

DC Power Supply PSD3205X

User Manual

scientific

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DC Power Supply PSD3205X

- Floating DC supply voltage
- DC 0-32 V, 0 - 5 A, output power 160 W
- Constant voltage & constant current mode operation
- Digital display for voltage & current
- Adjustable current limiter with display
- Overload & short circuit protection
- Output ON/ OFF control
- Beeper ON/ OFF control

The **PSD3205X** 32 V , 5 A Power supply is designed as a **constant current (CC)** & **constant voltage (CV)** source for laboratories, industries & field testing applications, featuring low power loss. It provides DC output voltages & is ideally suitable for complex analog & digital testing.

The DC output can be continuously adjusted from 0 to 32 V with coarse & fine controls. Current limit is also adjustable from 0-5A. Any over loading for adjusted current limit is indicated by "**CC**" LED & any high voltage or under voltage for input is indicated by "**HV/ UV**" LED.

3 digit display for voltage & 3 ½ display digit for current, the power supply is used to read the instantaneous values. In addition to low residual ripple & noise as well as excellent line & load regulation, the **PSD3205X** is provided with all protective circuits to ensure trouble free operation.

Technical Specifications

DC Output	:	Voltage: 0 - 32 V, Continuously variable by means of coarse & fine controls Current : 0- 5 A (Max.)
Setting Resolution	:	Voltage: 10 mV Current : 5 mA
Internal Resistance	:	$\leq 10 \text{ m}\Omega$
Transient Response	:	100 μsec to within 10 mV of set output voltage for load change from 10% to 90%.
Constant Voltage Mode		
Regulation	:	Line: $\pm (0.01\% + 2 \text{ mV})$ for $\pm 10\%$ change in line input Load: $\pm (0.01\% + 2 \text{ mV})$ for load change from zero to full load
Ripple & Noise	:	$\leq 0.5 \text{ mV rms max.}$, 20 Hz - 20 MHz.
Drift	:	$\leq \pm (0.2\% + 5 \text{ mV})$ within 8 hrs. Warm up at constant line, load & ambient temperature condition
Constant Current Mode		
Regulation	:	Line: $\pm (0.1\% + 250 \mu\text{A})$ for $\pm 10\%$ line change Load: $\pm (0.05\% + 250 \mu\text{A})$ for change in output voltage from 0 V to maximum output voltage
Ripple & Noise	:	$\leq 3 \text{ mArms}$
Drift	:	$< \pm (0.5\% + 5 \text{ mA})$ within 8 hrs. warmup at constant line, load & ambient temperature condition
Temp. Coefficient	:	$\leq \pm (0.05\% + 5 \text{ mV}/^\circ\text{C})$
Current setability	:	Adjustable between 0 A to 5 A
Display	:	3 digit for voltage & 3 $\frac{1}{2}$ digit for current
Display Resolution	:	Voltage: 100 mV Current: 10 mA
Accuracy	:	$\pm 3 \text{ D}$
Over load Indication	:	By lighting 'CC' LED
General Information		
Built-in overheat, overload, over & under mains/ line voltage protection		
Insulation	:	Between chassis & output $> 10 \text{ M}\Omega$ at 100 V DC Between chassis & AC plug $> 50 \text{ M}\Omega$ at 500 V DC
Power Supply	:	230 V $\pm 10\%$, 50 Hz

Operating Conditions : 0 - 50° C , 95 % RH
Storage Conditions : -20°C to 70°C
IP Protection : IP51
Dimension : W 204, H 161, D 342 mm
Weight : 9 kgs. Approx.
Accessories:
Standard: Spare Fuse

(Subject to change)

