M69910

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ARC LAMP POWER SUPPLY

MODEL 69910

USER MANUAL

Please read these instructions completely before operating this equipment. The specification and operating instructions apply only to the model(s) covered by this manual. If there are any questions or problems regarding the use of this equipment, please contact Newport or the representative from whom this equipment was purchased.
Rev: C

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I. INTRODUCTION

DESCRIPTION / FEATURES

The Newport model 69910 power supply was designed to meet the needs of a regulated source of power or current for proper operation of high power ARC light sources. The 69910 provides constant power/current operation of these sources of radiation, which is recommended for radiometric measurements or whenever highly stable light output is needed.

Features include:

- Adjustable output with preset so that the output can be set before running the lamp.
- Digital display for precise monitoring of current, voltage, power and lamp running time.
- LED indicators to show the status of important power supply functions.
- Start/stop control to ignite the lamp at preset values in order to minimize overshoot/undershoot of operating current to the lamp. Stop allows shut down of the lamp with continued cooling until the lamp reaches room temperature.
- Safety interlock connector to provide a safeguard against accidental exposure to UV light when used with a Newport lamp housing.
- Remote I/O connector on the rear panel to provide remote metering capability and direct connection to the Newport Digital Exposure System models 68950 or 68951. These are typically used when a high level of long term stability is required.
- RS-232 Port to enable remote communication, operation, and monitoring of the power supply.
- Optional IEEE-488 Communication (GPBI) to allow remote operation and monitoring of the power supply.

DIMENSIONS

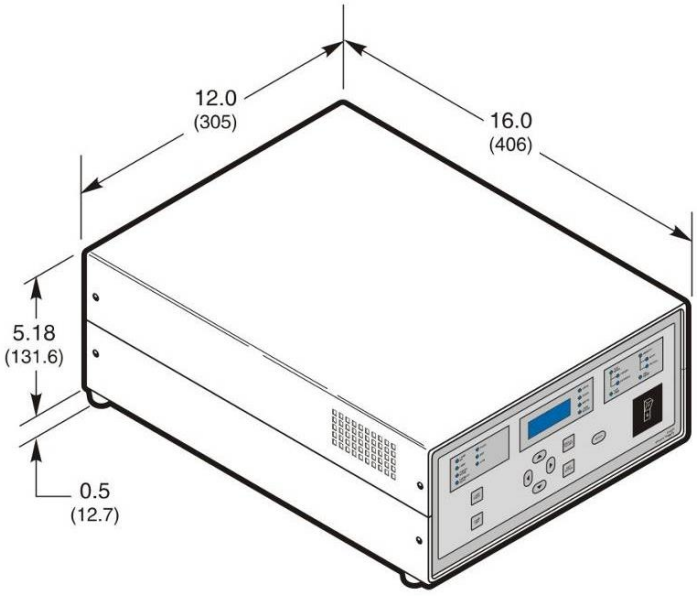

Figure 1

ORDERING INFORMATION

Arc Lamp	Lamp Description	Power Range Watts	Typical Voltage VDC	Typical Current ADC	Average Life (Hours)	Lamp Housing [1]
MERCURY LAMPS						
6283NS	200W Hg	160 - 220	57	3.5	1000	Research Housings
6286	350W Hg	280 - 385	60	6.0	1000	Research Housings
6285	500W Hg	400 – 550	76	6.6	800	Research Housings

Table 1 Arc lamps for Model 69910 600W power supply

Oriel lamp housings: Research Housings models 66901-66905, 67001, 67003, 67005 (the difference between these housings is the condenser lens).

The lamp / heat sink used depend upon the model of solar simulator or research arc lamp housing in which it will be installed.

If there are any questions regarding which lamp to order, contact Newport or your regional sales representative.

[1] Certain lamps may be used in solar simulation systems. Please refer to the solar simulator manual for lamp adapters and operation conditions when using the power supply in these systems.

69910 REPLACEMENT ITEMS

Model	Item Description
70010	Line Cord (North America, Japan) 10A, 125 VAC
70051	Hg Lamp interconnect cable

Table 2 Spare Components

Contact Newport or your regional sales representative for other line cord options.

