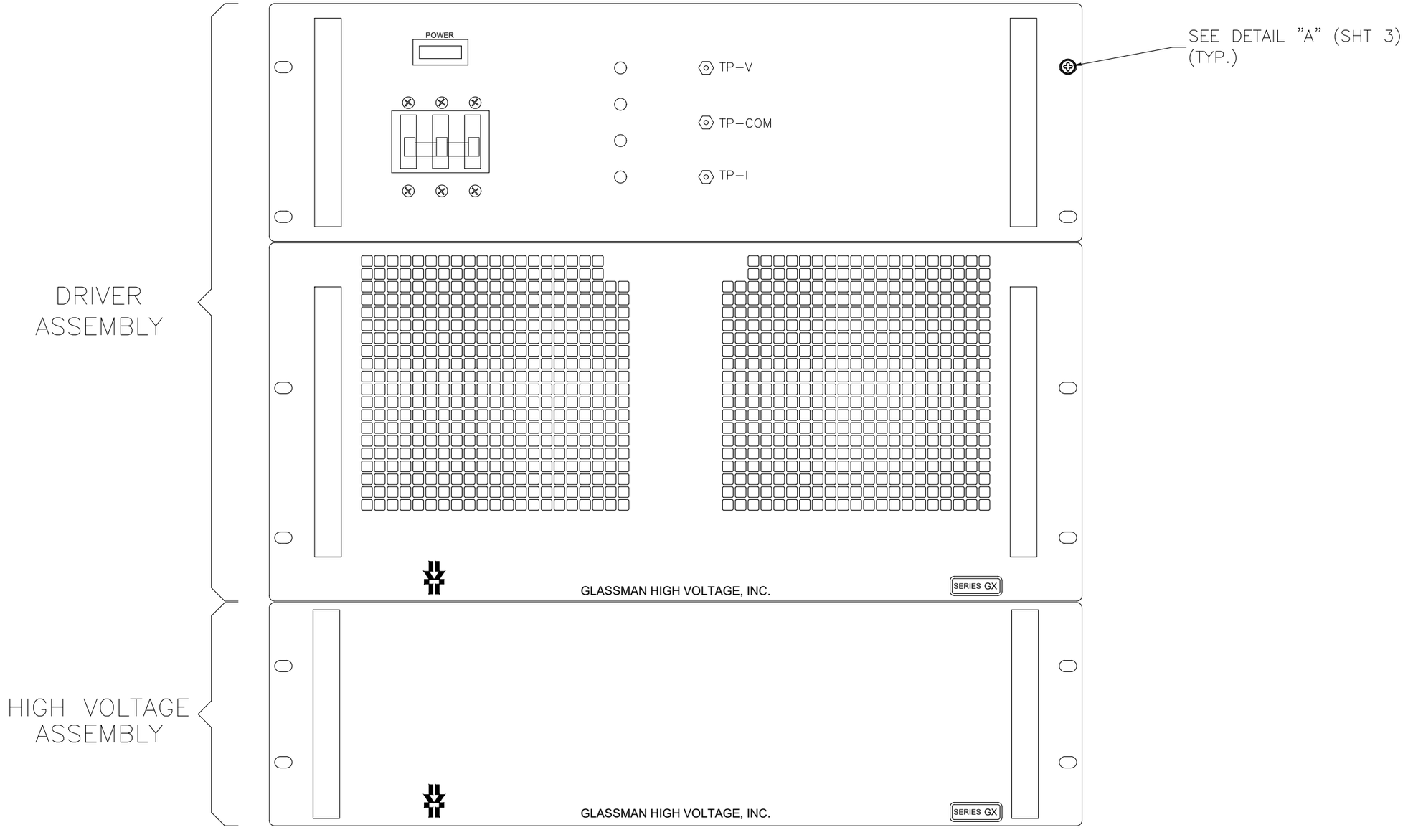
E1 – GROUND STUD

IN
(MM)

NET WEIGHT: 125 lbs. 46.66 kg.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE : DEC. XXX ± .005 XX ± .01 DEG. ±	FILE NO. EXTENSION \2016\98002C.DWG	XP Power 124 West Main Street, PO Box 317, High Bridge, NJ 08829-317 (908) 638-3800 Fax (908) 638-3700	
	APPROVALS	DATE	TITLE OUTLINE & INSTALLATION GX SERIES, 15–100KV SLAVE SYSTEM
	DRAWN EJM	012616	
	CHECKED GO	012716	D DWG.NO. 201698–002 REV. C
THIRD ANGLE PROJECTION	RELEASED		
DO NOT SCALE DRAWING			SCALE NONE SHEET 1 OF 3

REV	BY	DESCRIPTION	DATE	APPROVED
NR1	EJM	AIR EXHAUST CLARIFIED	040616	KJD
NR2	EJM	J6 NOTES ADDED	082316	KJD
A	EJM	ECN 10865: JHV5 DESC.	091216	HMS
A–1	MAL	TITLE BLOCK DESC. UPDATED & J1 IS FEMALE	121018	JMC
B	MM	ECN 11856: ADDED TWIST–LOK NOTE	020921	TJP
C	BB	ECN 12473: ADDED W12, NOTE 4 & UPDATED WARNING	010225	JMM



IN
(MM)

NET WEIGHT: 125 lbs. 46.66 kg.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE :
DEC. XXX ± .005 XX ± .01
DEG. ±

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

FILE NO. EXTENSION
\2016\98002C.DWG

APPROVALS	DATE
DRAWN EJM	012616
CHECKED GO	012716
RELEASED	

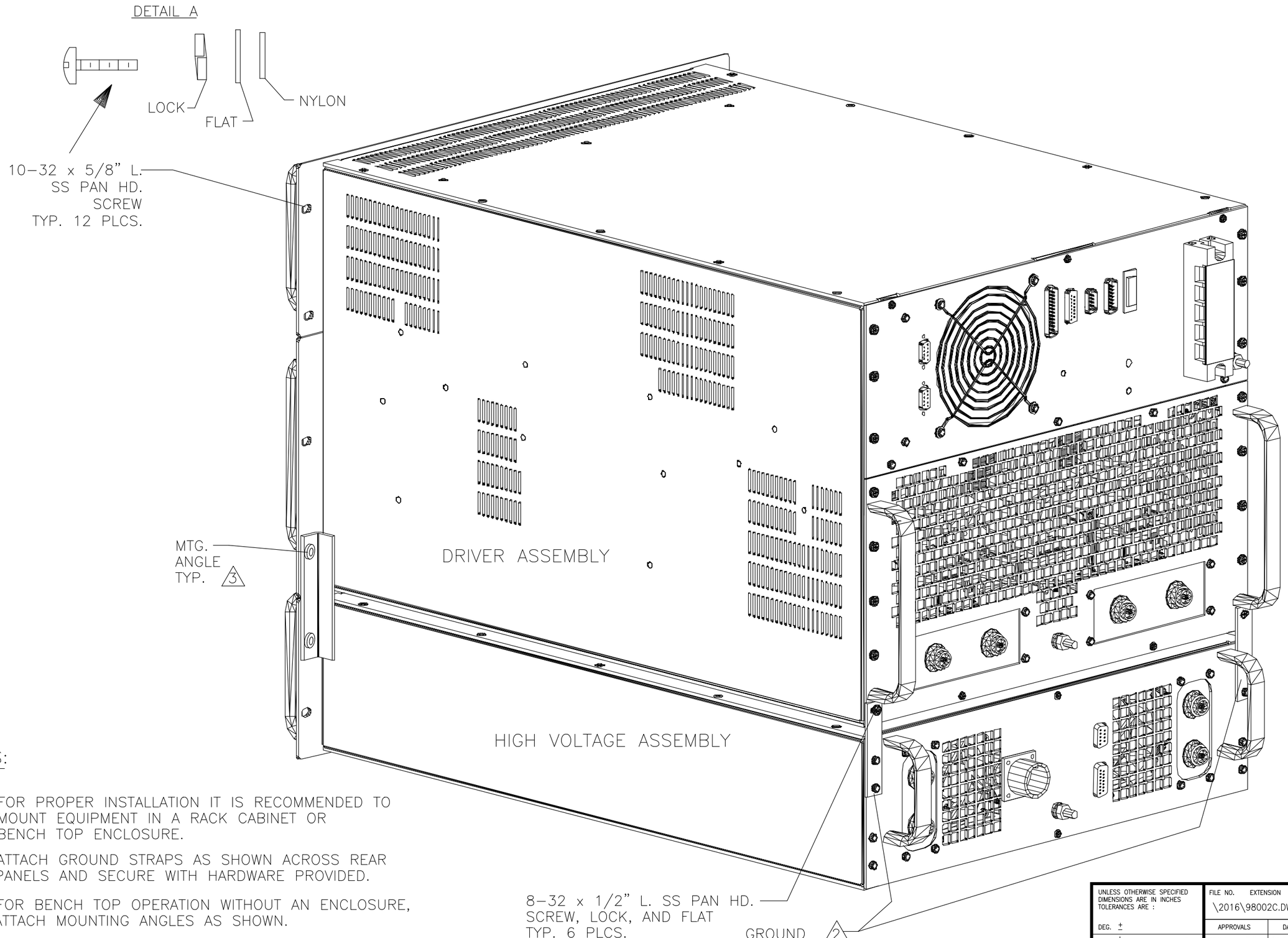
XP Power
124 West Main Street, PO Box 317, High Bridge, NJ 08829-317
(908) 638-3800 Fax (908) 638-3700

TITLE: OUTLINE & INSTALLATION
GX SERIES, 15–100KV
SLAVE SYSTEM

D | DWG.NO. 201698–002 | REV. C

SCALE NONE | SHEET 2 OF 3

REV	BY	DESCRIPTION	DATE	APPROVED



NOTES:

1 – FOR PROPER INSTALLATION IT IS RECOMMENDED TO MOUNT EQUIPMENT IN A RACK CABINET OR BENCH TOP ENCLOSURE.

2 – ATTACH GROUND STRAPS AS SHOWN ACROSS REAR PANELS AND SECURE WITH HARDWARE PROVIDED.

3 – FOR BENCH TOP OPERATION WITHOUT AN ENCLOSURE, ATTACH MOUNTING ANGLES AS SHOWN.

4 – CONNECT EXTERNAL GROUNDS TO HV CHASSIS E1 ONLY.

NET WEIGHT: 125 lbs. 46.66 kg.

IN
(MM)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE :
DEG. ±
THIRD ANGLE PROJECTION
DO NOT SCALE DRAWING

FILE NO. EXTENSION
\2016\98002C.DWG

APPROVALS		DATE
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CHECKED	GO	012716
RELEASED		

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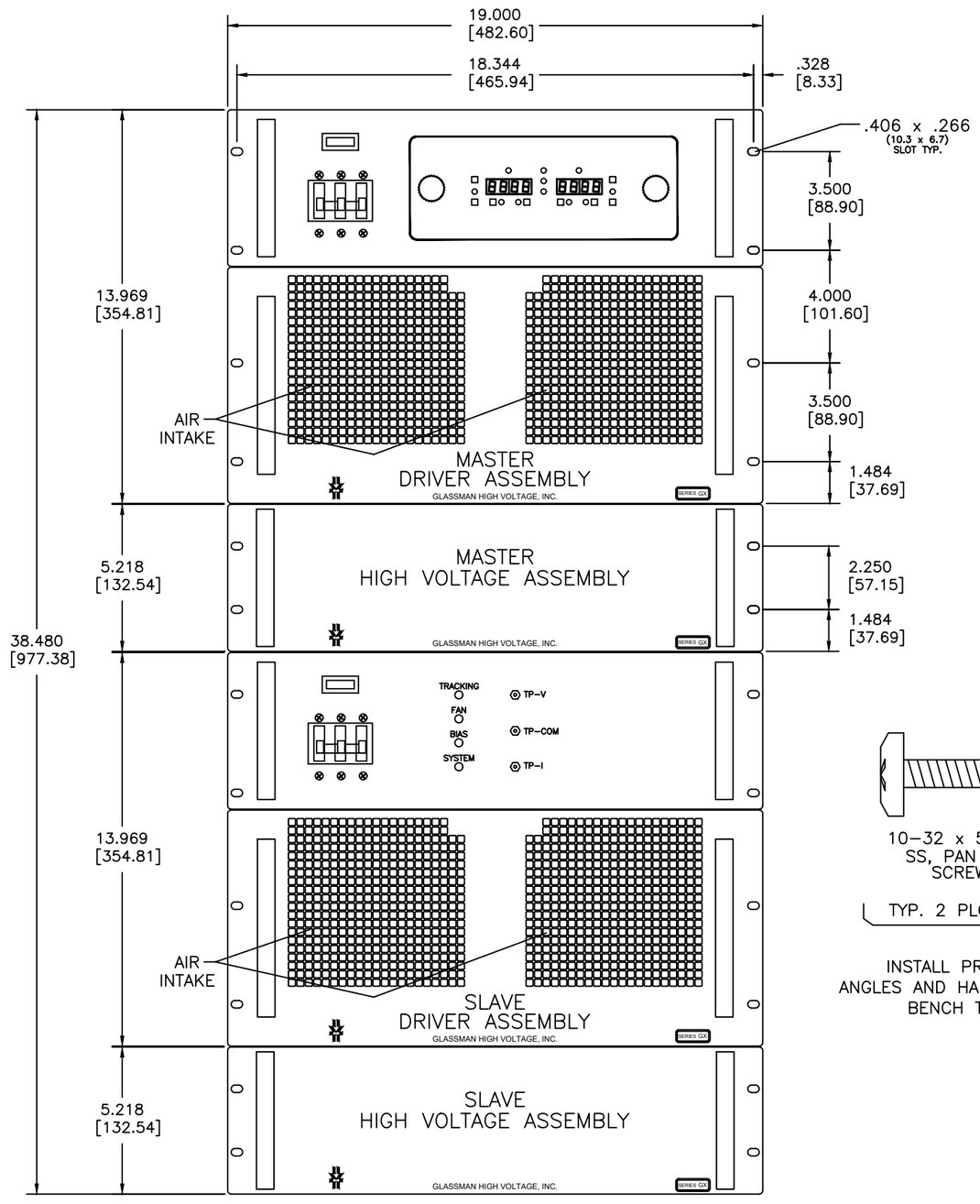
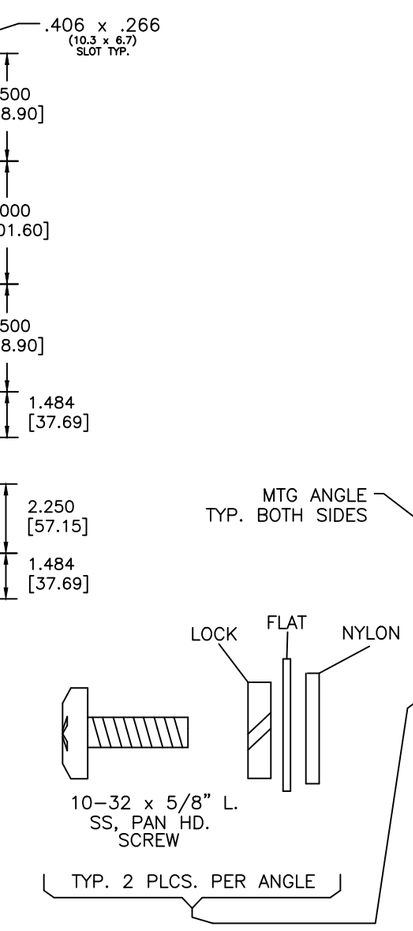
GX SERIES, 15–100KV
SLAVE SYSTEM