Front Panel Controls

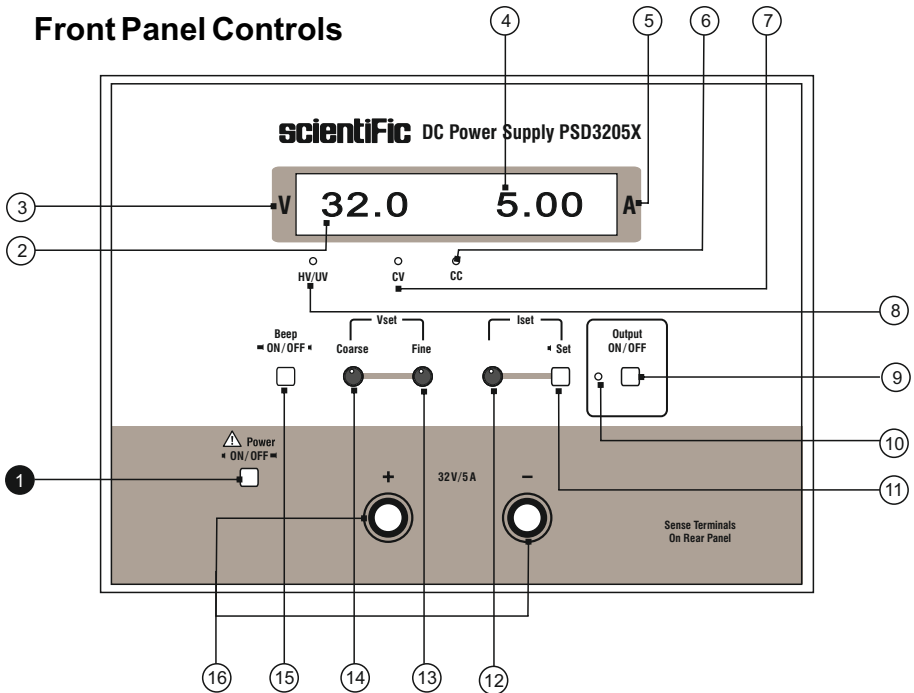


Fig.1 Front Panel Controls

- ① **Power:** The instrument is switched ON or OFF using this switch.
- ② **Voltage display:** This is 3 digit LED display that shows set output voltage.
- ③ **V:** Letter 'V' at left hand side of voltage display ②, indicates unit of voltage i. e. Volts.
- ④ **Current display:** This is 3 ½ digit LED display that shows the required set output current (after press & hold 'Set' push button) as well as applied load current across the output banana terminals.
- ⑤ **A :** Letter 'A' at right hand side of current display ④, indicates unit of current i.e. Ampere.
- ⑥ **CC indicator:** It indicates the overloaded condition or 'constant current mode' operation of instrument
- ⑦ **CV indicator:** It indicates 'constant voltage mode' operation of instrument.
- ⑧ **HV/ UV indicator:** It indicates the 'High Voltage mode' i.e. when line input

crosses specified upper limit, then this LED will glow & 'Under Voltage mode' i.e. when line input crosses specified lower limit, then this LED will glow

- ⑨ **Output ON/ OFF:** Output can be enabled or disabled with the help of this switch. When switch is in default state (released position), the output is 'OFF' & pressed then output is 'ON'.
- ⑩ **Output ON/ OFF Indicator:** It indicates ON/ OFF status of output, when LED is on Output is ON.
- ⑪ **Set (Push Button) :** To see the set output current on current display ④ press & hold this push button.
- ⑫ **Iset potentiometer:** The required output current is set by adjusting Iset control potentiometer. from 0 to 5 A.
- ⑬ **Vset Fine potentiometer:** The output voltage is set for the range of 2 V with high resolution by adjusting Vset fine control potentiometer..
- ⑭ **Vset Coarse potentiometer:** The coarse adjustment of output voltage is done by Vset coarse control potentiometer..
- ⑮ **Beep ON/ OFF:** Beeps can be enabled or disabled using this switch. In default state (released position) when the instrument is overloaded or in constant current mode then beeper is ON along with CC LED is ON. Beeper can be disabled by pressing this switch.
- ⑯ **+/- Terminals:** These are the output terminals. The load is applied across these terminals.