II. SAFETY NOTES

UV HAZARDS

- ***Our ARC Lamps produce considerable ultraviolet and infrared radiation. Avoid excessive exposure of the eyes or skin to radiation from these lamps. Protective eyewear, gloves, and UV Warning Signs are available from Newport.***

  49126 UV Safety Goggles
  49121 Protective Gloves, Size 10 (3 pair)
  49123 Protective Gloves, Size 8 (3 pair)

ELECTRICAL HAZARDS

- ***Make all connections to or from the power supply with the power off. There may be up to 200 volts present at the output terminals; this could be dangerous if care is not exercised when the power supply is on.***
- ***Do not use the power supply without its cover in place. Lethal voltages are present inside.***

FIRE HAZARDS

- ***Arc lamps are extremely hot during operation, and for several minutes after being shut off. Keep flammable objects away from the lamp and lamp housing.***
- ***Newport Research (Fan-Cooled) Housings are equipped with a condenser lens. The re-focused output of this lens can cause ignition of flammable targets (ex: wooden walls, certain chemicals).***
- ***Use the line cord that shipped with the power supply or equivalent substitute. Line cord is 14 AWG due to high currents at low AC voltages.***

KEEPING THE LAMP IN GOOD CONDITION

- ***Never touch the lamp envelope or element with uncovered fingers, even during installation, or its lifetime and performance can be negatively affected.***
- ***Do not run the lamp more than 10% above its current or power rating. Source lifetime will decrease dramatically at higher operating point.***
- ***Do not run the lamp less than 80% below its current or power rating. Spectral output will be adversely affected.***

III. USING THE POWER SUPPLY

REAR PANEL CONNECTIONS

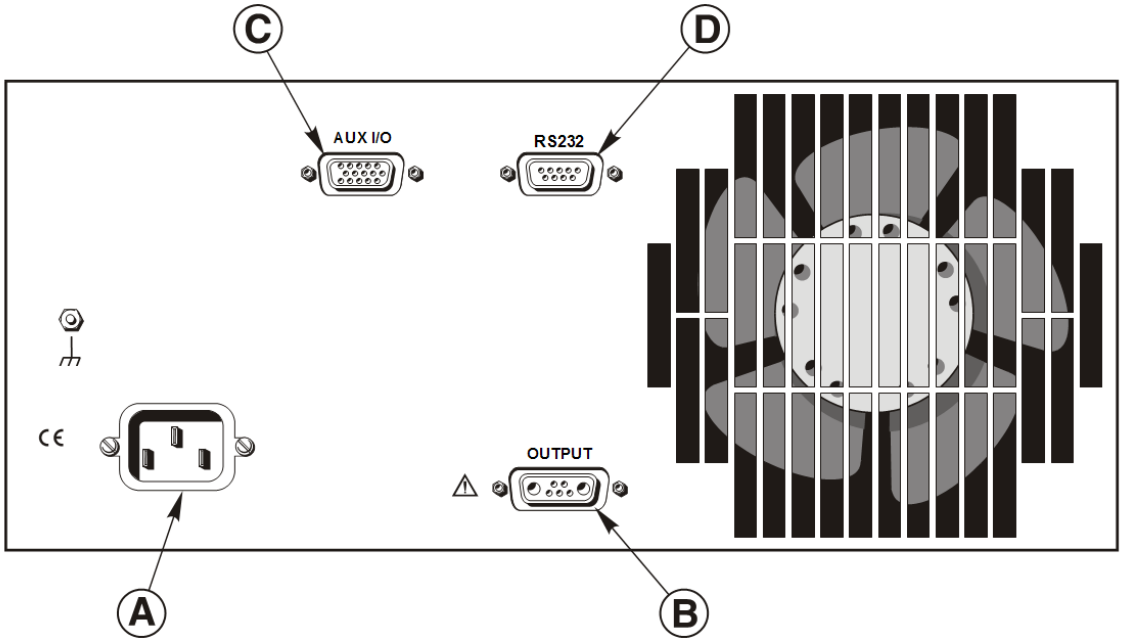

Figure 2

AC MAINS CONNECTION

NOTE: The Recommended Line Voltage for the 69910 is 95-264 VAC, 50/60 Hz.

Verify that the front panel power switch is in the off position, and then connect the provided AC cable between the IEC style socket (A in Figure) on the rear panel and the wall outlet.

Caution: Use the line cord shipped with the power supply or equivalent substitute. Line cord is 14 AWG due to high currents at low AC voltages.

LAMP CONNECTIONS

With the power supply off, connect the cables from the Newport lamp housing/ignitor to the OUTPUT connector, (B in Figure), which provide the necessary signals to interface to a Newport lamp housing and ignitor.

gives signal information at the rear terminals of the power supply. Please note that the 70051 cable has A1 and A2 pins reversed in the cable assembly.

PIN	SIGNAL	
A1	LAMP (-)	Connection to lamp negative terminal
A2	LAMP (+)	Connection to lamp positive terminal
1	GND	Ground for interlock (fan/elapsed time indicator if in housing)
2	INTERLOCK (+)	Connected to +12V to satisfy interlock
3	+12V	Dc voltage for interlock (fan/elapsed time indicator if in housing)
4	IGNITOR DRIVE	Momentary ground connection to fire Newport ignitor
5	INTERLOCK (-)	Connected to GND to satisfy interlock

Table 3 Pin out signals

MATING CONNECTOR:

Body: ITT# DAM-7W2P-K87 (includes pins 1-5)
Pins: ITT# DM 53745-1 (requires 2 per connector, A1 and A2)
Backshell: standard 15-pin D-SUB

INTERLOCK

The 69910 has a safety interlock feature which must be satisfied before the power supply output will activate and which, if broken during operation, will disable the power supply.

