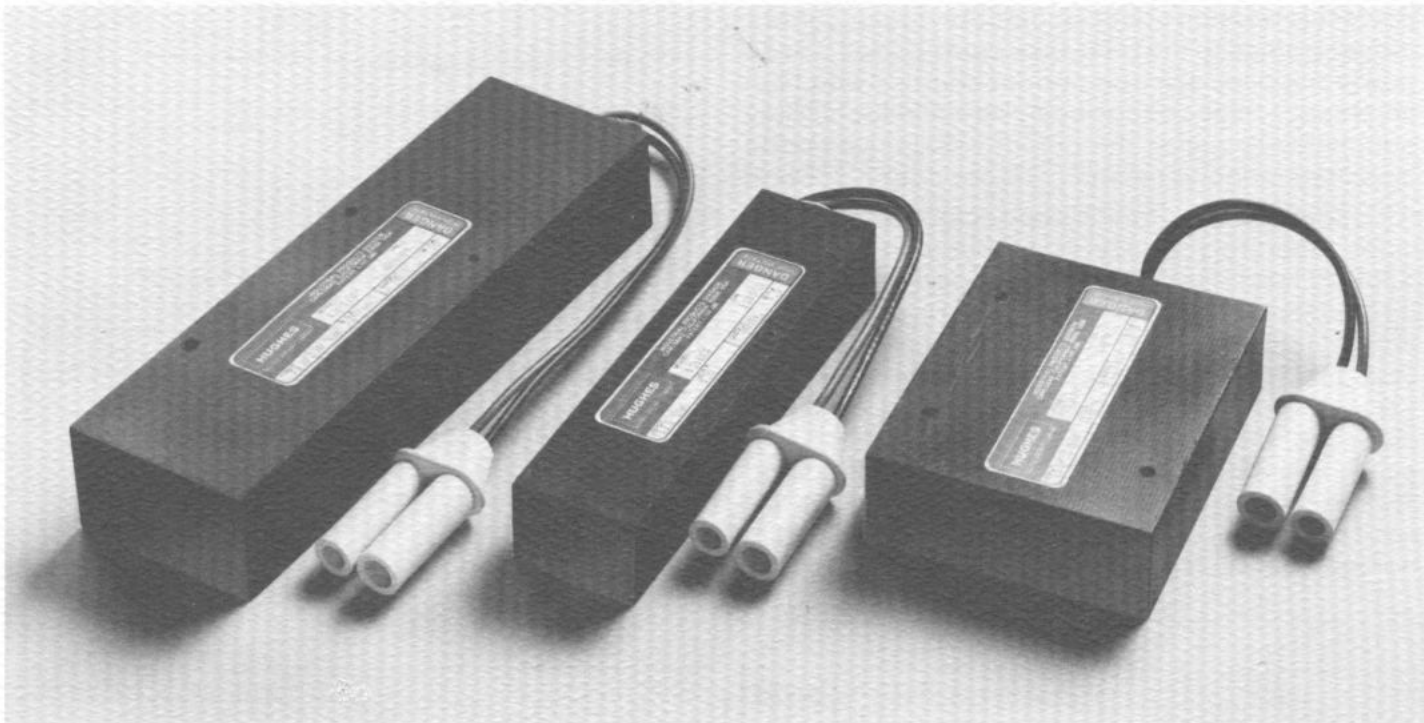


# Hughes OEM AC Input Helium-Neon Laser Power Supplies



## GENERAL DESCRIPTION

The Hughes OEM laser power supplies described in this brochure are compact, efficient modules designed to operate Hughes lasers in the 0.5 to 10 mW power range. These supplies operate at input voltages from 100 to 230 Vac, 50-400 Hz. A single configuration of each basic model provides for applications requiring either a high voltage connector or flying leads and either the three-second Bureau of Radiological Health (BRH) time delay or no delay. Models 431, 432, and 435 have received the Underwriters Laboratories Inc.® (UL) component recognition status. All power supplies are backed by a 12-month warranty, with extended warranties to 18 months for qualified Original Equipment Manufacturers. These power supplies employ modern patented circuit designs and are backed by many years of extensive testing and field usage.