Rear Panel Controls

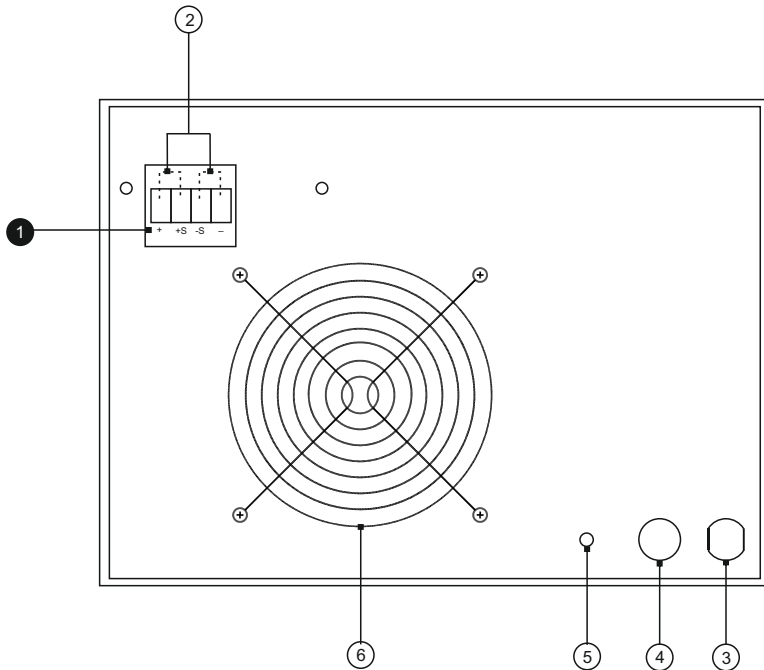


Fig.2 Rear Panel Controls

- ❶ **Sense block terminal:** This block consist of 4 terminals of output, as + ve Output (+), -ve Output (-), Sense + (S+), Sense - (S-)
- ❷ **Terminal shorting wire:** On rear panel at sense block +ve terminal (+) with sense + (S+) & -ve terminal (-) with Sense - (S-) to be shorted with wires of very low resistance.
- ❸ **Mains:** Mains input 230 VAC 50 Hz \pm 10%.
- ❹ **Fuse:** Fuse for mains is kept inside.
- ❺ **E terminal:** The power supply is floating DC power supply where ground reference is not shorted with earth terminal. Any ripple noise present in power supply reference ground is filtered to earth through a capacitor, that suppresses the common mode noise.
- ❻ **Fan:** Low noise fan cools the instrument. The speed of the fan depends on the temperature of the internal heatsink. Fan maintains the temperature of instrument, when over temperature condition occurs.

Operating Instructions

General Information

The logical front panel layout of **PSD3205X** ensures rapid familiarization with the various functions. However, even experienced operators should not neglect to carefully read the following instructions, to avoid any operational errors & to be fully acquainted with the instrument when later in use.

After unpacking the instrument, check for any mechanical damage or loose parts inside. Should there be any transportation damage, inform the supplier immediately & do not put the instrument into operation.

Safety

The case chassis & all measuring terminals are connected to the protective earth contact. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord without a protective conductor.

Warning!

Any interruption of the protective conductor inside or outside the instrument or disconnection of the protective earth terminal is likely to make the instrument dangerous. Intentional interruption is prohibited. The mains/line plug should be inserted before connections are made to measuring circuits.

When removing or replacing the metal case, the instrument must be completely disconnected from the mains supply. If any measurement or calibration procedures are unavoidable on the opened-up instrument, these must only be carried out by qualified personnel acquainted with the danger involved.

Operating Conditions

The ambient temperature range during operation should be between + 0° to + 50°C RH 90% & should not exceed -20°C or +70°C during transport or storage. The operational position is optional. Prior to calibration a warm-up time of approx 30 minutes is required.

First Time Operation

After unpacking the instrument check for mechanical damages. The instrument should be plugged in mains-plug of proper main supply 230 V \pm 10%. On switch ON no undue observation should be noticed. Once the instrument is switched "ON", the power "ON" is indicated by lighting of display .

Description

Output

PSD3205X can either be used as a constant voltage source with current limiting or as a constant current source with voltage limiting. The change of mode occurs sharply at the crossing of the voltage and current settings. Fig. 3 shows the output ranges.

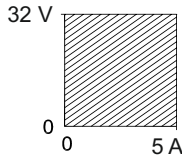


Fig. 3 Output ranges

Every point in hatched area can be used.

Display CV/CC Settings Function

The settings of the voltage control can be set on the front panel by varying the V_{set} potentiometer & current control can be set on the front panel by holding I_{set} push button & simultaneously varying the I_{set} potentiometer. This allows the current limit to be set when operating in the CV mode without shorting the output terminals.

Overload Protection

The power supply is fully protected against all overload conditions, including short circuit.

CV Regulation

The CV - load regulation should be measured directly on the sense output terminals because a few cm of cable can have a voltage drop of several mV (at high current!).

CC Regulation

For accurate CC - load regulation, do not use external voltage sensing. A voltage between S- and minus output will create a small error per volt. A voltage between S+ and + is not critical. The CC-stability is also affected by external voltage sensing.

Status Outputs

There are LEDs indicating status of output in various conditions as below:

CV (LED): It indicates “constant voltage” mode of instrument.

