MICRO X-RAY INC.

HIGH-VOLTAGE POWER SUPPLY

50kV, 50W

*The **High Voltage Power Supply, 50kV, 50W** is an ultra-compact X-Ray generator that offers tight regulation, high stability, and low ripple. Take control with local and analog GUI to set beam voltage, emission current, and filament current limits.*

Features include:

- **50kV at 2mA, 50W Max.**
- **Adjustable ground isolated filament supply**
- **Overvoltage and short circuit protection**
- **Voltage and current programming**
- **Local and remote emission control**
- **Safety interlock**
- **RS-232, Ethernet, & USB standard**
- **Redundant HV Monitor Signal Available**

TYPICAL APPLICATIONS

This high voltage power supply features a 0 to 50kV. high voltage output at 2mA and is limited to 50W. It is designed to run grounded cathode X-Ray tubes. Contact MXR to determine if the X-Ray tube of interest can be powered by this power supply.

OPTIONS

XCC	XRM Compatible HV Cable (50kV Only)
5VPM	0 to 5V Programming and Monitor Scaling
GB	Grid Bias
GF	Grounded Filament
5302	Mammoflex HV Cable
2001	Mammoflex HV cable for XCC option

SPECIFICATIONS

Input	+24Vdc ±10%, 5.0A Max. for 50W units
Output	0-50kV, 0-2mA limited to 50W
Efficiency	75%, typical
Voltage Control	**Local:** Internal multi-turn potentiometer to set voltage from 0 to full output voltage **Remote:** 0 to +10Vdc=0 to 100% rated output voltage. *Accuracy: ±1%, Z_{IN}: 10Mohm*
Emission Control	**Local:** Internal potentiometer to set beam current between 0 to full output current. **Remote:** 0 to +10Vdc=0 to 100% rated output current. *Accuracy:* ±1%, *Z_{IN}: 10Mohm. Filament limit and preheat control capability provided.*
Voltage & Current Monitors	0 to +10Vdc=0 to 100% rated output *Accuracy: ±1%*
Redundant Voltage Monitor	A redundant high voltage feedback divider where 0 to +10Vdc = 0 to 100% rated output is available.
Stability	0.05% per 8 hours after ½ hour warm-up
Digital Interface	RS-232, Ethernet, USB
DC Filament Supply	Isolated filament power supply generates emission current feedback signal for accurate low X-Ray tube current performance. **Current:** 3.5A, adjustable limit **Voltage:** 5.0V, max. compliance
Environment	**Operational:** 0˚C to +50˚C **Storage:** -40˚C to +85˚C **Humidity:** 0% to 90%, non-condensing
Temperature Coefficient	0.01% per ˚C, voltage and current
Cooling	User provided forced air cooling is required
Dimensions	**50kV Unit:** 4.0”H x 2.87”W x 8.00”D (101.6mm x 72.95mm x 202.2mm) **XCC:** 4.0”H x 2.87”W x 9.00”D (101.6mm x 72.95mm x 228.6mm)
Weight	4.5lbs (2.1kg) typical
Regulatory Approvals	Compliant to EEC EMC Directive. Compliant to EEC Low Voltage Directive. RoHS Compliant. UL/CUL recognized, File E227588.

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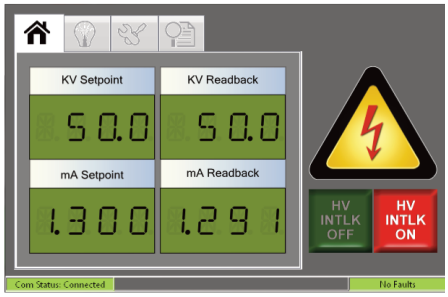
DIGITAL INTERFACE

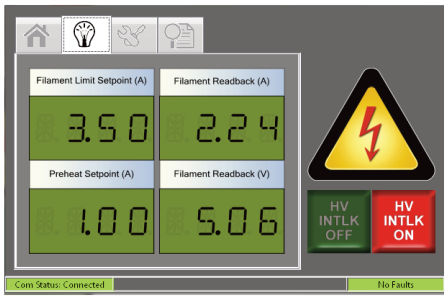
This high voltage power supply features a standard USB, RS-232 and Ethernet digital interface. Utilizing these standard digital interfaces can dramatically simplify power supply interfacing requirements, saving the user both time and money while enhancing functionality and overall capability. Micro X-Ray provides a GUI with the power supply that allows the customer to both customize operational features of the power supply while also providing basic power supply operational features. Details of the power supply's digital interface capability are described in detail in the manual.

