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Thermo Oriel

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300W RADIOMETRIC POWER SUPPLY

MODEL 69931

Please read the instructions carefully before operating this equipment. If there are any questions or problems regarding the use of this equipment, please contact THERMO ORIEL or the representative from whom the equipment was purchased.

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I. INTRODUCTION

I.1 DESCRIPTION / FEATURES

The Thermo Oriel model 69931 power supply was designed to meet the needs of a regulated source of current for proper operation of QTH and IR light sources. The 69931 provides constant current operation of these sources of radiation, which is usually required whenever a radiometric measurement is being made or whenever highly stable light output is needed. (Constant power operation is also available and will prevent element overdrive in case of varying impedance conditions.)

Features include:

- ☞ Adjustable output from 3 - 24A or 40 - 300W with preset so that the output can be set before running the lamp.
- ☞ Digital display is included for precise monitoring of current, voltage, power and lamp running time.
- ☞ LED indicators show the status of important power supply functions.
- ☞ Start/stop control gradually ramps the current up to and down from the preset value to minimize stress on the lamp and prolong its calibrated performance.
- ☞ Safety interlock connector provides a way of safeguarding against accidental exposure to UV light when used with a Thermo Oriel lamp housing.
- ☞ Remote I/O connector on the rear panel of the 69931 provides remote metering capability, and direct connection to the Thermo Oriel 68950 Light Intensity Controller. The 68950 is typically used when a high level of long term stability is required.
- ☞ RS-232 Communication allows remote operation and monitoring of the power supply.
- ☞ Optional IEEE Communication allows remote operation and monitoring of the power supply.

I.2 ORDERING INFORMATION

QTH Lamp	Lamp Description	Electrical Ratings
6332/6337	50W QTH Lamp	4.17A, 12V 50W nominal
6351/6353/ 6354/6355	75W QTH Lamp	6.25A, 12V, 75W nominal
6333/6359	100W QTH Lamp	8.34A, 12V, 100W nominal
6334	250W QTH Lamp	10.42A, 24V, 250W nominal
63358/63361	45W Calibrated QTH Lamp	6.50A
63355/63356	200W Calibrated QTH Lamp	6.50A
6575	Ceramic Element	7.5A, 3V nominal
6363	Infrared Emitter	11.67A, 12V, 140W nominal

Table 1

Thermo Oriel Calibrated Sources should only be used with the appropriate rod mounts. Do not use these lamps in housings. Factors such as internal reflection from the housing walls and temperature conditions inside the housing would have a significant effect on the lamp output, and the calibration would no longer be valid.

Figure 1 on page 6 shows a Research Lamp Housing as well as a QTH Lamp Mount. Section I.4, also on page 6, briefly compares the housing and the lamp mount.

I.3 69931 REPLACEMENT ITEMS

International

Model	Item Description
70010	Line Cord, 15A International Color Code
¹ 88010720	Plug (Great Britain, Ireland) 13A, 250VAC
¹ 88010801	Plug (Continental Europe) 16A, 250 VAC
¹ 88010732	Plug (Switzerland) 10A, 250VAC

Table 2

¹ Contact PANEL COMPONENTS CORPORATION
P.O.Box 115, Oskaloosa, IA 52577 (USA)
(515) 673-5000