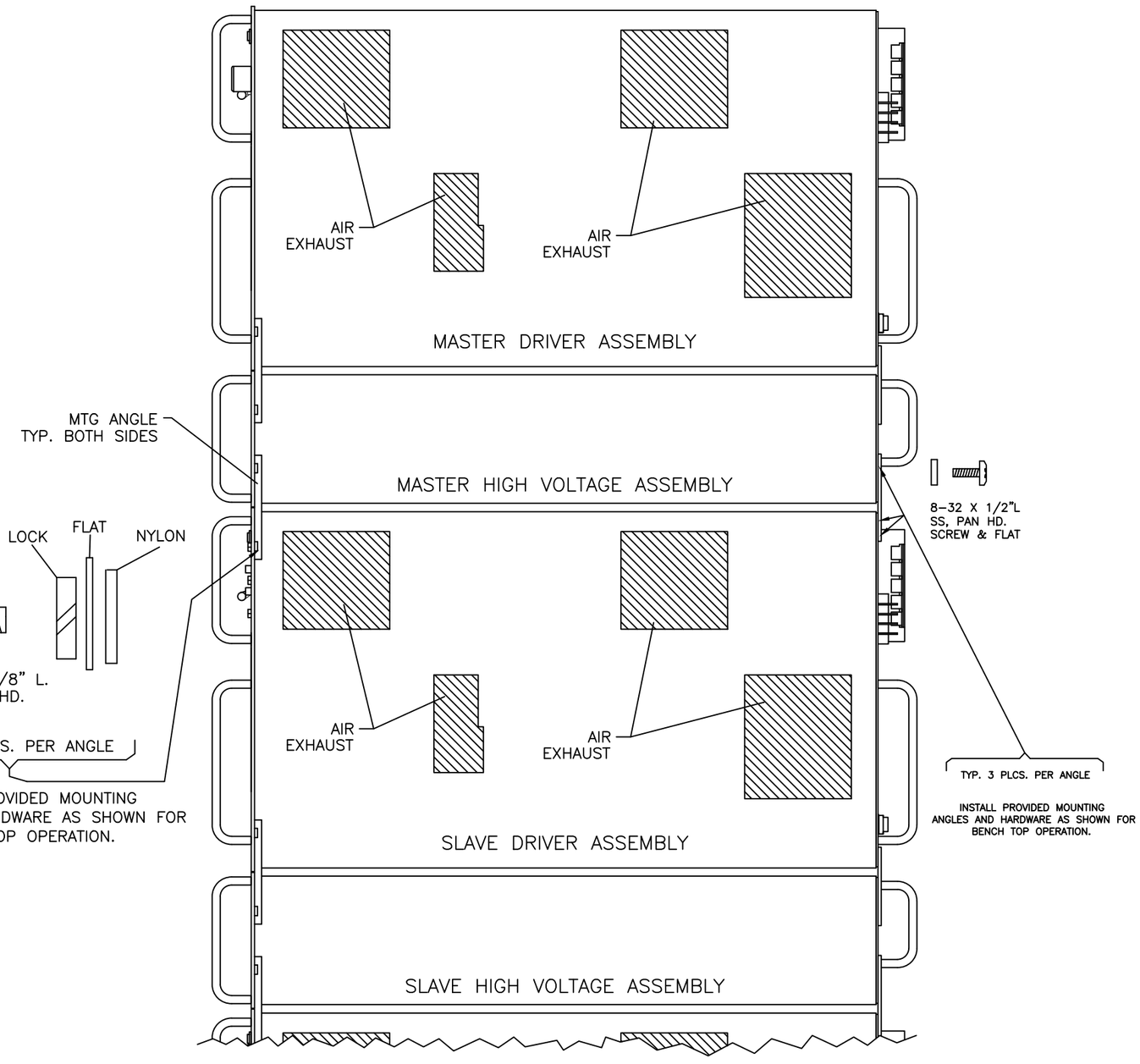
D | DWG.NO. 201698–002 | REV. C

SCALE NONE | SHEET 3 OF 3

REV	BY	DESCRIPTION	DATE	APPROVED
NR1	EJM	VARIOUS NOTES ADJUSTED	082416	KJD
A	JMC	ECN 11455: UPDATED SLAVE FRONT PANEL NOMENCLATURE	111218	KJD
A–1	MAL	TITLE BLOCK DESC. UPDATED & J1 IS FEMALE	121018	JMC
B	MM	ECN 11856: ADDED TWIST–LOK NOTE	020921	TJP
C	BB	ECN 12473: ADDED A1W11 & A2W12	010225	JMM







FOR PROPER INSTALLATION, IT IS RECOMMENDED TO
MOUNT EQUIPMENT IN A RACK CABINET OR BENCH TOP ENCLOSURE.

IN
(MM)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE :
DEC. XXX ± .005 XX ± .01
DEG. ±

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

FILE NO. EXTENSION
\2016\98003C.DWG

APPROVALS	DATE
DRAWN EJM	042616
CHECKED KJD	042616
RELEASED	

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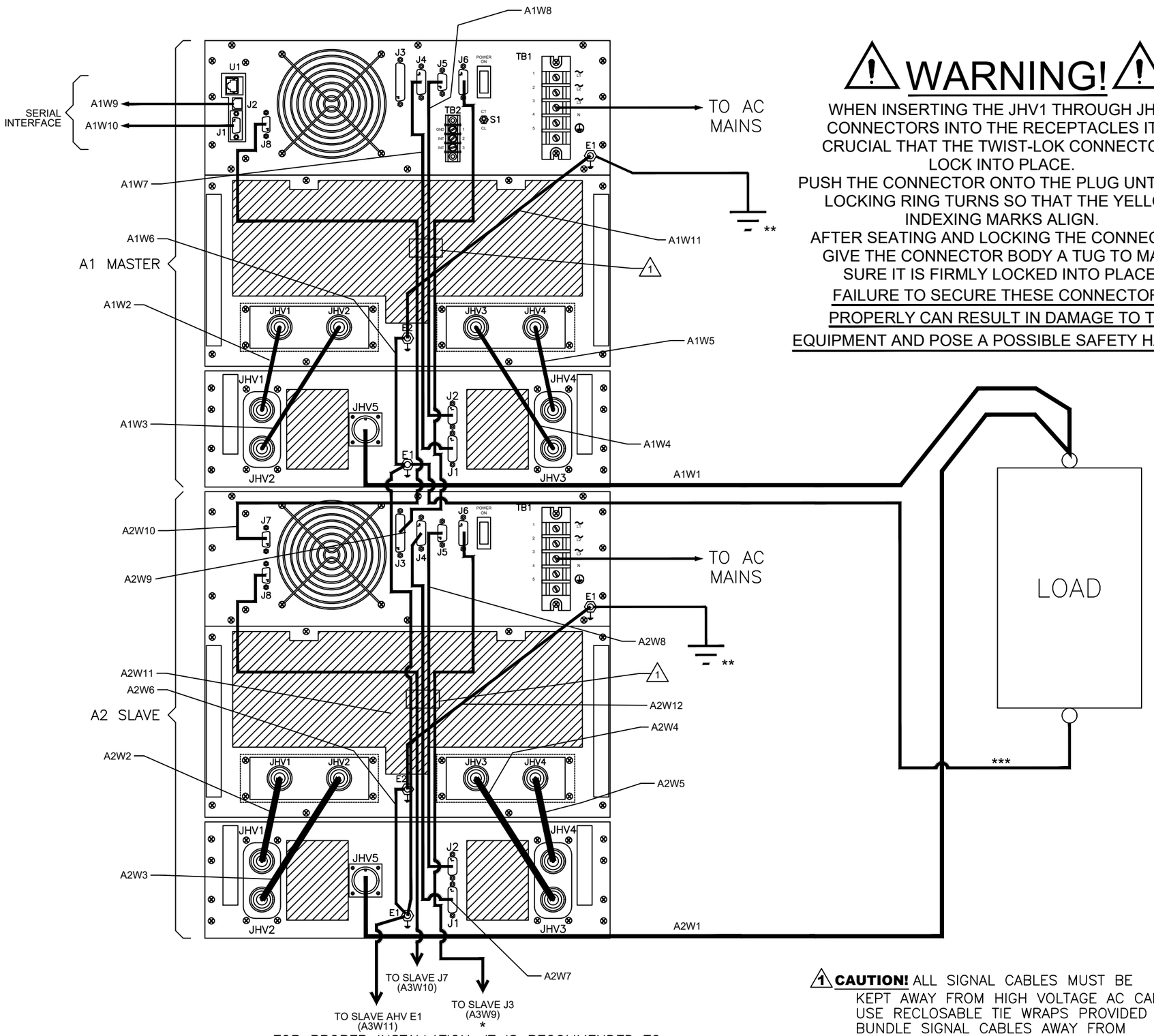
124 West Main Street, PO Box 317, High Bridge, NJ 08829-317
(908) 638-3800 Fax (908) 638-3700

TITLE OUTLINE & INSTALLATION
GX SERIES, 15–100KV
MASTER/SLAVE

D DWG.NO. 201698–003 REV. C

SCALE NONE SHEET 1 OF 2

REV	BY	DESCRIPTION	DATE	APPROVED



FOR PROPER INSTALLATION, IT IS RECOMMENDED TO MOUNT EQUIPMENT IN A FORCED AIR COOLED RACK CABINET OR BENCH TOP ENCLOSURE.

⚠ WARNING! ⚠

WHEN INSERTING THE JHV1 THROUGH JHV4 CONNECTORS INTO THE RECEPTACLES IT IS CRUCIAL THAT THE TWIST-LOK CONNECTORS LOCK INTO PLACE.
PUSH THE CONNECTOR ONTO THE PLUG UNTIL THE LOCKING RING TURNS SO THAT THE YELLOW INDEXING MARKS ALIGN.
AFTER SEATING AND LOCKING THE CONNECTOR GIVE THE CONNECTOR BODY A TUG TO MAKE SURE IT IS FIRMLY LOCKED INTO PLACE.
FAILURE TO SECURE THESE CONNECTORS PROPERLY CAN RESULT IN DAMAGE TO THE EQUIPMENT AND POSE A POSSIBLE SAFETY HAZARD!

MASTER DRIVER

E1 – GROUND **
E2 – GROUND
JHV1 – HIGH VOLTAGE AC
JHV2 – HIGH VOLTAGE AC
JHV3 – HIGH VOLTAGE AC
JHV4 – HIGH VOLTAGE AC
J1 – RS232 INTERFACE
J2 – USB INTERFACE
J3 – ANALOG REMOTE INTERFACE
J4 – HIGH VOLTAGE INTERFACE
J5 – HIGH VOLTAGE INTERFACE
J6 – MASTER/SLAVE INTERFACE OUT
J8 – SLAVE CONTROL OUT
U1 – ETHERNET (OPTION)
TB1 – AC INPUT
TB2 – SIGNAL INTERFACE

MASTER AHV

E1 – LOAD RETURN GROUND ***
J1 – DRIVER INTERFACE
J2 – DRIVER INTERFACE
JHV1 – HIGH VOLTAGE AC
JHV2 – HIGH VOLTAGE AC
JHV3 – HIGH VOLTAGE AC
JHV4 – HIGH VOLTAGE AC
JHV5 – HIGH VOLTAGE OUTPUT

SLAVE DRIVER

E1 – GROUND **
E2 – GROUND
JHV1 – HIGH VOLTAGE AC
JHV2 – HIGH VOLTAGE AC
JHV3 – HIGH VOLTAGE AC
JHV4 – HIGH VOLTAGE AC
J3 – MASTER/SLAVE INTERFACE IN
J4 – HIGH VOLTAGE INTERFACE
J5 – HIGH VOLTAGE INTERFACE
J6 – MASTER/SLAVE INTERFACE OUT *
J7 – SLAVE CONTROL IN
J8 – SLAVE CONTROL OUT
TB1 – AC INPUT

SLAVE AHV

E1 – GROUND
J1 – DRIVER INTERFACE
J2 – DRIVER INTERFACE
JHV1 – HIGH VOLTAGE AC
JHV2 – HIGH VOLTAGE AC
JHV3 – HIGH VOLTAGE AC
JHV4 – HIGH VOLTAGE AC
JHV5 – HIGH VOLTAGE OUTPUT

* - **CAUTION!** J6 OF LAST SLAVE UNIT MUST BE TERMINATED WITH CONNECTOR PROVIDED.

