NEDG SERIES
DUAL E-BEAM GUN SWITCHING POWER SUPPLIES

INSTRUCTION MANUAL

Version 1.01

NILES ELECTRONICS

Niles Electronics Inc.
440610 S. Grimmer Blvd.
Fremont, CA 94538-6382 USA
Tel.: (510) 252-0100
Fax: (510) 252-0106
Web Site: **www.nileselectronics.com**

May 2005


NEDG
CONTROL MODULE
NILES ELECTRONICS
MAIN POWER
HIGH VOLTAGE
10.00
DC KILOVOLTS
ADJUST
METER ZERO ADJ
MODE
PLC
LOC
HAND
GUN 1 EMISSION
BREAKER
WATER
AUX 2
.600
DC AMPERES
BIAS
GUN 2 EMISSION
.200
KEY LOCK
NEDG-8
HIGH VOLTAGE MODULE
BREAKER 1
BREAKER 2
POWER MODULE
230V ∿ 7 AMP
400V 3 ∿ 20 AMP

TABLE OF CONTENTS

4
POWER MODULE

5
HIGH VOLTAGE MODULE

6
CONTROL MODULE

WARRANTY

SAFETY WARNING

USER RESPONSIBILITY

CONTACT

1
OVERVIEW

SYSTEM COMPONENTS

The **NEDG Dual Electron Beam (E-Beam) Gun Power Supplies** are direct current, regulated constant high voltage power supplies. They are produced as two-gun version. Each model has two "HV Cables" from High Voltage Module and "two outputs" for Filament Transformers from the Power Module. 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. There are currently three models in this NEDG series i.e. NEDG-4, NEDG-6 and NEDG-8. The number in the model name stands for the power rating.

Each **NEDG Dual E-Beam Gun Power Supply** consists of the following components:

- Power Module with two power cords attached and two outputs to Filament Transformers
- High Voltage Module with two 15-ft HV coaxial cables attached
- Control Module
- Two Filament Transformers
- Rack Assembly for Power and High Voltage Modules

LIST OF ACCESSORIES

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

1) Two Filament Transformers *
2) Two 15-ft cables for Filament Transformer Primary windings
3) One B+ connection cable
4) One 22″ 7-pin cable
5) One 66″ 7-pin cable
6) One 66″ ribbon cable **
7) One 10″ ribbon cable **
8) One Instruction Manual (the one you are reading now)

* Niles Electronics Inc. accommodates filament transformer(s), 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.

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

2
SPECIFICATIONS

OVERALL SPECIFICATIONS

Input Voltage for Control:
- US: 208 Volts, single phase, 60 Hz, 7 Amps
- Europe: 230 Volts, single phase, 50 Hz, 7 Amps

Input Voltage for Power:
- US: 208/230 Volts, 3-phase, 60 Hz
  - (Upon request at the time of purchase. 4 KW and 6 KW only. Not available for 8 KW version.)
  - 20 Amps for NEDG-4, 30 Amps for NEDG-6
- Europe: 400 Volts, 3-phase, 50 Hz
  - 10 Amps for NEDG-4, 15 Amps for NEDG-6, 20 Amps for NEDG-8

Maximum output power:
- 4 KW for the NEDG-4 model
- 6 KW for the NEDG-6 model
- 8 KW for the NEDG-8 model

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

Maximum total emission current:
- 400 mA for the NEDG-4 model
- 600 mA for the NEDG-6 model
- 800 mA for the NEDG-8 model

Maximum emission current for each gun:
- 0 to rated current provided that the current sum of two guns' not to exceed the rated current

Ripple voltage: 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

DIMENSIONS AND WEIGHT

Control	E-Beam Sweep (Sold separately)	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	45 lbs	41 lbs

3
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

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

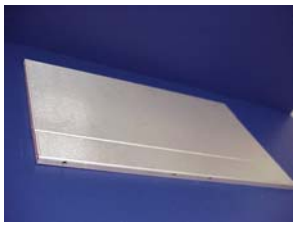
- Rack Assembly
- Cable Connections Between Modules
- Filament Transformer Connections
- High Voltage Cable Connections
- System Grounding
- Interlock Connections
- Remote Control Connections

