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CPS 3603 POWER SUPPLY

INSTRUCTION MANUAL

CONTRACT NO.		CPS	7313 SW TECH CENTER DRIVE PORTLAND, OR 97223 PH: (503) 598-9595 FAX: (503) 682-8164 WWW.CPSHV.COM
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CUSTOMER			

1. Safety

OPERATIONAL SAFETY

THIS POWER SUPPLY GENERATES VOLTAGES THAT ARE DANGEROUS AND MAY BE FATAL. OBSERVE EXTREME CAUTION WHEN WORKING WITH THIS EQUIPMENT.

All equipment must be properly grounded and all cables must be properly connected before applying power.

Note that high voltage may remain at internal capacitors during long period of time even without power.

Do not disconnect any cables from working equipment, because it may break some return ground and cause appearance of high voltage on unprotected conductors.

Do not ground yourself or work under wet or damp conditions.

SERVICING SAFETY

Maintenance does not require removing the instrument cover with the power on.

Servicing should only be done by qualified personnel aware of the electrical hazards.

“WARNING” notes in the text call attention to hazards in the operation of these units that could lead to possible injury or death.

“CAUTION” notes in the text indicate procedures to be followed to avoid possible damage to equipment.

Technical and safety assistance can be obtained from:

CPS Technical Support
7313 SW Tech Center Dr
Portland, OR 97223, USA

Phone: 503-598 9595
Fax: 503-684-8164
E-mail: info@cpshv.com

WARNING

IF THE EQUIPMENT IS USED IN ANY MANNER NOT SPECIFIED BY THE CPS, INC. (MANUFACTURER), THE PROTECTION PROVIDED IN THE POWER SUPPLY MAY BE IMPAIRED CAUSING EQUIPMENT DAMAGE.

2. Definitions of Symbols

Direct Current

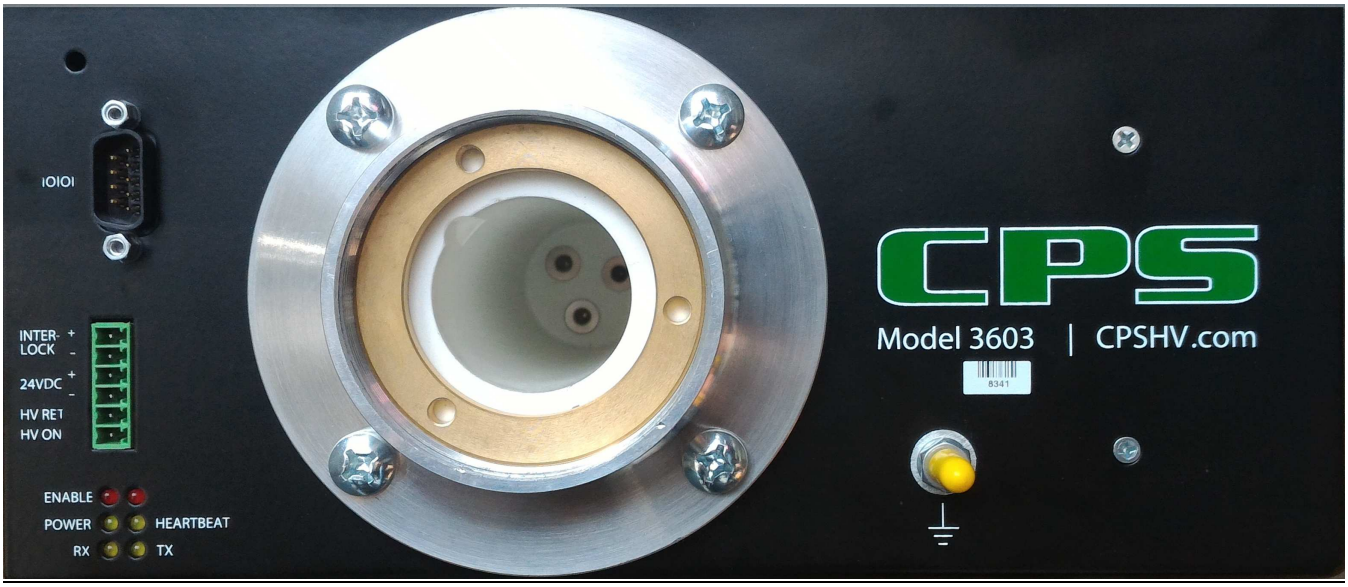
Protective Conductor Terminal

Caution (refer to accompanying documents)

