
NE-4 AND NE-6 E-BEAM GUN SWITCHING POWER SUPPLY

INSTRUCTION MANUAL

Version 2.11



NILES ELECTRONICS

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OVERVIEW

SYSTEM COMPONENTS

The **Electron Beam (E-Beam) Gun Power Supply** is a direct current, regulated constant high voltage power supply. It is produced only as a one-gun version. Intended for use with E-Beam guns, it is compatible with E-Beam guns using electromagnetic deflection or combinations of electromagnetic deflection and permanent magnet focusing.

The **E-Beam Gun Power Supply** consists of the following components:

- Power Module with two power cords attached
- High Voltage Module with a 15 ft HV coaxial cable attached
- Control Module
- Sweep Module
- Rack Assembly for Power and High Voltage Modules

A system of safety interlock functions protects both the operator and the equipment.

LIST OF ACCESSORIES

The following accessories will be included with the shipment of the **E-Beam Gun Power Supply**:

One filament transformer
One B+ connection cable
One 22" 7-pin cable

One 66" 7-pin cable

One 66" ribbon cable **

One Instruction Manual (the one you are reading)

****Do not replace the ribbon cable with round computer cable nor with a longer cable. Doing so will cause interference amongst wires.**

NOTE: Niles Electronics Inc. accommodates a filament transformer, since April 2005, with each power supply. The filament resistance, at room temperature, should not be less than 5 mOhms (5 thousandth Ohms). Too low filament resistance will trigger the “breaker fast-response sensor” circuitry. If the mentioned sensor is triggered, the breaker indicator LED goes off while the breaker does not pop out. The user can reset the indicator LED by pushing the “emission off” button. However, the problem cannot be solved until the filament resistance is corrected. Should any customer have questions regarding to this issue, please do not hesitate to contact Niles Electronics Inc.

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SPECIFICATIONS

OVERALL SPECIFICATIONS

Input Voltage for Control:

US: 208 Volts, single phase, 60 Hz, 3 Amps

Europe: 230 Volts, single phase, 50 Hz, 3 Amps

Input Voltage for Power:

US: 208 Volts, 3-phase, 60 Hz

Europe: 230 Volts, 3-phase, 50 Hz

US & Europe: 20 Amps for NE-4, 30 Amps for NE-6

Maximum output power:

4 KW for the NE-4 model

6 KW for the NE-6 model

High voltage range: from -3 kV to -10 kV (adjustable)

Maximum emission current:

0.4 Amps for NE-4

0.6 Amps for NE-6

Ripple: less than 150 Volts p-p

OUTPUT FOR FILAMENT TRANSFORMER PRIMARY COIL

Voltage: US: 0-208 Volts, single-phase, 60 Hz

Europe: 0-230 Volts, single-phase, 50 Hz

Primary Control: SCR pulse width control

Maximum Current: 2.0 Amps

Insulation rating required for Filament Transformer (Secondary to Primary and Core): 20 kV DC minimum

DIMENSIONS AND WEIGHT

Control	Sweep	Power	High Voltage
19" wide (full rack)	19" wide (full rack)	half-rack wide	half-rack wide
3.5" high (2U)	3.5" high (2U)	10.5" high (6U)	10.5" high (6U)
12.2" case depth	12.2" case depth	18.5" case depth	18.5" case depth
15" deep including connectors and knobs	14" deep including connectors and knobs	24" deep including strain relief	22" deep including strain relief
10 lbs	12 lbs	41 lbs	41 lbs

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INSTALLATION

SAFETY PRECAUTIONS

DANGER – HIGH VOLTAGE

High, potentially lethal, voltage is present within this equipment and at end of the high voltage cable. Great care must always be exercised when working with this equipment. Only qualified and properly trained personnel may test or work with this equipment.

All connections must be made with the power cords unplugged from their sources, or with the power turned OFF at the source (not just on the equipment). Work should not be carried out in cramped and/or cluttered areas.

INTRODUCTION

The E-Beam Gun Power Supply is designed to be mounted in a standard 19-inch rack cabinet. The complete installation comprises the following aspects:

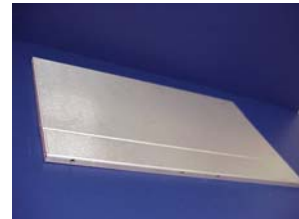
- Rack Assembly
- Cable Connections Between Modules
- Filament Transformer Connection
- High Voltage Cable Connection
- System Grounding
- Interlock Connections
- Remote Control Connections

Both the Power and the High Voltage Modules are half-rack wide and are to be mounted in the rack assembly, which can be placed in a 19-inch rack. There should be ample clearance on both the front and rear panels of these two modules to allow for proper airflow. If desired, it is allowable to place these two modules in the lower part of the 19" rack in order to preserve easier-to-reach space for other modules. The cables connecting the Control Module and the High Voltage Module are 66" long to allow for such usage. However, separating these two Modules by distances longer than 66" will impair the Power Supply's function.

RACK ASSEMBLY

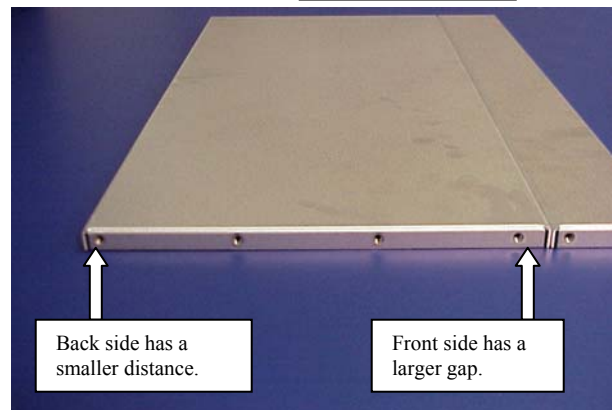
NOTE: Leaving the bolts slightly loose until all of the bolts are in position will make minor adjustments easier to make. Drive all of the bolts tight with a 10 lb-in torque at the end.