CC (LED): It indicates “constant current” mode of instrument.

HV/ UV (LED): It indicates “High Voltage” mode i. e. When mains/ line input crosses specified upper limit & “Under Voltage” mode i. e. When mains/ line input crosses specified lower limit, then this LED will glow.

Output ON/OFF (LED): When this LED glows, it indicates the ‘ON’ state of output.

Thermal Protection

The inbuilt thermal protection shuts down the output in case of insufficient cooling. After cooling down the instrument will start working again.

Hold - Up Time

The hold - up time depends on the load and the output voltage. A lighter load or a lower output voltage results in a longer hold - up time (see fig. 4).

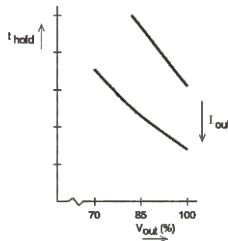


Fig. 4
Hold up time vs V_{out} with I_{out} as a parameter

Turn On Delay

The output voltage is available about 0.5 - 1 s after mains switched on.

Inrush Current

The inrush current is limited with a special circuit. Repeatedly switching “ON and OFF” does not change the maximum peak current. Switching ON and OFF at a fast rate can overheat the inrush current limiter.

Remote Sensing

The voltage at the load can be kept constant by remote sensing. This feature is not

recommended for normal use but only when the load voltage is not allowed to vary a few millivolts. Always use a shielded cable for sensing.

In order to compensate for the voltage drop across the load leads, the instrument will have to supply a higher voltage (see fig. 5): $U_{out} = (\text{voltage drop across each lead}) + (\text{voltage across the load})$.

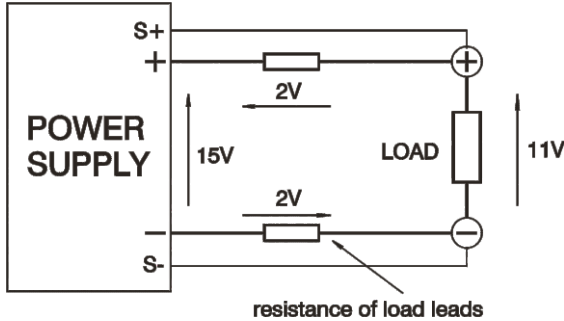


Fig. 5
Remote sensing

Series Operation

The PSD3205X can be connected in series without special precautions. Fig. 6 shows series operation of PSD3205X

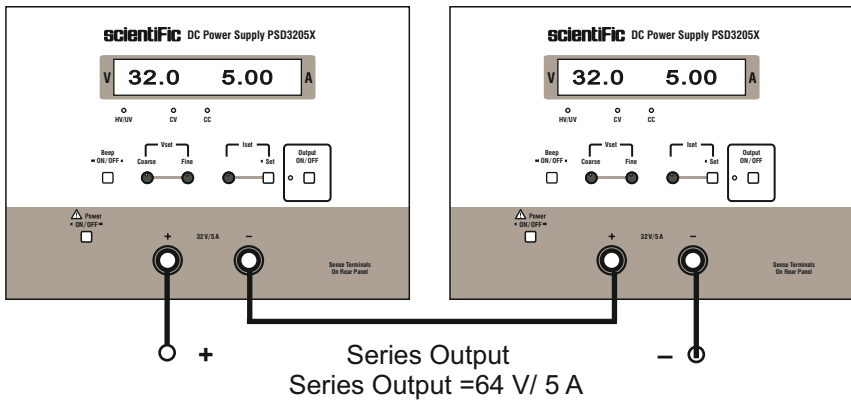
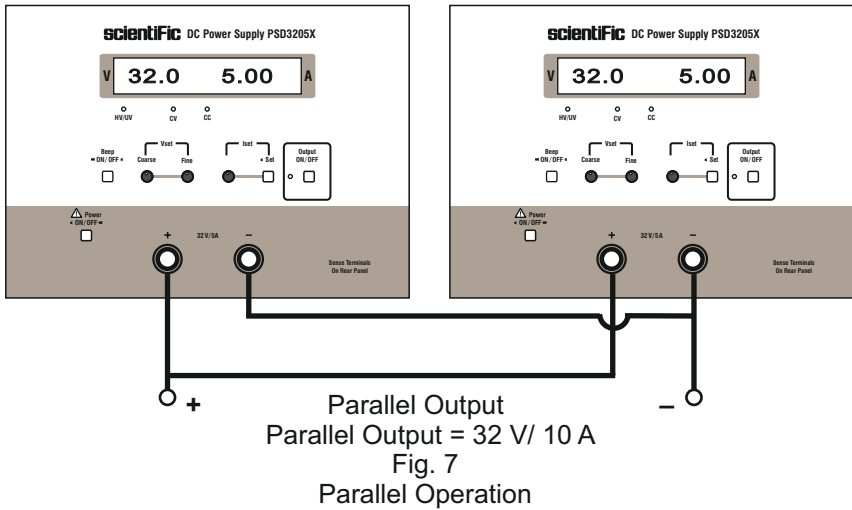


