

# Helium Neon

## Laser Power Supplies Catalog

AC & DC Input  
Power Supplies

*for the OEM*

## WHO WE ARE & WHAT WE DO

### Who we are

- ▶ Leading force in the HeNe power supply industry since 1969
- ▶ Manufacturer of OEM power supplies for HeNe gas lasers, as well as OEM laser diode products for analytical, biomedical, & industrial applications

### What we do

- ▶ Design & manufacture quality OEM HeNe power supplies & laser diode products
- ▶ Offer a standard HeNe power supply product line that features fully encased electronics
- ▶ Offer an advanced line of HeNe power supplies designed for low output current ripple and noise
- ▶ Provide a variety of options to enhance your HeNe power supply
- ▶ Make complete customer satisfaction our #1 goal



#### **Welcome— Thanks For Choosing PTI**

Thank you for selecting Power Technology, Inc. as your supplier of high-quality OEM power supplies for Helium Neon gas lasers. We are committed to providing you with a laser product that is ideal for your application. In fact, our HeNe power supplies are designed to meet the needs of a wide variety of applications, from spectroscopy to holography to laser-induced fluorescence. We also provide a variety of custom design services for medium to high-quantity orders. If you have questions regarding any of our HeNe laser power supplies, please email us or give us a call.

#### **Over 30 Years of Service— History of PTI Helium Neon Power Supplies**

We began manufacturing power supplies for Helium Neon gas lasers in 1969. At that time, the average HeNe power supply was quite bulky, about the size of a shoebox. The first PTI HeNe power supply, designed for a construction surveying system, was much more compact. In fact, the unit was approximately one-tenth the size of its competition. To this day, our company remains the oldest consistent manufacturer of power supplies for Helium Neon gas lasers.

#### **Standard & Advanced HeNe Power Supplies— Two Product Lines to Meet Your Needs**

To best meet the needs of your application, we offer two distinct lines of power supplies for HeNe gas lasers. Our standard line features basic AC and DC input power supplies with fully encased electronics. These units generate a relatively minimal amount of heat and typically do not require heat sinking.

Our advanced line of HeNe power supplies is designed for your more demanding applications, such as instrumentation and laboratory use. These DC input units feature an active filter that reduces current ripple, noise, and switching frequency by as much as 50%. They can also include an optional feature on the input lines to help reduce interference with other equipment on the same supply bus.

#### **HeNe Power Supply Options— To Customize Your Power Supply**

We offer a variety of options to help ensure that you have the perfect solution for your needs. For example, you can customize your AC or DC input unit with such options as a ballast module, CDRH delay, or reverse wire exit. For more information on our HeNe power supply options, see pages 16 through 17.

#### **Customer Satisfaction— Our Customers Come First**

Our ultimate goal is complete customer satisfaction. For over thirty years, we have adhered to this goal, and we will continue our dedication to product development and innovation to bring new solutions to an ever-evolving industry.



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Recommended option or accessory



Application notes, data sheets, and/or technical articles available



Related product



Mechanical drawings available



Defined technical term



Additional information available on our Web site

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## Please note—

Information contained within Power Technology, Inc.'s Helium Neon Laser Power Supplies Catalog is deemed at the time of publication to be accurate and reliable. All pricing, specifications, and product designs are subject to change without notice. Visit our Web site at [www.powertechnology.com](http://www.powertechnology.com) for the latest information on our products.



# HELIUM NEON LASER SYSTEM COMPONENTS

## Major HeNe Laser System Components

- Power source
- Power supply
- Ballast resistor
- HeNe laser



### Technical Definition

**Ballast resistor:** This mechanism is placed in series with the laser to promote a stable electrical discharge and to prevent the laser from oscillating.

*Helium Neon gas laser power supplies have taken on many shapes, sizes, and operating characteristics over the years. Our current lines of power supplies represent an evolution dating back to 1969 when we designed our first DC input HeNe laser power supply for a construction surveying application. We are currently manufacturing our fifth generation circuit design, which provides exceptional efficiency, stability, and reliability.*

## Major Components of a HeNe Laser System—

A complete HeNe laser system requires four major components.

- **AC or DC power source:** The input voltages required to operate a power supply are typically 10-14VDC, 22-30VDC, 90-110VAC (Japan), 100-130VAC, 180-220VAC (Europe), and 200-240VAC.
- **Power supply:** The power supply converts the input voltage to a high DC voltage capable of ionizing the HeNe gas and sustaining the operation by supplying a regulated current from a voltage source.
- **Ballast resistor:** This mechanism is placed in series with the HeNe laser anode to promote a stable electrical discharge and to prevent the laser from oscillating.
- **HeNe laser:** High voltage ionizes the helium and neon gas mixture and generates light at the desired wavelength. The following page contains more detailed information concerning how a HeNe laser works.

## Selecting & Handling a Ballast Resistor—

A ballast resistor works in series with the laser anode to prevent the laser from oscillating. The ballast resistor rating must be high enough to stop the oscillation, yet low enough to prevent unnecessary heat generation and avoid wasted electrical power. A 5W ballast resistor is typically the most reliable choice, although a lower Wattage resistor may be appropriate for smaller lasers running at less current. Because selecting a ballast resistor with the appropriate voltage and power rating is crucial, please consult one of our sales engineers if you have any questions.

Due to the high temperatures and voltage pulses that a ballast resistor must endure, wire wound resistors are the most reliable. To protect your ballast resistor and keep your HeNe system in working order, we recommend derating the resistor wattage by 50% or more, as well as insulating the ballast properly when connecting it to the laser tube.

Always place your ballast at the anode end. Most tube manufacturers recommend mounting the ballast less than three inches from the anode to help reduce stray capacitance between the anode and cathode. Stray capacitance may cause the system to begin oscillating.