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 have 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

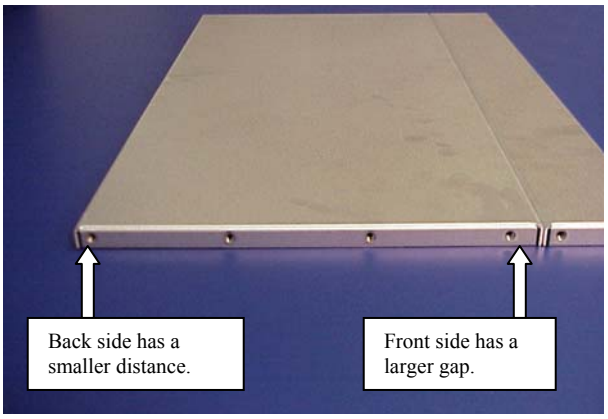
NOTE: Leaving the bolts slightly loose until all of the bolts are in position will make minor adjustments easier to make. Drive all of the bolts tight with a 10 lb-in torque at the end.
The pictures shown here are those of the NE-6. However, all the half-rack power and high voltage modules are to be mounted the same way.

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 downward 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 backside.

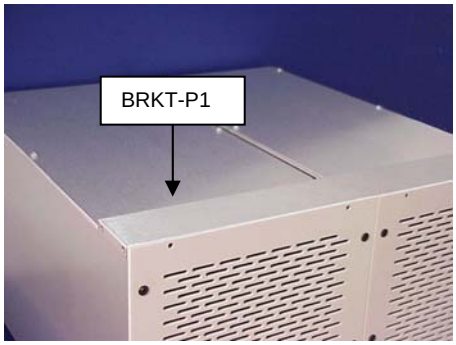


Looking at the assembly from the front, line up the High Voltage Module on top of BRKT-P2 and BRKT-P3 in the FRONT, LEFT corner. The front panel of the HV Module should hang over the two bottom pieces. Line up the two bottom holes in the front panel to the holes in BRKT-P2. Screw in two ½″ bolts with nylon washers, attaching these two pieces together.

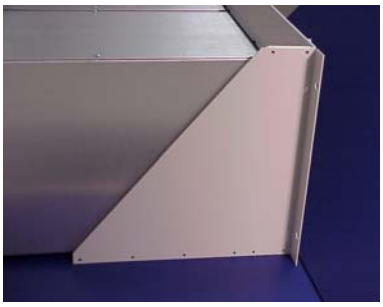
Place the Power Module to the right of the HV Module so that it is lined up in the FRONT, RIGHT corner of the two bottom pieces.

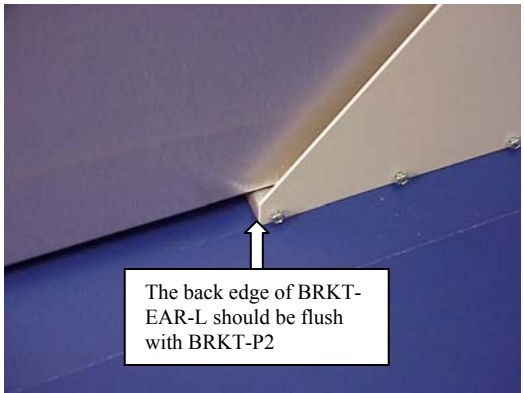
3. Line up the two bottom holes in the front panel of the Power Module to the holes in BRKT-P2. Screw in two ½″ bolts with nylon washers, attaching these two pieces together.

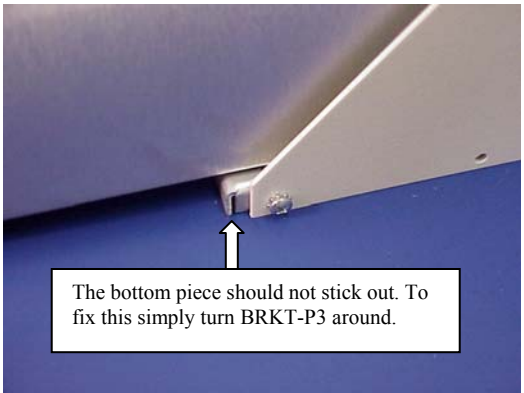
4. Place BRKT-P1 on top of the two Modules directly behind the front panels with the FEX nuts facing forward and the open side facing downwards. The notches in this piece enable the Modules to slide right out of the Rack Assembly from the front without disassembling the Rack. Line up the four holes in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



5. 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.