When connected to a Newport Lamp housing, cables must be attached, the housing must be closed properly and any over temperature sensor satisfied for the power supply to drive the lamp.

The cable used for the other applications includes 2 pairs of interlock wires in each cable, which are shorted together to represent a satisfied interlock condition. If an interlock is desired with these configurations, separate the brown and blue interlock wires at the lamp/element end of the cable and tie them into the interlock system. A contact closure is required to satisfy the interlock.

REMOTE CONNECTOR

Access to the internal metering and control signals is provided through this connector (C, Figure). It is a High Density 15 pin D-SUB connector with the following pin assignments:

Pin 1 External control input. A 2.5–5 volt DC signal will decrease the output approximately 20% maximum. 5 Vdc represents maximum turn down.
Pin 2 Not used.
Pin 3 Input control common.
Pin 4 Not used.
Pin 5 Remote start common
Pin 6 Not used.
Pin 7 Remote start/stop. Momentary contact with remote start common will start lamp if lamp is off. When lamp is on, this action will stop the lamp.
Pin 8 Not used.
Pin 9 Remote meter output: Power 0-2.0V indicates 0-600W.
Pin 10 Remote meter output. Current 0-2.0V indicates 0-12A.
Pin 11 Remote meter output: Voltage 0-2.5 indicates 0-100V.
Pin 12 Not used.
Pin 13 Not used.
Pin 14 Not used.
Pin 15 Not used.

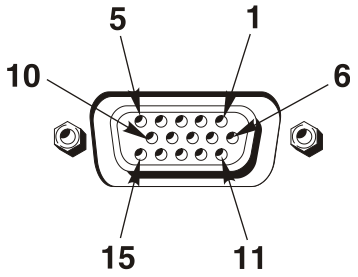

Figure 3

Remote Connector 15- Pin D-SUB Assignment

RS-232 CONNECTOR

Access to all of the power supply operating functions can be controlled via a RS-232 communications link to a PC. (D, Figure). It is a 9-pin D-SUB connector with the following pin assignments:

Pin 1 Not used.
Pin 2 TX.
Pin 3 RX.
Pin 4 Not used.
Pin 5 GND.
Pin 6 Not used.
Pin 7 Not used.
Pin 8 Not used.
Pin 9 Not used.

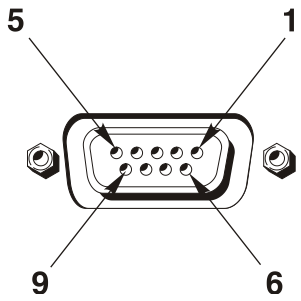

Figure 4

RS-232 Connector 9- Pin D-SUB Assignment

The cable for the RS-232 connection can be ordered from Newport as follows:

Computer	**Power Supply**	**Newport Part Number**
Female DB9	Male DB9	70040
Female DB25	Male DB9	10-60-015

Please contact your Newport sales representative to order the cable.