1. Place BRKT-P2 open side downwards with FEX nuts facing forward. NOTE: This piece looks very similar to BRKT-P1. It is important not to confuse the two. BRKT-P1 has notches in the front and the back while BRKT-P2 doesn't.



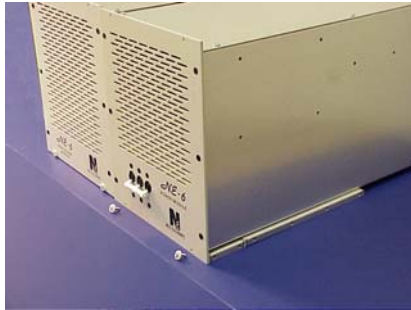
Steps 1&2

2. Place BRKT-P3 open side downwards directly behind BRKT-P2 so that the FEX nuts are on the sides. NOTE: Orientation of this piece is important. The front side should be labeled. If there is no label, the front is distinguished from the rear by the following: On the sides, the distance between the ends and the first FEX nut is unequal in the front and the back. The front side has a longer distance between the edge and the FEX nut than the back side.



3. Looking at the assembly from the front, line up the High Voltage Module on top of BRKT-P2 and BRKT-P3 in the FRONT, LEFT corner. The front panel of the HV Module should hang over the two bottom pieces.

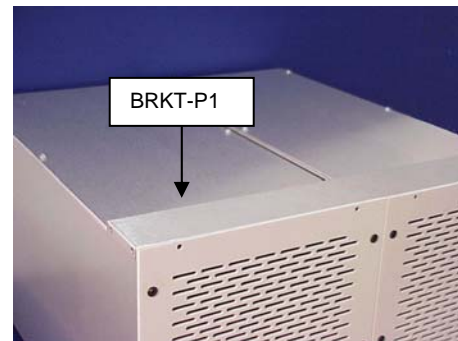
4. Line up the two bottom holes in the front panel to the holes in BRKT-P2. Screw in two ½" bolts with nylon washers, attaching these two pieces together.



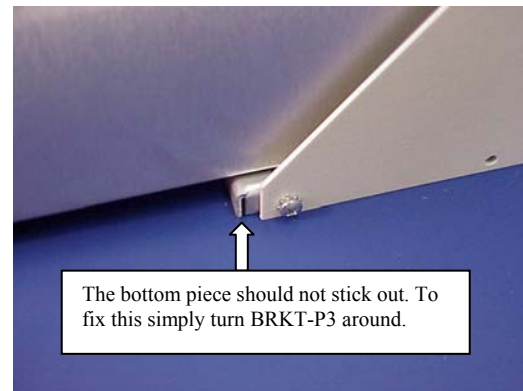
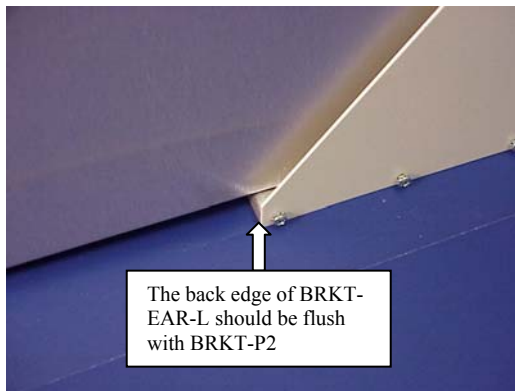
5. Place the Power Module to the right of the HV Module so that it is lined up in the FRONT, RIGHT corner of the two bottom pieces.

6. Line up the two bottom holes in the front panel of the Power Module to the holes in BRKT-P2. Screw in two ½" bolts with nylon washers, attaching these two pieces together.

7. Place BRKT-P1 on top of the two Modules directly behind the front panels with the FEX nuts facing forward and the open side facing downwards. The notches in this piece enable the Modules to slide right out of the Rack Assembly from the front without disassembling the Rack. Line up the four holes in the front panels with the four holes in BRKT-P1 and screw in four ½" bolts with nylon washers.



8. Place BRKT-EAR-L to the left of the HV module with the six FEX nuts lined up with the holes in BRKT-P2 and BRKT-P3. The slanted edge should be going downwards towards the back, and the front flap should bend to the left away from the modules. The back edge of BRKT-EAR-L should be flush with the back of BRKT-P2. If it is not, there is a gap between the two bottom pieces that bolts will catch on when sliding out Modules from the Rack Assembly in the future.



9. Screw in six 3/8" bolts with spring lock washers, affixing BRKT-EAR-L to BRKT-P2 and BRKT-P3 (the two bottom pieces.)
10. Screw in two 3/8" bolts with spring lock washers, affixing BRKT-EAR-L to BRKT-P1 (the top piece.)
11. Place BRKT-EAR-R to the right of the power module. This should look symmetrical to the left side, with the front flap bending to the right away from the modules.
12. Screw in six 3/8" bolts with spring lock washers, affixing BRKT-EAR-R to BRKT-P2 and BRKT-P3 (the two bottom pieces.)
13. Screw in two 3/8" bolts with spring lock washers, affixing BRKT-EAR-R to BRKT-P1 (the top piece.)