Fig. 6
Series Operation

Parallel Operation

PSD3205X can be used in parallel with other unit. Fig. 7 shows parallel mode of PSD3205X



Voltage & Current Limit

The Voltage and Current Limits maintain the output to a safe preset value. The limits can easily be set by varying the Vset potentiometer for voltage & by pressing Set push button & simultaneously varying Iset potentiometer for current on front panel.

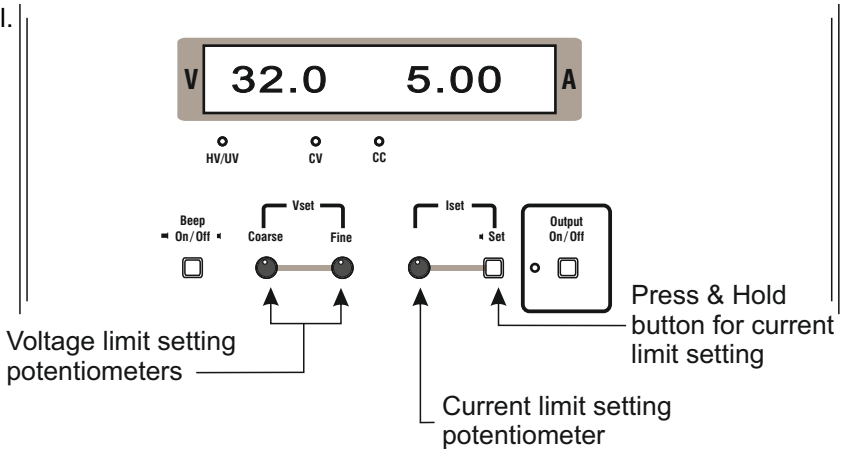


Fig. 8
Voltage & current adjustment controls on front panel

Cooling

A low noise blower cools the instrument. The speed of the fan depends on the temperature of the internal heatsink. Normally at 40 °C ambient and full load the fan will not work at full speed. A special feature is that the fan blows through a tunnel where the heatsink is situated, the delicate control circuitry is separated and will not be in the airflow path (see fig.9) The air enters from side front and exits at the rear side.

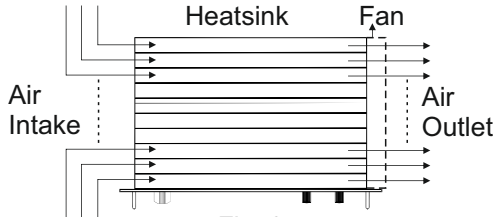


Fig. 9

The fan blows through the tunnel, where heatsink is situated

Dimensions

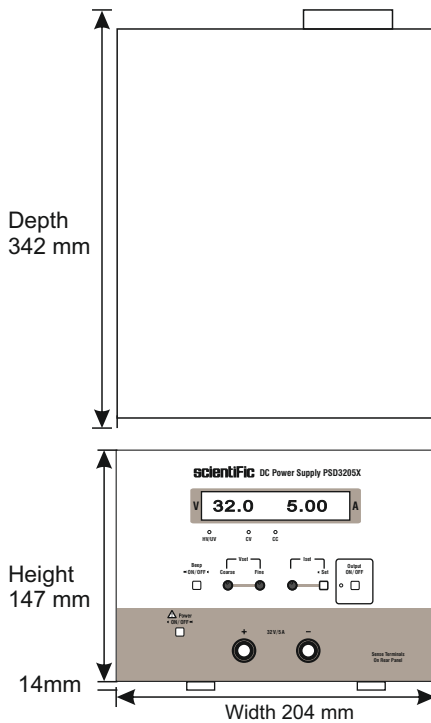


Fig. 10

Dimensions of instrument

Operation

Shorting terminals on sense block: Firstly on rear panel at sense block +ve terminal (+) with sense + (S+) & -ve terminal (-) with Sense - (S-) to be shorted with wires of very low resistance.