Caution, risk of electric shock

3. Introduction

The CPS 3603 is an AC/DC converter with digital interface. It provides floating bias (focus) and filament power supplies, grounded to output of the accelerating power supply. The digital interface uses RS-232 (serial port) communication to a computer with interactive control application.



4. Block Diagram

The CPS 3603 includes AC/DC Power Supply, HV-isolated Power Supply, Acceleration Power Supply and floating-ground Bias and Filament Power Supply. The Fiber Optic Interface provides communication between Earth-grounded and HV-grounded parts. The RS-232 Interface used for communication to external computer.
Connection diagram at Figure 1 explains how these units work together.

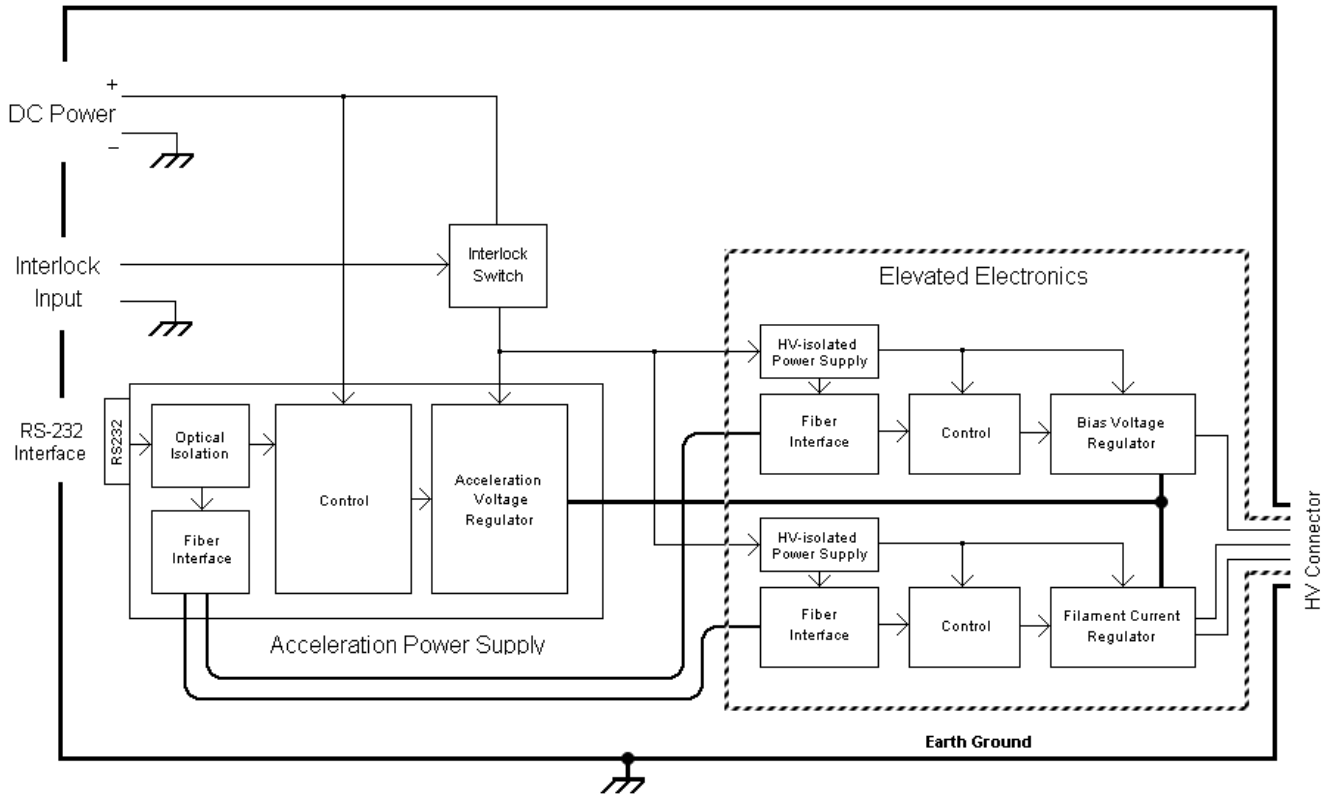


Figure 1. Block Diagram of 3603.