## HOW A HELIUM NEON GAS LASER WORKS



- ▶ HeNe laser is one of the most commonly used lasers on the market
- ▶ Standard HeNe laser consists of a glass tube with a mirror at each end

*The Helium Neon laser is one of the most economical and commonly used gas lasers on the market. The laser is typically designed to operate in the red at 632.8nm, although many users find it beneficial in the green at 543.5nm, yellow at 594.1nm, orange at 611.9nm, and in the infrared at 1523 or 3921nm.*

*HeNe lasers have been used extensively for such applications as*

*holography, spectroscopy, metrology, reprographics, laser light displays, medical treatments, and bar code scanning, although many users these days are replacing their existing HeNe systems with smaller, more efficient laser diode modules. (See the following page for information on semiconductor laser diode modules.)*

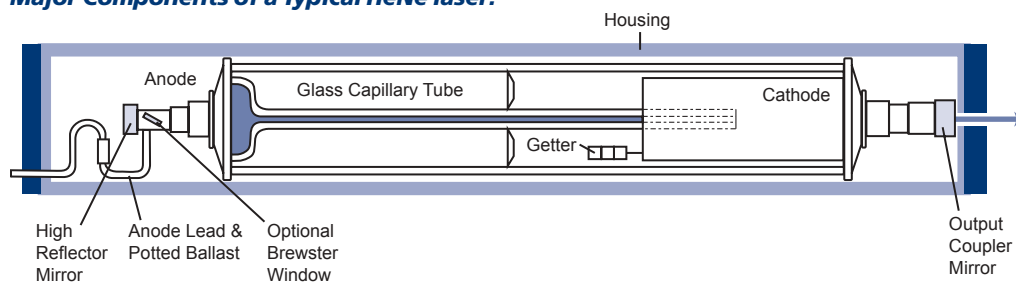
*The following is a basic description of how a HeNe laser works. If you have any questions, please do not hesitate to call or email.*

### General Description of a HeNe Laser—

The typical HeNe laser is basically an optical cavity that consists of a glass capillary tube with a mirror at each end. The tube contains a helium and neon gas mixture that, when excited, utilizes the mirrors at each end of the tube to transform the spontaneous emission into a stimulated laser light emission. One mirror (called the high reflector mirror) reflects virtually 100% of the light, while the other (called the output coupler mirror) reflects approximately 99%. Therefore, about 1% of the light will exit the laser at the desired wavelength.

Some HeNe lasers do not incorporate internal mirrors but, rather, include a special glass window, called a Brewster window. This window is mounted at a precise angle (Brewster angle) to allow light to pass through and become linearly polarized. The output coupler mirror is positioned outside of the HeNe tube. The light is almost completely transmitted, virtually cutting out reflection and resulting in a minimal loss of output power. This intense, clearly visible light is ideal for applications requiring the observation of extremely tiny particles, such as dust.

### Major Components of a Typical HeNe laser:



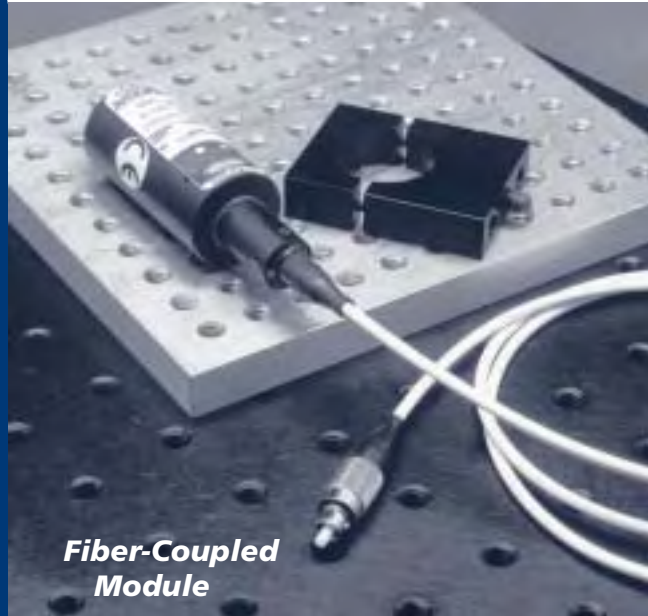
## HELIUM NEON GAS LASERS VS. LASER DIODE MODULES

### HeNe Laser Advantages

- Low divergence
- Superior beam quality
- Well-collimated output
- No external optics required
- Excellent coherence length

### Laser Diode Advantages

- Compact
- Efficient
- Wider variety of available wavelengths
- Cost-effective
- Beam circularization available



*Fiber-Coupled Module*

*Although HeNe gas lasers offer exceptional reliability and optical quality, users are quickly replacing them in their OEM applications with semiconductor laser diode technology. Laser diode modules offer many physical and electronic advantages over HeNe lasers.*

### HeNe Laser Advantages—

HeNe gas lasers provide superior optical characteristics. While laser diodes must take advantage of external optics to yield a high quality output beam, HeNe output is well-collimated and does not require external optics. HeNe lasers also offer excellent coherence lengths (10cm to several meters), and most small tubes operate as single-mode (TEM<sub>00</sub>).

### Semiconductor Laser Diode Advantages—

Laser diode modules are smaller, more efficient, and more versatile than HeNe lasers. For example, one of our more popular laser diode modules, the PPM, measures approximately 1.5 inches in diameter and 5.7 inches in length, while our smaller RC unit measures only 0.5 inch in diameter and 1.3 inches in length. Also, laser diode modules typically require less than 0.5W of energy, whereas an average HeNe laser requires 10 to 20W of energy to produce a few milliwatts of light. In addition, laser diodes provide an abundance of available wavelengths in the ultraviolet, visible, and infrared, while HeNe lasers limit users to half a dozen or so wavelengths.

Because of their compact size and low power requirements, laser diode modules have found their way into such OEM products as CD players and high-resolution printers. If a HeNe laser were incorporated into these applications, the products would likely be five to ten times their current size. Laser diode modules have also served users well in such demanding applications as spectroscopy, fluorescence, microscopy, holography, and biomedical analysis. In fact, laser diode modules can do virtually everything a HeNe can do, at a much lower cost, in a smaller package, and in a far more efficient manner.

*Laser diode =  
compact + efficient*

# HELIUM NEON GAS LASERS VS. LASER DIODE MODULES



## Methods of Beam Correction

- ▶ Employing the Blue Sky μLENS™
- ▶ Using a pair of anamorphic correcting prisms
- ▶ Coupling a laser beam into a fiber optic

## Laser Diode Optical Correction—

Although HeNe lasers provide well-collimated, superior output quality, they lack the efficient nature, compact size, and versatility of a laser diode module. By incorporating one of a variety of beam correction methods to our laser diode modules, users not only can benefit from the natural advantages of laser diode technology, but they can have a circularized, astigmatism-free beam, as well.