DIGITAL INTERFACE CONNECTORS

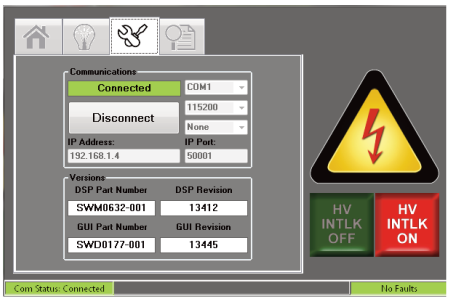
MAIN CONTROL SCREEN



FILAMENT STATUS SCREEN



COMMUNICATION SCREEN



GRID BIAS OPTION (GB)

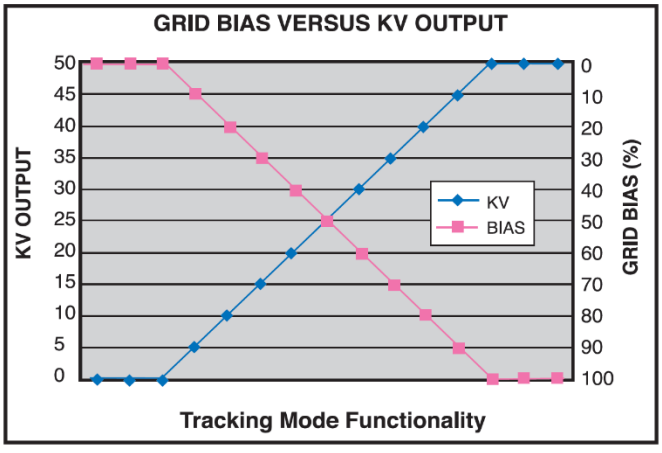
The Grid Bias Option for this high voltage power supply is specifically designed for popular commercially available grid bias X-Ray tubes. The Grid Bias voltage is developed via the use of a separate integrated high frequency switching circuit, providing maximum flexibility and control. The Grid Bias output is a voltage regulated, current compliant topology ideally suited for Wehnelt electrode applications. Arc and short circuit protection of the Grid Bias output prevents any damage due to transient events or installation errors.

TRACKING MODE OPERATION

Functioning in tracking mode the voltage monitor (0-10Vdc=0 to 50kV) of the main high voltage output is internally connected to the Grid Bias programming input (0-10Vdc=0 to -300Vdc of Grid Bias). Connected in this manner, the Grid Bias output will track in a linearly proportional fashion the setting of the main kV output.

A multiturn potentiometer limits the max. magnitude of Grid Bias output applied to the X-Ray tube, providing unparalleled flexibility.

The output of the Grid Bias option is provided via an auxiliary two position Pheonix Contact terminal block. Mating connector provided.



GRID BIAS SPECIFICATIONS

Output Voltage	0 to -300Vdc
Output Current	0.25mA max.
Load Regulation	1% of output voltage, no load to full load
Line Regulation	1% for a ±10% change in input voltage
Ripple	1% of maximum rated voltage

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HIGH VOLTAGE OUTPUT CONNECTOR

Drywell type detachable connector: 50kV, 7.25in and 50kV XCC, 8.25in.

POWER INPUT CONNECTOR

PIN	SIGNAL	PARAMETER
1	**+24V Input**	+24V at 5A, Max.
2	**+24V Return (Gnd.)**	Power Ground

FILAMENT CONNECTOR

PIN	SIGNAL	PARAMETER
1	**Filament Out**	0.3A to 3.5A, 5V max.
2	**Filament Return**	Filament Return

Note: GF (Grounded Filament) option.