I.4 LAMP HOUSING VS. LAMP MOUNT

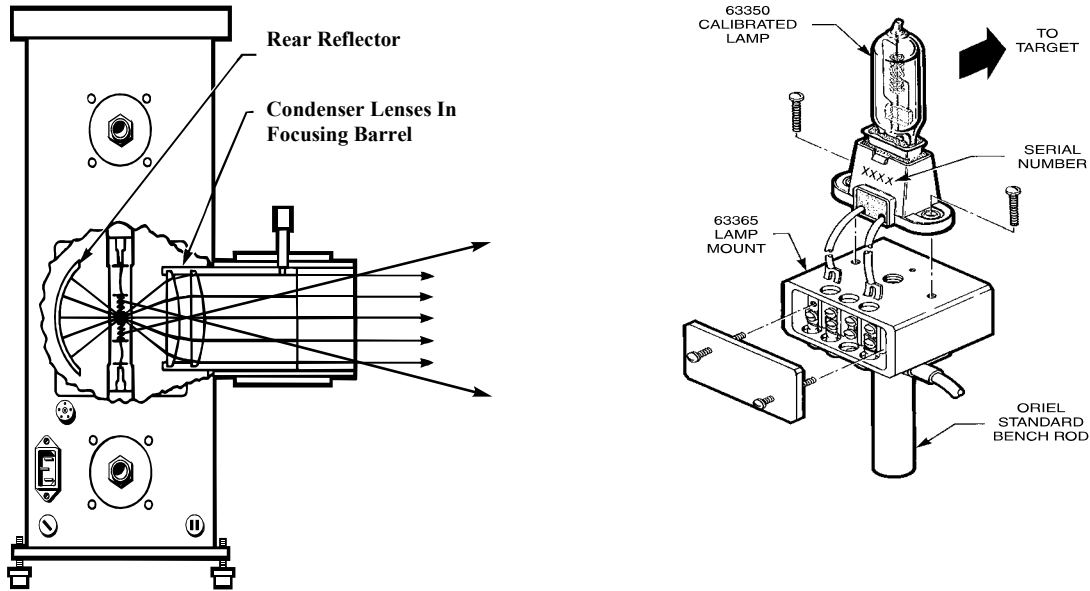


Figure 1

50-600W QTH RESEARCH HOUSING WITH AN F/1 CONDENSER

LAMP HOUSING

- Specifically designed for our 600 and 1000W QTH lamps.
- These fan-cooled housings have a safety interlock. When connected to the 69931 power supply, this system automatically shuts off the lamp if the housing overheats or the door is opened.
- Externally located lamp and rear reflector adjusters allow you to fine adjust the lamp and reflector position for maximum light collection.
- Mounting of the housing to an optical bench can be accomplished by removing the feet and using the screw slots.
- Remote voltage sense across lamp accounts for voltage dropped across cables.

MODEL 63350 1000W CALIBRATED QTH LAMP ON A 63365 LAMP MOUNT. (For Ref Only.)

LAMP MOUNT

- Economical alternative to lamp housings.
- Quick and simple lamp insertion / removal.
- Connects directly to 69931 Radiometric Power Supply or Thermo Oriel Transformer.
- 1/4-20 tapped hole for vertical and / or horizontal lamp mounting.
- Allow operation of QTH lamps in open air.
NOTE: QTH light sources produce harmful UV and a lot of visible and infrared radiation. Use protective eyewear and goggles to avoid excessive exposure of the eyes and skin to radiation from these lamps.

II. SAFETY NOTES

II.1 UV HAZARDS

- *Our QTH 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 Thermo Oriel.*

49125 UV Safety Spectacles
49126 UV Safety Goggles
49121 Protective Gloves
79004 Lighted Warning Signs (115 VAC, 250 mA, 50/60 Hz)
79005 Lighted Warning Signs (230 VAC, 125 mA, 50/60 Hz)

II.2 ELECTRICAL HAZARDS

- *Make all connections to or from the power supply with the power off. There may be up to 50 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.*

II.3 FIRE HAZARDS

- *Our non-calibrated QTH lamps should only be used in Thermo Oriel 50-600 W QTH Research (Fan-Cooled) Housings. Because these housing are equipped with a condenser lens, remember that re-focused output can cause ignition of flammable targets (ex: wooden walls, certain chemicals).*
- *Our calibrated QTH lamps should only be used in an “open air” environment. This requires using a lamp mount (see Section I.2). Keep all flammable materials away.*

II.4 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 at more than 10% above its current or power rating. Source lifetime will decrease dramatically at higher operating points.*

II.5 CALIBRATED QTH ISSUES

- *Never run calibrated lamps at any setting other than specified in the calibration certificate.*
- *Always connect calibrated lamps with the specified polarity to preserve calibrated output.*