6. Screw in six 3/8″ bolts with spring lock washers, affixing BRKT-EAR-L to BRKT-P2 and BRKT-P3 (the two bottom pieces.)

7. Screw in two 3/8″ bolts with spring lock washers, affixing BRKT-EAR-L to BRKT-P1 (the top piece.)

8. 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.

9. Screw in six 3/8″ bolts with spring lock washers, affixing BRKT-EAR-R to BRKT-P2 and BRKT-P3 (the two bottom pieces.)

10. 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 be able to fit into a standard 19″ rack correctly. However, with two Modules inside the Rack Assembly, it is heavy to mount the Rack Assembly into the 19″ rack. Removing the two modules out of the rack by removing the four front bolts of each module and slide the Modules out from the front of the Rack Assembly. Then, mount the Rack Assembly into 19″ rack. After the Rack Assembly is inside the 19″ rack. Slide the two Modules back in. **Putting some mechanical support from the 19″ rack to the rear ends of these two Modules is strongly recommended so that the each whole module weight does not hang on to the front panel.** The support is so positioned that the four front bolts can be turned in without very much stress. Scratching along the bottom pieces of the Rack Assembly 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 Transformers 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 Power 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. The Filament Transformer Outputs, on the rear panel of Power Module, for both guns look identical. However, they are wired and marked differently. If the plugs are not plugged into the sockets correctly, there will be no emission current.

HIGH VOLTAGE CABLE CONNECTION

The High Voltage connection is made with RG 213/U Cable. Shipment of the **NEDG Power Supply** will include two High Voltage Coaxial Cables in our standard length of approximately 15 feet. The center conductor of each 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).

In case that you just use one gun only, the not-in-use HV cable needs to be insulated very well and put out of reach for personnel safety.

SYSTEM GROUNDING

System grounding is for personnel safety purpose, not for operation function. Each of the four Modules has a Module Ground Stud. Connections should be made as the following:

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

A system of safety interlock functions protects both the operator and the equipment. The external interlocks are connected to the Power Supply and their installation is described below.

NEDG INTERLOCK INFORMATION

Ribbon Conductor No.	D-Sub 15 Pin No.	Description	For	
1	1	VAC	HV	
2	9	Common		
3	2	TANK	HV	
4	10	Common		
5	3	AUX HV	HV	
6	11	Common		
7	4	WATER 1	Gun 1	
8	12	Common		
9	5	WATER 2	Gun 2	
10	13	Common		
11	6	AUX 1	Gun 1	
12	14	Common		
13	7	AUX 2	Gun 2	
14	15	Common		
15	8	No Connection		

Explanation:

Logic State:	Low = Signal Line connects to Common. Means "Safe"
	High = Signal Line left Open. Means "Not Safe"
	Use of Normal-Open Micro-Switch is recommended

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 HV

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 power supply especially the High Voltage Module**. 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.** Fail to connect the two ribbon cables among the modules properly will also shut off this air interlock LED.

This power supply is air-cooled. It needs enough fresh airflow to keep working well. Make sure its air way is not blocked.

VACUUM INTERLOCK

A vacuum switch should be installed on the Tank so that it closes only if there is enough vacuum level 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.

AUX HV

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
- Water
- Aux 1 / 2

BREAKER

These two Thermo Breakers are located at the front panel of the Power Module, and work in series with the Filament Transformer Primary Windings. If the Filament Transformer is overloaded (which could result from the Secondary Winding being in short circuitry or too low Filament Resistance), the Breaker may or may not pop out (as there is a surge current detecting circuitry that can also turn off the Breaker Led without popping out the Breaker) 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 LED indicator is turned off again, 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.