We offer several methods of improving the beam quality of a laser diode and making it emit more like a HeNe laser.

- ▶ We can integrate Blue Sky Research's highly advanced μLENS™ into a variety of our packages. Microlensing circularizes the naturally elliptical light output of a laser diode. The microlensed diode emits a circular, diffraction-limited beam without the inclusion of correcting prisms and lenses. In addition, the extremely high entrance NA (numerical aperture) of the Blue Sky μLENS™ captures virtually all of the optical energy available from the laser diode.
- ▶ Another method of beam circularization employs a pair of anamorphic correcting prisms. By adjusting the angles of the prisms and incorporating a circular aperture, we can circularize an elliptical beam. For astigmatic correction, we use a weak cylindrical lens after the collimating lens. Employing both of these methods results in a cost-effective means of correcting a beam.
- ▶ A method of both circularizing an elliptical beam and correcting astigmatism involves coupling a laser beam into a fiber optic. This method yields a superior, circular beam with low light scattering and no residual astigmatism.

We at Power Technology, Inc. are one of the few HeNe power supply manufacturers capable of providing you with laser diode modules to update your existing HeNe applications. If laser diode products are of interest to you, please visit us on the Web at [www.powertechnology.com](http://www.powertechnology.com) and request one of our catalogs. Also, feel free to give one of our sales engineers a call to discuss your application.



The following is a sampling of our more popular laser diode modules, along with a few of their specifications.

SPECIFICATIONS	PM	PPM	IQ1C
Dimensions, Ø x L, in. [mm]	.50 x 2.00 [12.57 x 50.80]	1.50 x 5.70 [38.05 x 144.78]	1.50 x 6.20 [38.05 x 157.48]
Operating Voltage (VDC)	3.3 - 9	12 ± 1	11 - 14
Max. Operating Current (mA)	120	1200	3000
Max. Laser Drive Current (mA)	120	500	1000
μLENS™ Compatible	yes	yes	yes

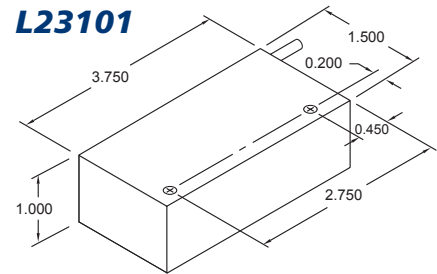
## Mechanical Drawings



Mechanical drawings for our laser diode products are available via fax or on our Web site.

# L23 SERIES HELIUM NEON LASER POWER SUPPLIES

- ▶ L23 series units are industry standard DC input power supplies
- ▶ L23101 has an input voltage of 10-14VDC



L23101

## Literature Applications

Product data sheets and other informative materials are available from the company or on our Web site.

## Related Products

See pages 12-13 for information on our advanced L23 power supplies for your more demanding applications.

Our standard line of HeNe laser power supplies generate a relatively minimal amount of heat, they typically do not require heat sinking. These units come complete with fully encased electronics for protection from dust and moisture. Because they

## L23 Standard Series DC Power Supplies—

Our L23 units are industry standard DC input power supplies for HeNe lasers up to 15mW. Each L23 provides greater than 75% efficiency. Because of this exceptional efficiency level, additional heat sinking is not required for any units except those operating in the AE power range. (See the following page for more information on power ranges.) Units in the AE power range provide approximately 7.5 square inches of heat sink.

### L23101:

The L23101 is a standard DC input power supply designed for OEM integration. The unit has an input voltage of 10-14VDC and is available in four power ranges from 2.5W to 25W.

SPECIFICATIONS	L23101				L23106				L23119	
	AL*	AM*	AH*	AE*	AL*	AL53*	AH*	AH53*	AL*	AH*
Dimensions, W x L x H, in. [mm]	1.50 x 3.75 x 1.00 [38.10 x 95.25 x 25.40]				1.06 x 2.20 x 0.66 [26.92 x 55.88 x 16.76]				1.30 x 3.20 x 0.850 [33.02 x 81.28 x 21.59]	
Input Voltage (VDC)	10-14				10-14	7-9.5	10-14	7-9.5	10-14	
Starting Voltage (kV)**	>8	>10	>10	>10	>8				>8	
Output Power (W)	2.5-7	5-10	9-17	16-25	2.5-6	2.5-6	4-8	4-8	3.5-7	6-10
Output Voltage (VDC)	900-1600	1300-2000	1700-3000	2500-3500	1100-1400	900-1400	1200-1800	1200-1800	1100-1600	1400-2000
Output Current (mA)	2.5-5	3.5-6	4.5-7	6-7.5	2.5-5				3.2-4.5	
Output Current Ripple (%)	<1 P-P @ nominal voltage				<8 RMS @ nominal voltage				<4 RMS @ nominal voltage	
Efficiency (%)	>75				>75				>75	
Temperature (°C)	-20 to +60				-15 to +60				-15 to +60	
Approximate Tube Output (mW)	1	1-3	2-5	5-15	1	1	1-3	1-3	0.5-1	1-2

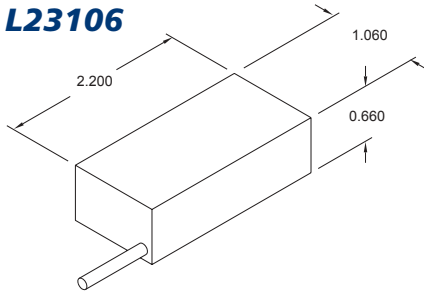
\* See page 9 for a description of these power ranges.

\*\* at nominal input voltage



# L23 SERIES HELIUM NEON LASER POWER SUPPLIES

## L23106

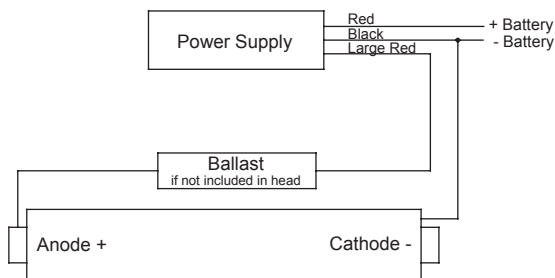


L23106 & L23119

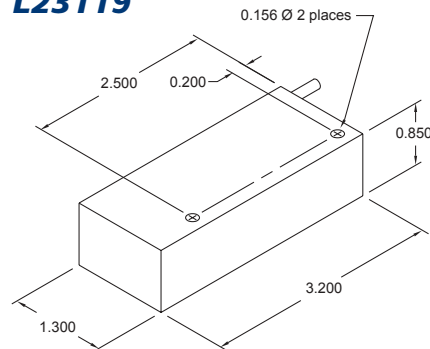
### L23106 & L23119:

The compact L23106 and L23119 power supplies are designed to operate laser tubes for applications requiring small size and portability. Such applications include barcode scanners and construction work. Both power supplies operate on 12VDC.