III. USING THE POWER SUPPLY

III.1 REAR PANEL CONNECTIONS

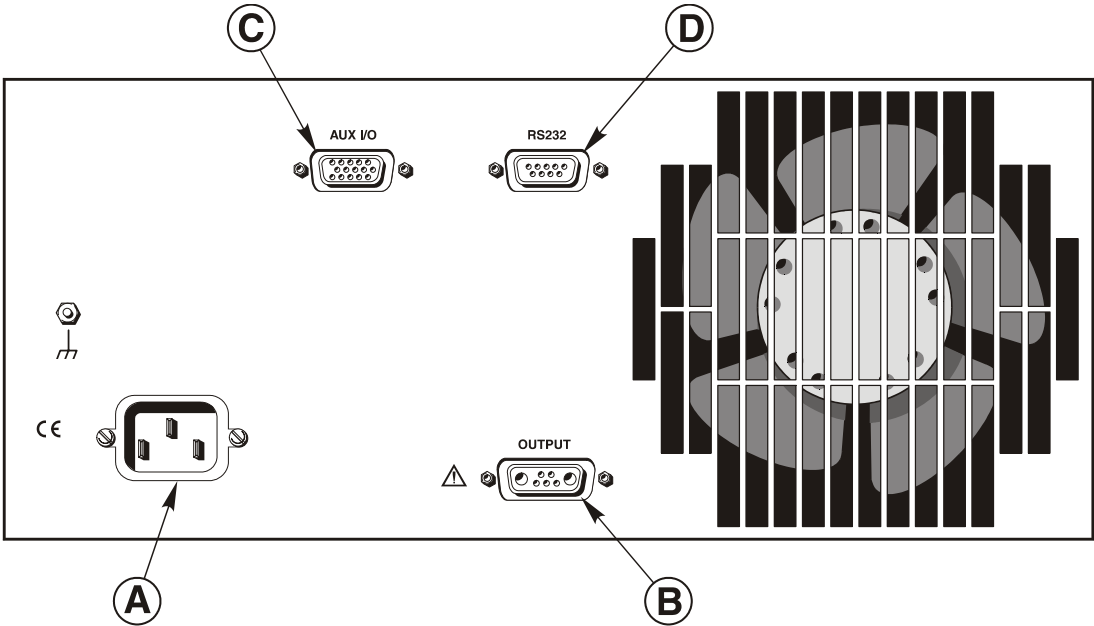


Figure 3

AC MAINS CONNECTION

NOTE: The Recommended Line Voltage For the 69931 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 3) on the rear panel and the wall outlet.

LAMP CONNECTIONS

With the power supply off, connect the cable from the Thermo Oriel lamp housing/mount to the OUTPUT connector, (B in Figure 3) which provides all the signals necessary to interface this power supply to Thermo Oriel lamp housing and rod mounts.

Table 3

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	SENSE (-)	Connected to LAMP (-)
5	INTERLOCK (-)	Connected to GND to satisfy interlock

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

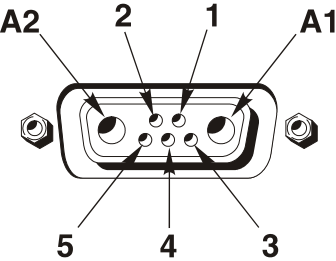


Figure 4

Output Connector Pin D-SUB Assignment

INTERLOCK

The 69931 has a safety interlock feature that 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 Thermo Oriel Research, Series Q, or Photomax housing, 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 (rod mounts, cylindrical/rod mount housings and the monochromator illuminator) includes 2 pairs of interlock wires, 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 in Figure 3). 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 turndown.
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 0-300W.
Pin 10	Remote meter output: Current. 0-2.0V indicates 0-24A.
Pin 11	Remote meter output: Voltage. 0-2.5V indicates 0-50V.
Pin 12	Not used.
Pin 13	Not used.
Pin 14	Not used.
Pin 15	Not used.

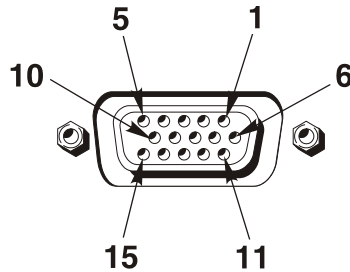


Figure 5
Remote Connector 15- Pin D-SUB Assignment

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 in Figure 3). 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.