Power ON: Switch ON the unit using power switch ①, the indicator for CV ⑦, 3 digit voltage reading display ②, 3 ½ digit current reading display ④, glow.

Voltage Setting: Set the required output voltage on voltage display ② using coarse ⑭ & fine ⑬ control adjustment potentiometers. The voltage is adjusted from 0 to 32.0 V (approx.). The fine control adjustment ⑬ is up to 2.0 V, while keeping coarse potentiometer ⑭ at any position.

Current Limit Setting: Press & hold Set push button ⑪. Set output current on current display using Iset control potentiometer ⑫. The output current limit can be varied from 0.00 A to 5.00 A (approx.) using Iset control potentiometer ⑫.

Output Status: For ON/ OFF of output, use Output ON /OFF push button ⑨. Normally output is OFF & when push button is pressed output is turned ON.

Note: For proper operation +ve sense (S+) should be shorted with +ve output (+) & -ve sense (S-) with -ve output (-) with the help of shorting wires on rear panel at sense block.

Connecting The Load: Output voltage sense input for the power supply unit. Ensure that when using 2- wire output, the shorting wires at sense block on rear panel are fully tightened so that output terminals & sense terminals are shorted. This will ensure the output regulation within specifications & proper functioning of power supply. Fig.11 shows Load application with 2 wire Measurement.

When using 4 wire system, the load is connected between '+' & '-' banana terminals on front panel with appropriate conductor/ wire size. The sense wires are connected from +sense & -sense terminal (on rear panel) to load terminals.

Front Panel

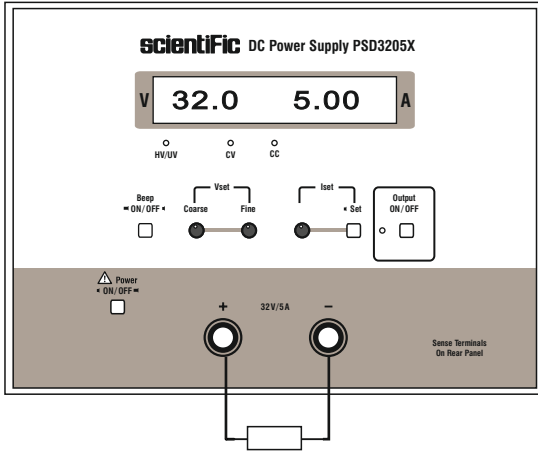


Fig.11 Load application with 2 wire Measurement

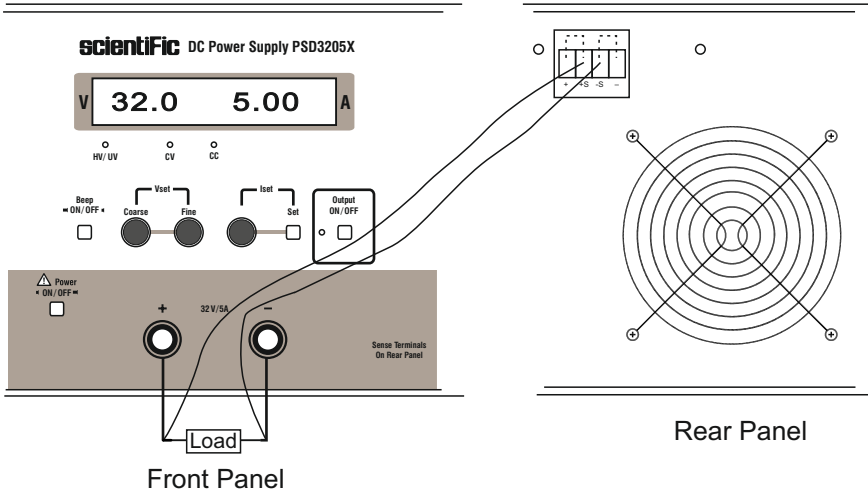


Fig.12 Load application with 4 wire Measurement

Ensure that all the four wires are tightened fully across the load to ensure regulation & proper functioning of power supply unit. Fig.12 Load application with 4 wire Measurement.