### L23101, L23106, & L23119 Typical Installation



### L23119



### A Recommended + Option

To operate your L23106 on 9VDC alkaline batteries, we recommend Option 53. See pages 16-17 for additional information on our available options.

## Power Ranges for AC & DC Power Supplies—

We offer AC and DC input power supplies in a variety of power ranges. The following labeling system is used to denote a particular power range and should appear as a part of each model number when ordering. See page 19 for information on creating a model number.

### Power Ranges (DC Input Units):

L	low power
M	medium power
H	high power
E	special high power unit with 39% more output power capability than an "H" power range unit

### Power Ranges (AC Input Units):

I	very low power
D	low power
No letter	standard power
E	special high power unit with 39% more output power capability than a standard unit

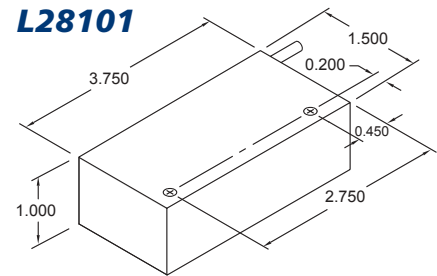
Please note: To indicate that the high voltage return lead is at ground potential, an "A" should appear before each letter above. For example, "AH" tells us not only that the high voltage return lead is at ground, but that the power range is high. Ground can be either negative or positive.

## L28 SERIES HELIUM NEON LASER POWER SUPPLIES

- ▶ L28 series units are industry standard DC input power supplies
- ▶ L28101 has an input voltage of 22-30VDC



L28101



### Related Products

See pages 14-15 for information on our advanced line of L28 HeNe power supplies for your more demanding applications.

### L28 Standard Series DC Power Supplies—

Our L28 units are industry standard DC input power supplies for Helium Neon lasers up to 15mW. Each provides greater than 75% efficiency and, therefore, typically does not require additional heat sinking. Units in the AE power range do, however, provide approximately 7.5 square inches of heat sink. (See page 9 for more information on power ranges.)

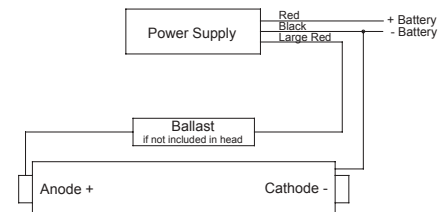
In addition to the standard L28101 model described below, we offer three variations that include options to reduce current ripple and conducted emissions. See pages 14-15 for information on our advanced line of L28 power supplies.

#### L28101:

The L28101 is a standard DC input power supply designed for OEM integration. The unit has an input voltage of 22-30VDC and is available in four power ranges from 2.5W to 25W.

SPECIFICATIONS	L28101			
	AL*	AM*	AH*	AE*
Dimensions, W x L x H, in. [mm]	1.50 x 3.75 x 1.00 [38.10 x 95.25 x 25.40]			
Input Voltage (VDC)	22-30			
Starting Voltage (kV)**	>8	>10	>10	>10
Output Power (W)	2.5-7	5-10	9-17	16-25
Output Voltage (VDC)	900-1600	1300-2000	1700-3000	2500-3500
Output Current (mA)	2.5-5	3.5-6	4.5-7	6-7.5
Output Current Ripple (%)	<1 P-P @ nominal voltage			
Efficiency (%)	>75			
Temperature (°C)	-20 to +60			
Approximate Tube Output (mW)	1	1-3	2-5	5-15

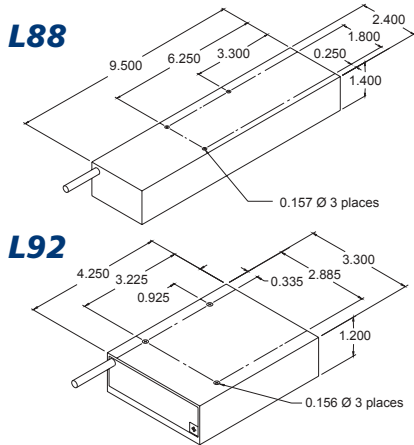
### L28101 Typical Installation



\* See page 9 for a description of these power ranges.  
\*\* at nominal input voltage

Industry standard  
DC input units

# L88 & L92 HELIUM NEON LASER POWER SUPPLIES



- L88 is the most powerful HeNe power supply manufactured in U. S.
- L92 is a current regulated dual input power supply

## L88 & L92 Standard AC Power Supplies—

Our L88 and L92 are highly efficient switching mode AC power supplies designed for a wide range of input voltages. Both are fully encased for protection from dust and moisture.

### L88:

Available in an output power range that extends from 35 to 75W, the L88 can drive some of the largest HeNe laser tubes on the market. The unit operates from 115VAC to 230VAC ± 10%.

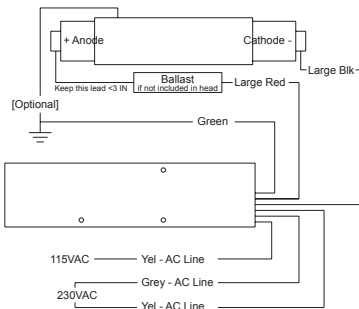
### L92:

The L92 is a current regulated dual input HeNe laser power supply. Users may select an AC input voltage range of 100 to 130VAC or 200 to 260VAC.

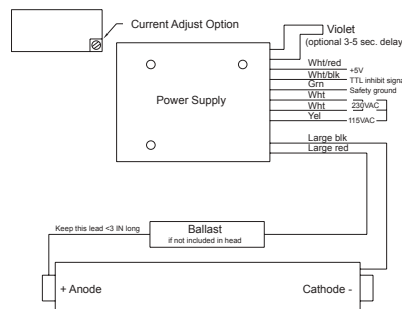
## A Recommended Option

A CDRH delay (Option B) is available for AC units requiring a 3- to 5-second time delay in the start of the laser tube. See pages 16-17 for additional information on our available options.