** - **WARNING!** REQUIRED USER SUPPLIED CONNECTION TO GOOD EARTH GROUND.

*** - **WARNING!** USER SUPPLIED LOAD RETURN TO E1 ON MASTER AHV

1 **CAUTION!** ALL SIGNAL CABLES MUST BE KEPT AWAY FROM HIGH VOLTAGE AC CABLES. USE RECLOSABLE TIE WRAPS PROVIDED TO BUNDLE SIGNAL CABLES AWAY FROM HIGH VOLTAGE CABLES.

IN
(MM)

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DEC. XXX ± .005 XX ± .01
DEG. ±

THIRD ANGLE PROJECTION

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\2016\98003C.DWG

APPROVALS		DATE
DRAWN	EJM	042616
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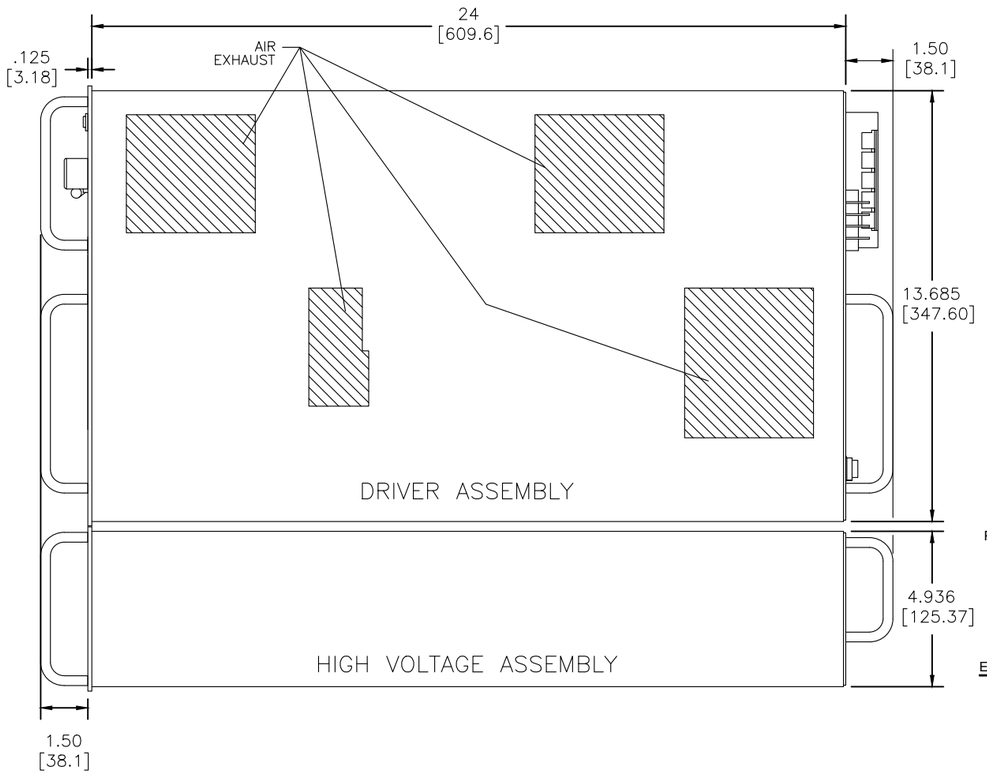
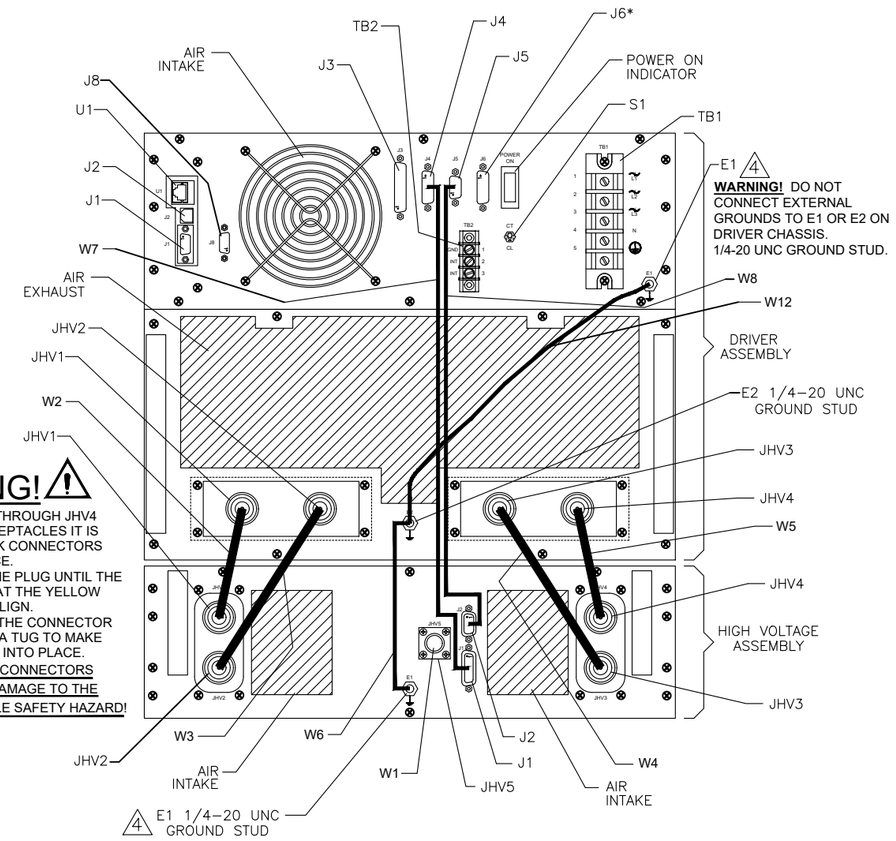
TITLE OUTLINE & INSTALLATION
GX SERIES, 15–100KV
MASTER/SLAVE

D | DWG.NO. 201698–003 | REV. C

SCALE NONE | SHEET 2 OF 2

REV	BY	DESCRIPTION	DATE	APPROVED
		SEE SHEET 2 FOR REV.		

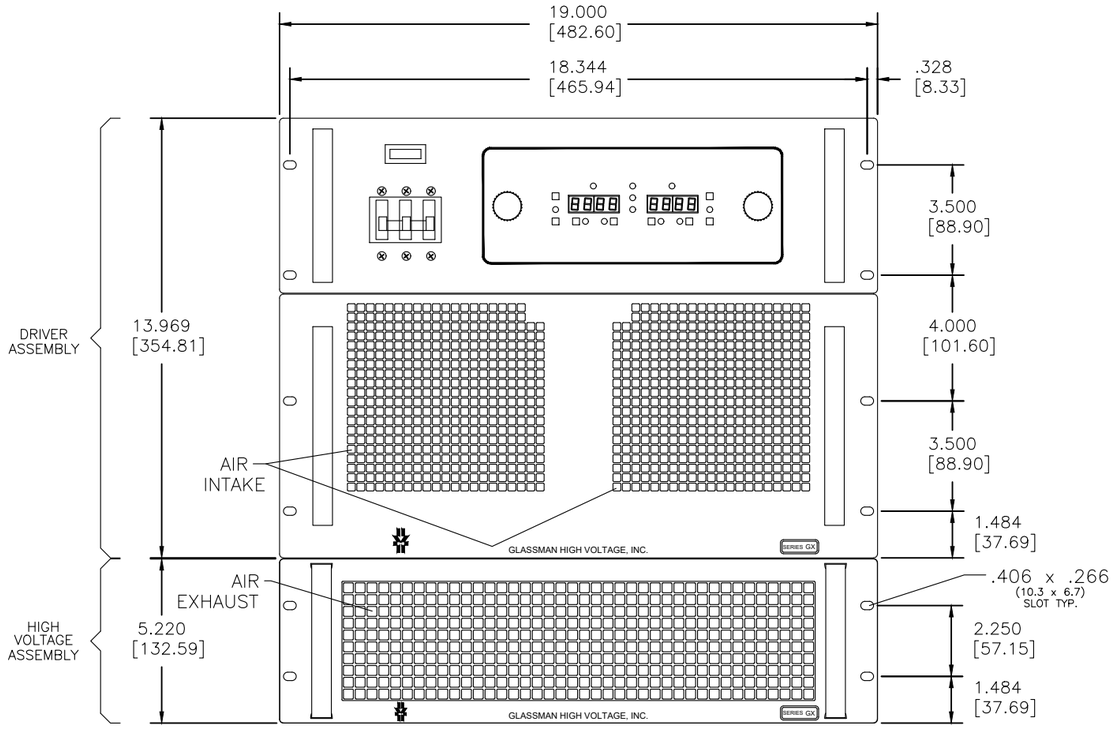




⚠ WARNING! ⚠

WHEN INSERTING THE JHV1 THROUGH JHV4 CONNECTORS INTO THE RECEPTACLES IT IS CRUCIAL THAT THE TWIST-LOK CONNECTORS LOCK INTO PLACE.
PUSH THE CONNECTOR ONTO THE PLUG UNTIL THE LOCKING RING TURNS SO THAT THE YELLOW INDEXING MARKS ALIGN.
AFTER SEATING AND LOCKING THE CONNECTOR GIVE THE CONNECTOR BODY A TUG TO MAKE SURE IT IS FIRMLY LOCKED INTO PLACE.
FAILURE TO SECURE THESE CONNECTORS PROPERLY CAN RESULT IN DAMAGE TO THE EQUIPMENT AND POSE A POSSIBLE SAFETY HAZARD!

WARNING! CONNECT GOOD EARTH GROUND, LOAD RETURN, AND ALL OTHER GROUNDS TO E1 ON HV CHASSIS.



DRIVER ASSEMBLY

J1 LEGEND		J2 LEGEND		J3 LEGEND		TB1 LEGEND			
1	DCD	1	+5V	2	COMMON	1	LINE	AC INPUT	380, 415 OR 480VAC
2	RX	2	D–	6	REMOTE VOLTAGE PROGRAM	2	LINE		+/– 10%
3	TX	3	D+	7	REMOTE CURRENT PROGRAM	3	LINE		48–63 HZ
4	DTR	4	COMMON	8	SIGNAL COMMON	4	NEUTRAL		3 PHASE
5	COMMON			9	VOLTAGE MONITOR	5	GROUND		
6	DSR			10	CURRENT MONITOR				
7	RTS			11	COMMON				
8	CTS			12	+REF				
10	GND/SHIELD			15	REMOTE HV ON				
11	GND/SHIELD			16	REMOTE HV ON				
				20	HV ENABLE				
U1 OPTION LEGEND				21	HV STATUS	TB2 LEGEND			
1	TXD+			22	FAULT STATUS	1	GROUND		
2	TXD–			23	MODE STATUS	2	INTERLOCK		
3	RXD+			24	ARC STATUS	3	INTERLOCK		
4	E POWER+			25	GROUND				
5	E POWER+								
6	RXD –			E1	– GROUND STUD				
7	E POWER–			E2	– GROUND STUD				
8	E POWER–								

J4 – HIGH VOLTAGE INTERFACE
J5 – HIGH VOLTAGE INTERFACE
J6 – MASTER/SLAVE INTERFACE OUT *
J8 – SLAVE CONTROL OUT

JHV1 THROUGH JHV4 – ALDEN/AMPHONOL 108870 (SHOWN)

*** CAUTION!** J6 MUST BE TERMINATED WITH CONNECTOR PROVIDED.

HIGH VOLTAGE ASSEMBLY

J1 – HIGH VOLTAGE INTERFACE
J2 – HIGH VOLTAGE INTERFACE

JHV1 THROUGH JHV4 – ALDEN/AMPHONOL 108870 (SHOWN)

JHV5 – HIGH VOLTAGE OUTPUT CONNECTOR 5–12KV AMPHENOL TYPE 83–1R OR EQUIVALENT (SHOWN)