The completed Rack

Once assembled, the Rack Assembly will fit easily into a standard 19" rack. It is designed with the ease of Module removal in mind. To remove a Module, simply remove the four front bolts and slide the Module out from the front of the Rack Assembly. Scratching along the bottom pieces is part of normal wear.

CABLE CONNECTIONS BETWEEN MODULES



The connections are also labeled on the rear panels of the Modules.

FILAMENT TRANSFORMER CONNECTION

The core of the Filament Transformer must be connected to the Tank ground. It is advisable to remove the paint/varnish from a small area around the mounting holes of the Transformer and the frame. The mounting bolts themselves will establish a proper ground connection. As a result, the Transformer Core and the Ground Shield will have the same potential as the Ground during normal operation. The Filament Transformer Primary must be connected to the Output at the rear panel of the Control Module. A 3.0 Amp Thermo Breaker is used for over current protection. Use of AWG16 Wire is recommended for the Filament Transformer Primary Coil connections.

HIGH VOLTAGE CABLE CONNECTION

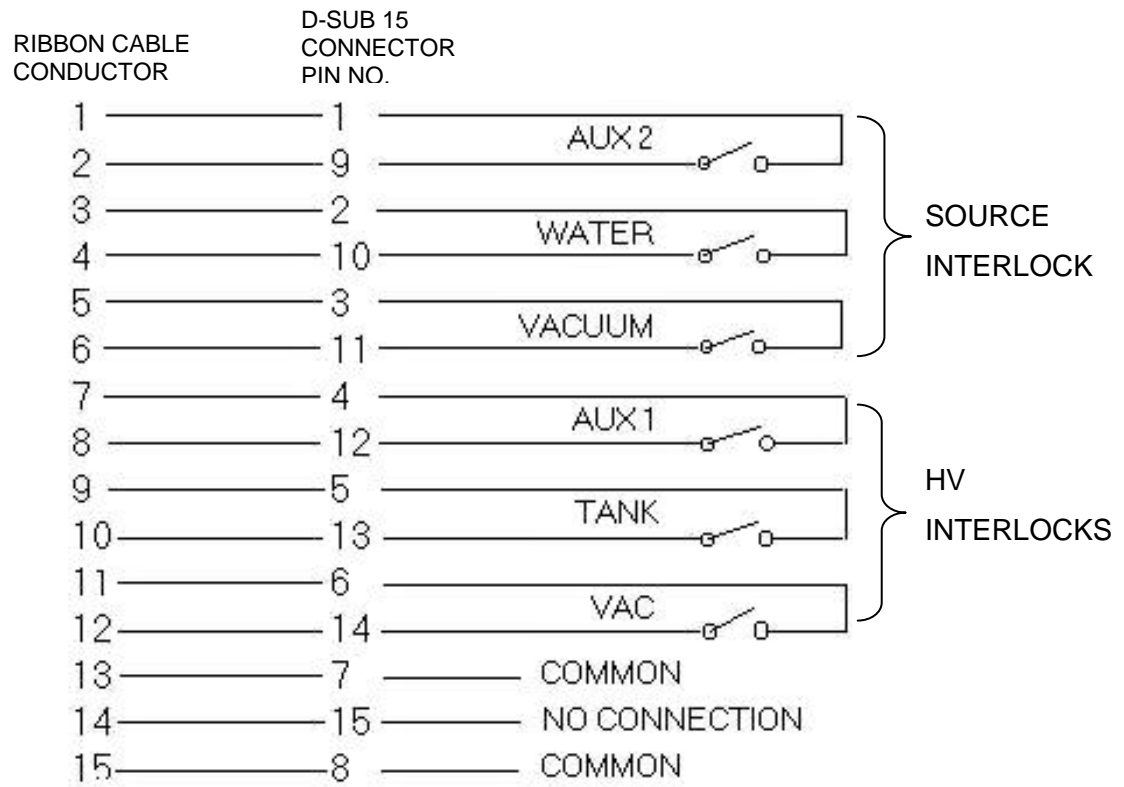
The High Voltage connection is made with RG 213/U Cable. Shipment of the **E-Beam Gun Power Supply** will include a High Voltage Coaxial Cable in our standard length of approximately 15 feet. The center conductor of this Coaxial Cable is the High Voltage Output and should be connected to the Secondary Winding of the Filament Transformer. The Copper Braided Shield should be connected to the Ground of the Vacuum Tank, as described in *Filament Transformer Connections* (see the section above).

SYSTEM GROUNDING

Each of the four Modules has a Module Ground Stud. Connections should be made as follows:

1. Connect the Control Module Ground Stud to the High Voltage Module Ground stud.
2. Connect the High Voltage Module Ground Stud to the Power Module Ground Stud.
3. Connect the Power Module Ground Stud to the System Ground Stud.
4. Connect the Sweep Ground Stud to the Vacuum Tank Ground.

INTERLOCK CONNECTIONS



The external interlocks are connected to the Power Supply and their installation is described below.

WARNING

All statements pertaining to operator and equipment safety apply only if the external interlocks are installed as specified below and only if the operator does not disable the safety features, inherent in the interlocks, by bypassing the switches. Although these interlocks are designed to protect both operator and equipment, extra care and good judgment should always be exercised when operating High Voltage equipment. It is conceivable that, under certain circumstances, an interlock could fail and hence, the interlocks should never be solely relied upon to provide 100% safety at all times.