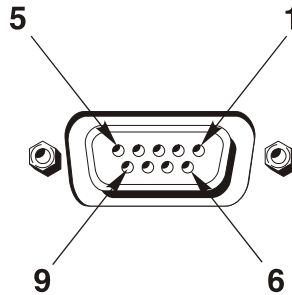


Figure 6
RS-232 Connector 9- Pin D-SUB Assignment

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

Computer	Power Supply	Thermo Oriel Part Number
Female DB9	Male DB9	10-60-018
Female DB25	Male DB9	10-60-015

Please contact your Thermo Oriel sales representative to order the cable.

III.2 FRONT PANEL CONTROLS AND DISPLAYS

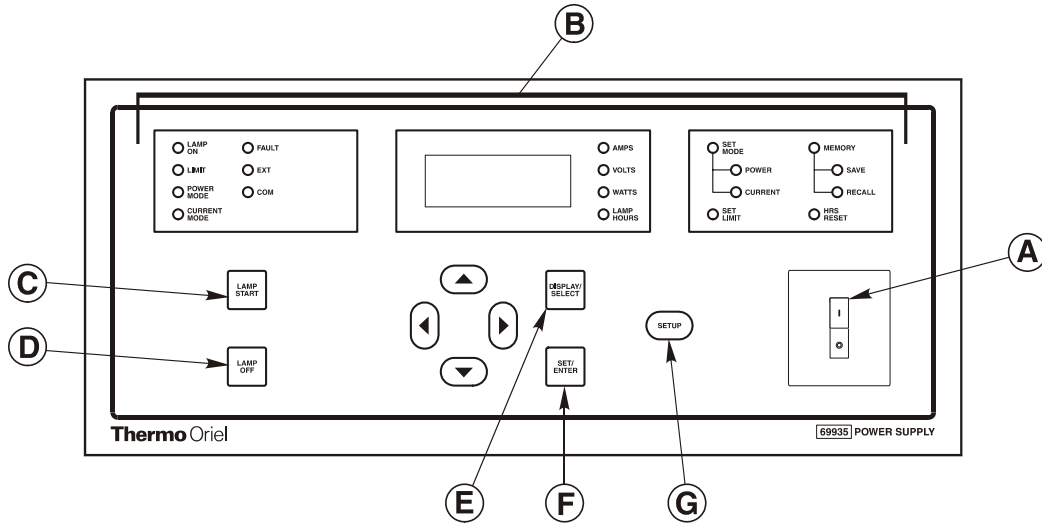


Figure 7
Front Panel Display

POWER (A)

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. There is no output until the “LAMP ON” button is pressed.

DISPLAY SECTION (B)

The display window 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 type of fault.

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 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, and lamp housing failure.
EXT -	Illuminates when the remote input is active, typically when the Thermo ORIEL 68950 Intensity Controller is connected. Disables front panel controls.
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 flashes while advancing through the parameters. See section III.3 for a detailed description of setup mode.

LAMP START (C)

This button begins a gradual ramp-up to the preset current or power level, as long as there are no fault conditions. During the ramp-up, the “LAMP ON” indicator will flash until the output current or power stabilizes, and then stays on. The ramp-up time is approximately 15 seconds and is independent of the preset current. As an example, the ramp-up time to 5.00A is the same as the ramp-up time to 10.00A.

LAMP OFF (D)

If the lamp is on, pressing this button begins a gradual ramp-down from the preset current or power level to 0. The “LAMP ON” indicator will flash until the output reaches 0, then goes off. The ramp-down time is approximately 15 seconds.

DISPLAY/SELECT (E)

Each time you press and release this button, the digital meter and associated units indicators switch between one of four functions - current (AMPS), voltage (VOLTS), power (WATTS), and lamp operating time (LAMP HOURS).

SET/ENTER (F)

Depressing the “SET/ENTER” button, at any time displays the preset current or power level. Holding the “SET/ENTER” button for 3 seconds allows the preset value to be changed. 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 the 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 8.33A, and the factory default preset for power is 100W.