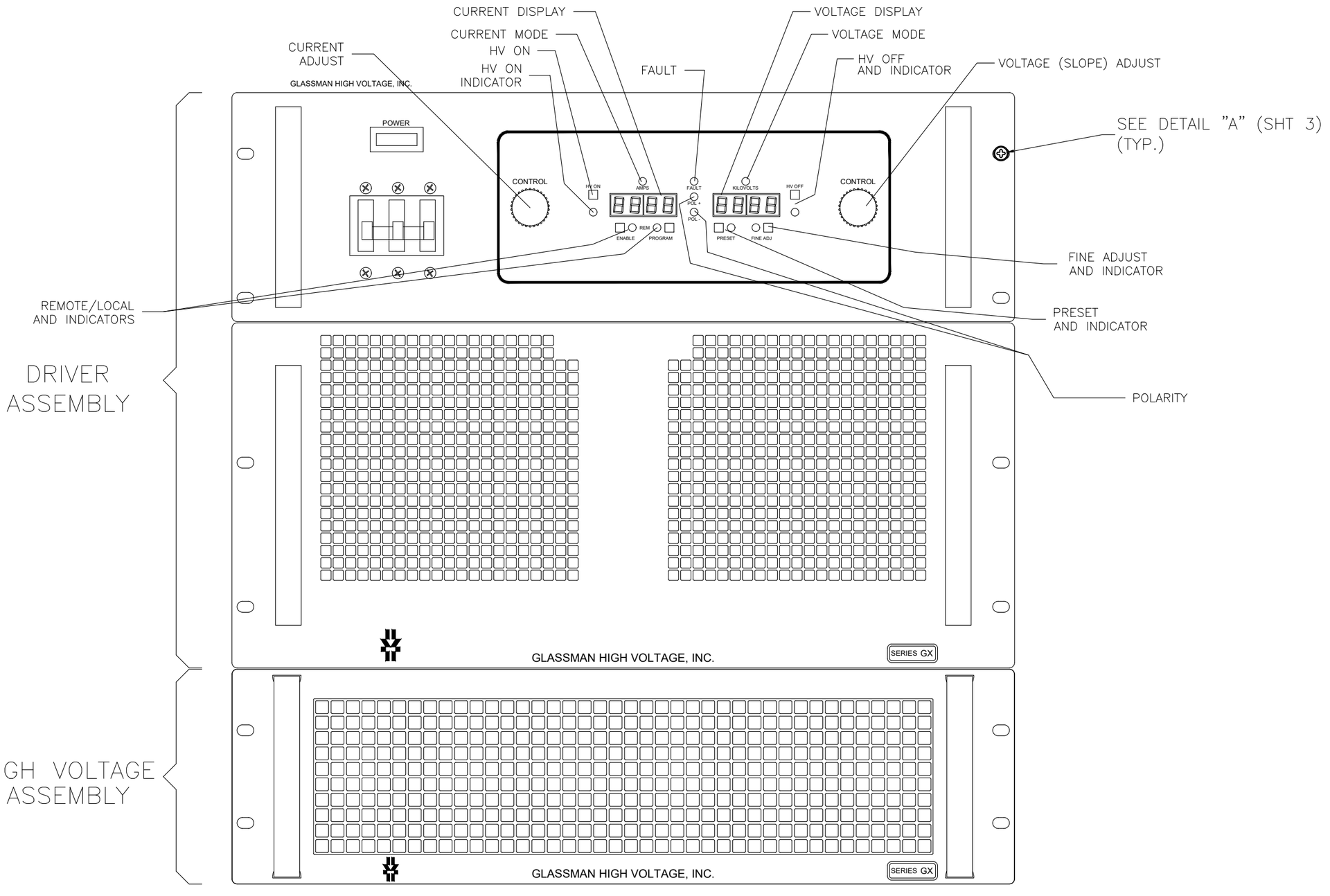
E1 – **WARNING!** LOAD RETURN GROUND STUD

IN
(MM)

NET WEIGHT: 125 lbs. 46.66 kg.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE : DEC. XXX ± .005 XX ± .01 DEG. ±	FILE NO. EXTENSION \2016\98004B.DWG	XP XP Power 124 West Main Street, PO Box 317, High Bridge, NJ 08829-317 (908) 638-3800 Fax (908) 638-3700	
THIRD ANGLE PROJECTION	APPROVALS / DATE	TITLE	OUTLINE & INSTALLATION GX SERIES, 5–12 KV MASTER SYSTEM
DO NOT SCALE DRAWING	DRAWN MAL 120718	D	DWG.NO. 201698–004 REV. B
	CHECKED JMC 120718	SCALE NONE	SHEET 1 OF 3
	RELEASED		

REV	BY	DESCRIPTION	DATE	APPROVED
A	MM	ECN 11856: ADDED TWIST-LOK NOTE	020921	TJP
B	BB	ECN 12473: ADDED W12, NOTE 4 & UPDATED WARNING	010225	JMM



IN
(MM)

NET WEIGHT: 125 lbs. 46.66 kg.

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TOLERANCES ARE :
DEC. XXX ± .005 XX ± .01
DEG. ±

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

FILE NO. EXTENSION
\2016\98004B.DWG

APPROVALS		DATE
DRAWN	MAL	120718
CHECKED	JMC	120718
RELEASED		

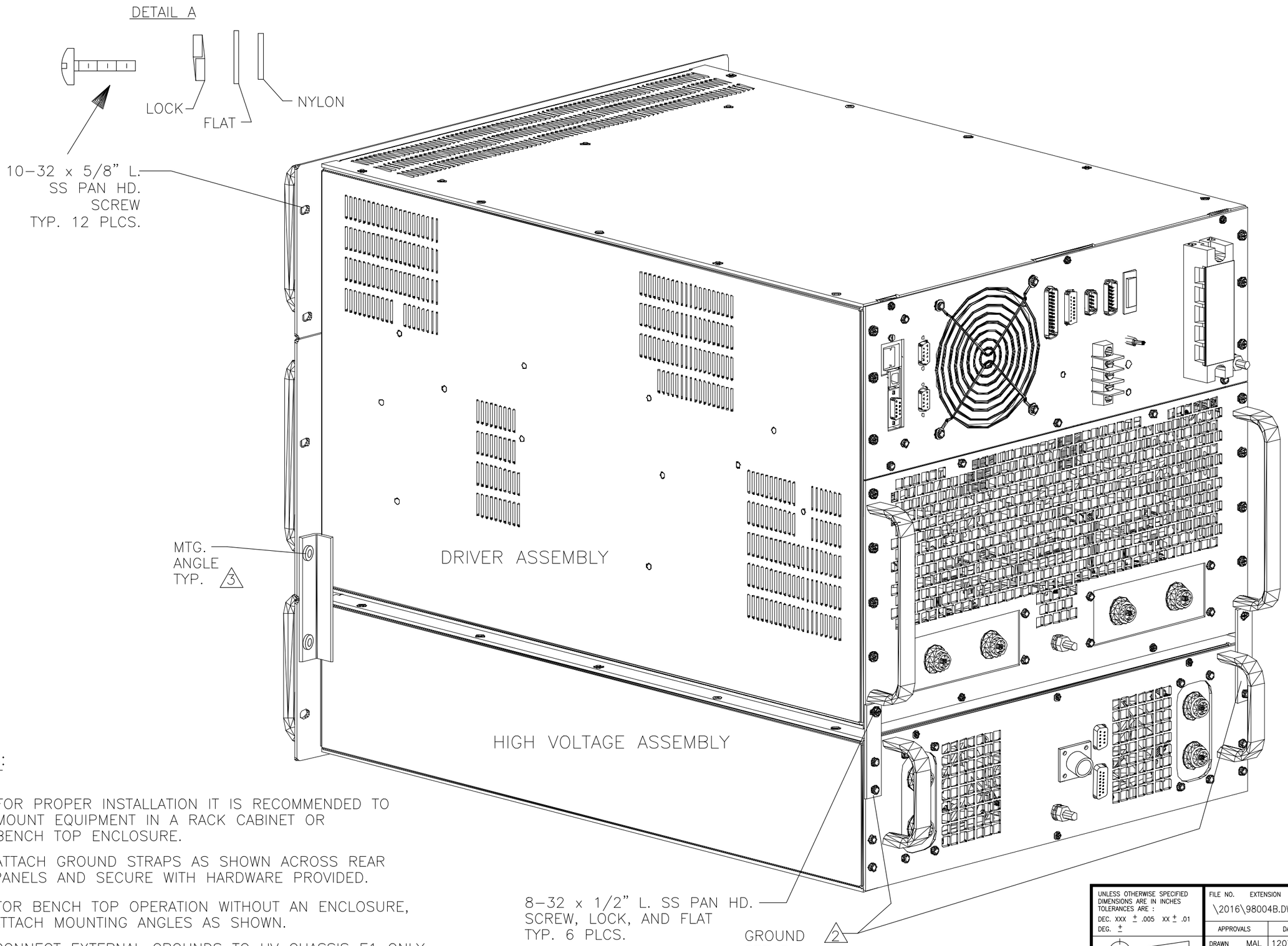
XP Power
124 West Main Street, PO Box 317, High Bridge, NJ 08829-317
(908) 638-3800 Fax (908) 638-3700

TITLE OUTLINE & INSTALLATION
GX SERIES, 5-12KV
MASTER SYSTEM

D | DWG.NO. 201698-004 | REV. B

SCALE NONE | SHEET 2 OF 3

REV	BY	DESCRIPTION	DATE	APPROVED



NOTES:

1 – FOR PROPER INSTALLATION IT IS RECOMMENDED TO MOUNT EQUIPMENT IN A RACK CABINET OR BENCH TOP ENCLOSURE.

2 – ATTACH GROUND STRAPS AS SHOWN ACROSS REAR PANELS AND SECURE WITH HARDWARE PROVIDED.

3 – FOR BENCH TOP OPERATION WITHOUT AN ENCLOSURE, ATTACH MOUNTING ANGLES AS SHOWN.

4 – CONNECT EXTERNAL GROUNDS TO HV CHASSIS E1 ONLY.

NET WEIGHT: 125 lbs. 46.66 kg.

IN
(MM)

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TOLERANCES ARE :
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DEG. ±

THIRD ANGLE PROJECTION

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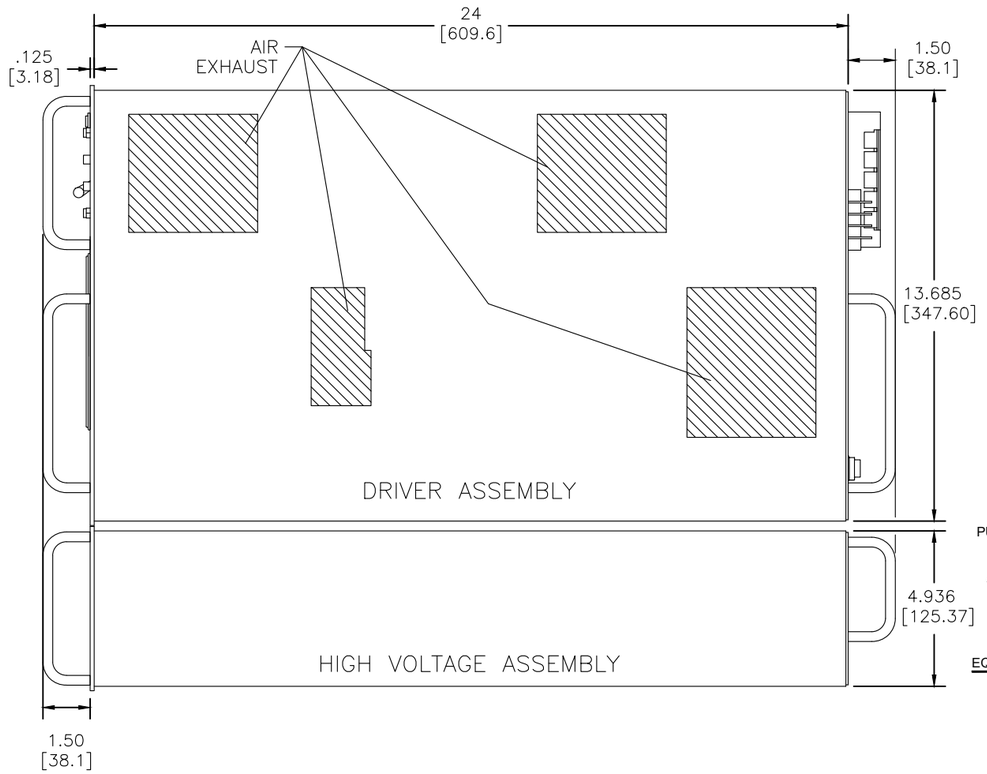
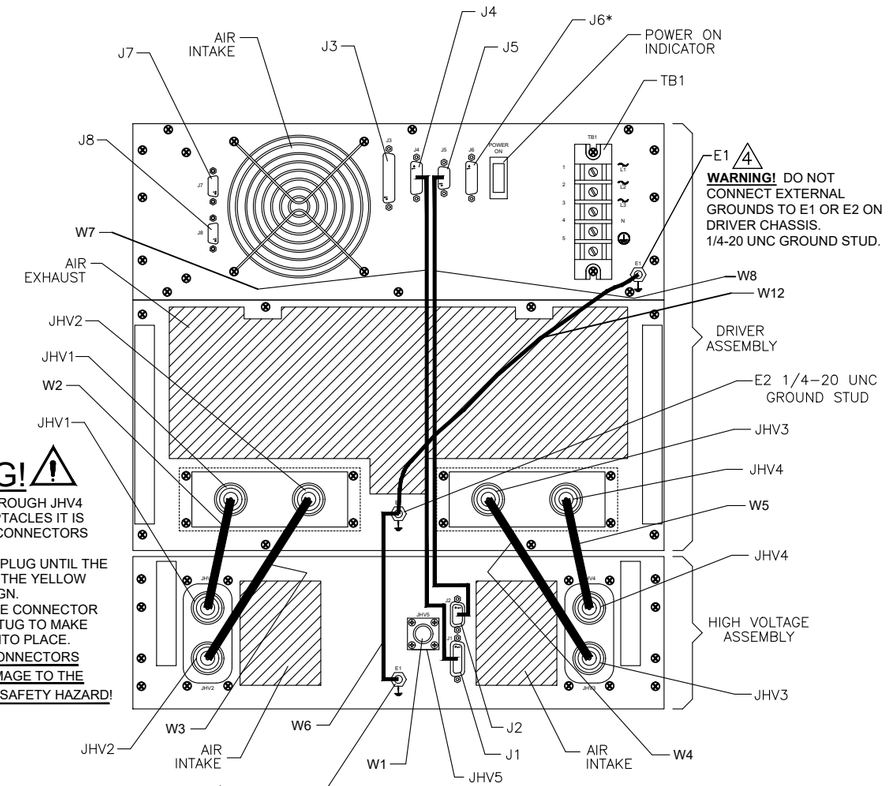
TITLE OUTLINE & INSTALLATION
GX SERIES, 5–12KV
MASTER SYSTEM

D DWG.NO. 201698–004 REV. B

SCALE NONE SHEET 3 OF 3

REV	BY	DESCRIPTION	DATE	APPROVED
		SEE SHEET 2 FOR REV.		