ANALOG INTERFACE CONNECTOR

MALE 15 PIN MINI "D"

PIN	SIGNAL	PARAMETER
1	**Monitor Return**	Signal Ground
2	**Voltage Monitor**	0-10V=0 to full scale, Z_{OUT}=1KΩ
3	**Current Monitor**	0-10V=0 to full scale, Z_{OUT}=1KΩ
4	**Interlock Output**	Connect 12V HVON bulb to pin 15 to enable
5	**+10 Volt Reference**	+10V at 1mA, max
6	**Filament Monitor**	1V=1amp, Z_{OUT}=1KΩ
7	**Voltage Program Input**	0-10 volts=0 to full scale, Z_{IN}=10MΩ
8	**Local Voltage Program***	0-10V, screwdriver adjust
9	**Filament Limit Setpoint***	1V=1A, screwdriver adjust
10	**Current Program Input**	0-10V=0 to full scale, Z_{IN}=10MΩ
11	**Local Current Program***	10 turn pot, screwdriver adjust
12	**Not used (+24 out for interlock)**	(Optional interlock configuration)
13	**Not used (Interlock Coil)**	(Optional interlock configuration)
14	**Filament Preheat Setpoint***	1V=1A, screwdriver adjust
15	**Interlock Return**	Interlock Ground

** Denotes 10 turn potentiometer accessible through holes in cover.*

GRID BIAS CONNECTOR

2 PIN PHOENIX CONTACT

PIN	SIGNAL	PARAMETER
1	**Ground**	Chassis Ground
2	**Grid Bias**	0 to -300Vdc

USB DIGITAL INTERFACE

4 PIN USB "B" CONNECTOR

PIN	SIGNAL	PARAMETER
1	**VBUS**	+5 Vdc
2	**D-**	Data -
3	**D+**	Data +
4	**GND**	Ground

ETHERNET DIGITAL INTERFACE

8 PIN RJ45 CONNECTOR

PIN	SIGNAL	PARAMETER
1	**TX+**	Transmit Data +
2	**TX-**	Transmit Data -
3	**RX+**	Receive Data +
4	**NC**	No Connection
5	**NC**	No Connection
6	**RX-**	Receive Data -
7	**NC**	No Connection
8	**NC**	No Connection

RS-232 DIGITAL INTERFACE

9 PIN FEMALE D CONNECTOR

PIN	SIGNAL	PARAMETER
1	**NC**	No Connection
2	**TX out**	Transmit Data
3	**RX in**	Receive Data
4	**NC**	No Connection
5	**SGND**	Ground
6	**NC**	No Connection
7	**NC**	No Connection
8	**Voltage Monitor 2**	0-10V=0 to full scale, Z_{OUT}=1KΩ
9	**Power supply OK**	+15V=OK 0V=Fault, Sink/Source 3mA max.

RoHS CE c US

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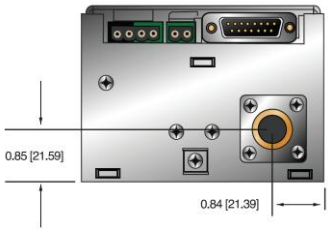
50kV UNIT

DIMENSIONS: in.[mm]