WATER

A water flow switch should be installed in the return line of the cooling system for each E-BEAM GUN. This switch should be open once there is not sufficient water flow to cool the Gun and associated shields.

AUX 1 / 2

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

REMOTE CONTROL SIGNAL LIST

	HAND HELD	PLC		FUNCTION DESCRIPTION
Ribbon Cable Conductor No.	D-SUB 37 Pin No.	D-Sub 37 Pin No.	Signal Direction	Digital High = +12V Digital Low = 0V All output signals have 1 KΩ Resistor in series. 5 Kohm resistance is recommanded for all the VRs
1	1		OUT	Handheld In Control = H
2	20		IN	HV ON/OFF Control Signal **
3	2		IN	HV Value Command Signal 5.25 V maximum *****
4	21		IN	Handheld Unit Connected ****
5	3		GND	
6	22		GND	
7	4		IN	Gun 1 ON/OFF Control Signal **
8	23		IN	Gun 1 Emission Control 8 V = 800 ma ***
9	5		IN	Gun 2 ON/OFF Control Signal **
10	24		IN	Gun 2 Emission Control 8 V = 800 ma ***
11	6	6	OUT	HV Interlock OK = H
12	25	25	OUT	Gun 1 Interlock OK = H
13	7	7	OUT	Gun 2 Interlock OK = H
14	26	26	-	Not Used
15	8	8	OUT	HV ON = 5.25 V. Used to power the HV control VR *
16	27	27	OUT	Gun 1 ON = 8 V. Used to power the Gun 1 Emission VR *
17	9	9	OUT	Gun 2 ON = 8 V. Used to power the Gun 2 Emission VR *
18	28	28	-	Not Used
19	10	10	OUT	HV Value. 5 V represent 10 KV
20	29	29	OUT	Gun 1 Current. 8 V represent 800 ma
21	11	11	OUT	Gun 2 Current. 8 V represent 800 ma
22	30	30	-	Not Used
23	12	12	OUT	12 V. For Handheld Unit Logic Circuitry *
24		31	OUT	PLC In Control = H
25		13	IN	HV ON/OFF Control Signal **
26		32	IN	HV Value Command Signal 5.25 V maximum *****
27		14	GND	
28		33	GND	
29		15	IN	Gun 1 ON/OFF Control Signal **
30		34	IN	Gun 1 Emission Control 8 V = 800 ma ***
31		16	IN	Gun 2 ON/OFF Control Signal **
32		35	IN	Gun 2 Emission Control 8 V = 800 ma ***
33		17	IN	PLC Connected ****
34		36	-	Not Used
		18		No Connection
		37		No Connection
		19		No Connection

* This voltage is mainly for Handheld Unit use. It can only supply enough current for the remote control. Do not use this voltage for other purpose.

** 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 ON/OFF push buttons on the front panel 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 for the Emission Current.

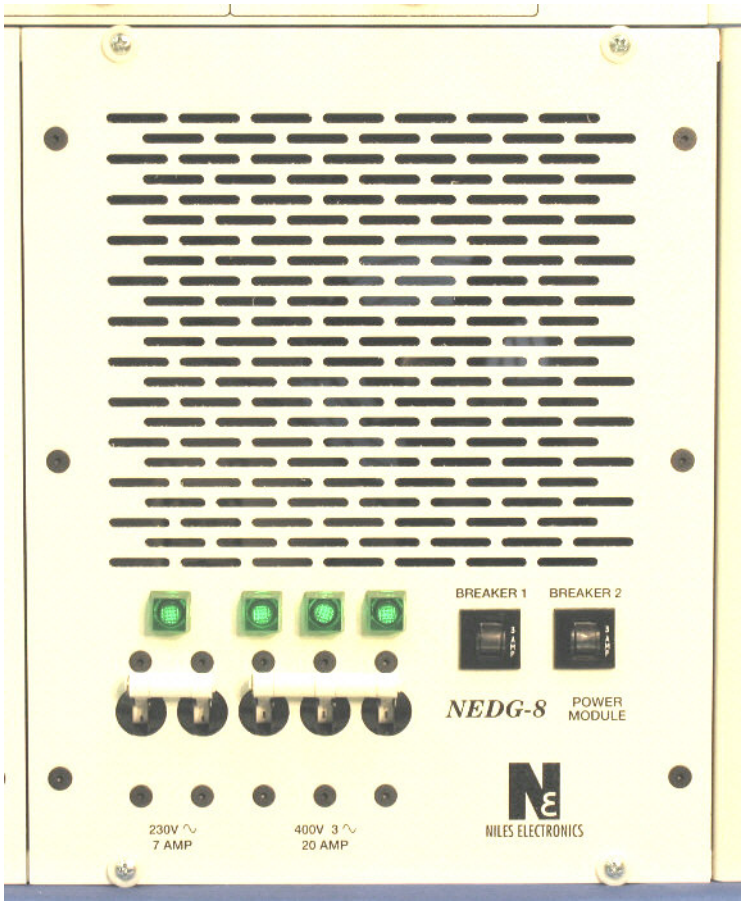
*** The High Voltage input resistance is greater than 15 KOhm to virtual ground while the Emission Current inputs have pull-up resistors, greater than 50 KOhm, connect to +12 V.