⚠ WARNING! ⚠

WHEN INSERTING THE JHV1 THROUGH JHV4 CONNECTORS INTO THE RECEPTACLES IT IS CRUCIAL THAT THE TWIST-LOK CONNECTORS LOCK INTO PLACE.
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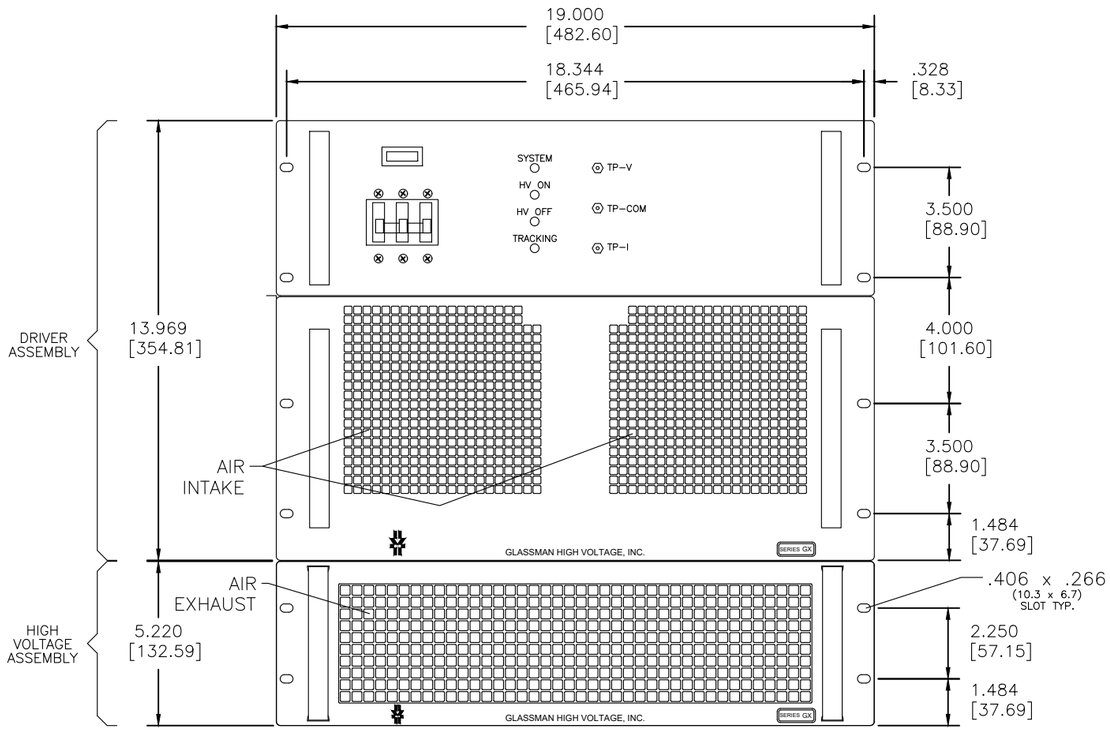

WARNING! CONNECT GOOD EARTH GROUND, LOAD RETURN, AND ALL OTHER GROUNDS TO E1 ON HV CHASSIS.

DRIVER ASSEMBLY

J3 LEGEND

1 SLAVE FAULT
2 HV ON SLAVE
3 RESERVED
4 HV ENABLE SLAVE
5 OPTION
6 POLARITY SLAVE
7 LVL CS
8 CURRENT MONITOR SLAVE
9 S COMMON
10 VOLTAGE PROGRAM SLAVE
11 CURRENT PROGRAM SLAVE
12 COMMON
15 GROUND

E1 – GROUND STUD
E2 – GROUND STUD

TB1 LEGEND

1 LINE
2 LINE
3 LINE
4 NEUTRAL
5 GROUND

AC INPUT 380, 415 OR 480VAC +/– 10% 48–63 HZ 3 PHASE

J4 – HIGH VOLTAGE INTERFACE
J5 – HIGH VOLTAGE INTERFACE
J6 – MASTER/SLAVE INTERFACE OUT *
J7 – SLAVE CONTROL IN
J8 – SLAVE CONTROL OUT

JHV1 THROUGH JHV4 – ALDEN/AMPHONOL 108870 (SHOWN)

*** CAUTION!** J6 MUST BE TERMINATED WITH CONNECTOR PROVIDED.

HIGH VOLTAGE ASSEMBLY

J1 – HIGH VOLTAGE INTERFACE
J2 – HIGH VOLTAGE INTERFACE

JHV1 THROUGH JHV4 – ALDEN/AMPHONOL 108870 (SHOWN)

JHV5 – HIGH VOLTAGE OUTPUT CONNECTOR 5–12KV AMPHENOL TYPE 83–1R OR EQUIVALENT (SHOWN)

E1 – GROUND STUD

NET WEIGHT: 125 lbs. 46.66 kg.

IN
(MM)

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DEC. XXX ± .005 XX ± .01
DEG. ±
THIRD ANGLE PROJECTION
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FILE NO. EXTENSION
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APPROVALS	DATE
DRAWN MAL	120718
CHECKED JMC	121018
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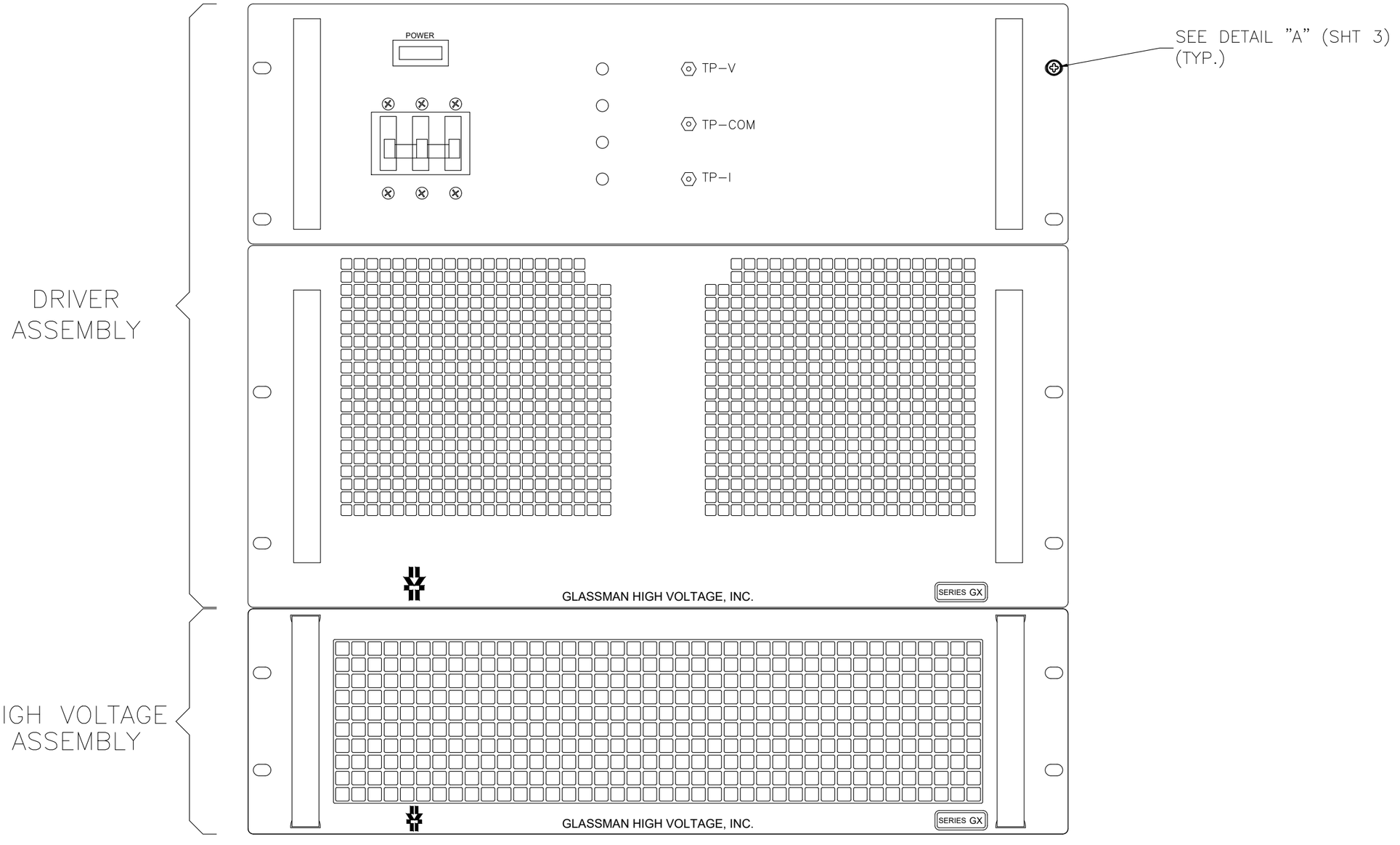
TITLE OUTLINE & INSTALLATION GX SERIES, 5–12KV SLAVE SYSTEM

D DWG.NO. 201698–005 REV. B

SCALE NONE SHEET 1 OF 3

REV	BY	DESCRIPTION	DATE	APPROVED
A	MM	ECN 11856: ADDED TWIST-LOK NOTE	021021	TJP
B	BB	ECN 12473: ADDED W12, NOTE 4 & UPDATED WARNING	010225	JMM



IN
(MM)

NET WEIGHT: 125 lbs. 46.66 kg.

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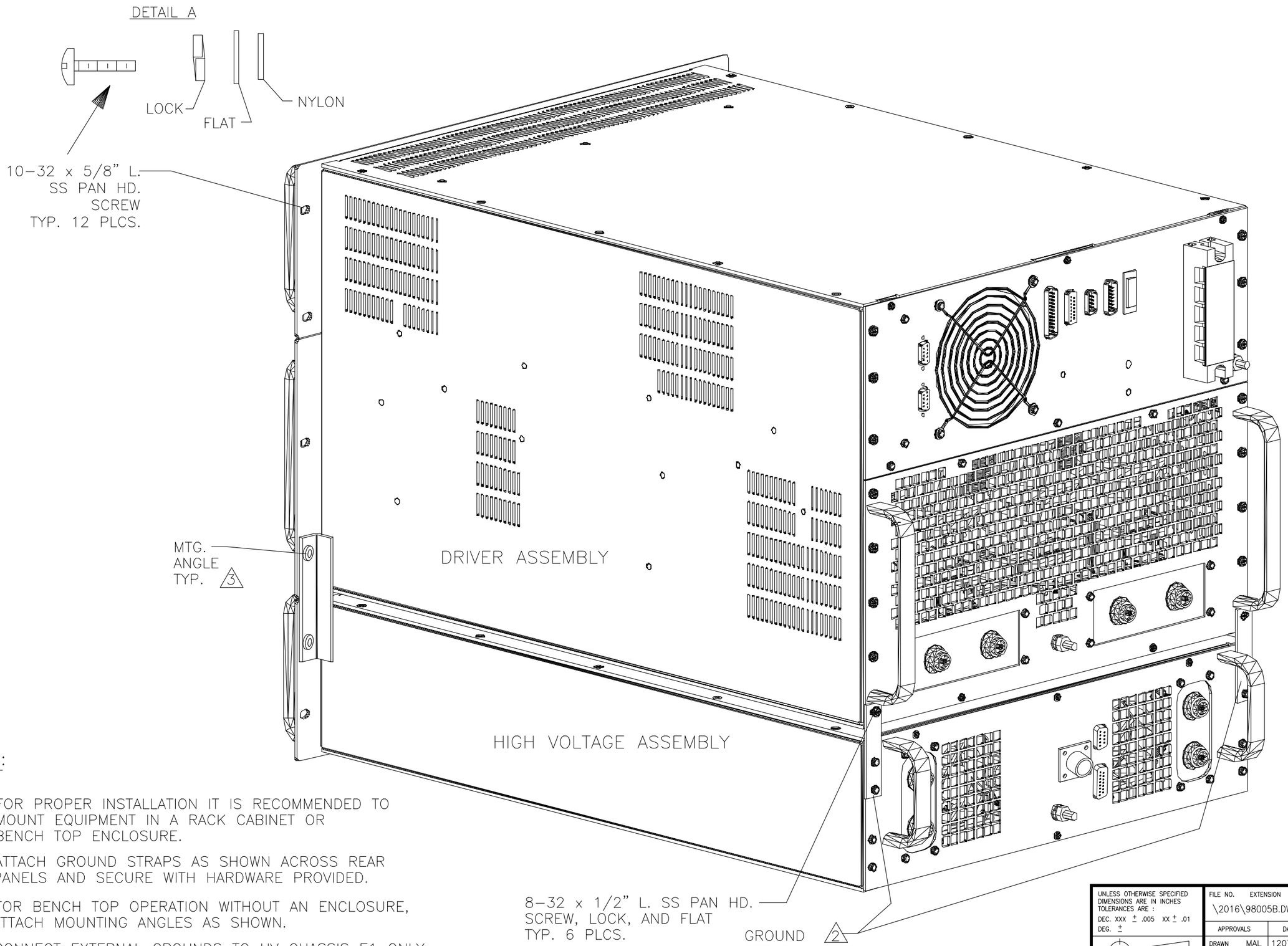
TITLE OUTLINE & INSTALLATION
GX SERIES, 5-12KV
SLAVE SYSTEM

D DWG.NO. 201698-005 REV. B

SCALE NONE SHEET 2 OF 3

REV	BY	DESCRIPTION	DATE	APPROVED



NOTES:

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4 – CONNECT EXTERNAL GROUNDS TO HV CHASSIS E1 ONLY.