## FEATURES

- Feedback regulated output current
- Feedback regulated start voltage
- Greater than 87% conversion efficiency
- No heat sinking required
- Internal BRH time delay (optional)
- Complete line isolation
- Complete fault protection
  - Output short circuit
  - Output open circuit
  - Brownout (excessively low input voltage)
- UL recognition for Models 431, 432, 435

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HUGHES AIRCRAFT COMPANY  
INDUSTRIAL PRODUCTS DIVISION  
CARLSBAD, CALIFORNIA

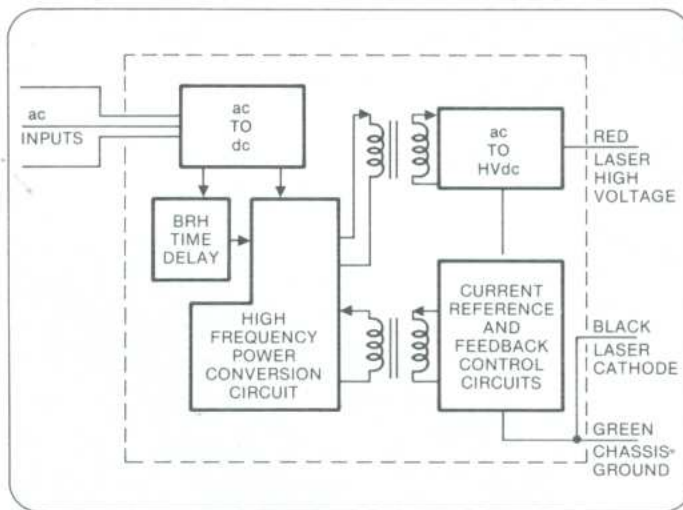
## THEORY OF OPERATION

These Hughes OEM power supplies employ a high frequency energy conversion circuit to provide greater than 87% conversion efficiency. The high power conversion efficiency allows cool and reliable operation; no heat sinking required. Complete dielectric isolation is maintained between the input and output stages.

As shown in the conceptual diagram at left, the laser operating current is regulated by an electronic feedback circuit which varies the timing in the power conversion stage so that the output current remains equal to the reference current level. These power supplies are true current sources with high impedance, high voltage compliance outputs. They automatically adjust the output voltage within the specified range to maintain a fixed output current.

A patented electronic output current filter provides laboratory quality dc output with a current ripple of less than 0.5% peak to peak (less than 1% for Models 431, 432, 437, 480). These power supplies are protected against output fault conditions including direct arcing to ground. Under output short circuit conditions, the supply's internal oscillator stops and the input power requirement drops to a small fraction of the operating power requirement. Therefore, long duration short circuit conditions are easily tolerated. Upon removal of the fault condition, normal operation commences.

## CONCEPTUAL DIAGRAM



## Common Specifications

- Operating temperature .....  $-20^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$
- Output voltage compliance .....  $\pm 200\text{ Vdc}$
- Optional BRH time delay ..... 3-5 seconds nominal
- Fusing requirements (All except 480) ..... 1 A conventional  
(0.5 A for 230 Vac)
- 480 fusing requirements ..... 3 A conventional  
(1.5 A for 230 Vac)
- Plasma tube ballast requirement .....

LC Series	LF Series	LP Series
75 k $\Omega$	60 k $\Omega$	75 k $\Omega$

Recommended 5 watt low inductance wirewound construction.  
Locate within 3 inches of the anode.

- Current regulation over input voltage range .....  $\pm .05\text{ mA}$

Laser Usage	Power Supply Model No.*	Input Power Requirements	Start Voltage	Sustaining Voltage	Output Current	Laser Beam Amplitude Ripple**
1,2,4 & 5 mW LF Series	<b>431LF4</b>	115 Vac $\pm$ 10%, 120 mA nom.	10 kVdc min.	1860 Vdc to 2450 Vdc	6.5 $\pm$ .15 mA	< 1% PTP
1 & 2 mW LC Series	<b>431LC4</b>	115 Vac $\pm$ 10%, 120 mA nom.	8 kVdc min.	1550 Vdc to 1750 Vdc	4.5 $\pm$ .15 mA	< 1% PTP
3 mW LF Series	<b>431HP4</b>	115 Vac $\pm$ 10%, 120 mA nom.	10 kVdc min.	1550 Vdc to 1750 Vdc	7.0 $\pm$ .15 mA	< 1% PTP
LP Series	<b>431LP4</b>	115 Vac $\pm$ 10%, 120 mA nom.	10 kVdc min.	1400 Vdc to 1600 Vdc	3.7 $\pm$ .15 mA	< 1% PTP
1,24 & 5 mW LF Series	<b>432LF4</b>	100 Vac $\pm$ 10%, 165 mA nom.	10 kVdc min.	1860 Vdc to 2450 Vdc	6.5 $\pm$ .15 mA	<0.8% PTP
LC Series	<b>432LC4</b>	100 Vac $\pm$ 10%, 165 mA nom.	8 kVdc min.	1550 Vdc to 1750 Vdc	4.5 $\pm$ .15 mA	<0.8% PTP
3 mW LF Series	<b>432HP4</b>	100 Vac $\pm$ 10%, 165 mA nom.	10 kVdc min.	1550 Vdc to 1750 Vdc	7.0 $\pm$ .15 mA	<0.8% PTP
LP Series	<b>432LP4</b>	100 Vac $\pm$ 10%, 165 mA nom.	10 kVdc min.	1400 Vdc to 1600 Vdc	3.7 $\pm$ .15 mA	<0.8% PTP
1,2,4 & 5 mW LF Series	<b>435LF4</b>	115/230 Vac $\pm$ 10%, 120/60 mA nom.	10 kVdc min.	1860 Vdc to 2450 Vdc	6.5 $\pm$ .15 mA	<0.5% PTP
0.5,1 & 2 mW LC Series	<b>435LC4</b>	115/230 Vac $\pm$ 10%, 120/60 mA nom.	8 kVdc min.	1600 Vdc to 1850 Vdc	4.5 $\pm$ .15 mA	<0.5% PTP
3 mW LF Series	<b>435LC4</b>	115/230 Vac $\pm$ 10%, 120/60 mA nom.	10 kVdc min.	1450 Vdc to 1850 Vdc	7.0 $\pm$ .15 mA	<0.5% PTP
LP Series	<b>435LP4</b>	115/230 Vac $\pm$ 10%, 120/60 mA nom.	10 kVdc min.	1300 Vdc to 1700 Vdc	3.7 $\pm$ .15 mA	<0.5% PTP
7 mW Series	<b>437LF4</b>	115/230 Vac $\pm$ 10%, 300/150 mA nom.	10 kVdc min.	2600 Vdc to 2800 Vdc	7.0 $\pm$ .15 mA	< 1% PTP
10 mW Series	<b>480LF4</b>	115/230 Vac $\pm$ 10%, 300/150 mA nom.	12 kVdc min.	3200 Vdc to 3400 Vdc	9.3 $\pm$ .15 mA	< 1% PTP

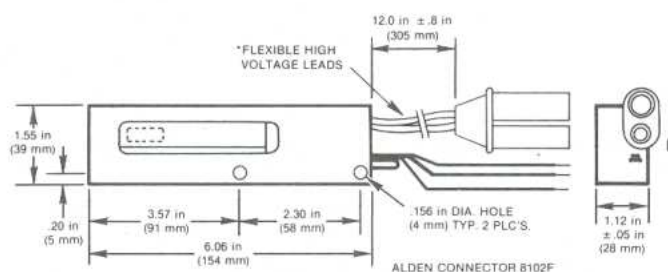
\*The above models provide the Alden high voltage connector/flying lead combination with enable loop for BRH time delay.

\*\*Includes only the laser beam amplitude ripple attributed to the power supply.

NOTE: UL listing number E81119(S) applies to basic model numbers 431, 432, 435.