5. Electrical Specifications

Input voltage	*24-28 VDC*
Input current	*5 A maximum*
Input power	*100 W maximum*
High voltage connector	*3 pin CA1-type Claymount*

Beam Supply

Output voltage	*up to minus 30 kV*
Output current	*0.3 mA maximum*
Set ability	*0.1 V steps*
Stability	*10 ppm/hour*
Ripple/Noise	*less than 300 mV p-p*

Bias Supply (referenced to the beam voltage)

Output voltage	*up to minus 1 kV*
Output current	*0.1 mA maximum*
Set ability	*0.01 V steps*
Stability	*50 ppm/hour*
Ripple/Noise	*less than 100 mV pp*

Filament Current Supply (referenced to the beam voltage)

Output voltage	*up to 5 V*
Output current	*0 to 5 A*
Set ability	*0.001 mA steps*
Stability	*100 ppm/hr*
Ripple/Noise	*less than 100 mV pp*

Input I/O	RS-232, 500V AC/DC ground-isolated
Fuse	5A

WARNING

QUALIFIED PERSONNEL MUST PERFORM REPLACEMENT OF FUSE. CONTACT CPS FOR INSTRUCTIONS.

6. Environmental Conditions

Model 3603 must operate under following conditions:

- The equipment is intended for indoor use only
- Operating temperature 0 to 40^0C
- Altitude up to 2000 m
- Maximum relative humidity 80% at 31^0C and 50% at 40^0C
- Installation category - Intended for use in installation category (over voltage category) II (IEC 1010-1 standard)
- Pollution degree - Category 2 (IEC 1010-1 standard)

7. Mechanical Specifications

Output Terminal: HV Connector: 3 pin CA1-type Claymount – provided, see Figure 2.

L - bias

C - filament positive

S - filament negative

RS-232 interface connector:

1 - DCD

2 - RxD

3 - TxD

4 - DTR

5 - GND

6 - DSR

7 - RTS

8 - CTS

9 - RING

Power connector:

1 – interlock positive

2 - interlock negative

3 - power positive

4 - power negative (connect to the ground)

5 – HV return (connect to the ground)

6 – HV “ON” LED

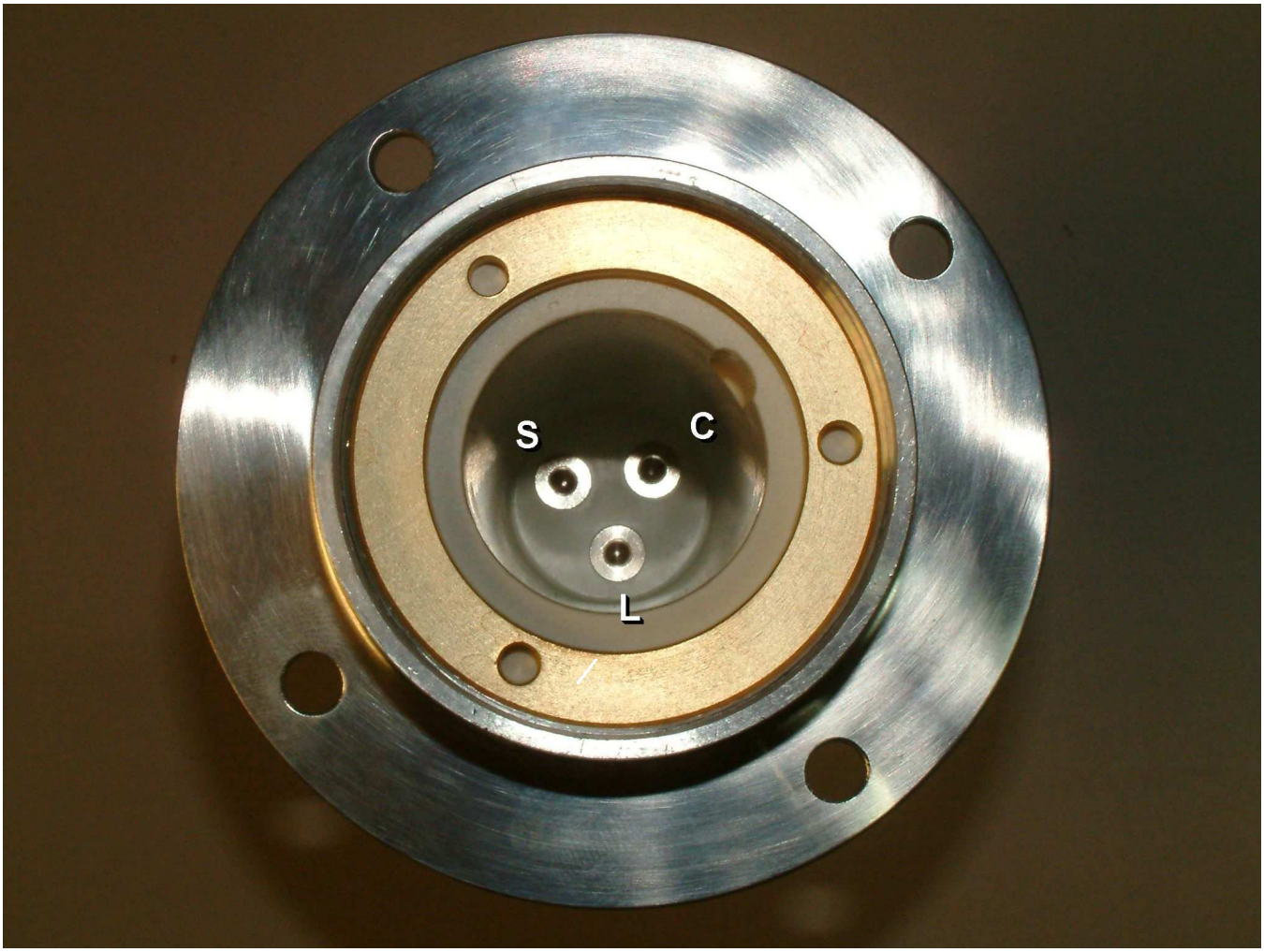


Figure 2. HV connector.

Unit Package: 254mm x 191mm x 114mm, see Figure 3.

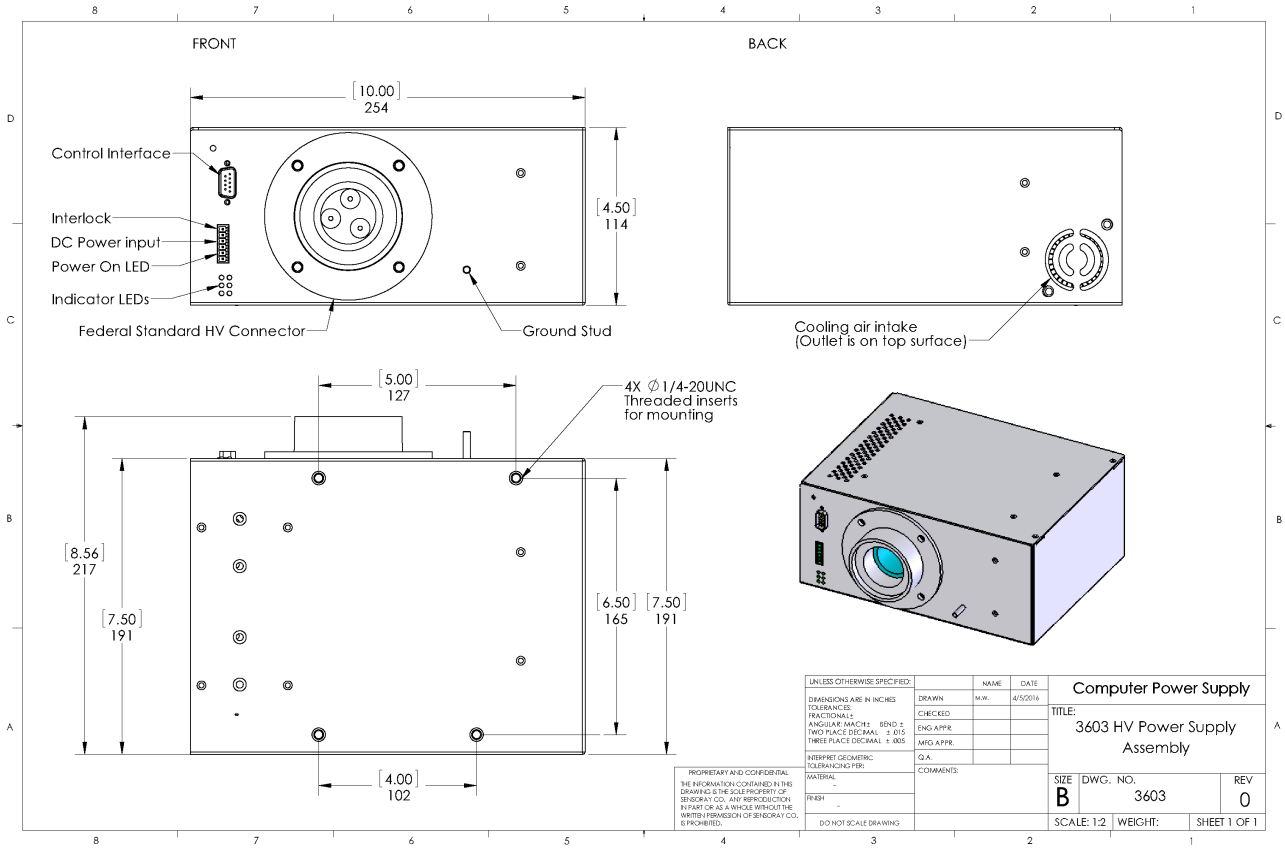


Figure 3. Physical layout and placement of connectors.

WARNING

THE CHASSIS OF THE CONVERTER/INTERFACE AND THE SHIELD OF THE HIGH VOLTAGE CABLE MUST BE GROUNDED. FAILURE TO FOLLOW THIS WARNING MAY RESULT IN SEVERE HEALTH HAZARD.

8. Operation

WARNING

THIS EQUIPMENT GENERATES DANGEROUS VOLTAGES THAT MAY BE FATAL. PROPER GROUNDING OF ALL HIGH VOLTAGE EQUIPMENT IS ESSENTIAL.

WARNING

THIS EQUIPMENT IS PERMANENTLY CONNECTED THEREFORE IT SHALL OPERATE IN BUILDINGS WITH A SWITCH OR CIRCUIT BREAKER. THIS EQUIPMENT MUST BE

INSTALLED IN CLOSE PROXIMITY OF THE SWITCH OR CIRCUIT BREAKER WITHIN EASY REACH OF OPERATOR. THIS SWITCH OR CIRCUIT BREAKER SHALL BE MARKED AS THE DISCONNECTING DEVICE FOR THE POWER SUPPLY.

CAUTION

BEFORE CONNECTING THE POWER SUPPLY TO THE POWER INPUT SUPPLY, FOLLOW THIS STEP-BY-STEP PROCEDURE.

FAILURE TO FOLLOW THESE PROCEDURES MAY VOID THE WARRANTY AND WILL RESULT IN SAFETY VIOLATION.

Step A
The chassis of the high voltage power supply must be grounded. Use the ground terminal for this connection.

Step B
Attach the high voltage output cable to the load. The cable used must be shielded with a wire braid that functions as the high voltage return.

Step C
Attach the mating plug on the high voltage cable to the HV output receptacle on the supply and hand tight. The dielectric silicon grease may be added to improve the connector's performance. Please contact connectors' manufacturer for the exact instructions. Make absolutely sure that a good high voltage output and high voltage return connection is made between the supply and the load.

Step D
Connect the digital RS-232 interface connector to the computer with a NULL-MODEM cable. Be sure that cable is connected to the host computer's COM port.

Step E
Attach an external switch to the interlock terminals or short them together. Shorted contacts enable outputs.

Step F
Attach the power supply to the power input in the proper polarity. Negative terminal must be grounded.

Step G
Attach an external HV indicator (optional) between positive power and HV ON terminal.

Step H
Turn the power supply ON.

Step I

Run the software on the control computer. Once the program is run, the 3603 Control Panel dialog window will appear on the screen (see Figure 4).

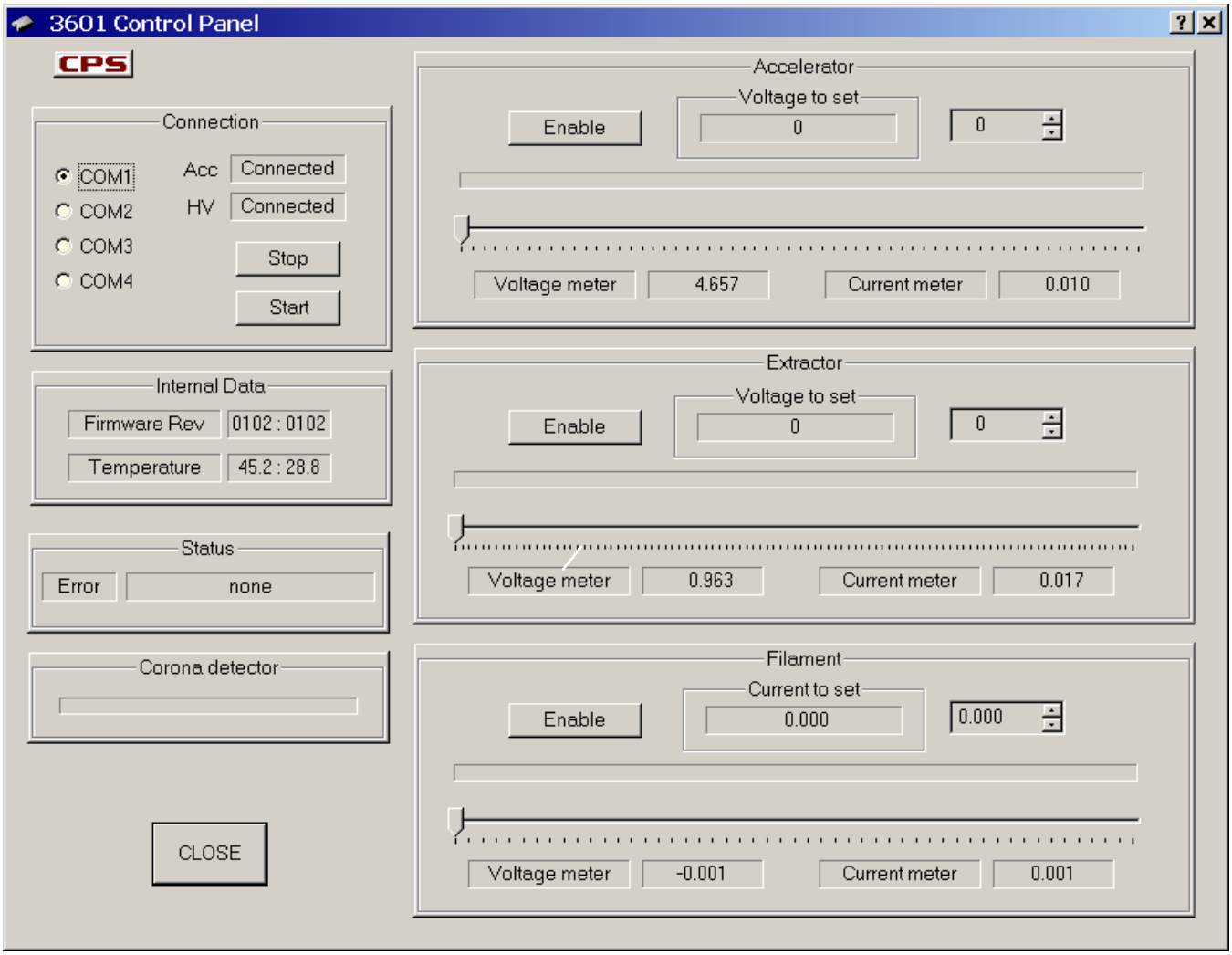


Figure 4. Control Panel screen.