NET WEIGHT: 125 lbs. 46.66 kg.

IN
(MM)

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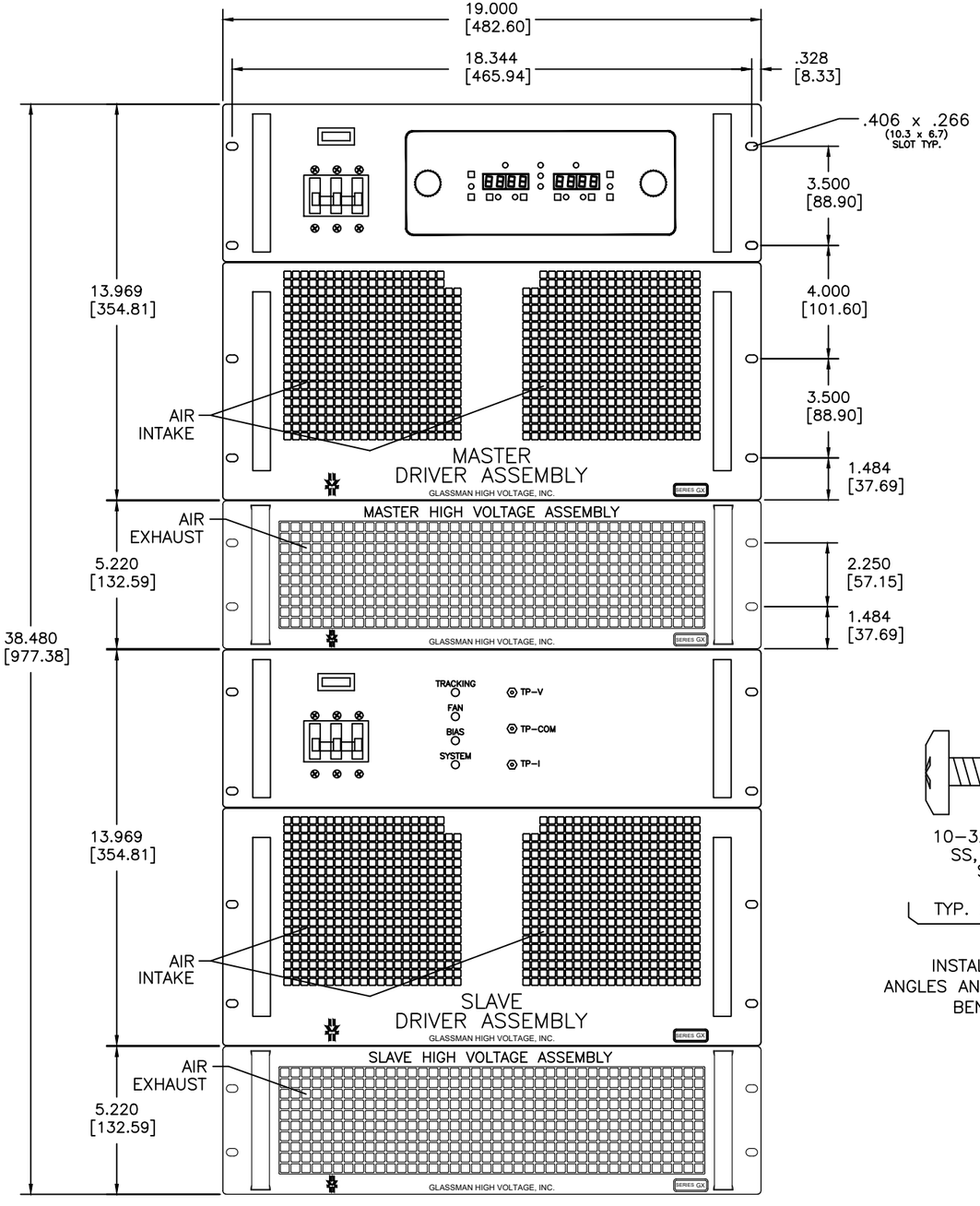
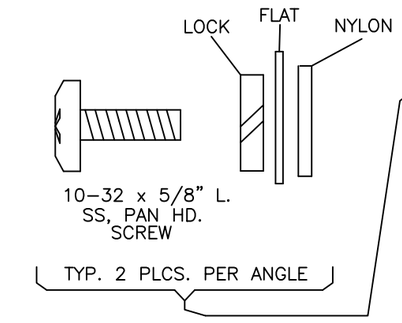
GX SERIES, 5–12KV
SLAVE SYSTEM

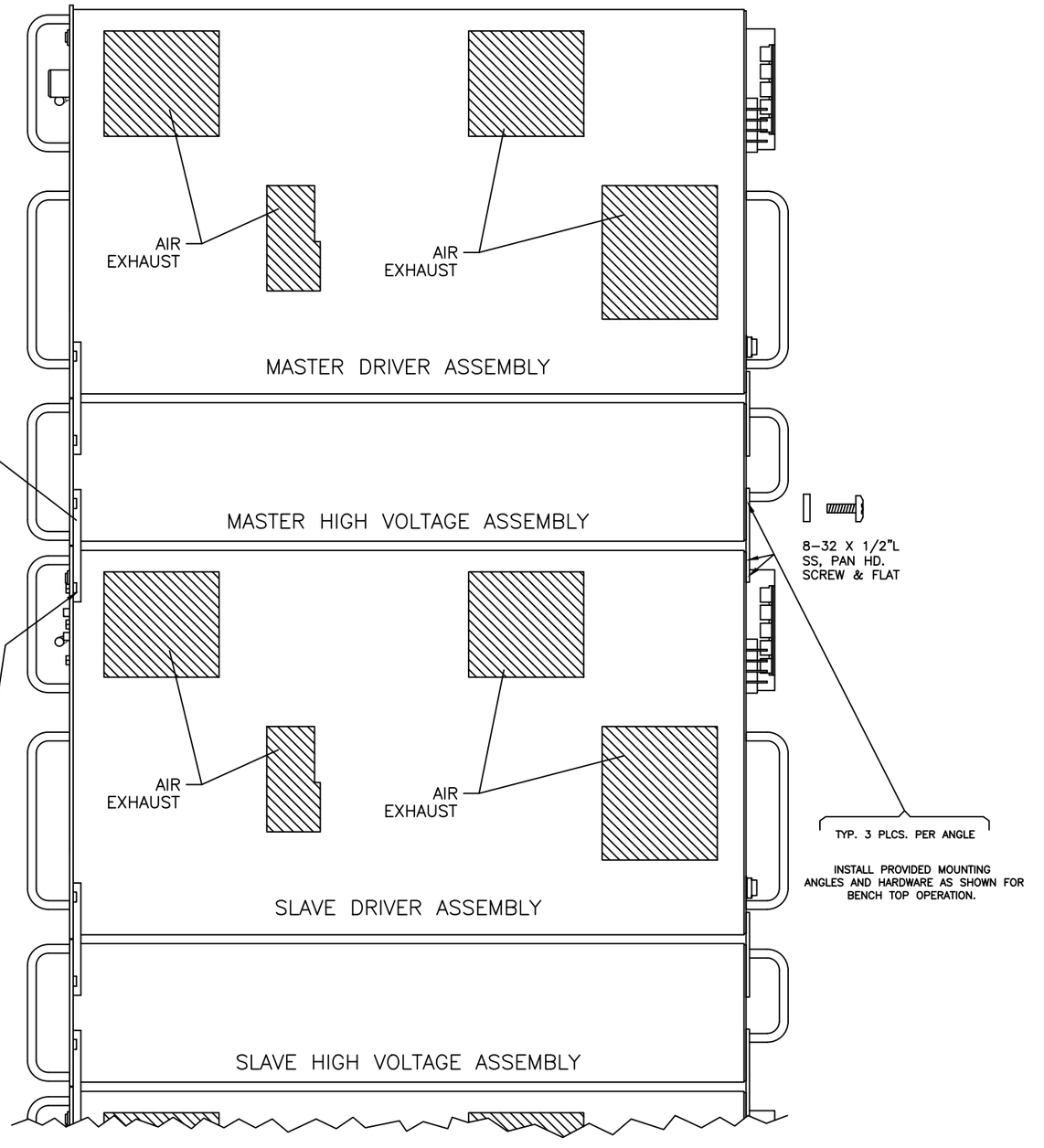
D | DWG.NO. 201698–005 | REV. B

SCALE NONE | SHEET 3 OF 3

REV	BY	DESCRIPTION	DATE	APPROVED
A	MM	ECN 11856: ADDED TWIST-LOK NOTE	021021	TJP
B	BB	ECN 12473: ADDED A1W11 & A2W12	010225	JMM







FOR PROPER INSTALLATION, IT IS RECOMMENDED TO
MOUNT EQUIPMENT IN A RACK CABINET OR BENCH TOP ENCLOSURE.

IN
(MM)

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THIRD ANGLE PROJECTION

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APPROVALS		DATE
DRAWN	MAL	120718
CHECKED	JMC	120718
RELEASED		

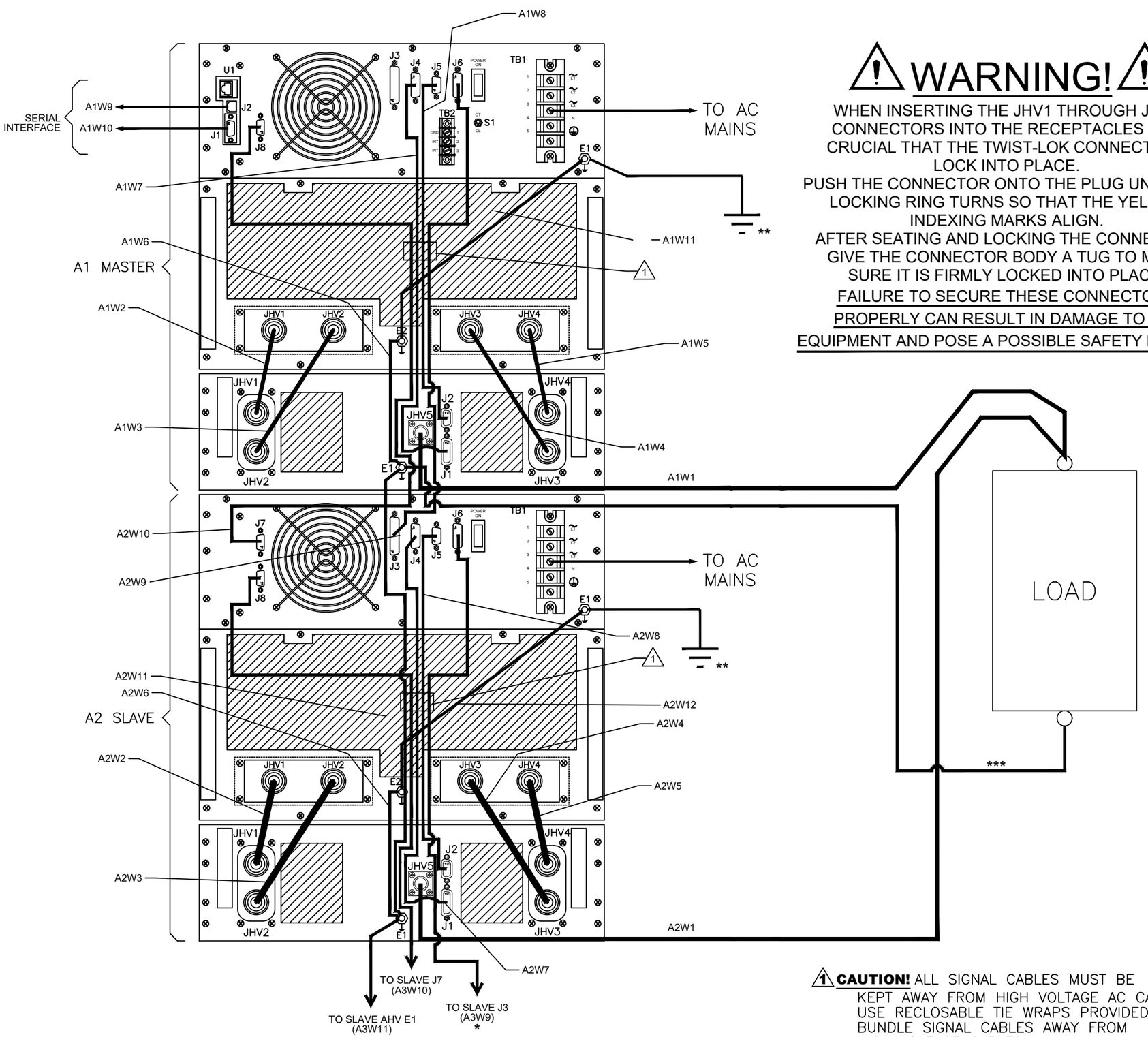
XP Power
124 West Main Street, PO Box 317, High Bridge, NJ 08829-317
(908) 638-3800 Fax (908) 638-3700

TITLE OUTLINE & INSTALLATION
GX SERIES, 5-12KV
MASTER/SLAVE

D DWG.NO. 201698-006 REV. B

SCALE NONE SHEET 1 OF 2

REV	BY	DESCRIPTION	DATE	APPROVED



FOR PROPER INSTALLATION, IT IS RECOMMENDED TO MOUNT EQUIPMENT IN A FORCED AIR COOLED RACK CABINET OR BENCH TOP ENCLOSURE.

