UWA ELEC5552

Project 2: MEMS Testing Power Supply (ANFF)
Team 14

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Operating and Maintenance Manual
Volume 1

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Team Contribution

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Julia Taule	22388829	Introduction Safety precautions Receiving, Handling and Storing Installation Specifications Operation Maintenance Troubleshooting

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1. Introduction

Congratulations on your purchase of the ELEC5552 Variable Power Supply. This model can deliver both DC and AC outputs and is continuously adjustable in the range 0-200V. It can be used for many applications, such as MEMS device testing. The device is delivered fully calibrated and tested ready for use in the lab.

2. Safety Precautions

This device supplies high voltages that can be harmful to humans. Ensure this manual is followed to ensure safe operation of the device.

Pay special attention to warnings and notices used in this manual such as:

> **WARNING: Failure to observe this instruction may cause injury to persons and damage the power supply and connected equipment.**

WARNING:

- Do not expose device to water or touch it with wet hands when live.
- Do not open the casing when the device is connected to power or 1 minute after disconnecting.
- All servicing should be carried out by competent qualified personnel only. Any modifications made to this device will void warranty.

CAUTION:

- This device is for indoor use only, and is not to be operated in a humid or high pollutant environment or near a heat source.
- Ensure input supply is within the ratings of the device prior to connection. See **Section 5** for device specifications.
- All ventilation is to be kept clear while in use to ensure sufficient heat dissipation.
- Ensure Chassis Earth is connected prior to operation.

2.1 Codes and Standards

This device is designed to comply with the relevant Australian Standards regarding the safety of electrical equipment. No modifications to the device should be undertaken, to ensure compliance with these standards.

This power supply complies with industry certifications and regulatory standards to ensure safe and reliable operation such as:

- CE Certification: The power supply meets the essential health and safety requirements defined by European Union directives.
- UL Certification: The power supply has been tested and certified by Underwriters Laboratories (UL) in order to meet safety and performance standards.
- RoHS Compliance: The power supply is RoHS compliant, thus is adheres to the Restriction of Hazardous Substances directive, reducing the use of hazardous materials.

3. Receiving, Handling and Storing

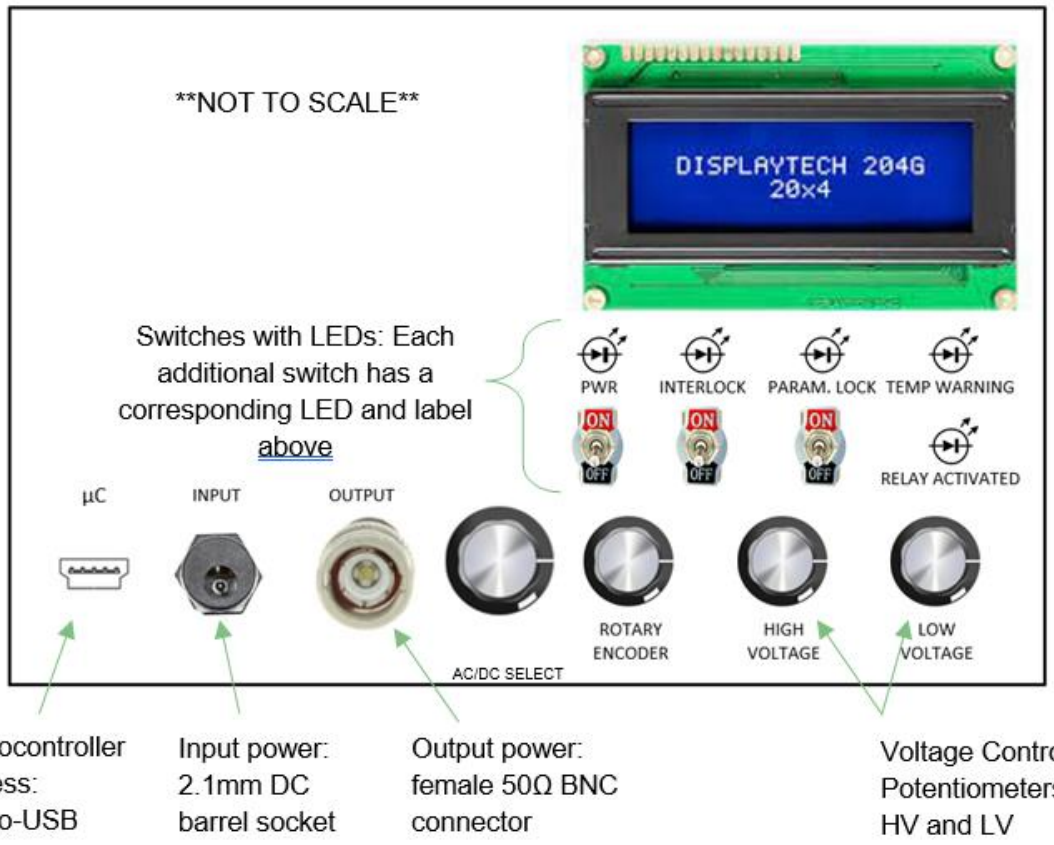
The device is delivered pre-calibrated and ready to use. Ensure careful handling and adherence to instructions on the packaging when opening.