FRONT



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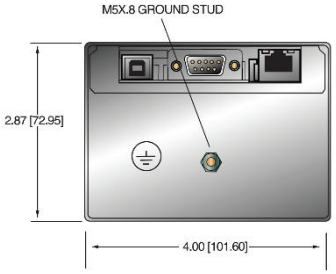
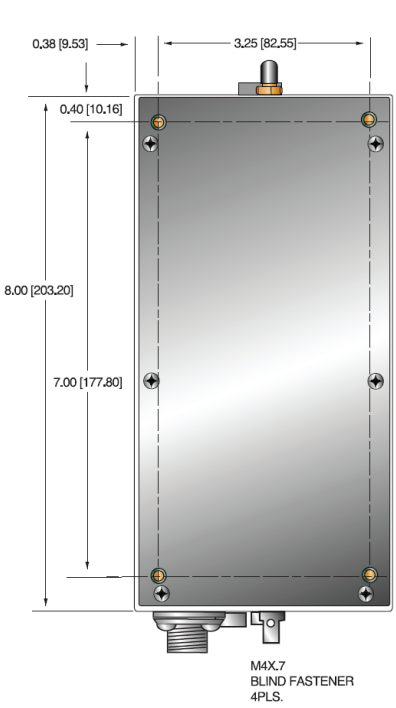
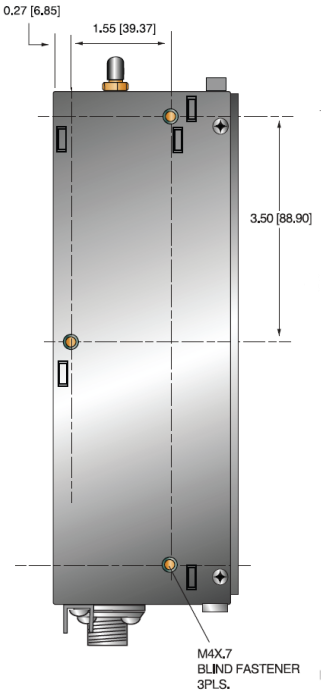


BOTTOM



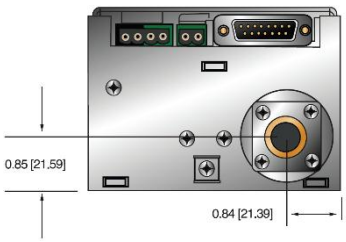
SIDE



50kV UNIT WITH XCC

DIMENSIONS: in.[mm]

FRONT



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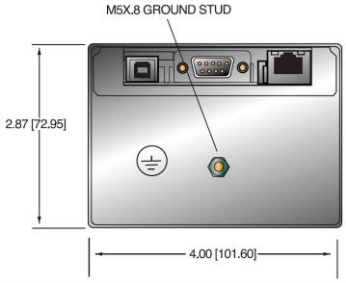

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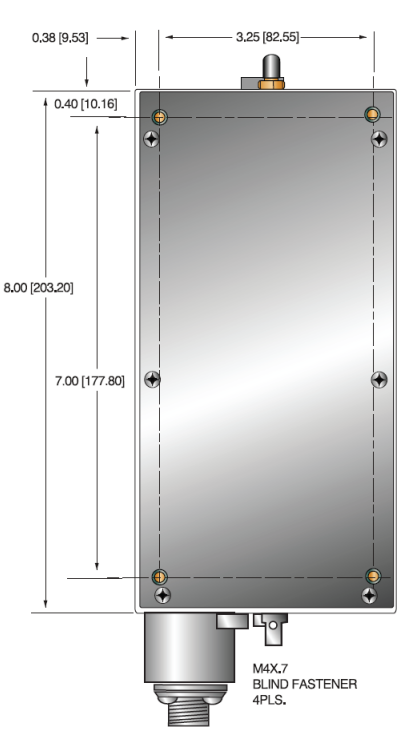

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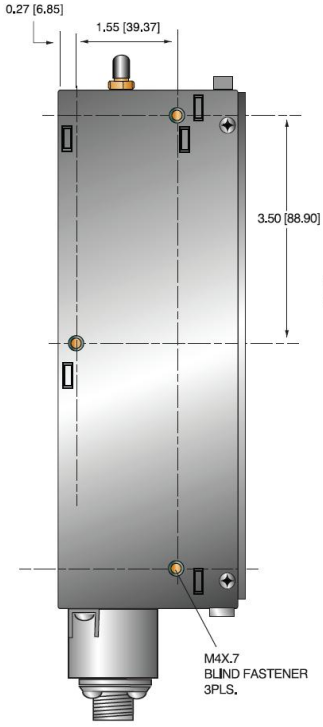