⚠ WARNING! ⚠

WHEN INSERTING THE JHV1 THROUGH JHV4 CONNECTORS INTO THE RECEPTACLES IT IS CRUCIAL THAT THE TWIST-LOK CONNECTORS LOCK INTO PLACE.
PUSH THE CONNECTOR ONTO THE PLUG UNTIL THE LOCKING RING TURNS SO THAT THE YELLOW INDEXING MARKS ALIGN.
AFTER SEATING AND LOCKING THE CONNECTOR GIVE THE CONNECTOR BODY A TUG TO MAKE SURE IT IS FIRMLY LOCKED INTO PLACE.
FAILURE TO SECURE THESE CONNECTORS PROPERLY CAN RESULT IN DAMAGE TO THE EQUIPMENT AND POSE A POSSIBLE SAFETY HAZARD!

MASTER DRIVER

E1 – GROUND **
E2 – GROUND
JHV1 – HIGH VOLTAGE AC
JHV2 – HIGH VOLTAGE AC
JHV3 – HIGH VOLTAGE AC
JHV4 – HIGH VOLTAGE AC
J1 – RS232 INTERFACE
J2 – USB INTERFACE
J3 – ANALOG REMOTE INTERFACE
J4 – HIGH VOLTAGE INTERFACE
J5 – HIGH VOLTAGE INTERFACE
J6 – MASTER/SLAVE INTERFACE OUT
J8 – SLAVE CONTROL OUT
U1 – ETHERNET (OPTION)
TB1 – AC INPUT
TB2 – SIGNAL INTERFACE

MASTER AHV

E1 – LOAD RETURN GROUND ***
J1 – DRIVER INTERFACE
J2 – DRIVER INTERFACE
JHV1 – HIGH VOLTAGE AC
JHV2 – HIGH VOLTAGE AC
JHV3 – HIGH VOLTAGE AC
JHV4 – HIGH VOLTAGE AC
JHV5 – HIGH VOLTAGE OUTPUT

SLAVE DRIVER

E1 – GROUND **
E2 – GROUND
JHV1 – HIGH VOLTAGE AC
JHV2 – HIGH VOLTAGE AC
JHV3 – HIGH VOLTAGE AC
JHV4 – HIGH VOLTAGE AC
J3 – MASTER/SLAVE INTERFACE IN
J4 – HIGH VOLTAGE INTERFACE
J5 – HIGH VOLTAGE INTERFACE
J6 – MASTER/SLAVE INTERFACE OUT *
J7 – SLAVE CONTROL IN
J8 – SLAVE CONTROL OUT
TB1 – AC INPUT

SLAVE AHV

E1 – GROUND
J1 – DRIVER INTERFACE
J2 – DRIVER INTERFACE
JHV1 – HIGH VOLTAGE AC
JHV2 – HIGH VOLTAGE AC
JHV3 – HIGH VOLTAGE AC
JHV4 – HIGH VOLTAGE AC
JHV5 – HIGH VOLTAGE OUTPUT

* - **CAUTION!** J6 OF LAST SLAVE UNIT MUST BE TERMINATED WITH CONNECTOR PROVIDED.

** - **WARNING!** REQUIRED USER SUPPLIED CONNECTION TO GOOD EARTH GROUND.

*** - **WARNING!** USER SUPPLIED LOAD RETURN TO E1 ON MASTER AHV

⚠1 **CAUTION!** ALL SIGNAL CABLES MUST BE KEPT AWAY FROM HIGH VOLTAGE AC CABLES. USE RECLOSABLE TIE WRAPS PROVIDED TO BUNDLE SIGNAL CABLES AWAY FROM HIGH VOLTAGE CABLES.

IN (MM)

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ARE :
DEC. XXX ± .005 XX ± .01
DEG. ±

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

FILE NO. EXTENSION \2016\98006B.DWG

APPROVALS	DATE
DRAWN MAL	120718
CHECKED JMC	120718
RELEASED	

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

TITLE: OUTLINE & INSTALLATION GX SERIES, 5–12KV MASTER/SLAVE

D | DWG.NO. 201698–006 | REV. B

SCALE NONE | SHEET 2 OF 2

REV	BY	DESCRIPTION	DATE	APPROVED
NR–1	JAG	FIXED GENDER OF J1 TO J4 CONN.	101615	KJD
NR–2	JAG	ADDED J6 AND J8	041216	KJD
NR–3	TJP	REVISED J3 PINS #'S & LABELS, ADDED GROUND NOTES	082416	KJD
NR–4	JAG	TITLE CHANGE & HV_RTN NUMBERING	120718	KLH
NR–5	BB	TITLE CHANGE	013120	

WARNING!!
REQUIRED USER SUPPLIED CONNECTION TO GOOD EARTH GROUND

GROUND STUD
E1

3 PHASE 48 – 63 Hz
380, 415 OR 480 VAC +/– 10%

TB1
L1 1
L2 2
L3 3
N 4
GND 5

TB2
GROUND 1
INTERLOCK 2 3

SLAVE INTERFACE OUTPUT

J8
1 V_ISO_OUT
2 ISO_COMMON
3 ER_ISO_OUT
4 –V_ISO__OUT
9 GROUND

J6 (1)
1 SLAVE_FLT
2 HV_ON_SLV
3 RESERVED
4 HV_ENABLE_SLV
5 OPTION
6 POL_SLV
7 LVL_CS
8 I_MON_SL
9 S_COMMON
10 V_PGM_SLV
11 I_PGM_SLV
12 COMMON

A1
DRIVER ASSEMBLY

J3 — ANALOG REMOTE
2 COMMON
6 RMT_VPGM
7 RMT_IPGM
8 SIG_COMMON
9 VMON
10 IMON
11 COMMON
12 +REF
15 RMT_HV_ON
16 RMT_HV_ON
20 HV_ENABLE
21 HV_STATUS
22 FAULT_STATUS
23 MODE_STATUS
24 RESERVED
25 GROUND

J1 — RS232
SHIELD 11 — SHIELD 10
1 DCD
2 RX
3 TX
4 DTR
5 COMMON
6 DSR
7 RTS
8 CTS
9 NC

J2 — USB
1 +5
2 DM
3 DP
4 FCOMMON
5 SHIELD
6 SHIELD

U1 — ETHERNET (OPTIONAL)
1 TXD+
2 TXD–
3 RXD+
4 EPWR+
5 EPWR+
6 RXD–
7 EPWR–
8 EPWR–

A1P4 — J4 — W7 — A2P1 — J1
1 COMMON
2 IFB1–
3 IFB1+
4 IFB2–
5 IFB2+
6 ARC_SENSE
7 POL
8 VFB–
9 VFB+
10 COMMON
11 HV_INTLK
12 HV_INTLK
13 +15V
14 –15V
15 GND

A1P5 — J5 — W8 — A2P2 — J2
1 –1.5V
2 +24V
3 SNS_F6
4 SNS_F7
5 HV_RTN1
6 HV_RTN2
7 HV_RTN3
8 HV_RTN4
9 GND

JHV1 — W2 — JHV1
JHV2 — W3 — JHV2
JHV3 — W4 — JHV3
JHV4 — W5 — JHV4
E2 — W6 — E1
E2 GROUND STUD
E1 GROUND STUD

A2
HIGH VOLTAGE ASSEMBLY

JHV5 HV OUT — W1 — HIGH VOLTAGE CABLE — USER LOAD

USER SUPPLIED LOAD RETURN

NOTES:
(1) – TERMINATOR PLUG CONNECTED TO J6 ON "STAND ALONE" MASTER UNITS. CONNECTING PINS 1 TO 9 & 7 TO12.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: DEC. XXX ± XX ± DEG. %	FILE NO. EXTENSION \2003\57001#5.1	GLASSMAN HIGH VOLTAGE INC. P.O BOX 317, HIGH BRIDGE, N.J. 08829 (908) 638–3800 FAX (908) 638–3700
USED WITH:	APPROVALS / DATE	TITLE: SYSTEM SCHEMATIC PS/GX, 40–100KV, MASTER
	DRAWN JAG 041615	
	CHECKED GO 041615	
DO NOT SCALE DRAWING	RELEASED	SIZE B / DWG NO 200357–001 / REV. NR–5
	USED WITH:	SCALE NONE / SHEET 1 OF 1

REV	BY	DESCRIPTION	DATE	APPROVED
NR–1	TJP	ADDED AXW11 & VARIOUS NOTE UPDATES	041316	KJD
NR–2	JAG	TITLE CHANGE & HV_RTN NUMBERING	120718	KLH
NR–3	BB	TITLE CHANGE	013120	

WARNING!!
REQUIRED USER SUPPLIED CONNECTION TO GOOD EARTH GROUND

GROUND STUD
E1

3 PHASE 48 – 63 Hz
380, 415 OR 480 VAC +/– 10%

TB1
L1 1
L2 2
L3 3
N 4
GND 5

TB2
GROUND 1
INTERLOCK 2
3

SLAVE INTERFACE OUTPUT

J8
1 V_ISO_OUT
2 ISO_COMMON
3 ER_ISO_OUT
4 –V_ISO__OUT
9 GROUND

J6
1 SLAVE_FLT
2 HV_ON_SLV
3 RESERVED
4 HV_ENABLE_SLV
5 OPTION
6 POL_SLV
7 LVL_CS
8 I_MON_SL
9 S_COMMON
10 V_PGM_SLV
11 I_PGM_SLV
12 COMMON

A1

DRIVER ASSEMBLY

SLAVE INTERFACE INPUT

J3
1 SLAVE_FLT
2 HV_ON_SLV
3 RESERVED
4 HV_ENABLE_SLV
5 OPTION
6 POL_SLV
7 LVL_CS
8 I_MON_SL
9 S_COMMON
10 V_PGM_SLV
11 I_PGM_SLV
12 COMMON
15 GROUND

J7
1 V_ISO_IN
2 ISO_COMMON
3 ER_ISO_IN
4 –V_ISO__IN
9 GROUND

J4 (A1P4)
J5 (A1P5)
J1 (A2P1)
J2 (A2P2)

W7
COMMON
IFB1–
IFB1+
IFB2–
IFB2+
ARC_SENSE
POL
VFB–
VFB+
COMMON
HV_INTLK
HV_INTLK
+15V
–15V
GND

W8
–1.5V
+24V
SNS_F6
SNS_F7
HV_RTN1
HV_RTN2
HV_RTN3
HV_RTN4
GND

JHV1 W2 JHV1
JHV2 W3 JHV2
JHV3 W4 JHV3
JHV4 W5 JHV4
E2 W6 E1
GROUND STUD
GROUND STUD

AXW11

GROUND CONNECTION TO MASTER OR NEAREST UPSTREAM SLAVE UNIT

A2
HIGH VOLTAGE ASSEMBLY

JHV5 HV OUT
W1 HIGH VOLTAGE CABLE
USER LOAD

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

USED WITH:

DO NOT SCALE DRAWING

FILE NO. EXTENSION
\2003\57002#3.1

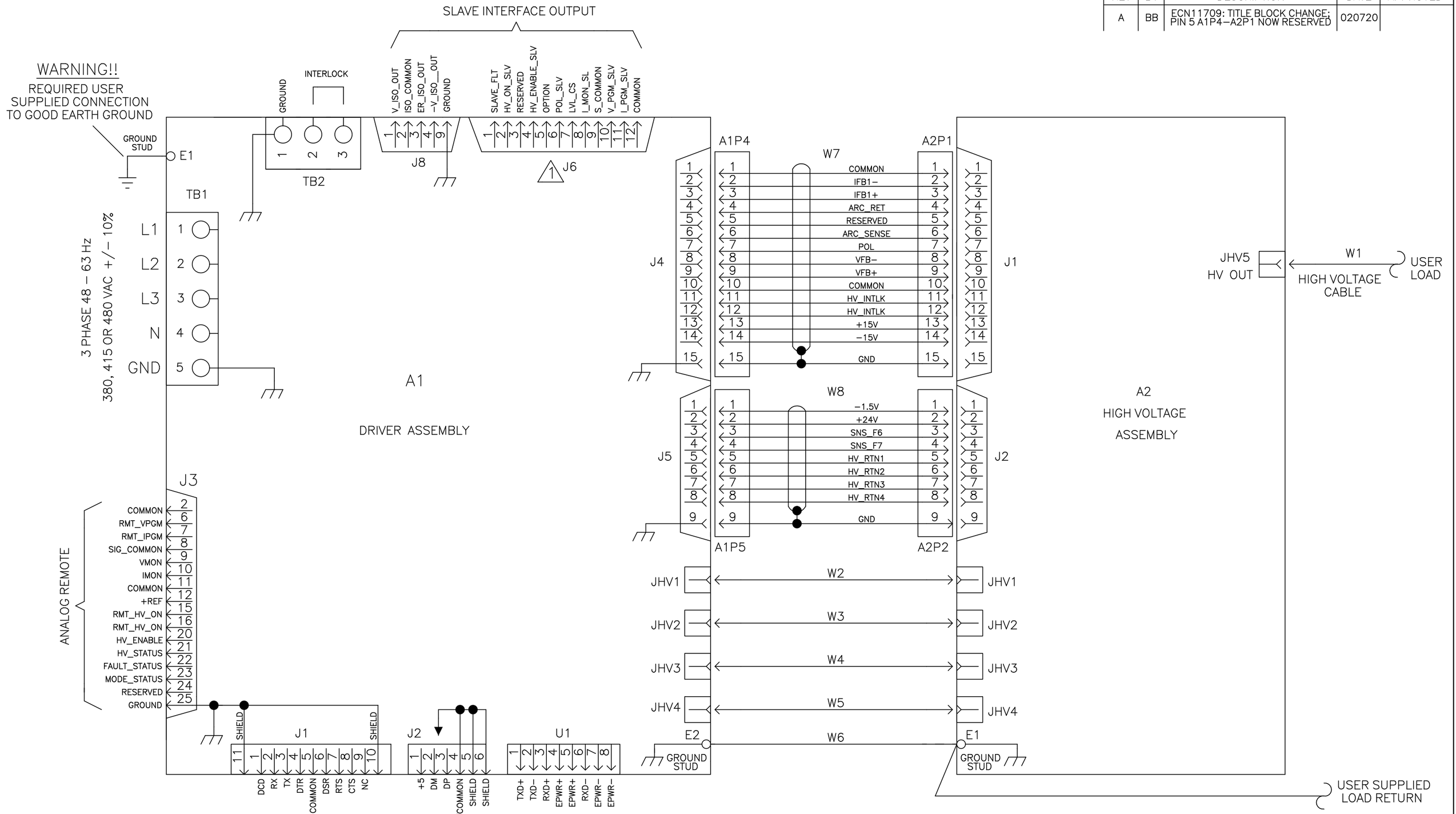
APPROVALS	DATE
DRAWN JAG	041316
CHECKED KJD	041316
RELEASED	
USED WITH:	