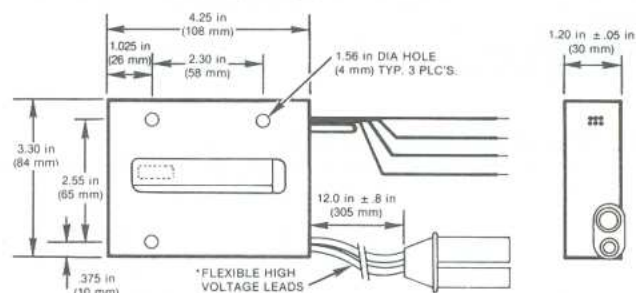
## Outline and Mounting

### Model 431 and 432



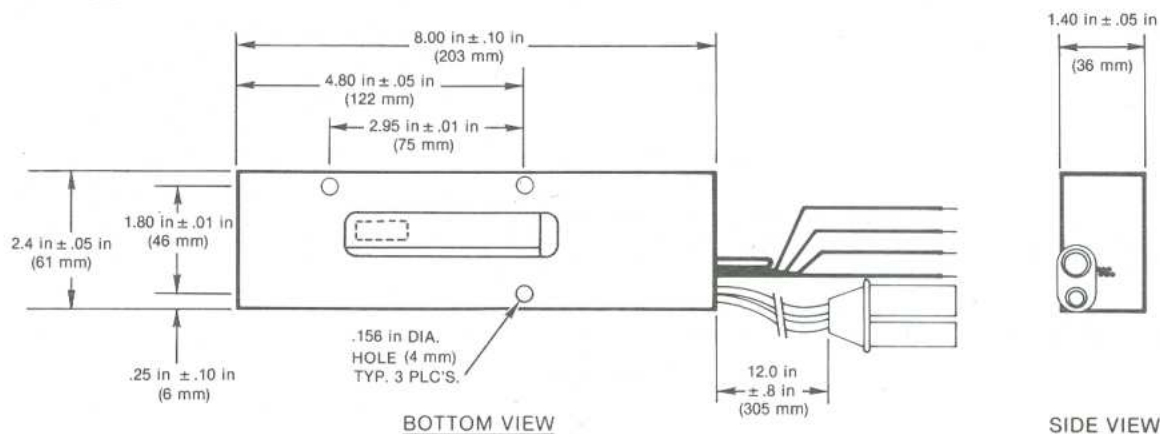
\*For flying lead applications cut to desired length and discard connector

### Model 435 and 437



\*For flying lead applications cut to desired length and discard connector

### Model 480



BOTTOM VIEW

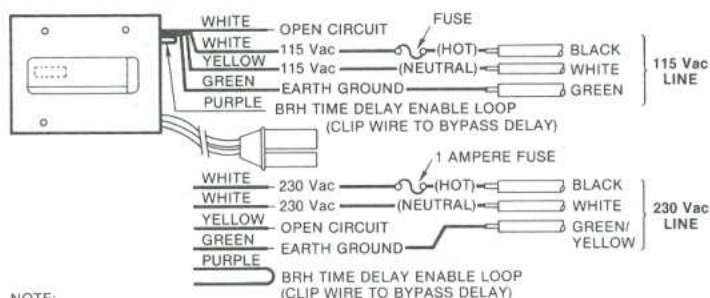
SIDE VIEW

## USER INFORMATION

- The green lead of the power supply must be connected to the earth ground of the power main to prevent the isolated output stage from acquiring a static charge.
- The laser cathode is grounded through an internal connection with the green input power lead.
- To disable the BRH time delay, clip the purple wire (BRH enable) loop to create an open circuit. Insulate exposed ends as necessary.
- For flying lead applications, cut the output leads to the desired length and discard the high voltage connector.

### INTERCONNECT WIRING DIAGRAM

#### 435, 437 and 480 Models

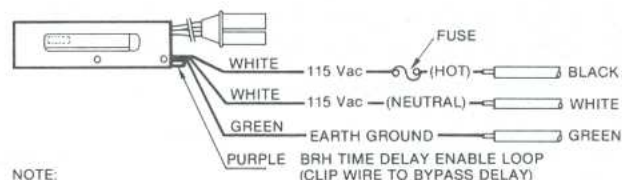


**NOTE:**

1. See "Common Specifications" for Recommended Fusing
2. Power Supply Cathode and Green Lead are Internally Connected
3. For Flying Leads: High Voltage Lead-Red, Cathode Lead-Black

#### Model 435 illustrated

#### 431 and 432 Models



**NOTE:**

1. See "Common Specifications" for Recommended Fusing
2. Power Supply Cathode and Green Lead are Internally Connected
3. For Flying Leads: High Voltage Lead-Red, Cathode Lead-Black



**HUGHES AIRCRAFT COMPANY • Industrial Products Division**  
6155 El Camino Real • Carlsbad, CA 92008 • Tel: (619) 438-9191, Ext. 590  
• TWX: 910-322-1393 HACINPD CSBD

**HUGHES AIRCRAFT SYSTEMS INTERNATIONAL**  
Frederik Hendriklaan 22, 2012-SH Haarlem, The Netherlands  
Tel: (23) 292453 • TLX: 47133 HASI NL