Check the status of connection in the [Connection] window. The [Acc] window represents connection status for the Accelerator and the [HV] window – the status of the High Voltage module connection. The both of them must be “Connected”. If no connection was established, the “no comm” displayed in the window.

In such case check that you use same serial port (COM1…COM4) to attach the interface cable as you selected in the [Connection] window. Refer to your computer manual regarding the COM port configuration.

The connection can be stopped with the [Stop] button and restarted with the [Start] button. If the connection was stopped with the [Stop] button or control application was closed, the 3603 automatically

disables all output. If the connection was interrupted by some external reason (cable disconnecting or a communication error), the 3603 keeps output voltages without disabling or reset.

Step G
The output power may be applied to the load. Set desirable value with a slider (coarse) and up/down control (fine). Make sure that the output voltage and current are adjusted within acceptable range. Enable or disable output with an [Enable] button. Note that 3603 always limits (ramp) the raising speed of output voltage for even and safety charging of output capacitors. The falling speed is limited by output capacitance and resistance.
You can read actual output values from a voltage and current meter.

WARNING

AFTER SWITCHING OFF, DO NOT HANDLE THE LOAD UNTIL THE POWER SUPPLY AND LOAD CAPACITANCES HAVE BEEN DISCHARGED.

WARNING

THE VOLTAGE METER ON THE SCREEN DOES NOT READ THE OUTPUT VOLTAGE WHEN THE INPUT POWER SUPPLY IS DISCONNECTED OR SWITCHED OFF, EVEN IF A HIGH VOLTAGE CHARGE STILL EXISTS ACROSS THE LOAD.

WARNING

ALWAYS OPERATE THE UNIT WITH THE COVER ON. DO NOT ATTEMPT TO ACCESS OR REPAIR ANY INTERNAL CIRCUITS. DANGEROUS AND POTENTIALLY LETHAL VOLTAGES ARE GENERATED INSIDE THE MODULE.

8. Control Panel

The 3603 Control Panel is a MS Windows application. One instance of the Control Panel can operate with one 3603. If you use two or more 3603, each one must be connected to individual COM port and be operated by individual instance of the Control Panel.
Some computers have no internal COM port controller, but this is possible to attach an external USB controller. Please contact CPS for assistance to purchase a controller. Refer your computer manual regarding the COM port configuration.

8.1. Installation

Create a new directory. The following files must be copied to this directory.

3601ctrl.exe	*Control Panel application*
c3601.dll	*Interface library*
3603.ini	*Calibration data*

8.2. Indicators and Controls

Appearance of the Control Panel is shown on Figure 5.

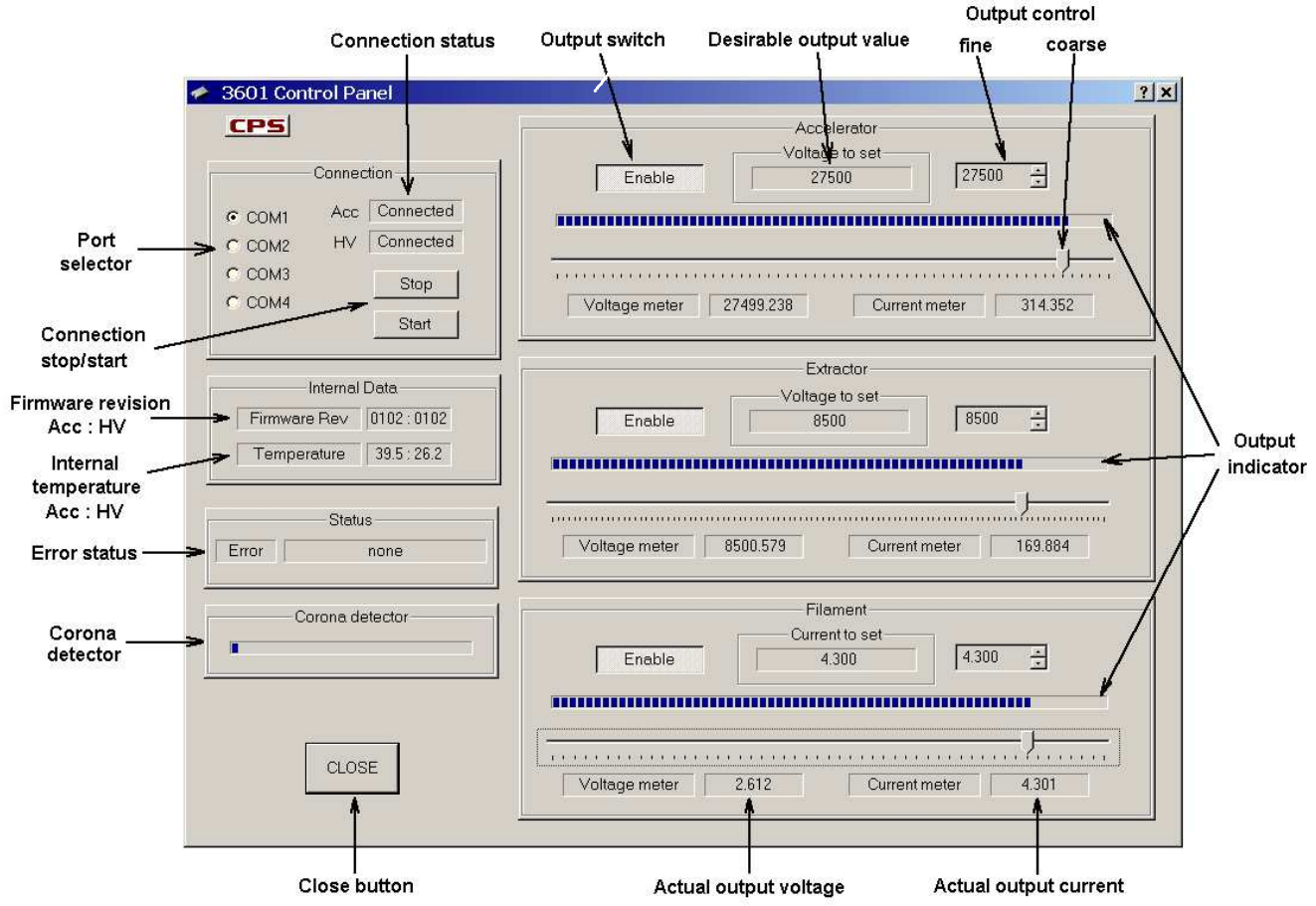


Figure 5. Control Panel screen.

- Port selector: select a COM port for communication.
- Connection stop/start: stop and start communication.
- Connection status: actual status of the connection for the accelerator (Acc) and high voltage (HV) modules.
- Output switch: enable (turn ON) or disable (turn OFF) an output.
- Desirable output value: the value (voltage or current) to set on an output.
- Output control: slider (coarse) and up/down control (fine) to adjust an output value.
- Output indicator: analog indicator of the actual value.
- Actual output voltage/current: digital voltage/current meter.
- Firmware revision: revision of internal program code for the accelerator (Acc) and high voltage (HV) modules.
- Internal temperature: internal temperature in Celsius degrees of the accelerator (Acc) and high voltage (HV) modules.
- Error status: status of last operation (brief description of the error or “none” if no error occurred).
- Corona detector: analog indicator of the fast variations of the output current. Such variations are usual result of the corona-type leakage in a high voltage circuit.
- Close button: turn 3603 off and close the Control Panel application.

9. Warranty

COMPUTER POWER SUPPLY, Inc. (CPS) warrants equipment of its manufacture against defective materials or workmanship for a period of one year from the date of shipment.

CPS will repair or replace any defective product, which was not damaged by negligence, misuse, improper installation, accident, unauthorized repair or alteration by the Buyer.

This warranty is applicable to the original Buyer only and constitutes the sole and exclusive warranty of the Seller. No other warranty is made, expressed or implied.