The device is to be stored in a cool, dry place and to be kept out of direct sunlight. Ensure power is not supplied to the device while in storage to avoid undesired wear on internal components.

4. Installation

This device is a stand-alone piece of equipment. It requires a 12VDC input via DC barrel socket. The output connection is a female BNC for compatibility with standard lab equipment.

Ensure the device is used in a clean environment and that ventilation of the device is not blocked while in use, to avoid excessive internal heat generation. The system's human-machine interface is pictured below, which is used to set device parameters including the output signal type, AC or modulation frequency and voltage, as well as the output protection current limit.



5. Specifications

Display	LCD 20x4
Display Accuracy	0.1V (10-bit ADC)
Voltage Output (DC)	0.8 to 200V
Current Output (DC, AC)	0 to 10mA
Voltage Output (AC)	0 to 200V_{RMS}
Ripple and Noise	<50mV_{p-p}
Installation Category	CAT 2 (?? Dep on casing ??)
Pollution Degree (IEC 60664-1)	2 (goes from 1 to 4)
Supply Voltage	12VDC
Dimensions	450mm x 100mm x150mm
Weight	~1kg

6. Operation

1. Connect Chassis earth to one of the provided earthing screw points on the enclosure. Uses simple earthing cable with circular connector.

2. Connect the 12 input power to device via barrel jack.
   Note: Ensure compatible ratings by referring to **Section 5**.

3. Connect your load to the output BNC connector.

4. Enable the output by the "power on" switch.
   CAUTION: The output terminal and load are now live – Do Not Touch.
   Note: A green LED should turn on at this point. If not, refer to trouble shooting guide below.

5. Use the large rotary switch labelled "AC/DC SELECT" to choose either AC, LV DC (0-30V), MV DC(30-80V) or HV DC(80-200V).

6. Select the output parameters including AC voltage and frequency, AC or DC modulated frequency and the current limit using the button in the rotary encoder, when the menu Screen has a ">" next to the desired parameter, it may be adjusted.

7. Adjust output parameters by rotating the encoder knob as desired while reading the display.

8. After parameters have been set, wait 1 minute prior to using power source to allow for internal controls and stabilization.

9. Once finished, switch off the power supply and disconnect the source.
   WARNING: Do not touch output terminal directly after disconnecting. Voltage will remain at the terminals for approximately 1 minute post de-energisation.

6.1 Default Parameters and Adjustment

The output is limited to 80V by default to ensure user safety. To override this interlock:

1. Set the Output Select to HV DC.
   WARNING: This enables voltages exceeding 80V at the output and may cause serious injury. Device only to be operated by qualified personnel.

Set the current output limit:

The default current output limit is 10mA. This can be adjusted to lower values by using the digital potentiometers to tune the R_2 resistance values and the R_1/R_2 ratio in the code:

$$9\text{mA} \rightarrow R_2 = 56k\Omega, \quad \frac{R_1}{R_2} = 0.018$$

$$8\text{mA} \rightarrow R_2 = 62.5k\Omega, \quad \frac{R_1}{R_2} = 0.016$$

$$7\text{mA} \rightarrow R_2 = 71k\Omega, \quad \frac{R_1}{R_2} = 0.014$$

$$6\text{mA} \rightarrow R_2 = 83k\Omega, \quad \frac{R_1}{R_2} = 0.012$$

$$5\text{mA} \rightarrow R_2 = 100k\Omega, \quad \frac{R_1}{R_2} = 0.010$$

$$4\text{mA} \rightarrow R_2 = 125k\Omega, \quad \frac{R_1}{R_2} = 0.008$$

$$3\text{mA} \rightarrow R_2 = 167k\Omega, \quad \frac{R_1}{R_2} = 0.006$$

$$2\text{mA} \rightarrow R_2 = 250k\Omega, \quad \frac{R_1}{R_2} = 0.004$$

$$1\text{mA} \rightarrow R_2 = 500k\Omega, \quad \frac{R_1}{R_2} = 0.002$$

7. Maintenance

Ensure storage and use instructions are adhered to. For any service or maintenance requests, please contact the supplier. For replacement components, please consult the individual component technical specification sheets or contact the supplier.

OCCURRENCE	ACTION
DAILY CHECKS	Perform visual inspection to check for loose or disconnected cables and wires.
	Monitor the power supply for any unusual smell or noise during operation.
WEEKLY CHECKS	Inspect the power supply's LED indicators to verify proper operation and status is shown.
	Confirm there are no signs of overheating, such as burning smells or hot spots.
MONTHLY CHECKS	Perform an extensive visual inspection of all internal

	components for signs of wear, loose connections, or damaged components.
	Using a multimeter, measure the output voltage and current to ensure they are within the specified range.
	Check the power supply's documentation and perform any firmware or software updates needed.
	Inspect the power supply's input and output terminals for any signs of corrosion or oxidation. Replace these or clean them as needed.

7.1 Visual and Mechanical Checks

Prior to energising the device, visually inspect all connections and outer components for evident damage and moisture or dust ingress.

CAUTION: Avoid opening the case unnecessarily as this can cause pollutant ingress, which can lead to increased deterioration of the device and components.

7.2 Cleaning

The device should be regularly dry-wiped to remove dust and other pollutants. Please refrain from cleaning the device with water.

OCCURRENCE	ACTIONS
DAILY TASKS	Inspect the exterior of the power supply for any visible dirt, dust or debris, and clean as required.
WEEKLY TASKS	Perform a comprehensive cleaning of the power supply's exterior, especially the vents and cooling components.

CAUTION: Avoid using conductive or abrasive materials to clean. Internal electronic components are highly sensitive to pollutants and moisture. Do not use water or any other conductive liquids as this may cause device to fault.

CAUTION: Internal cleaning should only be performed by qualified technicians.

CAUTION: Use appropriate personal protective equipment when cleaning. These can include gloves, safety glasses and dust mask.

7.2.1 Cleaning Procedure

1. Ensure the power supply is switched off and disconnected from the power source.
2. Use compressed air to remove dust and debris from external surfaces.
3. Brush away remaining dust and debris using a soft-bristle brush.
4. Use a lint-free cloth with isopropyl alcohol, ensuring it is not dripping wet, and wipe exterior surfaces.
5. Ensure the power supply is completely dry before reconnecting it to the power source.

8. Troubleshooting

Problem	Indications	Possible Causes	Suggested Solutions
Power Supply not working	Panel display not on	1. DC Power Supply not connected. 2. Fault detected and safety mechanism activated.	1. Check connection and power supply. 2. Visual inspection of device, contact supplier.
No output from power supply	Display showing zero voltage and current	1. Incorrect circuit selection. 2. Fault detected and output protection activated. 3. Output short circuited.	1. Refer to Section 6 for circuit selection. 2. Visual inspection of the device and contact supplier. 3. Check output connection and rewire after turning off the power supply
Inaccurate voltage reading	Actual voltage output is different from the displayed	1. Incorrect selection of measurement readout to display. 2. Voltage measurement/set calibration error	1. Refer to Section 6 for display selection. 2. Contact supplier
Output Select not working	Actual output different to selected	1. Incorrect use of output select switch. 2. Output select incorrect manufacturing	1. Refer to Section 6 for operation of output select. 2. Contact supplier

If you are unable to clarify the problem you are facing, please contact Team14 or any of our distributors for repair service.

9. Warranty

This product provides 5 years warranty under normal usage. Do not replace parts or undertake any form of modification to the product in order to keep the warranty effectively.