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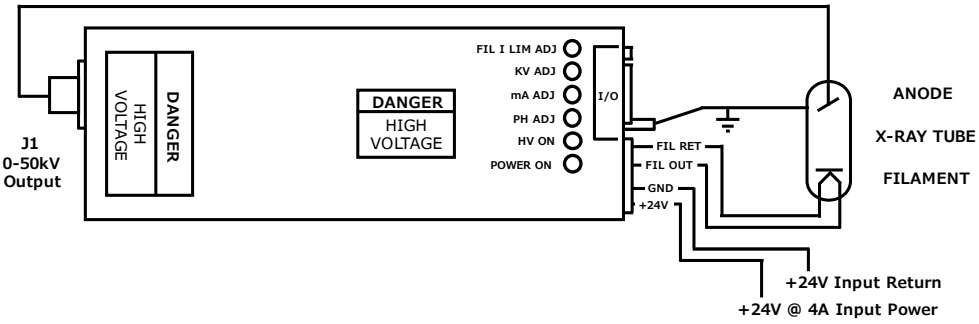
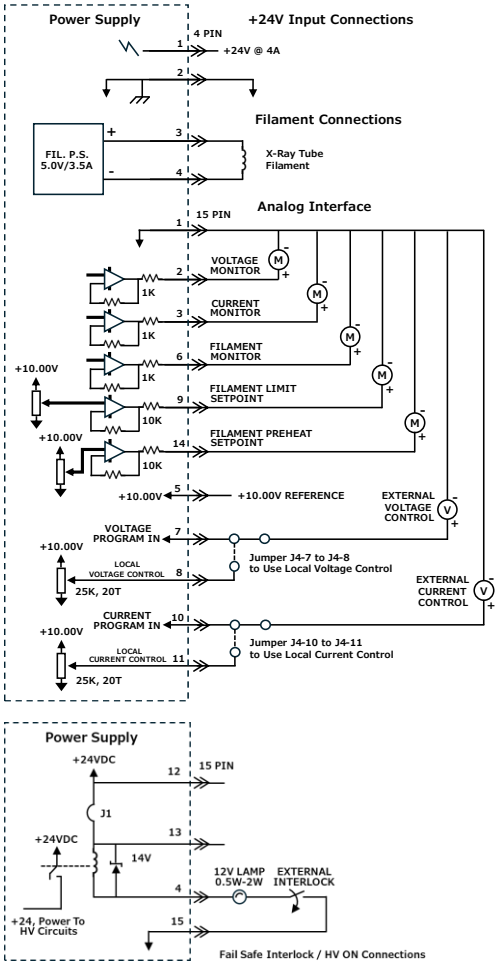
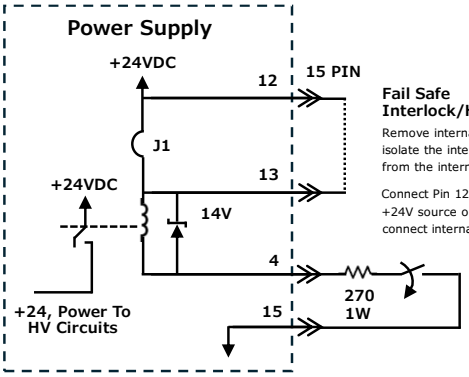


TYPICAL OPERATING SETUP



ALTERNATE INTERLOCK CONFIG.



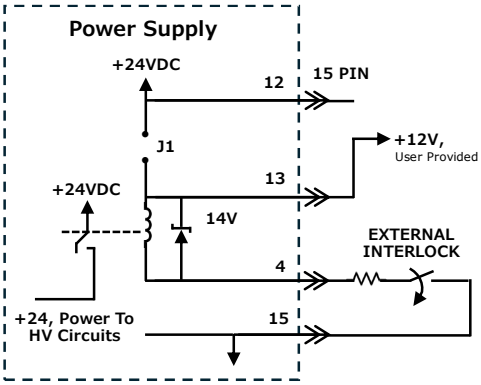
Fail Safe Interlock/HV ON:

Remove internal jumper J1 to isolate the interlock relay coil+ from the internal +24V.

Connect Pin 12 to an external +24V source or to Pin 12 to re-connect internal +24V.

Alternate Interlock Configuration:

Fail Safe Lamp replaced with a 270Ω (ohm) Resistor



Alternate Interlock Configuration:

Customer Provided +12V for HV ON Relay, Relay Return Grounded

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