FRONT PANEL CONTROLS AND DISPLAYS

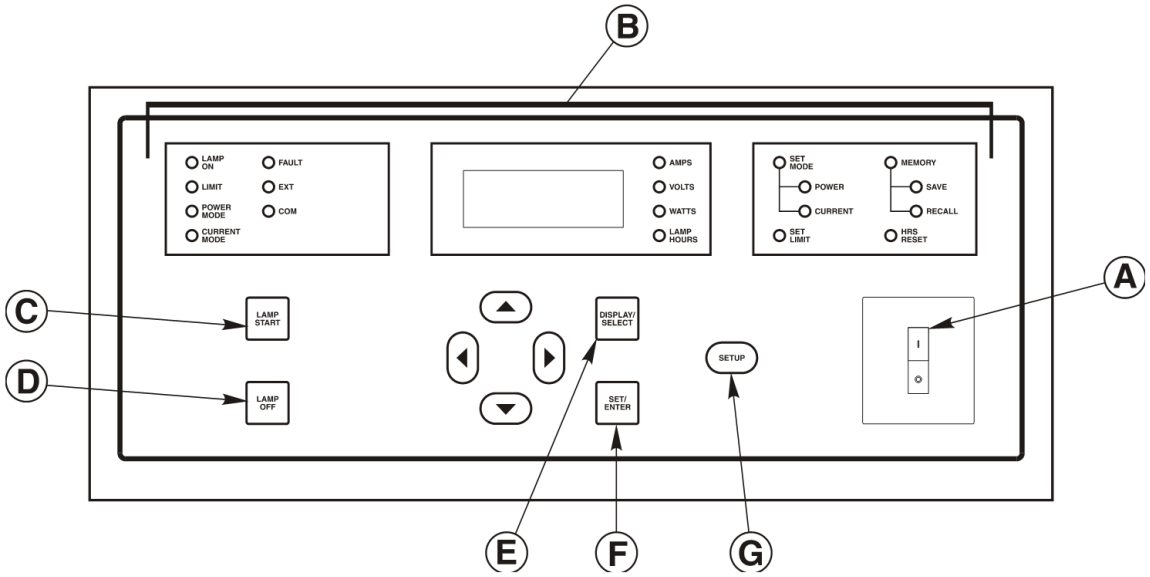

Figure 5

Front Panel Display

POWER

This is the AC mains power switch and circuit breaker. In the "ON" position AC power will be switched into the main circuitry of the power supply, (A in Figure 5). There is no output until the "LAMP ON" button is pressed with the interlock satisfied. The circuit breaker will turn off the power supply in the event of an electrical overload.

DISPLAY SECTION

The display section, (B in Figure 5), consists of a multi-function LED display and several LED indicators. It is divided into three areas - meter (center), status indicators (left), and setup indicators (right).

The METER AREA contains the display and units indicators. It normally displays one of four parameters; current (AMPS), voltage (VOLTS), power (WATTS), and Lamp operating time (LAMP HOURS). It is also used when setting current/power preset, current/power limit, user memory load/save, and to display a fault occurrence.

The STATUS AREA contains seven indicators:

LAMP ON - Flashes while ramping up to and down from the preset current or power level, and illuminates continuously when the output is at the preset value.

LIMIT - Illuminates when the output current/power reaches the set limit. Flashes when the output current/power reaches the hardware limit.

POWER MODE - Illuminates when the power supply is set to regulate output power.

CURRENT MODE- Illuminates when the power supply is set to regulate output current.

FAULT - Illuminates when the safety interlock loop is open, power supply failure or lamp housing failure.

EXT - Illuminates when the remote input is active, typically when the Newport Digital Exposure System is connected.

COMM - Illuminates when the power supply front panel is locked out via RS232 command. Control is through RS232 only.

The SETUP AREA is only active in setup mode. Each of the four indicators flash while advancing through the parameters. See section III.3 for a detailed description of setup mode.

LAMP START

This button, (C in Figure 5), starts the lamp at the preset power or current level, provided there are no fault conditions.

LAMP OFF

If the lamp is on, pressing this button (D in Figure 5) removes power to the lamp. The housing will still be powered allowing cooling fans to continue running until the lamp has reached a safe handling temperature.

DISPLAY/SELECT

Each time this button is pressed and released (E in Figure 5), the digital meter and associated units indicator switch between one of four functions - current (AMPS), voltage (VOLTS), power (WATTS), and lamp operating time (LAMP HOURS).

SET/ENTER

Depressing the "SET/ENTER" button, (F in Figure 5), at any time displays the preset power or current level. Holding the "SET/ENTER" button for 3 seconds allows the preset value to be changed to any value within valid limits (upper limit set in setup mode). The display will show the present value with one digit blinking. Pressing the up or down arrow will allow changes to this digit. Pressing the left or right arrow button will flash the digit to the right or left of presently blinking digit and allow changing that digit by using the up or down arrows. Pressing "SET/ENTER" will lock this value in as the new preset. NOTE: If the LAMP ON indicator is on, any change to preset is immediate to the output during adjustment without pressing "SET/ENTER". (This allows fine-tuning of output light intensity.) The factory default preset for current is 3A, and the factory default preset for power is 160W.

FACTORY RESTORE

The power supply can have all parameters restored to factory setting by applying AC power while holding down the "LAMP OFF" button. This will set the Power limit to 600 Watts, Current limit to 12 Amps, mode to power, and preset to 160 Watts.

SETUP MODE

Depressing the SETUP button (G in Figure 5), when LAMP ON indicator is off enters setup mode**. If LAMP ON indicator is illuminated the SETUP button is inactive.** Once in setup mode, there are four main items that may be set up – SET MODE, SET LIMIT, MEMORY, and HRS RESET. Pressing SETUP at any time will exit the setup mode. Newport recommends scrolling through the setup parameters a second time before exiting setup to verify all parameters. **CAUTION: Be sure to press "SET/ENTER" after each adjustment or the selection will not be entered and system will revert to previous setting.**

SET MODE

The “SET MODE” indicator should flash. This allows the operator to change from the default power regulation mode to current regulation mode. If the mode is correct and no changes are desired, pressing “DISPLAY/SELECT” will move on to “SET LIMIT”. To change the mode, press the up or down arrow. This will alternately illuminate the “CURRENT ” and “POWER ” indicators. Press “SET/ENTER” to enter the selection and move on to the next item.