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 300 Watts, Current limit to 24 Amps, mode to Current, and preset to 8.33Amps.

III.3 SETUP MODE

Depressing the SETUP button (G in Figure 7), when the 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. Thermo Oriel 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 you to change from the default current regulation mode to power 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 you to change the current limit or power limit within the range of 3.00 - 24.00 AMPS and 40 - 300 WATTS dependant upon 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 the 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 will flash. The “SAVE” led will illuminate allowing you to save up to five front panel setups. If you do 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 you will know what it contains without recalling each location and checking the parameters.)**

The “MEMORY” indicator will flash. The “RECALL” led will be illuminated allowing you to recall up to five front panel setups that you had previously saved. If you do 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 last reset. If you do 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”.

III.4 LAMP OPERATING TIME FUNCTION

The 69931 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.

Table 4 lists the average life of the QTH lamps compatible with the 69931 power supply.

Lamp Wattage	Model #	Average Life (hours)
50 Short Filament	6332	50
50 Long Filament	6337	3000
100	6333	50
250	6334	50
200	63355/63368	See the Warranty Policy provided with the lamp.
45	63358/63360	See the Warranty Policy provided with the lamp.

Table 4

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

III.5 OPERATING THE LAMP

Please refer to Figure 7.

CURRENT MODE:

If you are not using a Thermo ORIEL light source, use 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 in until the display reads the preset current with the least significant digit blinking. Using the up down arrows, you 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.

You can push the "SET/ENTER" button at any time to view the preset current. **(NOTE: If you cannot set the desired preset current, press "SET/ENTER" and then enter setup 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 "LAMP ON" indicator will flash which indicates that the current is gradually ramping up to the preset level. Once the preset level is reached, the "LAMP ON" indicator will illuminate continuously. You can use "DISPLAY SELECT" to display current, voltage, watts or lamp operating time. To shut off the lamp, press the "LAMP OFF" button. The "LAMP ON" indicator will flash as the current is ramping down to 0. Once the output reaches 0, the "LAMP ON" indicator goes off. Should the lamp fail to illuminate, refer to section III.6.

NOTE: If 68950 is being used, the 68950 must be off until lamp is stabilized by power-supply. Once control is shifted to 68950 all front panel controls become 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 in until the display reads the preset watts with the least significant digit blinking. Using the up down arrows, you 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. You can push the "SET/ENTER" button at any time to view the preset watts. **(NOTE: If you cannot set the desired preset watts, press "SET/ENTER" and then enter setup 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 "LAMP ON" indicator will flash which indicates that the power is gradually ramping up to the preset level. Once the preset level is reached, the "LAMP ON" indicator will illuminate continuously. You can use "DISPLAY SELECT" to display current, voltage, watts or lamp operating time. To shut off the lamp, press the "LAMP OFF" button. The "LAMP ON" indicator will flash as the power is ramping down to 0. Once the output reaches 0, the "LAMP ON" indicator goes off. Should the lamp fail to illuminate, refer to section III.6.

NOTE: If 68950 is being used, the 68950 must be off until lamp is stabilized by power-supply. Once control is shifted to 68950 all front panel controls become inactive.

III.6 TROUBLESHOOTING

This chart provides the basic troubleshooting information for the Thermo Oriel Model 69931 power supply when used with a Thermo Oriel 66800 series lamp housing. Contact a Thermo Oriel sales engineer or your local representative if more information is required.

Symptom	Action
Power supply does not turn on, e.g. <ul style="list-style-type: none"> • Fan not turning • Display does not turn on 	Check <ul style="list-style-type: none"> • Mains cord connection • Front panel circuit breaker on • AC power at wall outlet
Fault light <ul style="list-style-type: none"> • Display shows “iloc” 	Turn off AC power and Check <ul style="list-style-type: none"> • Cables connected to lamp housing • Door to lamp housing is closed • If lamp was running before fault, was fan on housing operational. This indicates over temperature in the lamp housing. Ensure no blockage of cooling air on housing.
Fault light <ul style="list-style-type: none"> • Display shows “P S” 	This message is displayed usually when trying to ignite and ignition fails. It is a result of no open circuit voltage, or open circuit voltage too low. Cycle power. If fault repeats contact Thermo Oriel for RMA information.
Fault light <ul style="list-style-type: none"> • Display shows “L P” 	This message is displayed usually when trying to ramp to power. It is a result of no current flow from supply after 5 second of trying to ramp up power to the lamp. <ul style="list-style-type: none"> • Check lamp connection and lamp filament. • Cycle power and try to power lamp again. • Try a new lamp • If fault repeats contact Thermo Oriel for RMA information.
Lamp doesn't start upon press of start button	If 68950 is being used, ensure it is turned off until lamp is up to operating point.