HIGH VOLTAGE INTERLOCKS

The **E-Beam Gun Power Supply** has two groups of interlock connections: one for the High Voltage and another for the Emission Current (Source Current). The High Voltage has the following interlocks:

- Air
- Vacuum
- Tank High Voltage Access
- Auxiliary 1

AIR INTERLOCK

Designed to detect when the equipment is overheating, both the Air Interlock light and the High Voltage will shut off should the temperature become too high. This happens when there is not sufficient fresh air in the system. **In the event that this occurs, check the airflow of the High Voltage Module.** It is recommended, however, that the equipment not be turned off because the system fan will drop the temperature of the equipment more rapidly. Pushing the HV “OFF” button again will reset the Air

Interlock switch automatically if the temperature has dropped sufficiently. **The light of the Air Interlock will come back on only if the reset has been successful.**

VACUUM INTERLOCK

A vacuum switch should be installed on the Tank so that it closes whenever there is enough vacuum inside the Tank.

TANK HIGH VOLTAGE ACCESS INTERLOCK

When these interlocks are installed, the switches on the doors and high voltage panels will normally remain open. They will be closed only when the doors of the chamber and all panels are in place. These interlocks should be closed only when there is no possible chance of coming into contact with high voltage.

AUXILIARY INTERLOCK 1

This interlock is provided to enable the user to insert additional interlocks, such as emergency off pushbuttons, crucible rotation interlocks, etc. If more than one interlock is required, simply connect the interlock switches in series.

EMISSION INTERLOCKS

The interlocks for the Emission Current are:

- Breaker
- HVAC
- Water
- Auxiliary 2

BREAKER

This Thermo Breaker works in series with the Filament Transformer Primary Winding. If the Filament Transformer is overloaded (which could result from the Secondary Winding being in short circuitry), the Breaker will pop out and its LED indicator will turn off. To reset, simply push the Breaker back into place, then push the Source “OFF” button to turn the LED indicator back on. **NOTE: The LED will light only if the Breaker is pushed in.** After resetting, the emission can be turned back on by pushing the Source “ON” button. However, if the Breaker pops out again, which will turn off the Breaker LED indicator, there is a problem that needs attention. At

such point, an inspection of the circuitry of the Filament Transformer and/or the Filament circuitry is required before operations can be resumed.

HVAC

The purpose of this interlock is to ensure that sufficient vacuum is present inside the Tank before the source can be energized. Normally, this level of vacuum is the same for the level required to energize the vacuum gauge filaments.

WATER

A water flow switch should be installed in the return line of the cooling system for the E-BEAM GUN. This switch should close automatically once there is sufficient water flow to cool the Gun and associated shields.

AUXILIARY 2

This interlock is provided to enable the user to insert additional interlocks.

REMOTE CONTROL CONNECTIONS

D-SUB 37 REMOTE CONTROL SIGNAL LIST (CAN BE DIVIDED INTO TWO 15 CONDUCTOR RIBBON CABLES AND CONNECTED TO TWO D-SUB 15 CONNECTORS)

HAND HELD		PLC		FUNCTION DESCRIPTION	
Ribbon Cable Conductor No.	D-SUB 37 Pin No.	Ribbon Cable Conductor No.	D-Sub 37 Pin No.	Signal Direction	(Digital High = +12V Digital Low = 0V) All output signals have 1 K Ω Resistor in series
1	1	21	11		Ground for Digital Signals
2	20	22	30	OUT	Is this remote control activated? H=YES L=NO
3	2	23	12	OUT	Are all HV Interlocks OK? H=YES L=NO
4	21	24	31	OUT	Are all Emission Current Interlocks OK? H=YES L=NO
5	3	25	13	IN	HV ON/OFF Control Signal **
6	22	26	32	IN	Emission Current ON/OFF Control **
7	4	27	14	OUT	Analog Control Reference Voltage $V_{REF} = 5.3 \sim 5.6V$ *
8	23	28	33	IN	Non-Inverting Input for HV *** ^
9	5	29	15	IN	Inverting Input for HV *** ^
10	24	30	34	IN	Non-Inverting Input for Emission Current ***
11	6	31	16	IN	Inverting Input for Emission Current ***
12	25	32	35		Ground for Analog Signals
13	7	33	17	OUT	HV Reading +5V represents 10KV
14	26	34	36	OUT	Emission Current Reading -3V Represents 600mA
15	8	35	18	IN	GND-Ribbon Cable in use. OPEN-No Connection ****
16	27	36	37		NOT USED
17	9	37	19		NOT USED
18	28				NOT USED
19	10				NOT USED
20	29				NOT USED

* This Voltage is mainly for hand-held unit use. It can supply enough current for only the remote control. Do not use this voltage for other purposes.

** The High Voltage is turned on by the Low to High edge of the ON/OFF Control Signal. 5V is enough for the High State, but do not input more than 12V. During the time that the ON/OFF Control Signal stays high, the front panel ON/OFF push buttons also gain control of the ON/OFF operation for safety reasons. The High Voltage is turned off by the Low State of its ON/OFF Control Signal. During the time that this Signal stays low, the front panel “ON” button cannot turn on the High Voltage. These statements are also true of the Emission Current.



*** Both the High Voltage and Emission Current take differential inputs. Each Input Terminal for Hand-Held signals have a 10 K Ω input resistance, while each Input Terminal for PLC signals have a 20 K Ω resistance. The different input resistances match the maximum voltages of the Hand-Held unit and the PLC, which are 5V and 10V respectively.