SET LIMIT

The “SET LIMIT” indicator should flash. This allows the operator to change the power limit or current limit within the range of 160 - 600 WATTS and 3.0 - 12.0 AMPS depending on the mode of operation. The display shows the limit in AMPS if in current mode, and WATTS if in power mode with the least significant digit blinking. If the limit is correct and no changes are desired, pressing “DISPLAY/SELECT” will move on to “MEMORY-SAVE”. To change the limit, press the up or down arrow. Pressing the left or right arrow button will flash the digit to the right or left of presently blinking digit and allow changing that digit by using the up or down arrows. Pressing “SET/ENTER” will lock this value in as the new limit and advance the setup to memory.

MEMORY

The “MEMORY” indicator should flash. The “SAVE” LED will be illuminated allowing the operator to save up to five (5) front panel setups. If the operator does not wish to save any parameters, pressing “DISPLAY/SELECT” will move on to “MEMORY –RECALL”. The display shows “1", which means “save to memory location “1”. Pressing the up or down arrows will increment the number through the 5 possible locations. Pressing “SET/ENTER” will save the active parameters to this location for future use by recalling the parameters from memory and advance the setup to memory recall. **(NOTE: Be sure to record what is saved to each location as that is the only way to know what it contains without recalling each location and checking the parameters.)**

The “MEMORY” indicator should flash. The “RECALL” LED will be illuminated allowing the operator to recall up to five (5) front panel setups that have been previously saved. If the operator does not wish to recall any parameters, pressing “DISPLAY/SELECT” will move on to “HRS RESET”. The display shows “1", which means “recall from memory location “1"”. Pressing the up or down arrows will increment the number through the 5 possible locations. Pressing “SET/ENTER” will recall the saved parameters from this location to the active parameters and advance the setup to “HRS RESET.

HRS RESET

The “HRS RESET” indicator should flash. The display will indicate accumulated lamp hours since the last reset. If the operator does not wish to reset the lamp hours, pressing “DISPLAY/SELECT” will move on to “SET MODE”. Pressing and holding “SET/ENTER” until the display goes blank will reset lamp hours and advance setup to “SET MODE”.

LAMP OPERATING TIME FUNCTION

The 69910 keeps track of operating time whenever the lamp is running. The digital display shows operating time from 0 - 9999 hours. This function may help you determine when to replace the lamp, and monitor the performance over time. Refer to Table 1 for average lifetimes of compatible arc lamps.

To reset the operating time to 0 hours, shut off the lamp (if it is presently running) and enter setup mode. Follow the procedure given in section III.3.

OPERATING THE LAMP

Please refer to Figure 5.

CURRENT MODE:

If a Newport light source is not being used, follow the manufacturer's specifications. If the lamp operating power and voltage are known, but the operating current is not, then determine the current setting by using Ohm's Law: amperes = power ÷ volts.

Turn on the power supply. The "CURRENT MODE" LED should illuminate. If not, switch to "CURRENT MODE" (see section III.3). Set the display to read current (AMPS). Press and hold the "SET/ENTER" button until the display reads the preset current with the least significant digit blinking. Using the up down arrows, the operator can change the blinking digit; use the left/right arrows to select another digit. Once the display is set for the desired current, press the "SET ENTER" button**.** The display will now show 0 AMPS. The operator can push the "SET/ENTER" button at any time to view the preset current. **(NOTE: If the operator cannot set the desired preset current, press "SET/ENTER" to enter setup mode per section III.3 and adjust the current limit to a value 10% higher than the desired operating point.)**

Press the "LAMP START" button. The ignitor will fire for approximately 5 seconds or until the lamp starts at the preset level. Once the preset level is reached, the "LAMP ON" indicator will illuminate. The operator can use "DISPLAY SELECT" to display current, voltage, watts or lamp operating time. To shut off the lamp, press the "LAMP OFF" button. Once the output reaches 0, the "LAMP ON" indicator will extinguish. Should the lamp fail to ignite refer to the troubleshooting section III.6.

NOTE: If the Digital Exposure System is being used, the 68945 controller must be turned off until the lamp has been stabilized by the power supply. Once control is shifted to the Digital Exposure System, all front panel control of the power supply becomes inactive.

POWER MODE:

Turn on the power supply. The 'POWER MODE' LED should illuminate. If not, switch to POWER MODE (see section III.3). Set the display to read power (WATTS). Press and hold the "SET/ENTER" button until the display reads the preset watts with the least significant digit blinking. Using the up/down arrows, the operator can change the blinking digit; use the left/right arrows to select another digit. Once the display is set for the desired wattage, press the "SET ENTER" button. The display will now show 0 WATTS. The operator can push the "SET/ENTER" button at any time to view the preset watts. **(NOTE: If the operator cannot set the desired preset watts, press "SET/ENTER" to enter setup mode per section III.3 and adjust the power limit to a value 10% higher than the desired operating point.**

Press the "LAMP START" button. The ignitor will fire for approximately 5 seconds or until the lamp starts at the preset level. Once the preset level is reached, the "LAMP ON" indicator will illuminate. The operator can use "DISPLAY SELECT" to display current, voltage, watts or lamp operating time. To shut off the lamp, press the "LAMP OFF" button. Once the output reaches 0, the "LAMP ON" indicator will extinguish. Should the lamp fail to ignite refer to the troubleshooting section III.6.