## L88 Typical Installation



## L92 Typical Installation



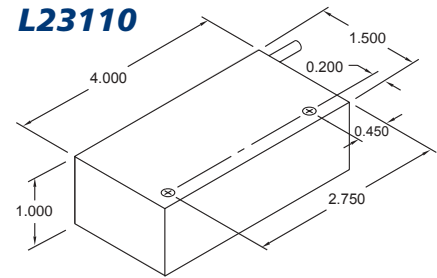
SPECIFICATIONS	L88	L92	L92I*	L92D*	L92E*
Dimensions, W x L x H, in. [mm]	2.40 x 9.50 x 1.40 [60.96 x 241.30 x 35.56]	3.30 x 4.25 x 1.20 [83.82 x 107.95 x 30.48]			
Input Voltage (VAC)	115 to 230 ± 10%	100-130 or 200-260	100-130 or 200-260	100-130 or 200-260	100-130 or 200-260
Starting Voltage (kV)**	>18	10	8	8	10
Output Power (W)	35-75	6-18	1.8-9	3.5	16-25
Output Voltage (VDC)	4000-7000	1400-3000	900-1500	1250-2000	2500-3500
Output Current (mA)	7-15	4-7	2-5	2.8-5.5	5.5-7.5
Temperature (°C)	-20 to +50	-20 to +60 operating, -40 to +85 storage			
Approximate Tube Output (mW)	35-75	1.5-7.0	0.5-1.5	1-2	5-15

\* See page 9 for a description of these power ranges.

\*\* at nominal input voltage

# L23 SERIES HELIUM NEON LASER POWER SUPPLIES

- ▶ L23 advanced series units include an active filter to reduce current ripple & noise
- ▶ L23110 has an input voltage of 10-14VDC



Our advanced series Helium Neon laser power supplies are designed for your more demanding applications, such as instrumentation and laboratory use. These units feature an active filter that reduces current ripple, noise, and switching frequency. They can also include an optional feature on the input lines to help reduce conducted emissions from the power supply while minimizing interference with other equipment on the same supply bus.

## L23 Advanced Series DC Power Supplies—

Our advanced series L23 units are DC input power supplies for HeNe lasers up to 15mW. These power supplies include all the benefits of our standard units—long life, maximum output, and greater than 75% efficiency—with the addition of an active filter to reduce current ripple and noise. Additional heat sinking is not required for any units except those operating in the AE power range. (See page 9 for more information on power ranges.) Units in the AE power range provide approximately 7.5 square inches of heat sink.

### L23110:

The L23110 is a DC input power supply designed for low current ripple on the output. The active filter (Option 38) typically reduces switching frequency and noise by an additional 50%. The unit has an input voltage of 10-14VDC and is available in four power ranges from 2.5W to 25W.

SPECIFICATIONS	L23110				L23111				L23120			
	AL*	AM*	AH*	AE*	AL*	AM*	AH*	AE*	AL*	AM*	AH*	AE*
Dimensions, W x L x H, in/mm	1.50 x 4.00 x 1.00 / 38.10 x 101.60 x 25.40				1.50 x 4.25 x 1.00 / 38.10 x 107.95 x 25.40				3.30 x 4.25 x 1.20 / 83.82 x 107.95 x 30.48			
Input Voltage (VDC)	10-14				10-14				10-14			
Starting Voltage (kV)**	>8	>10			>8	>10			>10			
Output Power (W)	2.5-7	5-10	9-17	16-25	2.5-7	5-10	9-17	16-25	2.5-7	5-10	9-17	16-25
Output Voltage (VDC)	900-1600	1300-2000	1700-3000	2500-3500	900-1600	1300-2000	1700-3000	2500-3500	900-1600	1300-2000	1700-3000	2500-3500
Output Current (mA)	2.5-5	3.5-6	4.5-7	6-7.5	2.5-5	3.5-6	4.5-7	6-7.5	2.5-5	3.5-6	4.5-7	6-7.5
Output Current Ripple (%)	<1 P-P @ nominal voltage				<1 P-P @ nominal voltage				<.5 P-P @ nominal voltage			
Efficiency (%)	>75				>75				>75			
Temperature (°C)	-20 to +60				-20 to +60				-20 to +60			
Approx. Tube Output (mW)	1	1-3	2-5	5-15	1	1-3	2-5	5-15	1	1-3	2-5	5-15

\* See page 9 for a description of these power ranges.

\*\* at nominal input voltage



# L23 SERIES HELIUM NEON LASER POWER SUPPLIES

**L23111:**

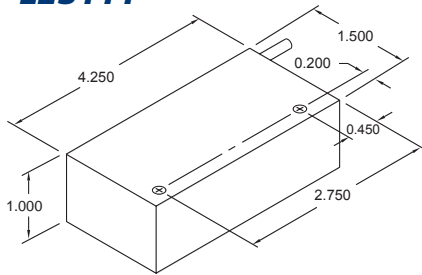
The L23111 is a highly efficient DC input HeNe power supply. Employing an active filter (Option 38) to this unit typically reduces switching frequency and noise by an additional 50%. Filtering on the input lines (Option 37) is also available. This option dramatically reduces conducted emissions from the switching section of the power supply. The L23111 features an input voltage of 10-14VDC and is available in four power ranges from 2.5W to 25W.

**L23120:**

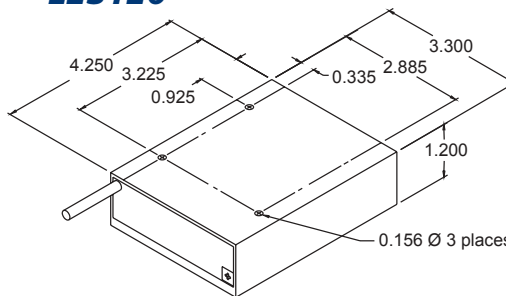
The L23120 features advanced circuit stability that provides superior thermal management for the power supply and helps eliminate the effects of outside influences. By employing an active filter (Option 38) to the L23120, users can reduce output noise with less than 0.5% P-P output current ripple, representing a decrease in switching frequency and noise by 90% over our standard line of power supplies. In addition, users can incorporate Option 37 on the input lines to reduce noise caused by conducted emissions from the switching section of the power supply. Option 37 minimizes interference with other equipment on the same power supply bus. The L23120 has an input voltage of 10-14VDC and is available in four power ranges from 2.5W to 25W.