**** This pin needs to be connected to the 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:
Caution: Turn off all the power before you go for the change.

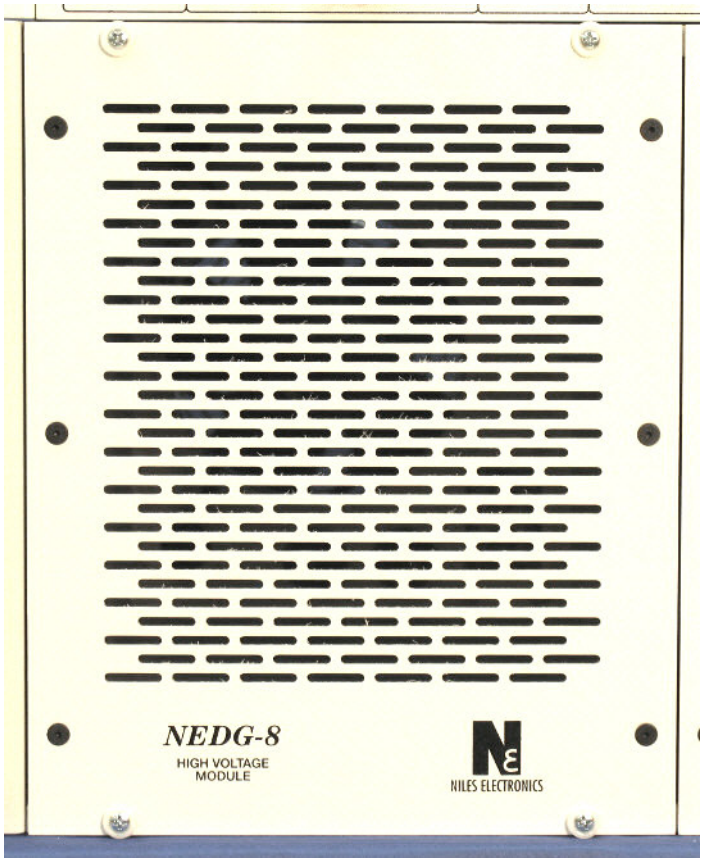
1. Take off the top lid of the Control Module.
2. On the large PCB labeled " PDGCON", there is a jumper with designator "JS" and with letters "HV Control Source" next to it.
3. The HV Adjust Variable Resistor on the front panel has sole control over the high voltage, even if the Remote Control is selected, when the jumper JS is set at the "Front Panel" side. This is how it is set at the time of shipment from Niles Electronics. Moving the jumper to the other side labeled Remote will give the user the option of adjusting the high voltage from the Remote Control Unit when the Remote is selected.

4
POWER MODULE



Main Switches:
There are two Magnetic Hydraulic Circuit Breakers and associated Green Neon Pilot Lights. Flipping the Breaker upwards will turn the power on. Flipping it downwards turns it off. The correspondent Pilot light(s) will indicate the status. Both Switches need to be turned on to work. However, the two circuitries are protected separately.