NOTE: If the Digital Exposure System is being used, the 68945 controller must be off until the lamp has been stabilized by the power supply. Once control is shifted to the Digital Exposure System, all front panel control of the power supply becomes inactive.

TROUBLESHOOTING

This chart provides the basic troubleshooting information for the Newport Power Supply Model 69910 when used with a Newport arc lamp housing. Contact a Newport sales engineer or your local representative if more information is required.

Symptom	Action
Power supply does not turn on, e.g. Fan not turning Display does not turn on	Check Mains cord connection • Front panel circuit breaker on AC power at wall outlet
Fault light Display shows “iloc”	Turn off AC power and check Cables connected to lamp housing • Door to lamp housing is closed If lamp was running before fault, was fan in housing operational? This indicates over temperature in the lamp housing. Ensure no blockage of cooling air on housing.
Fault light Display shows “P S”	This message is displayed usually when ignition fails. It is a result of no open circuit voltage, or open circuit voltage too low. Cycle power. If fault repeats contact Newport for RMA information.
Fault light Display shows “L P”	This message is displayed usually when ignition fails. It is a result of no current flow from supply after 5 seconds of trying to ignite the lamp. • Ticking sound heard from top of lamp housing during ignition cycle approximately once per second • Check lamp connection and polarity. A lamp installed upside down or with reversed polarity should be removed and replaced immediately. • Cycle power and try ignition again. • Check power and current limits are set appropriately to ignite the lamp. It may be that the limits are too low and need to be raised. Verify with lamp operating specifications. • Check hours on lamp. It may be at end of life and typically will be difficult to start. • Try a new lamp • If fault repeats contact Newport for RMA information.

Table 4 Troubleshooting Steps

III.7 RS-232 COMMUNICATIONS

The following table lists the commands used for remote communications with the power supply. Please see section III.1 for cable information. The baud rate is 9600 with 8 data bits, 1 stop bit and no parity.

Sent command	PS Response	Notes
STB?↵	STBXX↵ (HEX) Bit 7 - Lamp On Bit 6 - Ext Bit 5 - Power/Current Mode Bit 4 - Cal Mode Bit 3 - Fault Bit 2 - Comm Bit 1 - Limit Bit 0 - Interlock	Send status of LEDs lit on front panel (1=LED ON) Bit 5: 1= power mode 0= current mode
ESR?↵	ESRXX↵ (HEX) Bit 7 - Power On Bit 6 - User Request Bit 5 - Command Error Bit 4 - Execution Error Bit 3 - Device Dependant Error Bit 2 - Query Error Bit 1 - Request Control Bit 0 - Operation Complete	Send error register
AMPS?↵	XX.X↵	Send amps as displayed on front panel
VOLTS?↵	XX.X↵	Send volts as displayed on front panel
WATTS?↵	XXXX↵	Send watts as displayed on front panel
LAMP HRS?↵	XXXX↵	Send lamp hrs as displayed on front panel
A-PRESET?↵	XX.X↵	Send preset value
P-PRESET?↵	XXXX↵	Send preset value
A-LIM?↵	XX.X↵	Send current limit
P-LIM?↵	XXXX↵	Send power limit
IDN?↵	XXXXX↵	Send power supply model number
START↵	ESRXX↵ (See ESR command for Hex value definition)	Start lamp, update front panel
STOP↵	ESRXX↵ (See ESR command for Hex value definition)	Stop lamp, update front panel,

RST↵	ESRXX↵ (See ESR command for Hex value definition)	Reset Power Supply to Factory Defaults
RSTHRS↵	ESRXX↵ (See ESR command for Hex value definition)	Reset lamp hours to 0
MODE=X↵ X=1 for Current X=0 for Power	ESRXX↵ (See ESR command for Hex value definition)	Set desired mode if lamp is off, use last settings of that mode, Else return ESR error bit
COMM=X↵ X=1 for panel lockout X=0 for panel unlock	ESRXX↵ (See ESR command for Hex value definition)	Lockout/unlock front panel keys
SAVE=X↵ X = Memory location 1-5	ESRXX↵ (See ESR command for Hex value definition)	Save operation parameters to location specified
RECALL=X↵ X = Memory location 1-5	ESRXX↵ (See ESR command for Hex value definition)	If lamp off, set operation parameters to those of memory location. Else return ESR error bit
A-PRESET=XX.X↵	ESRXX↵ (See ESR command for Hex value definition)	With power supply in current mode, lamp ON or OFF, sets current to PRESET value if < current limit (A-LIM); else returns ESR error bit 5 (Command Error)
P-PRESET= XXXX↵	ESRXX↵ (See ESR command for Hex value definition)	With power supply in power mode, lamp ON or OFF, sets current to PRESET value if < power limit (P-LIM); else returns ESR error bit 5 (Command Error)
A-LIM=XX.X↵	ESRXX↵ (See ESR command for Hex value definition)	Set Current limit if current preset > limit, Preset = Limit
P-LIM=XXXX↵	ESRXX↵ (See ESR command for Hex value definition)	Set Power limit if power preset > limit, Preset = Limit