**** This pin needs to be connected to the Digital Ground at the Remote Control Unit. The Remote Control Unit cannot gain control if this fails to be done, even if it is connected to, and selected on the Control Module. This is an important safety feature to ensure that the Power Supply has a control source at all times.

^ Most customers prefer a high voltage that is adjustable only from the front panel of the Control Module. However, customers can still have the choice of a remotely adjustable high voltage by performing the following steps:

1. Take off the top lid of the Control Module.
2. On the PCB that is labeled "P20X", where "X" can be any alphabet, look for the two jumpers located next to two orange-colored relays.
3. The HV Adjust Variable Resistor on the front panel has sole control over the high voltage, even if the Remote Control is selected, when the two jumpers each contacts a center pin as well as a pin on the 6-pin DIP Header closest to the label "R75" on the PCB. This is where the two jumpers are located at the time of shipment from Niles Electronics. Moving the jumpers so that each contacts a center pin and a pin closest to the label "R78" on the other side of the 6-pin DIP Header will give the user the option of adjusting the high voltage from the Remote Control Unit when the Remote is selected. Be sure that the two jumpers are together, so that both are either closest to "R75" or to "R78."

4

POWER MODULE



Main Switch:

This is a Magnetic Hydraulic Circuit Breaker. Flipping it upwards will turn on the 3-phase, but not the single phase, power for the entire unit. Flipping it downwards turns it off.

The single phase power does not go through this breaker. (For detailed information please see Chapter 6.)

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HIGH VOLTAGE MODULE



There are no controls that can be touched on the front panel of the High Voltage Module. The output connection is to be made on the back panel. Please note that the NE-4 and the NE-6 models have different power ratings (4 KW and 6 KW, respectively) but are otherwise identical in outward appearance and in operation of these modules.

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CONTROL MODULE



FUNCTIONS

The front panel of the Control Module's consists of four distinct functions which are clearly labeled at the top of each section. They are, from left to right:

- Main Power
- High Voltage
- Output Power & Control Source
- Emission Current

MAIN POWER

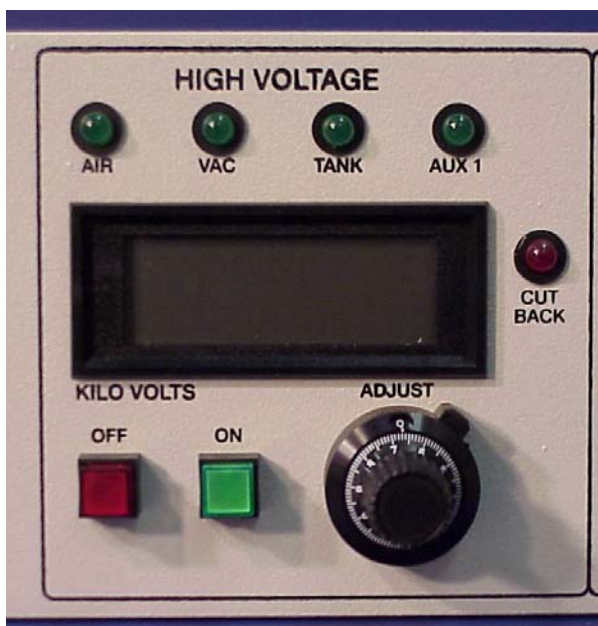


The Main Power has a Key Lock that prevents unauthorized access to the Power Supply. The OFF button lights red after the Key Lock is turned on. The ON push button lights green when the main power is on. If the Key Lock is turned off, no lights will be lit.

WARNING

This does not mean there is no voltage inside the Modules.

HIGH VOLTAGE



The High Voltage Interlock Indicator Lights, from left to right, are:

- AIR: Temperature inside HV Module
- VAC: Vacuum
- TANK: Tank High Voltage Access
- AUX 1: Auxiliary External Interlocks

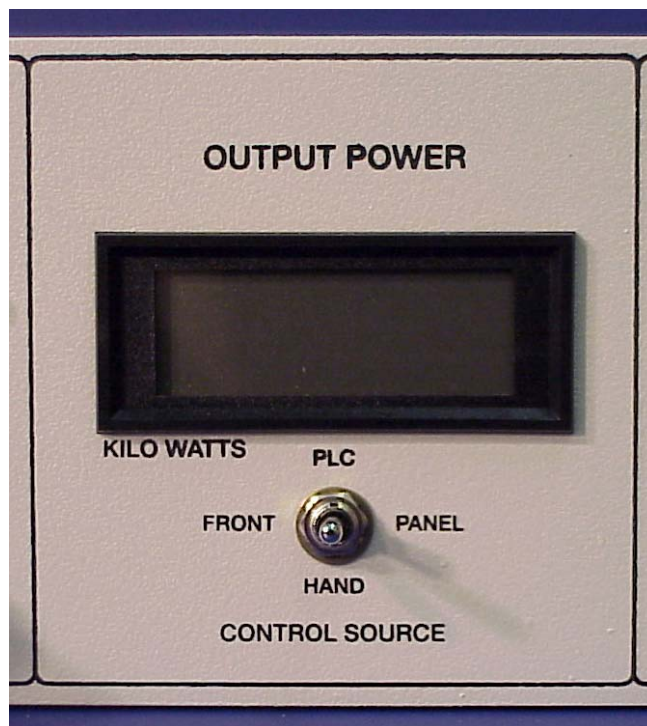
The Interlock LED Indicators (Air, VAC, Tank, Aux 1) light when the conditions these LEDs reflect are correct for operation of the system. (For greater detail of these Interlocks, please see

Chapter 3 – Interlock Connections.)