Table 5

III.7 RS-232 COMMUNICATIONS

The following table list the commands used for communications with the power supply. Please see section III.1 for cable information. The baud rate is 9600 with one stop bit and no parity.

Table 6

Sent command	PS Response	Notes
STB?↵	XX↵ (HEX) Bit 7 - Lamp On Bit 6 – See ESR Reg. (error bit) Bit 5 – Power/Current Mode Bit 4 – Cal Mode Bit 3 – Fault Bit 2 – Ext. Bit 1 - Limit Bit 0 – Rem	Send status of led's lit on front panel
ESR?↵	XX↵ (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.XX↵	Send amps as displayed on front panel
VOLTS?↵	XXX.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.XX↵	Send preset value
P-PRESET?↵	XXXX↵	Send preset value
A-LIM?↵	XX.XX↵	Send current limit
P-LIM?↵	XXXX↵	Send power limit
IDN?↵	XXXXXX↵	Send power supply model number

START.↓		Start lamp, update front panel
STOP.↓		Stop lamp, update front panel,
RST.↓		Reset Power Supply to Factory Defaults
RSTHRS.↓		Reset lamp hours to 0
MODE=X.↓ X = 1 for current X = 0 for power		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		Lockout/unlock front panel keys
SAVE=X.↓ X = Memory location 1-5		Save operation parameters to location specified
RECALL=X.↓ X = Memory location 1-5		If lamp off, set operation parameters to those of memory location. Else return ESR error bit
A-PRESET=XX.XX.↓		Set current to preset if <limit for current, Else return ESR error bit
P-PRESET= XXXX.↓		Set power to preset if <limit for power, Else return ESR error bit
A-LIM=XX.XX.↓		Set Current limit if current preset > limit, Preset = Limit
P-LIM=XXXX.↓		Set Power limit if power preset > limit, Preset = Limit

IV. APPLICATIONS

IV.1 STANDARD LAMPS

The Thermo Oriel model 69931 power supply is an excellent tool for radiometric applications. Most standard lamps are calibrated with a constant current source as specified by NIST. The calibration data is valid when the lamp is operated at the current level used by the calibration laboratory.

The 69931 will operate the 63358/63361 45W calibrated lamps at 6.50A, and the 63355/63368 200W calibrated lamps at 6.50A. For best stability, let the power supply and lamp run at operating current for at least 5 minutes.

IV.2 REMOTE CONNECTOR

The signals, which are available at the remote connector, allow you to monitor the current, voltage and wattage 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 input so that the lamp can be started with a simple contact closure from a remote location.

A control input is also included at the remote connector, which is intended for use with the Thermo Oriel Model 68950 Intensity Controller. When the 68950 is connected, a sample of the light at all or selected wavelengths 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.

IV.3 REMOTE VOLTAGE SENSING

Pin 4 of the output connector is connected to the negative side of the lamp in all Thermo Oriel Lamp Housings and Rod Mounts for remote voltage sensing. This will compensate for the voltage drops in the interconnection wires to the lamp, and provide a more accurate reading of output voltage and power.

To use this feature on non-Thermo Oriel lamp mounts and housings, connect pin 4 to the negative side of the lamp, as closely as possible to the lamp leads.