Table 4 RS-232 Commands

IV. APPLICATIONS

REMOTE CONNECTOR

The signals, which are available at the remote connector, allow the operator to monitor the current, voltage, and power output of the supply from a remote location via a meter or an A/D converter and a computer. There is also a remote start/stop input so that the lamp can be started/stopped with a simple momentary contact closure at a remote location.

A control input is also included at the remote connector, which is intended for use with the Newport Digital Exposure Systems Model 68950 or 69851. When the 68945 controller is connected, a sample of the light is compared to a reference. Any difference between the two is sent into the power supply to compensate for this change. The result will be improved stability in light output over time.

When the control input is active, the front panel “EXT” LED will illuminate. At this time the preset value of current/power becomes a maximum setting, and is otherwise overridden by the control input. The “LAMP ON”, “LAMP OFF”, “SET/ENTER” and “DISPLAY/SELECT” functions are always active.

V. SPECIFICATIONS

OUTPUT RATINGS	
Power	160 – 600 W
Current	3 – 12 A
Voltage (open circuit)	200 VDC
Voltage (loaded)	0 – 90 VDC
Operating Modes	Constant power and constant current
Voltage ripple into ohmic Load (load, power)	10 Ω, 500 W
%Voltage ripple (true RMS)	< 0.1%
Light ripple (true RMS)	< 1%
Meter accuracy (%full scale)	< 0.05%
DIGITAL METER RESOLUTION	
Voltage	0.1 VDC
Power	1 W
Current	0.1 A
Safety interlock voltage	12 VDC/GND
Line Regulation	0.01%
INPUT RATINGS	
Voltage	95 – 264 VAC
Current (max)	8 A
Power Factor	> 0.99
Frequency	47 – 63 Hz
Circuit Breaker	8 A, 2 POLE
Ambient operating Temperature	10 – 40 °C
Ambient Environmental Conditions	Up to 45% relative humidity, non-condensing
Weight	20 lbs. (9 kg)

VI. WARRANTY AND RETURNS

CONTACTING ORIEL® INSTRUMENTS

Oriel® Instruments belongs to Newport Corporation's family of brands. Thanks to a steadfast commitment to quality, innovation, hard work and customer care, Newport is trusted the world over as the complete source for all photonics and laser technology and equipment.

Founded in 1969, Newport is a pioneering single-source solutions provider of laser and photonics components to the leaders in scientific research, life and health sciences, photovoltaics, microelectronics, industrial manufacturing and homeland security markets.

Newport Corporation proudly serves customers across Canada, Europe, Asia and the United States through 9 international subsidiaries and 24 sales offices worldwide. Every year, the Newport Resource catalog is hailed as the premier sourcebook for those in need of advanced technology products and services. It is available by mail request or through Newport's website. The website is where one will find product updates, interactive demonstrations, specification charts and more.

To obtain information regarding sales, technical support or factory service, United States and Canadian customers should contact Oriel® Instruments directly.

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Sales: orielPV.sales@newport.com
Technical assistance or repair service: orielPV.service@newport.com

Customers outside of the United States must contact their regional representative for all sales, technical support and service inquiries. A list of worldwide representatives can be found on Newport's website: https://www.newport.com/contact/contactslocations

REQUEST FOR ASSISTANCE / SERVICE

Please have the following information available when requesting assistance or service:

1. Contact information for the owner of the product.
2. Instrument model number (located on the product label).
3. Product serial number and date of manufacture (located on the product label).
4. Description of the problem.

To help Oriel's Technical Support Representatives diagnose the problem, please note the following:

- Is the system used for manufacturing or research and development?
- What was the state of the system right before the problem?
- Had this problem occurred before? If so, when and how frequently?
- Can the system continue to operate with this problem, or is it non-operational?

- Were there any differences in the application or environment before the problem occurred?

REPAIR SERVICE

This section contains information regarding factory service for this product. The user should not attempt any maintenance or service of the system beyond the procedures outlined in this manual. This product contains no user serviceable parts other than what is noted in this manual. Any problem that cannot be resolved should be referred to Oriel® Instruments.

If the instrument needs to be returned for service, a Return Material Authorization (RMA) number must be obtained prior to shipment to Oriel® Instruments. This RMA number must appear on both the shipping container and the package documents.