GLASSMAN HIGH VOLTAGE INC.
P.O BOX 317, HIGH BRIDGE, N.J. 08829
(908) 638–3800 FAX (908) 638–3700

TITLE
SYSTEM SCHEMATIC
PS/GX, 40–100KV, SLAVE

SIZE B | DWG NO 200357–002 | REV. NR–3
SCALE NONE | SHEET 1 OF 1

REV	BY	DESCRIPTION	DATE	APPROVED
A	BB	ECN11709: TITLE BLOCK CHANGE; PIN 5 A1P4–A2P1 NOW RESERVED	020720	

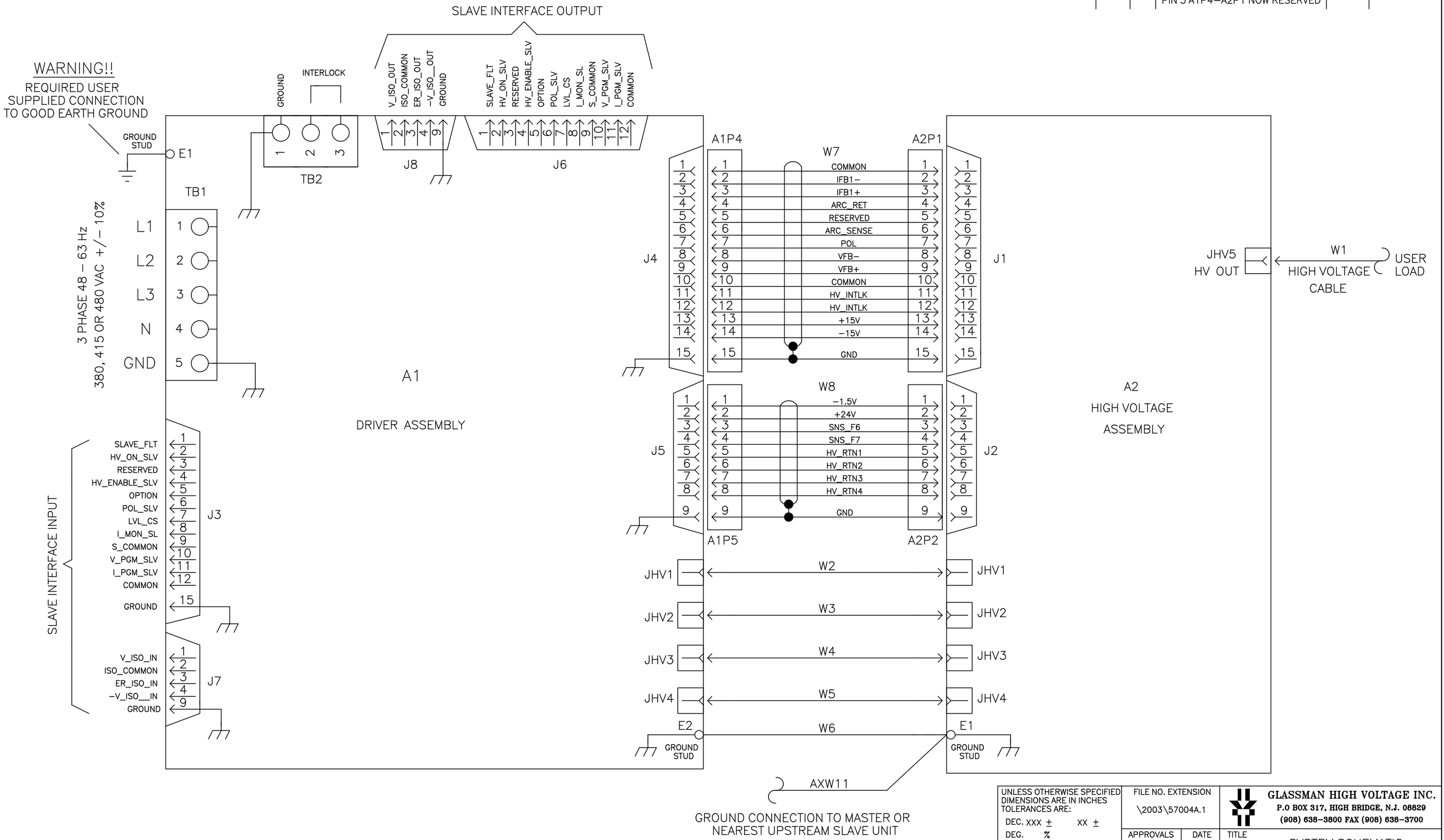


NOTES:

1 – TERMINATOR PLUG CONNECTED TO J6 ON "STAND ALONE" MASTER UNITS. CONNECTING PINS 1 TO 9 & 7 TO12.

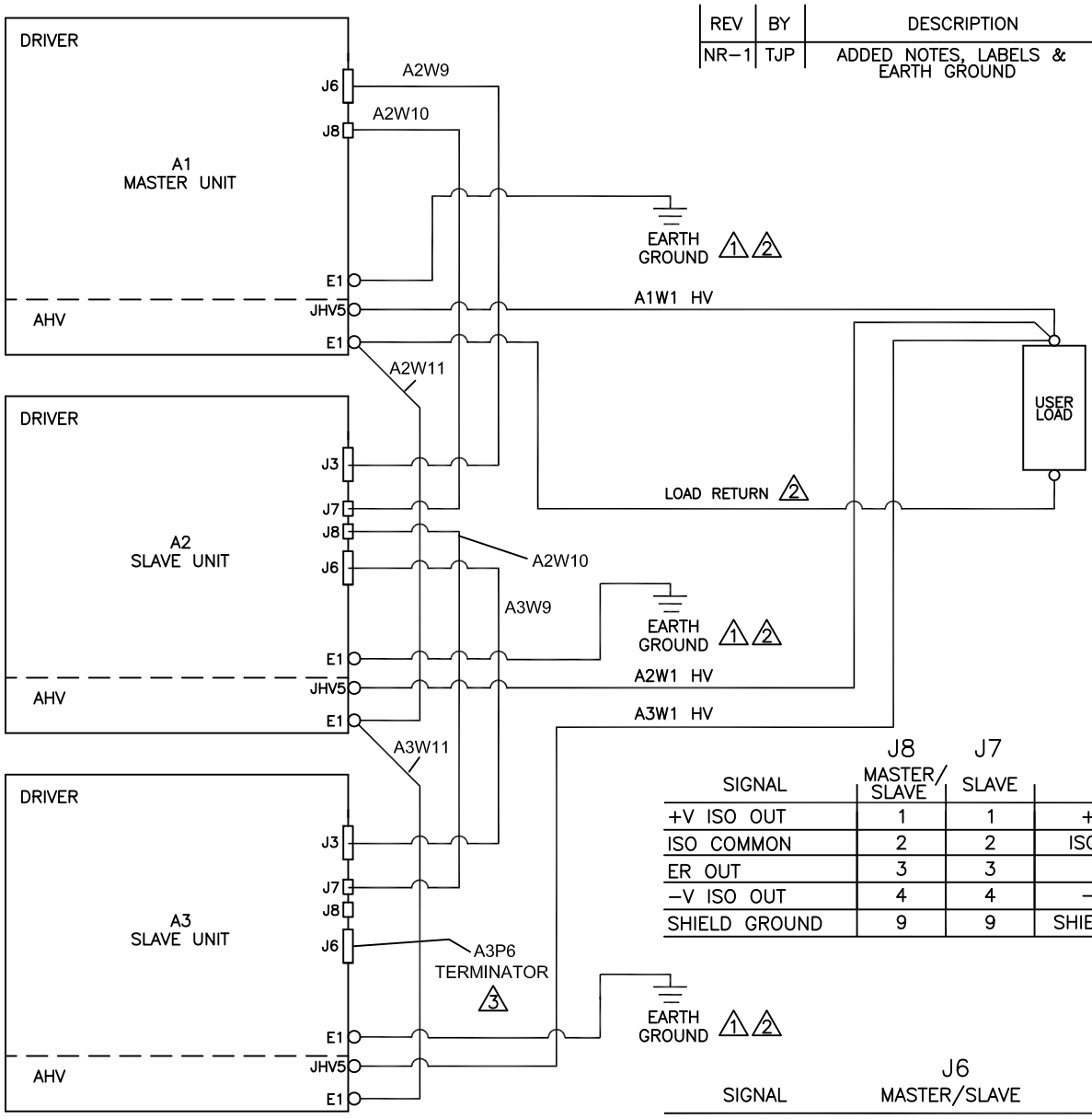
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: DEC. XXX ± XX ± DEG. %	FILE NO. EXTENSION \2003\57003A.1	GLASSMAN HIGH VOLTAGE INC. P.O BOX 317, HIGH BRIDGE, N.J. 08829 (908) 638–3800 FAX (908) 638–3700
USED WITH:	APPROVALS / DATE	TITLE: SYSTEM SCHEMATIC PS/GX, 5–30KV, MASTER
	DRAWN JAG 120718	
	CHECKED KLH 121018	
	RELEASED	
DO NOT SCALE DRAWING	USED WITH:	SIZE B · DWG NO 200357–003 · REV. A
		SCALE NONE · SHEET 1 OF 1

REV	BY	DESCRIPTION	DATE	APPROVED
A	BB	ECN11709: TITLE BLOCK CHANGE; PIN 5 A1P4–A2P1 NOW RESERVED	020720	



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: DEC. XXX ± XX ± DEG. %	FILE NO. EXTENSION \2003\57004A.1	GLASSMAN HIGH VOLTAGE INC. P.O BOX 317, HIGH BRIDGE, N.J. 08829 (908) 638–3800 FAX (908) 638–3700
USED WITH:	APPROVALS / DATE	TITLE: SYSTEM SCHEMATIC PS/GX, 5–30KV, SLAVE
	DRAWN JAG 120718	
	CHECKED KLH 121018	
	RELEASED	
DO NOT SCALE DRAWING	USED WITH:	SIZE B · DWG NO 200357–004 · REV. A
		SCALE NONE · SHEET 1 OF 1

REV	BY	DESCRIPTION	DATE	APPROVED
NR−1	TJP	ADDED NOTES, LABELS & EARTH GROUND	082316	



SIGNAL	J8 MASTER/SLAVE	J7 SLAVE	SIGNAL
+V ISO OUT	1	1	+V ISO IN
ISO COMMON	2	2	ISO COMMON
ER OUT	3	3	ER IN
−V ISO OUT	4	4	−V ISO IN
SHIELD GROUND	9	9	SHIELD GROUND

SIGNAL	J6 MASTER/SLAVE	J3 SLAVE
SLAVE FAULT	1	1
SLAVE HV ON	2	2
RESERVED	3	3
SLAVE HV ENABLE	4	4
OPTION	5	5
SLAVE POLARITY	6	6
LEVEL CS	7	7
SLAVE I MONITOR	8	8
COMMON	9	9
SLAVE V PROGRAM	10	10
SLAVE I PROGRAM	11	11
COMMON	12	12
NC	13	13
NC	14	14
SHIELD GROUND	NC	15

NOTES:

1. WARNING!! NEVER OPERATE THIS SYSTEM WITHOUT A GOOD EARTH GROUND CONNECTED AS SHOWN.

2. PROVIDED BY USER.

3. TERMINATOR IS A FEMALE PLUG WITH SOCKETS 1 & 9 AND 7 & 12 WIRED TOGETHER TO BE CONNECTED TO J6 OF THE LAST SLAVE UNIT OR MASTER UNIT FOR STAND ALONE OPERATION.

FILE NO. EXTENSION	
\1001\11001−1.DWG	
APPROVALS	DATE
DRAWN EJM	040616
CHECKED KJD	040616
RELEASED	

GLASSMAN HIGH VOLTAGE, INC.
P.O. BOX 317, HIGH BRIDGE, N.J. 08829
(908) 638−3800 FAX (908) 638−3700

TITLE
SYSTEM SCHEMATIC
GX MASTER/SLAVE

A	DWG.NO. 100111−001	REV. NR−1
SCALE NONE	SHEET 1 OF 1	