5
HIGH VOLTAGE MODULE



There are no controls that can be touched on the front panel of the High Voltage Module. The output connections are to be made on the back panel. Please note that the different models have different power ratings (4 KW, 6 KW and 8 KW) but are otherwise identical in outward appearance and in operation of these modules.

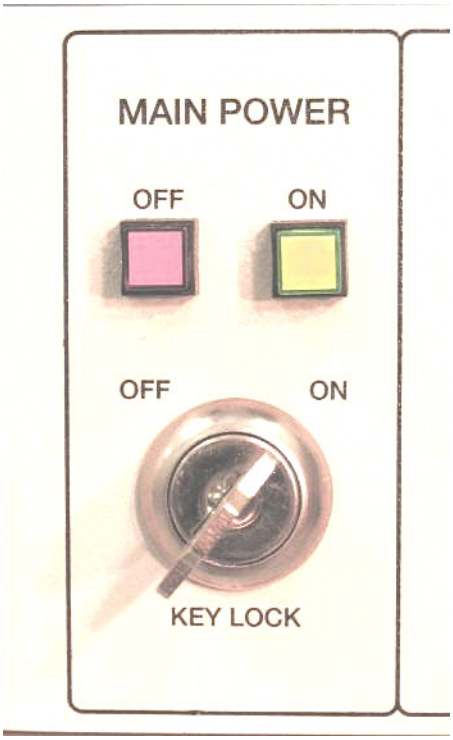
6
CONTROL MODULE

FUNCTIONS

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

- Main Power
- High Voltage Control
- Control Source Selection
- Gun 1 Emission Current Control
- Gun 2 Emission Current Control

MAIN POWER

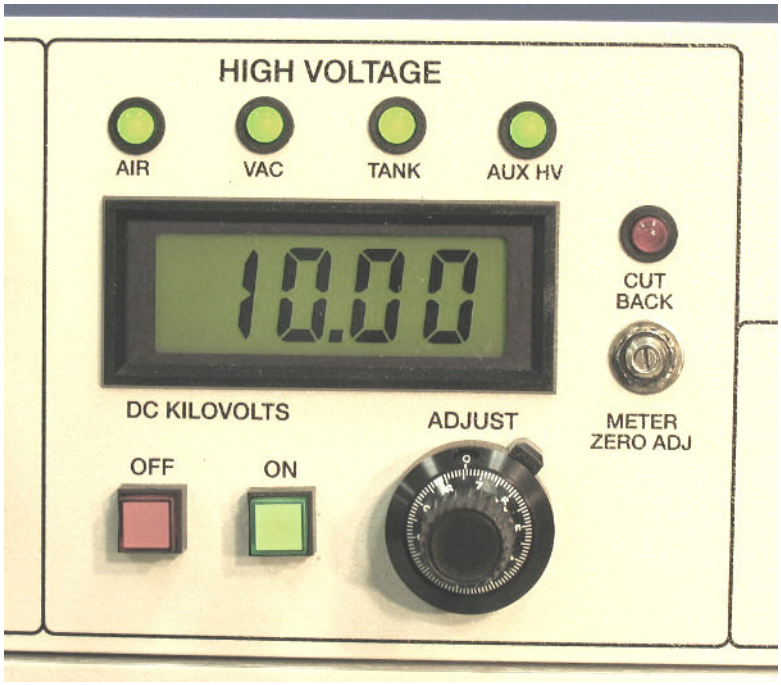


The Main Power has a Key Lock Switch that prevents unauthorized access to the Power Supply. The OFF button lights red after the Key Lock is turned on. The ON push button lights green when the main power is pushed on. If the Key Lock Switch is turned off, no lights will be lit.

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 HV: Auxiliary External Interlocks

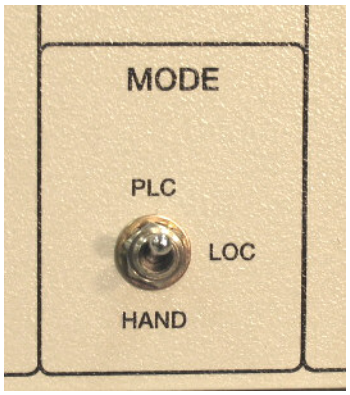
The Interlock LED Indicators (Air, VAC, Tank, Aux HV) light when the conditions these LEDs reflect are correct for operation of the system. (For greater detail of these Interlocks, please see Chapter 3 – Interlock Connections.)