- L23111 offers reduced switching frequency and noise level
- L23120 features advanced circuitry to provide more thermal stability for the unit

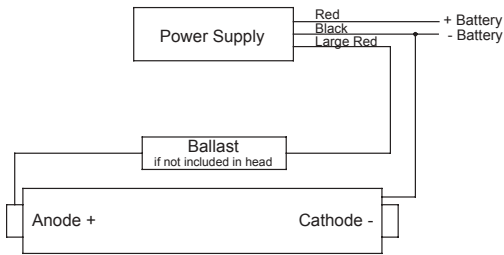
**L23111**



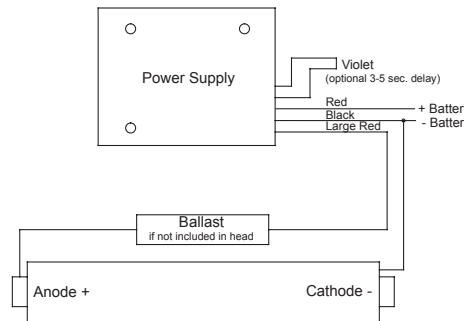
**L23120**



**L23110 & L23111  
Typical Installation**



**L23120  
Typical Installation**



**A Recommended Option**

Option 37 is an input filter that reduces conducted emissions from the switching section of the power supply. See pages 16-17 for additional information on our available options.

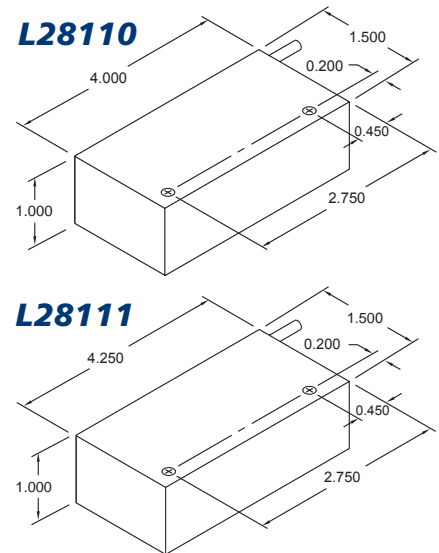
**Ripple & Noise—**

When considering the ripple and noise components of a power supply, keep in mind that any current fluctuations from the high frequency noise and plasma noise can be seen by the power supply as changes in impedance. As the power supply tries to compensate for these fluctuations, noise appears on the output of the power supply.

We have optimized the operation of each of our HeNe laser power supplies for minimum ripple without jeopardizing stability or current regulation.

# L28 SERIES HELIUM NEON LASER POWER SUPPLIES

- ▶ L28110 is designed for low current ripple on the output
- ▶ L28111 can incorporate an input filter (Option 37)



## L28 Advanced Series DC Power Supplies—

Our advanced series L28 units are DC input power supplies for Helium Neon lasers up to 15mW. As variations of our standard L28101 power supply featured on page 10, these units provide the greater than 75% efficiency and typically do not require additional heat sinking. However, our advanced series L28 units also include options to reduce current ripple and conducted emissions.

### L28110:

The L28110 is a DC input power supply designed for low current ripple on the output. The optional active filter (Option 38) can reduce switching frequency and noise by as much as 50%. The unit has an input voltage of 22-30VDC and is available in four power ranges from 2.5W to 25W.

### L28111:

In addition to the active filter (Option 38) that the L28110 can include, the L28111 can incorporate a filter on the input lines (Option 37) to reduce conducted emissions from the power supply switching section. The unit has an input voltage of 22-30VDC and is available in four power ranges from 2.5W to 25W.

SPECIFICATIONS	L28110				L28111				L28120			
	AL*	AM*	AH*	AE*	AL*	AM*	AH*	AE*	AL*	AM*	AH*	AE*
Dimensions, W x L x H, in/mm	1.50 x 4.00 x 1.00 / 38.10 x 101.60 x 25.40				1.50 x 4.25 x 1.00 / 38.10 x 107.95 x 25.40				3.30 x 4.25 x 1.20 / 83.82 x 107.95 x 30.48			
Input Voltage (VDC)	22-30				22-30				22-30			
Starting Voltage (kV)**	>8	>10			>8	>10			>10			
Output Power (W)	2.5-7	5-10	9-17	16-25	2.5-7	5-10	9-17	16-25	2.5-7	5-10	9-17	16-25
Output Voltage (VDC)	900-1600	1300-2000	1700-3000	2500-3500	900-1600	1300-2000	1700-3000	2500-3500	900-1600	1300-2000	1700-3000	2500-3500
Output Current (mA)	2.5-5	3.5-6	4.5-7	6-7.5	2.5-5	3.5-6	4.5-7	6-7.5	2.5-5	3.5-6	4.5-7	6-7.5
Output Current Ripple (%)	<1 P-P @ nominal voltage				<1 P-P @ nominal voltage				<.5 P-P @ nominal voltage			
Efficiency (%)	>75				>75				>75			
Temperature (°C)	-20 to +60				-20 to +60				-20 to +60			
Approx. Tube Output (mW)	1	1-3	2-5	5-15	1	1-3	2-5	5-15	1	1-3	2-5	5-15

\* See page 9 for a description of these power ranges.

\*\* at nominal input voltage

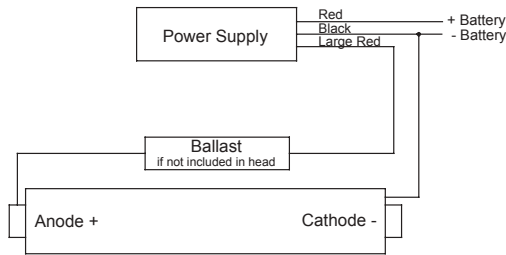
# L28 SERIES HELIUM NEON LASER POWER SUPPLIES

## L28120:

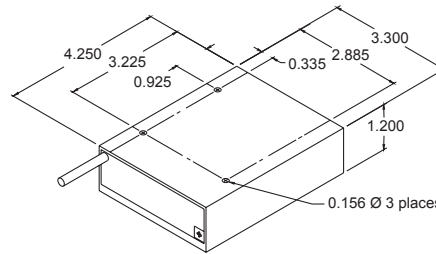
The L28120 features circuit board refinements that provide superior thermal management for the power supply. The unit also employs an active filter (Option 38) to reduce output noise with less than 0.5% P-P output current ripple, representing a decrease in switching frequency and noise by 90% over our standard line of power supplies. Users can also incorporate Option 37 on the input lines to reduce noise caused by conducted emissions from the switching section of the power supply. Option 37 minimizes interference with other equipment on the same power supply bus. The unit has an input voltage of 22-30VDC and is available in four power ranges from 2.5W to 25W.

► **L28120 provides superior thermal stability**

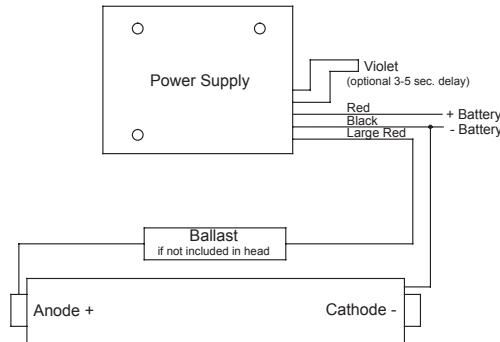
## L28110 & L28111 Typical Installation



## L28120



## L28120 Typical Installation



## Recommended + Option

To reduce conducted emissions from the switching section of the power supply, give Option 37 a try. See pages 16-17 for additional information on our available options.

## Measuring Efficiency—

Efficiency is the ratio of the useful output power to the input power of a device, usually expressed as a percentage. When measuring the efficiency of an AC input switching power supply, users must consider a few factors. A normal sinusoidal waveform with a resistive load can be measured with meters that read RMS current and voltage. For waveforms that are not sinusoidal, true RMS meters are normally used. When measuring the input current of a switching power supply, the high crest factor created from the charge of the filter capacitors exceeds the crest factor of most true RMS meters. Also, the phase shift from the bridge rectifiers makes accurate measurement with a true RMS meter difficult, if not impossible. The most practical form of measurement is to operate the power supply temporarily with a DC input. This procedure yields an accurate form of comparison between the input and output losses.

# OPTIONS FOR AC & DC INPUT UNITS

*We offer a variety of options to help you customize your HeNe power supply for your specific application. Please note that not every option is compatible with one another or with every power supply. If you have any questions regarding compatibility issues, please contact one of our sales engineers for assistance.*

CONNECTOR OPTIONS	AC OPTION	DC OPTION
<b>ALDEN CONNECTOR</b> (#8102-F)* - for anode and cathode connection	Z	02
<b>ALDEN CONNECTOR</b> (#8113-FP)* - 3 pin connector; customer must specify connections	03	03
CONTROL OPTIONS		
<b>POSITIVE ENABLE**</b> (white/red wire) - connect lead to positive to turn unit on; open to turn unit off	-	10
<b>TTL LEVEL INHIBIT**</b> (white/violet wire) - open lead or connect to positive to turn unit on; connect to return to turn unit off; can be controlled by TTL circuitry with proper interfacing	-	13
<b>TTL LEVEL ENABLE</b> (yellow wire) - connect lead to return to turn unit on; open to turn unit off (not compatible with Option 16); can be controlled by TTL circuitry with proper interfacing	-	14
<b>ENABLE/FLASHER</b> - connect red wire to +5VDC, black wire to return; connect white/orange wire to return to turn unit on; connect lead to +5VDC to turn unit off (approximately 10 $\mu$ A leakage during shutdown); or open lead to cycle unit on and off at factory preset rate	H	16
<b>LOW CURRENT DRAIN STANDBY ENABLE**</b> (white/yellow wire) - <5 $\mu$ A; connect lead to positive to turn unit on; open to turn unit off	-	17
<b>TTL LEVEL CONTROL</b> - with white/red wire connected to +5VDC, connect white/black wire to return to turn unit on; open to turn unit off (not compatible with Option H); can be controlled by TTL circuitry with proper interfacing; control circuitry requires 10mA minimum	K	-
OPERATING OPTIONS		
<b>INPUT FILTER</b> (Choke) - can dramatically reduce conducted emissions from the switching section of the power supply	-	37
<b>ACTIVE FILTER</b> (Low Ripple) - for models not currently available, this option can be engineered to a customer's specific needs; may result in a larger case size; reduction in ripple will depend on the laser tube used, power rating of the power supply, and size restraints of the total package	A	38
<b>SHUNT DIODE</b> - for lower battery drain, the series reverse polarity protection diode may be changed to a shunt diode; can increase efficiency up to 5%; a slow-blown fuse—3 amp for L23 and 2 amp for L28 series—should be used on the positive lead to protect the power supply from incorrect connection	-	39
<b>INCREASED STARTING VOLTAGE**</b> - increases capability of the power supply 20 to 50% higher than what is specified	J	42
<b>BALLAST MODULE**</b> - typically a 82KOhm, 7W resistor encapsulated in a tube 0.42" in diameter and 2.0" long; ballast must be less than three inches from the anode of the tube; maximum power that can be dissipated in each module is 3.5W	L	43
<b>NEGATIVE HIGH VOLTAGE OUTPUT**</b> - high voltage lead becomes a black 20KV lead	M	44
<b>CDRH DELAY</b> (Violet Wire Loop) - for customers requiring a 3- to 5-second delay in the start of the laser tube after power has been applied to the power supply; delay can be disabled by cutting the 1.5" loop	B	46
<b>EMI SHIELDING**</b> - contact the factory for more detailed information	S	47
<b>AUXILIARY OUTPUT**</b> - contact the factory for more detailed information	Y	-
<b>INCREASED LINE VOLTAGE**</b> - input nominal voltage can go up to 50% higher than the specified nominal with a $\pm$ 10% line change capability	-	52
<b>DECREASED LINE VOLTAGE**</b> - input nominal voltage can go down to 25% lower than the specified nominal with a $\pm$ 10% line change capability	F	53
<b>BLEEDER RESISTOR</b> - 100MOhm resistor on output	W	60
<b>OPEN CIRCUIT SHUTDOWN</b> - if laser tube does not start within one second of the time voltage is applied, power supply will shut down and must have the input voltage removed to reset the latch circuit	V	61
<b>HIGH TEMPERATURE**</b> - enables the power supply to operate in ambient temperatures up to 80°C	T	-