Return the product to Oriel® Instruments, freight prepaid, clearly marked with the RMA number and it will either be repaired or replaced it at Oriel®'s discretion.

Oriel® is not responsible for damage occurring in transit. The Owner of the product bears all risk of loss or damage to the returned Products until delivery at Oriel® 's facility. Oriel® is not responsible for product damage once it has left the facility after repair or replacement has been completed.

Oriel® is not obligated to accept products returned without an RMA number. Any return shipment received by Oriel® without an RMA number may be reshipped by Newport, freight collect, to the Owner of the product.

NON-WARRANTY REPAIR

For Products returned for repair that are not covered under warranty, Newport's standard repair charges shall be applicable in addition to all shipping expenses. Unless otherwise stated in Newport's repair quote, any such out-of-warranty repairs are warranted for ninety (90) days from date of shipment of the repaired Product.

Oriel® will charge an evaluation fee to examine the product and determine the most appropriate course of action. Payment information must be obtained prior to having an RMA number assigned. Customers may use a valid credit card, and those who have an existing account with Newport Corporation may use a purchase order.

When the evaluation had been completed, the owner of the product will be contacted and notified of the final cost to repair or replace the item. If the decision is made to not proceed with the repair, only the evaluation fee will be billed. If authorization to perform the repair or provide a replacement is obtained, the evaluation fee will be applied to the final cost. A revised purchase order must be submitted for the final cost. If paying by credit card, written authorization must be provided that will allow the full repair cost to be charged to the card.

WARRANTY REPAIR

If there are any defects in material or workmanship or a failure to meet specifications, notify Oriel® Instruments promptly, prior to the expiration of the warranty.

Except as otherwise expressly stated in Oriel®'s quote or in the current operating manual or other written guarantee for any of the Products, Oriel® warrants that, for the period of time set forth below with respect to each Product or component type (the "Warranty Period"), the Products sold

hereunder will be free from defects in material and workmanship, and will conform to the applicable specifications, under normal use and service when correctly installed and maintained. Oriel® shall repair or replace, at Oriel® 's sole option, any defective or nonconforming Product or part thereof which is returned at Buyer's expense to Oriel® facility, provided, that Buyer notifies Oriel® in writing promptly after discovery of the defect or nonconformity and within the Warranty Period. Products may only be returned by Buyer when accompanied by a return material authorization number ("RMA number") issued by Oriel®, with freight prepaid by Buyer. Oriel® shall not be responsible for any damage occurring in transit or obligated to accept Products returned for warranty repair without an RMA number. Buyer bears all risk of loss or damage to the Products until delivery at Oriel®'s facility. Oriel® shall pay for shipment back to Buyer for Products repaired under warranty.

WARRANTY PERIOD

All Products (except consumables such as lamps, filters, etc) described here are warranted for a period of twelve (12) months from the date of shipment or 3000 hours of operation, whichever comes first.

Lamps, gratings, optical filters and other consumables / spare parts (whether sold as separate Products or constituting components of other Products) are warranted for a period of ninety (90) days from the date of shipment.

WARRANTY EXCLUSIONS

The above warranty does not apply to Products which are (a) repaired, modified or altered by any party other than Oriel® ; (b) used in conjunction with equipment not provided or authorized by Oriel® ; (c) subjected to unusual physical, thermal, or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling, alteration, or tampering, or (d) considered a consumable item or an item requiring repair or replacement due to normal wear and tear.

DISCLAIMER OF WARRANTIES; EXCLUSIVE REMEDY

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES. EXCEPT AS EXPRESSLY PROVIDED HEREIN, ORIEL® MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, STATUTORY OR OTHERWISE, REGARDING THE PRODUCTS, SOFTWARE OR SERVICES. NEWPORT EXPRESSLY DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE FOR THE PRODUCTS, SOFTWARE OR SERVICES. THE OBLIGATIONS OF ORIEL® SET FORTH IN THIS SECTION SHALL BE ORIEL'S SOLE LIABILITY, AND BUYER'S SOLE REMEDY, FOR BREACH OF THE FOREGOING WARRANTY. Representations and warranties made by any person including distributors, dealers and representatives of Oriel®/ Newport Corporation which are inconsistent or in conflict with the terms of this warranty shall not be binding on Oriel® unless reduced to writing and approved by an expressly an authorized officer of Newport.

LOANER / DEMO MATERIAL

Persons receiving goods for demonstrations or temporary use or in any manner in which title is not transferred from Newport shall assume full responsibility for any and all damage while in their care, custody and control. If damage occurs, unrelated to the proper and warranted use and performance of the goods, recipient of the goods accepts full responsibility for restoring the goods to their original condition upon delivery, and for assuming all costs and charges.

This manual has been provided for information only and product specifications are subject to change without notice.
Any change will be reflected in future printings.