The Voltage Adjust Variable Resistor (labeled ADJUST on the panel) is located at the lower right of the High Voltage control group and is used to set the output voltage. The digital meter at the center of the High Voltage control group displays measured High Voltage.

Each flash of the Cut Back LED indicates the occurrence of arcing inside the Vacuum Chamber under normal operation. Since the Power Supply is designed to handle arcing quite well, the user may not notice its occurrence without the Cut Back LED. During an arc, the Power Supply is designed to cut the high voltage to 0V for about 20 milliseconds before recovering to full voltage. Consequently, the Voltage Meter will dip, giving apparently random readings. If arcing continues, the Voltage Meter will not give a steady reading and the Cut Back LED will continue flashing.

OUTPUT POWER & CONTROL SOURCE

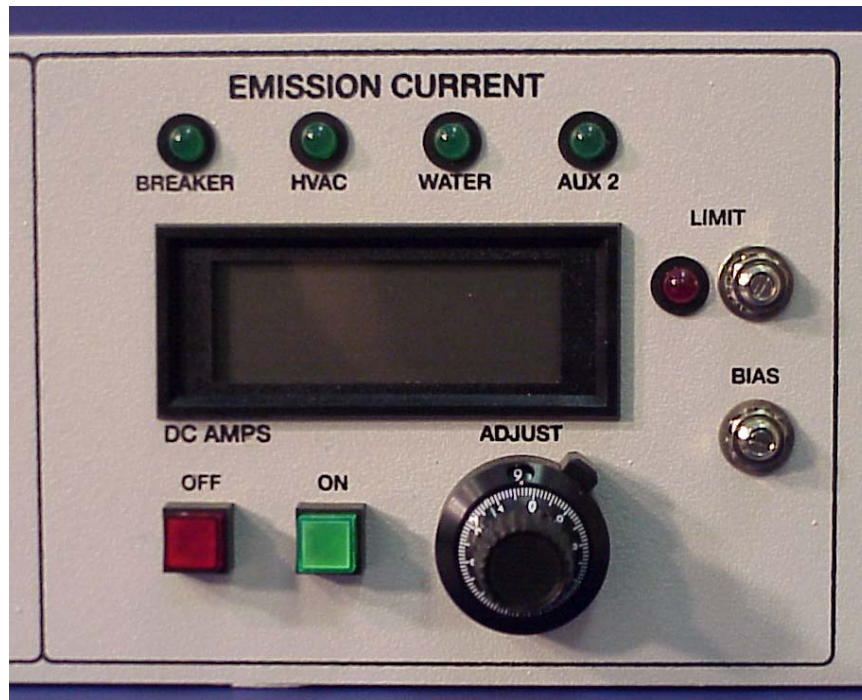


The digital meter at the center of the panel displays the output power.

The Control Source Switch, located below the power meter, has three settings to select the source from which the High Voltage and Emission Current will be controlled.

- PLC : automatic control
- FRONT PANEL: controlled by the Front Panel
- HAND: manual control via the Hand-Held Remote Control

EMISSION CURRENT



The Emission Current Interlock Indicator Lights, from left to right, are:

- BREAKER: Breaker Overload
- HVAC: High Vacuum
- WATER: Water
- AUX 2: Auxiliary Interlock 2

(The function of these Interlock Switches have been described in detail in Chapter 3 – Interlock Connections.)

The ON/OFF function is provided by the two pushbuttons at the lower left of the Emission Current section. . The OFF button lights red when the Source Filament is OFF. The ON button lights green when the Source Filament is ON.

The Limit Semi-Variable Resistor is used to limit the emission current by limiting the SCR turn-on angle. Since the line voltage is also a factor of the SCR output power, simply setting the Limit Semi-Variable Resistor will not definitively set the limit for maximum emission. If the line voltage changes, the Limit Semi-Variable Resistor will need to be adjusted accordingly.

The Limit LED indicates whether or not emission is being limited by the limit Semi-Variable Resistor. If the light is on, emission is being limited.

The BIAS Semi-Variable Resistor is used to calibrate the Adjust Variable Resistor so that a setting of zero on the Adjust Variable Resistor is the point just before the emission current comes on.

The Emission Current Variable Resistor (labeled ADJUST on the front panel) is used to set the desired value of emission current.

The digital meter at the center of the EMISSION CURRENT displays measured emission current.

OPERATION OF THE CONTROL MODULE

PRELIMINARY PRECAUTIONS

Prior to turning the system on for the first time, it is essential that the following conditions be ascertained:

The system has been installed correctly (see Chapter 3 Installation).

The Vacuum Tank is operational.

The Filament Transformer is installed according to specifications and is not shorted to ground.

The E-Beam gun has material in its crucible.

INITIAL TURN ON

1. Turn on the KEYLOCK.
2. Observe the Interlock lights. All the Interlock lights should be on. If any of these lights are not illuminated, this means that at least one of the Interlocks is open. These Interlock must be identified and properly remedied.
3. Wait at least five seconds.
4. Turn on the High Voltage by pressing the “ON” pushbutton.

5. Turn the “ADJUST” Variable Resistor Knob to the desired voltage. High Voltage will now be applied to the E-Beam gun.
6. Turn on the E-Beam source by depressing the “ON” pushbutton of the EMISSION CURRENT.
7. Slowly adjust the BIAS Variable Resistor of the EMISSION CURRENT until a small amount of emission current is evident. Check the E-Beam gun crucible for a beam.

TURN OFF

1. Reduce the ADJUST Variable Resistor of the EMISSION CURRENT to zero. If the indicated emission does not go to zero, the BIAS setting is too high and should be reduced before reducing the ADJUST Variable Resistor to zero.
2. Turn off the source filament power by depressing the OFF pushbutton of the EMISSION CURRENT.
3. Turn off the High Voltage by depressing the OFF pushbutton on the HIGH VOLTAGE. The indicated voltage reading will go to zero.
4. Press the red “OFF” in the MAIN POWER section.
5. Turn off the KEYLOCK.
6. Flip the Magnetic Hydraulic Circuit Breaker on the Power Module downwards to the “OFF” position.

WARNING

The system is NOT completely de-energized at this point, although it consumes very little power in this stand-by state. To completely de-energize the Power Supply, either unplug both power plugs from the source, or turn off power at the source itself.

7

E-BEAM SWEEP



SPECIFICATIONS

Output current: Dual Channel (longitudinal and lateral): ± 1.5 Amp, maximum, into a load with impedance not to exceed 10Ω

Output voltage: ± 15 V peak into coils with impedance greater than 10Ω .

Frequency range:

4 to 100 Hz (standard)

1 to 25 Hz (upon request)

Wave Output Forms:

- ✓ Saw-Tooth (one-dimensional shape)
- ✓ Sinusoidal (one-dimensional shape)
- ✓ Modulated and phase-locked (Circle or Spiral shape)

The Saw-Tooth and Sinusoidal waveform outputs cover a rectangular Sweep area. The Spiral covers a full round Sweep area. The Circle covers the perimeter of a circle but not the center. The output current can be adjusted by both Longitudinal and Lateral Amplitude Variable Resistors.

OPTIONS

The following options are available with the Sweep module:

Remote Handheld Control with a Joystick. This device is useful for evaporations that need to be monitored closely.

Four-Extra-Pattern Handheld Remote Control, which includes Programmable Logic Control (PLC). This device allows the user to create and store 4 additional patterns. The running patterns can be selected either manually on the Remote Control Unit, or from a PLC connected to the Sweep Module.

Each Optional Handheld Control is used by attachment to a ribbon cable, which is attached to the Sweep Module rear panel at the other end. Since only one Remote Control can be used at a time, their attachment to the ribbon cable were designed to be interchangeable.

FUNCTIONS



On the left of the front panel is the Power ON/OFF switch. Next to the Power switch are three switches with the following functions:

Local/Remote toggle switch: used to determine whether the Sweep will be operated directly from the front panel or from a Remote Handheld Control.

Pattern/Circle 3-position switch: The upper position chooses Sweep patterns. The lower position chooses a circle or spiral sweep. The center position chooses no sweep. ***SEE WARNING**

Regular/Spiral toggle switch: This switch is only used when the above switch is set to “Circle”.

“Regular” sets the sweep pattern to circle while the “Spiral” setting is self explanatory

***WARNING**

When the beam is not sweeping, the power intensity at the material to be evaporated is very high and may cause mishaps.



In the middle of the front panel are the Lateral and Longitudinal Controls. The layout for both the Lateral and the Longitudinal Controls is as follows (A picture of the Longitudinal Controls is not included as the layout of the controls is identical to that of the Lateral Controls):

Toggle switch: to select the desired output waveform

Amplitude: to adjust the output current

Position: to define the placement of the beam

Frequency: to define the sweep frequency

When set to “Circle” and “Regular”, the Lateral Frequency Variable Resistor determines the regular circle frequency, while the Lateral Frequency Variable Resistor has no function.

When set to “Circle” and “Spiral”, the Lateral Frequency determines the angular frequency while the Longitudinal Frequency determines the spiral in and out speed. In order to see a spiral, the Longitudinal Frequency should be much lower than that of the Lateral’s. Setting the Longitudinal Frequency to be higher than the Lateral Frequency will not harm the machine, but will produce a non-typical sweep pattern that some customers may actually prefer.

LED Display Bar: indicates the Position and Amplitude settings

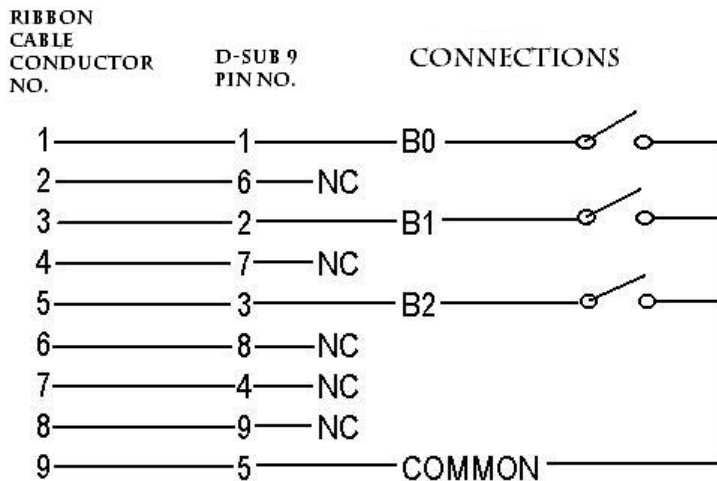
INSTALLATION

At the back panel of the Sweep Module, the connections to be made are clearly labeled. The following connections need to be made:

- ✓ Connect the Philmore 3-pin Male Connector on the E-Beam Gun Coils' 3-conductor Flat Cable to the Philmore 3-pin Female Connector on the Rear Panel. The center wire of the Flat Cable is the common.
- ✓ Connect with Handheld Remote Control: applicable if a Remote Control is being used.
- ✓ PLC Connection (See Chart Below)
- ✓ Power for Sweep: to connect the Sweep module to a power source.

PLC CONNECTION CHART

(Only needed when using the Four-Extra Pattern Remote Control Unit, with the PLC setting selected on the Remote Unit.)



B ₂	B ₁	B ₀	PATTERN NO.
X	0	0	0
X	0	1	1
X	1	0	2
X	1	1	3

KEY:

1 = Switch Closed

0 = Switch Opened

X = Disregard

REMOTE HANDHELD CONTROL WITH JOYSTICK (OPTIONAL)

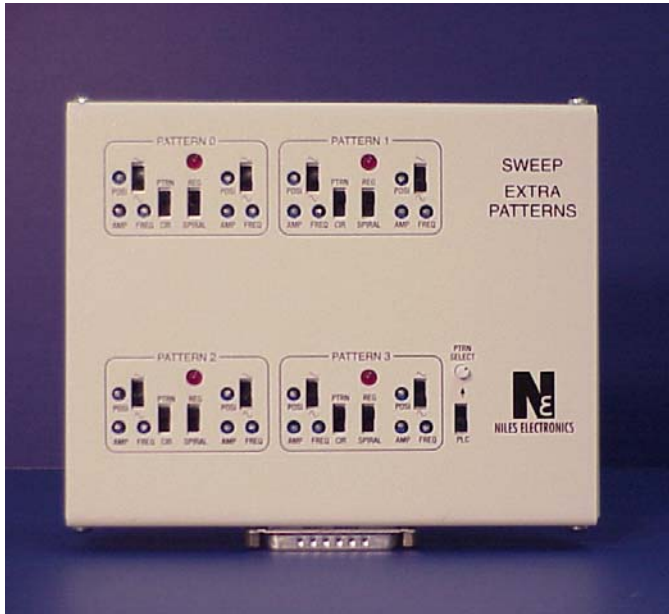
This remote handheld device replicates the functions and layout of the regular Sweep Module, but with the addition of the Pots/Stick switch and the Joystick to make lateral and longitudinal adjustments. For operation of this device, the connection needs to be made with the main Sweep unit and the Power Sweep unit turned on.



FUNCTIONS

(Please refer to pages 7-2 to 7-3 in the “Functions” section for explanation of the replicated features.) The Pots/Stick switch selects between using the Potentiometers (Variable Resistors), or the Joystick for control of the beam position. Flipping the switch up to “Pots” allows the beam to be adjusted laterally with the knob labeled “Position” directly to the left of the switch, and longitudinally with the knob labeled “Position” directly to the right of the switch. The advantage to using the Potentiometers is that they can be locked into place so that an accidental bump to the knobs will not affect the beam. Flipping the switch to “Stick” allows the beam to be adjusted with the joystick laterally by moving the stick left or right, and longitudinally by moving the stick up or down. The Joystick is especially useful for preconditioning.

FOUR-EXTRA-PATTERN HANDHELD REMOTE CONTROL (OPTIONAL)



This device allows the user to create and store 4 additional patterns. The patterns can be selected either manually on the remote control unit, or from a PLC connected to the Sweep Module. (For the detailed chart please see page 7-4.) The same D-SUB Connector on the Ribbon Cable connects to either the Four-Extra-Pattern Hand-Held Remote or the Remote Hand-Held Control with Joystick.

WARRANTY

The E-Beam Gun Switching Power Supply is guaranteed against faulty materials, functioning, and workmanship for a period of 12 months after delivery by Niles Electronics.

This warranty only covers failures due to defects in material or workmanship that occur during normal use, as described in this product manual. This warranty shall not apply if any repair has been performed or any alteration has been made by anyone other than an authorized Niles Electronics representative. This warranty shall not apply if failures occur which result from abuse, misuse, negligence, accident, mishandling, faulty installation, misapplication, improper operation or maintenance, alteration, modification, improper voltage supply, lightning damage, or damage that is attributable to acts of God.

The warrantor shall not be liable for incidental or consequential damages resulting from the use of this product, or arising out of any breach of this warranty. All express and implied warranties are limited to the applicable warranty period set forth above.

Repairs made under warranty at Niles Electronics' facilities will be made free of charge. Freight cost, both ways, will be at customer's expense. Niles Electronics reserves the right for any final warranty adjustment.

This warranty is limited only to repairs. No returns for refunds.

Safety Warning

IN CASE OF EQUIPMENT FAILURE:

If the equipment malfunctions, **DO NOT ATTEMPT TO TROUBLESHOOT**. The equipment was not designed for user troubleshooting, which may be dangerous to do. Contact Niles Electronics in the event of Power Supply failure. Shipment of the equipment back to Niles Electronics for repair may be necessary. If the customer's company cannot afford the down-time, it is recommended that spare units be purchased.

USER RESPONSIBILITY

The user is responsible for proper installation and operation, in accordance with the procedures described in this manual. If the user has any doubt about understanding these procedures, please contact Niles Electronics.

The warranty shall be null and void if the equipment has not been installed properly.

Alteration of the design of any function of the equipment, without the written consent of Niles Electronics, Inc. voids the warranty and is entirely the responsibility of the user.

CONTACT

Please contact Niles Electronics for any inquiries, installation, or repair issues.

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