The Meter Zero Adj semi-variable resistor is located at right lower corner of the digital meter and is used to adjust the HV meter reading to zero when there is no high voltage. Since the meter is very sensitive and the DC drift of the circuitry is inevitable, users may see small reading on the meter from time to time even if the reading should be zero. This is considered normal.

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 off the high voltage 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.

CONTROL SOURCE



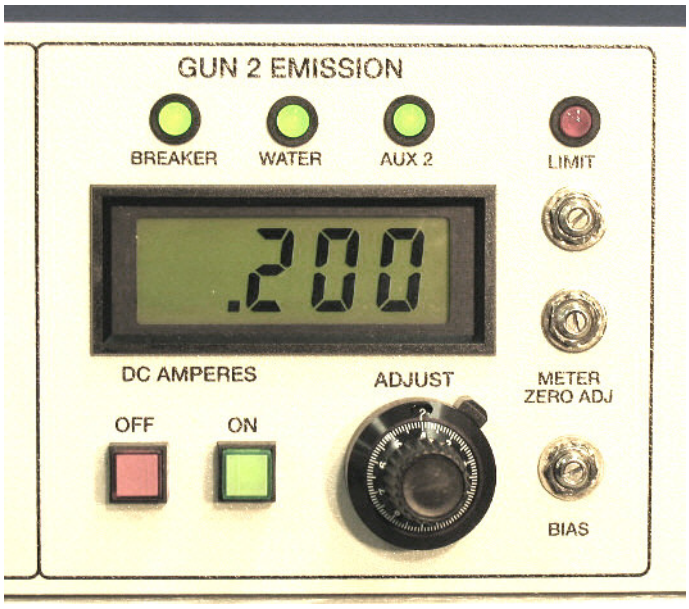
The Control Source Switch has three settings to select the source from which the High Voltage and Emission Current will be controlled.

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

Note: Important safety Features:

- If there is no Remote Control Unit properly connected to the Remote Control Connector located at the rear panel, the front panel gains the control regardless of the Control Source Switch position.
- If this switch is flipped during operation, the High Voltage will be turned off.

EMISSION CURRENT



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

- BREAKER: Breaker Overload
- WATER: Water
- AUX 1/2: Auxiliary Interlock

(The functions 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. Setting the Limit Semi-Variable Resistor will set the maximum emission allowed.

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 Meter Zero Adj is used to adjust the meter reading to zero while there is no emission current. Since the meter is very sensitive and the DC drift of the circuitry is inevitable, users should be expecting small reading on the meter even if the reading should be zero.

Filament needs to be heated beyond certain temperature to emit electrons. The BIAS Semi-Variable Resistor is used to pre-heat the filament and makes the filament temperature slightly below that is needed to start emitting electrons. Calibrate the Bias Semi-Variable Resistor so that a setting of zero on the Adjust Variable Resistor is the point just before the emission current comes on. Properly setting of the Bias yields smooth emission current control.

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 the Bias down until the emission goes to zero. Turn the Emission Adjust up and look into the crucible for the beam.
8. Start operating from here.

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 to zero after reducing the ADJUST Variable Resistor has been turned 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 should go to zero.
4. Press the red "OFF" in the MAIN POWER section.
5. Turn off the KEYLOCK.
6. Flip the Magnetic Hydraulic Circuit Breakers on the Power Module downwards to the "OFF" position.

WARNING

The system is NOT completely free of electricity at this point. To completely remove the electricity from the Power Supply, turn off power at where the power cords connect.

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 Inc.

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 is very 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 downtime, 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.

Our address is:

Niles Electronics, Inc.
44061 S. Grimmer Blvd.
Fremont, CA 94538-6382
U.S.A.
Telephone: (510) 252 – 0100
Fax: (510) 252 - 0106
www.NilesElectronics.com

DISTRIBUTOR: