


REVISIONS			
REV	DESCRIPTION	DATE	APPROVAL
A	RELEASE	10/16/01	PRL
B	RELEASE	02/18/05	VQD

INSTRUCTION MANUAL

For

2600 SERIES OF DIGITALLY CONTROLLED

High Voltage Power Supplies

CUSTOMER	CONTRACT NO.		 7313 SW TECH CENTER DRIVE PORTLAND, OR 97223 PH: (503) 598-9595 FAX: (503) 682-8164 WWW.CPSHV.COM			
	PREPARED P. R. Lubicki	DATE 10/16/01			TITLE INSTRUCTION MANUAL - 2600	
	CHECKED	DATE	SIZE A	FSCM NO. 31640	SPECIFICATION NO. 2600-89-0001	REV B
	APPROVED	DATE	SCALE 1:1		SHEET 1 OF 13	
	APPROVED	DATE				



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REV
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1. Safety:

OPERATIONAL SAFETY

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

High voltage power supplies must always be grounded.

Do not touch connections unless equipment is off and the capacitances of both the load and power supply are discharged.

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

SERVICING SAFETY

Maintenance may 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:

Viet Q. Do
7313 SW Tech Center Dr
Portland, OR 97224, USA
Phone: 503-598 9595
Fax: 503-684-8164
E-mail: <mailto:Viet@cpsvh.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.

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2. Definitions of Symbols

Direct Current



Protective Conductor Terminal



Caution (refer to accompanying documents)



Caution, risk of electric shock



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3. Introduction:

CPS Model 2600 sets the standard for high performance in modular high voltage power supplies. Standard configurations include a 30kV version (CPS P/N 2600-00-0030) and a 60kV version (CPS P/N 2600-00-0060) of either positive or negative polarity factory selected. Model 2600 delivers exceptional performance in all critical power supply parameters such as ripple, stability, temperature coefficient and regulation. Low ripple is achieved with special ripple cancellation circuitry. The advantages of this design include low stored energy, compact packaging and improved reliability should arcing occur.

The exceptional stability and low temperature coefficient of the 2600 are the result of careful design practice and the selection of quality components throughout.

The CPS Model 2600 series of power supplies is designed for system component or stand-alone laboratory use in applications requiring a stable, regulated, low-noise source of high voltage power. The applications include, but are not limited to the following: Capacitor charging, Phototube systems, Laser systems, electron microscopes, focused ion and electron beam systems, such as lithography, etc.

The unit is designed to safely withstand continuous short circuits without damage.

4. Features:

Wide output voltage range.

Very low ripple.

Excellent stability.

Low stored energy – below 0.65J at 30kV.

Low temperature coefficient.

Fully isolated RS-232 to fiber optic programming interface (not included, it must be ordered separately).

Precision V meter and I meter.

Separate internal grounds for case, signal and power.

5. Electrical Specifications:

Electrical specification is met after 1-hour warm-up time.

Output Polarity: Positive or negative (factory selected).

Output Voltage: 0 – 30/50kVDC (programmable).

Output Current: 500 μ A rated @ 50kV.

Output Ripple: < 100mV_{p-p} at full output voltage and 100 μ A load.

< 200mV_{p-p} at full voltage and up to 500 μ A load.

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- Load Regulation:* < 1V_{p-p} at full voltage and over 500μA load.
- Line regulation:* < 0.001% for load current change from 0 to 100μA at full voltage.
< 0.01% for load current change from 0 to 500μA at full voltage.
- Long term stability:* < 20ppm per 1 hour.
- Temperature Coefficient:* < 10ppm/°C.
- Output Protection:* Short circuit and arc protected.
- Programming:* 16 bit (24 bit optional) resolution for full output voltage.
- Voltage monitor:* 16 bit resolution for full output voltage.
- Current monitor:* 16 bit resolution for full output current.
- Operating temperature:* 0 to 50°C. **WARNING!** - external cooling must be provided to the input power side of enclosure for loads over 200μA.
- Input voltage:* 22 - 30 VDC (28 VDC optimum).
- Input current:* 400 mA max at no-load, 700 mA max at 100μA load, 2.5 A max at 500μA load.
- Internal Fuse:* 125V, 5A.

WARNING

Qualified personnel must perform replacement of fuse. Contact CPS for instructions.

6. Block Diagram:

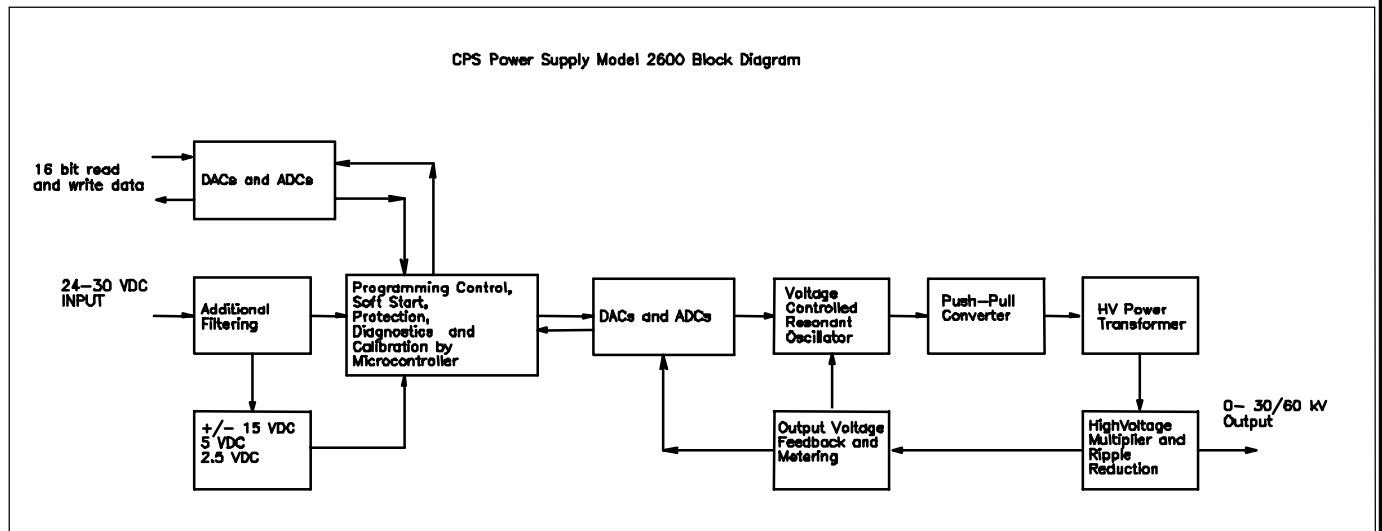


Fig. 1. Block diagram of 2600 high voltage power supply

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7. Environmental Conditions:

Model 2600 must operate under following conditions:

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

8. Mechanical Specifications:*Output Terminals:*

HV Connector – Provided. Input/Output control fiber optic transmitter HP model HFBR 1524 and receiver HFBR 2524. Power input connector PHOENIX CONTACT P/N MC 1,5/3-ST-3, 81 – pin #1 power input, pins #2 and #3 ground see Figure 2.

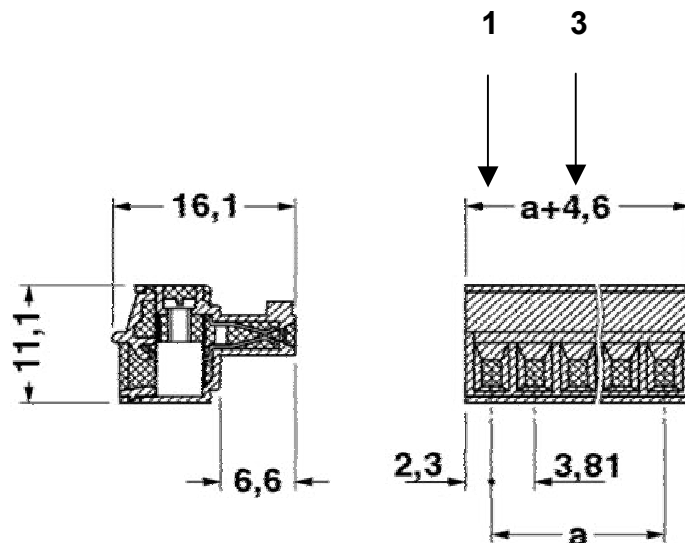


Fig. 2. Physical layout showing the PIN OUT of the power input connector.

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Unit Package:

10" x 9.5" x 3" – see Figure 3. Four mounting holes at the bottom (UNC 8-32) see Figure 3.

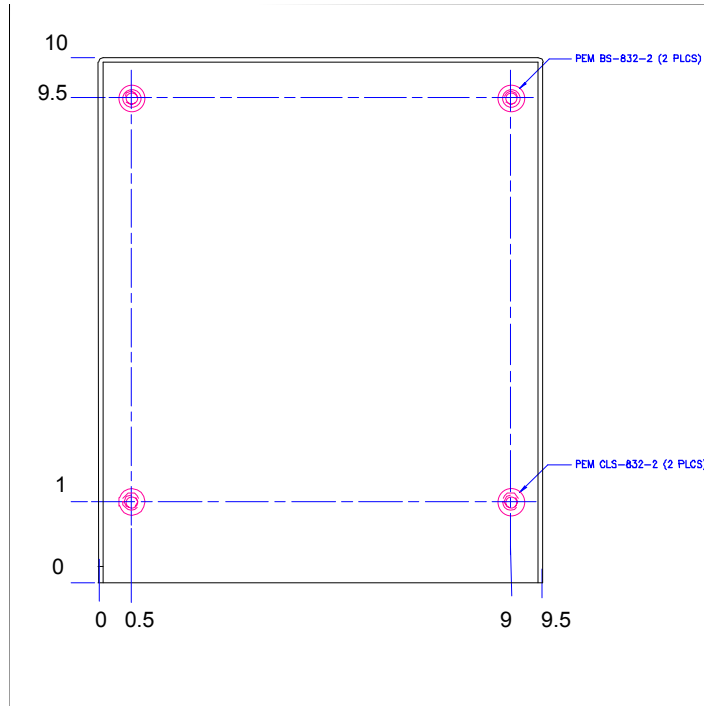


Fig. 3. Physical layout showing the placement of mounting holes on the bottom panel of 2600 power supply

These returns may be separated in order to control noise in some setup environments. The separation of signal, power and case returns allows to differentially program the power supply in order to avoid any noise injected from the low voltage side. The case return under any circumstances shall be connected to ground.

9. Block Diagram for Operation with 2600-00-0005 Interfaces

CPS, Inc. supplies also RS-232 to fiber optic interface and AC/DC converter in one box for operations from AC mains. The connection diagram below in Figure 4 explains how this two units work together.

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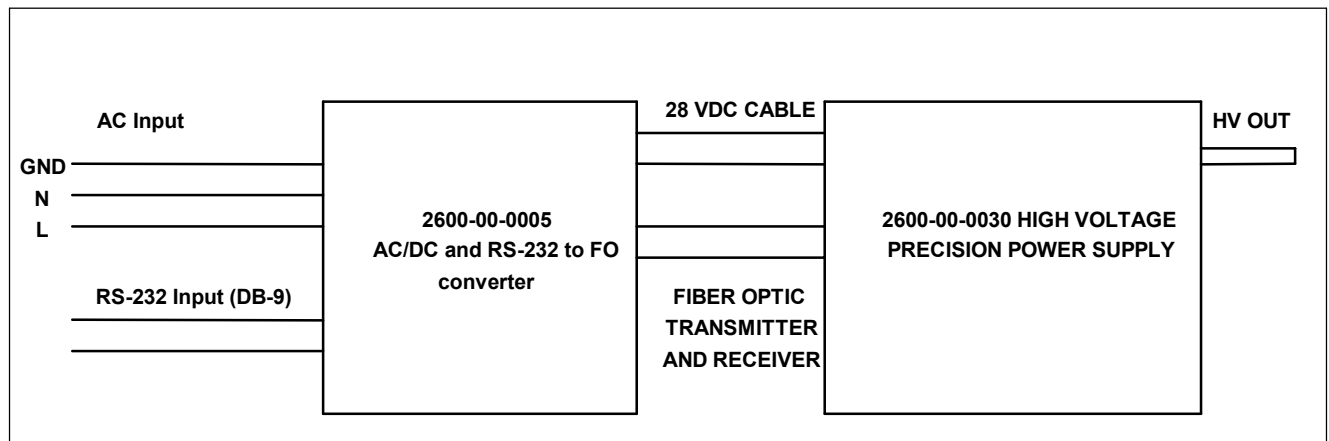


Figure 4. Block Diagram for Operation with 2600-00-0005 Interfaces

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.

10. 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.

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Step A

The chassis of the high voltage power supply must be grounded. Use the ground in the power input connector for this connection.

Step B

Attach the high voltage output cable to the load. The cable used should 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 tightens. Any type of 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 input power supply and the fiber optic cable to the equipment. Make certain that the connections match the transmitting and receiving sockets for the power supply and RS-232 to fiber optic converter (not included, any type that uses HFBR type of transmitting and receiving sockets can be used). Be sure that RS-232 cable is connected to the host computer's COM1 port.

Step E

Run the software on the control computer. Use any Microsoft Visual Basic for 32-bit Windows Development compiler, such as Visual Basic 5.0. Once the program is run, click on the "**Disable**" button in the upper-left side of the screen (see Figure 5).

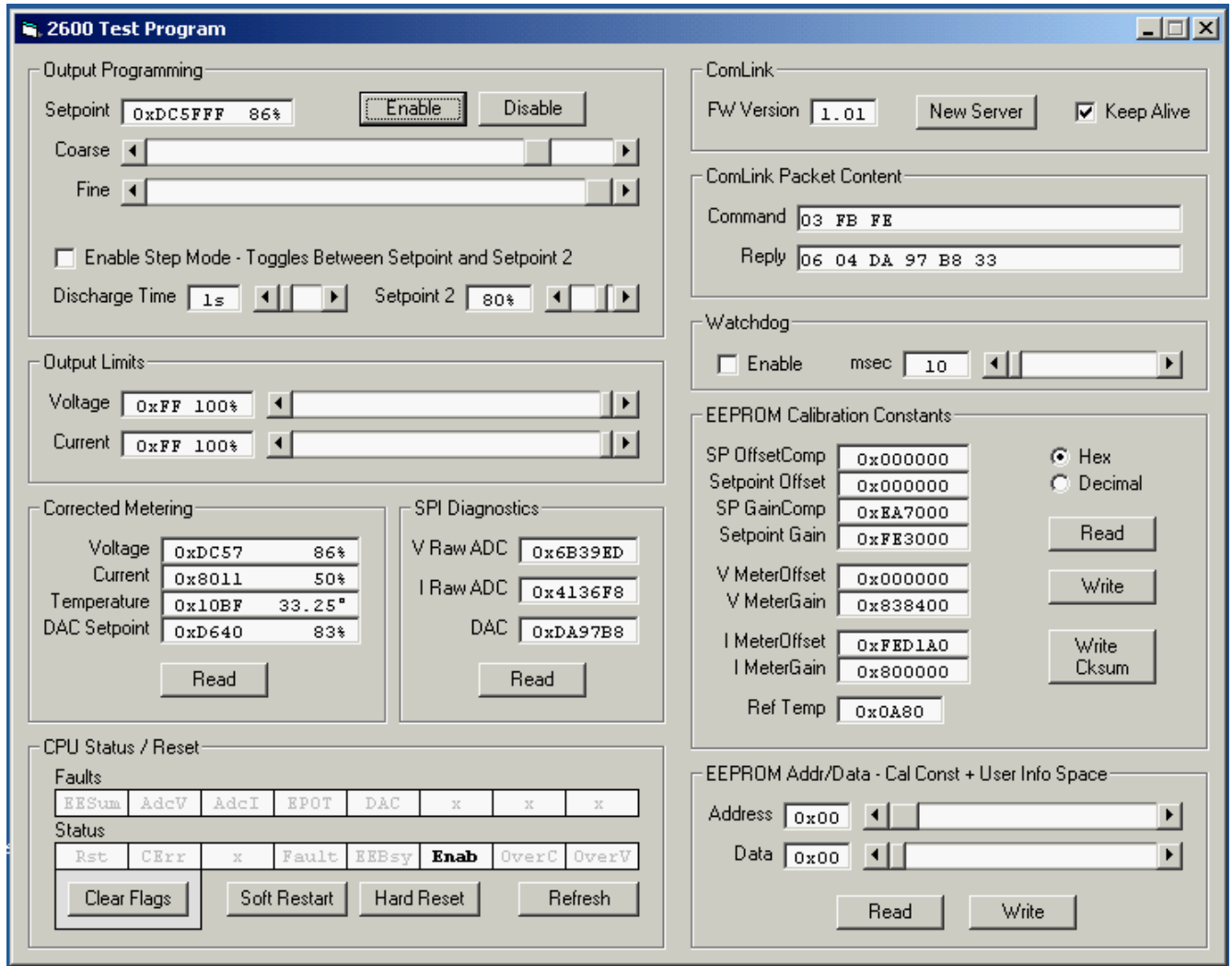


Figure 5. Control program VB 5.0 screen

Step F

The input power supply may now be connected and switched on. Make sure that the input voltage is adjusted within acceptable range.

Before enabling high voltage output by clicking on “**Enable**” button (left upper side), make sure that the “**Output Programming**” slider is adjusted to minimum, and voltage and current “**Output Limits**” sliders are set to required values. You can constantly read output values by checking “**Keep Alive**” in the upper left corner.

If there is an **EESum** fault displayed on the **CPU Status/Reset** section of the screen, click on the “**Read**” button in the **EEPROM Calibration Constants** section, then click on the “**Write**”

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and **“Write Cksum”** buttons, and finally click on the **“Soft Restart”** button in the **CPU Status/Reset** section. If the fault does not disappear, please contact technical help at CPS.

Step G

Enable the power supply by clicking on **“Enable”** button, and adjust the output voltage to a required value by using **“Output programming”** slider.

To switch off the high voltage output, disable the power supply or turn off input power supply.

To work in the step mode check the **“Enable Step Mode”** square and adjust the desired values.

Customer can modify the VB interface if other than supplied control schemes are required. CPS, Inc. can also provide this service. For firmware information please refer to the following documents (available on the diskette):

- 2600-81-0001_CommandSet
- 2600-81-0002_FirmwareStructure

CAUTION

The **“EEPROM Calibration Constants”** are factory adjusted during the final test procedure. Changing these constants may affect output and metering accuracy and/or temperature coefficient. These constants can be changed and written into micro controller’s memory under CPS’ supervision. If you need to recalibrate the power supply, contact technical help at CPS.

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.



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10. 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.