V. SPECIFICATIONS

AC Mains Input:	95 - 132 VAC/ 4.5A max 190 - 264 VAC/ 3A max 50/60 Hz
DC Current Output:	Adjustable from 3.00 - 24.00A In 0.01A increments
DC Power Output: (see note)	Adjustable from 40 - 300W In 1W increments
DC Voltage Output:	Load dependent, 50V max
Light Output Ripple:	Typically 0.05% R.M.S.
Meter Accuracy:	± 0.1% of full scale
Line / Load Regulation:	± 0.05%
Operating Temperature:	10 - 40°C
Weight:	20 lbs

WARRANTY AND RETURNS

WARRANTY

Thermo Oriel warrants that all goods described in this manual (except consumables such as lamps, bulbs, filters, ellipses, etc.) shall be free from defects in material and workmanship. Such defects become apparent within the following period:

1. All products described here, except spare parts: one (1) year or 3000 hours of operation, whichever comes first, after delivery of the goods to the buyer.
2. Spare parts: ninety (90) days after delivery of goods to the buyer.

Thermo Oriel's liability under this warranty is limited to the adjustment, repair and/or replacement of the defective part(s). During the above listed warranty period, Thermo Oriel shall provide all materials to accomplish the repaired adjustment, repair or replacement. Thermo Oriel shall provide the labor required during the above listed warranty period to adjust, repair and/or replace the defective goods at no cost to the buyer ONLY IF the defective goods are returned, freight prepaid, to a Thermo Oriel designated facility. If goods are not returned to Thermo Oriel, and the user chooses to have repairs made at their premises, Thermo Oriel shall provide labor for field adjustment, repair and/or replacement at prevailing rates for field service, on a portal-to-portal basis.

Thermo Oriel shall be relieved of all obligations and liability under this warranty of:

1. The user operates the device with any accessory, equipment or part not specifically approved or manufactured or specified by Thermo Oriel unless buyer furnishes reasonable evidence that such installations were not the cause of the defect. This provision shall not apply to any accessory, equipment or part which does not affect the safe operation of the device.
2. The goods are not operated or maintained in accordance with Thermo Oriel's instructions and specifications.
3. The goods have been repaired, altered or modified by other than authorized Thermo Oriel personnel.
4. Buyer does not return the defective goods, freight prepaid, to a Thermo Oriel facility within the applicable warranty period.

IT IS EXPRESSLY AGGreed THAT THIS WARRANTY SHALL REPLACE ALL WARRANTIES OF FITNESS AND MERCHANTABILITY. BUYER HEREBY WAIVES ALL OTHER WARRANTIES, GUARANTEES, CONDITIONS OR LIABILITIES, EXPRESSED OR IMPLIED, ARISING BY LAW OR OTHERWISE, WHETHER OR NOT OCCASIONED BY THERMO ORIEL'S NEGLIGENCE.

This warranty shall not be extended, altered or varied except by a written document signed by both parties. If any portion of this agreement is invalidated, the remainder of the agreement shall remain in full force and effect.

CONSEQUENTIAL DAMAGES-

Thermo Oriel shall not be responsible for consequential damages resulting from misfunctions or malfunctions of the goods described in this manual. Thermo Oriel's total responsibility is limited to repairing or replacing the malfunctioning or malfunctioning goods under the terms and conditions of the above described warranty.

INSURANCE-

Persons receiving goods for demonstrations, demo loan, temporary use or in any manner in which title is not transferred from Thermo Oriel, 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 condition upon original delivery, and for assuming all costs and charges.

RETURNS-

Before returning equipment to Thermo Oriel for repair, please call the Customer Service Department at (203) 377-8282. Have your purchase order number available before calling Thermo Oriel. The Customer Service Representative will give you a Return Material Authorization number (RMA). Having an RMA will shorten the time required for repair, because it ensures that your equipment will be properly processed. Write the RMA on the returned equipment's box. Equipment returned without a RMA may be rejected by the Thermo Oriel Receiving Department. Equipment returned under warranty will be returned with no charge for the repair or shipping. Thermo Oriel will notify you of any repairs not covered by the warranty, with the cost of the repair, before starting the work.

Please return equipment in the original (or equivalent) packaging. You will be responsible for damage incurred from inadequate packaging, if the original packaging is not used.

Include the cables, connector caps and antistatic materials sent and/or used with the equipment, so that Thermo Oriel can verify correct operation of these accessories.



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