## OPTIONS FOR AC & DC INPUT UNITS

AC OPTION	DC OPTION	CALIBRATION OPTIONS
C	22	<b>CURRENT ADJUST, EXTERNAL</b> (orange wires) - available with a maximum adjustment range of $\pm 30\%$ from a nominal point, limited by the operating capability of the model; adjustment may be accomplished in one of two ways: by using a 2K Ohm potentiometer or by using a factory dual or triple calibration; potentiometer - 10" leads; triple calibration - 10" leads; dual calibration - 1.5" lead loop; please specify type of external current adjustment required
X	25	<b>CURRENT ADJUST, INTERNAL</b> - available with a maximum adjustment range of $\pm 30\%$ from a nominal point, limited by the operating capability of the model
PHYSICAL OPTIONS		
P	30	<b>REVERSE WIRE EXIT</b> - switches the end of the power supply by which the input/output wires exit
-	31	<b>END MOUNTING HEATSINK**</b> - Allows mounting holes to exit end of unit; input/output wires exit end of heatsink
R	32	<b>OPPOSITE WIRE EXIT</b> - input/output wires exit opposite ends from each other

\*AMP and ALDEN are specific product or company names used strictly to identify the type and style of connector. Actual vendor will depend on availability.

\*\*These options, as well as the AMP CONNECTOR, are not available on safety agency certified or listed units.

*To customize  
your  
HeNe power supply*

# TECHNICAL TERMS

*Our Helium Neon Laser Power Supplies Catalog incorporates a number of terms that are helpful to understand if you are to make an informed decision regarding your power supply needs. The following are descriptions of the most common terms. Please contact one of our sales engineers if you have any unanswered questions concerning an unfamiliar product feature or characteristic.*



- ▶ **Ballast resistor:** This mechanism is placed in series with the laser to promote a stable electrical discharge and prevent the laser from acting as an oscillator.
- ▶ **Efficiency:** Efficiency is the ratio of the useful output power of a device to the input power, typically expressed as a percentage.
- ▶ **High frequency ripple:** High frequency ripple is any noise frequency higher than the power supply switching frequency. This type of noise typically results from stray capacitance between the tube and ballast.
- ▶ **Low frequency ripple:** Low frequency ripple is ripple that is commonly found in multiples of 60Hz, usually between 60 and 480Hz.
- ▶ **Plasma noise:** Plasma noise is typically any noise greater than 1MHz. Users can often minimize this type of noise by optimizing the operating current to change the current density in the discharge plasma.
- ▶ **Start voltage:** The starting voltage is the voltage required to ionize the HeNe gas during turn-on.
- ▶ **Switching frequency ripple:** This type of ripple results from the switching frequency of the power supply. Smaller power supplies generally provide fewer passive filtering components and, therefore, result in more ripple, while larger power supplies typically generate less ripple.

## Certifications—

We have obtained some level of certification for the majority of our HeNe laser power supplies, and a number of our products are certified by multiple organizations. These certifications indicate that our products have passed rigorous testing measures for safety, have met a variety of guidelines and standards, and, most importantly, are safe for our customers. Certifications include TÜV, CSA, ETL, and UL.

MODEL	SERIES	POWER RANGE	TÜV	CSA	ETL	UL
L23	101, 110, 111	AL, AM, AH	X	X	X	
L23	119	AH				X
L23	120	A	X	X		X
L23	120	AL, AM, AH, AE	X			
L28	101, 110, 111	AL, AM, AH	X	X	X	
L28	120	AL, AM, AH, AE	X			
L92				X	X	X

Call  
today!

# ORDERING INFORMATION

## How to Build Model Numbers—

The chart below details the standard model name, power range, options required, operating method for building a HeNe power supply current, operating voltage, and starting voltage. Feel free model number. Model numbers for our power supplies are determined by the model number. to give us a call if you need help in constructing your model number.

MODEL NUMBER	X 1	X 2	-	X 3	-	X 4	-	X 5
Model number:	Power supply model number				Digit 3:	Operating current in mA		
Digit 1:	Power range*				Digit 4:	Operating voltage in kV		
Digit 2:	Options as required**				Digit 5:	Starting voltage in kV		
Examples: L23101AH0214-6.5-2.6-10    L92EBZ-7-3.3-10    L23120A0239-6-4-4								

\* See page 9 for a description of the power ranges we offer for AC and DC input units.

\*\* See pages 16-17 for our available options.

## Placing an Order—

If possible, please have the following information on hand when ordering:

- ▶ Name or model number of the power supply that you are interested in and ideas for potential options that will benefit your application
- ▶ P. O. number
- ▶ Credit card number, expiration date, and exact name on card
- ▶ Delivery address, contact name, and phone number

## Order Requirements—

All payments are to be made in U.S. dollars. All orders are subject to a minimum invoice value. The domestic minimum is \$200, and the export minimum is \$500. Orders below the minimum are subject to a processing fee of \$20 (domestic) or \$100 (export).

## Delivery—

We ship via UPS (standard), FedEx, and DHL. Please let us know if you have a preferred method of shipping. For rush orders, we will gladly ship via overnight courier for an additional charge.

## Warranty Return Policy—

If your product is defective, you may return it during its designated warranty period for a prompt exchange or repair. All electronics carry a warranty of one year.

To return a product, please contact one of our sales engineers to request a Return Material Authorization (RMA) number. Requests for refunds and exchanges cannot be processed without a valid RMA number. Please have the following information available when requesting a number: product model number, serial number, and description of the problem. The company-issued RMA number must be prominently displayed on the returned package.

No returns will be accepted "collect" or "C. O. D." On all warranty returns, we will pay the shipping charges on the return of merchandise to the customer.



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**Web:**

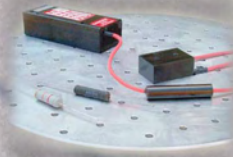
www.powertechnology.com

**Phone:**

501.407.0712

**Fax:**

501.407.0036



**Helium Neon Laser System Components**

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**How a Helium Neon Gas Laser Works**

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**Standard DC Power Supplies**

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**Standard AC Power Supplies**

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**Advanced DC Power Supplies**

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