Observations:

- **Constant Voltage Mode:** The output voltage is unchanged/ constant for load current applied up to set current value. Constant voltage mode is indicated by CV (LED) ⑦ ON.
- **Constant Current Mode:** When load current is increased more than the set current limit then output voltage starts decreasing with respect to increase in Load current. Constant current mode is indicated by CC LED ⑥ ON.

Note: Beeper can be disabled by pressing 'Beep ON/ OFF' push button. In CC mode, CV LED ⑦ is OFF & CC LED ⑥ is ON.

Correct Voltage Measurement: connect calibrated DMM across +ve sense & -ve sense terminals on rear panel for measuring correct voltage at output.

Series Parallel Mode Operation: The power supply **PSD3205X** has an electrically floating output which permits easy series or parallel connection with other power supply units to increase supply voltage or current ratings respectively.

HV/ UV Mode: When mains/ line input is more then the specified upper line input limit or mains/ line input goes lower than specified lower limit, then the instrument enters in 'HV/ UV Mode'. This is indicated by litting HV/ UV LED & output voltage is OFF at this situation. When line input comes back to within limit then the instrument, automatically comes back into working mode & then HV/ UV LED will be OFF with output voltage is ON.

Maintenance

There are no user serviceable part inside **PSD3205X**.Your **PSD3205X** power supply is thoughtfully engineered for ease of use, accuracy & reliability. The instrument is carefully tested & calibrated using standards traceable to National Laboratories.

Take care of your instrument by cleaning the exterior of the instrument regularly with a dusting brush. Dirt which is difficult to remove on the casing & plastic parts, can be removed with a moist cloth (99% water, 1% mild detergent) spirit or washing benzene (petroleum ether) can be used to remove greasy dirt. The display may be cleaned with water or washing benzene (but not with spirit-alcohol solvents), it must then be wiped with a dry clean lint-free cloth. Under no circumstances the cleaning fluid should get into the instrument. The use of cleaning agents can attack the plastic & paint surfaces.

Power Line Fuse Replacement

The power line fuse is located on rear panel on lower right side. In case, the instrument does not show any sign of working, no LED is lit or there is no display immediately switch OFF the mains power switch of the instrument & unplug the mains cord from the mains socket. With the help of small flat blade screwdriver remove the fuse cap of the fuse holder, located just below the socket. There is one spare fuse kept in the fuse cap, replace it for the defective one. Press the cap so that it locks in place . The rating of the fuse is 5 A, 250 V, slowblow, 5x20 mm glass fuse. Do not use a fuse with a higher value other wise it may damage the instrument in case, the mains voltage goes much higher than the rating of the mains fluctuation of $\pm 10\%$.

Dispatch Procedure For Service

No user serviceable parts are inside the instrument, should it become necessary to send back the instrument to factory for service, please observe the following procedure.

Before dispatching the instrument please write to us giving full details of the fault noticed.

1. After receipt of your communication, our service department. will advise you whether it is necessary to send the instrument back to us for repairs or the adjustment is possible in your premises.
2. Dispatch the instrument (only on the receipt of our advise) securely packed in original packing duly insured & freight paid along with accessories & a copy of the faults details noticed at our Service Center listed on last page of this manual, nearest to you.

E-Waste

We support environment sustainable measures and solicit your cooperation in this endeavor by way of sending the equipment to us at the end of the life of the product. The equipment will be sent for recycling through authorised recyclers as per E-Waste Management Rules.

Please writes to us at support@scientificindia.com for this purpose. Your support will go a long way as each and each and everybody's action can led to improve global environment.

Warranty Conditions

1. Scientific warrants all its Instruments to be free from defects in material & workmanship when used under normal operating conditions in accordance with the instructions given in the manual for a period of 12 (Twelve) months from date of purchase from Scientific or its authorised dealers. The service during the warranty period will be rendered on return to factory /service center basis.
2. Its obligation under this warranty is limited to repairing or replacing at its own discretion. This warranty shall not apply to any defect, failure or damage caused by accident, negligence, mis-application, alteration or attempt to repair, service or modify in any way.
3. This warranty does not include LED, fuses, batteries or accessories. This warranty is only valid with the original purchaser who must have properly registered the product within 15 days from date of purchase. No other warranty is expressed or implied.
4. When it becomes necessary to return the instrument to our Factory facility, kindly pack it carefully in the original carton or equivalent & ship it duly insured, transportation charges prepaid.
5. Your Scientific instrument is a complex electronic device & deserves the best service available by technicians thoroughly familiar with its service & calibration procedures.

Notes

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